

TECHNICAL **MAINTENANCE VEHICLE**

1.0 GENERAL

The Maintenance Vehicle is built for long trouble-free Life and is especially designed to meet increasing demands in the mining industry.

Features, such as optimum performance, speed, durability, ease of maintenance, driver's comfort and safety have been carefully considered and studied before being incorporated in the design.

Power is transmitted to the wheels by means of a remote mounted full powershift transmission. The front axle with its oil immersed multi-disc brakes and planetary reduction is driven from the transmission front output flange. The rear wheels are driven from the rear flange of the transmission, via the pivot steering / articulation and oscillation point to a rear-mounted differential axle fitted with planetary gear reduction and oil immersed multi-disc brakes.

The machine is of sturdy monocoque construction with the front and rear axles assembled on heavy-duty leaf springs with shock absorbers or suspension beams.

An accurately fabricated front and rear frame of 50 B steel frame with center articulation that allows pivot steering arrangement as well as independent oscillation of front and rear frames. This is achieved by the use of a turntable arrangement, which ensures that a uniform load is maintained on all four wheels and at the same time eliminates unnecessary stresses on the machine frame.

2.0 ENGINE

Air-cooled Deutz diesel F6L912W

Cylinder volume 942 ccm

Total displacement 5.65 l (swept volume)

Effect 63 kW / 2300 rpm (86 HP)

Fuel consumption 24l g/kWh at maximum torque 298 Nm / 1550 rpm

Engine oil volume 14 liters

Oil consumption not more than 1% of fuel burnt fuel tank volume 85 liters.

Donaldson air cleaner with an informer restriction indicator and double hose clamps on each hose joint.

Jet stop engine protection.

3.0 TRANSMISSION

Clark 11,6 HR18324 transmission 3-speed, long drop output.

The HR model consists of a torque converter and powershifted transmission in one package mounted directly to the engine.

The shift control valve assembly is mounted directly on the side of the converter housing. The function of the control valve assembly is to direct oil under pressure to the desired directional and speed clutches.

Provision is made that brakes are applied when transmission is in neutral. This is accomplished by use of a brake actuated shut-off valve. The speed and direction clutch assemblies are mounted inside the transmission case and are connected to the output shaft of the converter by direct gearing. The purpose of the speed or directional clutches is to direct the power flow through the gear train to provide the desired speed range and direction.

With the engine running, the converter-charging pump draws oil from the transmission sump through the removable oil suction screen and directs it through the pressure regulating valve and oil filter.

The pressure-regulating valve maintains pressure to the transmission control cover for actuating the direction and speed clutches. This requires a small portion of the total volume of oil used in the system.

The remaining volume of oil is directed through the torque converter circuit to the oil cooler and returns to the transmission for positive lubrication. This regulator valve consists of a hardened valve spool operating in a closely fitted bore.

The valve spool is spring loaded to hold the valve in a closed position. When a specific pressure is achieved, the spool works against the spring until a port is exposed along the side of the bore. This sequence of events provides the proper system pressure.

After entering the converter housing the oil is directed through the stator support to the converter blade cavity and exists in the passage between the turbine shaft and converter support. The oil then flows out of the converter to the oil cooler.

After leaving the cooler, the oil is directed to a lubricating fitting on the transmission, and through a series of tubes and passages lubricates the transmission bearings and clutches. The oil then gravity-drains to the transmission sump.

The hydraulic torque converter consists of three elements and their related parts to multiply engine torque.

The engine power is transmitted from the engine flywheel to the impeller element through the impeller cover. This element is the pump portion of the hydraulic torque converter and is the primary component, which starts the oil flowing to the other components – this result in torque multiplication.

This element can be compared to a centrifugal pump in that it picks up fluid at its center and discharges at its outer diameter.

The torque converter turbine is mounted opposite the impeller and is connected to the output shaft of the torque converter.

This element receives fluid at its outer diameter and discharges at its center. Fluid directed by the impeller out into the particular design of blading in the turbine and reaction member is the means by which the hydraulic torque converter multiplies torque.

The reaction member of the torque is located between and at the center or inner diameters of the impeller and turbine elements. Its function is to take the fluid, which is exhausting from the inner portion of the turbine, and change its direction to allow correct entry for recirculation into the impeller element.

The torque converter will multiply engine torque to its designed maximum multiplication ratio when the output shaft is at zero rounds per minute.

Therefore, we can say that as the output shafts is decreasing speed, the torque multiplication is increasing.

The shift control valve assembly consists of a valve body with selector valve spools.

A detent ball and spring in the selector spool provides one position for each speed range. A detent ball and spring in the direction spool provides three positions: one each for forward, neutral and reverse.

With the engine running and the directional control lever in neutral position, oil pressure from the regulating valve is blocked at the control valve and the transmission is in neutral. Movement of the forward and reverse spool will direct oil under pressure to either the forward or reverse direction clutch as desired.

When either direction clutch is selected to the opposite, clutch is relieved of pressure and vents back through the direction selector spool. The same procedure is used in the speed selector.

The direction or speed clutch assembly consists of a drum with internal splines and a bore to receive a hydraulically actuated piston. The piston is “oil tight” by the use of sealing rings.

A steel disc with external splines is inserted into the drum and reset against the piston. Next, a friction disc with splines at the inner diameter is inserted. Discs are alternated until the required total is achieved. A heavy back-up plate is then inserted and secured with a snap ring. A hub with OD splines is inserted and the of the discs with teeth on the inner diameter.

The discs and hub are free to increase in speed or rotate in the opposite direction as long as no pressure is present in that specific clutch.

To engage the clutch, as previously stated, the control valve is placed in the desired position; this allows oil under pressure to flow from the control valve through a passageway to a chosen clutch shaft. This shaft has a drilled passageway for oil under pressure to enter the shaft.

Oil pressure sealing rings are located on the clutch shaft. These rings direct oil under pressure to a desired clutch.

Pressure of the oil forces the piston and discs against the heavy back-up plate. The discs with teeth on the outer diameter enable the hub and clutch shaft to be locked together and allow them to drive as a unit.

There are bleed balls or bleed orifices, depending on the clutch piston which allow quick escape for oil when the pressure to the piston is released.

Therefore, full powershift in both forward and reverse;

Ratios	1 st	3,9:1
	2 nd	2,00:1
	3 rd	0,70:1

4.0 AXLES : RIGID DRIVE AXLES

Standard Hurth axles 172 with planetary reduction, ratio 15,41 : 1 and oil immersed multi-disc brakes.

Dynamic rated load capacity 7 000 daN

Static rated load capacity 14 000 daN

Maximum torque output:

Continuous 1 100 daNm

Intermittent 2 200 daNm

Maximum braking torque at road wheels with 70 – 80 bar 340 daNm at axle (10 plates, maximum 80 – 90 bar) x 4,25 at rim.

5.0 WHEELS FITTED TO AXLES : RIMS

165 mm x 450 sweng rims

6.0 TYRES

8,25 x 15 x 12 ply underground mining specials

Rolling radius = 0,418m

7.0 BRAKES

7.1 SERVICE BRAKES

Independent hydraulic operated multi-disc brakes on each wheel, activated by the same pedal.

Front and rear brakes operated by two independent systems brake at the same time. A charging valve is included in this circuit together with front and rear independent accumulation for brake application in the event of an engine shut down.

7.2 PARKING BRAKES

Fail-safe spring applied hydraulic released brakes are fitted in the center portion of the axles activated by a hand operated hydraulic valve lever mounted within easy reach from the drivers seat.

The park brake will remain in “on” position until manually (switched) or pull to “off” position.

A red light indicates to the driver that the park brake is “on” the park brake will also be activated when the engine is switched off, or a drop in transmission pressure.

7.3 EMERGENCY BRAKES

All three brake systems come into operation when the emergency brake is applied.

A red emergency stop button, push to apply, pull to release, is fitted within easy reach of the driver’s position to activate the emergency brake. Once depressed, the stop button will remain in depressed position until manually released.

NOTE: the following conditions will activate the emergency braking system.

- a) depress emergency button manually
- b) engine stall
- c) low transmission charge pressure
- d) switch off engine
- e) transmission in neutral

Both the service and park brake will come into action when the emergency brake is activated.

8.0 STEERING

Full power articulated steering 40 degrees both directions, frame oscillation 12 degrees (24 degrees total).

Open center joystick type hydraulic steering controller to control the pilot pressure, which is required to actuate the remote directional control valves. The pilot pressure valve is installed in the hydraulic system between the pump and the remote controlled directional control valve.

NOTE: This valve eliminates separate pilot pump and relief valve for a pilot system.

The joystick movement from neutral to full power is 21 degrees, the steering speed is proportional to the movement of the joystick, this operates two double-acting hydraulic cylinders mounted at the articulation point and onto rear frame.

9.0 HYDRAULICS

Engine side mounted tandem (19 cc/rev + 16 cc/rev Bosch gear pump).

Flow rate 42 liter's/min and 35 liter's/min at 2 200 rpm

Operating pressure 15 Mpa – 17,5 Mpa

Hydraulic oil tank volume 140 liter's

Mobile sensors (system 20) quick pressure, flow and temperature check points incorporated into the system.

10.0 ELECTRICS

Electrical panel and equipment is easily accessible for maintenance.

System voltage is 24 V DC.

Wiring diagram is colour-coded with schematic and wiring diagram supplied behind panel. Wiring numbered and colour-coded.

10.1 LIGHTS

Four forward-facing lights as headlamps and two red lights and the same at the back of the vehicle. These light units fitted to the vehicle with a single bolt and locknut allow for vertical adjustment of the light unit and horizontal. These lights fittings with Tungsten halogen lamp 50 Watt at 24 Volt have a beam spread of 30 degrees in both panels with a minimum of 60 lux at 5 meters on main beam axis.

10.2 ELECTRICAL ALTERNATOR

Brushless self-exciting alternator, with internal regulator rated at nominal current not less than 25 A at 24 V and ambient temperature of 120 degrees Celsius.

10.3 CONTROL PANEL

- 1 Vibro-type running hour meter for engine (Kienzle)
- 1 Engine temperature gauge (cylinder head temperature head sensing)
- 1 Engine oil pressure gauge and temperature (Deutz)
- 1 Transmission oil temperature gauge
- 1 Transmission oil pressure gauge
- 1 Fuel level gauge
- 1 Volt meter
- 2 Brake oil pressure gauges
- Joystick control
- Remote control shift

Protection or alarm system for low oil pressure and high engine temperature engine shut-off cable.

Accumulator pressure (for hydraulic starter)
Temperature and level gauge on hydraulic tank
Rev counter hour meter
Amber alternator warning light
Toggle switch for pilot pressure valve
Red warning light brake on
Jet stop