

# SERVICE

# MANUAL

## **MST SERIES**

### **RUBBER CRAWLER CARRIER**

MACHINE MODEL	SERIAL No.
MST-500	50101 and up
MST-600	1601 and up
MST-700	70101 and up
MST-800	866 and up
MST-1100	M01101 and up
MST-1100	K 11101 and up
MST-1500	15001 and up
MST-2000	M02107 and up
MST-2000	K 20101 and up
MST-2200	22001 and up
MST-2500	25101 and up

## **MOROOKA**

## INTRODUCTION

To allow the machine to maintain its performance over a long period, and to prevent breakdowns or trouble before they occur, it is important to carry out suitable operation, maintenance and inspection, troubleshooting, and repair work.

This service manual gives details of the **GENERAL, STRUCTURE AND FUNCTION, TESTING AND ADJUSTING, AND TROUBLESHOOTING** for the machine that are needed to carry out this work; in particular, inspection, troubleshooting, and repair work.

For details of the engine, see the shop manual for engine.

This service manual has been prepared to help you to improve the quality of your repairs by giving correct knowledge of the product and correct methods of repair, and by enabling you to carry out correct judgment.

Please read the contents thoroughly and make good use of them in your work.

We are constantly trying to improve the contents of our service manuals, so if you have any opinions or suggestions about the manual, please do not hesitate to contact us.

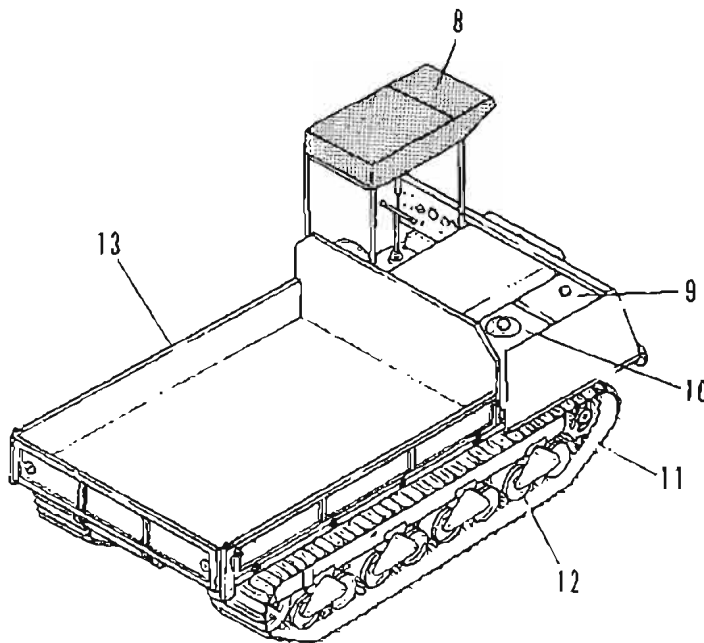
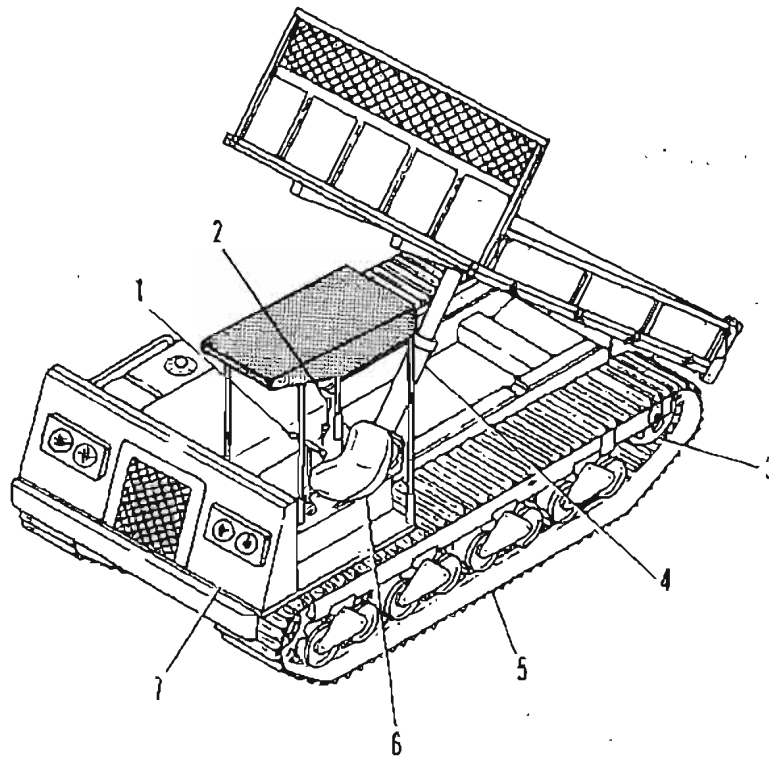
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# 01 GENERAL

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# GENERAL VIEW

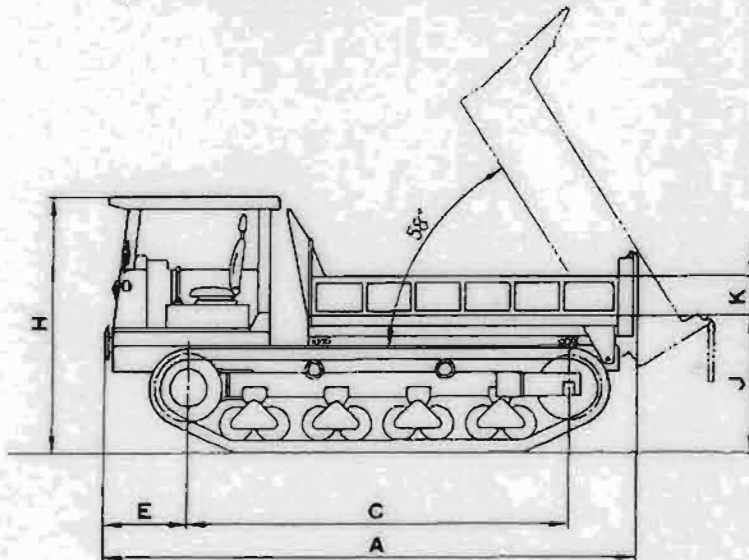
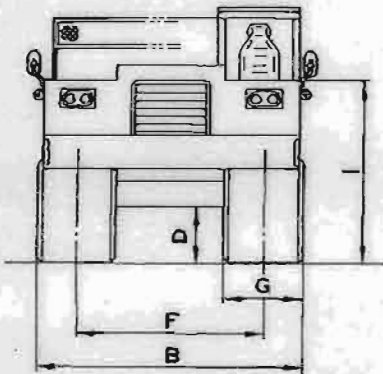
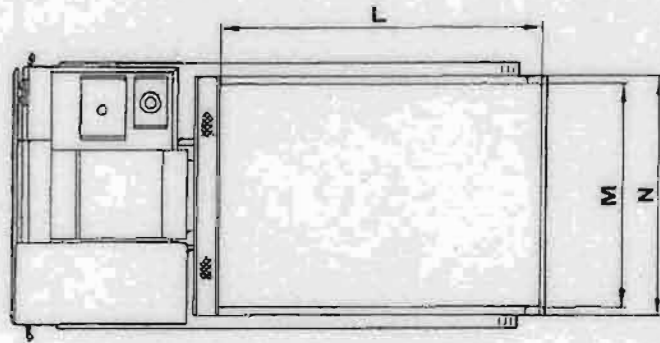


- 1. Travel control lever
- 2. Dump control lever
- 3. Rear idler
- 4. Dump cylinder
- 5. Rubber crawler

- 6. Operator's seat
- 7. Head lamp
- 8. Hood
- 9. Fuel tank
- 10. Hydraulic oil tank

- 11. Drive sprocket
- 12. Track roller
- 13. Carrier

# ASSEMBLY DRAWING



## DIMENSION TABLE

MODEL	MST-500	MST-600		MST-700	MST-800	
Serial No.	50101 and up	1601-2700	2701 and up	70101 and up	868-2500	2501 and up
A	3,600	3,840	3,830	4,200	4,500	4,365
B	1,850	2,000	2,000	2,150	2,300	2,300
C	2,450	2,930	2,930	2,930	3,160	3,130
D	350	355	355	355	440	470
E	500	500	500	500	580	636
F	1,400	1,500	1,500	1,600	1,700	1,700
G	450	500	500	550	600	600
H	2,150	2,200	2,200	2,250	2,300	2,343
I	1,400	1,425	-	1,500	1,550	-
J	900	940	940	1,028	1,140	1,160
K	350	350	350	350	350	350
L	2,150	2,250	2,250	2,550	2,600	2,600
M	1,650	1,700	1,700	1,850	2,000	1,950
N	1,800	1,880	-	1,950	2,100	-

MODEL	MST-1100	MST-1500	MST-2000	MST-2200	MST-2500	
Serial No.	11101 and up	15001 and up	20101 and up	22001 and up	25101 and up	
A	4,875	5,245	5,430	5,850	6,500	
B	2,400	2,500	2,700	2,750	3,000	
C	3,160	3,952	4,136	3,840	4,650	
D	440	530	540	500	600	
E	600	490	840	930	900	
F	1,700	1,800	1,900	2,000	2,100	
G	700	700	800	750	900	
H	2,300	2,440	2,500	2,600	2,700	
I	1,550	1,760	1,800	-	2,000	
J	1,140	1,280	1,350	1,385	1,550	
K	350	350	400	400	450	
L	2,850	3,100	3,400	3,600	4,000	
M	2,100	2,200	2,250	2,450	2,450	
N	2,200	2,300	2,400	-	2,650	

# SPECIFICATIONS

Model		MST-500	MST-600		MST-700
Serial No.		50101 and up	1601 - 2700	2701 and up	70101 and up
Machine weight (kg)		3,890	3,900	3,900	5,210
Performance	Max. loading capacity (kg)	2,500	3,000	3,000	3,500
	Dump body capacity (Struck) (m <sup>3</sup> )	1.2	1.4	1.4	1.5
	Min. turning radius (m)	1.9	2.0	2.0	2.2
	Grade ability (Deg)	35	35	35	35
	Travel speed (km/h)	0 - 11	0 - 12	0 - 12	0 - 10
Dimensions	Overall length (mm)	3,600	3,840	3,840	4,200
	Overall width (mm)	1,850	2,000	2,000	2,150
	Overall height (mm) (To the top of hood)	2,150	2,200	2,200	2,250
	Track gauge (mm)	1,400	1,500	1,500	1,600
	Track shoe width (mm)	450	500	500	550
	Number of links	65	78	78	76
	Link pitch (mm)	100	90	90	100
	Ground pressure (kg/cm <sup>2</sup> ) (Without load)	0.12	0.11	0.11	0.12
	Ground clearance (mm) (To the under surface of cross tube)	350	312	312	355
	Dump body width (mm)	1,600	1,700	1,700	1,850
	Dump body length (mm)	2,150	2,250	2,250	2,550
	Dump body height (mm)	350	350	350	350

MST-800		MST-1100	MST-1100	MST-1500	MST-2000
866 - 2400	2401 and up	M01101 and up	K11101 and up	15001 and up	M02101 and up
5,740	5,740	6,300	6,300	7,500	11,370
4,000	4,000	5,000	5,000	6,000	8,000
1.9	1.9	2.1	2.1	2.4	3.0
2.4	2.4	2.5	2.5	2.7	2.8
35	35	35	35	35	35
0 - 13	0 - 13	0 - 10	0 - 10	0 - 12	0 - 10
4,500	4,500	4,875	4,875	5,245	5,430
2,300	2,300	2,400	2,400	2,500	2,700
2,300	2,300	2,300	2,300	2,440	2,500
1,700	1,700	1,700	1,700	1,800	1,900
600	600	700	700	700	800
80	80	80	80	98	80
100	100	100	100	100	125
0.13	0.13	0.12	0.12	0.12	0.14
440	440	440	440	530	540
2,000	2,000	2,100	2,100	2,200	2,250
2,600	2,600	2,850	2,850	3,100	3,300
350	350	350	350	350	400



# SPECIFICATIONS

Model		MST-2000	MST-2200	MST-2500
Serial No.		K20101 and up	22001 and up	25101 and up
Machine weight (kg)		11,370	12,250	14,500
Performance	Max. loading capacity (kg)	8,000	10,000	10,000
	Dump body capacity (Struck) (m <sup>3</sup> )	3.0	3.52	4.4
	Min. turning radius (m)	2.8	3.23	3.4
	Grade ability (Deg)	35	35	35
	Travel speed (km/h)	0 - 10	0 - 14.5 (low stage)	0 - 12 (two stage)
Dimensions	Overall length (mm)	5,430	5,850	6,500
	Overall width (mm)	2,700	2,928	3,000
	Overall height (mm) (To the top of hood)	2,500	2,600	2,700
	Track gauge (mm)	1,900	2,000	2,100
	Track shoe width (mm)	800	750	900
	Number of links	80	66	80 (Serial No. 25101-25106) 74 (Serial No. 25107 and up)
	Link pitch (mm)	125	150	150
	Ground pressure (kg/cm <sup>2</sup> ) (Without load)	0.14	0.17	0.15
	Ground clearance (mm) (To the under surface of cross tube)	540	500	600
	Dump body width (mm)	2,250	2,450	2,450
	Dump body length (mm)	3,300	3,600	4,000
	Dump body height (mm)	400	400	450

Model		MST-500	MST-600		MST-700
Serial No.		50101 and up	1601 - 2700	2701 and up	70101 and up
Engine	Engine model	KOMATSU 4095L-1	MITSUBISHI 4D31	MITSUBISHI 4D31T	KOMATSU S4D95L-1
	Type	4-cycle, straight vertical, water cooling, direct injection type	4-cycle, straight vertical, water cooling, direct injection type	4-cycle, straight vertical, water cooling, direct injection type, turbocharged	4-cycle, straight vertical, water cooling, direct injection type, turbocharged
	No. of cylinders - bore x stroke (mm)	4 - 95 x 115	4 - 100 x 105	4 - 100 x 105	4 - 95 x 115
	Piston displacement (cc)	3,260	3,298	3,298	3,260
	Flywheel horsepower (HP/rpm)	77/2,800	74/2,800	87/2,800	87/2,500
	Max. torque (kgm/rpm)	22/1,600	21/1,600	28/2,200	29/1,600
	Fuel consumption ratio (g/PSH)	164	170	158	155
	Starting motor	24V, 2.8kW	24V, 3.2kW	24V, 3.2kW	24V, 2.8kW
	Alternator	24V, 15A	24V, 25A	24V, 25A	24V, 15A
Battery	12V, 70Ah x 2	12V, 100Ah x 2	12V, 100Ah x 2	12V, 100Ah x 2	
Power train	Type	HST	HST	HST	HST
	Main pump: Delivery (cc/rev)	43.0	51.6	51.6	51.6
	Max. hydraulic pressure (kg/cm <sup>2</sup> )	280	315	315	350
	Brake system	Service/parking	Service/parking	Service/parking	Service/parking
	Caution pressure of hydraulic charging (kg/cm <sup>2</sup> )	Max. 9.5	Max. 9.5	Max. 9.5	Max. 9.5
Work equipment hydraulic system	Charging pump: Delivery (cc/rev)	20.5	20.0	20.0	20.0
	Max hydraulic pressure (kg/cm <sup>2</sup> )	175	175	165	175
	Dump control valve	Single-train spool	Single-train spool	Single-train spool	Single-train spool
	Dump cylinder	Double-acting, piston type x 1	Double-acting, piston type x 1	Double-acting, piston type x 1	Double-acting, piston type x 2
	Cylinder stroke	600	600	600	600
	Cylinder bore	90	90	90	90
	Piston rod O.D.	45	45	45	45

Model		MST-800		MST-1100	MST-1100
Serial No.		866 - 2400	2401 and up	M01101 and up	K11101 and up
Engine	Engine model	MITSUBISHI 4D31T	MITSUBISHI 4D34T	MITSUBISHI 6D14	KOMATSU S6D95L-1
	Type	4-cycle, straight vertical, water cooling, direct injection type, turbocharged	4-cycle, straight vertical, water cooling, direct injection type, turbocharged	4-cycle, straight vertical, water cooling, direct injection type	4-cycle, straight vertical, water cooling, direct injection type, turbocharged
	No. of cylinders - bore x stroke (mm)	4 - 100 x 105	4 - 104 x 115	6 - 110 x 115	6 - 95 x 115
	Piston displacement (cc)	3,298	3,907	6,557	4,890
	Flywheel horsepower (HP/rpm)	99/3,000	114/3,000	116/2,500	132/2,500
	Max. torque (kgm/rpm)	28/2,100	33/1,800	39/1,600	45/1,600
	Fuel consumption ratio (g/PSH)	160	162	170	155
	Starting motor	24V, 3.2kW	24V, 5.0kW	24V, 4.5kW	24V, 5.6kW
	Alternator	24V, 26A	24V, 30A	24V, 30A	24V, 15A
Battery	12V, 100Ah x 2	12V, 100Ah x 2	12V, 100Ah x 2	12V, 100Ah x 2	
Power train	Type	HST	HST	HST	HST
	Main pump: Delivery (cc/rev)	51.6	51.6	51.6	51.6
	Max. hydraulic pressure (kg/cm <sup>2</sup> )	350	350	385	385
	Brake system	Service/parking	Service/parking	Service/parking	Service/parking
Caution pressure of hydraulic charging (kg/cm <sup>2</sup> )	Max. 9.5	Max. 9.5	Max. 9.5	Max. 9.5	
Work equipment hydraulic system	Charging pump: Delivery (cc/rev)	20.0	20.0	20.0	20.0
	Max. hydraulic pressure (kg/cm <sup>2</sup> )	165	165	165	165
	Dump control valve	Single-train spool	Single-train spool	Single-train spool	Single-train spool
	Dump cylinder	Double-acting, piston type x 2	Double-acting, piston type x 2	Double-acting, piston type x 2	Double-acting, piston type x 2
	Cylinder stroke	600	600	710	710
	Cylinder bore	90	90	100	100
	Piston rod O.D.	45	45	60	60

MST-1500	MST-2000	MST-2000	MST-2200	MST-2500
15001 and up	M02101 and up	K20101 and up	22001 and up	25101 and up
MITSUBISHI 6D14T	MITSUBISHI 6D16T	KOMATSU SA6D110-1	CATERPILAR 3306DIT	MITSUBISHI 6D22T
4-cycle, straight vertical, water cooling, direct injection type, turbocharged	4-cycle, straight vertical, water cooling, direct injection type, turbocharged	4-cycle, straight vertical, water cooling, direct injection type, turbocharged	4-cycle, straight vertical, water cooling, direct injection type, turbocharged	4-cycle, straight vertical, water cooling, direct injection type, turbocharged
6 - 95 x 115	6 - 118 x 115	6 - 110 x 125	6 - 121 x 152	6 - 130 x 140
6,557	7,545	7,130	10,500	11,149
152/2,500	197/2,500	233/2,600	251/2,200	296/2,200
51/1,400	67/1,600	81,5/1,800	99/1,400	117/1,400
165	150	160	162	155
24V, 4.5kW	24V, 4.5kW	24V, 7.5kW	24V, 7.5kW	24V, 5.5kW
24V, 30A	24V, 30A	24V, 25A	24V, 35A	24V, 30A
12V, 120Ah x 2	12V, 120Ah x 2	12V, 120Ah x 2	12V, 120Ah x 2	12V, 120Ah x 2
HST	HST	HST	HST	HST
69.8	89.0	89.0	110.9	125.0
385	350 (Serial No. M02105 and up) 385 (Serial No. M02101-02104)	350 (Serial No. K20129 and up) 385 (Serial No. K20101-20128)	325	350
Service/parking	Service/parking	Service/parking	Service/parking	Service/parking
Max. 9.5	Max. 9.5	Max. 9.5	Max. 9.5	Max. 9.5
20.0	36.0	36.0	56.0	63.0 (Serial No. 25101-25106) 45.0 (Serial No. 25107 and up)
165	165	165	165	165
Single-train spool	Single-train spool	Single-train spool	Single-train spool	Single-train spool
Double-acting, piston type x 2	Double-acting, piston type x 2	Double-acting, piston type x 2	Double-acting, piston type x 2	Double-acting, piston type x 2
700	1,000	1,000	1,000	1,000
110	130	130	130	130
80	70	70	70	70

# TABLE OF LUBRICANT AND WATER

RESERVOIR	KIND OF FLUID	AMBIENT TEMPERATURE						CAPACITY (ℓ)	
		-4 -20	14 -10	32 0	50 10	68 20	86°F 30°C	Specified amount	Refill capacity
Engine oil pan	Engine oil	SAE 30						MST-500 : 9.0	7.5
		SAE 10W						MST-600 : 7.0	6.0
		SAE 10W-30						MST-700 : 9.0	7.5
		SAE 10W-30						MST-800 : 7.0	6.0
		SAE 10W-30						MST-1100 : 12.5	10.5
		SAE 10W-30						MST-1500 : 20.0	18.0
Hydraulic tank	Hydraulic oil	#32						MST-2000 : 24.0	22.0
		#46						MST-2200 : 27.0	25.0
		#56						MST-2500 : 31.0	27.0
		#32						MST-500 : 53	50
		#46						MST-600 : 53	50
		#56						MST-700 : 63	60
Fuel tank	Diesel fuel	ASTM D975 No.1						MST-800 : 73	70
		ASTM D975 No.2						MST-1100 : 73	70
		ASTM D975 No.2						MST-1500 : 74	70
		ASTM D975 No.2						MST-2000 : 74	70
		ASTM D975 No.2						MST-2200 : 120	110
		ASTM D975 No.2						MST-2500 : 120	110
Cooling system	Water	Add antifreeze						MST-500 : 60	-
		Add antifreeze						MST-600 : 60	
		Add antifreeze						MST-700 : 60	
		Add antifreeze						MST-800 : 80	
		Add antifreeze						MST-1100 : 80	
		Add antifreeze						MST-1500 : 120	
Add antifreeze						MST-2000 : 145			
Add antifreeze						MST-2200 : 170			
Add antifreeze						MST-2500 : 210			

ASTM: American Society of Testing and Material

SAE: Society of Automotive Engineers

API: American Petroleum Institute

Specified capacity: Total amount of oil including oil for components and oil in piping.

Refill capacity: Amount of oil needed to refill system during normal inspection and maintenance.

**NOTE:**

- (1) When fuel sulphur content is less than 0.5%, change oil in the oil pan every periodic maintenance hours described in this manual.  
Change oil according to the following table if fuel sulphur content is above 0.5%.

Fuel sulphur content	Change interval of oil in engine oil pan
0.5 to 1.0%	1/2 of regular interval
Above 1.0%	1/4 of regular interval

- (2) When starting the engine in an atmospheric temperature of lower than 0°C, be sure to use engine oil of SAE 10W, SAE 10W-30 and SAE 15W-40, even though an atmospheric temperature goes up to 10°C more or less in the day time.
- (3) Use API classification CD as engine oil and if API classification CC, reduce the engine oil change interval to half.

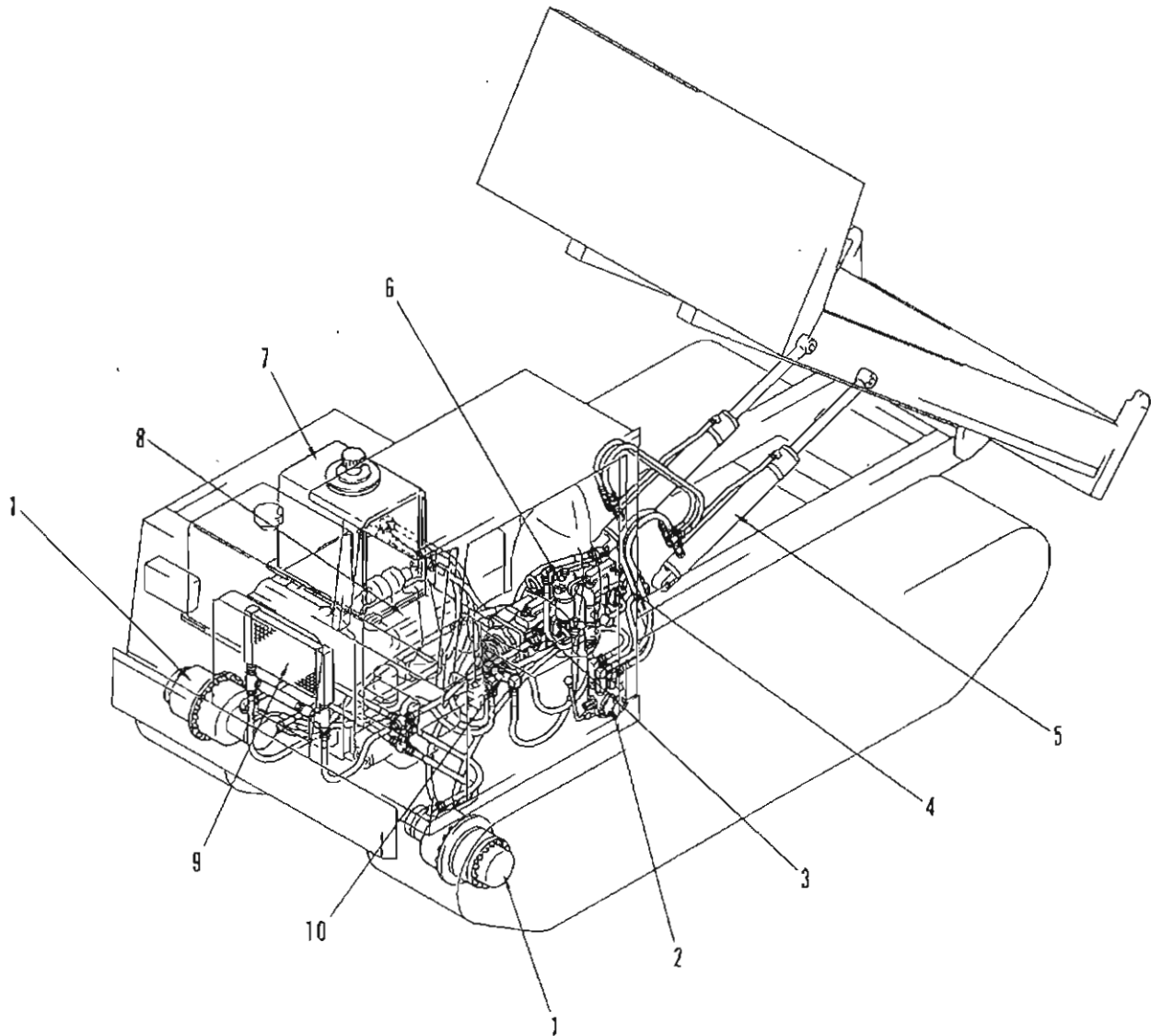
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# 10 STRUCTURE AND FUNCTION

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# HYDRAULIC PIPING



- |                       |                          |
|-----------------------|--------------------------|
| 1. Travel motor       | 6. Hydraulic line filter |
| 2. Dump control valve | 7. Hydraulic oil tank    |
| 3. Main pump          | 8. Engine                |
| 4. Charging pump      | 9. Oil cooler            |
| 5. Dump cylinder      | 10. Parking brake valve  |

## GENERAL

- The MST series adopt the HST (HydroStatic Transmission) by swash plate hydraulic pumps and motors. Therefore, they can withstand high-speed, high-pressure service conditions.

In particular not only sufficient strength is achieved against torsional vibration of the engine or sudden fluctuations in the engine load but also stable performance is obtained throughout the engine speed range.

In addition, the volumetric efficiency is so high that there is scarcely any oil leakage and the efficiency does not drop even if the oil temperature rises.

The original servo transmission mechanism which is adopted facilitates the forward/neutral/reverse lever operation.

In addition to above, the HST is of a maniblock type, which eliminates the piping of servo valves, relief valves, etc., so that it is easy to disassemble and reassemble.

Furthermore, the travel motor of the MST-2200 and MST-2500 has a high/low speed selector mechanism, so it is possible to select a speed to match the change in the load.

## OUTLINE OF HYDRAULIC CONSTITUTION

- There are basically 2 hydraulic circuits, i.e., the HST to generate traveling power and the work equipment circuit to control the dump body.

The HST has a pump charging circuit with 2 sets each of hydraulic variable pumps and hydraulic motors at the center of the circuit. The 2 sets of tandem hydraulic pumps are equipped with a charging pump in the rearmost section.

The power train is connected directly to the engine.

The 2 sets of hydraulic motors are equipped with a final reduction gear and a parking brake; they are mounted in the right and left front.

The work equipment circuit consists of a dump control valve and a dump cylinder.

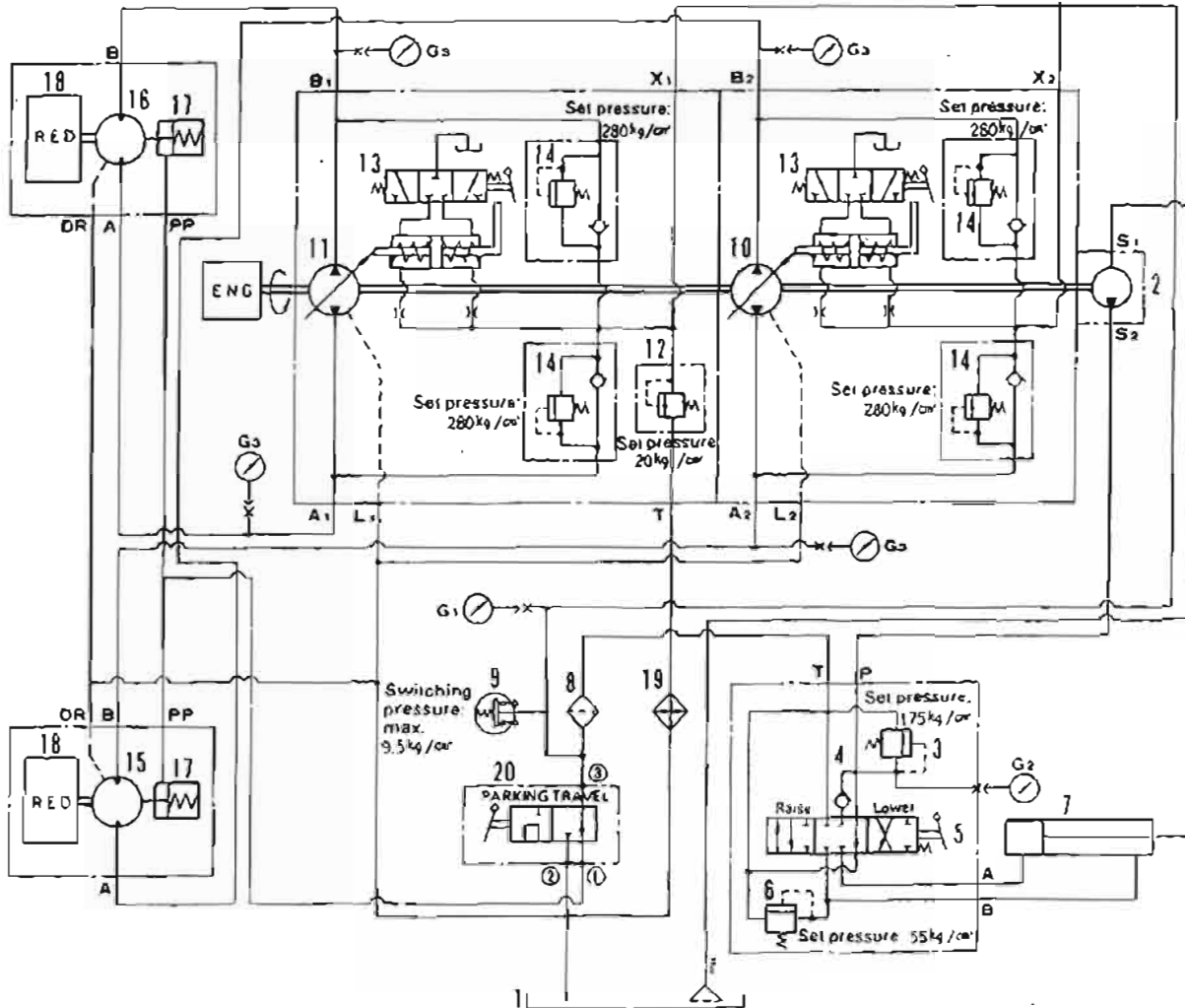
The dump control valve is of a single-train spool system for all models.

A double-acting, piston-type dump cylinder is adopted. One set are used in the MST-500 and 600. Two sets are used in the MST-700, 800, 1100, 1500, 2000, 2200 and 2500.

In addition to the above hydraulic equipment, the MST-2200 and 2500 are also equipped with a high-low 2-speed travel motor which can be switched between high and low speed by a solenoid valve operated by a switch in the operator's compartment.



# HYDRAULIC CIRCUIT DIAGRAM (MST-500)

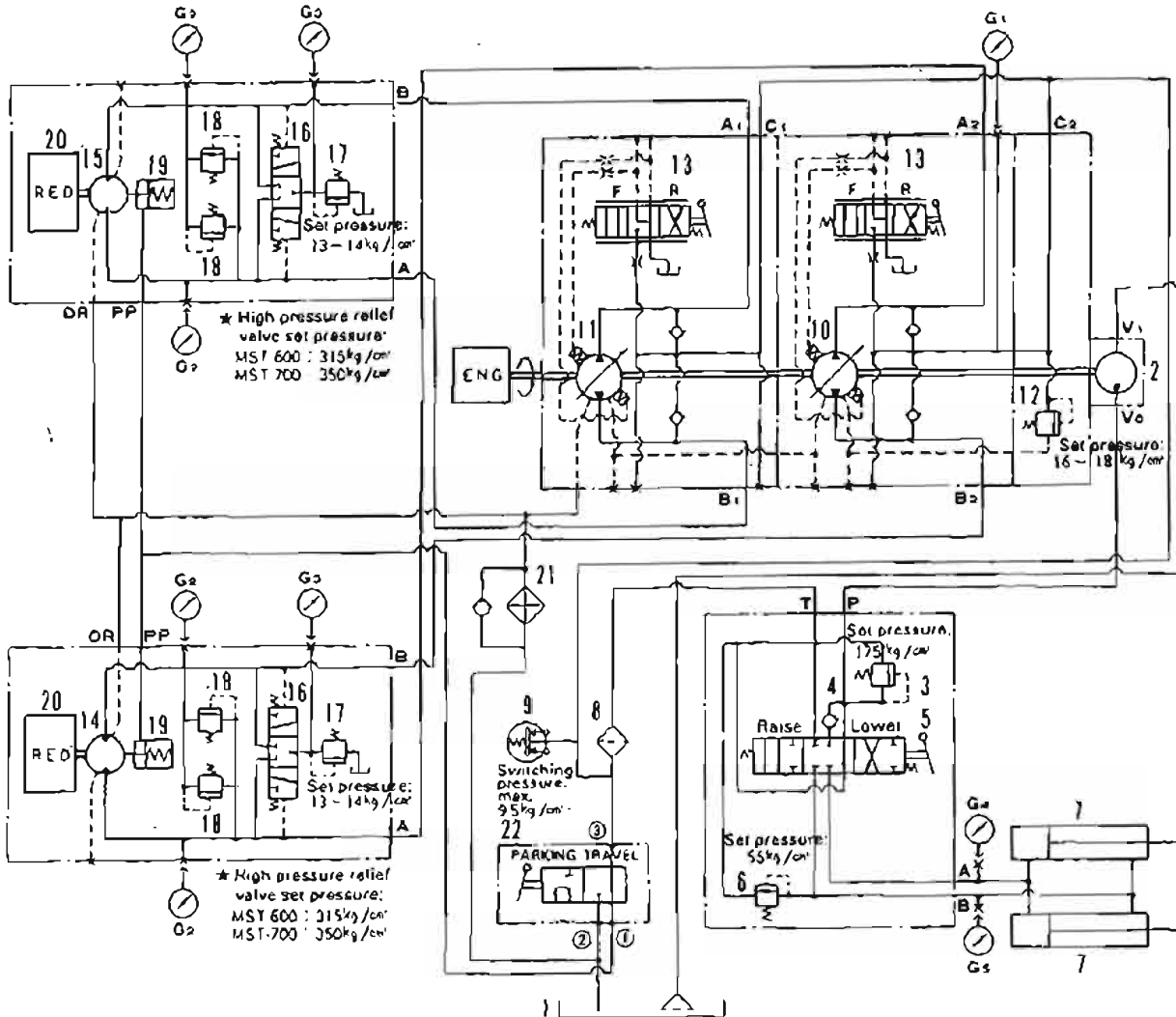


- |   |  |
|---|--|
| 1. Hydraulic oil tank                     | 13. Pump control valve   |
| 2. Charging pump                          | 14. High-pressure relief valve                                 |
| 3. Main relief valve                      | 15. Travel motor (for left traveling)                          |
| 4. Check valve                            | 16. Travel motor (for right traveling)                         |
| 5. Dump control valve                     | 17. Parking brake  |
| 6. Over-load relief valve (Lower side)    | 18. Final drive  |
| 7. Dump cylinder                          | 19. Oil cooler   |
| 8. Hydraulic line filter                  | 20. Parking brake valve  |
| 9. Low pressure switch                    |  |
| 10. Rear main pump (for left traveling)   | G <sub>1</sub> . Plug for charging pressure of main pump       |
| 11. Front main pump (for right traveling) | G <sub>2</sub> . Plug for main relief pressure of dump circuit |
| 12. Charging relief valve                 | G <sub>3</sub> . Plug for high-pressure of main pump           |

## OIL FLOW

- Oil in the hydraulic oil tank (1) is sucked up by charging pump (2) and enters port P of the control valve (5).  
If the control valve (5) is at the "HOLD" position, the oil which entered port P goes out of port T and flows completely to the HST circuit.  
If the control valve (5) is in an operating condition, it flows to the dump cylinder circuit.
- If the dump lever is at the "RAISE" or "LOWER" position, oil of the dump cylinder circuit opens the check valve (4), comes out of port A or B through the spool, enters bottom side or head side of the dump cylinder (7) and makes the dump body raise or lower. The oil which is returned to the cylinder is cleaned as it passes port T and the line filter (8) and flows to the HST circuit. The dump body raising pressure is set to  $175 \text{ kg/cm}^2$  by the main relief valve (3).  
The dump body lowering circuit pressure is set to  $55 \text{ kg/cm}^2$  by the over-load relief valve (6).
- If the control valve (5) is at the "HOLD" position, oil of the HST circuit flows completely through two circuits of the pump charging and parking brake release.
- The oil which flowed into the parking brake release circuit enters port (3) of the parking brake valve (20). If the parking brake lever is at the "TRAVEL" position, the oil which entered port (3) comes out of port (1), enters the brake port provided in the right and left travel motors and "releases" the parking brake (17).  
If the parking brake lever is at the "PARK" position, the port (3) and port (1) of the parking brake valve close and the port (1) and port (2) open to return the oil at the brake ports in the motors to the hydraulic oil tank.
- The oil which flowed into the pump charging circuit enters port X<sub>2</sub> of the rear pump and then port X<sub>1</sub> of the front pump through the pump's piping and supplies the amount of oil required by the main pump.  
The hydraulic pressure in the charging circuit is set to  $20 \text{ kg/cm}^2$  by the charge relief valve (12) built into the main pump.  
If the pump charging circuit pressure drops below  $9.5 \text{ kg/cm}^2$ , the low-pressure switch (9) is activated to warn the operator by flashing the warning lamp in order to prevent pump seizure.
- The main pumps (10) and (11) change the swash plate angle by means of the pump control valve (13) interlocked with the travel lever to adjust forward, reverse, and discharge, and send oil to the traveling motors.  
A high-pressure relief valve (14) is built into the main pump to set the main pump's discharging pressure to  $280 \text{ kg/cm}^2$ .
- The travel motors (15) and (16) turn according to the amount of oil sent from the main pump and their speed is reduced by the reduction gear (18) to drive the sprocket for running or turning the vehicle.

# HYDRAULIC CIRCUIT DIAGRAM (MST-600, 700)



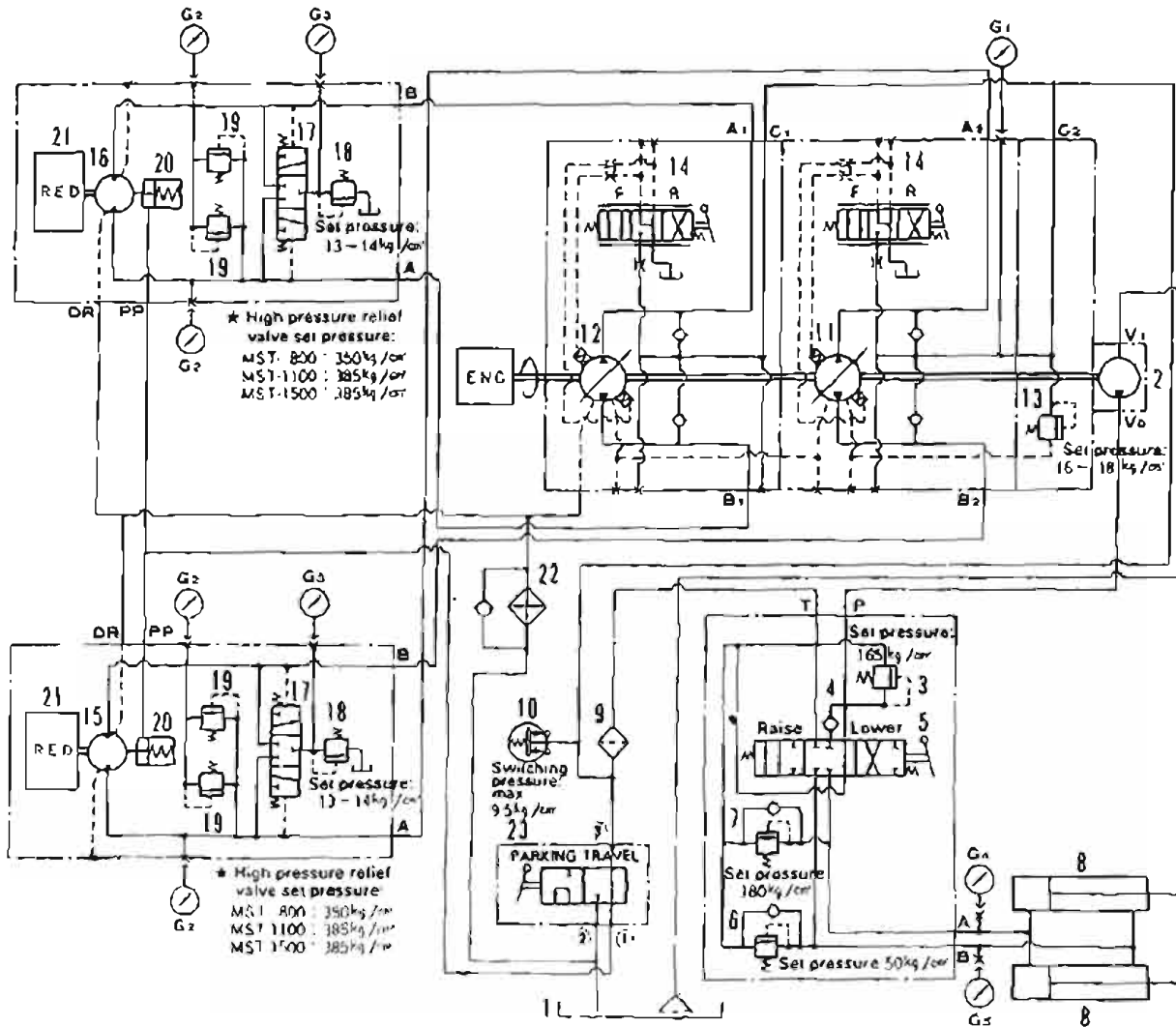
- |   |   |
|---|---|
| 1. Hydraulic oil tank                     | 14. Travel motor (for left traveling)                               |
| 2. Charging pump                          | 15. Travel motor (for right traveling)                              |
| 3. Main relief valve                      | 16. Shuttle valve   |
| 4. Check valve                            | 17. Motor charging relief valve                                     |
| 5. Dump control valve                     | 18. High-pressure relief valve                                      |
| 6. Over-load relief valve (Lower side)    | 19. Parking brake   |
| 7. Dump cylinder                          | 20. Final drive   |
| 8. Hydraulic line filter                  | 21. Oil cooler  |
| 9. Low-pressure switch                    | 22. Parking brake valve   |
| 10. Rear main pump (for left traveling)   | G <sub>1</sub> . Plug for charging pressure of main pump            |
| 11. Front main pump (for right traveling) | G <sub>2</sub> . Plug for high pressure of main pump                |
| 12. Charging relief valve                 | G <sub>3</sub> . Plug for charging pressure of travel motor         |
| 13. Pump control valve                    | G <sub>4</sub> . Plug for main relief pressure of dump circuit      |
|   | G <sub>5</sub> . Plug for over-load relief pressure of dump circuit |

## OIL FLOW

- Oil in the hydraulic oil tank (1) is sucked up by charging pump (2) and enters port P of the control valve (5).  
If the control valve (5) is at the "HOLD" position, the oil which entered port P goes out of port T and flows completely to the HST circuit.  
If the control valve (5) is in an operating condition, it flows to the dump cylinder circuit.
- If the dump lever is at the "RAISE" or "LOWER" position, oil of the dump cylinder circuit opens the check valve (4), comes out of port A or B through the spool, enters bottom side or head side of the dump cylinder (7) and makes the dump body raise or lower. The oil which is returned to the cylinder is cleaned as it passes port T and the line filter (8) and flows to the HST circuit. The dump body raising pressure is set to 175 kg/cm<sup>2</sup> by the main relief valve (3).  
The dump body lowering circuit pressure is set to 55 kg/cm<sup>2</sup> by the over-load relief valve (6).
- If the control valve (5) is at the "HOLD" position, oil of the HST circuit flows completely through two circuits of the pump charging and parking brake release.
- The oil which flowed into the parking brake release circuit enters port ③ of the parking brake valve (22). If the parking brake lever is at the "TRAVEL" position, the oil which entered port ③ comes out of port ①, enters the brake port provided in the right and left travel motors and "releases" the parking brake (19).  
If the parking brake lever is at the "PARK" position, the port ③ and port ① of the parking brake valve close and the port ① and port ② open to return the oil at the brake ports in the motors to the hydraulic oil tank.
- The oil which flowed into the pump charging circuit enters port C<sub>2</sub> of the rear pump and then port C<sub>1</sub> of the front pump through the pump's piping and supplies the amount of oil required by the main pump.  
The hydraulic pressure in the charging circuit is set to 16 - 18 kg/cm<sup>2</sup> by the charge relief valve (12) built into the main pump.  
If the pump charging circuit pressure drops below 9.5 kg/cm<sup>2</sup> the low-pressure switch (9) is activated to warn the operator by flashing the warning lamp in order to prevent pump seizure.
- The main pumps (10) and (11) change the swash plate angle by means of the pump control valve (13) interlocked with the travel lever to adjust forward, reverse, and discharge, and send oil to the traveling motors.
- The travel motors (14) and (15) turn according to the amount of oil sent from the main pump and their speed is reduced by the reduction gear (20) to drive the sprocket for running or turning the vehicle. A high-pressure relief valve (18) is built into the travel motor to set the main pump's discharging pressure. In addition, a flushing valve (combination of a shuttle valve (16) and a charge relief valve (17)) is built into the MST-600, and 700. It relieves the oil of the circuit which became the travel motor's discharging side (low-pressure side) to the oil cooler (21) to prevent overheating and clean hydraulic oil of the HST circuit.

# HYDRAULIC CIRCUIT DIAGRAM (MST-800 — 1500)

MST-800 Serial No. 866 —  
 MST-1100 Serial No. M01101 —, K11101 —  
 MST-1500 Serial No. 15001 — 15093



- |   |   |
|---|---|
| 1. Hydraulic oil tank                     | 15. Travel motor (for left traveling)                               |
| 2. Charging pump                          | 16. Travel motor (for right traveling)                              |
| 3. Main relief valve                      | 17. Shuttle valve   |
| 4. Check valve                            | 18. Motor charging relief valve                                     |
| 5. Dump control valve                     | 19. High-pressure relief valve                                      |
| 6. Over-load relief valve (Lower side)    | 20. Parking brake   |
| 7. Over load relief valve (Raise side)    | 21. Final drive   |
| 8. Dump cylinder                          | 22. Oil cooler  |
| 9. Hydraulic line filter                  | 23. Parking brake valve   |
| 10. Low-pressure switch                   |   |
| 11. Rear main pump (for left traveling)   | G <sub>1</sub> . Plug for charging pressure of main pump            |
| 12. Front main pump (for right traveling) | G <sub>2</sub> . Plug for high-pressure of main pump                |
| 13. Charging relief valve                 | G <sub>3</sub> . Plug for charging pressure of travel motor         |
| 14. Pump control valve                    | G <sub>4</sub> . Plug for main relief pressure of dump circuit      |
|   | G <sub>5</sub> . Plug for over-load relief pressure of dump circuit |

## OIL FLOW

- Oil in the hydraulic oil tank (1) is sucked up by charging pump (2) and enters port P of the control valve (5).

If the control valve (5) is at the "HOLD" position, the oil which entered port P goes out of port T and flows completely to the HST circuit.

If the control valve (5) is in an operating condition, it flows to the dump cylinder circuit.

- If the dump lever is at the "RAISE" or "LOWER" position, oil of the dump cylinder circuit opens the check valve (4), comes out of port A or B through the spool, enters bottom side or head side of the dump cylinder (8) and makes the dump body raise or lower. The oil which is returned to the cylinder is cleaned as it passes port T and the line filter (9) and flows to the HST circuit. The dump body raising pressure is set to  $165 \text{ kg/cm}^2$  by the main relief valve (3).

The dump body lowering pressure is set to  $50 \text{ kg/cm}^2$  by the over-load relief valve (6).

- If the control valve (5) is at the "HOLD" position, oil of the HST circuit flows completely through two circuits of the pump charging and parking brake release.
- The oil which flowed into the parking brake release circuit enters port ③ of the parking brake valve (23). If the parking brake lever is at the "TRAVEL" position, the oil which entered port ③ comes out of port ①, enters the brake port provided in the right and left travel motors and "releases" the parking brake (20).
- The oil which flowed into the pump charging circuit enters port C<sub>2</sub> of the rear pump and then port C<sub>1</sub> of the front pump through the pump's piping and supplies the amount of oil required by the main pump.

If the parking brake lever is at the "PARK" position, the port ③ and port ① of the parking brake valve close and the port ① and port ② open to return the oil at the brake ports in the motors to the hydraulic oil tank.

The hydraulic pressure in the charging circuit is set to  $16 - 18 \text{ kg/cm}^2$  by the charge relief valve (13) built into the main pump.

If the pump charging circuit pressure drops below  $9.5 \text{ kg/cm}^2$ , the low-pressure switch (10) is activated to warn the operator by flashing the warning lamp in order to prevent pump seizure.

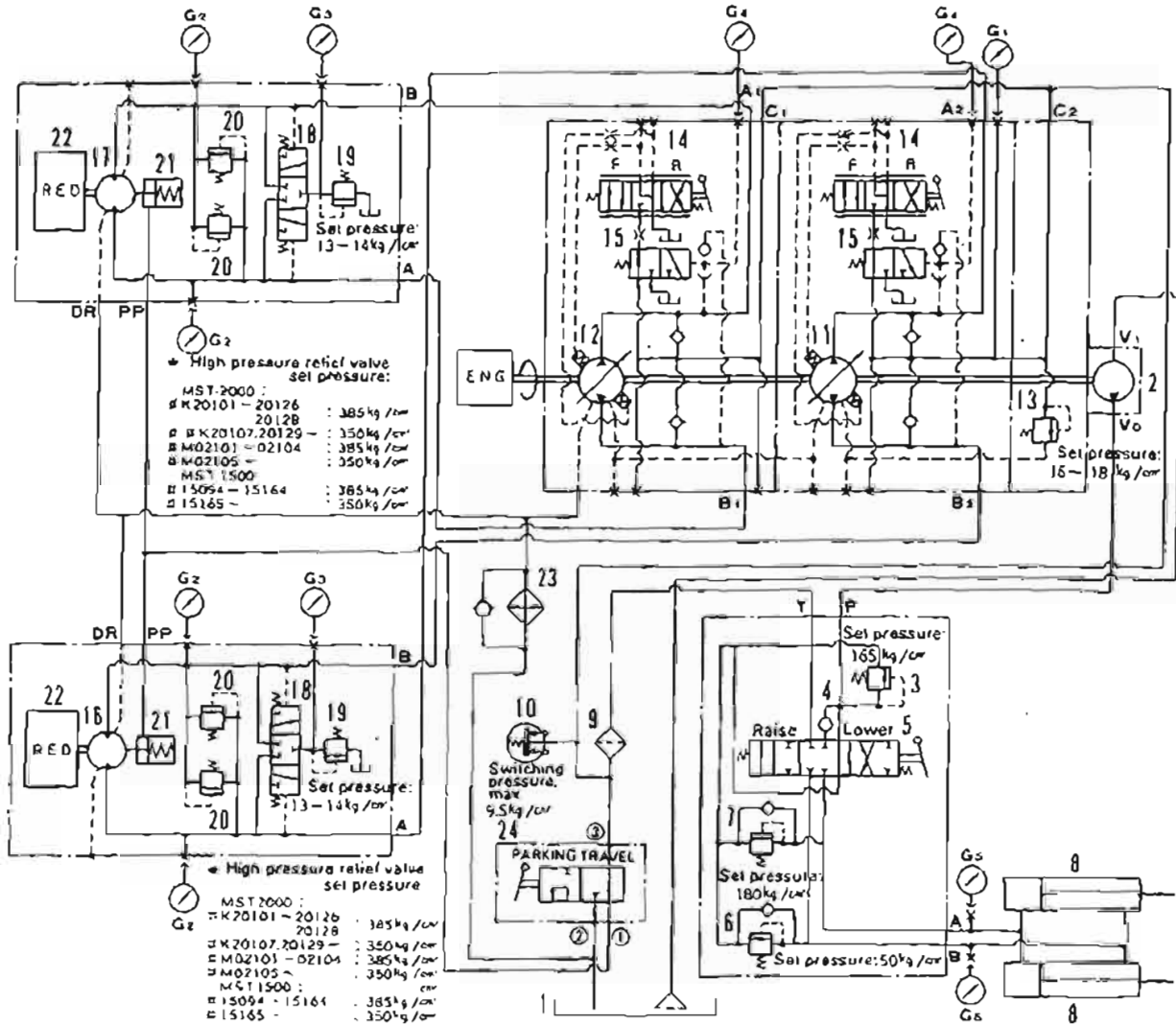
- The main pumps (11) and (12) change the swash plate angle by means of the pump control valve (14) interlocked with the travel lever to adjust forward, reverse, and discharge, and send oil to the travelling motors.

- The travel motors (15) and (16) turn according to the amount of oil sent from the main pump and their speed is reduced by the reduction gear to drive the sprocket for running or turning the vehicle. A high-pressure relief valve (19) is built into the travel motor to set the main pump's discharging pressure.

In addition, a flushing valve (combination of a shuttle valve (17) and a charge relief valve (18)) is built into the MST-800, 1100, and 1500. It relieves the oil of the circuit which became the travel motor's discharging side (low-pressure side) to the oil cooler (22) to prevent overheating and clean hydraulic oil of the HST circuit.

# HYDRAULIC CIRCUIT DIAGRAM (MST-1500, 2000)

MST-1500 Serial No. 15093 -  
 MST-2000 Serial No. M02101 -, K20101 -



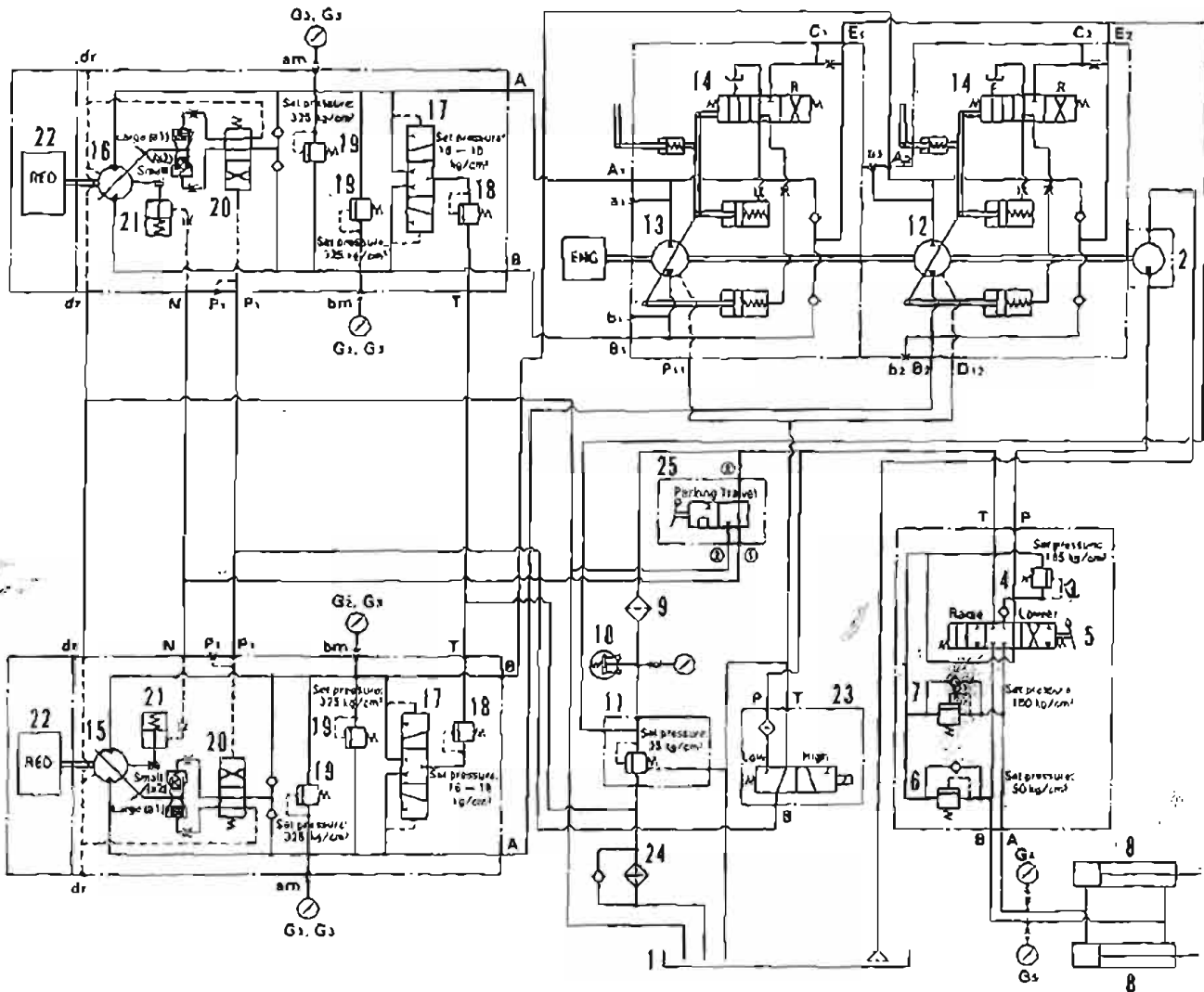
- |   |  |
|---|--|
| 1. Hydraulic oil tank                     | 16. Travel motor (for left traveling)                                  |
| 2. Charging pump                          | 17. Travel motor (for right traveling)                                 |
| 3. Main relief valve                      | 18. Shuttle valve  |
| 4. Check valve                            | 19. Charging relief valve  |
| 5. Dump control valve                     | 20. High-pressure relief valve   |
| 6. Over-load relief valve (Lower side)    | 21. Parking brake  |
| 7. Over-load relief valve (Raise side)    | 22. Final drive  |
| 8. Dump cylinder                          | 23. Oil cooler   |
| 9. Hydraulic line filter                  | 24. Parking brake valve  |
| 10. Low-pressure switch                   |  |
| 11. Rear main pump (for left traveling)   | G <sub>1</sub> . Plug for charging pressure of main pump               |
| 12. Front main pump (for right traveling) | G <sub>2</sub> . Plug for high-pressure of main pump                   |
| 13. Charging relief valve                 | G <sub>3</sub> . Plug for charging pressure of travel motor            |
| 14. Pump control valve                    | G <sub>4</sub> . Plug for charging pressure of pressure override valve |
| 15. Pressure override valve               | G <sub>5</sub> . Plug for main relief pressure of dump circuit         |
|   | G <sub>6</sub> . Plug for over-load relief pressure of dump circuit    |

## OIL FLOW

- Oil in the hydraulic oil tank (1) is sucked up by charging pump (2) and enters port P of the control valve (5).  
If the control valve (5) is at the "HOLD" position, the oil which entered port P goes out of port T and flows completely to the HST circuit.  
(If the control valve (5) is in an operating condition, it flows to the dump cylinder circuit.)
- If the dump lever is at the "RAISE" or "LOWER" position, oil of the dump cylinder circuit opens the check valve (4), comes out of port A or B through the spool, enters bottom side or head side of the dump cylinder (8) and makes the dump body raise or lower. The oil which is returned to the cylinder is cleaned as it passes port T and the line filter (9) and flows to the HST circuit. The dump body raising pressure is set to 165 kg/cm<sup>2</sup> by the main relief valve (3).  
The dump body lowering circuit pressure is set to 50 kg/cm<sup>2</sup> by the over-load relief valve (6).
- If the control valve (5) is at the "HOLD" position, oil of the HST circuit flows completely through two circuits of the pump charging and parking brake release.
- The oil which flowed into the parking brake release circuit enters port ③ of the parking brake valve (24). If the parking brake lever is at the "TRAVEL" position, the oil which entered port ③ comes out of port ①, enters the brake port provided in the right and left travel motors and "releases" the parking brake (21).  
If the parking brake lever is at the "PARK" position, the port ③ and port ① of the parking brake valve close and the port ① and port ② open to return the oil at the brake ports in the motors to the hydraulic oil tank.
- The oil which flowed into the pump charging circuit enters port C<sub>1</sub> of the rear pump and then port C<sub>2</sub> of the front pump through the pump's piping and supplies the amount of oil required by the main pump.  
The hydraulic pressure in the charging circuit is set to 16 - 18 kg/cm<sup>2</sup> by the charge relief valve (13) built into the main pump.  
If the pump charging circuit pressure drops below 9.5 kg/cm<sup>2</sup>, the low-pressure switch (10) is activated to warn the operator by flashing the warning lamp in order to prevent pump seizure.
- The main pumps (11) and (12) change the swash plate angle by means of the pump control valve (14) interlocked with the travel lever to adjust forward, reverse, and discharge, and send oil to the traveling motors.  
A pressure override valve (15) is built into the main pump. In the case of the main pump's discharging pressure reaching a continuous high-pressure relief condition, it shuts the oil flow to pump control valve (14) to return the main pump's swash plate angle to the neutral position. As the discharging pressure drops, the HST circuit is protected.
- The travel motors (16) and (17) turn according to the amount of oil sent from the main pump and their speed is reduced by the reduction gear to drive the sprocket for running or turning the vehicle. A high-pressure relief valve (20) is built into the travel motor to set the main pump's discharging pressure.  
In addition, a flushing valve (combination of a shuttle valve (18) and a charge relief valve (19)) is built into the MST-1500 and 2000. It relieves the oil of the circuit which became the travel motor's discharging side (low-pressure side) to the oil cooler (23) to prevent overheating and clean hydraulic oil of the HST circuit.



# HYDRAULIC CIRCUIT DIAGRAM (MST-2200)



- |   |  |
|---|--|
| 1. Hydraulic oil tank                     | 16. Travel motor (for right traveling) |
| 2. Charging pump                          | 17. Shuttle valve                      |
| 3. Main relief valve                      | 18. Charging relief valve              |
| 4. Check valve                            | 19. High-pressure relief valve         |
| 5. Dump control valve                     | 20. H-L speed changing valve           |
| 6. Over-load relief valve (Lower side)    | 21. Parking brake                      |
| 7. Over-load relief valve (Raise side)    | 22. Final drive                        |
| 8. Dump cylinder                          | 23. H-L speed changing solenoid valve  |
| 9. Hydraulic line filter                  | 24. Oil cooler                         |
| 10. Low-pressure switch                   | 25. Parking brake valve                |
| 11. Charging relief valve                 |  |
| 12. Rear main pump (for left traveling)   |  |
| 13. Front main pump (for right traveling) |  |
| 14. Pump control valve                    |  |
| 15. Travel motor (for left traveling)     |  |
- 
- |   |
|---|
| G <sub>1</sub> . Plug for charging pressure of main pump            |
| G <sub>2</sub> . Plug for high-pressure of main pump                |
| G <sub>3</sub> . Plug for charging pressure of travel motor         |
| G <sub>4</sub> . Plug for main relief pressure of dump circuit      |
| G <sub>5</sub> . Plug for over load relief pressure of dump circuit |

## OIL FLOW

- Oil in the hydraulic oil tank (1) is sucked up by charging pump (2) and enters port P of the control valve (5).

If the control valve (5) is at the "HOLD" position, the oil which entered port P goes out of port T and flows completely to the HST circuit.

If the control valve (5) is in an operating condition, it flows to the dump cylinder circuit.

- If the dump lever is at the "RAISE" or "LOWER" position, oil of the dump cylinder circuit opens the check valve (4), comes out of port A or B through the spool, enters bottom side or head side of the dump cylinder (8) and makes the carrier raise or lower.

The oil which is returned to the cylinder is cleaned as it passes port T and the line filter (9) and flows to the HST circuit. The dump body raising pressure is set to 165 kg/cm<sup>2</sup> by the main relief valve (3).

The dump body lowering pressure is set to 50 kg/cm<sup>2</sup> by the over-load relief valve (6).

- When control valve (5) is at the "HOLD" position, the oil in the HST circuit is all divided into three circuits and flows through the pump charge, travel motor high/low speed selector, and parking brake release circuits.

- The oil which flowed into the parking brake release circuit enters port (3) of the parking brake valve (25). If the parking brake lever is at the "TRAVEL" position, the oil which entered port (3) comes out of port (1), enters the brake port provided in the right and left travel motors and "releases" the parking brake (21).

If the parking brake lever is at the "PARK" position, the port (3) and port (1) of the parking brake valve close and the port (1) and port (2) open to return the oil at the brake ports in the motors to the hydraulic oil tank.

- The oil flowing through the travel motor high/low speed selector circuit enters port P of solenoid selector valve (23).

If the high/low speed selector switch in the operator's compartment is at the LOW SPEED position, the solenoid selector valve is not actuated. The circuit of ports P and B is closed, so the oil entering port P flows to other circuits. At the same time, the solenoid selector valve opens the circuit of ports B and T, so the pilot pressure (oil) at high/low speed selector valve (20) inside the motor is returned to the hydraulic tank, and the motor runs at low speed.

When the high/low speed selector switch in the operator's compartment is at the HIGH SPEED position, the solenoid selector valve is actuated, the circuit of ports P and B is opened, and the circuit of ports B and T is closed. When this happens, the oil entering port P flows from port P to port B, and

becomes the pilot pressure of the high/low speed selector valve inside the travel motor. This switches the valve, and the motor runs at high speed.

In other words, the solenoid selector valve switches the pilot pressure that controls the high/low speed selector valve inside the travel motor, and the high/low speed selector valve inside the travel motor switches the high pressure oil from the main pump and controls the swash plate angle of the travel motor.

- The oil flowing to the pump charge circuit passes through pump charge relief valve (11) at the rear of the operator's compartment, enters port E<sub>2</sub> of the rear pump, then enters port E<sub>1</sub> of the front pump, and supplies the required amount of oil for the main pump.

The pressure in the charge circuit is set to 25 kg/cm<sup>2</sup> by the charge relief valve.

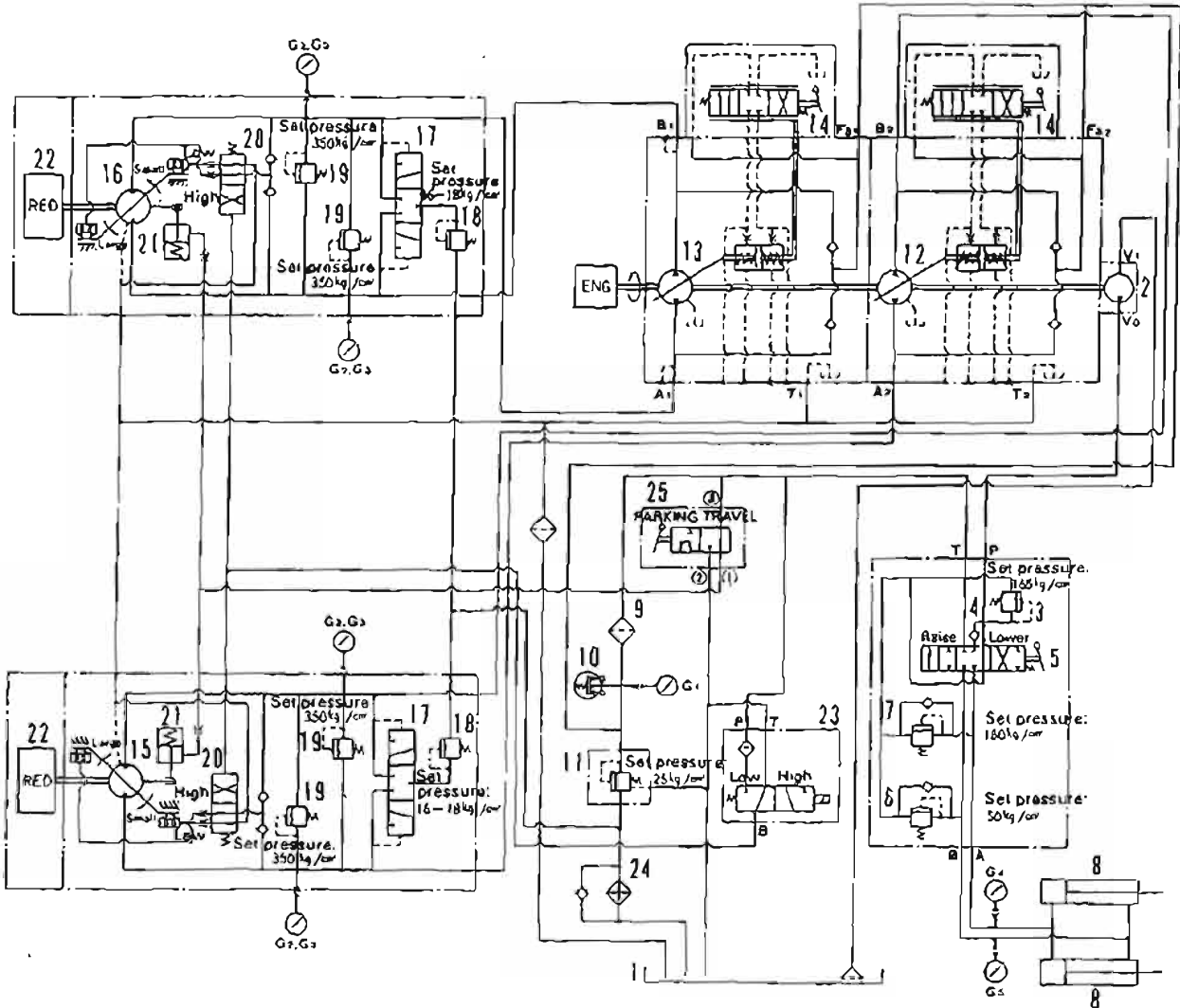
If the pressure in the pump charge circuit drops below 9.5 kg/cm<sup>2</sup>, low pressure switch (10) is actuated, and the caution lamp lights up to prevent seizure of the pump.

- The swash plate angle of main pumps (12) and (13) is changed by pump control valve (14) that is interconnected with the travel lever. It adjusts the direction of rotation (normal or reverse), and the discharge amount, and sends the oil to the travel motor.

- Travel motors (15) and (16) rotate in accordance with the amount of oil sent from the main pumps. This rotation is reduced by the reduction gear, and goes on to drive the sprocket to drive or turn the machine. Furthermore, high/low speed selector valve (20) is built into the travel motor. It is actuated by the pilot pressure from high/low speed solenoid selector valve (23), sends the oil at the high pressure side of the travel motor to the swash plate angle selector cylinder, and changes the swash plate angle of the travel motor to set the maximum level for the rotating speed. In other words, the travel motor has two stages.

In addition, the travel motor also has a built-in flushing valve [a combination of shuttle valve (17) and charge relief valve (18)], and this relieves the oil in the circuit at the discharge side (low pressure side) of the travel motor, sends it to oil cooler (24), and cleans the oil in the HST circuit while preventing the oil from overheating.

# HYDRAULIC CIRCUIT DIAGRAM (MST-2500)



- |   |  |
|---|--|
| 1. Hydraulic oil tank                     | 16. Travel motor (for right traveling)                         |
| 2. Charging pump                          | 17. Shuttle valve  |
| 3. Main relief valve                      | 18. High-pressure relief valve                                 |
| 4. Check valve                            | 19. Charging relief valve                                      |
| 5. Dump control valve                     | 20. H-L speed changing valve                                   |
| 6. Over-load relief valve (Lower side)    | 21. Parking brake  |
| 7. Over-load relief valve (Raise side)    | 22. Final drive  |
| 8. Dump cylinder                          | 23. H-L speed changing solenoid valve                          |
| 9. Hydraulic line filter                  | 24. Oil cooler   |
| 10. Low-pressure switch                   | 25. Parking brake valve  |
| 11. Charging relief valve                 |  |
| 12. Rear main pump (for left traveling)   | G <sub>1</sub> . Plug for charging pressure of main pump       |
| 13. Front main pump (for right traveling) | G <sub>2</sub> . Plug for high-pressure of main pump           |
| 14. Pump control valve                    | G <sub>3</sub> . Plug for charging pressure of travel motor    |
| 15. Travel motor (for left traveling)     | G <sub>4</sub> . Plug for main relief pressure of dump circuit |

## OIL FLOW

- Oil in the hydraulic oil tank (1) is sucked up by charging pump (2) and enters port P of the control valve (5).  
If the control valve (5) is at the "HOLD" position, the oil which entered port P goes out of port T and flows completely to the HST circuit.  
If the control valve (5) is in an operating condition, it flows to the dump cylinder circuit.
- If the dump lever is at the "RAISE" or "LOWER" position, oil of the dump cylinder circuit opens the check valve (4), comes out of port A or B through the spool, enters bottom side or head side of the dump cylinder (8) and makes the carrier raise or lower.  
The oil which is returned to the cylinder is cleaned as it passes port T and the line filter (9) and flows to the HST circuit. The dump body raising pressure is set to 165 kg/cm<sup>2</sup> by the main relief valve (3).  
The dump body lowering pressure is set to 50 kg/cm<sup>2</sup> by the over-load relief valve (6).
- When control valve (5) is at the "HOLD" position, the oil in the HST circuit is all divided into three circuits and flows through the pump charge, travel motor high/low speed selector, and parking brake release circuits.
- The oil which flowed into the parking brake release circuit enters port (3) of the parking brake valve (25). If the parking brake lever is at the "TRAVEL" position, the oil which entered port (3) comes out of port (1), enters the brake port provided in the right and left travel motors and "releases" the parking brake (21).  
If the parking brake lever is at the "PARK" position, the port (3) and port (1) of the parking brake valve close and the port (7) and port (2) open to return the oil at the brake ports in the motors to the hydraulic oil tank.
- The oil flowing through the travel motor high/low speed selector circuit enters port P of solenoid selector valve (23).  
If the high/low speed selector switch in the operator's compartment is at the LOW SPEED position, the solenoid selector valve is not actuated. The circuit of ports P and B is closed, so the oil entering port P flows to other circuits. At the same time, the solenoid selector valve opens the circuit of ports B and T, so the pilot pressure (oil) at high/low speed selector valve (20) inside the motor is returned to the hydraulic tank, and the motor runs at low speed.  
When the high/low speed selector switch in the operator's compartment is at the HIGH SPEED position, the solenoid selector valve is actuated, the circuit of ports P and B is opened, and the circuit of ports B and T is closed. When this happens, the oil entering port P flows from port P to port B, and

becomes the pilot pressure of the high/low speed selector valve inside the travel motor. This switches the valve, and the motor runs at high speed.

In other words, the solenoid selector valve switches the pilot pressure that controls the high/low speed selector valve inside the travel motor, and the high/low speed selector valve inside the travel motor switches the high pressure oil from the main pump and controls the swash plate angle of the travel motor.

- The oil flowing to the pump charge circuit passes through pump charge relief valve (11) at the rear of the operator's compartment, enters port Fa<sub>2</sub> of the rear pump, then enters port Fa<sub>1</sub> of the front pump, and supplies the required amount of oil for the main pump.

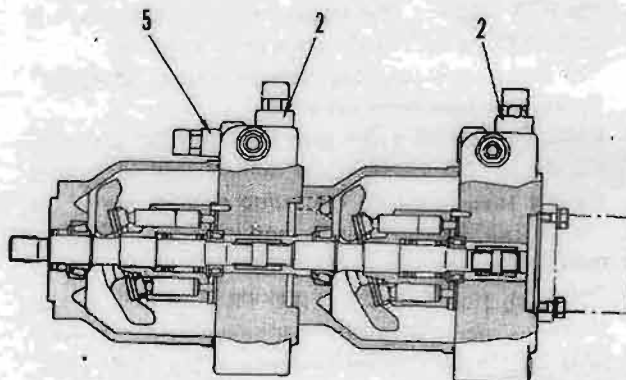
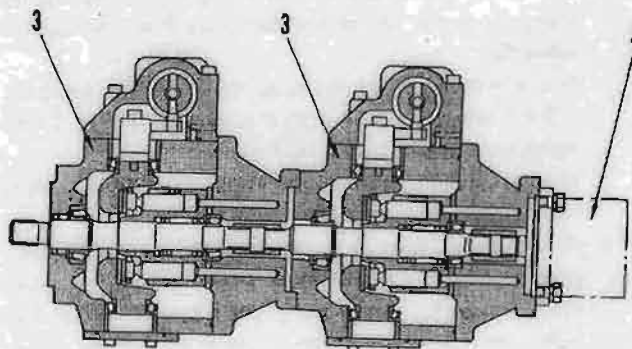
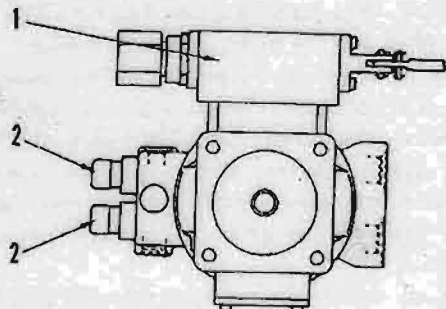
The pressure in the charge circuit is set to 25 kg/cm<sup>2</sup> by the charge relief valve.

If the pressure in the pump charge circuit drops below 9.5 kg/cm<sup>2</sup>, low pressure switch (10) is actuated, and the caution lamp lights up to prevent seizure of the pump.

- The swash plate angle of main pumps (12) and (13) is changed by pump control valve (14) that is interconnected with the travel lever. It adjusts the direction of rotation (normal or reverse), and the discharge amount, and sends the oil to the travel motor.
- Travel motors (15) and (16) rotate in accordance with the amount of oil sent from the main pumps. This rotation is reduced by the reduction gear, and goes on to drive the sprocket to drive or turn the machine. Furthermore, high/low speed selector valve (20) is built into the travel motor. It is actuated by the pilot pressure from high/low speed solenoid selector valve (23), sends the oil at the high pressure side of the travel motor to the swash plate angle selector cylinder, and changes the swash plate angle of the travel motor to set the maximum level for the rotating speed. In other words, the travel motor has two stages.

In addition, the travel motor also has a built-in flushing valve. [a combination of shuttle valve (17) and charge relief valve (18)], and this relieves the oil in the circuit at the discharge side (low pressure side) of the travel motor, sends it to oil cooler (24), and cleans the oil in the HST circuit while preventing the oil from overheating.

# HYDRAULIC PUMP (MST-500)



1. Pump control valve
2. High-pressure relief valve
3. Main pump
4. Charging pump
5. Charging relief valve

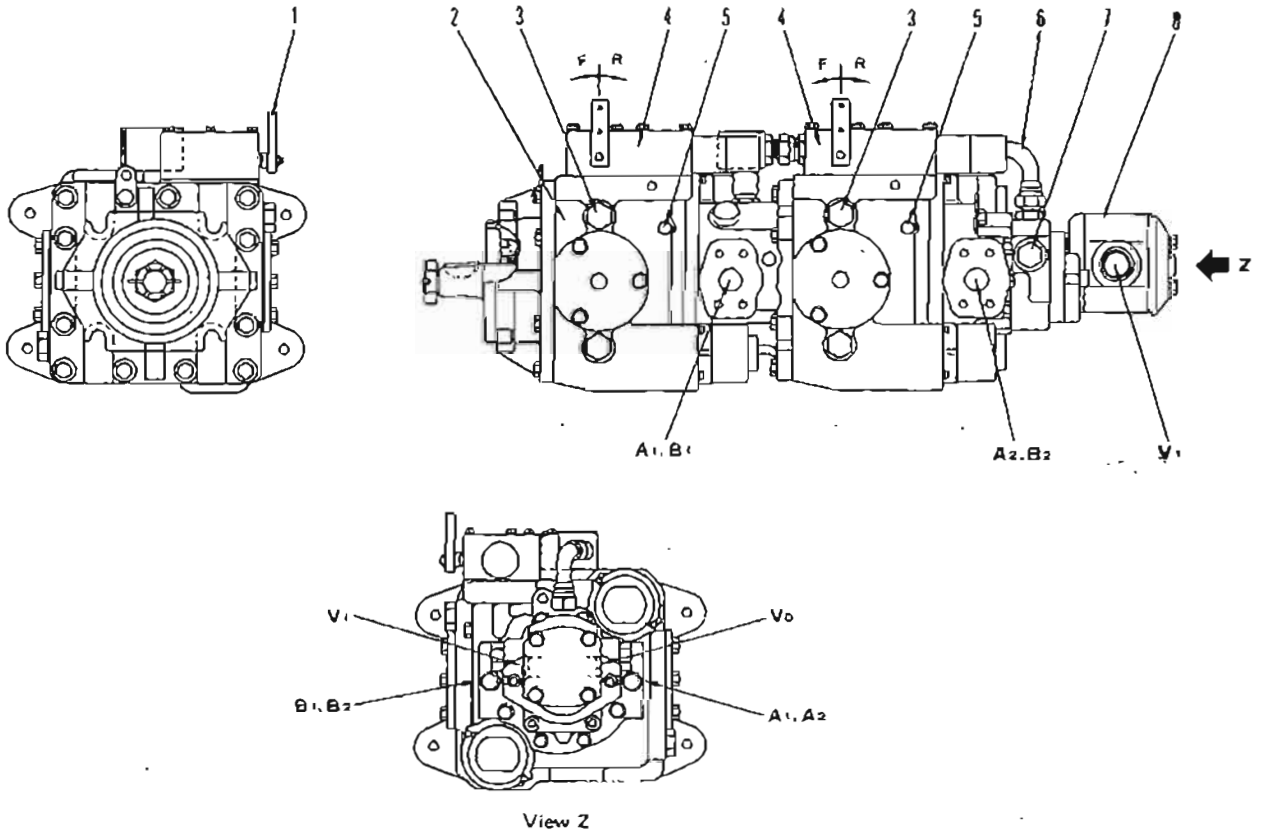
## GENERAL

- The hydraulic pumps are mounted in the rear part of the engine via a rubber coupling; they are 2 sets of tandem main pumps and a gear-type pump to supply oil to the charging and work equipment circuits, making up triple pumps. Swash plate-type main pumps are adopted.
- The table below shows the main pump's discharging and charging pressure.

Model	Pump discharge (cc/rev)	Charging pressure (kg/cm <sup>2</sup> )
MST-500	43.0	20

# HYDRAULIC PUMP (MST-600 — 1500)

MST-600 Serial No. 1601 —  
MST-700 Serial No. 70101 —  
MST-800 Serial No. 866 —  
MST-1100 Serial No. M01101 —, K11101 —  
MST-1500 Serial No. 15001 — 15093



1. Control lever
2. Main pump
3. Drain plug (7/8-14UNF)
4. Pump control valve
5. Plug for charging pressure (7/16-20UNF)
6. Tube (connecting front and rear charging ports)
7. Plug (right side is charging relief valve)
8. Charging pump

A<sub>1</sub>. To port B of right travel motor (Forward)  
B<sub>1</sub>. To port A of right travel motor (Reverse)  
A<sub>2</sub>. To port B of left travel motor (Forward)  
B<sub>2</sub>. To port A of left travel motor (Reverse)  
V<sub>0</sub>. To main pump charging and dump circuits  
V<sub>1</sub>. From hydraulic tank

## GENERAL

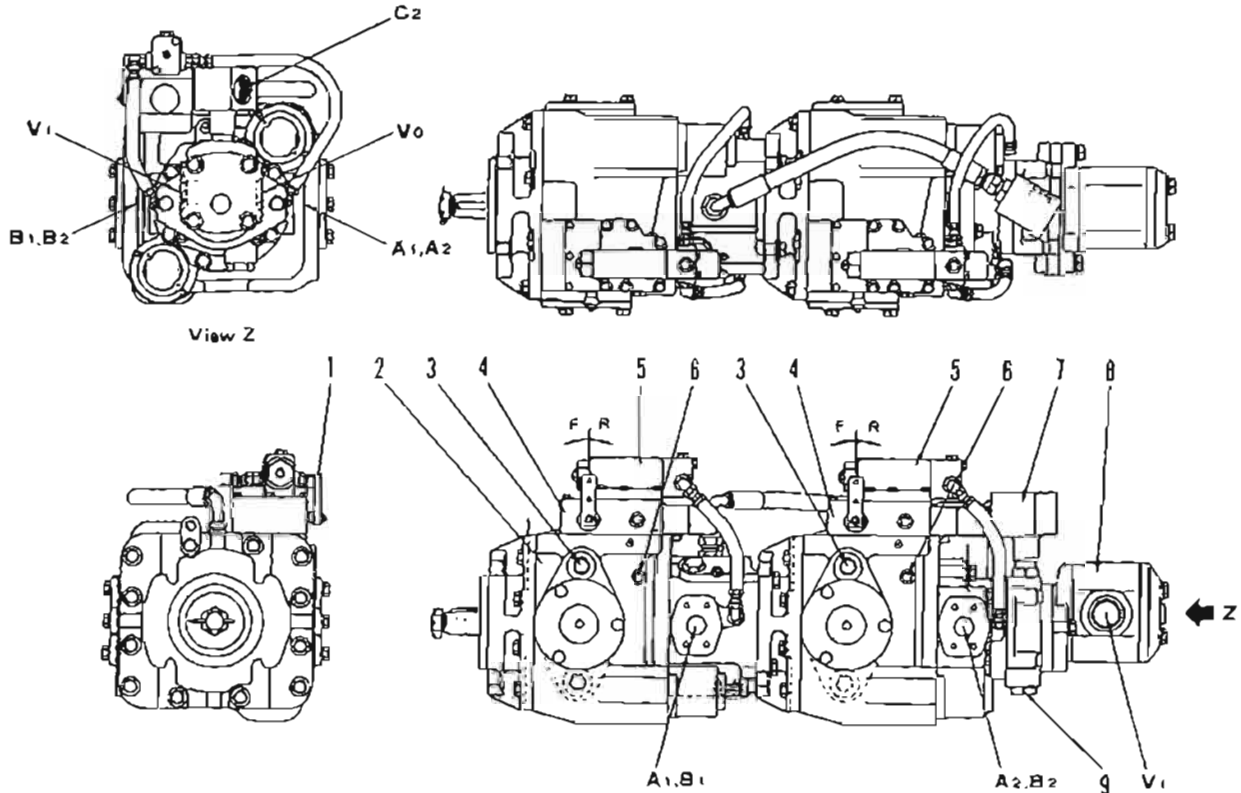
- The hydraulic pumps are mounted in the rear part of the engine via a rubber coupling; they are 2 sets of tandem main pumps and a gear-type pump to supply oil to the charging and work equipment circuits, making up triple pumps. Swash plate-type main pumps are adopted.
- The table below shows the main pump's discharging and charging pressure.

Model	Pump discharge (cc/rev)	Charging pressure (kg/cm <sup>2</sup> )
MST-600	51.6	16-18
MST-700	51.6	16-18
MST-800	51.6	16-18
MST-1100	51.6	16-18
MST-1500	69.8	16-18

# HYDRAULIC PUMP (MST-1500, 2000)

MST-1500 Serial No. 15094 -

MST-2000 Serial No. M02101 - , K20101 -



1. Control lever
2. Main pump
3. Drain plug (7/8-14UNF)
4. Pump control valve
5. Pressure override valve
6. Plug for charging pressure (7/16-20UNF)
7. Tube (connecting front and rear charging parts)
8. Charging pump
9. Charging relief valve

- A<sub>1</sub>. To port B of right travel motor (Forward)  
 B<sub>1</sub>. To port A of right travel motor (Reverse)  
 A<sub>2</sub>. To port B of left travel motor (Forward)  
 B<sub>2</sub>. To port A of left travel motor (Reverse)  
 V<sub>0</sub>. To main pump charging and dump circuits  
 V<sub>1</sub>. From hydraulic tank

## GENERAL

- The hydraulic pumps are mounted in the rear part of the engine via a rubber coupling; they are 2 sets of tandem main pumps and a gear-type pump to supply oil to the charging and work equipment circuits, making up triple pumps.

Swash plate-type main pumps are adopted.

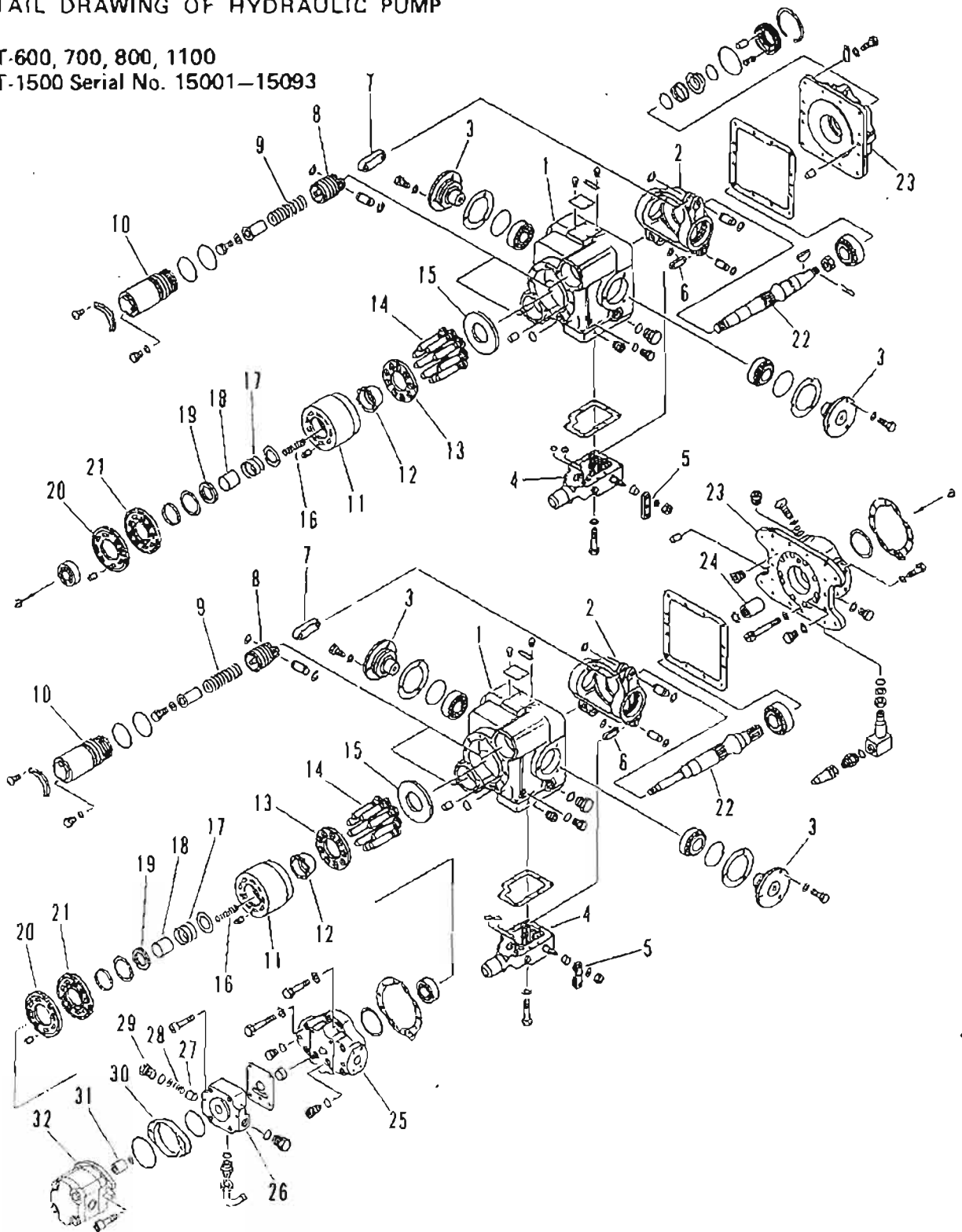
The pressure override valve is provided in the circuit between the charge relief valve and the pump control valve. If the main pump discharging pressure becomes continuously high, it shuts the oil flow to the pump control valve to return the pump's swash plate angle to the "NEUTRAL" position. As the main pump's discharge is stopped, the pressure drops to protect the traveling motors and the piping from abnormally high pressure.

- The table below shows the main pump's discharge and charging pressure.

Model	Pump discharge (cc/rev)	Charging pressure (kg/cm <sup>2</sup> )
MST-1500	69.8	16-18
MST-2000	89.0	16-18

# DETAIL DRAWING OF HYDRAULIC PUMP

MST-600, 700, 800, 1100  
MST-1500 Serial No. 15001-15093

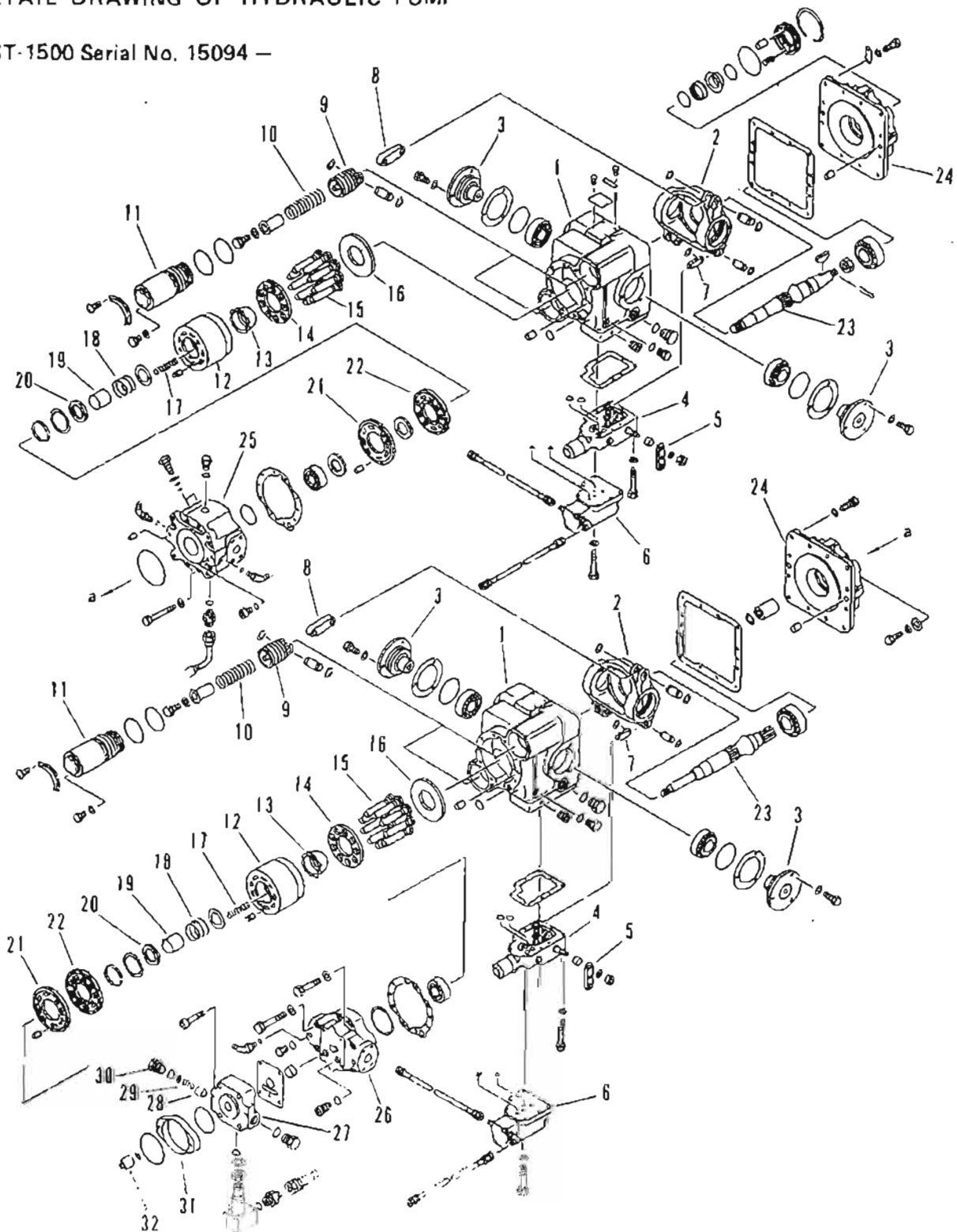


- |                  |                    |                   |                           |
|------------------|--------------------|-------------------|---------------------------|
| 1. Housing       | 9. Spring          | 17. Spring        | 25. Housing               |
| 2. Yoke          | 10. Sleeve         | 18. Guide         | 26. Housing               |
| 3. Trunnion      | 11. Cylinder block | 19. Retainer      | 27. Charging valve poppet |
| 4. Control valve | 12. Guide          | 20. Swash plate   | 28. Spring                |
| 5. Control lever | 13. Retainer       | 21. Bearing plate | 29. Spring                |
| 6. Link          | 14. Piston         | 22. Drive shaft   | 30. Support               |
| 7. Link          | 15. Thrust plate   | 23. Housing       | 31. Coupling              |
| 8. Yoke          | 16. Spring         | 24. Coupling      | 32. Charging pump         |



# DETAIL DRAWING OF HYDRAULIC PUMP

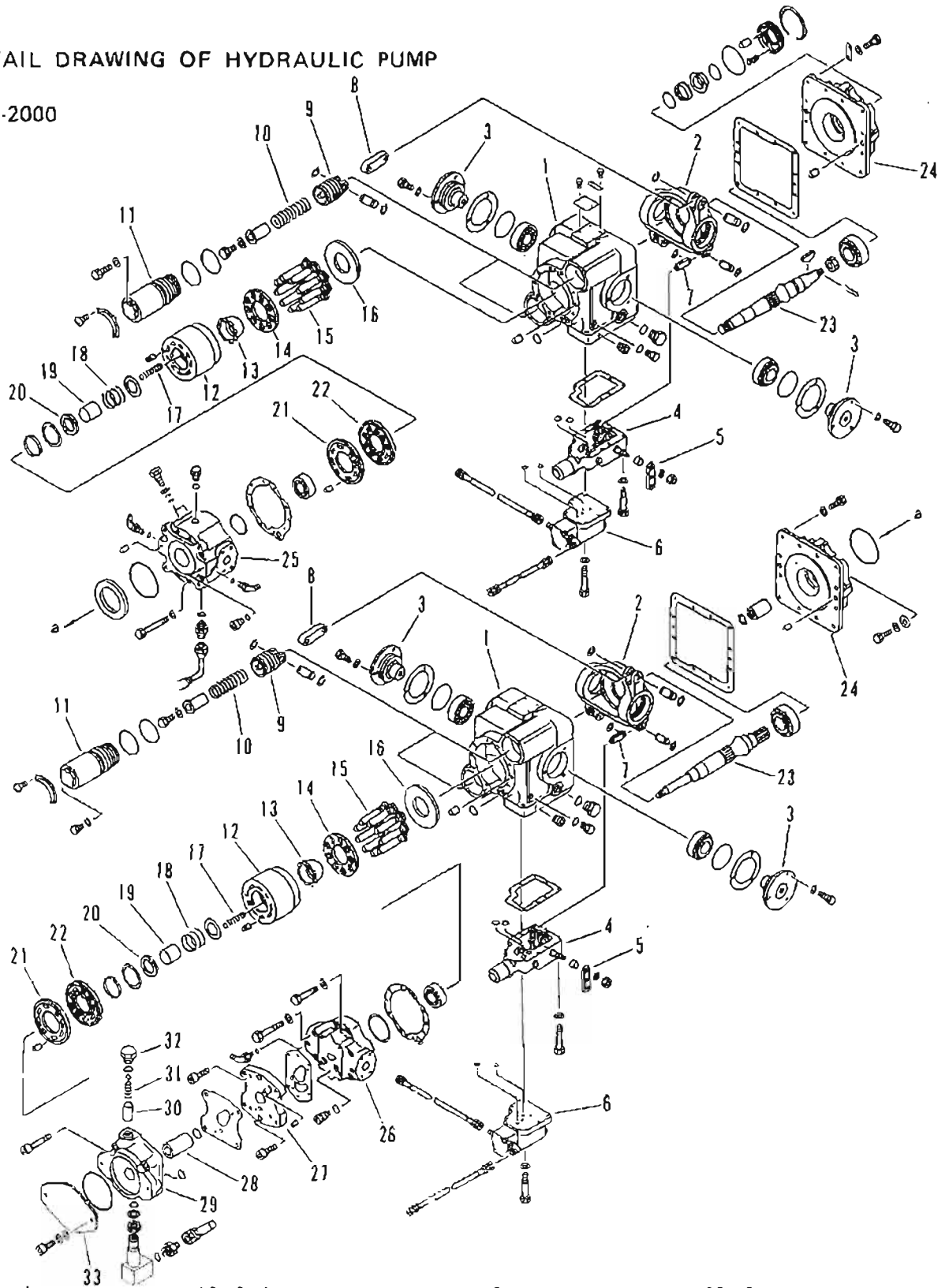
MST-1500 Serial No. 15094 —



- |                            |                    |                   |                           |
|----------------------------|--------------------|-------------------|---------------------------|
| 1. Housing                 | 9. Yoke            | 17. Spring        | 25. Housing               |
| 2. Yoke                    | 10. Spring         | 18. Spring        | 26. Housing               |
| 3. Trunnion                | 11. Sleeve         | 19. Guide         | 27. Housing               |
| 4. Control valve           | 12. Cylinder block | 20. Retainer      | 28. Charging valve poppet |
| 5. Control lever           | 13. Guide          | 21. Swash plate   | 29. Spring                |
| 6. Pressure override valve | 14. Retainer       | 22. Bearing plate | 30. Plug                  |
| 7. Link                    | 15. Piston         | 23. Drive shaft   | 31. Support               |
| 8. Link                    | 16. Thrust plate   | 24. Housing       | 32. Coupling              |

# DETAIL DRAWING OF HYDRAULIC PUMP

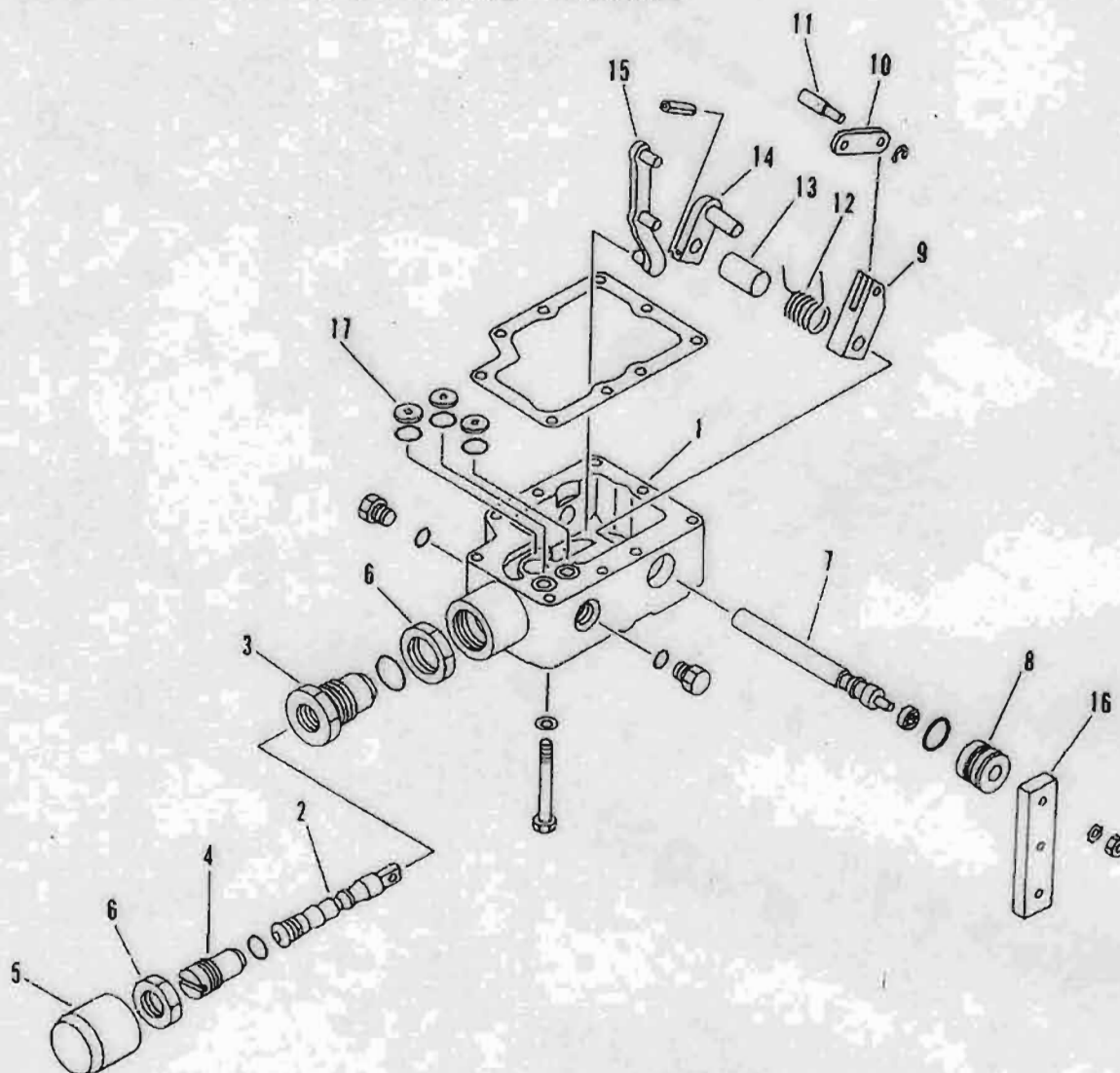
MST-2000



- |                            |                    |                   |                           |
|----------------------------|--------------------|-------------------|---------------------------|
| 1. Housing                 | 10. Spring         | 19. Guide         | 28. Coupling              |
| 2. Yoke                    | 11. Sleeve         | 20. Retainer      | 29. Housing               |
| 3. Trunnion                | 12. Cylinder block | 21. Swash plate   | 30. Charging valve popper |
| 4. Control valve           | 13. Guide          | 22. Bearing plate | 31. Spring                |
| 5. Control lever           | 14. Retainer       | 23. Drive shaft   | 32. Plug                  |
| 6. Pressure override valve | 15. Piston         | 24. Housing       | 33. Cover                 |
| 7. Link                    | 16. Thrust plate   | 25. Housing       |                           |
| 8. Link                    | 17. Spring         | 26. Housing       |                           |
| 9. Yoke                    | 18. Spring         | 27. Plate         |                           |

## DETAIL DRAWING OF PUMP CONTROL VALVE

★ The diagram shows the MST-600, 700, 800, 1100, 1500 and 2000.

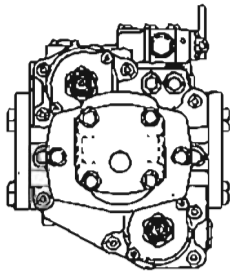


1. Valve housing
2. Valve spool
3. Sleeve
4. Adjustment screw
5. Cap
6. Lock nut
7. Shaft
8. Sleeve
9. Lever
10. Link
11. Shaft
12. Spring
13. Collar
14. Lever
15. Lever
16. Control lever
17. Orifice

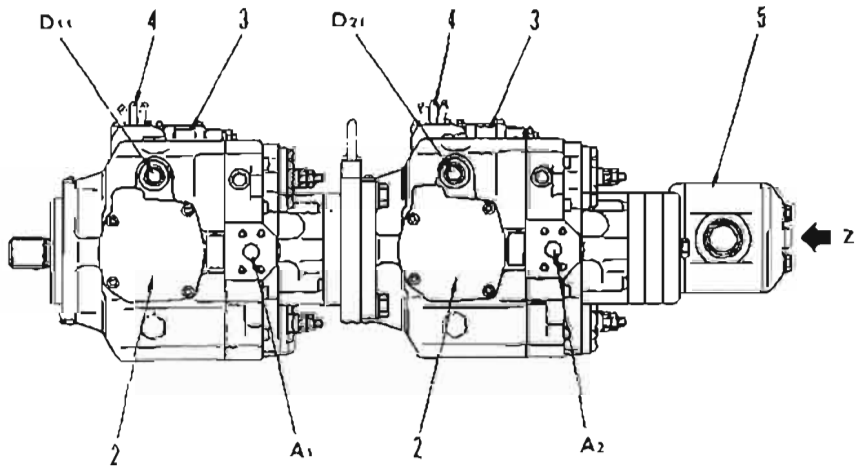
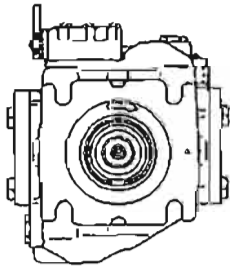
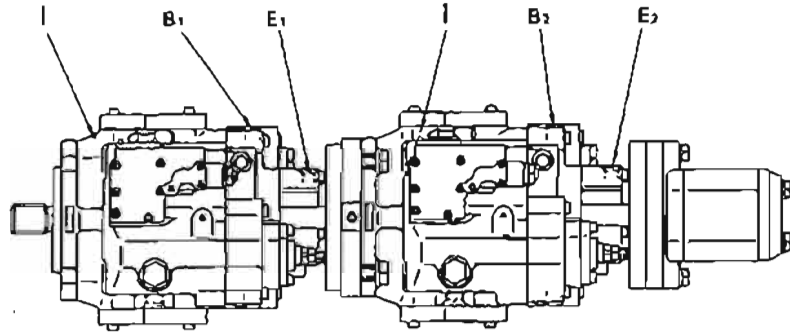
### GENERAL

- The pump control valve is mounted in the upper part of either of the front or rear main pumps. Interlocked with the linkage from the steering lever, it controls the main pump's swash plate angle to control the vehicle's traveling speed and turning motion. The control valve switches the oil from the charging pump.

# HYDRAULIC PUMP (MST-2200)



View Z



1. Main pump
2. Servo cylinder
3. Pump control valve
4. Control lever
5. Charging pump

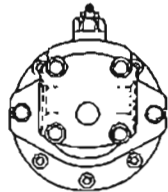
- A<sub>1</sub>. To port B of right travel motor (Forward)  
 B<sub>1</sub>. To port A of right travel motor (Reverse)  
 A<sub>2</sub>. To port B of left travel motor (Forward)  
 B<sub>2</sub>. To port A of left travel motor (Reverse)  
 To main pump charging and dump circuits  
 From hydraulic tank  
 E<sub>1</sub>. From charging pump  
 E<sub>2</sub>. From charging pump  
 D<sub>11</sub>. To hydraulic tank  
 D<sub>21</sub>. To hydraulic tank

## GENERAL

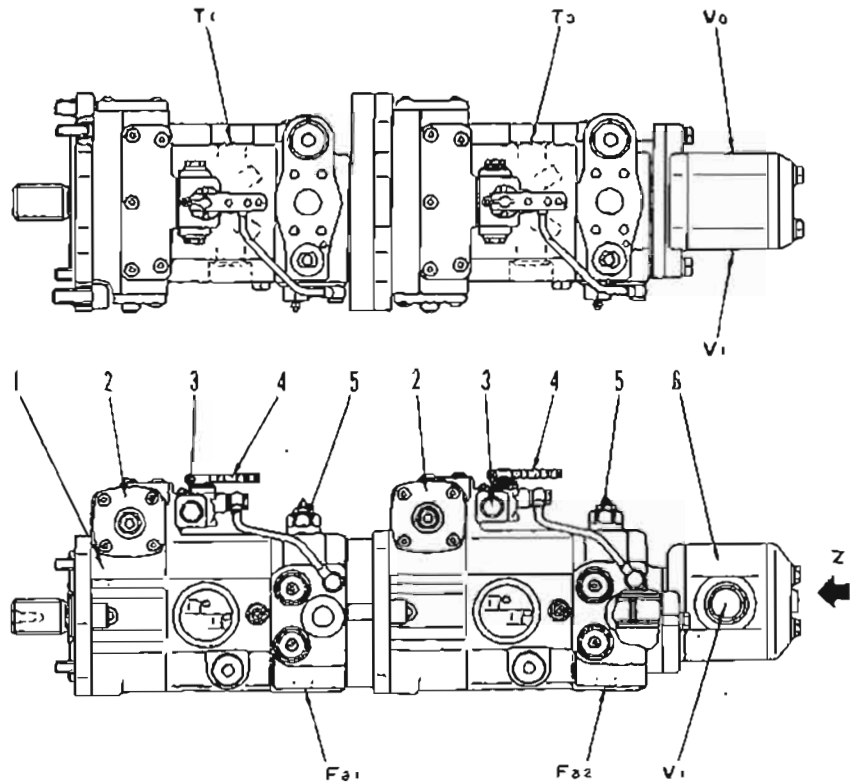
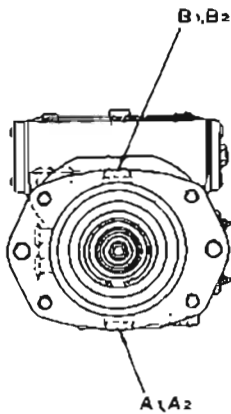
- The hydraulic pumps are mounted in the rear part of the engine via a rubber coupling; they are 2 sets of tandem main pumps and a gear-type pump to supply oil to the charging and work equipment circuits, making up triple pumps.  
Swash plate-type main pumps are adopted.  
Charge relief valve installed to the main pump has its actual function stopped, and the charge relief valve installed at the rear of the operator's compartment sets the pressure of the charge circuit.
- The table below shows the main pump's discharge and charging pressure.

Model	Pump discharge (cc/rev)	Charging pressure (kg/cm <sup>2</sup> )
MST-2200	110.9	25

# HYDRAULIC PUMP (MST-2500)



View Z



1. Main pump
2. Servo cylinder
3. Pump control valve
4. Control lever
5. Charging relief valve
6. Charging pump

- A<sub>1</sub>. To port B of right travel motor (Forward)  
 B<sub>1</sub>. To port A of right travel motor (Reverse)  
 A<sub>2</sub>. To port B of left travel motor (Forward)  
 B<sub>2</sub>. To port A of left travel motor (Reverse)  
 V<sub>0</sub>. To main pump charging and dump circuits  
 V<sub>1</sub>. From hydraulic tank  
 Fa<sub>1</sub>. From charging pump  
 Fa<sub>2</sub>. From charging pump  
 T<sub>1</sub>. To hydraulic tank  
 T<sub>3</sub>. To hydraulic tank

## GENERAL

- The hydraulic pumps are mounted in the rear part of the engine via a rubber coupling; they are 2 sets of tandem main pumps and a gear-type pump to supply oil to the charging and work equipment circuits, making up triple pumps.

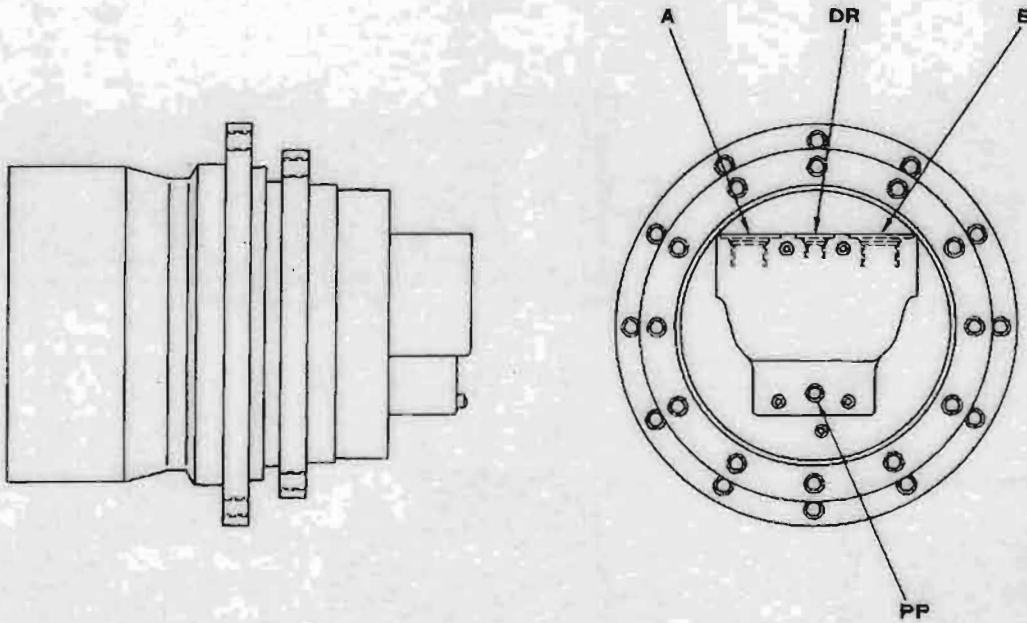
Swash plate-type main pumps are adopted.

Charge relief valve (5) installed to the main pump has its actual function stopped, and the charge relief valve installed at the rear of the operator's compartment sets the pressure of the charge circuit.

- The table below shows the main pump's discharge and charging pressure.

Model	Pump discharge (cc/rev)	Charging pressure (kg/cm <sup>2</sup> )
MST-2500	125	25

# TRAVEL MOTOR (MST-500)



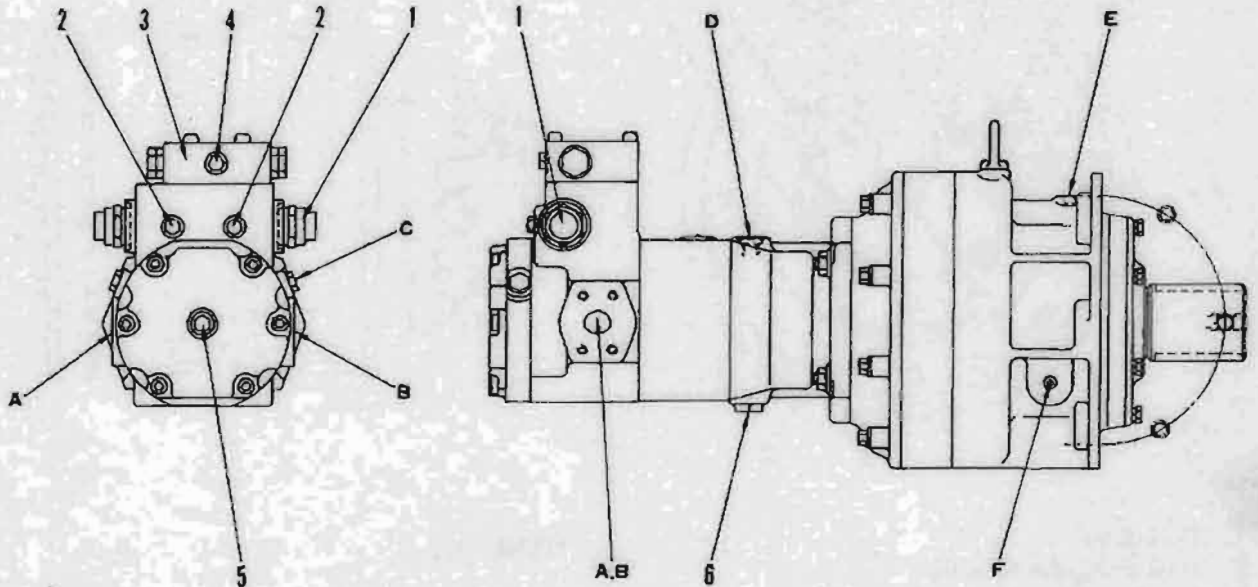
- A. From port A1 or A2 of main pump (Forward)
- B. From port B1 or B2 of main pump (Reverse)
- DR. To hydraulic tank
- PP. Port for parking brake

## GENERAL

- The travel motors are mounted in the right and left front of the main frame. They drive the sprocket to run or turn the vehicle.  
Swash plate-type travel motors are adopted.  
A parking disc brake and a planetary reduction gear are mounted.
- The table below shows the travel motor's discharge and high pressure relief pressure.

Model	Motor discharge (cc/rev)	Relief pressure (kg/cm <sup>2</sup> )	Max. output speed (rpm)	Brake pressure (kg/cm <sup>2</sup> )
MST-500	39.0	280	9.4	18

# TRAVEL MOTOR (MST-600)



1. High-pressure relief valve
  2. Plug for high-pressure (7/16-20UNF)
  3. Flushing valve
  4. Plug for charging pressure (7/16-20UNF)
  5. Plug for disengaged parking brake
  6. Drain plug
- A. From port B1 or B2 of main pump (Forward)  
 B. From port A1 of A2 of main pump (Reverse)  
 C. Port for parking brake  
 D. Drain port  
 E. Plug for oil supply (3/4-16UNF)  
 F. Plug for oil check (PT1/8)

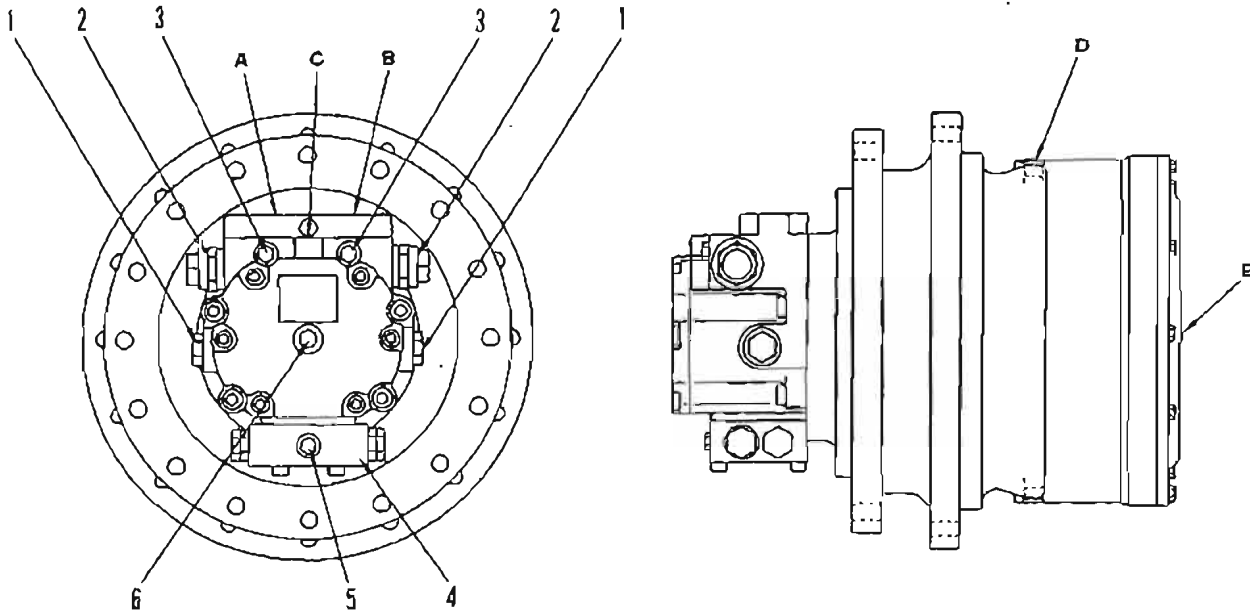
## GENERAL

- The travel motors are mounted in the right and left front of the main frame. They drive the sprocket to run or turn the vehicle. Swash plate-type travel motors are adopted. A parking disc brake and a planetary reduction gear are mounted.
- The table below shows the travel motor's discharge and high-pressure relief pressure.

Model	Motor discharge (cc/rev)	Relief pressure (kg/cm <sup>2</sup> )	Max. output speed (rpm)	Brake pressure (kg/cm <sup>2</sup> )
MT-600	51.6	315	130	9.5

- \* The pressure at high pressure relief is 7 times the total of the last two digits on the model name plate stuck to the motor.

# TRAVEL MOTOR (MST-700 — 2000)



- 1. Drain plug
- 2. High-pressure relief valve
- 3. Plug for high-pressure (7/16-20UNF)
- 4. Flushing valve
- 5. Plug for charging pressure (7/16-20UNF)
- 6. Plug for disengaged parking brake
  
- A. From port B1 or B2 of main pump (Reverse)
- B. From port A1 or A2 of main pump (Forward)
- C. Port for parking-brake
- D. Plug for oil supply (3/4-16UNF)
- E. Plug for oil check (PT1/8)

## GENERAL

- The travel motors are mounted in the right and left front of the main frame. They drive the sprocket to run or turn the vehicle. Swash plate-type travel motors are adopted. A parking disc brake and a planetary reduction gear are mounted.
- The table below shows the travel motor's discharge and high-pressure relief pressure.

Model	Motor discharge (cc/rev)	Relief pressure (kg/cm <sup>2</sup> )	Max. output speed (rpm)	brake pressure (kg/cm <sup>2</sup> )
MST-700	51.6	350	40.0	9.0
MST-800	51.6	350	40.0	9.0
MST-1100	69.8	385	54.9	9.0
MST-1500 (15001—15164)	69.8	385	54.9	9.0
MST-1500 (15165 and up)	69.8	350	54.9	9.0
MST-2000 (K20101—20128) (M02101—02104)	89.0	<del>385</del> 350	54.9	9.0
MST-2000 (K20129 and up) (M02105 and up)	89.0	350	54.9	9.0

- \* Stamped mark: A figure indicating the pressure is stamped on the head of the plug of the high pressure relief valve. (Example: 50, 55 (if the stamped mark is "50," the pressure is 7 times this value, so it is 350 kg/cm<sup>2</sup>; if the stamped mark is "55," the pressure is 7 times this, so it is 385 kg/cm<sup>2</sup>.)