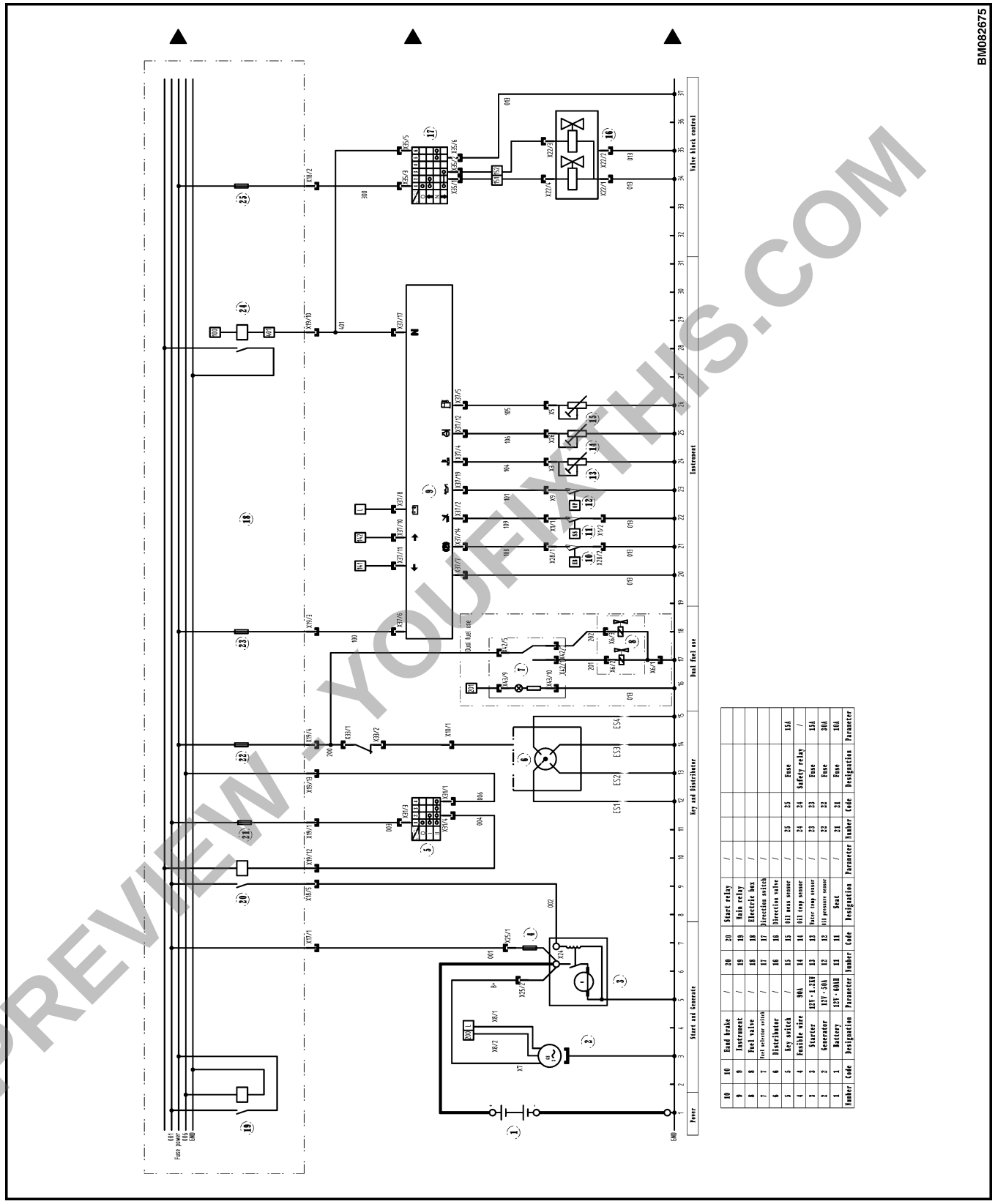


Figure 67. With NISSAN engine (K21, K25 Sheet 2 of 2)

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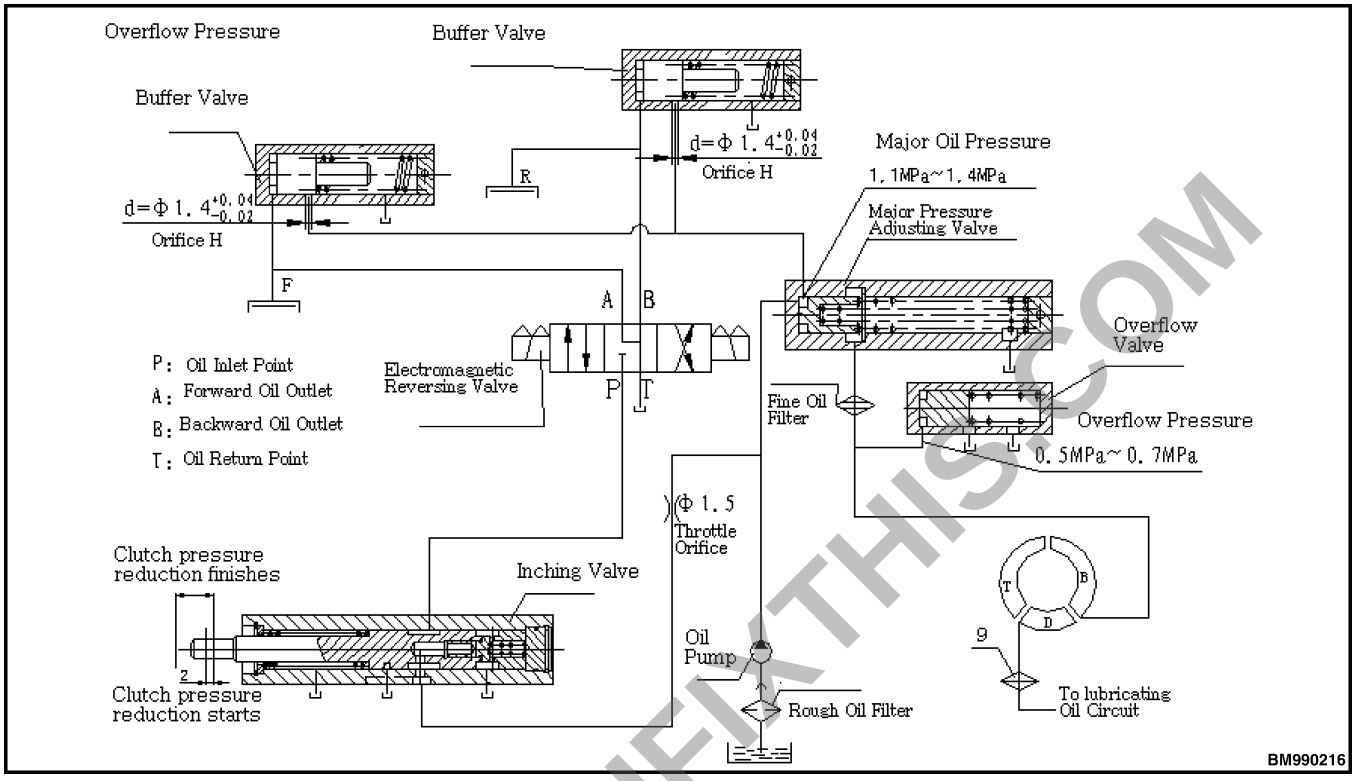


Figure 17. Hydraulic Oil Circuit

SPEED REDUCER AND SPEED DIFFERENTIAL

Speed Reducer

The speed reducer is located on the front of the transmission case (see Figure 18), and works to limit the rotating speed of the output shaft. The increased torque is then transmitted from the output shaft to the speed differential. The speed reducer is composed of a small spiral bevel gear on the output shaft, one large spiral bevel gear, and one small gear shaft. The large spiral bevel gear is mounted on the small gear shaft through the spline. The two ends of small gear shaft are both supported with a tapered roller bearing and gasket to adjust the side clearance.

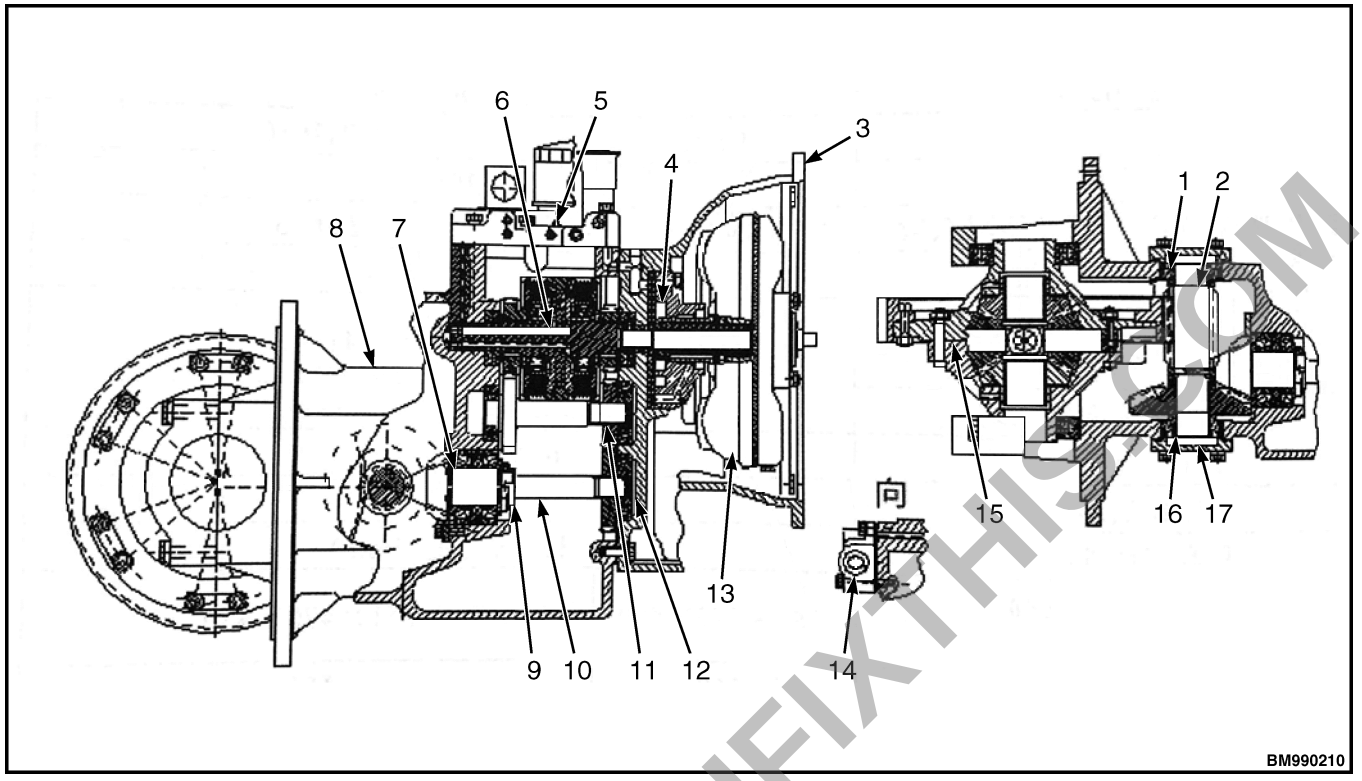
Speed Differential

The speed differential is mounted on the front of the drive axle, with ball bearings on both ends (see Figure 18).The speed differential is divided into left and right sections, with two half shaft gears and four planetary gears. A thrust washer is mounted between the housing of the differential and gear and creates clearance between the pairs of gears. The planetary gears are supported using two gear shafts. One gear shaft is fastened onto the body of the differential by a cylindrical pin. The other is fixed onto the housing of the speed differential using articulated bolts.

A half shaft gear and half shaft carry power from the transmission through the differential and to the wheels.

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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.

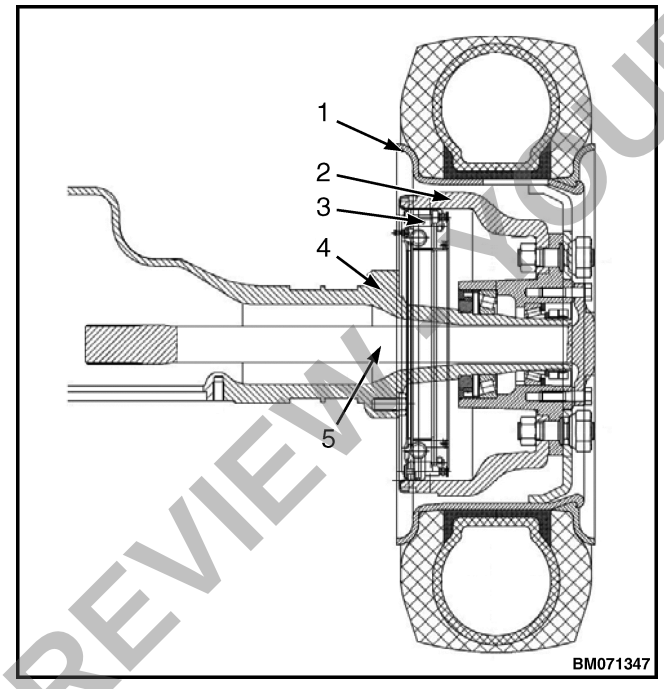
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Drive Axle

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

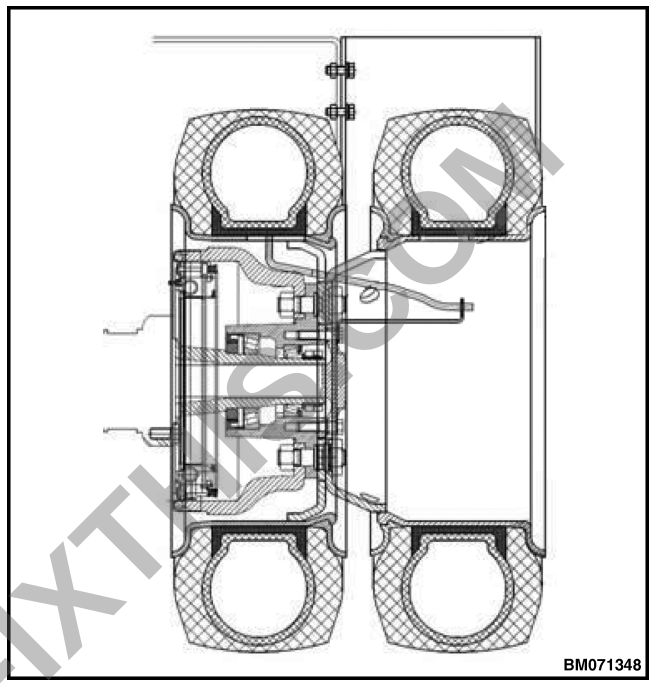


Figure 21. Dual Wheel Drive Axle

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).

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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
Abnormal Noise	Fluid tank level low	Add hydraulic fluid
	Suction pipe or oil filter blocked	Clean or replace suction pipe or filter
Fluid Leak	Steering cylinder guide sleeve damaged or hoses or joint damaged	Replace

Brake System

Type	Front Twin Wheel Brake, Internal Expansion, Hydraulic	
Pedal Lever Ratio	5.66	
Master Cylinder Diameter	19.05 mm (0.75 in.)	
Wheel Brake	2-2.5T	3-3.5T
Type	Dual Servo Type with Parking Brake	
Wheel Cylinder Diameter	28.6 mm (1.1 in.)	
Size of Brake Shoe (L×W×T)	324×60×7 mm (12.8×2.4×0.28 in.)	348×76×8 mm (13.7×2.99×0.31 in.)
Area of Brake Shoe	194.4 cm^2×4	264 cm^2×4
Inner Diameter of Brake Drum	310 mm (12.2 in.)	314 mm (12.4 in.)
Parking Brake	Front Twin Wheel Brake, Internal Expansion, and Hydraulic Type	

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Parameter		Model			
		H2.0UT	H2.0UT	H2.0UT	H2.0UT
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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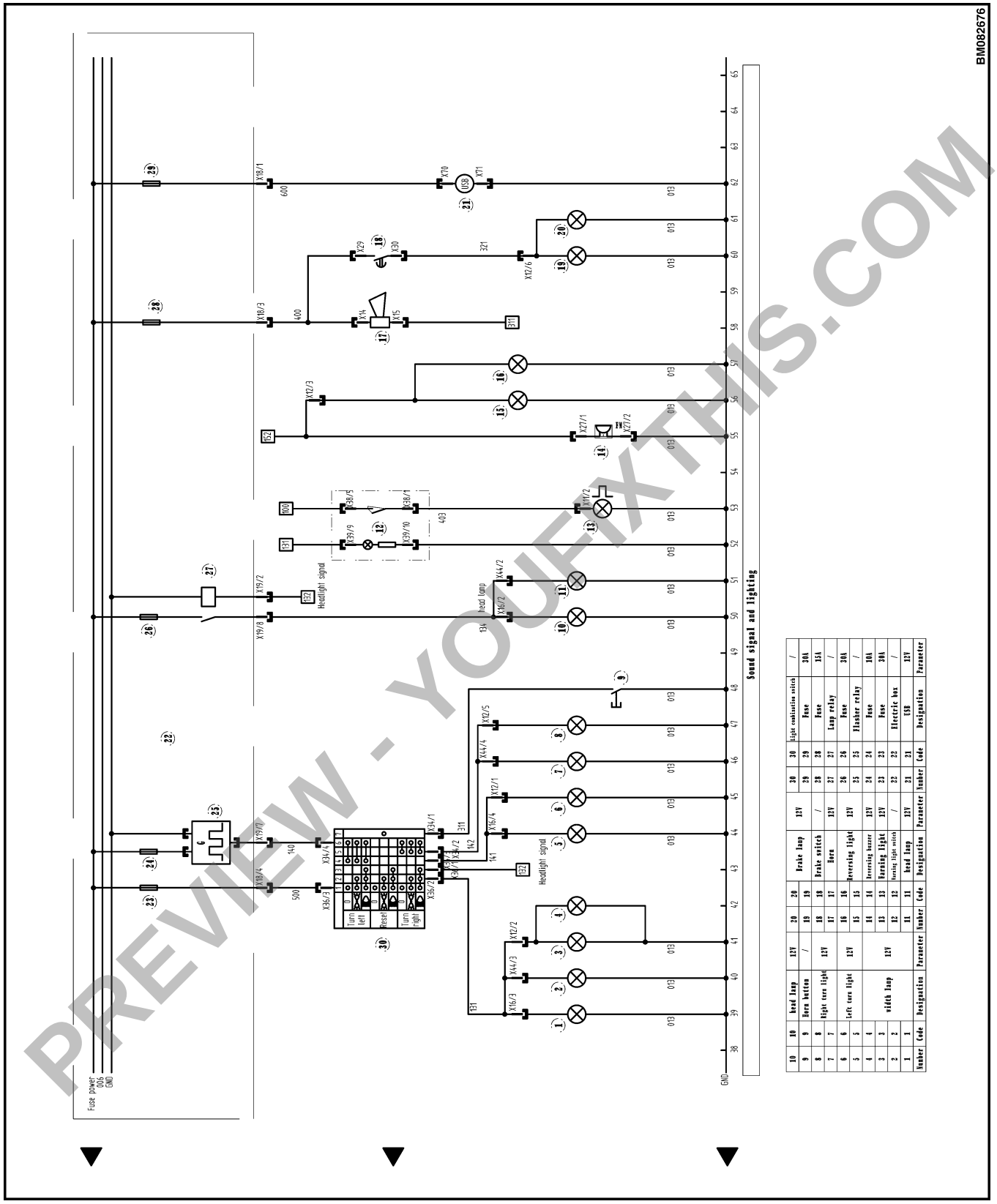
5. Clean the sediment from the outer surface of the radiator, using compressed air or high-pressure. Soak in detergent if needed.

Table 9. Oils Used for Forklift Truck

Name	Brand or Code (Domestic)
Gasoline	92#
Diesel Oil	To be selected and used according to diesel engine operation and maintenance manual, or according to GB252-2015 Light Diesel Oil. Summer 0# Winter -10~ -35#
Lubricating Oil	To be selected and used according to engine operation and maintenance manual, or according to gasoline engine: GB11121-2006 Diesel Engine: GB11121-2006 standard requirements and the tough degree of its working conditions
Hydraulic Oil	L-HM32
Hydraulic Drive Oil	6# Hydraulic Drive Oil
Gear Oil	85W/90
Brake Fluid	ZSM207 DOT3 Synthetic Brake Fluid
Lubricating Oil	3# Lithium Base Lubricating Grease Drop Point 170

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10	10	Head lamp	12V	20	20	Brake lamp	12V	30	30	Right combination switch	/
9	9	Horn button	/	19	19			29	29	Fuse	30A
8	8	Right turn light	12V	18	18	Brake switch	/	28	28	Fuse	15A
7	7			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	width lamp	12V	14	14	Reversing buzzer	12V	24	24	Fuse	10A
3	3			13	13	Warning light	12V	23	23	Fuse	30A
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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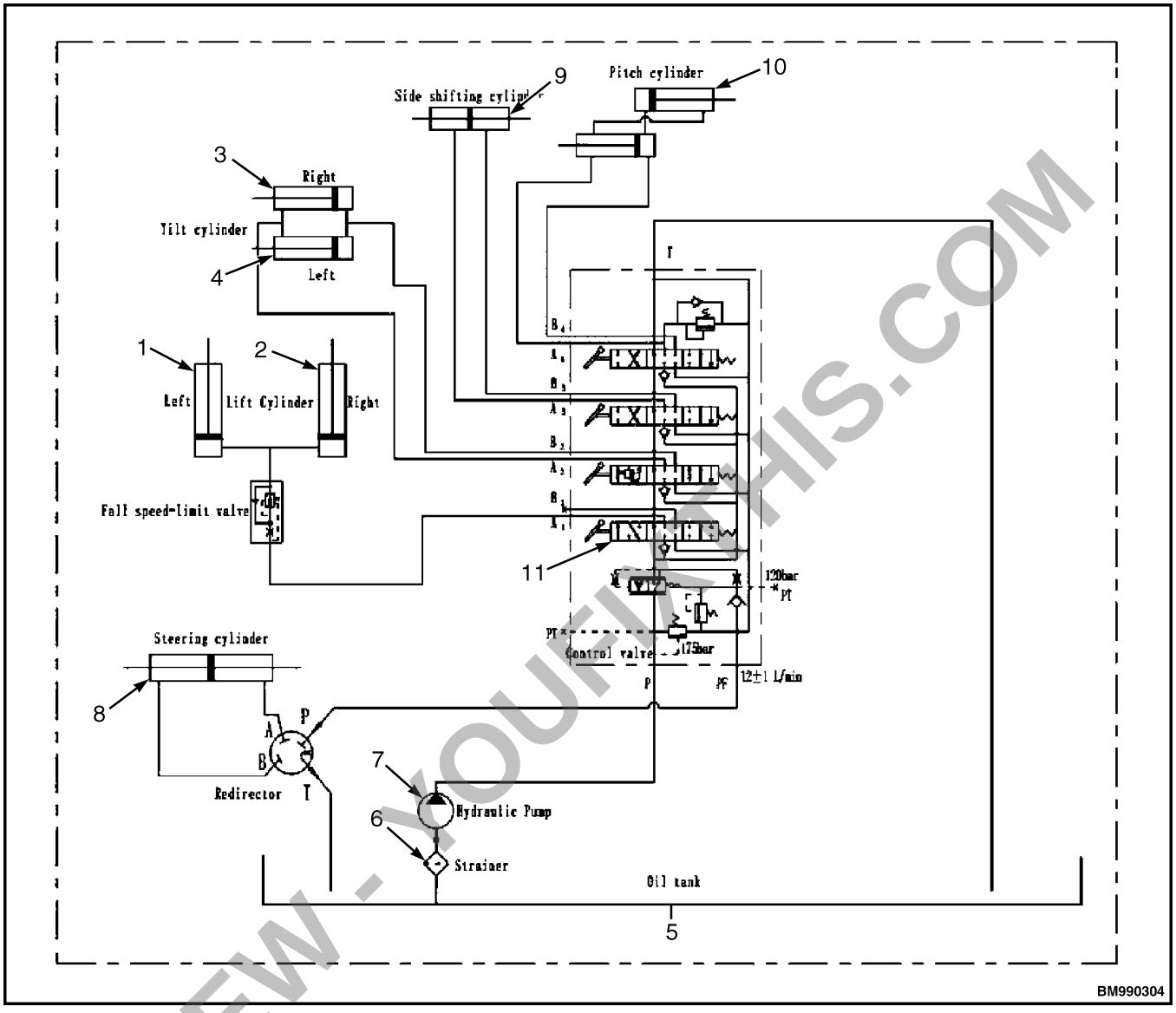


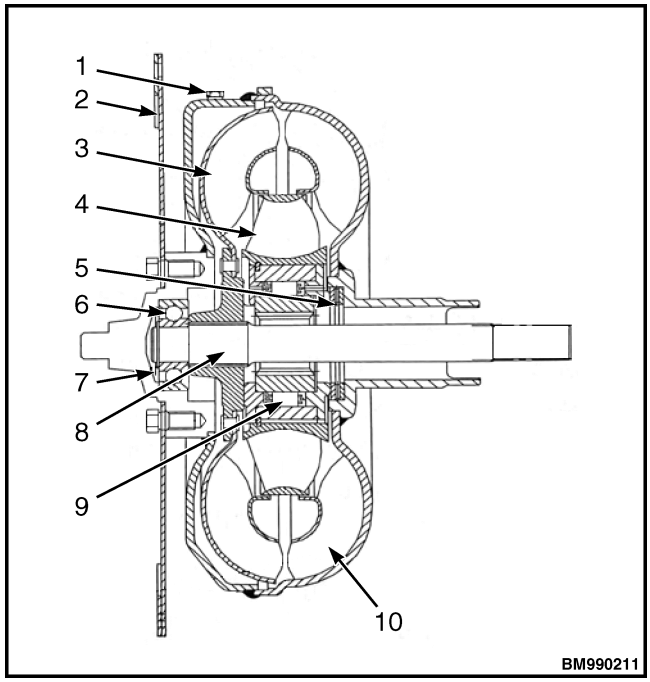
Figure 46. Oil Circuit of Hydraulic System

Legend for Figure 46.

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

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1. OIL DRAIN PLUG
2. FLEX PLATE
3. TURBINE
4. GUIDE PULLEY
5. THRUST BEARING
6. BALL BEARING
7. RETAINER RING
8. TURBO SHAFT
9. ONE-WAY CLUTCH
10. PUMP IMPELLER

Figure 12. Torque Converter

HYDRAULIC CLUTCH

A wet multi-disk hydraulic clutch is mounted on the input shaft of the hydraulic transmission case. To shift gears, it distributes hydraulic oil to forward or backward clutch through a control valve. Each clutch is composed of four alternately assembled spacers (item 18, Figure 13), four brake shoes (item 19, Figure 13), and one piston (item 2, Figure 13). The internal and external surfaces of the piston are fitted with seal rings to ensure a proper seal. In NEUTRAL position, the piston does not interact with the spacer and the brake shoe. While in gear, oil pressure acts on the piston. The spacer and the brake shoe compress each other, and an adapter transmits the power from torque converter to the driving gears (items 4 and 6, Figure 13).

The transmission of power from torque converter to hydraulic transmission case is as follows:

Turbine → Input Shaft Assembly → Spacer → Brake Shoe → Forward Gear or Reversing Gear → Output Shaft

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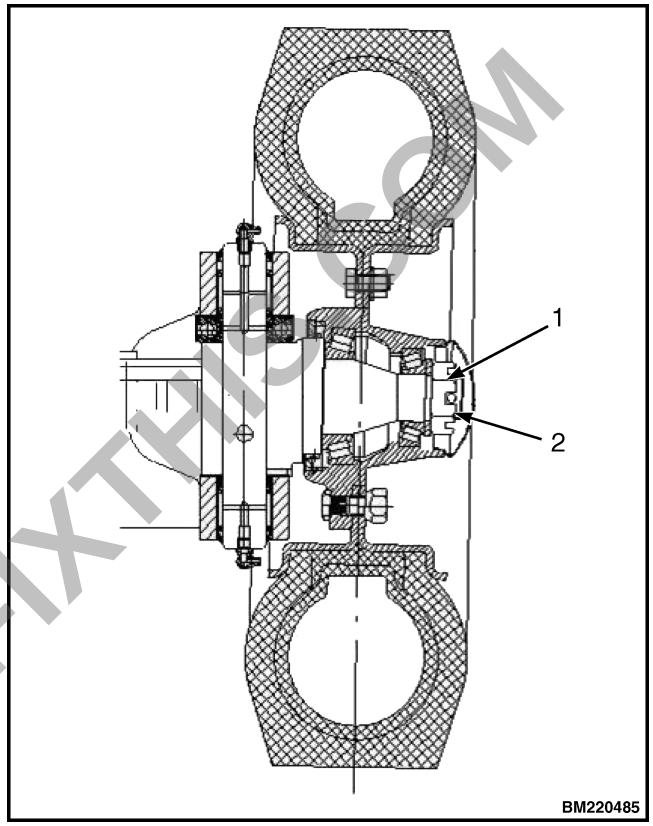
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Steering Universal Joint and King Pin

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

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