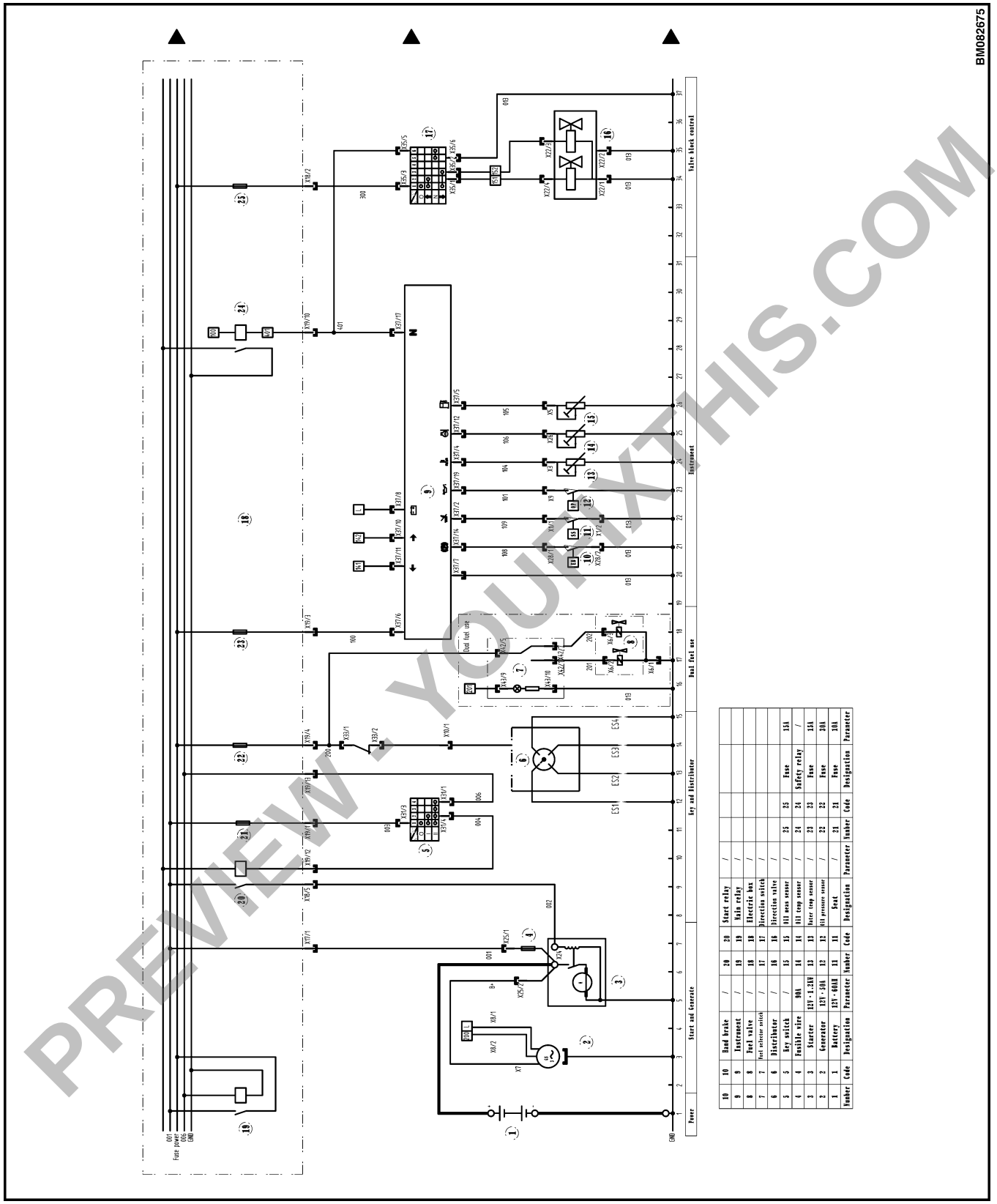
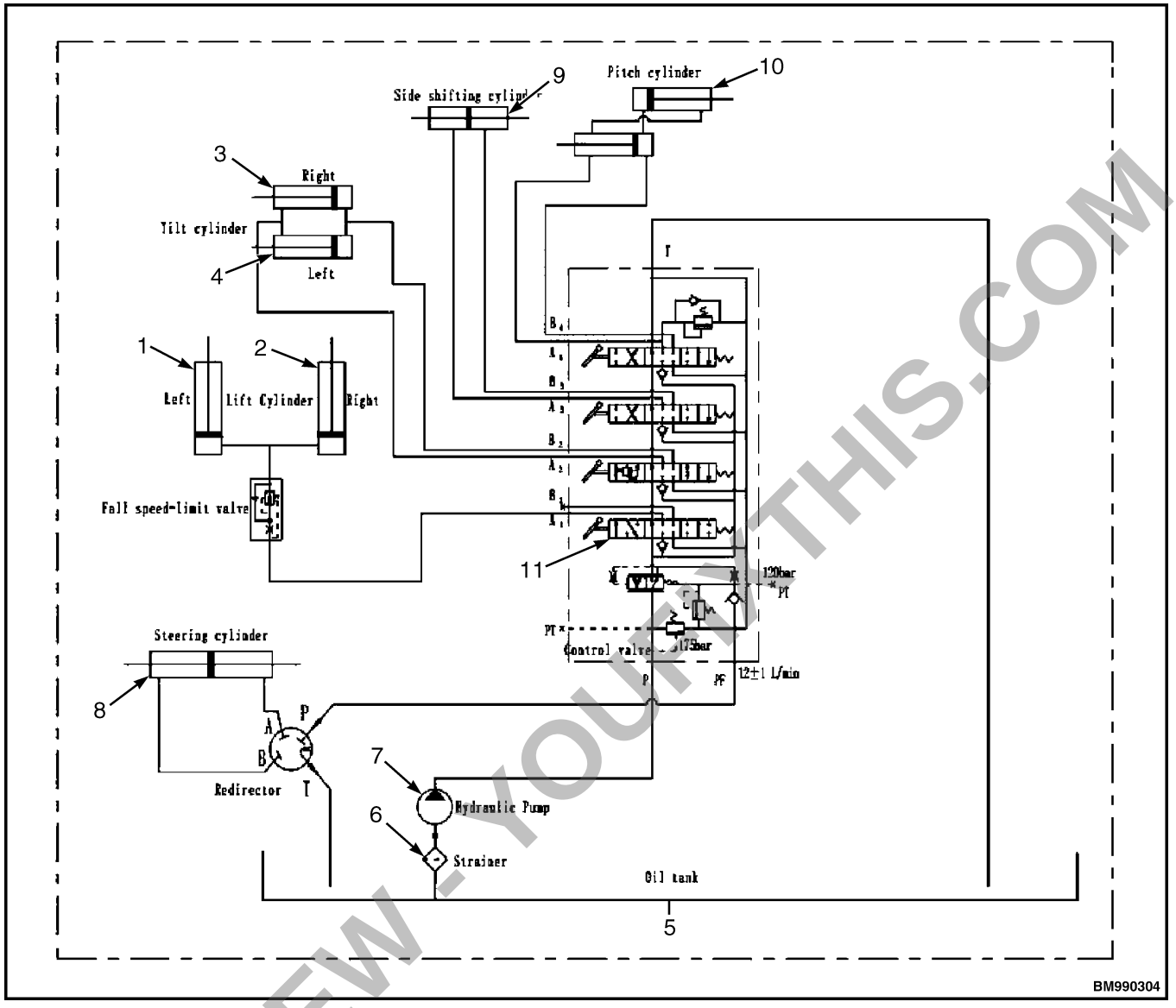


Figure 67. With NISSAN engine (K21, K25 Sheet 2 of 2)

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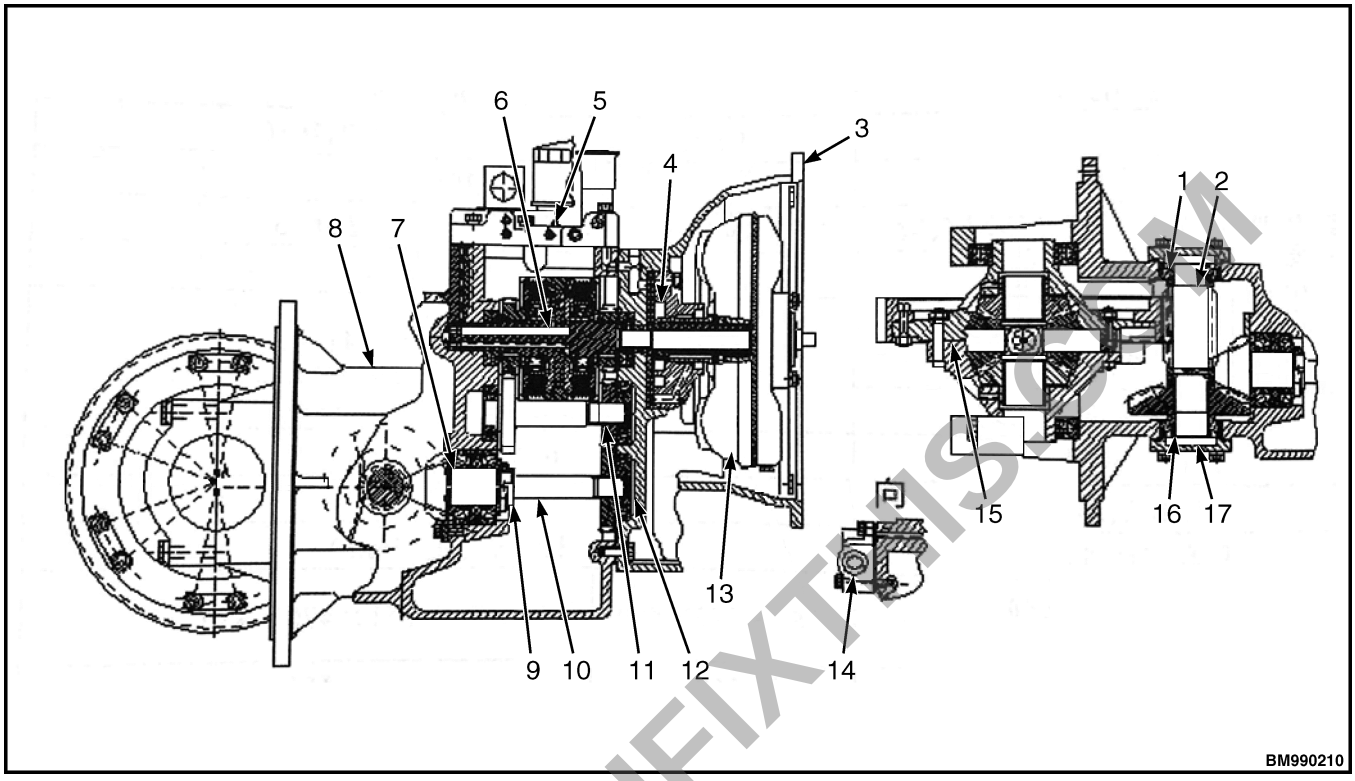


1. LEFT HAND LIFTING CYLINDER
2. RIGHT HAND LIFTING CYLINDER
3. RIGHT HAND TILT CYLINDER
4. LEFT HAND TILT CYLINDER
5. HYDRAULIC OIL TANK
6. FEEDING OIL FILTER
7. GEAR PUMP
8. STEERING CYLINDER
9. SIDE-SHIFT CYLINDER
10. PITCH CYLINDER
11. MULTI-WAY VALVE

Figure 46. Oil Circuit of Hydraulic System

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1. GEAR SHAFT
2. TAPERED ROLLER BEARING
3. TORQUE CONVERTER HOUSING ASSEMBLY
4. OIL PUMP ASSEMBLY
5. COVER AND CONTROL VALVE ASSEMBLY
6. CLUTCH ASSEMBLY
7. BEARING PLATE
8. HOUSING
9. IDLER SHAFT
10. OUTPUT SHAFT
11. IDLER GEAR
12. OUTPUT GEAR
13. HYDRAULIC TOR-CON CONVERTER
14. INCH VALVE ASSEMBLY
15. DIFFERENTIAL ASSEMBLY
16. SPIRAL BEVEL GEAR
17. BEARING CAP

Figure 11. Hydraulic Transmission Device

TORQUE CONVERTER

The torque converter is composed of a pump impeller, turbine, and guide pulley.

The torque converter is connected to a flexplate attached to the flywheel of the engine, which rotates the pump. Hydraulic oil flowing through the input shaft is sprayed onto the blades of the pump impeller, which sends the fluid into the turbine wheel and rotates the turbine wheel. The fluid enters the perimeter of the turbine, and then changes direction before leaving the center of the turbine, causing the turbine to spin.

Finally, the hydraulic oil flows into the blades of the guide pulley in a reverse direction, which sends the fluid back to the pump impeller.

The driving gear is connected with the pump impeller by two claws to the oil feed pump, and feeds the oil to the torque converter and the hydraulic transmission case. The turbine is connected to the shaft using a spline. The power created by the torque converter is transmitted from the turbine shaft to the gear-shift transmission case.

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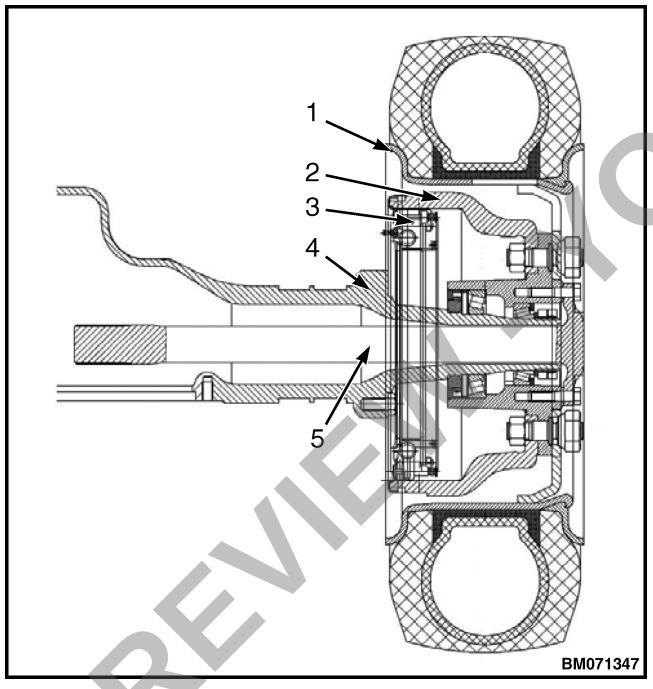
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Drive Axle

OVERVIEW

The drive axle is composed of axle housing, wheel hub, half shaft and brake. The axle housing is an integrated casting. The tire is attached to the wheel hub through the wheel rim using stub bolt and nut. The power is transmitted to the half shaft through through the speed differential, and finally the front wheel is turned by the wheel hubs. Each wheel hub is mounted on the axle housing through two tapered roller bearings, so the half shaft only bears the torque transmitted by wheel hub. An oil seal is fitted inside the wheel hub, to prevent entry of water and dust, or oil leak.

Different forklift truck sizes may use different sized wheel rims. 2-2.5T trucks may use a wheel rim equipped for single, narrow tire. 3-3.5T trucks, may use a rim equipped for a single wide tire or double tire. See Figure 20 or Figure 21.



1. WHEEL RIM
2. WHEEL HUB
3. BRAKE DEVICE
4. AXLE HOUSING
5. HALF SHAFT

Figure 20. Single Wheel Drive Axle

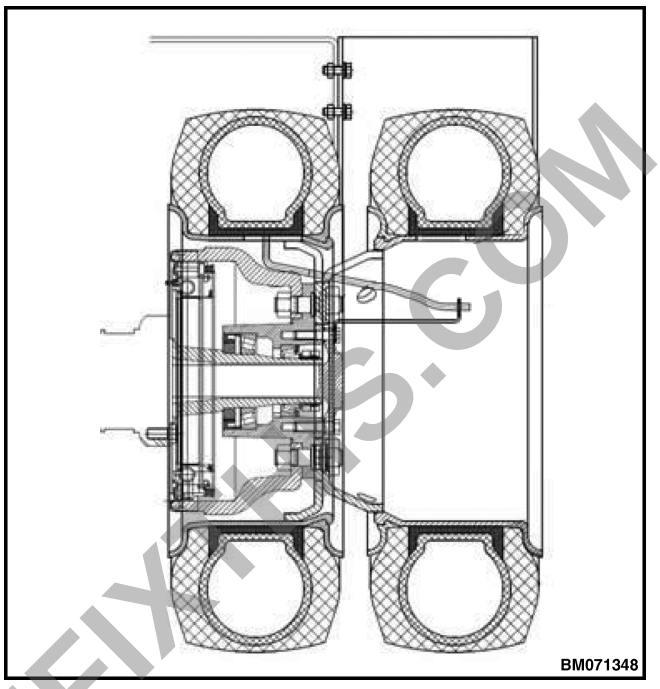


Figure 21. Dual Wheel Drive Axle

MAINTENANCE OF DRIVE AXLE

To replace the drive axle wheel nut:

1. Coat tapered roller bearing with lubricating grease.
2. Tighten the lock nuts. Make sure that the rotating torque of the wheel hub is 9.8-29.4 N•m (7.2-21.7 lbf ft).
3. Tighten the half shaft mounting nut. Torque to 96-111 N•m (70.8-81.9 lbf ft).
4. Tighten the wheel mounting nut. Torque to 470-550 N•m (346.7-405.7 lbf ft).
5. Tighten the brake drum mounting. Torque to 206-225 N•m (151.9-165.9 lbf ft).

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Table 8. Fuel, lubricating oil, and other requirements for use on Gasoline Engines (Nissan K21/Nissan K25/Mitsubishi S4S-455)

Item	Requirement	Remarks
Fuel	Use lead-free gasoline at 89 octane, equivalent to Number JIS K2202-1988 2	Equivalent to Chinese Standard GB484-86RQ-90 Number gasoline. DO NOT use lead gasoline, as engine will fail to combust completely and wil cause wear to engine components. Environmental concerns are also raised when lead gasoline is used.
Lubricating Oil	Application Specifications: API: Above SD Grade (Equivalent to above Chinese Q. Grade) SAE: For Normal Regions: 20W Cold Zones: 10W To be replaced after use for 200 hours or 1 month	
Anti-freezing Fluid (LLC-Long Life Coolant)	Equivalent to JIS K2234-1988, 2 Kinds LLC Concentration: Standard Zones (above -15°C) 30% Cold Zones (above -35°C) 50%. To be replaced every 2400 hours or 12 months	Antifreeze shall be referred to for implementation, and it is recommended to use long-acting anti-rust anti-freezing fluid (FD-2 Type, -35°C).
Fuel Filter	Replace every 2400 hours or 12 months	Use Nissan/Mitsubishi approved filter.
Engine Oil Filter	Replace every 600 hours or 3 months	Use Nissan/Mitsubishi approved filter.
Air Filter	Replace every 1200 hours or 6 months	Use Nissan/Mitsubishi approved filter.

NOTE: The replacement intervals listed in the table are for 8 hours per day. If the lift truck is to be operated 24 hours per day or in a harsh environment, items should be replaced more frequently.

Engine Adjustment

The engine must be adjusted periodically to maintain optimal performance of lift truck. Follow the steps below to adjust the engine idle speed.

1. Adjust idle speed (used for gasoline engine)

a. Warm up the engine until the temperature of engine cooling water reaches 85°C (185°F).

b. Mount tachometer on the engine. Use the idle speed adjusting screw to adjust the engine speed to 750 rpm for 2-3.5T forklift trucks.

c. Adjust the limit screw on the air throttle to increase engine speed.

d. Use idle speed adjusting screw, to adjust the engine for 2-3.5T to 750 rpm.

e. Repeat Step a through Step d until a stable rotating speed of 650 rpm is achieved.

2. Adjust the no-load maximum rotating speed (used for gasoline engine).

a. Warm up the engine until the temperature of engine cooling water reaches 85°C (185°F).

b. Shut down the engine, and confirm that the accelerator pedal is pushed down to the bottom and the air throttle is fully open.

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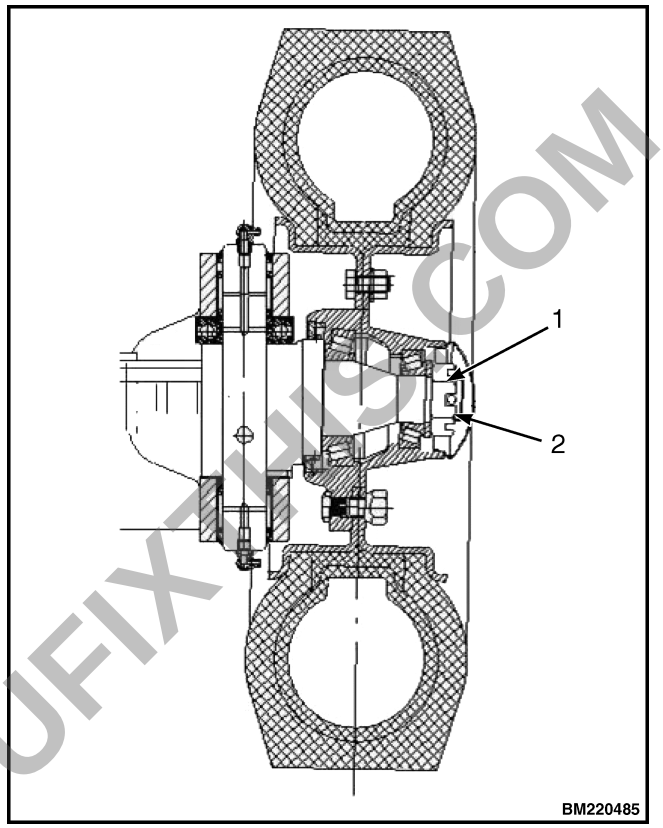
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Steering Universal Joint and King Pin

The steering universal joint is mounted between the upper and lower shaft sleeves on the two ends of the steering axle body using the king pin, thrust bearing, and gasket. The middle part of king pin is locked on the universal joint using a lock pin, while the two ends of the king pin are supported by needle roller bearings attached to the axle body. Oil seals are mounted on the two ends of needle roller bearings, and an oil cup is fitted on the king pin.

Adjustment for Pre-loading of Steering Wheel Bearing

1. Coat the inside and outside of the bearings as well as the wheel hub cover with lubricating grease. Coat the lip of the oil seal as well.
2. Install the bearing outer ring onto the wheel hub, and mount the wheel hub onto the shaft of steering universal joint.
3. Mount the flat washer and tighten the slot nut. Torque to 206-235 N•m (151.9-173.3 lbf ft).
4. Loosen the slot nut and then tighten the nut. Torque to 9.8 N•m (7.2 lbf ft).
5. Tap the wheel hub gently using a wooden hammer. Manually turn the wheel hub 3-4 times. Torque to 2.9-7.8 N•m (2.1-5.8 lbf ft).
6. When rotating torque is higher than the specified value, loosen nut by 1/6 turn, then check torque again.
7. Lock the slot nut using cotter pin, when specified rotating torque is reached.



1. SLOT NUT
2. GREASING LOCATION

Figure 26. Adjustment for Pre-loading

TROUBLESHOOT STEERING SYSTEM

Problem	Cause	Solution
Steering Wheel Not Turning	Oil pump damaged or out of action	Replace pump
	Bypass valve blocked or damaged	Clean or replace
	Rubber hose joint damaged or fluid line blocked	Clean or replace
Steering Operation Hard to Move	Bypass valve pressure too low	Adjust pressure
	Air present in oil circuit	Remove air
	Reset of steering gear out of operation, and positioning leaf spring broken	Replace leaf spring
	Excessive internal leak of steering cylinder	Inspect sealing of piston
Loose Steering Operation	Excessive oil flow	Adjust flow of bypass valve

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Parameter		Model			
		UT20P-W(B2)3	UT20P-W(B3)3	UT20P-W(A2)3	UT20P-W(A3)3
Performance Parameter					
Rated Capacity		2000 kg (4409 lb)			
Load Center		500 mm (19.7 in.)			
Lifting Height		3000 mm (118.1 in.)			
Free Lift Height		160 mm (6.3 in.)			
Mast Tilt Angle Front/Rear		6/12°			
Lifting Speed	No-Load	530 mm/s (1.74 in/s)			
	Full-Load	500 mm/s (1.64 in/s)			
Running Speed	Forward	19 kph (11.8 mph)			
	Backward	19 kph (11.8 mph)			
Max Traction Force	No-Load	15000 N (3372.1 lbf)			
	Full-Load	17000 N (3821.8 lbf)			
Gradeability	No-Load	20%			
	Full-Load	20%			
Min Turning Radius		2290 mm (90.2 in.)			
Min Right Angle Stacking Aisle Width **K**		3966 mm (156.1 in.)			
Size Parameter					
Total Length **L** (Without Fork)		3630 mm (142.9 in.)			
Total Width **W**		1150 mm (45.3 in.)			
Total Height **D** (Mast Retracted)		2010 mm (79.1 in.)			
Total Height **E** (Mast Extended)		4025 mm (158.5 in.)			
Wheelbase **F**		1600 mm (63 in.)			
Track Width	Front **Q1**	970 mm (38.2 in.)			
	Rear **Q2**	980 mm (38.6 in.)			
Front Overhang **B**		475 mm (18.7 in.)			
Rear Overhang **C**		484 mm (19.1 in.)			
Fork Dimension	Length	1070 mm (42.1 in.)			
	Width	122 mm (4.8 in.)			
	Height	40 mm (1.6 in.)			
Fork Spacing Adjustable Range		250-1000 mm (9.8-39.4 in.)			
Ground Clearance (Bottom of Mast)		125 mm (4.9 in.)			
Total Weight		3390 kg (7474 lb)			

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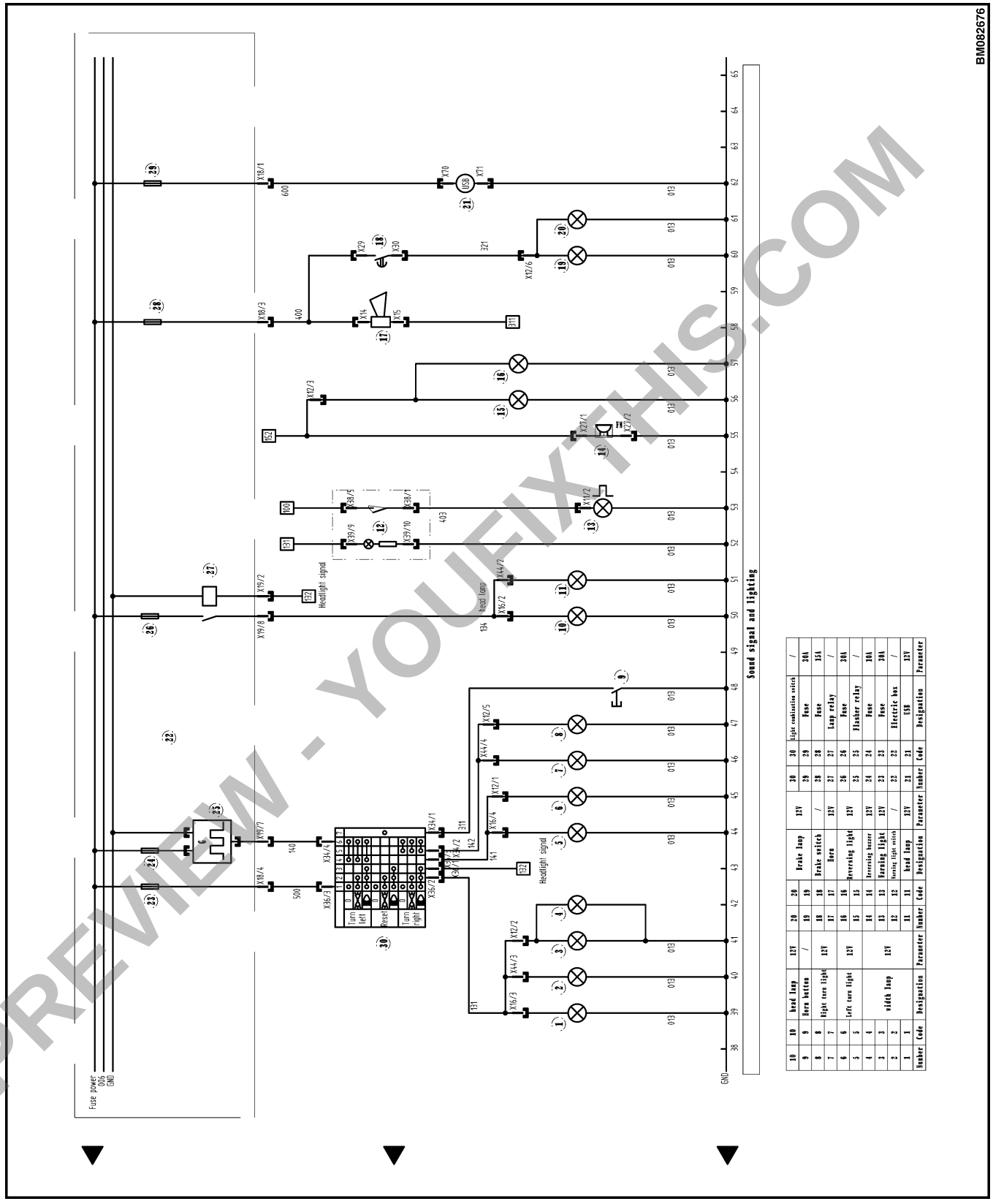
Table 5. Diesel (2.6L) (Continued)

Model		Yanmar 4TNE92
Max Torque/Speed		135.4-149/1500-1700 (N.m/rpm) 99.9-109.9/1500-1700 (lbf ft/rpm)
No-Load Min Speed		810 rpm
Min Fuel Specific Consumption g/ps.h		1018.3 (L/hph) 269 (g/hph)
Movement Direction		In Clockwise Direction Looking from the End of Fan
Total Length × Total Width × Total Height		711 x 526 x 717 mm (28 x 20.7 x 28.2 in.)
Firing Order		1-3-4-2-1
Valve Timing		
Valve Clearance	Inlet Valve (Heat Engine)	0.38 mm (0.02 in.)
	Exhaust Valve (Heat Engine)	0.38 mm (0.02 in.)
Cooling System		Forced Circulation Water Cooling
Lubricating System		Forced Lubrication
Main Part		
Membrane Type		Distributed Type
Paper Element Filter		Throttling Type
Gear Type		Paper Filtration
Paper Filtration		Cycloid Pump
Centrifugal Type		Eddy Current Type
Wax Type		Wax Pellet Type
Generator	Voltage	12V
	Current	40A
	Method of power generation	AC Generation, and Silicon Rectification
Starter	Voltage	12V
	Output Power kw	2 kW (2.68 hp)
Battery	Voltage	12V
	Capacity	90Ah

Refer to the engine operation and maintenance manuals for more information about engines used for 2-3.5t forklift trucks.

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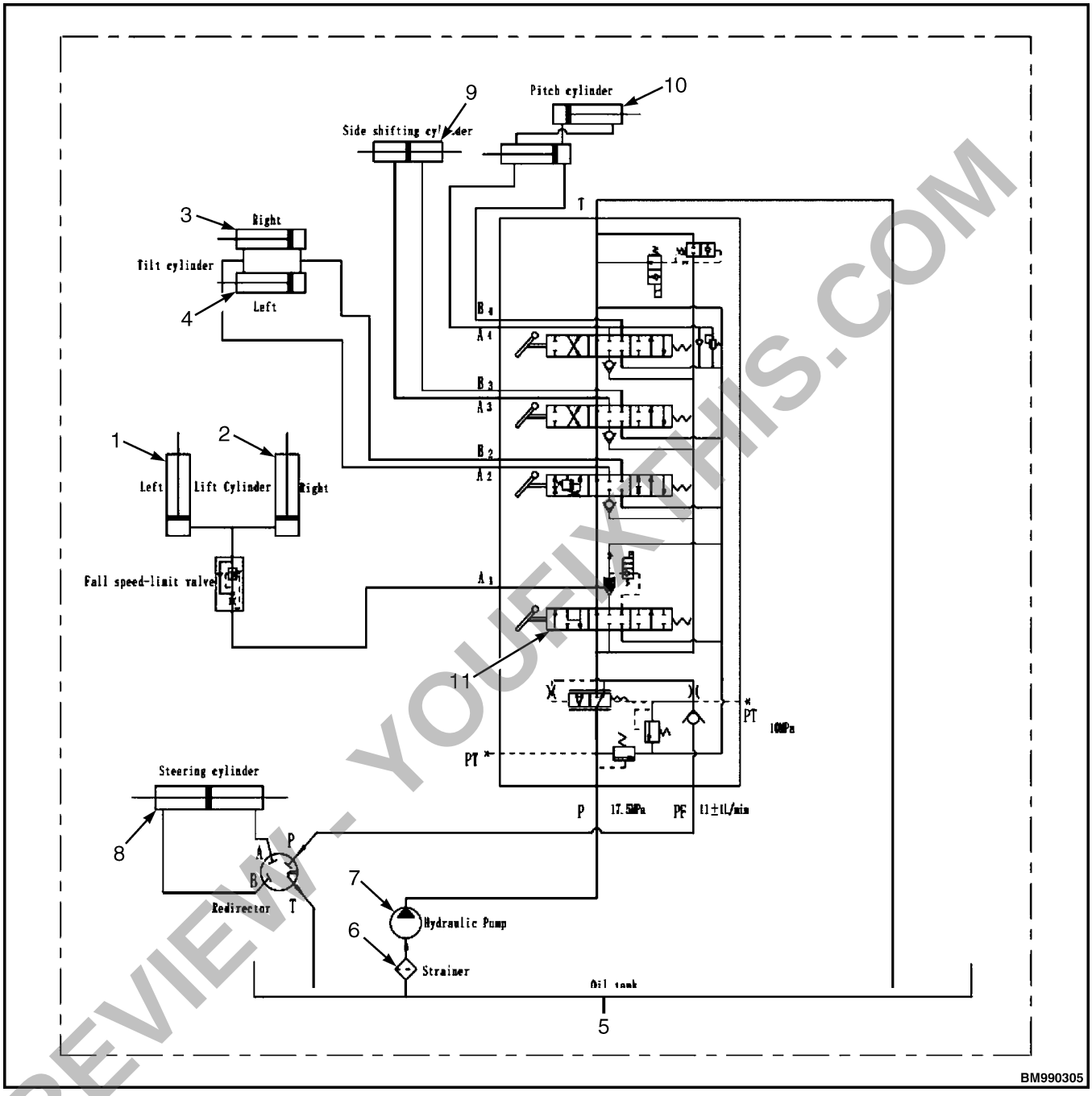


10	10	head lamp	12V	20	20	brake lamp	12V	30	30	light combination switch	/
9	9	horn button	/	19	19			29	29	fuse	30A
8	8			18	18	brake switch	/	28	28	fuse	15A
7	7	right turn light	12V	17	17	horn	12V	27	27	lamp relay	/
6	6	left turn light	12V	16	16	reversing light	12V	26	26	fuse	30A
5	5			15	15			25	25	flasher relay	/
4	4			14	14	reversing buzzer	12V	24	24	fuse	10A
3	3	width lamp	12V	13	13	turning light	12V	23	23	fuse	20A
2	2			12	12	turning light switch	/	22	22	electric box	/
1	1			11	11	head lamp	12V	21	21	USB	12V
Number	Code	Designation	Parameter	Number	Code	Designation	Parameter	Number	Code	Designation	Parameter

Figure 66. With NISSAN engine (K21, K25 Sheet 1 of 2)

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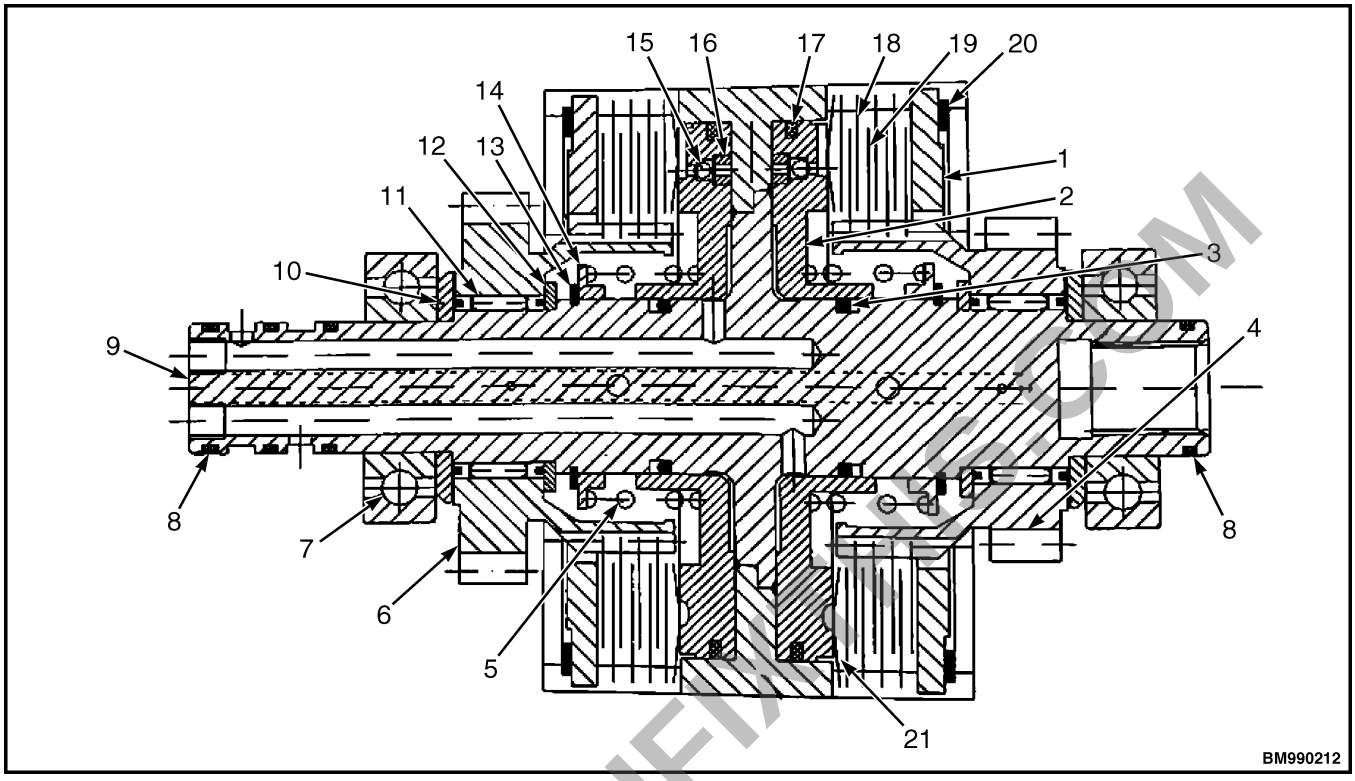


1. LEFT HAND LIFTING CYLINDER
2. RIGHT HAND LIFTING CYLINDER
3. RIGHT HAND TILT CYLINDER
4. LEFT HAND TILT CYLINDER
5. HYDRAULIC OIL TANK
6. FEEDING OIL FILTER
7. GEAR PUMP
8. STEERING CYLINDER
9. SIDE-SHIFT CYLINDER
10. PITCH CYLINDER
11. MULTI-WAY VALVE

Figure 47. Oil Circuit of Hydraulic System (OPS)

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1. END PLATE
2. PISTON
3. O-RING
4. FORWARD GEAR
5. RETURNING SPRING
6. REVERSING GEAR
7. BEARING
8. SEAL RING (A)
9. INPUT SHAFT ASSEMBLY
10. THRUST COLLAR (A)
11. NEEDLE BEARING
12. THRUST SHAFT COLLAR (B)
13. AXIS SNAP RING
14. SPRING SEAT
15. STEEL BALL
16. PLUG
17. SEAL RING (B)
18. SPACER
19. BRAKE SHOE
20. STOPPER
21. DISC PLATE

Figure 13. Hydraulic Clutch

CONTROL VALVE, SAFETY VALVE, AND INCHING VALVE

The **Control Valve** is mounted on the inner side of the transmission case cover (see Figure 14). The control valve includes three components: controlling slide valve, constant pressure valve and adjusting valve.

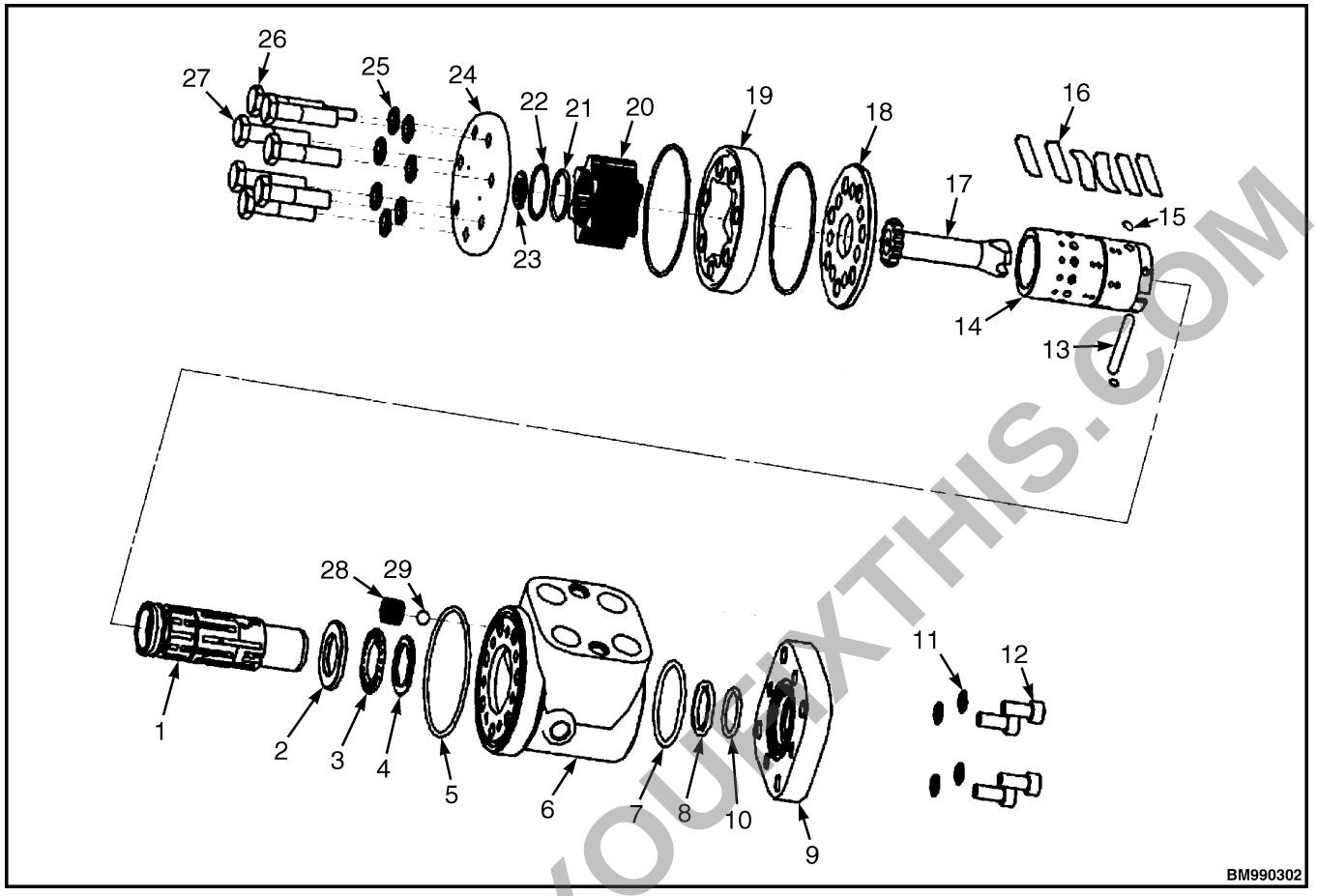
- **Controlling Slide Valve**: Used to control forward and backward functions.
- **Constant Pressure Valve**: Maintains the oil pressure of the hydraulic clutch to be within the range of 1.1-1.4 MPa (159.5-203.1 psi).
- **Adjusting Valve**: Located between inching valve and controlling slide valve. When controlling slide valve is fully open, this valve will adjust pressure to reduce the impact of clutch during engagement.

The **Overflow Valve** is connected to the transmission case, and maintains the oil pressure of torque converter within the range of 0.5-0.7 MPa (72.5-101.5 psi).

The **Inching Valve** is installed on the outer side of transmission case. The shaft of the valve is connected to the linking rod of the inching pedal. This shaft will move to the right when the inching pedal is pressed, and the oil pressure of hydraulic clutch is cut short, enabling the truck to inch forward. See Figure 15.

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1. VALVE ELEMENT
2. SLEEVE
3. NEEDLE BEARING
4. SLEEVE
5. O-RING
6. VALVE BODY
7. O-RING
8. X-TYPE SEAL
9. FRONT CAP
10. O-RING
11. SPRING WASHER
12. HEX SOCKET SCREW 20-30 N•m (14.8-22.1 psi)
13. PIN
14. VALVE DRUM
15. WASHER
16. SPRING SHIM
17. JOINT SHAFT
18. MIDDLE PLATE
19. ROTOR
20. STATOR
21. O-RING
22. SLIP RING
23. LIMIT RING
24. REAR CAP
25. WASHER
26. LIMIT BOLT 35-40 N•m (25.8-29.5 psi)
27. HEX FLANGED SCREW 35-40 N•m (25.8-29.5 psi)
28. THREAD BUSHING
29. STEEL BALLS

Figure 23. Hydraulic Steering Gear

Steering Cylinder

The steering cylinder is dual-action. The two ends of the piston rod are connected with a steering knuckle. Hydraulic fluid from the steering gear powers the piston rod to move left or right through the steering cylinder, allowing the truck to be steered to the left or right.

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