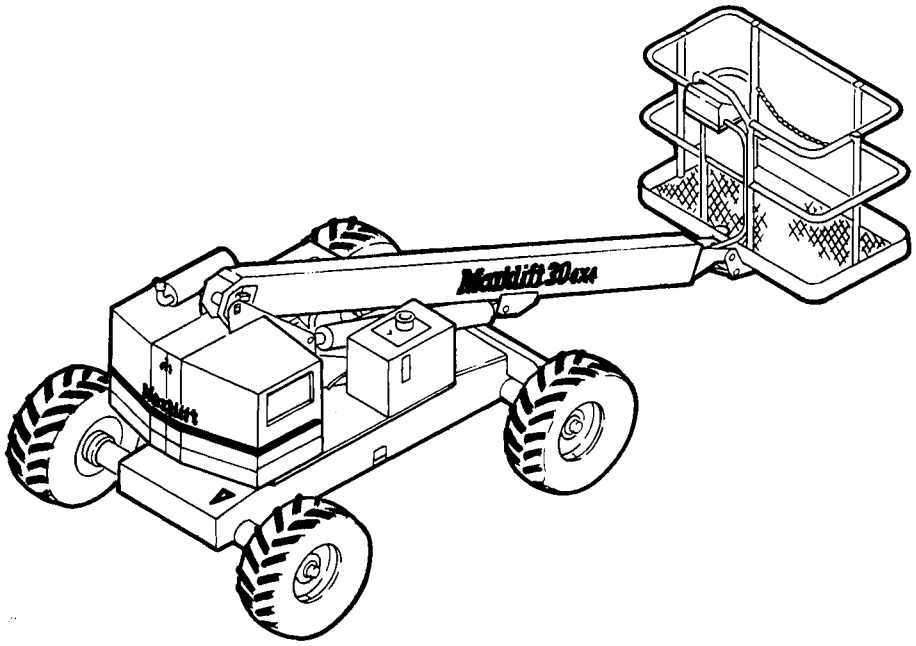
Marklift®

OPERATION MAINTENANCE AND PARTS MANUAL



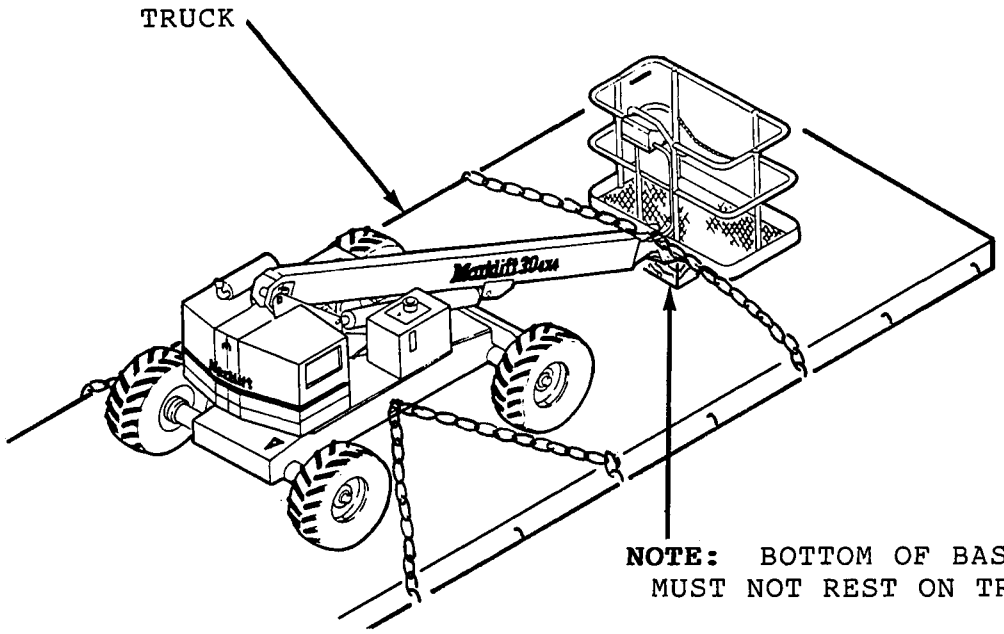
SELF-PROPELLED BOOM FOUR WHEEL DRIVE (MODEL 30 4X4)

FIRST EDITION - AUGUST 1987

17104

The Marklifts.
Mark Industries ▪ P.O. Box 720 ▪ Long Beach, CA 90801
(213) 639-9700 ▪ Toll Free (800) 421-1826 ▪ TELEX 677-361

6. When the boom is on the truck in position for proper weight distribution, it is chained down in the manner illustrated by the drawings below.



UNLOADING

1. Release the hold down chains and remove the block under the basket end of the boom arm. Lift the boom arm to horizontal or slightly above the horizontal position.

2. Insure that the winch cable is in a taut position and then lower the truck bed.

3. Allow the boom to gradually roll down the truck bed by winching out.

4. When the boom is completely on level ground, remove the winch cable from the boom.

5. Boom is now ready for normal operation.

A working knowledge of the hydraulic system facilitates trouble shooting and adjustments by a mechanic. Therefore the information below, although general, will provide the mechanic with such knowledge.

The **MARKLIFT** employs the latest components in mobile hydraulic equipment. The hydraulic circuit contains an engine driven two stage gear pump, one stage for the drive function only, the other stage for the steer and boom functions. The drive stage of the pump supplies the drive manifold. The drive manifold contains a by-pass compensator, a load sense shuttle, a relief valve, and a proportional control valve. the by-pass compensator is controlled by the load sense shuttle. The by-pass compensator delivers the required flow and pressure to the proportional control valve and by-passes the un-required flow back to the hydraulic tank. This provides maximum efficiency and minimum oil heat. The relief valve insures that the pressure will not exceed the drive requirement. The proportional control valve spool is pilot driven. The steer and boom function manifold contains the following:

1. A manifold pressure relief valve.
2. A dump valve.
3. Two directional control valves (for steer and rotation functions).

The operator should familiarize himself with the drive by raising the boom approximately 5 feet off the ground before driving the **MARKLIFT.**

The controller knob has a self centering safety feature. For best operation, place thumb over controller knob and wrap fingers loosely around locking stem. Now, rest the heel of the hand on the controller housing and apply a downward pressure with the thumb, making the index finger lift the locking stem. Once the stem is disengaged and moved forward or reverse, the pressure on the thumb may be relaxed because the locking stem has engaged the cam and cannot drop into the locking position until the lever or handle is returned to the center position.

Gradually raise the boom higher, and drive the **MARKLIFT** again until you reach maximum height. Remember, at all times, that the proportional signal from the controller to the valve is controlled by the operator. There is approximately 3 degrees of "dead" motion each side of the controller center position.

You will soon find that gradual starts and stops are easy to perform.

After the operator has been instructed by a trained operator and has spent 30 minutes practicing, he should be capable of smoothly starting and stopping the **MARKLIFT** on all proportional functions.

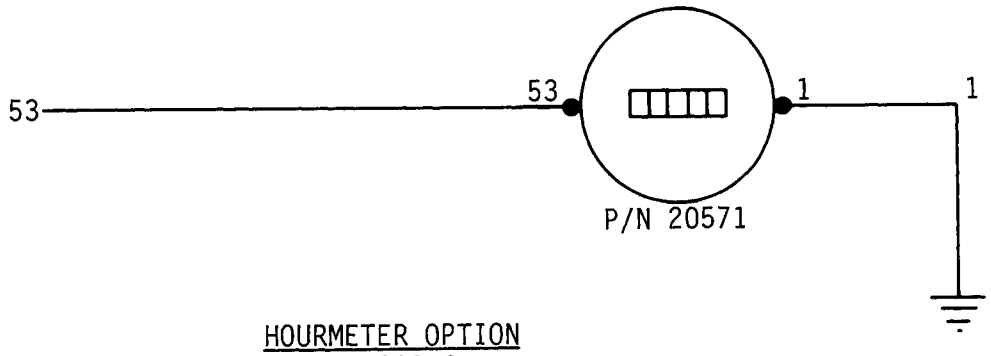
In an engine failure emergency, all boom hydraulic functions are operable with the emergency pump running. From the aerial platform, position emergency pump switch to "ON". This will start the emergency pump. Continue normal operation by pressing the foot switch and moving the toggle switches in the desired direction of motion.

Important; Aerial start switch must be on the "ON" position for the emergency hydraulics to function. Emergency function also applies to the ground control station.

SERVICE TOOLS

1. Volt/OHM meter.
2. Hydraulic pressure gauge (0-3000 PSI)
3. Battery hydrometer.
4. Photo tachometer.
5. Standard mechanics hand tools.
6. Cable tensioning tool MI #20053.
7. Radiator pressure tester.

ELECTRIC SCHEMATIC (HOURMETER)

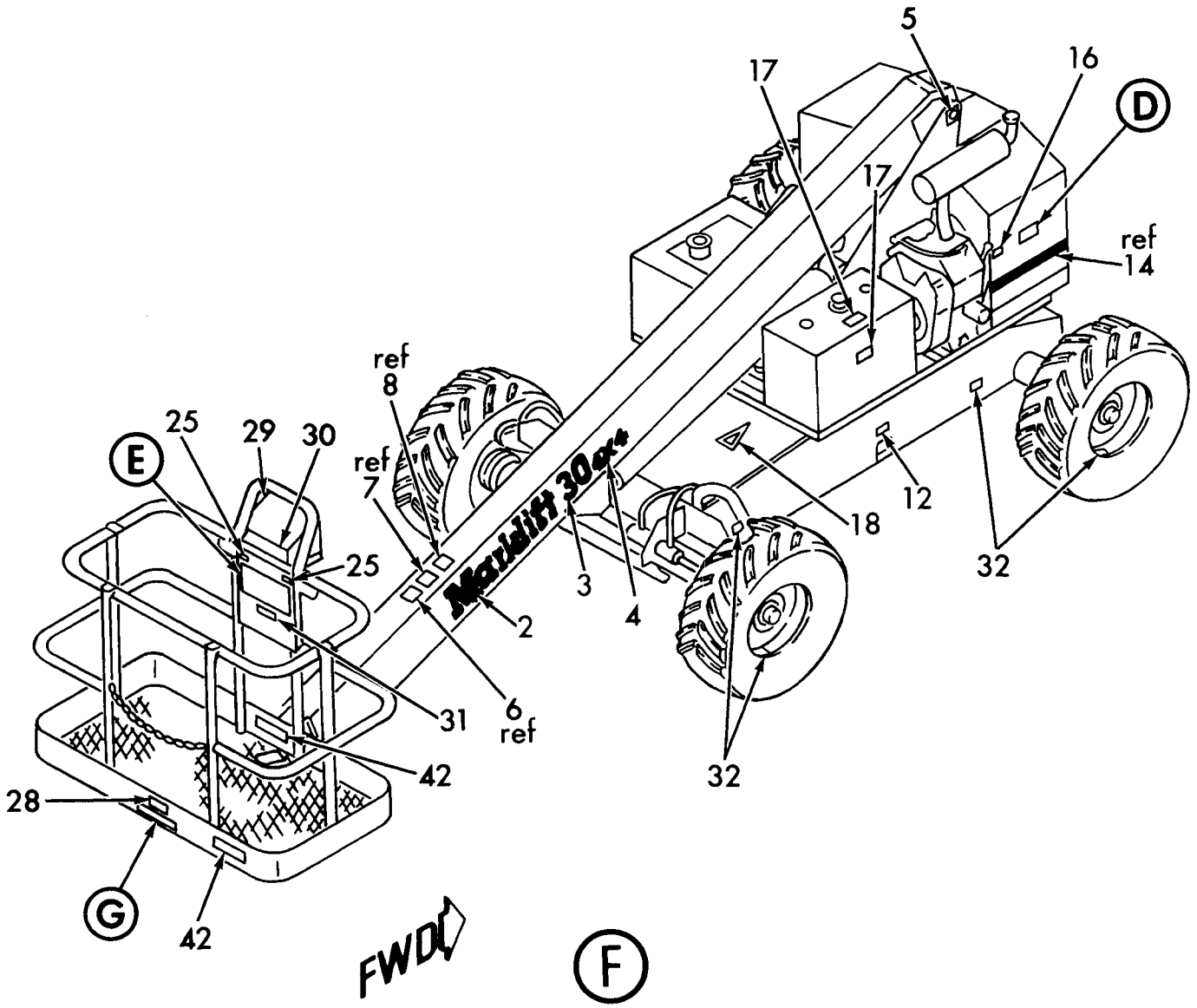


HOURMETER OPTION
P/N 23316

FINAL ASSEMBLY (30 4 X 4) (CONTINUED)

ITEM	PART NUMBER	DESCRIPTION 1234567	UNIT PER ASSY.
-1	20046	ASSEMBLY, FINAL	REF
2	67031	.KIT, DECAL (See Sect. 2, Fig. 4 for Details)	1
3	23667	.ASSEMBLY, CARRIAGE (See Sect. 3, Fig. 1 for Details)	1
4	60546	.SCREW, CAP (attaching part)	18
5	23689	.ASSEMBLY, TURRET (See Sect. 4, Fig. 1 for Details)	1
6	23777	.PIN	1
7	26454	.TUBE, ROUND	1
8	62009	.SCREW, CAP (attaching part)	2
9	63303	.WASHER, LOCK (attaching part)	2
10	65103	.FITTING, GREASE	2
11	23660	.ASSEMBLY, FINAL BOOM (See Sect. 5, Fig. 1 for Details)	1
12	70107	.SWITCH, LIMIT	1
13	70032	.LEVER, OPERATING	1
14	62615	.SCREW, CAP (attaching part)	2
15	63313	.WASHER, LOCK (attaching part)	2
16	2806	.RELIEF, STRAIN	1
17	23685	.PIN	1
-18	60539	.SCREW, CAP (attaching part)	1
-19	63319	.WASHER, LOCK (attaching part)	1
20	23509	.PIN	1
-21	60539	.SCREW, CAP (attaching part)	1
-22	63303	.WASHER, LOCK (attaching part)	1
23	20457	.PIN	1

- ITEM NOT ILLUSTRATED



ATTACH YOUR SAFETY BELT FIRST!

CAUTION OPERATING THIS MACHINE WITHOUT CORRECT SAFETY BELT ATTACHMENT COULD RESULT IN DEATH OR SERIOUS INJURY CAUTION

22385

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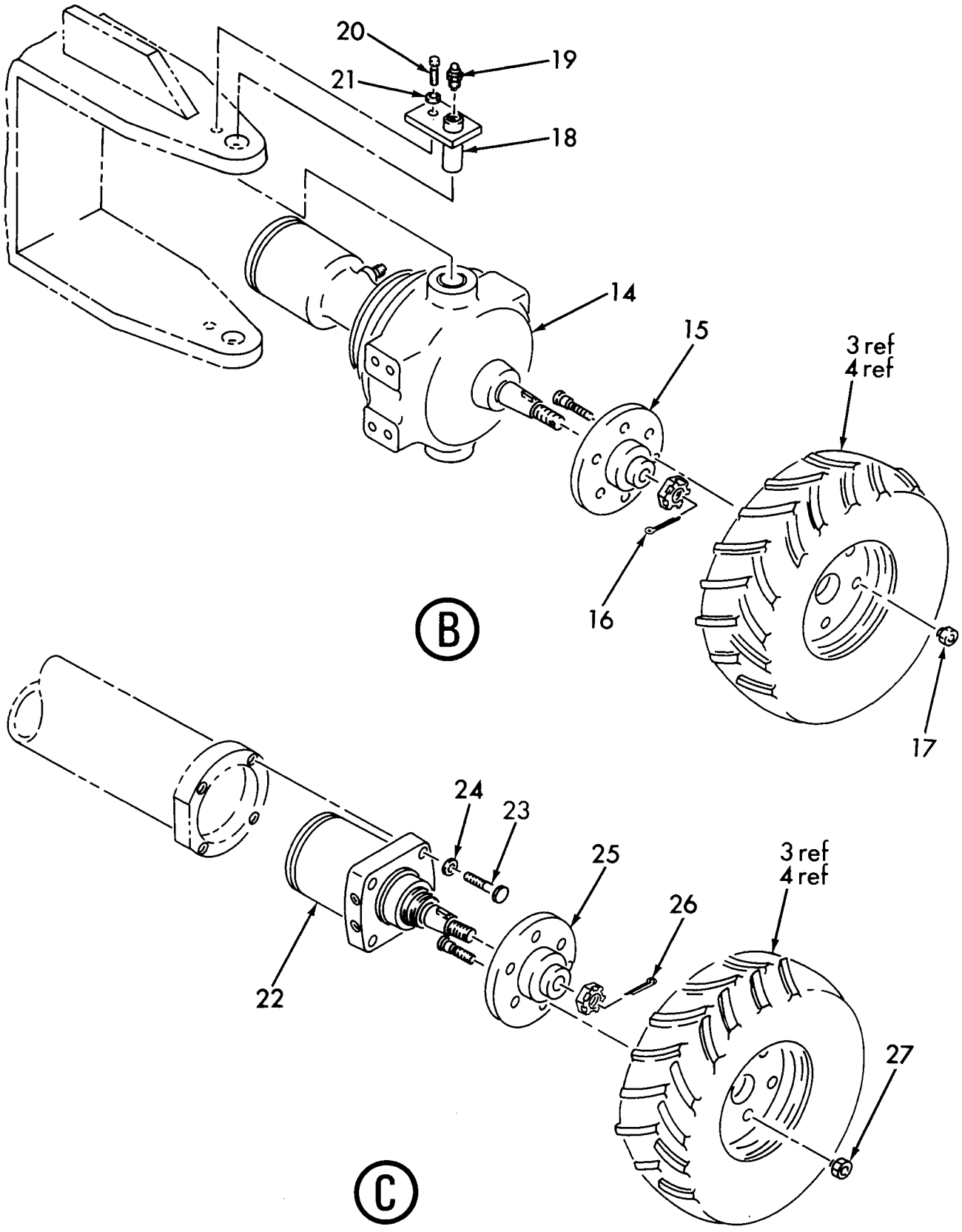
CARRIAGE ASSEMBLY (30 4 X 4) (CONTINUED)



MOTOR BRAKE ASSEMBLY (30 4 X 4) (CONTINUED)

ITEM	PART NUMBER	DESCRIPTION 1234567	UNIT PER ASSY.
52		..PISTON	1
53	66971	..KIT, SEAL	1
54		...RING, BACK-UP	1
55		...O-RING	1
56		...RING, BACK-UP	1
57		...O-RING	1

- ITEM NOT ILLUSTRATED

TURRET ASSEMBLY (30 4 X 4) (CONTINUED)

ITEM	PART NUMBER	DESCRIPTION 1234567	UNIT PER ASSY.
-1	23689	ASSEMBLY, TURRET (See Sect. 2, Fig. 1 for NHA)	REF
2	23681	.WELDMENT, TURRET	1
3	23739	.ASSEMBLY, ENGINE AND PUMP (See Sect. 4, Fig. 2 for Details)	1
-4	60610	.SCREW, CAP (attaching part)	4
5	23734	.ASSEMBLY, FUEL TANK (See Sect. 4, Fig 3 for Details)	1
-6	60395	.SCREW, CAP (attaching part)	4
-7	63319	.WASHER, LOCK (attaching part)	4
8	23731	.ASSEMBLY, HYDRAULIC TANK (See Sect. 4, Fig. 4 for Details)	1
-9	60395	.SCREW, CAP (attaching part)	4
-10	63319	.WASHER, LOCK (attaching part)	4
11	23664	.ASSEMBLY, MASTER LEVELING CYLINDER (See Sect. 4, Fig. 5 for Details)	1
12	23686	.PIN	1
-13	60542	.SCREW, CAP (attaching part)	1
-14	63303	.WASHER, LOCK (attaching part)	1
15	23787	.ASSEMBLY, LIFT CYLINDER (See Sect. 4, Fig. 6 for Details)	1
16	23684	.PIN	1
-17	60542	.SCREW, CAP (attaching part)	1
-18	63303	.WASHER, LOCK (attaching part)	1
19	23722	.GEAR, RING	1
20	60347	..SCREW, CAP (attaching part)	24
21	65103	.FITTING, GREASE	2
22	23694	.ASSEMBLY, ROTATION GEAR BOX (See Sect. 4, Fig. 7 for Details)	1

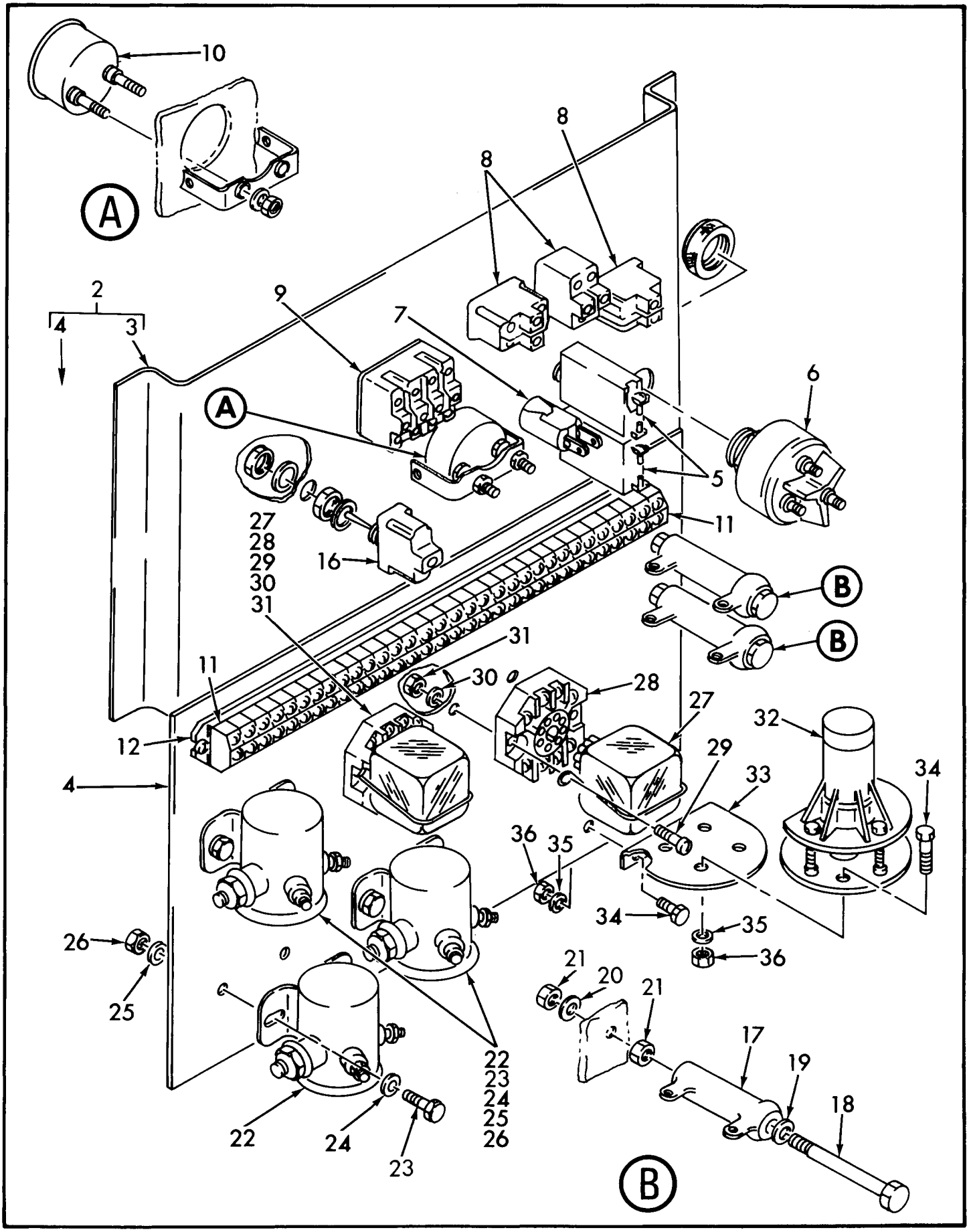
- ITEM NOT ILLUSTRATED

HYDRAULIC TANK ASSEMBLY (30 4 X 4) (CONTINUED)

ITEM	PART NUMBER	DESCRIPTION 1234567	UNIT PER ASSY.
-1	23731	ASSEMBLY, HYDRAULIC TANK (See Sect. 4, Fig. 1 for NHA)	REF
2	23728	.SUB-ASSEMBLY, HYDRAULIC TANK	1
3	23726	..TANK, HYDRAULIC	1
4	23729	..GASKET, COVER	1
5	23730	..PLATE, COVER	1
6	65907	..SCREW, THREAD (attaching part)	16
7	81182	..RETURN FILTER, TANK IMMERSED	1
-7A	67124	...ELEMENT, FILTER	1
8		..O-RING	1
9	60501	..SCREW, CAP (attaching part)	2
10	63301	..WASHER, LOCK (attaching part)	2
11	35022	..TUBE, ROUND	1
12	80021-03	..ELBOW, STREET	1
13	65213	..BREATHER	1
14	81184	..GAGE, FLUID LEVEL	1
15		...SCREW, CAP	2
16		...O-RING	2
17	16553	..NIPPLE	1
18	81183	..FILTER, SUCTION	1
19	80048-04	.PLUG, HOLLOW HEXAGON	1
20	80048-05	.PLUG, HOLLOW HEXAGON	2
21	52307	.ELBOW, STREET	1
22	16553	.NIPPLE	1
23	20050	.VALVE, BUTTERFLY	1
24	55100	.TEE, STREET	1

- ITEM NOT ILLUSTRATED

LOWER CONTROL PANEL ASSEMBLY (30 4 X 4)



FINAL BOOM ASSEMBLY (30 4 X 4) (CONTINUED)

ITEM	PART NUMBER	DESCRIPTION 1234567	UNIT PER ASSY.
-1	23660	ASSEMBLY, FINAL BOOM (See Sect. 2, Fig. 1 for NHA)	REF
2	23661	.ASSEMBLY INNER BOOM (See Sect. 5, Fig. 2 for Details)	1
3	23652	.MACHINING, OUTER BOOM	1
4	21782	..BUSHING	2
5	23163	.PIN, EXTENSION CYLINDER	1
6	62203	.SCREW, SET (attaching part)	2
7	23515	.COVER, DOUBLER PLATE	1
8	60324	.SCREW, CAP (attaching part)	4
9	63302	.WASHER, LOCK (attaching part)	4
10	23158	.COVER, PRESSURE PAD	2
11	22372	.PLATE, PAD PRESSURE	2
12	23160	.PAD, WEAR	2
13	62204	.SCREW, SET (attaching part)	4
14	61101	.NUT, JAM (attaching part)	4
15	60338	.SCREW, CAP (attaching part)	8
16	63302	.WASHER, LOCK (attaching part)	8
17	23159	.COVER, PRESSURE PAD	1
18	23164	.PLATE, PAD PRESSURE	1
19	23165	.PAD, WEAR	1
20	62204	.SCREW, SET (attaching part)	2
21	61101	.NUT, JAM (attaching part)	2
22	60338	.SCREW, CAP (attaching part)	4
23	63302	.WASHER, LOCK (attaching part)	4
24	23161	.BRACKET, BOOM END	1
25	60325	.SCREW, CAP (attaching part)	4
26	63303	.WASHER, LOCK (attaching part)	4

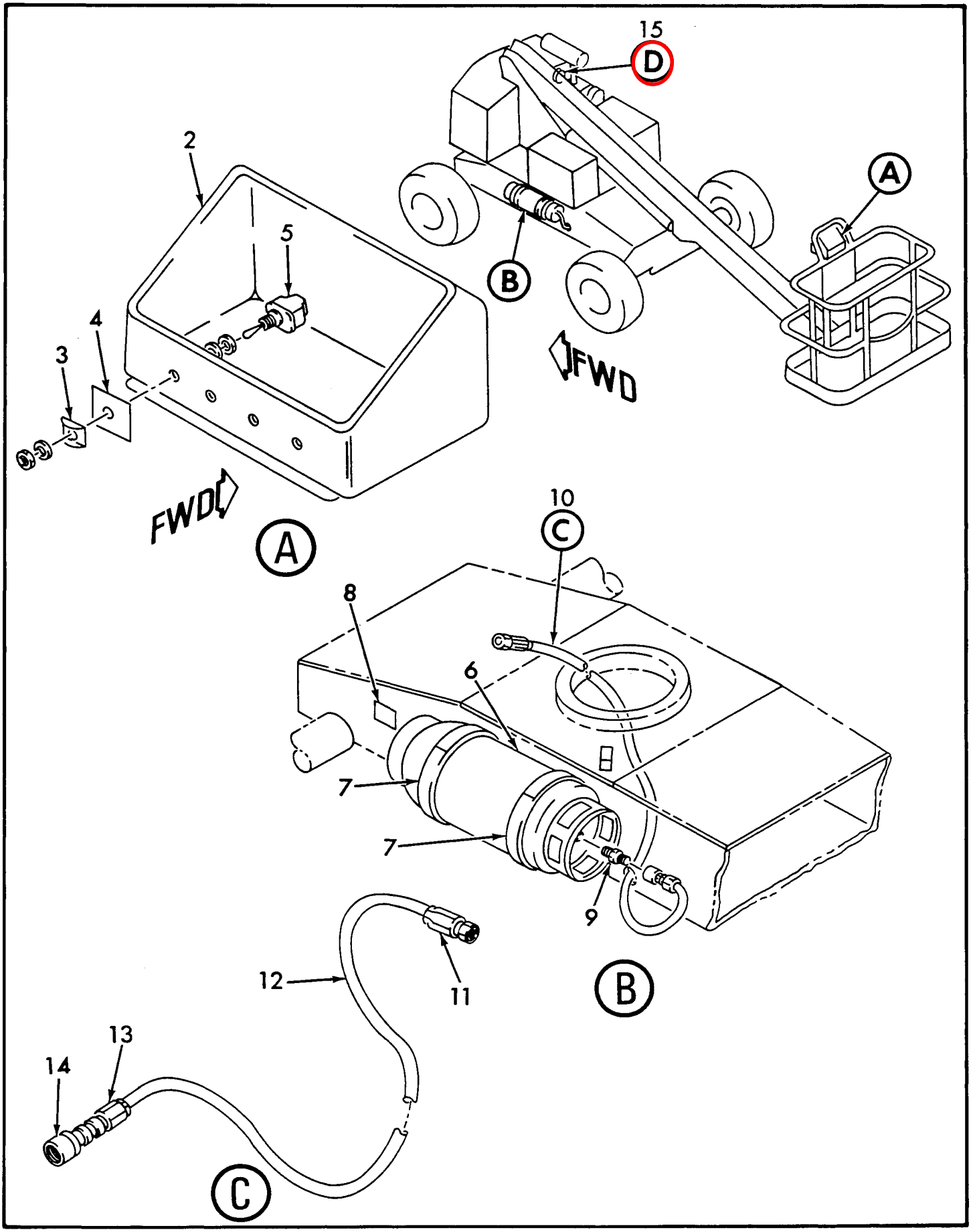
- ITEM NOT ILLUSTRATED

EXTENSION CYLINDER ASSEMBLY (30 4 X 4) (CONTINUED)

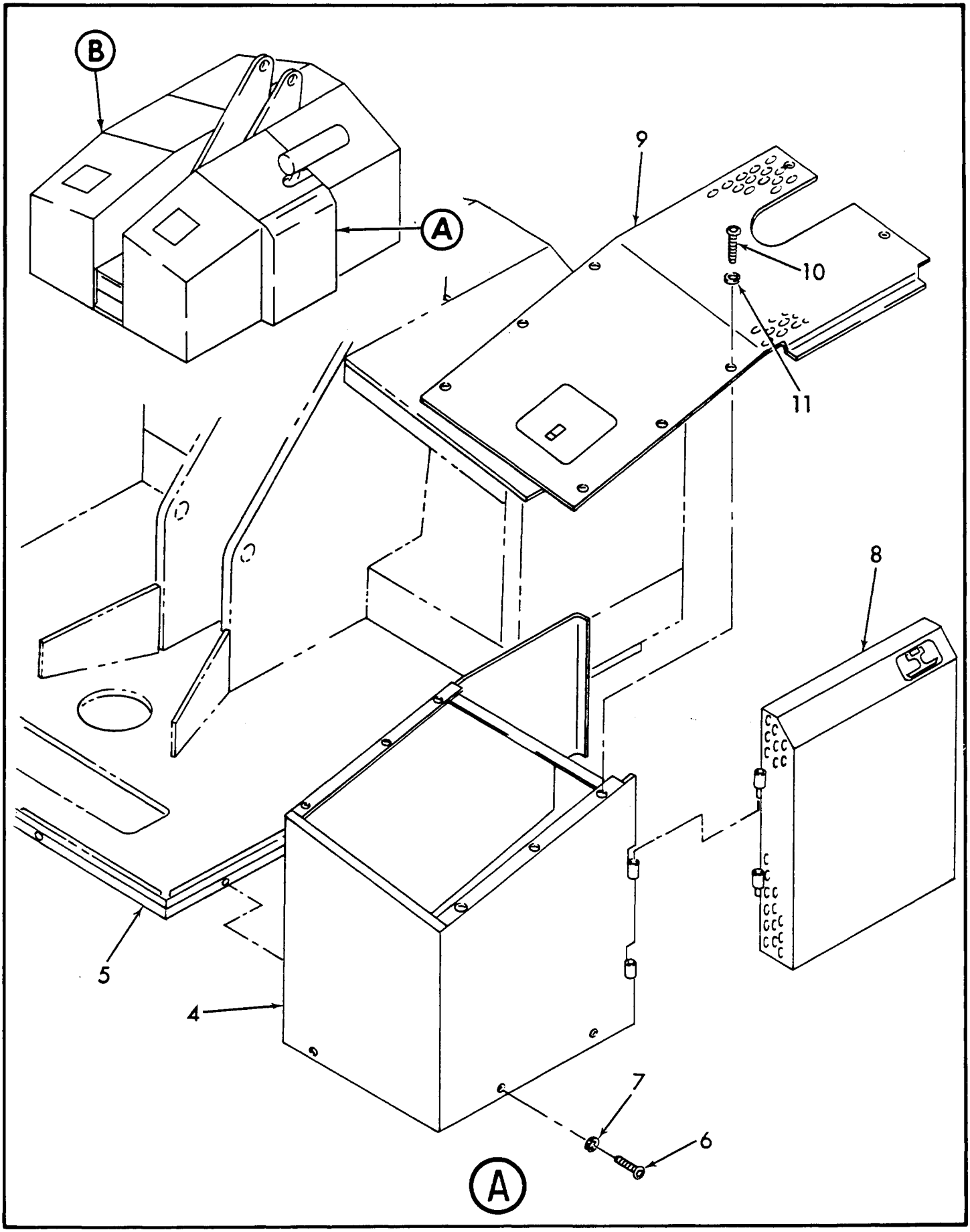
ITEM	PART NUMBER	DESCRIPTION 1234567	UNIT PER ASSY.
-1	23680	ASSEMBLY, EXTENSION CYLINDER (See Sect. 5, Fig. 2 for NHA)	REF
2	80012-11	.ELBOW, STRAIGHT THREAD	2
3	23657	.SUB-ASSEMBLY, EXTENSION CYLINDER	1
4	81006	..CARTRIDGE, OVER CENTER	2
5	22820	..BLOCK MANIFOLD	1
6	61947	..SCREW, CAP (attaching part)	4
7	63302	..WASHER, LOCK (attaching part)	4
8	26298	..TUBE, HYDRAULIC	1
9	80004-11	..CONNECTOR, STRAIGHT THREAD	1
10	80062-06	..SLEEVE	1
11	80060-06	..NUT	1
12	80051-03	..PLUG	1
13	23656	..CYLINDER, BOOM EXTENSION	1
14	67122	..BUSHING	4
15		..NUT, GLAND	1
16		..PISTON	1
17		..NUT, LOCK	1
18		..ROD	1
-19		..BARREL	1
-20	67050	..KIT, SEAL	1
21		...WIPER, ROD	1
22		...SEAL, ROD POLYPAK	1
23		...O-RING	1
24		...RING, BACK-UP	1
25		...O-RING	1
26		...BEARING, WEAR	2

- ITEM NOT ILLUSTRATED

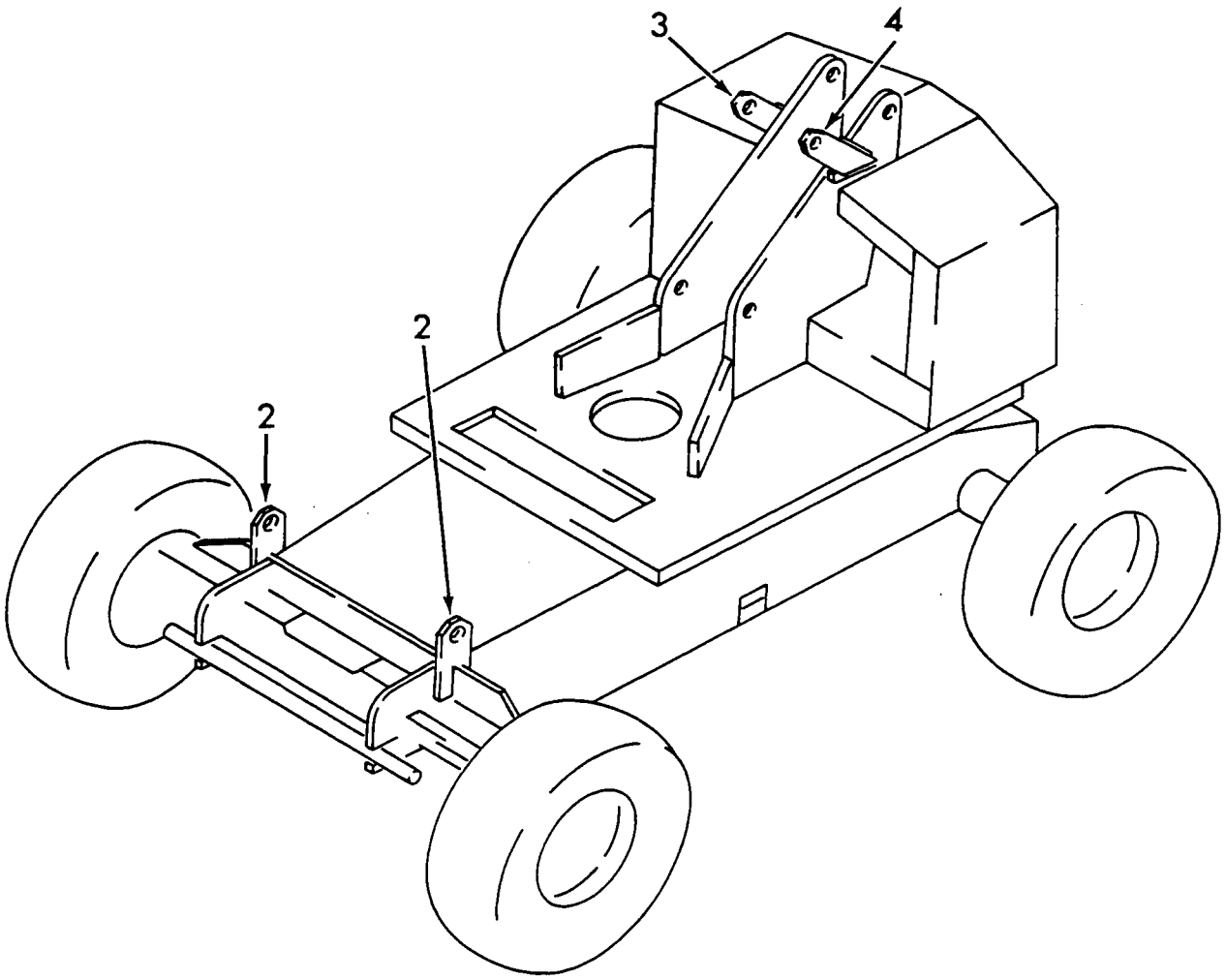
DUAL FUEL



SHEET METAL COWLING (AFT. JUL. '87)



LIFTING LUGS



ITEM	PART NUMBER	DESCRIPTION 1234567	UNIT PER ASSY.
-1	23315	ASSEMBLY, LUG LIFTING (OPTION) (See Sect. 6, Fig. 1 for NHA)	REF
2	23792	.LUG, CARRIAGE LIFTING	2
3	23793	.LUG, LEFT HAND TURRET LIFTING	1
4	23794	.LUG, RIGHT HAND TURRET LIFTING	1

- ITEM NOT ILLUSTRATED

from the flywheel. Thus, the problems of ***vapor lock*** and ***dieseling***, or ***run-on***, will also be minimized by this continued practice.

MAINTENANCE

AIR CLEANERS

The air cleaner is an essential accessory, filtering the air entering the carburetor and preventing abrasive dirt from entering the engine and wearing out valves and piston rings in a very short time.

The air cleaner must be serviced frequently, depending on the dust conditions in which the engine is operated. Check hose connections for leaks or breaks and replace all broken or damaged hose clamps on remote or side mounted air cleaners.

Excessive smoke or loss of power are good indications that the air cleaner requires attention.

DRY TYPE AIR CLEANER, Fig. 6

The dry element air cleaner mounted directly to the carburetor is standard equipment on this model engine. ***Do not*** oil element, and ***do not*** use gasoline or kerosene for cleaning.

Service Daily; or twice a day if engine is operating in very dusty conditions. Remove element and shake out the accumulated dust and dirt. Wipe out dirt from inside cover and from housing.

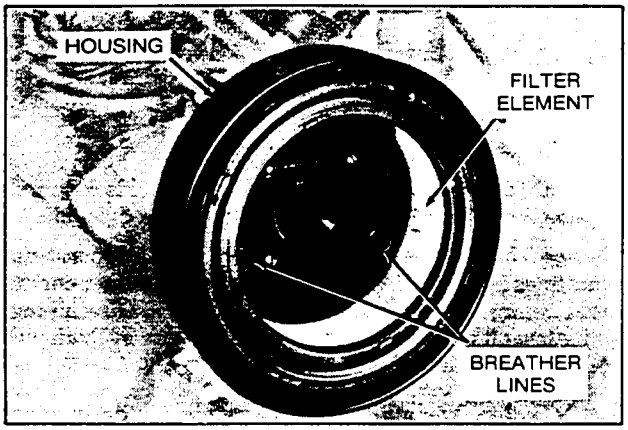


Fig. 6 DRY ELEMENT AIR CLEANER

Once Each Week; the filtering cartridge should be taken out and rinsed under a faucet with cold water, then wash by repeated dippings for several minutes in a solution of lukewarm water and a mild, ***Non-sudsing*** detergent. Rinse in cold water from the inside out, and allow to dry overnight before installing in air cleaner. In cold weather, protect element from freezing until dry.

After five washings or one year of service, whichever comes first, replace cartridge element. New filter elements are available from all Teledyne Wisconsin Motor Distributors and Service Centers.

HEAVY DUTY AIR CLEANERS, Fig. 7

Dry element, or oil bath heavy duty type air cleaners are optionally used, and are mounted either to the left hand side of the engine, or to the customer equipment structure.

DRY TYPE Heavy Duty Air Cleaner

Service Daily; squeeze rubber dust unloader once or twice a day to check for possible obstruction. If engine is operating in very dusty conditions, remove cartridge and shake out the accumulated dirt (do not tap or strike element — it may become damaged). Wipe out dirt from inside cover and bowl, after removing baffle and dumping out dust.

Once Each Week; The filtering cartridge should be taken out and rinsed under a faucet with cold water, then wash by repeated dippings for several minutes in a solution of lukewarm water and a mild, ***Non-sudsing*** detergent. Rinse in cold water from the inside out, and allow to dry overnight before re-installing. In cold weather, protect element from freezing until dry.

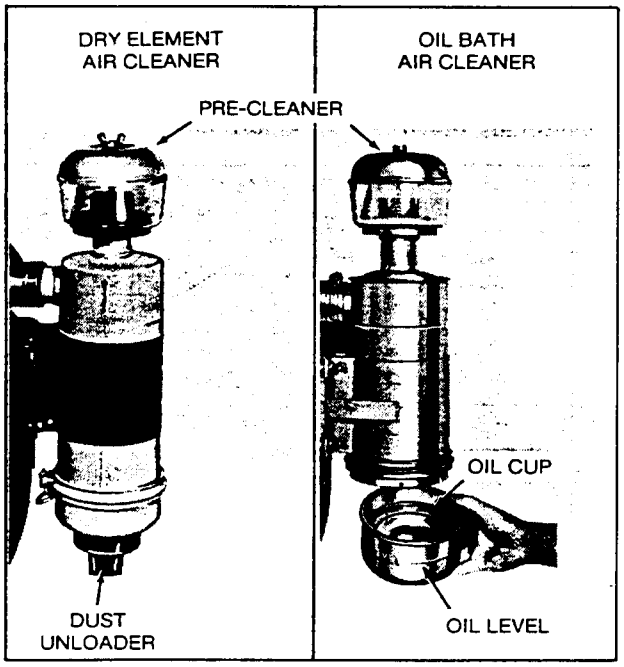


Fig. 7 HEAVY DUTY AIR CLEANERS

Do Not Use Gasoline, Kerosene or Solvent for Cleaning —Do Not Oil Element.

After ten washings or one year of service, replace cartridge. New cartridges are available at all ***Wisconsin Distributors*** and ***Service Centers***.

OIL BATH Heavy Duty Air Cleaner

Service Daily; or twice a day if engine is operating in very dusty conditions. ***Once each week***; in comparatively clean conditions.

Remove oil cup from bottom of air cleaner and clean thoroughly. Add the same grade of oil, as used in the engine crankcase, to the ***Level Line*** indicated on the oil cup.

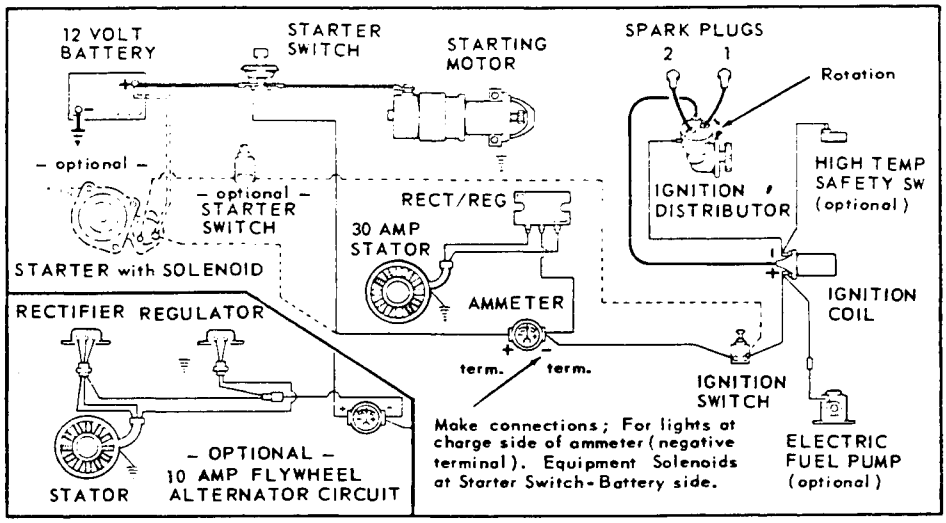


Fig. 30 WIRING DIAGRAM ELECTRICAL SYSTEM WITH FLYWHEEL ALTERNATOR

and the magnetic flux is provided by a permanent magnet in the flywheel which rotates around these stationary coils.

IMPORTANT

This is a ***Negative Ground*** system. Charging components will be damaged if grounded wrong in connecting or jumping batteries.

⚠ ***Caution:*** Handle battery carefully to prevent acid burns. Avoid sparks near battery — gas given off by battery is explosive.

Both ***10 amp*** and ***30 amp Flywheel Alternator*** systems are very similar, they can be distinguished from each other by the ammeter calibrations; ***0*** to ***15*** amps for the 10 amp circuit and ***0*** to ***30*** amps for the 30 amp circuit. Also, the 30 amp system has a ***single unit Rectifier/Regulator*** mounted to a cavity on the right hand side of the gear cover. The 10 amp system has ***separate Rectifier/Regulator modules*** mounted to a cover in the same location.

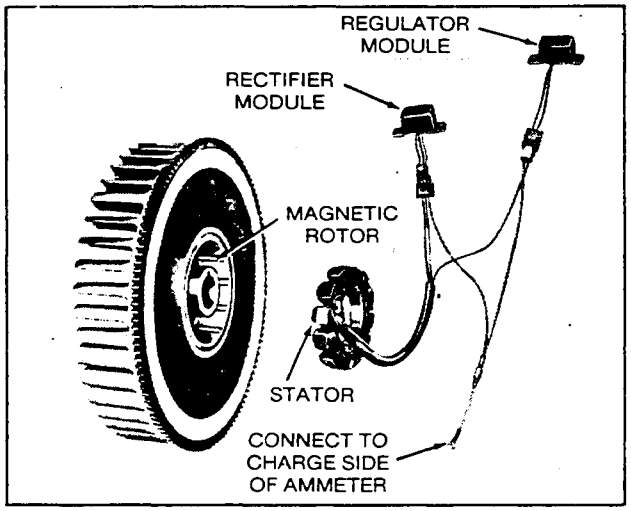


Fig. 31 10 AMP FLYWHEEL ALTERNATOR

IMPORTANT

While welding is being done on equipment or machinery

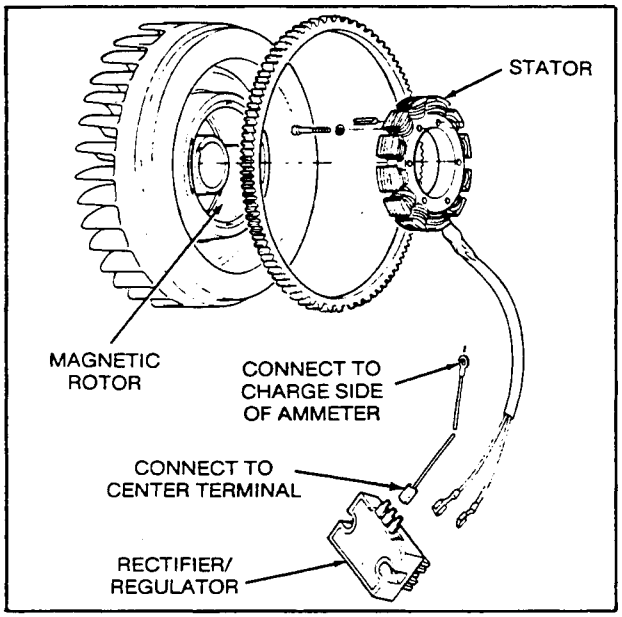


Fig. 31A 30 AMP FLYWHEEL ALTERNATOR

equipped with a Wisconsin engine, furnished with a flywheel alternator, disconnect battery completely from the electrical circuit (remove cables from positive and negative terminals of battery). This is a precautionary measure, since high electric current and voltage may appear during the welding process and damage the regulator.

PRECAUTIONS to be exercised in the use of both 10 amp and 30 amp Flywheel Alternators.

1. ***Do not*** reverse battery connections. Negative battery terminal must be grounded. Reverse polarity will damage rectifier.
2. Connect booster batteries — positive to positive and negative to negative.
3. ***Do not*** ground any wires from stator or modules which terminate at connectors.
4. ***Do not*** operate engine with battery disconnected, or disconnect the alternator output lead while the alter-

distributor advance arm mounting screw and remove distributor. Loosen governor oil line at crankcase and take out the 4 governor housing capscrews and lockwashers from inside of the gear cover. Pull housing free from dowel pins, then twist slightly to disengage governor gear from cam gear. Remove governor housing and gear/flyweight assemblies from gear cover, see *Fig. 40.*

In Reassembly; clean and lubricate all bearing surfaces. Replace parts that are damaged or if there is excessive wear, *see Chart, Fig. 41 and Governor Illustration, Fig. 42.* Mount distributor per *Timing Instructions, Page 14.*

With housing gasket in place on spacer plate, mount governor assembly (less distributor), carefully engaging governor gear with camshaft gear, and aligning holes in

GOVERNOR— CLEARANCE and WEAR LIMITS (inches)

Description	Original Dimension	Clearance	Wear Limit
Cross Shaft Diameter	.309/.310		.002
Cross Shaft Hole dia. in Housing	.312/.313	.002/.004	.002
Gear Shaft Diameter	.5000/.4996		.002
Gear Shaft Bearing I.D.	.501/.502	.0024/.0010	.002
Thrust Sleeve I.D.	.503/.505	.0030/.0054	.003

Fig. 41

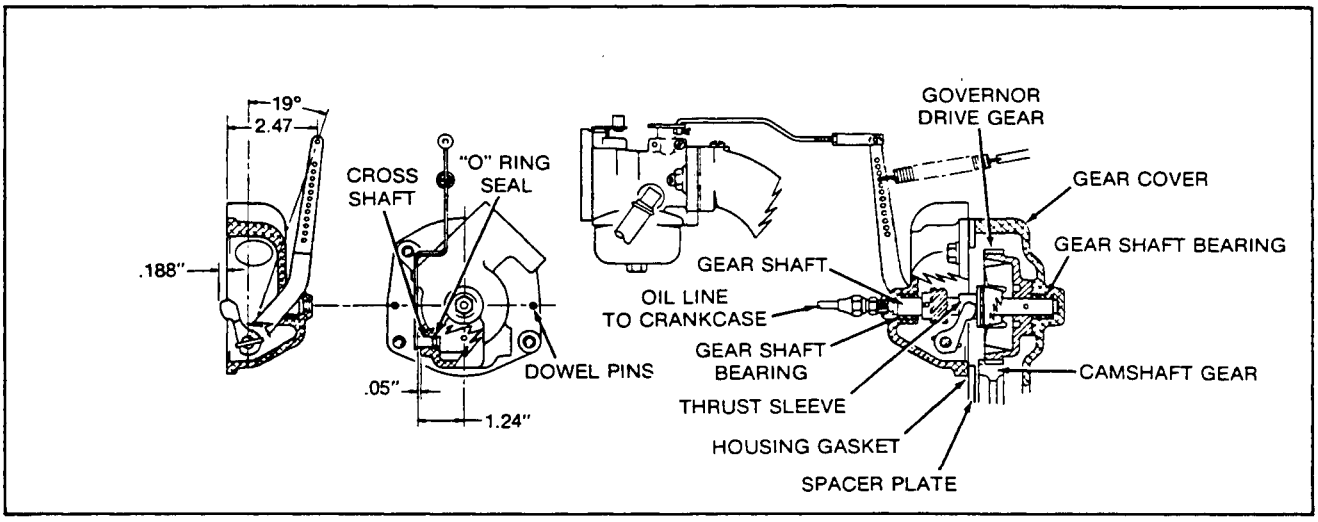


Fig. 42

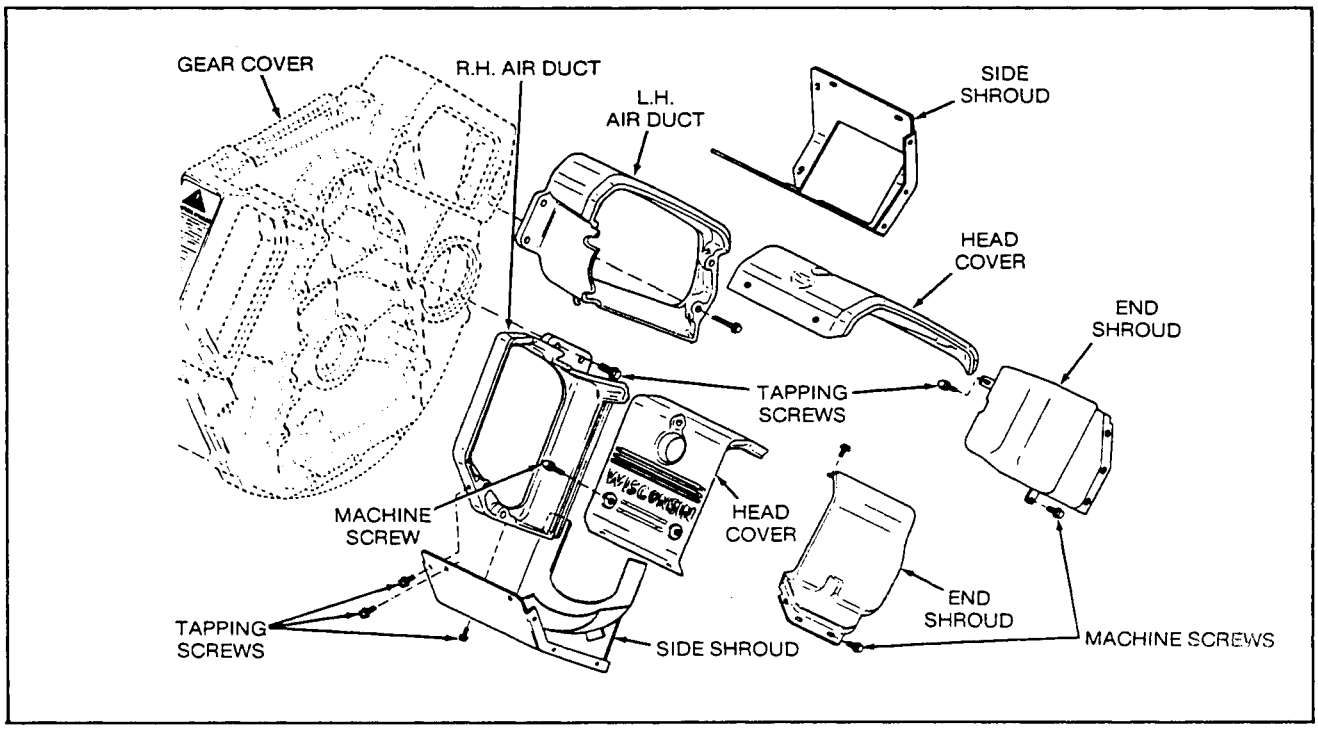
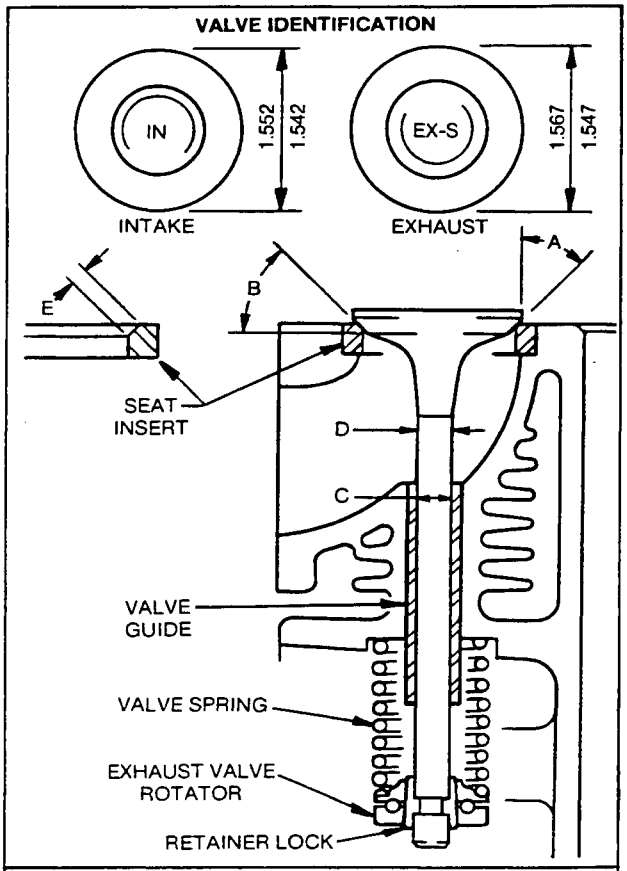


Fig. 43

Before grinding valves, inspect valve guides for possible replacement. Refer to *Valve Guide* paragraph. The valve face is ground at 45° to the vertical center line of the valve stem and the valve seat insert should also be ground at a 45° angle. ***After grinding,*** lap valves in place until a uniform ring will show entirely around the face of the valve. Clean valves and wash block thoroughly with a hot solution of soap and water. Wipe cylinder walls with clean lint free rags and light engine oil, especially if cylinders were rebored and honed.



SPECIFICATIONS ARE FOR BOTH INTAKE AND EXHAUST		
A - Valve Face Angle	45°	
B - Seat Insert Angle	45°	
C - Guide Inside Diameter	.312/.313"	
D - Valve Stem Diameter	**Clearance**	**Wear Limit**
Intake - .310/.311"	.001/.003"	.002"
Exhaust - Lock End .308/.309"	.003/.005"	.002"
Head End .308/.307"	.004/.006"	
E - Valve Insert Face	**Width** .057/.072"	**Max.** .087"

Fig. 71 VALVE and SEAT SPECIFICATIONS

Valves are approximately identical in size, but the material specifications are considerably different. The exhaust valves have a special ***long life*** heat resistant steel seat face, and is identified by the cast letters ***EX-S*** on the head. The intake valve has ***IN*** cast on the face and is to the left in the cylinder block — the exhaust valve is to the right. *See Fig's. 68 and 71.*

Valve guides in the cylinder block are easily replaceable by use of Wisconsin ***DF 72 driver tool.***

In Reassembly; mount guides as illustrated in *Fig. 71.* Maximum allowable clearance between valve stem and guide is .005 inch for intake valve, and .007 inch for exhaust valve. The inside diameter of the unassembled valve guide is .313/.314 inch. When pressed into the cylinder block, using DF-72 driver tool, the inside diameter should compress to an operating diameter of .312/.313 inches — ***If necessary ream to obtain the proper I.D.***

CAMSHAFT and VALVE TAPPETS

The valve tappets are cylindrical shaped and can be taken out from the top of the crankcase before the camshaft is removed. Tag tappets so that they can be reassembled back into the same holes that they were removed from. Camshaft and gear assembly can be taken out as a complete unit from the gear cover end of the crankcase as illustrated in *Fig. 72.*

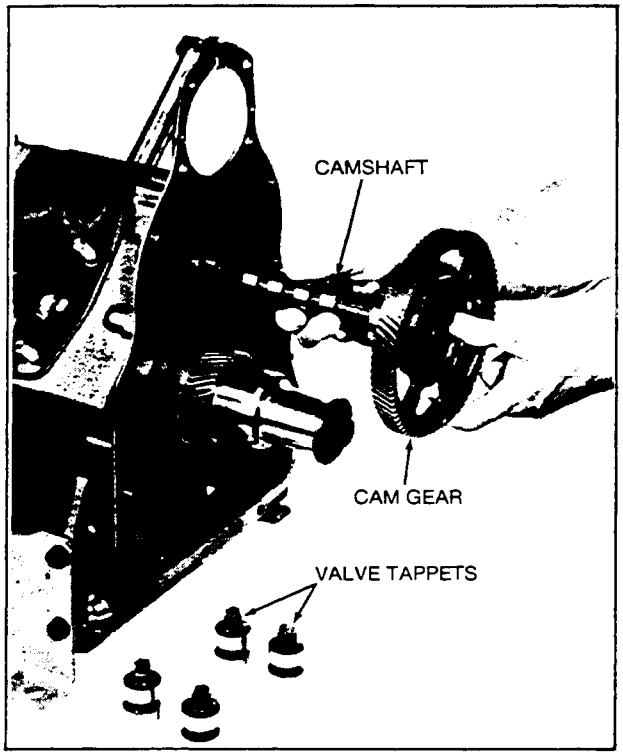


Fig. 72