

**2054, 2056, 2058  
2064 and 2066  
Combines**

**John Deere Werke Zweibrücken  
TM4505 (05DEC00)**

Printed in Germany  
ENGLISCH

# Introduction

## FOREWORD

This manual is written for an experienced technician. Essential tools required in performing certain service work are identified in this manual and are recommended for use.

Live with safety: Read the safety messages in the introduction of this manual and the cautions presented throughout the text of the manual.



This is the safety-alert symbol. When you see this symbol on the machine or in this manual, be alert to the potential for personal injury.

Technical manuals are divided in two parts: repair and operation and tests. Repair sections tell how to repair the components. Operation and tests sections help you identify the majority of routine failures quickly.

Information is organized in groups for the various components requiring service instruction. At the beginning of each group are summary listings of all applicable essential tools, service equipment and tools, other materials needed to do the job, service parts kits, specifications, wear tolerances, and torque values.

Technical Manuals are concise guides for specific machines. They are on-the-job guides containing only the vital information needed for diagnosis, analysis, testing, and repair.

Fundamental service information is available from other sources covering basic theory of operation, fundamentals of troubleshooting, general maintenance, and basic type of failures and their causes.

# Dealer Presentation Sheet

## SUPPLEMENT (OCT96) FOR TECHNICAL MANUAL TM4505 2054, 2056, 2058, 2064 AND 2066 COMBINES

Please insert the revised and new Groups in the correct sequence in your Technical Manual, discarding all original pages which have been revised.

The following Sections or Groups have been revised or are new:

Section 40	Group 05	revised
	Group 20	completely new
Section 50	Group 20	revised
Section 70	Group 20	completely new
	Group 21	completely new
Section 120	Group 30	completely new
	Group 35	completely new
Section 130	Group 05	completely new
	Group 10	completely new
Section 240	Group 10	revised*
	Group 11	completely new
	Group 15AG	completely new
	Group 15AH	completely new
	Group 16A	completely new
	Group 16H	completely new
	Group 16T	completely new
	Group 16V	completely new
	Group 16Z	completely new
	Group 16AA	completely new
	Group 16AB	completely new
Section 270	Group 20	revised

New or revised modules within the Groups listed above can be recognized by the broken left and right module frame lines.

*\* One leaf only. Group 240-10 now applies only up to Serial No. 062721. However, only the first leaf is supplied, as the information remains unchanged. We recommend that you write the words "up to Serial No. 062721" on each page of Group 240-10.*

ZX,DLR,XZCO96 -19-01OCT96

*Dealer Presentation Sheet*



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*All information, illustrations and specifications in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.*

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# Section 05 Safety

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*Contents*

### **HANDLE FLUIDS SAFELY—AVOID FIRES**

When you work around fuel, do not smoke or work near heaters or other fire hazards.

Store flammable fluids away from fire hazards. Do not incinerate or puncture pressurized containers.

Make sure machine is clean of trash, grease, and debris.

Do not store oily rags; they can ignite and burn spontaneously.



DX,FLAME -19-04JUN90

-UN-23AUG88  
TS227

### **PREVENT BATTERY EXPLOSIONS**

Keep sparks, lighted matches, and open flame away from the top of battery. Battery gas can explode.

Never check battery charge by placing a metal object across the posts. Use a volt-meter or hydrometer.

Do not charge a frozen battery; it may explode. Warm battery to 16°C (60°F).



DX,SPARKS -19-03MAR93

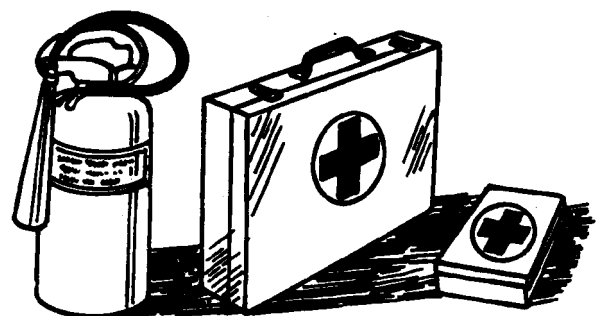
-UN-23AUG88  
TS204

### **PREPARE FOR EMERGENCIES**

Be prepared if a fire starts.

Keep a first aid kit and fire extinguisher handy.

Keep emergency numbers for doctors, ambulance service, hospital, and fire department near your telephone.



DX,FIRE2 -19-03MAR93

-UN-23AUG88  
TS291

## PREVENT ACID BURNS

Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into eyes.

Avoid the hazard by:

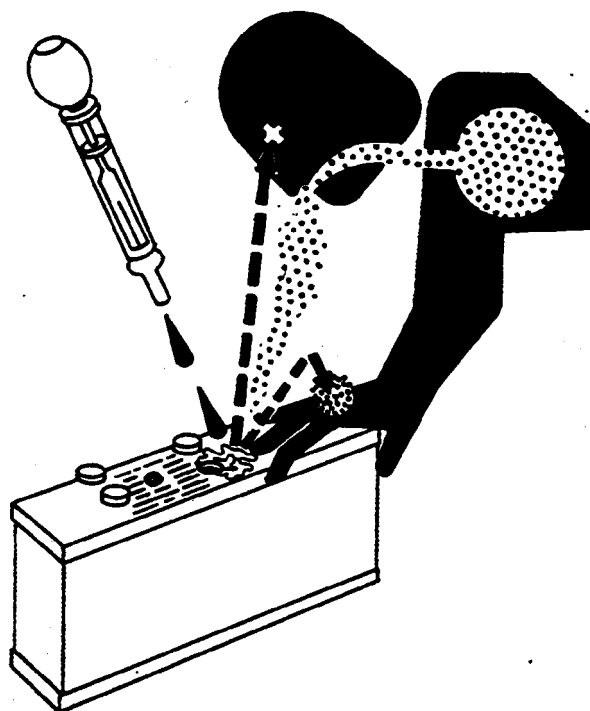
1. Filling batteries in a well-ventilated area.
2. Wearing eye protection and rubber gloves.
3. Avoiding breathing fumes when electrolyte is added.
4. Avoiding spilling or dripping electrolyte.
5. Use proper jump start procedure.

If you spill acid on yourself:

1. Flush your skin with water.
2. Apply baking soda or lime to help neutralize the acid.
3. Flush your eyes with water for 15—30 minutes. Get medical attention immediately.

If acid is swallowed:

1. Do not induce vomiting.
2. Drink large amounts of water or milk, but do not exceed 2 L (2 quarts).
3. Get medical attention immediately.



DX,POISON -19-21APR93

T5203 -UN-23AUG88

## Safety Information

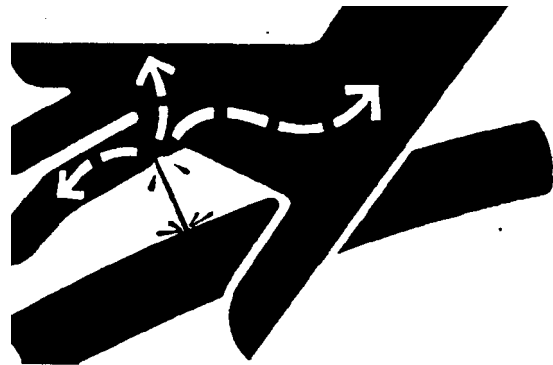
### AVOID HIGH-PRESSURE FLUIDS

Escaping fluid under pressure can penetrate the skin causing serious injury.

Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure.

Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, U.S.A.



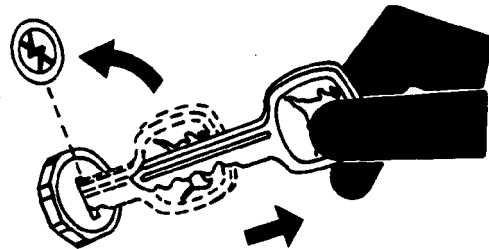
X9811 -JUN-23AUG88

DX,FLUID -19-03MAR93

### PARK MACHINE SAFELY

Before working on the machine:

- Lower all equipment to the ground.
- Stop the engine and remove the key.
- Disconnect the battery ground strap.
- Hang a "DO NOT OPERATE" tag in operator station.



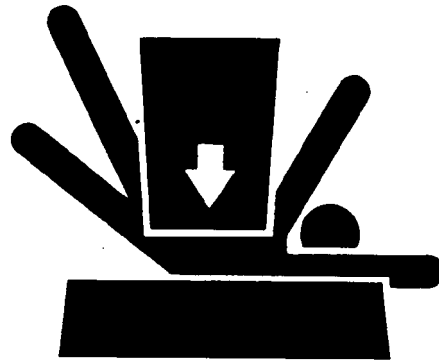
TS230 -JUN-24MAY89

DX,PARK -19-04JUN90

### SUPPORT MACHINE PROPERLY

Always lower the attachment or implement to the ground before you work on the machine. If you must work on a lifted machine or attachment, securely support the machine or attachment.

Do not support the machine on cinder blocks, hollow tiles, or props that may crumble under continuous load. Do not work under a machine that is supported solely by a jack. Follow recommended procedures in this manual.



DX,LOWER -19-04JUN90

-UN-23AUG88  
TS229

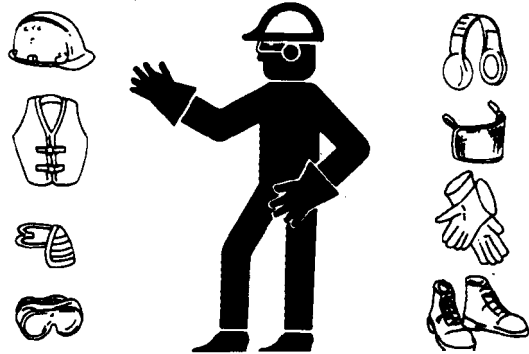
### WEAR PROTECTIVE CLOTHING

Wear close fitting clothing and safety equipment appropriate to the job.

Prolonged exposure to loud noise can cause impairment or loss of hearing.

Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.

Operating equipment safely requires the full attention of the operator. Do not wear radio or music headphones while operating machine.



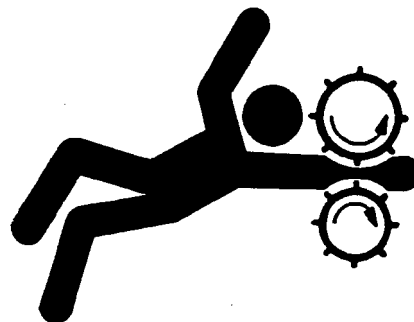
DX,WEAR -19-10SEP90

-UN-23AUG88  
TS206

### SERVICE MACHINES SAFELY

Tie long hair behind your head. Do not wear a necktie, scarf, loose clothing, or necklace when you work near machine tools or moving parts. If these items were to get caught, severe injury could result.

Remove rings and other jewelry to prevent electrical shorts and entanglement in moving parts.



DX,LOOSE -19-04JUN90

-UN-23AUG88  
TS228

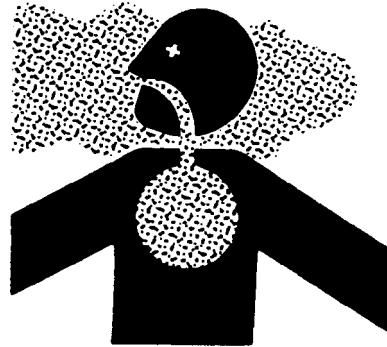


## Safety Information

### WORK IN VENTILATED AREA

Engine exhaust fumes can cause sickness or death. If it is necessary to run an engine in an enclosed area, remove the exhaust fumes from the area with an exhaust pipe extension.

If you do not have an exhaust pipe extension, open the doors and get outside air into the area.



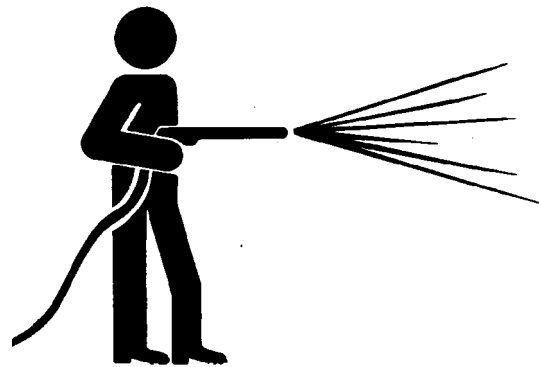
DX,AIR -19-04JUN90

TS220 -UN-23AUG88

### WORK IN CLEAN AREA

Before starting a job:

- Clean work area and machine.
- Make sure you have all necessary tools to do your job.
- Have the right parts on hand.
- Read all instructions thoroughly; do not attempt shortcuts.



DX,CLEAN -19-04JUN90

T6642EJ -UN-18OCT88

### REMOVE PAINT BEFORE WELDING OR HEATING

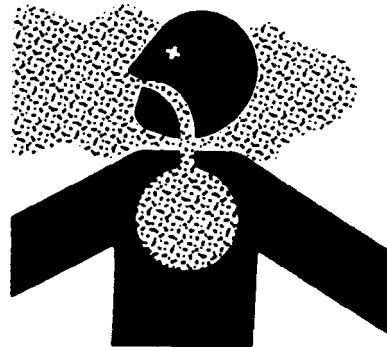
Avoid potentially toxic fumes and dust.

Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch.

Do all work outside or in a well ventilated area. Dispose of paint and solvent properly.

Remove paint before welding or heating:

- If you sand or grind paint, avoid breathing the dust. Wear an approved respirator.
- If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.



DX,PAINT -19-03MAR93

TS220 -UN-23AUG88

## Safety Information

### AVOID HEATING NEAR PRESSURIZED FLUID LINES

Flammable spray can be generated by heating near pressurized fluid lines, resulting in severe burns to yourself and bystanders. Do not heat by welding, soldering, or using a torch near pressurized fluid lines or other flammable materials. Pressurized lines can be accidentally cut when heat goes beyond the immediate flame area.



DX,TORCH -19-03MAR93

TS953 -UN-15MAY90

### ILLUMINATE WORK AREA SAFELY

Illuminate your work area adequately but safely. Use a portable safety light for working inside or under the machine. Make sure the bulb is enclosed by a wire cage. The hot filament of an accidentally broken bulb can ignite spilled fuel or oil.

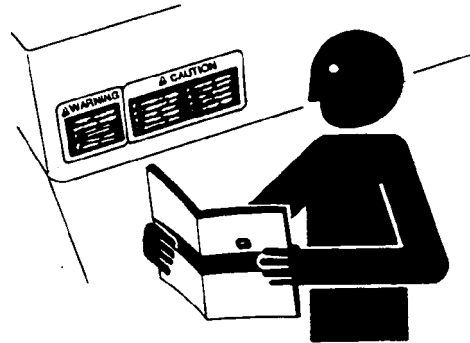


DX,LIGHT -19-04JUN90

TS223 -UN-23AUG88

### REPLACE SAFETY SIGNS

Replace missing or damaged safety signs. See the machine operator's manual for correct safety sign placement.



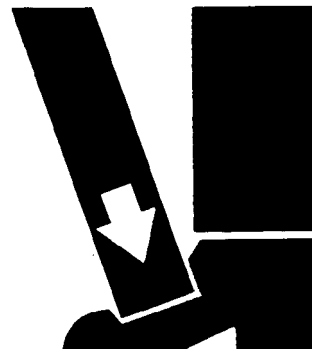
DX,SIGNS1 -19-04JUN90

TS201 -UN-23AUG88

### USE PROPER LIFTING EQUIPMENT

Lifting heavy components incorrectly can cause severe injury or machine damage.

Follow recommended procedure for removal and installation of components in the manual.



DX,LIFT -19-04JUN90

TS226 -UN-23AUG88

## SERVICE TIRES SAFELY

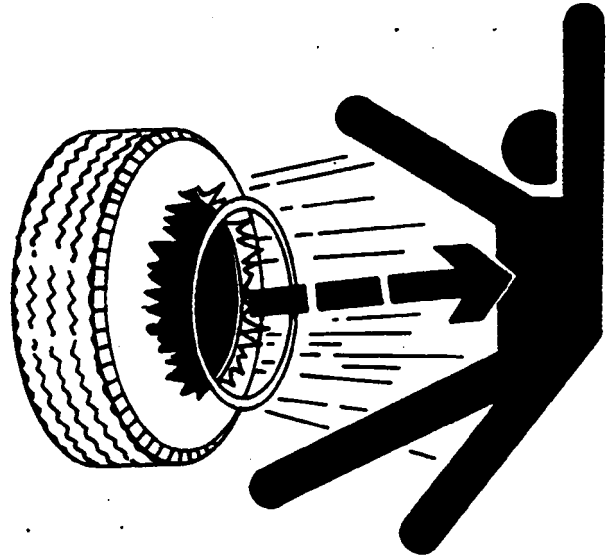
Explosive separation of a tire and rim parts can cause serious injury or death.

Do not attempt to mount a tire unless you have the proper equipment and experience to perform the job.

Always maintain the correct tire pressure. Do not inflate the tires above the recommended pressure. Never weld or heat a wheel and tire assembly. The heat can cause an increase in air pressure resulting in a tire explosion. Welding can structurally weaken or deform the wheel.

When inflating tires, use a clip-on chuck and extension hose long enough to allow you to stand to one side and NOT in front of or over the tire assembly. Use a safety cage if available.

Check wheels for low pressure, cuts, bubbles, damaged rims or missing lug bolts and nuts.



-UN-23AUG88

TS211

DX,RIM -19-24AUG90

## PRACTICE SAFE MAINTENANCE

Understand service procedure before doing work. Keep area clean and dry.

Never lubricate, service, or adjust machine while it is moving. Keep hands, feet, and clothing from power-driven parts. Disengage all power and operate controls to relieve pressure. Lower equipment to the ground. Stop the engine. Remove the key. Allow machine to cool.

Securely support any machine elements that must be raised for service work.

Keep all parts in good condition and properly installed. Fix damage immediately. Replace worn or broken parts. Remove any buildup of grease, oil, or debris.

Disconnect battery ground cable (-) before making adjustments on electrical systems or welding on machine.



-UN-23AUG88

TS218

DX,SERV -19-03MAR93

## Safety Information

### USE PROPER TOOLS

Use tools appropriate to the work. Makeshift tools and procedures can create safety hazards.

Use power tools only to loosen threaded parts and fasteners.

For loosening and tightening hardware, use the correct size tools. DO NOT use U.S. measurement tools on metric fasteners. Avoid bodily injury caused by slipping wrenches.

Use only service parts meeting John Deere specifications.



TTS779  
-UN-08NOV69

DX,REPAIR -19-04JUN90

### DISPOSE OF WASTE PROPERLY

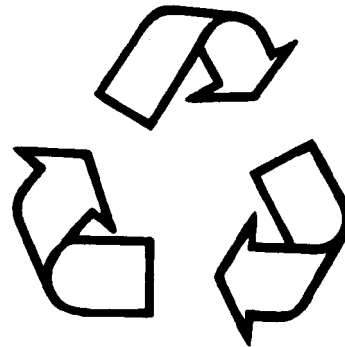
Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with John Deere equipment include such items as oil, fuel, coolant, brake fluid, filters, and batteries.

Use leakproof containers when draining fluids. Do not use food or beverage containers that may mislead someone into drinking from them.

Do not pour waste onto the ground, down a drain, or into any water source.

Air conditioning refrigerants escaping into the air can damage the Earth's atmosphere. Government regulations may require a certified air conditioning service center to recover and recycle used air conditioning refrigerants.

Inquire on the proper way to recycle or dispose of waste from your local environmental or recycling center, or from your John Deere dealer.



TTS1133  
-UN-26NOV90

DX,DRAIN -19-03MAR93

## LIVE WITH SAFETY

Before returning machine to customer, make sure machine is functioning properly, especially the safety systems. Install all guards and shields.



DX,LIVE -19-25SEP92

TS231 -19-07OCT88

*Safety Information*

# Section 10 General

## Contents

Page

### Group 05—Introduction

Technical Manual — Tabs . . . . . 10-05-1

### Group 10—Torques for Hardware

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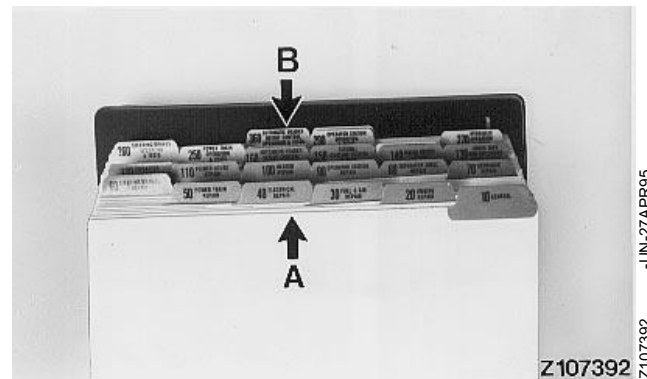


## TECHNICAL MANUAL TABS

### INTRODUCTION

To fully utilize this manual, you must understand how it is organized. Only two tab colours are used (green and yellow), each representing a different type of information. Spend a minute reading this now and save many minutes of searching later.

A—Green tabs  
B—Yellow tabs



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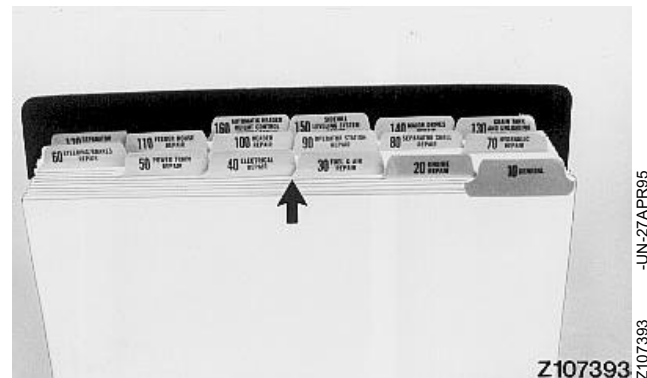
## GREEN TAB SECTIONS

The green tab sections are REPAIR sections, telling you how to repair components of the various systems.

Repair of a component includes:

- Removal from machine (if necessary)
- Disassembly (if necessary)
- Inspection
- Replacement of parts
- Assembly
- Adjustment
- Installation on machine (if necessary)

The numbers used for the repair (green tab) sections are part of an overall service publication numbering system. The numbers identify the same sections in the parts catalog, flat rate manual, service information bulletins, and service training courses.



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Z107393

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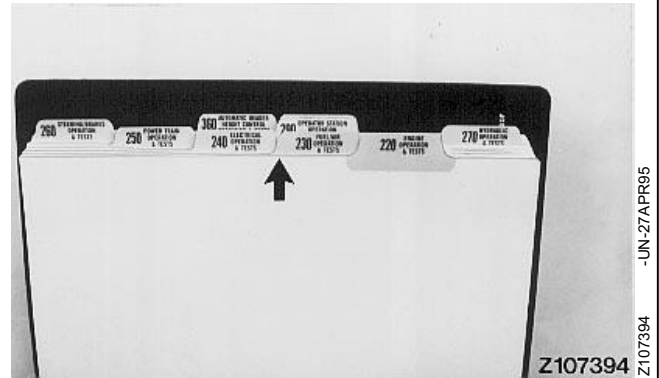
## YELLOW TAB SECTIONS

Each yellow tab section contains information on:

- OPERATION of various systems
- TESTING various systems
- SYSTEM DIAGRAMS

System operation explains how the system and its components work.

System tests tell you how to test the system and diagnose the problem.



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Z107394

Z107394

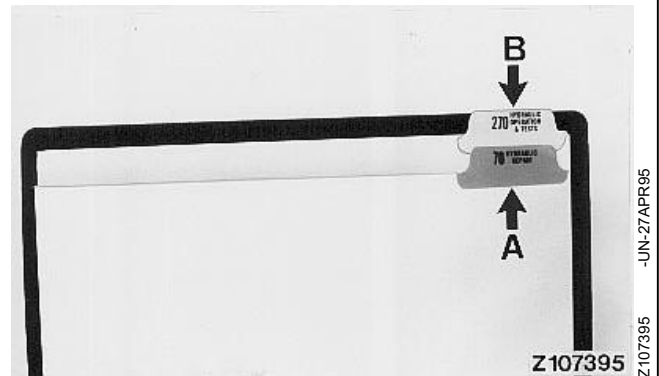
ZX.TMSPFH001032-19-22JUL91

## TAB POSITIONS

Each green tab and its corresponding yellow tab have the same tab position.

This helps you to quickly locate the related information.

- A—Green tab  
Section 70,  
Hydraulic System — Repair
- B—Yellow tab,  
Section 270,  
Hydraulic System — Operation and Tests



-UN-27APR95  
Z107395

Z107395

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### THREE-STEP PROCEDURE

Use the following three-step procedure to locate the desired information:

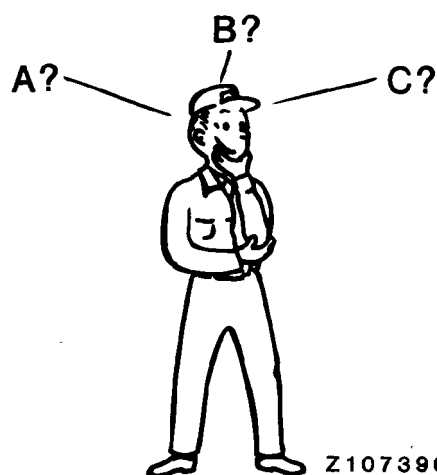
1. Determine the type of information you need. Is it?

- Repair?
- Operation?
- Tests?

2. Go to the appropriate section tab:

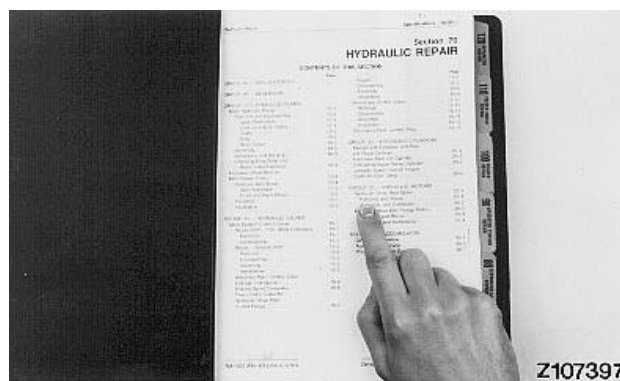
- Green for repair
- Yellow for operation and tests

3. Use the Table of Contents (at the beginning of each section) to locate the information.



-JUN-28APR95

Z107396



-JUN-27APR95

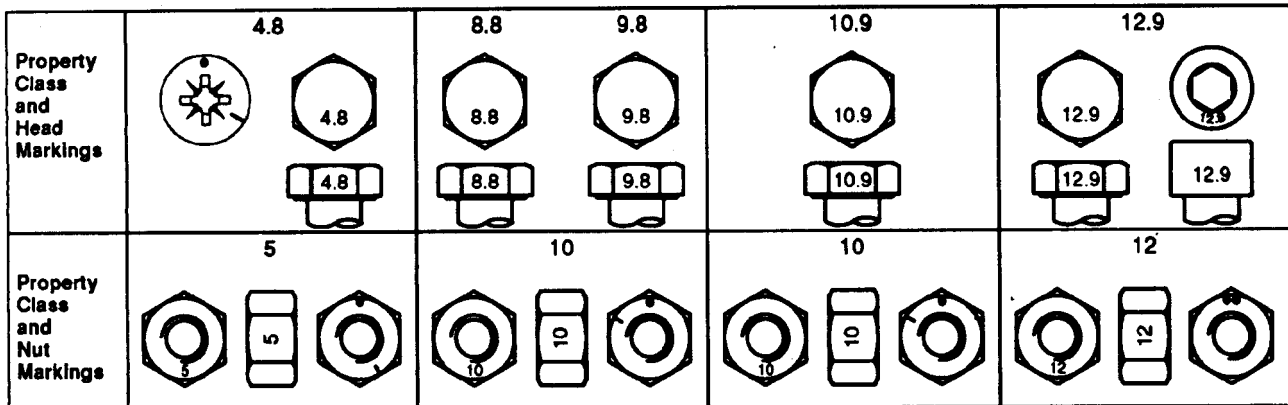
Z107397

ZX, TMSPFH001034-19-22JUL91



# Group 10 Torques for Hardware

## METRIC BOLT AND CAP SCREW TORQUE VALUES



TS1163 -19-04MAR91

Size	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
	Lubricated <sup>a</sup>		Dry <sup>a</sup>		Lubricated <sup>a</sup>		Dry <sup>a</sup>		Lubricated <sup>a</sup>		Dry <sup>a</sup>		Lubricated <sup>a</sup>		Dry <sup>a</sup>	
	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft
M6	4.8	3.5	6	4.5	9	6.5	11	8.5	13	9.5	17	12	15	11.5	19	14.5
M8	12	8.5	15	11	22	16	28	20	32	24	40	30	37	28	47	35
M10	23	17	29	21	43	32	55	40	63	47	80	60	75	55	95	70
M12	40	29	50	37	75	55	95	70	110	80	140	105	130	95	165	120
M14	63	47	80	60	120	88	150	110	175	130	225	165	205	150	260	190
M16	100	73	125	92	190	140	240	175	275	200	350	225	320	240	400	300
M18	135	100	175	125	260	195	330	250	375	275	475	350	440	325	560	410
M20	190	140	240	180	375	275	475	350	530	400	675	500	625	460	800	580
M22	260	190	330	250	510	375	650	475	725	540	925	675	850	625	1075	800
M24	330	250	425	310	650	475	825	600	925	675	1150	850	1075	800	1350	1000
M27	490	360	625	450	950	700	1200	875	1350	1000	1700	1250	1600	1150	2000	1500
M30	675	490	850	625	1300	950	1650	1200	1850	1350	2300	1700	2150	1600	2700	2000
M33	900	675	1150	850	1750	1300	2200	1650	2500	1850	3150	2350	2900	2150	3700	2750
M36	1150	850	1450	1075	2250	1650	2850	2100	3200	2350	4050	3000	3750	2750	4750	3500

DO NOT use these values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical property class.

Fasteners should be replaced with the same or higher property class. If higher property class fasteners are used, these should only be tightened to the strength of the original.













<sup>a</sup> "Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated without any lubrication.

Make sure fasteners threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

Tighten plastic insert or crimped steel-type lock nuts to approximately 50 percent of the dry torque shown in the chart, applied to the nut, not to the bolt head. Tighten toothed or serrated-type lock nuts to the full torque value.

DX.TORQ2 -19-16APR92

**UNIFIED INCH BOLT AND CAP SCREW TORQUE VALUES**

SAE Grade and Head Markings	NO MARK	1 or 2 <sup>b</sup> 	5 	5.1 	5.2 	8 	8.2 
	NO MARK	2 	5 		8 		

TS1162 -19-04/MAR91

Size	Grade 1				Grade 2 <sup>b</sup>				Grade 5, 5.1, or 5.2				Grade 8 or 8.2			
	Lubricated <sup>a</sup>		Dry <sup>a</sup>		Lubricated <sup>a</sup>		Dry <sup>a</sup>		Lubricated <sup>a</sup>		Dry <sup>a</sup>		Lubricated <sup>a</sup>		Dry <sup>a</sup>	
	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft
1/4	3.7	2.8	4.7	3.5	6	4.5	7.5	5.5	9.5	7	12	9	13.5	10	17	12.5
5/16	7.7	5.5	10	7	12	9	15	11	20	15	25	18	28	21	35	26
3/8	14	10	17	13	22	16	27	20	35	26	44	33	50	36	63	46
7/16	22	16	28	20	35	26	44	32	55	41	70	52	80	58	100	75
1/2	33	25	42	31	53	39	67	50	85	63	110	80	120	90	150	115
9/16	48	36	60	45	75	56	95	70	125	90	155	115	175	130	225	160
5/8	67	50	85	62	105	78	135	100	170	125	215	160	215	160	300	225
3/4	120	87	150	110	190	140	240	175	300	225	375	280	425	310	550	400
7/8	190	140	240	175	190	140	240	175	490	360	625	450	700	500	875	650
1	290	210	360	270	290	210	360	270	725	540	925	675	1050	750	1300	975
1-1/8	400	300	510	375	400	300	510	375	900	675	1150	850	1450	1075	1850	1350
1-1/4	570	425	725	530	570	425	725	530	1300	950	1650	1200	2050	1500	2600	1950
1-3/8	750	550	950	700	750	550	950	700	1700	1250	2150	1550	2700	2000	3400	2550
1-1/2	1000	725	1250	925	990	725	1250	930	2250	1650	2850	2100	3600	2650	4550	3350

DO NOT use these values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

Fasteners should be replaced with the same or higher grade. If higher grade fasteners are used, these should only be tightened to the strength of the original.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.

Make sure fasteners threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

Tighten plastic insert or crimped steel-type lock nuts to approximately 50 percent of the dry torque shown in the chart, applied to the nut, not to the bolt head. Tighten toothed or serrated-type lock nuts to the full torque value.

<sup>a</sup> "Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated without any lubrication.

<sup>b</sup> Grade 2 applies for hex cap screws (not hex bolts) up to 152 mm (6-in.) long. Grade 1 applies for hex cap screws over 152 mm (6-in.) long, and for all other types of bolts and screws of any length.

# Section 20 Engine

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**Group 05**  
**Removing and Installing Engine**

**SPECIAL OR ESSENTIAL TOOLS**

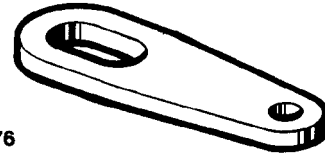
*NOTE: Order tools according to information given in the U.S. SERVICE-GARD™ Catalog or in the European Microfiche Tool Catalog (MTC).*

DX,TOOLS -19-05JUN91

Lifting eye . . . . . JD-244-1

LX002476 -UN-07NOV94

**LX002476**

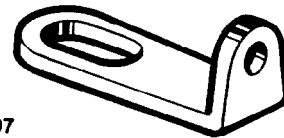


ZX,TMXZCO003887-19-15FEB95

Lifting eye . . . . . JD-244-2

LX002297 -UN-07NOV94

**LX002297**

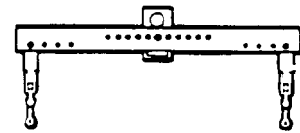


ZX,TMXZCO003888-19-15FEB95

Lifting sling . . . . . JDG23

ZX005462 -UN-28APR95

**ZX005462**



ZX,TMXZCO003889-19-15FEB95

## ENGINES OF Z SERIES COMBINES

Combine Model	Engine Type	kW	HP
2054	CD 6068 H Z 001	132	180
2056	RG 6076 A Z 031	151	205
2058/2064	RG 6076 A Z 030	170	230
2066	RG 6076 H Z 031	199	270

ZX, TMXZCO003906-19-15FEB95

## ENGINE DESIGNATION CODES

CD	- Saran
RG	- Engine Works
6	- Number of cylinders
068	- Displacement = 6.8 liters
076	- Displacement = 7.6 liters
H	- Turbocharged, air-to-air intercooled
A	- Turbocharged, air-to-water intercooled
000000	- Serial number
Z	- Engine user (Zweibrücken factory)
001	- Engine version
030	- Engine version
031	- Engine version

ZX, TMXZCO003948-19-15FEB95

## DIESEL ENGINE OIL

Use oil viscosity based on the expected air temperature range during the period between oil changes.

The following oil is preferred.

- John Deere PLUS-50®

If John Deere PLUS-50 engine oil and a John Deere oil filter are used, the service interval for oil and filter changes may be extended by 50 hours.

The following oil is also recommended:

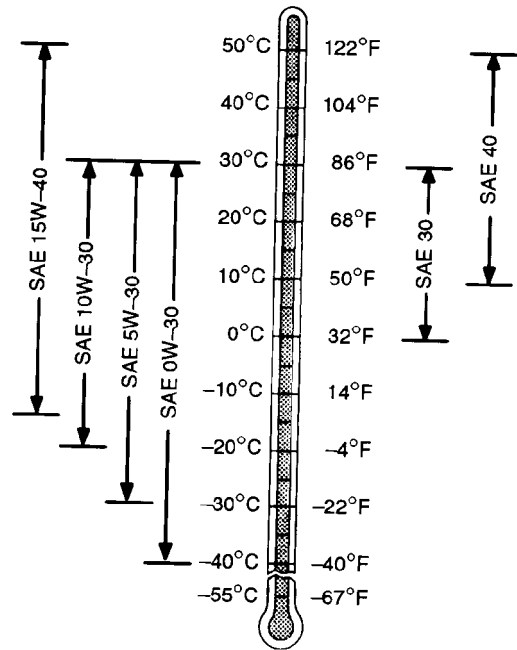
- John Deere TORQ-GARD SUPREME®

Other oils may be used if they meet one or more of the following:

- John Deere UNI-GARD™
- API Service Classification CG-4
- API Service Classification CF-4
- API Service Classification CE
- CCMC Specification D5 and Mercedes Benz MB228.3
- CCMC Specification D4 and Mercedes Benz MB228.1

**Viscosity grade SAE 15W-40 is preferred.**

If diesel fuel with sulfur content greater than 0.5% is used, reduce the service interval by 50%.



DX,ENOIL -19-16SEP94

-UN-12SEP94

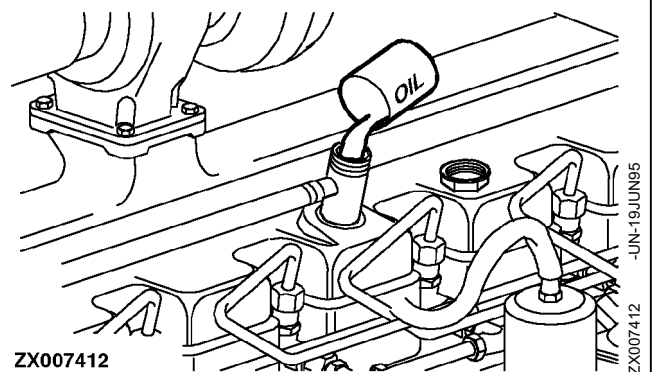
TS1619

## CRANKCASE CAPACITIES, INCLUDING FILTER CHANGE

### ENGINE OIL

6.8-L engine (414 cu in.):  
Crankcase capacity is 19 L (5.0 U.S. gal)

7.6-L engine (466 cu in.):  
Crankcase capacity is 25 L (6.6 U.S. gal)



ZX,OMXZCO002060-19-01MAR95

-UN-19/JUN95

## PREPARATIONS FOR ENGINE REMOVAL

**CAUTION:** Observe safety rules. See Section 05, Group 05.

Swing unloading auger to the side.

Disconnect battery.

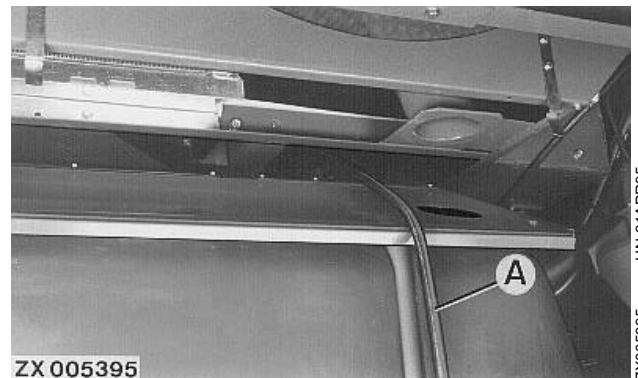
ZX, TMXZCO003890-19-15FEB95

## DRAINING COOLANT

Install a hose (A) with a length of 3 m (9.8 ft.) and 11 mm (0.43 in.) ID on radiator drain tap and open tap.

Drain coolant into a suitable container.

Loosen radiator cap.



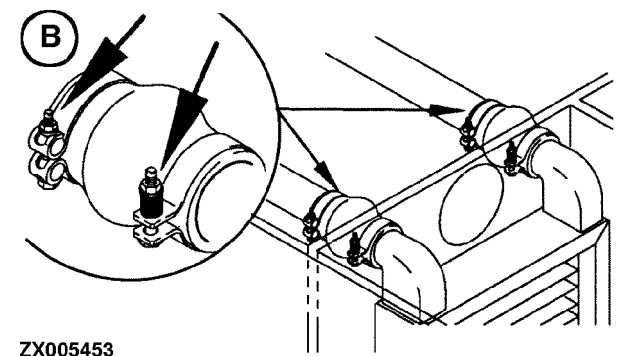
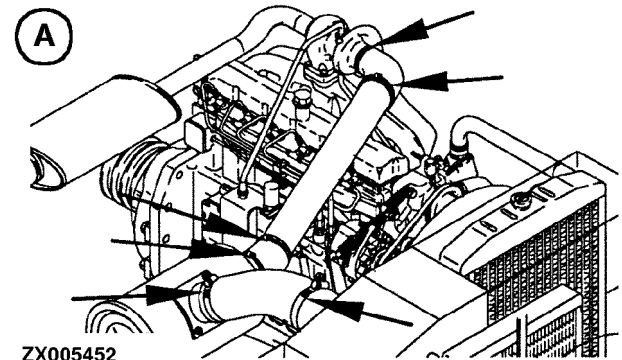
ZX, TMXZCO003891-19-15FEB95

## REMOVING AIR INTAKE LINES

Loosen clamps and remove lines.

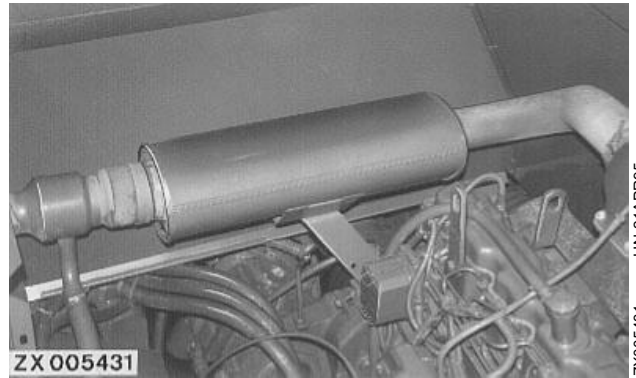
Install plastic caps on all openings.

A—2056, 2058, 2064  
B—2054, 2066



ZX, TMXZCO003892-19-15FEB95

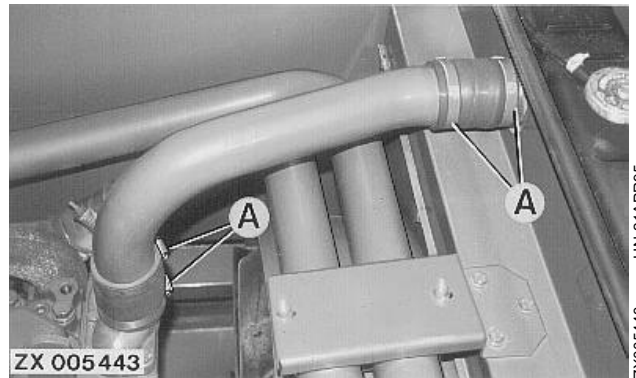
## REMOVING MUFFLER ASSEMBLY



ZX, TMXZCO003893-19-15FEB95

## LOOSENING RADIATOR CONNECTIONS

Loosen hose clamps (A).



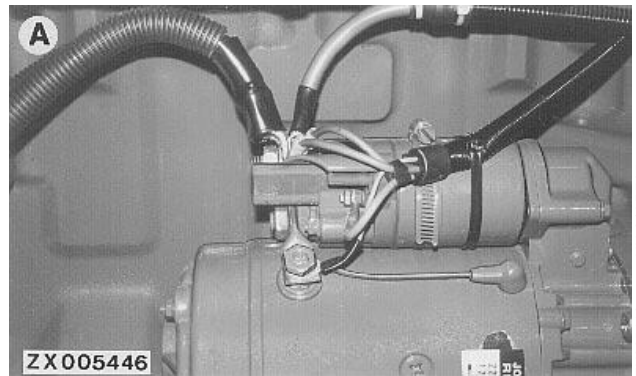
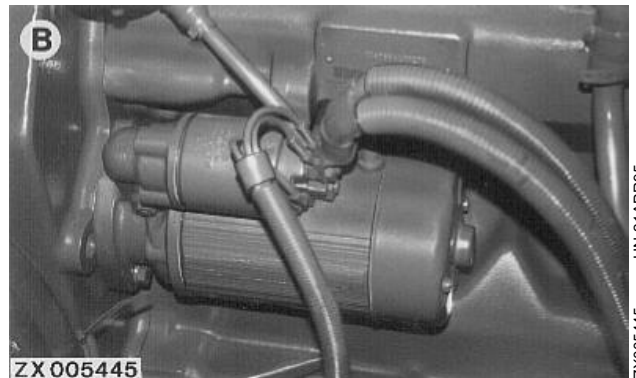
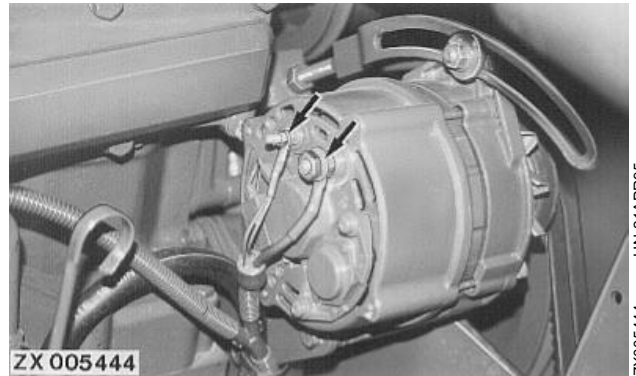
2054 Combine Shown

ZX, TMXZCO003894-19-15FEB95

## ELECTRICAL CONNECTIONS

Disconnect electrical connections at alternator and starting motor.

A—2054  
B—2056-2066



ZX, TMXZCO003895-19-15FEB95

Disconnect cable connections at oil pressure, coolant temperature and speed sending units.

ZX, TMXZCO003896-19-15FEB95

## Removing and Installing Engine/Hydrostatic Pump

### DISCONNECTING FUEL LINES

Disconnect hoses at fuel transfer pump and at engine return line.

ZX, TMXZCO003897-19-15FEB95

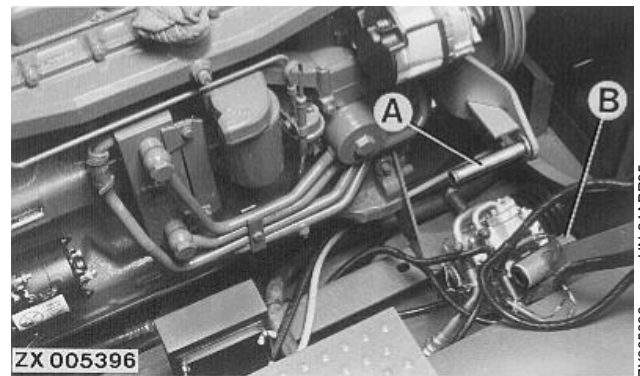
### REMOVING AIR CONDITIONING COMPRESSOR

**IMPORTANT: Do not loosen pressure hoses at compressor.**

Slacken and remove compressor belt.

Remove snap ring from compressor support (A).

Remove compressor assembly (B) with support.



ZX, TMXZCO003898-19-15FEB95

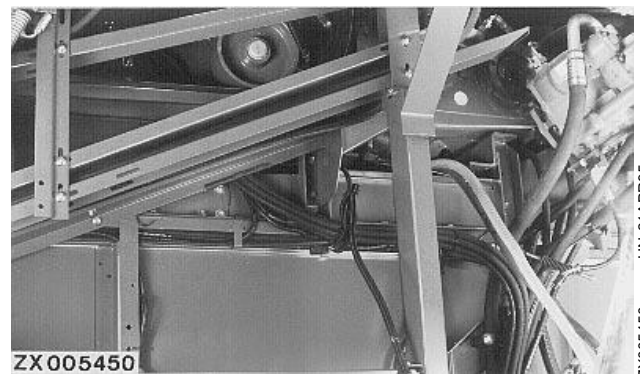
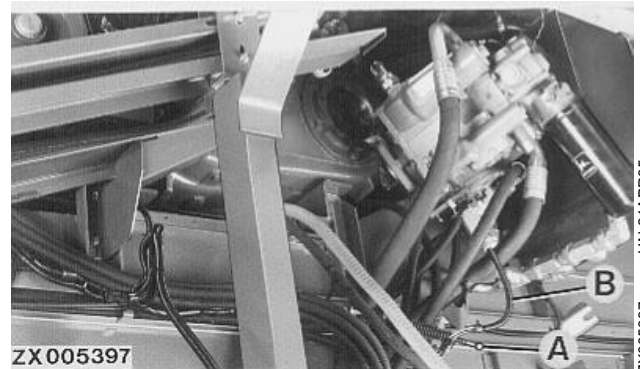
### REMOVING HYDROSTATIC PUMP

**IMPORTANT: Do not loosen pressure hoses.**

Disconnect bowden cable (A).

Disconnect electrical cable (B) of reverse travel switch.

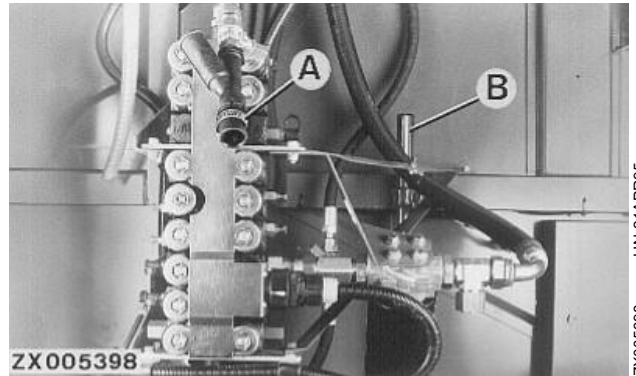
Remove hydrostatic pump from intermediate transmission. Secure the pump to prevent it from falling to the ground.



ZX, TMXZCO003899-19-15FEB95

### DISCONNECTING ENGINE OIL DRAIN HOSE

Disconnect oil drain hose (A) from drain pipe (B) at hose clamp.



ZX, TMXZCO003900-19-15FEB95

### REMOVING SEPARATOR DRIVE

Remove upper belt guide from unloading drive.

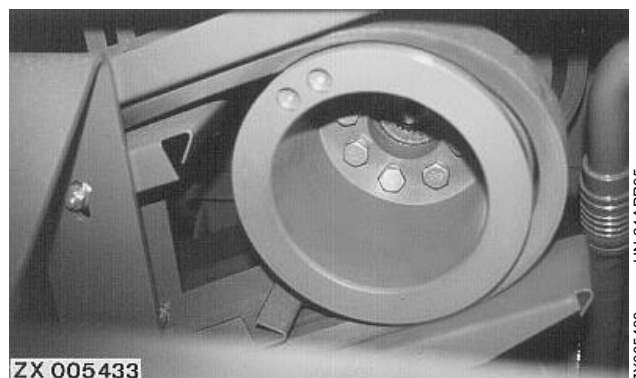
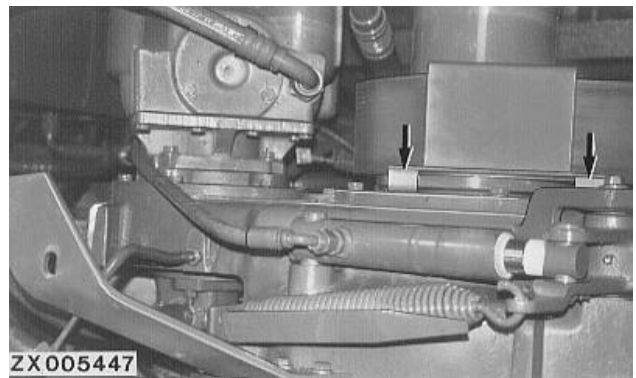
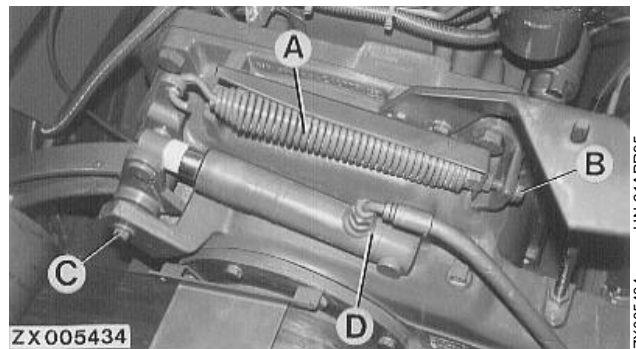
Remove spring (A) after loosening tensioner screw (B).

Remove screw (C) from idler mounting. Remove idler with lift cylinder (D).

Loosen two screws on hold-down sheet and remove sheet.

Remove screws from engine pulley and lift off pulley.

- A—Spring
- B—Tensioner screw
- C—Screw
- D—Lift cylinder



ZX, TMXZCO003901-19-15FEB95



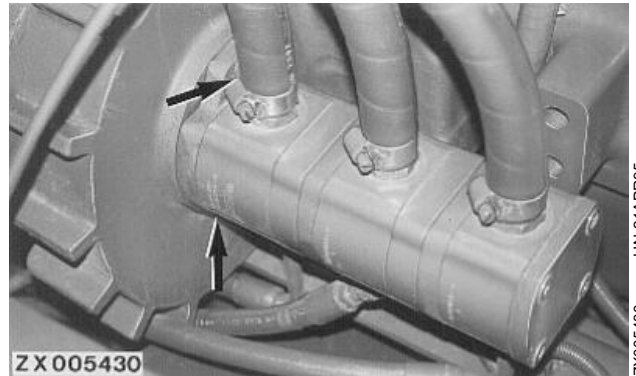
## REMOVING HYDRAULIC PUMPS

**IMPORTANT:** Do not disconnect suction line and two pressure lines.

Loosen one pressure hose to gain access to the nut.

Remove two pump attaching nuts.

Remove hydraulic pump assemblies.



ZX005430

-UN-21APR95  
ZX005430

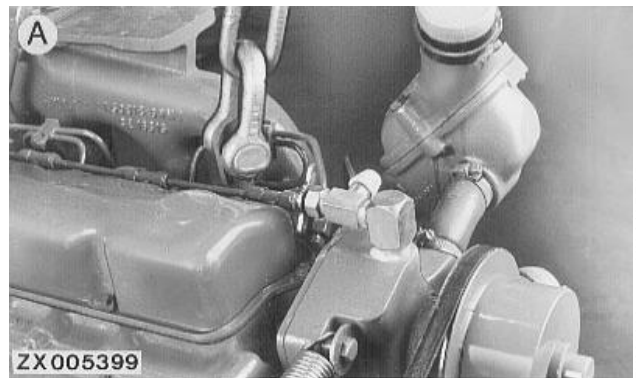
ZX, TMXZCO003902-19-15FEB95

## REMOVING HEATER HOSES

Loosen heater hoses at inlet and outlet side and remove them.

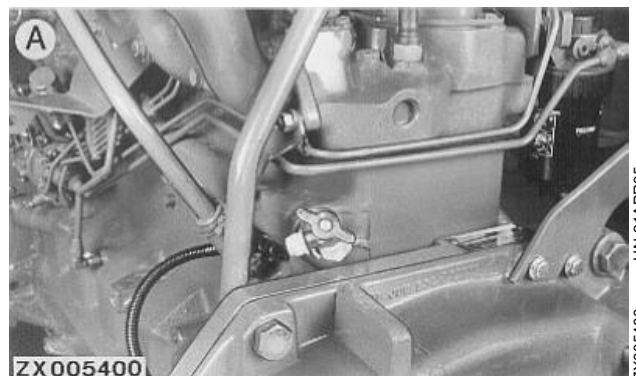
A—2054

B—2056-2066



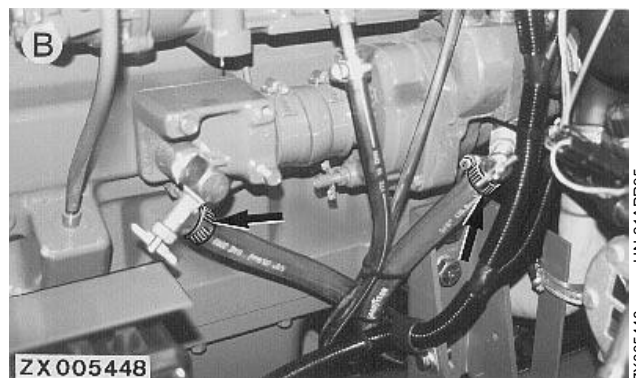
ZX005399

-UN-21APR95  
ZX005399



ZX005400

-UN-21APR95  
ZX005400



ZX005448

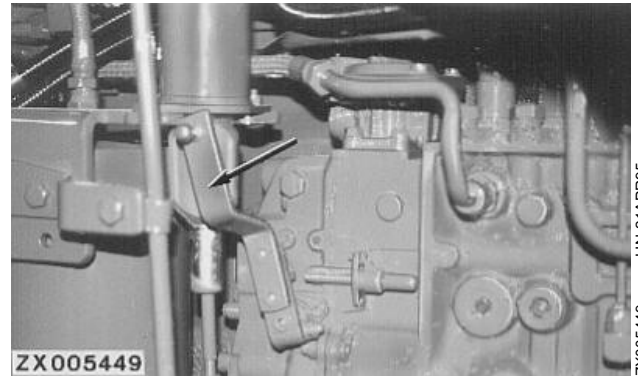
-UN-21APR95  
ZX005448

ZX, TMXZCO003903-19-15FEB95

## Removing and Installing Engine/Engine Speed Linkage

### ENGINE SPEED LINKAGE

Loosen bowden cable for engine speed adjustment.



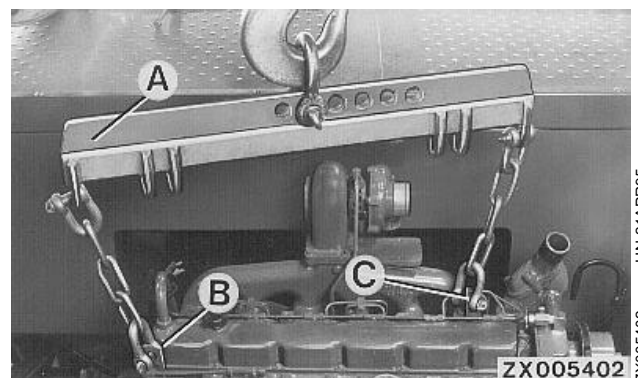
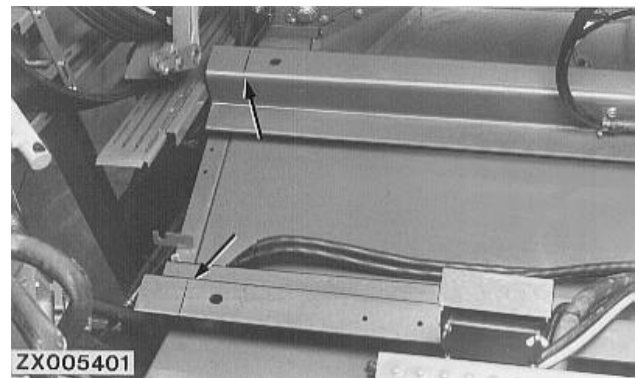
ZX, TMXZCO003904-19-15FEB95

-UN-21APR95  
ZX005449

### DISASSEMBLY STEPS ON ENGINE

Mark position of engine bracket on engine support and remove attaching screws.

Attach lifting device (A) to existing brackets (B) and (C).



ZX, TMXZCO003905-19-15FEB95

-UN-21APR95  
ZX005401

-UN-21APR95  
ZX005402

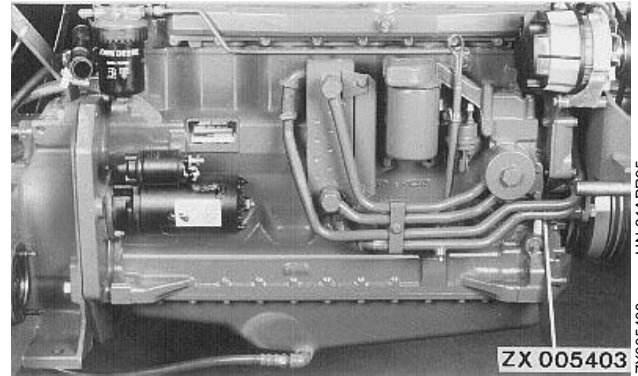
## LIFTING OFF ENGINE

**CAUTION:** The engine is heavy. It weighs 600 - 816 kg (1323 - 1799 lb), depending on combine model.

**IMPORTANT:** Lift off engine, using special tool JDG23.

Lifting device must have a minimum lifting height of 5.5 m (18 ft.).

Lift off engine and swing it to the rear.



ZX, TMXZCO003907-19-15FEB95

## ENGINE REPAIR

For engine repair, refer to the relevant Technical Manual as listed below:

Combine	Engine type	
2054	CD6068HZ001	CTM3274
2056	RG6076AZ031	CTM4
2058	RG6076AZ030	CTM4
2064	RG6076AZ030	CTM4
2066	RG6076AZ031	CTM4

ZX, TMXZCO003908-19-15FEB95

## INSTALLING ENGINE

For engine installation, reverse removal procedure. Before starting engine, check the following: engine oil level, hydraulic system oil level, hydrostatic system oil level (if necessary) and coolant level. Add oil or coolant as required.

ZX, TMXZCO003909-19-15FEB95

## PREPARATIONS FOR ADJUSTING BELT GUIDES ON MAIN COUNTERSHAFT AND UNLOADING DRIVE

Start the engine and allow pressure to build up in the hydraulic system.

Shut off engine.

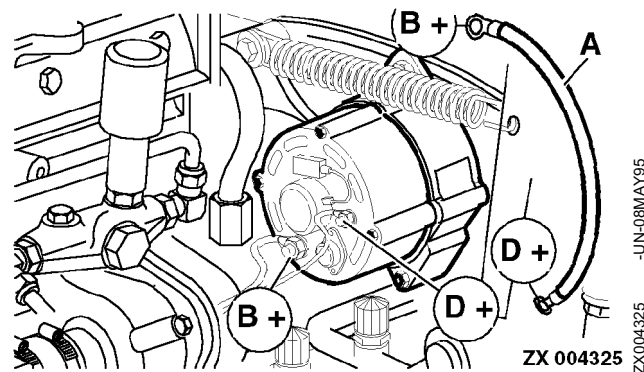
Attach bridge (A).

Put road safety switch in field position.

Switch on ignition.

To adjust the belt guide on the main countershaft, press the separator switch on the switch console.

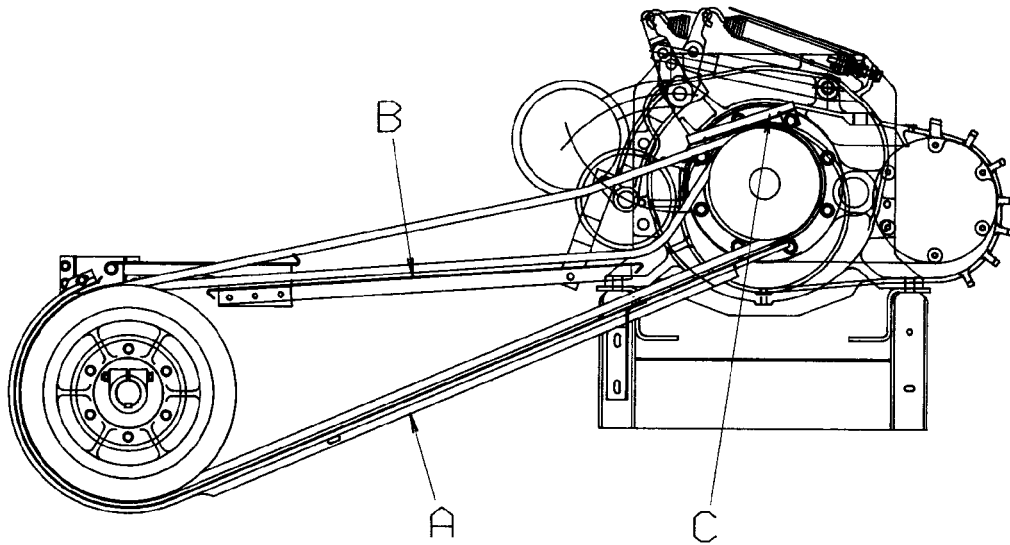
To adjust the belt guide on the unloading drive, press the unloading drive switch on the switch console.



-JUN-08MAY95  
ZX004325

ZX,OMXZC0002250-19-05OCT92

## MAIN COUNTERSHAFT DRIVE



ZX003948

ZX003948  
-JUN-02MAY95

Adjusting belt guides:

Tension belts with machine not running.

Adjust belt guide (A) until 4 - 6 mm (0.16 - 0.24 in.)  
clearance is obtained between guide and belt (B).

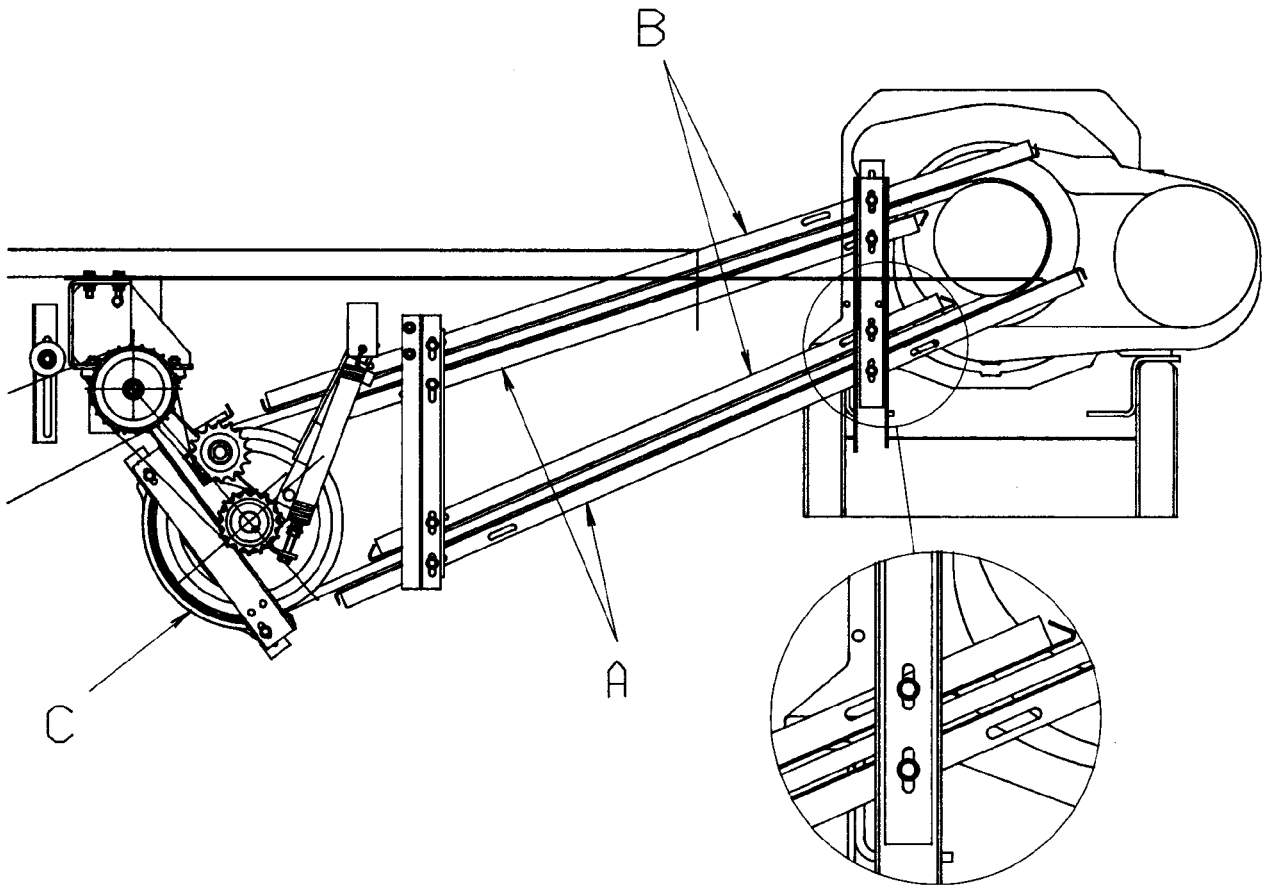
Slacken belt again.

Adjust belt guide (C) until approx. 5 mm (0.20 in.)  
clearance is obtained between guide and belt (B) with  
belt slackened.

Remove bridge from alternator.

ZX, TMXZCO003910-19-15FEB95

## UNLOADING DRIVE



ZX003949

ZX003949 -UN-02MAY95

Adjusting belt guides:

Tension belts with machine not running.

Adjust belt guides (A) and (C) until approx. 5 mm (0.20 in.) clearance is obtained between guide and belt.

Slacken belt again.

Adjust belt guides (B) so that the belt does not become caught when disengaging drive.

Belt guides (A) and (B) must not come into contact with belt guide (C).

Remove bridge from alternator.

ZX, TMXZCO003911-19-15FEB95

# Fuel, Air Intake and Cooling Systems

## Section 30

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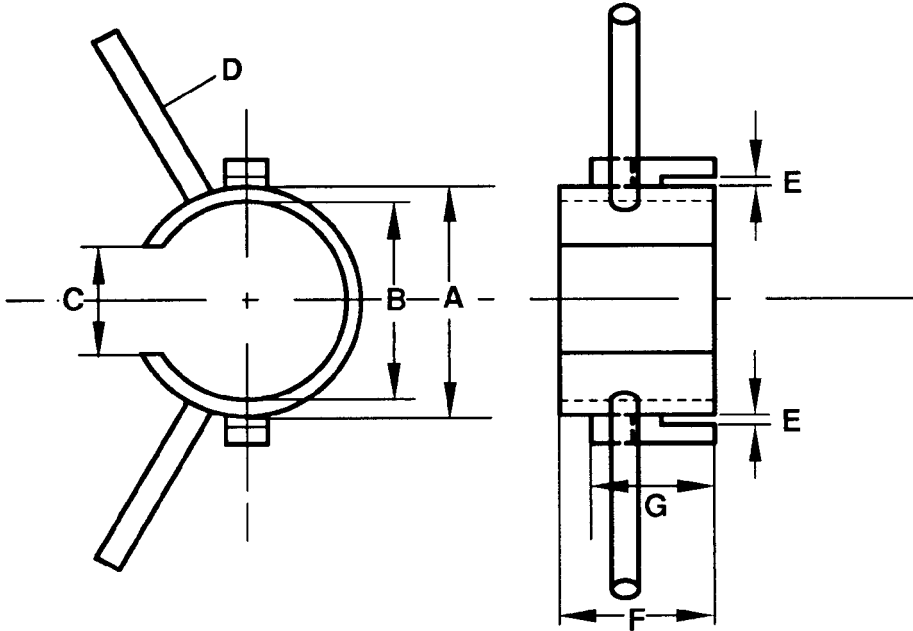
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*Contents*



**SPECIAL TOOL (SELF-MANUFACTURED)**



ZX005391

ZX005391 -JUN-03MAY95

- A—75 mm (2.95 in.) dia.
- B—65 mm (2.56 in.) dia.
- C—35 mm (1.38 in.)
- D—8 mm (0.3 in.) dia., length 100 mm (3.94 in.)
- E—3 mm (0.12 in.)
- F—50 mm (1.97 in.)
- G—30 mm (1.20 in.)

Tool for removal and installation of fuel gauge sending unit

ZX, TMXZCO003912-19-15FEB95

**GENERAL INFORMATION**

**⚠ CAUTION:** When repairing the fuel system, never permit smoking, naked flames or playing with fire.

**Fuel Tank Capacity**

2054 up to a certain serial number . . . . .	305 L (92.5 U.S. gal)
2054 - 2064 Hillmaster . . . . .	450 L (119 U.S. gal)
2066, 2066 Hillmaster . . . . .	550 L (145.3 U.S. gal)

ZX, TMXZCO003913-19-15FEB95

## REMOVING FUEL TANK

**IMPORTANT: Drain fuel from tank before removal.**

Loosen fuel line at filter (A).

Loosen fuel return line at tank (B).

Disconnect electrical cable from fuel gauge sending unit (C).

Remove rear panel (D).

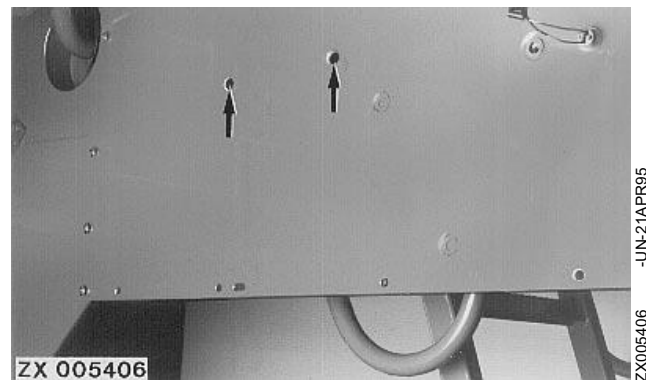
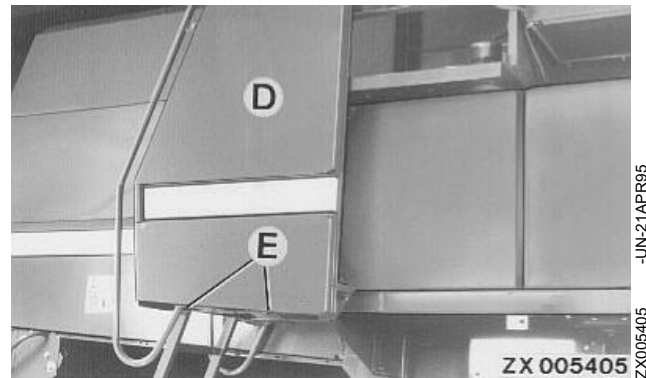
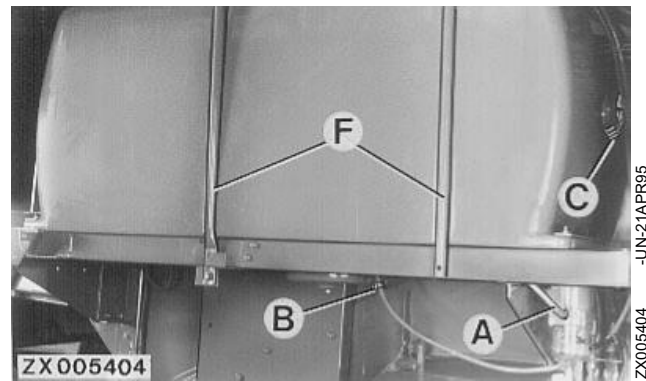
Remove rear handrails (E).

Remove stays (F).

Remove filter assembly.

Remove two screws from hood.

- A—Filter
- B—Tank
- C—Fuel gauge sending unit
- D—Panel
- E—Handrails
- F—Stays



ZX, TMXZCO003914-19-15FEB95

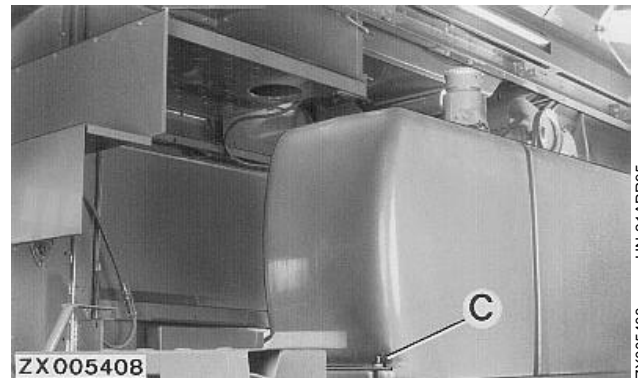
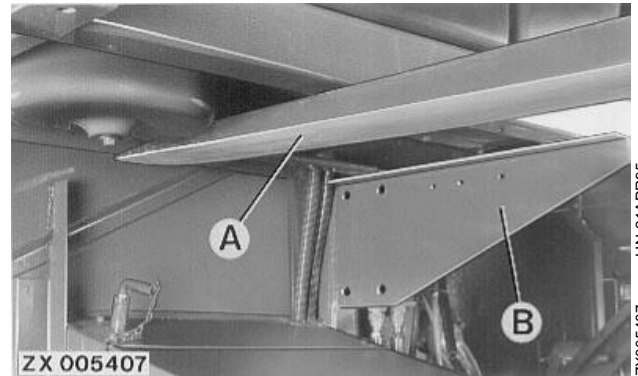
## REMOVING TANK SUPPORT

Place lift fork (A) below tank support.

Remove four screws from the two supports (B) and lower tank until tank filler neck is clear of floor plate.

Remove tank sideways.

Remove straps (C) from lower tank attaching points on right and left-hand side.



ZX, TMXZCO003917-19-15FEB95

## INSTALLING FUEL TANK

Install fuel tank, reversing removal procedure.

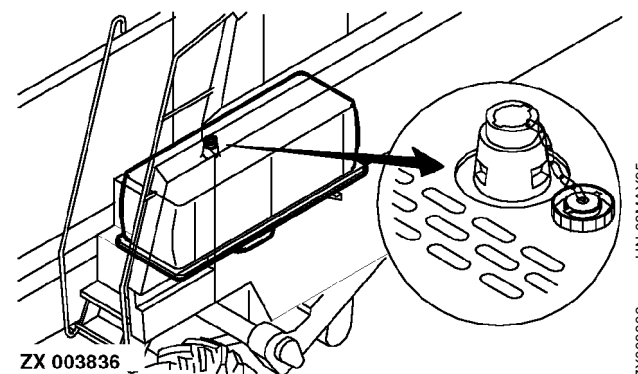
ZX, TMXZCO003919-19-15FEB95

## FUEL TANK FILLER NECK

The fuel tank filler neck is closed with a tank cap.

The fuel tank is vented through an opening in the cap.

Clean dust and chaff from the surrounding area before removing tank cap.



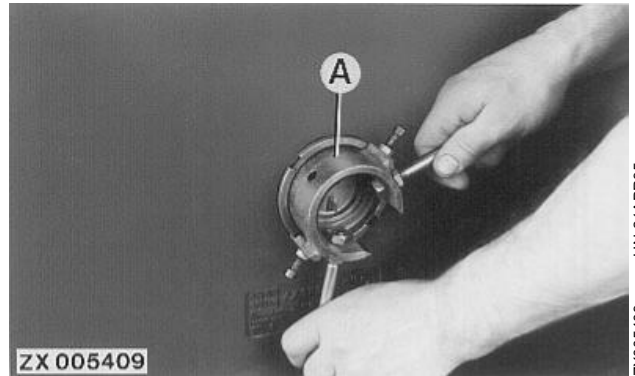
ZX, OMXZCO002089-19-13NOV92

### REMOVING FUEL GAUGE SENDING UNIT

Drain fuel until fuel level is well below the fuel gauge sending unit.

Disconnect the three cable connectors.

Using special tool (A), turn the sending unit all the way counter-clockwise and remove it.



ZX, TMXZCO003920-19-15FEB95

ZX005409 -UN-21APR95

### INSTALLING FUEL GAUGE SENDING UNIT

Install fuel gauge sending unit with O-ring.

Using special tool, turn the sending unit clockwise until contacts (A) and (B) are in vertical position.



ZX, TMXZCO003921-19-15FEB95

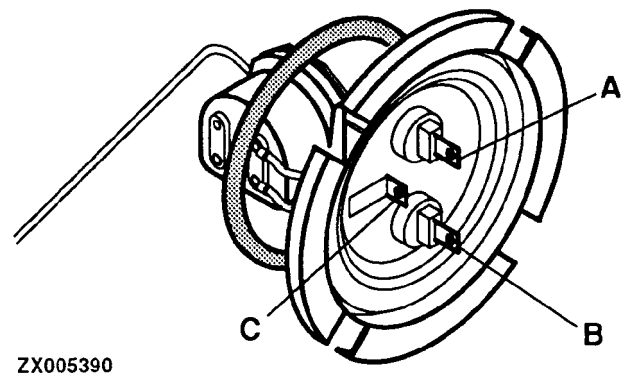
ZX005410 -UN-21APR95

### CONNECTING CABLES

Connect brown cable (031) to red connection "A".

Connect red cable (033) to white connection "B".

Connect black cable to ground "C".

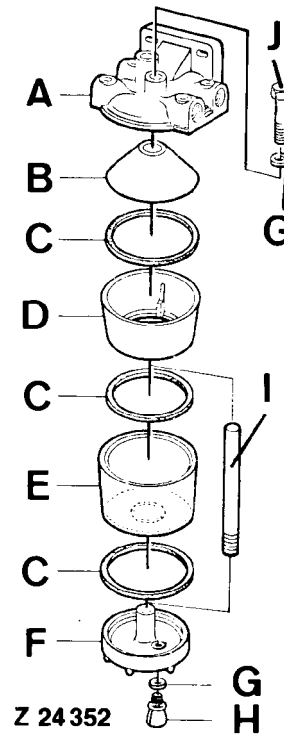


ZX, TMXZCO003922-19-15FEB95

ZX005390 -UN-03MAY95

**WATER TRAP, EXPLODED VIEW (UP TO SERIAL NUMBER XXXXXX)**

- A—Filter cover
- B—Bowl
- C—Sealing rings
- D—Filter body
- E—Sight glass
- F—Filter base
- G—Gasket
- H—Drain screw
- I—Threaded pipe
- J—Bleed screw

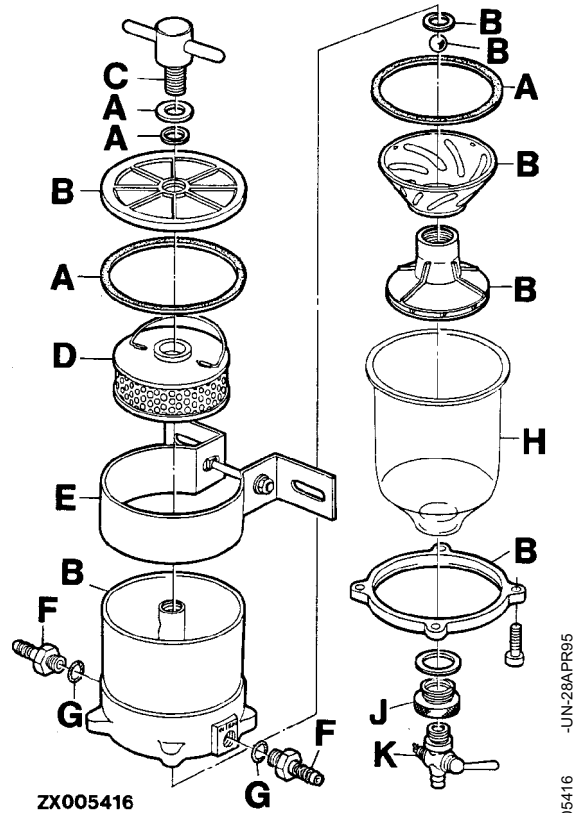


ZX,TMXZCO003918-19-15FEB95

Z24352 -UN-28APR95

**FUEL FILTER WITH WATER TRAP,  
EXPLODED VIEW (FROM SERIAL NUMBER  
XXXXXX)**

- A—Gasket set
- B—Repair set
- C—Special screw
- D—Filter element
- E—Holding strap
- F—Hose connection
- G—O-ring
- H—Sight glass
- J—Knurled nut
- K—Drain tap

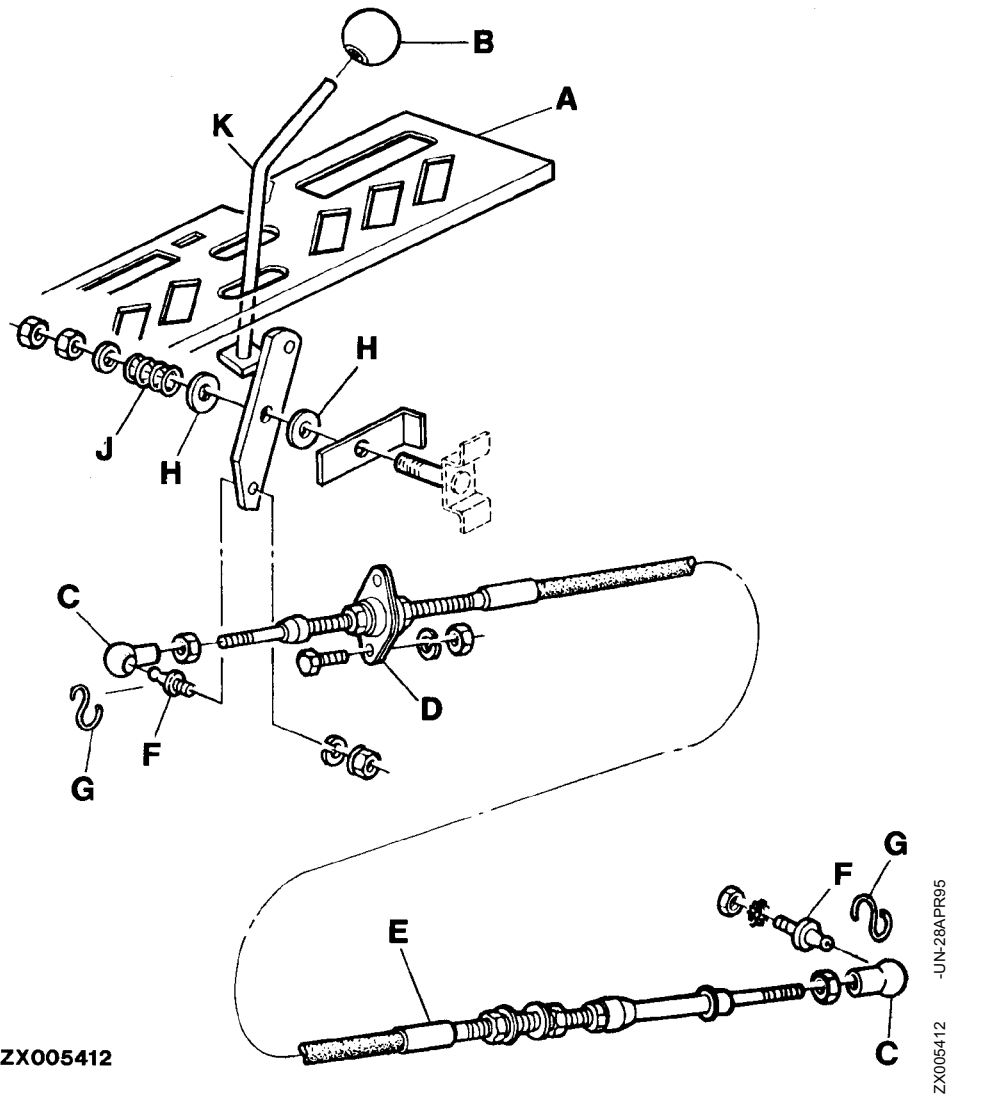


ZX005416

ZX005416 -UN-28APR95

ZX,TMXZCO003923-19-15FEB95

**BOWDEN CABLE FOR SPEED ADJUSTMENT**



A—Console  
B—Handle  
C—Ball joint

D—Joint  
E—Bowden cable  
F—Ball socket

G—Retainer  
H—Special washer

J—Spring  
K—Throttle lever

## REPLACING BOWDEN CABLE FOR SPEED ADJUSTMENT

**IMPORTANT: Do not bend the bowden cable.**

Remove console.

Disconnect throttle lever at thread and remove together with rubber boot. Remove handle from lever.

Remove right-hand cover (A). Remove plastic clamping device (B) from bowden cable.

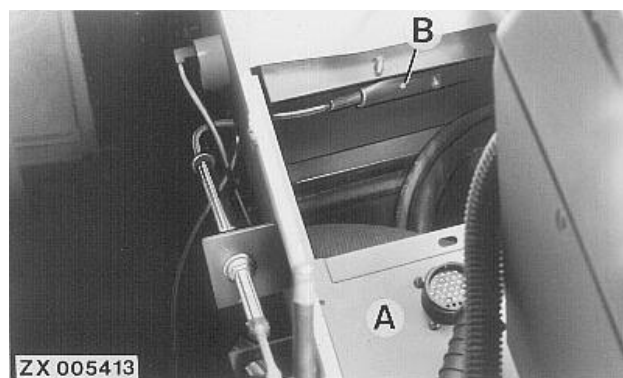
Disconnect ball joint at throttle lever and remove together with cable joint.

Slacken feeder house drive idler.

Remove all clamps from bowden cable.

Disconnect bowden cable at fuel injection pump bracket.  
Disconnect ball joint.

Pull bowden cable to the rear out of retainers.



ZX005413  
-UN-21APR95

ZX, TMXZCO003925-19-15FEB95

## INSTALLING BOWDEN CABLE

For installation, reverse removal procedure.

ZX, TMXZCO003926-19-15FEB95

## ADJUSTING BOWDEN CABLE

Adjust bowden cable so that speed control lever at injection pump contacts adjusting screw stop (at full throttle position).

ZX, TMXZCO003927-19-15FEB95



### ADJUSTING ENGINE SPEEDS

Slow idle . . . . . 1250 ± 50 rpm  
Fast idle . . . . . 2350 + 50 rpm

Check engine speeds with separator engaged.

ZX, TMXZCO003928-19-15FEB95

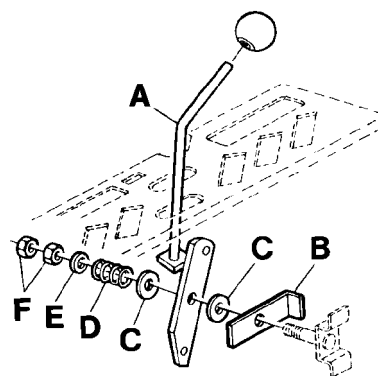
### ADJUSTING THROTTLE LEVER

Tighten throttle lever (A) by means of nut (F) so that lever does not move out of full throttle position.

Secure nut (F).

- A—Throttle lever
- B—Retaining strap
- C—Special washers
- D—Spring
- E—Washer
- F—Nut

ZX005414

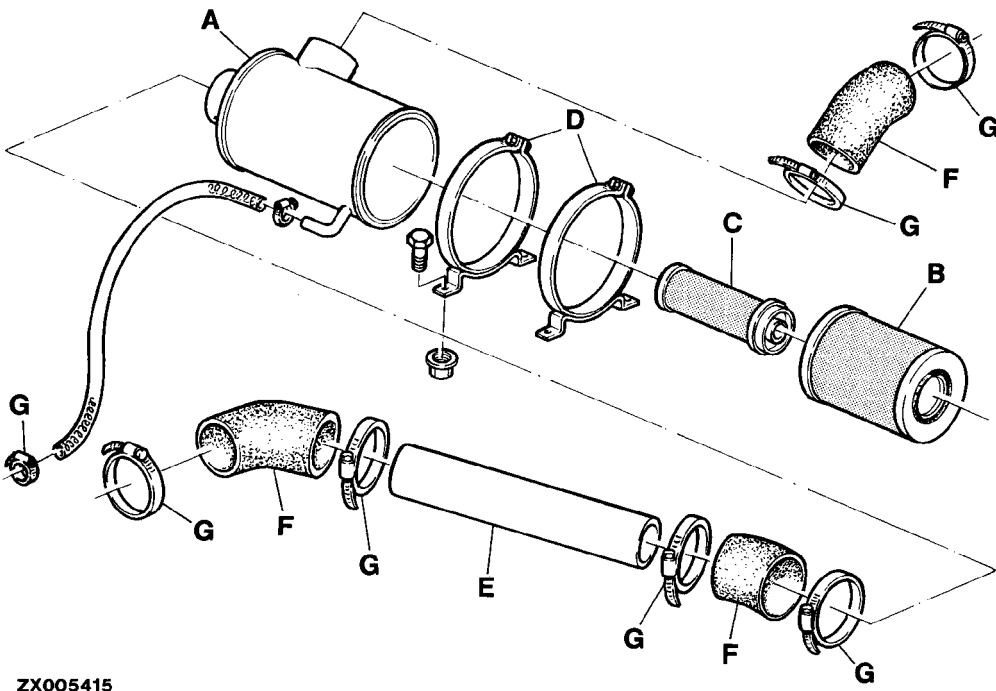


ZX, TMXZCO003929-19-15FEB95

ZX005414 -UN-28APR95

*Fuel System/Water Trap*

**AIR CLEANER, EXPLODED VIEW**



- A—Air cleaner housing
- B—Air cleaner element
- C—Safety element
- D—Air cleaner housing clamps
- E—Suction tube
- F—Hose sections
- G—Hose clamps

### INSTALLING AIR CLEANER ELEMENTS

**IMPORTANT:** Never use a wet or damp element. Make sure that rear rubber sealing rings are absolutely clean and seated correctly.

Install safety element (B).

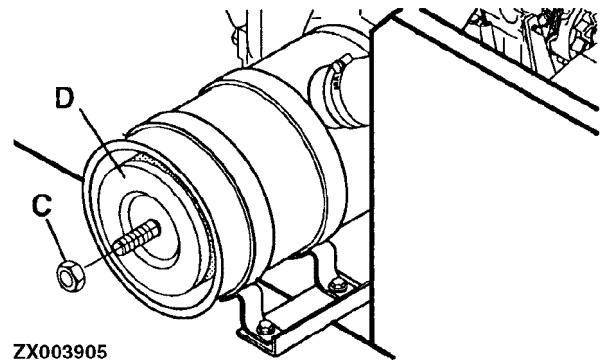
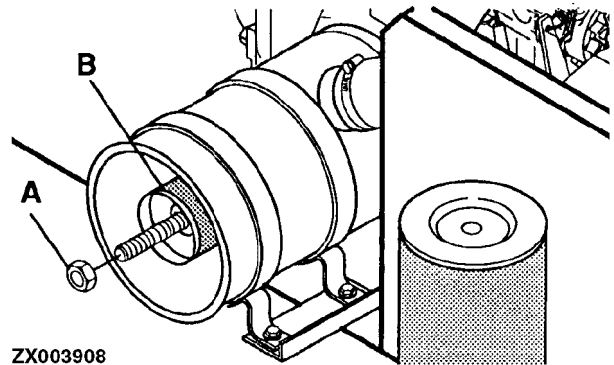
Tighten hex. nut (A).

Install air cleaner element (D).

Tighten hex. nut (C).

Put on filter cover and secure.

- A—Hex. nut
- B—Safety element
- C—Hex. nut
- D—Air cleaner element



ZX, TMXZCO003916-19-15FEB95

-UN-08MAY95

ZX003908

-UN-08MAY95

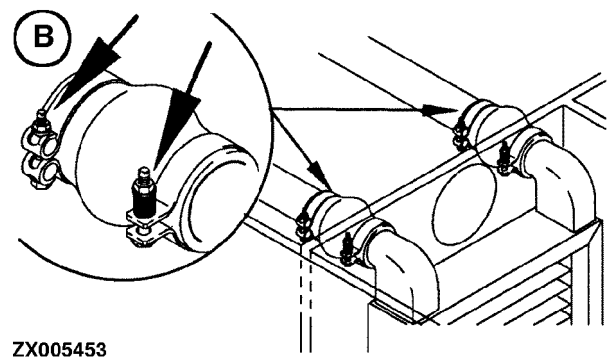
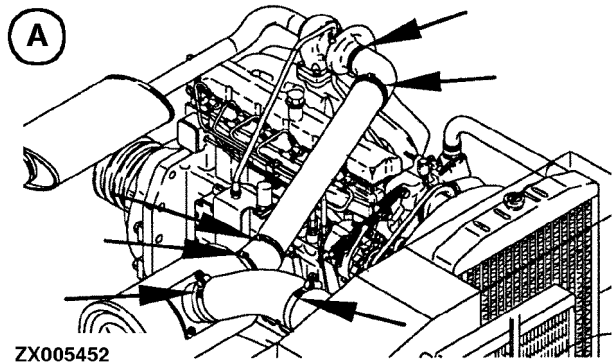
ZX003905

### AIR INTAKE LINES

Connections between steel tube and rubber hoses are sealed by hose clamps.

At least once a year, check and make sure that all hose clamps are seated and tightened correctly. When necessary, replace hoses or clamps.

- A—2056, 2058, 2064
- B—2054, 2066



ZX, TMXZCO003915-19-15FEB95

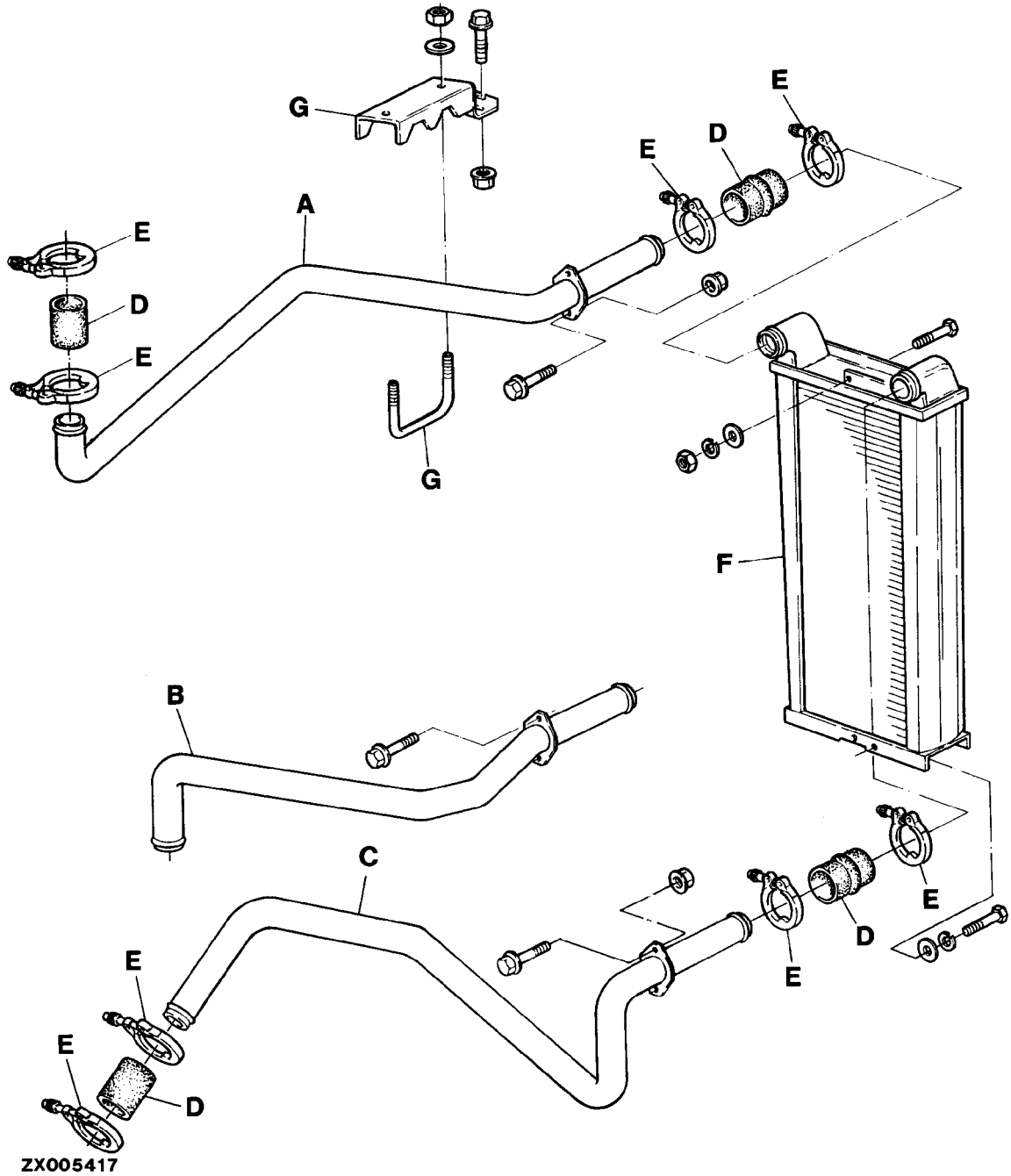
-UN-08MAY95

ZX005452

-UN-08MAY95

ZX005453

**INTERCOOLER WITH INTAKE AND SUCTION LINES**



A—Intake line  
B—Suction line, 2054

C—Suction line, 2066  
D—Rubber hose sections

E—Hose clamps  
F—Intercooler

G—Bracket

ZX005417 -UN-28APR95

ZX, TMXZCO003931-19-15FEB95

## **REPLACING INTERCOOLER**

Loosen hose clamps at intake and suction line and slide back rubber hoses.

Remove upper and lower intercooler attaching screw and lift out intercooler.

Install plastic caps on all air intake and outlet openings.

ZX, TMXZCO003932-19-15FEB95

## **INSTALLING INTERCOOLER**

Before installing intercooler, make sure that seals are in good condition. Replace seals, if necessary.

Install intercooler, reversing removal procedure.

Tighten hose clamps as far as possible.

ZX, TMXZCO003933-19-15FEB95

## ENGINE COOLANT

John Deere COOL-GARD is filled into the cooling system at the factory. It protects against corrosion and against frost down to  $-37^{\circ}\text{C}$  ( $-34^{\circ}\text{F}$ ).

**IMPORTANT: Use only John Deere COOL-GARD in the cooling system, independent of the season. Drain system and refill with fresh coolant every 2 years.**

If no John Deere COOL-GARD is available, use independent of the season a mixture of 50% ethylene-glycol antifreeze/corrosion inhibitor and 50% clear, soft water. This mixture also provides protection against corrosion and against frost down to  $-37^{\circ}\text{C}$  ( $-34^{\circ}\text{F}$ ).

Never use any cooling system sealing additives.

### Operating in Tropical Conditions

If no John Deere COOL-GARD or antifreeze is available, use the following mixture when refilling the cooling system: Use clean soft water and add 3% John Deere ENGINE COOLANT CONDITIONER TY16004 (30 ml per liter of water).

**IMPORTANT: Drain system and refill with fresh coolant mixture every year. This coolant mixture protects the system against corrosion, but not against frost.**



ES111859 -UN-05JAN89

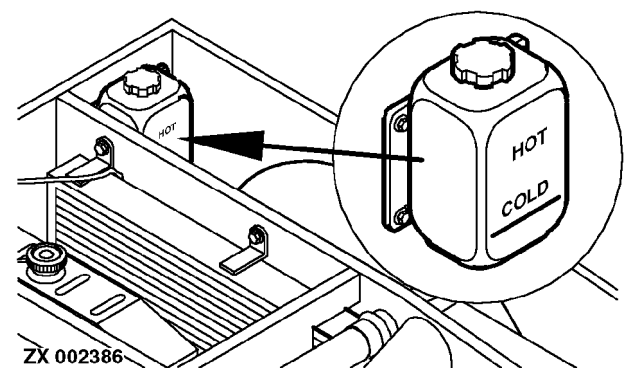
RC4690 -UN-14DEC88

FX,COOLG -19-29SEP94

## COOLING SYSTEM CAPACITY

### ENGINE COOLANT

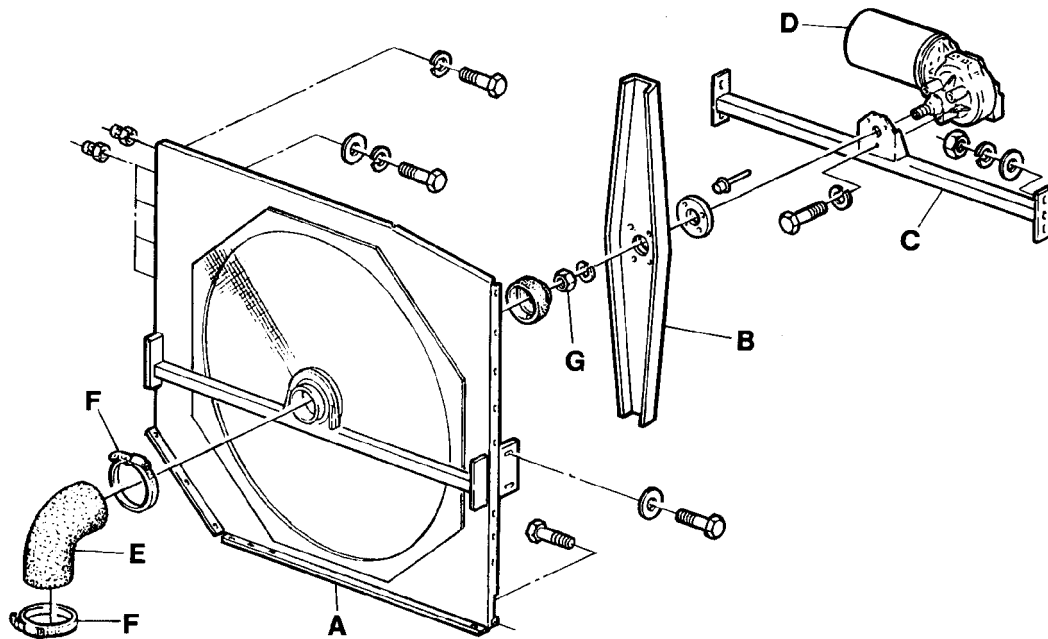
6.8-L engine (414 cu in.) and  
7.6-L engine (466 cu in.):  
Capacity is 30 L (7.9 U.S. gal)



ZX,OMXZC0002061-19-13NOV92

ZX002386 -UN-08MAY95

**SUCTION SYSTEM, EXPLODED VIEW**



ZX005418

A—Suction screen  
B—Suction blade

C—Crossbeam  
D—Electric motor

E—Suction hose  
F—Hose clamp

G—Nut

ZX005418 -JUN-28APR95

ZX,TMXZCO003934-19-15FEB95

**REPLACING SUCTION BLADE**

Remove crossbeam.

Remove nut and lift off suction blade.

For installation, reverse removal procedure.

ZX,TMXZCO003935-19-15FEB95

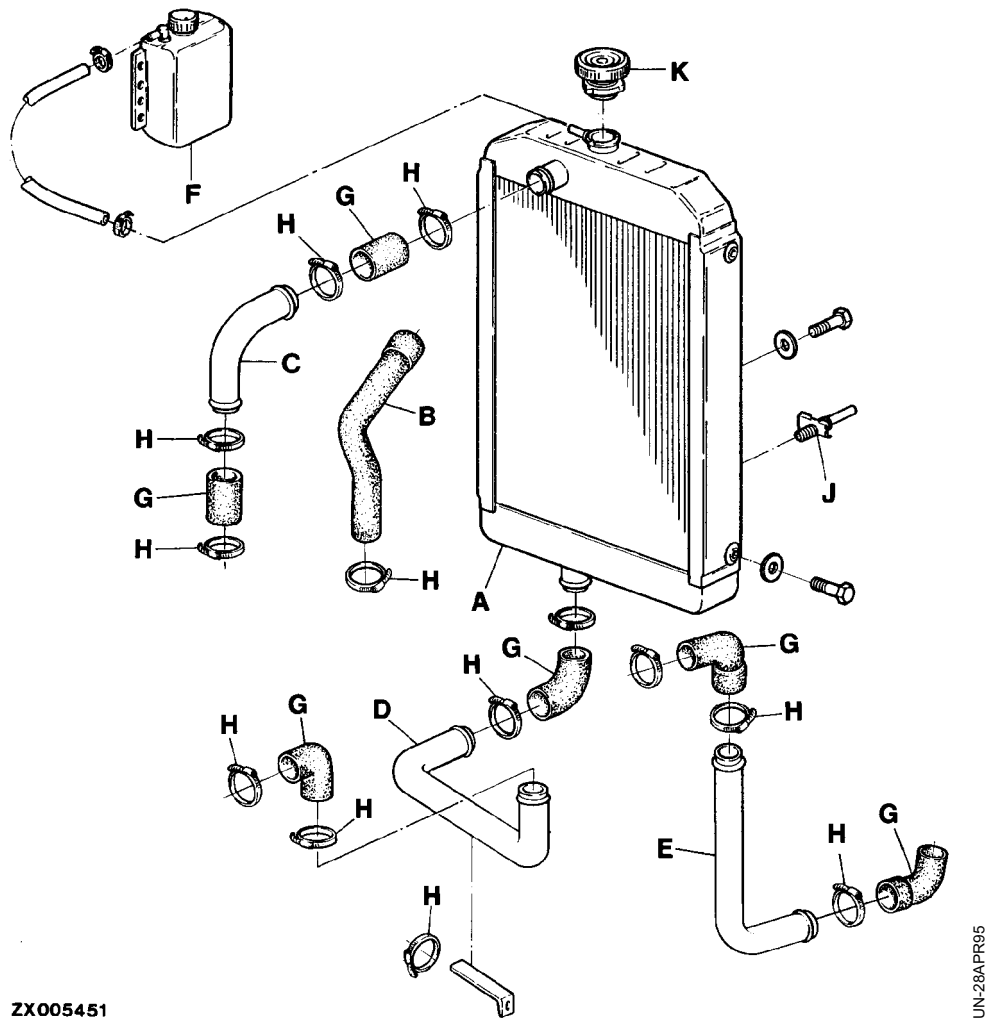


## **ADJUSTING SUCTION BLADE**

Adjust suction blade at crossbeam until a clearance of 7 - 8 mm (0.27 - 0.31 in.) is obtained between blade and suction screen (measured at outer ends of blade).

ZX, TMXZCO003936-19-15FEB95

**RADIATOR, EXPLODED VIEW**



- |                      |                      |                        |                |
|----------------------|----------------------|------------------------|----------------|
| A—Radiator           | D—Pipe (2056 - 2066) | G—Rubber hose sections | J—Drain tap    |
| B—Hose (2054)        | E—Pipe (2054)        | H—Hose clamps          | K—Radiator cap |
| C—Pipe (2056 - 2066) | F—Expansion tank     |                        |                |

ZX, TMXZCO003937-19-15FEB95

## **REMOVING RADIATOR**

Drain coolant.

Disconnect engine coolant connection.

Remove support with fan.

Remove lateral radiator attaching screws (bottom and top).

Pull out radiator from the top.

ZX, TMXZCO003938-19-15FEB95

## **INSTALLING RADIATOR**

For installation, reverse removal procedure.

Check if seals are in good condition. Replace, if necessary.

ZX, TMXZCO003939-19-15FEB95



# Section 40 Electrical System

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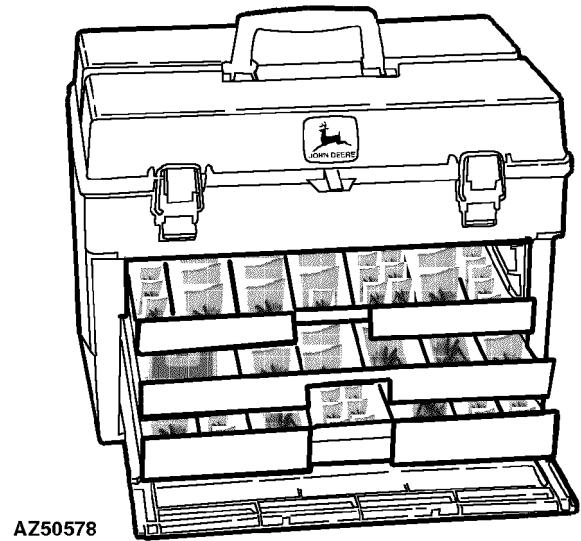
*Contents*

**SPECIAL OR ESSENTIAL TOOLS**

*NOTE: Order tools according to information given in the U.S. SERVICEGARD™ Catalog or in the European Microfiche Tool Catalog (MTC).*

DX,TOOLS -19-20JUL95

Repair kit ..... AZ50578  
Connector repair



AZ50578

-JUN-12JAN96  
AZ50578

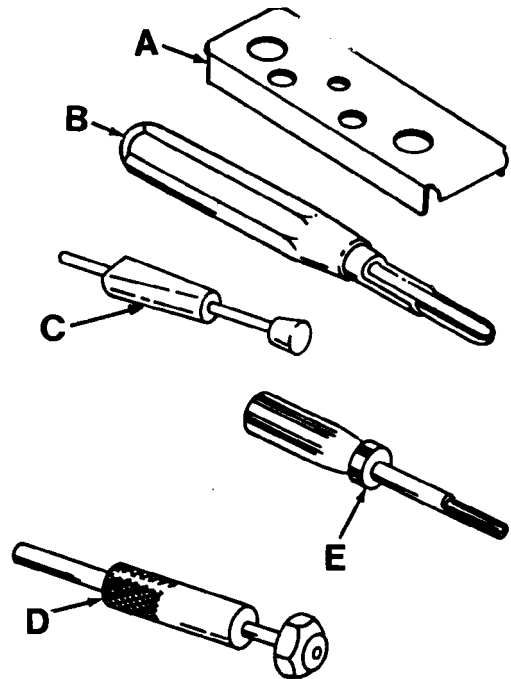
ZX,TMSPFH004747-19-31JAN96

**ELECTRICAL REPAIR TOOL KIT**

Holding plate for SURE-SEAL™ connectors (A) ..... JDG107  
Contact insertion tool (B) ..... JDG139  
Contact extraction tool (C) ..... JDG140  
Contact extraction tool (D) ..... JDG142  
Contact extraction tool (E) ..... JDG143

*NOTE: All tools are part of electrical repair tool kit JDG155.*

*NOTE: SURE-SEAL™ is a trade name of the ITT Cannon company.*



Z106569

-JUN-28APR95  
Z106569

ZX,TMSPFH000369-19-22SEP95

*Connectors/Special Tools*

Electrical repair tool kit . . . . . JDG359

T6606AB -UN-23AUG88

Repairing DEUTSCH connectors

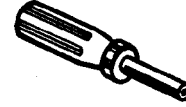


ZX,53T,JDG359 -19-31JAN96

Weatherpack Extraction Tool . . . . . JDG364

T6606AC -UN-23AUG88

Used to remove contacts from Weatherpack electrical connectors.

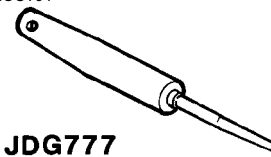


53T,JDG364 -19-20OCT92

Extraction tool . . . . . JDG777

JDG777 -UN-12OCT94

Removing METRI PACK male or female connectors



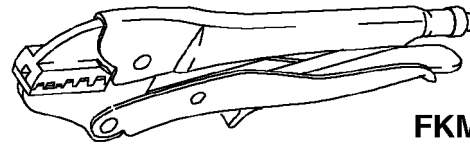
**JDG777**

ZX,TMSPFH004748-19-31JAN96

Crimping pliers . . . . . FKM10467

FKM10467 -UN-12JAN96

For non-insulated electrical connectors



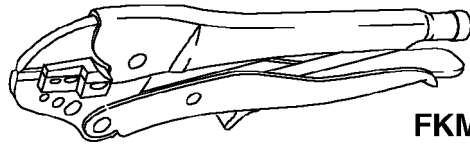
**FKM10467**

ZX,TMSPFH004749-19-31JAN96

Crimping pliers . . . . . FKM10468

FKM10468 -UN-12JAN96

For insulated electrical connectors



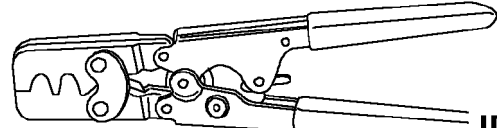
**FKM10468**

ZX,TMSPFH004750-19-31JAN96

Crimping pliers . . . . . JDG783 or JDG707

JDG783 -UN-12JAN96

For WEATHER PACK connectors



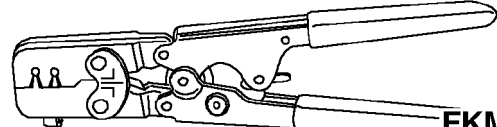
**JDG783**

ZX,TMSPFH004751-19-31JAN96

Crimping pliers . . . . . FKM10469

FKM10469 -UN-12JAN96

For METRI PACK connectors



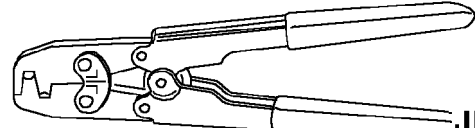
**FKM10469**

ZX,TMSPFH004752-19-31JAN96

Crimping pliers . . . . . JDG707

JDG707 -UN-12JAN96

For Schlemmer connectors with a diameter of 3.5 mm (0.14 in.).



**JDG707**

ZX,TMSPFH004759-19-31JAN96



## ELECTRICAL CONNECTOR HANDLING

Electrical connectors must not be forcibly mated or unmated. All are designed to be mated easily. If you have to use tools, you may be doing something wrong. Prying or forcing connectors may cause permanent damage to the locking mechanism, contacts, or both.

When working on connectors, make sure you are working on the correct terminal. Remember that male and female halves are mirror images of each other. Look for the terminal number on the connector body. The connection of improper electrical circuits can cause unusual electrical symptoms.

When an electrical connector is repaired, it is important that the proper terminals are used. In some of these connectors, different terminals are used to carry different currents. If contacts of different materials are mated, corrosion may develop that could affect performance.

When removing terminals from connectors, it is very important to use the correct extraction tool and gently remove the terminal. The connector body can be damaged if terminals are just "jerked" out of it. The damage caused will prevent the new terminal from staying in the connector, making replacement of the connector body necessary.

When installing a new terminal on a wire, make sure the insulation crimp and wire crimp are both made properly. Each part of the terminal crimps is designed for a specific purpose. Failure to properly crimp the wire contact area can result in poor or no electrical contact. Failure to crimp the insulation support properly can result in problems getting the terminal into the connector body, thus causing premature failure.

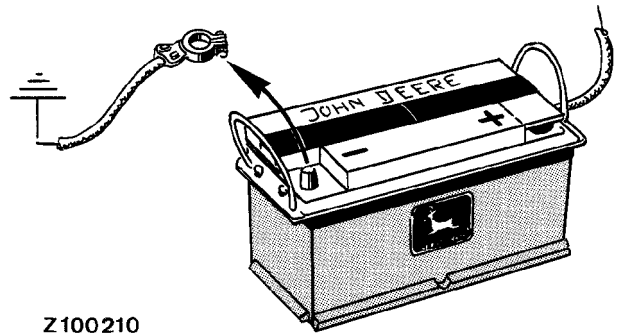


H37083  
-UN-01FEB89

HX.1401.4020.H -19-20OCT92

### DISCONNECTING ELECTRICAL CIRCUIT

Disconnect battery ground strap before carrying out any electrical repairs on the machine.



Z100210

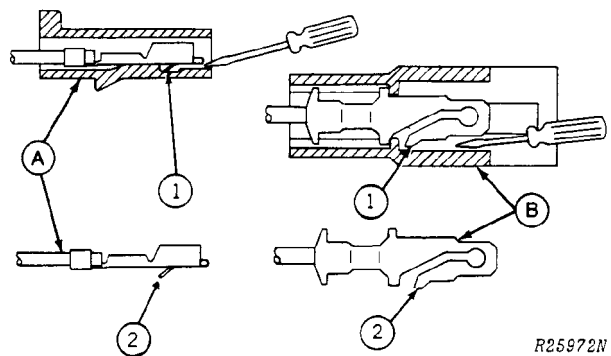
ZX.TMSPFH000370-19-01FEB91

-UN-27APR95  
Z100210

### REPLACING CONNECTORS

1. Using a small screwdriver, depress locking tang on terminal. Remove wire from connector.
2. Bend locking tang back in original position before installing new connector body.

A—Female terminal  
B—Male terminal



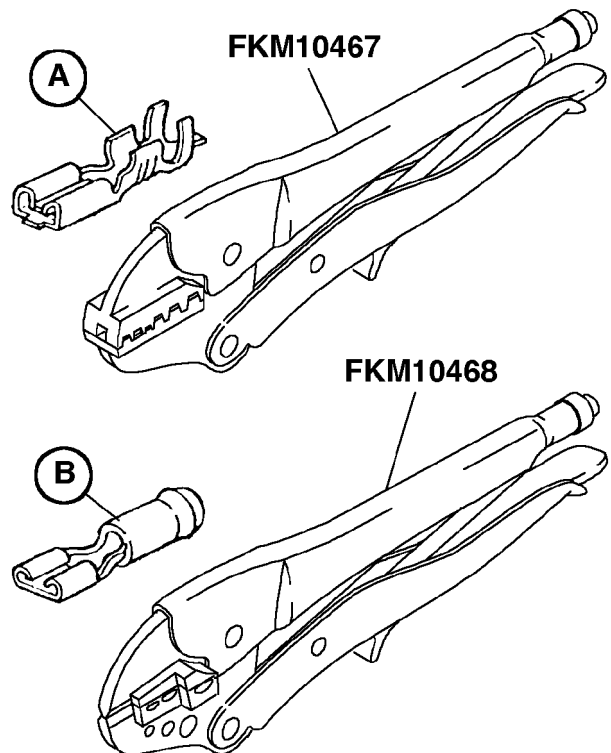
R25972N

ZX.TMSPFH000371-19-22JUL91

-UN-12MAY95  
R25972N

### INSULATED AND NON-INSULATED CONNECTORS

1. Remove insulation from end of wire.
2. Install non-insulated connector (A) on wire end, using crimping pliers FKM10467.
3. Install insulated connector (B) on wire end, using crimping pliers FKM10468.



ZX008391

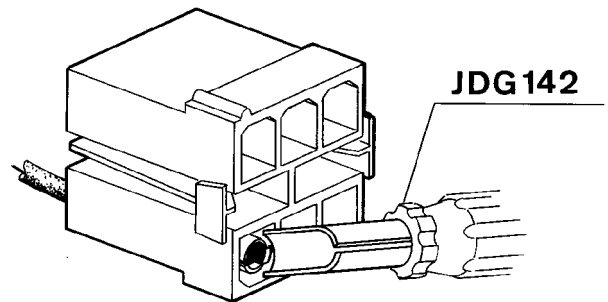
ZX.TMSPFH004753-19-31JAN96

-UN-12JAN96  
ZX008391

### REPLACING SMALL MATE-N-LOK™ CONTACTS IN CONNECTOR HOUSINGS

1. Using extraction tool JDG142, press contact (A) out of connector. Position tool JDG142 opposite the contact slot.
2. Push new contact in connector.

*NOTE: MATE-N-LOK™ is a trade name of the AMP company.*



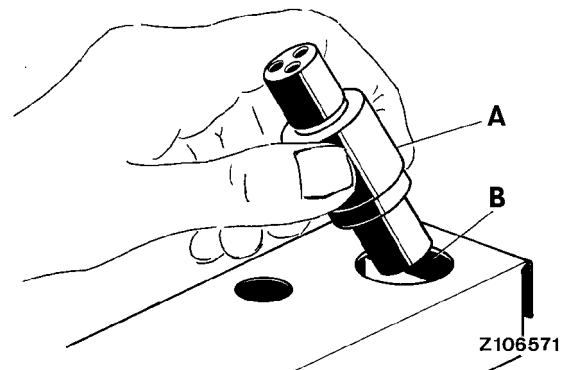
ZX001706

ZX, TMSPFH000373-19-22FEB92

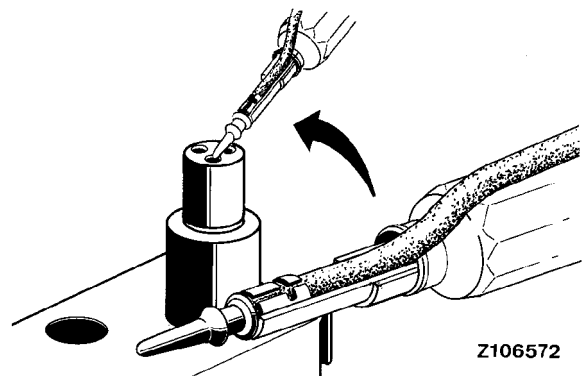
-UN-27APR95  
ZX001706

### REPLACING SURE-SEAL™ CONNECTOR BODIES

1. Pull out all wires from defective connector body.
2. Put both new connector body halves together.
3. Place connector body (A) in relevant bore (B) of holding plate JDG107.
4. Using insertion tool JDG139, press individual contacts into connector body.



Z106571



Z106572

ZX, TMSPFH000374-19-22FEB92

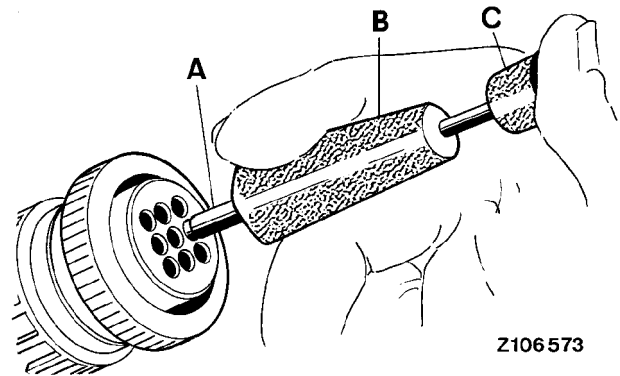
-UN-27APR95  
Z106571

-UN-27APR95  
Z106572

## REPLACING MATE-N-LOK™ AND CPC™ PIN AND SOCKET CONTACTS

1. Depending upon type of connector, select correct extraction tool (JDG140 or JDG143).
2. Slide sleeve (A) of extraction tool over contact.
3. Turn hand grip (B) to disconnect contact and press out by means of knob (C).
4. Install new contact in plug.

**NOTE:** MATE-N-LOK™ AND CPC™ are trade names of the AMP company.



-UN-27APR95  
Z106573

ZX.TMSPFH000375-19-22FEB92

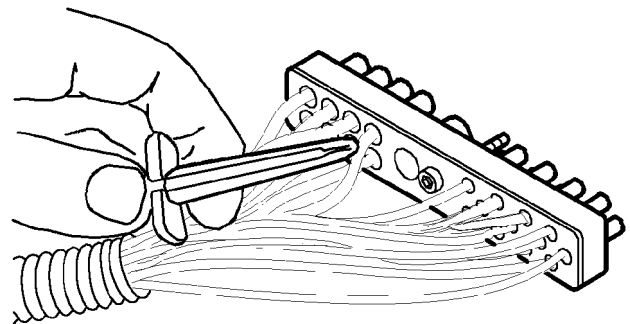
## REPLACING DEUTSCH™ CONNECTORS

1. Select an extraction tool suitable for the size of the cable to be removed.
  - a. Extraction tool JDG361 for size 2.5 mm<sup>2</sup> (12 to 14 AWG).
  - b. Extraction tool JDG362 for size 1.0 mm<sup>2</sup> (16 to 18 AWG).
  - c. Extraction tool JDG363 for size 0.5 mm<sup>2</sup> (20 AWG).
2. Position extraction tool against cable as shown in illustration.
3. Slide extraction tool to the rear along the cable until the tip of the tool engages in the cable.

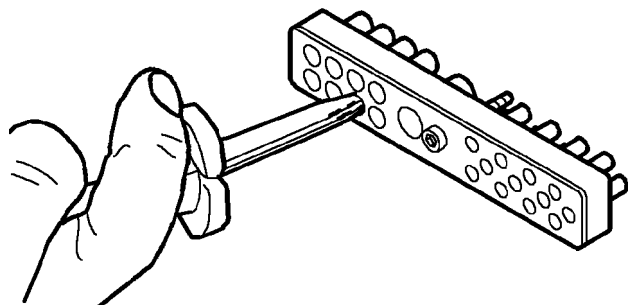
**IMPORTANT:** When inserting the tool into the connector, take care **NOT** to twist the tool.

4. Slide the extraction tool along the cable into the connector until it is located over the contact.
5. Remove the cable from the connector using the extraction tool.

**NOTE:** DEUTSCH is a trade name of DEUTSCH CO.



-UN-17MAY95  
ZX005483

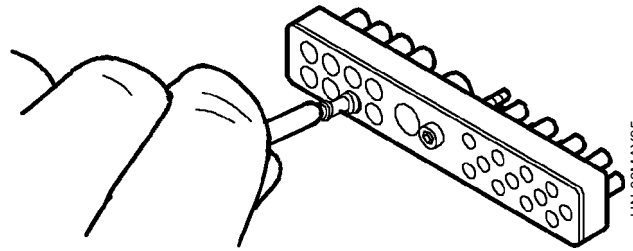


-UN-03MAY95  
ZX005484

ZX.TMXZCO003994-19-31JAN96

**IMPORTANT: Using a sleeve of the appropriate size, insert the contact at the correct location.**

6. Slide contact into the pin-and-socket contact until resistance is encountered.
7. Check that the contact is seated firmly in the pin-and-socket contact by pulling gently on the cable.
8. In the same way, insert the remaining cables into the new pin-and-socket contact.



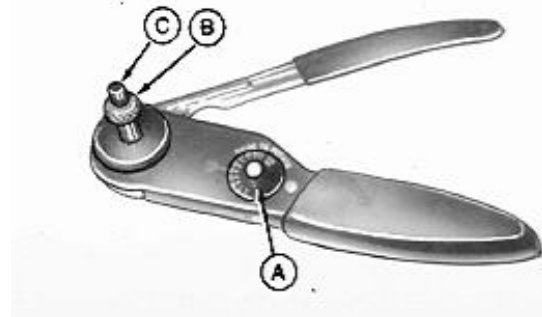
ZX005485

-UN-03MAY95  
ZX005485

ZX,TMXZCO003995-19-28FEB95

### INSTALL DEUTSCH CONTACT

1. Strip 6 mm (1/4 in.) insulation from wire.
2. Adjust selector (A) on JDG360 Crimper for correct wire size.
3. Loosen lock nut (B) and turn adjusting screw (C) in until it stops.

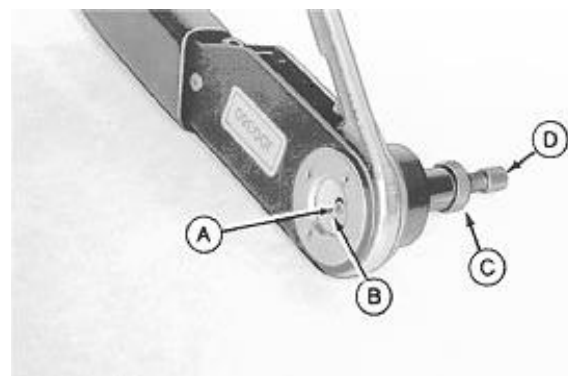


DX,ECONN,W -19-04JUN90

TS117 -UN-23AUG88

**IMPORTANT: Select proper size contact "sleeve" or "pin" to fit connector body.**

4. Insert contact (A) and turn adjusting screw (D) until contact is flush with cover (B).
5. Tighten lock nut (C).



DX,ECONN,X -19-04JUN90

TS0134 -UN-23AUG88

**IMPORTANT: Contact must remain centered between indentors while crimping.**

6. Insert wire in contact and crimp until handle touches stop.
7. Release handle and remove contact.



TS118  
-UN-23AUG88

DX,ECONN,Y -19-04JUN90

**IMPORTANT: If all wire strands are not crimped into contact, cut off wire at contact and repeat contact installation procedures.**

*NOTE: Readjust crimping tool for each crimping procedure.*

8. Inspect contact to be certain all wires are in crimped barrel.



TS0135  
-UN-23AUG88

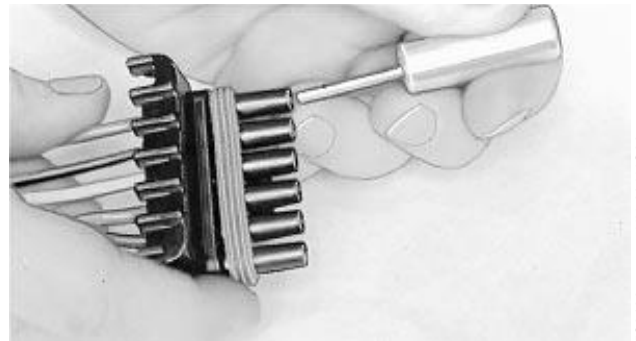
DX,ECONN,Z -19-04JUN90

## REPLACE WEATHER PACK™ CONNECTOR

**IMPORTANT: Identify wire color locations with connector terminal letters.**

1. Open connector body.
2. Insert JDG364 Extraction Tool over terminal contact in connector body.
3. Hold extractor tool fully seated and pull wire from connector body.

*NOTE: If terminal cannot be removed, insert wire or nail through extractor tool handle and push terminal contact from connector.*



TS0128  
-UN-23AUG88

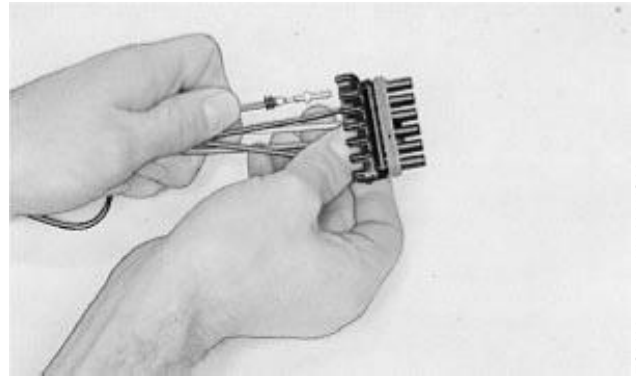
WEATHER PACK is a trademark of PACKARD ELECTRIC

DX,ECONN,O -19-03NOV94

**IMPORTANT: Carefully spread contact lances to assure good seating on connector body.**

*NOTE: Connector bodies are "keyed" for proper contact mating. Be sure contacts are in proper alignment.*

4. Push contact into new connector body until fully seated.
5. Pull on wire slightly to be certain contact is locked in place.
6. Transfer remaining wires to correct terminal in new connector.
7. Close connector body.



TS0130 -UN-23AUG88

DX,ECONN,R -19-04JUN90

## WEATHER PACK MALE AND FEMALE CONNECTORS

*NOTE: Wire seals are color coded for three sizes of wire:*

- Green - Wire size 0.75 mm<sup>2</sup> (18 to 20 AWG)
- Grey - Wire size 1.5 mm<sup>2</sup> (14 to 16 AWG)
- Blue - Wire size 4.0-6.0 mm<sup>2</sup> (10 to 12 AWG)

1. Slip correct size seal on wire.

**IMPORTANT: The seal must fit snug over the wire insulation, without a gap between the seal and the insulation.**

2. Strip insulation from wire to expose 6 mm (1/4 in.) length of wire. Align seal with edge of insulation.



TS0136 -UN-23AUG88

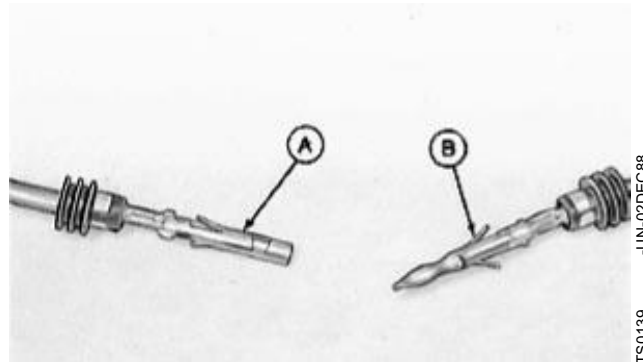
ZX,15004005,3 -19-31JAN96

3. Put proper size contact on wire and crimp in place, using crimping pliers JDG783.

4. Seal is crimped in place together with the wire in a one-step action, using crimping pliers JDG783.

*NOTE: When using crimping pliers JDG707, crimping is a two-step action. Use lower recess to crimp wire and upper recess to crimp seal.*

**IMPORTANT: The illustration shows proper installation of sleeve (A) and pin (B).**



ZX,ECONN,AB -19-31JAN96

-UN-02NOV94

TS1623

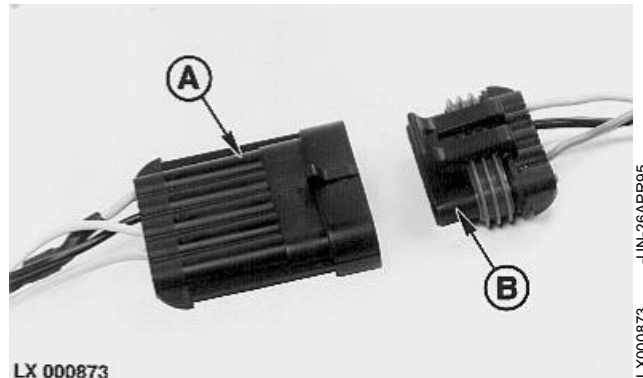
-UN-02DEC88

TS0139

## REPLACING METRI PACK CONNECTORS<sup>1</sup>

*NOTE: 4 to 6-pin connectors are installed on the machines.*

A—Male terminal  
B—Female terminal



LX 000873

ZX,TMXZCO004127-19-22SEP95

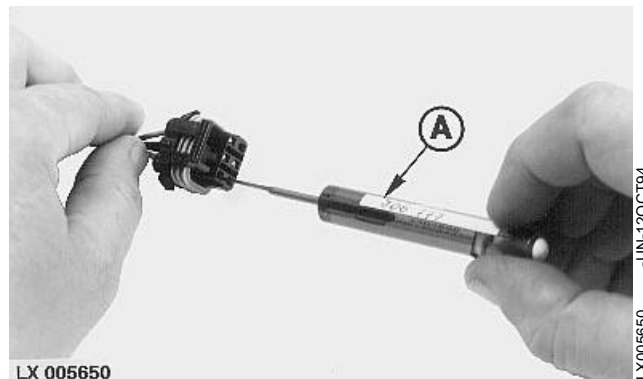
-UN-26APR95

LX000873

<sup>1</sup> METRI PACK is a trade name of the PACKARD ELECTRIC company

## Removing Male or Female Terminal

A—JDG777<sup>1</sup>



LX 005650

LX,40,05004247 -19-01MAR93

-UN-12OCT94

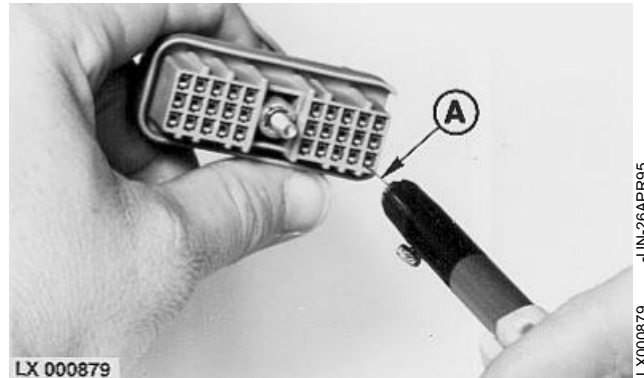
LX005650

<sup>1</sup> For METRI PACK connectors, 150 series



### Removing a Female Terminal on Multiple-Pin Connectors for Electronic Units

Using a pointed tool (A), depress locking tang and pull out terminal.



ZX,TMSPFH004761-19-31JAN96

### Installing METRI PACK Male or Female Terminal

*NOTE: Wire seals are color coded for three sizes of wire:*

- Green - Wire size 0.75 mm<sup>2</sup> (18 to 20 AWG)
- Grey - Wire size 1.5 mm<sup>2</sup> (14 to 16 AWG)
- Blue - Wire size 4.0-6.0 mm<sup>2</sup> (10 to 12 AWG)

*NOTE: On multiple-pin connectors of electronic units, seal is installed in connector housing.*

1. Slip correct size seal on wire.

**IMPORTANT: The seal must fit snug over the wire insulation, without a gap between the seal and the insulation.**

2. Strip insulation from wire to expose 6 mm (1/4 in.) length of wire. Align seal with edge of insulation.

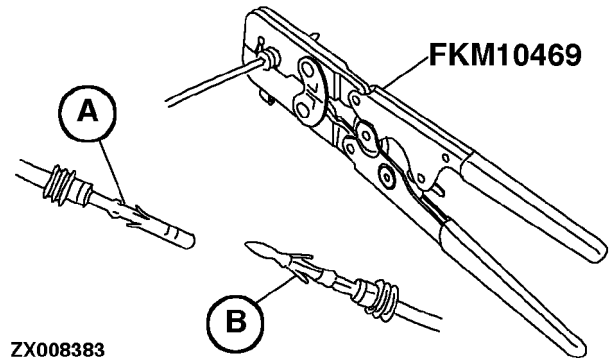


ZX,TMSPFH004754-19-31JAN96

**NOTE:** On multiple-pin connectors of electronic units, first insert wire through connector housing before crimping contact.

3. Put proper size contact (A) or (B) on wire and crimp in place, using crimping pliers FKM10469.

4. Seal is crimped in place together with the wire in a one-step action, using crimping pliers FKM10469.



ZX008383

-JUN-12JAN96  
ZX008383

ZX.TMSPFH004760-19-31JAN96

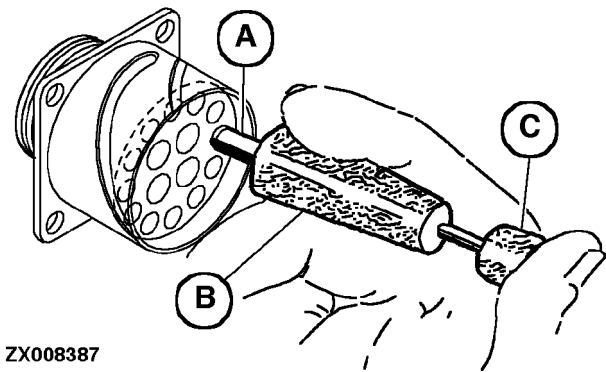
## REPLACING SCHLEMMER™ CONNECTORS

1. Depending on contact used, select proper extraction tool (JDG140 or JDG143).

2. Slide sleeve (A) of extraction tool over contact.

3. Loosen contact by turning handle (B) and push it out, using button (C).

**NOTE:** SCHLEMMER is a trade name of Josef Schlemmer GmbH.



ZX008387

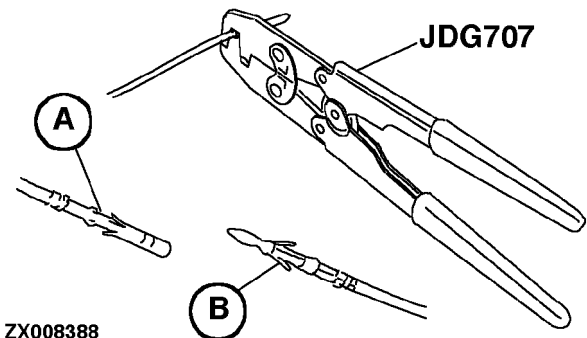
-JUN-15APR96  
ZX008387

ZX.TMSPFH004762-19-31JAN96

4. Put a new proper size contact (A) or (B) on wire and crimp in place, using crimping pliers (JDG707 or FKM10467):

- JDG707 for contact with 3.5 mm (0.14 in.) dia.
- FKM10467 for contact with 1.6 mm (0.06 in.) dia.

5. Install contact in connector housing.



ZX008388

-JUN-12JAN96  
ZX008388

ZX.TMSPFH004763-19-31JAN96

6. Apply sealant at locations where wires enter connector housing.



ZX008389

ZX008389 -UN-12JAN96

ZX,TMSPFH004764-19-31JAN96



## GENERAL INFORMATION

**CAUTION:** Before working on the electrical system, always disconnect the battery ground cable.

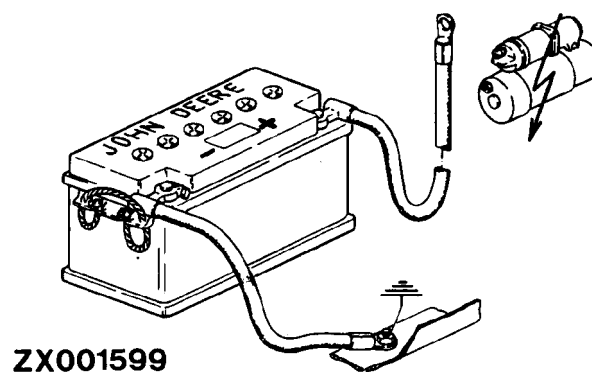
*NOTE:* Refer to relevant component manual for information on repairing the alternator and starting motor.

ZX, TMXZCO003940-19-15FEB95

## INSTALLING BATTERIES AND CONNECTING TO CORRECT POLES

**IMPORTANT:** Make sure batteries are connected to the correct poles. The positive cable (from starter motor) to the positive (+) poles, the negative cable (from ground) to the negative (—) poles.

Reversed polarity will result in permanent damage to the electrical system.



-UN-04APR95  
ZX001599

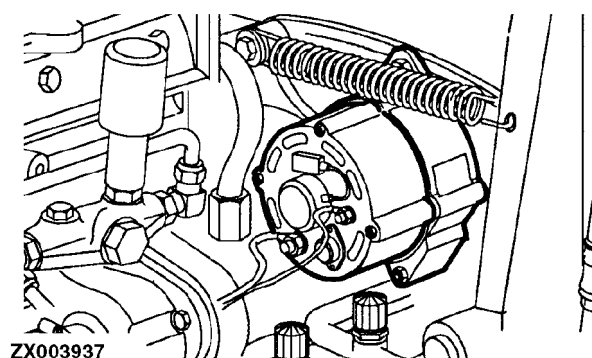
ZX, OMXZCO002185-19-05OCT92

## REMOVING THE ALTERNATOR

Disconnect ground cable from battery.

Disconnect cables "B+" and "D+".

Loosen attaching screws and lift out alternator.



-UN-08MAY95  
ZX003937

ZX, TMXZCO003941-19-15FEB95

## REPAIRING THE ALTERNATOR

*NOTE: Refer to relevant component manual for information on repairing the alternator.*

ZX, TMXZCO003942-19-15FEB95

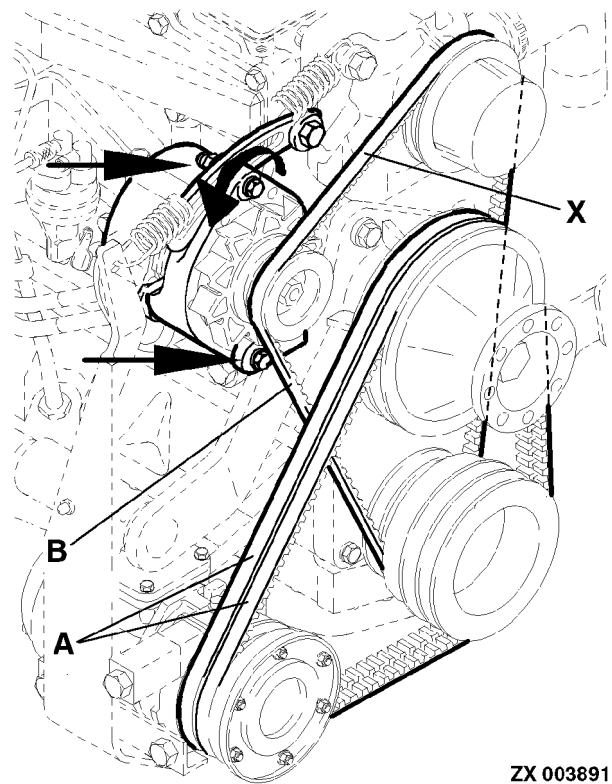
## DRIVE BELTS (6.8-L ENGINE)

**IMPORTANT: Belts must be cool when tension is adjusted. Exert pressure on mounting brackets only.**

To retension, slacken off attaching and adjusting screws. Pull alternator outwards. Tighten screws.

Check tension of belt (B) at point (X). Flexion on the belt should not exceed 5 mm (0.2 in.).

- A—Drive belts for fan (2 x) and air conditioning compressor (if equipped)
- B—Drive belts for coolant pump and alternator



ZX 003891

ZX003891 -UN-19JUN95

ZX,OMXZCO002113-19-13NOV92

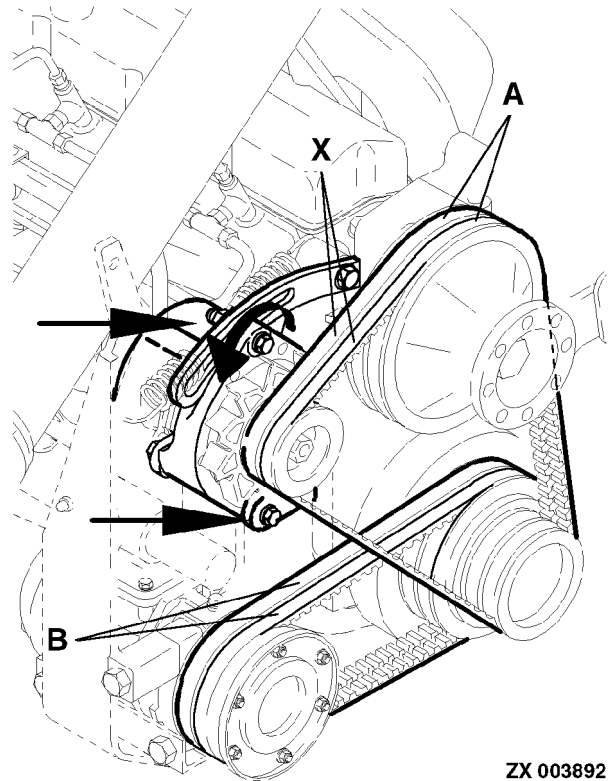
## DRIVE BELTS (7.6-L ENGINE)

**IMPORTANT:** Belts must be cool when tension is adjusted. Exert pressure on mounting brackets only.

To retension, slacken off attaching and adjusting screws. Pull alternator outwards. Tighten screws.

Check tension of belt (A) at point (X). Flexion on the belt should not exceed 5 mm (0.2 in.).

- A—Drive belt for fan and alternator
- B—Drive belt for air conditioning compressor (if equipped)



ZX 003892

ZX,OMXZC0002114-19-13NOV92

ZX003892 -UN-19JUN95

*Alternator/Drive Belts - 7.6 L Engine*



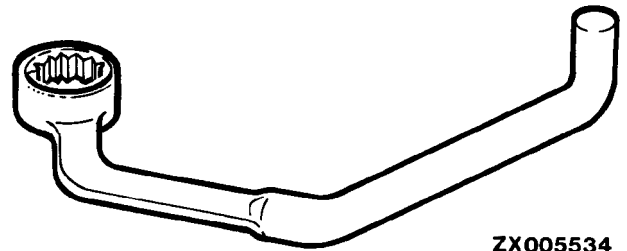
**SPECIAL OR ESSENTIAL TOOLS**

*NOTE: Order tools according to information given in the U.S. SERVICE-GARD™ Catalog or in the European Microfiche Tool Catalog (MTC).*

DX,TOOLS -19-05JUN91

Special wrench ..... JDE80(A)

Installing and removing the starting motor



**ZX005534**

-UN-28APR95  
ZX005534

ZX,TMXZCO003943-19-15FEB95

**GENERAL INFORMATION**



**CAUTION:** Before working on the electrical system, always disconnect the battery ground cable.

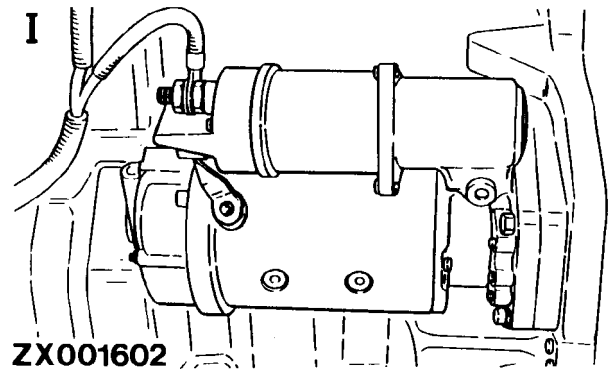
*NOTE: Refer to relevant component manual for information on repairing the alternator and starting motor.*

ZX,TMXZCO003940-19-15FEB95

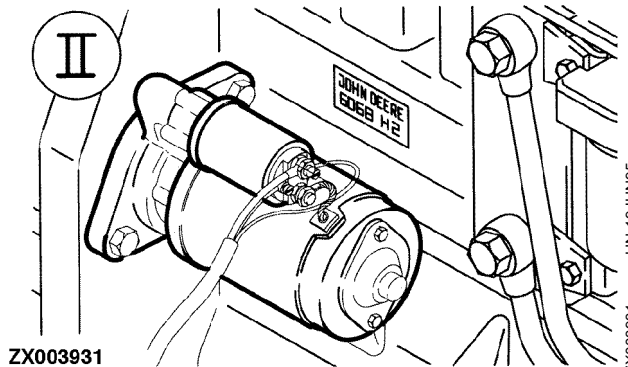
## STARTING MOTOR

**IMPORTANT:** Before working on the electrical system, always remove the ground cable. This will prevent unnecessary damage.

- I—7.6-liter engine (466 cu in.)
- II—6.8-liter engine (414 cu in.)



Looking to front



Looking to rear

ZX,TMXZCO003944-19-15FEB95

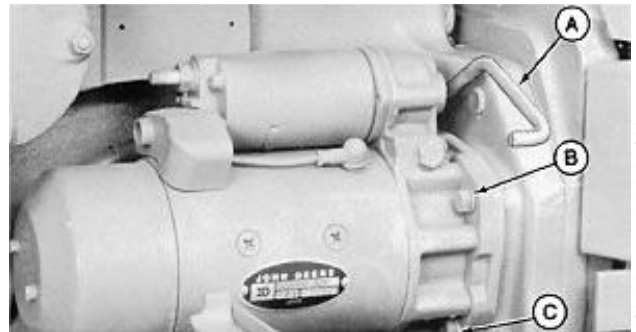
## INSTALL STARTING MOTOR

Install starting motor mounting screws (B) and (C).

Tighten screws to 47 N·m (35 lb-ft).

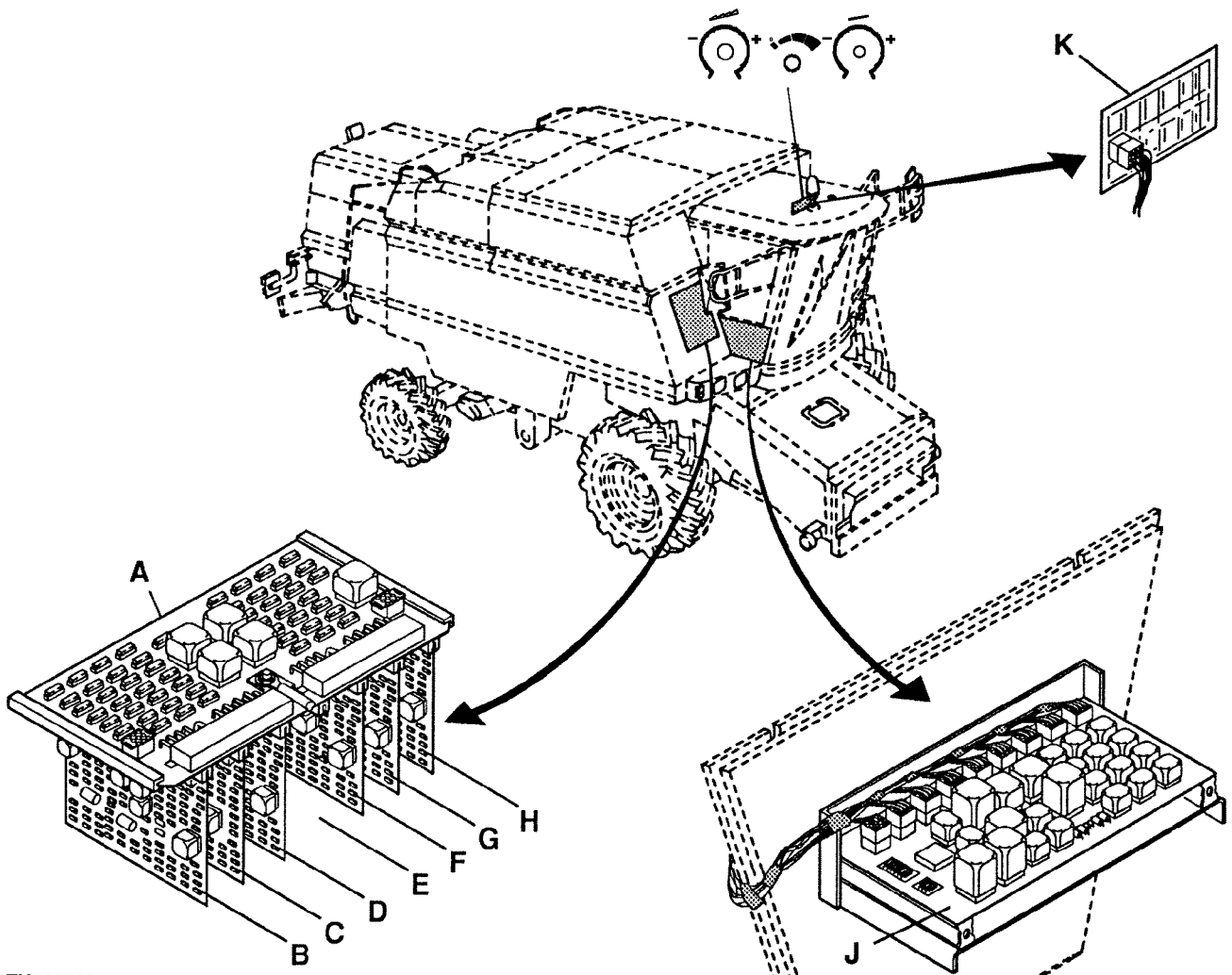
Use JDE80 starter wrench (A) to install mounting screw behind starting motor.

Connect all cables.



ZX,TMXZCO004128-19-15FEB95

ELECTRONIC BOARDS



ZX009233

A—Fuse board  
B—Speed monitoring board  
C—Header control board  
D—DIAL-A-MATIC™ relay board

E—Not used  
F—Reel speed board  
G—Combine data center control board

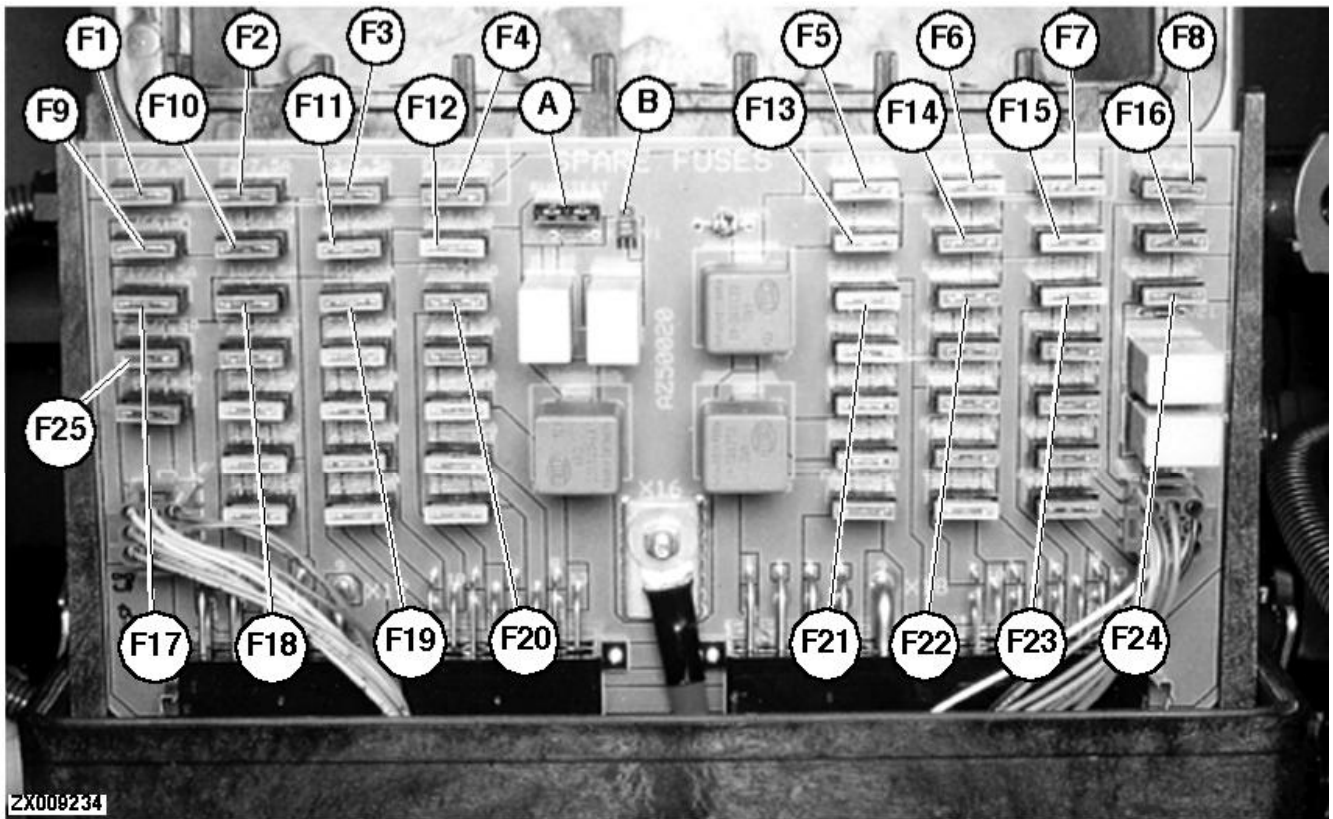
H—Relay board  
J—Relay diode board

K—Harvest performance monitor board

ZX009233 -UN-22MAY96

ZX,OMXZC0002188-19-02MAY96

## FUSES ON FUSE BOARD



A—Fuse tester

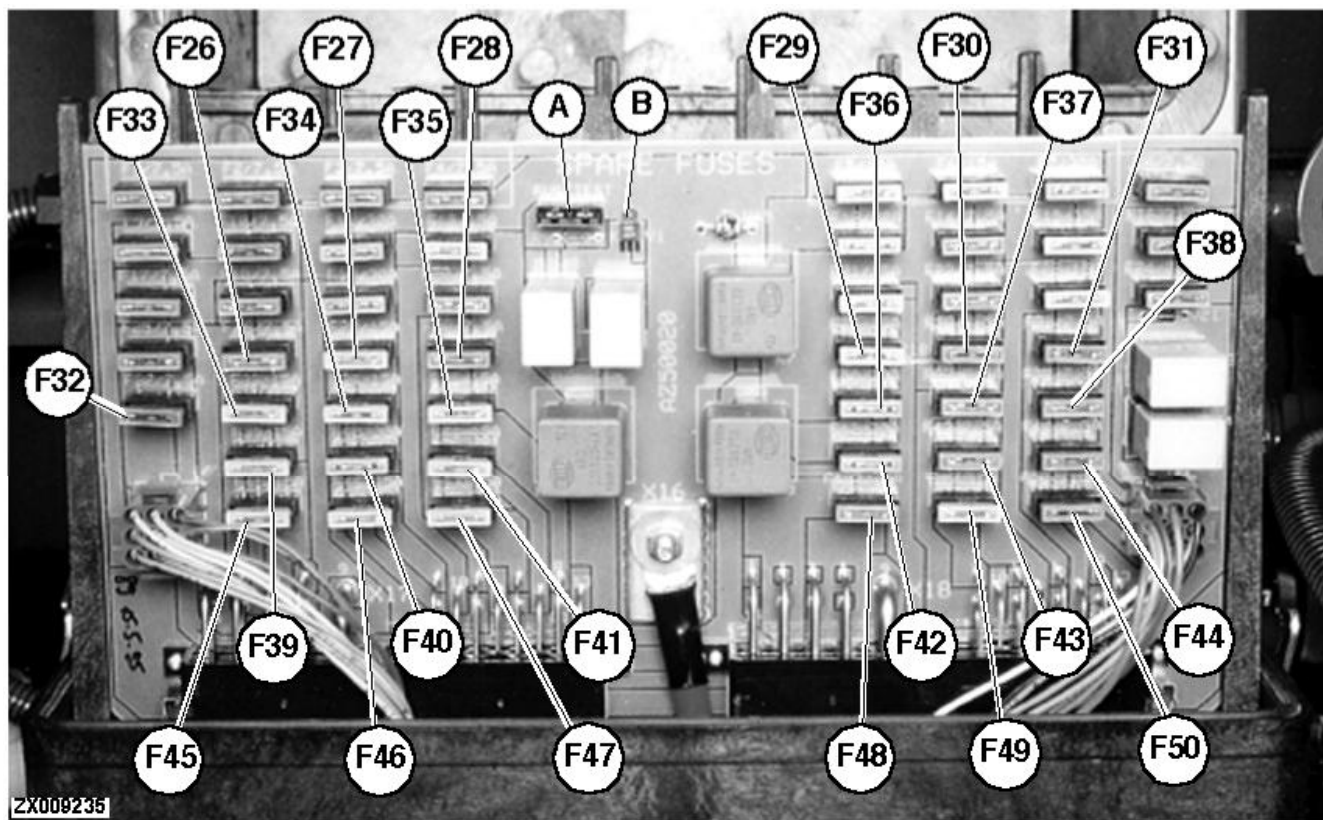
B—Luminous diode

- F 1 — 7.5 A fuse, spare
- F 2 — 7.5 A fuse, spare
- F 3 — 7.5 A fuse, spare
- F 4 — 7.5 A fuse, spare
- F 5 — 15 A fuse, spare
- F 6 — 15 A fuse, spare
- F 7 — 30 A fuse, spare
- F 8 — 7.5 A fuse, fan and cylinder speed adjustment
- F 9 — 7.5 A, fuse, right parking light
- F 10 — 7.5 A fuse, left parking light
- F 11 — 30 A fuse, fan adjustment
- F 12 — 15 A fuse, brake lights, reel speed adjustment
- F 13 — 30 A fuse, work lights on cab roof
- F 14 — 7.5 A, fuse, straw warning device, electronic infotrak monitor
- F 15 — 15 A fuse, chopper distributor adjustment

- F 16 — 7.5 A fuse, engine shut-off solenoid
- F 17 — 7.5 A fuse, dash panel lighting
- F 18 — 7.5 A fuse, radio, CB, clock
- F 19 — 30 A fuse, work lights on platform and rear lights
- F 20 — 7.5 A fuse, turn signals
- F 21 — 15 A fuse, radiator cleaner
- F 22 — 7.5 A fuse, radio, CB, clock
- F 23 — 15 A fuse, separator and header clutch
- F 24 — 7.5 A fuse, indicator lights, temperature gauge
- F 25 — 7.5 A fuse, left low-beam

**IMPORTANT:** Never use fuses stronger than those specified. If fuses keep blowing in one circuit, have the electrical system inspected by your John Deere dealer.

## FUSES ON FUSE BOARD (CONTINUED)



A—Fuse tester

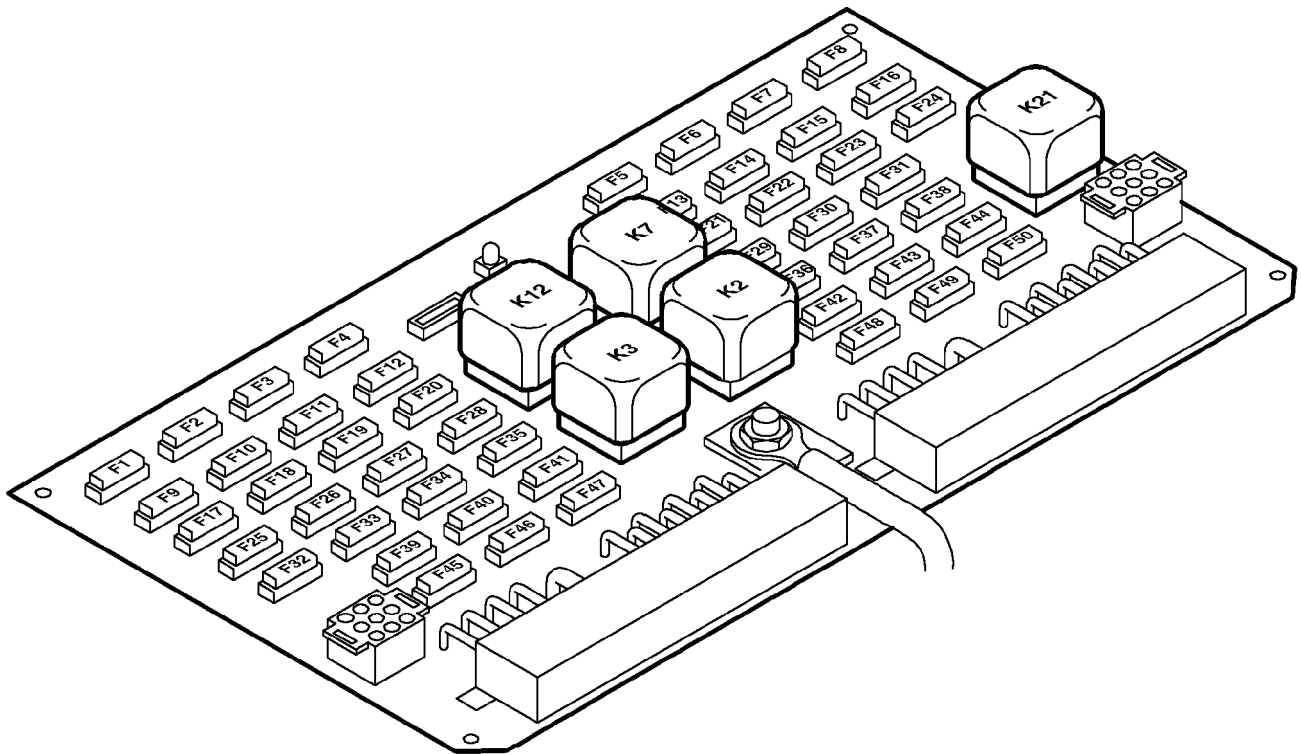
B—Luminous diode

- F 26 — 7.5 A fuse, cutting platform controls
- F 27 — 15 A fuse, horn
- F 28 — 7.5 A fuse, combine data center
- F 29 — 15 A fuse, combine leveling system
- F 30 — 7.5 A fuse, four-wheel drive
- F 31 — 7.5 A fuse, speed monitoring system
- F 32 — 7.5 A fuse, right-hand low beam
- F 33 — 15 A fuse, raising/lowering header
- F 34 — 15 A fuse, hazard warning flashers
- F 35 — 15 A fuse, beacon lights
- F 36 — 30 A fuse, windshield wipers, grain tank light
- F 37 — 7.5 A fuse, adjustable mirror
- F 38 — 7.5 A fuse, harvest performance monitor
- F 39 — 15 A fuse, grain tank unloading system
- F 40 — 30 A fuse, starter switch

- F 41 — 15 A fuse, concave adjustment
- F 42 — 30 A fuse, air conditioning system
- F 43 — 7.5 A fuse, DIAL-A-MATIC™
- F 44 — 7.5 A fuse, left-hand high beam
- F 45 — 15 A fuse, reel control
- F 46 — 15 A fuse, starting aid
- F 47 — 15 A fuse, spare
- F 48 — 7.5 A fuse, D+ alternator
- F 49 — 15 A fuse, cigarette lighter, power outlets, seat compressor
- F 50 — 7.5 A fuse, right-hand high beam

**IMPORTANT:** Never use fuses stronger than those specified. If fuses keep blowing in one circuit, have the electrical system inspected by your John Deere dealer.

### FUSE BOARD — RELAYS TO SERIAL NUMBER 064252



ZX 002546

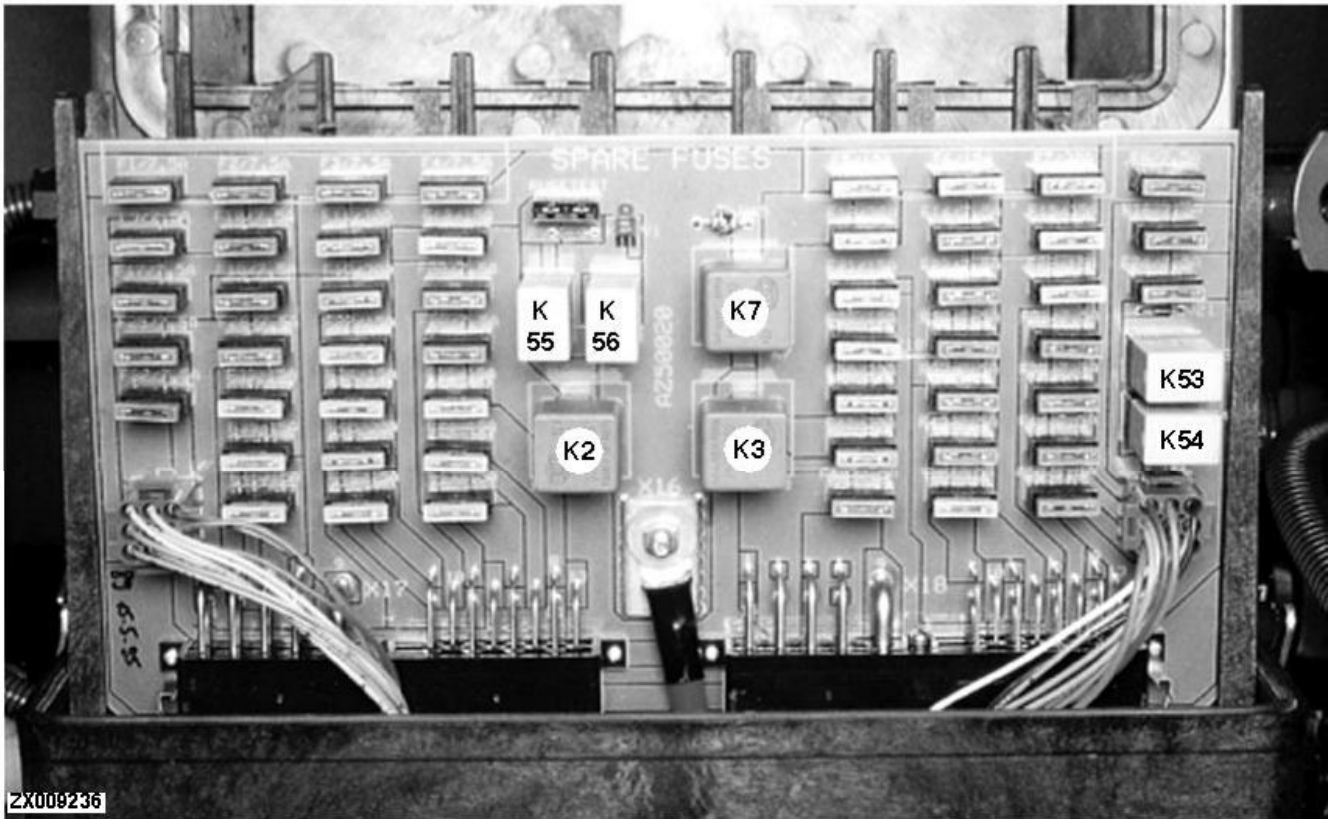
K 2 — Relay for basic line  
K 3 — Relay for basic line  
K 7 — Work light relay

K 12 — Relay, field operation/road travel  
K 21 — Relay, separator clutch

ZX, TMXZCO006768-19-01SEP96

ZX002546 -JUN-16-JUN-95

### FUSE BOARD — RELAYS FROM SERIAL NUMBER 064253

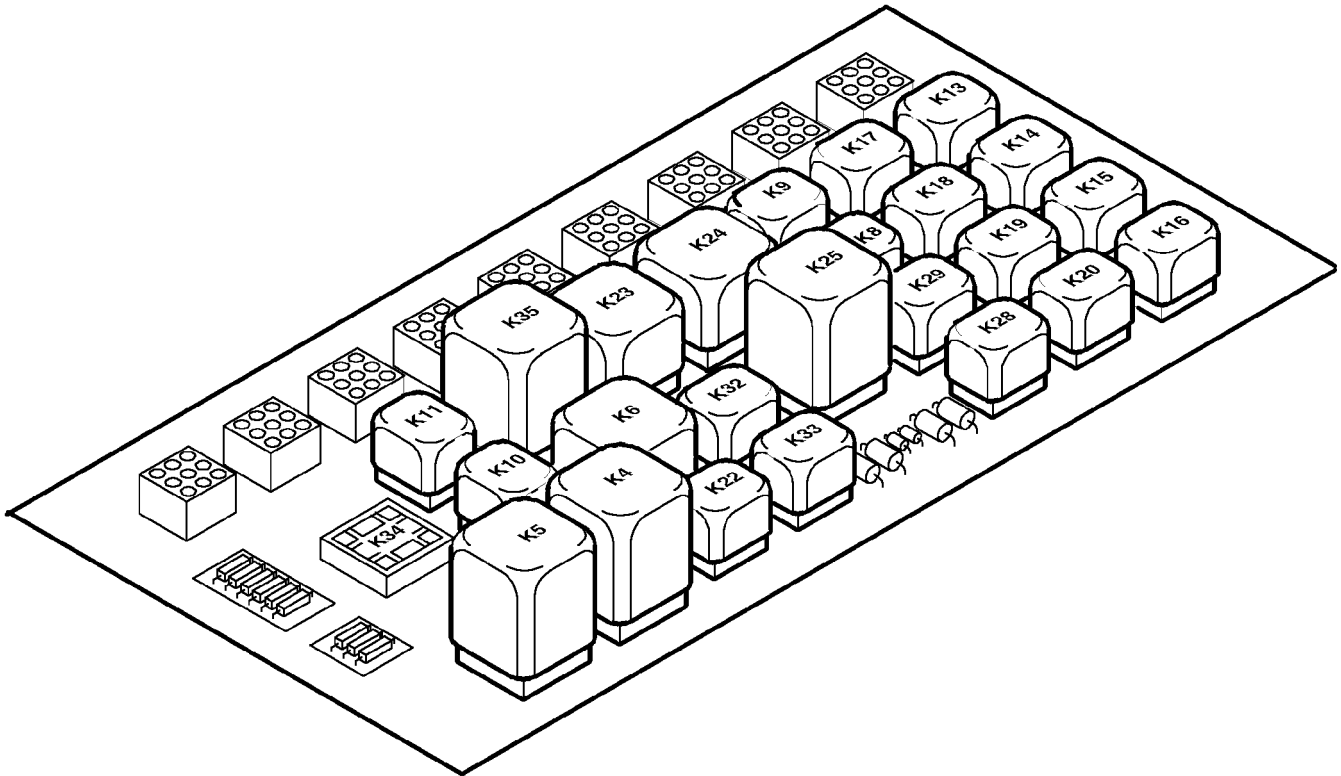


K 2 — Relay for basic line  
K 3 — Relay for basic line  
K 7 — Work light relay

K 53 — Relay, field operation/road travel  
K 54 — Relay, field operation/road travel  
K 55 — Relay, separator clutch  
K 56 — Relay, separator clutch

ZX,TMXZCO002191-19-01SEP96

## RELAY AND DIODE BOARD UP TO SERIAL NUMBER 064252



ZX 002547

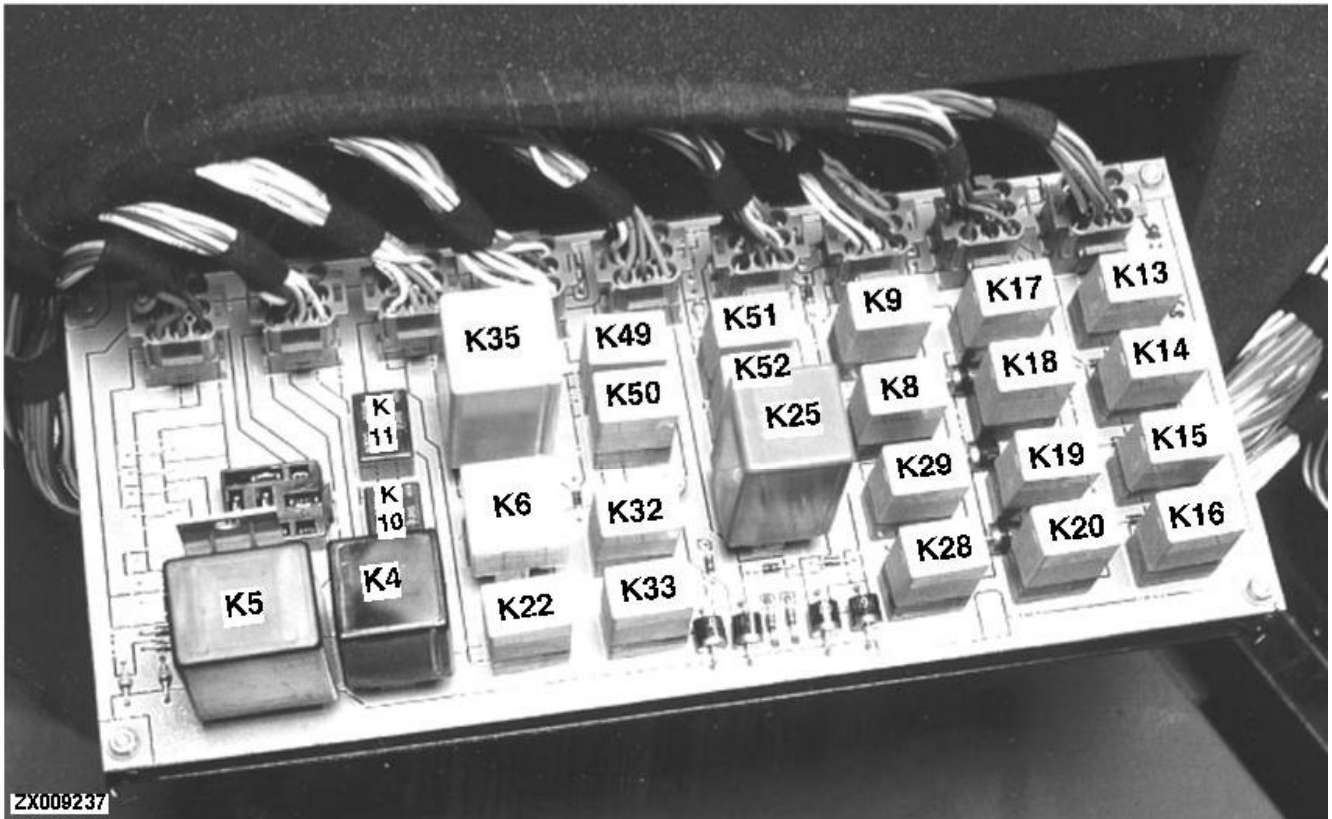
- K 4 — Buzzer timer relay
- K 5 — Flasher
- K 6 — Relay, straw warning device
- K 8 — Hillmaster relay, left
- K 9 — Hillmaster relay, right
- K 10 — Relay, fan speed alarm
- K 11 — Relay, cylinder speed alarm
- K 13 — Relay, lower header quickly
- K 14 — Relay, lower header slowly
- K 15 — Relay, raise header quickly
- K 16 — Relay, raise header slowly
- K 17 — Relay, lower reel

- K 18 — Relay, raise reel
- K 19 — Relay, move reel to the rear
- K 20 — Relay, move reel to the front
- K 22 — Relay, straw warning device
- K 23 — Safety relay, header drive
- K 24 — Safety relay, unloading auger drive
- K 25 — Timer relay, unloading auger swing
- K 28 — Relay, adjusting feeder house speed
- K 29 — Relay, adjusting feeder house speed
- K 32 — Relay, adjusting reel speed
- K 33 — Relay, adjusting reel speed
- K 35 — Timer relay, header drive

ZX, TMXZC006769-19-01SEP96



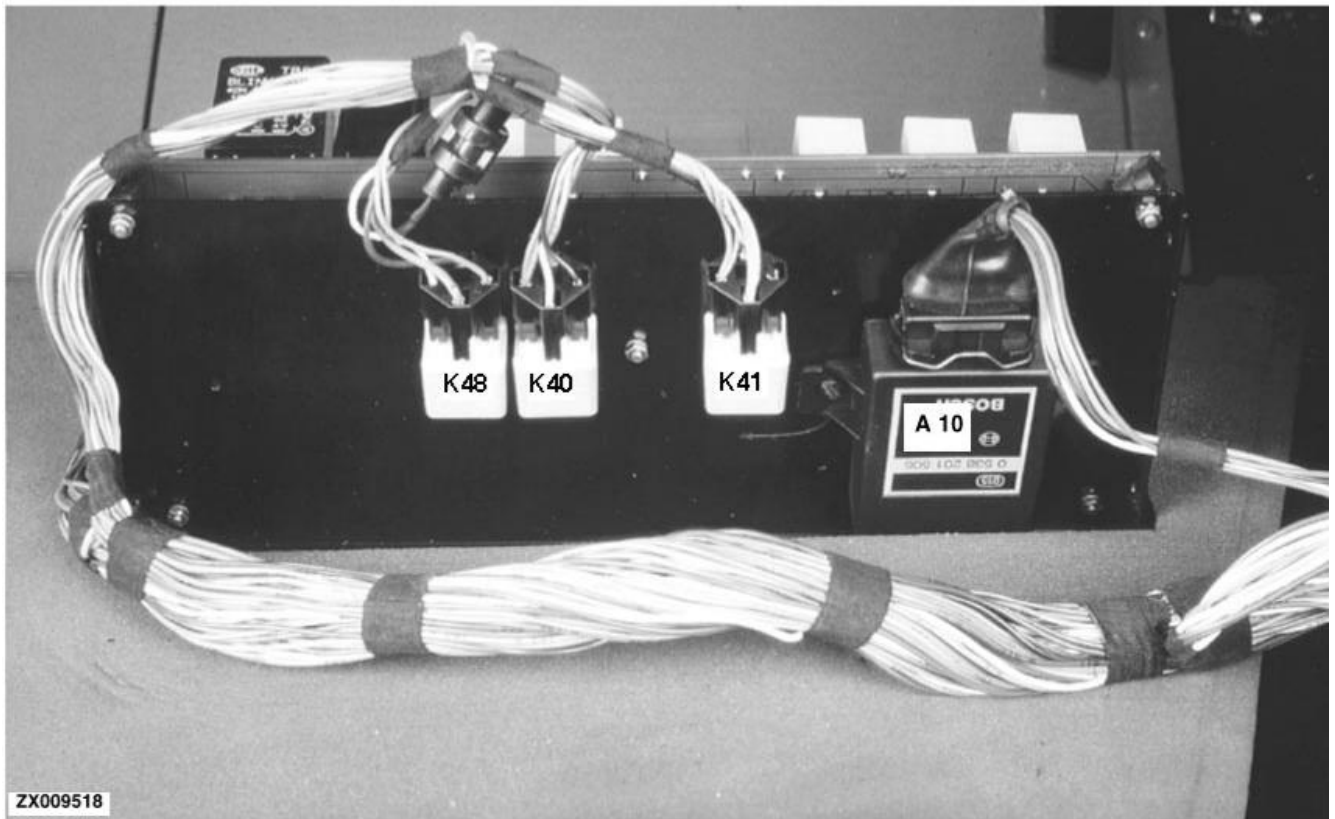
## RELAY AND DIODE BOARD FROM SERIAL NUMBER 064253



- K 4 — Buzzer timer relay
- K 5 — Flasher
- K 6 — Relay, straw warning device
- K 8 — Relay, float control
- K 9 — Hillmaster relay
- K 10 — Relay, fan speed alarm
- K 11 — Relay, cylinder speed alarm
- K 13 — Relay, lower header quickly
- K 14 — Relay, lower header slowly
- K 15 — Relay, raise header quickly
- K 16 — Relay, raise header slowly
- K 17 — Relay, lower reel
- K 18 — Relay, raise reel
- K 19 — Relay, move reel to the rear
- K 20 — Relay, move reel to the front

- K 22 — Relay, straw warning device
- K 25 — Timer relay, unloading auger swing
- K 28 — Relay, reducing feeder house speed
- K 29 — Relay, increasing feeder house speed
- K 32 — Relay, increasing reel speed
- K 33 — Relay, reducing reel speed
- K 35 — Timer relay, header drive
- K 49 — Header relay
- K 50 — Header relay
- K 51 — Unloading auger drive relay
- K 52 — Unloading auger drive relay

## RELAY AND DIODE BOARD (CONTINUED)



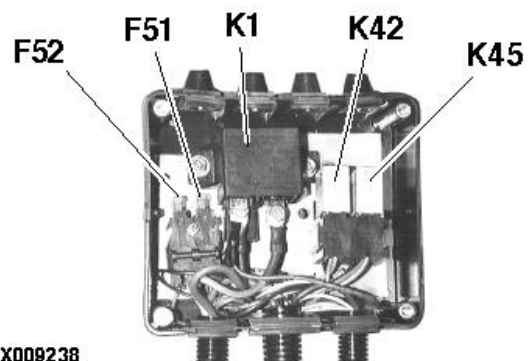
A 10 — Float control  
K 40 — Relay, header horizontal adjustment, left

K 41 — Relay, header horizontal adjustment, right  
K 48 — Relay, beacon indicating grain tank is 3/4 full

ZX, TMXZCO006774-19-01SEP96

## ELECTRICAL BOX IN ENGINE COMPARTMENT

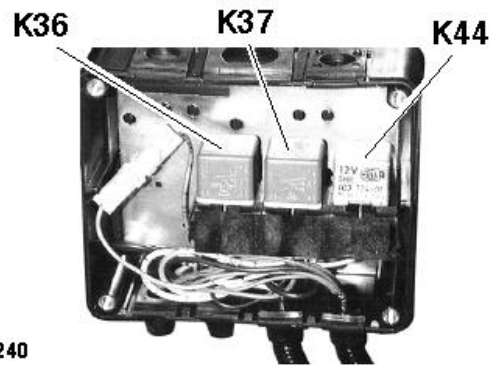
F 51 — 7.5 A fuse, reverse travel alarm  
F 52 — 7.5 A fuse, header electrical clutch  
K 01 — Starting motor relay  
K 42 — Relay, header electrical clutch  
K 45 — Relay D+



ZX, OMXZCO006511-19-02MAY96

## ELECTRICAL BOX FOR FAN ADJUSTMENT

- K 36 — Relay, increasing speed of fan
- K 37 — Relay, decreasing speed of fan
- K 44 — Timer relay



ZX009240

ZX.OMXZC0006513-19-02MAY96

ZX009240 -JUN-23MAY96

*Main Electrical System/Electrical Box for Fan Adjustment*

# Section 50 Power Train

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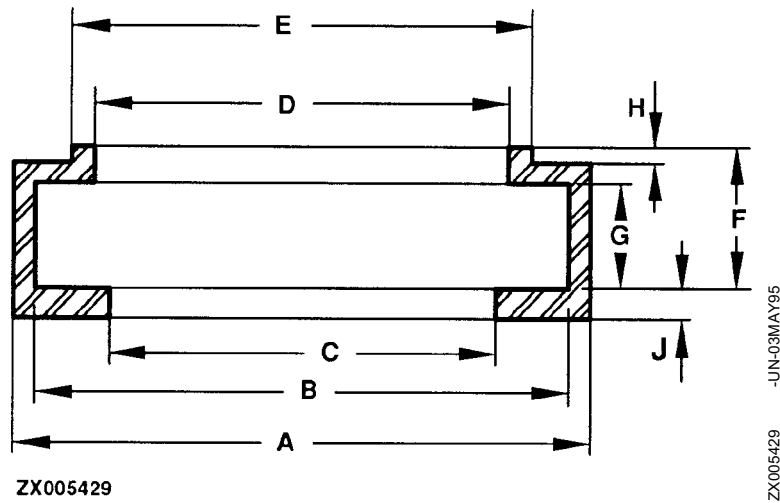
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**SPECIAL TOOL (SELF-MANUFACTURE)**



A—125 mm (4.9 in.) dia.  
B—116 mm (4.6 in.)  
C—85 mm (3.35 in.) dia.

D—91 mm (3.6 in.) dia.  
E—99 mm (3.9 in.) dia.

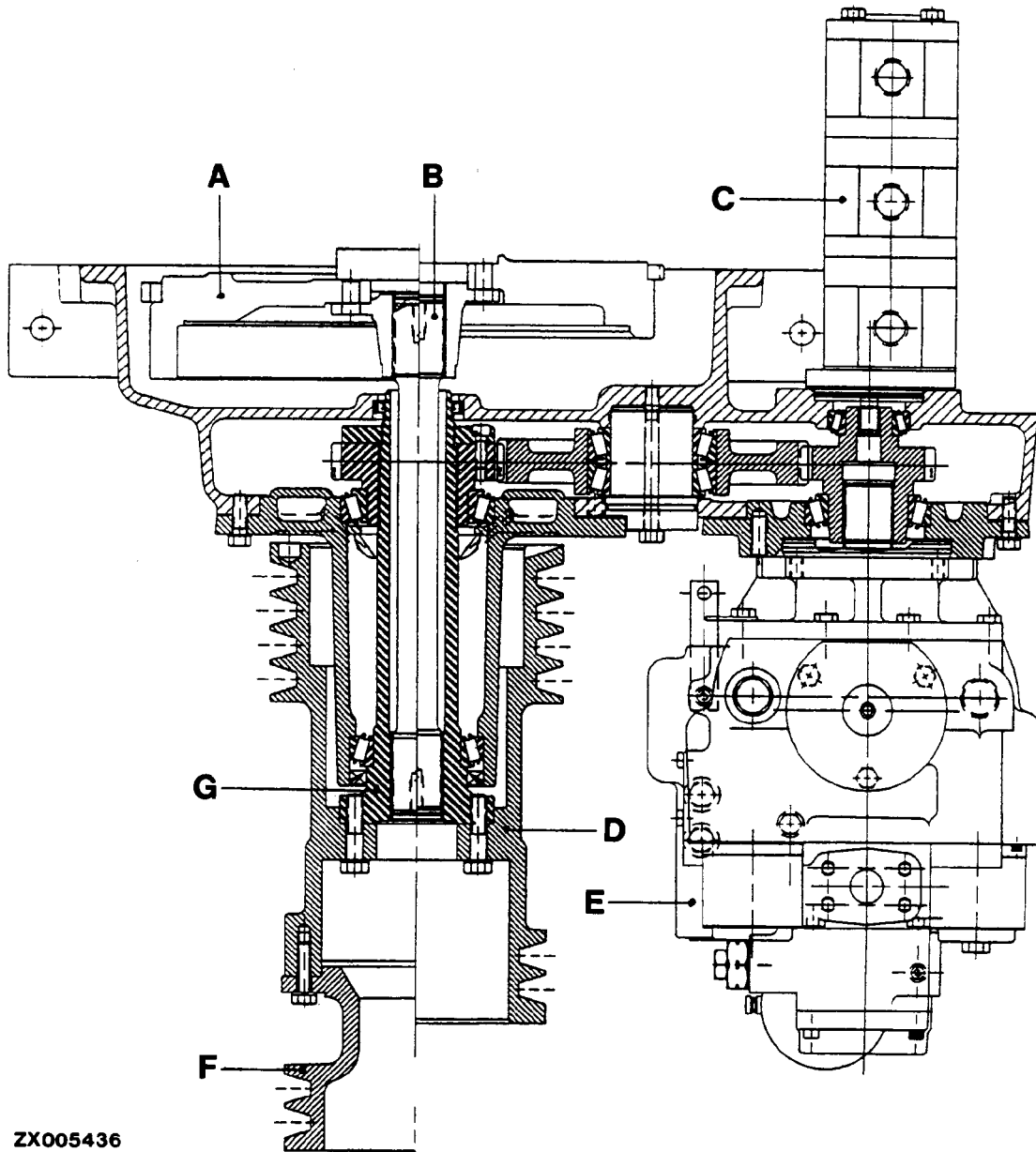
F—30 mm (1.2 in.)  
G—23 mm (0.9 in.)

H—3 mm (0.12 in.)  
J—6 mm (0.24 in.)

Tool for pulling sealing ring into input housing

ZX, TMXZCO003945-19-15FEB95

### INTERMEDIATE TRANSMISSION AND COMPONENTS



ZX005436

-UN-28APR95

ZX005436

A—Engine flywheel  
B—Input shaft

C—Triple hydraulic pump  
D—Countershaft pulley

E—Hydrostatic pump  
F—Additional pulley

G—Hollow shaft

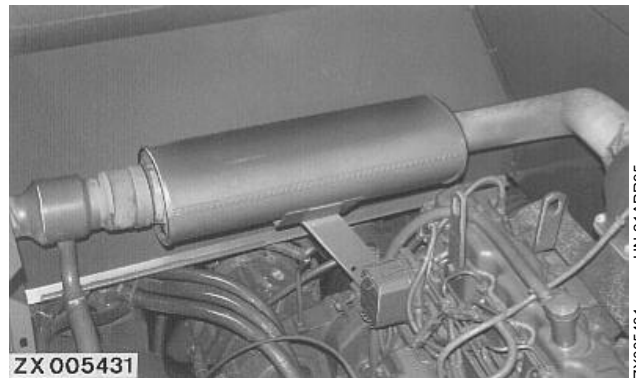
ZX, TMXZCO003946-19-15FEB95



## REMOVING THE INTERMEDIATE TRANSMISSION

Drain oil. Capacity is 2.4 liter (0.63 US gal.).

Remove muffler assembly.



ZX, TMXZCO003947-19-15FEB95

**IMPORTANT: Do not disconnect any pressure hoses.**

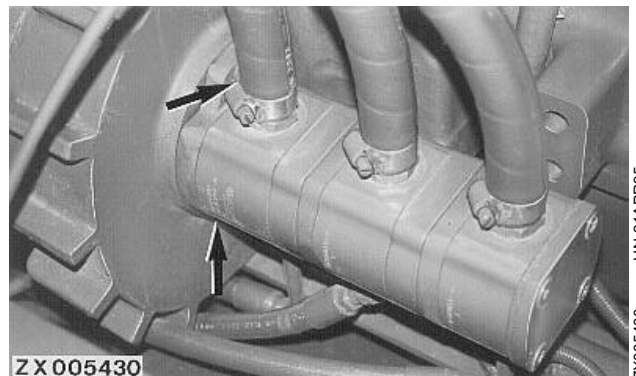
Remove hydrostatic pump and secure it so that it cannot fall.



ZX, TMXZCO003949-19-15FEB95

**IMPORTANT: Do NOT disconnect the suction lines and the two pressure lines.**

Remove the triple hydraulic pump. Disconnect one pressure hose to gain access to the attaching nut.

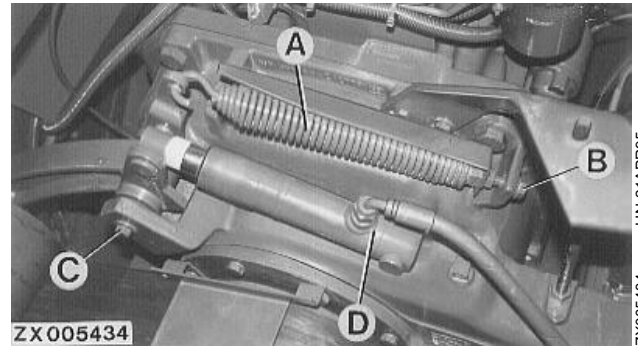


ZX, TMXZCO003950-19-15FEB95

Intermediate Transmission/Removing Intermediate Transmission

Remove tensioning screw (B) and take off spring (A).

Remove tensioning roller by taking out screw (C), and disengage cylinder (D).

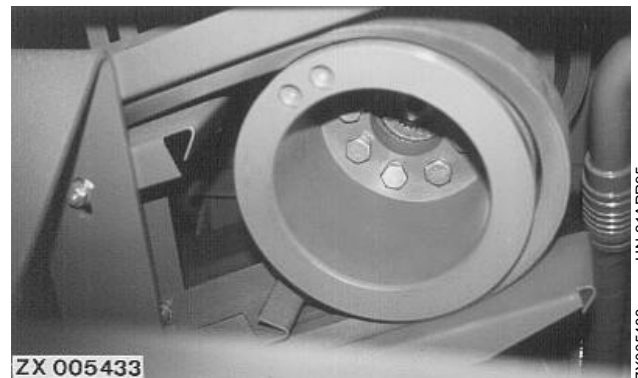


-UN-21APR95  
ZX005434

ZX, TMXZCO003951-19-15FEB95

Remove engine pulley.

On 2064 and 2066 combines, first remove the additional pulley.



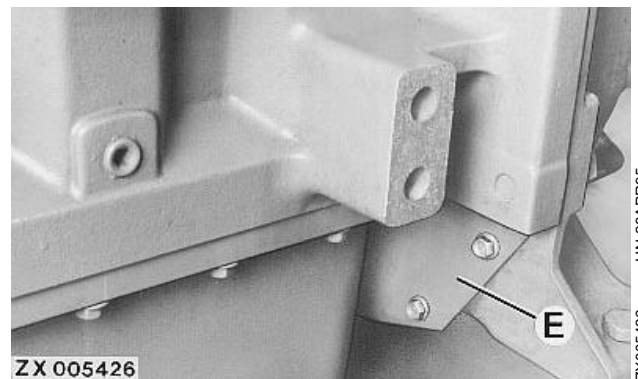
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ZX005433

ZX, TMXZCO003952-19-15FEB95

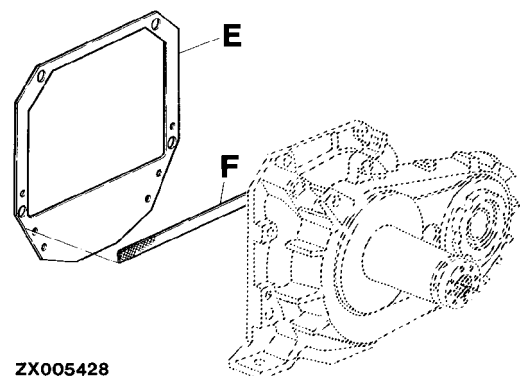
Unbolt intermediate transmission from engine.

Unbolt sealing plate (E) at both ends of the intermediate transmission.

- E—Sealing plate
- F—Sealing strip



-UN-28APR95  
ZX005426



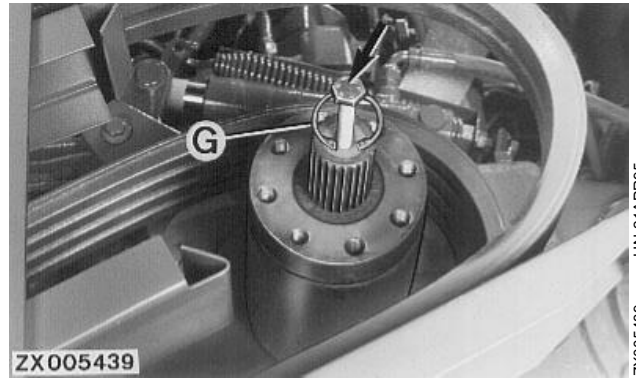
-UN-28APR95  
ZX005428

ZX, TMXZCO003953-19-15FEB95

## Intermediate Transmission/Removing Intermediate Transmission

Remove snap ring (G) from hollow shaft and use an M10x50 screw to pull the drive shaft out of the hollow shaft.

Take the two screws out of the engine mounting.

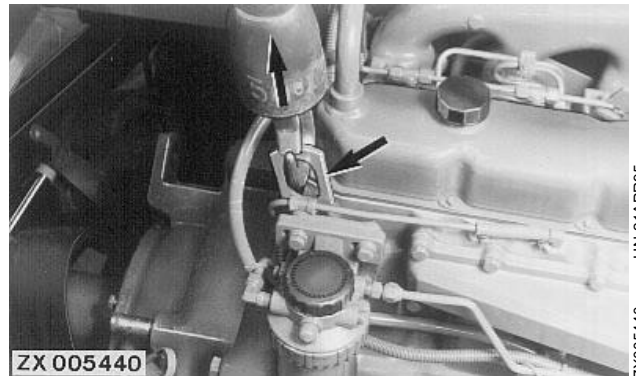


ZX, TMXZCO003954-19-15FEB95

-UN-21APR95  
ZX005439

Raise engine slightly at the intermediate transmission end to relieve pressure.

Place wooden blocks under the engine at left and right, and lower engine onto them.

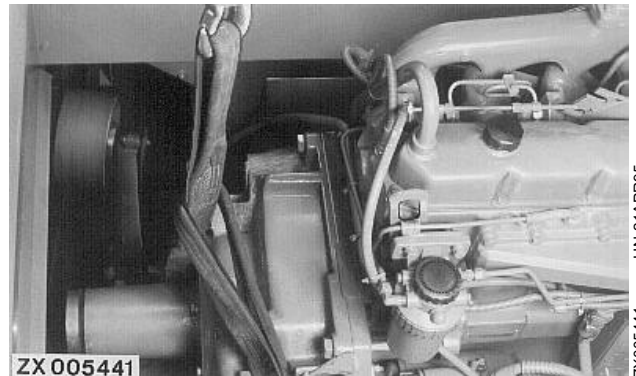


ZX, TMXZCO003955-19-15FEB95

-UN-21APR95  
ZX005440

**⚠ CAUTION: Intermediate transmission box weighs 130 kg (286.6 lb).**

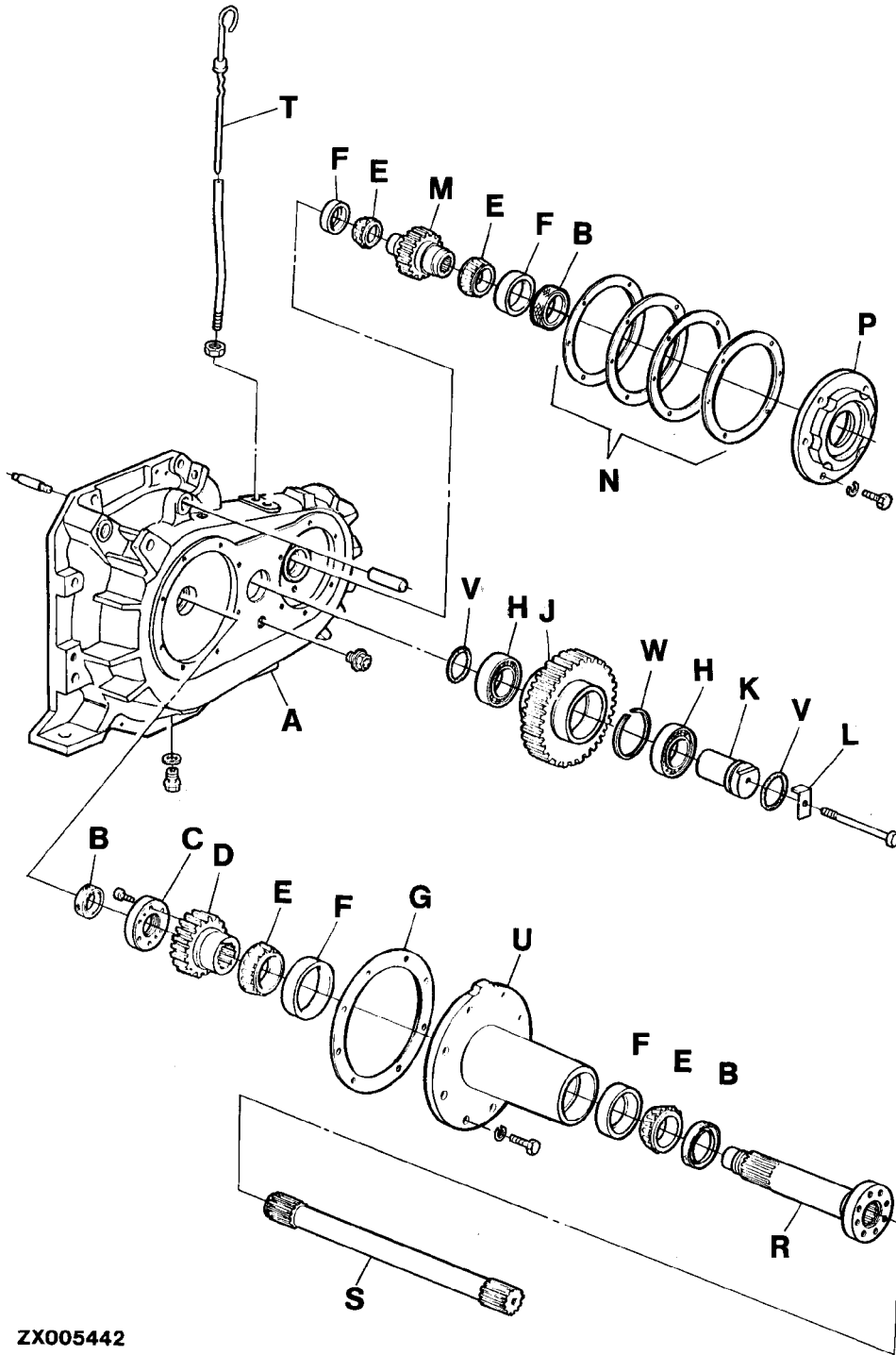
Secure the intermediate transmission with a wire rope and use a hoist to lift it out.



ZX, TMXZCO003956-19-15FEB95

-UN-21APR95  
ZX005441

**COMPONENTS OF INTERMEDIATE TRANSMISSION**



ZX005442

ZX005442 -UN-28APR95

- |                        |                        |                |                |
|------------------------|------------------------|----------------|----------------|
| A—Housing              | F—Bearing ring         | L—Retainer     | S—Drive shaft  |
| B—Seal ring            | G—Seal                 | M—Pinion       | T—Oil dipstick |
| C—Locking plate        | H—Taper roller bearing | N—Shims        | U—Housing      |
| D—Gear                 | J—Gear                 | P—Cover        | V—O-ring       |
| E—Taper roller bearing | K—Shaft                | R—Hollow shaft | W—Steel ring   |

ZX, TMXZC0003957-19-15FEB95

## GENERAL ASSEMBLY INSTRUCTIONS

Before assembling, coat all bearings with SAE 90 oil.

Before assembling, coat the lips of the seal rings with FWA 160 grease.

ZX, TMXZCO003958-19-15FEB95

## INSTALLING 62-TOOTH CENTRAL GEAR

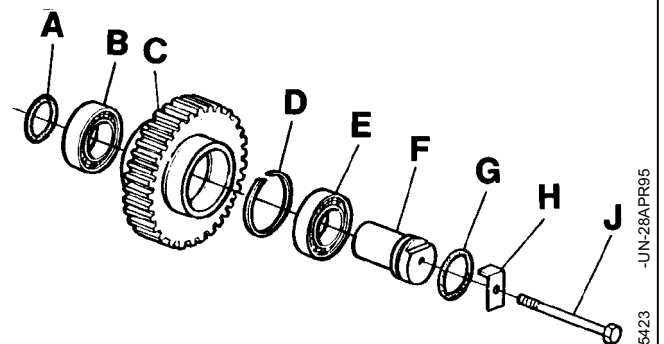
Install steel ring (D) in gear (C).

Insert taper roller bearings (B) and (E).

Place O-ring (A) in housing and O-ring (G) on shaft (F).  
Apply grease to both O-rings.

Insert gear (C) and install it together with shaft (F) and screw (J). Tighten to 54 N·m (40 lb-ft) and secure with retainer (H).

Turn shaft so that end of shaft can engage in input housing.



ZX005423

- A—O-ring
- B—Taper roller bearing
- C—Gear (62-tooth)
- D—Steel ring
- E—Taper roller bearing
- F—Shaft
- G—O-ring
- H—Retainer
- J—M10x110 screw

ZX005423 -UN-28APR95

ZX, TMXZCO003959-19-15FEB95

## ADJUSTING AXIAL PLAY OF HOLLOW SHAFT

Insert hollow shaft (L) with seal ring (K) and two taper roller bearings (D) and (J), plus the 36-tooth gear (C) into input housing (G).

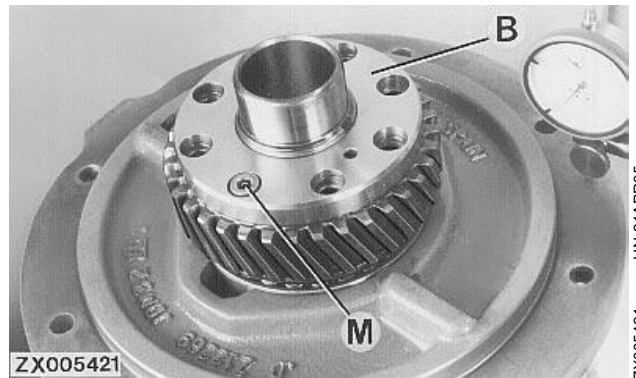
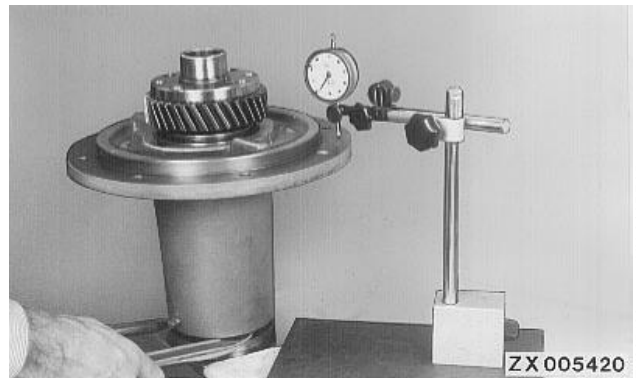
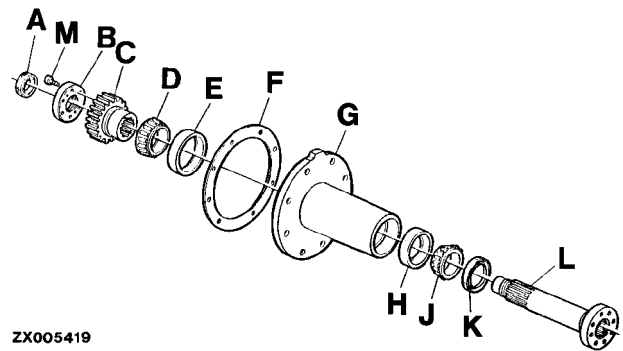
Use locking plate (B) to press the assembly together.

The self-made special tool is required to press seal ring (K) into the housing.

Slacken off locking plate and retighten it until there is a clearance of 0.03 - 0.08 mm (0.0012 - 0.0031 in).

Use hex. socket screw (M) to secure the locking plate. Coat screw with Loctite 243 and tighten it to 30 N·m (22 lb-ft).

- A—Seal ring
- B—Locking plate
- C—Gear (36-tooth)
- D—Taper roller bearing
- E—Bearing ring
- F—Seal
- G—Housing
- H—Bearing ring
- J—Taper roller bearing
- K—Seal ring
- L—Hollow shaft
- M—M8x25 hex. socket screw

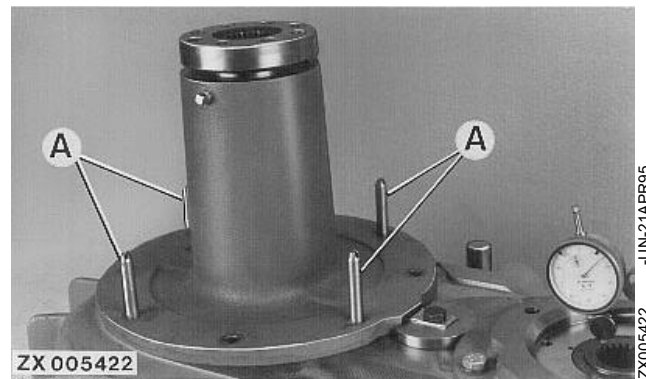


## INSTALLING THE INPUT HOUSING ASSEMBLY

**IMPORTANT:** Four guide pins (A) must be installed to prevent the seal ring being damaged during installation. (Make the guide pins yourself).

Slide the assembly evenly over the guide pins and onto the housing.

Bolt the assembly to the housing. Coat the bolts with Loctite 243, and tighten them to 54 N·m (40 lb-ft).



ZX005422 -UN-21APR95

ZX, TMXZCO003961-19-15FEB95

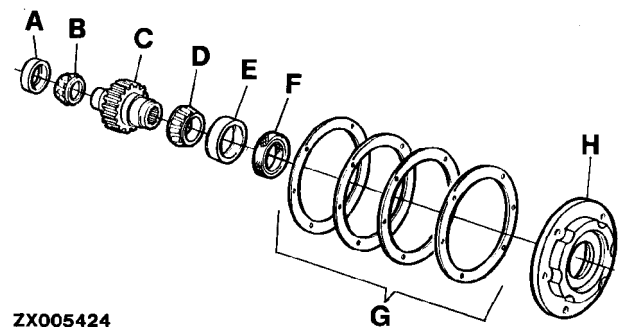
## INSTALLING 25-TOOTH PINION

Install bearing ring (A) in housing.

Install the two taper roller bearings (B) and (D) on the pinion, and insert into housing.

Install bearing ring (E) and seal ring (F) on the cover. Install cover with the word "TOP" facing upward.

Coat screws with Loctite 243 and tighten them to 54 N·m (40 lb-ft).



ZX005424

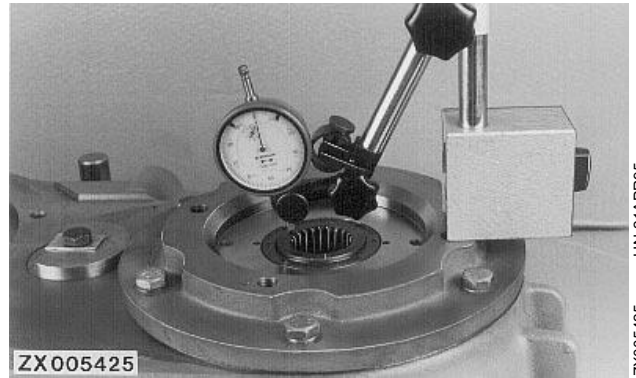
ZX005424 -UN-28APR95

- A—Bearing ring
- B—Taper roller bearing
- C—Pinion (25-tooth)
- D—Taper roller bearing
- E—Bearing ring
- F—Seal ring
- G—Shims 0.10; 0.15; 0.25; 0.5 mm  
(0.004; 0.006; 0.01; 0.02 in.)
- H—Cover

ZX, TMXZCO003962-19-15FEB95

### ADJUSTING AXIAL PLAY AT PINION

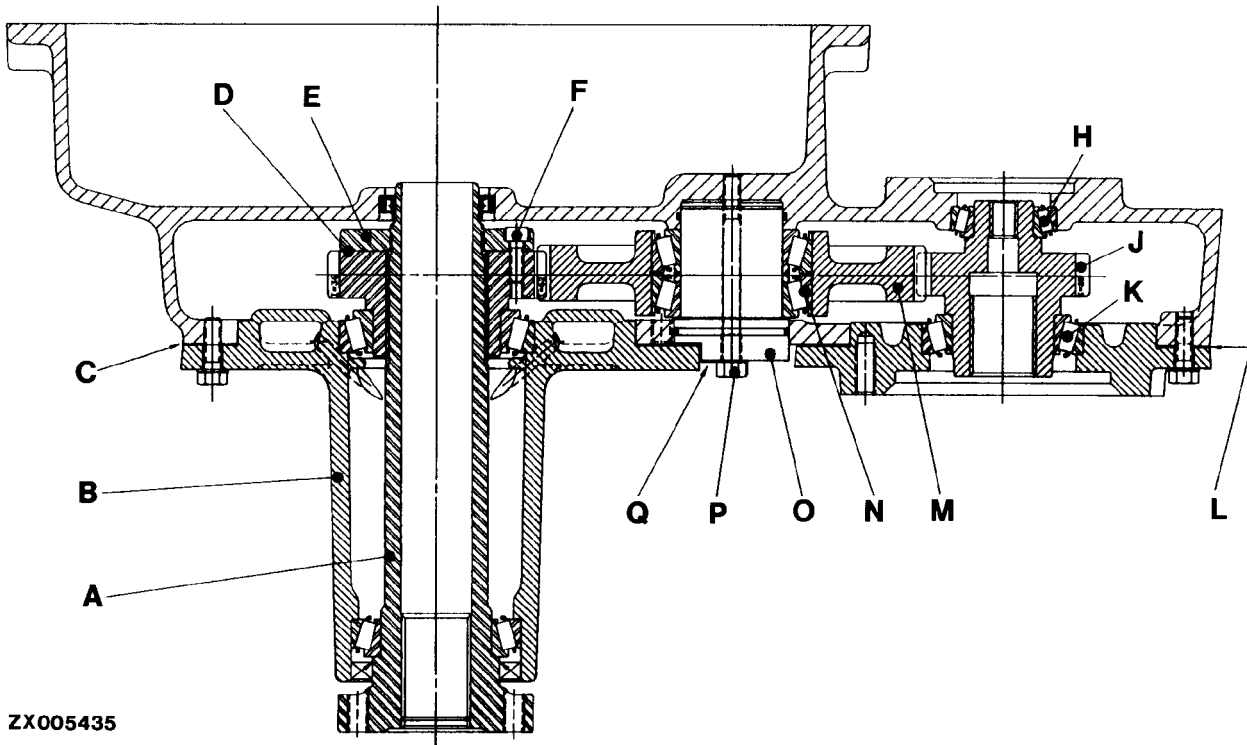
Install cover with shims so that there is a clearance of 0.05 - 0.13 mm (0.002 - 0.005 in).



ZX005425 -UN-21APR95

ZX, TMXZCO003963-19-15FEB95

### ASSEMBLY OF INTERMEDIATE TRANSMISSION



ZX005435

ZX005435 -UN-28APR95

A—Hollow shaft  
B—Input housing  
C—Seal  
D—36-tooth gear

E—Locking plate  
F—Hex. socket screw  
H—Taper roller bearing  
J—25-tooth pinion

K—Taper roller bearing  
L—Shims  
M—62-tooth gear  
N—Taper roller bearing

O—Shaft  
P—M10x110 screw  
Q—Retainer

ZX, TMXZCO003964-19-15FEB95



## INSTALLING THE INTERMEDIATE TRANSMISSION

To install, follow the removal procedure in reverse.

Fill with oil. Capacity is 2.4 liter (0.63 US gal.) Oil must meet SAE 90 SCL. Check level at dispstick.

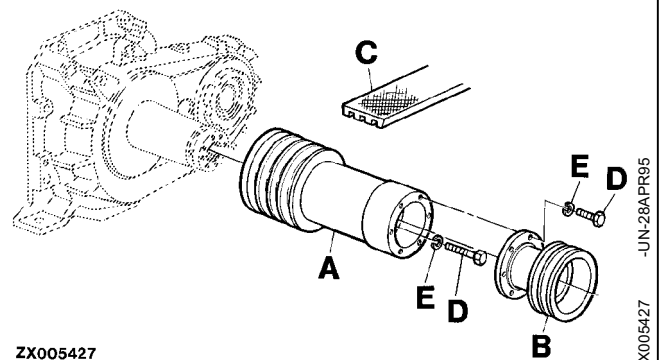
ZX, TMXZCO003965-19-15FEB95

## INSTALLING BELT PULLEY

To facilitate installation, screw two M12x120 studs into the hollow shaft.

Put on pulley, and locate it centrally. Then remove studs and tighten the attaching screws.

- A—Engine pulley
- B—Additional pulley for 2064 and 2066
- C—Drive belt
- D—Screw
- E—Spring washer



ZX, TMXZCO003966-19-15FEB95

## ADJUSTING BELT GUIDE

See description in Section 20-05.

ZX, TMXZCO003967-19-15FEB95

*Intermediate Transmission/Adjusting Belt Guide*

**Group 10**  
**Transmission and Differential**

**OTHER MATERIAL**

<b>Number</b>	<b>Name</b>	<b>Use</b>
TY15130	Form-in-Place Gasket	To seal hydrostatic adapter and front cover to transmission.
T43512	Thread Lock and Sealer (medium strength)	To coat threads of cap screws on differential ring gear.
TY9374	Sealer-Thread	To coat threads of lube pump, bearing cap, and differential cradle.

ZX.TMSPFH000054-19-22JUL91

## SPECIFICATIONS

Item	Measurement	Specification
Brake Assembly-to-Transmission Cap Screws	Torque	620 N·m (460 lb-ft)
Hydrostatic Transmission Adapter-to-Transmission Cap Screws	Torque	320 N·m (235 lb-ft)
Transmission Mounting Cap Screws	Torque	320 N·m (235 lb-ft)
Differential Cradles-to-Transmission Case Cap Screws	Torque	320 N·m (235 lb-ft)
Ring Gear-to-Differential Cap Screws	Torque	130 N·m (97 lb-ft)
Pinion Shaft Bearing Carrier Cap Screws	Torque	75 N·m (55 lb-ft)
Transmission Cover-to-Transmission Cap Screws	Torque	75 N·m (55 lb-ft)
Transmission Lube Pump-to-Transmission Cap Screws	Torque	75 N·m (55 lb-ft)
Shifter Cam	End Play	0.00—0.25 mm (0.00—0.01 in.)
Differential Adjustment	End Play	0.08—0.25 mm (0.003—0.010 in.)
Pinion Shaft Adjustment	End Play	0.08—0.25 mm (0.003—0.010 in.)
Input Shaft Adjustment	End Play	0.01—0.20 mm (0.0005—0.008 in.)

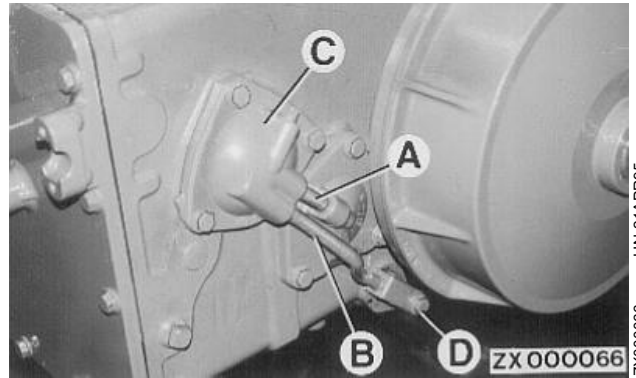
ZX.TMSPFH000055-19-22JUL91

## DRAIN OIL, REMOVE SUCTION SCREEN

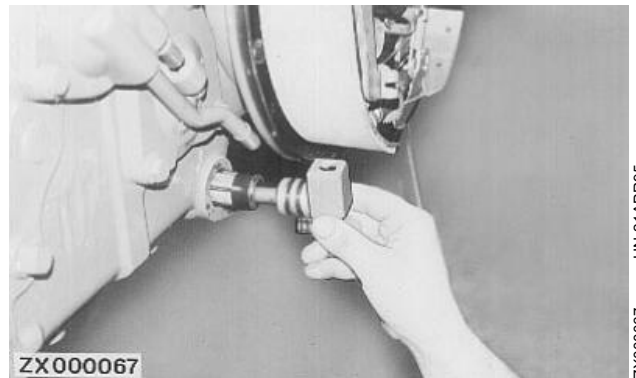
Slide tubes (A) and (B) towards pump (C).

Loosen screw (D) and pull out suction screen.

Catch escaping oil in a suitable container.



-UN-21APR95  
ZX000066



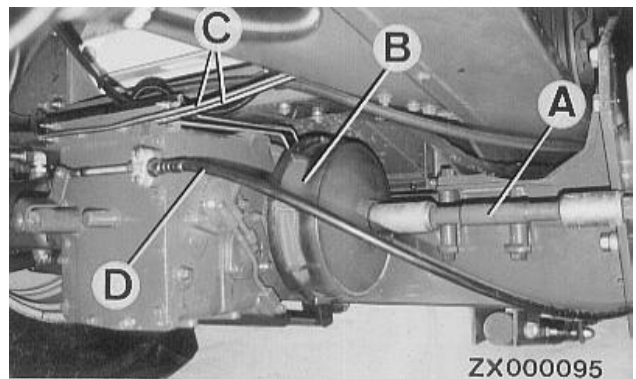
-UN-21APR95  
ZX000067

ZX.TMSPFH000263-19-22JAN91

## REMOVE TRANSMISSION

**⚠ CAUTION: The transmission is heavy (300 kg; 675 lb). Danger of accidents!**

1. Remove drive shafts (A).
2. Remove brake drums (B). Disconnect parking brake cable and brake line (C).
3. Disconnect shift cable (D) from transmission. Disconnect electrical cable to speed sensor.
4. Remove hydrostatic motor and suspend on machine frame.
5. Safely support transmission using a trolley jack. Loosen four attaching screws and roll transmission away from bottom of machine.



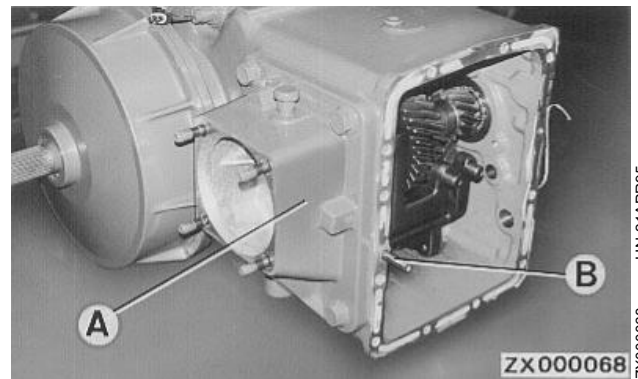
-UN-21APR95  
ZX000095

ZX.TMSPFH000264-19-22JUL91

## REMOVE AND REPAIR SHIFTER FORKS AND SHIFTER CAM

**NOTE:** Shifter fork and shifter cam can be replaced without removing transmission.

1. Remove front cover and hydrostatic transmission adapter (A).
2. Remove dowel pin (B).



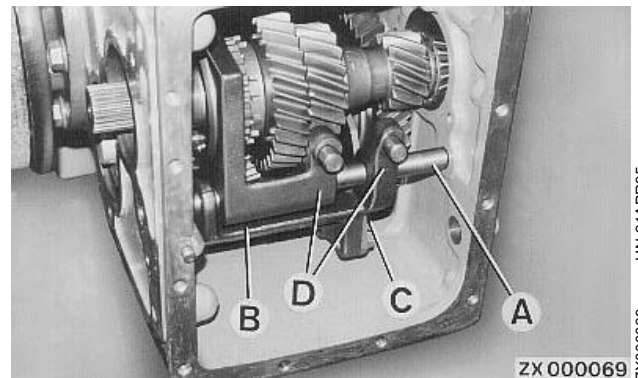
3. Remove rail (A) and shifter forks (B) and (C).

4. Inspect shifter cam to be certain grooves are free of burrs and there are no flat spots. Also inspect mating shifting surfaces on shifter rail.

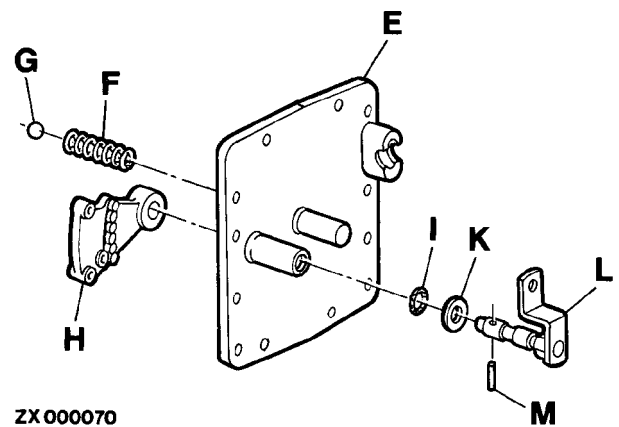
Replace shifter forks or rollers (D) if they appear damaged or worn.

5. When replacing a roller (D) or pin, press pin flush with roller. Roller must be able to turn freely on pin. The usual cause for a roller pin to break is clash shifting.

6. Inspect all shift collars in the transmission for wear. They can cause the transmission to "jump" out of gear damaging shift forks. Incorrectly adjusted shift linkage can cause excessive wear to shift collars.

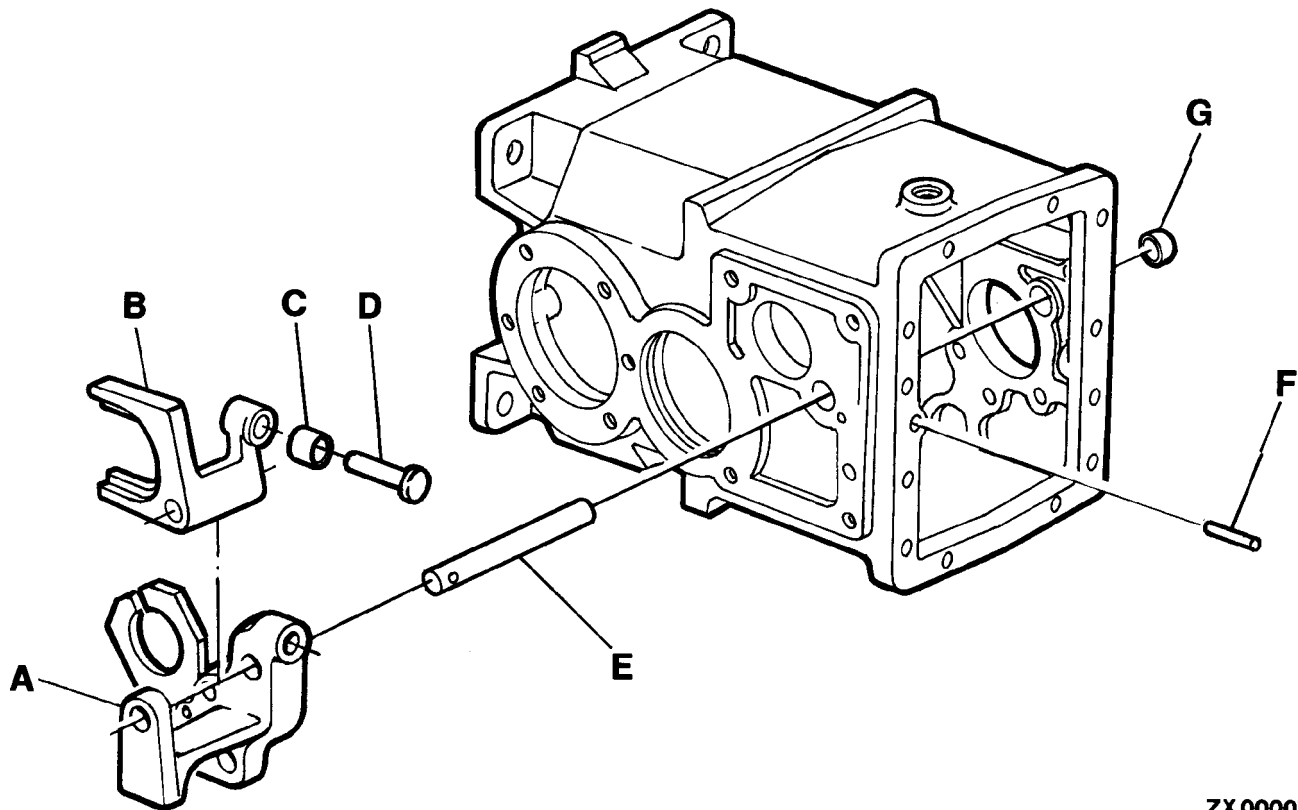


- A—Rail
- B—Shifter Fork
- C—Shifter Fork
- D—Rollers
- E—Front Cover
- F—Spring
- G—Detent Ball
- H—Shifter Cam
- I—O-Ring
- K—Washer
- L—Lever
- M—Spring Pin



ZX.TMSPFH000057-19-22JAN91

## INSTALL SHIFTER FORKS



ZX 000071

A—Shifter Fork  
B—Shifter Fork

C—Roller (2 used)  
D—Pin (2 used)

E—Rail  
F—Dowel Pin

G—Cap

1. Install rollers and pins (C) and (D).  
Roller must turn freely on pin and pin must be flush with top of roller.

2. Install shifter forks (A) and (B) on shifter rail (E) and install dowel pin (F).

3. Check for adequate shifter fork movement. All gears must turn freely when transmission is turned by hand.

*NOTE: Apply 1.5 mm (0.06 in.) bead flexible sealant to counterbore of housing when installing cap (G).*

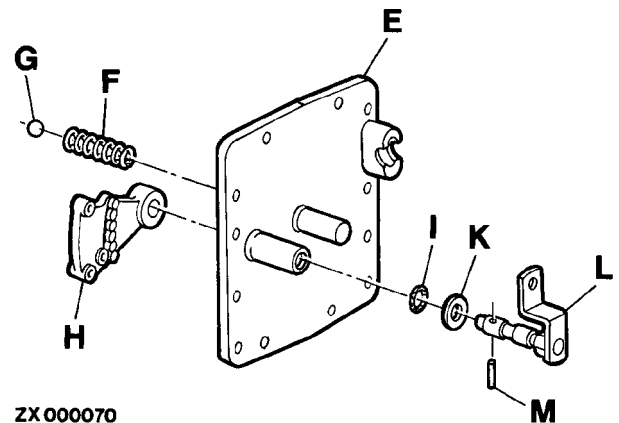
ZX, TMSPFH000058-19-22JUL91

ZX000071 -JUN-02MAY95

## INSTALL FRONT COVER WITH SHIFTER CAM

1. Install detent ball (G). Ball must rest against spring (F). Install lever (L) with washer and O-ring. Install spring pin (M).
2. Adjust cam and arm to 0.00—0.25 mm (0.00—0.01 in.) endplay.
3. Apply a continuous 1.5 mm (0.06 in.) wide bead of form-in-place gasket to transmission housing. Install front cover (E) and tighten cap screws to 75 N·m (55 lb-ft).
4. Fill transmission with 9.6 l (2.5 US gal.) of recommended lubricant.

E—Front Cover  
 F—Spring  
 G—Detent Ball  
 H—Shifter Cam  
 I—O-Ring  
 K—Washer  
 L—Lever  
 M—Spring Pin



ZX000070

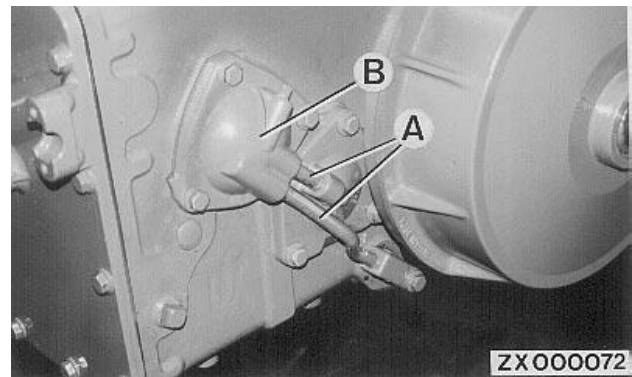
-UN-28APR95  
 ZX000070

ZX.TMSPFH000059-19-22JUL91

## REMOVE AND INSTALL TRANSMISSION LUBE PUMP

*NOTE: If pump is not delivering at least 100 kPa (1.0 bar) (15 psi) oil pressure, it must be repaired.*

1. Slide tubes (A) out of pinion carrier and block.
2. Remove three cap screws to remove pump (B).



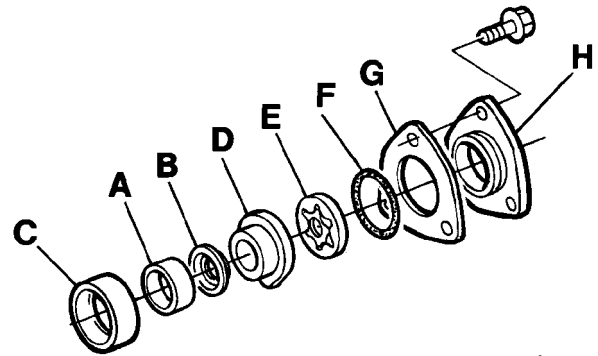
ZX000072

-UN-21APR95  
 ZX000072

ZX.TMSPFH000060-19-22JUL91



3. Carefully pull pump away from transmission to catch drive pin which usually will fall from drive shaft. Be careful not to disturb shim pack.
4. Repair or replace pump as necessary. If a new pump housing is installed, the shim pack must be checked.
5. Install shim pack (G) (thickness greater than original pack) with lube pump housing. Tighten cap screws to 75 N·m (55 lb-ft). Leave O-ring (F) off at this time.
6. Adjust shim pack to get 0.01—0.20 mm (0.0005—0.008 in.) preload. Use one plastic shim next to each cast surface.
7. Install O-ring on lube pump housing. Install shim pack and lube pump assembly.
8. Apply thread lock and sealer (medium strength) to cap screw threads. Install cap screws and tighten to 75 N·m (55 lb-ft).
9. Slide oil tubes into pinion carrier and block.



ZX 000073

- A—Bearing Cap
- B—Spring Washer
- C—Bushing
- D—Liner
- E—Gear Pump
- F—O-Ring
- G—Shim
- H—Pump Housing

ZX000073 -UN-28APR95

ZX.TMSPFH000277-19-22JUL91

## REMOVE COUNTERSHAFT

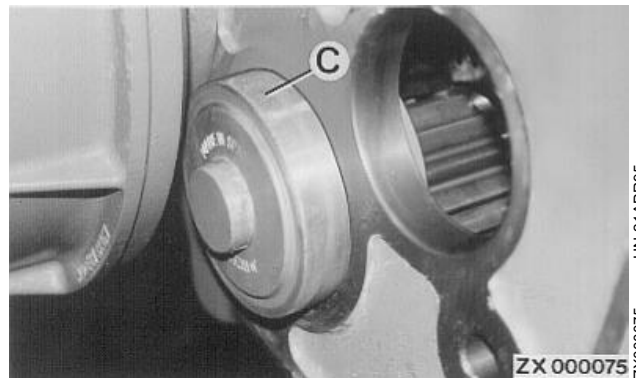
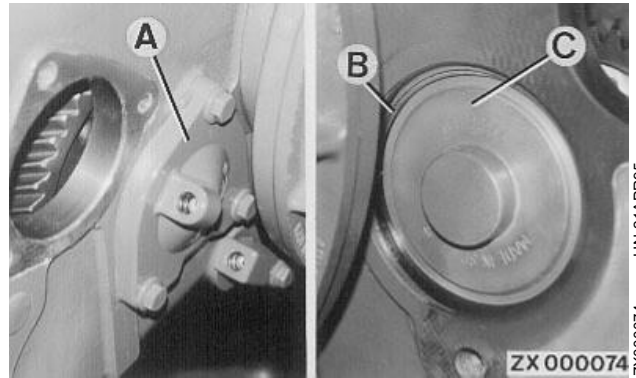
Remove attaching screws and lift off bearing cap (A).

Remove snap ring (B).

Drive out bearing cap (C) by tapping lightly on countershaft with a lead hammer.

**NOTE:** For countershaft removal and installation, bearing supports of differential must be removed.

*Slightly turn differential to the side.*



ZX.TMSPFH000265-19-22JUL91

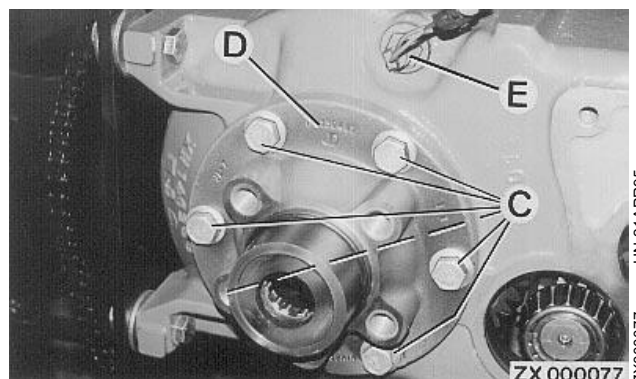
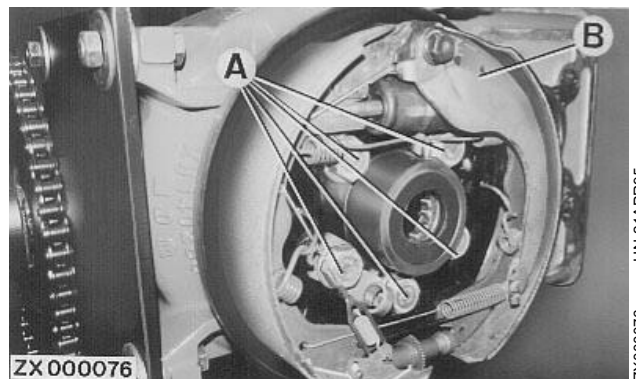
## REMOVE DIFFERENTIAL

Remove screws (A) and anchor plate (B) on both sides. Turn out sensor (E).

Remove screws (C) and bearing support (D) on both sides.

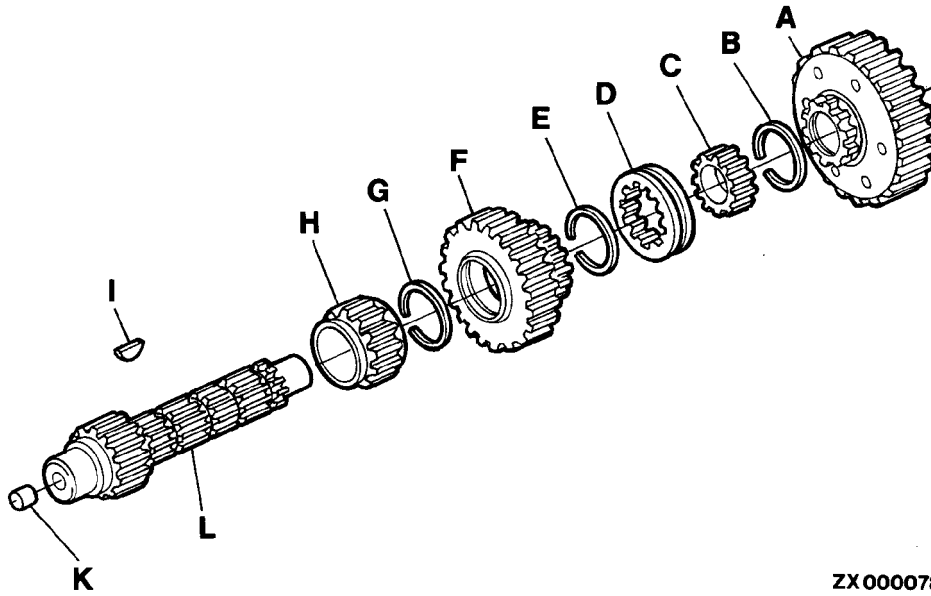
Remove countershaft and differential from transmission case.

- A—Anchor plate attaching screws
- B—Anchor plate
- C—Bearing support attaching screws
- D—Differential bearing supports
- E—Ground speed sensor



ZX.TMSPFH000266-19-22JUL91

**COUNTERSHAFT, EXPLODED VIEW**



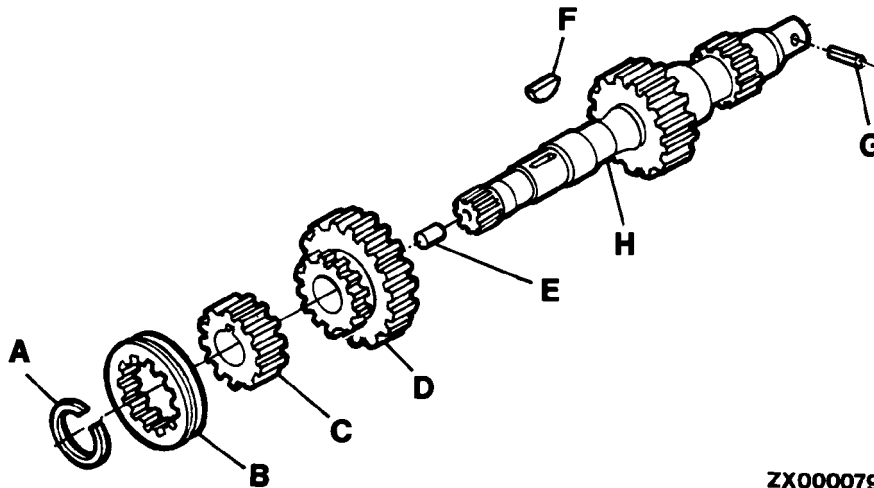
- |             |                |             |                |
|-------------|----------------|-------------|----------------|
| A—Gear      | D—Shift collar | G—Snap ring | K—Plug         |
| B—Snap ring | E—Snap ring    | H—Gear      | L—Countershaft |
| C—Sleeve    | F—Gear         | I—Key       |                |

ZX000078

-JUN-02MAY95  
ZX000078

ZX.TMSPFH000267-19-22JUL91

**INPUT SHAFT, EXPLODED VIEW**



- |                |          |        |         |
|----------------|----------|--------|---------|
| A—Snap ring    | C—Sleeve | E—Plug | G—Pin   |
| B—Shift collar | D—Gear   | F—Key  | H—Shaft |

ZX000079

-JUN-28APR95  
ZX000079

ZX.TMSPFH000268-19-22JUL91

## DISASSEMBLE DIFFERENTIAL

Remove ring gear.



ZX,TMSPFH000269-19-22JUL91

H40175  
-UN-15MAR89

Drive out spring pin.



ZX,TMSPFH000270-19-22JAN91

H40177  
-UN-13JAN89

Remove snap rings.

Take out differential components.



ZX,TMSPFH000271-19-22JAN91

H40178  
-UN-13JAN89

### PREASSEMBLE DIFFERENTIAL

1. Pack all bearings with grease. Coat thrust surfaces and bores of bevel gears and pinion gears with oil. Thrust washers must be tabbed in place.
2. Install bevel gears, pinion gears, thrust washers, and differential pins. Install snap rings. Gears must rotate freely.
3. Install ring gear. Apply thread lock (medium strength) to cap screws. Tighten them up to 130 N·m (100 lb-ft).

ZX.TMSPFH000276-19-22JUL91

### ASSEMBLE TRANSMISSION

Assemble transmission, reversing disassembly procedure.

Apply thread sealer TY9374 to all screws.

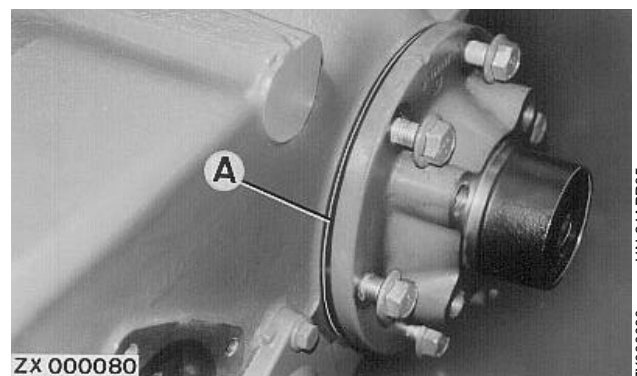
ZX.TMSPFH000272-19-22JUL91

### ADJUST BEARING END PLAY OF DIFFERENTIAL ASSEMBLY

Remove or add shims (A) to obtain a bearing end play of 0.08—0.25 mm (0.003—0.010 in.).

Install a plastic shim as first and last shim.

Tighten screws to 320 N·m (235 lb-ft).



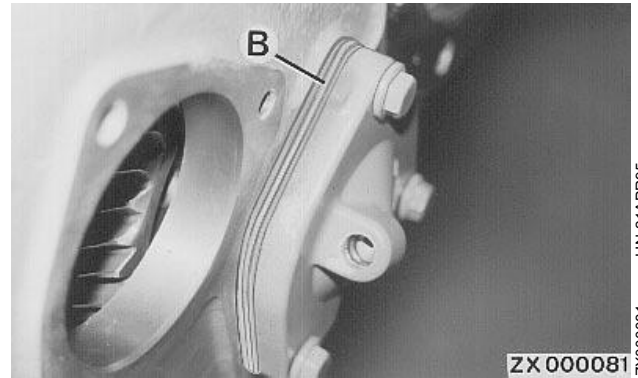
ZX.TMSPFH000273-19-23FEB92

## ADJUSTING BEARING END PLAY OF COUNTERSHAFT

Remove or add shims (B) to obtain a bearing end play of 0.08—0.25 mm (0.003—0.010 in.).

Install a plastic shim as first and last shim.

Tighten screws to 75 N·m (55 lb-ft).



ZX.TMSPFH000274-19-22JUL91

## INSTALL TRANSMISSION

Using a trolley jack, roll transmission under machine and attach to front axle.

Connect mechanical parts such as parking brake cables, drive shafts, shift cable as well as hydrostatic motor.

Connect electrical ground speed sensor.

Connect brake line and bleed brake system (see Section 60).

Adjust parking brake.

Fill transmission with specified oil.

ZX.TMSPFH000275-19-22FEB92

# Group 15 Planetary Final Drives

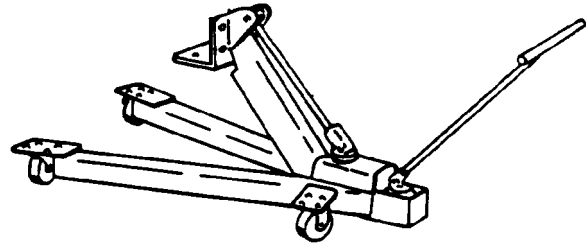
## SPECIAL OR ESSENTIAL TOOLS

*NOTE: Order tools according to information given in the U.S. SERVICE-GARD™ Catalog or in the European Microfiche Tool Catalog (MTC).*

DX,TOOLS -19-05JUN91

**Service Jack** ..... **D05070ST**

To remove and install final drives.

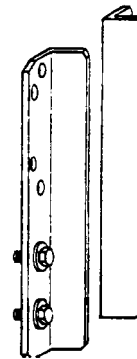


H40598 -UN-14SEP89

ZX,TMXZC0002386-19-25NOV92

**Final Drive Adapter** ..... **JT05874**

Use with D05070ST Service Jack to remove and install final drives.



H40599 -UN-05SEP89

1401,5010,AD -19-12SEP91

## SERVICE EQUIPMENT AND TOOLS

*NOTE: Order tools from your SERVICE-GARD™ Catalog. Some tools may be available from a local supplier.*

Name	Use
17-1/2 and 30 Ton Puller Set	To remove and install bearings and seals.
Bushing, Bearing, and Seal Driver Set	To remove and install bearings and seals.
Service Jack Adapter	To remove and install final drive.

1401,5015,A -19-12SEP91

*Planetary Final Drives/Service Equipment and Tools*

**OTHER MATERIALS**

<b>Number</b>	<b>Name</b>	<b>Use</b>
TY6333	Multipurpose Grease	Pack Bearings
. . . . .	Masking Tape	Wrap shaft splines to prevent damage to seals during assembly.
TY15130	Form-in-Place Gasket	Seal inner and outer halves.
AR41870	Corrosion Inhibitor	Protect components in storage.
TY6304	Flexible Sealant	Seal spindle cap.

1401,5015,B -19-12SEP91



*Planetary Final Drives/Specifications*

**SPECIFICATIONS**

Item	Measurement	Specification
Front Tire and Wheel . . . . .	Approximate Weight . . . . .	340 kg (750 lb)
Final Drive . . . . .	Capacity . . . . .	6.2 L (6.5 qt.)
	Approximate Weight . . . . .	252 kg (555 lb)
Final Drive-to-Axle Top Two Cap Screws . . . . .	Torque . . . . .	405 N·m (300 lb-ft)
Final Drive-to-Axle Bottom Two Rearward Middle Cap Screws . . . . .	Torque . . . . .	200 N·m + 90° (148 lb-ft)
Final Drive-to-Axle Forward Middle Cap Screws . . . . .	Torque . . . . .	200 N·m + 180° (148 lb-ft)
Front Wheel Bolts . . . . .	Torque . . . . .	200 N·m (150 lb-ft) + 1/4 turn.
Quill-to-Inner Housing Cap Screws . . . . .	Torque . . . . .	73 N·m (55 lb-ft)
Pinion Shaft . . . . .	End play . . . . .	0.02—0.2 mm (0.0008—0.008 in.)
Axle Shaft Bearing Cap Screw . . . . .	Torque . . . . .	900 N·m (660 lb-ft) and additionally tighten to align locking plate
Inner Housing-to-Outer Housing Cap Screws . . . . .	Torque . . . . .	305 N·m (225 lb-ft)

1401,5015,C -19-12SEP91

## REMOVE AND INSTALL FINAL DRIVE

*NOTE: It is not necessary to remove the entire final drive to service the outer half of drive unit.*

**CAUTION:** Grain tank must be empty and header removed.

1. Loosen wheel bolts one turn. Do not remove at this time.

**CAUTION:** Block up front axle before removing wheels.

**CAUTION:** Jack must have a minimum rating of 5443 kg (6 ton).

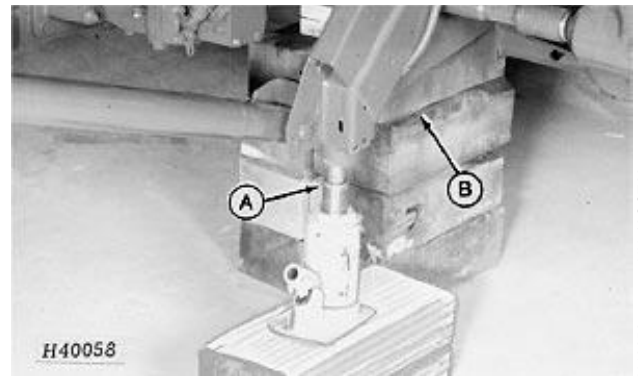
2. Raise combine with jack (A).

3. Block up front axle (B).

**CAUTION:** The approximate weight of tire and wheel is 340 kg (750 lb) (without liquid ballast).

4. Support tire and wheel and remove wheel bolts to remove front tire and wheel.

5. Drain final drive. Approximate capacity is 6.2 L (6.5 qt.)

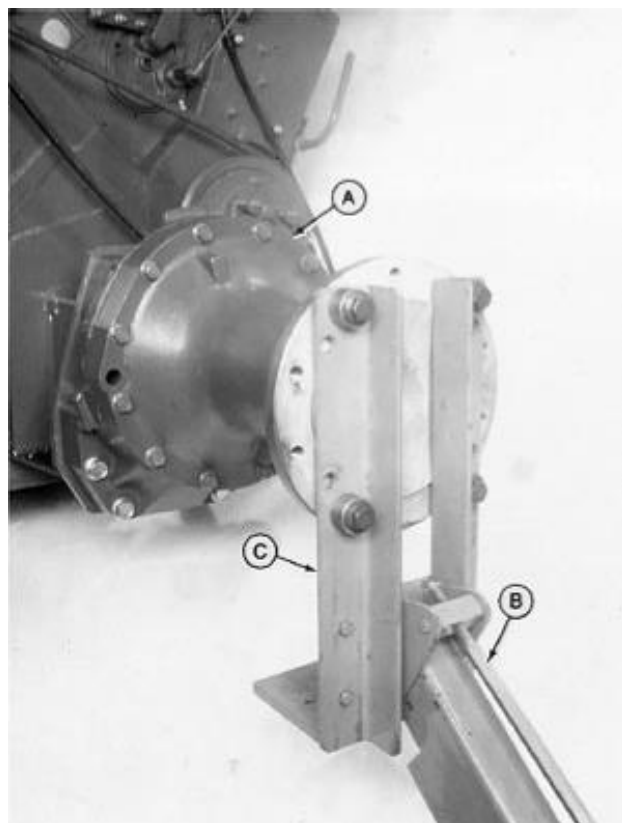


1401,5015,E -19-12SEP91

Planetary Final Drives/Remove and Install Final Drive

**CAUTION:** The approximate weight of final drive is 252 kg (555 lb).

6. Use D05070ST Service Jack with JT05874 Final Drive Adapter (C) to remove final drive (A).



1401,5015,J -19-12SEP91

H41336 -UN-25AUG89

7. Remove spiral snap ring (D).

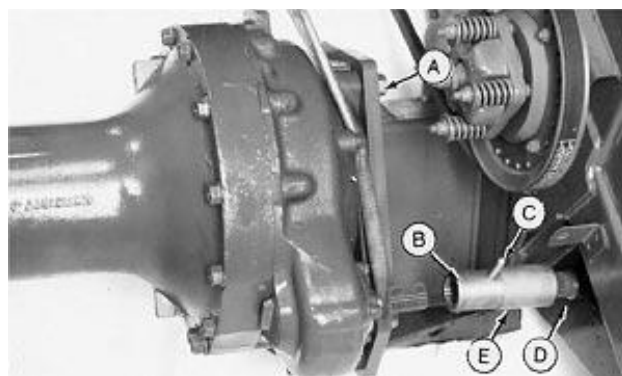
8. Slide sleeve (E) inward.

9. Remove pin (C).

10. Drive coupler (B) inward.

11. Remove cap screws (A).

12. Repair final drive. (See Disassemble and Assemble Final Drive in this group.)



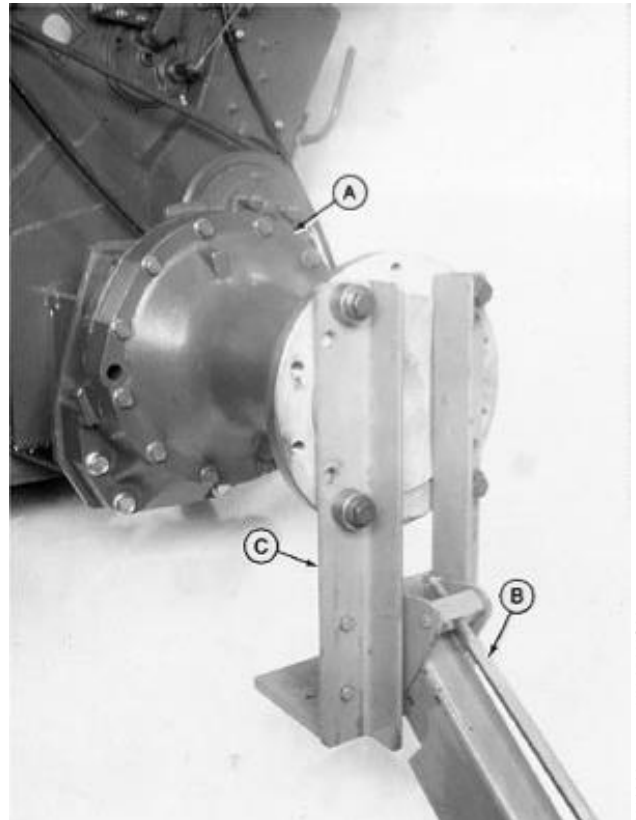
1401,5015,G -19-12SEP91

H40579 -UN-20APR89

- A—Cap Screw (6 used)
- B—Coupler
- C—Pin
- D—Spiral Snap Ring
- E—Sleeve

**CAUTION:** The approximate weight of final drive is 252 kg (555 lb).

13. Use D05070ST Service Jack (B) with JT05874 Final Drive Adapter (C) to install final drive (A).



1401,5015,K -19-12SEP91

H41336 -UN-25AUG89

14. Install final drive with cap screws (A). (See Specifications in Section 50, Group 15.)

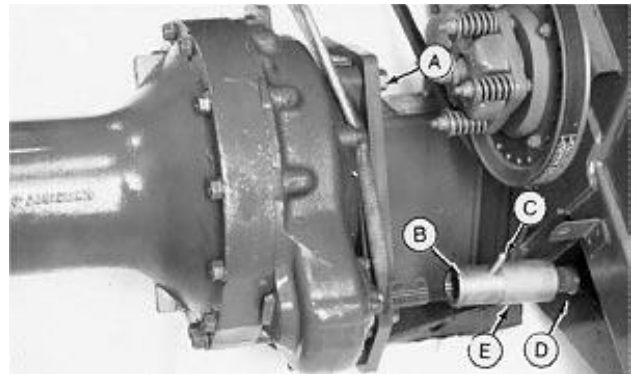
15. Apply multipurpose grease to drive shaft splines and couplers.

16. Drive coupler (B) toward final drive and drive in pin (C).

17. Slide sleeve (E) over coupler and install spiral snap ring (D).

18. Fill final drive with 6.2 L (6.5 qt.) of recommended lubricant. (See Section 10, Group 20.)

19. Install wheel. Tighten bolts to 200 N·m (150 lb-ft) plus 1/4 turn.

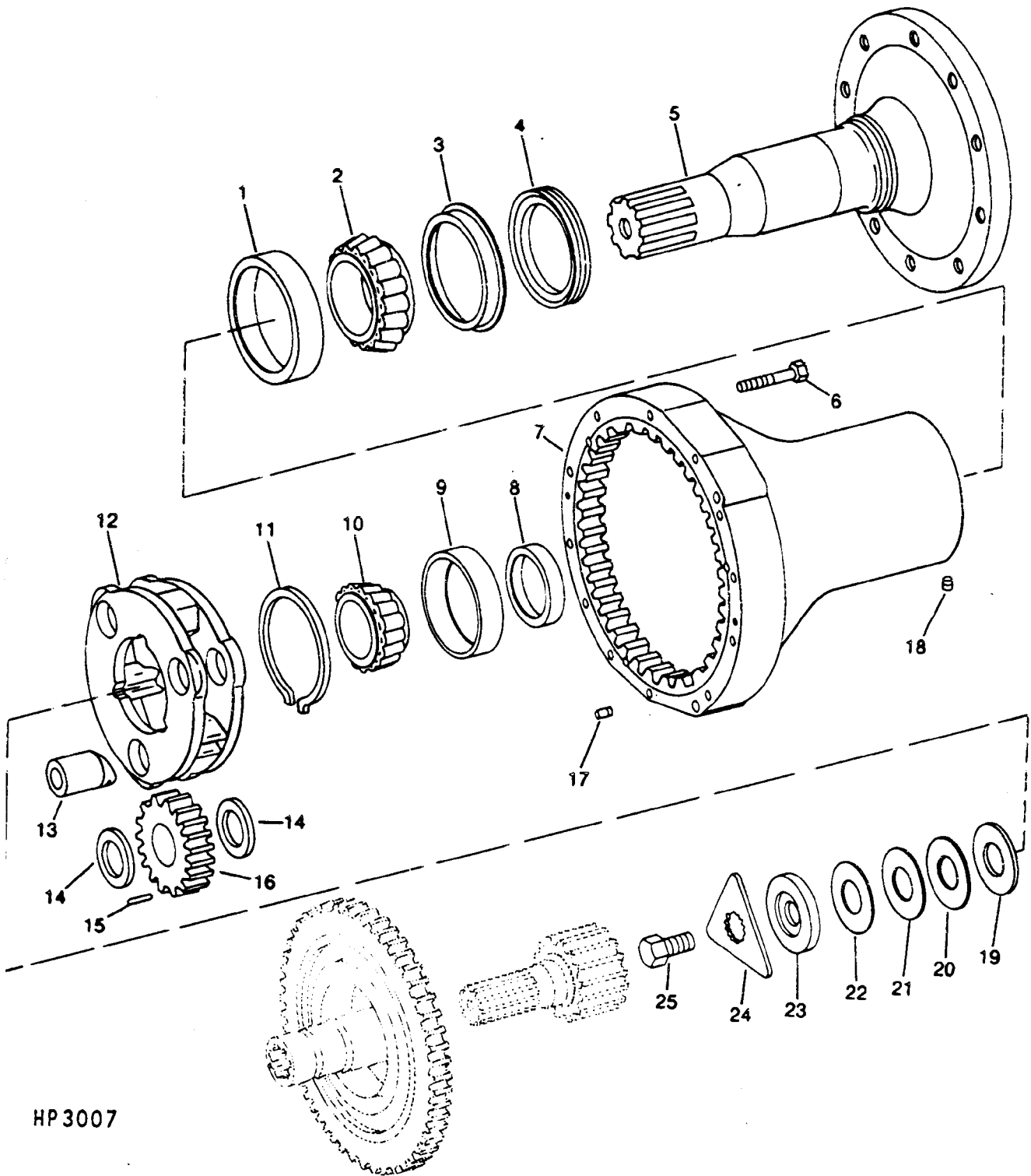


A—Cap Screw (6 used)  
B—Coupling  
C—Pin  
D—Spiral Snap Ring  
E—Sleeve

1401,5015,H -19-12SEP91

H40579 -UN-20APR89

DISASSEMBLE AND ASSEMBLE FINAL DRIVE



HP 3007

HP3007  
-JUN-31MAY89

ZX, TMXZC002504-19-01DEC92

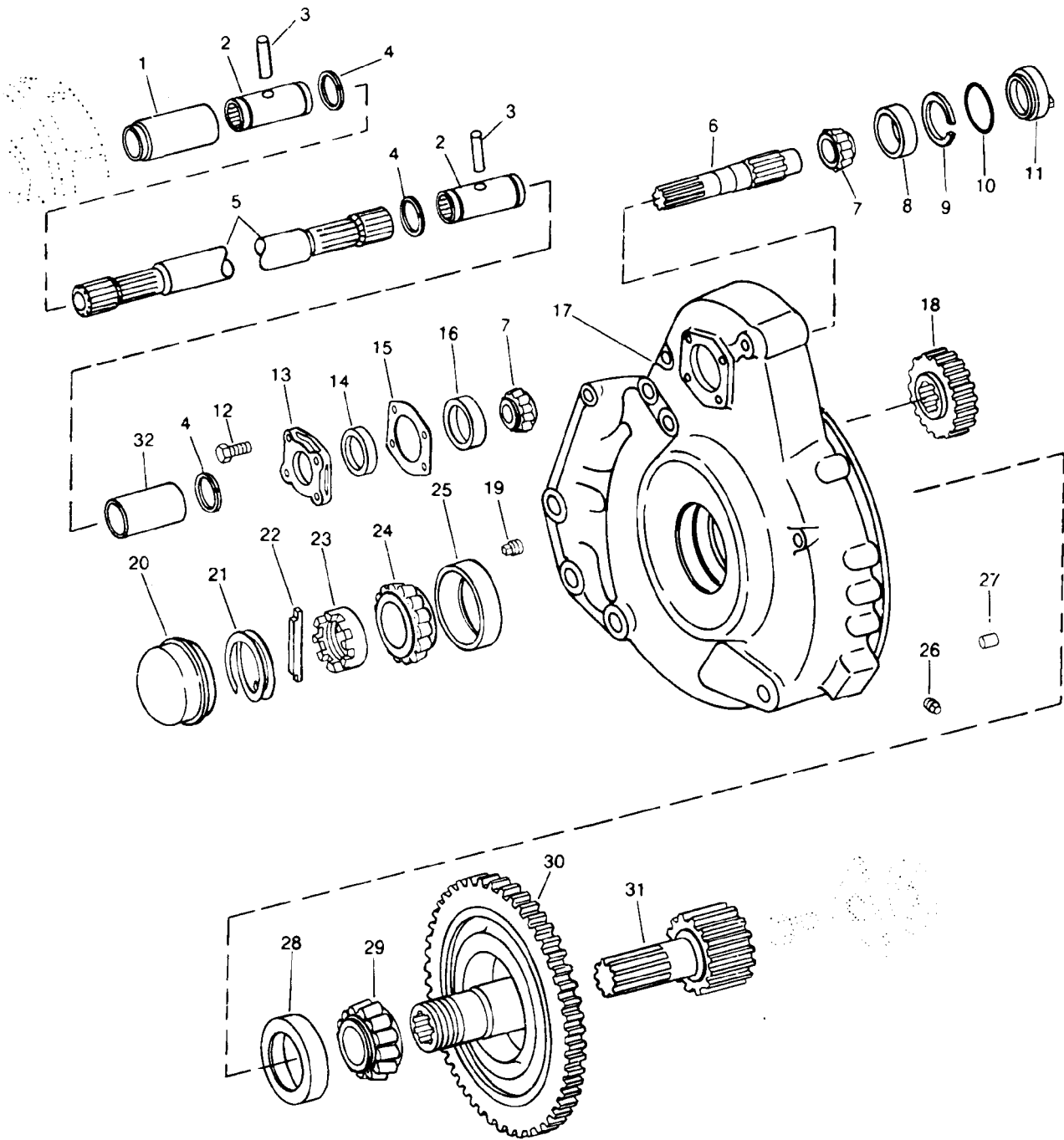
*Planetary Final Drives/Disassemble and Assemble Final Drive*

1—Bearing Cup	8—Seal	14—Thrust Washer (6 used)	20—Shim (as required)
2—Bearing Cone	9—Bearing Cup	15—Needle Bearing (72 used)	21—Shim (as required)
3—Oil Cup	10—Bearing Cone	16—Pinion (3 used)	22—Shim (as required)
4—Seal	11—Snap Ring	17—Dowel Pin (3 used)	23—Washer
5—Spindle	12—Pinion Carrier	18—Lube Fitting	24—Lock Plate
6—Cap Screw (12 used)	13—Shaft (3 used)	19—Thrust Washer (2 used)	25—Self-Locking Screw
7—Housing			

*Legend for Planetary Final Drive*

1401,5015,AP -19-12SEP91

Planetary Final Drives/Disassemble and Assemble Final Drive



- 1—Sleeve
- 2—Coupling (2 used)
- 3—Pin (2 used)
- 4—Snap Ring (3 used)
- 5—Drive Shaft
- 6—Pinion Shaft
- 7—Bearing Cone (2 used)
- 8—Bearing Cup

- 9—Snap Ring
- 10—O-Ring
- 11—Cap
- 12—Cap Screw (4 used)
- 13—Quill
- 14—Seal
- 15—Shim (as required)
- 16—Bearing Cup

- 17—Inner Housing
- 18—Pinion
- 19—Plug
- 20—Dust Cap
- 21—Retaining Ring
- 22—Key
- 23—Nut
- 24—Bearing Cone

- 25—Bearing Cup
- 26—Pipe Plug (2 used)
- 27—Dowel Pin (2 used)
- 28—Bearing Cup
- 29—Bearing Cone
- 30—Gear
- 31—Pinion
- 32—Sleeve

Planetary Final Drives/Disassemble and Assemble Final Drive

**CAUTION:** The approximate weight of planetary final drive is 252 kg (555 lb).

1. Stand final drive on axle flange.
2. Remove 12 cap screws. Lift off inner housing.

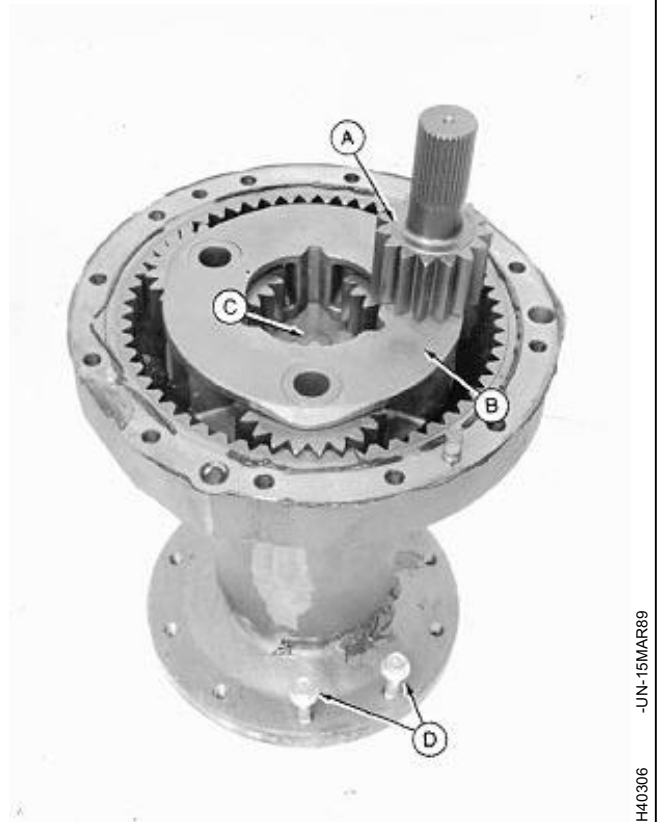


H40305  
-UN-15MAR89

1401,5015,L -19-12SEP91

3. Remove sun gear (A).
4. Install two bolts (D). Place bar between them to hold final drive when removing cap screw and lock plate (C).
5. Remove cap screw, lock plate, washer, and shims (C).
6. Remove pinion carrier (B).

A—Sun Gear  
B—Pinion Carrier  
C—Cap Screw and Lock Plate  
D—Install two Bolts



H40306  
-UN-15MAR89

1401,5015,M -19-12SEP91



Planetary Final Drives/Disassemble and Assemble Final Drive

7. Hoist final drive 25 mm (1 in.) from surface and tap out axle. Hoist housing away from axle.

*NOTE: Lay final drive on its side if hoist is not available to tap axle out of housing using a mallet.*



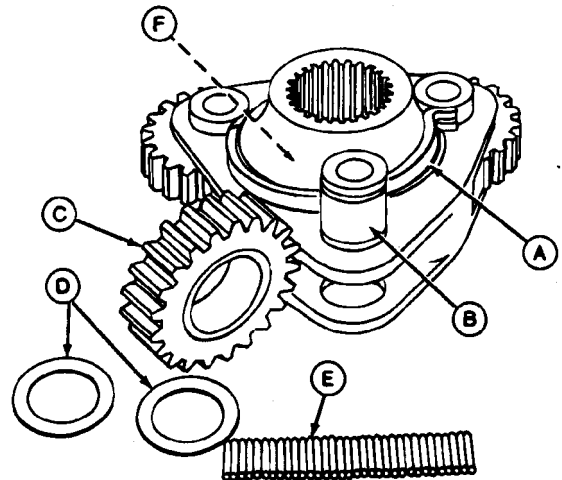
1401,5015,N -19-12SEP91

H40307 -UN-15MAR89

8. Remove snap ring (A) to remove shafts (B), pinions (C), thrust washers (D), needle bearings (E), and shims (F).

9. Inspect parts for wear or damage. Replace as necessary.

- A—Snap Ring
- B—Shaft (3 used)
- C—Pinion (3 used)
- D—Thrust Washer (6 used)
- E—Needle Bearing (72 used)
- F—Shims (as required)



1401,5015,O -19-12SEP91

H41130 -UN-07SEP89

Planetary Final Drives/Disassemble and Assemble Final Drive

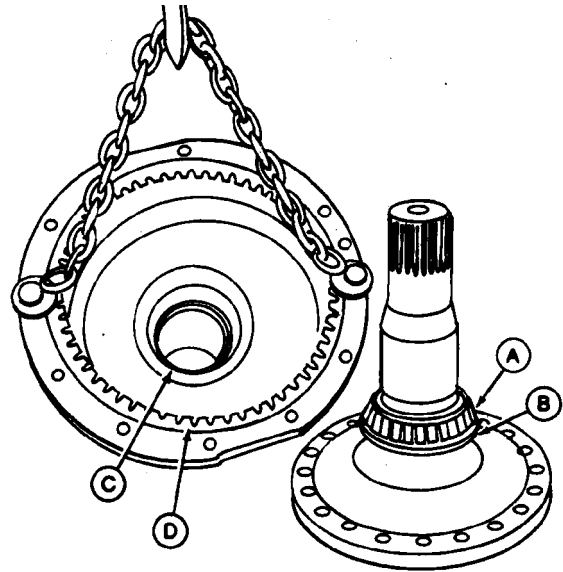
10. Inspect bearing, seals, and ring gear (A-D) for wear or damage.

11. Use a suitable puller to remove bearing (A) if required. Replace seal with cup (C) if bearing is replaced.

*NOTE: Seals may need to be replaced but bearing may not.*

*NOTE: Ring gear (D) is pressed into housing and cannot be replaced without replacing housing.*

12. Wash all parts in a clean, safe solvent.



1401,5015,P -19-12SEP91

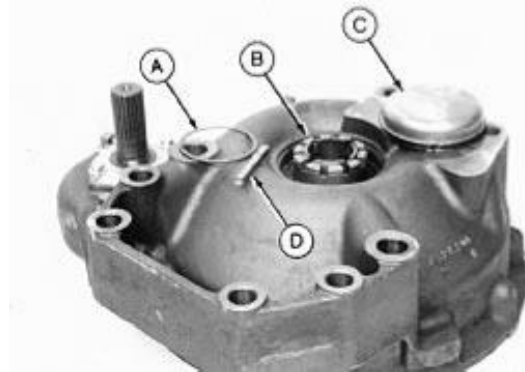
H41131 -UN-07SEP89

13. Pry off cap (C). Remove retaining ring (A), and key (D). Use JDG528 wrench to remove nut (B).

14. Remove bearing cone.

**⚠ CAUTION: Use a lifting device for heavy components.**

15. Lift inner housing off gear.



1401,5015,Q -19-12SEP91

H40309 -UN-15MAR89

16. Inspect bearing cups (A). If necessary to replace, drive bearing cups from inner housing using a brass drift.

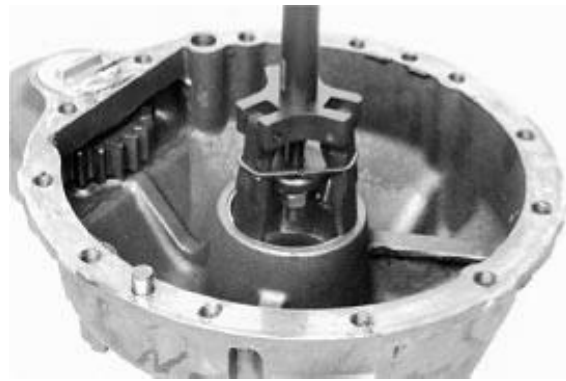


1401,5015,R -19-12SEP91

H40310 -UN-15MAR89

Planetary Final Drives/Disassemble and Assemble Final Drive

17. Remove bearing cups in inner housing bore.



1401,5015,S -19-12SEP91

H40311 -UN-15MAR89

18. Remove cap with O-ring (A).

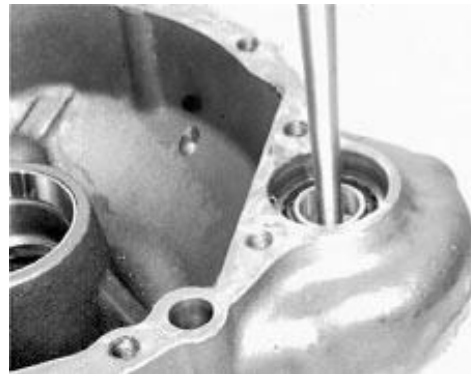
19. Remove quill and shims (B).



1401,5015,T -19-12SEP91

H40312 -UN-15MAR89

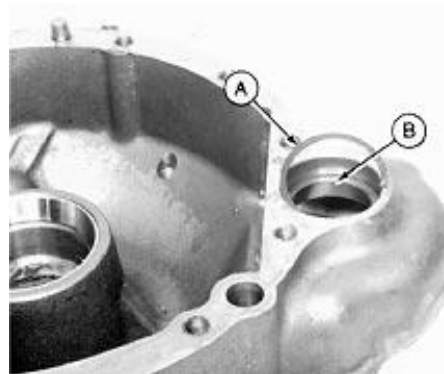
20. Remove pinion shaft with bearing cone, bearing cup, and seal. Remove gear.



1401,5015,U -19-12SEP91

H40313 -UN-15MAR89

21. Remove snap ring (A) and bearing cup (B) if needed to replace.



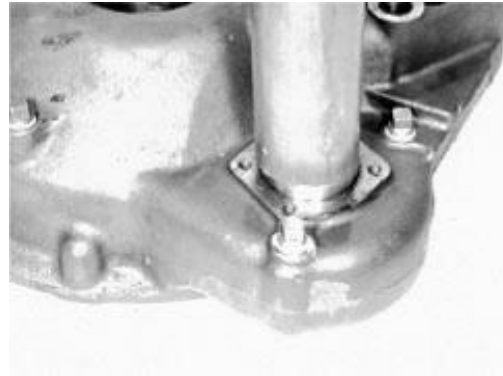
1401,5015,V -19-12SEP91

H40314 -UN-15MAR89

Planetary Final Drives/Disassemble and Assemble Final Drive

22. Apply a light coating of multipurpose grease (or equivalent) to pinion shaft bore.

23. Install bearing cup and seal.

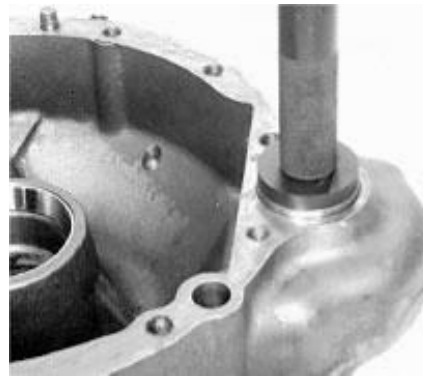


1401,5015,W -19-12SEP91

H40315 -UN-15MAR89

24. Apply a light coating of multipurpose grease (or equivalent) to pinion shaft bore.

25. Install bearing cup and snap ring.



1401,5015,X -19-12SEP91

H40316 -UN-15MAR89

26. Place gear (B) in position in inner housing. Install pinion shaft (A).



1401,5015,Y -19-12SEP91

H40317 -UN-15MAR89

27. Be sure gear (B) turns freely. Coat new O-ring with multipurpose grease and install on pinion bearing cap. Install cap (A), indexed as shown.



1401,5015,Z -19-12SEP91

H40312 -UN-15MAR89

Planetary Final Drives/Disassemble and Assemble Final Drive

28. Install oil seal (A) in quill. Grease seal to aid in assembly.

29. Install old shims (B) if not damaged. If damaged, assemble a new pack as follows:

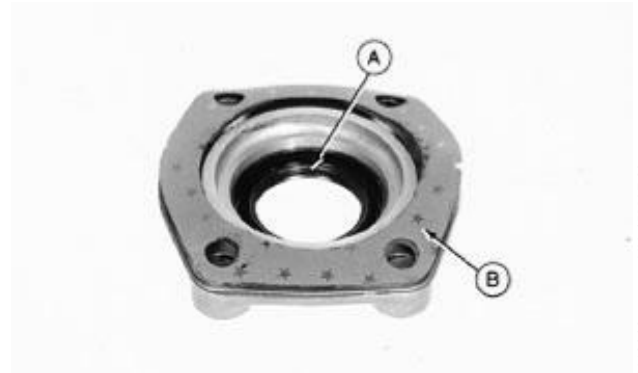
- 0.13 mm (0.005 in.), 2 used, plastic
- 0.25 mm (0.010 in.), 1 used, steel
- 0.51 mm (0.020 in.), 1 used, steel

**IMPORTANT: Place plastic shims against each cast surface.**

30. Place strips of masking tape over pinion shaft splines to protect seal in quill. Bring tape ends together at end of shaft.

31. Install shim pack on quill. Install quill carefully over pinion shaft. Tighten cap screws to 73 N·m (55 lb-ft). Remove tape.

**IMPORTANT: Quill is aluminum. Do not overtighten cap screws.**



H40318 -UN-15MAR89

1401,5015,AA -19-12SEP91

32. Mount dial indicator on housing and check pinion shaft for 0.02—0.2 mm (0.0008—0.008 in.) end play.

33. Remove or add shims to get correct end play. Tighten cap screws to 73 N·m (55 lb-ft).



H40319 -UN-15MAR89

1401,5015,AB -19-12SEP91

34. Remove bearing cone (A) from gear shaft if necessary to replace.



H40320 -UN-15MAR89

1401,5015,AC -19-12SEP91

Planetary Final Drives/Disassemble and Assemble Final Drive

35. Hand pack bearing cone with multipurpose grease.

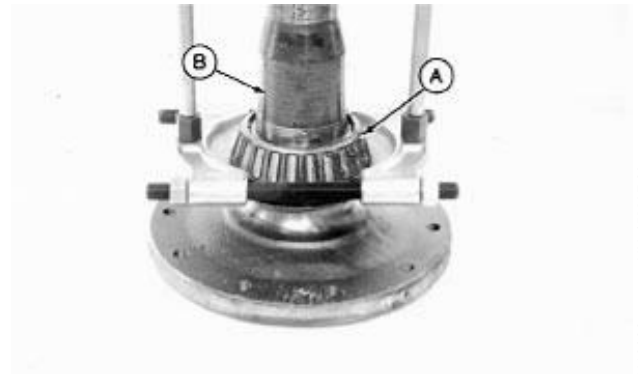
36. Install bearing cone on gear. Bearing cone is a press fit.



1401,5015,AD -19-12SEP91

H40320 -UN-15MAR89

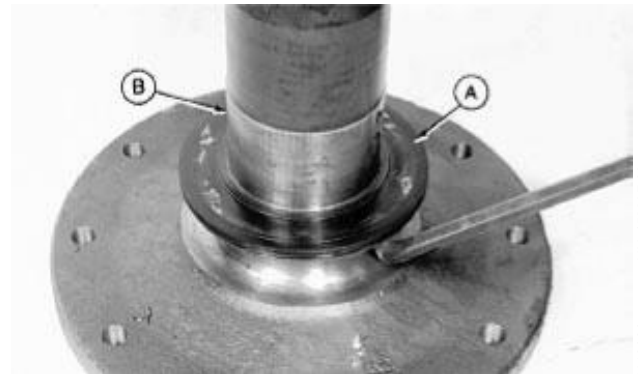
37. Inspect bearing cone (A). If necessary to replace, remove bearing cone from axle (B).



1401,5015,AE -19-12SEP91

H40322 -UN-15MAR89

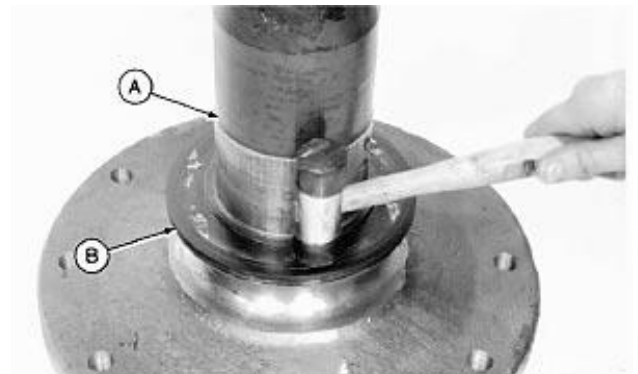
38. Remove seal (A) from axle (B).



1401,5015,AF -19-12SEP91

H40323 -UN-15MAR89

39. Install oil seal (B) with flanged metal portion of seal facing toward axle flange on axle (A). Coat lips of seal with multipurpose grease (or equivalent).



1401,5015,AG -19-12SEP91

H40324 -UN-15MAR89

Planetary Final Drives/Disassemble and Assemble Final Drive

40. Pack bearing cone with multipurpose grease.

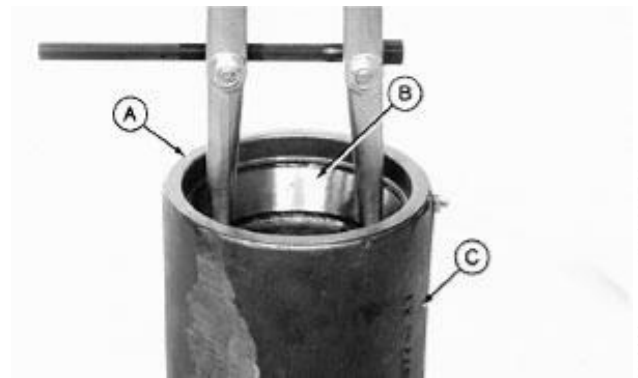
41. Install bearing cone (B) on axle (A).



1401,5015,AH -19-12SEP91

H40325 -UN-15MAR89

42. Remove oil cup (A) and bearing cup (B) from outer housing (C).



1401,5015,AI -19-12SEP91

H40326 -UN-15MAR89

43. Apply a light coating of multipurpose grease (or equivalent) to bore of outer housing (B). Install bearing cup (A).



1401,5015,AJ -19-12SEP91

H40327 -UN-15MAR89

44. Install oil cup (A) on outer housing (B) using a mallet.

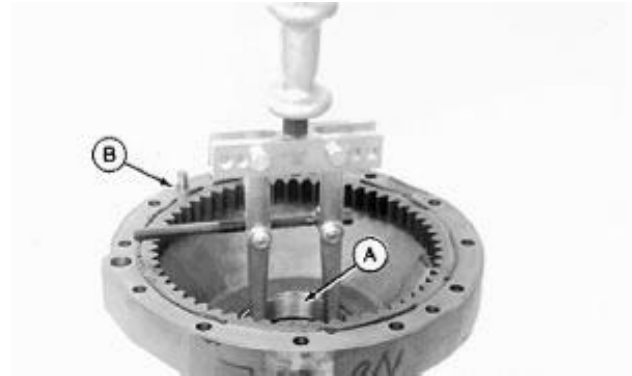


1401,5015,AK -19-12SEP91

H40328 -UN-15MAR89

*Planetary Final Drives/Disassemble and Assemble Final Drive*

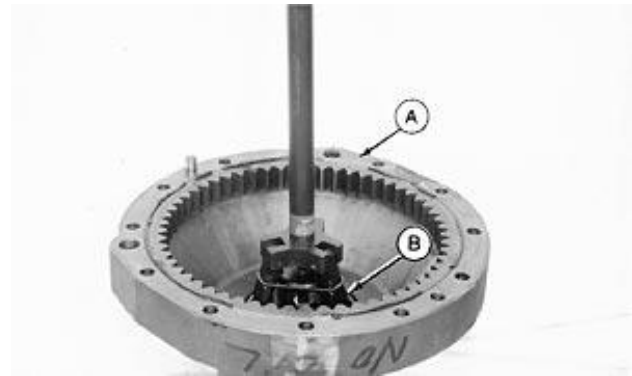
45. Remove bearing cup (A) from outer housing (B).



1401,5015,AL -19-12SEP91

H40329 -UN-15MAR89

46. Apply a light coating of multipurpose grease (or equivalent) to bore of outer housing (A). Install bearing cup (B).



1401,5015,AM -19-12SEP91

H40330 -UN-15MAR89



## Planetary Final Drives/Disassemble and Assemble Final Drive

47. Install axle (C) in outer housing.

48. Install two lead balls (6—8 mm [0.24—0.31 in.] diameter) on end of spindle 180° apart. Use grease or flatten slightly to hold in place.

49. Install carrier assembly (A) on top of lead balls.

50. Install cap screw (B). Tighten to 550 N·m (400 lb-ft) while rotating housing.

51. Remove carrier and lead balls. Measure thickness of each lead. Install shim pack equal to average of lead balls measurements. Shim pack must include thrust washer.

Shims available:

- 0.76 mm (0.003 in.) steel
- 0.127 mm (0.005 in.) steel
- 0.508 mm (0.02 in.) steel

52 Install shim pack, carrier and cap screw.

53. Tighten cap screw to 900 N·m (664 lb-ft) while rotating housing.

54. Install lock plate. If plate does not align, turn over or tighten as required.



1401,5015,AN -19-12SEP91

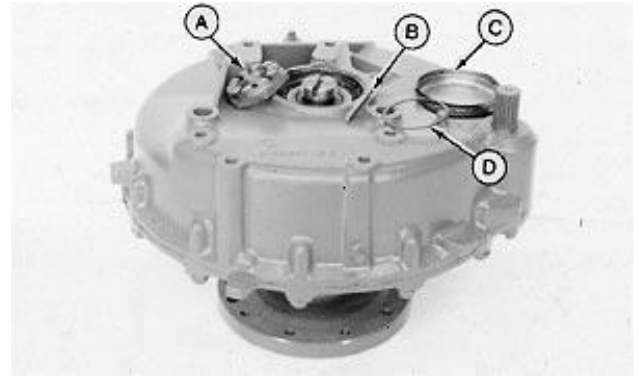
**CAUTION:** Use a lifting device for heavy components.

55. Install gear. Align gear teeth with pinion shaft gear teeth.

56. Apply a continuous bead of Form-in-Place Gasket to outer housing. It must be applied around all cap screw holes.

57. Attach inner housing to outer housing. Tighten 12 cap screws (E) to 305 N·m (225 lb-ft).

58. Install nut (A). Tighten nut until bearing end play is removed. Do not overtighten (preload) bearings. Install all key (B), retaining ring (D). Apply 1.5 mm bead of flexible sealant around cap (C). Install cap (C).



- A—Nut
- B—Key
- C—Cover
- D—Retaining Ring
- E—Cap Screw (12 used)

H40228 -UN-06JUL89

1401,5015,AO -19-12SEP91

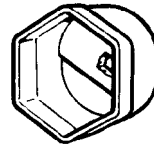
**SPECIAL OR ESSENTIAL TOOLS**

*NOTE: Order tools according to information given in the U.S. SERVICEGARD™ Catalog or in the European Microfiche Tool Catalog (MTC).*

DX,TOOLS -19-20JUL95

Axle nut socket . . . . . JDG665

JDG665 -UN-28APR95



**JDG665**

ZX,TMSPFH000286-19-01MAR94

**SPECIFICATIONS**

Item	Measurement	Specification
Drive pinion	Axial play	0.05—0.13 mm (0.002—0.005 in.)
Shim (steel)	Thickness	0.13 mm (0.005 in.)
Shim (steel)	Thickness	0.25 mm (0.010 in.)
Shim (steel)	Thickness	0.50 mm (0.020 in.)
Shim (plastic)	Thickness	0.08 mm (0.003 in.)

ZX,TMSPFH000287-19-22JUL91

**SPECIFICATIONS**

Item	Measurement	Specification
Nut of flanged axle	Torque	100 N·m (70 lb-ft)
Flanged axle	Rolling drag torque (with lubricated bearing)	7—13 N·m (5—10 lb-ft)
Housing cover attaching screws	Torque	50 N·m (35 lb-ft)
Drive pinion bearing cover attaching screws	Torque	85 N·m (60 lb-ft)
Attaching screws, final drive to front axle	Torque	430 N·m (300 lb-ft)

ZX,TMSPFH000288-19-22JUL91

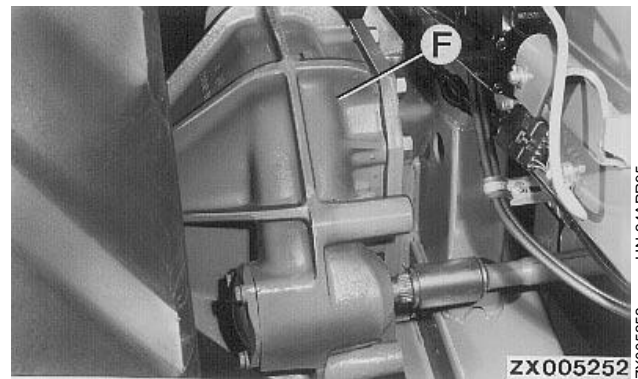
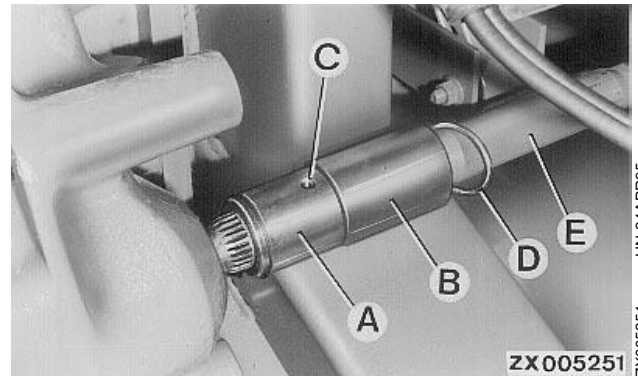
## REMOVE FINAL DRIVE

**⚠ CAUTION: Final drive is heavy. Danger of accidents!**

Loosen snap ring (D) and slide retaining sleeve (B) inward. Remove spring pin (C) and slide connecting sleeve (A) off drive pinion.

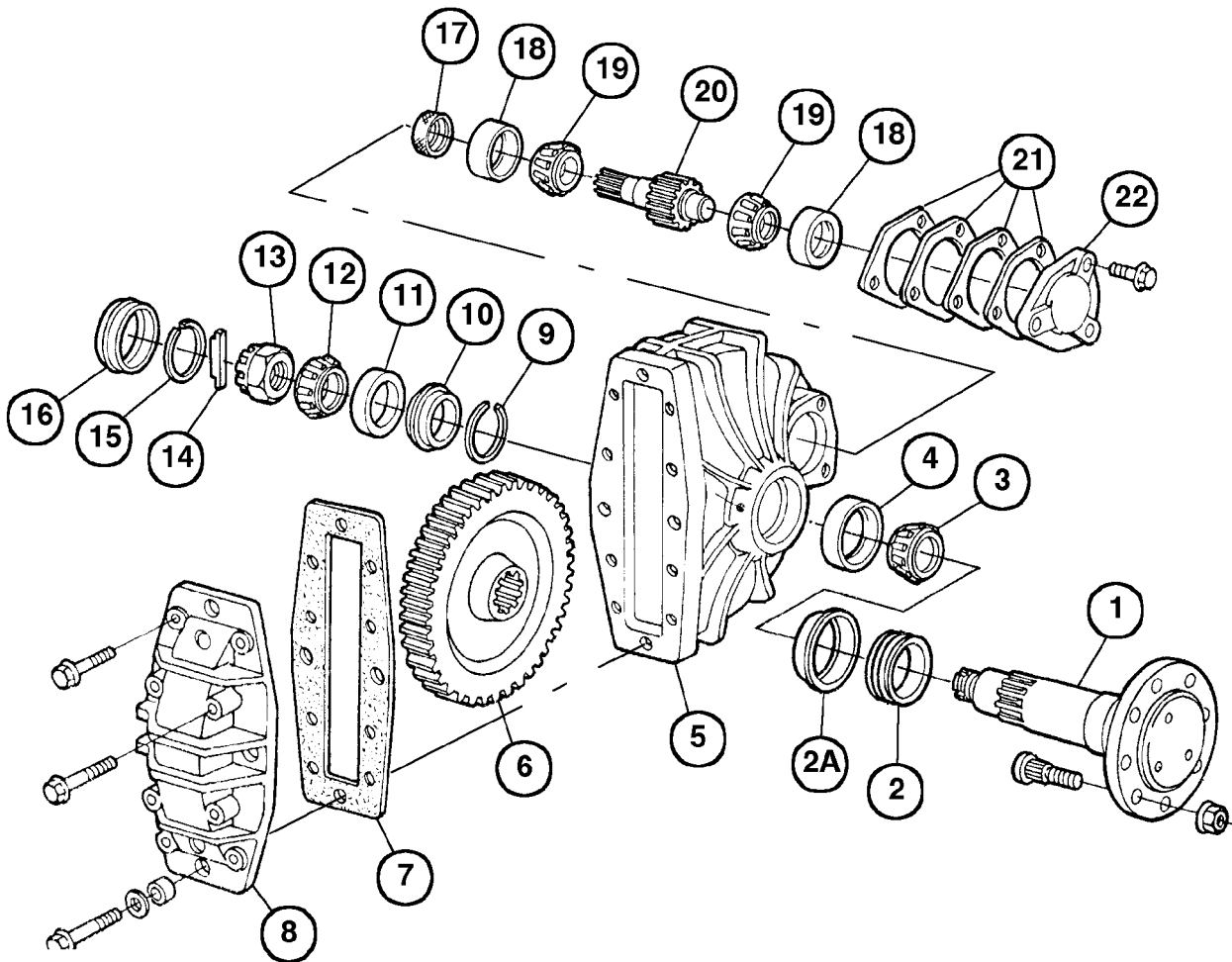
Attach final drive (F) to a suitable hoist. Loosen attaching screws and lift off final drive.

- A—Connecting sleeve
- B—Retaining sleeve
- C—Spring pin
- D—Snap ring
- E—Drive shaft
- F—Final drive



ZX, TMXZC0003230-19-01MAR94

**DISASSEMBLE FINAL DRIVE**



ZX008664

- |                        |                 |                         |                         |
|------------------------|-----------------|-------------------------|-------------------------|
| 1—Flanged axle         | 6—Gear          | 12—Taper roller bearing | 18—Bearing cup          |
| 2—Oil seal             | 7—Gasket        | 13—Nut                  | 19—Taper roller bearing |
| 2A—Oil seal seat       | 8—Housing cover | 14—Key                  | 20—Drive pinion         |
| 3—Taper roller bearing | 9—Snap ring     | 15—Snap ring            | 21—Shim                 |
| 4—Bearing cup          | 10—Spacer       | 16—Cap                  | 22—Bearing housing      |
| 5—Housing              | 11—Bearing cup  | 17—Shaft seal           |                         |

ZX008664 -UN-23FEB96

ZX.TMSPFH000290-19-31JAN96

## REPAIR FINAL DRIVE

Check all parts for serviceability and replace as necessary.

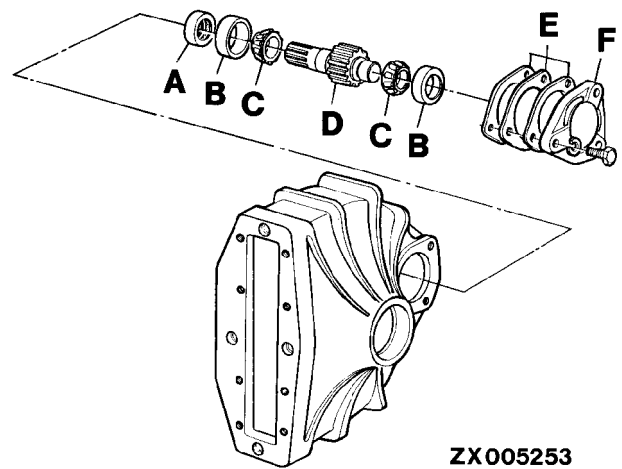
Replace all seals.

ZX.TMSPFH000326-19-22JUL91

## INSTALL DRIVE PINION

Install drive pinion (D) into final drive housing. Use the same number of shims with the same thickness as installed previously.

- A—Seal
- B—Bearing cup
- C—Taper roller bearing
- D—Drive pinion
- E—Shims
- F—Bearing housing



ZX005253 -UN-28APR95

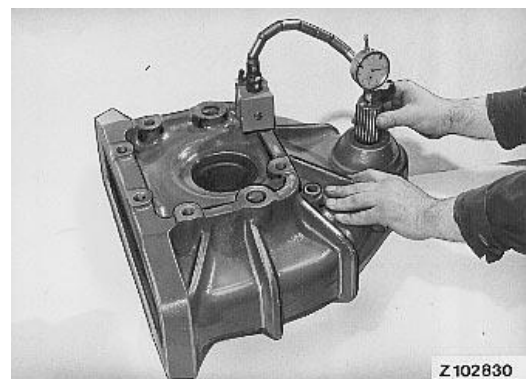
ZX.TMXZCO003231-19-01MAR94

## ADJUST DRIVE SHAFT END PLAY

Drive shaft end play should be 0.05—0.13 mm (0.002—0.005 in.).

Use steel or plastic shims to adjust end play.

When installing required shim pack, use a plastic shim as first and last shim to obtain a sealing effect.



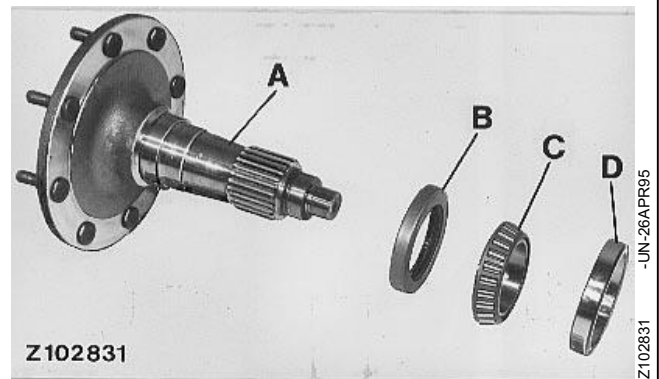
Z102830 -UN-26APR95

ZX.TMSPFH000291-19-15SEP91

### PREASSEMBLE FLANGED AXLE

Slide a new oil seal (B) on flanged axle with sealing lips facing inward. Place taper roller bearing on flanged axle.

- A—Flanged axle
- B—Oil seal
- C—Taper roller bearing
- D—Bearing cup



### INSTALL FLANGED AXLE

Install preassembled flanged axle into housing.

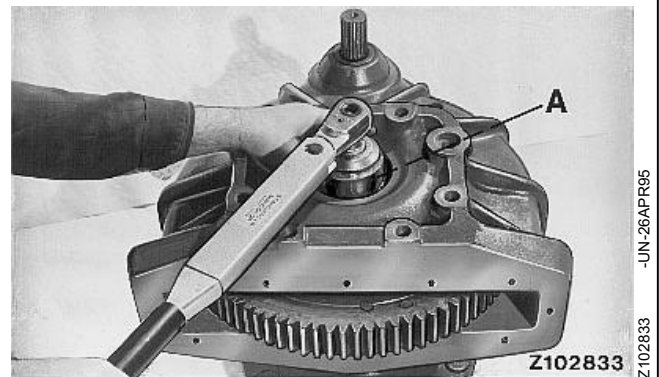
ZX.TMSPFH000292-19-31JAN96

### TIGHTEN FLANGED AXLE

Tighten nut (A) of flanged axle to 100 N·m (70 lb-ft).

Using a lead hammer, lightly tap both sides of flanged axle to seat bearing cups.

Check rolling drag torque. It should be 7—13 N·m (5—10 lb-ft). Adjust rolling drag torque, if necessary, by loosening or tightening nut (A).



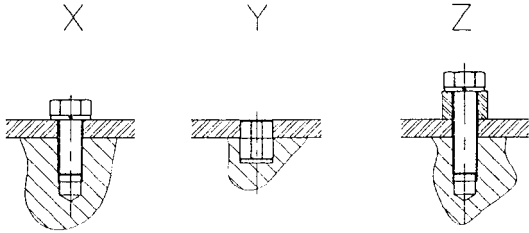
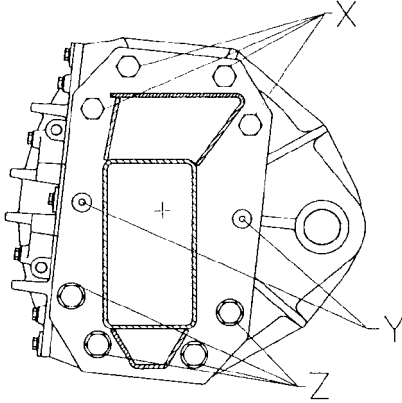
**INSTALL FINAL DRIVE**

Attach final drive to front axle.

Tighten attaching screws to 430 N·m (300 lb-ft).

Fill transmission with oil (refer to Operator's Manual).

- X—Attaching screws without bushings
- Y—Centering bushings
- Z—Attaching screws with bushings



ZX003827

ZX, TMXZCO003233-19-01MAR94

ZX003827 -UN-02MAY95

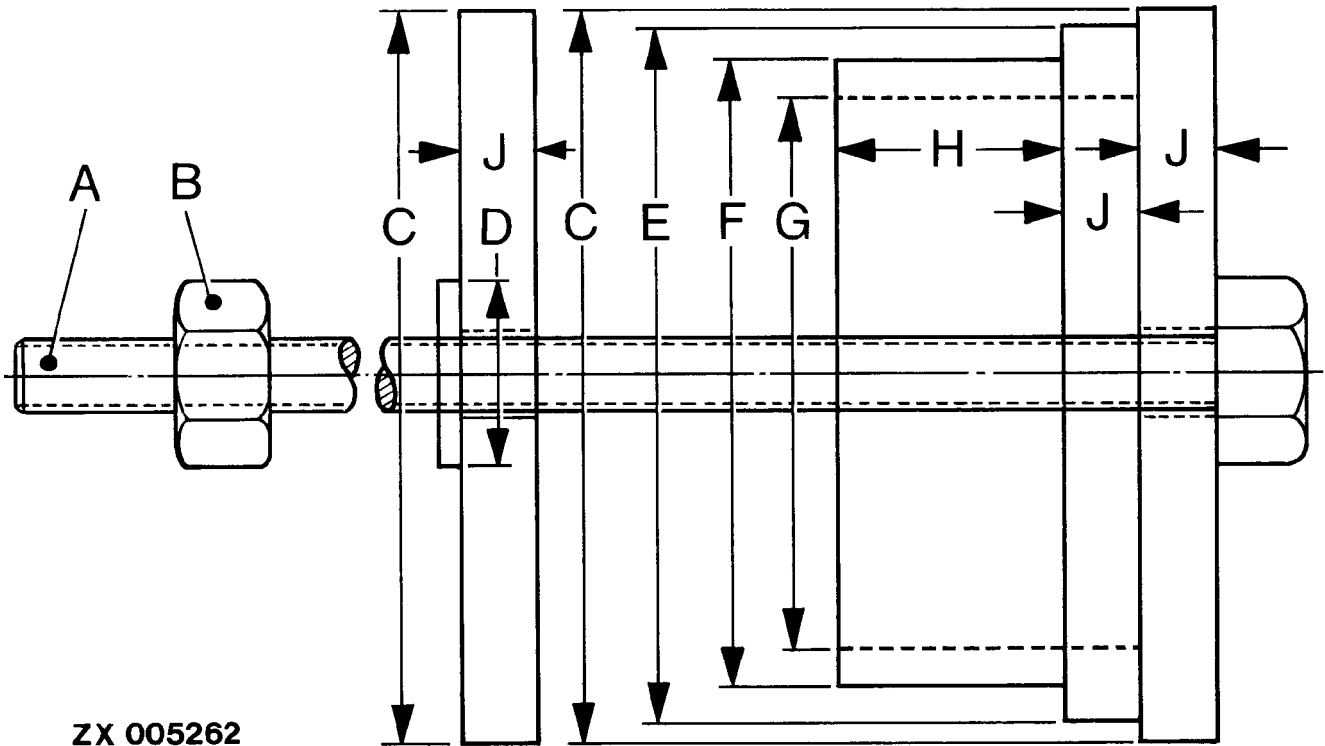


**SPECIAL OR ESSENTIAL TOOLS**

*NOTE: Order tools according to information given in the U.S. SERVICE-GARD™ Catalog or in the European Microfiche Tool Catalog (MTC).*

DX,TOOLS -19-05JUN91

**SPECIAL TOOL (SELF-MANUFACTURED)**



A—M20x450 mm spindle  
B—M20 nut  
C—200 mm (7.87 in.)

D—50x5 mm (1.97x0.2 in.)  
E—191 mm (7.52 in.)

F—173 mm (6.81 in.)  
G—150 mm (5.9 in.)

H—60 mm (2.36 in.)  
J—20 mm (0.79 in.)

Tool for installation of wear bushings in pivot arm housing.

ZX,TMXZCO003267-19-30MAR94

ZX005262 -UN-28APR95

**SPECIFICATIONS**

Item	Measurement	Specification
Pivot arm	Axial play	0.75-1.0 mm (0.03-0.04 in.)
Shim (steel)	Thickness	0.75 and 1.0 mm (0.03 and 0.04 in.)

ZX,TMXZCO003268-19-30MAR94

## SPECIFICATIONS

Item	Measurement	Specification
Pivot arm to final drive, attaching screws	Torque	430 N·m (300 lb-ft)
Control disk to pivot arm, attaching screws	Torque	120 N·m (90 lb-ft)

ZX.TMXZCO003269-19-30MAR94

## REMOVING FINAL DRIVES

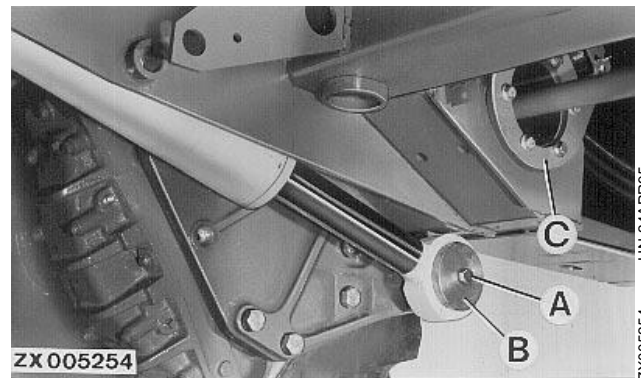
**⚠ CAUTION: Final drive is heavy. DANGER OF ACCIDENTS!**

Remove right-hand front wheel.

Remove screw (A) and washer (B) at piston rod attaching point.

Remove control disk (C).

Pull out final drive with pivot arm.



A—Screw  
B—Washer  
C—Control disk

ZX.TMXZCO003270-19-30MAR94

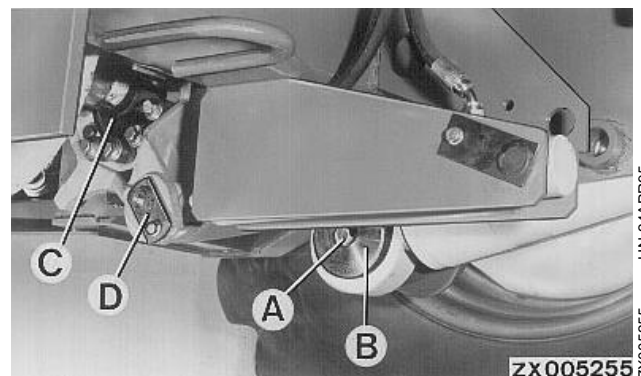
Remove left-hand front wheel.

Remove screw (A) and washer (B) at piston rod attaching point.

Disconnect control cylinder (D).

Remove control disk (C).

Pull out final drive with pivot arm.

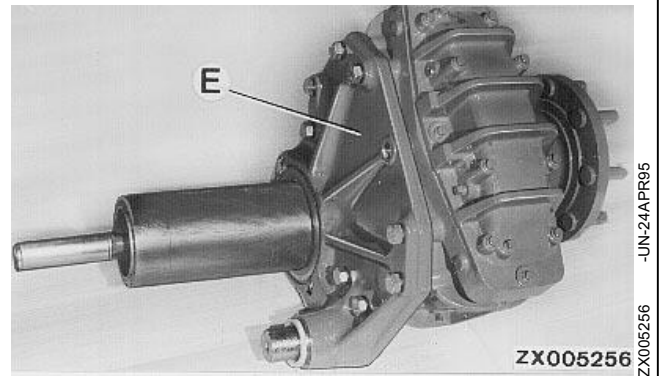


A—Screw  
B—Washer  
C—Control disk  
D—Control cylinder

ZX.TMXZCO003271-19-30MAR94

*Hillmaster Final Drives/Removal*

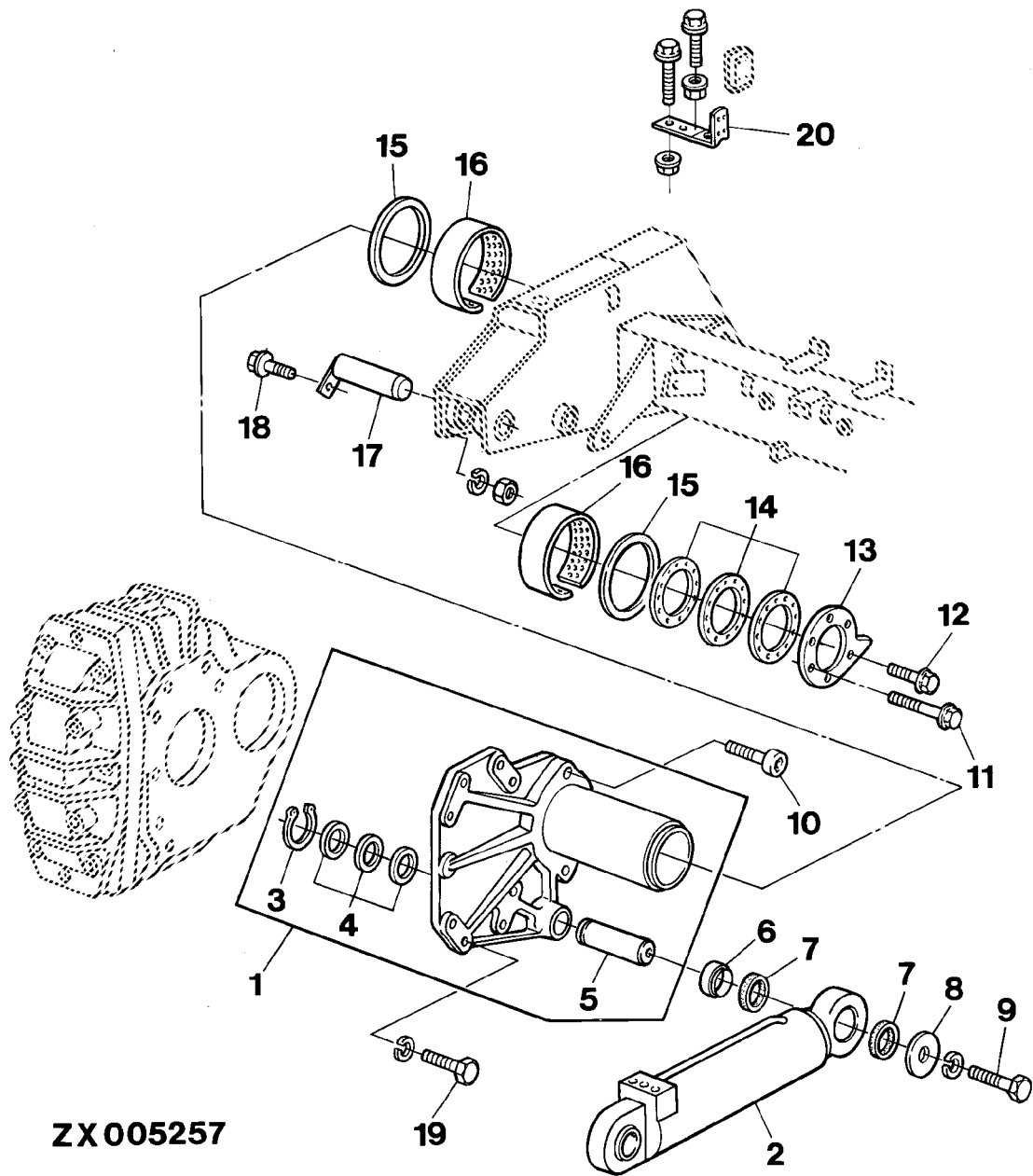
Detach pivot arm (E) from final drive after loosening attaching screws.



ZX.TMXZC0003272-19-30MAR94

ZX005256 -UN-24APR95

**DISASSEMBLING ATTACHING PARTS OF RIGHT-HAND FINAL DRIVE**



**ZX 005257**

- 1—Pivot arm, right-hand
- 2—Pivot cylinder
- 3—Snap ring
- 4—Washers
- 5—Mounting bolt
- 6—Guide

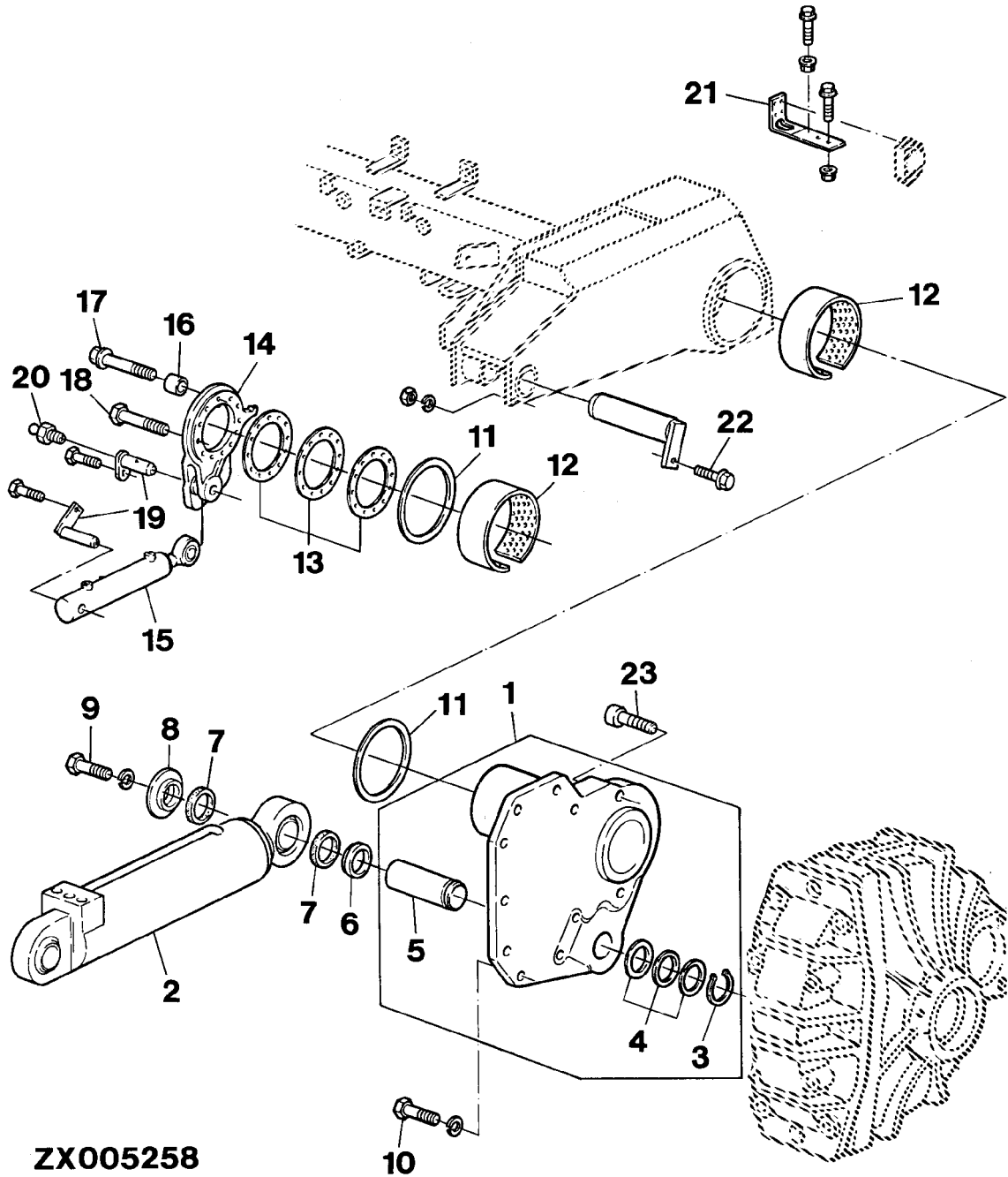
- 7—Seal ring
- 8—Washer
- 9—M16x35 screw
- 10—M22x80 fillister-head screw

- 11—M12x60 screw
- 12—M12x35 screw
- 13—Control disk
- 14—Shims
- 15—Thrust ring

- 16—Brass bushing
- 17—Retaining bolt
- 18—M10x30 screw
- 19—M22x80 screw
- 20—Retainer

ZX005257 -UN-03MAY95

DISASSEMBLING ATTACHING PARTS OF LEFT-HAND FINAL DRIVE



ZX005258

ZX005258 -UN-03MA Y95

- |                        |                                |                     |                                 |
|------------------------|--------------------------------|---------------------|---------------------------------|
| 1—Pivot arm, left-hand | 8—Washer                       | 13—Shims            | 19—Retaining bolt               |
| 2—Pivot cylinder       | 9—M16x35 screw                 | 14—Control disk     | 20—Grease fitting               |
| 3—Snap ring            | 10—M22x80 fillister-head screw | 15—Control cylinder | 21—Retainer                     |
| 4—Washers              | 11—Thrust ring                 | 16—Bushing          | 22—M10x30 screw                 |
| 5—Mounting bolt        | 12—Brass bushing               | 17—M12x60 screw     | 23—M22x160 fillister-head screw |
| 6—Guide                |                                | 18—M12x50 screw     |                                 |
| 7—Seal ring            |                                |                     |                                 |

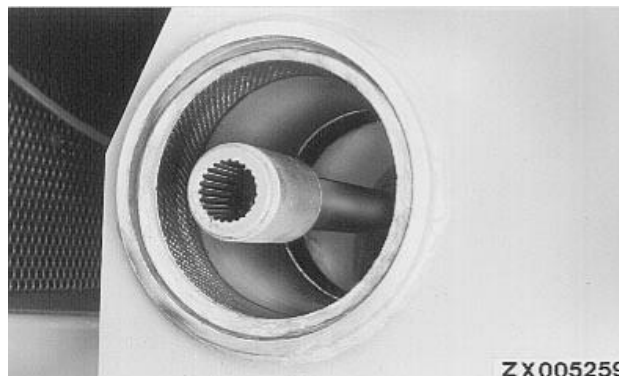
## DISASSEMBLING FINAL DRIVES

For information on disassembly and repair of final drives, refer to Group 20 of this Section.

ZX.TMXZCO003274-19-30MAR94

## REPAIRING SWING ARM BEARING

Check brass bushing in pivot bearing for wear and replace, if necessary. Use the special tool to install a new bushing.



ZX.TMXZCO003275-19-30MAR94

## INSTALLING FINAL DRIVES

Attach final drive to pivot arm. Torque attaching screws to 430 N·m (300 lb-ft).

Grease brass bushings in pivot bearing and install complete pivot arm.

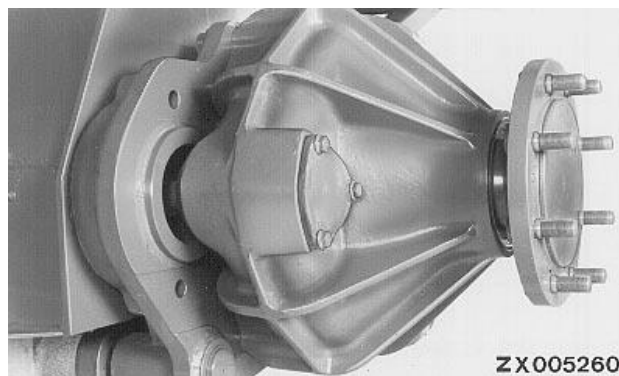
Refill transmission with oil (see Operator's Manual).

Adjust axial play to 0.75 mm (0.03 in.) by adding shims.

Install control disk so that end switch is actuated with machine lowered.

Install swing cylinder and tighten screw to 120 N·m (90 lb-ft).

On the left-hand side, attach control cylinder to control disk.

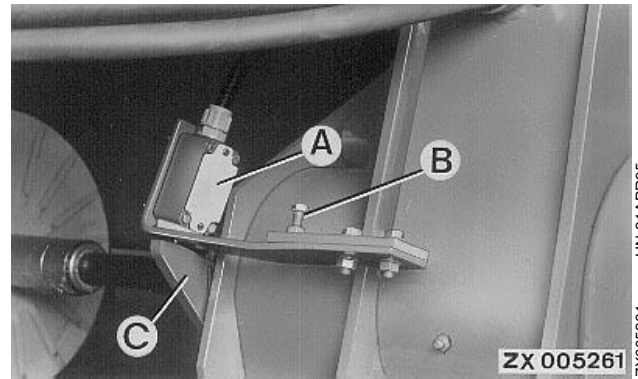


ZX.TMXZCO003276-19-30MAR94

## ADJUSTING END SWITCH

For fine adjustment of end switch, tilt combine manually to one side. On the opposite side, adjust retainer of end switch (A) by means of screw (B) so that the switch interrupts power supply. Afterwards, turn screw (B) 2/3 turns further and secure with lock nut. Adjust end switch on the other side in the same way.

- A—End switch
- B—Adjusting screw
- C—Control disk



ZX, TMXZC0003277-19-30MAR94





# Group 25 Hydrostatic Ground Speed Drive

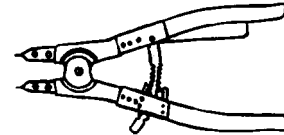
## SPECIAL OR ESSENTIAL TOOLS

*NOTE: Order tools according to information given in the U.S. SERVICE-GARD™ Catalog or in the European Microfiche Tool Catalog (MTC).*

DX,TOOLS -19-05JUN91

Snap Ring Pliers . . . . . JDG114  
Remove internal snap rings.

H40188 -UN-12JAN89



ZX,TMXZC0002387-19-25NOV92

Seal Remover . . . . . JDG351  
Remove rotating seal.

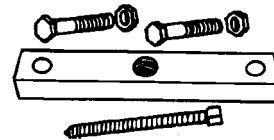
H40189 -UN-15JUN89



1401,5020,B -19-12SEP91

Press Assembly . . . . . JDG109  
Install bearings.

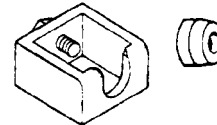
H40187 -UN-15JUN89



1401,5020,C -19-12SEP91

Bearing Service Set . . . . . JDG96  
Pull bearings on motor and pump.

H40440 -UN-15MAR89



1401,5020,D -19-12SEP91

Hydrostatic Transmission  
Tool Kit . . . . . JDG630  
To repair hydrostatic pump and motor.

1401,5020,FD -19-12SEP91

## SERVICE EQUIPMENT AND TOOLS

*NOTE: Order tools from the U.S. SERVICEGARD™ Catalog or from the European Microfiche Tool Catalog (MTC). Some tools may be available from a local supplier.*

Name	Use
D15032 Vacuum Pump	To perform service work without draining reservoir.
D01209AA Slide Hammer	To remove bearing cups.
D01399AA Slide Hammer	To remove pump trunnions.
D01290AA Puller and D01243AA Puller	To remove bearing cones.
D17525C1 Magnetic Base and D17526C1 English or D17527C1 Metric Dial Indicators	To measure shaft end play.
D17511C1 Micrometer	To measure swashplate end play.
Feeler Gauge	To adjust trunnion shim pack.
Spring Scale	To check swashplate movement.
*Cylinder Barrel Clamping Tool	To remove and install hydrostatic pump cylinder barrel.

\*Fabricated Tool, dealer made.

1401,5020,E -19-12SEP91

## OTHER MATERIAL

Number	Name	Use
T43512	Thread Lock and Sealer (Medium Strength)	Apply to threads of piston shoulder bolts.

ZX, TMXZCO002388-19-25NOV92

**SPECIFICATIONS**

Item	Measurement	Specification
Hydrostatic Motor:		
Motor . . . . .	Approximate Weight . . . . .	40 kg (90 lb)
Motor Housing-to-Cover Cap Screws . . . . .	Torque . . . . .	47 N·m (35 lb-ft)
Motor-to-Mount Cap Screws . . . . .	Torque . . . . .	115 N·m (85 lb-ft)
Motor Shaft . . . . .	End Play . . . . .	0.05-0.18 mm (0.002-0.007 in.)
Valve Block-to-Motor Cap Screws . . . . .	Torque . . . . .	47 N·m (35 lb-ft)
High Pressure Relief and Low Pressure Valve-to-Valve Block . . . . .	Torque . . . . .	163-197 N·m (120-145 lb-ft)
Shuttle Valve Plugs . . . . .	Torque . . . . .	92-111 N·m (68-72 lb-ft)
Motor Cover-to-Housing Cap Screws . . . . .	Torque . . . . .	38-46 N·m (28-34 lb-ft)
Hydrostatic Pump:		
Pump . . . . .	Approximate Weight . . . . .	68 kg (160 lb)
Pump-to-Engine Gear Case Cap Screws . . . . .	Torque . . . . .	130 N·m (96 lb-ft)
Pump Drive Shaft . . . . .	End Play . . . . .	0.05-0.18 mm (0.002-0.007 in.)
Pump Trunnion Cap Screws . . . . .	Torque . . . . .	38-46 N·m (28-34 lb-ft)
Shoulder Bolt-to-Servo Piston Cap Screw . . . . .	Torque . . . . .	22-26 N·m (192-228 lb-in.)
Swashplate Movement . . . . .	Force . . . . .	9-22 N (2-5 lb force)
Swashplate Play . . . . .	Movement . . . . .	0.013 mm (0.0005 in.) Parallel 0.03 mm (0.001 in.) Rock

Continued on next page

*Hydrostatic Ground Speed Drive/Serial Number Plate*

Item	Measurement	Specification
Valve-to Pump Body Cap Screws . . . . .	Torque . . . . .	22-26 N·m (192-228 lb-in.)
Pump Mounting Plate Cap Screws . . . . .	Torque . . . . .	38-46 N·m (28-34 lb-ft)
Cover-to-Pump Cap Screws . . . . .	Torque . . . . .	38-46 N·m (28-34 lb-ft)
Charge Pump-to-Pump Cover Cap Screws . . . . .	Torque . . . . .	22-26 N·m (192-228 lb-in.)
Control Valve-to-Pump Cap Screws . . . . .	Torque . . . . .	22-26 N·m (192-228 lb-in.)
Low Pressure Relief Valve . . . . .	Torque . . . . .	163-197 N·m (120-145 lb-ft)
Cover-to-Housing Cap Screws . . . . .	Torque . . . . .	22-26 N·m (192-228 lb-in.)

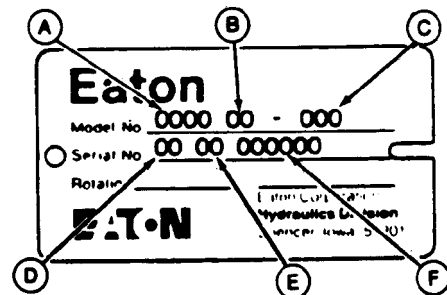
ZX.TMXZCO002505-19-01DEC92

### SERIAL NUMBER PLATE

A serial number plate is on the pump and motor.

List the entire serial number in all correspondence. This number provides the factory with valuable information when communicating with the manufacturer concerning service. It also allows warranty claims to be matched with returned units.

Be certain to include the entire serial number on the return tag with the unit.



- A—Displacement (cu. in./rev.) as 0033 = 3.3 CIR
- B—Type of Product: as
  - 21 = Variable Displacement Pump
  - 31 = Fixed Displacement Motor
  - 41 = Variable Displacement Motor
- C— Specific Unit Configuration
- D—Month of Manufacture
- E—Year of Manufacture
- F—Specific Serial Number of Unit

H41401 -UN-06NOV89

1401,5020,FE -19-12SEP91

## **CLEAN HYDROSTATIC MOTOR**

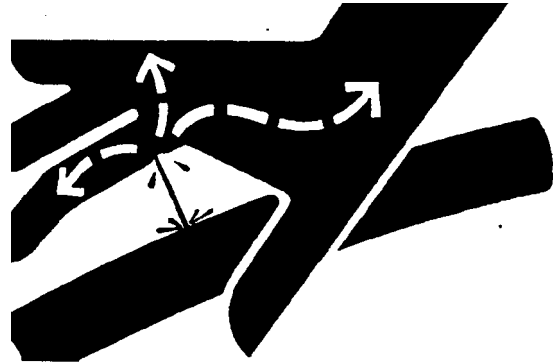
**IMPORTANT: Always use clean tools and keep open surfaces free of dirt and foreign matter. Cleanliness is essential when servicing the hydrostatic system.**

Clean outside of motor thoroughly. Either steam clean or wash with solvent. Clean surrounding area so dirt will not get into system when hoses and line are disconnected.

1401,5020,J -19-12SEP91

## REMOVE AND INSTALL HYDROSTATIC MOTOR

**!** **CAUTION:** Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.



If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury may call the Deere & Company Medical Department in Moline, Illinois, or other knowledgeable medical source.

**IMPORTANT:** When disconnecting a line, hose, or transfer tube from a hydrostatic component, always mark end and port from which it was removed so that it can be connected to proper port when reassembling.

Also, when disconnecting a line, hose, or transfer tube from a component, always plug them to keep dirt out of system. Use a plastic plug or plastic bag - never a cloth. Cloth contains lint which can damage hydrostatic system.

High pressure hoses have clamp-type bolted fittings with O-rings. When this type of fitting is disassembled, inner surfaces must be cleaned thoroughly and new O-rings installed. This is to insure a tight seal and reduce possibility of leakage.

1. Stop engine. Operate hydraulic controls to release pressure.
2. Install D15032 vacuum pump on reservoir or drain reservoir. Approximate capacity is 34L (36 qt.).

## Hydrostatic Ground Speed Drive/Disassemble Hydrostatic Motor

3. Disconnect lines (A). Plug lines or cover with plastic bags.

**CAUTION:** The approximate weight of motor is 40 kg (90 lb).

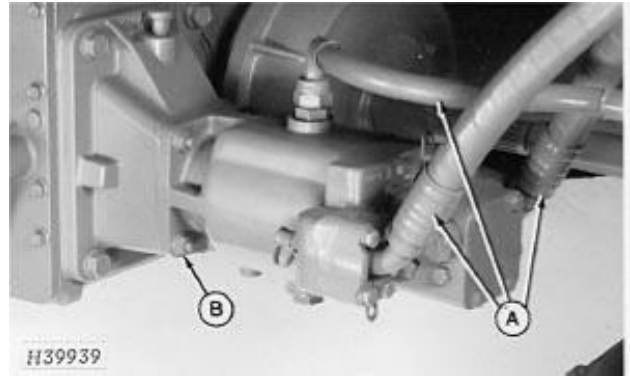
4. Remove four cap screws (B) and pull motor away from transmission mount.

5. Repair motor as necessary.

6. Attach motor to mount with four cap screws (B). Tighten to 115 N·m (85 lb-ft).

7. Replace O-rings in hoses (A). Connect hoses to motor.

8. Check oil levels. Start engine and bleed system. (See procedure in this group.)



H39939 -UN-10OCT88

1401.5020,L -19-12SEP91

## DISASSEMBLE HYROSTATIC MOTOR

1. Set motor on a sleeve, at least 50 mm (2 in.) high or wooden support.



N32841 -UN-21SEP88

ZX,TMXZCO002506-19-01DEC92

Hydrostatic Ground Speed Drive/Disassemble Hydrostatic Motor

**IMPORTANT: Do not drop block on motor end cover while removing.**

2. Remove valve block.



1401,5020,N -19-12SEP91

*NOTE: Clean dirt out of seal area using a spray or solvent prior to disassembly. Do not use a cloth or brush.*

3. Remove internal snap ring using JDG114 Snap Ring Pliers.



ZX,TMXZCO002391-19-25NOV92



Hydrostatic Ground Speed Drive/Disassemble Hydrostatic Motor

4. Remove stationary seal assembly using 1/4 x 20 UNC bolt (A). DO NOT scratch finished surfaces.



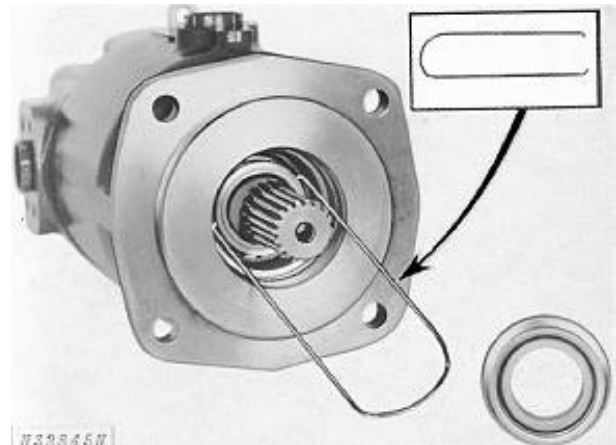
N38074 -UN-29SEP88

1401,5020,P -19-12SEP91

5. Remove rotating seal using JDG351 Seal Remover.

**IMPORTANT: DO NOT mark or damage inner surface of shaft seal or outer surface of housing seal. Wrap shaft seal and housing seal in clean paper to protect finished surfaces.**

6. Remove O-ring if it did not come with rotating seal.



N32845 -UN-21SEP88

1401,5020,Q -19-12SEP91

## Hydrostatic Ground Speed Drive/Disassemble Hydrostatic Motor

7. Internal parts are spring loaded. To avoid internal damage, remove six of eight bolts securing end cover to motor housing, leaving two opposite bolts tight. Gradually and evenly remove those two bolts. End cover should raise. If not, carefully tap end cover from housing.

8. Carefully remove end cover (A). If valve plate (B) is stuck to end cover, hold in place and remove with cover. If not allow valve plate to drop.

- A—End Cover
- B—Valve Plate
- C—Gasket
- D—Bearing Plate



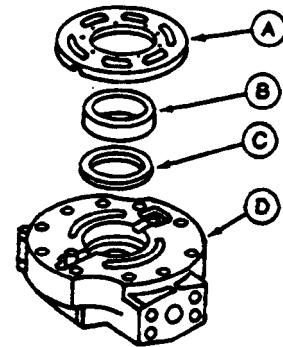
N32847 -UN-21SEP88

1401,5020,T -19-12SEP91

9. Remove bearing cup (B) from end cover (D). Use a slight twisting motion. Bearing cup is a slip fit in end cover.

10. Remove shims (C), from end cover. Do not misplace shims as they are used to adjust shaft bearing end play of motor output shaft.

- A—Valve Plate
- B—Bearing Cup
- C—Shims
- D—End Cover



N37727 -UN-23JAN89

1401,5020,U -19-12SEP91

Hydrostatic Ground Speed Drive/Disassemble Hydrostatic Motor

**IMPORTANT: Handle bearing and valve plates with extreme care. Plates are lapped to extremely close tolerances for flatness.**

11. If valve plate is not removed with end cover, insert a small screwdriver in oil drain slots of valve plate. Carefully pry valve plate away from bearing plate.

12. Insert a small screwdriver in oil drain slot of bearing plate. Carefully lift plate from cylinder barrel.

13. Wrap both parts separately in clean paper.



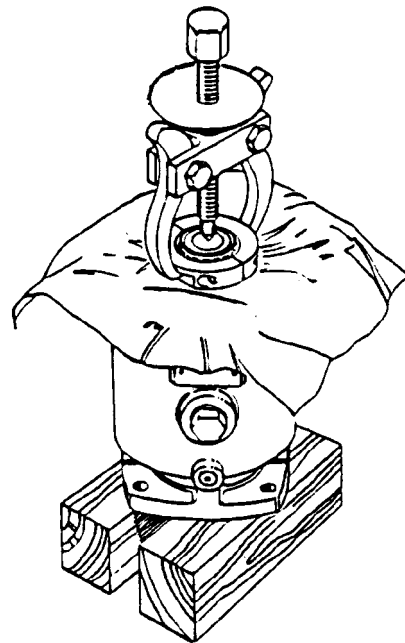
-UN-21SEP88

N32848

1401,5020,V -19-12SEP91

14. Place a small block under motor shaft to raise it. Protect cylinder barrel with a clean cloth or paper before pulling bearing.

15. Use low clearance puller from JDG630 Hydrostatic Transmission Tool Kit to remove end cover bearing cone.



-UN-11NOV89

H41407

1401,5020,W -19-12SEP91

*Hydrostatic Ground Speed Drive/Disassemble Hydrostatic Motor*

16. Lay motor on its side and remove cylinder barrel (A) and shaft assemblies (B) as complete units. If pistons do not come out with barrel, remove separately. Wrap parts separately in clean paper.



1401.5020,X -19-12SEP91

## INSPECT PARTS

*NOTE: Some internal parts of the motor and pump are similar in appearance and function; others have the same part number.*

Most part failures are identifiable by inspecting the part and comparing it to the following information to determine the suspected cause of failure.

(Worn) This condition is usually indicated by a smooth but definite wear pattern in or across finished surfaces. A worn condition is usually caused by a lack of lubrication or very fine abrasive contamination suspended in the fluid.

(Scored) This condition is usually indicated by fine scratch marks in or across finished surfaces. Scoring usually is caused by a lack of or improper lubrication or possible abrasive contamination suspended in the fluid.

(Scratched) This condition is usually indicated by small scratches in or across finished surfaces. It is usually caused by abrasive contamination suspended in the fluid.

(Grooved) This condition is usually indicated by grooves cut in or across finished surfaces. Grooves are usually caused by a lack of lubrication or large particle contamination suspended in the fluid.

(Discoloration) This condition is usually indicated by a noticeable change in color on the finished surfaces. Discoloring usually is caused by a lack of or improper lubrication.

Excessive fluid temperature may also cause this condition by increasing the lubricating film loss between rotating mating parts.

(Smearred) This condition is usually indicated by the presence of bronze embedded in or across finished mating surfaces. Smearing is usually caused by a lack of or improper lubrication or possible abrasive contamination suspended in the fluid. Excessive fluid temperature may also cause this condition by the lubricating fluid film loss between rotating mating parts.

(Galled) This condition is usually indicated by the presence of material that has been removed from one surface, normally by friction, and sometimes adhered to its mating component surface. Galling usually is caused by a lack of or improper lubrication. Excessive fluid temperature may also cause this condition by increasing the lubricating fluid loss between rotating mating parts.

(Eroded) This condition is usually indicated by erosion (pitted appearance) or removal of material from finished surfaces. Eroding is usually caused by cavitation or voids in the fluid.

(Rolled) This condition is usually indicated by the extreme outer edge of the finished surface being deformed or rolled over. Rolled usually is caused by a lack of lubrication to the edges of these finished surfaces when subjected to over speeding or block lift conditions.

## LACK OF LUBRICATION

The following terminology will be used for determining probable causes of system and/or part failure.

Lack of lubrication is probably the most common, yet misinterpreted terminology associated with failure analysis of system and/or part failures. It usually is a result of condition(s) that create an insufficient oil film required to lubricate rotating part surfaces.

Without the proper oil film, rotating metal-to-metal surfaces create friction and excessive temperatures that usually cause premature part failures.

Depending on the severity of the oil film loss and friction, rotating critical surfaces will become severely worn, smeared, galled or noticeably discolored.

1401,5020,AC -19-12SEP91

## ABRASIVE CONTAMINATION

Abrasive contamination is probably the second most common, yet identifiable terminology.

This condition usually is system-related by the introduction of abrasive foreign particles that damage the critical surface areas as they pass through the system.

These abrasive particles usually are larger than the lubricating oil film thickness required to lubricate part surfaces.

A lack of lubrication may also be created by abrasive contamination that creates excessive leakage passages between critical rotating surfaces.

Depending on the size and amount of abrasive contamination passing through or contacting parts, the rotating surfaces will become worn, scored, scratched or grooved.

1401,5020,AD -19-12SEP91

## CAVITATION

Cavitation is sometimes confused with the lack of lubrication which usually is the result of, but not the cause of cavitation.

This condition usually is created by the presence of air suspended in the oil.

Excessive amounts of air in the oil will not provide an adequate film required to properly lubricate.

Partial or total restriction of the pump inlet will also create cavitation.

Depending on the severity of cavitation, rotating surfaces will become eroded, scored, smeared or galled.

1401,5020,AE -19-12SEP91

## Hydrostatic Ground Speed Drive/Overspeeding

Excessive oil temperature is sometimes the result or lack of lubrication, but not necessarily the direct cause. This condition usually is system-created by improper system cooling, high pressure oil passing over relief valves and excessive closed loop leakage. Excessive oil temperatures usually will decrease the fluid viscosity or lubrication oil film thickness required to lubricate rotating surfaces.

Depending on the condition or severity of oil temperature, rotating surfaces usually will become scored, smeared, galled or discolored.

1401,5020,AF -19-12SEP91

The most common cause of improper lubrication is created by chemical contaminants present in the hydraulic fluid, such as water. Water not only creates improper lubrication to rotating surfaces, but also creates undesirable chemical changes to the oil and mating surfaces.

Depending on the severity of the improper lubrication used, component parts usually will become discolored, scored, smeared, or galled.

1401,5020,AG -19-12SEP91

### **OVER SPEEDING**

Over speeding is sometimes associated with the lack of lubrication, which usually is the result of, but not necessarily the direct cause of over speeding.

Hydrostatic transmissions by design, are subject to operate within certain speed limitations. When units are operated above their design limitations, certain parts separate or tip, creating excessive loading to small areas of these parts.

This small area usually is located on the outer edge of rotating parts, and because of the excessive loading subject to this area, the lubrication is removed also. Depending on the severity of over speeding that creates this excessive loading and loss of lubrication to rotating parts, a rolled, scored, smeared or galled condition will occur.

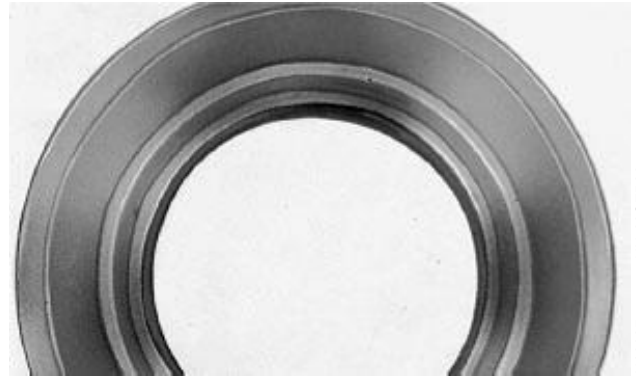
1401,5020,AH -19-12SEP91

## INSPECT SHAFT SEAL

The shaft seal assembly is a pressure-type mechanical seal that consists of two mating parts, a bronze rotating half and a steel stationary half.

To properly seal the shaft, the fine lapped sealing surface located on each seal half must be smooth, flat, and free of all nicks, burrs, and scratches.

The scoring across the sealing surfaces indicates the seal was subject to abrasive contamination.



N36987 -UN-22SEP88

1401,5020,AI -19-12SEP91

The scoring marks across the sealing surface indicate that it was subject to abrasive contamination.



H50349 -UN-20JAN89

1401,5020,AJ -19-12SEP91

The smearing around the center of the sealing surface indicates it was subject to a lack of/or insufficient lubrication. This condition usually is a result of insufficient oil film to properly lubricate rotating part mating surfaces.

The discoloration on this bronze seal half indicates the possibility of excessive oil temperatures.

Water not only creates an improper lubrication condition, but will also cause undesirable chemical changes to the oil. This chemical change to the oil will cause the bronze parts to discolor or turn dark.



H50350 -UN-20JAN89

1401,5020,AK -19-12SEP91



## INSPECT THRUST PLATE

The smearing on this thrust plate surface indicates it was subjected to a lack of/or insufficient lubrication. This condition usually is a result of insufficient oil film required to properly lubricate rotating part surfaces.

This thrust plate may be reused by installing it with the smeared side toward the swashplate, only if the thrust plate is not damaged in any way. The other finished side must be smooth, flat and free of any nicks, burrs, and scratches.

1401,5020,AL -19-12SEP91

The scoring marks on this thrust plate indicate it was subjected to abrasive contamination. This contamination may have been suspended in the oil.



H50352  
-UN-20JAN89

1401,5020,AM -19-12SEP91

The discoloration on this thrust plate indicates it was subjected to extremely high temperature. This condition is a result of very high oil temperature.

This thrust plate should not be reversed and reused because the excessive temperature created bends.



H50353  
-UN-20JAN89

1401,5020,AN -19-12SEP91

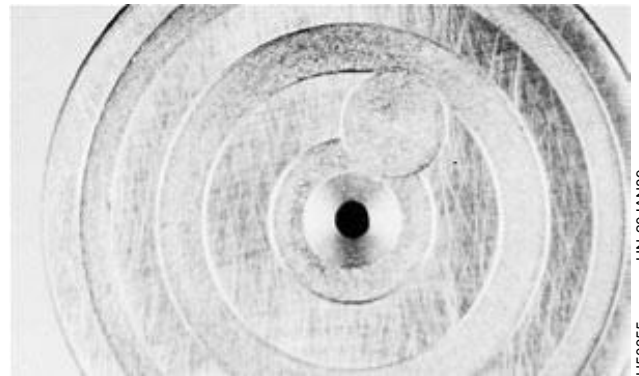
### INSPECT FIXED SWASHPLATE

The scoring on this fixed swashplate indicates it was subjected to abrasive contamination.

1401,5020,AO -19-12SEP91

### INSPECT PISTON SLIPPER

The small scratch marks across this slipper face indicates that it was subjected to some very fine abrasive.



H50355  
-UN-20JAN89

1401,5020,AP -19-12SEP91

The scoring on this piston slipper face indicates it was subjected to abrasive contamination. A small particle of contamination is embedded into the balance land of this piston slipper.



H50356  
-UN-20JAN89

1401,5020,AQ -19-12SEP91

The galling around the underside of this slipper indicates it was subjected to an over speeding condition.

Over speeding usually causes the piston slipper to tip and scrape against the edge of its mating part, creating galling.



H50357  
-UN-20JAN89

1401,5020,AR -19-12SEP91

*Hydrostatic Ground Speed Drive/Inspect Piston Retainer*

The smearing across this slipper indicates it was subjected to a severe lack of or insufficient lubrication.

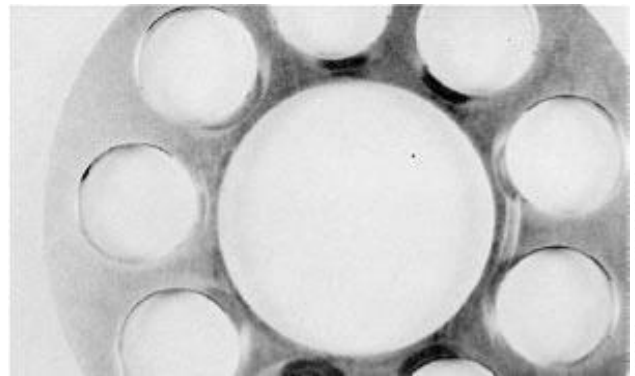


H50358  
-UN-20JAN89

1401,5020,AS -19-12SEP91

**INSPECT PISTON RETAINER**

The scoring around the nine holes and center hole indicates it was subjected to a fine abrasive contamination.



H50359  
-UN-20JAN89

1401,5020,AT -19-12SEP91

The scoring around the nine holes indicates it was subjected to fine abrasive contamination.

The galling on the center hole usually is created by a lack of lubrication.

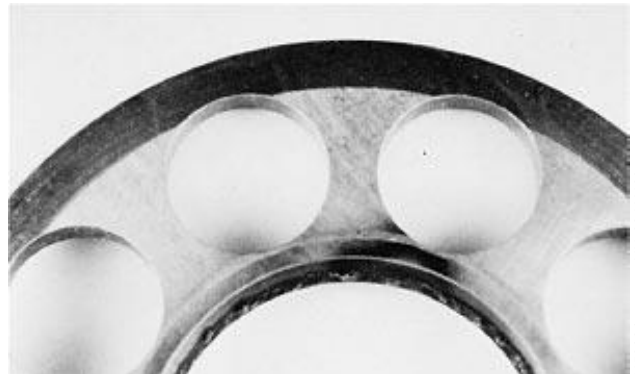


H50360  
-UN-20JAN89

1401,5020,AU -19-12SEP91

The slight scoring around the nine piston slipper holes indicates it was subjected to a fine abrasive.

The galling on the center hole usually is created by a lack of lubrication.



H50361  
-UN-20JAN89

1401,5020,AV -19-12SEP91

## Hydrostatic Ground Speed Drive/Inspect Bearing Plate

The discoloration on this retainer indicates it was subjected to possible improper lubrication or excessive heat.



1401,5020,AW -19-12SEP91

H50362  
-UN-20JAN89

### INSPECT CYLINDER BLOCK

The scoring in these cylinder barrel bushings indicates it was subjected to abrasive contamination. This contamination between the cylinder bushing and pistons caused two of the bushings to be pulled out of the cylinder barrel.

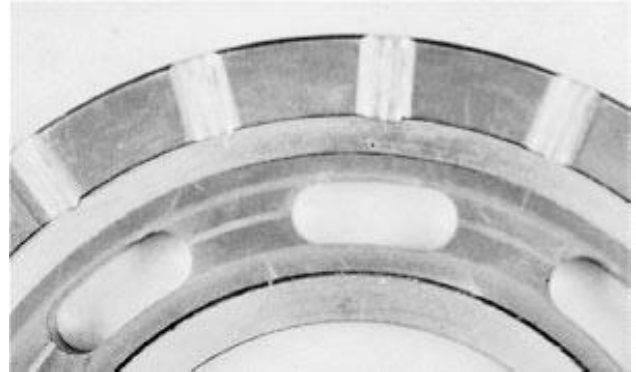


1401,5020,AZ -19-12SEP91

H50365  
-UN-20JAN89

### INSPECT BEARING PLATE

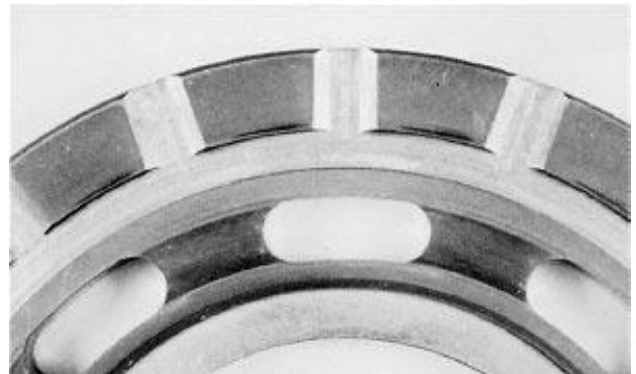
The grooving between the port or kidneys on this bearing plate indicates it was subjected to particle contamination.



1401,5020,BA -19-12SEP91

H50366  
-UN-20JAN89

The discoloration between the port or kidneys indicates it was possibly subjected to an improper oil. This condition most likely was caused by water in the system. Water under pressure tends to discolor bronze parts.



1401,5020,BB -19-12SEP91

H50367  
-UN-20JAN89

*Hydrostatic Ground Speed Drive/Inspect Bearing Plate*

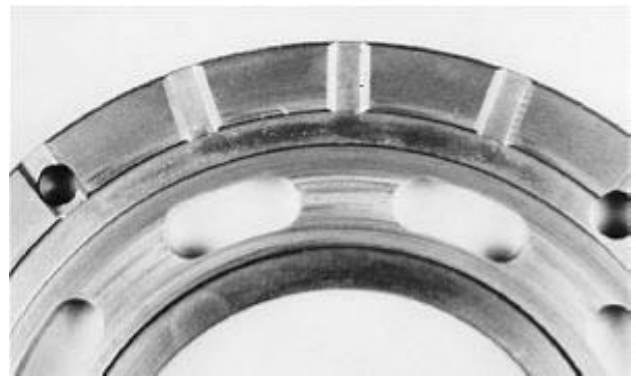
The discoloration and grooving between the port or kidneys indicates it was not only subjected to improper fluid but also to particle contamination.



1401,5020,BC -19-12SEP91

H50368  
-UN-20JAN89

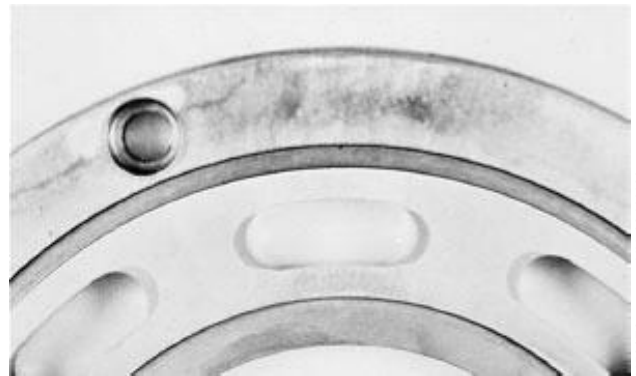
The smearing on the balance lands and slight erosion between the port or kidneys indicates it was subjected to a lack of or improper lubrication or possibly cavitation.



1401,5020,BD -19-12SEP91

H50369  
-UN-20JAN89

The corrosion appearance on the back side of the plate indicates possible cavitation. This condition usually is the result of the bearing plate being separated or pulled off its mating part in a fluttering motion.



1401,5020,BE -19-12SEP91

H50370  
-UN-20JAN89

The smearing on the balance lands, inner bearing support area and erosion of the leading edge of the port or kidneys indicates it was subjected to a lack of or improper lubrication or cavitation.

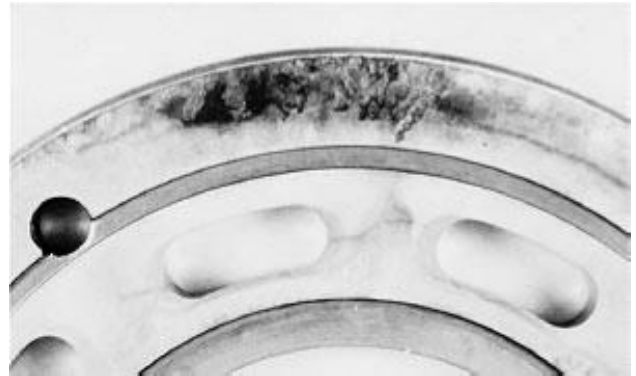


1401,5020,BF -19-12SEP91

H50371  
-UN-20JAN89

*Hydrostatic Ground Speed Drive/Inspect Bearing Plate*

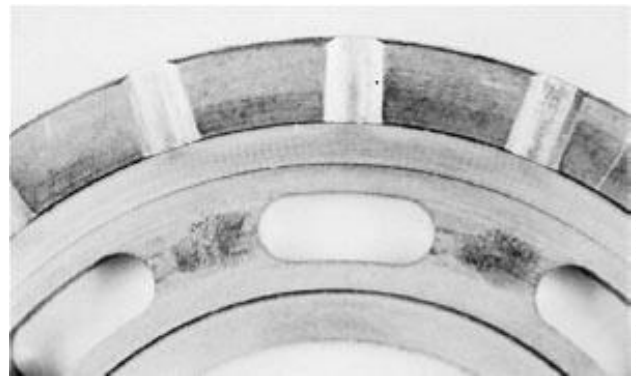
The corrosion appearance on the back side of the plate indicates possible extended cavitation.



H50372  
-UN-20JAN89

1401,5020,BG -19-12SEP91

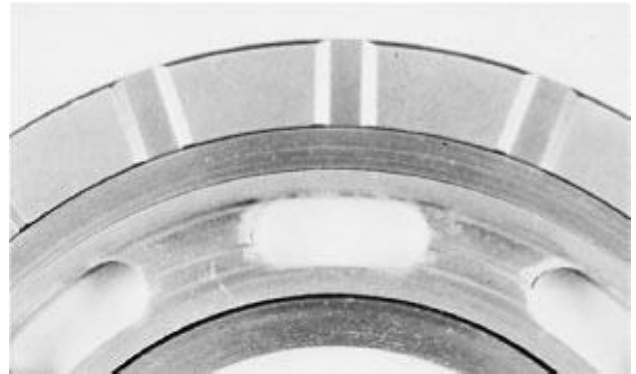
The erosion noted between the port or kidneys indicates it was subjected to cavitation.



H50373  
-UN-20JAN89

1401,5020,BH -19-12SEP91

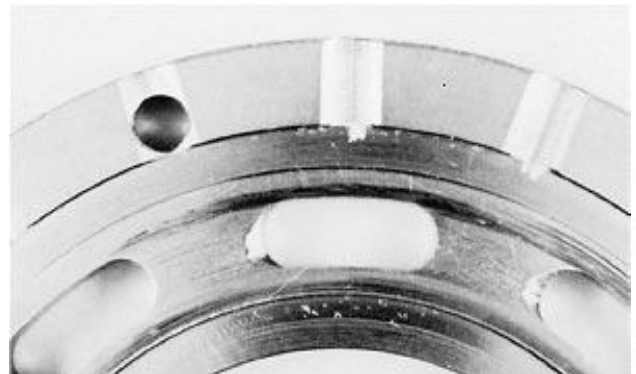
The erosion on the leading edges and grooves between the port or kidneys indicates it was subjected to cavitation and particle contamination.



H50374  
-UN-20JAN89

1401,5020,BI -19-12SEP91

The erosion on the leading edges and in between the port or kidneys indicates it was subjected to extended cavitation. The smearing on the inner and outer balance lands indicates a possible lack of or insufficient lubrication.

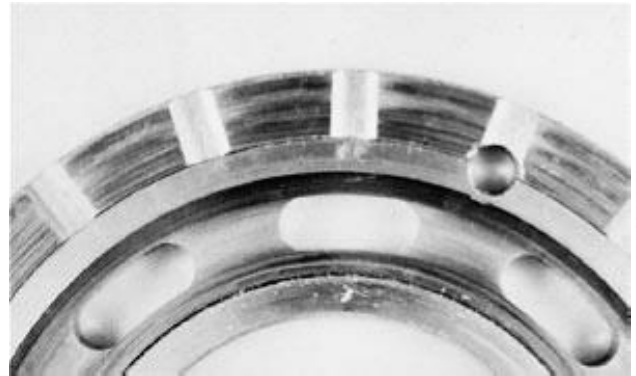


H50375  
-UN-20JAN89

1401,5020,BJ -19-12SEP91

*Hydrostatic Ground Speed Drive/Inspect Valve Plate*

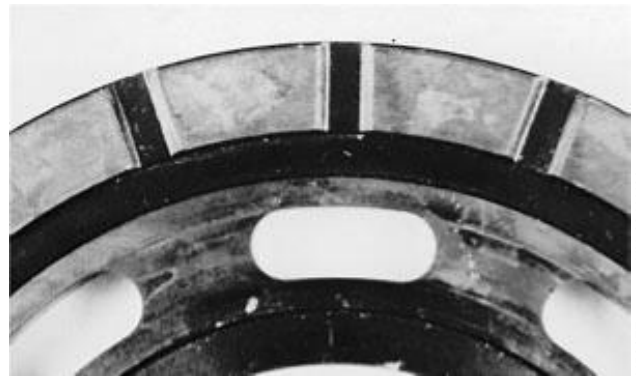
The smearing across the entire face of this bearing plate indicates it was subjected to a lack of or insufficient lubrication.



H50376  
-UN-20JAN89

1401,5020,BK -19-12SEP91

The severe discoloration noted on this bearing plate indicates it was subjected to a very high oil temperature.



H50377  
-UN-20JAN89

1401,5020,BL -19-12SEP91

**INSPECT VALVE PLATE**

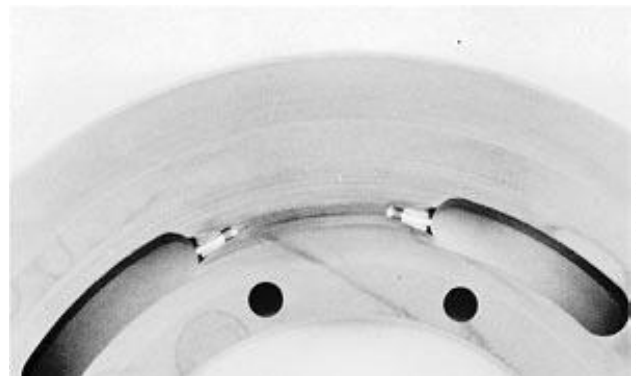
The smearing on both the inner plate and outer balance lands indicates it was subjected to a lack of or insufficient lubrication.



H50378  
-UN-20JAN89

1401,5020,BM -19-12SEP91

The heavier score marks between the port or kidneys and lighter score marks noted on the balance lands and bearing support areas indicate the valve plate was subjected to abrasive contaminants.

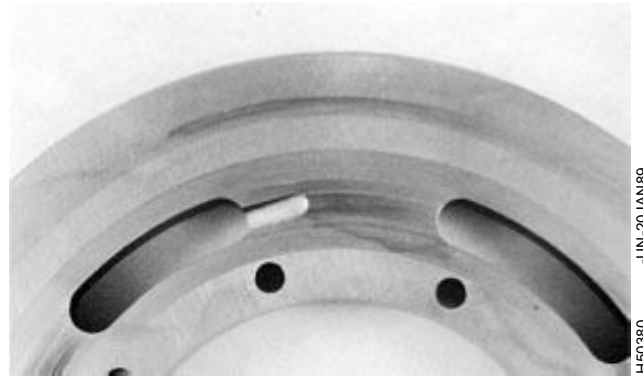


H50379  
-UN-20JAN89

1401,5020,BN -19-12SEP91

*Hydrostatic Ground Speed Drive/Inspect Valve Plate*

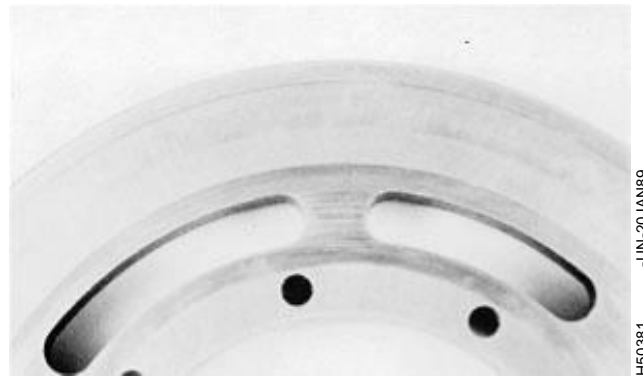
The scoring marks on the balance lands and bearing support area indicate the valve plate was subjected to abrasive contamination. Also noticeable, is some smearing between the port or kidneys and inner bearing support area indicating a possible lack of or improper lubrication.



1401,5020,BO -19-12SEP91

H50380  
-UN-20JAN89

The scoring on the balance lands and inner part of the bearing support area indicates abrasive contamination. Also noticeable is some smearing between the port or kidneys and extreme outer edge of the bearing support, which indicates possible over speeding. Over speeding usually causes the rotating parts to tip and contact only their outer edges rather than across the entire surface. When tipped, excessive loading to small contact areas occurs.



1401,5020,BP -19-12SEP91

H50381  
-UN-20JAN89

The smearing on the bearing support area indicates the valve plate was subjected to a lack of and possibly improper lubrication. Close inspection shows cracks across this area, likely created by friction, probably as a result of the loss of lubricating oil film required to properly lubricate mating part surfaces. Also shown is some very heavy scoring between the port or kidneys caused by particle abrasive contamination suspended in the system oil.



1401,5020,BQ -19-12SEP91

H50382  
-UN-20JAN89

The discoloration between the balance indicates it was subjected to high fluid temperature or possibly a complete loss of lubrication.



1401,5020,BR -19-12SEP91

H50383  
-UN-20JAN89



## Hydrostatic Ground Speed Drive/Inspect Bearing and Race

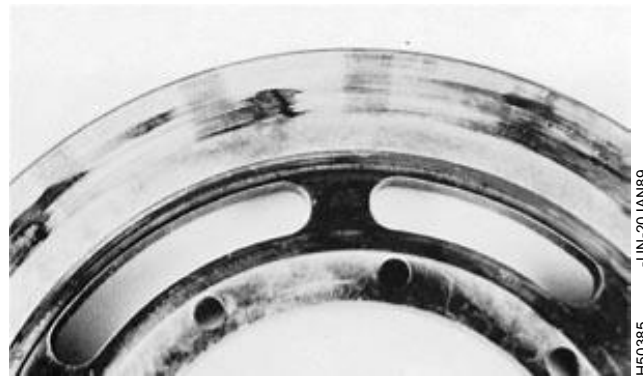
The discoloration of this valve plate indicates it was subjected to a high oil temperature or improper fluid.



1401,5020,BS -19-12SEP91

H50384  
-UN-20JAN89

The discoloration of this valve plate indicates it was subjected to excessive oil temperature. The scoring across the plate surface indicates a possible lack of or improper lubrication.

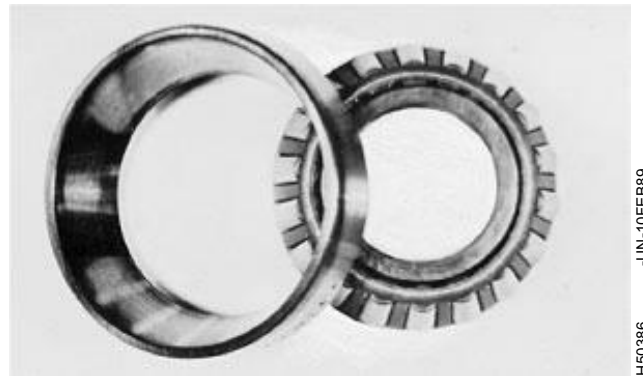


1401,5020,BT -19-12SEP91

H50385  
-UN-20JAN89

### INSPECT BEARING AND RACE

The discoloration indicates excessive system temperatures.



1401,5020,BU -19-12SEP91

H50386  
-UN-10FEB89

The grooves across this trunnion bearing race indicates it was subjected to an improper bearing preloading. This condition is the result of the insufficient preload, allowing the trunnion to move back and forth during operation.



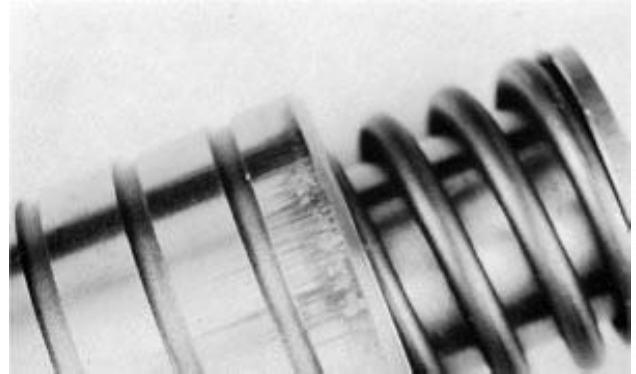
1401,5020,BV -19-12SEP91

H50387  
-UN-20JAN89

*Hydrostatic Ground Speed Drive/Inspect Drive Shaft*

**INSPECT SERVO PISTON**

The scratches on this servo piston indicate it was subjected to abrasive contamination.



H50388  
-UN-20JAN89

1401,5020,BW -19-12SEP91

The scoring inside the threaded end on this servo sleeve indicates it was subjected to abrasive contamination or lack of lubrication.

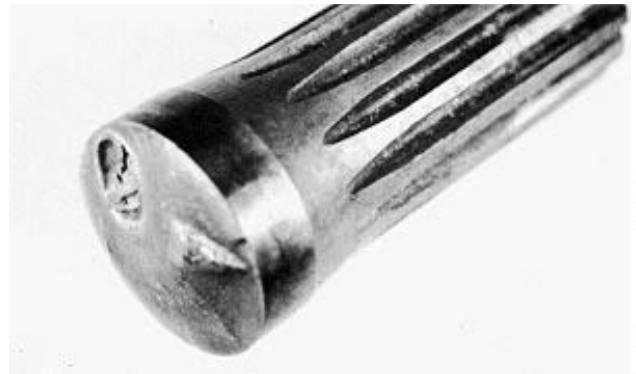


H50389  
-UN-20JAN89

1401,5020,BX -19-12SEP91

**INSPECT DRIVE SHAFT**

This broken shaft end indicates a severe side loading or misalignment.

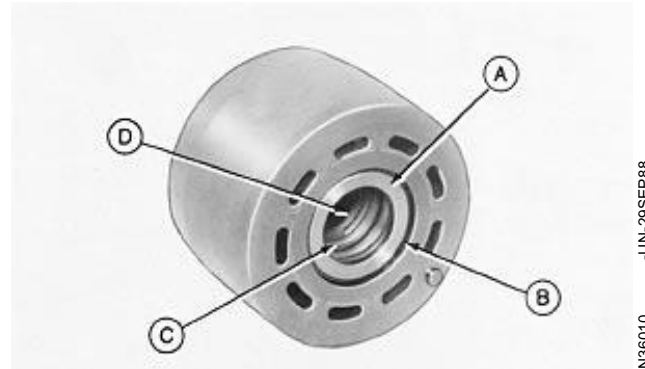


H50390  
-UN-20JAN89

1401,5020,BY -19-12SEP91

## REPLACE CYLINDER BLOCK SPRING

1. Press outer retaining ring (A) down to compress spring (C).
2. Remove spiral retaining ring (B).
3. Remove retaining ring, spring, and beveled inner retainer (D).
4. Replace spring and reinstall parts.
5. Install beveled inner retainer (D) with beveled side toward splined end of block.
6. Install outer retaining ring (A) with shoulder towards open end of block.
7. Compress spring and outer retaining ring, then install spiral retaining ring.

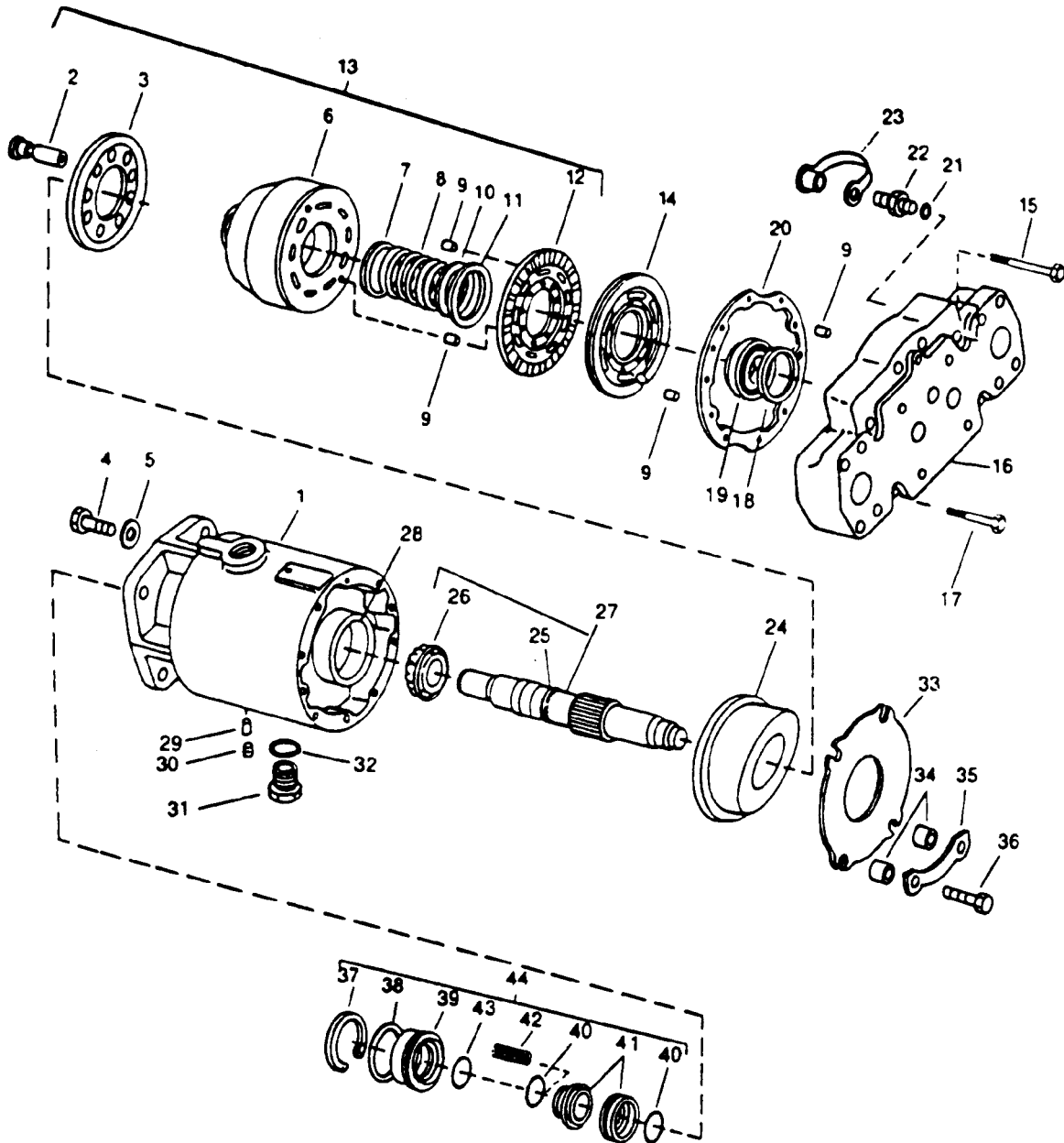


**A—Outer Retaining Ring**  
**B—Spiral Retaining Ring**  
**C—Spring**  
**D—Inner Retainer (Beveled)**

N36010 -UN-29SEP88

1401,5020,BZ -19-12SEP91

**ASSEMBLE MOTOR**



- |                   |                       |                   |                    |
|-------------------|-----------------------|-------------------|--------------------|
| 1—Housing         | 12—Plate              | 23—Cover (2 used) | 34—Spacer (4 used) |
| 2—Piston          | 13—Kit                | 24—Swashplate     | 35—Strap           |
| 3—Retainer        | 14—Plate              | 25—Snap Ring      | 36—Screw (4 used)  |
| 4—Screw (2 used)  | 15—Cap Screw (6 used) | 26—Flange         | 37—Snap Ring       |
| 5—Washer (2 used) | 16—Cover              | 27—Shaft          | 38—O-Ring          |
| 6—Cylinder Block  | 17—Cap Screw (2 used) | 28—Bearing Cup    | 39—Retainer        |
| 7—Washer          | 18—Shim               | 29—Pin            | 40—O-Ring (2 used) |
| 8—Spring          | 19—Bearing            | 30—Plug           | 41—Seal Kit        |
| 9—Pin (5 used)    | 20—Gasket             | 31—Plug           | 42—Spring (6 used) |
| 10—Washer         | 21—O-Ring (2 used)    | 32—O-Ring         | 43—O-Ring          |
| 11—Snap Ring      | 22—Coupler (2 used)   | 33—Plate          | 44—Seal Kit        |

H41402 -UN-08NOV89

## Hydrostatic Ground Speed Drive/Assemble Motor

1. Assemble motor using exploded view for parts reference. Install new O-rings and gaskets. Apply petroleum jelly to O-rings and finished surfaces. Apply clean hydraulic oil to parts as specified.

1401,5020,CB -19-12SEP91

2. If housing (1), end cover (15), rear bearing (18), drive shaft (21) or front bearing or cup (22, 23) were replaced, check drive shaft end play. Assemble items 1, 15, 18, 21, 22 and 23 and gasket (19), making sure bearing races and cups are properly seated.

Tighten bolts (14 and 16) to 47 N·m (35 lb-ft) and check end play of shaft. Set end play to 0.05-0.18 mm (0.002-0.007 in.) by shimming the end cover bearing (between bearing cup and bottom of bore in the end cover) as required. Disassemble after obtaining acceptable end play.

1401,5020,CC -19-12SEP91

3. Set housing on sleeve or wood block used for disassembly, with mounting flange down.

4. Slide swashplate (B) onto shaft and let it rest on bearing. Lower shaft and swashplate into housing, aligning slot (A) with dowel pin.

**NOTE:** Clearance between swashplate and housing bore is slight, requiring accurate alignment for assembly.



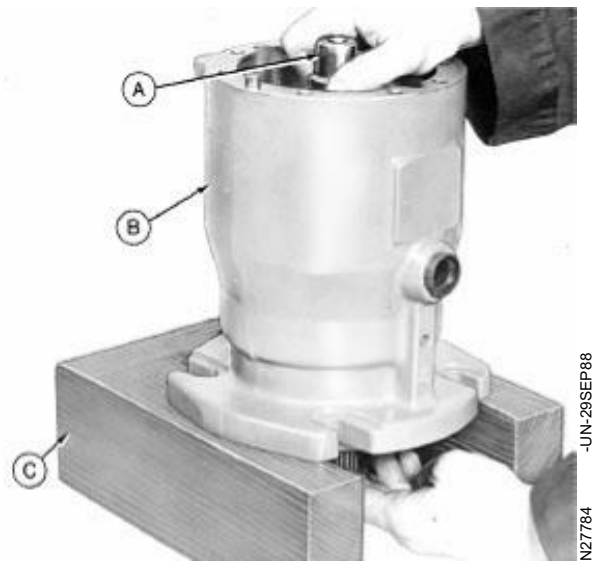
1401,5020,CD -19-12SEP91

## Hydrostatic Ground Speed Drive/Assemble Motor

5. To align the swashplate with its bore, place one hand at each end of shaft. Move shaft (A) with swashplate up and down gently 3 mm (1/8 in.) at the same time making a slight angular motion with the shaft until the swashplate drops into place.

**NOTE:** Hold swashplate in place, particularly when housing (B) is laid on its side to install cylinder block. If swashplate slot moves off locating pin, repeat Steps 4 and 5.

A—Shaft  
B—Housing  
C—Wood Block



1401,5020,CE -19-12SEP91

6. Apply a light coat of hydraulic oil to cylinder block parts.

7. Install slipper retainer plate (beveled side of plate toward cylinder barrel).

8. Install nine slipper pistons.

**NOTE:** Piston-to-bore clearance is critical. Do not force piston into bore. If tightness occurs, check bore and piston for contamination, burrs, or damage.

9. Check the six dowels for alignment. Make sure dowel pins are correctly installed (B) and not misaligned (A).



1401,5020,CF -19-12SEP91

10. Cover swashplate, shaft and cylinder block assembly with hydraulic oil prior to installing cylinder block.

11. Lay housing on its side.

12. Install cylinder barrel on drive shaft while stabilizing shaft with free hand. Rotate cylinder barrel to engage shaft splines.



1401,5020,CG -19-12SEP91

Hydrostatic Ground Speed Drive/Assemble Motor

13. Set motor on block with shaft down, being careful not to bump shaft and cause it to move up out of ball guide.

14. Use JDG109 Press Assembly (A) and ball and block (B) to press rear bearing on end of shaft until bearing cone is against shoulder of shaft.



1401,5020,CH -19-12SEP91

15. Install shims (C) as required to obtain shaft end-play (See step 2). Also install bearing cup (B) in end cover (A).



1401,5020,CI -19-12SEP91

## Hydrostatic Ground Speed Drive/Assemble Motor

16. Generously coat with petroleum jelly then install bearing plate (brass) on cylinder barrel. Use dowel pins to locate plate. Coat bearing plate (D) with hydraulic oil.

17. Install end cover gasket (C) on motor.

18. Coat valve plate (B) (side towards cover) with petroleum jelly and set on end cover (A). Align dowel pin in end cover with slot in plate.

19. While holding valve plate inside end cover, align scribe marks and install end cover.

A—End cover  
B—Valve Plate  
C—Gasket  
D—Bearing Plate



N32847  
-UN-21SEP88

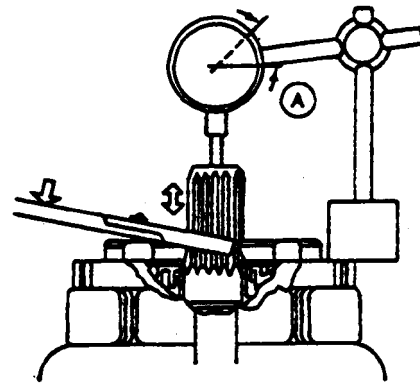
1401,5020,CJ -19-12SEP91

20. Tighten bolts alternately on each side to draw the cover down evenly. Tighten bolts to 38-46 N·m (28-34 lb-ft).

21. Remove motor from blocks.

22. Use a rubber mallet to tap shaft end. This seats the bearings.

23. Using D17525C1 Magnetic Base and D17526C1 Dial Indicator, measure shaft end play. Grip shaft with pliers, pry shaft out for total end play. End play (A) should be 0.05-0.18 mm (0.002-0.007 in.). If not, remove cover and re-shim behind end cover bearing cup.



N37728  
-UN-29SEP88

1401,5020,CK -19-12SEP91



Hydrostatic Ground Speed Drive/Assemble Motor

24. Align scribe marks and install valve block and new O-rings.

*NOTE: Backup washers on two main ports in valve block must be installed with flat side next to end cover when assembled.*

25. Install four cap screws and tighten to 38-46 N·m (28-34 lb-ft).



-UN-21SEP88

N32841

1401,5020,CL -19-12SEP91

26. Install new O-ring on stationary seal retainer.

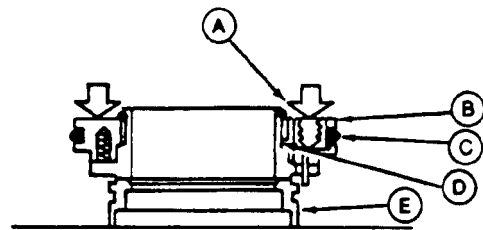
27. Install six springs in seal retainer (C).

28. Install new O-ring (E) in seal retainer.

29. Align dowel pin of seal retainer with notch in stationary seal, then install seal.

30. Position stationary seal assembly on rotating seal (F). Push assembly down and carefully install retaining O-ring (A).

31. Install O-ring in I.D. of rotating seal.



A—Retaining O-ring  
B—Seal Retainer  
C—O-ring  
D—O-ring  
E—Rotating Seal

-UN-15MAR89  
H40203

1401,5020,CM -19-12SEP91

32. Clean shaft area with a spray cleaner, such as an electrical contact cleaner or clean solvent in a spray bottle.

**IMPORTANT: Do not use solvent from parts cleaning tank. This solvent may be contaminated and defeat the purpose of cleaning shaft area.**

33. If installing a new seal assembly, wash anti-rust agent off new rotating and stationary seals. Use same spray cleaner used to clean shaft area. Do not use a brush, cloth, etc., to clean seals.

34. Grip rotating seal with JDG351 Seal Remover Tool.

35. Again, spray seals using cleaner or clean solvent.

**IMPORTANT: Do not touch sealing surfaces of rotating and stationary seals after cleaned. The sealing surfaces on seals are sensitive enough to leak with only a finger print on them.**

36. Carefully seat rotating seal against shaft inner race. Be careful not to touch or scratch sealing surface or leakage will result.

37. Clean stationary seal as done previously and install. Press stationary seal into flange, being careful not to touch or damage large O-ring on snap ring groove.

38. Using JDG114 Snap Ring Pliers, install new snap ring (bold arrow), BEVELED EDGE OUT. Make sure snap ring is fully expanded in its groove. Avoid damaging finished surfaces.

39. Rotate shaft, being careful not to damage splines. If shaft binds, re-check end play and reshim.



## REMOVE AND INSTALL MOTOR VALVE BLOCK (MANIFOLD)

**!** **CAUTION:** Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury may call the Deere & Company Medical Department in Moline, Illinois, or other knowledgeable medical source.

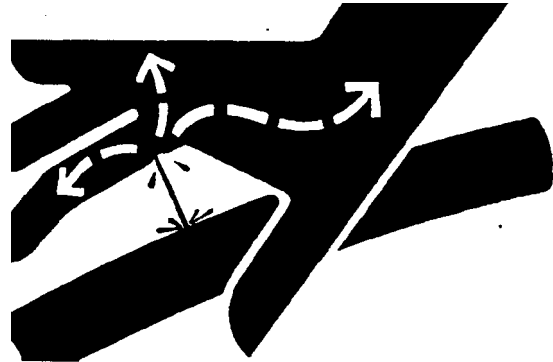
1. Stop Engine. Operate all controls to release hydraulic pressure.

**IMPORTANT:** Clean outside of motor thoroughly. Either steam clean or wash with solvent. Also clean surrounding area so dirt will not get into system. If internal work is to be performed, keep work bench, tools and equipment clean.

When disconnecting a line, hose or transfer tube from a hydrostatic component, always mark end and port from which it was removed so that it can be connected to proper port when reassembling.

Also, when disconnecting a line, hose, or transfer tube from a component, always plug them and component to keep dirt out of system. Use a plastic plug or plastic bag - never a cloth. Cloth contains lint which can damage hydrostatic system.

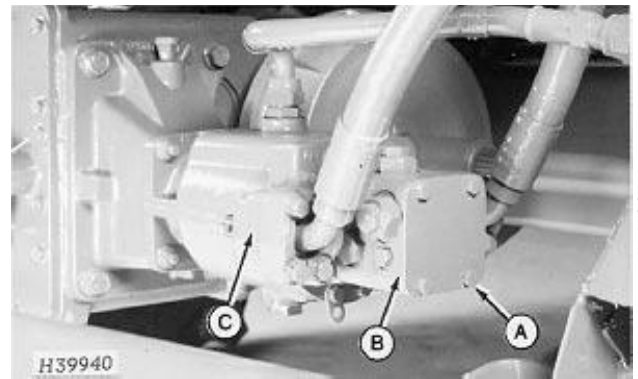
High pressure hoses have clamp-type bolted fittings with O-rings. When this type of fitting is disassembled, inner surfaces must be cleaned thoroughly and new O-rings installed. This is to insure a tight seal and reduce possibility of leakage.



X9811  
-JUN-23AUG88

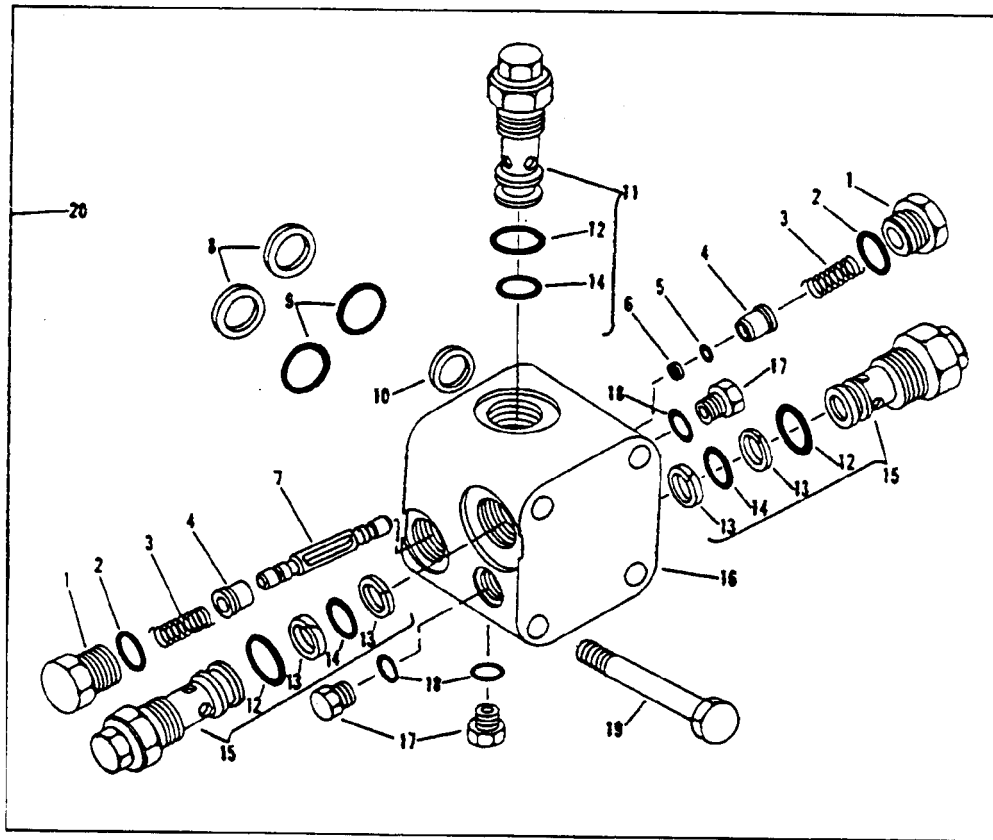
## Hydrostatic Ground Speed Drive/Remove and Install Motor Valve Block

2. Scribe a line between valve block and motor to assist in proper reassembly.
3. Remove four cap screws (A) to remove valve block (B) (manifold) from motor (C). It is not necessary to remove motor to service valve block. Place a container under valve block to catch any oil that drains when block is removed. Do not save drained oil.
4. Plug holes in end cap of motor with plastic plugs to minimize oil loss.
5. Cover motor end cap with plastic to keep dirt out of motor.
6. Repair valve block as necessary.
7. Attach valve block (B) to motor (C) with four cap screws (A). Tighten to 47 N·m (35 lb-ft).
8. Check oil level. Start engine and bleed system. (See procedure in this group.)



1401,5020,CP -19-12SEP91

**REPAIR MOTOR VALVE BLOCK**



H40204 -JUN-20/JUN88

- |                    |                   |                    |                       |
|--------------------|-------------------|--------------------|-----------------------|
| 1—Plug (2 used)    | 6—Ring            | 11—Valve           | 16—Block              |
| 2—O-Ring ( 2 used) | 7—Spool           | 12—O-Ring (3 used) | 17—Plug (3 used)      |
| 3—Spring (2 used)  | 8—Washer (2 used) | 13—Ring (4 used)   | 18—O-Ring (3 used)    |
| 4—Valve ( 2 used)  | 9—O-Ring (2 used) | 14—O-Ring (3 used) | 19—Cap Screw (4 used) |
| 5—O-Ring           | 10—Seal           | 15—Valve (2 used)  | 20—Valve              |

1. Remove outer hex plugs (1) to remove shuttle valve spool (7) and components from both sides of valve block.

2. Remove low pressure control valve (11).

3. Remove high pressure relief valves (15) from both sides of valve block. Wrench only on hex section next to block body.

*Hydrostatic Ground Speed Drive/Repair Motor Valve Block*

4. Clean all parts in solvent and dry thoroughly.
5. Check parts for excessive wear and scoring. Replace if necessary. If a high pressure relief valve or low pressure control valve are defective, the complete valve must be replaced. Individual parts are NOT available.
6. Install new O-rings on hex plugs and valves.
7. Install high pressure relief valves and low pressure control valve in valve block. Tighten to 163-197 N·m (120-145 lb-ft).
8. Install shuttle valve components. Tighten hex plugs to 92-111 N·m (68-82 lb-ft).

1401,5020.CR -19-12SEP91

## REMOVE HYDROSTATIC PUMP

1. Clean pump and surrounding area thoroughly.

**!** **CAUTION:** Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

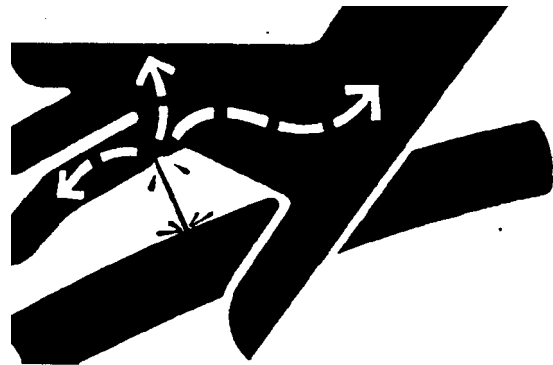
If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury may call the Deere & Company Medical Department in Moline, Illinois, or other knowledgeable medical source.

2. Stop Engine. Operate all controls to release hydraulic pressure.

**IMPORTANT:** When disconnecting a line, hose, or transfer tube from a hydrostatic component, always mark end and port from which it was removed so that it can be connected to proper port when reassembling.

Also, when disconnecting a line, hose, or transfer tube from a component, always plug them and component to keep dirt out of system. Use a plastic plug or plastic bag - never a cloth. Cloth contains lint which can damage hydrostatic system.

High pressure hoses have clamp-type bolted fittings with O-rings. When this type of fitting is disassembled, inner surfaces must be cleaned thoroughly and new O-rings installed. This is to insure a tight seal and reduce possibility of leakage.



X9811  
-JUN-23AUG88

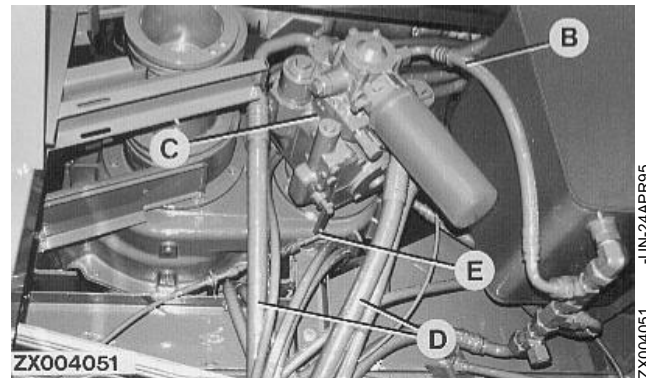
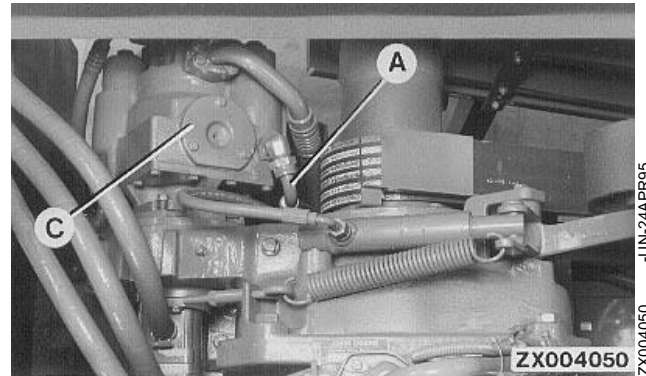
## Hydrostatic Ground Speed Drive/Disassemble Hydrostatic Pump

3. Drain hydrostatic oil at fixed-displacement motor. Remove line (A) from hydrostatic pump (for venting purposes).
4. Disconnect suction line (B) at charge pump and turn line until open end points upwards.
5. Disconnect high pressure hoses (D) and control cable (E) at hydrostatic pump (C).
6. Attach pump to a suitable hoist.

**⚠ CAUTION: Approximate weight of pump is 68 kg (160 lb).**

7. Remove four cap screws and remove pump.

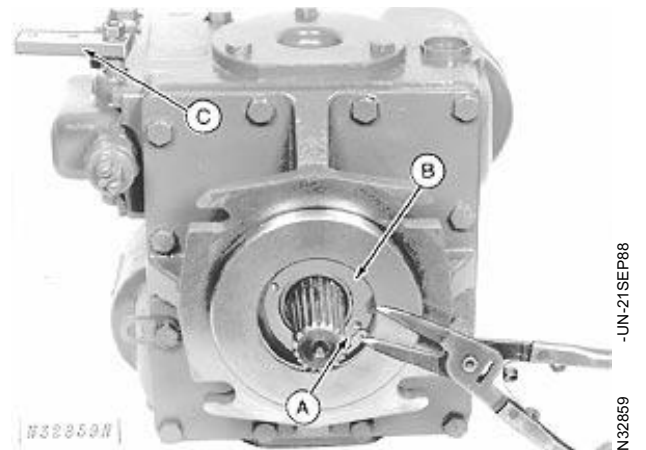
A—Line to Hydrostatic Oil Cooler  
B—Charge Pump Suction Line  
C—Hydrostatic Pump  
D—High Pressure Hose (2 used)  
E—Control cable



ZX.TMXZCO002393-19-25NOV92

## DISASSEMBLE HYDROSTATIC PUMP

1. Remove snap ring (A) holding front seal (B). DO NOT rest pump on control lever arm (C).

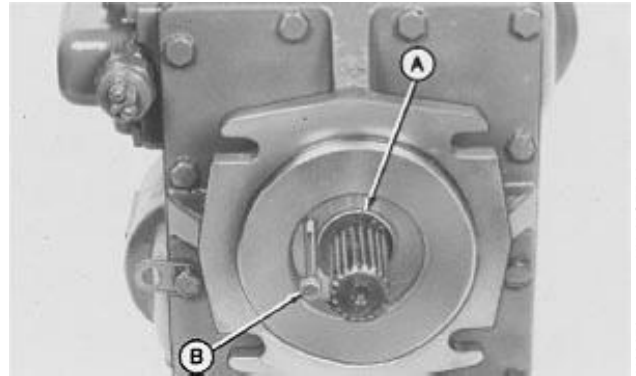


ZX.TMXZCO002507-19-01DEC92



## Hydrostatic Ground Speed Drive/Disassemble Hydrostatic Pump

2. Remove stationary seal (A) using 1/4-UNC cap screw (B). Wrap seal in clean paper.



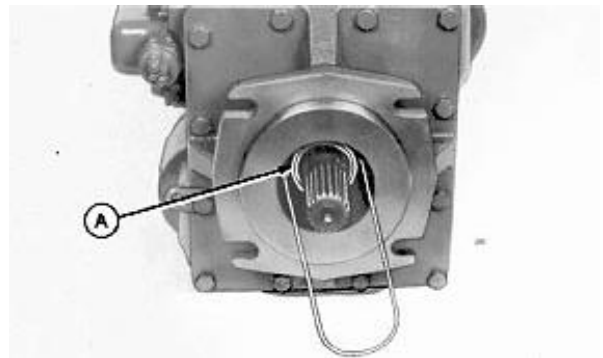
1401,5020,CV -19-12SEP91

N38073 -UN-29SEP88

3. Remove rotating seal (A) using JDG351 Seal Remover.

**IMPORTANT: Do not damage inner surface of seal. Wrap in clean paper.**

4. Remove O-ring if it did not come out with rotating seal.

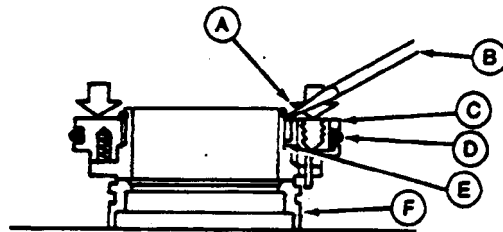


1401,5020,CW -19-12SEP91

N36817 -UN-22SEP88

5. Position stationary seal assembly on rotating seal (F).
6. Press stationary seal assembly down, then use a small screwdriver (B) to carefully remove retaining O-ring (A). Do not damage O-ring seat.

- A—Retaining O-ring
- B—Seal Retainer
- C—O-Ring
- D—O-Ring
- E—Rotating Seal

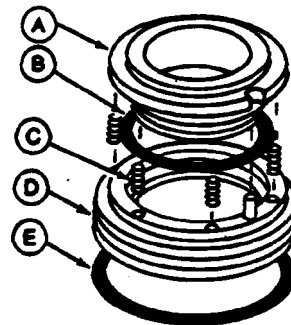


1401,5020,CX -19-12SEP91

N37725 -UN-22SEP88

7. Remove stationary seal (A) from seal retainer (D).
8. Remove O-ring (B).
9. Remove six springs (C).
10. Remove O-ring (E) from retainer.

- A—Stationary Seal
- B—O-Ring
- C—Spring (6 used)
- D—Seal Retainer
- E—O-Ring

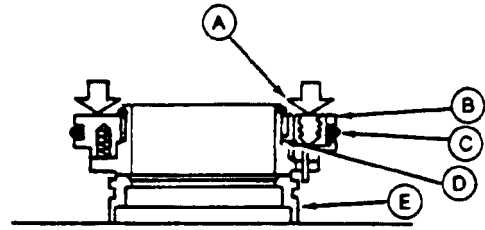


1401,5020,CY -19-12SEP91

N37726 -UN-23JAN89

Hydrostatic Ground Speed Drive/Disassemble Hydrostatic Pump

11. Install new O-ring on stationary seal retainer.
12. Install six springs in seal retainer (B).
13. Install new O-ring (D) in seal retainer.
14. Align dowel pin of seal retainer with notch in stationary seal, then install seal.
15. Position stationary seal assembly on rotating seal (E). Push assembly down and carefully install retaining O-ring (A).
16. Install O-ring in I.D. of rotating seal.



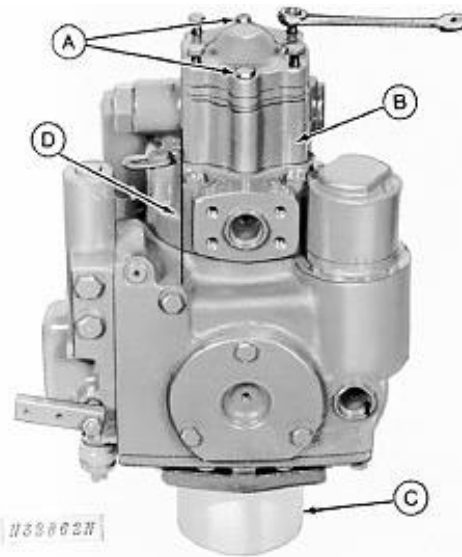
- A—Retaining O-Ring
- B—Seal Retainer
- C—O-Ring
- D—O-Ring
- E—Rotating Seal

1401,5020,CZ -19-12SEP91

H40203 -UN-15MAR89

17. Set pump on sleeve or wooden blocks (C). Scribe a line (D) across pump, end cover and charge pump.
18. After turning out four screws, remove charge pump (B) and gasket. DO NOT remove two cap screws (A). These cap screws hold the pump sections together.

- A—Do Not Remove These Cap Screws
- B—Charge Pump
- C—Sleeve or Blocks
- D—Scribe Line



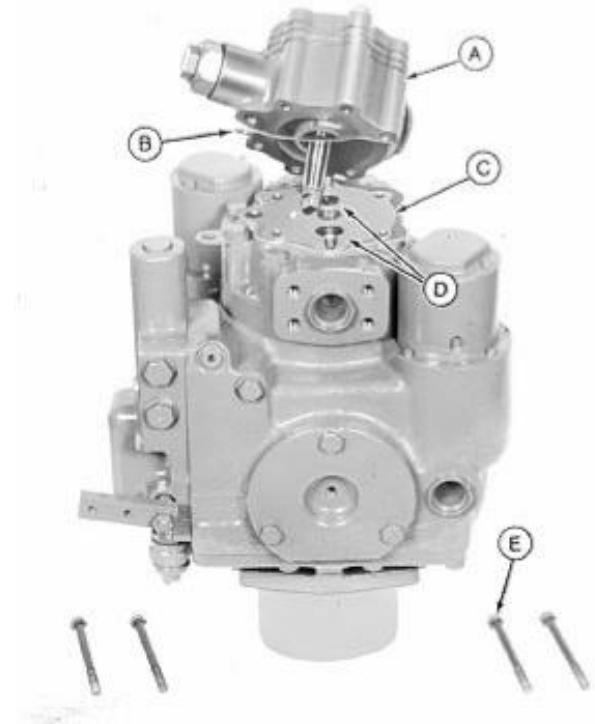
ZX,TMXZCO002517-19-01DEC92

N32862 -UN-21SEP88

## Hydrostatic Ground Speed Drive/Disassemble Hydrostatic Pump

19. Remove charge pump (A). DO NOT pry charge pump away from end cover. Tap with a plastic hammer.

- A—Charge Pump
- B—Gasket
- C—End Cover
- D—Check Valves



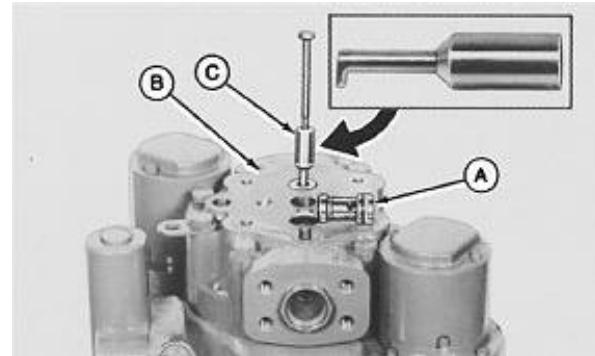
ZX,TMXZC0002518-19-01DEC92

N32863 -UN-06JAN92

20. Inspect check valves (A) in end cap (B). If oil is visible in valve bores, they are functioning properly. If there is no oil in check valve, it may be leaking and should be removed and checked.

If one check valve is replaced, replace the other check valve to provide for uniform operation.

Insert a screwdriver through high pressure port of end cover to remove check valve cartridges or a tool (C) may be made from bar stock, or from a stiff wire. Insert hook inside check valve cross hole, then pull from end cover.

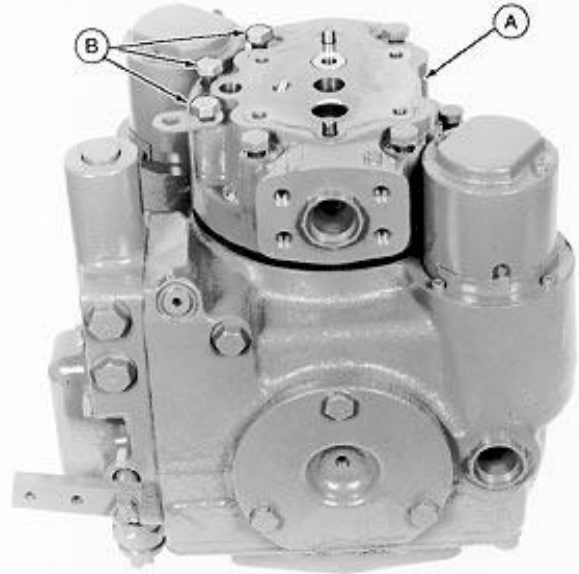


N36818 -UN-22SEP88

1401,5020,DC -19-12SEP91

## Hydrostatic Ground Speed Drive/Disassemble Hydrostatic Pump

21. Internal parts are spring loaded. To avoid internal damage, remove six screws (B), securing end cover (A) to pump. Leave two opposite screws tight. Gradually and evenly, remove the last two bolts. If end cover does not raise, carefully tap end cover from housing.



N32865  
-UN-21SEP88

1401,5020,DD -19-12SEP91

22. Remove cover (A). If valve plate (B) is stuck to end cover, hold it in place while removing cover. Do not allow valve plate to drop out of cover.

- A—End Cover
- B—Valve Plate
- C—Gasket
- D—Bearing Plate



-UN-06APR89

N32866

1401,5020,DE -19-12SEP91

Hydrostatic Ground Speed Drive/Disassemble Hydrostatic Pump

23. Remove bearing cup (A) from end cover. Use D01209AA Slide Hammer if necessary.

24. Remove shims, if any, from under bearing cup.

25. If valve plate (B) was not removed with end cover, insert a small screwdriver in oil drain slots of valve plate. Carefully pry valve plate away from bearing plate.

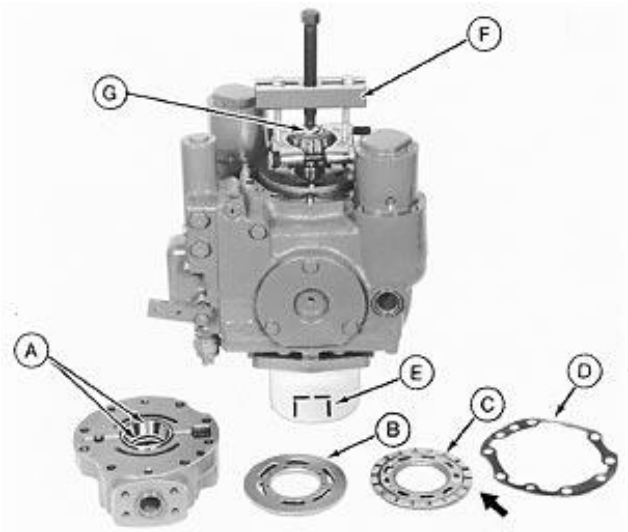
26. Insert a small screwdriver in oil drain slot of bearing plate (C) and carefully lift plate from cylinder barrel.

27. Wrap both parts separately in clean paper.

28. Place a small block (E) under motor shaft to raise it.

29. Place a clean cloth or paper on cylinder barrel to protect it when pulling bearing.

30. Pull bearing using JDG96 Bearing Puller or D01290AA Puller and D01243AA Puller. Place hardened washer (G) or ball on shaft for protection.



N32867 -UN-21SEP88

- A—Bearing Cup and Shims
- B—Valve Plate
- C—Bearing Plate
- D—Gasket
- E—Block
- F—Puller
- G—Washer

1401,5020,DF -19-12SEP91

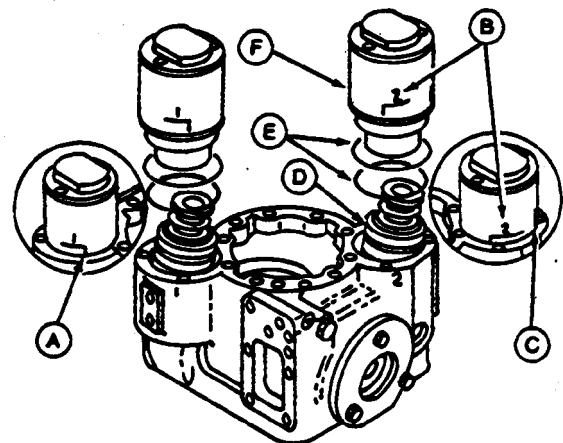
31. Scribe a line (A) to align during assembly. Also mark each cylinder (B) and corresponding side of housing. DO NOT interchange cylinders.

32. Remove retainer (C).

33. Remove threaded servo sleeves (F) and O-rings (E).

**IMPORTANT: Protect servo pistons (D) to insure against damage.**

- A—Scribed Line
- B—Cylinder Mark
- C—Retainer
- D—Servo Piston
- E—O-Rings
- F—Servo Sleeves



N37729 -UN-22SEP88

1401,5020,DJ -19-12SEP91

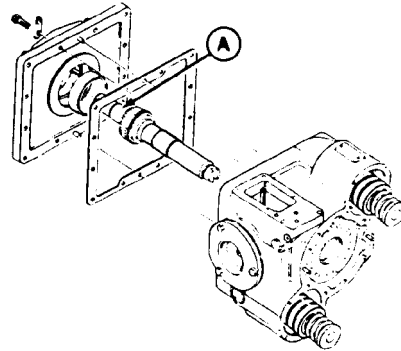
Hydrostatic Ground Speed Drive/Disassemble Hydrostatic Pump

34. Lay pump on its side. Remove cap screws from mounting flange. Carefully remove mounting flange from pump housing.

*NOTE: If it is necessary to replace mounting flange bearing cup, use a long punch or internal bearing puller.*

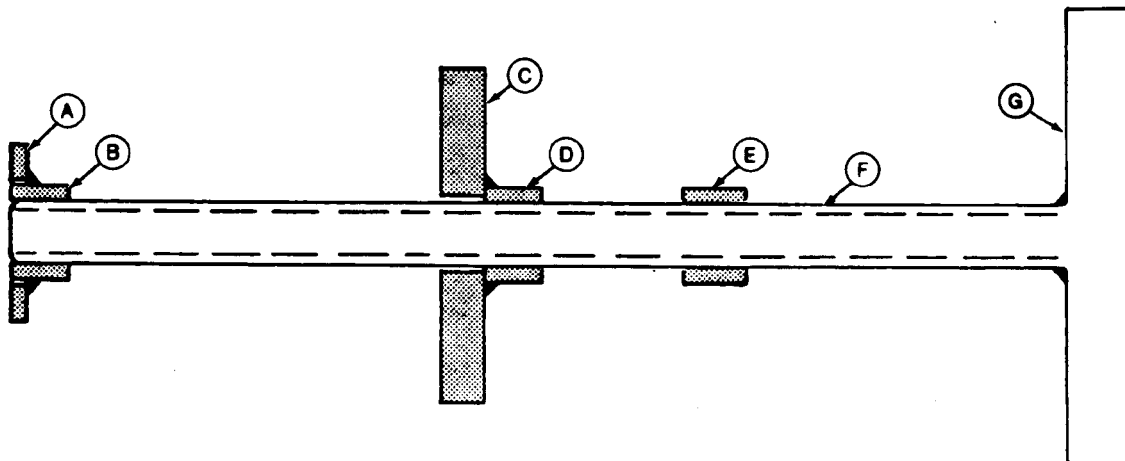
35. Remove mounting flange gasket and dowel pins from pump housing. Gasket may have remained on mounting flange.

36. Remove pump shaft assembly (A) from cylinder barrel.



H41413 -UN-01DEC89

1401,5020,DH -19-12SEP91



H41414 -UN-01DEC89

A—Washer, 44.5 mm  
(1 3/4 in) O.D. x 27 mm  
(1 1/16 in) I.D. x 4 mm  
(5/32 in)

B—5/8 11 NC Nut, 23.8 mm  
(15/16 in) Across Flats  
Welded to Washer

C—Plate, 82.6 mm (3 1/4 in)  
O.D. x 19 mm  
(3/4 in) I.D. x 11.1 mm  
(7/16 in)

D—5/8 11 NC Nut, 23.8 mm  
(15/16 in) Across Flats  
Welded to Plate

E—5/8 11 NC Nut, 23.8 mm  
(15/16 in) Across Flats

F—5/8 11 NC Thread Rod,  
Length 269.9 mm  
(10 5/8 in)

G—T-Handle, 15.9 mm  
(5/8 in) Dia. x 114.3 mm  
(4 1/2 in) Red Welded to  
Threaded Rod

37. Make special tool as shown above.

ZX,TMXZCO002563-19-01DEC92

Hydrostatic Ground Speed Drive/Disassemble Hydrostatic Pump

38. Install tool (A) through swashplate and cylinder barrel. Install 5/8 in. nut with washer against retaining ring and washer. To engage nut, turn threaded rod inward until finger tight.

39. Hold assembly tool rod and turn large washer and nut to pull and hold cylinder barrel against swashplate.

40. With either servo piston assembly in upper position, remove lower retaining ring from swashplate linkage pin. Remove linkage pin through case drain hole in pump housing.

41. Remove servo piston assembly through servo sleeve opening. Do not damage servo piston when removing it through threaded area of pump housing.

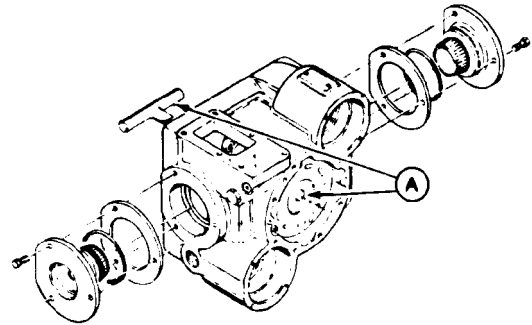
42. Carefully reposition pump housing with other servo piston assembly in upper position. Remove lower retaining ring and linkage pin.

43. Remove servo piston assembly through servo sleeve opening.

**IMPORTANT: Do not damage servo piston when removing it through threaded area of pump housing.**

44. Reposition pump assembly so that one trunnion points upward. Use prick punch to mark both trunnion and pump housing with a 1. These marks are used for identification at reassembly.

45. Remove three trunnion cap screws.

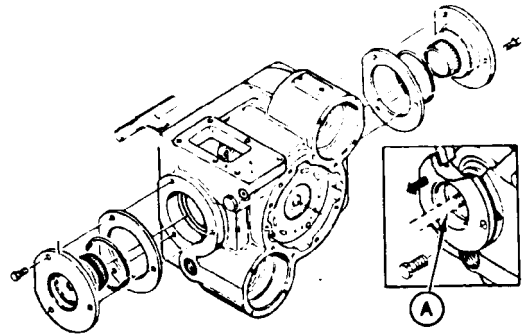


H41415 -UN-01DEC89

1401,5020,DK -19-12SEP91

Hydrostatic Ground Speed Drive/Disassemble Hydrostatic Pump

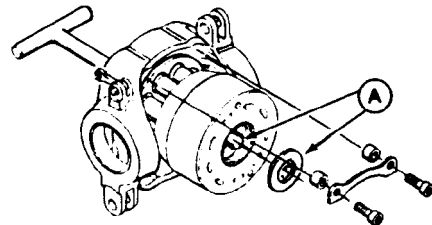
46. Remove trunnion with a slide hammer (A) by inserting into threaded hole in trunnion.
47. Position housing so other trunnion points upward. Mark trunnion and housing with a 2 to identify during assembly.
48. Remove trunnion.
49. Remove O-rings from both trunnions.
50. Remove trunnion shims being sure same shim set remains with each trunnion to set trunnion bearing preload during assembly.
51. Carefully remove swashplate and cylinder barrel assembly through mounting flange end of housing. Tilt swashplate so servo linkage ears clear housing.



H41416 -UN-01DEC89

1401,5020,DL -19-12SEP91

52. Remove tool (A). Be sure pistons remain in cylinder barrel.
53. Position cylinder barrel and swashplate so swashplate is down. Remove retaining strap on one side of swashplate. Loosen other retaining strap to remove cylinder barrel from swashplate.
54. Carefully position cylinder barrel and swashplate with swashplate up. Remove swashplate by lifting slightly and sliding it over to disengage from retaining strap.
55. Remove thrust plate and retaining strap from swashplate.



H41417 -UN-01DEC89

1401,5020,DV -19-12SEP91



Hydrostatic Ground Speed Drive/Disassemble Hydrostatic Pump

**IMPORTANT:** For reassembly, identify pistons, sleeves, housing, and swashplate link-ups with a letter, number, color, etc.

56. Remove retaining clips (B), pins (C), and servo pistons (E) from swashplate, then remove from piston.

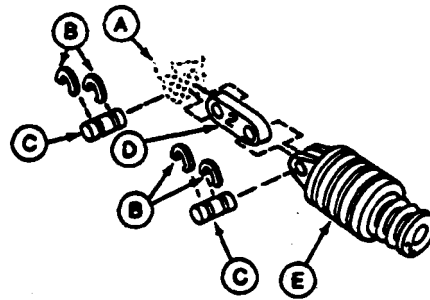
57. Compress spring retainer and springs.

58. Remove shoulder bolt from piston.

**CAUTION:** Retain spring load when disassembling servo piston.

59. Carefully and gradually loosen shoulder bolt.

60. Remove retainer and springs.



- A—Swashplate
- B—Clips
- C—Pin
- D—Link
- E—Servo Piston

1401.5020.DM -19-12SEP91

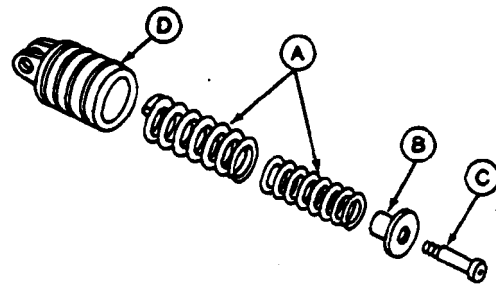
N37733 -UN-29SEP88

61. Install springs and spring retainer in piston (D).

62. Compress spring assembly.

63. Apply thread lock and sealer (medium strength) to shoulder bolt (C), then install. Tighten to 22-26 N·m (192-228 lb-in.).

- A—Springs
- B—Retainer
- C—Shoulder Bolt
- D—Piston



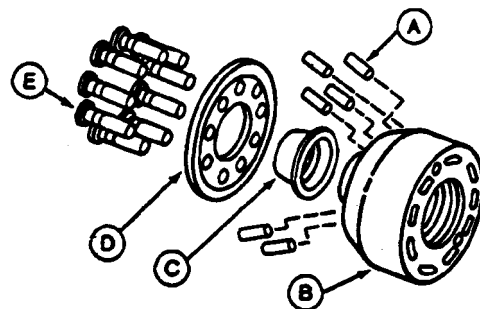
1401.5020.DN -19-12SEP91

N37734 -UN-22SEP88

64. Remove nine piston slippers (E) and retaining plate (D).

65. Remove retaining plate guide (C) and six pins (A).

- A—Pin (6 used)
- B—Cylinder Barrel
- C—Retaining Plate Guide
- D—Retaining Plate
- E—Piston Slipper (9 used)



1401.5020.DO -19-12SEP91

N37735 -UN-22SEP88

*Hydrostatic Ground Speed Drive/Disassemble Hydrostatic Pump*

66. If spring (C) appears damaged or contaminated, press retaining ring (A) down to compress spring.

67. Remove outer retaining ring (B).

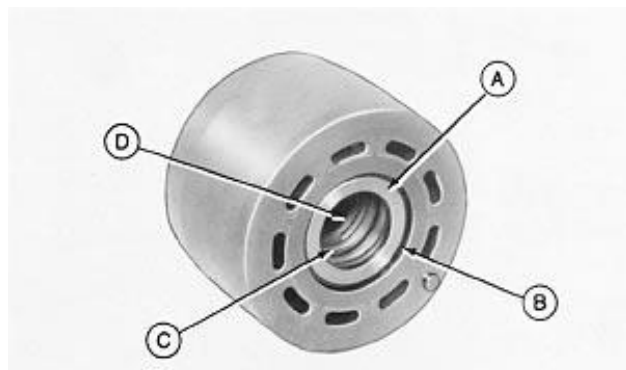
68. Remove retaining ring, spring, and beveled inner retainer (D).

69. Wash parts with clean solvent and replace spring.

70. Install beveled inner retainer (D) with beveled side toward splined end of block.

71. Install outer retainer (A) with shoulder toward open end of block.

72. Compress spring and outer retainer, then install retaining ring.

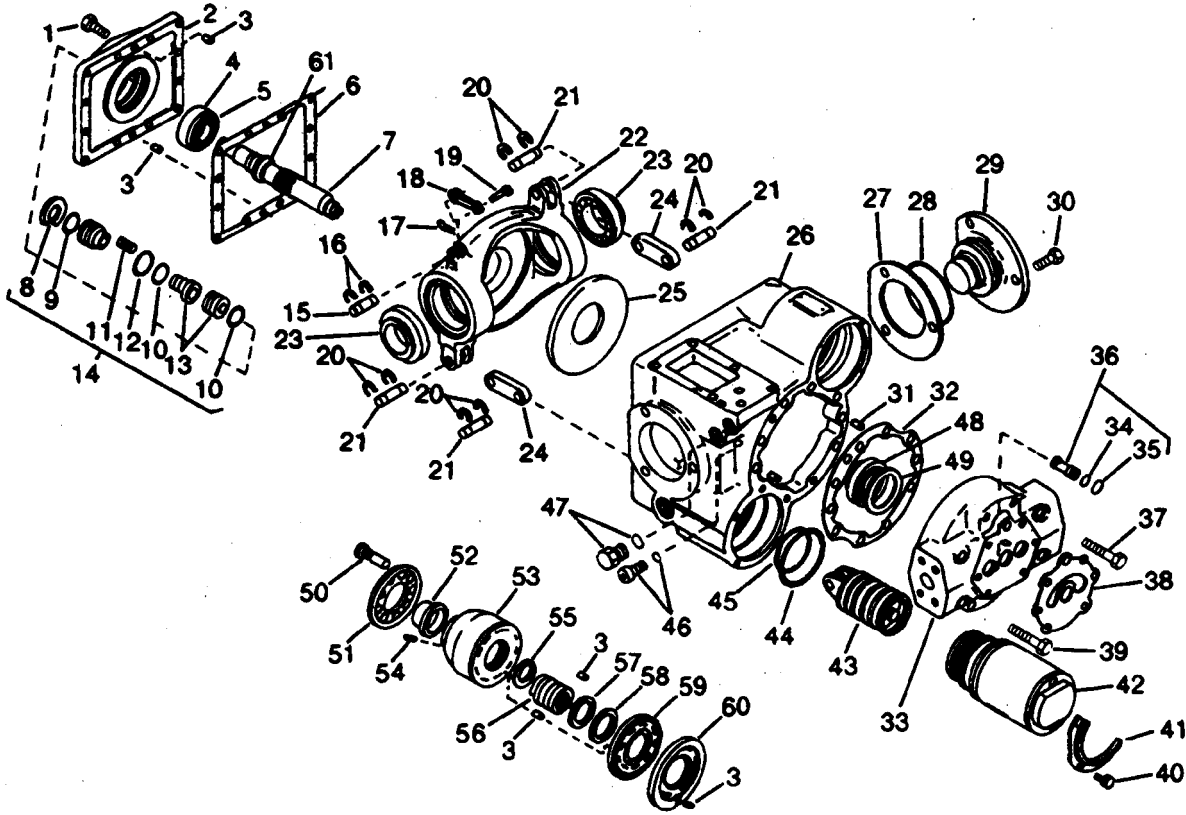


**A—Retaining Ring**  
**B—Outer Retaining Ring**  
**C—Spring**  
**D—Inner Retainer**

N36010 -UN-29SEP88

1401,5020,DP -19-12SEP91

**ASSEMBLE DRIVE PUMP**



- |                       |                        |                          |                     |
|-----------------------|------------------------|--------------------------|---------------------|
| 1—Cap Screw (12 used) | 17—Pin                 | 32—Gasket                | 47—Plug with O-Ring |
| 2—Cover               | 18—Link                | 33—Cover                 | 48—Bearing          |
| 3—Dowel (5 used)      | 19—Pin                 | 34—O-Ring (2 used)       | 49—Shims            |
| 4—Cup                 | 20—Ring (8 used)       | 35—Back-up Ring (2 used) | 50—Piston (9 used)  |
| 5—Cone                | 21—Pin (4 used)        | 36—Valve (2 used)        | 51—Retainer         |
| 6—Gasket              | 22—Swashplate          | 37—Cap Screw (6 used)    | 52—Guide            |
| 7—Shaft               | 23—Bearing (2 used)    | 38—Gasket                | 53—Barrel           |
| 8—Ring                | 24—Link (2 used)       | 39—Cap Screw             | 54—Dowel (6 used)   |
| 9—O-Ring              | 25—Plate               | 40—Cap Screw (4 used)    | 55—Spacer           |
| 10—O-Ring (2 used)    | 26—Housing             | 41—Retainer (2 used)     | 56—Spring           |
| 11—Spring (6 used)    | 27—Shims (as required) | 42—Sleeve (2 used)       | 57—Spacer           |
| 12—O-Ring             | 28—O-Ring (2 used)     | 43—Piston (2 used)       | 58—Ring             |
| 13—Seal               | 29—Trunnion (2 used)   | 44—O-Ring (2 used)       | 59—Plate            |
| 14—Seal               | 30—Cap Screw (6 used)  | 45—O-Ring (2 used)       | 60—Plate            |
| 15—Pin                | 31—Dowel               | 46—Plug with O-Ring      | 61—Retaining Ring   |
| 16—Ring (2 used)      |                        |                          |                     |

N38183 -UN-29SEP88

1401,5020,DQ -19-12SEP91

Hydrostatic Ground Speed Drive/Assemble Hydrostatic Pump

1. Wash pump body and parts with clean solvent. Dry with compressed air. Keep parts clean.

*NOTE: Refer to "Inspect Parts", which follows pump repair procedure, for examples of parts damage and probable causes.*

2. Inspect middle land of slippers on pistons (50, exploded view) for nicks and scratches.

3. Inspect the following for wear or damage:

Races in Swashplate (22)  
Bearing Plate (59)  
Valve Plate (60)  
Ball Guide (52)  
Bearings (4, 5, 23, 48)  
Internal Splines of Cylinder Barrel (53)

Replace parts as necessary.

*NOTE: If bearing plate (59) is scored, eroded or smeared, replace it.*

4. Assemble pump using exploded view. Install O-rings and gaskets. Apply petroleum jelly to O-rings and finished surfaces. Apply clean hydraulic oil to parts when specified in following instructions.

1401,5020,DR -19-12SEP91

5. Install pins, clips and link to connect servo pistons to swashplate.

6. Cover pistons with clean hydraulic oil.

ZX,TMXZCO002394-19-25NOV92

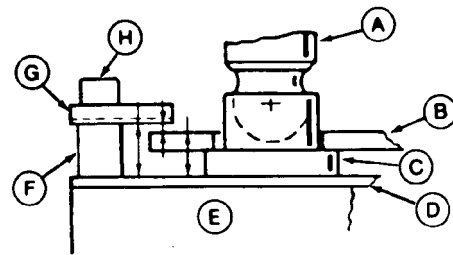
## Hydrostatic Ground Speed Drive/Assemble Hydrostatic Pump

7. Install slipper retainer plate and piston slippers in cylinder barrel.

8. Check fixed clearance of unit. Measure height of retaining strap spacer with a micrometer or calipers.

Measure thickness of both piston slipper flange and slipper retainer plate (B and C). Subtracting this measurement from spacer (F) measurement gives fixed clearance of unit. Fixed clearance must not exceed 0.20 mm (0.008 in.). If fixed clearance exceeds 0.20 mm (0.008 in.), replace worn parts, as piston slipper assemblies, thrust plate, retaining strap and slipper retainer plate.

Fixed Clearance = Spacer height - (slipper flange + retainer plate)



- |                          |                   |
|--------------------------|-------------------|
| A—Piston                 | E—Swashplate      |
| B—Slipper Retainer Plate | F—Spacer          |
| C—Piston Slipper         | G—Retaining Strap |
| D—Thrust Plate           | H—Cap Screw       |

1401,5020,FF -19-12SEP91

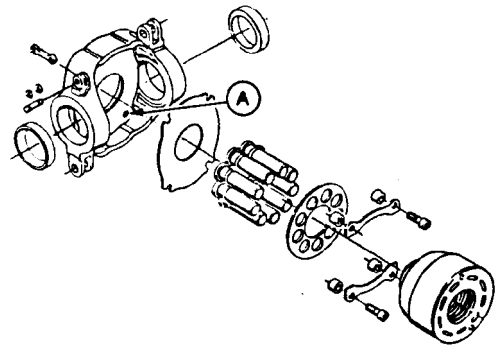
H41418 -UN-01DEC89

9. Apply thread lock and sealer (high strength) in first or second thread down in each of four holes (A) in swashplate.

10. Install thrust plate. Install spacer, retaining strap, and cap screws on one retaining strap. Do not tighten cap screws.

11. Put cylinder barrel assembly on clean flat surface with piston slippers up. Carefully install swashplate on cylinder barrel by slightly lifting side without retaining strap. Slide swashplate over to engage installed retaining strap around piston retainer.

12. Carefully reposition cylinder barrel and swashplate with swashplate in down position. Install remaining spacers, strap and cap screws in swashplate. Tighten all four cap screws to 24 N·m (17.5 lb-ft).

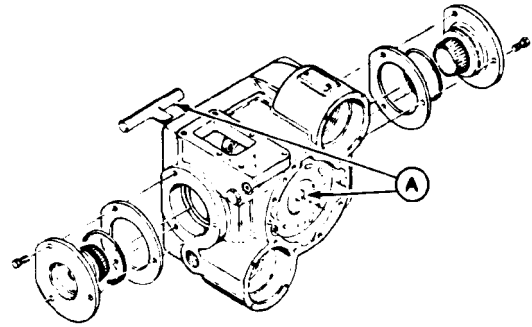


1401,5020,FG -19-12SEP91

H41419 -UN-01DEC89

## Hydrostatic Ground Speed Drive/Assemble Hydrostatic Pump

13. Install assembly tool (A) on swashplate/cylinder barrel assembly.
14. Position pump housing on its side. Carefully install swashplate/cylinder barrel assembly in housing with swashplate feedback linkage facing control valve opening.
15. Install shims on each trunnion. Lubricate and install O-rings in groove around each trunnion.
16. Align swashplate bearing cup with trunnion through hole. Install previously marked trunnion in housing. You may have to slightly tap trunnion to fully engage it with housing.
17. Install cap screws and tighten as follows:
  - Models 33 to 39—38 N·m (28 lb-ft)
  - Models 44 to 64—60 N·m (44 lb-ft)
18. Position housing on opposite side and install other trunnion.

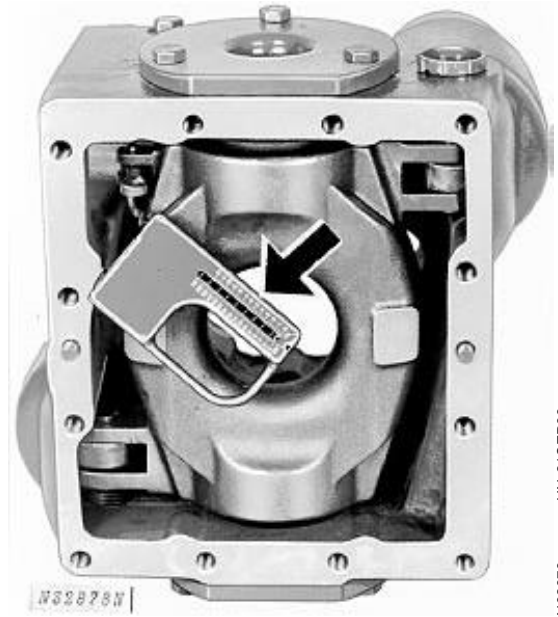


H41415 -UN-01DEC89

1401,5020,FH -19-12SEP91

Hydrostatic Ground Speed Drive/Assemble Hydrostatic Pump

19. Check movement of swashplate by attaching a spring scale to control link. If more than 9-22 N (2-5 lb) is required to move swashplate, disassemble and add more shims.



-UN-21SEP88

N32878

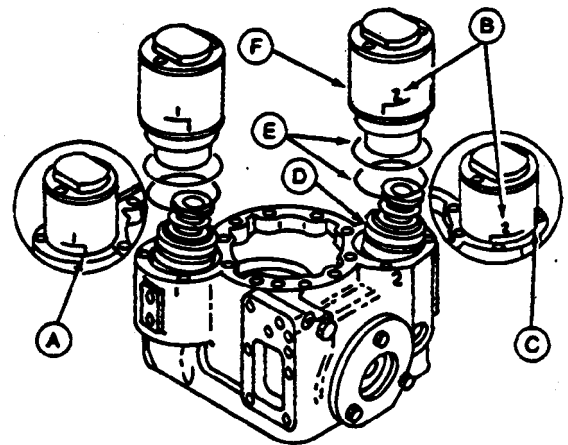
1401,5020,DX -19-12SEP91

20. Reposition swashplate control link in valve mounting hole.

21. Lubricate servo sleeve O-rings (E), then install on sleeves (F).

22. Install servo sleeves in pump housing, matching to scribed location lines (A) as close as possible.

- A—Location Marks
- B—Identification Marks
- C—Retainer Stakes
- D—Servo Piston
- E—O-Rings
- F—Servo Sleeve



-UN-22SEP88

N37729

1401,5020,DY -19-12SEP91

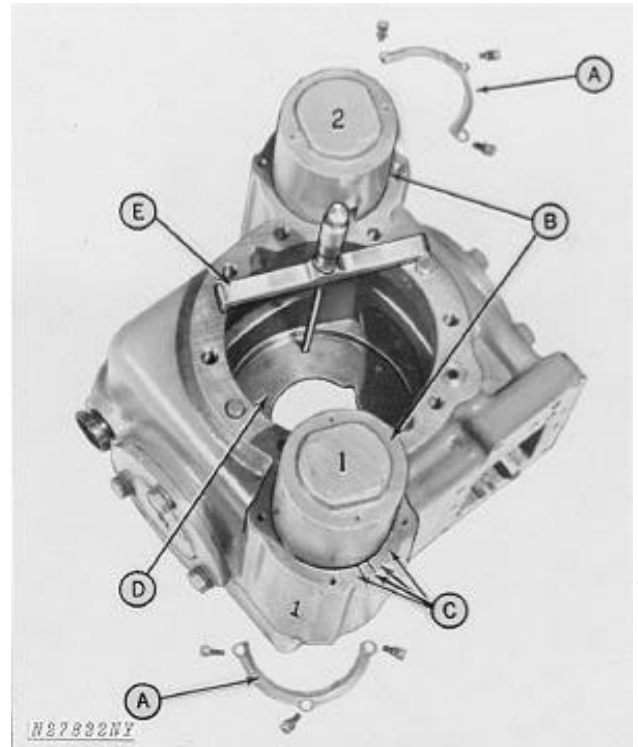
## Hydrostatic Ground Speed Drive/Assemble Hydrostatic Pump

23. Using D17511C1 Micrometer (E), check play in swashplate. Plate should measure within 0.013 mm (0.0005 in.) parallel and less than 0.03 mm (0.001 in.) rock.

24. If new swashplate, pistons, or cylinders are used, reset neutral position of swashplate.

To reset to neutral, locate D17511C1 Micrometer on each side of swashplate. Loosen or tighten cylinders 1/4 turn or less until readings are equal on both sides, and there is no play in swashplate.

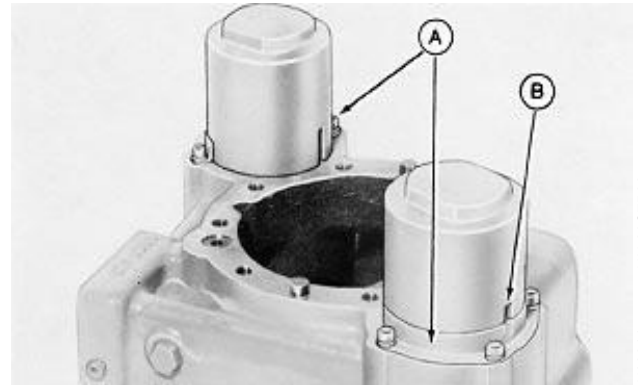
- A—Retainers
- B—Cylinder
- C—Scribed Lines
- D—Swashplate
- E—D17511C1 Micrometer



N27822  
-UN-29SEP88

1401,5020,DZ -19-12SEP91

25. Install retainers (A) and set in slot (B).



N36011  
-UN-29SEP88

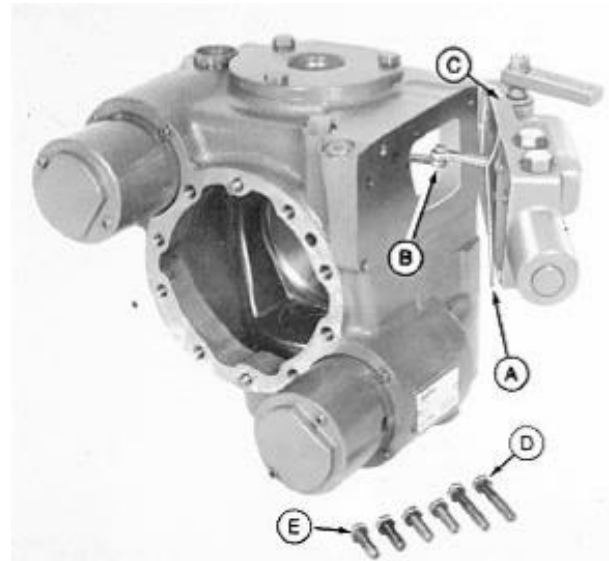
1401,5020,EA -19-12SEP91



Hydrostatic Ground Speed Drive/Assemble Hydrostatic Pump

26. Install new gasket (A) before installing valve (C).

27. Assemble valve (C) to swashplate link (B) by hooking links together.



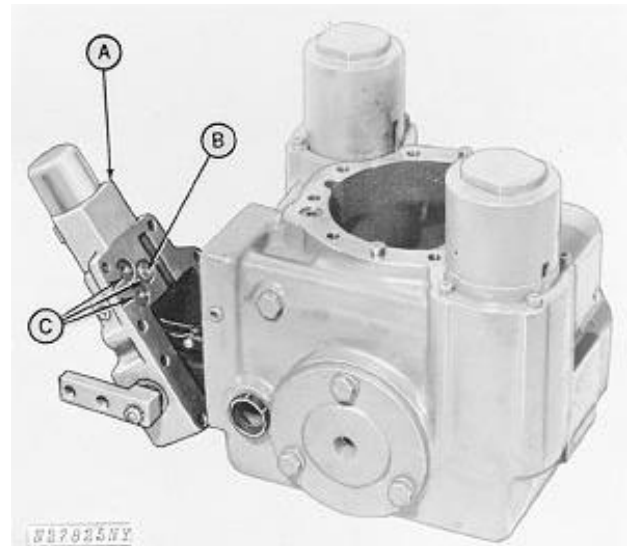
-UN-03JAN92  
N37730

1401,5020,EB -19-12SEP91

28. Install O-rings (C) and orifice plate (B) in valve (A).

29. Make sure control link points toward end cover section of unit or unit will not function properly.

30. Attach valve to body. Tighten screws to 22-26 N·m (264-312 lb-in.).



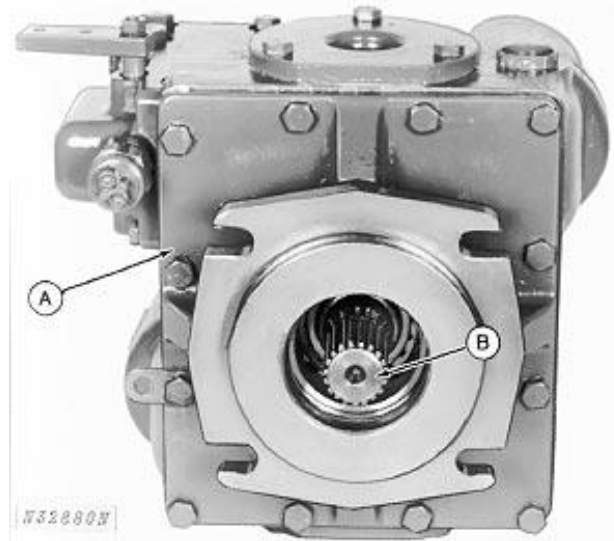
-UN-21SEP88  
N27825NY

1401,5020,EC -19-12SEP91

## Hydrostatic Ground Speed Drive/Assemble Hydrostatic Pump

31. Install drive shaft (B) with splined end towards mounting plate.

32. Install new gasket and mounting plate (A). Tighten screws to 38-46 N·m (28-34 lb-ft).



1401,5020,ED -19-12SEP91

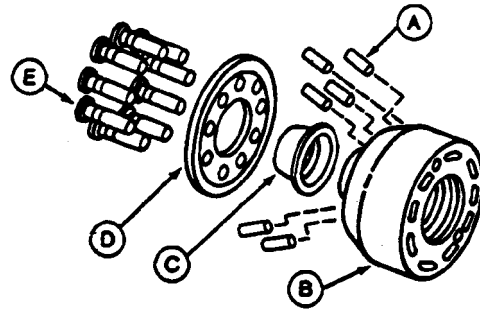
N32880 -UN-21SEP88

33. Install six pins (A) and retainer plate guide (C).

34. Clean and lubricate nine piston slippers (E) and retaining plate (D).

35. Install retainer plate, beveled side toward retainer guide, and piston slippers.

**NOTE:** *Piston to bore clearance is critical. Do not force piston into bore. If tightness occurs, check bore and piston for contamination, burrs, or damage.*



- A—Pin (6 used)
- B—Cylinder Barrel
- C—Retainer Plate Guide
- D—Retainer Plate
- E—Piston Slipper (9 used)

1401,5020,EE -19-12SEP91

N37735 -UN-22SEP88

## Hydrostatic Ground Speed Drive/Assemble Hydrostatic Pump

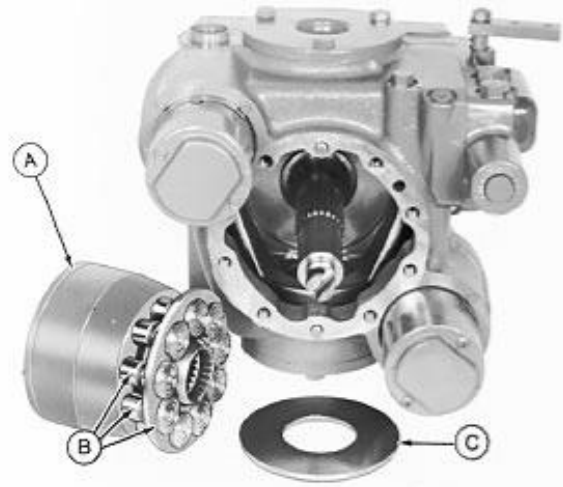
36. Oil barrel (A) and components with clean hydraulic oil and assemble. Be sure dowel pins are correctly installed and pistons (B) are free to move.

37. Oil thrust plate (C) with clean hydraulic oil and install in swashplate.

*NOTE: Two different thrust plates have been used. Older model pumps have a rigid, 6 mm (1/4 in.) thick plate. Newer models have a flexible, 0.8 mm (1/32 in.) plate. These plates are not interchangeable. When replacing plates, make sure replacement is same as removed plate.*

*The thicker thrust plate has one side with a round identification. Install identification side towards swashplate. The thinner plate can be installed either way.*

38. Align splines in ball guide with shaft splines and install.



N32868  
-UN-21SEP88

1401,5020,EF -19-12SEP91

39. Set pump on sleeve or block, being careful not to bump end of shaft. Place a spacer between end of shaft and work bench to raise shaft slightly.

40. Using JDG109 Bearing Installer and sleeve, press rear bearing onto shaft until bearing cone seats against shoulder of shaft.

41. Remove spacer between shaft and work bench.



N32881  
-UN-21SEP88

1401,5020,EG -19-12SEP91

## Hydrostatic Ground Speed Drive/Assemble Hydrostatic Pump

42. Install dowel pins in face of cylinder barrel assembly.

43. Generously lubricate bronze surface of bearing plate with petroleum jelly, then install bearing plate (D) on barrel, locating with pins.

44. Coat valve plate (B) (side towards end cover) with petroleum jelly and install in end cover (A). Align dowel pin in end cover with slot in plate.

45. Align scribe marks and install cover (A). Tighten end cover screws alternately to draw down cover evenly. Tighten screws to 38-46 N·m (28-34 lb-ft).

A—End Cover  
B—Valve Plate  
C—Gasket  
D—Bearing Plate



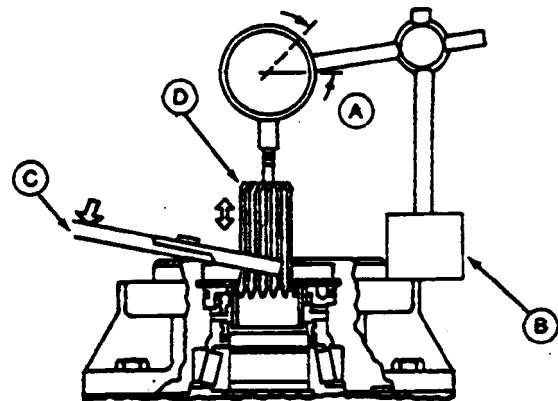
1401.5020.EH -19-12SEP91

46. Remove pump from blocks.

47. Using a rubber mallet, tap end of shaft to seat bearings.

48. Using D17525C1 Magnetic Base (B) and D17526C1 Dial Indicator, measure total shaft end play. Grip shaft (D) with pliers (C), pry shaft out for total end play. End play (A) should be 0.05-0.18 mm (0.002-0.007 in.). If not, remove cover and reshim behind end cover bearing cup.

A—End Play  
B—D17525C1 Magnetic Base  
C—Pliers  
D—Shaft



1401.5020.EI -19-12SEP91

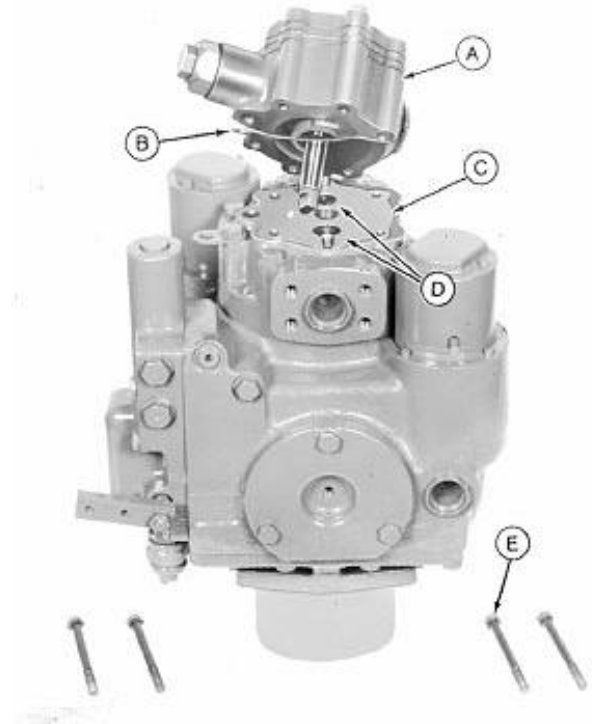
## Hydrostatic Ground Speed Drive/Assemble Hydrostatic Pump

49. Lubricate check valve O-rings, then press check valves (D) into end cover until flush with surface of end cover.

50. Install new gasket (B), aligning holes with opening in charge pump.

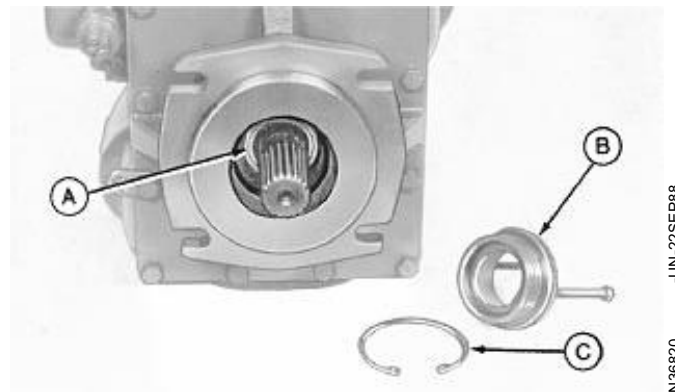
51. Align tang on charge pump (A) with slot in drive shaft. Align scribe marks and insert shaft through end cover. Make sure charge pump engages dowel pins.

52. Install screws and alternately tighten to 22-26 N·m (264-312 lb-in.).



ZX,TMXZC0002519-19-01DEC92

N32863 -UN-06.JAN192



53. Place pump on its side. Do not set pump on control lever arm.

54. Clean shaft area with a spray cleaner, such as an electrical contact cleaner or clean solvent in a spray bottle.

**IMPORTANT: Do not use solvent from parts cleaning tank. This solvent may be contaminated and defeat the purpose of cleaning shaft area.**

55. If installing a new seal assembly, wash anti-rust agent off new rotating and stationary seals. Use same spray cleaner used to clean shaft area. Do not use a brush, cloth, etc., to clean seals.

56. Grip rotating seal (A) with JDG351 Seal Remover Tool.

57. Again, spray seals using cleaner or clean solvent.

**IMPORTANT: Do not touch sealing surfaces of rotating and stationary seals after cleaning. The sealing surfaces on seals are sensitive enough to leak with only a finger print on them.**

58. Carefully seat rotating seal against shaft inner race. Be careful not to touch or scratch sealing surface or leakage will result.

59. Clean stationary seal (B) as done previously and install. Press stationary seal into flange, being careful not to touch or damage large O-ring on snap ring groove.

60. Using JDG114 Snap Ring Pliers, install snap ring (C), BEVELED EDGE OUT. Make sure snap ring is fully expanded in its groove. Avoid damaging finished surfaces.

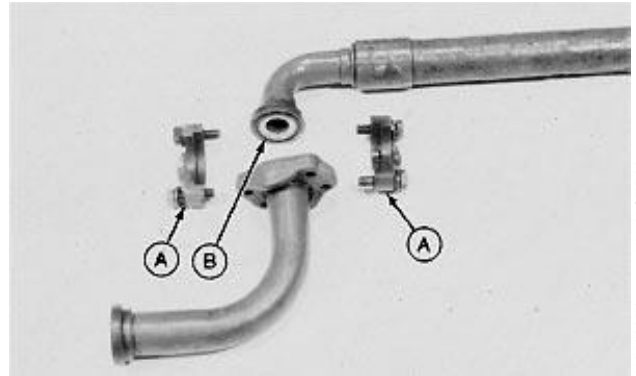
61. Rotate shaft being careful not to damage splines. If shaft binds, check end play and correct.

ZX,TMXZC0002395-19-25NOV92

## REPLACE HIGH-PRESSURE LINE CENTER PIVOT O-RINGS

Whenever a high-pressure line is removed from the machine, replace the center pivot O-ring as follows:

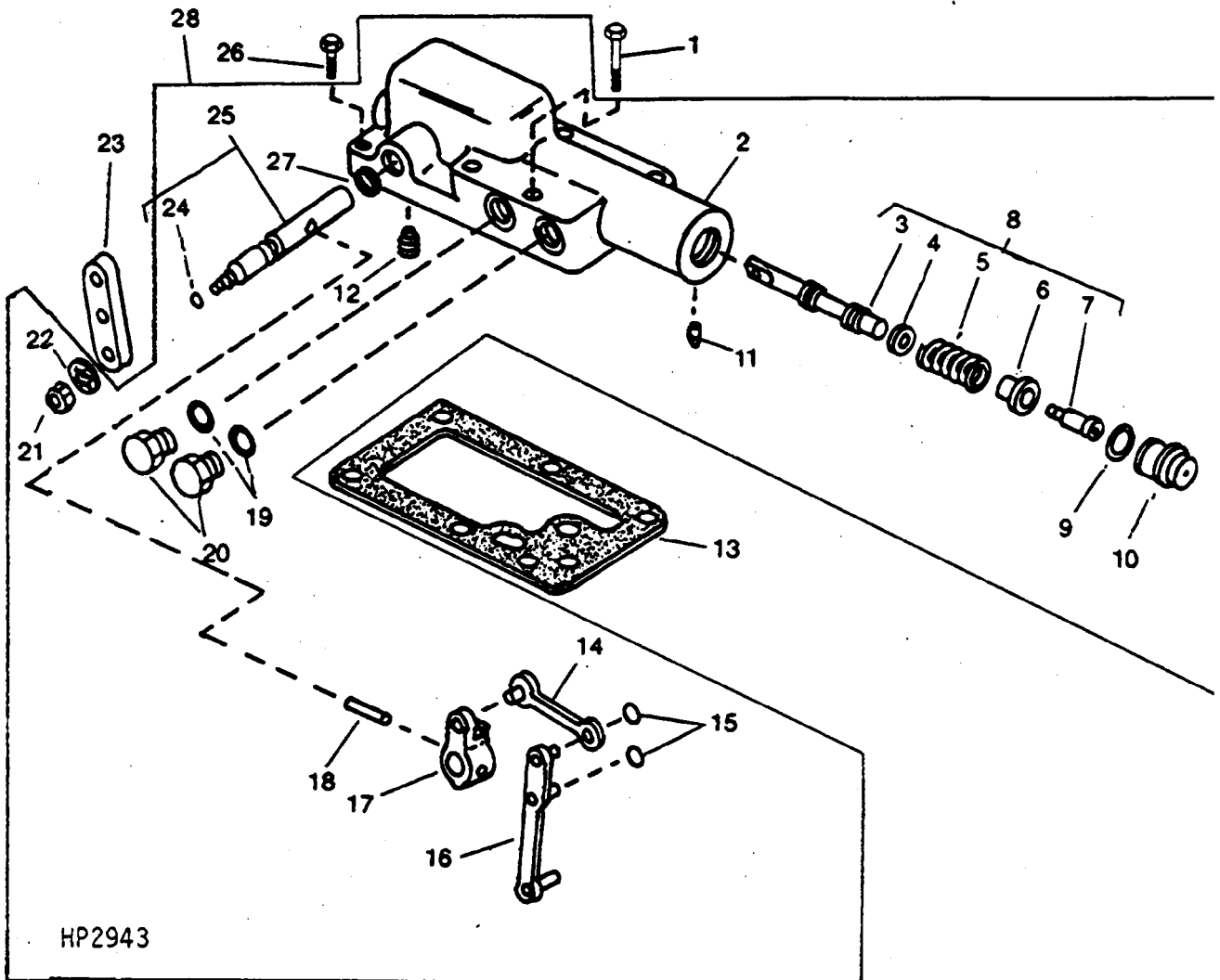
1. Remove clamps (A) from high-pressure line couplings.
2. Remove O-rings (B) from center coupling of both high-pressure lines.
3. Clean coupler joint surfaces prior to reassembly.
4. Coat new O-rings with clean hydrostatic oil and install.
5. Assemble high-pressure lines, hoses, and steel lines.  
Loosely install clamps.



NB4320F1 -JUN-29SEP88

1401,5020,EL -19-12SEP91

REPAIR CONTROL VALVE



- |                      |                    |                       |                       |
|----------------------|--------------------|-----------------------|-----------------------|
| 1—Cap Screw (2 used) | 8—Repair Kit       | 15—Snap Ring (2 used) | 22—Washer             |
| 2—Housing            | 9—O-Ring           | 16—Control Link       | 23—Link               |
| 3—Spool              | 10—Adjusting Screw | 17—Connector          | 24—O-Ring             |
| 4—Washer             | 11—Bolt            | 18—Spring Pin         | 25—Shaft              |
| 5—Spring             | 12—Set Screw       | 19—O-Ring (2 used)    | 26—Cap Screw (4 used) |
| 6—Retainer           | 13—Gasket          | 20—Plug (2 used)      | 27— Seal              |
| 7—Cap Screw          | 14—Link            | 21—Nut                | 28—Complete Valve     |

1401,5020,EM -19-12SEP91

HP2943 -UN-13APR89



## Hydrostatic Ground Speed Drive/Repair Control Valve

Valve may be removed from pump without removing pump from combine. Disconnect control linkage.

1. Remove six screws to loosen valve.
2. Unhook link (16) from control link.
3. Discard drained oil and cover opening in pump housing to keep dirt out.
4. Unhook link (14) from connector (17), loosen set screw (12), remove spring pin (18) and pull shaft (25) out of valve.
5. Scribe two lines on adjusting screw (10) to indicate setting.
6. Loosen set screw and remove adjusting screw (10) and spool (3).
7. Clean all part in solvent and dry thoroughly. Replace all worn or damaged parts and install new O-rings.
8. Insert spool kit (8) into housing. Screw centering spring adjusting screw (10) until scribe marks align. Tighten set screw.
9. If new spool, spring or adjusting screw is installed, turn adjusting screw into housing until just contacting spring. DO NOT compress spring.
10. Install pivot shaft, new sealing washer and O-ring. Tighten set screw (12) and install pin (18) and connect link (14) in connector (17).
11. Check spool (3) for end play by moving it back and forth. If there is end play, tighten adjusting screw (10) until it touches spring. Exert a slight back and forth force on spool while adjusting screw. DO NOT compress spring beyond its installed length.
12. Hook link (16) into control link. Make sure control link is pointing toward end cover of housing or unit will not function properly.
13. Tighten attaching bolts to 22-26 N·m (264-312 lb-in.).

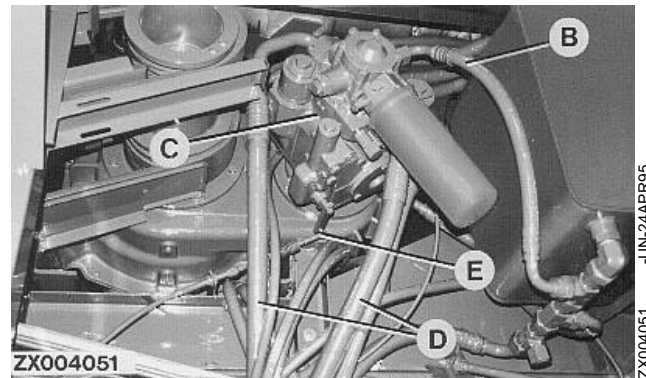
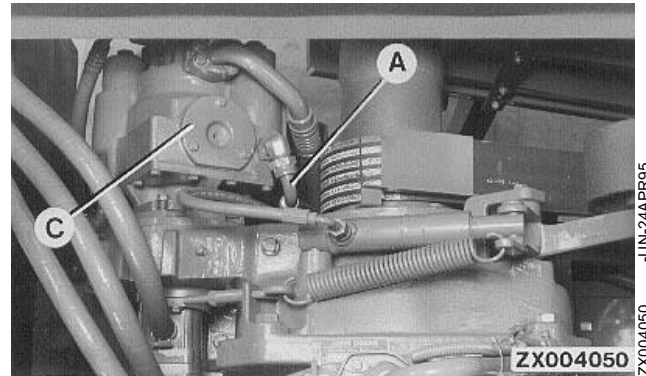
1401,5020,EN -19-12SEP91

## INSTALL HYDROSTATIC PUMP

**CAUTION:** The approximate weight of the pump is 68 kg (160 lb).

1. Attach pump with four cap screws. Tighten screws to 130 N·m (96 lb-ft).
2. Connect lines and control cable to pump (C). Use new O-rings. Before connecting line (A), fill hydrostatic pump housing with clean hydrostatic oil.
3. Check oil level. Start engine and bleed system.

A—Line to Hydrostatic Oil Cooler  
B—Charge Pump Suction Line  
C—Hydrostatic Pump  
D—High Pressure Hose (2 used)  
E—Control Cable



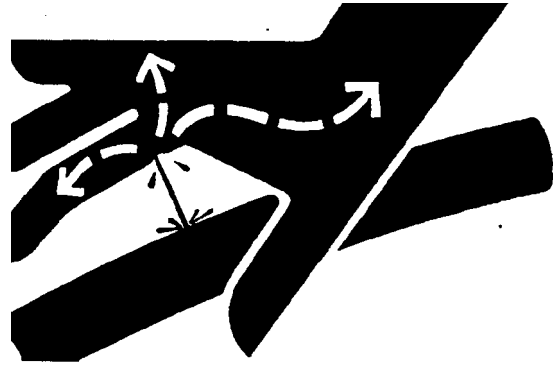
ZX.TMXZC0002396-19-25NOV92

## REMOVE AND INSTALL CHARGE PUMP

**! CAUTION:** Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury may call the Deere & Company Medical Department in Moline, Illinois, or other knowledgeable medical source.

1. Stop engine. Operate controls to release hydraulic pressure.

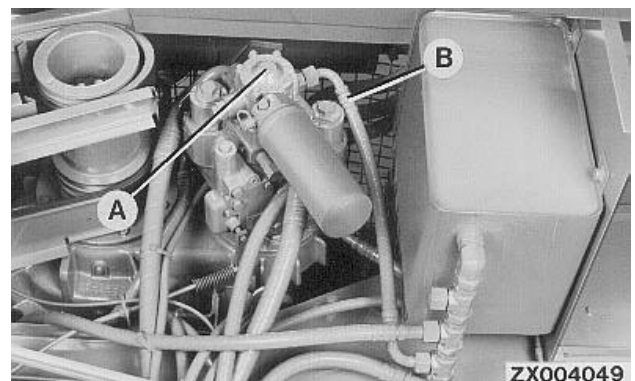


-UN-23AUG88  
X9811

ZX, TMXZC0002508-19-01DEC92

2. Thoroughly clean charge pump area.
3. Disconnect line (B) to charge pump (A).
4. Remove charge pump (A).
5. Repair pump as necessary.
6. Install charge pump (A).
7. Connect line (B) to charge pump (A).

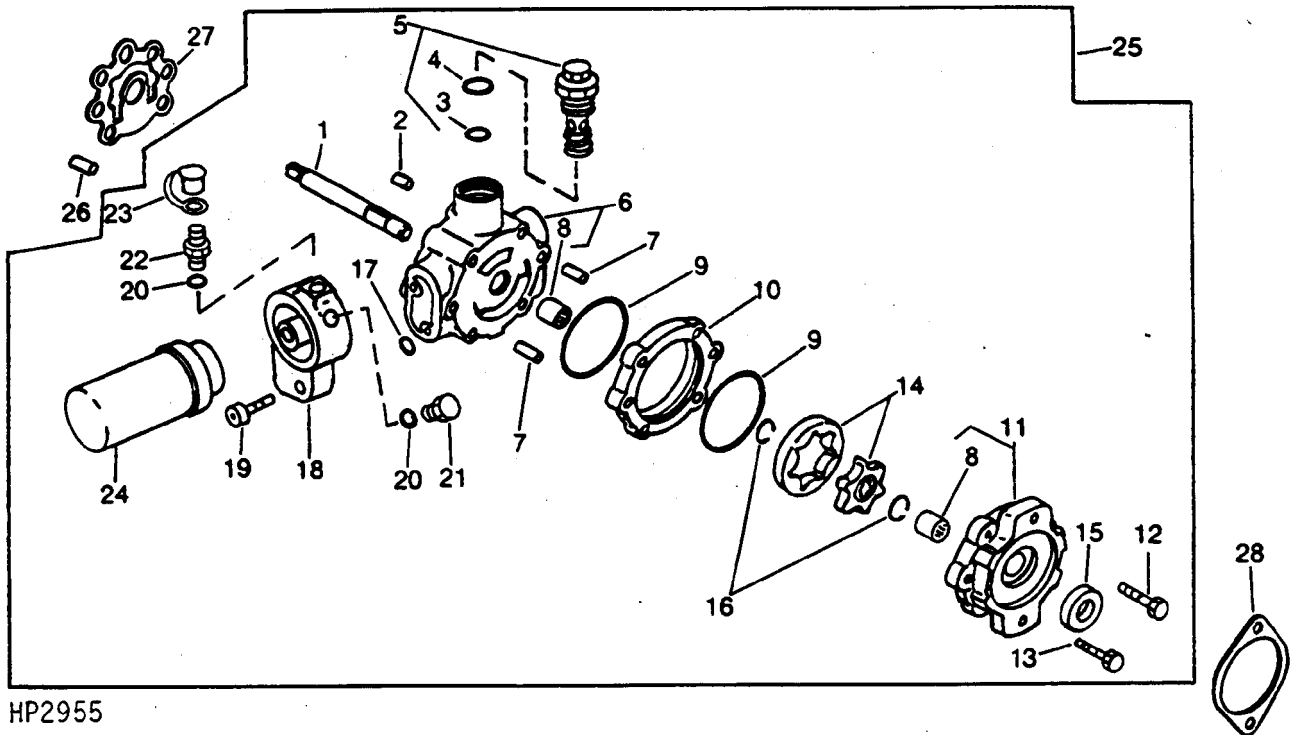
A—Charge Pump  
B—Line to Charge Pump



-UN-24APR95  
ZX004049

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REPAIR CHARGE PUMP



HP2955

UN-10OCT88  
HP2955

- |                                |                              |                       |                  |
|--------------------------------|------------------------------|-----------------------|------------------|
| 1—Shaft                        | 7—Bushing                    | 14—Rotor              | 22—Test Port     |
| 2—Pin                          | 8—Needle Bearing             | 15—Seal               | 23—Dust Cap      |
| 3—O-Ring                       | 9—O-Ring (2 used)            | 16—Snap Ring (2 used) | 24—Filter        |
| 4—O-Ring                       | 10—Spacer                    | 17—O-Ring             | 25—Pump Complete |
| 5—Charge Pressure Relief Valve | 11—Cover with Needle Bearing | 18—Filter Base        | 26—Pin           |
| 6—Housing with Needle Bearing  | 12—Cap Screw                 | 19—Cap Screw          | 27—Gasket        |
|                                | 13—Cap Screw                 | 20—O-Ring             | 28—Gasket        |
|                                |                              | 21—Plug               |                  |

1. Scribe a line across pump sections.
2. Remove cap screws (12 and 13).
3. Inspect rotor assembly (14), shaft (1) and body (6) for excessive wear or scoring. Replace if necessary.
4. Remove and clean pressure relief valve (5).
5. Install new O-rings and packings.
6. Assemble pump, aligning scribe marks.
7. Tighten pressure relief valve (5) to 163-197 N·m (120-145 lb-ft).
8. Tighten cap screws (12 and 13) to 22-26 N·m (192-228 lb-in.).

ZX, TMXCO002398-19-25NOV92

## INSTALL CONTROL CABLE

1. Carefully remove old cable. Note how it was attached. Install new cable in the same manner.

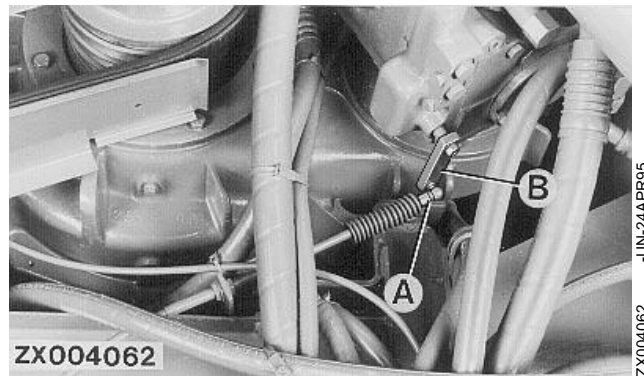
2. Adjust new cable to be sure combine will not “creep” with hydrostatic drive lever in neutral.

Place hydrostatic drive lever in neutral.

Attach ball joint (A) on cable to bore of arm (B).

3. Do not move the arm when attaching the ball joint. It must pass freely into the bore. Turn ball joint off or on rod to adjust.

4. Start engine. The combine should not “creep” with hydrostatic drive lever in neutral. If creeping does occur, readjust cable at ball joint.



ZX.TMXZCO002399-19-25NOV92

*Hydrostatic Ground Speed Drive/Install Control Cable*

# Section 60

## Brakes, Steering, Rear Axle

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*Contents*



### REMOVING BRAKE MASTER CYLINDER

1. Drain brake fluid at bleed valve in a suitable container.

2. Unhook spring (A).

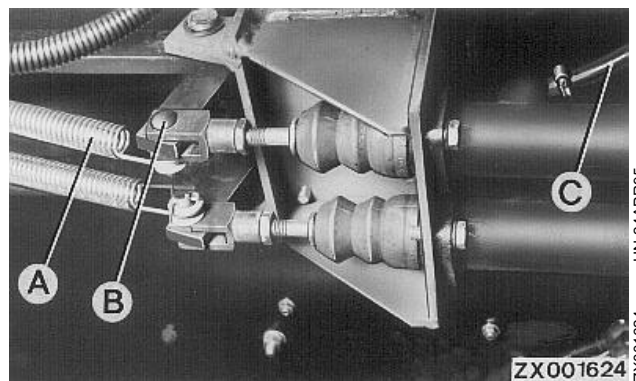
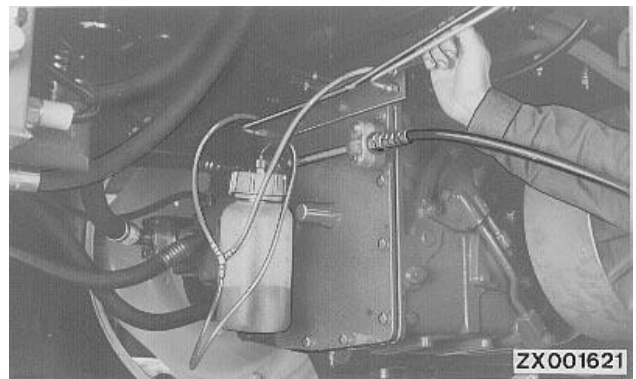
Remove pin (B).

Remove hose (C).

Remove brake line on pressure side. If necessary, disconnect cable to brake light switch.

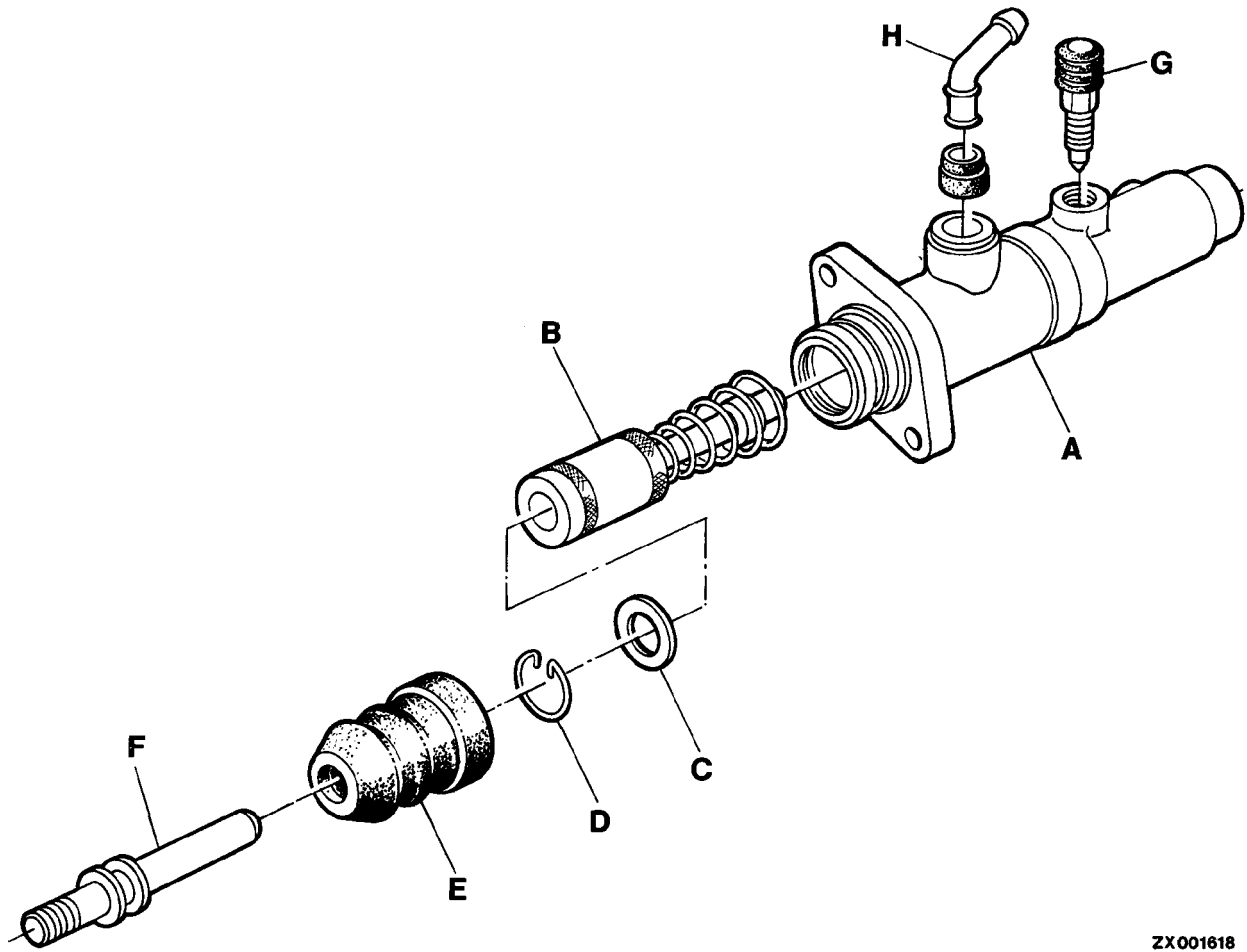
Remove brake master cylinder attaching screws and brake master cylinder.

**A—Spring**  
**B—Pin**  
**C—Hose**



ZX,TMSPFH001097-19-23SEP91

**REPAIRING BRAKE MASTER CYLINDER**



A—Brake master cylinder housing  
B—Double-stage piston

C—Washer  
D—Snap ring

E—Boot  
F—Rod

G—Bleed screw  
H—Oil inlet

After snap ring (D) has been removed brake master cylinder can be disassembled.

**IMPORTANT:** To ensure exact operation do not repair double-stage piston (B). Replace double-stage piston (B) as a unit, if necessary.

If brake master cylinder is worn, rusty or has visible scores, replace it as a unit.

When assembling brake master cylinder make sure bore in boot (E) is at the bottom to drain condensation water.

ZX001618

ZX001618 -UN-03MAY95

### INSTALLING BRAKE MASTER CYLINDER

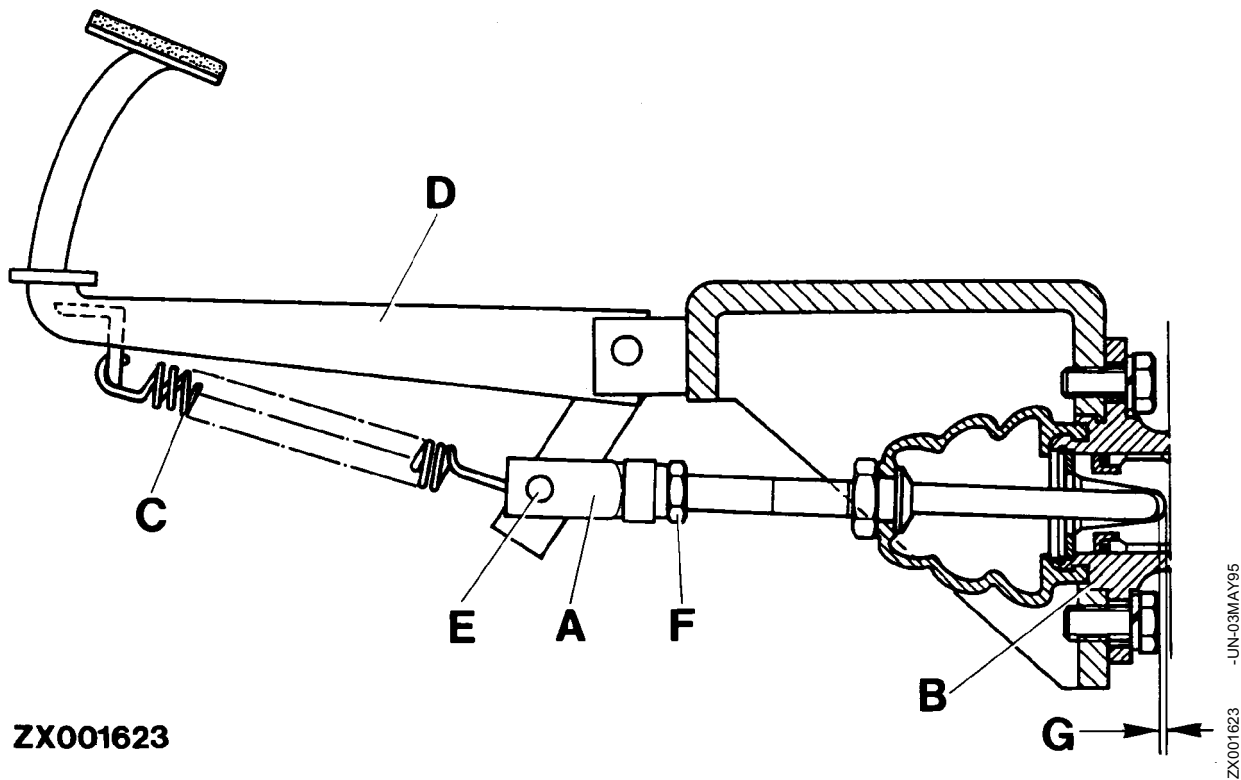
Install brake master cylinder by reversing removal procedure.

Bleed brake system after yoke adjustment has been completed.

Check adjustment of yoke after installation and correct adjustment, if necessary.

ZX,TMSPFH001099-19-23SEP91

### ADJUSTING YOKE AT BRAKE MASTER CYLINDER



ZX001623

A—Yoke  
B—Brake master cylinder

C—Retracting spring  
D—Brake pedal

E—Pin  
F—Lock nut

G—Distance 0.5—1 mm  
(0.02—0.04 in.)

Adjust yoke (A) at brake master cylinder until a clearance (G) of 0.5—1 mm (0.02—0.04 in.) is

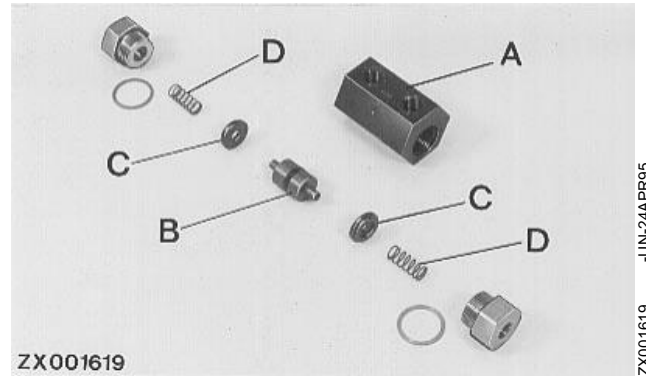
obtained between rod and brake piston with brake pedal in home position.

ZX,TMSPFH001100-19-23SEP91

## REPAIRING PRESSURE EQUALIZING VALVE

Replace pressure equalizing valve with a new one, when defective.

- A—Housing
- B—Piston
- C—Stop washer
- D—Spring



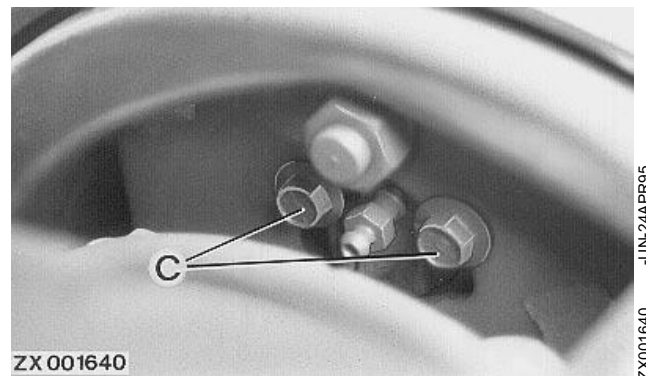
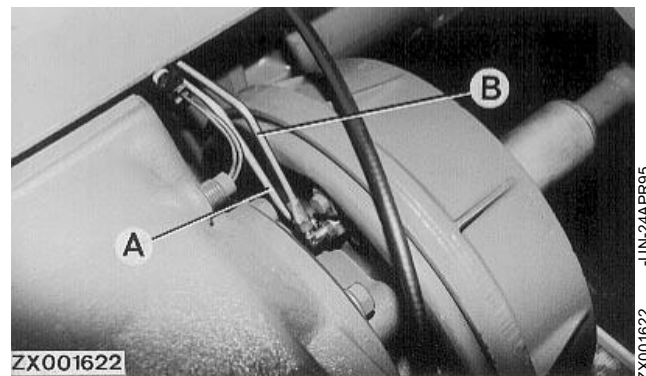
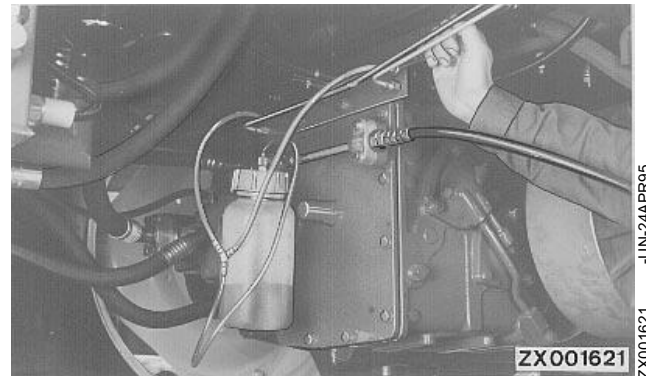
ZX, TMSPFH001101-19-23SEP91

ZX001619 -UN-24APR95

## REMOVING BRAKE OPERATING CYLINDER

1. Open bleeding valve and drain brake fluid in a suitable container.
2. Remove brake drum and brake linings.
3. Remove brake line (A) and bleed line (B).
4. Remove brake operating cylinder after having removed attaching screws (C).

- A—Brake line
- B—Bleed line
- C—Attaching screws



ZX, TMSPFH001102-19-01OCT91

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ZX001622 -UN-24APR95

ZX001640 -UN-24APR95

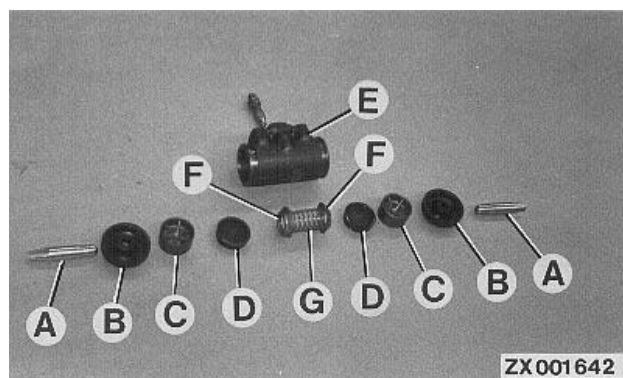
## REPAIRING BRAKE OPERATING CYLINDER

Disassemble brake operating cylinder.

Check all parts for wear, scores or rust.

Use suitable repair kit if any parts are damaged.

- A—Rod
- B—Dust boot
- C—Brake piston
- D—Boot
- E—Brake operating cylinder housing
- F—Plate washer
- G—Spring



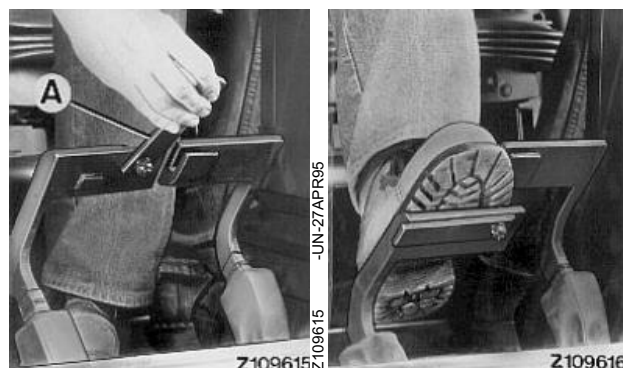
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ZX001642

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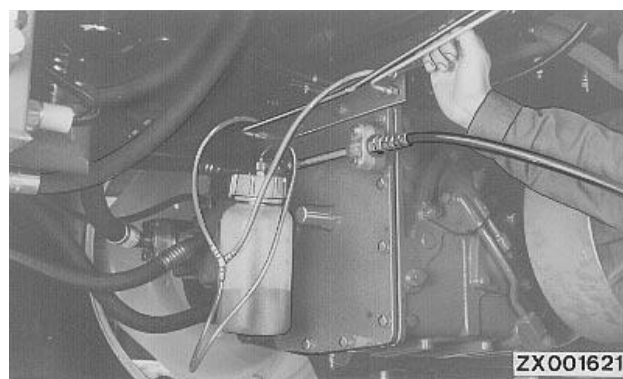
## BLEEDING BRAKE SYSTEM

1. Fill brake fluid reservoir.
2. Attach a transparent plastic hose to bleed valve to catch escaping oil in a container.
3. Unlock brake pedals.
4. Depress brake pedal of brake being bled approx. five times and keep in depressed position.
5. For a short time open bleed valve of brake being bled, then close again.
6. Release brake pedal and repeat steps 4 and 5 until escaping brake fluid is free of bubbles.



Z109615

Z109616



ZX001621

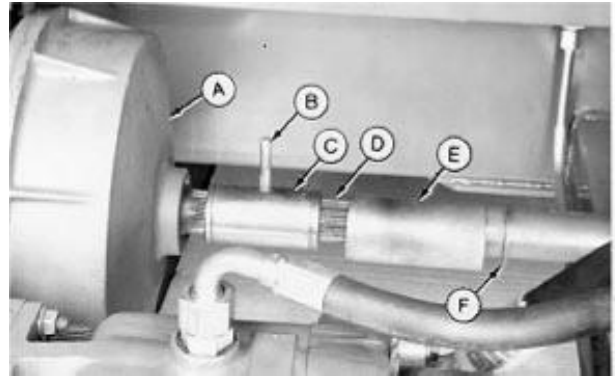
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ZX001621

ZX,TMSPFH001104-19-23SEP91

*Brake Operating Assembly/Bleeding Brake System*

## REMOVING BRAKE DRUM

1. Remove snap ring (F) to slide coupling (E) from sleeve (C).
2. Remove pin (B) from sleeve (C).
3. Remove drive shaft (D) from brake drum (A).
4. Remove brake drum.
5. Pry plug out of hole in brake drum. Disconnect parking brake cable at equalizer bar. Disconnect brake line. Remove five cap screws that secure brake assembly to transmission. Lower assembly to the ground and remove brake drum.



A—Brake drum  
B—Pin  
C—Sleeve  
D—Drive shaft  
E—Coupling  
F—Snap ring

ZX,1401,6010,C -19-12SEP91

H40510 -UN-06SEP89

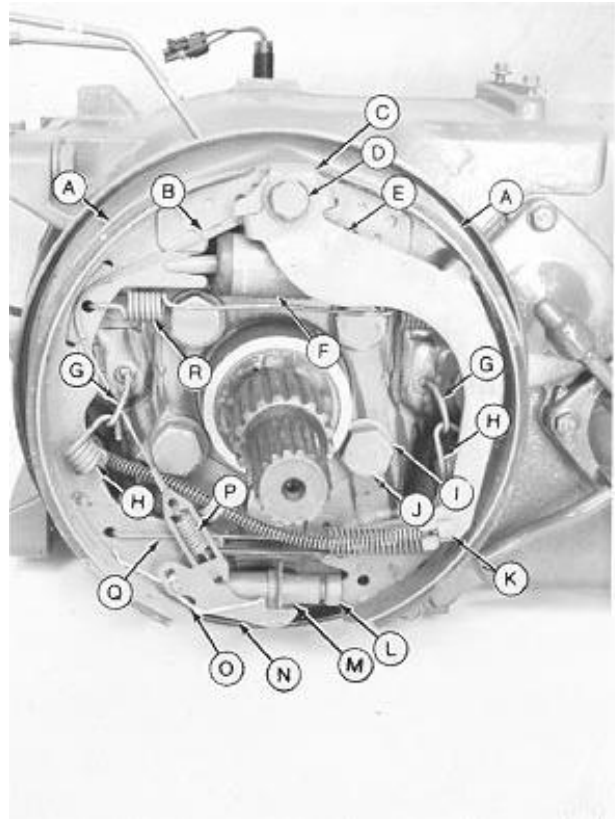
## REMOVING BRAKE SHOE

1. Remove brake drum (see this Group).
2. Remove springs (H and O—R) to remove brake shoes (A) from backing plate.

*NOTE: Only remove anchor bolt (D) if it is necessary to repair park brake mechanism.*

**IMPORTANT: Keep hands clean when handling brake shoes. Do not permit oil or grease to come in contact with linings.**

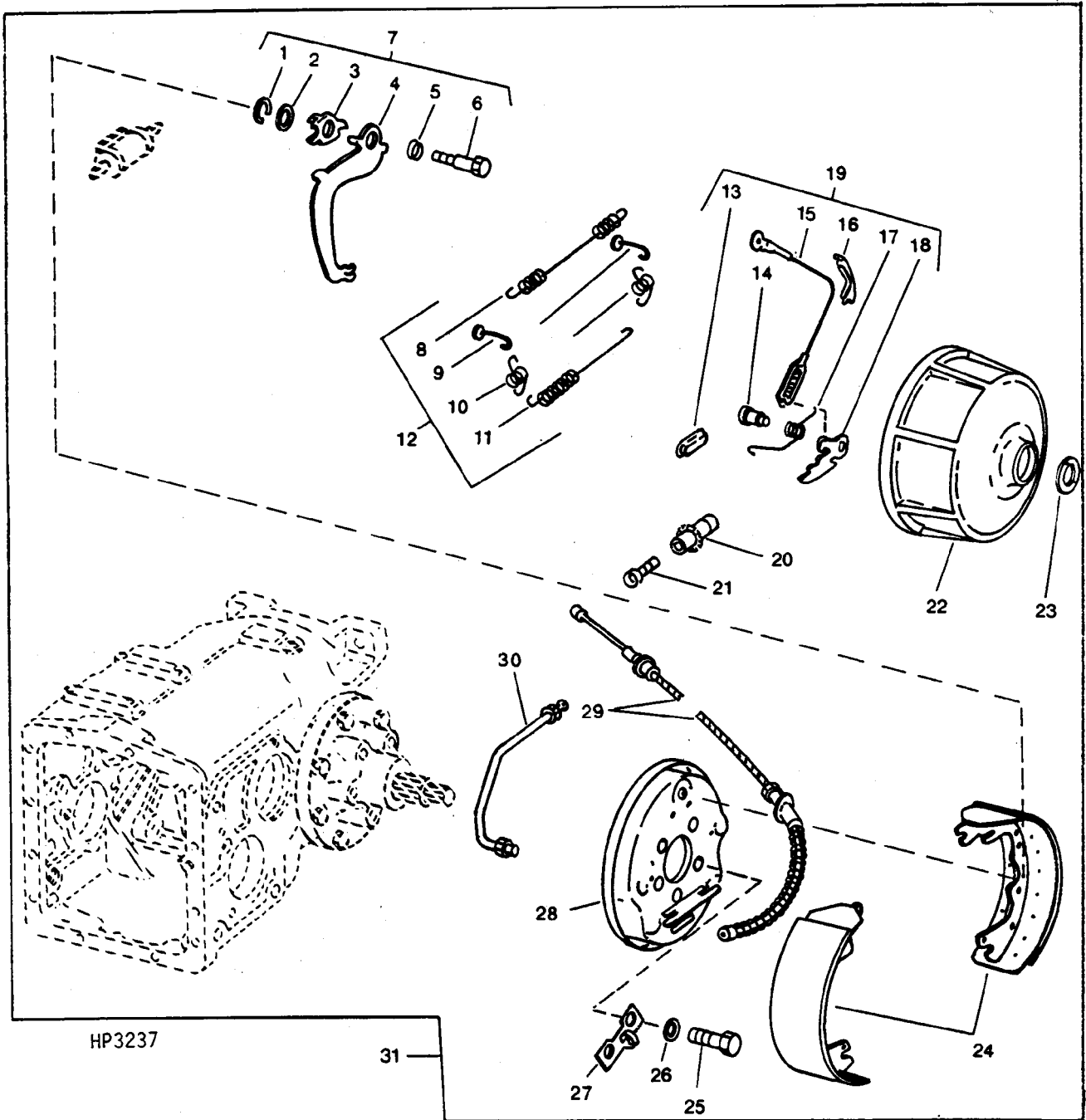
A—Brake shoe (2 used)	K—Cable
B—Cable	L—Support pin
C—Eccentric plate	M—Adjuster bolt
D—Anchor bolt	N—Brake adjusting lever
E—Park brake lever	O—Spring
F—Piston	P—Spring
G—Hook (2 used)	Q—Spring
H—Spring (2 used)	R—Spring
I—Washer (4 used)	
J—Cap screw (5 used)	



ZX,1401,6010,D -19-12SEP91

H40511 -UN-06SEP89

REPAIR BRAKES



HP3237

31

HP3237 -UN-10OCT88

ZX,1401,6010,E -19-12SEP91



## Brakes/Brake Components

1—Snap ring	9—Hook	17—Spring	25—Brake to transmission cap screws (5 used)
2—Washer	10—Spring	18—Brake adjusting lever	26—Washer
3—Eccentric plate	11—Spring	19—Adjusting screw kit	27—Guide
4—Park brake lever	12—Spring kit	20—Adjusting screw	28—Backing plate
5—Spring	13—Cover	21—Support pin	29—Cable (to pedal)
6—Anchor bolt	14—Pin	22—Brake drum	30—Fluid line
7—Park brake kit	15—Cable	23—Snap ring	
8—Spring	16—Guide	24—Brake shoes	

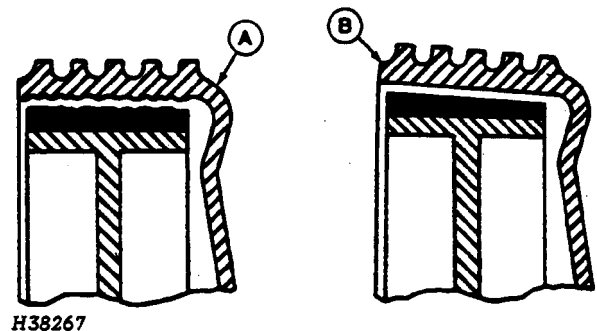
### Legend for Exploded View of Brakes

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. Clean backing plate (28). Be sure shoe support points are smooth and free of rough edges.</p> <p>2. Clean support pin (21) threads and check for thread damage. The adjusting screw (20) must turn freely.</p> <p>3. Check springs (5, 8, 10, 11 and 17) and other parts for loss of tension and damage. Replace weak springs and any damaged or worn parts.</p> <p>4. Shoe linings must not be glazed, soiled with grease or brake fluid or otherwise damaged. There must be a minimum of 0,8 mm (1/32 in.) lining remaining above rivet heads at the thinnest point.</p> | <p>5. Brake shoes (24) must not be distorted, cracked or have broken welds.</p> <p>6. Check slave cylinder by pulling back edge of dust boot. There should be no brake fluid inside the boot. If inside of boot is wet, repair cylinder as described.</p> <p>7. Each brake drum (22) can be turned down a maximum of 1,52 mm (0.060 in.) from the diameter or 0,76 mm (0.030 in.) on each side.</p> <p>Rebore or replace the drum if the out of roundness exceeds 0,15 mm (0.006 in.). Measure out of roundness with a dial indicator with brake drum mounted on a lathe.</p> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

ZX,1401,6010,F -19-12SEP91

8. Rebore or replace brake drum if the contact surface has scoring deeper than 0,25 mm (0.010 in.) (A). The best method of checking scoring depth is to mount the brake drum on a lathe.
9. Rebore or replace brake drum if the inside diameter of the drum at the open end exceeds the inside diameter at the closed end by more than 0,25 mm (0.010 in.) (B). Measure diameters with a micrometer.

A—Scored brake drum  
B—Bell shaped brake drum



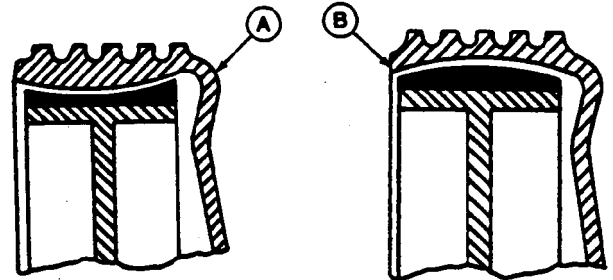
H38267

-UN-10OCT88  
H38267

ZX,1401,6010,G -19-12SEP91

10. Rebore or replace the drum if the surface variance exceeds 0,13 mm (0.005 in.) on the side. Measure this with a straight edge and a narrow feeler gauge.

- A—Convex brake drum
- B—Concave brake drum



H38268

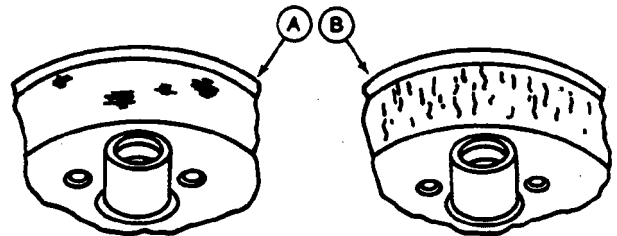
-UN-10OCT88  
H38268

ZX.1401.6010.H -19-12SEP91

11. Rebore or replace the drum if hard or chill spots (A) cause noticeable effects of pedal pulsations or brake roughness.

12. Rebore or replace the drum if heat checks (B) are plainly visible or can be felt with a fingernail.

- A—Hard or chill spots
- B—Heat checks



H38269

-UN-10OCT88  
H38269

ZX.1401.6010.I -19-12SEP91

## ASSEMBLING BRAKES

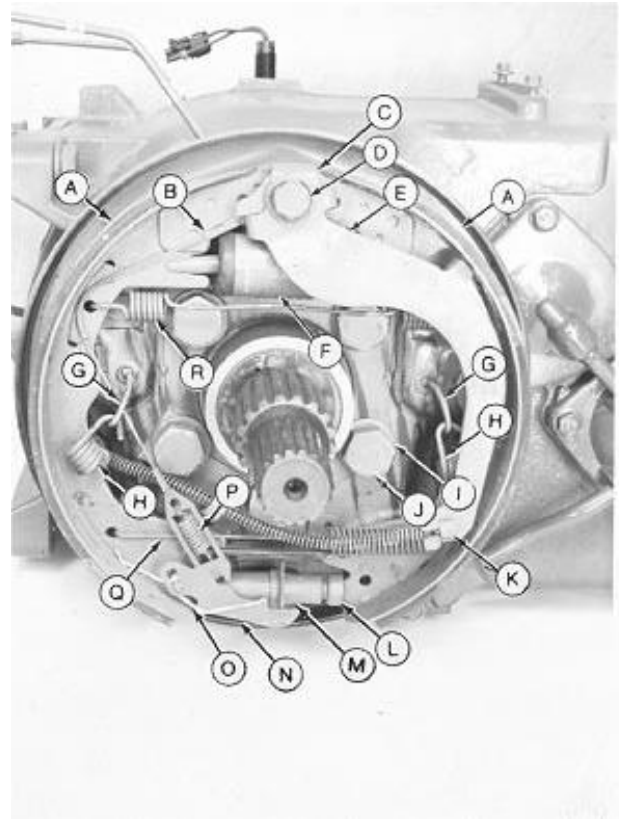
1. Apply a small amount of SAE multipurpose type grease to eccentric plate (C) mechanism behind the anchor bolt (D). Be certain parts are moving freely, but do not over-lubricate. Also apply a small amount of this grease to the dimples on the backing plate on which the brake shoes (A) ride.

2. Install parts (A—R).

3. Tighten nut on anchor bolt (D) to 45 N·m (33 lb-ft).

4. Tighten cap screws (J) to 620 N·m (460 lb-ft) anziehen.

- |                       |                         |
|-----------------------|-------------------------|
| A—Brake shoe (2 used) | K—Cable                 |
| B—Cable               | L—Support pin           |
| C—Eccentric plate     | M—Adjusting screw       |
| D—Anchor bolt         | N—Brake adjusting lever |
| E—Park brake lever    | O—Spring                |
| F—Piston              | P—Spring                |
| G—Hook (2 used)       | Q—Spring                |
| H—Spring (2 used)     | R—Spring                |
| I—Washer (4 used)     |                         |
| J—Cap screw (5 used)  |                         |



-UN-06SEP89  
H40511

ZX.1401.6010.J -19-12SEP91

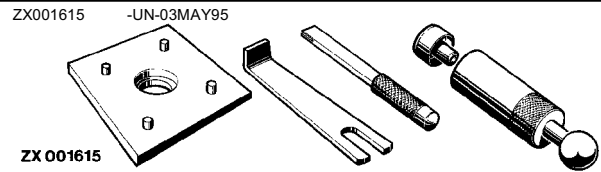
**SPECIAL OR ESSENTIAL TOOLS**

*NOTE: Order tools according to information given in the U.S. SERVICE-GARD™ Catalog or in the European Microfiche Tool Catalog (MTC).*

DX,TOOLS -19-05JUN91

Tool kit . . . . . KML10018

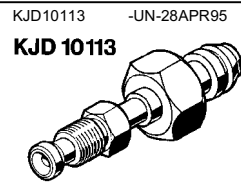
Installation of hydrostatic steering valve.



ZX,TMSPFH001105-19-23SEP91

Test fitting . . . . . KJD10113

Use with R. Bosch nozzle tester JT25510



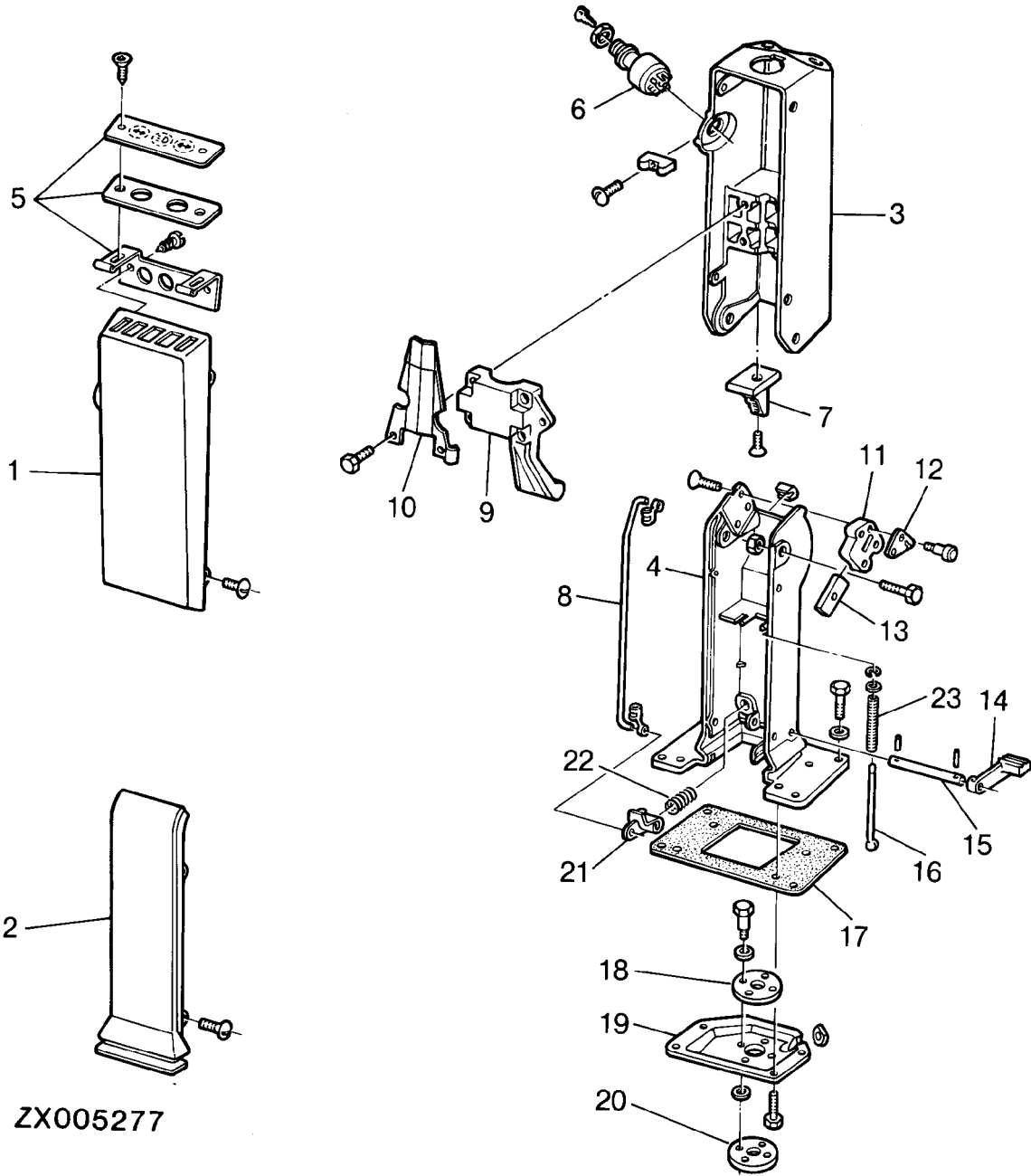
ZX,TMSPFH003505-19-05JUL94

## SPECIFICATIONS

Item	Measurement	Specification
Pressure-control valve	Pressure adjustment range	13000-14000 kPa (130-140 bar; 1885-2030 psi)
Safety valve	Pressure adjustment range	18000-20000 kPa (180-200 bar; 1960-2900 psi)
Cover to housing	Torque	30 N·m (23 lb-ft)
Threaded plug on safety valves	Torque	30 N·m (23 lb-ft)
Straight screw connections to steering valve	Torque	55 N·m (40 lb-ft)
Steering wheel to spindle, hex. nut	Torque	50 N·m (35 lb-ft)
Adjusting ring on spindle, self-locking hex. nut	Torque	20 N·m (15 lb-ft)
Slotted nut to ball joints	Torque	180 N·m (133 lb-ft)
Slotted nut to adjustable tie rod	Torque	180 N·m (133 lb-ft)
Steering cylinder screws to wheel motor	Torque	325 N·m (240 lb-ft)
Lower screws, tie rod to wheel motor	Torque	136 N·m (100 lb-ft)
Clamp screw for clamp on ball joint	Torque	45 N·m (33 lb-ft)
Clamp screws on adjustable axle	Torque	420 N·m (177 lb-ft)
Screws, wheel motor to sliding sleeve	Torque	575 N·m (424 lb-ft)
Rear wheel nuts	Torque	180 N·m (133 lb-ft)

ZX, TMSPFH003471-19-29JUN94

**STEERING COLUMN COMPONENTS**

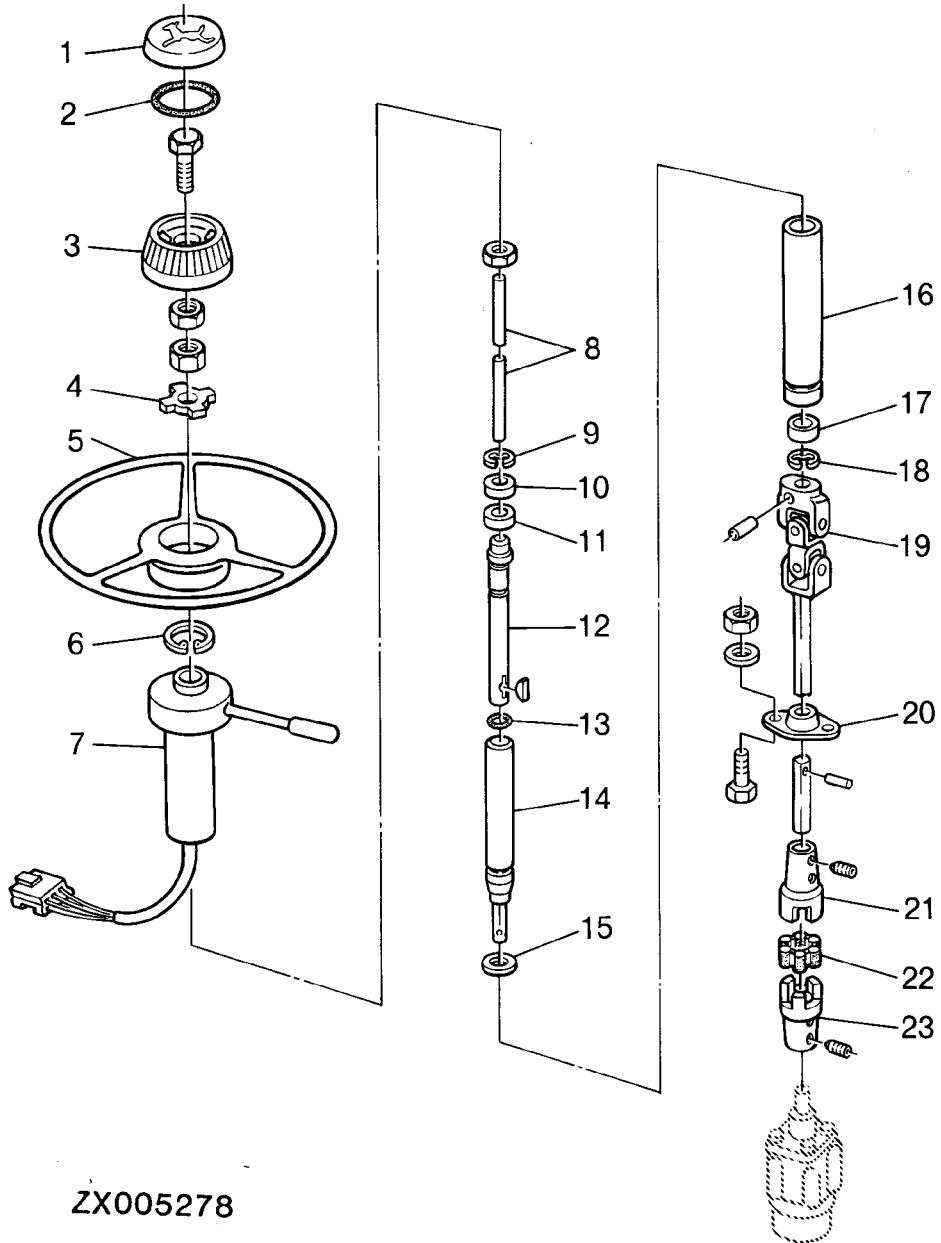


ZX005277

- |                                    |                  |                  |            |
|------------------------------------|------------------|------------------|------------|
| 1—Panel                            | 6—Starter switch | 12—Plate         | 18—Disk    |
| 2—Cover                            | 7—Cam            | 13—Sliding plate | 19—Cover   |
| 3—Upper section of steering column | 8—Rod            | 14—Pedal         | 20—Disk    |
| 4—Lower section of steering column | 9—Guide          | 15—Shaft         | 21—Bracket |
| 5—Indicator light mounting         | 10—Cover         | 16—Screw         | 22—Spring  |
|                                    | 11—Bracket       | 17—Plate         | 23—Spring  |

ZX005277 -UN-02MAY95

**STEERING COLUMN COMPONENTS (CONTINUED)**

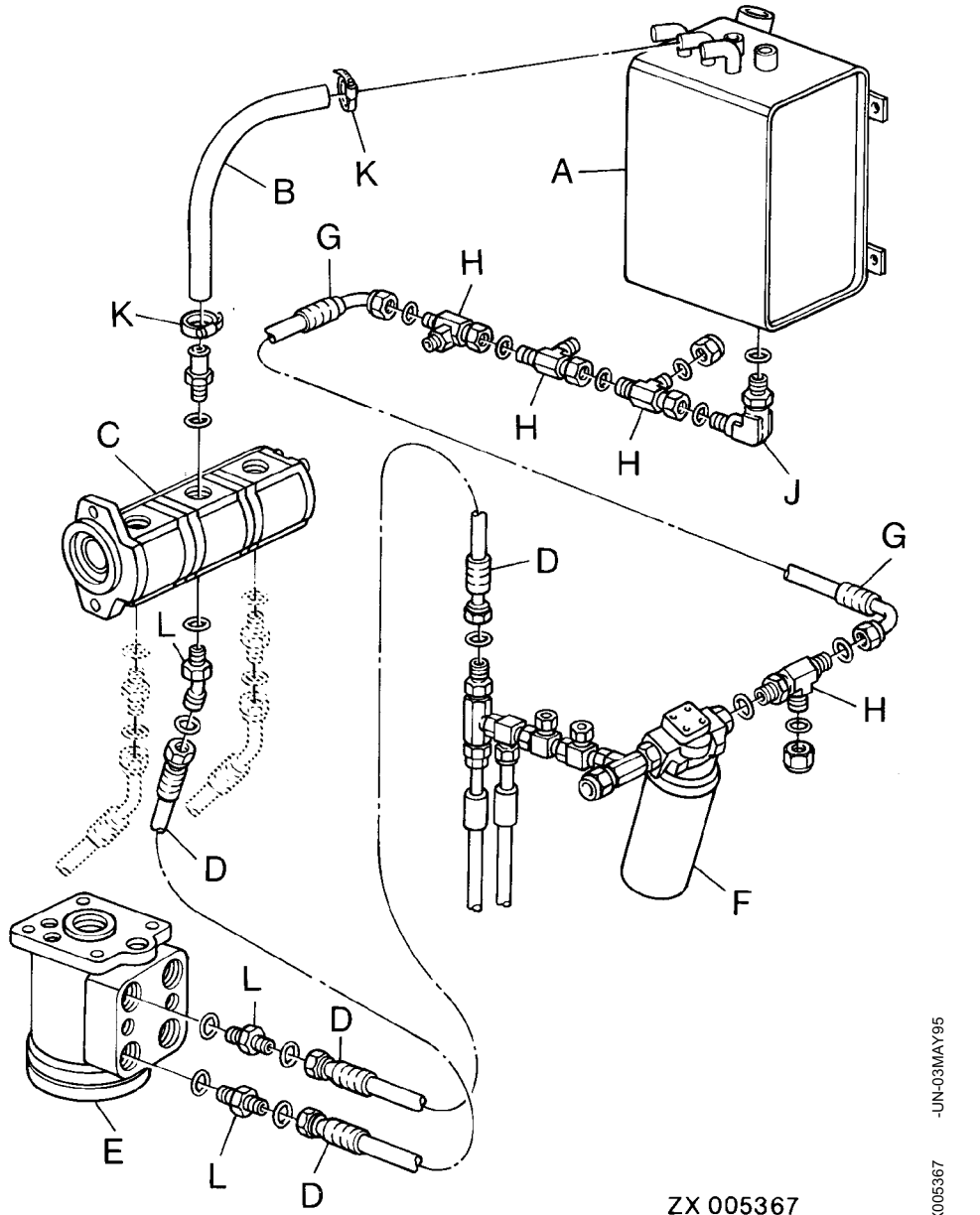


ZX005278

ZX005278 -UN-02MAY95

- |                  |                         |              |                          |
|------------------|-------------------------|--------------|--------------------------|
| 1—Cap            | 7—Turn indicator switch | 13—Ring      | 19—Universal joint shaft |
| 2—O-ring         | 8—Shaft                 | 14—Shaft     | 20—Guide                 |
| 3—Adjusting ring | 9—Snap ring             | 15—Washer    | 21—Coupler               |
| 4—Retainer       | 10—Bearing              | 16—Shaft     | 22—Connector             |
| 5—Wheel          | 11—Bearing              | 17—Bearing   | 23—Coupler               |
| 6—Snap ring      | 12—Shaft                | 18—Snap ring |                          |

**STEERING HYDRAULIC CIRCUIT**



- |                           |                  |                 |               |
|---------------------------|------------------|-----------------|---------------|
| A—Hydraulic oil reservoir | D—Pressure line  | G—Return line   | K—Hose clamp  |
| B—Suction line            | E—Steering valve | H—T-fitting     | L—Screw union |
| C—Steering pump           | F—Filter         | J—Elbow fitting |               |

ZX 005367

-JUN-03MAY95

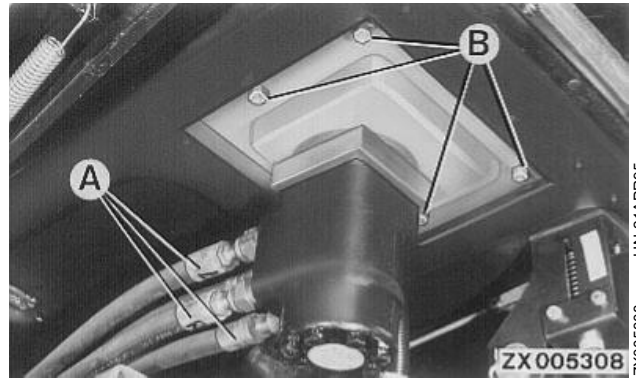
ZX005367

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## REMOVING THE STEERING VALVE

Unscrew hydraulic lines (A), seal all openings with stoppers mark the hoses.

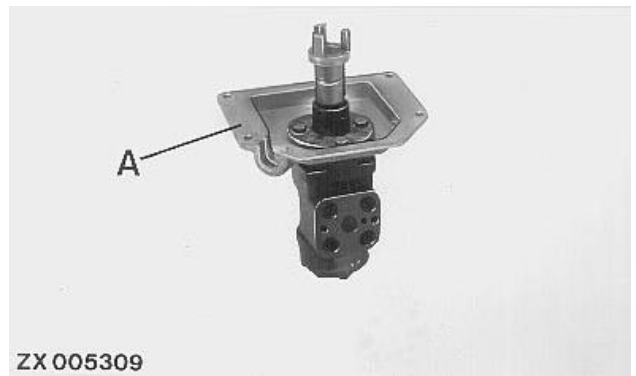
Take four screws (B) out of steering valve plate and lift off steering valve together with the plate.



ZX,TMSPFH003417-19-29JUN94

ZX005308 -UN-21APR95

Unscrew plate (A) from steering valve.

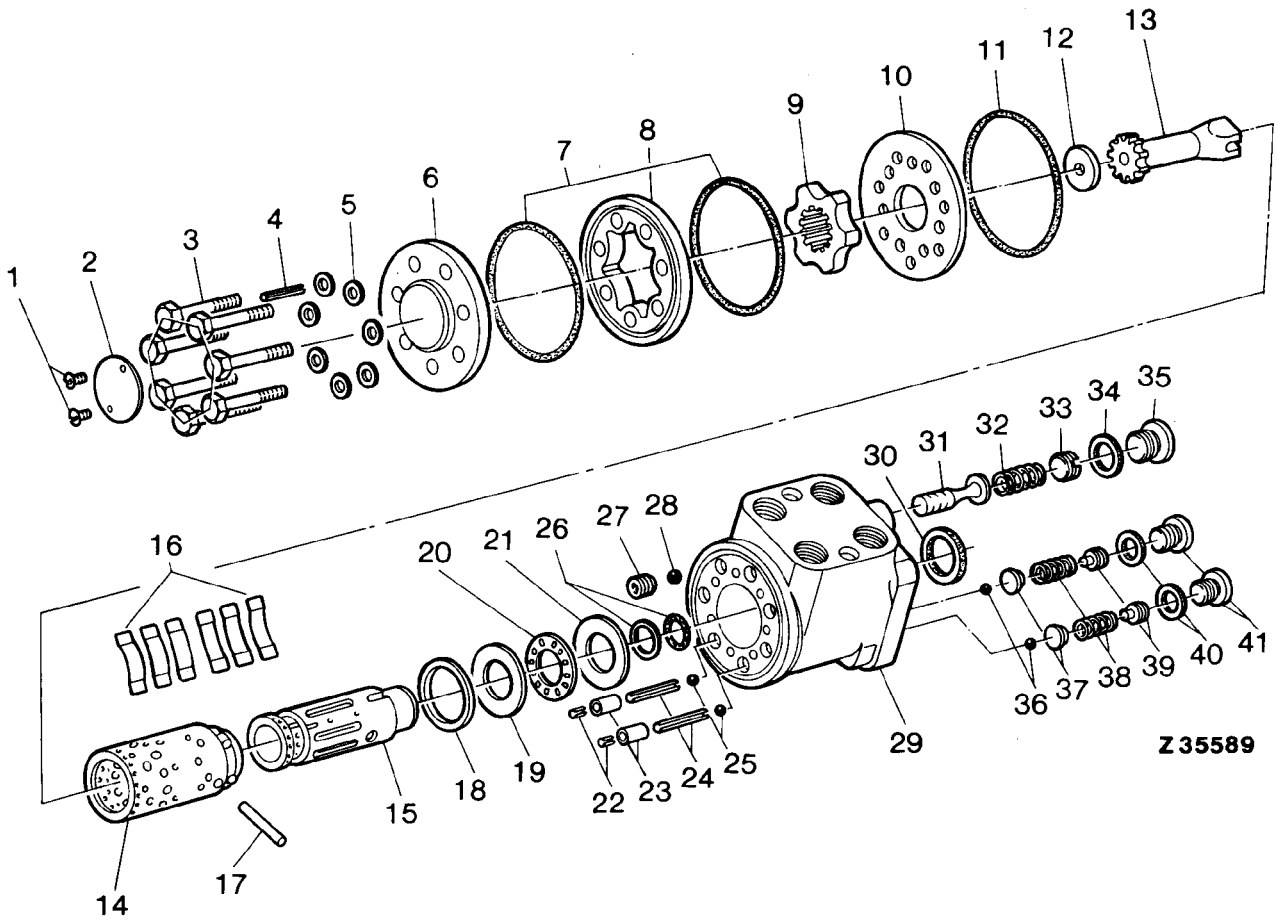


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ZX005309 -UN-21APR95



**STEERING VALVE COMPONENTS**



**Z 35589**

- |                           |                          |                            |                    |
|---------------------------|--------------------------|----------------------------|--------------------|
| 1—Flat, round-head screws | 12—Spacer ring           | 22—Spring pin              | 32—Spring          |
| 2—Type plate              | 13—Drive shaft           | 23—Bushing                 | 33—Adjusting screw |
| 3—Cap screws              | 14—Valve sleeve          | 24—Spring pin              | 34—Seal ring       |
| 4—Roll pin                | 15—Valve spool           | 25—Ball (2 used)           | 35—Plug            |
| 5—Seal washers            | 16—Leaf springs (6 used) | 26—O-ring and back-up ring | 36—Ball            |
| 6—Cover                   | 17—Cross pin             | 27—Threaded bushing        | 37—Valve head      |
| 7—O-rings                 | 18—Retaining ring        | 28—Ball                    | 38—Spring          |
| 8—Stator                  | 19—Bearing race          | 29—Housing                 | 39—Adjusting screw |
| 9—Rotor                   | 20—Thrust bearing        | 30—Seal ring               | 40—Seal ring       |
| 10—Distributor plate      | 21—Bearing race          | 31—Valve piston            | 41—Plug            |

-UN-03MAY95  
Z35589

ZX.TMSPFH003419-19-29JUN94

## DISASSEMBLING THE STEERING UNIT

### Disassembling the metering unit

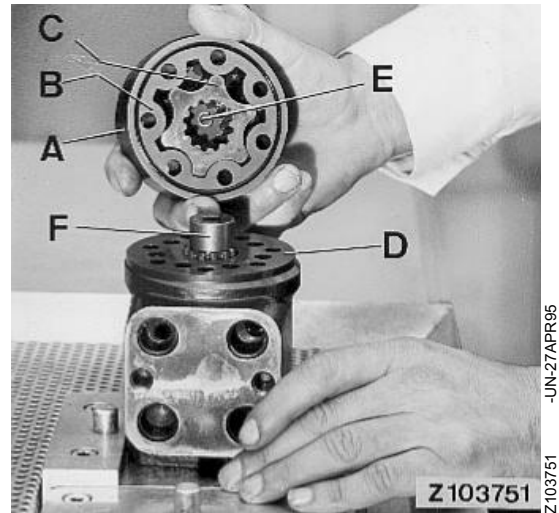
Thoroughly clean exterior of steering unit and install in clamping device KML10018-1 for dismantling.

**IMPORTANT: Always use clamping device KML10018-1. Never attempt to clamp pump housing in a vice as this would seize the honed valve spool and render the unit unserviceable.**

Remove the seven cap screws of cover (A).

*NOTE: One of the seven cap screws is longer than the others. A roll pin is located in this screw.*

Remove cover (A), rotor (C), stator (B) and, if required, spacer ring (E). Then remove distributor plate (D) and drive shaft (F).



- A—Cover
- B—Stator
- C—Rotor
- D—Distributor plate
- E—Spacer ring
- F—Drive shaft

ZX,TMSPFH003420-19-29JUN94

## REMOVING SAFETY VALVES

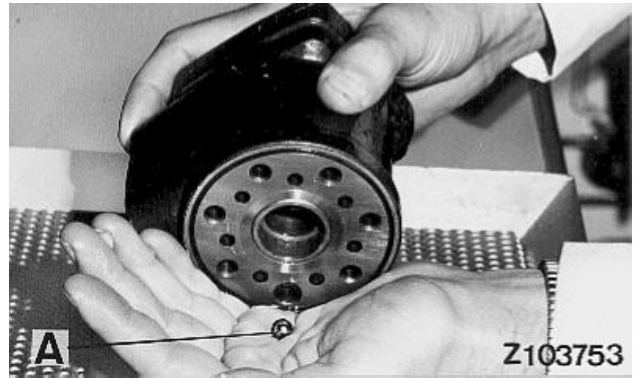
Hold steering unit (B) at an angle and shake it to remove both safety valves (A).



ZX,TMSPFH003421-19-29JUN94

### REMOVING CHECK VALVE

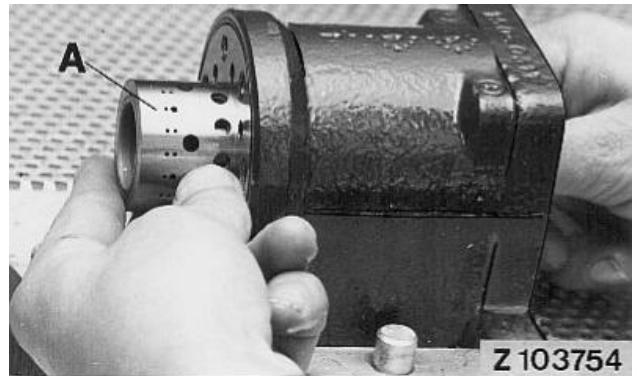
Remove threaded bushing and shake out check valve ball (A).



ZX,TMSPFH003422-19-29JUN94

### REMOVING SPOOL AND SLEEVE

Press against spool to press spool (A) and the sleeve together with the retaining ring and bearing races out of the housing. Make sure that the cross pin is aligned in sleeve and spool. The cross pin is visible through the open end of the spool.



ZX,TMSPFH003423-19-29JUN94

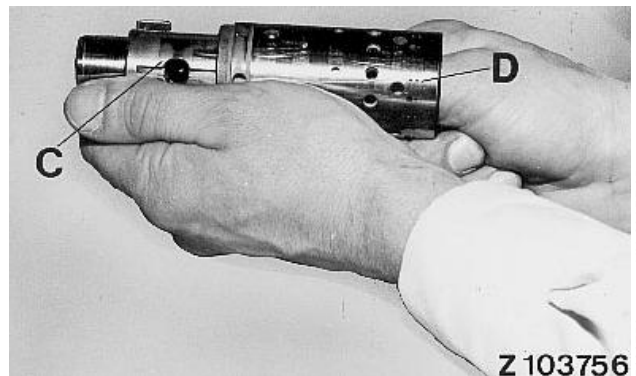
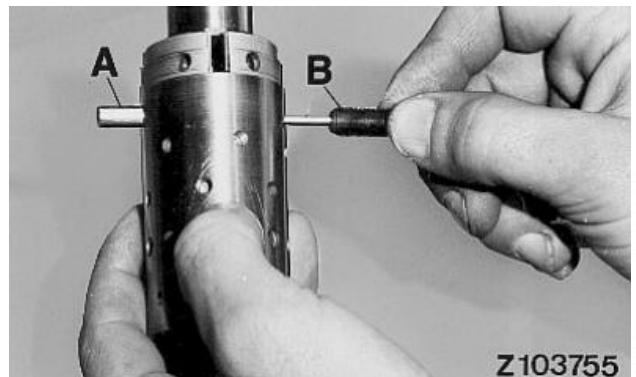
### DISASSEMBLING THE SPOOL ASSEMBLY

Using special cap screw with roll pin (B) (cover attaching screw), press cross pin (A) out of spool assembly.

Carefully press spool (C) out of sleeve (D).

**IMPORTANT: Do not cant, as this would cause jamming. Press out carefully.**

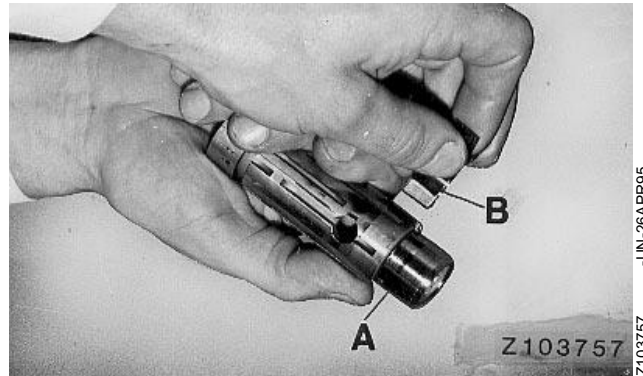
- A—Cross pin
- B—Cap screw with roll pin
- C—Valve spool
- D—Valve sleeve



ZX,TMSPFH003424-19-29JUN94

### REMOVING LEAF SPRINGS

Press spring pack (B) out of the valve spool (A).



ZX,TMSPFH003425-19-29JUN94

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### REMOVING SEAL RING

Use a suitable tool to remove seal ring (A) from the housing.



ZX,TMSPFH003426-19-29JUN94

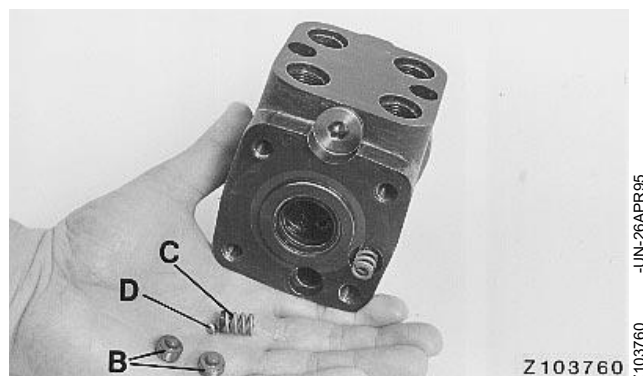
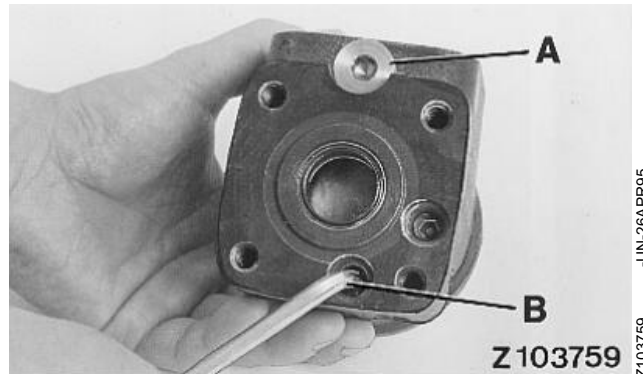
-UN-26APR95  
Z103758

### REMOVING THE SAFETY VALVES

*NOTE: Disassemble safety valves only when absolutely necessary. These valves are set to a specified pressure.*

Remove safety valve plug (A) and adjusting screw (B) with a 6 mm hex. socket wrench. Shake out spring with piston (C) and ball (D). Do not remove valve seats as these are secured with Loctite.

- A—Valve plug
- B—Adjusting screw
- C—Spring with piston
- D—Ball



ZX,TMSPFH003427-19-29JUN94

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Z103759

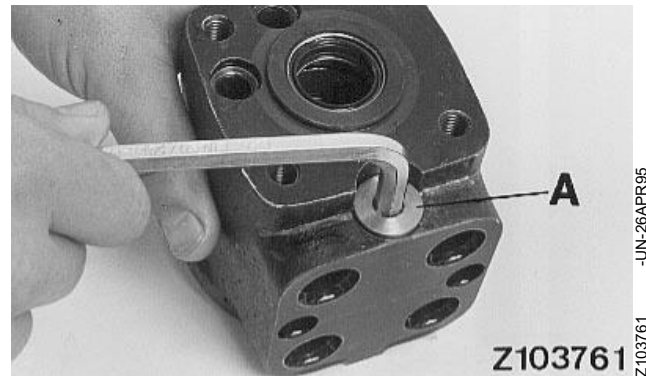
-UN-26APR95  
Z103760

## REMOVING PRESSURE-CONTROL VALVE

*NOTE: Disassemble pressure-control valve only when absolutely necessary. These valves are set to a specified pressure.*

Using an 8 mm hex. socket wrench, remove valve plug (A). Remove adjusting screw (B) with a screwdriver.

Shake out spring and piston (C). Do not attempt to remove valve seat as it is secured with Loctite.



ZX.TMSPFH003428-19-29JUN94

## REPAIRING THE STEERING UNIT

Clean all parts thoroughly. Inspect all parts, and replace any that are no longer in perfect condition.

Inspect the following parts closely for excessive wear, scoring or damage:

All housing bores and channels and the edges of the machined surfaces.

Surface condition of valve sleeve and spool. Some burnishing is acceptable.

Check edges and grooves of valve sleeve and spool.

Check valve spool bearing surface for rust, pitting and wear.

Check thrust bearing and bearing races for pitting.

In addition, it is recommended to replace all seals, washers and — if necessary — the leaf springs.



-UN-27APR95  
Z35741

ZX,TMSPFH003429-19-29JUN94

## ASSEMBLING THE STEERING UNIT

### General

Before resuming assembly, again wash all parts in clean, petroleum-based solvent and place on a fiberless absorbent paper for drying.

**IMPORTANT: Do not, under any circumstances, use rags or cotton waste.**

ZX,TMSPFH003430-19-29JUN94

### INSTALLING PRESSURE-CONTROL VALVE

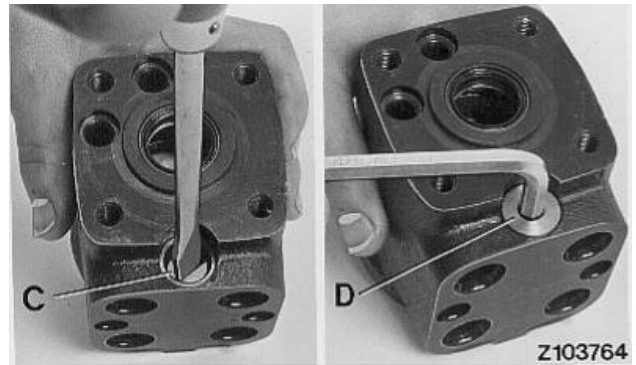
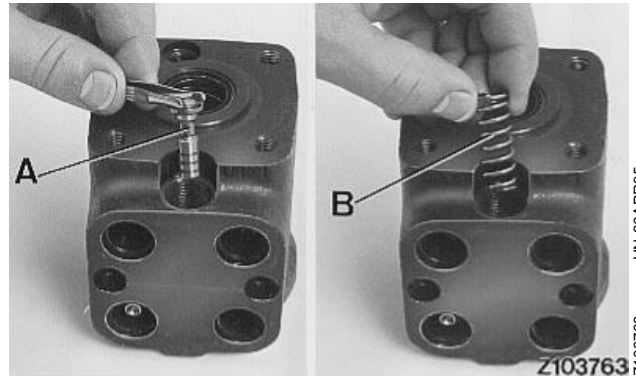
Use tweezers to install piston (A) in pressure-control valve.

Insert spring (B) over the piston and into the bore.

Coat the thread of adjusting screw (C) with T43512 sealant. Screw in adjusting screw (C) until the spring comes under pressure.

Install seal ring in groove of bore. Install plug (D) in bore and tighten to 40 - 60 N·m (29 - 43 ft-lb).

- A—Piston
- B—Spring
- C—Adjusting screw
- D—Plug



ZX.TMSPFH003431-19-29JUN94

### INSTALLING SAFETY VALVES

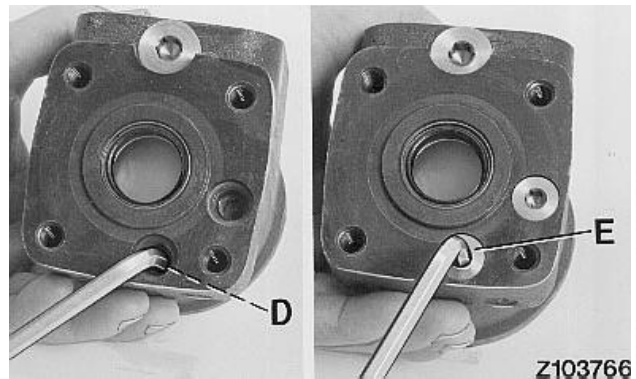
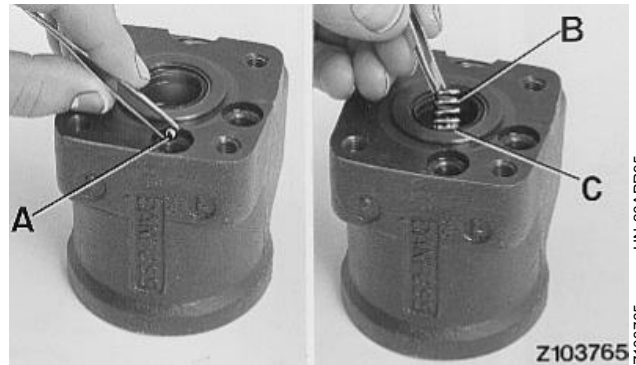
Use tweezers to install ball (A) in the bore of the safety valves.

Coat springs on valve cones with vaseline, and assemble. Insert spring (B) together with valve cones (C) in the respective bore.

Coat adjusting screw (D) with T43512 sealant. Tighten the screw until the spring is under tension.

Place sealing ring in the groove of the bore, and screw in plug (E). Tighten plug (E) to 30 - 40 N·m (22 - 29 ft-lb).

- A—Ball
- B—Spring
- C—Valve cone
- D—Adjusting screw
- E—Plug

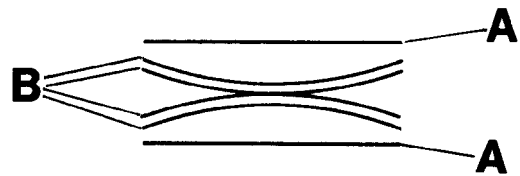


ZX.TMSPFH003432-19-29JUN94

### ARRANGING THE LEAF SPRINGS

Lay leaf springs (A) and (B) down as shown in the illustration.

- A—Straight leaf spring (2 used)
- B—Convex leaf spring (4 used)



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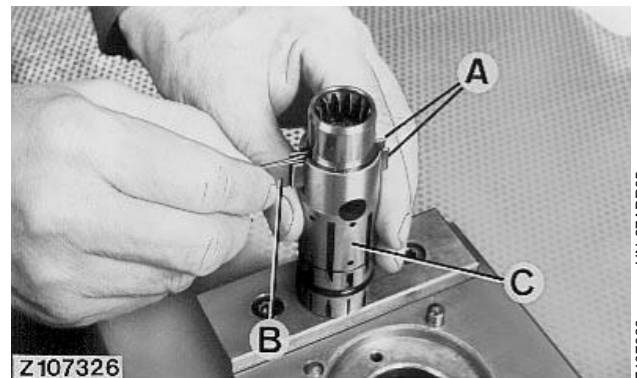
ZX,TMSPFH003433-19-29JUN94

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Z103768

### INSTALLING THE LEAF SPRINGS

Insert the two straight leaf springs (A) into the slot. Slide the four convex springs (B) between the straight springs (A) and align spring pack.

- A—Straight leaf spring (2 used)
- B—Convex leaf spring (4 used)
- C—Valve spool



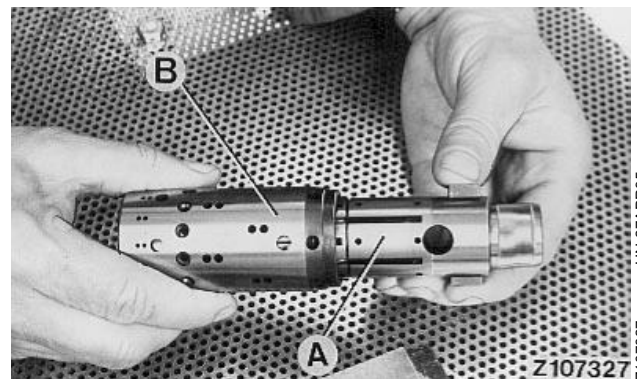
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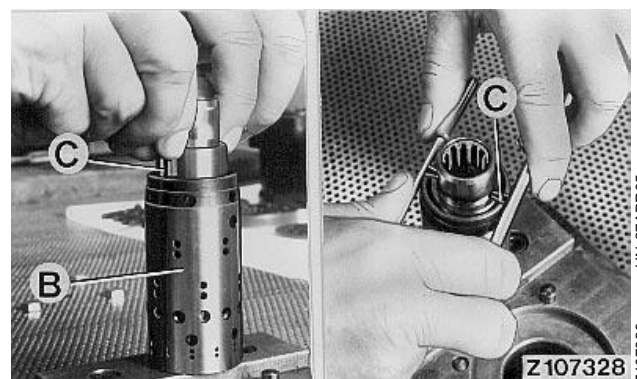
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Z107326

### ASSEMBLING THE SPOOL ASSEMBLY

Assemble the sleeve and spool (A), pressing spring pack together and inserting it into sleeve (B). Align spring pack (C).



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ZX,TMSPFH003435-19-29JUN94

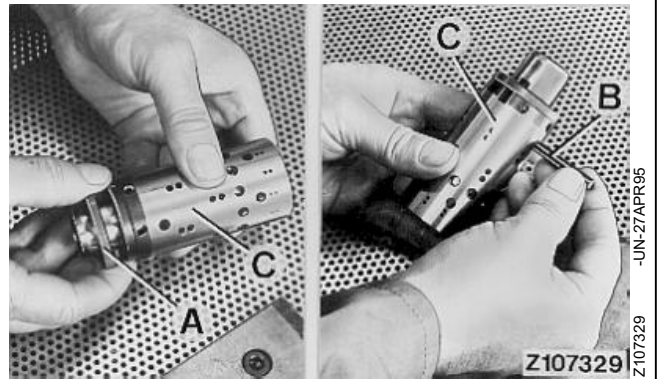
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-UN-27APR95  
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### INSTALLING RETAINING RING AND CROSS PIN

Slide retaining ring (A) over valve assembly (C). Make sure that the ring rotates freely over the spring pack. Insert cross pin (B) into spool assembly.



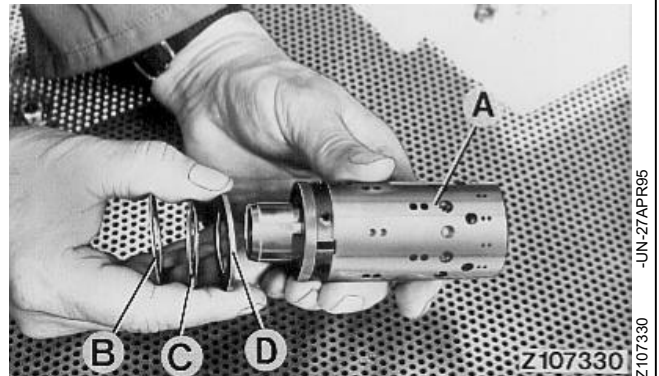
ZX,TMSPFH003436-19-29JUN94

### ASSEMBLING THE THRUST BEARING

Slide bearing race (B), thrust washer (C) and axial washer (D) into place.

*NOTE: Chamfer on bearing race (B) must face valve spool end.*

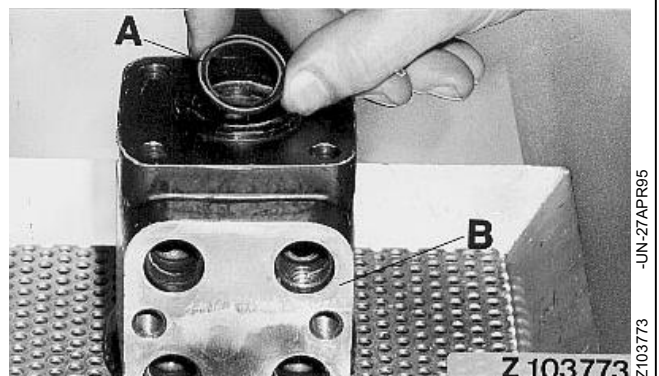
- A—Valve assembly
- B—Bearing race
- C—Thrust bearing
- D—Axial washer



ZX,TMSPFH003437-19-29JUN94

### INSTALLING THE SEAL RING

With lip facing outwards, position new seal ring (A) into groove in housing (B) and tap ring into groove with a suitably sized drift.



ZX,TMSPFH003438-19-29JUN94

### INSTALLING O-RING AND BACK-UP RING

Coat rings (E) with hydraulic oil and slide over small piston (A).

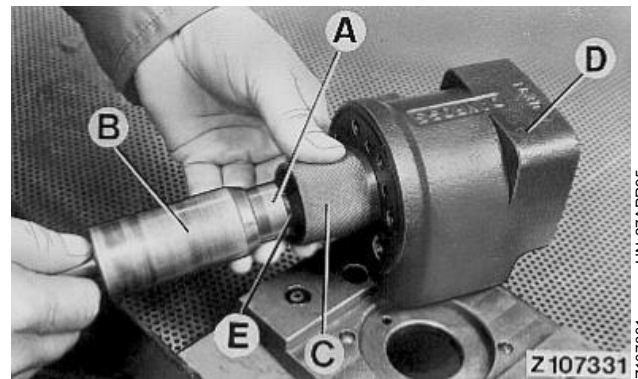
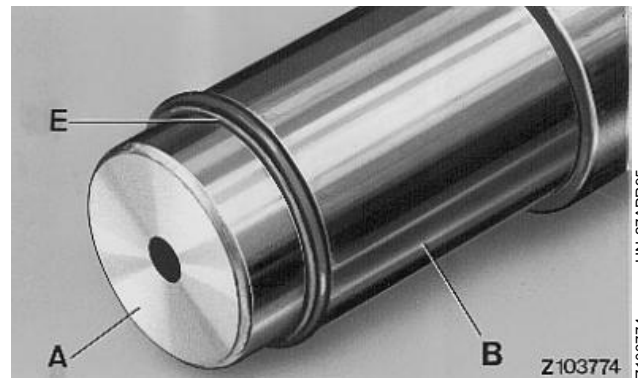
Press sleeve (C) of the special tool into housing (D) until it contacts stop.

Using the small piston (A), press large piston (B) of special tool into sleeve (C) until it contacts stop.

Pull sleeve (C), together with large piston (B), out of housing (D).

**NOTE:** Small piston remains in the steering valve until it is pushed out when the spool assembly is installed.

- A—Small piston KML10018-5
- B—Large piston KML10018-2
- C—Sleeve of KML10018-2
- D—Housing
- E—O-ring with back-up ring

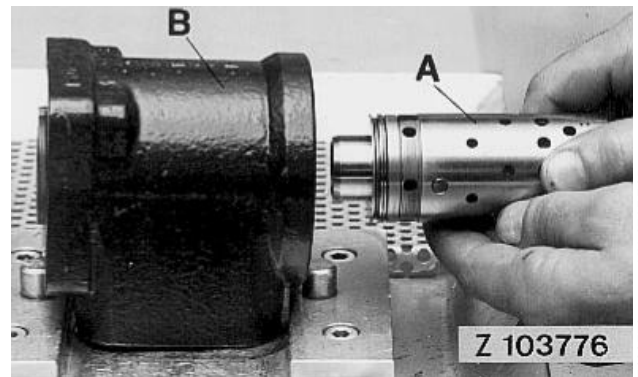


ZX.TMSPFH003439-19-29JUN94

### INSTALLING SPOOL ASSEMBLY

Before installing spool assembly, coat it with oil. Insert pre-assembled spool assembly (A) into the bore in housing (B), applying a slight twisting movement.

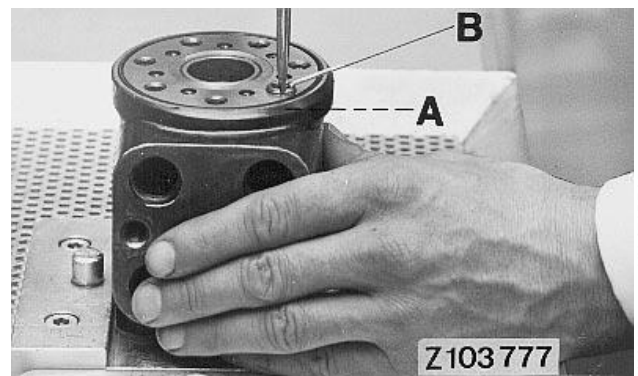
**IMPORTANT:** Make sure that the cross pin is horizontal.



ZX.TMSPFH003440-19-29JUN94

### INSTALLING THE CHECK VALVE

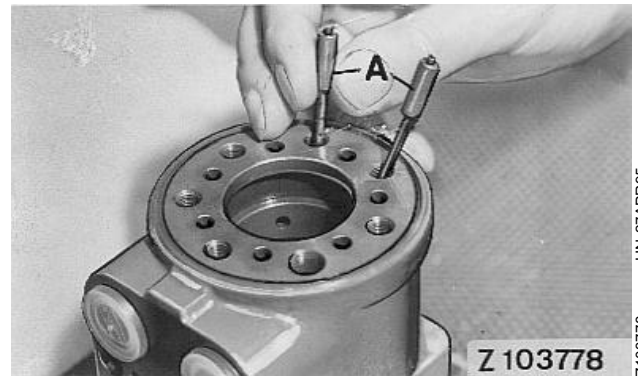
Insert ball (A) into bore. Screw threaded bushing (B) into bore until slight resistance is felt. Bushing should not protrude beyond housing surface.



ZX.TMSPFH003441-19-29JUN94

### INSTALLING SAFETY VALVES

Install the two safety valves (A). Do not forget to put the balls in the bores.

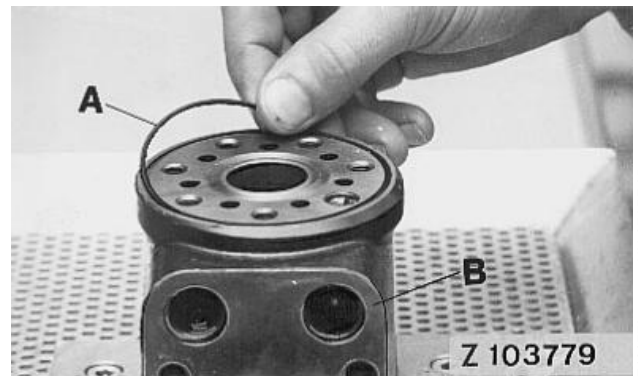


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-UN-27/APR95

### INSTALLING THE O-RING

Install O-ring (A) in housing (B).

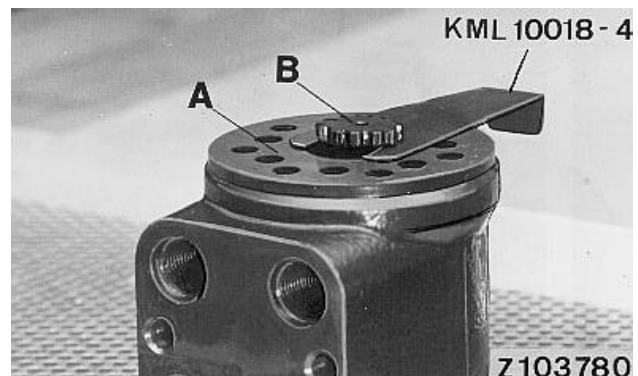


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Z 103779  
-UN-27/APR95

### INSTALLING DISTRIBUTOR PLATE AND DRIVE SHAFT

Install distributor plate (A) so that the bores are aligned with the corresponding bores in the housing. Insert drive shaft (B) so that the slot is parallel to the connection side. Use special tool KML10018-4 to hold drive shaft (B).



ZX, TMSPFH003444-19-29JUN94

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-UN-27/APR95

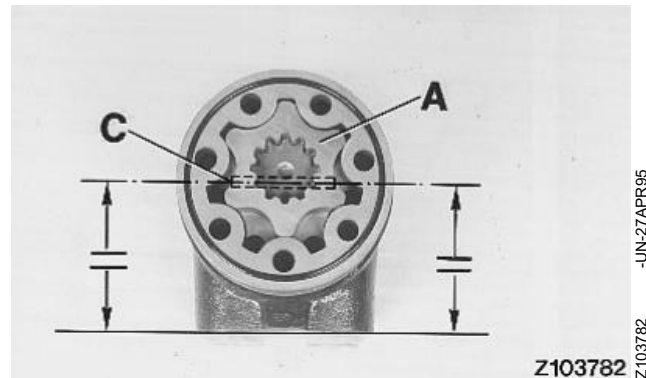
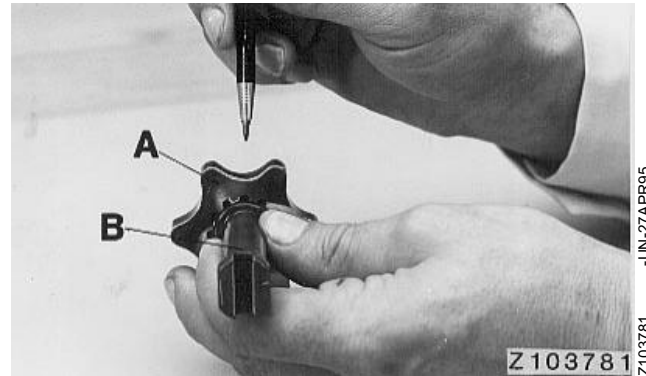
### INSTALLING ROTOR AND STATOR

Install rotor (A) on drive shaft (B) so that rotor cavity is positioned in slot of drive shaft (B) as shown.

*NOTE: Illustration shows plainly the desired position of rotor and shaft. This assembly, described below, must be reached even although slot of drive shaft and cross pin are not visible.*

Rotor (A) and cross pin (C) must be in the specified position.

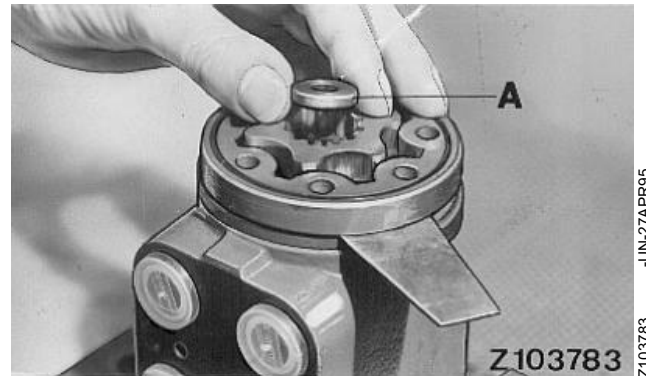
**IMPORTANT:** It is absolutely necessary for satisfactory performance of the steering unit that the cross pin is in the position shown.



ZX,TMSPFH003445-19-29JUN94

### INSTALLING SPACER RING

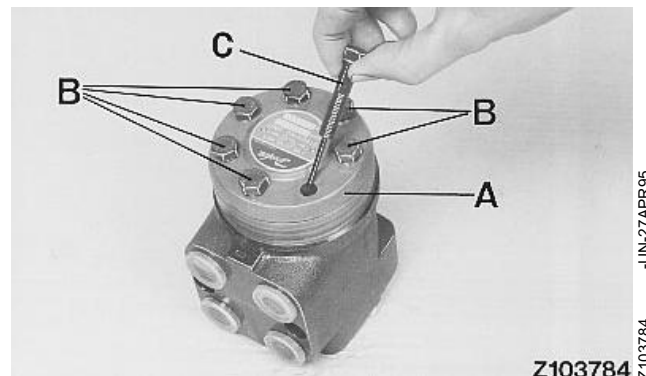
Insert spacer ring (A) as shown.



ZX,TMSPFH003446-19-29JUN94

### INSTALLING METERING UNIT COVER

Use seven cap screws (B) to secure cover (A). Insert cap screw (C) with roll pin in the correct bore. Tighten cap screws to 30 - 35 N·m (22 - 25 ft·lb).



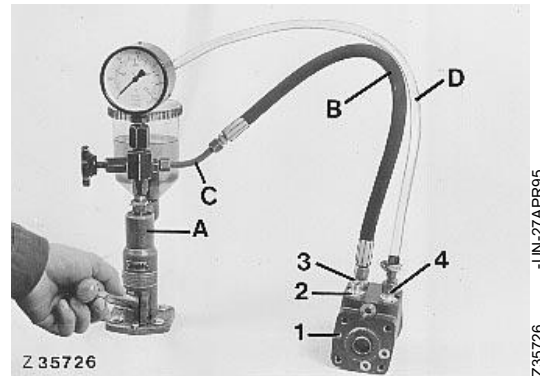
ZX,TMSPFH003447-19-29JUN94

## TESTING THE SAFETY VALVES

*NOTE: Safety valves must always be tested prior to testing the pressure-control valve.*

Connect hose (B) to connection (3), steering cylinder (r.h. turn). Secure plastic hose (D) to return connection (4).

Build up pressure with lever of tester (A). Tester pressure gauge should show 180 - 195 bar (2610 - 2830 psi). Use same procedure to test safety valve for left-hand turn, connecting hose (B) to connection (2), steering cylinder (l.h. turn).



- A—Bosch nozzle tester
- B—Original steering hose (inlet)
- C—Test fitting KJD10113 (see “Special Tools”)
- D—Plastic return hose
- 1—Steering valve
- 2—Steering cylinder connection (l.h. turn)
- 3—Steering cylinder connection (r.h. turn)
- 4—Return connection

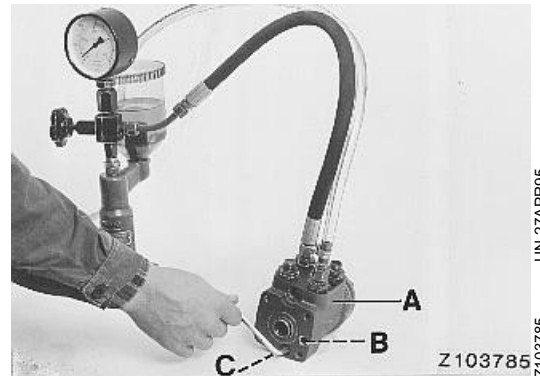
ZX.TMSPFH003448-19-29JUN94

## ADJUSTING THE SAFETY VALVES

Adjust pressure of safety valve by turning adjusting screws (B) and (C). First remove respective plug. Use a 6 mm hex. socket wrench to turn screw in to increase pressure or out to decrease pressure. Recheck valve operating pressure after adjustment.

When pressure is correct, install plug and tighten to 30 - 40 N·m (22 - 29 ft-lb).

- A—Steering valve
- B—Adjusting screw (l.h. turn)
- C—Adjusting screw (r.h. turn)

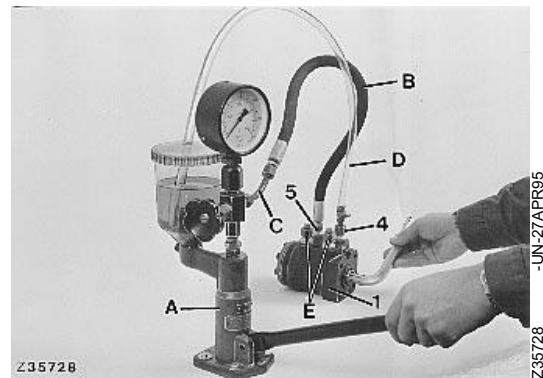


ZX.TMSPFH003449-19-29JUN94

## TESTING THE PRESSURE-CONTROL VALVE

Connect hose (B) to pressure connection (5) and return hose (D) to return connection (4). Seal both connections to the steering cylinder with dealer-manufactured plugs. Use a 5/8" hex. socket wrench to turn steering valve to full left- or right-hand lock and hold in this position. Operate pump lever of tester (A) to build up pressure. With control valve adjusted correctly, pressure should rise to 135 bar (1960 psi).

- A—Bosch nozzle tester
- B—Original steering hose (inlet)
- C—Test fitting KJD10113 (see "Special Tools")
- D—Plastic return hose
- E—Plug (dealer-fabricated)
- 1—Steering valve
- 4—Return connection
- 5—Pressure connection



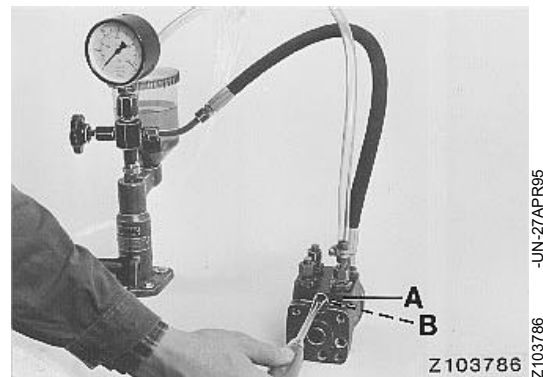
ZX, TMSPFH003450-19-29JUN94

## ADJUSTING THE PRESSURE-CONTROL VALVE

Remove plug. Use a screwdriver to turn adjusting screw (B). Turn screw in to increase pressure, or out to decrease pressure.


After adjusting the valve, install plug and tighten to 50 N·m (36 ft-lb).

- A—Steering valve
- B—Adjusting screw



ZX, TMSPFH003451-19-29JUN94

## BLEEDING THE HYDROSTATIC STEERING SYSTEM

 **CAUTION: Do not drive the combine harvester after repairs on the hydrostatic steering until the system has been bled.**

Raise the rear axle and start the engine.

Turn the steering wheel several times to the right- and left-hand stops.

*NOTE: Air will bleed out only at the oil reservoir. Oil in the lines to the steering cylinder does not flow in the circuit, but moves back and forth with the air bubbles. Therefore, air in the system may be slow in reaching the steering unit and oil reservoir.*

When the oil in the reservoir is clear (not cloudy or creamy) and no play is noticeable at the steering wheel, the system is free of air.

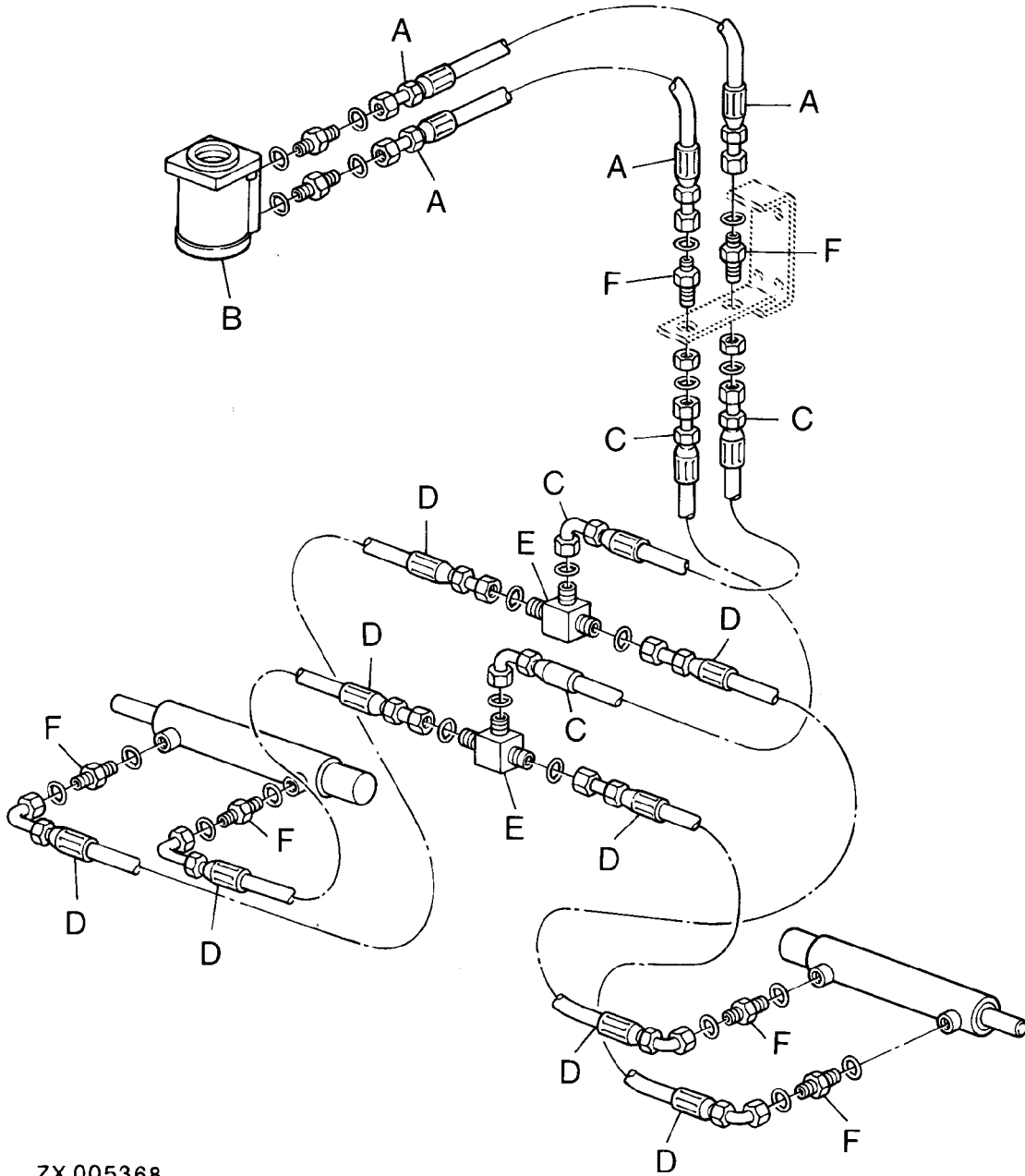
ZX,TMXZCO004129-19-15FEB95

## REMOVING THE HYDRAULIC STEERING PUMP

See "Removing and Repairing the Pump" in Section 70, Group 10.

ZX,TMSPFH003453-19-29JUN94

### HYDRAULIC LINES TO STEERING CYLINDERS



ZX 005368

A—Pressure line  
B—Steering valve

C—Pressure line to elbow fitting

D—Pressure line to steering cylinder

E—T-fitting  
F—Screw union

ZX005368 -UN-03MAY95

ZX,TMXZCO003970-19-15FEB95



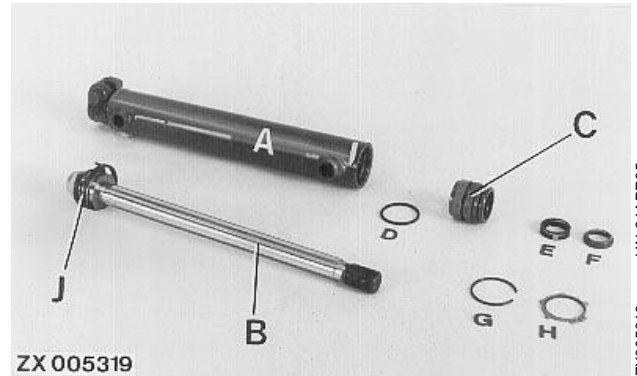
## DISMANTLING THE STEERING CYLINDERS

Press snap ring (H) out of the groove and slide guide (C) inward.

Use a drift to take ring (G) out of the bore in the housing.

Pull out guide (C) together with grooved ring (E), wiper ring (F) and O-ring (D).

Piston (J), with one sealing ring and one wiper ring, is secured to the piston rod by a self-locking nut.



ZX 005319

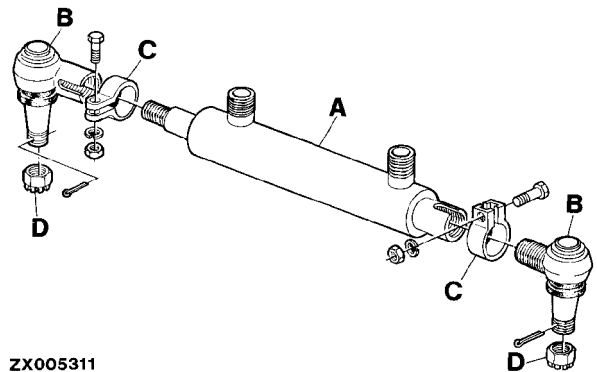
- A—Housing
- B—Piston rod with piston
- C—Guide
- D—O-ring
- E—Grooved ring
- F—Wiper ring
- G—Snap ring
- H—Snap ring
- J—Piston with sealing rings

ZX.TMSPFH003458-19-29JUN94

ZX005319 -UN-21APR95

## STEERING CYLINDER WITH BALL JOINTS

- A—Cylinder
- B—Ball joint
- C—Clamp
- D—Slotted nut



ZX005311

ZX.TMSPFH003459-19-29JUN94

ZX005311 -UN-02MAY95

### ADJUSTING STEERING ANGLE AT STEERING CYLINDER

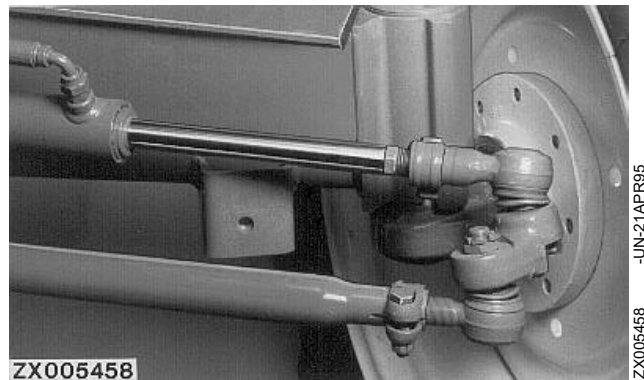
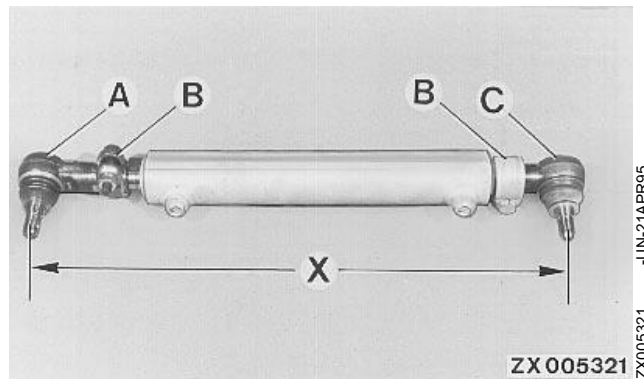
X-545 mm (21.45 in.) with standard axle, adjustable axle and four-wheel drive

Screw ball joint (A) on piston rod end fully onto the thread, and clamp it securely using clamp (B). Tighten the clamp screw to 45 N·m (33 lb-ft).

Screw ball joint (C) in until dimension (X) is achieved from cone to cone (with the piston rod pushed in). Tighten the clamp screw to 45 N·m (33 lb-ft).

Install steering cylinder and tighten slotted nut to 180 N·m (133 lb-ft).

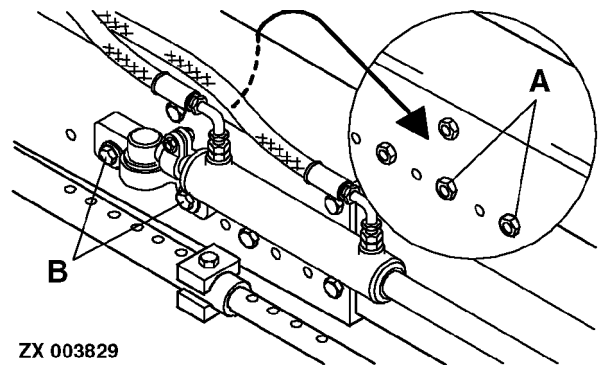
Finally, secure the nut with a cotter pin.



ZX,TMXZCO003971-19-15FEB95

### STEERING CYLINDER SUPPORT ATTACHING SCREWS TO REAR AXLE

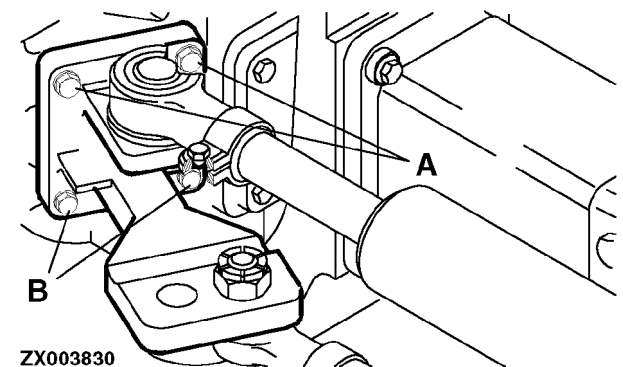
Tighten nuts (A) on cap screws (B) at right and left to 240 N·m (170 lb-ft).



ZX,TMXZCO003972-19-15FEB95

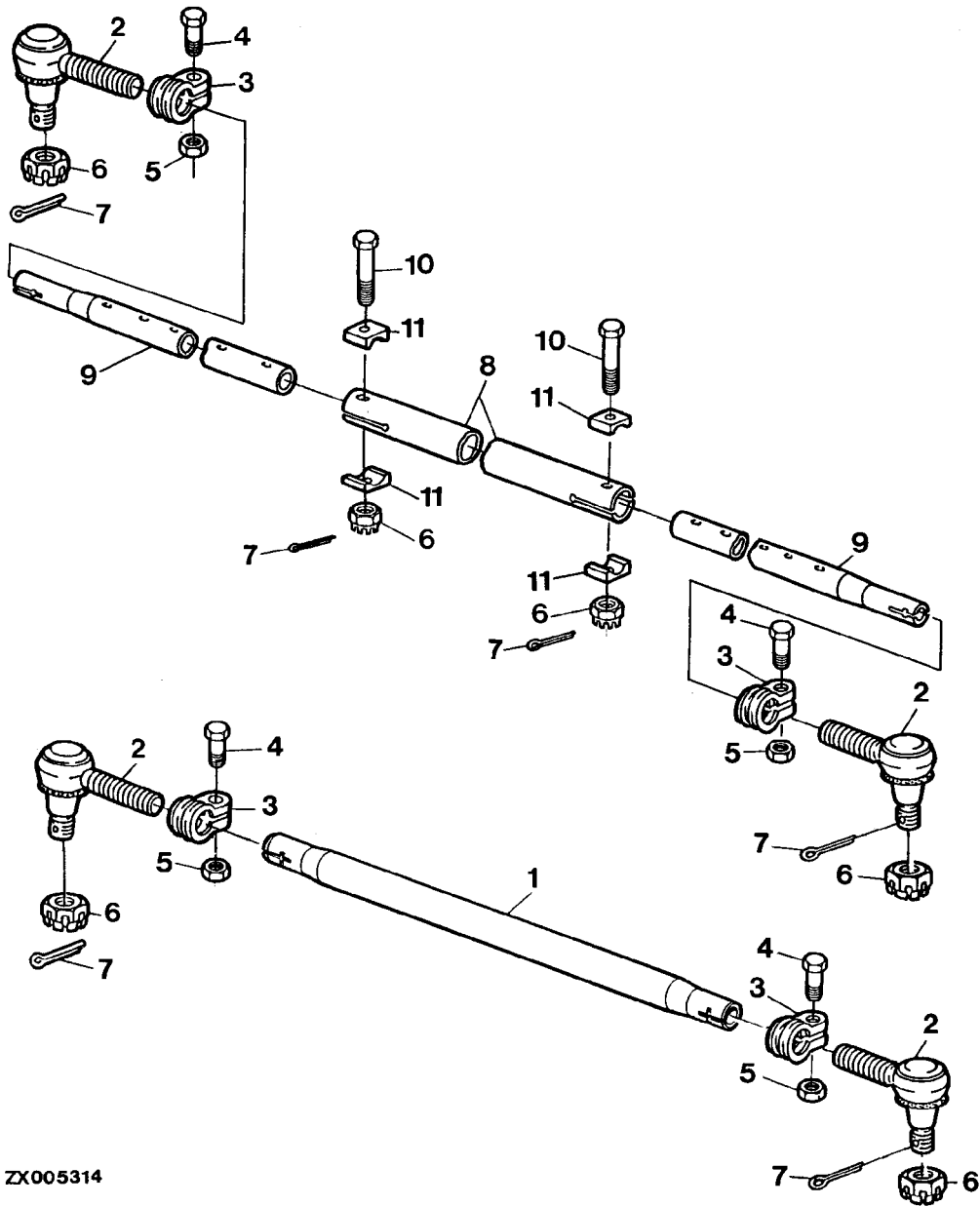
### STEERING CYLINDER SUPPORT ATTACHING SCREWS TO WHEEL MOTOR

At both sides, tighten cap screws (A) to 325 N·m (240 lb-ft) and cap screws (B) to 163 N·m (120 lb-ft).



ZX,TMXZCO003973-19-15FEB95

**TIE ROD — EXPLODED VIEW**



ZX005314

-JUN-03MAY95  
ZX005314

- |                             |               |                                                |                     |
|-----------------------------|---------------|------------------------------------------------|---------------------|
| 1—Tie rod for standard axle | 4—Clamp screw | 7—Cotter pin                                   | 9—Tie rod extension |
| 2—Ball joint                | 5—Nut         | 8—Tie rod for adjustable axle (center section) | 10—Screw            |
| 3—Clamp                     | 6—Slotted nut | 11—Clamp plate                                 |                     |

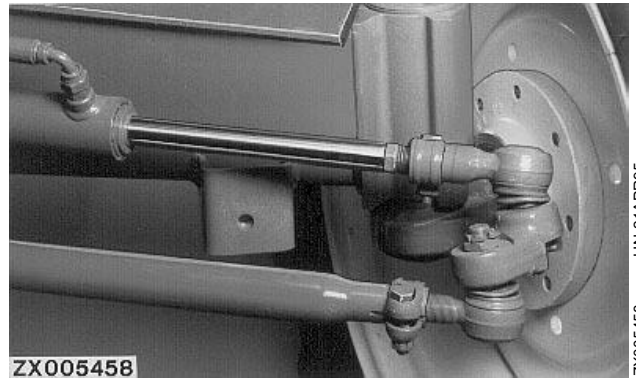
## ADJUSTING TOE-IN

Screw in the ball joints at both ends of the tie rod.  
Screw in by the same distance at both sides.

Adjust the length of the tie rod so that a toe-in of 0 mm  
(0 in.) is reached.

Tighten the ball joint clamps to 45 N·m (33 lb-ft).

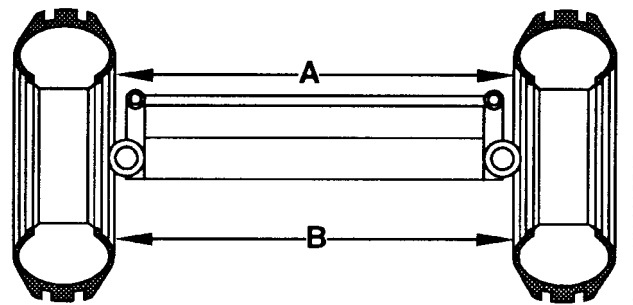
Install slotted nut. Tighten to 180 N·m (133 lb-ft) and  
secure with a cotter pin.



ZX, TMXZCO003974-19-15FEB95

## CHECKING REAR WHEEL TOE-IN

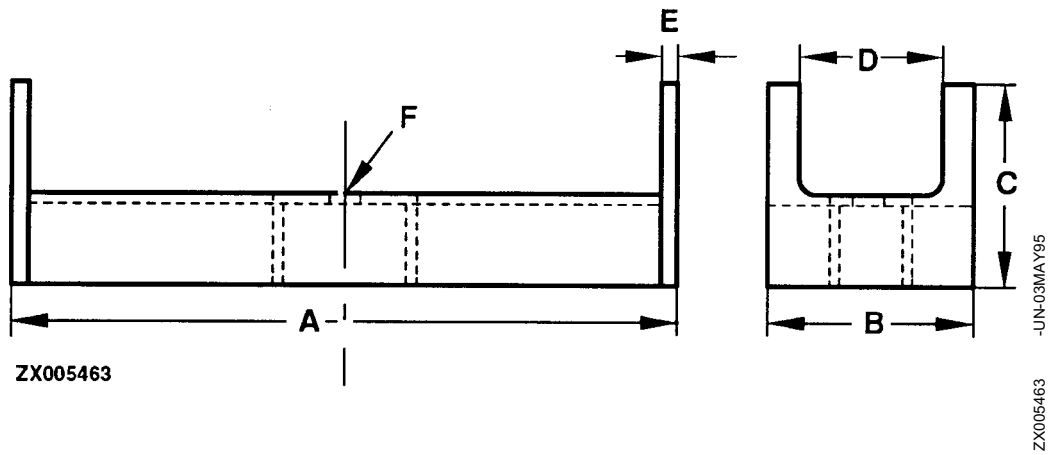
Measure track width (A) at the rim lip level with the axle,  
and mark the point of measurement on the tire. Move  
the vehicle until the point of measurement has moved  
through 180°. Now measure distance (B). When toe-in is  
0 mm, dimensions (A) and (B) must be the same.



ZX 005312

ZX, TMSPFH003463-19-29JUN94

**SPECIAL TOOL (SELF-MANUFACTURE)**



A—650 mm (25.6 in.)  
B—200 mm (7.9 in.)

C—200 mm (7.9 in.)  
D—140 mm (5.5 in.)

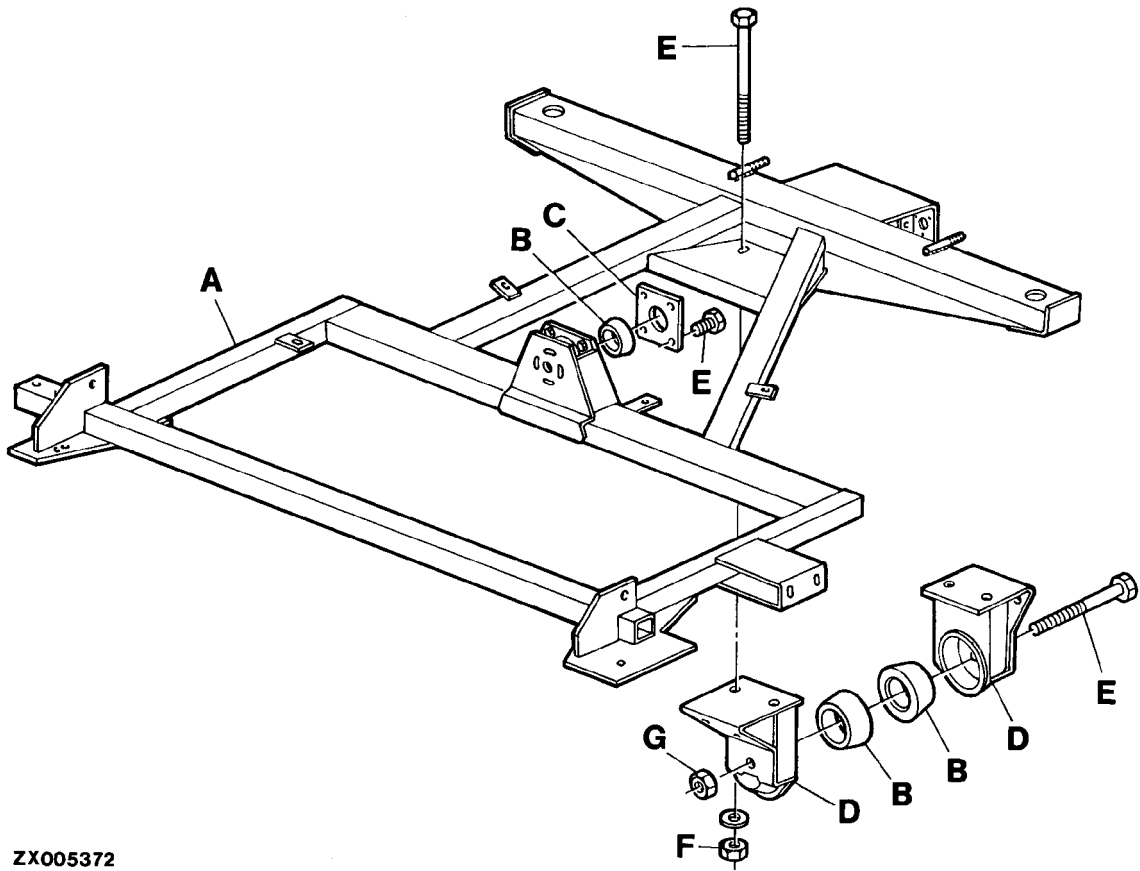
E—16 mm (0.6 in.)

F—30 mm (1.2 in.) dia.

**Tool for raising the rear axle**

ZX,TMXZCO003975-19-15FEB95

**STANDARD REAR AXLE SUPPORT AND REAR AXLE ATTACHMENT**



ZX005372

A—Standard support  
B—Insert

C—Retaining plate  
D—Bracket

E—Screw  
F—Nut

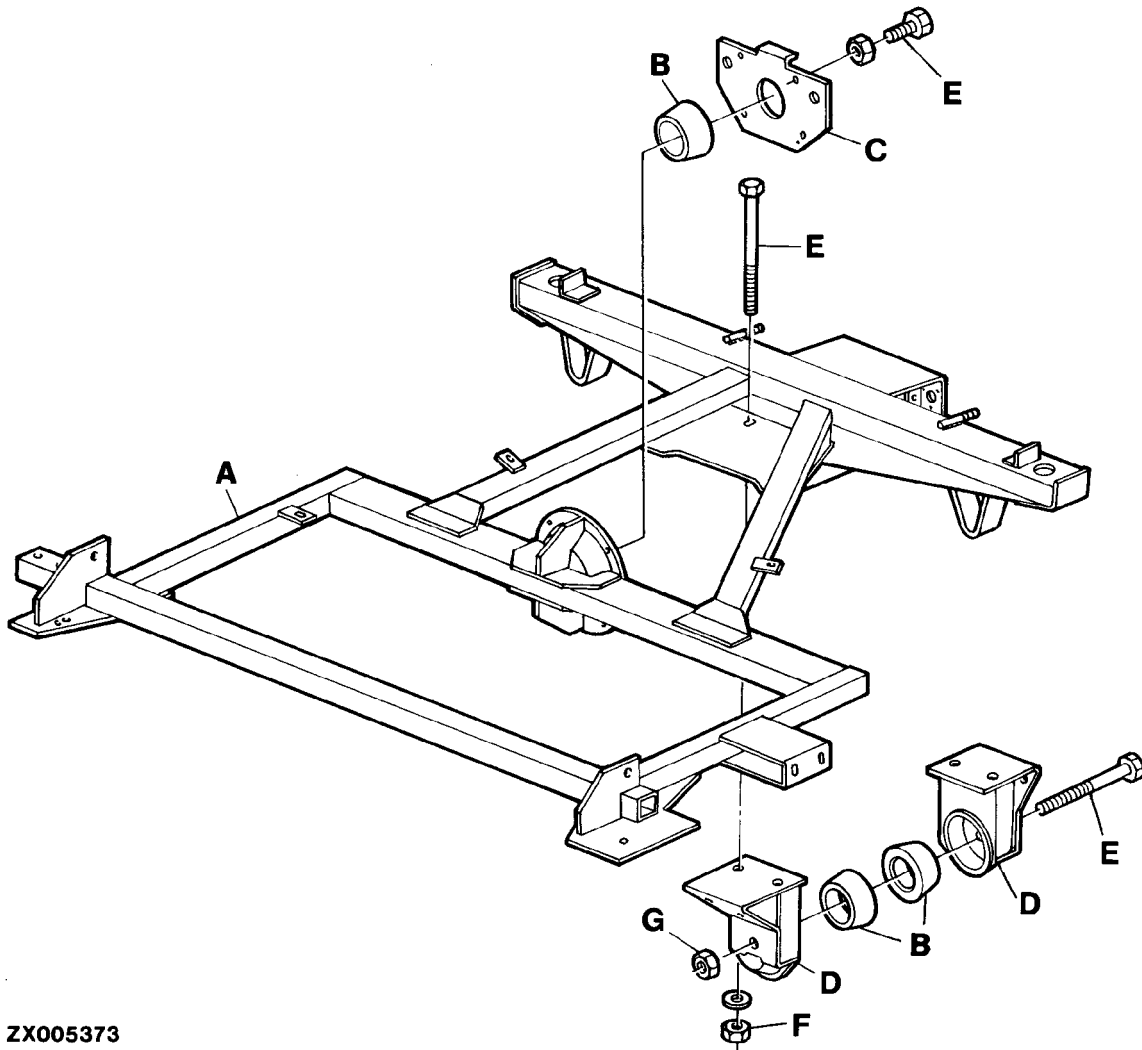
G—Self-locking nut

*NOTE: The rear axle support is welded to the side panels and cannot be replaced.*

ZX005372 -JUN-28/APR95

ZX,TMXZCO003976-19-15FEB95

### HILLMASTER REAR AXLE SUPPORT AND REAR AXLE ATTACHMENT



ZX005373

ZX005373 -UN-28APR95

A—Hillmaster support  
B—Insert

C—Retaining plate  
D—Bracket

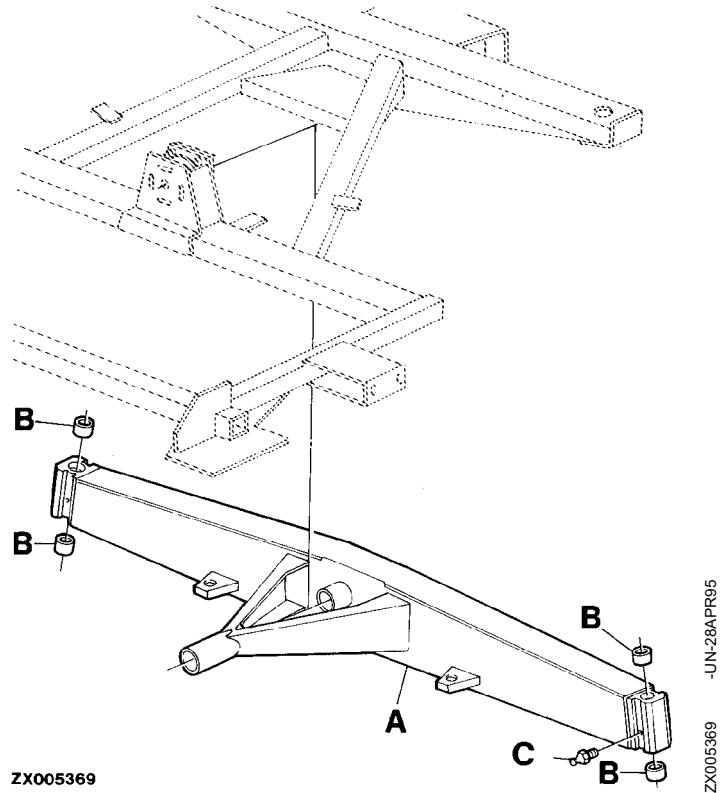
E—Screw  
F—Nut

G—Self-locking nut

*NOTE: The rear axle support is welded to the side panels and cannot be replaced.*

ZX,TMXZCO003977-19-15FEB95

**STANDARD REAR AXLE — EXPLODED VIEW**



A—Axle

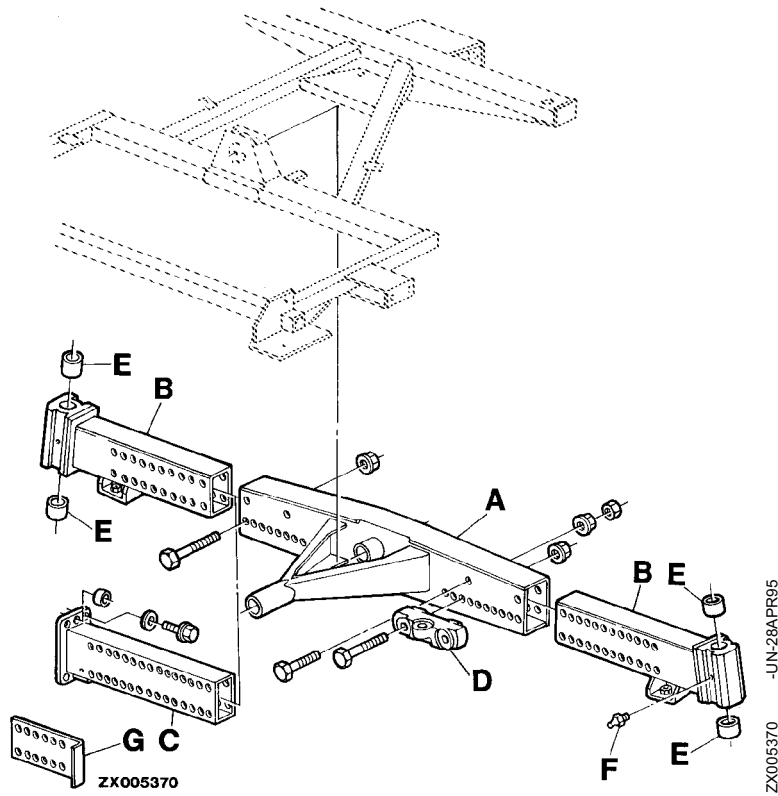
B—Brass bushing

C—Grease fitting

ZX, TMXZCO003978-19-15FEB95



**ADJUSTABLE REAR AXLE — EXPLODED VIEW**



A—Axle center section  
B—Axle extension

C—Extension for four-wheel drive

D—Steering cylinder support  
E—Brass bushing

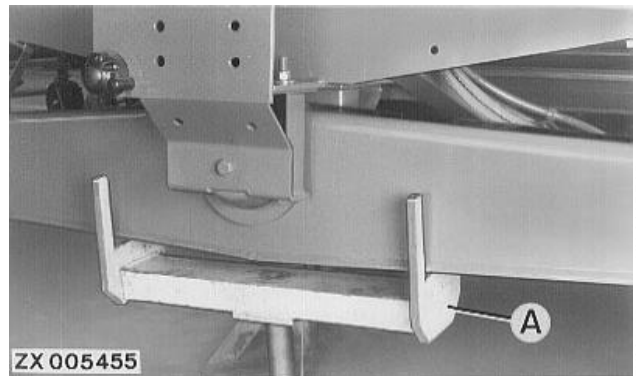
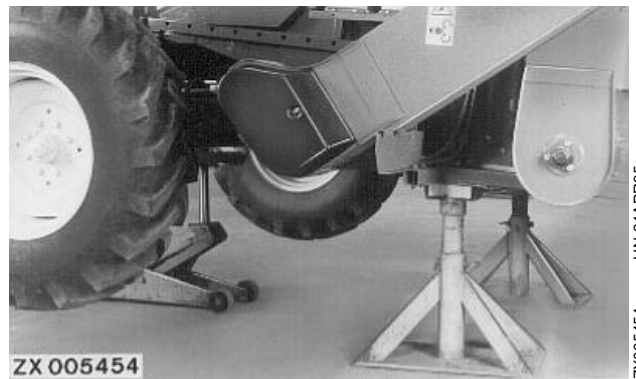
F—Grease fitting  
G—Spacer

ZX, TMXZCO003979-19-15FEB95

## REMOVING THE REAR AXLE

**CAUTION:** Take action to prevent the front wheels from turning (use chocks). Use a jack to raise the combine harvester and support it securely on adjustable support stands.

Raise the combine harvester and support stands high enough to allow the rear axle to be lowered using a jack and support (A).



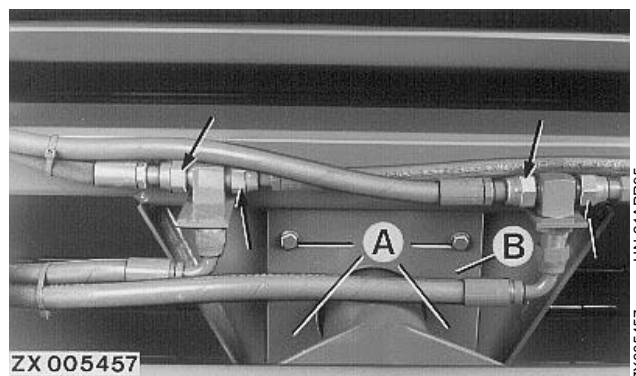
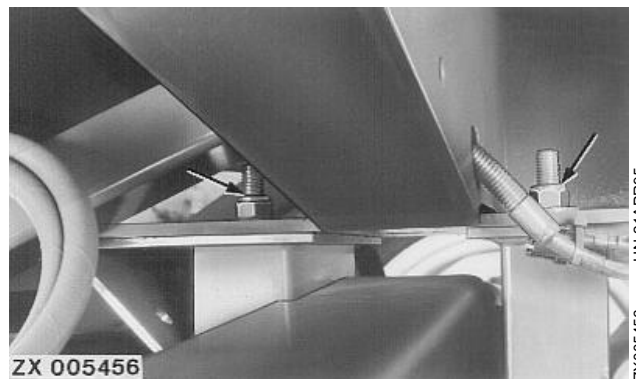
ZX, TMXZCO003980-19-15FEB95

Place jack and support under the center of the axle and remove the four screws from the brackets.

Remove the four screws (A) from retaining plate (B).

Disconnect the hydraulic lines. Seal the open ends.

Lower the axle and roll it out on its wheels.



ZX, TMXZCO003981-19-15FEB95

## INSTALLING THE REAR AXLE

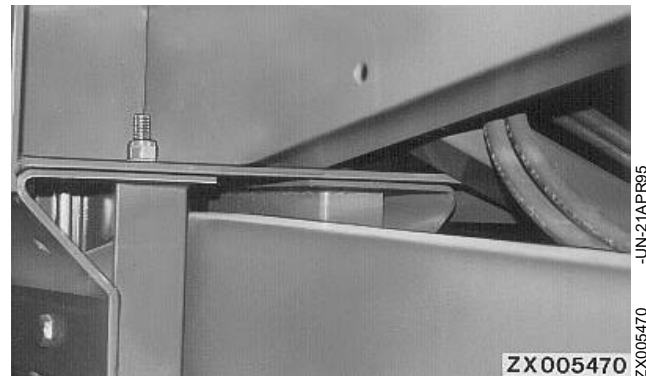
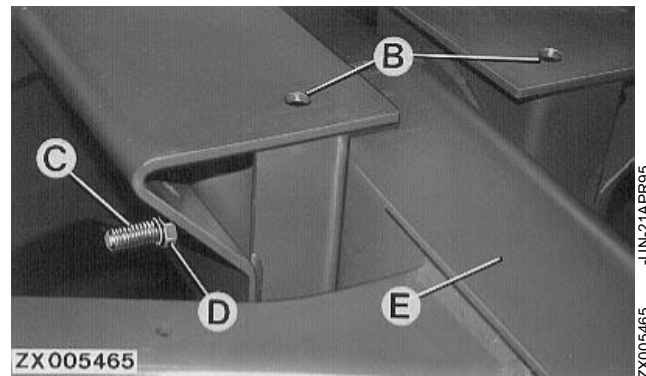
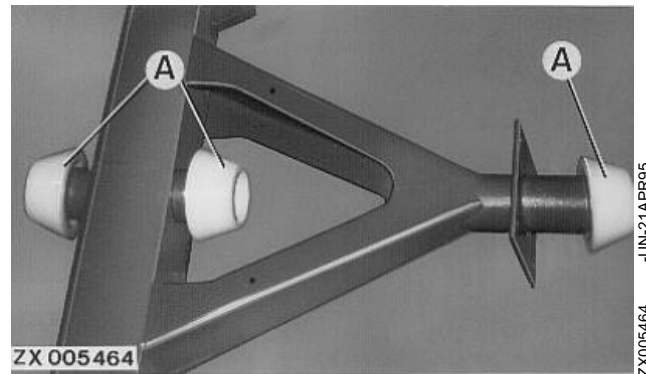
Check plastic bearings (A) for wear, and replace if necessary.

Use screw (C) and self-locking nut (D) to secure the two brackets (B) and plastic bearings to the axle (E).

Tighten the screws and nuts, then slacken them off until the axle can pivot.

To continue, follow the removal procedure in reverse.

- A—Plastic bearings
- B—Brackets
- C—Screw
- D—Self-locking nut
- E—Axle



## ADJUSTING REAR AXLE WIDTH

**CAUTION:** When changing axle widths, rear frame of harvester must be raised and supported properly.

Block front wheels (use chocks).

Raise rear axle until tires are approx. 2.5 cm (1 in.) off ground.

Remove steering cylinder support attaching screws (A) and rear axle cap screws (B) on both sides.

Also screw out tie rod bolt (C).

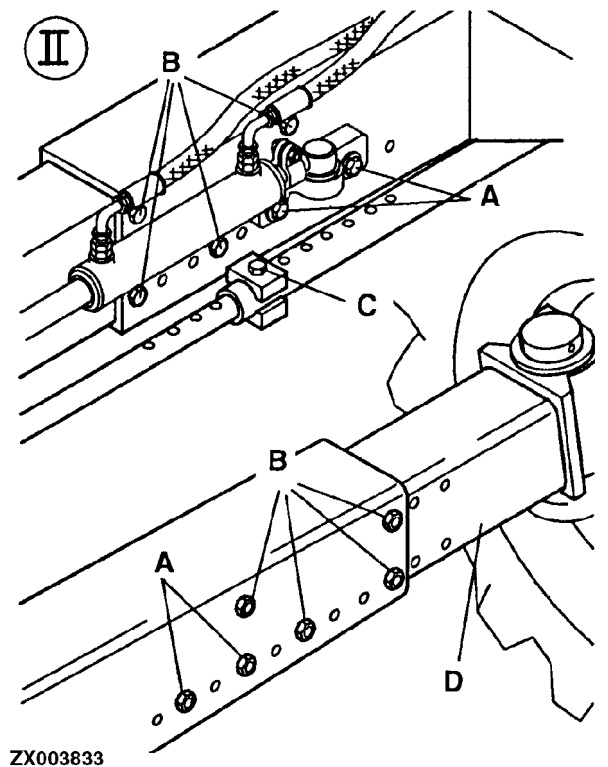
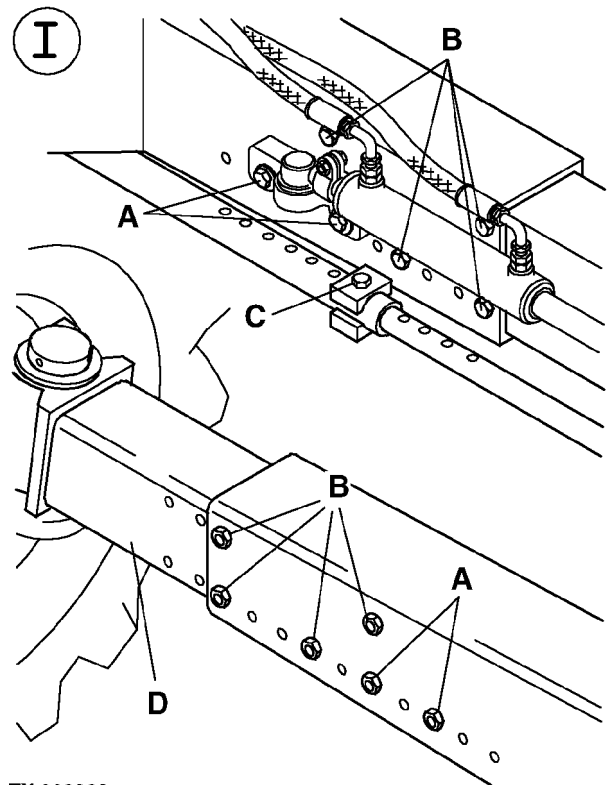
Pull or push sliding sleeve (D) in or out to desired width.

Reinstall screws (A), (B) and (C) and tighten.

Lower rear axle.

Make sure screws (A) and (B) are tightened to 240 N-m (170 lb-ft).

- I—L.h. side
- II—R.h. side
- A—Steering cylinder support attaching screws
- B—Sliding sleeve attaching screws
- C—Tie rod bolt
- D—Sliding sleeve



-UN-08MAY95  
ZX003832

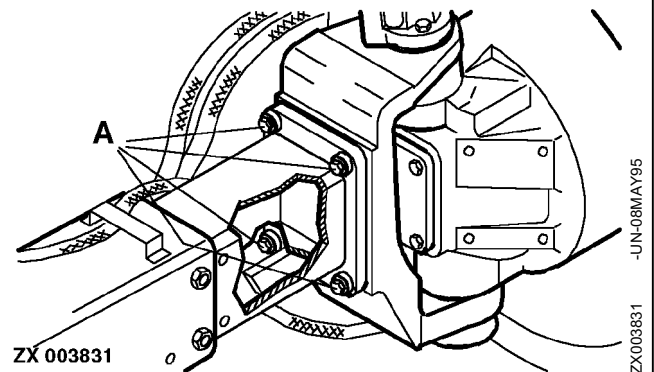
-UN-08MAY95  
ZX003833

ZX, TMXZCO003983-19-15FEB95

## Rear Axle/Rear Wheel Tread

### WHEEL MOTOR YOKE ATTACHING SCREWS TO REAR AXLE SLIDING SLEEVE

Tighten cap screws (A) at both sides to 575 N·m (424 lb-ft).

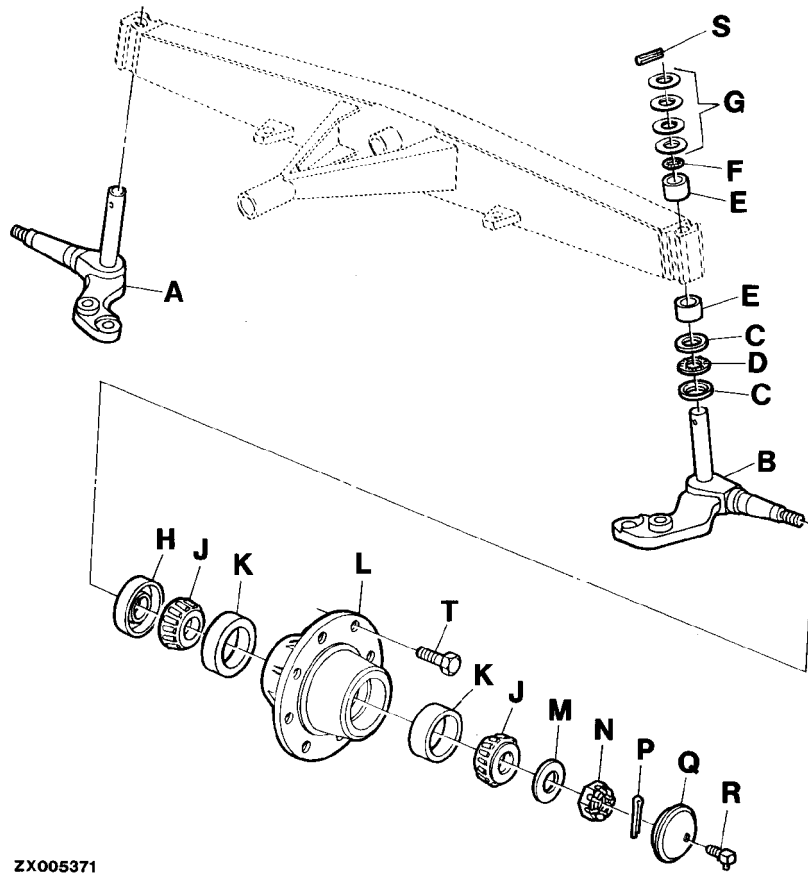


### REAR WHEEL TREAD

With 14.9-24 tires and an adjustable axle, rear wheel tread can be adjusted between 2.94 m (9.65 ft) and 3.53 m (11.58 ft.).

ZX, TMXZCO003985-19-15FEB95

**SPINDLE AND WHEEL HUB — EXPLODED VIEW**



- |                       |                                                |               |                        |
|-----------------------|------------------------------------------------|---------------|------------------------|
| A—R.h. spindle        | F—O-ring                                       | K—Bearing cup | Q—Cover                |
| B—L.h. spindle        | G—0.5 mm (0.02 in.) or<br>2 mm (0.08 in.) shim | L—Wheel hub   | R—Plug                 |
| C—Thrust bearing ring | H—Sealing ring                                 | M—Washer      | S—Spring pin           |
| D—Thrust bearing      | J—Taper roller bearing cone                    | N—Slotted nut | T—Wheel-attaching bolt |
| E—Bushing             |                                                | P—Cotter pin  |                        |

ZX005371 -UN-28APR95

ZX, TMXZCO003986-19-15FEB95

## INSTALLING SPINDLE

Check bushings in spindle mountings for wear, and replace if necessary.

Coat thrust bearings (A) with grease and install on spindle.

Insert spindle in axle mounting.

Install O-ring (B) and shims (C). Install sufficient shims to allow spring pin (D) to be installed without applying pressure to the bearing.



ZX, TMXZCO003987-19-15FEB95

## ASSEMBLING WHEEL HUB AND ADJUSTING BEARINGS

Press in the bearing races and fill wheel hub (C) with approx. 250 g (8.8 oz.) of grease.

Insert the rear taper roller bearing cone (B) and sealing ring (A) into wheel hub (C), with lettering outward.

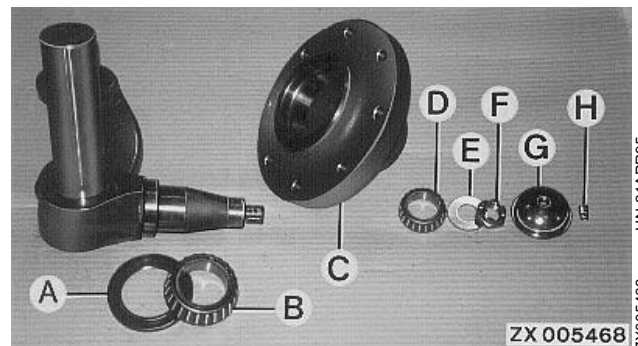
Slide pre-assembled wheel hub onto spindle and install front taper roller bearing cone (D) with washer (E) and slotted nut (F).

Tighten slotted nut until resistance is encountered. Turn wheel hub at the same time.

Slacken slotted nut by 1/6 of a turn, and secure with a cotter pin.

Install cover (G) and lubricate the wheel hub at the grease fitting.

Finally, replace grease fitting with plug (H).



- A—Sealing ring
- B—Bearing cone
- C—Wheel hub
- D—Bearing cone
- E—Washer
- F—Slotted nut
- G—Cover
- H—Plug

ZX, TMXZCO003988-19-15FEB95

Rear Axle/Rear Tire Pressures

**REAR TIRES FOR STANDARD AND HILLMASTER COMBINE HARVESTERS**

Tire size	Code	2054	2056	2058	2064	2066
10,5/80-18	10PR	•	•			
12,5/80-18	10PR	•	•			
14,5/75-20	8PR	•	•	•	•	•
16,0/70-20	10PR	•	•	•	•	•
14,9-24	8PR	•	•	•	•	•
16,9-24	8PR	•	•	•	•	•
500/60-22,5	10PR	•	•	•	•	•

ZX, TMXZCO003989-19-15FEB95

**REAR TIRE PRESSURE**

Tire size	KPa	bar	psi
10,5/80-18	370	3.7	53.7
12,5/80-18	250	2.5	36.3
14,5/75-20	180	1.8	26.1
16,0/70-20	200	2.0	29.0
14,9-24	180	1.8	26.1
16,9-24	170	1.7	24.7
500/60-22,5	150	1.5	21.8

ZX, TMXZCO003990-19-15FEB95



# Section 70 Hydraulic System

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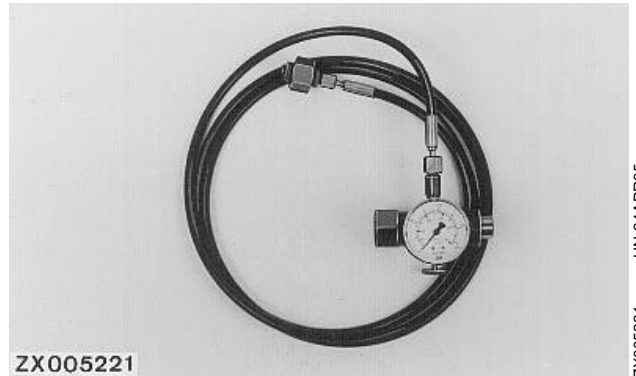
*Contents*

**SPECIAL OR ESSENTIAL TOOLS**

*NOTE: Order tools according to information given in the U.S. SERVICE-GARD™ Catalog or in the European Microfiche Tool Catalog (MTC).*

DX,TOOLS -19-05JUN91

Accumulator charging and testing device . . . . . FKM10448

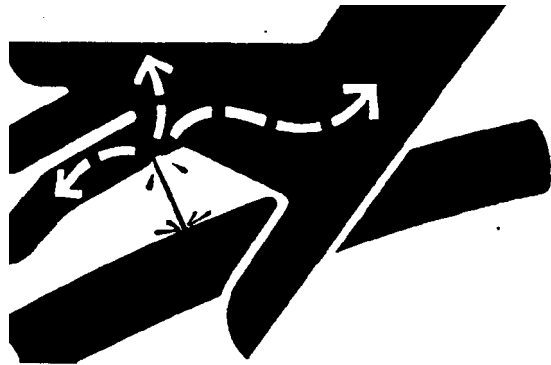


ZX005221 -UN-24APR95

ZX,TMXZCO003126-19-03JAN94

**!** **CAUTION:** Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, U.S.A.



X9811 -UN-23AUG88

DX,FLUID2 -19-09AUG91

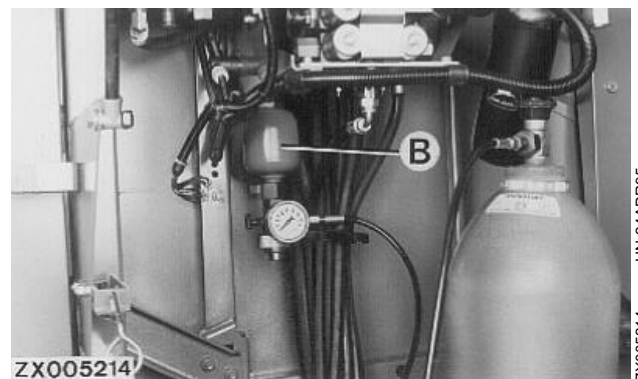
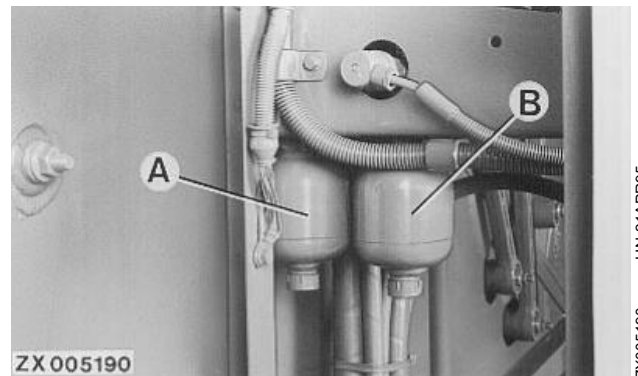
## MAIN DRIVE/UNLOADING SYSTEM ACCUMULATORS

The unloading system accumulators have a capacity of 0,35 L (0.09 US.gal.) and are precharged with nitrogen under a pressure of 3800 kPa (38 bar) (550 psi).

*NOTE: Before connecting testing device FKM10448 to accumulator, slightly loosen accumulator hex. socket screw. This will avoid damage to the testing device when accumulator is opened.*

For checking accumulator (A), connect testing device FKM10448 to accumulator (A). For checking accumulator (B), connect testing device FKM10448 to accumulator (B).

- A—Accumulator, main drive
- B—Accumulator, main drive/unloading system

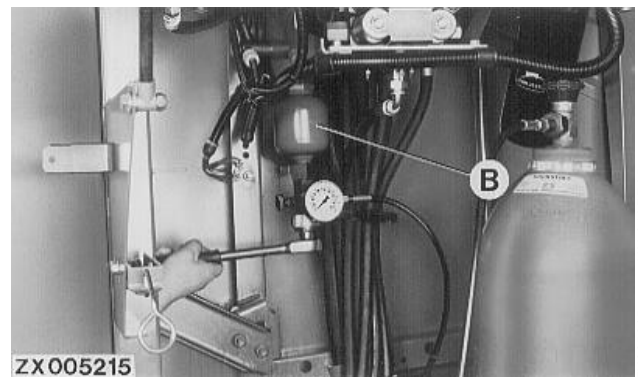


ZX, TMXZCO003028-19-03JAN94

*NOTE: Before checking accumulator (B), engage and disengage main clutch several times with engine shut off, starter switch in position II and road safety switch in field position to relieve hydraulic pressure.*

Use a ratchet on testing device to open accumulator valve.

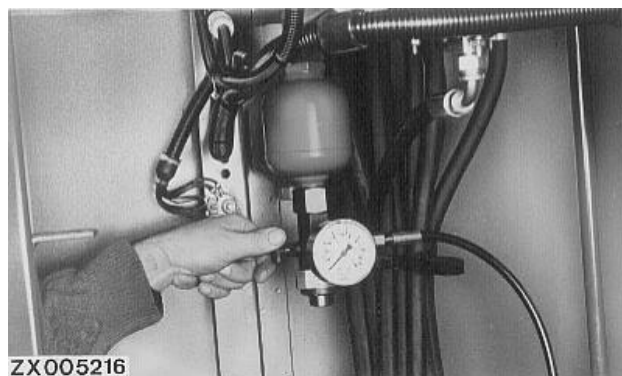
Accumulator charging pressure is indicated by the pressure gauge. If charging pressure is too low, the accumulator must be charged with nitrogen.



ZX, TMXZCO003128-19-03JAN94

## Accumulators/Header Float System Accumulator

The accumulator may be charged by loosening knurled screw. If the accumulator is not connected to an external nitrogen source (under pressure), pressure is reduced by opening knurled screw.



ZX,TMXZCO003129-19-03JAN94

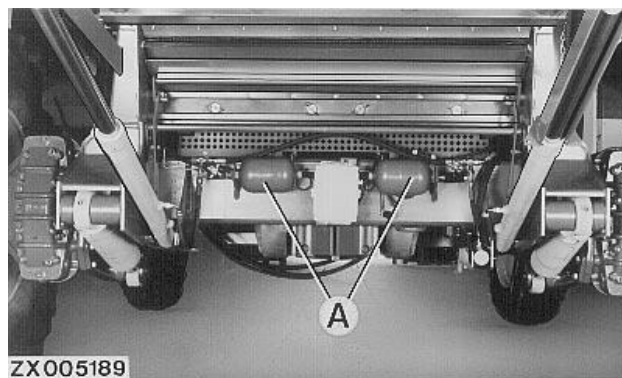
-UN-24APR95  
ZX005216

## HEADER FLOAT SYSTEM ACCUMULATOR

The combines are equipped with one or two accumulator(s). Accumulator capacity is 2 L (0.53 US.gal).

Accumulator charging pressure depends on weight of header and lift cylinder diameter.

**A—Accumulator**



ZX,TMXZCO003029-19-03JAN94

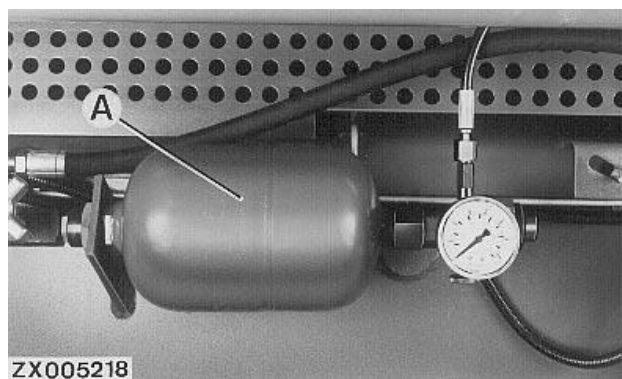
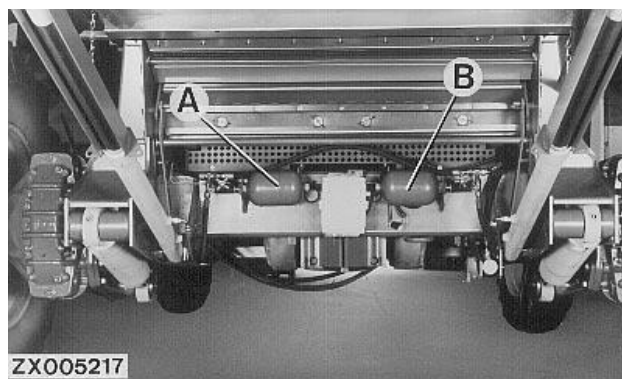
-UN-21APR95  
ZX005189

## CHECKING HEADER FLOAT SYSTEM ACCUMULATOR(S)

*NOTE: Before connecting testing device FKM10448 to accumulator, slightly loosen accumulator hex. socket screw. This will avoid damage to the testing device when accumulator is opened.*

For checking accumulator (A), connect testing device FKM10448 to accumulator (A). For checking accumulator (B), connect testing device FKM10448 to accumulator (B).

Relieve pressure in hydraulic line to header lift cylinders by actuating switch for lowering header.

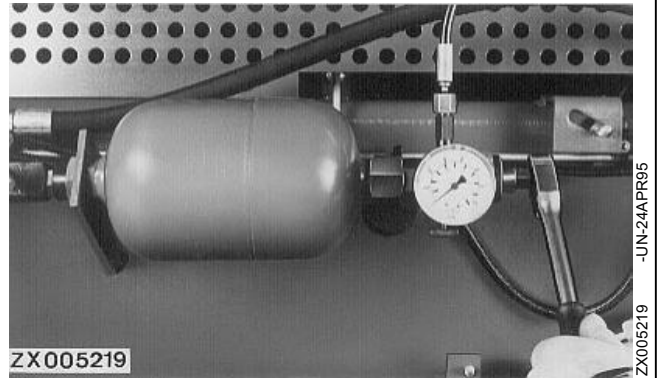


ZX,TMXZCO003131-19-03JAN94

-UN-24APR95  
ZX005218

Accumulators/Header Float System Accumulator

Use a ratchet on testing device to open accumulator valve. Accumulator charging pressure is indicated by the pressure gauge. If charging pressure is too low, the accumulator must be charged with nitrogen.



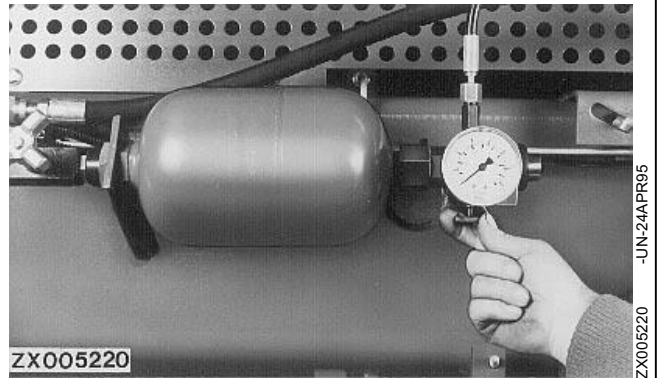
ZX005219

ZX, TMXZCO003133-19-03JAN94

-UN-24APR95  
ZX005219

The accumulator may be charged by loosening knurled screw. If the accumulator is not connected to an external nitrogen source (under pressure), pressure is reduced by opening knurled screw.

Adjust charging pressure according to the following table.



ZX005220

ZX, TMXZCO003134-19-03JAN94

-UN-24APR95  
ZX005220

**CHARGING PRESSURES OF HEADER FLOAT SYSTEM ACCUMULATOR(S)**

14'	.....	6000 kPa (60 bar; 870 psi)
16'	.....	6500 kPa (65 bar; 940 psi)
18'	.....	7000 kPa (70 bar; 1015 psi)
20'	.....	8000 kPa (80 bar; 1160 psi)
25'	.....	9000 kPa (90 bar; 1300 psi)

The pressures given in the table apply to machines with standard feeder house and standard cutting platforms with a lift cylinder diameter of 55 mm.

For machines equipped with 60 mm dia. lift cylinders, subtract 1000 kPa (10 bar; 150 psi) from the values given.

For machines with Hillmaster feeder house (header lateral tilt), add 1000 kPa (10 bar; 150 psi) to the values given.

When cutting platforms with Hardox plates are used, add 1000 kPa (10 bar; 150 psi) to the values given.

When several of the points mentioned above apply to a certain machine, add or subtract the corresponding values as necessary.

ZX, TMXZCO003130-19-03JAN94

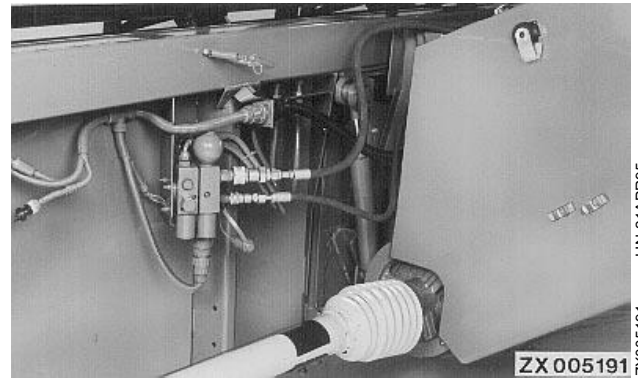
## HEADER ACCUMULATOR

An accumulator is integrated in the header hydraulic system lines. With header detached, it prevents an excessive pressure build-up caused by solar radiation.

Accumulator capacity is 75 cm<sup>3</sup> (4.6 cu.in.) and is precharged with a pressure of 500 kPa (5 bar; 70 psi).

The accumulator is maintenance-free and cannot be repaired.

**IMPORTANT: Before removing accumulator, relieve pressure in hydraulic system.**



ZX.TMXZC0003047-19-18NOV93

*Accumulators/Header Accumulator*



## GENERAL REPAIR INFORMATION

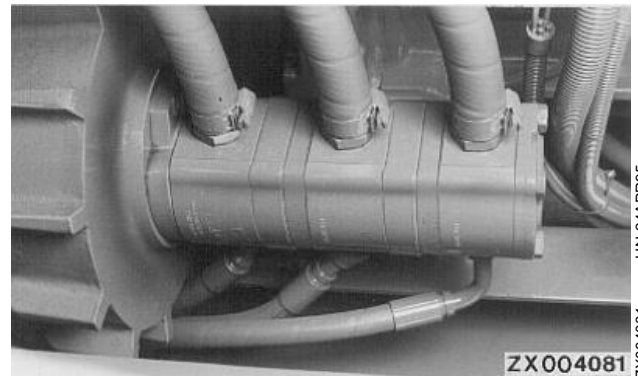
**IMPORTANT:** Prior to opening hydraulic components, thoroughly clean surrounding area. Observe the utmost cleanliness when repairing hydraulic components.

ZX,TMSPFH000674-19-23FEB92

## REMOVING HYDRAULIC PUMP

Disconnect suction and pressure lines from hydraulic pump. Immediately plug openings.

Remove both attaching screws and lift off pump.

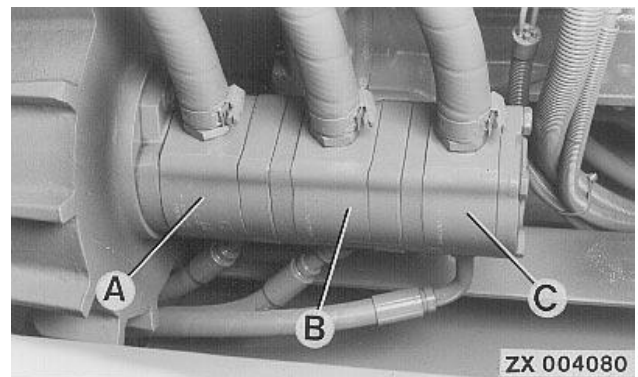


ZX,TMXZCO001967-19-01JUN92

*NOTE: Replace complete pump if bushings, gears or housing are defective or worn.*

It is only possible to replace unserviceable seals.

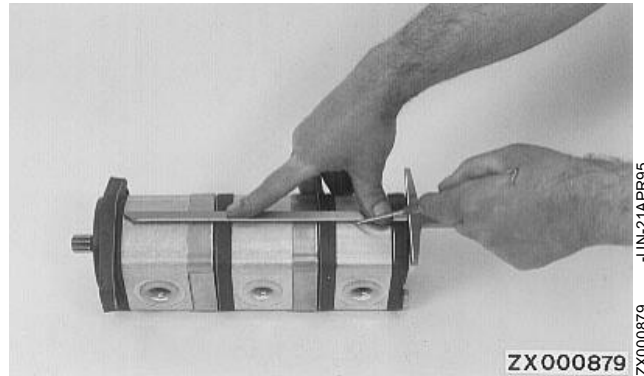
- A—Hydraulic pump
  - Standard machine 35 L/Min. (9.2 gpm)
  - Hillmaster 45 L/Min. (11 gpm)
- B—Hydraulic pump 25 L/Min. (6.5 gpm) (steering)
- C—Hydraulic pump
  - Standard machine 15 L/Min. (3.9 gpm)
  - Hillmaster 35 L/Min. (9.2 gpm)



ZX,TMXZCO001968-19-01JUN92

### MARKING HYDRAULIC PUMP

**IMPORTANT:** Mark all pump parts prior to removal to ensure correct reinstallation.

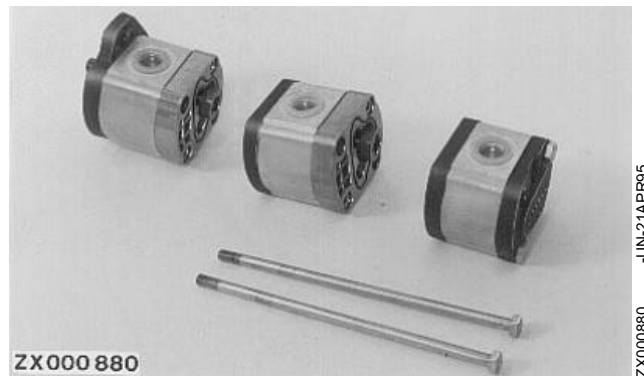


ZX.TMSPFH000677-19-06JUN91

### DISASSEMBLING HYDRAULIC PUMP

*NOTE:* Two of the four cap screws are longer and hold together the hydraulic pump which consists of three pump units.

To disassemble remove the two longer cap screws.



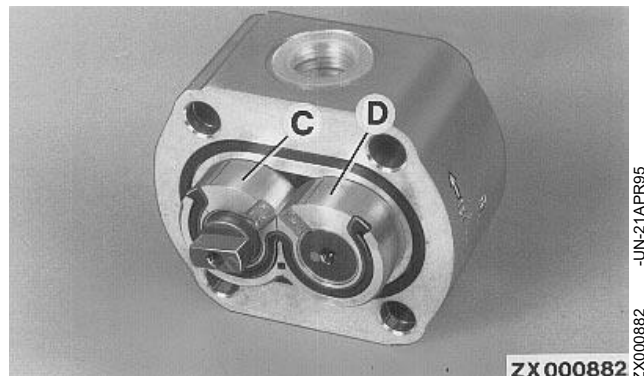
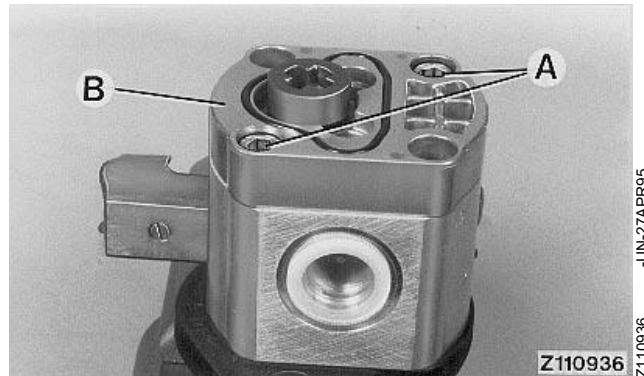
ZX.TMSPFH000678-19-22JUL91

Disassemble parts of pump which have to be repaired:

Remove screws (A).

Remove intermediate cover (B).

Remove front bushings (C) and (D).



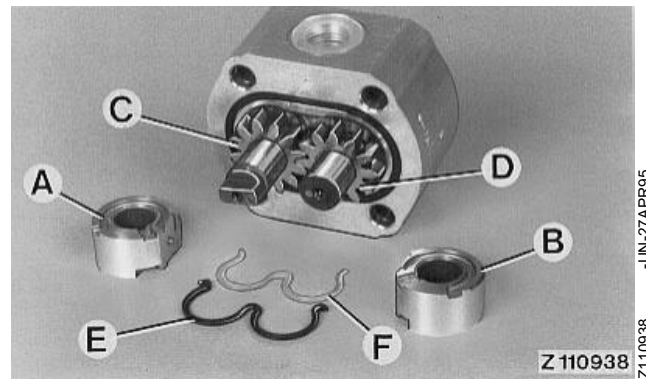
ZX.TMSPFH000679-19-06JUN91

## Triple Hydraulic Pump/Disassemble Hydraulic Pump

Press out gears with rear bushings.

**NOTE:** Mark all parts prior to removal to ensure correct reinstallation.

- A—Bushing
- B—Bushing
- C—Drive gear
- D—Driven gear
- E—Gasket
- F—Gasket support



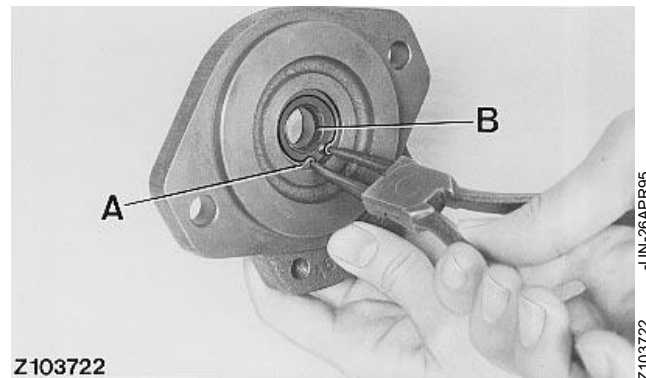
ZX,TMSPFH000680-19-06JUN91

-UN-27APR95  
Z110938

## REPLACE SHAFT SEAL

Remove snap ring (A) and extract seal ring (B), taking care not to damage seal seat surface.

When installing seal ring, make sure sealing lip faces toward the inside.



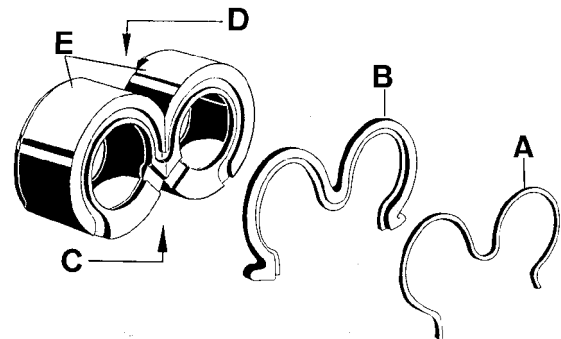
ZX,TMSPFH000681-19-06JUN91

-UN-26APR96  
Z103722

## INSTALLING GASKET AND SUPPORT

Install gasket (B) and support (A) in bushings, noting position of support (A).

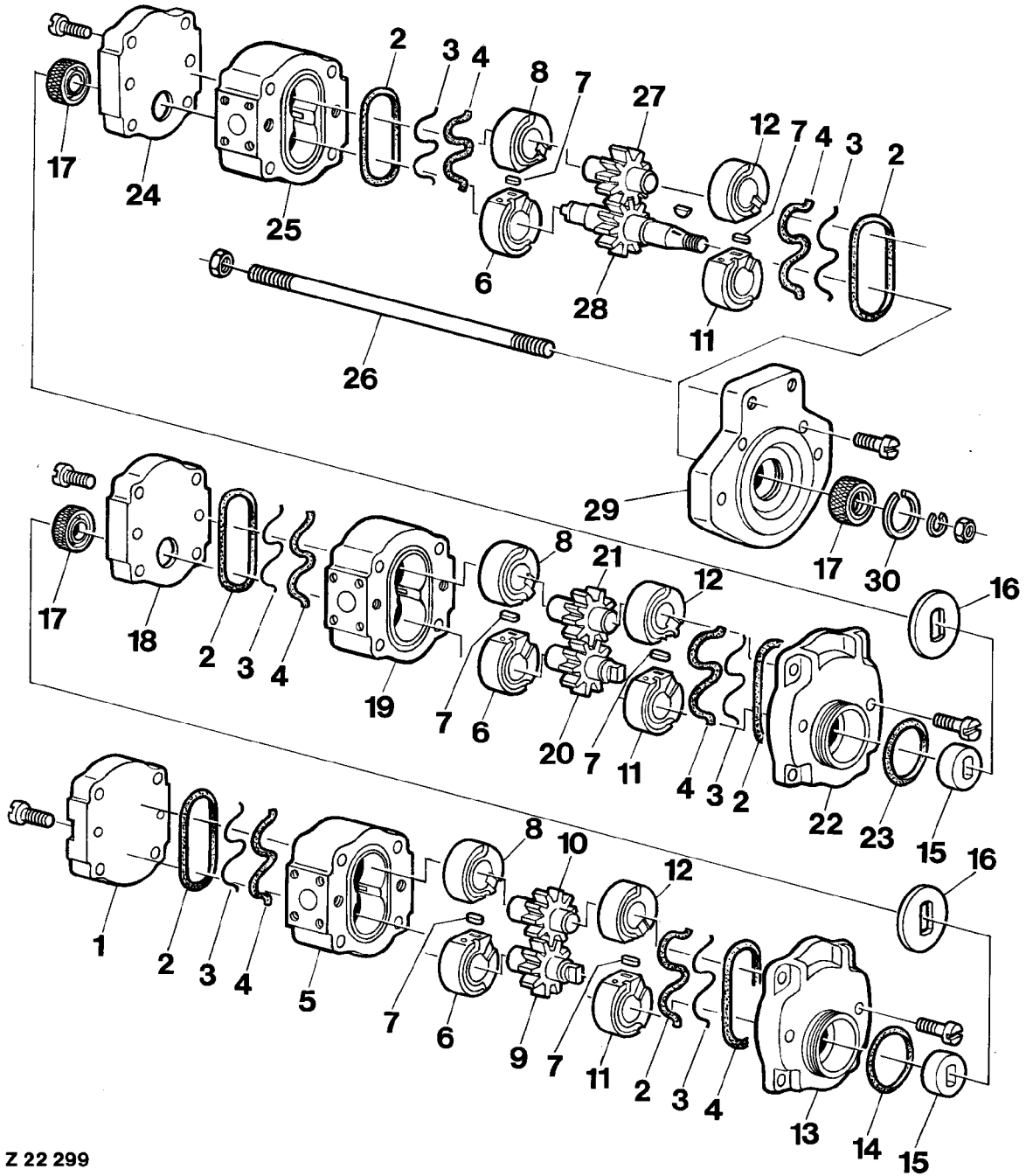
- A—Support
- B—Gasket
- C—Suction side
- D—Pressure side
- E—Bushing set



ZX,TMSPFH000682-19-06JUN91

-UN-02MAY95  
Z103724

TRIPLE HYDRAULIC PUMP, EXPLODED VIEW



Z 22 299

- |                |                       |                       |                       |
|----------------|-----------------------|-----------------------|-----------------------|
| 1—Cover        | 9—Drive gear          | 17—Shaft seal         | 24—Intermediate plate |
| 2—Seal ring    | 10—Driven gear        | 18—Intermediate plate | 25—Housing            |
| 3—Back-up ring | 11—Bushing            | 19—Housing            | 26—Tie bolt (4 used)  |
| 4—Seal ring    | 12—Bushing            | 20—Drive gear         | 27—Driven gear        |
| 5—Housing      | 13—Intermediate plate | 21—Driven gear        | 28—Drive gear         |
| 6—Bushing      | 14—O-ring             | 22—Intermediate plate | 29—End plate          |
| 7—Spring pin   | 15—Carrier            | 23—O-ring             | 30—Snap ring          |
| 8—Bushing      | 16—Washer             |                       |                       |

Z22299  
-JUN-02MAY95

ZX,TMSPFH000683-19-16JUN91

## **ASSEMBLING HYDRAULIC PUMP**

Assemble hydraulic pump, noting marks made before disassembly.

Coat all moving parts with clean hydraulic oil before assembling.

Use new gaskets.

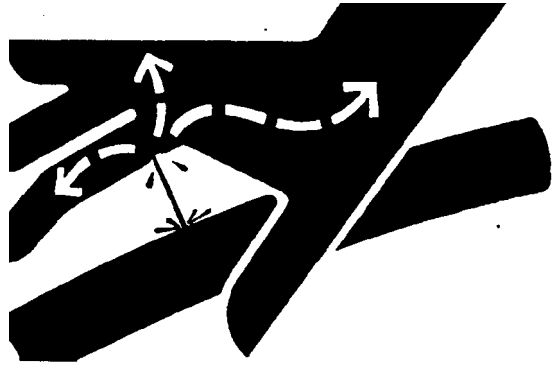
ZX.TMSPFH000684-19-22JUL91

*Triple Hydraulic Pump/Assemble Hydraulic Pump*

## Group 15 Electromagnetic Control Valve

**CAUTION:** Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, U.S.A.



X9811  
-UN-23AUG88

DX,FLUID2 -19-09AUG91

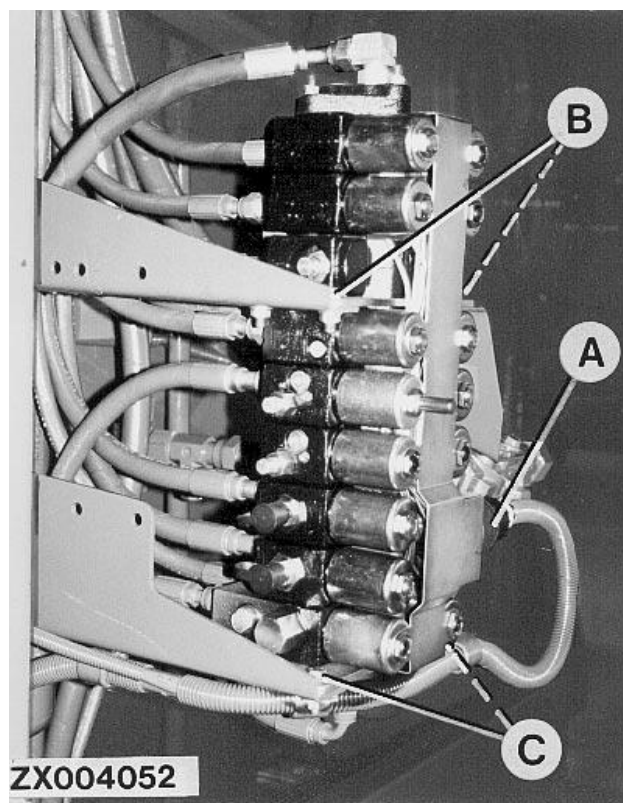
### GENERAL REPAIR INFORMATION

**IMPORTANT:** Prior to opening hydraulic components, thoroughly clean surrounding area. Observe the utmost cleanliness when repairing hydraulic components.

ZX,TMSPFH000955-19-23FEB92

## REMOVE BASIC MACHINE SOLENOID VALVE BLOCK

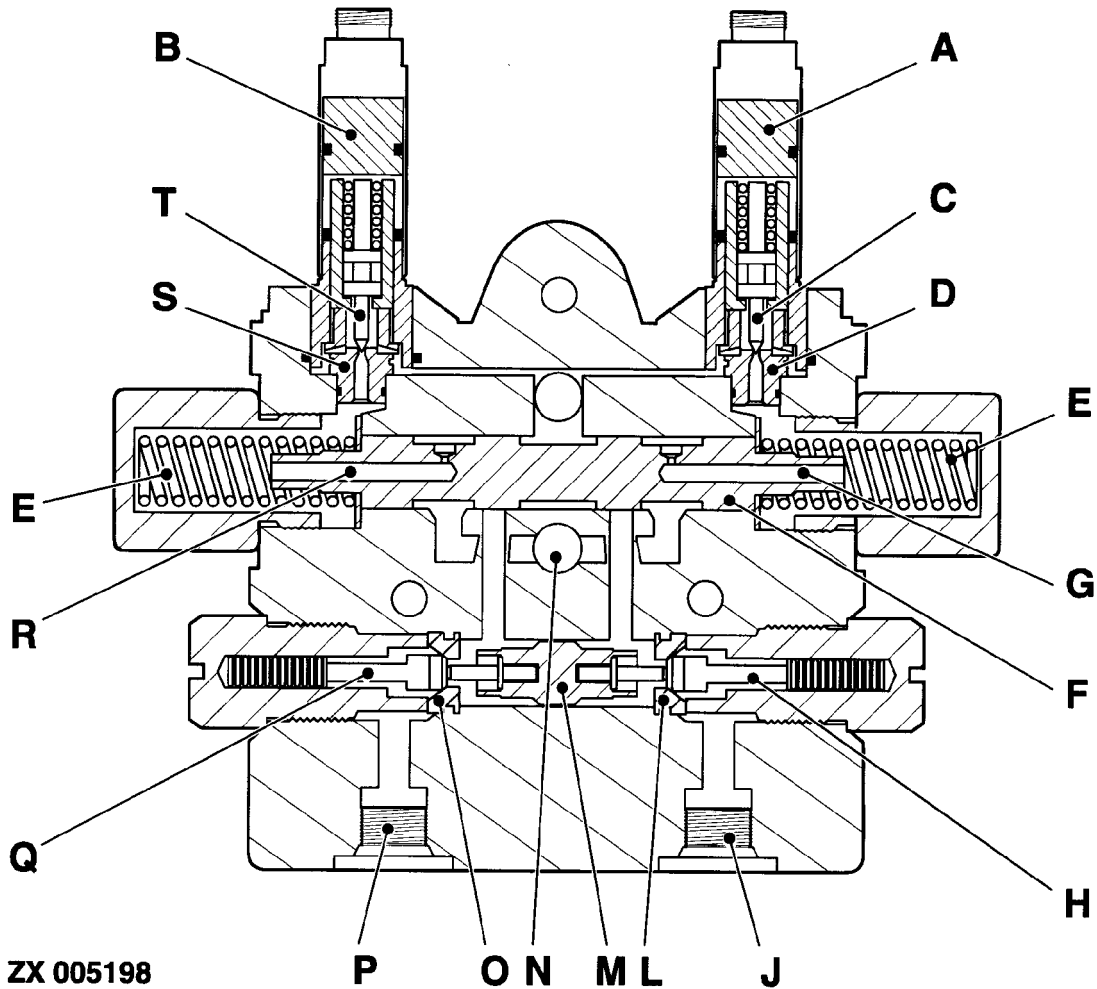
1. Lower harvesting unit completely and adjust lowest threshing cylinder speed to relieve pressure in hydraulic lines.
2. Disconnect wiring harness from solenoid valve block at disconnect point (A).
3. Mark hydraulic lines and disconnect at solenoid valve block.
4. Plug all openings immediately.
5. Loosen screws (B) and (C) and remove solenoid valve block.



ZX.TMXZC0002402-19-25NOV92



**REPAIRING SOLENOID VALVE PLATE 'SWINGING OUT UNLOADING AUGER'**



- |                     |                           |                               |                     |
|---------------------|---------------------------|-------------------------------|---------------------|
| A—Solenoid          | F—Control plunger         | M—Check valve control plunger | Q—Check valve       |
| B—Solenoid          | G—Oil passage             | N—Return oil passage          | R—Oil passage       |
| C—Needle valve      | H—Check valve             | O—Check valve seat            | S—Needle valve seat |
| D—Needle valve seat | J—Pressure oil connection | P—Pressure oil connection     | T—Needle valve      |
| E—Spring            | L—Check valve seat        |                               |                     |

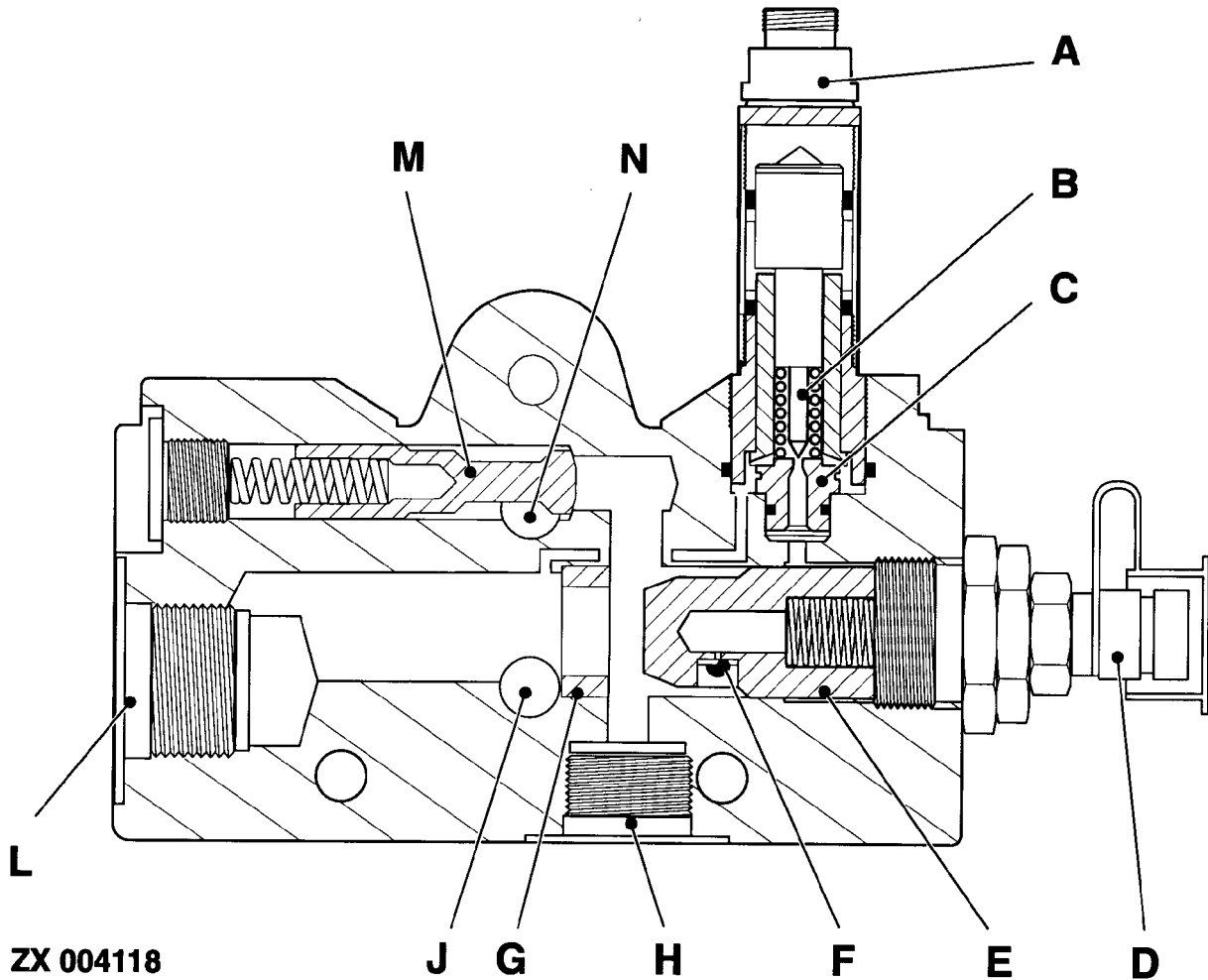
Disassemble solenoid valve plate.

Once removed, seals must be replaced with new ones.

Check all bores, orifices and valve seats for restriction. Replace damaged parts.

ZX, TMXZCO003030-19-18NOV93

**PRESSURE VALVE REPAIR**



- A—Solenoid
- B—Needle valve
- C—Needle valve seat
- D—Pressure test port

- E—Control plunger
- F—Orifice
- G—Control plunger seat

- H—Hydraulic oil inlet
- J—Return oil passage
- L—Hydraulic oil outlet (to reservoir)

- M—Check valve
- N—Pressure oil passage

Disassemble solenoid valve plate.

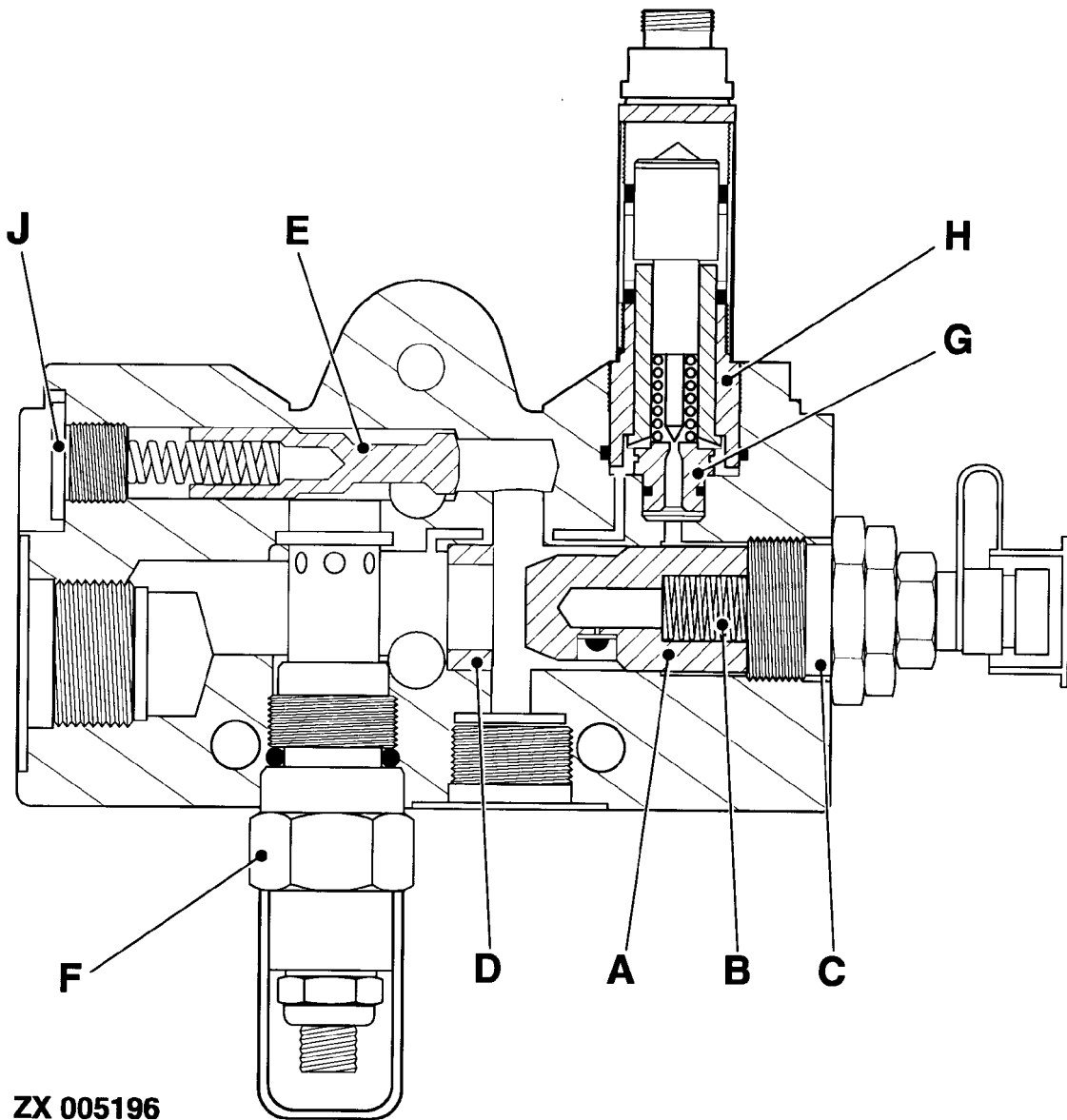
Replace damaged parts.

Check all bores, orifices and valve seats for restriction.

Once removed, seals must be replaced with new ones.

ZX, TMXZCO003031-19-18NOV93

**REPAIRING PRESSURE VALVE WITH PRESSURE RELIEF VALVE**



**ZX 005196**

A—Control plunger  
B—Spring  
C—Plug with test connection

D—Control plunger seat  
E—Check valve plunger

F—Pressure relief valve  
G—Needle valve seat

H—Solenoid  
J—Plug

Remove plugs (C) and (J).

Screw out pressure relief valve (F) and solenoid (H).

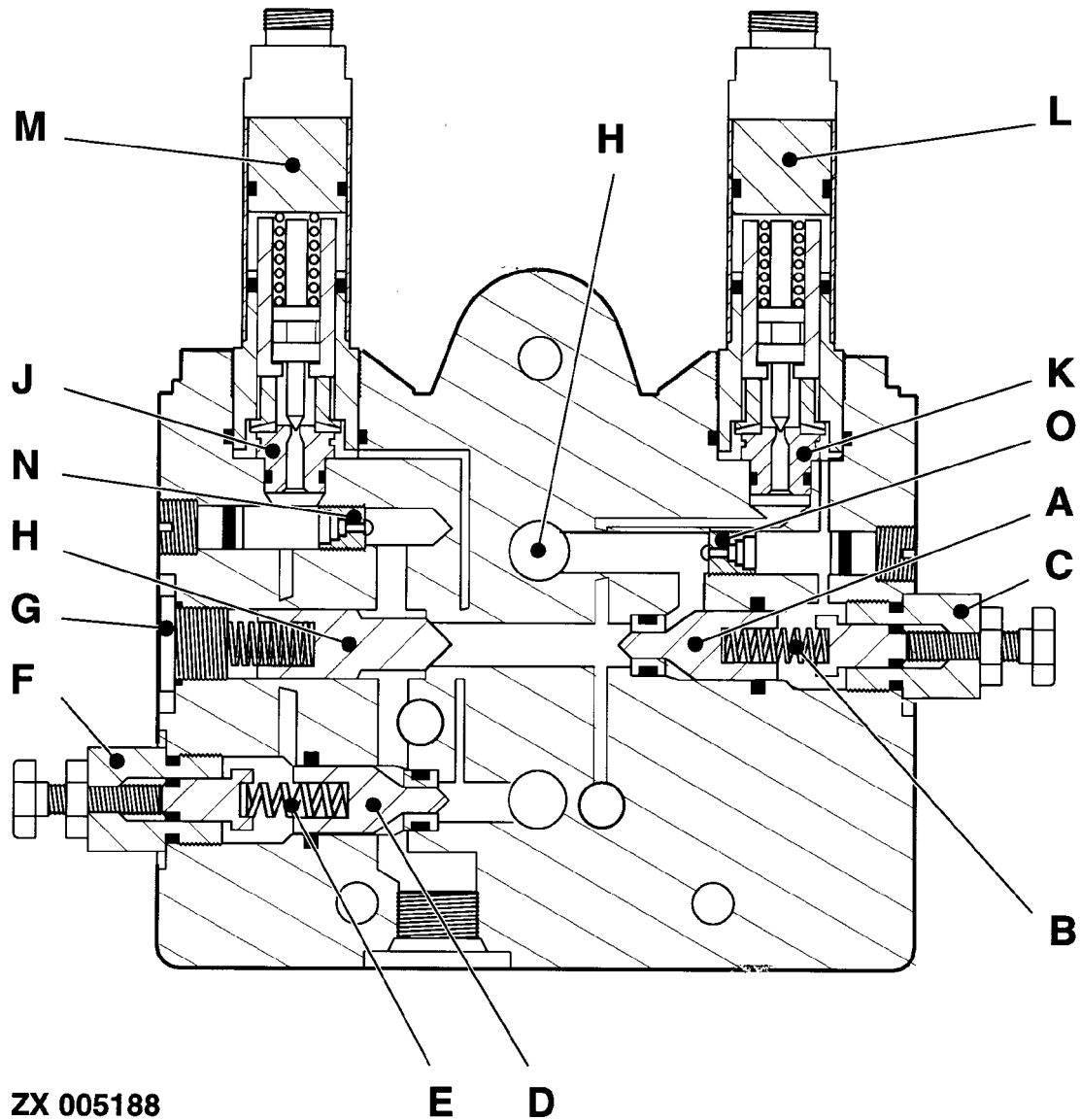
Check all bores, orifices and valve seats for restriction.

Replace damaged parts.

Once removed, seals must be replaced with new ones.

ZX, TMXZC0003032-19-18NOV93

**REPAIRING SOLENOID VALVE PLATE 'RAISING/LOWERING HARVESTING UNIT'**



A—Control plunger, raising harvesting unit  
 B—Spring  
 C—Cap with adjusting screw for raising speed

D—Control plunger, lowering harvesting unit  
 E—Spring  
 F—Cap with adjusting screw for lowering speed

G—Plug  
 H—Check valve  
 J—Needle valve seat  
 K—Needle valve seat

L—Solenoid  
 M—Solenoid  
 N—Orifice  
 O—Orifice

Disassemble solenoid valve plate.

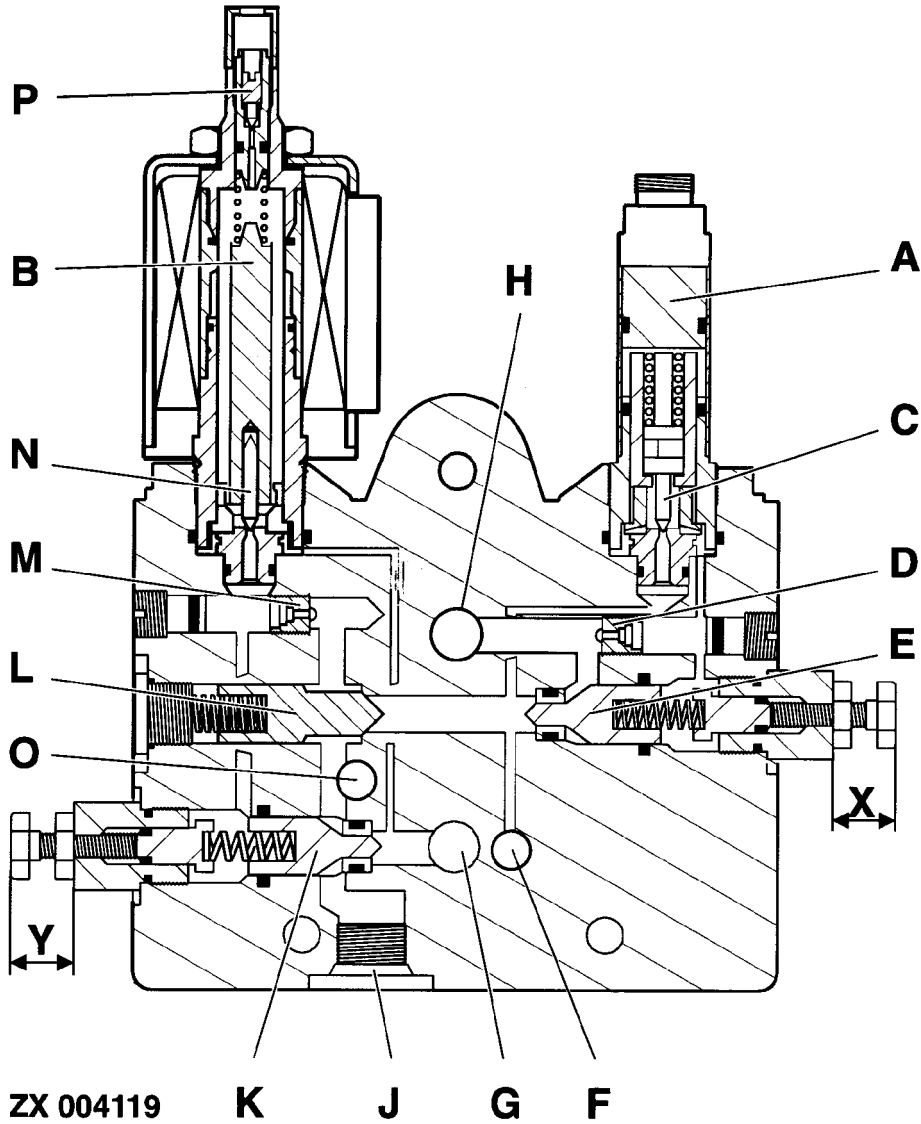
Check all bores, orifices and valve seats for restriction.

Replace damaged parts.

Once removed, seals must be replaced with new ones.

ZX, TMXZC003033-19-18NOV93

**REPAIRING SOLENOID VALVE PLATE 'RAISING/LOWERING HARVESTING UNIT, FLOAT CONTROL'**



- |                            |                                                     |                             |                        |
|----------------------------|-----------------------------------------------------|-----------------------------|------------------------|
| A—Solenoid                 | F—Connecting passage to second solenoid valve plate | J—Pressure oil passage      | O—Connecting passage   |
| B—Solenoid                 | G—Return oil passage                                | K—Control plunger, lowering | P—Bleed screw          |
| C—Needle valve             | H—Pressure oil passage                              | L—Check valve               | X—Adjustment, raising  |
| D—Orifice                  |                                                     | M—Orifice                   | Y—Adjustment, lowering |
| E—Control plunger, raising |                                                     | N—Needle valve              |                        |

Disassemble solenoid valve plate.

Replace damaged parts.

Check all bores, orifices and valve seats for restriction.

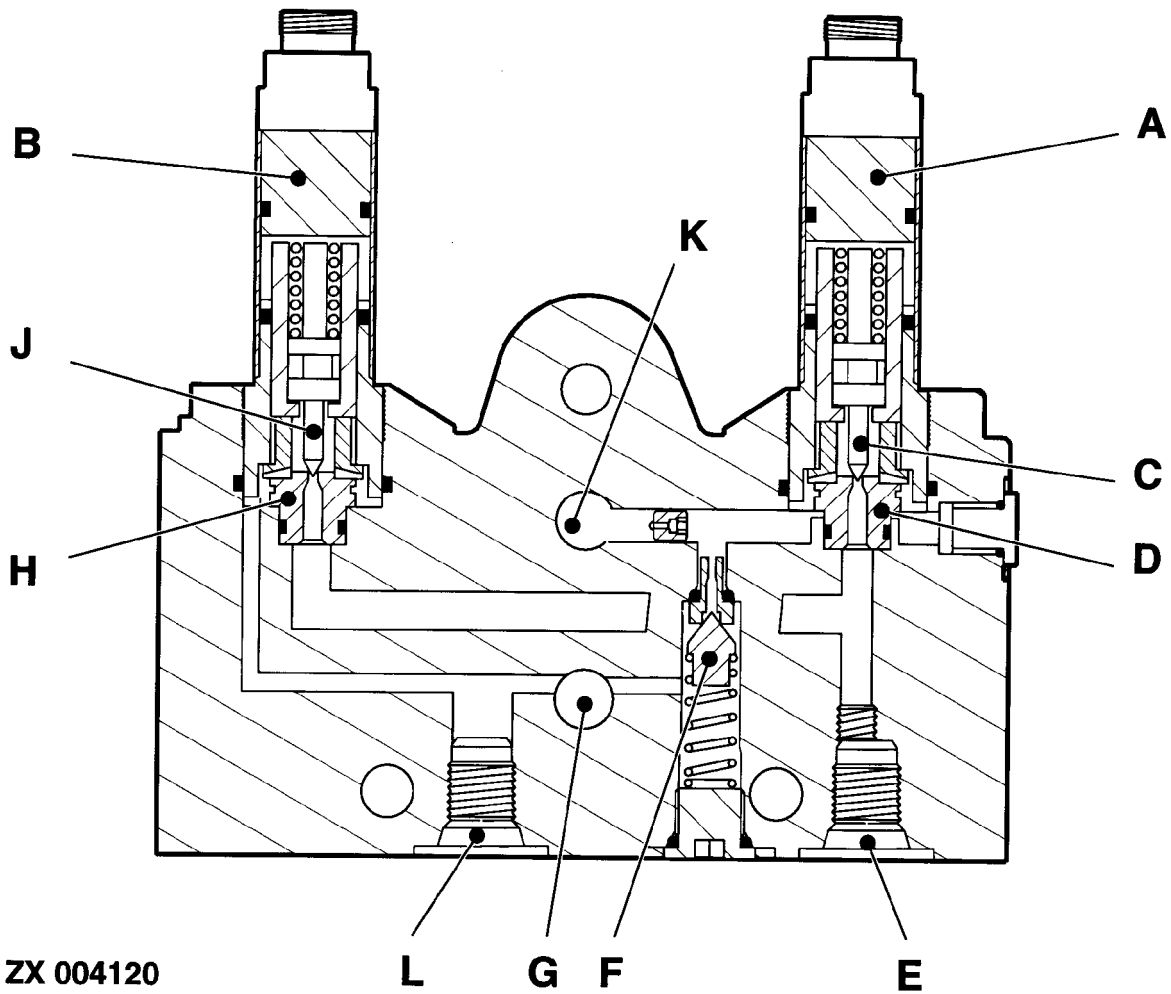
Once removed, seals must be replaced with new ones.

ZX 004119 K J G F

ZX004119 -UN-02MAY95

ZX, TMXZCO003034-19-18NOV93

**REPAIRING SOLENOID VALVE PLATE 'CYLINDER SPEED ADJUSTMENT'**



ZX 004120

- |                |                           |                      |                               |
|----------------|---------------------------|----------------------|-------------------------------|
| A—Solenoid     | D—Needle valve seat       | G—Return oil passage | K—Pressure oil passage        |
| B—Solenoid     | E—Pressure oil connection | H—Needle valve seat  | L—Return passage to reservoir |
| C—Needle valve | F—Pressure relief valve   | J—Needle valve       |                               |

Disassemble solenoid valve plate.

Replace damaged parts.

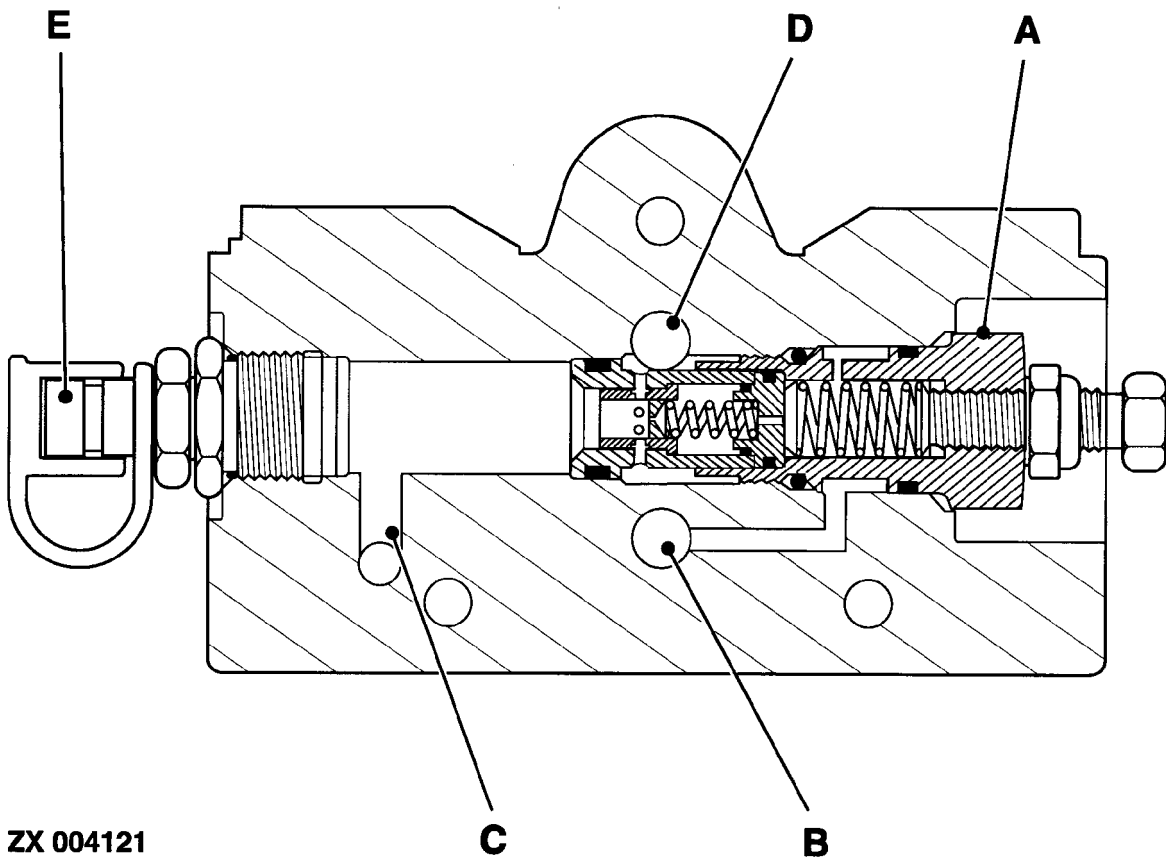
Check all bores, orifices and valve seats for restriction.

Once removed, seals must be replaced with new ones.

ZX.TMXZCO003035-19-18NOV93

ZX004120 -JUN-02MAY95

**REPAIR PRESSURE REDUCTION UNIT**



**ZX 004121**

-JUN-02MAY95  
ZX004121

**A—Pressure reduction valve**  
**B—Return oil passage**

**C—Passage for reduced pressure oil**

**D—Pressure oil passage**

**E—Test connection**

Remove pressure reduction valve (A) from housing.

Once removed, seals must be replaced by new ones.

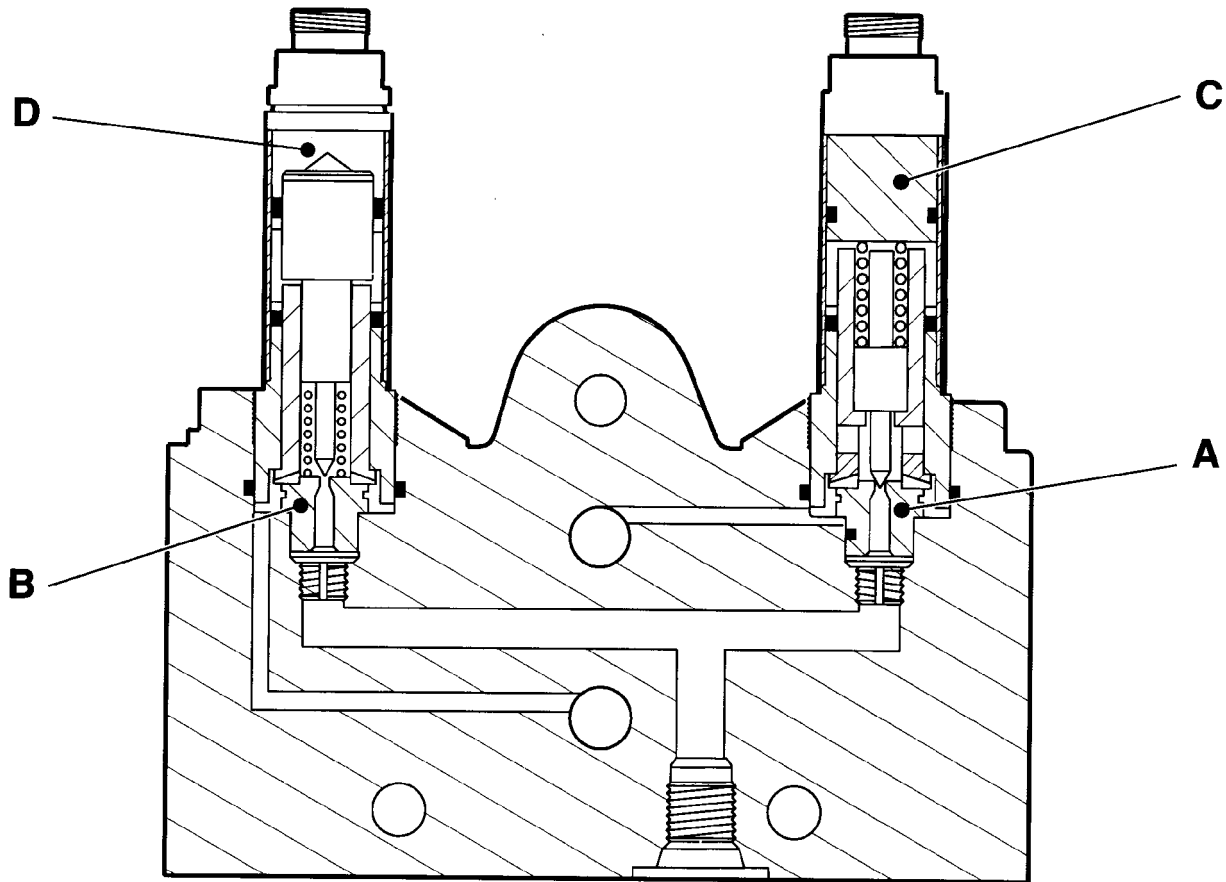
Remove test connection (E).

*NOTE: Pressure reduction valve (A) interrupts oil flow at 6500 kPa (65 bar) (950 psi). Replace complete valve, if defective.*

Check bores in housing and in pressure reduction valve (A) for restriction.

ZX.TMXZCO003036-19-18NOV93

**REPAIR SOLENOID VALVE PLATE FOR ENGAGING/DISENGAGING MAIN DRIVE OR UNLOADING DRIVE**



**ZX 005192**

A—Needle valve seat

B—Needle valve seat

C—Solenoid

D—Solenoid

Disassemble solenoid valve plate.

Replace damaged parts.

Check all bores, orifices and needle valve seats for restriction.

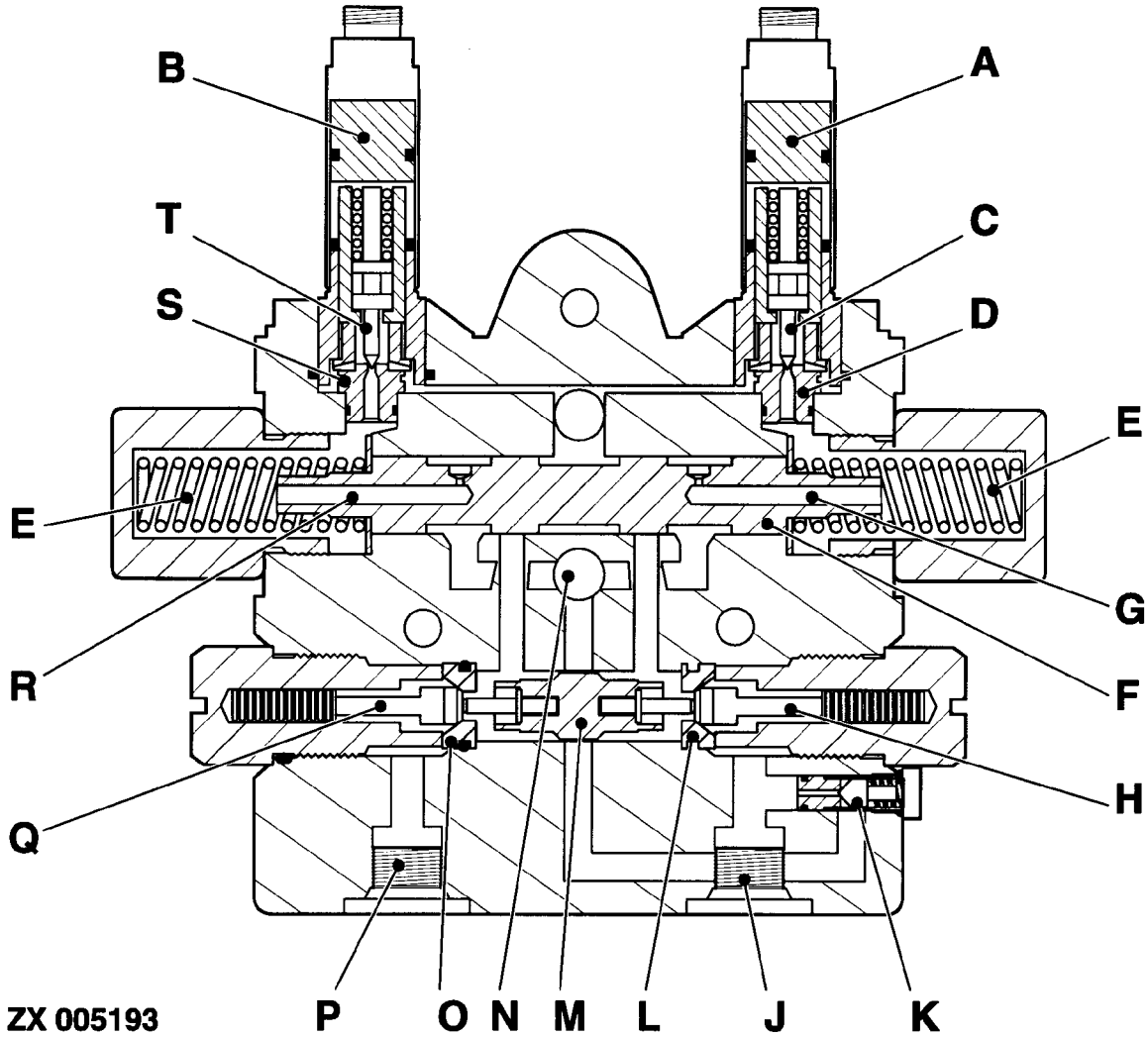
Once removed, seals must be replaced by new ones.

ZX, TMXZCO003037-19-18NOV93

ZX005192 -JN-02MAY95



**REPAIR SOLENOID VALVE PLATE FOR HORIZONTAL REEL ADJUSTMENT**



ZX 005193

ZX005193 -UN-02MAY95

- |                     |                           |                               |                           |
|---------------------|---------------------------|-------------------------------|---------------------------|
| A—Solenoid          | F—Control plunger         | L—Check valve seat            | P—Pressure oil connection |
| B—Solenoid          | G—Oil passage             | M—Check valve control plunger | Q—Check valve             |
| C—Needle valve      | H—Check valve             | N—Return oil passage          | R—Oil passage             |
| D—Needle valve seat | J—Pressure oil connection | O—Check valve seat            | S—Needle valve seat       |
| E—Spring            | K—Thermal relief valve    |                               | T—Needle valve            |

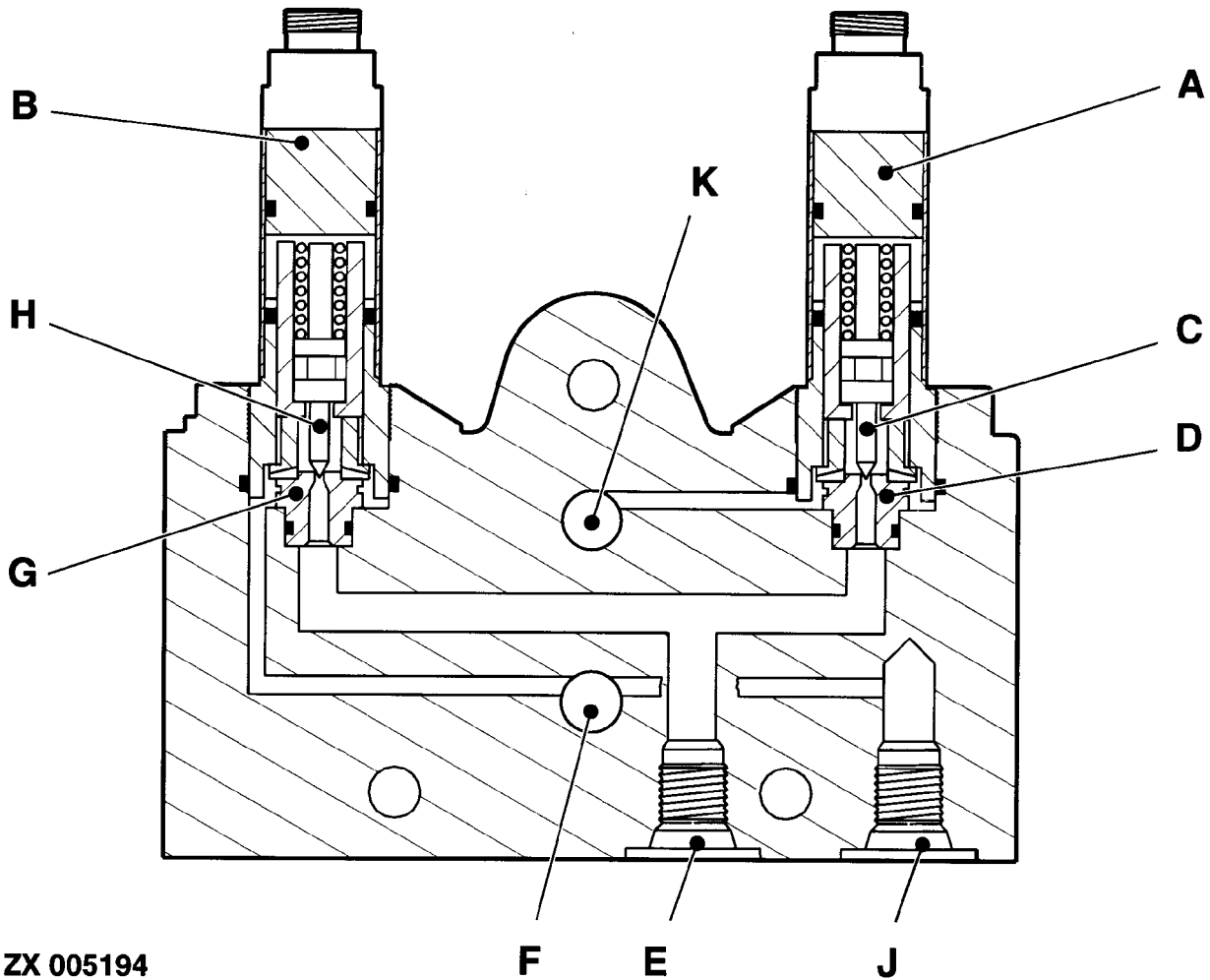
Disassemble valve plate.

Replace damaged parts.

Check all bores, orifices and valve seats for restriction.

Once removed, seals must be replaced by new ones.

**REPAIR SOLENOID VALVE PLATE FOR REEL LIFT**



**ZX 005194**

- |                |                           |                     |                          |
|----------------|---------------------------|---------------------|--------------------------|
| A—Solenoid     | D—Needle valve seat       | G—Needle valve seat | J—Accumulator connection |
| B—Solenoid     | E—Pressure oil connection | H—Needle valve      | K—Pressure oil passage   |
| C—Needle valve | F—Return oil passage      |                     |                          |

Disassemble solenoid valve plate.

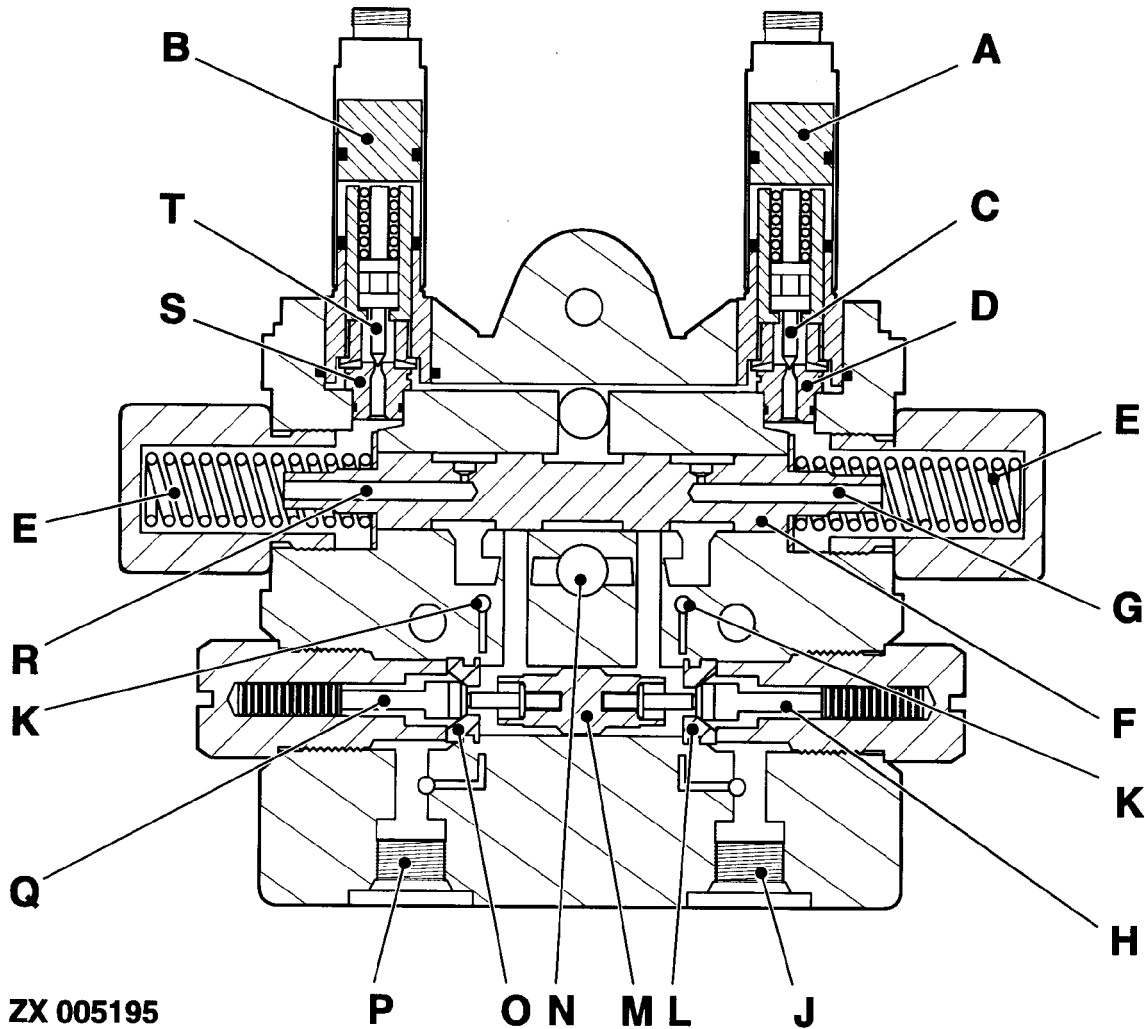
Check needle valve seats for restriction.

Replace damaged parts.

ZX, TMXCO003039-19-18NOV93

ZX005194 -JN-02MAY95

**REPAIR SOLENOID VALVE PLATE FOR HEADER LATERAL TILT**



ZX 005195

ZX005195 -UN-02MAY95

- |                     |                                       |                               |                           |
|---------------------|---------------------------------------|-------------------------------|---------------------------|
| A—Solenoid          | G—Oil passage                         | L—Check valve seat            | P—Pressure oil connection |
| B—Solenoid          | H—Check valve                         | M—Check valve control plunger | Q—Check valve             |
| C—Needle valve      | J—Pressure oil connection             | N—Return oil passage          | R—Oil passage             |
| D—Needle valve seat | K—Connection to pressure relief plate | O—Check valve seat            | S—Needle valve seat       |
| E—Spring            |                                       |                               | T—Needle valve            |
| F—Control plunger   |                                       |                               |                           |

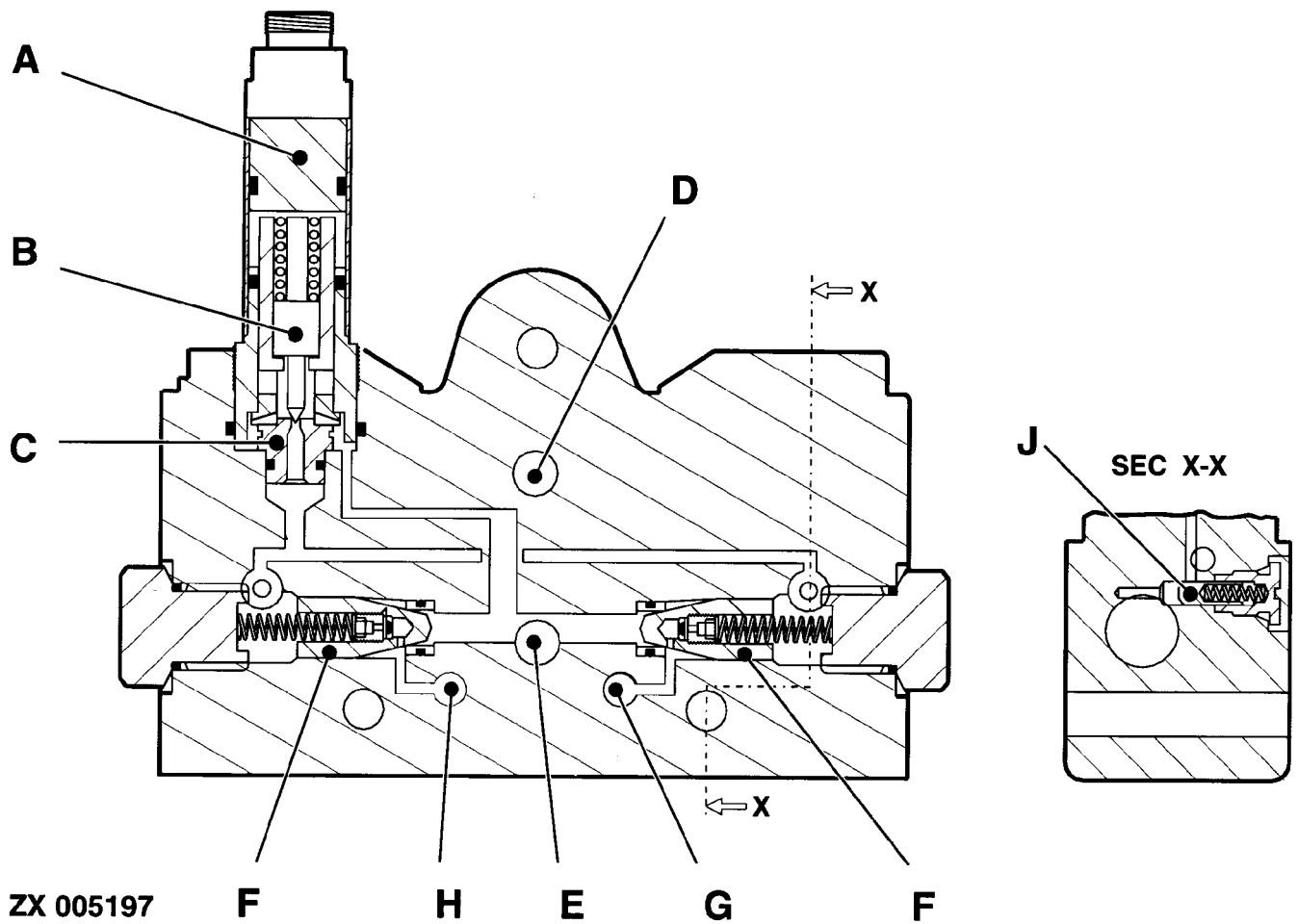
Disassemble solenoid valve plate.

Replace damaged parts.

Check all bores, orifices and valve seats for restriction.

Once removed, seals must be replaced by new ones.

**REPAIR SOLENOID VALVE PLATE FOR PRESSURE RELIEF (HEADER LATERAL TILT)**



A—Solenoid  
B—Needle valve  
C—Needle valve seat

D—Pressure oil passage  
E—Return oil passage  
F—Control plunger

G—Connection to hydraulic cylinder  
H—Connection to hydraulic cylinder

J—Check valve

Disassemble solenoid valve plate.

Replace damaged parts.

Check all bores, orifices and valve seats for restriction.

Once removed, seals must be replaced by new ones.

ZX, TMXZCO003041-19-18NOV93

ZX005197 -UN-02MAY95

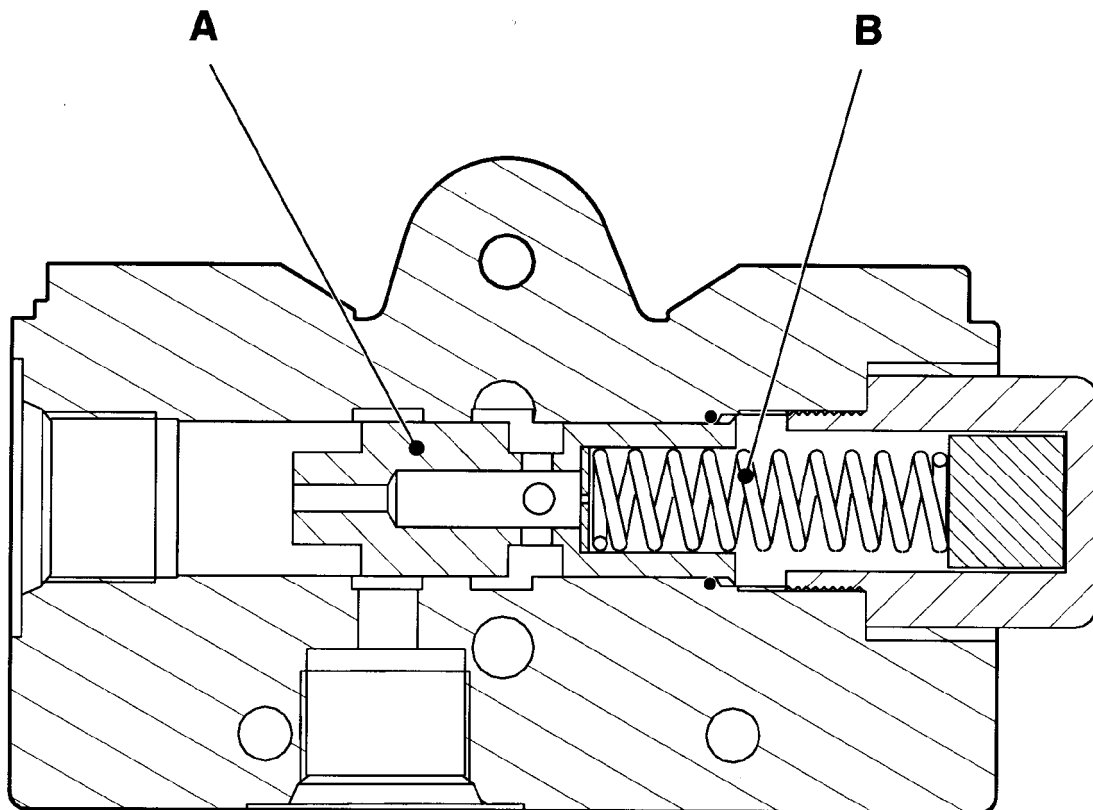
## REPAIR SOLENOID VALVE PLATE FOR VARIABLE FEEDER HOUSE DRIVE

*NOTE: The solenoid valve plate for variable feeder house drive is identical with the solenoid valve*

*plate for reel lift (refer to information given in this Group).*

ZX, TMXZC0003042-19-18NOV93

## REPAIR FLOW DIVIDER



### ZX 005200

Remove cap from housing. Take piston (A) and spring (B) out of valve plate.

Check all bores for restriction.

Replace damaged parts.

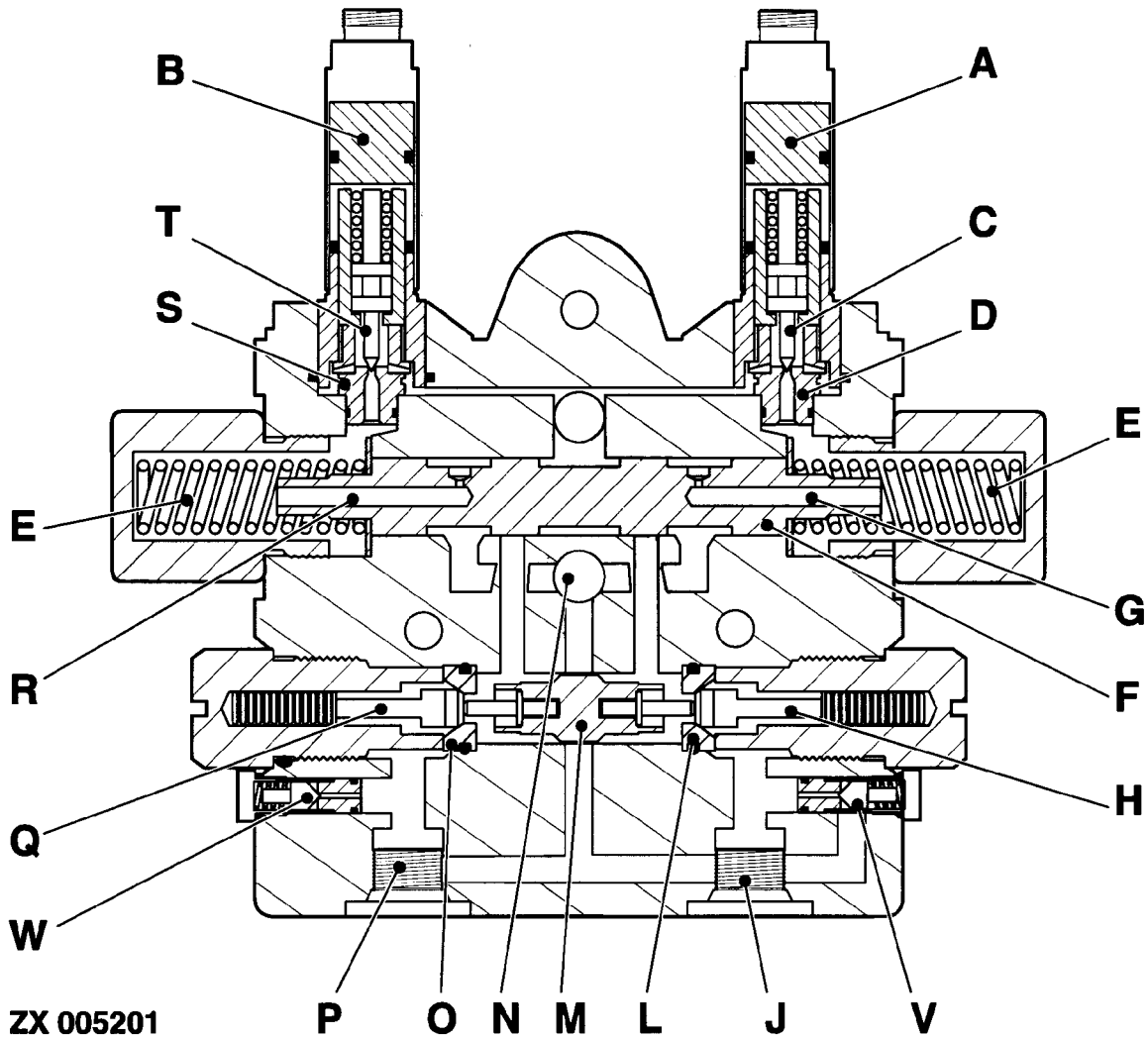
ZX, TMXZC0003043-19-18NOV93

## **REPAIR PRESSURE VALVE**

*NOTE: The pressure valve of Hillmaster combines is almost identical with the pressure valve of standard combines. The only difference is that no check valve is installed. When ordered as spare part, the valve plate is supplied with a check valve.*

ZX.TMXZC0003044-19-18NOV93

**REPAIR SOLENOID VALVE PLATE FOR HILLMASTER CONTROL**



ZX 005201

ZX005201 -UN-02MAY95

- |                     |                               |                           |                        |
|---------------------|-------------------------------|---------------------------|------------------------|
| A—Solenoid          | G—Oil passage                 | N—Return oil passage      | S—Needle valve seat    |
| B—Solenoid          | H—Check valve                 | O—Check valve seat        | T—Needle valve         |
| C—Needle valve      | J—Pressure oil connection     | P—Pressure oil connection | V—Thermal relief valve |
| D—Needle valve seat | L—Check valve seat            | Q—Check valve             | W—Thermal relief valve |
| E—Spring            | M—Check valve control plunger | R—Oil passage             |                        |
| F—Control plunger   |                               |                           |                        |

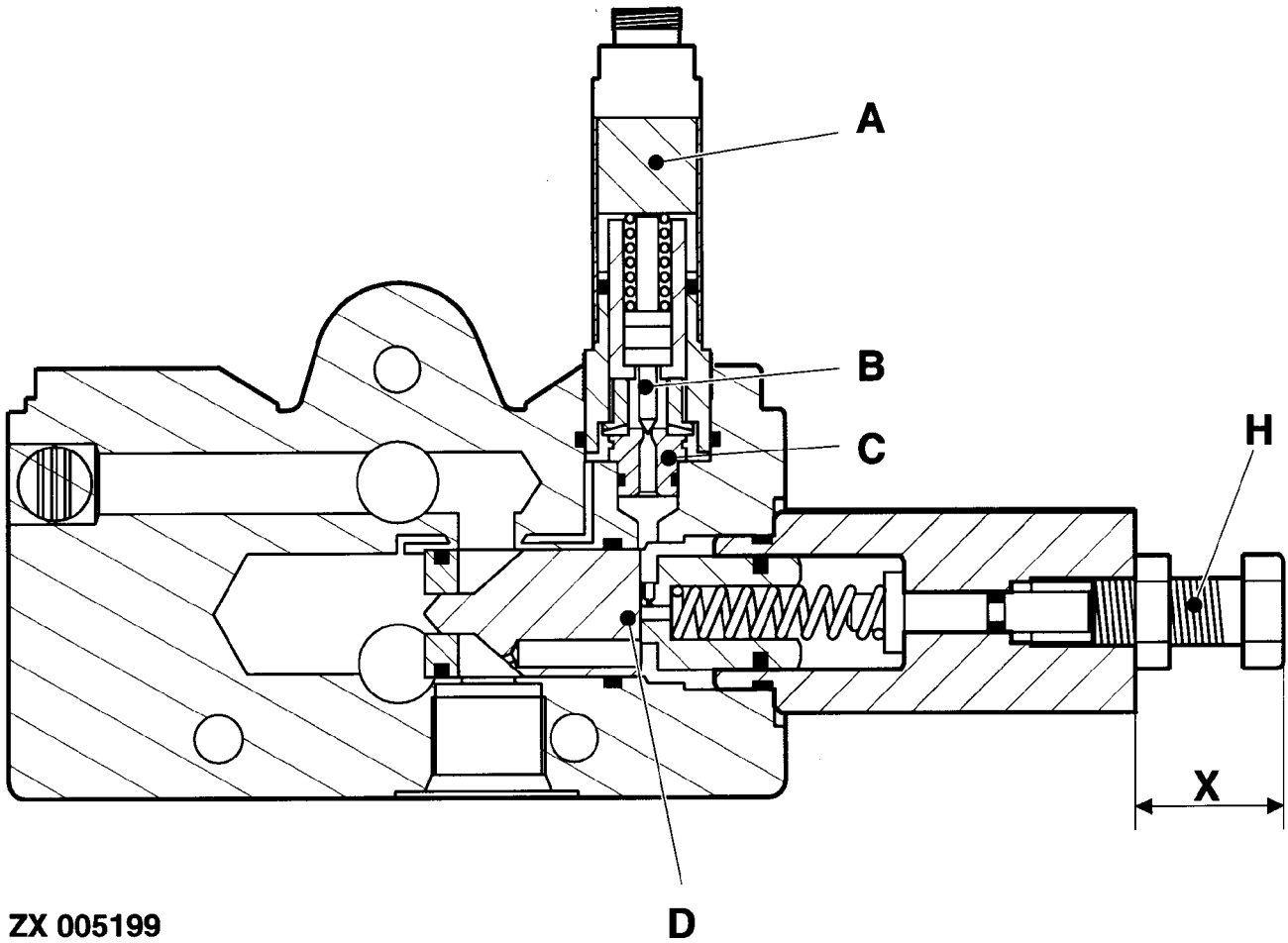
Disassemble solenoid valve plate.

Replace damaged parts.

Check all bores, orifices and valve seats for restriction.

Once removed, seals must be replaced by new ones.

### REPAIR RATE-OF-DROP SOLENOID VALVE PLATE



**ZX 005199**

A—Solenoid  
B—Needle valve

C—Needle valve seat  
D—Control plunger

H—Rate-of-drop adjusting  
screw

X—Adjusting dimension

Disassemble solenoid valve plate.

Replace damaged parts.

Check all bores, orifices and needle valve seats for restriction.

ZX, TMXZCO003046-19-18NOV93

ZX005199 -JUN-02MAY95



**GENERAL INFORMATION**

**A. Damage to the Piston Rod**

Watch out for the following:

- Piston rods must not be subject to mechanical damage, such as dents.
- Prevent ice from forming on the running surface, as ice can damage the wiper ring.
- Piston rods must not be washed with acidic solutions or cleaning solutions that adversely affect chrome.
- Piston rods that are exposed to the elements when extended must be treated with non-corrosive grease if left inoperative for lengthy periods.
- Sticky dirt such as clay etc. must be carefully removed before the cylinder is operated.

Cylinders whose piston rods are extended but inaccessible must be actuated periodically.

**B. Damage to Cylinder Barrels**

- Never perform welding work on cylinder barrels. Cylinder barrels must never be subjected to thermal shocks (e.g. from welding rods etc.).
- Cylinder barrels must never be subjected to mechanical damage.

**C. Mis-aligned Cylinders**

Cylinders that are installed off-center and have no ball-and-socket joints are subject to dangerous lateral forces, which cause wear on the piston rod and guides. (An exception to this is cylinders built to withstand lateral forces).

ZX, TMXZCO006613-19-01AUG96

**SPECIFICATIONS**

Item	Measurement	Specification
Nut in cylinder for swinging out the unloading auger	Torque	114 ± 11 N-m (84 ± 8 lb-ft)
Nut in cylinder that controls the pivoting shield	Torque	114 ± 11 N-m (84 ± 8 lb-ft)

ZX, TMXZCO006623-19-01SEP96

### DISASSEMBLY AND CHANGING THE SEALS

Using a blunt screwdriver, press axially against snap ring (A) and at the same time turn piston rod (B).

It should take about one turn before the snap ring jumps off the piston rod.

Turn the piston rod in the direction of the arrow.

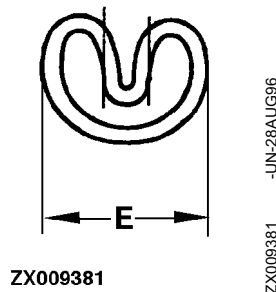
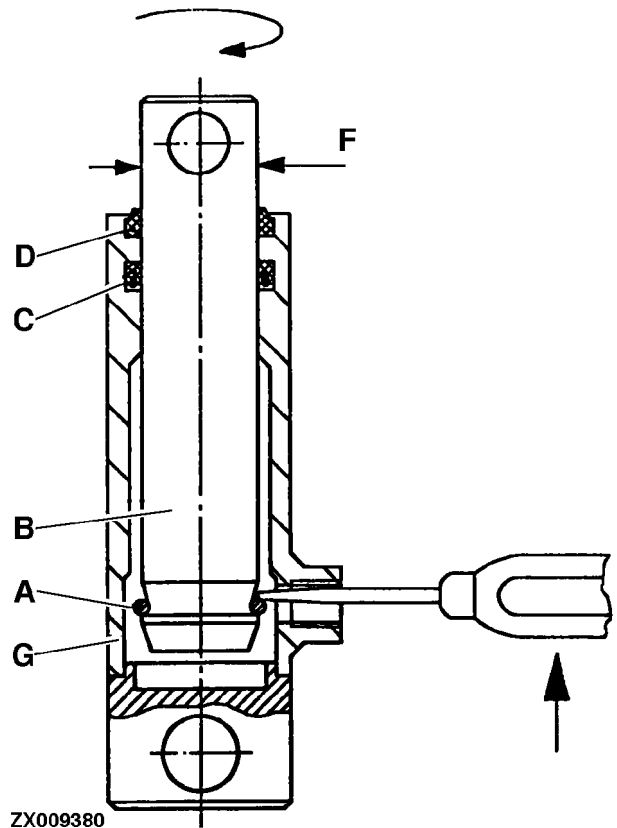
Use a blunt inscribing tool to extract grooved ring (C).

Once the piston rod is removed, wiper ring (D) can be removed easily from the groove.

Fold the new grooved ring (C) into a heart shape (E), leaving no sharp edges. Use snap ring pliers to hold the grooved ring together and push it in through bore (F). It will expand to fill the groove.

Install new wiper ring (D) in the wiper ring groove.

- A—Snap ring
- B—Piston rod
- C—Grooved ring
- D—Wiper ring
- E—Grooved ring in "heart" shape
- F—Piston rod bore
- G—Cylinder barrel



ZX009380 -JUN-28AUG96

ZX009381 -JUN-28AUG96

ZX.TMXZCO006614-19-01AUG96

### ASSEMBLING THE PISTON

Place snap ring (B) on piston rod (C) and slide the piston rod into cylinder (A).

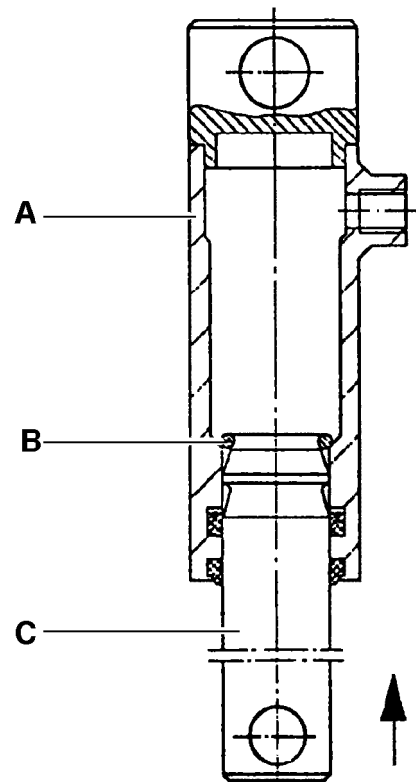
As shown by the arrow, insert the piston as far as it will go.

Place the end of the piston rod on a wooden surface and strike the end of the cylinder barrel once with a hammer. The blow should be brief but hard.

This causes the snap ring to jump into the snap ring groove.

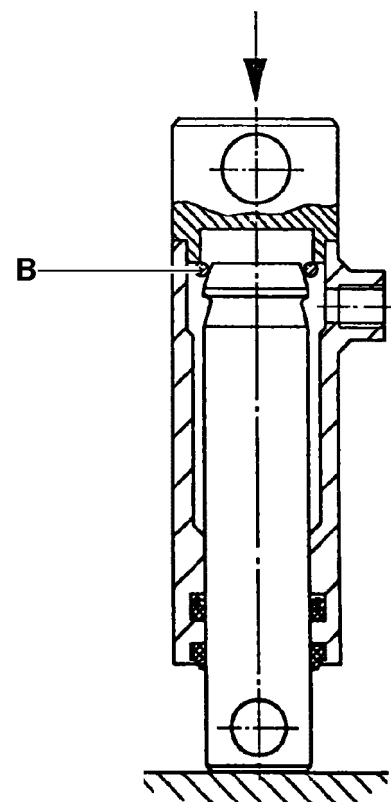
Look through disassembly hole to check that the snap ring is in its proper position.

- A—Cylinder
- B—Snap ring
- C—Piston rod



ZX009382

ZX009382 -UN-28AUG96

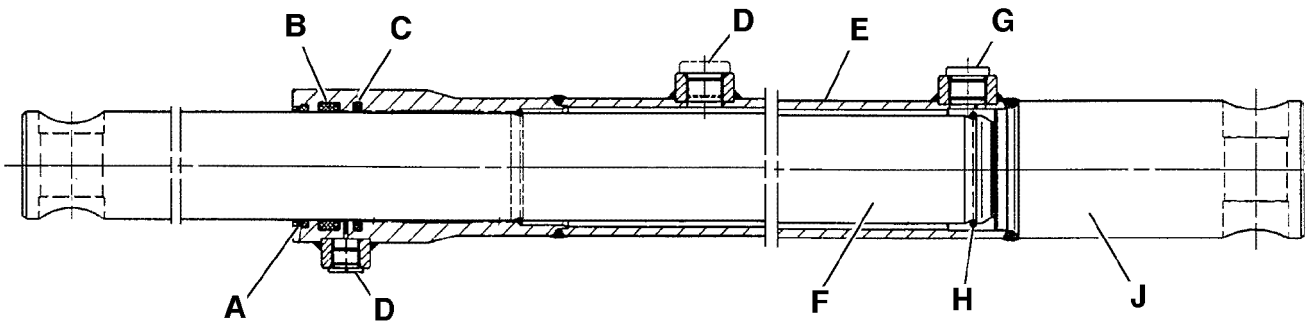


ZX009383

ZX009383 -UN-28AUG96

ZX.TMXZCO006615-19-01AUG96

**CYLINDER FOR RAISING HEADER**



ZX009384

A—Wiper ring  
B—Grooved ring  
C—Rod seal

D—Plug with O-ring  
E—Cylinder barrel  
F—Piston rod

G—Hose connection and  
disassembly hole

H—Snap ring  
J—Cylinder base

**Disassembly and Changing the Seals**

Use a blunt screwdriver to press snap ring (H) down towards cylinder base (J).

Extract piston rod (F) from cylinder barrel (E).

Use a blunt inscribing tool to remove all seals, and replace them with new ones.

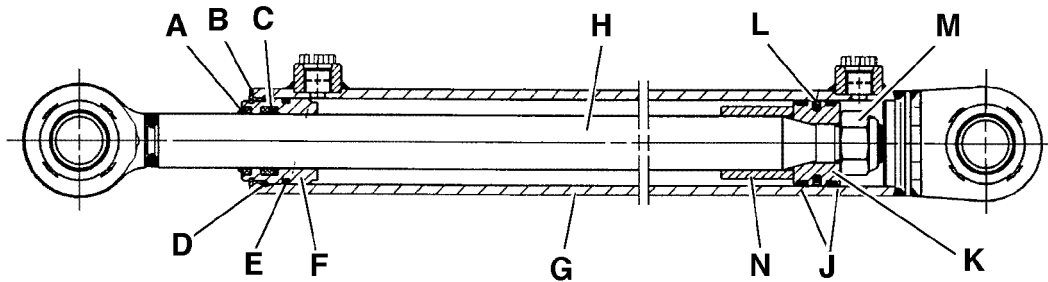
**IMPORTANT: Take care not to damage the base of the groove.**

Assemble in reverse order.

ZX,TMXZCO006616-19-01SEP96

ZX009384 -UN-28AUG96

**CYLINDER FOR SWINGING OUT THE UNLOADING AUGER**



ZX009385

ZX009385 -UN-29AUG96

- |                  |                   |              |               |
|------------------|-------------------|--------------|---------------|
| A—Wiper ring     | E—O-ring          | H—Piston rod | L—"Glyd" ring |
| B—Retaining ring | F—Guide           | J—Guide band | M—Nut         |
| C—Grooved ring   | G—Cylinder barrel | K—Piston     | N—Bushing     |
| D—Snap ring      |                   |              |               |

**Disassembly and Changing the Seals**

Use assembly pliers to remove retaining ring (B).

Push back guide (F) until snap ring (D) is exposed.

Use a blunt screwdriver to pry out snap ring (D).

Pull out piston rod (H) and piston (K).

If necessary, slacken nut (M) and take off piston (K).

Use a blunt inscribing tool to remove all seals, and replace them with new ones.

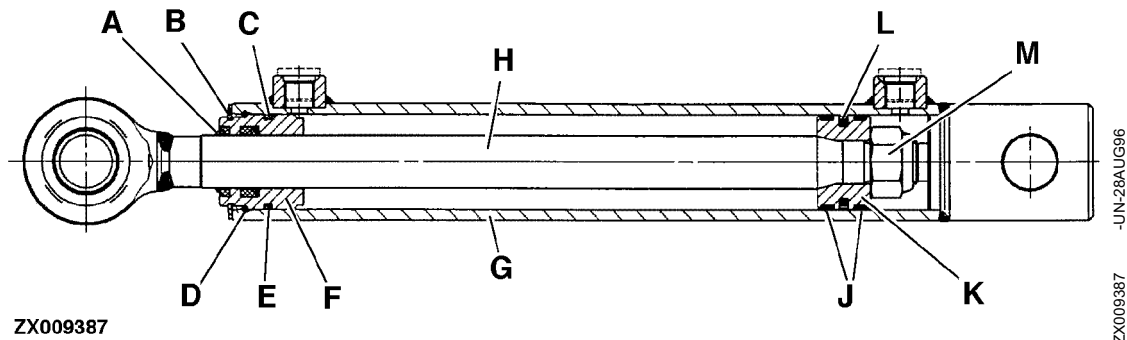
**IMPORTANT: Take care not to damage the base of the groove.**

Assemble in reverse order.

Tighten nut (M) to  $114 \pm 11$  N·m ( $84 \pm 8$  lb-ft).

ZX,TMXZCO006617-19-01SEP96

**PIVOTING SHIELD CONTROL CYLINDER**



A—Wiper ring  
B—Retaining ring  
C—Grooved ring

D—Snap ring  
E—O-ring  
F—Guide

G—Cylinder barrel  
H—Piston rod  
J—Guide band

K—Piston  
L—“Glyd” ring  
M—Nut

**Disassembly and Changing the Seals**

- Use assembly pliers to remove retaining ring (B).
- Push back guide (F) until snap ring (D) is exposed.
- Use a blunt screwdriver to pry out snap ring (D).
- Pull out piston rod (H) and piston (K).
- Slacken nut (M) and take off piston (K).

Use a blunt inscribing tool to remove all seals, and replace them with new ones.

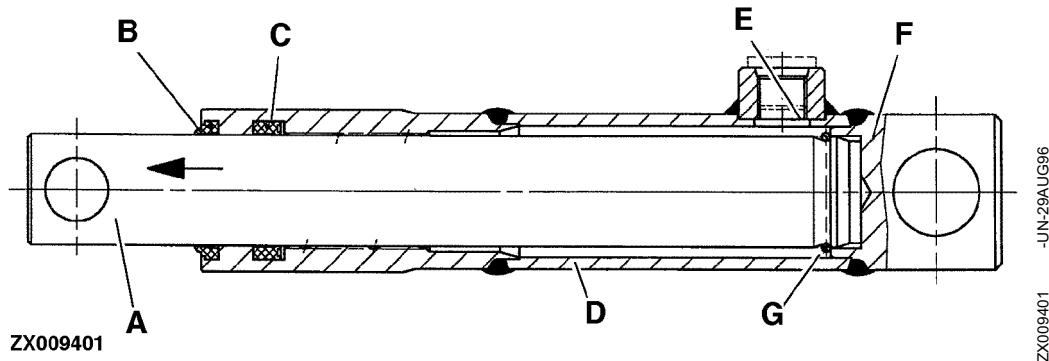
**IMPORTANT: Take care not to damage the base of the groove.**

Assemble in reverse order.

Tighten nut (M) to  $114 \pm 11$  N-m ( $84 \pm 8$  lb-ft).

ZX,TMXZCO006618-19-01SEP96

**BELT TENSIONING CYLINDER**



A—Piston rod  
B—Wiper ring

C—Grooved ring  
D—Cylinder barrel

E—Disassembly hole  
F—Cylinder base

G—Snap ring

**Disassembly and Changing the Seals**

Pull piston rod (A) in the direction of the arrow until snap ring (G) becomes visible in disassembly hole (E).

Insert a blunt screwdriver through disassembly hole (E) and press snap ring (G) down towards cylinder base (F).

Extract the piston rod from cylinder barrel (D).

Use a blunt inscribing tool to remove all sealing components.

**IMPORTANT: Take care not to damage the base of the groove.**

Assemble in reverse order.

ZX.TMXZCO006619-19-01AUG96

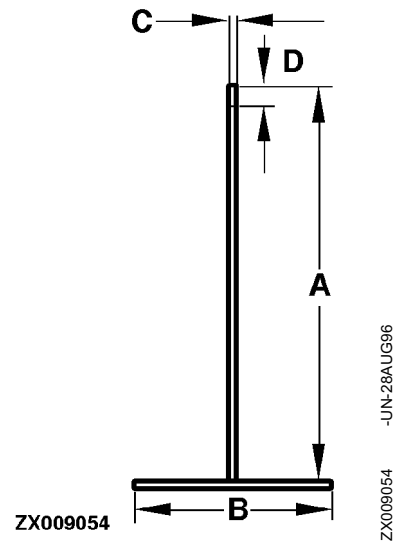
*Hydraulic Cylinders/Belt Tensioning Cylinder*



### MAKING A SPECIAL TOOL

Tool for disassembling and assembling the valve seat and piston in the check valve.

- A—200 mm (7.9 in.)
- B—100 mm (4.0 in.)
- C—Diameter 4 mm (0.16 in.)
- D—M4 thread, 10 mm (0.4 in.)



ZX, TMXZC0006620-19-01AUG96

### SPECIFICATIONS

Item	Measurement	Specification
Nut in hillmaster hydraulic cylinders	Torque	1400 ± 140 N·m (1033 ± 103 lb-ft)
Screw plug on check valve	Torque	130 ± 13 N·m (96 ± 10 lb-ft)

ZX, TMXZC0006621-19-01AUG96

### OTHER MATERIALS

Number	Name	Use
TY9371	Loctite 270	Securing the guide in the hillmaster hydraulic cylinder

ZX, TMXZC0006767-19-01SEP96

## GENERAL INFORMATION

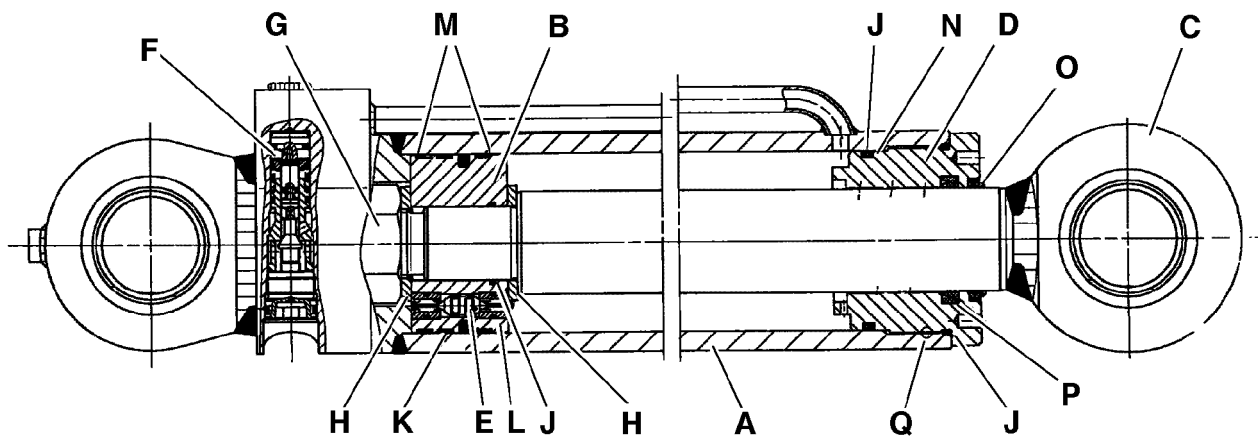
**CAUTION:** Never work on the hillmaster cylinders unless the combine harvester has already been lowered.

*NOTE:* Refer to Operator's Manual, "Operating With Hillmaster Levelling System".

**CAUTION:** Danger! Hillmaster cylinders weigh approx. 55 kg (121 lb).

ZX, TMXZC0006622-19-01AUG96

## COMPONENTS OF HILLMASTER CYLINDER



ZX009055

A—Cylinder barrel	E—Compensating valve	J—O-ring	N—Spiral back-up ring
B—Piston	F—Check valve	K—Guide ring	O—Wiper ring
C—Piston rod	G—Nut	L—"Glyd" ring	P—Grooved ring
D—Guide	H—Washer	M—Guide band	Q—Secure with Loctite

### Disassembly and Changing the Seals

Heat the area of the cylinder around the thread on guide (D) to a temperature of at least 300°C (572°F), break the Loctite seal and use assembly pliers to unscrew guide (D).

Pull out piston rod (C) and piston (B).

Remove nut (G), washers (H), piston (B) and guide (D) from the piston rod.

Use a blunt inscribing tool to remove all seals, and replace them with new ones.

**IMPORTANT:** Take care not to damage the base of the groove.

Assemble the cylinder in reverse order.

Tighten nut (G) to 1400 ± 140 N·m (1033 ± 130 lb-ft).

Apply Loctite 270 (TY9371) to the thread of guide (D) before inserting and tightening the guide.

-JUN-28AUG96  
ZX009055

ZX, TMXZC0006624-19-01SEP96

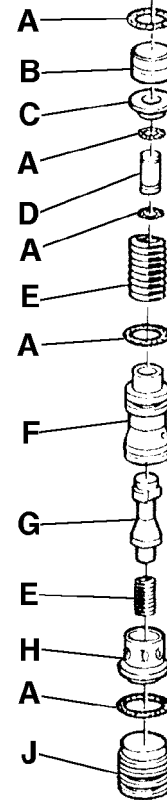
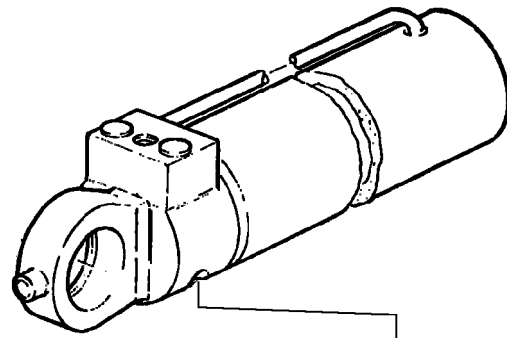
## CHECK VALVE COMPONENTS

### Removing the Check Valve

Use a hex. socket wrench with a width across flats of 17 mm to take out screw plug (J).

One after the other, remove spring (E), sleeve (H) and valve cone (G).

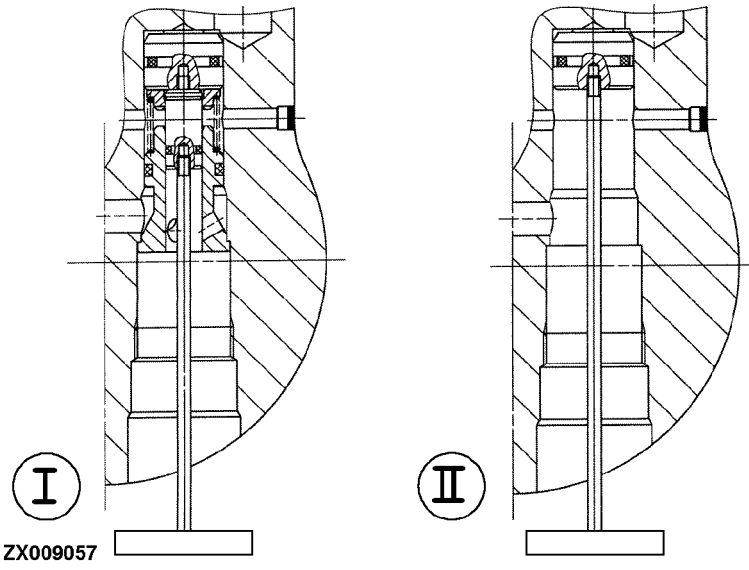
- A—O-ring
- B—Piston
- C—Bushing
- D—Pin
- E—Spring
- F—Valve seat
- G—Valve cone
- H—Sleeve
- J—Screw plug



ZX009056

ZX009056 -UN-28AUG96

ZX.TMZCO006625-19-01AUG96



### Removing the Check Valve (Continued)

Screw the (self-manufactured) disassembly tool into pin (D; refer to "Check Valve Components").

Pulling on the disassembly tool (fig. I) releases the valve seat (F) and allows spring (E), bushing (C) and pin (D) to be removed.

Now screw the disassembly tool (fig. II) into piston (B), and pull out the piston.

Refer to "Check Valve Components" for the identifying letters.

Use a blunt inscribing tool to remove all seal rings, and replace them with new ones.

**IMPORTANT: Take care not to damage the base of the groove.**

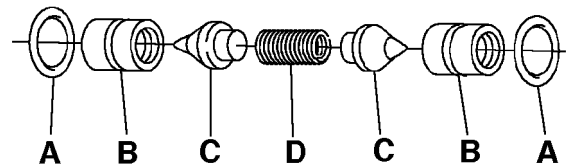
Assemble in reverse order.

Tighten screw plug (J) to  $130 \pm 13$  N·m ( $96 \pm 10$  lb·ft).

ZX, TMXZCO006626-19-01SEP96

### COMPONENTS OF COMPENSATING VALVE

- A—O-ring
- B—Valve seat
- C—Valve cone
- D—Spring

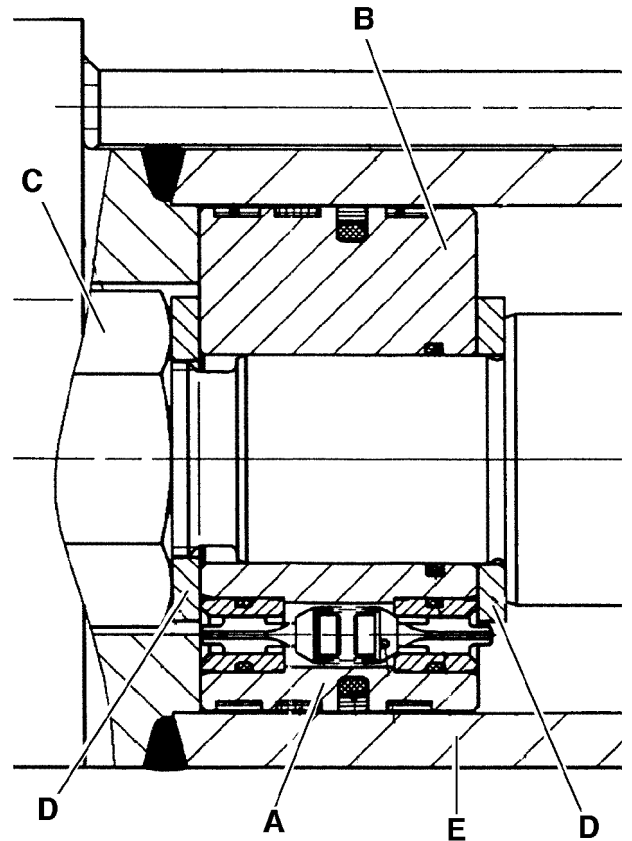


ZX009058

ZX, TMXZCO006627-19-01AUG96

### COMPENSATING VALVE INSTALLED IN PISTON

- A—Compensating valve assembly
- B—Piston
- C—Nut
- D—Washer
- E—Cylinder barrel



ZX009059

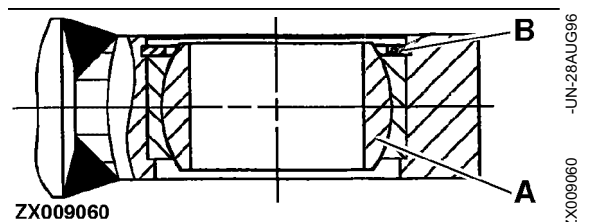
-JUN-28AUG96  
ZX009059

ZX.TMXZCO006628-19-01AUG96

### ATTACHMENT OF HILLMASTER CYLINDER

The ball-and-socket joint is maintenance-free.

- A—Ball-and-socket joint on piston rod
- B—Retaining ring



ZX009060

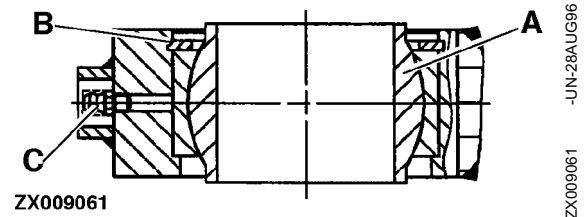
-JUN-28AUG96  
ZX009060

ZX.TMXZCO006629-19-01AUG96

*Hillmaster Hydraulic Cylinder/Attachment of Hillmaster Cylinder*

The ball-and-socket joint must be lubricated via the grease fitting. Lubricate every 50 hours.

- A—Ball-and-socket joint on base
- B—Retaining ring
- C—Grease fitting



ZX009061 -UN-28AUG96

ZX, TMXZC0006630-19-01AUG96

# Section 80 Miscellaneous

## Contents

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- Remove Clamping Ring Bearings . . . . . 80-05-1
- Repair Clamping Ring Bearings . . . . . 80-05-1

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- Sheave Inspection . . . . . 80-10-1

**Group 15—Drive Chains**

- Safety Wires . . . . . 80-15-2
- Chains with O-Rings . . . . . 80-15-3

**Group 20—Side Guard**

- Removal and Installation Tool . . . . . 80-20-1
- Removing Side Guard . . . . . 80-20-2
- Installing Side Guard . . . . . 80-20-2

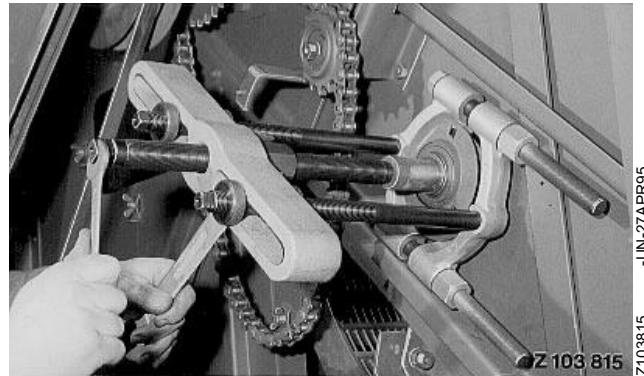
*Contents*



### REMOVING CLAMPING RING BEARINGS

Use a commercial puller to remove ball bearings from cylinder or beater shafts.

Use a puller combination, as shown, if bearings are hard to remove.



ZX, TMXZC0002707-19-13MAY93

-UN-27APR95  
Z103815

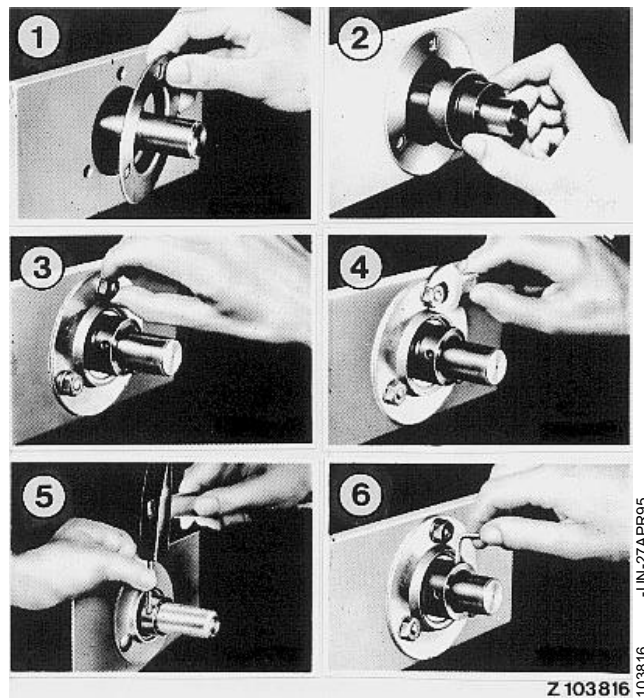
### REPAIRING CLAMPING RING BEARINGS

Check if bearings are in good condition. Replace, if necessary.

ZX, TMXZC0002708-19-13MAY93

### INSTALLING CLAMPING RING BEARINGS WITH SHEET METAL HOUSING (EXAMPLE)

1. Guide one flange half over the shaft and align with corresponding holes.
2. Install bearing with clamping ring on shaft.
3. Assemble other flange half, install attaching screws and tighten finger tight. Repeat procedure on other end of shaft.
4. Firmly tighten attaching screws at both ends.
5. Tighten clamping ring by turning it in rotating direction of shaft. Stake ring with a punch.
6. Lock clamping ring with a setscrew.



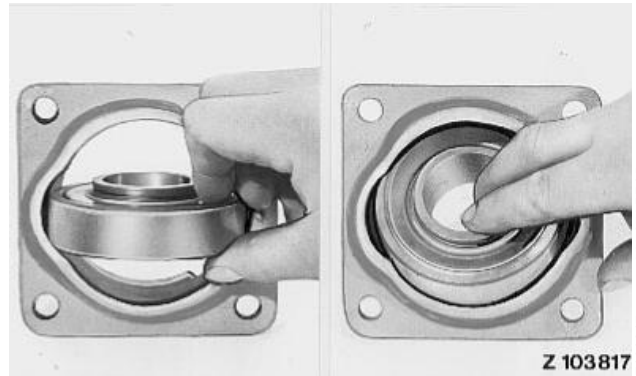
ZX, TMXZC0002709-19-13MAY93

-UN-27APR95  
Z103816

## INSTALLING CLAMPING RING BEARINGS WITH CAST IRON HOUSINGS

### Preassembling Clamping Ring Bearings

Insert bearing into cast iron housing as shown in illustration.



ZX, TMXZC0002710-19-13MAY93

-UN-27/APR95  
Z103817

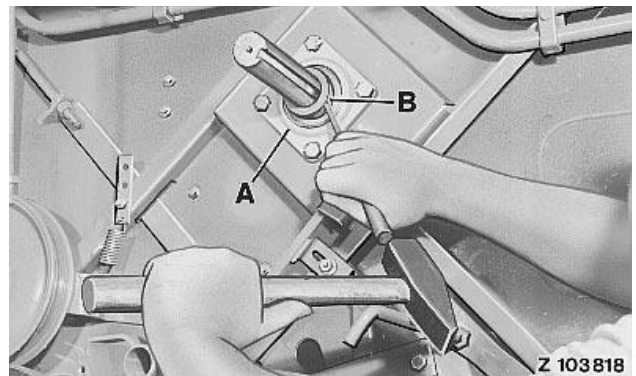
### Installing Clamping Ring Bearings

Slide preassembled clamping ring bearings on both ends of shaft.

Secure cast iron housing (A) on both sides with attaching screws.

Tighten clamping ring (B) in direction of shaft rotation and stake with a punch.

Lock clamping ring (B) with a setscrew.



ZX, TMXZC0002711-19-13MAY93

-UN-27/APR95  
Z103818

### SHEAVE INSPECTION

Before replacing a belt, always check all sheaves for chips, cracks, bent sidewalls, rust, corrosion etc.

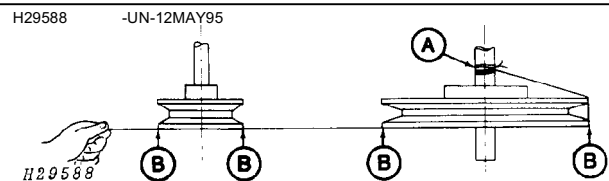
Sheaves must have a smooth dry surface to grip to deliver full power. Replace any defective sheaves.

ZX, TMXZC0002712-19-13MAY93

### SHEAVE ALIGNMENT

Misaligned sheaves will result in reduced belt life. Use a straightedge or cord to check sheave alignment:

1. Position straightedge or cord to touch sheaves at indicated points. Shafts must be parallel.
2. Rotate each sheave a half revolution and note whether contact of either sheave with straightedge or cord is disturbed. If so, shaft is bent or the sheave wobbling.



- A—Tie cord to shaft**  
**B—Cord must touch sheaves at indicated points**

ZX, TMXZC0002713-19-13MAY93

*Drive Belts/Sheave Inspection*

## DRIVE CHAINS

### Chain Tension

Check chains frequently for correct tension during the first several hours of operation.

The amount of slack in a chain should be approx. 2% of the distance between centers of drive and driven sprockets, with all slack removed on the tensioner sprocket side.

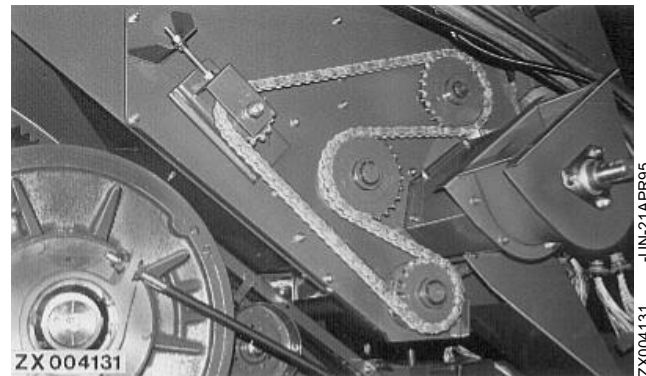
Example: If center distance between a drive and a driven sprocket is 250 mm (10 in.), slack should be 5 mm (0.2 in.).

Excessively loose chains will cause rapid and excessive wear of chain rollers, sprocket teeth and possibly chain-driven machine components.

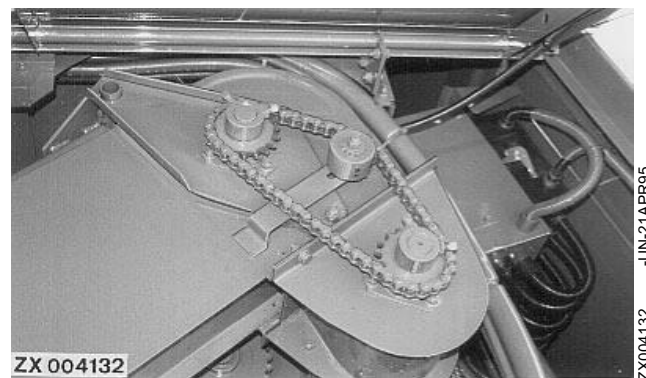
Excessively tight chains cause undue load on bearings, shafts and chains.

### Chain Maintenance

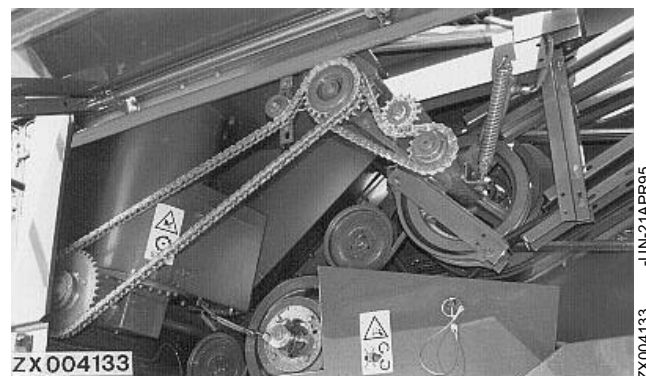
Grease or oil chains at regular intervals.



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-UN-21APR95



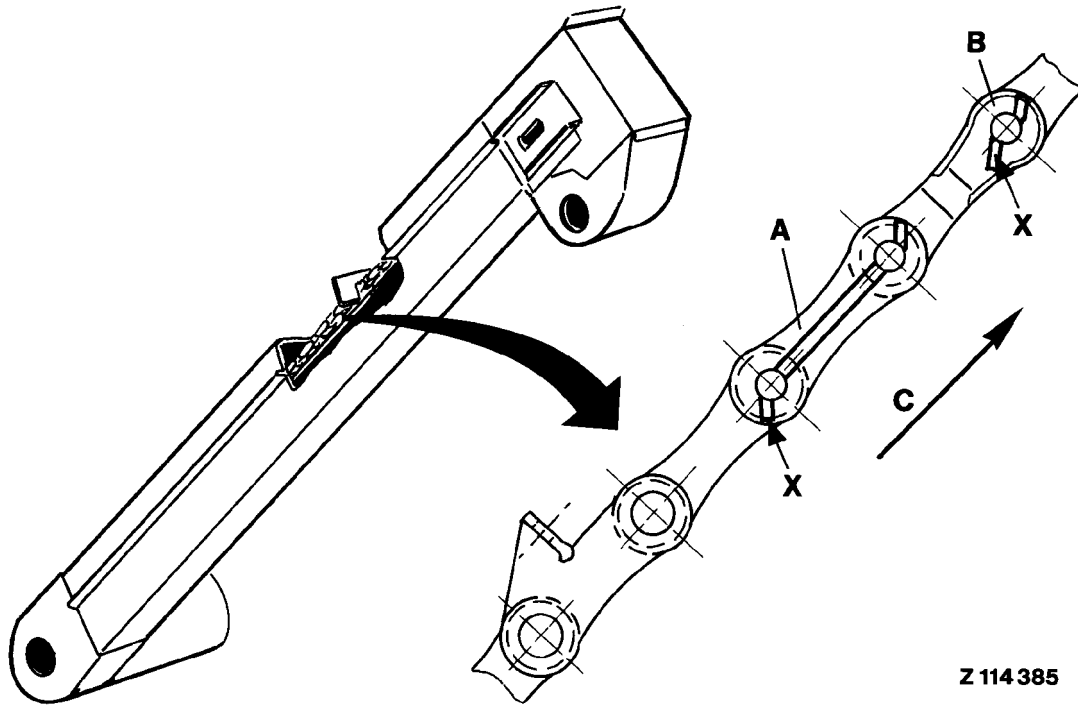
ZX004132  
-UN-21APR95



ZX004133  
-UN-21APR95

ZX,TMXZCO002714-19-13MAY93

**SAFETY WIRES**



-JUN-28APR95  
Z114385

**Z 114 385**

A—Connecting link

B—Offset connecting link

C—Chain travel direction

X—Bend wire at this location as shown

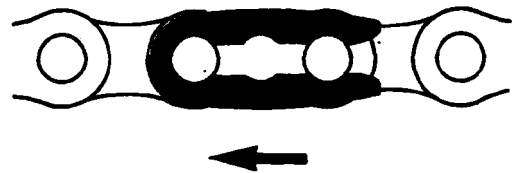
Install safety wire for conveyor chain with bent end facing upward and in direction of chain travel.

Bend other end as shown (see X).

ZX,TMXZCO002715-19-13MAY93

**DRIVE CHAINS — CONNECTING LINK**

Certain chains are connected with a connecting link as shown opposite. Always connect chain as shown with closed end of connecting link towards direction of chain travel.



**E11025**

-JUN-20SEP88  
E11025

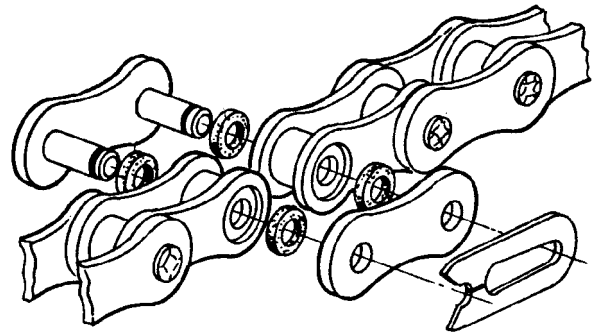
ZX,TMXZCO002716-19-13MAY93

## CHAINS WITH O-RINGS

The drive chain may have O-rings and connecting link on some drives.

**IMPORTANT:** Do not repair drive chains with O-rings when installed (e.g. replacing pin link). Remove, install or repair these chains without opening them.

*NOTE:* When repairing chain, refer to the following steps.



Z109765

-UN-27APR95  
Z109765

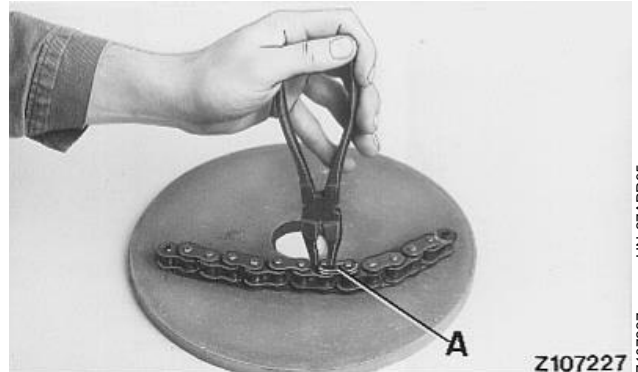
ZX,TMXZC0002717-19-13MAY93

## DISASSEMBLING CHAINS WITH O-RINGS

Use suitable pliers to remove connecting link (A) from pin link.

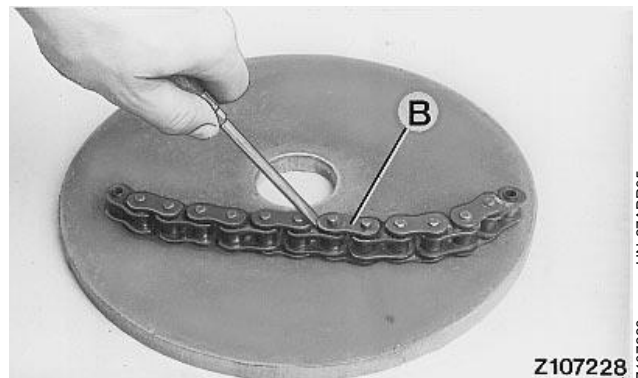
Remove link section (B) with a screwdriver.

- A—Connecting link
- B—Link section



Z107227

-UN-27APR95  
Z107227



Z107228

-UN-27APR95  
Z107228

ZX,TMXZC0002718-19-13MAY93

## ASSEMBLING CHAINS WITH O-RINGS

Slide an O-ring on each pin of pin link against link.

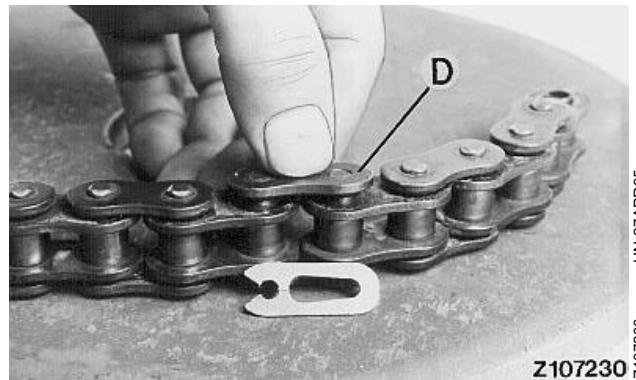
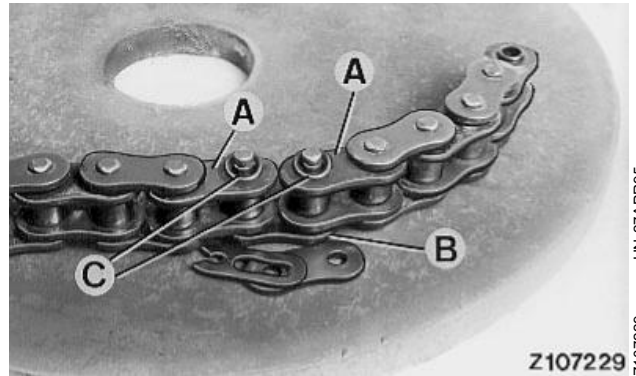
Lubricate bores and pins of pin link with John Deere chain spray or equivalent lubricant.

Insert pins of pin link (B) into both end links (A) of the chain.

Slide the remaining two O-rings (C) on the pins.

Place link section (D) on the pins.

- A—End links
- B—Pin link
- C—O-ring
- D—Link section





## Drive Chains/Chains with O-Rings

Use the hollow punch (A) (bore of punch must be slightly larger than diameter of link pin) to exert pressure on link section (B).

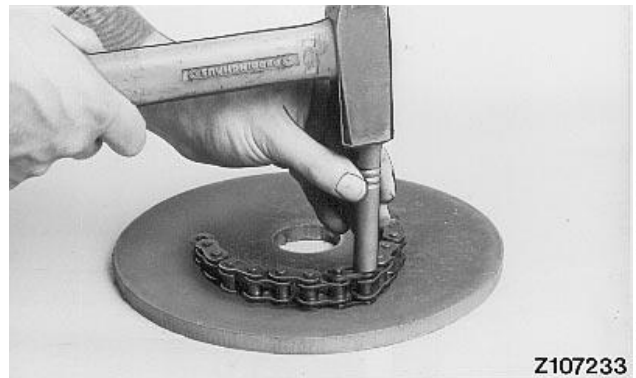
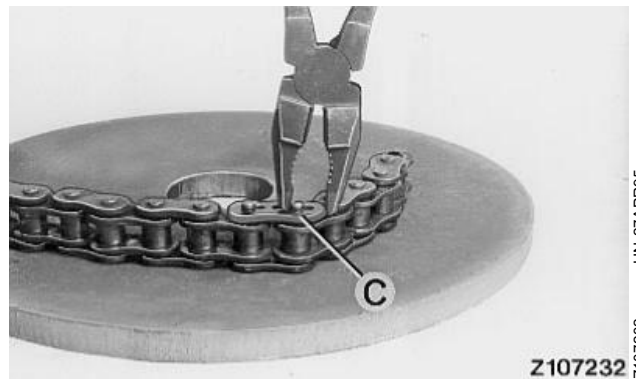
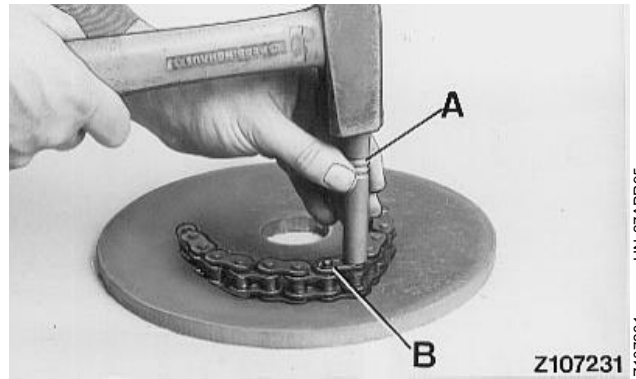
*NOTE: Pin grooves of pin links must be exposed.*

Using suitable pliers, slide connecting link (C) into pin grooves.

*NOTE: Closed end of connecting link must point in direction of chain travel.*

To make sure that the connecting link is seated correctly in the pin grooves use a hollow punch and a hammer to tap slightly on the connecting link. Install chain closed.

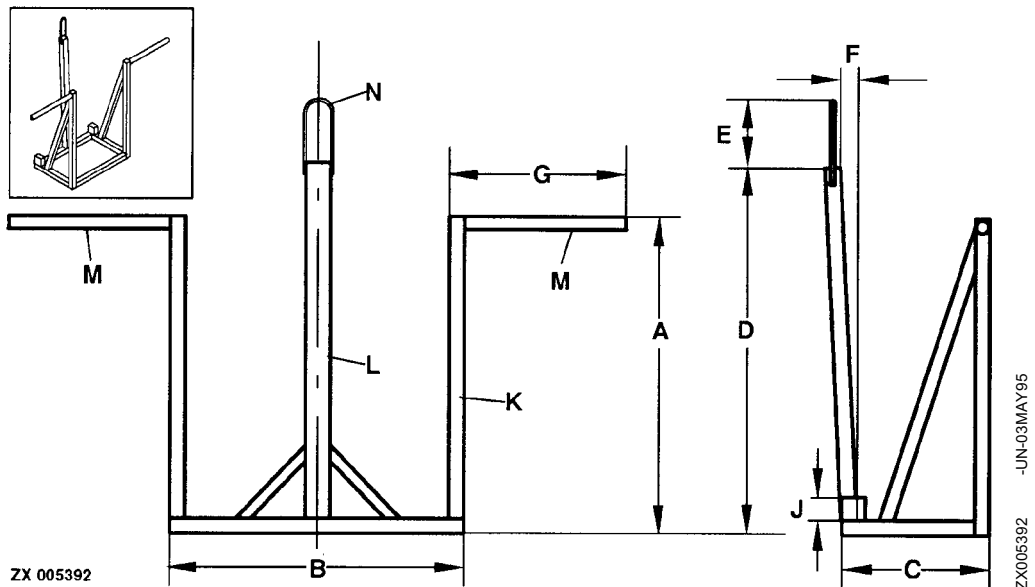
- A—Hollow punch
- B—Link section
- C—Connecting link



ZX,TMXZC0002720-19-13MAY93

*Drive Chains/Chains with O-Rings*

**REMOVAL AND INSTALLATION TOOL (SELF-MANUFACTURE)**



- |                       |                      |                                                    |                    |
|-----------------------|----------------------|----------------------------------------------------|--------------------|
| A—1080 mm (42.52 in.) | E—230 mm (9.05 in.)  | K—Length 50 mm (0.2 in.),<br>Width 50 mm (0.2 in.) | M—32 mm (1.26 in.) |
| B—1000 mm (39.37 in.) | F—30 mm (1.18 in.)   | L—Length 80 mm (0.3 in.),<br>Width 50 mm (0.2 in.) | N—12 mm (0.47 in.) |
| C—500 mm (19.68 in.)  | G—600 mm (23.62 in.) |                                                    |                    |
| D—1260 mm (49.61 in.) | J—80 mm (3.15 in.)   |                                                    |                    |

**Device for holding large side guards during  
removal and installation**

ZX, TMXZCO003991-19-15FEB95

## REMOVING SIDE GUARD

**CAUTION:** Guard is heavy, weighing approx. 50 kg (110 lb.).

Disconnect electrical connection for side lights.

Open the guard and insert self-manufactured holding device (A).

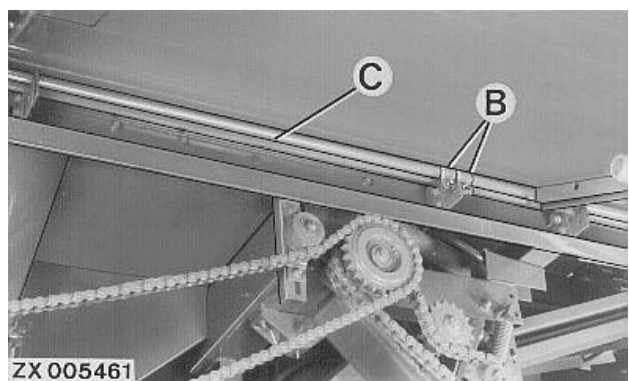
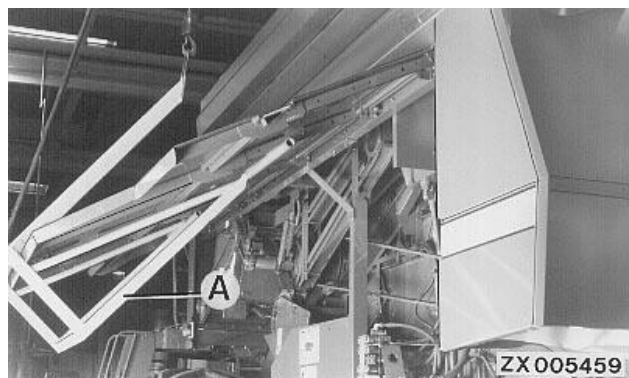
Disconnect support cylinder from guard.

Use holding device to raise guard and gain easier access to the upper attachment points.

Take screws out of retaining lugs.

Slacken off clamps (B), which are used to adjust the guard.

Lift out the complete guard at tube (C), and swing it aside.



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## INSTALLING SIDE GUARD

To install guard, follow removal procedure in reverse.

Once the guard is installed, align it correctly and adjust it using the clamps.

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# Section 90 Operator's Cab and Air Conditioning

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### Group 10—Operator's Cab Heating System

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*Contents*

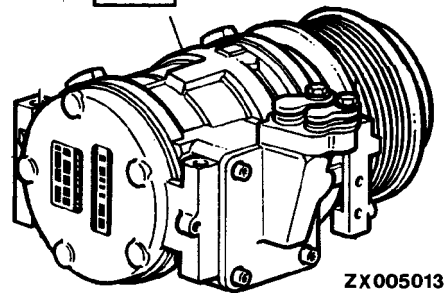
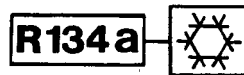
# Group 05 Air Conditioning System - R134a

## GENERAL INFORMATION

The air conditioning system is filled with R134a refrigerant which does not contain CFC.

The R134a air conditioning system can be identified by the compressor.

**IMPORTANT:** Use only R134a refrigerant in this air conditioning system. When using R12 refrigerant, the entire system including the compressor will be damaged.



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## SPECIAL OR ESSENTIAL TOOLS

*NOTE:* Order tools according to information given in the U.S. SERVICE-GARD™ Catalog or in the European Microfiche Tool Catalog (MTC).

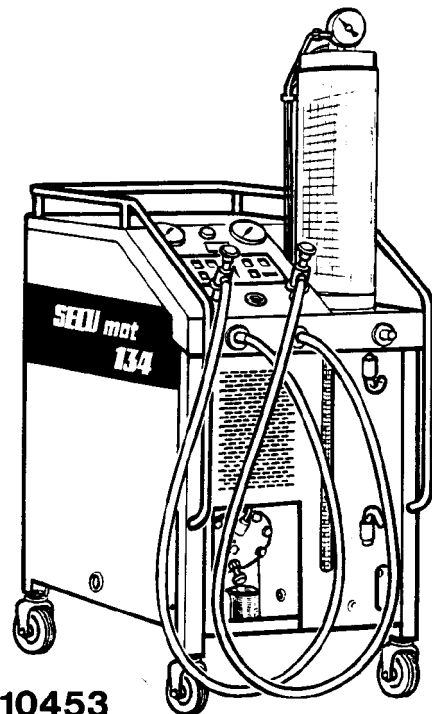
DX,TOOLS -19-05JUN91

Service unit . . . . . FKM10453

Discharging, evacuating, filling, cleaning and checking the air conditioning system

*NOTE:* All work performed with this unit must be carried out in accordance with the service unit operator's manual.

**IMPORTANT:** Use only service units suitable for handling R134a refrigerant.



**FKM10453**

FKM10453 -UN-28APR95

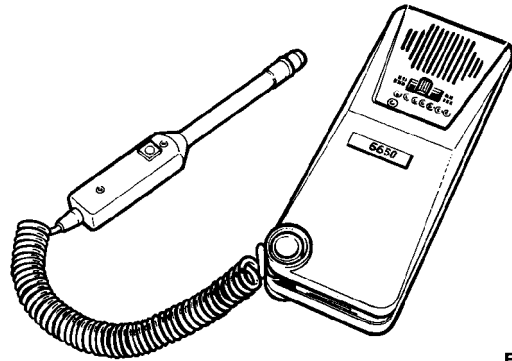
ZX,TMSPFH002841-19-30AUG94

Air Conditioning System - R134a/Special Tools

Leak tester . . . . . FKM10444

Identifying refrigerant leaks.

*NOTE: Leak tester can be used with R12 as well as R134a refrigerant.*



FKM10444

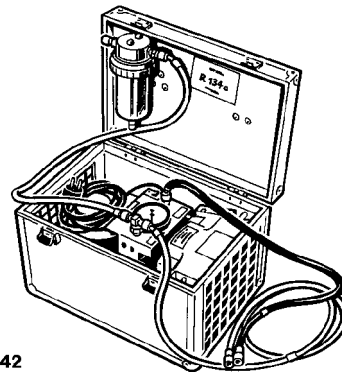
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FKM10444 -UN-17MAR95

Discharging unit . . . . . FKM10442

Discharging refrigerant from the system.

**IMPORTANT: Use only service units suitable for handling R134a refrigerant.**



FKM10442

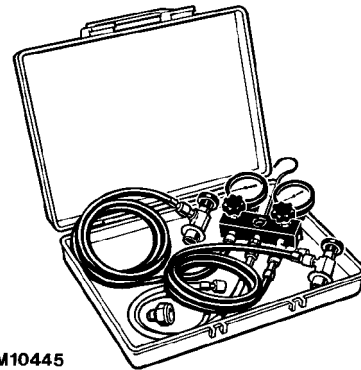
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FKM10442 -UN-27APR95

Gauge set . . . . . FKM10445

Evacuating, filling and checking the air conditioning system.

**IMPORTANT: Use only service units suitable for handling R134a refrigerant.**



FKM10445

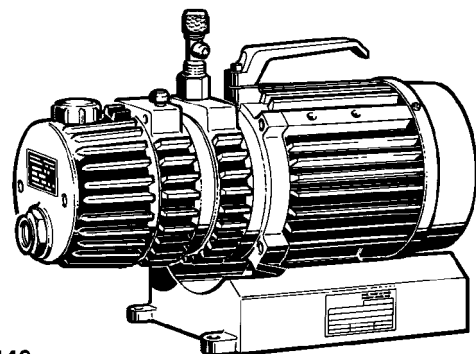
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FKM10445 -UN-27APR95

Vacuum pump . . . . . FKM10440

Evacuating the system.

*NOTE: The vacuum pump is suitable for both R12 and R134a refrigerant.*



FKM10440

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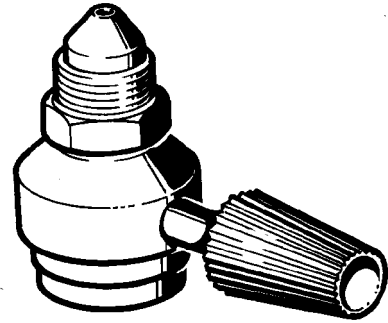
FKM10440 -UN-27APR95



Charging valve . . . . . FKM10443

Filling the system.

**IMPORTANT: Use only service units suitable for handling R134a refrigerant.**



FKM10443

LX,ROSG 003849-19-03FEB93

FKM10443 -UN-06MAR96

Refrigerant can (R134a; 920g; 750 ml) . . . . FKM10447

Filling the system.

**IMPORTANT: Use only service units suitable for handling R134a refrigerant.**



FKM10447

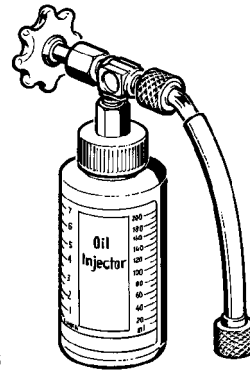
LX,ROSG 003848-19-02FEB93

FKM10447 -UN-27APR95

Oil injector . . . . . FKM10436

Filling air conditioning system with refrigerant oil.

**IMPORTANT: Use PAG oil (ND-Oil8) only.**



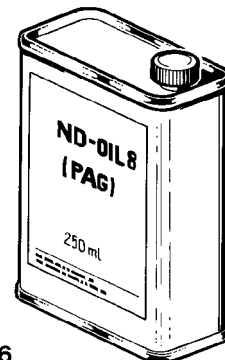
FKM10436

ZX,TMXZCO003097-19-01DEC93

FKM10436 -UN-27APR95

PAG refrigerant oil (ND-Oil8; 250 ml) . . . . FKM10446

**IMPORTANT: Use PAG oil (ND-Oil8) only.**



FKM10446

LX,ROSG 003850-19-03FEB93

FKM10446 -UN-27APR95

## **SPECIFICATIONS**

<b>Item</b>	<b>Measurement</b>	<b>Specification</b>
Air conditioning system	Refrigerant capacity	2400 g (85 oz)
Hub to pulley	Clearance	0.35—0.65 mm (0.014—0.026 in.)
Compressor	Oil quantity	160 ml (5.4 fl oz)
Air conditioning system, high pressure side	Refrigerant pressure	1500—2000 kPa (15—20 bar) (218—290 psi)
Air conditioning system, low pressure side	Refrigerant pressure	50—200 kPa (0.5—2 bar) (7.5—29 psi)
Compressor clutch coil	Current draw at 12 volts, 20°C (68°F)	2.2 A, 40 W power
Hub attaching screw	Torque	15 N·m (11 lb-ft)
High and low pressure switches	Torque	16 N·m (12 lb-ft)
Hex. socket screw of compressor manifold	Torque	25 N·m (18 lb-ft)
O-ring threaded connections	Width across flats 19 mm, 5/8"	14—20 N·m (10—15 lb-ft)
	Width across flats 22 mm, 3/4"	33—39 N·m (24—29 lb-ft)
	Width across flats 27 mm, 7/8"	35—42 N·m (26—31 lb-ft)

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## SAFETY AT WORK



**CAUTION:** Certain basic safety regulations apply when dealing with air conditioning systems, and must be observed at all times. They are backed up by legislation covering safety precautions for air conditioning systems. The following excerpts are particularly important:

1. Air conditioning systems may be operated, serviced or repaired by authorized, trained personnel only.
2. Adolescents should not be allowed to carry out service work on air conditioning systems involving the discharge of Category 1 or 2 refrigerants, unless trade training of adolescents over 16 years old requires such work. In this case, the adolescent must be supervised by a trained adult.
3. Before repairing components carrying refrigerant, remove refrigerant as far as necessary to ensure that the work can be carried out safely.

4. Refrigerant should be extracted by suction and re-used. When refrigerant is discharged into the air, there is the danger of asphyxiation, especially if work is being performed in an inspection pit, since refrigerant is heavier than air and concentrates at the lowest level. Moreover, refrigerant is odorless and colorless, so small quantities emerging from a leak cannot be detected. In such a case, ensure that there is adequate ventilation at the place of work.

5. Smoking and naked flames are not permitted in enclosed spaces where refrigerant has been released. High temperatures cause chemical reactions in the refrigerant gas, and highly poisonous substances can form. If inhaled, these substances have serious effects on health.

6. High temperatures produced by welding and soldering cause very high pressures inside components of the air conditioning system, and these pressures may result in an explosion.

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## HANDLING REFRIGERANT



**CAUTION:** When handling refrigerant, always wear safety glasses and leather gloves. Contact with escaping refrigerant may result in serious frostbite, or even blindness if the refrigerant strikes the eye.

Whenever there is the risk of refrigerant encountering high temperatures, wear a suitable breathing mask while working. However, a breathing mask provides no protection against asphyxiation if large quantities of refrigerant escape.

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## IN AN EMERGENCY

- Rinse eye with cold water; preferably use a 1% boric acid solution.
- Wash affected parts of the body with water, or preferably with a solution consisting of one part essence of vinegar and five parts water.
- See a doctor as soon as first aid has been administered.

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## SAFETY EQUIPMENT

This equipment consists of safety glasses, safety gloves and, where appropriate, a breathing mask (if there is the risk of poisonous gases being released).

Prepare a 1% boric acid solution for rinsing the eyes and a solution consisting of 1 part essence of vinegar and 5 parts water for washing affected parts of the body. Also provide a first aid kit.



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LX002150

## STORAGE OF REFRIGERANT CONTAINERS

**CAUTION:** Refrigerant containers are under pressure, and this pressure increases rapidly when the temperature of the container rises. The thin-walled refill containers are particularly at risk in this respect. Refrigerant containers must never be exposed to temperatures over 52°C (120°F).

Never store pressurized containers in the vicinity of heat sources or in places exposed to direct sunlight. Never open pressurized containers by force or damage them in any way.

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## R134A REFRIGERANT

**IMPORTANT:** The air conditioning system operates using R134a refrigerant (tetrafluorethane). This substance does not contain any chlorine atoms, so it does not have a detrimental effect on the ozone in the Earth's atmosphere.

Even so, the refrigerant must never be discharged straight into the air. It must be trapped in a recycling unit. Refrigerant stored in a recycling unit may be re-used at any time.

The recycling unit used to do this must be of a type suitable for handling R134a refrigerant.

The boiling point of R134a is minus 26.5°C (minus 15.7°F) and its freezing point is minus 101°C (minus 149.8°F).

R134a has a corrosive effect on copper as well as various seals and components used in the R12 system. For this reason, never use R134a refrigerant in a system that has previously used R12. Before replacing any component, it is vital to check whether it is compatible with the type of refrigerant used.

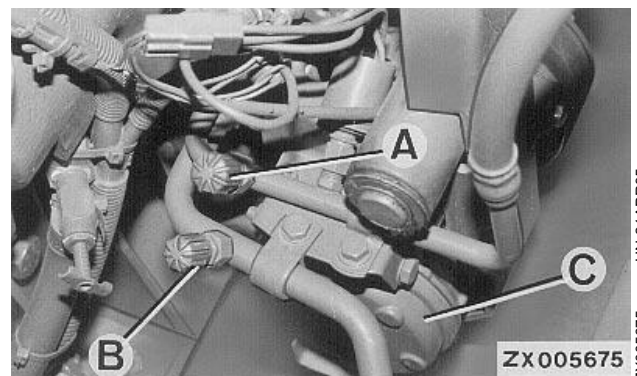
It is still essential to ensure that the correct refrigerant oil is used. R12 systems were lubricated with mineral oil, which is totally unsuitable for R134a systems. The latter require PAG oil, which mixes very well with the refrigerant and provides ideal lubrication throughout the system.

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## TEST AND SERVICE PORTS

The test and service ports are located at compressor refrigerant lines.

- A—Test port - high side valve
- B—Test port - low side valve
- C—Compressor



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## DISCHARGING THE SYSTEM

**CAUTION:** To prevent injury, wear protective goggles and gloves when servicing the air conditioning system.

Connect the red hose to the pressure connection and the blue hose to the suction connection (oil separator) of discharge unit FKM10442 (A).

Connect the other ends of the hoses as follows:

Connect the blue hose to low-side valve (C), using connecting valve (B). Connect the red hose to a commercially available R134a recycling container.

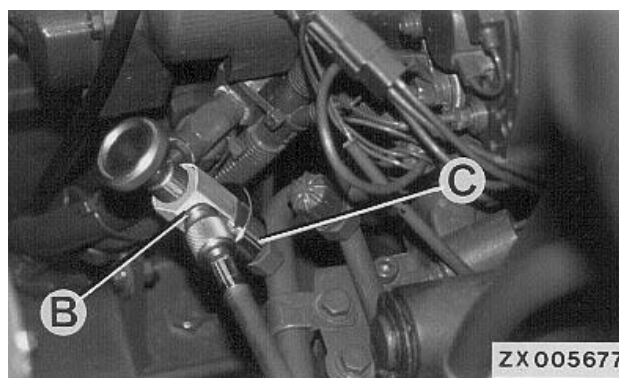
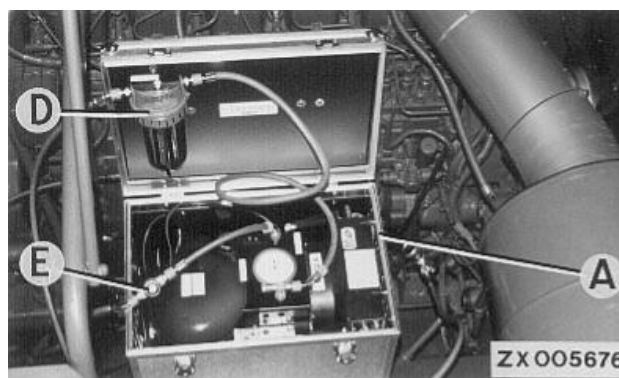
*NOTE: The recycling container must be weighed repeatedly during the discharging process to make sure that it is not over-filled.*

Tighten all connections and switch on the discharge unit.

The discharge unit discharges the system until the suction pressure switch trips and switches the unit off at a pressure of approx. -30 kPa (-0.3 bar; -4.5 psi).

*NOTE: If the system is already discharged, i.e. no rise in pressure can be observed, do not attempt to discharge the system further. Avoid air ingestion.*

At the sight-glass in the oil separator, observe how much oil has been sucked out. When the system is subsequently recharged, remember to top up with the same quantity of fresh oil.



- A—Discharge unit (FKM10442)
- B—Connecting valve (blue)
- C—Low-side valve
- D—Oil separator
- E—Connector for recycling container

## EVACUATING THE SYSTEM

**CAUTION:** To prevent the risk of injury, always wear protective goggles and gloves when working on the air conditioning system.

**NOTE:** Evacuating the system means sucking all the air out of the system until a vacuum is obtained. Every time the system is discharged, it must then be evacuated, otherwise air and moisture will enter the openings before they can be capped.

Connect dual gauge set FKM10445 (D) as follows:

Open the two manual valves on the test equipment. Connect the red hose to high-side valve (A) and the blue hose to low-side valve (B).

Connect the yellow hose to vacuum pump FKM10440 (C) and switch on the pump.

The system should reach a vacuum pressure of 100 kPa; 1 bar; 14.5 psi (1000 mbar; 75 cm Hg; 29 in. Hg) within 5 minutes.

**NOTE:** If this vacuum pressure is not reached within 5 minutes, all joints must be checked, and it may be necessary to perform a leak test as well.

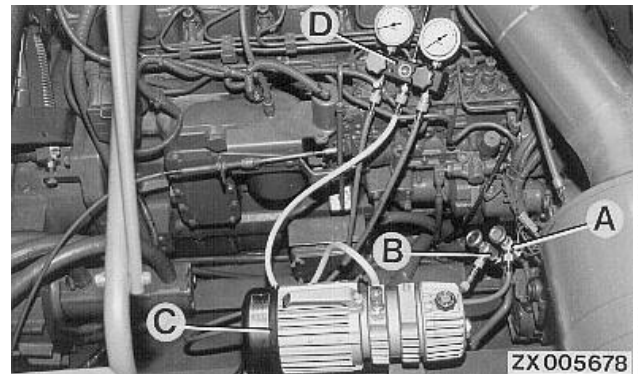
Close the valves and switch off the pump. Wait 5 minutes. The gauge should not rise by more than 3.4 kPa; 0.034 bar; 0.5 psi (34 mbar; 2.5 cm Hg; 1 in. Hg).

Switch on the pump again and open the valves.

Extract air from the system for at least 30 minutes.

Close the valves and disconnect the pump.

**NOTE:** Do not open the system; the vacuum must remain until the system is filled.



A—High-side valve  
B—Low-side valve  
C—Vacuum pump FKM10440  
D—Dual gauge set FKM10445

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## FILLING THE SYSTEM

**CAUTION:** To prevent the risk of injury, always wear protective goggles and gloves when working on the air conditioning system. To avoid damaging the compressor while putting refrigerant into the high-side section of the system, it is VITAL to shut off the engine first.

Connect dual gauge set FKM10445 (C) and evacuate the system as described in "Evacuating the System".

Screw charging valve FKM10443 (A) into refrigerant can FKM10447 (B) and connect the yellow hose.

**IMPORTANT:** A system using R134a refrigerant must NEVER be filled with R12.

Open charging valve (A) and high-side valve (D). Neither of the two gauges should indicate a pressure vacuum.

*NOTE: If the low-side pressure gauge fails to rise, there must be a blockage in the system. Any blockages must be cleared.*

Wait till the pressure has stopped rising, then close the high-side valve (D).

Run the engine at 2100 rpm and set the system to maximum cooling effect.

Hold refrigerant can (B) upright and open low-side valve (E).

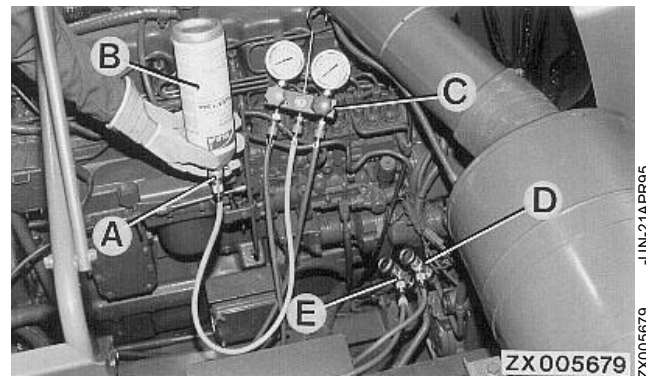
**IMPORTANT:** Liquid refrigerant must not enter the compressor. Liquid refrigerant will damage the compressor.

Specified capacity: 2.4 kg (5.29 lb).

**CAUTION:** The temperature of the refrigerant must not exceed 50°C (120°F), otherwise the refrigerant can may explode.

When the filling process is completed, close charging valve (A).

Check if enough refrigerant is in the system by looking at the sight-glass in the receiver-drier. If bubbles occur, top up with more refrigerant.



A—Charging valve FKM10443  
B—Refrigerant can FKM10447  
C—Dual gauge set FKM10445  
D—High-side valve  
E—Low-side valve

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## TOPPING UP A PARTLY DISCHARGED SYSTEM

It may become necessary to top up the system with small amounts of refrigerant in order to compensate for refrigerant lost through leakage or service work. In the event of a major leak or if there are signs of oil loss (e.g. an oil film), check the oil level in the compressor before topping up with refrigerant.

Connect gauge set FKM10445 (C) as described in "Filling the System".

Connect the yellow hose to refrigerant can FKM10447 (B).

**IMPORTANT: Never attempt to fill an R134a system with R12 refrigerant.**

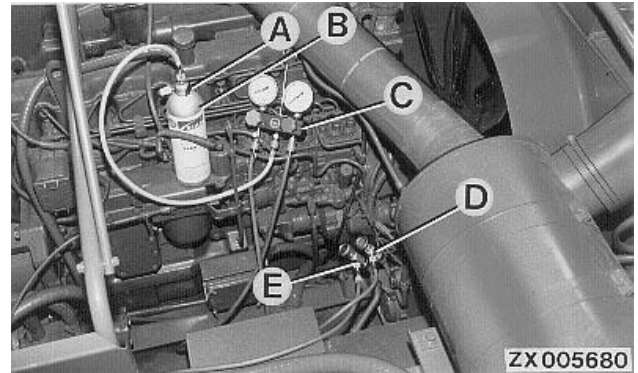
Unfasten the hose connection at gauge set (C). Briefly open charging valve (A) so that air can escape from the yellow hose. Tighten the hose connection.

Run the system at maximum cooling effect.

Hold refrigerant can (B) upright and open low-side valve (E).

Observe the sight-glass at the receiver-drier. When no more air bubbles are visible, add a further 0.2 to 0.4 kg (7 to 14 oz.) of refrigerant.

**CAUTION:** The temperature of the refrigerant must never exceed 50°C (120°F), otherwise the refrigerant can may explode.



A—Charging valve FKM10443  
B—Refrigerant can FKM10447  
C—Dual gauge set FKM10445  
D—High-side valve  
E—Low-side valve

## FILLING WITH REFRIGERANT OIL

**CAUTION:** To prevent the risk of injury, always wear protective goggles and gloves when working on the air conditioning system.

Connect dual gauge set FKM10445 (C) as described in "Evacuating the System".

Evacuate the system as described in "Evacuating the System".

Close the valves and disconnect the pump.

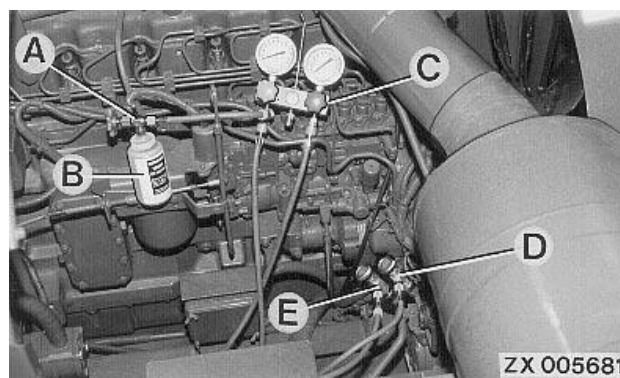
Read how much oil is extracted during the evacuation process at the sight-glass in the oil separator. Add the same amount of new oil plus 10 ml (0.3 fl.oz.) to the oil injector.

**IMPORTANT:** Use PAG oil (ND-Oil8) only. Refrigerant oil is extremely hygroscopic — this means it attracts moisture in large amounts from the atmosphere. For this reason, do not open the system and oil can any longer than necessary.

Connect refrigerant oil injector FKM10436 (B) to the low side of gauge set.

Open charging valve (A) of oil injector (B) and low-side valve (E).

*NOTE: The vacuum within the system will draw oil into the system.*



- A—Charging valve
- B—Oil injector FKM10436
- C—Dual gauge set FKM10445
- D—High-side valve
- E—Low-side valve

## OIL CAPACITIES OF AIR CONDITIONING COMPONENTS

If one of the air conditioning components has been removed, the oil drained and the component cleaned (separately), add the following amounts of oil to the refrigerant circuit:

Component	ml	fl oz
Condenser	60 ml	2 fl oz
Evaporator	60 ml	2 fl oz
Receiver-drier	10 ml	0.3 fl oz
Refrigerant lines	110 ml	3.9 fl oz
Compressor	60 ml	2 fl oz

If a new compressor is installed, it must contain the full capacity of 160 ml (5.4 fl. oz.).

If the entire system is disassembled and all the lines and components (including compressor) are discharged and cleaned individually, add the full capacity of 300 ml (11 fl. oz.) to the system after re-assembly.

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## LEAK TEST

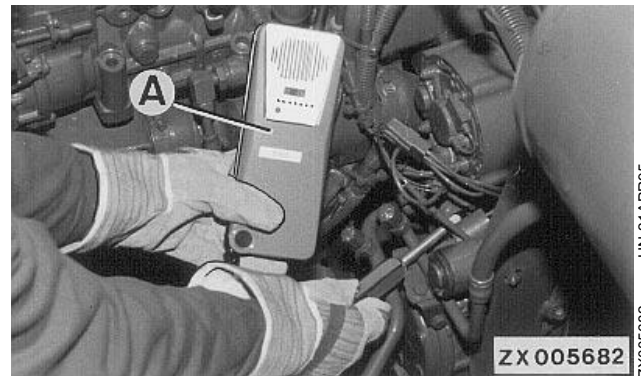
**NOTE:** The leak test confirms that an oily patch on the exterior of the system is caused by a leak. Perform a leak test only on systems that are ready for operation. If the system has already lost some of its refrigerant, top it up with refrigerant before testing for leaks.

Connect dual gauge set FKM10445 and evacuate the test hoses.

Read the static pressure at the low-side pressure gauge. If the pressure is less than 340 kPa (3.4 bar; 50 psi), top up with refrigerant.

Go over the entire system with the probe of electronic leak tester FKM10444 (A).

**NOTE:** Always look underneath each potential leak, as R134a refrigerant is heavier than air. Dense concentrations of R134a in the air may affect the result of the test.



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## REMOVING THE COMPRESSOR

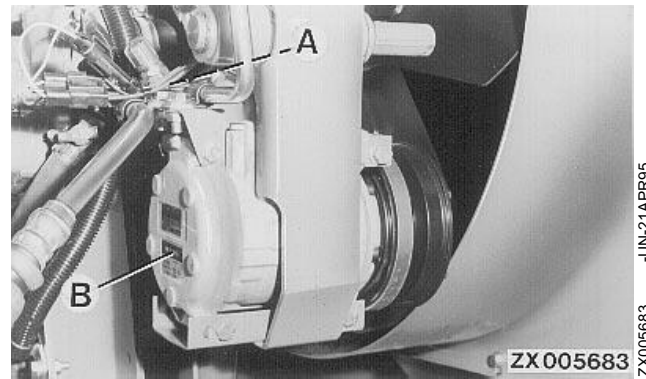
Drain the refrigerant (see "Discharging the System").

Remove the drive belt.

Slacken attaching screws of line clamping plate (A) and remove the lines.

Seal all openings and lines so that no dirt can get in.

Remove the compressor.



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## CHECKING OIL LEVEL IN THE COMPRESSOR

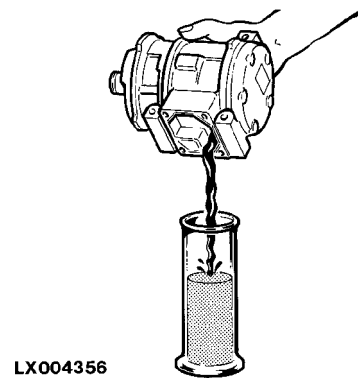
Remove the compressor manifold (see "Checking the Compressor Manifold").

Drain compressor oil through the suction line connection.

Dispose of the oil in an environmentally friendly way.

Fill with refrigerant oil as described in "Filling with Refrigerant Oil".

*NOTE: Replace the receiver-drier every time the system is opened.*



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LX004356

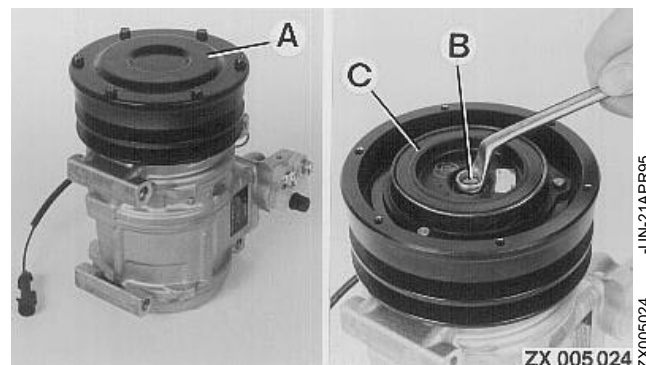
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## DISASSEMBLING THE COMPRESSOR CLUTCH

### Removing the Clutch Hub

Remove cover (A).

Remove screw (B) and pull out clutch hub (C).



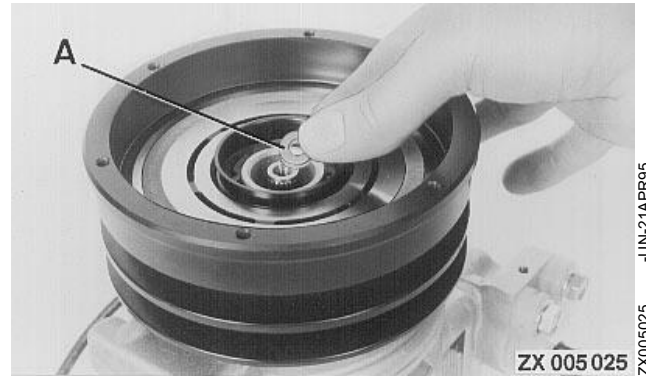
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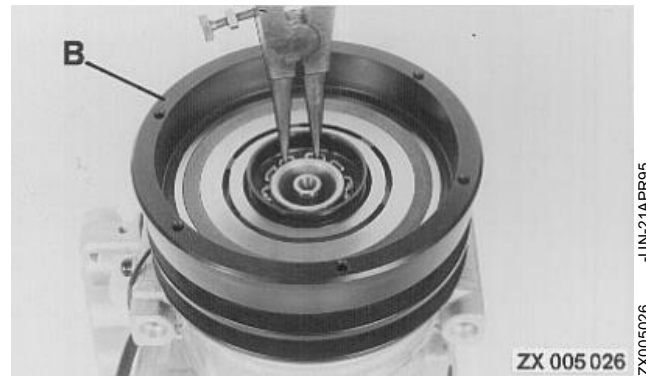
### Removing the Clutch Plate

Remove shims (A) and keep them ready for re-installation.

Remove snap ring and take off clutch plate (B).



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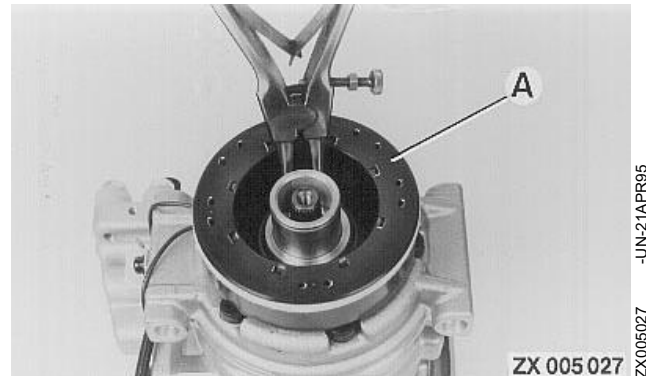
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### Removing Magnetic Coil

Remove snap ring.

Disconnect magnetic coil cable at compressor and take off magnetic coil (A).

*NOTE: When re-installing the snap ring, make sure that the chamfered side of the snap ring is at the top.*



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## CHECKING CLUTCH HUB CLEARANCE

*NOTE: Clutch coil is NOT polarity sensitive.*

1. Use a feeler gauge to measure the clearance between pulley and clutch hub. Attach feeler gauge to pulley as shown and connect compressor to a 12 volts battery using a set of jumper wires.
2. Turn the pulley and measure the clearance again at three different points of clutch hub circumference. The distance between the measuring points should be equal. Specified clearance is 0,35—0,65 mm (0.014—0.026 in.). Add or remove shims as required.
3. Tighten the clutch hub retaining bolt to 15 Nm (11 lb-ft) after clearance has been adjusted correctly..



ZX005028 -UN-21APR95

ZX.TMSPFH002859-19-16JUN93

## CHECKING THE COMPRESSOR MANIFOLD

Take out hex. socket screws (A) and remove manifold (B).

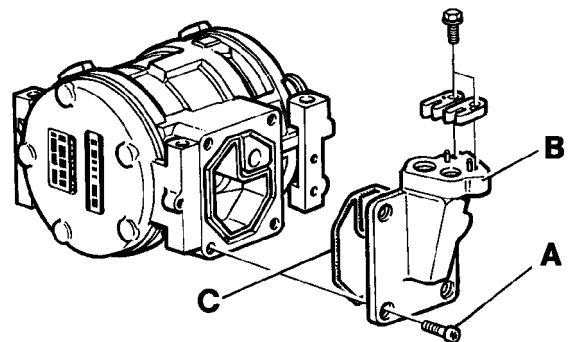
Discard gasket (C). Check the contact surfaces.

Apply oil to new gasket (C), and install.

Install manifold.

Tighten hex. socket screws to 25 Nm (18 lb-ft).

- A—Hex. socket screw
- B—Manifold
- C—Manifold gasket



LX004361

LX004361 -UN-19SEP94

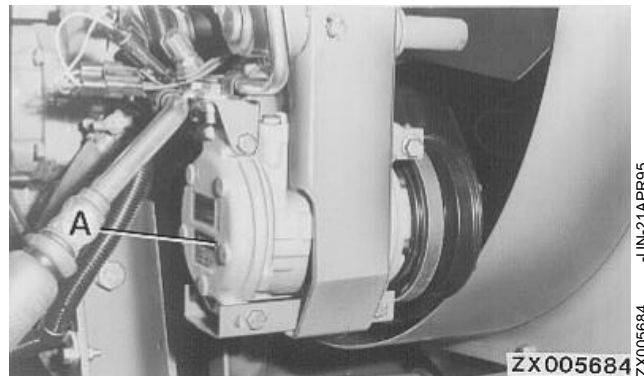
ZX.TMSPFH002860-19-16JUN93

## INSTALLING THE COMPRESSOR

Before installing, ensure that the compressor contains the specified amount of oil.

Install the compressor (A).

Install drive belt.



ZX, TMXZC0003107-19-01DEC93

-UN-21APR95  
ZX005684

## REMOVING AND INSTALLING THE CONDENSER

1. Discharge the air conditioning system.
2. Disconnect refrigerant lines at the condenser.
3. Seal the open ends with plastic caps.
4. Remove condenser (A). Drain the refrigerant oil and dispose of it in an environmentally friendly way.

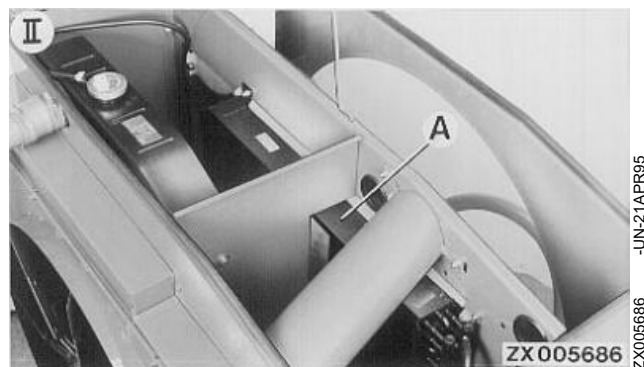
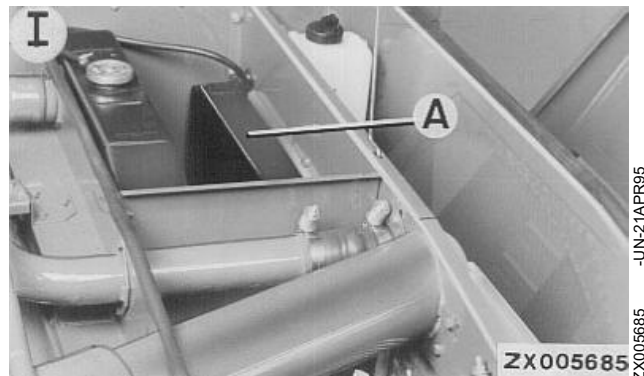
*NOTE: The condenser and the hydraulic oil cooler are joined to an assembly. Condenser is located in the lower part.*

*NOTE: Fill with new refrigerant oil as described in "Filling with Refrigerant Oil".*

*NOTE: Replace the receiver-drier every time the system is opened.*

5. Evacuate the system, fill with refrigerant, and check.

A—Condenser  
I—2054,2066  
II—2056,2058,2064



ZX, TMXZC0003119-19-02DEC93

-UN-21APR95  
ZX005685

-UN-21APR95  
ZX005686

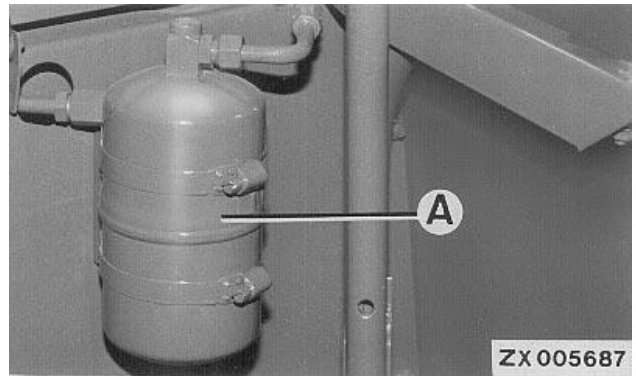
## REMOVING AND INSTALLING THE RECEIVER-DRIER

1. Discharge the air conditioning system.
2. Disconnect the refrigerant lines.
3. Seal the open ends with plastic caps.
4. Remove receiver-drier (A).

**IMPORTANT:** As soon as the dessicant material reaches its saturation level, the receiver-drier must be replaced, otherwise the system will become contaminated with moisture. Replace the receiver-drier every time an air conditioning component is removed or replaced.

*NOTE: Fill with new refrigerant oil as described in "Filling with Refrigerant Oil".*

5. Evacuate the system, fill with refrigerant, and check.



ZX,TMXZC0003108-19-01DEC93

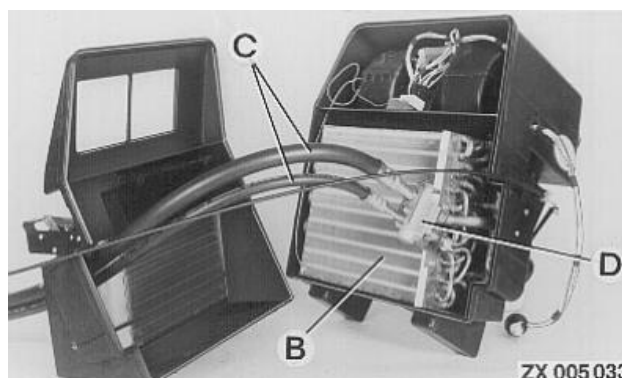
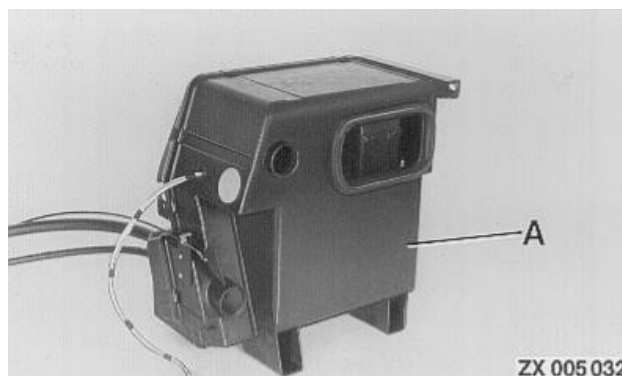


## REMOVING AND INSTALLING THE EVAPORATOR AND EXPANSION VALVE

1. Discharge the air conditioning system.
2. Remove the passenger's seat.
3. Remove air conditioning system housing (A) completely. Housing is attached at the floor by means of two screws and at the rear wall by means of one screw.
4. Open housing (A)
5. Disconnect refrigerant lines (C) at expansion valve (D). Drain refrigerant oil and dispose of it in an environmentally friendly way.
6. Seal the open ends with plastic caps.
7. Remove evaporator (B) and expansion valve (D).

**NOTE:** Replace the receiver-drier every time the system is opened.

- A—Housing
- B—Evaporator
- C—Refrigerant lines
- D—Expansion valve

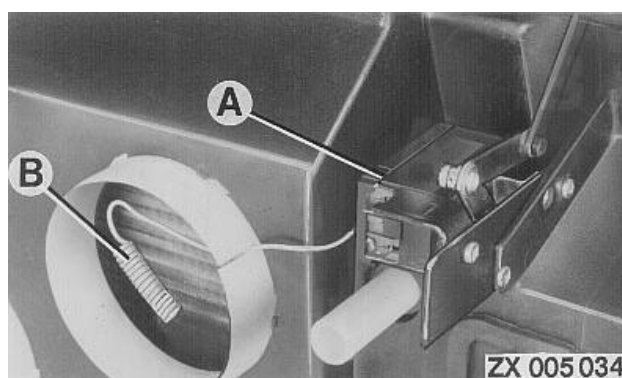


ZX,TMSPFH002864-19-16JUN93

## REMOVING AND INSTALLING THE THERMOSTAT SWITCH

1. Remove the two bowden cables.
2. Disconnect the two wires.
3. Remove thermostat switch (A) and sensing bulb (B).

**IMPORTANT:** Never bend or squash the sensing bulb capillary tube.



ZX,TMSPFH002865-19-16JUN93

## REMOVING AND INSTALLING THE HIGH/LOW PRESSURE SWITCH

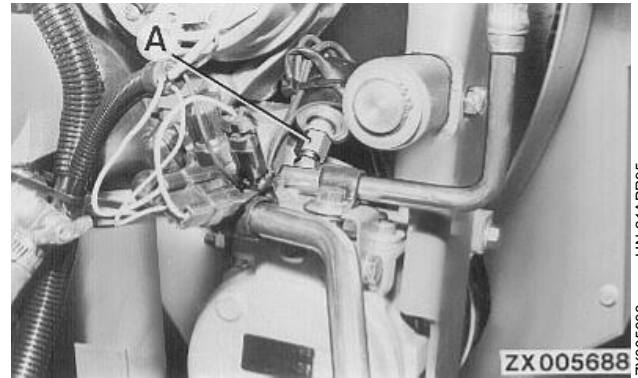
*NOTE: There is no need to discharge the system when removing or installing high pressure switch (A) and low pressure switch (B).*

The line connections are equipped with a check valve.

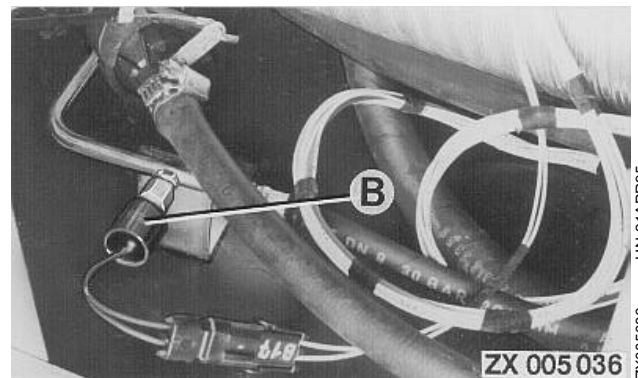
The high pressure switch is located at the compressor refrigerant line.

The low pressure switch is located near the air conditioning system housing in the operator's cab.

Tighten new switches (A) and (B) to 16 Nm (12 lb-ft).



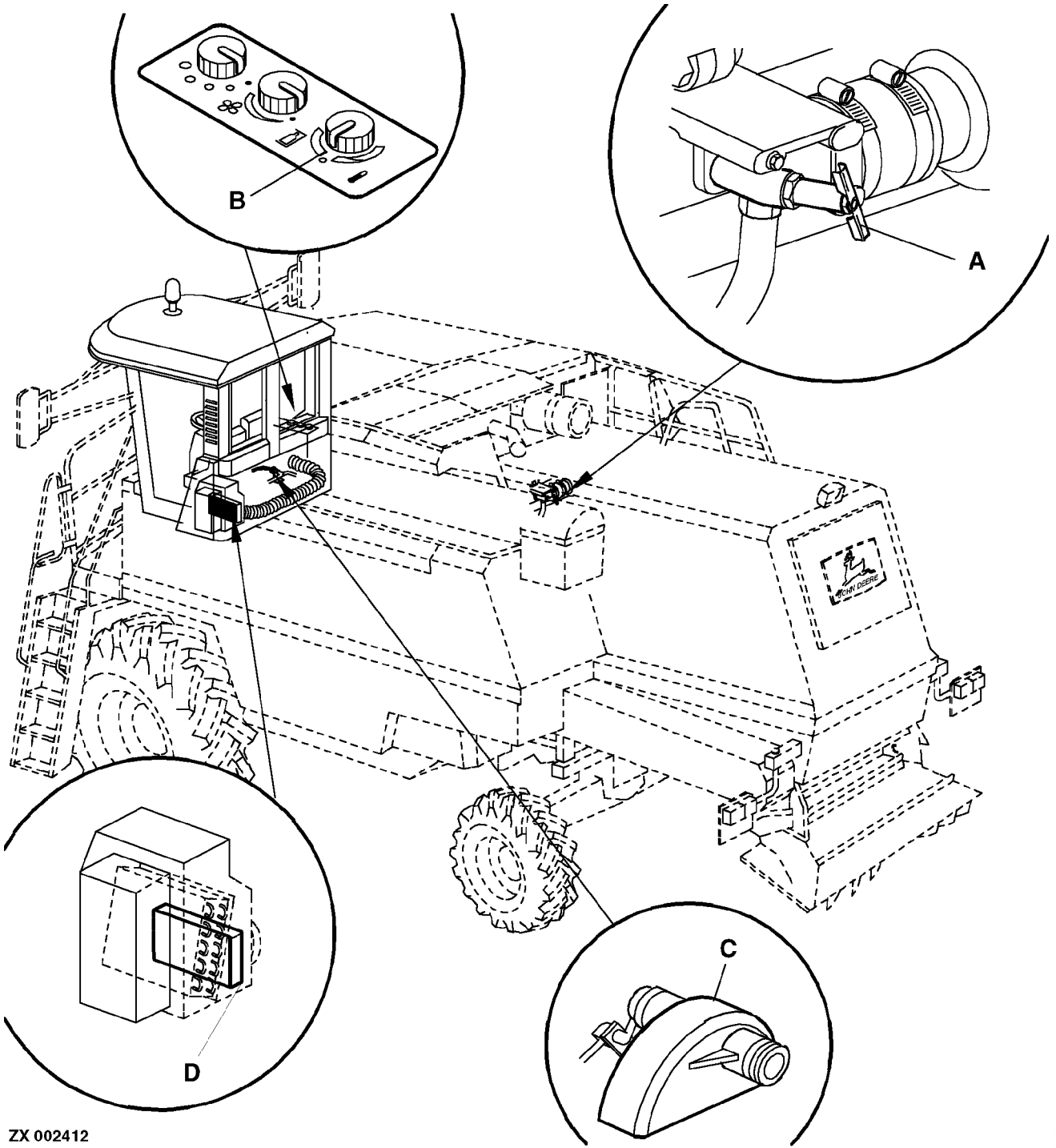
High pressure switch



Low pressure switch

ZX,TMXZC0003109-19-01DEC93

HEATER COMPONENTS



ZX 002412

A—Heater valve at cylinder block

B—Air conditioning/heater rotary switch

C—Heater control in cab

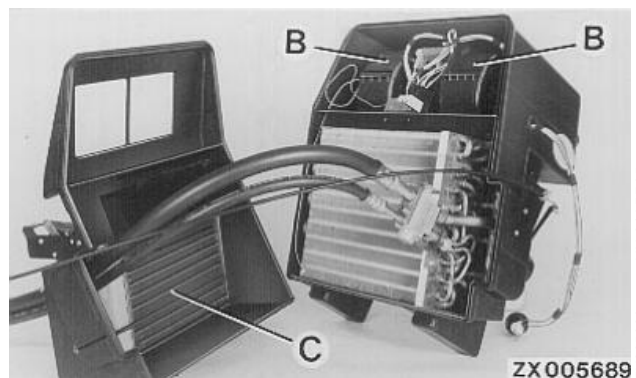
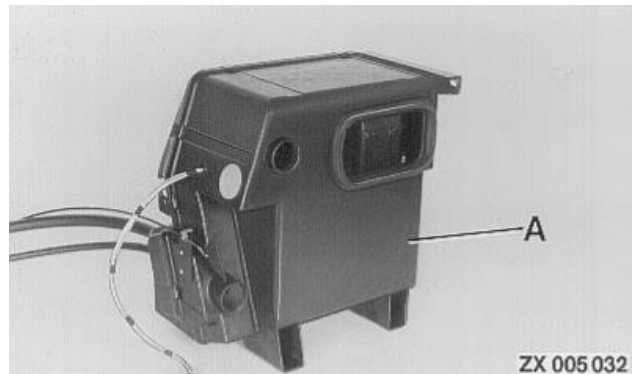
D—Radiator

ZX002412 -UN-08MAY95

## REMOVING AND INSTALLING FAN AND RADIATOR

1. Discharge the cooling system.
2. Remove the passenger's seat.
3. Remove air conditioning/heating system housing (A) completely. Housing is attached at the floor by means of two screws and at the rear wall by means of one screw.
4. Open housing (A).
5. Disconnect and remove fan (B)
6. Disconnect coolant lines from radiator (C) and remove radiator

A—Housing  
B—Fan  
C—Radiator

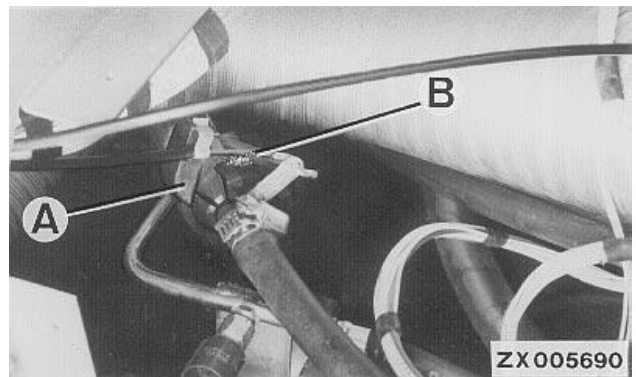


ZX, TMXZC0003111-19-01DEC93

## REMOVING AND INSTALLING HEATER CONTROL

Coolant control is located next to air conditioning/heating system housing in operator's cab.

1. Drain cooling system.
2. Disconnect heater hoses at heater control (A), disconnect bowden cable (B) and remove heater control (A).



ZX, TMXZC0003112-19-01DEC93

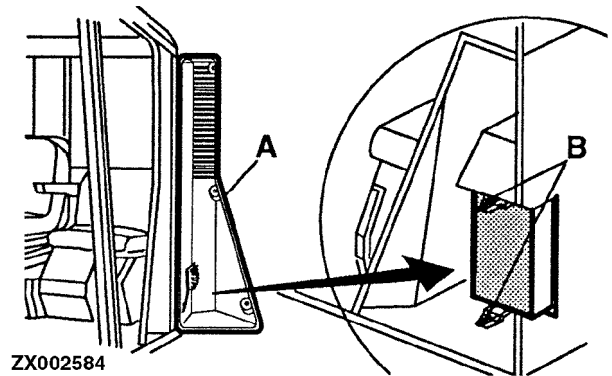
### REMOVING OPERATOR'S CAB MAIN FILTER ELEMENT

Open service cover (A).

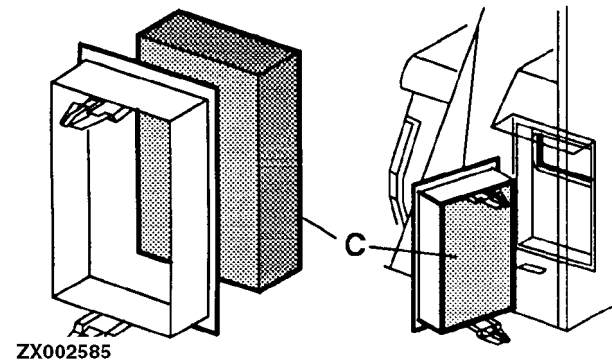
Disengage fasteners (B).

Lift out filter housing with element (C).

When reinstalling, make sure filter element is in correct position.



-UN-08MAY95  
ZX002584



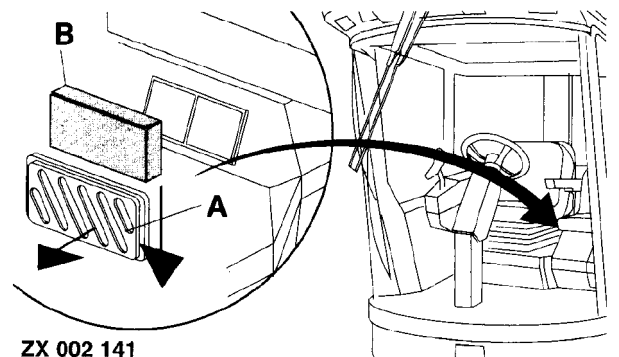
-UN-08MAY95  
ZX002585

ZX,TMXZC0003113-19-01DEC93

### REMOVING AND INSTALLING RECIRCULATING FILTER

Press down grille (A) and pull out to the top.

Lift out filter element (B).



-UN-03APR95  
ZX002141

ZX,TMXZC0003114-19-01DEC93

*Operator's Cab Heating System/Cab Filters*

# Section 110 Feeder House

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### Group 05—Removing Feeder House

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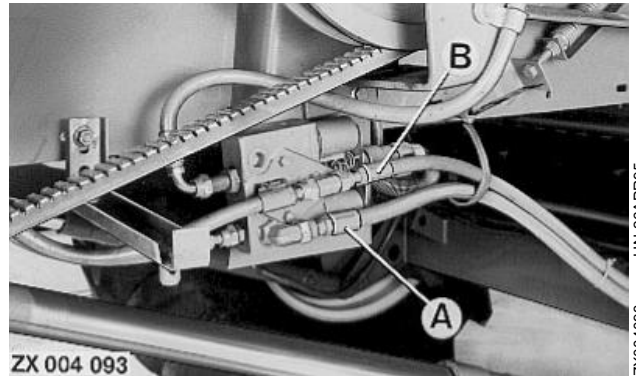


## Group 05 Removing Feeder House

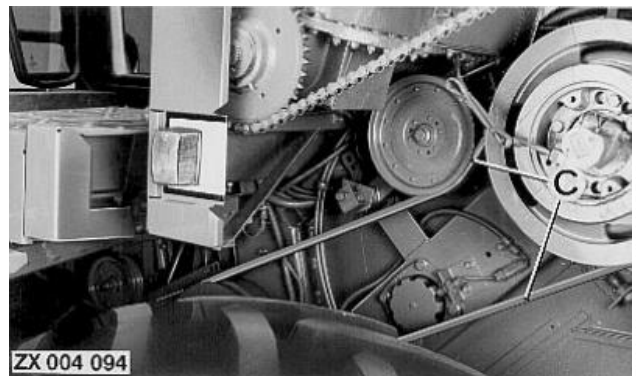
### REMOVING FEEDER HOUSE

**CAUTION:** Remove feeder house only with combine on level and solid ground.

Disconnect hose connections (A) and (B). Seal open hose ends with metal plugs.

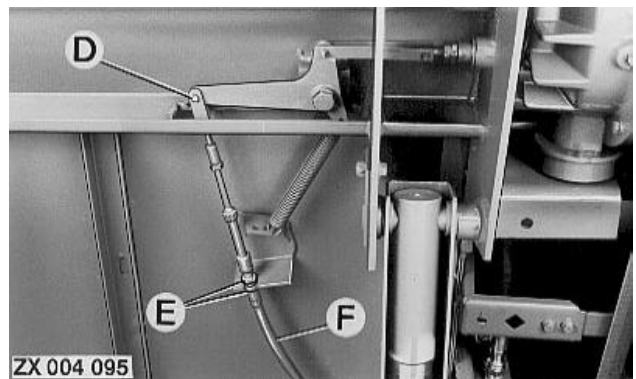


Remove drive belt (V-belt) (C).

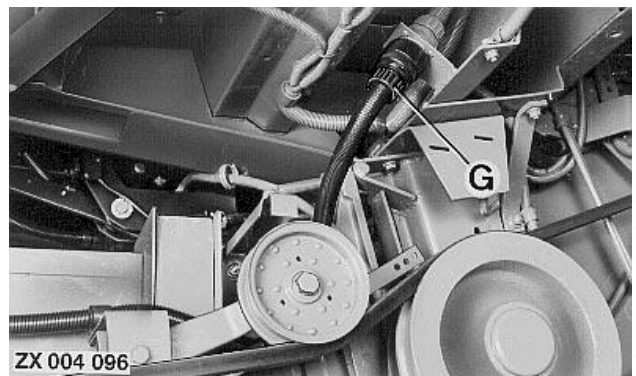


Remove pin (D). Loosen clamping nuts (E).

Remove cable (F). Remove cable retainers from feeder house after turning out attaching screws.

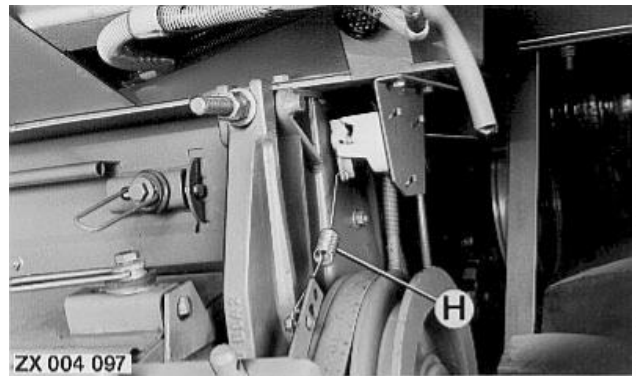


Disconnect connector (G).



## Removing Feeder House/Removing Feeder House

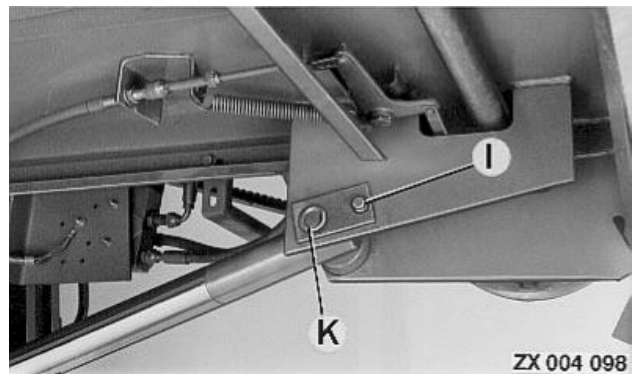
Disconnect spring (H).



ZX, TMXZC0002725-19-13MAY93

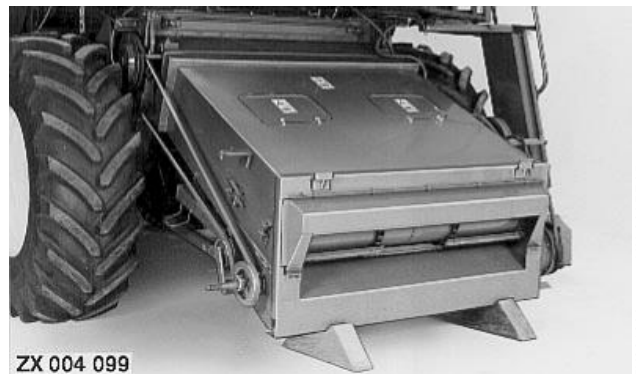
Support front end of feeder house, using a suitable jack.

Remove locking screw (I) and drive out pin (K). Place hydraulic cylinder on the ground.



ZX, TMXZC0002726-19-13MAY93

Lower jack and support front end of feeder house on two wooden blocks.

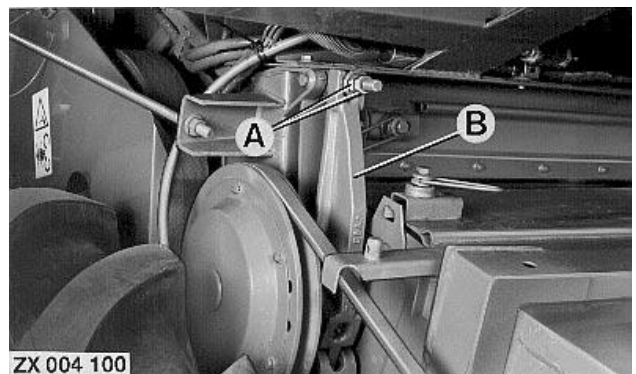


ZX, TMXZC0002727-19-13MAY93

Support rear side of feeder house by means of support stands.

Loosen lock nuts (A) and turn threaded pin upwards.

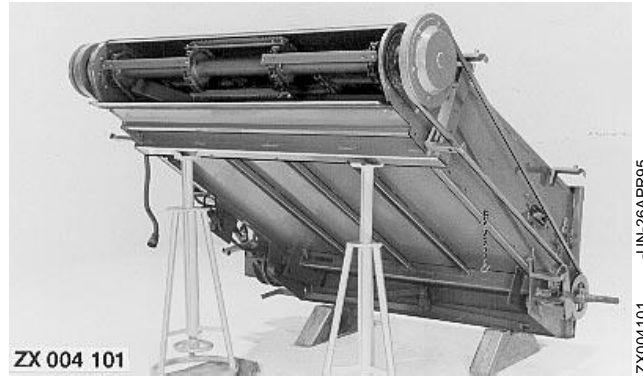
Remove clamps (B) on right and left-hand sides.



ZX, TMXZC0002728-19-13MAY93

Removing Feeder House/Removing Feeder House

Back up combine.



ZX.TMXZC0002729-19-13MAY93

*Removing Feeder House/Removing Feeder House*

# Section 120 Separator and Cleaning Unit

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Assembly . . . . .	120-05-4

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Align Belt Pulley . . . . .	120-35-4

*Contents*

## Group 05 Cylinder Drive Reduction Gear

### DISASSEMBLE CYLINDER DRIVE REDUCTION GEAR

Remove attaching screws of cover (A).

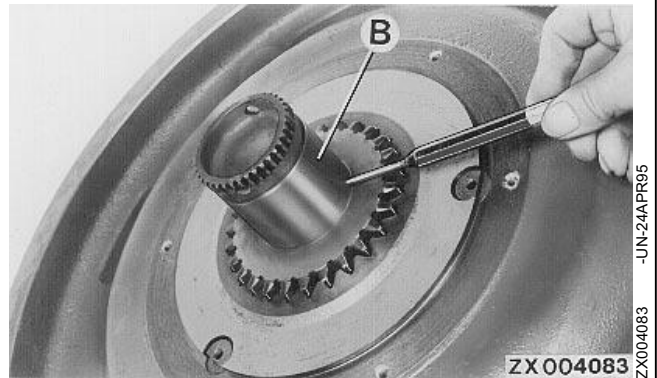
Remove cover (A).



ZX, TMXZC0002130-19-05OCT92

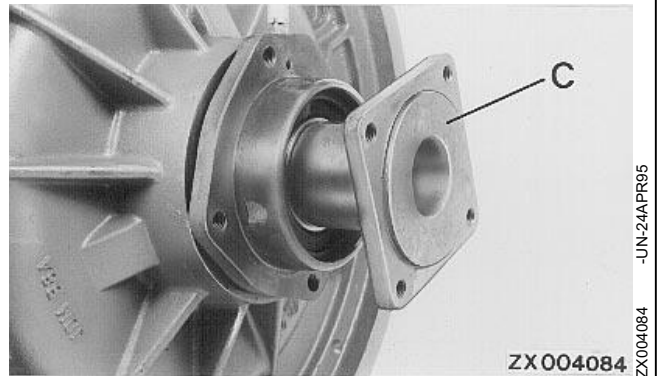
Use a mandrel or similar tool to hold locking ball  
between sliding sleeve (B) and shaft in place.

Before removing sliding sleeve, take out locking ball and  
spring through bore.



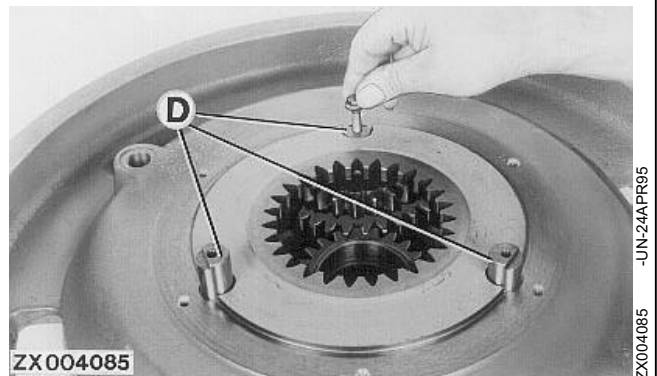
ZX, TMXZC0002131-19-05OCT92

Drive flanged shaft (C) out of gearcase.



ZX, TMXZC0002132-19-05OCT92

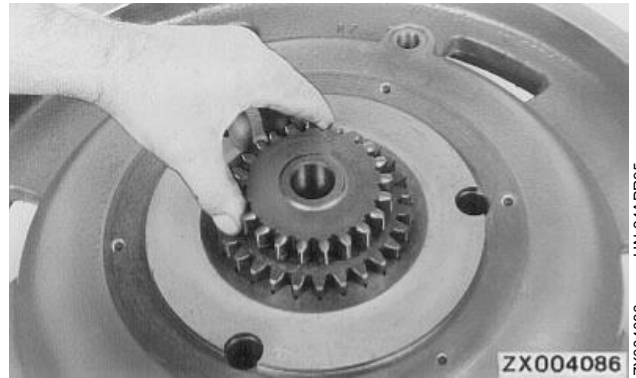
Using an M6 screw, pull the three planet gear shafts (D)  
out of gearcase.



ZX, TMXZC0002133-19-05OCT92

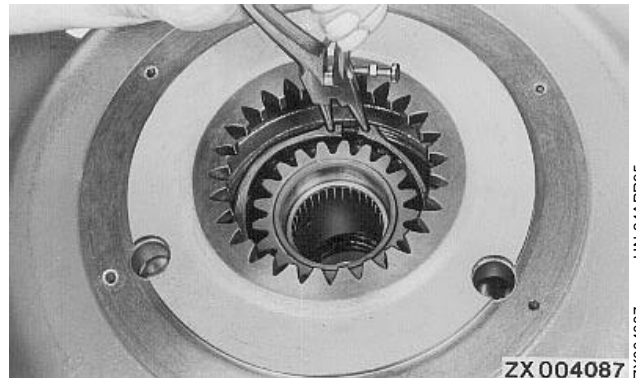
## Cylinder Drive Reduction Gear/Repair

Take individual planet gears (3 used) out of gearcase.



ZX, TMXZC0002134-19-05OCT92

Remove snap ring and drive sun gear out of gearcase.



ZX, TMXZC0002135-19-05OCT92

### **REPAIR CYLINDER DRIVE REDUCTION GEAR**

Check all parts of cylinder drive reduction gear for wear or damage.

Replace worn or damaged parts as necessary.

Whenever seals are removed, install new ones.

ZX, TMXZC0002136-19-05OCT92



## INSTRUCTIONS FOR ASSEMBLY OF CYLINDER DRIVE REDUCTION GEAR

1. Before assembly, wash all parts. Make sure that all parts are clean and free of chips.

2. Lubricate all bearing points and seals with SAE multipurpose grease before assembly.

Fill space between dust and sealing lips of seals with grease.

3. Before pressing bearing (H) on flanged shaft, position snap ring (J).

4. When installing planet gears, note "zero" position.

5. Apply sealant to screws before installation.

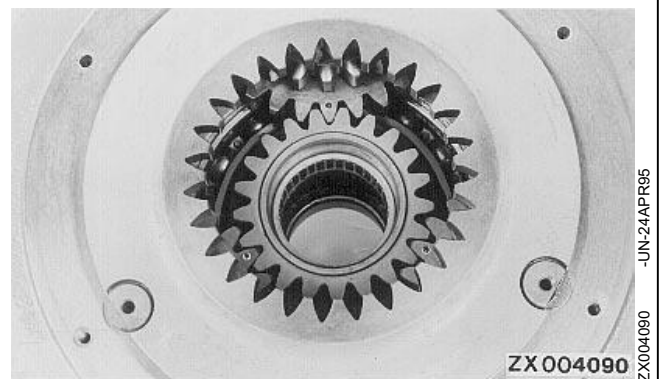
Seal sun gear against side wall by means of sealant before installation.

6. Fill gearcase with 2.2 L (0.6 U.S.gal) of SAE 90 gear case oil.

ZX, TMXZC0002137-19-05OCT92

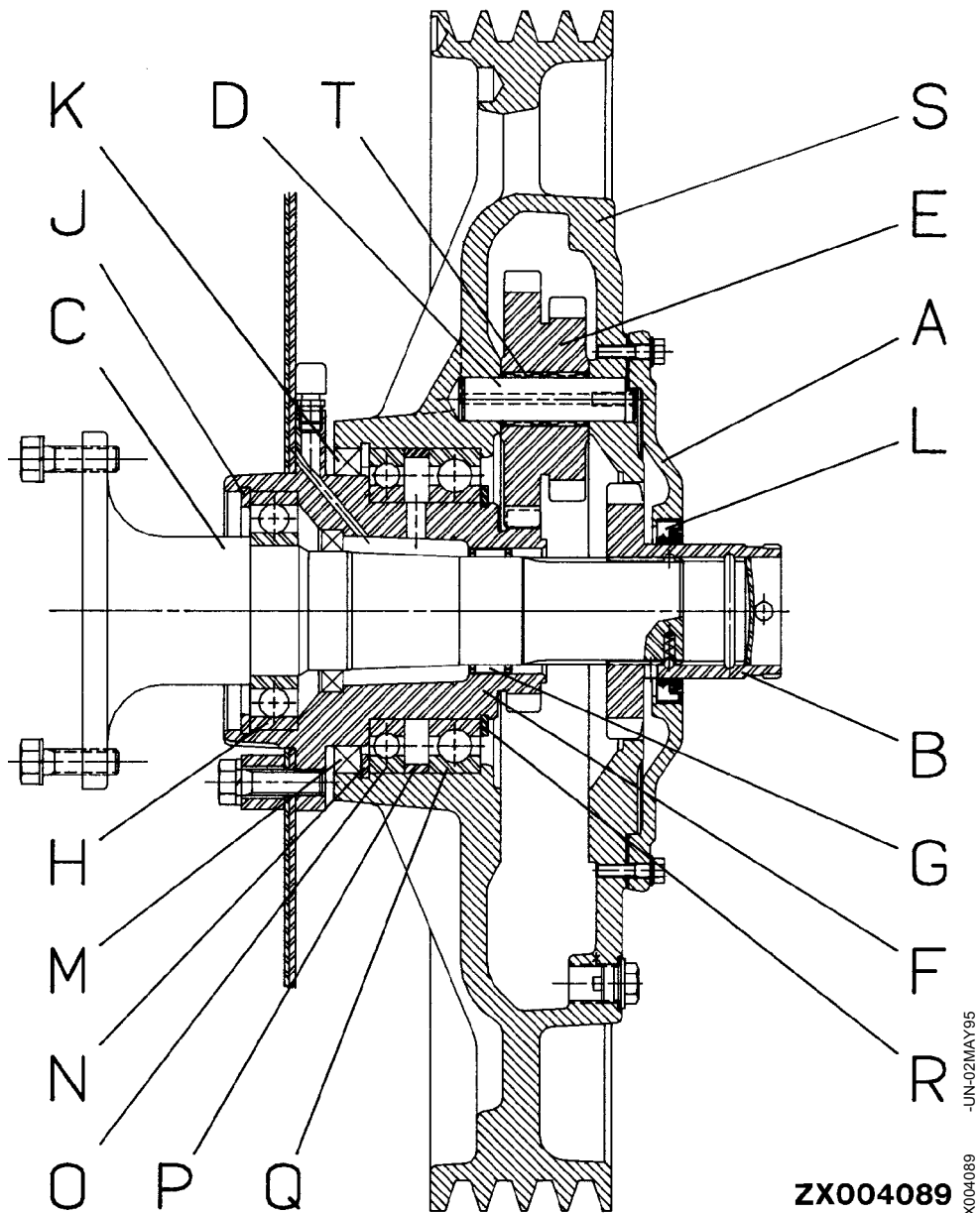
## ADJUST PLANET GEARS

Install planet gears with marked teeth facing center of reduction gear unit.



ZX, TMXZC0002138-19-05OCT92

**ASSEMBLE CYLINDER DRIVE REDUCTION GEAR**



**ZX004089**

ZX004089  
-UN-02MAY95

- |                              |                  |                |                        |
|------------------------------|------------------|----------------|------------------------|
| A—Cover                      | F—Sun gear       | L—Shaft seal   | P—Spacer               |
| B—Sliding sleeve             | G—Needle bearing | M—Shaft seal   | Q—Ball bearing         |
| C—Flanged shaft              | H—Ball bearing   | N—Snap ring    | R—Snap ring            |
| D—Planet gear shaft (3 used) | J—Snap ring      | O—Ball bearing | S—Pulley with gearcase |
| E—Planet gear                | K—Shaft seal     |                |                        |

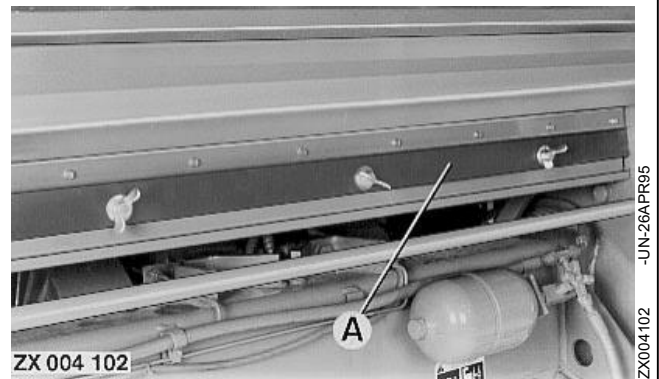
Assemble cylinder drive reduction gear, using above illustration as a guide.

## Group 10 Threshing Cylinder

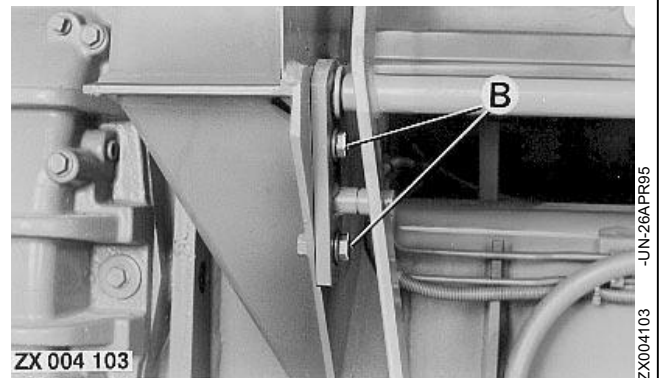
### REMOVING THRESHING CYLINDER

*NOTE: Prior to threshing cylinder removal, feeder house must be removed. If the threshing cylinder is equipped with filler plates, remove these plates prior to threshing cylinder removal.*

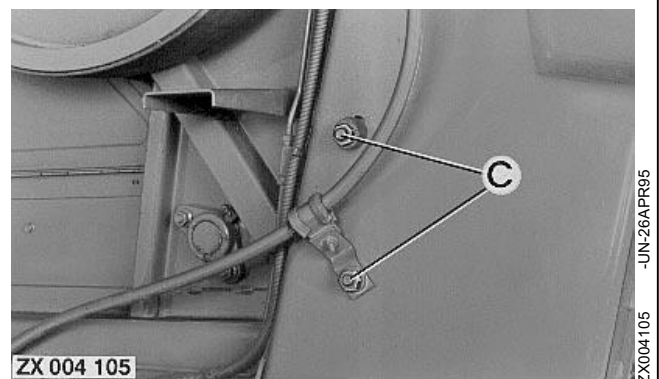
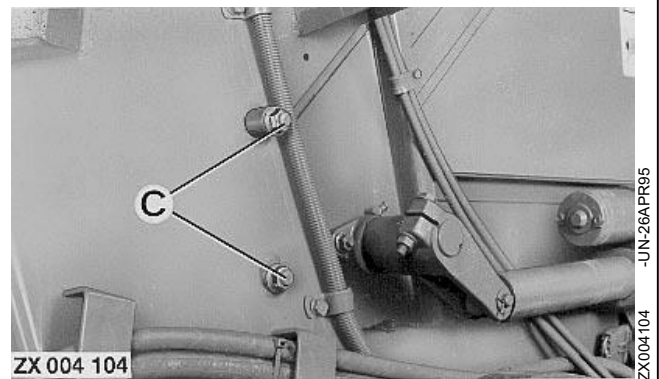
Remove cover bar (A).



Turn out attaching screws (B) of stone trap locking mechanism on right and left-hand sides.

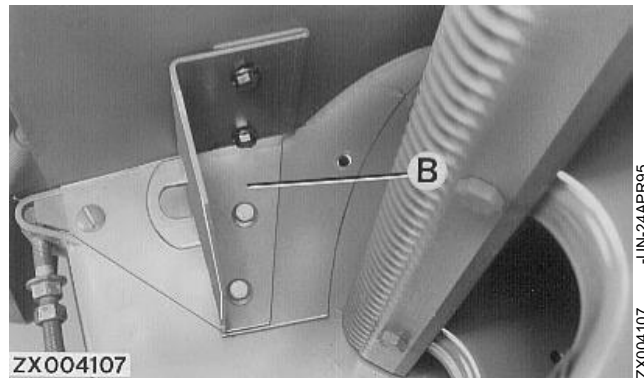
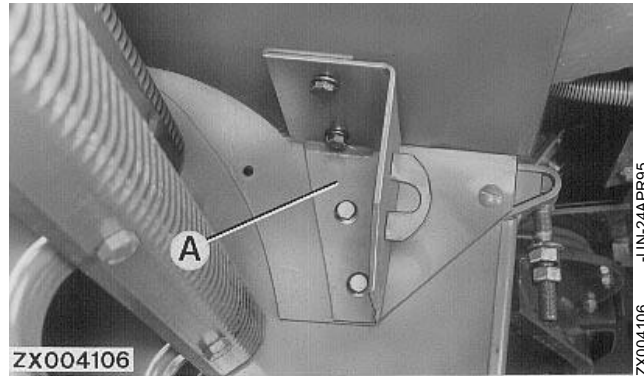


Remove attaching screws (C) of stone trap on right and left-hand sides. Lift stone trap out of machine frame. Two persons are required to perform this job.



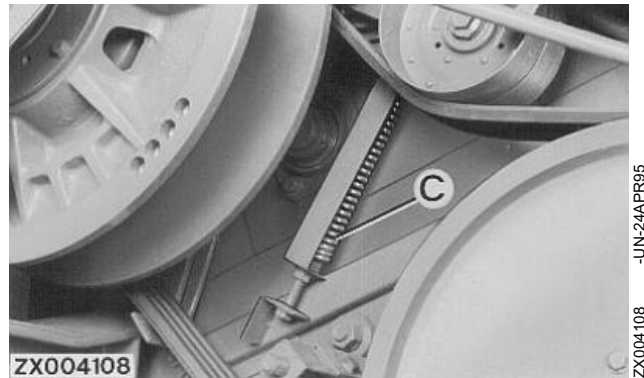
## Threshing Cylinder/Remove Threshing Cylinder

Remove straps (A) and (B).



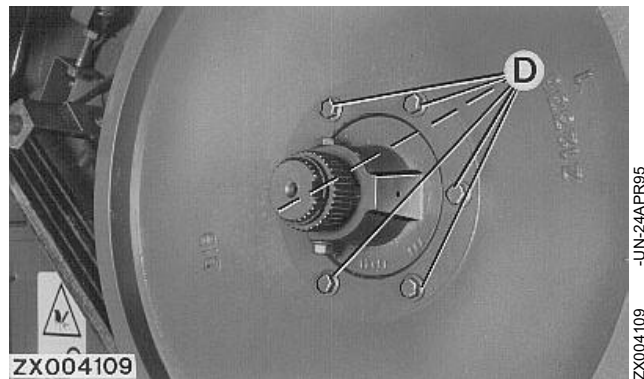
ZX,TMXZC0002733-19-13MAY93

Completely relieve spring tensioner (C).



ZX,TMXZC0002734-19-13MAY93

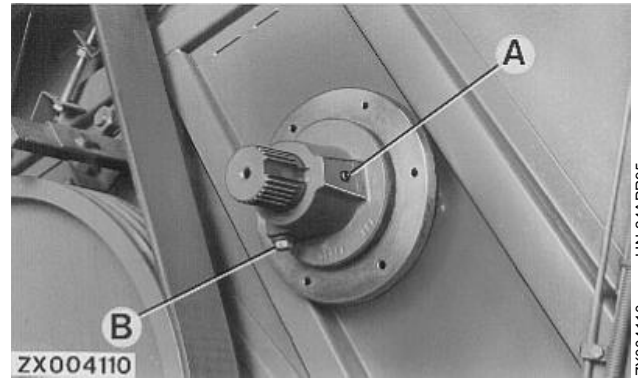
Turn out attaching screws (D). Lift pulley off hub and leave it suspended in the V-belt.



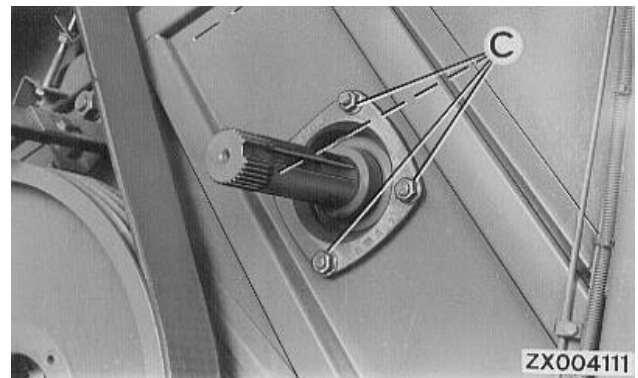
ZX,TMXZC0002735-19-13MAY93

## Threshing Cylinder/Remove Threshing Cylinder

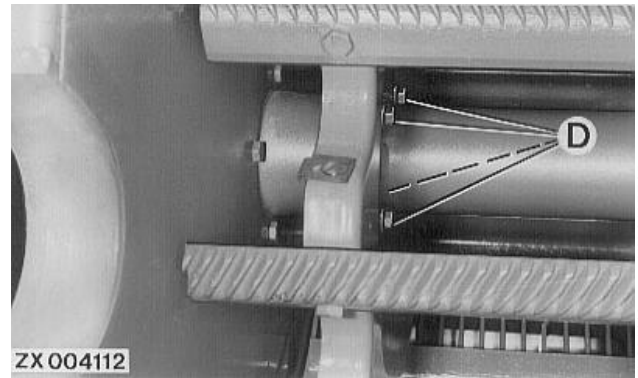
Turn out hex. socket screw (A). Loosen cap screw (B) and lift hub off the shaft.



Raise concave to highest position from the cab.  
Turn out attaching screws (C).



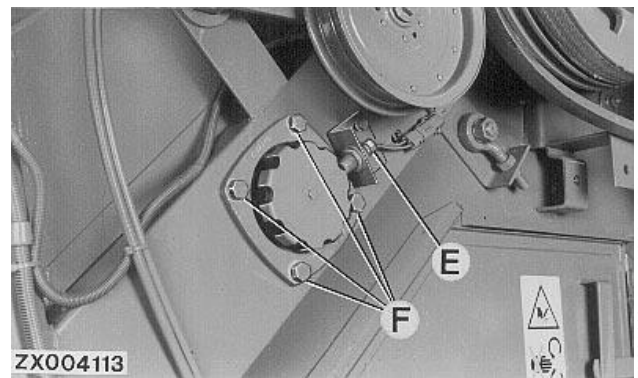
Separate stub shaft from threshing cylinder by loosening screws (D) and take stub shaft out of combine frame.



Loosen lock nuts of speed sending unit (E). Remove speed sending unit.

Turn out attaching screws (F).

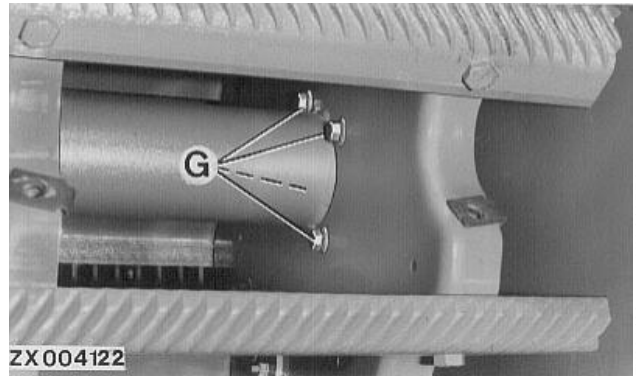
Remove bearing housing half.



## Threshing Cylinder/Remove Threshing Cylinder

Turn out flange screws (G). Separate stub shaft from threshing cylinder.

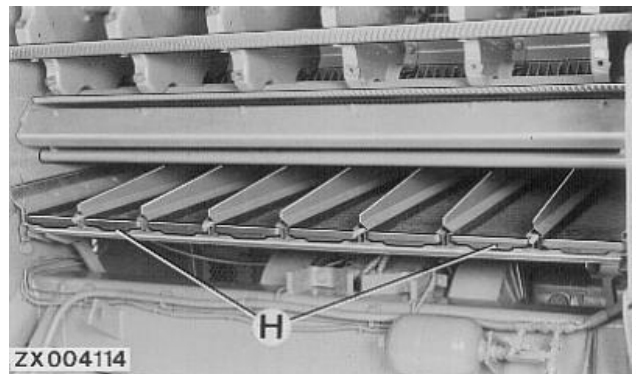
- The threshing cylinder touches the concave -



ZX, TMXZC0002988-19-04OCT93

Pull out two plastic grids (H) of grain pan.

Place two 10 x 12 cm (0.4 x 0.5 in.) wooden supports with a length of 4 m (1.6 in.) against grain pan at the points where the grids have been removed.



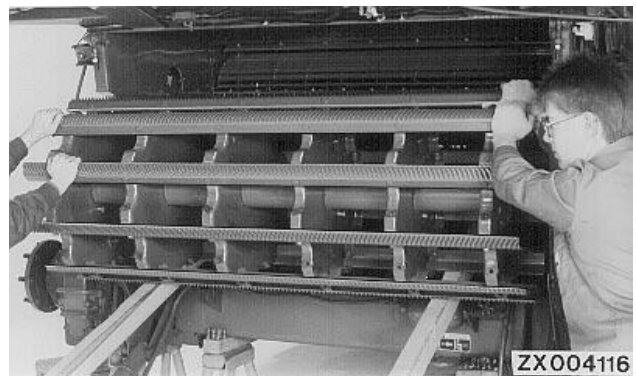
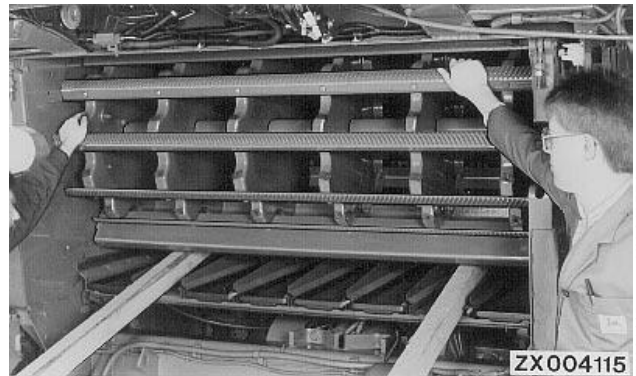
ZX, TMXZC0002740-19-13MAY93

**CAUTION:** Secure threshing cylinder to prevent it from rolling out of combine.

Move concave to lowest position from the cab.

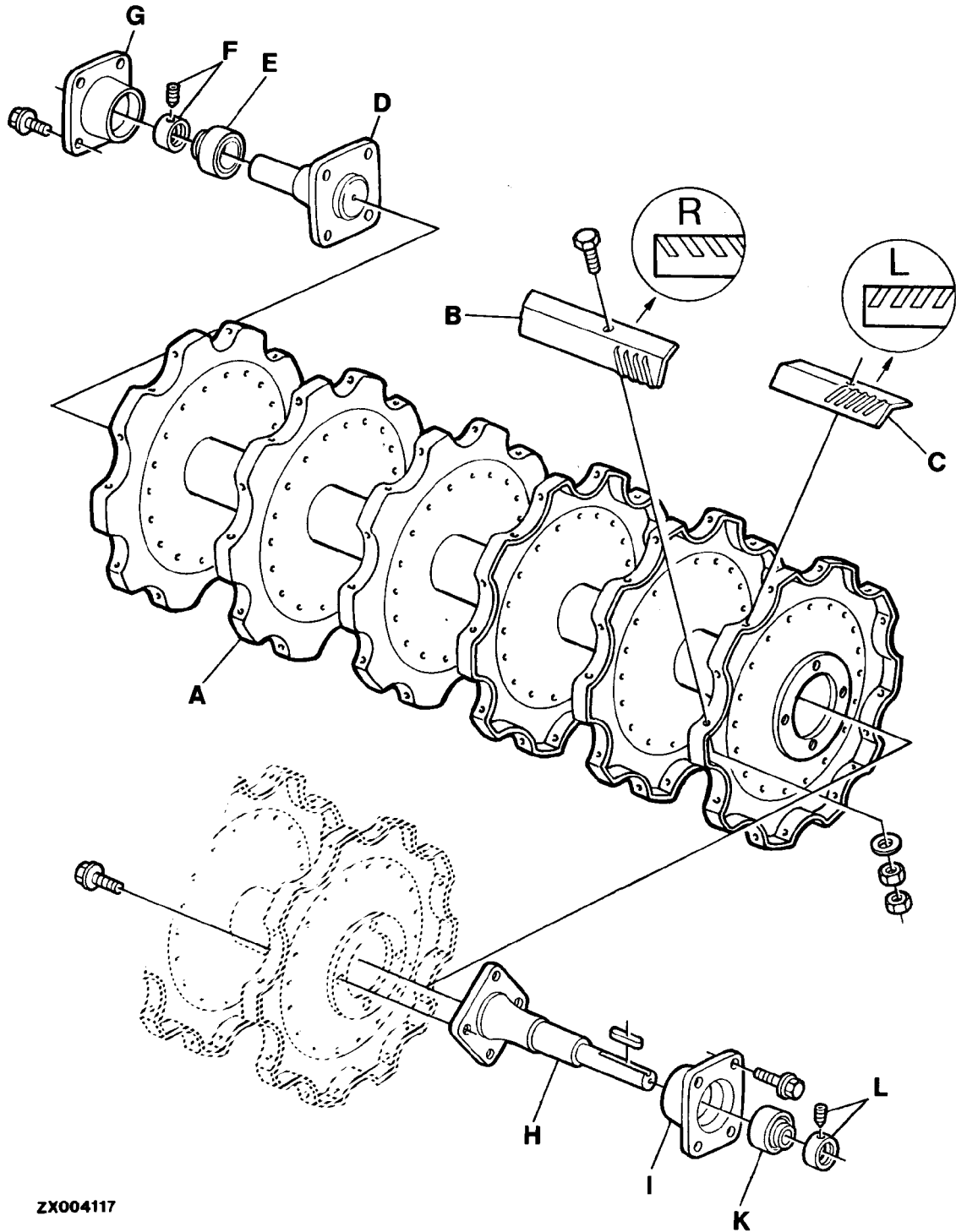
Roll threshing cylinder out of machine over concave front edge and the two wooden supports. Two persons are required to perform this job.

*NOTE: When removing threshing cylinder from combine, make sure that a deep spot of the cylinder is rolled over the concave front edge.*



ZX, TMXZC0002741-19-13MAY93

REPAIRING THRESHING CYLINDER



ZX004117

A—Cylinder assembly  
(welded)  
B—Rasp bar (right-serrated)

C—Rasp bar (left-serrated)  
D—Stub shaft, left  
E—Clamping ring bearing

F—Clamping ring  
G—Bearing housing  
H—Stub shaft, right

I—Bearing housing  
K—Clamping ring bearing  
L—Clamping ring

ZX, TMXZC0002742-19-13MAY93

*Threshing Cylinder/Repair Threshing Cylinder*



## Group 30 Variable Cylinder Drive

### SPECIAL OR ESSENTIAL TOOLS

*NOTE: Order tools according to information given in the U.S. SERVICEGARD™ Catalog or in the European Microfiche Tool Catalog (MTC).*

DX,TOOLS -19-20JUL95

### ASSEMBLY AND DISASSEMBLY TOOL

Spring tensioning device for lower unit of variable cylinder drive, KMZ10001.



**KMZ10001**

-UN-28AUG96  
KMZ10001

ZX,TMXZCO006631-19-01SEP96

### OTHER MATERIALS

Order no.	Designation	Application
TY9370	Loctite 243	Clamp nut to variable drive
TY15969	Loctite 638	Bolts in variable drive

ZX,TMXZCO006770-19-01SEP96

### SPECIFICATIONS

Item	Measurement	Specification
Clamp nut to variable drive	Torque	300 N·m (221 lb-ft)
Clamp screw on variable drive	Torque	55 N·m (40.6 lb-ft)
Screws on flanged shaft	Torque	31 N·m (23 lb-ft)
Screws to bearing support	Torque	90 N·m (66.4 lb-ft)
Screws to hub and variable sheave	Torque	90 N·m (66.4 lb-ft)

ZX,TMXZCO006771-19-01SEP96

## REPLACING THE V-BELT ON VARIABLE CYLINDER DRIVE

Close the upper variable drive (A).

On the lower variable drive (B), insert at least two M12x65 screws into the threaded bores provided. This holds the variable drive sheaves apart.

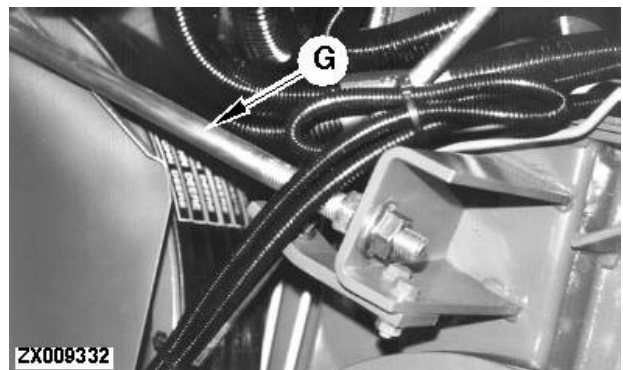
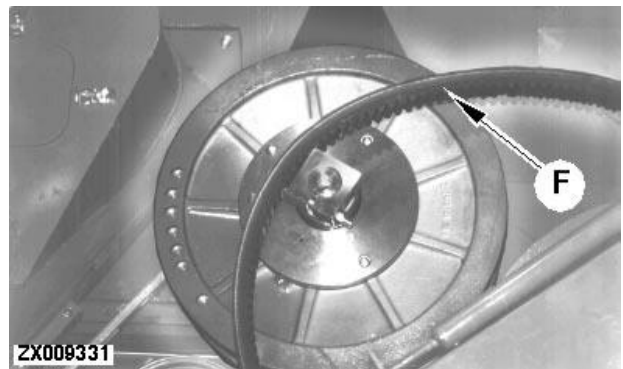
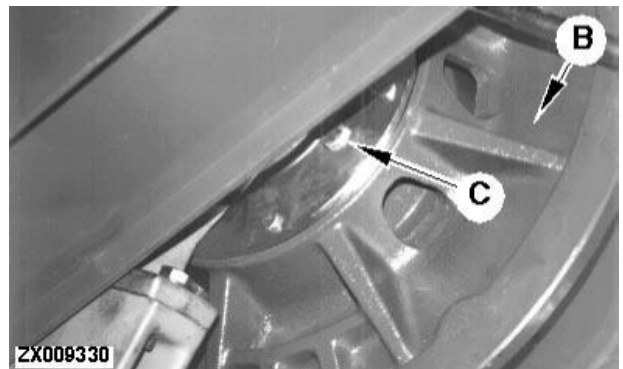
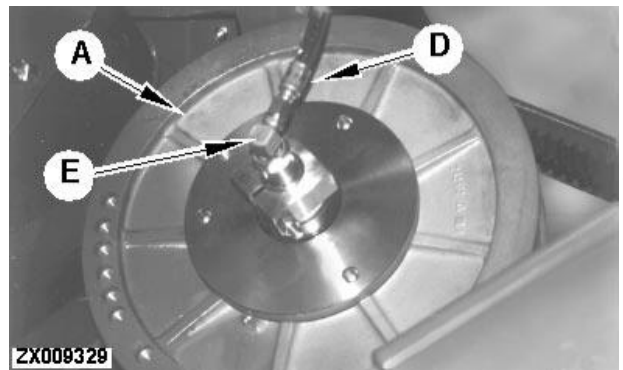
Run the separator and bleed the pressure in hydraulic line (D) by separating the upper variable drive sheaves (A).

Unscrew elbow fitting (E) from countershaft.

Take V-belt (F) off the upper variable drive.

Unbolt support (G).

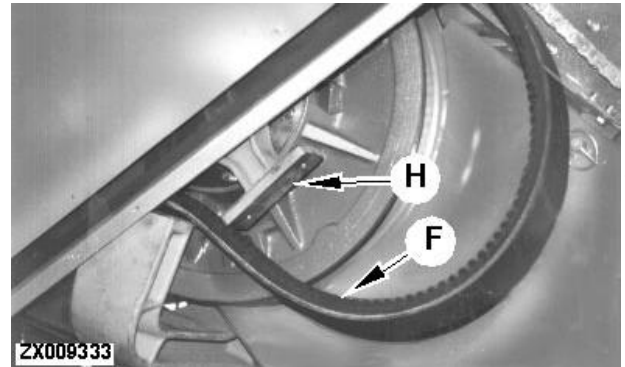
- A—Variable drive
- B—Variable drive
- C—Threaded bores
- D—Hydraulic line
- E—Elbow fitting
- F—V-belt
- G—Support



## REPLACING THE V-BELT ON VARIABLE CYLINDER DRIVE (CONTINUED)

Take two screws out of the bearing support (H), raise the variable drive, pull the support forward and remove V-belt (F).

*NOTE: On 6-walker combines, the tailings elevator must be partly unfastened and pulled far enough away from the machine to allow V-belt (F) to clear the bearing support (H).*



ZX.TMXZC0006588-19-01AUG96

## INSTALLING THE V-BELT

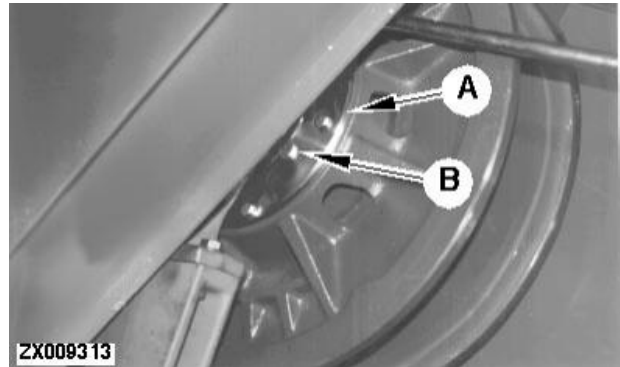
To install V-belt, follow removal procedure in reverse order.

ZX.TMXZC0006589-19-01AUG96

## REMOVING THE UPPER UNIT OF VARIABLE CYLINDER DRIVE

Before disassembling, close the variable drive hydraulically.

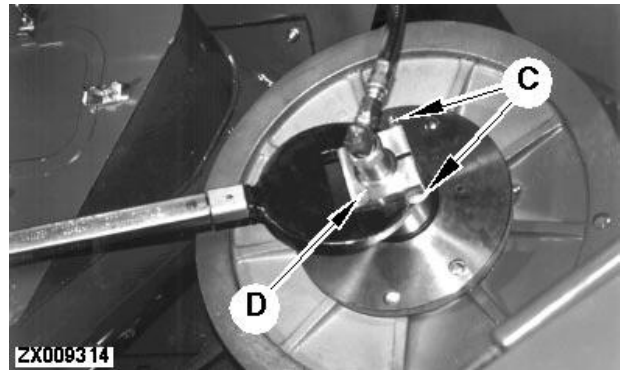
On flange (A) of the lower variable drive, screw in at least two M12x65 screws (three threaded bores (B) are provided). This holds the variable drive sheaves apart.



ZX.TMXZC0006590-19-01AUG96

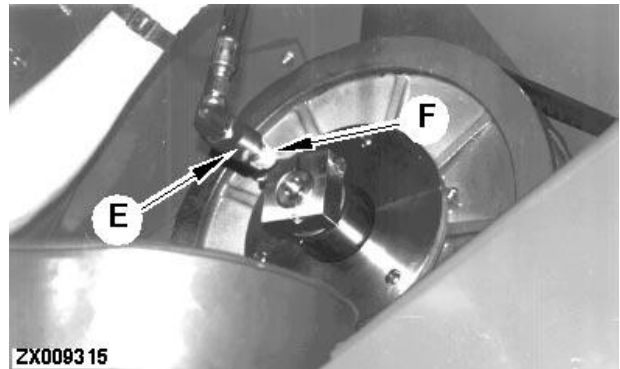
Run the separator and bleed the pressure in hydraulic line by separating the upper variable drive sheaves.

Slacken off clamp screw (C) and square nut (D).



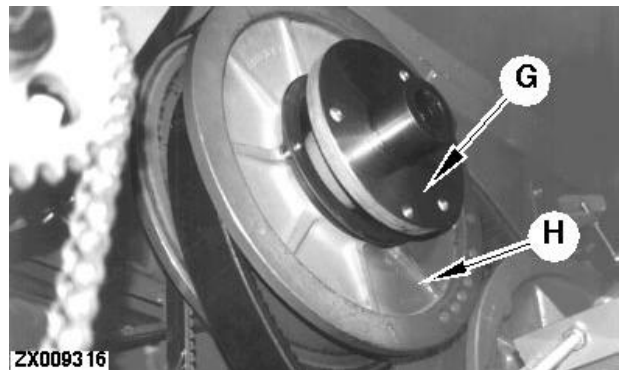
ZX.TMXZC0006591-19-01AUG96

Unscrew pressure hose (E). Trap any remaining oil and seal line with plug (F).



ZX.TMXZC0006592-19-01AUG96

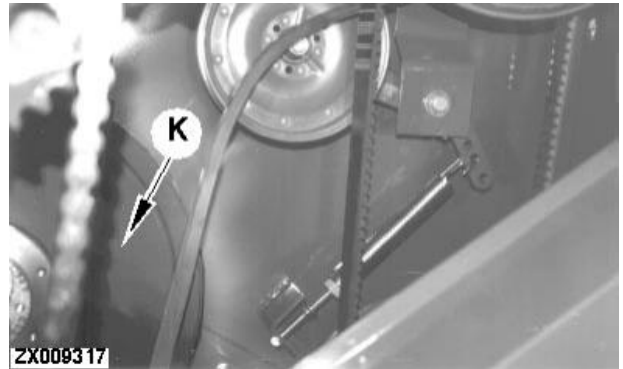
Remove ring-shaped piston assembly (G) and outer variable drive sheave (H).



ZX.TMXZC0006593-19-01AUG96

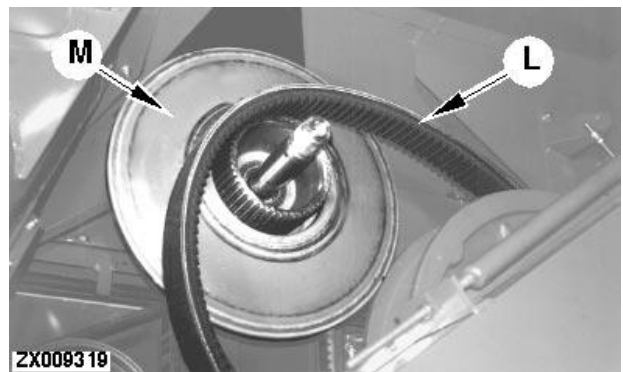
### REMOVING THE UPPER UNIT OF VARIABLE CYLINDER DRIVE (CONTINUED)

Relieve tension on V-belts to blower variable drive (J) and to elevator drive (K). Remove the V-belt from the rear variable drive sheave.



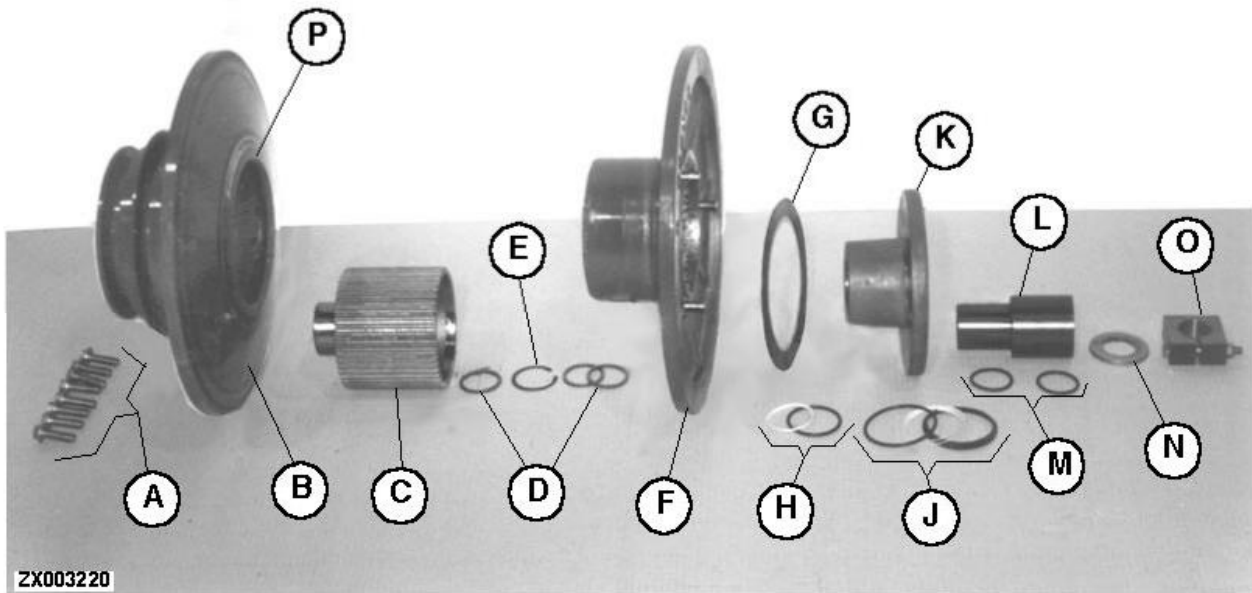
ZX,TMXZC0006594-19-01AUG96

Put down V-belt (L) and remove the variable drive sheave assembly (M).



ZX,TMXZC0006595-19-01AUG96

**COMPONENTS OF VARIABLE CYLINDER DRIVE, UPPER UNIT**



A—Flanged-head screws  
 B—Rear variable drive sheave  
 C—Hub  
 D—Washers (3 used)

E—Snap ring  
 F—Front variable drive sheave  
 G—Intermediate ring  
 H—Seat of seals

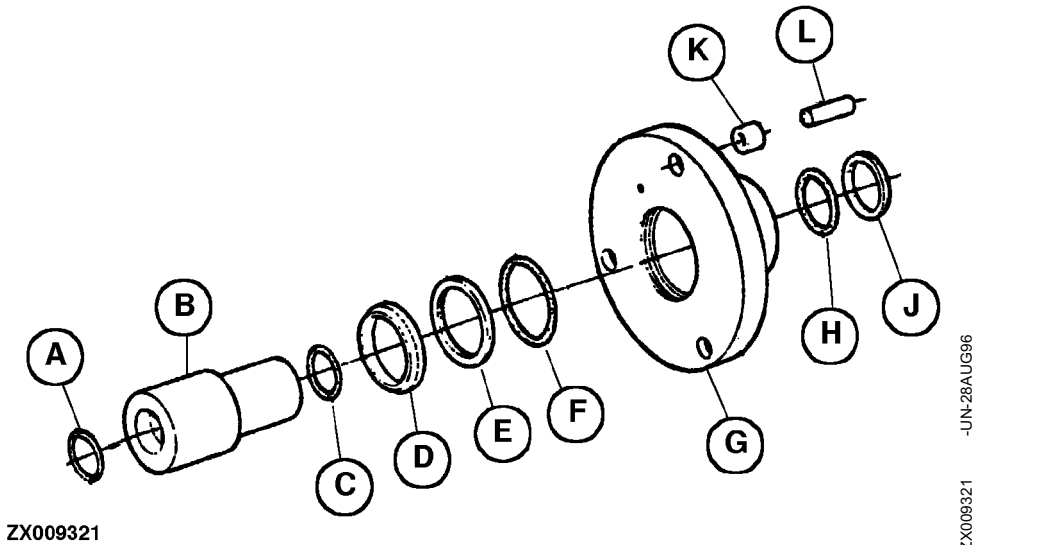
J—Set of seals  
 K—Ring-shaped piston  
 L—Stepped cylinder  
 M—O-ring (2 used)

N—Washer  
 O—Clamp nut and clamp screw  
 P—Seal ring

ZX009320 -UN-30AUG96

ZX.TMXZC0006596-19-01AUG96

### COMPONENTS OF RING-SHAPED PISTON



A—O-ring  
B—Stepped cylinder  
C—O-ring

D—Wiper ring  
E—Spiral back-up ring  
F—O-ring

G—Ring-shaped piston  
H—O-ring  
J—Spiral back-up ring

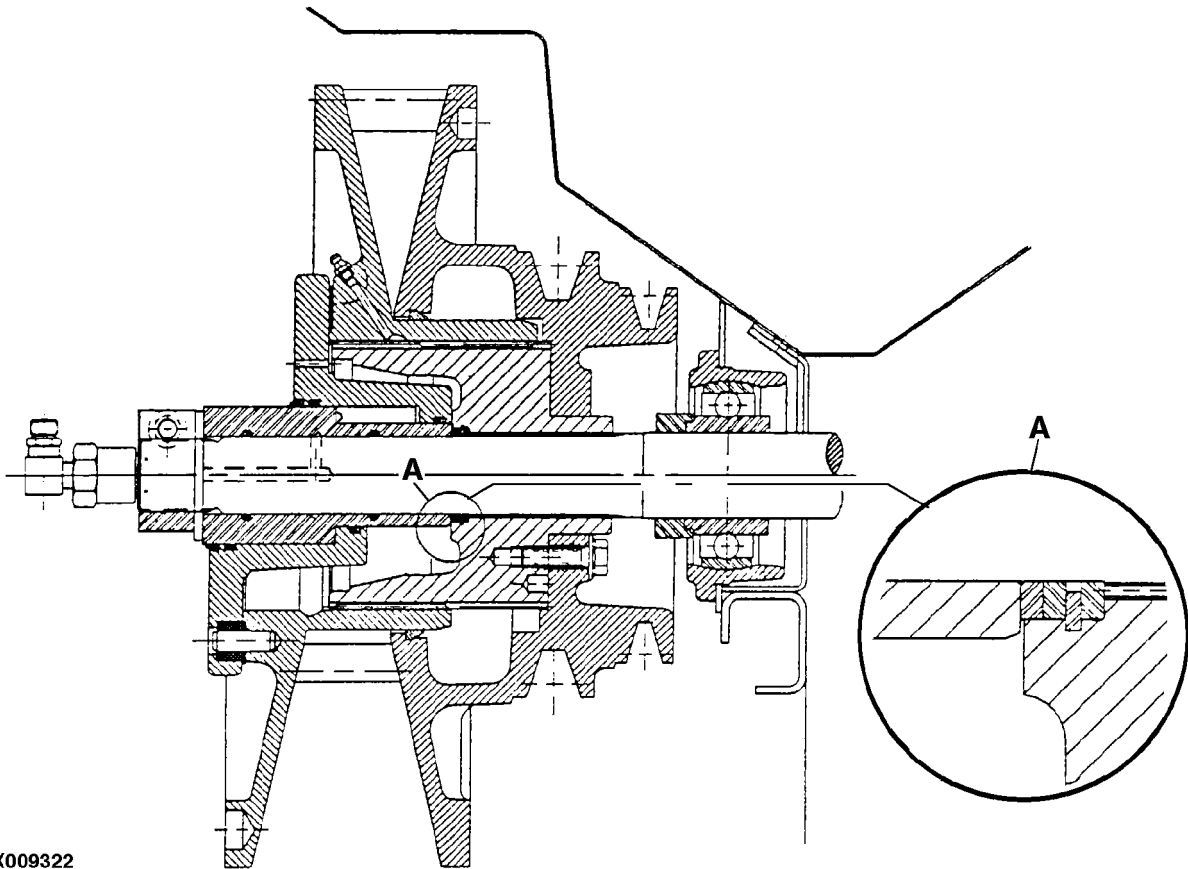
K—Bushing (3 used)  
L—Pin (3 used)

ZX009321

ZX009321 -UN-28AUG96

ZX.TMXZC0006597-19-01AUG96

**ASSEMBLY OF VARIABLE CYLINDER DRIVE (UPPER UNIT), UP TO SERIAL NO. 064838**



ZX009322

ZX009322 -UN-28AUG96

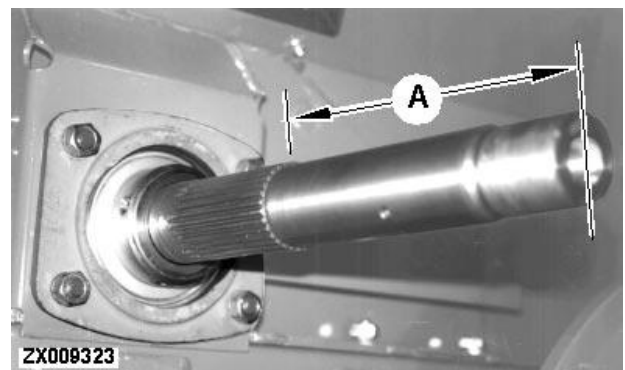
ZX.TMXZCO006598-19-01AUG96

**INSTALLING THE VARIABLE DRIVE**

The countershaft must be installed with 386 mm (15.2 in.) separating the sidewall from the front edge of the shaft.

Before assembly, coat all bearing points and seals with multi-purpose grease.

A—386 mm (15.2 in.)



ZX009323

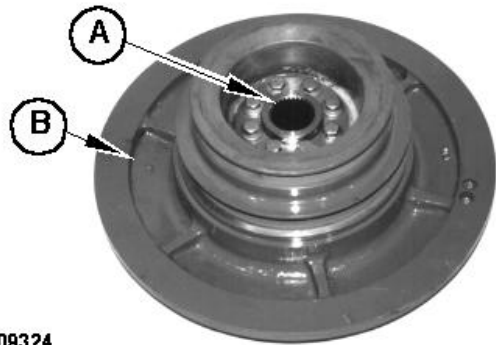
ZX009323 -UN-30AUG96

ZX.TMXZCO006599-19-01AUG96



### INSTALLING THE VARIABLE DRIVE (CONTINUED)

Using 8 flat-collar screws coated with Loctite 243 (TY9370), bolt hub (A) onto variable drive sheave (B). Tighten the screws to 90 N·m (66.4 lb-ft).

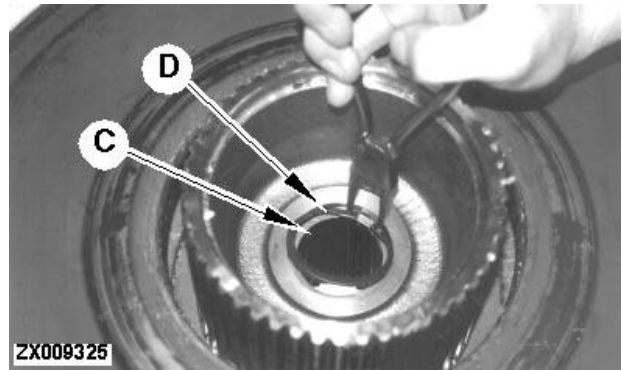


ZX009324

ZX,TMXZC0006600-19-01AUG96

-JUN-28AUG96  
ZX009324

Place one washer (C) in the hub and secure it in position with a snap ring (D).



ZX009325

ZX,TMXZC0006601-19-01AUG96

-JUN-05SEP96  
ZX009325

Slide the variable drive sheave onto the countershaft and install two more washers in front of the snap ring.

See detail (A) in "Assembly of Variable Cylinder Drive".



ZX009326

ZX,TMXZC0006602-19-01AUG96

-JUN-28AUG96  
ZX009326

## INSTALLING THE VARIABLE DRIVE (CONTINUED)

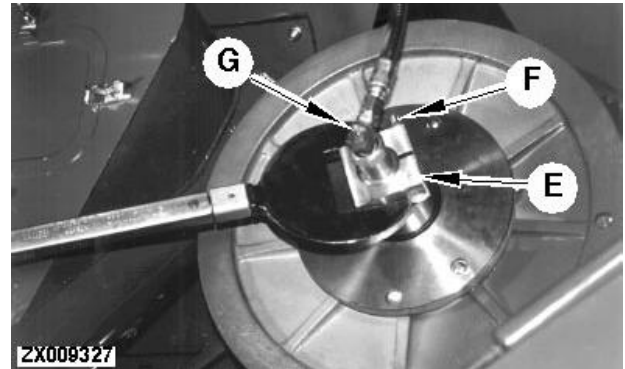
Install the front variable drive sheave and ring-shaped piston. Insert clamp nut (E) (treated with Loctite TY 9370), and tighten to 300 N·m (221 lb-ft).

Tighten clamp screw (F) to 55 N·m (40.6 lb-ft).

Apply sealing tape to the pressure hose and elbow fitting (G), and screw the latter tight.

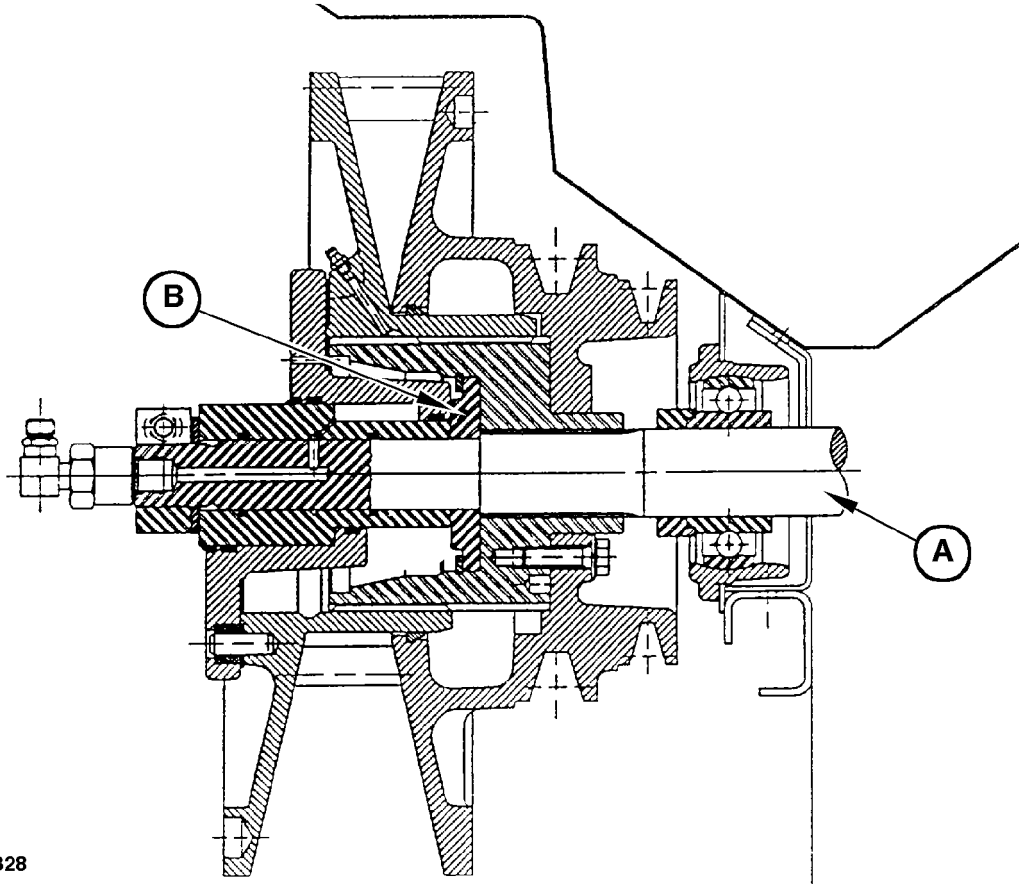
Check that the connection is tight.

With the variable drive sheaves closed, lubricate the variable drive using the grease fitting provided.



ZX, TMXZC0006603-19-01AUG96

**ASSEMBLY OF VARIABLE CYLINDER DRIVE (UPPER UNIT), FROM SERIAL NO. 064839**



ZX009328

This assembly differs from the previous one in having a modified countershaft (A) and an additional spacer ring (B).

ZX009328 -JUN-28AUG96

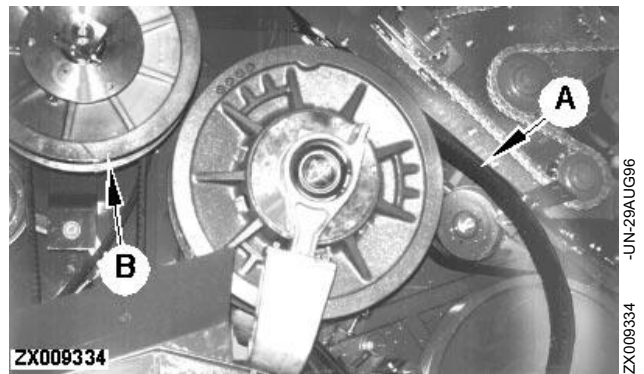
ZX, TMXZC0006604-19-01AUG96

## REMOVING THE LOWER UNIT OF VARIABLE CYLINDER DRIVE

Remove the large side guard on the right-hand side (see Section 80).

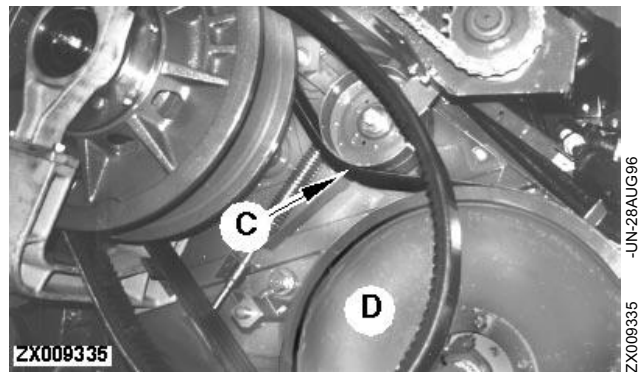
Remove the tailings elevator (see Section 130).

Take variable drive V-belt (A) off the upper variable drive (B). See description at "Replacing The V-Belt On Variable Cylinder Drive".



ZX, TMXZC0006605-19-01AUG96

Relieve tension on power band to cylinder drive (C), and take it off belt sheave (D).

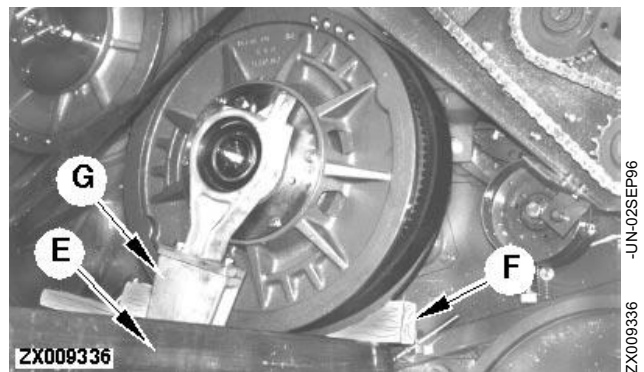


ZX, TMXZC0006606-19-01AUG96

Support the variable drive unit with a forklift truck (E), and secure with wooden chocks (F).

**CAUTION:** The variable drive unit weighs approx. 100 kg (220 lb).

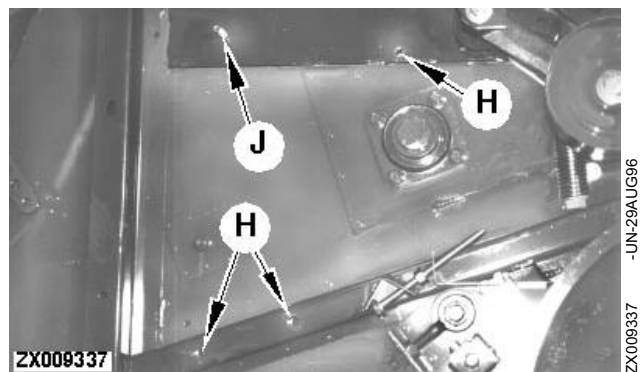
Unbolt the variable drive mounting assembly (G) at the four points where it is attached to the sidewall, and lower the complete variable drive unit.



ZX, TMXZC0006607-19-01AUG96

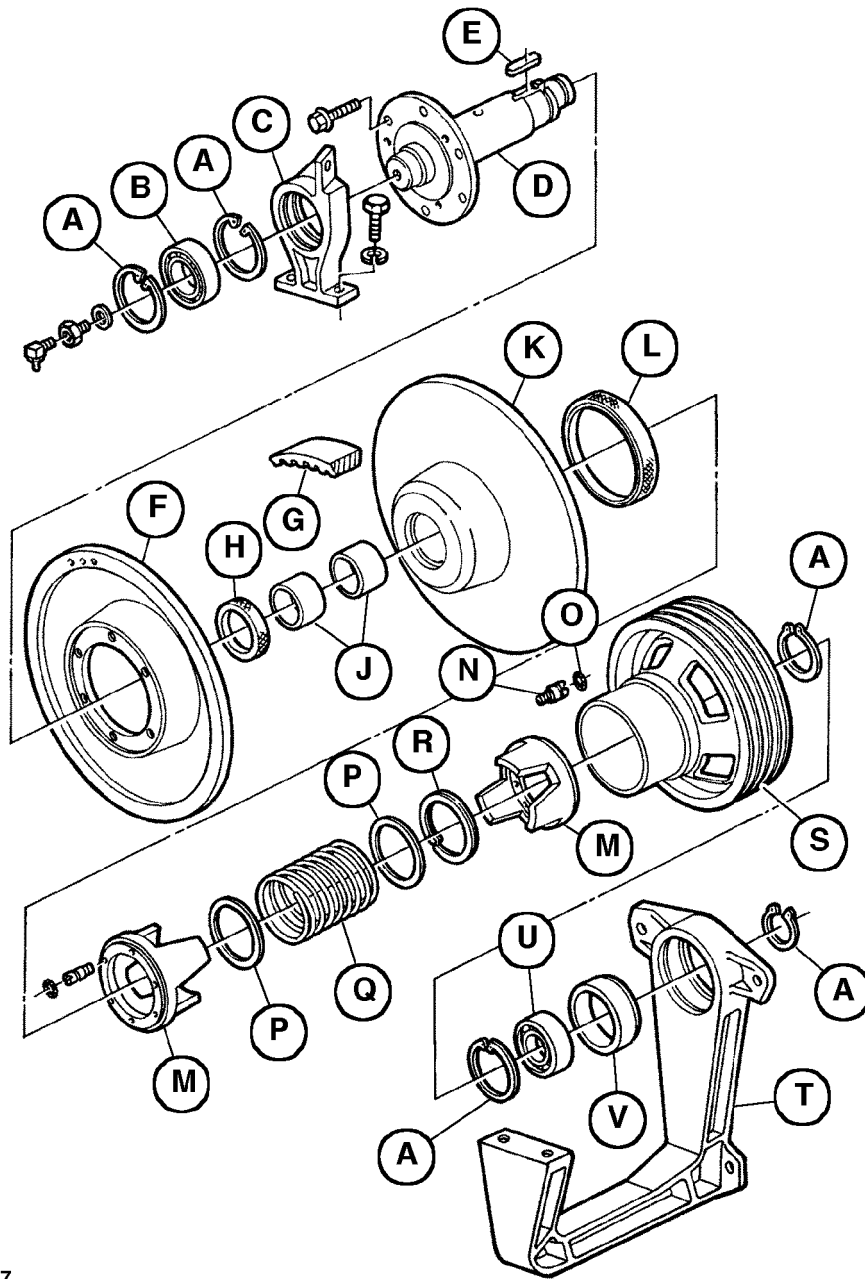
Here are the points where the variable drive mounting is attached.

H—Threaded bores  
J—Threaded pin



ZX, TMXZC0006608-19-01AUG96

COMPONENTS OF VARIABLE CYLINDER DRIVE, LOWER UNIT



ZX009347

ZX009347 -JUN-28AUG96

A—Snap ring  
 B—Ball bearing  
 C—Bearing support  
 D—Flanged shaft  
 E—Key  
 F—Sheave

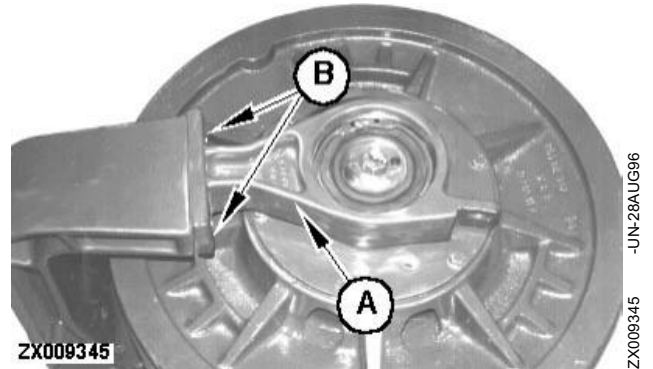
G—V-belt  
 H—Seal ring  
 J—Brass bushing  
 K—Sheave  
 L—Seal ring

M—Ring with lugs  
 N—Stud  
 O—O-ring  
 P—Washer  
 Q—Spring

R—Double snap ring  
 S—Belt sheave  
 T—Variable drive mounting  
 U—Ball bearing  
 V—Bearing ring

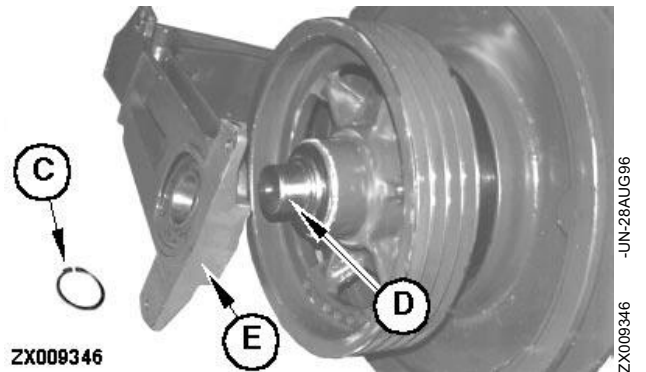
### DISASSEMBLING THE LOWER UNIT OF THE VARIABLE CYLINDER DRIVE

Take two screws (B) out of the bearing support (A).



ZX.TMXZCO006633-19-01AUG96

Take snap ring (C) off flanged shaft (D), and disassemble variable drive mounting (E).

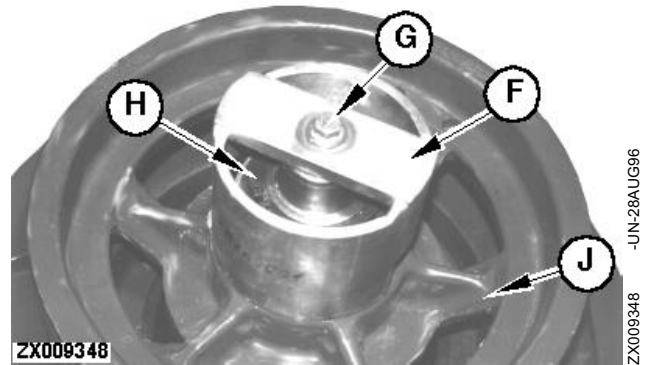


ZX.TMXZCO006634-19-01AUG96

Place the thrust ring (F) of tool KMZ10001 on the belt sheave (J) and use an M12x40 screw (G) to press the thrust ring onto the belt sheave.

Remove snap ring (H).

- F—Thrust ring
- G—Screw
- H—Snap ring
- J—Belt sheave



ZX.TMXZCO006635-19-01AUG96

Lift off belt sheave (J) from above.



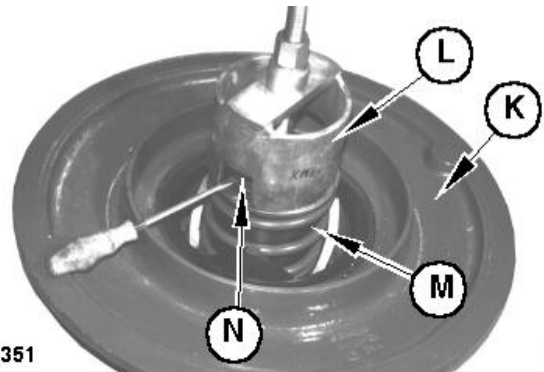
ZX.TMXZCO006636-19-01AUG96

### DISASSEMBLING THE LOWER UNIT OF THE VARIABLE CYLINDER DRIVE (CONTINUED)

Lift variable drive sheave (K) off the flanged shaft and place it on the spindle of tool KMZ10001. By using thrust ring (L) to compress spring (M), it becomes possible to remove the double snap ring (N).

- K—Variable drive sheave
- L—Thrust ring
- M—Spring
- N—Double snap ring

ZX009351



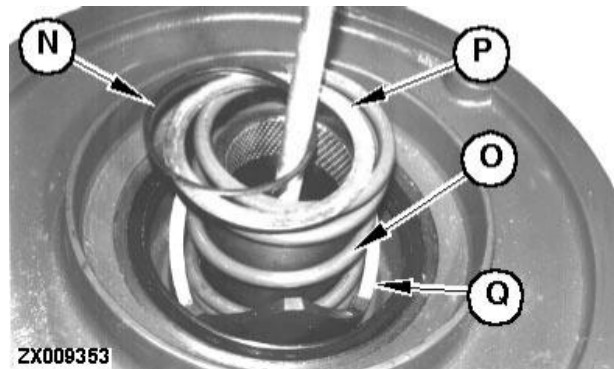
-JUN-28AUG96  
ZX009351

ZX.TMXZCO006637-19-01AUG96

By slackening the nut on the spindle of the tool, the pressure on spring (O) is relieved, and it becomes possible to remove double snap ring (N), washer (P), spring (O) and the ring with lugs (Q).

- N—Double snap ring
- O—Spring
- P—Washer
- Q—Ring with lugs

ZX009353

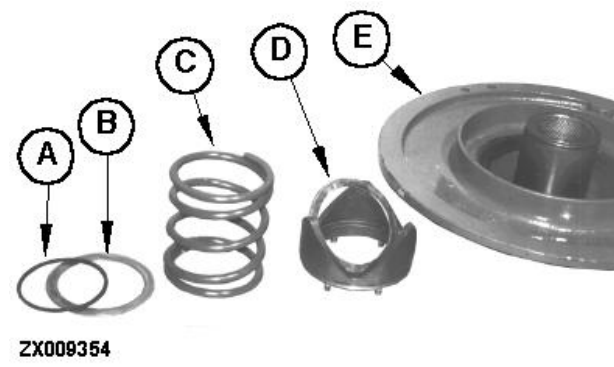


-JUN-29AUG96  
ZX009353

ZX.TMXZCO006638-19-01AUG96

- A—Double snap ring
- B—Washer
- C—Spring
- D—Ring with lugs
- E—Variable drive sheave

ZX009354



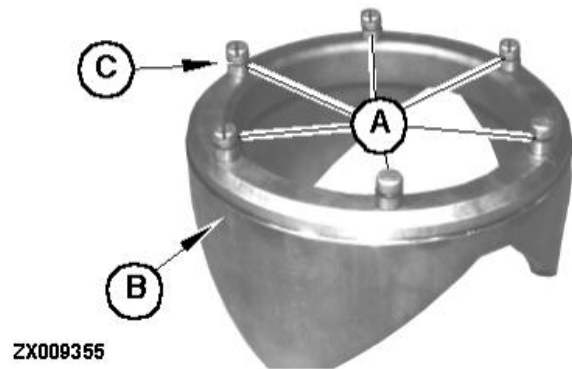
-JUN-28AUG96  
ZX009354

ZX.TMXZCO006639-19-01AUG96

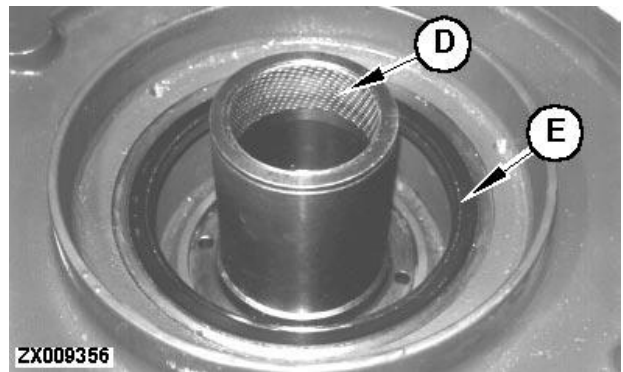
### REPAIRING THE LOWER UNIT OF THE VARIABLE CYLINDER DRIVE

Insert locating screws (A) into the ring with lugs (B). Use Loctite 638 (TY15969) on the screws.

Replace all O-rings (C) with new ones.

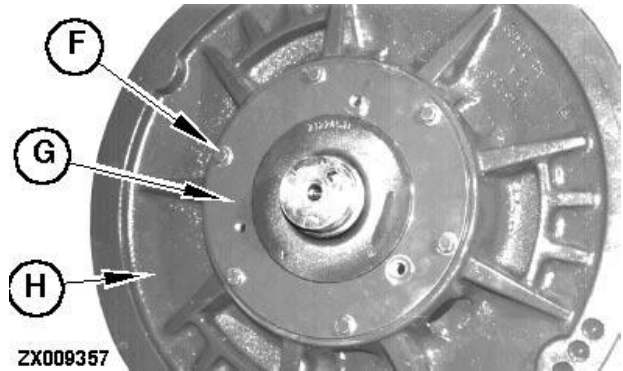


If brass bushings (D) and seal ring (E) are worn, replace them.



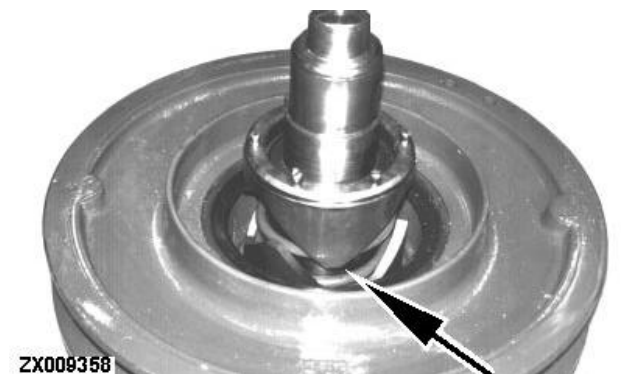
### ASSEMBLING THE LOWER UNIT OF THE VARIABLE CYLINDER DRIVE

Use screws (F) to bolt flanged shaft (G) to the variable drive sheave (H). Apply Loctite 243 (TY9370) to the screws before inserting them, and tighten to 31 N·m (23 lb-ft).



Fill the cavity between the lugged rings and the spring with approx. 0.86 kg (30 oz.) of multi-purpose grease.

Apply Molykote to the end surfaces of the lugged rings.





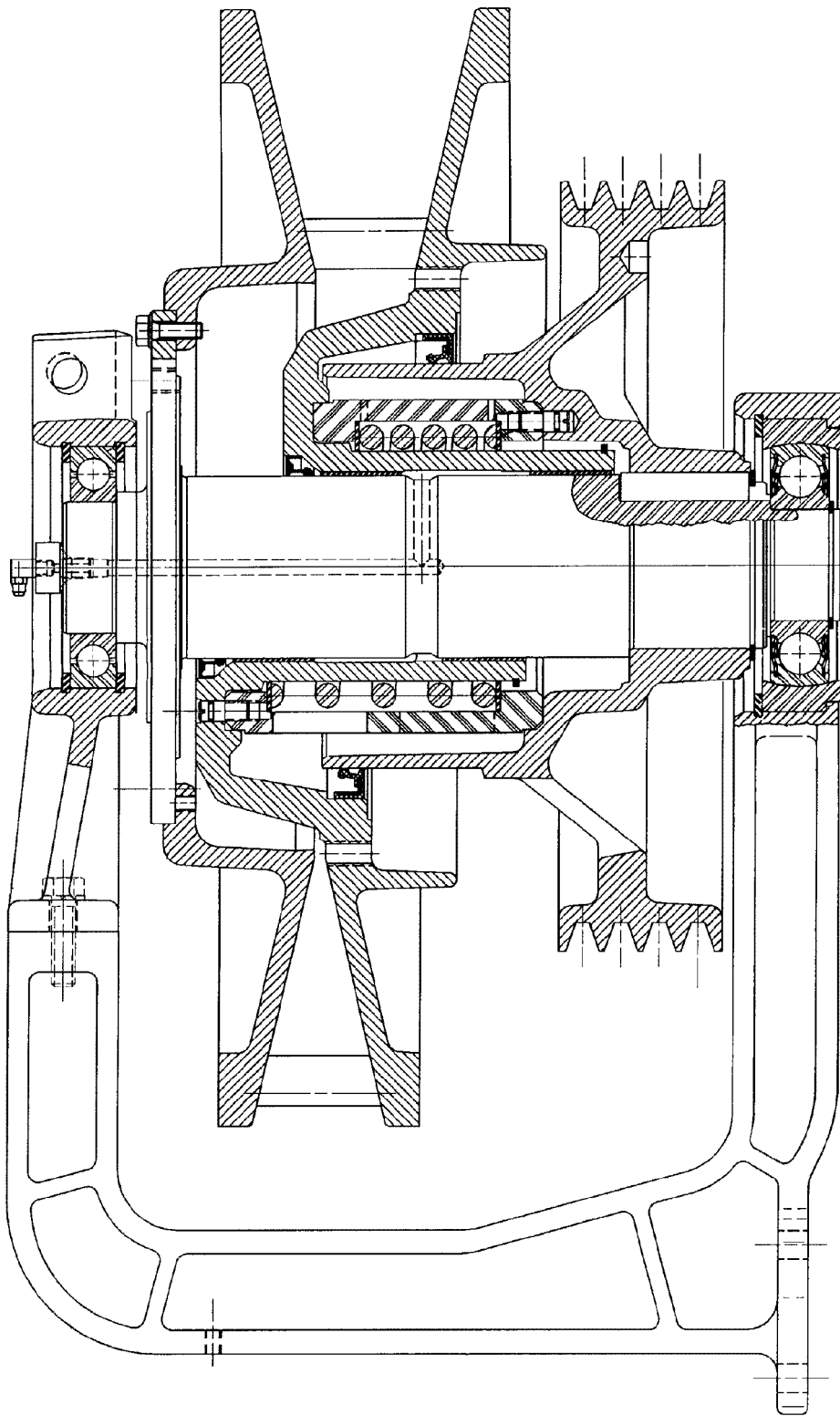
**ASSEMBLING THE LOWER UNIT OF THE  
VARIABLE CYLINDER DRIVE (CONTINUED)**

For further assembly, follow removal procedure in reverse order.

Tighten the two screws on the bearing support to 90 N·m (66.4 lb-ft).

ZX.TMXZC0006644-19-01AUG96

**ASSEMBLY, LOWER UNIT OF VARIABLE CYLINDER DRIVE**



ZX009360

ZX009360 -JN-28AUG96

ZX, TMXZC0006645-19-01AUG96

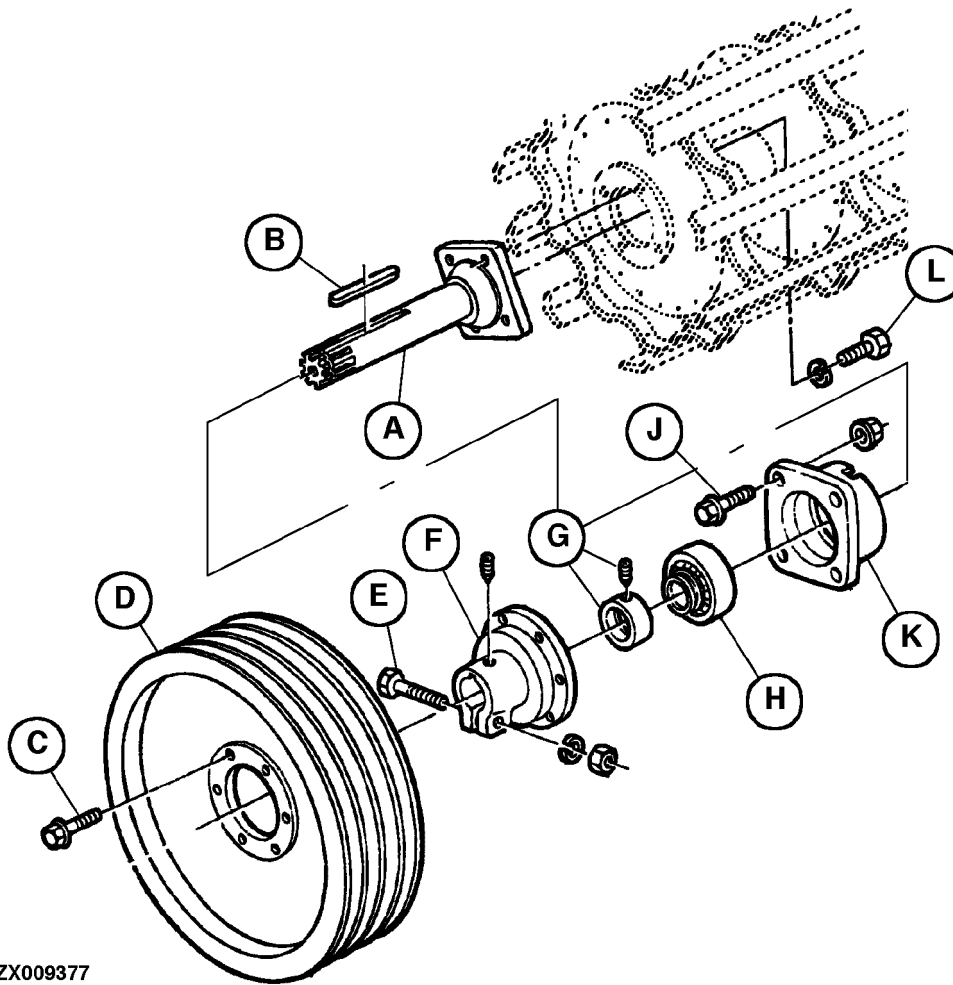
# Group 35 Cylinder Drive and Reduction Gear

## SPECIFICATIONS

Item	Measurement	Specification
Screws in belt pulley and clamping hub	Torque	73 N·m (53.8 lb-ft)
Screw in clamping hub	Torque	85 N·m (62.7 lb-ft)
Screws in bearing housing	Torque	50 N·m (37 lb-ft)
Screws in flanged shaft	Torque	130 N·m (96 lb-ft)
Screws in clamping plate	Torque	80 N·m (59 lb-ft)

ZX, TMXZCO006772-19-01SEP96

**EXPLODED VIEW OF CYLINDER DRIVE UP TO SERIAL NO. 064623**



ZX009377

-JUN-28AUG96  
ZX009377

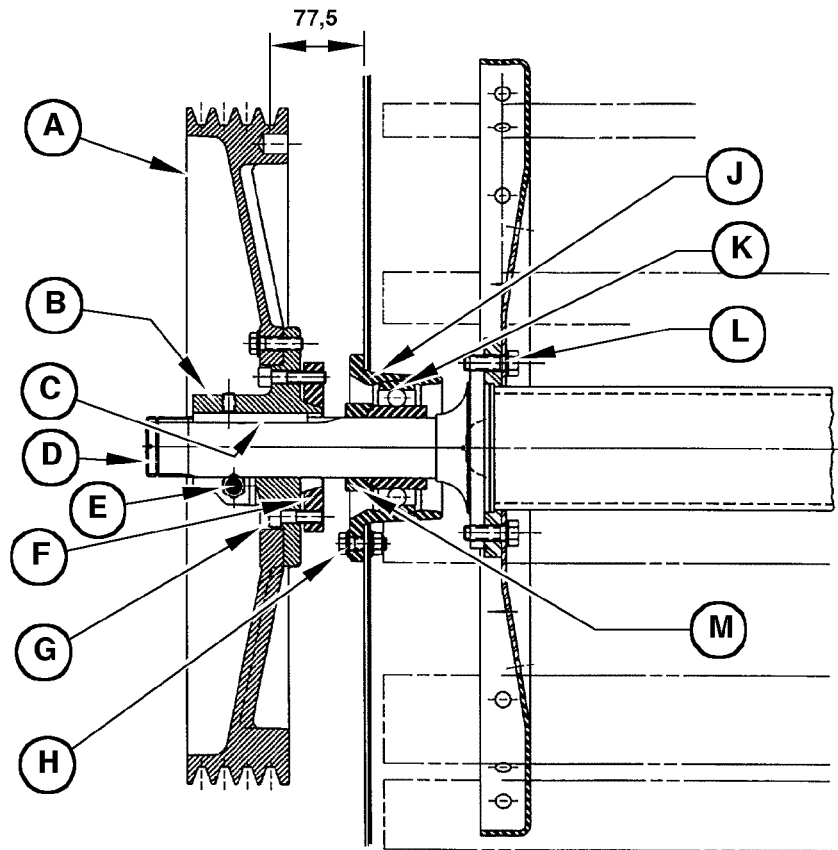
- |                 |                |                              |                   |
|-----------------|----------------|------------------------------|-------------------|
| A—Flanged shaft | D—Belt pulley  | G—Clamping ring              | K—Bearing housing |
| B—Key           | E—M12x90 screw | H—Self-aligning ball bearing | L—M12x35 screw    |
| C—M10x35 screw  | F—Clamping hub | J—M12x30 screw               |                   |

— Tighten screw (C) to 73 N·m (53.8 lb-ft).  
 — Tighten screw (E) to 85 N·m (62.7 lb-ft).

— Tighten screw (J) to 50 N·m (37 lb-ft).  
 — Tighten screw (L) to 130 N·m (96 lb-ft).

ZX.TMXZCO006646-19-01AUG96

**EXPLODED VIEW OF CYLINDER DRIVE FROM SERIAL NO. 064624**



ZX009378

ZX009378  
-UN-30AUG96

A—Belt pulley  
B—Clamping hub  
C—Key  
D—Flanged shaft

E—M12x90 screw  
F—Clamping plate  
G—M10x35 fillister-head screw

H—M12x30 screw  
J—Bearing housing  
K—Self-aligning ball bearing

L—M12x35 screw  
M—Clamping ring

- Tighten screw (E) to 85 N·m (62.7 lb-ft).
- Tighten screw (G) to 80 N·m (59 lb-ft).
- Tighten screw (H) to 50 N·m (37 lb-ft).
- Tighten screw (L) to 130 N·m (96 lb-ft).

**IMPORTANT: Tighten fillister-head screws (G) evenly, otherwise the clamping plate will become skewed.**

ZX.TMXZCO006647-19-01AUG96

## ALIGNING THE BELT PULLEY

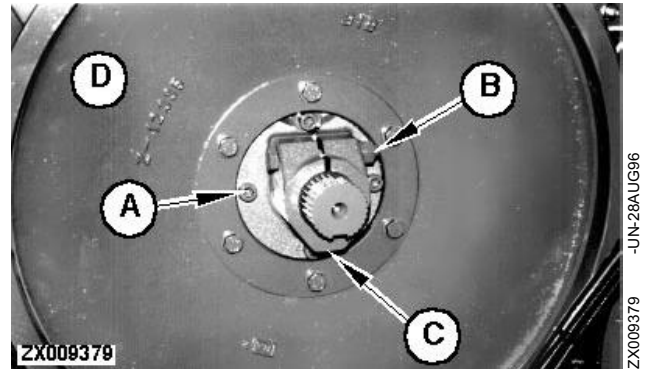
Slacken off fillister-head screws (A), clamping plate (B) and set-screw (C).

Align the belt pulley to suit the power band.

Tighten fillister-head screws (A) evenly to 80 N·m (59 lb-ft).

Tighten clamping screw (B) to 85 N·m (62.7 lb-ft).

Then tighten set-screw (C).



ZX, TMXZC0006648-19-01AUG96

**Section 130**

# **Grain Recovery and Unloading System**

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**Group 10—Clean Grain Elevator**

Remove the Clean Grain Elevator . . . . . 130-10-1

Install the Clean Grain Elevator . . . . . 130-10-2

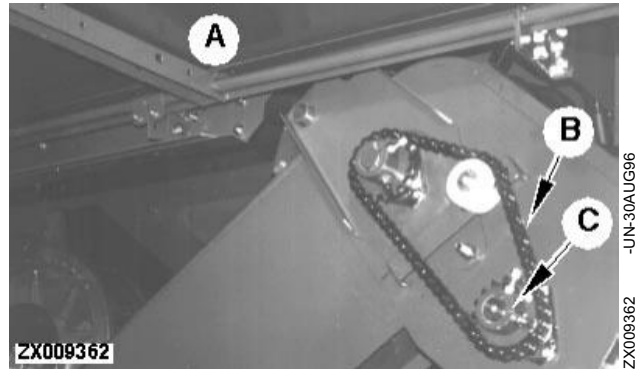
*Contents*



**REMOVING THE TAILINGS ELEVATOR**

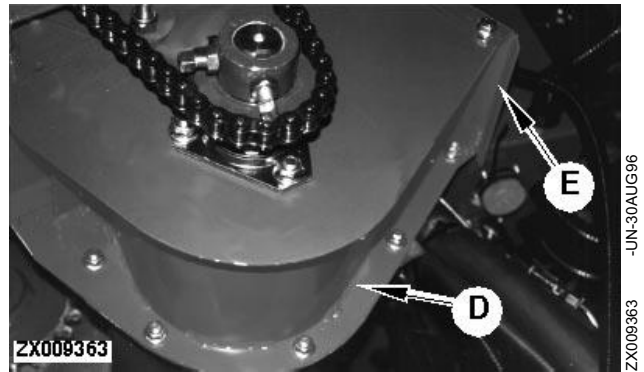
Remove the large side guard (A; see description in Section 80).

Remove drive chain (B) and sprocket (C).



ZX.TMXZCO006649-19-01AUG96

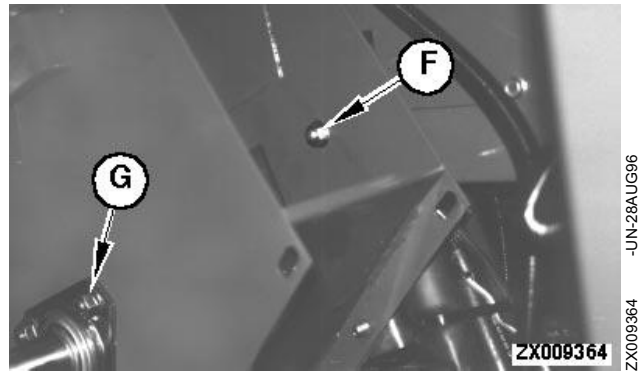
Take 6 screws out of housing (D) and lift off cover (E).



ZX.TMXZCO006650-19-01AUG96

Take out screw (F).

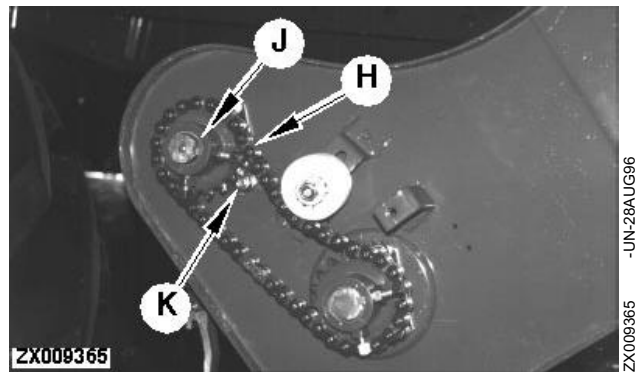
Slacken off nuts (G) on the bearing flange.



ZX.TMXZCO006651-19-01AUG96

Remove lower drive chain (H) and sprocket (J).

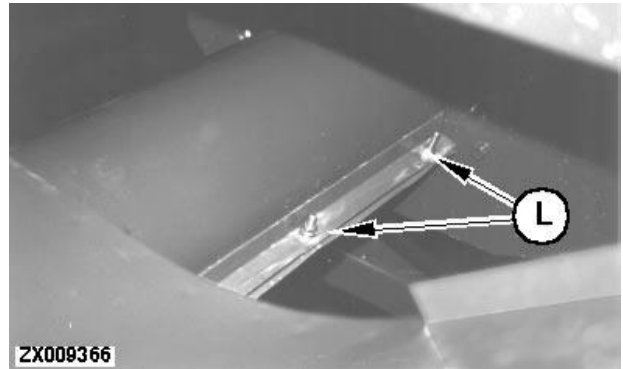
Slacken off nuts (K) on the bearing flange.



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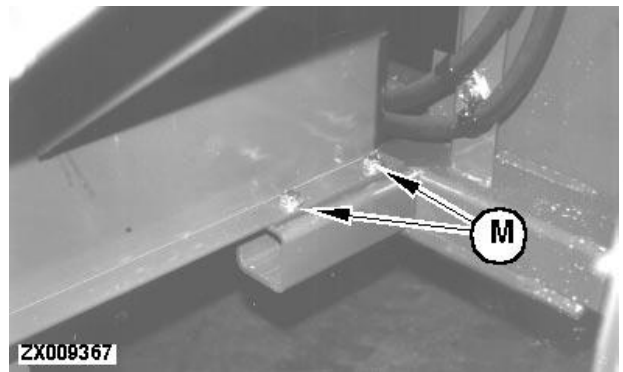
### REMOVING THE TAILINGS ELEVATOR (CONTINUED)

Slacken off screws (L) on the sheet-metal cover.



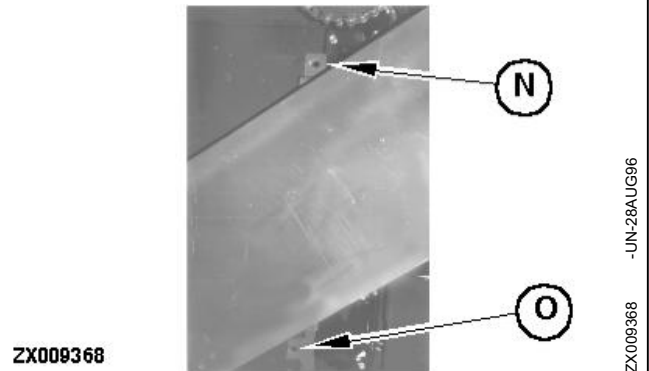
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Take screws (M) out of the support.



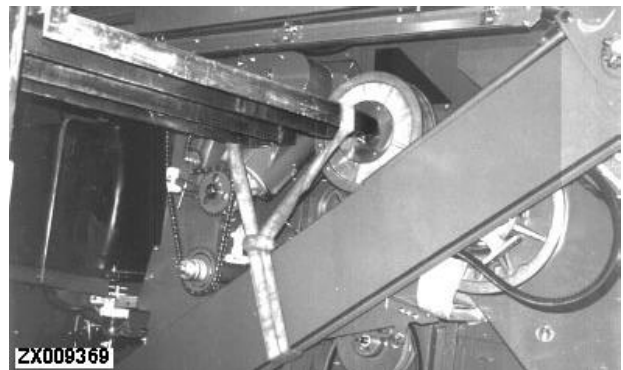
ZX, TMXZC0006654-19-01AUG96

Takes screws (N) and (O) out of the central attaching element.



ZX, TMXZC0006655-19-01AUG96

Suspend the elevator by a cable from a forklift truck, and move it to the side.



ZX, TMXZC0006656-19-01AUG96

## **INSTALLING THE TAILINGS ELEVATOR**

To install the tailings elevator, follow the removal procedure in reverse order.

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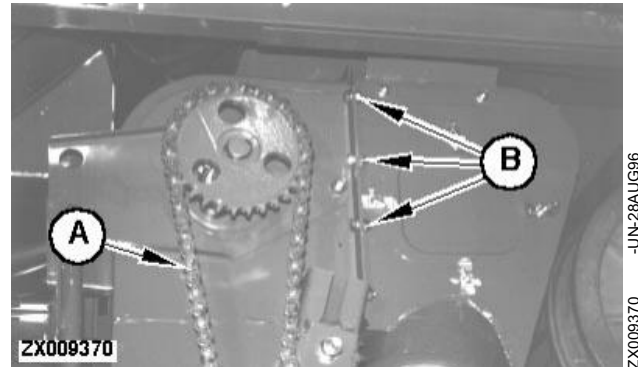
*Tailings Elevator/Install Tailings Elevator*

## REMOVING THE CLEAN GRAIN ELEVATOR

Before the clean grain elevator can be removed, it is first necessary to remove the tailings elevator.

Relieve the tension on drive chain (A), and remove.

Take out the screws on both sides of the elevator top section (B).

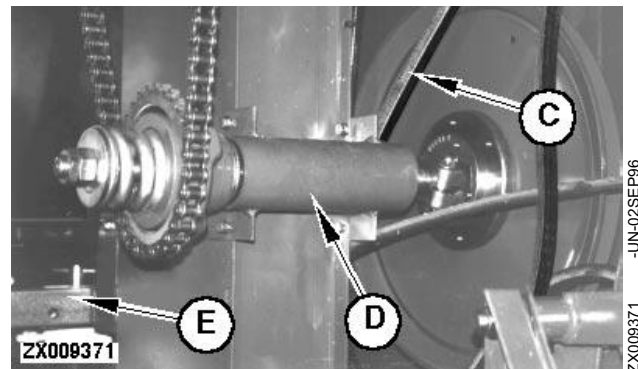


ZX, TMXZC0006658-19-01AUG96

Relieve the tension on drive belt (C), and remove.

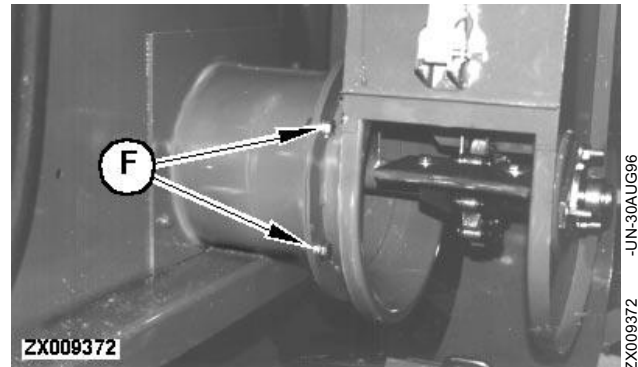
Take out the screws and remove drive (D) from the elevator.

Disconnect attaching element (E).



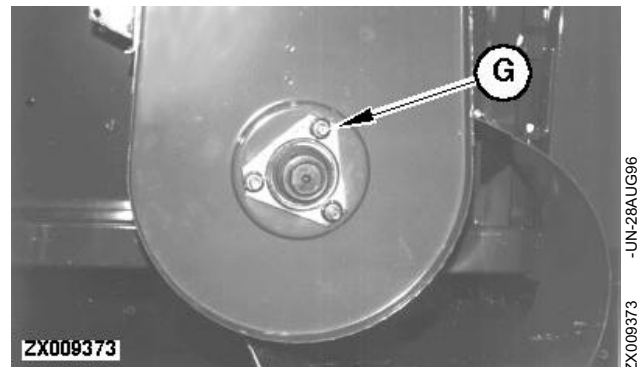
ZX, TMXZC0006659-19-01AUG96

Disconnect the elevator from inlet (F).



ZX, TMXZC0006660-19-01AUG96

Remove the tensioning ring and slacken off screws (G) at the bearing flange.



ZX, TMXZC0006661-19-01AUG96

## **REMOVING THE CLEAN GRAIN ELEVATOR (CONTINUED)**

Use a forklift truck to lift the elevator off the machine.

ZX, TMXZCO006703-19-01AUG96

## **INSTALLING THE CLEAN GRAIN ELEVATOR**

To install the clean grain elevator, follow the removal procedure in reverse order.

ZX, TMXZCO006704-19-01AUG96

# Fuel, Air Intake and Cooling Systems

Section 230

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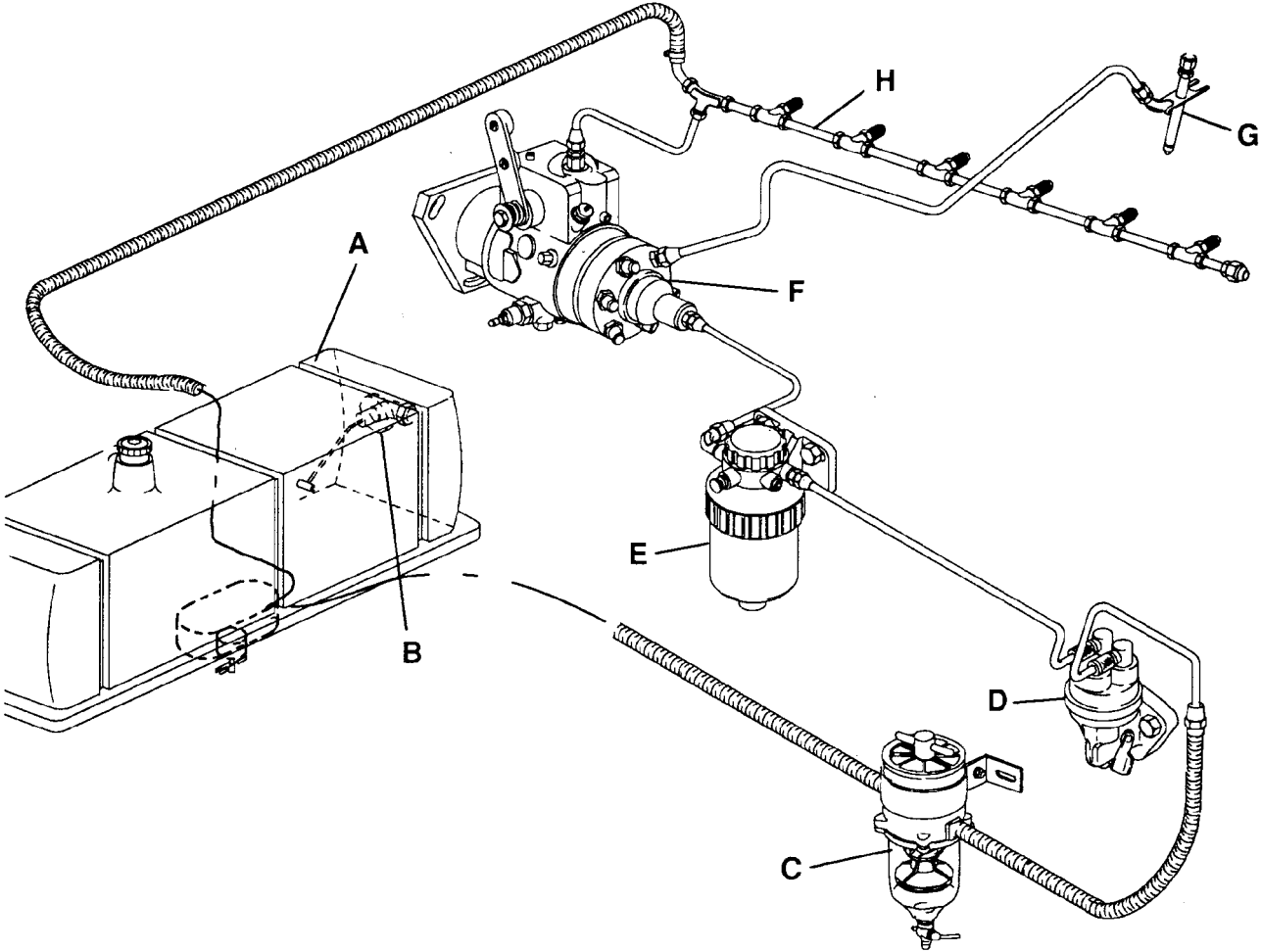
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**FUEL SYSTEM, 2054 WITH 6.8-LITER ENGINE**



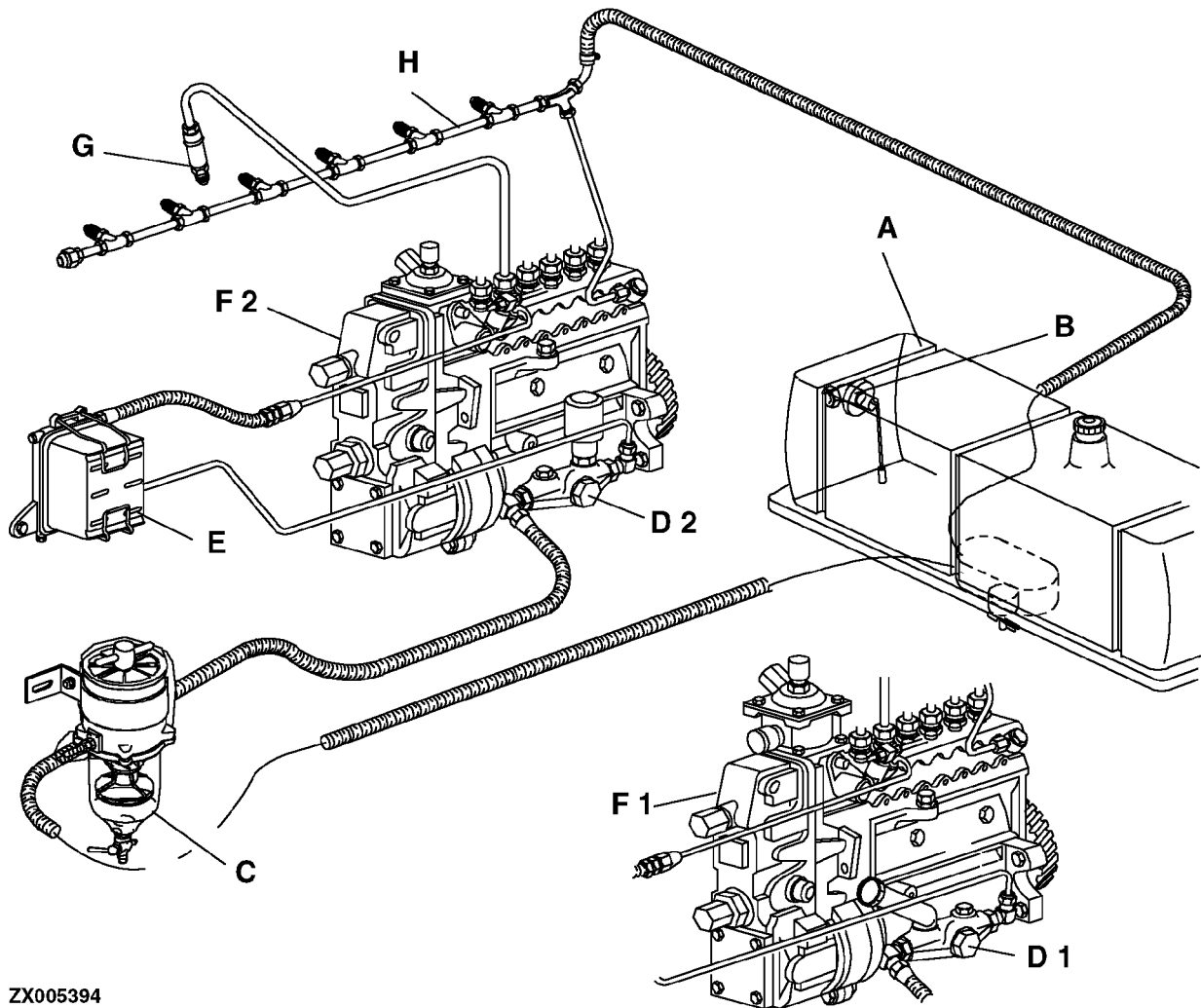
ZX005393

- A—Fuel tank
- B—Fuel gauge sending unit
- C—Filter with water trap
- D—Fuel transfer pump
- E—Fuel filter
- F—Injection pump
- G—Injection nozzle
- H—Return line

ZX005393 -UN-03MAY95

ZX, TMXZCO003997-19-28FEB95

**FUEL SYSTEM, 2056-2066 WITH 7.6-LITER ENGINE**



ZX005394

A—Fuel tank  
 B—Fuel gauge sending unit  
 C—Filter with water trap  
 D1—Fuel transfer pump (2056)

D2—Fuel transfer pump (2058-2066)  
 E—Fuel filter

F1—Injection pump (2056)  
 F2—Injection pump (2058-2066)

G—Injection nozzle  
 H—Return line

ZX005394 -UN-19JUN95

ZX, TMXZCO003998-19-28FEB95

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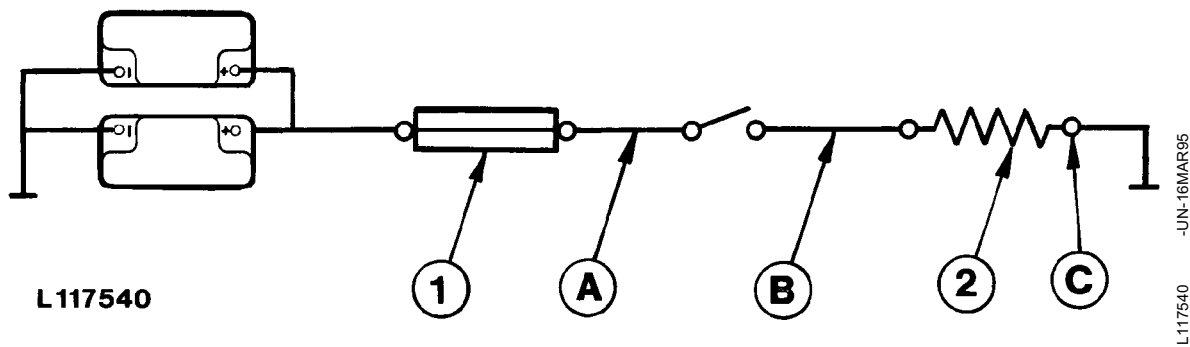
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**ELECTRICAL CIRCUIT MALFUNCTIONS**



1—Fuse

2—Load

The four possible circuit malfunctions are:

1. High resistance circuit
2. Open circuit
3. Grounded circuit
4. Shorted circuit

There are only three “areas” in a simple electrical circuit where circuit malfunction can occur (see simple circuit above).

1. Before the controlling switch (A)
2. After the controlling switch but before the load (B)
3. After the load (C)

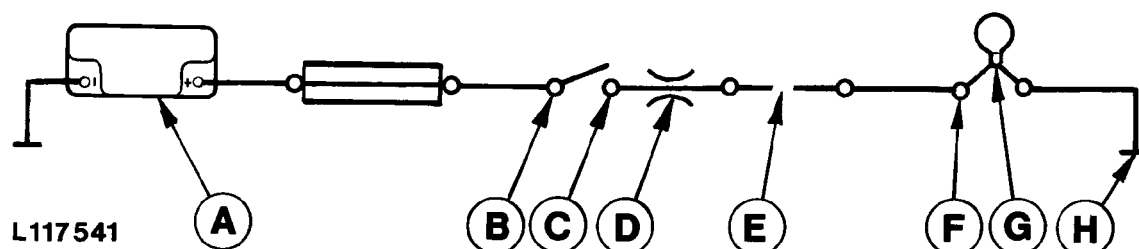
Component malfunctions can easily be confused with circuit malfunctions. Caution must therefore be exercised when isolating the cause of the problem.

Example: A component may not operate before an electrical connection is disconnected, but it operates when the connector is reconnected.

Reason: High resistance in the circuit created a voltage drop at the connector terminals, preventing the proper amount of current from flowing to the component.

ZX, TMSPFH000377-19-22JUL91

## OPEN CIRCUIT



L117541

-UN-16MAR95

L117541

A—Voltage Source  
B—Controlling Switch

C—Component Terminal  
D—High Resistance Circuit

E—Open Circuit  
F—Component Terminal

G—Load  
H—Ground

A high resistance circuit can result in slow, dim or no component operation (i.e. loose, corroded, dirty or oily terminals, gauge of wire too small or broken strands in cable).

An open circuit results in no component operation, as the circuit is incomplete (E) (i.e. broken wire, terminals disconnected, open protection device or switch).

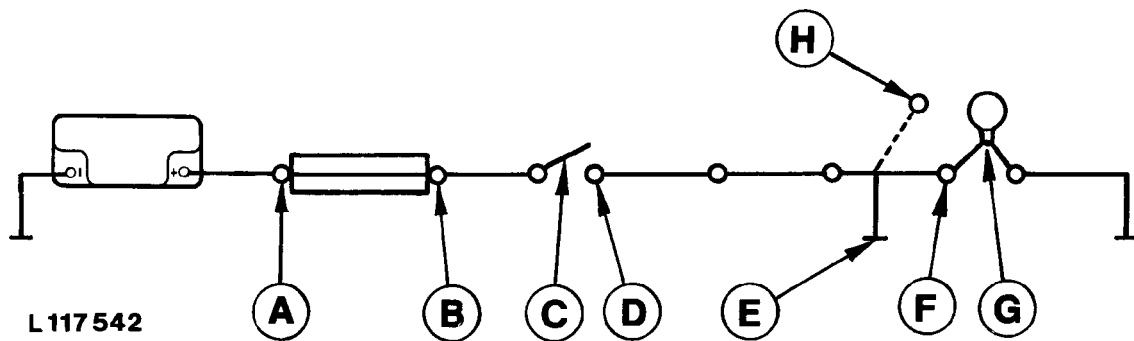
Test for a high resistance circuit (D) or an open circuit (E) as follows:

1. With controlling switch (B) closed and load (G) connected, check for proper voltage at an easily accessible location between (C) and (F).
  - a. If voltage is low, move toward voltage source (A) to locate point of voltage drop.
  - b. If voltage is correct, move toward load (G) and ground terminal (H) to locate point of voltage drop.
2. Repair circuit as required.
3. Repeat operational check after completing the repair.

ZX, TMSPFH000378-19-22JUL91



## GROUNDING CIRCUIT



L117542 -UN-16MAR95

A—Component Terminal  
B—Component Terminal

C—Controlling Switch  
D—Component Terminal

E—Grounded Circuit  
F—Component Terminal

G—Load  
H—Component Terminal

A grounded circuit results in no component operation and the fuse will blow (i.e. power wire to ground).

Test for a grounded circuit (E) as follows:

1. Controlling switch (C) open, fuse not blown.
  - a. If there is continuity, there is a grounded circuit between (B) and (C).
  - b. No continuity, go to 2.

2. Disconnect load (G) at (F).

3. With controlling switch (C) open, check for continuity to ground between (D) and (H).

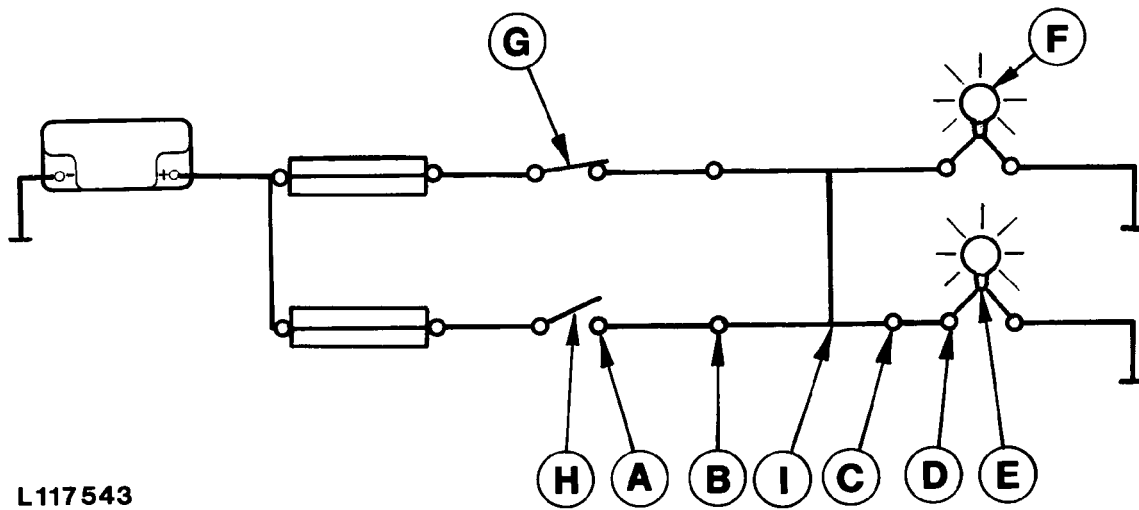
If there is continuity, there is a grounded circuit between (D) and (H).

4. Repair circuit as required.

5. Repeat operational check after completing the repair.

ZX, TMSPFH000379-19-22JUL91

**SHORTED CIRCUIT**



L117543

L117543 -UN-16MAR95

- |                      |                       |                       |                      |
|----------------------|-----------------------|-----------------------|----------------------|
| A—Component Terminal | D—Component Terminal  | F—Load-type Component | H—Controlling Switch |
| B—Circuit Connector  | E—Load-type Component | G—Switch              | I—Shorted Circuit    |
| C—Circuit Connector  |                       |                       |                      |

A shorted circuit usually results in two components operating when one of the switches is closed (i.e. improper wire-to-wire contact).

Test for a shorted (I) or improperly wired circuit as follows:

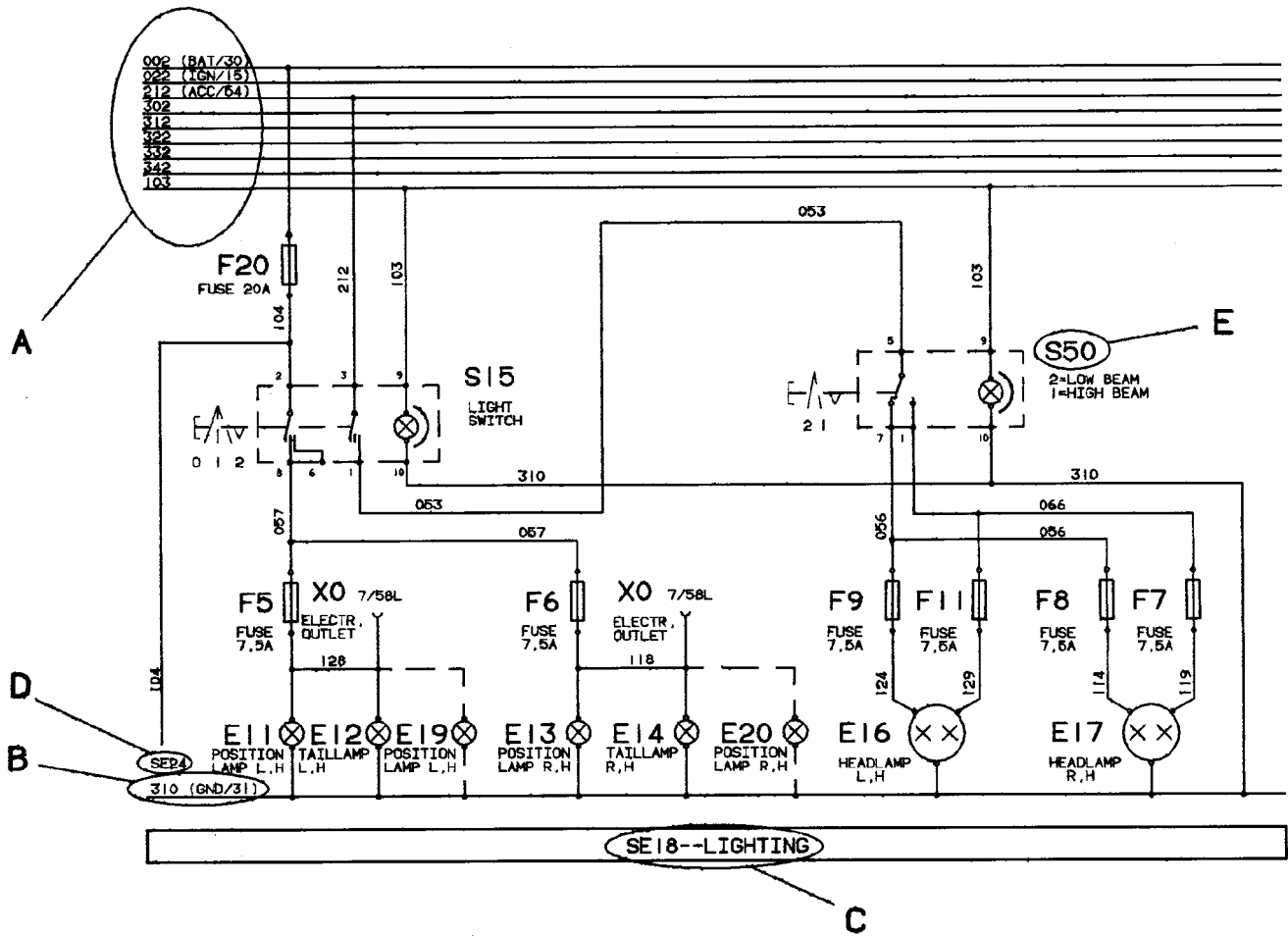
1. Turn on switch (G) for correct component (F) to operate.
2. Start at controlling switch (H) of component (E) which should not be operating and disconnect wire at terminal (A).
3. Follow circuit and disconnect wire at connectors (B, C or D) until component ceases to operate.
4. The shorted circuit or improper connection will be between the last two locations at which the wire was disconnected. In the example above, between (B) and (C).

5. Repair circuit:

- a. Wires not in a loom: Wrap individual wires with electrical tape and band as required.
- b. Wires in a loom: If hot spots exist in the shorted area of harness, replace harness. If hot spots are not noticeable, install a new wire of proper gauge between last two connections. Tape wire to outside of harness.

6. Repeat operational check after completing the repair.

**HOW TO READ A FUNCTIONAL SCHEMATIC**



ZX000781

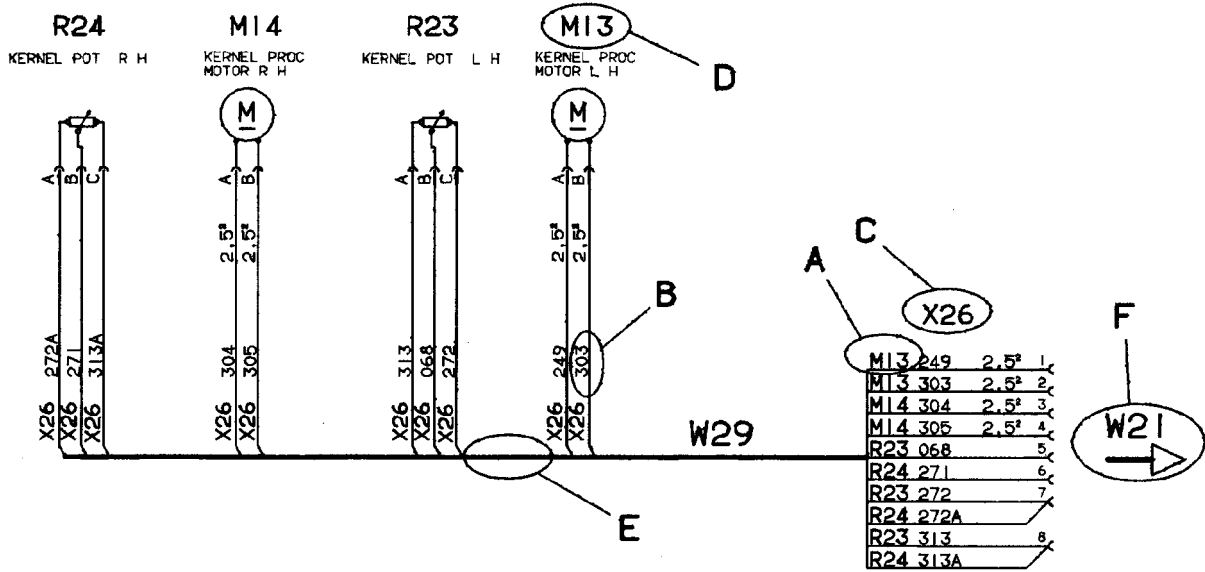
- A—Power Supply Wire Number
- B—Ground Wire No. 310
- C—Section Identification
- D—Section to which Cable is routed
- E—Component Identification

The functional schematic is divided into functional sections (SE01 to SE30). The component designations, numbering system as well as symbols are identical with the corresponding data in the wiring

and harness diagram. Switches and relays are shown in "Off" position. Cables and wires leading to components not belonging to the standard equipment are all indicated by dotted lines.

ZX.TMXZC001969-19-05OCT92

### HOW TO READ A WIRING AND HARNESS DIAGRAM



ZX000782

A—Component to which Cable or Wire is routed  
 B—Wiring Number with Colour Code

C—Pin Number  
 D—Component Identification

E—Wires arranged in a Wiring Harness

F—Identification where the Harness is continued

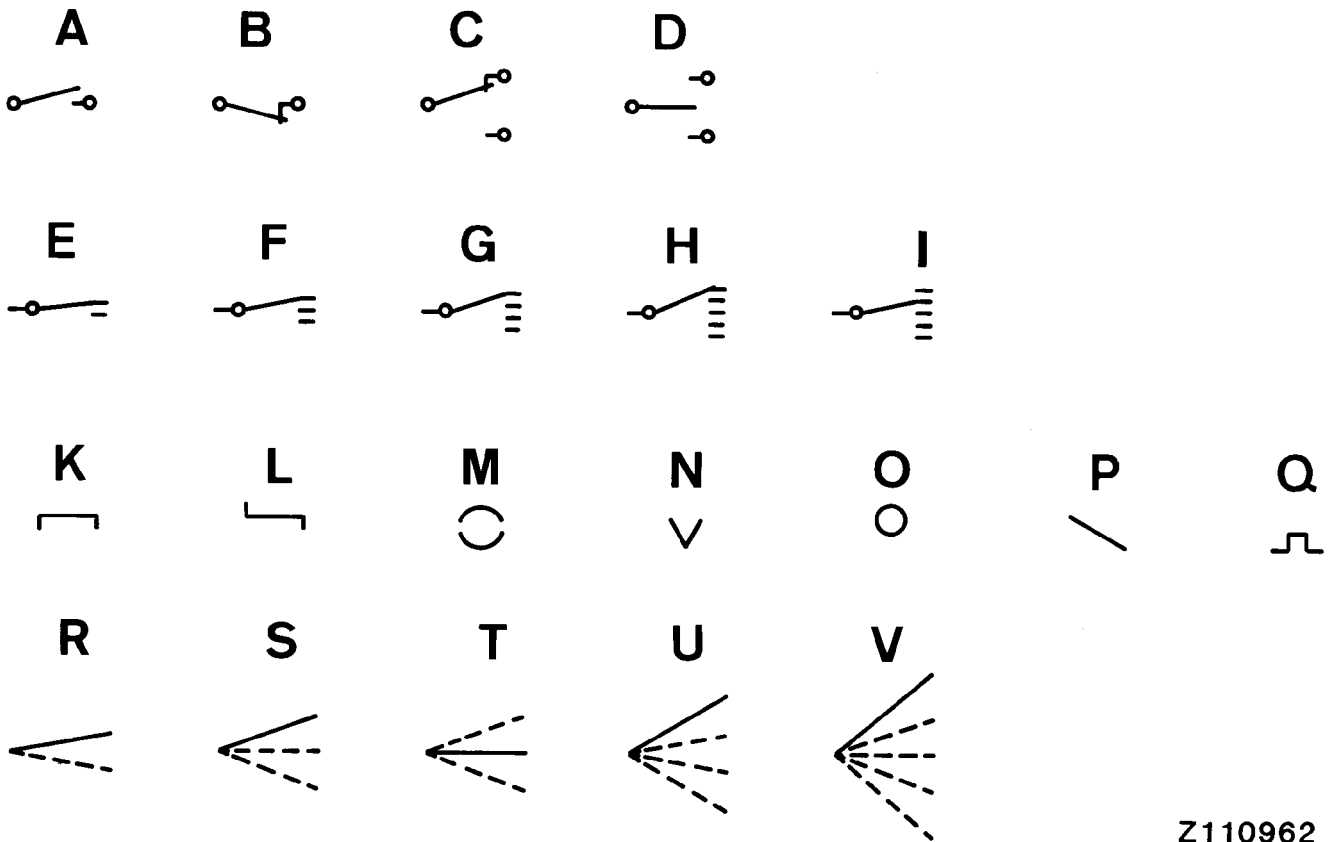
Wiring and harness diagrams are divided into wiring harnesses. The individual harness connectors are also shown. Each wire and the wire color are identified by a number. If the wire cross section is not stated, the wire has a cross section of 1 mm<sup>2</sup>. Before a cable or wire joins a wiring harness, information concerning the cable routing is given.

#### COLOR CODE

The last digit of the wire number is the color:

XX0	BLACK
XX1	BROWN
XX2	RED
XX3	ORANGE
XX4	YELLOW
XX5	GREEN
XX6	BLUE
XX7	VIOLET
XX8	GRAY
XX9	WHITE

**SYMBOLS IN SYSTEM DIAGRAMS**



Z110962

A—Circuit Closing Switch  
 B—Circuit Opening Switch  
 C—Change-over Switch  
 D—Two-way Closing Switch  
 with Center Position  
 E—Two-way Switch  
 F—Three-way Switch

G—Four-way Switch  
 H—Five-way Switch  
 (Basic Position I)  
 I—Five-way Switch  
 (Basic Position II)  
 K—Push-pull Switch  
 L—Rotary Switch

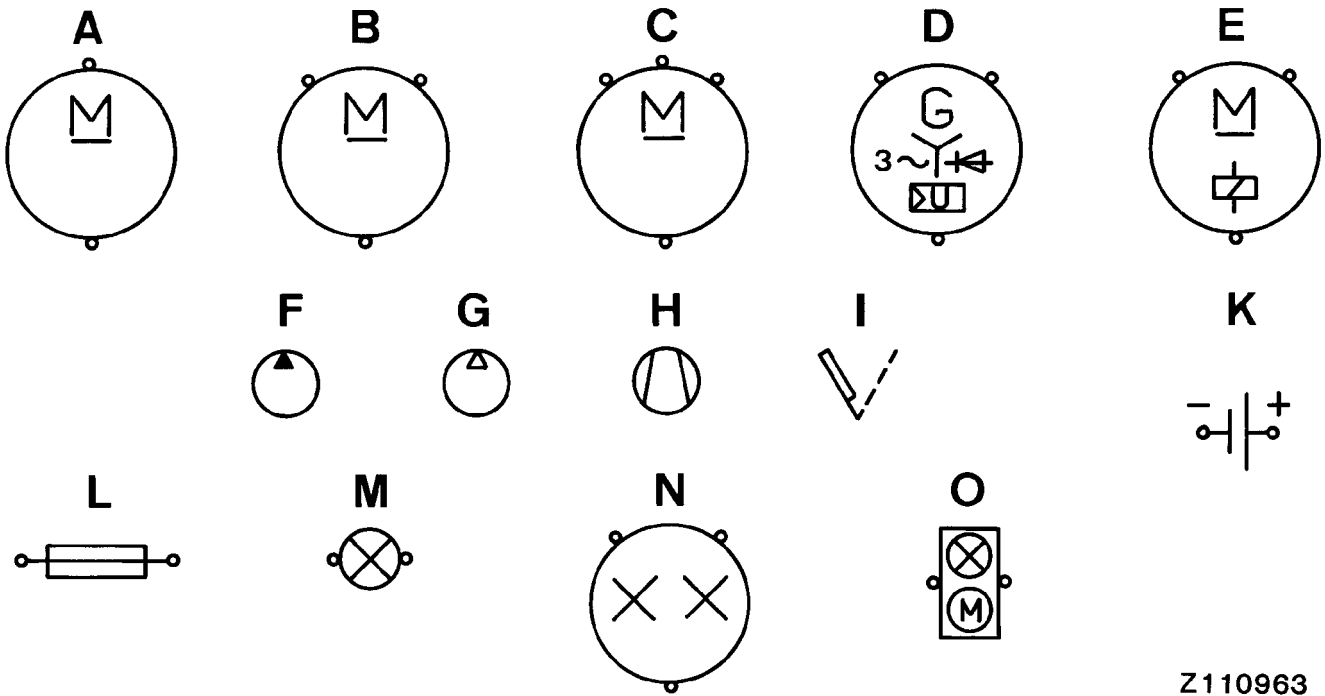
M—Key Switch  
 N—Detent  
 O—End Switch  
 P—Foot-operated Switch  
 Q—Actuator  
 R—2 Switch Positions

S—3 Switch Positions  
 (Basic Position I)  
 T—3 Switch Positions  
 (Basic Position II)  
 U—4 Switch Positions  
 V—5 Switch Positions

ZX, TMSPFH000383-19-22JUL91

Z110962 -UN-02MAY95

**SYMBOLS IN SYSTEM DIAGRAMS (CONTINUED)**



Z110963

A—D.C. Motor  
(2 Connections)  
B—D.C. Motor  
(3 Connections)  
C—D.C. Motor  
(4 Connections)

D—Alternator with Rectifier  
and Regulator  
E—Starting Motor with  
Solenoid  
F—Fuel Pump

G—Compressor  
H—Fan  
I—Windshield Wiper  
K—Battery

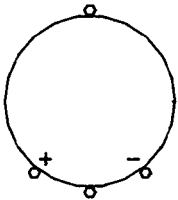
L—Fuse  
M—Bulb  
N—Bulb with two Filaments  
O—Revolving Light

Z110963 -JUN-02MAY95

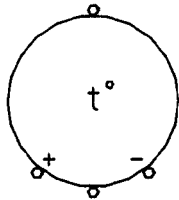
ZX, TMXZC0002140-19-05OCT92

**SYMBOLS IN SYSTEM DIAGRAMS (CONTINUED)**

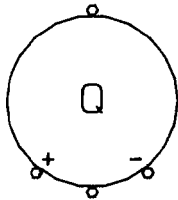
**A**



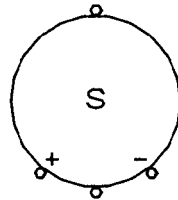
**B**



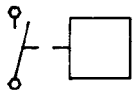
**C**



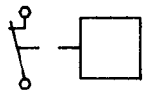
**D**



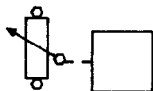
**E**



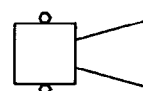
**F**



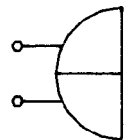
**G**



**H**



**J**



ZX004063

A—Gauge  
 B—Temperature Gauge  
 C—Level Gauge  
 D—Travel Distance or Height Gauge

E—Sending Unit (Circuit Closing Switch)  
 F—Sending Unit (Circuit Opening Switch)

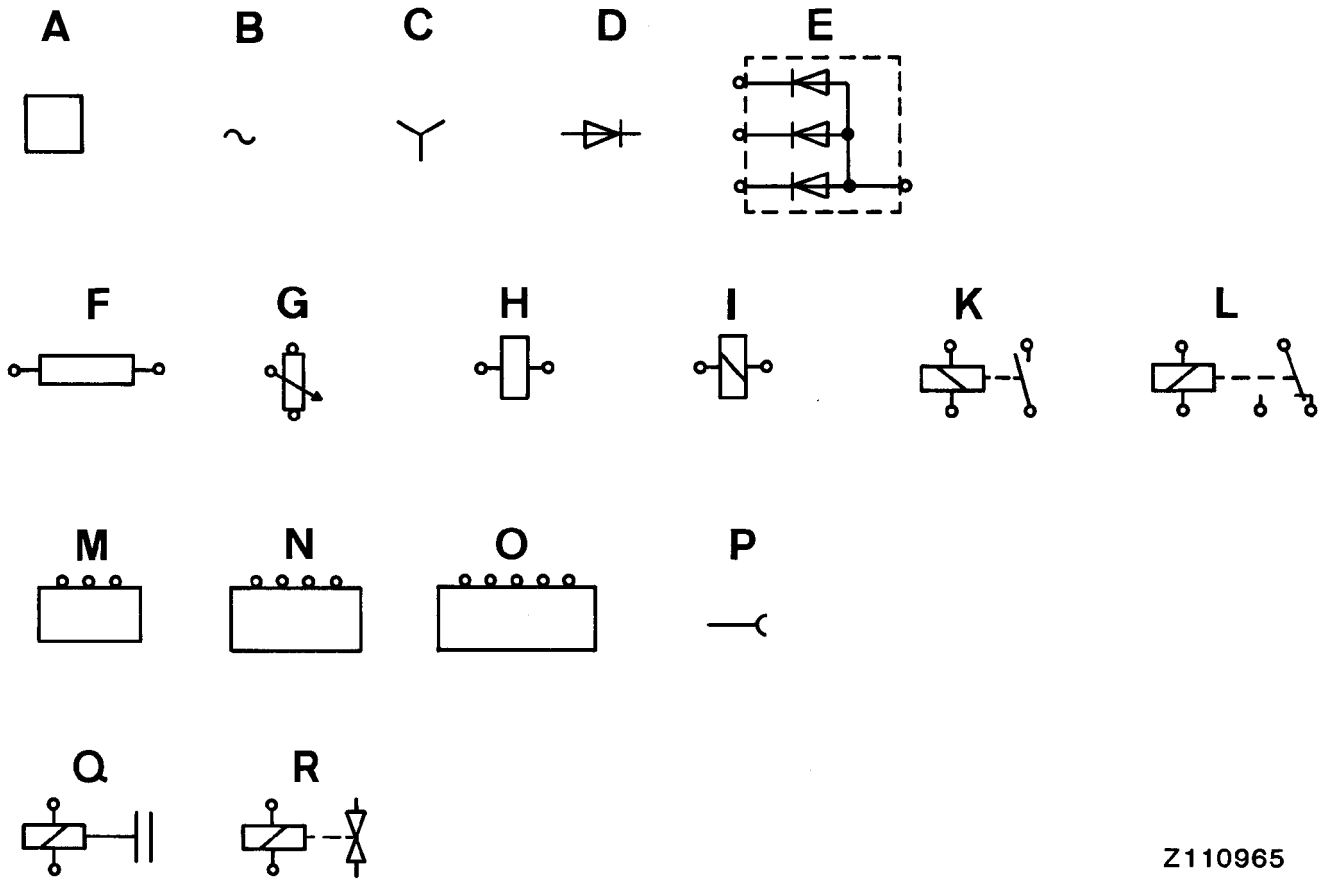
G—Sending Unit (Variable Resistor)

H—Horn  
 J—Buzzer

ZX, TMXZC0002141-19-05OCT92

-JUN-02/MAY/95  
ZX004063

**SYMBOLS IN SYSTEM DIAGRAMS (CONTINUED)**



Z110965

A—Switch Symbol (General)  
 B—Alternating Current  
 C—Y-Connection  
 D—Diode  
 E—Diode Block  
 F—Resistor  
 G—Variable Resistor

H—Electro-Mechanical Drive  
 I—Electro-Mechanical Drive with Coil  
 J—Electro-Mechanical Drive with Coil and Closing Switch  
 K—Electro-Mechanical Drive with Coil and Change-Over Switch

M—Electrical Component (3 Connections)  
 N—Electrical Component (4 Connections)  
 O—Electrical Component (5 Connections)

P—Plug-In Connector  
 Q—Electric Clutch  
 R—Valve, Operated Electro-Mechanically

Z110965 -JUN-02MAY95

ZX,TMXZCO002142-19-05OCT92



## COMPONENT IDENTIFICATION TABLE

Each component (electrical device) and main connector will have an identification letter assigned to it. A number is added to the letter to separate and

indicate the different components within that letter group.

Identification Letter	Component Type	Examples
A	System, subassembly, parts group	Control units, radio, logic module
B	Signal transducer	Speed sensors, pressure sensors, pressure switches, horns, pickups, limit-value sensors, pulse generators, loudspeakers, inductive pickups, probes, air-flow sensors, oil pressure switches, temperature sensors, ignition voltage pickups
C	Condenser, capacitor	Condensers and capacitors, general
D	Binary device, memory	Integrated circuits, pulse counters, magnetic tape recorders
E	Various devices and equipment	Headlights, clearance lights, heating devices, air conditioning systems, spark plugs, ignition distributors
F	Protection device	Fuses, overload protection devices, polarity protection devices, circuit breakers
G	Power supply, generator	Batteries, generators, alternators, charging units
H	Monitor, alarm, signalling device	Indicator lights, turn signal lights, stop lights, audible alarms, warning lights, buzzers
K	Relay	Battery relays, turn signal relays, solenoids, starting relays, warning flashers
L	Inductor	Choke coils, coils, windings
M	Motor	Electric motors, starting motors
N	Regulator, amplifier	Regulators (electronic or electromechanical), voltage stabilizers
P	Measuring instrument	Ammeter, diagnostic connectors, tachometers, fuel gauge, pressure gauges, measuring points, test points, speedometers
R	Resistor	Flame glow plugs, sheathed-element flame glow plugs, heating resistors, NTC resistors, PTC resistors, potentiometers, regulating resistors

ZX, TMXZCO002181-19-05OCT92

General Information/Component Identification Table

**COMPONENT IDENTIFICATION TABLE (CONTINUED)**

Identification Letter	Component Type	Examples
S	Switch	Switches and pushbuttons, light switch, horn switch, flasher switch
T	Transformer	Ignition coil, ignition transformer
U	Modulator, converter	DC transformers
V	Semiconductor, electron tubes	Transistors, diodes, electron tubes, rectifiers, semiconductors, thyristors, zener diodes
W	Transmission path, conductor, antenna	Wiring harnesses, antennas, shielding components, shielded conductors
X	Terminal, plug, plug and socket connection	Connectors, electrical connections, line connectors, sockets, plugs, terminals
Y	Electrically actuated mechanical device	Permanent magnets, injection valves (solenoid-operated), electromagnetic clutches and brakes, air valves, fuel pumps, solenoids, switching valves, start valves, locking systems
Z	Electrical filter	Interference suppression filters

ZX, TMXZC0002182-19-05OCT92

**SPECIAL OR ESSENTIAL TOOLS**

*NOTE: Order tools according to information given in the U.S. SERVICE-GARD™ Catalog or in the European Microfiche Tool Catalog (MTC).*

DX,TOOLS -19-05JUN91

**MULTIMETER**

Multimeter . . . . . JT05791



ZX001756

ZX,TMSPFH001915-19-17JAN94

-UN-27APR95  
ZX001756

**WIRING HARNESS TESTER**

Wiring harness tester . . . . . FKM10438

*NOTE: By means of this "Wiring Harness Tester" electrical system checks can be carried out. The electrical signals are received by inserting T-adapters into connectors.*

Case . . . . . JT02048

Test box with extension cable . . . . . JT02006

- T-adapter, 37-pin . . . . . KJD10176
- T-adapter, 21-pin . . . . . KJD10175
- T-adapter, 16-pin . . . . . KJD10174
- T-adapter, 37-pin . . . . . JT02013
- T-adapter, 16-pin . . . . . JT02009
- T-adapter, 9-pin . . . . . JT02008
- T-adapter, 4-pin . . . . . JT02007



ZX001760

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-UN-24APR95  
ZX001760

## USE OF WIRING HARNESS TESTER

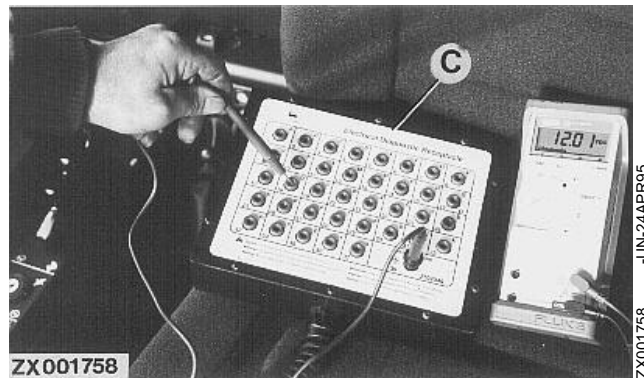
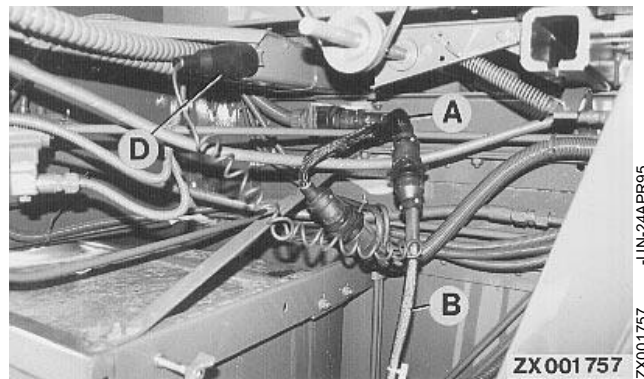
Disconnect connector to be tested and insert suitable T-adapter (A) into the connector.

Connect third T-adapter terminal to test box (C) via extension cable (B).

Connect clip (D) to machine frame (ground connection).

The individual signals coming from the connector can be received at the test box by means of the multimeter.

- A—T-adapter
- B—Extension cable (test box)
- C—Test box
- D—Ground clip



ZX, TMSPFH001914-19-22APR92

**SECTION SURVEY**

SE 01 — Power supply / starting motor	SE 16 — Electrical mirror adjustment
SE 02A — Cold weather starting aid, Waterloo engine	SE 17 — Work lights
SE 02B — Cold weather starting aid, Saran engine	SE 18 — Straw warning device
SE 03A — Engine stop, Waterloo engine	SE 19 — Stop lights, reel speed adjustment
SE 03B — Engine stop, Saran engine	SE 20 — DIAL-A-MATIC™
SE 04 — Fuse tester	SE 21 — Separator, header engagement
SE 05 — Instruments	SE 22 — Digital infotrak monitor, speed monitoring system
SE 06 — Chopper distributor adjustment	SE 23 — Harvest performance monitor
SE 07 — Windshield washer system	SE 24 — Hillmaster leveling system
SE 08 — Radio, citizen band, clock	SE 25A — Separator adjustment
SE 09 — Indicator lights I	SE 25B — Separator adjustment, combine data center
SE 10 — Indicator lights II	SE 26 — Header adjustments (cutting height, reel, float)
SE 11 — Cigarette lighter, sockets	SE 27 — Grain tank unloading system
SE 12 — Light functions	SE 28 — Four-wheel drive
SE 13 — Flasher function	SE 29 — Header horizontal adjustment
SE 14 — Revolving hazard warning lights	SE 30 — Float control
SE 15 — Air conditioning system	

ZX, TMXZC0001772-19-01DEC92

## WIRING HARNESS SURVEY

W 1 — Main distribution wiring harness	W 17 — Battery ground cable
W 2 — Cab wiring harness	W 18 — Positive battery cable
W 3 — Switch console wiring harness	W 20 — Straw hood wiring harness
W 4 — Corner post wiring harness	W 21 — Power supply cable
W 5 — Armrest wiring harness	W 22 — Header wiring harness
W 6 — Air conditioning and fan wiring harness	W 23 — Combine data center wiring harness
W 7 — Basic wiring harness, front	W 25 — Chopper wiring harness
W 8 — Steering column wiring harness	W 26 — Chaff spreader wiring harness
W 9 — Basic wiring harness, rear	W 27 — Wiring harness, straw warning device
W 10 — Feeder house wiring harness	W 28 — Ground cable, straw warning device
W 12 — Wiring harness, Saran engine	W 29 — Leveling system wiring harness
W 13 — Wiring harness, Waterloo engine	W 32 — Header lighting wiring harness
W 14 — Optional equipment wiring harness	W 39 — Wiring harness, electrical mirror adjustment
W 15 — Grain tank wiring harness	

ZX, TMXZC0001773-19-01DEC92

## COMPONENT SURVEY

	Section	Wiring Harness
A 1 — Reel speed control . . . . .	19	W 1
A 2 — DIAL-A-MATIC™ relay board . . . . .	20	W 1
A 3 — Electronic speed monitoring system . . . . .	22	W 1
A 4 — Harvest performance monitor . . . . .	23	W 2
A 5 — Combine data center . . . . .	25	W 23
A 6 — Header control . . . . .	26	W 1
A 8 — Leveling control box, Hillmaster . . . . .	24	W 29
A 9 — Control board, combine data center . . . . .	25	W 1
A 10 — Float control . . . . .	30	W 3
A 11 — Relay board, combine data center . . . . .	25	W 1
A 12 — Radio . . . . .	08	W 2
A 13 — Citizen band . . . . .	08	W 2
A 14 — Relay and diode board . . . . .	--	W 2
A 15 — Fuse board . . . . .	--	W 1
A 16 — Warning module I . . . . .	09	W 4
A 17 — Warning module II . . . . .	10	W 4
A 18 — Infotrak monitor . . . . .	22	W 2
B 1 — Sending unit, brake fluid level . . . . .	09	W 7
B 2 — Sending unit, engine oil pressure . . . . .	09	W 12; W 13
B 3 — Light sensor . . . . .	23	W 2
B 4 — Sending unit, coolant temperature . . . . .	05	W 12; W 13
B 5 — Sending unit, reel speed . . . . .	19	W 22
B 6 — Sending unit, ground speed . . . . .	22	W 7
B 7 — Sending unit, hydraulic oil filter . . . . .	10	W 9
B 8 — Sending unit, hydraulic oil temperature . . . . .	09	W 9
B 9 — Thermostat (protection against freezing) . . . . .	15	W 6
B 10 — Sending unit, air cleaner . . . . .	10	W 12; W 13
B 11 — Sending unit, fuel tank . . . . .	05	W 9
B 12 — Horn . . . . .	18	W 7
B 13 — Temperature switch, air conditioning . . . . .	15	W 2
B 14 — Low pressure switch, air conditioning . . . . .	15	W 2
B 15 — High pressure switch, air conditioning . . . . .	15	W 12; W 13
B 16 — Speed sending unit, straw chopper . . . . .	22	W 25
B 17 — Speed sending unit, tailings elevator . . . . .	22	W 7
B 18 — Speed sending unit, cross shaker . . . . .	22	W 9
B 19 — Speed sending unit, clean grain elevator . . . . .	22	W 7
B 20 — Speed sending unit, chaff spreader . . . . .	22	W 26
B 21 — Straw walker sensor, right-hand . . . . .	23	W 20
B 22 — Straw walker sensor, left-hand . . . . .	23	W 20
B 23 — Sieve sensor (5-walker machine) . . . . .	23	W 9
B 24 — Sieve sensor (6-walker machine) . . . . .	23	W 9
B 25 — Sending unit, grain tank indicator 1/2 . . . . .	10	W 15
B 26 — Sending unit, grain tank indicator 3/4 . . . . .	10	W 15
B 27 — Sending unit, grain tank indicator 4/4 . . . . .	10	W 15

ZX, TMXZCO001774-19-17 JAN94

Functional Schematics & Harness Diagrams, up to Ser.No. 062721/Component Survey

	Section	Wiring Harness
B 28 — Sending unit, engine speed . . . . .	22	W 12; W 13
B 29 — Sending unit, threshing cylinder speed . . . . .	22	W 7
B 30 — Sending unit, fan speed . . . . .	22	W 7
B 31 — Pressure switch, main clutch . . . . .	27	W 9
B 34 — Sending unit, hydr. oil fill level 1 . . . . .	10	W 9
B 35 — Sending unit, hydr. oil fill level 2 . . . . .	09	W 9
B 39 — Loudspeaker, left-hand . . . . .	08	W 2
B 40 — Loudspeaker, right-hand . . . . .	08	W 2
E 1 — Headlight, left-hand . . . . .	12	W 7
E 2 — Headlight, right-hand . . . . .	12	W 7
E 3 — Rear work light . . . . .	17	W 20
E 4 — Cab roof work light, outer r.h. . . . .	17	W 2
E 5 — Cab roof work light, inner r.h. . . . .	17	W 2
E 6 — Cab roof work light, outer l.h. . . . .	17	W 2
E 7 — Cab roof work light, inner l.h. . . . .	17	W 2
E 8 — Unloading auger work light . . . . .	17	W 15
E 9 — Cigarette lighter . . . . .	11	W 3
E 10 — Grain tank lighting . . . . .	07	W 15
E 11 — Lighting (according to local requirements) . . . . .	12	W 7
E 12 — Cab interior lighting . . . . .	07	W 2
E 13 — Tail light, left-hand . . . . .	12	W 20
E 14 — Tail light, right-hand . . . . .	12	W 20
E 15 — Clearance light, left-hand . . . . .	12	W 7
E 16 — Clearance light, right-hand . . . . .	12	W 7
E 17 — Straw hood lighting . . . . .	07	W 20
E 18 — Platform work light, right-hand . . . . .	17	W 7
E 19 — Platform work light, left-hand . . . . .	17	W 7
E 22 — Registration plate lighting . . . . .	12	W 20
E 23 — Clearance light, header, left-hand . . . . .	12	W 32
E 24 — Clearance light, header, right-hand . . . . .	12	W 32
E 25 — Work light, mirror bracket . . . . .	17	W 2
E 26 — Work light, mirror bracket . . . . .	17	W 2
F 1 — Fuse, 7.5 amps., spare . . . . .	--	A 15
F 2 — Fuse, 7.5 amps., spare . . . . .	--	A 15
F 3 — Fuse, 7.5 amps., spare . . . . .	--	A 15
F 4 — Fuse, 7.5 amps., spare . . . . .	--	A 15
F 5 — Fuse, 15 amps., spare . . . . .	--	A 15
F 6 — Fuse, 15 amps., spare . . . . .	--	A 15
F 7 — Fuse, 30 amps., spare . . . . .	--	A 15
F 8 — Fuse, 7.5 amps., fan and threshing cylinder speed adjustment . . . . .	25	A 15

ZX, TMXZCO001775-19-17JAN94



Functional Schematics & Harness Diagrams, up to Ser.No. 062721/Component Survey

	Section	Wiring Harness
F 9 — Fuse 7.5 amps., parking light, r.h. . . . .	12	A 15
F 10 — Fuse 7.5 amps., parking light, l.h. . . . .	12	A 15
F 11 — Fuse 30 amps., fan adjustment . . . . .	25	A 15
F 12 — Fuse 15 amps., stop lights, reel speed adjustment . . . . .	19	A 15
F 13 — Fuse 30 amps., cab roof work lights . . . . .	17	A 15
F 14 — Fuse 7.5 amps., straw warning device, electronic infotrak monitor . . . . .	18	A 15
F 16 — Fuse 7.5 amps., engine shut-off solenoid . . . . .	03A/B	A 15
F 17 — Fuse 7.5 amps., instrument lighting . . . . .	12	A 15
F 18 — Fuse 7.5 amps., radio, citizen band, clock . . . . .	08	A 15
F 19 — Fuse 30 amps., platform work lights and rear work light . . . . .	21	A 15
F 20 — Fuse 7.5 amps., flasher functions . . . . .	13	A 15
F 21 — Fuse 15 amps., radiator cleaner motor . . . . .	21	A 15
F 22 — Fuse 7.5 amps., radio, citizen band, clock . . . . .	08	A 15
F 23 — Fuse 15 amps., separator and header clutch . . . . .	21	A 15
F 24 — Fuse 7.5 amps., indicator lights, temperature gauge . . . . .	05	A 15
F 25 — Fuse 7.5 amps., low-beam headlight, l.h. . . . .	12	A 15
F 26 — Fuse 7.5 amps., header controls . . . . .	26	A 15
F 27 — Fuse 15 amps., horn . . . . .	18	A 15
F 28 — Fuse 7.5 amps., combine data center . . . . .	25	A 15
F 29 — Fuse 15 amps., leveling system . . . . .	24	A 15
F 30 — Fuse 7.5 amps., four-wheel drive . . . . .	28	A 15
F 31 — Fuse 7.5 amps., speed monitoring system . . . . .	22	A 15
F 32 — Fuse 7.5 amps., low-beam headlight, r.h. . . . .	12	A 15
F 33 — Fuse 15 amps., raise/lower header . . . . .	26	A 15
F 34 — Fuse 15 amps., hazard warning lights . . . . .	13	A 15
F 35 — Fuse 15 amps., revolving warning lights . . . . .	14	A 15
F 36 — Fuse 15 amps., windshield wiper, grain tank lighting . . . . .	07	A 15
F 37 — Fuse 7.5 amps., mirror adjustment . . . . .	16	A 15
F 38 — Fuse 7.5 amps., performance monitor . . . . .	23	A 15
F 39 — Fuse 15 amps., grain tank unloading system . . . . .	27	A 15
F 40 — Fuse 30 amps. starter switch . . . . .	01	A 15
F 41 — Fuse 15 amps., concave adjustment . . . . .	25	A 15
F 42 — Fuse 30 amps., air conditioning system . . . . .	15	A 15
F 43 — Fuse 7.5 amps., DIAL-A-MATIC™ . . . . .	20	A 15
F 44 — Fuse 7.5 amps., full-beam headlight, l.h. . . . .	12	A 15
F 45 — Fuse 15 amps., reel control . . . . .	26	A 15
F 46 — Fuse 15 amps., starting aid . . . . .	2A/B	A 15
F 47 — Fuse 15 amps., spare . . . . .	—	A 15
F 48 — Fuse 7.5 amps., alternator D+ . . . . .	01	A 15
F 49 — Fuse 15 amps., cigarette lighter, seat compressor . . . . .	11	A 15
F 50 — Fuse 7.5 amps., full-beam headlight, r.h. . . . .	12	A 15

ZX.TMXZCO001776-19-01JUL92

Functional Schematics & Harness Diagrams, up to Ser.No. 062721/Component Survey

	Section	Wiring Harness
G 1 — Battery 12 V, 88 AH . . . . .	01	W 12; W 13
G 2 — Alternator . . . . .	01	W 12; W 13
H 1 — Brake fluid indicator light . . . . .	09	W 4
H 2 — Engine oil pressure indicator light . . . . .	09	W 4
H 3 — Parking brake indicator light . . . . .	09	W 4
H 4 — Coolant temperature indicator light . . . . .	09	W 4
H 5 — Indicator light, unloading auger swing . . . . .	10	W 4
H 6 — Fuel level indicator light . . . . .	10	W 4
H 7 — Hydraulic oil filter indicator light . . . . .	10	W 4
H 8 — Hydraulic oil temperature indicator light . . . . .	09	W 4
H 9 — Four-wheel drive indicator light . . . . .	10	W 4
H 10 — Air cleaner indicator light . . . . .	09	W 4
H 11 — Alternator indicator light . . . . .	10	W 4
H 12 — Alarm light ("STOP") . . . . .	09	W 4
H 13 — Turn signal light, rear left-hand . . . . .	13	W 20
H 14 — Turn signal light, rear right-hand . . . . .	13	W 20
H 15 — Turn signal light, front left-hand . . . . .	13	W 7
H 16 — Turn signal light, front right-hand . . . . .	13	W 7
H 17 — Additional turn signal light, left-hand . . . . .	13	W 7
H 18 — Additional turn signal light, right-hand . . . . .	13	W 9
H 19 — Indicator light, straw warning device . . . . .	09	W 4
H 20 — Buzzer . . . . .	09	W 2
H 21 — Revolving hazard warning light . . . . .	14	W 2
H 22 — High pressure indicator light (AC system) . . . . .	10	W 4
H 23 — Indicator light, straw chopper speed . . . . .	09	W 4
H 24 — Indicator light, tailings elevator speed . . . . .	09	W 4
H 25 — Indicator light, cross shaker speed . . . . .	09	W 4
H 26 — Indicator light, grain elevator speed . . . . .	09	W 4
H 27 — Grain tank fill indicator light 1/2 . . . . .	10	W 4
H 28 — Grain tank fill indicator light 3/4 . . . . .	10	W 4
H 29 — Grain tank fill indicator light 4/4 . . . . .	10	W 4
H 31 — Indicator light, fan speed . . . . .	09	W 4
H 32 — Indicator light, cylinder speed . . . . .	09	W 4
H 33 — Full-beam indicator light . . . . .	12	W 8
H 34 — Turn signal indicator light 1, combine . . . . .	13	W 8
H 35 — Turn signal indicator light 2, trailer . . . . .	13	W 8
H 36 — Revolving hazard warning light . . . . .	14	W 9
H 37 — Hillmaster combine, automatic operation . . . . .	10	W 4
H 38 — Hillmaster combine, manual operation . . . . .	10	W 4
H 39 — Hillmaster combine, end stop . . . . .	10	W 4
H 40 — Hydraulic oil level indicator light . . . . .	10	W 4
H 41 — Turn signal light, header, left-hand . . . . .	13	W 32
H 42 — Turn signal light, header, right-hand . . . . .	13	W 32
H 43 — Stop light, left-hand . . . . .	19	W 20
H 44 — Stop light, right-hand . . . . .	19	W 20
K 1 — Starting motor relay . . . . .	01	W 12; W 13
K 2 — Basic relay . . . . .	01	A 15
K 3 — Basic relay . . . . .	01	A 15

ZX, TMXCO001777-19-01DEC92

Functional Schematics & Harness Diagrams, up to Ser.No. 062721/Component Survey

	Section	Wiring Harness
K 4 — Buzzer timer relay . . . . .	09	A 14
K 5 — Flasher . . . . .	13	A 14
K 6 — Relay, straw warning device . . . . .	18	A 14
K 7 — Relay, work lights . . . . .	17	A 15
K 8 — Hillmaster leveling relay, left-hand . . . . .	24	A 14
K 9 — Hillmaster leveling relay, right-hand . . . . .	24	A 14
K 10 — Relay, fan speed alarm . . . . .	22	A 14
K 11 — Relay, cylinder speed alarm . . . . .	22	W 14
K 12 — Relay, field operation — road travel . . . . .	22	A 15
K 13 — Relay, lower header quickly . . . . .	26	A 14
K 14 — Relay, lower header slowly . . . . .	26	A 14
K 15 — Relay, raise header quickly . . . . .	26	A 14
K 16 — Relay, raise header slowly . . . . .	26	A 14
K 17 — Relay, lower reel . . . . .	26	A 14
K 18 — Relay, raise reel . . . . .	26	A 14
K 19 — Relay, move reel to the rear . . . . .	26	A 14
K 20 — Relay, move reel to the front . . . . .	26	A 14
K 21 — Relay, separator clutch . . . . .	21	A 15
K 22 — Relay, straw warning device . . . . .	18	A 14
K 23 — Safety relay, header drive . . . . .	21	A 14
K 24 — Safety relay, unloading auger drive . . . . .	27	A 14
K 25 — Timer relay, unloading auger swing . . . . .	27	A 14
K 28 — Relay, adjust feeder house speed . . . . .	26	A 14
K 29 — Relay, adjust feeder house speed . . . . .	26	A 14
K 32 — Relay, adjust reel speed . . . . .	17	A 14
K 33 — Relay, adjust reel speed . . . . .	17	A 14
K 35 — Timer relay, header drive . . . . .	21	A 14
K 36 — Relay, adjust fan speed . . . . .	25	W 9
K 37 — Relay, adjust fan speed . . . . .	25	W 9
M 1 — Starting motor . . . . .	01	W 12; W 13
M 2 — Reel speed adjusting motor . . . . .	19	W 22
M 3 — Windshield wiper motor . . . . .	07	W 2
M 4 — Cab fan . . . . .	15	W 6
M 5 — Seat compressor . . . . .	11	W 5
M 8 — Concave adjusting motor . . . . .	25	W 7
M 9 — Fan speed adjusting motor . . . . .	25	W 9
M 11 — Windshield washer pump . . . . .	07	W 9
M 12 — Radiator cleaner motor . . . . .	21	W 12; W 13
M 13 — Distributor adjusting motor . . . . .	06	W 25
P 1 — Coolant temperature gauge . . . . .	05	W 4
P 2 — Fuel gauge . . . . .	05	W 4
P 3 — Header height gauge . . . . .	05	W 4
P 5 — Grain loss indicator . . . . .	05	W 4
P 7 — Clock . . . . .	08	W 2
P 8 — Distributor gauge . . . . .	06	W 4

ZX, TMXZCO001778-19-01DEC92

Functional Schematics & Harness Diagrams, up to Ser.No. 062721/Component Survey

	Section	Wiring Harness
R 1 — Fan resistor . . . . .	15	W 6
R 2 — Potentiometer, concave adjustment . . . . .	25	W 7
R 3 — Potentiometer, header height . . . . .	26	W 14
R 4 — Sending unit, header height . . . . .	26	W 7
R 5 — Potentiometer, reel height . . . . .	26	W 14
R 6 — Sending unit, reel height . . . . .	26	W 22
R 7 — Potentiometer, reel horizontal position . . . . .	26	W 14
R 8 — Sending unit, reel horizontal position . . . . .	26	W 22
R 9 — Resistor, LED fuse tester . . . . .	04	A 15
R 13 — Potentiometer, header float . . . . .	26	W 14
R 14 — Potentiometer, distributor adjustment . . . . .	06	W 25
S 1 — Starter switch . . . . .	01	W 8
S 2 — Hydrostatic safety switch . . . . .	01	W 5
S 3 — Cold weather starting aid switch . . . . .	02A/B	W 8
S 4 — Indicator light test switch . . . . .	10	W 2
S 5 — Parking brake control switch . . . . .	09	W 7
S 6 — Header float switch . . . . .	30	W 5
S 7 — Stop light switch . . . . .	19	W 7
S 8 — Horn button . . . . .	18	W 8
S 9 — Potentiometer, reel speed . . . . .	17	W 14
S 10 — Reel speed switch . . . . .	17	W 5
S 11 — Hazard warning light switch . . . . .	13	W 2
S 12 — Turn signal switch . . . . .	13	W 8
S 13 — Light switch . . . . .	12	W 2
S 14 — Grain tank lighting switch . . . . .	07	W 2
S 15 — Switch, straw warning device (cross shaker) . . . . .	18	W 9
S 16 — Switch, straw warning device (walkers) . . . . .	18	W 20
S 17 — Switch, straw warning device (chopper) . . . . .	18	W 20
S 18 — Revolving hazard warning light switch . . . . .	14	W 2
S 19 — Switch for cab roof work lights . . . . .	17	W 2
S 20 — Windshield wiper switch . . . . .	07	W 2
S 21 — Windshield washer switch . . . . .	07	W 2
S 22 — Fan switch . . . . .	15	W 2
S 23 — DIAL-A-MATIC™ switch . . . . .	20	W 14
S 24 — Speed monitoring switch, chopper . . . . .	22	W 25
S 25 — Air conditioning switch . . . . .	25	W 2
S 27 — Switch, raise/lower header . . . . .	26	W 5
S 28 — Automatic function switch . . . . .	26	W 5
S 29 — Switch, reel height adjustment . . . . .	26	W 5

ZX, TMXZCO001779-19-17JAN94

Functional Schematics & Harness Diagrams, up to Ser.No. 062721/Component Survey

	Section	Wiring Harness
S 30 — Switch, reel horizontal adjustment . . . . .	26	W 5
S 31 — Road safety switch . . . . .	21	W 2
S 32 — Switch, header control . . . . .	26	W 14
S 33 — Separator drive switch . . . . .	21	W 3
S 34 — Header drive switch . . . . .	21	W 3
S 35 — Unloading auger drive switch . . . . .	27	W 3
S 36 — Switch, concave adjustment . . . . .	25	W 5
S 38 — Switch, combine data center . . . . .	25	W 14
S 39 — Switch, unloading auger swing . . . . .	27	W 3
S 40 — Switch, cylinder speed adjustment . . . . .	25	W 5
S 41 — Switch, fan speed adjustment . . . . .	25	W 5
S 42 — Parking brake switch . . . . .	09	W 5
S 44 — Four-wheel drive switch . . . . .	28	W 7
S 47 — Emergency cut-off switch . . . . .	21	W 5
S 48 — Work light switch . . . . .	17	W 2
S 49 — Full-beam headlight switch . . . . .	12	W 2
S 50 — Manual leveling control switch . . . . .	24	W 3
S 51 — Leveling control switch automatic/manual . . . . .	24	W 3
S 52 — Demoisturizer switch (air conditioning) . . . . .	15	W 3
S 53 — Switch, header variable drive . . . . .	26	W 3
S 54 — Switch, distributor adjustment . . . . .	06	W 14
S 55 — Reverse travel switch . . . . .	25	W 5
S 59 — End switch, leveling to the left . . . . .	24	W 29
S 60 — End switch, leveling to the right . . . . .	24	W 29
S 62 — Switch, header horizontal adjustment . . . . .	29	W 3
S 63 — Battery switch . . . . .	01	W 12; W 13
S 64 — Mirror adjusting switch . . . . .	16	W 39
S 65 — Mirror heater switch . . . . .	16	W 39
S 66 — Switch, header lateral tilt . . . . .	26	
V 1 — Fuse tester . . . . .	04	A 15
V 13 — Diode Y 6 . . . . .	26	A 14
V 14 — Diode Y 4 . . . . .	26	A 14
V 15 — Diode Y 2 . . . . .	26	A 14
V 16 — Diodes Y 3 and Y 5 . . . . .	26	A 14
V 17 — Diode Y 18 . . . . .	26	A 14
V 18 — Diode Y 19 . . . . .	26	A 14
V 19 — Diode Y 16 . . . . .	26	A 14
V 20 — Diode Y 17 . . . . .	26	A 14

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	Section	Wiring Harness
V 21 — Diodes Y 22 and Y 23	21	A 15
V 24 — Diodes Y 26 and Y 27	27	A 14
V 25 — Diode Y 10	27	A 14
V 26 — Diode Y 11	27	A 14
V 27 — Diode Y 34	21	A 14
V 28 — Diode Y 31	26	A 14
V 29 — Diode Y 30	26	A 14
V 30 — Diode Y 12	24	A 14
V 31 — Diode Y 13	24	A 14
V 32 — Diode K 13	26	A 14
V 33 — Diode K 14	26	A 14
V 34 — Diode K 15	26	A 14
V 35 — Diode K 16	26	A 14
V 36 — Diode K 17	26	A 14
V 37 — Diode K 18	26	A 14
V 38 — Diode K 19	26	A 14
V 39 — Diode K 20	26	A 14
V 40 — Diode K 28	26	A 14
V 41 — Diode K 29	26	A 14
V 42 — Diode, raise header	26	A 14
V 43 — Diode, lower header	26	A 14
V 44 — Diode, header horizontal adjustment	29	A 14
V 45 — Diode, header horizontal adjustment	29	A 14
V 46 — Diode, leveling to the left	24	A 14
V 47 — Diode, leveling to the right	24	A 14
V 48 — Diode, header float control	30	A 14
V 51 — Diode K 8	24	A 14
V 52 — Diode K 9	24	A 14
V 53 — Diode Y 14	29	A 14
V 54 — Diode Y 15	29	A 14
X 0 — Ground connection, cab wiring harness	--	W 2
X 1 — Ground connection, distribution harness	--	W 1
X 2 — Disconnect point, radio (USA)	--	W 2
X 5 — Fuse tester socket	04	A 15
X 6 — Connection, relay board	--	W 2
X 7 — Connection, relay board	--	W 2
X 8 — Connection, relay board	--	W 2
X 9 — Connection, relay board	--	W 2
X 10 — Connection, relay board	--	W 2
X 11 — Connection, relay board	--	W 2
X 12 — Connection, relay board	--	W 2
X 13 — Connection, relay board	--	W 2
X 14 — Connection, relay board	--	W 2

ZX, TMXZCO001781-19-17JAN94

Functional Schematics & Harness Diagrams, up to Ser.No. 062721/Component Survey

	Section	Wiring Harness
X 15 — Trailer socket . . . . .	--	W 9
X 16 — Terminal, fuse board . . . . .	--	W 21; W 12
X 17 — Connection, fuse board, l.h. . . . .	--	W 1
X 18 — Connection, fuse board, r.h. . . . .	--	W 1
X 21 — Disconnect point, header wiring harness . . . . .	--	W 10; W 22
X 22 — Disconnect point, chopper wiring harness . . . . .	--	W 9; W 25
X 23 — Disconnect point, cab . . . . .	--	W 7; W 2
X 24 — Disconnect point, solenoid valve block, basic hydraulics . . . . .	--	W 9
X 25 — Disconnect point, cab . . . . .	--	W 1; W 2
X 26 — Disconnect point, cab . . . . .	--	W 1; W 2
X 27 — Disconnect point, cab . . . . .	--	W 1; W 2
X 28 — Disconnect point, cab . . . . .	--	W 1; W 2
X 29 — Splice . . . . .	--	W 2
X 31 — Flasher control point (USA/Europe) . . . . .	13	W A 14
X 32 — Disconnect point, header solenoid block . . . . .	--	W 22
X 33 — Ground, rear basic wiring harness . . . . .	--	W 9
X 34 — Ground, header . . . . .	--	W 22
X 35 — Disconnect point, armrest wiring harness . . . . .	--	W 2; W 5
X 36 — Disconnect point, master control lever . . . . .	--	W 5
X 37 — Disconnect point, switch console harness . . . . .	--	W 2; W 3
X 38 — Disconnect point, optional eqpt. harness . . . . .	--	W 2; W 14
X 39 — Disconnect point, relay board, data center . . . . .	--	W 1
X 40 — Disconnect point, cross shaker switch . . . . .	--	W 9
X 41 — Disconnect point, straw chopper . . . . .	--	W 20
X 42 — Disconnect point, data center control board . . . . .	--	W 1
X 43 — Disconnect point, straw hood harness . . . . .	--	W 20; W 9
X 44 — Disconnect point, basic harness, r.h. . . . .	--	W 2; W 9
X 45 — Disconnect point, cab . . . . .	--	W 2; W 9
X 46 — Disconnect point, platform wiring harness . . . . .	--	W 7; W 2
X 47 — Disconnect point, hillmaster harness . . . . .	--	W 29; W 1
X 48 — Disconnect point, grain tank harness . . . . .	--	W 15; W 9
X 49 — Disconnect point, corner post harness . . . . .	--	W 2; W 4
X 50 — Disconnect point, electronic box of speed monitoring system . . . . .	--	W 1
X 51 — Disconnect point, header control . . . . .	--	W 1
X 52 — Disconnect point, DIAL-A-MATIC electronic box . . . . .	--	W 1
X 53 — Disconnect point, spare . . . . .	--	W 1
X 54 — Ground connection, engine wiring harness . . . . .	--	W 12; W 13
X 55 — Disconnect point, combine data center . . . . .	--	W 2; W 23
X 56 — Disconnect point, reel speed control . . . . .	--	W 1

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Functional Schematics & Harness Diagrams, up to Ser.No. 062721/Component Survey

	Section	Wiring Harness
X 62 — Disconnect point, engine wiring harness . . . . .	--	W 12; W 13
X 64 — Ground connection, basic harness, l.h. . . . .	--	W 1
X 65 — Disconnect point, steering column harness . . . . .	--	W 7; W 8
X 66 — Disconnect point, air conditioning harness . . . . .	--	W 2; W 6
X 67 — Socket, rear axle . . . . .	09	W 9
X 68 — Socket, service platform . . . . .	09	W 9
X 69 — Splice . . . . .	--	W 4
X 70 — Disconnect point, spare . . . . .	--	W 1
X 71 — Disconnect point, chaff spreader harness . . . . .	--	W 25; W 26
X 72 — Disconnect point, data center relay board . . . . .	--	W 1
X 73 — Disconnect point, feeder house solenoid block . . . . .	--	W 10
X 74 — Disconnect point, Hillmaster solenoid block . . . . .	--	W 29
X 75 — Connection, leveling control box . . . . .	--	W 29
X 76 — Disconnect point, corner post harness . . . . .	--	W 2; W 4
X 77 — Disconnect point, feeder house harness . . . . .	--	W 7; W 10
X 78 — Splice . . . . .	--	W 2
X 79 — Splice . . . . .	--	W 1
X 80 — Splice . . . . .	--	W 1
X 81 — Splice . . . . .	--	W 1
X 82 — Disconnect point, front basic harness . . . . .	--	W 7; W 1
X 83 — Splice . . . . .	--	W 1
X 86 — Splice . . . . .	--	W 20
X 87 — Splice . . . . .	--	W 20
X 88 — Disconnect point, switch console harness . . . . .	--	W 2; W 3
X 89 — Splice . . . . .	--	W 20
X 90 — Ground connection, straw hood . . . . .	--	W 20
X 91 — Disconnect point, walker sensor, left-hand . . . . .	--	W 20
X 92 — Disconnect point, walker sensor, right-hand . . . . .	--	W 20
X 93 — Disconnect point, sieve sensor . . . . .	--	W 9
X 94 — Disconnect point, straw hood lighting . . . . .	--	W 20
X 95 — Disconnect point, spare . . . . .	--	W 22
X 96 — Disconnect point, ground . . . . .	--	W 3
X 97 — Disconnect point, electric mirror adjustm. . . . .	--	W 2; W 39
X 98 — Disconnect point, electric mirror adjustm. . . . .	--	W 2; W 39
X 100 — Ground connection, feeder house . . . . .	--	W 10
X 101 — Disconnect point, header lighting . . . . .	--	W 22; W 32
X 102 — Disconnect point, underslung chopper . . . . .	--	W 22; W 32
X 104 — Disconnect point, spare . . . . .	--	W 22; W 32
X 105 — Diagnostic socket . . . . .	--	W 2
X 117 — Disconnect point, fuse board . . . . .	--	W 1
X 118 — Disconnect point, fuse board . . . . .	--	W 1
X 159 — Connection, Hillmaster end switch . . . . .	--	W 29
X 160 — Connection, Hillmaster end switch . . . . .	--	W 29

ZX, TMXZCO001784-19-17JAN94



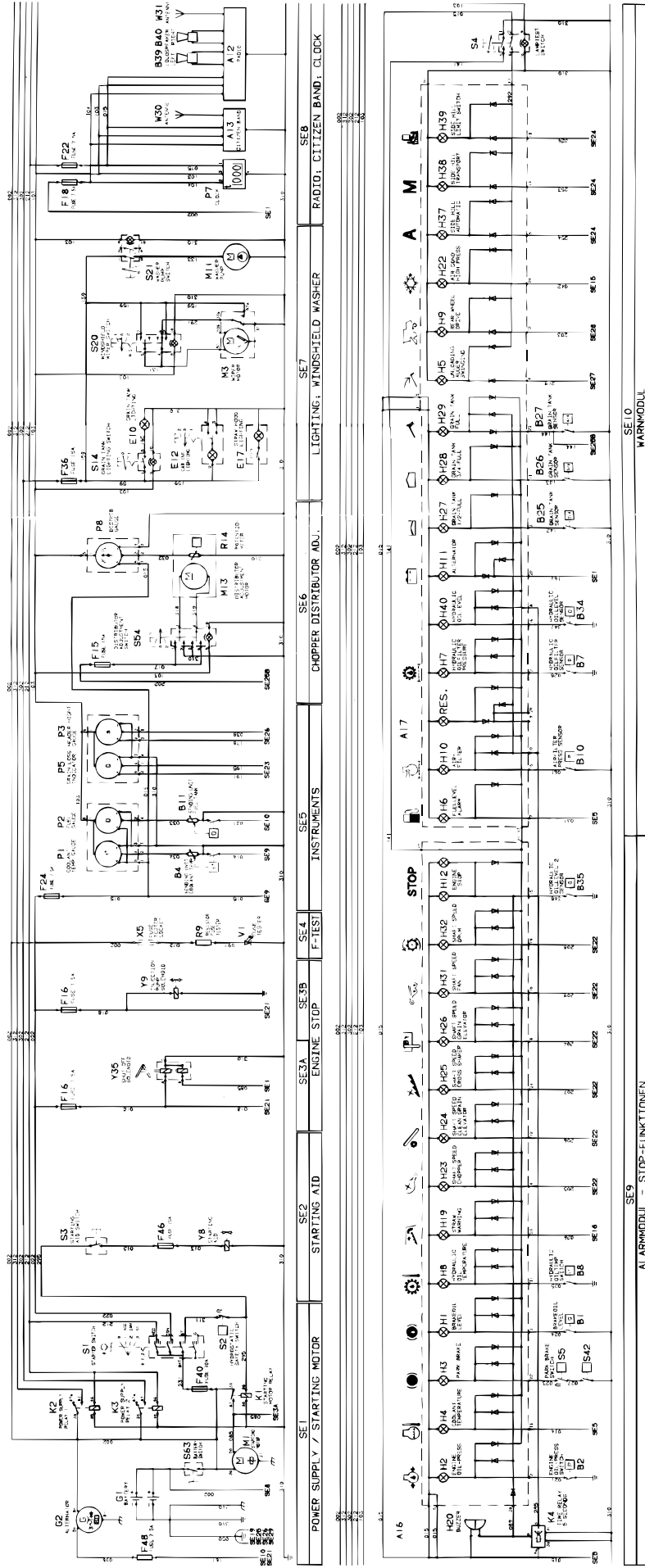
Functional Schematics & Harness Diagrams, up to Ser.No. 062721/Component Survey

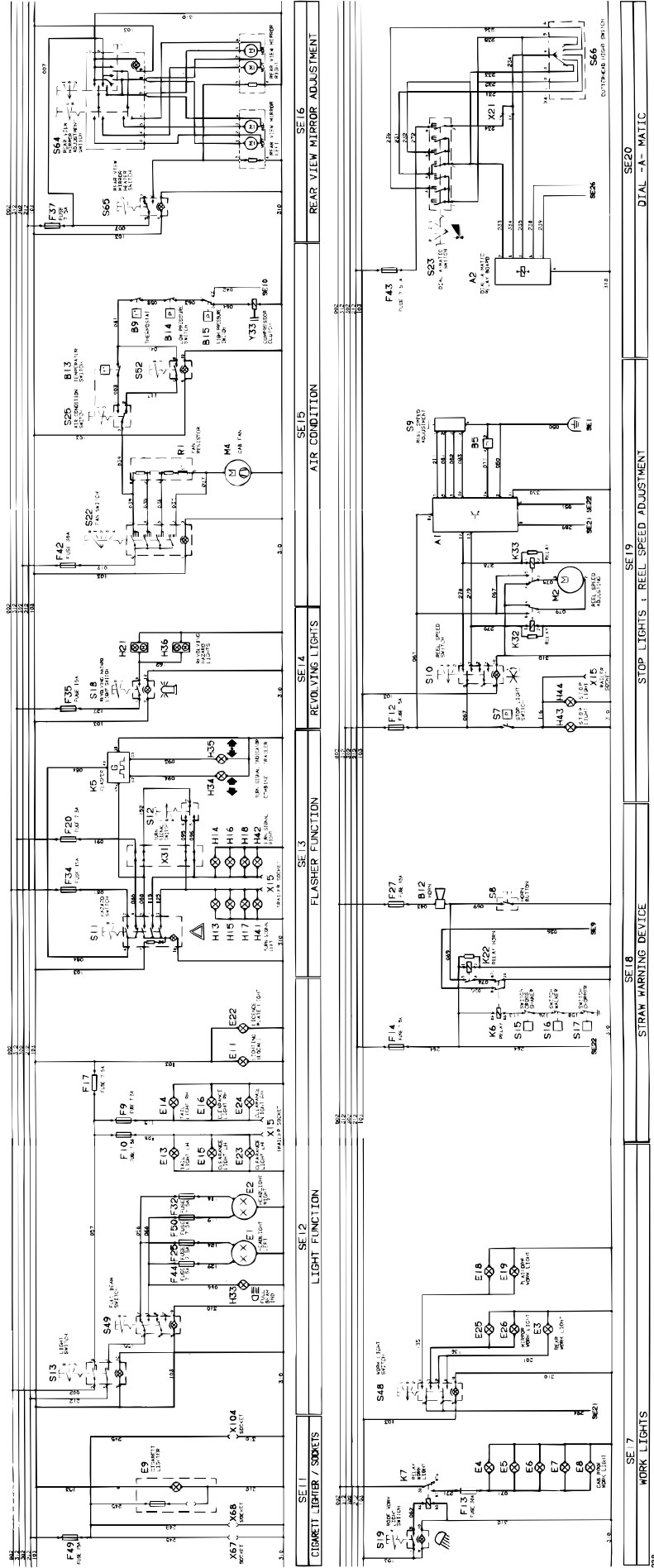
	Section	Wiring Harness
Y 1 — Pressure valve 1 . . . . .	27	W 9
Y 2 — Pressure valve 2 . . . . .	26	W 9
Y 3 — Solenoid, raise header . . . . .	26	W 9
Y 4 — Solenoid, lower header . . . . .	26	W 9
Y 5 — Solenoid, raise header . . . . .	26	W 9
Y 6 — Solenoid, lower header . . . . .	26	W 9
Y 8 — Solenoid, ether starting aid . . . . .	02A	W 13
Y 9 — Solenoid, shut off engine . . . . .	03B	W 12
Y 10 — Solenoid, swing in unloading auger . . . . .	27	W 9
Y 11 — Solenoid, swing out unloading auger . . . . .	27	W 9
Y 12 — Solenoid, leveling to the left . . . . .	24	W 29
Y 13 — Solenoid, leveling to the right . . . . .	24	W 29
Y 14 — Solenoid, header horizontal position, left-hand . . . . .	29	W 10; W 11
Y 15 — Solenoid, header horizontal position, right-hand . . . . .	29	W 10; W 11
Y 16 — Solenoid, move reel to the front . . . . .	26	W 11; W 22
Y 17 — Solenoid, move reel to the rear . . . . .	26	W 11; W 22
Y 18 — Solenoid, lower reel . . . . .	26	W 11; W 22
Y 19 — Solenoid, raise reel . . . . .	26	W 11; W 22
Y 20 — Solenoid, lower combine . . . . .	24	W 29
Y 22 — Solenoid, engage separator . . . . .	21	W 9
Y 23 — Solenoid, engage separator . . . . .	21	W 9
Y 26 — Solenoid, unloading grain . . . . .	27	W 9
Y 27 — Solenoid, unloading grain . . . . .	27	W 9
Y 28 — Solenoid, reduce cylinder speed . . . . .	25	W 9
Y 29 — Solenoid, increase cylinder speed . . . . .	25	W 9
Y 30 — Solenoid, reduce feeder house speed . . . . .	26	W 10
Y 31 — Solenoid, increase feeder house speed . . . . .	26	W 10
Y 32 — Solenoid, four-wheel drive . . . . .	22	W 9
Y 33 — Compressor clutch . . . . .	15	W 13; W 12
Y 34 — Header clutch . . . . .	21	W 7
Y 35 — Engine shut-off solenoid . . . . .	03A	W 13

ZX, TMXZCO001783-19-01JUL92

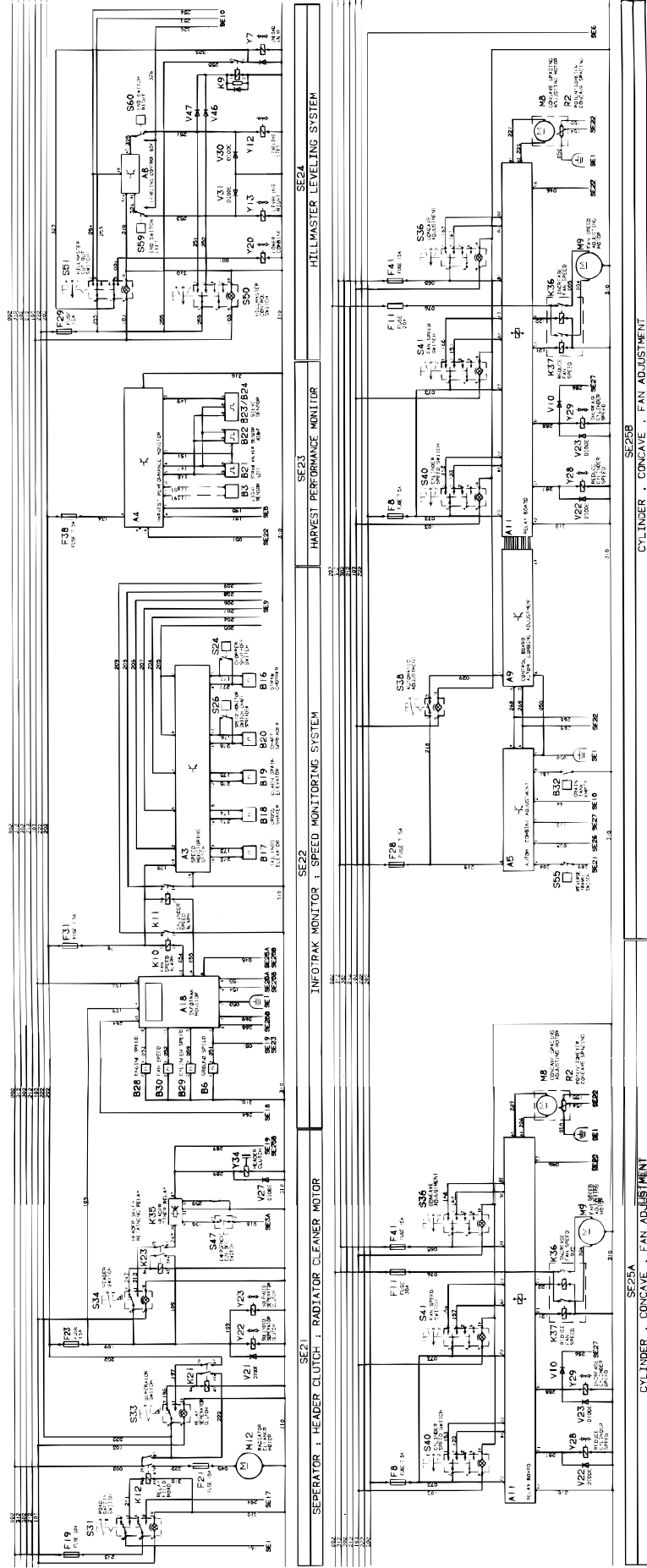


Functional Schematics & Harness Diagrams, up to Ser.No. 06271/Functional Schematic, Part 1





ZK00528

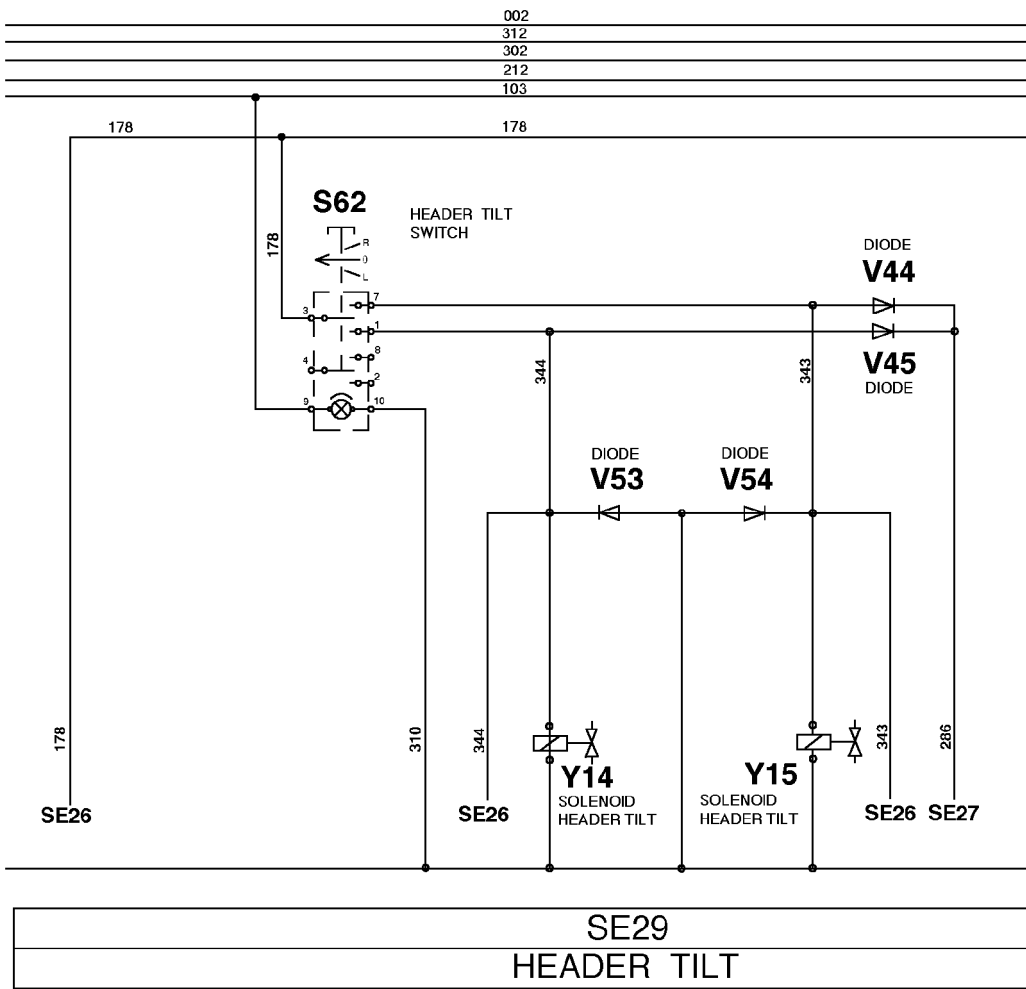


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Z Series Combines  
PN=416

240-10-17

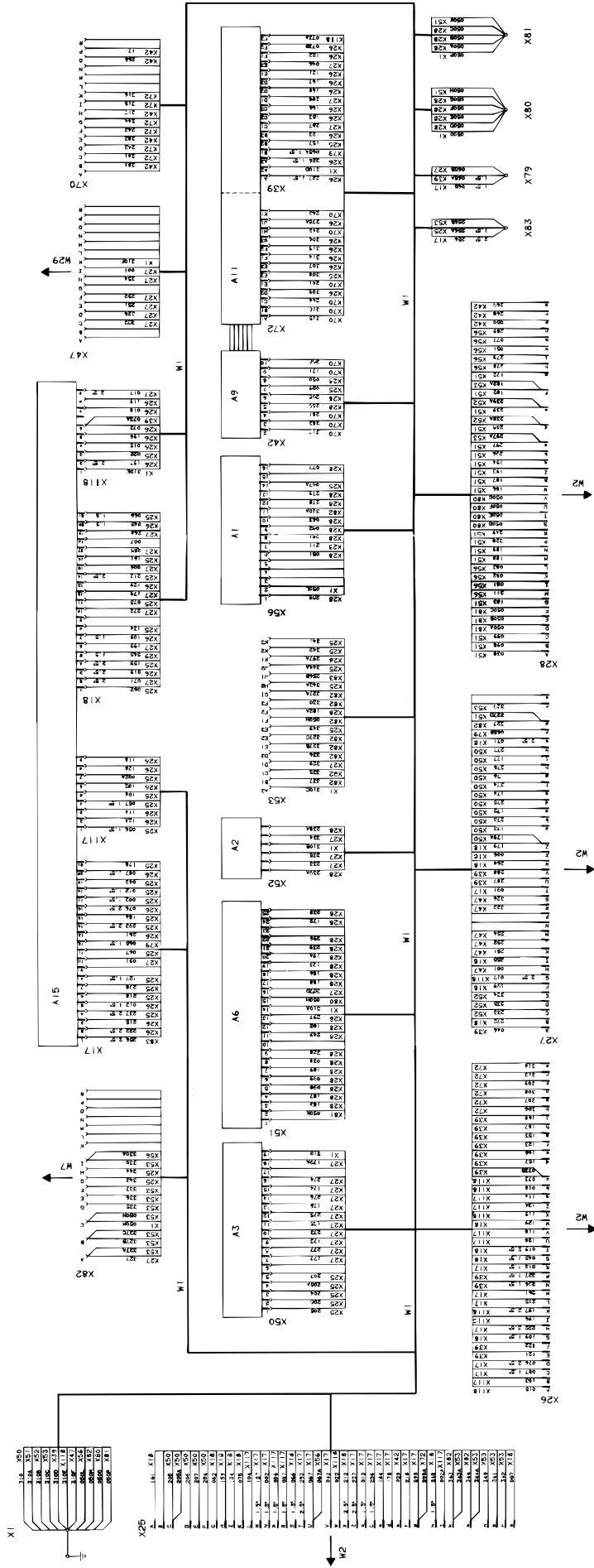
TM4505 (05DEC00)



ZX005240



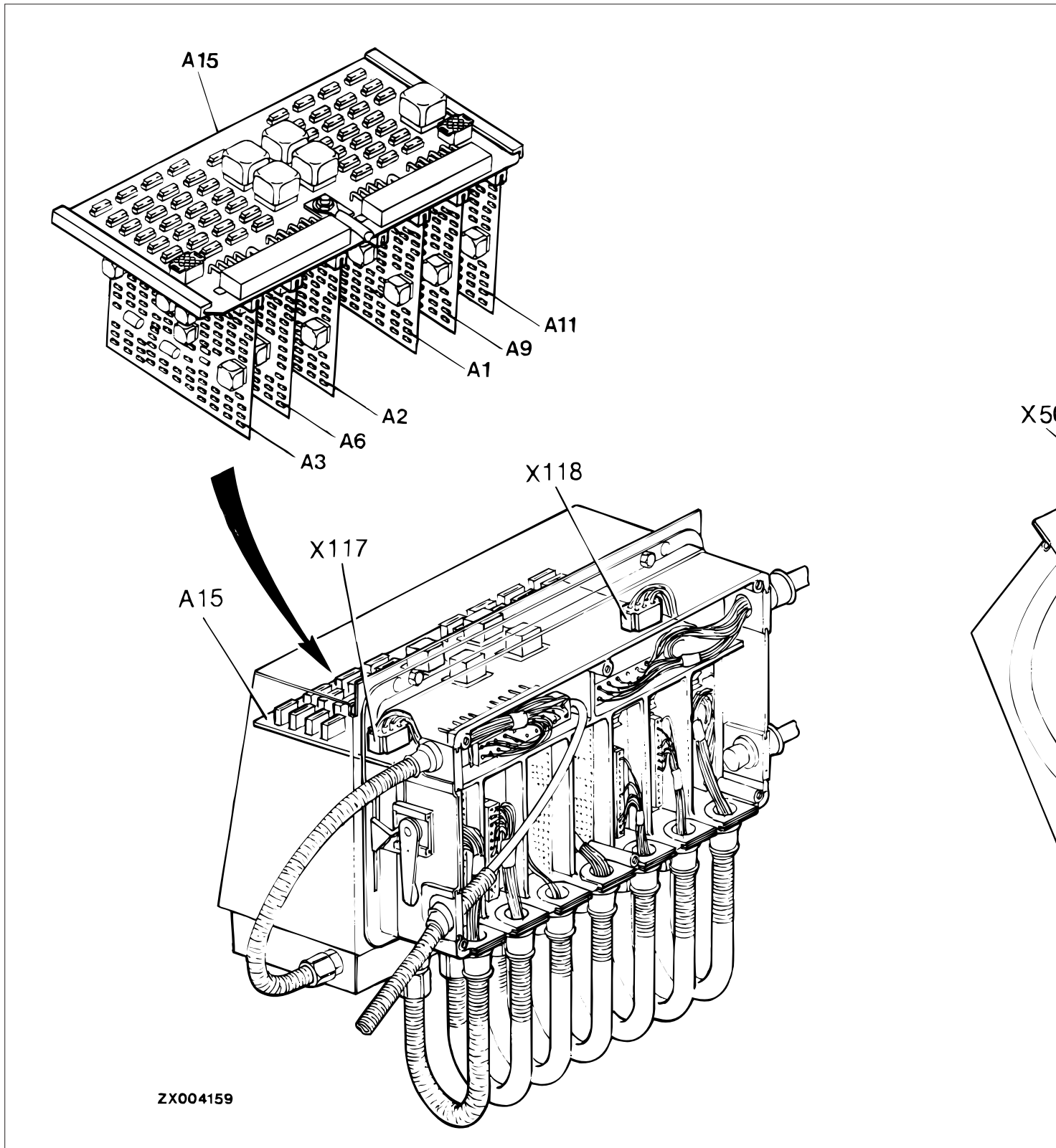
WIRING AND HARNESS DIAGRAM OF MAIN DISTRIBUTION WIRING HARNESS W1



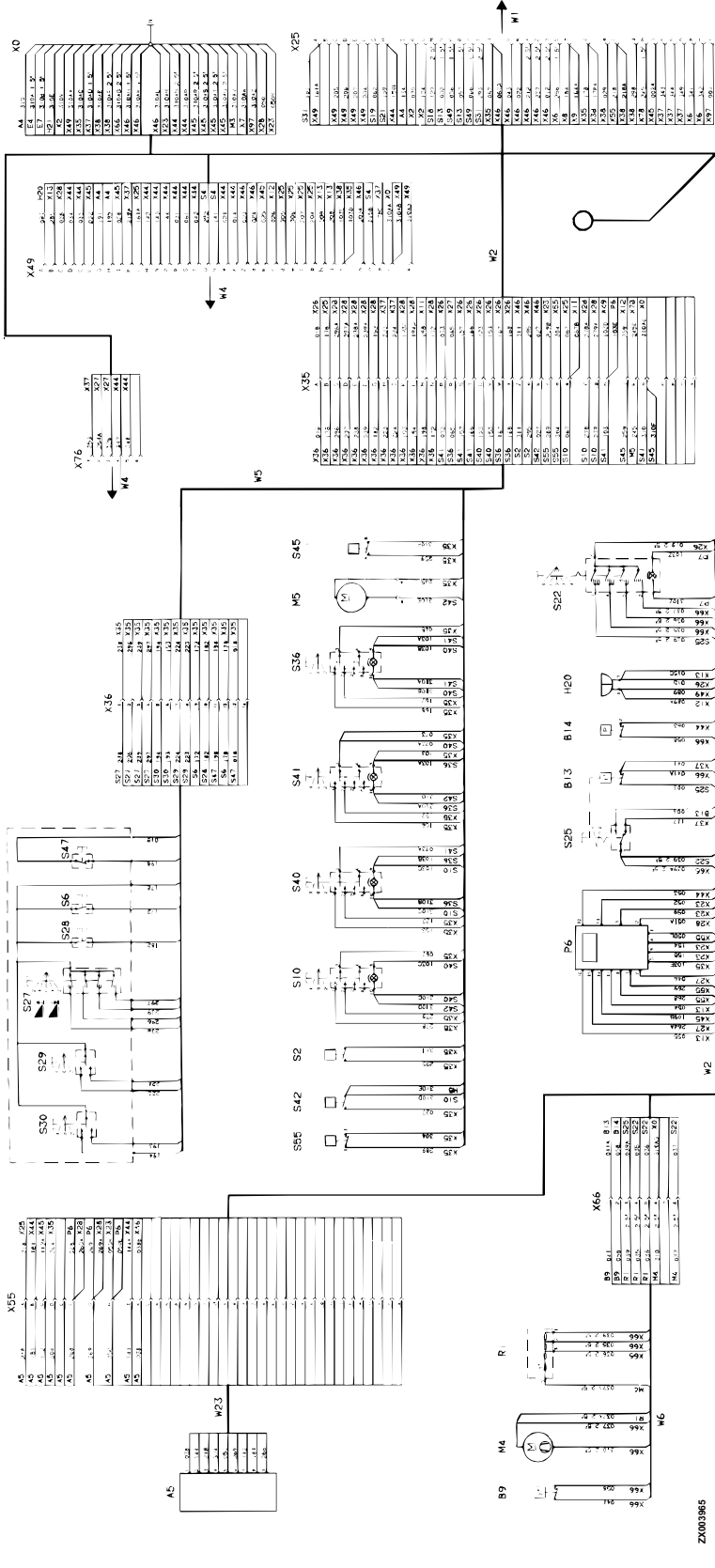
ZX005164



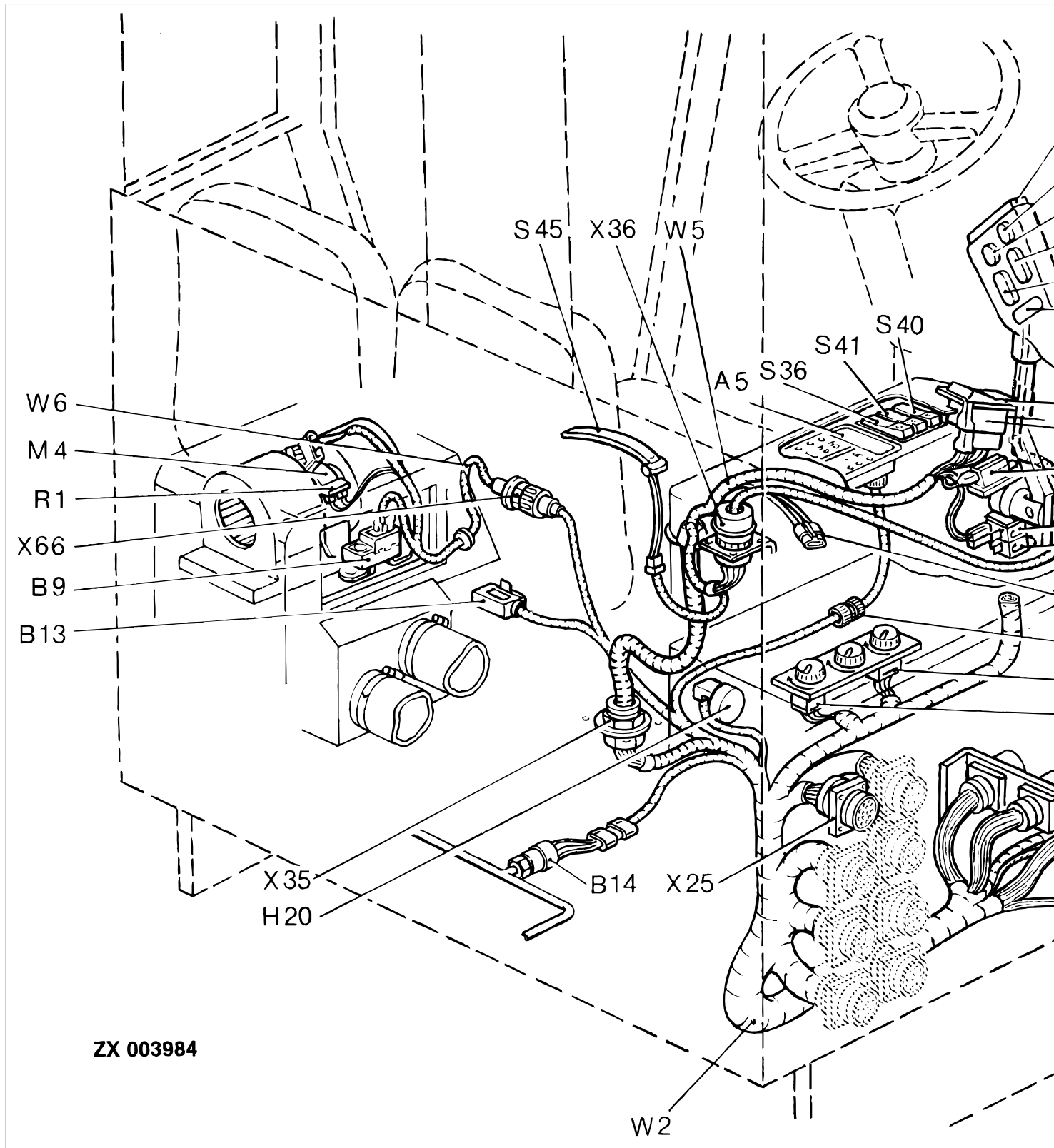
### LOCATION OF MAIN DISTRIBUTION WIRING HARNESS W1 WITH COMPONENTS



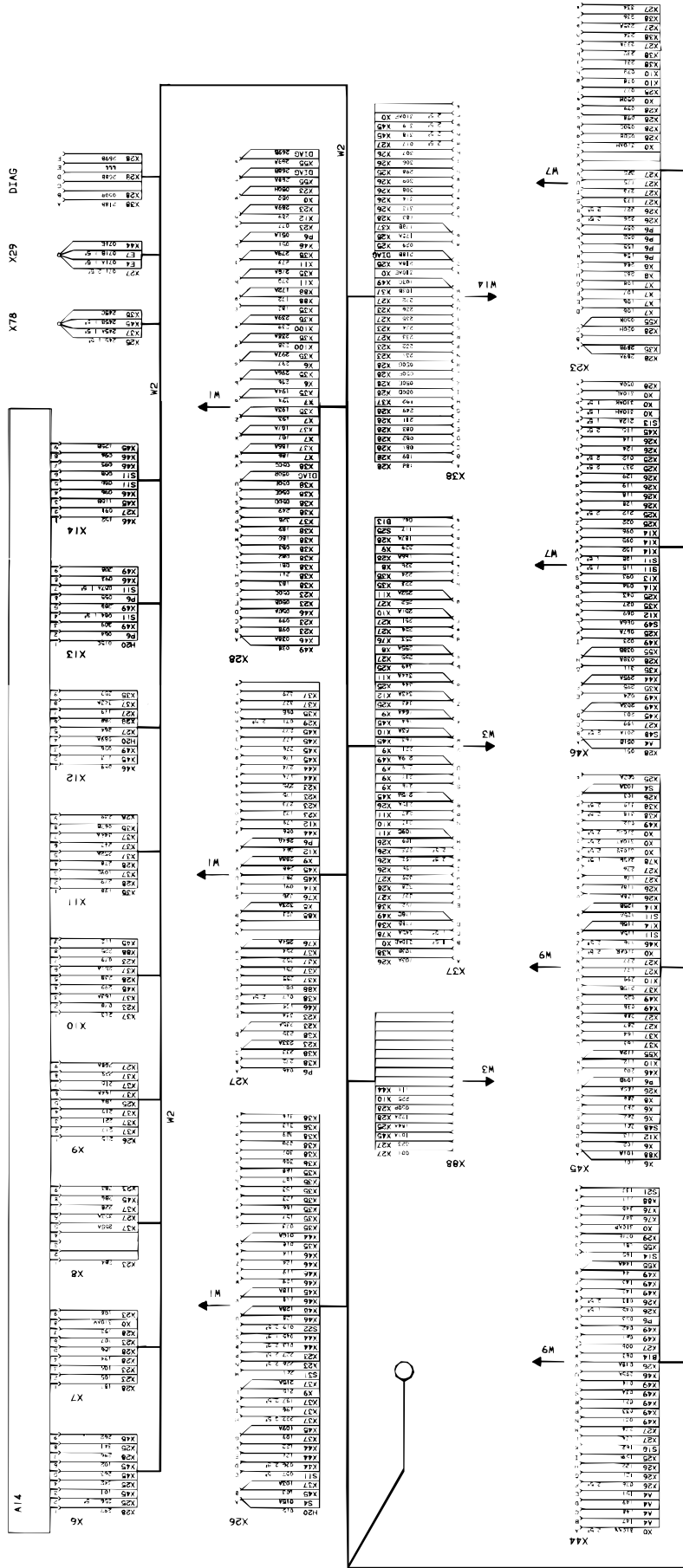
**WIRING AND HARNESS DIAGRAM OF CAB WIRING HARNESS W2 (PART 1), ARMREST WIRING HARNESS W5 AND AIR CONDITIONING WIRING HARNESS W6**



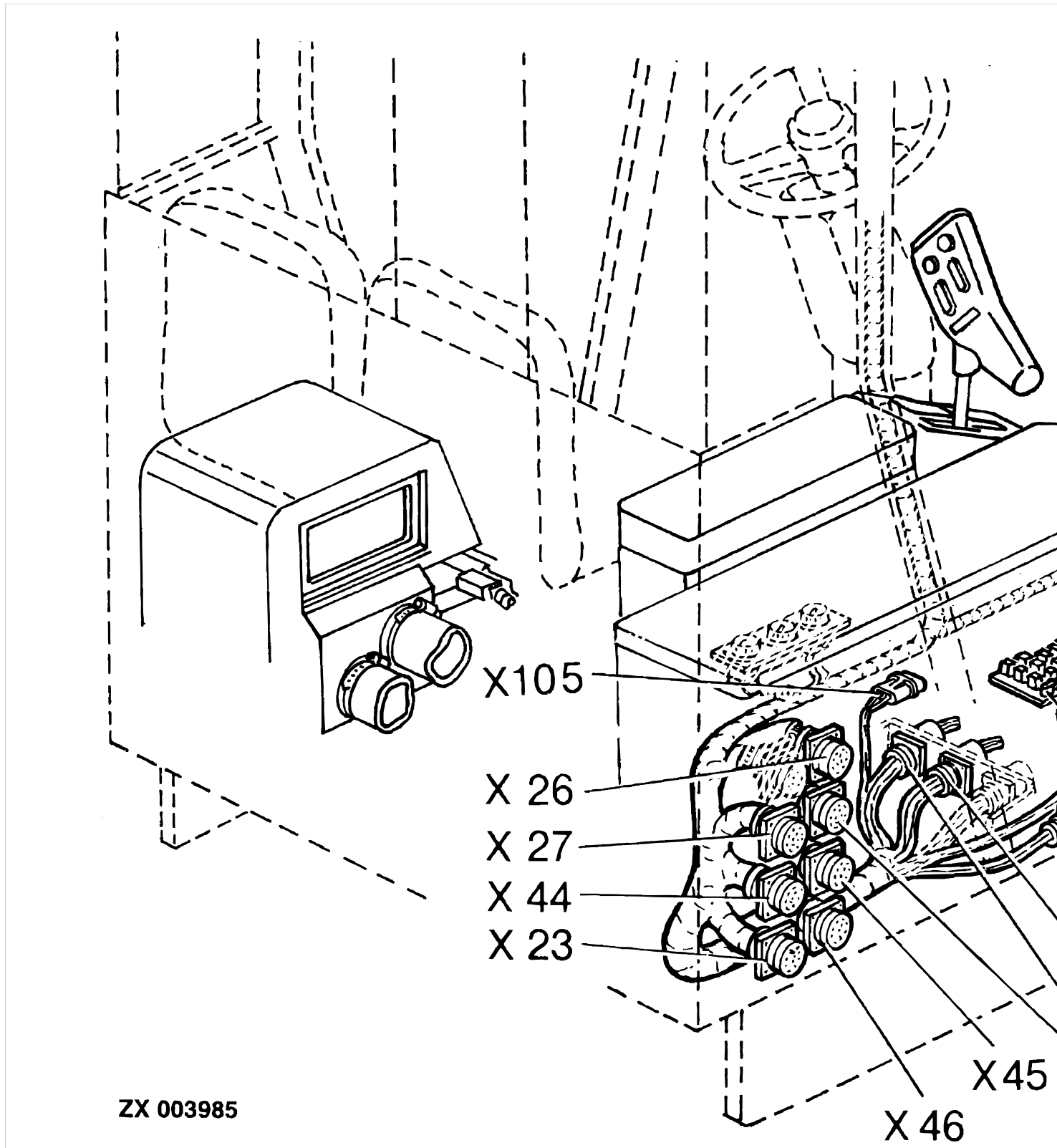
### LOCATION OF CAB WIRING HARNESS W2 (PART 1), ARMREST WIRING HARNESS W5 AND AIR CONDITIONING WIRING HARNESS W6 WITH COMPONENTS



WIRING AND HARNESS DIAGRAM OF CAB WIRING HARNESS W2 (PART 2)

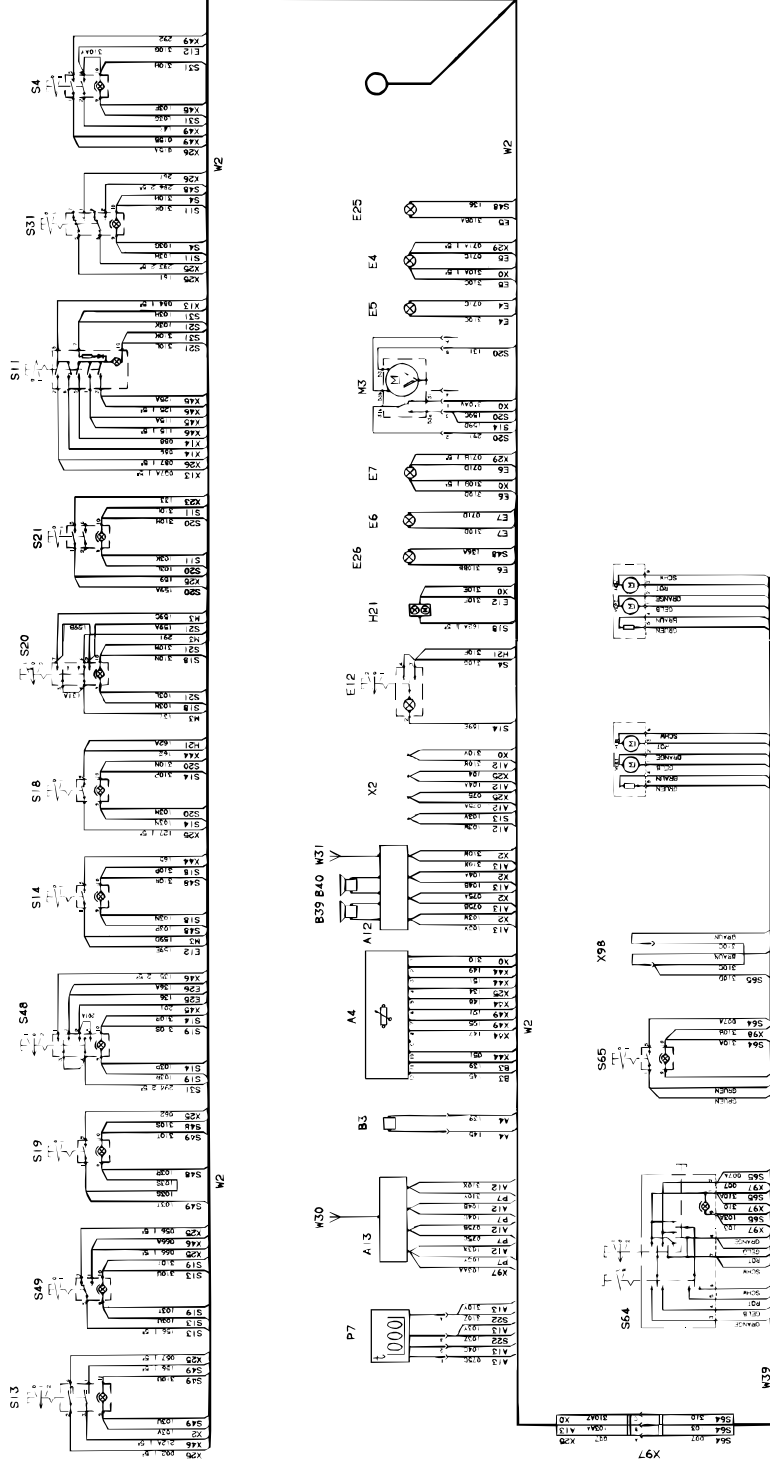


### LOCATION OF CAB WIRING HARNESS W2 (PART 2) WITH COMPONENTS



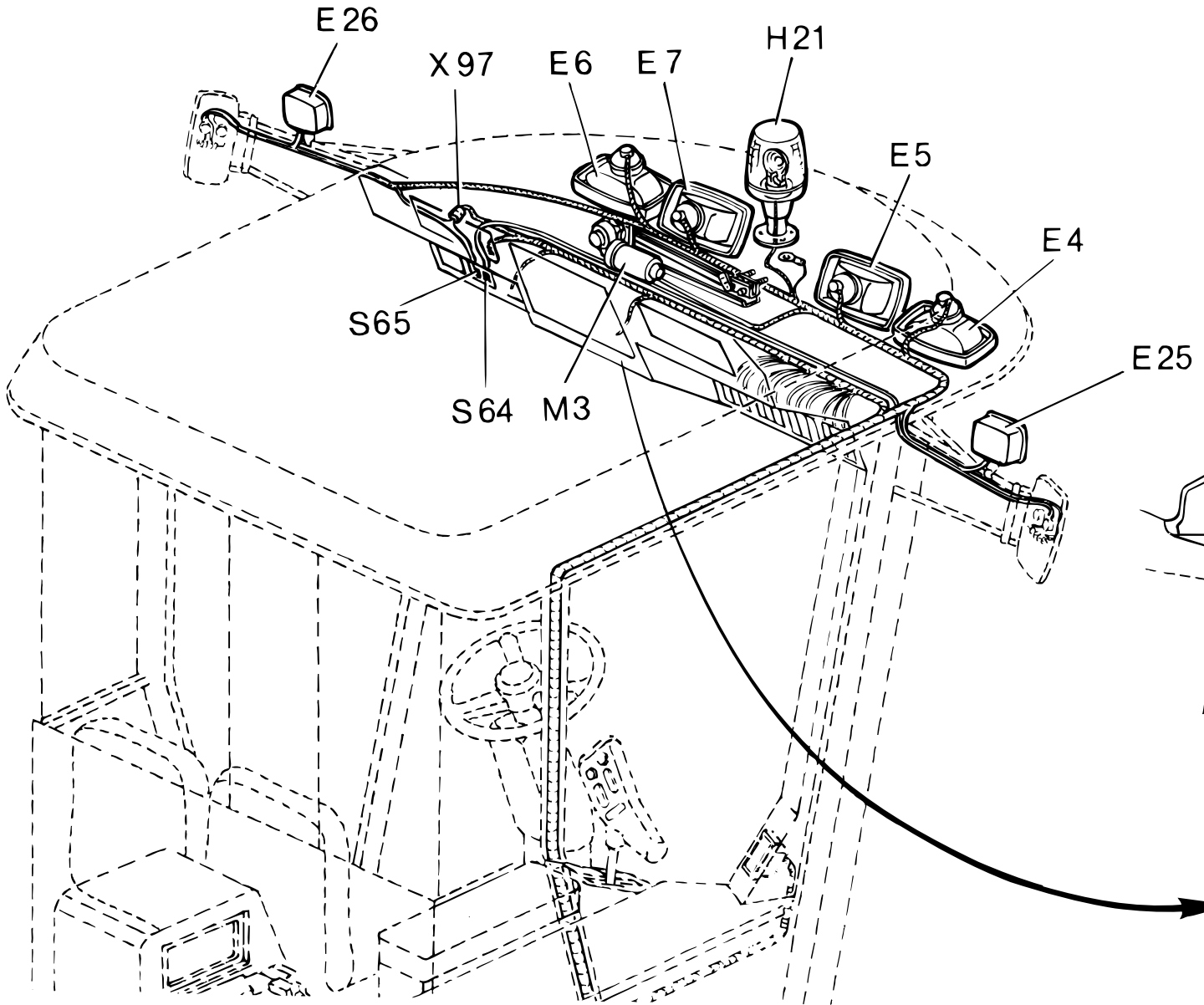
ZX 003985

**WIRING AND HARNESS DIAGRAM OF CAB WIRING HARNESS W2 (PART 3) AND REAR VIEW MIRROR WIRING HARNESS W39**

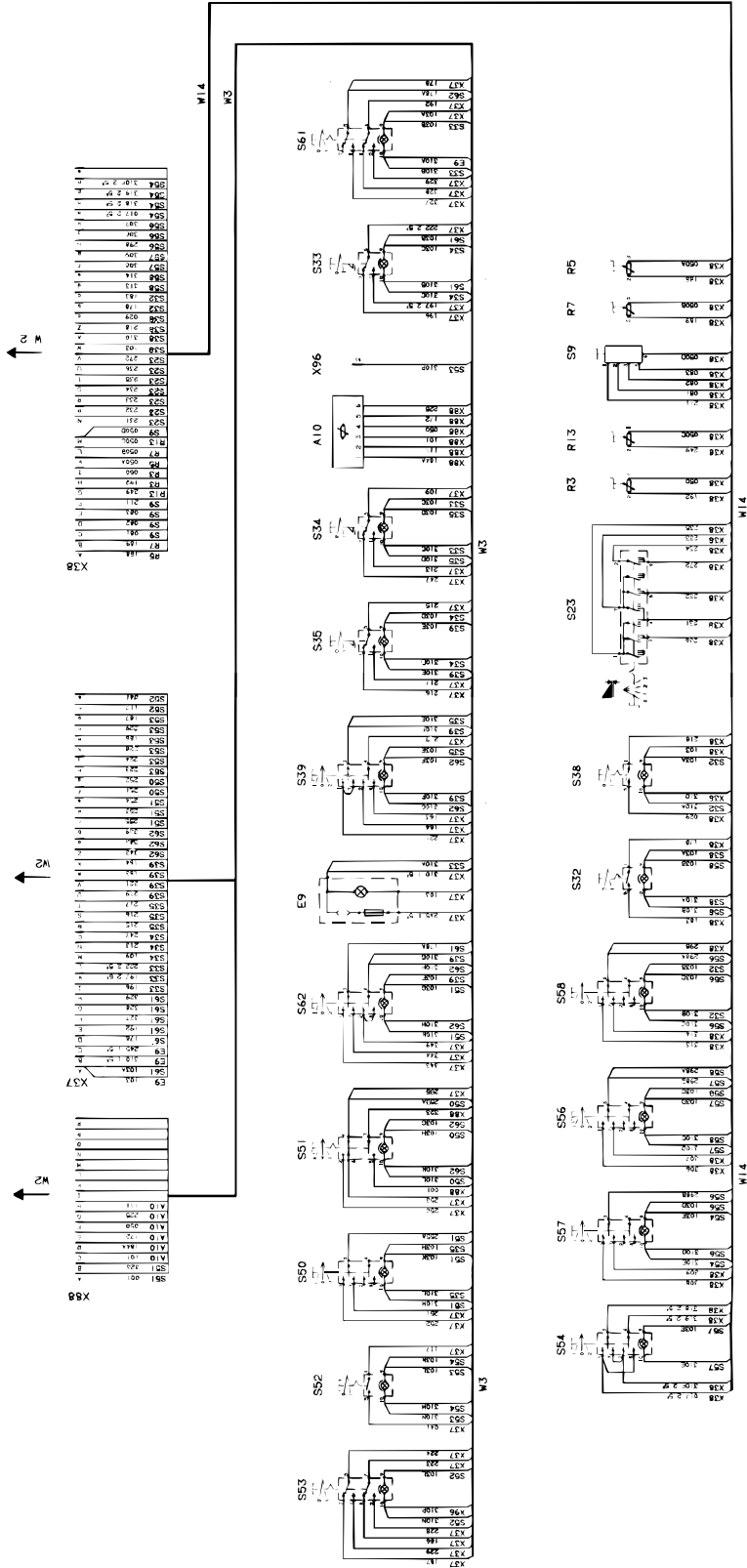


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**LOCATION OF CAB WIRING HARNESS W2 (PART 3) AND REAR VIEW MIRROR WIRING HARNESS W39 WITH COMPONENTS**



**WIRING AND HARNESS DIAGRAM OF SWITCH CONSOLE WIRING HARNESS W3 AND OPTIONAL EQUIPMENT WIRING HARNESS W14**



ZK003968

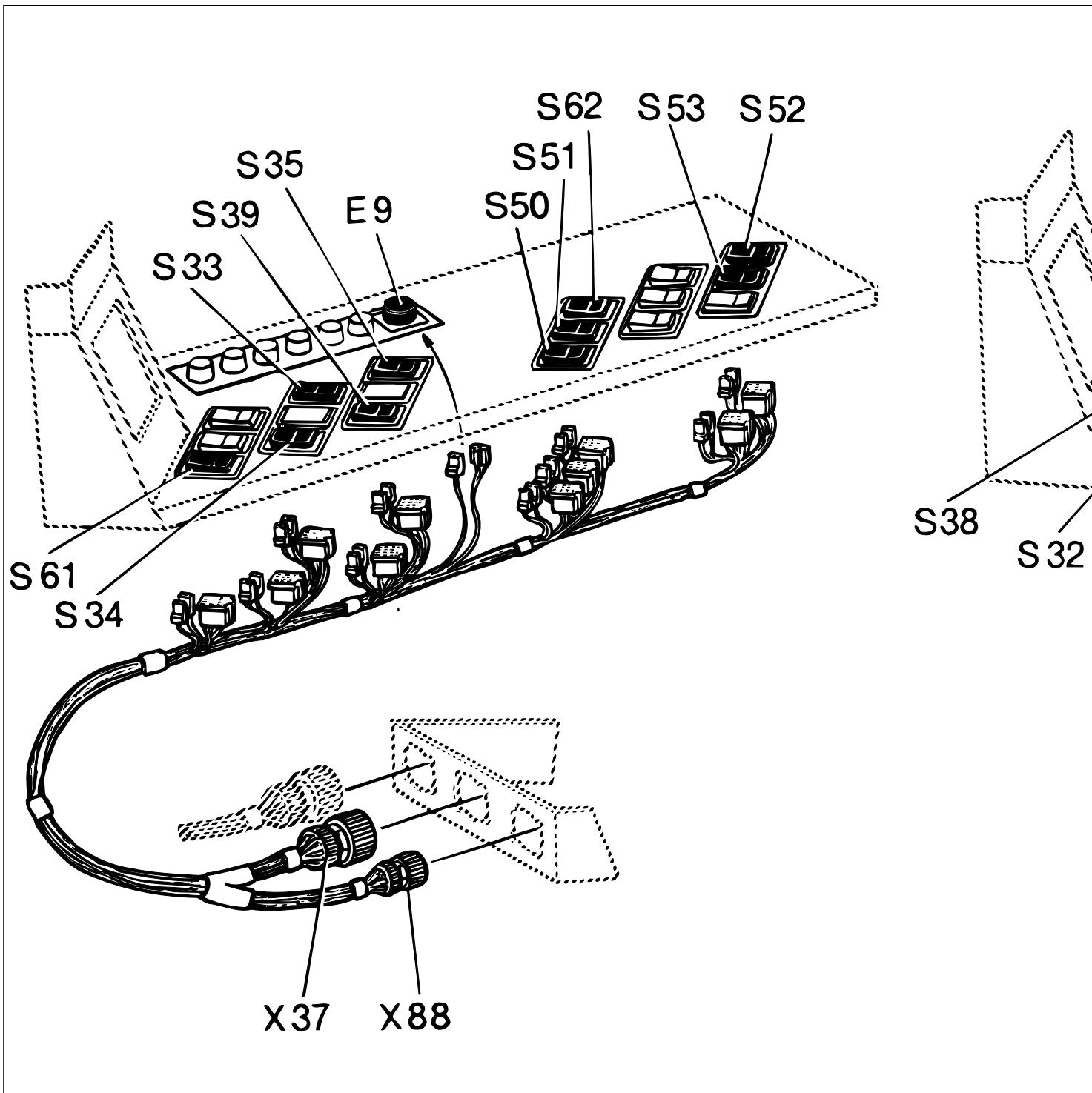
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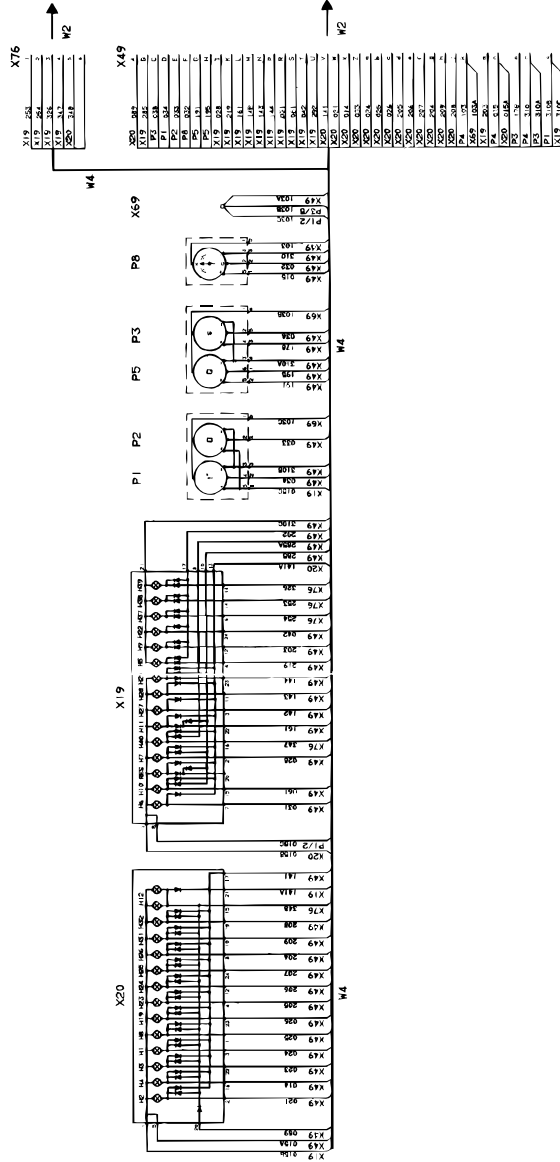
Z Series Combines  
PN=427



### LOCATION OF SWITCH CONSOLE WIRING HARNESS W3 AND OPTIONAL EQUIPMENT WIRING HARNESS W14 WITH COMPONENTS

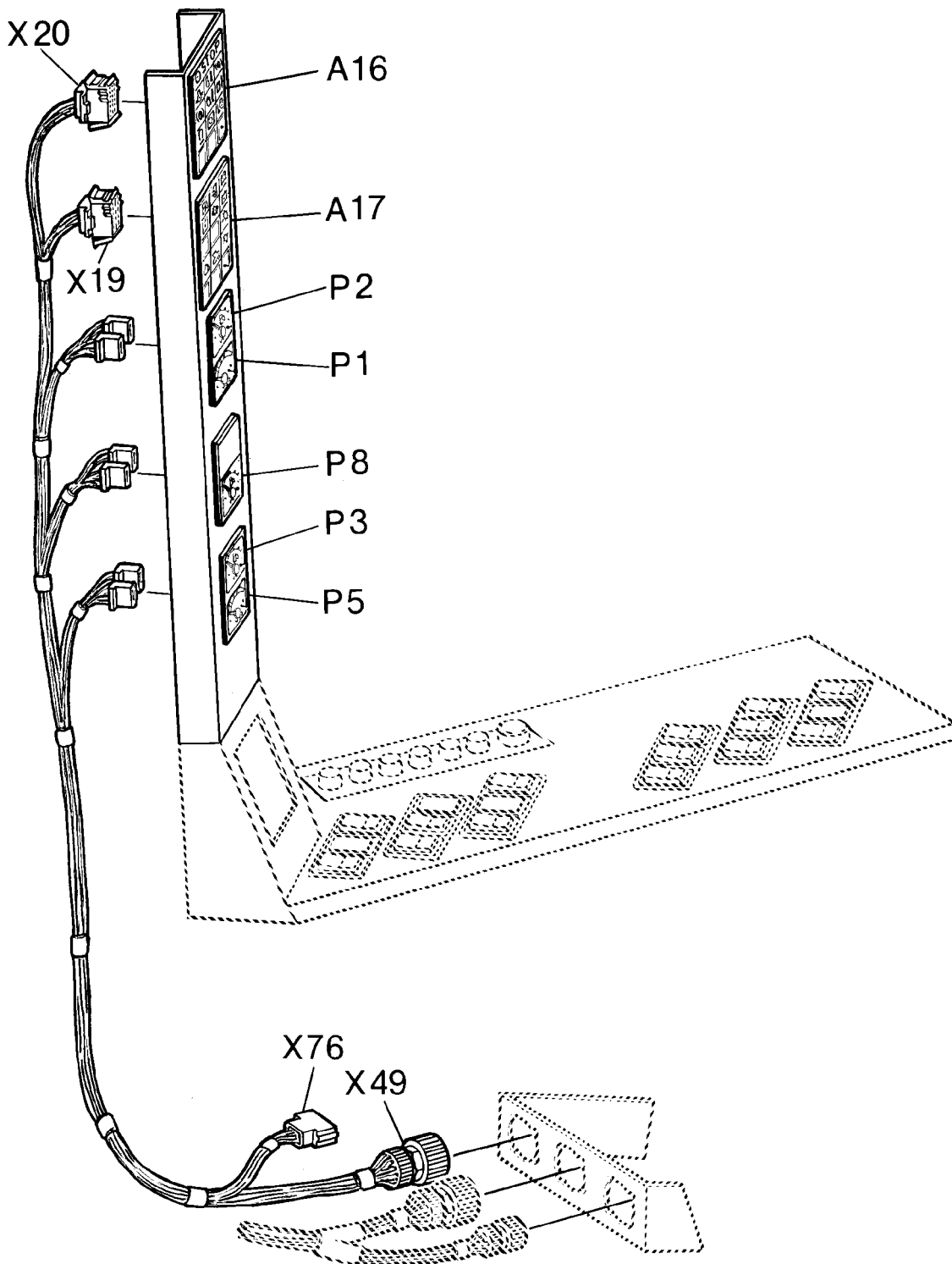


WIRING AND HARNESS DIAGRAM OF CORNER POST WIRING HARNESS W4



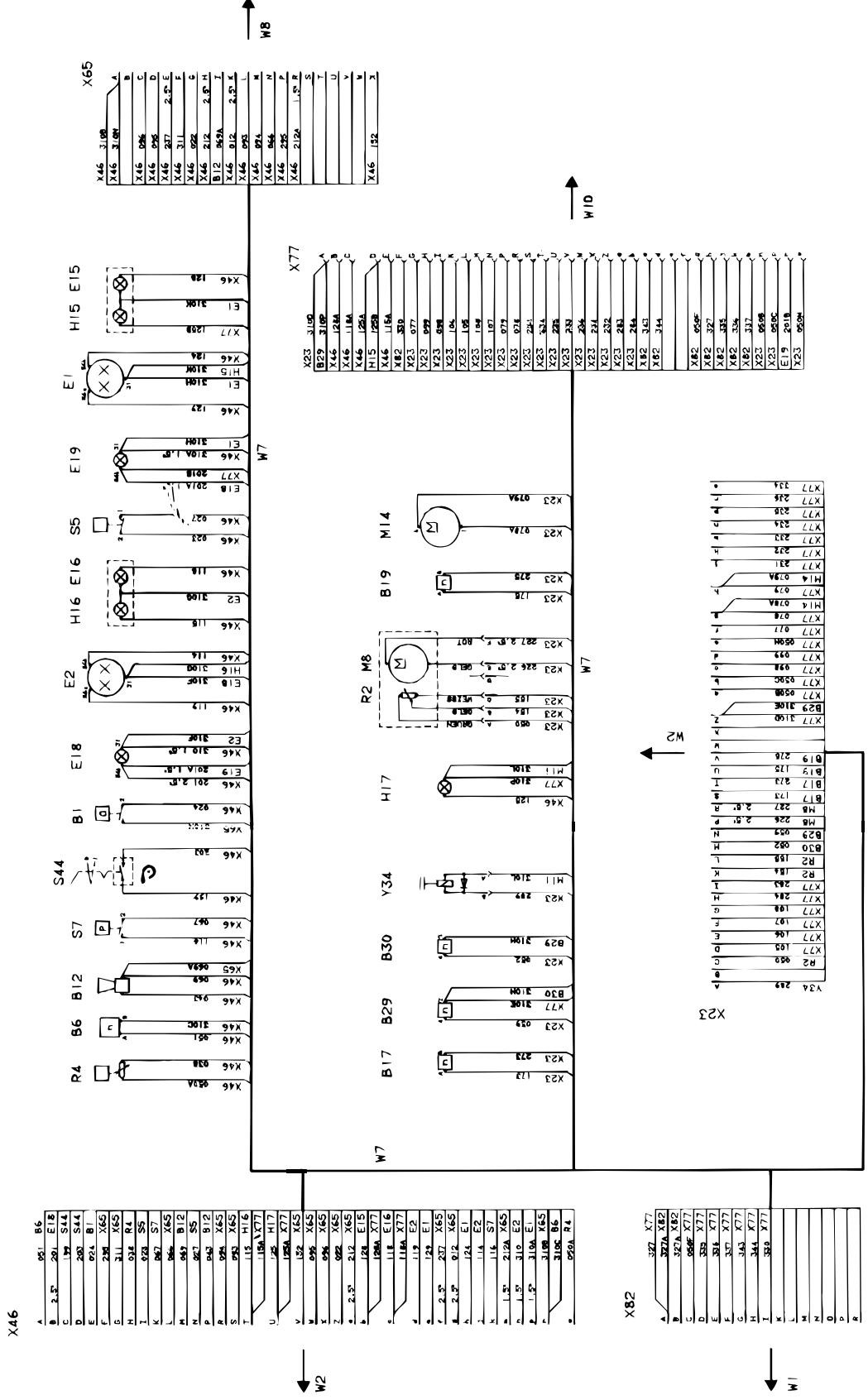
ZK003969

### LOCATION OF CORNER POST WIRING HARNESS W4 WITH COMPONENTS

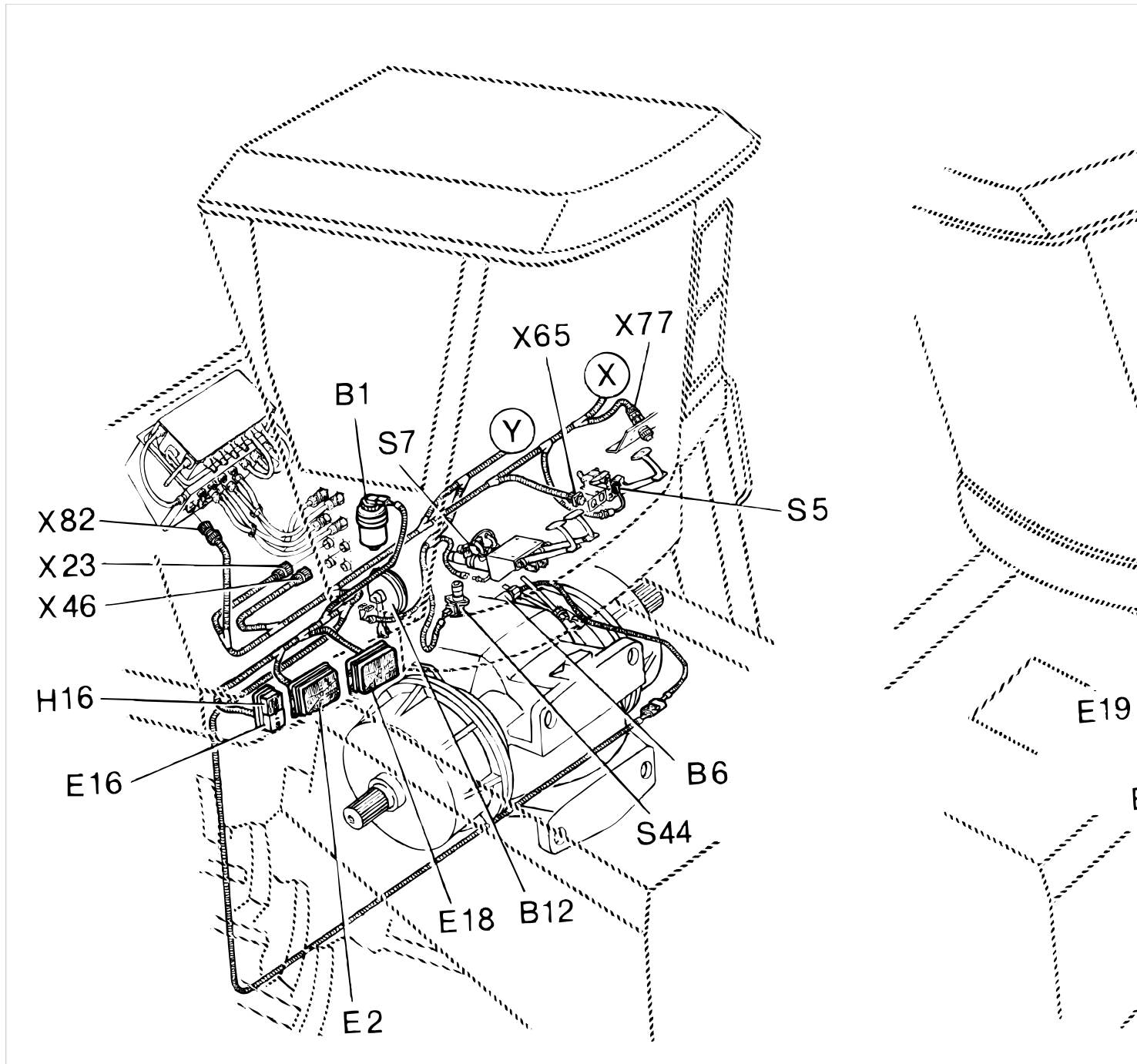


ZX003983

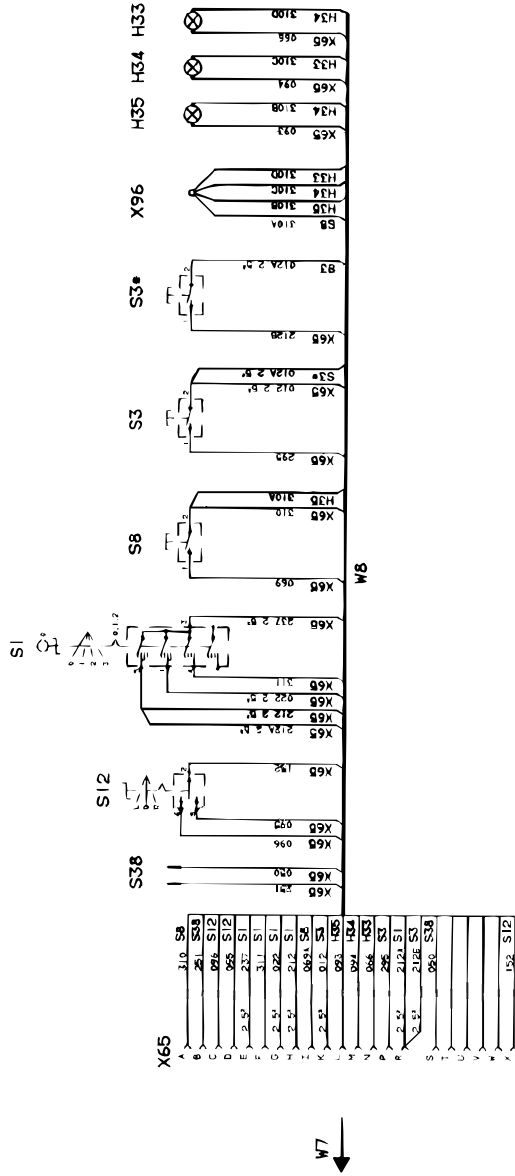
### WIRING AND HARNESS DIAGRAM OF FRONT BASIC WIRING HARNESS W7



### LOCATION OF FRONT BASIC WIRING HARNESS W7 WITH COMPONENTS

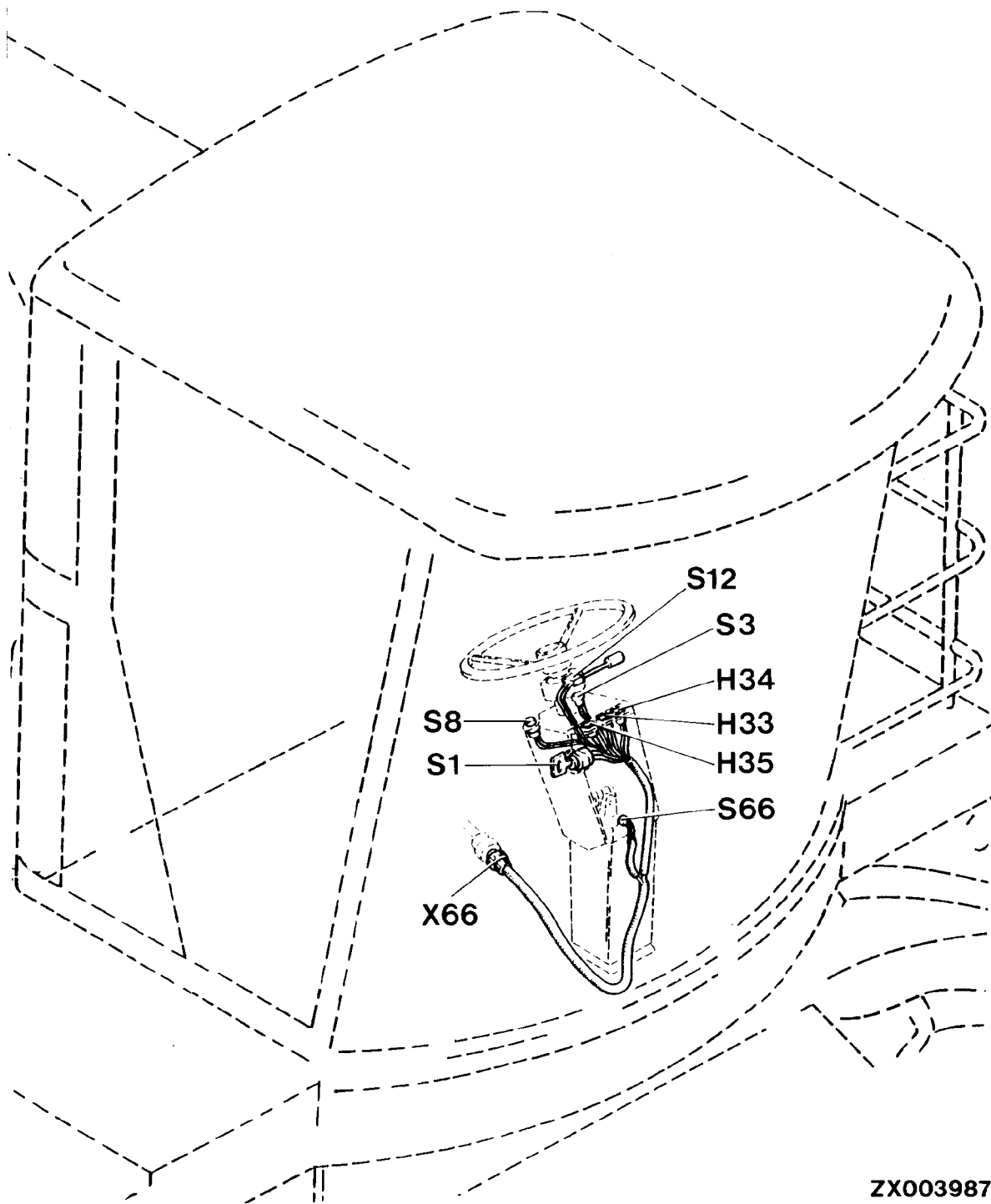


**WIRING AND HARNESS DIAGRAM OF STEERING COLUMN WIRING HARNESS W8**



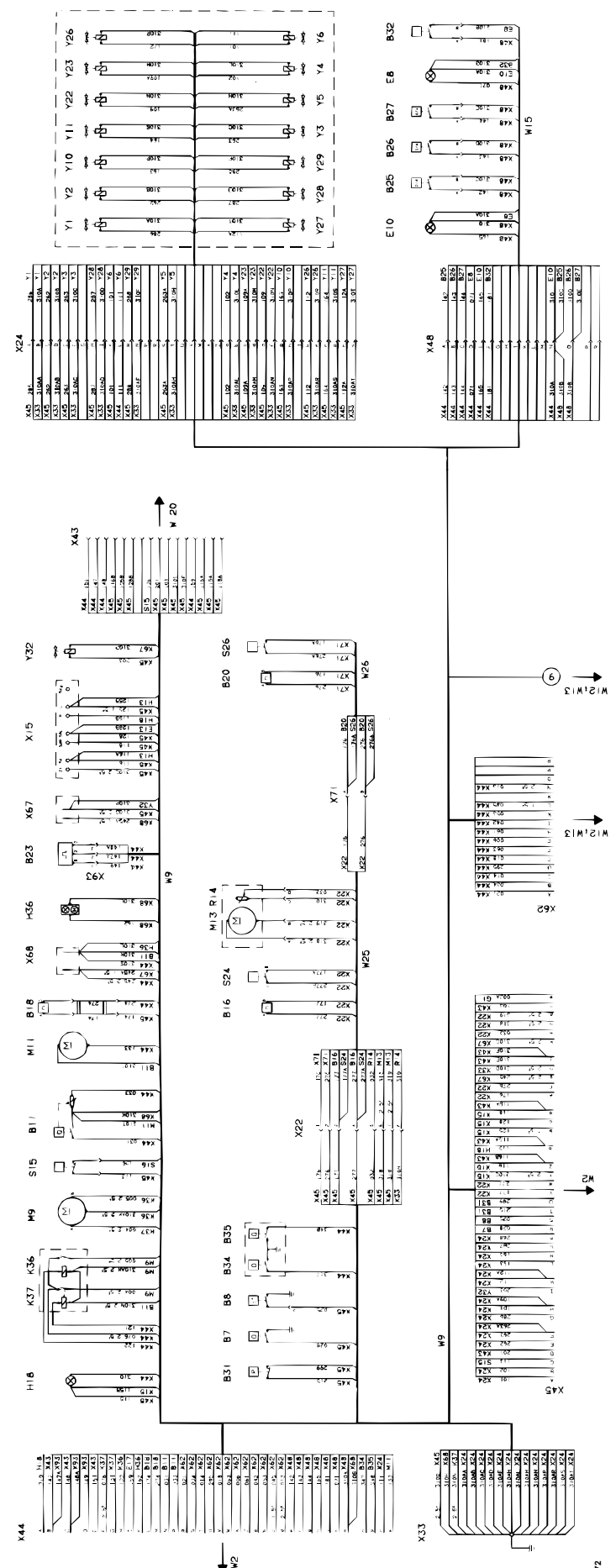
ZX003971

### LOCATION OF STEERING COLUMN WIRING HARNESS W8 WITH COMPONENTS



ZX003987

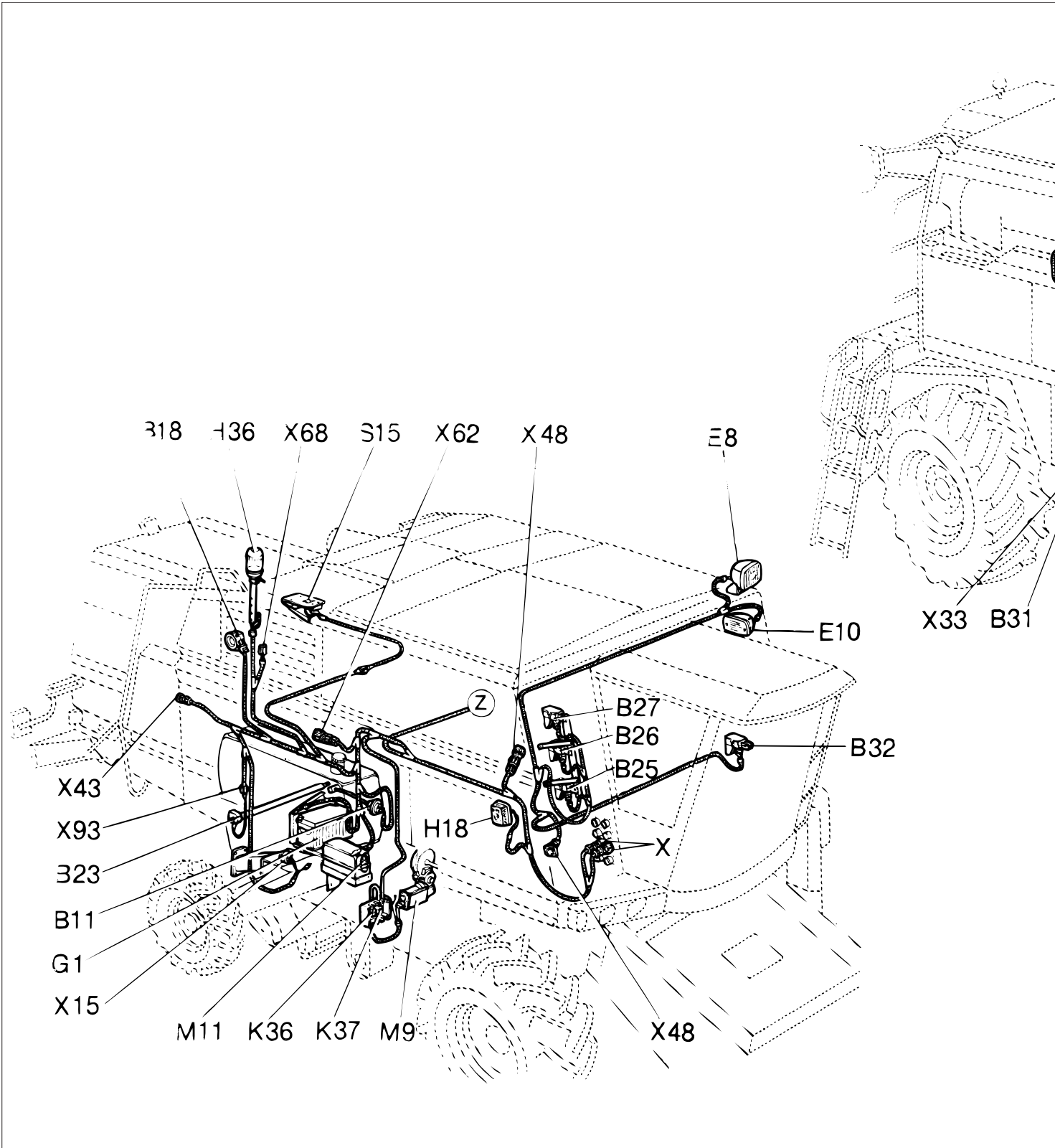
**WIRING AND HARNESS DIAGRAM OF REAR BASIC WIRING HARNESS W9, GRAIN TANK WIRING HARNESS W15, CHOPPER WIRING HARNESS W25 AND CHAFF SPREADER WIRING HARNESS W26**



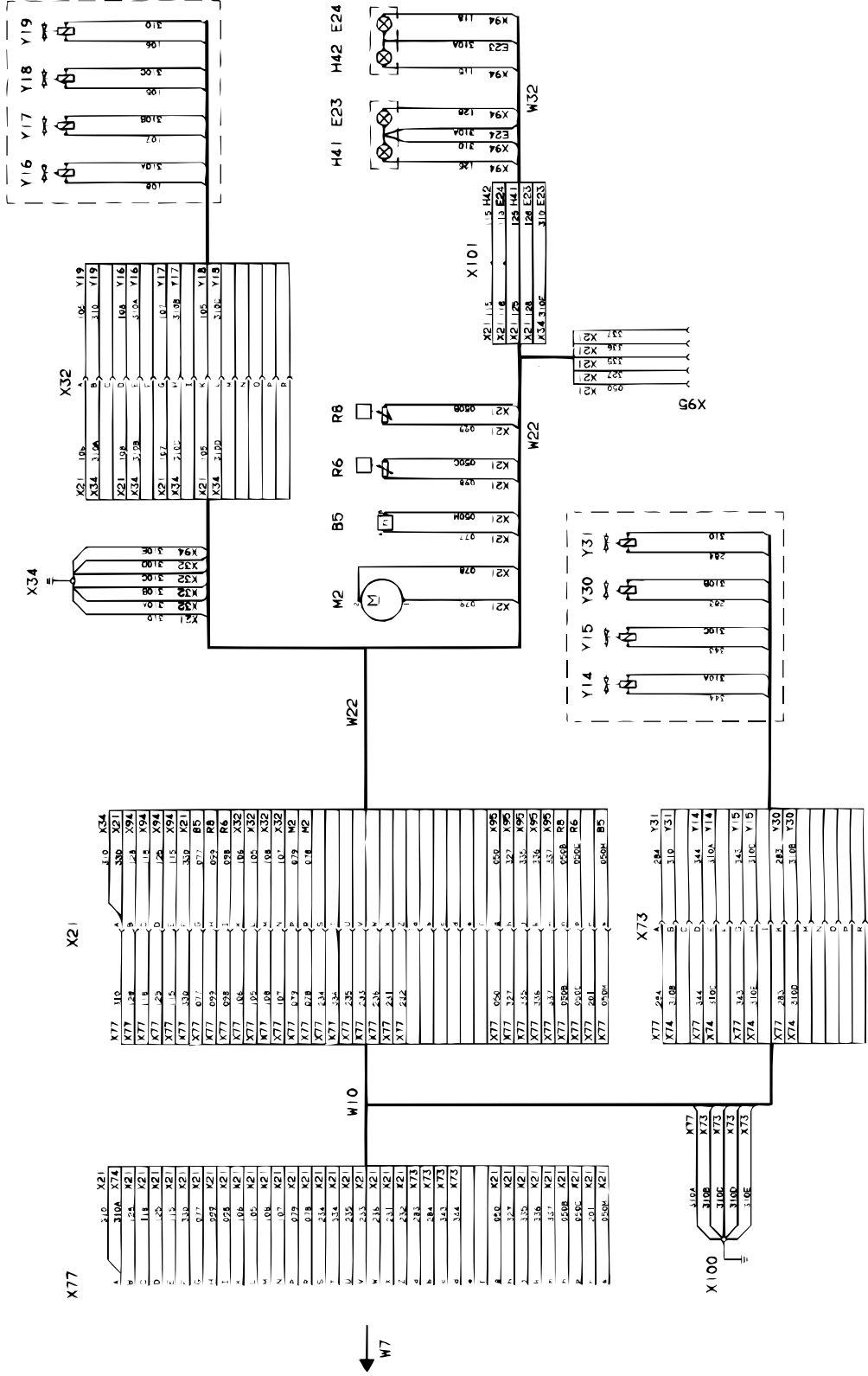
ZK003972



**LOCATION OF REAR BASIC WIRING HARNESS W9, GRAIN TANK WIRING HARNESS W15, CHOPPER WIRING HARNESS W25 AND CHAFF SPREADER WIRING HARNESS W26**

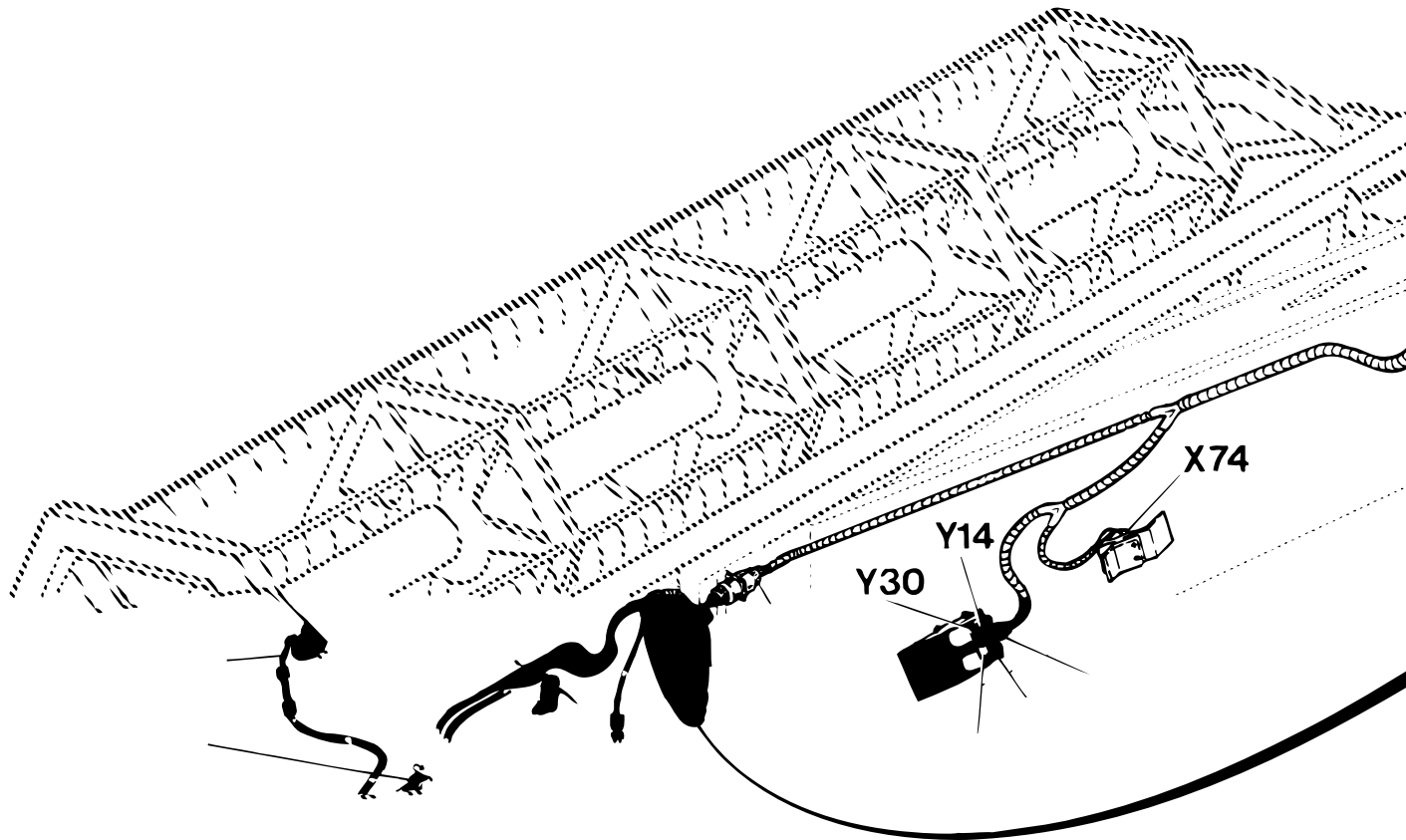


**WIRING AND HARNESS DIAGRAM OF FEEDER HOUSE WIRING HARNESS W10,  
HEADER WIRING HARNESS W22 AND HEADER LIGHTING WIRING HARNESS W32**

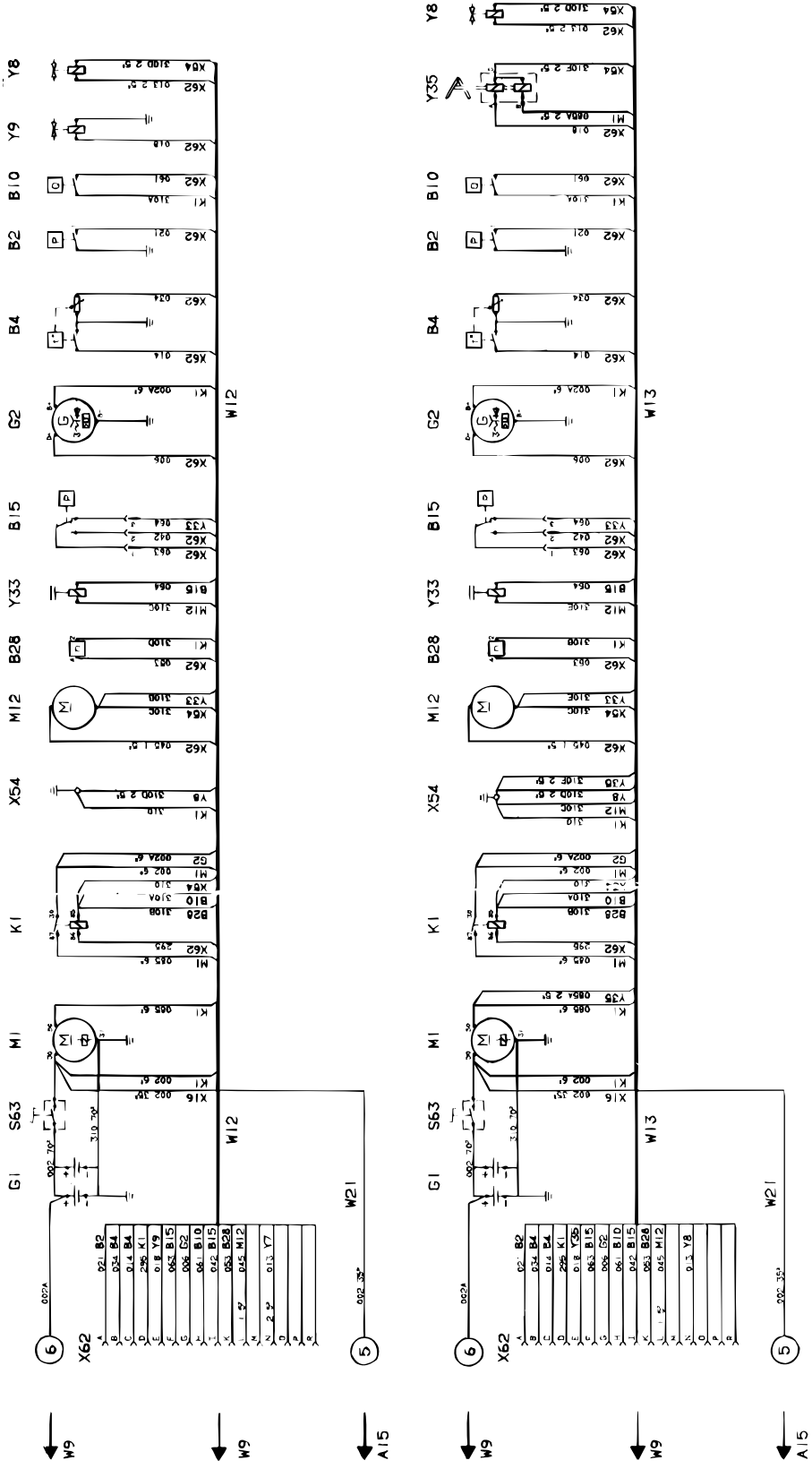


ZX003973

**LOCATION OF FEEDER HOUSE WIRING HARNESS W10, HEADER WIRING HARNESS W22 AND HEADER LIGHTING WIRING HARNESS W32 WITH COMPONENTS**

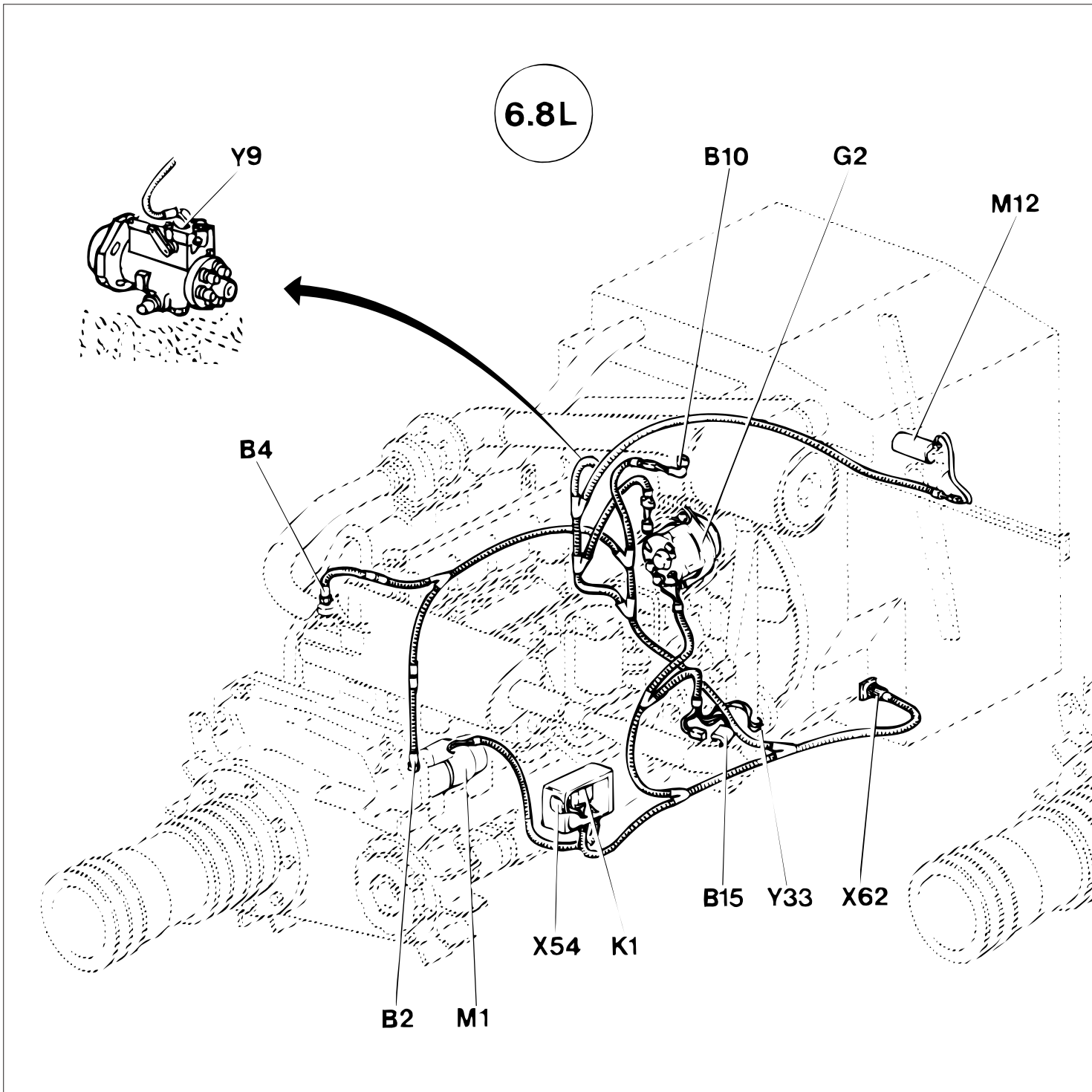


WIRING AND HARNESS DIAGRAM OF ENGINE WIRING HARNESSES W12 AND W13

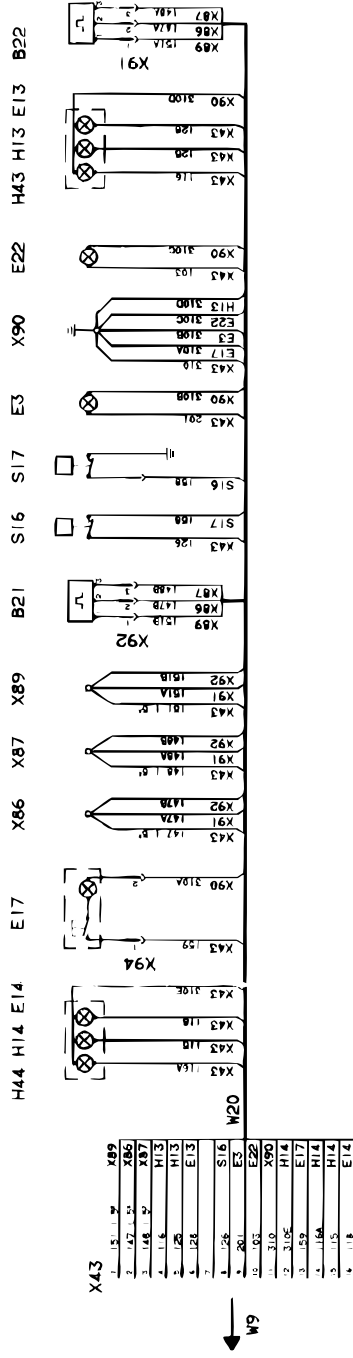


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### LOCATION OF ENGINE WIRING HARNESS W12 AND W13 WITH COMPONENTS

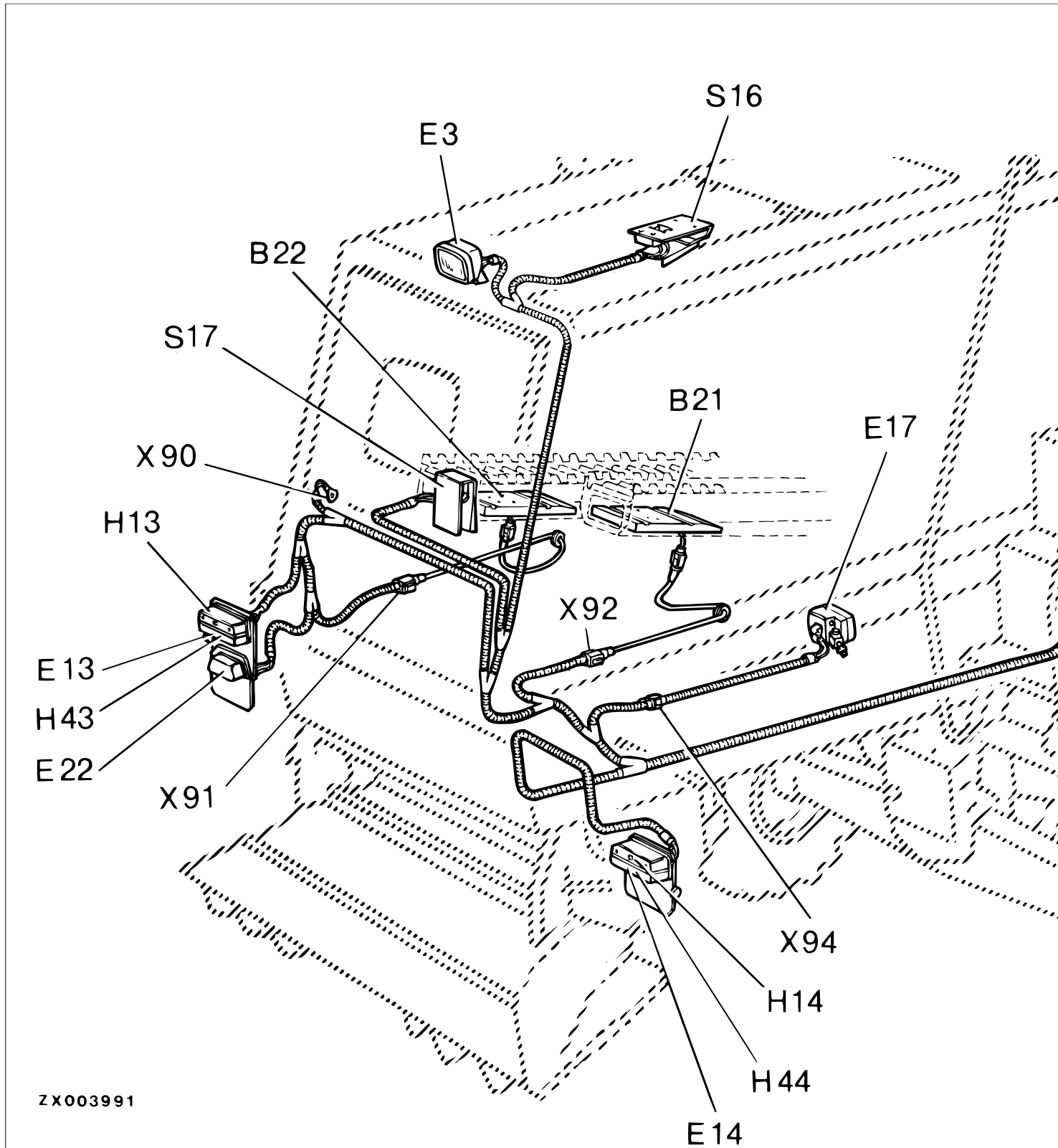


**WIRING AND HARNESS DIAGRAM OF STRAW HOOD WIRING HARNESS W20**



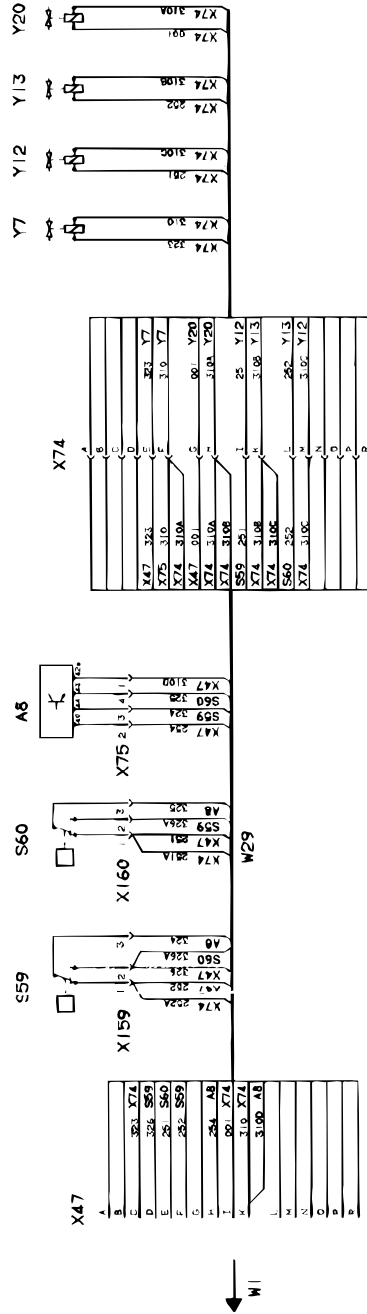
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1040 X 620

### LOCATION OF STRAW HOOD WIRING HARNESS W20 WITH COMPONENTS



ZX003991

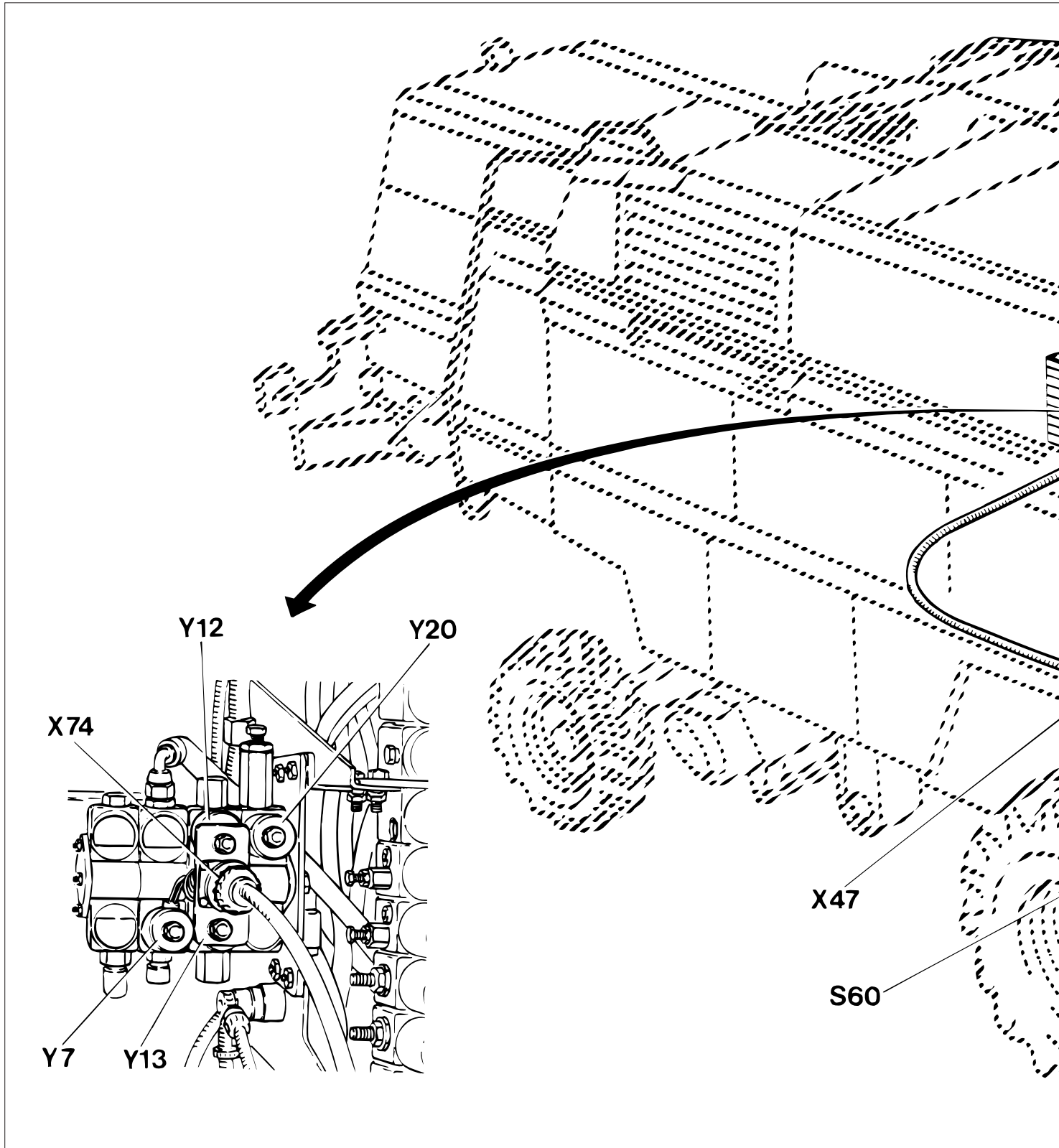
**WIRING AND HARNESS DIAGRAM OF LEVELING SYSTEM WIRING HARNESS W29**



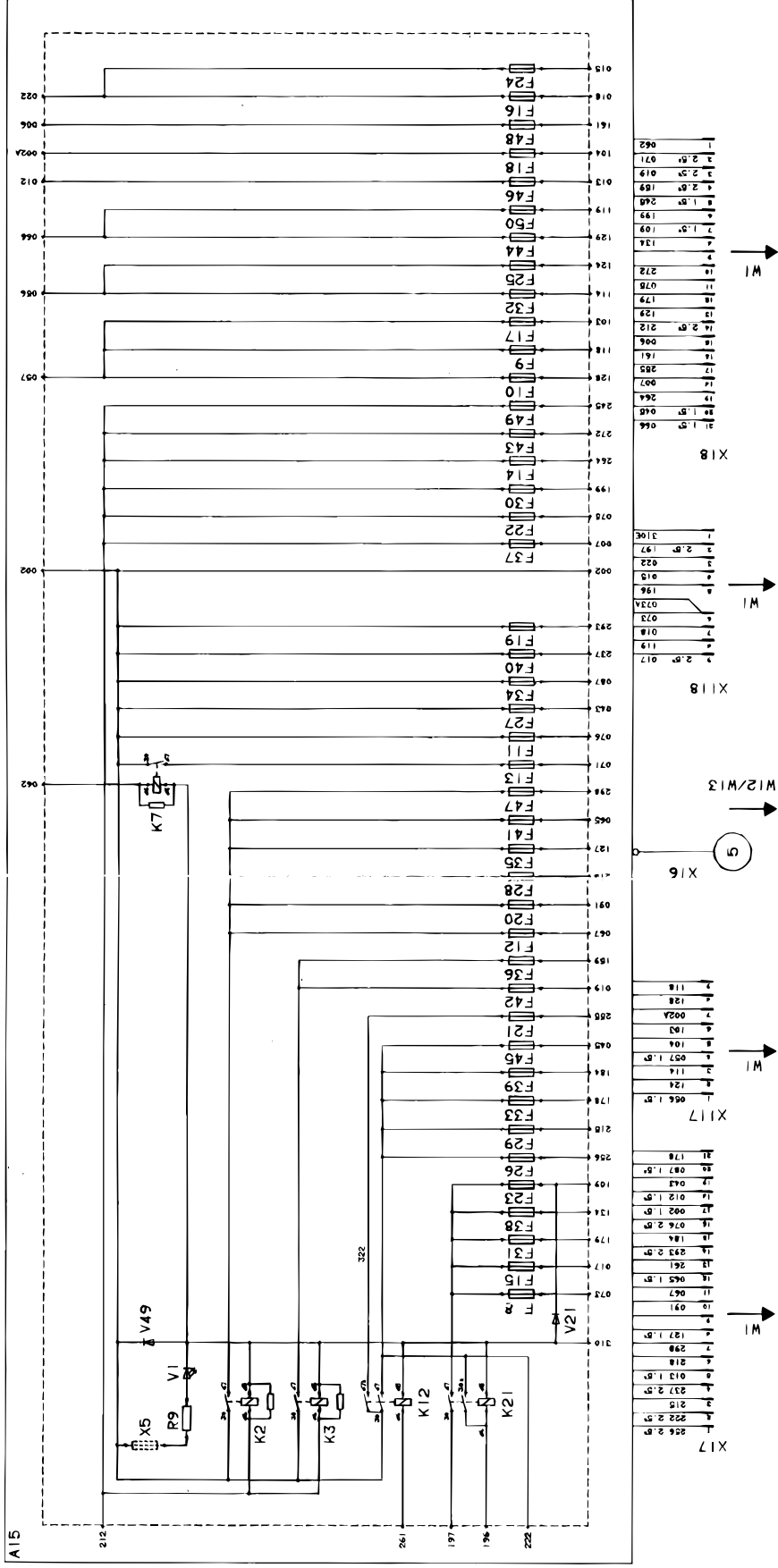
ZX003976



### LOCATION OF LEVELING SYSTEM WIRING HARNESS W29 WITH COMPONENTS



**WIRING AND HARNESS DIAGRAM OF FUSE BOARD A15**



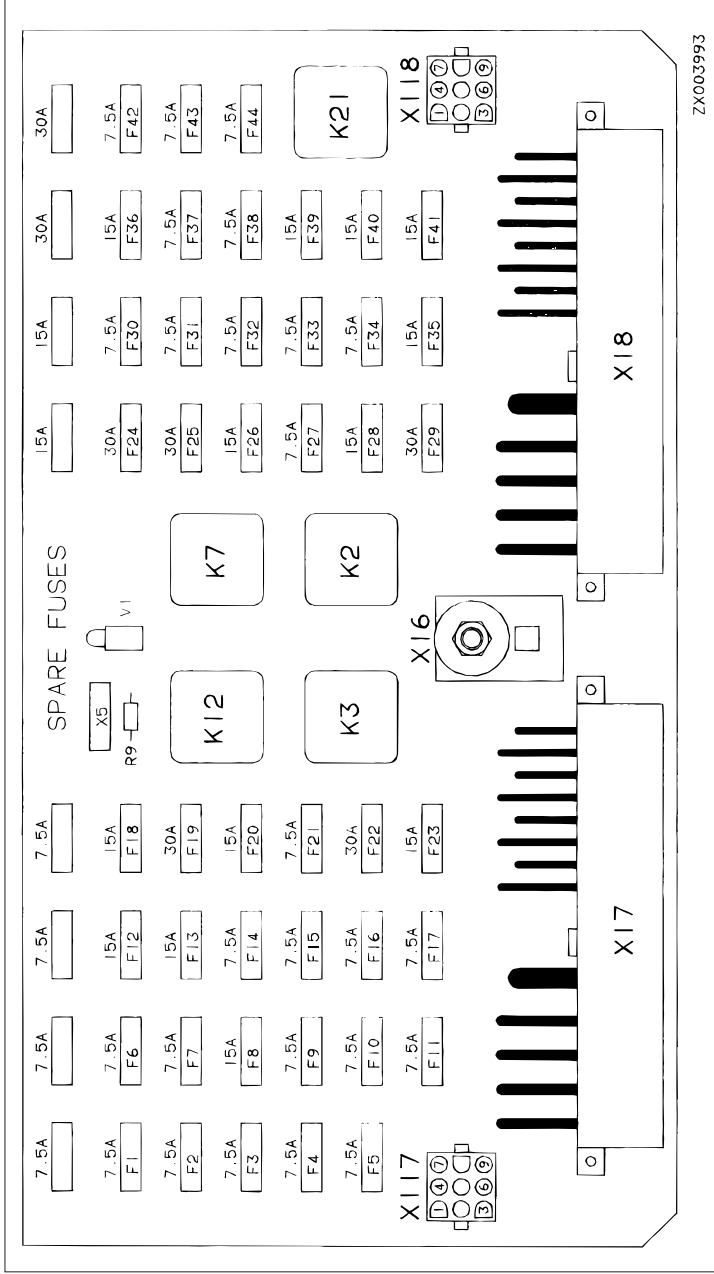
ZX003977

TM4505 (05DEC00)

**240-10-46**

ZX1MXZ000273-19-050C03Z  
Z Series Combines  
06.000  
PN=445

**LOCATION OF COMPONENTS ON FUSE BOARD A15**





**SECTION SURVEY**

SE 01 — Power supply / starting motor	SE 17 — Work lights
SE 02A — Cold weather starting aid, Waterloo engine	SE 18 — Straw warning device
SE 02B — Cold weather starting aid, Saran engine	SE 19 — Stop lights, reel speed adjustment
SE 03A — Engine stop, Waterloo engine	SE 20 — DIAL-A-MATIC™
SE 03B — Engine stop, Saran engine	SE 21 — Separator, header engagement
SE 04 — Fuse tester	SE 22 — Digital infotrak monitor, speed monitoring system
SE 05 — Instruments	SE 23 — Harvest performance monitor
SE 06 — Chopper distributor adjustment	SE 24 — Hillmaster leveling system
SE 07 — Windshield washer system	SE 25A — Separator adjustment
SE 08 — Radio, citizen band, clock	SE 25B — Separator adjustment, combine data center
SE 09 — Indicator lights I	SE 26 — Header adjustments (cutting height, reel, float)
SE 10 — Indicator lights II	SE 27 — Grain tank unloading system
SE 11 — Cigarette lighter, sockets	SE 28 — Four-wheel drive
SE 12 — Light functions	SE 29 — Header horizontal adjustment
SE 13 — Flasher function	SE 30 — Float control
SE 14 — Revolving hazard warning lights	SE 31 — Reverse drive alarm
SE 15 — Air conditioning system	SE 32 — Timer relay
SE 16 — Electrical mirror adjustment	

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## WIRING HARNESS SURVEY

- |                                               |                                                              |
|-----------------------------------------------|--------------------------------------------------------------|
| W 1 — Main distribution wiring harness        | W 26 — Chaff spreader wiring harness                         |
| W 2 — Cab wiring harness                      | W 27 — Wiring harness, straw warning device                  |
| W 3 — Switch console wiring harness           | W 28 — Ground cable, straw warning device                    |
| W 4 — Corner post wiring harness              | W 29 — Leveling system wiring harness                        |
| W 5 — Armrest wiring harness                  | W 30 — Citizens' Band antenna                                |
| W 6 — Air conditioning and fan wiring harness | W 31 — Radio antenna                                         |
| W 7 — Basic wiring harness, front             | W 32 — Header lighting wiring harness                        |
| W 8 — Steering column wiring harness          | W 33 — Wiring harness for ultra-sonic sensors                |
| W 9 — Basic wiring harness, rear              | W 34 — Wiring harness for Logic relay board                  |
| W 10 — Feeder house wiring harness            | W 35 — Frame wiring harness switch (220mm)                   |
| W 11 — Feeder house wiring harness, USA       | W 36 — Wiring harness switch, batt. neg. terminal            |
| W 12 — Wiring harness, Saran engine           | W 37 — Four-wheel drive wiring harness                       |
| W 13 — Wiring harness, Waterloo engine        | W 38 — Wiring harness, mirror adjustment                     |
| W 14 — Optional equipment wiring harness      | W 39 — Wiring harness, electrical mirror adjustment          |
| W 15 — Grain tank wiring harness              | W 40 — Header wiring harness                                 |
| W 18 — Positive battery cable                 | W 41 — Header wiring harness, without hydraulics<br>(Europe) |
| W 20 — Straw hood wiring harness              | W 42 — Unterslung chopper wiring harness                     |
| W 21 — Power supply cable                     | W 45 — 25 ft. header wiring harness (USA)                    |
| W 22 — Header wiring harness                  | W 46 — Header wiring harness with DIAL-A-MATIC™              |
| W 23 — Combine data center wiring harness     | W 47 — Adapter cable for header electr. clutch               |
| W 24 — Wiring harness for sieve motors        |                                                              |
| W 25 — Chopper wiring harness                 |                                                              |
- NOTE: See Group 10 for all wiring plans not shown here.

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## COMPONENT SURVEY

	Section	Wiring Harness
A 1 — Reel speed control . . . . .	19	W 1
A 2 — DIAL-A-MATIC™ relay board . . . . .	20	W 1
A 3 — Electronic speed monitoring system . . . . .	22	W 1
A 4 — Harvest performance monitor . . . . .	23	W 2
A 5 — Combine data center . . . . .	25	W 23
A 6 — Header control . . . . .	26	W 1
A 8 — Leveling control box (Hillmaster) . . . . .	24	W 29
A 9 — Control board, combine data center . . . . .	25	W 1
A 10 — Float control . . . . .	30	W 3
A 11 — Relay board, combine data center . . . . .	25	W 1
A 12 — Radio . . . . .	08	W 2
A 13 — Citizens' Band radio . . . . .	08	W 2
A 14 — Relay and diode board . . . . .	—	W 2
A 15 — Fuse board . . . . .	—	W 1
A 16 — Warning module I . . . . .	09	W 4
A 17 — Warning module II . . . . .	10	W 4
A 18 — Infotrak monitor . . . . .	22	W 2
B 1 — Sending unit, brake fluid level . . . . .	09	W 7
B 2 — Sending unit, engine oil pressure . . . . .	09	W 12; W 13
B 3 — Light sensor . . . . .	23	W 2
B 4 — Sending unit, coolant temperature . . . . .	05	W 12; W 13
B 5 — Sending unit, reel speed . . . . .	19	W 22
B 6 — Sending unit, ground speed . . . . .	22	W 7
B 7 — Sending unit, hydraulic oil filter . . . . .	10	W 9
B 8 — Sending unit, hydraulic oil temperature . . . . .	09	W 9
B 9 — Thermostat (protection against freezing) . . . . .	15	W 6
B 10 — Sending unit, air cleaner . . . . .	10	W 12; W 13
B 11 — Sending unit, fuel tank . . . . .	05	W 9
B 12 — Horn . . . . .	18	W 7
B 13 — Temperature switch, air conditioning . . . . .	15	W 2
B 14 — Low pressure switch, air conditioning . . . . .	15	W 2
B 15 — High pressure switch, air conditioning . . . . .	15	W 12; W 13
B 16 — Speed sending unit, straw chopper . . . . .	22	W 25
B 17 — Speed sending unit, tailings elevator . . . . .	22	W 7
B 18 — Speed sending unit, cross-shaker . . . . .	22	W 9
B 19 — Speed sending unit, clean grain elevator . . . . .	22	W 7
B 20 — Speed sending unit, chaff spreader . . . . .	22	W 26
B 21 — Straw walker sensor, right-hand . . . . .	23	W 20
B 22 — Straw walker sensor, left-hand . . . . .	23	W 20
B 23 — Sieve sensor (5-walker machine) . . . . .	23	W 9
B 24 — Sieve sensor (6-walker machine) . . . . .	23	W 9
B 25 — Sending unit, grain tank indicator 1/2 . . . . .	10	W 15
B 26 — Sending unit, grain tank indicator 3/4 . . . . .	10	W 15
B 27 — Sending unit, grain tank indicator 4/4 . . . . .	10	W 15

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Functional Schematics & Harness Diagrams, from Ser.No. 062722/Component Survey

	Section	Wiring Harness
B 28 — Sending unit, engine speed . . . . .	22	W 12; W 13
B 29 — Sending unit, threshing cylinder speed . . . . .	22	W 7
B 30 — Sending unit, fan speed . . . . .	22	W 7
B 31 — Pressure switch, main clutch . . . . .	27	W 9
B 34 — Sending unit, hydr. oil fill level 1 . . . . .	10	W 9
B 35 — Sending unit, hydr. oil fill level 2 . . . . .	09	W 9
B 39 — Loudspeaker, left-hand . . . . .	08	W 2
B 40 — Loudspeaker, right-hand . . . . .	08	W 2
B 43 — Reverse drive alarm, buzzer . . . . .	31	W 20
E 1 — Headlight, left-hand . . . . .	12	W 7
E 2 — Headlight, right-hand . . . . .	12	W 7
E 3 — Rear work light . . . . .	17	W 20
E 4 — Cab roof work light, outer r.h. . . . .	17	W 2
E 5 — Cab roof work light, inner r.h. . . . .	17	W 2
E 6 — Cab roof work light, outer l.h. . . . .	17	W 2
E 7 — Cab roof work light, inner l.h. . . . .	17	W 2
E 8 — Unloading auger work light . . . . .	17	W 15
E 9 — Cigarette lighter . . . . .	11	W 3
E 10 — Grain tank lighting . . . . .	07	W 15
E 11 — Lighting (according to local requirements) . . . . .	12	W 7
E 12 — Cab interior lighting . . . . .	07	W 2
E 13 — Tail light, left-hand . . . . .	12	W 20
E 14 — Tail light, right-hand . . . . .	12	W 20
E 15 — Clearance light, left-hand . . . . .	12	W 7
E 16 — Clearance light, right-hand . . . . .	12	W 7
E 17 — Straw hood lighting . . . . .	07	W 20
E 18 — Platform work light, right-hand . . . . .	17	W 7
E 19 — Platform work light, left-hand . . . . .	17	W 7
E 22 — Registration plate lighting . . . . .	12	W 20
E 23 — Clearance light, header, left-hand . . . . .	12	W 32
E 24 — Clearance light, header, right-hand . . . . .	12	W 32
E 25 — Work light, mirror bracket . . . . .	17	W 2
E 26 — Work light, mirror bracket . . . . .	17	W 2
F 1 — Fuse, 7.5 amps., spare . . . . .	--	A 15
F 2 — Fuse, 7.5 amps., spare . . . . .	--	A 15
F 3 — Fuse, 7.5 amps., spare . . . . .	--	A 15
F 4 — Fuse, 7.5 amps., spare . . . . .	--	A 15
F 5 — Fuse, 15 amps., spare . . . . .	--	A 15
F 6 — Fuse, 15 amps., spare . . . . .	--	A 15
F 7 — Fuse, 30 amps., spare . . . . .	--	A 15
F 8 — Fuse, 7.5 amps., fan and threshing cylinder speed adjustment . . . . .	25	A 15

ZX, TMXZCO004857-19-15MAR96



Functional Schematics & Harness Diagrams, from Ser.No. 062722/Component Survey

	Section	Wiring Harness
F 9 — Fuse 7.5 amps., parking light, r.h. . . . .	12	A 15
F 10 — Fuse 7.5 amps., parking light, l.h. . . . .	12	A 15
F 11 — Fuse 30 amps., fan adjustment . . . . .	25	A 15
F 12 — Fuse 15 amps., stop lights, reel speed adjustment . . . . .	19	A 15
F 13 — Fuse 30 amps., cab roof work lights . . . . .	17	A 15
F 14 — Fuse 7.5 amps., straw warning device, electronic infotrak monitor . . . . .	18	A 15
F 15 — Fuse 15 amps., distributor adjustment on straw chopper . . . . .	6B	A 15
F 16 — Fuse 7.5 amps., engine shut-off solenoid . . . . .	03A/B	A 15
F 17 — Fuse 7.5 amps., instrument lighting . . . . .	12	A 15
F 18 — Fuse 7.5 amps., radio, citizen band, clock . . . . .	08	A 15
F 19 — Fuse 30 amps., platform work lights and rear work light . . . . .	21	A 15
F 20 — Fuse 7.5 amps., flasher functions . . . . .	13	A 15
F 21 — Fuse 15 amps., radiator cleaner motor . . . . .	21	A 15
F 22 — Fuse 7.5 amps., radio, citizen band, clock . . . . .	08	A 15
F 23 — Fuse 15 amps., separator and header clutch . . . . .	21	A 15
F 24 — Fuse 7.5 amps., indicator lights, temperature gauge . . . . .	05	A 15
F 25 — Fuse 7.5 amps., low-beam headlight, l.h. . . . .	12	A 15
F 26 — Fuse 7.5 amps., header controls . . . . .	26	A 15
F 27 — Fuse 15 amps., horn . . . . .	18	A 15
F 28 — Fuse 7.5 amps, combine data center . . . . .	25	A 15
F 29 — Fuse 15 amps., leveling system . . . . .	24	A 15
F 30 — Fuse 7.5 amps., four-wheel drive . . . . .	28	A 15
F 31 — Fuse 7.5 amps., speed monitoring system . . . . .	22	A 15
F 32 — Fuse 7.5 amps., low-beam headlight, r.h . . . . .	12	A 15
F 33 — Fuse 15 amps., raise/lower header . . . . .	26	A 15
F 34 — Fuse 15 amps., hazard warning lights . . . . .	13	A 15
F 35 — Fuse 15 amps., revolving warning lights . . . . .	14	A 15
F 36 — Fuse 15 amps., windshield wiper, grain tank lighting . . . . .	07	A 15
F 37 — Fuse 7.5 amps., mirror adjustment . . . . .	16	A 15
F 38 — Fuse 7.5 amps., performance monitor . . . . .	23	A 15
F 39 — Fuse 15 amps., grain tank unloading system . . . . .	27	A 15
F 40 — Fuse 30 amps. starter switch . . . . .	01	A 15
F 41 — Fuse 15 amps., concave adjustment . . . . .	25	A 15
F 42 — Fuse 30 amps., air conditioning system . . . . .	15	A 15
F 43 — Fuse 7.5 amps., DIAL-A-MATIC™ . . . . .	20	A 15
F 44 — Fuse 7.5 amps., full-beam headlight, l.h. . . . .	12	A 15
F 45 — Fuse 15 amps., reel control . . . . .	26	A 15
F 46 — Fuse 15 amps., starting aid . . . . .	2A/B	A 15
F 47 — Fuse 15 amps., spare . . . . .	—	A 15
F 48 — Fuse 7.5 amps., alternator D+ . . . . .	01	A 15

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Functional Schematics & Harness Diagrams, from Ser.No. 062722/Component Survey

	Section	Wiring Harness
F 49 — Fuse 15 amps., cigarette lighter, seat compressor . . . . .	11	A 15
F 50 — Fuse 7.5 amps., full-beam headlight, r.h. . . . .	12	A 15
F 51 — Fuse 7.5 amps., electro-clutch for header drive . . . . .	31	W12/W13
F 52 — Fuse 7.5 amps., reverse drive alarm . . . . .	31	W12/W13
G 1 — Battery 12 V, 88 AH . . . . .	01	W 12; W 13
G 2 — Alternator . . . . .	01	W 12; W 13
H 1 — Brake fluid indicator light . . . . .	09	W 4
H 2 — Engine oil pressure indicator light . . . . .	09	W 4
H 3 — Parking brake indicator light . . . . .	09	W 4
H 4 — Coolant temperature indicator light . . . . .	09	W 4
H 5 — Indicator light, unloading auger swing . . . . .	10	W 4
H 6 — Fuel level indicator light . . . . .	10	W 4
H 7 — Hydraulic oil filter indicator light . . . . .	10	W 4
H 8 — Hydraulic oil temperature indicator light . . . . .	09	W 4
H 9 — Four-wheel drive indicator light . . . . .	10	W 4
H 10 — Air cleaner indicator light . . . . .	09	W 4
H 11 — Alternator indicator light . . . . .	10	W 4
H 12 — Alarm light ("STOP") . . . . .	09	W 4
H 13 — Turn signal light, rear left-hand . . . . .	13	W 20
H 14 — Turn signal light, rear right-hand . . . . .	13	W 20
H 15 — Turn signal light, front left-hand . . . . .	13	W 7
H 16 — Turn signal light, front right-hand . . . . .	13	W 7
H 17 — Additional turn signal light, left-hand . . . . .	13	W 7
H 18 — Additional turn signal light, right-hand . . . . .	13	W 9
H 19 — Indicator light, straw warning device . . . . .	09	W 4
H 20 — Buzzer . . . . .	09	W 2
H 21 — Revolving hazard warning light . . . . .	14	W 2
H 22 — High pressure indicator light (AC system) . . . . .	10	W 4
H 23 — Indicator light, straw chopper speed . . . . .	09	W 4
H 24 — Indicator light, tailings elevator speed . . . . .	09	W 4
H 25 — Indicator light, cross shaker speed . . . . .	09	W 4
H 26 — Indicator light, grain elevator speed . . . . .	09	W 4
H 27 — Grain tank fill indicator light 1/2 . . . . .	10	W 4
H 28 — Grain tank fill indicator light 3/4 . . . . .	10	W 4
H 29 — Grain tank fill indicator light 4/4 . . . . .	10	W 4
H 31 — Indicator light, fan speed . . . . .	09	W 4
H 32 — Indicator light, cylinder speed . . . . .	09	W 4
H 33 — Full-beam indicator light . . . . .	12	W 8
H 34 — Turn signal indicator light 1, combine . . . . .	13	W 8
H 35 — Turn signal indicator light 2, trailer . . . . .	13	W 8
H 36 — Revolving hazard warning light . . . . .	14	W 9
H 37 — Hillmaster combine, automatic operation . . . . .	10	W 4
H 38 — Hillmaster combine, manual operation . . . . .	10	W 4
H 39 — Hillmaster combine, end stop . . . . .	10	W 4
H 40 — Hydraulic oil level indicator light . . . . .	10	W 4
H 41 — Turn signal light, header, left-hand . . . . .	13	W 32

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Functional Schematics & Harness Diagrams, from Ser.No. 062722/Component Survey

	Section	Wiring Harness
H 42 — Turn signal light, header, right-hand . . . . .	13	W 32
H 43 — Stop light, left-hand . . . . .	19	W 20
H 44 — Stop light, right-hand . . . . .	19	W 20
K 1 — Starting motor relay . . . . .	01	W 12; W 13
K 2 — Basic relay . . . . .	01	A 15
K 3 — Basic relay . . . . .	01	A 15
K 4 — Buzzer timer relay . . . . .	09	A 14
K 5 — Flasher . . . . .	13	A 14
K 6 — Relay, straw warning device . . . . .	18	A 14
K 7 — Relay, work lights . . . . .	17	A 15
K 8 — Float control relay . . . . .	24	A 14
K 9 — Hillmaster leveling relay . . . . .	24	A 14
K 10 — Relay, fan speed alarm . . . . .	22	A 14
K 11 — Relay, cylinder speed alarm . . . . .	22	W 14
K 12 — Relay, field operation — road travel . . . . .	22	A 15
K 13 — Relay, lower header quickly . . . . .	26	A 14
K 14 — Relay, lower header slowly . . . . .	26	A 14
K 15 — Relay, raise header quickly . . . . .	26	A 14
K 16 — Relay, raise header slowly . . . . .	26	A 14
K 17 — Relay, lower reel . . . . .	26	A 14
K 18 — Relay, raise reel . . . . .	26	A 14
K 19 — Relay, move reel to the rear . . . . .	26	A 14
K 20 — Relay, move reel to the front . . . . .	26	A 14
K 21 — Relay, separator clutch . . . . .	21	A 15
K 22 — Relay, straw warning device . . . . .	18	A 14
K 23 — Safety relay, header drive . . . . .	21	A 14
K 24 — Safety relay, unloading auger drive . . . . .	27	A 14
K 25 — Timer relay, unloading auger swing . . . . .	27	A 14
K 26 — Relay, increasing concave gap . . . . .	25B	A 11 integrated
K 27 — Relay, reducing concave gap . . . . .	25B	A 11 integrated
K 28 — Relay, adjust feeder house speed . . . . .	26	A 14
K 29 — Relay, adjust feeder house speed . . . . .	26	A 14
K 30 — Relay, cylinder faster . . . . .	25B	A 11 integrated
K 31 — Relay, cylinder slower . . . . .	25B	A 11 integrated
K 32 — Relay, adjust reel speed . . . . .	17	A 14
K 33 — Relay, adjust reel speed . . . . .	17	A 14
K 35 — Timer relay, header drive . . . . .	21	A 14
K 36 — Relay, adjust fan speed . . . . .	25	W 9
K 37 — Relay, adjust fan speed . . . . .	25	W 9
K 38 — Relay, increasing fan speed . . . . .	25B	A 11 integrated
K 39 — Relay, decreasing fan speed . . . . .	25	A 11 integrated
K 42 — Relay, header el.-clutch (moving motor) . . . . .	31	
K 45 — Relay, D+ (moving motor) . . . . .	31	
K 46 — Separator timer relay . . . . .	32	
M 1 — Starting motor . . . . .	01	W 12; W 13
M 2 — Reel speed adjusting motor . . . . .	19	W 22
M 3 — Windshield wiper motor . . . . .	07	W 2
M 4 — Cab fan . . . . .	15	W 6

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Functional Schematics & Harness Diagrams, from Ser.No. 062722/Component Survey

	Section	Wiring Harness
M 5 — Seat compressor . . . . .	11	W 5
M 8 — Concave adjusting motor . . . . .	25	W 7
M 9 — Fan speed adjusting motor . . . . .	25	W 9
M 11 — Windshield washer pump . . . . .	07	W 9
M 12 — Radiator cleaner motor . . . . .	21	W 12; W 13
M 13 — Distributor adjusting motor . . . . .	06	W 25
M 14 — Reel variator (US header) . . . . .	--	
M 15 — Mirror . . . . .	--	
M 16 — Mirror . . . . .	--	
P 1 — Coolant temperature gauge . . . . .	05	W 4
P 2 — Fuel gauge . . . . .	05	W 4
P 3 — Header height gauge . . . . .	05	W 4
P 5 — Grain loss indicator . . . . .	05	W 4
P 6 — Digital clock . . . . .	--	
P 7 — Clock . . . . .	08	W 2
P 8 — Distributor gauge . . . . .	06	W 4
R 1 — Fan resistor . . . . .	15	W 6
R 2 — Potentiometer, concave adjustment . . . . .	25	W 7
R 3 — Potentiometer, header height . . . . .	26	W 14
R 4 — Sending unit, header height . . . . .	26	W 7
R 5 — Potentiometer, reel height . . . . .	26	W 14
R 6 — Sending unit, reel height . . . . .	26	W 22
R 7 — Potentiometer, reel horizontal position . . . . .	26	W 14
R 8 — Sending unit, reel horizontal position . . . . .	26	W 22
R 9 — Resistor, LED fuse tester . . . . .	04	A 15
R 13 — Potentiometer, header float . . . . .	26	W 14
R 14 — Potentiometer, distributor adjustment . . . . .	06	W 25
R 16 — Glow-type starting aid . . . . .	--	
S 1 — Starter switch . . . . .	01	W 8
S 2 — Hydrostatic safety switch . . . . .	01	W 5
S 3 — Cold weather starting aid switch . . . . .	02A/B	W 8
S 4 — Indicator light test switch . . . . .	10	W 2
S 5 — Parking brake control switch . . . . .	09	W 7
S 6 — Header float switch . . . . .	30	W 5
S 7 — Stop light switch . . . . .	19	W 7
S 8 — Horn button . . . . .	18	W 8
S 9 — Potentiometer, reel speed . . . . .	17	W 14
S 10 — Reel speed switch . . . . .	17	W 5
S 11 — Hazard warning light switch . . . . .	13	W 2
S 12 — Turn signal switch . . . . .	13	W 8
S 13 — Light switch . . . . .	12	W 2
S 14 — Grain tank lighting switch . . . . .	07	W 2
S 15 — Switch, straw warning device (cross shaker) . . . . .	18	W 9
S 16 — Switch, straw warning device (walkers) . . . . .	18	W 20
S 17 — Switch, straw warning device (chopper) . . . . .	18	W 20
S 18 — Revolving hazard warning light switch . . . . .	14	W 2

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Functional Schematics & Harness Diagrams, from Ser.No. 062722/Component Survey

	Section	Wiring Harness
S 19 — Switch for cab roof work lights . . . . .	17	W 2
S 20 — Windshield wiper switch . . . . .	07	W 2
S 21 — Windshield washer switch . . . . .	07	W 2
S 22 — Fan switch . . . . .	15	W 2
S 23 — DIAL-A-MATIC™ switch . . . . .	20	W 14
S 24 — Speed monitoring switch, chopper . . . . .	22	W 25
S 25 — Air conditioning switch . . . . .	25	W 2
S 27 — Switch, raise/lower header . . . . .	26	W 5
S 28 — Automatic function switch . . . . .	26	W 5
S 29 — Switch, reel height adjustment . . . . .	26	W 5
S 30 — Switch, reel horizontal adjustment . . . . .	26	W 5
S 31 — Road safety switch . . . . .	21	W 2
S 32 — Switch, header control . . . . .	26	W 14
S 33 — Separator drive switch . . . . .	21	W 3
S 34 — Header drive switch . . . . .	21	W 3
S 35 — Unloading auger drive switch . . . . .	27	W 3
S 36 — Switch, concave adjustment . . . . .	25	W 5
S 38 — Switch, combine data center . . . . .	25	W 14
S 39 — Switch, unloading auger swing . . . . .	27	W 3
S 40 — Switch, cylinder speed adjustment . . . . .	25	W 5
S 41 — Switch, fan speed adjustment . . . . .	25	W 5
S 42 — Parking brake switch . . . . .	09	W 5
S 44 — Four-wheel drive switch . . . . .	28	W 7
S 47 — Emergency cut-off switch . . . . .	21	W 5
S 48 — Work light switch . . . . .	17	W 2
S 49 — Full-beam headlight switch . . . . .	12	W 2
S 50 — Manual leveling control switch . . . . .	24	W 3
S 51 — Leveling control switch automatic/manual . . . . .	24	W 3
S 52 — Demoisturizer switch (air conditioning) . . . . .	15	W 3
S 53 — Switch, header variable drive . . . . .	26	W 3
S 54 — Switch, distributor adjustment . . . . .	06	W 14
S 55 — Reverse travel switch . . . . .	25	W 5
S 59 — End switch, leveling to the left . . . . .	24	W 29
S 60 — End switch, leveling to the right . . . . .	24	W 29
S 62 — Switch, header horizontal adjustment . . . . .	29	W 3
S 63 — Battery switch . . . . .	01	W 12; W 13
S 64 — Mirror adjusting switch . . . . .	16	W 39
S 65 — Mirror heater switch . . . . .	16	W 39
S 66 — Switch, header lateral tilt . . . . .	26	
S 69 — Reverse drive alarm switch		
V 1 — Fuse tester . . . . .	04	A 15
V 2 — Diode, pressure switch . . . . .	26	A 14
V 3 — Diode, raising header . . . . .	26	A 14
V 4 — Diode, increasing feeder house speed . . . . .	26	A 14
V 5 — Diode, reel raising function . . . . .	26	A 14
V 6 — Diode, reel back function . . . . .	26	A 14
V 7 — Diode, reel forward function . . . . .	26	A 14
V 8 — Diode, swinging unloading auger in . . . . .	26	A 14

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Functional Schematics & Harness Diagrams, from Ser.No. 062722/Component Survey

	Section	Wiring Harness
V 9 — Diode, swinging unloading auger out . . . . .	26	A 14
V 10 — Diode, increasing cylinder speed . . . . .	26	A 14
V 11 — Diode, concave gauge . . . . .	26	A 14
V 12 — Diode, concave gauge . . . . .	--	
V 13 — Diode Y 6 . . . . .	26	A 14
V 14 — Diode Y 4 . . . . .	26	A 14
V 15 — Diode Y 2 . . . . .	26	A 14
V 16 — Diodes Y 3 and Y 5 . . . . .	26	A 14
V 17 — Diode Y 18 . . . . .	26	A 14
V 18 — Diode Y 19 . . . . .	26	A 14
V 19 — Diode Y 16 . . . . .	26	A 14
V 20 — Diode Y 17 . . . . .	26	A 14
V 21 — Diodes Y 22 and Y 23 . . . . .	21	A 15
V 22 — Diode Y 28 . . . . .	--	
V 23 — Diode Y 29 . . . . .	--	
V 24 — Diodes Y 26 and Y 27 . . . . .	27	A 14
V 25 — Diode Y 10 . . . . .	27	A 14
V 26 — Diode Y 11 . . . . .	27	A 14
V 27 — Diode Y 34 . . . . .	21	A 14
V 28 — Diode Y 31 . . . . .	26	A 14
V 29 — Diode Y 30 . . . . .	26	A 14
V 30 — Diode Y 12 . . . . .	24	A 14
V 31 — Diode Y 13 . . . . .	24	A 14
V 32 — Diode K 13 . . . . .	26	A 14
V 33 — Diode K 14 . . . . .	26	A 14
V 34 — Diode K 15 . . . . .	26	A 14
V 35 — Diode K 16 . . . . .	26	A 14
V 36 — Diode K 17 . . . . .	26	A 14
V 37 — Diode K 18 . . . . .	26	A 14
V 38 — Diode K 19 . . . . .	26	A 14
V 39 — Diode K 20 . . . . .	26	A 14
V 40 — Diode K 28 . . . . .	26	A 14
V 41 — Diode K 29 . . . . .	26	A 14
V 42 — Diode, raise header . . . . .	26	A 14
V 43 — Diode, lower header . . . . .	26	A 14
V 44 — Diode, header horizontal adjustment . . . . .	29	A 14
V 45 — Diode, header horizontal adjustment . . . . .	29	A 14
V 46 — Diode, leveling to the left . . . . .	24	A 14
V 47 — Diode, leveling to the right . . . . .	24	A 14
V 48 — Diode, header float control . . . . .	30	A 14
V 51 — Diode K8 . . . . .	24	A 14
V 52 — Diode K9 . . . . .	24	A 14
V 53 — Diode Y14 . . . . .	29	A 14
V 54 — Diode Y15 . . . . .	29	A 14
V 55 — Diode Y13 . . . . .	--	
V 56 — Diode Y6 . . . . .	--	
V 57 — Diode Y6 . . . . .	--	
V 58 — Diode DIAL-A-MATIC™ . . . . .	--	
V 59 — Diode K43 . . . . .	--	
V 60 — Diode K41 . . . . .	--	
V 61 — Diode K40 . . . . .	--	
V 62 — Zener diode 1N5344B . . . . .	--	

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Functional Schematics & Harness Diagrams, from Ser.No. 062722/Component Survey

	Section	Wiring Harness
V 63 — Zener diode 1N5344B . . . . .	--	
V 64 — Zener diode 1N5444B . . . . .	--	
X 0 — Ground connection, cab wiring harness . . . . .	--	W 2
X 1 — Ground connection, distribution harness . . . . .	--	W 1
X 2 — Disconnect point, radio (USA) . . . . .	--	W 2
X 3 — Disconnect point, Citizens' Band radio . . . . .	--	
X 4 — Disconnect point, header DIAL-A-MATIC™ switch . . . . .	--	
X 5 — Fuse tester socket . . . . .	04	A 15
X 6 — Connection, relay board . . . . .	--	W 2
X 7 — Connection, relay board . . . . .	--	W 2
X 8 — Connection, relay board . . . . .	--	W 2
X 9 — Connection, relay board . . . . .	--	W 2
X 10 — Connection, relay board . . . . .	--	W 2
X 11 — Connection, relay board . . . . .	--	W 2
X 12 — Connection, relay board . . . . .	--	W 2
X 13 — Connection, relay board . . . . .	--	W 2
X 14 — Connection, relay board . . . . .	--	W 2
X 15 — Trailer socket . . . . .	--	W 9
X 16 — Terminal, fuse board . . . . .	--	W 21; W 12
X 17 — Connection, fuse board, l.h. . . . .	--	W 1
X 18 — Connection, fuse board, r.h. . . . .	--	W 1
X 19 — Plug for warning light block . . . . .	--	
X 20 — Plug for alarm light block . . . . .	--	
X 21 — Disconnect point, header wiring harness . . . . .	--	W 10; W 22
X 22 — Disconnect point, chopper wiring harness . . . . .	--	W 9; W 25
X 23 — Disconnect point, cab . . . . .	--	W 7; W 2
X 24 — Disconnect point, solenoid valve block, basic hydraulics . . . . .	--	W 9
X 25 — Disconnect point, cab . . . . .	--	W 1; W 2
X 26 — Disconnect point, cab . . . . .	--	W 1; W 2
X 27 — Disconnect point, cab . . . . .	--	W 1; W 2
X 28 — Disconnect point, cab . . . . .	--	W 1; W 2
X 29 — Splice 071 . . . . .	--	W 2
X 30 — Electronic ground adjusting potentiometers . . . . .	--	
X 31 — Programming window flasher . . . . .	13	W A 14
X 32 — Plug for solenoid block 2 . . . . .	--	W 22
X 33 — Ground distributor, hydraulic block 1 . . . . .	--	W 9
X 34 — Ground distributor, hydraulic block 2 . . . . .	--	W 22
X 35 — 37-terminal armrest plug . . . . .	--	W 2; W 5
X 36 — Plug for forward/reverse lever . . . . .	--	W 5
X 37 — Plug for dashboard 1 . . . . .	--	W 2; W 3
X 38 — Plug for dashboard 2 . . . . .	--	W 2; W 14
X 39 — 18-term. plug on data center relay board . . . . .	--	W 1
X 40 — Cross-shaker switch plug . . . . .	--	W 9
X 41 — Straw chopper plug . . . . .	--	W 20
X 42 — Data center control board plug . . . . .	--	W 1
X 43 — Straw hood wiring harness plug . . . . .	--	W 20; W 9

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Functional Schematics & Harness Diagrams, from Ser.No. 062722/Component Survey

	Section	Wiring Harness
X 44 — Plug for basic harness, r.h. . . . .	--	W 2; W 9
X 45 — Plug for basic harness, l.h. . . . .	--	W 2; W 9
X 46 — Plug for platform wiring harness . . . . .	--	W 7; W 2
X 47 — Plug for Hillmaster harness . . . . .	--	W 29; W 1
X 48 — Plug for grain tank harness . . . . .	--	W 15; W 9
X 49 — Plug for corner post harness . . . . .	--	W 2; W 4
X 50 — Plug for electronic box of speed monitoring system . . . . .	--	W 1
X 51 — Plug for header control . . . . .	--	W 1
X 52 — Plug for DIAL-A-MATIC™ electronic box . . . . .	--	W 1
X 53 — Spare plug . . . . .	--	W 1
X 54 — Ground connection, engine wiring harness . . . . .	--	W 12; W 13
X 55 — Plug for combine data center . . . . .	--	W 2; W 23
X 56 — Plug for reel speed control . . . . .	--	W 1
X 57 — Plug for electronic row guidance . . . . .	--	
X 58 — Plug for flex. cable on chaffer . . . . .	--	
X 59 — Plug for flex. cable on sieve . . . . .	--	
X 60 — Plug for flex. cable on chaffer extension . . . . .	--	
X 61 — Plug for revolving beacon light . . . . .	--	
X 62 — Plug for engine wiring harness . . . . .	--	W 12; W 13
X 63 — Plug (according to local requirements) . . . . .	--	
X 64 — Ground connection, basic harness, l.h. . . . .	--	W 1
X 65 — Plug for steering column harness . . . . .	--	W 7; W 8
X 66 — Plug for air conditioning harness . . . . .	--	W 2; W 6
X 67 — Socket, rear axle . . . . .	09	W 9
X 68 — Socket, engine . . . . .	--	
X 69 — Plug for battery + clock; radio; CB-radio . . . . .	--	
X 71 — Plug for chaff spreader harness . . . . .	--	W 25; W 26
X 72 — Plug for data center relay board . . . . .	--	W 1
X 73 — Plug for 16-terminal hydraulic block . . . . .	--	W 10
X 74 — Plug for Hillmaster solenoid block . . . . .	--	W 29
X 75 — Connection, leveling control box . . . . .	--	W 29
X 76 — Plug for corner post harness . . . . .	--	W 2; W 4
X 77 — Plug for feeder house harness . . . . .	--	W 7; W 10
X 78 — Splice 245 . . . . .	--	W 2
X 79 — Splice 075 . . . . .	--	W 1
X 80 — Splice 1, ground for electronics . . . . .	--	W 1
X 81 — Splice 2, ground for electronics . . . . .	--	W 1
X 82 — Plug for ultrasonic sensors . . . . .	--	W 7; W 1
X 83 — Splice 256 . . . . .	--	W 1
X 84 — Splice 327 . . . . .	--	
X 85 — Splice 050 . . . . .	--	
X 86 — Splice 147 . . . . .	--	W 20
X 87 — Splice 148 . . . . .	--	W 20
X 88 — Dashboard plug . . . . .	--	W 2; W 3
X 89 — Splice 151 . . . . .	--	W 20
X 90 — Ground connection, straw hood . . . . .	--	W 20
X 91 — Plug for walker sensor, l.h. . . . .	--	W 20
X 92 — Plug for walker sensor, r.h. . . . .	--	W 20

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Functional Schematics & Harness Diagrams, from Ser.No. 062722/Component Survey

	Section	Wiring Harness
X 93 — Plug for sieve sensor . . . . .	--	W 9
X 94 — Plug for straw hood lighting . . . . .	--	W 20
X 95 — 5-terminal plug for ultrasonic sensors . . . . .	--	W 22
X 96 — Bosch plug for float control . . . . .	--	W 3
X 97 — Plug for electrical mirror adjustment . . . . .	--	W 2; W 39
X 98 — Ground connection, electrical mirror adjustment . . . . .	--	W 3
X 99 — 2-terminal plug, 4-wheel drive solenoid valve . . . . .	--	
X 100 — Ground connection hydraulic block 3 . . . . .	--	W 10
X 101 — Plug for header lighting . . . . .	--	W 22; W 32
X 102 — Plug for underslung chopper . . . . .	--	
X 103 — Float control bridging plug . . . . .	--	
X 104 — Plug for seat compressor . . . . .	--	
X 105 — Plug for data bus . . . . .	--	W 2
X 117 — 9-terminal plug for l.h. Power Board . . . . .	--	W 1
X 118 — 9-terminal plug for r.h. Power Board . . . . .	--	W 1
X 119 — Service plug for ECU . . . . .	--	
X 120 — Service plug for ECU . . . . .	--	
X 121 — Service plug for ECU . . . . .	--	
X 122 — Splice for ECU harness . . . . .	--	
X 123 — Splice for ECU harness . . . . .	--	
X 159 — Plug for Hillmaster end switch . . . . .	--	W 29
X 160 — Plug for Hillmaster end switch . . . . .	--	W 29
X 161 — 6-terminal plug, header electrical clutch . . . . .	--	
X 162 — 2-terminal plug, reverse drive alarm . . . . .	--	
X 163 — 2-terminal plug, grain tank switch . . . . .	--	
Y 1 — Main valve, solenoid control block . . . . .	27	W 9
Y 2 — Header solenoid valve . . . . .	26	W 9
Y 3 — Solenoid, raise header . . . . .	26	W 9
Y 4 — Solenoid, lower header . . . . .	26	W 9
Y 5 — Solenoid, raise header . . . . .	26	W 9
Y 6 — Solenoid, lower header . . . . .	26	W 9
Y 8 — Solenoid, ether starting aid . . . . .	02A	W 13
Y 9 — Solenoid, shut off engine . . . . .	03B	W 12
Y 10 — Solenoid, swing in unloading auger . . . . .	27	W 9
Y 11 — Solenoid, swing out unloading auger . . . . .	27	W 9
Y 12 — Solenoid, leveling to the left . . . . .	24	W 29
Y 13 — Solenoid, leveling to the right . . . . .	24	W 29
Y 14 — Solenoid, header horizontal position, left-hand . . . . .	29	W 10; W 11
Y 15 — Solenoid, header horizontal position, right-hand . . . . .	29	W 10; W 11
Y 16 — Solenoid, move reel to the front . . . . .	26	W 11; W 22

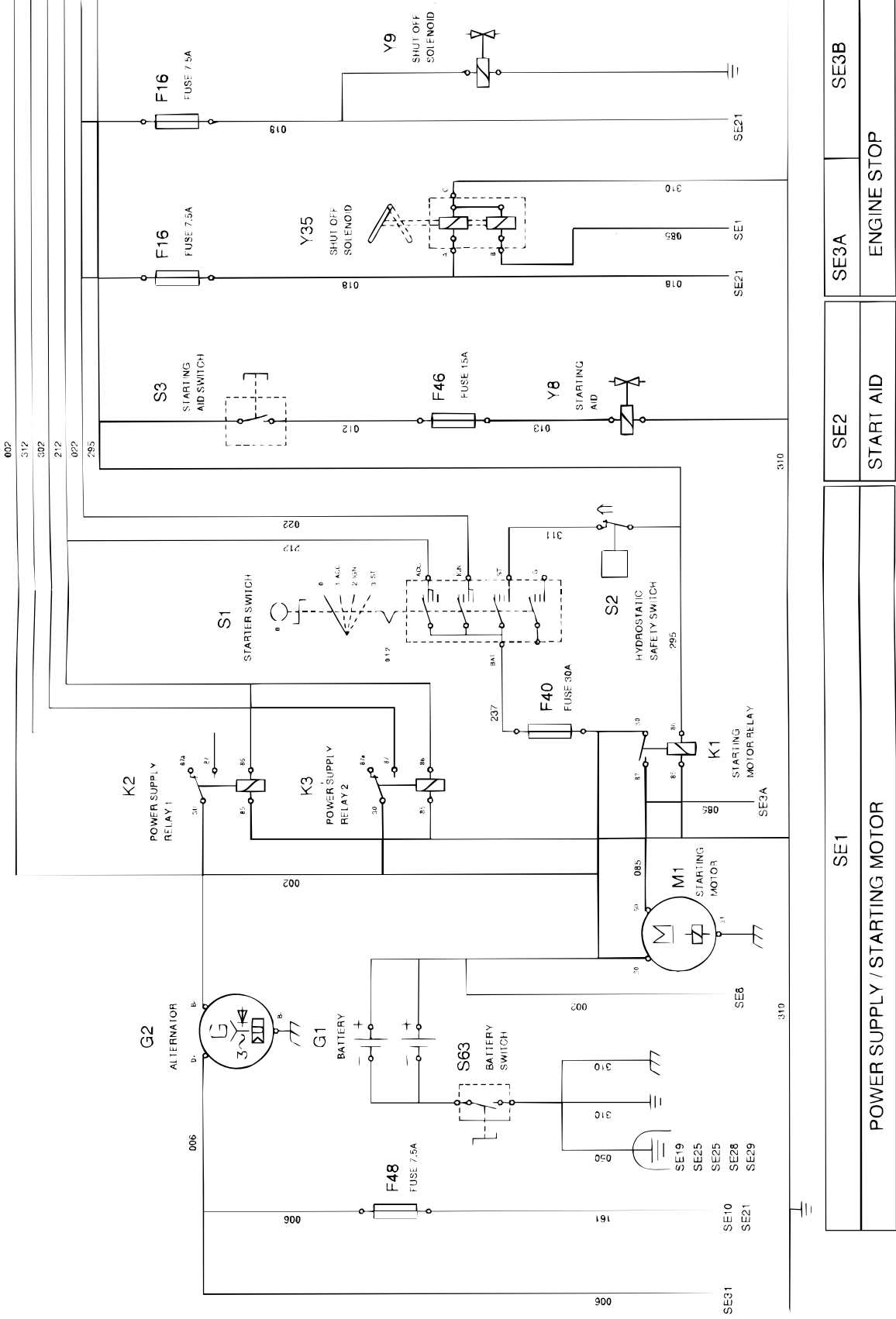
ZX, TMXZCO004866-19-15MAR96

Functional Schematics & Harness Diagrams, from Ser.No. 062722/Component Survey

	Section	Wiring Harness
Y 17 — Solenoid, move reel to the rear . . . . .	26	W 11; W 22
Y 18 — Solenoid, lower reel . . . . .	26	W 11; W 22
Y 19 — Solenoid, raise reel . . . . .	26	W 11; W 22
Y 20 — Solenoid, lower combine . . . . .	24	W 29
Y 22 — Solenoid, engage separator . . . . .	21	W 9
Y 23 — Solenoid, engage separator . . . . .	21	W 9
Y 26 — Solenoid, unloading grain . . . . .	27	W 9
Y 27 — Solenoid, unloading grain . . . . .	27	W 9
Y 28 — Solenoid, reduce cylinder speed . . . . .	25	W 9
Y 29 — Solenoid, increase cylinder speed . . . . .	25	W 9
Y 30 — Solenoid, reduce feeder house speed . . . . .	26	W 10
Y 31 — Solenoid, increase feeder house speed . . . . .	26	W 10
Y 32 — Solenoid, four-wheel drive . . . . .	28	W 9
Y 33 — Compressor clutch . . . . .	15	W 13; W 12
Y 34 — Header clutch . . . . .	21	W 7
Y 35 — Engine shut-off solenoid . . . . .	03A	W 13
Y 36 — Solenoid, underslung chopper . . . . .	-	

ZX, TMXZCO004867-19-15MAR96

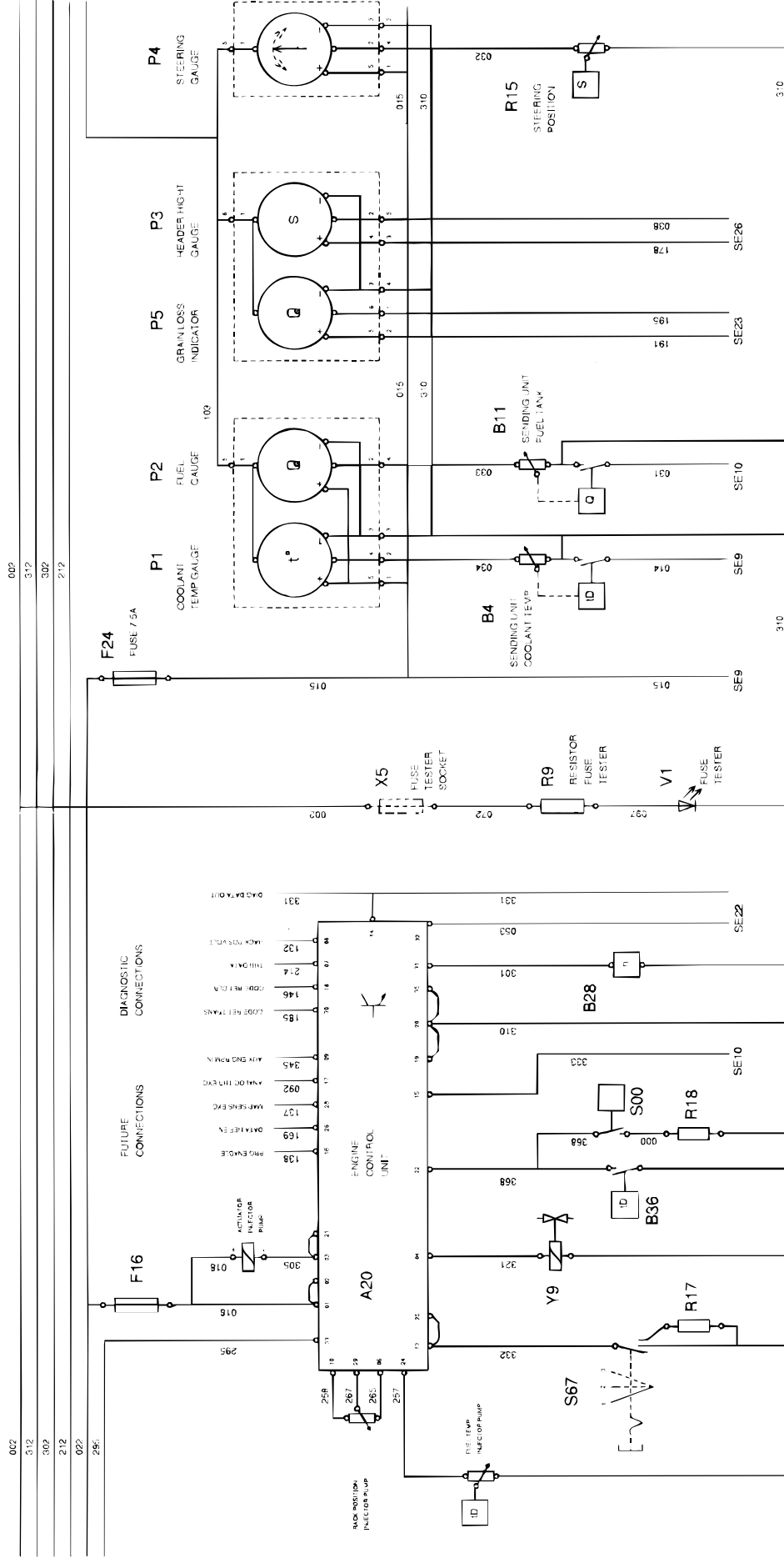
**FUNCTIONAL SCHEMATIC, SECTIONS 1, 2, 3A AND 3B**



ZX008205

SE1	SE2	SE3A	SE3B
POWER SUPPLY / STARTING MOTOR		ENGINE STOP	
		START AID	

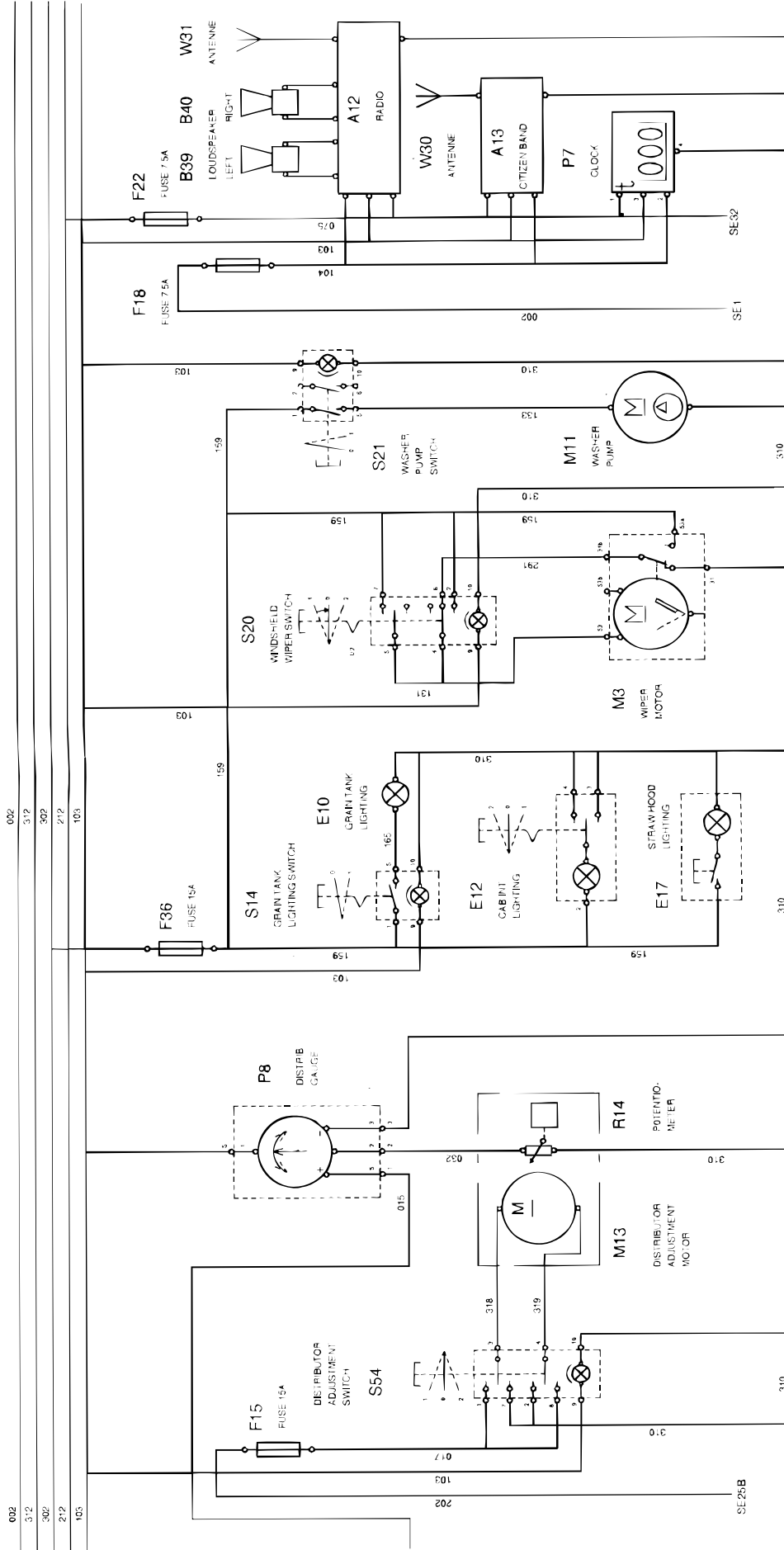
**FUNCTIONAL SCHEMATIC, SECTIONS 3C, 4, 5 AND 6A**



SE3C	SE4	SE5	SE6A
ENGINE ELECTRONIC MANAGEMENT	F-TEST	INSTRUMENTS	STEERING

ZX008206

**FUNCTIONAL SCHEMATIC, SECTIONS 6B, 7 AND 8**



SE6B	SE7	SE8
CHOPPER DISTRIBUTOR ADJ.	LIGHTING, WINDSHIELD WASHER	RADIO; CLOCK

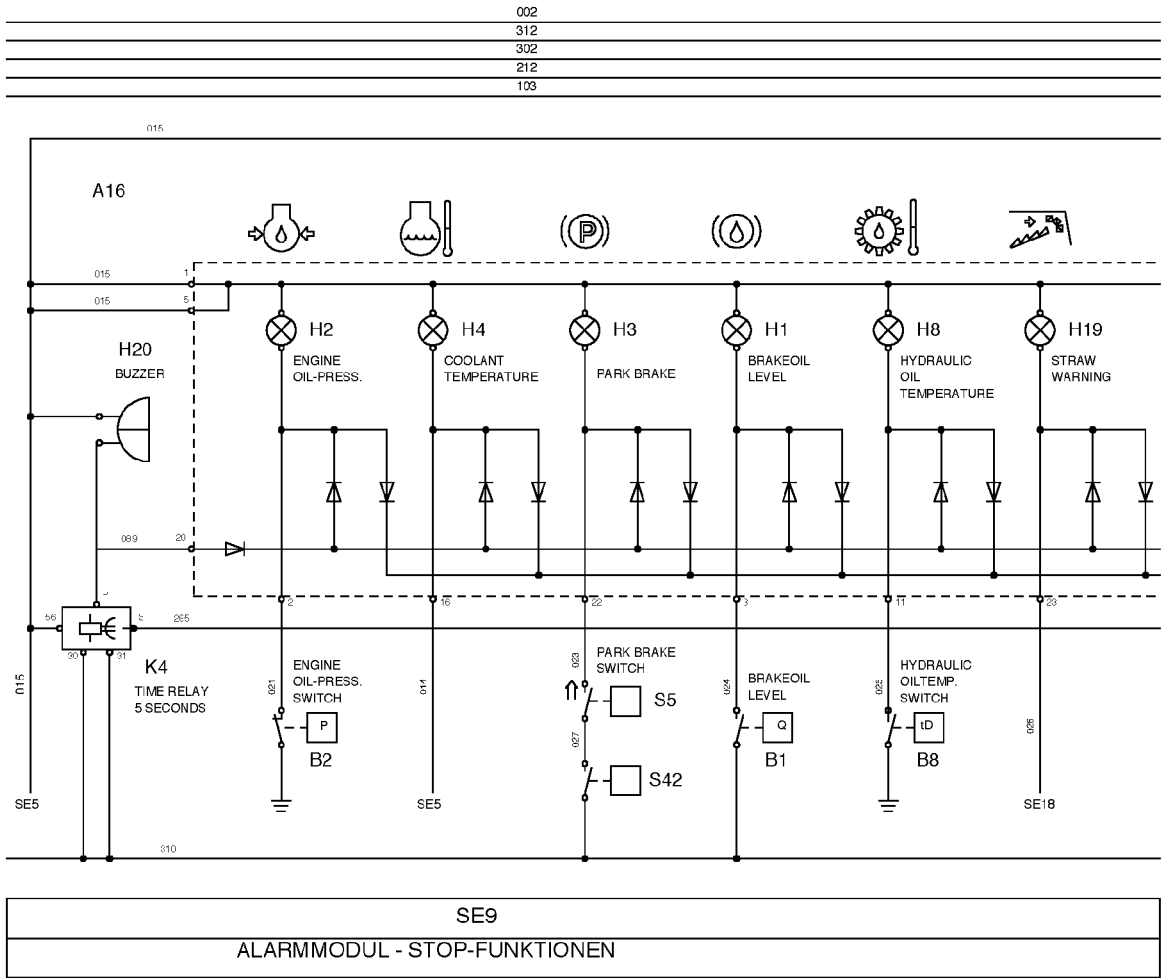
ZX008207

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ZX1MXZ006983-19-15MAR99  
Z Series Combines  
061300  
PN=464

**FUNCTIONAL SCHEMATIC, SECTION 9**



ZX008208

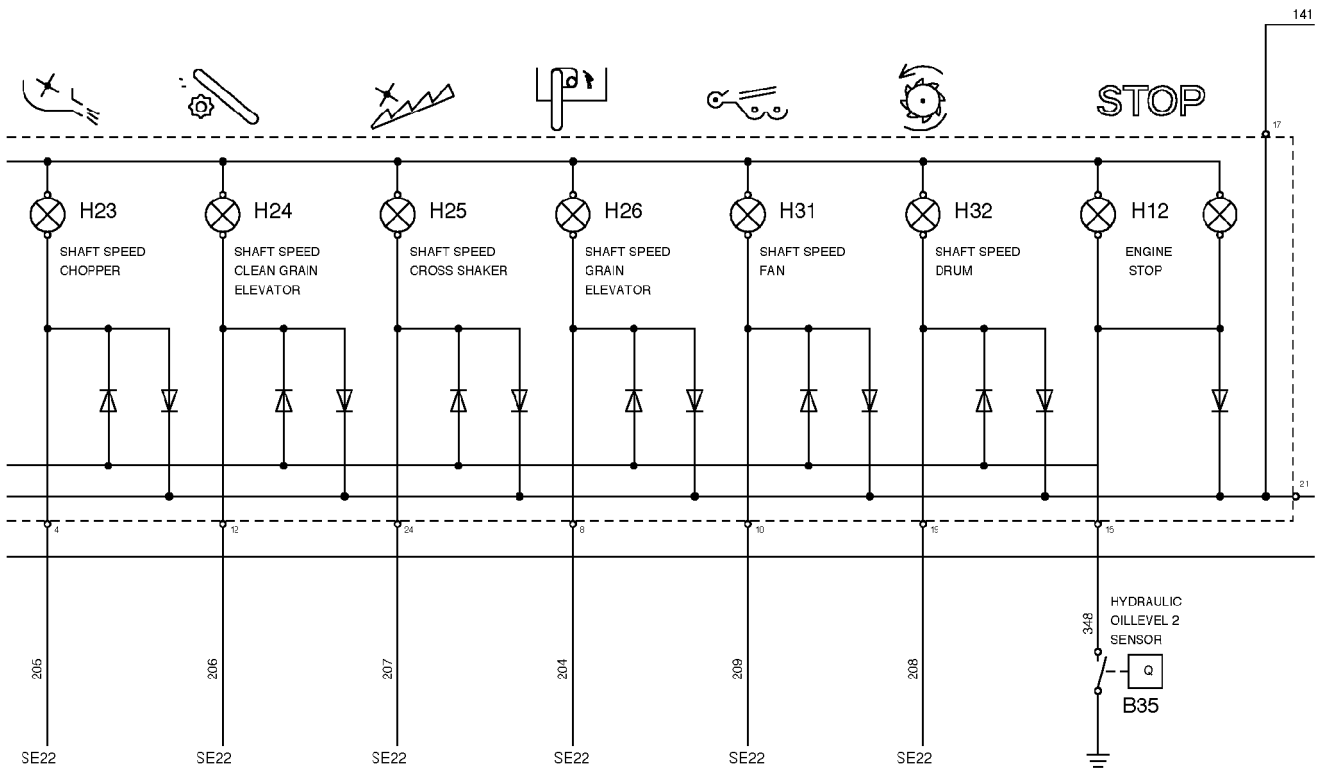
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### FUNCTIONAL SCHEMATIC, SECTION 9A

002
312
302
212
103

015



310

SE9A  
ALARMMODUL - STOP-FUNKTIONEN

ZX008601

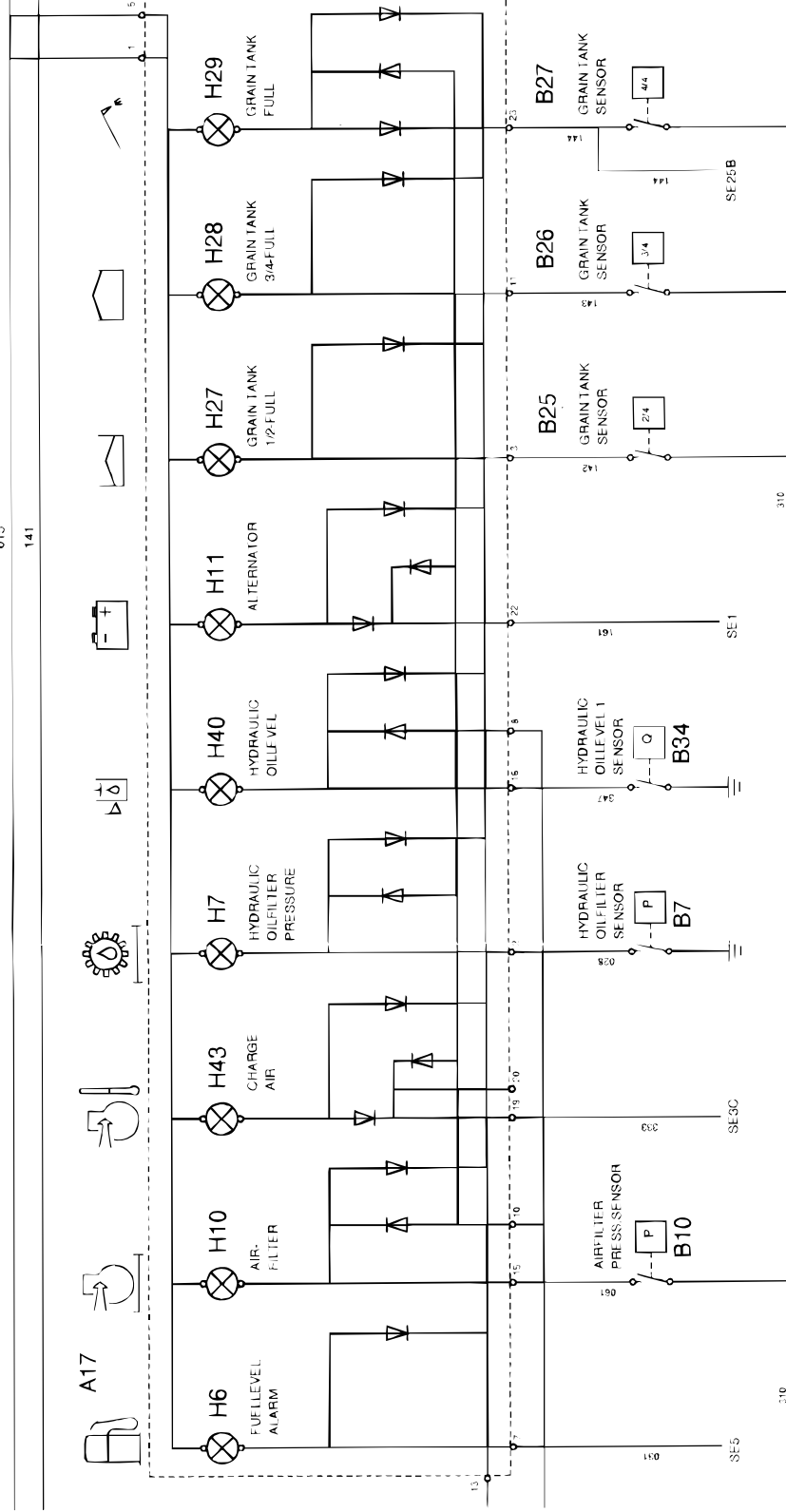
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ZX, TMXZCO005137-19-15MAR96

**FUNCTIONAL SCHEMATIC, SECTION 10A**

002  
312  
302  
212  
103

015  
141



SE10A  
WARNMODUL

ZX008209

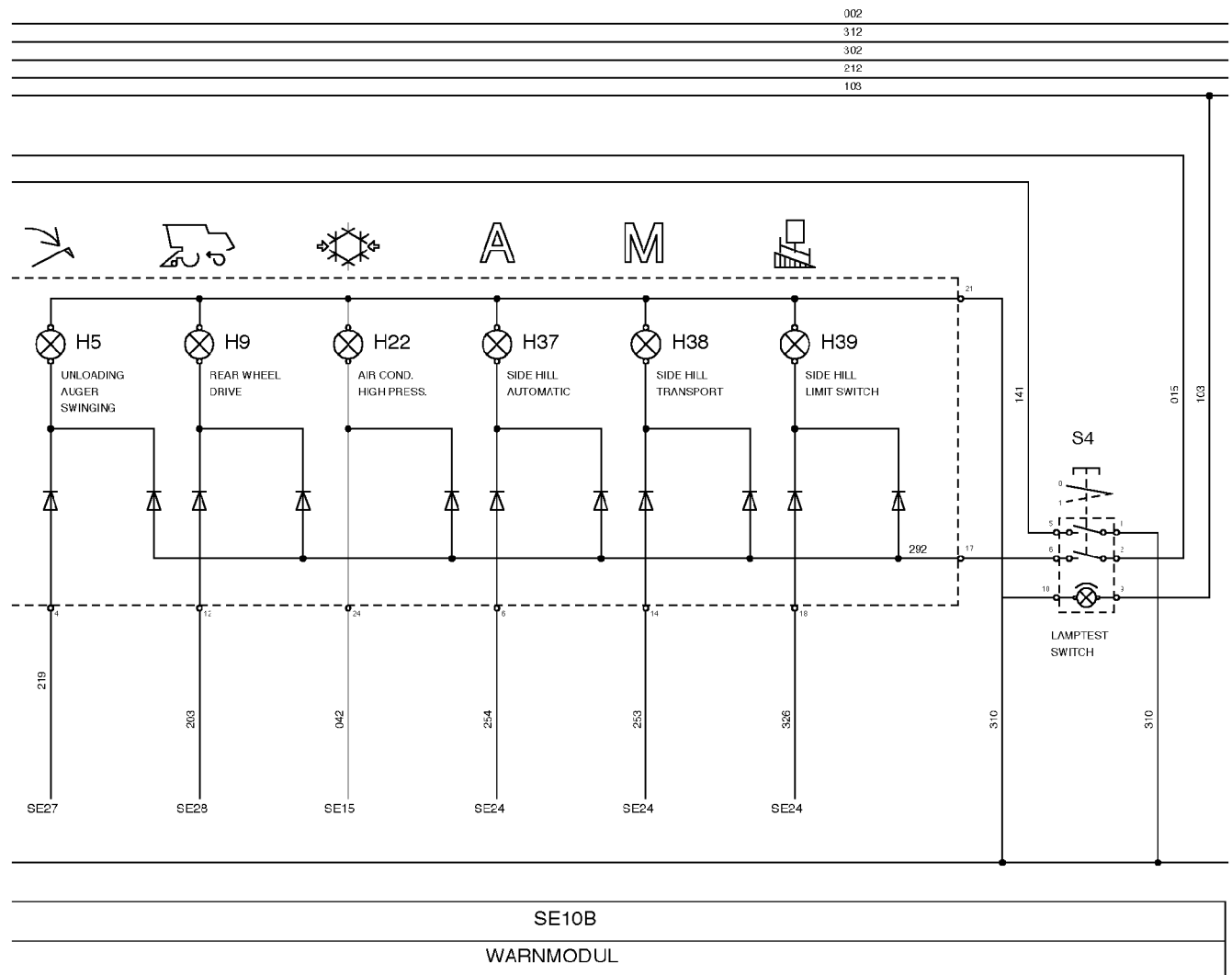
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061300  
PN=467

240-11-20

TM4505 (05DEC00)



**FUNCTIONAL SCHEMATIC, SECTION 10B**

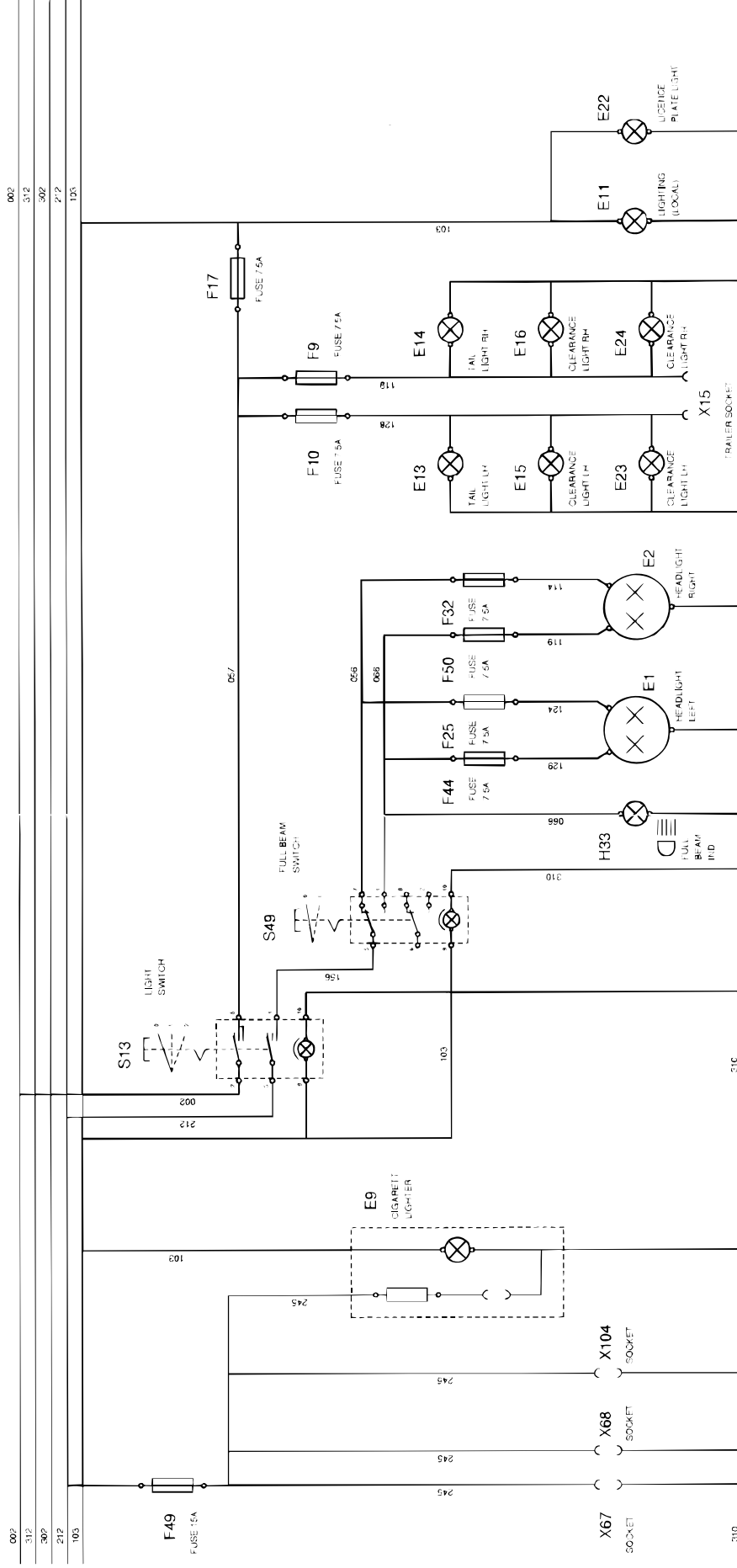


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ZX008210 -JUN-24OCT96

ZX, TMXZCO004834-19-15MAR96

**FUNCTIONAL SCHEMATIC, SECTIONS 11 AND 12**



SE11	SE12
CIGARETT LIGHTER / SOCKETS	LIGHT FUNCTION

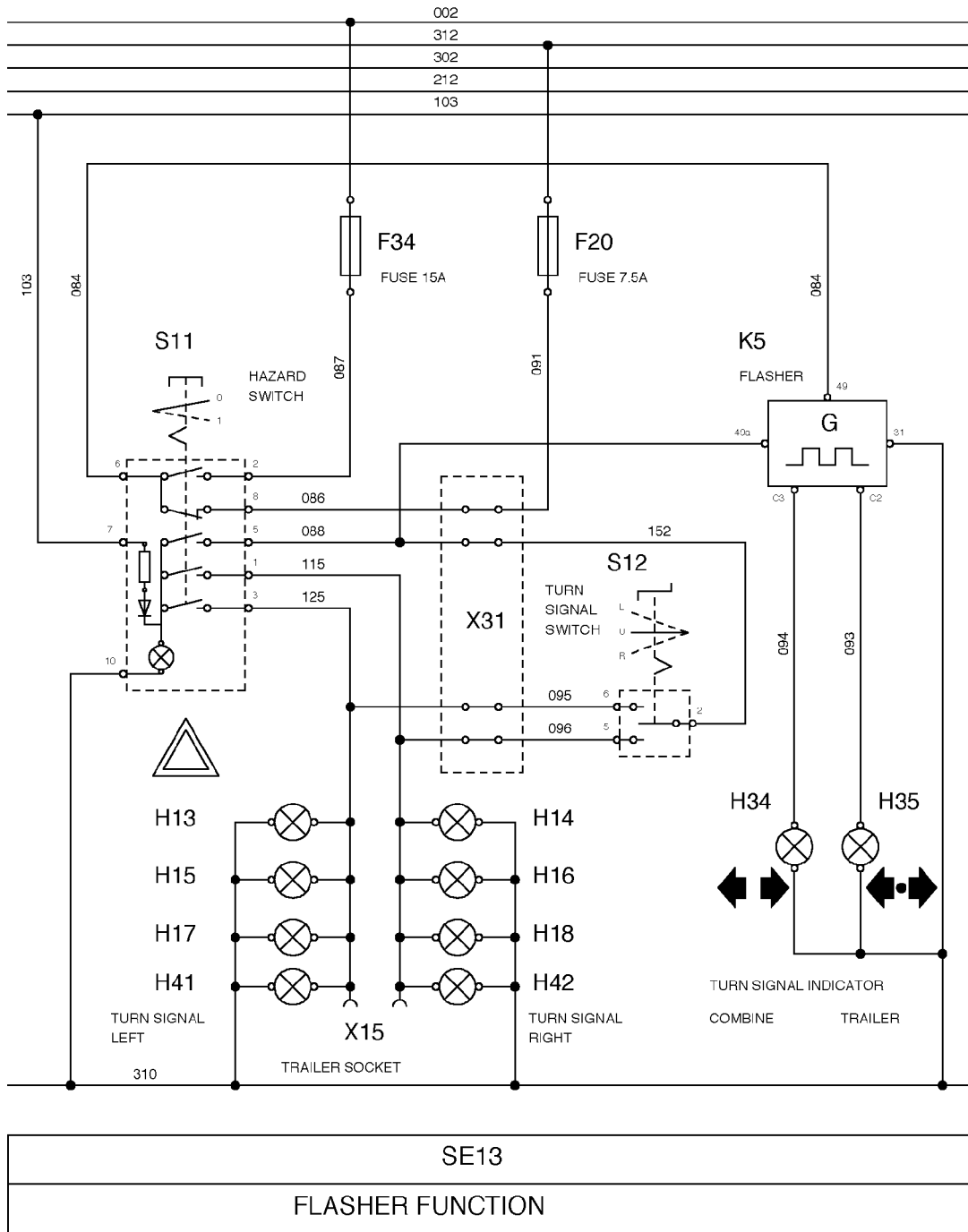
ZX008211

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240-11-22

ZX1MXZ006955-19-15MAR95  
Z Series Combines  
061300  
PN=468

**FUNCTIONAL SCHEMATIC, SECTION 13**



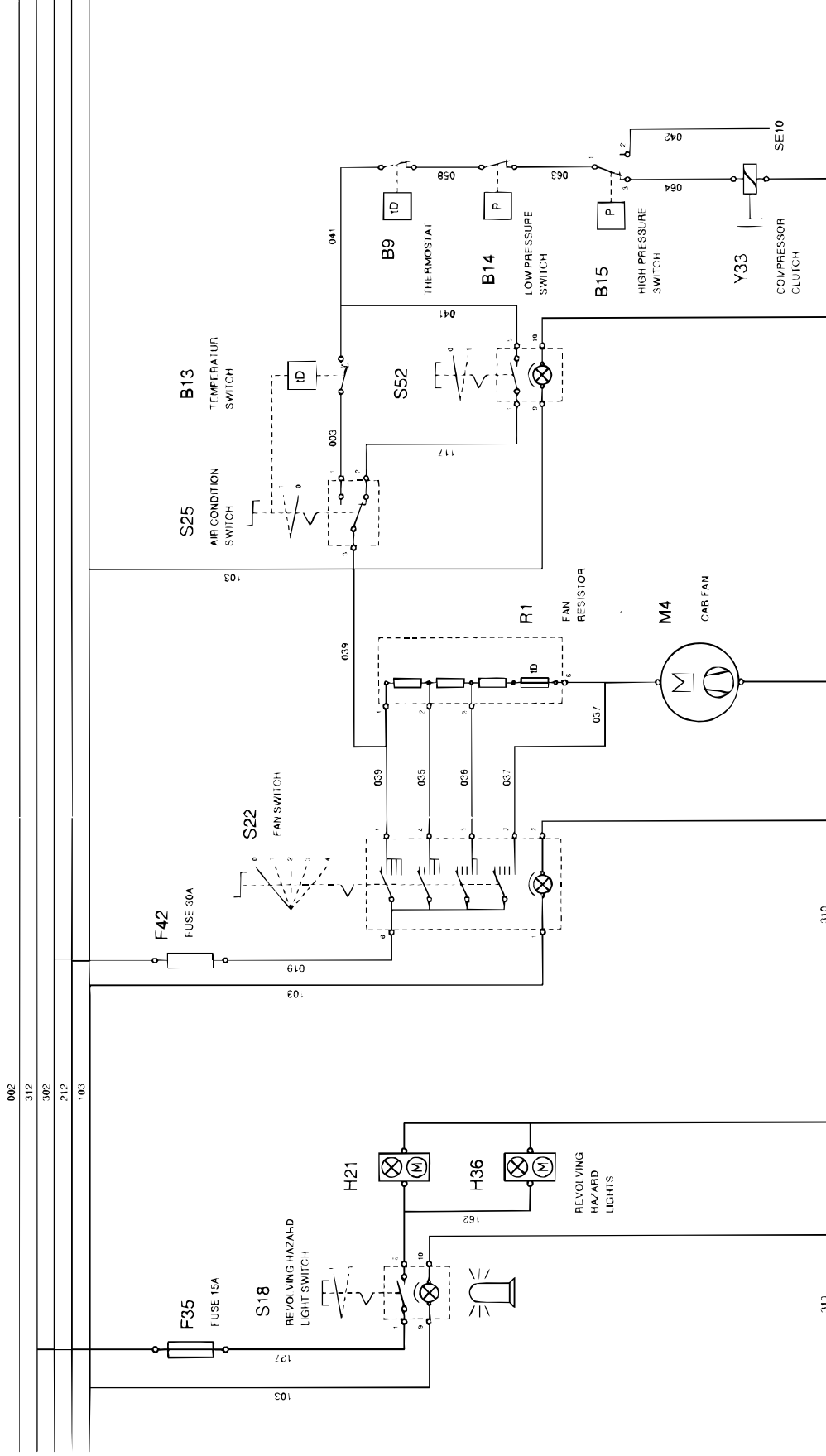
SE13  
FLASHER FUNCTION

ZX008212

-JUN-25APR96  
ZX008212

ZX, TMXZC0004836-19-15MAR96

FUNCTIONAL SCHEMATIC, SECTIONS 14 AND 15



SE14	SE15
REVOLVING LIGHTS	AIR CONDITION

ZX0008213

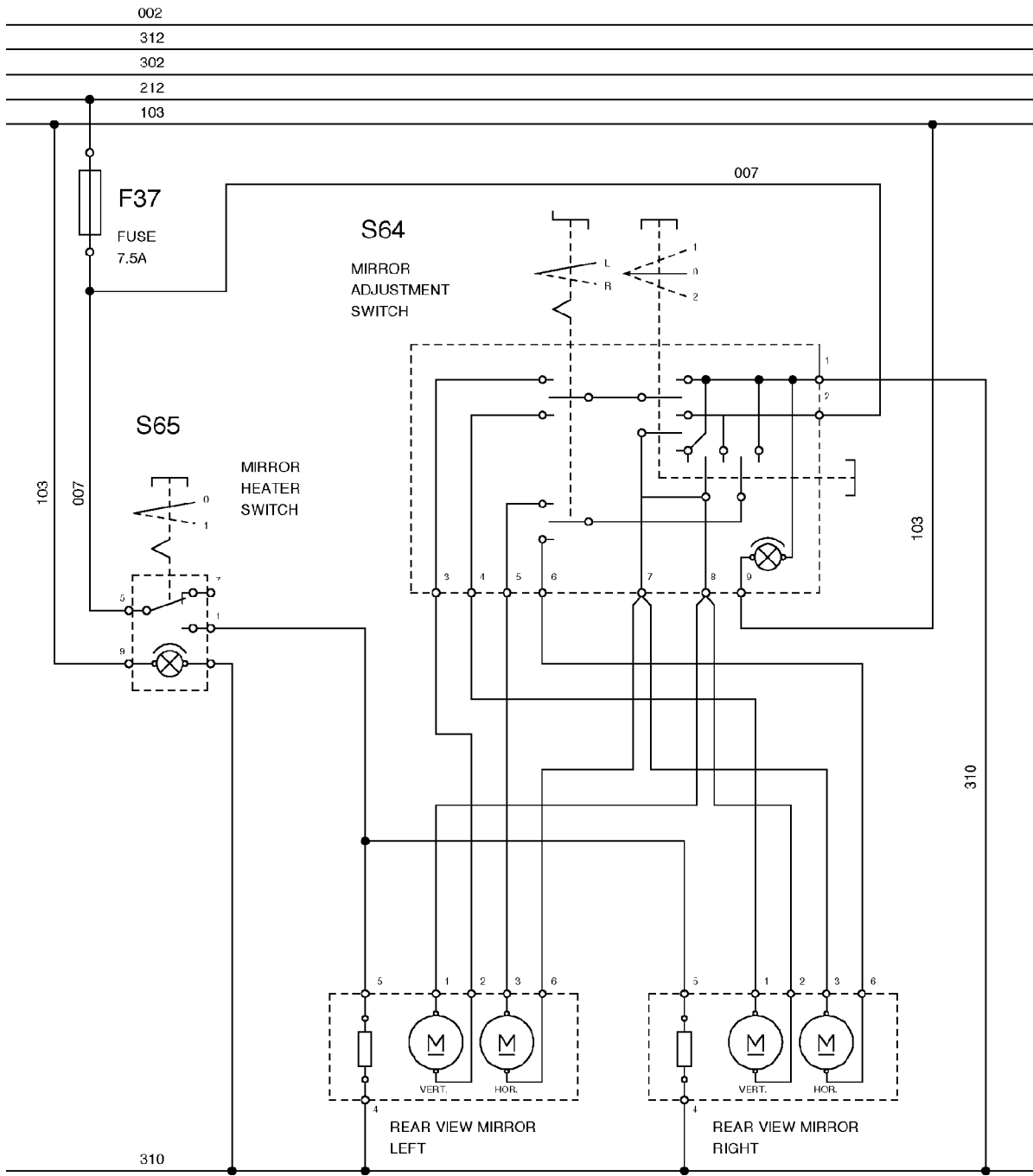
TM4505 (05DEC00)

240-11-24

Z Series Combines  
061300  
PN=4171

ZX1MXZ006937-19-15MAR95

**FUNCTIONAL SCHEMATIC, SECTION 16**



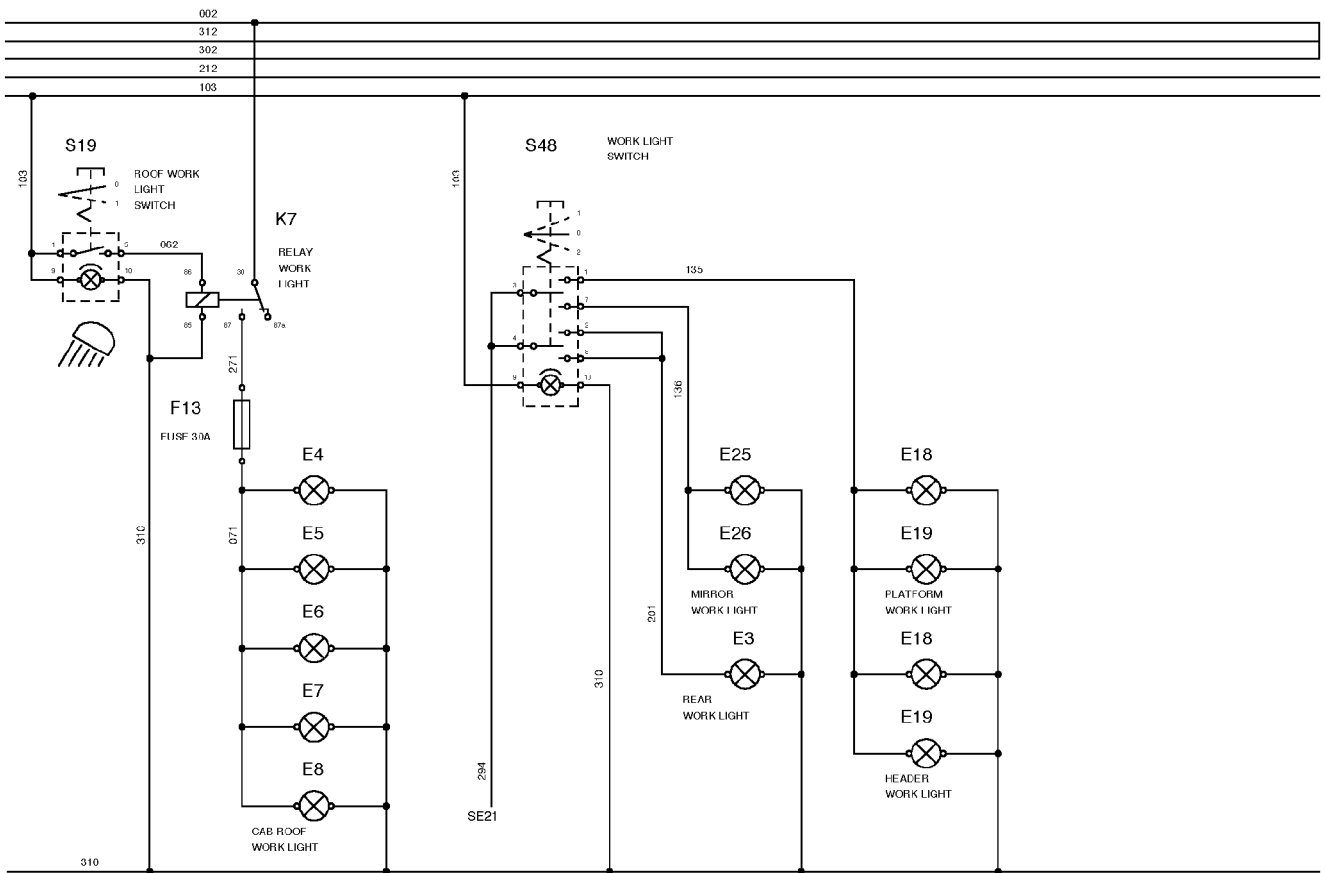
**SE16**  
**REAR VIEW MIRROR ADJUSTMENT**

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ZX008602 -UN-24OCT96

ZX, TMXZC0006561-19-15MAR96

**FUNCTIONAL SCHEMATIC, SECTION 17**



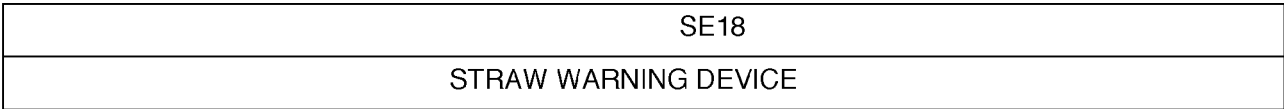
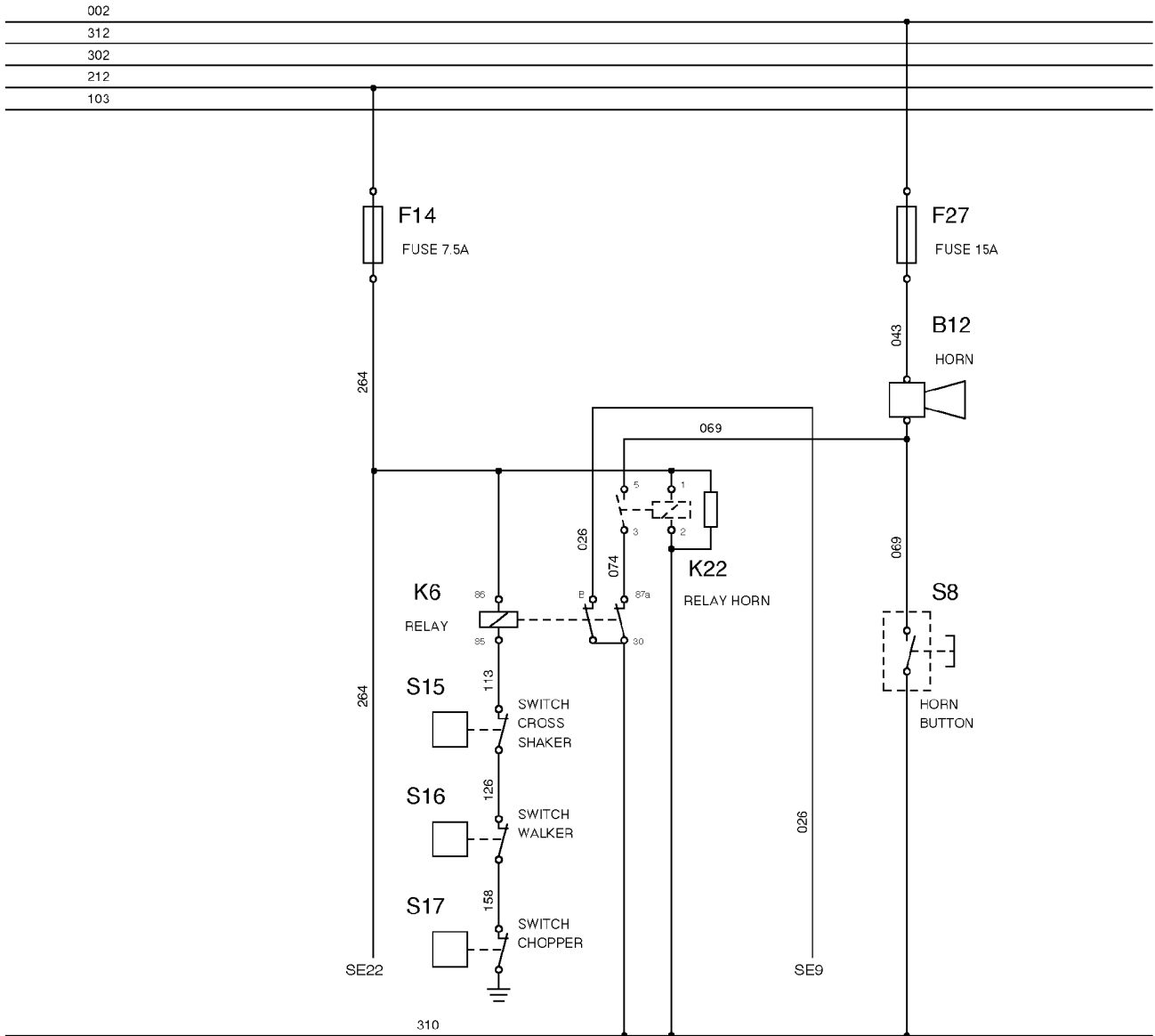
SE17  
WORK LIGHTS

ZX008214

ZX008214 -JUN-24OCT96

ZX, TMXZCO004838-19-15MAR96

**FUNCTIONAL SCHEMATIC, SECTION 18**

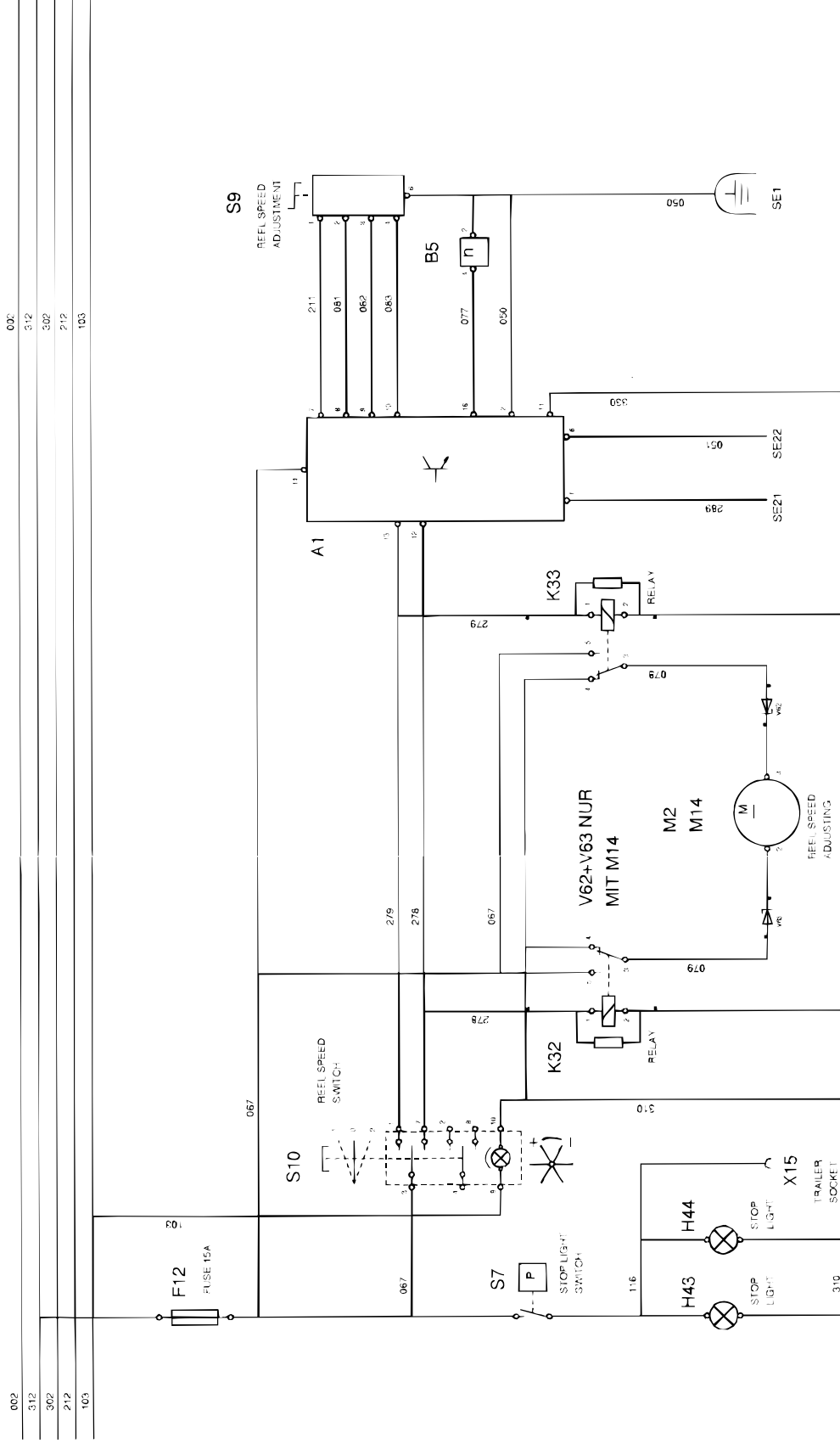


ZX008215

-UN-25APR96  
ZX008215

ZX, TMXZCO004839-19-15MAR96

**FUNCTIONAL SCHEMATIC, SECTION 19**



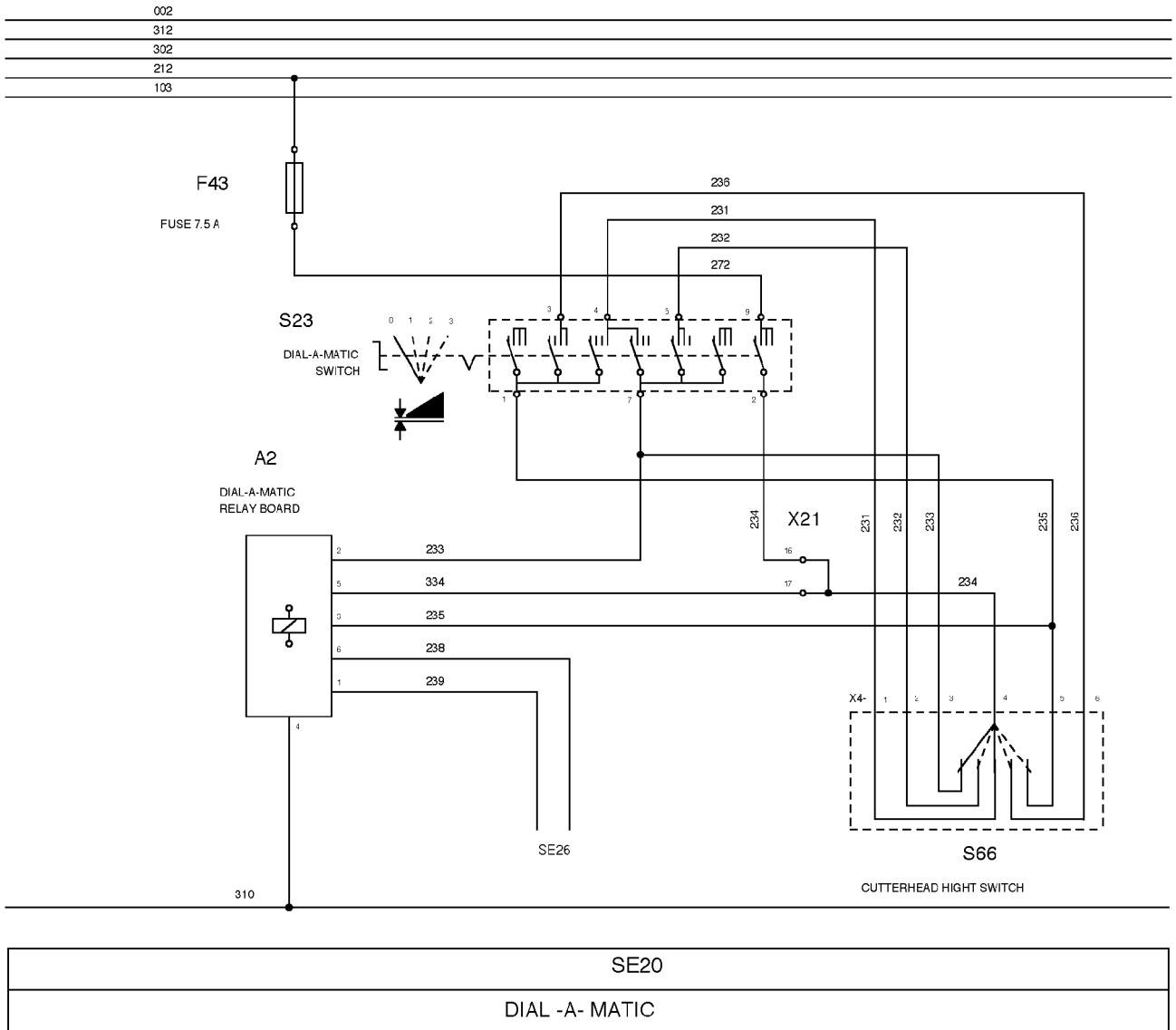
SE19

STOP LIGHTS ; REEL SPEED ADJUSTMENT

ZX008216



**FUNCTIONAL SCHEMATIC, SECTION 20**

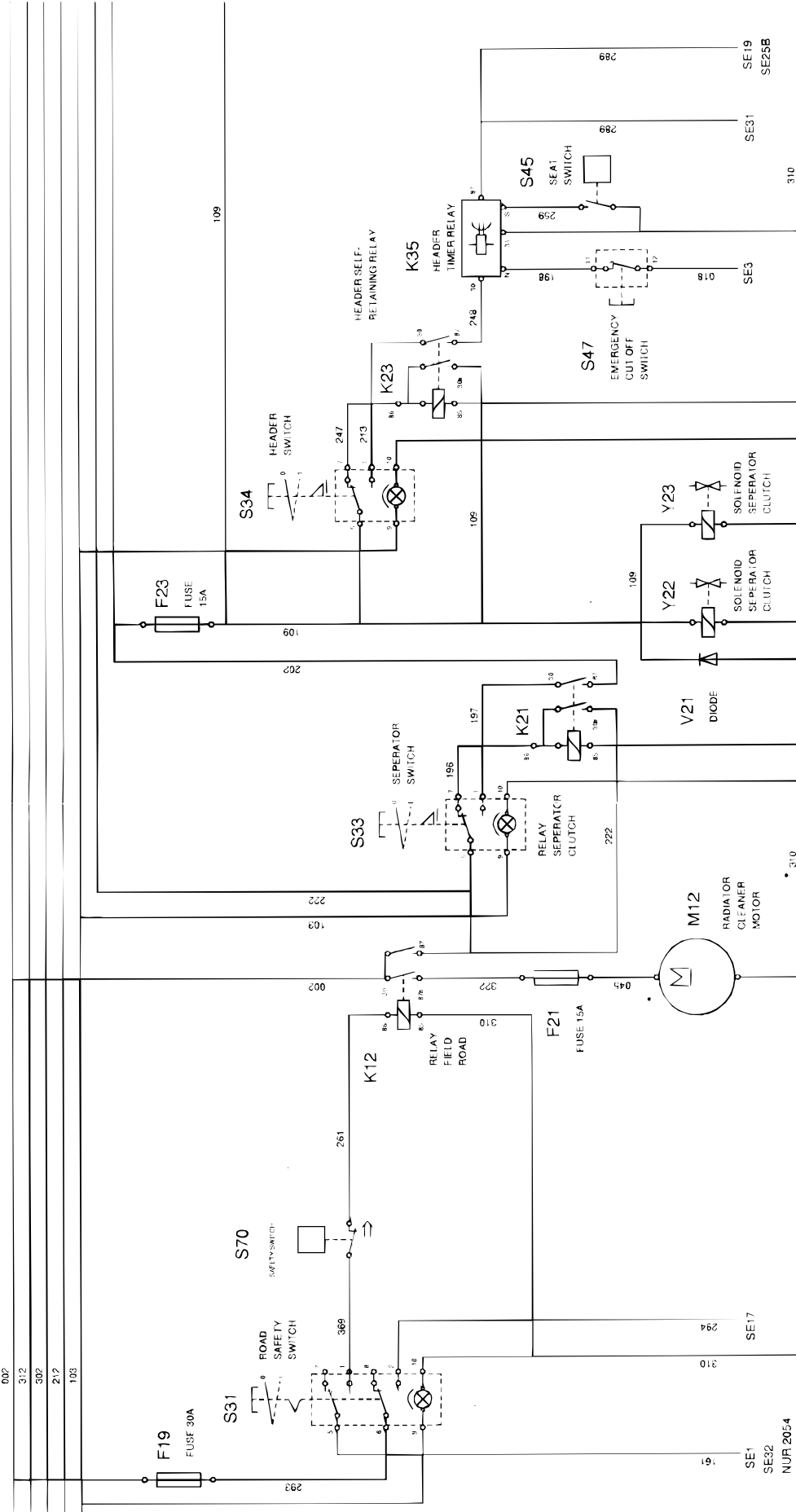


-JUN-25APR96  
ZX008217

ZX008217

ZX.TMXZCO004841-19-15MAR96

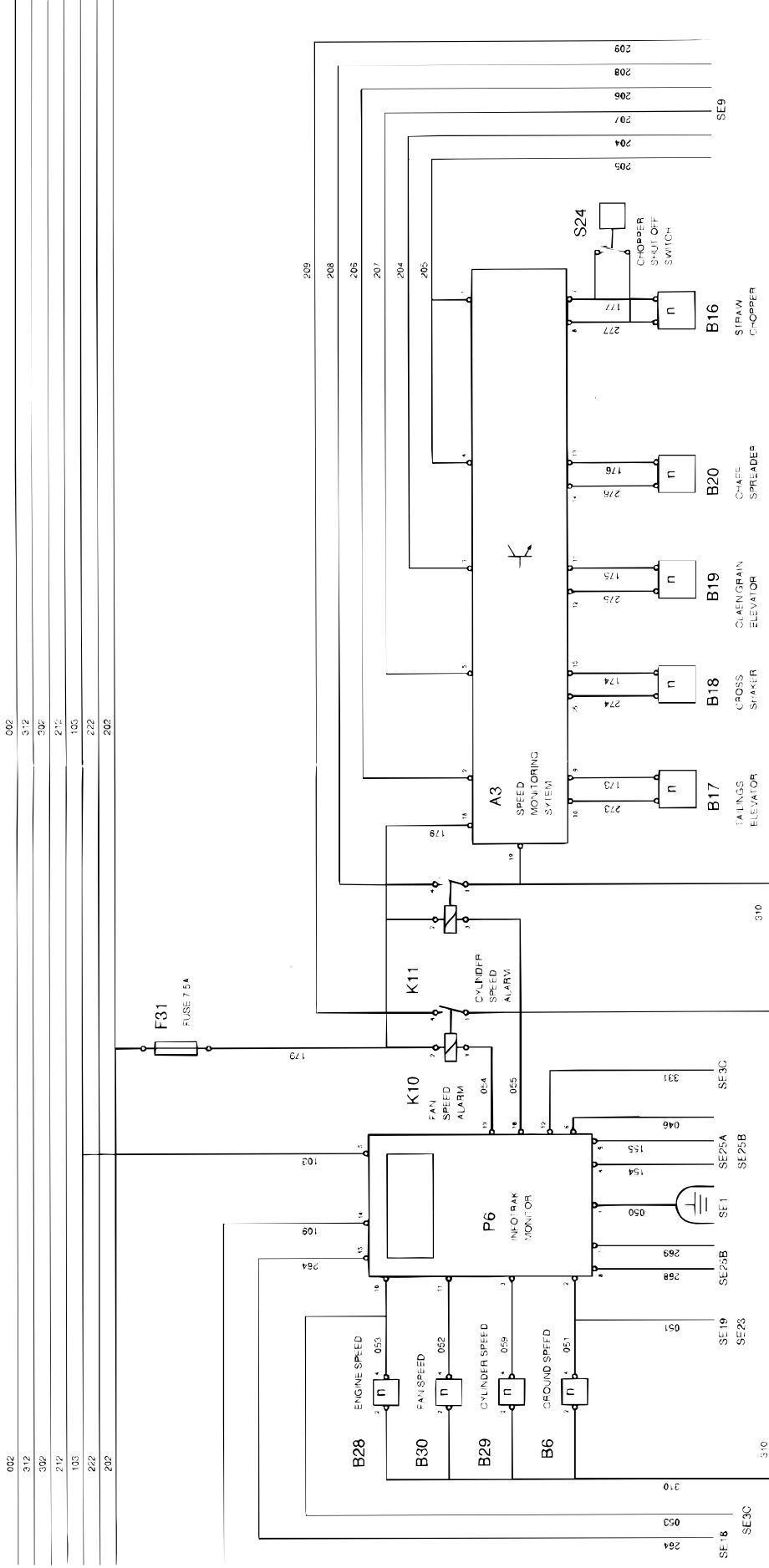
**FUNCTIONAL SCHEMATIC, SECTION 21**



SE21  
SEPARATOR : HEADER CLUTCH ; RADIATOR CLEANER MOTOR

ZX0008218

**FUNCTIONAL SCHEMATIC, SECTION 22**



SE22  
**INFOTRAK MONITOR ; SPEED MONITORING SYSTEM**

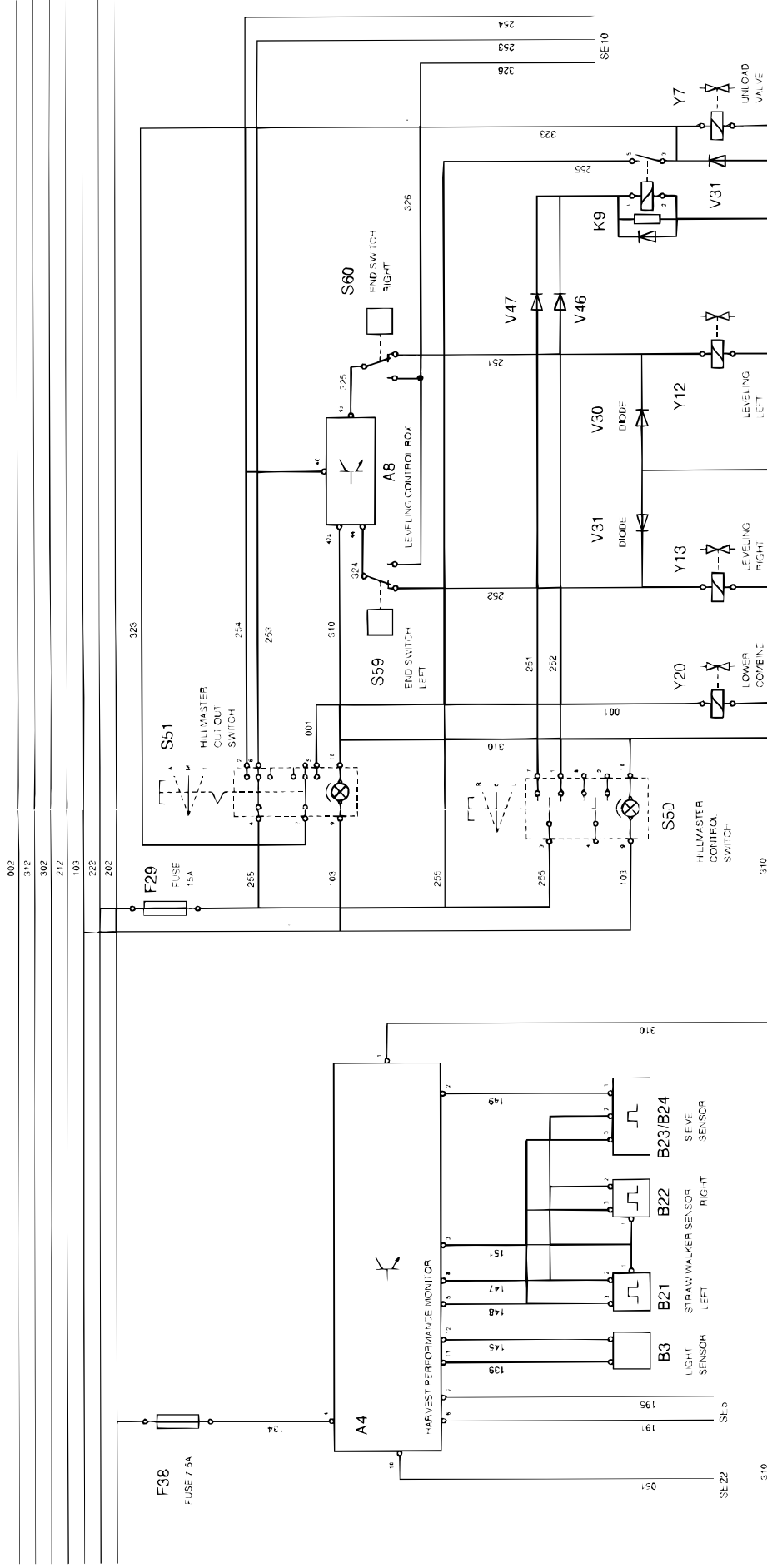
ZX0008219

ZX1MXZ0006953-19-15MAR95  
 Z Series Combines  
 061300  
 PN=478

**240-11-31**

TM4505 (05DEC00)

**FUNCTIONAL SCHEMATIC, SECTIONS 23 AND 24**



SE23	SE24
HARVEST PERFORMANCE MONITOR	
HILLMASTER LEVELING SYSTEM	

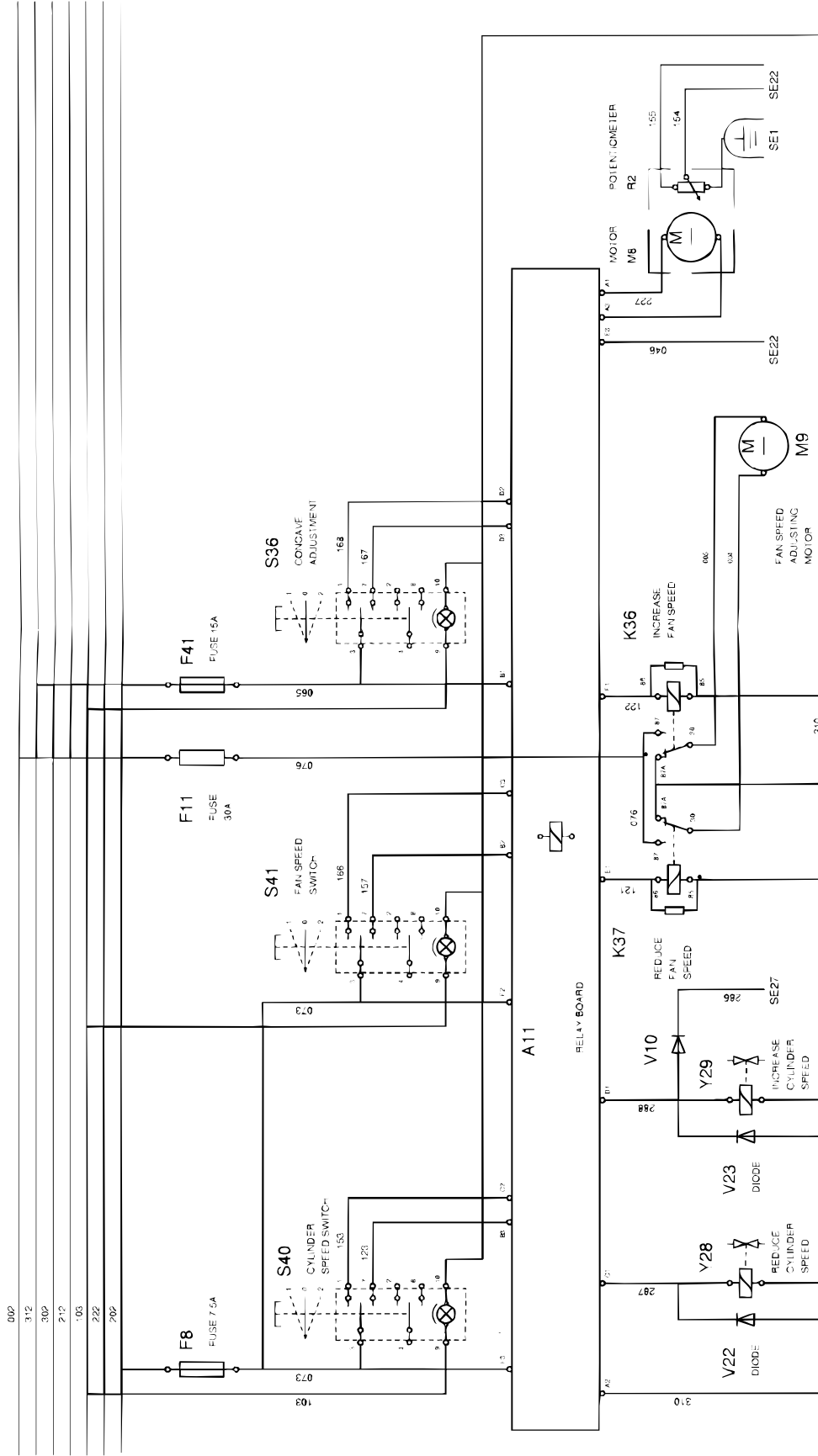
ZX0008220

TM4505 (05DEC00)

240-11-32

ZX1MXZ0006954-19-15MAR95  
Z Series Combines  
061300  
PN#479

**FUNCTIONAL SCHEMATIC, SECTION 25A**



SE25A  
CYLINDER , CONCAVE , FAN ADJUSTMENT

ZX008221

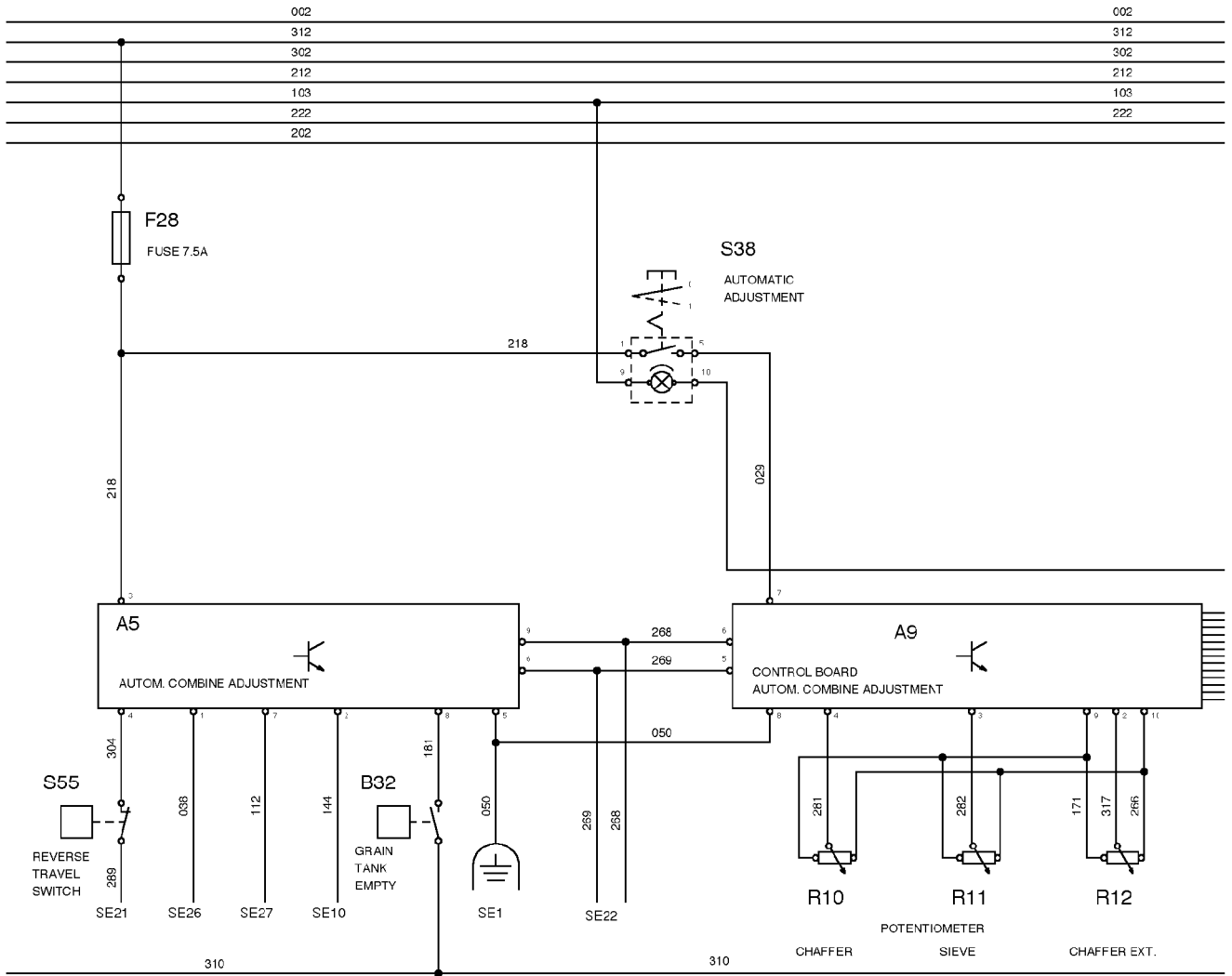
TM4505 (05DEC00)

240-11-33

Z Series Combines  
061300  
PN=480

ZX1MXZ006955-19-15MAR95

**FUNCTIONAL SCHEMATIC, SECTION 25B**



SE25B

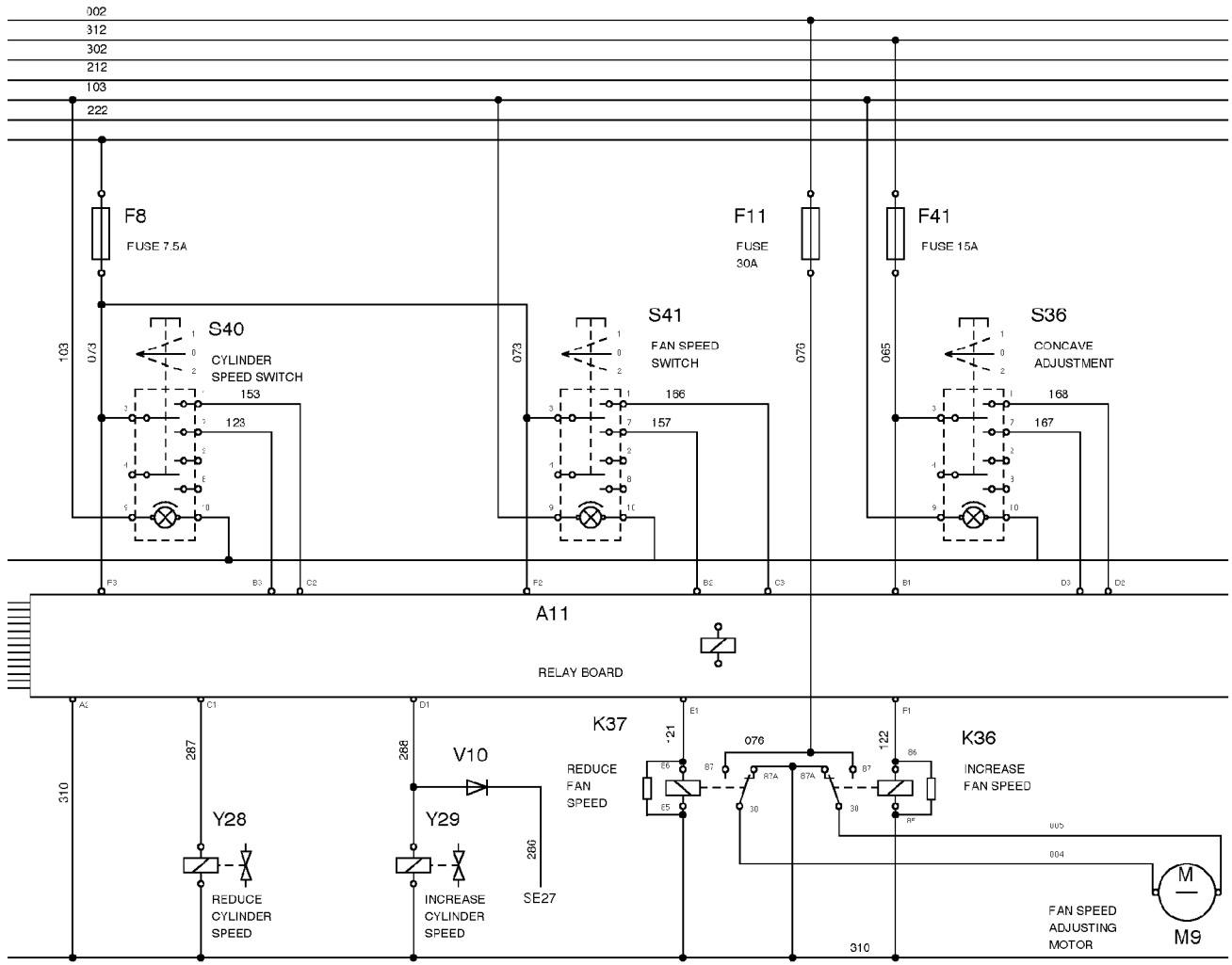
CYLINDER, CONCAVE, FAN ADJUSTMENT

ZX008222

-UN-10OCT96  
ZX008222

ZX, TMXZC004846-19-15MAR96

**FUNCTIONAL SCHEMATIC, SECTION 25B1**



SE25B1

CYLINDER , CONCAVE , FAN ADJUSTMENT

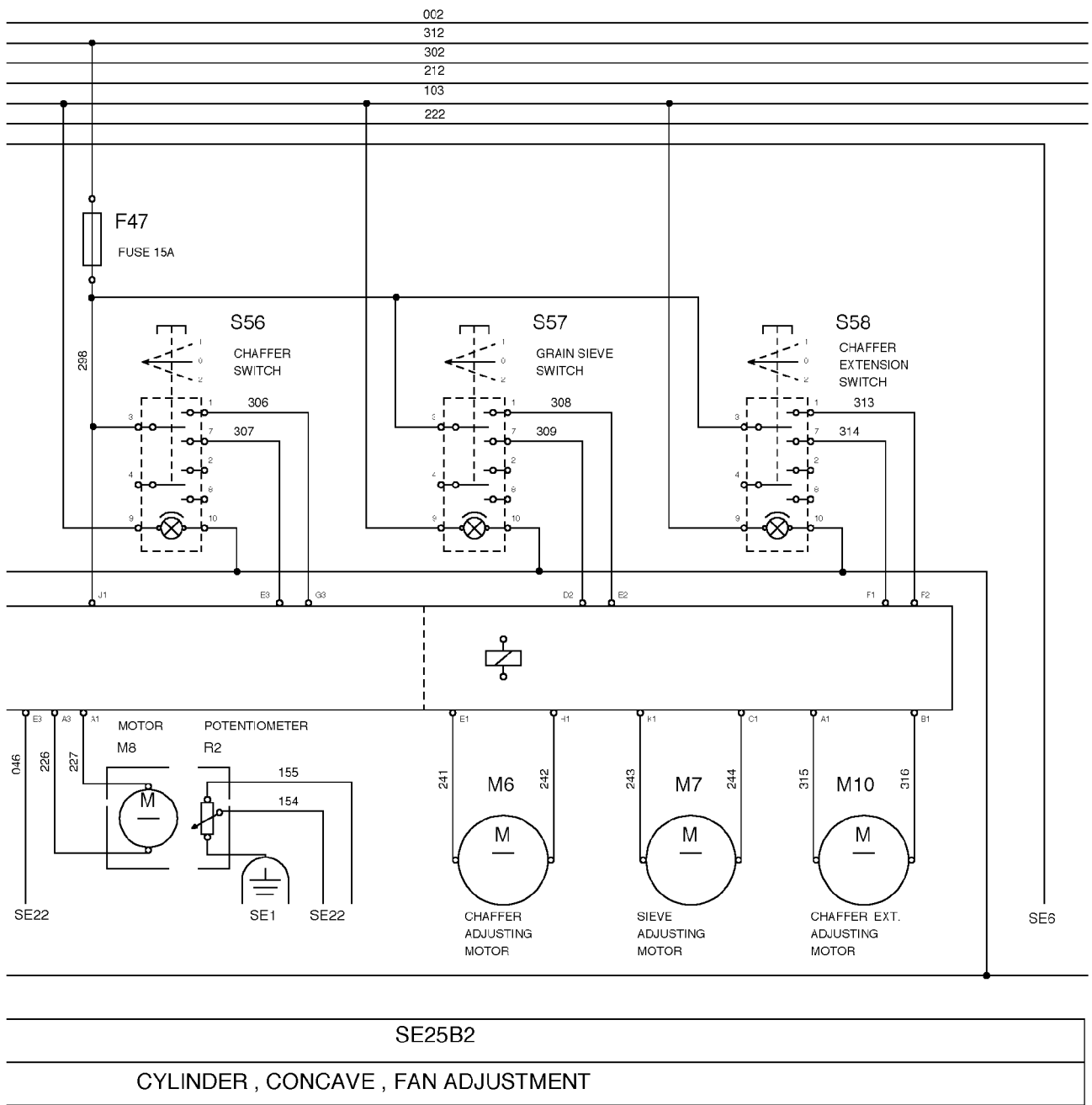
ZX008603

-JN-12SEP96

ZX008603

ZX.TMXZCO005139-19-15MAR96

**FUNCTIONAL SCHEMATIC, SECTION 25B2**



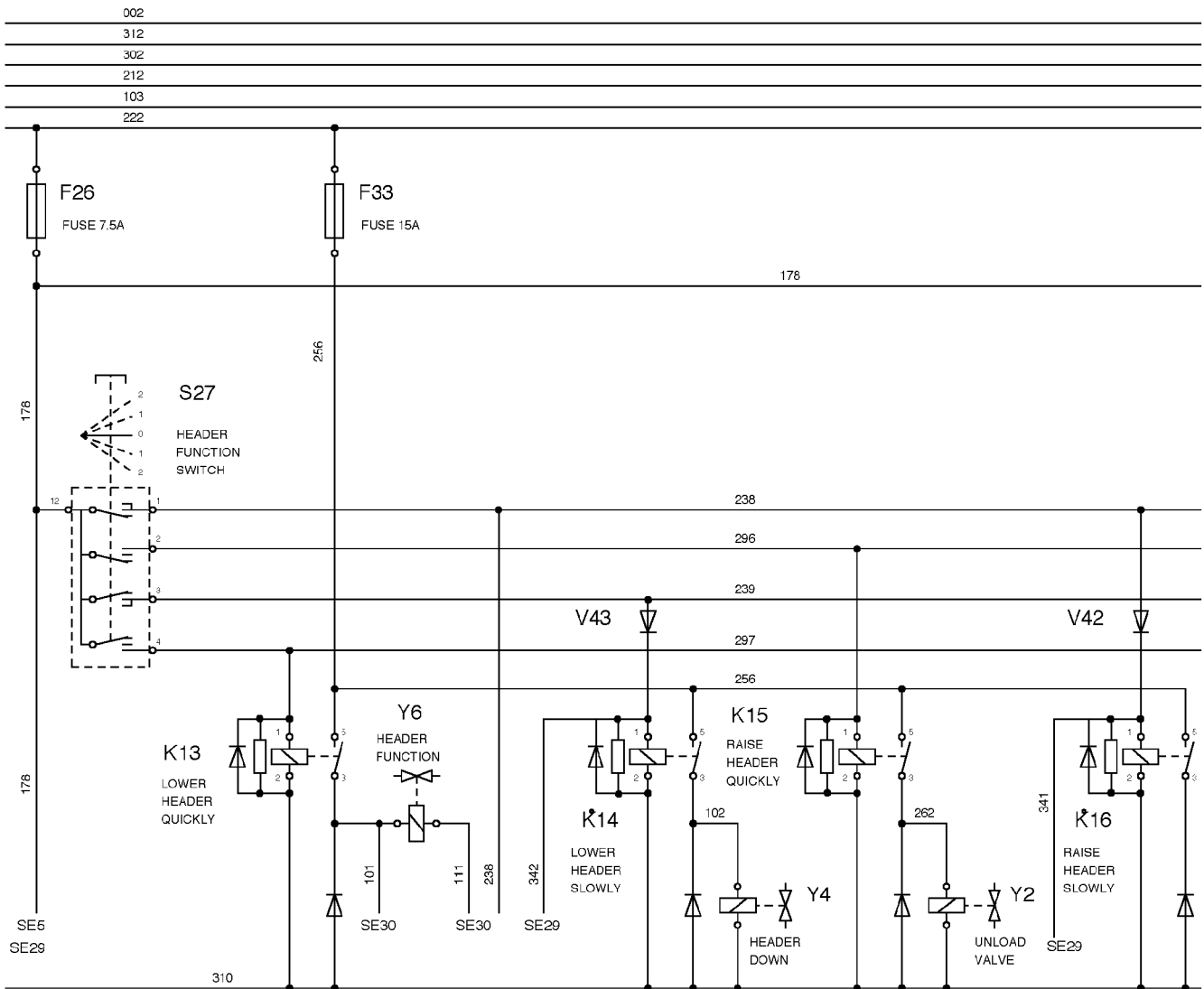
ZX008604

-JUN-25/APR96  
ZX008604

ZX,TMXCO005140-19-15MAR96



**FUNCTIONAL SCHEMATIC, SECTION 26A**



**SE26A**

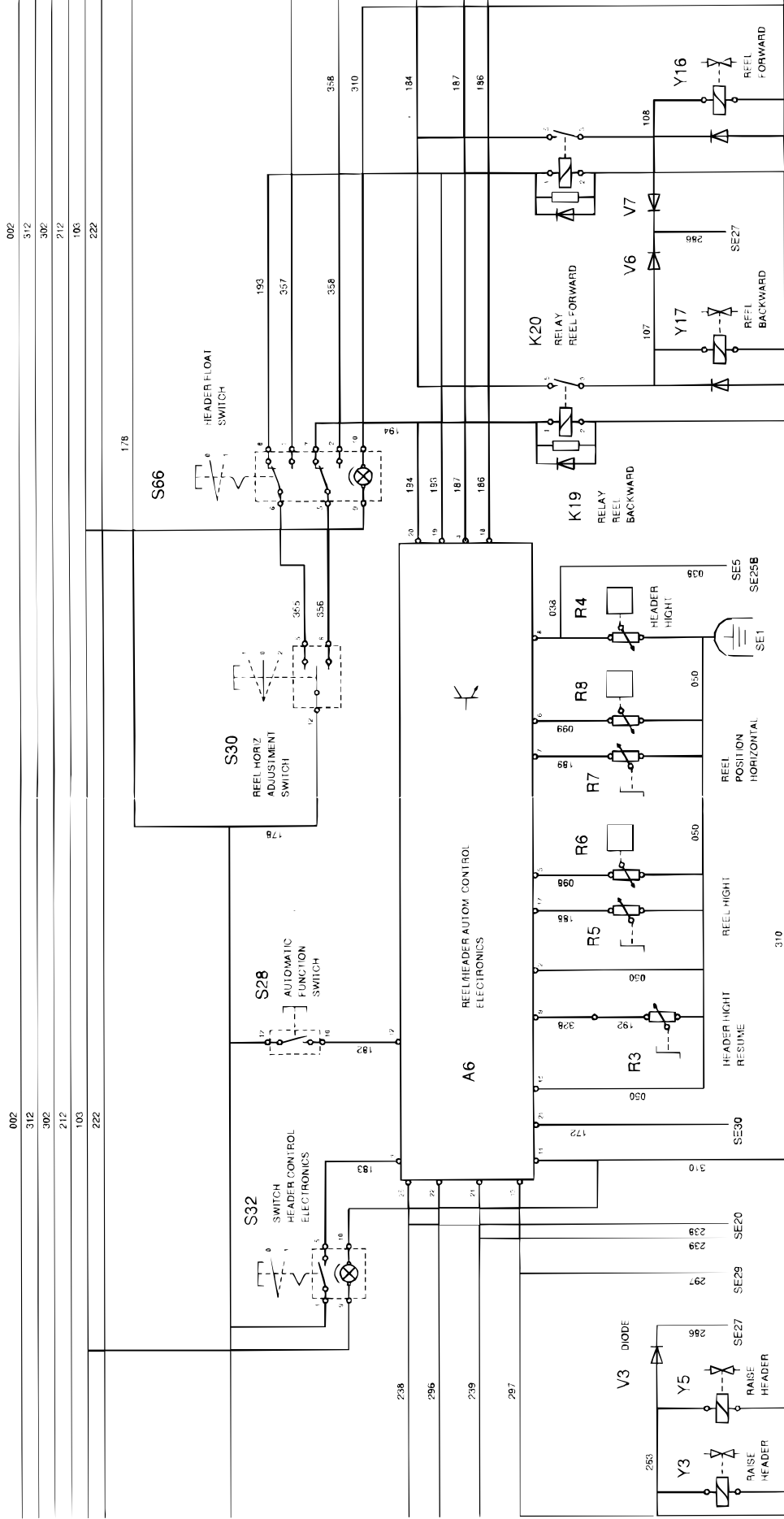
HEADER ADJUSTMENT (CUTTING HEIGHT; REEL; FLOAT)

ZX008224

-JUN-25OCT96  
ZX008224

ZX.TMXZCO004848-19-15MAR96

**FUNCTIONAL SCHEMATIC, SECTION 26B**



**SE26B**

**HEADER ADJUSTMENT (CUTTING HEIGHT; REEL; FLOAT)**

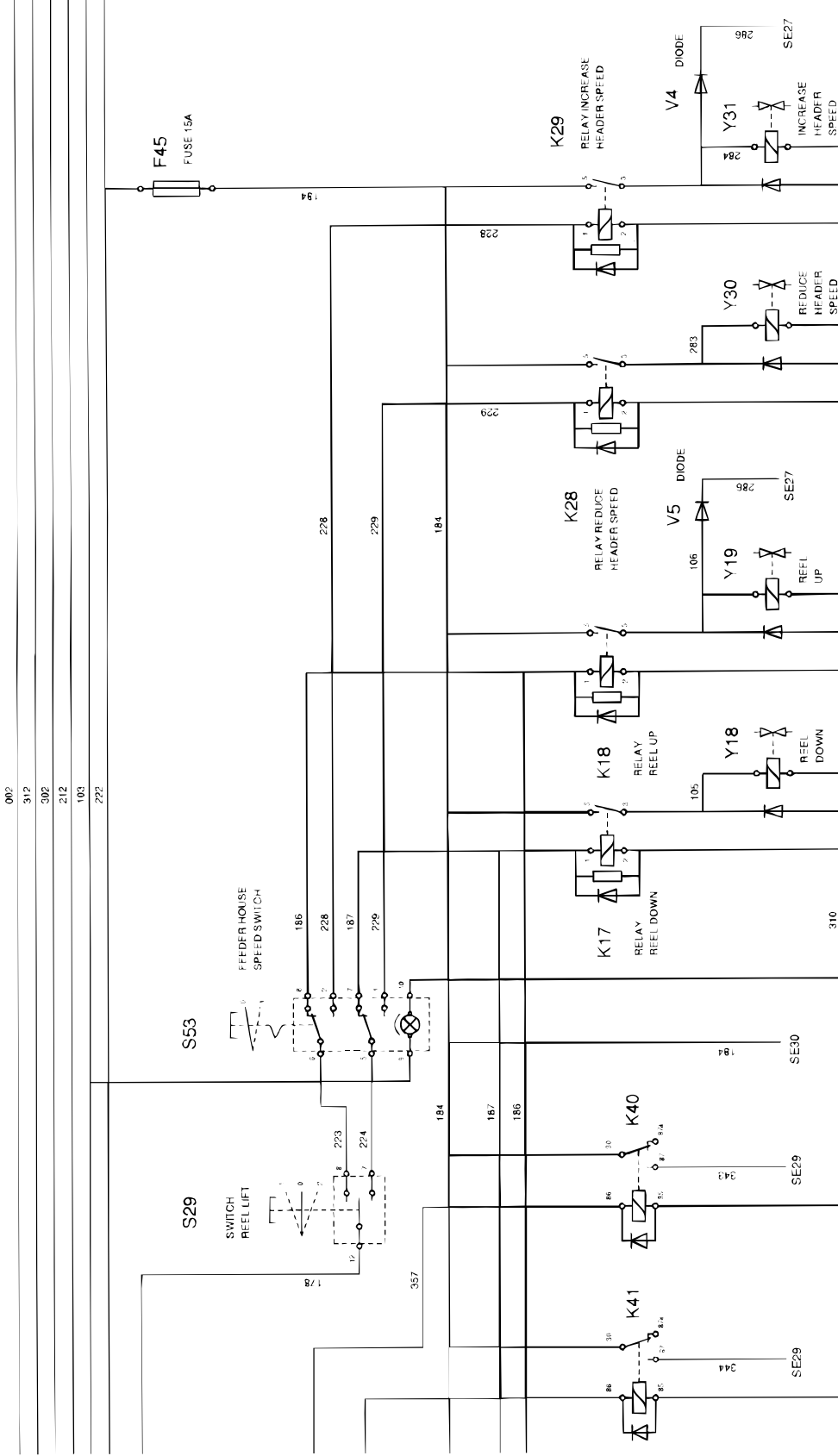
ZX008225

ZX1MXZ006959-19-15MAR95  
Z Series Combines  
061300  
PN=485

**240-11-38**

TM4505 (05DEC00)

FUNCTIONAL SCHEMATIC, SECTION 26C



SE26C

HEADER ADJUSTMENT (CUTTING HEIGHT; REEL; FLOAT)

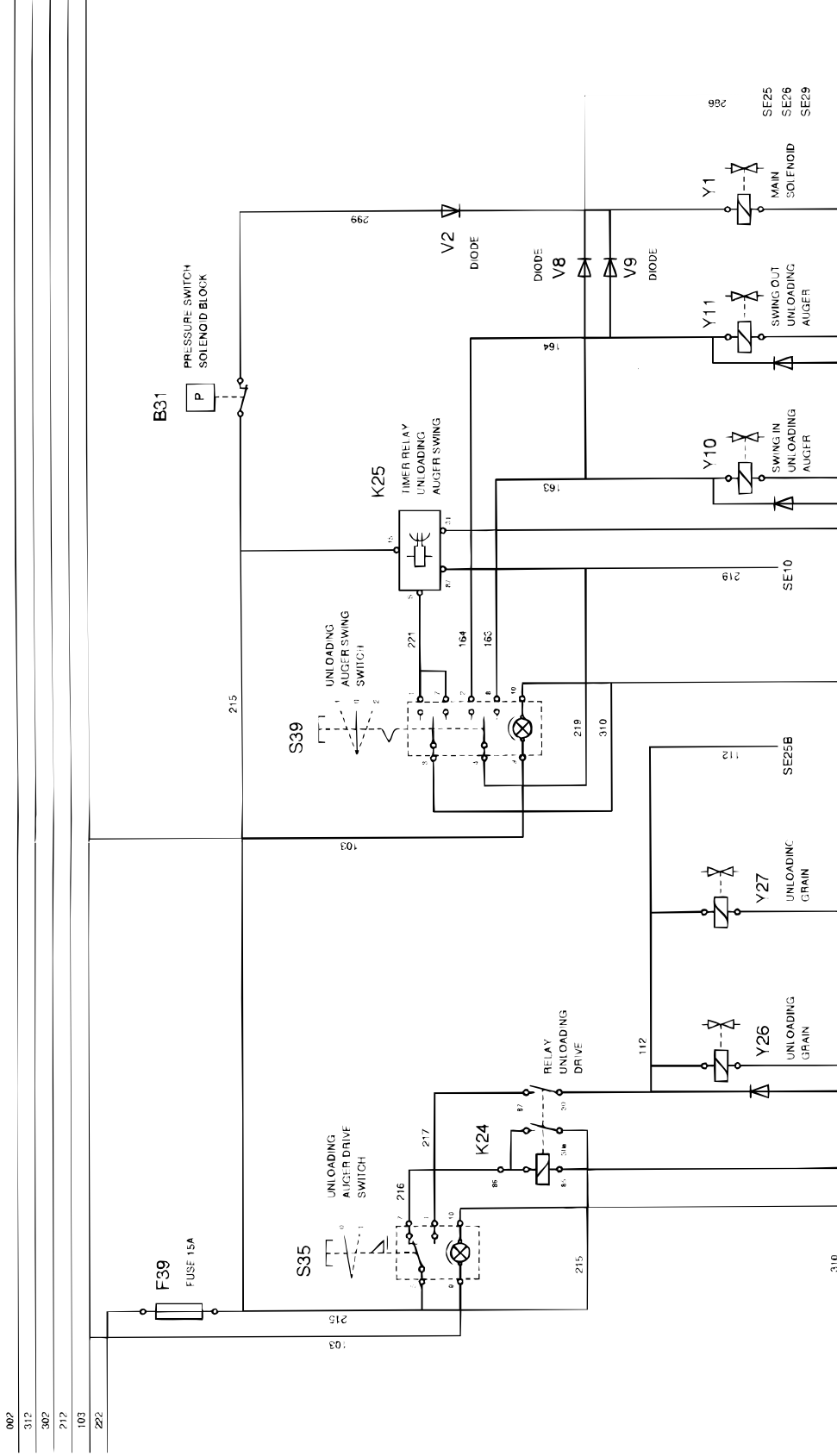
ZX008226

ZX1MXZ0069501915MAR95  
Z Series Combines  
061306  
PN=486

240-11-39

TM4505 (05DEC00)

**FUNCTIONAL SCHEMATIC, SECTION 27**



SE27

GRAIN TANK UNLOADING SYSTEM

ZX008227

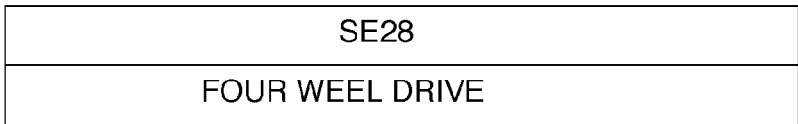
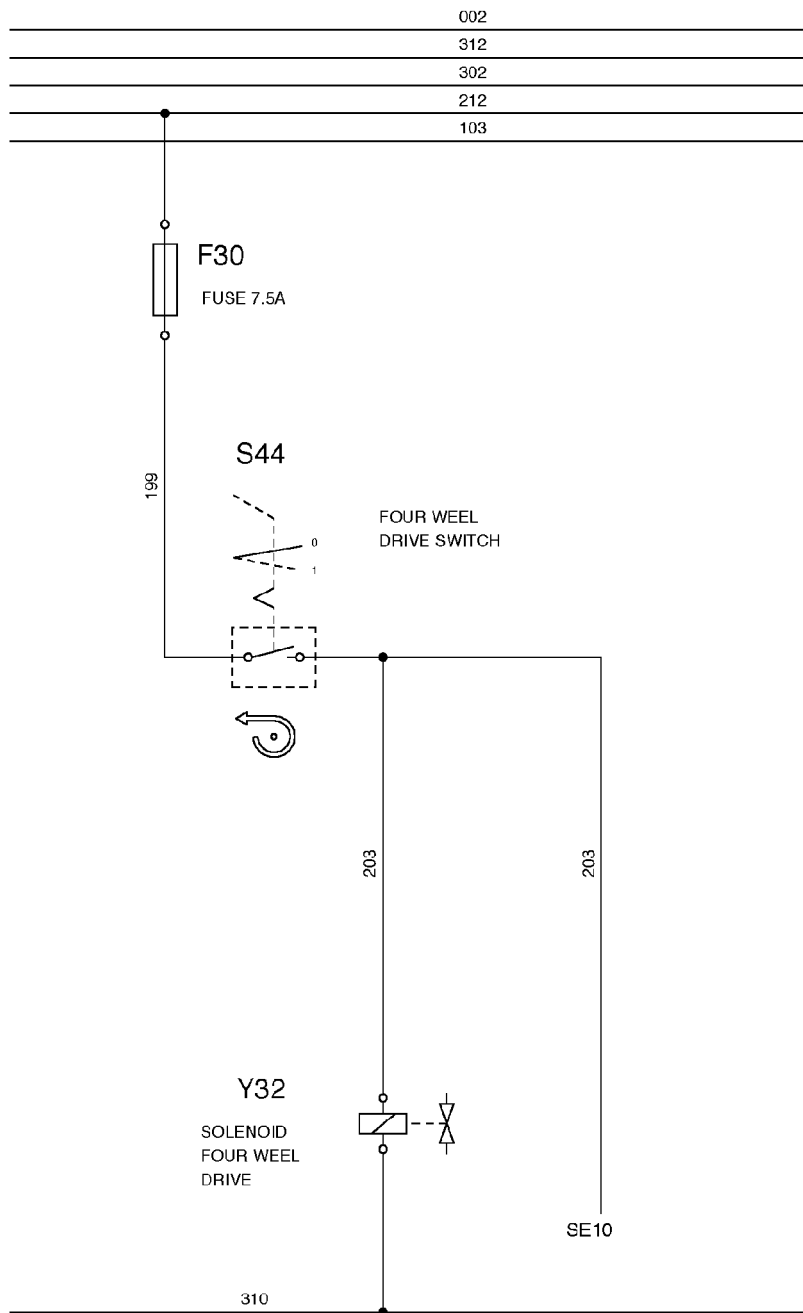
ZX1MXZ000541-19-15MAR99  
Z Series Combines  
06/000

**240-11-40**

TM4505 (05DEC00)

PN=487

**FUNCTIONAL SCHEMATIC, SECTION 28**

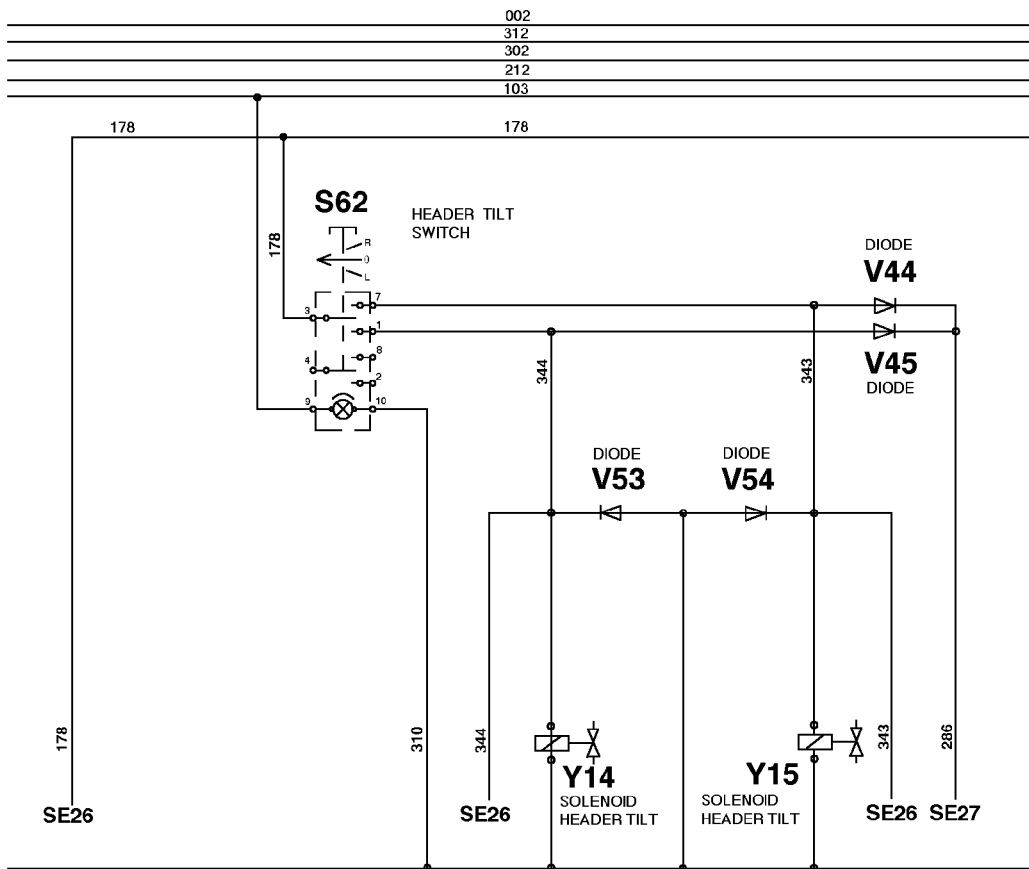


ZX008228

ZX008228 -JUN-24/OCT96

ZX, TMXZC0004851-19-15MAR96

**FUNCTIONAL SCHEMATIC, SECTION 29**

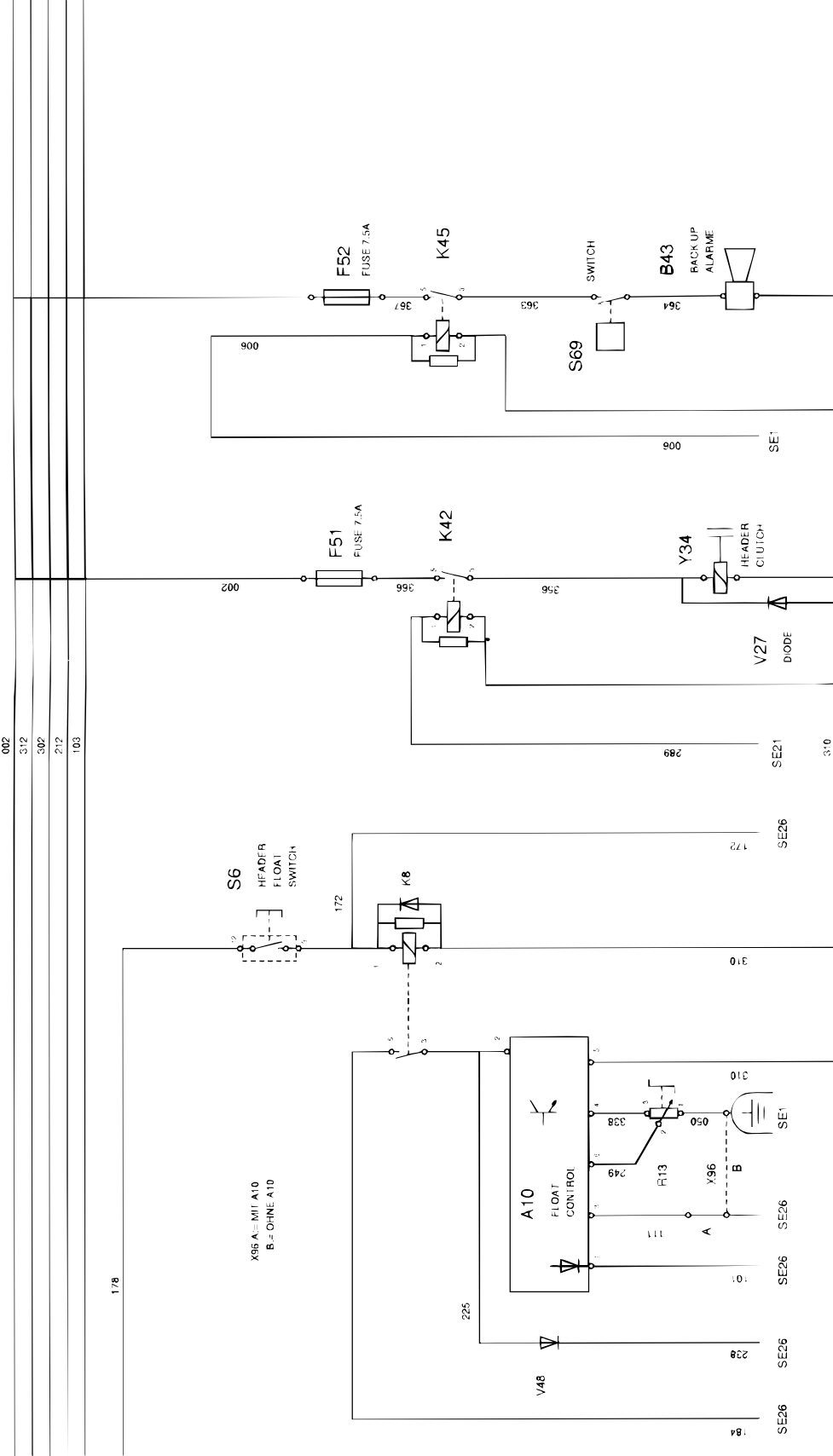


ZX005240

ZX005240 -UN-25APR96

ZX, TMXZCO004852-19-15MAR96

**FUNCTIONAL SCHEMATIC, SECTIONS 30 AND 31**

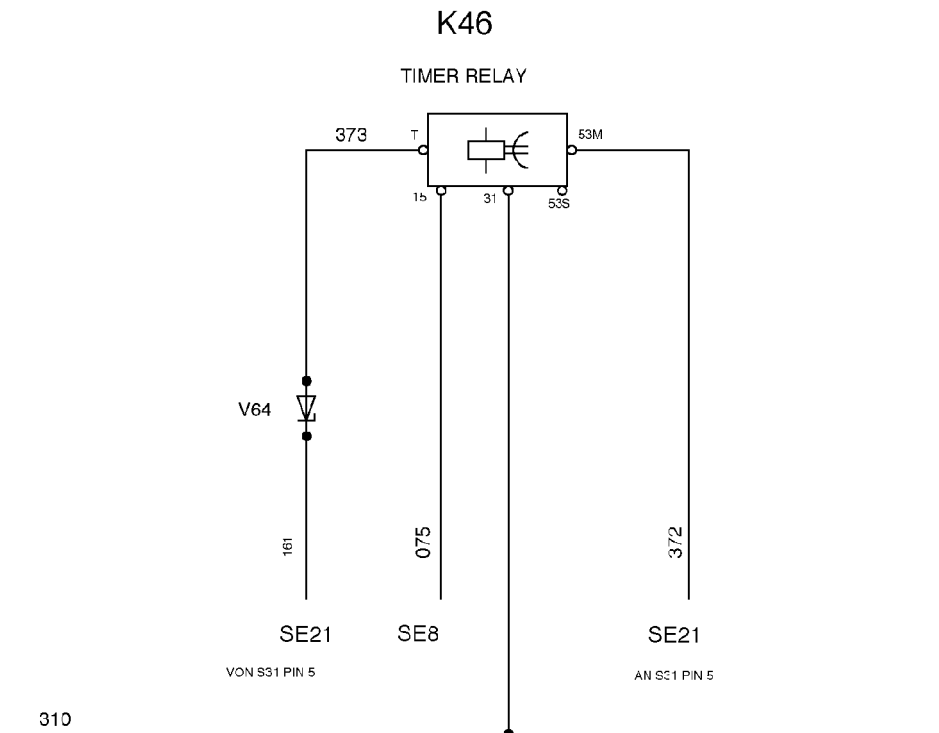


SE30	FLOAT CONTROL
SE31	BACK UP ALARME

ZX008599

**FUNCTIONAL SCHEMATIC, SECTION 32**

002
312
302
212
103



SE32
TIMER RELAY 4,5S MD 2054

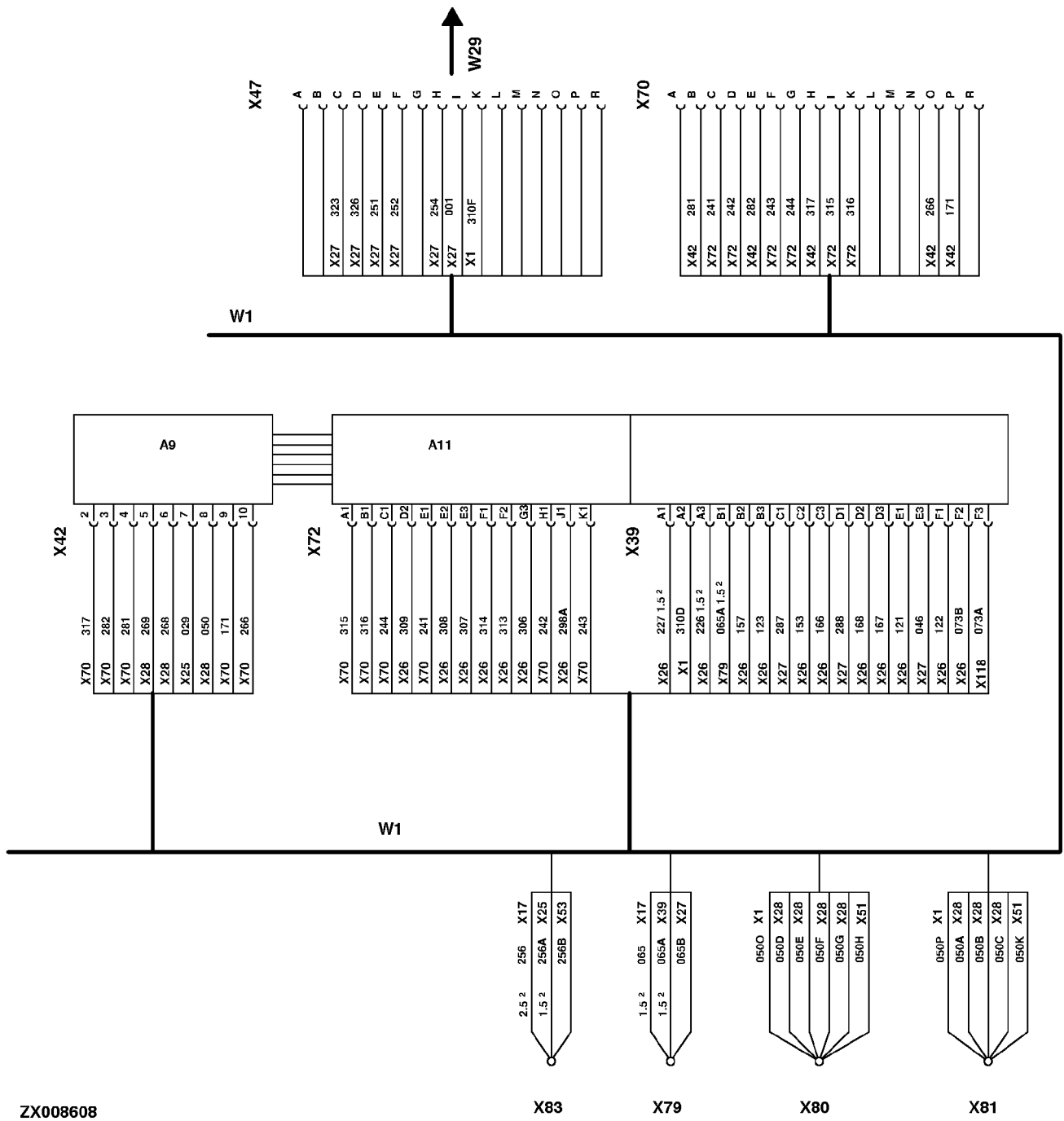
ZX008600

ZX008600 -JUN-24OCT96





# WIRING AND HARNESS DIAGRAM OF MAIN DISTRIBUTION HARNESS, PART 1

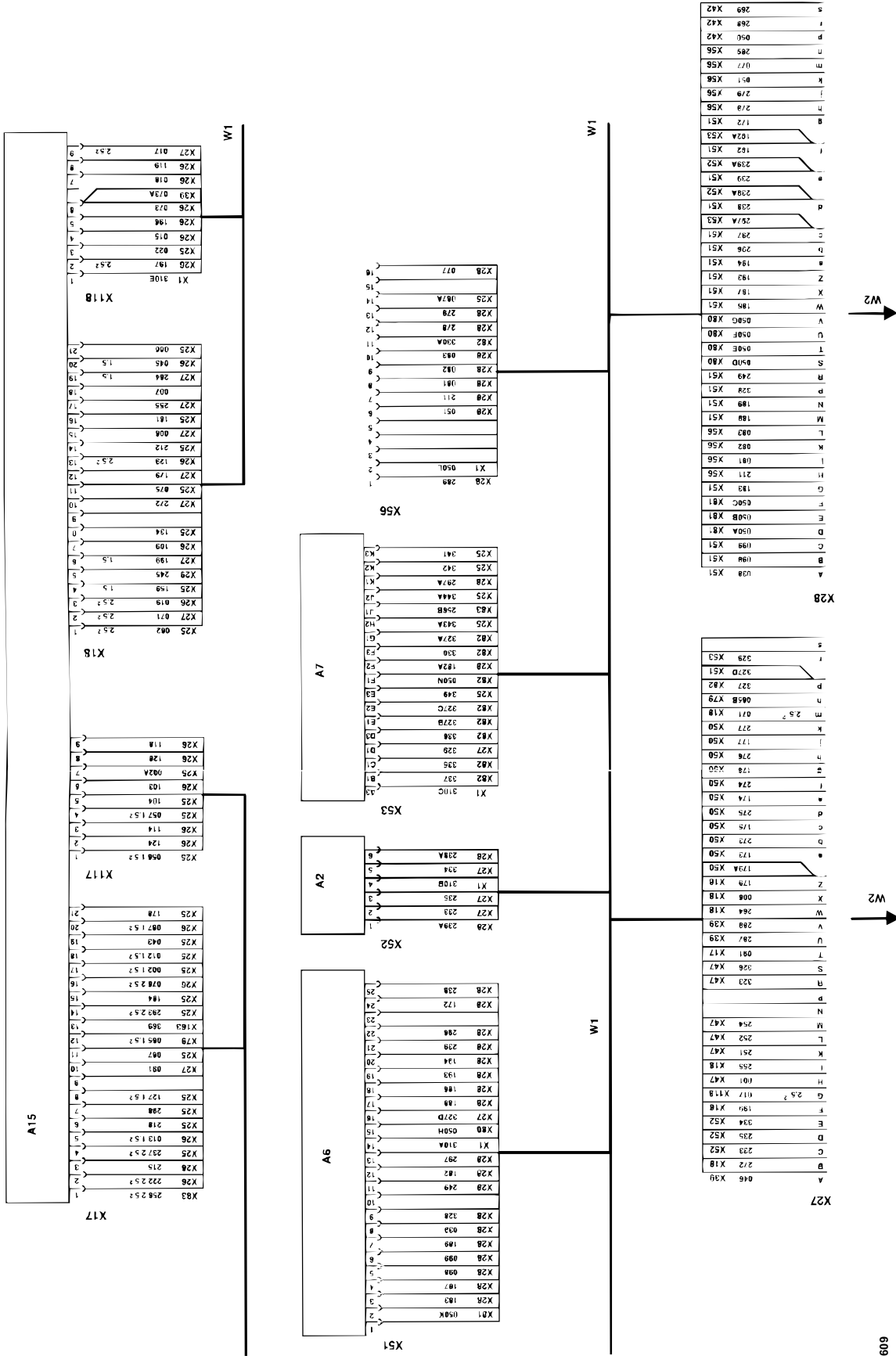


ZX008608 -JUN-13MAY96

ZX, TMXZCO006545-19-15MAR96



WIRING AND HARNESS DIAGRAM OF MAIN DISTRIBUTION HARNESS, PART 2



ZX0080600

TM4505 (05DEC00)

240-11-48

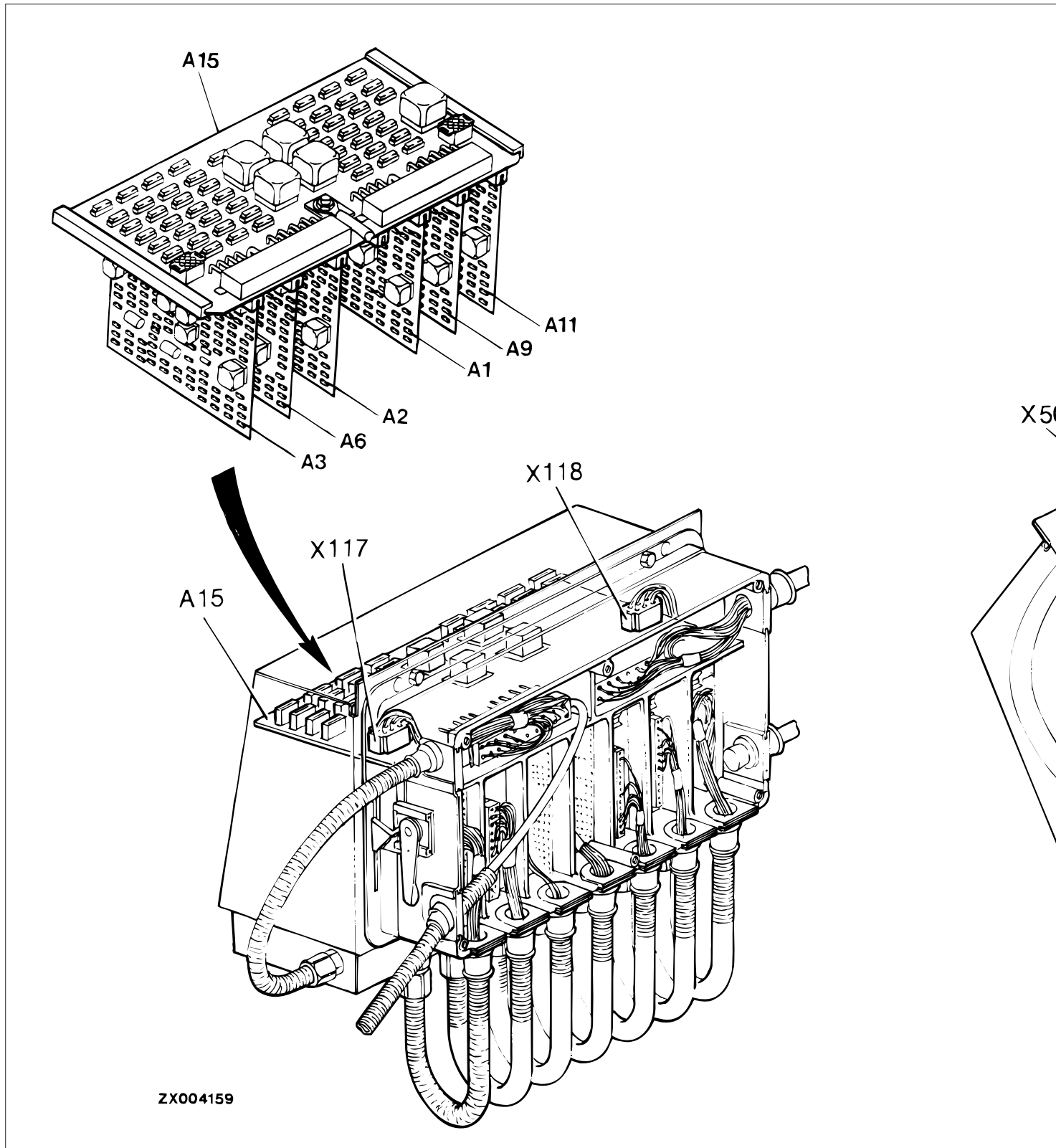
Z Series Combines

061300

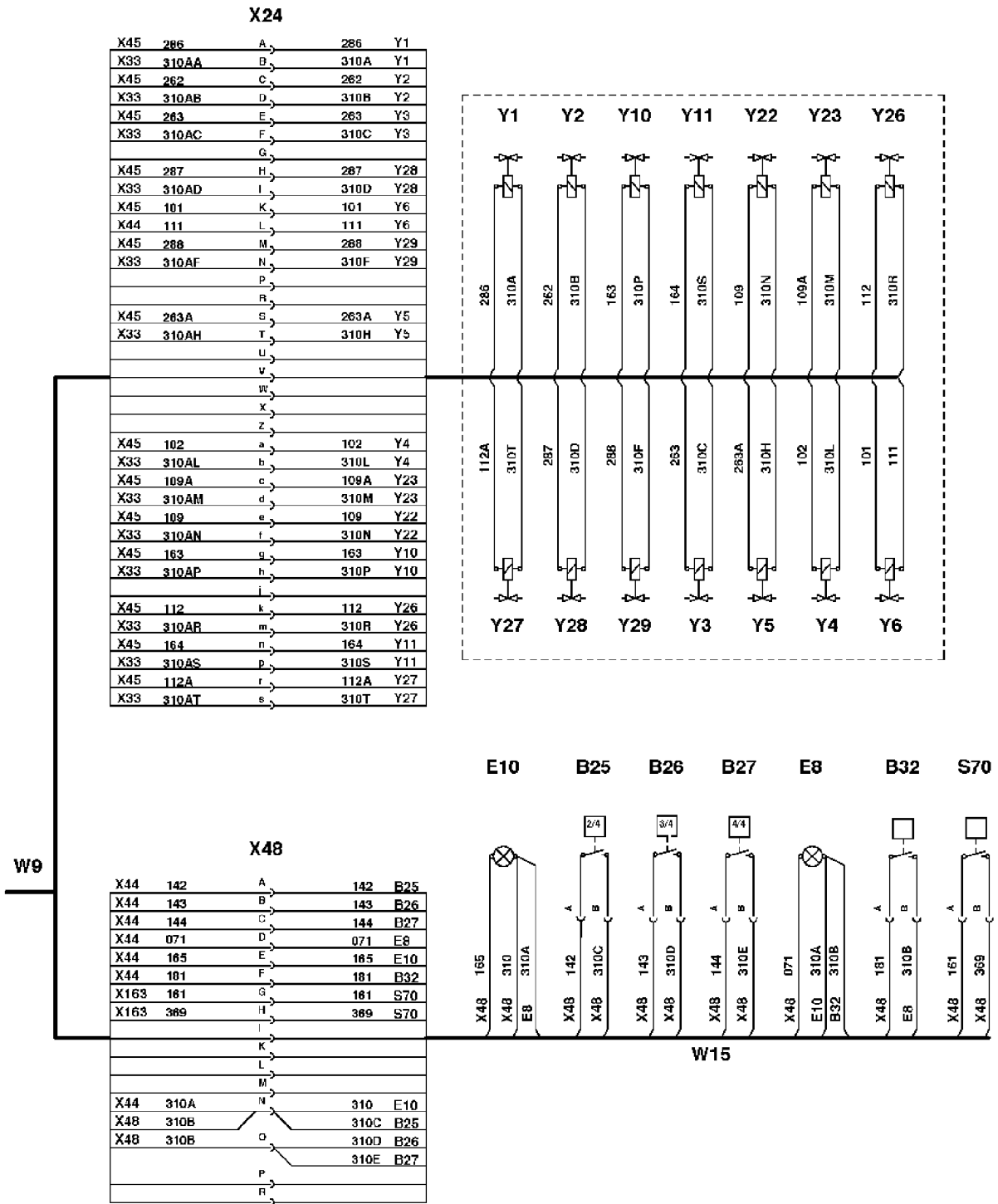
PN=495

ZX.TMXZ000656-19-15MAR95

### LOCATION OF MAIN DISTRIBUTION WIRING HARNESS W1 WITH COMPONENTS



### WIRING AND HARNESS DIAGRAM OF REAR BASIC WIRING HARNESS W9, GRAIN TANK WIRING HARNESS W15, CHOPPER WIRING HARNESS W25 AND CHAFF SPREADER WIRING HARNESS W26, PART 1



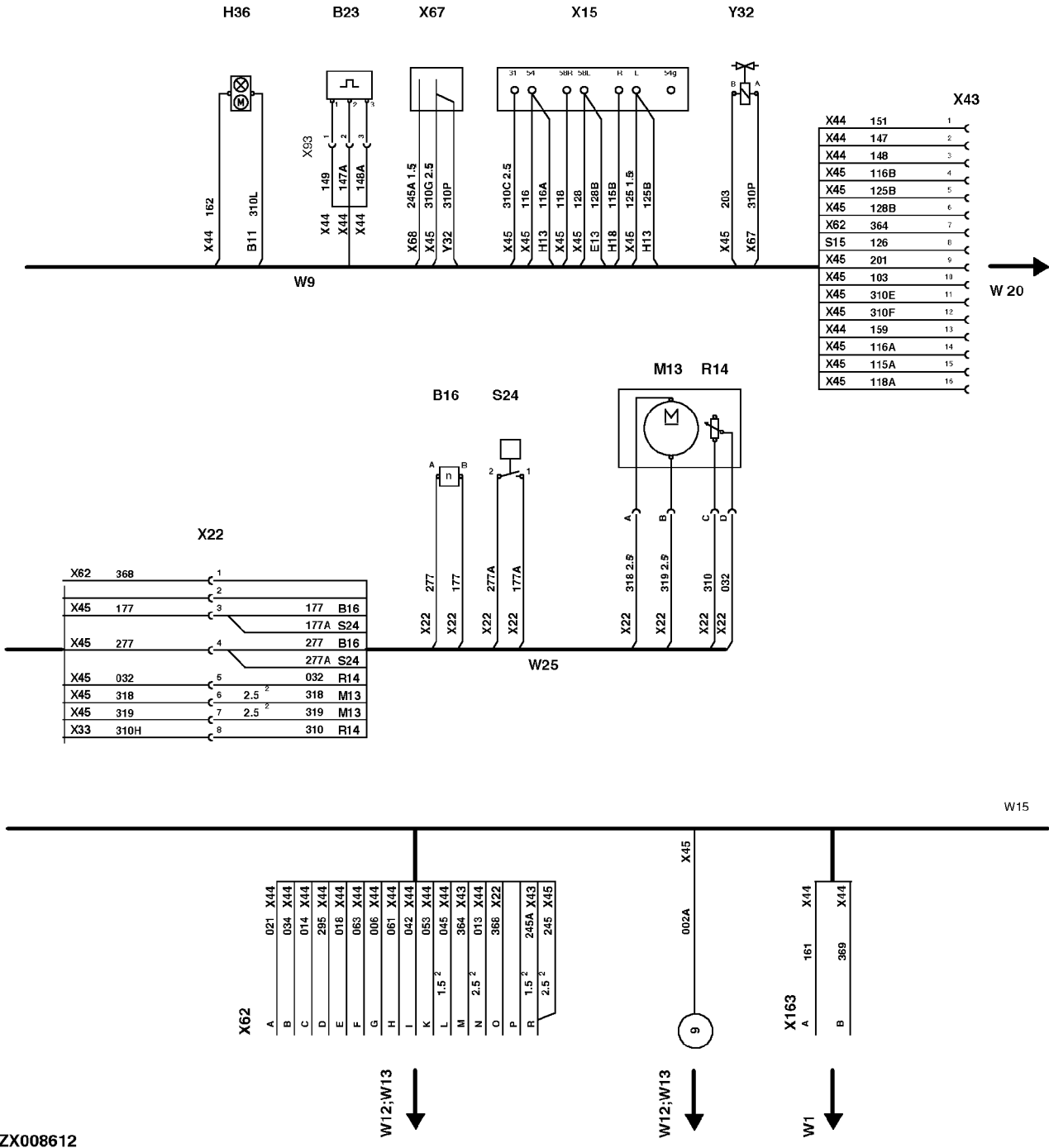
ZX008611

ZX008611 -JUN-20JUN96

ZX, TMXCO006482-19-15MAR96



**WIRING AND HARNESS DIAGRAM OF REAR BASIC WIRING HARNESS W9, GRAIN TANK WIRING HARNESS W15, CHOPPER WIRING HARNESS W25 AND CHAFF SPREADER WIRING HARNESS W26, PART 2**



ZX008612

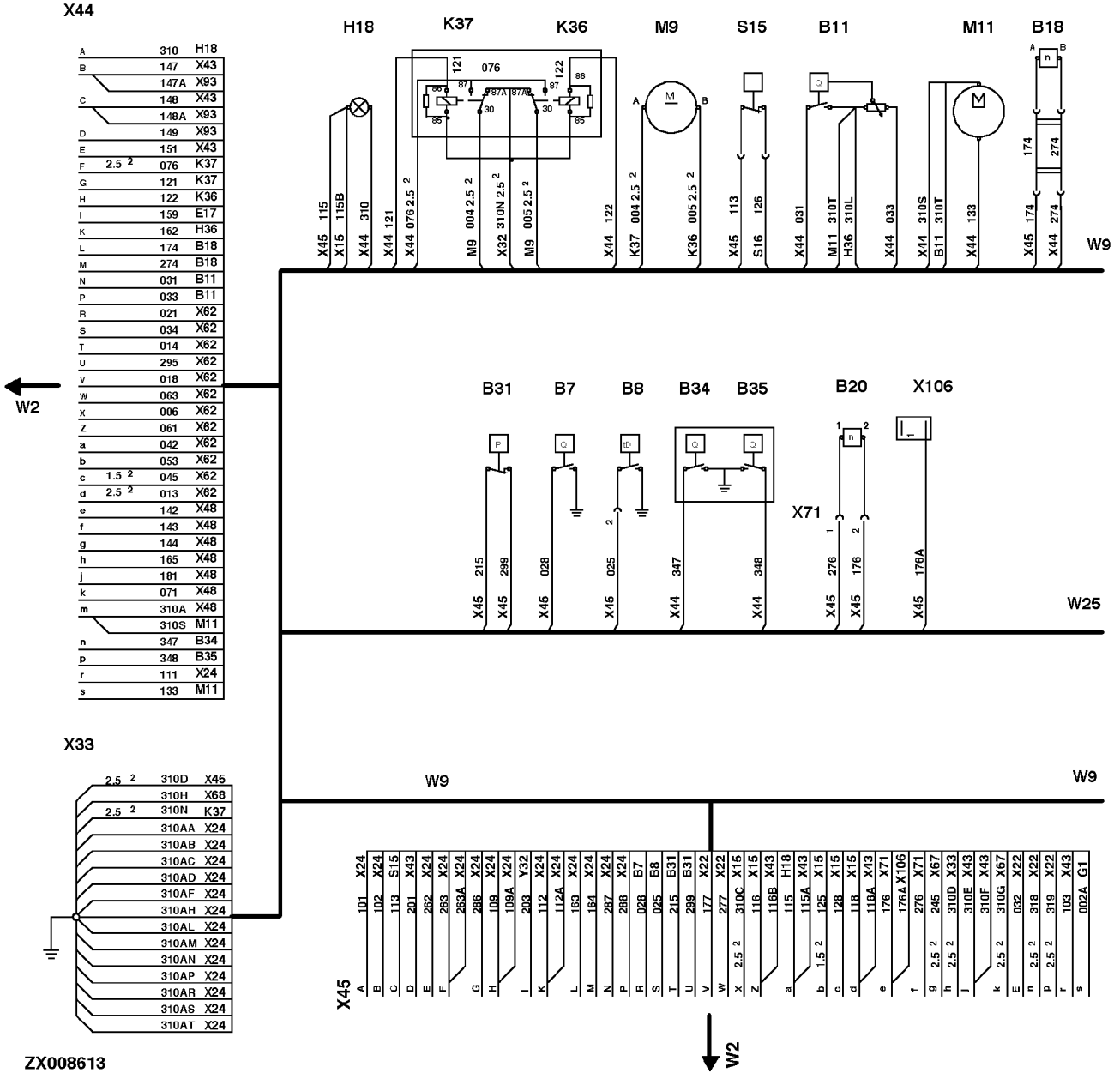
ZX008612 -JUN-21MAY96

ZX,TMXCO006550-19-15MAR96





**WIRING AND HARNESS DIAGRAM OF REAR BASIC WIRING HARNESS W9, GRAIN TANK WIRING HARNESS W15, CHOPPER WIRING HARNESS W25 AND CHAFF SPREADER WIRING HARNESS W26, PART 3**

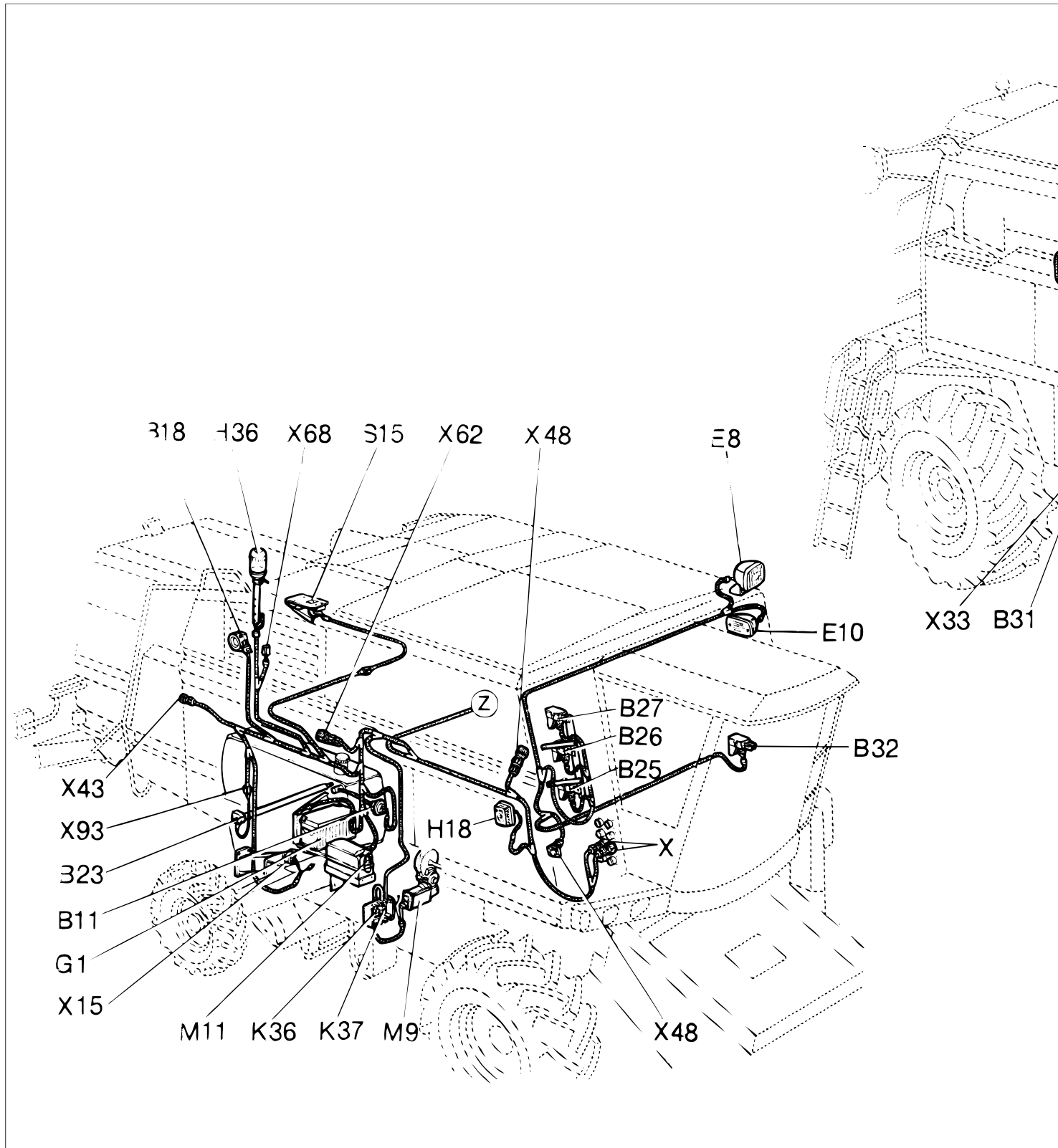


ZX008613

-JUN-21MAY96  
ZX008613

ZX, TMXZCO006551-19-15MAR96

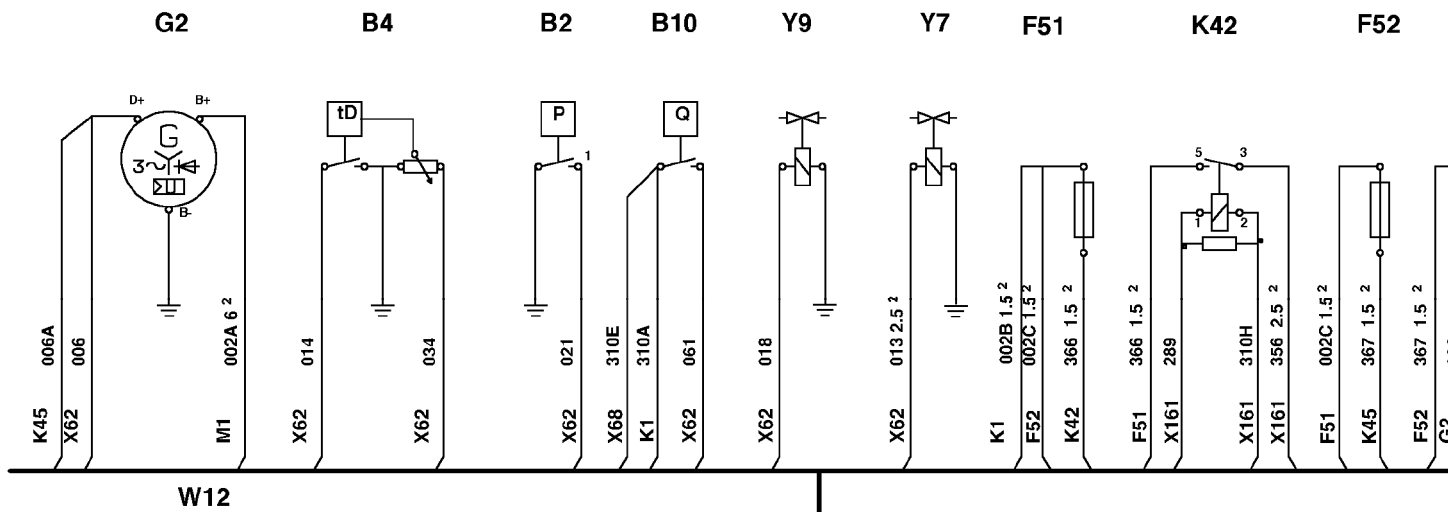
**LOCATION OF REAR BASIC WIRING HARNESS W9, GRAIN TANK WIRING HARNESS W15, CHOPPER WIRING HARNESS W25 AND CHAFF SPREADER WIRING HARNESS W26**



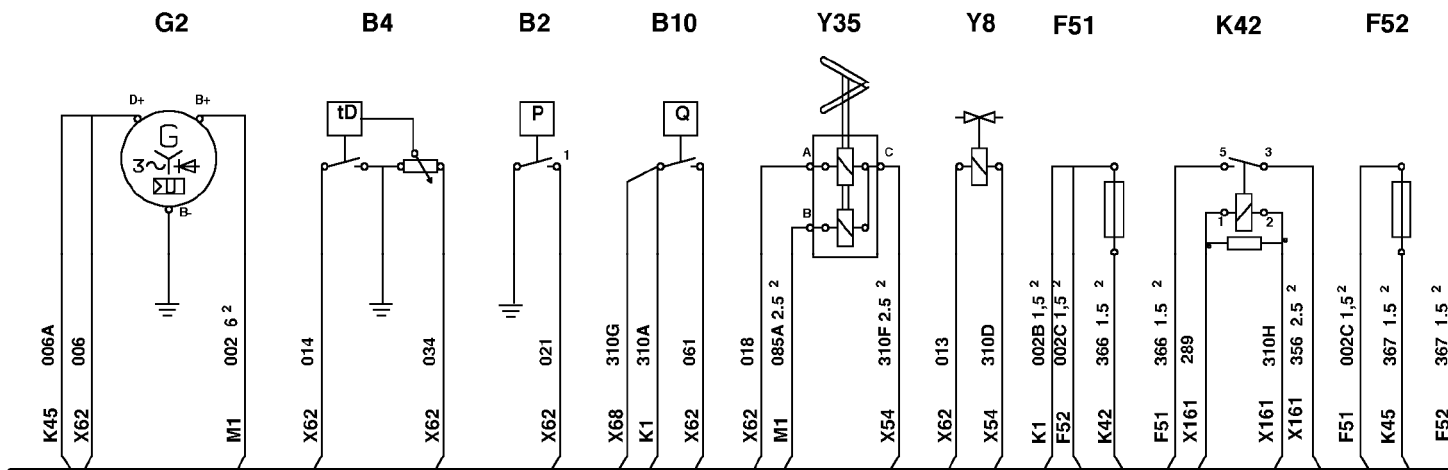




### WIRING AND HARNESS DIAGRAM OF ENGINE WIRING HARNESSES W12 AND W13, PART 1



W12		X161		W13	
K42	289	A	289	Y34A	
K42	310H	B	310H	Y34A	
K45	363 1.5 2	C	363 1.5 2	S69	
X62	364 1.5 2	D	364 1.5 2	S69	
K42	356 2.5 2	E	356 2.5 2	Y34	
X54	310G 2,5 2	F	310G 2,5 2	Y34	



W13		X161		W12	
K42	289	A	289	Y34A	
K42	310H	B	310H	Y34A	
K45	363	C	363	S69	
X62	364	D	364	S69	
K42	356 2.5 2	E	356 2.5 2	Y34	
X54	310G 2,5 2	F	310G 2,5 2	Y34	

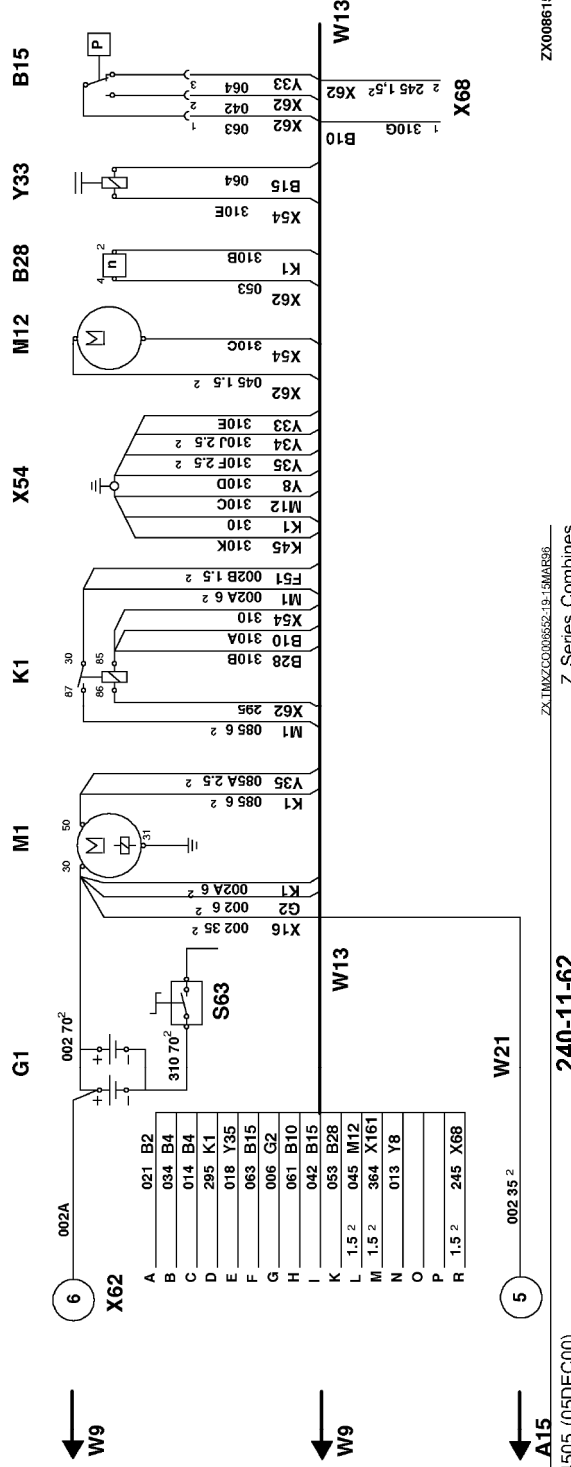
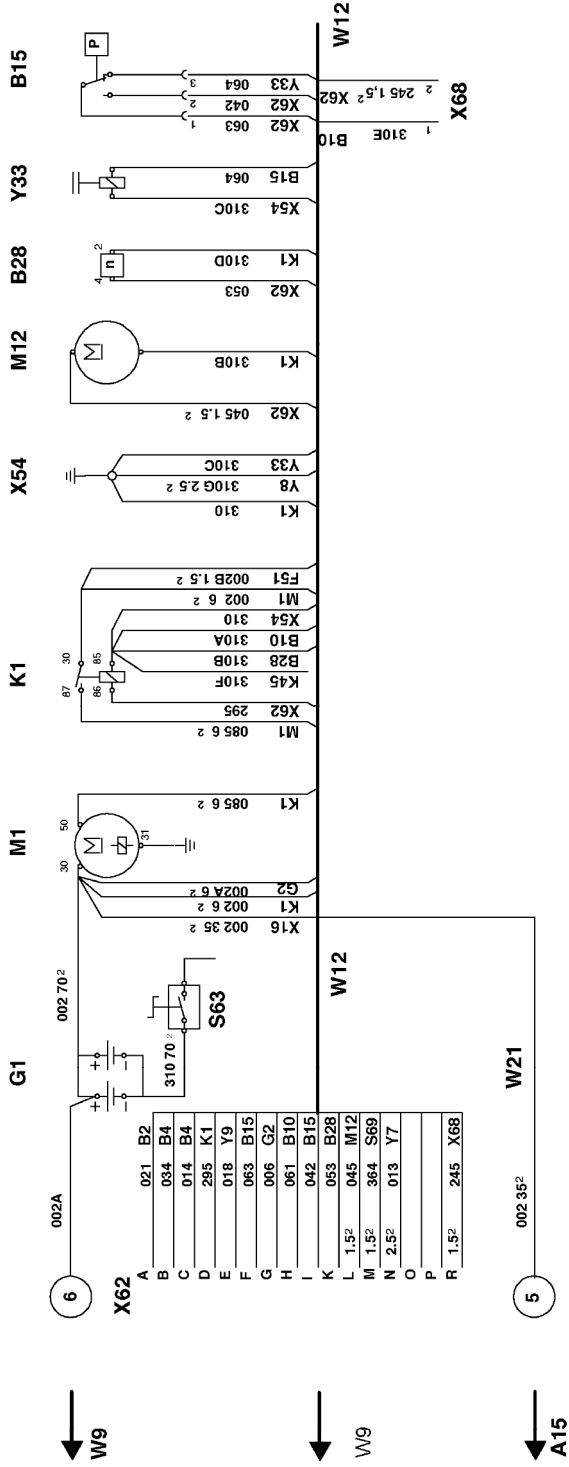




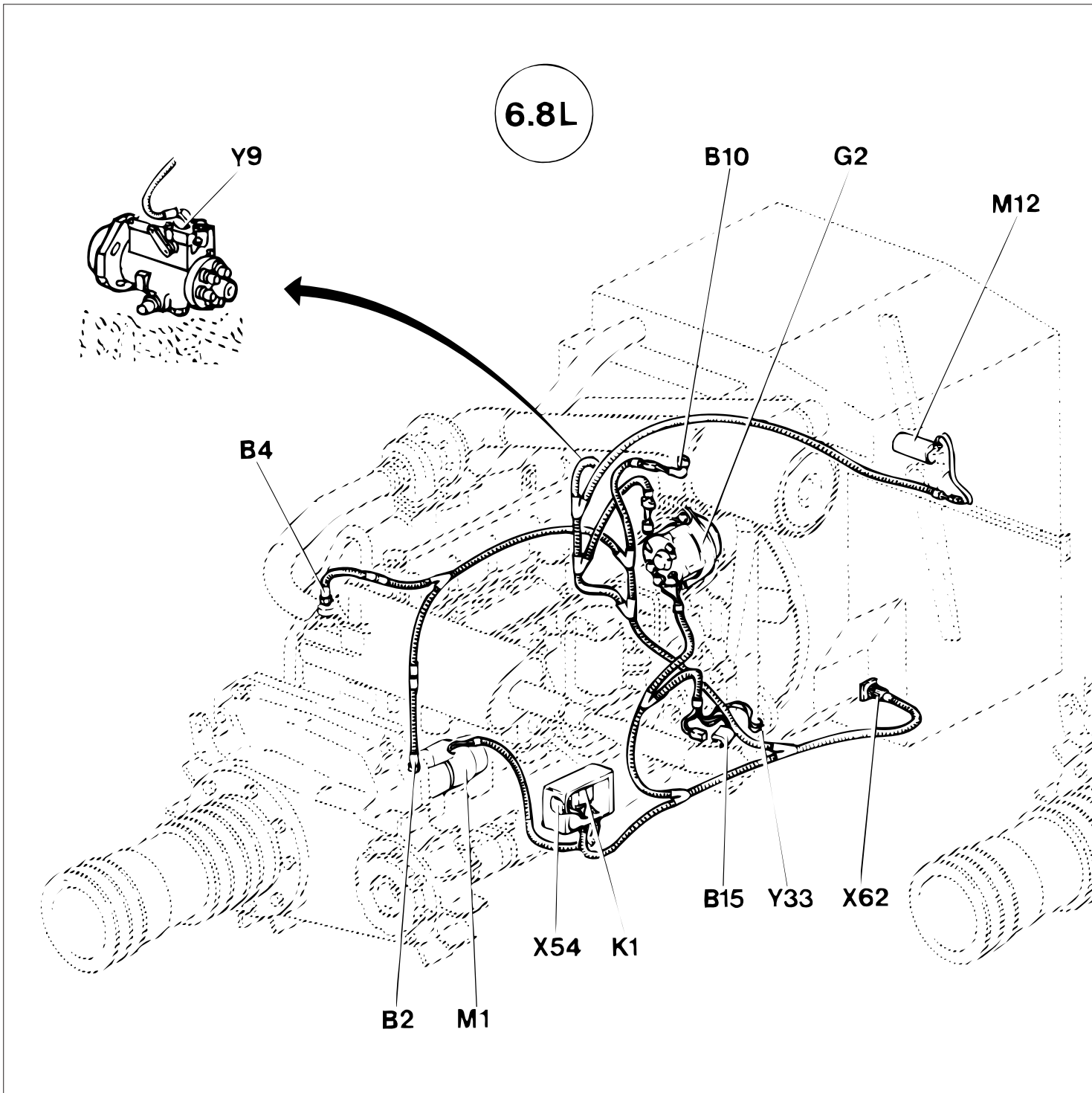




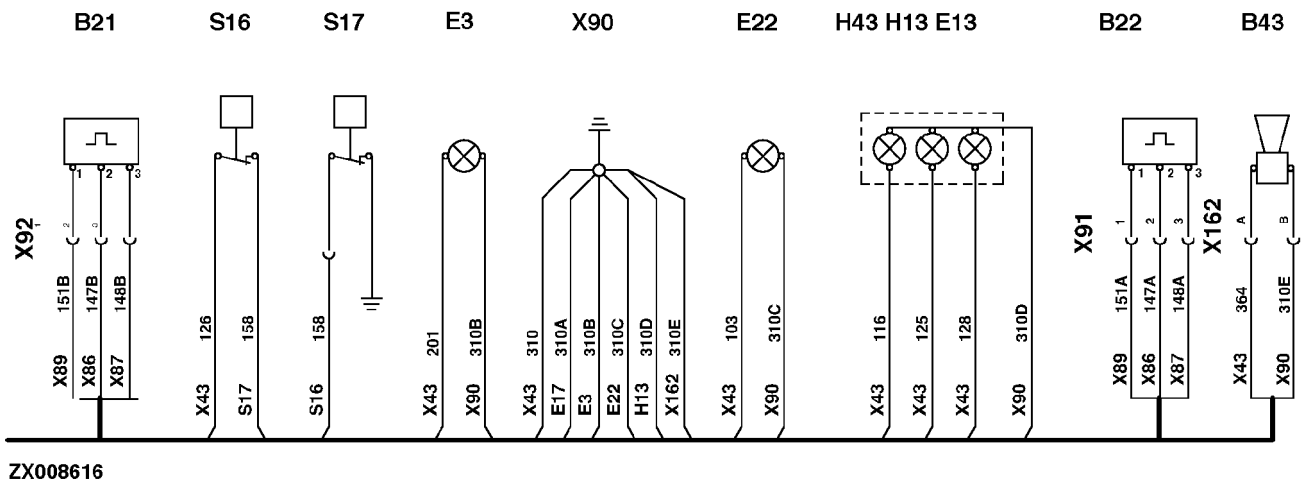
WIRING AND HARNESS DIAGRAM OF ENGINE WIRING HARNESSES W12 AND W13,  
PART 2



### LOCATION OF ENGINE WIRING HARNESS W12 AND W13 WITH COMPONENTS



### WIRING AND HARNESS DIAGRAM OF STRAW HOOD WIRING HARNESS W20, PART 1

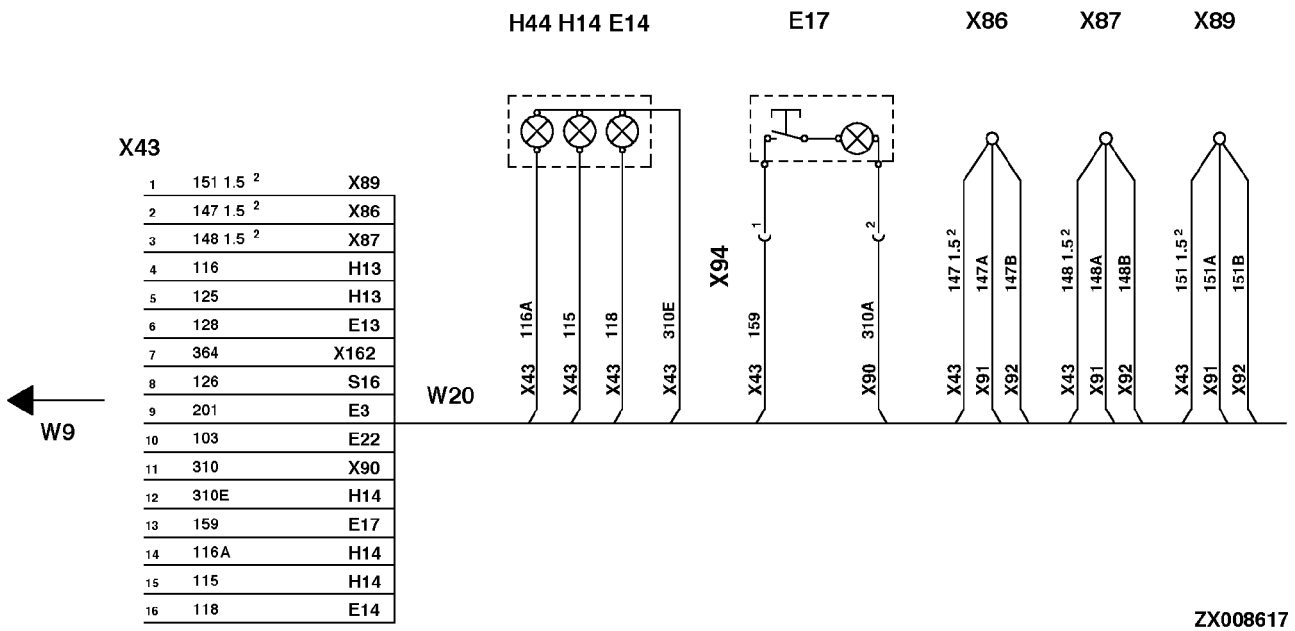


ZX008616 -UN-13MAY96

ZX, TMXZCO006496-19-15MAR96



### WIRING AND HARNESS DIAGRAM OF STRAW HOOD WIRING HARNESS W20, PART 2

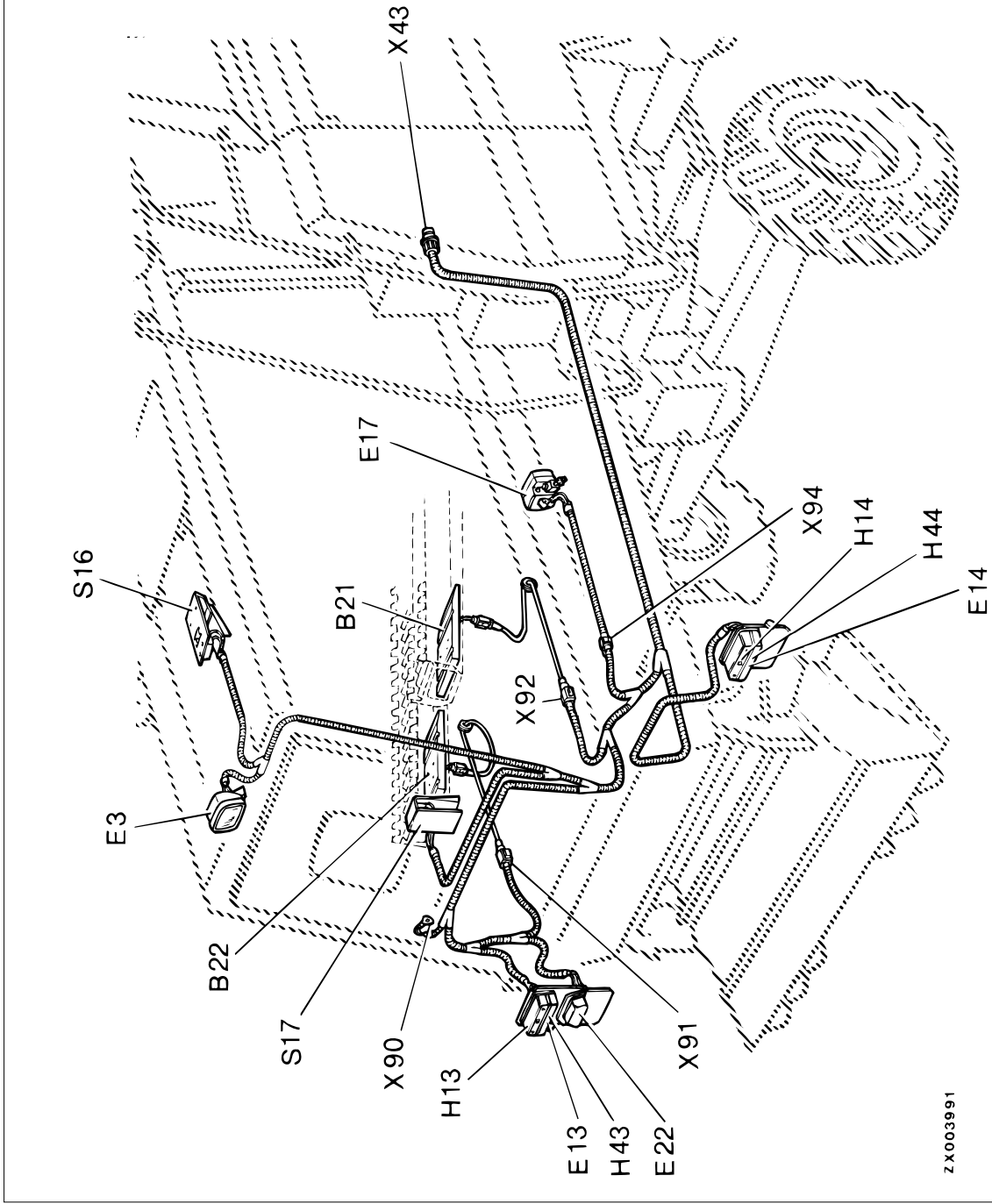


ZX008617

ZX008617 -JN-13MAY96

ZX, TMXZCO006553-19-15MAR96

**LOCATION OF STRAW HOOD WIRING HARNESS W20 WITH COMPONENTS**



ZX003991





**Group 15A**

**Current Supply/Starting Motor to Ser.No. 062721**

### SPECIFICATIONS

Item	Measurement	Specification
Alternator	Capacity	120 A
Batteries	Number	2
Batteries	Voltage	12 V
Battery	Capacity	88 AH

ZX, TMXZCO002403-19-17JAN94

### OPERATIONAL INFORMATION

Clearance lights, hazard warning lights, work lights and horn may be switched on regardless of starter switch position.

With starter switch in position (I), all electrical systems may be switched on, with the exception of gauges and indicator lights. These components are activated when starter switch is turned to position (II).

With hydrostatic ground speed drive lever in neutral position, starting motor may be operated by turning starter switch to position (III).

*NOTE: Power is supplied to memory functions of clock, radio and citizen band from a point located in front of the battery switch which may be installed. This ensures correct operation of these components with battery switch in "OFF" position.*

ZX, TMXZCO002405-19-25NOV92

### THEORY OF OPERATION

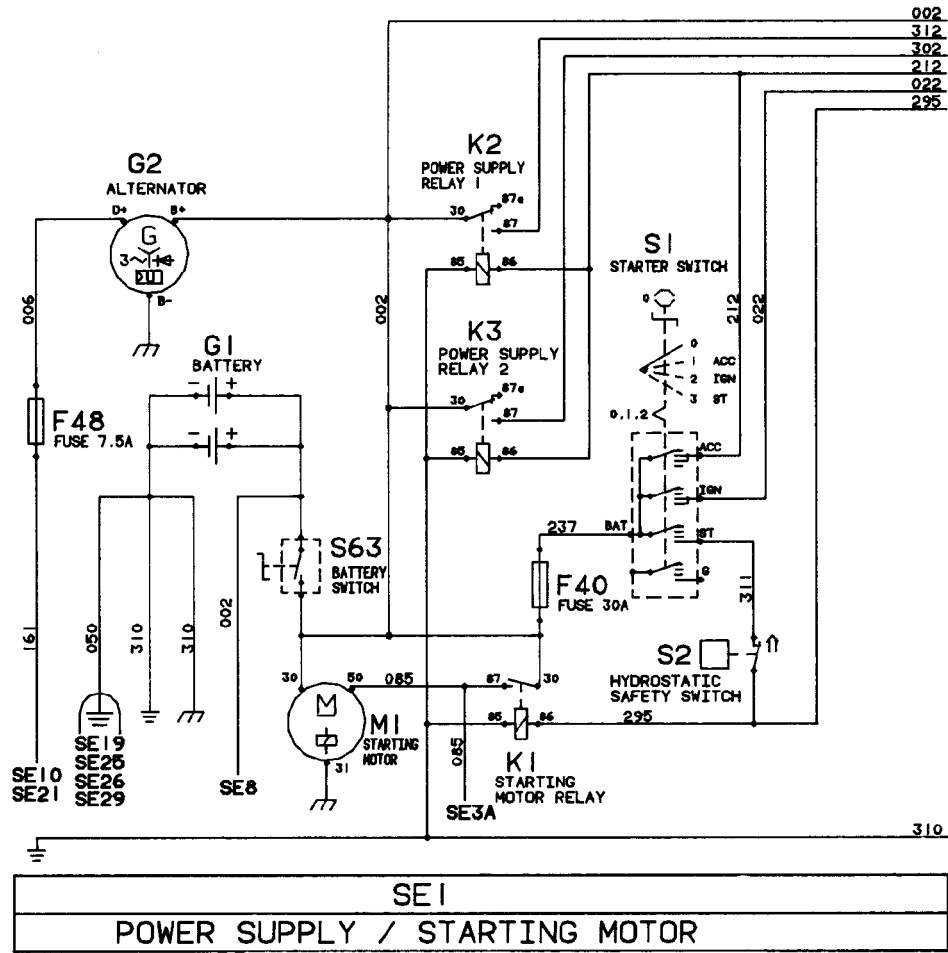
The negative battery terminal is connected to the machine frame on all combine models. The positive battery terminal is connected to terminal (30) of starting motor and to the fuse board on which the fuses and basic relays (K2) and (K3) are located.

The starter switch is supplied with current via fuse (F40).

The hydrostatic ground speed control lever must be in neutral position when starting the engine. This will activate switch (S2).

ZX, TMXZCO002404-19-25NOV92

**FUNCTIONAL SCHEMATIC OF SECTION 1**

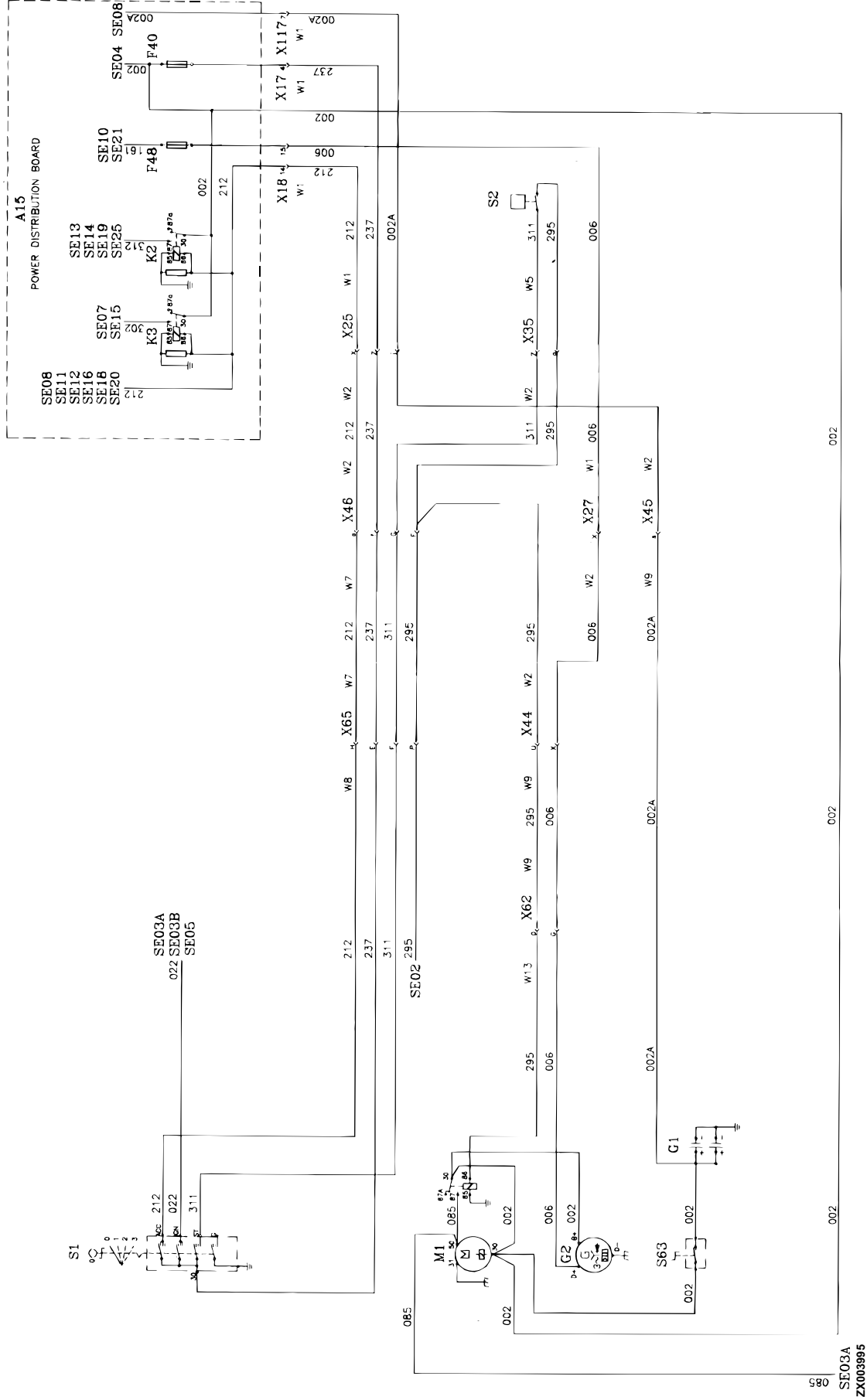


ZX003994

-UN-02MAY95  
ZX003994

- |                                                           |                                                                     |                                                                    |                                                                                |
|-----------------------------------------------------------|---------------------------------------------------------------------|--------------------------------------------------------------------|--------------------------------------------------------------------------------|
| A15 — Fuse board                                          | X18 — Connection, distribution harness (W1) to fuse board           | X44 — Disconnect point, cab harness (W2), rear basic harness (W9)  | X62 — Disconnect point, rear basic harness (W9), engine harness (W13)          |
| F40 — Fuse, 30 amps.                                      | X25 — Disconnect point, distribution harness (W1), cab harness (W2) | X45 — Disconnect point, cab harness (W2), rear basic harness (W9)  | X65 — Disconnect point, front basic harness (W7), steering column harness (W8) |
| F48 — Fuse, 7.5 amps.                                     | X27 — Disconnect point, distribution harness (W1), cab harness (W2) | X46 — Disconnect point, cab harness (W2), front basic harness (W7) | X117 — Connection, distribution harness (W1) to fuse board                     |
| G1 — Batteries                                            | X35 — Disconnect point, cab harness (W2), armrest harness (W5)      |                                                                    |                                                                                |
| G2 — Alternator                                           |                                                                     |                                                                    |                                                                                |
| K1 — Starting motor relay                                 |                                                                     |                                                                    |                                                                                |
| K2 — Basic relay                                          |                                                                     |                                                                    |                                                                                |
| K3 — Basic relay                                          |                                                                     |                                                                    |                                                                                |
| M1 — Starting motor                                       |                                                                     |                                                                    |                                                                                |
| S1 — Starter switch                                       |                                                                     |                                                                    |                                                                                |
| S2 — Hydrostatic safety switch                            |                                                                     |                                                                    |                                                                                |
| S63 — Battery switch                                      |                                                                     |                                                                    |                                                                                |
| X17 — Connection, distribution harness (W1) to fuse board |                                                                     |                                                                    |                                                                                |

DIAGNOSTIC SCHEMATIC OF SECTION 1





**Group 16A**

**Current Supply/Starting Motor from Ser.No. 062722**

### SPECIFICATIONS

Item	Measurement	Specification
Alternator	Capacity	120 A
Batteries	Number	2
Batteries	Voltage	12 V
Battery	Capacity	88 AH

ZX, TMXZCO002403-19-17JAN94

### OPERATIONAL INFORMATION

Clearance lights, hazard warning lights, work lights and horn may be switched on regardless of starter switch position.

With starter switch in position (I), all electrical systems may be switched on, with the exception of gauges and indicator lights. These components are activated when starter switch is turned to position (II).

With hydrostatic ground speed drive lever in neutral position, starting motor may be operated by turning starter switch to position (III).

*NOTE: Power is supplied to memory functions of clock, radio and citizen band from a point located in front of the battery switch which may be installed. This ensures correct operation of these components with battery switch in "OFF" position.*

ZX, TMXZCO002405-19-25NOV92

### THEORY OF OPERATION

On all combine models, the negative battery terminal is connected to the machine frame via the main battery switch (S63). The positive battery terminal is connected to terminal (30) of starting motor and to the fuse board on which the fuses and basic relays (K2) and (K3) are located.

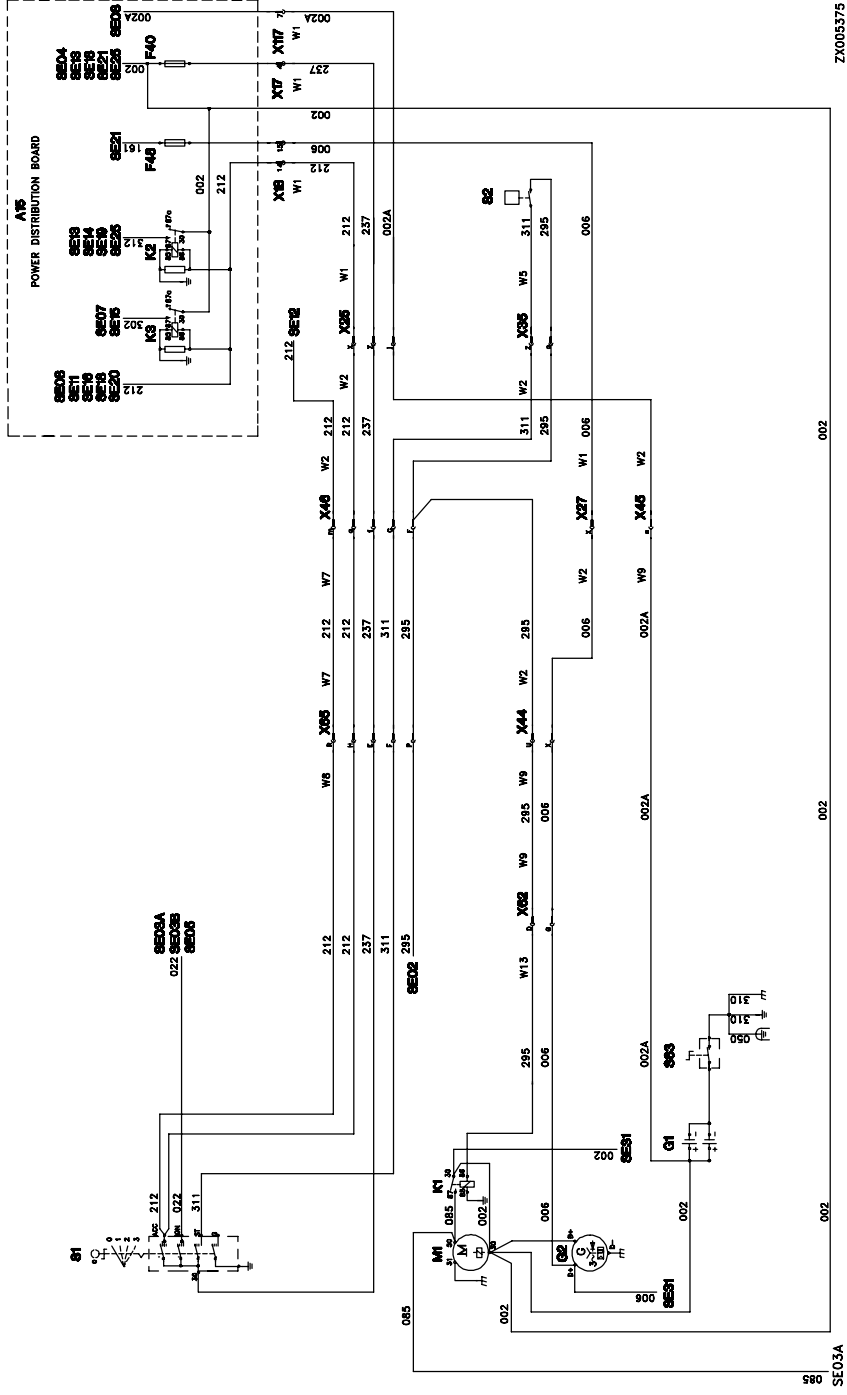
The starter switch is supplied with current via fuse (F40).

The hydrostatic ground speed control lever must be in neutral position when starting the engine. This will activate switch (S2) and change switch (S63) from a positive conductor to a negative one.

ZX, TMXZCO005138-19-15MAR96



DIAGNOSTIC SCHEMATIC OF SECTION 1







## Group 15B Cold Weather Starting Aid

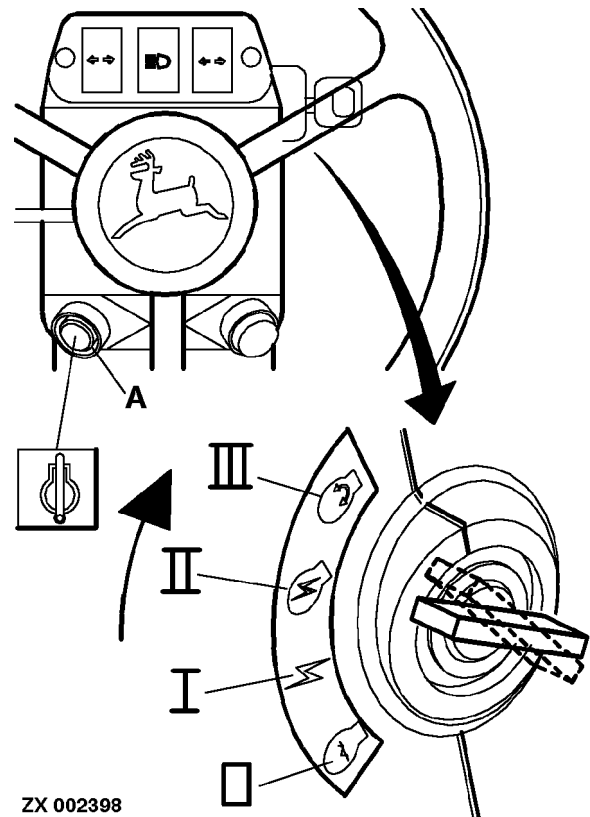
### OPERATIONAL INFORMATION

The cold weather starting aid injects ether fluid into the intake manifold while cranking engine by means of starting motor.

Ether is highly flammable. The heat created in the combustion chamber is sufficient to ignite the injected ether. This in turn will ignite the fuel/air mixture.

Operating cold weather starting aid:

Turn starter switch to position III. As soon as the engine is cranking, push ether starting aid button (A). After the engine has started, release starter switch and starting aid button.



ZX 002398

ZX,TMXZCO003182-19-17JAN94

ZX002398 -UN-10APR95

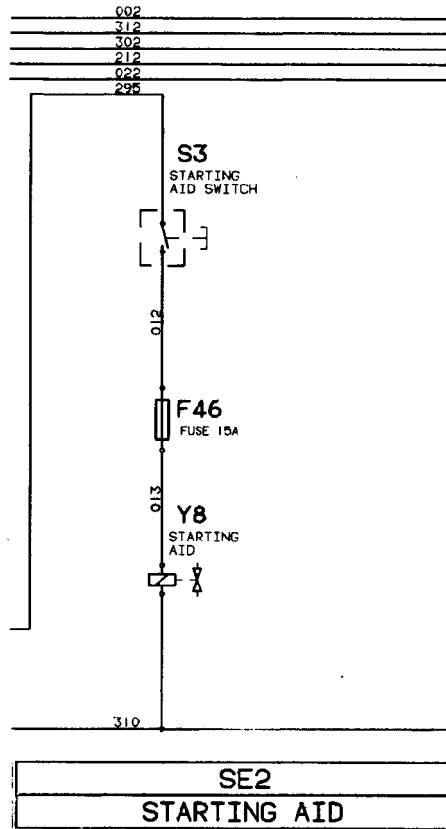
### THEORY OF OPERATION

With starter switch in position III, voltage is supplied to starting motor relay coil via hydrostatic safety switch. At the same time, voltage is supplied to starting aid switch (S3) via wire 295.

Solenoid (Y8) is activated by actuating switch (S3), which will inject ether into the intake manifold.

ZX,TMXZCO003183-19-17JAN94

**FUNCTIONAL SCHEMATIC OF SECTION 2**



ZX005243 -JUN-28APR95

**ZX005243**

- A15—Fuse board
- F46—Fuse, 15 amps.
- S3 —Ether starting aid switch
- X17—Connection, distribution harness (W1) to fuse board
- X25—Disconnect point, distribution harness (W1), cab harness (W2)

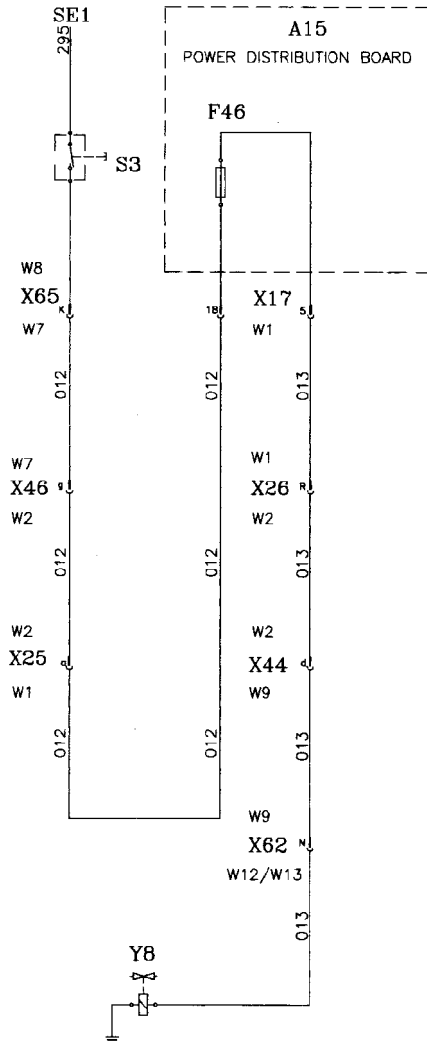
- X44—Disconnect point, cab harness (W2), basic harness (W9)
- X46—Disconnect point, cab harness (W2), front basic harness (W7)

- X62—Disconnect point, rear basic harness (W9), engine harness (W12/W13)
- X65—Disconnect point, front basic harness (W7), steering column harness (W8)

- Y8 —Solenoid, ether starting aid

ZX,TMXZCO003184-19-17JAN94

### DIAGNOSTIC SCHEMATIC OF SECTION 2



ZX003997 -JUN-02MAY95

ZX003997

ZX, TMXZCO003185-19-17JAN94



## OPERATIONAL INFORMATION

When starter switch is moved back from position (II) to position (I), the engine is shut off electrically.

On the 7.6 Liter engine, a shut-off lever is moved by interrupting current supply to the lever retaining solenoid.

On the 6.8 Liter engine, the fuel supply is shut off by means of a solenoid valve in the fuel pump.

ZX, TMXZCO002408-19-25NOV92

## THEORY OF OPERATION

### 7.6 LITER ENGINE

When moving starter switch from position (I) to position (II), coil of (Y2) is supplied with current via wire (288).

In addition, the second coil of (Y2) is activated via wire (045) during the starting procedure, moving the shut-off lever at fuel injection pump.

The engine is ready for starting.

After starting procedure is completed, the second coil is again without current.

The engine shut-off lever is held in operating position by the retaining coil.

For shutting off the engine current supply to the retaining coil is interrupted.

A return spring moves shut-off lever at fuel injection pump to the zero position.

### 6.8 LITER ENGINE

Fuel supply at injection pump is interrupted by a solenoid.

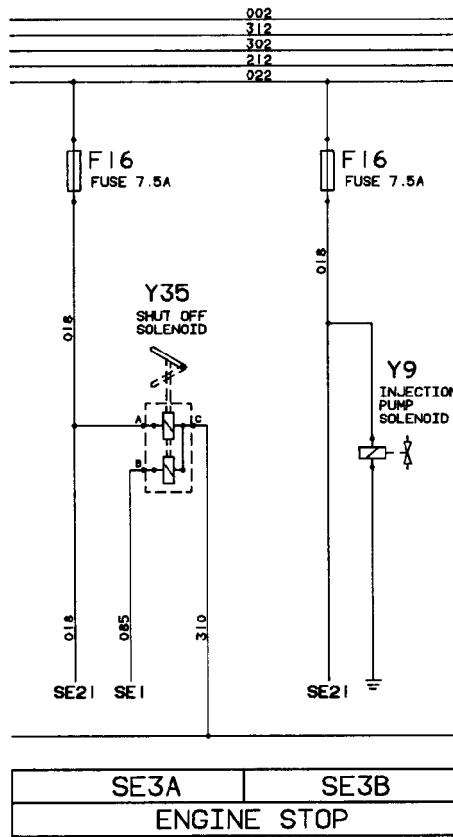
With engine running, solenoid coil is supplied with current, keeping solenoid valve open.

When current supply is interrupted, the valve is closed by spring force.

*NOTE: If fuse (F16) fails, the machine will stop.*

ZX, TMXZCO002409-19-25NOV92

**FUNCTIONAL SCHEMATIC OF SECTIONS 3A AND 3B**



ZX003998

ZX003998 -UN-02MAY95

- A15 —Fuse board
- F16 —Fuse, 7.5 amps.
- X44 —Disconnect point, cab harness (W2), basic harness (W9)
- X26 —Disconnect point, distribution harness (W1), cab harness (W2)

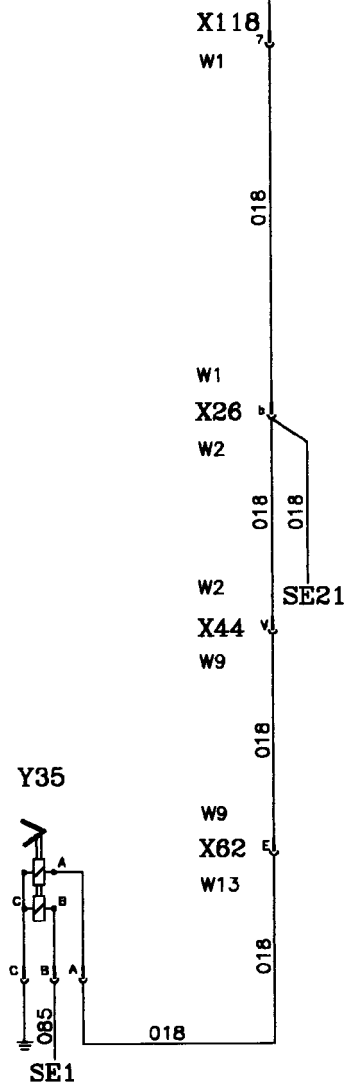
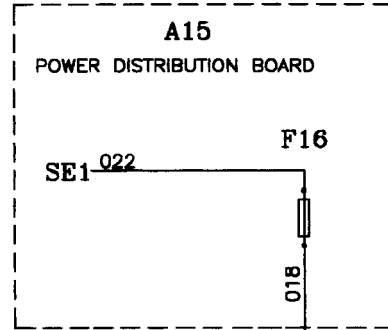
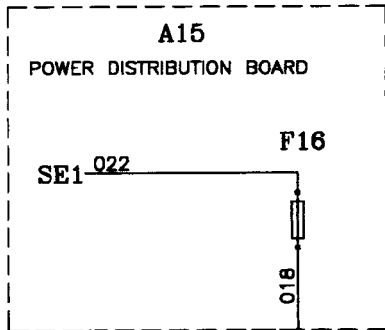
- X62 —Disconnect point, rear basic harness (W9), engine harness (W12/W13)

- X118—Connection, distribution harness (W1) to fuse board
- Y9 —Engine shut-off solenoid

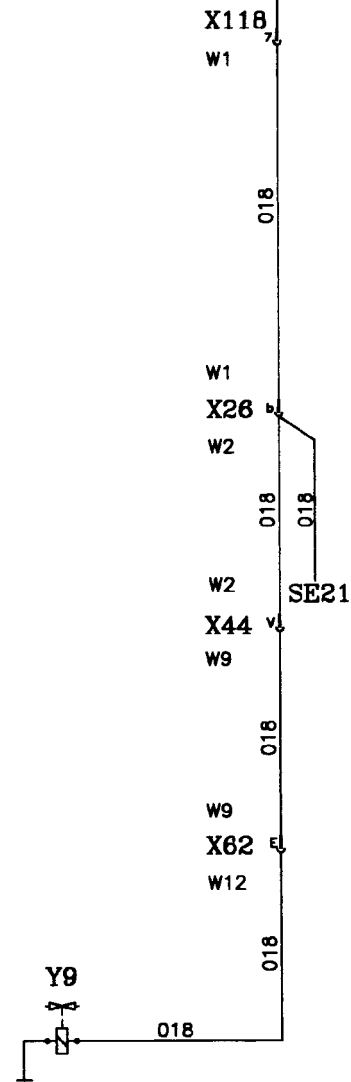
- Y35 —Engine shut-off solenoid

ZX,TMXZCO002410-19-17JAN94

**DIAGNOSTIC SCHEMATIC OF SECTIONS 3A AND 3B**



SE3A



SE3B

ZX003999

ZX003999 -JUN-02MAY95

*Engine Shut-Off Device/Diagnostic Schematic, Sections 3A and 3B*



### OPERATIONAL INFORMATION

The combine is equipped with analog gauges to display coolant temperature, fuel level, grain losses and header height.

When certain limit values are reached, the coolant or fuel level sending units activate indicator lights and buzzer.

ZX, TMXZCO002412-19-25NOV92

### THEORY OF OPERATION

With starter switch in position (II), the gauges are supplied with current via fuse (F24).

The COOLANT TEMPERATURE GAUGE (P1) is connected to sending unit (B4) via wire (034).

Sending unit (B4) is a variable resistor.

At a coolant temperature of 20°C (68°F) resistance is very high. The gauge shows a very low temperature.

At a coolant temperature of 110°C (240°F) resistance is low. The gauge shows a high temperature.

The FUEL GAUGE (P2) is connected to sending unit (B11) via wire (033).

Sending unit (B11) is a variable resistor.

At a low fuel level in fuel tank, resistance is low. Gauge shows empty tank.

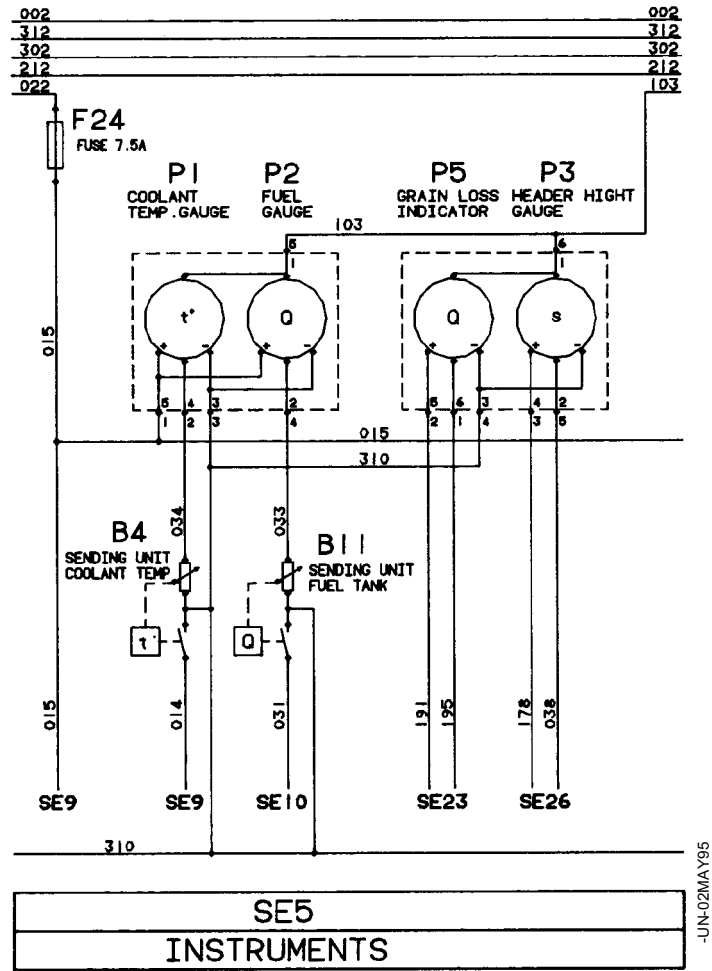
At a high fuel level in fuel tank, resistance is high. Gauge shows full tank.

The HEADER HEIGHT GAUGE receives signals from potentiometer (R4) on feeder house.

Display of GRAIN LOSS GAUGE is controlled by harvest performance monitor (A4).

ZX, TMXZCO002413-19-25NOV92

FUNCTIONAL SCHEMATIC OF SECTION 5



ZX004027 -JUN-02MAY95

ZX004027

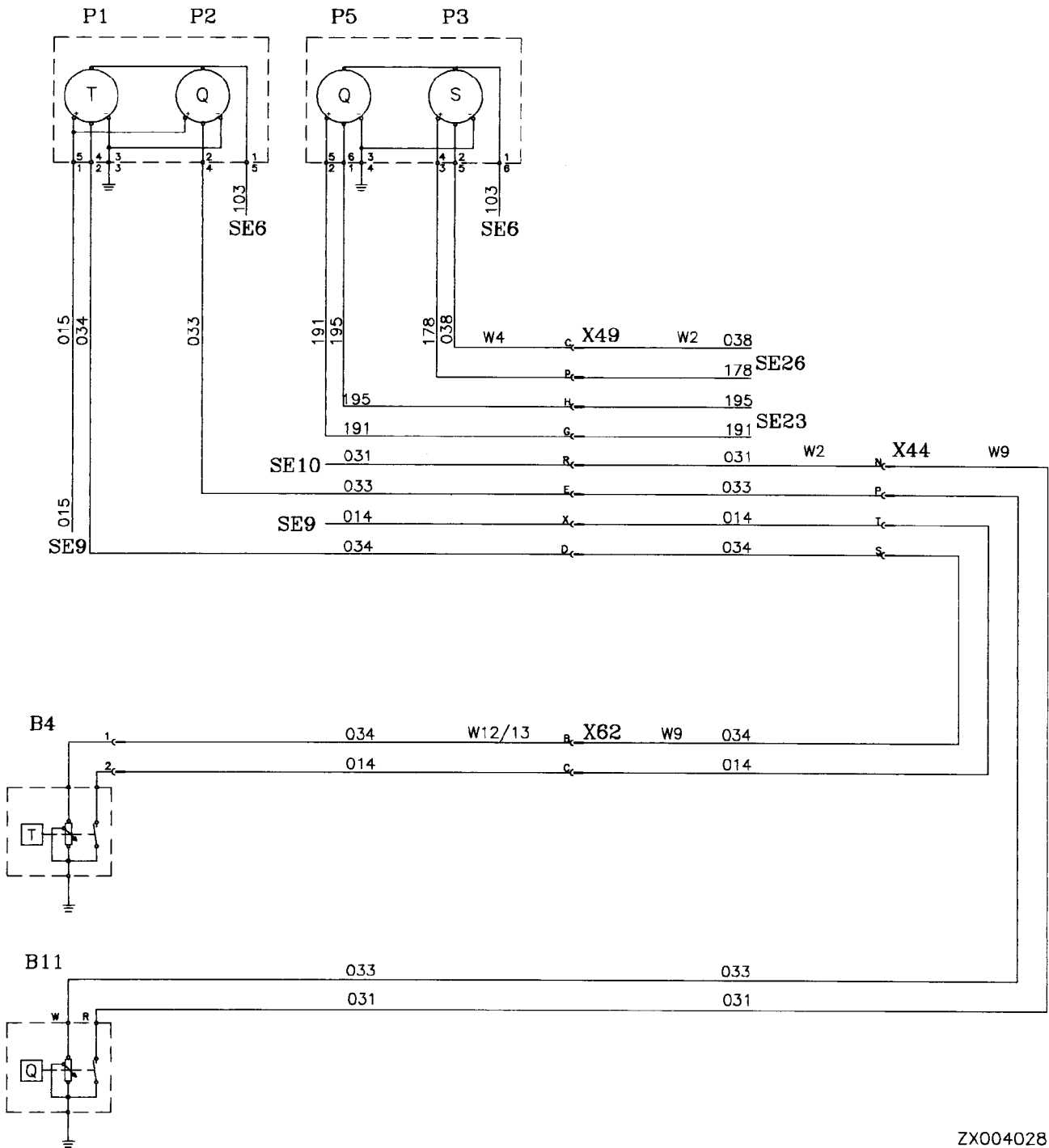
B4 —Coolant temperature sending unit  
 B11—Fuel tank sending unit  
 F24—Fuse, 7.5 amps.  
 P1 —Coolant temperature gauge

P2 —Fuel gauge  
 P3 —Header height gauge  
 P5 —Grain loss indicator  
 X44—Disconnect point, cab harness (W2), rear basic harness (W9)

X62—Disconnect point, rear basic harness (W9), engine harness (W12/W13)

ZX,TMXZCO002414-19-17JAN94

**DIAGNOSTIC SCHEMATIC OF SECTION 5**



ZX004028

ZX, TMXZC0002415-19-25NOV92

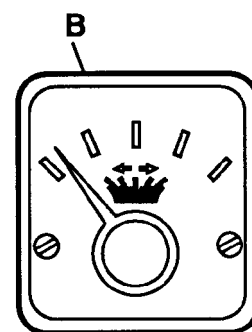
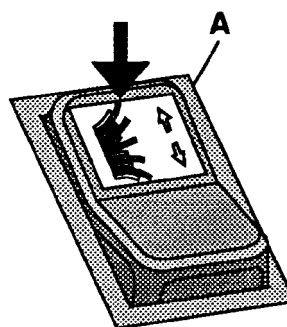


## Group 15F Chopper Distributor Adjustment

### OPERATIONAL INFORMATION

With separator engaged, it is possible to distribute chopped material to the right or left by repositioning distributor plates. Gauge (B) shows direction of material distribution.

- A—Chopper distributor switch
- B—Chopper distributor gauge



ZX 004015

ZX, TMXZC0002416-19-25NOV92

-UN-28APR95  
ZX004015

### THEORY OF OPERATION

Switch (S54) is supplied with current via wire (202) (depending on position of separator switch) and via fuse (F15). Ground connection is also established by means of switch (S54).

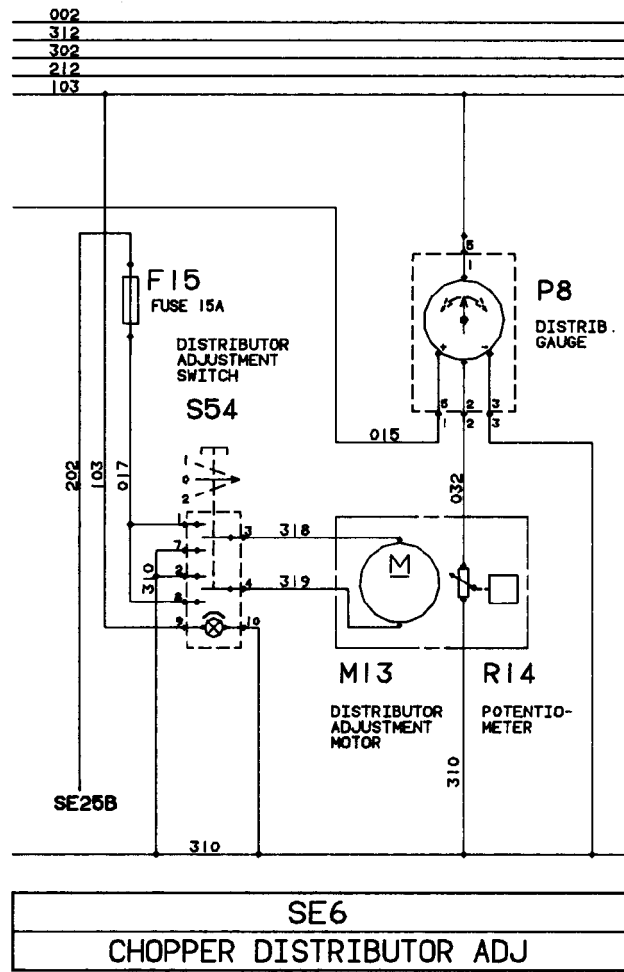
Rotating direction of electric motor (M13) depends on position of switch (S54).

An internal mechanical slip clutch prevents overloading of the system.

Gauge (P8) is controlled by potentiometer (R14) integrated in electric motor.

ZX, TMXZC0002417-19-25NOV92

**FUNCTIONAL SCHEMATIC OF SECTION 6**



ZX004029

-JUN-02MAY95  
ZX004029

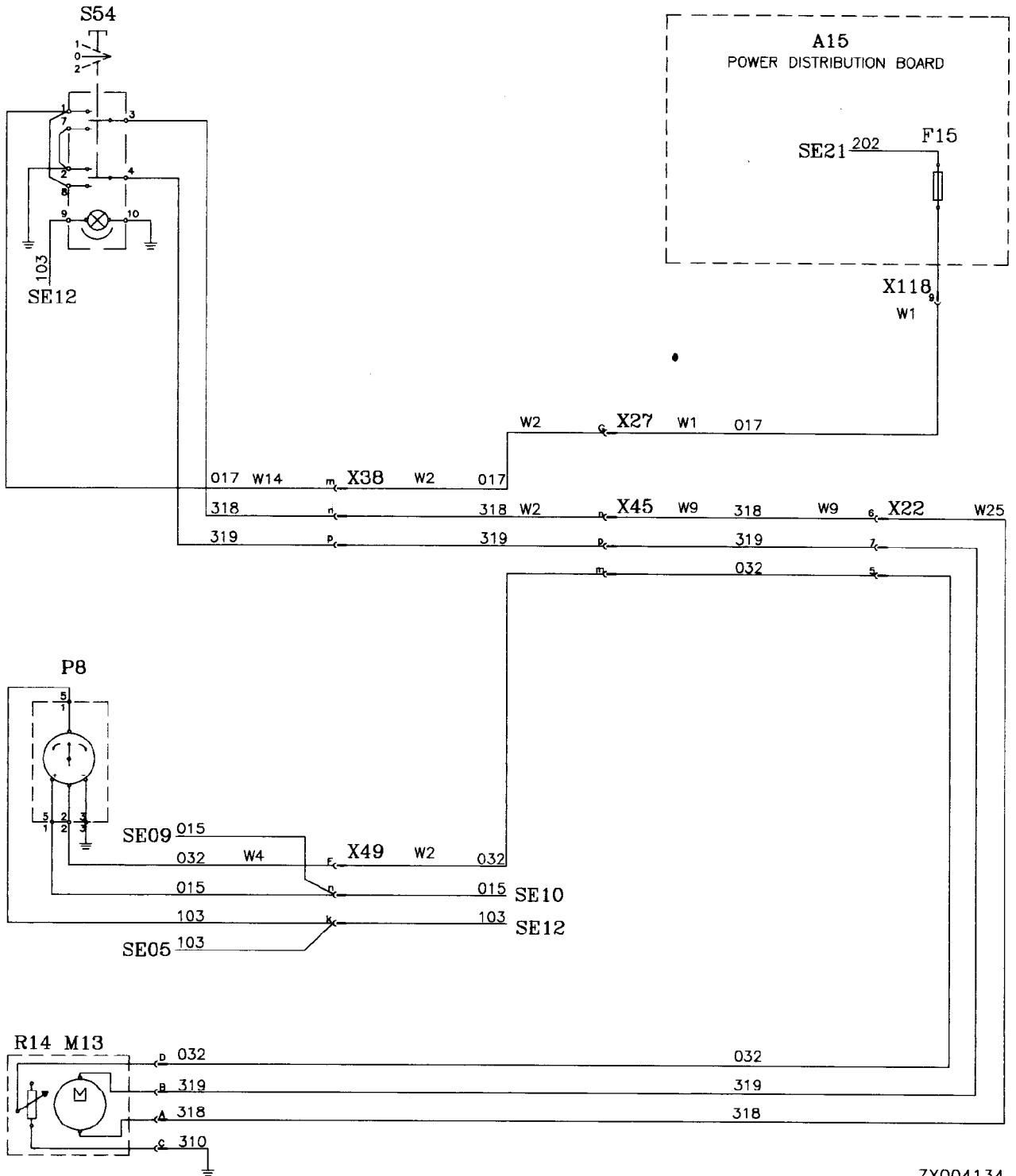
- A15 —Fuse board
- F15 —Fuse, 15 amps.
- M13 —Distributor adjusting motor
- P8 —Distributor gauge
- R14 —Potentiometer
- S54 —Switch, distributor adjustment

- X22 —Disconnect point, rear basic harness (W9), Chopper harness (W25)
- X27 —Disconnect point, distribution harness (W1), cab harness (W2)

- X38 —Disconnect point, cab harness (W2), switch console harness (W14)
- X49 —Disconnect point, cab harness (W2), corner post harness (W4)

- X118—Connection, cab harness to fuse board

**DIAGNOSTIC SCHEMATIC OF SECTION 6**



ZX004134

-JUN-02MAY95  
ZX004134

ZX, TMXZCO003127-19-03JAN94





## Group 15G Windshield Wiper/Washer System

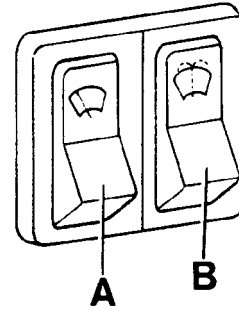
### OPERATIONAL INFORMATION

With starter switch in position (I), windshield wiper/washer may be switched on by actuating switches (A) or (B).

Windshield wiper switch (A) is a tumbler/rocker switch, for one-cycle or continuous wiper operation.

Windshield washer rocker switch (B) can be actuated regardless of position of switch (A).

Cab, grain tank and straw hood lighting are located in the same circuit.



**ZX004091**

ZX004091 -UN-28APR95

ZX.TMXZCO002420-19-25NOV92

### THEORY OF OPERATION

With starter switch in position (I), current is supplied to switches (S20) and (S21) via fuse (F36).

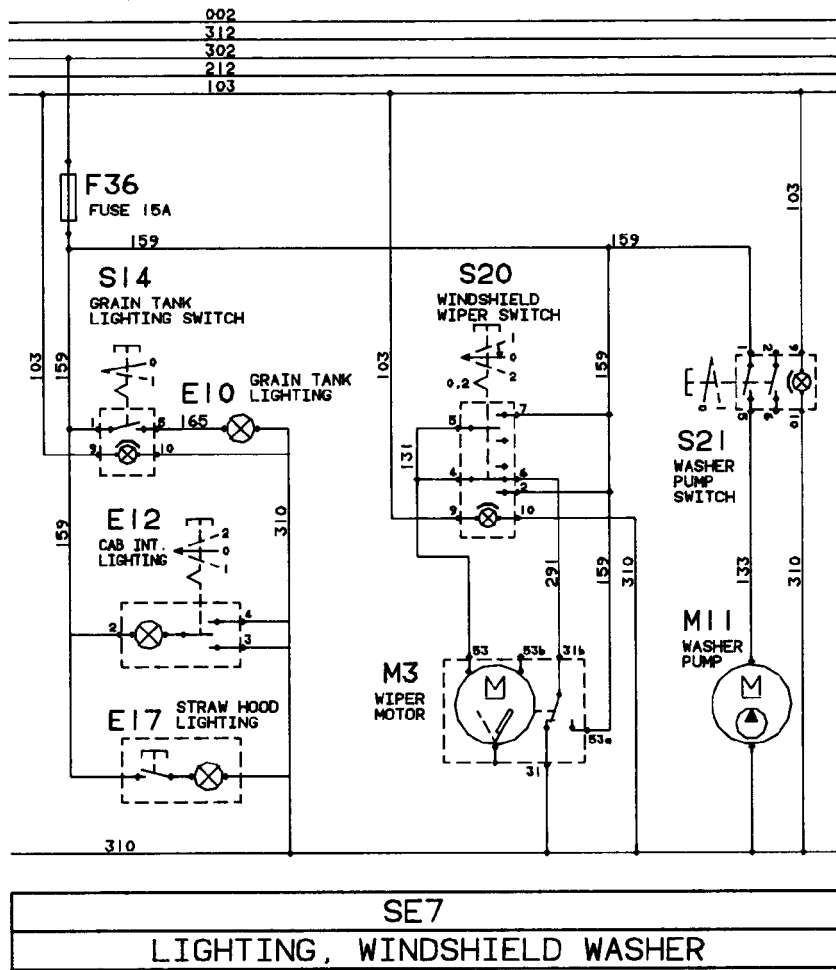
Windshield wiper will operate in wiper switch position (I) or (II). Position (I) is for one-cycle operation, position (II) for continuous operation.

After shutting off windshield wiper, wiper motor (M3) will automatically return it to "park" position.

Switch (S21) activates the windshield washer pump.

ZX.TMXZCO002421-19-25NOV92

FUNCTIONAL SCHEMATIC OF SECTION 7



SE7  
LIGHTING, WINDSHIELD WASHER

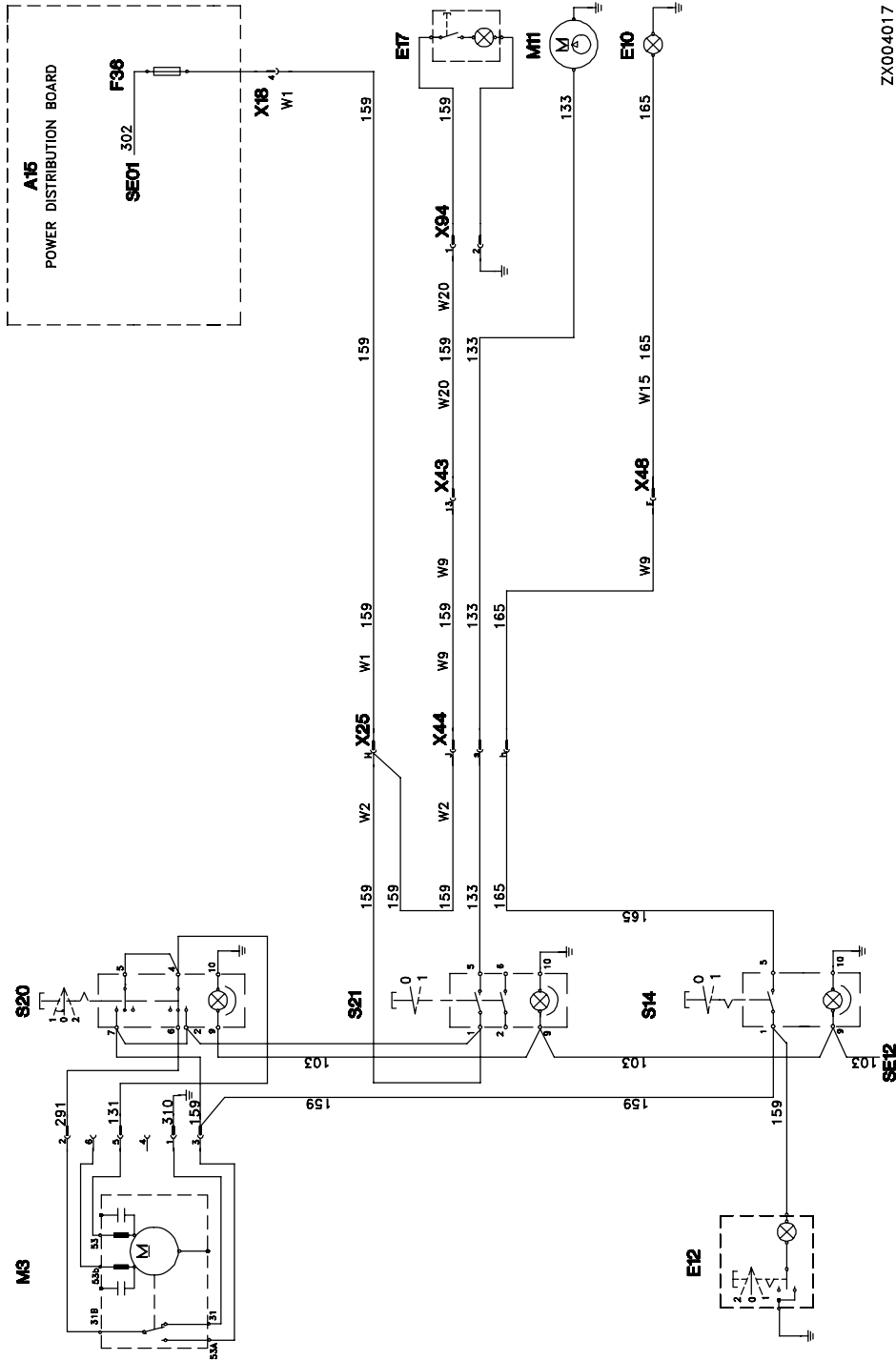
ZX004016

ZX004016 -UN-02MAY95

- |                            |                                                    |                                                               |                                                               |
|----------------------------|----------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|
| A15—Fuse board             | S14—Grain tank lighting switch                     | X25—Disconnect point, distribution harness — cab harness      | X44—Disconnect point, cab harness — rear basic harness        |
| E10—Grain tank lighting    | S20—Windshield wiper switch                        | X43—Disconnect point, rear basic harness — straw hood harness | X48—Disconnect point, rear basic harness — grain tank harness |
| E12—Cab interior lighting  | S21—Windshield washer switch                       |                                                               |                                                               |
| E17—Straw hood lighting    | X18—Connection, fuse board to distribution harness |                                                               |                                                               |
| F36—Fuse, 15 amps.         |                                                    |                                                               |                                                               |
| M3—Windshield wiper motor  |                                                    |                                                               |                                                               |
| M11—Windshield washer pump |                                                    |                                                               |                                                               |

ZX.TMXZCO002422-19-25NOV92

DIAGNOSTIC SCHEMATIC OF SECTION 7



ZX004017



**Group 15H**  
**Radio, Interior Lighting to Ser.No. 062721**

**OPERATIONAL INFORMATION**

With starter switch in position (I), display of digital clock will light up. When parking lights are switched on, display is dimmed by 50%.

At the same time the radio, citizen band or interior light may be switched on with starter switch in position (I).

ZX,TMSPFH001734-19-22FEB92

**THEORY OF OPERATION**

With starter switch in position (I), power is supplied to radio (A12) and citizen band (A13) via fuse (F22), allowing the operator to switch on these components.

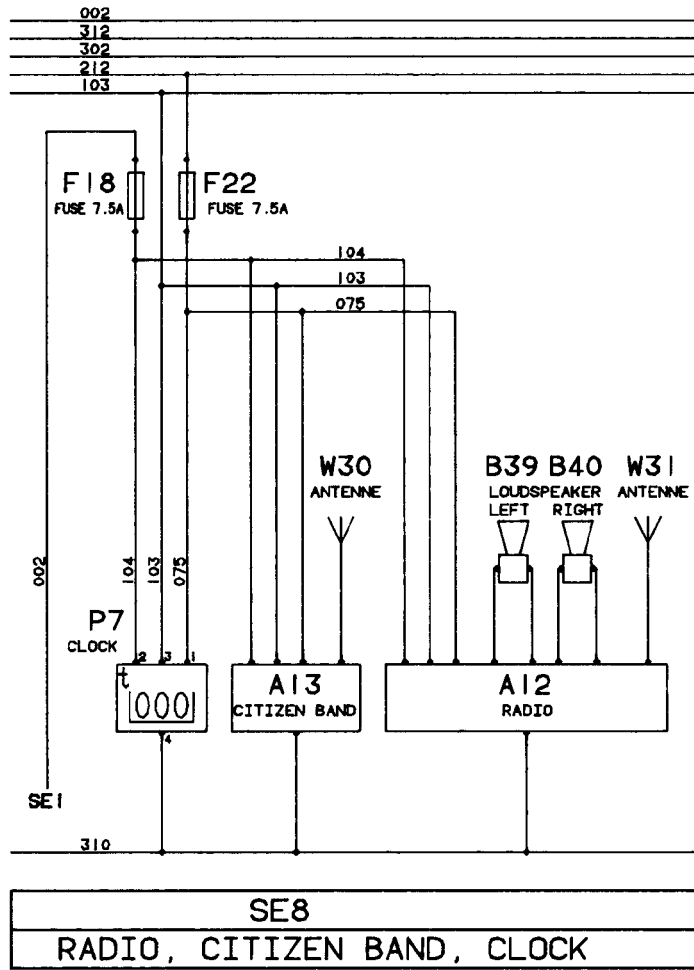
When current is supplied to digital clock via wire (103) (with lights switched on), display is dimmed by 50%.

Display of digital clock (P7) will light up.

Digital clock, radio and citizen band are continuously supplied with current via fuse (F18).

ZX,TMXZCO002424-19-25NOV92

**FUNCTIONAL SCHEMATIC OF SECTION 8**



ZX004018

ZX004018 -UN-02MAY95

A12—Radio  
 A13—Citizen band  
 A15—Fuse board  
 F18—Fuse, 7.5 amps.

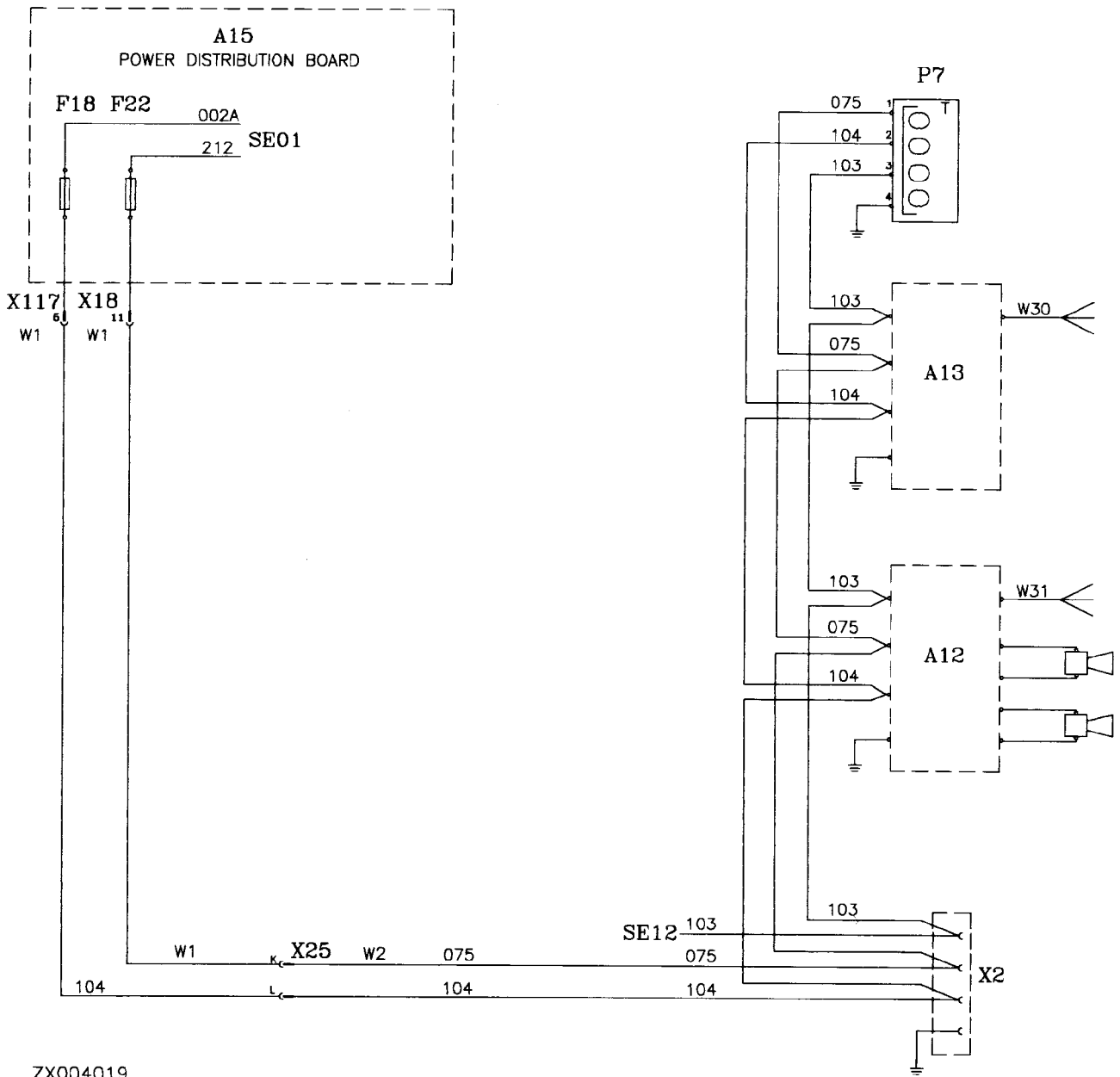
F22—Fuse, 7.5 amps.  
 P7—Digital clock  
 X2—Disconnect point, radio (USA)

X18—Connection, fuse board to distribution harness  
 X25—Disconnect point, distribution harness — cab harness

X117—Connection, fuse board to distribution harness

ZX, TMXZCO002425-19-25NOV92

**DIAGNOSTIC SCHEMATIC OF SECTION 8**



ZX004019

ZX.TMXZCO002426-19-25NOV92

ZX004019 -JUN-02MAY95





# Group 16H Radio, Interior Lighting from Ser.No. 062722

## OPERATIONAL INFORMATION

With starter switch in position (I), display of digital clock will light up. When parking lights are switched on, display is dimmed by 50%.

At the same time the radio, citizen band or interior light may be switched on with starter switch in position (I).

ZX,TMSPFH001734-19-22FEB92

## THEORY OF OPERATION

With starter switch in position (I), power is supplied to radio (A12) and citizen band (A13) via fuse (F22), allowing the operator to switch on these components.

Digital clock, radio and citizen band are continuously supplied with current via fuse (F18).

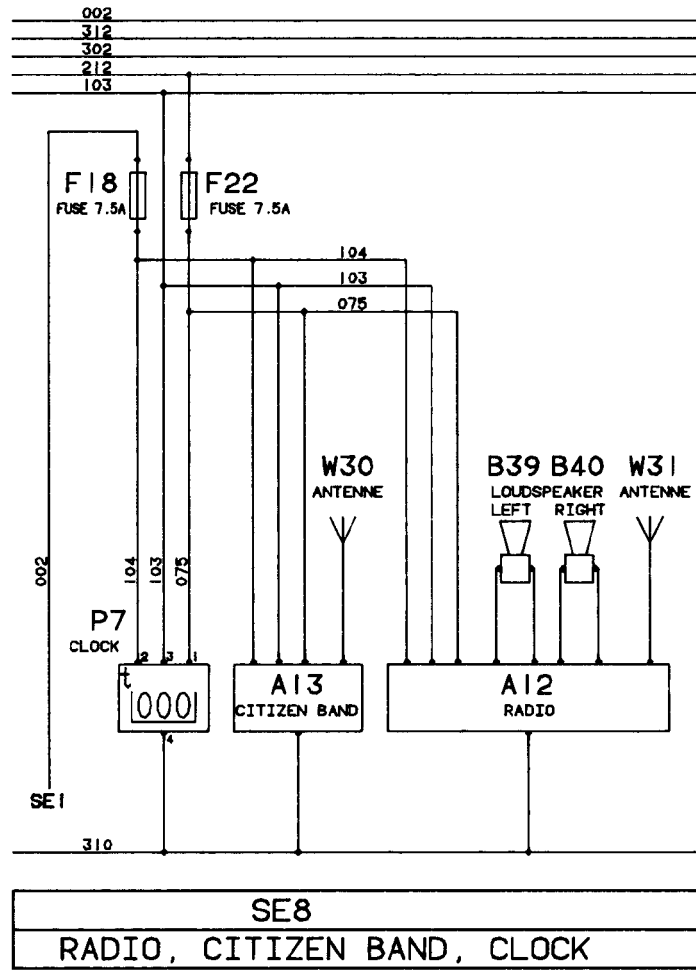
Display of digital clock (P7) will light up.

*NOTE: Connection from line (075) to relay (K46) in Section 32 applies only in the case of the 2054 combine.*

When current is supplied to digital clock via wire (103) (with lights switched on), display is dimmed by 50%.

ZX,TMXZCO006479-19-15MAR96

**FUNCTIONAL SCHEMATIC OF SECTION 8**



ZX004018

-UN-02MAY95  
ZX004018

A12—Radio  
A13—Citizen band  
A15—Fuse board  
F18—Fuse, 7.5 amps.

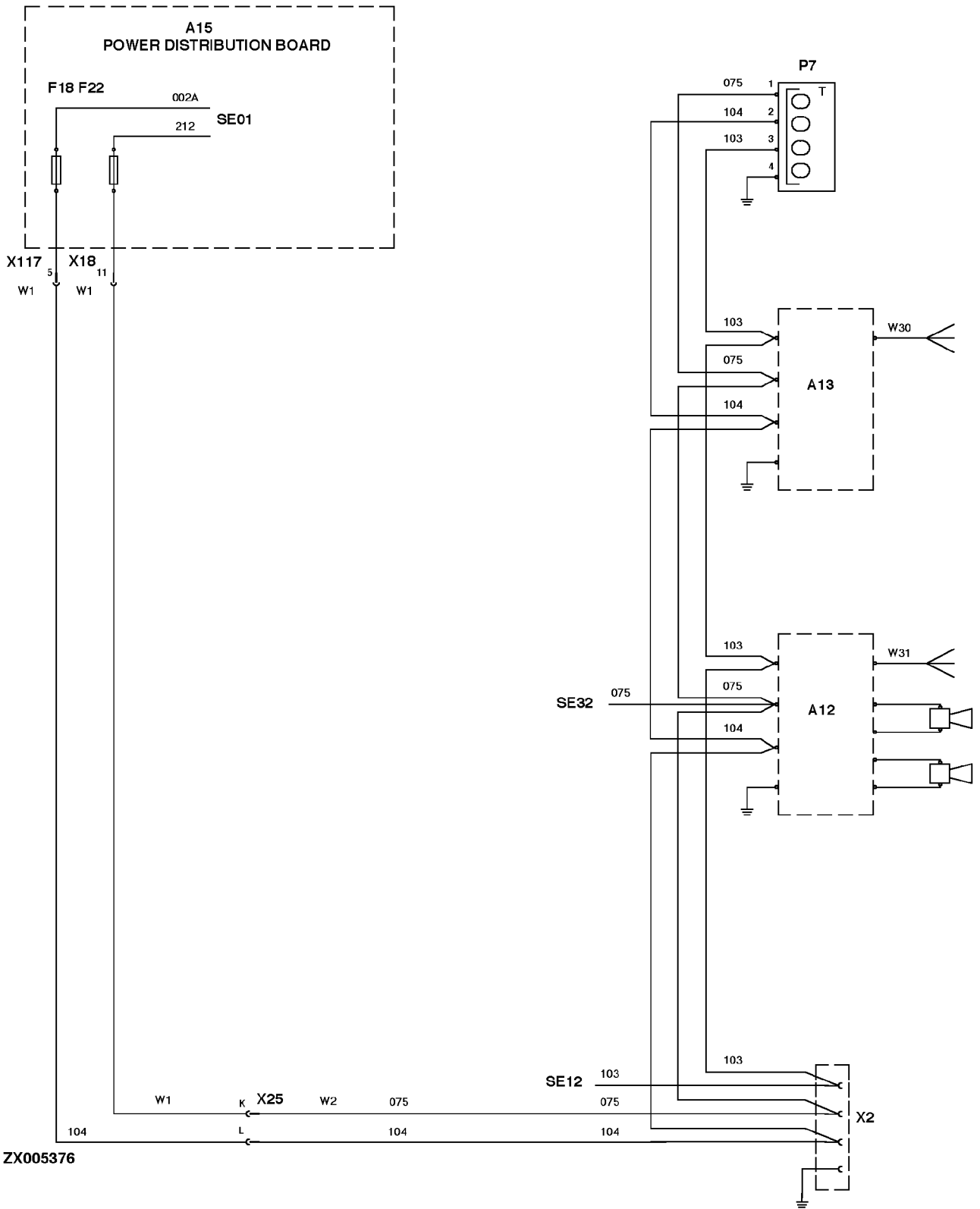
F22—Fuse, 7.5 amps.  
P7—Digital clock  
X2—Disconnect point, radio (USA)

X18—Connection, fuse board to distribution harness  
X25—Disconnect point, distribution harness — cab harness

X117—Connection, fuse board to distribution harness

ZX,TMXZCO006554-19-15MAR96

**DIAGNOSTIC SCHEMATIC OF SECTION 8**



ZX005376 -JUN-05JUN96

ZX, TMXZCO006480-19-15MAR96



# Group 15L Cigarette Lighter, Seat Compressor

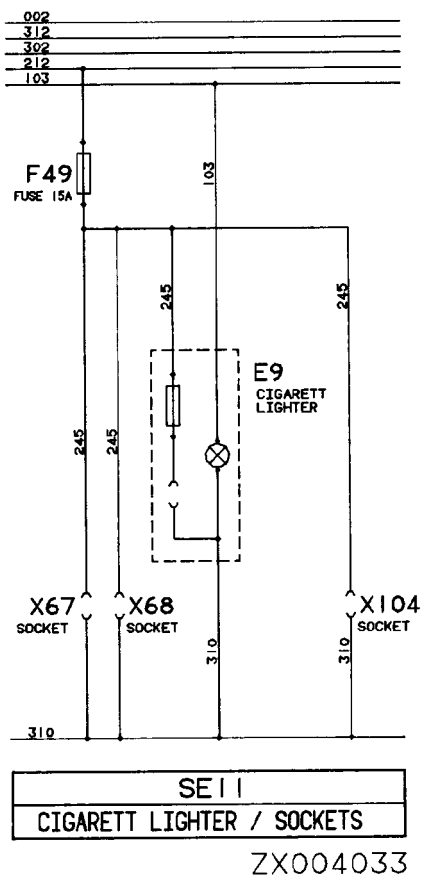
## OPERATIONAL INFORMATION

The machine is equipped with sockets for auxiliary equipment which are powered with starter switch in position (II).

When the machine is equipped with an air-cushioned seat, the seat compressor is connected to socket (X104) located inside cab.

ZX, TMXZCO002427-19-25NOV92

## FUNCTIONAL SCHEMATIC OF SECTION 11



-UN-02MAY95

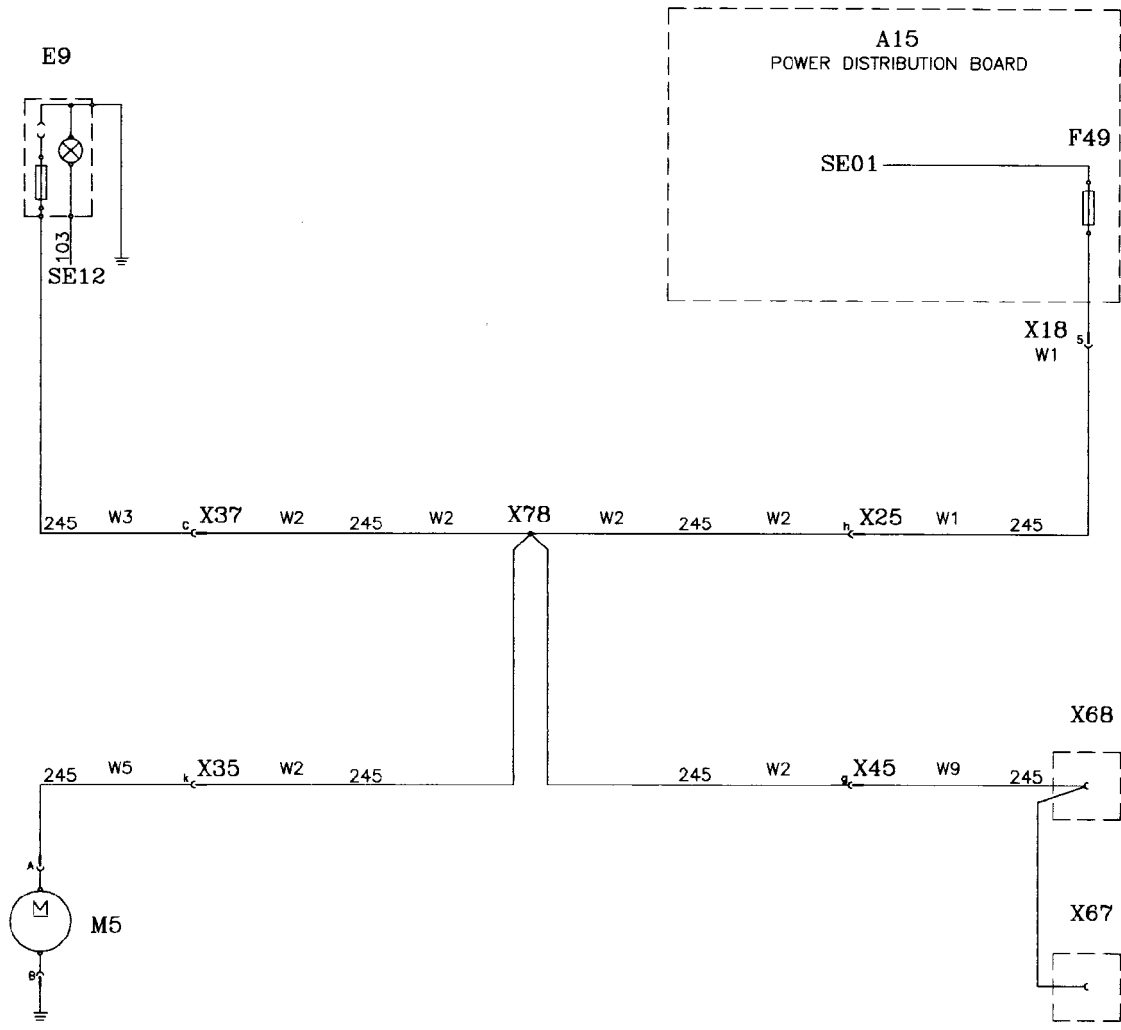
ZX004033

- A15 — Fuse board
- E9 — Cigarette lighter
- F49 — Fuse 15 amps.
- X18 — Connection, main distribution harness (W1) to fuse board
- X25 — Disconnect point, main distribution harness (W1), cab harness (W2)

- X35 — Disconnect point, cab harness (W2), armrest harness (W5)
- X37 — Disconnect point, cab harness (W2), switch console harness (W3)
- X45 — Disconnect point, cab harness (W2), rear basic wiring harness (W9)
- X67 — Socket
- X68 — Socket
- X104 — Socket

ZX, TMXZCO002428-19-13MAY93

**DIAGNOSTIC SCHEMATIC OF SECTION 11**



ZX004034

ZX, TMXZC0002743-19-13MAY93

ZX004034 -JUN-02MAY95



## OPERATIONAL INFORMATION

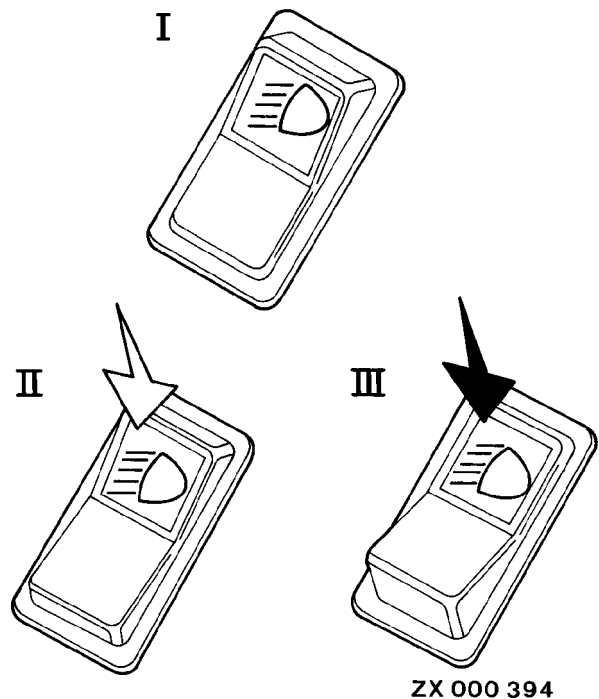
In position (II) of dual-stage, double contact switch (S13), parking lights are switched on and in position (III) full or low-beam headlights.

Parking lights can be switched on regardless of starter switch position.

To switch on full or low-beam headlights, starter switch must be in position (I) or (II).

When parking lights are switched on, switch and instrument lighting is also switched on. At the same time, infotrak monitor and digital clock displays are dimmed.

- I—Light functions off
- II—Parking lights, switch and instrument lighting
- III—Low-beam headlights, only with starter switch positions (I) or (II)



ZX 000 394

ZX.TMXZCO002429-19-25NOV92

ZX000394 -JUN-04MAY95

## THEORY OF OPERATION

Light switch (S13) is a dual-stage, double contact switch.

The first contact is used for parking lights and instrument lighting, the second contact for low/full-beam headlights.

The parking light system is divided into three circuits which are protected individually.

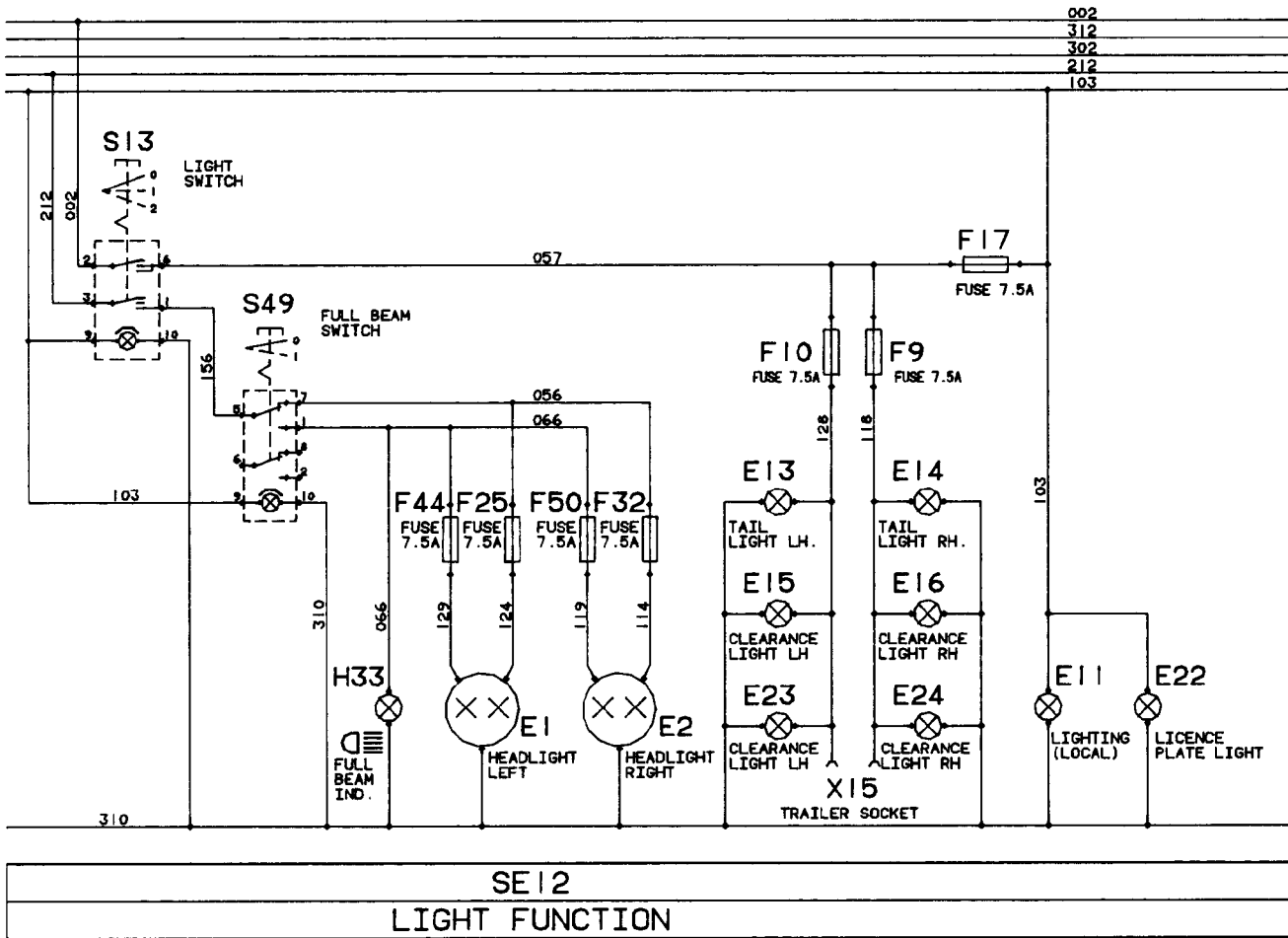
One circuit is provided for left-hand parking lights, one for right-hand parking lights and another circuit for switch and instrument lighting.

The low/full-beam headlight circuit is connected to the starter switch.

In light switch position (III), low- or full-beam headlights are switched on, depending on position of low/full-beam headlight switch.

ZX.TMXZCO002430-19-25NOV92

FUNCTIONAL SCHEMATIC OF SECTION 12



- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>E1 —Headlight, l.h.</li> <li>E2 —Headlight, r.h.</li> <li>E13 —Tail light, l.h.</li> <li>E14 —Tail light, r.h.</li> <li>E15 —Clearance light, l.h.</li> <li>E16 —Clearance light, r.h.</li> <li>E22 —Registration plate light</li> <li>E23 —Clearance light, header, l.h.</li> <li>E24 —Clearance light, header, r.h.</li> <li>F9 —Fuse 7.5 amps.</li> <li>F10 —Fuse 7.5 amps.</li> <li>F17 —Fuse 7.5 amps.</li> <li>F25 —Fuse 7.5 amps.</li> <li>F32 —Fuse 7.5 amps.</li> <li>F44 —Fuse 7.5 amps.</li> <li>F50 —Fuse 7.5 amps.</li> <li>H33 —Full-beam indicator light</li> <li>S13 —Light switch</li> </ul> | <ul style="list-style-type: none"> <li>S49 —Full-beam switch</li> <li>X15 —Trailer socket</li> <li>X17 —Connection, main distribution harness (W1) to fuse board</li> <li>X18 —Connection, main distribution harness (W1) to fuse board</li> <li>X21 —Disconn. point, feeder house harness (W10), header harness (W22)</li> <li>X25 —Disconn. point, main distribution harness (W1), cab harness (W2)</li> <li>X26 —Disconn. point, main distribution harness (W1), cab harness (W2)</li> <li>X37 —Disconn. point, cab harness (W2), switch console harness (W3)</li> <li>X38 —Disconn. point, cab harness (W2), optional equipment harness (W14)</li> </ul> | <ul style="list-style-type: none"> <li>X43 — Disconn. point, rear basic harness (W9), straw hood harness (W20)</li> <li>X45 — Disconn. point, cab harness (W2), rear basic harness (W9)</li> <li>X46 — Disconn. point, cab harness (W2), front basic harness (W7)</li> <li>X65 — Disconn. point, front basic harness (W7), steering column harness (W8)</li> <li>X77 — Disconn. point, front basic harness (W7), feeder house harness (W10)</li> <li>X101 — Disconn. point, header harness (W22), header lighting harness (W32)</li> <li>X117 — Connection, main distribution harness (W1) to fuse board</li> <li>X118 — Connection, main distribution harness (W1) to fuse board</li> </ul> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

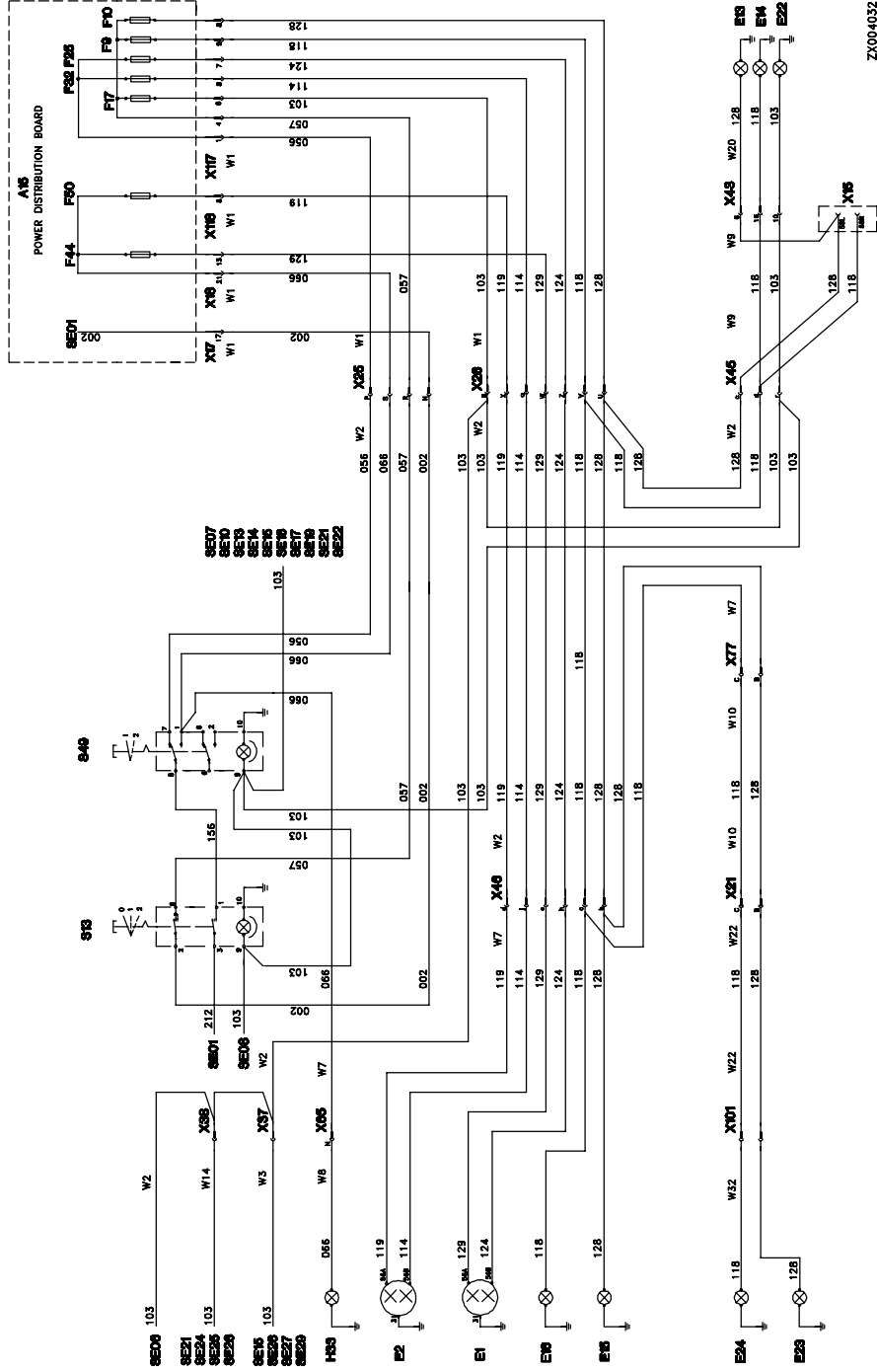
ZX004031

ZX.TMXCO002431-19-13MAY93

-JUN-02MAY95  
ZX004031



DIAGNOSTIC SCHEMATIC OF SECTION 12



ZX00-032



## **OPERATIONAL INFORMATION**

When driving on public roads, use turn signal switch to indicate direction of machine travel.

switch regardless of starter switch position (hazard warning light function).

In emergency situations both turn signal lights can be switched on by means of the hazard warning light

ZX, TMXZCO002432-19-25NOV92

## **THEORY OF OPERATION**

### **TURN SIGNAL LIGHTS**

Power is supplied to terminal (49) of flasher via fuse (F20) and hazard warning light switch (S11). Terminal (31) establishes ground connection.

When actuating turn signal switch (S12), current flows to the right or left-hand turn signal lights. Flasher (K5) generates the required flashing frequency and activates the corresponding turn signal indicator light via terminal (C2) or (C3).

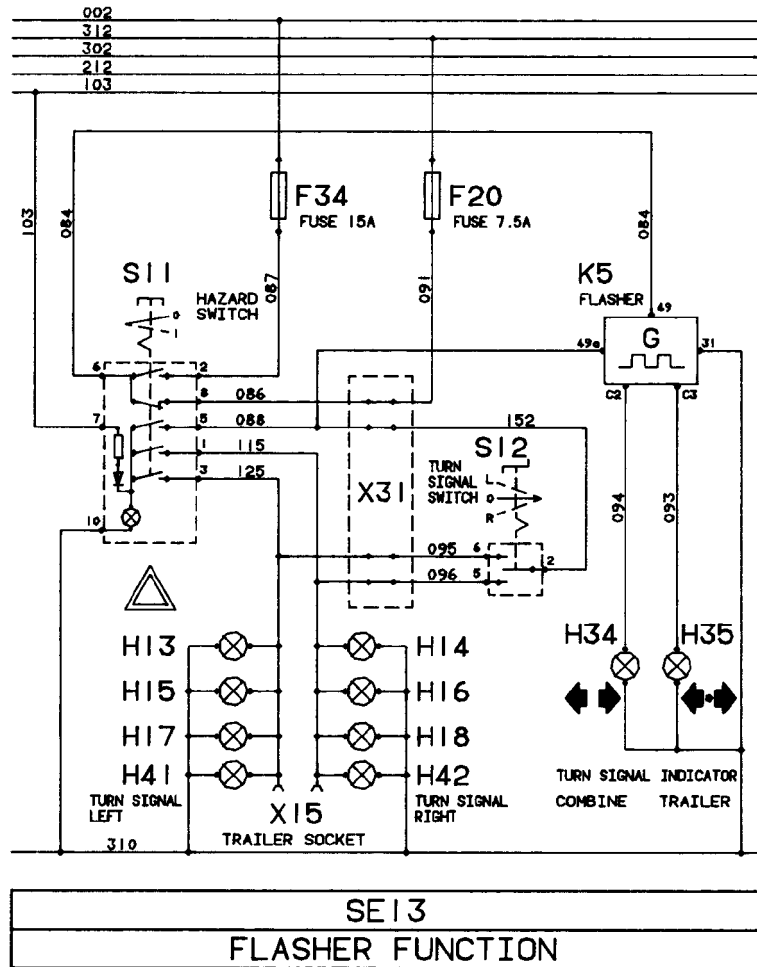
### **HAZARD WARNING LIGHTS**

With hazard warning light switch (S11) in position (I), power is supplied to terminal (49) of flasher via fuse (F34) regardless of starter switch position.

At the same time the turn signal lights on both sides of the machine are connected to terminal (49A) of flasher. This generates the required flashing frequency.

ZX, TMXZCO002433-19-25NOV92

FUNCTIONAL SCHEMATIC OF SECTION 13



SE 13  
FLASHER FUNCTION

ZX004035

-UN-02MAY95  
ZX004035

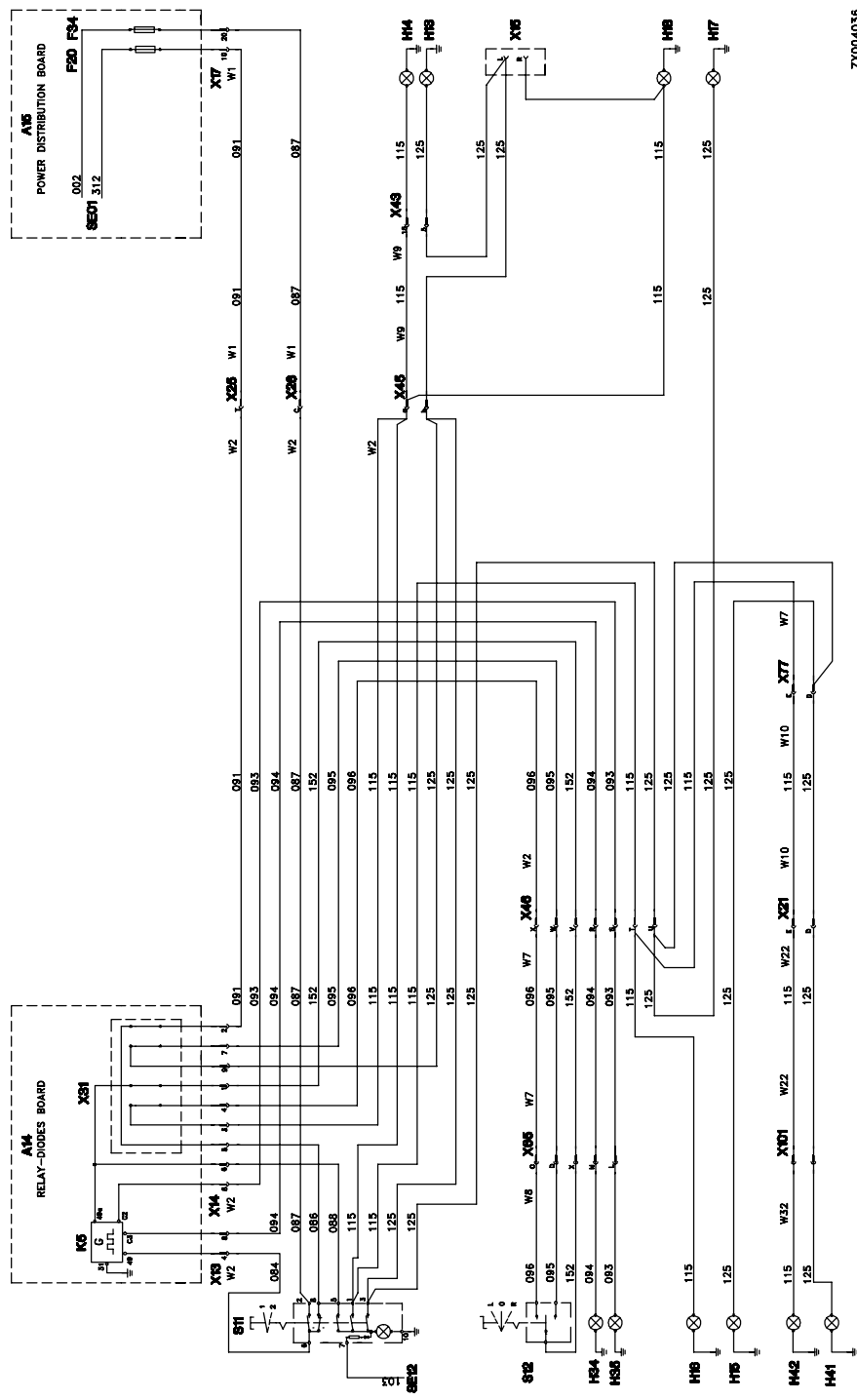
- A14—Relay and diode board
- A15—Fuse board
- F20—Fuse 7.5 amps.
- F34—Fuse 15 amps.
- H13—Turn signal light, rear l.h.
- H14—Turn signal light, rear r.h.
- H15—Turn signal light, front l.h.
- H16—Turn signal light, front r.h.
- H17—Add. turn signal light, l.h.
- H18—Add. turn signal light, r.h.

- H34—Turn signal indicator light 1, combine
- H35—Turn signal indicator light 2, trailer
- H41—Turn signal light, header, l.h.
- H42—Turn signal light, header, r.h.
- K5—Flasher
- S11—Hazard warning light switch
- S12—Turn signal switch
- X13—Connection, cab harness (W2) to relay and diode board

- X14—Connection, cab harness (W2) to relay and diode board
- X15—Trailer socket
- X17—Connection, main distribution harness (W1) to fuse board
- X21—Disconn. point, feeder house harness (W10), header harness (W22)
- X25—Disconn. point, main distribution harness (W1), cab harness (W2)
- X26—Disconn. point, main distribution harness (W1), cab harness (W2)

- X31—Soldered connection on board
- X43—Disconn. point, rear basic harness (W9), straw hood harness (W20)
- X45—Disconn. point, cab harness (W2), rear basic harness (W9)
- X46—Disconn. point, cab harness

## DIAGNOSTIC SCHEMATIC OF SECTION 13



ZX004036



## Group 150 Revolving Hazard Warning Lights

### OPERATIONAL INFORMATION

With starter switch in position (I) or (II) the revolving hazard warning lights may be switched on by means of switch (S18).

ZX.TMXZCO002435-19-25NOV92

### THEORY OF OPERATION

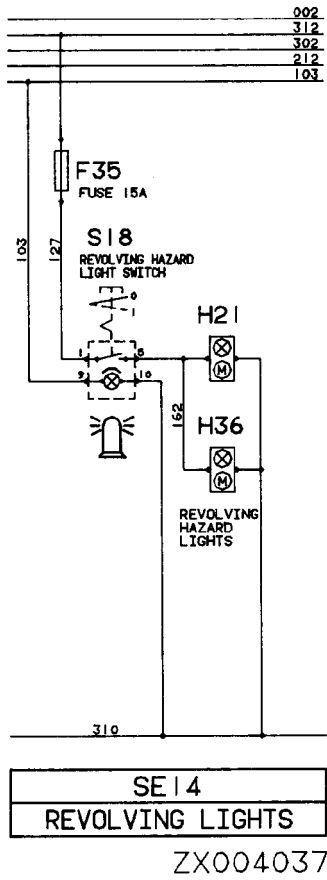
With starter switch in position (I) or (II), switch (S18) is powered via fuse (F35).

current. The revolving motion is accomplished by means of an electric motor.

If switch (S18) is activated, revolving hazard warning lights (H21) and (H36) are directly supplied with

ZX.TMXZCO002436-19-25NOV92

**FUNCTIONAL SCHEMATIC OF SECTION 14**



ZX004037 -UN-02MAY95

A15—Fuse board  
 F35—Fuse 15 amps.  
 H21—Revolving hazard warning light  
 H36—Revolving hazard warning light

S18—Revolving hazard warning light switch  
 X17—Connection, main distribution harness (W1) to fuse board

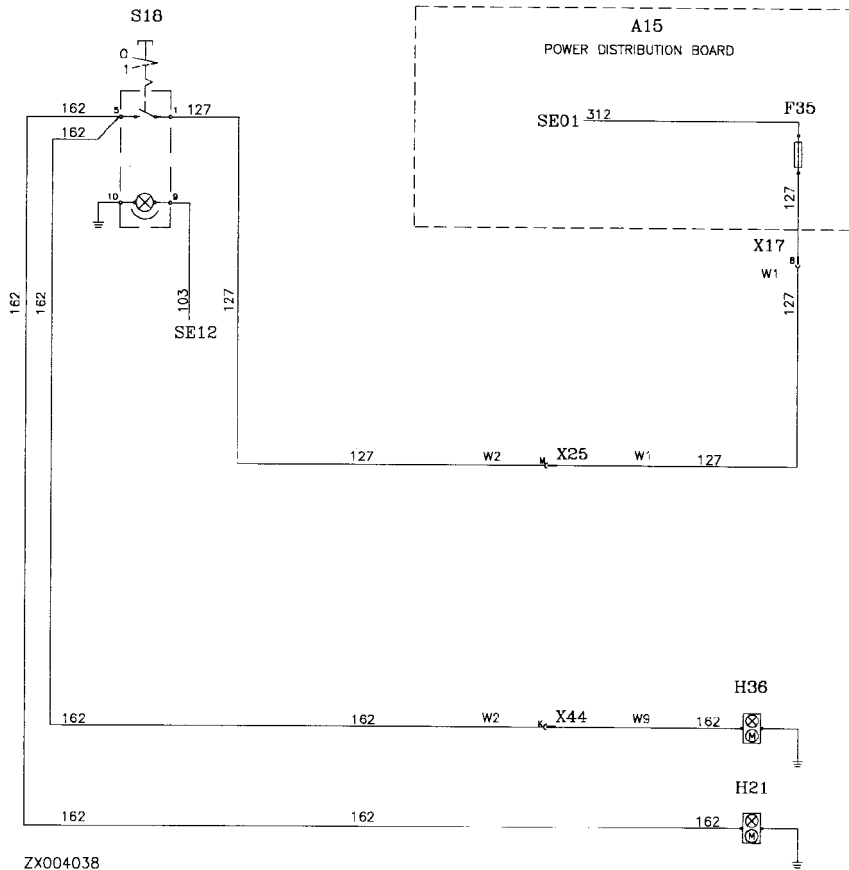
X25—Disconn. point, main distribution harness (W1), cab harness (W2)

X44—Disconn. point, cab harness (W2), basic harness (W9)

ZX,TMXZCO002437-19-13MAY93



**DIAGNOSTIC SCHEMATIC OF SECTION 14**



ZX004038

ZX, TMXZC0002746-19-13MAY93

ZX004038 -UN-02MAY95

*Revolving Hazard Warning Lights/Diagnostic Schematic, Section 14*

## Group 15P Fan, Air Conditioning System

### OPERATIONAL INFORMATION

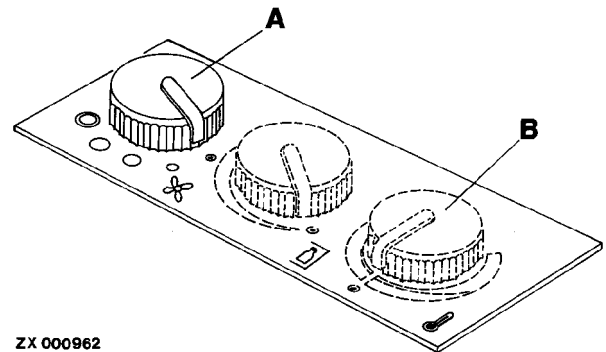
With starter switch in position (I) or (II) fan may be switched on by means of rotary switch (A).

Fan can be adjusted to four speeds.

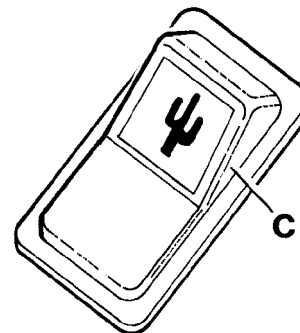
With fan running, the air conditioning system can be adjusted to the desired temperature by means of rotary switch (B).

Even if air conditioning system is switched off at rotary switch (B) (e.g. switch turned to heating position), it can be switched on to maximum output by means of switch (C).

*NOTE: The above combination is used, for example, to reduce moisture content of cab air when windows are misted.*



ZX 000962



ZX 000963

ZX.TMXZCO002438-19-25NOV92

-UN-02MAY95  
ZX000962

-UN-28APR95  
ZX000963

### THEORY OF OPERATION

With starter switch in position (I) or (II), switch (S22) is supplied with current via fuse (F42).

Fan (M4) can be adjusted to four speeds by means of resistor (R1).

As soon as rotary switch (S22) is turned to position (I) or further, switch (S25) is supplied with current.

Either air conditioning system or heater can be switched on by means of switch (S25).

In neutral position or when heater is switched on, the contact of switch (S25) is in "0" position. Thus

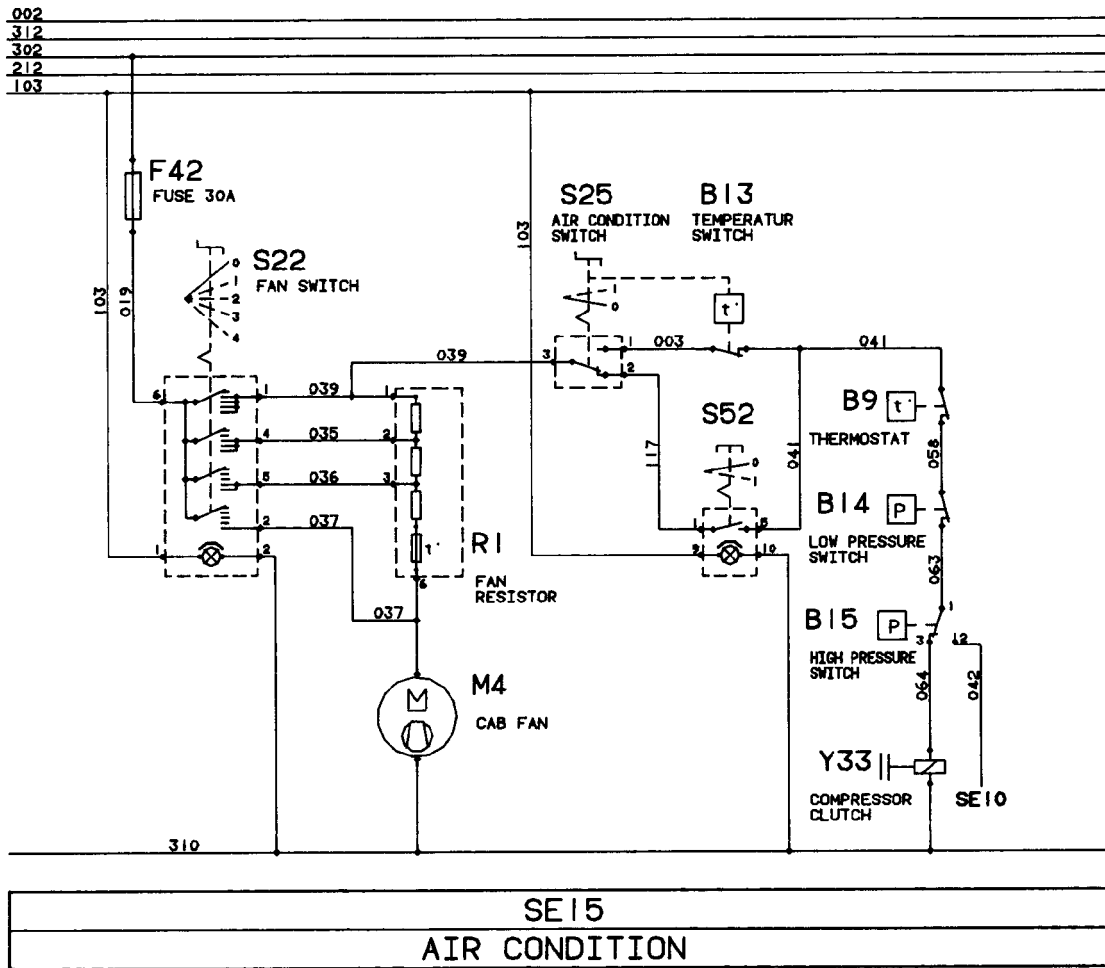
switch (S52) is supplied with current, making it possible to switch air conditioning system to maximum output.

With air conditioning system switched on by means of switch (S25), electromagnetic clutch (Y33) is activated via thermostat (B9), low pressure switch (B14) and high pressure switch (B15).

If pressure in air conditioning system is too high, high pressure switch (B15) is activated and the corresponding indicator light in SE10 will glow.

ZX.TMXZCO002439-19-25NOV92

FUNCTIONAL SCHEMATIC OF SECTION 15

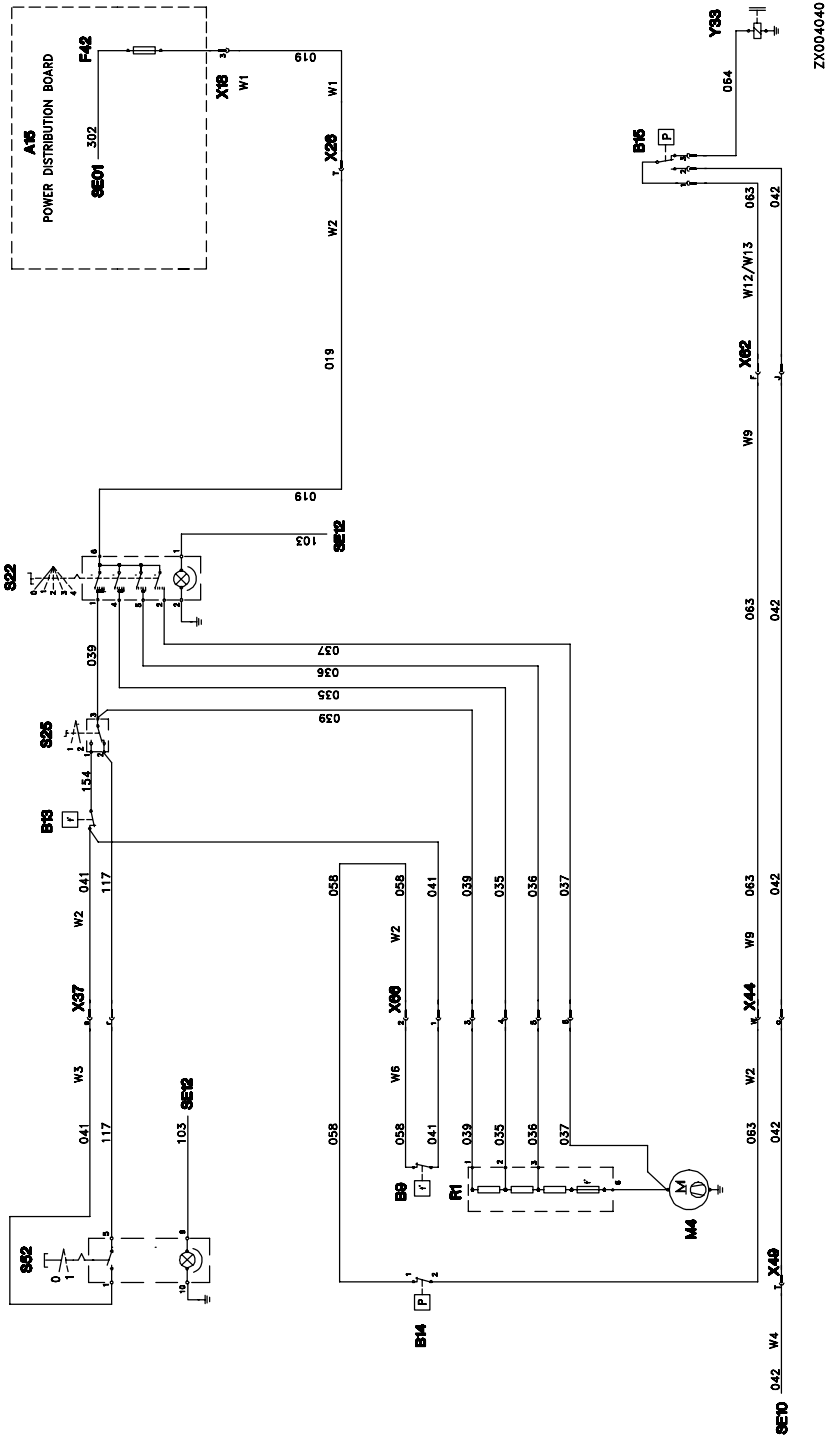


-JUN-02MAY95  
ZX004039

ZX004039

- |                                             |                                                              |                                                                 |                                                                             |
|---------------------------------------------|--------------------------------------------------------------|-----------------------------------------------------------------|-----------------------------------------------------------------------------|
| A15—Fuse board                              | F42—Fuse 30 amps.                                            | X26—Disconn. point, main distribution harness (W1), cab harness | X62—Disconn. point, rear basic harness (W9), engine harness (W12/W13)       |
| B9—Thermostat (protection against freezing) | M4—Cab fan                                                   | X37—Disconn. point, cab harness (W2)                            | X66—Disconn. point, cab harness (W2), air conditioning and fan harness (W6) |
| B13—Temperature switch, air conditioning    | R1—Fan resistor                                              |                                                                 |                                                                             |
| B14—Low pressure switch, air conditioning   | S22—Fan switch                                               |                                                                 |                                                                             |
| B15—High pressure switch, air conditioning  | S25—Air conditioning switch                                  |                                                                 |                                                                             |
|                                             | S52—Demoisturizer switch                                     |                                                                 |                                                                             |
|                                             | X18—Connection, main distribution harness (W1) to fuse board |                                                                 |                                                                             |

DIAGNOSTIC SCHEMATIC OF SECTION 15





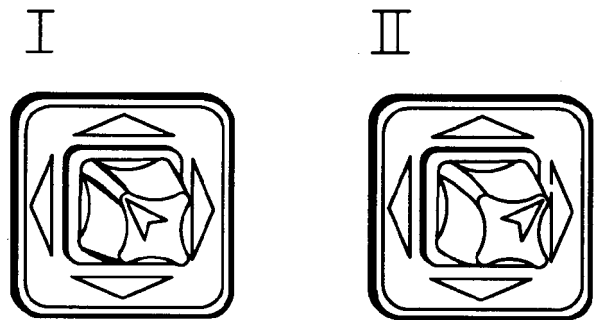
## Group 15Q Electrical Mirror Adjustment

### OPERATIONAL INFORMATION

For mirror adjustment starter switch must be turned to position (I) or further.

Move mirrors up/down or to the right/left according to arrows on switch.

- I—Adjusting l.h. outside mirror
- II—Adjusting r.h. outside mirror



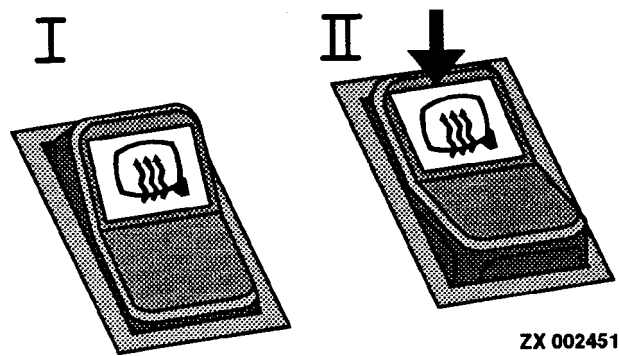
ZX 002452

ZX, TMXZC0002441-19-25NOV92

ZX002452 -UN-28APR95

Switching on mirror heater is only possible with starter switch turned to position (I) or further.

- I—Mirror heater off
- II—Mirror heater on



ZX 002451

ZX, TMXZC0002442-19-25NOV92

ZX002451 -UN-28APR95

### THEORY OF OPERATION

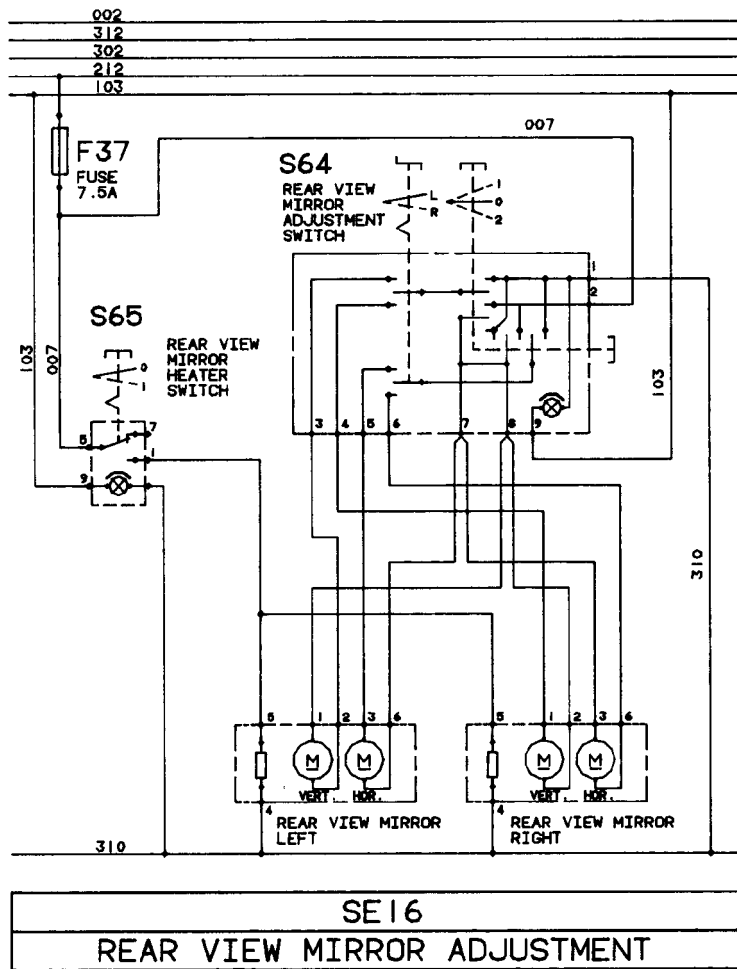
Mirror heater switch (S65) and mirror adjusting switch (S64) are powered via fuse (F37).

Turn mirror adjusting switch knob to select mirror to be adjusted. Mirror adjustment is carried out by tilting

switch to the right/left or up/down. This will reposition mirror surface by activating electric motors integrated in mirror housing.

ZX, TMXZC0002443-19-25NOV92

**FUNCTIONAL SCHEMATIC OF SECTION 16**



ZX004041

-UN-02MAY95  
ZX004041

A15—Fuse board  
F37—Fuse 7.5 amps.  
S64—Mirror adjusting switch  
S65—Mirror heater switch

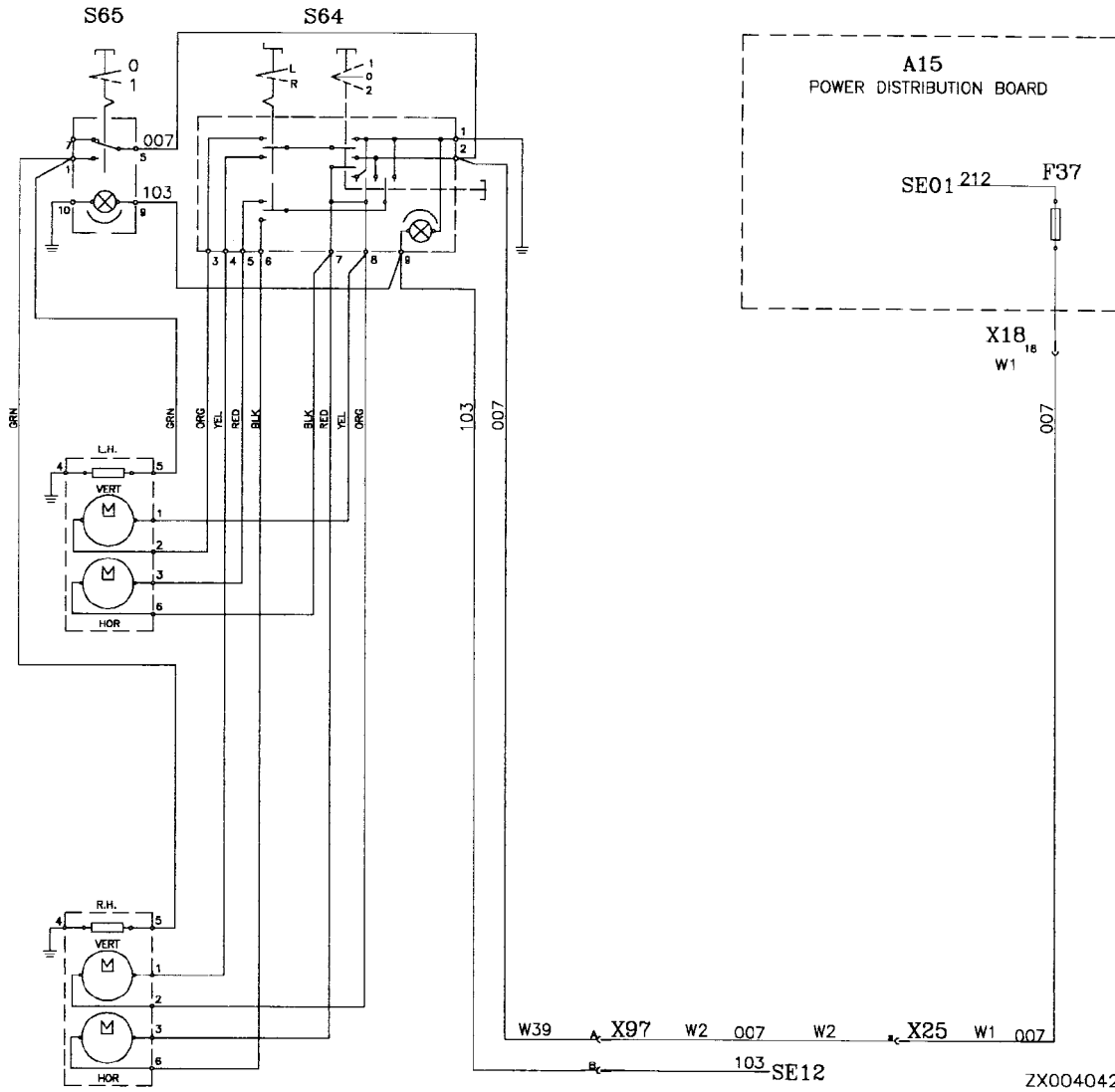
X18—Connection, main distribution harness (W1) to fuse board  
X25—Disconn. point, main distribution harness (W1), cab harness (W2)

X97—Disconn. point, cab harness (W2), harness for electrical mirror adjustment (W39)

ZX.TMXZCO002444-19-13MAY93



**DIAGNOSTIC SCHEMATIC OF SECTION 16**



ZX004042 -JUN-02MAY95

ZX,TMXZCO002748-19-13MAY93



### OPERATIONAL INFORMATION

With parking lights on, the work lights on cab roof and unloading auger may be switched on by actuating switch (S19).

With road safety switch in field position, work lights on mirror arms, straw hood and operator's platform may also be switched on.

ZX, TMXZCO002445-19-25NOV92

### THEORY OF OPERATION

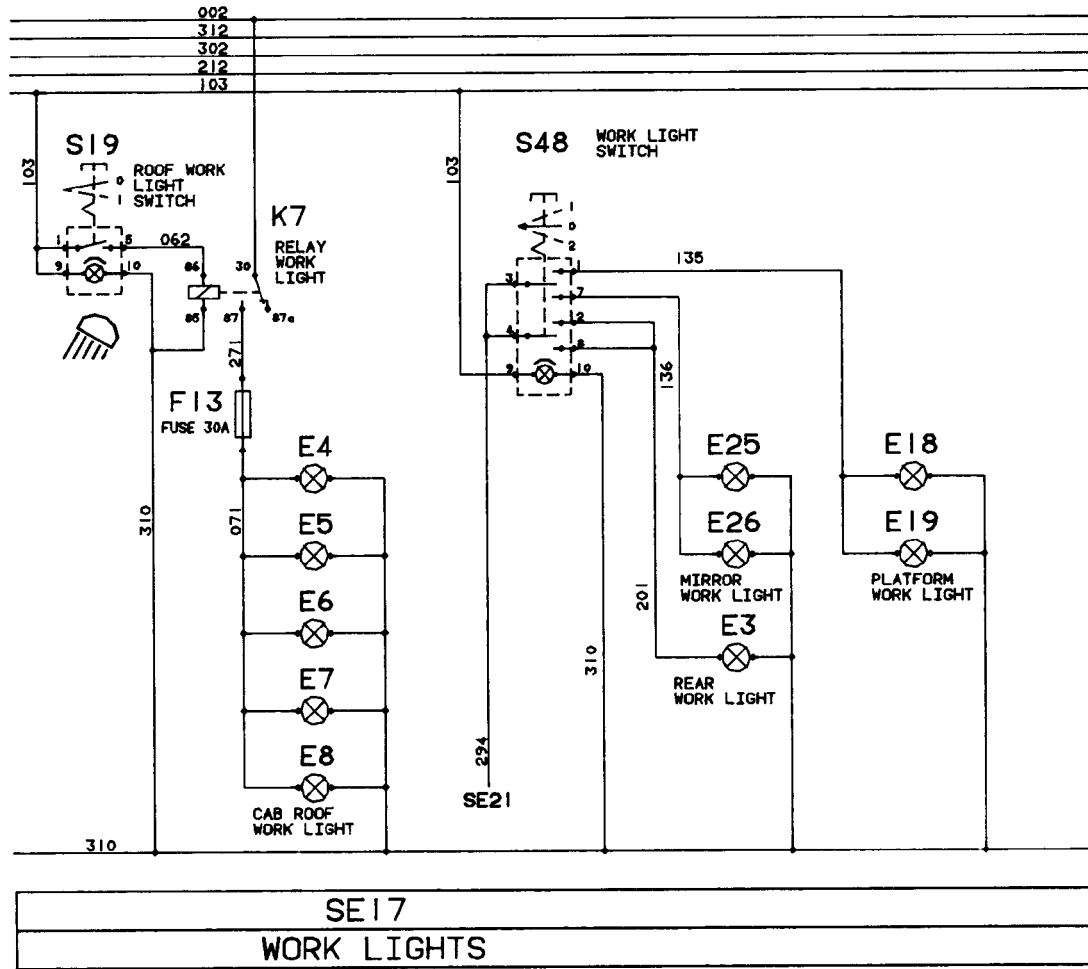
With parking lights switched on, switch (S19) is supplied with current via wire (103).

When switch (S19) is activated, relay (K7) is also activated and thus cab roof and unloading auger work lights are switched on directly.

Work lights on operator's platform, mirror arms and straw hood may be switched on in any starter switch position by means of switch (S48), depending on position of road safety switch, even if parking lights are not switched on.

ZX, TMXZCO002446-19-25NOV92

FUNCTIONAL SCHEMATIC OF SECTION 17

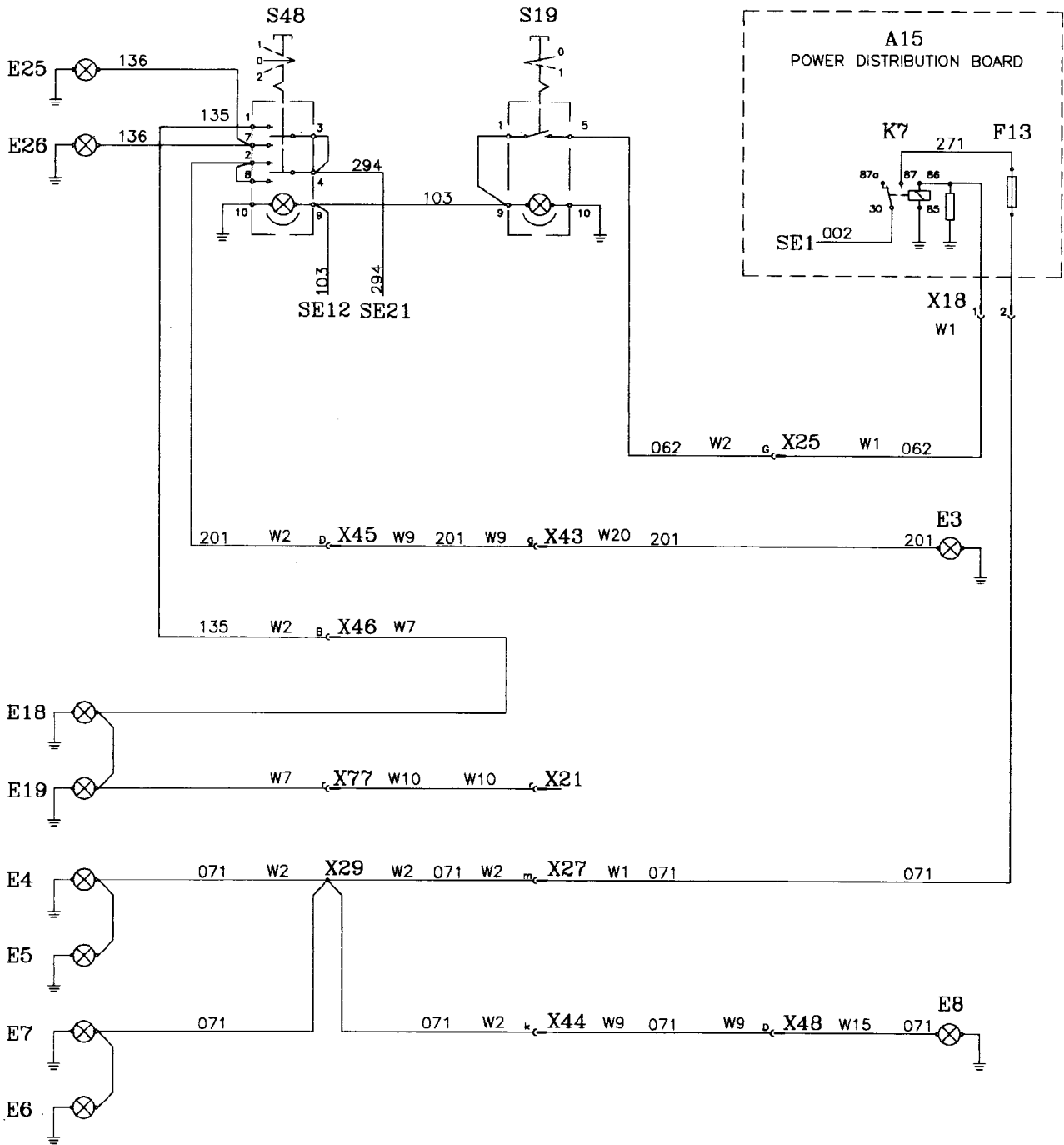


-UN-02MAY95  
ZX004043

ZX004043

- |                                    |                                                                      |                                                                       |                                                                       |
|------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------|
| A15—Fuse board                     | E18—Platform work light, r.h.                                        | X27—Disconn. point, main distribution harness (W1), cab harness (W2)  | X45—Disconn. point, cab harness (W2), rear basic harness (W9)         |
| E3—Rear work light                 | E19—Platform work light, l.h.                                        | X29—Splice                                                            | X46—Disconn. point, cab harness (W2), front basic harness (W7)        |
| E4—Cab roof work light, outer r.h. | E25—Work light, mirror bracket                                       | X43—Disconn. point, rear basic harness (W9), straw hood harness (W20) | X48—Disconn. point, rear basic harness (W9), grain tank harness (W15) |
| E5—Cab roof work light, inner r.h. | E26—Work light, mirror bracket                                       | X44—Disconn. point, cab harness (W2), rear basic harness (W9)         |                                                                       |
| E6—Cab roof work light, outer l.h. | X18—Connection, main distribution harness (W1) to fuse board         |                                                                       |                                                                       |
| E7—Cab roof work light, inner l.h. | X25—Disconn. point, main distribution harness (W1), cab harness (W2) |                                                                       |                                                                       |
| E8—Unloading auger work light      |                                                                      |                                                                       |                                                                       |

**DIAGNOSTIC SCHEMATIC OF SECTION 17**



ZX004044

ZX, TMXZC002749-19-31MAY95



## Group 15S Straw Warning Device

### OPERATIONAL INFORMATION

The straw warning device is provided to detect plugging of material in the entire straw walker area. The first sensor is located in front of the cross shaker, the second one behind the cross shaker and the third one above the straw chopper.

When plugging of material occurs, the "STOP" light of the indicator light unit will glow. In addition the buzzer and horn will sound.

ZX.TMXZCO002448-19-25NOV92

### THEORY OF OPERATION

Horn (B12) is continuously supplied with current via fuse (F27).

When actuating switch (S8), the horn is connected to ground and the horn signal will be heard.

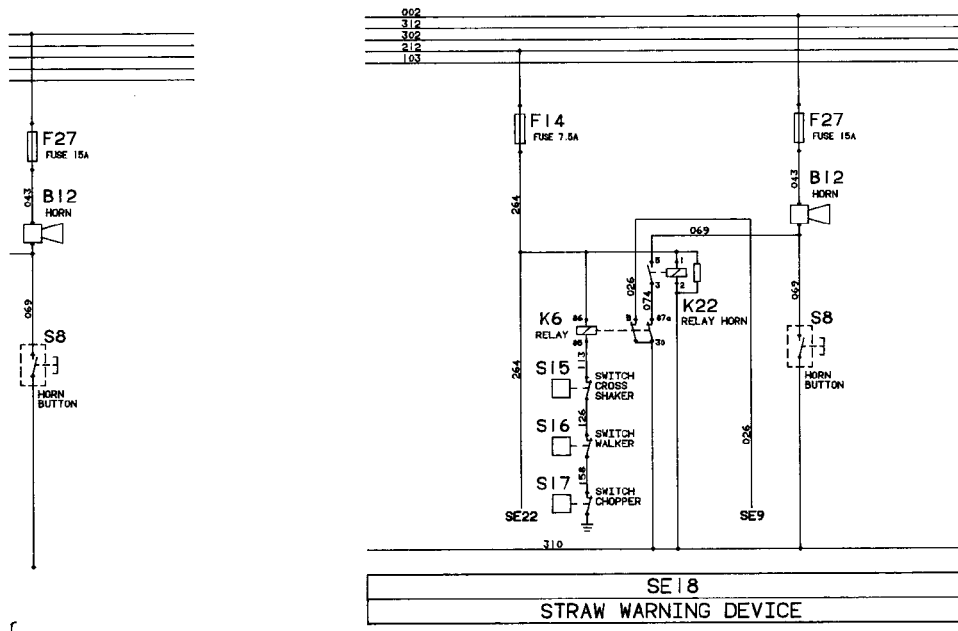
With starter switch in position (I), relays (K6) and (K22) are supplied with current via fuse (F14). Switches (S15), (S16) and (S17) are in "OFF"

position (closed). This causes relay (K6) to open and relay (K22) to close, interrupting ground connection to horn, buzzer and indicator light.

If one of the switches (S15), (S16) or (S17) is actuated due to excessive straw accumulation in the straw hood, relay (K6) establishes ground connection to horn, buzzer and indicator light.

ZX.TMXZCO002449-19-25NOV92

FUNCTIONAL SCHEMATIC OF SECTION 18



ZX004045

-UN-02MAY95  
ZX004045

- A14—Relay and diode board
- A15—Fuse board
- B12—Horn
- F14—Fuse 7.5 amps.
- F27—Fuse 15 amps.
- K6—Relay, straw warning device
- K22—Relay, straw warning device
- S8—Horn button
- S15—Switch, straw warning device (cross shaker)
- S16—Switch, straw warning device (walkers)

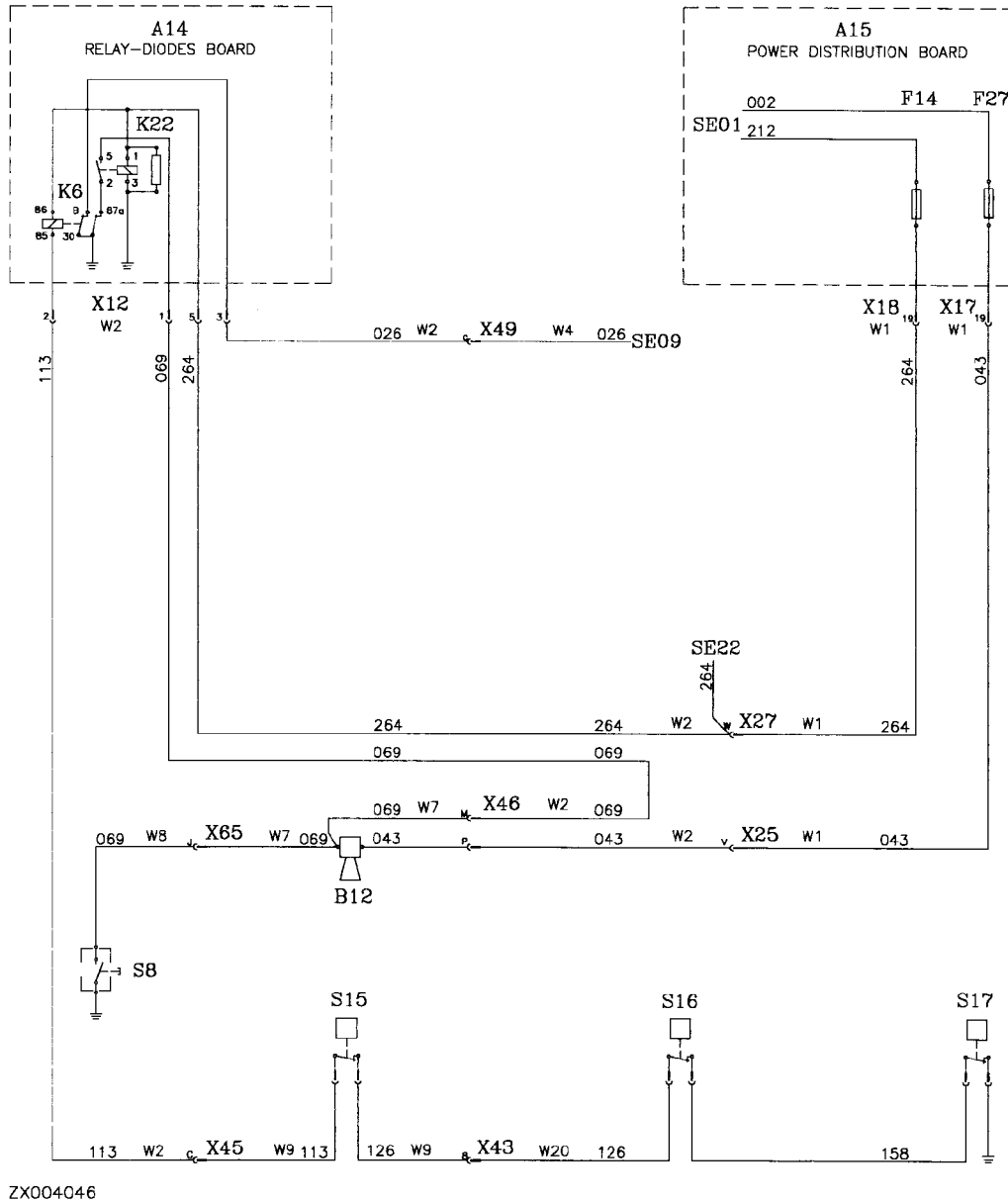
- S17—Switch, straw warning device (chopper)
- X12—Connection, cab harness (W2) to relay board
- X17—Connection, main distribution harness (W1) to fuse board
- X18—Connection, main distribution harness (W1) to fuse board

- X25—Disconn. point, main distribution harness (W1), cab harness (W2)
- X27—Disconn. point, main distribution harness (W1), cab harness (W2)
- X43—Disconn. point, rear basic harness (W9), straw hood harness (W20)
- X45—Disconn. point, cab harness (W2), rear basic harness (W9)

- X46—Disconn. point, cab harness (W2), front basic harness (W7)
- X49—Disconn. point, cab harness (W2), corner post harness (W4)
- X65—Disconn. point, front basic harness (W7), steering column harness (W8)



**DIAGNOSTIC SCHEMATIC OF SECTION 18**



ZX004046

ZX.TMXZCO002750-19-13MAY93

ZX004046 -JUN-02MAY95



# Group 15T Reel Speed Adjustment to Ser.No. 062721

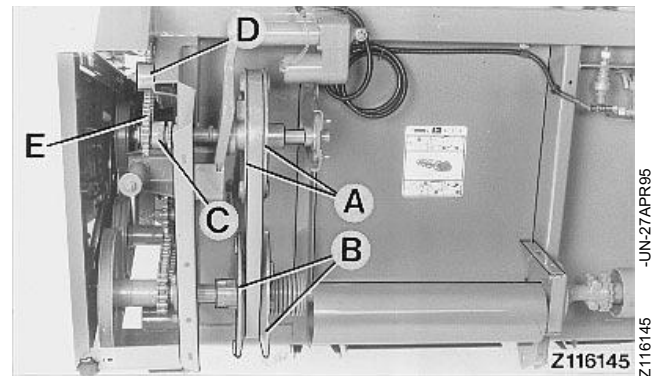
## OPERATIONAL INFORMATION

Reel height, reel horizontal position and reel speed may be adjusted for best performance according to harvesting conditions. A variable drive controlled by an electric motor permits infinite reel speed adjustment within a certain range.

The reel speed adjusting motor can be activated by a switch in the cab or by the reel speed control system.

ZX, TMXZCO002510-19-01DEC92

Depending on position of double sprocket (C), reel speed may be adjusted within a range of 14—30 rpm [this equals 3.2—6.8 km/h (2—4.2 mph)] or 23—50 rpm [5.2—10.8 km/h (3.2—6.7 mph)].



ZX, TMXZCO002511-19-01DEC92

The reel speed control system activates the electric motor which controls variable reel drive. In this case the following adjusting ranges are also obtained: 14—30 rpm [this equals 3.2—6.8 km/h (2—4.2 mph)] or 22—50 rpm [5.2—10.8 km/h (3.2—6.7 mph)].

*NOTE: The reel speed control system will only operate within a ground speed range from 1.2 km/h (0.75 mph) to 10 km/h (6 mph).*

ZX, TMXZCO002512-19-01DEC92

## THEORY OF OPERATION

With starter switch in position (I) or (II), current is supplied to switch (S10) and reel speed control system (A1).

Stop light switch (S7) is also supplied with current.

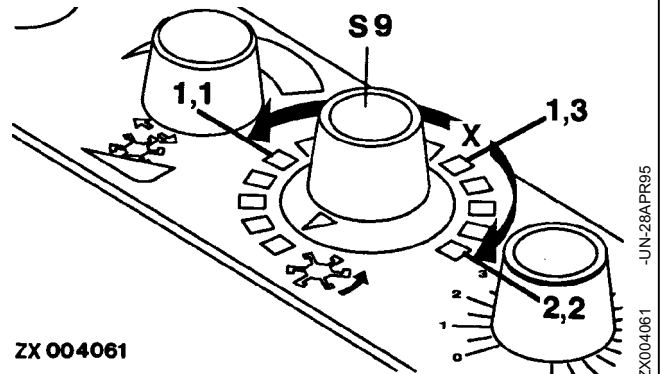
When actuating switch (S10), relay (K32) or (K33) is activated. This will increase or reduce reel speed.

ZX, TMXZCO002513-19-01DEC92

## Reel Speed Adjustment to Ser.No. 062721/Diagnostic Mode

With header running (wire 289 powered), a diagnostic mode is activated when turning speed ratio switch (potentiometer) (S9) to first position. The other switch positions will provide various reel speed ratios.

The speed ratio switch (S9) is connected to reel speed control system (A1) by means of four wires, providing 13 possible switch positions.



ZX, TMXZCO002521-19-25NOV92

### POSITIONS OF SPEED RATIO SWITCH S9

BIT	OFF	TEST	0.80	1.00	1.10	1.15	1.20	1.25	1.30	1.50	1.80	2.00	2.20
1	0	X	0	X	0	X	0	X	0	X	0	X	0
2	0	X	X	0	0	X	X	0	0	X	X	0	0
3	0	X	X	X	X	0	0	0	0	X	X	X	X
4	0	X	X	X	X	X	X	X	X	0	0	0	0

*NOTE: (X) means that the corresponding switch connection is grounded.*

ZX, TMXZCO002522-19-25NOV92

### DIAGNOSTIC MODE

The program of the reel speed control system provides a diagnostic mode. In this mode input and output signals of the system are tested.

#### Diagnostic Procedure:

1. Move micro switch 1 to "ON" position (switches 2 to 5 are already "ON").
2. Move speed ratio switch (S9) to "OFF" position.
3. Start engine; engage separator and header.

4. Drive combine with a speed of 5.5 km/h (3.5 mph).

5. At a ground speed of 5.5 km/h (3.5 mph) move speed ratio switch (S9) to test position.

6. Continue to drive combine with an exact speed of 5.5 km/h (3.5 mph) for 30 seconds.

7. Stop combine. Keep separator and header running. Read error displays at LED's.

ZX, TMXZCO002523-19-25NOV92

## ERROR CODE DISPLAY

0 — LED off

X — LED on

Error Code	Problem	Solution
A—0 B—0 C—0 D—0	No voltage	Check fuse (F12)
A—X B—0 C—0 D—0	No ground speed signal	Check sending unit on 3-speed transmission
A—0 B—X C—0 D—0	Ground speed signal not within operating range	See "Operating Range of Reel Speed Control System" in "Controls and Instruments" Section of Operator's Manual
A—X B—X C—0 D—0	No reel speed signal	Check sending unit at cutting platform
A—0 B—0 C—X D—0	Reel speed signal not within operating range	See "Operating Range of Reel Speed Control System" in "Controls and Instruments" Section of Operator's Manual
A—X B—0 C—X D—0	Error "Bit 1" at reel speed control switch	
A—0 B—X C—X D—0	Error "Bit 2" at reel speed control switch	
A—X B—X C—X D—0	Error "Bit 3" at reel speed control switch	
A—0 B—0 C—0 D—X	Error "Bit 4" at reel speed control switch	

ZX, TMXZCO002514-19-01DEC92

**ERROR CODE DISPLAY (CONTINUED)**

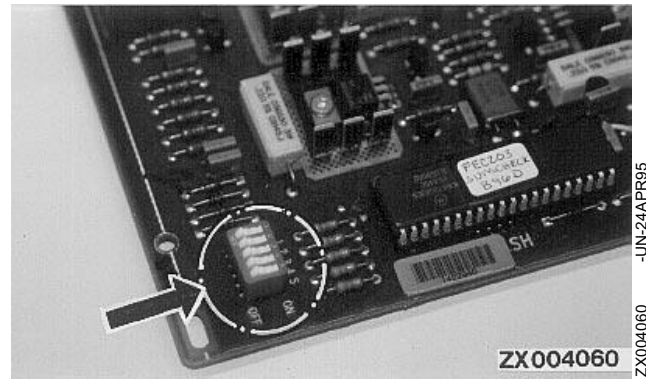
0 — LED off  
X — LED on

Error Code	Problem	Solution
A—X B—0 C—0 D—X	Option A, output 1 shorted to ground	
A—0 B—X C—0 D—X	Option A, output 2 shorted to ground	
A—X B—X C—0 D—X	Reel does not accelerate	
A—0 B—0 C—X D—X	Reel does not slow down	
A—X B—0 C—X D—X	Reel speed control switch not in diagnostic position	See "Reel Speed Control Switch" in "Controls and Instruments" Section of Operator's Manual
A—0 B—X C—X D—X	Fault not found	
A—X B—X C—X D—X	All contacts to reel speed control switch open	

ZX, TMXZCO002515-19-01DEC92

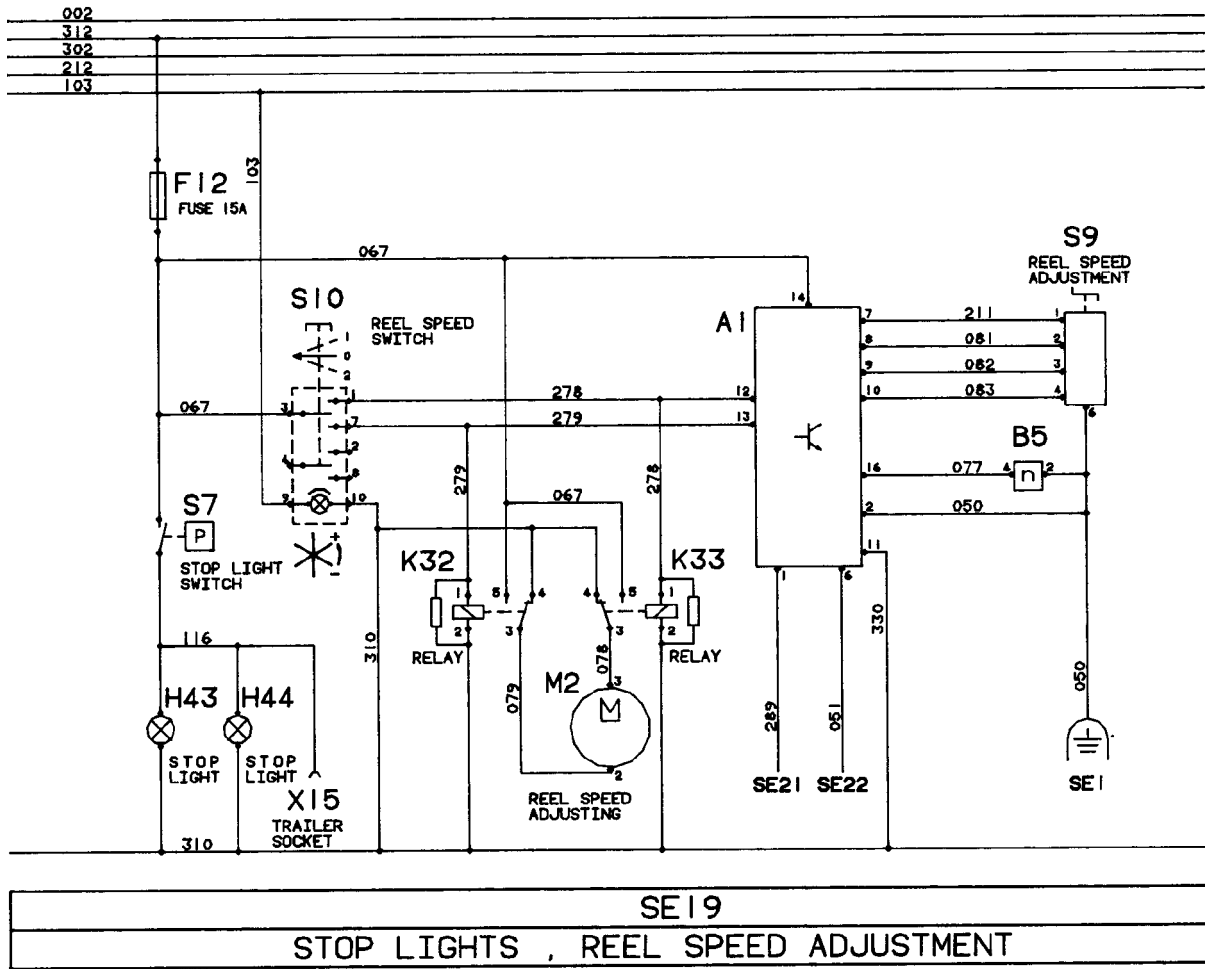
## OPERATING ADJUSTMENT OF MICRO SWITCHES

During normal operation, micro switch 1 on board of reel speed control system is in "OFF" position, while switches 2 to 5 are in "ON" position.



ZX,TMXZC0002516-19-01DEC92

FUNCTIONAL SCHEMATIC OF SECTION 19



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ZX004054

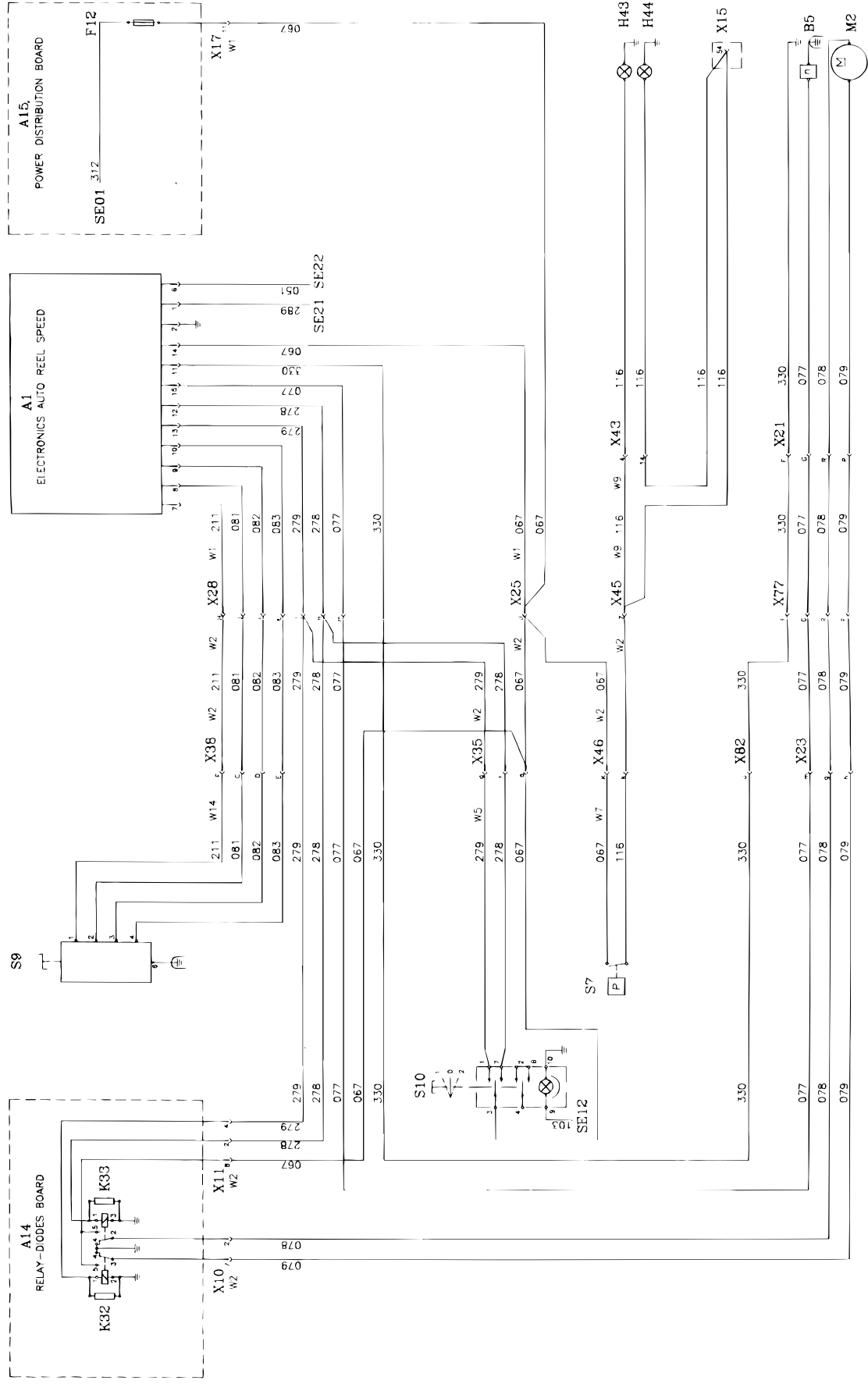
ZX004054

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>A1—Reel speed control<br/>                 A14—Relay and diode board<br/>                 A15—Fuse board<br/>                 B5—Sending unit, reel speed<br/>                 F12—Fuse 15 amps.<br/>                 H43—Stop light, l.h.<br/>                 H44—Stop light, r.h.<br/>                 K32—Relay, adjust reel speed<br/>                 K33—Relay, adjust reel speed<br/>                 M2—Reel speed adjusting motor<br/>                 S7—Stop light switch<br/>                 S9—Potentiometer, reel speed</p> | <p>S10—Reel speed switch<br/>                 X10—Connection, cab harness (W2) to relay board<br/>                 X11—Connection, cab harness (W2) to relay board<br/>                 X17—Connection, main distribution harness (W1) to fuse board<br/>                 X21—Disconn. point, feeder house harness (W10), header harness (W22)<br/>                 X23—Disconn. point, cab harness (W2), front basic harness (W7)</p> | <p>X25—Disconn. point, main distribution harness (W1), cab harness (W2)<br/>                 X28—Disconn. point, main distribution harness (W1), cab harness (W2)<br/>                 X35—Disconn. point, cab harness (W2), armrest harness (W5)<br/>                 X38—Disconn. point, cab harness (W2), optional equipment harness (W14)</p> | <p>X43—Disconn. point, rear basic harness (W9), straw hood harness (W20)<br/>                 X45—Disconn. point, cab harness (W2), rear basic harness (W9)<br/>                 X46—Disconn. point, cab harness (W2), front basic harness (W7)</p> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

ZX, TMXCO002503-19-13MAY93



**DIAGNOSTIC SCHEMATIC OF SECTION 19**



ZX0004055



## Group 16T Reel Speed Adjustment from Ser.No. 062722

### OPERATIONAL INFORMATION

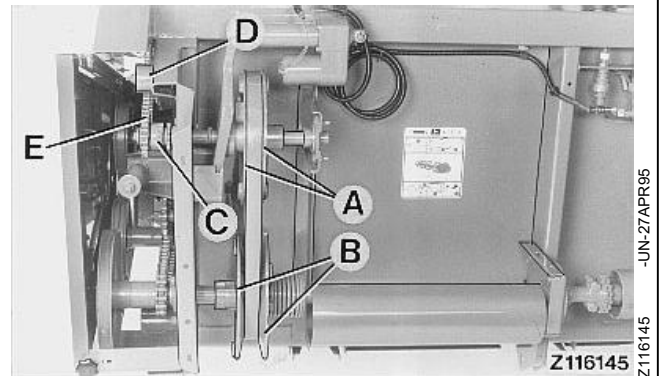
Reel height, reel horizontal position and reel speed may be adjusted for best performance according to harvesting conditions. A variable drive controlled by an electric motor permits infinite reel speed adjustment within a certain range.

The reel speed adjusting motor can be activated by a switch in the cab or by the reel speed control system.

*NOTE: Diodes (V62) and (V63) are installed only in conjunction with motor (M14).*

ZX.TMXZCO005146-19-15MAR96

Depending on position of double sprocket (C), reel speed may be adjusted within a range of 14—30 rpm [this equals 3.2—6.8 km/h (2—4.2 mph)] or 23—50 rpm [5.2—10.8 km/h (3.2—6.7 mph)].



ZX.TMXZCO002511-19-01DEC92

The reel speed control system activates the electric motor which controls variable reel drive. In this case the following adjusting ranges are also obtained:  
14—30 rpm [this equals 3.2—6.8 km/h (2—4.2 mph)]  
or 22—50 rpm [5.2—10.8 km/h (3.2—6.7 mph)].

*NOTE: The reel speed control system will only operate within a ground speed range from 1.2 km/h (0.75 mph) to 10 km/h (6 mph).*

ZX.TMXZCO002512-19-01DEC92

## THEORY OF OPERATION

With starter switch in position (I) or (II), current is supplied to switch (S10) and reel speed control system (A1).

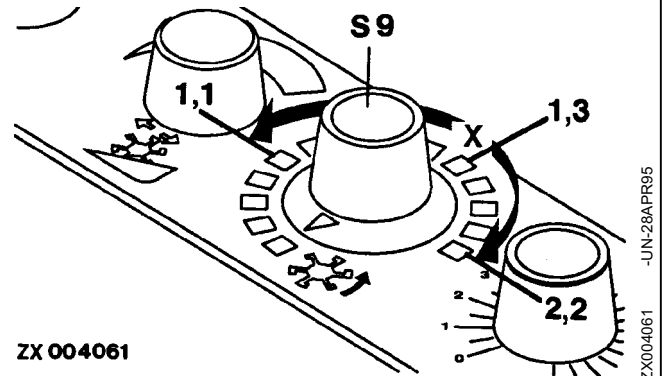
Stop light switch (S7) is also supplied with current.

When actuating switch (S10), relay (K32) or (K33) is activated. This will increase or reduce reel speed.

ZX, TMXZC0002513-19-01DEC92

With header running (wire 289 powered), a diagnostic mode is activated when turning speed ratio switch (potentiometer) (S9) to first position. The other switch positions will provide various reel speed ratios.

The speed ratio switch (S9) is connected to reel speed control system (A1) by means of four wires, providing 13 possible switch positions.



ZX, TMXZC0002521-19-25NOV92

## POSITIONS OF SPEED RATIO SWITCH S9

BIT	OFF	TEST	0.80	1.00	1.10	1.15	1.20	1.25	1.30	1.50	1.80	2.00	2.20
1	0	X	0	X	0	X	0	X	0	X	0	X	0
2	0	X	X	0	0	X	X	0	0	X	X	0	0
3	0	X	X	X	X	0	0	0	0	X	X	X	X
4	0	X	X	X	X	X	X	X	X	0	0	0	0

NOTE: (X) means that the corresponding switch connection is grounded.

ZX, TMXZC0002522-19-25NOV92

## **DIAGNOSTIC MODE**

The program of the reel speed control system provides a diagnostic mode. In this mode input and output signals of the system are tested.

### **Diagnostic Procedure:**

1. Move micro switch 1 to "ON" position (switches 2 to 5 are already "ON").
2. Move speed ratio switch (S9) to "OFF" position.
3. Start engine; engage separator and header.
4. Drive combine with a speed of 5.5 km/h (3.5 mph).
5. At a ground speed of 5.5 km/h (3.5 mph) move speed ratio switch (S9) to test position.
6. Continue to drive combine with an exact speed of 5.5 km/h (3.5 mph) for 30 seconds.
7. Stop combine. Keep separator and header running. Read error displays at LED's.

ZX, TMXZC0002523-19-25NOV92

## ERROR CODE DISPLAY

0 — LED off

X — LED on

Error Code	Problem	Solution
A—0 B—0 C—0 D—0	No voltage	Check fuse (F12)
A—X B—0 C—0 D—0	No ground speed signal	Check sending unit on 3-speed transmission
A—0 B—X C—0 D—0	Ground speed signal not within operating range	See "Operating Range of Reel Speed Control System" in "Controls and Instruments" Section of Operator's Manual
A—X B—X C—0 D—0	No reel speed signal	Check sending unit at cutting platform
A—0 B—0 C—X D—0	Reel speed signal not within operating range	See "Operating Range of Reel Speed Control System" in "Controls and Instruments" Section of Operator's Manual
A—X B—0 C—X D—0	Error "Bit 1" at reel speed control switch	
A—0 B—X C—X D—0	Error "Bit 2" at reel speed control switch	
A—X B—X C—X D—0	Error "Bit 3" at reel speed control switch	
A—0 B—0 C—0 D—X	Error "Bit 4" at reel speed control switch	

ZX, TMXZCO002514-19-01DEC92

**ERROR CODE DISPLAY (CONTINUED)**

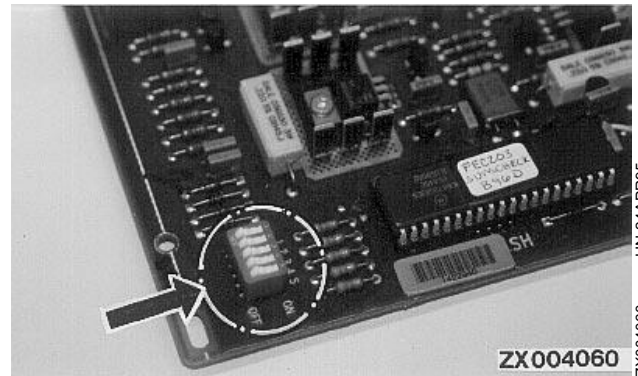
0 — LED off  
X — LED on

Error Code	Problem	Solution
A—X B—0 C—0 D—X	Option A, output 1 shorted to ground	
A—0 B—X C—0 D—X	Option A, output 2 shorted to ground	
A—X B—X C—0 D—X	Reel does not accelerate	
A—0 B—0 C—X D—X	Reel does not slow down	
A—X B—0 C—X D—X	Reel speed control switch not in diagnostic position	See "Reel Speed Control Switch" in "Controls and Instruments" Section of Operator's Manual
A—0 B—X C—X D—X	Fault not found	
A—X B—X C—X D—X	All contacts to reel speed control switch open	

ZX, TMXZCO002515-19-01DEC92

## OPERATING ADJUSTMENT OF MICRO SWITCHES

During normal operation, micro switch 1 on board of reel speed control system is in "OFF" position, while switches 2 to 5 are in "ON" position.

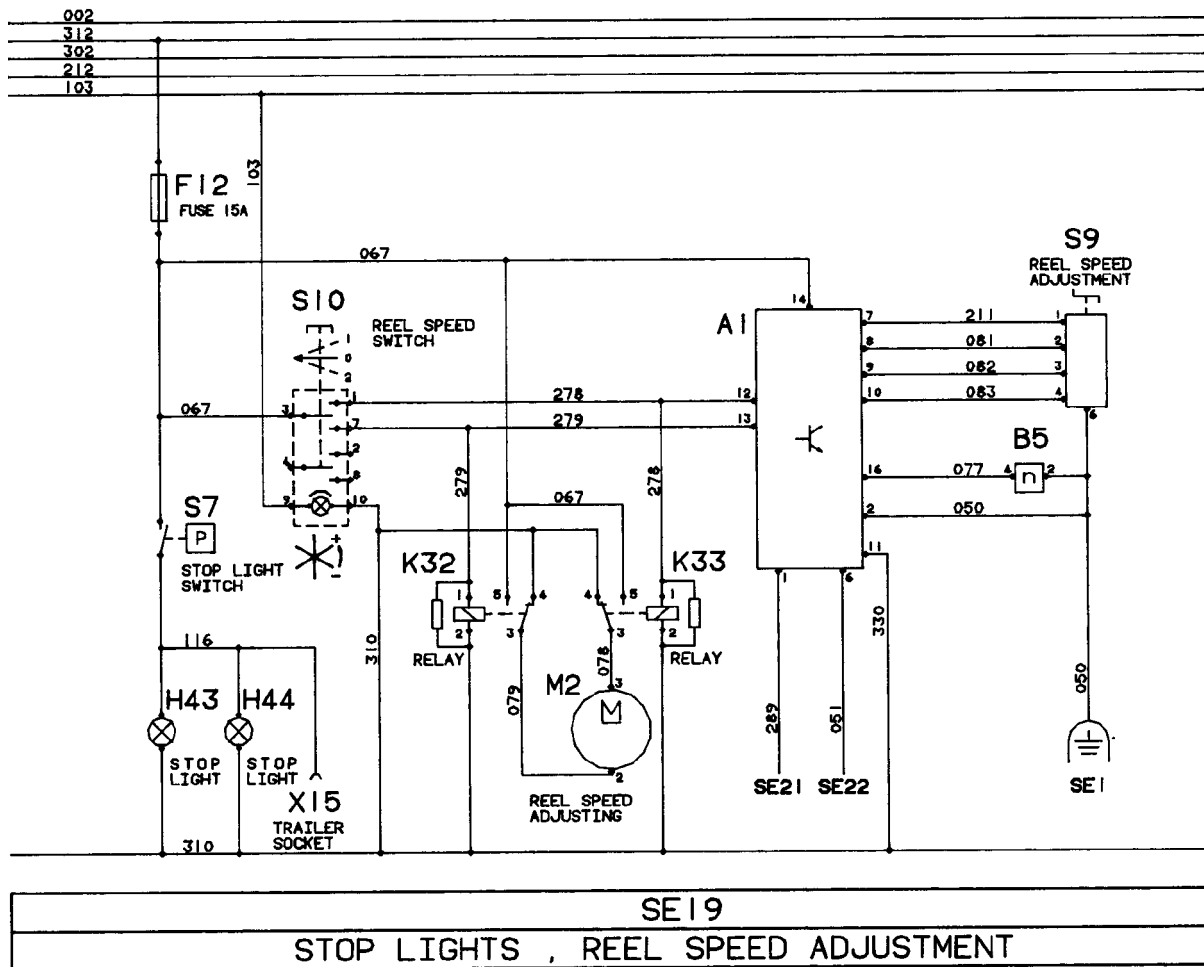


ZX,TMXZC0002516-19-01DEC92

ZX004060 -UN-24A PR95



**FUNCTIONAL SCHEMATIC, SECTION 19**



**SE19**  
**STOP LIGHTS , REEL SPEED ADJUSTMENT**

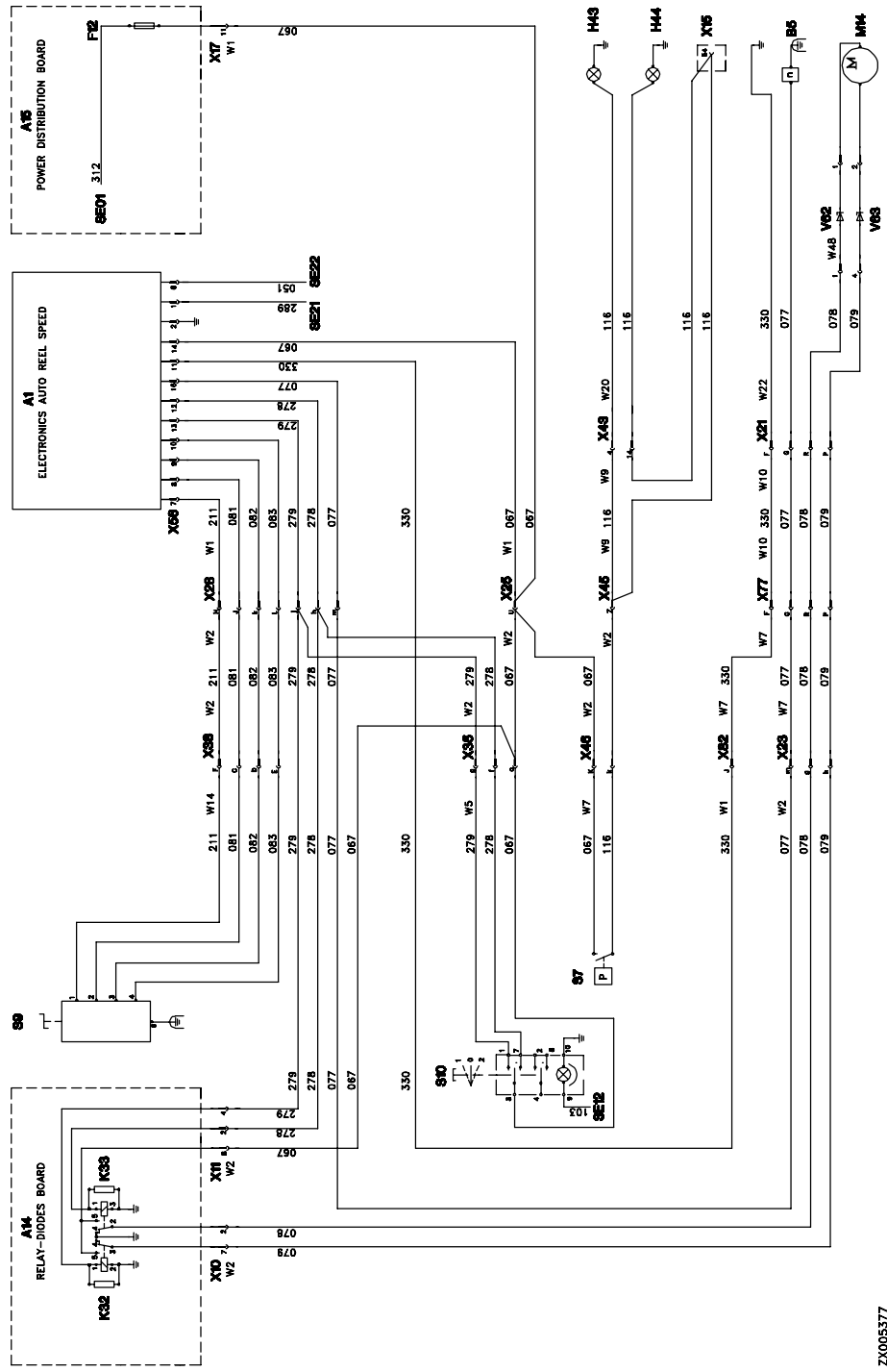
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-JUN-02MAY95  
ZX004054

- |                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>A1—Reel speed control<br/>A14—Relay and diode board<br/>A15—Fuse board<br/>B5—Sending unit, reel speed<br/>F12—Fuse 15 amps.<br/>H43—Stop light, l.h.<br/>H44—Stop light, r.h.<br/>K32—Relay, adjust reel speed<br/>K33—Relay, adjust reel speed<br/>M2—Reel speed adjusting motor<br/>M14—Reel speed adjusting motor<br/>S7—Stop light switch</p> | <p>S9—Potentiometer, reel speed<br/>S10—Reel speed switch<br/>X10—Connection, cab harness (W2) to relay board<br/>X11—Connection, cab harness (W2) to relay board<br/>X17—Connection, main distribution harness (W1) to fuse board<br/>X21—Disconn. point, feeder house harness (W10), header harness (W22)</p> | <p>X23—Disconn. point, cab harness (W2), front basic harness (W7)<br/>X25—Disconn. point, main distribution harness (W1), cab harness (W2)<br/>X28—Disconn. point, main distribution harness (W1), cab harness (W2)<br/>X35—Disconn. point, cab harness (W2), armrest harness (W5)<br/>X38—Disconn. point, cab harness (W2), optional equipment harness (W14)</p> | <p>X43—Disconn. point, rear basic harness (W9), straw hood harness (W20)<br/>X45—Disconn. point, cab harness (W2), rear basic harness (W9)<br/>X46—Disconn. point, cab harness (W2), front basic harness (W7)<br/>V62—Diode<br/>V63—Diode</p> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

ZX, TMXCO005147-19-15MAR96

### DIAGNOSTIC SCHEMATIC, SECTION 19



ZX005377

## **OPERATIONAL INFORMATION**

The ground pressure once adjusted by the operator on 900 Series cutting platforms will be kept constant by the DIAL-A-MATIC™.

Three different ground pressures can be preselected by means of the rotary switch on switch console.

By raising cutting platform manually the DIAL-A-MATIC™ is switched off. It is actuated again by lowering the platform manually (even for a short period of time only).

ZX, TMXZCO002752-19-13MAY93

## **THEORY OF OPERATION**

Rotary switch (S23) in switch console is supplied with current via fuse (F43). By moving switch (S23) to positions 1, 2 or 3, electronic box (A2) and sending unit at cutting platform (S66) are supplied with current.

This preselection via switch determines which of the three center contacts in sending unit (S66) is without connection to electronic box (A2).

The contact revolving in relation to cutting platform ground pressure transmits a signal to the electronic control box (A2) until the revolving contact reaches the stationary contact without connection to electronic control box (A2).

The input signal is converted in the electronic control box (A2) and used for raising and lowering cutting platform (via wires 238 and 239).

ZX, TMXZCO002753-19-13MAY93

## TESTING THE DIAL-A-MATIC

DIAL-A-MATIC test can be carried out by bridging various terminals at connection (X4) to cutting platform. Proceed as follows:

1. Run engine at fast idle.
2. Move road safety switch to field position. Engage separator drive.

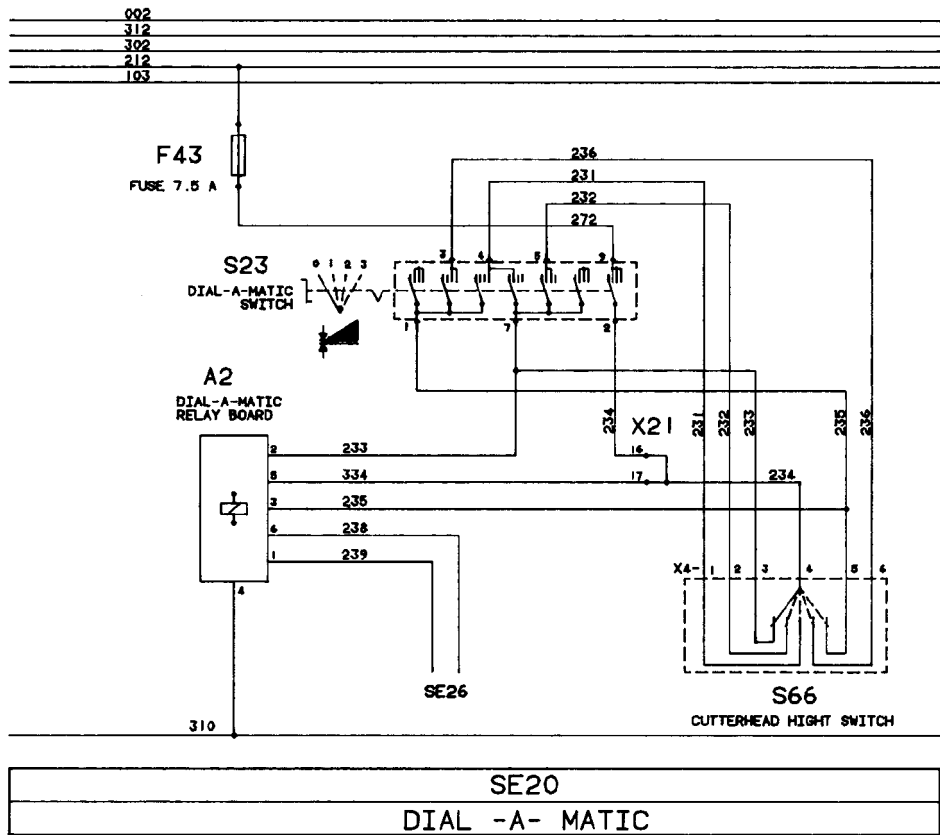
**⚠ CAUTION: It is possible during DIAL-A-MATIC test that feeder house moves up or down. DANGER OF ACCIDENTS.**

3. Move rotary switch (S23) in switch console to position 1,2 or 3 and press switch for a short period of time to lower cutting platform.
4. Check according to the following chart by bridging connection terminals.

CONNECTION X4	SWITCH POSITION			FEEDER HOUSE
	1	2	3	
Bridge contacts	4—5	4—5, 6	4—5, 6, 1	Feeder house rising
Bridge contacts	4—6	4—1	4—2	Feeder house not moving
Bridge contacts	4—1, 2, 3	4—2, 3	4—3	Feeder house lowering

ZX, TMXZCO002754-19-13MAY93

FUNCTIONAL SCHEMATIC OF SECTION 20



ZX004056 -JUN-02MAY95

- A2—Electronic box  
DIAL-A-MATIC
- A15—Fuse board
- F43—Fuse 7,5A
- S23—DIAL-A-MATIC switch
- S66—DIAL-A-MATIC sending  
unit
- X18—Connection main  
distribution harness  
(W1) to fuse board

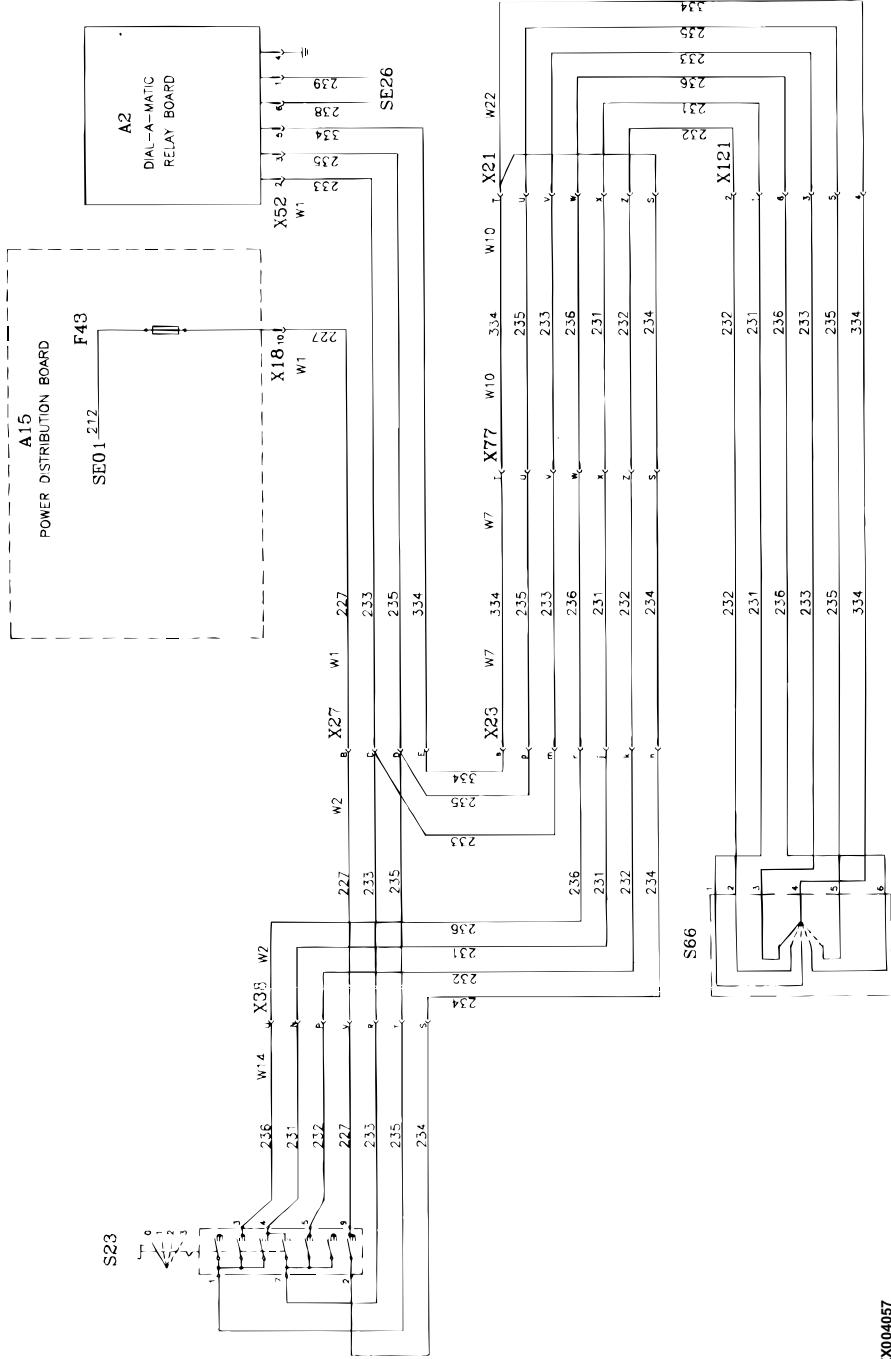
- X21—Disconnect point feeder  
house harness (W10),  
cutting platform  
harness (W22)
- X23—Disconnect point front  
basic wiring harness  
(W7)-cab wiring  
harness (W2)

- X27—Disconnect point main  
distribution harness  
(W1)-cab wiring  
harness (W2)
- X38—Disconnect point cab  
wiring harness (W2),  
optional equipment  
wiring harness (W14)

- X52—Connection main  
distribution harness  
(W1)-electronic box  
DIAL-A-MATIC

ZX.TMXCO002755-19-13MAY93

DIAGNOSTIC SCHEMATIC OF SECTION 20



ZX004057

# Group 15V Separator, Harvesting Unit to Ser.No. 062721

## OPERATIONAL INFORMATION

By moving road safety switch to field position all hydraulic functions (including all hillmaster functions) can be used. At the same time fan in front of radiator is rotating.

Now separator and rear work lights can be switched on as well.

A safety device prevents the separator from being switched on when road safety switch is moved to field position.

With separator engaged, harvesting unit can be engaged as well.

A similar safety device prevents that the harvesting unit is engaged at the same time separator is switched on.

ZX, TMXZC0002757-19-13MAY93

## THEORY OF OPERATION

With engine running, the road safety switch is supplied with current from terminal (D+) of alternator via fuse (F48). When switching to field position, relay (K12) is activated and wire (222) is supplied with current.

With switch (S33) in neutral position, relay (K21) has been activated. When separator drive is engaged, relay (K21) is kept in position and wire (202) is supplied with current.

Solenoids (Y22) and (Y23) are now supplied with current via fuse (F23). The hydraulic cylinder activated by the solenoids tensions the separator drive V-belt.

Harvesting unit is basically engaged in the same way as the separator.

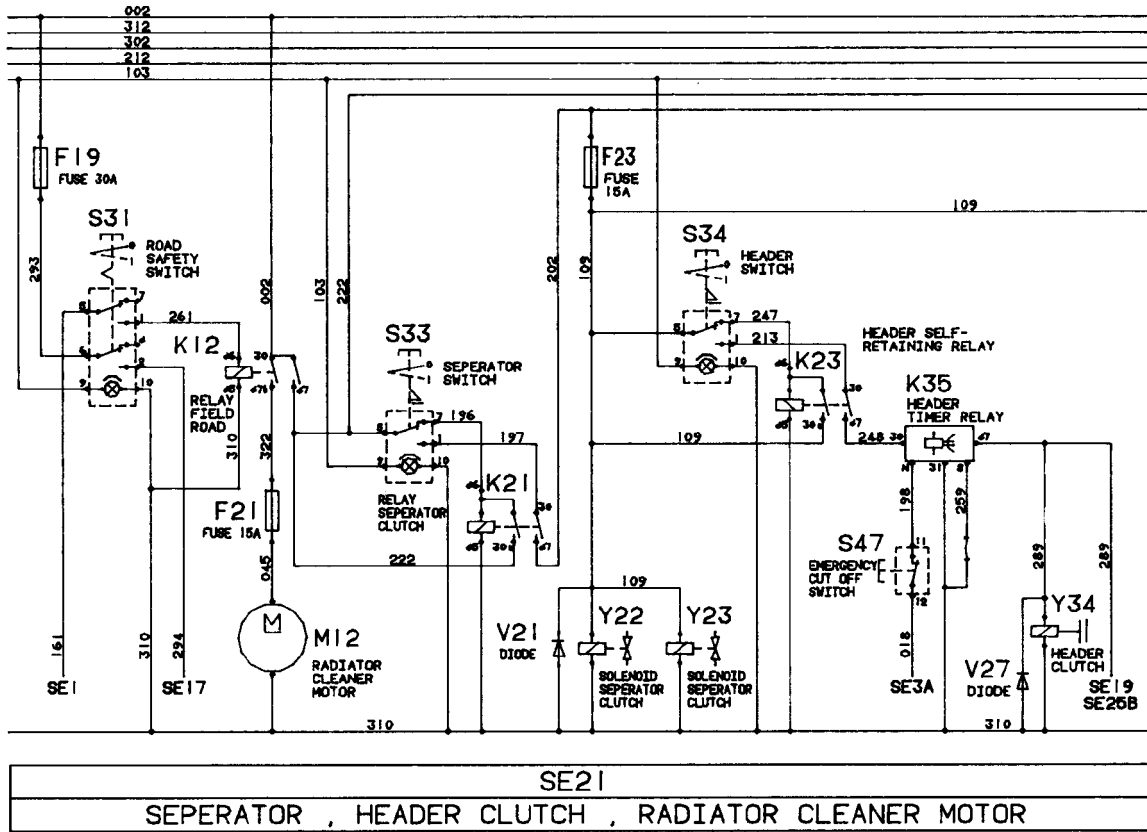
The time delay relay integrated in the circuit is not used. Harvesting unit is directly engaged and disengaged via switch (S34).

Actuating emergency cut-off switch interrupts the input signal of wire (198) to time delay relay. Wire (289) is without current supply and harvesting unit drive is interrupted by the electromagnetic clutch.

*NOTE: Interruption of wire 259 or connection of terminal (S) to ground causes harvesting unit to be disengaged 5 seconds after engagement.*

ZX, TMXZC0002758-19-13MAY93

FUNCTIONAL SCHEMATIC OF SECTION 21

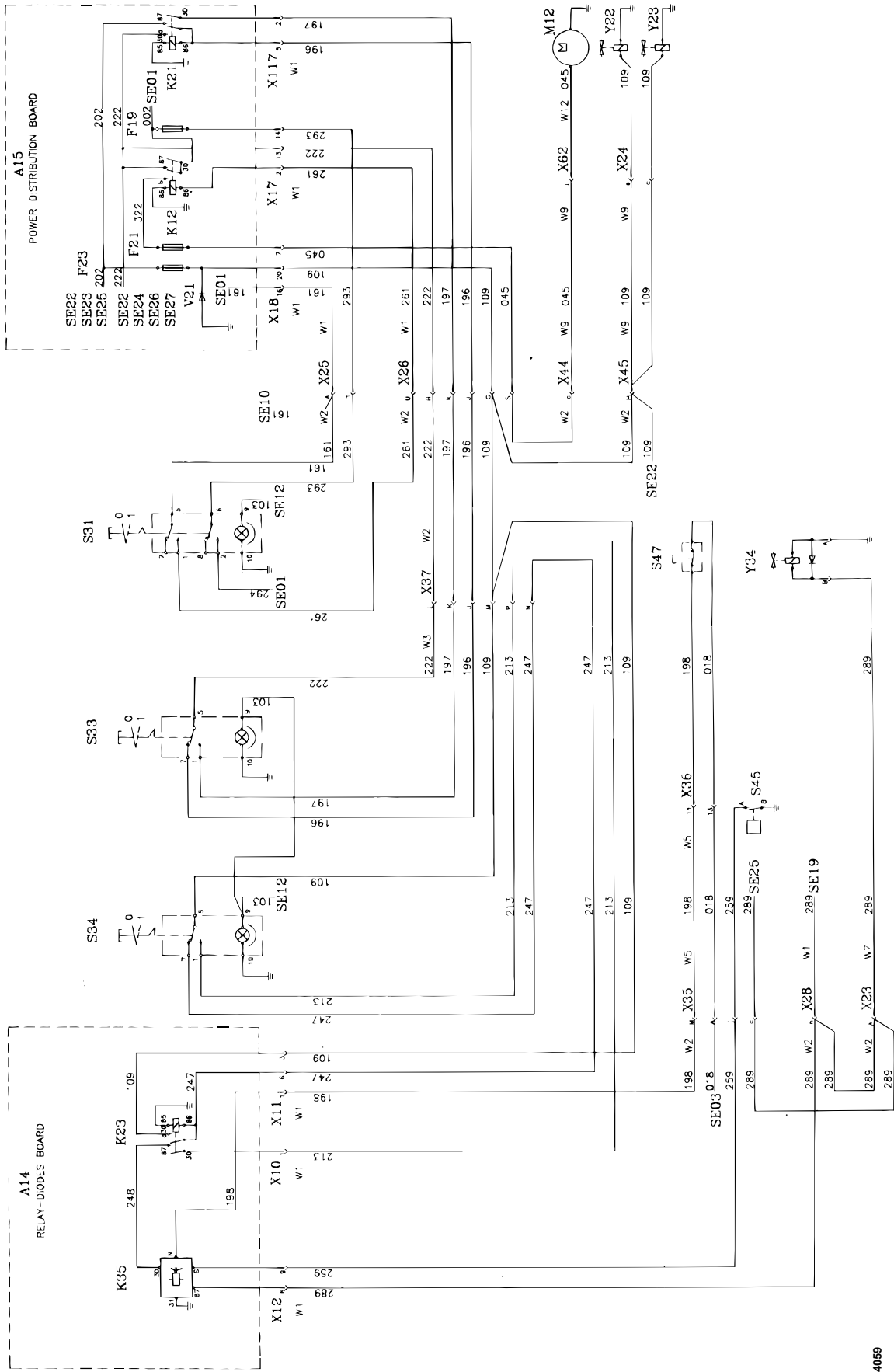


- |                                               |                                                                 |                                                                       |                                                                        |
|-----------------------------------------------|-----------------------------------------------------------------|-----------------------------------------------------------------------|------------------------------------------------------------------------|
| A14 —Relay and diode board                    | V2 —Diode, pressure switch                                      | X24 —Conn.solenoid valve block                                        | X37 —Disconn. point cab harness (W2)-switch console harness (W3)       |
| A15 —Fuse board                               | X10 —Connection cab harness (W2)-relay board                    | X25 —Disconnect point main distribution harness (W1)-cab harness (W2) | X44 —Disconnect point cab harness (W2)-rear basic harness (W9)         |
| F19 —Fuse 30A                                 | X11 —Connection cab harness (W2)-relay board                    | X26 —Disconn. point main distribution harness (W1)-cab harness (W2)   | X45 —Disconnect point cab harness (W2)-rear basic harness (W9)         |
| F21 —Fuse 15A                                 | X12 —Connection cab harness (W2)-relay board                    | X28 —Disconnect point main distribution harness (W1)-cab harness (W2) | X62 —Disconnect point rear basic harness (W9)-engine harness (W12/W13) |
| F23 —Fuse 15A                                 | X17 —Connection main distribution harness (W1)-fuse board       | X35 —Disconnect point cab harness (W2)-armrest harness (W5)           | X117 —Conn. main distribution harness (W1)-fuse board                  |
| K12 —Relay, field operation-road travel       | X18 —Connection main distribution harness (W1)-fuse board       | X36 —Conn. master control lever-armrest harness (W5)                  | Y22 —Solenoid,engage separator                                         |
| K21 —Relay, separator clutch                  | X23 —Disconnect point cab harness (W2)-front basic harness (W7) |                                                                       | Y23 —Solenoid,engage separator                                         |
| K35 —Time delay relay, cutting platform drive |                                                                 |                                                                       | Y34 —Harvesting unit clutch                                            |
| M12 —Radiator cleaner motor                   |                                                                 |                                                                       |                                                                        |
| S31 —Road safety switch                       |                                                                 |                                                                       |                                                                        |
| S33 —Separator drive switch                   |                                                                 |                                                                       |                                                                        |
| S34 —Harvesting unit drive switch             |                                                                 |                                                                       |                                                                        |
| S47 —Emergency cut-off switch                 |                                                                 |                                                                       |                                                                        |

ZX, TMXCO002759-19-13MAY93



DIAGNOSTIC SCHEMATIC OF SECTION 21



ZX004059



**Group 16V**

**Separator, Harvesting Unit, from Ser.No. 062722**

**OPERATIONAL INFORMATION**

By moving road safety switch to field position all hydraulic functions (including all hillmaster functions) can be used. At the same time fan in front of radiator is rotating.

Now separator and rear work lights can be switched on as well.

A safety device prevents the separator from being switched on when road safety switch is moved to field position.

With separator engaged, harvesting unit can be engaged as well.

A similar safety device prevents that the harvesting unit is engaged at the same time separator is switched on.

ZX, TMXZC0002757-19-13MAY93

## THEORY OF OPERATION

With engine running, the road safety switch is supplied with current from terminal (D+) of alternator via fuse (F48). When switching to field position, relay (K12) is activated and wire (222) is supplied with current.

With switch (S33) in neutral position, relay (K21) has been activated. When separator drive is engaged, relay (K21) is kept in position and wire (202) is supplied with current.

Solenoids (Y22) and (Y23) are now supplied with current via fuse (F23). The hydraulic cylinder activated by the solenoids tensions the separator drive V-belt.

Harvesting unit is basically engaged in the same way as the separator.

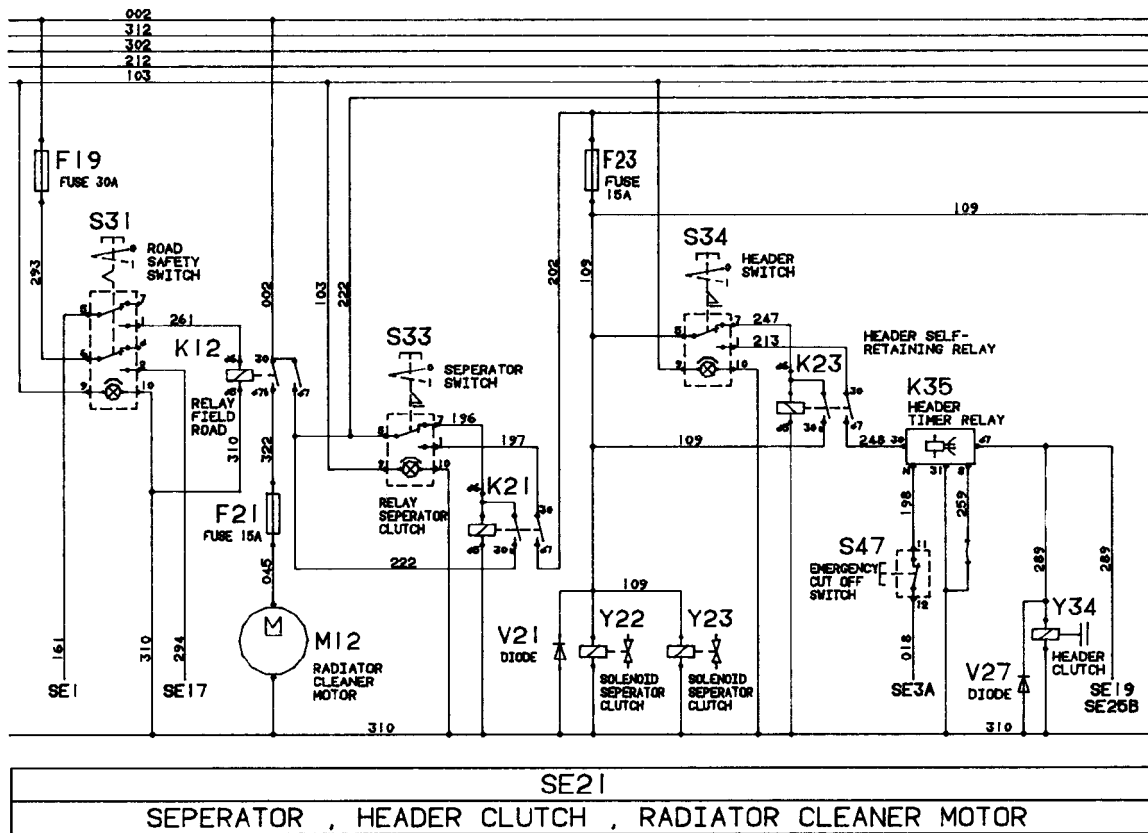
The time delay relay integrated in the circuit is not used. Harvesting unit is directly engaged and disengaged via switch (S34).

Actuating emergency cut-off switch interrupts the input signal of wire (198) to time delay relay. Wire (289) is without current supply and harvesting unit drive is interrupted by the electromagnetic clutch.

*NOTE: Interruption of wire 259 or connection of terminal (S) to ground causes harvesting unit to be disengaged 5 seconds after engagement.*

ZX, TMXZC0002758-19-13MAY93

### FUNCTIONAL SCHEMATIC OF SECTION 21

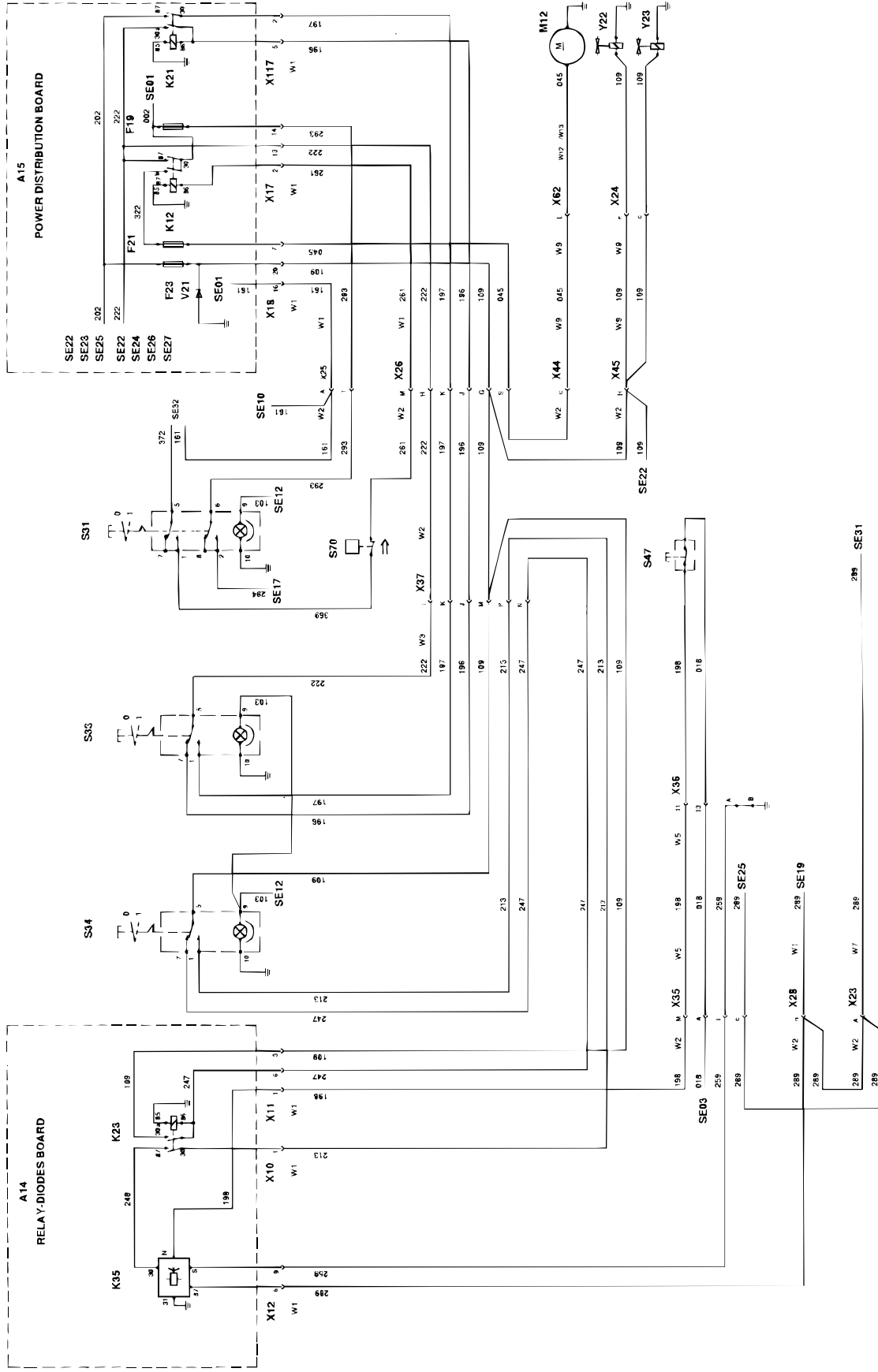


ZX004058

- |                                               |                                                                 |                                                                       |                                                                        |
|-----------------------------------------------|-----------------------------------------------------------------|-----------------------------------------------------------------------|------------------------------------------------------------------------|
| A14 —Relay and diode board                    | V2 —Diode, pressure switch                                      | X24 —Conn.solenoid valve block                                        | X37 —Disconn. point cab harness (W2)-switch console harness (W3)       |
| A15 —Fuse board                               | X10 —Connection cab harness (W2)-relay board                    | X25 —Disconnect point main distribution harness (W1)-cab harness (W2) | X44 —Disconnect point cab harness (W2)-rear basic harness (W9)         |
| F19 —Fuse 30A                                 | X11 —Connection cab harness (W2)-relay board                    | X26 —Disconn. point main distribution harness (W1)-cab harness (W2)   | X45 —Disconnect point cab harness (W2)-rear basic harness (W9)         |
| F21 —Fuse 15A                                 | X12 —Connection cab harness (W2)-relay board                    | X28 —Disconnect point main distribution harness (W1)-cab harness (W2) | X62 —Disconnect point rear basic harness (W9)-engine harness (W12/W13) |
| F23 —Fuse 15A                                 | X17 —Connection main distribution harness (W1)-fuse board       | X35 —Disconnect point cab harness (W2)-armrest harness (W5)           | X117 —Conn. main distribution harness (W1)-fuse board                  |
| K12 —Relay, field operation-road travel       | X18 —Connection main distribution harness (W1)-fuse board       | X36 —Conn. master control lever-armrest harness (W5)                  | Y22 —Solenoid,engage separator                                         |
| K21 —Relay, separator clutch                  | X23 —Disconnect point cab harness (W2)-front basic harness (W7) |                                                                       | Y23 —Solenoid,engage separator                                         |
| K35 —Time delay relay, cutting platform drive |                                                                 |                                                                       | Y34 —Harvesting unit clutch                                            |
| M12 —Radiator cleaner motor                   |                                                                 |                                                                       |                                                                        |
| S31 —Road safety switch                       |                                                                 |                                                                       |                                                                        |
| S33 —Separator drive switch                   |                                                                 |                                                                       |                                                                        |
| S34 —Harvesting unit drive switch             |                                                                 |                                                                       |                                                                        |
| S47 —Emergency cut-off switch                 |                                                                 |                                                                       |                                                                        |

ZX, TMXCO002759-19-13MAY93

**DIAGNOSTIC SCHEMATIC, SECTION 21**



ZX005378

# Group 15W Infotrak Monitor, Speed Monitoring System

## OPERATIONAL INFORMATION, INFOTRAK-MONITOR

With starter switch in position (I) the infotrak monitor is ready for operation.

The infotrak monitor is identical with the ones in other John Deere products.

By the input of certain specific machine data the infotrak monitor is adjusted to the combine's needs.

All important separator drives are monitored by the speed monitoring system for decreasing of speed. An optical and an acoustical signal indicate the operator if the speed drops below a certain level.

ZX, TMXZC0002761-19-13MAY93

## INPUT OF SPECIFIC MACHINE DATA

**IMPORTANT:** Each time different size drive wheels are installed or tire radius changes due to wear, the infotrak monitor must be calibrated accordingly. This will also ensure correct area counter operation.

### Activate Input Status

Press key combination (C + D) and simultaneously turn starter switch from position (0) to position (I). The position indicator will move to upper left-hand position.

### Data Input

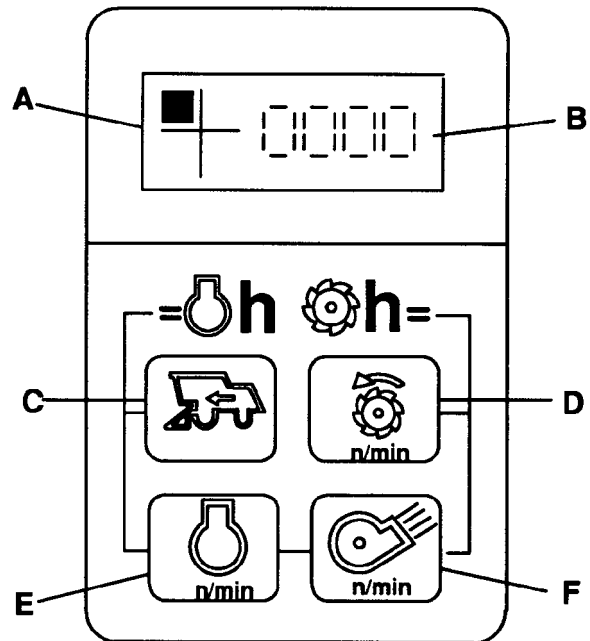
Press key (C): displayed value will increase.  
Press key (E): displayed value will decrease.

### Data Storage

Press key combination (D + F). At the same time the position indicator will move to another field (upper right-hand, lower right-hand, lower left-hand field).

### Deactivate Input Status

After input and storage of all data, turn starter switch to position (0).



ZX 002352

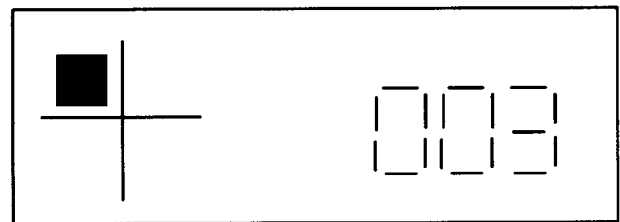
- A—Position indicator
- B—Display panel
- C—Key for ground speed display
- D—Key for cylinder speed display
- E—Key for engine speed display
- F—Key for fan speed display

ZX,OMXZC0001834-19-14NOV92

## MACHINE CODE

Input code for mph:  
03 — Combine

Input code for km/h:  
23 — Combine



ZX 002483

ZX,OMXZC0001835-19-13APR92



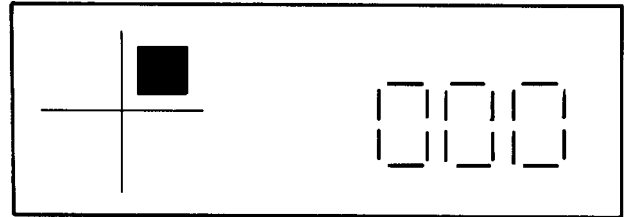
### TRANSMISSION SPEED RATIO CODE

00 — Final drive (85/11)  
Z12231 (I)

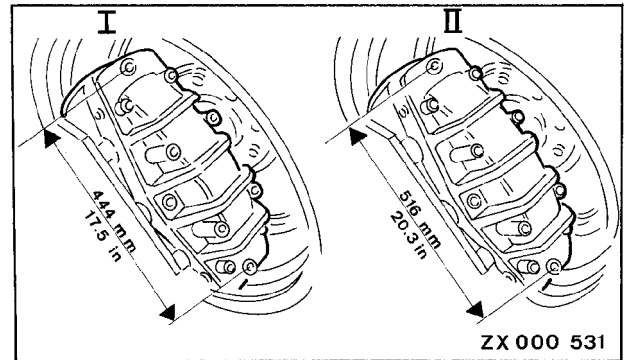
01 — Final drive (97/11)  
Z12232 (II)

02 — Planetary final drive

I—Final drive 85/11  
II—Final drive 97/11



ZX 000 843



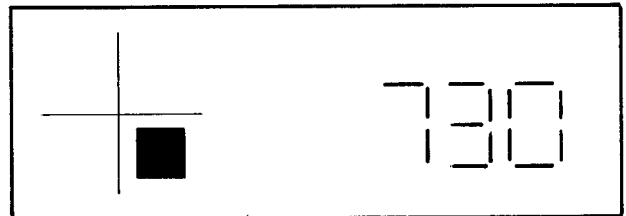
ZX 000 531

ZX,OMXZCO001836-19-13APR92

### TIRE RADIUS CODE

For input of tire radius code, use actual tire radius. On machines with machine code 03 the radius must be keyed in in inches. On machines with machine code 23 the radius must be keyed in in millimeters.

*NOTE: Refer to the tire chart in the operator's manual (Section "Wheels and Axles") for tire radius. Radius can also be determined by proceeding according to the following instructions.*



ZX 000 532

ZX,TMXZCO002762-19-13MAY93

## DETERMINING TIRE RADIUS

### Requirements:

- Combine on solid ground
- Correct tire pressures
- Combine steering wheels in straight-ahead position

Mark tire and ground with dashes.

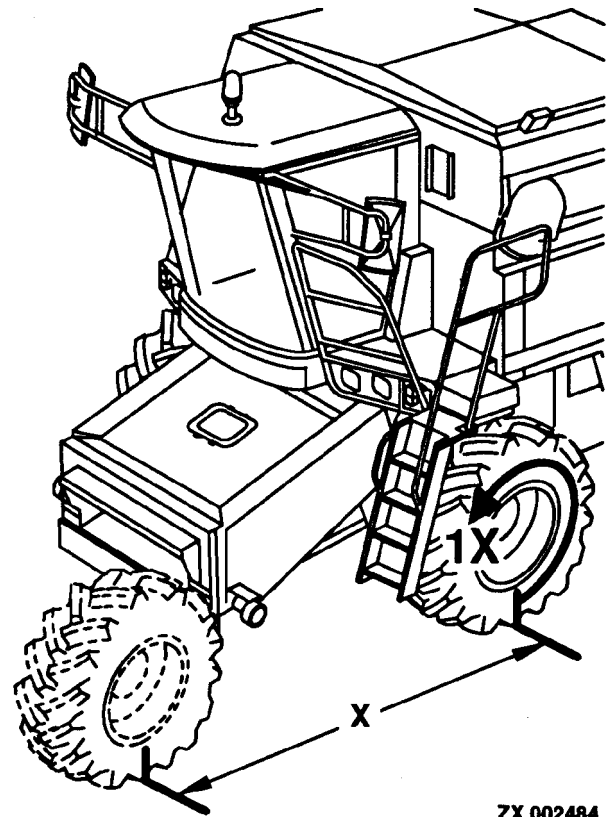
Drive combine until marked tire has completed one revolution.

Transfer tire mark to ground.

Measure distance (X) between ground marks.

Divide measured distance (X) by 6.28.

The value obtained is the tire radius for infotrak monitor input.



ZX 002484

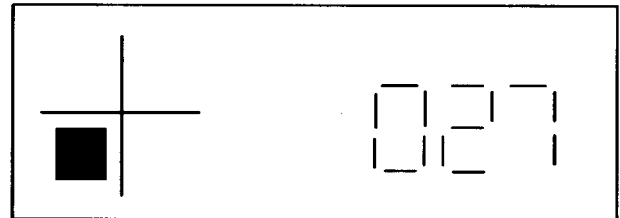
ZX,OMXZCO001838-19-14NOV92

-UN-28APR95  
ZX002484

## ENGINE IMPULSE CODE

24 — 2054 combine

27 — 2056—2066 combines



ZX 002485

ZX,OMXZCO001839-19-13APR92

-UN-28APR95  
ZX002485

## ERROR CODES, INFOTRAK-MONITOR

As soon as the infotrak monitor displays a three digit number followed by an "E" a malfunction or error of the operator is indicated.

The cause of a machine malfunction may be a broken wire etc.

Error code	Problem	Solution
101E	Counter of engine operating hours in infotrak monitor is defective	Replace infotrak monitor
102E	Counter of working hours in infotrak monitor is defective	Replace infotrak monitor
122E	Concave adjustment impossible, Sensor signal in wrong range (too low)	Voltage between pin 4 and 9 on infotrak monitor not between 1 and 4 Volts, wire on potentiometer (R2) may not be correctly connected
123E	Concave adjustment impossible, Sensor signal in wrong range (too high)	Voltage between pin 4 and 9 on infotrak monitor not between 1 and 4 Volts, wire on potentiometer (R2) may not be correctly connected
128E	No reaction from infotrak monitor	Check data lines 268 and 269 for correct connection, malfunction of infotrak monitor possible
129E	No reaction from control board	Check data lines 268 and 269 for correct connection, possibly control board of machine computer defective
130E	Adjusting motor can not reduce fan speed to the desired rpm	Check fuses F3, F25
131E	Variator can not reduce cylinder speed to the desired rpm	Check fuse F3
132E	Adjusting motor can not reduce concave clearance to desired gap	Check fuse F41
135E	Adjusting motor can not increase fan speed to the desired rpm	Check fuses F3, F25
136E	Variator can not increase cylinder speed to the desired rpm	Check fuse F3
137E	Adjusting motor can not increase concave clearance to desired gap	Check fuse F41

ZX, TMXZC0002763-19-13MAY93

## OPERATIONAL INFORMATION, SPEED MONITORING SYSTEM

For better monitoring of drive systems the machines are equipped with a speed monitoring system.

The following speeds are monitored:

- Cylinder speed
- Fan speed

- Clean grain elevator
- Tailings elevator
- Cross shaker
- Straw chopper
- Chaff spreader

*NOTE: Cylinder and fan speeds are monitored via infotrak monitor.*

ZX.TMXZCO002764-19-13MAY93

## THEORY OF OPERATION

Impulse pick-up units are installed at tailings elevator, clean grain elevator, cross shaker, straw chopper and chaff spreader shafts. On the shafts magnet rings are attached which influence the impulse pick-up units.

If speed of one shaft drops to below 65% of rated shaft speed, the corresponding indicator light is connected to ground and the buzzer sounds.

If shaft speed exceeds 85% of the rated speed, the corresponding alarm is switched off again.

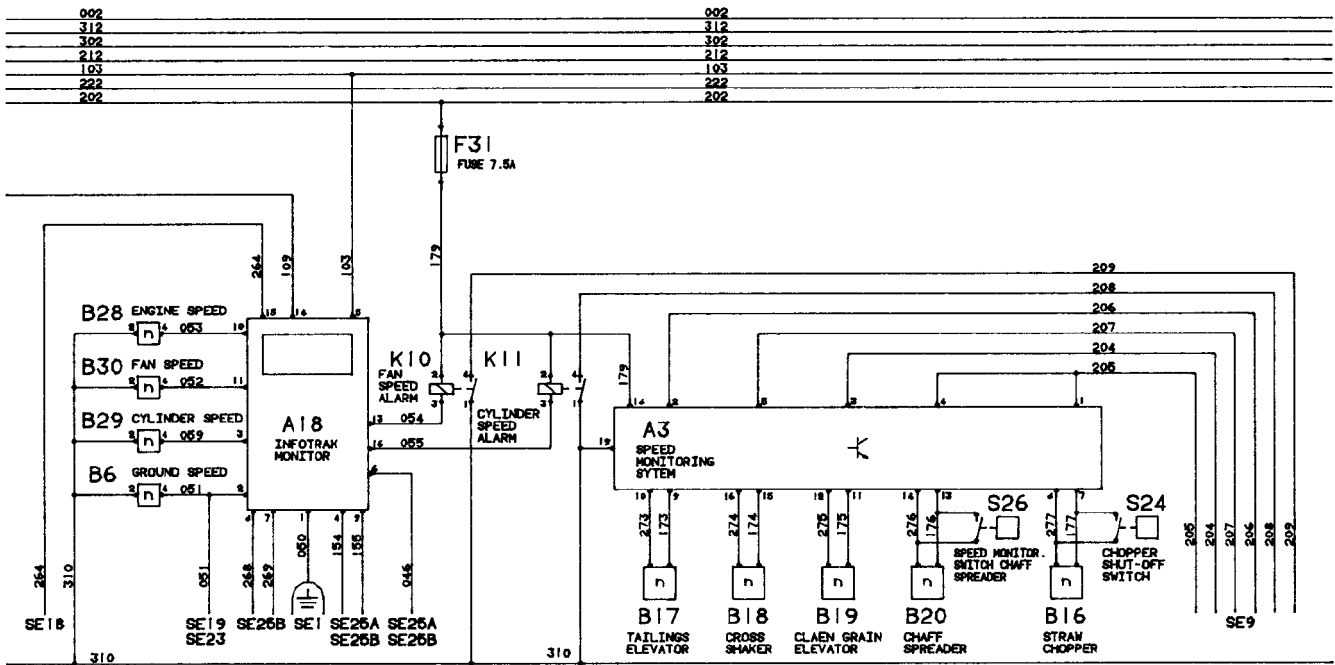
Shaft alarm speeds are:

Clean grain elevator	370 rpm
Tailings elevator	300 rpm
Cross shaker	210 rpm
Straw chopper	1730 rpm
Chaff spreader	130 rpm

*NOTE: If straw chopper or chaff spreader are disengaged, the additional switch (S24) or (S26) switches off the speed monitoring system for the shaft concerned.*

ZX.TMXZCO002765-19-13MAY93

### FUNCTIONAL SCHEMATIC OF SECTION 22



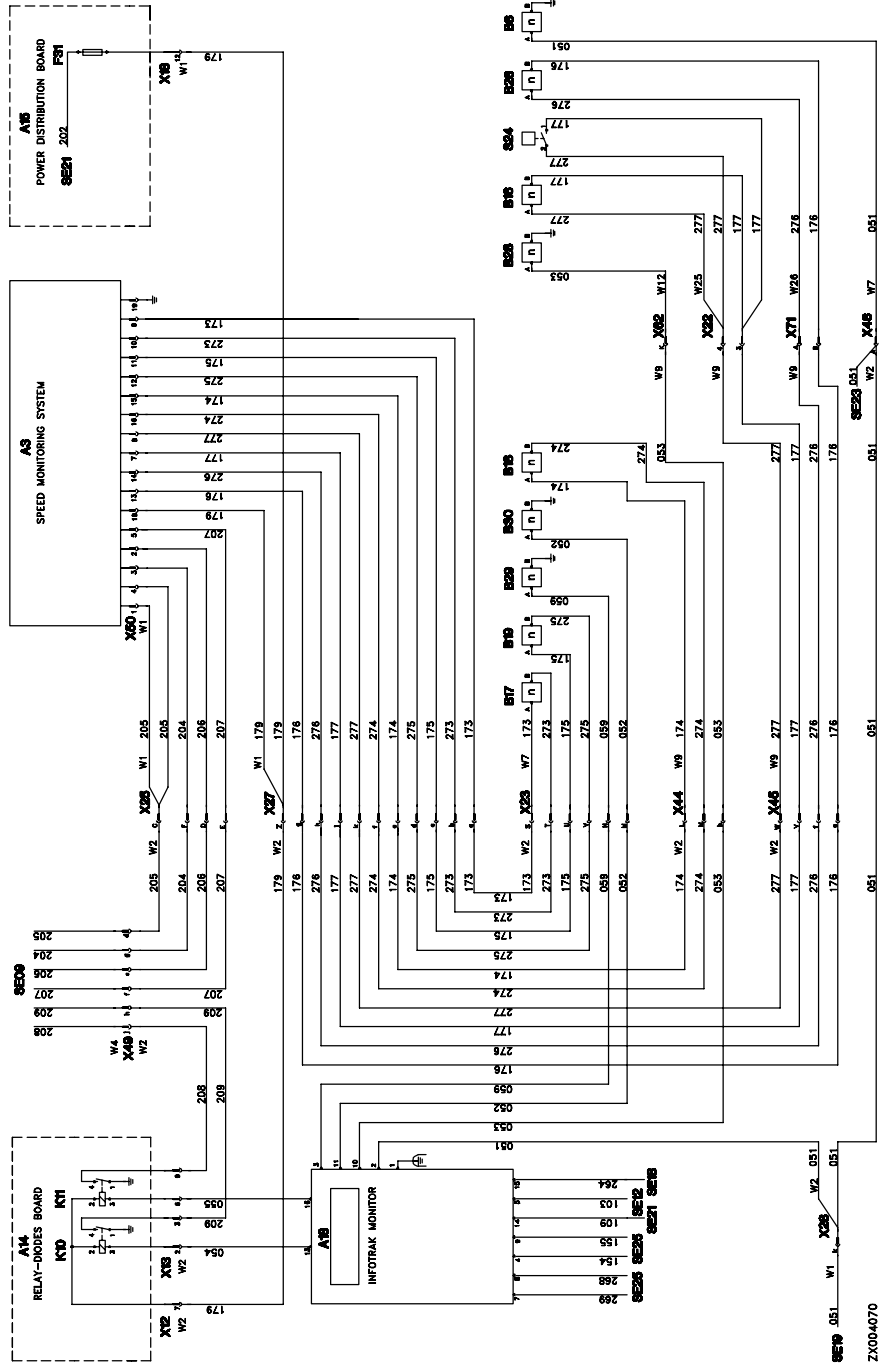
**SE22**  
**INFOTRAK MONITOR , SPEED MONITORING SYSTEM**

ZX004069

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>A3—Electronic speed monitoring system</p> <p>A14—Relay and diode board</p> <p>A15—Fuse board</p> <p>A18—Infotrak monitor</p> <p>B6—Ground speed sending unit</p> <p>B16—Straw chopper speed sending unit</p> <p>B17—Tailings elevator speed sending unit</p> <p>B18—Cross shaker speed sending unit</p> <p>B19—Clean grain elevator speed sending unit</p> <p>B20—Chaff spreader speed sending unit</p> <p>B28—Engine speed sending unit</p> <p>B29—Cylinder speed sending unit</p> | <p>B30—Fan speed sending unit</p> <p>K10—Relay, fan speed alarm</p> <p>K11—Relay, cylinder speed alarm</p> <p>S24—Speed monitoring switch, straw chopper</p> <p>X12—Connection cab harness (W2)-relay and diode board</p> <p>X13—Connection cab harness (W2)-relay and diode board</p> <p>X18—Connection main distribution harness (W1)-fuse board</p> <p>X22—Disconnect point rear basic harness (W9)-chopper harness (W25)</p> <p>X23—Disconnect point cab harness (W2)-front basic harness (W7)</p> | <p>X25—Disconnect point main distribution harness (W1)-cab harness (W2)</p> <p>X27—Disconnect point main distribution harness (W1)-cab harness (W2)</p> <p>X28—Disconnect point main distribution harness (W1)-cab harness (W2)</p> <p>X44—Disconnect point cab harness (W2)-rear basic harness (W9)</p> <p>X45—Disconnect point cab harness (W2)-rear basic harness (W9)</p> <p>X46—Disconnect point cab harness (W2)-front basic harness (W7)</p> | <p>X49—Disconnect point cab harness (W2)-corner post harness (W4)</p> <p>X50—Connection main distribution harness(W1)-electronic speed monitoring system</p> <p>X62—Disconnect point rear basic harness (W9)-engine harness (W12/W13)</p> <p>X71—Disconnect point rear basic harness (W9)-chaff spreader harness (W26)</p> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

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ZX004069

DIAGNOSTIC SCHEMATIC OF SECTION 22



## **OPERATIONAL INFORMATION**

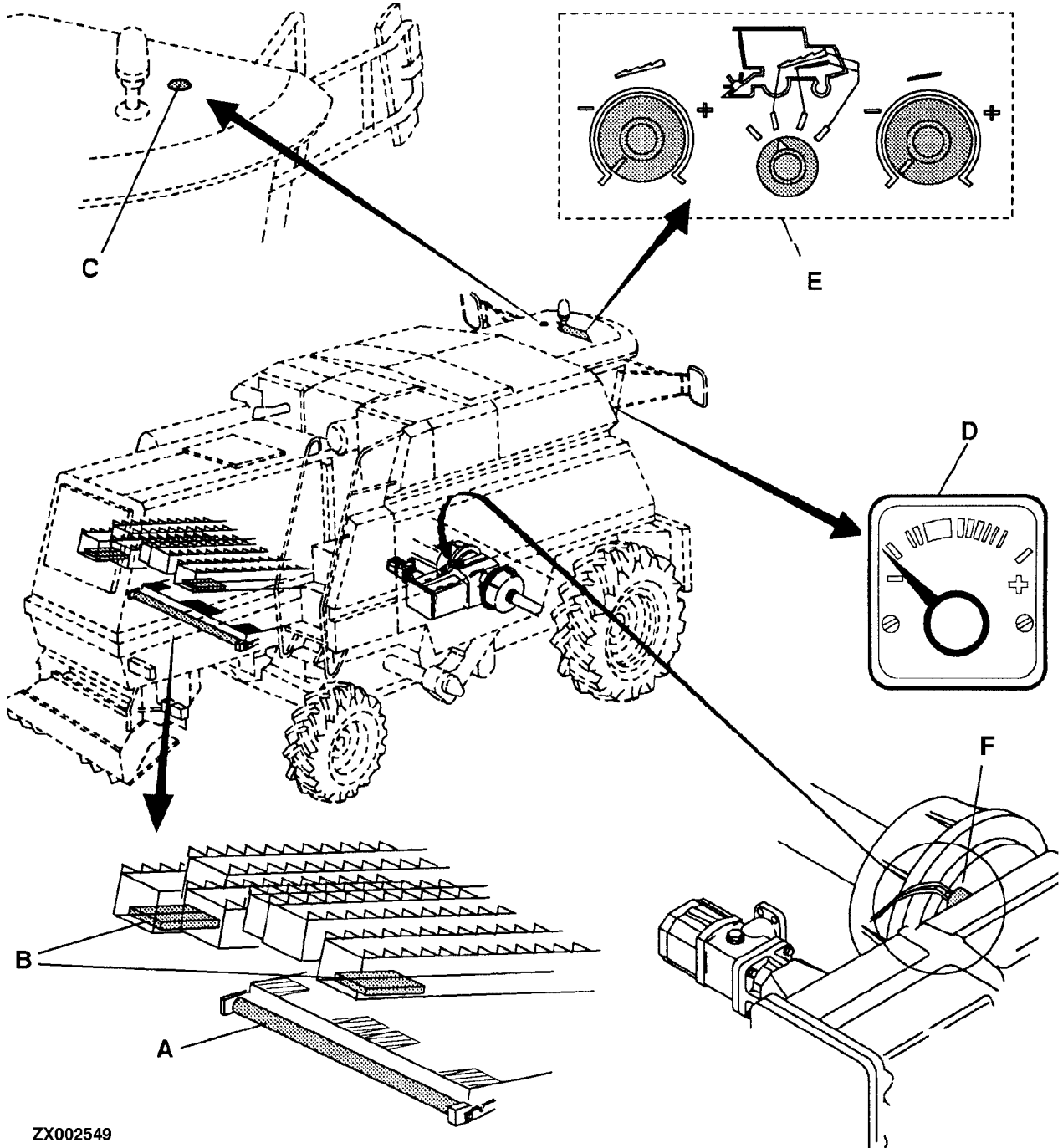
Sensors are located at the end of the cleaning shoe and straw walkers which record the amount of grains falling on the sensor surface.

Ground speed is measured by sensor (F) and light conditions (day/night) and moisture by sensor (C). Once these factors have been taken into account, the loss rate is shown at display unit (D). Display unit (D) indicates the loss level in relation to the level that is acceptable to the user.

The performance monitor enables the operator to use maximum combine capacity within the performance range selected by him. After the operator has adjusted the combine and cutting platform to suit the harvesting conditions, he must set the monitor to these conditions by means of the adjusting/selecting unit (E).

ZX, TMXZCO003211-19-17JAN94

**HARVEST PERFORMANCE MONITOR**



ZX002549

ZX002549 -UN-19MAY95

A—Cleaning shoe sensor  
B—Straw walker sensors

C—Light sensor  
D—Display unit

E—Adjusting/selecting unit

F—Ground speed sensor



## OPERATIONAL ADJUSTMENT OF HARVEST PERFORMANCE MONITOR

While threshing, adjust potentiometers (A) and (B) so that needle of display unit (C) moves to the center of the green sector (X) at a given, accepted loss level.

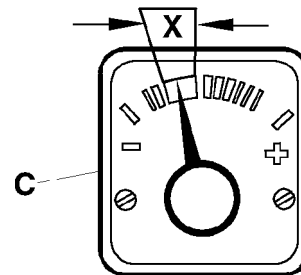
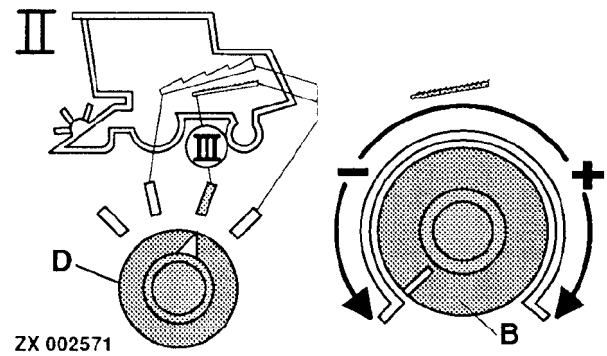
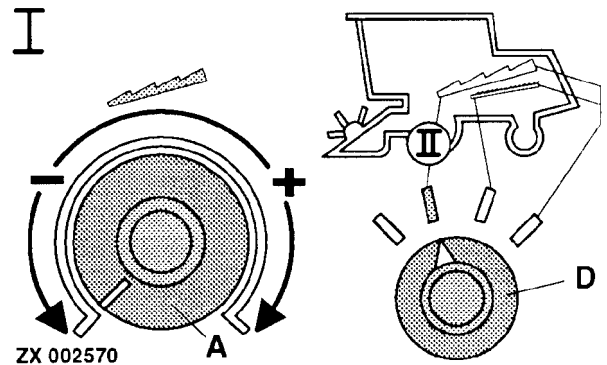
I — Set potentiometer for straw walker losses:

- Move selector switch (D) to position (II).
- Use potentiometer (A) to bring the needle into the green sector (X).

II — Set potentiometer für cleaning shoe losses:

- Move selector switch (D) to position (III).
- Use potentiometer (B) to bring the needle into the green sector (X).

- A—Potentiometer, straw walker sensitivity
- B—Potentiometer, cleaning shoe sensitivity
- C—Display unit
- D—Selector switch
- X—Green sector

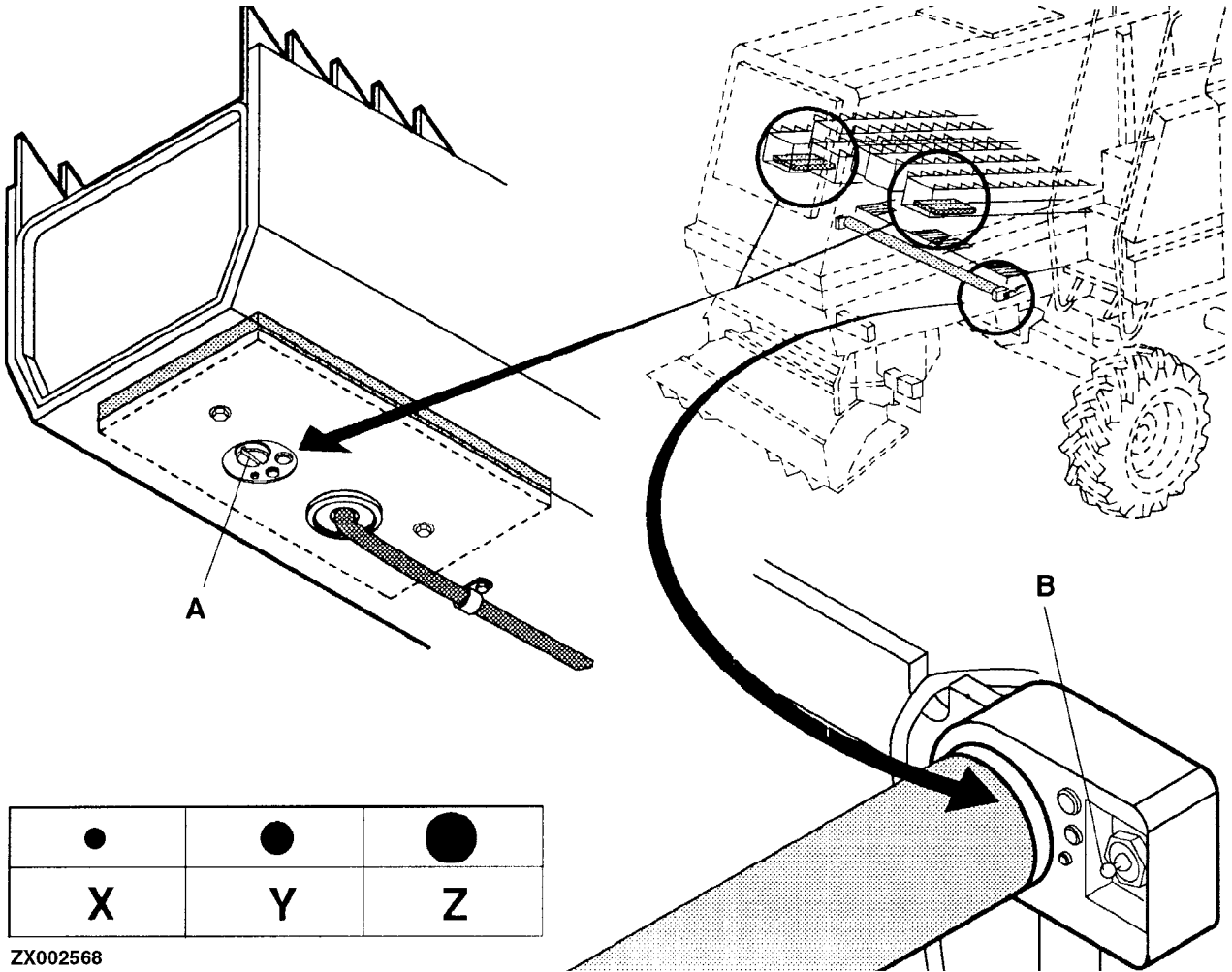


-UN-08MAY95  
ZX002570

-UN-08MAY95  
ZX002571

-UN-08MAY95  
ZX002572

**SETTING SENSOR SENSITIVITY**



ZX002568

-UN-09MAY95  
ZX002568

**A**—Switch for grain size setting at straw walker sensor

**B**—Switch for grain size setting at cleaning shoe sensor

**X**—Higher sensor sensitivity for fine grain crops  
**Y**—Medium sensor sensitivity for medium grain crops

**Z**—Lower sensor sensitivity for coarse grain crops

ZX,TMXZCO003212-19-17JAN94

## OPERATIONAL CHECK OF HARVEST PERFORMANCE MONITOR

**CAUTION:** Before carrying out the operational check, remove fuse F23. This prevents the separator from being engaged while at the same time ensuring that the harvest performance monitor is supplied with power.

Start the engine.  
Put road safety switch in field position.  
Move separator switch to ON position.

### I — Check straw walker sensors:

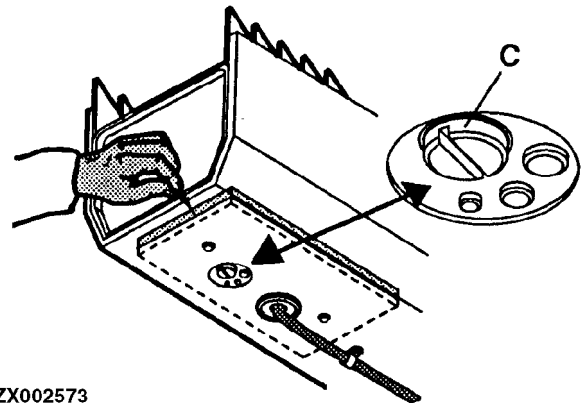
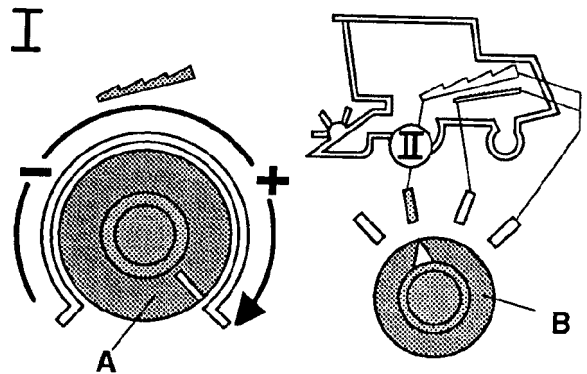
- Turn potentiometer (A) clockwise as far as it will go.
- Set selector switch (B) to position (II) (straw walkers).
- Rotary switch (C) should be in the medium position at both sides.
- Actuate the left and right straw walker sensors by tapping them lightly with a hard object or by dropping kernels on them. A second person is required to observe the needle at the display. The needle must be seen to move.

### II — Check cleaning shoe sensor:

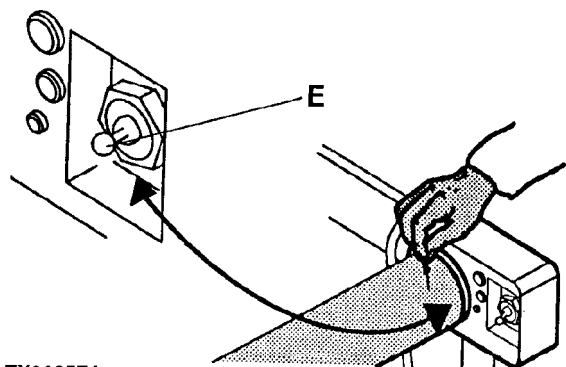
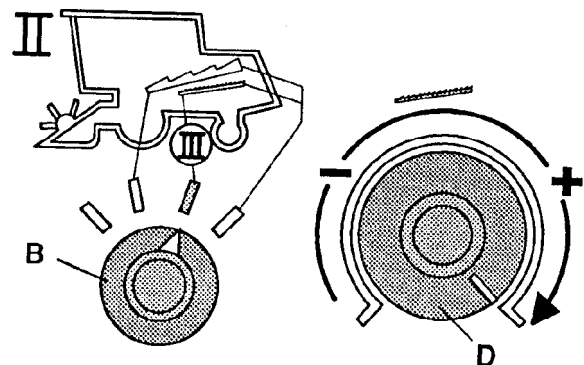
- Turn potentiometer (D) clockwise as far as it will go.
- Set selector switch (B) to position (III) (cleaning shoe).
- Tumbler switch (E) should be in the middle position.
- Check cleaning shoe sensor in the same way as the straw walker sensors.
- Switch on the parking light and check whether the display light is on.
- Switch off the parking light. Disengage the separator and remove the switch key.
- If a fault occurs during the check described above, rectify the fault as necessary.

**NOTE:** Once the operational check is completed, put fuse F23 back in place.

- A—Potentiometer, straw walker sensitivity
- B—Selector switch
- C—Rotary switch
- D—Potentiometer, cleaning shoe sensitivity
- E—Tumbler switch



ZX002573



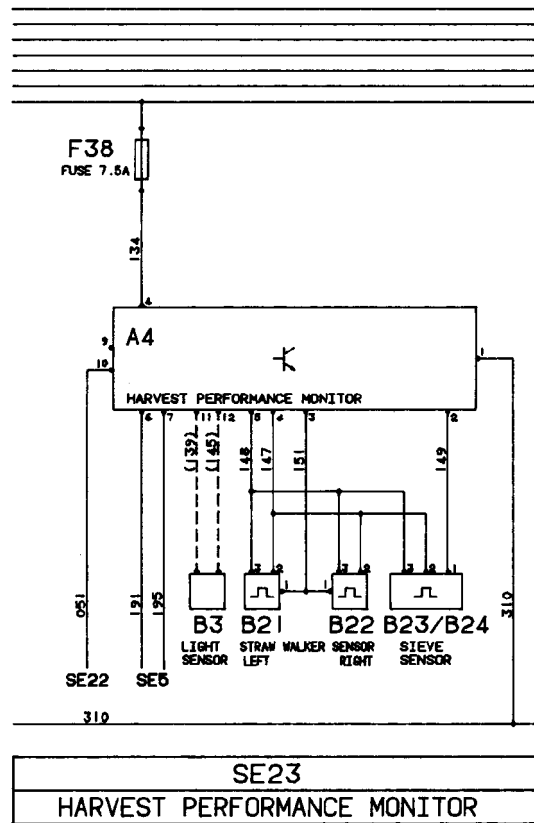
ZX002574

-UN-08MAY95  
ZX002573

-UN-08MAY95  
ZX002574

ZX,TMXZCO003213-19-17JAN94

**FUNCTIONAL SCHEMATIC OF SECTION 23**



-UN-02MAY95  
ZX004071

ZX004071

**A4**—Harvest performance monitor  
**A15**—Fuse board  
**F38**—Fuse, 7.5 amps.  
**B3**—Light sensor  
**B21**—Straw walker sensor, right  
**B22**—Straw walker sensor, left  
**B23**—Cleaning shoe sensor (5 walkers)

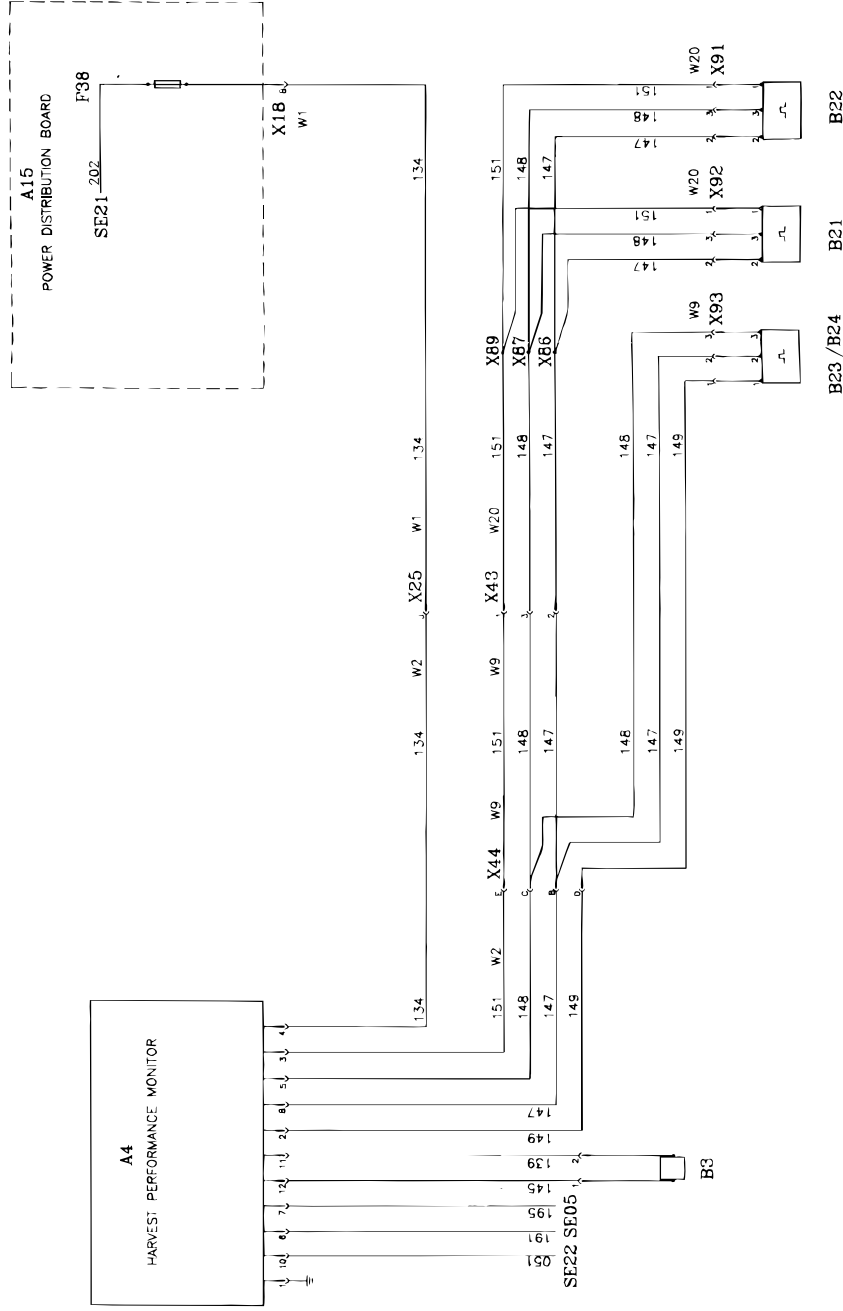
**B24**—Cleaning shoe sensor (6 walkers)  
**X18**—Connection, distribution harness (W1) to fuse board  
**X25**—Disconnect point, distribution harness (W1), cab harness (W2)

**X43**—Disconnect point, rear basic harness (W9), straw hood harness (W20)  
**X44**—Disconnect point, cab harness (W2), rear basic harness (W9)  
**X86**—Splice

**X87**—Splice  
**X88**—Splice  
**X91**—Connection, straw walker sensor, left  
**X92**—Connection, straw walker sensor, right  
**X93**—Connection, cleaning shoe sensor

ZX,TMXZCO003214-19-17JAN94

DIAGNOSTIC SCHEMATIC OF SECTION 23



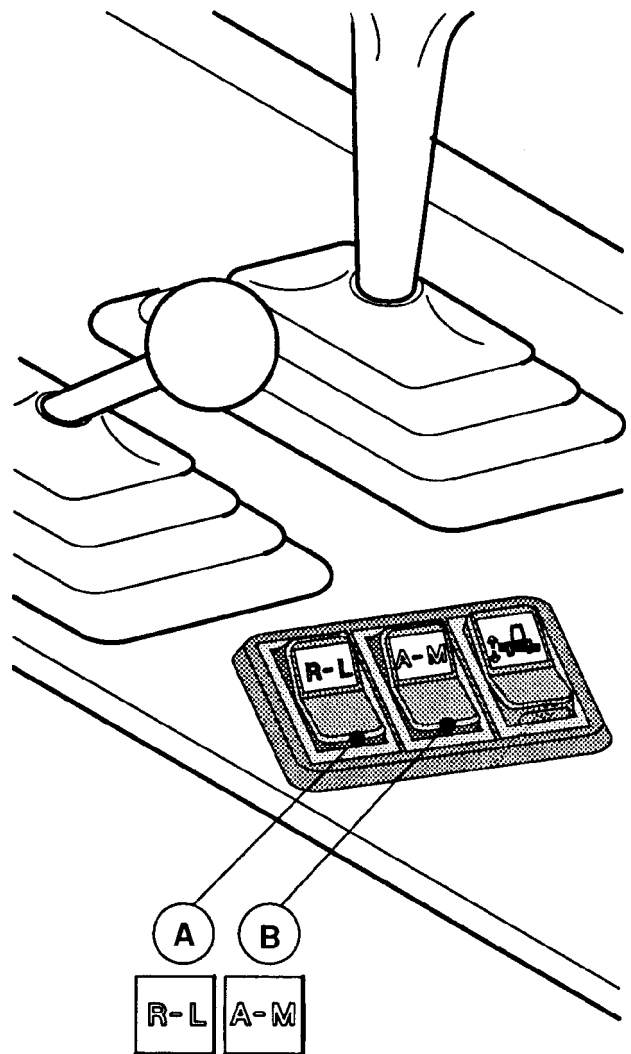
ZX004072



## OPERATIONAL INFORMATION

Two switches for Hillmaster leveling system operation are provided in the switch console. Switch (B) is used as selector switch. Depending on switch position, the system operates manually, automatically or the combine may be lowered for driving on public roads.

Switch (A) is used to tilt the machine manually to the right or left. With selector switch (B) in position (III), hydraulic oil from the retracting cylinder is routed to the hydraulic oil reservoir when tilting combine to the right or left.



ZX 004064

-UN-02MAY95  
ZX004064

ZX,TMXZCO003216-19-17JAN94

## THEORY OF OPERATION

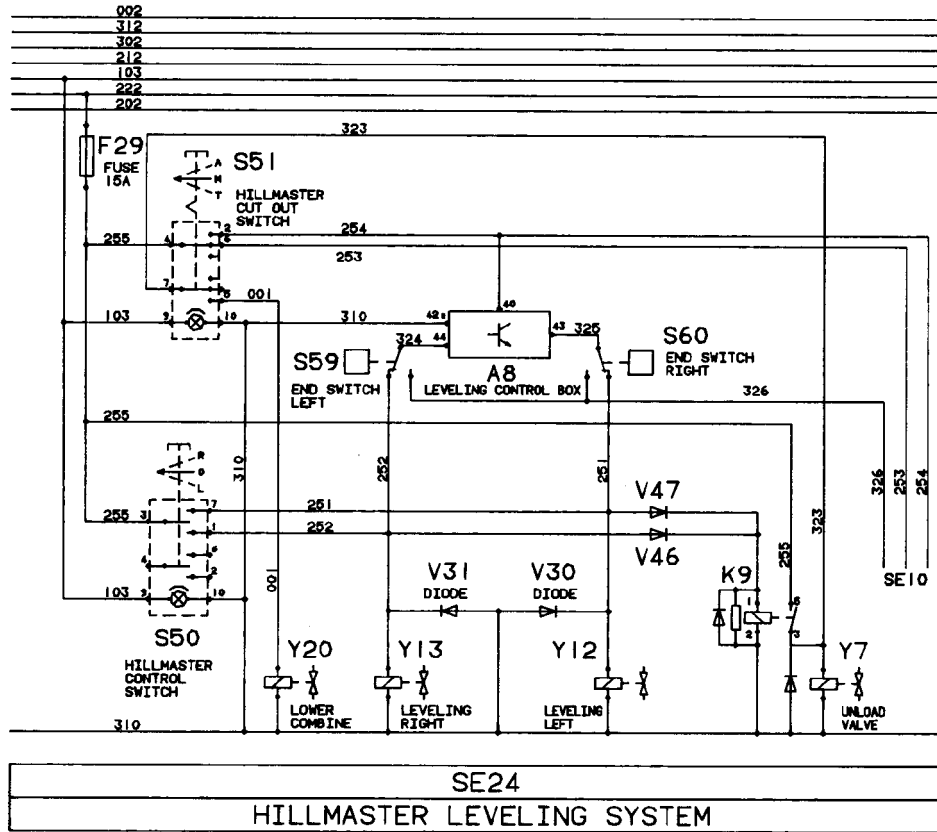
With road safety switch in field position and engine running, power is supplied to switches (S50) and (S51) via fuse (F29). When actuating switch (S50), solenoids (Y12) or (Y13) are activated. Pressure valve (Y7) is also activated via relay (K9). In addition, solenoid (Y20) is activated with selector switch (S51) in position (T) to lower the combine.

With selector switch (S51) in position (M), leveling control box (A8) is supplied with power. The output signals of the leveling control box also activate solenoids (Y12) and (Y13) and pressure valve (Y7).

When maximum tilt is reached, end switch (S59) or (S60) changes position and the indicator light in the cab will glow.

ZX,TMXZCO003217-19-17JAN94

FUNCTIONAL SCHEMATIC OF SECTION 24



ZX005249

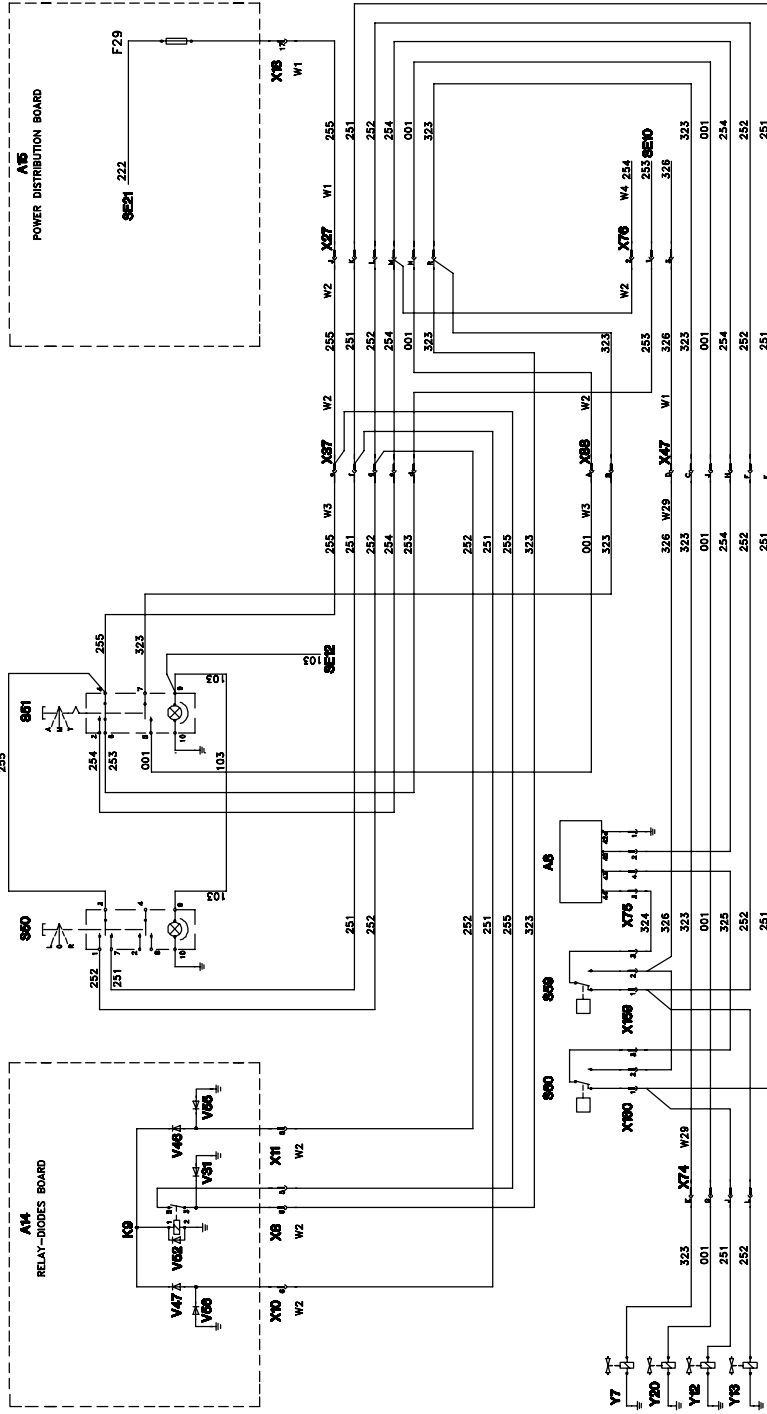
-JUN-02MAY/95  
ZX005249

- |                                                |                                                                    |                                                                            |                                                                      |
|------------------------------------------------|--------------------------------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------------------------------|
| A8 —Leveling control box                       | V52 —Diode                                                         | X37 —Disconnect point, cab harness (W2), switch console harness (W3)       | X76 —Disconnect point, cab harness (W2), corner post harness (W4)    |
| A14 —Relay and diode board                     | V55 —Diode                                                         | X47 —Disconnect point, distribution harness (W1), Hillmaster harness (W29) | X88 —Disconnect point, cab harness (W2), switch console harness (W3) |
| A15 —Fuse board                                | V56 —Diode                                                         | X74 —Connection, Hillmaster harness (W29) to solenoid valve block          | X159—Connection, Hillmaster harness (W29) to left end switch         |
| F29 —Fuse, 15 amps.                            | X8 —Connection, cab harness (W2) to relay and diode board          | X75 —Connection, Hillmaster harness (W29) to leveling control box          | X160—Connection, Hillmaster harness (W29) to right end switch        |
| S50 —Manual leveling control switch            | X10 —Connection, cab harness (W2) to relay and diode board         |                                                                            |                                                                      |
| S51 —Leveling control switch, automatic/manual | X11 —Connection, cab harness (W2) to relay and diode board         |                                                                            |                                                                      |
| S59 —End switch, leveling to the left          | X18 —Connection, distribution harness (W1) to fuse board           |                                                                            |                                                                      |
| S60 —End switch, leveling to the right         | X27 —Disconnect point, distribution harness (W1), cab harness (W2) |                                                                            |                                                                      |
| V31 —Diode                                     |                                                                    |                                                                            |                                                                      |
| V46 —Diode                                     |                                                                    |                                                                            |                                                                      |
| V47 —Diode                                     |                                                                    |                                                                            |                                                                      |

ZX.TMXZCO003218-19-17JAN94



DIAGNOSTIC SCHEMATIC OF SECTION 24



ZX004123



# Group 15Z Separator Adjustment to Ser.No. 062721

## OPERATIONAL INFORMATION

The concave and threshing cylinder/fan speeds may be adjusted by means of rocker switches in the cab.

Current cylinder speed may be displayed at the Infotrak monitor. When adjusting concave spacing, the

corresponding value is also displayed at the Infotrak monitor.

*NOTE: Separator must be running when adjusting cylinder and fan speeds.*

ZX, TMXZCO003222-19-17 JAN94

## THEORY OF OPERATION

Adjusting threshing cylinder speed:

With separator engaged, power is supplied to switch (S40) via fuse (F8). When actuating the switch, relays on board (A11) are activated, which in turn activate solenoids (Y28) or (Y29) and provide hydraulic adjustment of cylinder variable drive.

Adjusting fan speed:

With separator engaged, power is supplied to switch (S41) via fuse (F8). When actuating the switch, relays on board (A11) are activated which in turn activate

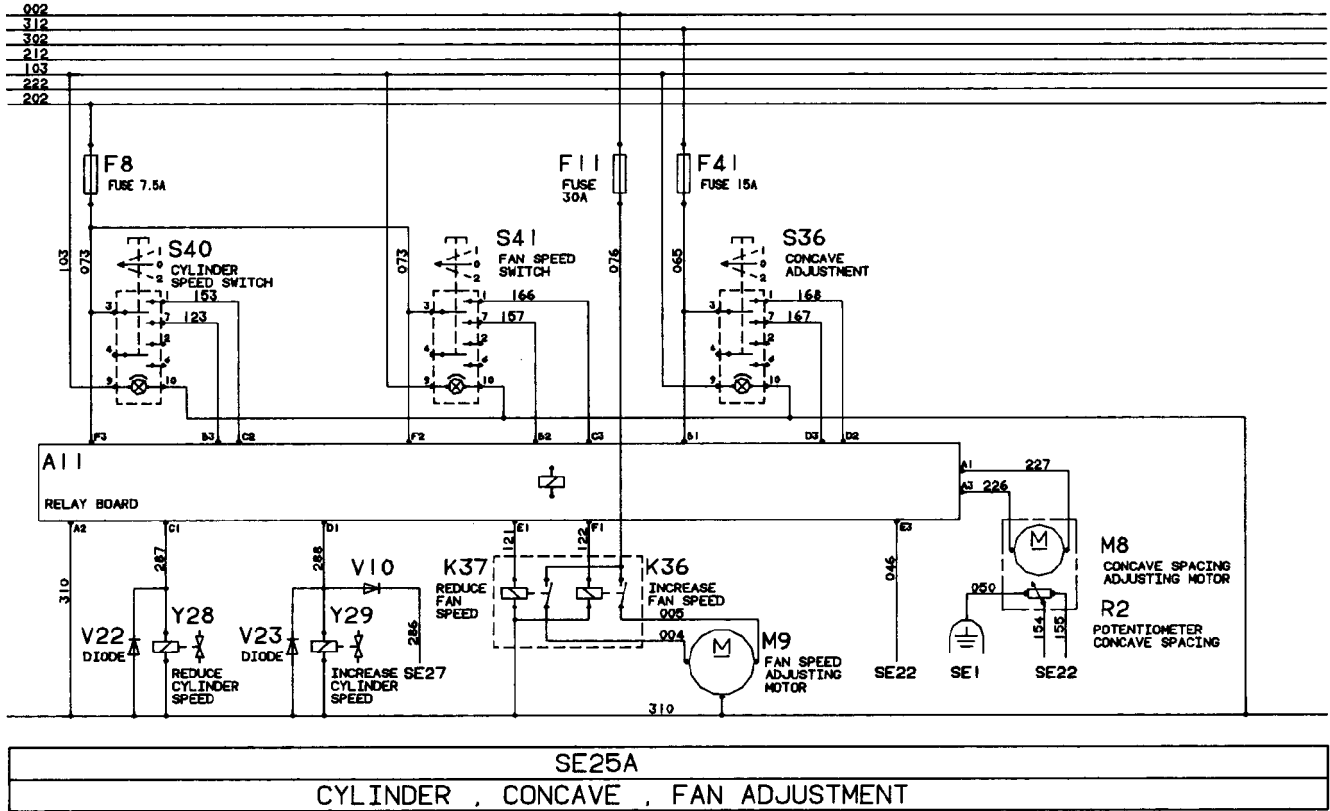
relay (K36) or (K37). Motor (M9) will then adjust variable fan speed drive.

Adjusting concave:

With starter switch in position (I), power is supplied to switch (S36) via fuse (F41). When actuating the switch, motor (M8) is activated via relays on board (A11). Motor (M8) is used for concave adjustment. Potentiometer (R2) integrated in motor (M8) will transmit the concave spacing value to the Infotrak monitor.

ZX, TMXZCO003223-19-17 JAN94

**FUNCTIONAL SCHEMATIC OF SECTION 25A**

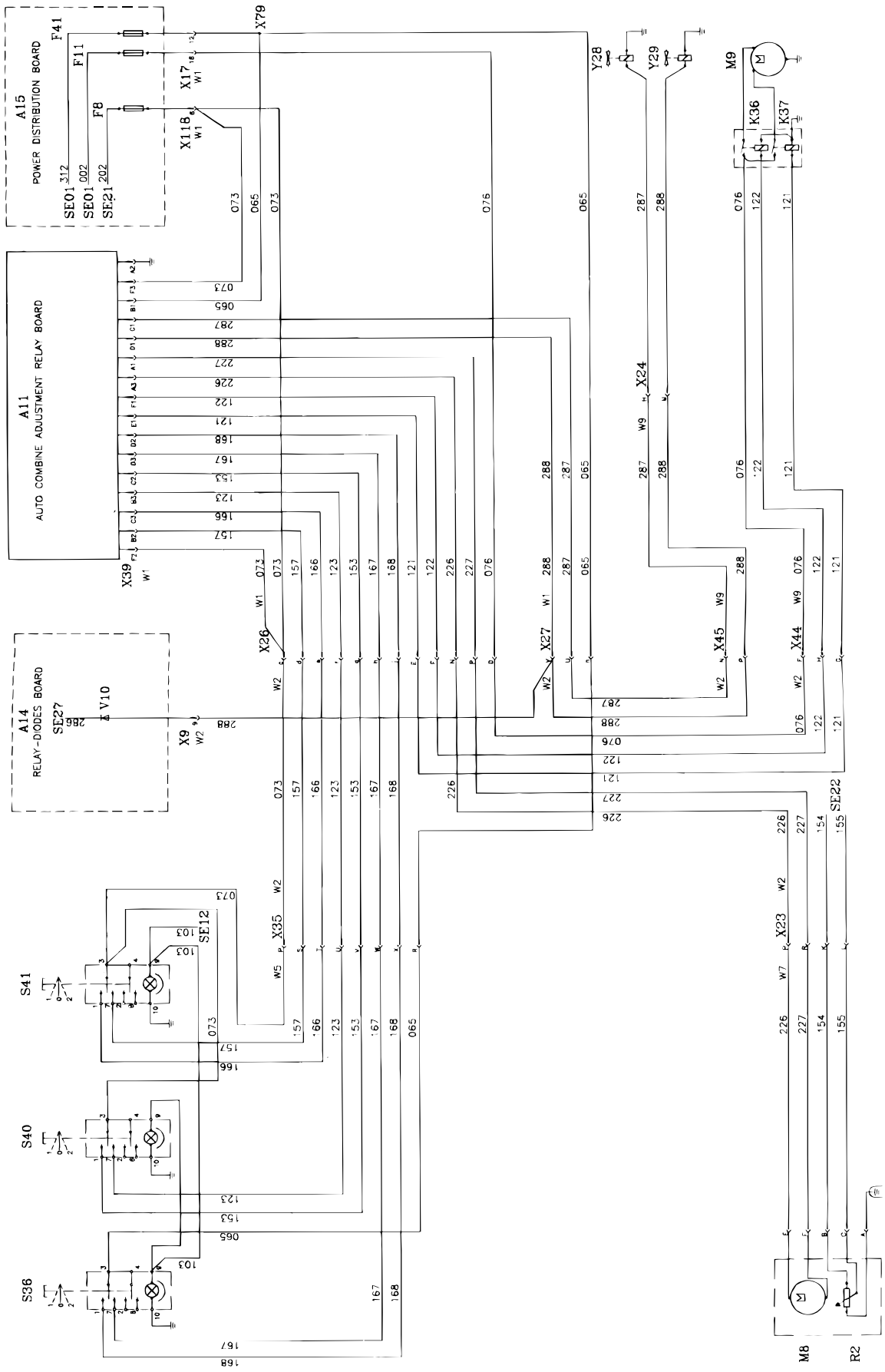


ZX005250

- |                                        |                                                                    |                                                                       |                                                                         |
|----------------------------------------|--------------------------------------------------------------------|-----------------------------------------------------------------------|-------------------------------------------------------------------------|
| A11 —Relay board, combine data center  | S41 —Switch, fan speed adjustment                                  | X26 —Disconnect point, distribution harness (W1), cab harness (W2)    | X40 —Connection, distribution harness (W1) to data center control board |
| A14 —Relay and diode board             | V10 —Diode                                                         | X27 —Disconnect point, distribution harness (W1), cab harness (W2)    | X44 —Disconnect point, cab harness (W2), rear basic harness (W9)        |
| A15 —Fuse board                        | X9 —Connection, cab harness (W2) to relay and diode board          | X28 —Disconnect point, distribution harness (W1), cab harness (W2)    | X45 —Disconnect point, cab harness (W2), rear basic harness (W9)        |
| F8 —Fuse, 7.5 amps.                    | X17 —Connection, distribution harness (W1) to fuse board           | X35 —Disconnect point, cab harness (W2), armrest harness (W5)         | X55 —Disconnect point, cab harness (W2), data center harness (W23)      |
| F11 —Fuse, 30 amps.                    | X23 —Disconnect point, cab harness (W2), front basic harness (W7)  | X38 —Disconnect point, cab harness (W2), optional harness (W14)       | X79 —Splice                                                             |
| F28 —Fuse, 7.5 amps.                   | X24 —Connection, rear basic harness (W9) to solenoid valve block   | X39 —Connection, distribution harness (W1) to data center relay board | X118 —Connection, distribution harness (W1) to fuse board               |
| F41 —Fuse, 15 amps.                    | X25 —Disconnect point, distribution harness (W1), cab harness (W2) |                                                                       |                                                                         |
| K36 —Relay, adjust fan speed           |                                                                    |                                                                       |                                                                         |
| K37 —Relay, adjust fan speed           |                                                                    |                                                                       |                                                                         |
| M8 —Concave adjusting motor            |                                                                    |                                                                       |                                                                         |
| M9 —Fan speed adjusting motor          |                                                                    |                                                                       |                                                                         |
| R2 —Potentiometer, concave adjustment  |                                                                    |                                                                       |                                                                         |
| S36 —Switch, concave adjustment        |                                                                    |                                                                       |                                                                         |
| S40 —Switch, cylinder speed adjustment |                                                                    |                                                                       |                                                                         |

ZX.TMXZCO003224-19-17JAN94

**DIAGNOSTIC SCHEMATIC OF SECTION 25A**



ZX004136



## Group 16Z

# Separator Adjustment from Ser.No. 062722

### OPERATIONAL INFORMATION

The concave and threshing cylinder/fan speeds may be adjusted by means of rocker switches in the cab.

corresponding value is also displayed at the Infotrak monitor.

Current cylinder speed may be displayed at the Infotrak monitor. When adjusting concave spacing, the

*NOTE: Separator must be running when adjusting cylinder and fan speeds.*

ZX, TMXZCO003222-19-17 JAN94

### THEORY OF OPERATION

Adjusting threshing cylinder speed:

relay (K36) or (K37). Motor (M9) will then adjust variable fan speed drive.

With separator engaged, power is supplied to switch (S40) via fuse (F8). When actuating the switch, relays on board (A11) are activated, which in turn activate solenoids (Y28) or (Y29) and provide hydraulic adjustment of cylinder variable drive.

Adjusting concave:

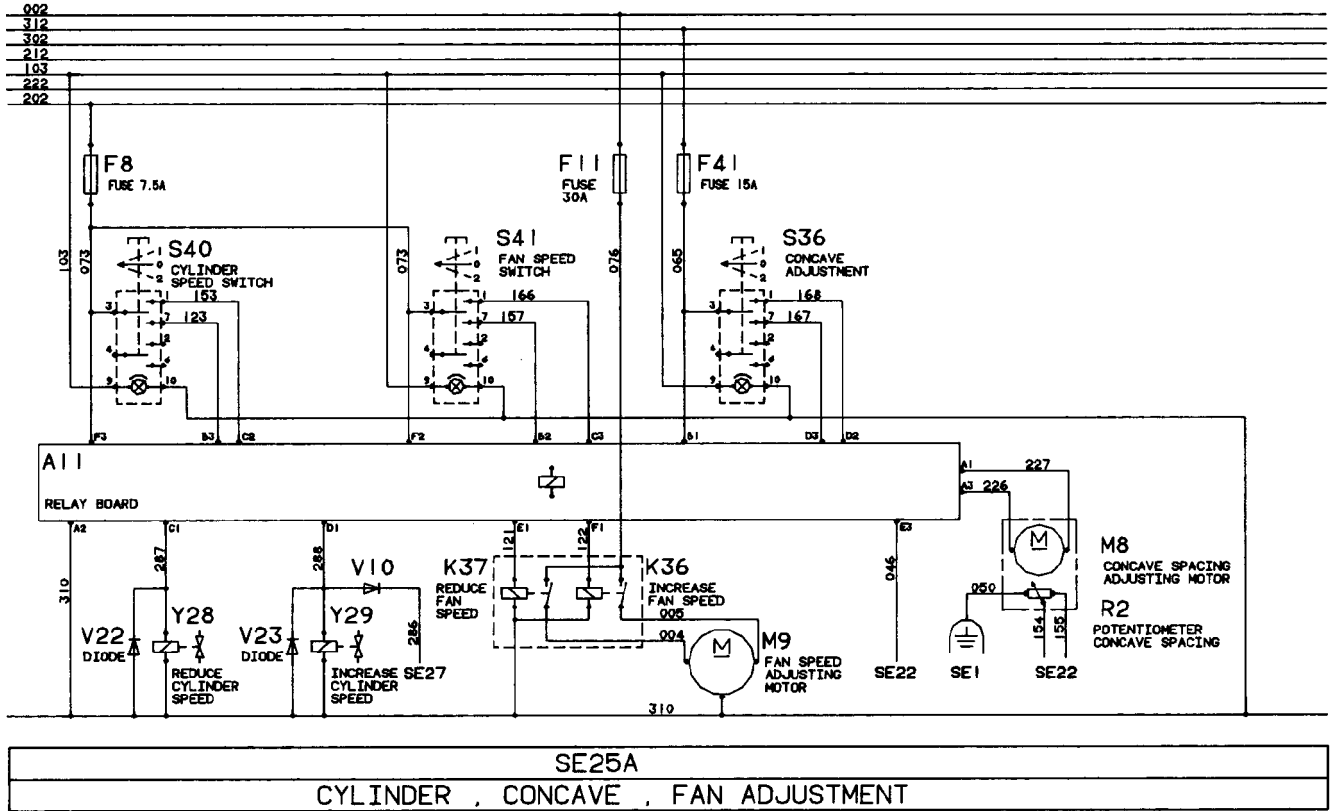
Adjusting fan speed:

With starter switch in position (I), power is supplied to switch (S36) via fuse (F41). When actuating the switch, motor (M8) is activated via relays on board (A11). Motor (M8) is used for concave adjustment. Potentiometer (R2) integrated in motor (M8) will transmit the concave spacing value to the Infotrak monitor.

With separator engaged, power is supplied to switch (S41) via fuse (F8). When actuating the switch, relays on board (A11) are activated which in turn activate

ZX, TMXZCO003223-19-17 JAN94

**FUNCTIONAL SCHEMATIC OF SECTION 25A**



**SE25A**  
**CYLINDER , CONCAVE , FAN ADJUSTMENT**

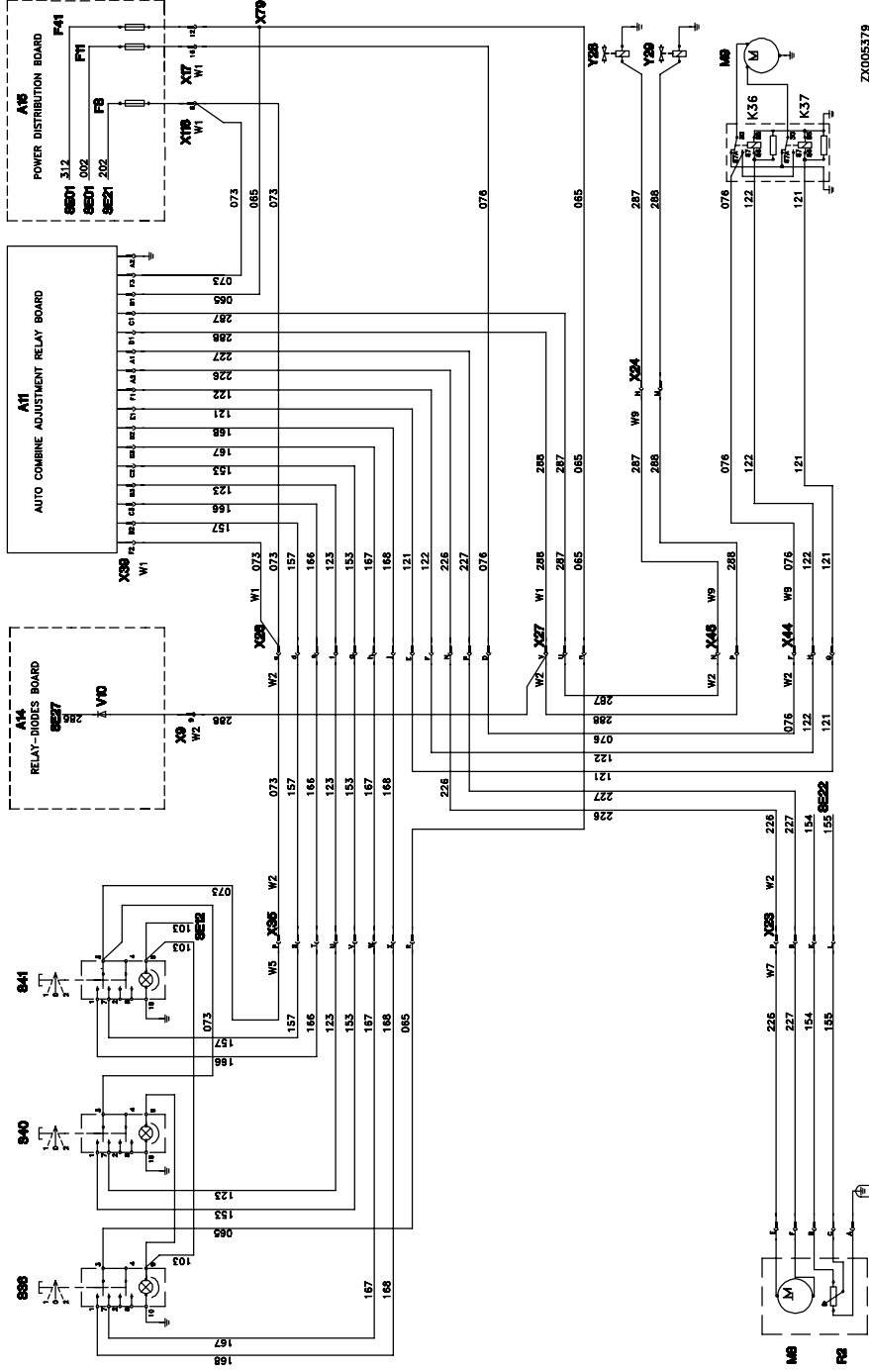
ZX005250

- |                                        |                                                                    |                                                                       |                                                                         |
|----------------------------------------|--------------------------------------------------------------------|-----------------------------------------------------------------------|-------------------------------------------------------------------------|
| A11 —Relay board, combine data center  | S41 —Switch, fan speed adjustment                                  | X26 —Disconnect point, distribution harness (W1), cab harness (W2)    | X40 —Connection, distribution harness (W1) to data center control board |
| A14 —Relay and diode board             | V10 —Diode                                                         | X27 —Disconnect point, distribution harness (W1), cab harness (W2)    | X44 —Disconnect point, cab harness (W2), rear basic harness (W9)        |
| A15 —Fuse board                        | X9 —Connection, cab harness (W2) to relay and diode board          | X28 —Disconnect point, distribution harness (W1), cab harness (W2)    | X45 —Disconnect point, cab harness (W2), rear basic harness (W9)        |
| F8 —Fuse, 7.5 amps.                    | X17 —Connection, distribution harness (W1) to fuse board           | X35 —Disconnect point, cab harness (W2), armrest harness (W5)         | X55 —Disconnect point, cab harness (W2), data center harness (W23)      |
| F11 —Fuse, 30 amps.                    | X23 —Disconnect point, cab harness (W2), front basic harness (W7)  | X38 —Disconnect point, cab harness (W2), optional harness (W14)       | X79 —Splice                                                             |
| F28 —Fuse, 7.5 amps.                   | X24 —Connection, rear basic harness (W9) to solenoid valve block   | X39 —Connection, distribution harness (W1) to data center relay board | X118 —Connection, distribution harness (W1) to fuse board               |
| F41 —Fuse, 15 amps.                    | X25 —Disconnect point, distribution harness (W1), cab harness (W2) |                                                                       |                                                                         |
| K36 —Relay, adjust fan speed           |                                                                    |                                                                       |                                                                         |
| K37 —Relay, adjust fan speed           |                                                                    |                                                                       |                                                                         |
| M8 —Concave adjusting motor            |                                                                    |                                                                       |                                                                         |
| M9 —Fan speed adjusting motor          |                                                                    |                                                                       |                                                                         |
| R2 —Potentiometer, concave adjustment  |                                                                    |                                                                       |                                                                         |
| S36 —Switch, concave adjustment        |                                                                    |                                                                       |                                                                         |
| S40 —Switch, cylinder speed adjustment |                                                                    |                                                                       |                                                                         |

ZX.TMXZCO003224-19-17JAN94



**DIAGNOSTIC SCHEMATIC, SECTION 25A**



ZX005379

*Separator Adjustment from Ser.No. 062722/Diagnostic Schematic, Section 25A*

**Group 15AA**

**Separator Adjustment, Combine Data Center to Ser.No. 062721**

**OPERATIONAL INFORMATION**

The combine data center integrated in the right-hand armrest essentially consists of an area counter and a system for automatic separator adjustments.

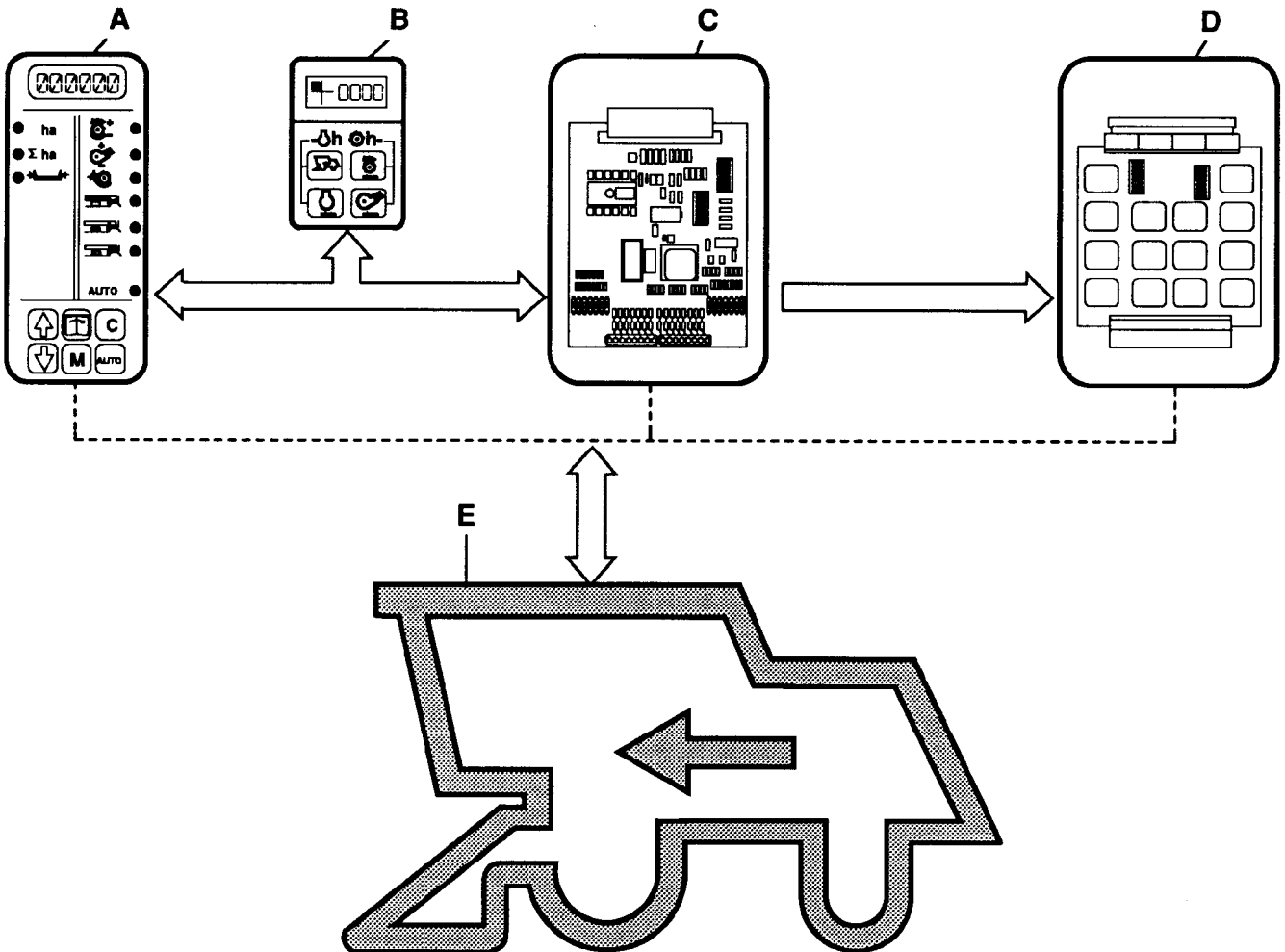
Area counting is based on travel distance during harvesting and cutting width.

Automatic settings are performed depending on the type of crop selected on the combine data center.

A data or signal transfer takes place between the mentioned components. Actual settings (speeds, clearances) and error codes (in case of malfunctions) are displayed on the Infotrak monitor.

ZX, TMXZCO003227-19-17JAN94

**SYSTEM COMPONENTS (“AREA COUNTER” AND “AUTOMATIC SEPARATOR ADJUSTMENTS”)**



A—Combine data center  
 B—Infotrak monitor  
 C—Control board (for automatic machine adjustments only)

D—Relay board  
 E—Combine (sensors, switches, solenoids, motors)

ZX 002487

ZX002487 -JUN-03MAY95

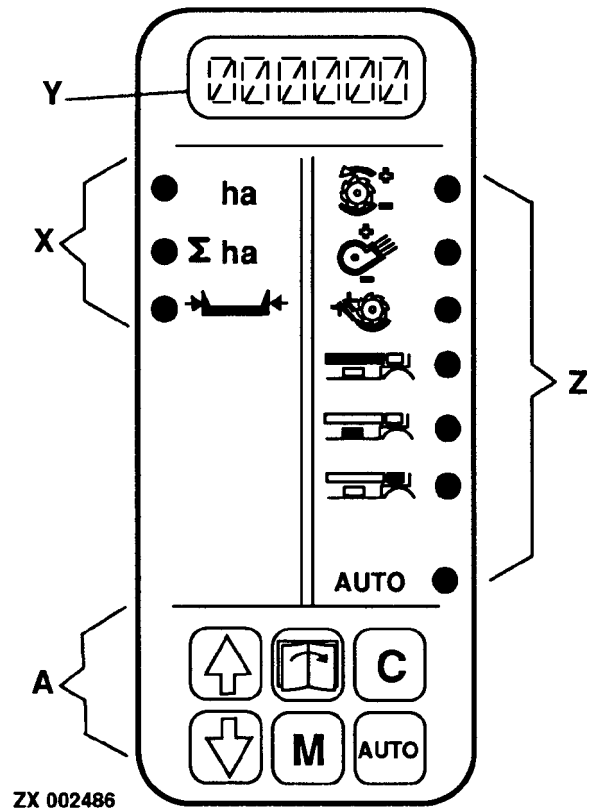
ZX,TMXZCO003187-19-17JAN94

### COMBINE DATA CENTER

With starter switch in position (I), the combine data center is ready for operation.

**Functions:**

- A—Controls (6 keys)
- X—Area counter
- Y—Display (6 digits)
- Z—Setting unit



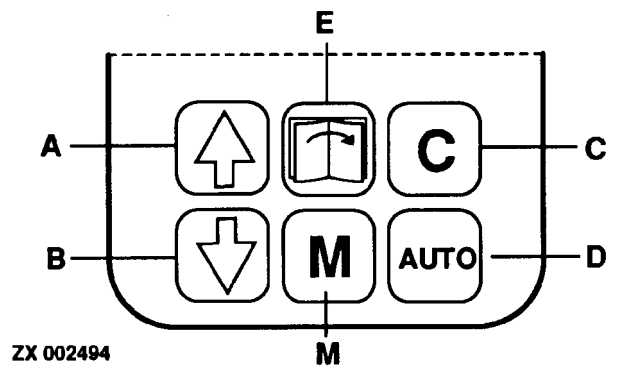
ZX 002486

ZX, TMXZCO003228-19-17JAN94

-UN-28APR95  
ZX002486

### CONTROL KEYS

- A—Up
- B—Down
- C— • Clear
  - Calibrate
  - Cancel
- D—Automatic function (AUTO)
- E—Page change
- M— • Modify
  - Memory



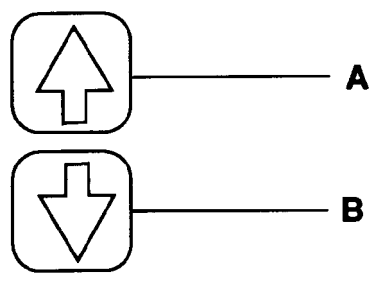
ZX 002494

ZX, OMXZCO001847-19-20JUL92

-UN-28APR95  
ZX002494

### Keys A and B

These keys are used to run through the various functions of area counter, display panel or setting unit. If "Modify" mode is activated by pressing key (M), displayed values may be increased or decreased at given increments by pressing these keys.



ZX 002513

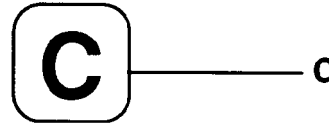
ZX, OMXZCO001848-19-20JUL92

-UN-28APR95  
ZX002513

### Key C

This key is used to set data center displays to “zero” (e.g. area, header width) and to clear crop settings created by the operator.

This key is also used to interrupt automatic settings, to leave the automatic or modify mode and for input of partial header width.



ZX 002516

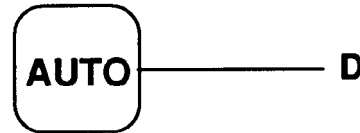
ZX,OMXZCO001851-19-20JUL92

-UN-27APR95  
ZX002516

### Key D

This key is used to activate automatic functions for setting combine components according to the values of the previously selected crop (cylinder speed, fan speed and concave spacing). During the setting procedure, the “AUTO” light of the setting unit will glow. The light will go out as soon as the setting procedure is completed.

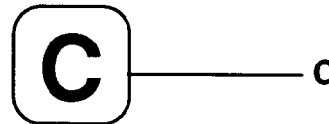
*NOTE: During the setting procedure, the automatic mode may be left by pressing key (C).*



ZX 002517

ZX,OMXZCO001852-19-20JUL92

-UN-28APR95  
ZX002517



ZX 002516

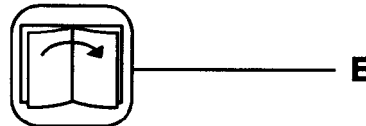
-UN-27APR95  
ZX002516

### Key E

This key is used to “jump” from one unit of combine data center to another:

- From area counter to display
- From display to setting unit
- From setting unit back to area counter

This key is also used for the “Select Language” mode.



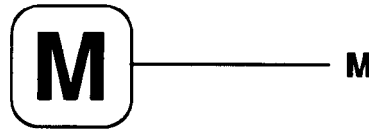
ZX 002514

ZX,OMXZCO001849-19-20JUL92

-UN-27APR95  
ZX002514

### Key M

If a certain setting (e.g. fan speed for a crop version created by the operator or header width) is to be changed, select the corresponding function and press key (M). Now the setting can be changed, using the "arrow" keys. The new setting is saved by pressing key (M) once again.



**ZX 002515**

ZX,OMXZCO001850-19-20JUL92

ZX002515  
-UN-27APR95

## AREA COUNTER

### Requirements:

- Starter switch in position (I) or (II).
- Infotrak monitor correctly programmed
- Header within range of header height gauge (not necessary for reading display only).

### Setting Instructions

Display (A) of area counter always lights up when unit is switched on.

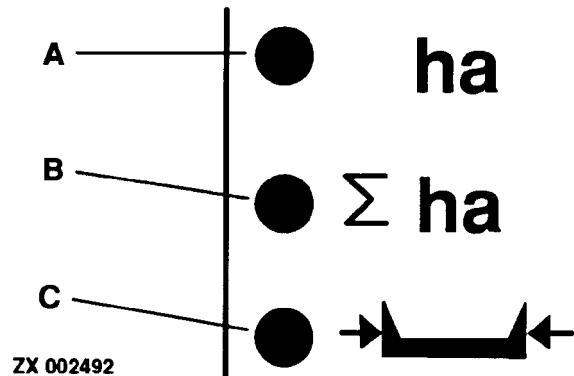
Area values can only be cleared, but not changed. Total area values can neither be cleared nor changed.

The smallest area that can be displayed is 0.1 hectare or 0.1 acre.

The smallest setting increment for header width is 0.1 m or 0.5 ft.

When full width of header is not used during operation, partial width may be set in 1/4 increments. Header width will return to the previously saved value if header moves out of range of header height gauge.

*NOTE: The displayed measurement units for width and area are determined by infotrak monitor programming (see this Section).*



- A—Area function light
- B—Total area function light
- C—Header width function light

ZX002492 -UN-28APR95

ZX,OMXZCO001845-19-14NOV92

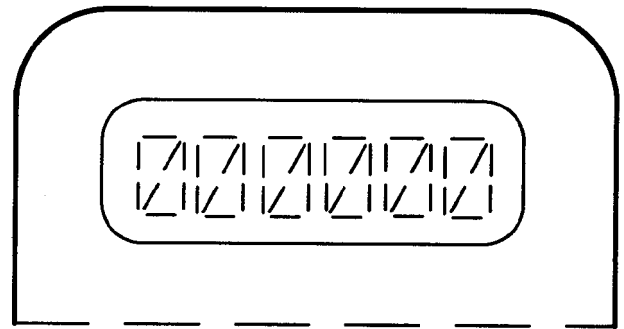


## DISPLAY

With ignition turned on, the following data are displayed:

- Preloaded settings for various crops
- Area counter data (area, total area, header width)
- Preloaded crops (9), crops created by the operator (14)
- Languages available:

German	DEUTSC
French	FRANCA
Spanish	ESPANI
Italian	ITALIA
Dutch	NEDERL
Danish	DANSK
Swedish	SVENSK
English	ENGLIS



ZX 002488

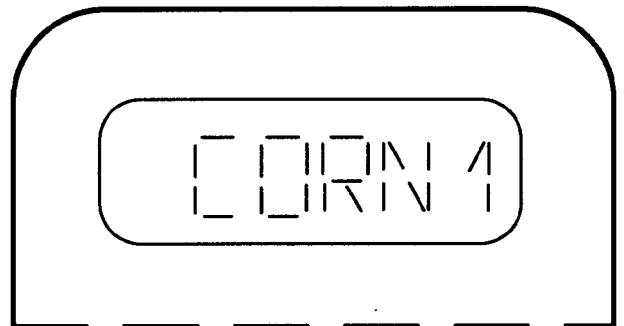
ZX002488 -UN-28APR95

ZX,OMXZCO001842-19-20JUL92

## Factory-Loaded Crops

- Barley
- Corn
- Beans
- Peas
- Wheat
- Rye
- Sunflowers
- Oats
- Rape

*NOTE: The names of the factory-loaded (permanent memory) crops end with a number 1.*



ZX 002489

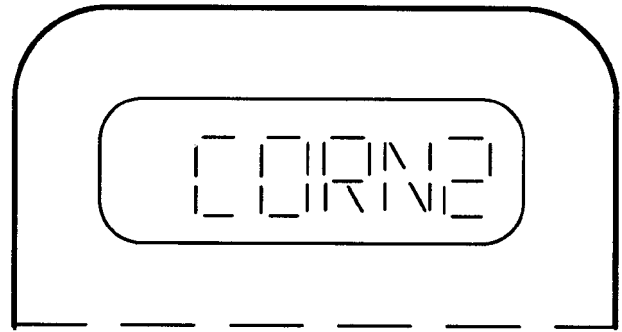
ZX002489 -UN-28APR95

ZX,OMXZCO001843-19-20JUL92

### Crop Codes Created by the Operator

For each of the previously mentioned crops (all of which are entered into the memory at the factory), the operator may enter one modified crop into the data center memory, including all necessary settings according to harvesting conditions. The names of these crop versions, created by the operator, end with a number 2.

*NOTE: The crops entered into data center memory by the operator may be recorded on the bottom of right-hand armrest.*



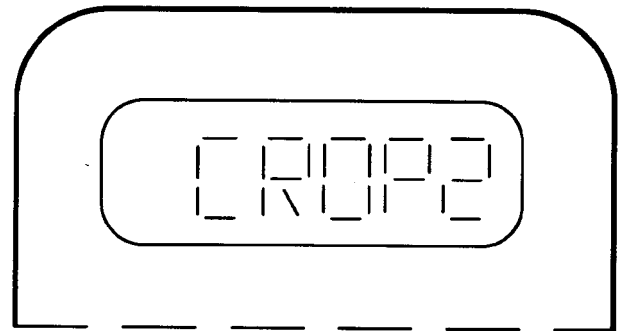
ZX002490 -JUN-28APR95

ZX,OMXZCO001844-19-13NOV92

### Special Crops

The operator may enter five additional special crops into the data center memory. These crops are named CROP2, CROP3—CROP6.

*NOTE: The crops entered into data center memory by the operator may be recorded on the bottom of right-hand armrest.*



ZX002491 -JUN-28APR95

ZX,OMXZCO001910-19-20JUL92

## SETTING UNIT

### Requirements:

To start automatic setting of functions (A, B and C):

- Engine must be running (throttle lever pushed all the way forward)
- Separator must be engaged
- Switch for automatic machine adjustments must be ON

### Setting Instructions

Values of functions (A—F) for the previously selected crop are displayed and may be changed as follows:

Function	Increments	Setting range
A	10 rpm	0—2550 rpm
B	10 rpm	0—2550 rpm
C	1 mm (1/16 in.)	0—50 mm (0—3-1/8 in.)
D	1 mm (1/16 in.)	0—50 mm (0—3-1/8 in.)
E	1 mm (1/16 in.)	0—50 mm (0—3-1/8 in.)
F	1 mm (1/16 in.)	0—50 mm (0—3-1/8 in.)

Values of functions (A—F) for crops ending with a number "1" (e.g. "CORN1") are factory loaded (permanent memory) and cannot be changed.

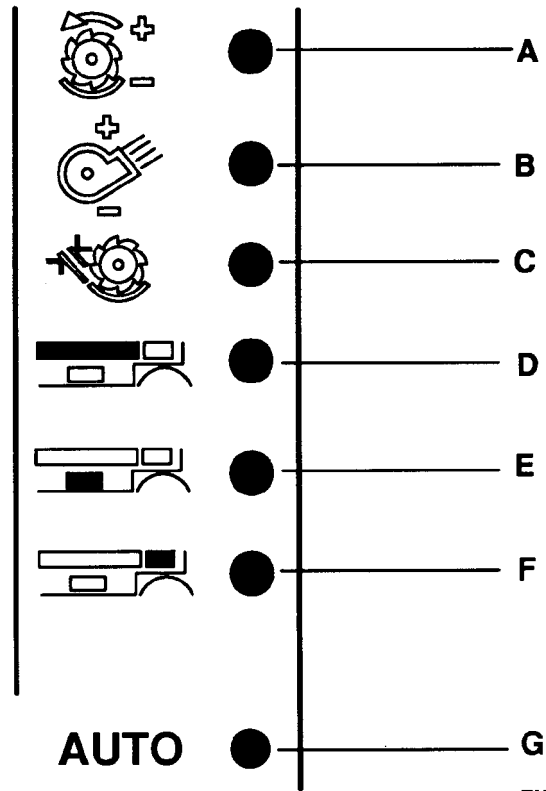
Values of functions (A—F) for crops ending with a number "2" (e.g. "CORN2") may be cleared or changed.

Values of functions (A—F) for "CROP2" to "CROP6" may also be cleared or changed.

Functions (A—C) are set automatically by pressing the "AUTO" key (if the above requirements are met).

Values of functions (D—F) are only displayed. Setting must be carried out manually.

Lights (A—C) and (G) will glow during automatic setting procedure.



- A—Cylinder speed function light
- B—Fan speed function light
- C—Concave spacing function light
- D—Chaffer function light
- E—Sieve function light
- F—Chaffer extension function light
- G—Automatic function light

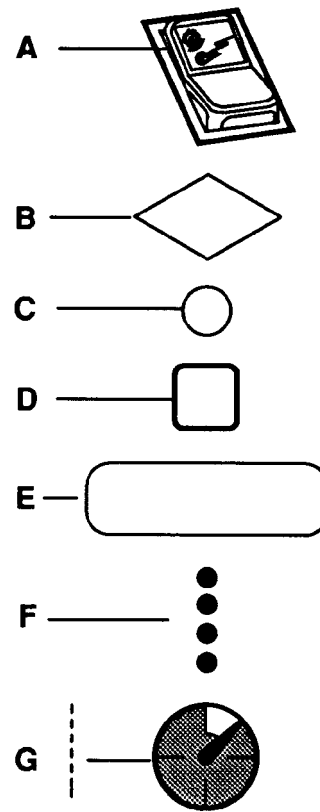
ZX 002493

-UN-28APR95  
ZX002493

## OPERATIONAL DIAGRAMS

### Explanation of Symbols:

- A—Switch on automatic machine adjustments
- B—Shows the combine data center unit to be selected:
  - X-Area counter
  - Y-Display
  - Z-Setting unit
- C—Shows individual functions of area counter/setting unit (blue light)
- D—Shows the key to be pressed (bold enclosure)
- E—Display information
- F—Shows possible choices
- G—Shows time required for individual procedure



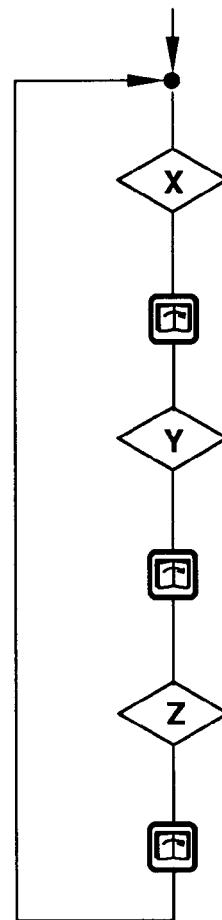
ZX 002518

ZX,OMXZCO001853-19-20JUL92

ZX002518 -UN-28APR95

### SELECTING COMBINE DATA CENTER UNITS

- Turn starter switch to position (I).
- Combine data center will switch to area counter (X).
- Press "PAGE" key.
- Combine data center will switch to display (Y).
- Press "PAGE" key.
- Combine data center will switch to setting unit (Z).



ZX 002328

ZX002328 -UN-28APR95

ZX,OMXZCO001854-19-20JUL92

## SELECTING AREA COUNTER FUNCTIONS

- Select "Area Counter" unit.

Light of "Area" function will glow.

The harvesting area (for each day) is displayed.

- Press "Down" key.

Light of "Total Area" function will glow.

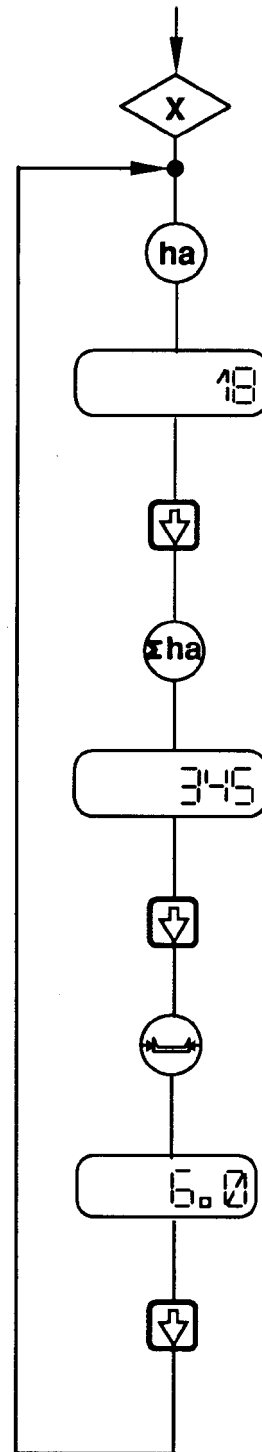
The total harvesting area is displayed.

- Press "Down" key.

Light of "Header Width" function will glow.

Header width (cutting width) is displayed.

*NOTE: Running through the various crop displays or setting unit functions is done in a similar way as described above.*



ZX 002519

ZX002519 -JUN-03MAY95

ZX,OMXZCO001983-19-20JUL92

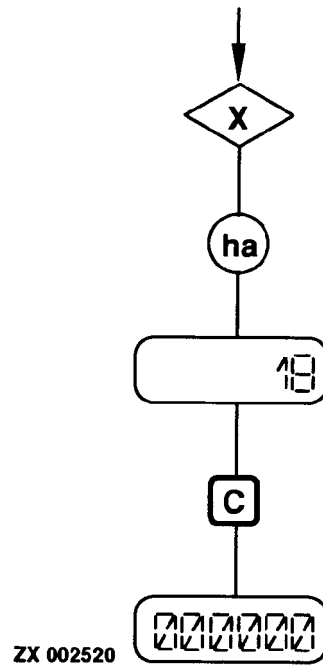
### CLEARING "AREA" DISPLAY

- Select "Area Counter" unit.
- Select "Area" function.

The harvesting area for the day will be displayed.

- Press key (C) ("Clear").

Display will change to "zero".



ZX002520 -JUN-28APR95

ZX,OMXZCO001855-19-20JUL92

### CHANGING HEADER WIDTH

- Select "Area Counter" unit.
- Select "Header Width" function.

The current header width (cutting width) will be displayed.

- Press "Modify" key (M).

An "M" will appear at the left of the display.

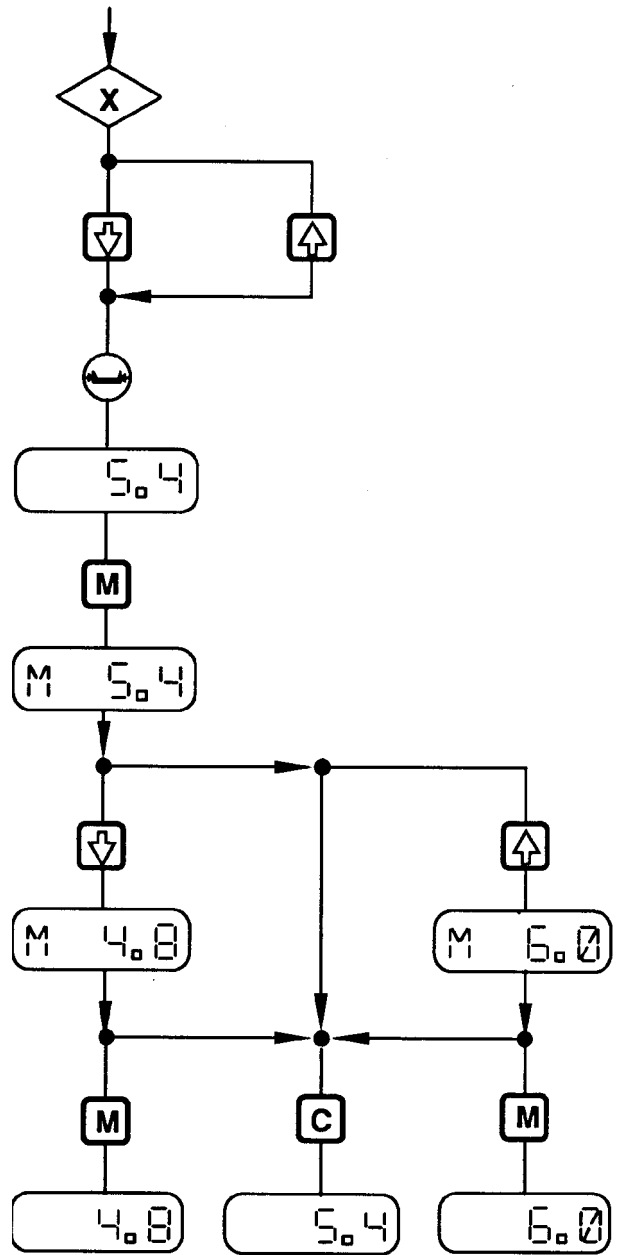
- Press "Up" or "Down" key.

The changed header width will be displayed.

- Press key (M) again.

The displayed setting is saved; the "M" at the left of the display will disappear.

*NOTE: After pressing the "M" key, it is always possible to interrupt the setting of the new header width by pressing "Cancel" key (C). The previous header width will be displayed once again.*



ZX 002521

ZX002521 -JUN-28A-PR95

ZX,OMXZCO001984-19-20JUL92



### SETTING PARTIAL HEADER WIDTH

- Select "Area Counter" unit.
- Select "Header Width" function.

The current header width will be displayed.

- Press "Calibrate" key (C).

"3/4" will be displayed = 3/4 of the previous header width (cutting width).

- Press "Calibrate" key (C).

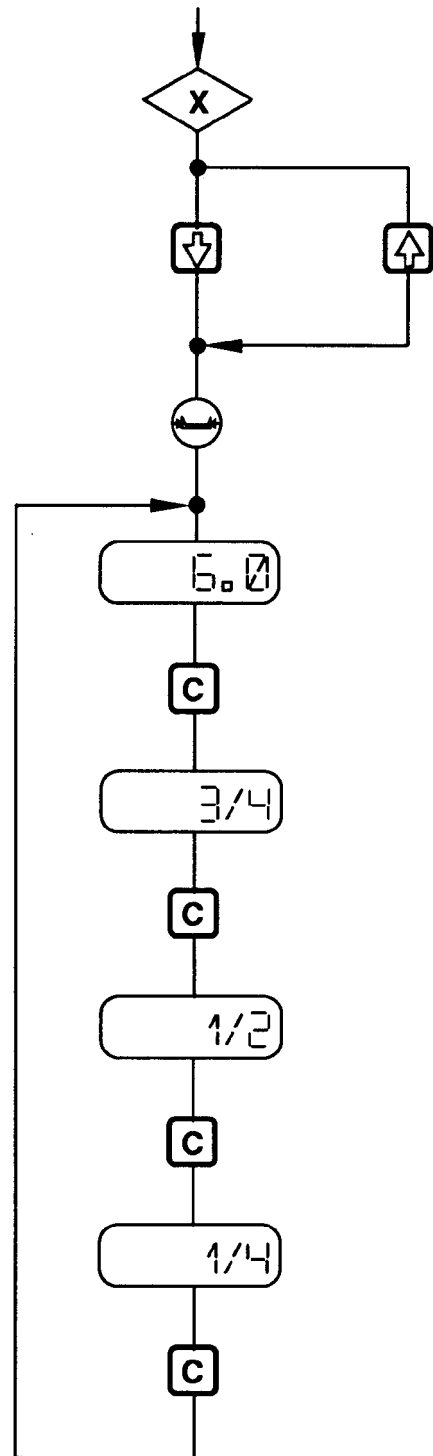
"1/2" will be displayed = 1/2 of the previous header width (cutting width).

- Press "Calibrate" key (C).

"1/4" will be displayed = 1/4 of the previous header width (cutting width).

- Press "Calibrate" key (C).

The cutting width saved previously will be displayed.



ZX 002522

ZX002522 -JUN-03MAY95

ZX,OMXZCO001856-19-20JUL92

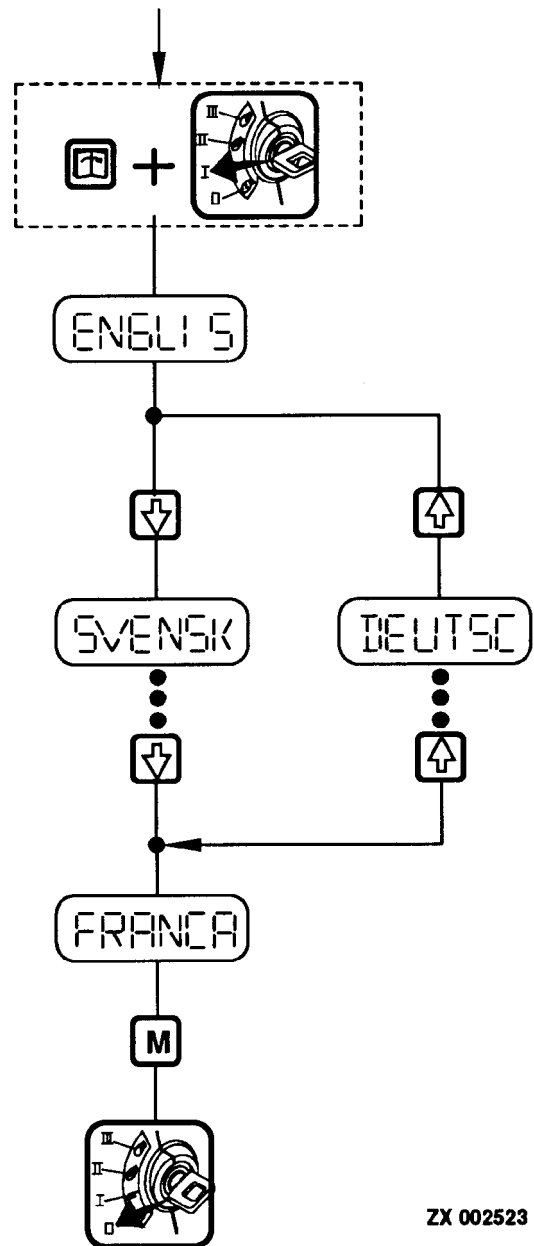
## SELECTING LANGUAGE

- Press “Page” key while turning starter switch to position (I).

The language saved previously will be displayed.

- Press “Up” or “Down” key until desired language is displayed.
- Press “Memory” key (M).
- Turn starter switch to position (0).

The desired language is saved.



ZX 002523

ZX,OMXZCO001857-19-20JUL92

ZX002523 -UN-28APR95

## SELECTING CROP

*NOTE: This procedure is required to start automatic settings and to change to a different crop.*

- Select "Display" unit.

The crop selected previously will be displayed.

- Press "Up" or "Down" key until desired crop is displayed.

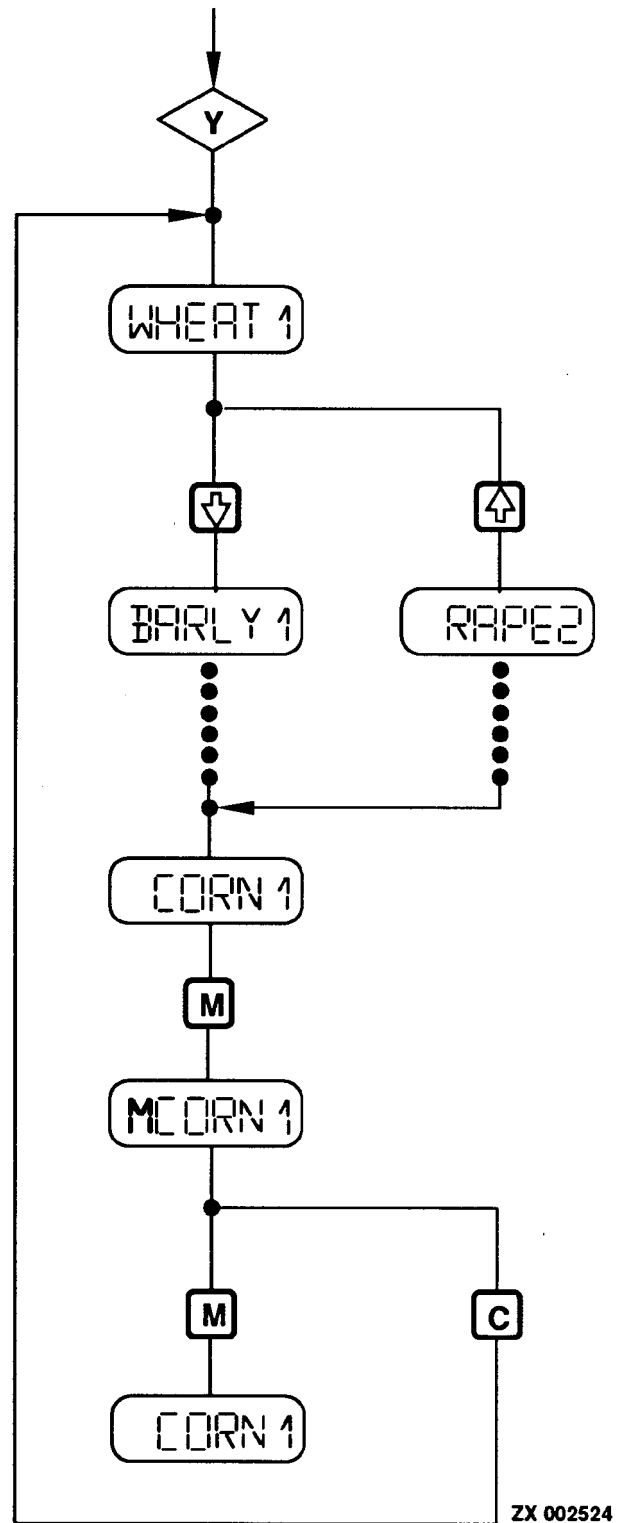
- Press "Modify" key (M).

A flashing "M" will appear at the left of the display.

- Press key (M) again.

The selected crop is saved; the "M" at the left of the display will disappear.

*NOTE: After pressing the "M" key, it is possible to interrupt crop selecting procedure by pressing "Cancel" key (C).*



ZX 002524

-JUN-03MAY95  
ZX002524

ZX,OMXZCO001985-19-20JUL92

### AUTOMATIC MACHINE SETTING ACCORDING TO CROP SELECTED

- Separator must be engaged.
- Switch on function "Automatic Machine Adjustments".
- Select "Display" unit.

The selected crop will be displayed.

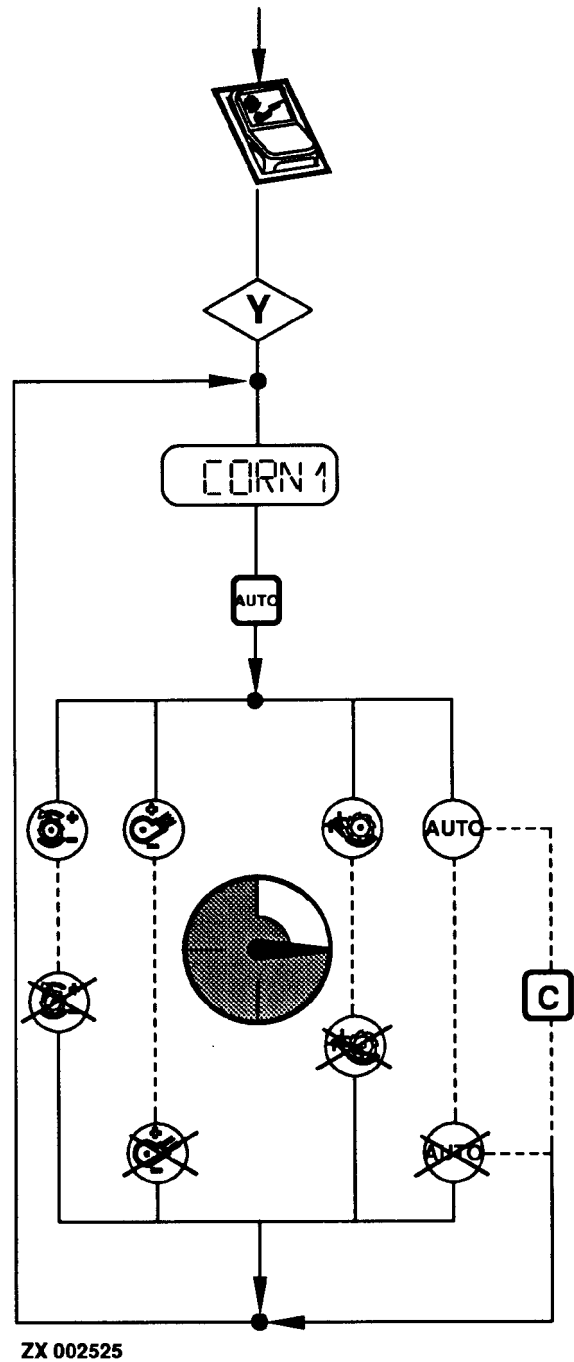
- Press "AUTO" key.

Lights of functions

- Cylinder speed
  - Fan speed
  - Concave spacing and
  - Automatic operation ("AUTO")
- will glow until the corresponding setting is completed.

After setting procedure for all functions is completed, the "AUTO" light will go out.

*NOTE: It is possible to interrupt setting procedure by pressing "Cancel" key (C).*



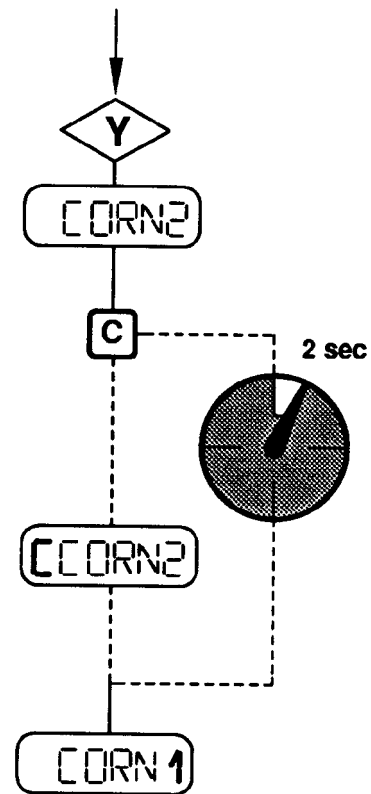
ZX,OMXZCO001960-19-20JUL92

## CLEARING CROPS CREATED BY THE OPERATOR

- Select "Display" unit.
- Select crop to be cleared (ending with a number "2" or named "CROP2"—"CROP6").
- Press "Clear" key (C) for 2 seconds.

For 2 seconds, a "C" will appear at the left of the display.

Display will change to crop version ending with a number "1".



ZX 002526

ZX002526 -UN-28APR95

ZX,OMXZCO01986-19-20JUL92

### READING SETTINGS FOR SELECTED CROP

- Select "Display" unit.

The previously selected crop will be displayed.

- Select "Setting Unit" function.

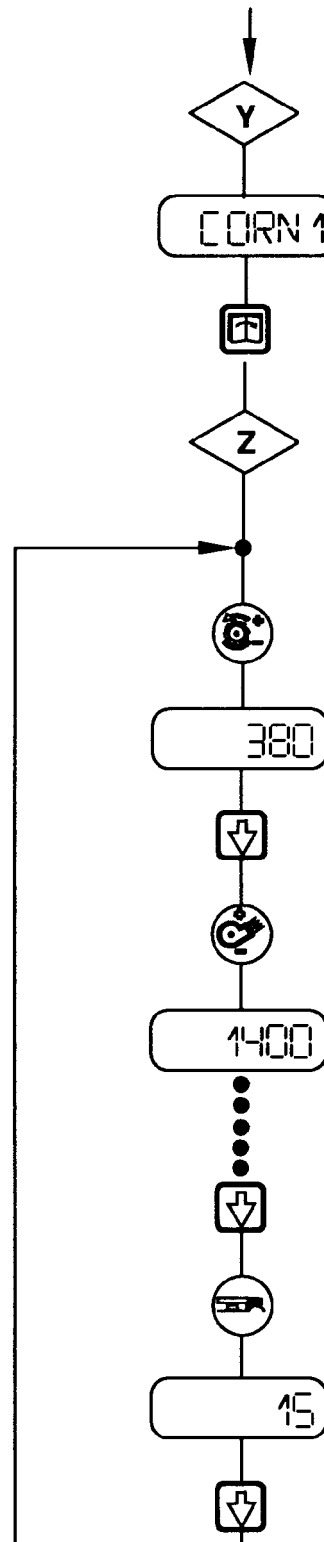
- Select "Cylinder Speed" function.

The cylinder speed for the selected crop is displayed.

- Select "Fan Speed" function.

The fan speed for the selected crop is displayed.

*NOTE: The remaining settings may be displayed in the same way.*



ZX 002527

ZX002527 -JUN-02MAY95

ZX,OMXZCO001858-19-20JUL92

## CHANGING CROP SETTINGS

### (Crops Created by the Operator)

- Select "Display" unit.

The previously selected crop will be displayed.

- Select "Setting Unit" function.
- Select "Cylinder Speed" function.

The cylinder speed for the selected crop is displayed.

- Press "Modify" key (M).

An "M" will appear at the left of the display.

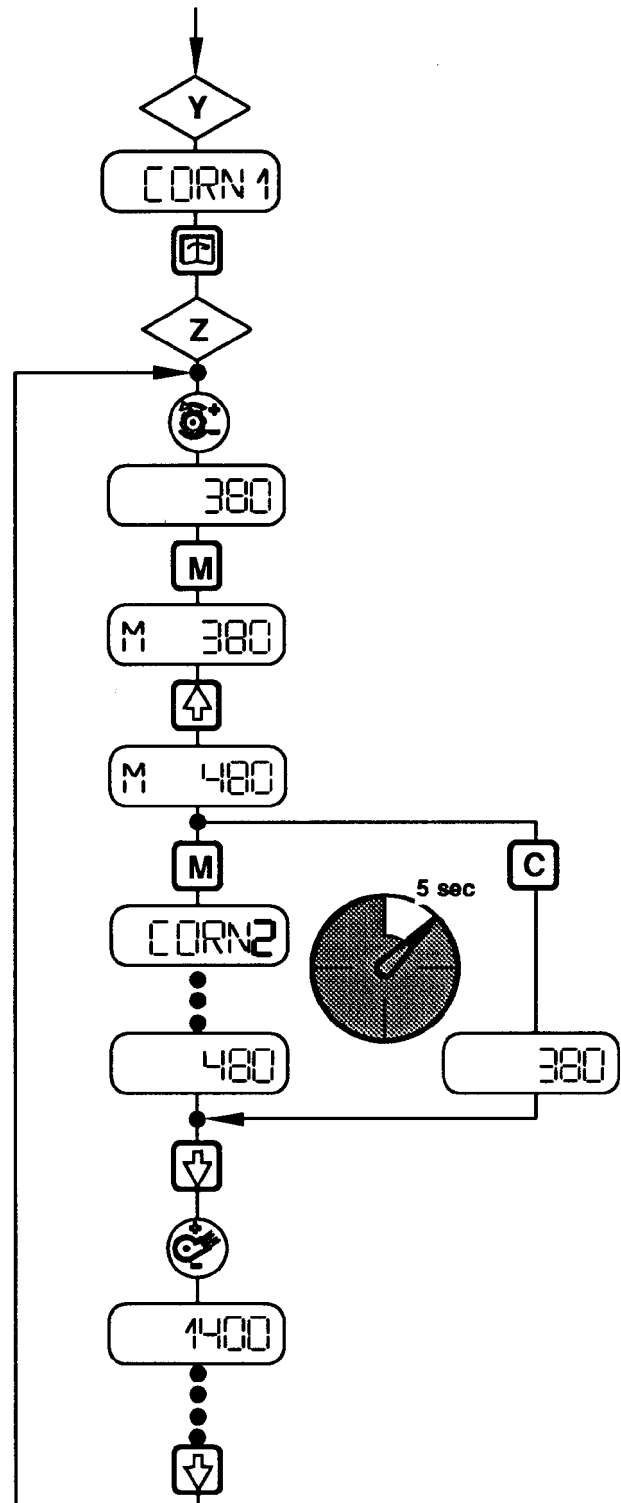
- Press "Up" or "Down" key until desired display appears.

*NOTE: At this time it is possible to interrupt changing procedure by pressing "Cancel" key (C).*

- Press key (M) again.

The crop created by the operator is saved (indicated by a "2" behind the crop name); the "M" at the left of the display will disappear.

*NOTE: The values for the remaining functions are changed in the same way.*



ZX 002528

ZX002528  
-JUN-03MAY/95

ZX,OMXZCO001987-19-20JUL92

### INDIVIDUAL SETTING OF CHANGED VALUES (AUTOMATIC SETTING)

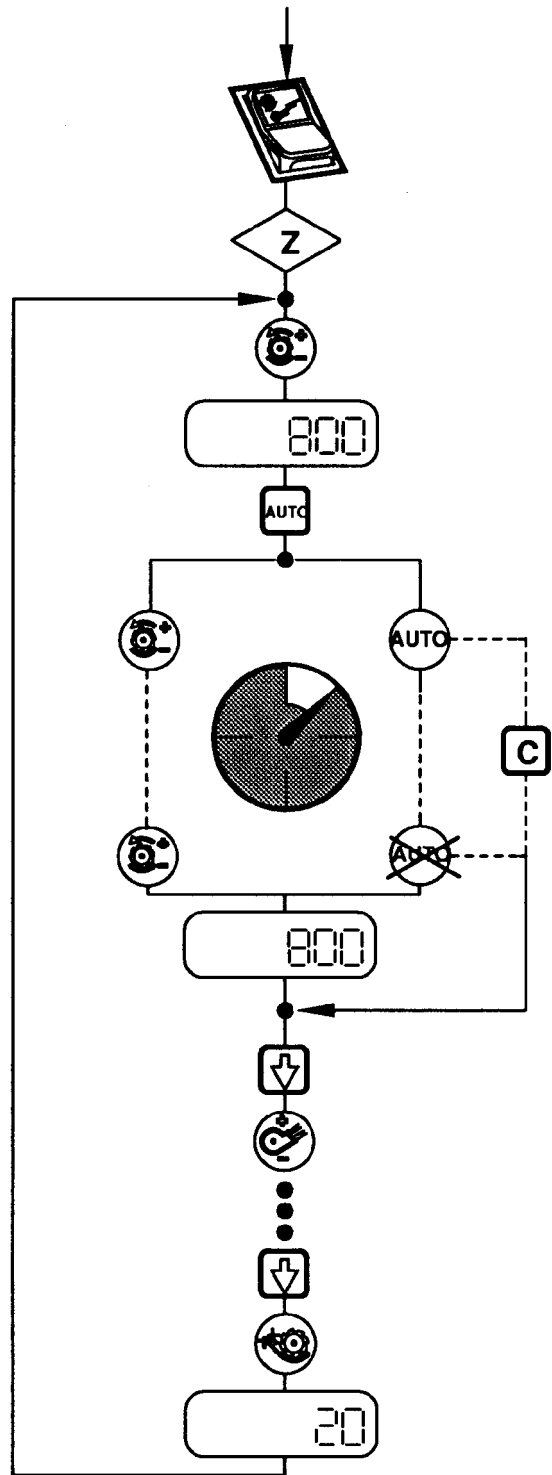
- Separator must be engaged.
- Switch on function "Automatic Machine Adjustments".
- Select "Setting Unit" function.
- Select "Cylinder Speed" function.

The corresponding value is displayed.

- Press "AUTO" key.

The light of the selected function and the "AUTO" light will glow during automatic setting procedure.

*NOTE: It is possible to interrupt setting procedure by pressing "Cancel" key (C).*



ZX 002529

ZX002529 -JUN-03MAY95

ZX,OMXZCO001859-19-20JUL92



## THEORY OF OPERATION

Manual adjustments of cylinder speed, fan speed and concave spacing are identical with the procedures described in Group 240-15Z.

These adjustments may be performed automatically by means of the combine data center.

The relays on the relay board are activated by control board (A9) via connecting wires. Control board (A9) and combine data center (A5) are connected to the

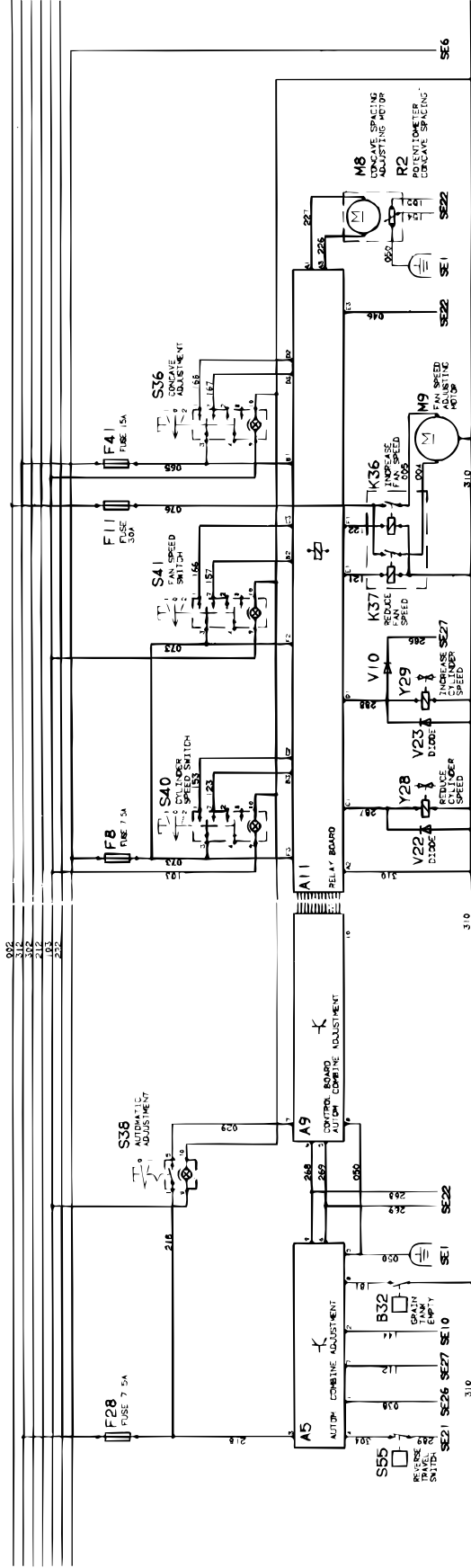
Infotrak monitor via data transfer wires (268) and (269).

Wire 038 transmits the signal from the header height sending unit to the combine data center. Wire 304 transmits a signal from switch (S55) during reverse travel to switch off the area counter.

*NOTE: The infotrak monitor displays error codes in case of combine data center malfunctions.*

ZX,TMXZCO003188-19-17JAN94

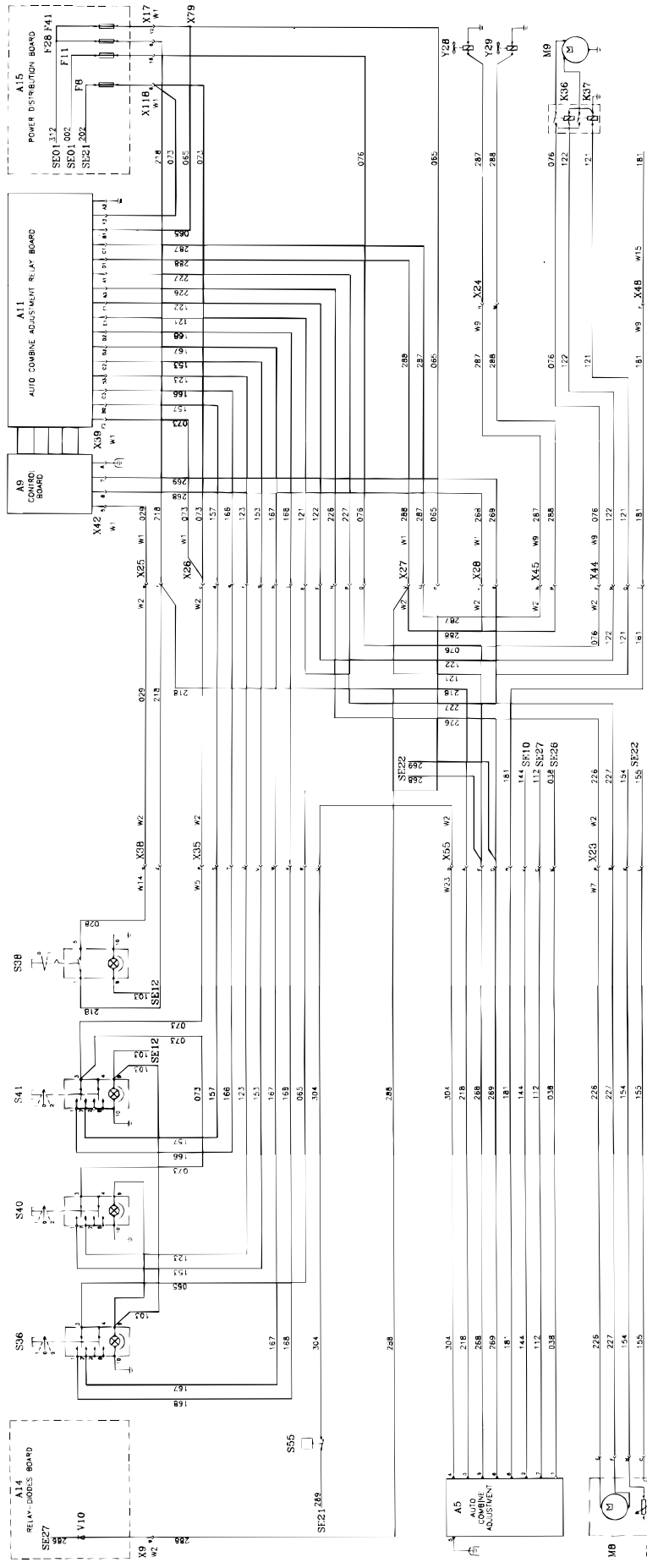
FUNCTIONAL SCHEMATIC OF SECTION 25B



ZX005263  
SE25B  
CYLINDER, CONCAVE, FAN ADJUSTMENT

- A5 — Combine data center
- A9 — Control board, combine data center
- A11 — Relay board, combine data center
- A14 — Relay and diode board
- A15 — Fuse board
- F8 — Fuse, 7.5 amps.
- F11 — Fuse, 30 amps.
- F28 — Fuse, 7.5 amps.
- F41 — Fuse, 15 amps.
- K36 — Relay, adjust fan speed
- K37 — Relay, adjust fan speed
- M8 — Concave adjusting motor
- M9 — Fan speed adjusting motor
- R2 — Potentiometer, concave adjustment
- S36 — Concave adjusting switch
- S40 — Fan speed switch
- S41 — Fan speed switch
- V10 — Diode
- X9 — Connection, cab harness (W2) to relay and diode board
- X17 — Connection, distribution harness (W1) to fuse board
- X23 — Disconnect point, cab harness (W2), front basic harness (W7)
- X24 — Connection, rear basic harness (W9) to solenoid valve block
- X25 — Disconnect point, distribution harness (W1)
- X26 — Disconnect point, distribution harness (W1), cab harness (W2)
- X27 — Disconnect point, distribution harness (W1)
- X28 — Disconnect point, distribution harness (W1)
- X35 — Disconnect point, cab harness (W2), armrest harness (W5)
- X38 — Disconnect point, cab harness (W2), optional harness (W14)
- X39 — Connection, distribution harness (W1) to data center relay board
- X42 — Connection, distribution harness (W1) to data center control board
- X44 — Disconnect point, cab harness (W2), rear basic harness (W9)
- X45 — Disconnect point, cab harness (W2), rear basic harness (W9)
- X55 — Disconnect point, cab harness (W2), data center harness (W23)
- X79 — Splice
- X118 — Connection, distribution harness (W1) to fuse board

DIAGNOSTIC SCHEMATIC OF SECTION 25B





**Group 16AA**

**Separator Adjustment, Combine Data Center from Ser.No. 062722**

**OPERATIONAL INFORMATION**

The combine data center integrated in the right-hand armrest essentially consists of an area counter and a system for automatic separator adjustments.

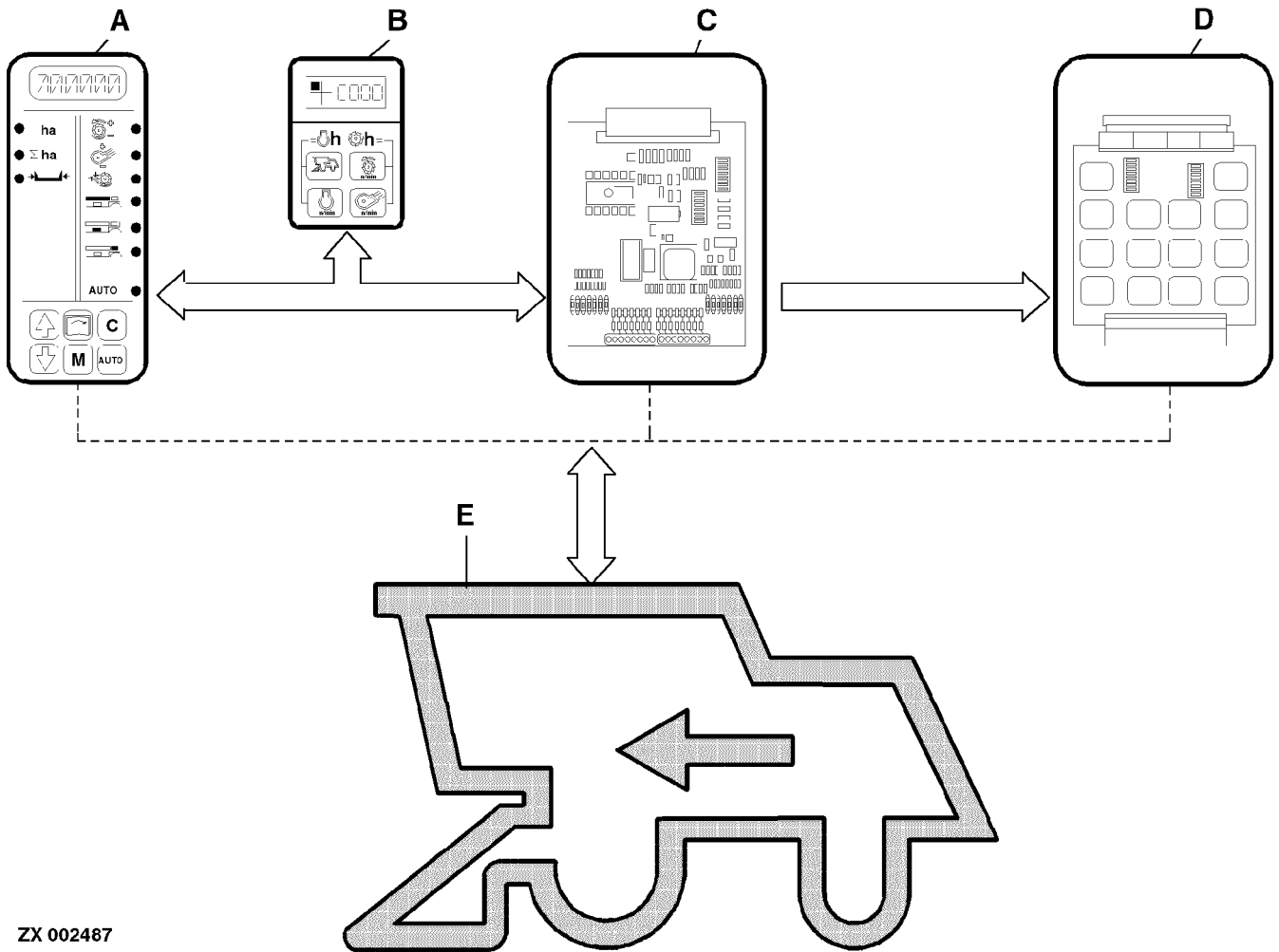
Area counting is based on travel distance during harvesting and cutting width.

Automatic settings are performed depending on the type of crop selected on the combine data center.

A data or signal transfer takes place between the mentioned components. Actual settings (speeds, clearances) and error codes (in case of malfunctions) are displayed on the Infotrak monitor.

ZX, TMXZCO003227-19-17JAN94

**SYSTEM COMPONENTS (“AREA COUNTER” AND “AUTOMATIC SEPARATOR ADJUSTMENTS”)**



ZX 002487

A—Combine data center  
 B—Infotrak monitor  
 C—Control board (for automatic machine adjustments only)

D—Relay board  
 E—Combine (sensors, switches, solenoids, motors)

ZX, TMXZCO003187-19-15JUL96

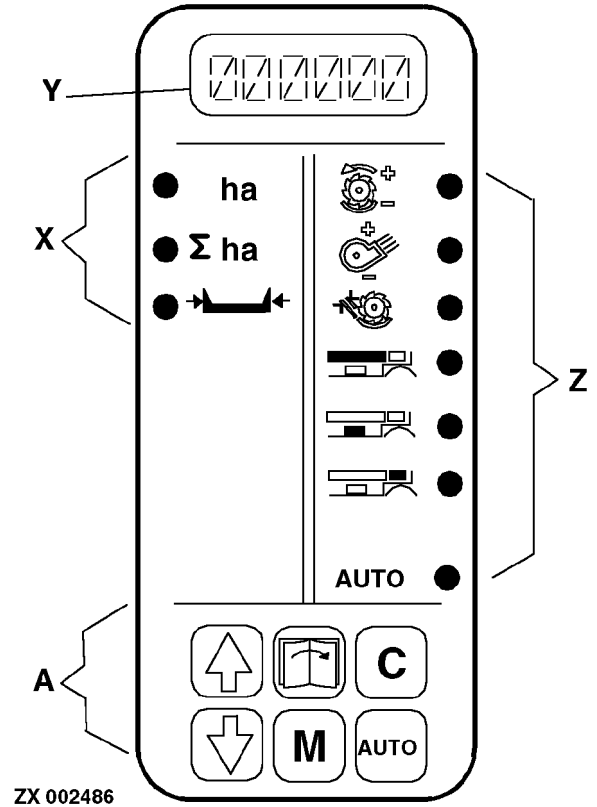
ZX002487 -UN-21JUN95

## COMBINE DATA CENTER

With starter switch in position (I), the combine data center is ready for operation.

### Functions:

- A—Controls (6 keys)
- X—Area counter
- Y—Display (6 digits)
- Z—Setting unit



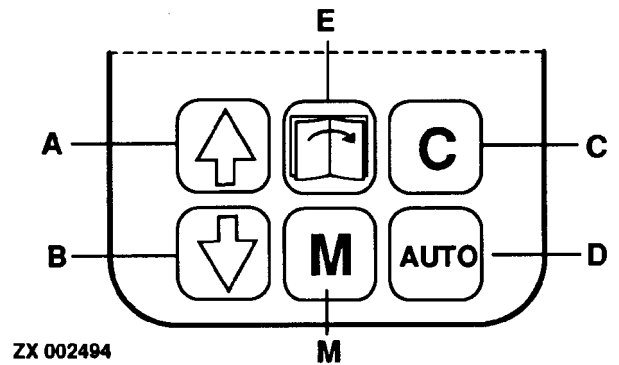
ZX 002486

ZX, TMXZCO003228-19-15JUL96

-UN-16JUN95  
ZX002486

## CONTROL KEYS

- A—Up
- B—Down
- C— • Clear
  - Calibrate
  - Cancel
- D—Automatic function (AUTO)
- E—Page change
- M— • Modify
  - Memory



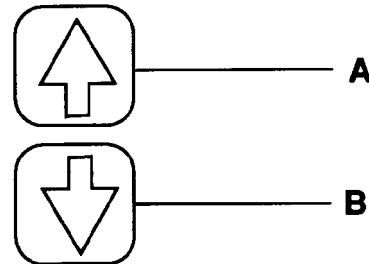
ZX 002494

ZX, OMXZCO001847-19-20JUL92

-UN-28APR95  
ZX002494

## Keys A and B

These keys are used to run through the various functions of area counter, display panel or setting unit. If "Modify" mode is activated by pressing key (M), displayed values may be increased or decreased at given increments by pressing these keys.



ZX 002513

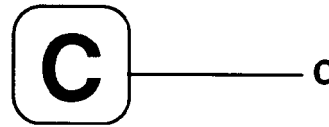
ZX, OMXZCO001848-19-20JUL92

-UN-28APR95  
ZX002513

### Key C

This key is used to set data center displays to “zero” (e.g. area, header width) and to clear crop settings created by the operator.

This key is also used to interrupt automatic settings, to leave the automatic or modify mode and for input of partial header width.



ZX 002516

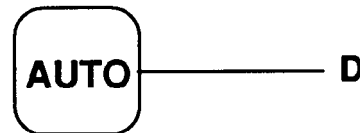
ZX,OMXZCO001851-19-20JUL92

-UN-27APR95  
ZX002516

### Key D

This key is used to activate automatic functions for setting combine components according to the values of the previously selected crop (cylinder speed, fan speed and concave spacing). During the setting procedure, the “AUTO” light of the setting unit will glow. The light will go out as soon as the setting procedure is completed.

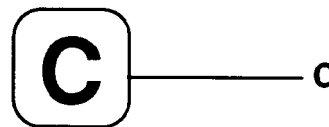
*NOTE: During the setting procedure, the automatic mode may be left by pressing key (C).*



ZX 002517

ZX,OMXZCO001852-19-20JUL92

-UN-28APR95  
ZX002517



ZX 002516

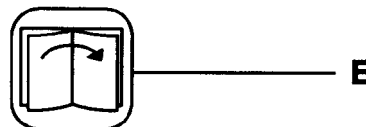
-UN-27APR95  
ZX002516

### Key E

This key is used to “jump” from one unit of combine data center to another:

- From area counter to display
- From display to setting unit
- From setting unit back to area counter

This key is also used for the “Select Language” mode.



ZX 002514

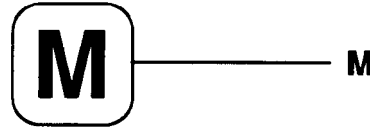
ZX,OMXZCO001849-19-20JUL92

-UN-27APR95  
ZX002514



**Key M**

If a certain setting (e.g. fan speed for a crop version created by the operator or header width) is to be changed, select the corresponding function and press key (M). Now the setting can be changed, using the "arrow" keys. The new setting is saved by pressing key (M) once again.



**ZX 002515**

ZX,OMXZCO001850-19-20JUL92

ZX002515  
-UN-27APR95

## AREA COUNTER

### Requirements:

- Starter switch in position (I) or (II).
- Infotrak monitor correctly programmed
- Header within range of header height gauge (not necessary for reading display only).

### Setting Instructions

Display (A) of area counter always lights up when unit is switched on.

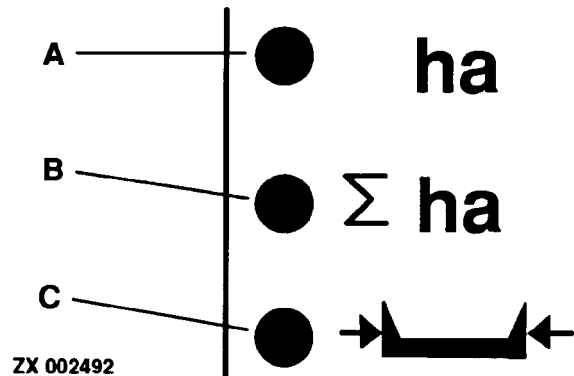
Area values can only be cleared, but not changed. Total area values can neither be cleared nor changed.

The smallest area that can be displayed is 0.1 hectare or 0.1 acre.

The smallest setting increment for header width is 0.1 m or 0.5 ft.

When full width of header is not used during operation, partial width may be set in 1/4 increments. Header width will return to the previously saved value if header moves out of range of header height gauge.

*NOTE: The displayed measurement units for width and area are determined by infotrak monitor programming (see this Section).*



- A—Area function light
- B—Total area function light
- C—Header width function light

ZX002492 -UN-28APR95

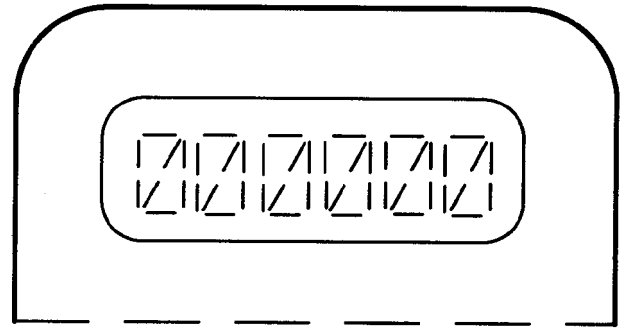
ZX,OMXZCO001845-19-14NOV92

## DISPLAY

With ignition turned on, the following data are displayed:

- Preloaded settings for various crops
- Area counter data (area, total area, header width)
- Preloaded crops (9), crops created by the operator (14)
- Languages available:

German	DEUTSC
French	FRANCA
Spanish	ESPANI
Italian	ITALIA
Dutch	NEDERL
Danish	DANSK
Swedish	SVENSK
English	ENGLIS



ZX 002488

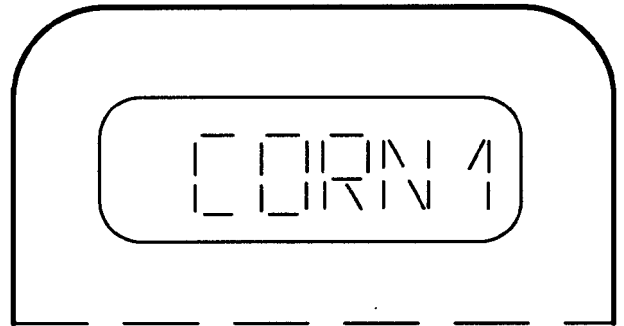
ZX002488 -UN-28APR95

ZX,OMXZCO001842-19-20JUL92

## Factory-Loaded Crops

- Barley
- Corn
- Beans
- Peas
- Wheat
- Rye
- Sunflowers
- Oats
- Rape

*NOTE: The names of the factory-loaded (permanent memory) crops end with a number 1.*



ZX 002489

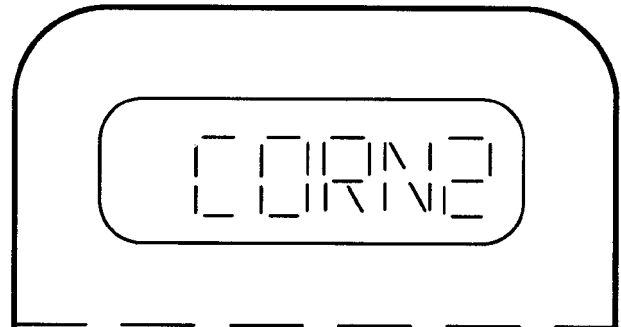
ZX002489 -UN-28APR95

ZX,OMXZCO001843-19-20JUL92

### Crop Codes Created by the Operator

For each of the previously mentioned crops (all of which are entered into the memory at the factory), the operator may enter one modified crop into the data center memory, including all necessary settings according to harvesting conditions. The names of these crop versions, created by the operator, end with a number 2.

*NOTE: The crops entered into data center memory by the operator may be recorded on the bottom of right-hand armrest.*



ZX 002490

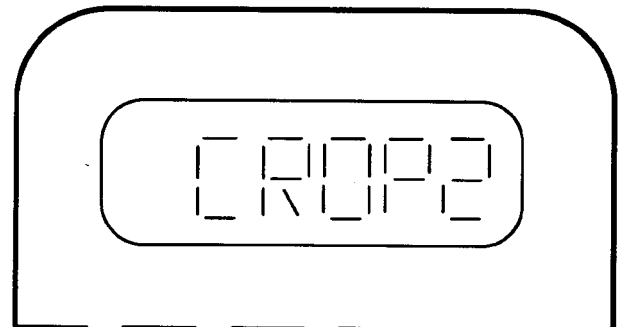
ZX002490 -JUN-28APR95

ZX,OMXZCO001844-19-13NOV92

### Special Crops

The operator may enter five additional special crops into the data center memory. These crops are named CROP2, CROP3—CROP6.

*NOTE: The crops entered into data center memory by the operator may be recorded on the bottom of right-hand armrest.*



ZX 002491

ZX002491 -JUN-28APR95

ZX,OMXZCO001910-19-20JUL92

## SETTING UNIT

### Requirements:

To start automatic setting of functions (A, B and C):

- Engine must be running (throttle lever pushed all the way forward)
- Separator must be engaged
- Switch for automatic machine adjustments must be ON

### Setting Instructions

Values of functions (A—F) for the previously selected crop are displayed and may be changed as follows:

Function	Increments	Setting range
A	10 rpm	0—2550 rpm
B	10 rpm	0—2550 rpm
C	1 mm (1/16 in.)	0—50 mm (0—3-1/8 in.)
D	1 mm (1/16 in.)	0—50 mm (0—3-1/8 in.)
E	1 mm (1/16 in.)	0—50 mm (0—3-1/8 in.)
F	1 mm (1/16 in.)	0—50 mm (0—3-1/8 in.)

Values of functions (A—F) for crops ending with a number "1" (e.g. "CORN1") are factory loaded (permanent memory) and cannot be changed.

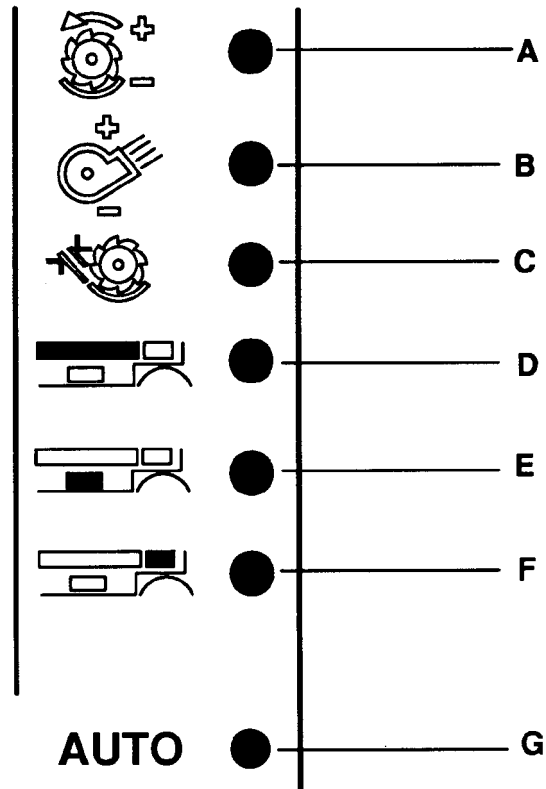
Values of functions (A—F) for crops ending with a number "2" (e.g. "CORN2") may be cleared or changed.

Values of functions (A—F) for "CROP2" to "CROP6" may also be cleared or changed.

Functions (A—C) are set automatically by pressing the "AUTO" key (if the above requirements are met).

Values of functions (D—F) are only displayed. Setting must be carried out manually.

Lights (A—C) and (G) will glow during automatic setting procedure.



- A—Cylinder speed function light
- B—Fan speed function light
- C—Concave spacing function light
- D—Chaffer function light
- E—Sieve function light
- F—Chaffer extension function light
- G—Automatic function light

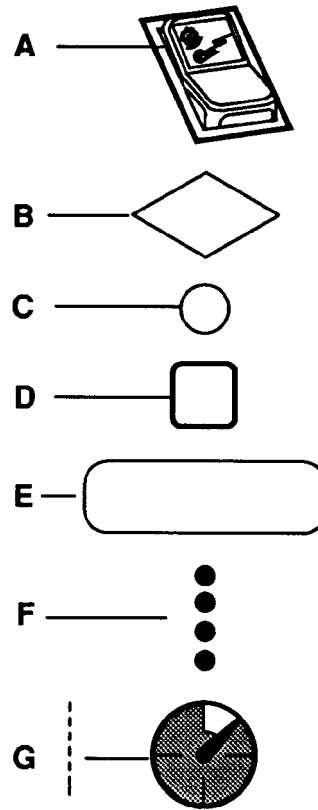
ZX 002493

-UN-28APR95  
ZX002493

### OPERATIONAL DIAGRAMS

#### Explanation of Symbols:

- A—Switch on automatic machine adjustments
- B—Shows the combine data center unit to be selected:
  - X-Area counter
  - Y-Display
  - Z-Setting unit
- C—Shows individual functions of area counter/setting unit (blue light)
- D—Shows the key to be pressed (bold enclosure)
- E—Display information
- F—Shows possible choices
- G—Shows time required for individual procedure



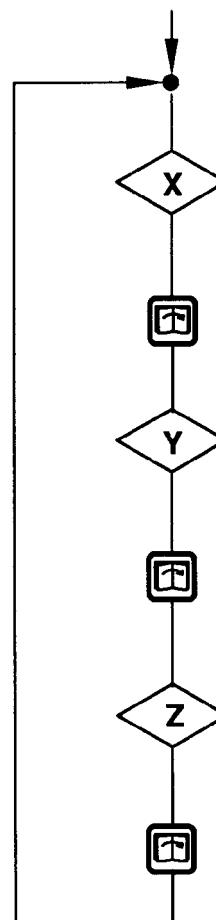
ZX 002518

ZX,OMXZCO001853-19-20JUL92

ZX002518 -UN-28APR95

### SELECTING COMBINE DATA CENTER UNITS

- Turn starter switch to position (I).
- Combine data center will switch to area counter (X).
- Press "PAGE" key.
- Combine data center will switch to display (Y).
- Press "PAGE" key.
- Combine data center will switch to setting unit (Z).



ZX 002328

ZX002328 -UN-28APR95

ZX,OMXZCO001854-19-20JUL92

### SELECTING AREA COUNTER FUNCTIONS

- Select "Area Counter" unit.

Light of "Area" function will glow.

The harvesting area (for each day) is displayed.

- Press "Down" key.

Light of "Total Area" function will glow.

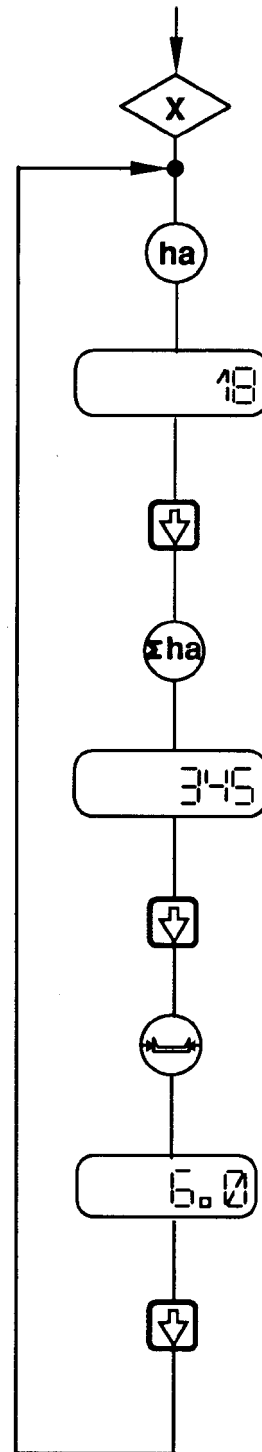
The total harvesting area is displayed.

- Press "Down" key.

Light of "Header Width" function will glow.

Header width (cutting width) is displayed.

*NOTE: Running through the various crop displays or setting unit functions is done in a similar way as described above.*



ZX 002519

ZX002519 -JUN-03MAY95

ZX,OMXZCO001983-19-20JUL92



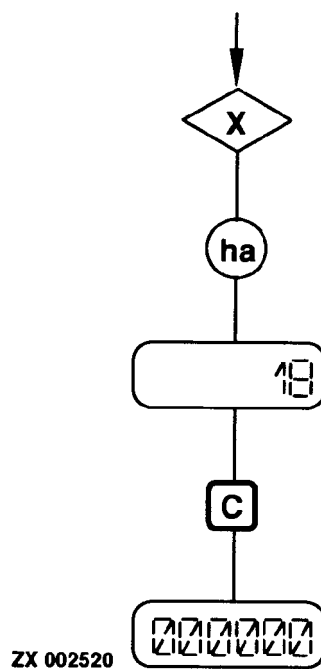
### CLEARING "AREA" DISPLAY

- Select "Area Counter" unit.
- Select "Area" function.

The harvesting area for the day will be displayed.

- Press key (C) ("Clear").

Display will change to "zero".



ZX002520 -JUN-28APR95

ZX,OMXZCO001855-19-20JUL92

## CHANGING HEADER WIDTH

- Select "Area Counter" unit.
- Select "Header Width" function.

The current header width (cutting width) will be displayed.

- Press "Modify" key (M).

An "M" will appear at the left of the display.

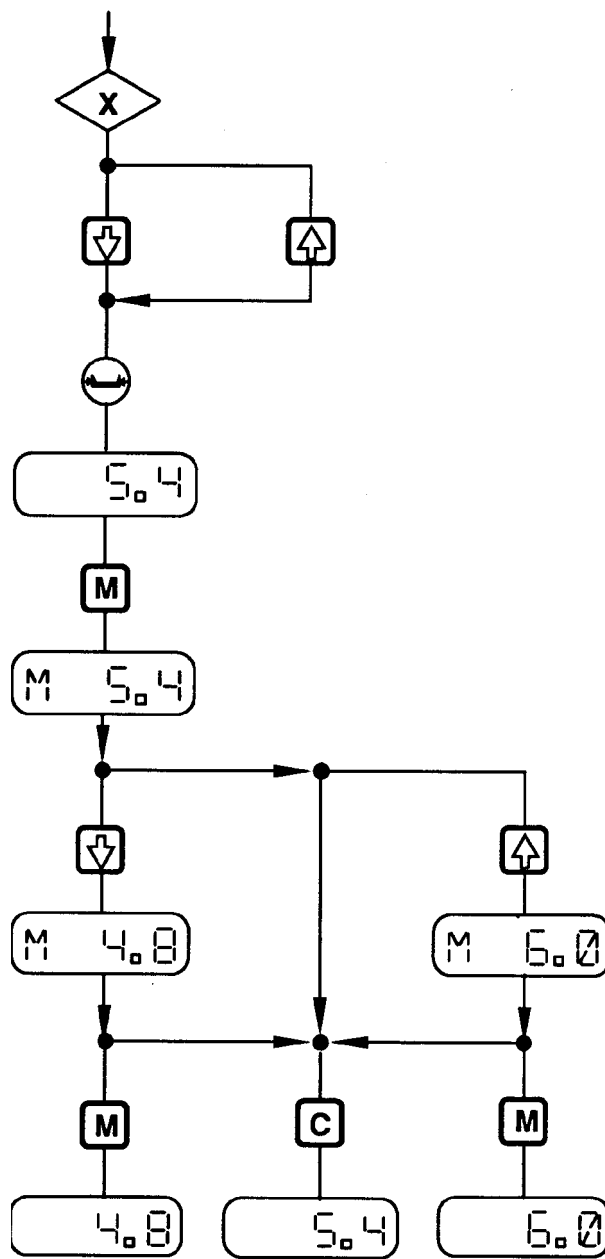
- Press "Up" or "Down" key.

The changed header width will be displayed.

- Press key (M) again.

The displayed setting is saved; the "M" at the left of the display will disappear.

*NOTE: After pressing the "M" key, it is always possible to interrupt the setting of the new header width by pressing "Cancel" key (C). The previous header width will be displayed once again.*



ZX 002521

ZX002521 -JUN-28A-PR95

ZX,OMXZCO001984-19-20JUL92

### SETTING PARTIAL HEADER WIDTH

- Select "Area Counter" unit.
- Select "Header Width" function.

The current header width will be displayed.

- Press "Calibrate" key (C).

"3/4" will be displayed = 3/4 of the previous header width (cutting width).

- Press "Calibrate" key (C).

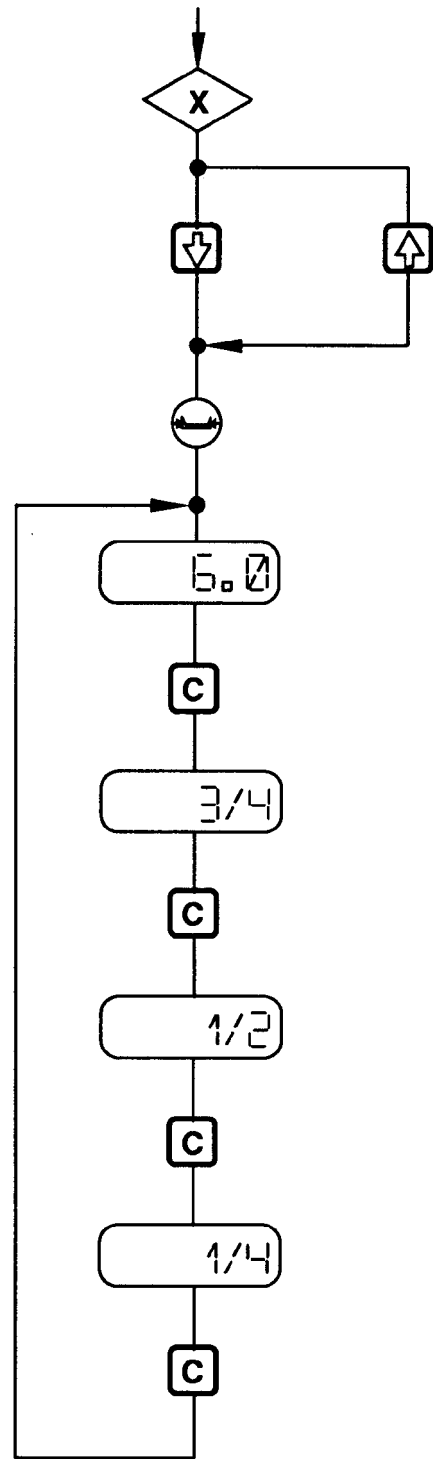
"1/2" will be displayed = 1/2 of the previous header width (cutting width).

- Press "Calibrate" key (C).

"1/4" will be displayed = 1/4 of the previous header width (cutting width).

- Press "Calibrate" key (C).

The cutting width saved previously will be displayed.



ZX 002522

ZX002522 -JUN-03MAY95

ZX,OMXZCO001856-19-20JUL92

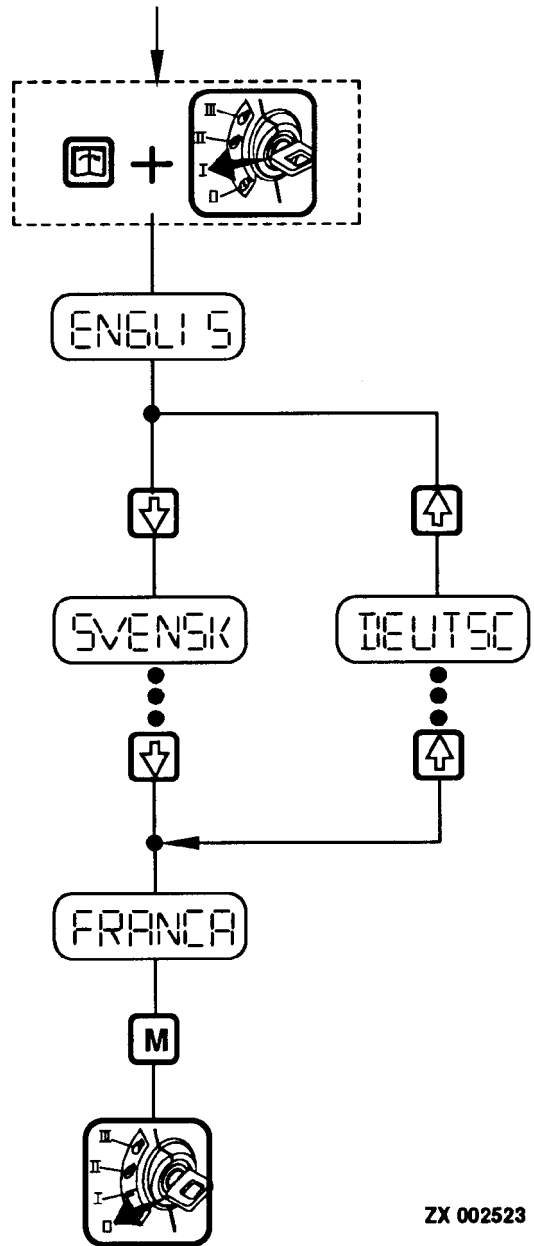
### SELECTING LANGUAGE

- Press “Page” key while turning starter switch to position (I).

The language saved previously will be displayed.

- Press “Up” or “Down” key until desired language is displayed.
- Press “Memory” key (M).
- Turn starter switch to position (0).

The desired language is saved.



ZX 002523

ZX,OMXZCO001857-19-20JUL92

ZX002523 -UN-28APR95

### SELECTING CROP

*NOTE: This procedure is required to start automatic settings and to change to a different crop.*

- Select "Display" unit.

The crop selected previously will be displayed.

- Press "Up" or "Down" key until desired crop is displayed.

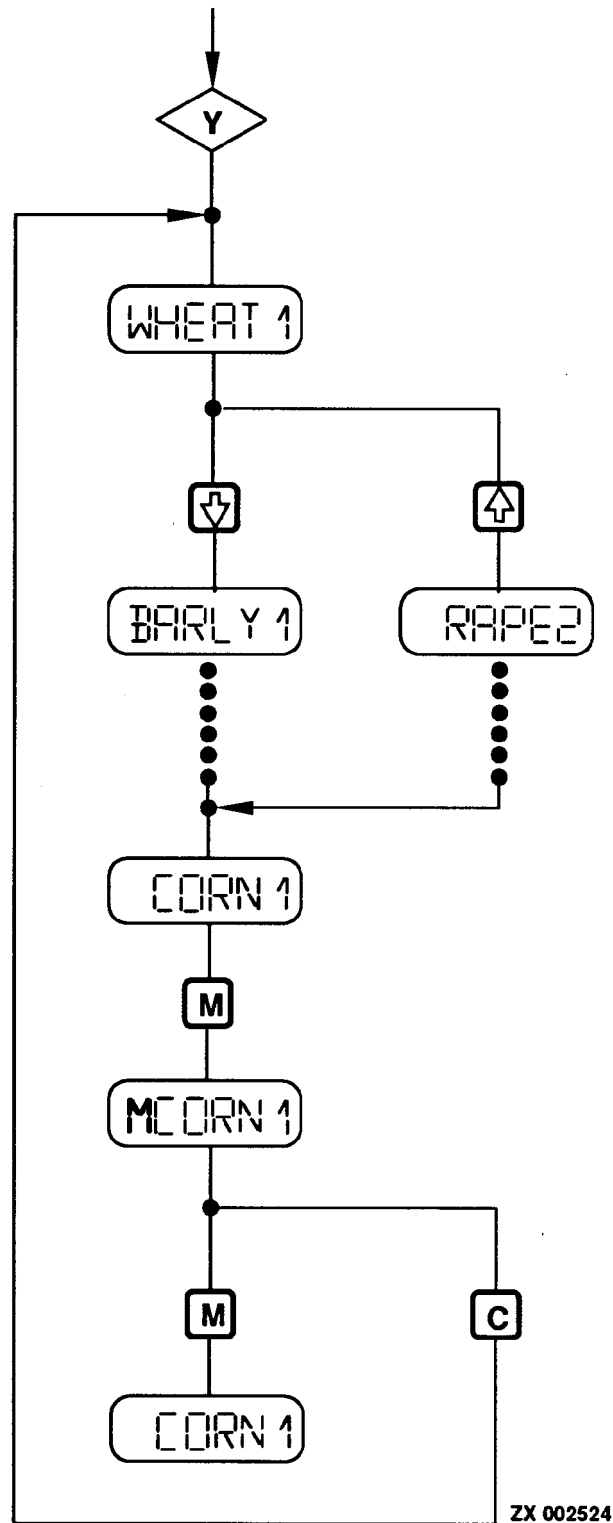
- Press "Modify" key (M).

A flashing "M" will appear at the left of the display.

- Press key (M) again.

The selected crop is saved; the "M" at the left of the display will disappear.

*NOTE: After pressing the "M" key, it is possible to interrupt crop selecting procedure by pressing "Cancel" key (C).*



ZX 002524

-JUN-03MAY95  
ZX002524

ZX,OMXZCO001985-19-20JUL92

### AUTOMATIC MACHINE SETTING ACCORDING TO CROP SELECTED

- Separator must be engaged.
- Switch on function "Automatic Machine Adjustments".
- Select "Display" unit.

The selected crop will be displayed.

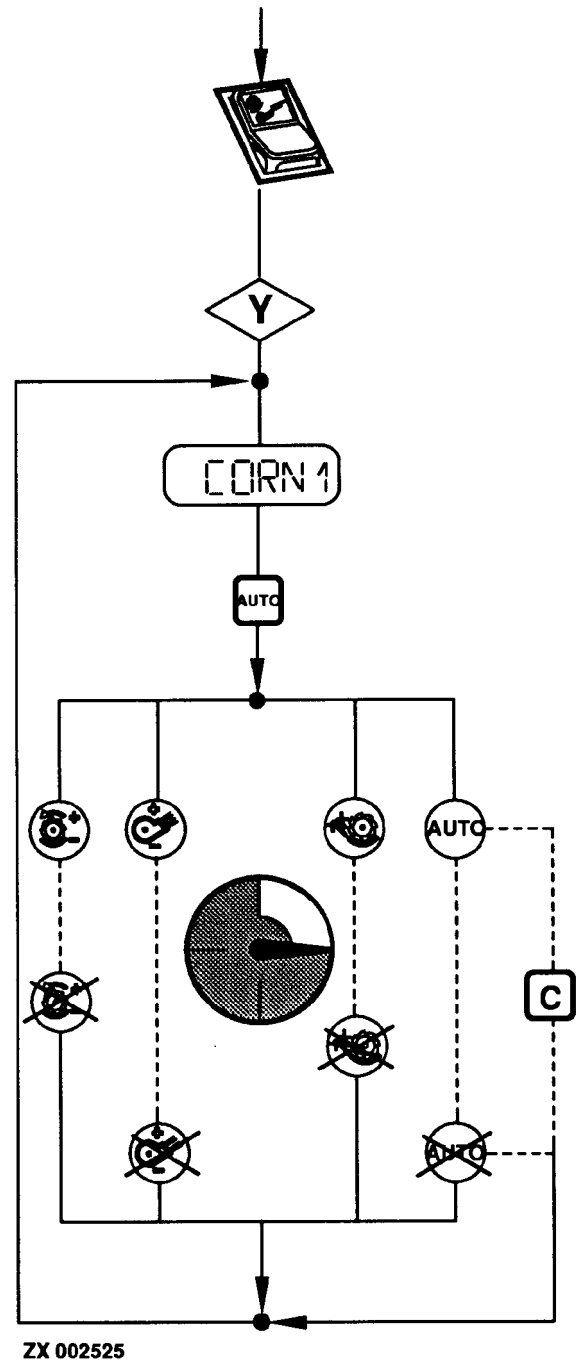
- Press "AUTO" key.

Lights of functions

- Cylinder speed
  - Fan speed
  - Concave spacing and
  - Automatic operation ("AUTO")
- will glow until the corresponding setting is completed.

After setting procedure for all functions is completed, the "AUTO" light will go out.

*NOTE: It is possible to interrupt setting procedure by pressing "Cancel" key (C).*



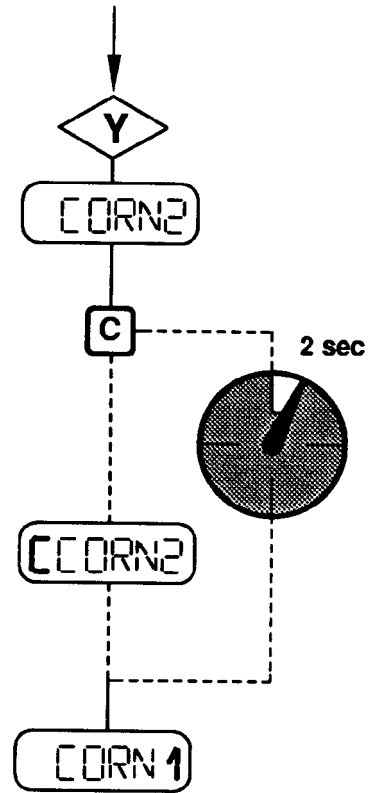
ZX,OMXZCO001960-19-20JUL92

### CLEARING CROPS CREATED BY THE OPERATOR

- Select "Display" unit.
- Select crop to be cleared (ending with a number "2" or named "CROP2"—"CROP6").
- Press "Clear" key (C) for 2 seconds.

For 2 seconds, a "C" will appear at the left of the display.

Display will change to crop version ending with a number "1".



ZX 002526

ZX002526 -UN-28APR95

ZX,OMXZCO01986-19-20JUL92

### READING SETTINGS FOR SELECTED CROP

- Select "Display" unit.

The previously selected crop will be displayed.

- Select "Setting Unit" function.

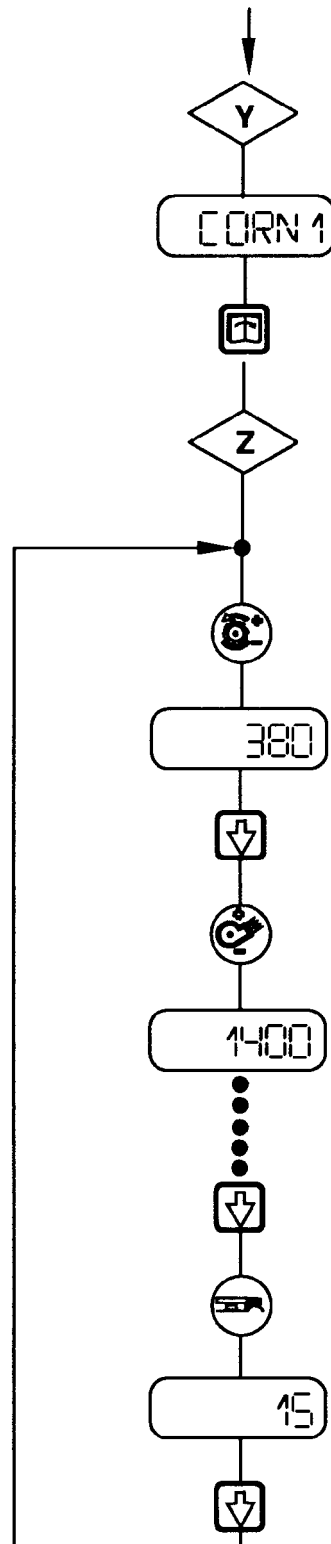
- Select "Cylinder Speed" function.

The cylinder speed for the selected crop is displayed.

- Select "Fan Speed" function.

The fan speed for the selected crop is displayed.

*NOTE: The remaining settings may be displayed in the same way.*



ZX 002527

ZX002527 -JUN-02MAY95

ZX,OMXZCO001858-19-20JUL92



### CHANGING CROP SETTINGS

#### (Crops Created by the Operator)

- Select "Display" unit.

The previously selected crop will be displayed.

- Select "Setting Unit" function.
- Select "Cylinder Speed" function.

The cylinder speed for the selected crop is displayed.

- Press "Modify" key (M).

An "M" will appear at the left of the display.

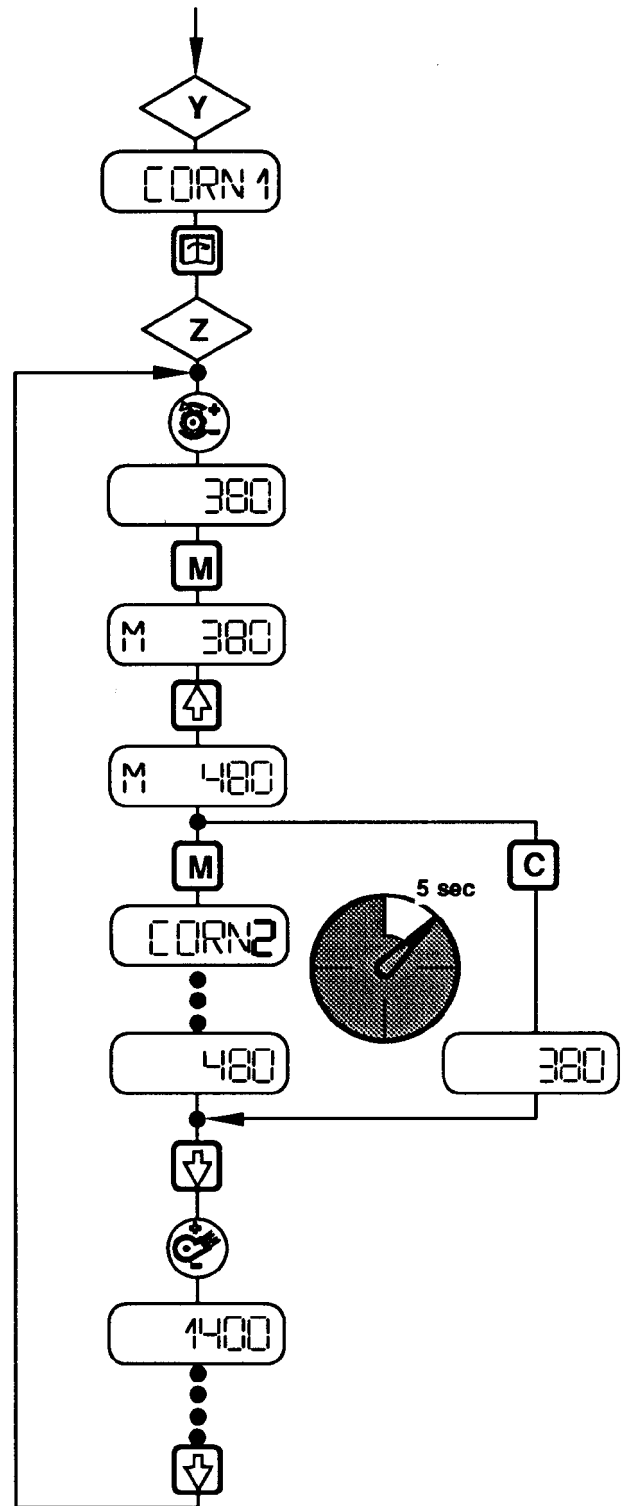
- Press "Up" or "Down" key until desired display appears.

*NOTE: At this time it is possible to interrupt changing procedure by pressing "Cancel" key (C).*

- Press key (M) again.

The crop created by the operator is saved (indicated by a "2" behind the crop name); the "M" at the left of the display will disappear.

*NOTE: The values for the remaining functions are changed in the same way.*



ZX 002528

-JUN-03MAY/95  
ZX002528

ZX,OMXZCO001987-19-20JUL92

### INDIVIDUAL SETTING OF CHANGED VALUES (AUTOMATIC SETTING)

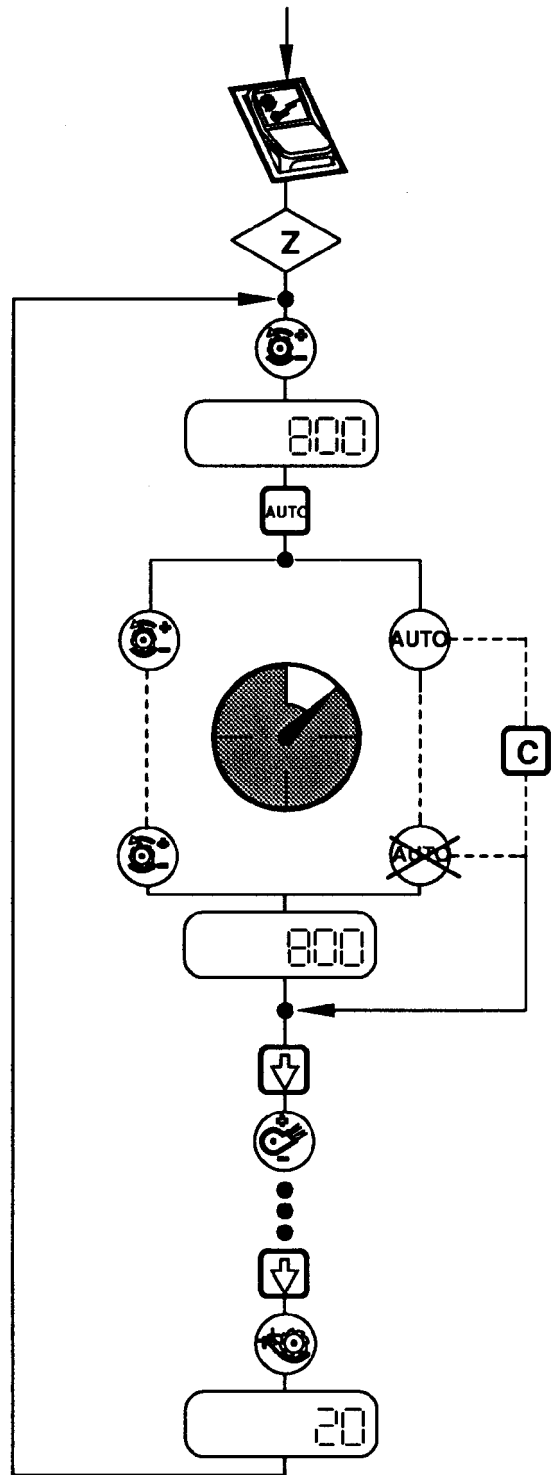
- Separator must be engaged.
- Switch on function "Automatic Machine Adjustments".
- Select "Setting Unit" function.
- Select "Cylinder Speed" function.

The corresponding value is displayed.

- Press "AUTO" key.

The light of the selected function and the "AUTO" light will glow during automatic setting procedure.

*NOTE: It is possible to interrupt setting procedure by pressing "Cancel" key (C).*



ZX 002529

-JUN-03MAY/95  
ZX002529

ZX,OMXZCO001859-19-20JUL92

## THEORY OF OPERATION

Manual adjustments of cylinder speed, fan speed and concave spacing are identical with the procedures described in Group 240-15Z.

These adjustments may be performed automatically by means of the combine data center.

The relays on the relay board are activated by control board (A9) via connecting wires. Control board (A9) and combine data center (A5) are connected to the

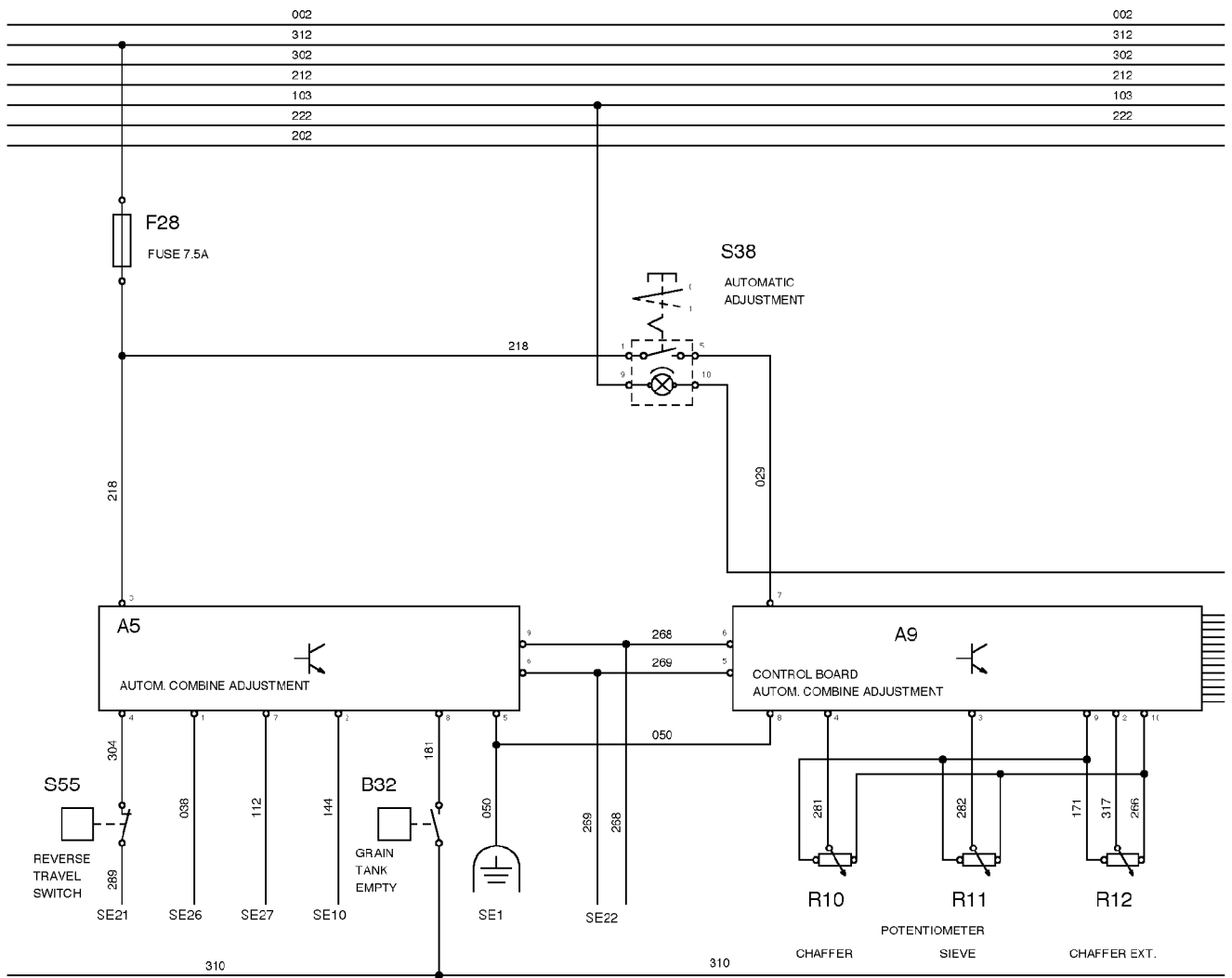
Infotrak monitor via data transfer wires (268) and (269).

Wire 038 transmits the signal from the header height sending unit to the combine data center. Wire 304 transmits a signal from switch (S55) during reverse travel to switch off the area counter.

*NOTE: The infotrak monitor displays error codes in case of combine data center malfunctions.*

ZX, TMXZCO003188-19-17JAN94

**FUNCTIONAL SCHEMATIC, SECTION 25B**



SE25B  
CYLINDER, CONCAVE, FAN ADJUSTMENT

ZX008222

ZX, TMXZCO006547-19-15MAR96

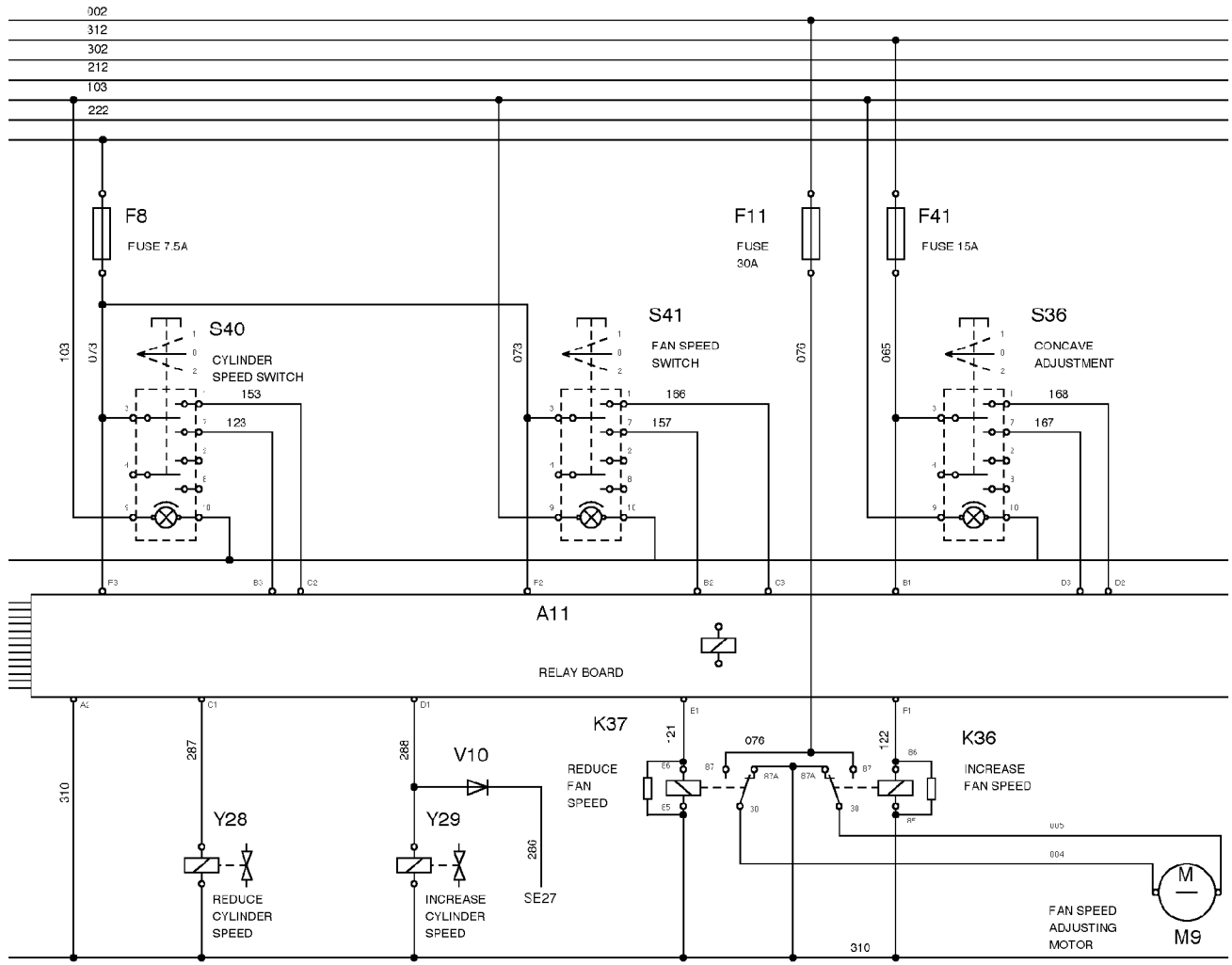
UN-100CT96  
ZX008222

## FUNCTIONAL SCHEMATIC, SECTION 25B

A5 — Combine data center	R2 — Potentiometer, concave adjustment	X27 — Disconnect point, distribution harness (W1), cab harness (W2)	X42 — Connection, distribution harness (W1) to data center control board
A9 — Control board, combine data center	V10 — Diode	X28 — Disconnect point, distribution harness (W1), cab harness (W2)	X44 — Disconnect point, cab harness (W2), rear basic harness (W9)
A11 — Relay board, combine data center	X9 — Connection, cab harness (W2) to relay and diode board	X35 — Disconnect point, cab harness (W2), armrest harness (W5)	X45 — Disconnect point, cab harness (W2), rear basic harness (W9)
A14 — Relay and diode board	X17 — Connection, distribution harness (W1) to fuse board	X38 — Disconnect point, cab harness (W2), optional harness (W14)	X55 — Disconnect point, cab harness (W2), data center harness (W23)
A15 — Fuse board	X23 — Disconnect point, cab harness (W2), front basic harness (W7)	X39 — Connection, distribution harness (W1) to data center relay board	X79 — Splice
F8 — Fuse, 7.5 amps.	X24 — Connection, rear basic harness (W9) to solenoid valve block		X118 — Connection, distribution harness (W1) to fuse board
F11 — Fuse, 30 amps.	X25 — Disconnect point, distribution harness (W1), cab harness (W2)		
F28 — Fuse, 7.5 amps.	X26 — Disconnect point, distribution harness (W1), cab harness (W2)		
F41 — Fuse, 15 amps.			
K36 — Relay, adjust fan speed			
K37 — Relay, adjust fan speed			
M8 — Concave adjusting motor			
M9 — Fan speed adjusting motor			

ZX.TMXZCO006555-19-15MAR96

**FUNCTIONAL SCHEMATIC, SECTION 25B1**



SE25B1

CYLINDER , CONCAVE , FAN ADJUSTMENT

ZX008603

-JN-12SEP96

ZX008603

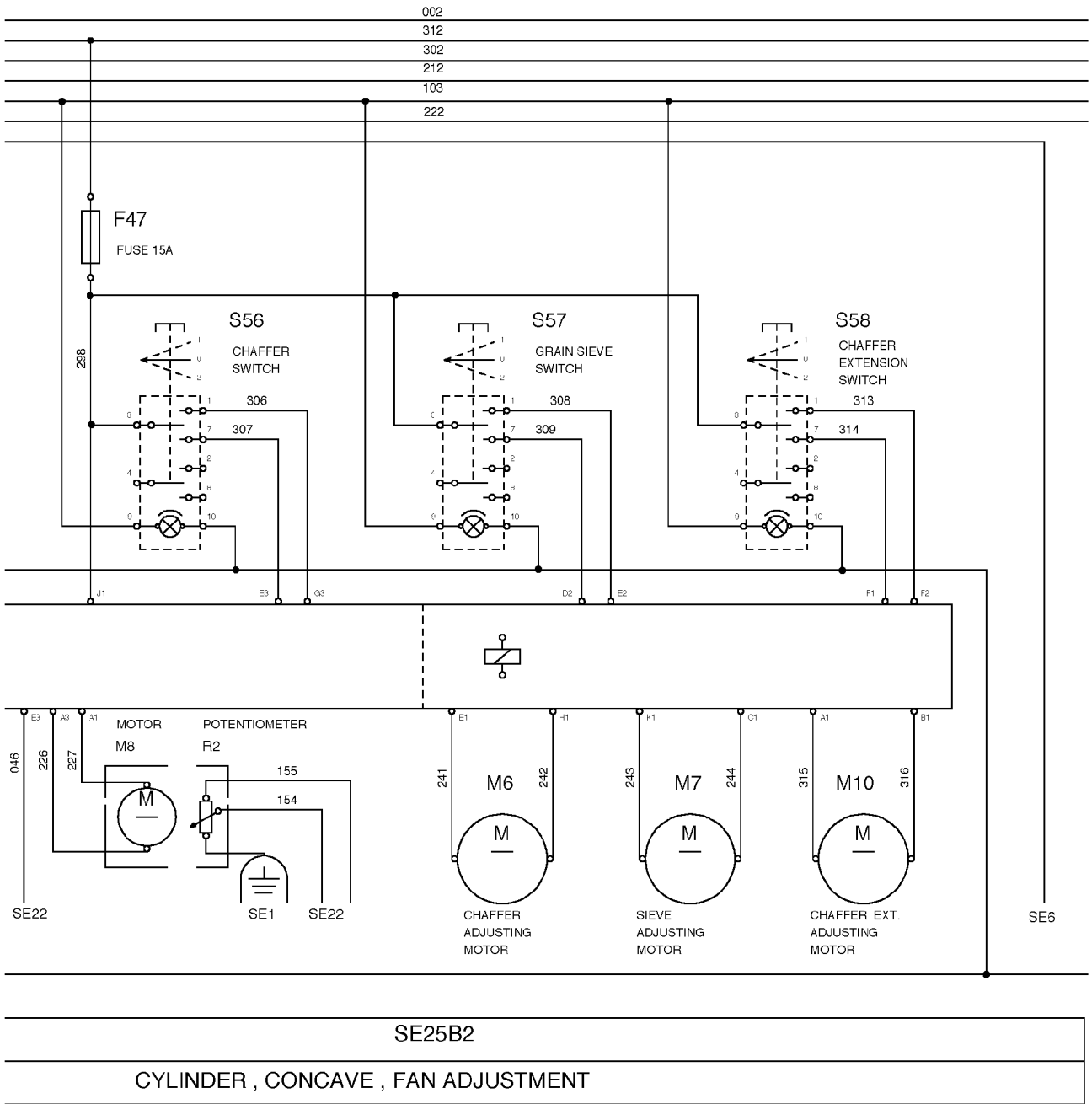
ZX.TMXZCO006565-19-15MAR96

## FUNCTIONAL SCHEMATIC, SECTION 25B1

A5 — Combine data center	R2 — Potentiometer, concave adjustment	X27 — Disconnect point, distribution harness (W1), cab harness (W2)	X42 — Connection, distribution harness (W1) to data center control board
A9 — Control board, combine data center	V10 — Diode	X28 — Disconnect point, distribution harness (W1), cab harness (W2)	X44 — Disconnect point, cab harness (W2), rear basic harness (W9)
A11 — Relay board, combine data center	X9 — Connection, cab harness (W2) to relay and diode board	X35 — Disconnect point, cab harness (W2), armrest harness (W5)	X45 — Disconnect point, cab harness (W2), rear basic harness (W9)
A14 — Relay and diode board	X17 — Connection, distribution harness (W1) to fuse board	X38 — Disconnect point, cab harness (W2), optional harness (W14)	X55 — Disconnect point, cab harness (W2), data center harness (W23)
A15 — Fuse board	X23 — Disconnect point, cab harness (W2), front basic harness (W7)	X39 — Connection, distribution harness (W1) to data center relay board	X79 — Splice
F8 — Fuse, 7.5 amps.	X24 — Connection, rear basic harness (W9) to solenoid valve block		X118 — Connection, distribution harness (W1) to fuse board
F11 — Fuse, 30 amps.	X25 — Disconnect point, distribution harness (W1), cab harness (W2)		
F28 — Fuse, 7.5 amps.	X26 — Disconnect point, distribution harness (W1), cab harness (W2)		
F41 — Fuse, 15 amps.			
K36 — Relay, adjust fan speed			
K37 — Relay, adjust fan speed			
M8 — Concave adjusting motor			
M9 — Fan speed adjusting motor			

ZX.TMXZCO006568-19-15MAR96

**FUNCTIONAL SCHEMATIC, SECTION 25B2**



ZX008604

-JUN-25/APR96  
ZX008604

ZX.TMXZCO006571-19-15MAR96

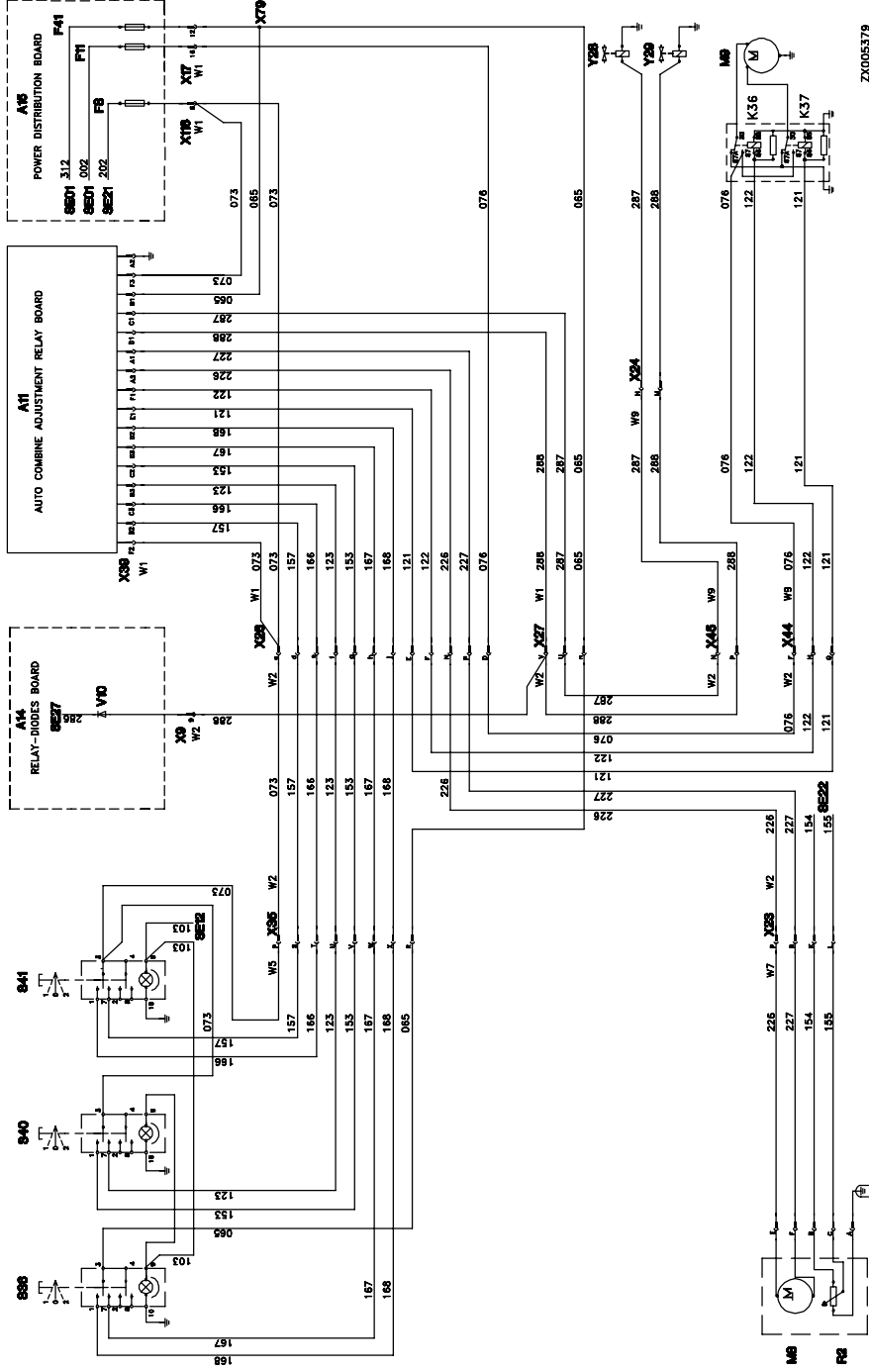


## FUNCTIONAL SCHEMATIC, SECTION 25B2

A5 — Combine data center	R2 — Potentiometer, concave adjustment	X27 — Disconnect point, distribution harness (W1), cab harness (W2)	X42 — Connection, distribution harness (W1) to data center control board
A9 — Control board, combine data center	V10 — Diode	X28 — Disconnect point, distribution harness (W1), cab harness (W2)	X44 — Disconnect point, cab harness (W2), rear basic harness (W9)
A11 — Relay board, combine data center	X9 — Connection, cab harness (W2) to relay and diode board	X35 — Disconnect point, cab harness (W2), armrest harness (W5)	X45 — Disconnect point, cab harness (W2), rear basic harness (W9)
A14 — Relay and diode board	X17 — Connection, distribution harness (W1) to fuse board	X38 — Disconnect point, cab harness (W2), optional harness (W14)	X55 — Disconnect point, cab harness (W2), data center harness (W23)
A15 — Fuse board	X23 — Disconnect point, cab harness (W2), front basic harness (W7)	X39 — Connection, distribution harness (W1) to data center relay board	X79 — Splice
F8 — Fuse, 7.5 amps.	X24 — Connection, rear basic harness (W9) to solenoid valve block		X118 — Connection, distribution harness (W1) to fuse board
F11 — Fuse, 30 amps.	X25 — Disconnect point, distribution harness (W1), cab harness (W2)		
F28 — Fuse, 7.5 amps.	X26 — Disconnect point, distribution harness (W1), cab harness (W2)		
F41 — Fuse, 15 amps.			
K36 — Relay, adjust fan speed			
K37 — Relay, adjust fan speed			
M8 — Concave adjusting motor			
M9 — Fan speed adjusting motor			

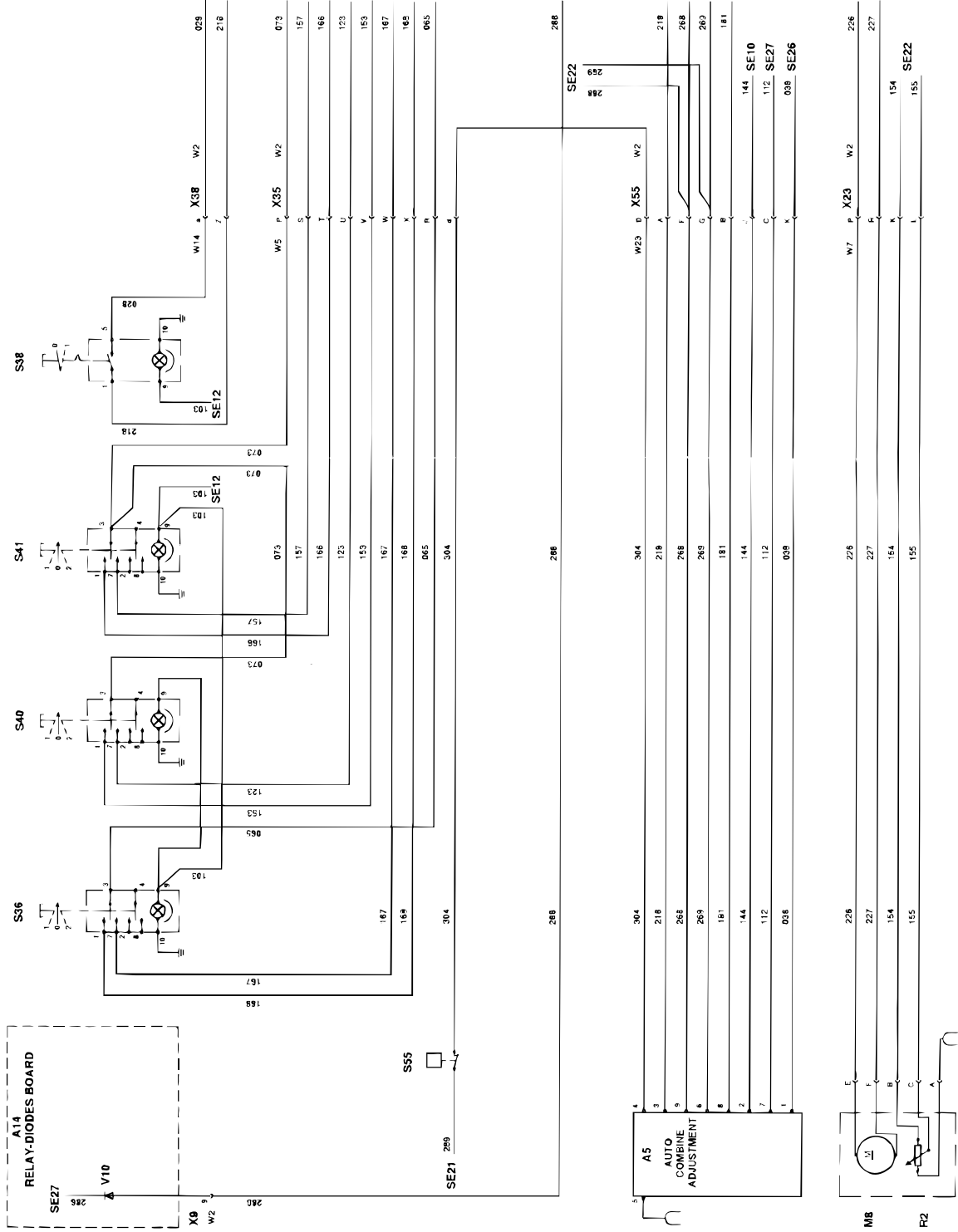
ZX.TMXZCO006566-19-15MAR96

**DIAGNOSTIC SCHEMATIC, SECTION 25A**



ZX005379

**DIAGNOSTIC SCHEMATIC, SECTION 25B**



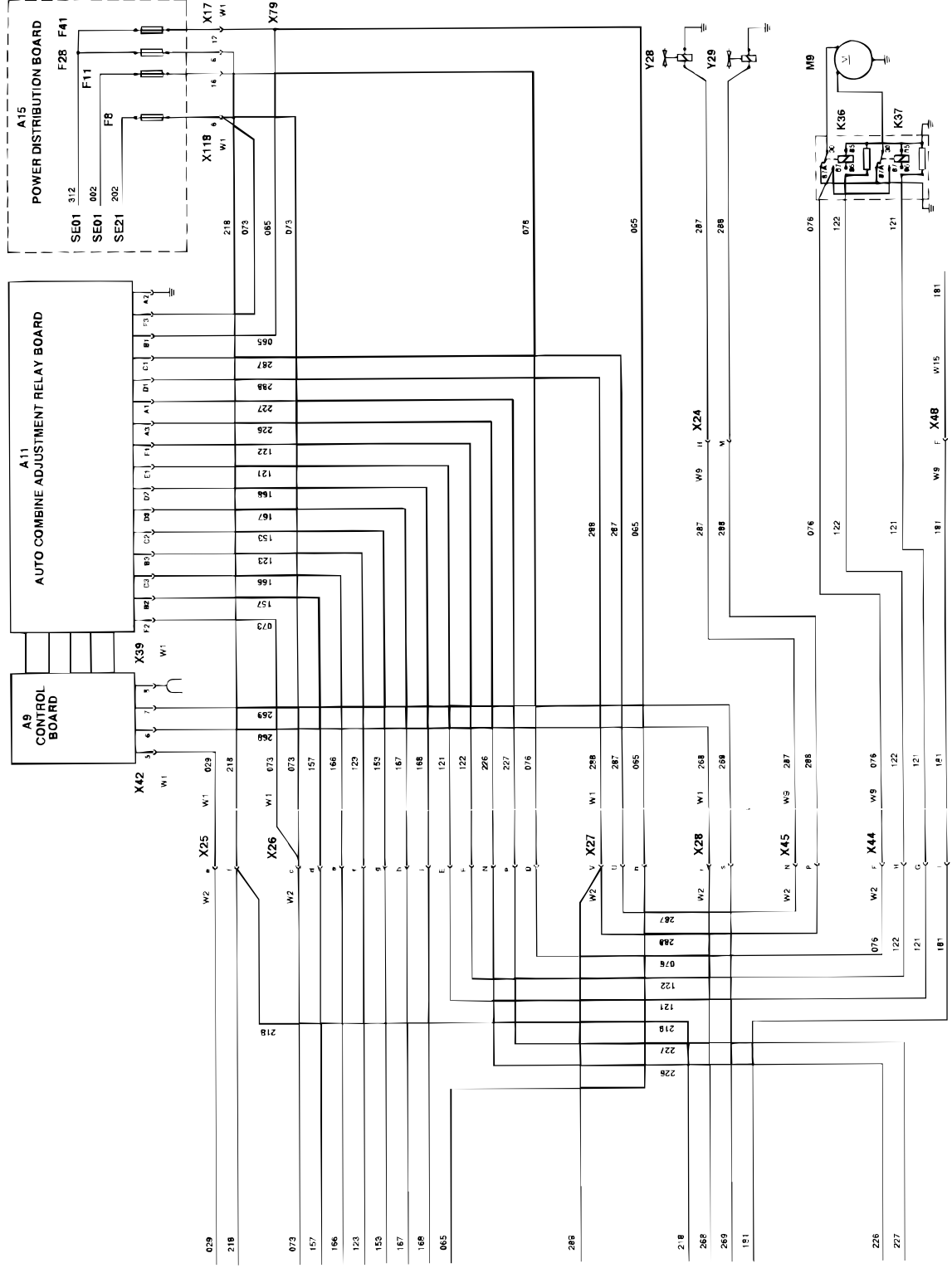
ZX005380

TM4505 (05DEC00)

**240-16AA-31**

ZX1MXZ000567-19-15MAR95  
Z Series Combines  
06/13/00  
PN=694

**DIAGNOSTIC SCHEMATIC, SECTIONS 25B1 AND 25B2**



ZX005381

## Group 15AB Header Adjustments to Ser.No. 062721

### OPERATIONAL INFORMATION

All header settings such as header lift, reel lift and horizontal reel adjustment are carried out hydraulically and are controlled electrically.

The basic adjustment preset by the operator can be obtained automatically at any time by pressing a button.

*NOTE: For safety reasons, header or reel can only be adjusted with engine running and road safety switch in "field" position.*

ZX, TMXZCO003191-19-17 JAN94

### THEORY OF OPERATION

As switches (S27, S29 and S30) are not designed for high current draw, a relay is located in front of each hydraulic function solenoid of this Section.

All switches and header control (A6) are protected by fuse (F26).

Operating current for solenoids used for raising/lowering header is supplied via fuse (F33).  
Operating current for solenoids of reel functions and variable feeder house drive is supplied via fuse (F45).

Depending on position of selector switch (S53), switch (S29) activates the solenoids for raising or lowering

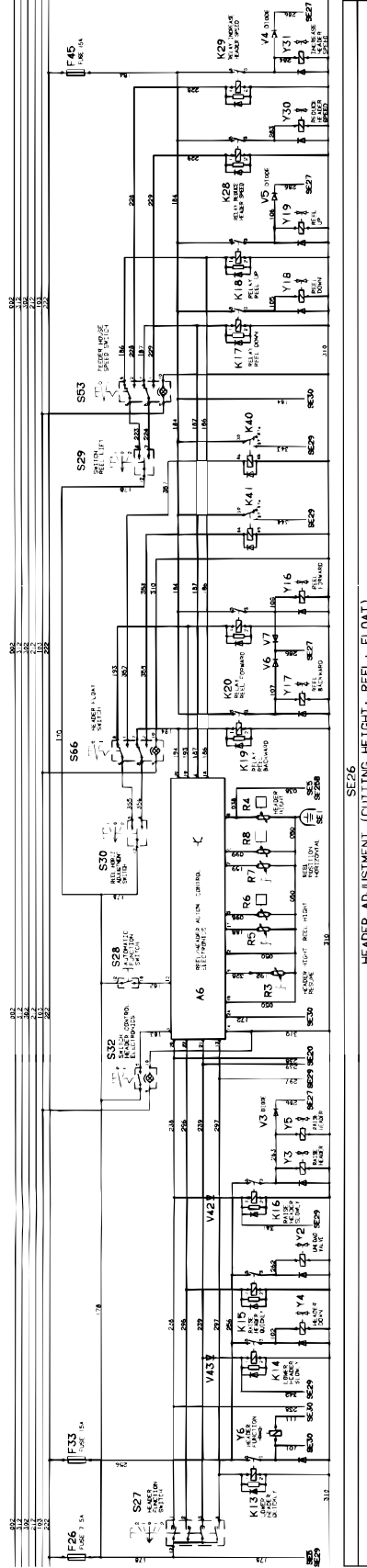
reel or the solenoids for increasing or decreasing header speed.

Potentiometers (R4, R6 and R8) indicate reel position (height and horizontal position) and header height (needed for electronic control). Potentiometers (R3, R5 and R7) in the switch console can be used to select desired settings. When actuating switch (S28), the header is automatically set according to the selected values.

*NOTE: Manual control functions will override automatic control functions.*

ZX, TMXZCO003192-19-17 JAN94

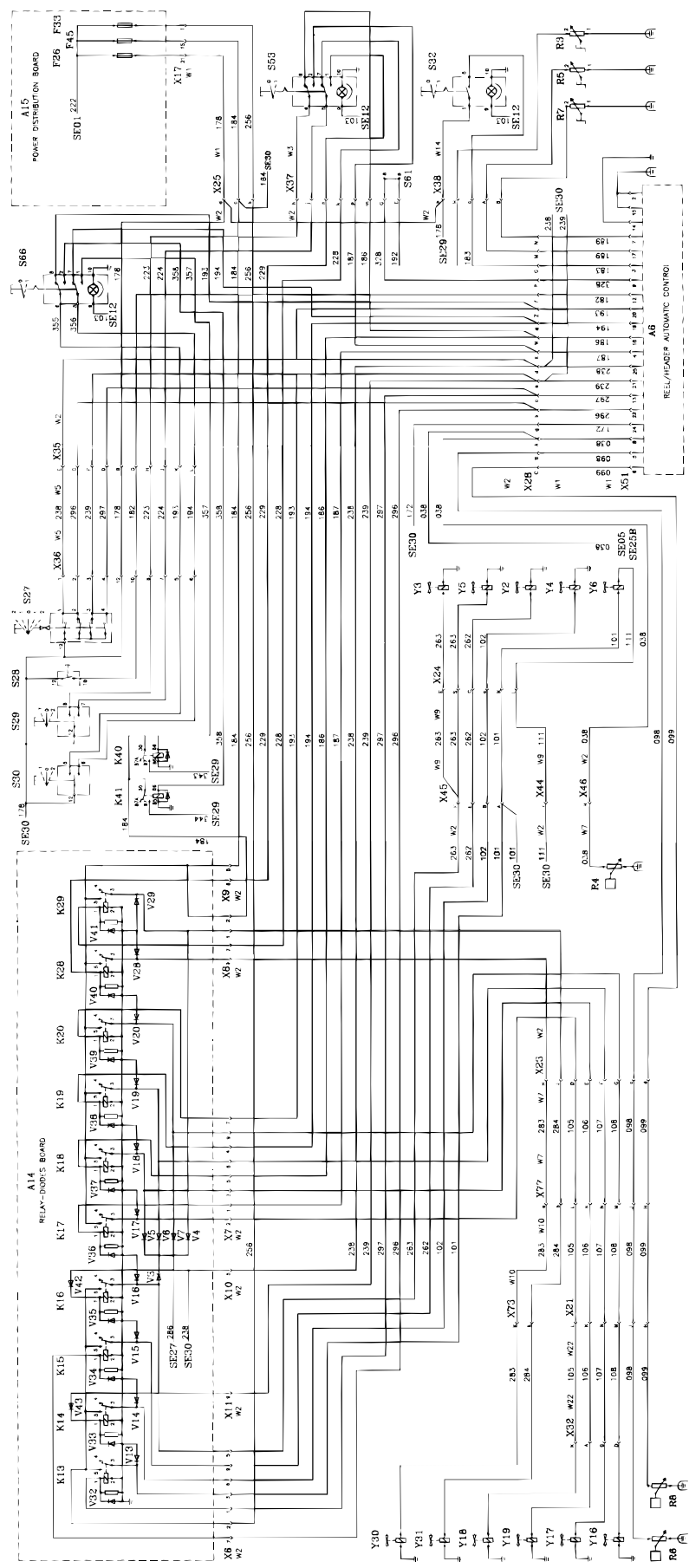
FUNCTIONAL SCHEMATIC OF SECTION 26



ZK005244  
13797334

- A6 —Automatic header control 7.5 amps.
- F26 —Fuse, 15 amps.
- F33 —Fuse, 15 amps.
- F45 —Fuse, 15 amps.
- K13 —Relay, lower header quickly
- K14 —Relay, lower header slowly
- K15 —Relay, raise header quickly
- K16 —Relay, raise header slowly
- K17 —Relay, lower reel
- K18 —Relay, raise reel
- K19 —Relay, move reel to height resume
- K20 —Relay, move reel to the front
- K28 —Relay, variable header drive (slow)
- K29 —Relay, variable header drive (fast)
- K40 —Relay, tilting header to the left
- K41 —Relay, tilting header to the right
- R3 —Potentiometer, header height resume
- R4 —Potentiometer, header height
- R5 —Potentiometer, reel height
- R6 —Selector switch, raise reel/variable header
- R7 —Potentiometer, reel position
- R8 —Selector switch, horizontal tilt
- S27 —Switch, raise/lower header
- S29 —Switch, raise reel
- S30 —Switch, reel horizontal controls
- S32 —Switch, resume
- S33 —Selector switch, raise reel/variable header
- S66 —Selector switch, horizontal reel adjustment/header lateral tilt

DIAGNOSTIC SCHEMATIC OF SECTION 26



ZK004125

Z Series Combines  
PN=688

240-15AB-3

TM4505 (05DEC00)





## Group 16AB Header Adjustments from Ser.No. 062722

### OPERATIONAL INFORMATION

All header settings such as header lift, reel lift and horizontal reel adjustment are carried out hydraulically and are controlled electrically.

The basic adjustment preset by the operator can be obtained automatically at any time by pressing a button.

*NOTE: For safety reasons, header or reel can only be adjusted with engine running and road safety switch in "field" position.*

ZX, TMXZCO003191-19-17JAN94

### THEORY OF OPERATION

As switches (S27, S29 and S30) are not designed for high current draw, a relay is located in front of each hydraulic function solenoid of this Section.

All switches and header control (A6) are protected by fuse (F26).

Operating current for solenoids used for raising/lowering header is supplied via fuse (F33).  
Operating current for solenoids of reel functions and variable feeder house drive is supplied via fuse (F45).

Depending on position of selector switch (S53), switch (S29) activates the solenoids for raising or lowering

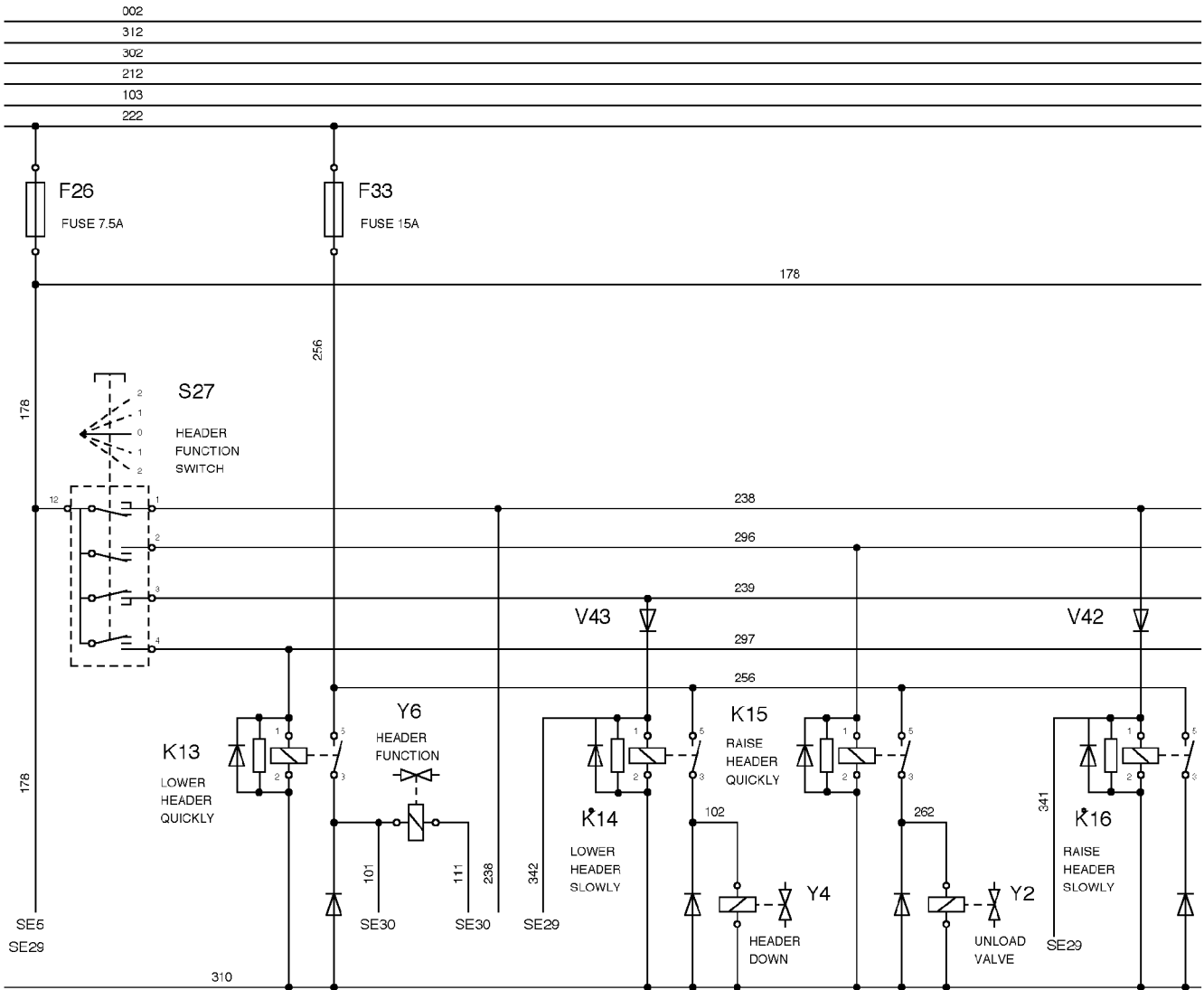
reel or the solenoids for increasing or decreasing header speed.

Potentiometers (R4, R6 and R8) indicate reel position (height and horizontal position) and header height (needed for electronic control). Potentiometers (R3, R5 and R7) in the switch console can be used to select desired settings. When actuating switch (S28), the header is automatically set according to the selected values.

*NOTE: Manual control functions will override automatic control functions.*

ZX, TMXZCO003192-19-17JAN94

**FUNCTIONAL SCHEMATIC, SECTION 26A**



**SE26A**

HEADER ADJUSTMENT (CUTTING HEIGHT; REEL; FLOAT)

ZX008224

ZX.TMXZCO006548-19-15MAR96

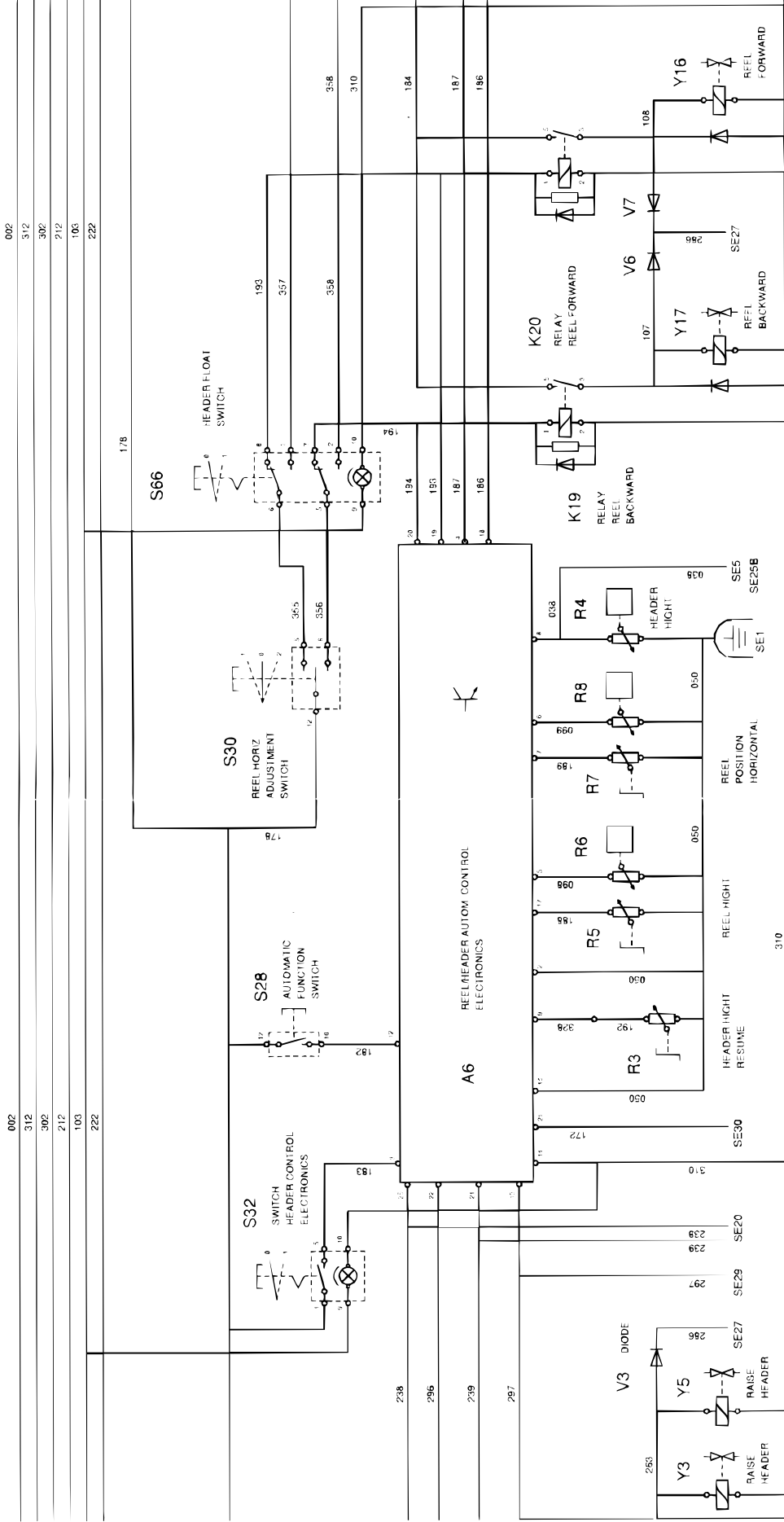
-JUN-25OCT96  
ZX008224

## FUNCTIONAL SCHEMATIC, SECTION 26A

A6 —Automatic header control	K18 —Relay, raise reel	R3 —Potentiometer, header height resume	S29 —Switch, raise reel
F26 —Fuse, 7.5 amps.	K19 —Relay, move reel to the rear	R4 —Sending unit, header height	S30 —Switch, reel horizontal adjustment
F33 —Fuse, 15 amps.	K20 —Relay, move reel to the front	R5 —Potentiometer, reel height	S32 —Switch, resume controls
F45 —Fuse, 15 amps.	K28 —Relay, variable header drive (slow)	R6 —Sending unit, reel height	S53 —Selector switch, raise reel/variable header drive
K13 —Relay, lower header quickly	K29 —Relay, variable header frive (fast)	R7 —Potentiometer, reel position	S66 —Selector switch, horizontal reel adjustment/header lateral tilt
K14 —Relay, lower header slowly	K40 —Relay, tilting header to the left	R8 —Sending unit, reel position	
K15 —Relay, raise header quickly	K41 —Relay, tilting header to the right	S27 —Switch, raise/lower header	
K16 —Relay, raise header slowly			
K17 —Relay, lower reel			

ZX, TMXZCO006567-19-15MAR96

**FUNCTIONAL SCHEMATIC, SECTION 26B**



**SE26B**

**HEADER ADJUSTMENT (CUTTING HEIGHT, REEL; FLOAT)**

ZX008225

TM4505 (05DEC00)

**240-16AB-4**

ZX.TMXZ0000588.19.15MAR99  
Z Series Combines  
06/300  
PN=703

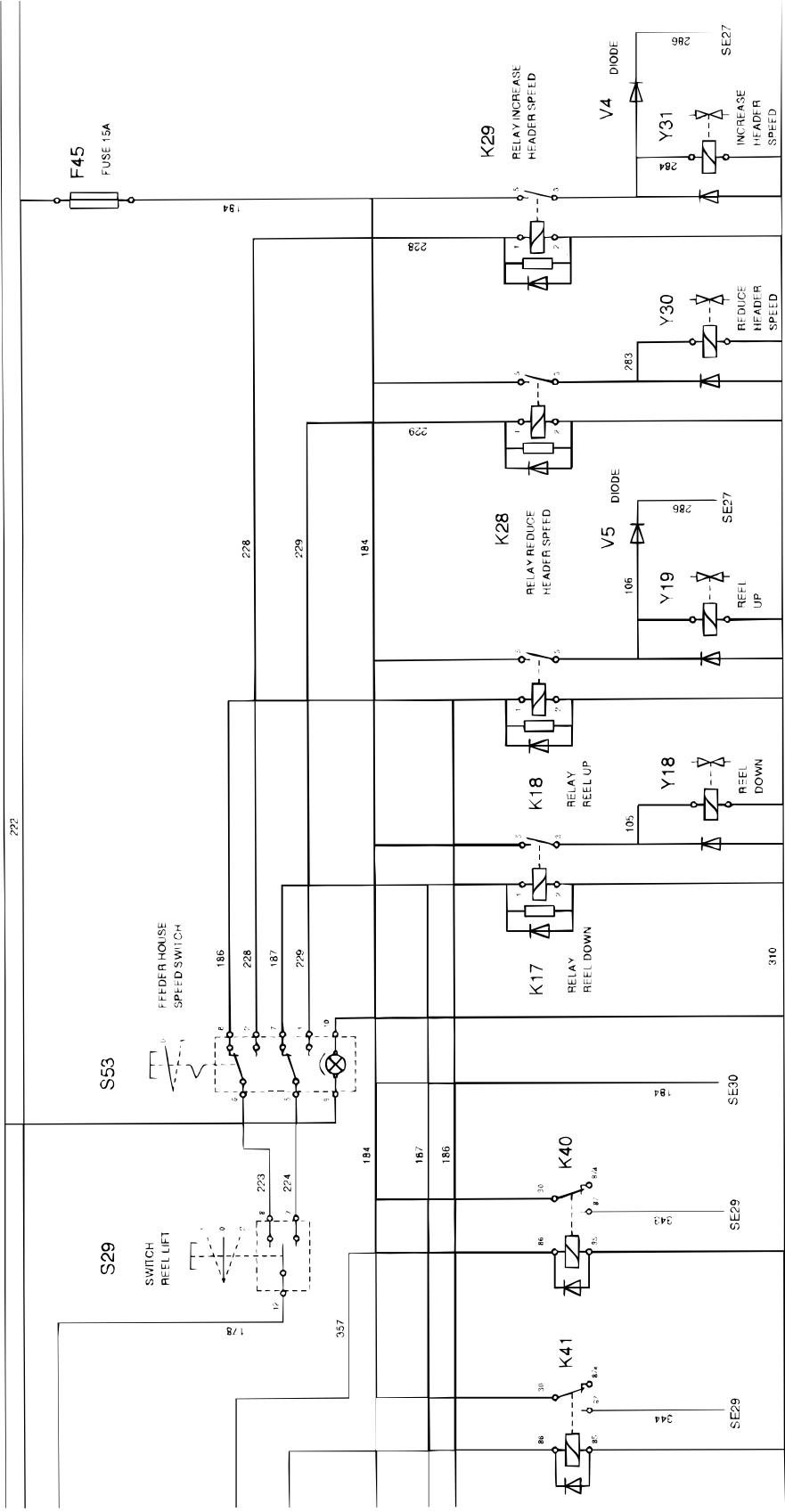
## FUNCTIONAL SCHEMATIC, SECTION 26B

A6 —Automatic header control	K18 —Relay, raise reel	R3 —Potentiometer, header height resume	S29 —Switch, raise reel
F26 —Fuse, 7.5 amps.	K19 —Relay, move reel to the rear	R4 —Sending unit, header height	S30 —Switch, reel horizontal adjustment
F33 —Fuse, 15 amps.	K20 —Relay, move reel to the front	R5 —Potentiometer, reel height	S32 —Switch, resume controls
F45 —Fuse, 15 amps.	K28 —Relay, variable header drive (slow)	R6 —Sending unit, reel height	S53 —Selector switch, raise reel/variable header drive
K13 —Relay, lower header quickly	K29 —Relay, variable header frive (fast)	R7 —Potentiometer, reel position	S66 —Selector switch, horizontal reel adjustment/header lateral tilt
K14 —Relay, lower header slowly	K40 —Relay, tilting header to the left	R8 —Sending unit, reel position	
K15 —Relay, raise header quickly	K41 —Relay, tilting header to the right	S27 —Switch, raise/lower header	
K16 —Relay, raise header slowly			
K17 —Relay, lower reel			

ZX, TMXZCO006564-19-15MAR96

FUNCTIONAL SCHEMATIC, SECTION 26C

002  
312  
302  
212  
103  
222



SE26C

HEADER ADJUSTMENT (CUTTING HEIGHT; REEL; FLOAT)

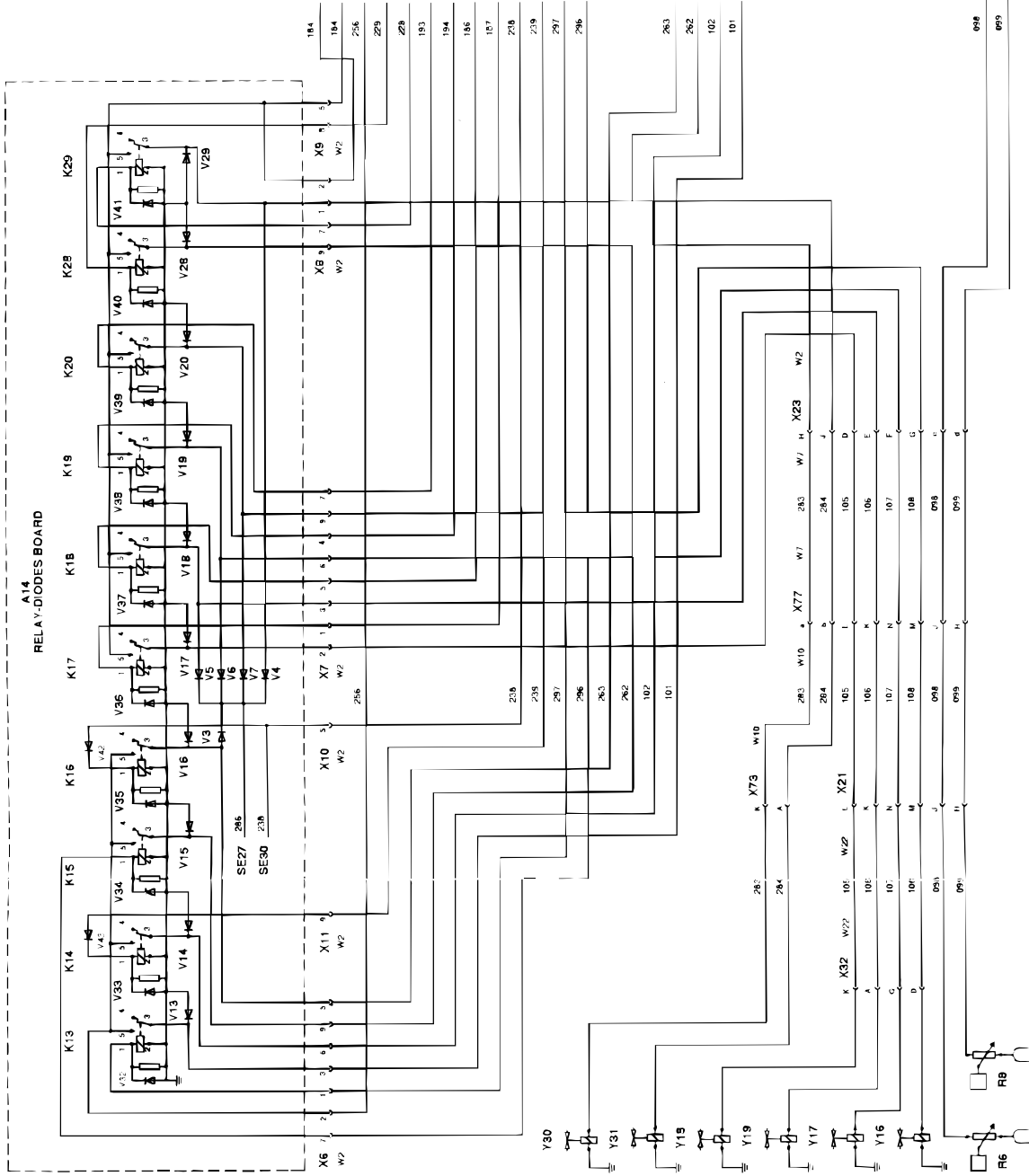
ZX008226

## FUNCTIONAL SCHEMATIC, SECTION 26C

A6 —Automatic header control	K18 —Relay, raise reel	R3 —Potentiometer, header height resume	S29 —Switch, raise reel
F26 —Fuse, 7.5 amps.	K19 —Relay, move reel to the rear	R4 —Sending unit, header height	S30 —Switch, reel horizontal adjustment
F33 —Fuse, 15 amps.	K20 —Relay, move reel to the front	R5 —Potentiometer, reel height	S32 —Switch, resume controls
F45 —Fuse, 15 amps.	K28 —Relay, variable header drive (slow)	R6 —Sending unit, reel height	S53 —Selector switch, raise reel/variable header drive
K13 —Relay, lower header quickly	K29 —Relay, variable header frive (fast)	R7 —Potentiometer, reel position	S66 —Selector switch, horizontal reel adjustment/header lateral tilt
K14 —Relay, lower header slowly	K40 —Relay, tilting header to the left	R8 —Sending unit, reel position	
K15 —Relay, raise header quickly	K41 —Relay, tilting header to the right	S27 —Switch, raise/lower header	
K16 —Relay, raise header slowly			
K17 —Relay, lower reel			

ZX,TMXZCO006563-19-15MAR96

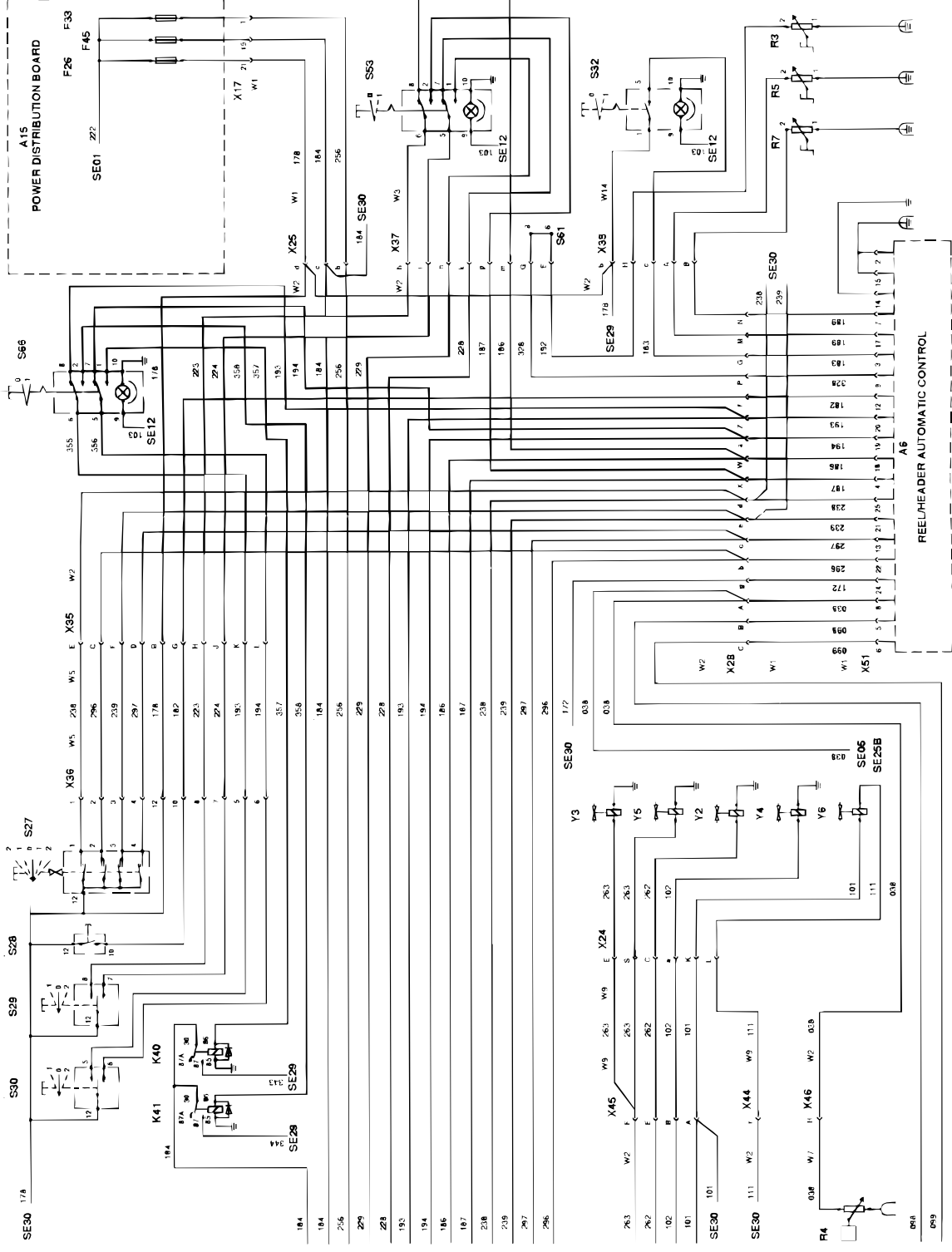
### DIAGNOSTIC SCHEMATIC, SECTIONS 26A, 26B AND 26C



ZX005382



### DIAGNOSTIC SCHEMATIC, SECTIONS 26A, 26B AND 26C



ZX005383

TM4505 (05DEC00)

240-16AB-9

ZX1MXZ0006901915MAR95  
Z Series Combines  
06/3/98  
PN=708



## Group 15AC Grain Tank Unloading System

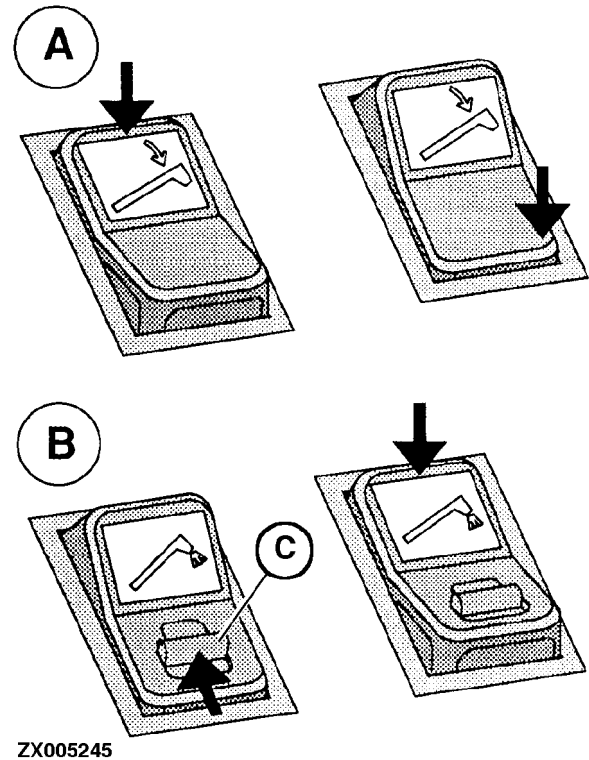
### OPERATIONAL INFORMATION

Switch (A) is used to swing unloading auger in or out.

*NOTE: A timer relay interrupts current supply to electromagnetic control valve after 22 seconds to prevent overheating of the hydraulic system.*

Switch (B) is used to engage unloading auger drive. A switch lock is provided to avoid unintentional engagement of unloading auger drive.

- A—Switch, swing unloading auger in or out
- B—Unloading auger drive switch
- C—Switch lock



ZX005245

ZX005245  
-JUN-19/MAY 95

ZX, TMXZCO003195-19-17JAN94

### THEORY OF OPERATION

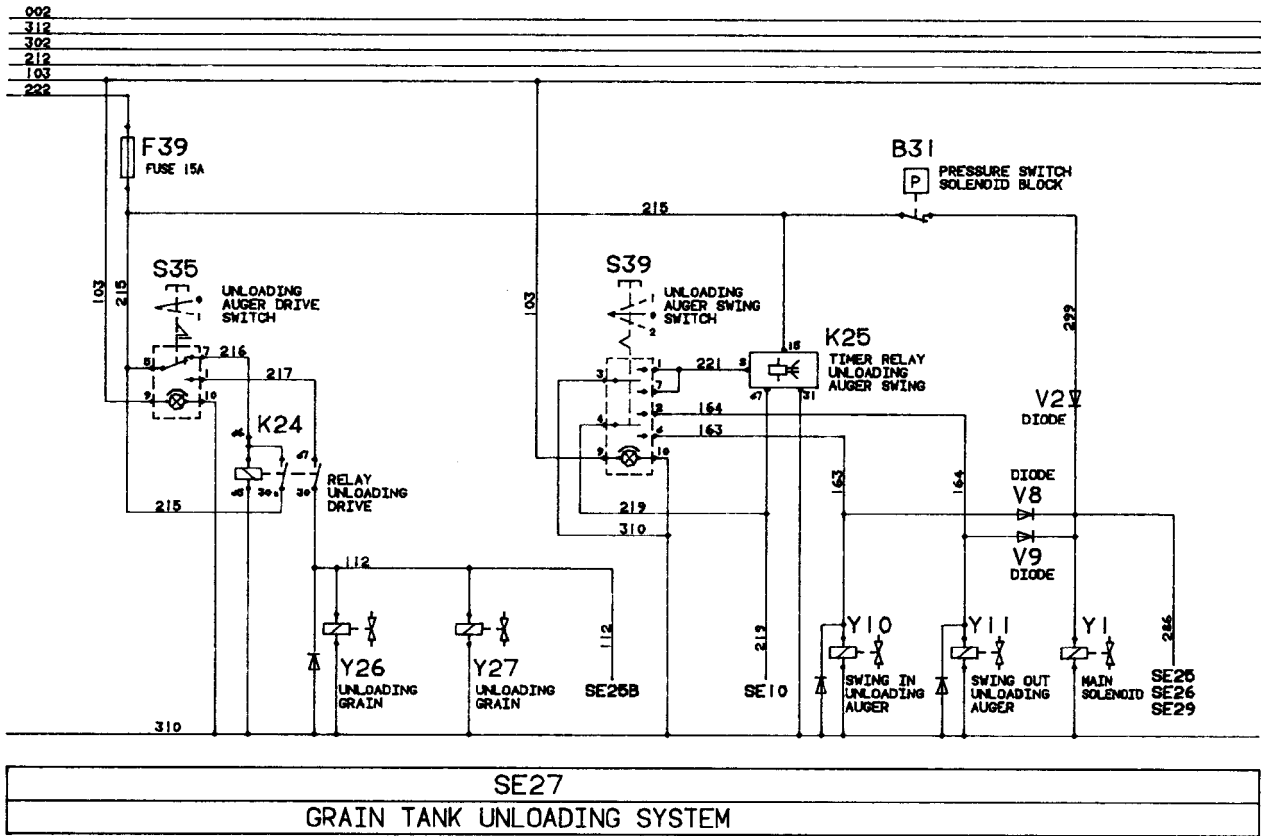
With road safety switch in “field” position and engine running, power is supplied to switches (S35) and (S39), pressure switch (B31) and timer relay (K25) via fuse (F39).

With switch (S35) in neutral position, relay (K24) is activated. When engaging unloading auger drive, relay (K24) is held in position. Solenoids (Y26) and (Y27) are activated. The pressure valve is activated by pressure switch (B31), depending on pressure.

When swinging unloading auger in or out, double contact switch (S39) connects terminal (S) of timer relay (K25) to ground. Thus terminal (87) of timer relay is supplied with power. The second contact of double contact switch (S39) activates the solenoid for swinging unloading auger in or out. The timer relay powers terminal (87) for 22 seconds.

ZX, TMXZCO003196-19-17JAN94

FUNCTIONAL SCHEMATIC OF SECTION 27

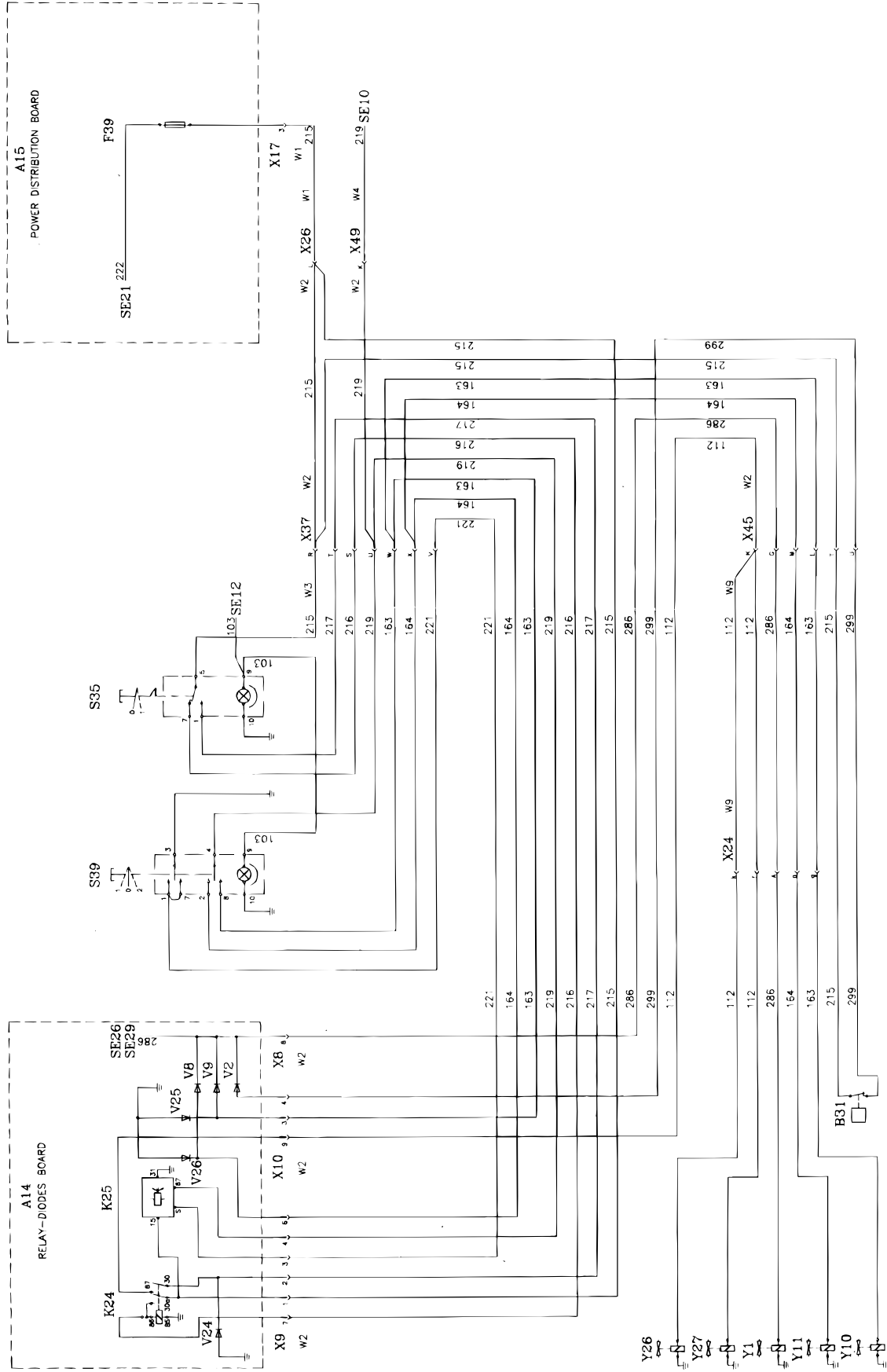


ZX005246

- |                                          |                                                            |                                                                      |                                                                   |
|------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------------|-------------------------------------------------------------------|
| A14 —Relay and diode board               | V9 —Diode                                                  | X24 —Connection, rear basic harness (W9) to solenoid valve block     | X49 —Disconnect point, cab harness (W2), corner post harness (W4) |
| A15 —Fuse board                          | V24 —Diode                                                 | X26 —Disconnect point, distribution harness (W1), cab harness (W2)   | Y1 —Pressure valve 1                                              |
| B31 —Pressure switch, main clutch        | V25 —Diode                                                 | X37 —Disconnect point, cab harness (W2), switch console harness (W3) | Y10 —Solenoid, swing in unloading auger                           |
| F39 —Fuse, 15 amps.                      | V26 —Diode                                                 | X45 —Disconnect point, cab harness (W2), rear basic harness (W9)     | Y11 —Solenoid, swing out unloading auger                          |
| K24 —Safety relay, unloading auger drive | X8 —Connection, cab harness (W2) to relay and diode board  |                                                                      | Y26 —Solenoid, unloading grain tank                               |
| K25 —Timer relay, unloading auger swing  | X9 —Connection, cab harness (W2) to relay and diode board  |                                                                      | Y27 —Solenoid, unloading grain tank                               |
| S35 —Unloading auger drive switch        | X10 —Connection, cab harness (W2) to relay and diode board |                                                                      |                                                                   |
| S39 —Switch, unloading auger swing       | X17 —Connection, distribution harness (W1) to fuse board   |                                                                      |                                                                   |
| V2 —Diode                                |                                                            |                                                                      |                                                                   |
| V8 —Diode                                |                                                            |                                                                      |                                                                   |

ZX, TMXZCO003197-19-17JAN94

DIAGNOSTIC SCHEMATIC OF SECTION 27



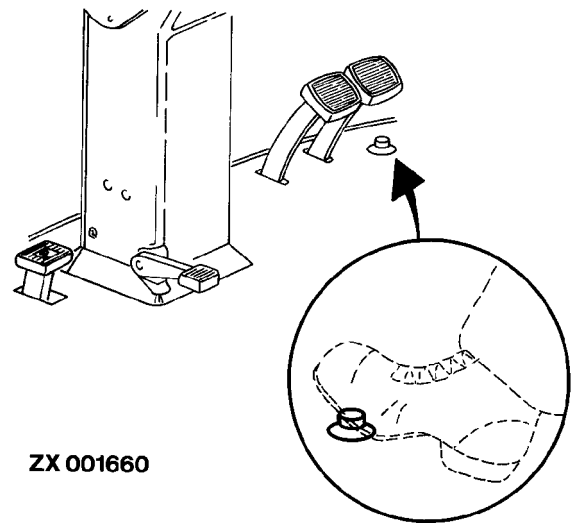
ZX004126



### OPERATIONAL INFORMATION

With starter switch in position (II), hydraulic four-wheel drive may be engaged by means of switch (S44).

An indicator light shows that four-wheel drive is engaged.



ZX, TMXZCO003199-19-17JAN94

### THEORY OF OPERATION

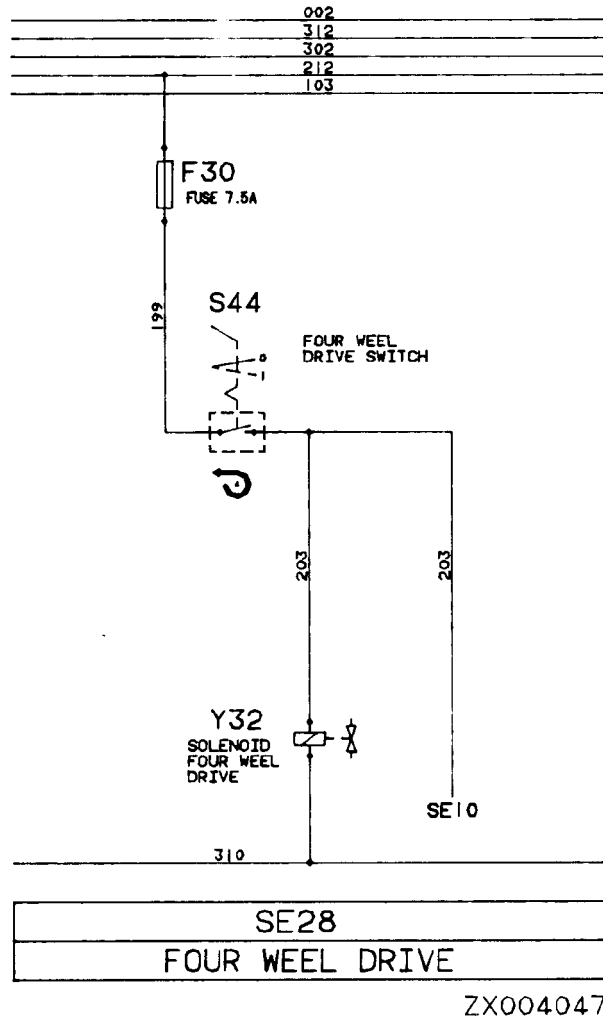
With starter switch in position (II), power is supplied to switch (S44) via fuse (F30).

When actuating switch (S44), solenoid (Y32) is activated and a certain amount of hydrostatic oil flow is directed to the rear axle.

At the same time an indicator light in Section 10 will glow.

ZX, TMXZCO003200-19-17JAN94

FUNCTIONAL SCHEMATIC OF SECTION 28



-JUN-17MAY95  
ZX004047

- A15— Fuse board
- F30— Fuse
- S44— Four-wheel drive switch
- Y32— Four-wheel drive solenoid
- X18 —Connection, distribution harness (W1) to fuse board

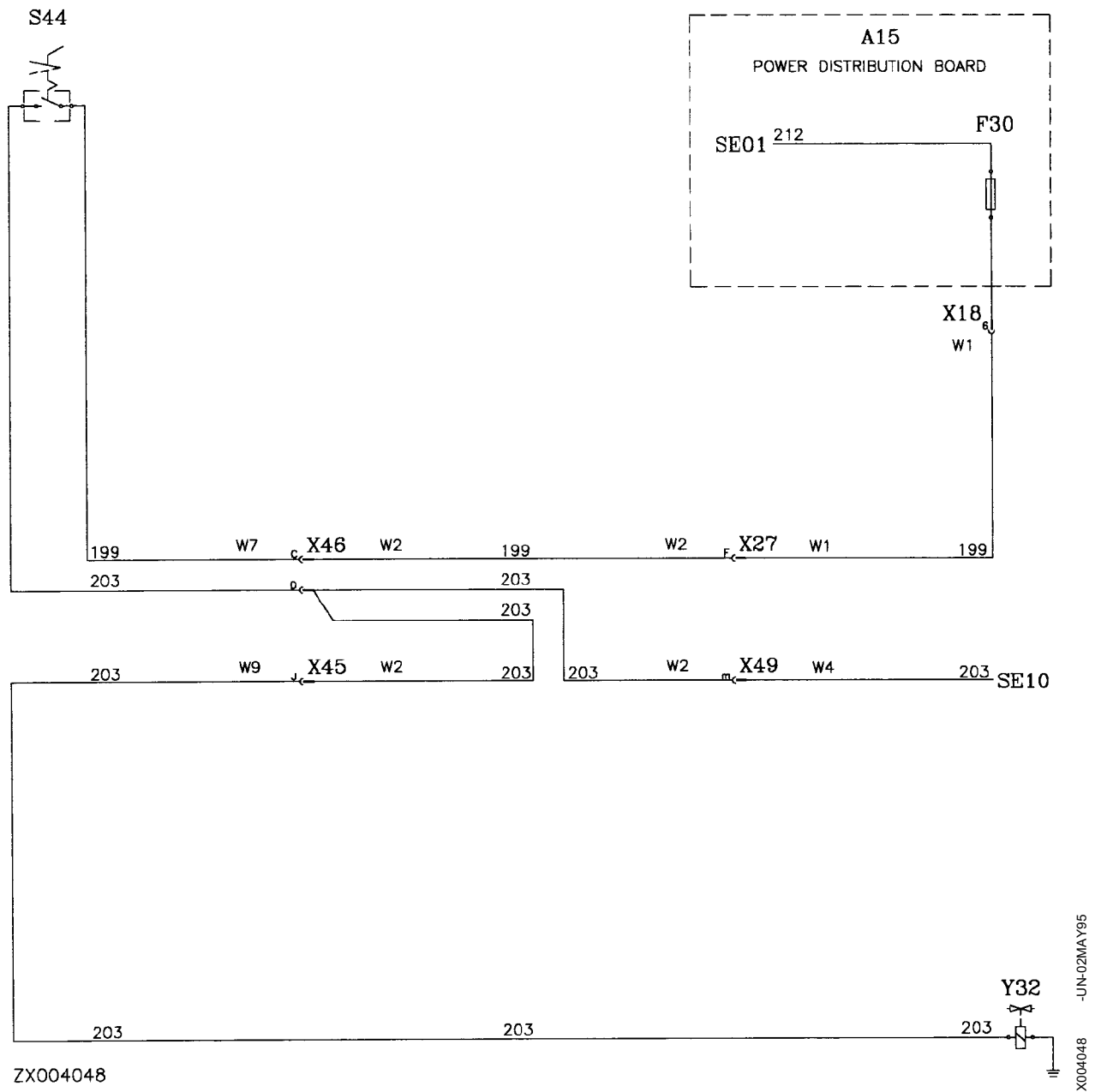
- X27 —Disconnect point, distribution harness (W1), cab harness (W2)
- X37 —Disconnect point, cab harness (W2), switch console harness (W3)

- X45 —Disconnect point, cab harness (W2), rear basic harness (W9)

- X49 —Disconnect point, cab harness (W2), corner post harness (W4)



**DIAGNOSTIC SCHEMATIC OF SECTION 28**



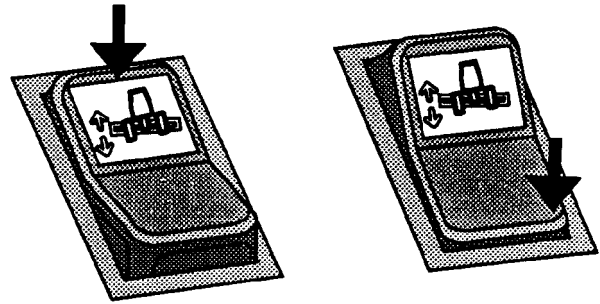
ZX, TMXZCO003202-19-17JAN94



## Group 15AE Header Lateral Tilt Function

### OPERATIONAL INFORMATION

This function is provided to tilt the header laterally, e.g. when working on slopes. It will provide a uniform cutting height over the entire header width. Without the lateral tilt function, cutting height on the uphill side would be higher than on the downhill side due to combine weight distribution.



ZX005247

ZX, TMXZCO003203-19-17 JAN94

ZX005247  
-UN-28APR95

### THEORY OF OPERATION

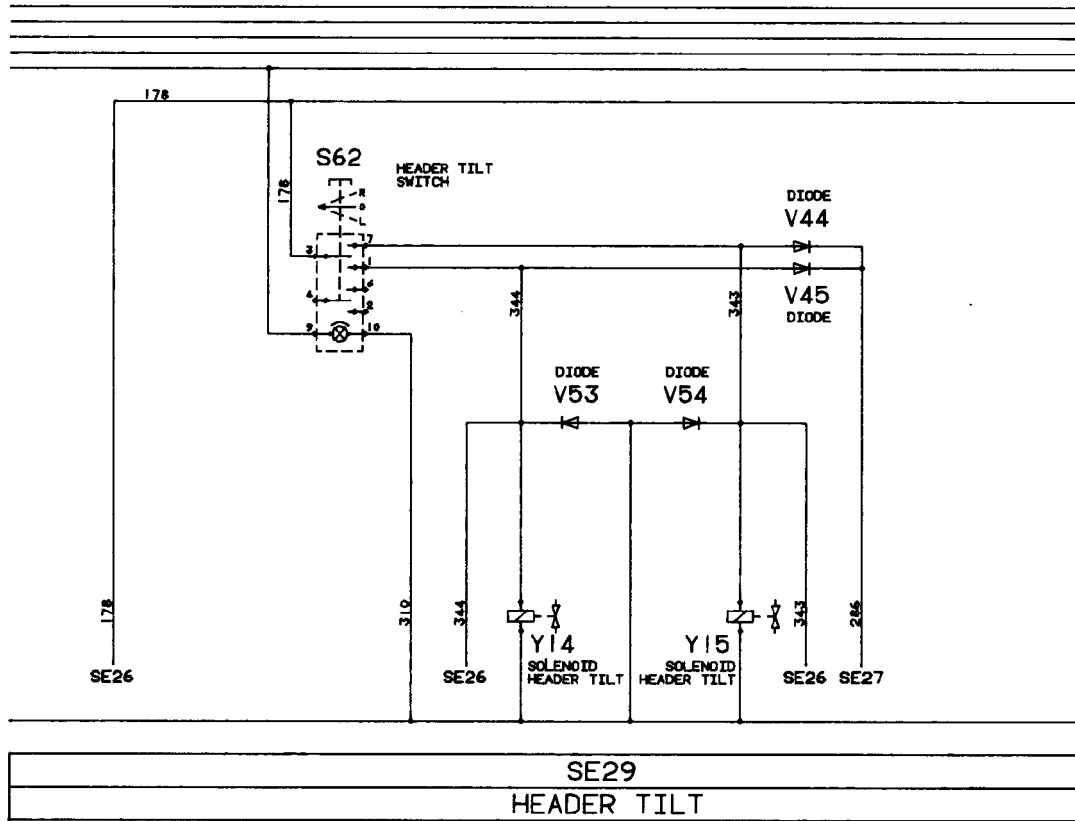
With road safety switch in “field” position and engine running, power is supplied to switch (S22) via fuse (F26). When tilting header to the left or right, solenoid (Y14) or (Y15) is activated.

Pressure valve (Y1) in Section 27 is also activated via diode (V44) or (V45).

*NOTE: Switch (S62) is normally not installed, because Section 26 is used to control the function. Field installation of the switch is possible.*

ZX, TMXZCO003204-19-17 JAN94

**FUNCTIONAL SCHEMATIC OF SECTION 29**



ZX005248

-UN-02MAY95  
ZX005248

A14 —Relay and diode board  
 S62 —Switch, header lateral tilt  
 X11 —Connection, cab harness (W2) to relay and diode board  
 X12 —Connection, cab harness (W2) to relay and diode board

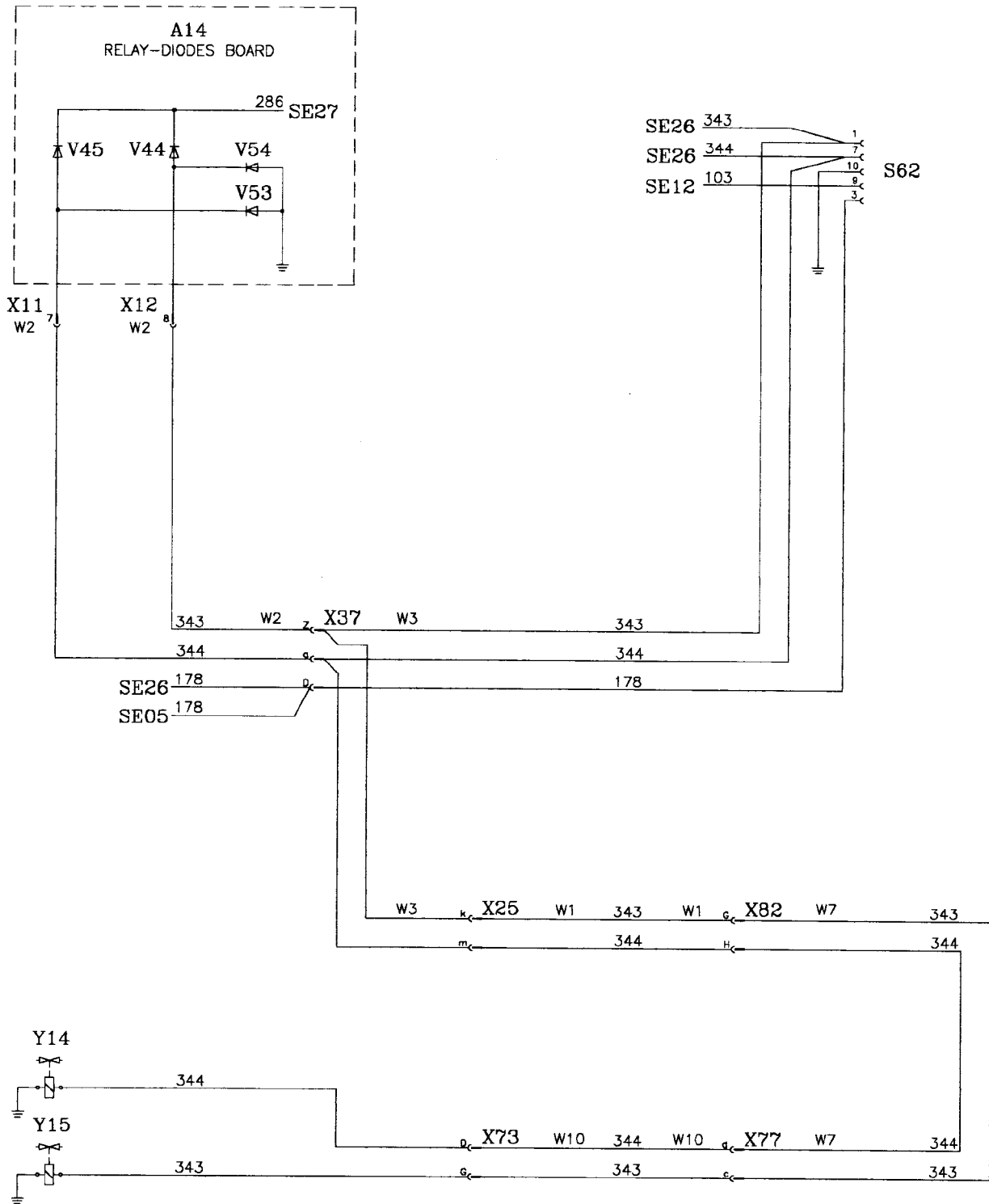
X25 —Disconnect point, distribution harness (W1), cab harness (W2)  
 X37 —Disconnect point, cab harness (W2), switch console harness (W3)

X73 —Connection, feeder house harness (W10) to solenoid valve block  
 X77 —Disconnect point, front basic harness (W7), feeder house harness (W10)

X82 —Disconnect point, distribution harness (W1), front basic harness (W7)

ZX, TMXZCO003205-19-17JAN94

**DIAGNOSTIC SCHEMATIC OF SECTION 29**



ZX004127

-UN-02MAY95  
ZX004127

ZX, TMXZCO003206-19-17JAN94



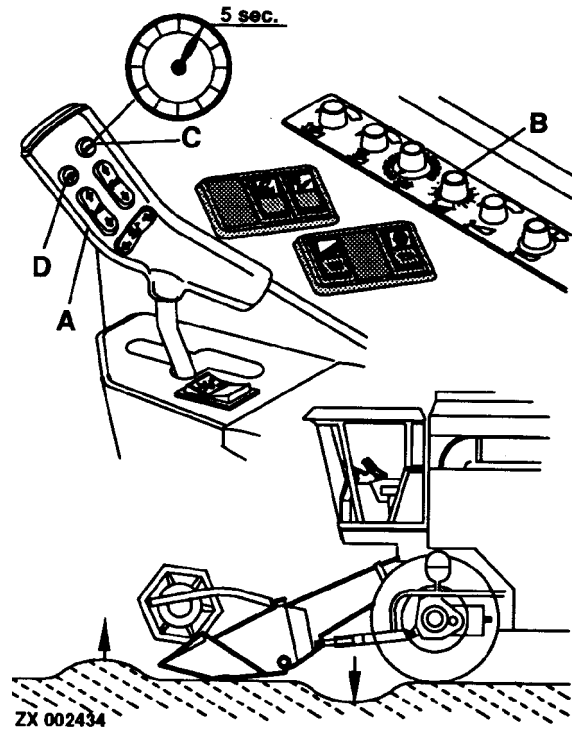
## Group 15AF Header Float Control

### OPERATIONAL INFORMATION

A preset float is selected by pressing button (C). Float is obtained by activating hydraulics of header lift system.

Use potentiometer (B) to adjust desired header float.

**IMPORTANT:** Do not operate float control for more than one minute without interruption to avoid overheating of the hydraulic oil.



ZX,TMXZCO003207-19-17JAN94

### THEORY OF OPERATION

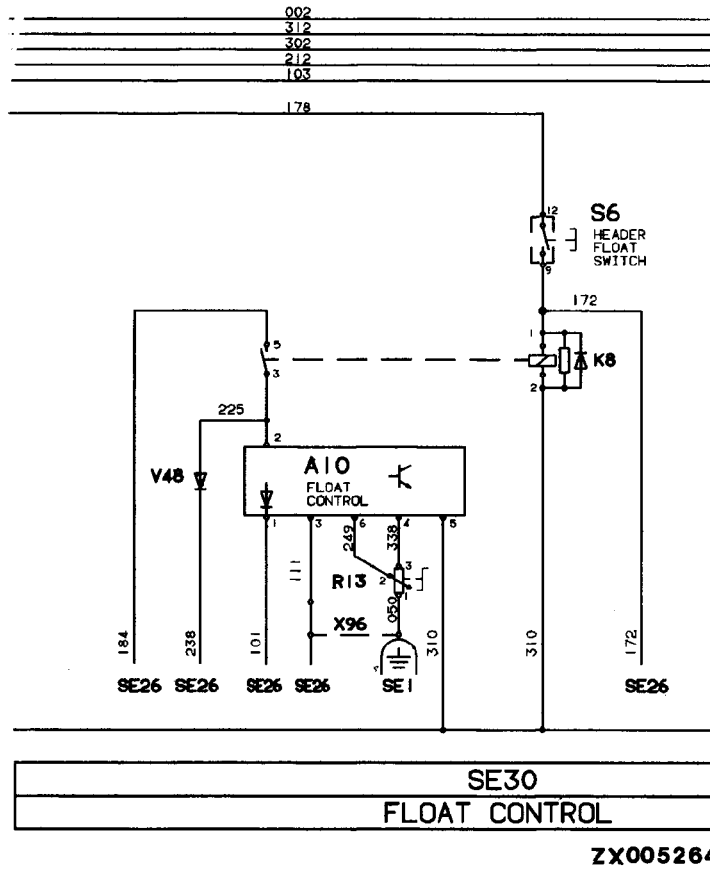
Float control system (A10) is powered via wire 184. When switch (S6) is actuated, header control system (A6) in Section 26 is switched off. The function "raise header slowly" is activated via diode (V48) and wire 238.

At the same time, coil of solenoid (Y6) is supplied with voltage via wires 101 and 102.

Depending on potentiometer setting, float control electronics will provide a current between 350 and 900 mA to the solenoid coil. This in turn will provide a lower or higher hydraulic system pressure.

ZX,TMXZCO003208-19-17JAN94

**FUNCTIONAL SCHEMATIC OF SECTION 30**



ZX005264 -UN-28APR95

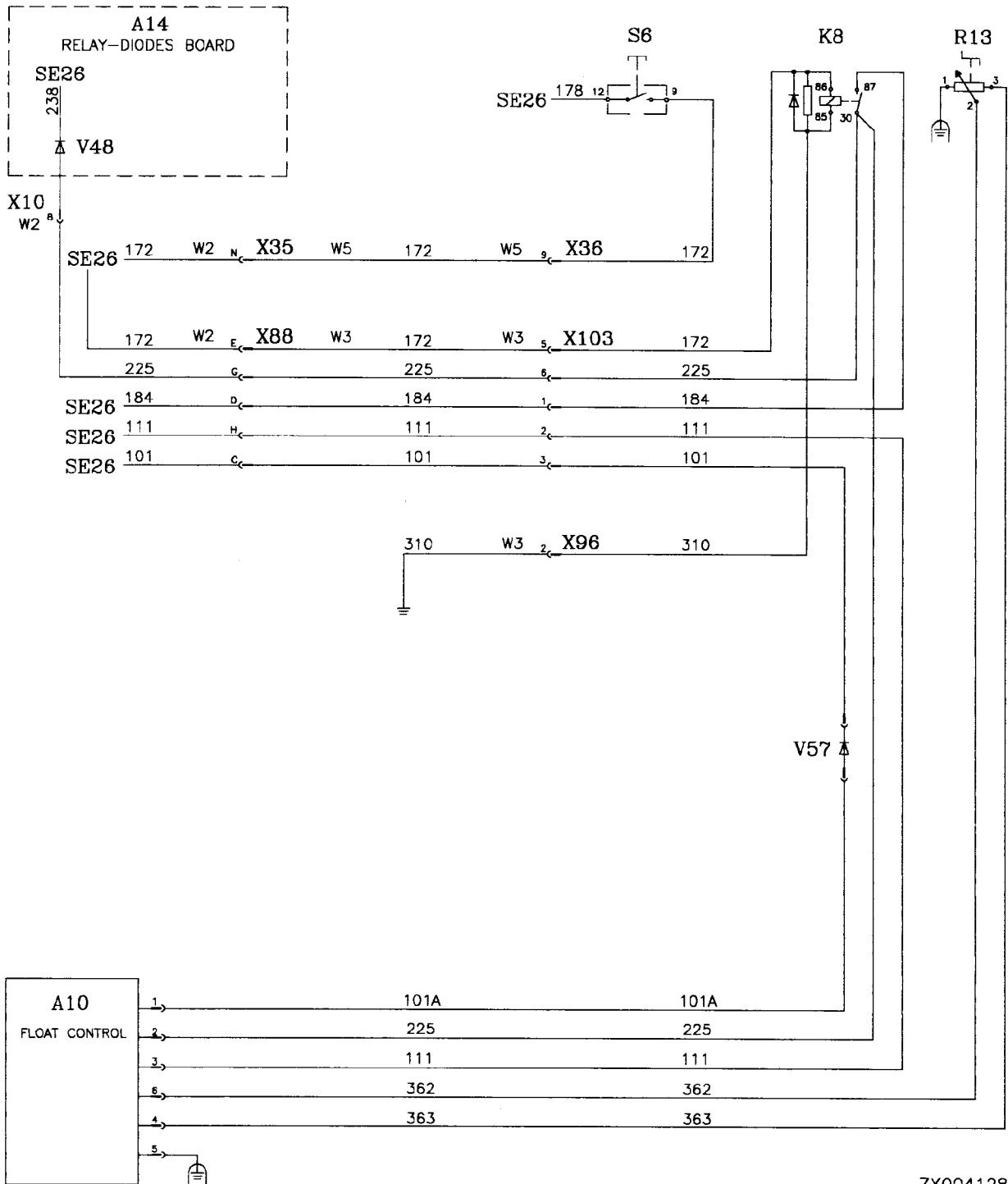
ZX005264

- |                                                       |                                                               |                                                                      |                                                                 |
|-------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------------|
| A10 —Float control                                    | X35 —Disconnect point, cab harness (W2), armrest harness (W5) | X88 —Disconnect point, cab harness (W2), switch console harness (W3) | X103—Connection, switch console harness to float control system |
| A14 —Relay and diode board                            | X36 —Connection, armrest harness (W5) to multifunction lever  | X96 —Disconnect point, ground                                        |                                                                 |
| K8 —Relay                                             |                                                               |                                                                      |                                                                 |
| R13 —Potentiometer                                    |                                                               |                                                                      |                                                                 |
| S6 —Header float switch                               |                                                               |                                                                      |                                                                 |
| X10 —Connection, cab harness to relay and diode board |                                                               |                                                                      |                                                                 |

ZX,TMXZCO003209-19-17JAN94



**DIAGNOSTIC SCHEMATIC OF SECTION 30**



ZX004128

-JUN-02MAY95

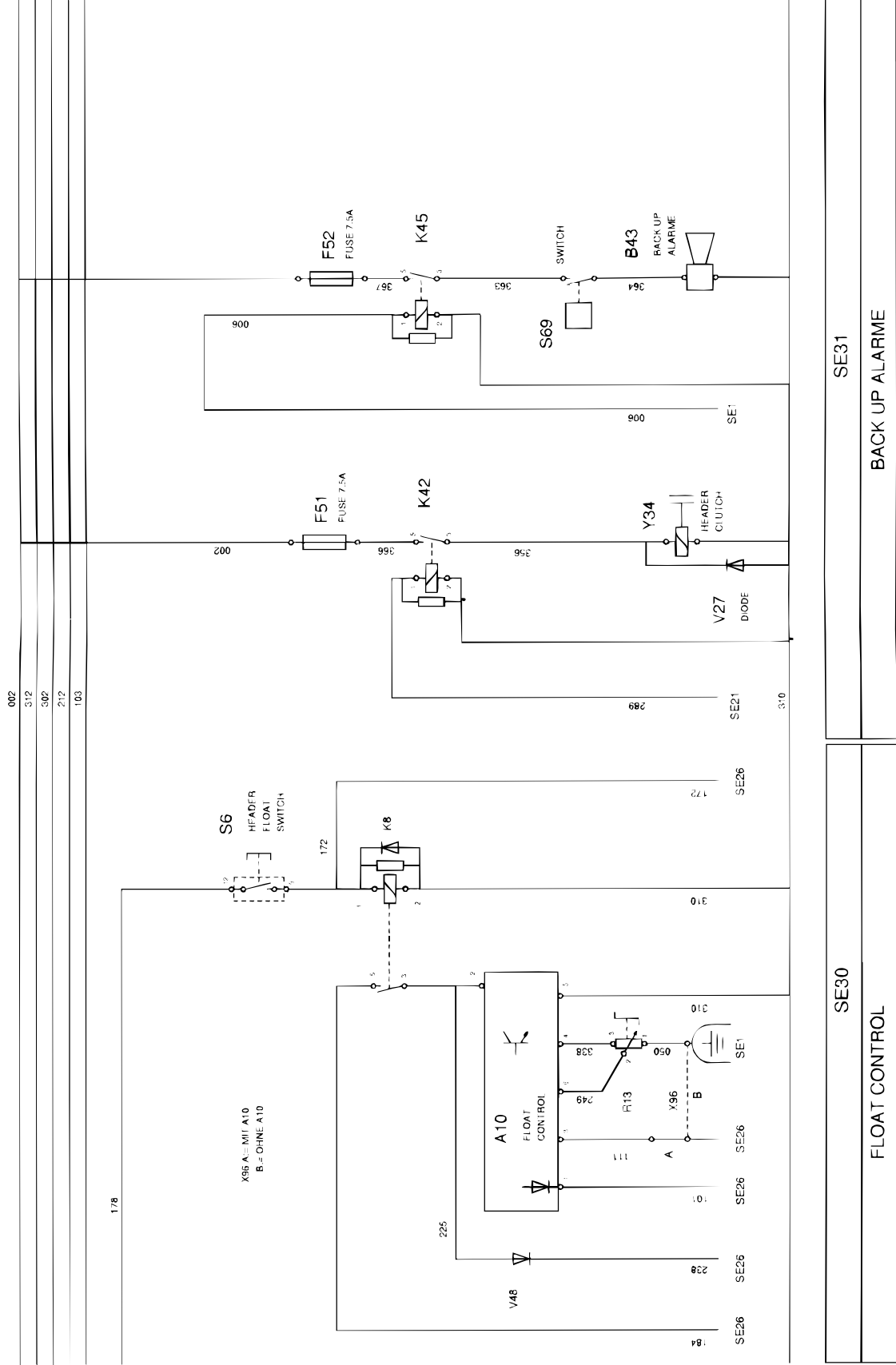
ZX004128

ZX, TMXZCO003210-19-17JAN94



**Group 15AG**  
**Reverse Drive Alarm from Ser.No. 062722**

**FUNCTIONAL SCHEMATIC, SECTIONS 30 AND 31**



ZX008599

TM4505 (05DEC00)

**240-15AG-1**

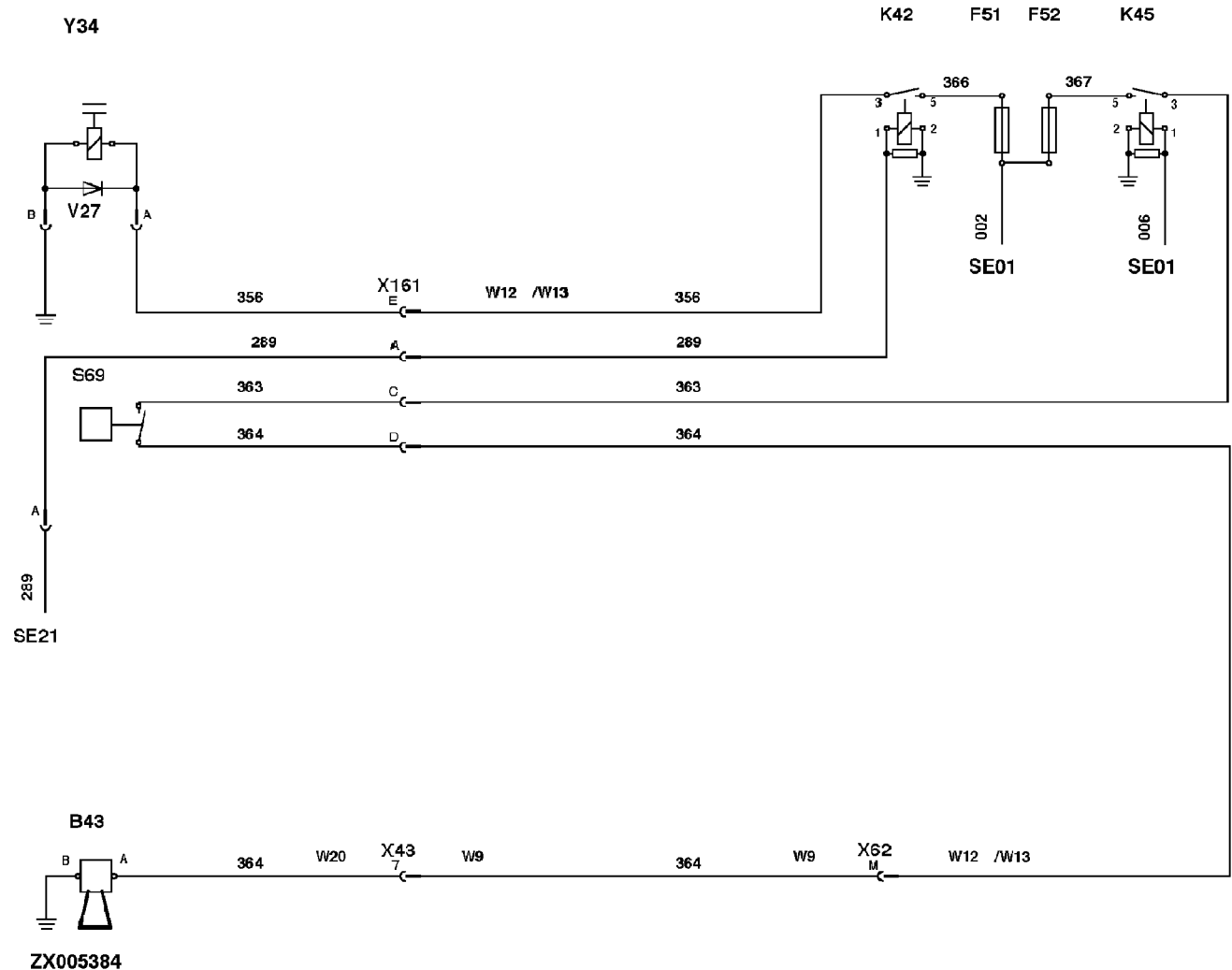
ZX1MXZ000659-19-15MAR99  
Z Series Combines  
06/1998  
PN=726

**FUNCTIONAL SCHEMATIC, SECTIONS 30 AND 31**

- |                                                        |                                       |                                                  |                              |
|--------------------------------------------------------|---------------------------------------|--------------------------------------------------|------------------------------|
| B43 —Reverse drive alarm buzzer                        | K42 —Relay, el. clutch (moving motor) | S69 —Reverse drive alarm switch                  | K45 —Relay D+ (moving motor) |
| F51 —Fuse, 7.5 amps., electric clutch for header drive | Y34 —Electric clutch, header          | F52 —Fuse, 7.5 amps., header reverse drive alarm |                              |
|                                                        | V27 —Diode                            |                                                  |                              |

ZX.TMXZCO006570-19-15MAR96

**DIAGNOSTIC SCHEMATIC, SECTION 31**

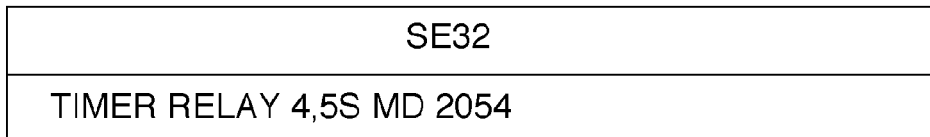
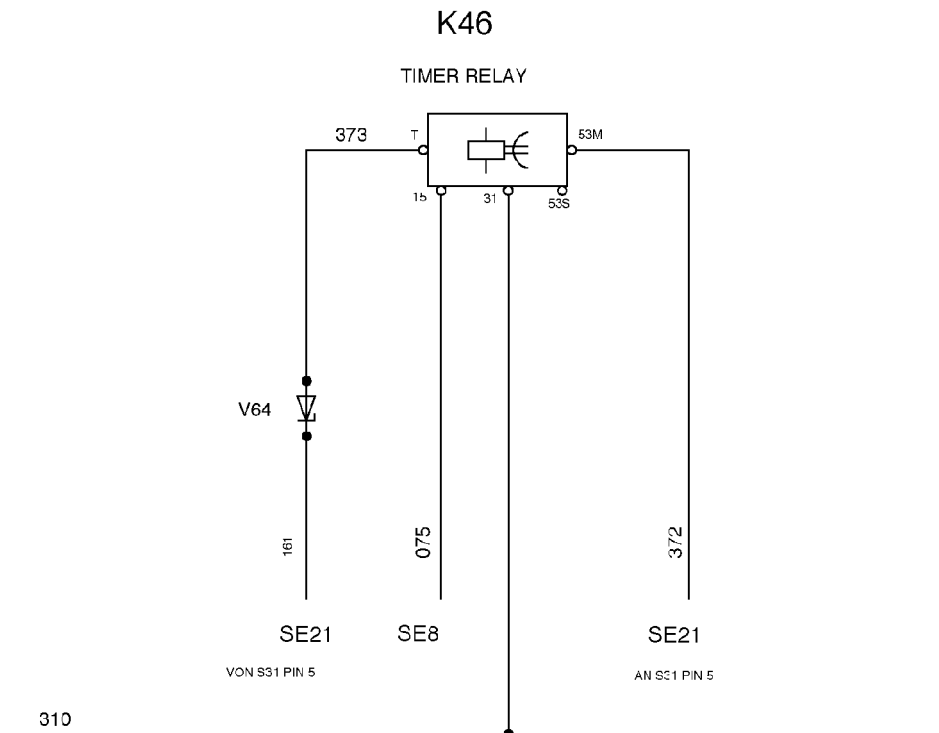


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**Group 15AH**  
**Separator Timer Relay from Ser.No. 062722**

**FUNCTIONAL SCHEMATIC, SECTION 32**

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312
302
212
103



ZX008600

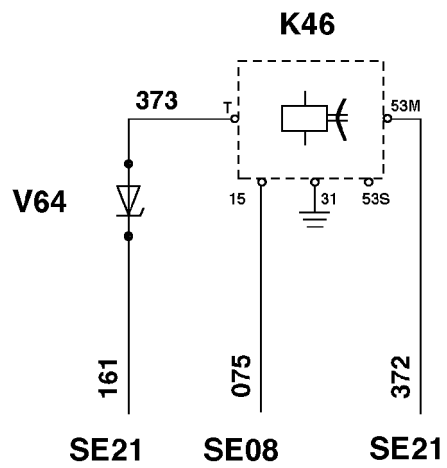
**K46 —Timer relay, separator**

**V64 —Zener diode 1N5444B**

ZX008600 -JUN-24OCT96

ZX, TMXZCO006492-19-15MAR96

**DIAGNOSTIC SCHEMATIC, SECTION 32**



ZX005385

ZX005385 -UN-16SEP96

ZX.TMXZC0006495-19-15MAR96

# Section 250 Power Train

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*Contents*

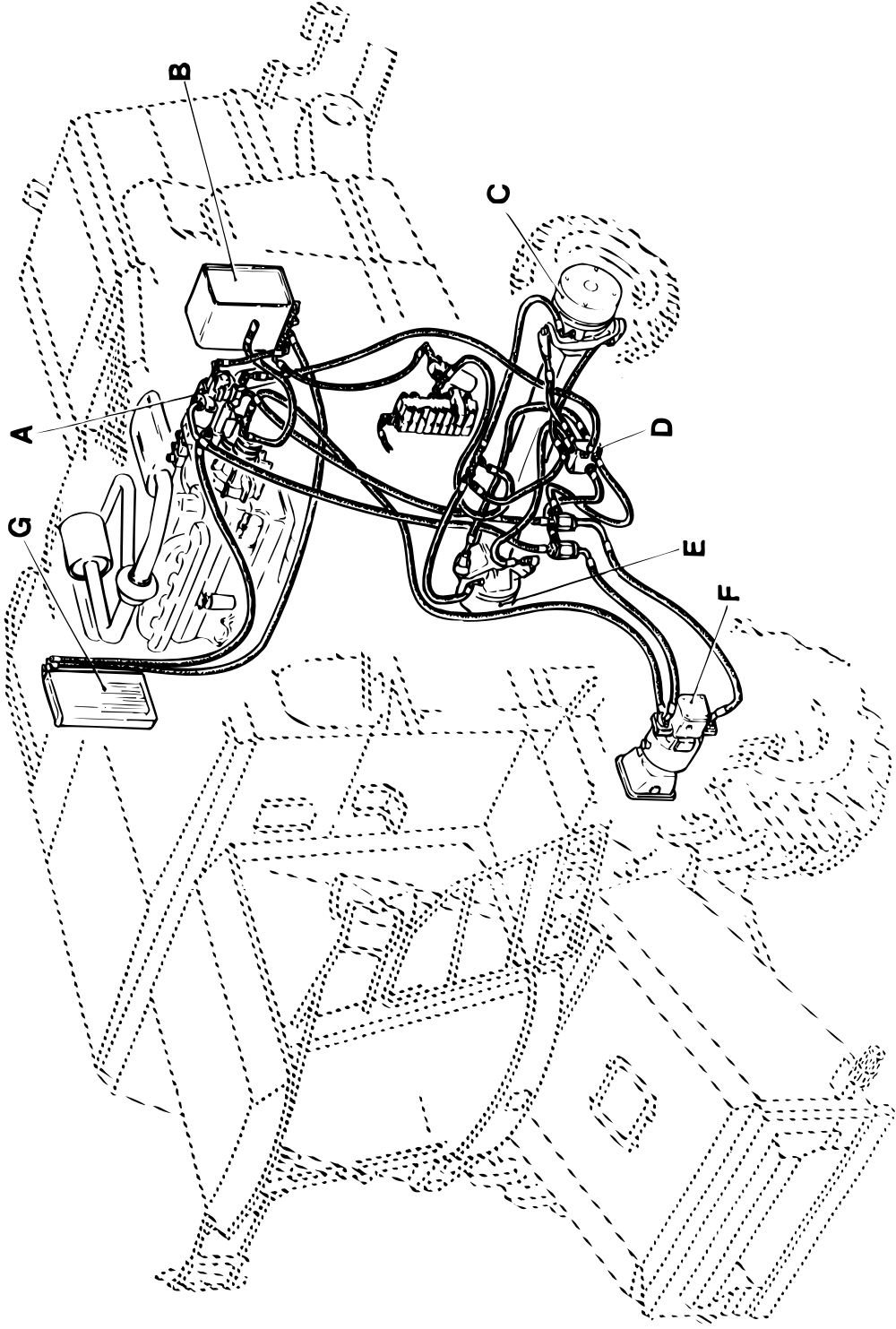


**SPECIFICATIONS**

Item	Measurement	Specification
Variable pump and fixed-displacement motor	Displacement	75 cm <sup>3</sup> /rev. (4.6 in <sup>3</sup> /rev.)
Charge pump	Flow (at max. speed)	45 L/Min. (11.8 gpm)
Variable pump swashplate	Angle variation	0° — 18°
Variable pump	Weight	70 kg (154 lb)
Fixed-displacement motor	Weight	38 kg (83.7 lb)
Control valve orifice	Diameter	0.9 mm (0.036 in.)
Hydraulic oil	Operating temperature	50 — 80°C (122 — 176°F)
Charge pump, neutral position	Pressure	1500 kPa (15 bar) (220 psi)
Charge pump, operating position	Pressure	1100 kPa (11 bar) (160 psi)
High pressure relief valves	Test pressure	Flushing pressure plus pressure setting of relief valves
Setting of high pressure relief valves	Pressure	46500 kPa (465 bar) (6750 psi)
Overload valve setting	Pressure	44000 kPa (440 bar) (6400 psi)
Oil cooler relief valve	Relief pressure	100 kPa (1 bar) (14.5 psi)
Pump and motor	Max. speed	3345 rpm
Cam lobe motor	Displacement	1200 cm <sup>3</sup> /rev. (73 in <sup>3</sup> /rev.)
Oil flow (forward or reverse)	Max. displacement	80 L/Min. (21 gpm)
Motor drain to reservoir	Max. oil quantity	Approx. 3.8 L/Min. (1 gpm) (each motor)
Cam lobe motor	Capacity of oil	2.8 L (0.75 U.S.gal)
Cam lobe motor	Weight	160 kg (360 lb)

ZX,TMXZCO002451-19-17JAN94

**HYDROSTATIC DRIVE POWER TRAIN**



ZX005317

ZX1MZX000252-19-17/ANBL  
Z Series Combines  
06/00  
PN=731

**250-05-2**

TM4505 (05DEC00)

## HYDROSTATIC DRIVE — COMPONENTS

A—Variable pump  
B—Hydraulic oil reservoir

C—Cam lobe motor, left  
D—Four-wheel drive solenoid

E—Cam lobe motor, right  
F—Fixed-displacement motor

G—Oil cooler

The hydrostatic ground speed drive transmits engine power to the drive wheels via a hydraulic pump and motor.

Variable pump (A) is driven by the Diesel engine via intermediate drive.

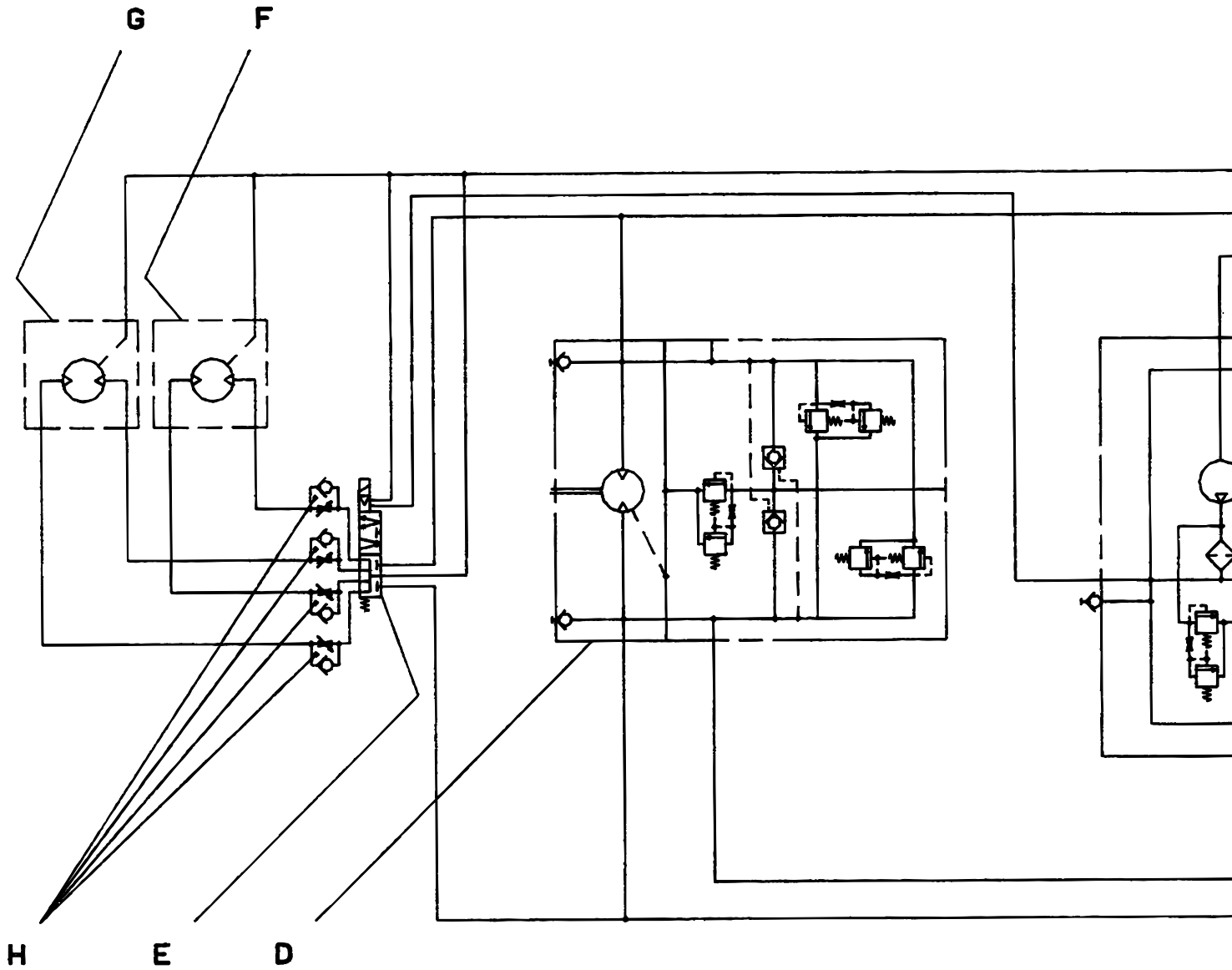
Variable pump (A) is connected to fixed-displacement motor (F) by means of hoses. From the motor, power is transmitted to the individual transmission speed ranges via transmission input shaft. Finally, engine power reaches the final drives and front wheels.

When four-wheel drive is engaged, solenoid (D) directs a certain amount of oil to hydraulic (cam lobe) motors (C) and (E).

The hydrostatic drive has no oil circuit of its own, but draws oil from behind the hydraulic oil filter and returns it to the hydraulic oil reservoir via an oil cooler.

ZX, TMXZCO002453-19-17JAN94

**HYDROSTATIC SYSTEM CIRCUIT DIAGRAM**



A—Hydraulic oil reservoir  
 B—Pressure relief valve  
 C—Variable pump  
 D—Fixed-displacement motor

E—Four-wheel drive solenoid valve  
 F—Cam lobe motor, right-hand

G—Cam lobe motor, left-hand  
 H—Flow control valve  
 X—Return line for cam lobe motor leak-off oil

Y—Charge pump suction line  
 Z—Return line to hydraulic system

*Hydrostatic Drive/Hydrostatic Drive Circuit Diagram*

## HYDROSTATIC DRIVE OPERATION, NEUTRAL POSITION

A—Variable pump	E—Overload cut-off valve	J—High pressure relief valve	N—Hydrostatic system oil cooler
B—Charge pump	F—Fixed-displacement motor	K—Four-wheel drive solenoid valve	O—Hydraulic oil reservoir
C—Charge pressure relief valve	G—Flushing pressure relief valve	L—Cam lobe motor, right	Q—Low pressure oil (return)
D—Servo control valve	H—High pressure relief valve	M—Cam lobe motor, left	R—Charge pressure

The hydrostatic ground speed drive consists essentially of an axial piston pump and an axial piston hydraulic motor which are connected hydraulically. The axial piston pump is driven by the Diesel engine.

Displacement of axial piston pump per revolution is variable. Therefore, this pump is referred to as "variable pump". Displacement of axial piston hydraulic motor is not variable. Therefore, this motor is called "fixed-displacement motor".

With control lever in cab in neutral position, the variable pump flow is at zero, i.e. when drive shaft rotates at rated speed, no hydraulic oil is delivered to the fixed-displacement motor.

The charge pump draws hydraulic oil into the circuit. The charge pressure relief valve, integrated in the

variable pump, limits pressure to approx. 1500 kPa (15 bar; 220 psi).

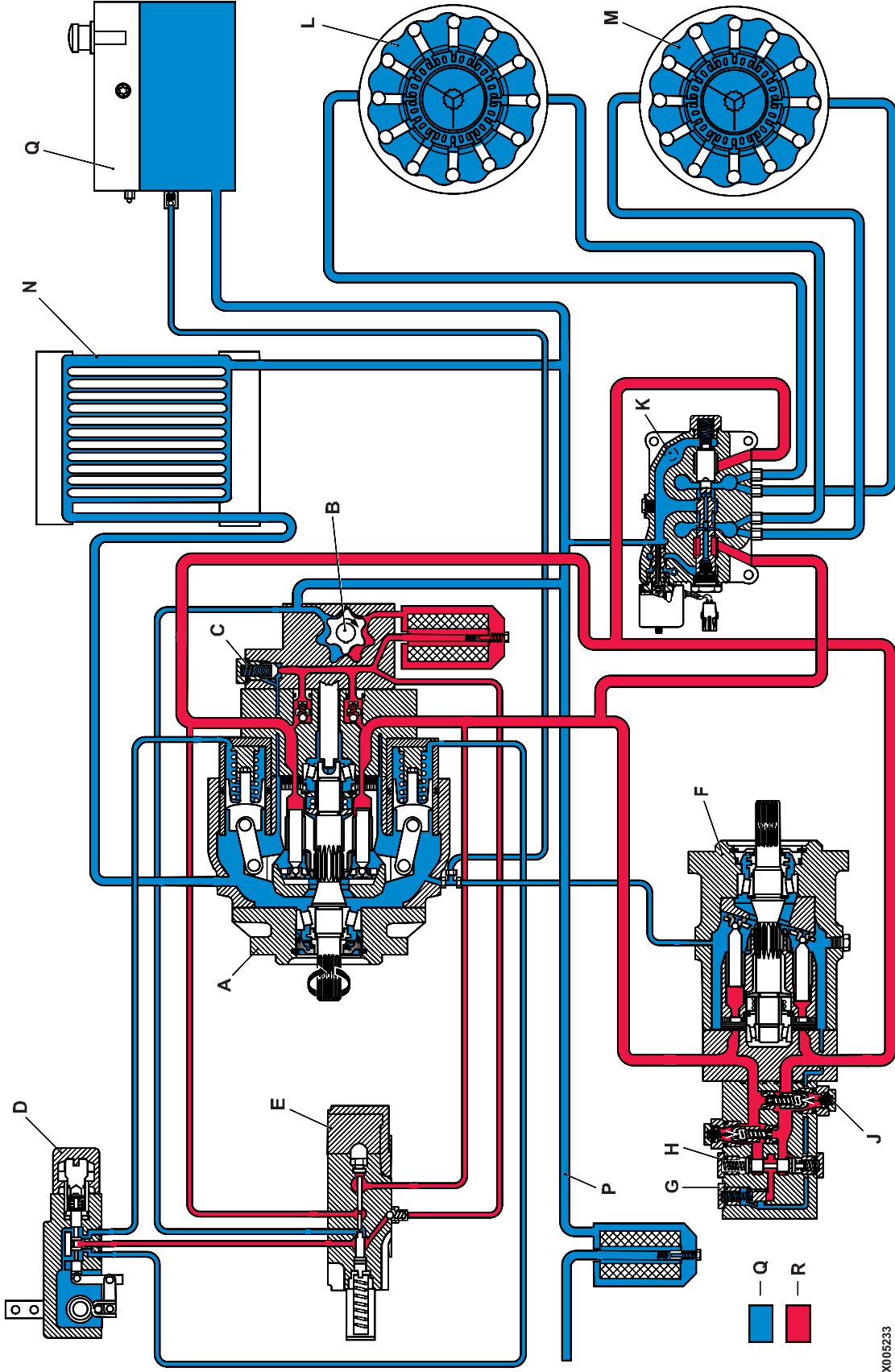
Oil flow from the pressure relief valve is routed to the hydraulic oil reservoir via the oil cooler. If housing pressure is too high (cold oil), the pressure relief valve in front of the oil cooler is activated allowing oil to flow directly to the hydraulic oil reservoir.

On machines with four-wheel drive, hydraulic (cam lobe) motors are installed at the rear wheels. When four-wheel drive is engaged, oil flow from variable pump is distributed to fixed-displacement motor and to both cam lobe motors.

The hydrostatic system has no hydraulic oil reservoir of its own, but the charge pump draws hydraulic oil from the hydraulic system return line behind the oil filter.

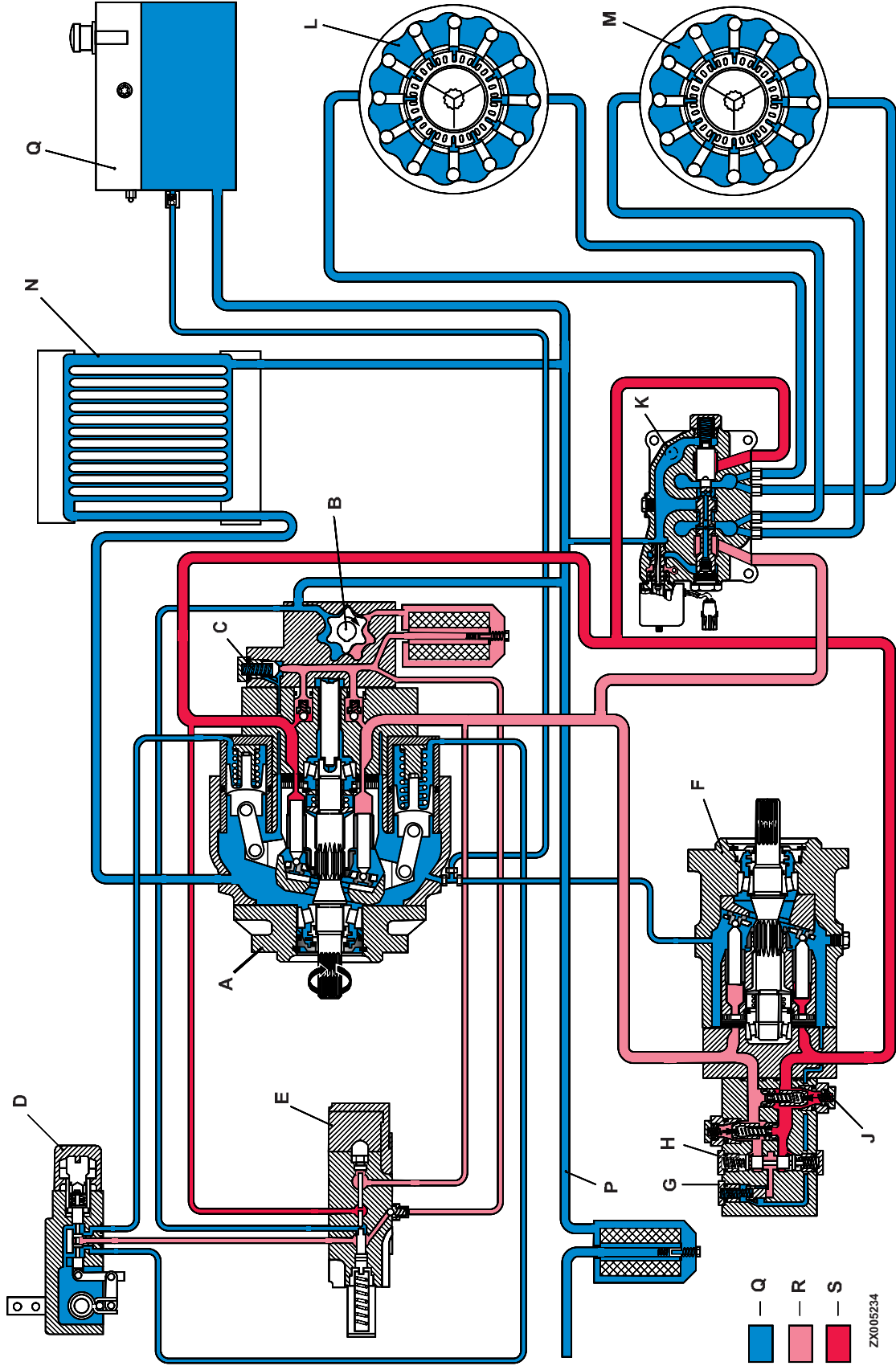
ZX, TMXZCO003170-19-17JAN94

HYDROSTATIC DRIVE OPERATION, NEUTRAL POSITION



ZX005233

HYDROSTATIC DRIVE OPERATION, FORWARD TRAVEL





## HYDROSTATIC DRIVE OPERATION, FORWARD TRAVEL

A—Variable pump	F—Fixed-displacement motor	K—Four-wheel drive solenoid valve	O—Hydraulic oil reservoir
B—Charge pump	G—Flushing pressure relief valve	L—Cam lobe motor, right	Q—Low pressure oil (return)
C—Charge pressure relief valve	H—High pressure relief valve	M—Cam lobe motor, left	R—Charge pressure
D—Servo control valve	J—High pressure relief valve	N—Hydrostatic system oil cooler	S—High pressure oil
E—Overload cut-off valve			

When hydrostatic drive control lever is moved forward with engine running, variable pump delivers pressure oil to the fixed-displacement motor. This motor is attached to the transmission and transmits power to the transmission input shaft. The transmission offers three different speed ratios which can be selected by means of shift lever in cab.

Forward movement of control lever is transmitted to the servo control valve of the variable pump via a

cable. The servo control valve directs oil to one of the servo pistons, which causes the swashplate to move out of neutral position.

*NOTE: On machines operating in Germany, swashplate adjusting angle for forward travel is limited. This in turn will limit max. travel speed on public roads to 20 km/h according to legal requirements.*

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## HYDROSTATIC DRIVE OPERATION, FORWARD TRAVEL WITH FOUR-WHEEL DRIVE

A—Variable pump	F—Fixed-displacement motor	K—Four-wheel drive solenoid valve	O—Hydraulic oil reservoir
B—Charge pump	G—Flushing pressure relief valve	L—Cam lobe motor, right	Q—Low pressure oil (return)
C—Charge pressure relief valve	H—High pressure relief valve	M—Cam lobe motor, left	R—Charge pressure
D—Servo control valve	J—High pressure relief valve	N—Hydrostatic system oil cooler	S—High pressure oil
E—Overload cut-off valve			

When four-wheel drive is engaged, the oil delivered by the variable pump is also routed to hydraulic motors located at the rear wheels. Flow control valves at each outlet of the four-wheel drive solenoid valve ensure sufficient oil flow to the fixed-displacement motor of the front axle.

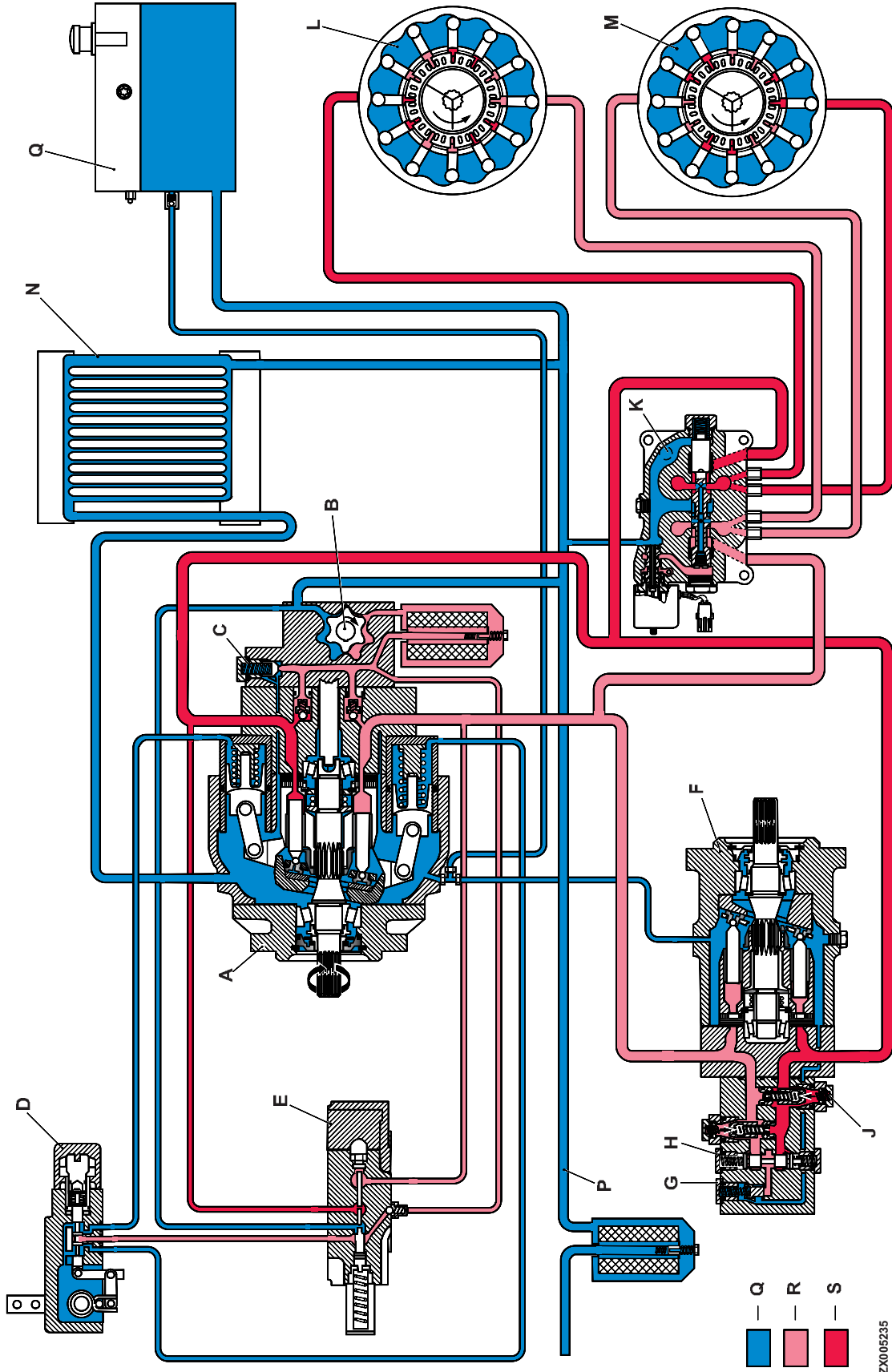
*NOTE: When engaging four-wheel drive, ground speed control lever should be moved in*

*desired direction as far as possible to provide max. oil flow of variable pump.*

**IMPORTANT: To avoid overload damage to the hydrostatic system, four-wheel drive should only be engaged at low speeds and soft ground conditions.**

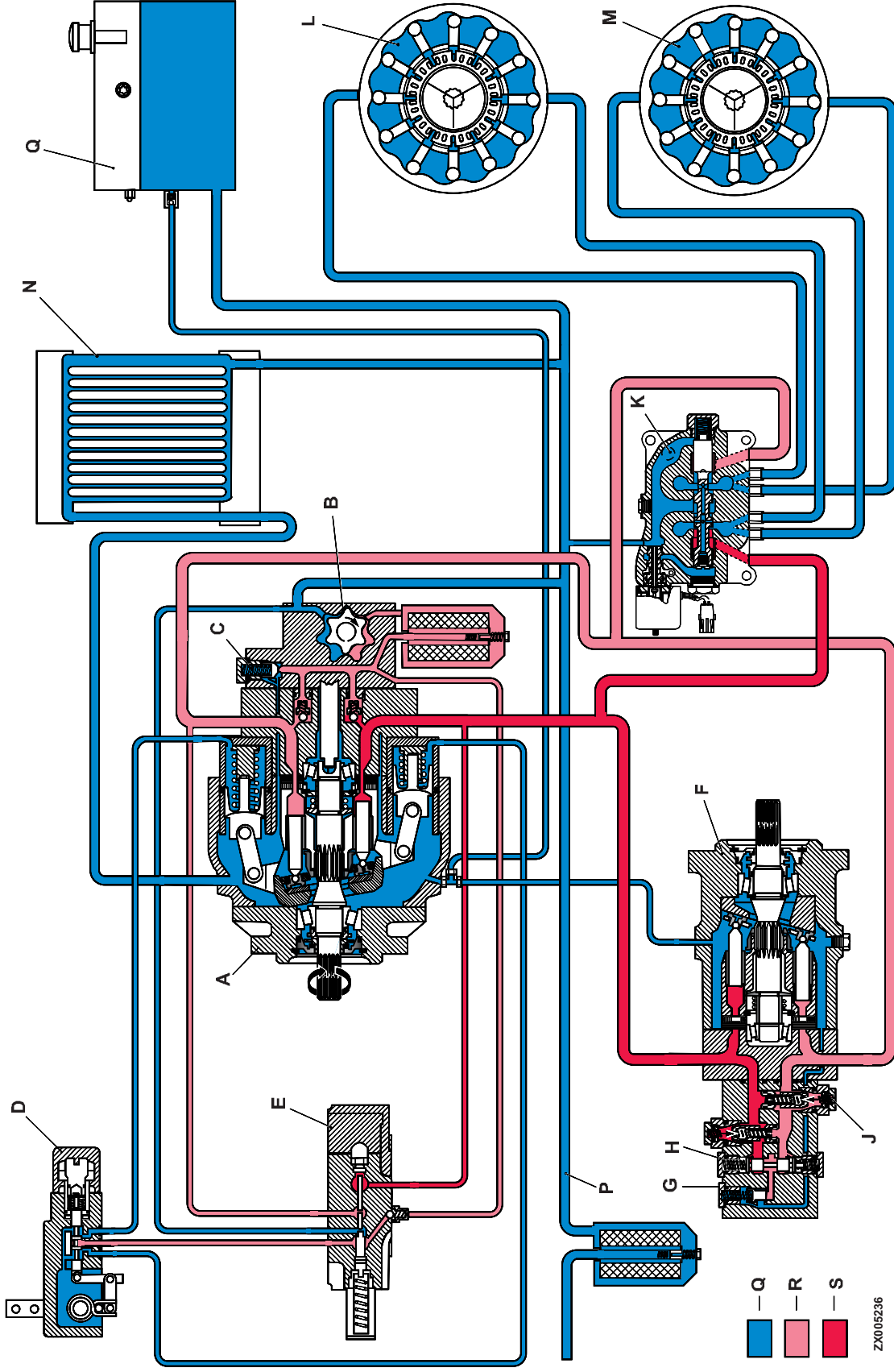
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### HYDROSTATIC DRIVE OPERATION, FORWARD TRAVEL WITH FOUR-WHEEL DRIVE



ZX005235

**HYDROSTATIC DRIVE OPERATION, REVERSE TRAVEL**



- Q
  - R
  - S
- ZX005236

## HYDROSTATIC DRIVE OPERATION, REVERSE TRAVEL

A—Variable pump	F—Fixed-displacement motor	K—Four-wheel drive solenoid valve	O—Hydraulic oil reservoir
B—Charge pump	G—Flushing pressure relief valve	L—Cam lobe motor, right	Q—Low pressure oil (return)
C—Charge pressure relief valve	H—High pressure relief valve	M—Cam lobe motor, left	R—Charge pressure
D—Servo control valve	J—High pressure relief valve	N—Hydrostatic system oil cooler	S—High pressure oil
E—Overload cut-off valve			

For reverse travel, oil flows to the servo pistons for swashplate angle variation in opposite direction as compared to forward travel. The swashplate moves in opposite direction and the variable pump delivers pressure oil to the fixed-displacement motor, causing the motor to rotate in reverse direction.

A stop at the control lever located in the operator's cab limits swashplate angle variation for reverse

travel. This in turn limits max. oil flow and reverse travel speed.

For this reason the flow control valves at the four-wheel drive solenoid outlets for reverse travel are designed to provide less oil flow.

ZX, TMXZCO003176-19-17JAN94

## HYDROSTATIC DRIVE OPERATION, OVERLOAD CONDITIONS

A—Variable pump  
B—Charge pump  
C—Charge pressure relief valve  
D—Servo control valve  
E—Overload cut-off valve

F—Fixed-displacement motor  
G—Flushing pressure relief valve  
H—High pressure relief valve  
J—High pressure relief valve

K—Four-wheel drive solenoid valve  
L—Cam lobe motor, right  
M—Cam lobe motor, left  
N—Hydrostatic system oil cooler

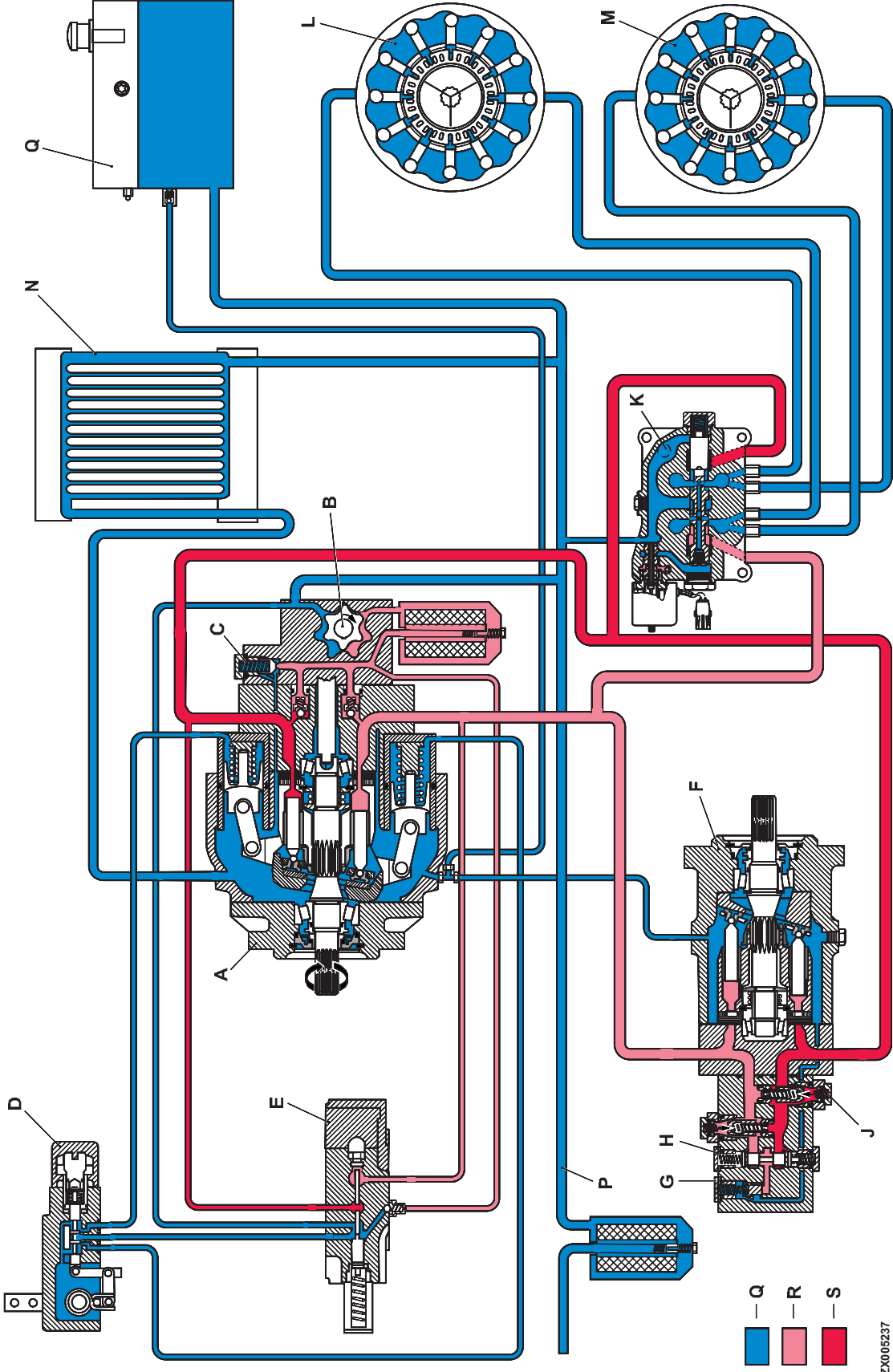
O—Hydraulic oil reservoir  
Q—Low pressure oil (return)  
R—Charge pressure  
S—High pressure oil

When the hydrostatic system is overloaded and pressure in one of the high pressure hoses reaches 44000 kPa (440 bar; 6400 psi) or more, the overload valve in the supply line to servo control valve opens a path to route oil back to the reservoir. The pressure holding the servo pistons will drop and the swashplate moves back towards the center position.

The swashplate moves to a position in which oil delivery is just sufficient to maintain a pressure of 44000 kPa (440 bar; 6400 psi). This will avoid rapid overheating of the system.

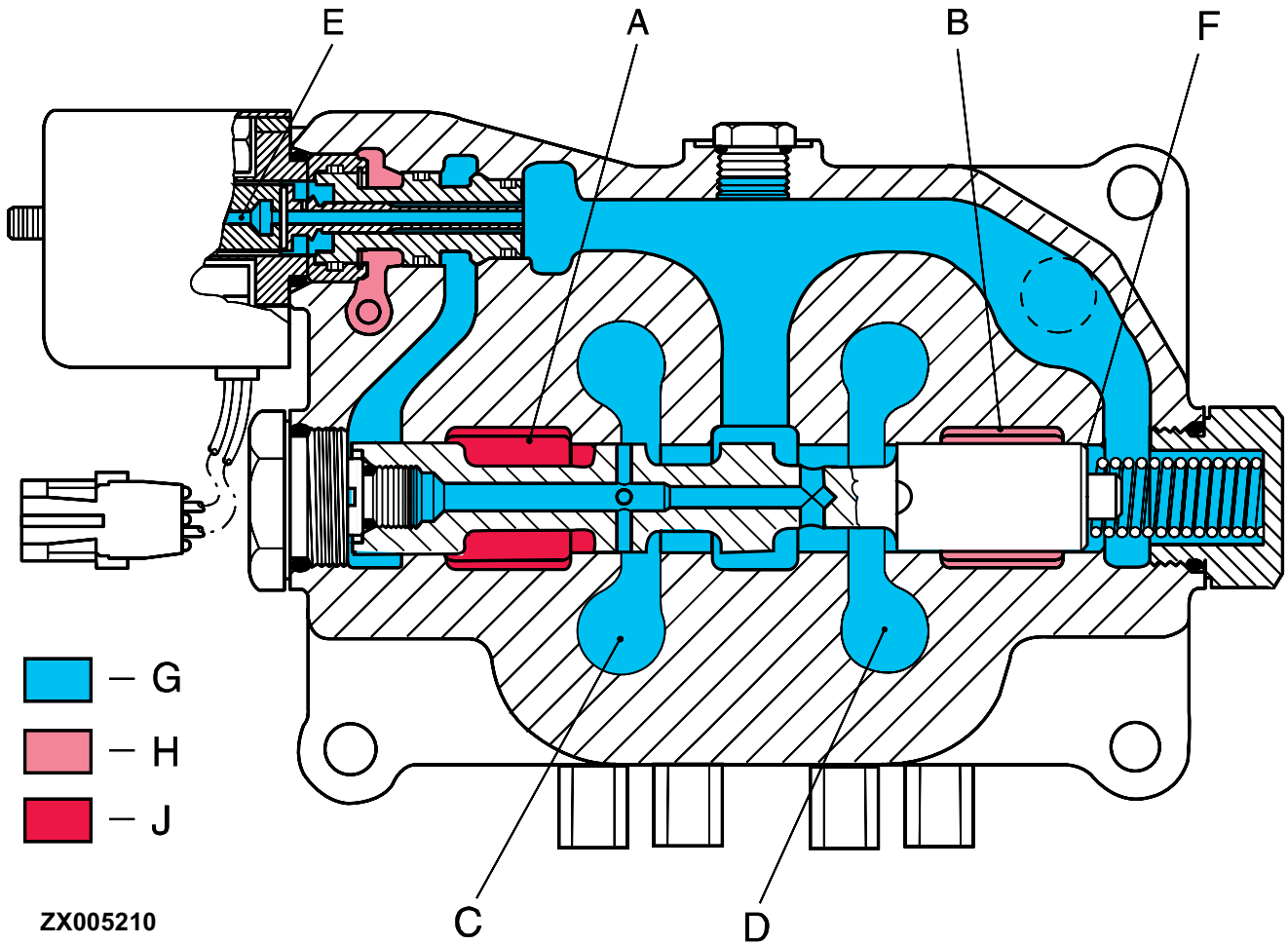
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**HYDROSTATIC DRIVE OPERATION, OVERLOAD CONDITIONS**



ZX005237

**FOUR-WHEEL DRIVE SOLENOID VALVE, DISENGAGED POSITION**



A—High pressure oil passage (forward)  
 B—High pressure oil passage (reverse)

C—Passage to cam lobe motors (forward)  
 D—Passage to cam lobe motors (reverse)

E—Solenoid valve  
 F—Plunger  
 G—Low pressure oil (return oil)

H—Charge pressure  
 I—High pressure oil

With four-wheel drive shut off, solenoid valve (E) is not activated. Pressure oil from charge pump does not reach plunger (F). Plunger (F) remains in

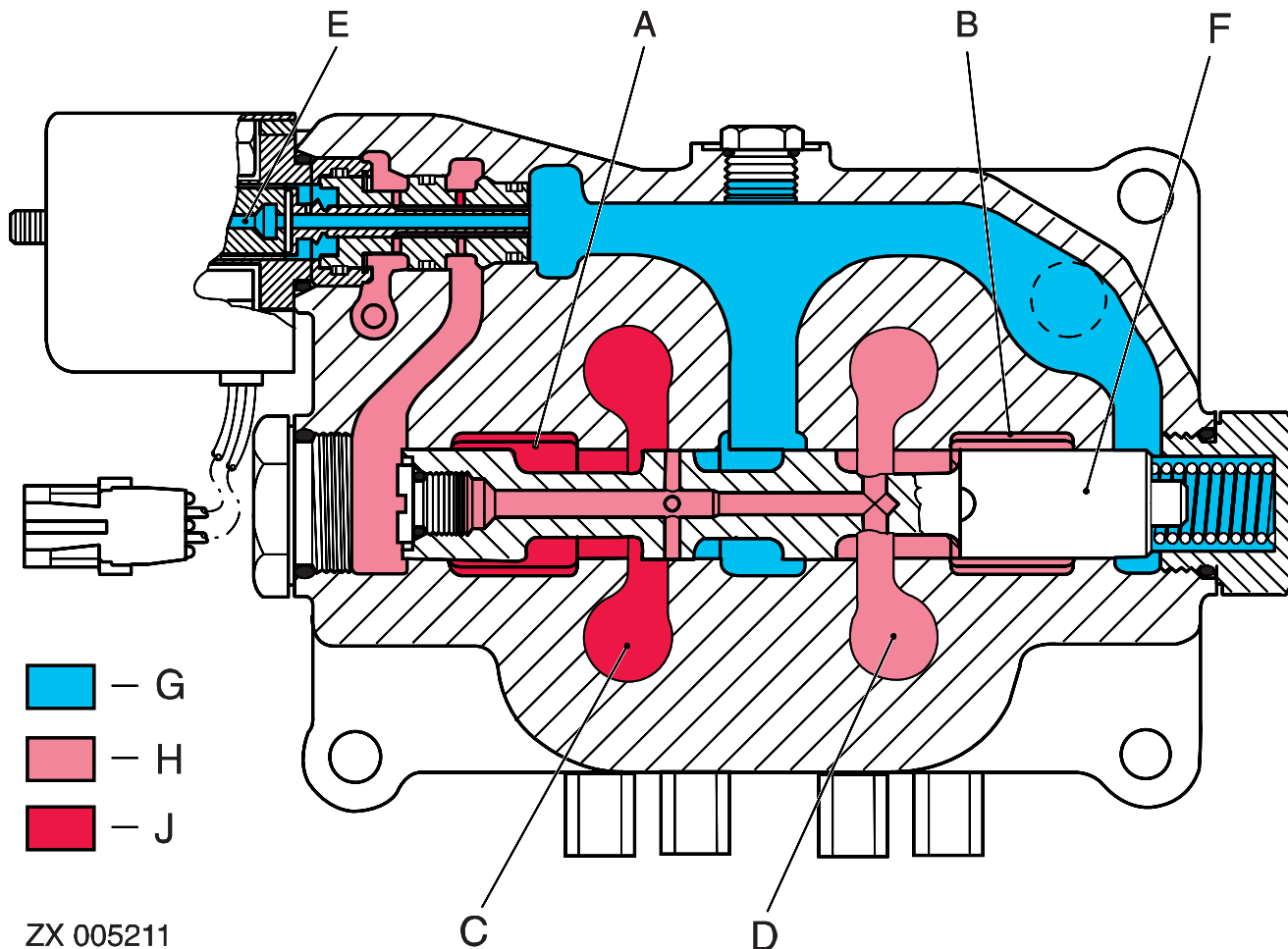
left-hand end position where there is no connection between front axle drive oil passages and rear axle drive oil passages.

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ZX005210 -UN-25JAN98



**FOUR-WHEEL DRIVE SOLENOID VALVE, ENGAGED POSITION**



- A—High pressure oil passage (forward)
- B—High pressure oil passage (reverse)
- C—Passage to cam lobe motors (forward)
- D—Passage to cam lobe motors (reverse)
- E—Solenoid valve
- F—Plunger
- G—Low pressure oil (return oil)
- H—Charge pressure
- I—High pressure oil

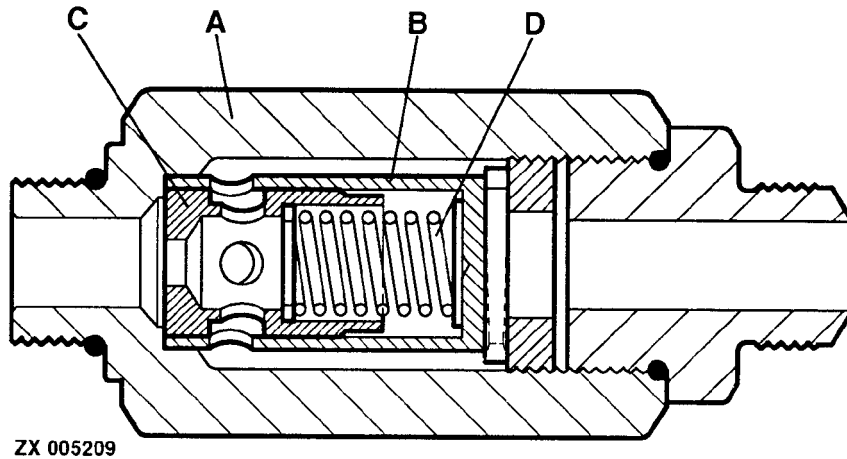
With four-wheel drive engaged, solenoid valve (E) is activated. Pressure oil is directed from the charge pump to face of plunger (F). Plunger (F) is moved against spring force. Now front axle high pressure

lines and rear axle high pressure lines (to cam lobe motors) are connected to each other. Hydraulic oil flow is distributed to front and rear axles.

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## FOUR-WHEEL DRIVE FLOW CONTROL VALVES



ZX 005209

-UN-28APR95  
ZX005209

**A—Housing**

**B—Insert**

**C—Piston**

**D—Spring**

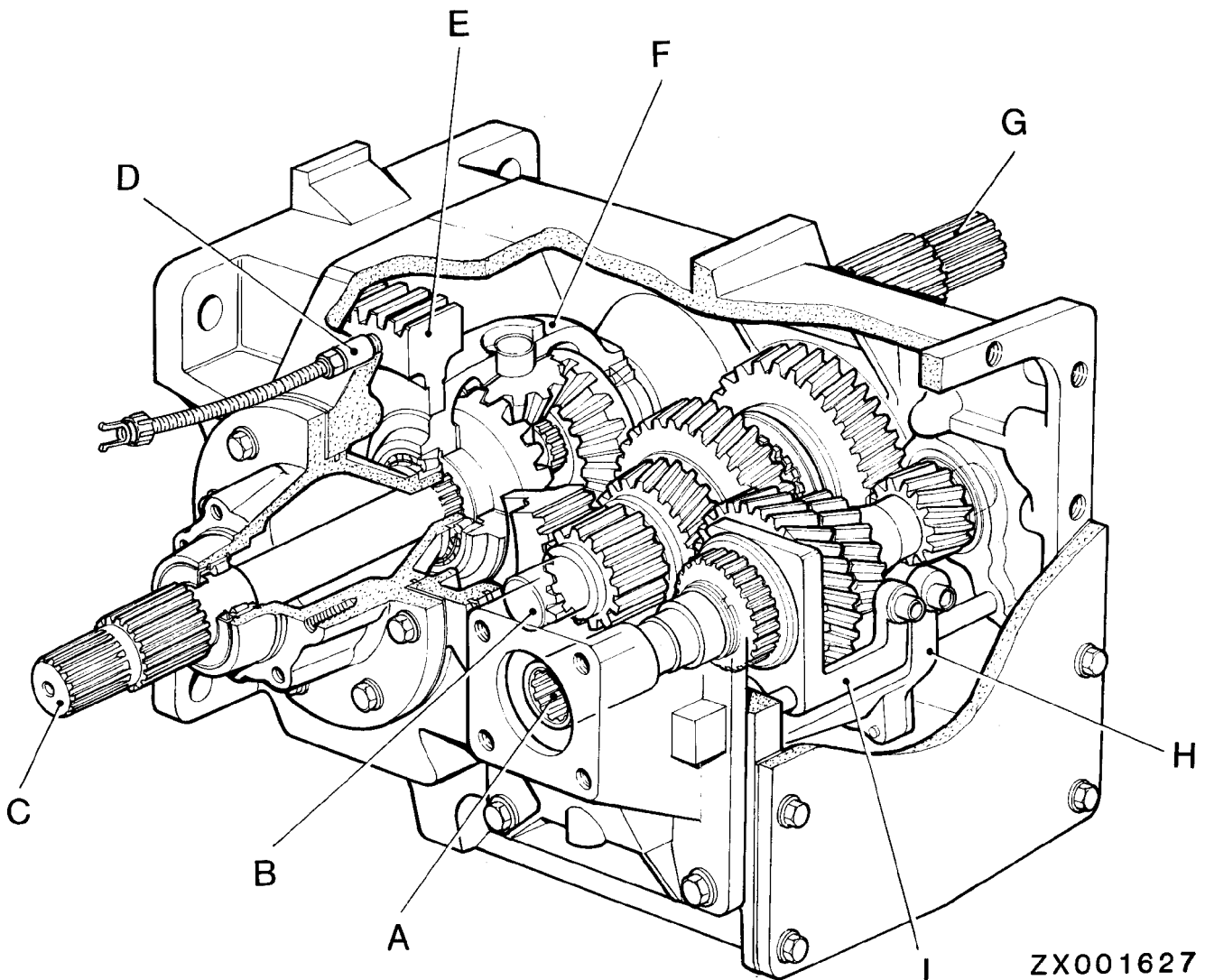
Machines with four-wheel drive are provided with four flow control valves. They are located directly at the electromagnetic control valve used for engaging four-wheel drive.

The two flow control valves for forward travel limit oil flow to 80 L/Min (21 gpm). The two flow control valves for reverse travel limit oil flow to 53 L/Min (14 gpm).

Max. delivery of variable pump is 255 L/Min (67 gpm). In Germany, max. delivery is limited to 200 L/Min (53 gpm), because speed limit for road travel is 20 km/h. For this reason the control lever must be moved as far as possible when rear wheels start to spin to ensure an adequate oil supply to fixed-displacement motor.

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THREE-SPEED TRANSMISSION — OPERATION



A—Transmission input shaft  
B—Countershaft  
C—Differential output shaft,  
left-hand

D—Speed sending unit  
E—Differential ring gear  
F—Differential housing

G—Differential output shaft,  
right-hand

H—Shifter fork  
I—Shifter fork

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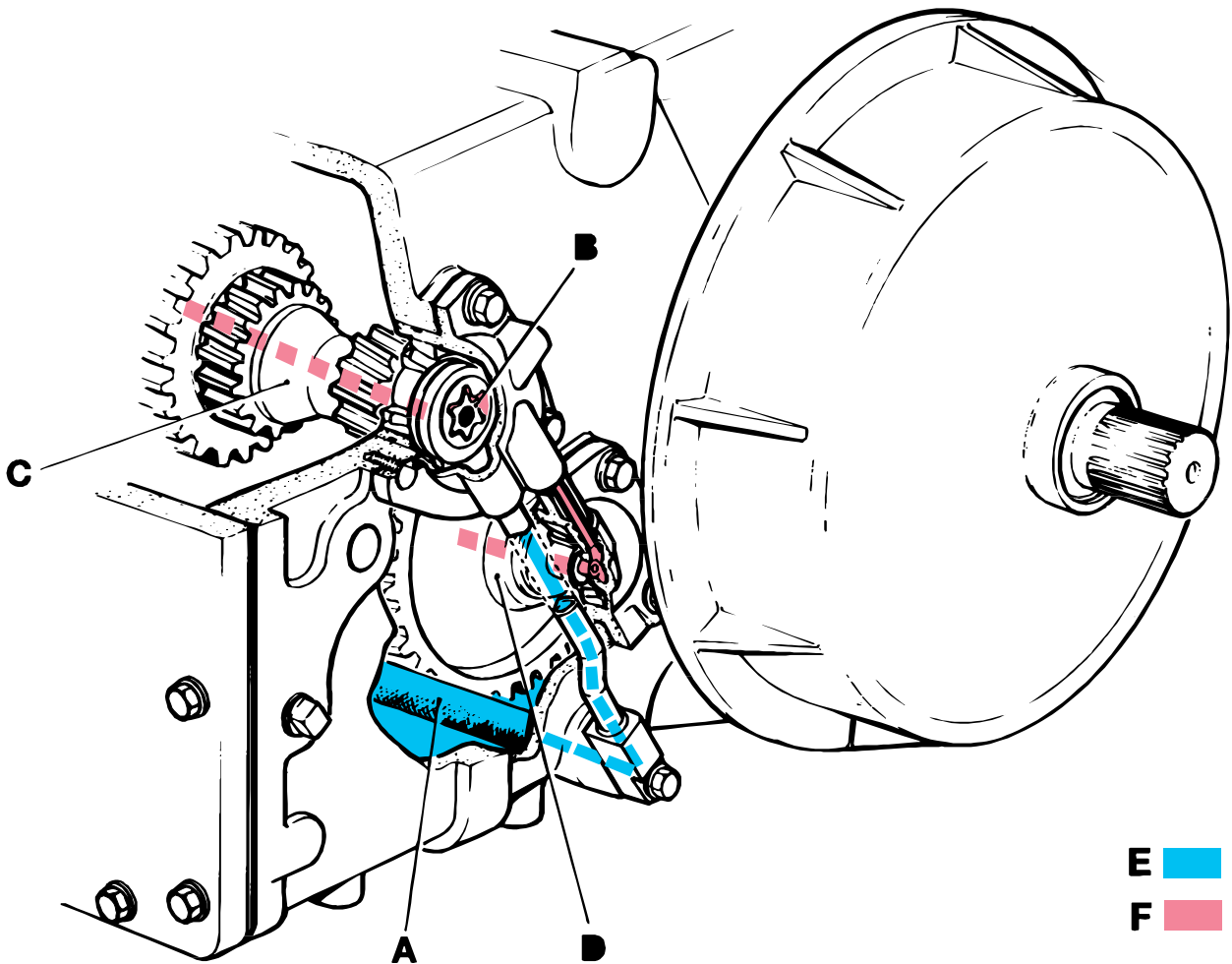
Power is transmitted from fixed-displacement motor of hydrostatic drive to countershaft (B) via transmission input shaft (A).

Three different speed ratios are obtained by laterally moving shifter forks (H) and (I).

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**LUBRICATION OF THREE-SPEED TRANSMISSION**



A—Suction filter

B—Lube pump

C—Transmission input shaft

D—Countershaft

Transmission input shaft and countershaft are pressure lubricated.

via an external line, into lubrication bore of countershaft.

Lube pump (B) draws oil from the sump and forces it into lubrication bore of transmission input shaft and,

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# Section 260 Brakes, Steering, Rear Axle

## Contents

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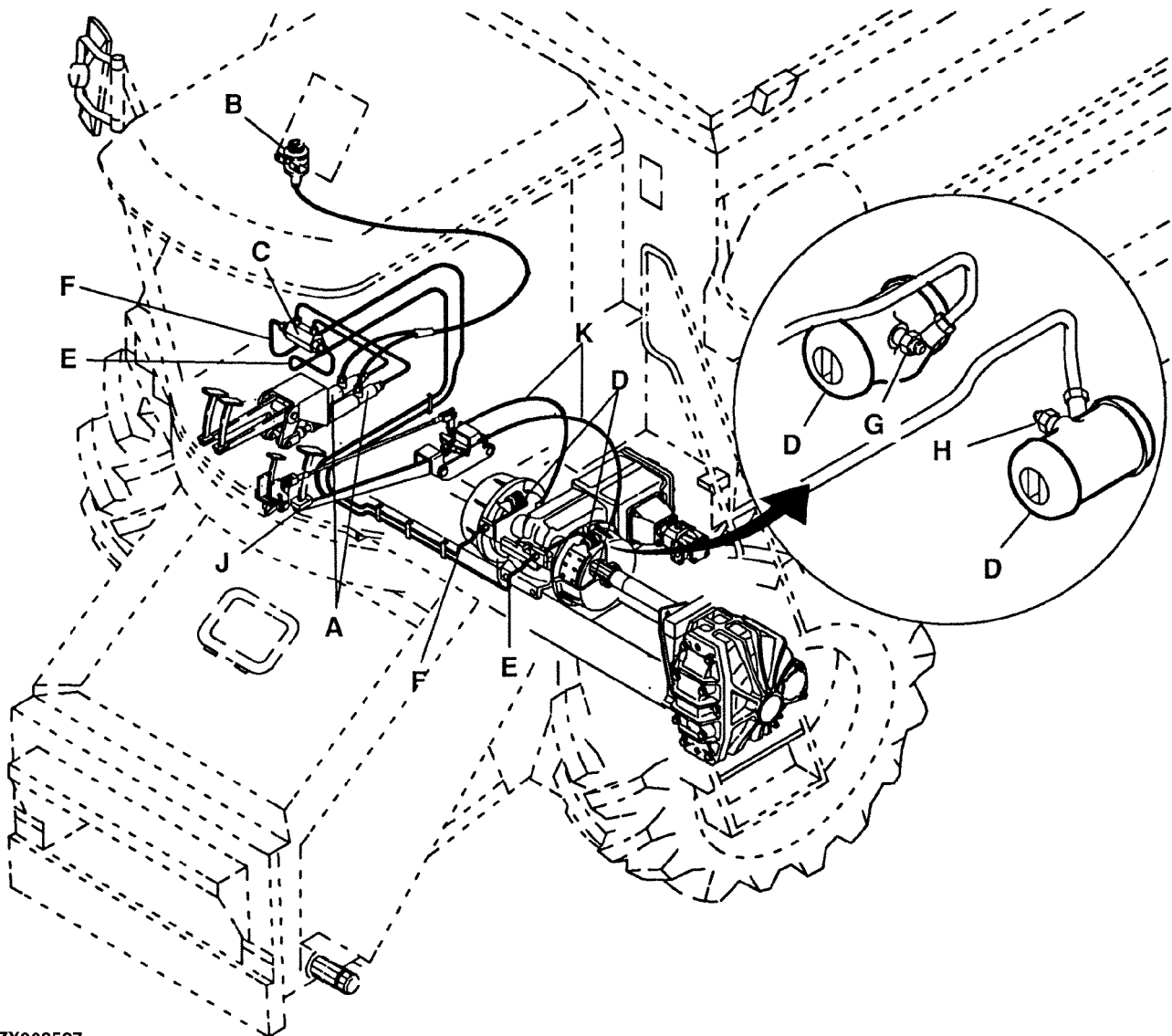
### Group 05—Brake Operating System

Brake Operation . . . . .	260-05-1
Brake Master Cylinder — Operation . . . .	260-05-2
Pressure Equalizing Valve . . . . .	260-05-4

### Group 10—Drum Brakes

*Contents*

**BRAKE OPERATION**



ZX002587

- |                                     |                             |               |                                       |
|-------------------------------------|-----------------------------|---------------|---------------------------------------|
| A—Brake master cylinder<br>(2 used) | C—Pressure equalizing valve | F—Brake line  | J—Parking brake operating<br>assembly |
| B—Brake fluid reservoir             | D—Brake slave cylinder      | G—Bleed valve | K—Parking brake cables                |
|                                     | E—Brake line                | H—Bleed valve |                                       |

Drum brakes acting on drive shafts are located on both sides of the transmission.

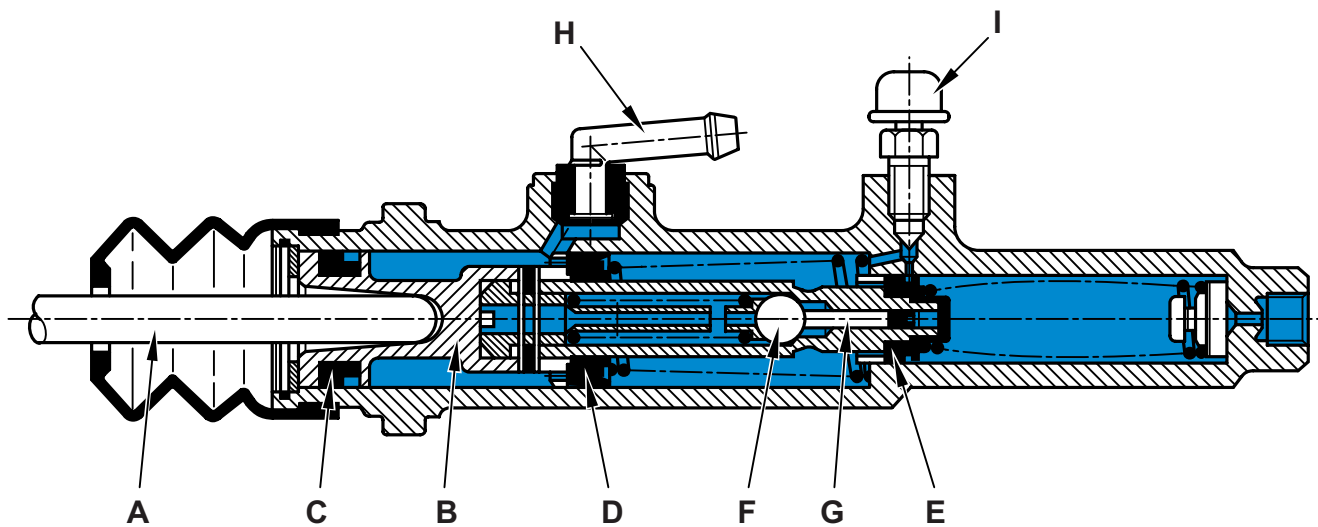
Pressure equalizing valve (C) ensures equal braking action on both sides.

Brake pedal forces are transmitted hydraulically to slave cylinders (D) via two double-stage master cylinders (A).

The parking brake operated by a pedal to the left of the steering column also acts on the drum brakes. Braking force is transmitted to brake drums via cables (K).

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## BRAKE MASTER CYLINDER — OPERATION



ZX000975 -UN-28JAN98

ZX000975

A—Piston rod  
B—Double-stage piston  
C—Secondary boot

D—Primary boot (low pressure cylinder)  
E—Primary boot (high pressure cylinder)

F—Valve ball  
G—Plunger

H—Brake fluid inlet  
I—Bleed valve

Drum brakes are actuated in two stages: JOINING brake linings and drum and PRESSING linings against drum.

For joining brake linings and drum — with little pedal travel — only a low pressure is needed. The joining process is accomplished by the large diameter cylinder stage (charging stage).

To press linings against drum, a high pressure must be exerted; a relatively long pedal travel is still available for this purpose. Now the small diameter cylinder stage (pressure stage) is used.

Changing from charging stage to pressure stage is a continuous process.

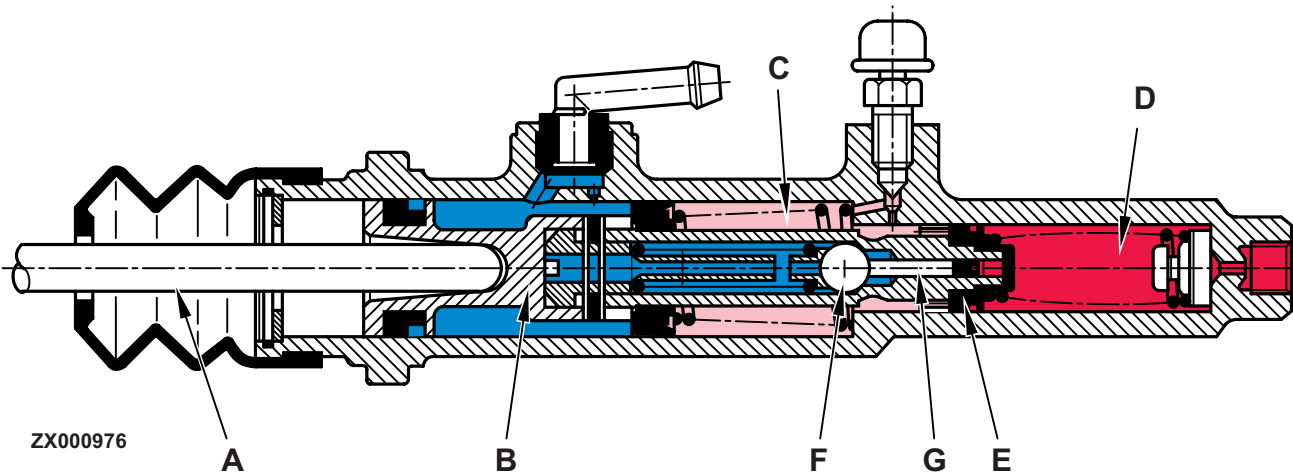
### Neutral Position

The above illustration shows neutral position of double-stage brake master cylinder.

Piston (B) is in end position, there is some play between piston rod (A) and piston (B). Equalizing bores are free, allowing brake fluid to flow to the brake fluid reservoir.

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A—Piston rod  
B—Double-stage piston

C—Low pressure stage  
D—High pressure stage

E—Pressure spring  
F—Ball

G—Plunger

### Low Pressure Braking Action

When brakes are applied and piston of brake master cylinder is moved away from neutral position, the full amount of brake fluid from low pressure stage (C) and high pressure stage (D) flows to the brake slave cylinder.

The brake shoes are rapidly brought into contact with the brake drum.

When brake fluid force acting on ball (F) is bigger than force of spring (E), the ball is moved from its

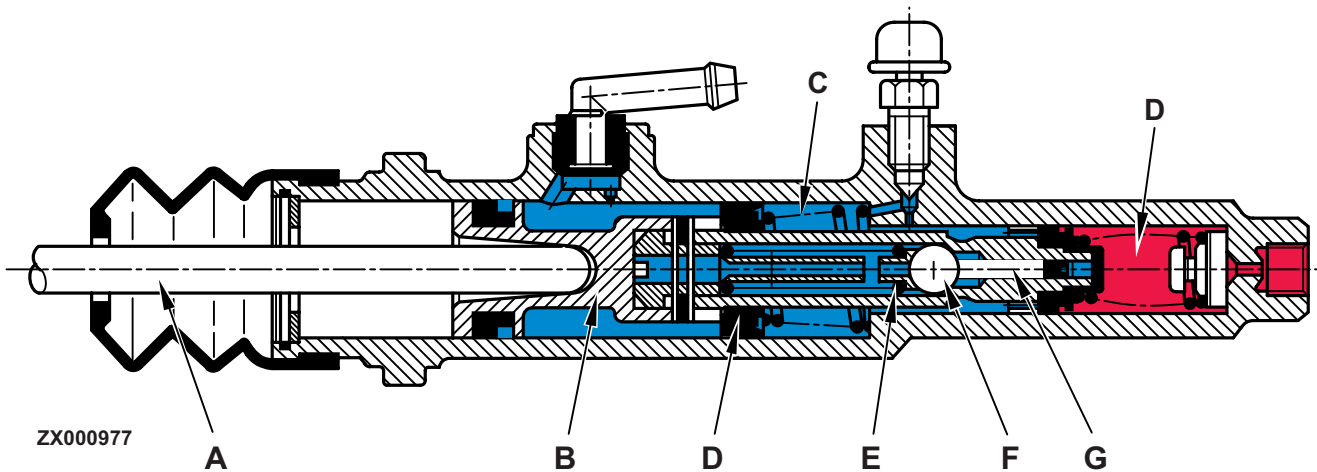
seat and allows brake fluid from low pressure stage to flow back through hollow plunger.

Now only brake fluid from high pressure stage flows to the brake slave cylinder.

As soon as pressure in high pressure stage increases, pressure in low pressure stage will decrease continuously. The pressure change is transmitted to ball (F) by plunger (G).

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## Brake Operating System/Pressure Equalizing Valve



A—Piston rod  
B—Double-stage piston

C—Low pressure stage  
D—High pressure stage

E—Pressure spring  
F—Ball

G—Plunger

### High Pressure Braking Action

With brakes fully applied, i.e. very high pressure in high pressure stage (D), ball (F) is completely pushed from its seat by plunger (G). Pressure in low pressure stage drops to 0 kPa (0 bar) (0 psi).

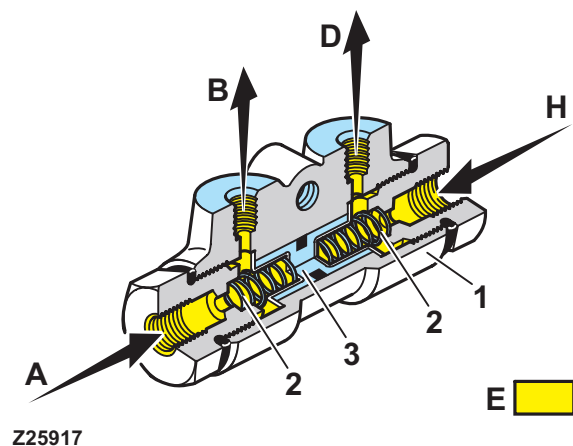
The full pedal force is now transmitted to high pressure stage (D). A very high pressure will build up due to the relatively small piston surface, resulting in a very high braking force.

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## PRESSURE EQUALIZING VALVE

The valve equalizes pressure in both brake circuits. This is achieved by moving piston (3) from center position.

- 1—Pressure equalizing valve
- 2—Spring
- 3—Piston
- A—Inlet port (l.h. circuit)
- B—Outlet port (l.h. circuit)
- C—inlet port (r.h. circuit)
- D—Outlet port (r.h. circuit)
- E—Brake fluid



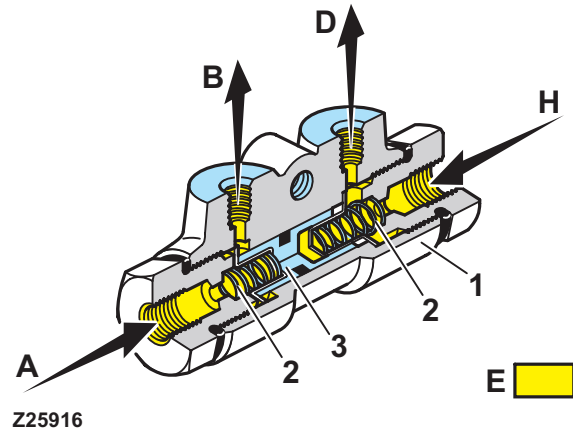
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## Brake Operating System/Pressure Equalizing Valve

When pressure differs considerably in both brake circuits, e.g. when operating only one brake pedal or when one brake circuit fails to function, piston (3) is moved fully against the stop to maintain pressure.

- 1—Pressure equalizing valve
- 2—Spring
- 3—Piston
- A—Inlet port (l.h. circuit)
- B—Outlet port (l.h. circuit)
- C—Inlet port (r.h. circuit)
- D—Outlet port (r.h. circuit)
- E—Brake fluid

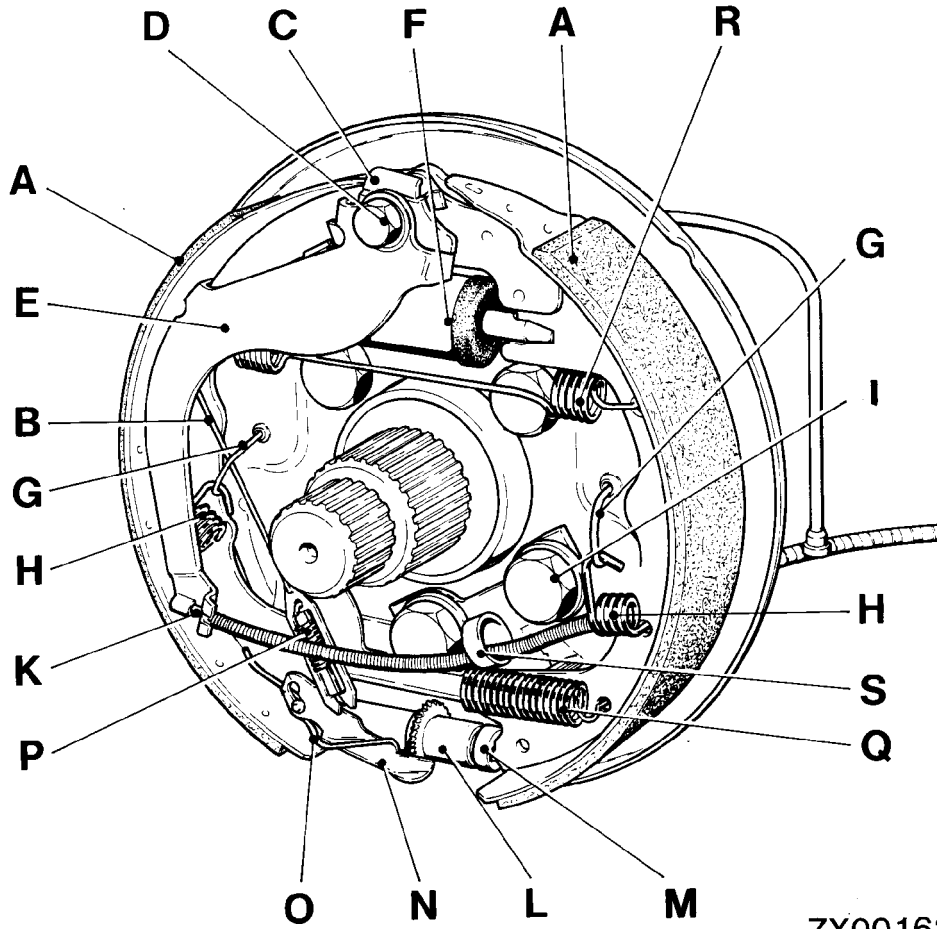


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*Brake Operating System/Pressure Equalizing Valve*

DRUM BRAKE COMPONENTS



-JUN-03MAY95  
ZX001625

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- |                       |                                |                         |                             |
|-----------------------|--------------------------------|-------------------------|-----------------------------|
| A—Brake shoe          | F—Brake operating cylinder     | K—Parking brake cable   | P—Cylinder spring           |
| B—Adjusting cable     | G—Hook                         | L—Brake adjusting screw | Q—Lower retracting spring   |
| C—Eccentric plate     | H—Brake shoe retainer          | M—Support pin           | R—Upper retracting spring   |
| D—Cap screw           | I—Anchor plate attaching screw | N—Brake adjusting lever | S—Parking brake cable guide |
| E—Parking brake lever |                                | O—Retracting spring     |                             |

When operating brakes, the operating cylinder (F) forces brake shoes against the brake drum resulting in braking action.

When front brake shoe (A) moves, cable (B) is tensioned and moves lever (N) upwards. By means of this mechanism the brakes are adjusted automatically.

ZX, TMSPFH001096-19-01DEC92

*Drum Brakes*

# Section 270 Hydraulic System

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*Contents*



## DESCRIPTION OF HYDRAULIC SYSTEM

The machine is equipped with a so-called “open-center hydraulic system”, i.e. with engine running at constant speed the hydraulic pump conveys a constant amount of hydraulic oil.

The hydraulic pump is a triple pump.

Flow rates for basic machine are as follows:

- Pump (A) conveys 35 L/min. (9.2 gpm)
- Pump (B) conveys 25 L/min. (6.5 gpm)
- Pump (C) conveys 15 L/min. (4.0 gpm)

Flow rates for Hillmaster machines are as follows:

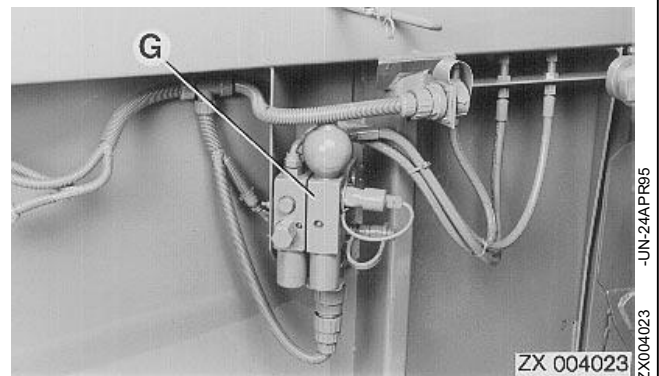
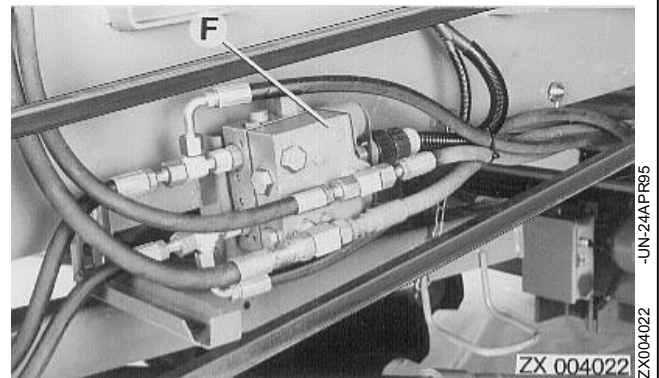
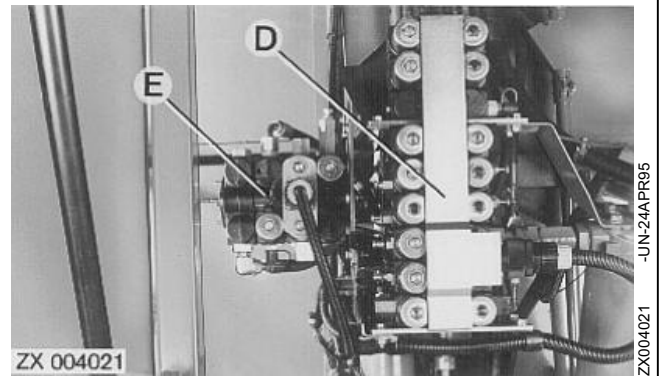
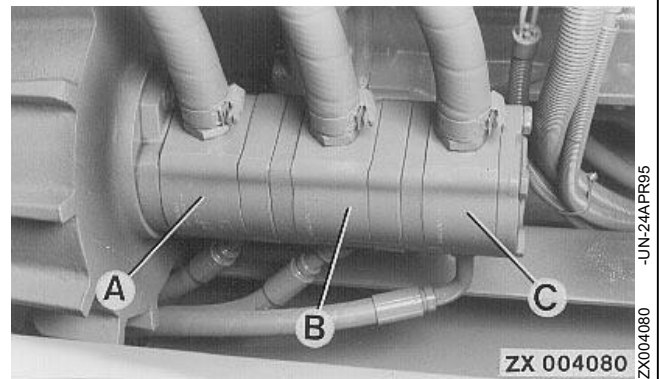
- Pump (A) conveys 45 L/min. (11 gpm)
- Pump (B) conveys 25 L/min. (6.5 gpm)
- Pump (C) conveys 35 L/min. (9.2 gpm)

For pumps (A) and (B), pressure valves are located in solenoid valve block (D) (one pressure valve for each of these pumps). If no pressure oil is required, the pressure valves direct pressure-free oil back to the reservoir via the oil cooler.

On Hillmaster combines, hydraulic pump (A) delivers oil to Hillmaster solenoid valve block (E). An integrated flow divider controls hydraulic oil flow, providing 30 L/min. (7.8 gpm) for the Hillmaster system and 15 L/min. (3.9 gpm) for the basic hydraulic functions, i.e. solenoid valve block (D).

Hydraulic functions of feeder house and header are controlled by solenoid valve blocks (F) and (G). A pressure valve in solenoid valve block (D) is also activated.

- A—Hydraulic pump**
  - Standard machine 35 L/min. (9.2 gpm)
  - Hillmaster 45 L/min. (11 gpm)
- B—Hydraulic pump 25 L/min. (6.5 gpm) (steering system)**
- C—Hydraulic pump**
  - Standard machine 15 L/min. (3.9 gpm)
  - Hillmaster 35 L/min. (9.2 gpm)
- D—Solenoid valve block, basic machine**
- E—Solenoid valve block, Hillmaster**
- F—Solenoid valve block, feeder house**
- G—Solenoid valve block, header**



HYDRAULIC SYMBOLS (AS DEFINED BY ISO 1219)

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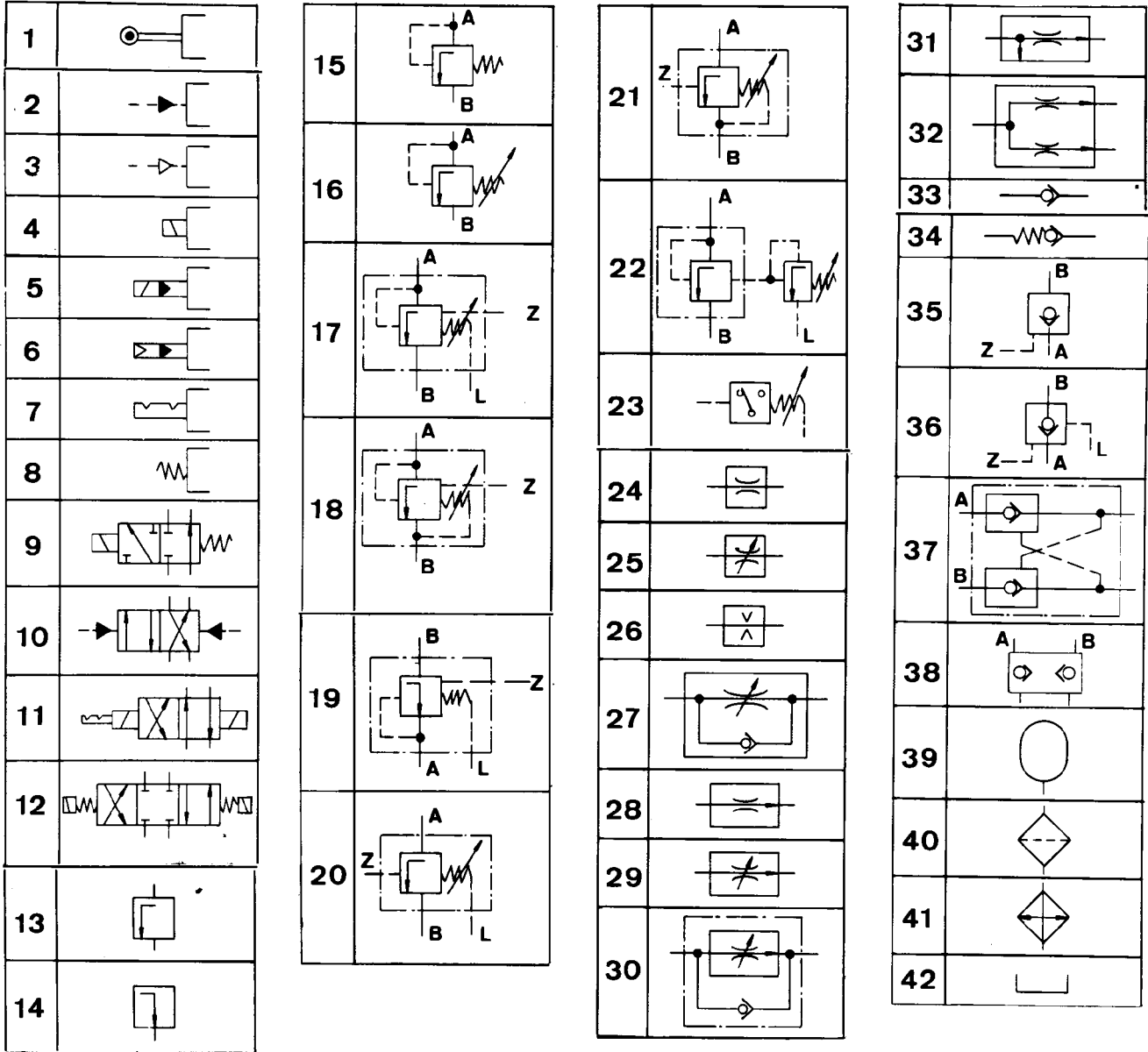
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## LEGEND — GRAPHIC SYMBOLS FOR HYDRAULICS

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1—Working (main) line<br/>                 2—Pilot (control) line<br/>                 3—Liquid (drain/return) line<br/>                 4—Bleed station<br/>                 5—Plugged port<br/>                 6—Port with connector<br/>                 7—Shaft, lever or rod<br/>                 8—Spring<br/>                 9—Orifice<br/>                 10—Restriction<br/>                 11—Direction of flow<br/>                 12—Direction of rotation<br/>                 13—Adjustable or variable component<br/>                 14—Component enclosure<br/>                 15—Pressure gauge<br/>                 16—Pressure source<br/>                 17—Mechanical clutch<br/>                 18—Unidirectional fixed displacement pump<br/>                 19—Unidirectional variable displacement pump<br/>                 20—Bidirectional fixed displacement pump<br/>                 21—Bidirectional variable displacement pump<br/>                 22—Unidirectional fixed displacement motor<br/>                 23—Unidirectional variable displacement motor<br/>                 24—Bidirectional fixed displacement motor<br/>                 25—Bidirectional variable displacement motor<br/>                 26—Unidirectional fixed displacement pump, operating in opposite flow direction as motor</p> | <p>27—Unidirectional variable displacement pump, operating in opposite flow direction as motor<br/>                 28—Unidirectional fixed displacement pump/motor, operating in one flow direction as pump/motor<br/>                 29—Unidirectional variable displacement pump/motor, operating in one flow direction as pump/motor<br/>                 30—Bidirectional fixed displacement pump/motor operating in both directions as pump/motor<br/>                 31—Bidirectional variable displacement pump/motor operating in both directions as pump/motor<br/>                 32—Unidirectional hydraulic transmission with unidirectional variable displacement pump and fixed displacement motor<br/>                 33—Bidirectional hydraulic transmission with bidirectional variable displacement pump and variable displacement motor</p> | <p>34—Single acting hydraulic cylinder<br/>                 35—Double-acting hydraulic cylinder<br/>                 36—Double-acting differential hydraulic cylinder<br/>                 37—Double-acting unidirectional fixed cushion hydraulic cylinder<br/>                 38—Direction control valves are symbolized by multiple envelopes. The number of numerically identified envelopes equals the number of valve shift positions.<br/>                 39—Arrows and lines within the envelopes connect valve ports and indicate internally open flow paths. Small cross bars indicate internally blocked valve ports.<br/>                 40—Directional control valves are defined by the number of ports (ways) followed by the number of valve shift positions<br/>                 41—The first digit is the number of ports (ways); the second digit the number of valve shift positions, e.g.: 3/2 or three-way two-position valve, 4/2 or four-way two-position valve, 4/3 or four-way three-position, 5/3 or five-way three-position</p> | <p>42—Valve connections (ports) are defined by capital letters, e.g.:<br/>                 A, B, C Working lines<br/>                 P Inlet (pressure) lines<br/>                 R, S Return (drain) lines<br/>                 X, Y, Z Pilot (control) lines<br/>                 43—Zero position of directional control valves with internal return is the position to which moving valve parts return, when pressure is released.<br/>                 44—Zero position of directional control valves with internal return is the position to which moving valve parts return, when pressure is released.<br/>                 45—Circulation flow path<br/>                 46—Flotation flow path<br/>                 47—Valve ports blocked internally<br/>                 48—Advance flow path<br/>                 49—Reverse flow path<br/>                 50—Two-position valve with transition<br/>                 51—Direct manual operation<br/>                 52—Hand lever operation</p> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

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HYDRAULIC SYMBOLS (AS DEFINED BY ISO 1219)



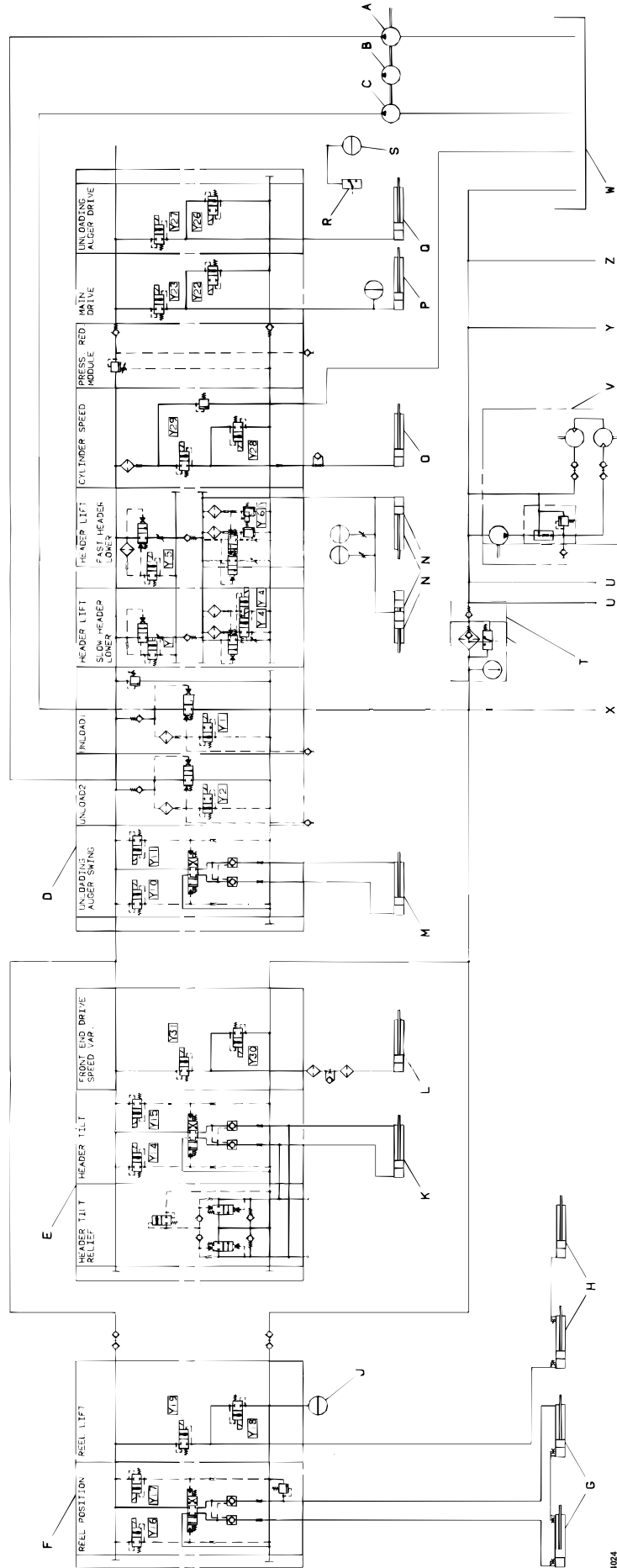
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## LEGEND — GRAPHIC SYMBOLS FOR HYDRAULICS

- |                                                                                 |                                                                                              |                                                                                     |                                                               |
|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------|
| 1—Mechanical (roller-head) actuator                                             | 13—Pressure control valve, 0-position normally blocked                                       | 21—Adjustable pressure control valve, remote operated with internal pilot oil drain | 31—Three-way flow control valve                               |
| 2—Hydraulic actuator                                                            | 14—Pressure control valve, 0-position normally normally open                                 | 22—Pressure relief valve, remote operated                                           | 32—Flow divider                                               |
| 3—Pneumatic actuator                                                            | 15—Pressure relief valve, fixed spring pressure                                              | 23—Pressure switch                                                                  | 33—Check valve without spring                                 |
| 4—Electromagnetic (solenoid) actuator                                           | 16—Adjustable pressure relief valve                                                          | 24—Orifice, fixed restriction                                                       | 34—Spring loaded check valve                                  |
| 5—Solenoid pilot and hydraulic actuator                                         | 17—Adjustable pressure relief valve, remote control connection with external pilot oil drain | 25—Orifice, variable restriction                                                    | 35—Check valve pilot-operated to open with internal oil drain |
| 6—Pneumatic pilot and hydraulic actuator                                        | 18—Adjustable pressure relief valve, remote control connection with internal pilot oil drain | 26—Viscosity influenced restriction                                                 | 36—Check valve pilot-operated to open with external oil drain |
| 7—Detent actuator                                                               | 19—Fixed pressure reduction valve, remote control connection with external pilot oil drain   | 27—Adjustable flow control valve with bypass                                        | 37—Pilot operated double check valve in detail                |
| 8—Spring-loaded return                                                          | 20—Adjustable pressure control valve, remote operated with external pilot oil drain          | 28—Fixed unidirectional flow control valve                                          | 38—Same valve simplified                                      |
| 9—4/2 directional control valve with solenoid actuator and spring loaded return |                                                                                              | 29—Variable unidirectional flow control valve                                       | 39—Hydraulic accumulator                                      |
| 10—4/2 valve with external hydraulic actuator and return                        |                                                                                              | 30—Variable unidirectional flow control valve with bypass check valve               | 40—Filter, strainer                                           |
| 11—4/2 valve with detent and solenoid actuator and return                       |                                                                                              |                                                                                     | 41—Cooler                                                     |
| 12—4/3 valve with solenoid actuator, spring centered                            |                                                                                              |                                                                                     | 42—Reservoir (vented)                                         |

ZX,TMSPFH000952-19-01.JUL91

HYDRAULIC SYSTEM CIRCUIT DIAGRAM — BASIC MACHINE FUNCTIONS



Z0044024

ZUMMERSCHAFFER  
Z Series CombiS  
PN=763

270-05-6

TM4505 (05DEC00)

## EXPLANATION OF SYMBOLS

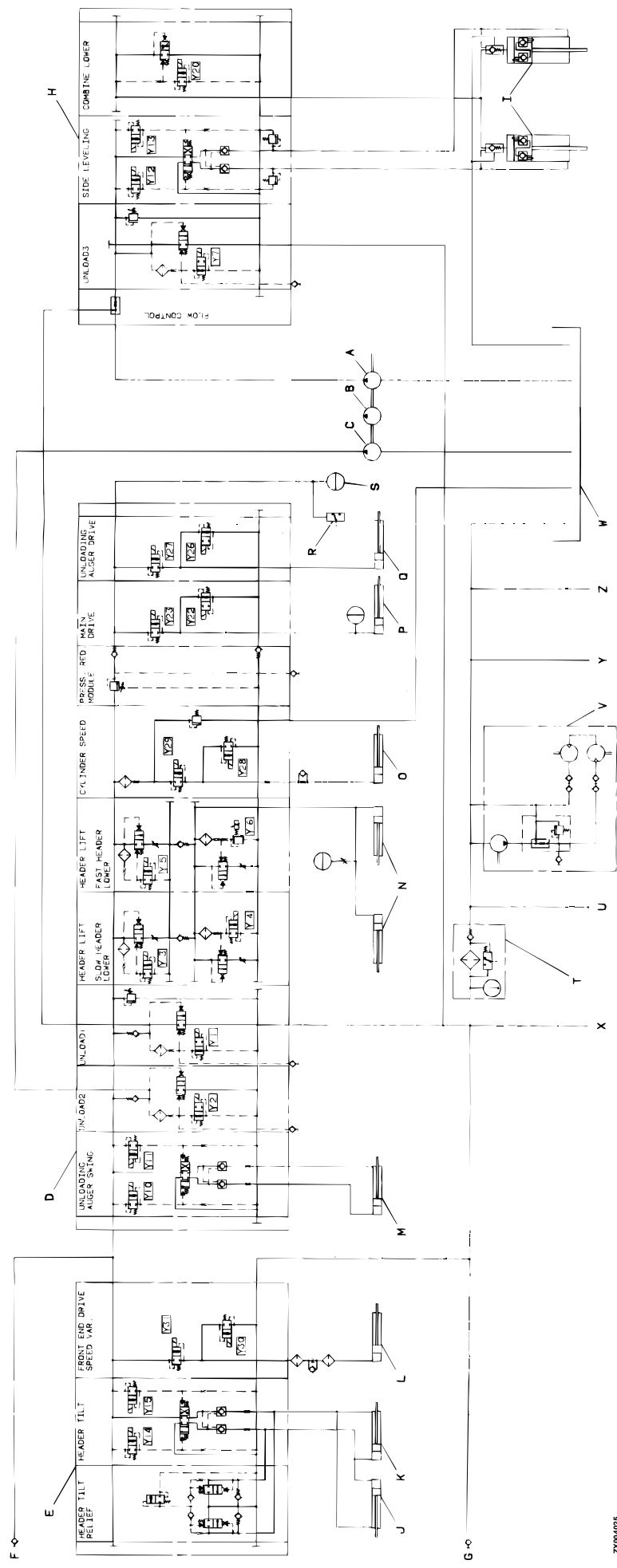
A—Hydraulic pump	H—Hydraulic cylinder, raise reel	O—Cylinder, variable threshing cylinder drive	V—Hydraulic chaff spreader drive
B—Hydraulic pump	J—Accumulator	P—Tensioning cylinder, main drive	W—Hydraulic oil reservoir
C—Hydraulic pump	K—Hydraulic cylinder, header parallel adjustment	Q—Tensioning cylinder, unloading drive	X—Return connection from powered rear axle
D—Solenoid valve block, basic machine	L—Cylinder, variable feeder house drive	R—Pressure switch	Y—Suction line of hydrostatic ground drive
E—Solenoid valve block, feeder house	M—Hydraulic cylinder, swing out unloading auger	S—Accumulator	Z—Return line of hydrostatic ground drive
F—Solenoid valve block, header	N—Header lift cylinder	T—Hydraulic oil filter	
G—Hydraulic cylinder, horizontal reel adjustment		U—Drain connection	

*NOTE: Connections (X), (Y) and (Z) are continued in hydrostatic system circuit diagram (refer to Section 250).*

*"Y" designations of solenoids are identical with those in the electrical system diagrams.*

ZX, TMXZC0002458-19-25NOV92

HYDRAULIC SYSTEM CIRCUIT DIAGRAM — HILLMASTER MACHINE FUNCTIONS



ZX004025

ZX004025-000000  
Z Series Combines  
PN=765

270-05-8

TM4505 (05DEC00)



## EXPLANATION OF SYMBOLS

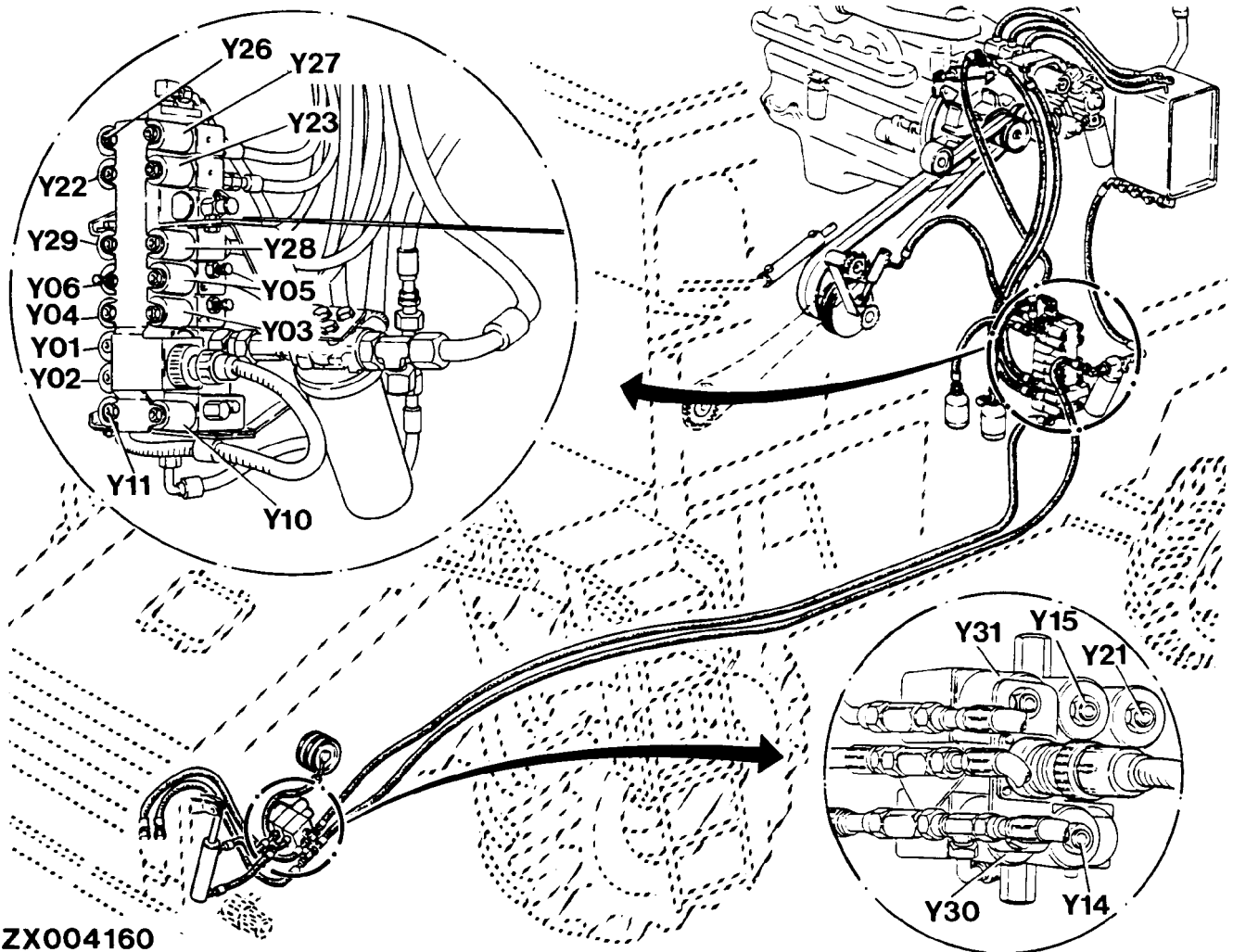
A—Hydraulic pump	J—Hydraulic cylinder, header parallel adjustment	N—Header lift cylinder	U—Drain connection
B—Hydraulic pump	(master cylinder at final drive)	O—Cylinder, variable threshing cylinder drive	V—Hydraulic chaff spreader drive
C—Hydraulic pump	K—Hydraulic cylinder, header parallel adjustment	P—Tensioning cylinder, main drive	W—Hydraulic oil reservoir
D—Solenoid valve block, basic machine	L—Cylinder, variable feeder house drive	Q—Tensioning cylinder, unloading drive	X—Return connection from powered rear axle
E—Solenoid valve block, feeder house	M—Hydraulic cylinder, swing out unloading auger	R—Pressure switch	Y—Suction line of hydrostatic ground drive
F—Header quick coupler		S—Accumulator	Z—Return line of hydrostatic ground drive
G—Header quick coupler		T—Hydraulic oil filter	
H—Solenoid valve block, Hillmaster			

*NOTE: Connections (X), (Y) and (Z) are continued in hydrostatic system circuit diagram (refer to Section 250).*

*"Y" designations of solenoids are identical with those in the electrical system diagrams.*

*General Information/Hydraulic System Circuit Diagram*

SOLENOID VALVES — BASIC MACHINE

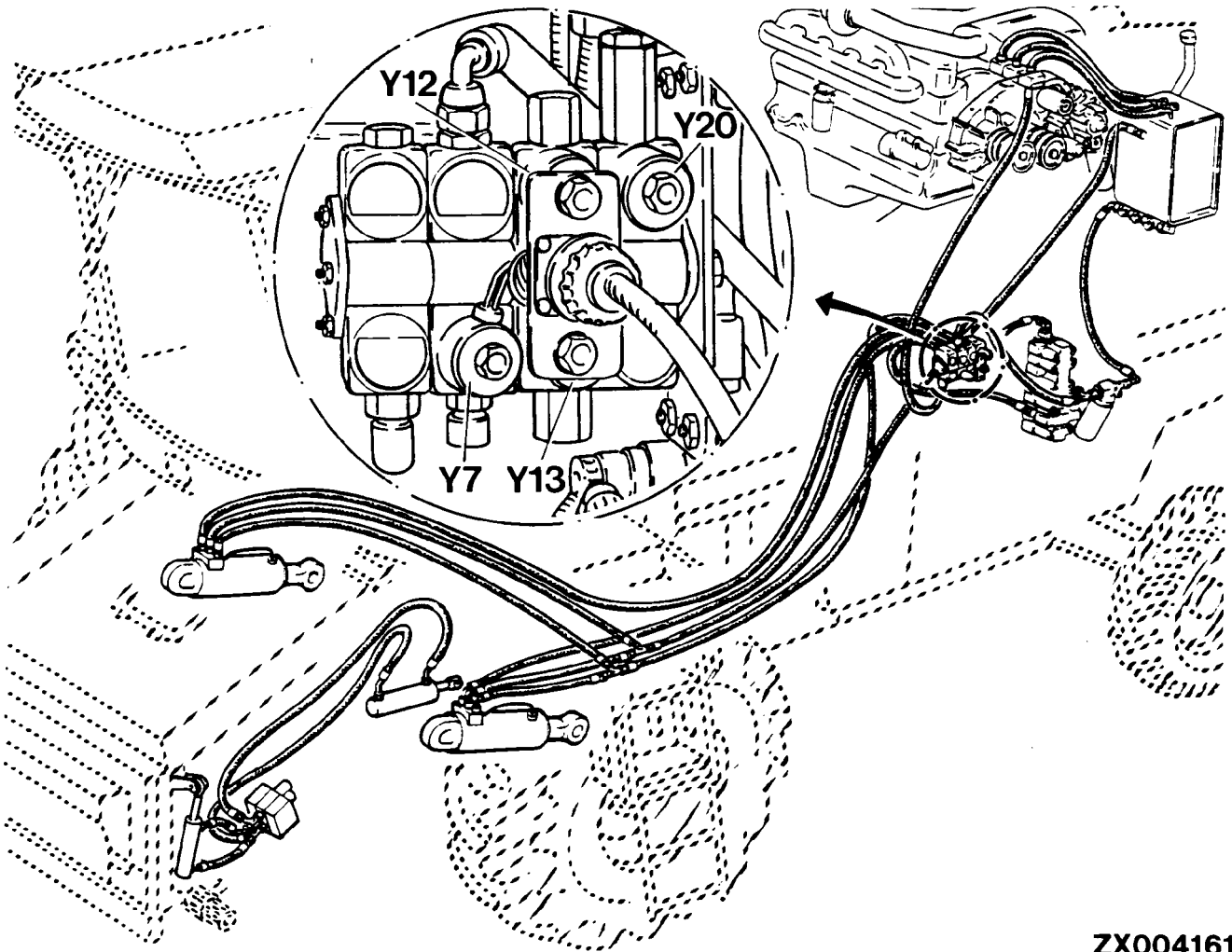


ZX004160

- |                                               |                                                |
|-----------------------------------------------|------------------------------------------------|
| Y 1 — Pressure valve 1                        | Y 22 — Solenoid, switching on separator        |
| Y 2 — Pressure valve 2                        | Y 23 — Solenoid, switching on separator        |
| Y 3 — Solenoid, raising header                | Y 26 — Solenoid, unloading grain tank          |
| Y 4 — Solenoid, lowering header               | Y 27 — Solenoid, unloading grain tank          |
| Y 5 — Solenoid, raising header                | Y 28 — Solenoid, reducing cylinder speed       |
| Y 6 — Solenoid, lowering header               | Y 29 — Solenoid, increasing cylinder speed     |
| Y 10 — Solenoid, swinging in unloading auger  | Y 30 — Solenoid, reducing feeder house speed   |
| Y 11 — Solenoid, swinging out unloading auger | Y 31 — Solenoid, increasing feeder house speed |
| Y 14 — Solenoid, header leveling, left side   |                                                |
| Y 15 — Solenoid, header leveling, right side  |                                                |
| Y 21 — Solenoid not allocated                 |                                                |

ZX.TMXZCO003067-19-25NOV93

### SOLENOID VALVES — HILLMASTER



**ZX004161**

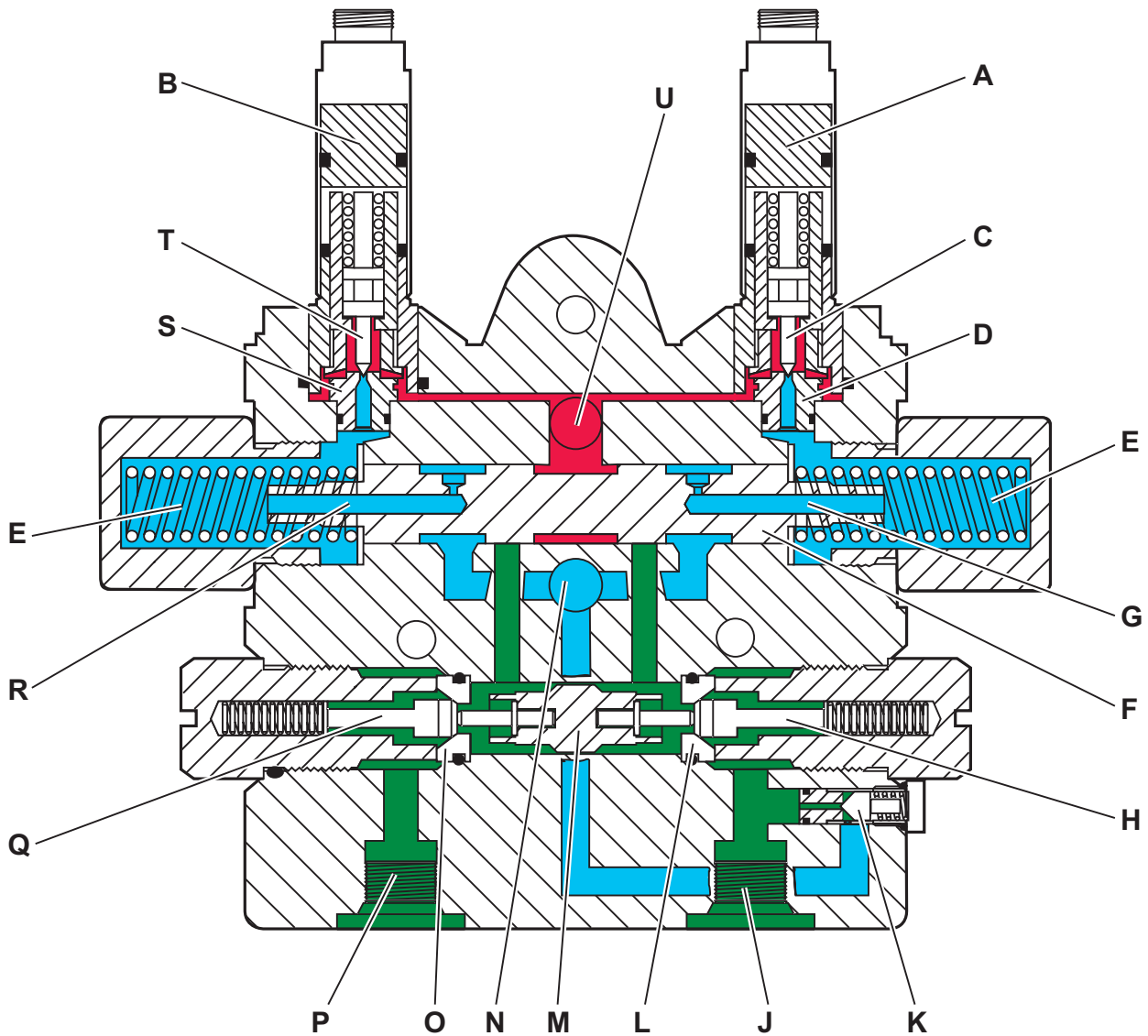
Y 7 — Pressure valve 3  
Y 12 — Solenoid, leveling system, left

Y 13 — Solenoid, leveling system, right  
Y 20 — Solenoid, lowering combine

ZX.TMXZCO003068-19-25NOV93

ZX004161 -JUN-03/MAY95

**SOLENOID VALVE PLATE FOR HORIZONTAL REEL ADJUSTMENT, NEUTRAL POSITION**



-UN-06MAY98  
ZX004137

ZX004137

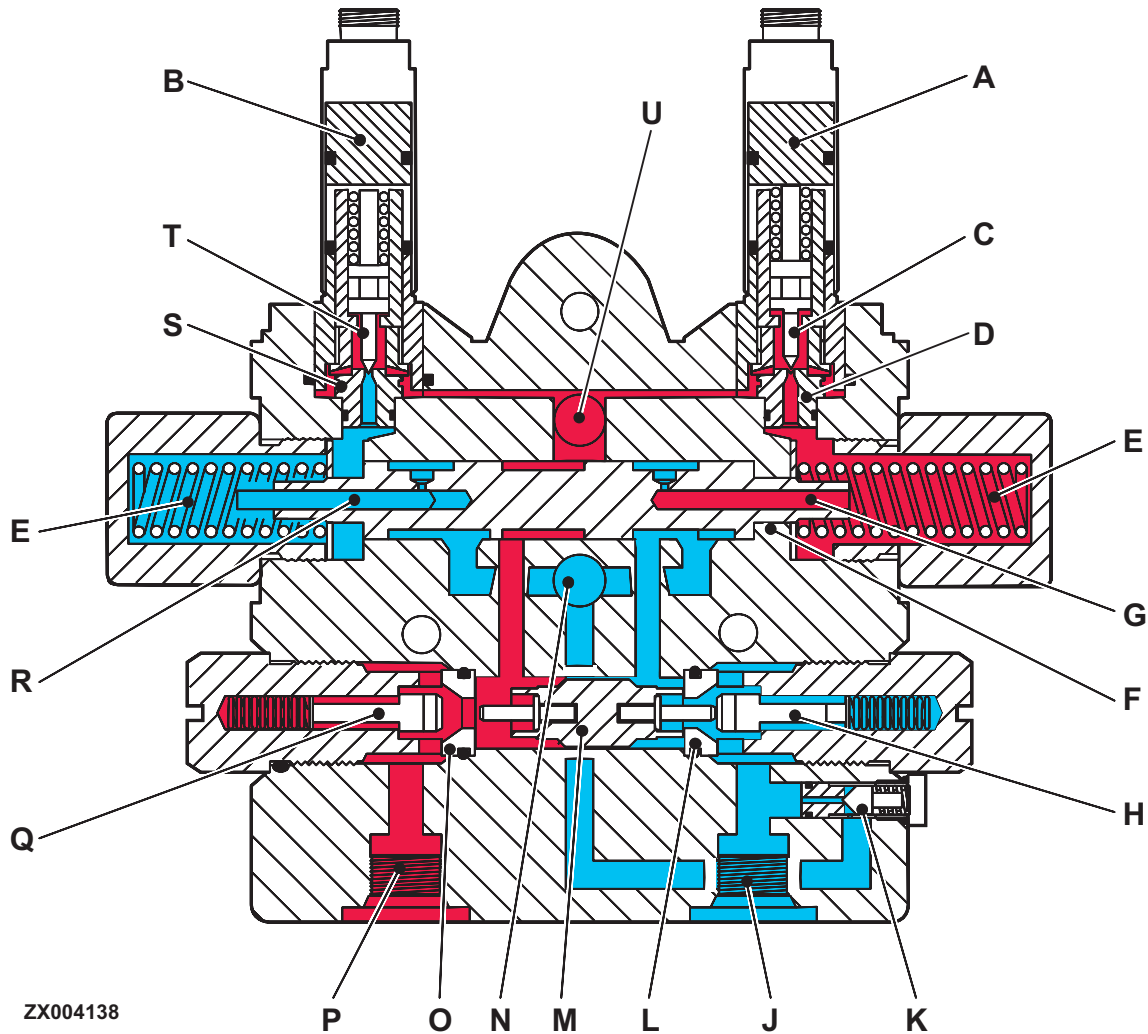
- |                     |                            |                            |                        |
|---------------------|----------------------------|----------------------------|------------------------|
| A—Solenoid          | F—Control plunger          | L—Check valve seat         | Q—Check valve          |
| B—Solenoid          | G—Return oil passage       | M—Piston                   | R—Return oil passage   |
| C—Needle valve      | H—Check valve              | N—Return oil passage       | S—Needle valve seat    |
| D—Needle valve seat | J—Connection, working line | O—Check valve seat         | T—Needle valve         |
| E—Spring            | K—Thermal relief valve     | P—Connection, working line | U—Pressure oil passage |

The solenoid valve plate for horizontal reel adjustment is a 3/4 directional control valve plate with integrated check valves.

In neutral position, solenoids (A) and (B) are closed (without current). Orifices of control plunger (F) relieve pressure on both sides of plunger, moving it to center position. Both check valves are closed.

ZX.TMXZCO003069-19-25NOV93

**SOLENOID VALVE PLATE FOR HORIZONTAL REEL ADJUSTMENT, WORKING POSITION**



ZX004138

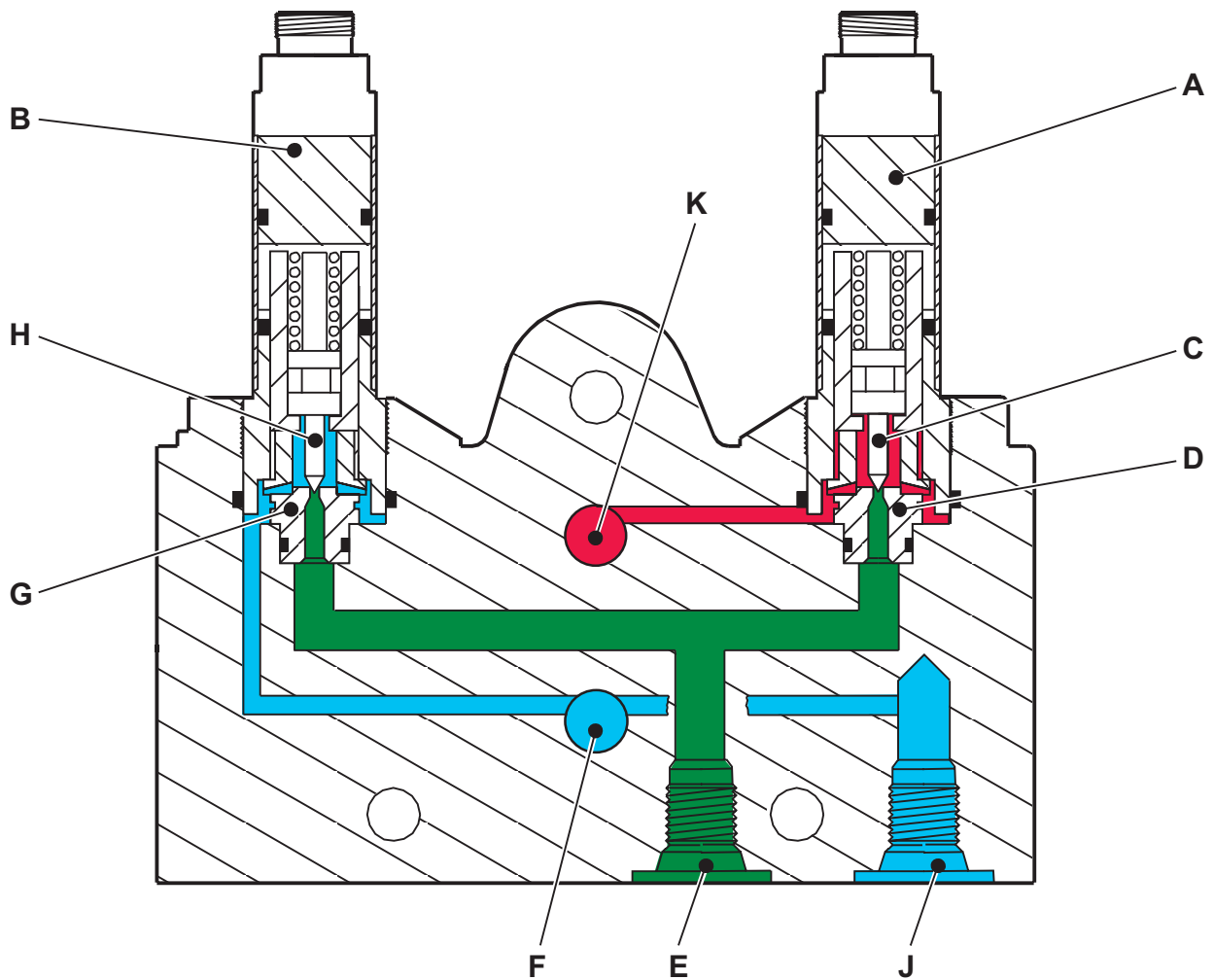
ZX004138 -UN-22APR98

- |                     |                            |                            |                        |
|---------------------|----------------------------|----------------------------|------------------------|
| A—Solenoid          | F—Control plunger          | L—Check valve seat         | Q—Check valve          |
| B—Solenoid          | G—Return oil passage       | M—Piston                   | R—Return oil passage   |
| C—Needle valve      | H—Check valve              | N—Return oil passage       | S—Needle valve seat    |
| D—Needle valve seat | J—Connection, working line | O—Check valve seat         | T—Needle valve         |
| E—Spring            | K—Thermal relief valve     | P—Connection, working line | U—Pressure oil passage |

In working position, needle valve (C) or (T) is opened electromagnetically. Control plunger (F) moves to the right or left and routes pressure oil to the working line

via the check valve. Pressure moves piston (M) to the opposite side, opening return check valve. The reel is moved forward or rearward.

**SOLENOID VALVE PLATE FOR REEL LIFT, NEUTRAL POSITION**



ZX004139

ZX004139 -UN-28APR98

A—Solenoid  
B—Solenoid  
C—Needle valve

D—Needle valve seat  
E—Cylinder connection

F—Return oil passage  
G—Needle valve seat

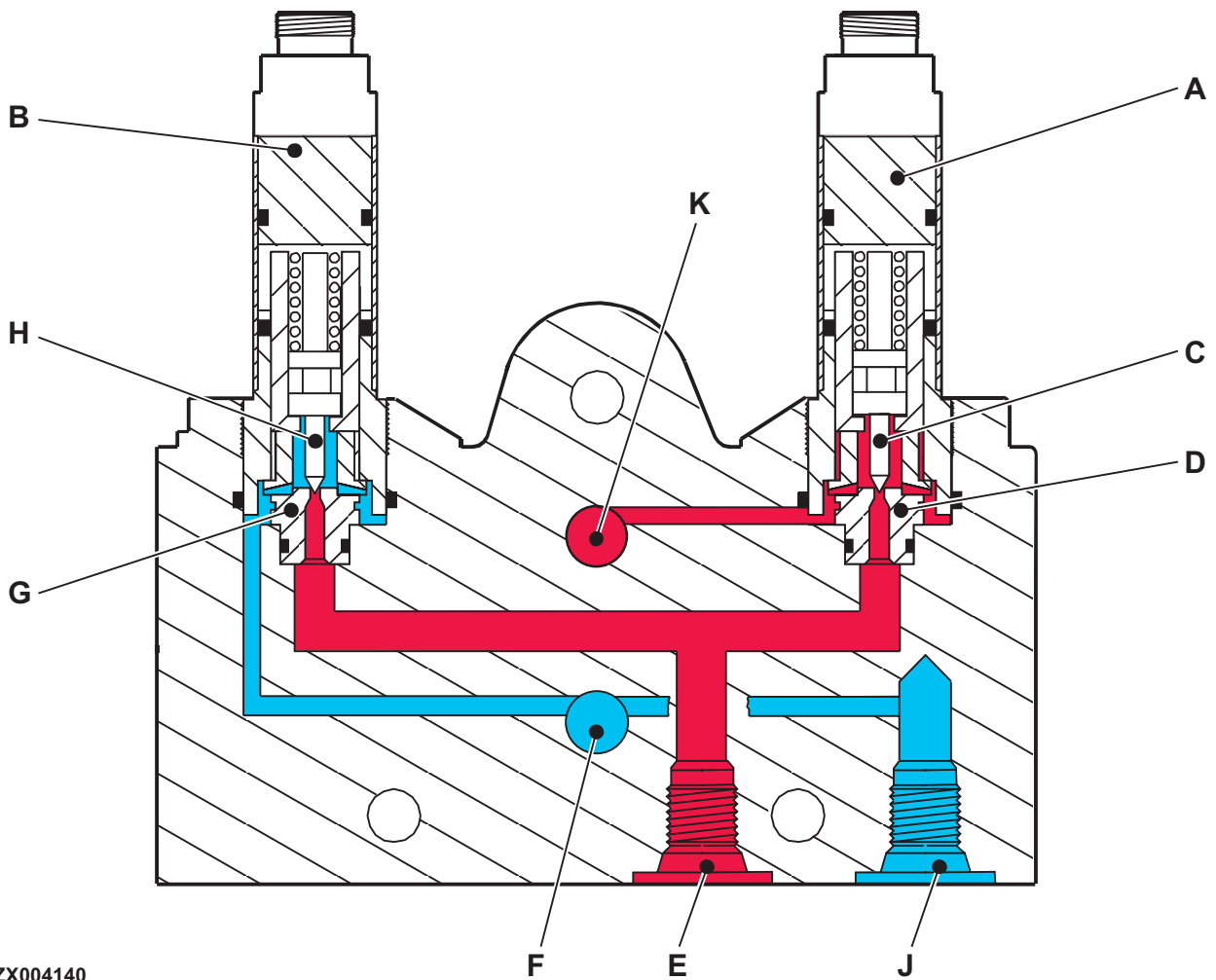
H—Needle valve  
J—Accumulator connection

A hydraulic cylinder or a hydraulically adjustable variable drive is connected to (E).

When using solenoid valve plate on cutting platform, an accumulator is connected to (J) to facilitate the coupling process.

ZX.TMXZCO003071-19-25NOV93

**SOLENOID VALVE PLATE FOR REEL LIFT, 'RAISE' POSITION**



ZX004140

ZX004140 -UN-28APR98

- |                |                       |                      |                          |
|----------------|-----------------------|----------------------|--------------------------|
| A—Solenoid     | D—Needle valve seat   | F—Return oil passage | H—Needle valve           |
| B—Solenoid     | E—Cylinder connection | G—Needle valve seat  | J—Accumulator connection |
| C—Needle valve |                       |                      |                          |

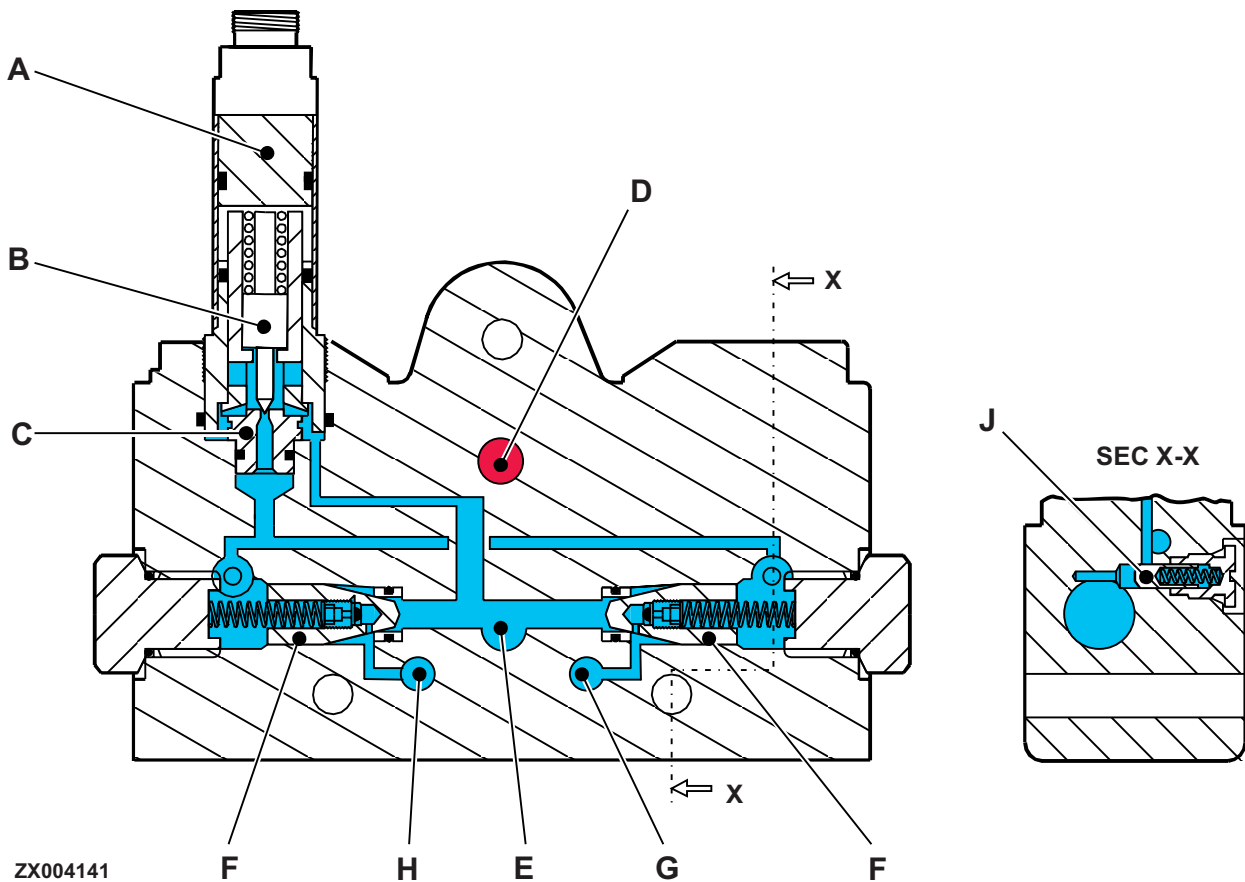
Needle valve (C) is opened, routing pressure oil to connection (E).

Needle valve (H) is opened to lower reel.

ZX.TMXZCO003072-19-25NOV93



**SOLENOID VALVE PLATE FOR PRESSURE RELIEF (HEADER LATERAL TILT)**



ZX004141

- |                            |                        |                                 |               |
|----------------------------|------------------------|---------------------------------|---------------|
| A—Solenoid (not installed) | D—Pressure oil passage | G—Hydraulic cylinder connection | J—Check valve |
| B—Needle valve             | E—Return oil passage   | H—Hydraulic cylinder connection |               |
| C—Needle valve seat        | F—Control plunger      |                                 |               |

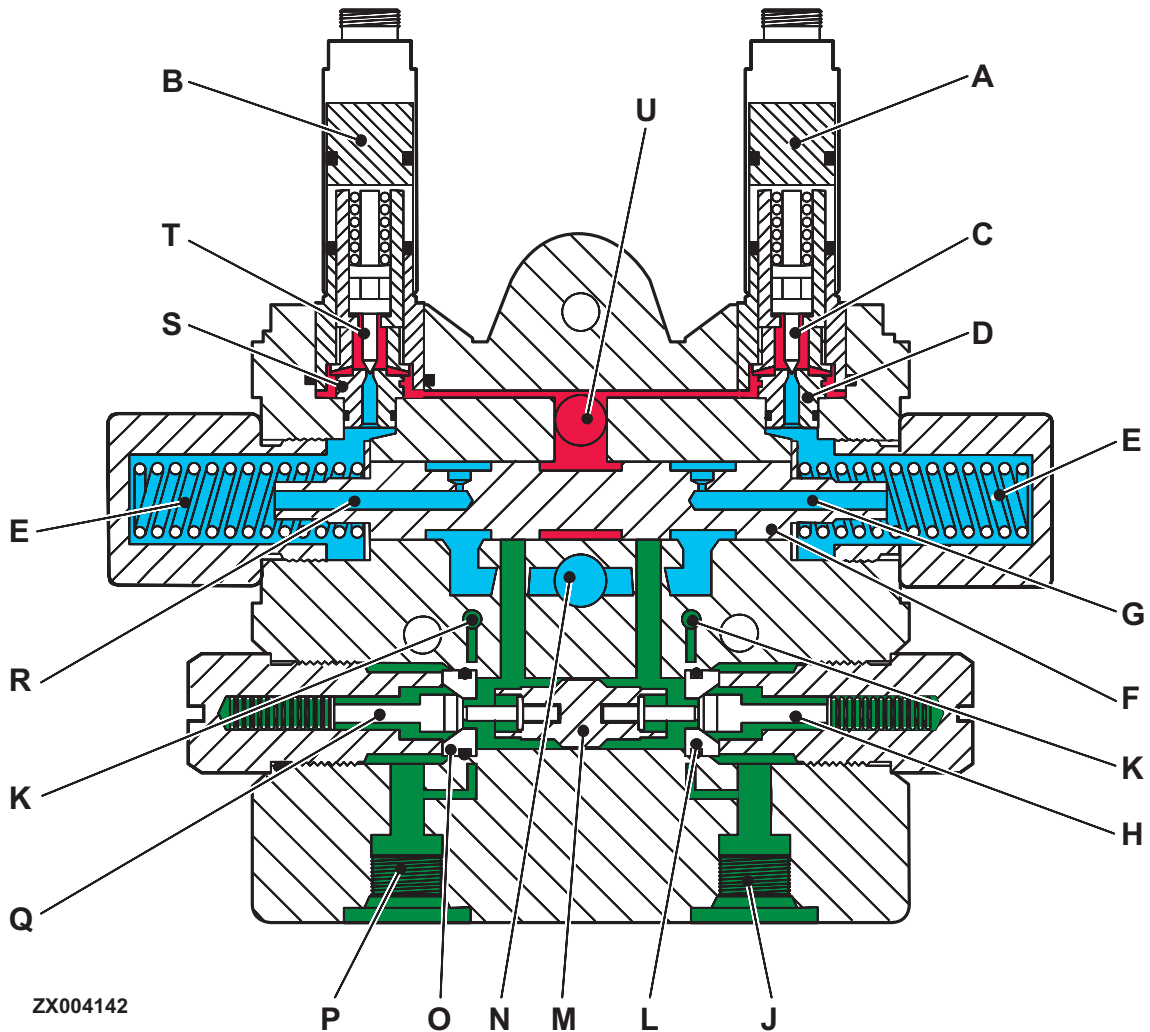
This solenoid valve plate is used on machines provided with header lateral tilt function.

When the cutting platform is lowered and touches the ground on one side, high pressure is created on

corresponding side of double-acting hydraulic cylinder. The pressure relief valves installed on right and left-hand side limit pressure to 12500 kPa (125 bar; 1800 psi), controlled by needle valve (B).

ZX004141 -UN-06MAY98

**SOLENOID VALVE PLATE FOR HEADER LATERAL TILT, NEUTRAL POSITION**



ZX004142

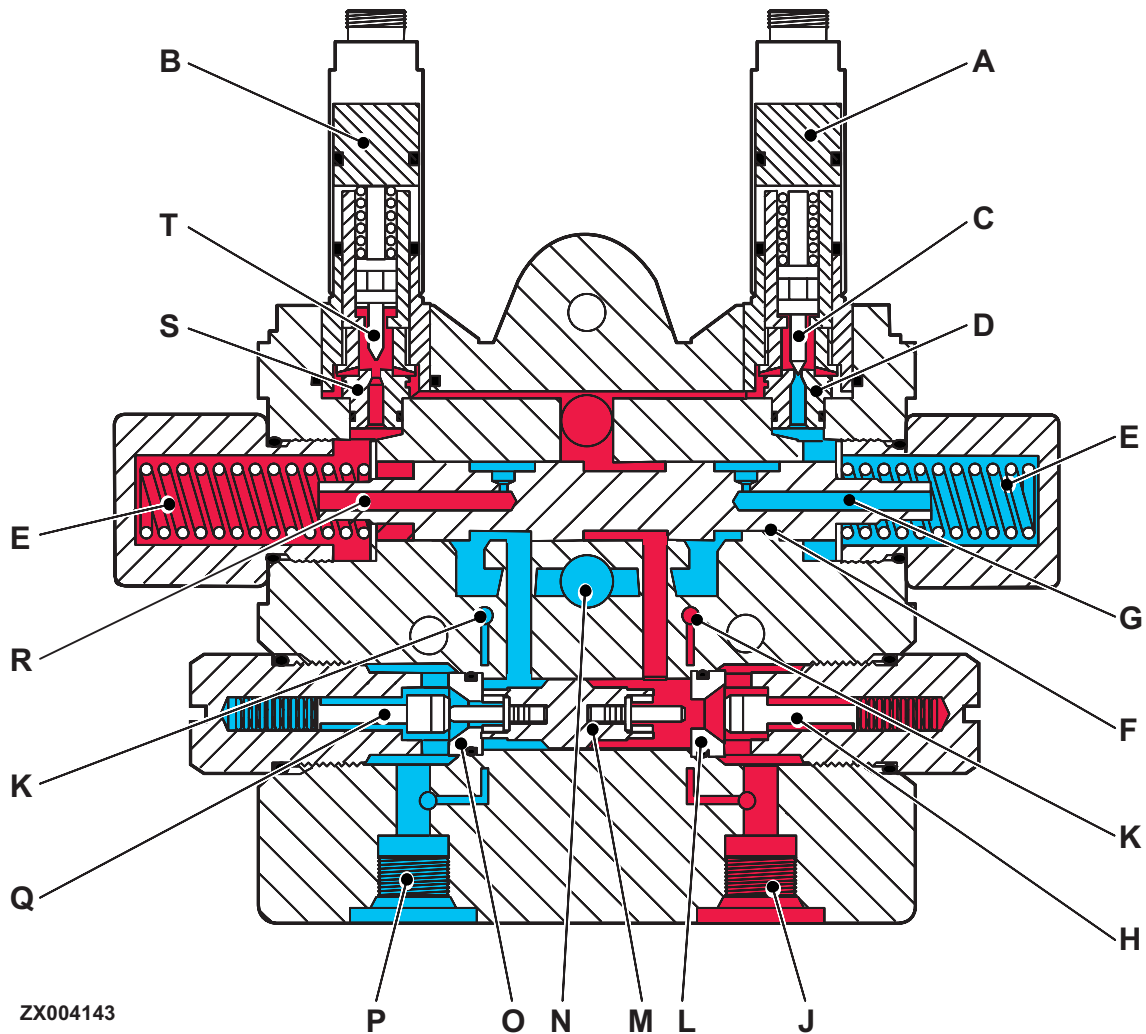
-UN-23APR98  
ZX004142

- |                     |                                               |                            |                        |
|---------------------|-----------------------------------------------|----------------------------|------------------------|
| A—Solenoid          | G—Return oil passage                          | L—Check valve seat         | Q—Check valve          |
| B—Solenoid          | H—Check valve                                 | M—Piston                   | R—Return oil passage   |
| C—Needle valve      | J—Connection, working line                    | N—Return oil passage       | S—Needle valve seat    |
| D—Needle valve seat | K—Connecting passage to pressure relief plate | O—Check valve seat         | T—Needle valve         |
| E—Spring            |                                               | P—Connection, working line | U—Pressure oil passage |
| F—Control plunger   |                                               |                            |                        |

The function of the solenoid valve plate for header lateral tilt corresponds to the function of the solenoid valve plate for horizontal reel adjustment (refer to information in this Group).

The only difference is that two connecting passages (K) to the solenoid valve plate for pressure relief are provided.

**SOLENOID VALVE PLATE FOR HEADER LATERAL TILT, WORKING POSITION**



ZX004143 -UN-23APR98

- |                     |                                               |                            |                        |
|---------------------|-----------------------------------------------|----------------------------|------------------------|
| A—Solenoid          | G—Return oil passage                          | L—Check valve seat         | Q—Check valve          |
| B—Solenoid          | H—Check valve                                 | M—Piston                   | R—Return oil passage   |
| C—Needle valve      | J—Connection, working line                    | N—Return oil passage       | S—Needle valve seat    |
| D—Needle valve seat | K—Connecting passage to pressure relief plate | O—Check valve seat         | T—Needle valve         |
| E—Spring            |                                               | P—Connection, working line | U—Pressure oil passage |
| F—Control plunger   |                                               |                            |                        |

In working position, needle valve (C) or (T) is opened electromagnetically. Control plunger (F) is moved to the right or left and directs pressure oil to the working

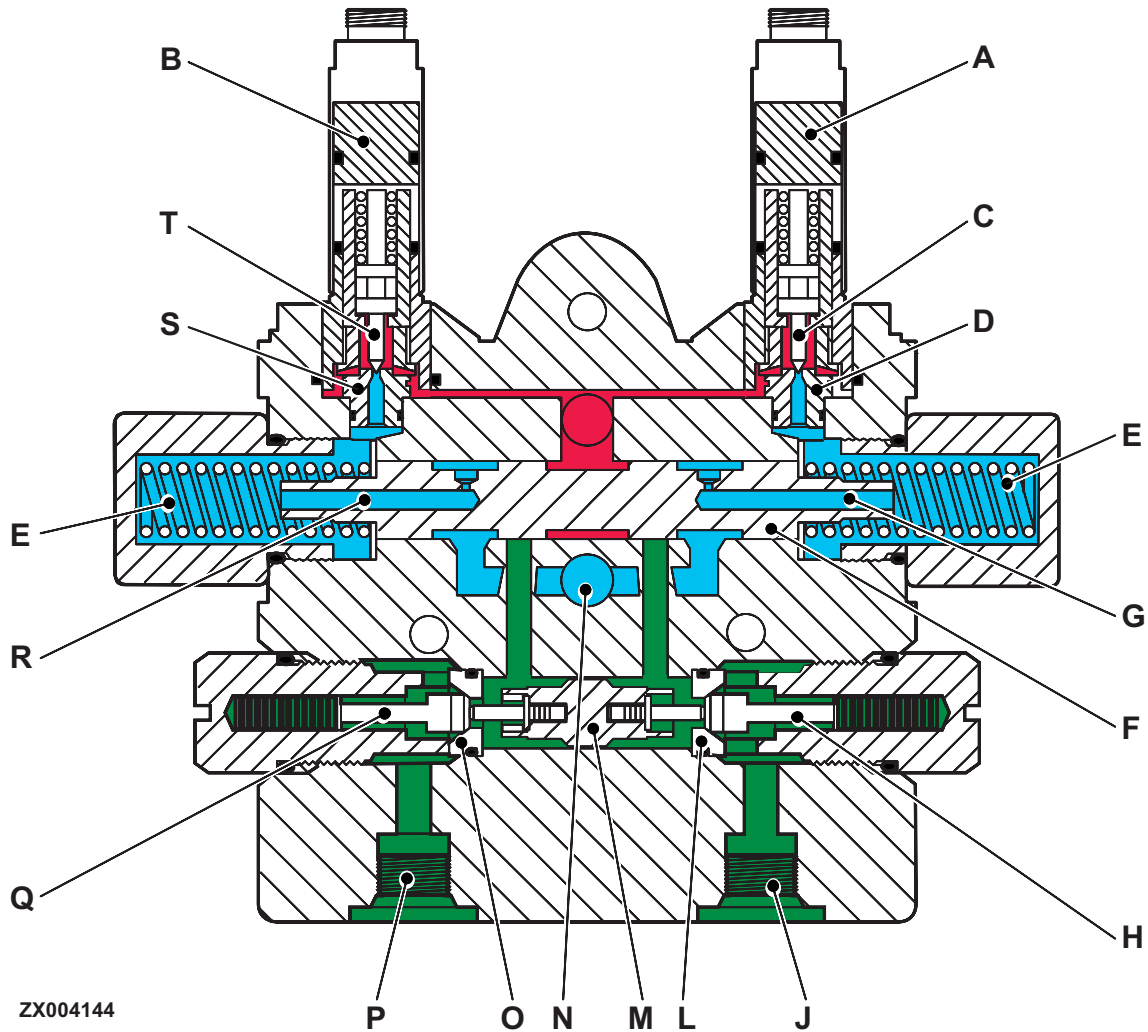
line via the check valve. Pressure moves piston (M) to the opposite side, opening return check valve. The cutting platform is tilted to the right or left.

**SOLENOID VALVE PLATE FOR  
HARVESTING UNIT VARIABLE DRIVE**

*NOTE: The solenoid valve plate for harvesting unit variable drive is identical with the solenoid valve plate for reel lift. Refer to information given in this Group.*

ZX, TMXZC0003076-19-25NOV93

**SOLENOID VALVE PLATE FOR SWINGING OUT UNLOADING AUGER, NEUTRAL POSITION**

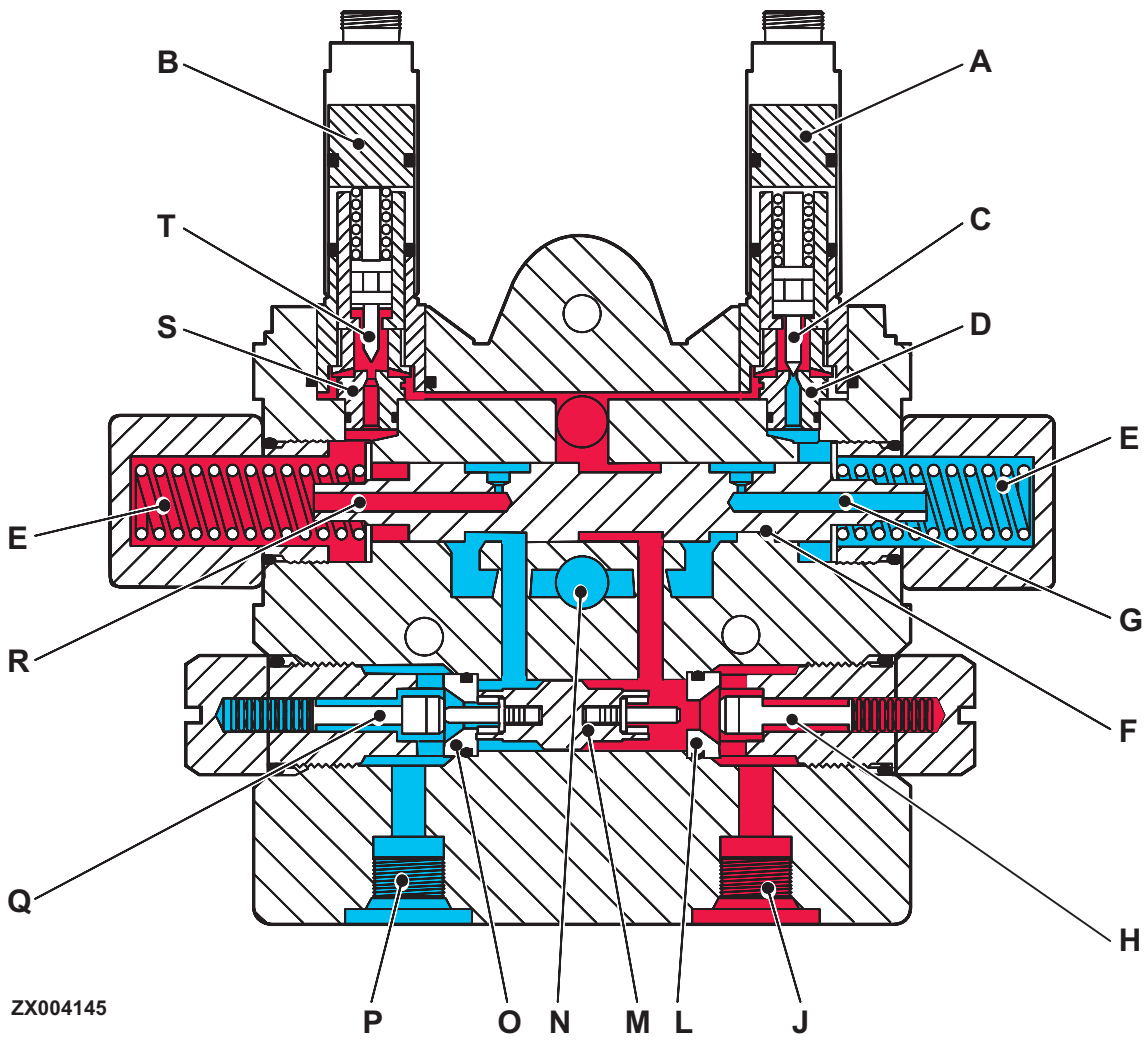


- |                     |                            |                            |                        |
|---------------------|----------------------------|----------------------------|------------------------|
| A—Solenoid          | F—Control plunger          | M—Piston                   | R—Return oil passage   |
| B—Solenoid          | G—Return oil passage       | N—Return oil passage       | S—Needle valve seat    |
| C—Needle valve      | H—Check valve              | O—Check valve seat         | T—Needle valve         |
| D—Needle valve seat | J—Connection, working line | P—Connection, working line | U—Pressure oil passage |
| E—Spring            | L—Check valve seat         | Q—Check valve              |                        |

Pilot-operated check valves are located in front of the connections to the double-acting hydraulic cylinder.

This makes it possible to hold the unloading auger securely in any position.

**SOLENOID VALVE PLATE FOR SWINGING OUT UNLOADING AUGER, WORKING POSITION**

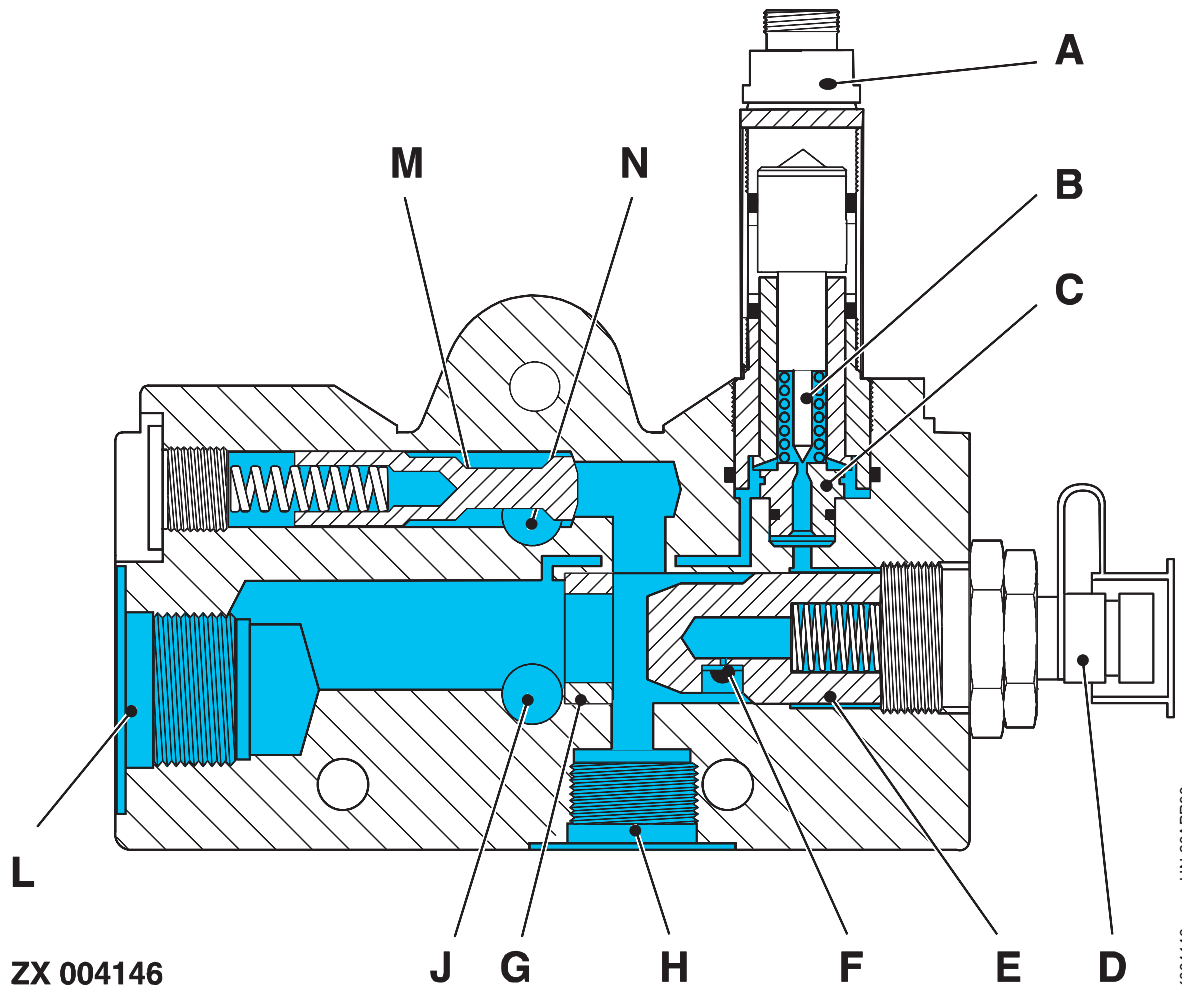


- |                     |                            |                            |                        |
|---------------------|----------------------------|----------------------------|------------------------|
| A—Solenoid          | F—Control plunger          | M—Piston                   | R—Return oil passage   |
| B—Solenoid          | G—Return oil passage       | N—Return oil passage       | S—Needle valve seat    |
| C—Needle valve      | H—Check valve              | O—Check valve seat         | T—Needle valve         |
| D—Needle valve seat | J—Connection, working line | P—Connection, working line | U—Pressure oil passage |
| E—Spring            | L—Check valve seat         | Q—Check valve              |                        |

Plunger (F) is pressurized on one side by opening one needle valve. This moves the plunger out of center position to right or left-hand end position, providing a connection between pressure oil passage

(U) and line (J) or (P). The pressure buildup opens the check valve on the opposite side to provide a return oil connection.

**PRESSURE VALVE IN NEUTRAL POSITION**



-UN-23APR98  
ZX004146

- A—Solenoid
- B—Needle valve
- C—Needle valve seat
- D—Pressure test connection
- E—Control plunger

- F—Orifice
- G—Control plunger seat
- H—Connection, pressure oil from hydraulic pump
- J—Return oil passage (with connection to the other valve plates)

- L—Connection, return oil to hydraulic oil reservoir
- M—Check valve plunger

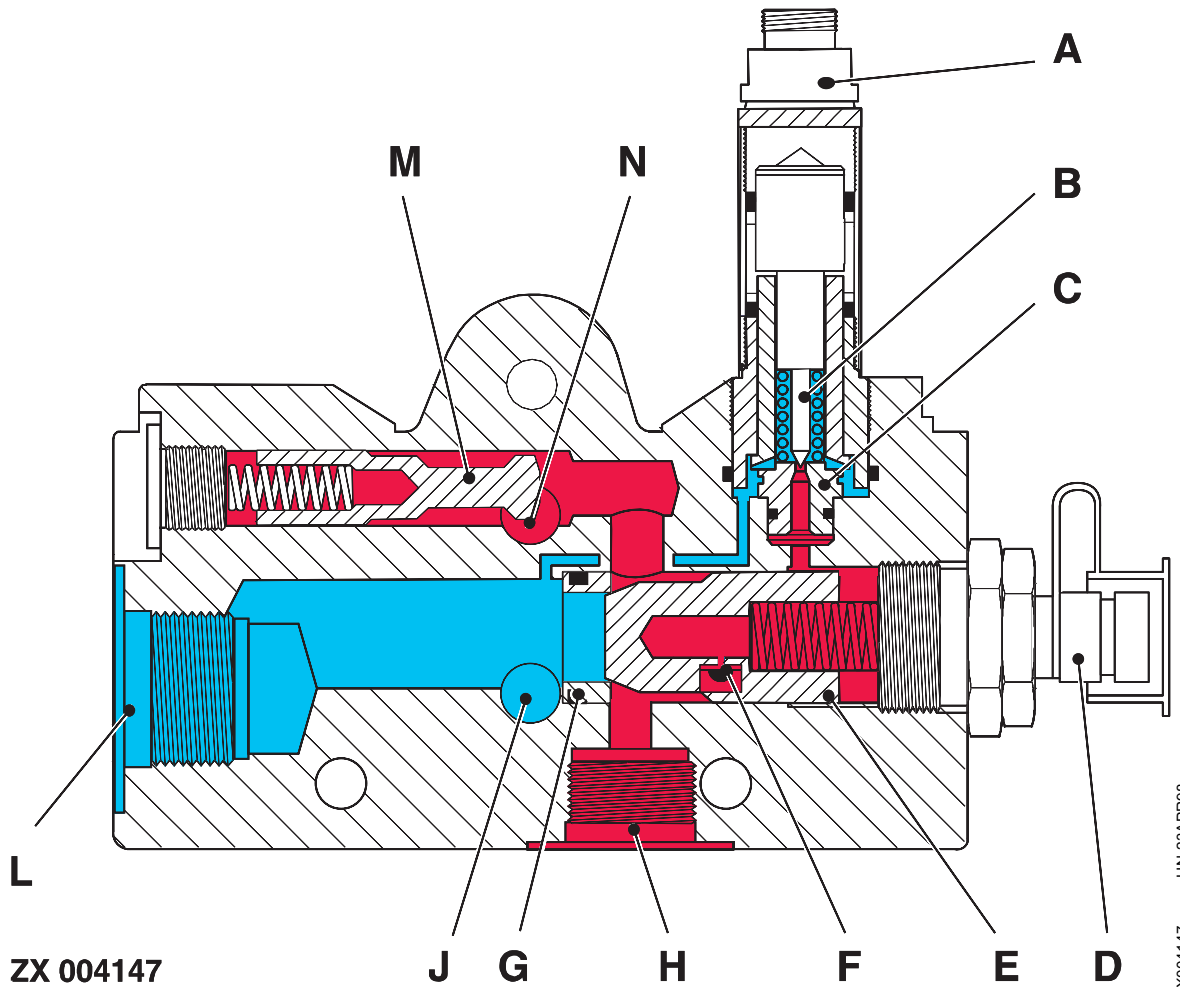
- N—Pressure oil passage (with connection to the other valve plates)

With pressure valve in neutral position, needle valve (B) is open. Space behind control plunger (E) is pressure-free, because this space is connected to return oil passage and, via connection (L), to hydraulic oil reservoir.

Oil from hydraulic pump entering at connection (H) pushes plunger (E) back and returns to hydraulic oil reservoir via connection (L).

ZX, TMXZCO003079-19-25NOV93

**PRESSURE VALVE IN WORKING POSITION**



ZX004147 -UN-23APR98

- A—Solenoid
- B—Needle valve
- C—Needle valve seat
- D—Pressure test connection
- E—Control plunger

- F—Orifice
- G—Control plunger seat
- H—Connection, pressure oil from hydraulic pump
- J—Return oil passage (with connection to the other valve plates)

- L—Connection, return oil to hydraulic oil reservoir
- M—Check valve plunger

- N—Pressure oil passage (with connection to the other valve plates)

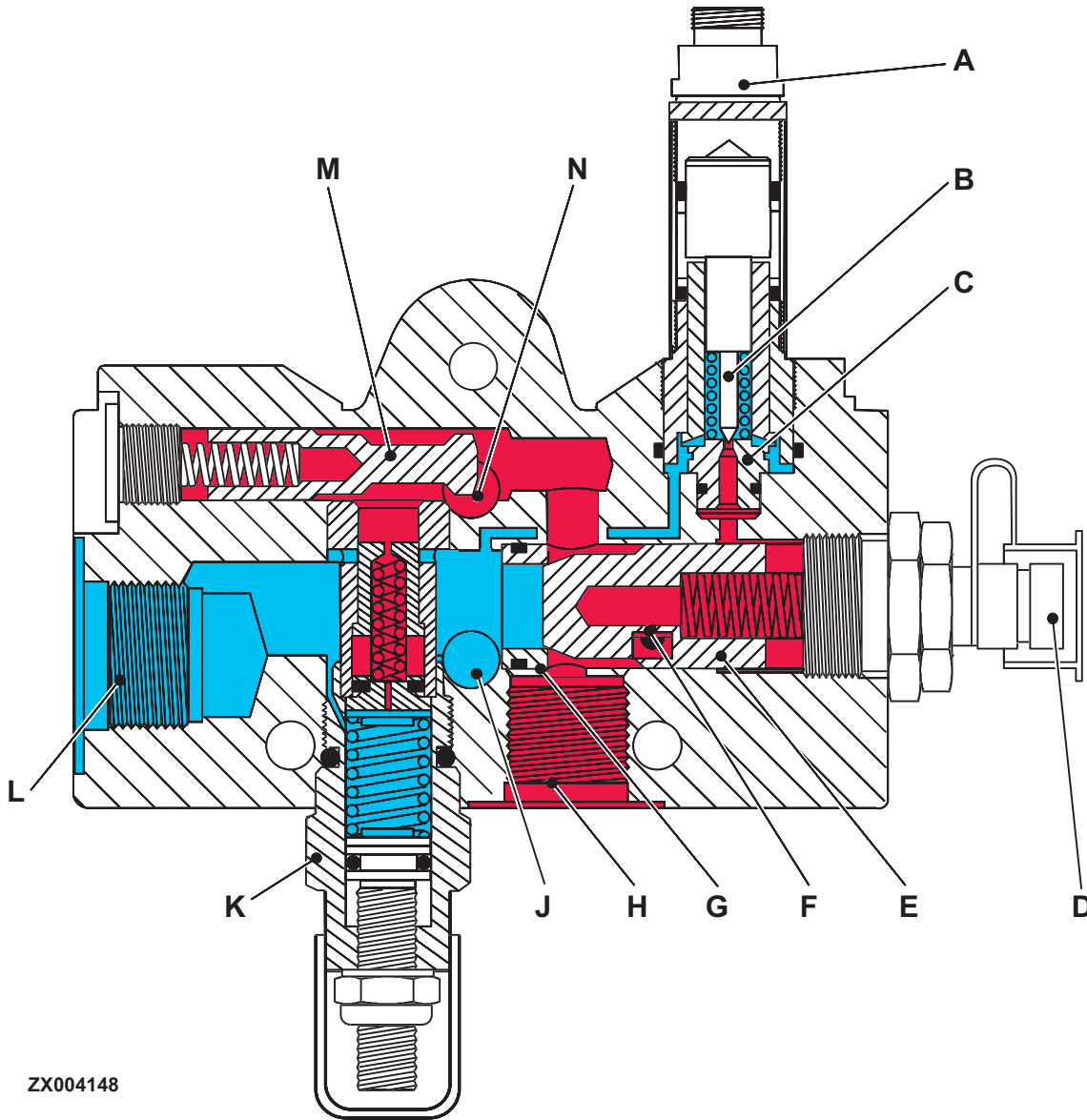
With pressure valve in working position, needle valve (B) is pressed on its seat (C) by solenoid (A). There is no connection between space behind plunger (E) and return oil passage.

The pressure oil pushes back plunger (M) of check valve and flows into pressure oil passage (N). Pressure oil can flow from pressure oil passage (N) to one of the control valve plates (arranged parallel) to perform any desired hydraulic function.

Orifice (F) builds up pressure behind plunger. Due to the pressure buildup and spring force, control plunger (E) is pressed on its seat (G). The connection to return oil passage is interrupted.



**PRESSURE VALVE WITH PRESSURE RELIEF VALVE**



-JUN-23/APR98  
ZX004148

**A—Connection, pressure oil from hydraulic pump**

**B—Connection, return oil to hydraulic oil reservoir**

**C—Pressure oil passage**

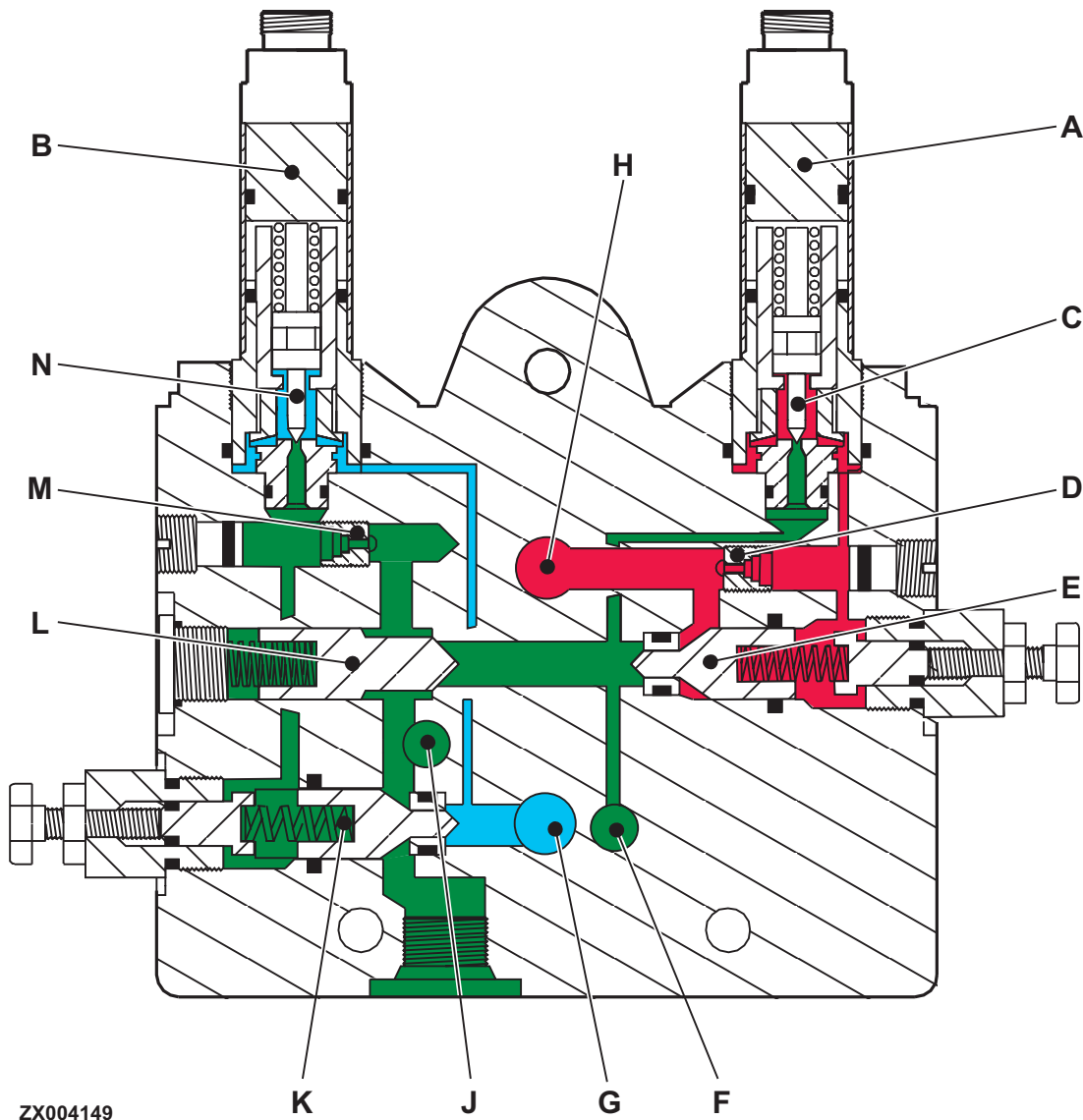
**D—Pressure relief valve**

Operation of pressure valve with relief valve is similar to operation of pressure valve without relief valve.

incorporated relief valve. Relief valve opening pressure is 22000 kPa (220 bar; 3200 psi).

The only difference is a connecting bore between pressure oil passage and return oil passage with

**SOLENOID VALVE PLATE 'RAISING HARVESTING UNIT', NEUTRAL POSITION**



ZX004149

-UN-28APR98  
ZX004149

A—Solenoid  
B—Solenoid  
C—Needle valve  
D—Orifice  
E—Control plunger, raising

F—Connecting passage  
G—Return passage  
H—Pressure oil passage  
J—Connecting passage

K—Control plunger, lowering  
L—Check valve  
M—Orifice  
N—Needle valve

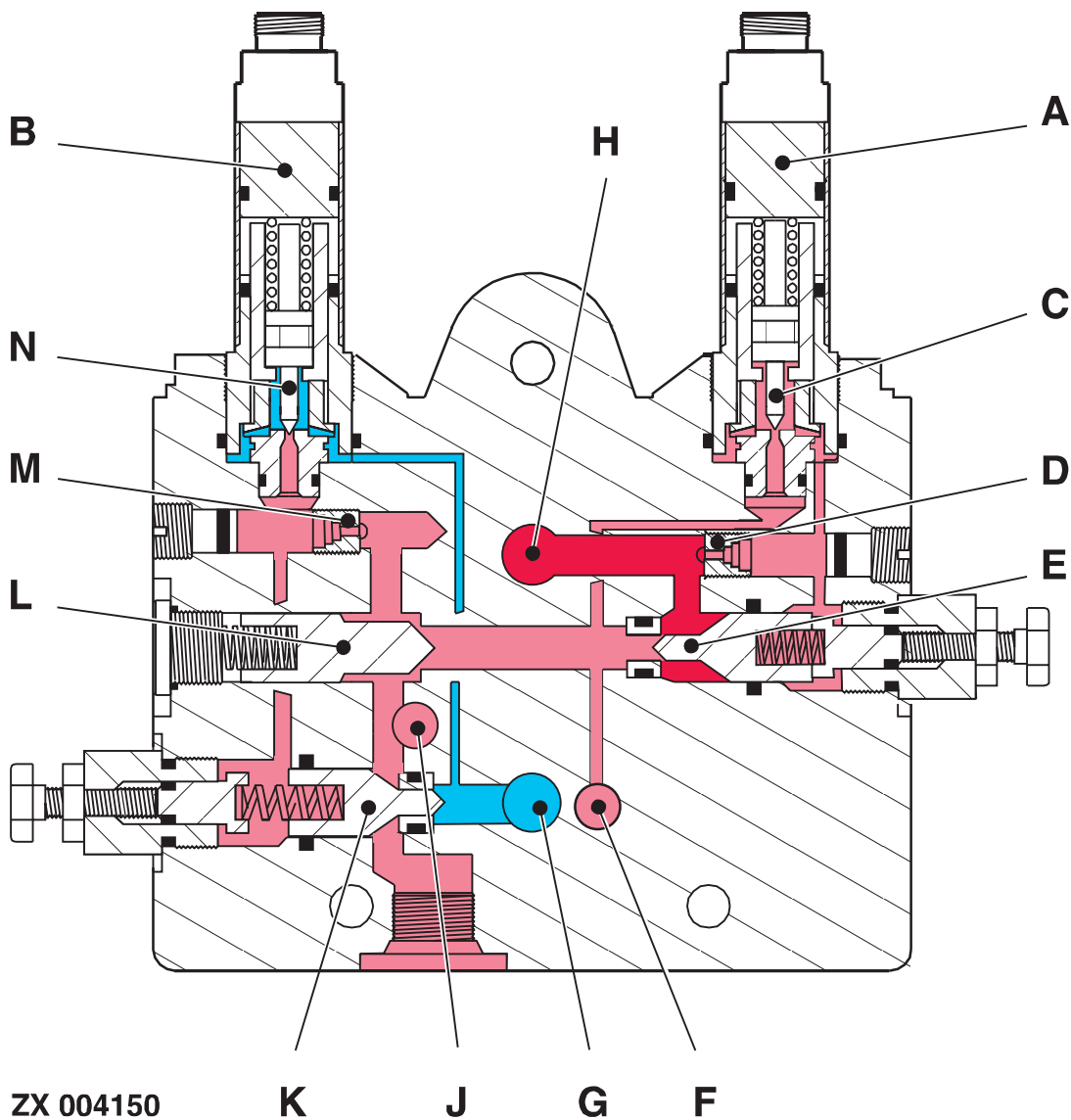
X—Dimension for lift rate adjustment  
Y—Dimension for rate-of-drop adjustment

In neutral position needle valves (C) and (N) are closed by spring pressure. Pressure can be built up via orifices (M) and (D) in space behind control plungers (E) and (K) and both control plungers are pressed on their seats. Pressure oil passage (H) and return oil passage (G) are closed by lift cylinder connection.

When no hydraulic functions are operated and pressure oil passage is without pressure, check valve (L) prevents hydraulic oil from flowing back. This in turn prevents harvesting unit from lowering.

ZX.TMXZCO003082-19-25NOV93

**SOLENOID VALVE PLATE 'RAISING HARVESTING UNIT', RAISING POSITION**



ZX004150 -UN-28APR98

ZX 004150

K

J

G

F

- A—Solenoid
- B—Solenoid
- C—Needle valve
- D—Orifice
- E—Control plunger, raising

- F—Connecting passage
- G—Return oil passage
- H—Pressure oil passage
- J—Connecting passage

- K—Control plunger, lowering
- L—Check valve
- M—Orifice
- N—Needle valve

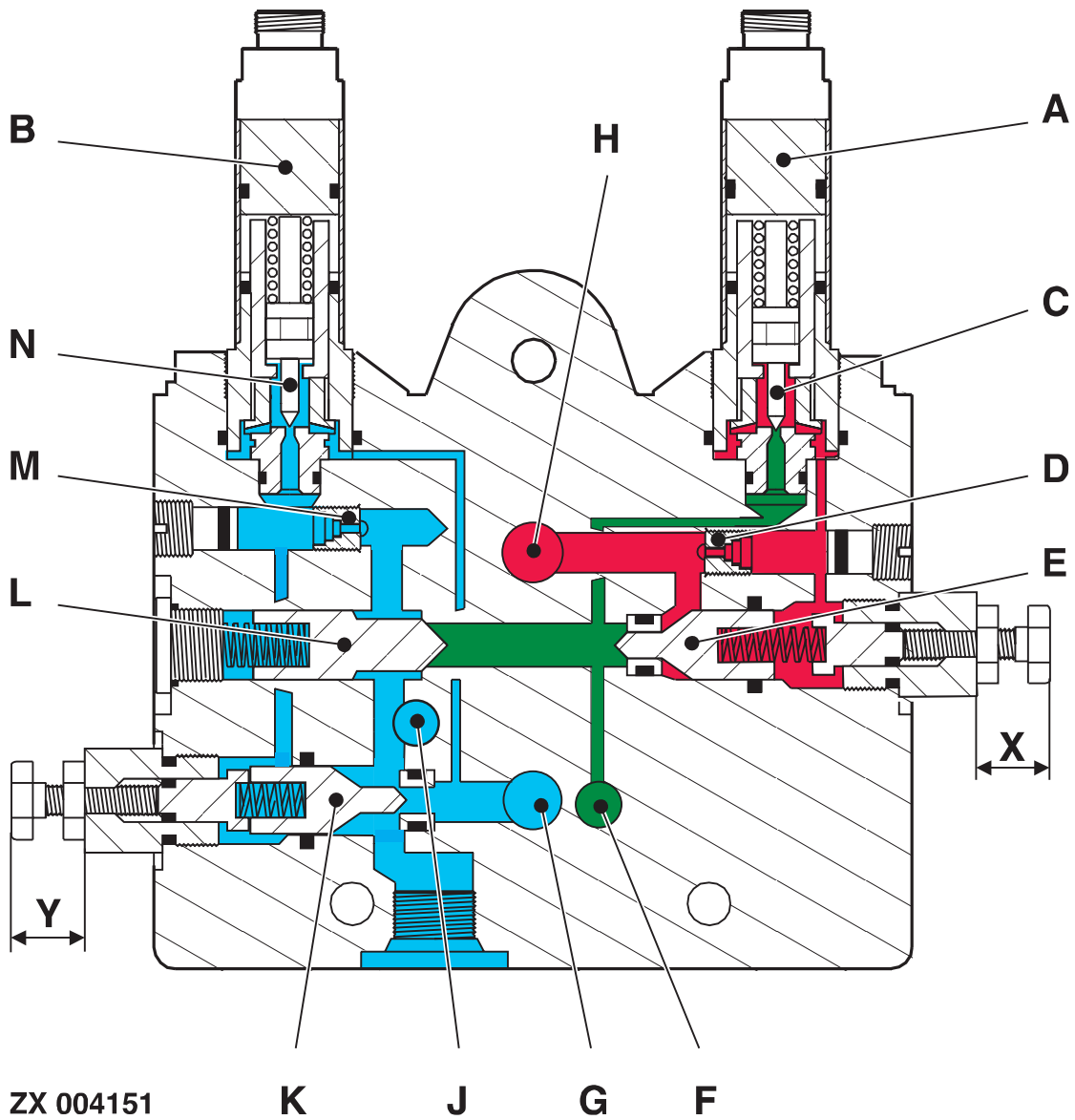
- X—Dimension for lift rate adjustment
- Y—Dimension for rate-of-drop adjustment

To raise harvesting unit solenoid (A) is activated. Needle valve (C) opens and so connection between space behind control plunger (E) and passage to harvesting unit lift cylinder (blocked by control plunger, E) is open.

This causes pressure to drop in space behind control plunger (E), and plunger (E) to open. Pressure oil flows past check valve (L) to harvesting unit lift cylinders.

ZX.TMXZCO003083-19-25NOV93

**SOLENOID VALVE PLATE 'RAISING HARVESTING UNIT', LOWERING POSITION**



ZX004151 -UN-28APR98

- A—Solenoid
- B—Solenoid
- C—Needle valve
- D—Orifice
- E—Control plunger, raising

- F—Connecting passage
- G—Return oil passage
- H—Pressure oil passage
- J—Connecting passage

- K—Control plunger, lowering
- L—Check valve
- M—Orifice
- N—Needle valve

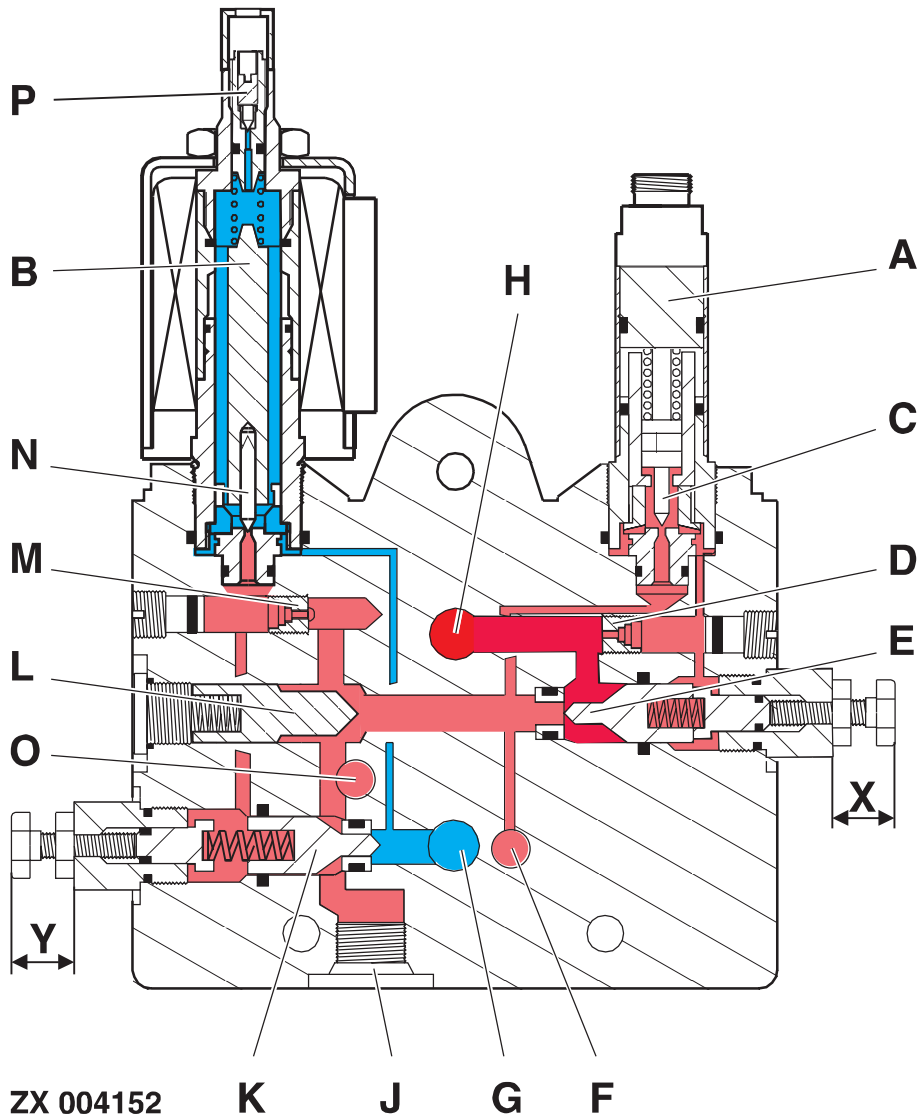
- X—Dimension for lift rate adjustment
- Y—Dimension for rate-of-drop adjustment

To lower harvesting unit solenoid (A) is activated. Needle valve (C) opens and so connection between space behind control plunger (E) and return oil passage (G) is open.

This causes pressure to drop in space behind control plunger (E), and plunger (E) to open. Oil can now flow from harvesting unit lift cylinders to return oil passage (G).

ZX.TMXZCO003084-19-25NOV93

**SOLENOID VALVE PLATE 'RAISING HARVESTING UNIT', FLOAT POSITION**



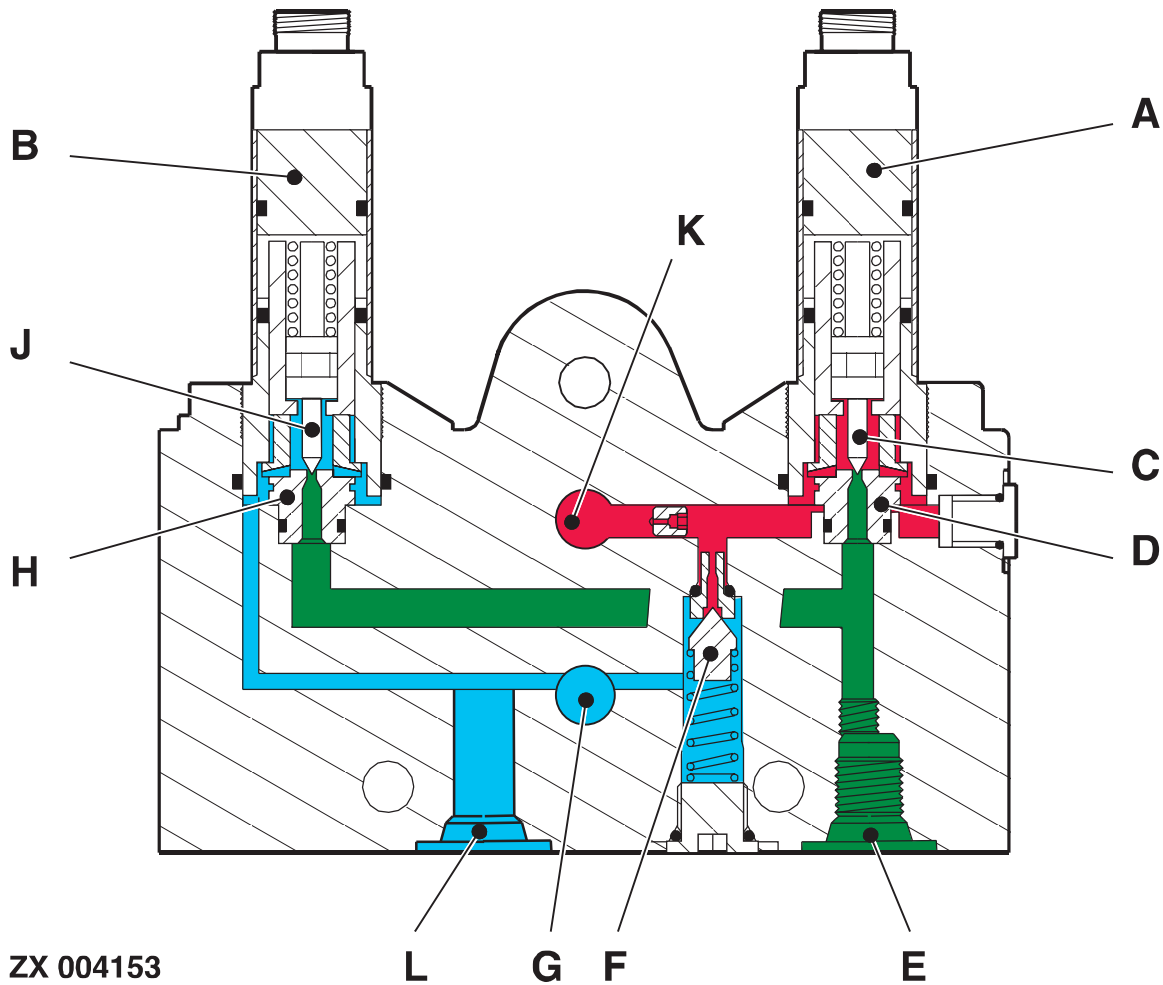
-UN-28APR98  
ZX004152

- |                            |                               |                   |                                         |
|----------------------------|-------------------------------|-------------------|-----------------------------------------|
| A—Solenoid                 | F—Connecting passage          | L—Check valve     | X—Dimension for lift rate adjustment    |
| B—Steel core               | G—Return oil passage          | M—Orifice         | Y—Dimension for rate-of-drop adjustment |
| C—Needle valve             | H—Pressure oil passage        | N—Needle valve    |                                         |
| D—Orifice                  | J—Connection to lift cylinder | O—Connecting bore |                                         |
| E—Control plunger, raising | K—Control plunger, lowering   | P—Bleed screw     |                                         |

To obtain float function, the solenoid valve plate is equipped with a special solenoid (B). For float function the solenoid is supplied with an electric

current between 300 and 900 mA. Depending on current a certain needle valve (N) opening pressure is obtained which determines ground pressure.

**SOLENOID VALVE PLATE 'CYLINDER VARIABLE DRIVE ADJUSTMENT'**



ZX 004153

ZX004153 -UN-28APR98

A—Solenoid  
B—Solenoid  
C—Needle valve  
D—Needle valve seat

E—Connection, cylinder variable drive  
F—Pressure relief valve

G—Return oil passage  
H—Needle valve seat  
J—Needle valve

K—Pressure oil passage  
L—Return connection to reservoir

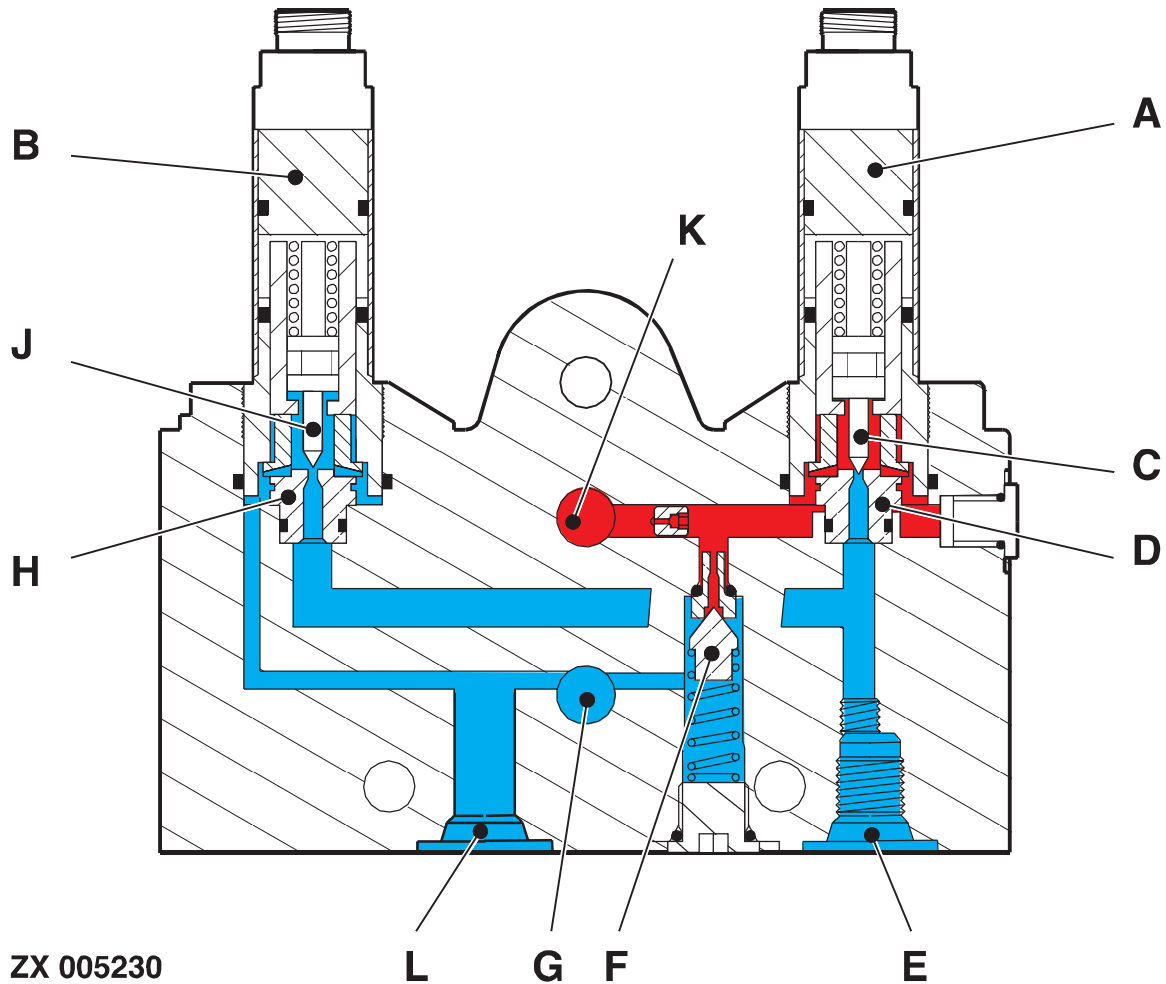
Threshing cylinder variable drive hydraulic cylinder is connected to connection (E) of solenoid valve plate. By activating solenoid (B) and opening needle valve (J) hydraulic oil is discharged from variable drive cylinder.

By activating a pressure valve and solenoid (A) hydraulic oil is directed to variable drive cylinder.

Pressure relief valve (F) limits pressure to 7000 kPa (70 bar; 1015 psi).

ZX,TMXZCO003086-19-14JAN94

**SOLENOID VALVE PLATE 'CYLINDER VARIABLE DRIVE ADJUSTMENT', INCREASING SPEED**



ZX005230 -JUN-28APR98

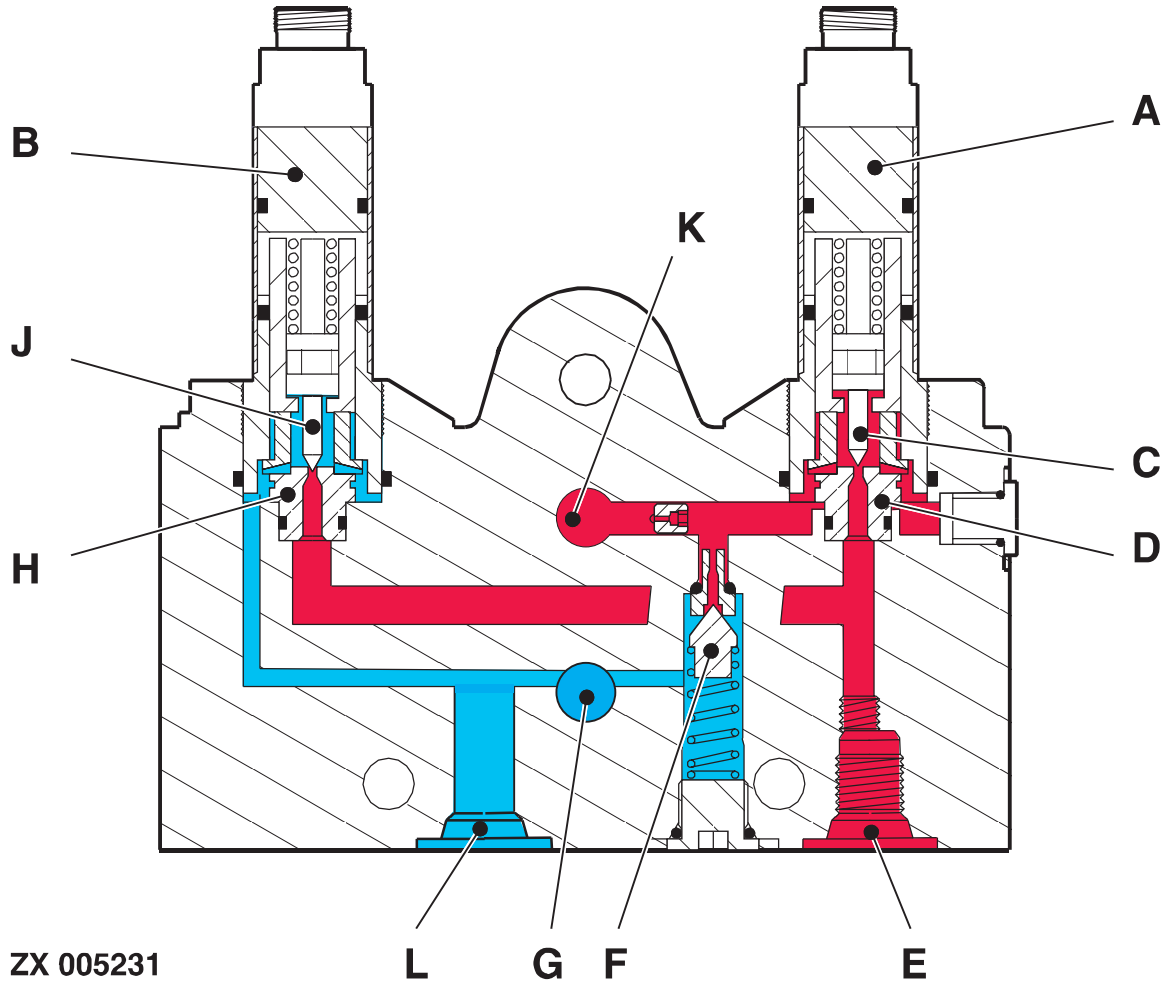
- |                     |                                       |                      |                                  |
|---------------------|---------------------------------------|----------------------|----------------------------------|
| A—Solenoid          | E—Connection, cylinder variable drive | G—Return oil passage | K—Pressure oil passage           |
| B—Solenoid          | F—Pressure relief valve               | H—Needle valve seat  | L—Return connection to reservoir |
| C—Needle valve      |                                       | J—Needle valve       |                                  |
| D—Needle valve seat |                                       |                      |                                  |

One pressure valve and solenoid (A) are activated to increase threshing cylinder speed. The orifice in the pressure oil passage limits oil flow. Pressure relief valve (F) limits pressure to 7000 kPa (70 bar;

1015 psi). An additional orifice plate is located in connection (E). This ensures that cylinder variable drive adjustment is not carried out too rapidly.

ZX,TMXZCO003167-19-14JAN94

**SOLENOID VALVE PLATE 'CYLINDER VARIABLE DRIVE ADJUSTMENT', DECREASING SPEED**



ZX 005231

ZX005231 -UN-28APR98

A—Solenoid  
B—Solenoid  
C—Needle valve  
D—Needle valve seat

E—Connection, cylinder  
variable drive  
F—Pressure relief valve

G—Return oil passage  
H—Needle valve seat  
J—Needle valve

K—Pressure oil passage  
L—Return connection to  
reservoir

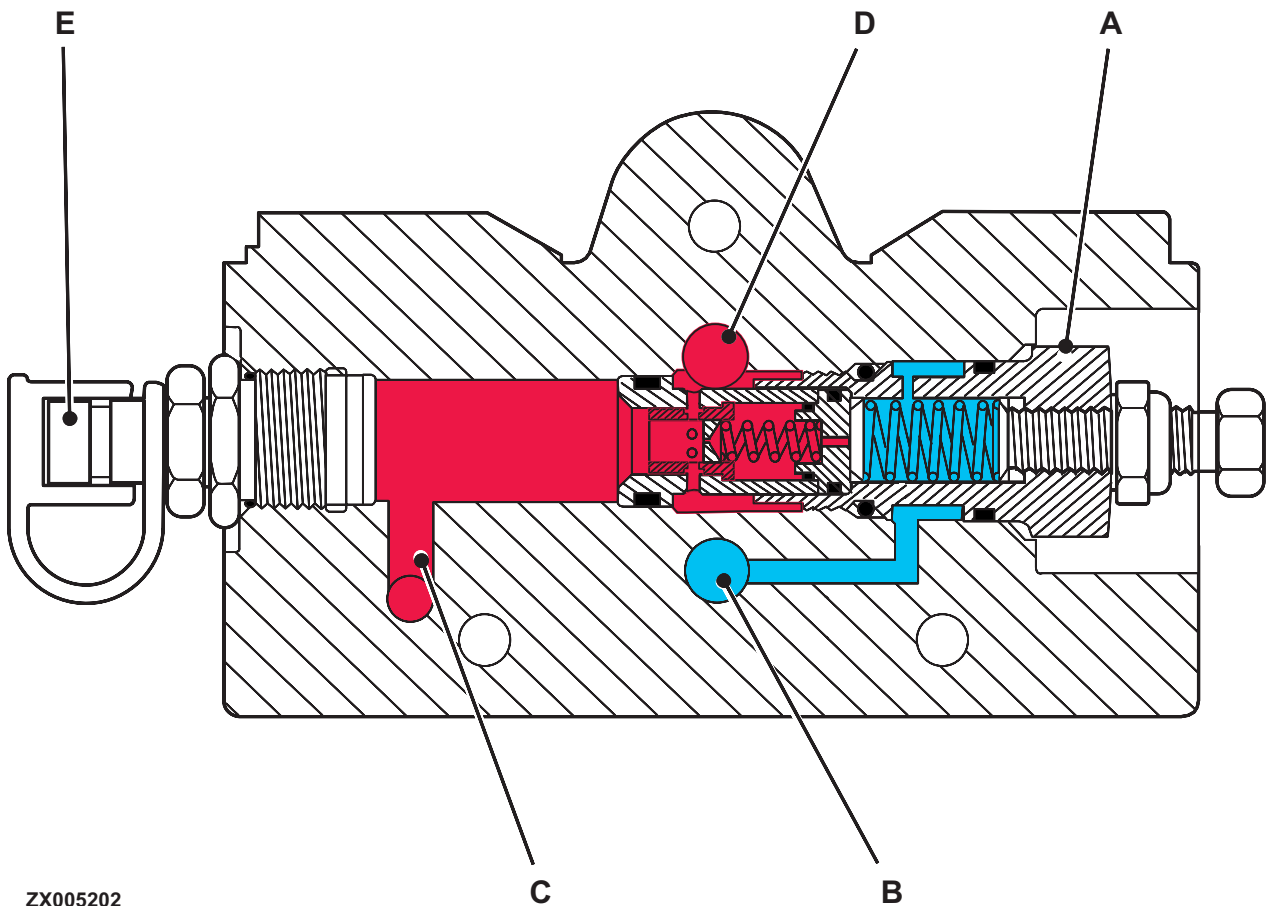
Solenoid (B) is activated to decrease threshing cylinder speed. Hydraulic oil flows via needle valve

seat into the return oil passage and back to the hydraulic oil reservoir.

ZX,TMXZCO003168-19-14JAN94



**PRESSURE REDUCING VALVE**



ZX005202

-JUN-28A-PR8  
ZX005202

**A—Pressure reducing insert**

**B—Return oil passage**

**C—Pressure oil passage to main clutch solenoid valve plate**

**D—Pressure oil passage from pressure valves**

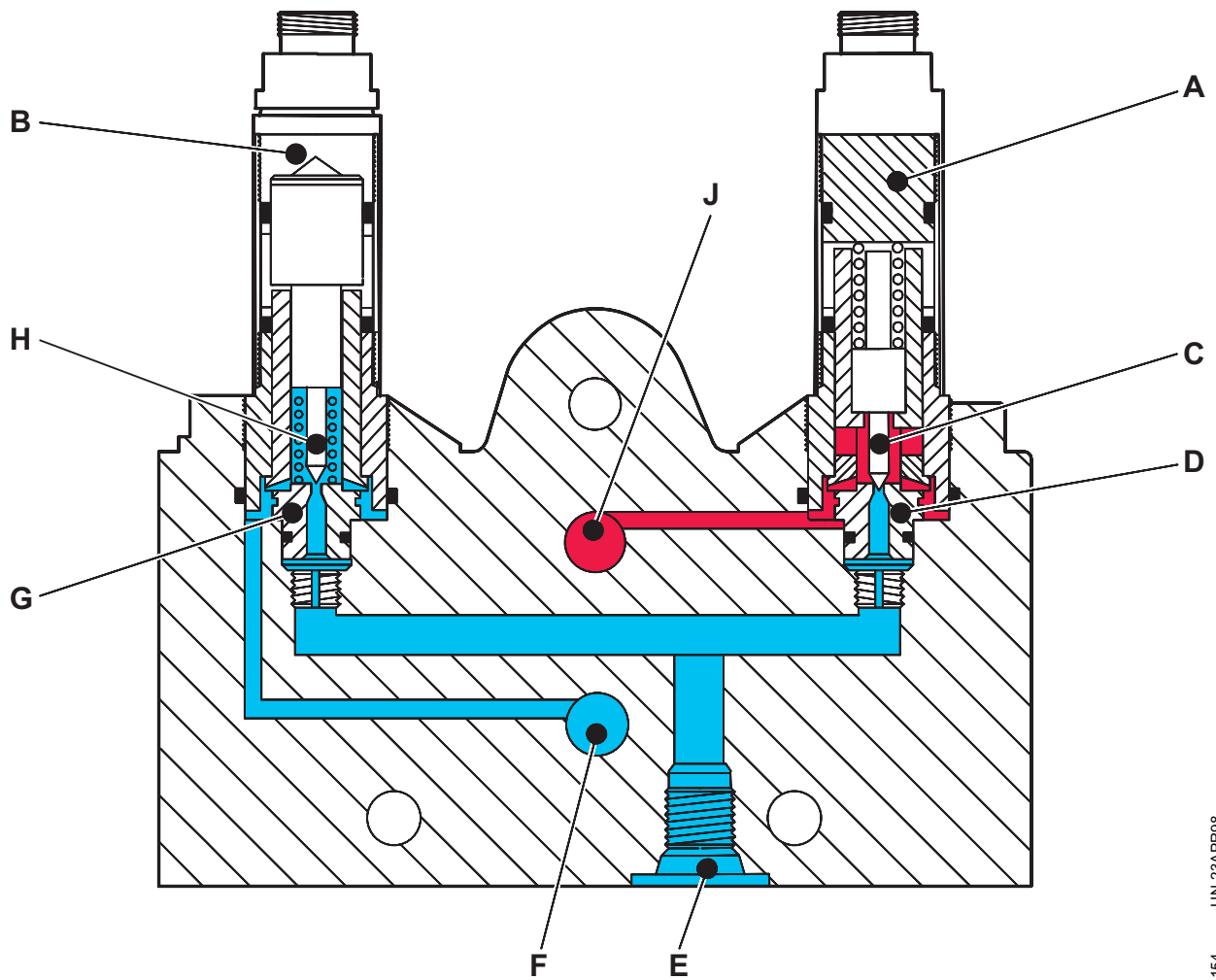
The purpose of pressure reducing valve is to limit oil pressure which is necessary for main clutch operation to 6500 kPa (65 bar; 940 psi) max.

(210 bar; 3050 psi) max. (when other hydraulic functions are operated) to 6500 kPa (65 bar; 940 psi) max. in passage (C).

The pressure reducing insert (A) limits pressure from pressure valves in passage (D) of 21000 kPa

ZX.TMXZCO003087-19-25NOV93

**SOLENOID VALVE PLATE 'ENGAGING SEPARATOR OR UNLOADING DRIVE', NEUTRAL POSITION**



ZX004154

ZX004154 -UN-23APR98

A—Solenoid  
B—Solenoid  
C—Needle valve

D—Needle valve seat  
E—Connection to main  
clutch

F—Return oil passage  
G—Needle valve seat

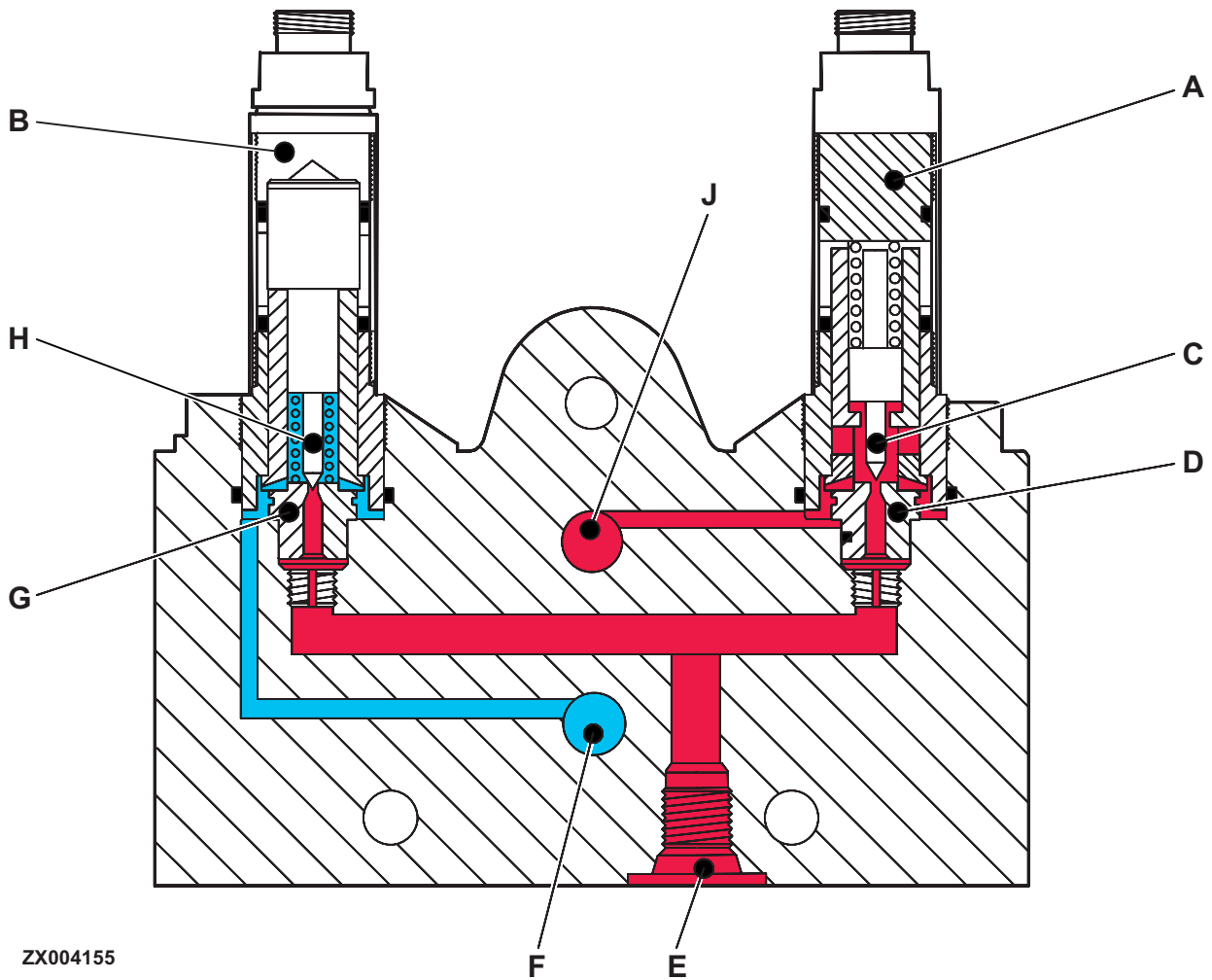
H—Needle valve  
J—Pressure oil passage

With solenoid valve plate in neutral position, solenoid valve (A) is closed without current and solenoid valve (B) open without current. In this position

connection (E) leading to main clutch, is connected to return oil passage. Main clutch is without pressure and thus disengaged.

ZX.TMXZCO003088-19-25NOV93

**MAIN CLUTCH SOLENOID VALVE PLATE IN OPERATING POSITION**



ZX004155 -JUN-23APR98

A—Solenoid  
B—Solenoid  
C—Needle valve

D—Needle valve seat  
E—Connection to main  
clutch

F—Return oil passage  
G—Needle valve seat

H—Needle valve  
J—Pressure oil passage

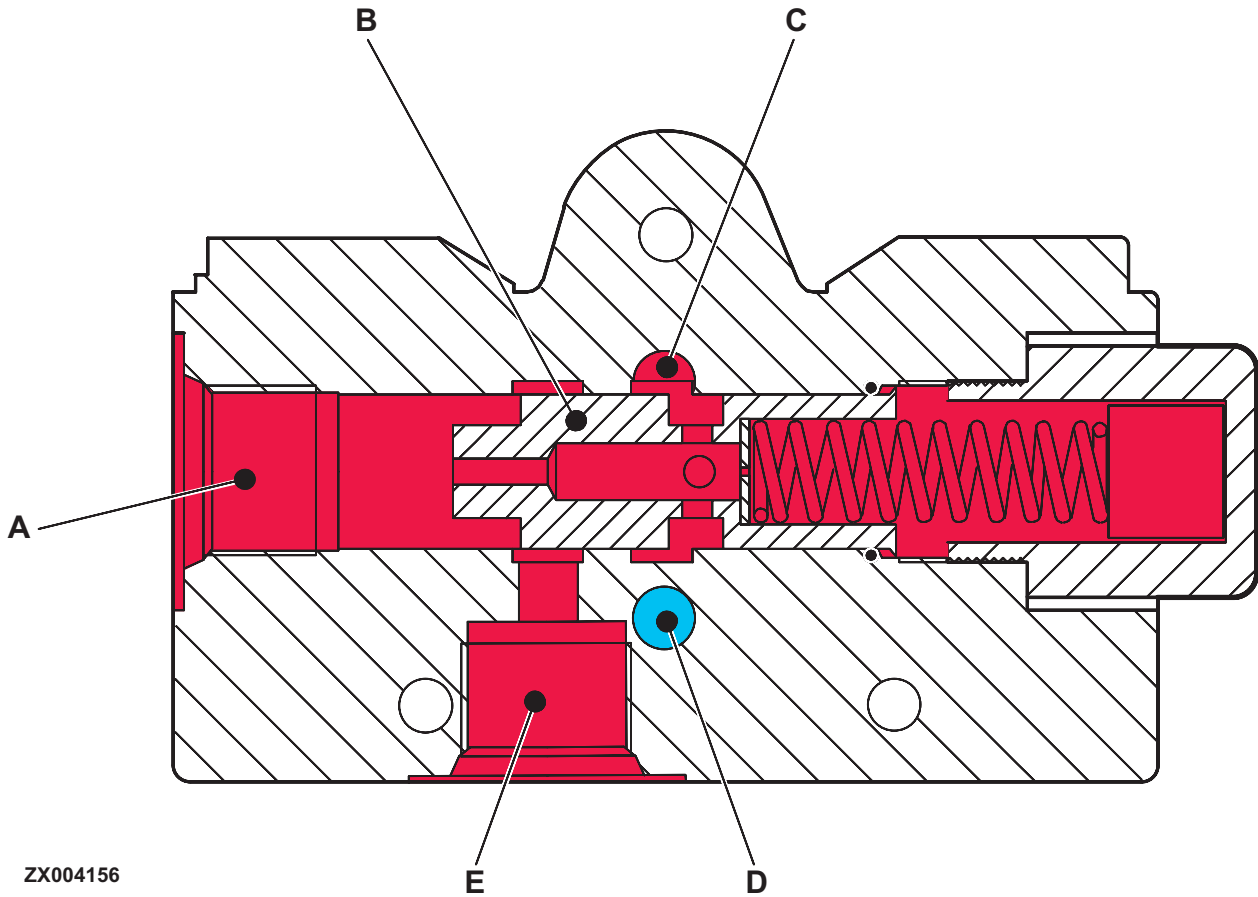
With solenoid valve in operating position solenoid valves (A) and (B) are activated, solenoid valve (A) opens and provides a connection between pressure oil passage and connection (E).

Solenoid valve (B) interrupts connection to return oil passage.

Via connection (E) pressure is built up in main clutch and main clutch is engaged.

ZX.TMXZCO003089-19-25NOV93

**FLOW DIVIDER (HILLMASTER)**



ZX004156

ZX004156 -UN-22APR98

A—Supply from pump  
B—Spool

C—Pressure oil passage  
(primary system)

D—Return oil passage  
E—Connection to main  
solenoid valve block

The first module at hillmaster combine hydraulic valve block is the flow divider. It is supplied from hydraulic pump with 45 L/min (12 US gal/min) oil via connection (A). Hillmaster system is supplied with priority via spool (B) and passage (C) with 27 L/min

(7 US gal/min) oil approx. The surplus amount of oil of 18 L/min (5 US gal/min) approx. flows via connection (E) to secondary system, the combine main valve block with pressure valve (Y1).

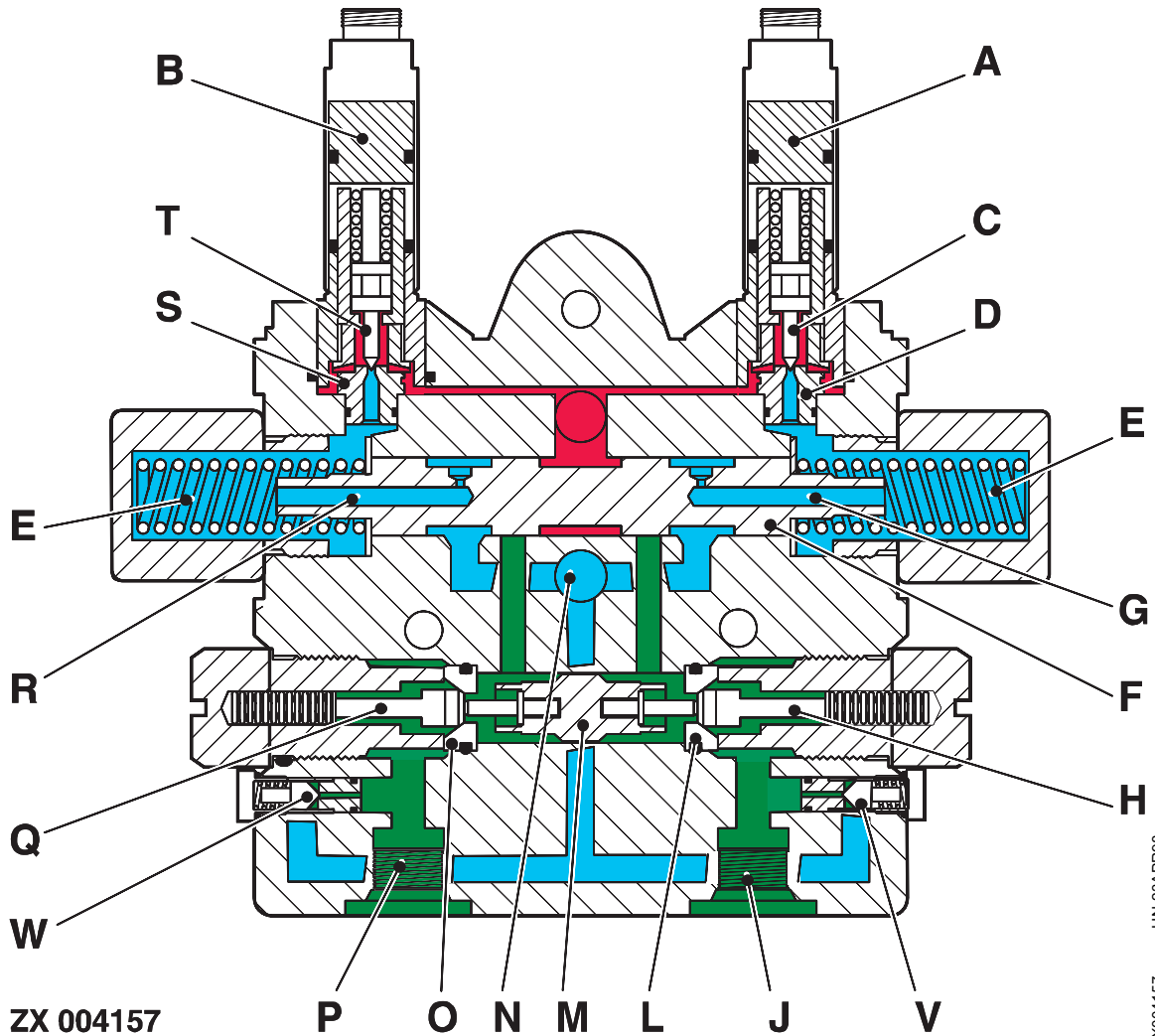
ZX.TMXZCO003090-19-25NOV93

## **PRESSURE VALVE, HILLMASTER**

Function of pressure valve of hillmaster combine solenoid valve block is the same as function of pressure valve on basic machine. The difference is that on hillmaster combines no check valve is installed. Opening pressure of pressure relief valve is 22000 KPa (220 bar; 32000 psi).

ZX, TMXZC0003091-19-25NOV93

**SOLENOID VALVE PLATE 'HILLMASTER', TILTING LATERALLY**



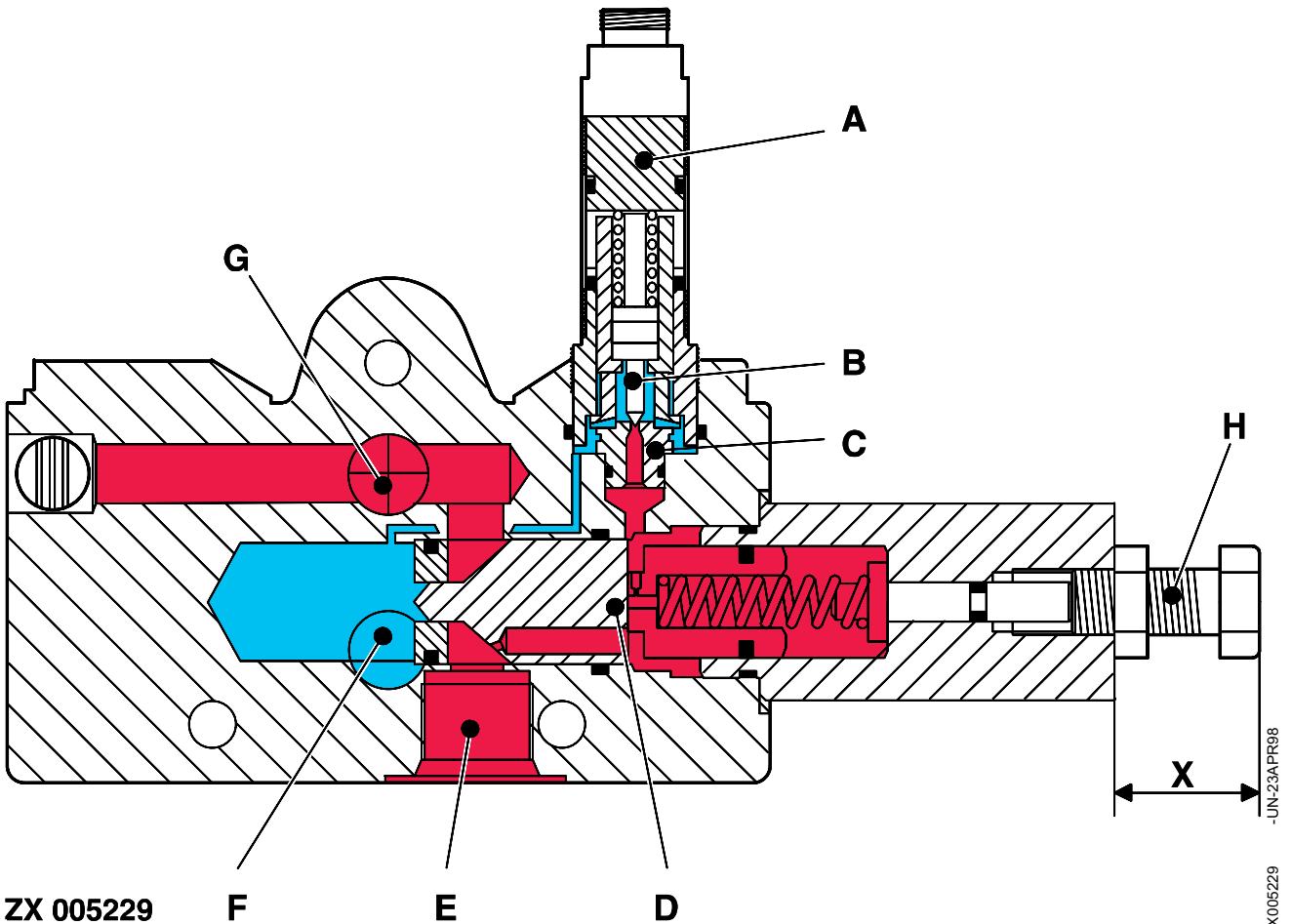
ZX004157 -UN-23APR98  
ZX004157

- |                     |                         |                         |                        |
|---------------------|-------------------------|-------------------------|------------------------|
| A—Solenoid          | G—Return oil passage    | N—Return oil passage    | S—Needle valve seat    |
| B—Solenoid          | H—Check valve           | O—Check valve seat      | T—Needle valve         |
| C—Needle valve      | J—Connection, work line | P—Connection, work line | U—Pressure oil passage |
| D—Needle valve seat | L—Check valve seat      | Q—Check valve           | V—Thermal relief valve |
| E—Spring            | M—Plunger               | R—Return oil passage    | W—Thermal relief valve |
| F—Control plunger   |                         |                         |                        |

Function of solenoid valve plate shown is the same as the function of solenoid valve plate for swinging out unloading auger. A difference is, that on hillmaster combines a pressure relief valve (V) and

(W) is integrated in each connection for work line. This is to avoid pressure build-up caused by heating up hydraulic oil by solar radiation.

**SOLENOID VALVE PLATE 'LOWERING MACHINE', NEUTRAL POSITION**



A—Solenoid  
B—Needle valve  
C—Needle valve seat

D—Control plunger  
E—Connection to piston side  
of hillmaster hydraulic  
cylinders

F—Return oil passage  
G—Passage without function  
H—Adjusting screw

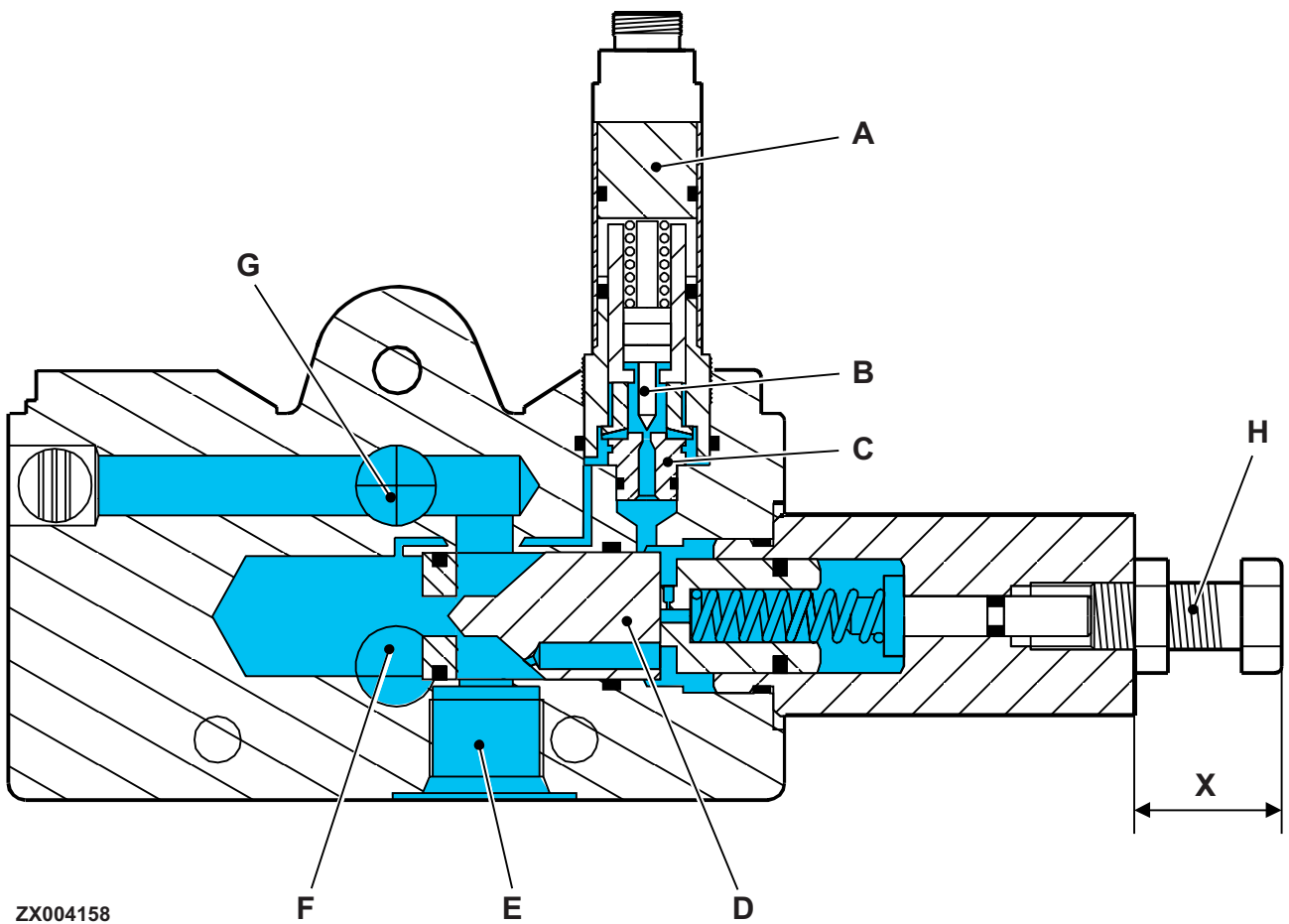
X—Dimension for adjustment  
20 mm (0.88 in.)

In neutral position, needle valve (B) is closed. Pressure from connection (E) also builds up behind plunger (D). This closes passage (F) and return line to hydraulic oil reservoir.

With needle valve (B) open, no pressure can build up behind plunger (D). This will open return oil passage and the oil can flow to the hydraulic oil reservoir.

ZX, TMXZCO003166-19-13JAN94

**SOLENOID VALVE PLATE 'LOWERING MACHINE'**



A—Solenoid  
B—Needle valve  
C—Needle valve seat

D—Control plunger  
E—Connection of piston-side  
connecting lines

F—Return oil passage  
G—Passage without function  
(blocked)

H—Adjusting screw  
X—Dimension for adjustment  
20 mm (0.80 in.)

Connection (E) is connected to hydraulic line connecting hillmaster cylinder piston sides. Oil flowing during normal lateral tilting from one hydraulic cylinder to the other, is directed to return oil passage if

solenoid (A) is activated. This prevents one hydraulic cylinder from extending when the other one is retracted, and the machine is lowering.

ZX.TMXZCO003093-19-25NOV93



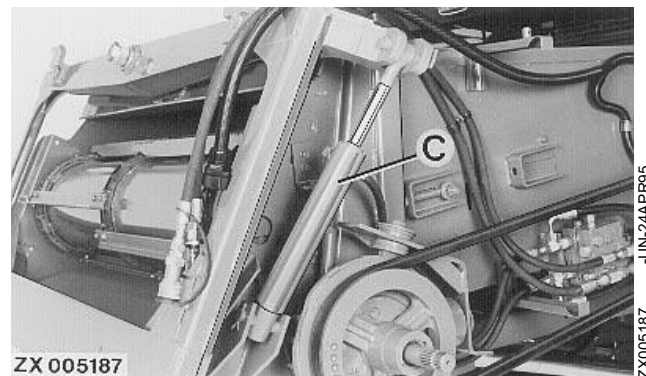
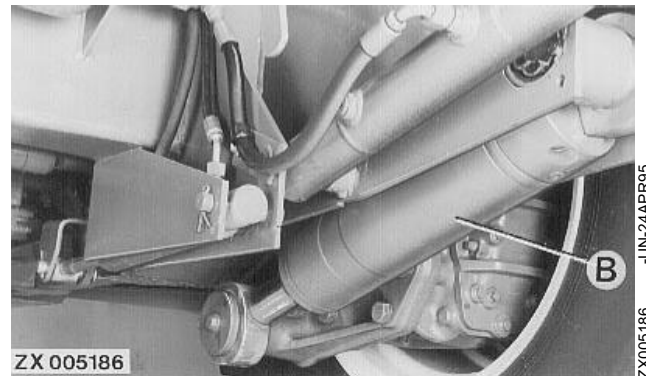
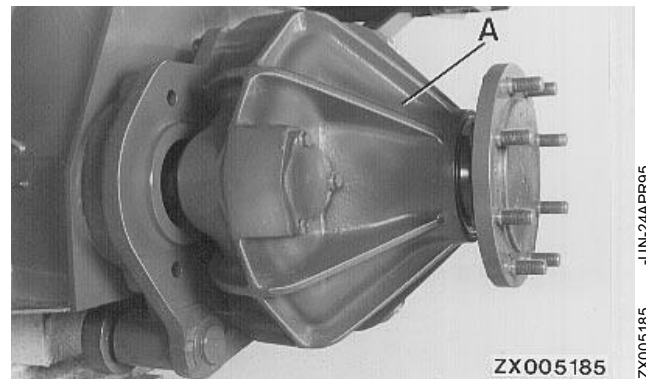
## Group 15 Hillmaster Leveling System

### GENERAL INFORMATION

On combines with Hillmaster leveling system, final drives pivot on front axle. Final drive position is determined by hydraulic cylinders (one on each side of the combine).

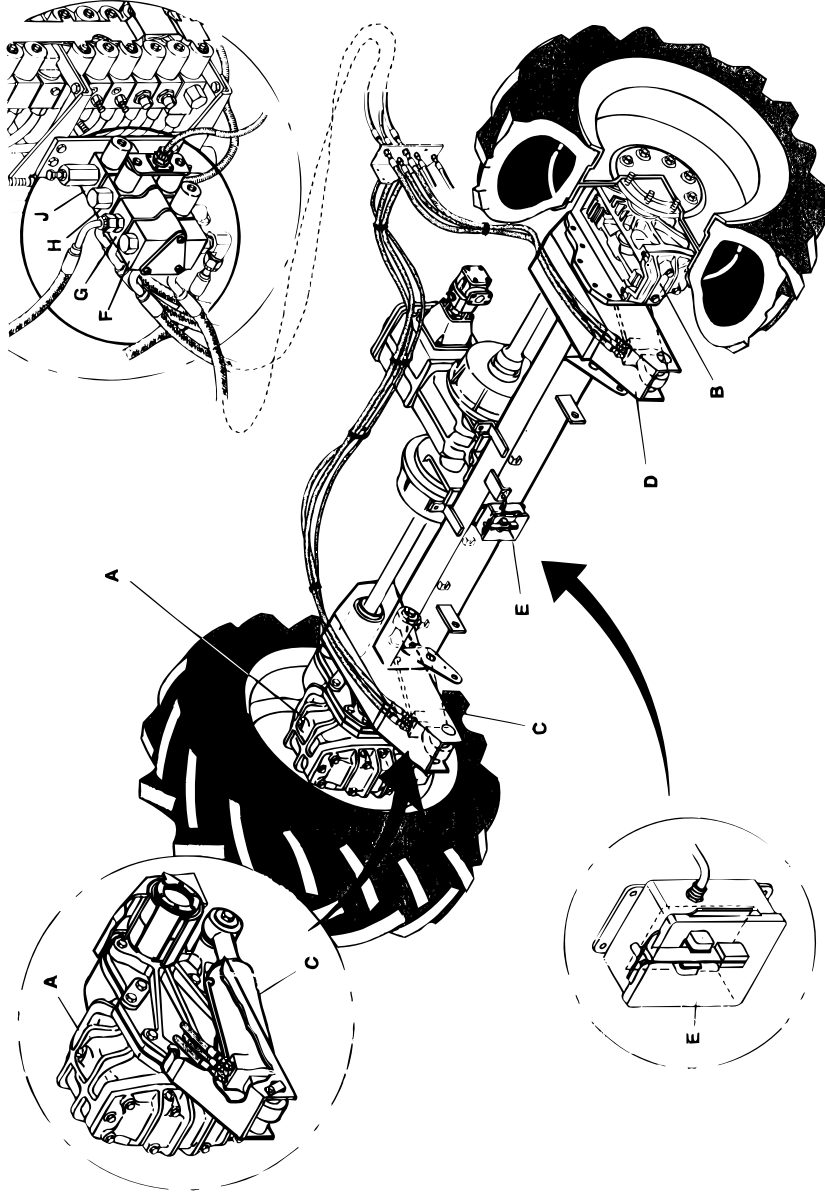
The cutting platform pivots on feeder house. Cutting platform position in relation to slope angle is determined by a master cylinder on final drive and a slave cylinder on pivoting shield of feeder house.

- A—Pivoting final drive
- B—Final drive hydraulic cylinder
- C—Pivoting shield hydraulic cylinder



ZX, TMXZCO003147-19-07JAN94

**HILLMASTER LEVELING SYSTEM COMPONENTS**



ZX005223

ZX1MZX0003149:19/07/AN/EL  
Z Series Combines  
06/19/00  
PN=799

**270-15-2**

TM4505 (05DEC00)

## HILLMASTER LEVELING SYSTEM COMPONENTS

A—Final drive, right  
B—Final drive, left  
C—Hillmaster hydraulic cylinder, right

D—Hillmaster hydraulic cylinder, left  
E—Level sensing control box

F—Flow divider  
G—Pressure valve  
H—Solenoid valve plate, tilting to the right/left

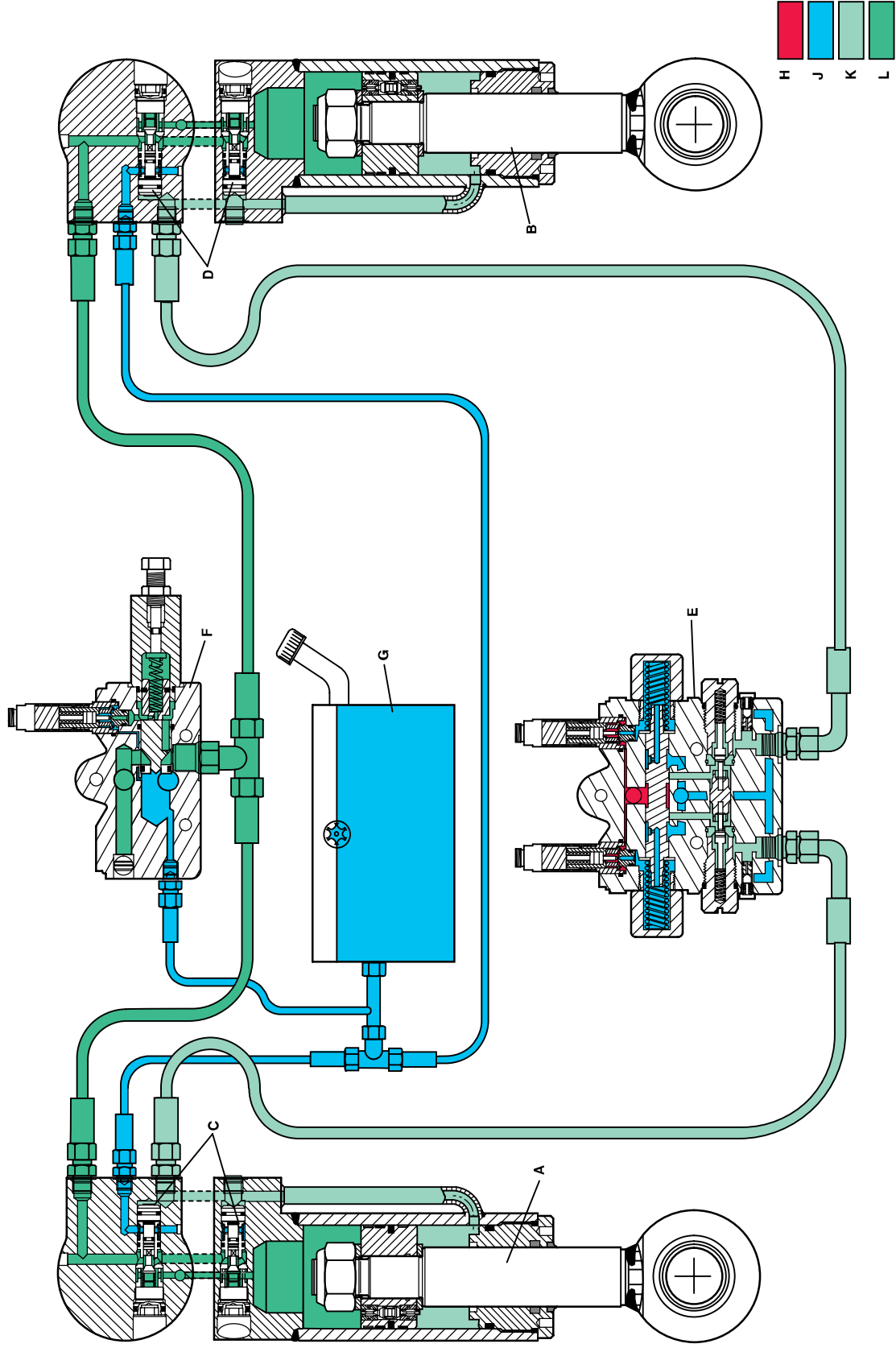
J—Solenoid valve plate, lowering combine

The final drives are bolted to two support plates, which can be pivoted around a horizontal axis relative to the axle. The plate is held in a certain position relative to the axle or pivoted by a large hydraulic cylinder.

A pendulum in the level sensing control box is used to sense slope angle. This box transmits a signal until the pendulum is centered in the box and the combine is exactly level.

ZX, TMXZCO003149-19-07JAN94

### PREPARING HILLMASTER LEVELING SYSTEM FOR OPERATION



ZX005222

ZX.TM.ZC003150.19.07.ANH  
Z Series Combines  
06.000  
PN=801

270-15-4

TM4505 (05DEC00)

## PREPARING HILLMASTER LEVELING SYSTEM FOR OPERATION

A—Hydraulic cylinder, right  
B—Hydraulic cylinder, left  
C—Pilot-operated check valve  
D—Pilot-operated check valve

E—Solenoid valve plate, Hillmaster control  
F—Solenoid valve plate, lowering combine

G—Reservoir  
H—Hydraulic oil, high pressure  
J—Hydraulic oil, pressure-free (return oil)

K—Hydraulic oil, trapped  
L—Hydraulic oil, trapped

Before operating Hillmaster leveling system, it is necessary to move the machine from lowered position (for road travel) to higher position (for field operation).

This is done by moving combine to maximum right or left-hand tilt position by operating manual leveling control switch.

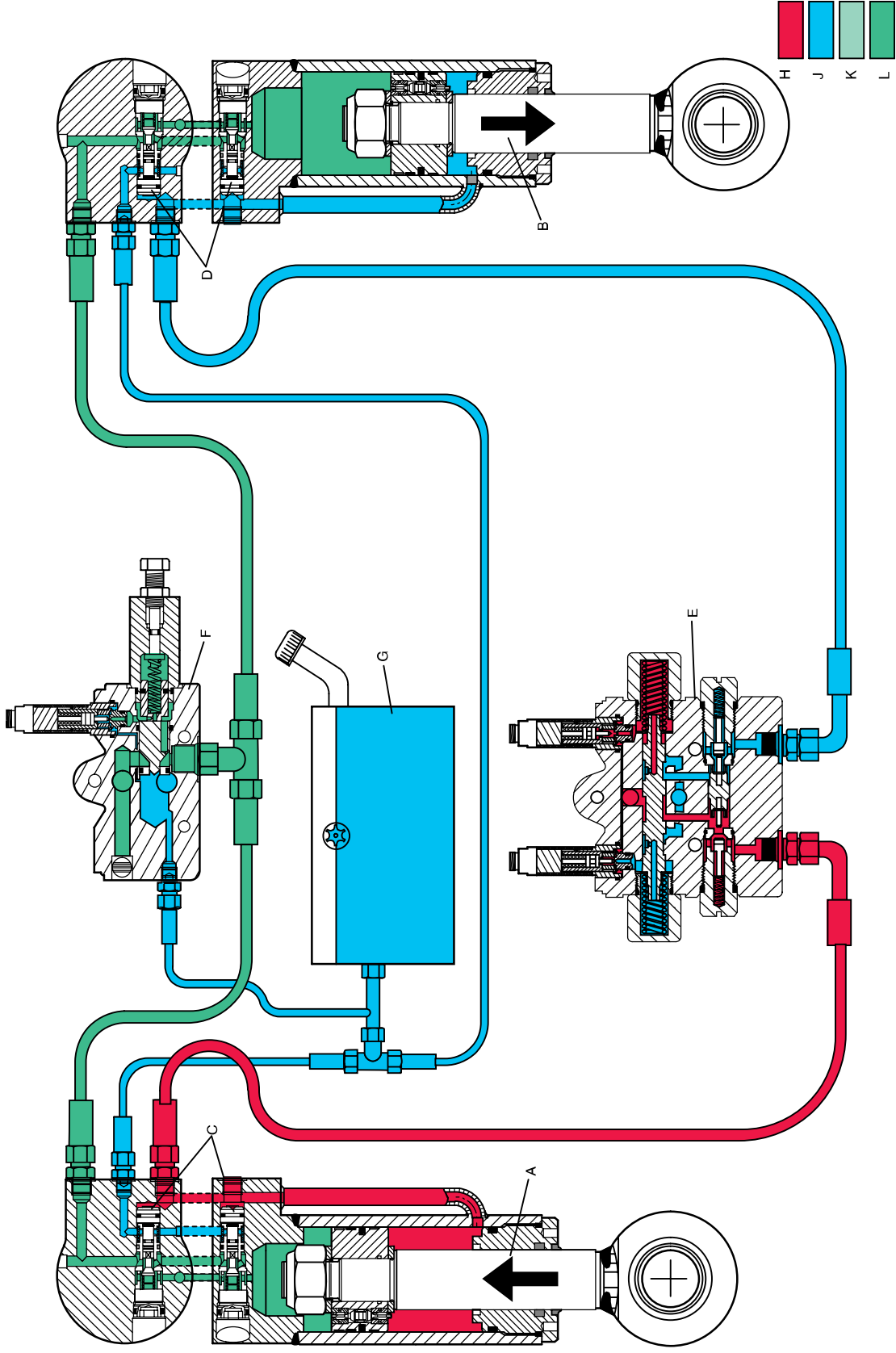
During the tilting process, the solenoid valve directs hydraulic oil to the rod side of one hydraulic cylinder

and, via the check valves in the piston, to the piston side of the opposite cylinder. The piston side of the hydraulic cylinder is filled with hydraulic oil, causing the cylinder to extend.

When the combine is moved back to center position, oil flows back from the piston side of the extended hydraulic cylinder. This means that both hydraulic cylinders are halfway extended with combine in center position (on level ground).

ZX, TMXZCO003151-19-07JAN94

### HILLMASTER LEVELING SYSTEM OPERATION, LEVELING TO THE RIGHT



ZX005224

ZX1MZX000152-19-07/ANSEL  
Z Series Combines  
04/03/00  
PN=603

270-15-6

TM4505 (05DEC00)

## HILLMASTER LEVELING SYSTEM OPERATION, LEVELING TO THE RIGHT

A—Hydraulic cylinder, right  
B—Hydraulic cylinder, left  
C—Pilot-operated check valve  
D—Pilot-operated check valve

E—Solenoid valve plate, Hillmaster control  
F—Solenoid valve plate, lowering combine

G—Reservoir  
H—Hydraulic oil, high pressure  
J—Hydraulic oil, pressure-free (return oil)

K—Hydraulic oil, trapped  
L—Hydraulic oil, trapped

*NOTE: During leveling system operation, the machine is held in position by pilot-operated check valves integrated in the hydraulic cylinders, e.g. if a hydraulic hose should burst. Hydraulic oil is trapped on the piston side of hydraulic cylinders.*

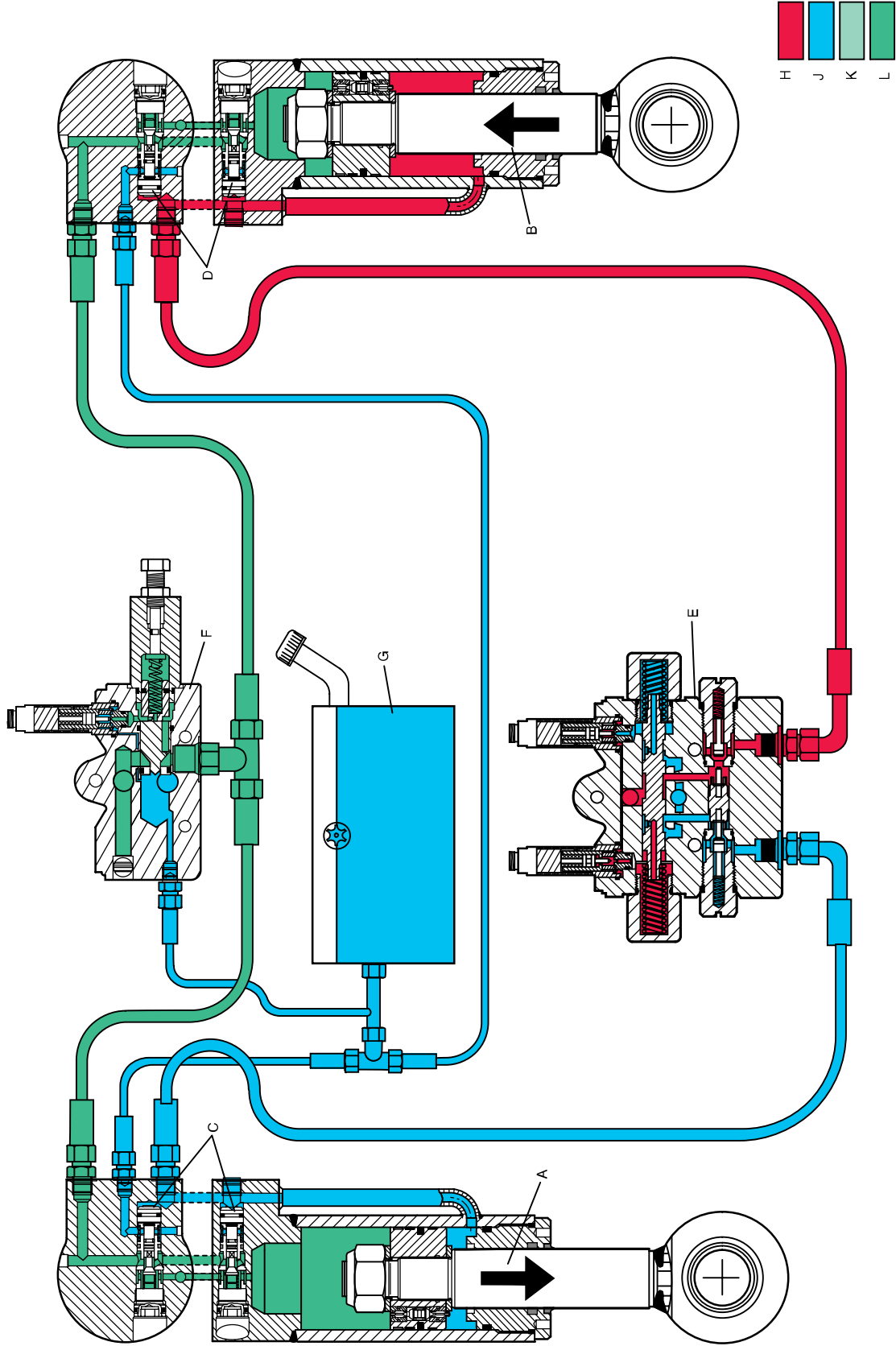
When leveling to the right, the solenoid valve plate routes hydraulic oil to the right-hand hydraulic cylinder. Oil pressure is directed to the rod side of the hydraulic cylinder. At the same time the pilot-operated check valve in the hydraulic cylinder head is activated, allowing trapped oil to flow out of

the piston side. The right-hand hydraulic cylinder is retracted.

The oil flow from the right-hand cylinder is directed to the piston side of the left-hand cylinder. The left-hand cylinder is extended by the same distance as the right-hand cylinder is retracted.

The oil flowing out of the rod side of the left-hand hydraulic cylinder is directed to the return passage of the solenoid valve plate and returned to the hydraulic oil reservoir.

HILLMASTER LEVELING SYSTEM OPERATION, LEVELING TO THE LEFT



ZX005226

ZX.TM.ZX0003154.19.07.A/ENL  
Z Series Combines  
04.03.00  
PN=605

270-15-8

TM4505 (05DEC00)



## HILLMASTER LEVELING SYSTEM OPERATION, LEVELING TO THE LEFT

A—Hydraulic cylinder, right  
B—Hydraulic cylinder, left  
C—Pilot-operated check valve  
D—Pilot-operated check valve

E—Solenoid valve plate, Hillmaster control  
F—Solenoid valve plate, lowering combine

G—Reservoir  
H—Hydraulic oil, high pressure  
J—Hydraulic oil, pressure-free (return oil)

K—Hydraulic oil, trapped  
L—Hydraulic oil, trapped

*NOTE: During leveling system operation, the machine is held in position by pilot-operated check valves integrated in the hydraulic cylinders, e.g. if a hydraulic hose should burst. Hydraulic oil is trapped on the piston side of hydraulic cylinders.*

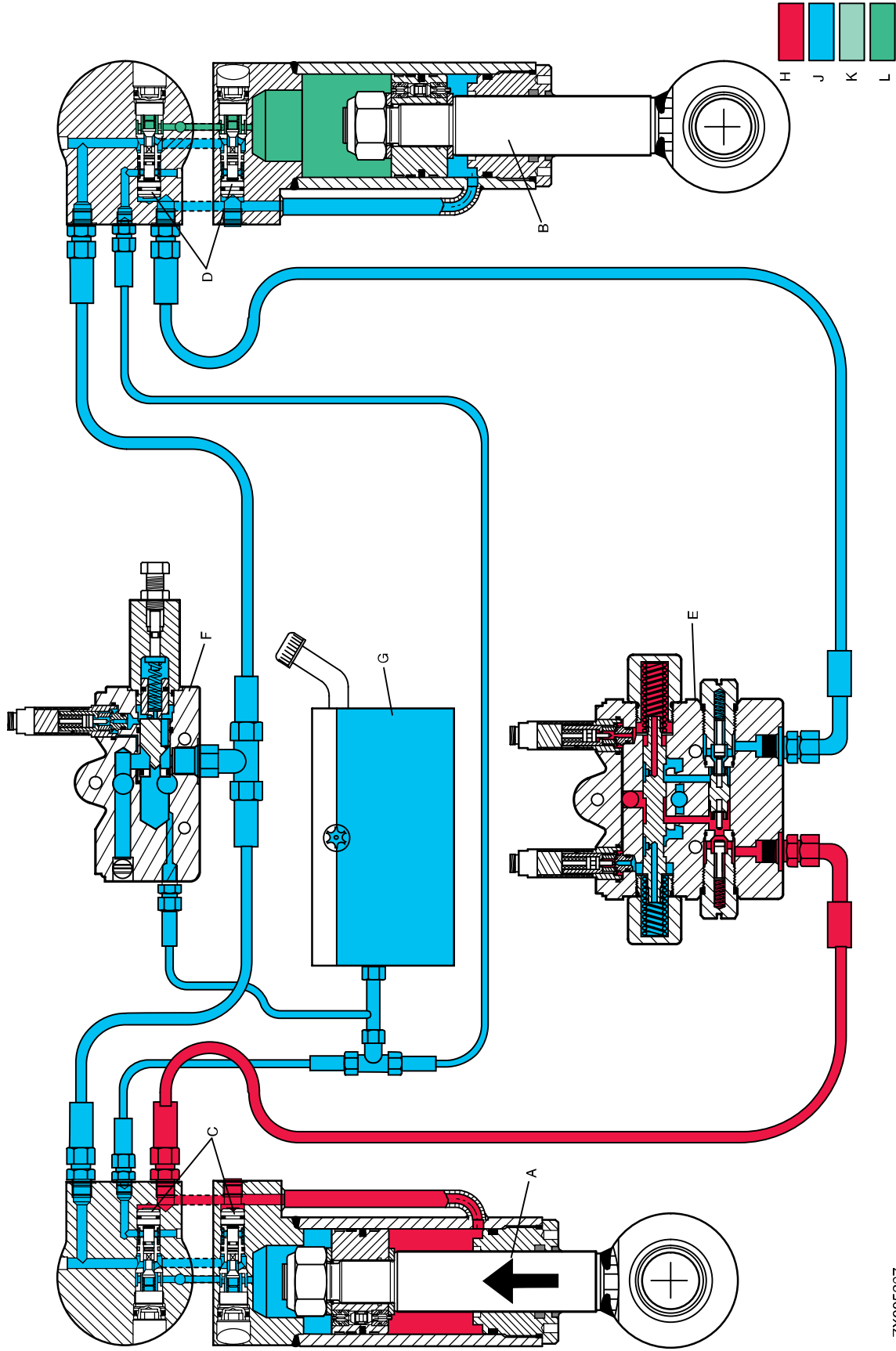
When leveling to the left, the solenoid valve plate routes hydraulic oil to the left-hand hydraulic cylinder. Oil pressure is directed to the rod side of the hydraulic cylinder. At the same time the pilot-operated check valve in the hydraulic cylinder head is

activated, allowing trapped oil to flow out of the piston side. The left-hand hydraulic cylinder is retracted.

The oil flow from the left-hand cylinder is directed to the piston side of the right-hand cylinder. The right-hand cylinder is extended by the same distance as the left-hand cylinder is retracted.

The oil flowing out of the rod side of the right-hand hydraulic cylinder is directed to the return passage of the solenoid valve plate and returned to the hydraulic oil reservoir.

### HILLMASTER LEVELING SYSTEM OPERATION, LOWERING COMBINE



ZX005227

TM4505 (05DEC00)

270-15-10

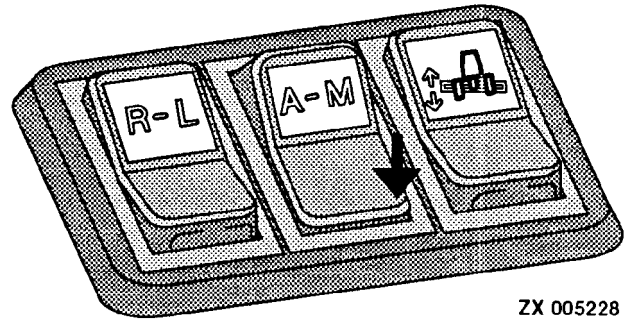
ZX.TM.ZX003156.19.07.A/ENH  
Z Series Combines  
06.03.00  
PN=607

## HILLMASTER LEVELING SYSTEM OPERATION, LOWERING COMBINE

*NOTE: Before driving a Hillmaster combine on public roads, it must be moved to lowered position to ensure that the maximum permissible height of 4 m (13 ft) is not exceeded.*

When lowering a Hillmaster combine, the solenoid valve plate for lowering combine is activated as well as the lateral tilt hydraulic function. In this case the oil displaced from the piston side does not flow to the opposite hydraulic cylinder, but to the hydraulic oil reservoir via the solenoid valve plate for lowering combine.

*NOTE: For more information on solenoid valve plate function, refer to Group 10 of this Section. Electrical system operation is described in Group 240-15Y.*

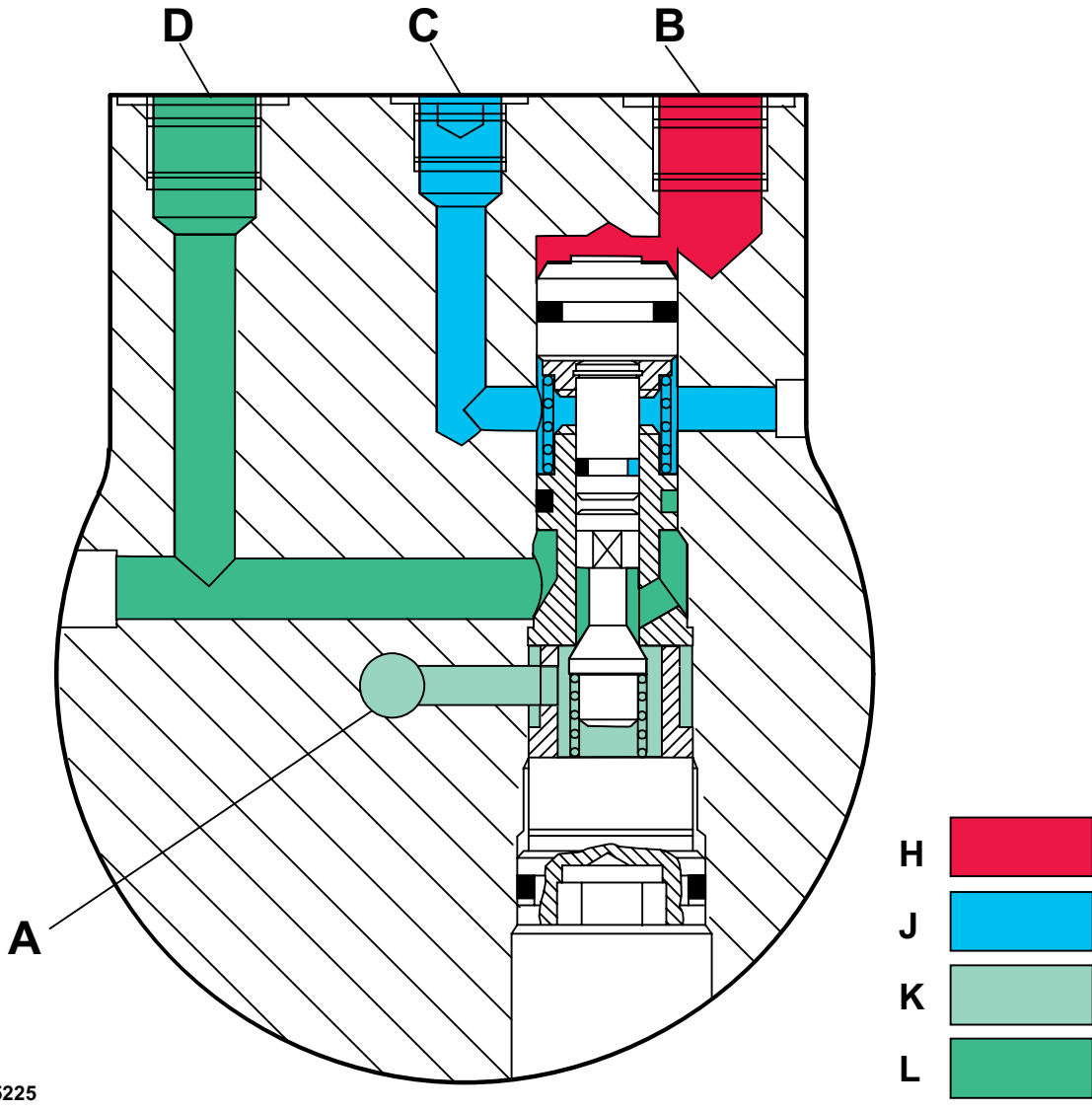


ZX 005228

ZX005228 -UN-02MAY95

ZX, TMXZCO003157-19-07JAN94

**CHECK VALVE IN HILLMASTER HYDRAULIC VALVE BLOCK**



ZX 005225

ZX006225 -UN-23APR98

A—Connection to piston side of hydraulic cylinder  
 B—Connection to rod side of hydraulic cylinder  
 C—Connection to hydraulic oil reservoir

D—Connection to piston side of opposite hydraulic cylinder  
 H—Hydraulic oil, high pressure

J—Hydraulic oil, pressure-free (return oil)  
 K—Hydraulic oil, trapped

L—Hydraulic oil, trapped

When the solenoid valve plate of Hillmaster leveling system is activated, it will direct hydraulic oil to the rod side of the hydraulic cylinder to be retracted. At the same time, hydraulic oil pressure opens pilot-operated check valve via connection (B). This

allows oil from the piston side to flow to the opposite hydraulic cylinder via connections (A) and (D). Connection (C) to the hydraulic oil reservoir is always pressure-free.

## SPECIAL OR ESSENTIAL TOOLS

*NOTE: Order tools according to information given in the U.S. SERVICE-GARD™ Catalog or in the European Microfiche Tool Catalog (MTC).*

DX,TOOLS -19-05JUN91

Universal pressure test kit (A) . . . . . FKM10002



-UN-27APR95  
Z103807

ZX,TMSPFH001812-19-22FEB92

Quick coupler . . . . . JT03264



ZX001719 -UN-26APR95

ZX,TMSPFH001805-19-22FEB92

## SPECIFICATIONS

Item	Measurement	Specification
Hydraulic pump I (standard)	Delivery	35 L/Min. (9.2 gpm)
Hydraulic pump I (Hillmaster)	Delivery	45 L/Min. (11 gpm)
Hydraulic pump III (standard)	Delivery	15 L/Min. (4 gpm)
Hydraulic pump III (Hillmaster)	Delivery	35 L/Min. (9.2 gpm)
Pressure relief valve	Setting	21 000 kPa (210 bar) (3050 psi)
Pressure reduction unit	Setting	6500 kPa (65 bar) (940 psi)
Main clutch pressure	Minimum pressure	5000 kPa (50 bar) (725 psi)
Pressure switch	Shut-off pressure	6000 kPa (60 bar) (870 psi)
Variable threshing cylinder drive pressure	Maximum pressure	7000 kPa (70 bar) (1020 psi)

ZX,TMXZCO003159-19-13JAN94

### CHECKING PRESSURE RELIEF VALVE

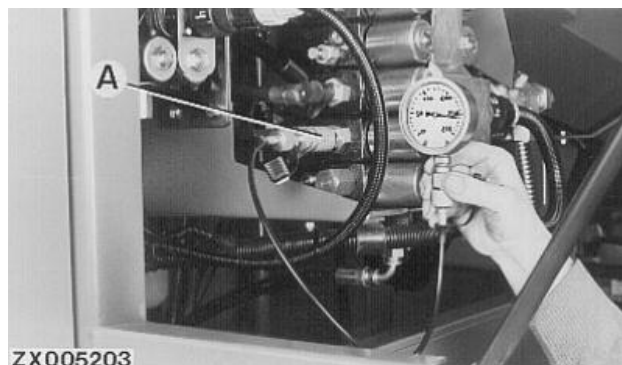
Connect a pressure gauge with a measuring range of 0—25 000 kPa (0—250 bar) (0—3600 psi) to test port (A).

Run engine at fast idle.

Press switch for raising header.

Read pressure at gauge. Pressure should be 21 000 kPa (210 bar) (3050 psi).

If this pressure is not obtained, the cause may be a malfunction of the pressure relief valve, the pressure valve or the corresponding hydraulic pump section.



ZX, TMXZCO003160-19-13JAN94

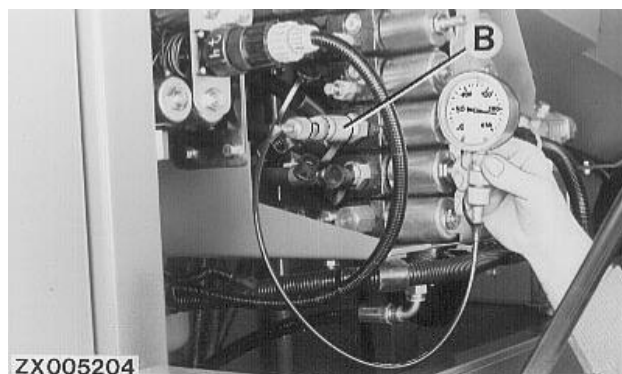
Connect a pressure gauge with a measuring range of 0—25 000 kPa (0—250 bar) (0—3600 psi) to test port (B).

Run engine at fast idle.

Press switch for raising header.

Read pressure at gauge. Pressure should be 21 000 kPa (210 bar) (3050 psi).

If this pressure is not obtained, the cause may be a malfunction of the pressure relief valve, the pressure valve or the corresponding hydraulic pump section.

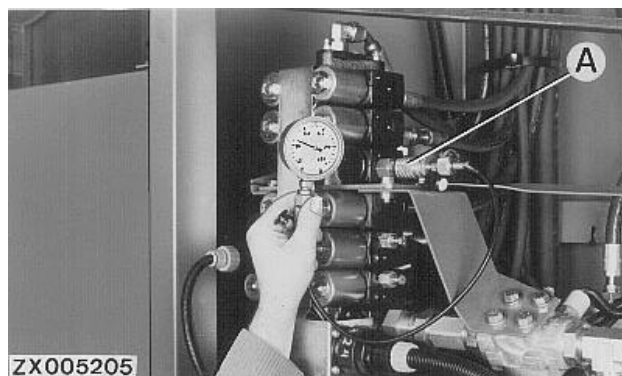


ZX, TMXZCO003161-19-13JAN94

### CHECKING PRESSURE REDUCTION UNIT

1. Connect a pressure gauge to test port (A).
2. Engage unloading drive with engine running.
3. Swing in unloading auger against stop until pressure relief valve is activated.

The gauge should show a pressure of 6500 kPa (65 bar) (940 psi).

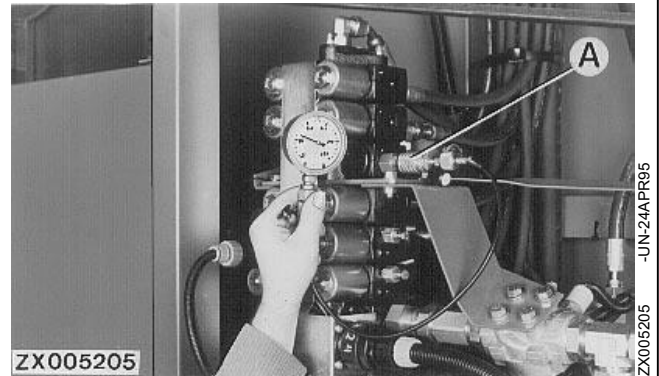


ZX, TMXZCO003162-19-13JAN94

### CHECKING PRESSURE SWITCH

1. Referring to "Checking Pressure Reduction Unit", perform steps 1 and 3.
2. Temporarily disengage and reengage main clutch to discharge accumulator. When pressure has dropped to 5000 kPa (50 bar) (725 psi), it should increase again to 6000 kPa (60 bar) (8700 psi).

A—Test port



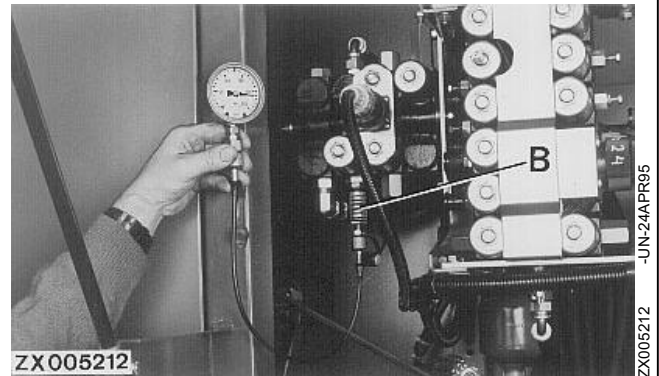
ZX, TMXZCO003163-19-13JAN94

### CHECKING THE PRESSURE RELIEF VALVE ON THE HILLMASTER BLOCK

Connect pressure gauge to test port (B).

Swing out the hillmaster combine automatically.  
Maximum pressure should be no more than 21000 kPa (210 bar; 3050 psi).

Swing out the hillmaster combine manually as far as the stop. Maximum pressure should be approx. 15000 kPa (150 bar; 2180 psi).



ZX, TMXZCO006773-19-01SEP96

### CHECKING PRESSURE RELIEF VALVE OF CHAFF SPREADER DRIVE

Disconnect quick coupler (A).

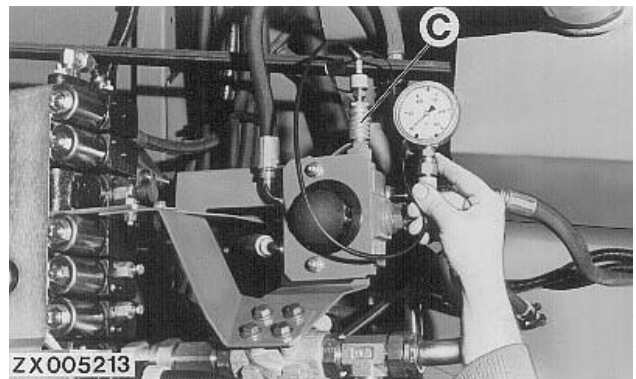
Engage separator.

Connect a pressure gauge to test port (C).

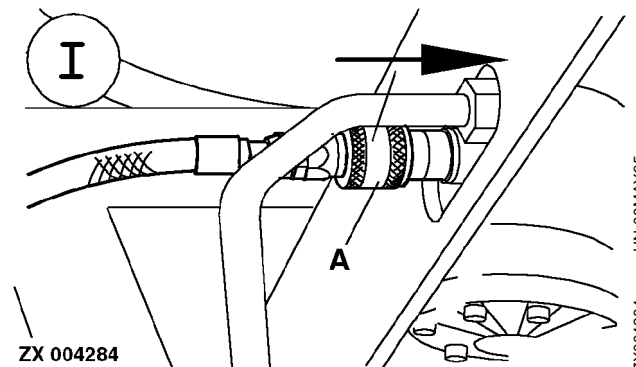
Read pressure at gauge.

Maximum pressure should be 21000 kPa (210 bar; 3050 psi).

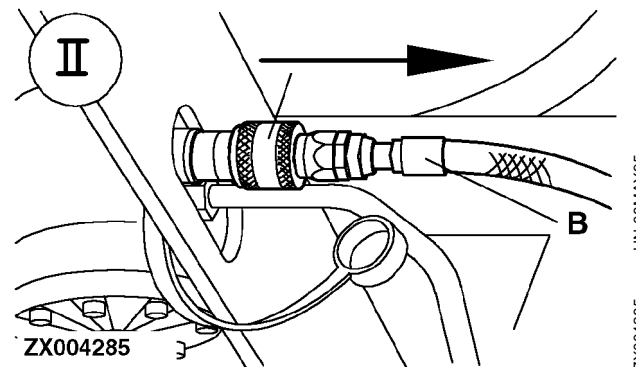
- A—Quick coupler (inlet flow)
- B—Quick coupler (return flow)
- C—Pressure test port



ZX005213 -UN-24APR95



ZX004284 -UN-08MAY95



ZX004285 -UN-08MAY95

ZX,TMXZCO003165-19-13JAN94



# Section 290 Operator's Cab

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#### Group 20 —Cab Ventilation

*Contents*

## Group 05 Operational Tests

### TEST SEQUENCE

Perform the operational checks in 290-05 first. In many cases, this is sufficient to allow the cause of the fault to be identified.

If the operational checks in 290-05 do not identify the fault, perform the checks in 290-10A, 10B and 10C. These lead the user to the cause of the fault one step at a time.

LX,29005003398 -19-01FEB93

### OPERATIONAL CHECKS ON AIR CONDITIONING, HEATER AND OPERATOR'S SEAT

*NOTE: In the following preliminary checks, it is possible to identify a fault without using tools or a testing device.*

LX,29005003399 -19-01FEB93

; Tests with the engine shut off	Open cab doors.  Compressor switched on.  Thermostat switched on.  Main switch on.	Switch on blower several times.  The compressor clutch must give an audible click.	OK: Proceed from Test ' .  NOT OK: See Section 240-15.
‘	Move blower switch from lowest setting to highest setting.	Blower not operating.  Remove and check fuse F42.  Re-install fuse.	OK: Proceed with Test Æ.  NOT OK: One or both of the blower motors is defective, proceed with Test Ô.
Æ	Set blower switch to maximum output.  Set switch to direct airflow in all possible directions.  Check air louvers in all positions.		OK: Proceed with Test Ä.  NOT OK: Repair air louvers and airflow direction switch. Proceed with Test Ä.

LX,29005003400 -19-01FEB93

ZX,TMXZC0003115-19-01DEC93

LX,29005003402 -19-01FEB93

*Operational Tests*

<p>Å <b>Tests with engine switched on</b></p>	<p>a. Run engine at 2000 rpm.</p> <p>b. Set blower switch to maximum output.</p> <p>c. Set thermostat switch to maximum cooling effect.</p> <p>d. Keep cab doors closed.</p>	<p>Check the following: Look for bubbles at sight-glass on receiver-drier. Compressor intake line should be cool or cold. Cold airflow from air louvers after approx. 6 minutes.</p>	<p><b>OK:</b> Proceed with Test Ö.</p> <p><b>NOT OK:</b> Repair ventilation system. Proceed with Test Ú.</p> <p style="text-align: right;"><small>LX,29005003403 -19-01FEB93</small></p>								
<p>Ö <b>Temperature test</b></p>	<p>Measure outside temperature (in the shade).</p> <p>Switch on air conditioning system. Wait 15 to 20 minutes and measure temperature at front air louver (see table).</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Outside temperature</th> <th style="text-align: left;">Min. diff. in temperature</th> </tr> </thead> <tbody> <tr> <td>less than 24°C (75°F)</td> <td>12°C (20°F)</td> </tr> <tr> <td>between 24—32°C (75—90°F)</td> <td>14°C (25°F)</td> </tr> <tr> <td>over 32°C (90°F)</td> <td>16°C (30°F)</td> </tr> </tbody> </table>	Outside temperature	Min. diff. in temperature	less than 24°C (75°F)	12°C (20°F)	between 24—32°C (75—90°F)	14°C (25°F)	over 32°C (90°F)	16°C (30°F)	<p><b>OK:</b> Proceed with Test Ö.</p> <p><b>NOT OK:</b> Proceed with Test Ú.</p> <p style="text-align: right;"><small>LX,29005003404 -19-01FEB93</small></p>
Outside temperature	Min. diff. in temperature										
less than 24°C (75°F)	12°C (20°F)										
between 24—32°C (75—90°F)	14°C (25°F)										
over 32°C (90°F)	16°C (30°F)										
<p>Ø <b>Check heater switch</b></p>	<p>Turn heater switch clockwise. After approx. 2 minutes, warm air should flow from the air louvers.</p> <p>Turn heater switch counterclockwise. After a few minutes, cold air should flow from the air louvers.</p>	<p><b>OK:</b> Proceed with Test Ö.</p> <p><b>NOT OK:</b> Replace heater switch. Proceed with Test Ú.</p> <p style="text-align: right;"><small>ZX,TMXZCO003116-19-01DEC93</small></p>									
<p>Û <b>Check Air Comfort Seat</b></p>	<p>Start the engine and actuate height adjustment lever briefly. The seat should move automatically to the center position.</p>	<p><b>NOT OK:</b> Fuse or compressor defective. Proceed with Test Ú.</p> <p style="text-align: right;"><small>LX,29005003407 -19-01FEB93</small></p>									

*Operational Tests*


**Ú RESULT OF FUNCTIONAL TESTS**

NOT OK: See Groups 10A, 10B and 10C.

LX,29005003406 -19-01FEB93

*Operational Tests*

## SAFETY AT WORK

 **CAUTION:** Certain basic safety regulations apply when dealing with air conditioning systems, and must be observed at all times. They are backed up by legislation covering safety precautions for air conditioning systems. The following excerpts are particularly important:

1. Air conditioning systems may be operated, serviced or repaired by authorized, trained personnel only.
2. Adolescents should not be allowed to carry out service work on air conditioning systems involving the discharge of Category 2 or 3 refrigerants, unless trade training of adolescents over 16 years old requires such work. In this case, the adolescent must be supervised by a trained adult.
3. Before repairing components carrying refrigerant, remove refrigerant as far as necessary to ensure that the work can be carried out safely.


4. Refrigerant should be extracted by suction and re-used. When refrigerant is discharged into the air, there is the danger of asphyxiation, especially if work is being performed in an inspection pit, since refrigerant is heavier than air and concentrates at the lowest level. Moreover, refrigerant is odorless and colorless, so small quantities emerging from a leak cannot be detected. In such a case, ensure that there is adequate ventilation at the place of work.

5. Smoking and naked flames are not permitted in enclosed spaces where refrigerant has been released. High temperatures cause chemical reactions in the refrigerant gas, and highly poisonous substances can form. If inhaled, these substances have serious effects on health.

6. High temperatures produced by welding and soldering cause very high pressures inside components of the air conditioning system, and these pressures may result in an explosion.

ZX.TMXZCO002461-19-25NOV92

## HANDLING REFRIGERANT

 **CAUTION:** When handling refrigerant, always wear safety glasses and leather gloves. Contact with escaping refrigerant may result in serious frostbite, or even blindness if the refrigerant strikes the eye.

Whenever there is the risk of refrigerant encountering high temperatures, wear a suitable breathing mask while working. However, a breathing mask provides no protection against asphyxiation if large quantities of refrigerant escape.

ZX.TMXZCO002462-19-25NOV92

## IN AN EMERGENCY

- Rinse eye with cold water; preferably use a 1% boric acid solution.
- Wash affected parts of the body with water, or preferably with a solution consisting of one part essence of vinegar and five parts water.
- See a doctor as soon as first aid has been administered.

ZX, TMXZCO002520-19-01DEC92

## SAFETY EQUIPMENT

This equipment consists of safety glasses, safety gloves and, where appropriate, a breathing mask (if there is the risk of poisonous gases being released).

Prepare a 1% boric acid solution for rinsing the eyes and a solution consisting of 1 part essence of vinegar and 5 parts water for washing affected parts of the body. Also provide a first aid kit.



LX002150

ZX, TMXZCO002463-19-25NOV92

-UN-26JUL94  
LX002150

## STORAGE OF REFRIGERANT CONTAINERS

**CAUTION:** Refrigerant containers are under pressure, and this pressure increases rapidly when the temperature of the container rises. The thin-walled refill containers are particularly at risk in this respect. Refrigerant containers must never be exposed to temperatures over 52°C (120°F).

Never store pressurized containers in the vicinity of heat sources or in places exposed to direct sunlight. Never open pressurized containers by force or damage them in any way.

ZX, TMXZCO002464-19-25NOV92



## R134A REFRIGERANT

**IMPORTANT:** The air conditioning system operates using R134a refrigerant (tetrafluoroethane). This substance does not contain any chlorine atoms, so it does not have a detrimental effect on the ozone in the Earth's atmosphere.

Even so, the refrigerant must never be discharged straight into the air. It must be trapped in a recycling unit.

Refrigerant stored in a recycling unit may be re-used at any time.

The recycling unit used to do this must be of a type suitable for handling R134a refrigerant.

The boiling point of R134a is minus 26.5°C (minus 15.7°F) and its freezing point is minus 101°C (minus 149.8°F).

R134a has a corrosive effect on copper as well as various seals and components used in the R12 system. For this reason, never use R134a refrigerant in a system that has previously used R12. Before replacing any component, it is vital to check whether it is compatible with the type of refrigerant used.

It is still essential to ensure that the correct refrigerant oil is used. R12 systems were lubricated with mineral oil, which is totally unsuitable for R134a systems. The latter require PAG oil, which mixes very well with the refrigerant and provides ideal lubrication throughout the system.

ZX.TMXZCO002465-19-25NOV92

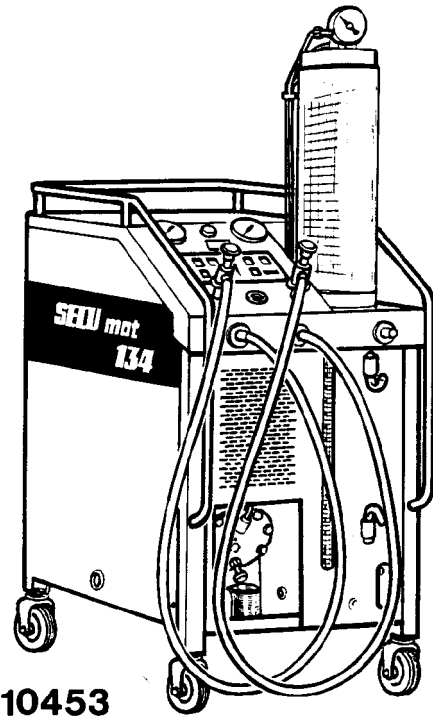
### SPECIAL TOOLS

Service unit ..... FKM10453

Evacuating, filling, cleaning and checking the air conditioning system.

*NOTE: All work performed with this unit must be carried out in accordance with the service unit operator's manual.*

**IMPORTANT: Use only service units suitable for handling R134a refrigerant.**



**FKM10453**

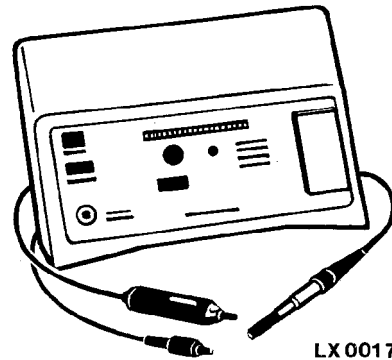
FKM10453 -JUN-28APR95

ZX, TMXZCO002466-19-15FEB95

Leak tester ..... LX001767

Pinpointing a refrigerant leak.

*NOTE: Use only leak testers suitable for finding R134a leaks.*



**LX 001767**

LX001767 -JUN-28APR95

ZX, TMXZCO002467-19-15FEB95

## SPECIFICATIONS

Item	Measurement	Specification
Air conditioning system	Refrigerant quantity	2400 g (85 oz)
Evacuating system	Vacuum at sea level	100 kPa (1 bar) (14.5 psi)
Air conditioning system with compressor	Oil quantity	300 cm <sup>3</sup> (18.3 cu in.)
Compressor	Oil quantity	160 cm <sup>3</sup> (9.8 cu in.)
Air conditioning system, pressure side (2200 rpm)	Refrigerant pressure	1500—2000 kPa (15—20 bar) (218—290 psi)
Air conditioning system, suction side (2200 rpm)	Refrigerant pressure	80—200 kPa (0.8—2 bar) (11—29 psi)
Compressor clutch coil	Current draw (at 12 volts)	2.2 amps. max.
Temperature control switch set for max. cooling:		
• Contact points open (low limit)	Temperature at capillary tube	-1° to 1°C (30° to 34°F)
• Contact points closed (high limit)	Temperature at capillary tube	1.8° to 3.8°C (35° to 39°F)
Temperature control switch set for min. cooling:		
• Contact points closed (high limit)	Temperature at capillary tube	13.6° to 17.6°C (56° to 64°F)
Ice protection switch		
• Contact points open (low limit)	Temperature at capillary tube	-3° to -1°C (26° to 30°F)
• Contact points closed (high limit)	Temperature at capillary tube	0.5° to 2.5°C (33° to 36°F)
Double radial fan (installed)	Current draw (at 12 volts)	13 amps.

ZX.TMXZCO002468-19-25NOV92

## TROUBLESHOOTING

Symptom	Problem	Solution
<b>No cooling effect</b>	System not in operation.	Switch on compressor switch. Turn temperature control switch counterclockwise. Switch on fan.  If functioning, proceed to checks <b>1</b>
	<b>Inadequate cooling effect</b>	Condenser severely contaminated. Clean condenser.  Evaporator severely contaminated. Clean evaporator.  Actuating cables of temperature control switch not functioning correctly. Check and adjust actuating cables.  Insufficient tension at compressor drive belt. Replace drive belt or belt tensioner.  Coolant leak See checks <b>3</b>  Thermostat switch not functioning correctly. See checks <b>4 A</b>  Compressor not functioning correctly. See checks <b>5</b>
<b>Intermittent or poor cooling effect</b>	System components iced up.	Evacuate refrigerant and refill with recycled or new refrigerant. Replace receiver-drier.
<b>Unusual noises when system is in operation</b>	Insufficient tension at compressor drive belt.	Replace drive belt or belt tensioner.
	Defective compressor	Replace compressor.

ZX, TMXZCO002469-19-25NOV92

## EXPLANATION OF CHECKS

The checks on the following pages show how to find an existing fault and then rectify it.

Visual checks are performed first, as this is the simplest way to eliminate possible causes of the fault.

The preliminary checks reveal whether individual components of the air conditioning system are functioning correctly.

Next, the leak tester is used to check if there is a leak at any point in the air conditioning circuit.

Up to this stage, the checks are relatively straightforward and do not involve lots of tools. The subsequent tests, however, may involve repair work or the replacement of major components, depending on the results of the test.

If the checks do not produce a clear result, observe the note below.

*NOTE: A frequent cause of faults in air conditioning systems is too much moisture in the refrigerant circuit. Moisture results in air conditioning components icing up from the inside and functioning incorrectly. Too much moisture can also produce acid, which destroys the air conditioning system from within.*

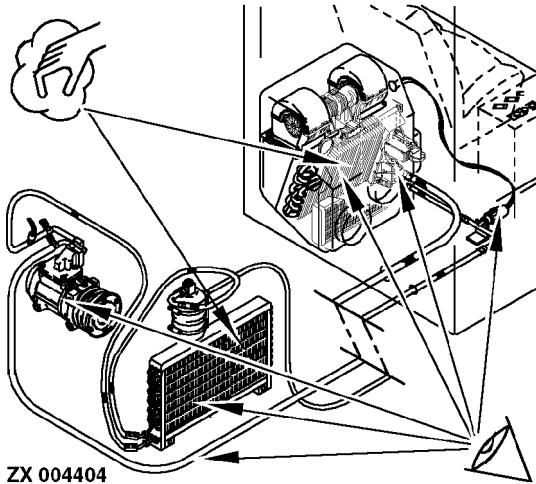
*If moisture is suspected, the air conditioning system must be evacuated, cleaned, bled and refilled with new or recycled refrigerant. The refrigerant oil contained in the compressor must be changed.*

*It is particularly important to replace the receiver-drier, as it gradually loses its ability to absorb moisture. Eventually, it loses this ability altogether.*

## AIR CONDITIONING SYSTEM, CHECKS

ZX, TMXZC0002470-19-25NOV92

### ; VISUAL CHECKS



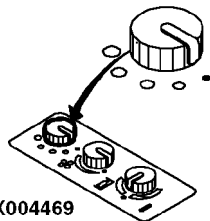
ZX 004404

ZX004404 -UN-08MAY95

- a. Check tension of compressor belt.
- b. Cab filters must be clean.
- c. Air passages must be clear.
- d. Check for damaged lines.
- e. Hoses must not be deformed or trapped.
- f. Condenser and evaporator must not be contaminated.
- g. All electrical lines must be OK.
- h. Listen for unusual noises while the system is operating.

ZX, TMXZC0002471-19-25NOV92

### ' A PRELIMINARY CHECKS



ZX004469

ZX004469 -UN-08MAY95

Switch on ignition and run the fan at each possible speed.

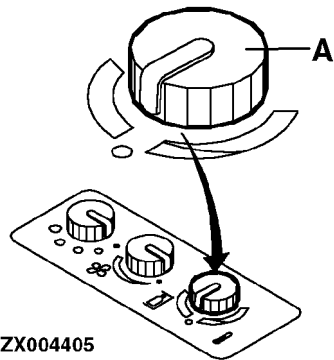
**NOT OK:** See Section 240-15.

**OK:** Proceed with checks.

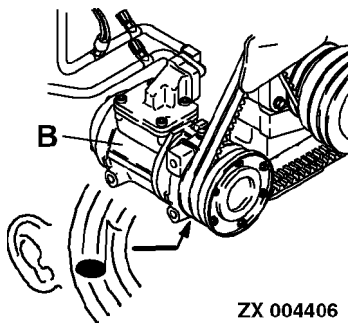
ZX, TMXZC0002472-19-25NOV92

Troubleshooting — Air Conditioning System/System Checks

B



ZX004405 -UN-08MAY95



ZX004406 -UN-08MAY95

Switch on ignition and run fan at lowest possible speed. Set temperature control switch (A) to operate the air conditioning system.

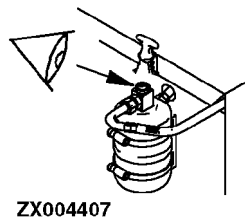
Note whether the clicking of the magnetic clutch can be heard at compressor (B).

**NOT OK:** See Section 240-15.

**OK:** Proceed with checks.

ZX, TMXZCO002473-19-25NOV92

C



ZX004407 -UN-08MAY95

Run engine at 2200 rpm and set air conditioning to full output. Observe refrigerant flowing past the sight glass at receiver-drier.

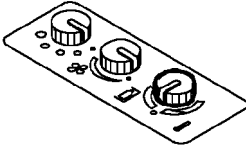

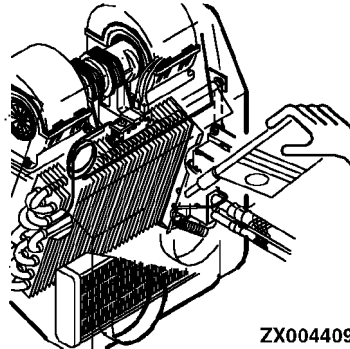
After some time, the bubbles in the refrigerant should disappear completely.

**NOT OK:** The air conditioning system must be topped up.

**OK:** Proceed with checks.

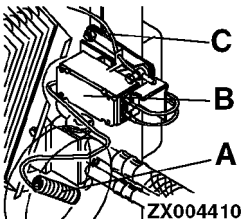
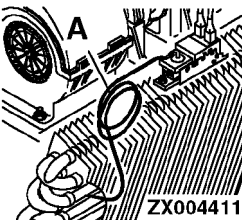
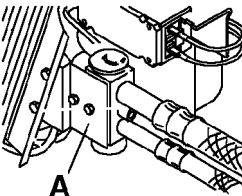
ZX, TMXZCO002474-19-25NOV92

Troubleshooting — Air Conditioning System/System Checks

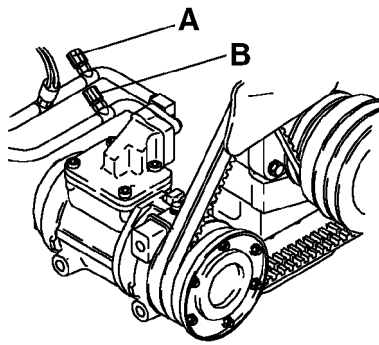
<p>D</p>	 <p><b>ZX004408</b> ZX004408 -UN-08MAY95</p>	<p>Run engine at 800 rpm and set temperature control switch to max. cooling position.</p> <p>At the moment the switch trips, the engine sound should change slightly.</p>	<p><b>NOT OK:</b> The compressor or its magnetic clutch must be repaired. See Section 90.</p> <p><b>OK:</b> Proceed with checks.</p> <p>ZX,TMXZCO002475-19-16JUN93</p>
<p>Æ A <b>LEAK TEST</b></p>	 <p><b>LX001762</b> LX001762 -UN-28APR95</p> <p><b>▲ CAUTION: Keep away from moving engine parts at all times. Avoid accidents!</b></p> <p>Hold the leak tester at the air outlets in the cab to test whether there is a leak in the evaporator housing.</p>	<p>Run the engine at 1000 rpm and switch on fan and air conditioning system. Use FKM10444 leak tester to check the entire refrigerant circuit for leaks. Comply with the manufacturer's instructions.</p>	<p><b>NOT OK:</b> If the leak tester indicates a leak while testing at the air outlets, proceed with Æ B.</p> <p>If a leak is found at another part of the system, the leak must be repaired or the leaking component must be replaced. See Section 90.</p> <p><b>OK:</b> Proceed with Å</p> <p>ZX,TMXZCO002476-19-15FEB95</p>
<p>B <b>REFRIGERANT LEAK AT EVAPORATOR HOUSING</b></p>	 <p><b>ZX004409</b> ZX004409 -UN-08MAY95</p>	<p>Open evaporator housing under passenger seat. Run engine at 1000 rpm and switch on fan and air conditioning system.</p> <p>Use leak tester FKM10444 to test evaporator, expansion valve and refrigerant lines for leaks.</p>	<p><b>NOT OK:</b> If a leak is found at any part of the system, the leak must be repaired or the leaking component must be replaced. See Section 90.</p> <p><b>OK:</b> Proceed with Å.</p> <p>ZX,TMXZCO002477-19-15FEB95</p>



Troubleshooting — Air Conditioning System/System Checks

<p><b>Ä COMPONENT CHECKS</b></p> <p>A Thermostat switch</p>	 <p>ZX004410 -UN-08MAY95</p>	<p>Open evaporator housing under passenger seat.</p> <p>Check that sensing bulb (A) is not damaged.</p> <p>Make sure that thermostat switch (B) is actuated correctly. Do this by actuating the temperature switch several times and observing cable (C).</p> <p>Check all electrical contacts of the thermostat switch.</p>	<p><b>NOT OK:</b> To correct faults, see Section 90.</p> <p><b>OK:</b> Proceed with checks.</p>
<p><b>B Ice protection switch</b></p>	 <p>ZX004411 -UN-08MAY95</p>	<p>Make sure that capillary tube (A) is not damaged and inserted into evaporator.</p> <p>Check all electrical contacts of the ice protection switch.</p>	<p><b>NOT OK:</b> To correct faults, see Section 90.</p> <p><b>OK:</b> Proceed with checks.</p>
<p><b>C Evaporator</b></p>	<p>Remove any contamination and check for signs of damage.</p>	<p><b>NOT OK:</b> If the evaporator shows signs of damage, it must be replaced. See Section 90.</p> <p><b>▲ CAUTION:</b> Before removing the evaporator, first evacuate the refrigerant from the air conditioning system.</p> <p><b>OK:</b> Proceed with checks.</p>	<p>ZX,TMXZCO002478-19-25NOV92</p>
<p><b>D Expansion valve</b></p>	 <p>ZX004412 -UN-08MAY95</p>	<p>Check that there are no signs of damage at thermal head (A). Check all connections.</p>	<p><b>NOT OK:</b> Replace expansion valve.</p> <p><b>▲ CAUTION:</b> Before removing the expansion valve, evacuate refrigerant from the air conditioning system.</p> <p><b>OK:</b> Proceed with checks.</p>

**Ö** Compressor, pressure tests



ZX004413

ZX004413 -UN-08MAY95

**A—High pressure connection**  
**B—Low pressure connection**

Connect the pressure gauges of the service unit to the compressor.

Run engine at 2200 rpm. Switch on fan and set temperature control switch to max. cooling position.

On the high pressure side, the pressure reading must be 1500—2000 kPa (15—20 bar) (218—290 psi).

On the low pressure side, the pressure reading must be 80—200 kPa (0.8—2 bar) (11—29 psi).

**NOT OK:** See pressure deviations.

ZX, TMXZC0002482-19-25NOV92

## PRESSURE DEVIATIONS

Symptom	Problem	Solution
<b>Low pressure and high pressure both too high</b>	System has been over-filled.	Reduce amount of refrigerant in system.
	Condenser is contaminated or plugged.	Clean or unplug condenser. Replace condenser, if necessary.
<b>Low pressure too low and high pressure too high</b>	Condenser plugged.	Unplug condenser or replace, if necessary.
	Receiver-drier plugged.	Unplug receiver-drier or replace, if necessary.
	Expansion valve not operating correctly.	Replace expansion valve.
<b>Low pressure too high but high pressure normal</b>	Compressor not operating correctly.	Repair or replace compressor.
<b>Low pressure and high pressure are the same</b>	Compressor not operating.	Check drive belt. Check electrical wiring. Change high/low pressure switch. Check thermostat switch, see Section 240. Check magnetic clutch of compressor.
<b>Low pressure too low but high pressure normal</b>	Not enough refrigerant in circuit.	Top up system.
	Expansion valve not operating correctly.	Replace expansion valve.
	Evaporator contaminated or plugged.	Clean evaporator. Unplug evaporator or replace, if necessary.
<b>Low pressure and high pressure both too low</b>	Not enough refrigerant in circuit.	Top up system.
	Receiver-drier plugged.	Unplug receiver-drier or replace, if necessary.
	Expansion valve not operating correctly.	Replace expansion valve.

Continued on next page

*Troubleshooting — Air Conditioning System/System Checks*

<b>Symptom</b>	<b>Problem</b>	<b>Solution</b>
<b>Low pressure and high pressure both too low (Continued)</b>	Too much moisture in circuit, causing components to ice up.	Evacuate system, replace receiver-drier and then refill system.
	Compressor not operating correctly.	Repair compressor or replace, if necessary.

ZX, TMXZC0002483-19-25NOV92

## Group 10B

# Troubleshooting — Ventilation and Heating Systems

Symptom	Problem	Solution
<b>Inadequate flow of fresh air</b>	Main filter or recirculating air filter clogged	Clean or replace filters. See Section 90, Group 10
	Air inlets clogged	Clean air inlets
	Blower motor defective	Replace blower. See Section 90, Group 10
	Blower motor switch defective	Replace switch
	Loose wire connection	Reconnect or replace wires. See Section 240, Group 10
<b>Blower not working</b>	Blower motor defective	Replace blower. See Section 90, Group 10
	Blower motor switch defective	Replace switch
	Wire broken, or loose connection	Reconnect or replace wires. See Section 240, Group 10
	Electrical circuit interrupted	Check circuit. See Section 240, Group 15
<b>Blower operating too slowly or irregularly</b>	Blower motor shaft is jamming	Replace blower. See Section 90, Group 10
	Loose wire	Reconnect wire or replace connection. See Section 240, Group 10
	Blower motor switch defective	Replace switch
<b>Inadequate heating effect</b>	Engine thermostat defective	Replace thermostat. See Component Technical Manual "Engines"
	Foreign bodies in heating element or heater hoses	Clean heater element or heater hoses
	Heater switch not operating correctly	Check heater switch. Replace if necessary. See Section 90, Group 10
	Blower not operating correctly	Clean blower. Replace if necessary
	Blockage at air inlets	Clean air inlets
<b>Ice or misting on windows does not clear properly</b>	Air louvers not directed properly	Direct the air louvers properly

Continued on next page

*Troubleshooting — Ventilation and Heating Systems*

<b>Symptom</b>	<b>Problem</b>	<b>Solution</b>
<b>Heater valve does not turn coolant flow off</b>	Blower not operating correctly	Clean blower. Replace if necessary. See Section 90, Group 10
	Heater switch not operating correctly	Check heater switch. Replace if necessary. See Section 90, Group 10
	Inlet and outlet hoses wrongly connected	Connect inlet and outlet hoses correctly. See Section 90, Group 10
	Heater switch defective	Replace heater switch. See Section 90, Group 10

ZX,TMXZCO003117-19-01DEC93

### COMFORT SEATS

Symptom	Problem	Solution
<b>Correct weight adjustment not possible</b>	Springs over-extended	Replace springs.
	Spring broken	See above.
<b>Seat bounces</b>	Shock absorber defective	Replace shock absorber.
<b>Seat cannot be adjusted</b>	Loose screw connections	Tighten or replace screw connections.
	Locking device defective	Replace locking device.
<b>Seat shakes</b>	Loose screw connections	Tighten or replace screw connections.

LX,29010C003391-19-01FEB93

### AIR COMFORT SEAT

Symptom	Problem	Solution
<b>Seat does not move to center position</b>	Wire not connected or loose	Reconnect or replace wire. See Section 240, Group 10
	Fuse defective	Replace fuse
	Compressor defective	Replace compressor
	Air spring defective	Replace air spring
<b>Seat bounces</b>	Shock absorber defective	Replace shock absorber
<b>Seat cannot be adjusted</b>	Loose screw connections	Tighten or replace screw connections
	Locking device defective	Replace locking device
<b>Seat shakes</b>	Loose screw connections	Tighten screw connections

ZX,TMXZCO003118-19-01DEC93





**PRINCIPLE OF HEAT EXCHANGE**

ART NOT FOUND  
LX002148

LX002148 -UN-

**A**—Liquid refrigerant under high pressure  
**B**—Gaseous refrigerant under high pressure

**C**—Gaseous refrigerant under low pressure

**D**—Exchange of heat  
**E**—Energy in the form of heat

The simplified example set out below is intended to show how heat is exchanged in an air conditioning system. Each explanation concludes with the part of the air conditioning system that corresponds to the principle involved.

**Fig. 1:** Gaseous refrigerant is contained in a cylinder which has a certain reserve of energy (E) in the form of heat. (intake line of compressor)

**Fig. 2:** A piston reduces the space in which the gaseous refrigerant is trapped. This concentrates the heat (E) in a smaller space. This means that the temperature inside the cylinder is now higher than it was before. Heat is now exchanged, with the surrounding area absorbing the heat of the gas. Heat always moves from a hotter substance to a colder one. (compressor to condenser)

**Fig. 3:** The pressurized refrigerant condenses on the cylinder wall and becomes a liquid. The gas has transferred its heat through the cylinder wall to the surrounding area. (condenser)

**Fig. 4:** The space inside the cylinder is increased. This means that the pressure drops rapidly and the liquid refrigerant is free to expand. The refrigerant evaporates and returns to its gaseous state. In consequence, the heat remaining in the gas is free to spread through a larger area. The temperature inside the cylinder drops and heat is exchanged once again. This time the heat is absorbed from the surrounding area by the cold cylinder. (expansion valve and evaporator)

LX,290,20002575-19-28FEB92

## R134A REFRIGERANT

**IMPORTANT:** The air conditioning system operates using R134a refrigerant (tetrafluoroethane). This substance does not contain any chlorine atoms, so it does not have a detrimental effect on the ozone in the Earth's atmosphere.

Even so, the refrigerant must never be discharged straight into the air. It must be trapped in a recycling unit.

Refrigerant stored in a recycling unit may be re-used at any time.

The recycling unit used to do this must be of a type suitable for handling R134a refrigerant.

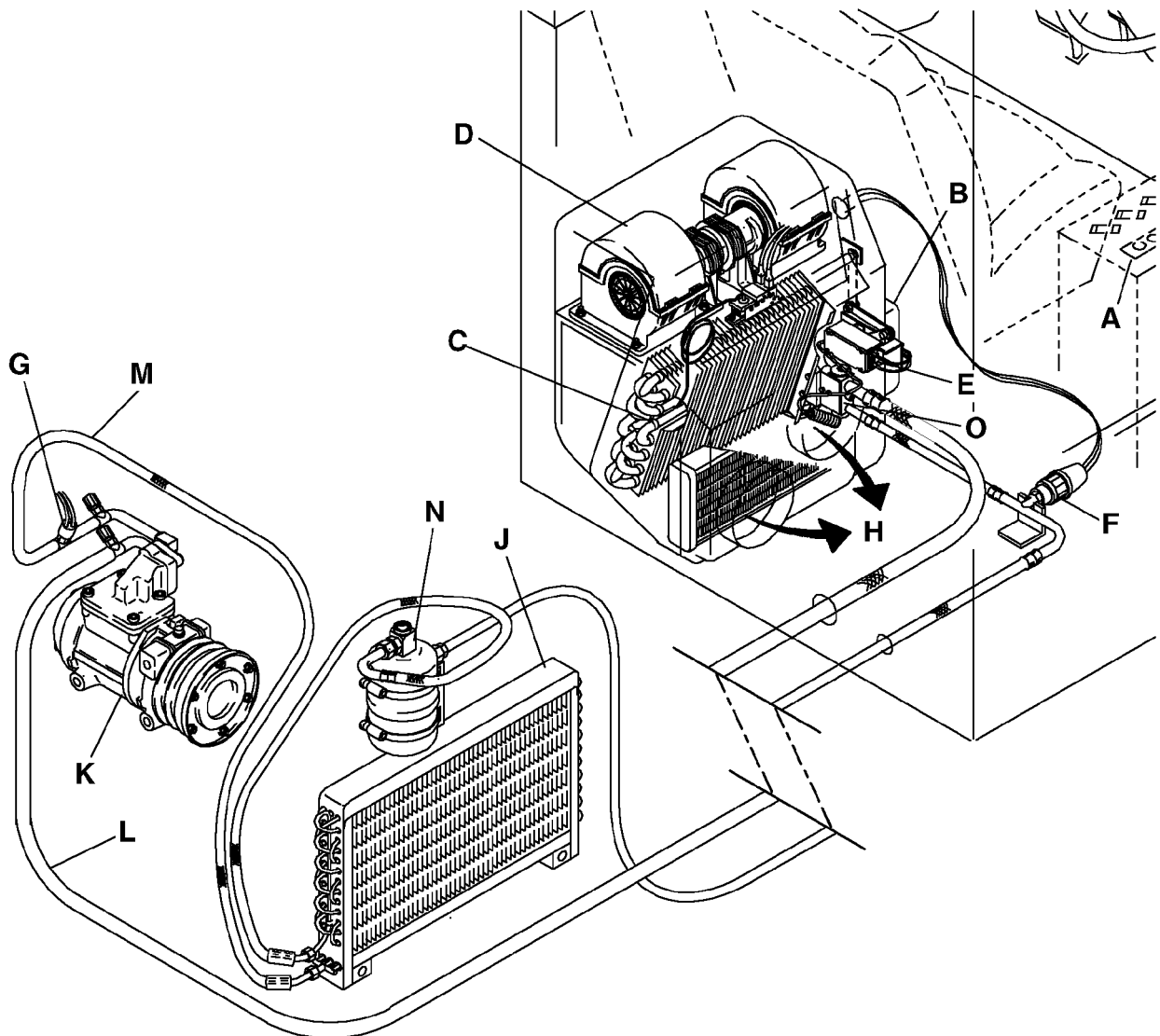
The boiling point of R134a is minus 26.5°C (minus 15.7°F) and its freezing point is minus 101°C (minus 149.8°F).

R134a has a corrosive effect on copper as well as various seals and components used in the R12 system. For this reason, never use R134a refrigerant in a system that has previously used R12. Before replacing any component, it is vital to check whether it is compatible with the type of refrigerant used.

It is still essential to ensure that the correct refrigerant oil is used. R12 systems were lubricated with mineral oil, which is totally unsuitable for R134a systems. The latter require PAG oil, which mixes very well with the refrigerant and provides ideal lubrication throughout the system.

LX,290,20002578-19-28FEB92

**LAYOUT OF REFRIGERANT CIRCUIT**



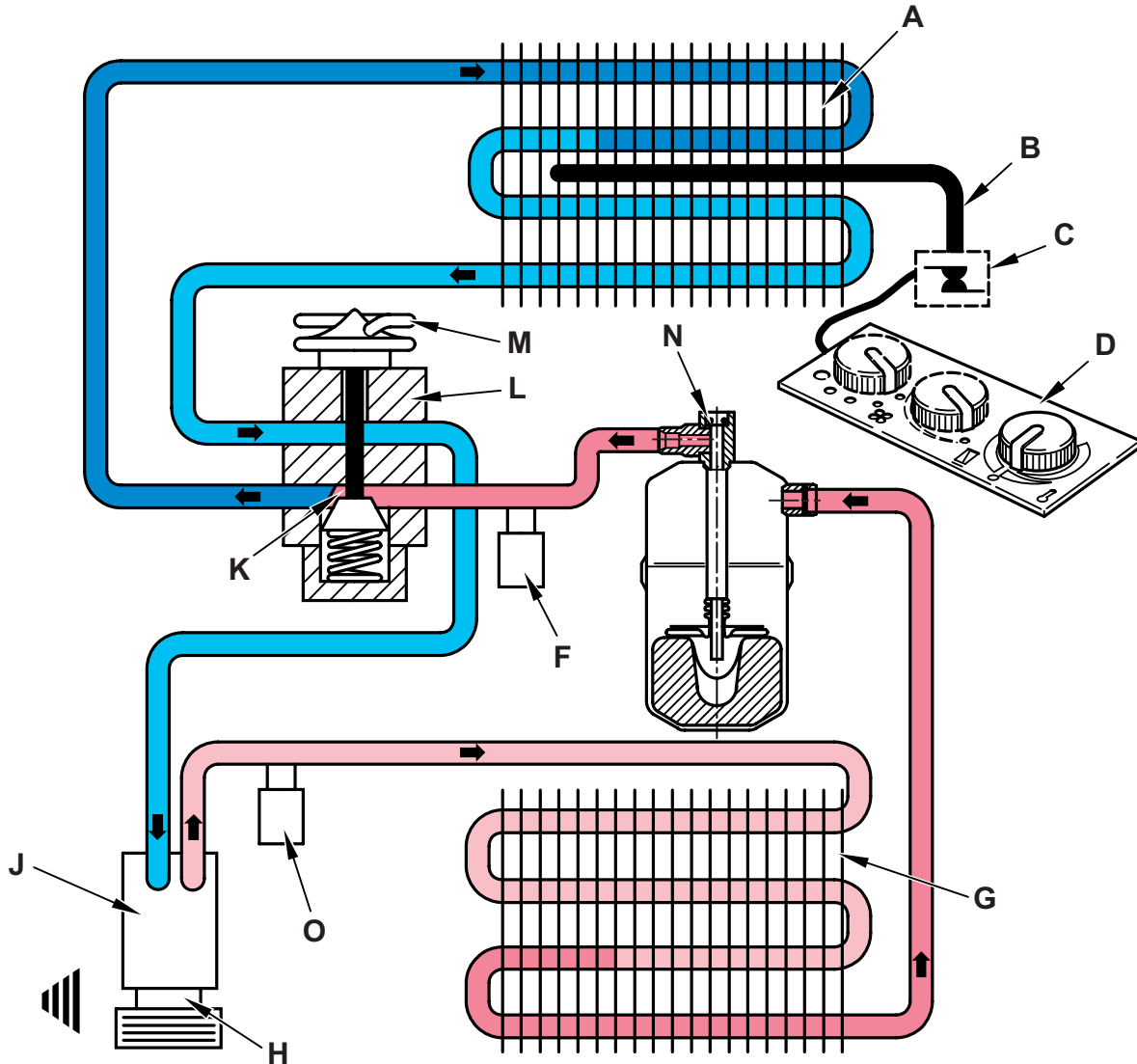
ZX004414

- |                              |                        |                        |                      |
|------------------------------|------------------------|------------------------|----------------------|
| A—Temperature control switch | D—Blower fan           | H—Flow of air into cab | M—High-pressure line |
| B—Cab air filter             | E—Thermostat switch    | J—Condenser            | N—Receiver-drier     |
| C—Evaporator                 | F—Low pressure switch  | K—Compressor           | O—Expansion valve    |
|                              | G—High pressure switch | L—Low-pressure line    |                      |

-UN-08MAY95  
ZX004414

ZX.TMXZCO002484-19-25NOV92

**DESCRIPTION OF REFRIGERANT CIRCUIT FUNCTION**



ZX004415



- |                              |                       |                                           |                                          |
|------------------------------|-----------------------|-------------------------------------------|------------------------------------------|
| A—Evaporator                 | F—Low pressure switch | M—Thermal head                            | R—Liquid refrigerant under low pressure  |
| B—Sensing bulb               | G—Condenser           | N—Sight glass                             | S—Gaseous refrigerant under low pressure |
| C—Thermostat switch          | H—Magnetic clutch     | O—High pressure switch                    |                                          |
| D—Temperature control switch | J—Compressor          | P—Liquid refrigerant under high pressure  |                                          |
| E—Receiver-drier             | K—Variable throttle   | Q—Gaseous refrigerant under high pressure |                                          |
|                              | L—Expansion valve     |                                           |                                          |

-JUN-28/JAN98  
ZX004415

ZX, TMXZCO002485-19-01DEC92

## DESCRIPTION OF REFRIGERANT CIRCUIT FUNCTION (CONTINUED)

The air conditioning system operates on the compression principle. The main components are the compressor (J), condenser (G), receiver-drier (E), expansion valve (L), evaporator (A), temperature control switch (D), thermostat switch (C), high pressure switch (O) and low pressure switch (F).

Gaseous refrigerant is compressed in compressor (J), causing it to absorb heat. Then the pressurized gas is fed through the condenser (G), where it transfers its heat to the cooling fins and condenses.

Now in the form of a pressurized liquid, the refrigerant flows through receiver-drier (E), where a special filter separates out all impurities including moisture and acid.

A sight glass (N) is provided at the receiver-drier (E). Through this can be seen whether the refrigerant is in a completely liquid state at this point, and whether there is enough refrigerant in the circuit.

After it leaves the receiver-drier (E), the refrigerant passes to expansion valve (L), where it is fed through a variable throttle (K). The pressure is still high at the inlet side of the expansion valve. Once the refrigerant has passed through the throttle, however, it is free to expand and cool down.

Expansion is completed in evaporator (A), where the refrigerant returns to its gaseous state and cools down the surrounding area considerably. The refrigerant transfers its cold temperature to the evaporator's cooling fins, and air flowing into the evaporator is cooled down.

High pressure switch (O) and low pressure switch (F) determine the refrigerant pressure. This is required in order to switch off the compressor if the pressure becomes too high or too low.

Thermostat switch (C) controls the cooling output by switching compressor (J) on or off. The thermostat switch can be reset by turning temperature control switch (D).

The refrigerant flows back via the evaporator return line and is unimpeded as it passes through the housing of expansion valve (L). There it comes under the influence of the gas-filled thermal head (M), which actuates variable throttle (K) in relation to the temperature. In this way, the refrigerant always flows to evaporator (A) at the optimum rate.

Then the gaseous refrigerant is fed back into compressor (J), and the circuit is closed.

ZX.TMXZCO002486-19-25NOV92

## COMPRESSOR

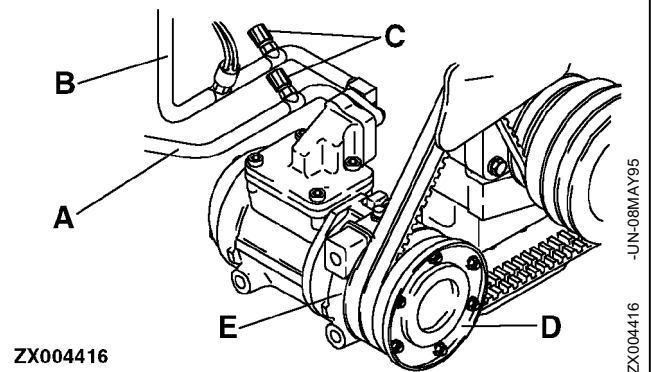
The compressor is located on the engine and is driven by a multi-groove drive belt. The compressor is of the axial piston compressor type and is controlled by a swashplate.

The purpose of the compressor is to ingest the gaseous refrigerant from the low pressure area, to compress it and send it on to the condenser.

When this happens, the low pressure gas is compressed into a smaller space, which greatly increases the temperature of the refrigerant.

The compressor drive assembly includes a magnetic clutch, which allows the compressor to be switched on and off while the air conditioning system is in operation. This is necessary to keep the temperature in the cab as nearly constant as possible.

The compressor housing also serves as the reservoir for refrigerant oil. The compressor is normally switched on and off by the thermostat switch. If refrigerant pressure becomes too high or too low, the compressor is switched off by the high or low pressure switch.



- A—Suction line
- B—Pressure line
- C—Test ports
- D—Drive belt pulley
- E—Magnetic clutch

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## CONDENSER

The condenser is located in front of the radiator. The purpose of the condenser is to cool down the pressurized refrigerant gas so that it condenses and leaves the condenser as a liquid.

The cooling effect is produced by the airflow created by the fan blades. The condenser's inlet is connected to the compressor's pressure connection, its return line to the receiver-drier.

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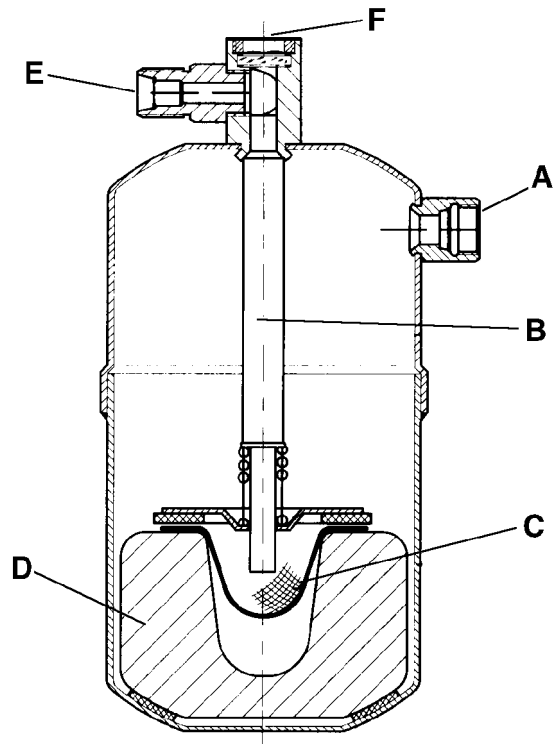
## RECEIVER-DRIER

The receiver-drier performs two functions. Firstly, it receives high pressure refrigerant from the condenser and stores it until it is required by the evaporator. Secondly, it absorbs moisture that would have a detrimental effect on the system's ability to operate.

The sight glass on the receiver-drier enables the refrigerant to be observed when tests or service work are being performed. The receiver-drier's inlet is connected to the condenser, and its return line to the expansion valve.

The receiver-drier should be replaced every time the air conditioning system is repaired.

- A—To expansion valve
- B—Tube
- C—Screen
- D—Dessicant block
- E—From condenser
- F—Sight glass



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ZX004417 -JUN-08MAY95

## EXPANSION VALVE

The expansion valve is located on the left side of the evaporator looking in the direction of forward travel and is connected to the evaporator's inlet and return lines.

The expansion valve is a diaphragm valve with a stainless steel thermal head. Its purpose is to control the throughflow of refrigerant in relation to the return temperature from the evaporator.

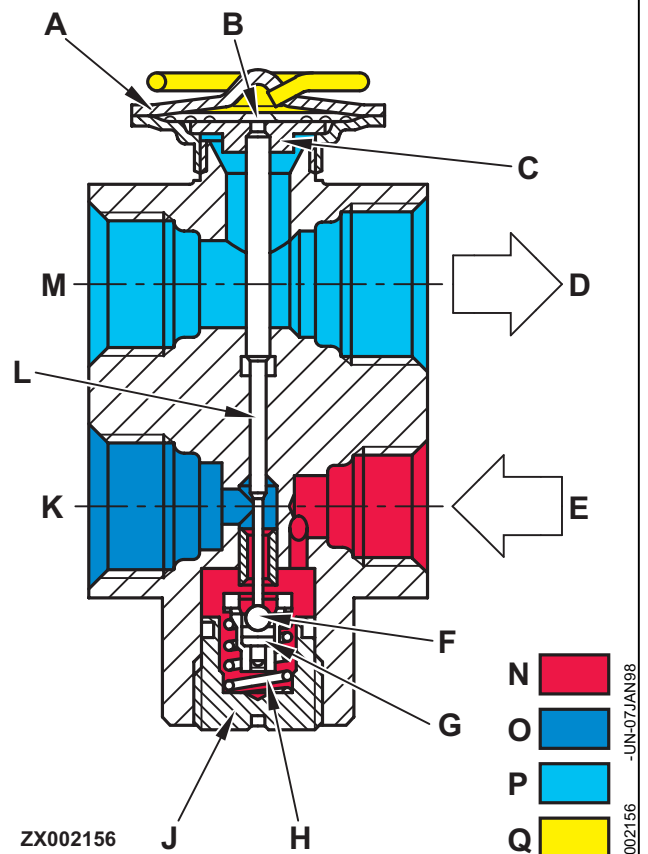
If too much refrigerant flows through the evaporator, liquid refrigerant could reach the compressor via the return line and cause damage to the compressor.

Too much liquid refrigerant is one reason why the system may not be performing well, as the refrigerant does not evaporate completely.

A variable throttle is located in the inlet to the expansion valve. This throttle is formed by valve ball (F) and actuating pin (L). At this point the pressure of the liquid refrigerant is reduced considerably. This allows the refrigerant to expand and change into its gaseous state in the evaporator, thus bringing down the temperature.

Once the refrigerant has left the evaporator, it has to flow through the expansion valve once again. However, it does not do so through the throttle, but through a passage where the refrigerant temperature can be registered by thermal head (A).

The thermal head is filled with gas, which expands and contracts as the temperature rises and falls. This process is employed to produce a movement at diaphragm (B) that is passed on to the throttle. This makes it possible to control the throughflow of refrigerant in relation to its temperature.

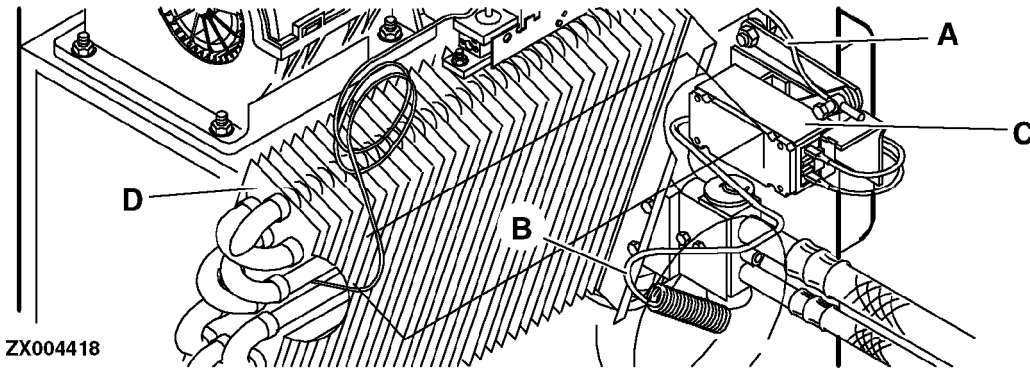


- A—Thermal head
- B—Diaphragm
- C—Pressure plate
- D—To compressor
- E—From receiver-drier
- F—Valve ball
- G—Ball seat
- H—Spring
- J—Plug
- K—To evaporator
- L—Actuating pin
- M—From evaporator
- N—Liquid high pressure refrigerant
- O—Liquid low pressure refrigerant
- P—Gaseous low pressure refrigerant
- Q—Gas in thermal head

ZX.TMXZCO002490-19-25NOV92



## THERMOSTAT SWITCH



A—Actuating cable

B—Sensing bulb (gas-filled capillary tube)

C—Thermostat switch

D—Evaporator

Thermostat switch (C) is located at the left side of the evaporator (looking in the direction of forward travel), inside the evaporator housing.

It is operated by actuating cable (A), which moves in response to the temperature control switch. The cable also changes position of air control flap.

The thermostat switch controls the cooling output of the air conditioning system by switching the compressor on and off, thus regulating the evaporator's temperature. This effect is determined by the position to which the temperature control switch is set.

The switch consists of a set of contacts which receive current via the fan switch. Current flows on from the thermostat switch to the magnetic clutch for the compressor.

The opening and closing of the electrical contacts is controlled by a gas-filled capillary tube (B), one end of which is fitted with a diaphragm or bellows. The other (spiral) end of the capillary tube protrudes into air flow at housing outlet.

When the thermostat switch is actuated, the switch contacts close, allowing current to flow between the switch and the compressor. However, the compressor comes into operation only if the ventilator fan is also in operation.

Once the temperature in evaporator (D) reaches a preselected lower limit, the switch contacts open and the compressor is shut off. The compressor remains shut off until the temperature in the evaporator reaches the upper limit.

When this happens, the switch contacts close again and the compressor comes into operation once more. In this way, the compressor is switched on and off as required and in relation to the temperature inside the evaporator.

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ZX004418 -JUN-08MAY95

## EVAPORATOR

The evaporator is located in the evaporator housing, underneath the operator's seat. It allows the heat transfer to take place between the refrigerant and the cab air. The same component also includes the heat exchanger for the heating system; this makes use of engine coolant to heat the cab air as required. It is controlled via the heating valve.

The refrigerant is still in its liquid form as it comes from the expansion valve. It expands in the evaporator and becomes a gas. The resulting low

temperature is transferred to the cooling fins and the airflow produced by the fan transfers its heat to the fins.

The moisture in the ambient air condenses when it comes into contact with the cold evaporator fins. The condensation is drained away via a drain hose.

The gaseous refrigerant is removed from the evaporator outlet via the expansion valve to the compressor.

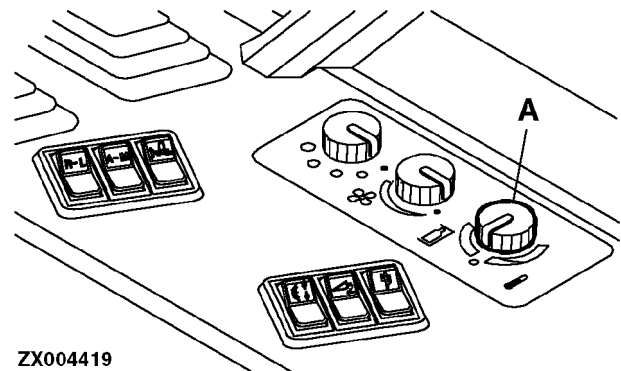
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## TEMPERATURE CONTROL SWITCH AND COMPRESSOR SWITCH

Temperature control switch (A) is a combined control element located on the switch console in the cab. Depending on its setting, it activates the heating or air conditioning system by means of two actuating cables.

If the knob is set to the blue sector, the heating valve is shut off and the thermostat switch is on. At the same time, the compressor is switched on by an integrated electric switch.

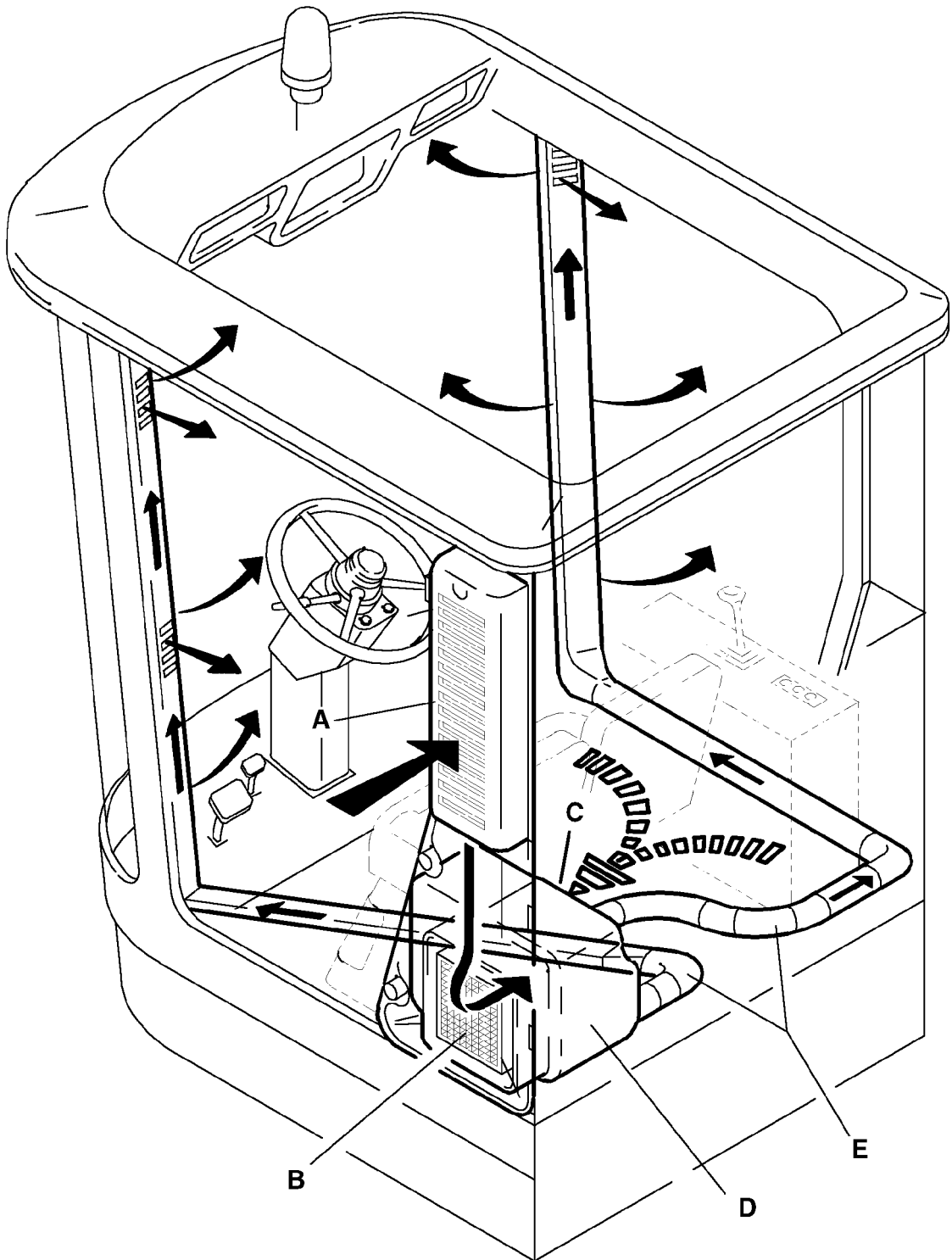
This situation is reversed when the switch is set to the red sector.



-JUN-08MAY95  
ZX004419

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AIR INTAKE AND DISTRIBUTION



ZX 002413

A—Air intake channel  
B—Air (main) filter

C—Recirculating air filter

D—Fan

E—Air outlet channels

ZX002413 -JUN-08MAY95

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*Cab Ventilation*

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