



COMPONENTS AND REPAIR MANUAL

2006 Perimeter Rd. Greenville, SC 29605
Toll Free: 800-435-9340 - Phone: 864-277-5870
Fax: 864-235-9661 - www.mightymole.com
email: mmole@mightymole.com

**MODEL MCL 36/42C
EARTH BORING MACHINE
PART NO. 3620000**

**MACHINE SERIAL NO.:
3642C 122713 34 & LATER**

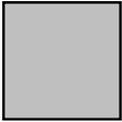
MANUAL PART NO.: E250155



Machine Serial # _____

Purchased &
Serviced Thru: _____

Purchase Date: _____



WARNING: Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. **Wash hands after handling.**

WARNING: The engine exhaust from this product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

TABLE OF CONTENTS

McL 36/42C

DESCRIPTION	PAGE
Machine Specifications and System Operating Specifications	1.1.0
Fill Points, Filters and Routine Maintenance	2.1.0
Decal Placement	2.2.0
Machine Assemblies, Parts Details	3.0
Carriage Assembly	3.1.0
Roll Bar Assembly	3.2.0
Powertrain Assembly	3.3.0
Dog Plate Assembly	3.4.0
Casing Pusher Assembly & Adapters	3.5.0
Master Track Assembly	3.6.0
Engine Exhaust System	3.7.0
Hydraulic Tank Assembly	3.8.0
Hydraulic Cylinder	3.9.0
Hydraulic Pump Seal Kit	3.10.0
Hydraulic Pump Coupling	3.11.0
Replacement Disk Kit	3.12.0
Clutch Seal Kit	3.13.0
Clutch Bearing Kit	3.14.0
Machine Operating Systems	4.0
Hydraulic System and Components	4.1.0
Electrical System (Wiring Diagram)	4.2.0
Machine Parts and Repair	5.0
Engine (Operation and Parts)	5.1.0-5.1.38
Transmission (Parts)	5.2.0
Gearbox (Parts)	5.3.0
Hydraulic Pump Coupling	5.4.0
Clutch	5.5.0
Hydraulic Thrust Cylinder	5.6.0
Hydraulic Dog Plate Cylinder	5.7.0
Hydraulic Valve (Parts)	5.8.0

MACHINE SPECIFICATIONS

MCL 36/42C

SPECIFICATIONS OF MCL 42 HD

EARTH BORING MACHINE

Boring Range: **ENGLISH** **METRIC**
Cased Bore 12"-36" 304 mm-914.4 mm
(Optional)

Engine: 75 HP (ISO Max) Turbo Charged Air Cooled Diesel Engine

Transmission: 4 forward speeds, 1 reverse

Clutch: Hydraulic clutch with Operator Presence Control

Final Drive: Planetary reduction, 3" hex chuck (76 mm)

Auger Torque:

43,493 ft/lbs. peak (58,968.6 Nm) in 1st gear
21,265 ft/lbs. peak (28,831.5 Nm) in 2nd gear
11,631 ft/lbs. peak (15,769 Nm) in 3rd gear
6,882 ft/lbs. peak (9,330.7 Nm) in 4th gear
51,202 ft/lbs. peak (69,420.6 Nm) in Reverse

Forward Thrust: 400,000 lbs. (1,779.3 kN) max @ 3,500 psi (241.3 bar)

Dog Plate: Hydraulically activated

Hydraulic Filtration: 1. Suction strainer - 100 mesh
2. In-take return filter - 12 micron replaceable element
3. 10 micron spin-on return filter

Fuel Tank: 10 gallon (47.8L) capacity with sight gauge

Dimensions/Weights

Machine: 62" (1574.8 mm) wide x 117.25" (2,978.15 mm) long x 54.75" (1390.65 mm) high

Carriage with 42" Pusher 7,300lbs. (3311 kg)

Carriage with 36" Pusher 7,200 lbs (3,263.9 kg)

9' (2734mm)Track: 60" (1524 mm)wide x 12" (304.8 mm) high - 1,100 lbs.(499 kg)

5' (1524 mm)Track Extension: 600 lbs. (272 kg)

Bore Centerline: 26.25" (666.7 mm)

SYSTEM OPERATION SPECIFICATIONS

McL 36/42C

Engine

1. Speed Idle: 1050-1150 Max.: 2400-2500
2. Oil SAE 5W-30 or refer to manual section 5.0
3. Fuel Commercially available diesel fuel with less than 0.5% sulphur content. Refer to manual section 5.0.
4. Fuel Tank Capacity ~ 15 Gallons (56 l.)

Gearbox

- Capacity 80-90 wt. gear oil with EP additives

Transmission

- Capacity Synthetic 50 wt. transmission fluid

Hydraulic System

- 1 Hydraulic Pump Pressure Compensated w/ Load Sense
Compensator Setting: ~ 5000 psi
Stand-by Setting: ~ 250-300 psi
2. Hydraulic Control Valve
Main Thrust System Electric-proportional w/ Manual operation
Relief Valve Setting: ~ 5100 + psi
3. Hydraulic Control Valve
Secondary System Dog Plate Spool Relief Valve
Setting: ~ 500 psi
4. Hydraulic Fluid: 76 Unax AW #46 or equivalent

ISO grade 46, hydraulic fluid with anti-wear additives. Contains additives that provide oxidation resistance, rust and corrosion protection, foaming resistance and have water separating characteristics. Consult McLaughlin Manufacturing Co. for recommendations on cold weather operation.
5. Hydraulic Tank Capacity ~ 60 Gallons (225 l.)

Electrical System

1. Battery 12V DC w/ 700 CCA Max.
2. Hydraulic Control Valve
Main Thrust System 12V DC w/ Electric Solenoid
3. Preheat System 12 V DC w/ manual delay
4. Fuses 12V DC, Inline and panel, SFE and ATO styles
5. Cartridge Valves 12V DC at 1-3 Amps

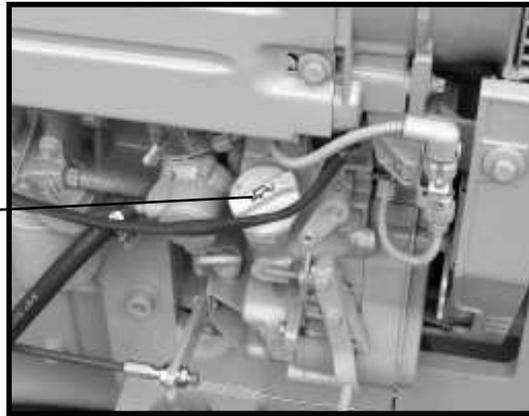
*Specifications subject to change without notice or obligation.

FILTERS AND FILL POINTS

McL 36/42C

1. Engine Oil Fill - Use only manufacturer's approved oils (Reference section 5.1 Engine Operation).

1



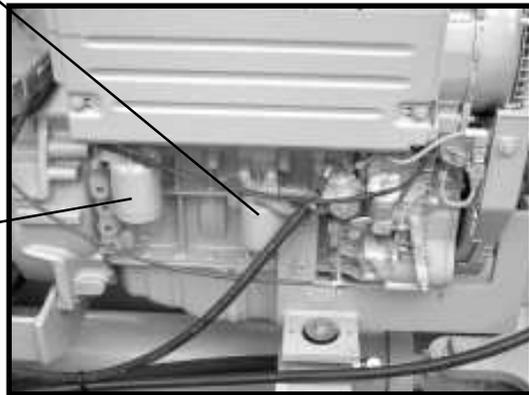
2. Dip Stick - Check daily with engine warm. Fill as needed to the upper dash mark on the stick.

2



3. Oil Filter - Use only manufacturer approved engine filter. Reference section 5.1 Engine Operations for specifications and maintenance.

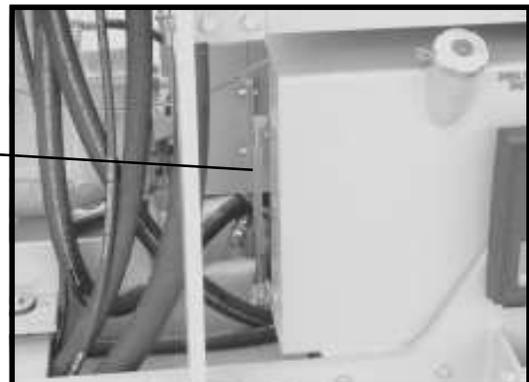
3, 4



4. Fuel Filter - Use only manufacturer's approved replacement filters. (Reference section 5.1 Engine Operation for maintenance schedule).

5

5. Fuel Level - Fill as needed with branded grades of diesel fuel with a sulfur content below 0.5% (Reference section 5.0 Engine Operation for approved fuel specifications).

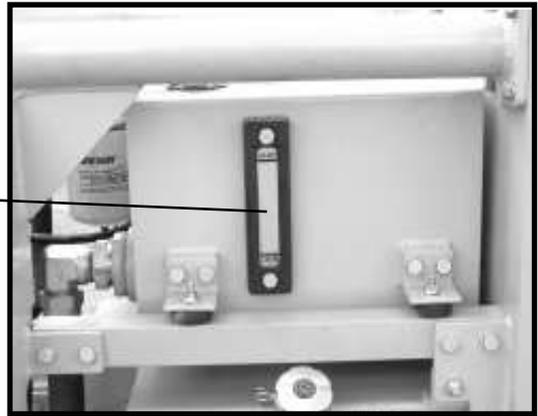


FILTERS AND FILL POINTS

McL 36/42C

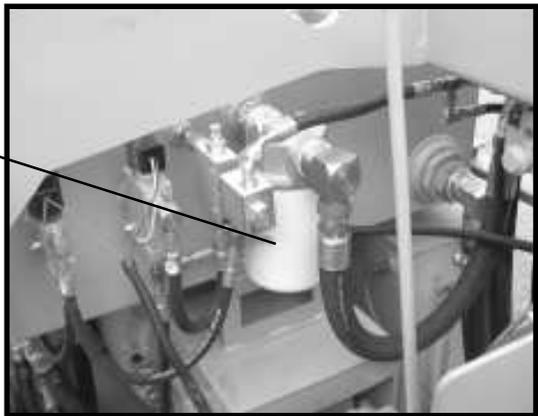
6. Hydraulic Oil Level - Fill to 1 1/2" below top of tank (with cylinders retracted). Change oil after first 1000 hours of use, then annually.

6



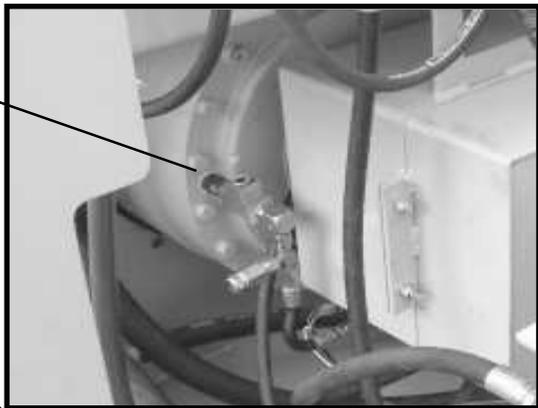
7. Hydraulic Oil Filter - Replace all filters with every engine oil change or if required by filter indicator, whichever comes first. Clean or replace in-tank suction strainer annually when oil is changed.

7



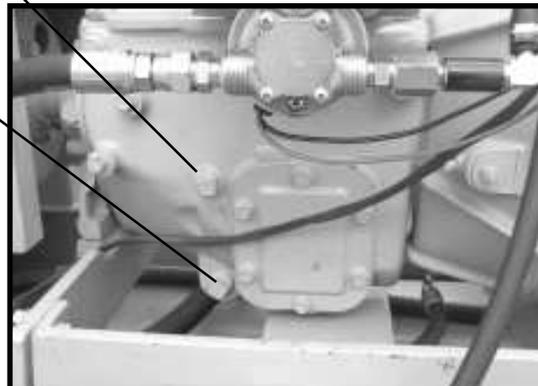
8. Gearbox Oil Fill - Fill to check point. Change after first 50 hours of use, then every 1000 hours or annually.

8



9. Transmission Oil Fill - Fill to check point with #50 synthetic transmission fluid. Change after first 50 hours of use, then every 1000 hours or annually. Drain.

9



10. Engine Air Cleaner - Check air cleaner element condition using the filter indicator. Clean or replace element when indicator is in the "red zone." Clean or replace when required by the filter indicator or annually, whichever comes first. Reference pages 5.1.25 & 5.1.26 of the Engine Operation section for more information.

DECAL PLACEMENT

MCL 36/42G



⚠ WARNING

Electricity, or Gas
Explosion Can Kill

Locate Utilities
Call 888-258-0808

J000210 - WARNING
LOCATE UTILITIES

⚠ WARNING

**AVOID DEATH OR SERIOUS INJURY
YOU MUST:**

- Read and understand operators manual and safety signs (decals) before starting machine.
- Be sure all personnel know and follow safe operating procedures.
- Stop engine before
 - Opening spoil ejector door
 - Working in casing
 - Working in exit pit
 - Doing any maintenance
- Properly vent exhaust fumes.
- Always secure auger in casing before lifting.
- DO NOT modify this machine.
- Always bore with at least a trained operator and trained helper.
- Know and obey all codes and regulations.
- Machine may move without warning while freeboring.
- Relieve pressure in hydraulic system before servicing.
- DO NOT operate with guards removed.

J000020 - WARNING
AVOID DEATH

⚠ WARNING

STOP
Death or serious injury
could result.
DO NOT go forward of
operator while boring.

J000080 - WARNING
DO NOT GO FORWARD

**OPERATION
AND
SAFETY MANUAL**

J800030 - INSTRUCTION
OPERATOR'S MANUAL

⚠ DANGER

**ENTANGLEMENT
HAZARD**

Rotating auger and cutting
head will cause death or
serious injury.
Stay away.
Do not wear loose clothing.

J000100 - DANGER
ENTANGLEMENT HAZARD

DECAL APPLICATION:
REMOVE OIL AND DIRT FROM SURFACE.
MAKE SURE SURFACE IS SMOOTH.

DECAL PLACEMENT
MGL 36/42G



J000120 - DANGER
ROTATING BLADES



J000080 - WARNING
DO NOT GO FORWARD



J000200 - DANGER
MACHINE PARTS



J000160 - WARNING
PINCH POINT
2 REQUIRED

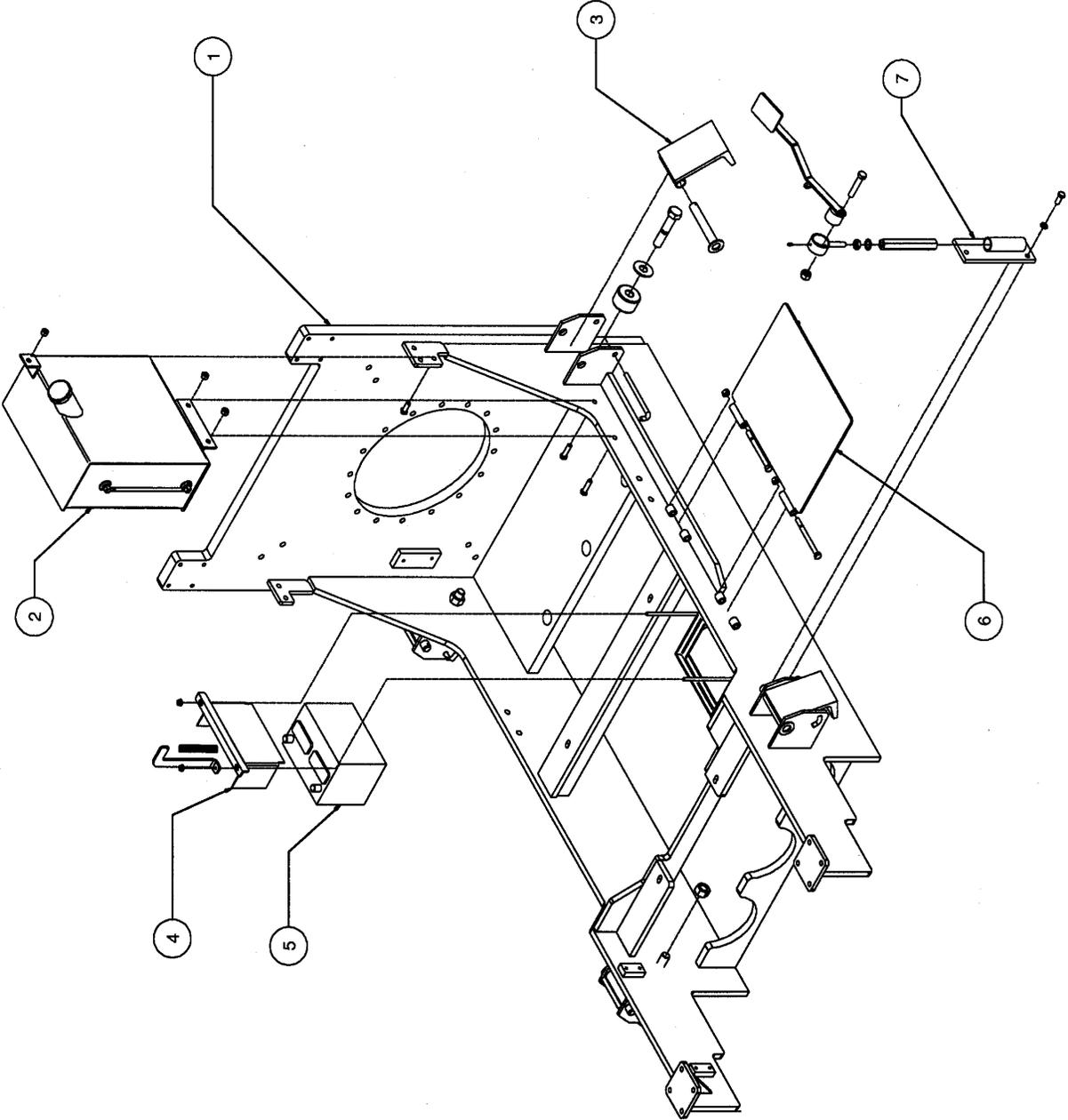


J802000 - WARNING
ROTATING SHAFT



CARRIAGE ASSEMBLY

MCL 36/42C



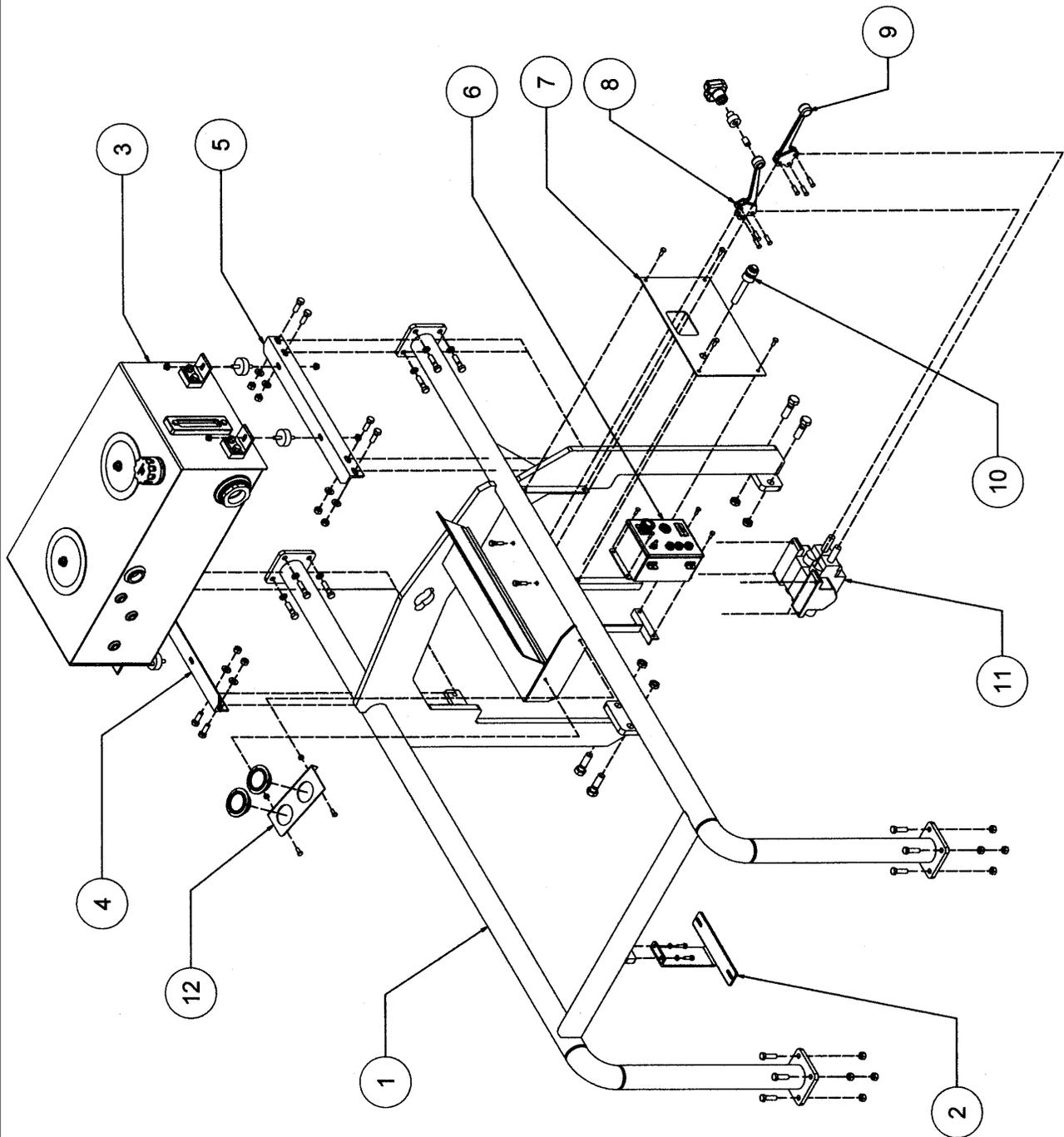
CARRIAGE ASSEMBLY

MCL 36/42C

ITEM #	QTY.	NUMBER	DESCRIPTION
1	1	3620101	Carriage
2	1	3620150	Fuel Tank
	1	U000821	Screw, HC 1/2-13 X 1.25"
	2	U000860	Screw, HC 1/2-13 X 1.75"
	3	U120120	Nut, Lock 1/2-13
3	4	3620113	Hold Down
	4	3620152	Hold Down Pin
	4	U320040	Pin, Cotter
	4	3620107	Hold Down Lock Pin
	4	R700175	Pin, R-Clip
	4	W000080	Wheel
	4	U001570	Screw, HC 1-8 X 5.00"
	4	U200170	Washer, Flat 1" X 2 1/2" O.D.
4	1	3600105	Battery Hold Down
	2	U120200	Nut, Flange 3/8-16
	1	3620119	Foot Brake Spring Post
	1	U610050	Spring
5	1	X400020	Battery, 12V
6	1	3620108	Operator Platform
	2	U001030	Screw, HC 1/2-13 X 6.0"
	2	U120120	Nut, Lock 1/2-13
7	1	2400066	Foot Bracket
	2	U000821	Screw, HC 1/2-13 X 1.25"
	2	U210111	Washer, Lock 1/2
	1	2400058	Brake Adjustment
	1	T500080	Grease Fitting
	1	2400059	Track Brake
	1	U160020	Nut, Jam 3/4-10"
	1	U220040	Washer, Star 3/4"
	1	2400053	Brake Foot Pedal
	1	U001260	Screw, HC 5/8-11 X 3.25"
	1	U120020	Nut, Nylock 5/8-11

ROLL BAR ASSEMBLY

Mcl 36/42C



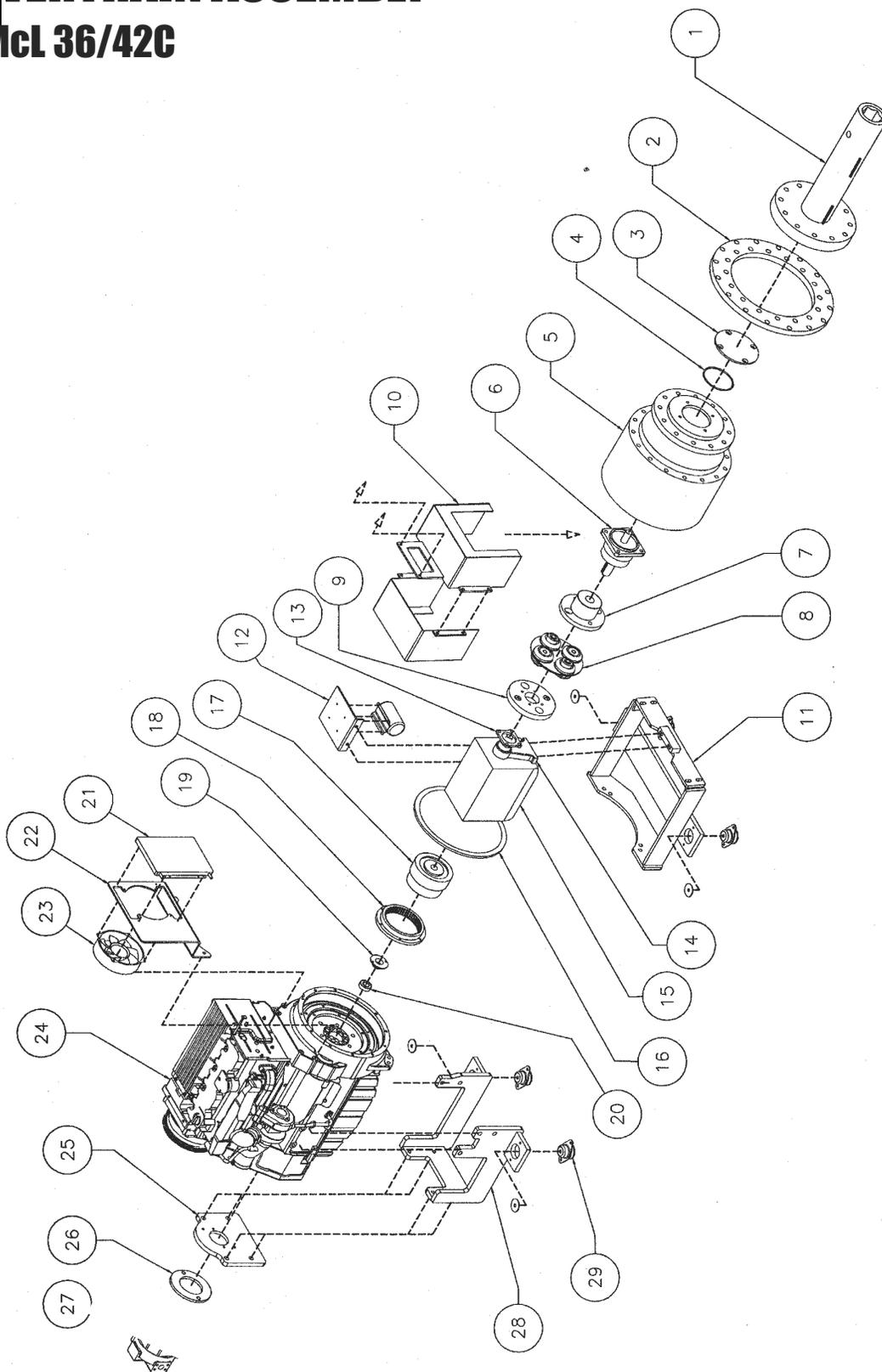
ROLL BAR ASSEMBLY

MCL 36/42C

ITEM#	QTY.	NUMBER	DESCRIPTION
1	1	3620101	Roll Cage
	8	U000890	Screw, HC 1/2-13 X 2.00" G8
	8	U210111	Washer, Lock 1/2"
	8	U000865	Screw, HC 1/2-13 X 1.75" G8
	8	U120120	Nut, Hex 1/2-13
	4	U001420	Screw, HC 3/4-10 X 2.50"
	4	U120040	Nut, Nylock 3/4-10
2	1	3620223	Air Filter Mount Plate
	2	U000200	Screw, HC 5/16-18 X 1.00"
	2	U120120	Nut, Lock 1/2-13
3	1	3620702	Hydraulic Tank
	4	4800762	Hydraulic Tank Isolator
	8	U120200	Nut, Flange 3/8-16
4	1	3620117	Hydraulic Tank Mount Left
	4	U000840	Screw, HC 1/2-13 X 1.50"
	4	U200100	Washer, Flat 1/2"
	4	U120120	Nut, Lock 1/2-13
5	1	3620118	Hydraulic Tank Mount Right
	4	U000840	Screw, HC 1/2-13 X 1.50"
	4	U200100	Washer, Flat 1/2"
	4	U120120	Nut, Lock 1/2-13
6	1	3620801	Console Box
	4	U000040	Screw, HC 1/4-20 X .75"
	4	U120100	Nut, Lock 1/4-20
7	1	3620217	Console Cover
	4	U000180	Screw, HC 5/16-18 X .75"
	4	U110040	Nut, Nylock 5/16-18
8	1	3620710	Grip Mount Valve Handle
	1	T421005	3/8" Close Nipple
	1	4810716	Grip Adapter
	1	4800810	Grip with Switch
9	1	3600203	Valve Handle with Pins
10	1	3600116	Throttle Control
	1	3600115	Throttle Cable
	1	3600131	Throttle Cable Bulk Head Adapter
	1	2400077	Throttle Cable Bracket
	1	U200020	Washer, Flat 1/4"
11	1	3600096	Valve
	4	U000460	Screw, HC 3/8-16 X 1.50"
12	1	3620224	Gauge Plate
	2	HD00092	Pressure Gauge
	2	U000180	5/16-18 X .75"
	2	U110040	Nut, Nylock 3/8-16

POWERTRAIN ASSEMBLY

McL 36/42C



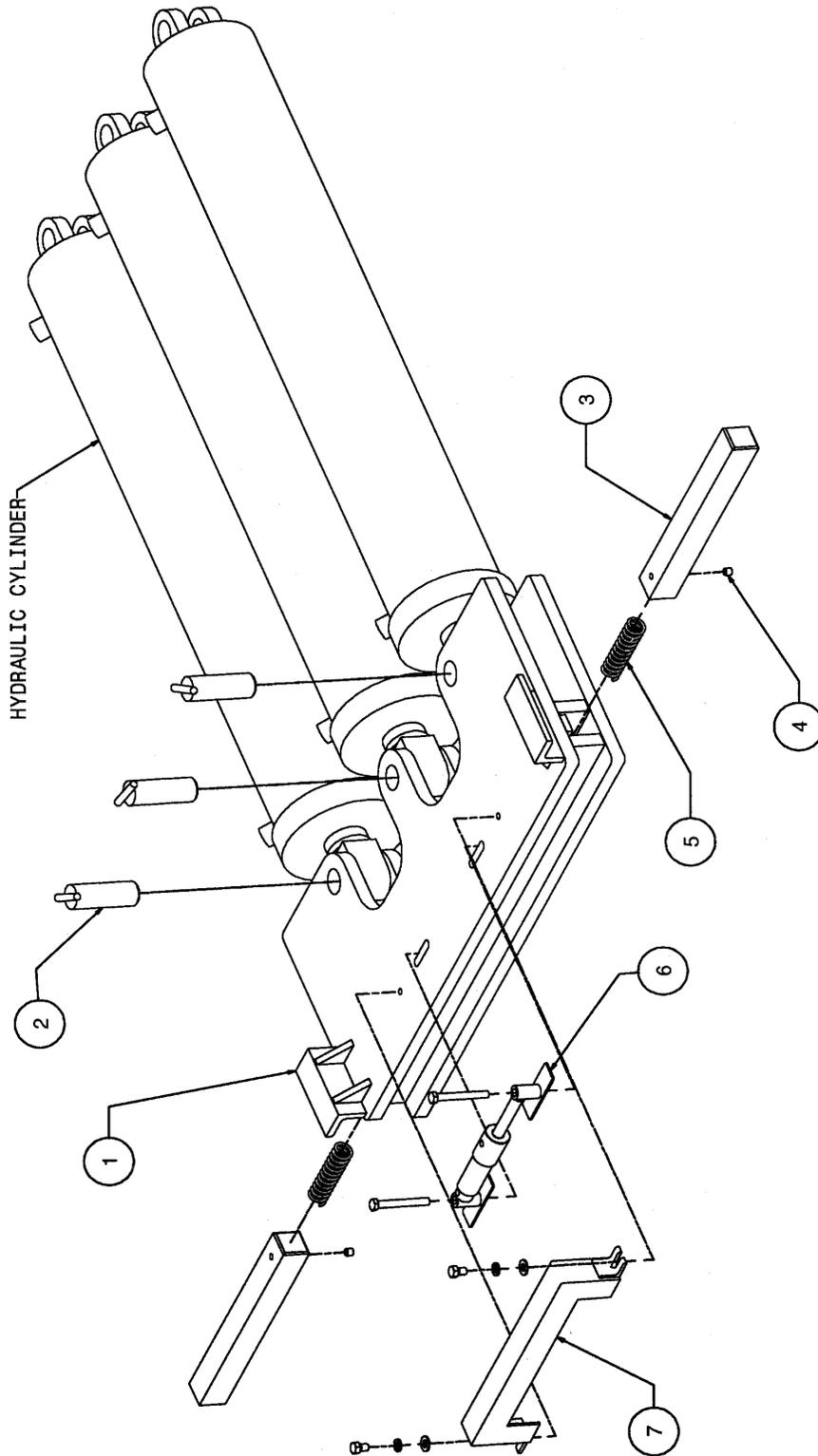
POWERTRAIN ASSEMBLY

McL 36/42C

ITEM	QTY	PART #	DESCRIPTION	ITEM	QTY	PART #	DESCRIPTION
1	1	3620510	3" CHUCK	17	1	3600210	HYDRAULIC CLUTCH
	12	U001465	SCREW, HC 3/4"-10 X 3.25" ZP G8		1	TH00093	HYDRAULIC HOSE
	12	U210160	WASHER, LOCK 3/4"		1	T401101	ELBOW, 90DEG
2	1	3620302	GEAR HUB ADAPTER RING	18	1	3600211	DRIVE SHELL
	16	U001420	SCREW, HC 3/4"-10 X 2.50" ZP G5		6	U010305	SCREW, HSH 8MM X 1.25 X 30MM
	16	U210160	WASHER, LOCK 3/4"		6	U210350	WASHER, LOCK 8MM HIGH COLLAR
3	1	3620303	GEARBOX SEAL PLATE	19	1	3600277	CLUTCH SPACER
	4	U030130	SCREW, SFH 1/2"-13 X 1.00	20	1	W300060	TAILSHAFT BEARING
4	1	W200180	O-RING	21	1	3620304	HEAT EXCHANGER
5	1	3620301	GEAR HUB		2	U000040	SCREW, HC 1/4"-20 X .75"
	16	U001420	SCREW, HC 3/4"-10 X 2.50" ZP G5		2	U200020	WASHER, FLAT 1/4"
	16	U210160	WASHER, LOCK 3/4"		2	U210060	WASHER, LOCK 1/4"
6	1	P340000	INPUT ADAPTER	22	1	3620305	HEAT EXCHANGER MOUNTING BRACKET
	1	U410140	KEY, 3/8" SQ X 1.50"		2	U001620	10MM - 1.50" X 25MM
	4	U000840	SCREW, HC 1/2"-13 X 1.50"		2	U210222	WASHER, LOCK 10MM
	4	U210100	WASHER, LOCK 1/2"	23	1	3620802	HEAT EXCHANGE FAN
7	1	P260200	COUPLING CENTER MEMBER	24	1	3600091	ENGINE, DUETZ
	2	U001320	SCREW, HC 5/8"-11 X 4.00"	25	1	3620161	PUMP ADAPTER WELDMENT
	2	U210140	NUT, LOCK 5/8"		4	U001195	SCREW, HC 5/8"-11 X 1.75"
8	1	P260210	COUPLING CENTER MEMBER		4	U210140	WASHER, LOCK 5/8"
	2	U001280	SCREW, HC 5/8"-11 X 3.50"	27	1	CM00010	HYDRAULIC PUMP
	2	U210140	WASHER, LOCK 5/8"		2	U000860	SCREW, HC 1/2"-13 X 1.75"
9	1	3600070	COUPLING ADAPTER PLATE		2	U210100	WASHER, LOCK 1/2"
	4	U000760	SCREW, HC 7/16"-14 X 1.25"		2	U200110	WASHER, FLAT 1/2" SAE HARDENED
	4	U210080	WASHER, LOCK 7/16"	28	1	3620130	ENGINE MOUNT BRACKET
10	1	3620333	COUPLING GUARD ASSEMBLY		6	U010289	SCREW, HSH 14MM X 2.0 X 45MM GR12.9
		3620325	BASE SHIELD		6	U210115	WASHER, FLAT 9/16" SAE HARDENED
		3620330	EXTENSION SHIELD	29	4	3600086	ENGINE ISOLATOR
	4	U000420	SCREW, HC 3/8"-16 X 1.00"		4	3600089	SNUBBLING WASHER
	4	U210060	WASHER, LOCK 3/8"		4	U000960	SCREW, HC 1/2"-13 X 4.00"
	4	U100060	NUT, HEX 3/8"		4	U200110	WASHER, FLAT 1/2" SAE HARDENED
11	1	3620140	ENGINE/TRANSMISSION MOUNT ASSEMBLY	4	4	U120120	NUT, LOCK 1/2"-13
	1	3620136	ENGINE MOUNT				
	4	U001660	SCREW, HC 14MM X 2.0 X 50MM				
	4	U210120	WASHER, LOCK 14MM				
	1	3620142	TRANSMISSION MOUNT	*	1	3620160	PUMP SHAFT HUB
	4	U000840	SCREW, HC 1/2"-13 X 1.50"				
	4	U210100	WASHER, LOCK 1/2"	*		NOT SHOWN	
	4	U200100	WASHER, FLAT 1/2"				
	2	U000540	SCREW, HC 3/8"-16 X 2.50"				
	2	U200040	WASHER, LOCK 5/18"				
12	1	3620319	OIL PUMP MOUNT BRACKET				
	4	U000425	SCREW, HC 3/8"-16 X 1.00"				
	4	U210060	WASHER, LOCK 3/8"				
	4	U200600	WASHER, FLAT 3/8"				
	1	3620320	OIL PUMP				
	4	U000020	SCREW, HC 1/4"-20 X .50"				
	4	U200020	WASHER, FLAT 1/4"				
	4	U210020	WASHER, LOCK 1/4"				
13	1	3600132	COMPANION FLANGE				
14	1	3600117	BEARING RETAINER				
15	1	3600114	TRANSMISSION				
16	1	P230020	BELL HOUSING				
	12	U001620	SCREW, HC 10MM X .50" X 25MM				
	12	U210222	WASHER, LOCK 10MM				
	1	T400391	BULKHEAD ADAPTER				
	1	3600141	INSPECTION PLATE				
	2	U000160	SCREW, HC 5/16"-18 X .50"				
	2	U200040	WASHER, LOCK 5/16"				

DOG PLATE ASSEMBLY

MCL 36/42C

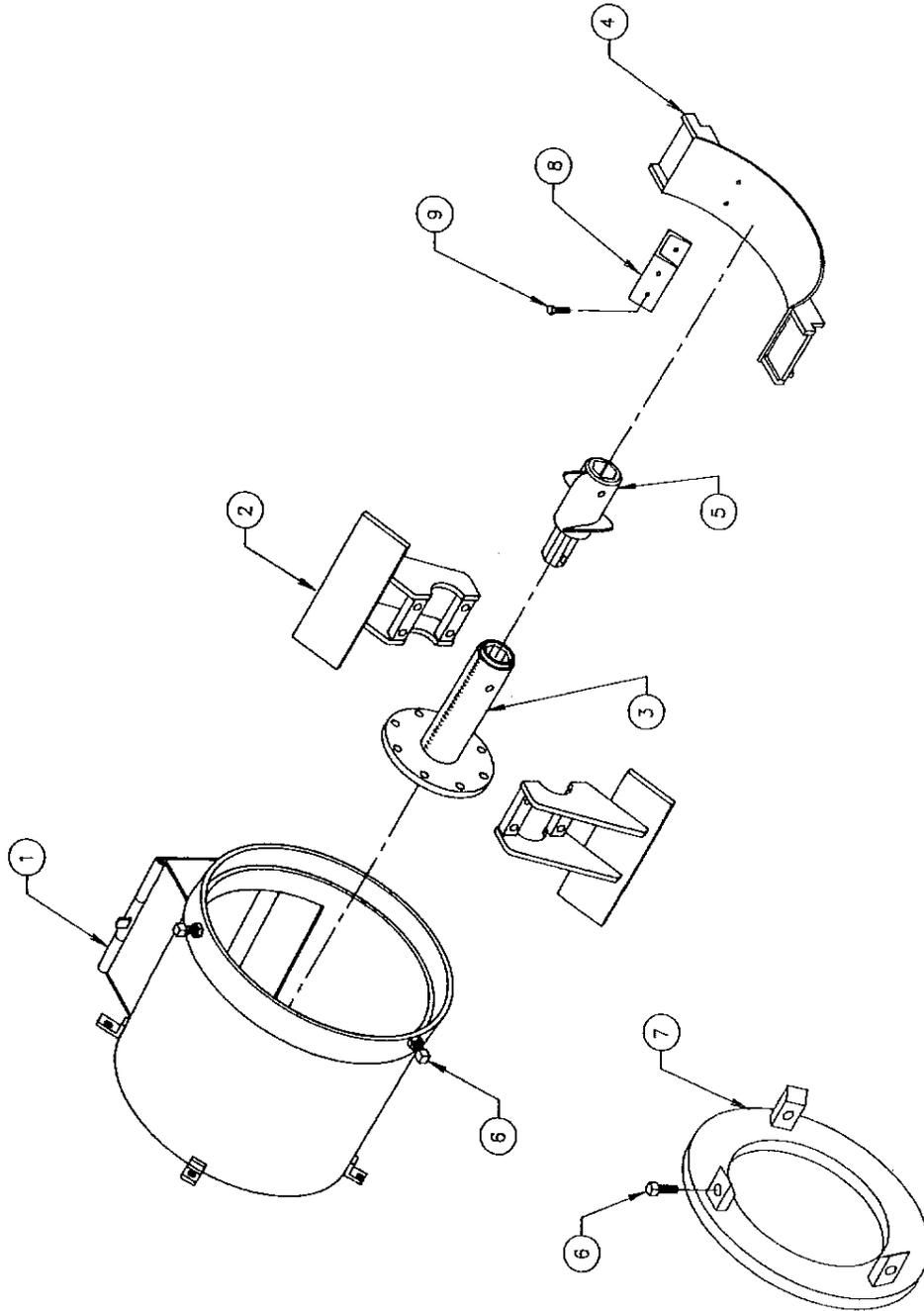


DOG PLATE ASSEMBLY

MCL 36/42C

ITEM #	QTY.	NUMBER	DESCRIPTION
1	1	3600065	Dog Plate
2	3	3600077	Cylinder Pin
3	2	3600064	Dog Pin
4	2	U024040	Screw, Set 1/2-13 X .50"
5	2	U600060	Compression Spring
6	1	3600124	Hydraulic Cylinder
7	2	U000980	Screw, HC 1/2-13 X 4.00"
	1	3600122	Cylinder Guard
	2	U200100	Washer, Flat 1/2"
	2	U210111	Washer, Lock 1/2"
	2	U000810	Screw, HC 1/2-13 X .75"

36" CASING PUSHER/SPOIL EJECTOR McL 36/42C



36" CASING PUSHER/SPOIL EJECTOR

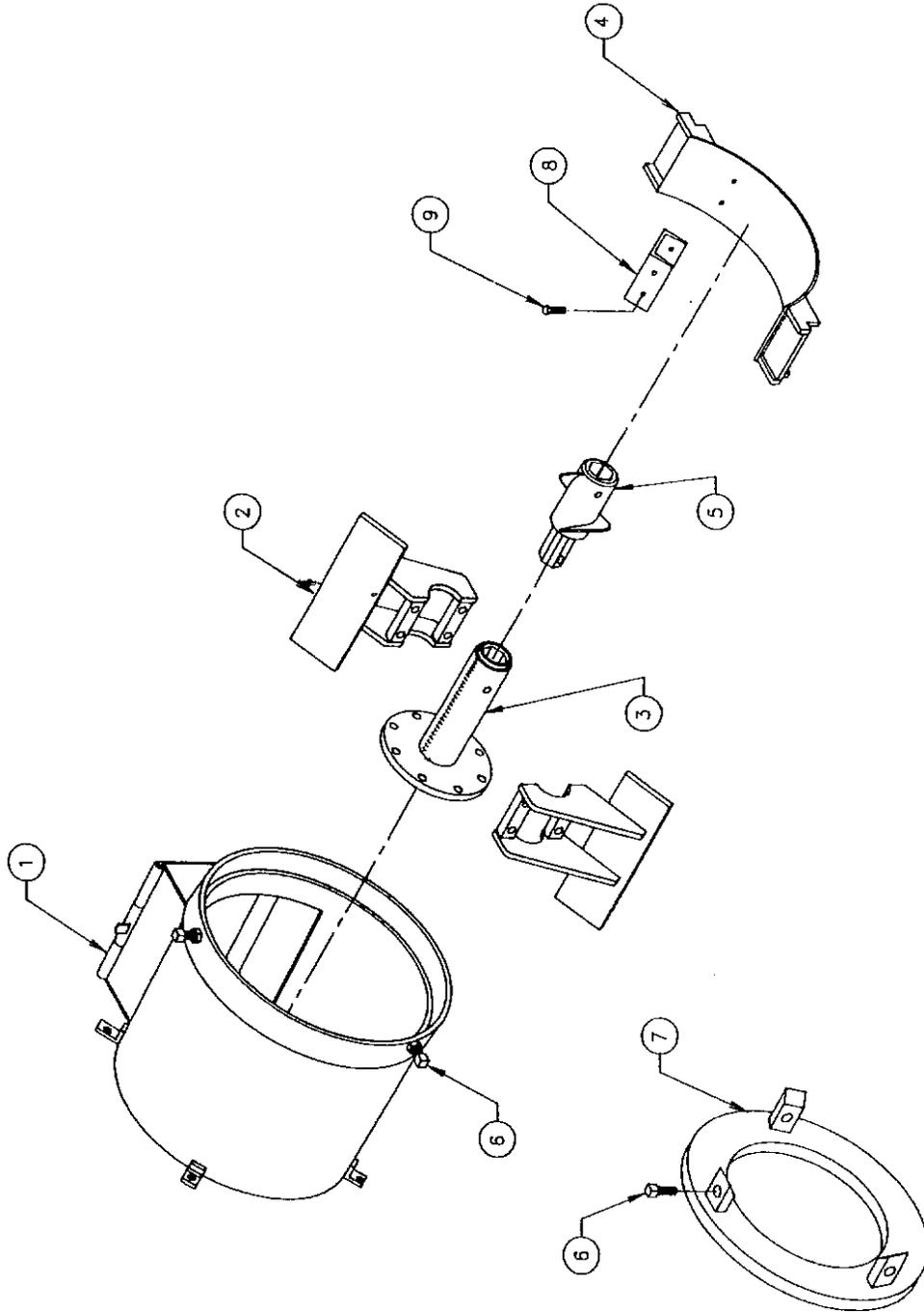
MCL 36/42C

ITEM#	QTY.	NUMBER	DESCRIPTION
1	1	3600054	Casing Pusher Assembly
	4	U001380	Screw, HC .750-10X2.00
	4	U210160	Washer, Lock .750
	2	U320015	Pin, Cotter .125X1.00
	1	3600052	Spoil Ejector Door Assembly
2	2	3620506	Spoil Ejector Paddle Assembly
	4	U001500	Screw, HC .750-10X3.750
	4	U210160	Washer, Lock .750
	4	U100200	Nut, Hex .750-10
3	1	3620510	Chuck Assembly
	12	U001555	Screw, HC .750-16X2.500
	12	U210160	Washer, Lock .750
	1	U001580	Screw, HC 1.000-8X6.000
	1	U120060	Nut, NY 1.000-8
4	1	3600082	Saddle Assembly
5	1	R800560	Chuck Extension
6	3	U020120	Screw, SQ .750-10X2.00

Optional Equipment:
(available upon request)

7	A690120	Adapter Kit, 12"
	A690160	Adapter Kit, 16"
	A690180	Adapter Kit, 18"
	A690200	Adapter Kit, 20"
	A690240	Adapter Kit, 24"
	A690300	Adapter Kit, 30"
8	A69012S	Shoe 12" Adapter
	A69016S	Shoe 16" Adapter
	A69018S	Shoe 18" Adapter
	A69020S	Shoe 20" Adapter
	A69024S	Shoe 24" Adapter
	A69030S	Shoe 30" Adapter
9	U000880	Screw, HC .500-13X2.00 (4 Req'd)
	U210100	Washer, Lock .500 (4 Req'd)
	U100120	Nut, Hex .500-13 (4 Req'd)
	3620505	Paddle Assembly 36" Kit Includes 2 Paddles with Mounting Hardware

42" CASING PUSHER/SPOIL EJECTOR McL 36/42C



42" CASING PUSHER/SPOIL EJECTOR

McL 36/42C

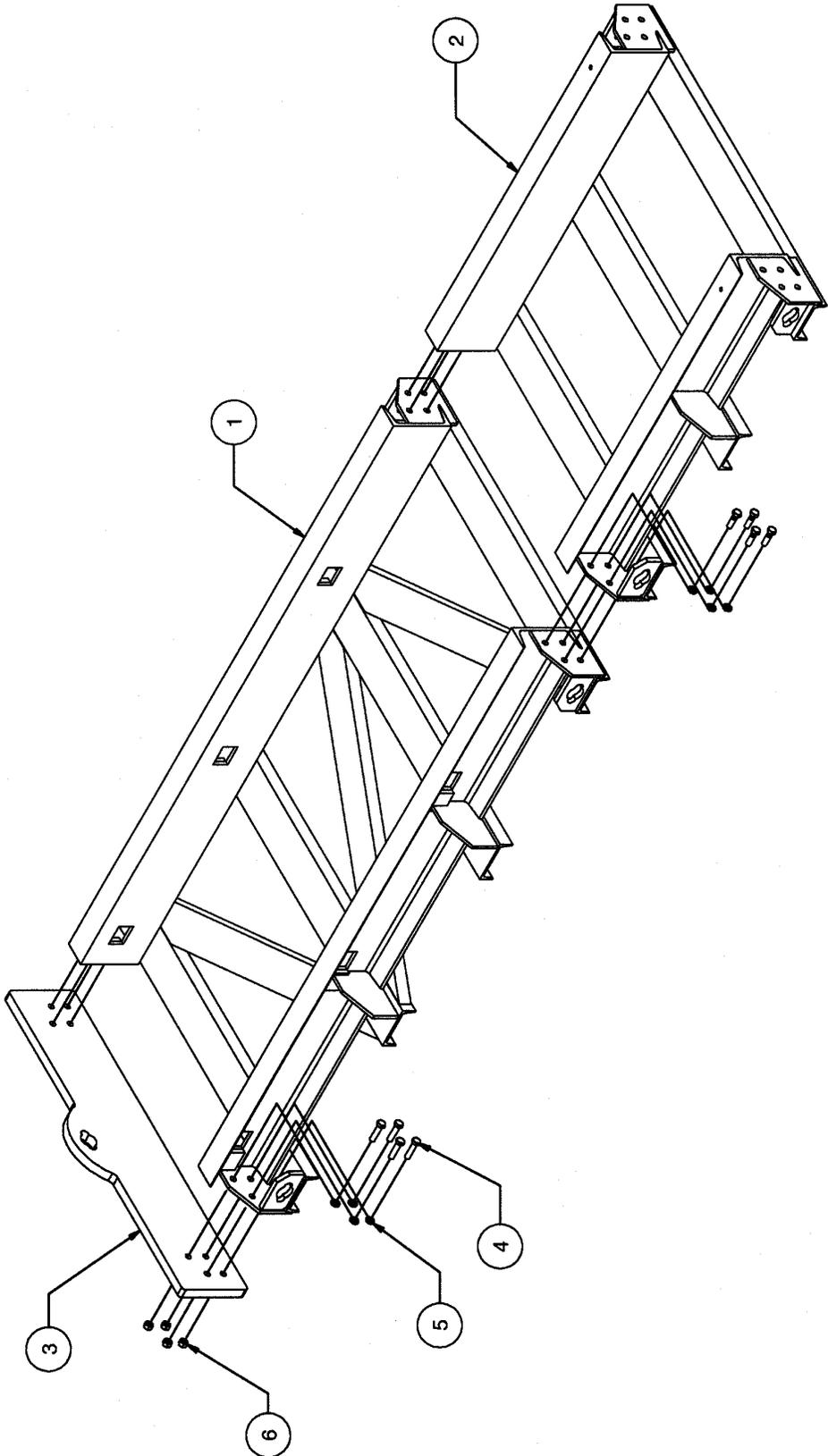
ITEM#	QTY.	NUMBER	DESCRIPTION
1	1	4200007	Casing Pusher Assembly
	4	U001380	Screw, HC .750-10X2.00
	4	U210160	Washer, Lock .750
	2	U320015	Pin, Cotter .125X1.00
	1	3600052	Spoil Ejector Door Assembly
2	2	3620502	Spoil Ejector Paddle Assembly
	4	U001500	Screw, HC .750-10X3.750
	4	U210160	Washer, Lock .750
	4	U100200	Nut, Hex .750-10
3	1	3620510	Chuck Assembly
	12	U001555	Screw, HC .750-16X2.500
	12	U210160	Washer, Lock .750
	1	U001580	Screw, HC 1.000-8X6.000
	1	U120060	Nut, NY 1.000-8
4	1	4200011	Saddle Assembly
5	1	R800560	Chuck Extension
6	3	U020120	Screw, Sq. 750-10X2.00

Optional Equipment (available upon request)

7		4200033	Adapter Kit, 12"
		4200020	Adapter Kit, 16"
		4200021	Adapter Kit, 18"
		4200022	Adapter Kit, 20"
		4200024	Adapter Kit, 24"
		4200027	Adapter Kit, 30"
		4200031	Adapter Kit, 36"
8		4200034	Shoe 12" Adapter
		4200035	Shoe 16" Adapter
		A69012S	Shoe 18" Adapter
		4200036	Shoe 20" Adapter
		A69018S	Shoe 24" Adapter
		A69024S	Shoe 30" Adapter
		A69030S	Shoe 36" Adapter
9		U000880	Screw, HC .500-13X2.00 (4 req'd)
		U210100	Washer, Lock .500 (4 req'd)
		U100120	Nut, Hex .500-13 (4 req'd)
		3620501	Paddle Assembly 42" Kit Includes 2 Paddles with Mounting Hardware

MASTER TRACK ASSEMBLY

MCL 36/42C



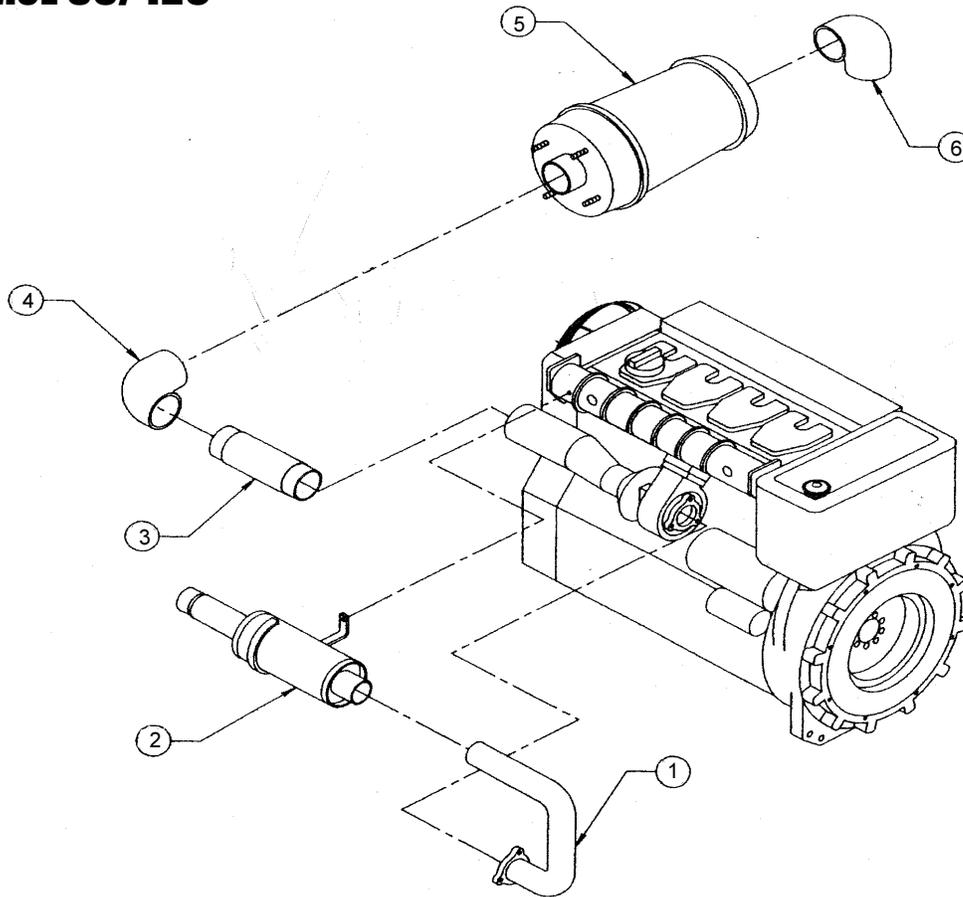
MASTER TRACK ASSEMBLY

MCL 36/42C

ITEM #	QTY	NUMBER	DESCRIPTION
1	3	3620601	9 FT Track
2	1	3620615	5 FT Track Extension
3	1	3620611	Push Plate
4	32	U001420	Screw, HC 3/4-10 x 2.50 Lg
5	8	U001440	Screw, HC 3/4-10 x 3.00 Lg
6	40	U100200	Nut, Hex, 3/4-10
7	40	U210160	Washer, Flat 3/4"

ENGINE EXHAUST SYSTEM

McL 36/42C



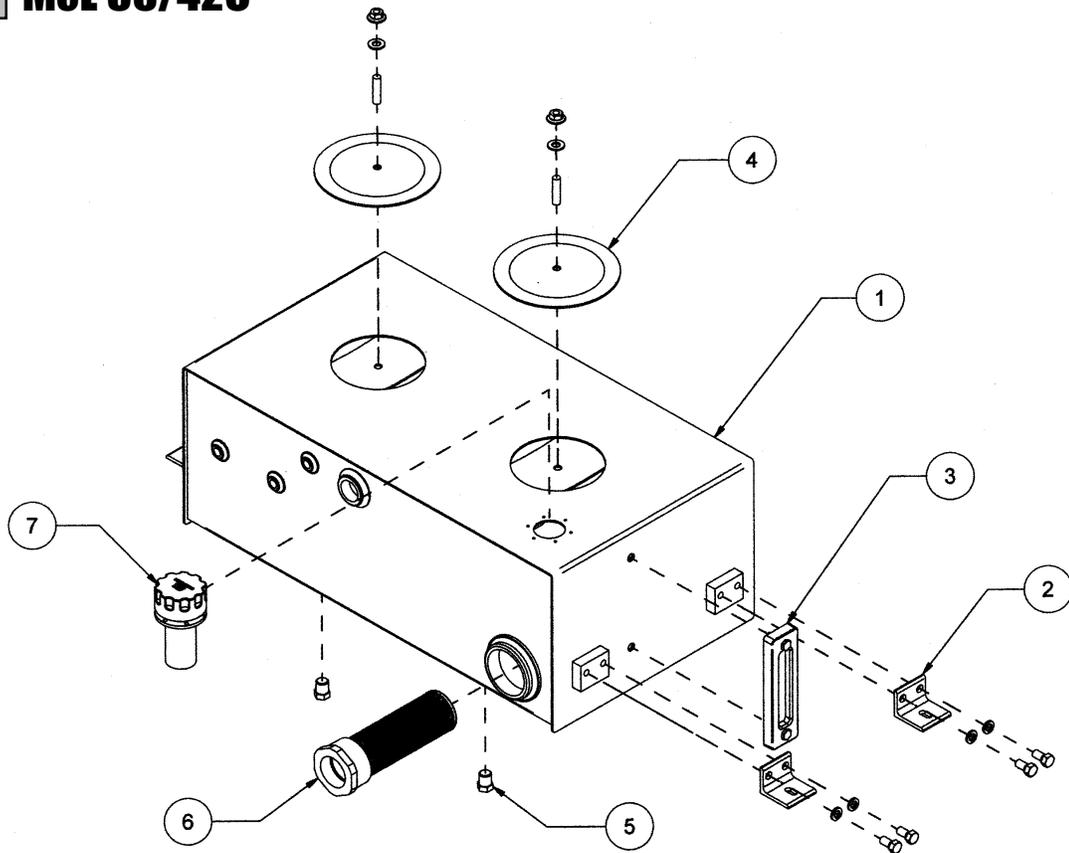
ENGINE EXHAUST SYSTEM

McL 36/42C

ITEM #	QTY.	NUMBER	DESCRIPTION
1	1	4200047	Exhaust Pipe Assembly
	3	U100270	Nut, Hex 8mm X 1.25
	3	U210055	Washer, Lock 8mm
2	1	4200046	Muffler Assembly
	1	U001590	Screw, HC 8mm X 1.25 X 15mm
	1	U800120	U-Clamp 2.00"
3	1	4200052	Air Intake Tube
	1	U800070	Clamp, Band 3.00"
4	1	4200042	Elbow
	1	4200041	Air Filter Indicator
5	1	3600262	Air Cleaner Complete
	1	3600260	Replacement Element
	1	3600261	Safety Element
	1	3600268	Air Discharge Valve
6	1	4200042	Elbow

HYDRAULIC TANK ASSEMBLY

McL 36/42C



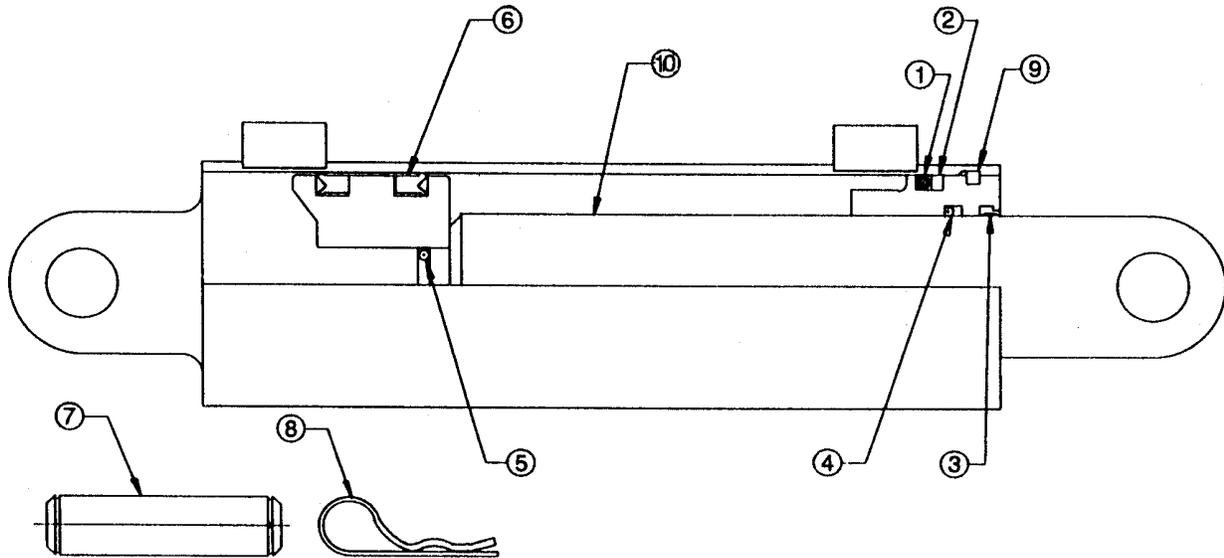
HYDRAULIC TANK ASSEMBLY

McL 36/42C

ITEM #	QTY.	NUMBER	DESCRIPTION
1	1	3620703	Hydraulic Tank
2	4	3620708	Foot Mount
	8	U000815	Screw, HC 1/2-13 X 1.0 ZP G5
	8	U210111	Washer, Lock
3	1	T720120	Sight Gauge
4	2	4800758	Clean Out Cover
5	2	T405150	Plug, 1/4" NPT HC
6	1	4800761	Suction Strainer
7	1	2050068	Fill Cap

HYDRAULIC CYLINDER

Mcl 36/42C



HYDRAULIC CYLINDER

Mcl 36/42C

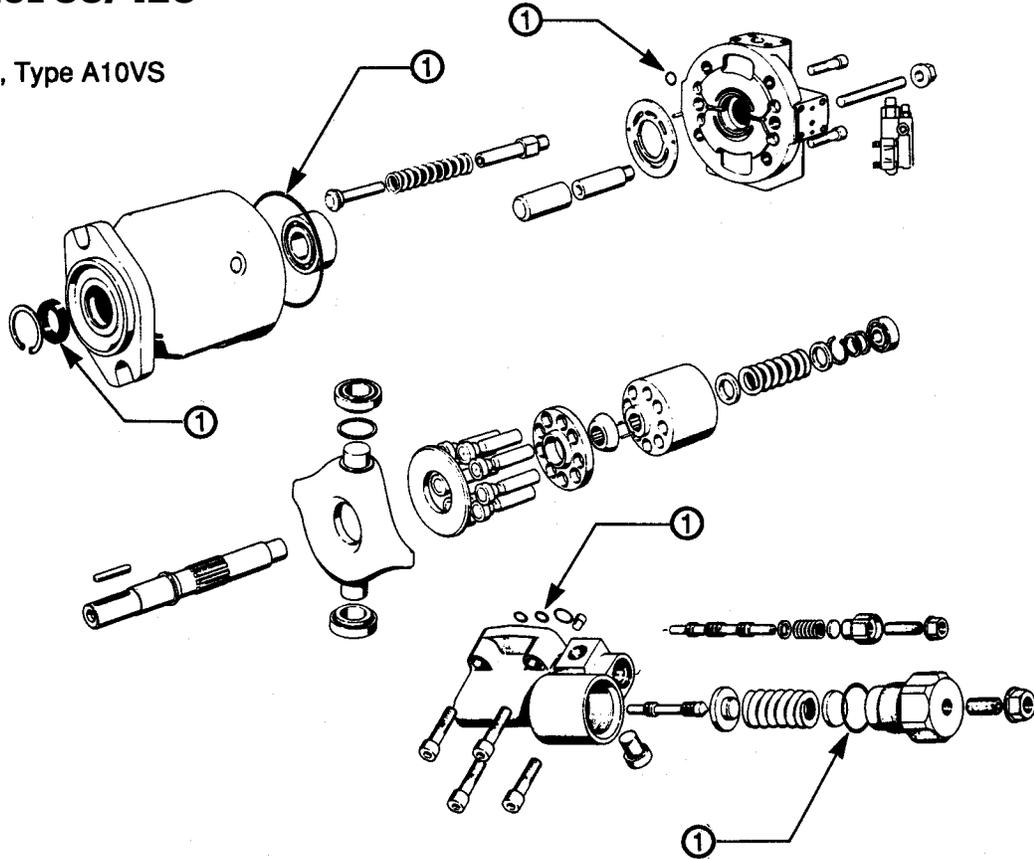
ITEM #	QTY.	NUMBER	DESCRIPTION
1-6	1*	3600157	Seal Kit Includes: 1 - (1) O-Ring 2 - (1) Back-up 3 - (1) Wiper 4 - (1)U-Cup 5 - (1)O-Ring 6 - (2) U-Cup
7	1*	3600161	Clevis Pin
8	2*	3600162	Clip Pin
9	1*	3600177	Retaining Ring Head Cap
10	1*	3600178	Rod Assembly

*Per Cylinder

HYDRAULIC PUMP SEAL KIT

MCL 36/42C

Pump, Type A10VS



HYDRAULIC PUMP SEAL KIT

MCL 36/42C

ITEM #	QTY.	NUMBER	DESCRIPTION
1	1	3600201	Seal Kit

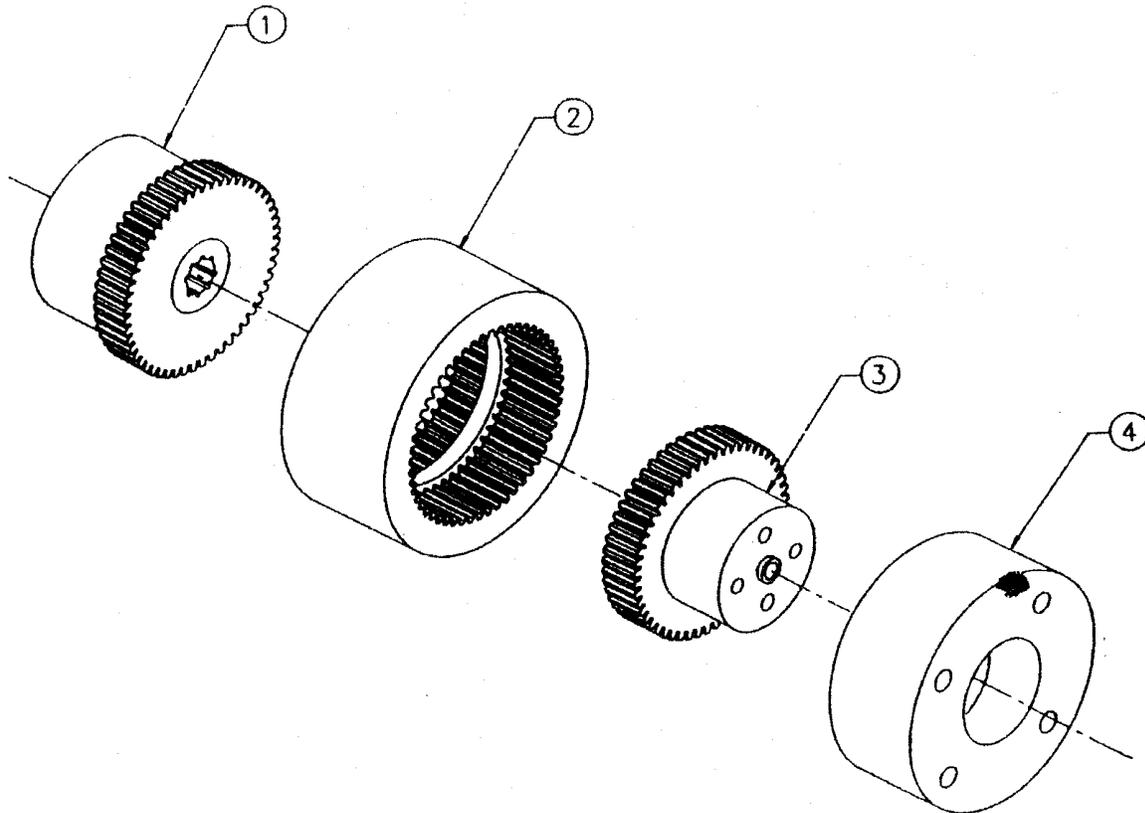
Kit Includes:

- (1) Shaft Seal
- (1) Seal Rings
- (6) U-Set Rings
- (2) Plugs
- *(22) O-Rings

*Note: O-Rings are included for all pump configurations.
O-Rings must be matched to current configuration.

HYDRAULIC PUMP COUPLING

Mcl 36/42C



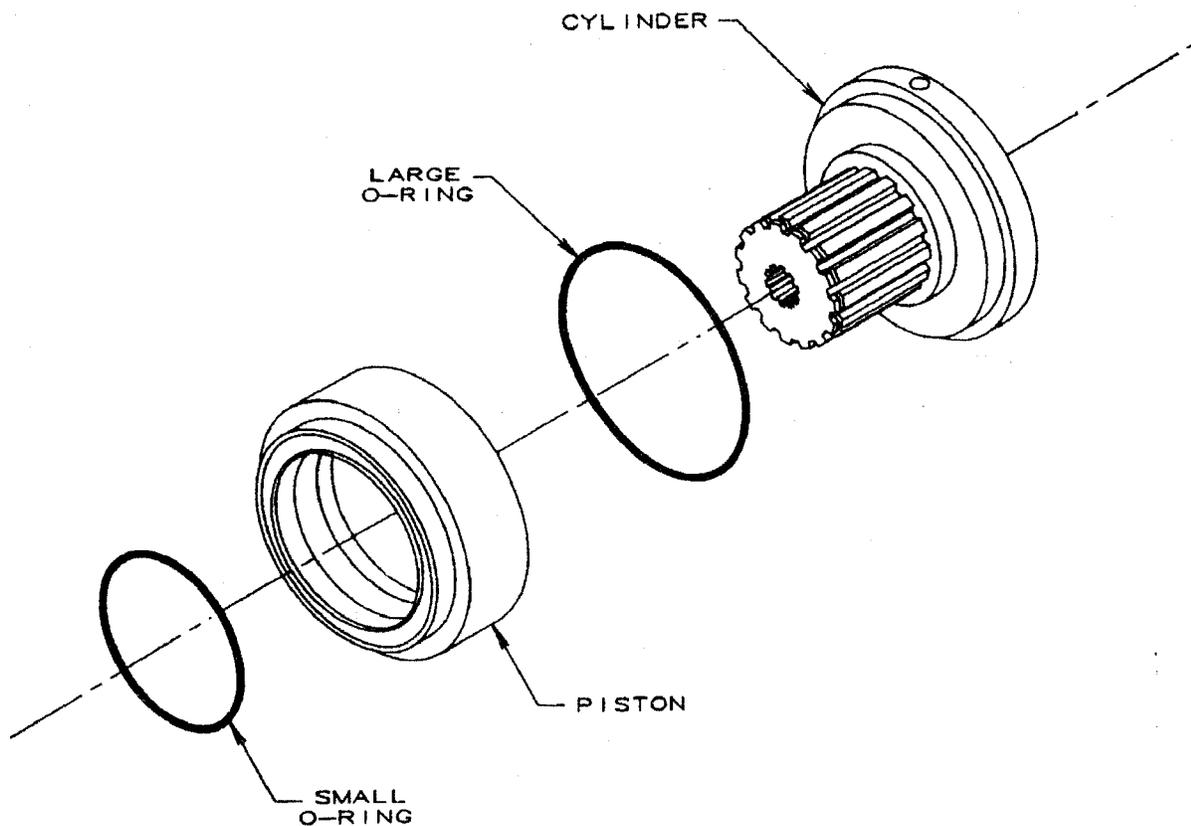
HYDRAULIC PUMP COUPLING

Mcl 36/42C

ITEM #	QTY.	NUMBER	DESCRIPTION
1	1	3600159	Coupling Hub
2	1	2400121	Nylon Sleeve
3	1	2400156	Pulley Hub
4	1	2400122	Pulley Flange

CLUTCH SEAL KIT

McL 36/42C

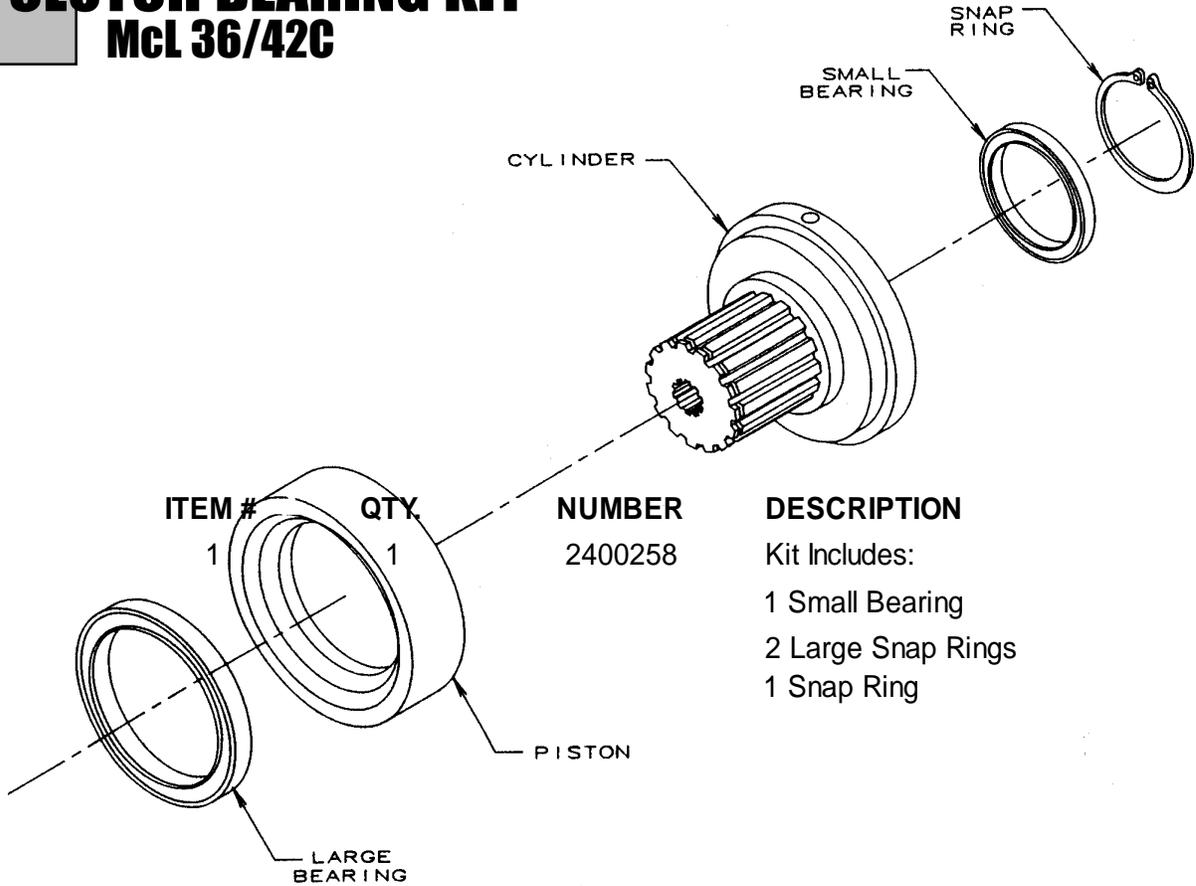


CLUTCH SEAL KIT

McL 36/42C

ITEM #	QTY	NUMBER	DESCRIPTION
1	1	3600221	Kit Includes: 1 Small O-Ring 1 Large O-Ring

CLUTCH BEARING KIT McL 36/42C



ITEM #	QTY	NUMBER	DESCRIPTION
1	1	2400258	Kit Includes: 1 Small Bearing 2 Large Snap Rings 1 Snap Ring

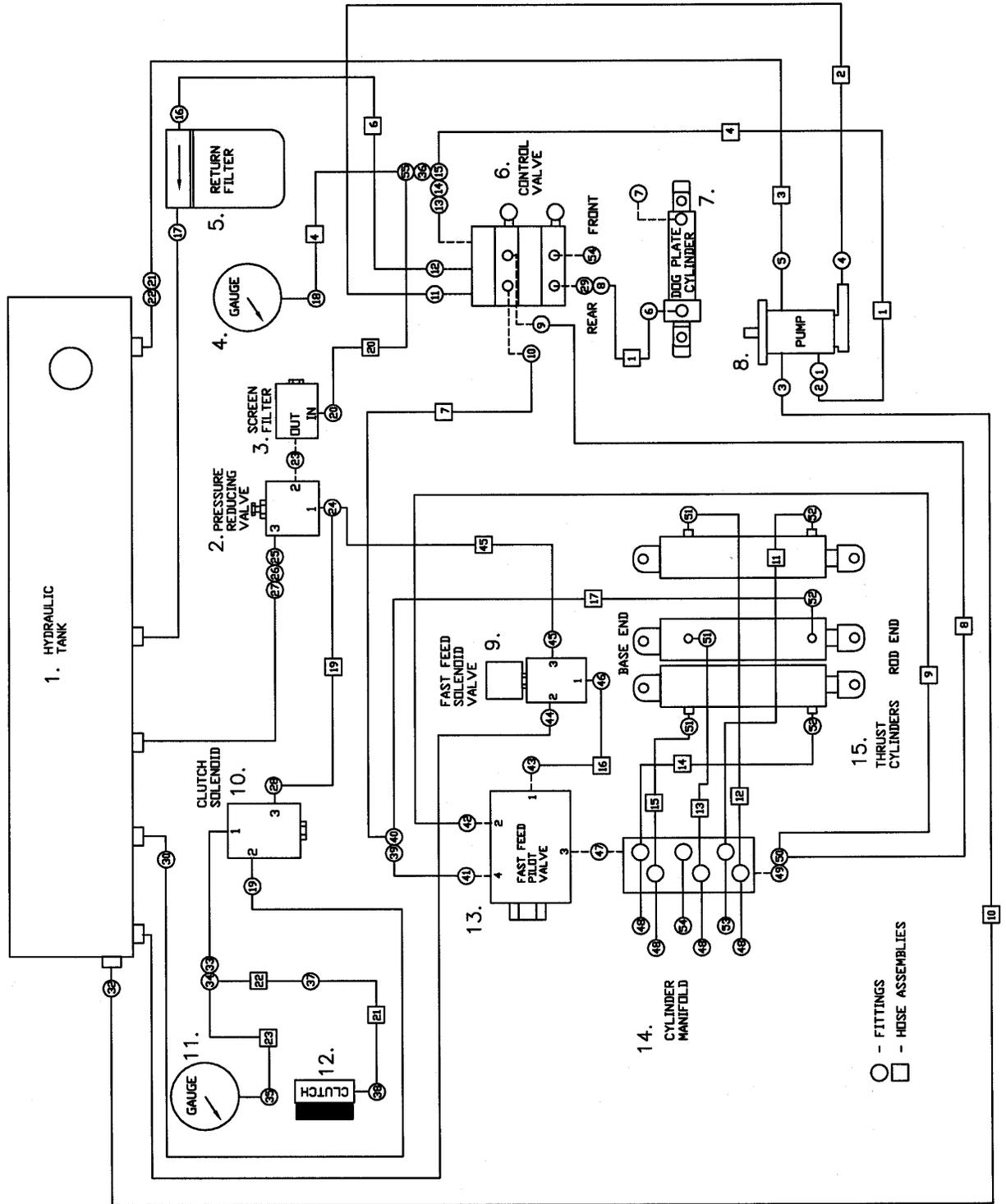
CLUTCH BEARING KIT McL 36/42C

ITEM #	QTY	NUMBER	DESCRIPTION
1	1	3600222	Kit Includes: 1 Small Bearing 2 Large Snap Rings 1 Snap Ring

HYDRAULIC SYSTEM

McL 36/42C

HOSES AND FITTINGS



Hose Assembly and Routing

#	Placement	Hose #	Hose Callout	Cut Length	Left End Fitting	Right End Fitting
TH36201	1 Pressure - Pump outlet to Vavle inlet	#16	FC-659	98	16FJ / 90 / Long Neck	16-FJ / ST
TH36202	2 Load Sense - Pump to Valve	#4	GH-781	103	04-FJ / ST	04-FJ / 45
TH36203	3 Suction - Tank to Pump	#24	FC-619	85	24-FJ / ST	#24 Split Flng / 45
TH36204	4 Valve Tee - Pressure Gauge	#4	GH-781	32	04-FJ / ST	04-FJ / 90
TH36205	5 Valve - Dog Plate Cylinder	#4	GH-781	136	06-FJ / ST	04-FJ / ST
TH36206	6 Valve - Return Filter (Tank)	#24	FC-619	26	24-FJ / ST	24-FJ / ST
TH36207	7 Valve Rear Work Port - FF Valve #4 Tee	#16	FC-619	72	16-FJ / ST	16-FJ / ST
TH36208	8 Valve Front Work Port - Cyl. Manifold	#16	FC-619	72	16-FJ / ST	16-FJ / ST
TH36209	9 Cyl. Manifold Tee - FF Valve #2	#16	FC-619	12	16-FJ / ST	16-FJ / ST
TH36210	10 Case Drain - Tank to Pump	#8	FC-619	92	08-FJ / ST	08-FJ / ST
TH36211	11 Cylinder Manifold - Cylinder, Right, Rod	#12	FC-619	72	12-FJ / ST	12-FJ / ST
TH36212	12 Cylinder Manifold - Cylinder, Right, Base	#12	FC-619	31	12-FJ / ST	12-FJ / ST
TH36213	13 Cylinder Manifold - Cylinder, Center, Base	#12	FC-619	22	12-FJ / ST	12-FJ / ST
TH36214	14 Cylinder Manifold - Cylinder, Left, Rod	#12	FC-619	61	12-FJ / ST	12-FJ / ST
TH36215	15 Cylinder Manifold - Cylinder, Left, Base	#12	FC-619	21	12-FJ / ST	12-FJ / ST
TH36216	16 FF Solenoid, #1 - FF Pilot, #1	#4	GH-781	28.5	04-FJ / ST	04-FJ / ST
TH36217	17 FF Pilot, #4 - Cylinder, Center, Rod	#12	FC-619	71	12-FJ / ST	12-FJ / ST
TH36218	18 PRV Tee, #1 - FF Solenoid, #3	#6	GH-781	17.5	06-FJ / ST	06-FJ / ST
TH36219	19 PRV Tee, #1 - Clutch Solenoid, #3	#6	GH-781	11.5	06-FJ / ST	06-FJ / ST
TH36220	20 Valve Pressure Tee - PRV Tee	#6	GH-781	10.5	06-FJ / ST	06-FJ / ST
TH36221	21 Bell Housing Bulkhead - Clutch Piston	#6	GH-781			
TH36222	22 Clutch Solenoid, #1 - Bell Housing Bulkhead	#6	GH-781	42.5	06-FJ / ST	06-FJ / ST / 90
TH36223	23 Clutch Solenoid Tee, #1 - Clutch Pressure Gauge	#4	GH-781	41 1/2	06-FJ / ST	06-FJ / ST / 45

Fittings Callout List

#	Description	McL PN			
			26	Union, 06FJ-06FP	T400083
			27	Union, 06MP-06MP	T400803
			28	Elbow, 90, 08MB-06MJ	T401270
			29	Union, 08FJ-04MJ	T400700
			30	Union, 08MJ-08MP	T400040
				O-Ring, #8	W200025
1	Union, 16 SPF - 16FB	4800767	31	Elbow, 90, 16FJ-16MJ	T401630
2	Elbow, 90, 16MP-16MJ	1BA16FJC16	32	Elbow, 90, 08MP-08MJ	T401140
3	Union, 8MB-8MJ	T400140	33	Union, 08MB-06MJ	T400135
4	Elbow, 90, 04MB-04MJ	T401230	34	Tee, 06FJ-06MJ-06MJ	T402153
5	Kit, #24 Split Flange Kit	T410450	35	Union, 04FP-04MJ	T400110
6	Swivel Elbow, 90, 06MP-06MJ	T401700	36	Tee, 06FJ-06MJ-06MJ	T402153
7	Vented Cap	T400801	37	Bulkhead, 06MJ-06MJ	T400391
8	Union, 16MB-04MJ	T404030	38	Elbow, 90, 06MP-06MJ	T401102
9	Union, 12MB-16MJ	T400520	39	Elbow, 90, 16FJ-16MJ	T401630
10	Union, 12MB-16MJ	T400520	40	Tee, 16FJ-16MJ-16MJ	T402220
11	Elbow, 90, 06MB-04MJ	T401240	41	Union, 16MB-16MJ	T400530
12	Union, 16MB-16MJ	T400530	42	Elbow, 90, 16MB-16MJ	T401650
13	Union, 16MB-16MJ	T400530	43	Elbow, 90, 06MB-04MJ	T401240
14	Special Fitting Assembly		44	Union, 06MP-06MJ	T400028
15	Elbow, 90, 06FJ-06MJ	T401228		O-Ring, #6	W200015
16	Elbow, 90, 24MP-16MJ	T401610	45	Union, 06MB-04MJ	T400550
17	Union, 24MP-24MP	T400810	46	Union, 06MB-04MJ	T400550
18	Union, 04FP-04MJ	T400110	47	Union, 12MB-16MB	T400537
19	Elbow, 90, 06FJ-06MJ	T401228	48	Union, 12MB-12MJ	T400220
20	Elbow, 45, 06MB-06MJ	T401572	49	Elbow, 90, 12MB-12MJ	T401340
21	Elbow, 90, 24MP-24MJ	T401200	50	Tee, 12FJ-12MJ-12MJ	T402170
22	Union, 32MP-24FP	T410110	51	Elbow, 45, 12MP-12MJ	T401585
23	Union, 06MB-06MB	T400038	52	Elbow, 90, 12MP-12MJ	T401180
24	Tee, 06MB-06MJ-06MJ	T402148	53	Elbow, 90, 12FJ-12MJ	T401480
25	Union, 06MJ-06MP	T400028	54	Plug, 16MB	T405080
	O-Ring, #6	W200015			

Hydraulic Components

#	Placement	
1	Hydraulic Tank	6320702
2	Pressure Reducing Valve	3600119
3	Screen Filter	N/A
4	Gauge	4800784
5	Return Filter	T700100
6	Control Valve	3620720
7	Dog Plate Cylinder	3600124
8	Hydraulic Pump	CM00420
9	Fast Feed Solenoid Valve	2400371
10	Clutch Solenoid Assembly	
	Cartridge	3600356
	Body	3600357
	Coil	3600355
11	Gauge	4810723
12	Clutch	3600210
13	Fast Feed Pilot Valve	3600280
14	Cylinder Manifold	3600098
15	Thrust Cylinder	3600370

NOTE: For replacement Hose Assemblies, please include hose length and end fittings.

4.1.2

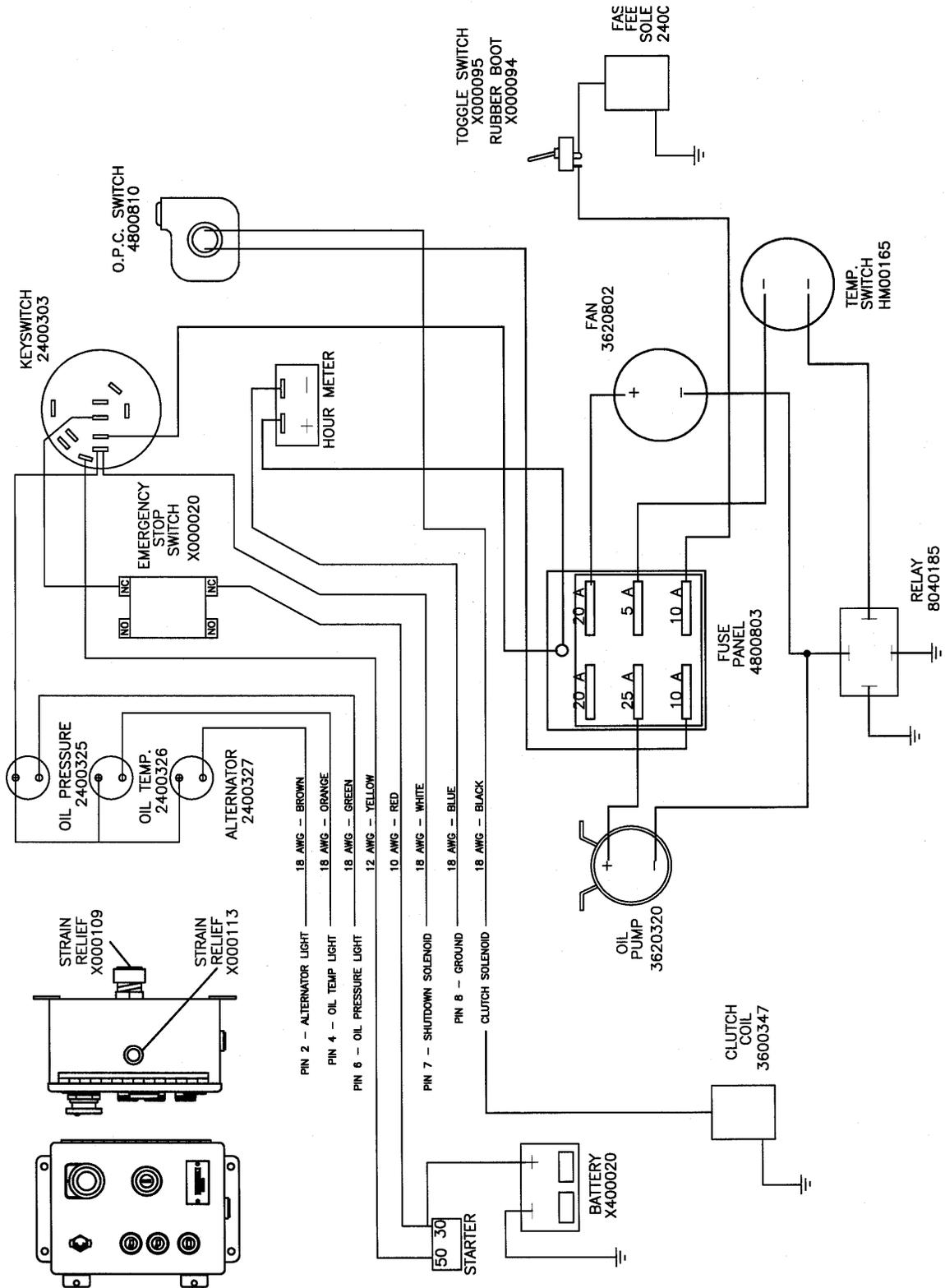
HYDRAULIC SYSTEM
McL 36/42G
HOSES AND FITTINGS

ELECTRICAL SYSTEM

MCL 36/42C

WIRING DIAGRAM

ENGINE DETAIL



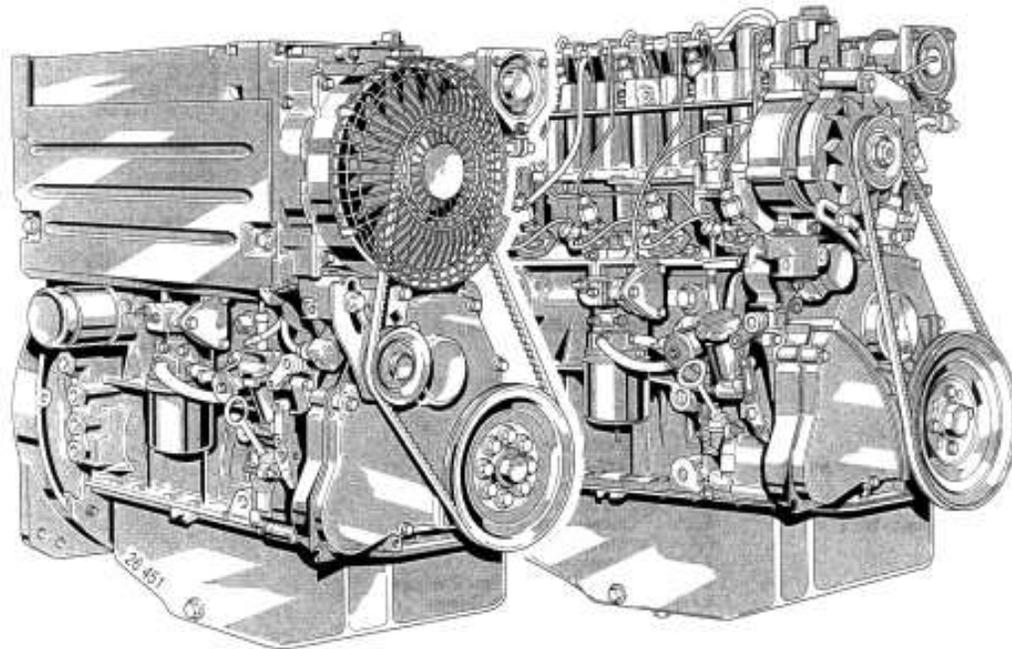
5.1 ENGINE DETAILS

McL 36/42C

DETAIL	PAGE
ENGINE DESCRIPTION	5.1.1
MODEL DESIGNATION	5.1.2-5.1.3
ENGINE PARTS	5.1.4-5.1.7
OIL CIRCUIT & FUEL SYSTEM	5.1.8
COMMISSIONING	5.1.9-5.1.10
STARTING	5.1.11
MONITORING SYSTEMS	5.1.12
STOPPING	5.1.13
OPERATING CONDITIONS	5.1.14
LUBE OIL	5.1.15
FUEL	5.1.16
MAINTENANCE SCHEDULE	5.1.17
MAINTENANCE CHART	5.1.18
MAINTENANCE WORK COMPLETED	5.1.19-5.1.20
LUBRICATION SYSTEM	5.1.21-5.1.22
FUEL SYSTEM	5.1.23
COOLING SYSTEM	5.1.24
CUMBUSTIONAIR FILTER	5.1.25-5.1.26
BELT DRIVES	5.1.27-5.1.28
ADJUSTMENTS	5.1.29
ACCESSORIES/BATTERY	5.1.30-5.1.31
ENGINE CLEANING	5.1.32
DIAGNOSIS CHART	5.1.33
ENGINE PRESERVATION	5.1.34
ENGINE SPECIFICATIONS AND SETTINGS	5.1.35-5.1.36
TORQUE WRENCH SETTINGS/TOOLS	5.1.37
ORDERING SPARE PARTS	5.1.38

ENGINE DESCRIPTION

GENERAL 1



DEUTZ Diesel Engines

are the product of many years of research and development. The resulting know-how, coupled with stringent quality standards, guarantee their long service life, high reliability and low fuel consumption.

It goes without saying that DEUTZ Diesel Engines meet the highest standards for environmental protection.

Beware of Running Engine

Shut the engine down before carrying out maintenance or repair work. Ensure that the engine cannot be accidentally started. Risk of accidents. When the work is complete, be sure to refit any panels and guards that have been removed. Never fill the fuel tanks while the engine is running. Observe industrial safety regulations when running the engine in an enclosed space or underground.

Care and Maintenance

Sound care and maintenance practices will ensure that the engine continues to meet the requirements placed on it. Recommended service intervals must be observed and service and maintenance work carried out conscientiously. Special care should be taken under abnormally demanding operating conditions.

Safety



This symbol is used for all safety warnings.

Please follow them carefully. The attention of operating personnel should be drawn to these safety instructions. General safety and accident prevention regulations laid down by law must also be observed.

Service

Please contact one of our authorized service representatives in the event of breakdowns or for spare parts inquiries. Our trained specialists will carry out repairs quickly and professionally, using only genuine spare parts.

Original parts from DEUTZ AG are always produced in accordance with state-of-the-art technology. Please turn to the end of this manual for further instructions.

California Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm

Asbestos



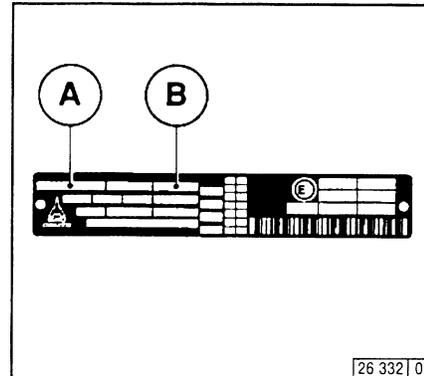
DEUTZ original parts are asbestos-free.

MODEL DESIGNATION

2.1 Model

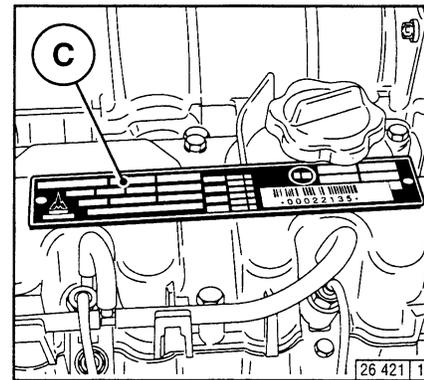
2.1.1 Rating Plate

The model **A**, the engine serial number **B** and the performance data are stamped on the rating plate. The model and engine serial number must be given when ordering parts.



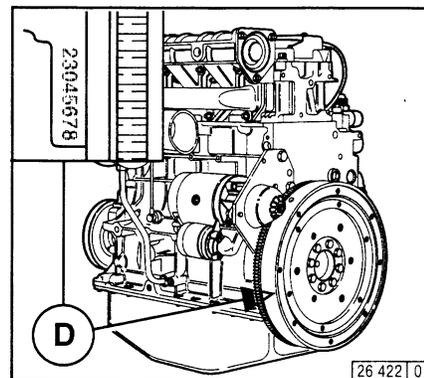
2.1.2 Location of Rating Plate

The rating plate **C** is attached to the valve cover.



2.1.3 Engine Serial Number

The engine serial number **B** is stamped on the crankcase **D** as well as the rating plate.

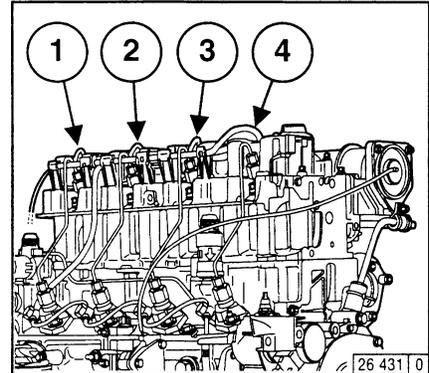


ENGINE DESCRIPTION

2.1 Model

2.1.4 Numbering of Cylinders

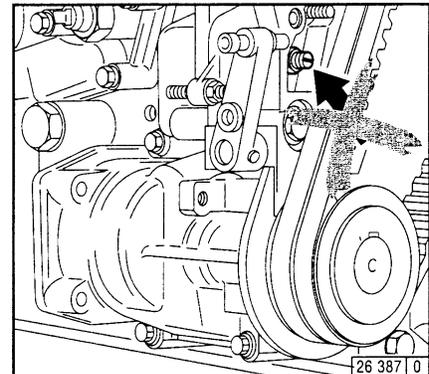
Cylinders are numbered consecutively, beginning at the flywheel end.



2.1.5 Fuel Delivery Lock

The manufacturer shall not be held liable for damages resulting from adjustments made to the regulator by the operator. The lock screws are protected in order to prevent this:

1. with locking paint on model:
torque balancer
2. with plastic protective cap on model:
without torque balancer

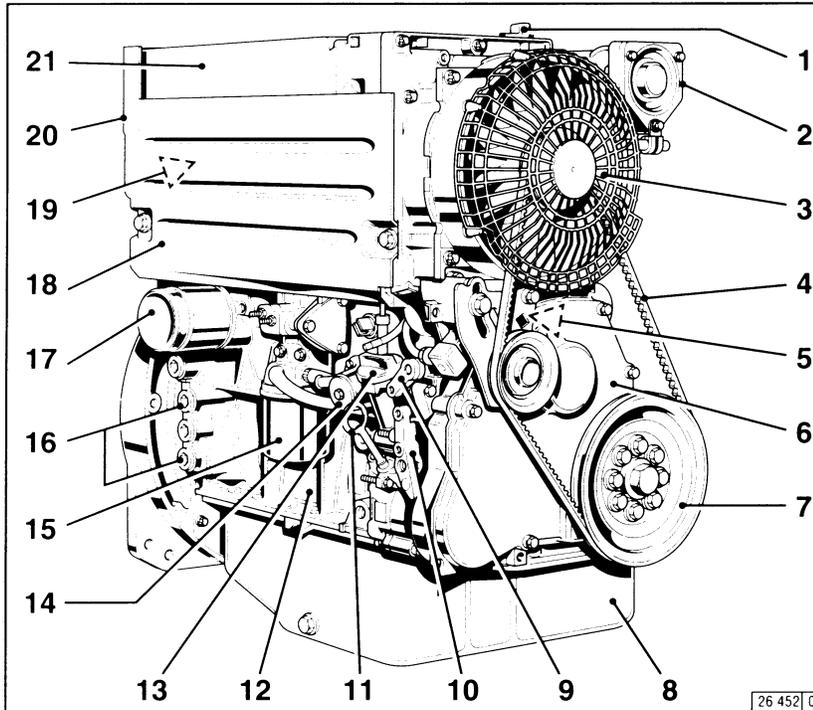


Adjustments to the regulator are to be carried out only by authorized DEUTZ SERVICE - specialists.

ENGINE DESCRIPTION

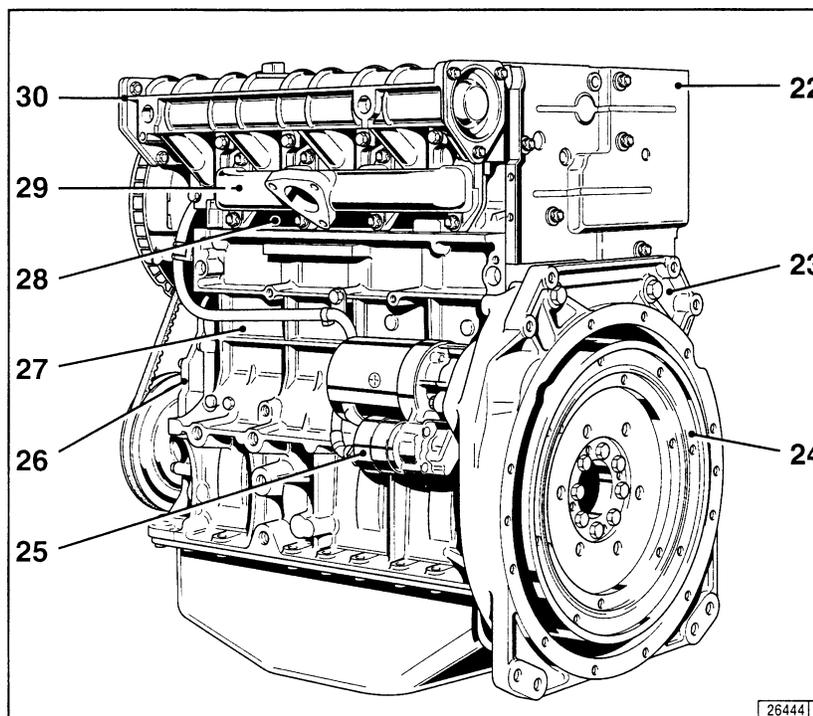
2.2 Engine Illustrations

2.2.1 Service Side FL 1011F



- 1 Oil filler neck (valve-gear cover)
- 2 Charge-air line / air-intake line
- 3 Fan with integrated generator
- 4 Narrow V-belt
- 5 Solenoid
- 6 Toothed belt cover
- 7 V-belt pulley on crankshaft
- 8 Oil Sump
- 9 Cut-out handle
- 10 Speed control lever
- 11 Oil dipstick
- 12 Crankshaft housing
- 13 Oil fill point (on side of crankcase)
- 14 Fuel pump
- 15 Easy-change fuel filter
- 16 Connecting facility for oil heater
- 17 Lube oil easy-change filter
- 18 Removable coolant intake hood
- 19 Injection pumps
- 20 Date plate
- 21 Oil cooler

2.2.2 Exhaust Side FL 1011F

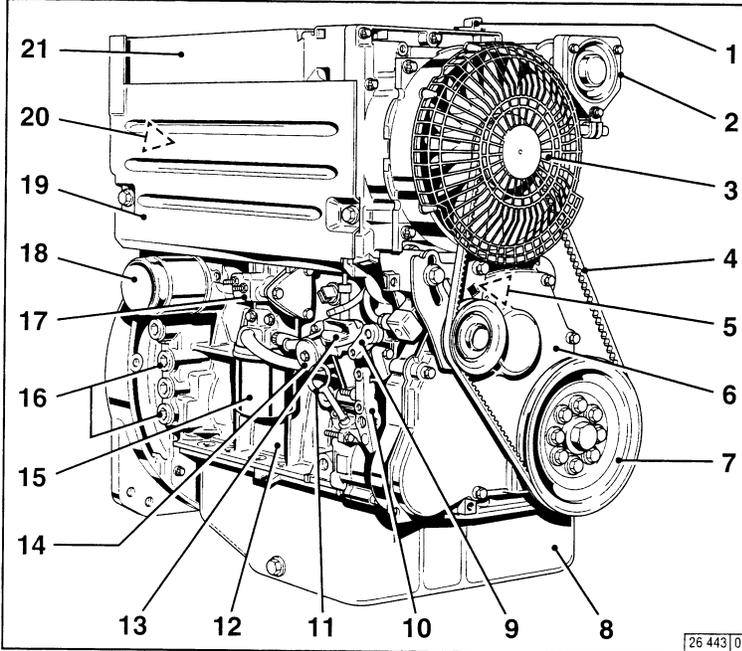


- 22 Date plate
- 23 Connection housing (SAE)
- 24 Flywheel with ring gear
- 25 Starter
- 26 Front cover
- 27 Crankcase
- 28 Cylinder head
- 29 Exhaust manifold pipe
- 30 Air-intake pipe

ENGINE DESCRIPTION

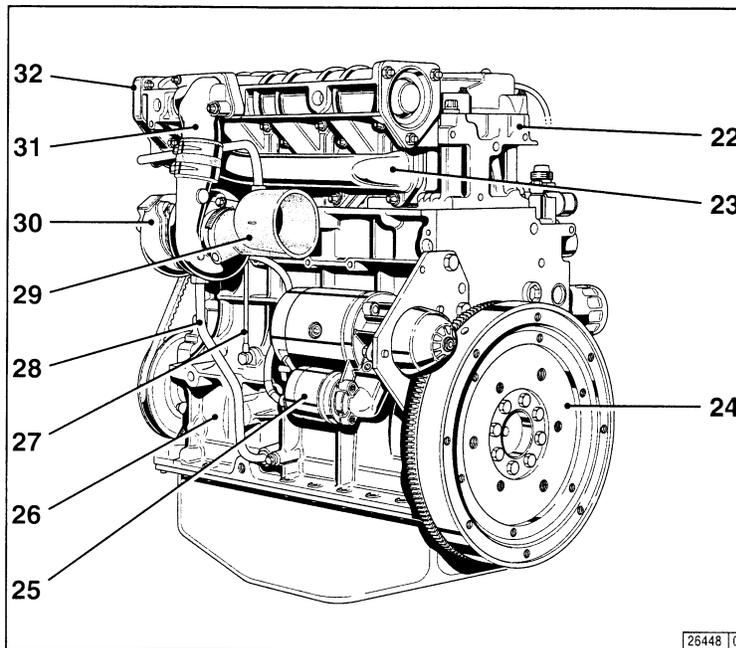
2.2 Engine Illustrations

2.2.3 Service Side BFL 1011F



- 1 Oil filler neck (valve-gear housing cover)
- 2 Charge-air line / air-intake line
- 3 Fan with integrated generator
- 4 Narrow V-belt
- 5 Solenoid
- 6 Wheel-house cover
- 7 V-belt pulley on crankshaft
- 8 Oil sump
- 9 Cut-out handle
- 10 Speed control lever
- 11 Oil dipstick
- 12 Crankshaft housing
- 13 Oil fill point (on side of crankcase)
- 14 Fuel pump
- 15 Easy-change fuel filter
- 16 Connection facility for oil heater
- 17 Charge-air pressure full-load stop (LDA)
- 18 Lube oil easy-change filter
- 19 Removable coolant intake hood
- 20 Injection pumps
- 21 Oil cooler

2.2.4 Exhaust Side BFL 1011F

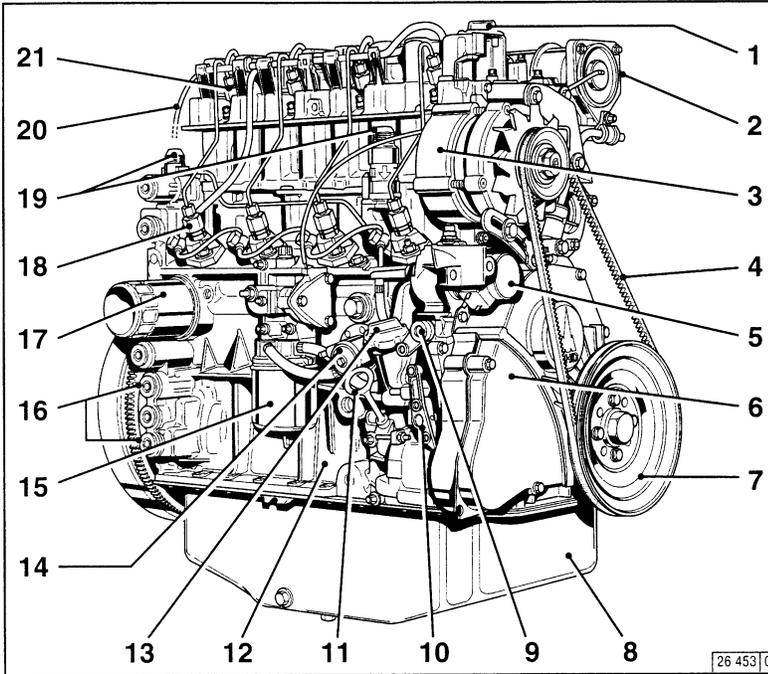


- 22 Cylinder head
- 23 Exhaust manifold pipe
- 24 Flywheel with ring gear
- 25 Starter
- 26 Crankshaft housing
- 27 Inlet line to TC (Lube oil)
- 28 Return line from TC (Lube oil)
- 29 Induction pipe
- 30 Turbocharger (TC)
- 31 Intake manifold
- 32 Air-intake line

ENGINE DESCRIPTION

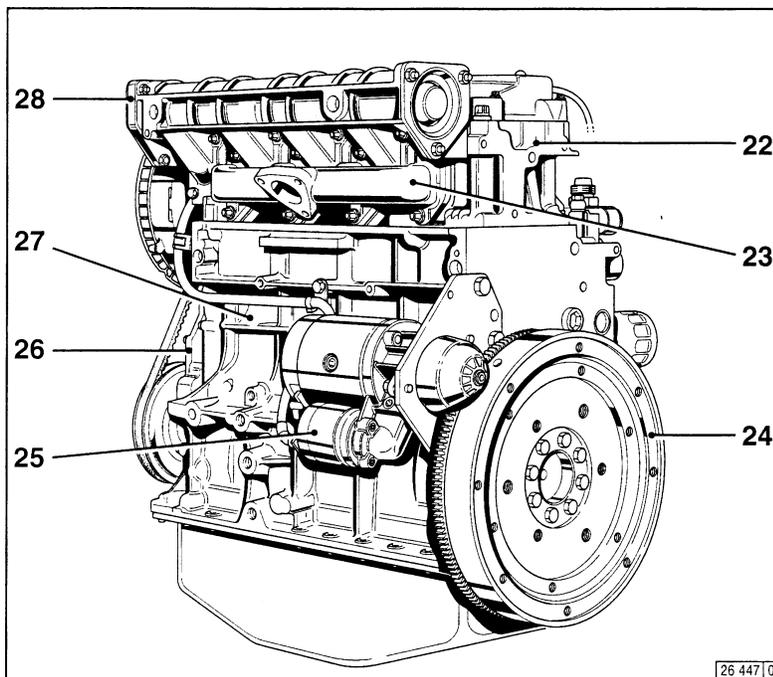
2.2 Engine Illustrations

2.2.5 Service Side FM 1011F



- 1 Oil filler neck (valve-gear housing)
- 2 Charge-air line / air-intake line
- 3 Generator
- 4 Narrow V-belt
- 5 Solenoid
- 6 Wheel-house cover
- 7 V-belt pulley on crankshaft
- 8 Oil sump
- 9 Cut-out handle
- 10 Speed control lever
- 11 Oil dipstick
- 12 Crankshaft
- 13 Oil fill point (on side of crankcase)
- 14 Fuel pump
- 15 Easy-change fuel filter
- 16 Connecting facility for oil heater
- 17 Lube oil easy-change filter
- 18 Injection pumps
- 19 Connection for oil cooler
- 20 Leakage-fuel line
- 21 Injection valves

2.2.6 Exhaust Side FM 1011F

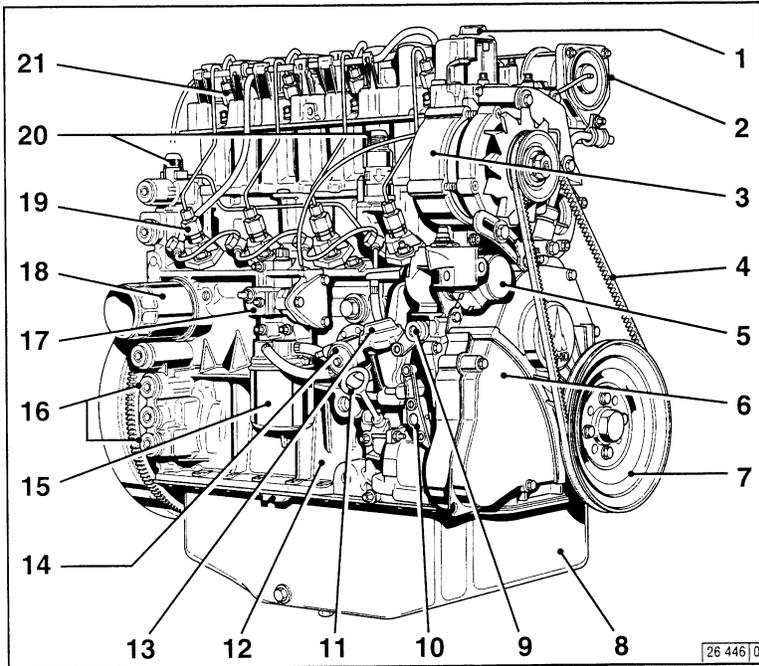


- 22 Cylinder head
- 23 Exhaust manifold line
- 24 Flywheel with ring gear
- 25 Starter
- 26 Front cover
- 27 Crankcase
- 28 Intake pipe

ENGINE DESCRIPTION

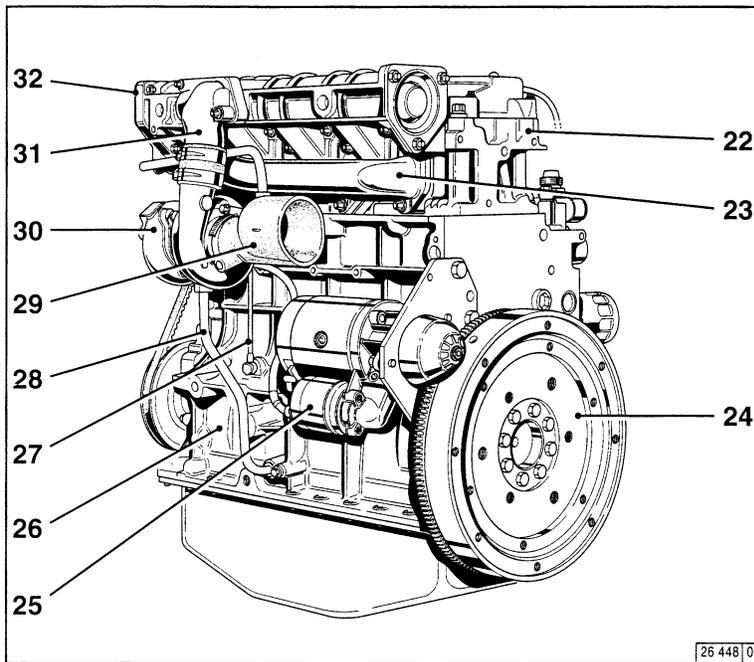
2.2 Engine Illustrations

2.2.7 Service Side BFM 1011F



- 1 Oil filler neck (valve-gear housing cover)
- 2 Charge-air line / air-intake line
- 3 Generator
- 4 Narrow V-belt
- 5 Solenoid
- 6 Wheel-house cover
- 7 V-belt on crankshaft
- 8 Oil sump
- 9 Cut-out handle
- 10 Speed control lever
- 11 Oild dipstick
- 12 Crankshaft housing
- 13 Oil fill point (on side of crankcase)
- 14 Fuel pump
- 15 Easy-change fuel filter
- 16 Connecting facility for oil heater
- 17 Charge-air pressure full-load stop (TC)
- 18 Lube oil easy-change
- 19 Injection pumps
- 20 Oil cooler connection
- 21 Injection valves

2.2.8 Exhaust side BFM 1011F

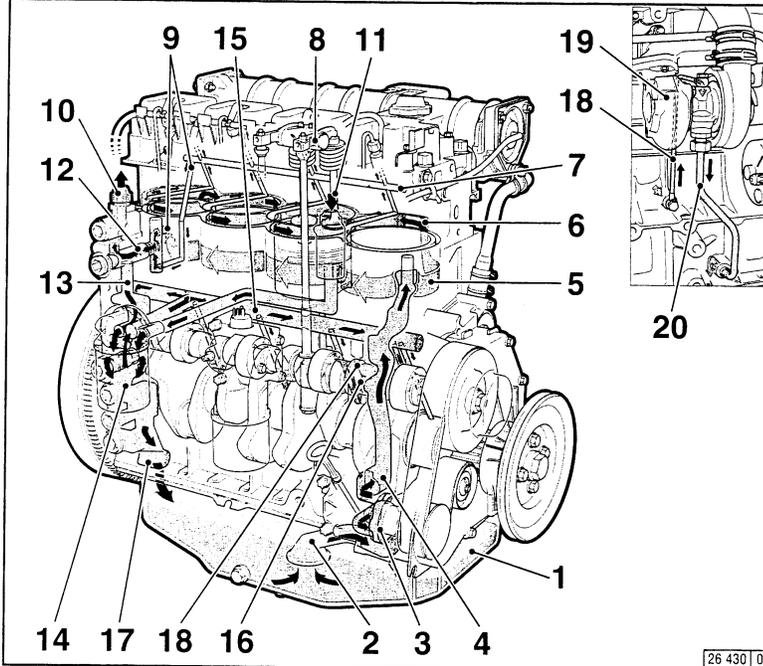


- 22 Cylinder head
- 23 Exhaust manifold pipe
- 24 Flywheel with ring gear
- 25 Starter
- 26 Crankshaft
- 27 Inlet line to TC (Lube Oil)
- 28 Return line from TC (Lube Oil)
- 29 Induction manifold
- 30 Turbocharger (TC)
- 31 Intake manifold
- 32 Air-intake line

ENGINE OPERATION

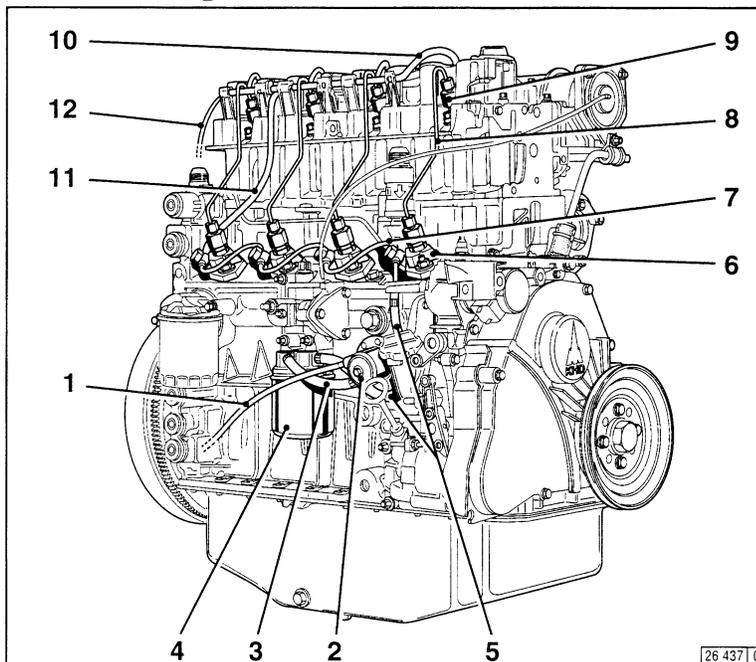
2.3 Oil Circuit & 2.4 Fuel System

2.3.1 Lube Oil Circuit Schematic



- 1 Oil sump
- 2 Intake manifold
- 3 Oil pump
- 4 Main oil duct
- 5 Oil-cooled cylinder
- 6 Cylinder head cooling neck
- 7 Oil duct for rocker arm lubrication
- 8 Rocker arm
- 9 Oil manifold for the thermostat
- 10 Intake to external engine oil cooler
- 11 Return from external engine oil cooler
- 12 Thermostat housing with slide thermostat
- 13 Oil duct to oil filter
- 14 Oil filter
- 15 Oil duct to the cam, con-rod and crankshaft bearing
- 16 Injection jet for cooling the pistons
- 17 Oil return via crankcase to the oil sump
- 18 Lube oil intake to turbocharger
- 19 Turbocharger
- 20 Return from turbocharger to oil sump

2.4.1 Fuel system schematic

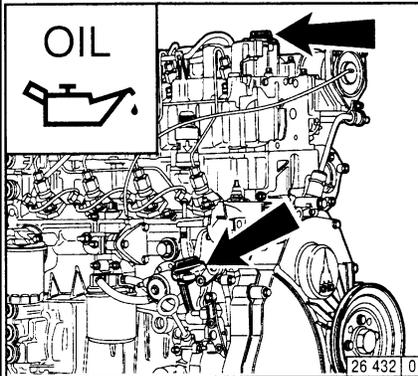


- 1 Fuel line from tank to fuel pump
- 2 Fuel pump
- 3 Fuel line from pump to easy-change fuel filter
- 4 Easy-change fuel filter
- 5 Fuel line from filter to injection pump
- 6 Injection pumps
- 7 Fuel distributor line
- 8 Injection lines
- 9 Injection valves
- 10 Fuel leakage line
- 11 Fuel overflow pipe
- 12 Fuel return to tank

ENGINE OPERATION

3.1 Commissioning

3.1.1 Adding Engine Oil



As a rule, engines are delivered empty of oil. Pour lube oil into the oil filler neck (arrow). For oil grade and viscosity, see pg 4.1

3.1.1.1 Initial Engine Oil Fill-up for B/FM1011F Series

- Fill oil into the oil sump up to the “max” mark on the engine dip stick (for oil top-up quantity see 9.1)
- Switch off the engine.
- Start the engine and allow to run at a low idling speed for approx. 2 mins.
- Check the oil level, if necessary, top up oil to the “max” mark.

3.1.1.2 Initial Engine Oil Fill-up for B/FM 1011F Series

- Fill oil into the oil sump up to the “min.” mark on the engine dip stick.
- In addition, top up the oil quantity of the supply hoses and of the external oil cooler (according to manufacturer’s details).
- Allow the engine to run warm until the thermostat opens (at approx. 95 deg. C).
- Allow the engine to run for approx. 2 mins.
- Switch off the engine.
- Check the oil level, and if necessary, top up oil to the “max.” mark.

3.1.1.3 Initial Engine Oil Fill-up for B/FM 1011F Genset Engine

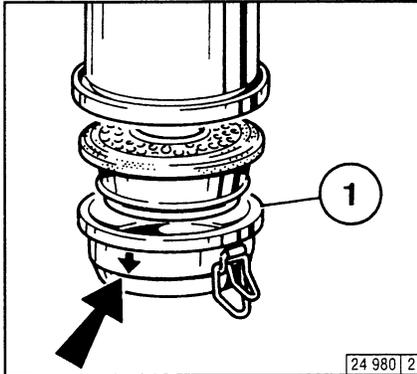
- Fill oil into the oil sump up to the “max.” mark on the engine dip stick (for oil quantity see 9.1).
- Start up the engine and allow to run at a lower idling speed for approx. 2 mins.
- Switch of the engine.
- Check the oil level and fill up with oil up to the “max.” mark.

If the person operating the engine does not run up the engine until the thermostat opens, the oil level may lie above the “max” mark on the engine dip stick when delivered. The level can then only be assessed after the engine has been run up.

ENGINE OPERATION

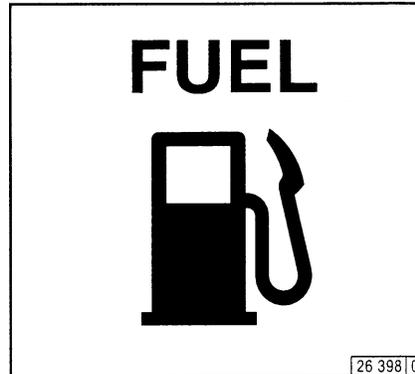
3.1 Commissioning

3.1.2 Filling Oil Bath Air Filter with Engine Oil



Fill oil cup 1 of the oil bath cleaner with oil up to the arrow.
For oil grade and viscosity, see 4.1.

3.1.3 Adding Fuel



Use only commercial-grade fuel. For fuel grade, see 4.2. Use summer or winter-grade fuel, depending on the ambient temperature.



Do not fill the precleaner dust collector (if fitted) with oil.



Never fill the tank while the engine is running. Keep the filler cap area clean and do not spill fuel.

3.1.4 Other Preparations

- Check battery and cable connections, see 6.7.1
- Transport hooks
Remove if fitted (see 6.7.3)
- Trial run
After the engine has been prepared, let it run for about 10 minutes without load.

During and after trial run

- Check the engine for leaks
After the engine has been turned off
- Check the oil level, see 6.1.2
If necessary, top up oil, see 3.1.1
- Retension V-belts, see 6.5

- Breaking in
During the break-in phase-about 200 operating hours - check the oil level twice a day. After the engine is broken in, checking once a day will be sufficient.

3.1.5 Additional Maintenance Work

When commissioning new and reconditioned engines, the following additional maintenance work must be carried out:

After 50-150 OH

- Change lube oil, see 6.1.2
- Change oil filter cartridge, see 6.1.3
- Change fuel filter cartridge, see 6.2.1.
- Check V-belts and retension as necessary, see 6.5.
- Check engine for leaks.

- Check the engine mount and adjust as necessary, see 9.2.

After 500 OH

- Check the valve clearance and adjust as necessary, see 6.6.1.

ENGINE OPERATION

3.2 Starting

3.2.1 Electric Starting



Before starting, make sure that nobody is standing in the immediate vicinity of the engine or driven machine.

After repair work:

Check that all guards have been replaced and that all tools have been removed from the engine.

When starting with flame glow system, do not use any other starter substance (e.g. injection with start pilot).

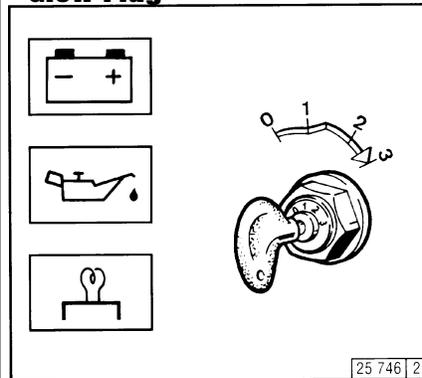
Caution: If the speed regulator has been removed, the engine must not be tested under any circumstances:

Disconnect the battery.

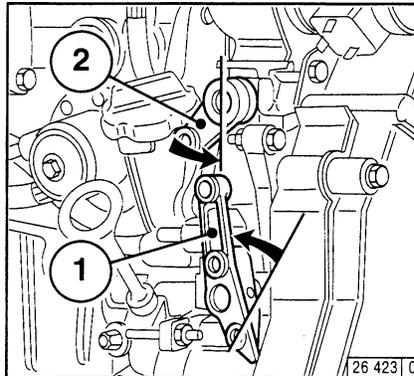
Do not actuate the starter for more than 20 seconds. If the engine does not catch wait a minute then try again.

If the engine does not catch after two attempts, refer to the Diagnosis Chart (see 7.1)

with Cold-Start Aid - Glow Plug

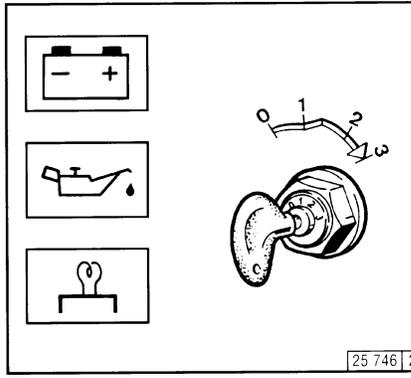


- Insert key.
 - Position 0 = no operating voltage
- Turn key clockwise.
 - Position 1 = operating voltage
 - Pilot lights come on.
- Push the key in and turn further clockwise against spring pressure
 - Glow plug indicator light comes on
 - Position 2 = Preheat, hold for approx 1 minute.
 - Preheat lamp comes on.
 - Position 3 = Start
- Release key as soon as engine fires.
 - Pilot lights go out.



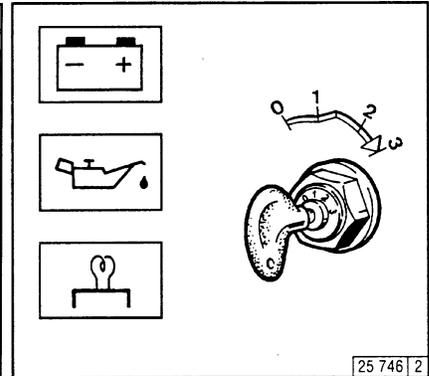
- Where possible, disengage the clutch to separate the engine from any driven parts.
- Move speed control lever 1 into idle position.
- Move cut-out handle, 2, into operating position.

with Cold-Start Aid - Ether Starting System

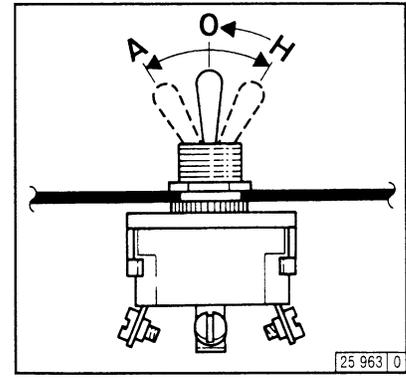


- Insert key.
 - Position 0 = no operating voltage
- Turn key clockwise
 - Position 1 = operating voltage
 - Pilot lights comes on.
- Push key in and turn further clockwise against spring pressure
 - Position 2 = no function
 - Position 3 = start
- Release key as soon engine fires
 - Pilot lights go out

Starting without Cold-Start Aid



- Insert key.
 - Position 0 = no operating voltage
- Turn key clockwise
 - Position 1 = no operating voltage
 - Pilot lights come on.
- Push the key in and turn it further clockwise against spring pressure
 - Position 2 = no function
 - Position 3 = start



- Starting fluid is injected automatically in switch position A, as long as the starter is operated.
- To assist acceleration at lower temperatures and to avoid white fumes, briefly hold the arctic switch in switch position H.

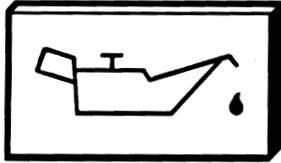


The switch must not be moved to position H when the engine is switched off and the ignition is switched on.

ENGINE OPERATION

3.3 Monitoring Systems

3.3.1 Engine Oil Pressure



25 752 | 1

Oil Pressure Pilot Light

- The oil pressure pilot light comes on with operating voltage on and engine off.
- The oil pressure pilot light should go out when the engine is running.



25 753 | 0

Oil Pressure Indicator

- The pointer must remain in the green sector over the entire range.



25 754 | 0

Oil Pressure Gauge

- The pointer must indicate the minimum oil pressure (see 9.1).

3.3.2 Engine Tempera-



24 985 | 0

Temperature Gauge

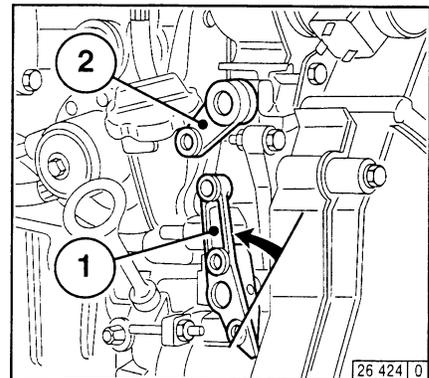
- The engine temperature gauge pointer should remain in the green sector most of the time. It should rarely enter the yellow-green sector. If the pointer enters the orange sector, the engine is overheating. Turn off and establish the cause from the Diagnosis Chart (see 7.1).

ENGINE OPERATION

3.4 Stopping

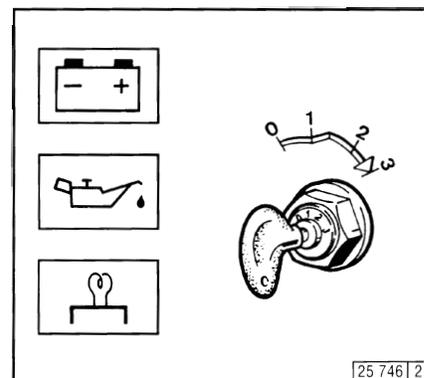
3.4.1 Mechanical Shutdown

- Move speed control lever 1 to low idle.
- Operate shutdown lever 2 until the engine comes to a stop. The charge pilot light and the oil pressure pilot light will come on when the engine stops.
- Turn key counter-clockwise (to position 0) and remove. The pilot lights will go out.



3.4.2 Electrical Shutdown (Ignition Key)

- Turn key counter-clockwise (to position 0) and remove. The pilot lights will go out.



Ignition Key

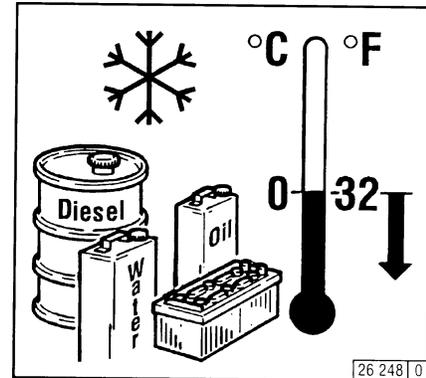
If possible, do not suddenly switch off the engine when under full load.

ENGINE OPERATION

3.5 Operating Conditions

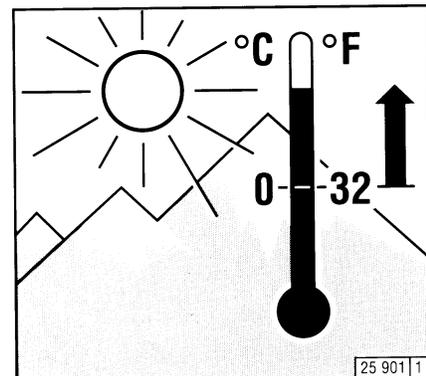
3.5.1 Winter Operation

- Lube Oil Viscosity
 - Select the oil viscosity (SAE grade) according to the ambient temperature when the engine is started, see 4.1.2
 - Increase oil change frequency when operating below -10°C , see 6.1.1
- Diesel Fuel
 - Use winter-grade diesel fuel for operation below 0°C , see 4.2.2
- Additional Maintenance Work
 - Drain the sludge from the fuel tank once a week. (Unscrew the sludge drain plug).
 - If necessary, allow the oil in the oil bath air cleaner and the engine oil to settle at the ambient temperature.
 - Below -20°C , after removing the starter if necessary, smear the ring gear on the fly wheel via the pinion bore from time to time with cold-resistant grease, (e.g. Bosch grease FT 1 V 31).
- Cold-Start Aid
 - At temperatures near or below freezing point, use glow plugs if necessary, see 3.2.1. This not only lowers the starting limit temperature, but provides easier starting at temperatures normally not requiring a starting aid.
This not only lowers the starting limit temperature, but provides easier starting at temperatures normally not requiring a starting aid.
- Battery
 - Efficient cold starting requires a healthy battery, see 6.7.1
 - The starting limit temperatures can be lowered by $4\text{--}5^{\circ}\text{C}$ by heating the battery up to about $+20^{\circ}\text{C}$. (To do so, remove the battery and store in a warm place.)



3.5.2 High Ambient Temperatures High Altitude

- As the altitude and ambient temperature rise, the density of air tends to decrease, which affects the maximum power output of the engine, the exhaust gas quality and, in extreme cases, the starting behavior. Under transient conditions, the engine can be used at altitudes up to 1000m and temperatures up to 30°C . If the engine is to operate under more severe conditions (at higher altitudes or temperatures), it will be necessary to reduce the injected fuel quality and thus, engine power.
- If you have any doubts about engine operation under these or similar conditions, ask your engine or equipment supplier whether the engine has been derated in the interests of reliability, service life and exhaust gas quality (smoke). Otherwise contact DEUTZ SERVICE.



OPERATING MEDIA

4.1 Lube Oil

4.1.1 Quality Grade

Lube oils are differentiated by **Deutz** according to their performance and quality class. Oils of other, comparable specifications can be used.

Approved oils:			
Deutz	DQC I	DQC II	DQC III
ACEA	E2-96	E3/96/E5-02	E4-99
API	CF/CF-4	CH-4/CG-4	-
DHD	-	DHD-1	-

The precise assignment of the admissible oil qualities to the engines is indicated in chapter 6.1.1. If in doubt, contact your service representative.

4.1.2 Viscosity

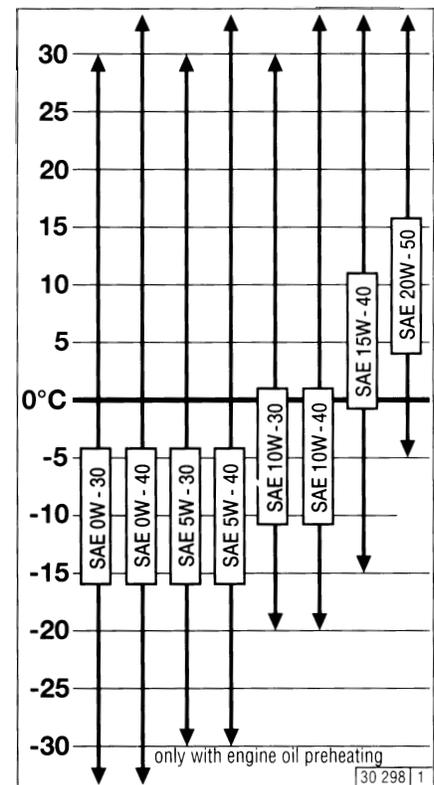
Generally, multi-grade oils shall be used. In closed heated rooms at temperatures >5 deg.C, also single-grade oils can be used.

As the viscosity of lube oil is dependent on temperature, the choice of SAE grade should be governed by the ambient temperature prevailing at the engine operating site.

Optimum operating behaviour will be attained if you take the accompanying oil viscosity diagram as a guide.

Should the temperature fall temporarily below the limits of the SAE grade selected, cold starting may be affected but the engine will not be damaged. In order to keep wear to a minimum, do not exceed application limits for extended periods of time.

Synthetic lube oils feature an improved temperature and oxidation stability.



OPERATING MEDIA

4.2 Fuel

4.2.1 Quality Grade

Use commercially available diesel fuel with less than 0.5% sulphur content. If the sulphur content is higher than 0.5% oil change intervals should be reduced, see 6.1.1

The following fuel specifications / standards are approved:
(refer to TR 0199-3002)

- **Diesel fuel**
 - DIN EN 590
 - BS 2869: A1 and A2
(with A2, take note of the sulphur content)
 - ASTM D 975-88; 1-D and 2-D
 - NATO Code F-54 and F-75
 - ISO 8217 DMS
 - ISO 8217 DMA
- **Light heating oil**
according to DIN 51603
ASTM D 396; 1 and 2
BS 2869 Class D

- **Jet Fuel**
 - F34/F35/F44 (kerosene)
 - F54 (equivalent to diesel fuel according to DIN EN 590)
 - XF 63 (equivalent to F34 + F35 with
- **Bio diesel fuel**
- according to DIN 51606 - FAME

Exhaust emission levels which may be determined in the cause of type approval tests always refer to the reference fuel prescribed by the authorities for the type approval test.



Diesel fuels must never be mixed with petrol (normal and super grade petrol)!

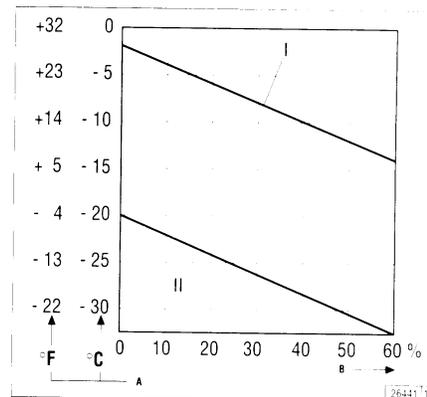
4.2.2 Winter-Grade Fuel

Waxing may occur at low temperatures, clogging the fuel system and reducing engine efficiency. If the ambient temperature is less than 0°C, winter-grade fuel (suitable down to -20°C) should be used. This fuel is usually available from the filling stations well in advance of the cold months.

- At temperatures below -20°C, kerosene should be added to the diesel fuel. The relevant percentages are given in the diagram at the right.
- Special diesel fuels can be used for climatic zones down to -44°C.

If summer-grade diesel fuel must be used at temperatures below 0°C, up to 60% kerosene can be added (see diagram).

In most cases, adequate resistance to cold can be obtained by adding a flow improver (additive). Please contact your DEUTZ partner.



Legend:	
I	Summer diesel fuel
II	Winter diesel fuel
A	Ambient
B	Proportion of Kerosene to be



Mix in tank only. Fill with the appropriate amount of kerosene first, then add the diesel fuel.

ROUTINE MAINTENANCE

5.1 Maintenance Schedule

Routine Maintenance

once after	Operating Hours (OP) every 1)							check	see Section
	50-150	125	250	500	750	1000	2000		
every 10 OH or daily	●							clean	
●								change	
								Operation	6.1.2/3,1.4
								Oil level in engine / separate container ⁹⁾	
								Engine leaks	6.4
								Oil bath ³⁾ - and dry type air cleaners ⁴⁾	6.7.1
								Battery and cable connectors	6.3.1
								Cooling system (depending on engine use ³⁾)	6.1.1
								Engine oil (depending on engine use ⁴⁾ ⁶⁾)	6.1.3
								Oil filter cartridge (depending on oil change interval) ⁴⁾ ⁶⁾)	6.2.1
								Fuel filter cartridge	6.6.1
								Valve clearance (adjust if necessary)	9.2
								Engine mounts (retighten if necessary)	6.5
								V-belts (retension if necessary)	
								Toothed belts ⁸⁾ ¹⁰⁾	
								Injection valve	
								Fuel pump / strainer ⁵⁾	6.2.2
								Fuel leakage line (change defective lines) ¹¹⁾	6.2.3

The specified engine maintenance times are maximum values. Depending on the operating environment, shorter maintenance intervals may be required. Please observe the operating instructions of the equipment manufacturer.

- 1) recommended maximum
- 2) once when commissioning new and reconditioned engines
- 3) clean if needed
- 4) Oil quality API-CF-4, CG-4, CH-4 or ACEA-E1-3/96 and E4-98
- 5) change if required
- 6) for oil change intervals, naturally aspirated engines, see Section 6.1.1
- 7) for oil change intervals, turbocharged engines, see Section 6.1.1
- 8) without toothed belt ventilation renew after 3000 running hours, after 5 years at the latest if running hours are not reached; in both cases together with idler pulley with toothed belt ventilation renew after 4500 running hours, after 5 years at the latest, if running hours are not reached; in both cases together with idler pulley
- 9) during run-in period, check 2 x daily
- 10) retensioning of toothed belts is not permitted
- 11) Change at the latest after 2 years.

ROUTINE MAINTENANCE

5.2 Maintenance Chart

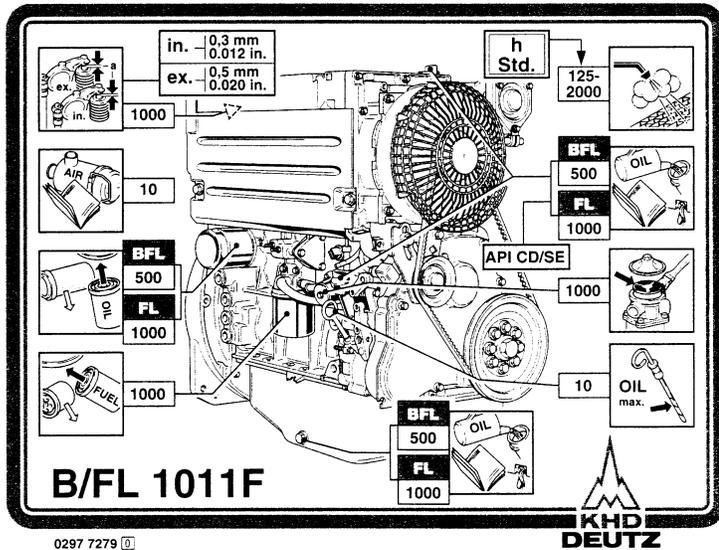
5.2 Maintenance Chart

The maintenance chart shown is supplied as a self-adhesive label with each engine. It should be affixed where it can be seen clearly on the engine or driven equipment.

Check that this is the case.

If necessary, ask your engine or equipment supplier for a fresh supply of labels.

Routine work should be carried out according to the schedule in 5.1



0297 7279

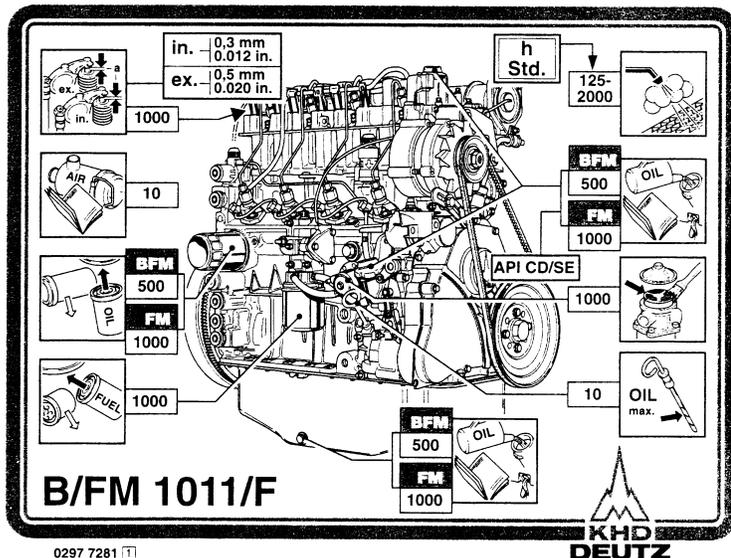
5.2 Maintenance Chart

The maintenance chart shown is supplied as a self-adhesive label with each engine. It should be affixed where it can be seen clearly on the engine or driven equipment.

Check that this is the case.

If necessary, ask your engine or equipment supplier for a fresh supply of labels.

Routine work should be carried out according to the schedule in 5.1



0297 7281



Stop the engine before carrying out any maintenance work.

ROUTINE MAINTENANCE

5.3 Maintenance Work Completed

OH	Date	Signature / Stamp	OH	Date	Signature / Stamp
* 50			—		
125			250		
375			500		
625			750		
875			1000		
1125			1250		
1375			1500		
1625			1750		
1875			2000		
2125			2250		
2375			2500		
2625			2750		

Duly completed maintenance jobs can be recorded and signed off in the above chart.
 * After commissioning of new and reconditioned engines.

OH	Date	Signature / Stamp	OH	Date	Signature / Stamp
2875			3000		
3125			3250		
3375			3500		
3652			3750		
3875			4000		
4125			4250		
4375			4500		
4625			4750		
4875			5000		
5125			5250		
5375			5500		
5625			5750		

Duly completed maintenance jobs can be recorded and signed off in the above chart.

ROUTINE MAINTENANCE

5.3 Maintenance Work Completed

OH	Date	Signature / Stamp	OH	Date	Signature / Stamp
5875			6000		
6125			6250		
6375			6500		
6625			6750		
6875			7000		
7125			7250		
7375			7500		
7625			7750		
7875			8000		
8125			8250		
8375			8500		
8625			8750		

Duly completed maintenance jobs can be recorded and signed off in the above chart.

SERVICE AND MAINTENANCE

6.1 Lubrication System

6.1.1 Oil Change Intervals

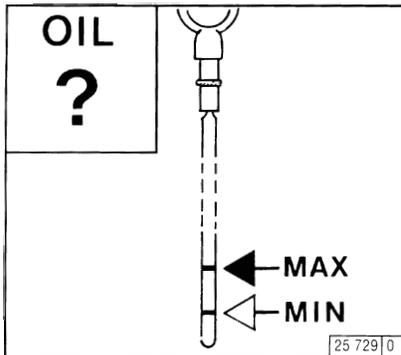
- The oil change intervals are dependent on the engine application and the quality of the lube oil.
 - If the engine runs fewer hours during the year than stated in the table, the oil should be changed at least once a year.
 - The table refers to the following conditions:
 - For diesel fuel: sulphur content max. 0.5% by weight.
 - Continuous ambient temperatures down to -10°C (+14°F)
 - If the sulphur content is > 0.5 to 1% or the continuous ambient temperature below -10°C (+14°F), the intervals between oil changes should be halved.
 - In case of fuels containing more than 1% sulphur, contact your **service representative**.
- Gensets as referred to here are units operating in parallel with the main / with each other. Emergency power units are dealt with in TC 0199-99-1126.

6.1.1.1 Equipment Engines

Deutz lube oil quality class	Lube oil grade						
	DQC I		DQC II		DQC III		
ACEA-specification	E2-96		E3-96/E5-02		E4-99		
API-specification	CF/CF-4		CG-4/CH-4		-		
Worldwide specification	-		DHD-1		-		
special DEUTZ release list	-		-		see chap. 4.1.2.1		
Standard lube oil code for building equipment and nonroad vehicles	EO..		EO...C		-		
Engine series	Engine version	Lube oil change intervals in op. hours					
		Oil use		Oil use		Oil use	
		normal	high	normal	high	normal	high
1011/2011	Naturally aspirated engines	1000	500	1000	500	1000	500
	Turbocharged engines	250	125	500	250	500	250

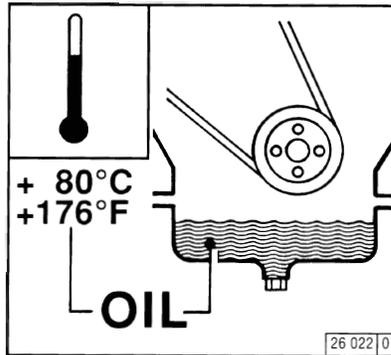
6.1.2 Checking Oil/ Checking Engine Oil

6.1.2.1 Checking Oil Level 6.1.2.2 Engine Oil Change

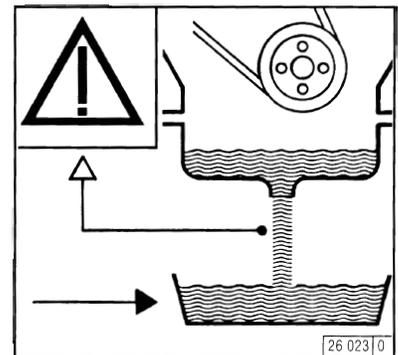


- Check the oil level with the engine turned off.
- Ensure that the engine or vehicle is in a level position.
- Remove the oil dipstick
- Wipe the dipstick with a non-fibrous, clean cloth.
- Insert it to the top and remove again.
- Check the oil level, and if necessary, top up to the "MAX" mark. If the oil level is only just above the "MIN" mark, more oil must be added.

The oil level must not fall below the "MIN" marking.



- Allow the engine to warm up.
- Ensure that the engine or vehicle is on a level position.
- Turn the engine off.



- Place oil tray under the engine.
- Unscrew drain plug.
- Drain oil.
- Fit oil drain plug, with the new gasket and tighten firmly (for torque, see 9.2)
- Check oil level, see 6.1.2.1
- Pour in lube oil.
 - For grade/viscosity, see 4.1
 - For quantity, see 9.1

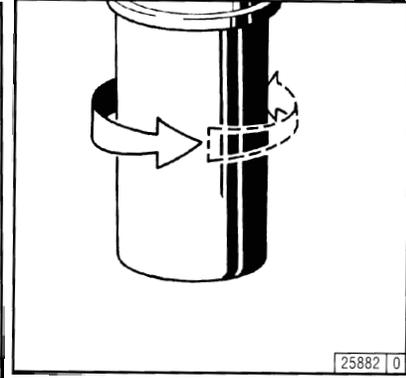
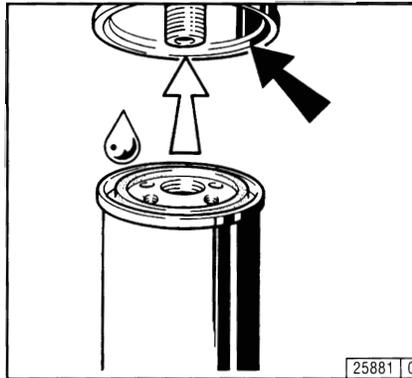
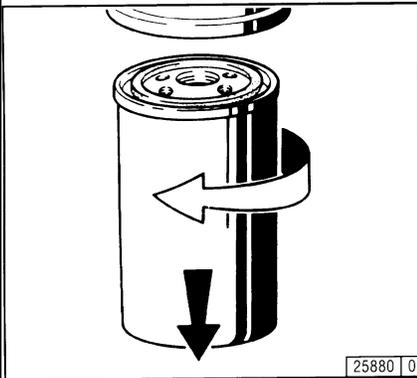


Be careful when draining hot oil - danger of scalds! Do not let used oil run into the soil but catch it in a container ready for proper disposal.

SERVICE AND MAINTENANCE

6.1 Lubrication System

6.1.3 Changing Oil Filter



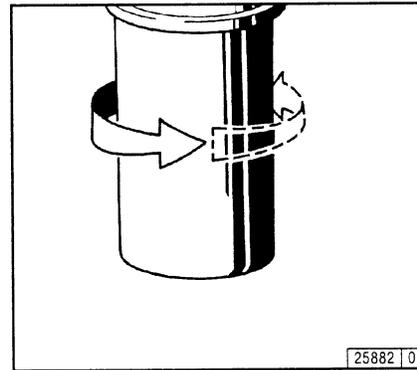
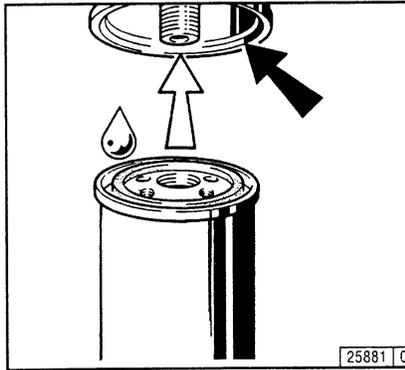
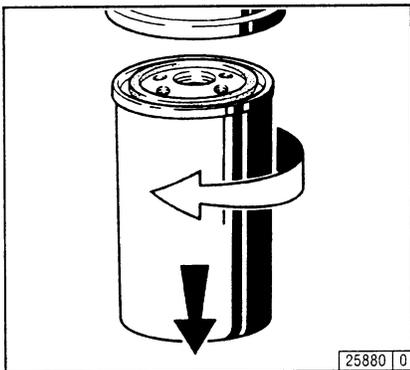
- Undo the filter cartridge using a commercial tool and spin off.
- Catch any dripping oil.

- Clean any dirt from the filter carrier rim.
- Lightly oil the rubber gasket of the new oil filter cartridge.
- Screw in the new cartridge finger tight against the gasket.



Beware of burns from hot oil.

6.2.1 Changing Fuel Filter



- Close fuel stopcock.
- Undo fuel filter cartridge with commercial tool and spin off.
- Catch any fuel.

- Clean any dirt from the filter cartridge with a final half-turn.
- Apply light film of oil or diesel fuel to the rubber gasket of the new fuel filter cartridge.
- Screw in the new cartridge finger tight against the gasket.

- Tighten the fuel filter cartridge with a final half-turn.
- Open fuel stopcock.
- Check for leaks.

The fuel system does not need to be bled.

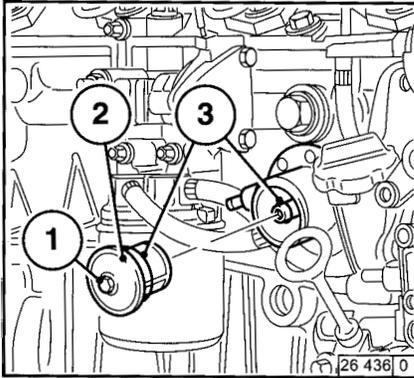


Keep naked flames away when working on the fuel system. Do not smoke!

SERVICE AND MAINTENANCE

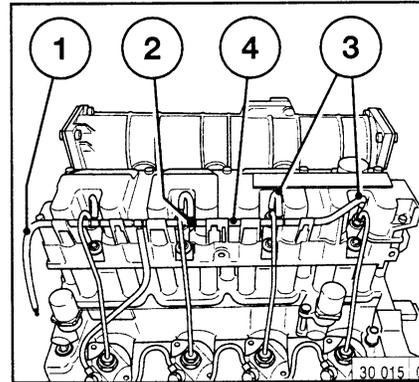
6.2 Fuel System

6.2.2 Fuel Pump Cleaning the Strainer



- Close the fuel shut-off valve.
- Loosen and unscrew the hexagonal nut 1.
- Remove the fuel stainer cover, 2, (cover and strainer one unit).
- Clean the fuel stainer with diesel fuel. Replace if necessary.
- Place seals, 3, in position.
- Mount the fuel strainer cover, 2.
- Tighten the hexagonal screw, 1.
- Check for leaks.

6.2.3 Change Fuel Leakage Line



- Close the fuel shutoff valve
- Disconnect rubber hoses, 3, from the injection valves.
- Disconnect rubber hose, 1, from fuel tank.
- Disconnect rubber hoses, 4, 3 and 1 from unions, 2, and dispose of in an environmentally friendly manner.
- Connect new rubber hoses 4, 3, and 1, to unions, 2.
- Connect rubber hoses 3 to injection valves.
- Open fuel shutoff valve
- Check for leaks after start-up.



No naked flames when working on the fuel system.
NO SMOKING!

SERVICE AND MAINTENANCE

6.3 Cooling System

6.3.1 Cleaning Intervals

- The amount of contamination in the cooling system depends on the engine application.
- Spilled oil or fuel on the engine increases the risk of contamination. Be especially careful if the engine is used in dusty environments.
- Serious contamination can occur, for example:
 - on construction sites where there is a high level of air borne dust.
 - in harvesting applications where there are high concentrations of chaff and chopped straw in the vicinity of the machine.
- Because applications vary, cleaning intervals have to be determined from case to case. The cleaning intervals given in the table on the below can be used as a guide.
- Clean the engine as described in 6.8.1.

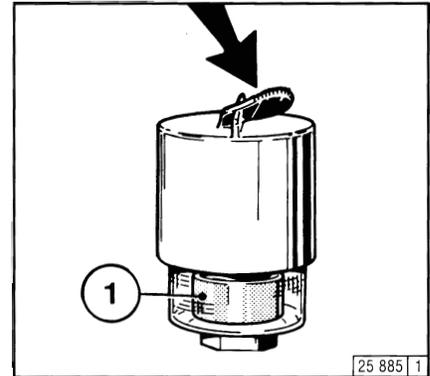
Inspection and cleaning intervals Recommended OH	Engine application
2000	Ships, Electrical units in enclosed areas, pumps
1000	Vehicles on reinforced highways
500	Tractors, fork-lift trucks, mobile electrical units
250	Vehicles on construction sites and on roads with loose surfaces, construction machinery, compressors, mining equipment
125	Agricultural machinery, tractors used for harvesting purposes

SERVICE AND MAINTENANCE

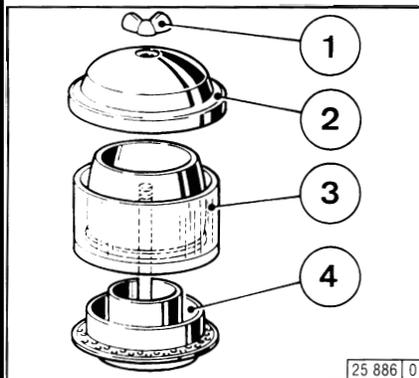
6.4 Combustion Air Filter

6.4.1 Cleaning Intervals

- The amount of dirt in the air cleaner depends on the amount of dust in the air and the size of the air cleaner used. If a high level of dust is anticipated, a cyclone-type precleaner can be fitted to the air cleaner.
- Cleaning intervals will have to be determined from case to case.
- Air cleaner servicing is needed when:
 - **Service indicator**
the red signal, 1, is fully visible when the engine is off.
 - **Service switch**
the yellow pilot light comes on when the engine is running.
- After carrying out service work, reset the signal by pressing the button on the service indicator.



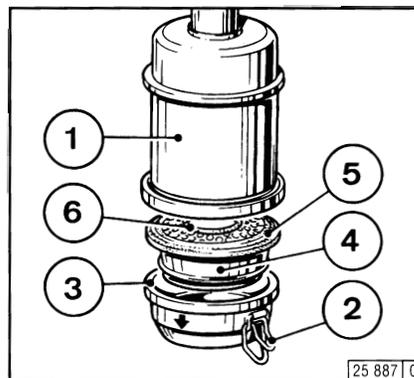
6.4.2 Emptying Cyclone Type Precleaner



- Undo wing nut 1 and remove cover 2.
- Remove collector bowl 3 from lower section 4 and empty. Clean leaves, straw and other foreign matter from lower section of pre-cleaner.
- Reposition collector bowl 3 onto lower section 4, fasten cover 2 in place by tightening wing nut 1.

Never fill collector bowl with oil. Replace collector bowl if damaged.

6.4.3 Cleaning Oil Bath Air Cleaner



- Turn engine off and wait about 10 minutes for the oil to drain from filter housing 1.
- Release snap clips 2 and remove oil cup 3 together with filter element 4. If necessary pry element out with a screwdriver, taking care not to damage the rubber gasket 5.
- Remove dirty oil and sludge. Clean oil cup.
- Clean filter element 4 in diesel fuel and allow to drip-dry.
- Clean filter housing 1 if very dirty.
- Inspect and replace rubber gasket 5 and 6 if necessary.
- Fill oil cup with engine oil up to the mark (arrow) (for viscosity, see 4.1.2).
- Refit oil cup and element to filter housing and secure with snap rings.

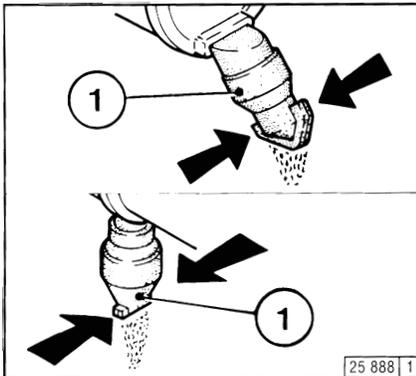


Never clean air cleaner with gasoline. Dispose of cold oil in accordance with environmental regulations.

SERVICE AND MAINTENANCE

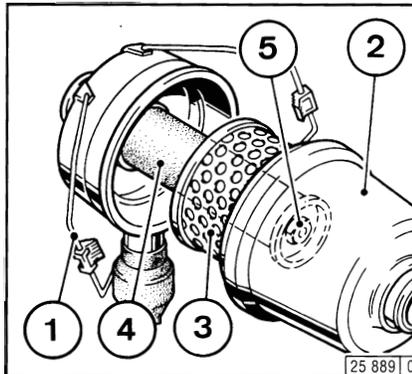
6.4 Combustion Air Filter

6.4.4 Dry Type Air Cleaner Dust Discharge Valve



- Empty dust discharge valve 1 by pressing apart lips of discharge slot as indicated by arrows.
- Clean discharge slot from time to time.
- Remove any caked dirt by pressing together the upper section of the valve.
- The amount of dirt in the air cleaner depends on the amount of dust in the air and the size of the air cleaner used. If a high level of dust is anticipated, a cyclone-type precleaner can be fitted to the air cleaner.

Filter Cartridges



- Undo clip fasteners 1.
- Take off hood 2 and remove cartridge 3.
- Clean cartridge (replace at least once a year).
- Clean cartridge 3.
Blow out from inside out with dry compressed air (max. 5 bar), (or in difficult cases, tap out, taking care not to damage the cartridge, or wash according to manufacturer's instructions).
- Through regular removal and replacement, the gaskets on the filter cartridge can become damaged. Check paper filter (light showing through) and gaskets for damage. Replace if necessary.
- After five cleaner services or after two years at the latest, replace safety cartridge 4 (never clean).
To do so:
 - Undo hex. nut 5 and remove cartridge 4.
 - Install new cartridge, insert and tighten hex. nut.
- Cleaning intervals will have to be determined from case to case.
- Install cartridge 3, replace hood 2 and do up clip fasteners 1.

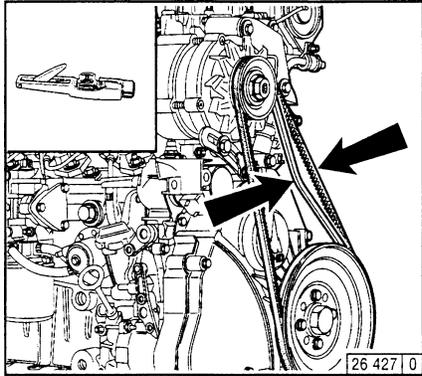


Never clean filter cartridge with gasoline or hot fluids.

SERVICE AND MAINTENANCE

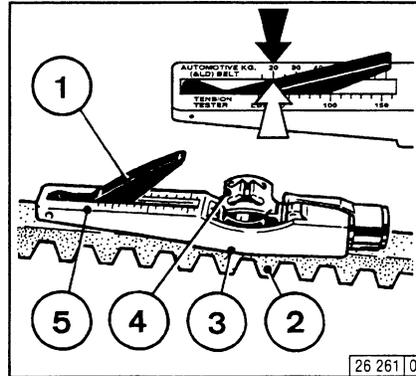
6.5 Belt Drives

6.5.1 Checking V-Belts



- Inspect entire V-belt for damage.
- Replace damaged V-belts, run engine for 15 minutes, then check belt tension.
- After installing new belts, run engine for 15 min. then check belt tension.
- To check the tension of the V-belt, use a tension gauge (see 9.3).

- Place indicator arm, 1, into belt.
- Position gauge on V-belt, 2, midway between the pulleys, with flange, 3, on bottom of gauge against the edge of belt.
- Push slowly on the black pad, 4, at right angles to belt, 2, until the spring is heard or felt to trigger.



- Carefully remove the gauge without altering the position of the indicator arm 1.
- Read off the value where the black indicator arm, 1, intersects scale 5 (arrow). For settings, see 9.1.
- If necessary, retension belt and measure again.



Check tension and change belts only with the engine off. Refit belt guard, if provided.

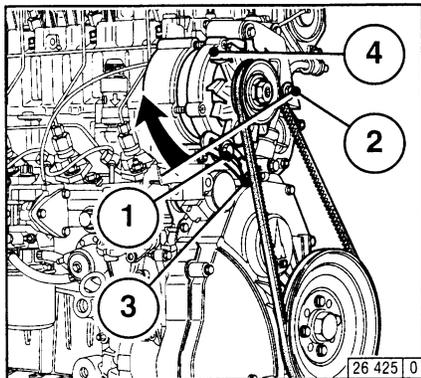


When new V-belts are fitted, check the belt tension after ca. 15 minutes running time.

SERVICE AND MAINTENANCE

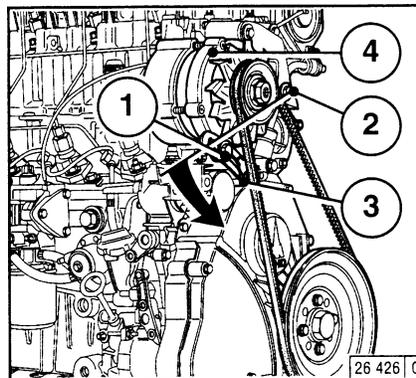
6.5 Belt Drives

6.5.2 Tensioning Alternator Belts



- Slacken off bolts 1,2 and 3.
- Adjust alternator, 4, in direction of arrow by turning bolt 3 until correct belt tension is achieved.
- Retighten bolts 1,2 and 3.

6.5.3 Changing Alternator Belts



- Slacken off bolts 1,2 and 3.
- Adjust alternator, 4, in direction of arrow by turning bolt 3.
- Remove and replace belt.
- Adjust alternator, 4, against the direction of the arrow by turning bolt 3, until correct belt tension is achieved.
- Retighten bolts 1, 2 and 3.

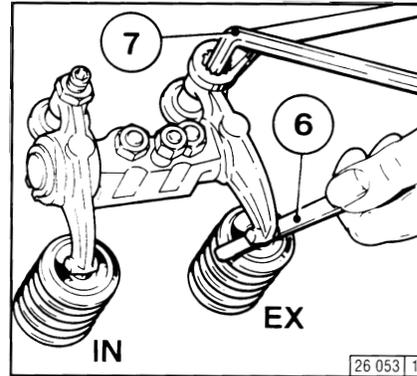
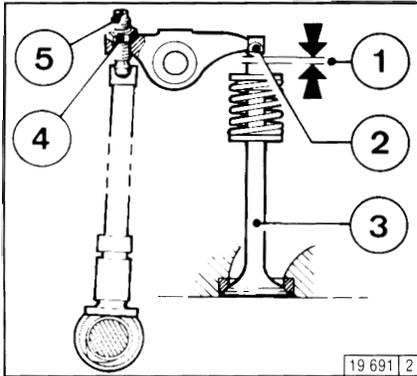


Check tension and change belts only with the engine off. Refit belt guard, if provided.

SERVICE AND MAINTENANCE

6.6 Adjustments

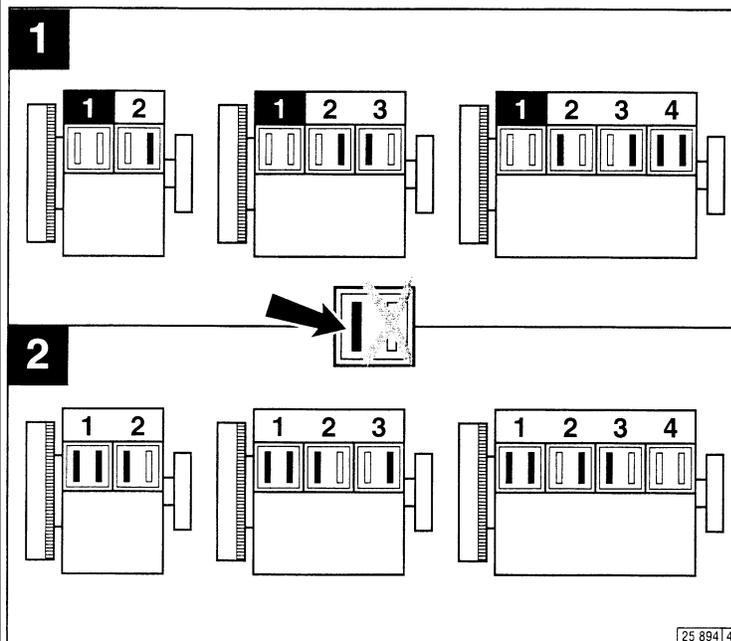
6.6.1 Checking / Adjusting Valve Clearances



- Remove the cylinder head cover.
- Position crankshaft as per schematic
- Before adjusting valve clearance, allow engine to cool down for at least 30 minutes. The oil temperature should be below 80°C.
- Check valve clearance 1 between rocker arm / tappet contact face 2 and valve stem 3 with feeler gauge 6 (there should be only slight resistance when feeler blade is inserted).
For permissible valve clearance, see 9.1

- Adjust valve clearance if necessary:
 - Release locknut 4.
 - Use screwdriver 7 to turn setscrew 5 so that the correct clearance is attained after locknut 4 has been tightened.
- Check and adjust valve clearance on all remaining cylinders.
- Replace cylinder head cover (use new gasket if needed).

6.6.1.1 Valve Clearance Adjustments Sche-



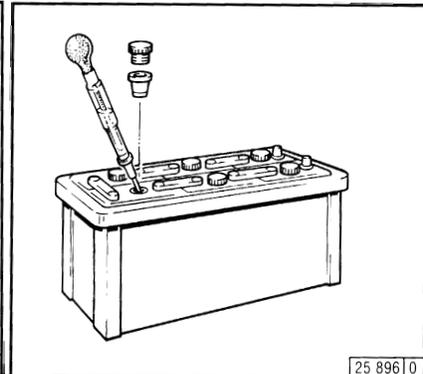
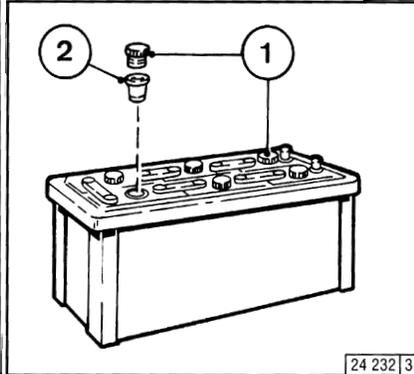
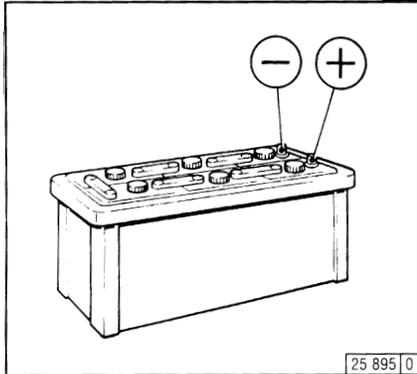
- **Crankshaft Position 1:**
Turn crankshaft until both valves in cylinder 1 overlap (exhaust valve about to close, inlet valve about to open). Adjust clearance of valve **marked in black** on schematic. Mark respective rocker arm with chalk to show that adjustment has been done.
- **Crankshaft Position 2:**
Turn crankshaft one full revolution (360°). Adjust clearance of valves **marked in black** on schematic.

SERVICE AND MAINTENANCE

6.7 Accessories

6.7.1 Battery

6.7.1.1 Checking Battery and Cable Connectors



- Keep battery clean and dry.
- Undo dirty clamps.
- Clean terminal posts (+ and -) and clamps of the battery, grease with acid-free and acid-resistant grease.
- When reassembling, ensure that clamps make good contact. Turn clamp bolts finger tight.
- Remove caps 1.
- If testers 2 are used, the electrolyte should come up to their base.
- If testers are not used, the electrolyte level should be 10 - 15mm above the top of the plates.
- If necessary, top up with distilled water.
- Replace caps.
- Measure the electrolyte density of individual cells with a commercial hydrometer.

The hydrometer reading (see table on following page) indicates the state of charge. During measurement, the temperature of the electrolyte should preferably be +20°C.

in [kg/ l]		in[°Bé (Baumégrad) *]		State of Charge
Normal	Tropics	Normal	Tropics	
1,28	1,23	32	27	Fully charged
1,20	1,12	24	16	Half charged, recharge
1,12	1,08	16	11	Discharged, recharge immediately

* Measurement of electrolyte density in ° Bé (Baumégrad) is out of date and rarely used today.



The gasses emitted by the battery are explosive! Keep sparks and naked flames away from the battery.

Do not allow battery acid to come
Wear protective goggles. Do not rest tools on the battery.

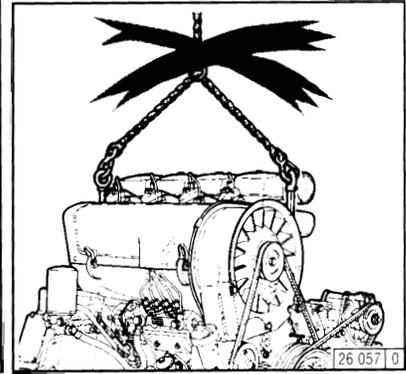
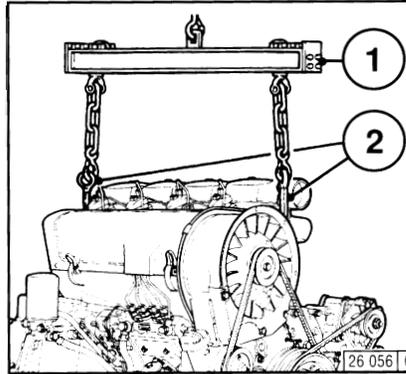
SERVICE AND MAINTENANCE

6.7 Accessories

6.7.2 Three-Phase Alternator

- Never disconnect the cable between battery, alternator and regulator while the engine is running.
- If, however, it is necessary to start and operate the engine without the battery, disconnect the regulator from the alternator before starting.
- Be sure not to confuse the battery terminals.
- Replace defective bulb of the charge pilot lamp immediately.
- When washing the engine, cover up the alternator and regulator.
- The habit of touching a lead against the frame to check whether it is live must under no circumstances be used with three-phase electrical systems.
- In case of electric welding connect ground terminal on the welder directly to the piece being welded.

6.7.3 Lifting Tackle



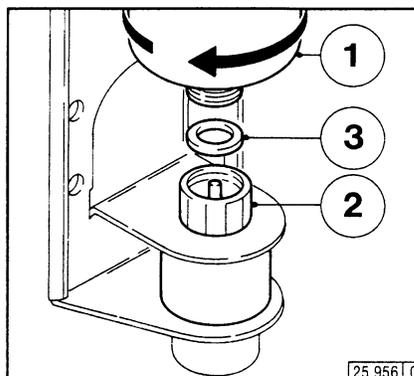
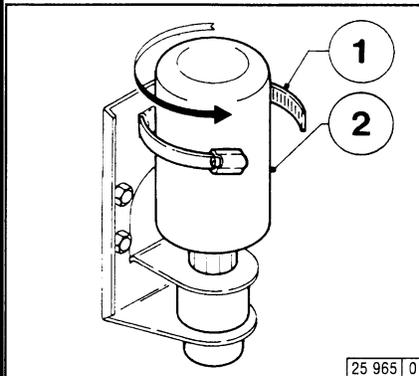
- Always use proper lifting tackle 1 when transporting the engine.
- After transportation and before commissioning of the engine: Remove transport eyes 2.



Use only the correct lifting tackle.

6.7.3 Ether Starting System

6.7.4.1 Changing the Fluid Container



- Before removing the container, clean the container support and the top of the solenoid valve.
- Loosen the bracket 1.
- Unscrew the fluid container, 2.
- Empty or replace the depressurized fluid container.
- Place the container, 1, on the solenoid valve, 2 and tighten by hand.
- When mounting, ensure that gasket, 3 is seated correctly.
- Pull in the brackets.
- Check for leaks.



Before commissioning, leave the fluid container of the ether starting system in position for 15 minutes. Check for leaks.

The starting fluid is inflammable. Ensure that the container is not damaged. Prevent foreign substances from entering the container. The fluid container must not be stored at temperatures about 50 deg. C.

SERVICE AND MAINTENANCE

6.8 Engine Cleaning

6.8.1 Engine Cleaning

Preparation

- Switch off the engine.
- Remove engine covers, cooling-air hoods. Replace them after cleaning and before the test run.
- Cover electrical / electronic components / connections (e.g. alternator, starter, governor, solenoid).

Using compressed air

- Blow air through the engine, taking particular care not to damage the cooler and cooling fins (begin to blow through air from exhaust side.)
Remove the dirt which has blown into the interior space.

Using cold-cleaning compound

- Spray the engine with the commercial cold-cleaning compound and allow to react for approximately 10 mins.
- Spray clean the engine with a strong water jet, repeat if necessary.
- Allow the engine to run up so that the remaining water evaporates.

Using high pressure device

- Clean the engine with a steam jet (max. spray pressure. of 60 bar, max. steam pressure of 90deg.C.
- Allow the engine to run up so that the remaining water evaporates.



Clean engine only when the engine is switched off.

FAULTS, CAUSES AND REMEDIES

7.1 Diagnosis Chart

Fault										Remedy		
Engine fails or is difficult to start										Inspect	I	
Engine starts but runs unevenly or stalls										Adjust	A	
Engine overheats. Temperature monitor gives warning										Replace	R	
Engine gives poor performance										Clean	C	
Engine not firing on all cylinders										Top up	T	
Engine has little or no oil pressure										Lower level	L	
Engine oil consumption excessive												
Engine smokes – blue												
– white												
– black												
Cause										Section		
●										Not declutched (where possible)	Operation	I
●						●				Below starting limit temperature		I
●		●								Engine shut-off lever not in stop position (shut-off magnet defective)		I
		●		●						Oil level too low		T
		●	●			●	●			Oil level too high		L
				●	●	●	●			Excessive inclination of engine		I/A
						●	●			Engine predominantly operated at lower load		I
●		●	●			●	●		●	Air cleaner clogged / turbocharger defective	Combustion air	R
		●	●			●	●		●	Air cleaner service switch / indicator defective		I/R
			●							LDA defective (leak in connecting line) only with charged engines		I/R
		●	●			●	●		●	Exhaust counter pressure too high		I
			●			●	●		●	Charge-air line leaking, only with charged engines		I/A
		●	●			●	●		●	Charge-air line leaking, only with charged engines	Cooling system	I/C
		●	●			●	●		●	Charge air cooler clogged		I/C
		●		●						Oil cooler air and/or oil side clogged		I/C
		●								Cooling fan or exhaust thermostat defective, V-belts ripped or loose		I/R
		●								Cooling air temperature rise / heating short circuit		I
		●								Cooling air fins loose, cracked or missing		I

Fault										Remedy		
Engine fails or is difficult to start										Inspect	I	
Engine starts but runs unevenly or stalls										Adjust	A	
Engine overheats. Temperature monitor gives warning										Replace	R	
Engine gives poor performance										Clean	C	
Engine not firing on all cylinders										Top up	T	
Engine has little or no oil pressure										Lower level	L	
Engine oil consumption excessive												
Engine smokes – blue												
– white												
– black												
Cause										Section		
●										Battery defective or discharged	Electrics	I
●										Electric cable connections to starter electrical system loose or oxidised		I
●										Starter defective or pinion does not engage		I
				●						Oil pressure switch/oil pressure gauge defective		I/R
●	●	●	●	●			●	●		Incorrect valve clearance	Engine	A
●	●	●	●	●						Leaking injection line		I/C
		●								Vent line clogged		I/C
●	●						●			Flame glow system/heating pipe defective		I/R
●	●	●	●	●			●	●		Injection valve defective		I/R
●	●	●	●	●						Air in fuel system		P/R
●	●	●	●	●						Fuel filter/fuel pre-cleaner clogged		I/C/R
		●					●			Oil filter defective		R
●				●	●					Incorrect SAE class or grade of engine lube oil		R
●	●		●	●			●	●		Compression pressure too low		I
						●				Oil in combustion chamber		I/C

ENGINE PRESERVATION

8.1

If the engine is to remain idle for an extended period of time, it is necessary to take protective measures to prevent rust formation. The preservative measures described here will protect the engine for up to 6 months. The procedure will have to be reversed before the engine is recommissioned.

- Anti-corrosion oils to specification:
 - MIL-L-21260B
 - TL 9150-037/2
 - Nato Code C 640 / 642
- Recommended cleansing agent to remove preservatives when recommissioning engine:
 - Petroleum benzine (hazardous materials class A3)

8.1.1 Preserving Engine

- Clean engine (with cold cleansing agent if preferred) using high pressure equipment.
- Run engine until warm, then turn off.
- Drain engine oil, see 6.1.2 and fill with anti-corrosion oil.
- If necessary, clean oil bath cleaner, see 6.4.3, and fill with anti-corrosion oil.
- Drain fuel from tank.
- Make up a mixture of 90% diesel fuel and 10% anti-corrosion oil, and refill fuel tank.
- Run engine for about 10 minutes.
- Turn engine off.
- Turn engine over manually several times to preserve the cylinders and combustion chamber. When rotating with starter, place shut-off lever in stop position.
- Remove V-belts and store dry in wrapped condition.
- Spray grooves on V-belts pulleys with anti-corrosion spray.

8.1.2 Removing Engine Preservatives

- Remove anti-corrosion agent from grooves in V-belt pulleys.
- Install V-belts. Retension after brief operation if necessary, see 6.5
- Remove plugs from intake port and exhaust port.
- Set the engine in operation.

TECHNICAL SPECIFICATIONS

9.1 Engine Specifications and Settings

Model	F2L 1011F	F3L 1011F	F4L 1011F	F4L 1011FL*
Numbers of cylinders	2	3	4	4
Cylinder arrangement	vertical in line			
Bore [mm]	91			
Stroke [mm]	105	105	105	112
Total displacement [cm ³]	1366	2049	2732	2912
Compression ratio [ε]	18,5			
Working cycle	4-stroke diesel engine			
Combustion system	naturally aspirated engine with direct injection			
Direction of rotation	counter clockwise			
Weight incl. integrated cooling system as per DIN 70020-A (without starter, with alternator) ca. [kg]	167	208	249	250
Engine power [kW (PS)]	1)			
Speed [1/min]	1)			
Lubrication	pressure lubrication			
SAE oil	20 W 20			
Max. oil temperature in oil sump [°C]	130			
Min. oil pressure in warm condition, oil temperature 110 °C at: 900/min (low idling speed) [bar]	1,4 ³⁾			
1800 /min [bar]	2,2 ³⁾			
max. 3300 /min, *max. 3000 /min [bar]	3 ³⁾			
Oil change quantity (oil sump) ca. [ltr.]	6 ²⁾	5,5 ²⁾	10 ²⁾	10 ²⁾
Oil change quantity with filter (Standard 0.5 ltr.) ca. [ltr.]	6,5 ²⁾	6 ²⁾	10,5 ²⁾	10,5 ²⁾
Valve clearance with cold engine [mm]	inlet 0.3			
(Engine cooling time at least 30 Min.: Oil temperature below 80°C) [mm]	exhaust 0.5			
Start of delivery [°crank angle b TDC]	1)			
Injector opening pressure: vehicle/genset engine [bar]	210 / 250 ⁺⁸			
Firing order of the engine	1 - 2	1 - 2 - 3	1 - 3 - 4 - 2	1 - 3 - 4 - 2
V-Belt tension: Pretension / Retension (after the engine has been running under load for 15 mins): [N]	450 / 350 ±20			

¹⁾ Engine power, speed, start of delivery are stamped on engine rating plate, see also 2.1.

²⁾ Ca. value can vary depending on model. **The upper oil dipstick marking should always be taken as authoritative.**

³⁾ Values for engines without engine oil heating.

Model	BF3L 1011F/L	BF4L 1011F/FT
Number of cylinders	3	4
Cylinder arrangement	vertical in line	
Bore [mm]	91	
Stroke [mm]	105/112	105
Total displacement [cm ³]	2184	2732
Compression ratio [ε]	17	
Working cycle / Combustion system	4-stroke diesel with turbocharging and direct injection	
Direction of rotation	counter clockwise	
Weight without cooling system [kg]	Refer to head-office	
Weight without starter, with alternator as per DIN 70020-A ca. [kg]	233	256
Engine power [kW (PS)]	1)	
Speed [1/min]	1)	
Lubrication	pressure lubrication	
SAE oil	20 W 20	
Max. oil temperature in the oil sump [°C]	130	
at: 900/min (low idling speed) [bar]	1,4 ³⁾	
1800 /min [bar]	2,2 ³⁾	
max. 3000 /min [bar]	3 ³⁾	
Oil change quantity (oil sump without cooling system) ca. [ltr.]	7,5	10 ²⁾
Oil change quantity with filter (Standard 0.5 ltr.) ca. [ltr.]	8	10,5 ²⁾
Valve clearance with cold engine [mm]	inlet 0,3 + 0,1 / exhaust 0,5 + 0,1	
(Engine cooling time at least 30 mins.: oil temperature below 80°C) [mm]	210 / 250 ⁺⁸	
Injector opening pressure: vehicle/genset engine [bar]	1)	
Start of delivery [°crank angle b TDC]	1)	
Firing order of the engine	1 - 2 - 3	1-3-4-2
V-Belt tension: Pretension / Retension (after the engine has been running under load for 15 mins): [N]	450 / 350 ±20	

¹⁾ Engine power, speed, start of delivery are stamped on engine rating plate, see also 2.1.

²⁾ Ca. value can vary depending on oil sump and or cooler design (external cooling system). **The upper oil dipstick marking should always be taken as authoritative.**

³⁾ Values for engines without engine oil heating.

TECHNICAL SPECIFICATIONS

9.1 Engine Specifications and Settings

Model	F3M 1011F	F4M 1011F
Number of cylinders	3	4
Cylinder arrangement	vertical in line	
Bore [mm]	91	
Stroke [mm]	112	112
Total displacement [cm ³]	2184	2912
Compression ratio [ε]	18,5	
Working cycle	4-stroke diesel engine	
Combustion system	naturally aspirated engine with direct injection	
Direction of rotation	counter clockwise	
Weight without cooling system (without starter, with generator) ca. [kg]	200	242
Engine power [kW (PS)]	1)	
Speed [1/min]	1)	
Lubrication	Druckumlaufschmierung	
SAE oil	20 W 20	
Maximum oil temperature in the oil sump [°C]	130	
Minimum oil pressure in warm condition, oil temperature 110 °C, at: 900/min (low idling speed) [bar]	1,4 ³⁾	
1800 /min [bar]	2,2 ³⁾	
max. 3000 /min [bar]	3 ³⁾	
Engine with Thermostat		
Oil change quantity without external cooler (see 3.1.1.2)/ without filter approx. [ltr.]	5,5 ²⁾	10 ²⁾
Oil change quantity without external cooler (see 3.1.1.2) + filter replacement (Standard 0.5 litre) approx. [ltr.]	6 ²⁾	10,5 ²⁾
Genset engine without Thermostat:		
Oil change quantity including cooler (see 3.1.1.3)/ without filter approx. [ltr.]	8,5 ²⁾	13 ²⁾
Oil change quantity including cooler (see 3.1.1.3) + filter replacement (Standard 0.5 litre) approx. [ltr.]	9 ²⁾	13,5 ²⁾
Valve clearance at cold engine (Engine cooling time at least 30 mins.: oil temperature below 80°C) [mm]	inlet 0,3 + 0,1 / exhaust 0,5 + 0,1	
Start delivery [°crank angle b TDC]	1)	
Injector opening pressure: vehicle/genset engine [bar]	210 / 250 ⁺⁸	1 - 3 - 4 - 2
Firing order of the engine	1 - 2 - 3	1 - 3 - 4 - 2
V-Belt tension: Pretension / Retension (after the engine has been running under load for 15 mins): [N]	450 / 350 ±20	

¹⁾ Engine power, speed, start of delivery are stamped on engine rating plate, see also 2.1.

²⁾ Ca. value can vary depending on oil sump and or cooler design (external cooling system). **The upper oil dipstick marking should always be taken as authoritative.**

³⁾ Values for engines without engine oil heating.

Model	BF3M 1011 F	BF4M 1011 F
Number of cylinders	3	4
Cylinder arrangement	vertical, in line	
Bore [mm]	91	
Stroke [mm]	112	112
Total displacement [cm ³]	2184	2912
Compression ratio [ε]	17	
Working cycle	4-stroke diesel	
Combustion system	turbocharging and direct injection	
Direction of rotation	counter clockwise	
Weight without cooling system (without starter, with generator) ca. [kg]	226	249
Engine power [kW (PS)]	1)	
Speed [1/min]	1)	
Lubrication	pressure lubrication	
SAE oil	20 W 20	
Maximum oil temperature in the oil sump [°C]	130	
Minimum oil pressure in warm condition, oil temperature 110 °C, at: 900/min (low idling speed) [bar]	1,4 ³⁾	
1800 /min [bar]	2,2 ³⁾	
max. 2800 /min [bar]	3 ³⁾	
Engine with Thermostat		
Oil change quantity without external cooler (see 3.1.1.2)/ without filter approx. [ltr.]	7,5	10 ²⁾
Oil change quantity without external cooler (see 3.1.1.2) + filter replacement (Standard 0.5 litre) approx. [ltr.]	8	10,5 ²⁾
Genset engine without Thermostat:		
Oil change quantity including cooler (see 3.1.1.3)/ without filter approx. [ltr.]	11	13,5 ²⁾
Oil change quantity including cooler (see 3.1.1.3) + filter replacement (Standard 0.5 litre) approx. [ltr.]	11,5	14 ²⁾
Valve clearance at cold engine (Engine cooling time at least 30 mins.: oil temperature below 80°C) [mm]	inlet 0,3 +0,1 / exhaust 0,5 +0,1	
Start delivery [°crank angle b TDC]	1)	
Injector opening pressure: vehicle/genset engine [bar]	210 / 250 ⁺⁸	1-3-4-2
Firing order of the engine	1-2-3	1-3-4-2
V-Belt tension: Pretension / Retension (after the engine has been running under load for 15 mins): [N]	400 / 300 ±20	

¹⁾ Engine power, speed, start of delivery are stamped on engine rating plate, see also 2.1.

²⁾ Ca. value can vary depending on oil sump and or cooler design (external cooling system). **The upper oil dipstick marking should always be taken as authoritative.**

³⁾ Values for engines without engine oil heating.

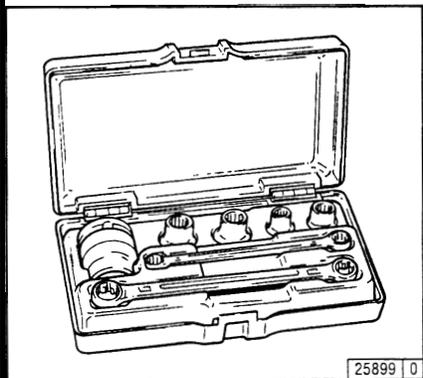
TECHNICAL SPECIFICATIONS

9.2 Torque Wrench Settings

Location	Preload [Nm]			Torquing Load [Nm]				Total [Nm]	Remarks
	1st Stage	2nd Stage	3rd Stage	1st Stage	2nd Stage	3rd Stage	4th Stage		
Rocker cover								8,5	
Rocker arm set screw								21	
Air intake manifold								21	
Exhaust manifold								40	
Oil drain plug								55	
Injector mounting								21	TORX
Injector line mounting								22	
Oil pan (cast iron)								31	
Oil pan (sheet metal)								21	

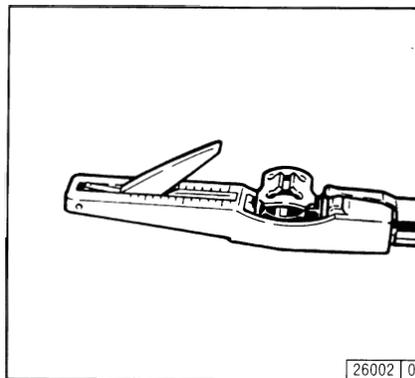
TECHNICAL SPECIFICATIONS

9.3 Tools



The TORX wrench set (order number 8189) is used with engines in the 1011 series. This system was chosen because of the many advantages it offers:

- *Outstanding accessibility to bolts.
- *High load transfer when loosening and tightening.
- *Almost impossible for socket to slide off or break.



The V-belt tension gauge can be obtained under order number 81 15 + 81 20 from:

COMPANY WILBÄR
 Postfach 14 05 80
 D-42826 Remscheid

ORDERING SPARE PARTS

Mcl 36/42C

Order information

Please specify the following information when ordering original DEUTZ parts.

- Engine no.
- Ident. no.
- Quantity

Document structure

- The picture diagrams in this spare parts list are sorted according to engine assembly groups.
- Each section is preceded by an overview of the assembly groups.
- The ident. no. **08/23** is made up of the assembly group (e.g. **08**) and item number (e.g. **23**).

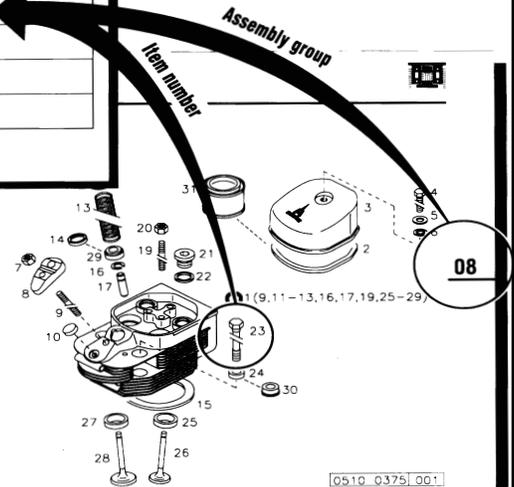
Ordering spare parts

Engine no.: 8 516 449

Item	Qty.	Ident. no.	Comments
1.	1	01 2	
2.	4	08 23	
3.	1	15 6	

Nr.27	ø45,66mm	(1.7976in.)
Nr.25	ø40,16mm	(1.5811in.)
Nr.17	ø15,00mm	(0.5906in.)
Nr.27.1	ø45,76mm	(1.8016in.)
Nr.27.2	ø45,86mm	(1.8055in.)
Nr.27.3	ø46,96mm	(1.8094in.)
Nr.25.1	ø40,26mm	(1.5850in.)
Nr.25.2	ø40,36mm	(1.5890in.)
Nr.25.3	ø40,46mm	(1.5929in.)
Nr.17.1	ø15,25mm	(0.6004in.)
Nr.17.2	ø15,50mm	(0.6102in.)

Übermaßstufen
Oversizes
Cote réparation
Misura maggiorata
Medida de desgaste
Overdimensioner
Overmaten
Ремонтные размеры
أكبر من المقادير
بمقادير أكبر



11

Service

Knowing it's DEUTZ

DEUTZ has always stood for excellence in motor construction, pioneering many developments in the industry. As an independent motor manufacturer, we offer — worldwide — a comprehensive range of diesel and gas motors spanning from 4kW to 7,400kW. Our products are perfectly tailored to meet our customers' individual requirements.

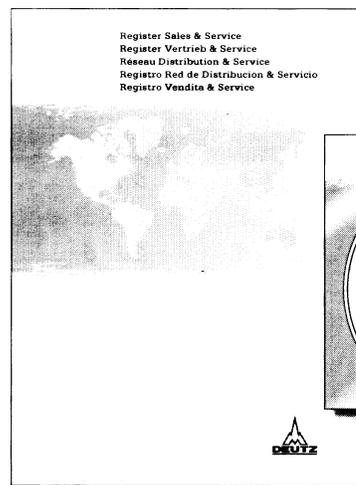
Over 1.4 million DEUTZ motors do their job reliably all over the world. We are determined to preserve the high standard of performance and dependability of our motors, thus keeping our customers satisfied at all times. Therefore we are represented worldwide through a network of highly competent service partners who will meet the needs of our customers, wherever they are.

This is why DEUTZ is not only the name for motors which pack a lot of inventive genius. DEUTZ also means reliable service and comprehensive support to enhance your motor's performance.

This index Sales & Service offers you an overview of the DEUTZ partners in your vicinity, including the products for which they are responsible and the range of services provided. But even when no direct product responsibility is mentioned, your DEUTZ partner will be happy to help you with expert advice.

The Index is constantly updated. Please ask your DEUTZ service partner for the latest edition.

DEUTZ AG — at your service.



Order-No.: 0297 7444



Order-No.: 0297 7445 (CD-ROM)

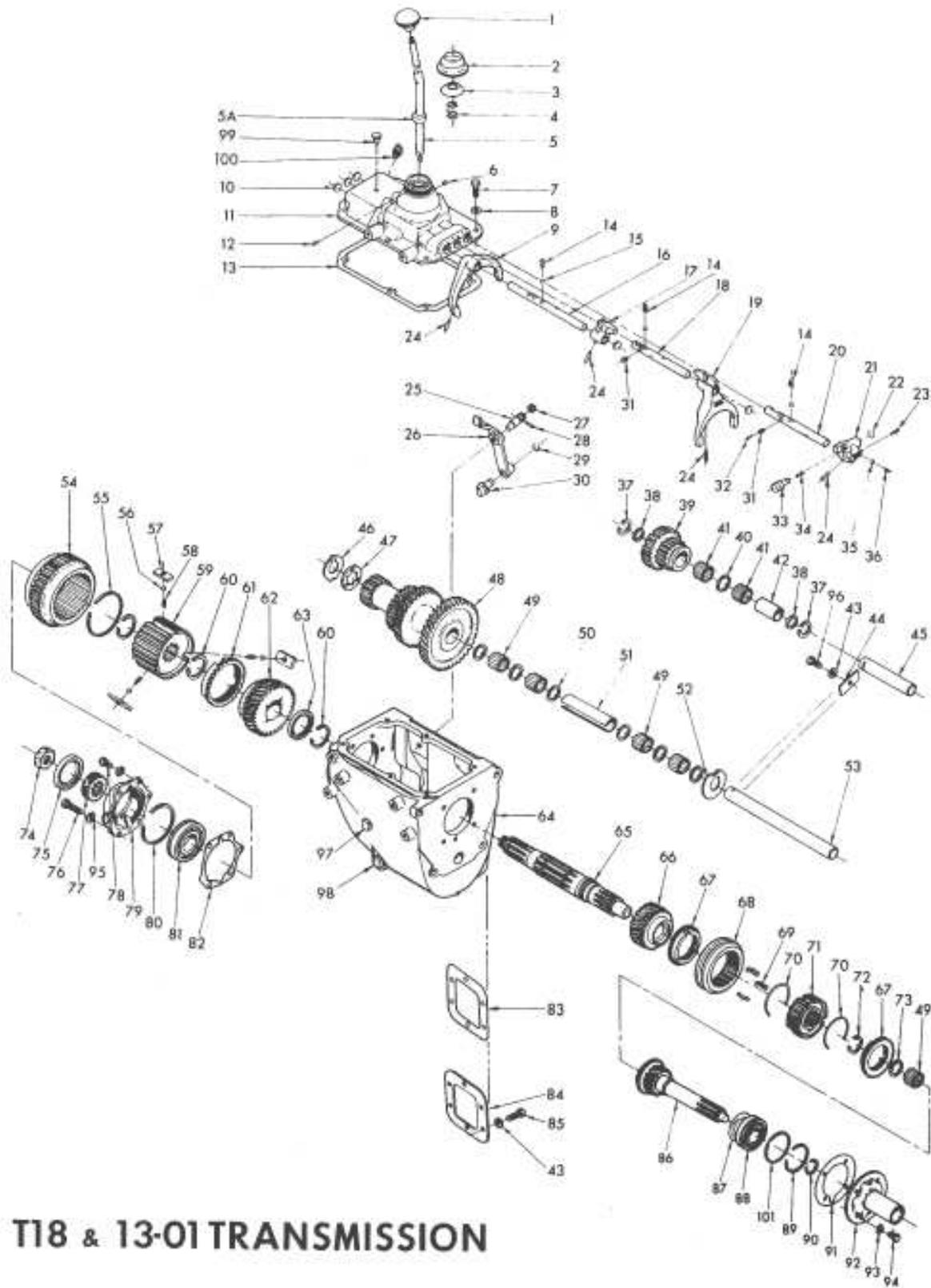
Obtainable from the local service Partner responsible for you or from:

DEUTZ AG
Deutz-Mülheimer Str. 147-149
D-51057 Köln

Phone: 0049-221-822-0
Telefax: 0049-221-822-5304
Telex: 8812-0 khd d
<http://www.deutz.de>

TRANSMISSION PARTS

McL 36/42C



T18 & 13-01 TRANSMISSION

TRANSMISSION PARTS

McL 36/42C

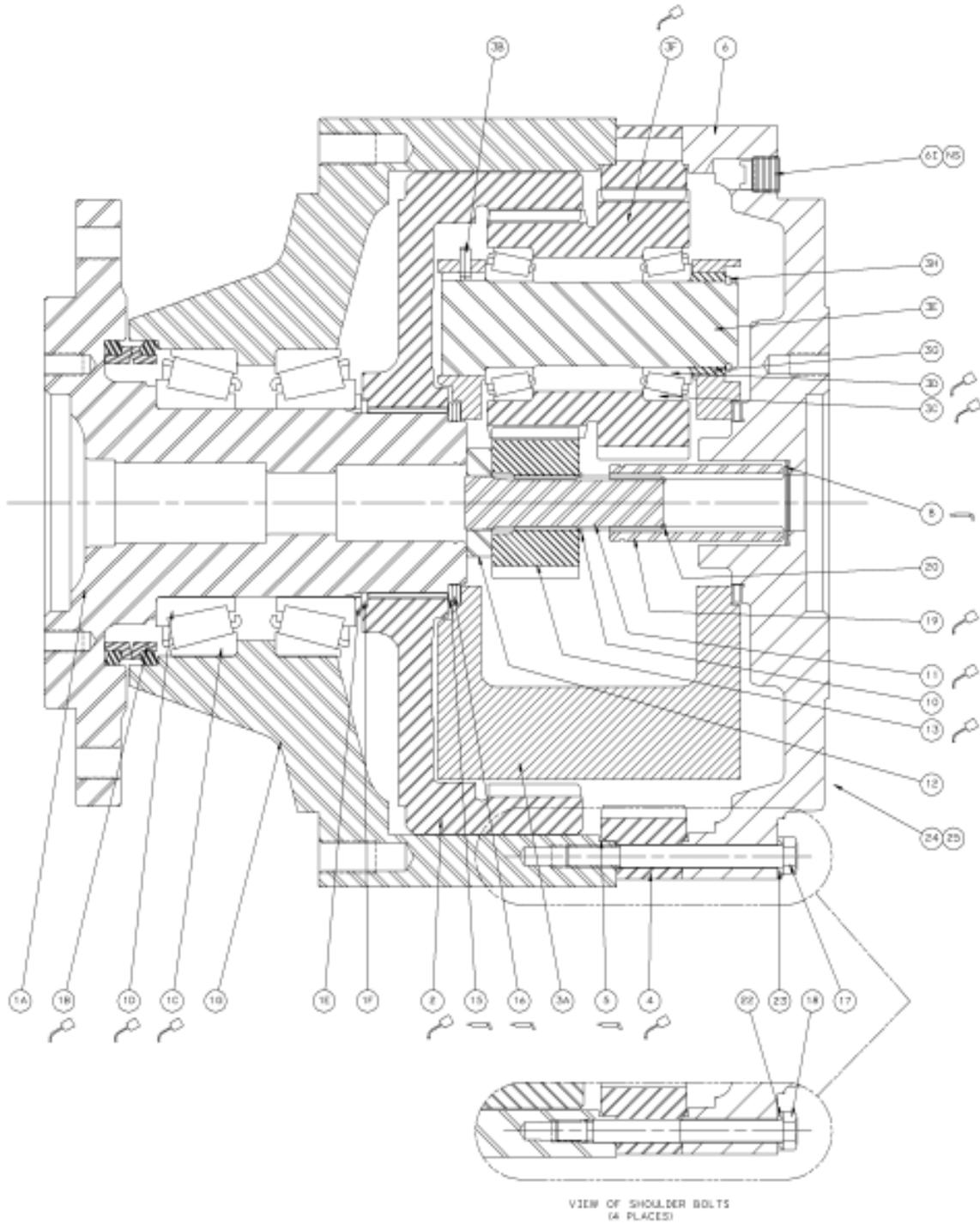
ITEM #	QTY.	NUMBER	DESCRIPTION	ITEM #	QTY.	NUMBER	DESCRIPTION
				48	1	P130044	Countershaft Gears
1	1	P130098	Control Lever Handball	49	88	P130045	Bearing Roller
2	1	P130001	Control Housing Cap	50	6	P130046	Countershaft Gear Bearing Spacer
3	1	P130099	Control Lever Spring Washer	51	1	P130047	Countershaft Bearing Spacer
4	1	P130100	Control Lever Spring	52	1	P130048	Countershaft Thrust Washer, Front
5	1	P130101	Control Lever Assembly	53	1	P130049	Countershaft
6	1	P130002	Taper Plug	54	1	P130050	Low and 2nd Speed Gear
7	6	P130003	Screw, HC 3/8-16 X .875"	55	1	P130051	Shift Plate Retaining Ring
8	6	P130004	Washer, Lock 3/8"	56	1	P130052	3/8 Dia. Steel Ball
9	1	P130005	Shift Fork, 1st and 2nd	57	1	P130053	Shifting Plate
10	6	P130006	Expansion Plug	58	3	P130054	Spring
11	1	P130007	Control Housing	59	1	P130055	Low and 2nd Speed Clutch Hub
12	1	P130102	Control Housing Pin	60	3	P130057	Main Shaft 2nd Speed Gear
13	1	P130008	Control Housing Gasket	61	2	P130058	Synchronizer Blocking Ring
14	2	P130009	Poppet Spring	62	1	P130059	Main Shaft 2nd Speed Gear
14a	1	P130103	Poppet Spring, 3rd and Direct	63	1	P130060	Thrust Washer 2nd Speed Gear
15	3	P130010	Steel Ball	64	1	P130061	Transmission Case
16	1	P130011	Shift Rail, Low and 2nd	65	1	P130062	Main Shaft
17	1	P130012	Shift Rail End 1st and 2nd	66	1	P130063	Main Shaft 3rd Speed Gear
18	1	P130013	Shift Rail, 3rd and Direct	67	1	P130064	Synchronized Blocking Ring
19	1	P130014	Shift Fork, 3rd and Direct	68	1	P130065	Order Ass'y 3rd and Direct Clutch Sleeve
20	1	P130015	Shift Rail, Reverse	69	3	P130066	Shifting Plate
21	1	P130016	Shift Rail End, Reverse	70	2	P130067	Synchronized Spring
22	1	P130017	Reverse Plunger "C" Washer	71	1	P130068	Order Ass'y 3rd and Direct Clutch Hub
23	1	P130018	Pin, Cotter 1/8 X .875"	72	1	P130070	Clutch Hub Snap Spacer
24	1	P130019	Pin, Spring 3/8 X 1.125"	73	1	P130071	Bearing Spacer
25	1	P130020	Shifting Arm Pivot	74	1	P130072	Main Shaft Nut
26	1	P130021	Reverse Shifting Arm	75	1	P130073	Oil Seal
27	1	P130022	O-Ring	76	1	P130074	Screw, HC 3/8-16 X 1.875"
28	1	P130023	Taper Pin	77	1	P130075	Speedometer Gear Spacer
29	1	P130024	Shifting Shoe "C" Washer	78	4	P130076	Screw, HC 3/8-16 X 1.00"
30	1	P130025	Shifting Shoe, Reverse	79	1	P130077	Main Shaft Bearing Retainer Gasket
31	2	P130026	Interlock Plunger	80	1	P130078	Bearing Snap Ring
32	1	P130027	Interlock Pin	81	1	P130086	Annular Bearing
33	1	P130028	Reverse Plunger	82	1	P130080	Main Shaft Bearing Retainer Gasket
34	1	P130029	Reverse Plunger Spring	83	1	P130081	Power Opening Cover Gasket
35	1	P130030	Steel Ball	84	1	P130082	Power Opening Cover
36	1	P130031	Poppet Spring	85	6	P130083	Screw, HC 3/8-16 X .625
37	2	P130032	Reverse Idler Snap Ring	86	1	P130077	Main Drive Gear
38	2	P130033	Reverse Idler Thrust Washer	87	1	P130085	Main Drive Gear Oil Baffle
39	1	P130035	Reverse Idler Gear	88	1	P130079	Annular Bearing
40	1	P130036	Reverse Idler Roller Spacer	89	1	P130078	Bearing Snap Ring
41	74	P130037	Bearing Roller	90	1	P130097	Main Drive Gear Bearing Retainer
42	1	P130038	Reverse Idler Shaft Sleeve	91	1	P130080	Main Shaft Bearing Retainer Gasket
43	1	P130039	Washer, Lock 3/8"	92	1	P130089	Main Drive Gear Bearing Retainer
44	1	P130040	Idler and Countershaft Lock Plate	93	4	P130090	Washer, Lock 5/16"
45	1	P130041	Reverse Idler Shaft	94	4	P130091	Bolt, Oil Seal 5/16-18 X .875"
46	1	P130042	Countershaft Thrust Washer, Rear	95	5	P130092	Washer, Lock 3/8"
47	1	P130043	Countershaft Thrust Washer	96	1	U000400	Screw, HC 3/8-16 X 3/4"
				97	1	P130093	Filler Plug 3/4"
				98	1	P130093	Drain Plug 3/4"
				99	1	P130095	Beather
				100*	1	n/a	Backup Light Switch
				101**	1	3600117	Support Foot

*Replaced with item 100

** Not Shown

GEARBOX PARTS

McL 36/42C



GEARBOX PARTS

MCL 36/42C

ITEM #	NUMBER	DESCRIPTION
15	3620301-15	Washer, Thrust
16	3620301-16	Bearing, Thrust
1A	3620301-1A	Spindle
6	3620301-6	Cover, Input
1C	3620301-1C	Bearing, Tapered-Cup
1D	3620301-1D	Bearing, Tapered-Cone
1B	3620301-1B	Seal, Face
1E	3620301-1E	Washer, Thrust
18	3620301-18	Bolt, Shdr
5	3620301-5	O-Ring
8	3620301-8	Washer, Thrust
24	3620301-15	Plate, ID *India*
1F	3620301-1F	Retention, Ring-Ext
25	3620301-25	Screw, Drive
61	3620301-61	Pipe Plug, Magn-NPTF
23	3620301-23	Washer, Lock
22	3620301-22	Washer, Lock Plug, Cardboard
1G	3620301-1G	Housing
3E	3620301-3E	Shaft, Planet
3G	3620301-3G	Spacer, Thrust
3A	3620301-3A	Carrier
3C	3620301-3C	Bearing, Tapered-Cup
3D	3620301-3D	Bearing, Tapered-Cone
3H	3620301-3H	Retention, Ring-Extension
3B	3620301-3B	Pin, Roll
13	3620301-13	Gear, Sun
11	3620301-11	Shaft, Input
19	3620301-19	Coupling
3F	3620301-3F	Gear, Cluster Set
2	3620301-2	Gear, Internal
4	3620301-4	Gear, Ring
12	3620301-12	Spacer, Input
20	3620301-20	Retention, Ring -Internal
10	3620301-10	Retention, Ring-External

REPAIR INSTRUCTIONS

McL 36/42C



WARNING:
Moving parts. Keep all guards in place. Shut down engine before service or maintenance. Being caught in machinery may cause serious injury.



WARNING:
Crushing weight can cause serious injury. Place machine on solid surface to prevent rollover or falling.



WARNING:
High pressure. Leaking hydraulic fluid under pressure can penetrate and cause serious injury. Check for leaks with card board. Relieve pressure before working on any system.



WARNING:
Do not modify this machine. Use only authorized McLaughlin repair parts. Failure to comply can result in serious injury. Service this equipment according with maintenance instructions in this manual.

TRANSMISSION COUPLING REPLACEMENT

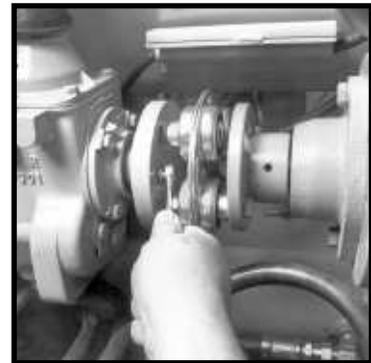
DISASSEMBLY

1. Remove the coupling guard.
2. Loosen but do not remove the four (4) bolts which attach the adapter plate to the transmission output flange. For leverage, place a large screw driver between two (2) of the four (4) bolts connecting the coupling to the adapter plate.
3. Loosen but do not remove the four (4) bolts which attach the adapter plate to the transmission output flange. For leverage, place a large screw driver between two (2) of the four (4) bolts connecting the coupling to the adapter plate.
4. Using the same method described in No. 3 loosen the two (2) bolts which screw directly into the adapter plate. Pull these two (2) bolts out enough so they are no longer in contact with the adapter plate.
5. Loosen the two (2) bolts and nuts that attach the coupling to the key shaft flange. (NOTE: A THINNER WRENCH IS REQUIRED TO FIT IN BETWEEN THE HEAD OF THE BOLT AND THE FLANGE). Once the bolts are loose the nuts can be removed.
6. Slide the flange and coupling toward the front of the machine on the input adapter key shaft.
7. Remove the four (4) bolts that attach the adapter plate to the transmission output flange.
8. Remove the adapter plate.
9. Slide the coupling and flange toward the transmission as far as needed to remove the remaining four (4) bolts.

3



7



9



10. Using a screw driver, carefully separate the coupling from the coupling flange.
11. Remove the square key from the shaft and slide the coupling flange off the shaft.

REASSEMBLY

12. Apply a light coat of anti-sieze to the keyed shaft.
13. Put the coupling flange on the shaft and line it up with the keyed slot on the shaft. Replace the square key.
14. Align the two piloting shoulders of the coupling with their corresponding holes on the flange.
15. Using the two (2) longer bolts put one through each pilot shoulder and tighten with a nut until pilot is in the flange.
16. Slide the coupling and flange up on the shaft as far as possible.
17. Pilot the adapter plate onto the transmission flange. (NOTE: MAKE SURE THAT ALL FOUR (4) SCREWS ARE IN THE CORRESPONDING HOLES BOTH ON THE ADAPTER AND THE FLANGE.) Tighten until flush in an alternating pattern.
18. Slide the coupling and flange toward the coupling adapter and align the two piloting shoulders of the coupling with their corresponding holes on the adapter.
19. Using the two (2) shorter bolts, put one through each pilot shoulder and tighten. (NOTE: MAKE SURE THAT EACH BOLT IS CORRECTLY ALIGNED IN ITS CORRESPONDING TAPPED HOLE).
20. Again, using the same method described in No. 3 tighten all four (4) adapter bolts and both coupling-adapter bolts.
21. Tighten the two (2) screws and nuts that attach the coupling to the flange.
22. Make sure the square key is flush with the end of the keyed shaft and tighten the key shaft set screw.
23. Replace the coupling guard.

10



14



17



19



22



REPAIR INSTRUCTIONS

MCL 36/42C

HYDRAULIC PUMP COUPLING REPLACEMENT

DISASSEMBLY

1. Remove the two (2) bolts and lockwashers that attach the pump to the pump mount.
2. Using a hoist or crane, slide the pump out of the coupling and pump mount.
3. Grasp the coupling hub and pull it through the pump mount.
4. Remove the four (4) bolts that attach the pulley flange to the engine pulley.
5. Pull the pulley hub and nylon sleeve out of the pulley flange pilot and up out of the pump mount.
6. Remove the four (4) bolts that attach the pulley flange to the engine pulley.
7. Remove the pulley flange.

REASSEMBLY

8. Take the pulley flange part of the alignment tool and bolt to the engine pulley.
9. Slide the alignment bar through the pump mount onto the pulley flange pilot.

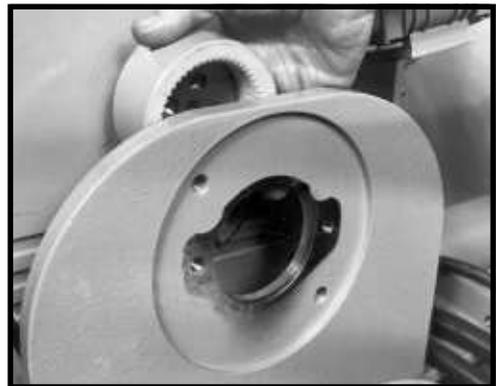
3



4



5



9

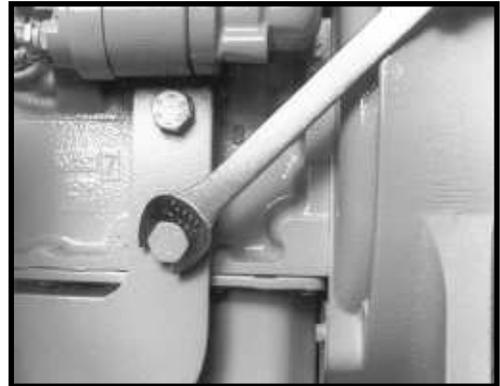


REPAIR INSTRUCTIONS

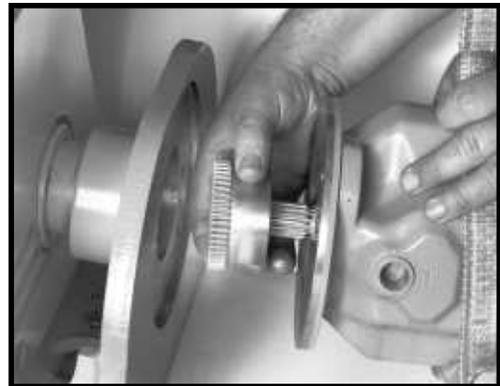
MCL 36/42C

10. If tool does not slide on, loosen but do not remove the four (4) bolts that attach the pump mount to the engine.
11. When the alignment bar slides on and off of the pulley flange pilot, the pump mount is properly aligned.
12. Leave the alignment tool in place and tighten the four (4) loose bolts on the engine. (Torque bolts to 124 ft lbs.). Once mount is in place, the tool should be easily removed. If binding occurs, return to step eleven (11).
13. Remove alignment pulley flange.
14. Apply removable Loctite to the four (4) bolts that attach the pulley flange to the engine pulley and tighten.
15. Put nylon sleeve onto the pulley hub. Pilot the pulley hub and sleeve onto the pulley flange. Apply removable Loctite to the four (4) bolts and tighten .
16. Apply a light coat of anti-sieze to the splined pump shaft.
17. Put the coupling hub onto the pump shaft.
18. Slide the pump and coupling hub through the pump mount into the nylon sleeve. (Note: The coupling hub may need to be rotated in order to go in the nylon sleeve).
19. Tighten the two (2) bolts and lockwashers that attach the pump to the pump mount.

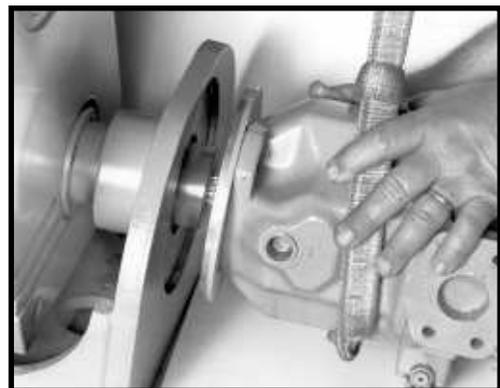
10



17



18



REPAIR INSTRUCTIONS

McL 36/42C

HYDRAULIC CLUTCH REPLACEMENT

NOTE: THIS PROCEDURE REQUIRES A MECHANICAL CRANE. DO NOT ATTEMPT THIS PROCEDURE ALONE.

DISASSEMBLY

Step 1: Transmission Coupling Removal

1. Follow the **TRANSMISSION COUPLING REPLACEMENT (Disassembly) INSTRUCTIONS**.

Step 2: Clutch Removal

2. Once the transmission coupling has been removed, further breakdown of the power train can be done.

3. Disconnect the hydraulic hose to the clutch at the solenoid. Use a male cap to block the hose. (NOTE: NOT SUFFICIENTLY BLOCKING THE HOSE COULD RESULT IN A LOSS OF HYDRAULIC FLUID).

4. Remove six (6) of the eight (8) bolts attaching the bell housing to the engine. Leave one (1) bolt at the top of the bell housing and one (1) at the bottom. Remove transmission support assembly.

5. Position the crane directly above the transmission. Wrap a nylon strap around the transmission so it is between the oil drain plug and the transmission spacer plate. Carefully raise the crane just enough to take the weight off the remaining two (2) bolts. Remove the last two (2) bolts.

6. Remove the bell housing inspection plate. Firmly hold the clutch on the shaft while the transmission is separated from the engine.

7. Carefully trolley the transmission out of the machine on the operator's side. (NOTE: BE CAREFUL NOT TO DAMAGE HYDRAULIC LINES AND MACHINE COMOPONENTS STILL IN PLACE).

8. Place the transmission on a solid surface.

9. Disconnect the hydraulic hose inside the bell housing at the clutch. (DO NOT ALLOW HYDRAULIC FLUID TO COME IN CONTACT WITH THE DISKS OF THE CLUTCH).

3



4

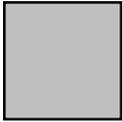


6



9





10. Remove the clutch spacer.
11. Remove the clutch by pulling it off the end of the input shaft of the transmission. Lay the clutch on a solid surface facing upward.

IF TOTALLY REPLACING THE CLUTCH REFER TO NO. 33

Step 3: Clutch Disassembly

Refer to the following steps for clutch disassembly.

Steps 12-14 Disk Kit Replacement

Steps 12-17 Seal Kit Replacement

Steps 12-19 Bearing Kit Replacement

12. Remove and discard the snap ring holding the disks together. (NOTE: THE DISKS ARE UNDER PRESSURE. THE DISKS MUST BE COMPRESSED BEFORE THE SNAP RING CAN BE REMOVED. EYE PROTECTION MUST BE WORN FOR SAFETY).
13. Once the snap ring is off, remove the front plate. Remove and discard the following: six (6) belleville springs, five (5) separator disks, and six (6) friction disks. (DO NOT DISCARD THE FRONT PLATE OR PRESSURE PLATE).
14. Clean the front plate and pressure plate if necessary. (MAKE SURE THAT BOTH PLATES ARE COMPLETELY DRY BEFORE REASSEMBLING).
15. Support cylinder assembly, on bearing side, and push down on hub. Remove and discard snap ring. (EYE PROTECTION MUST BE WORN FOR SAFETY).
16. Support clutch on pressure plate. Push down on hub to remove from cylinder assembly.
17. Use low air pressure to separate cylinder assembly from piston assembly and pressure plate. Remove and discard o-rings. At this point, inspect bearing for wear. If bearings are acceptable, refer to step 23.
18. Remove the two (2) bearing removal plugs in cylinder face. Use two (2) 1/4" diameter rods to tap bearing out of cylinder counterbore. (NOTE: DO NOT STRIKE THE COUNTERBORE WITH THE RODS).
19. Remove the two (2) bearing removal plugs in piston face. Use two (2) 1/4" diameter rods to tap bearing out of piston counterbore. (NOTE: DO NOT STRIKE THE COUNTERBORE WITH THE RODS).

11



12



16



17



18



REPAIR INSTRUCTIONS

MCL 36/42C

ASSEMBLY

Step 4: Clutch Assembly

Refer to the following steps for clutch assembly:

Steps 29-31 Disk Kit Assembly

Steps 23-32 Seal Kit Assembly

Steps 20-32 Bearing Kit Assembly

20. Install bearing removal plugs in the cylinder and piston face. Apply a light coat of "Locktite" removable thread locker #242 (or equivalent) to the inner and outer races of the bearings. (NOTE: APPLY A FEW DROPS OF REMOVABLE THREAD SEALANT TO THE PLUGS. TIGHTEN PLUGS TO "JUST BELOW" THE CYLINDER AND PISTON FACES).
21. Press a new sealed bearing onto the pressure plate by pressing on the outer race of the bearing.
22. Press a new sealed bearing onto the pressure plate by pressing on the inner race of the bearing.
23. Apply a light oil to all o-ring surfaces and grooves before assembling the clutch. Install o-rings into the proper o-ring grooves.
24. Align the anti-rotation pin in the piston with the blind holes in the cylinder. Carefully press the piston onto the cylinder. As the piston o-ring begins to slide onto the cylinder, it may be necessary to guide the o-ring into the o-ring groove.
25. Assemble the pressure plate and bearing assembly into the cylinder and piston assembly by pressing on the pressure plate.
26. Assemble the hub into the cylinder assembly by supporting hub on the splined end. Place the cylinder assembly on the hub and press the bearing onto the hub. (NOTE: PRESS ON THE INNER RACE OF THE BEARING). As the bearing is being pressed onto the hub, it is necessary to align the internal spline of the pressure plate with the external spline of the hub.

23



24



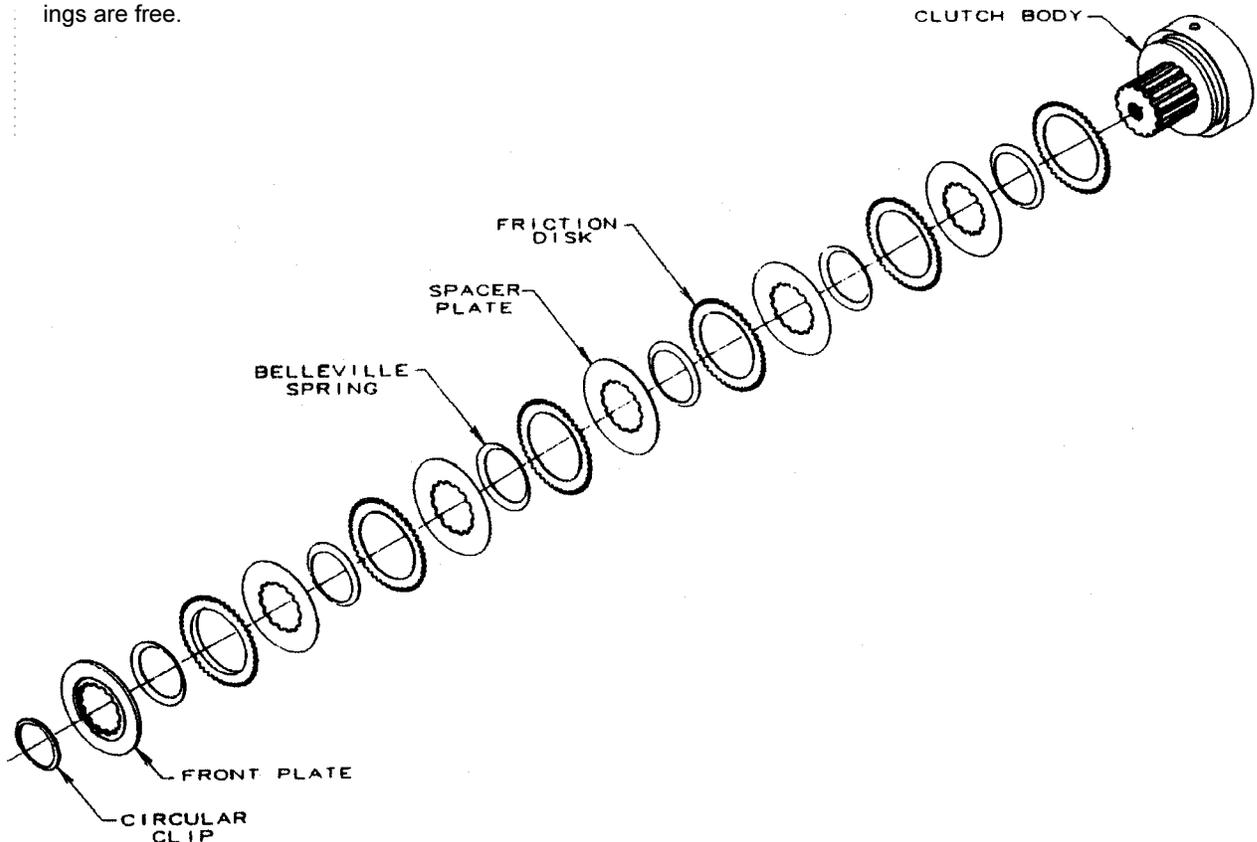
REPAIR INSTRUCTIONS

MCL 36/42C

27. Install the retaining ring. (EYE PROTECTION MUST BE WORN FOR SAFETY).
28. Seat the bearing against the retaining ring by supporting pressure plate and pressing on the hub.
29. The reassembly order of the disk kit is as follows:
 - 1st - Friction Disk
 - 2nd - Belleville Spring (O.D. facing pressure plate)*
 - 3rd - Spacer PlateThis order is repeated until all disks, springs and spacer plates are in place.

*Note: Belleville springs must be intalled I.D. to I.D. for proper clutch operation.
30. Install front plate and reinsert snap ring. (EYE PROTECTION MUST BE WORN FOR SAFETY). (NOTE: DISKS MUST BE COMPRESSED IN ORDER TO HAVE ACCESS TO THE SNAP RING GROOVE).
31. Rotate disks by hand to insure proper seating. The disks should be evenly spaced.
32. Rotate the hub in the cylinder to insure that the bearings are free.

29



REPAIR INSTRUCTIONS

MCL 36/42C

ASSEMBLY

Step 5: Installing the hydraulic clutch fitting. (These instructions are for use only if the fitting is being changed or replaced.)

33. Remove the hydraulic clutch fitting from the old clutch.
34. Clean off any remaining sealant from the fitting.
35. Apply a drop of removable thread sealant to the pipe thread of the fitting. (NOTE: THE FITTING MUST BE CLEAN AND DRY BEFORE ANY SEALANT CAN BE APPLIED).
36. Install the fitting with the sealant into the clutch and tighten. (NOTE: THE FITTING MUST BE FACING THE SAME DIRECTION AS IT WAS BEFORE IT WAS REMOVED).

Step 6: Installing the clutch

37. Replace the clutch on the input shaft of the transmission. Slide the clutch spacer over the input shaft until it bottoms against the spline. (NOTE: BE SURE THE CLUTCH FITTING IS PROPERLY IN THE CLUTCH RESTRAINT CLIP).
38. Wrap the hydraulic clutch hose around the inside of the bell housing so it reaches the clutch fitting. Tighten the hose making sure it is securely inside the bell housing. (THE HOSE MUST NOT EXTEND PAST THE FRONT PLANE OF THE BELL HOUSING).
39. Replace the nylon strap between the oil drain plug and the transmission spacer plate.
40. Move the transmission back into the machine carriage. (BE CAREFUL NOT TO DAMAGE HYDRAULIC LINES AND MACHINE COMPONENTS STILL IN PLACE).

36



38



REPAIR INSTRUCTIONS

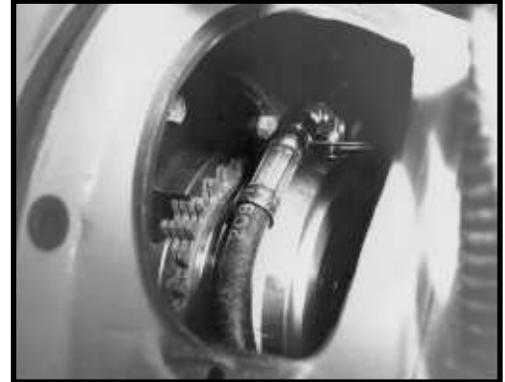
MCL 36/42C

41. Line up the clutch disks with the slots in the drive shell. The disks must be aligned one-at-a-time. (EXTRA CARE MUST BE TAKEN WHEN INSTALLING THE CLUTCH INTO THE DRIVE SHELL. ANY SUDDEN MOVEMENT, SIDE-TO-SIDE OR UP AND DOWN, CAN CAUSE THE TEETH OF THE DISKS TO BREAK OFF. DO NOT FORCE THE DISKS INTO THE DRIVE SHELL).
42. Once all six (6) disks are fully in the drive shell, slide the bell housing into its pilot on the engine.
43. Replace the bell housing inspection plate.
44. Replace and tighten two (2) bolts and lockwashers, one (1) at the top of the bell housing and one (1) on bottom. (ALL SIX (6) DISKS MUST BE COMPLETELY INSIDE THE DRIVE SHELL BEFORE ANY TIGHTENING OF THE BOLTS CAN BE DONE).
45. Replace the other six (6) bolts and lockwashers, and hand tighten. (MAKE SURE THAT ALL EIGHT (8) BOLTS ARE PROPERLY ALIGNED IN THEIR CORRESPONDING HOLES). Replace transmission support assembly.
46. Once all bolts are aligned, final tightening can be done.
47. Remove the cap on the hydraulic hose and reattach it to the bulkhead adapter on the bottom of the bell housing.

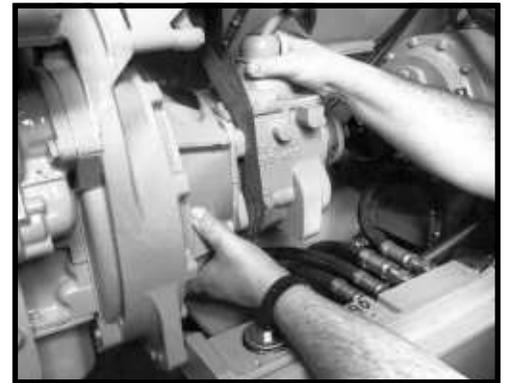
Step 7: Reinstalling the Transmission Coupling

48. Follow the Transmission Coupling Replacement (Assembly) instructions.

41



42



WARRANTY RETURN GOODS POLICY

LIMITED WARRANTY

The Manufacturer warrants its products to be free from defects in material and workmanship for a period of twelve months from the date of shipment from the factory. The Manufacturer shall not be responsible for any damage resulting to or caused by its products by reason of installation, improper storage, unauthorized service, alteration of the products, neglect or abuse, or use of the product in a manner inconsistent with its design. The warranty does not extend to any component parts not manufactured by Manufacturer; however, Manufacturer's warranty herein shall not limit any warranties made by manufacturers of component parts which extend to Buyer.

Claims for defects in material and workmanship shall be made in writing to Manufacturer within ten days of discovery of defect. Manufacturer may either send a service representative or have the product returned to its factory at Buyer's expense for inspection. Upon notification of defect, Manufacturer will issue a return goods authorization number to Buyer. The return goods authorization number must accompany the product returned. If judged by the Manufacturer to be defective in material or workmanship, the product will be replaced or repaired at the option of the Manufacturer, free from all charges except authorized transportation. Buyer shall be responsible for all maintenance services consisting of lubrication and cleaning of equipment, replacing expandable parts, making minor adjustments, and performing operating checks, all in accordance with procedures outlined in Manufacturer's maintenance literature.

THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES AND NO REPRESENTATIONS, GUARANTEES, OR WARRANTIES, EXPRESS OR IMPLIED, (INCLUDING BUT NOT LIMITED TO A WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE), ARE MADE BY THE MANUFACTURER IN CONNECTION WITH THE MANUFACTURE OR SALE OF ITS PRODUCTS. NO EMPLOYEE, DISTRIBUTOR, OR REPRESENTATIVE IS AUTHORIZED TO CHANGE THIS WARRANTY ON BEHALF OF MANUFACTURER.

THE REMEDIES OF BUYER SET FORTH HEREIN ARE EXCLUSIVE AND ARE IN LIEU OF ALL OTHER REMEDIES. THE LIABILITY OF MANUFACTURER WHETHER IN CONTRACT, TORT, UNDER ANY WARRANTY, OR OTHERWISE SHALL NOT EXTEND BEYOND ITS OBLIGATION TO REPAIR OR REPLACE, AT ITS OPTION ANY PRODUCT OR PART FOUND BY MANUFACTURER TO BE DEFECTIVE IN MATERIAL OR WORKMANSHIP. MANUFACTURER SHALL NOT BE LIABLE FOR COST OF INSTALLATION AND/OR REMOVAL OR BE RESPONSIBLE FOR DIRECT, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES OF ANY NATURE.

GENERAL RETURNS OF MERCHANDISE

1. All returns must be pre-authorized
 - A. Please call our parts department for an RGA number
 - B. Please include RGA number on the outside of box
 - C. Include any required paper work or special instructions
 - D. Items returned without an RGA number will not be accepted
2. All returns are subject to a 20% restock charge.
3. Special items are non-returnable
 - A. Non-stock parts
 - B. Custom parts
 - C. If you are unsure about a parts status when ordering, ask your McLaughlin representative if the item fits on of the above conditions.
4. Items must be returned within thirty days of original order date.
5. Items not returned within 30 days from the date of RGA is issued will not be accepted.
6. The item(s) must be in new condition. Used item(s) are not returnable.