SERVICE REPAIR

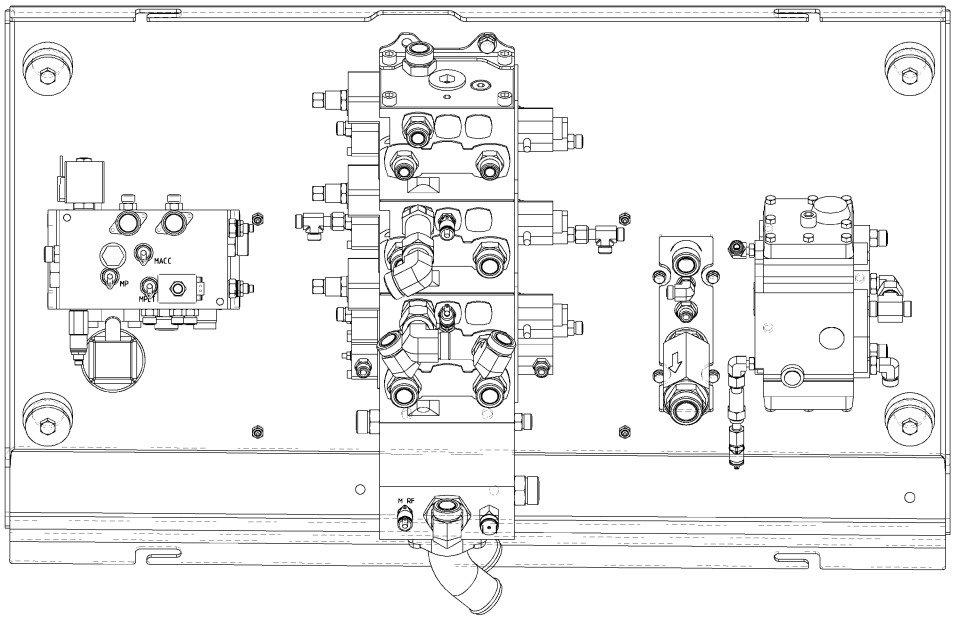
MANUAL

Hyster F117 (H1050HD-CH, H1150HD-CH) Forklift

HYSTER

HYDRAULIC PLATE

H40.00-48.00XM-12
(H800-1050HD/HDS) [A917];
H40.00-52.00XM-16CH
(H1050HD-CH, 1150HD-CH) [F117]



HYSTER

PART NO. 1616438

2000 SRM 1233

SAFETY PRECAUTIONS
MAINTENANCE AND REPAIR

- When lifting parts or assemblies, make sure all slings, chains, or cables are correctly fastened, and that the load being lifted is balanced. Make sure the crane, cables, and chains have the capacity to support the weight of the load.
- Do not lift heavy parts by hand, use a lifting mechanism.
- Wear safety glasses.
- DISCONNECT THE BATTERY CONNECTOR before doing any maintenance or repair on electric lift trucks. Disconnect the battery ground cable on internal combustion lift trucks.
- Always use correct blocks to prevent the unit from rolling or falling. See HOW TO PUT THE LIFT TRUCK ON BLOCKS in the **Operating Manual** or the **Periodic Maintenance** section.
- Keep the unit clean and the working area clean and orderly.
- Use the correct tools for the job.
- Keep the tools clean and in good condition.
- Always use **HYSTER APPROVED** parts when making repairs. Replacement parts must meet or exceed the specifications of the original equipment manufacturer.
- Make sure all nuts, bolts, snap rings, and other fastening devices are removed before using force to remove parts.
- Always fasten a DO NOT OPERATE tag to the controls of the unit when making repairs, or if the unit needs repairs.
- Be sure to follow the **WARNING** and **CAUTION** notes in the instructions.
- Gasoline, Liquid Petroleum Gas (LPG), Compressed Natural Gas (CNG), and Diesel fuel are flammable. Be sure to follow the necessary safety precautions when handling these fuels and when working on these fuel systems.
- Batteries generate flammable gas when they are being charged. Keep fire and sparks away from the area. Make sure the area is well ventilated.

NOTE: The following symbols and words indicate safety information in this manual:

WARNING

Indicates a condition that can cause immediate death or injury!

CAUTION

Indicates a condition that can cause property damage!

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This section is for the following models:

H40.00-48.00XM-12 (H800-1050HD/HDS) [A917];
H40.00-52.00XM-16CH (H1050HD-CH, 1150HD-CH) [F117]

General

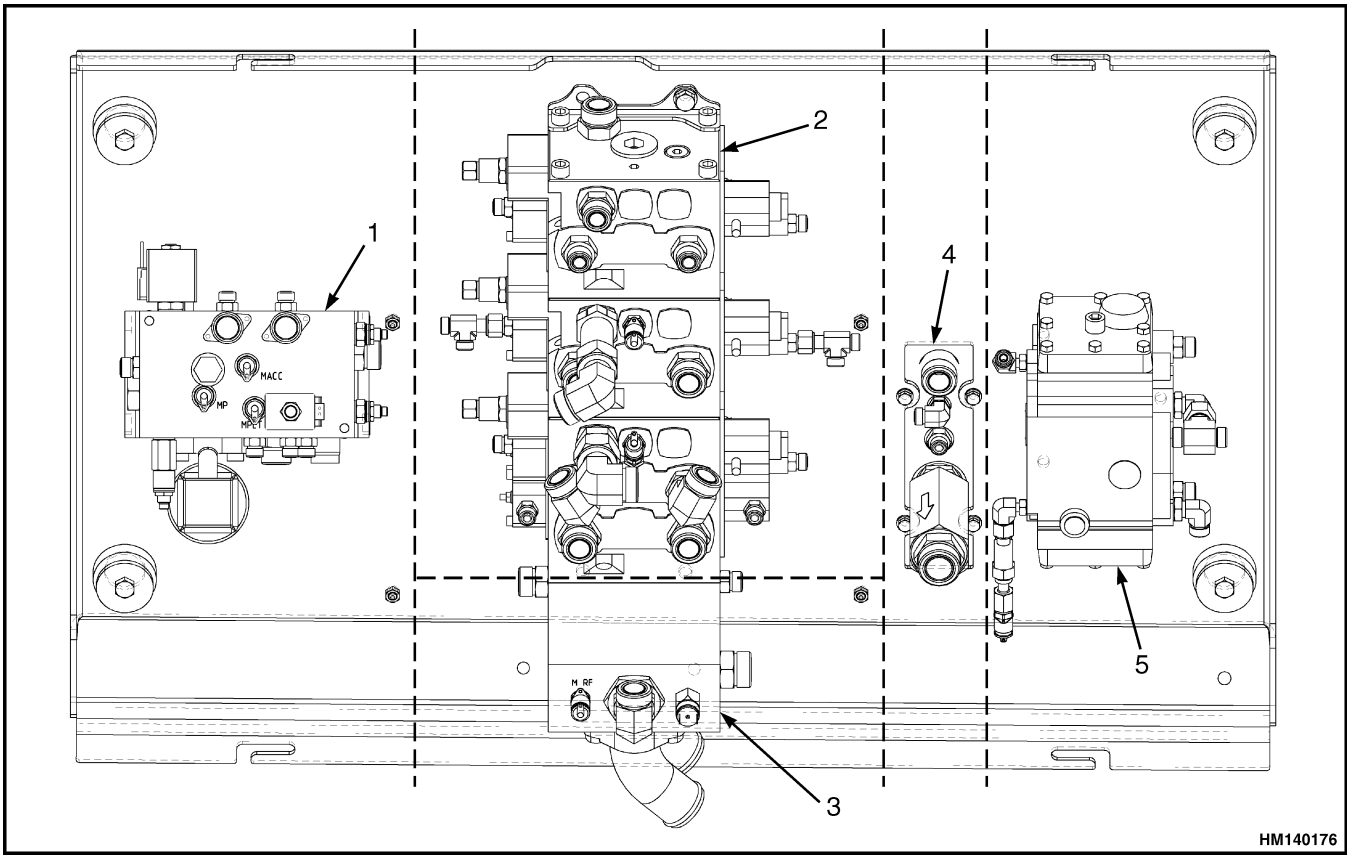
This section has the description and operation of the hydraulic components that are assembled on the Hydraulic Plate. The section also has disassembly, assembly, repair, calibration, and troubleshooting for most components that are assembled on the Hydraulic Plate.

The five sections of the Hydraulic Plate are as follows (see Figure 1):

- Section 1 contains the manifold with most of the hydraulic system valves and test ports.
- Section 2 contains the main control valve.
- Section 3 contains the return manifold.
- Section 4 contains brake manifold.
- Section 5 contains the flow amplifier.

The Hydraulic Plate is an integral part of the total hydraulic system. See the following sections for description, operation, and repair information of hydraulic components in these systems:

- **Hydraulic System** 1900 SRM 1239
- **Steering System** 1600 SRM 1109
- **Parking Brake** 1800 SRM 1117
- **Service Brake** 1800 SRM 1038
- **Mast** 4000 SRM 1160
- **Hydraulic Gear Pumps** 1900 SRM 97
- **Tilt Cylinders** 2100 SRM 1116
- **Extendable Container Attachment (Elme), 812, 813, 815, and 818 Series** 5000 SRM 723 (F117 only)



1. MANIFOLD SECTION
2. MAIN CONTROL VALVE SECTION
3. RETURN MANIFOLD SECTION
4. BRAKE MANIFOLD SECTION
5. FLOW AMPLIFIER SECTION

Figure 1. Hydraulic Plate Sections

Description and Operation

HYDRAULIC OIL SUPPLY

Two gear pumps supply the flow of oil for the components of the hydraulic system. These pumps are driven by a gear arrangement in the torque converter housing. The inlet hose for each gear pump is connected to the hydraulic tank with a manual shutoff valve.

The cover end section of the right-hand tandem pump supplies oil to the accumulator charge valve for the brake pilot system, auxiliary section, and lift section. The shaft end section of this tandem pump supplies oil for the single spool main control valve (lift section).

The cover end section of the left-hand tri-section pump circulates oil in tank through heat exchanger circuit and oil-cooled brakes. The shaft end section of this pump supplies oil to flow amplifier for steering system. Oil that is not needed for steering flows from flow amplifier to the two spool main control valve (tilt/lift section). When the operator is not steering, all of oil from pump flows to main control valve.

NOTE: Oil that is returned to the hydraulic tank is filtered.

MANIFOLD, SECTION 1 OF HYDRAULIC PLATE

The relief valve limits input oil pressure supplied to accumulator charge valve to 28 MPa (4061 psi), and forces oil to flow through a high pressure oil filter (20 micron), if oil is needed to charge the accumulator. See Figure 2. The accumulator charge valve controls charging rate and pressure of oil in the accumulator for brake/pilot system. The accumulator charge valve stops charging when accumulator pressure reaches upper limit. See Measurements and Adjustments. When accumulator pressure reaches lower limit, see Measurements and Adjustments, the accumulator charge valve allows oil from pump to charge accumulator. Adjustment at the spring of check valve in accumulator charge valve sets high and low limit pressure at accumulator. This pressure can be measured at check port MACC.

Oil pressure from accumulator is supplied to brake treadle. The right-hand pedal only activates the service brakes. The left-hand pedal first disengages the transmission, then the service brakes will be activated. Both pedals will engage the brake pressure switch to operate the stop lights. For brake treadle pressures, see Measurements and Adjustments. Brake pressure can be measured at check port MSB4.

Oil pressure from accumulator is also supplied to the pressure switch that operates the warning light in event of low brake pressure and to the solenoid valve for the parking brake. Both are integrated in the cab manifold. See Figure 2. The solenoid valve can be operated by a switch located on the instrument panel. The solenoid valve is normally energized during operation for oil pressure to compress the spring to release parking brake. For further information on the brake circuit, see the section **Service Brake** 1800 SRM 1038.

The reducer valve for the pilot is set at 5 MPa (725 psi) and controls the pressure and supply of hydraulic oil to pilot circuits for remote control valves for lift, tilt, and auxiliary. See Figure 2. The setting can be checked at check port MPLT.

MAIN CONTROL VALVE, SECTION 2 OF HYDRAULIC PLATE

Description

The main control valve controls the operation of the lift (2 sections), tilt and auxiliary cylinders. See Figure 3. The main control valve is fastened to a plate in the frame. The valve is also divided into a lift/tilt section, lift section and auxiliary section. Every section has it's own primary relief valve, set on 23.5 MPa (3410 psi). The tilt section has an impact relief valve, set on 25 MPa (3625 psi), which is activated during contact and opens a tank line to allow the mast to tilt backward.

Each section of the valve has a spool and valve body. On the fork lift truck, the control spools for the tilt and auxiliary are the same, however a different type of spool is used in the lift section of the valve. All spools have metering notches to improve the control of oil flow. When a lever is operated, a pilot pressure is generated and activates the end of a spool. Each spool has springs that return the spool to the **NEUTRAL** position as soon as the control lever is released. The spring package is different in every section.

Operation

The main control valve controls the lift, tilt, and auxiliary functions. In these valves, the spools can be operated without preventing the flow of oil to the other spools.

The two-spool section (tilt/lift section) of the main control valve receives oil from the flow amplifier of the steering system. The single spool (lift section) receives oil directly from the hydraulic pump (tandem).

The main control valve has four passages through each section. When the spools are in the **NEUTRAL** position, the oil flows through the open-center passage and returns to the hydraulic tank. A spool makes a restriction in the open-center passage when the spool is moved from the **NEUTRAL** position. This restriction causes an increase in pressure in the parallel passage. This passage is common to all sections of the valve, but oil cannot flow freely through it. The pressure in the parallel passage causes the oil to flow through the check valve into a supply cavity in the valve body. The spool opens a path from the supply cavity to the hydraulic cylinders to do work, and also opens the tank line.

Auxiliary Section

The single spool control valve will, depending on the function selected by the operator, cause either output Aux A or output Aux B to supply hydraulic oil to carriage/attachment. When output Aux A supplies the oil, the solenoid valve provides the return to hydraulic tank. When output Aux B supplies the oil, the solenoid valve provides the return to the tank. When no function is selected by the operator, both solenoid valves provide return to hydraulic tank. Oil that is not used to operate auxiliary functions is added to the flow of the lift functions. The pressure of the oil of the single spool main control valve can be checked at check port MP.

Tilt Section

Each port in the tilt section of the single spool control valve is connected to the tilt cylinders. When the spool is moved to the forward tilting position, the spool makes a restriction in the open-center passage. The increased pressure in the parallel passage causes oil to flow to the tilt cylinders and pressure to the impact relief valve. The impact relief valve is set on 25 MPa (3625 psi) and will be activated during contact. This allows the operator to tilt the mast backwards. When the spool is in the backward tilting position, the spool opens the paths from the tilt cylinders to the hydraulic tank. Tilt lock relief valves prevents the mast from tilting forward too fast by keeping some back pressure at the rod ends of the tilt cylinders. The pressure of the oil of the two-spool main control valve can be checked at check port M3.

Lift Section

Each port in the lift section of the control valve is connected to the lift cylinders. The main control valve has two lift sections, and will not start together. One section is delayed. See Figure 3. When the spool is moved to the **LIFT** position, the spool makes a restriction in the open-center passage. The increases pressure in the parallel passage causes oil to flow through the check valve to the supply cavity. When the spool is in the **LOWER** position, the spool opens the paths from the lift cylinders to the drain cavity. The maximum **LOWER** speed is controlled by the lower control valves in the lift cylinders. Oil from the pump can flow through the open-center passage when the spool is in the **LOWER** position or the **NEUTRAL** position. The **NEUTRAL** position of the spool closes the passages to the ports for the lift cylinders.

The pressure of the oil of the single spool main control valve can be checked at check port M2.

RETURN MANIFOLD, SECTION 3 OF HYDRAULIC PLATE

The return manifold regulates and directs the flow of oil from all components to the hydraulic plate and the cab manifold to the hydraulic tank, except cooling flow of the brakes. See Figure 3.

Two hydraulic lines are connected from the return manifold to the hydraulic tank. Oil from the manifold returns through two filters (10 micron) with a maximum pressure of 300 kPa (43.5 psi) to the hydraulic tank.

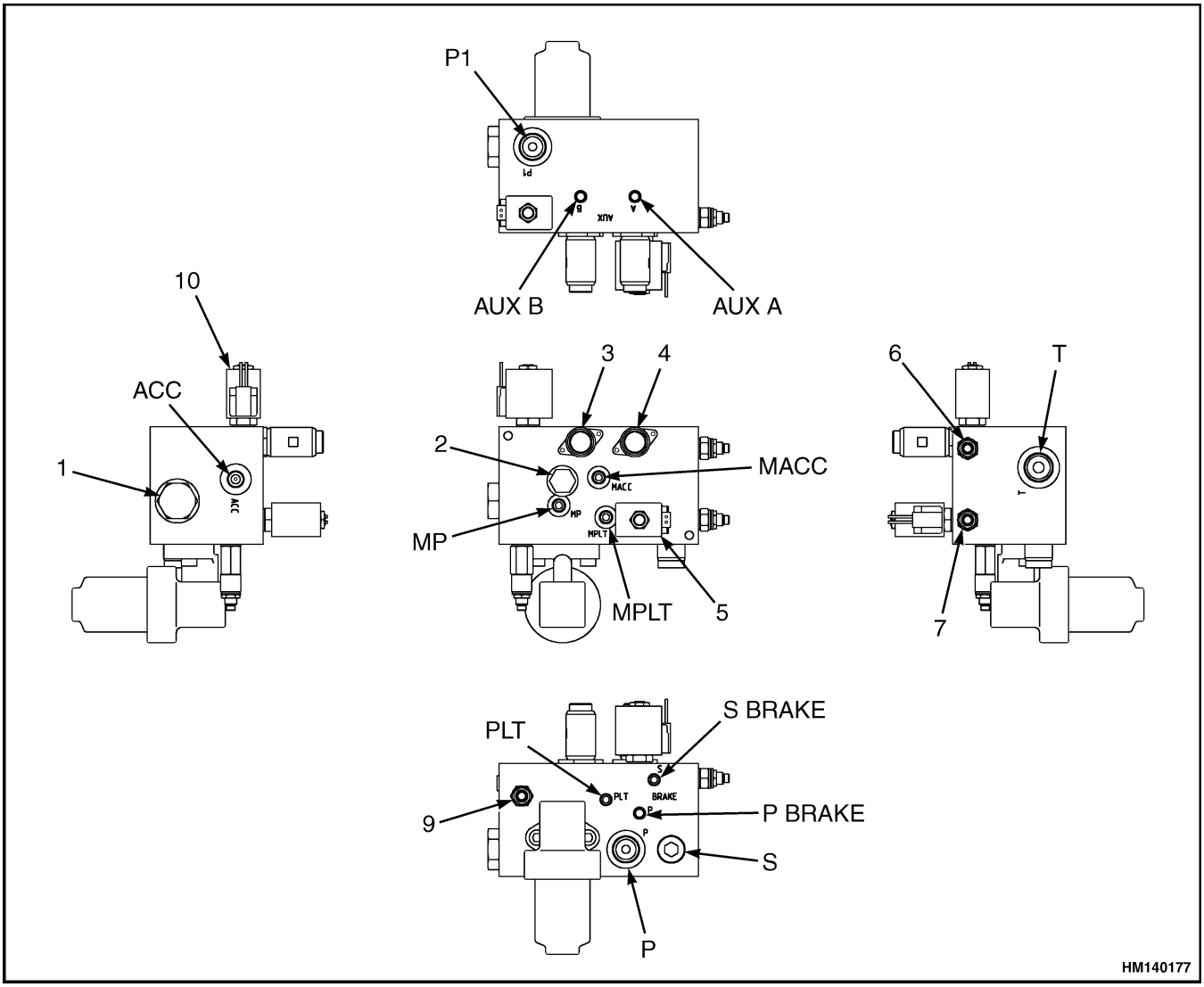


Figure 2. Manifold

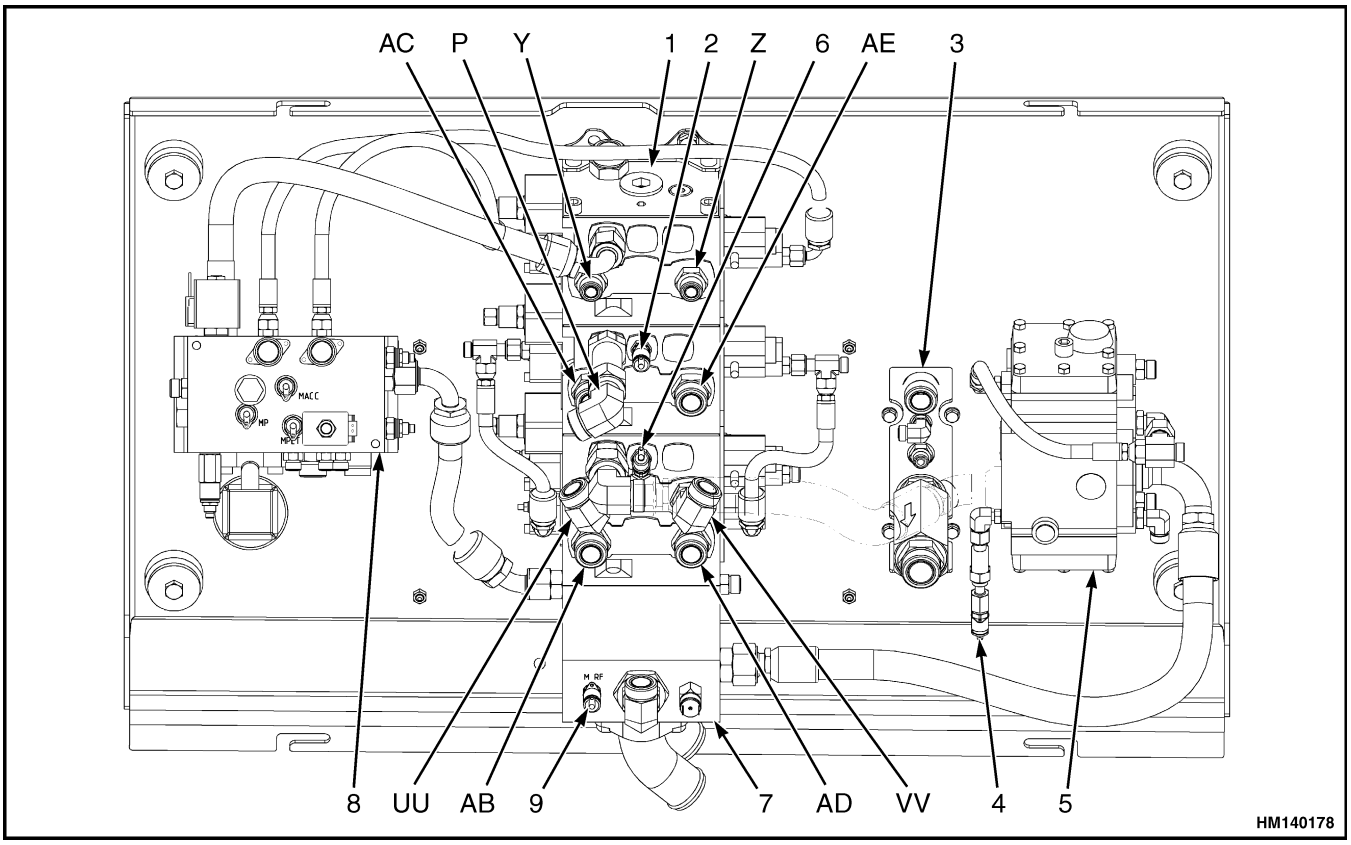
Legend for Figure 2

NOTE: THE FOLLOWING TABLE INDICATES HYDRAULIC CONNECTIONS TO/FROM THE MANIFOLD. LETTERING IN PARENTHESIS INDICATES LOCATION AND IS STAMPED ON MANIFOLD.

Hydraulic Line Connections			
Location	**Connection**	**Location**	**Connection**
ACC	To/From Accumulator	P1	Pump Supply to Single Spool Control Valve (oil supply for auxiliary functions)
Aux A	To Single Spool Control Valve (pilot pressure for auxiliary functions)	P Brake	Park Brake Pressure Supply To Brake Manifold
Aux B	To Single Spool Control Valve (pilot pressure for auxiliary functions)	S Brake	Service Brake Pressure Supply To Cab Manifold
P	Pump Supply From Gear Pump	T	To Return Manifold
PLT	Pilot Supply To cab manifold (lift/tilt control lever)		

NOTE: ITEMS 1 THROUGH 10 ARE VALVES, MEASUREMENT PORTS, AND PRESSURE SWITCHES. NUMBERS IN PARENTHESIS INDICATE LOCATION AND ARE STAMPED ON MANIFOLD.

Item	Description	Stamping on Manifold
1	6.9 Pressure Maintaining Valve	(1.02)
2	Check Valve	(1.09)
3	3-way Directional Control Valve	(1.15)
4	3-way Directional Control Valve	(1.16)
5	3-way Directional Control Valve	(1.14)
6	Pilot Reducing Valve	(1.13)
7	Brake Reducing Valve	(1.12)
8	Main Relief Valve	(1.04)
9	Charger Valve	(1.10)
10	Accumulator Charge Disabling Solenoid	(1.11)
MACC	Check Port MACC for Accumulator Pressure	M ACC
MP	Check Port MP for Pump Pressure	M P
MPLT	Check Port MPLT for Pilot Pressure	M PLT



Main Control Valve Connections		
Line	**Connection**	**Function**
(AB)	To Lift/Tilt Manifold	Lift/Lower
(AC)	To Lift/Tilt Manifold	Lift/Lower
(AD)	To Lift/Tilt Manifold	Lift/Lower
(AE)	To Lift/Tilt Manifold	Lift/Lower
(UU)	To Lift/Tilt Manifold	Tilt
(VV)	To Lift/Tilt Manifold	Tilt
(Y)	To Lift/Tilt Manifold	Auxiliary
(Z)	To Lift/Tilt Manifold	Auxiliary
(P)	From Gear Pump	Oil Supply

1. MAIN CONTROL VALVE
2. CHECK PORT M2
3. BRAKE MANIFOLD
4. CHECK PORT M1
5. FLOW AMPLIFIER
6. CHECK PORT M3
7. RETURN MANIFOLD
8. MAIN MANIFOLD
9. CHECK PORT M RF

Figure 3. Hydraulic Plate Layout

BRAKE MANIFOLD, SECTION 4 OF HYDRAULIC PLATE

The brake manifold regulates and directs the flow of oil for the brake cooling circuit, service brake, and parking brake.

Cooling Circuit

Cooling oil for the oil-cooled brakes comes from the cover end 48 cm^3 (2.94 $in.^3$) tri-section pump. This oil flows through the thermostatic bypass valve to the service brakes at each drive wheel. If the oil is above 70°C (158°F), the valve will direct the oil through the air-to-oil heat exchanger before it goes to the brakes. A check valve keeps the pressure in the brake assemblies to less than 140 kPa (20 psi). Oil from the brakes returns through a filter (20 micron), with a 35 kPa (5 psi) bypass, to the hydraulic tank.

Service Brake

Oil for activating the service brake comes from the cab manifold. The service brake pedal (treadle valve) controls the pressure of the oil to the service brake piston at each drive wheel.

The pressure of the hydraulic oil supplied to the brake manifold can be checked at check port MSB4, integrated in the cab manifold.

The hydraulic line also functions as a return line when the brake treadle is not operated. Oil flows back through the brake treadle and return manifold to the hydraulic tank.

Parking Brake

Oil for releasing the parking brake comes from the main manifold.

An electrical signal triggers the parking brake valve. The parking brake valve position changes, and oil pressure in the parking brake cylinder is relieved. The spring pressure automatically applies the brake if the system loses oil pressure.

FLOW AMPLIFIER, SECTION 5 OF HYDRAULIC PLATE

The flow amplifier regulates and directs flow of oil to the steering cylinder. See Figure 3 and Hydraulic Schematic. The flow amplifier increases oil flow five times more than pilot input flow from steering control unit. The rate of oil flow to steering cylinder is directly proportional to rate of pilot flow from steering control unit. The flow amplifier receives oil from the, 132.5 cm^3 (8.09 $in.^3$), per revolution pump. When there is no steering demand, the priority valve in the flow amplifier allows oil to flow from pump to main control valve. The pressure of hydraulic oil supplied to amplifier can be checked at check port M7. For further information, see the section **Steering System** 1600 SRM 1109.

Manifold, Section 1 of Hydraulic Plate

GENERAL

All pressure switches, valves, and other associated items installed on the manifold can be replaced. Before removal of any part, check that the area is clean and protected against dirt and fluid contamination.

NOTE: It is not necessary to remove the manifold to replace manifold components. Only remove the manifold from the mounting plate when the whole component is to be replaced.

WARNING

Never work under a raised carriage or forks. Lower the carriage or use blocks and chains on the mast weldments and carriage so that they cannot move. Verify the moving parts are attached to parts that do not move.

Some parts have compressed springs under them that can have enough force to cause damage or injury. Always use caution and wear eye protection when removing parts.

Before removing any hydraulic components or disconnecting any hydraulic lines, release the hydraulic pressure from the hydraulic circuit as follows:

- **Shut engine OFF and completely lower carriage. Install blocks at wheels to prevent lift truck from moving.**
- **Release the accumulator pressure by operating the brake pedal.**

The manifold (see)Figure 2 is an integral part of the Hydraulic Plate. For more information on the repairs to all parts of the Hydraulic Plate, see the section **Hydraulic System** 1900 SRM 1239.

VALVES AND PRESSURE SWITCHES

WARNING

Cleaning solvents can be flammable and toxic. Cleaning solvents can also cause skin irritation. When using cleaning solvents, always follow the solvent manufacturer's recommended safety precautions.

NOTE: Only use plugs that have been cleaned in solvent.

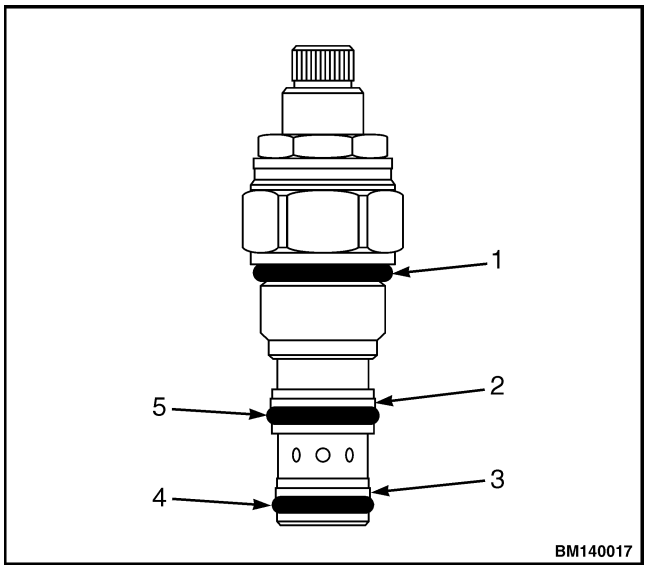
NOTE: In the event that seals are missing, check manifold for missing seals and remove.

NOTE: Cartridge valves and switches are not field-serviceable with exception of external seals and electrical solenoids. In event of a defective component, completely replace valve of switch.

NOTE: Check manifold for cracks. If there are cracks in manifold, the manifold should be replaced.

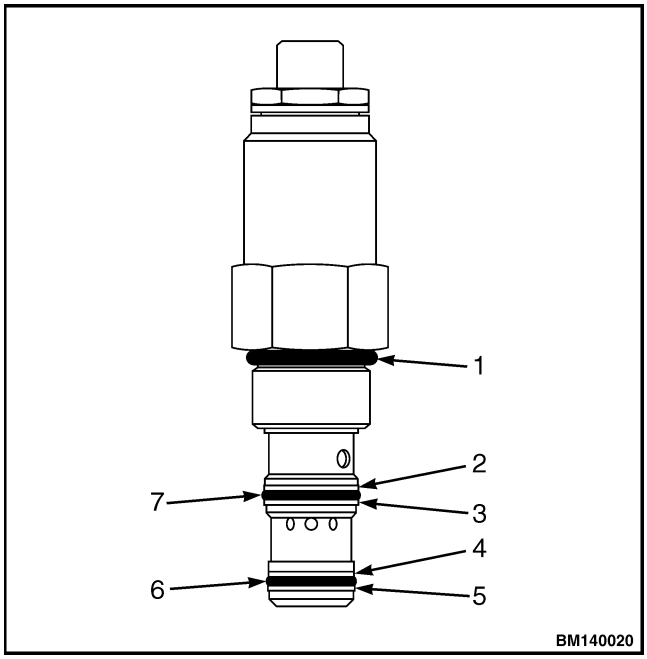
The valves and pressure switch seals are serviceable parts of the manifold. Use the following procedures for repair:

1. Unscrew the cartridge valve of switch from manifold.
2. Check that all seals are attached to cartridge valve or switch.
3. Install a temporary plug in place of cartridge valve or switch.
4. Clean cartridge valve or switch in solvent and inspect component for damage.
5. Install new seals. For correct order of backup rings and O-rings. See Figure 4, Figure 5, Figure 6, Figure 7, Figure 8, and Figure 9.
6. Lubricate component/valve with clean hydraulic oil before installation.
7. Remove temporary plug.
8. Install and torque component/valve or switch to value listed in Torque Values.



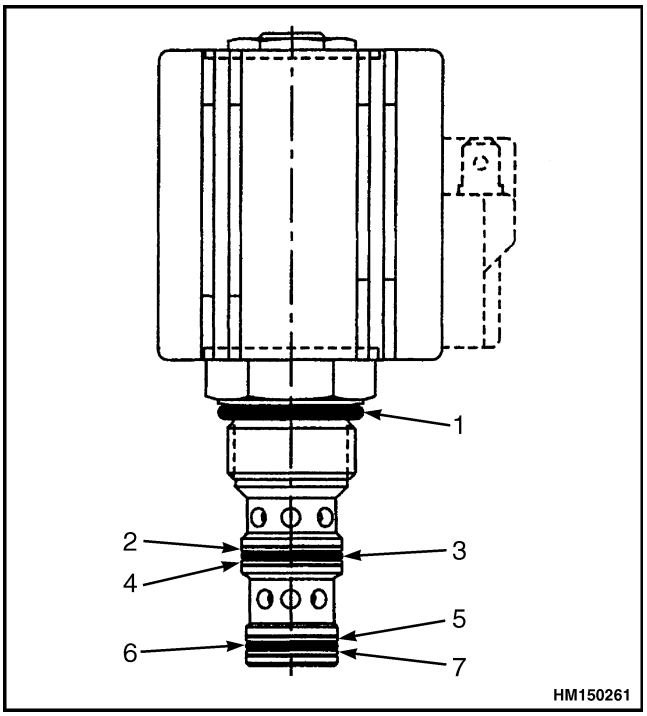
1. O-RING
2. BACKUP RING
3. BACKUP RING
4. O-RING
5. O-RING

Figure 4. Reducing Valve Cartridge (1.12/1.13)



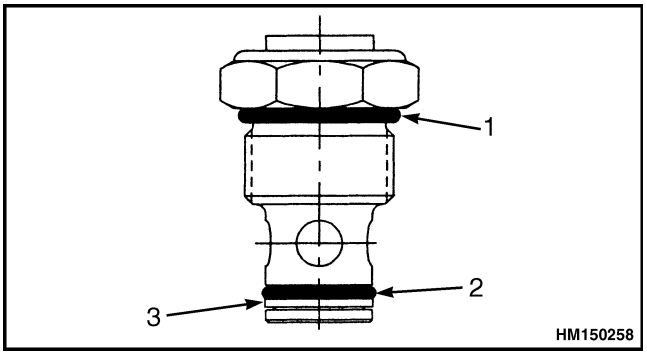
1. O-RING
2. BACKUP RING
3. BACKUP RING
4. BACKUP RING
5. BACKUP RING
6. O-RING
7. O-RING

Figure 5. Charger Valve Cartridge (1.10)



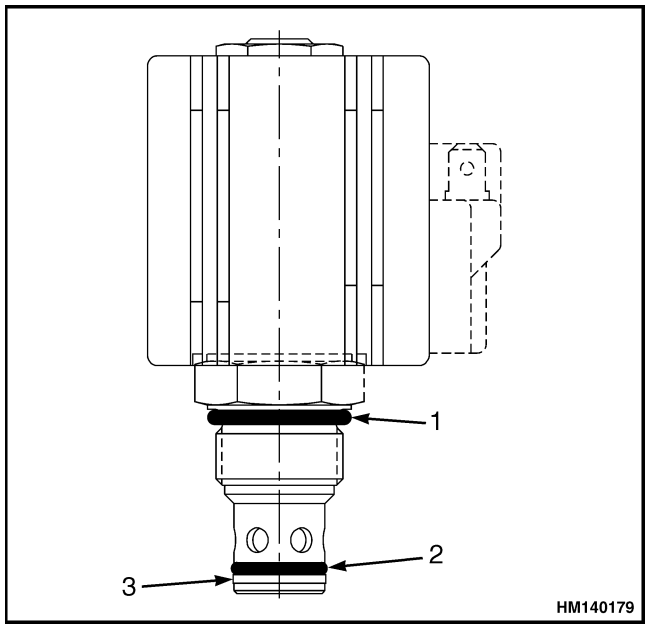
1. O-RING
2. BACKUP RING
3. O-RING
4. BACKUP RING
5. BACKUP RING
6. O-RING
7. BACKUP RING

Figure 6. Solenoid Control Valve Cartridge (1.14)



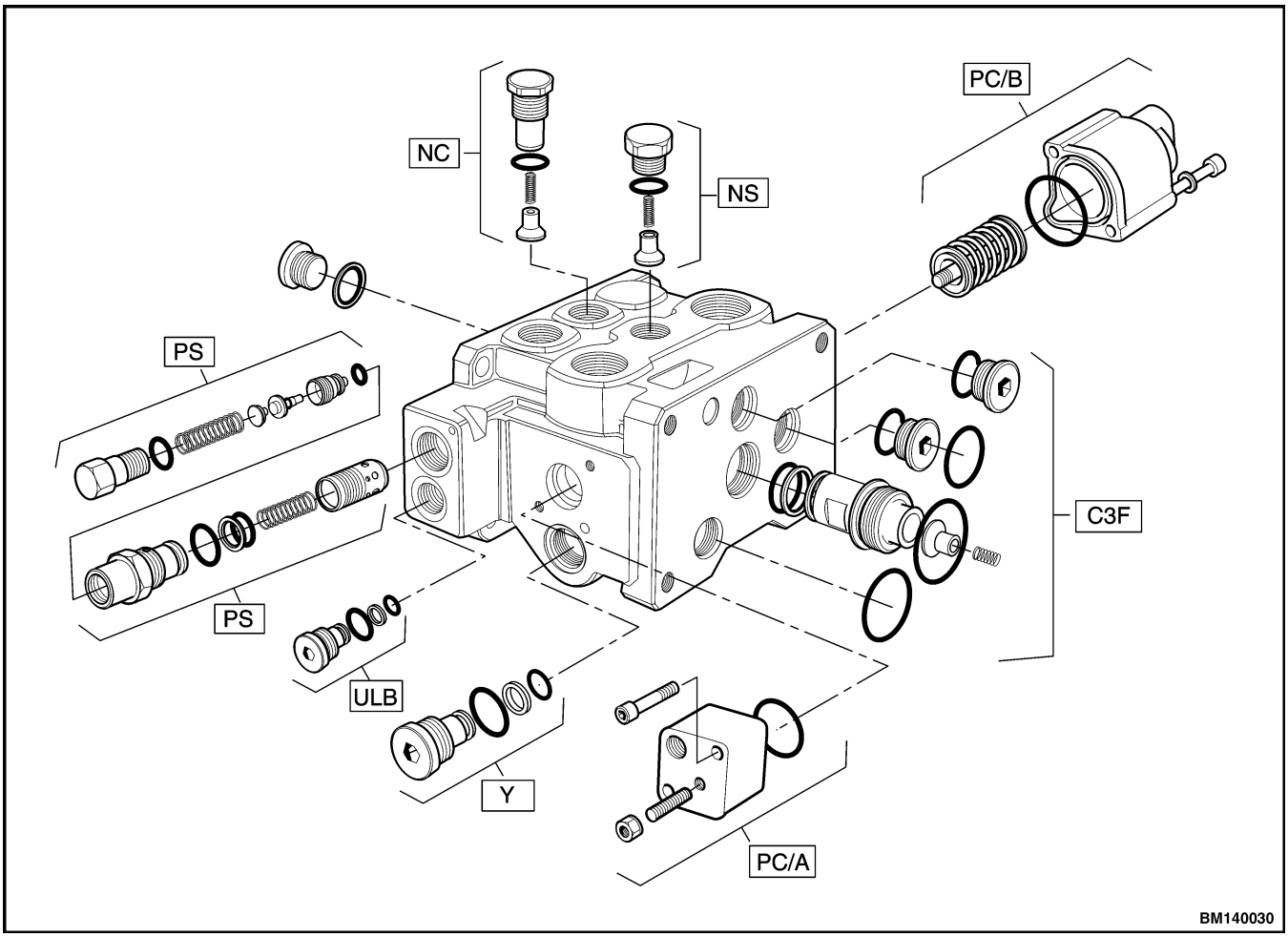
1. O-RING
2. O-RING
3. BACKUP RING

Figure 7. Check Valve Cartridge (1.09)



1. O-RING
2. O-RING
3. BACKUP RING

Figure 8. Accumulator Charge Disabling Solenoid Cartridge (1.11)



NC	Check Valve, Common	PC/A	Spool Actuator
NS	Check Valve, Section	Y	Plug, Relief Cavity
PC/B	Spool Actuator	ULB	Plug, Unloading Cavity
C3F	Flange Kit	PS	Main Relief Valve

Figure 9. Main Control Valve Section (Single Spool for Auxiliary)

Main Control Valve, Section 2 of Hydraulic Plate

REMOVE

WARNING

Lower carriage completely before working on control valve or hydraulic system.

Do not work under a raised carriage. Put mast in a vertical position and lower carriage completely before disconnecting any parts of hydraulic system. The mast can lower suddenly and cause injury if the carriage is not lowered. This procedure will make sure that the carriage cannot lower suddenly and cause injury or death.

Proceed as follows:

1. Place the lift truck on a solid, even, and level surface.
2. Shut down the engine.
3. Put blocks on both sides (front and back) of the tires to prevent movement of the lift truck.
4. Turn the key switch to the **ON** position.

WARNING

Apply brake pedal 10 to 20 times until accumulated hydraulic brake pressure is released.

5. Turn the key switch to the **OFF** position.
6. Close shutoff valves on the bottom of the tank.
7. Remove the cover on the topside of the frame.
8. Tag and disconnect electric wires at spools of control valve.
9. Put tags for identification on hydraulic lines. Disconnect the hydraulic lines from the main control valve. Keep the end of the hose above the hydraulic tank until a plug is installed in the hose. Put caps on the open lines, ports, or other connectors.

NOTE: Only remove the main control valve from mounting plate when part to be repaired is not accessible. Disassemble main control valve as necessary for repairs. Most repairs are for replacement of O-rings.

10. Remove the four bolts that fasten the main control valve on the hydraulic plate.

WARNING

The main control valve weighs approximately 65 kg (145 lb) and can cause serious injury if the control valve is not lifted properly or falls. Verify that the main control valve has proper support before removing the mounting bolts. Use a lifting device to remove the main control valve, and verify that the main control valve is secure and cannot fall out of the lifting device.

11. Remove the control valve from the hydraulic plate.

DISASSEMBLE

1. To remove a spool, remove end cap from valve section. Carefully pull spool from valve section. Keep the spring package together. Put tags on spools that are removed. Spools must be installed in the sections from which they are removed.
2. Remove seal retainer for top of spool. Remove O-rings and wipers from both ends of the section of the valve and spring packages.

NOTE: The main control valve is divided into a lift/tilt section, lift section, and auxiliary section. Each section has a different spool or spools, and spring packages.

3. Remove auxiliary section, lift section, and lift/tilt section as follows:

Auxiliary Section

CAUTION

Make sure to protect machined surfaces for O-rings when the sections are separated. Small defects can cause leaks.

1. Place the main control valve on a clean and level surface.
2. Loosen the four nuts. See Figure 10.
3. Carefully remove the four nuts and bolts.
4. Carefully slide the auxiliary section from the lift section.

5. Remove O-rings installed between the auxiliary section and lift section.

Lift Section

CAUTION

Make sure to protect machined surfaces for O-rings when the sections are separated. Small defects can cause leaks.

1. Place the main control valve on a clean and level surface.
2. Disassemble the auxiliary section. See Auxiliary Section.
3. Loosen the four nuts. See Figure 10 and Figure 11.
4. Carefully remove the four nuts and bolts.
5. Carefully slide the lift section from the lift/tilt section.
6. Remove O-rings installed between the lift section and lift/tilt section.

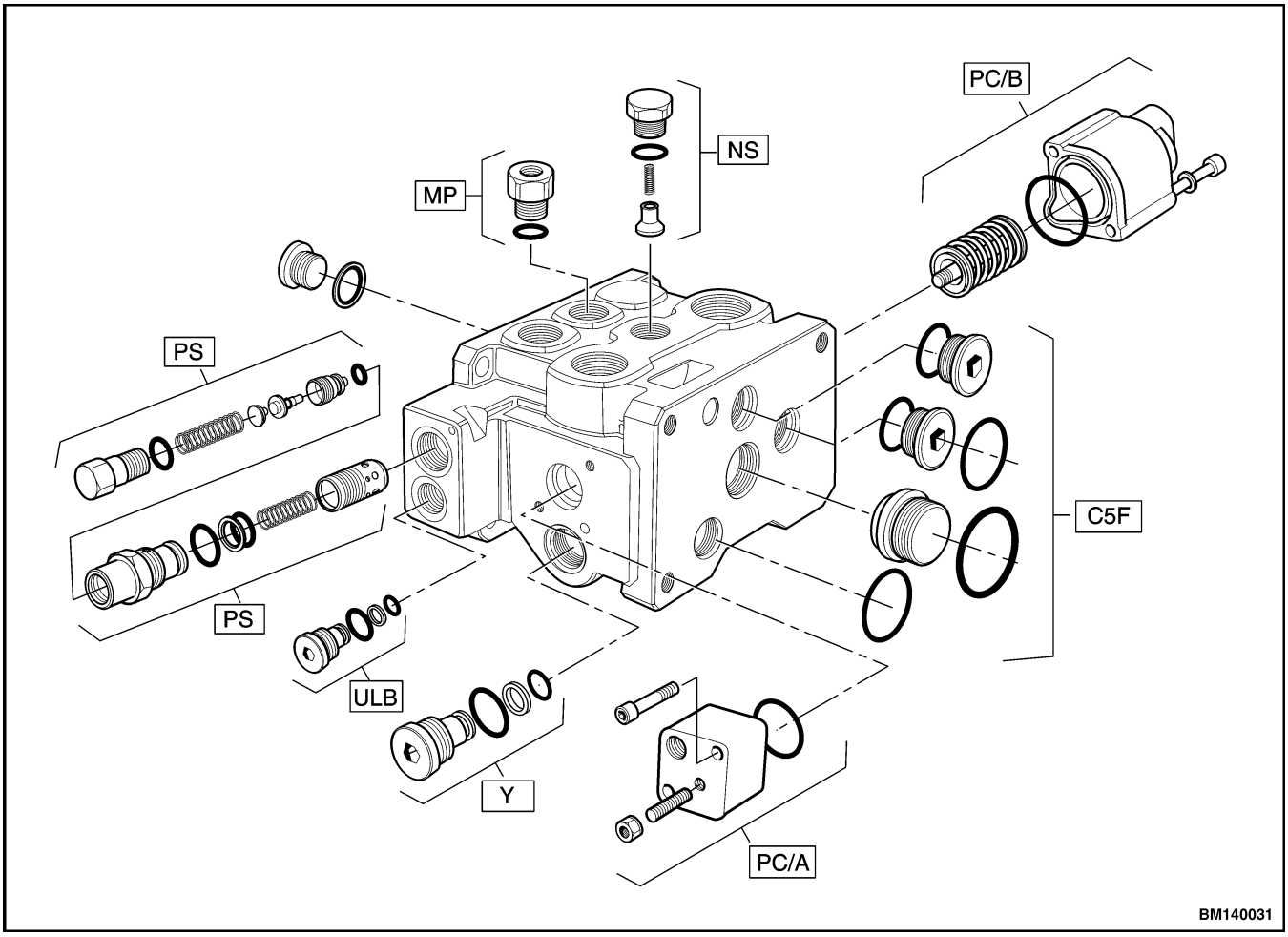


Figure 10. Main Control Valve Section (Single Spool for Lift)

Legend for Figure 10

NS	Check Valve, Section	PC/A	Spool Actuator
MP	Check Valve, Check Port	Y	Plug, Relief Cavity
PC/B	Spool Actuator	ULB	Plug, Unloading Cavity
C5F	Flange Kit	PS	Main Relief Valve

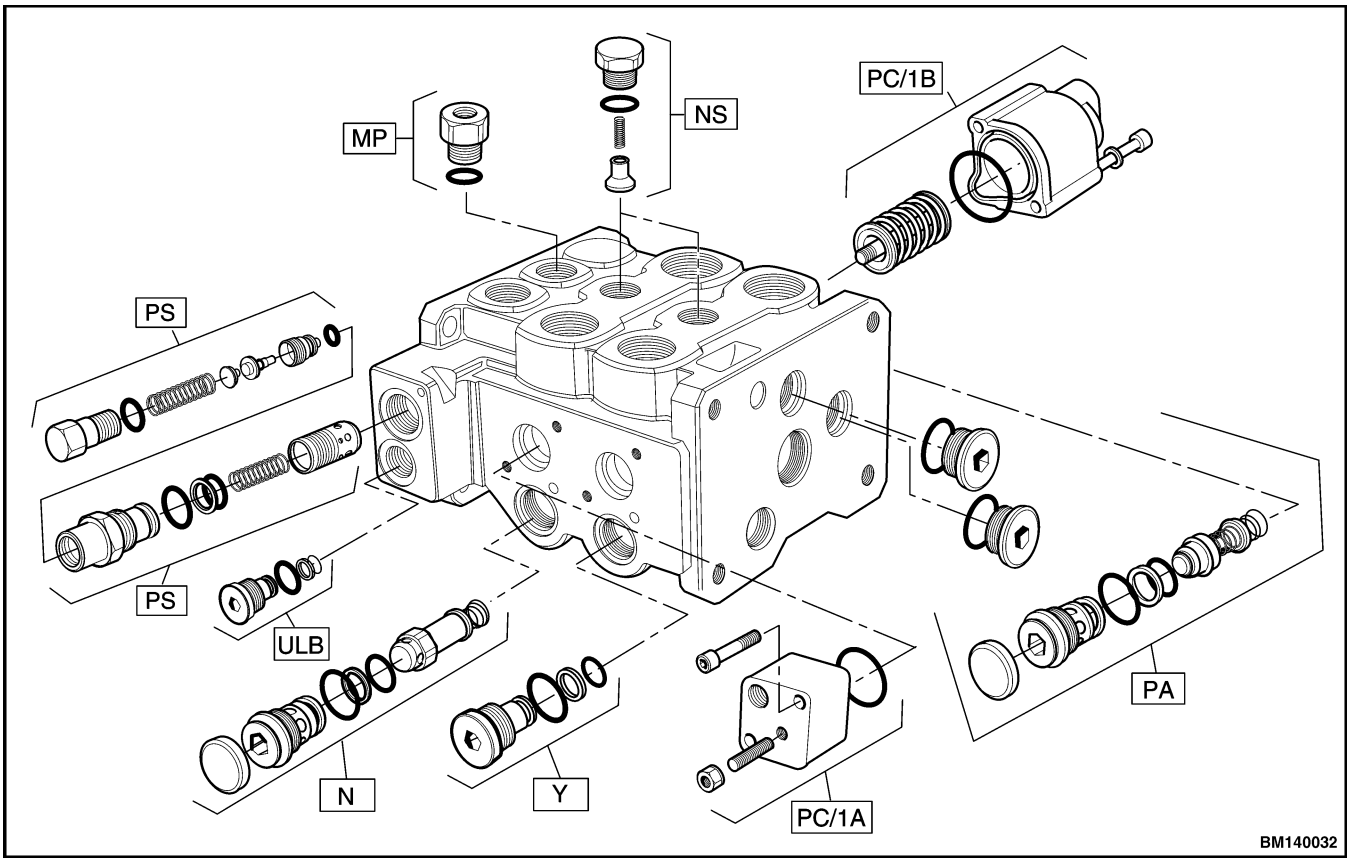
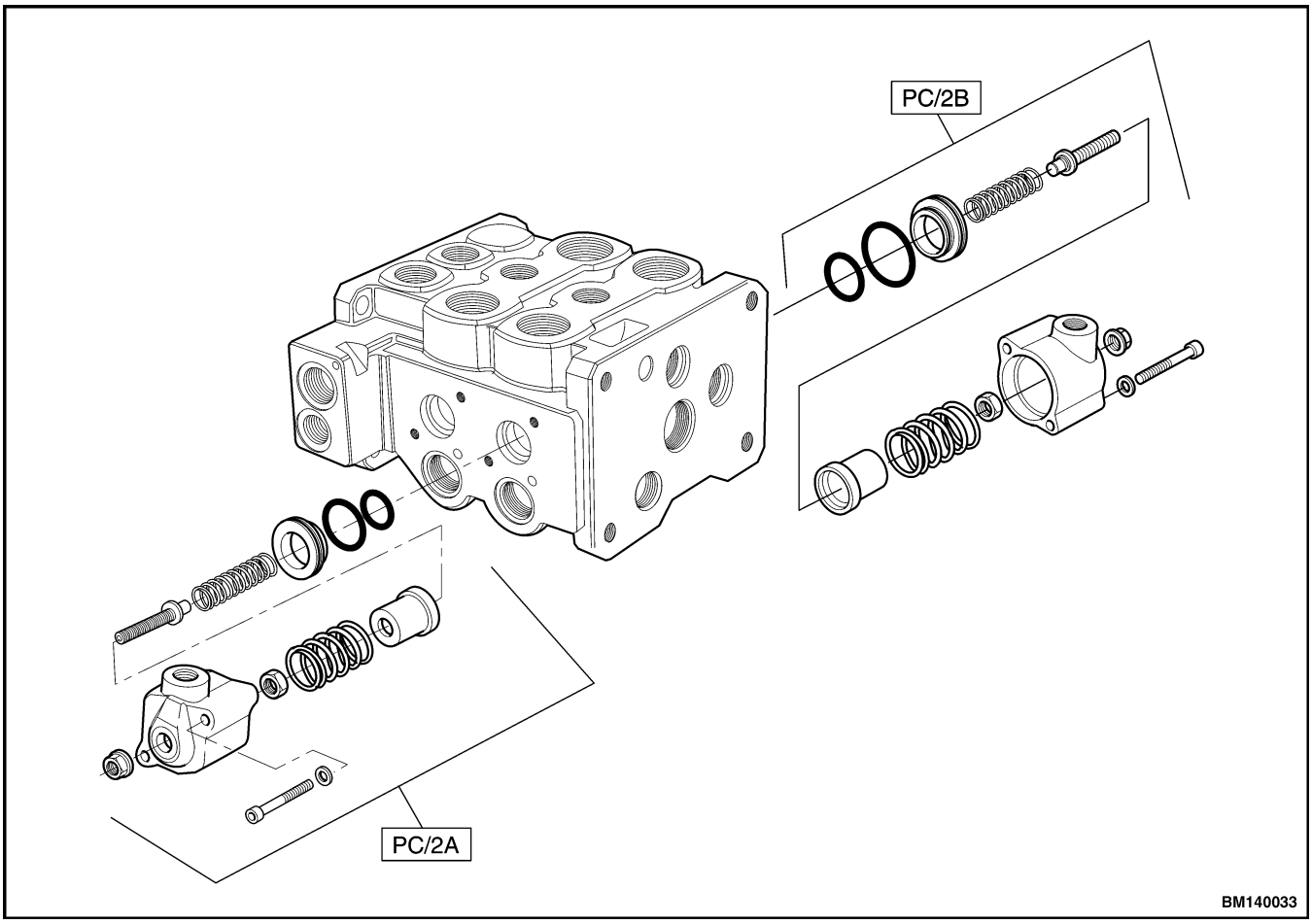


Figure 11. Main Control Valve Section (Two-Spool for Tilt/Lift) (Sheet 1 of 2)



MP	Check Valve, Check Port	PA	Plug, Relief Valve
NS	Check Valve, Section	ULB	Plug, Unloading Cavity
PC/1B	Spool Actuator	PS	Main Relief Valve
N	Check Valve, Anti-cavitation	PC/2B	Spool Actuator
PC/1A	Spool Actuator	PC/2A	Spool Actuator
Y	Plug, Relief Cavity		

Figure 11. Main Control Valve Section (Two-Spool for Tilt/Lift) (Sheet 2 of 2)

Lift/Tilt Section

CAUTION

Make sure to protect machined surfaces for O-rings when the sections are separated. Small defects can cause leaks.

1. Place the main control valve on a clean and level surface.
2. Loosen the four nuts. See Figure 10 and Figure 11.
3. Carefully remove the four nuts and bolts.
4. Carefully slide the lift/tilt section from the lift section.
5. Remove O-rings installed between the lift section and lift/tilt section.

NOTE: Do not try to repair a relief valve. Replace the relief valve if it is damaged or cannot be properly adjusted.

NOTE: For the spool designation, each spool has a imprinted letter code to facilitate identification during tuning or servicing the field.

CLEAN AND INSPECT

WARNING

Cleaning solvents can be flammable and toxic and can cause skin irritation. When using cleaning solvents, always follow the solvent manufacturer's recommended safety precautions.

Compressed air can move particles and cause injury to the user or to other personnel. Make sure compressed air path is away from all personnel. Wear eye protection.

1. Clean all parts of control valve with solvent. Carefully dry parts with compressed air.
2. Check spools and bores for defects. If a spool or bore has damage, replace valve section that has the damaged part or parts. Make sure that bores and grooves for O-rings are smooth and do not have dirt or defects.
3. Check the check valves and relief valves for damage. Replace valves as necessary.

ASSEMBLE

Auxiliary Section

CAUTION

Before installing parts in valve body, make sure all parts are clean. Replace all seals and O-rings. Lubricate all parts with clean hydraulic oil during assembly.

CAUTION

Verify that nuts and bolts torque specifications are to the values listed. Incorrect torque values may cause a malfunction of the spools.

1. Install new seals in bore in each section. See Figure 10.
2. Install new O-rings between sections.
3. Install check valves.

CAUTION

When positioning the sections, do not damage the O-rings.

4. Carefully position the auxiliary section in line with the lift section.
5. Install nuts, finger tight, on the four bolts.
6. Torque the four nuts to 80 N•m (59 lbf ft).
7. Install springs.
8. Lubricate spools with clean hydraulic oil. Make sure that dirt does not get on any of the parts. Carefully install spools in valve body. Make sure that spools move freely in bores. Install seal retainers and end caps.

Lift Section

CAUTION

Before installing parts in valve body, make sure all parts are clean. Replace all seals and O-rings. Lubricate all parts with clean hydraulic oil during assembly.

CAUTION

Verify that bolt torque specifications are to the values listed. Incorrect torque values may cause a malfunction of the spools.

1. Install new seals in bore in each section. See Figure 10.
2. Install new O-rings between sections.
3. Install check valves.

CAUTION

When positioning the sections, do not damage the O-rings.

4. Carefully position the lift section in line with the lift/tilt section.
5. Install nuts, finger tight, on the four bolts.
6. Torque the four nuts to 80 N•m (59 lbf ft).