INSTRUCTION FOR SERVICING AND OPERATION OF PLYMOUTH MODEL HSG LOCOMOTIVE POWERED WITH INTERNATIONAL HARVESTER U263 ENGINE, SUNDSTRAND PUMP AND STAFFA MOTOR.

FOREWORD

Plymouth Locomotives are easy to operate and service, but it is desirable that the operator be familiar with the construction, function and care of the various parts of the locomotive.

The engine and accessory bulletins and these operating instructions should be carefully read. A study of the assembly prints furnished with each locomotive will give a clear conception of the machine.

INSTRUCTIONS FOR ORDERING REPAIRS

Always give serial number, model and gauge of locomotive. This information will be found on the name plate. The serial number and model of the engine or accessories should also be given in connection with the above when parts for these are wanted. The engine and accessories are covered by separate bulletins. The locomotive parts, other than the engine and accessories are shown on assembly prints included with the parts lists. These prints give the symbol numbers, and by referring to the parts list the name and quantities used can be determined.

Always specify method of shipment of your order. If none is given we will use our best judgment and ship the cheapest way. Your careful attention and adherence to the above instructions will assist us in giving you prompt and correct service.

We carry a large stock of repairs at our factory in Plymouth, Ohio, to insure our customers of prompt service.

Your locomotive includes hydrostatic drive components and it was designed with you in mind. Ease of operation, maintenance, adjustment and repair was major design consideration.

Operators, maintenance men and repair men should study these instructions and the other books and instructions furnished before operating or servicing the locomotive.

GENERAL INSTRUCTIONS

The general construction is simple. A variable displacement hydraulic pump is driven by the engine to produce a variable flow of hydraulic fluid under pressure. This flow is conducted through flexible high pressure hose to a hydraulic motor, the output speed of which is in direct ratio to the flow, and the output torque in direct ratio to the pressure. The direction of rotation of the output shaft is determined by the position of control lever on the pump.

The hydraulic motor is connected to a drive shaft which drives both axles by means of sprockets and chains.

The rate of speed is regulated by the volumn control of the pump; therefore, only a throttle and pump control lever are required for full operation of your locomotive. Service braking is accomplished hydrostatically. Therefore, only a parking or emergency brake is required.

The recommended method of operation is to set throttle at an engine speed suitable for the work to be done and then use pump control lever for all control operations, pushing the lever forward for a forward motion and pulling backward for a backward motion. This lever is spring loaded to return to neutral from any position and should be operated slowly and steadily to get smooth accelaration and deceleration. The operators will soon become adept at the manipulation of this control.

INSTRUCTIONS FOR SERVICING AND OPERATION OF PLYMOUTH MODEL HSG LOCOMOTIVE

NOTE: The lever on the pump does not directly control the displacement. It presets a hydraulic valve which in turn controls the fluid flow to hydraulic cylinders which are built into the pump to control displacement, and direction of flow. There is a time lag between movement of lever and actual change of displacement. This time lag provides smooth acceleration and smooth hydrostatic braking.

For very slow locomotive speeds a throttle setting of approximately 1/2 is permissible. A higher engine speed will provide for a higher max. locomotive speed. A high engine speed is recommended when heavy train loads are to be handled even though a high locomotive speed is not desired.

The maximum train load that can be handled at high speed is limited by the power of the engine. It is possible to overload the engine and stall it if an attempt is made to accelerate an excessive train load to a high speed, or to accelerate too fast. The operator will soon learn to sense when the engine is being lugged and he will ease the control handle toward neutral to relieve the load on the engine.

There is a neutral position stop on the pump control hand lever quadrant. To pass this stop going from forward to reverse, or reverse to forward, it is necessary to move handle to the left or right, then forward or backward past stop. If the hand lever is not restrained it will be returned to neutral by the return spring. This is a "Dead Man" feature.

BRAKING

For normal service braking, it is only necessary to move the pump control lever toward neutral position until the desired amount of braking is obtained. Do not move control lever all the way to neutral until locomotive is nearly stopped because wheel rotation is stopped when lever is moved to neutral.
Do not use engine throttle to decelerate locomotive. Always use the pump control. This is important because it is necessary to maintain engine speed to prevent cavitation in the motor.

W A R N I N G

Although it is possible to "plug" the controls by moving the control lever past the neutral position before the locomotive has come to a stop this practice is not recommended and the operator is warned that under certain conditions the engine may be stalled and rotated backwards which would result in damage to the hydrostatic components and the engine. If engine is stalled with pump in stroke the pump may not return to no stroke (neutral) and it may be necessary to activate the by-passing device per instructions under "Towing the Locomotive" to allow the engine to be started without building up pressure in the hydrostatic system.

PARKING BRAKE

The parking brake hand wheel is located to the right of the operator.

This parking brake should always be applied when the locomotive is left unattended, especially if it is parked on a grade with the engine stopped.

Your hydrostatic transmission is an effective parking brake when the engine is running and the charge pump can maintain the volumn of trapped fluid in the system. However, when the charge pump is not running normal internal leakage can, in time, result in

loss of fluid from the motor cylinders, if the locomotive is parked on a grade.

ENGINE

Your engine is an International Harvester Model U263. Study the instruction manuals carefully. It explains the operation and servicing of engine.

INSTRUMENT PANEL

There are three gauges on the instrument panel which indicate the operating condition of the engine. They are engine oil pressure gauge, engine temperature gauge, and ammeter.

Other items on the panel are:

BATTERY SWITCH: This has two labeled positions and must be on to energize the electrical circuits. It should be turned off if the locomotive is left unattended.

KEY SWITCH and STARTER: This switch has four positions. Left energizes the accessory circuits with ignition off. Vertical is off. Right energizes the accessory circuits with ignition on. Extreme Right against the spring energizes the starter.

ENGINE CHOKE CONTROL.

FRONT LIGHTS SWITCH: Pull out one notch for dim, all the way out for bright.

REAR LIGHTS SWITCH: Pull out one notch for dim, all the way out for bright.

FRONT DEFROSTER FAN SWITCH: Pull out to operate fan.

REAR DEFROSTER FAN SWITCH: Pull out to operate fan.

HEATER: The heater fan switch has four positions: Knob in is off, knob out one notch is slow, knob out two notches medium, knob out three notches is fast.

MANUAL RESET CIRCUIT BREAKERS at top of panel are labeled ACC.-ENG.-LIGHTS. To reset breaker the red button should be depressed and immediately released. If overload or short circuit is not corrected, holding button depressed will burn out breaker.

The ACC. breaker protects the fans, window wipers and heater circuits.

The ENG. breaker protects the ignition system, fuel gauge, engine oil pressure gauge, water temperature gauge and ammeter.

The LIGHTS breaker protects all the light circuits and the trouble light socket under the left side of the hood on the fire wall.

The hydraulic temperature, charge pressure and filter gauges are explained in the hydrostatic system portion of these instructions.

HYDROSTATIC SYSTEM

The controls of the hydrostatic system are covered under general instructions elsewhere in these sheets.

Specific instructions for servicing the separate components are given in the manufacturers bulletins furnished. These instructions should be studied carefully to learn the function of, and the proper service procedure, for each separate component.

INSTRUCTIONS FOR SERVICING AND OPERATION OF PLYMOUTH MODEL HSG LOCOMOTIVE

There are three gauges on the instrument panel which indicate the operating condition of the hydrostatic components. They are charge pressure gauge, fluid temperature gauge and filter condition indicator. The charge pressure should read at least 100 P.S.I. with engine running at idle speed and 180-220 P.S.I. with engine speed of 1000 R.P.M. or higher. The charge pressure should always be observed each time the engine is started and if the pressure is less than 100 P.S.I. the engine should be stopped immediately and the system checked using Sunstrand Bulletin #9454 as a trouble shooting guide.

The fluid temperature should never be allowed to exceed 180° F. under continuous operations. A maximum of 200° F. for very short periods of time (five minutes or less) is acceptable.

There is an oil cooler provided in the system to cool the fluid and it would be under the most adverse operating condition only that a high fluid temperature should be experienced; however, as an added safety measure a temperature switch is provided to blow the locomotive horn as a warning if the temperature reaches 200° F.

In the event that the temperature reaches 200° F. it is suggested that the control handle be moved toward neutral BUT NOT INTO NEUTRAL and that the engine be operated at approximately 1/2 throttle. This will keep the fluid circulating in the system and allow it to be cooled while the load is reduced.

If the fluid filter condition indicator nears the red lined portion of the gauge when the fluid is warm this is warning that the filter element needs changing. Use only genuine replacement element providing 10 micron filtration.

The reservoir was filled at the factory with approximately 14 gal. of Mobile #300 hydraulic fluid.

NOTE: This fluid was used by Plymouth Locomotive Works for the initial fill because it was recommended as a suitable fluid for this application and because of its wide distribution. There are other fluids on the market which are also suitable.

The proper level of the fluid in the reservoir is approximately 1" below the top (inside) and is level with the top of the baffle visible through the fill pipe. The filler cap contains an air filter to keep particulate matter out of the reservoir as it breathes due to varying fluid temperature. Keep cover over filler cap closed to protect cap from weather and dirt.

The fluid filter is located near the left rear corner of the reservoir and there is a shut off valve in the piping between the filter housing and the reservoir. This valve may be closed when changing filter elements to prevent excessive loss of fluid, but it MUST BE OPENED before attempting to start engine.

For long hydrostatic component life it is absolutely necessary that the fluid be kept clean; therefore, be very careful not to allow any contaminant to enter the system when changing filter element.

CHAIN DRIVE COMPONENTS

The final drive shaft is driven by the hydraulic motor which has a splined output shaft which fits an internal spline in the end of the final drive shaft. This is a greased spline engagement since it is in the same housing as the large heavy duty bearing carrying the shaft. This bearing housing and the bearing housing on the other end of

the shaft were filled at the factory to the proper level with Mobilplex EP #1 bearing lubricant. Check this lubricant yearly in the following manner.

For the large bearing nearest the motor there are two 1/8" pipe plugs, one on the front side of the housing and one on the rear. After carefully cleaning the exterior of the housing remove both pipe plugs and install a grease fitting in port on front of housing. Pump Mobilplex EP #1 grease through this fitting until it comes out of the rear port. Use the same procedure for the other housing, pumping grease through the lowest port until it comes out the highest port. All pipe plugs should be reinstalled. Do not leave grease fitting installed.

The axle drive chains are lubricated by means of chain oilers. These oilers should be kept filled with oil and the flow adjusted so the chains show a liberal coating of oil at all times.

The chains were adjusted for proper tension at the factory but they should be checked frequently and not allowed to become excessively loose.

Chain tightness adjustment is made by moving the axles and this is done by means of the adjusting screws located at each axle boxing location. The proper adjustment is when the chain has a total up and down movement of approximately 1" to 1 1/2" measured in the center of the span. If top and bottom span of chain are both loose add the movement of each to obtain this measurement. Care should be taken to keep the axles parallel with each other and at 90° to center line of chains. Allow 1/64 clearance between each slide and axle bearing boxing. The clearance between ears on each axle bearing boxing and slides should be approximately 3/32 to provide 3/16 total end motion of axle. As wear occurs add shims between slides and frame to obtain this correct clearance.

RADIATOR SHUTTERS

The control for the radiator shutters is mounted on the angle between the cab front sheet and the control stand. The shutters are held in an open position by springs. To close shutters turn the knob in a clockwise direction.

SANDERS

The sander operating handles located below the instrument panel.

To apply sand while moving in a forward direction pull the handle toward the operator and latch in either the first or second notch depending upon amount of sand desired. Move the handle toward the front of cab to apply sand when moving backward. The center notch of the bar is the off position.

EMERGENCY FUEL SHUTOFF

The handles are located at the outside front corners of the cab. A quick pull on either handle will move the lever off of the plunger on the spring loaded fuel shutoff valve causing it to close.

To reset the valve move the lever over the valve plunger.

HAND THROTTLE

The hand throttle located on the left side of the control stand will hold the engine throttle at any desired position by means of friction discs. The amount of friction

can be varied by an adjusting nut on the underside of the hand throttle.

WINDOW WIPERS

Each window wiper is individually controlled by the switch on the wiper.

BATTERY

Check water level every two weeks and keep filled to approximately 3/8" above plates with clean distilled water. Do not over fill.

Check the specific gravity occasionally. It should read 1.250 or higher for a fully charged battery.

TOWING THE LOCOMOTIVE

If the locomotive must be towed with a dead engine for any reason the following instructions must be followed:

The hydrostatic system includes a device to unseat a high pressure relief valve, thus creating an effective bypass route for the hydraulic fluid, allowing it to bypass the pump when the locomotive is being towed and the motor is acting as a pump. This device is located near and to the right of the motor on the right side of the high pressure relief valve block. It will be recognized as a screw in the end of a round cap on the end of a hex. projection on side of relief valve block. For normal operation the screw is backed out of round cap until it contacts stop and locked with locknut. To tow locomotive be sure parking brake is applied, back off locknut to head and screw in the screw until it contacts stop.

The locomotive can now be towed or pushed very slowly, after releasing brake.

W A R N I N G

When moving the locomotive in this manner there is no charge pressure and no cooling of the fluid; therefore, it is extremely important that the rate of movement be very slow, (no faster than one to one and one-half M. P. H.) A higher speed may cause cavitation in the motor and an excessive build up of heat in the fluid. Every few hundred feet, stop and check fluid temperature by feeling the relief valve block. If it is uncomfortably warm, let it cool before proceeding.

To tow locomotive at a higher rate of speed or for a long distance it is suggested that the drive chains be removed.

INSTRUCTIONS FOR SERVICING AND OPERATION OF PLYMOUTH MODEL HSD LOCOMOTIVE

THINGS TO DO EACH DAY

Check water in radiator.
Check engine lubricating oil.
Check all fluid lines for leaks.
Check tension of belts.
Check tension of chains.
Check level of hydraulic fluid in reservoir.
Oil axle boxing slides.
Fill chain oilers.

GENERAL CARE

After a new locomotive has been in service a week or so, check all bolts for tightness.

Keep locomotive clean, lubricated and adjusted.

The life of the hydrostatic components depends upon the type and condition of the fluid in the system. Always use a suitable fluid and be extra careful not to allow any contaminant to enter system.

Exclusive of the engine there are ten locations on the locomotive that require greasing with a grease gun. Two of these (on sprocket shaft) have been discussed elsewhere in these instructions. The other seven are located as follows:

One on outside of each axle bearing cover. These should receive additional lubricant each 100 hrs. Use a high grade medium bearing grease.

One on each end of the brake shaft on the outside side of the locomotive, one on the inner brake shaft bearing that is reached thru the opening above the right step. There is one fitting on the control stand in the operator's compartment. These fittings should be serviced as needed.

W A R N I N G

In cold weather when the hydraulic fluid is cold and has high viscosity the engine should be run no faster than low idle RPM until a little heat is built up in the fluid.

Since the system charge pump is direct driven by the main pump shaft it operates at engine speed and at high speed with heavy fluid a pressure higher than that recommended may occur in the main pump housing due to resistance in lines and cooler.

Also, the hydraulic fluid filter may be subjected to an undue suction which may damage the filter element.

Never run engine faster than low idle R.P.M. if the pointer on the filter condition indicator is in the red lined portion of the dial.

CAPACITIES

Engine Crankcase	-	8 qts. - 9 qts. with filter change
Radiator	-	6 gal.
Air Cleaner	-	2 1/2 pts.
Hydraulic System	-	19 gal.

PLYMOUTH LOCOMOTIVE WORKS
Div. of The Fate-Root-Heath Co.,
Plymouth, Ohio,
U. S. A.

EQUIPMENT CHECK LIST -- OPERATORS

1. OPERATING CONTROLS AND INSTRUMENTS

The operator must thoroughly familiarize himself with the instruments and controls provided for operation of this engine. There are important differences between various engines; therefore, regardless of previous experience with other machines, the operator should fully understand what each control is for and how to use it. before starting to operate the engine.

2. HOURMETER

The hourmeter indicates the actual hours of engine operation. Its range is from zero to 10,000 hours. When the hourmeter reaches 10,000 hours, it automatically starts again at zero.

3. SAFETY ENGINE OIL PRESSURE INDICATOR

This indicator is part of the instrument panel(safety gauges) attachment. The safety engine oil pressure indicator shows the pressure of the lubricating oil circulating through the engine. If the oil pressure drops below minimum operating pressure, the engine will automatically stop.

4. HEAT INDICATOR

The heat indicator shows the temperature of the coolant circulating in the engine.

SAFETY HEAT INDICATOR

This indicator is part of the instrument panel(safety gauge) attachment. The safety heat indicator registers the temperature of the coolant circulating in the engine. If the temperature of the coolant reaches 195 F, the engine will automatically stop.

AMMETER

This instrument indicates the rate at which the battery is being charged or discharged.

TACHOURMETER

The upper half of this indicator shows the engine rpm; the lower half of the indicator shows the indicated hours of engine operation.
This indicator has a correction factor to determine the actual hours of engine operation from the indicated hours. Refer to example following.

EXAMPLE:

Engine rpm - 2000

Indicated hours - 100

Todetermine the actual hours of operation, multiply the indicated hours (100) by the correction factor (.83). The actual hours: 83 hours.

5. IGNITION AND STARTER SWITCH

This switch has four positions: 1. Switch to the left ("ON") position for accessories; 2. "OFF" position; 3. "ON" position to the right to energize the electrical system; 4. Switch all the way to the right("ST" position) for cranking the engine.

PREPARING THE ENGINE FOR EACH DAY'S WORK

6. FUEL SYSTEM(GASOLINE)

Fill the fuel tank. Use a gasoline conforming to the specifications. DO NOT USE DIRTY FUEL.

7. STARTING the ENGINE

NOTE: Never operate the cranking motor for more than 30 seconds at one time. If the engine does not start, allow the cranking motor to cool two or three minutes before cranking again.

8. INSTRUMENT CHECK

Check all indicators immediately after starting, again upon reaching operating temperature and at frequent intervals during operation to assure proper care through prompt detection of irregularities. If any of the indicators do not register properly; stop the engine.

AMMETER
The ammeter should indicate "charge" whenever the engine is operating at a speed faster than low idle speed. If it indicates "discharge" or a high rate of "charge" continuously while the engine is operating at this speed, investigate the cause immediately.

HEAT INDICATOR

The heat indicator point must be in "RUN" range, after the engine is warmed up, for the most efficient operation.

ENGINE OIL PRESSURE INDICATOR

If the indicator pointer does not move into the "IDLE" range while idling or into the "RUN" range when the speed of the engine is increased, stop the engine and inspect the oil system to find the cause.

9. COOLING SYSTEM

NOTE: Do not start the engine until the cooling system is filled with coolant.. Remove the radiator cap or expansion tank filler cap and check to be sure the coolant comes to a level approximately one inch below the filler neck. Add coolant if necessary. Install the filler cap or radiator cap and tighten securely.

10. CAUTION: NEVER FILL THE FUEL TANK WHEN ENGINE IS OPERATING. KEEP THE FUNNEL OR HOSE NOZZLE USED FOR POURING IN THE FUEL, IN CONTACT WITH THE METAL OF THE TANK TO AVOID THE POSSIBILITY OF AN ELECTRIC SPARK IGNITING THE GAS.

DATE: [illegible]-22-68 CHECKED: C.T.D. SHEET TOTAL 11

PLYMOUTH MODEL HSG 5 TON 36 GA. LOCOMOTIVE

LENGTH OVER BUMPERS 11'-6", WIDTH 59" HEIGHT 8'-6"

WHEELBASE 44 1/2", DIA. WHEELS 18"

MANUFACTURED BY THE FATE-ROOT-HEATH COMPANY, PLYMOUTH, OHIO. DATE: 5-28-68

PURCHASER: OLIN MATHIESON CHEMICAL CO. VENDORS NO.: 382-0528

PURCHASER'S ORDER NO.: DATE: 10-2-68

SHIPPED TO: BARABOO, WISCONSIN

SPECIAL EQUIPMENT:

EQUIPMENT			
COUPLERS	LINK & PIN	HYDRAULIC PUMP	[illegible]
ENGINE	IHC UC 263	SANDERS	[illegible]
HORN	ELECTRIC	SPRINGS	[illegible]
HYDRAULIC MOTOR	STAFFA	STARTER	[illegible]
		WHEELS	[illegible]

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CAB	10	HORN	[illegible]
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HE 10008 LIST OF ASSEMBLY PRINTS FOR SHOP

HE 10009 LIST OF PRINTS & LITERATURE SENT TO CUSTOMER

ITEM	MAKE	SERIAL #
ENGINE	INTERNATIONAL HARVESTER	8A17[illegible]
ALTERNATOR	DELCO-REMY	507[illegible]
VOLTAGE REGULATOR	DELCO-REMY	862[illegible]
STARTER	DELCO-REMY	
HYDRAULIC PUMP	SUNDSTRAND	53500
HYDRAULIC MOTOR	STAFFA	13808
SWITCH KEY	CUMMINS	573

ASSEMBLE REAR CHAIN TOWARDS CENTERLINE, FRONT CHAIN TOWARDS SIDE FRAME.
HEADS OF PINS TOWARD EACH OTHER.
ADJUST CHAINS SO THEY ARE TIGHT WITH F12086 3/8" THICK WOOD
BLOCKS UNDER AXLE BOXINGS. BLOCKS TO BE LEFT IN PLACE DURING
SHIPMENT, AND REMOVED BY CUSTOMER.

DATE: 4-22-96 SHEET 2 TOTAL 11

PLYMOUTH MODEL HSG 5 TON 36 GAUGE LOCOMOTIVE

ROD	ENG #	INTERNATIONAL HARVESTER CO.
1	UC 253	INTERNATIONAL HARVESTER 6 CYLINDER GASOLINE ENGINE. GOVERNED AT 2500 RPM NO LOAD. RATED AT 92 HP @ 2400 RPM
		INCLUDES THE FOLLOWING
1	304549R93	BLOWER FAN
1	305190R91	FLYWHEEL WITH RING GEAR
1	318441R91	FLYWHEEL HOUSING
1	349144R91	OIL BATH AIR CLEANER
1	601212C91	STARTER 12 VOLT D-R1107350
1	4051210R91	ALTERNATOR 32A. 12V. NEG. D-R 1100805
1		VOLTAGE REGULATOR 12V.NEG. D-R 1119507
6		SPARK PLUGS CHAMPION 8 CON.
1	275301C1	FAN BELT
1	62-474-DA	THROTTLE CONTROL, HAND
1	298009R91	WATER TEMPERATURE GAUGE
1	298016R91	WATER TEMPERATURE SENDER
1	327145R91	OIL PRESSURE GAUGE
1	328331R91	OIL PRESSURE SENDER
1	702283C1	AMMETER
1	265116R92	MUFFLER
2		CLAMP FOR MUFFLER

ROD	SYMBOL	NAME OF PART	MATL
		FRH CO. PARTS USED WITH ENGINE	
2	HS 325	SUPPORT FOR ENGINE, REAR	S
1	HS 326	SUPPORT FOR ENGINE, FRONT	S
1	HS 327	SHIM FOR FRONT ENGINE SUPPORT	MS
1	HS 387	SUPPORT FOR CIRCUIT BREAKER	HR
		RADIATOR AND OIL COOLER	
4	HS 206	CLAMP TO MOUNT OIL COOLER	
2	HS 207	SHIM UNDER HS206 CLAMPS, LOWER	
1	HS 330	HOOD FOR FAN	
2	HS 331	BRACKET FOR VP1568-12 COOLER, UPPER	
1	HS 332L	ANGLE TO SUPPORT RADIATOR, LEFT	
1	HS 332R	ANGLE TO SUPPORT RADIATOR, RIGHT	
2	HS 333	COVER FOR OPENING ON FAN HOOD	
1	HS 381	PIPE WITH HEATER CONNECTION	
1	PF 411	DRAIN COCK	
1	PF 472	HOSE FOR RADIATOR, UPPER	
1	VF 11	HOSE FOR ENGINE WATER INLET	
1	VP 1568-12	OIL COOLER	
1	R-489	RADIATOR	
6	VP 815	HOSE CLAMPS FOR RADIATOR HOSE	
1		HOSE FOR RADIATOR, LOWER 2 3/8 I.D. x 4"	
2		2 x 1 1/2 PIPE BUSHING	
1		2" PIPE PLUG	
1		1 1/2 x 90° ELL	
1		1 1/2 x 1/2 x 1 1/2 TEE	
1		1 1/2 x 8" LONG PIPE, THD ONE END	
2		1 1/2 x 6" LONG PIPE, THD ONE END	
1	RL 316	U BOLT FOR LOWER RADIATOR PIPE	

DATE: 3-22-88 CHECKED: [illegible]

SHEET 3 TOTAL 11

PLYMOUTH MODEL HSG 5 TON 36 GAUGE LOCOMOTIVE

ROD	SYMBOL	NAME OF PART	MATL.
		HYDRAULIC MOTOR BASE & DRIVE SPROCKET ASSEMBLY	
1	HS 85X	BASE FOR HYDRAULIC MOTOR & DRIVE SPROCKET	MS
1	HS 86	ADAPTER FOR MOTOR	MS
1	HS 87	RETAINER FOR OIL SEAL	S
1	HS 88	COVER FOR OIL SEAL	MS
1	HS 89	SHAFT FOR DRIVING SPROCKETS INC. VP 1582	S
1	HS 90	SPROCKET, DRIVING, DOUBLE, 18 TOOTH	S
1	HS 279	DOWEL STUD FOR STAFFA MOTOR MOUNT	S
2	VP 1330	LOCK NUT FOR HS 279 STUD	S
1	VP 1577	OIL SEAL FOR HS87	
1	VP 1578	OIL SEAL FOR HS88	
1	VP 1575-[illegible]	RETAINING RING, INTERNAL [illegible]	
1	VP 1576-[illegible]	RETAINING RING, EXTERNAL, SMALL [illegible]	
1	VP 1576-550	RETAINING RING, EXTERNAL, LARGE [illegible]	
4		[illegible] NUTS	
1	3L28	BEARING, BALL, [illegible] 128KA)	
1	AS212-TS	BEARING, ROLLER, [illegible]	
6		CAPSCREW HX S. 1 x 3 1/2 SEMI-FIN NUT & L.W. [illegible]	
2		CAPSCREW HX S. 1 x 6 1/2 H.D. SEMI-FIN NUT [illegible] HS177W	
4		CAPSCREW HX S. 3/4 x 6 NC, [illegible]	S
4		CAPSCREW STD. 1/2 x 3 NC WITH L.W. FOR HS88	S
1	#32	WOODRUFF KEY	S
4		1/8 SQ. HD. PIPE PLUG. FOR HS86 & HS88	S
		HYDROSTATIC COMPONENTS	
4	HS 30	CAP SCREW FOR HYDRAULIC PUMP	S
4	HS 31	WASHER FOR HS30	S
6	HS 92	STUD FOR HS93X MANIFOLD	S
1	HS 93X	MANIFOLD FOR VP 1581 MOTOR	MS
6	HS 94X	STUD FOR HS93X MANIFOLD & HS 193 PLATE	S
1	HS 184	SLEEVE FOR RELIEF VALVE UNLOADING PLUNGER	CRS
1	HS 185	REWORK OF SUNDSTRAND 9800831 PLUNGER GUIDE	
1	HS 186	PLUNGER FOR UNLOADING RELIEF VALVE	
1	HS 193	PLATE WITH HOSE ADAPTERS ON HS 93X MANIFOLD	B
1	HS 216	CONNECTOR BLOCK FOR HYDRAULIC LINES	
1	HS 228	SPECIAL FITTING FOR PUMP CASE DRAIN	S
1	HS 231	CLAMP FOR HS 216	MS
4	HS 360	BOLT FOR [illegible] PUMP ADAPTER	[illegible]
1	HS 384	SUPPORT FOR VP 1584 HYDRAULIC TUBE	MS
1	HS 385	BAR FOR HS 384 TO SUPPORT HS 231	MS
2	VP 965-3/4	STAT-O-SEAL WASHER, MOTOR DRAIN FITTING & PLUG	
1	VP 1395-1	HYDRAULIC PUMP	
1	VP 1396	OIL FILTER, WITH #1588 CONDITION GAUGE	
1	VP 1397	ELEMENT FOR VP1396 FILTER, EXTRA	
1	VP 1561-6	HYDRAULIC PUMP DRIVE ASSEMBLY	
1	VP 1566-200	TEMPERATURE SWITCH, HYD. FLUID WARNING	
1	VP 1572	MANIFOLD VALVE ASSEMBLY WITH BY-PASS DEVICE	
1	VP 1573	"O" RING KIT FOR VP 1572 VALVE	
1	VP 1581	HYDRAULIC MOTOR	

DATE: 3-22-68 CHECKED: [illegible]

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PLYMOUTH MODEL HSG 5 TON 36 GAUGE LOCOMOTIVE

	ROD	SYMBOL	NAME OF PART	MATL.
				S
	1	VP 1582	SPLINE ADAPTER FOR HYDRAULIC MOTOR	
	1	VP 1584	HYDRAULIC TUBE ASSEMBLY	
	2	VP 1600	AEROQUIP HOSE ASSEMBLY 18" LONG	
	2	VP 1600-1	AEROQUIP HOSE ASSEMBLY 27" LONG	
	1	VP 1605	RELIEF VALVE, FLUID LINE TO COOLER	
	4	AEROQUIP	6-74446-16 SPLIT FLANGE 1"	
	2	AEROQUIP	22550-219 "O" RING FOR PUMP PORTS	
	8	AEROQUIP	6-74446-26 SPLIT FLANGE 1 1/4"	
	6	AEROQUIP	22550-222 "O" RING FOR 1 1/4 SPLIT FLANGE CL[illegible]	
	6	AEROQUIP	900556-[illegible] PLUG, INCLUDES 22612-8 O-RING	
	4	AEROQUIP	FF 5162-1620 90° TUBE BEND ADAPTER	
	2	AEROQUIP	[illegible] "O" RING FOR [illegible]	
	1	AEROQUIP	[illegible]	
FURN. ON MOTOR	2	DOUBLE A	50-61[illegible] O-RING FOR MOTOR PORTS	
	16		CAPSCREW HF 3/16 x 1 1/2 NC FOR 1 1/4 SP[illegible]	
	8		CAPSCREW HF 3/8 x 1 1/4 NC 1" SPLIT FLAN[illegible]	
	8		CAPSCREW HF 3/8 x 3/4 NC WITH L.W. - [illegible]	
	6		NUT 3/8-24 HF AMERICAN STD. HEAT TREATED. [illegible]	
			BRAKE ASSEMBLY	
	1	#1040HS	PEACOCK HANDBRAKE WITH 61 LINKS OF CHAIN PLUS	
			#15 END LINK	
	1	HS 240Y	BRAKE SHAFT WITH LEVERS	CRS
	2	HS 241	PIN FOR END OF BRAKE SHAFT	HS
	2	HS 243	BLOCK FOR POSITIONING BRAKE SHOE LEVER	CRS
	1	HS 245	PIN FOR JL 3390 SHEAVE	CRS
	1	HS 246	PIN FOR BRAKE CHAIN ANCHOR	S
	2	HS 247Y	PIN FOR BRAKE SHOE	
				CRS
	2	DL 135	ROD TO ALIGN BRAKE SHOE	S
	1	DL 166	SPRING FOR BRAKE SHOE RETURN & BRAKE CHAIN	
				CI
	2	FL 129A	BRAKE SHOE	
	4	[illegible] 15	GREASE FITTING	
	2	[illegible]3387	LOCK PLATE FOR HS245 PIN	
	1	[illegible]3390	SHEAVE FOR BRAKE CHAIN	
	1	[illegible] 307	BUSHING FOR JL3390 SHEAVE	
				S
	2		CAPSCREWS, 1/2-13 x 3 3/4" LONG	S
	2		FLEXLOCK NUT 1/2-13	
			THROTTLE ASSEMBLY	
			MODIFICATION OF IHC 367 742 RI GOV. SPRING BRACKET	
	1	HS 393	ROD FOR THROTTLE, FRONT	CRS
	1	HS 394	SUPPORT FOR THROTTLE CABLE ON ENGINE	S
	1	HS 395	FULCRUM LEVER FOR THROTTLE	S
	1	HS 396		
	1	VP 1606	PUSH-PULL CABLE FOR THROTTLE	
	2	VP 1607	CLEVIS & PIN FOR PUSH-PULL CABLE	

DATE: [illegible]

SHEET 5 TOTAL 11

PLYMOUTH MODEL HSG 5 TON 36 GAUGE LOCOMOTIVE

	ROD	SYMBOL	NAME OF PART	MATL.
			AXLES & WHEELS	
	2	FL 37	SPROCKET ON AXLE 18 T.	S
	2	FL 38B	HUB FOR AXLE SPROCKET	S
	4	FL 90B	BOXING FOR AXLE	CI
	4	FL 538C	CENTER FOR CARWHEEL	CI
	4	•FL 2795	COVER FOR AXLE BOXING	CI
	4	FL 2796	PLATE TO RETAIN BEARING ON AXLE	S
	12	FL 2816A	CAPSCREW FOR BEARING RETAINING PLATE	S
	4	FL 3745	PLUG FOR AXLE SPROCKET	[illegible]
	4	FL 3746	RETAINER FOR AXLE SPROCKET PLUG	[illegible]
	2	FL 5083Y	AXLE	[illegible]
	4	FL 593	BEARING SPACER FOR AXLE BOXING	[illegible]
	12	TL 367	BOLT FOR SPROCKET	[illegible]
	8		BEARING, TIMKEN 580 CONE, 572 CUP	[illegible]
	12	T50608	SHIM TIMKEN .005 THICK FOR FL2796	[illegible]
	12	T50609	SHIM TIMKEN .007 THICK FOR FL2796	[illegible]
	4	T50610	SHIM TIMKEN .020 THICK FOR FL2796	[illegible]
	4	VP 15	TIRE FOR CARWHEEL	[illegible]
				BOLT
	12		NUT, FLEXLOCK 3/4-16 FOR TL 367	
	16		CAPSCREW 3/4-10 x 1 3/4	
	16		EVERLOCK WASHER 3/4	
	4	V	WOODRUFF KEY	
	4	GC 13	ALEMITE GREASE FITTING	
			FRAME AND RELATED PARTS	
	4	HS 181	TIE BAR UNDER AXLE BOXING	MS
	1	HS 324	FRAME ASSEMBLY	S
	2	HS 345	TIE BAR FOR FRAME	MS
	2	HS 346	STEP FOR FRAME	S
	4	CL 60	SPRING, FOR AXLE	MS
	4	FL 2086	SHIM UNDER AXLE BOXING (SHIPPING ONLY)	[illegible]
	8	FL 3235A	SLIDE FOR AXLE BOXING	[illegible]
	2	FL 3810	COUPLING PIN	[illegible]
	8	FL 5005	BAR TO CLAMP AXLE BOXING SLIDE	[illegible]
	8	FL 5006	SHIM FOR AXLE BOXING SLIDE	[illegible]
	4	RL 813	WASHER FOR SPRING SEAT	[illegible]
	4	RL 878Y	WASHER OVER RL813	
	4		CAPSCREW 3/4-10 x 2 1/2 FOR RL 813	
	16		CAPSCREW 3/4-10 x 4 SLIDE CLAMPING	
	16		SET SCREW 3/4-10x 4 SLIDE ADJUSTING	
	4		PLAIN WASHER 3/4	
	4		LOCKWASHER 3/4	
	16		NUT 3/4-10	
	8		NUT 1 1/4-7 FOR HS345 TIE BAR	
			CHAINS & CHAIN OILERS	
	2	VP9140T-44	DRIVE CHAIN TO AXLES	S
	2	VP9142T	OFFSET LINK	S

DATE: 3-22-68 CHECKED: J.A.W.

SHEET 6 TOTAL 11

PLYMOUTH MODEL HSG 5 TON 36 GAUGE LOCOMOTIVE

	ROD	SYMBOL	NAME OF PART	MATL.
	6	VP 261	CLIP FOR 5/16 COPPER TUBES	S
	2	VP 443	CHAIN OILERS	
	1	JL 5303	SUPPORT FOR CHAIN OILERS	MS
	4		1/4" PIPE ELBOWS x 90°	MI
	2		1/4" CLOSE NIPPLE	BSP
	2		1/4" x 2 1/2" LONG NIPPLE	BSP
	2		CHAIN OILER TUBES 5/16 COPPER x 54" LONG	COPPER
	2	88-LB	IMPERIAL CONNECTOR 5/16 COPPER TO 1/4" IPT	BRASS
			RADIATOR SHUTTER ASSY.	
	1	HS 391	SUPPORT FOR SHUTTER CONTROL	MS
	1	VP 1611	RADIATOR SHUTTER	
	1	VP 1612	HAND CONTROL FOR VP1611 SHUTTER	
	1	[illegible]	CABLE FOR SHUTTER CONTROL, 144" LG.	
	1	VP 1614-96	CASING FOR VP 1612 [illegible] 96" LG.	
			OPERATORS SEAT	
	1	FL 3894	PEDESTAL FOR OPERATORS SEAT	S
	1	FL 3927	ADJUSTING POST FOR OPERATORS SEAT	S
	1	RL 256A	PLUG FOR SEAT BASE	CI
	1	VP 742	SEAT AND BACK REST	W
	1		2" PIPE GROUPING	S
			HORN	
	1	VP 28A	PUSH BUTTON FOR HORN	
	1	VP 622	HORN 12 V.	
	1	VP 623	RELAY FOR HORN	
			CAB HEATER	
	1	VP 735-12	HEATER FOR CAB	
	6	VP 812	CLAMP FOR HEATER HOSE	
	1	VP 171	BRASS HOSE	
	1		TEE [illegible] x 1/4	
	2		3/8 PIPE 1" 1/4" LONG, THREAD ONE END	
	1		2 1/2" LONG #19B SINGLE BRAID AIR HOSE 5/8 [illegible] COUPLERS	
	1		40" LONG #19B SINGLE BRAID AIR HOSE 5/8 [illegible] COUPLERS	
	1		65" LONG #19B SINGLE BRAID AIR HOSE 5/8 [illegible] COUPLERS	
			MISCELLANEOUS	
	1	FL 3995	FRAME IN CAB FOR CHART	HRS
	2	VP 744	REFLECTOR	
	4	VP 1060	SUN VISOR	
	1	VP 1601	FIRE EXTINGUISHER, 5# DRY CHEMICAL	
			FLOORING	
	1	HS 358	CLOSURE FOR CAB FLOOR	HRS
	1	HS 371	LEFT FRONT SECTION OF FLOOR	WOOD
	1	HS 372	CENTER FRONT SECTION OF FLOOR	WOOD
	1	HS 373	RIGHT FRONT SECTION OF FLOOR	WOOD
	1	HS 374	REAR SECTION OF FLOOR	WOOD

PLYMOUTH MODEL HSG 5 TON 36 GAUGE LOCOMOTIVE SHEET 7 TOTAL 11

QTY	SYMBOL	NAME OF PART	MATL.
	HS 1034	CONTROL STAND ASSEMBLY	
2	HS 280H	STOP FOR HANDLE ON CONTROL STAND	MS
1	HS 280X	CONTROL STAND	S
1	HS 282	LEVER FOR CONTROL HANDLE	CRS
1	HS 283	HUB FOR CONTROL LEVER	MS
1	HS 284	HANDLE FOR CONTROL STAND	CRS
1	HS 285	EXPANSION PLUG FOR CONTROL HANDLE	S
1	HS 286	PIN FOR CONTROL HANDLE	S
1	HS 287	ROCKER ARM FOR INDEXER	S
1	HS 288	PIN FOR ROCKER ARM ROLLER	S
1	HS 289	COVER FOR ROCKER SPRING RECESS	CRS
1	HS 351	TAPPED BLOCK TO MOUNT CONTROL STAND	S
1	HS 352	LEVER FOR PUMP CONTROL ROD	S
1	HS 353	HOLDER FOR RA17 BEARING	S
1	HS 354	SHAFT WITH CAM PLATE	S
1	HS 355	ROD FOR PUMP CONTROL	S
1	HS 389	BRACE FOR CONTROL STAND	S
1	DL 466	SPACER	S
1	GC 18	GREASE FITTING	ST
1	RC 417	BEARING	S
1	ML 1805A	SPACER 1/4 THICK	S
1	ML 1805B	SPACER 5/16 THICK	S
2	PTA 5-19	YOKE END	S
2	PTA5-20	PIN FOR PTA 5-19	S
1	PTA 10-64	SPRING FOR ROCKER ARM	
2	VP 345	SPRING IN CONTROL HANDLE	S
2	VP 1116	BALL IN CONTROL HANDLE	S
1	1614DC	NICE BALL BEARING	S
3		#3 x 1 1/2" TAPER PIN	S
2		3/8-24 JAM NUT	S
		FUEL TANK & RELATED PARTS	
1	FL 78D	TANK FOR FUEL	S
2	FL 1503	SADDLE FOR FUEL TANK	S
2	FL 1505	BAND FOR CLAMPING FUEL TANK	S
1	HS 347	TAPPED BLOCK FOR FUEL TANK BRACE	S
1	HS 348	TAPPED BLOCK FOR FUEL TANK BRACE	S
2	HS 350	BRACE FOR FUEL TANK SADDLE	S
1	HS 386	SUPPORT FOR EMERGENCY SHUT OFF VALVE	S
		CHAIN - SHORT - 21 LINKS	
		CHAIN - LONG - 82 LINKS	
1		3/8 COPPER TUBING x 32" LONG	
2	DL 625A	SPRING FOR SHUTOFF VALVE PULL HANDLE	S
1	HL 902	LEVER FOR SHUTOFF VALVE	CI
2	HL 1336	EMERGENCY SHUTOFF VALVE PULL HANDLE	S
1	PF 130	GLOBE VALVE 1/4"	BRASS
1	PF 158	GASOLINE EMERGENCY SHUTOFF VALVE	BRASS
1	VP 230	FUEL FILLER, CAP & SCREEN	

DATE: 3-22-68 CHECKED: J.T.P.

PLYMOUTH MODEL HSG 5 TON 36 GAUGE LOCOMOTIVE SHEET 8 TOTAL 11

	ROD	SYMBOL	NAME OF PART	MATL.
	1		PIPE NIPPLE 1/4" x 2 THREAD BACK 1 1/8 FROM END	BSP
	1		PIPE NIPPLE 2" x 11 1/2" LONG	BSP
	1		PIPE NIPPLE 2" x 5" LONG	BSP
	1		PIPE ELBOW 2" x 45°	
	2	89 LB.	IMPERIAL 90° CONNECTOR 5/16 COPPER x 1/4 I.P.T.	BRASS
	1		5/16 COPPER TUBE x 18" LONG	COPPER
			BATTERY & BATTERY BOX	
	1	1144H	BATTERY EDD-8D 12 VOLT	
	1	HS 378	BOX FOR BATTERY	
	1	HS 379	ANGLE TO SUPPORT BATTERY BOX COVER	
	1	HS 392	COVER FOR CABLE AT END OF BATTERY BOX	
	1	DL 9010	BAR TO CLAMP BATTERY	
	1	DL 9382	COVER FOR BATTERY COMPARTMENT	
	2	DL 9383	STUD FOR BATTERY BOX	
	2		5/16-18 WING NUT	
	1		PEEL BACK SPONGE RUBBER, 5/32 x 1" x 72 1/2"	
			INSTRUMENT PANEL, GAUGES & ELECTRICAL PARTS	
	1	HS 174	SUPPORT FOR FILTER CONDITION GAUGE	
	1	HS 376	PANEL FOR INSTRUMENTS	
	1	HS 377A	END FOR INSTRUMENT PANEL	
	2	HS 377B	CLIP FOR INSTRUMENT PANEL END	
	1	HS 382	CLIP FOR CONDUIT BOX	
	1	HS 383	SUPPORT FOR CONDUIT	
	4	DL 5687	BRACKET FOR HEADLIGHT	
	1	DL 6401	ANGLE FOR BATTERY CABLE CLIP	
	1	VP 61	CHOKE CONTROL	
	2	VP 208	PANEL LIGHT	
	1	VP 269	DOME LIGHT FOR CAB. USE #1141 21 C.P. 12V BULB	
	2	VP 291	SWITCH FOR DEFROSTER FAN	
	1	VP 444	HYDRAULIC FLUID TEMPERATURE GAUGE	
	1	VP 520	SWITCH FOR HEATER	
	2	VP 535A	SWITCH FOR HEADLIGHTS	
	4	VP 651-12	HEADLIGHTS	
	1	VP 709	KEY & STARTER SWITCH	
	1	VP 740	INSPECTION LIGHT. USE #1004 12V. 15 C.P. D.C. BULB	
	1	VP 740A	SOCKET FOR INSPECTION LIGHT	
	2	VP 741	DEFROSTER FANS	
	2	VP 1126-10	TERMINAL STRIP	
	1	VP 1153	HYDRAULIC CHARGE PRESSURE GAUGE	
	1	VP 1199	BATTERY DISCONNECT SWITCH	
	3	VP 1246M-25	CIRCUIT BREAKER 25 AMP. MANUAL RESET	
	1	VP 1247A-35	CIRCUIT BREAKER 35 AMP. AUTO. RESET	
	1	VP 1248	HOURMETER	
	1	VP 1249	MOUNTING RING FOR HOURMETER	
	4	VP1292-12-66	WINDOW WIPER MOTOR	
	4	VP 1293	ARM FOR WINDOW WIPER	
	4	VP 1294-14	BLADE FOR WINDOW WIPER	
	1	VP 1396B	GAUGE, FILTER CONDITION	

DATE: 3-22-68 CHECKED: [illegible]

PLYMOUTH MODEL HSG 5 TON 36 GAUGE LOCOMOTIVE SHEET 9 TOTAL 11

	REQ	SYMBOL	NAME OF PART	MATL.
	1	VP 1608	ELECTRIC FUEL GAUGE, RECEIVER	
	1	VP 1609	ELECTRIC FUEL GAUGE SENDER	
	1	VP 1610	ADAPTER FOR ELECTRIC FUEL GAUGE	
	1	PB-93	SWITCH FOR DOMELIGHT	
*	1	298009R91	ENG. WATER TEMPERATURE GAUGE	
*	1	327145R91	ENG. OIL PRESSURE GAUGE	
*	1	702283C1	AMMETER	
*		ALSO LISTED	ON SHEET #2 WITH IHC PARTS	
			EXHAUST PIPING & SPARK ARRESTER	
	1	HS361	FLANGE FOR EXHAUST OUTLET ON ENGINE	MS
	1	HS 364	PIPE FOR HS361 FLANGE	MSP
	1	HS 365	PIPE FOR EXHAUST CENTER SECTION	MSP
	1	HS 366	SEAL RING FOR EXHAUST PIPE	MS
	1	HS 367	SCREEN FOR SPARK ARRESTER	SCREEN
	1	HS 368	COVER FOR SPARK ARRESTER	MS
	2	HS 369	BAND FOR SPARK ARRESTER	MS
	1	VP1542-2:375	RAINCAP FOR 2 3/8 O.D. EXHAUST PIPE	
	2		3/8-16 NC X 1 1/4 STAINLESS STEEL CAPSCREW FOR HS361	
	6		#10-24 x 1/2 STAINLESS STEEL BOLT WITH NUT & L.W.	
			FOR SPARK ARRESTER	
			HYDRAULIC RESERVOIR	
	1	HS 125X	BREATHER & CAP FOR HS343 RESERVOIR	S
	1	HS 343	RESERVOIR FOR HYDRAULIC FLUID	MS
	1	HS 344	SUPPORT FOR VP1396 FILTER	MS
	1	HS 356	BLOCK TO SUPPORT VP1396 FILTER	MS
	1	HS 363X	SUPPORT FOR FLUID PIPE	MS
	2	FL 2968	TAPPED BLOCK FOR HS343	MS
	2	DL 244	"U" BOLT FOR HS363X SUPPORT	MSP
	1	DL 5113W	FILL PIPE FOR HYDRAULIC RESERVOIR	
	1	FF 435	1/2" SHUTOFF COCK FOR HS343 RESERVOIR DRAIN	
	1	FF 437	SHUTOFF COCK BETWEEN RESERVOIR & FILTER	
			HOOD & RELATED PARTS	
	2	HS 334	DOOR FOR HOOD WITH LOCK, LEFT FRONT & RIGHT REAR	HRS
	2	HS 335	DOOR FOR HOOD WITH LOCK, RIGHT FRONT & LEFT REAR	HRS
	1	HS 336	SIDE FOR HOOD, LEFT	HRS
	1	HS 337	SIDE FOR HOOD, RIGHT	HRS
	1	HS 338	TOP FOR HOOD, FRONT	HRS
	1	HS 339	TOP FOR HOOD REAR & SAND BOX	HRS
	1	HS 340	SUPPORT FOR SHUTTER, UPPER	S
	1	HS 341	SUPPORT FOR SHUTTER, LOWER	S
	2	HS 342	COVER ON HOOD TOP	HRS
	1	HS 370	SEAL AROUND AIR CLEANER	HRS
	8	DL 5892	BLOCK TO SPACE HOOD TOP	MS
	1	DL 9456	NAME PLATE FOR FRONT OF HOOD	CI
	8	VP 99A	HINGE FOR HOOD DOOR	S
	4	VP 1585A	LOCK FOR HOOD DOOR	S

DATE: 3-22-68 CHECKED:

PLYMOUTH MODEL HSG 5 TON 36 GA. LOCOMOTIVE SHEET 10 TOTAL 11

	ROD	SYMBOL	NAME OF PART	MATL.
			CAB ASSEMBLY	
	1	HS 328	CAB ASSEMBLY	S
	4	HS 329	WEATHER STRIP FOR DOOR	
	1	HS 367	CLOSURE FOR FRONT OF CAB	HRS
	2	BL 987A	DOOR HANDLE, INNER	MS
	2	BL 1072	HAND HOLD FOR REAR OF CAB	MS
	1	FL 3859	DOOR FOR CAB, RIGHT	HRS
	1	FL 3860	DOOR FOR CAB, LEFT	HRS
	2	FL 3878	BAR FOR DOOR SLIDE, LOWER INNER	MS
	2	FL 3879	BAR FOR DOOR SLIDE, OUTER	MS
	1	FL 3932	CLOSURE FOR FUEL TANK PIPE	CRS
	1	FL 3933	GASKET FOR FL3932 CLOSURE	RUBBER
	4	FL 3983	SHIM UNDER WEATHER STRIP, CAB DOORS	HRS
	1	ML 1308B	BRACKET FOR CAB DOME LIGHT	CRS
	4	VP 548	GLASS FOR CAB, 1/4 SAFETY 18 x 26	GLASS
	4	VP 749	GLASS FOR CAB, DUOLITE SAFETY GLASS 1/4	GLASS
	4	33197-R	INLAND FILLER STRIP, 87 5/8 LG, FOR VP548	RUBBER
	4	755474	INLAND WINDOW CHANNEL, 87 5/8 LG, FOR VP548	RUBBER
	4	33197-R	INLAND FILLER STRIP, 95 3/4 LG, FOR VP749	RUBBER
	4	755474	INLAND WINDOW CHANNEL, 95 3/4 LG, FOR VP749	RUBBER
	2		1" THICK GLASS WOOL INSULATING BLANKET x 24 1/4 x 96 3/4 FOR FL3859 & FL3860 DOOR	
			SANDER GROUP	
	4	AL 1212	HEAD FOR SAND VALVE	CI
	4	AL 1214	SPRING FOR SAND VALVE	CI
	4	CL 79	HOUSING FOR SAND VALVE	CI
	4	CL 80	DEFLECTOR FOR SAND IN VALVE	CI
	1	CL 81	LEVER FOR SANDER SHAFT	CI
	2	CL 82	LEVER FOR LIFTING SAND VALVE	CI
	2	CL 83	BRACKET FOR SANDER SHAFT	CI
	1	CL 84	HANDLE FOR SANDER OPERATION	CI
	4	CL 139	PLATE FOR SAND VALVE	MS
	4	CL 160	STEM FOR SAND VALVE	CRS
	1	CL 322	PIN FOR CL81 LEVER	S
	2	FL 1475	COVER FOR SAND BOX	CI
	2	FL 1476	CHAIN FOR FL1475 COVER	S
	1	FL 1478	GUIDE FOR SANDER CONNECTING BAR	MS
	1	FL 3920X	CONNECTING BAR FOR SANDER HANDLE	MS
	1	FL 3921X	SHAFT FOR SANDER	CRS
	2	HS 388	SUPPORT FOR SAND PIPE REAR	MS
	4	PF 44	HOSE FOR SAND PIPE	RUBBER

DATE: 3-22-68 CHECKED: J.T.D. LOCOMOTIVE NUMBER

PLYMOUTH MODEL HSG 5 TON LOCOMOTIVE SHEET 11 TOTAL 11

AEROQUIP HOSE & FITTING

NOTES: CUT HOSE TO LENGTH GIVEN

THE FITTINGS USED WITH EACH HOSE ARE INDICATED AFTER HOSE LENGTH BY ITEM NUMBER AND ARE ITEMIZED AT THE END OF HOSE LIST

ROD	HOSE	LENGTH	FITTING ITEM # END 1			END 2	LOCATION OR DESCRIPTION OF HOSE
1	1503-4	99	1	3	3	2	CHARGE PRESSURE GAUGE LINE
1	1503-4	89	4	3	3	2	FILTER CONDITION GAUGE LINE
1	1503-4	50	5	3	3	2	FUEL LINE
1	1503-10	24	6	7	8	9	STATTA MOTOR CASE TO RESERVOIR
1	1503-10	13	13	12	12	10	MANIFOLD BLOCK PORT "T" TO [illegible]
1	1503-12	15	15	11	11	9	SUNDSTRAND PUMP CASE TO PUMP
1	1503-12	8	9	11	11	9	PUMP TO LOWER INLET TO COOLER
1	1503-12	19	9	11	11	9	RELIEF VALVE TO TOP AT COOLER
1	1503-12	23	9	11	11	9	OUTLET OF COOLER TO RESERVOIR
1	1503-12	17	9	11	12	14	FLUID FILTER TO CHARGE PUMP

AEROQUIP FITTINGS

ITEM	ROD	SYMBOL	
1	1	202702-4-4S	STRAIGHT ADAPTER, 7/16-20 JIC TO 7/16-20 STRAIGHT THREAD
2	3	2021-2-4S	STRAIGHT ADAPTER, 7/16-20 JIC TO 1/8 MALE PIPE THREAD
3	6	411-4S	STRAIGHT SWIVEL, -7/16-20 JIC THREAD
4	1	2024-2-4S	90° ADAPTER
5	1	2021-4-4-8	STRAIGHT ADAPTER, 7/16-20 JIC TO 1/4 MALE PIPE THREAD
6	1	202702-8-10S	STRAIGHT ADAPTER 7/8-14 JIC TO 3/4-16 STRAIGHT THREAD
			NOTE: REMOVE "O" RING & USE VP965-3/4 STATO-SEAL
7	1	190296-10S	90° SWIVEL ELBOW - 7/8-14 JIC THREAD
8	1	411-12-10S	STRAIGHT SWIVEL - 1 1/16-12 JIC THREAD
9	9	2021-12-12S	STRAIGHT ADAPTER- 1 1/16-12 JIC TO 3/4 MALE PIPE
10	1	202702-10-10S	STRAIGHT ADAPTER - 7/8 JIC TO 7/8-14 STRAIGHT THREAD
11	9	411-12S	STRAIGHT SWIVEL - 1 1/16-12 JIC THREAD
12	1	190261-12S	90° SWIVEL ELBOW, 1 1/16-12 JIC THREAD
13	1	202702-8-10S	STRAIGHT ADAPTER-7/8-14 JIC TO 3/4-16 STRAIGHT THREAD
14	1	202702-10-12S	STRAIGHT ADAPTER - 1 1/16-12 JIC TO 7/8-14 STRAIGHT ADAPTER
15	1	2023-12-12S	45° ADAPTER 1 1/16-12 JIC TO 3/4 MALE PIPE THREAD

	PART NUMBER	DESCRIPTION	QTY.
1)	9006150-1190	Back-up Washer	2
2)	9004101-1190	"O" Ring	2
3)	9004100-0200	"O" Ring	1

ORIGINAL

ROUNDNESS (TIR)	PARALLELISM (TIR)	BASIC LOCATION (R.)	CENTRAL LOCATION (TIR)
ANGULARITY (TIR)	STRAIGHT-FLAT (TIR)	PERPENDICULARITY (TIR)	CONCENTRICITY (TIR)

SCALE

MATL.

TITLE Manifold Valv Mounting Seal Packa

DESIGN JOB NO. 553

DRAFTSMAN G.N.M.

CHECKER

PROJECT ENG. Bottinger 8-29-67

SECTION MGR.

RELEASED BY

SUNDSTRAND HYDRO-TRANSMISSI DIV. OF SUNDSTRAND C LA SALLE, ILLINO

DWG. NO. 9510049

EC	LET	DATE	BY	REMARKS
1743			RC	WAS P/N 9700190
		3-3-66		ENG. REL.

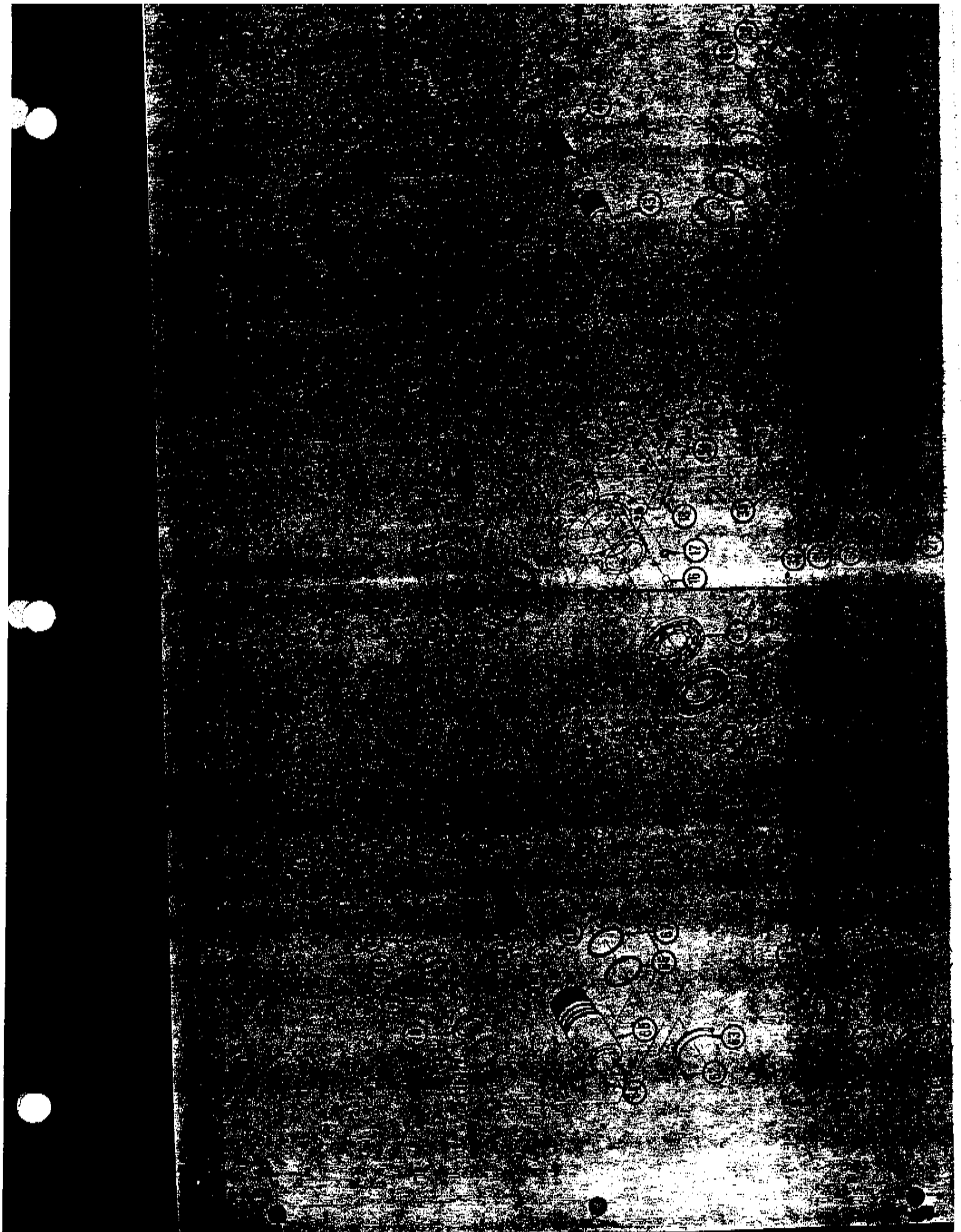
PARTS LIST

Variable Displacement Pump

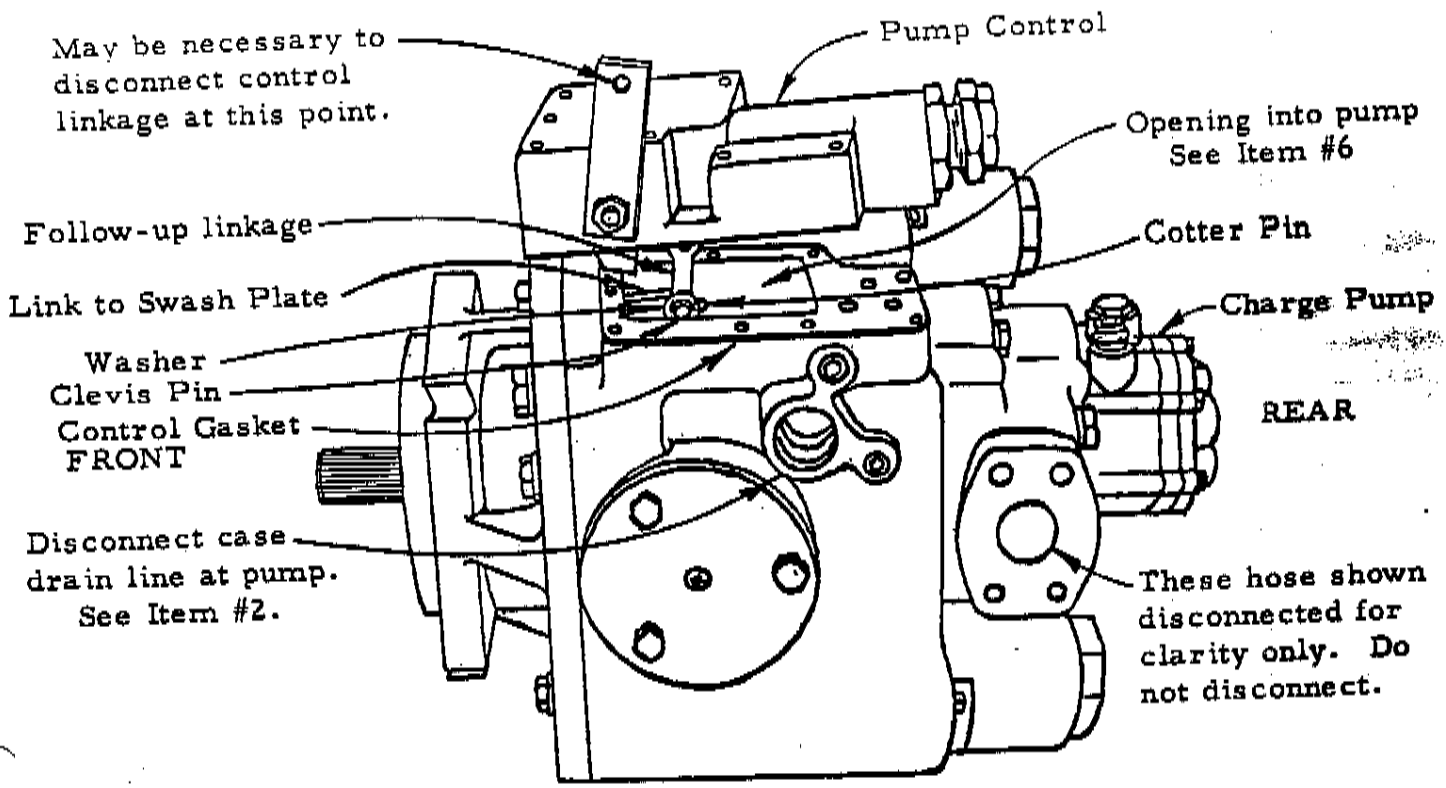
Model 23-2036

Ref #	Qty	Part Number	Part Description
1	4	9007200-2536	Hex Head Screw
2	4	9009610-2850	Washer
3	1	9801038-03	Charge Pump Assembly
4	1	9801074	Charge Pump Gasket
5	2	9800648	Check Valve Assembly
5A	2	9800721	Check Valve
5B	2	9004101-0150	'O' Ring
6	4	9007200-4430	End Cap Screw
7	4	9007200-4438	End Cap Screw
8	8	9009610-4778	Washer
9	1	9230285	End Cap
10	1A/R	9230482	Shim
11	1	9230127	End Cap Gasket
12	1	9001415-0002	Rear Bearing
13	1	9004800-3110	Pin
14	1	9230197	Valve Plate
15	1	9230288	Bearing Plate
16	2	9004800-3708	Pin
17	1	9004101-0140	'O' Ring
18	1	9230239	Pump Housing
19	7	9007200-2530	Hex Head Screw
20	2	9007200-2526	Hex Head Screw
21	9	9009610-2850	Washer
22	1	9003560-2500	Jam Nut
23	1	9009660-2500	Washer
24	1	9800916	Control Handle
25	1	9800917	Spacer
26	1	9004600-0607	Cotter Pin
27	1	9009610-2850	Washer
28	1	9800893	Control Valve Assembly
29	1	9800432	Orifice
30	3	9004101-0140	'O' Ring
31	1	9801076	Pin
32			Not Used
33	1	9800138	Control Valve Gasket
34	1	9005001-1200	Plug
35	1	9005101-4400	Hex Head Plug
36	1	9004201-2500	'O' Ring
37	6	9007200-4416	Hex Head Screw
38	6	9009610-4778	Washer
39	2	9230018	Trunnion
40	A/R	9230019	Shim
41	2	9004100-2320	'O' Ring
42	2	9001430-0001	Trunnion Bearing
43	1	9230469	Drive Shaft
44	1	9001435-0001	Front Bearing
45	1	9800210	Connecting Link
46	2	9006320-0025	Retaining Ring

47	1	9004830-2501	Pivot Pin
48	4	9006320-0062	Retaining Ring
49	2	9004830-6201	Pin
50	1	9230124	Front Cover Gasket
51	2	9004800-3708	Pin
52	1	9230128	Front Cover
53	12	9009610-4778	Washer
54	4 & 8	9007200-4422 & 4424	Hex Head Screw
55	1	9240147	Seal
56	2	9004102-1360	'O' Ring
57	8	9220242	Seal Spring
58	1	9004610-1212	Groove Pin
59	1	9004100-2380	'O' Ring
60	1	9240093	Seal Retainer
61	1	9006201-0387	Retaining Ring
62	4	9007300-1906	Socket Head Screw
63	2	9220419	Sleeve Retainer
64	4	9005001-0600	Plug
65	2	9220691	Servo Sleeve
66	2	9004100-1440	'O' Ring
67	2	9004100-1420	'O' Ring
68	2	9007200-2508	Cap Screw
69	2	9009625-2601	Washer
70	2	9220479	Spring Guide
71	2	9220436	Servo Spring
72	2	9510014	Servo Piston
73	2	9004830-6201	Pin
74	4	9006320-0062	Retaining Ring
75	2	9230151	Servo Link
76	1	9230247	Pilot
77	1	9006250-0250	Retaining Ring
78	1	9230014	Spring Retainer
79	1	9230015	Spring Guide
80	1	9230011	Cylinder Block Spring
81	1	9230013	Spring Seat
82	9	9230012	Retainer Spring
83	1	9220760	Pin
84	1	9230248	Cylinder Block Assembly
85	1	9230158	Retainer Guide
86	1	9230234	Slipper Retainer
87	9	9230241	Piston Assembly
88	1	9230235	Thrust Plate
89	1	9230225	Swashplate



INSTALLATION PROCEDURE
ORIFICING PUMP CONTROL TO SLOW RESPONSE
CHANGING CONTROL OR CONTROL GASKET



1. Wash all dirt from top of pump.

2. Disconnect the case drain hose which runs between the pump and reservoir at the pump and raise as high as possible to keep loss of oil at a minimum.

3. Remove (9) 1/4"-20 screws.

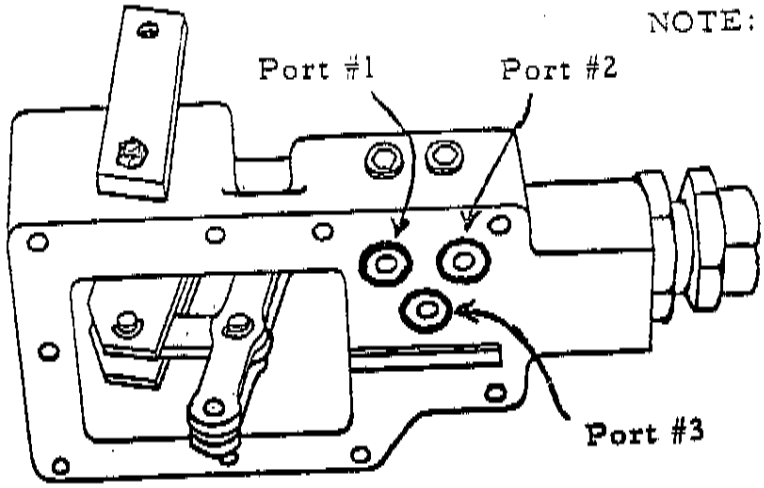
4. Raise pump control as high as possible and tilt toward front of pump. This should be done carefully to prevent damaging the pump control gasket and to make sure the three "O" rings remain in place and are not jarred loose to fall inside the pump. (See #2)

5. Inspect the control gasket and if it is damaged, it should be replaced.

6. Immediately cover the opening into the pump with a clean shop towel. This will prevent anything from falling into the internal parts of the pump while installing the orifice.

7. To replace the control valve or the control valve gasket take the following steps:

   (a) Cover the opening into the pump housing with a clean cloth.
   (b) Remove the orifice, if used, and the three "O" rings from the control valve housing.
   (c) Remove the small cotter pin.
   (d) Remove the small washer.



NOTE: All three ports contain an "O" ring.

Orifice plug pressed into and held by "O" ring in Port #3.

View of Underside of Pump Control
Fig 2

(e) Remove the clevis pin. NOTE: The clearance between this pin and the three holes it passes thru is very small. Wiggling the control valve from side to side as the pin is pulled will ease the job of removing it. Do not drive it out.

(f) Put the new gasket in place. Coating the gasket with light grease will help hold it in place.

(g) Place the link to the swash plate in the follow up linkage and push the clevis pin into place.

(h) Put the washer on the clevis pin.

(i) Put the cotter pin into place. Do not reuse the old cotter pin.

8. Place the three "O" rings into place in the control valve housing. It is recommended that the "O" rings be coated with light grease to hold them in place.

9. Insert the orifice plug into the I.D. of the "O" ring in Port #3 (See Fig. 2). NOTE: The orifice is provided with a small projection or guide on one side. This guide is designed to fit into the drilled hole in the control valve housing. The orifice plug is so designed that the slight press between it and the I.D. of the "O" ring will hold the orifice plug in place while the pump control is being bolted back down.

10. Remove the cloth covering the opening into the pump.

11. Swing the follow-up linkage as far as possible toward the rear of the pump and lower the pump control to its normal position.

12. Replace the (9) 1/4"-20 bolts, tightening them SNUGLY. Replace case drain hose

13. Replace lost oil and run system for a short period and recheck for proper oil level in reservoir.

14. Reconnect the linkage to the control and if necessary, readjust the mechanical "stops" so that the mechanism driven by the pump operates at the desired speed.

REPLACEMENT PROCEDURE
CHARGE PUMP CHECK VALVES

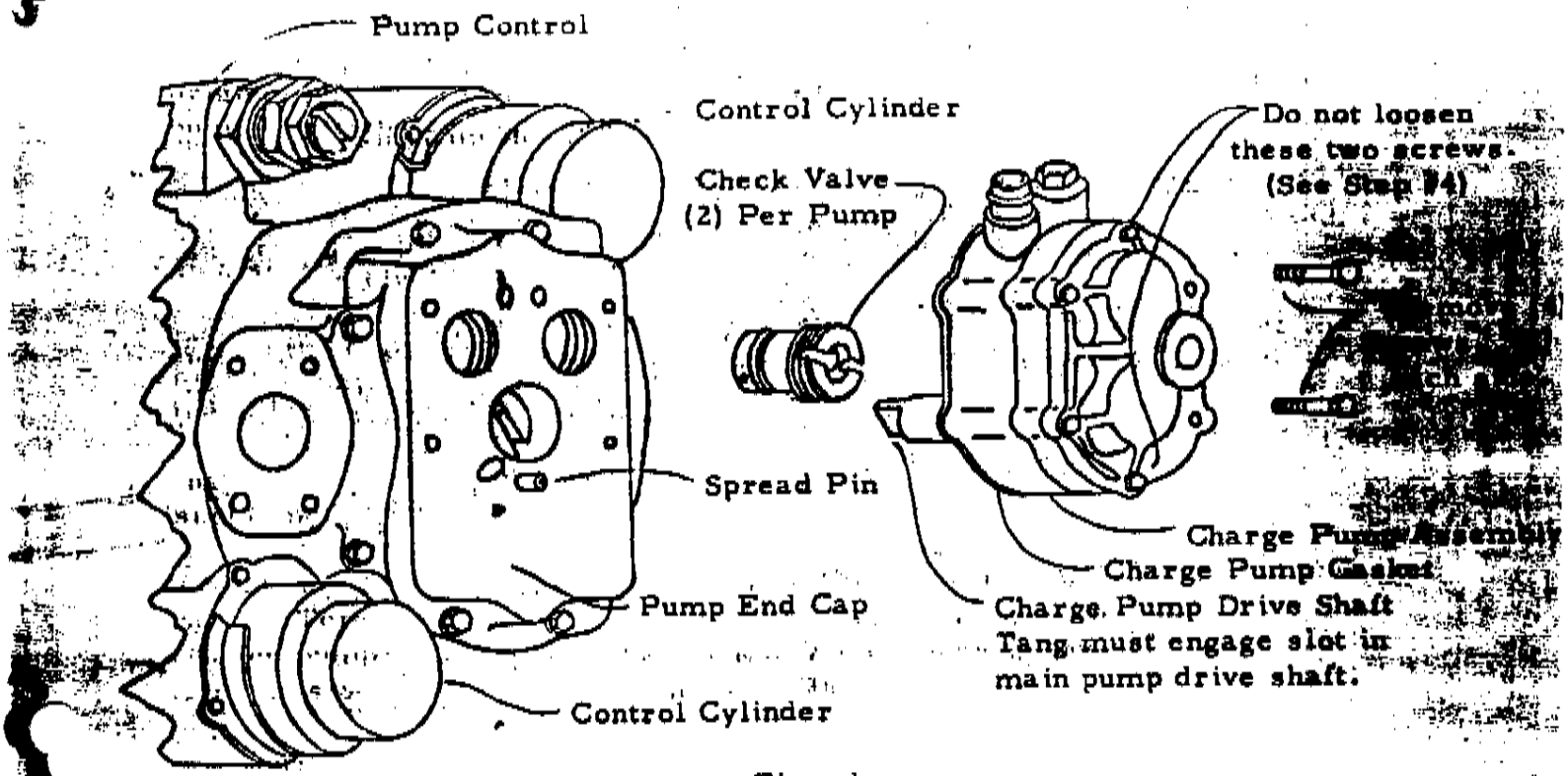


Fig. 1

Replacement Procedure

1. Wash all dirt from pump.

2. Disconnect the suction hose between the reservoir and charge pump at the charge pump. Raise the loose end as high as possible to minimize the loss of oil.

3. Disconnect the pump case drain hose (not the large high pressure hose) at the top case drain port in the pump. This is the hose running between the pump and the cooler or reservoir. Raise the loose end as high as possible to minimize the loss of oil. The high pressure hose is shown disconnected in Fig. 1 for clarity only.

4. Remove two 1/4-20 hex. head cap screws from each side of the charge pump. Do not loosen the two screws located one at the top and one at the bottom. These two screws are used to hold the charge pump together and are not attached to the end cap.

5. Remove the charge pump assembly. This assembly is located by a spread pin. It may be necessary to wiggle the charge pump to overcome the friction of this spread pin. Do not use a screwdriver or anyother tool to force the

(Over)

charge pump away from the main pump. NOTE: Note position of tang on charge pump shaft. If the shaft is then turned, it can be returned to its original position, making reassembly of the tang into the slot of the main pump drive shaft much easier.

6. Remove the two check valves. This can be done with a wide bladed screwdriver or flat piece of metal approximately 3/32" thick by 5/8" wide used as a screwdriver.

7. Install the two new check valves. Coat the "O" rings with light grease to prevent their being damaged as the valve is screwed into place. Make sure the valves are turned in tight.

8. Install the charge pump gasket. If the gasket is damaged in any way, it should be replaced.

9. Install the charge pump. Slip body onto the spread pin and tighten the [illegible] bolts. Torque the bolts to 70-75 inch pounds. NOTE: The tang on the charge pump drive shaft must be aligned with and engaged into the corresponding slot in the main pump drive shaft.

10. Reconnect hoses.

11. Replace lost oil.

12. Start vehicle engine at a slow idle for approximately two minutes. Check oil level to be sure its at the level called out in the vehicle specifications.

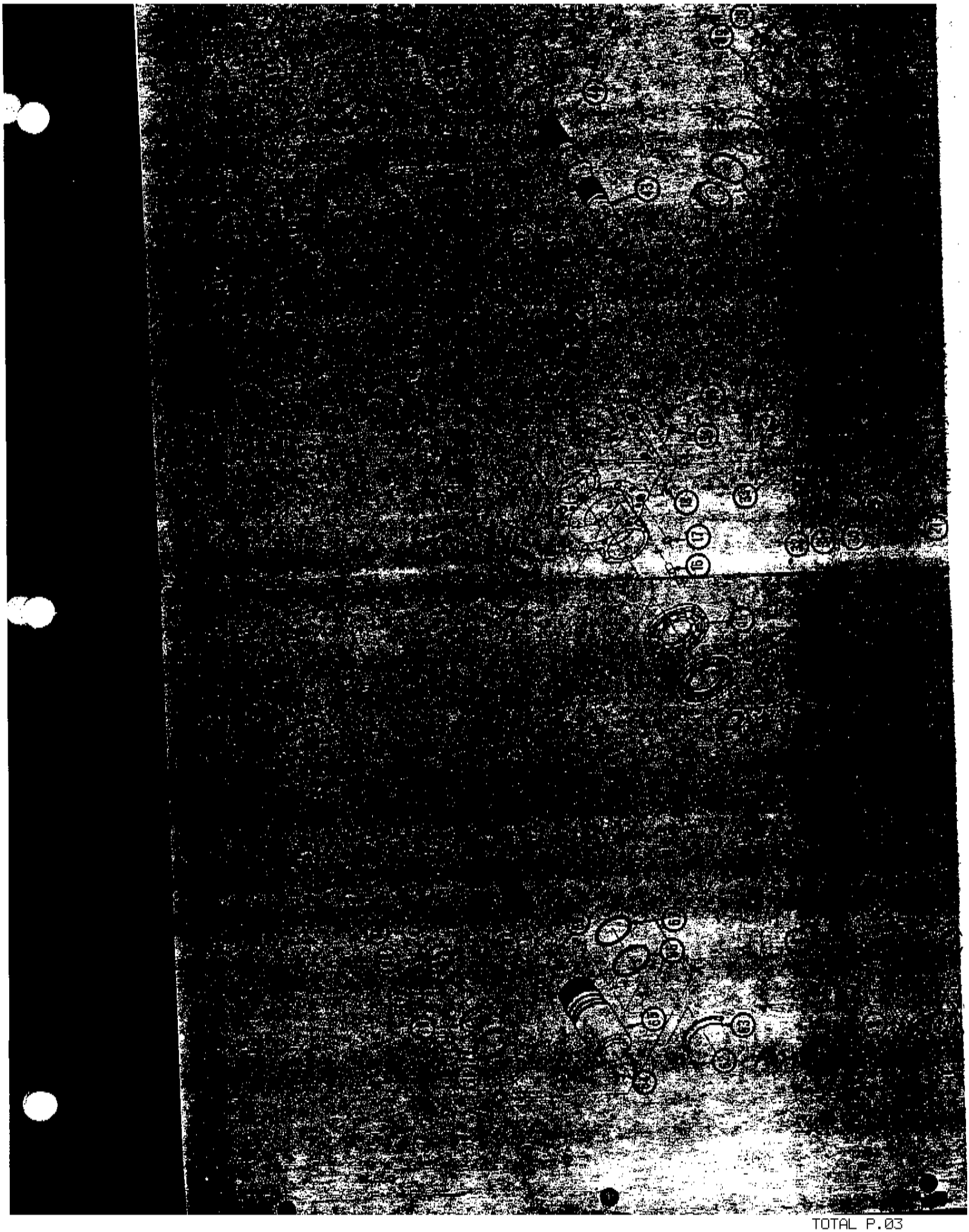
PARTS LIST

Variable Displacement Pump

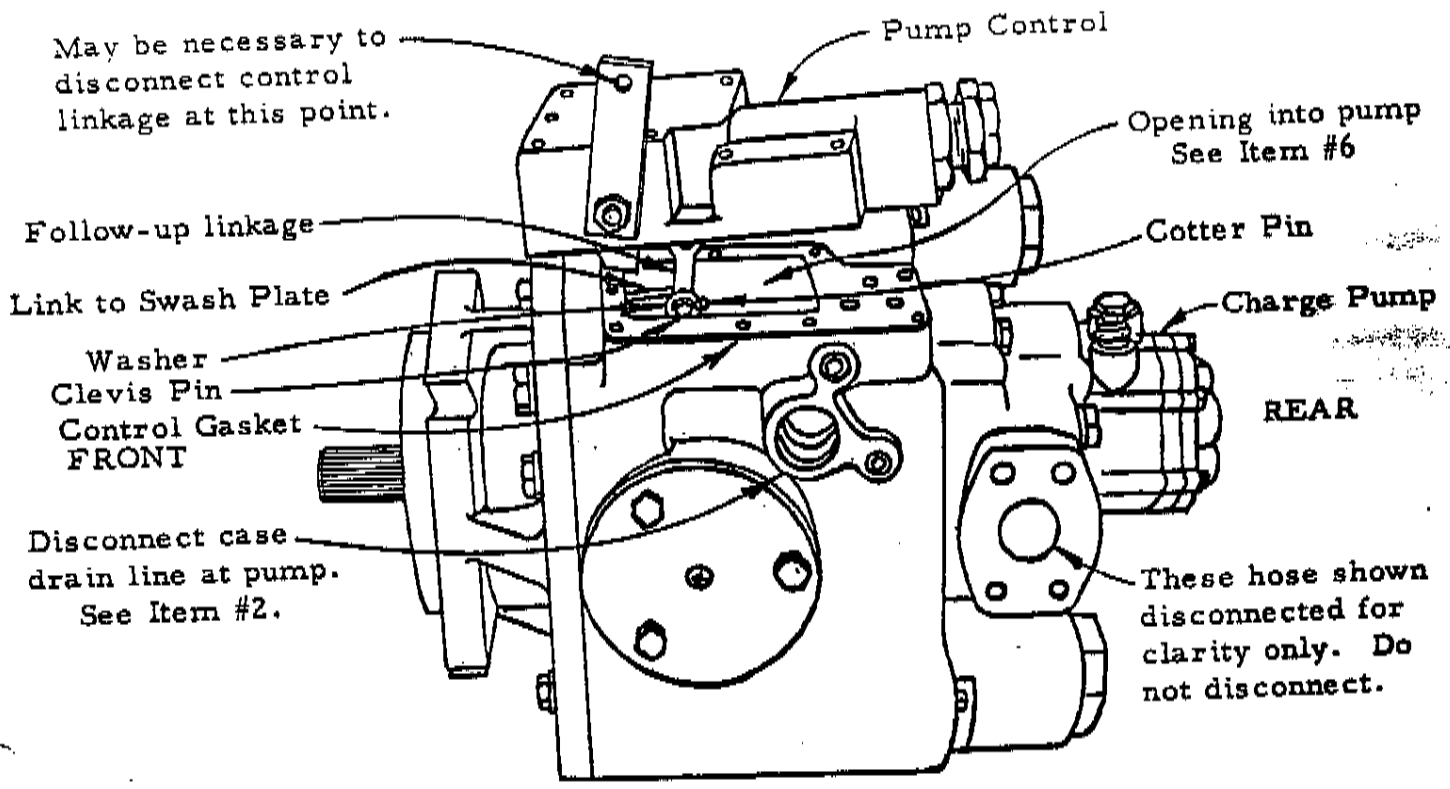
Model 23-2036

Ref #	Qty	Part Number	Part Description
1	4	9007200-2536	Hex Head Screw
2	4	9009610-2850	Washer
3	1	9801038-03	Charge Pump Assembly
4	1	9801074	Charge Pump Gasket
5	2	9800648	Check Valve Assembly
5A	2	9800721	Check Valve
5B	2	9004101-0150	'O' Ring
6	4	9007200-4430	End Cap Screw
7	4	9007200-4438	End Cap Screw
8	8	9009610-4778	Washer
9	1	9230285	End Cap
10	1A/R	9230482	Shim
11	1	9230127	End Cap Gasket
12	1	9001415-0002	Rear Bearing
13	1	9004800-3110	Pin
14	1	9230197	Valve Plate
15	1	9230288	Bearing Plate
16	2	9004800-3708	Pin
17	1	9004101-0140	'O' Ring
18	1	9230239	Pump Housing
19	7	9007200-2530	Hex Head Screw
20	2	9007200-2526	Hex Head Screw
21	9	9009610-2850	Washer
22	1	9003560-2500	Jam Nut
23	1	9009660-2500	Washer
24	1	9800916	Control Handle
25	1	9800917	Spacer
26	1	9004600-0607	Cotter Pin
27	1	9009610-2850	Washer
28	1	9800893	Control Valve Assembly
29	1	9800432	Orifice
30	3	9004101-0140	'O' Ring
31	1	9801076	Pin
32			Not Used
33	1	9800138	Control Valve Gasket
34	1	9005001-1200	Plug
35	1	9005101-4400	Hex Head Plug
36	1	9004201-2500	'O' Ring
37	6	9007200-4416	Hex Head Screw
38	6	9009610-4778	Washer
39	2	9230018	Trunnion
40	A/R	9230019	Shim
41	2	9004100-2320	'O' Ring
42	2	9001430-0001	Trunnion Bearing
43	1	9230469	Drive Shaft
44	1	9001435-0001	Front Bearing
45	1	9800210	Connecting Link
46	2	9006320-0025	Retaining Ring

47	1	9004830-2501	Pivot Pin
48	4	9006320-0062	Retaining Ring
49	2	9004830-6201	Pin
50	1	9230124	Front Cover Gasket
51	2	9004800-3708	Pin
52	1	9230128	Front Cover
53	12	9009610-4778	Washer
54	4 & 8	9007200-4422 & 4424	Hex Head Screw
55	1	9240147	Seal
56	2	9004102-1360	'O' Ring
57	8	9220242	Seal Spring
58	1	9004610-1212	Groove Pin
59	1	9004100-2380	'O' Ring
60	1	9240093	Seal Retainer
61	1	9006201-0387	Retaining Ring
62	4	9007300-1906	Socket Head Screw
63	2	9220419	Sleeve Retainer
64	4	9005001-0600	Plug
65	2	9220691	Servo Sleeve
66	2	9004100-1440	'O' Ring
67	2	9004100-1420	'O' Ring
68	2	9007200-2508	Cap Screw
69	2	9009625-2601	Washer
70	2	9220479	Spring Guide
71	2	9220436	Servo Spring
72	2	9510014	Servo Piston
73	2	9004830-6201	Pin
74	4	9006320-0062	Retaining Ring
75	2	9230151	Servo Link
76	1	9230247	Pilot
77	1	9006250-0250	Retaining Ring
78	1	9230014	Spring Retainer
79	1	9230015	Spring Guide
80	1	9230011	Cylinder Block Spring
81	1	9230013	Spring Seat
82	9	9230012	Retainer Spring
83	1	9220760	Pin
84	1	9230248	Cylinder Block Assembly
85	1	9230158	Retainer Guide
86	1	9230234	Slipper Retainer
87	9	9230241	Piston Assembly
88	1	9230235	Thrust Plate
89	1	9230225	Swashplate



INSTALLATION PROCEDURE
ORIFICING PUMP CONTROL TO SLOW RESPONSE
CHANGING CONTROL OR CONTROL GASKET



1. Wash all dirt from top of pump.

2. Disconnect the case drain hose which runs between the pump and reservoir at the pump and raise as high as possible to keep loss of oil at a minimum.

3. Remove (9) 1/4"-20 screws.

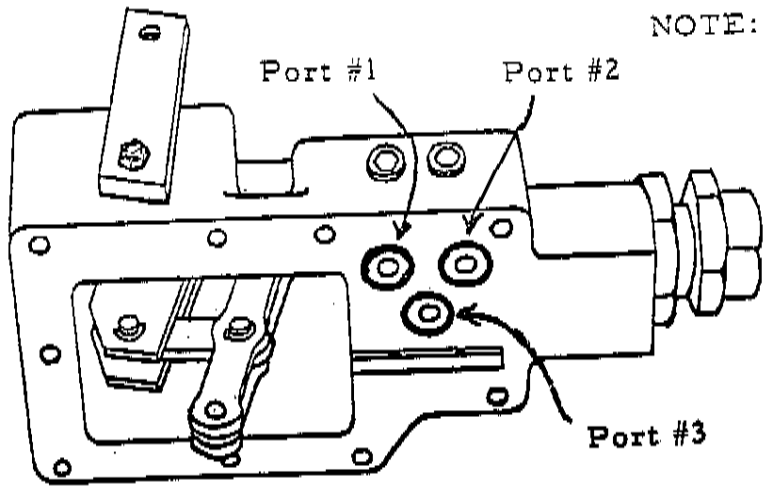
4. Raise pump control as high as possible and tilt toward front of pump. This should be done carefully to prevent damaging the pump control gasket and to make sure the three "O" rings remain in place and are not jarred loose to fall inside the pump. (See #2)

5. Inspect the control gasket and if it is damaged, it should be replaced.

6. Immediately cover the opening into the pump with a clean shop towel. This will prevent anything from falling into the internal parts of the pump while installing the orifice.

7. To replace the control valve or the control valve gasket take the following steps:

   (a) Cover the opening into the pump housing with a clean cloth.
   (b) Remove the orifice, if used, and the three "O" rings from the control valve housing.
   (c) Remove the small cotter pin.
   (d) Remove the small washer.



NOTE: All three ports contain an "O" ring.

Orifice plug pressed into and held by "O" ring in Port #3.

View of Underside of Pump Control
Fig 2

(e) Remove the clevis pin. NOTE: The clearance between this pin and the three holes it passes thru is very small. Wiggling the control valve from side to side as the pin is pulled will ease the job of removing it. Do not drive it out.

(f) Put the new gasket in place. Coating the gasket with light grease will help hold it in place.

(g) Place the link to the swash plate in the follow up linkage and push the clevis pin into place.

(h) Put the washer on the clevis pin.

(i) Put the cotter pin into place. Do not reuse the old cotter pin.

8. Place the three "O" rings into place in the control valve housing. It is recommended that the "O" rings be coated with light grease to hold them in place.

9. Insert the orifice plug into the I.D. of the "O" ring in Port #3 (See Fig. 2). NOTE: The orifice is provided with a small projection or guide on one side. This guide is designed to fit into the drilled hole in the control valve housing. The orifice plug is so designed that the slight press between it and the I.D. of the "O" ring will hold the orifice plug in place while the pump control is being bolted back down.

10. Remove the cloth covering the opening into the pump.

11. Swing the follow-up linkage as far as possible toward the rear of the pump and lower the pump control to its normal position.

12. Replace the (9) 1/4"-20 bolts, tightening them SNUGLY. Replace case drain hose

13. Replace lost oil and run system for a short period and recheck for proper oil level in reservoir.

14. Reconnect the linkage to the control and if necessary, readjust the mechanical "stops" so that the mechanism driven by the pump operates at the desired speed.

Sundstrand Hydro-Transmiss
Bulletin #9423
January, 1965

REPLACEMENT PROCEDURE
CHARGE PUMP CHECK VALVES

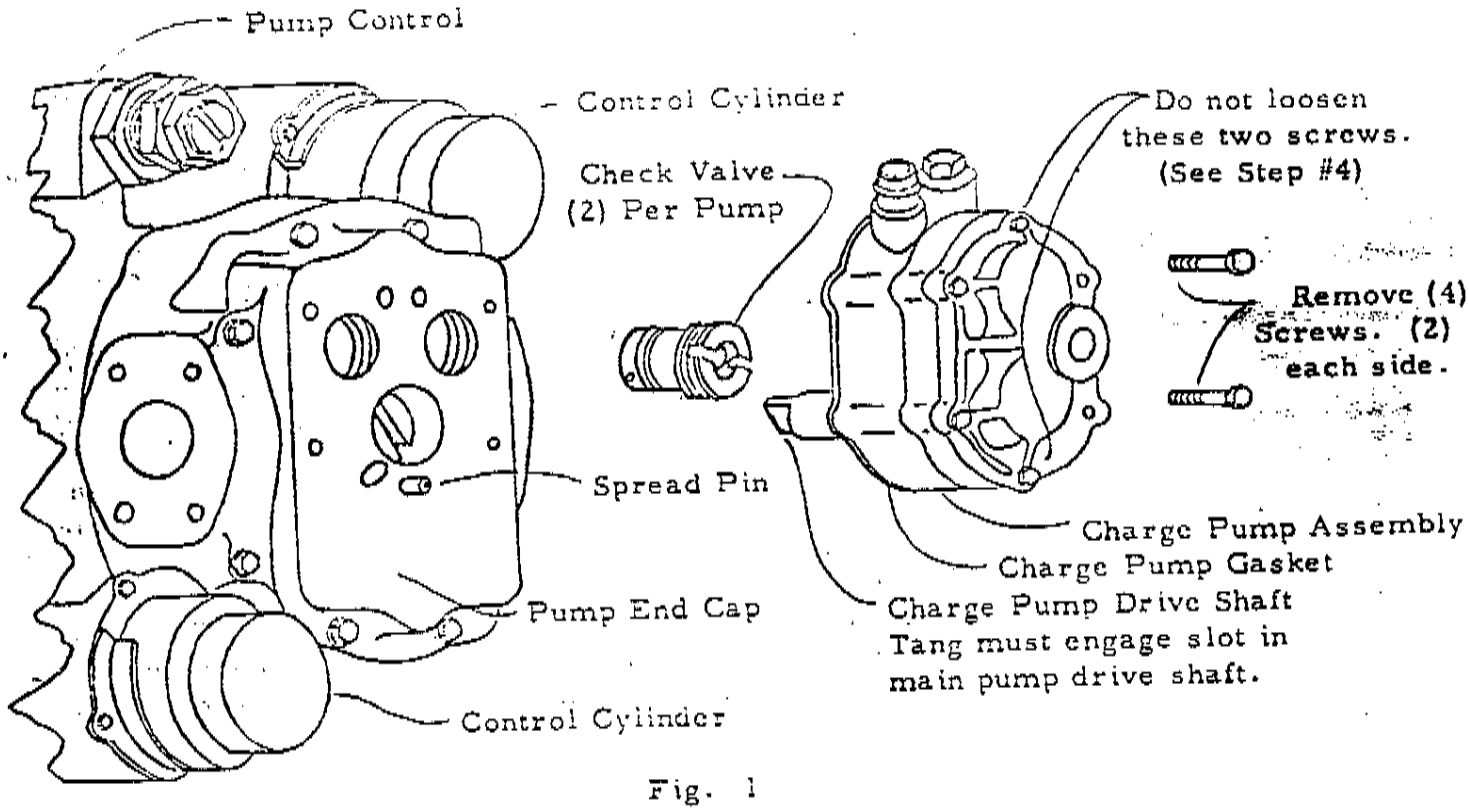


Fig. 1

Replacement Procedure

1. Wash all dirt from pump.

2. Disconnect the suction hose between the reservoir and charge pump at the charge pump. Raise the loose end as high as possible to minimize the loss of oil.

3. Disconnect the pump case drain hose (not the large high pressure hose) at the top case drain port in the pump. This is the hose running between the pump and the cooler or reservoir. Raise the loose end as high as possible to minimize the loss of oil. The high pressure hose is shown disconnected in Fig. 1 for clarity only.

4. Remove two 1/4-20 hex. head cap screws from each side of the charge pump. Do not loosen the two screws located one at the top and one at the bottom. These two screws are used to hold the charge pump together and are not attached to the end cap.

5. Remove the charge pump assembly. This assembly is located by a spread pin. It may be necessary to wiggle the charge pump to overcome the friction of this spread pin. Do not use a screwdriver or anyother tool to force the

(Over)

charge pump away from the main pump. NOTE: Note position of tang on charge pump shaft. If the shaft is then turned, it can be returned to its original position, making reassembly of the tang into the slot of the main pump drive shaft much easier.

6. Remove the two check valves. This can be done with a wide bladed screwdriver or flat piece of metal approximately 3/32" thick by 5/8" wide used as a screwdriver.

7. Install the two new check valves. Coat the "O" rings with light grease to prevent their being damaged as the valve is screwed into place. Make sure the valves are turned in tight.

8. Install the charge pump gasket. If the gasket is damaged in any way, it should be replaced.

9. Install the charge pump. Slip body onto the spread pin and tighten the four bolts. Torque the bolts to 70-75 inch pounds. NOTE: The tang on the charge pump drive shaft must be aligned with and engaged into the corresponding slot in the main pump drive shaft.

10. Reconnect hoses.

11. Replace lost oil.

12. Start vehicle engine at a slow idle for approximately two minutes. Check oil level to be sure its at the level called out in the vehicle specifications.

Sundstrand Hydro-Transmission
Bulletin #9422
January, 1965

HEAVY DUTY TRANSMISSION START-UP PROCEDURE

Before installing a transmission on a machine, inspect the transmission for damage in shipping or handling. All tools, pans, cans, plugs, etc., must be clean prior to use on the system. Never use drained oil.

(1) After the units have been installed, remove the threaded plug in the charge pressure port from the side of the main pump housing (See Figure 1). Install a 600 PSI gauge with a short section of hose to this port. The threaded plug may be either 1/8 NPT or 7/16-20 straight thread.

(2) Check all fittings to be sure they are tight.

(3) Loosen the charge pump line at the inlet to the charge pump (See Figure 1).

(4) Fill the pump case through the case drain opening with an approved oil (See last page for oils)

(5) Fill the reservoir with an approved oil. When oil appears at the loosened hose at the charge pump inlet, tighten the hose and continue filling the reservoir. Leave reservoir cap loose so air will escape.

NOTE: If gravity feed does not fill the line to the charge pump, it must be filled by hand.

(6) The pump must be in neutral. It is recommended that the control linkage be left disconnected until after initial start-up.

(7) With the coil wire removed or the rack closed, turn the engine over for fifteen seconds.

(8) Start the engine maintaining as low an idle as possible for five minutes. During start-up, pressure surges will be seen on the 600 PSI gauge. While running at low idle, charge pressure must be above 100 PSI. If it is not, shut down and trouble shoot - according to Bulletin 9454.

Cont. on Page 2

Cont. from Page 1

(9) Increase engine speed to approximately 1000 RPM. Charge pressure on the 600 PSI gauge should be 180-220 PSI.

(10) Shut down engine and connect linkage to displacement control.

(11) Check fluid level in reservoir and add an approved oil if necessary.

(12) Start engine and run at 1500 to 2000 RPM. Charge pressure should be 180-220 PSI.

(13) Move the directional control handle slightly to the forward and reverse position. Charge pressure will drop to 150-190 PSI when pump is in stroke.

(14) Should the charge pressure fall below 100 PSI during the start-up procedure discontinue start-up until trouble has been found. See trouble shooting Bulletin #9454.

(15) Shut down engine, remove gauge and replace plug in gauge port. Check reservoir oil level and tighten oil fill cap.

Machine is now ready for operation.

HEAVY DUTY VARIABLE DISPLACEMENT PUMP

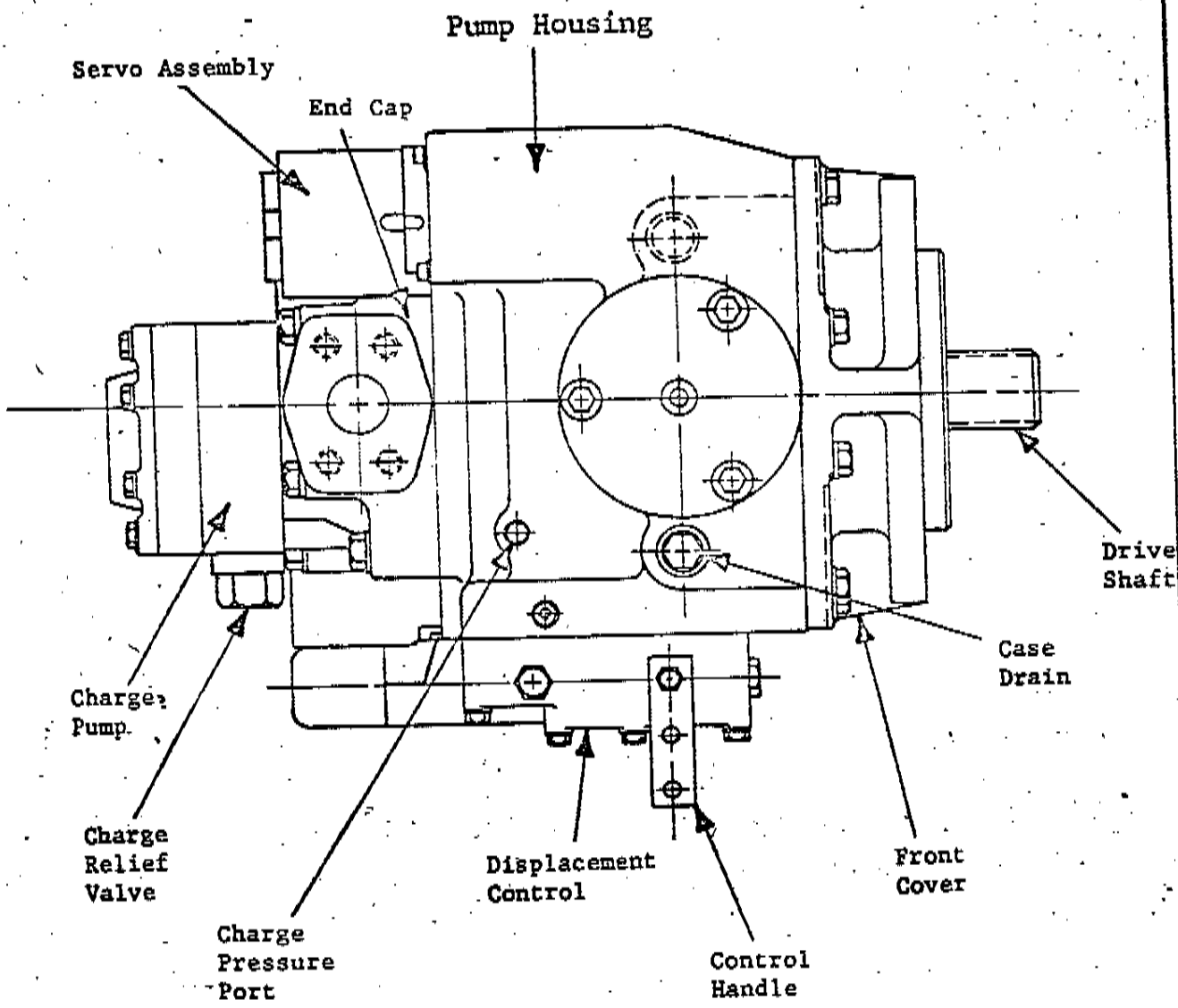


Figure I.

RECOMMENDED OILS

Approved oils for Use in Sundstrand Hydrostatic Transmissions

Approval has been given for the following oils for use in Sundstrand Hydrostatic Transmissions:

For operating temperatures above 10°F.

1. Mobilfluid 300 from the Mobil Oil Company.
2. Rykon Industrial Oil No. 21 or American Hydraulic Oil - All Weather from the American Oil Company.
3. Hy-Tran from International Harvester.

NOTE: For "make-up" in the field when the above oils are not available Type A - Suffix A automatic transmission fluid (Mobilfluid 200 from the Mobil Oil Company) may be added.

These oils may be mixed in any ratio to fill a system as they are compatible.

For operating temperatures below 10°F.

1. Mil-H-5606 Hydraulic Fluid.

VARIABLE PUMP OR VARIABLE MOTOR DISASSEMBLY PROCEDURE

1. Remove pump from the installation or vehicle.

   A. If possible, the pump should be steam cleaned while still on the vehicle or installation and before any hose is disconnected. If a steam cleaner is not available, wash the pump, especially the fittings, with fuel oil or suitable solvent. Do not use paint thinner or acetone. Remove any dirt from the vehicle or installation which could be accidently dislodged and enter the pump during the reinstallation procedure.

   B. Disconnect all hose. In most cases, it is recommended that the oil be discarded and replaced with new oil when the system is again started.

   C. Remove the mounting bolts and set the pump on a clean work bench. A few minutes spent cleaning off a work bench before starting to work will save time later as the work progresses. Putting a drip pan approximately 18" square by 1" deep under the pump will help to keep the oil, that is still in the pump, off the work bench and floor.

2. Remove the shaft seal (Item 1).

   A. A few pumps are designed with a seal that is held in place with four cap screws. Most seals are held in place with a large snap ring (Item 45). Remove either the cap screws or the snap ring as the case may be.

B. In either case, once the bolts or snap ring is removed, the seal retainer can usually be removed without the use of tools. Due to the squeeze on the "O" ring (Item 1A), the seal retainer (Item 47) and the steel half of the seal (Item 1C), Items 1A, 1B and 1C will all be removed with the seal retainer. Set this group aside in a place where the seal cannot be damaged by a slip of a wrench.

NOTE: Unless the seal is going to be replaced, the lapped surface of the steel half of the seal (Item 1C) should be protected from damage at all times.

C. Remove the bronze half of the seal (Item 1D). This part is held in place by the squeeze on the "O" ring (Item 1F). It can usually be wiggled off the shaft with the fingers. A few seals incorporate a small spread pin in the drive shaft to "drive" the bronze half of the seal. In a very few cases, this pin may have worn a groove into the I. D. of the seal half. If so, hold the shaft stationary and rotate the seal half as far as it will go in the direction of shaft rotation. This will again line up the slot in the seal half with the drive pin and the seal half can be removed. However, once in awhile even after the drive pin is lined up with the slot, it may be necessary to pry the part loose by using two screw drivers. If this is necessary, make sure all pressure is applied against the sides of the seal half and that the lapped sealing surface is not damaged in any way.

3. Remove the charge pump (Item 22).

A. The charge pump is held in place by four bolts (Item 21) located along the straight sides of the charge pump. The other two bolts located on the top and bottom portion of the charge pump are used to hold the three main sections of the charge pump together when it is removed from the main pump.

B. The charge pump is "located" by a spread pin between it and the end cap of the main pump. Due to the drag of this pin, it may be necessary to "work" the charge pump up and down while pulling to separate it from the main pump. DO NOT PRY with a screw driver or other tools!

C. Remove and inspect the charge pump gasket (Item 20). If it is all right, lay is aside with the charge pump. If it is damaged in any way, it should be replaced.

4. Remove the two check valves (Item 24). The body of the check valve assembly is threaded. The whole check valve assembly can be removed by unscrewing it from the end cap. The check valves are turned in quite tight at the factory, and it may be necessary to use a small drag link socket or equivalent to remove them.

5. Remove the end cap.

A. The end cap is held by eight hex head bolts (Item 19) and is positioned by two dowel pins (Item 26). Usually as the last bolt is removed, the end cap will be pushed away from the housing a short distance. If this does not happen, it will be necessary to break it loose by the careful use of a plastic or babbit hammer. NOTE: Never force a screw driver or wedge between any two surfaces of any Sundstrand product.

B. The valve plate (Item 52) is loosely doweled (Item 51) to the end cap for position only. However, due to the extreme flatness of the face of the end cap and the mating surface of the valve plate, an oil seal will exist between these two parts causing the valve plate to cling to the end cap. On occasion, the brass bearing plate (Item 53) will, for the same reason, cling to the valve plate. Therefore, as the end cap is lifted, extreme caution should be exercised to prevent the valve plate from being damaged should it become loose and fall.

C. Set the end cap aside with the lapped surface up. The lapped surface should be protected from damage at all times.

6. Remove the end cap gasket (Item 15) and "O" ring (Item 17). If either is damaged, they should be replaced.

7. Remove the valve plate (Item 52). If the valve plate remained on the end cap, they can be separated by first washing both parts with clean fuel oil or solvent. This will break the oil seal and the parts can then be easily separated.

If the valve plate remained with the brass bearing plate in the pump, it can be removed by sliding it to one side off the valve plate and lifting.

8. Remove the brass bearing plate (Item 53). The material in this plate is relatively soft and can be easily scratched and damaged. Wash the plate with clean fuel oil or solvent to break the oil seal and lift the plate from the cylinder block (Item 55). There are drain slots milled into the back of the brass bearing plate running radially to the outside diameter.

As an aid in removing the brass bearing plate, a brass pry can be carefully inserted into one of these drain grooves and the bearing plate lifted. Do not force these two pieces apart at any other point other than at the drain slots.

9. Remove the rear bearing (Item 50). Use a standard bearing puller to pull the rear bearing. Be sure you can rotate bearing cage while pulling. Pull only on the inner race not the cage or rollers. The pump shaft should be protected from damage by placing a suitable piece of metal between the ram of the puller and the shaft. NOTE: The face of the cylinder block (Item 55) is a lapped surface and can be easily damaged by careless handling of the puller while assembling the jaws under the bearing.

10. Remove the spring guide (Item 72). This part is a sleeve type spacer and is not held in place by any mechanical tie.

11. Remove the cylinder block (Item 55). Place the pump housing (Item 39) in a horizontal position. Grasp the block with the fingers and pull. The piston assemblies (Item 56) and retainer (Item 63) usually stay in the housing and have to be removed later. However, if it is possible to remove the block with the pistons still in place, it simplifies the job.

12. Remove the slipper retainer guide (Item 62). If the pistons came out with the block as it was removed, this step has been taken care of. If it stays in the housing, rotate the guide slightly until the two splines are again lined up and slip it back down the shaft (Item 48) and out of the hous-

ing. A few pumps contain spacers located inside the guide and fitting between the guide and the neck of the cylinder block. They should be discarded and not returned to the pump during reassembly.

13. Remove the nine pistons (Item 56) and the slipper retainer (Item 65). If the pistons remained in the block as it was removed, this step has been taken care of. If they remained in the housing, insert your hand or hands, as space allows, into the housing and gather up all nine pistons. This will prevent their lodging against the sides of the housing hampering their removal. Some or all of the slippers may form an oil seal with the thrust plate (Item 64) making it necessary to pull on that piston individually to break it loose.

14. Remove the thrust plate (Item 64). This part is cradled in the swash plate (Item 61) with very little side clearance. If the pump is to be completely disassembled, it is easier to remove the thrust plate after the swash plate has been removed from the housing. If the swash plate is not going to be removed, a metal rod approximately 10" long with a small hook approximately 1/16" high on the end makes a good tool for removing the thrust plate. Two notches are provided in the I. D. of the swash plate on a plane parallel to the center line of the trunnions. These notches provide clearance behind the thrust plate permitting the engagement of the hook. By pulling first on one side and then the other, the thrust plate can be "worked" out of the swash plate and removed.

15. Remove the front cover (Item 43). The front cover is held in place by eight bolts (Item 2) and positioned by two dowel pins (Item 3). It may be necessary to jar the cover loose with a plastic or babbit hammer. Do not drive a screw driver or wedge between the cover and housing.

16. Remove the front cover gasket (Item 42). If necessary, scrape both the front cover and pump housing free of any particles of gasket material that might have remained on either.

17. Remove the drive shaft (Item 48). With the front cover removed, the shaft will easily slide out the front of the housing.

18. Remove the control valve assembly (Item 14).

A. Remove the eight cap screws (Item 13) which hold the control in place and lift the control assembly as high as possible.

B. Remove the small clevis pin (Item 9) which connects the two follow-up links on the control with the connecting link attached to the swash plate. If the control valve assembly (Item 14) is being removed without the rest of the pump being disassembled, it is strongly recommended that before removing the small cotter key (Item 10) used to hold the clevis pin, a long piece of tag wire or equivalent be run through the eye of the cotter key. This will prevent the cotter key from accidentally falling into the pump if dropped.

The clevis pin (Item 9) can now be removed. The clearance between the O. D. of the body of this pin and the I. D. of the three holes it passes through is very small; therefore, the pin does not slide out easily. Wiggling the control housing (Item 14) as you pull on the

clevis pin will make its removal easier. Here again, if the control valve assembly (Item 14) is being removed without the pump being disassembled, take care not to drop the clevis pin inside the pump housing. If you do and it cannot be fished out with a magnet, it will be necessary to disassemble the pump piece by piece until the clevis pin is found.

Lay the control valve assembly aside. Further disassembly of this valve is usually not necessary. It should be thoroughly washed and blown out with compressed air.

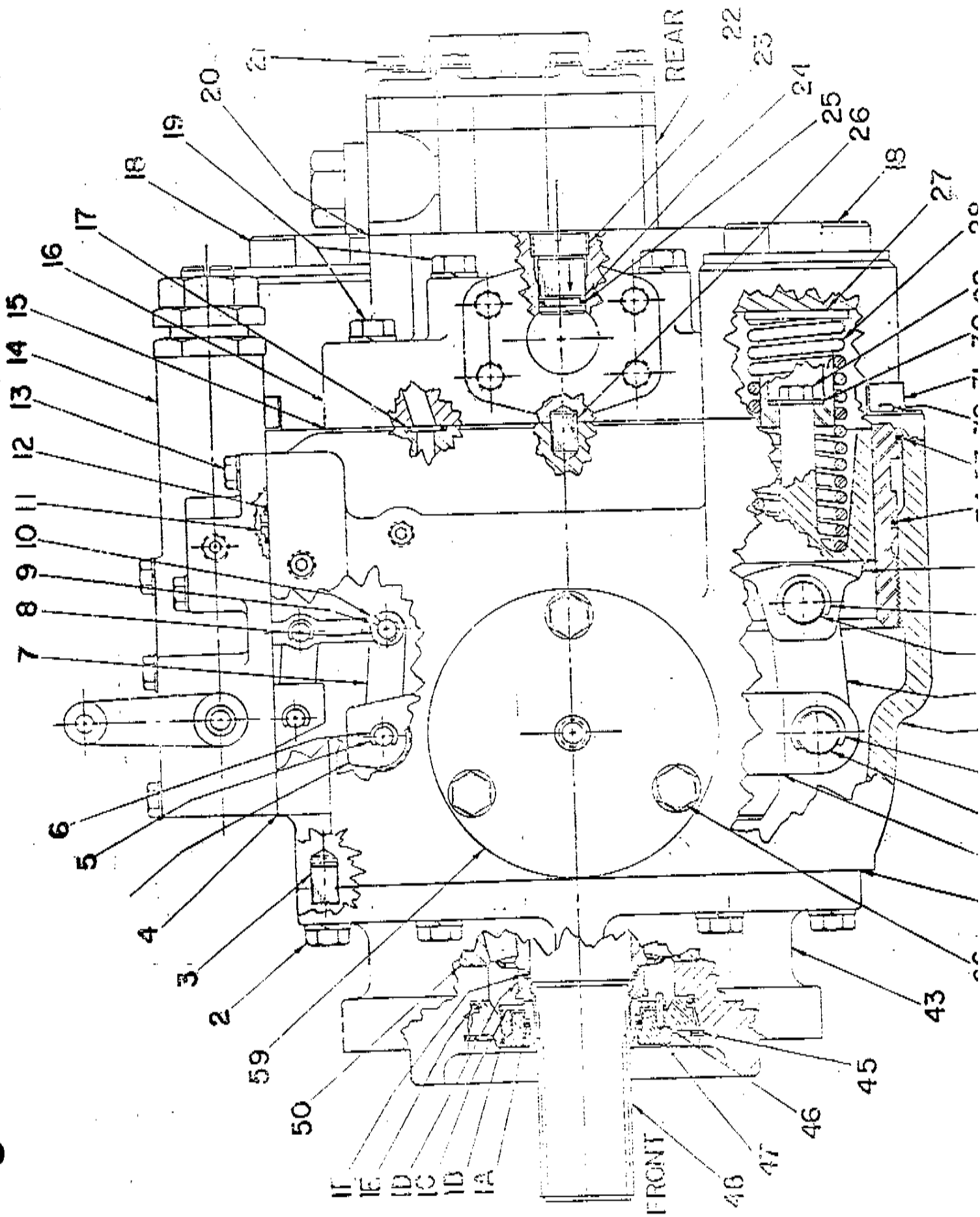
19. Remove the trunnions (Item 59). Remove the three bolts (Item 66) that hold each trunnion in place. Use a spanner wrench and rotate the trunnion back and forth with one hand as you push on the inside face of the trunnion with the other hand. It is necessary to overcome the drag of the "O" ring (Item 58) to remove the trunnion. The inner race of the trunnion bearing (Item 60) usually, but not always, comes out with the trunnion.

20. With the trunnions removed, it is now possible to lift the swash plate (Item 61) out of the housing.

The pump is now completely disassembled. All parts should be inspected. Those needing to be replaced should be replaced and those needing rework, reworked. Thoroughly wash all parts in clean solvent or fuel oil and then keep them clean. Wrap them in either clean rags or plastic. If the parts are to remain disassembled for any period of time,

they should be protected from rust and accidental damage. You can save yourself a lot of time and effort by not allowing any lapped surface to become scratched or nicked. The parts of any quality piece of hydraulic equipment do not have to be treated like the parts out of a watch; but on the other hand, due to the high pressures the pumps and motors are required to handle today, any abuse to the parts during the repair procedure will result in an inefficient or inoperative unit after it is assembled.

Sundstrand Hydro-Transmissic
Bulletin #9427
January, 1964
Revised: March, 1965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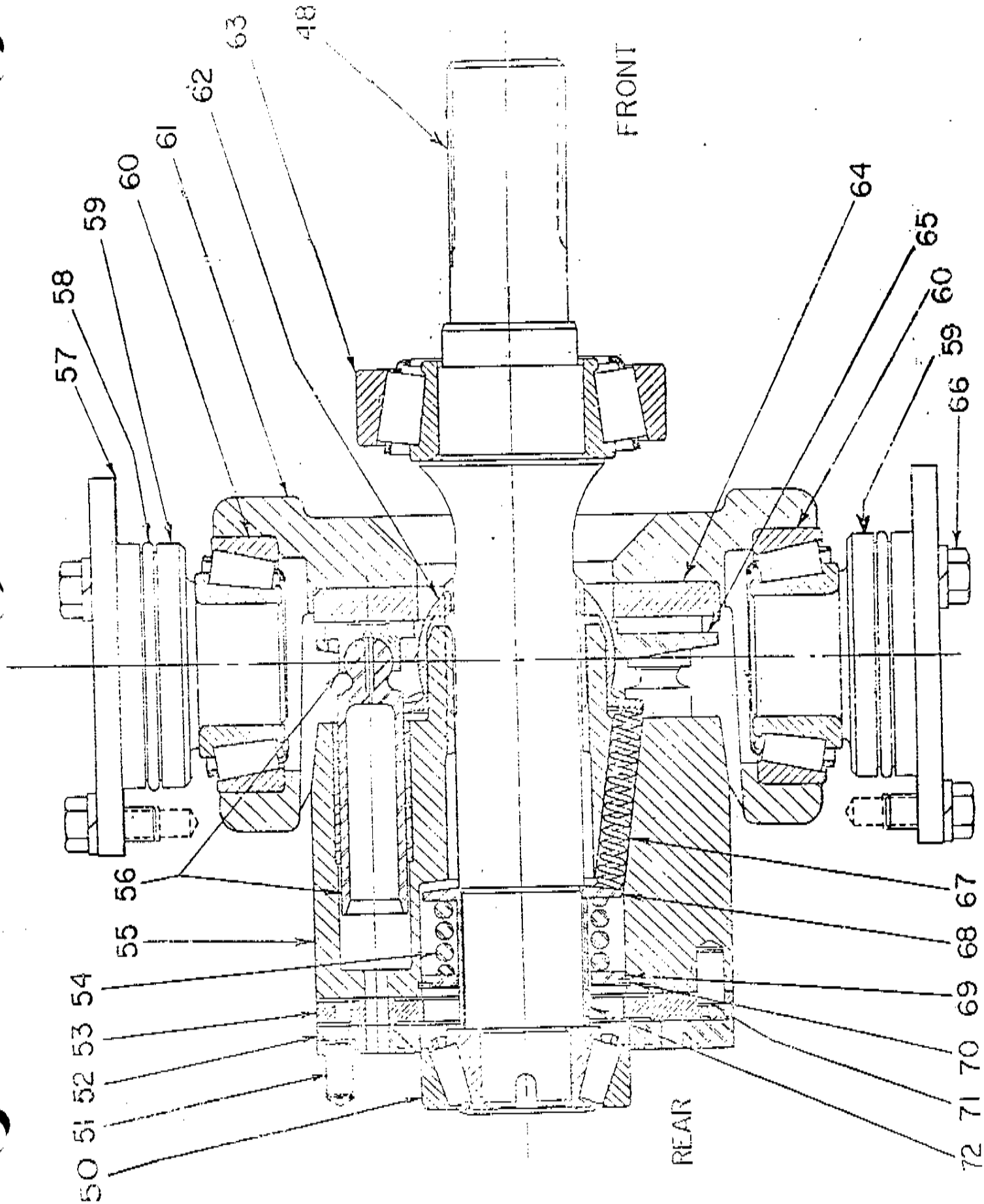
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PUMP REASSEMBLY

The primary thing to keep in mind when assembling any piece of hydraulic equipment is cleanliness. The same care and cleanliness should be extended to the parts of the pump that would be extended to the injectors of a diesel engine. Just prior to assembly, each part, old and new and especially those with lapped surfaces, should be carefully, but thoroughly, scrubbed to remove any trace of dirt or lapping compound. As the parts are assembled they should be liberally covered with the type oil the pump will eventually operate in. Never allow two unlubricated surfaces to move against each other.

The following is a step-by-step procedure to follow in reassembling the pump.

1. Replace Bearings, if necessary (Items #50, #60, #63).

   If necessary, replace any of the four tapered Bearings. This should be done with care. If possible they should be pressed rather than driven into place.

BEARING FITS

Bearing		Mating Part	Fit
Front Item #63	Cup*	Front Cover (Item #43)	Slip
	Cone	Drive Shaft (Item #46)	Press
Rear Item #50	Cup	End Cap (Item #16)	Slip
	Cone**	Drive Shaft (Item #46)	Press
Trunnion Item #60	Cup	Swash Plate (Item #61)	Press
	Cone	Trunnion (Item #59)	Slip

* See procedure for establishing shaft end play Step #3.

** Do not press the cone of the Rear Bearing onto the Shaft until the Cylinder Block is in place, see Step #19, or unless the drive shaft end play is to be checked, see Step #3.

2. Set preload on Trunnion Bearings (Item #60).

   If either a new Swash Plate (Item #61), Trunnion (Item #59), or Trunnion Bearings (Item #60) were replaced or if the plastic Trunnion Gaskets (Item #57) were lost, it will be necessary to establish the desired preload on the Trunnion Bearings as follows.

A. Remove the "O" Rings from the Trunnions.

B. Return the same thickness of Gasket (Item #57) to each Trunnion that was present when the pump was disassembled.

C. Slip the Trunnion Bearing Cones onto the Trunnions.

D. Place the Swash Plate (Item #61) in the Housing, lining up the bearing races with the Trunnion bores in the Housing (Item #39).

E. Insert the Trunnions, minus the "O" Rings, into the Housing and Swash Plate. The clearance between the Trunnions and their bores in the Housing is small, therefore, it is easy to bind the Trunnions as they are being put into place. A plastic hammer may be used to lightly tap the Trunnions as an aid in assembly.

F. Tighten one Trunnion Bolt (Item #66) on each Trunnion.

G. Attach a spring scale to either of the two bores for the Swash Plate Pin (Item #41). With the proper thickness of Trunnion Gaskets, it will require between 3 and 4 pounds pull to move the Swash Plate. Add or subtract Gaskets (Item #57) until this reading is obtained. Gaskets should be added or subtracted evenly to each side. The total thickness of Gaskets on one Trunnion should not exceed the total thickness of Gaskets on the other by more than .005".

H. When the proper preload is established, remove the Trunnions from the Housing.

3. Set Shaft end play. (Should be .003" to .013")

If a new Drive Shaft (Item #48), End Cap (Item #16), Front Cover (Item #43), and Front Bearing (Item #63) are used, the Shaft end play should be checked as follows.

A. Press the Cone of both the Front and Rear Bearings onto the Drive Shaft.

B. Install the End Cap Gasket (Item #15) and End Cap (Item #16).

C. Tighten two of the End Cap Bolts to 27-30 ft.lbs.

D. Put the Front Cover Gasket (Item #42) onto the Housing.

E. Place the Drive Shaft in the Housing with the Cone of the Rear Bearing in its Cup.

F. Place the Front Cover (Item #43) into place.

G. Tighten at least one bolt (centrally located) on each side to 27-30 ft. lbs.

H. The end play of the Shaft can now be checked and should be between .003" and .013".

4. Assemble the Servo Pistons (Item #35).

NOTE: If the old Swash Plate (Item #61), the two Servo Piston Assemblies (Items #27 thru #41), and the two Servo Sleeves (Item #17) are to be reused, they should all be returned to the same position they were removed from. See Step #13 for the correct procedure to follow to set the neutral position of the Swash Plate if any of these parts are replaced with new or if the parts have become mixed up.

A. Check the grooves on the O.D. of the Servo Piston (Item #35) making sure there are no burrs or foreign material present.

B. Place the Servo Control Spring (Item #28) in the I.D. of the Servo Piston (Item #35).

C. Insert the Spring Guide (Item #27) into the Servo Control Spring.

D. Insert the 1/4-20 screw (Item #29) into the Washer (Item #30) and drop both into the I.D. of the Spring Guide so the screw threads extend thru the hole in the end of the Guide.

E. Compress the Servo Control Spring until the 1/4-20 screw can be engaged and tightened into the Servo Piston.

F. Place the Servo Piston Link (Item #38) into the Clevis of the Servo Piston.

G. Insert the Servo Piston Pin (Item #37) into place, pinning the Link to the Swash Plate.

H. Fasten the Servo Piston Pin into place with two Snap Rings (Item #36).

I. Assemble the other Piston Assembly in the same manner.

5. Attach the Servo Piston Assemblies to the Swash Plate.

A. Lay the Swash Plate flat on the workbench and place the free end of the Servo Piston Links (Item #38) into the two Clevises provided on the Swash Plate. The joggle in the Servo Piston Link should be arranged so that the Pistons are "stepped" outward from the center line of the pump.

B. Insert the two Swash Plate Piston Pins (Item #41) thru the Clevis of the Swash Plate, pinning both Links to the Swash Plate.

C. Fasten the pin in place with two Snap Rings (Item #40).

6. Attach the Control Link (Item #7) to the Swash Plate.

A. Position the Control Link (Item #7) in the Clevis provided in the Swash Plate.

B. Insert the Clevis Pin (Item #6) into place pinning the Link to the Swash Plate.

C. Fasten the Pin in place with two small Snap Rings (Item #5).

7. Install the Swash Plate (Item #61).

A. Set the pump Housing on the bench with the Front Cover opening facing you and the opening for the Control upward.

B. Insert the Swash Plate with the Servo Piston Assemblies and Control Link attached into the Housing. As this is done, the two Servo Pistons should be placed into the openings provided for the Servo Sleeves. This should be done with care to prevent damage to the Pistons.

NOTE: Make sure the Swash Plate is positioned so that the Control Link (Item #7) is next to the opening provided in the Housing for the Control Assembly (Item #14). and pointing toward the End Cap (rear) end of the Housing.

8. Install the Trunnions.

A. Cover the Trunnion "O" Rings (Item #59) with grease and put them in place on the Trunnions. The grease is used to prevent the "O" Ring from being damaged as the Trunnion enters the Housing.

B. Place the Trunnions thru the bores in the Housing and into the Swash Plate. The clearance between the Trunnion and its bore is small and it is, therefore, easy to bind the two parts together. A plastic or babbit hammer may be used to lightly tap the Trunnion "home", if necessary.

C. Tighten the Trunnion Bolts (Item #66) to 27-30 ft. lbs.

9. Install the Servo Sleeves (Item #18).

A. Cover the "O" Rings (Items #33 and #34) with grease and put them in place on the Sleeves.

NOTE: "O" Ring (Item #34) is slightly smaller in O.D. than (Item #33) and goes in the groove toward the open end of the Sleeve.

B. Turn both Sleeves into the Housing until the scribed lines on the Sleeves and those on the Housing line up. These lines should have been scribed at the factory during the original assembly or at the time of disassembly. If the Swash Plate, all parts of the Servo Piston Assemblies and both of the Servo Sleeves are to be returned to the pump and not replaced with new parts, lining up the scribed marks will return the Swash Plate to its neutral position.

10. Setting neutral position of Swash Plate.

If any of the parts mentioned in Step #9B were replaced with new parts or as a check to make sure the Swash Plate is in absolute neutral, the following procedure should be used.

A. Turn both Servo Sleeves into the Housing as evenly as possible, until all angular play is taken out of the Swash Plate. This will happen when the Servo Sleeves are both just touching the Spring Guides (Item #27). Do not turn the Sleeves in beyond this point causing any compression of the Servo Control Spring (Item #28).

Using a depth mike measure from the machined surface of the Housing, which makes contact with the End Cap Gasket, to the machined surface of the Swash Plate. This is the surface against which the Thrust Plate bears. The measurement should be made at two points equally spaced from the center line of the pump and as near to the outside diameter of the machined recess as possible. Measure one side then the other. Note which side is low and back off (turn counterclockwise) the Servo Sleeve nearest this side 1/8 - 1/4 turn. Turn the other Sleeve in (clockwise) a like amount or until the angular free play is again removed from the Swash Plate. Repeat this process until the machined recess of the Swash Plate is absolutely parallel to the machined surface of the Housing which touches the End Cap Gasket and there is absolutely no angular free play in the Swash Plate.

C. Install the Sleeve Retainer (Item #31).

Use the Socket Head Set Screws (Item #32) previously removed. Use a screwdriver to set Retainer in slot in the Sleeve to prevent the sleeve rotation.

11. Install the Control Assembly (Item #14).

A. Put the Control Gasket (Item #4) in place.

B. Cover the three "O" Rings (Item #12) with grease to hold them in place and put them in the recesses provided in the Control Valve Housing.

C. If used, press the Orifice Plug (Item #11) into "O" Ring in the middle port in the Control Valve Housing.

D. Place the Swash Plate Link (Item #7) between the "Follow-Up" Linkage of the Control.

E. Put the small Snap Ring in the groove in the Clevis Pin (Item #9) and insert it thru the "Follow-Up" Links and the Swash Plate Control Link.

F. Place the small Washer (Item #8) on the Clevis Pin.

G. Insert the small Cotter Pin (Item #10) thru the Clevis Pin. Do not use the old Cotter Pin.

H. Fasten in place using the proper bolts (Item #13). Tighten to 85-90 in.lb. NOTE: Be sure to put the proper length bolt in the correct hole.

12. Install the Thrust Plate (Item #64).

Place the Thrust Plate into the machined recess in the Swash Plate. The chamfered side goes against the Swash Plate. The clearance between this Plate and its recess is small, therefore, care should be taken to insure it lies flat.

13. Install the Drive Shaft (Item #46).

If the Cone of the Rear Bearing was pressed onto the Drive Shaft to establish the shaft end play, it should be removed at this time. The cone of the Front Bearing should be in place. Slide the Shaft thru the I.D. of the Swash Plate from the Front Cover End taking care not to move the Thrust Plate out of position.

14. Install the Front Cover Gasket (Item #42).

15. Install the Front Cover (Item #43).

Tighten the bolts that hold it in place to 27-30 ft.lbs.

16. Assemble the Cylinder Block.

A. If a new Cylinder Block (Item #55) is used or if the old Block was completely disassembled, it will be necessary to assemble the Spring Seat (Item #68), the Block Spring (Item #54), the Spring Retainer (Item #69) and Retaining Ring (Item #70) into the Block as follows.

(1) Place the Spring Seat (Item #68) into the Block. The chamfered side of this part goes toward the spline end of the Block.

(2) Drop the Block Spring into the Block.

(3) Place the Spring Retainer (Item #69) on top of the Block Spring with the notched side toward the face of the Block.

(4) Secure a bolt at least approximately an inch longer than the Block. Slide a washer (or washers) with an O.D. larger than the I.D. of the Block Spline. Slide this bolt thru the Block and place a washer (or washers) on the other end that is slightly smaller in O.D. than the O.D. of the Spring Retainer (Item #69).

Tighten a nut onto the bolt until the Block Spring is compressed enough for the Spring Retainer to move past the groove for the Retaining Ring (Item #70).

(5) Assemble the Retaining Ring into the slot provided in the I.D. of the Block and remove the bolt and washers.

(6) Put nine (9) Slipper Retainer Springs (Item #67) into the Block. Place the Retainer Guide (Item #62) on the Block. The missing tooth of the spline in the Guide should be lined up with the missing tooth in the spline of the Block. Cover the Guide with oil.

(7) Place the nine (9) Piston Assemblies (Item #56) into the Slipper Retainer (Item #65).

(8) Assemble the nine (9) Pistons into the Block. This is easiest done by holding the Slipper Retainer over the Block so that the Pistons will barely enter the bores. When all nine (9) Pistons are started in the bores, lower the Slipper Retainer to the Retainer Guide and push all nine (9) Pistons down into the Block.

(9) Cover the Cylinder Block and Piston Assemblies liberally with clean oil.

17. Assemble the Cylinder Block Assembly into the Housing.

A. Lay the Housing on its side with the control up (Item #14).

B. Turn the Drive Shaft until the missing tooth in the spline is on top.

C. Pull the Drive Shaft as far as possible toward the front of the pump and clamp a collar or "C" clamp onto it to prevent it being bumped or pushed toward the rear of the pump as the assembly continues.

D. Pick up the Cylinder Block Assembly and slide it into the Housing and onto the Drive Shaft. It is necessary to line up the missing tooth on the Shaft with the missing tooth in the Retainer Guide and the Cylinder Block. Push the Block all the way "home".

18. Install the Spring Guide (Item #72).

This sleeve-like part is used as a spacer. It should slide freely onto the Shaft and into the Block. If it does not drop into place freely, the Block Spring is not concentrically positioned and should be moved into proper position with a screwdriver.

19. Press the cone of the Rear Bearing (Item #50) onto the Shaft.

This can either be done with an Arbor Press or a bearing puller. In either case, make sure the tool is clean and no dirt will fall into the pump. As the cone is pressed into position, the Retainer Springs (Item #67) will be compressed and the whole Cylinder Block Assembly will drop a quarter to three quarters of an inch, depending on the size pump, into the Housing.

20. Install the Bearing Plate (Item #53).

Set the pump Shaft downward on the block of wood used during disassembly.

NOTE: Do not bump or push the Shaft toward the rear of the pump. If this happens, the Shaft Spline can become disengaged with the Spline in the Retainer Guide and the two parts can then become out of phase. The Retainer Guide will, in this case, be extensively damaged as the End Cap is bolted in place.

Put the Dowel Pins (Item #71) into the Block. Make sure the face of the Cylinder Block and the Bearing Plate are absolutely free of any foreign material such as dirt, lint, etc. These two parts should lie absolutely flat against the other.

Cover the Bearing Plate liberally with oil.

21. Place the Valve Plate (Item ~~#51~~ 52a) on the End Cap (Item #16).

Put the Cup of the Rear Bearing (Item #50) and Dowel Pin (Item #51) in place in the End Cap. Make sure the End Cap and Valve Plate are free of any dirt or lint that would prevent the parts from laying absolutely flat against the other.

Cover the face of the End Cap with a thin, even coat of oil soluable grease such as vasoline. Put the Valve Plate (Item #52) into place and press it down into the grease.

22. Put the End Cap Gasket (Item #15), "O" Ring (Item #17), and Dowel Pins (Item #26) into place on the Housing. Coating the Gasket with a thin, even coat of light grease will make it easier to remove the Gasket should it be necessary to again service the pump in the future.

23. Install the End Cap (Item #16).

Carefully pick up the End Cap, with the Valve Plate in place, turn it over, and lower it in place until the Valve Plate touches the Bearing Plate. This should be done carefully so as not to dislodge the Valve Plate.

Tighten the End Cap Bolts to 27-30 ft.lbs.

24. Install the Charge Pump (Item #22).

A. Lay the pump on its side.

B. Place the Charge Pump Gasket in place, making sure the opening for the Charge Pressure Relief Valve of the Charge Pump is not covered. This Gasket can be put on in four different positions, three of which are wrong.

C. Make sure the Aluminum Spacer is in place over the Idler Shaft.

D. Line up the angle of the tang on the Charge Pump Shaft with the slot in the main pump Drive Shaft.

E. Insert the Charge Pump Drive Shaft into the main pump End Cap and the Charge Pump Body onto the Spread Pin used as a locator pin.

F. Tighten the four bolts that hold the Charge Pump in place to 85-90 in.lbs.

25. Install the Shaft Seal (Item #1).

A. Cover the Shaft Seal "O" Ring (Item #1F) with grease and put it in place in the I.D. of the Shaft Seal (Item #1D).

B. Check the end of the pump Drive Shaft for any burrs that would cut the Shaft Seal "O" Ring. Slide the Shaft Seal (Item #1D) onto the Shaft and press it into place with the exist lip against the inner race of the Front Bearing.

C. Place the Seal Springs (Item #1B) in place in the Seal Retainer (Item #1D). The Stop Pin (Item #46) should be driven securely into the Seal Retainer.

D. Cover the Housing Seal "O" Ring (Item #1A) with grease and put it in place on the skirt of the Housing Seal (Item #1C).

E. Press the Housing Seal (Item #1C) into the Retainer with the fingers, engaging the Stop Pin in the slot in the Housing Seal. Press down on the Housing Seal, compressing the Seal Springs. Release the pressure and make sure the Seal Springs push the Housing Seal back to its original position. This will insure an even pressure being maintained between the Seal halves.

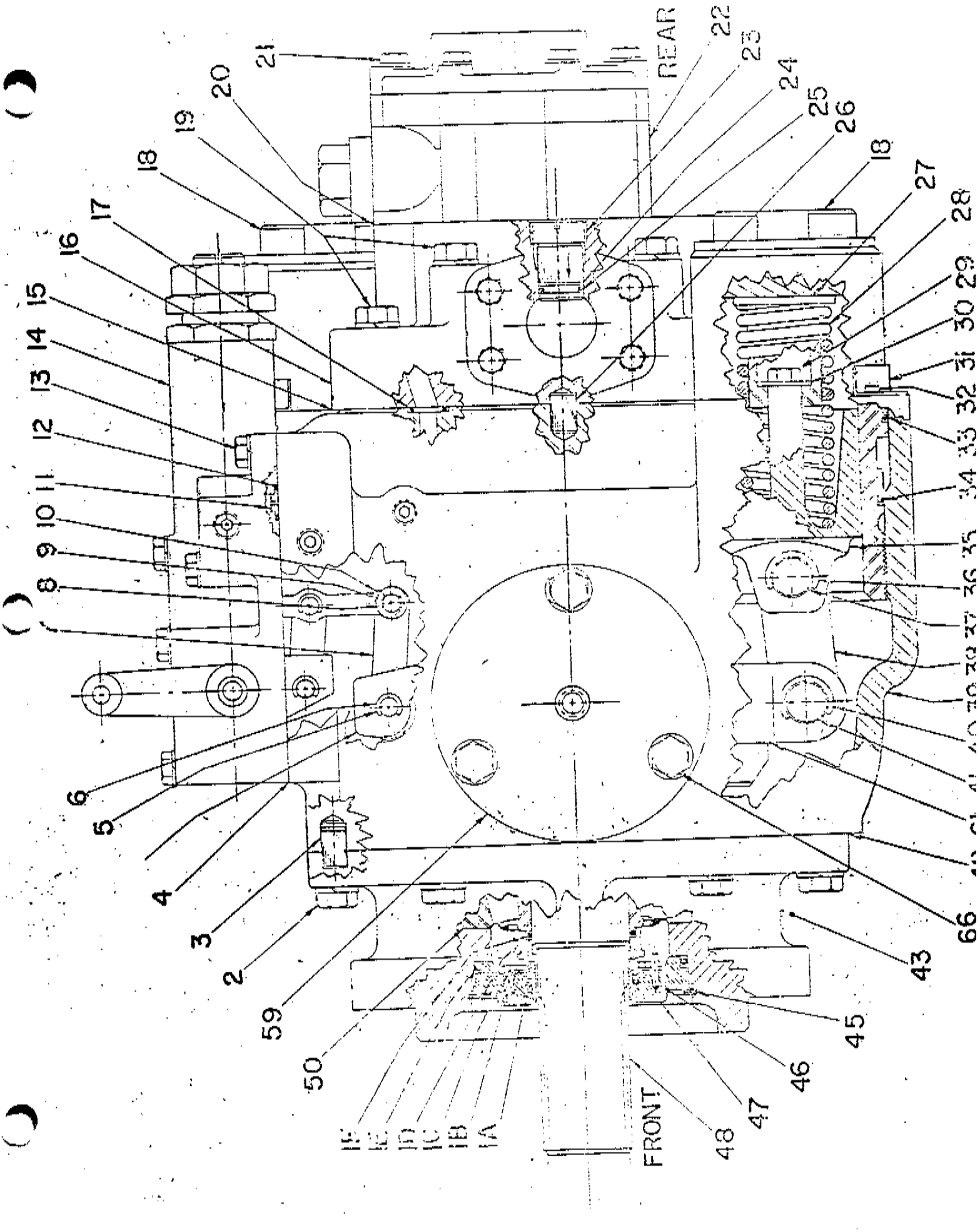
F. Cover the Retainer "O" Ring (Item #1E) with grease and put it in place on the O.D. of the Retainer.

G. Push the Retainer, as assembled in Steps D thru F, into the Housing far enough to allow the Snap Ring (Item #45) to be put in place.

H. Using a large set of Tru-Arc pliers, place the Seal Snap Ring (Item #47) in place.

26. Using a lever, such as a pair of Channel Locks, rotate the pump Shaft several revolutions by hand, making sure it turns fairly free.

If the pump is to be in storage for any length of time, it should be completely filled with oil and all ports plugged. Just prior to being installed on a vehicle, the Shaft should again be rotated several revolutions by hand.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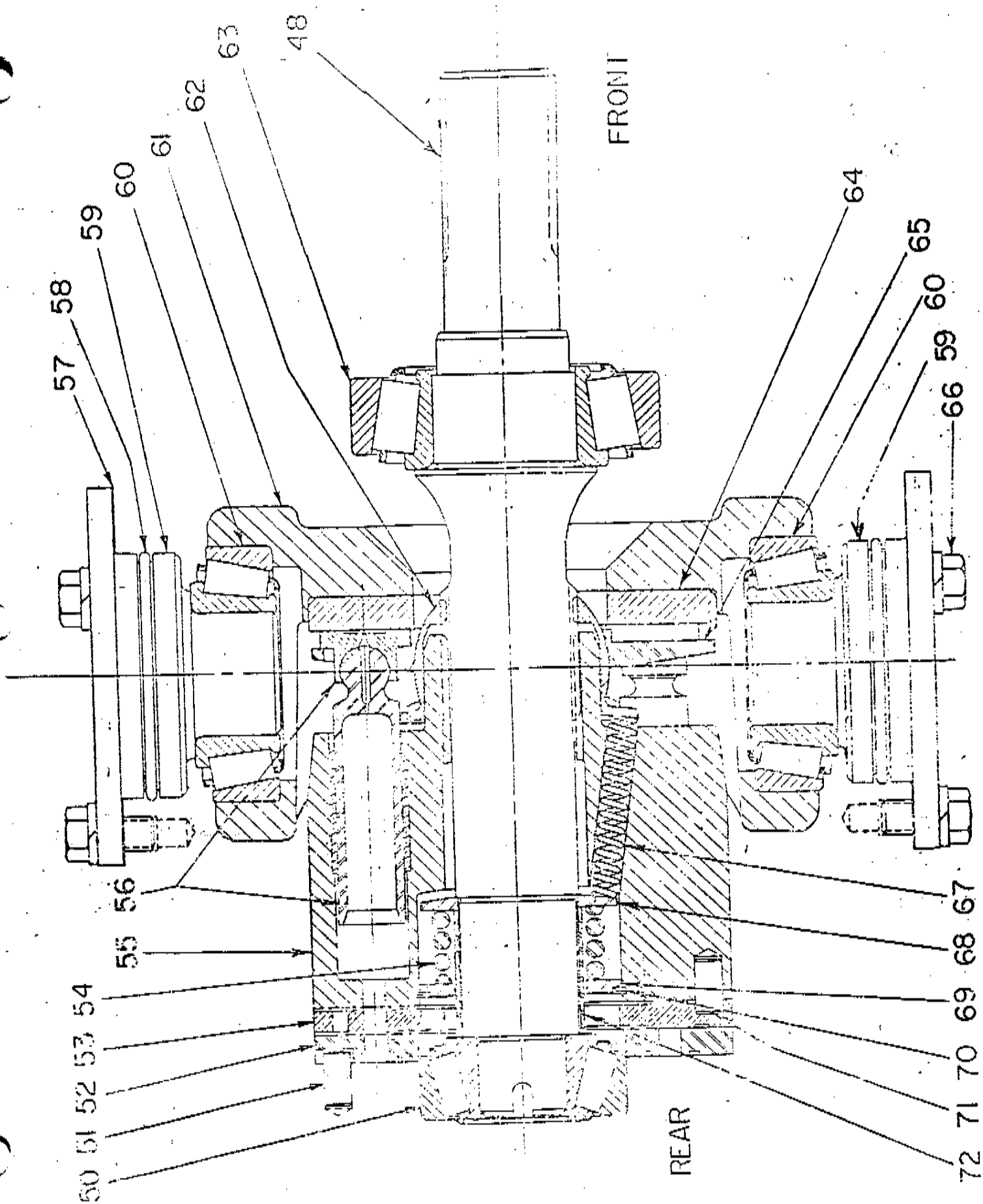
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SUNDSTRAND HYDRO-TRANSMISSION
SERVICE BULLETIN
TROUBLE SHOOTING PROCEDURE

I. System* Will Not Operate in Either Direction.

Cause	Remedy
A. System Low on Oil	1. Check oil level in reservoir and replenish, if necessary. 2. Locate and fix leak or leaks causing the loss of oil.
B. Faulty Control Linkage to Pump	1. Check the entire linkage to make sure it is connected and free to operate as it should.
C. By-Pass Valve (If Used) Stuck Open	1. Make sure the By-Pass or Dumping Valve is closing properly. NOTE: Do not confuse By-Pass Valve with the high pressure relief valves located in the motor manifold.
D. Disconnected Coupling	1. Check to see that the coupling from the prime mover to the pump and the coupling from the motor shaft to the driven mechanism is not slipping or broken.
E. Low or Zero Charge	1. Install pressure gage (capable of 600 PSI) in either the 1/8 N.P.T. in the charge pump or in the side of the main pump.. NOTE: Charge pressure may also be taken by attaching a pressure gage to the port on the rear of the motor manifold (See Bulletin #0438). This port, however, is blocked by the shuttle valve when the hydrostatic system is in neutral: therefore, the system must be operating either in the forward or reverse direction to obtain a pressure.

* The word "system" denotes both pump and motor plus all lines, valves, filters, controls, etc., leading to and in between them.

reading at this port. Operating pressure may also be taken at the manifold as explained in Bulletin #9438.

2. Set pump speed to at least 500 RPM. Charge pressure should read at least 120 PSI or more when main pump control lever is in pumping position and fluid motor is operating.

3. Low charge pressure may be caused by:

   a. Charge pressure relief valve in charge pump stuck open.

   b. Filter or suction line clogged.

   c. Charge pump drive shaft sheared.

   d. Internal damage to pump or motor.

F. Low and Fluctuating Charge Pressure

1. Air in system. Air will also cause system to be noisy. Check all fittings, especially around filter, in the suction line and locate the point or points where air is being drawn into the system. Tighten fittings and joints where air leaks exist.

2. Charge pressure relief valve in the motor manifold stuck open. Pressure will be normal when the pump is in neutral but low when in stroke.

3. Internal damage to pump or motor.

G. Faulty Check Valves

1. Remove the two ball check valves located in the end cap of the pump under the charge pump and check the following: (See Bulletin #9422)

   a. Check valve to see if poppet or ball is missing.

   b. Check to see if the valve seat is eroded.

NOTE: If any of the above conditions exist, replace both check valves with Sundstrand Part #9800402.

H. Internal Damage To Pump or Motor — indicated by:

1. Low or zero charge pressure (See I-E). Charge pressure may also fluctuate rapidly.

2. Maximum obtainable operating pressure in both forward and reverse is less than the normal relief valve setting. Charge pressure, which will also be lower than normal, will drop to zero when the maximum pressure is reached.

3. Pieces or flakes of brass in the reservoir filter.

4. Noisy unit (pump or motor).

NOTE: If either unit is considered damaged, the other unit should be carefully checked.

II. System Operates in One Direction Only.

Cause	Remedy
A. Faulty Control Linkage	1. Check the entire linkage to make sure it is connected and free to operate as it should. 2. Make sure the control "stop", if used, is not out of adjustment.
B. High Pressure Relief Valve Stuck Open	1. Switch the two high pressure relief valves. If the system operates in the direction which would not operate before, one of the pressure relief valves is stuck open. These valves should be examined and the stuck valve disassembled and cleaned. Reset relief valves and retest system.
C. One Check Valve Faulty	Follow instructions given in I-G.
D. Faulty Directional Control Valve (Located on Pump)	NOTE: Do not change the position of any of the set nuts or the slotted plug on the end of the control unless it is necessary to remove the control valve spool.

1. Disconnect control linkage at directional control arm. Move the control arm back and forth by hand. If it moves freely with no resistance, the control valve should be removed and checked for broken parts or a bent control shaft.

III. Neutral Difficult or Impossible to Find.

Cause		Remedy
A. Faulty Linkage	1.	Disconnect control linkage at directional control arm. If system now returns to neutral, linkage to the control is out of adjustment in some way.
B. Control Valve Out of Adjustment	1.	See II-D NOTE.
	2.	If the hex nuts and slotted plug have been moved out of adjustment, the following steps must be taken:
	a.	Disconnect control linkage at the control.
	b.	Remove the two 1/8" pipe plugs on the rounded part of the control housing.
	c.	Loosen the smaller of the two jam nuts and back the slotted plug off two turns (counter-clockwise).
	d.	Turn the slotted plug in (clockwise) and feel it make contact with the spring seat on the control spool. It should just touch the spring seat.
	e.	Hold the slotted plug with a large screwdriver to prevent it from moving and tighten the small jam nut.
	f.	Loosen the larger of the two jam nuts.
	g.	Turn the hex behind this jam nut in or out until by looking into the two 1/8" N.P.T. holes, the slots on the control spool appear to be symmetrically located in each hole.

h. Replace pipe plugs and start system. If system creeps in either direction, turn hex behind large jam nut in or out until neutral is found.

i. Hold hex to prevent it from moving and tighten large jam nut.

j. Reconnect control linkage.

C. Servo Cylinder Out of Adjustment

1. Remove the two sleeve retainers.

2. Return the servo cylinders to their original position. When the proper position of the servo cylinder was established at the factory, both the servo cylinder and the pump housing were marked with corresponding scribed lines. Matching these lines will return the cylinder or cylinders to their original position and re-establish neutral.

3. Re-install the two sleeve retainers and restake, if necessary.

NOTE: Servo cylinders do not move out of position on their own. If they get out of adjustment, it has to be done by human hands.

IV. System Operating Hot (Reservoir Temperature Above 180°).

Cause	Remedy
A. Oil Level Low	1. Replenish oil supply.
B. Oil Cooler Clogged	1. Clean cooler air passages.
C. Oil Cooler Being By-Passed	1. Cooler by-pass valve, if used, stuck open.
D. Clogged Filter or Suction Line	1. Replace filter. Clean or replace suction line.
E. Internal Leakage (Usually accompanied	1. One of the high pressure relief valves may be stuck partially open. Install gages and read the charge

by loss of acceleration and power)

pressure and operating pressure in both directions. If the operating pressure is 200 PSI or more, lower than normal in one direction and normal in the other, switch the high pressure relief valves. If the low pressure also switches to the opposite side of the circuit, disassemble, check and clean the faulty (low relief valve. Reinstall and recheck. Charge pressure should be normal at all times.

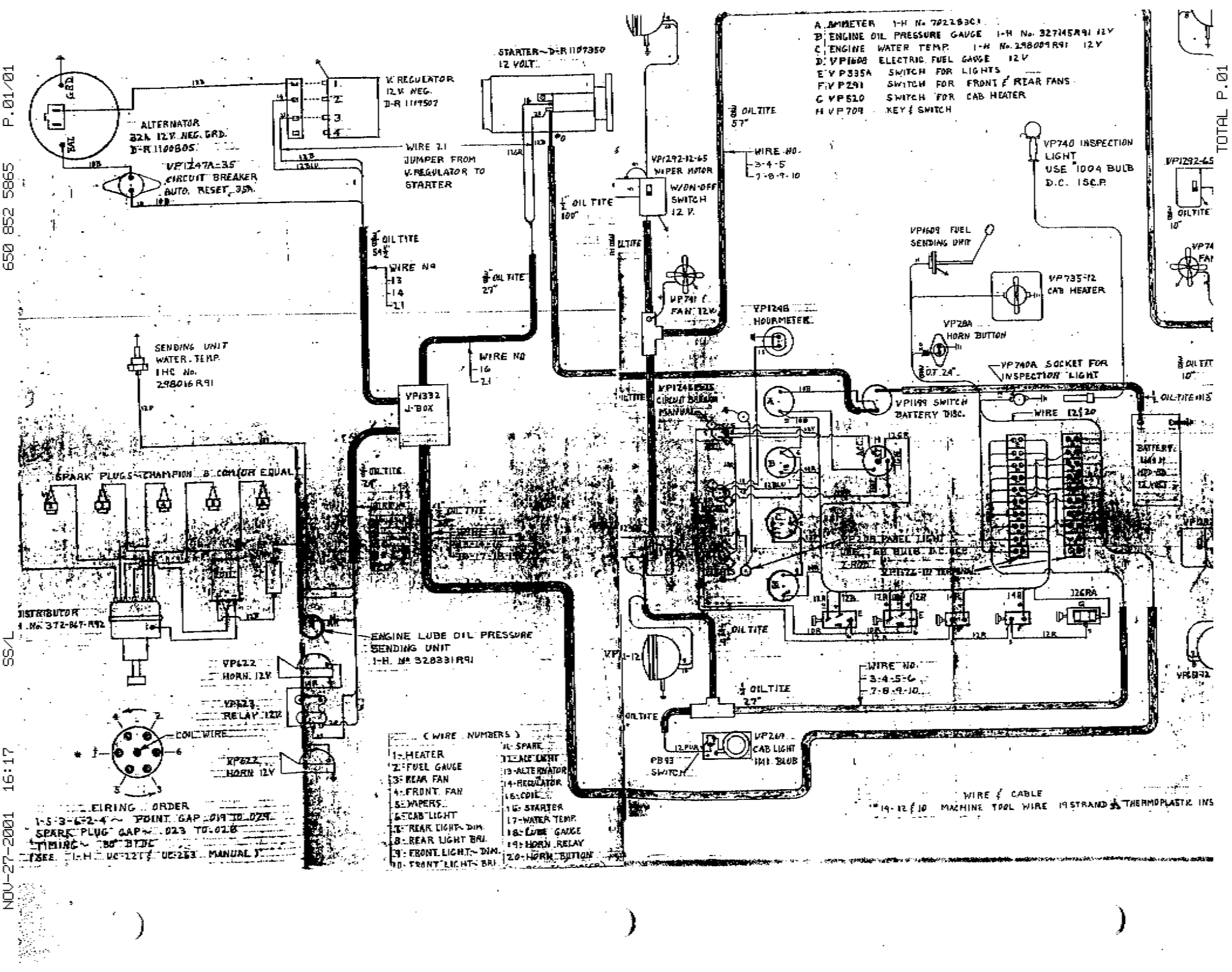
2. Internal parts of pump or motor (or both) worn. Maximum obtainable operating pressure lower than the normal high pressure relief valve setting in both directions. When this pressure is reached, the pressure will drop to or very near to zero. System will also be noisy at this point with the most noise issuing from the unit that is most worn. If either unit is considerably worn or damaged, the other unit should also be carefully checked. Replace the worn parts in the units affected or replace the complete unit.

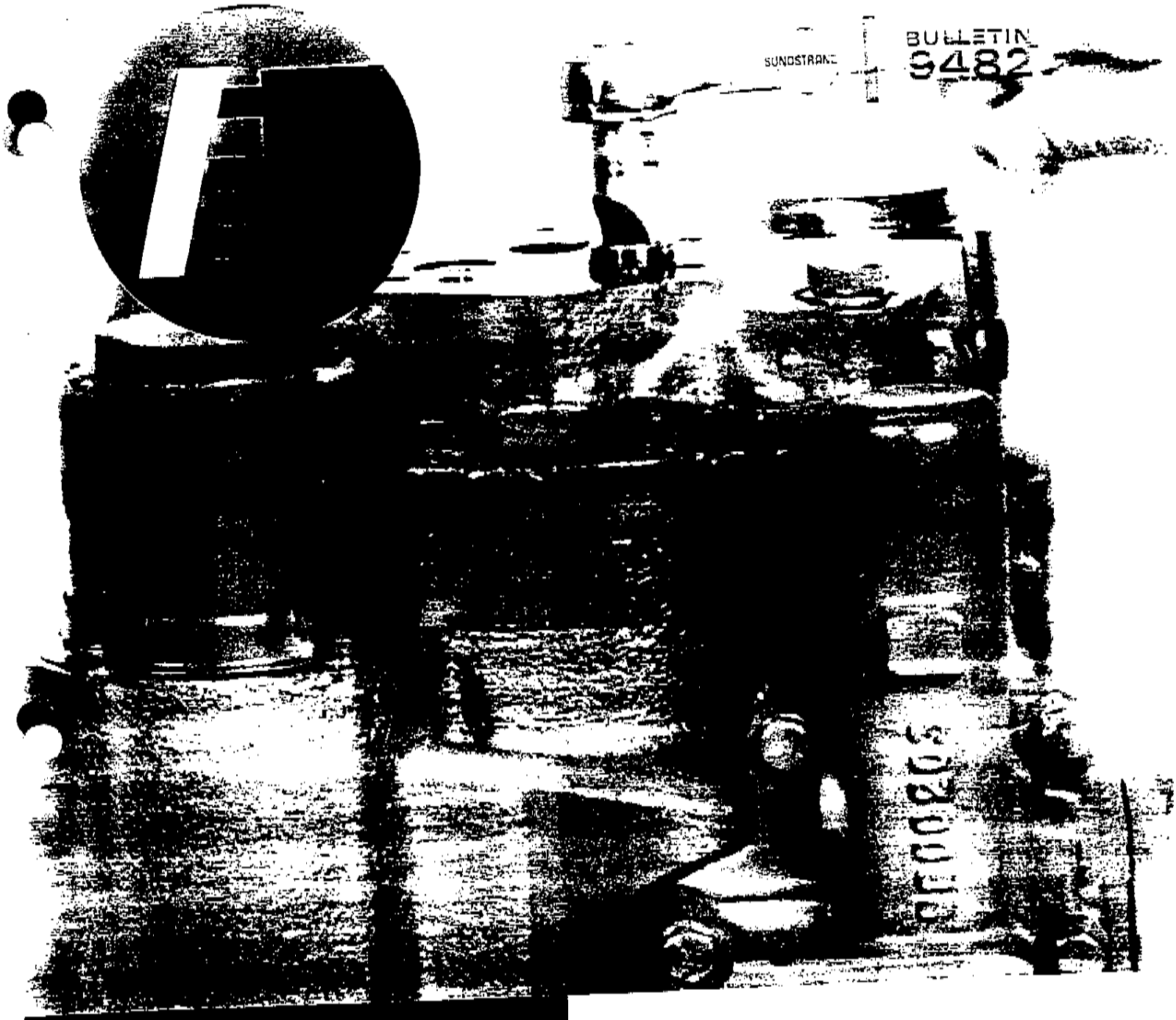
V. System Noisy

Cause	Remedy
A. Air in System	1. Low oil level in reservoir.
	2. Suction line between reservoir and charge pump, including suction filter, leaking at some point and allowing air to be drawn into system. A good indication of air in the system is a considerable amount of foam in the reservoir.
	3. End of return line within the reservoir not submerged in oil.
B. Hose or Tubing Not Properly Insulated	1. Make sure hose or tubing is not touching any metal that can act as a sounding board for the natural hydraulic hum.
	2. Insulate hose and tubing clamps with rubber to absorb noise.

Acceleration and Deceleration Sluggish.

	Cause		Remedy
A.	Air in System	1.	See Step V-A.
B.	Low Charge Pressure	1.	See Step E-3.
C.	Control Orifice Plug Partially Blocked	1.	Remove the bolts that hold the control in place and check the orifice. If this is clean, remove the charge pump and blow air through the passage between the pump and control.
D.	Internal Wear or Damage	1.	See Step I-H.
E.	Engine Lugs Down	1.	Consult vehicle engine manual.





replacement of major assemblies

SUNDSTRAND·HYDRO-TRANSMISSION
DIVISION OF SUNDSTRAND CORPORATION
LA SALLE, ILLINOIS

CONTENTS

INTRODUCTION

It may become necessary to replace a part of the hydrostatic transmission. The following procedures will assist you. As with all hydraulic equipment, cleanliness is very important. Before removing any of these components, clean the immediate area to prevent dirt from getting into the transmission. While working on the transmission, it would be a good opportunity to inspect all hoses for tightness, change the filter and oil, if necessary, and replace any oil lost during servicing.

Variable Displacement Pump
Model
23-2036

Ref #	Qty	Part Number	Part Description
1	4	9007200-2536	Hex Head Screw
2	4	9009610-2850	Washer
3	1	9801038-03	Charge Pump Assembly
4	1	9801074	Charge Pump Gasket
5	2	9800648	Check Valve Assembly
5A	2	9800721	Check Valve
5B	2	9004101-0150	'O' Ring
6	4	9007200-4430	End Cap Screw
7	4	9007200-4438	End Cap Screw
8	8	9009610-4778	Washer
9	1	9230285	End Cap
10	1A/R	9230482	Shim
11	1	9230127	End Cap Gasket
12	1	9001415-0002	Rear Bearing
13	1	9004800-3110	Pin
14	1	9230197	Valve Plate
15	1	9230288	Bearing Plate
16	2	9004800-3708	Pin
17	1	9004101-0140	'O' Ring
18	1	9230239	Pump Housing
19	7	9007200-2530	Hex Head Screw
20	2	9007200-2526	Hex Head Screw
21	9	9009610-2850	Washer
22	1	9003560-2500	Jam Nut
23	1	9009660-2500	Washer
24	1	9800916	Control Handle
25	1	9800917	Spacer
26	1	9004600-0607	Cotter Pin
27	1	9009610-2850	Washer
28	1	9800893	Control Valve Assembly
29	1	9800432	Orifice
30	3	9004101-0140	'O' Ring
31	1	9801076	Pin
32			Not Used
33	1	9800138	Control Valve Gasket
34	1	9005001-1200	Plug
35	1	9005101-4400	Hex Head Plug
36	1	9004201-2500	'O' Ring
37	6	9007200-4416	Hex Head Screw
38	6	9009610-4778	Washer
39	2	9230018	Trunnion
40	A/R	9230019	Shim
41	2	9004100-2320	'O' Ring
42	2	9001430-0001	Trunnion Bearing
43	1	9230469	Drive Shaft
44	1	9001435-0001	Front Bearing
45	1	9800210	Connecting Link
46	2	9006320-0025	Retaining Ring

47	1	9004830-2501	Pivot Pin
48	4	9006320-0062	Retaining Ring
49	2	9004830-6201	Pin
50	1	9230124	Front Cover Gasket
51	2	9004800-3708	Pin
52	1	9230128	Front Cover
53	12	9009610-4778	Washer
54	4 & 8	9007200-4422 & 4424	Hex Head Screw
55	1	9240147	Seal
56	2	9004102-1360	'O' Ring
57	8	9220242	Seal Spring
58	1	9004610-1212	Groove Pin
59	1	9004100-2380	'O' Ring
60	1	9240093	Seal Retainer
61	1	9006201-0387	Retaining Ring
62	4	9007300-1906	Socket Head Screw
63	2	9220419	Sleeve Retainer
64	4	9005001-0600	Plug
65	2	9220691	Servo Sleeve
66	2	9004100-1440	'O' Ring
67	2	9004100-1420	'O' Ring
68	2	9007200-2508	Cap Screw
69	2	9009625-2601	Washer
70	2	9220479	Spring Guide
71	2	9220436	Servo Spring
72	2	9510014	Servo Piston
73	2	9004830-6201	Pin
74	4	9006320-0062	Retaining Ring
75	2	9230151	Servo Link
76	1	9230247	Pilot
77	1	9006250-0250	Retaining Ring
78	1	9230014	Spring Retainer
79	1	9230015	Spring Guide
80	1	9230011	Cylinder Block Spring
81	1	9230013	Spring Seat
82	9	9230012	Retainer Spring
83	1	9220760	Pin
84	1	9230248	Cylinder Block Assembly
85	1	9230158	Retainer Guide
86	1	9230234	Slipper Retainer
87	9	9230241	Piston Assembly
88	1	9230235	Thrust Plate
89	1	9230225	Swashplate

CHA

	PART NUMBER	DESCRIPTION
1)	9006150-1190	Back-up Washer
2)	9004101-1190	"O" Ring
3)	9004100-0200	"O" Ring

MANI

SHUTTL

HI-PR
RELIEF

ROUNDNESS TIR	PARALLELISM TIR	BASIC LOCATION (R)	
ANGULARITY TIR	STRAIGHT,FLAT TIR	PERPENDICULARITY TIR	

MATL.

DESIGN JOB NO. 55

DRAFTSMAN S.N.M

CHECKER

PROJECT ENG

SECTION MGR

RELEASED BY

acement main pump

BULLETIN 9482
SECTION 1

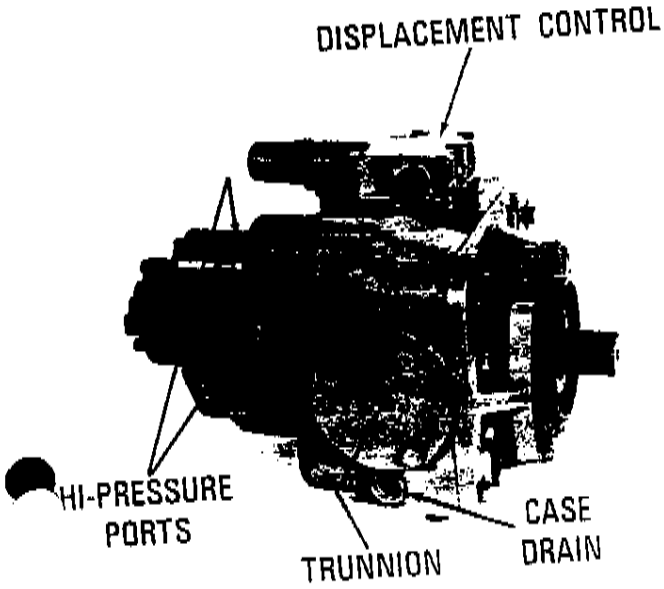


FIG. C

A. REMOVAL (See Figure C)

1. Remove control linkage from Displacement Control.

2. Loosen reservoir cap to relieve any system pressure.

3. Place drain pan or bucket under the pump.

4. Remove the five (5) hoses. Place clean plastic plugs in lines and pump ports to prevent oil loss as each line is removed. (Do not use rags).

5. Remove the four (4) mounting bolts.

6. Place a sling around pump or an eye bolt in the trunnion. remove pump from application.

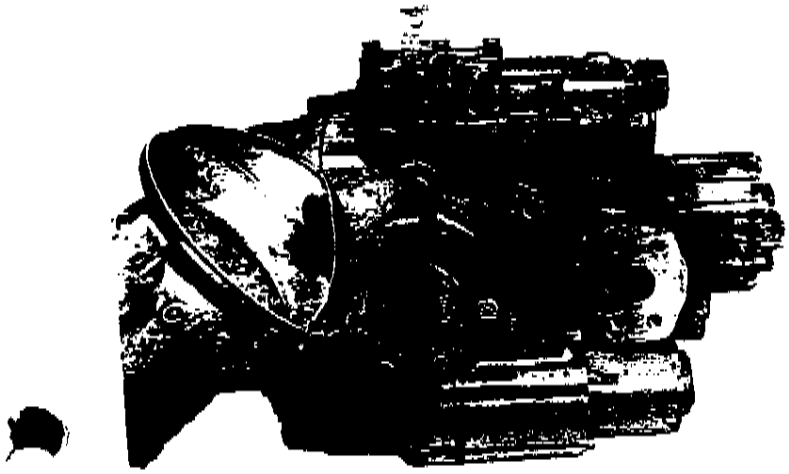


FIG. D

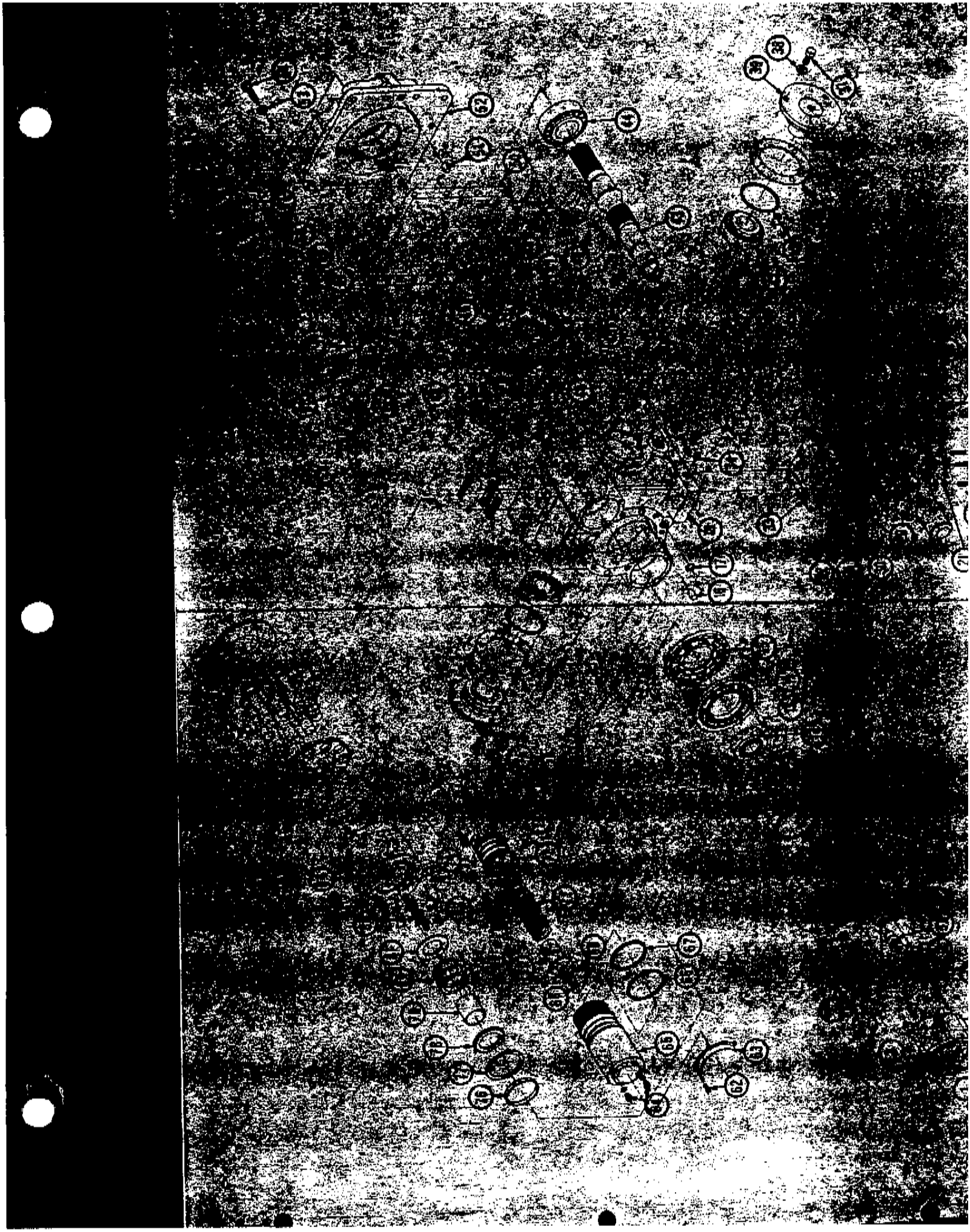
B. INSTALLATION

1. Mount pump on application using the four (4) mounting bolts.

2. Remove all shipping plugs as lines are installed. See plumbing diagram at rear of bulletin for correct line installation. Be sure lines are tightened to correct torques.

NOTE: *It is recommended the pump case be filled by hand to assure proper lubrication upon start-up. See Fig D.*

3. Install control linkage to Displacement Control. Consult owners manual for setting of neutral.



replacement of charge pump

BULLETIN 9482
SECTION 3

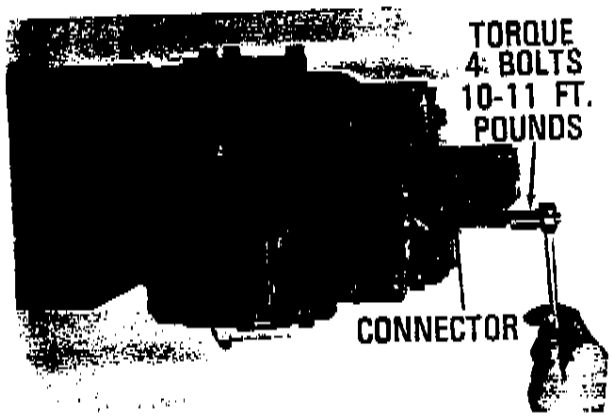


FIG. G

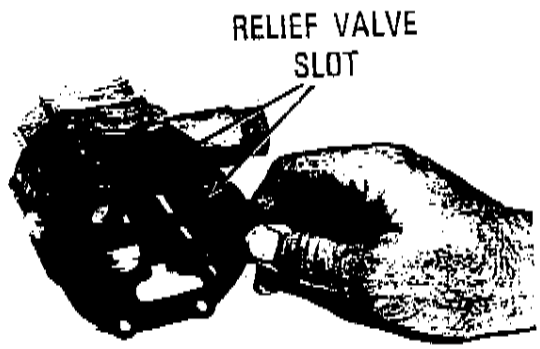


FIG. H

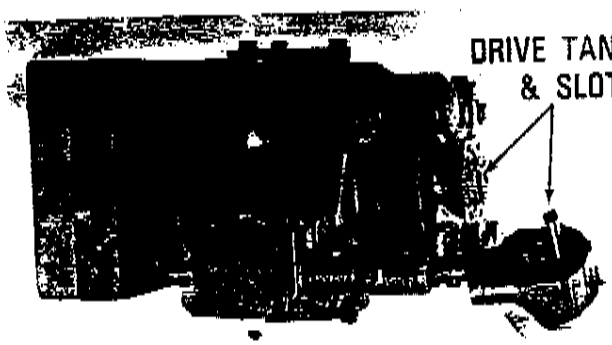


FIG. I

A. REMOVAL

1. Remove the line connecting charge pump to reservoir and plug with clean plastic plug to prevent draining of reservoir.

2. Remove the four (4) capscrews.

NOTE: *Do not remove the capscrew at the top and bottom of the charge pump, as these hold the charge pump together. See Figure G.*

3. Pull charge pump away from main pump.

NOTE: *Do not use sharp tools to pry charge pump from main pump. A scratch on the sealing surface may cause a leak. If charge pump does not pull loose, tap lightly on side of charge pump with plastic hammer to break paint or gasket seal.*

B. INSTALLATION

1. Install a new gasket. Make sure the new gasket is properly installed. See Figure H. If positioned wrong the relief valve port is covered by the gasket.

2. Line up the drive tang on charge pump shaft with slot in main pump shaft. See Figure I. The charge pump should assemble freely with main pump freely. Do not force charge pump into position.

3. Torque the four (4) mounting bolts to 10-11 ft. lbs.

replacement of charge pump

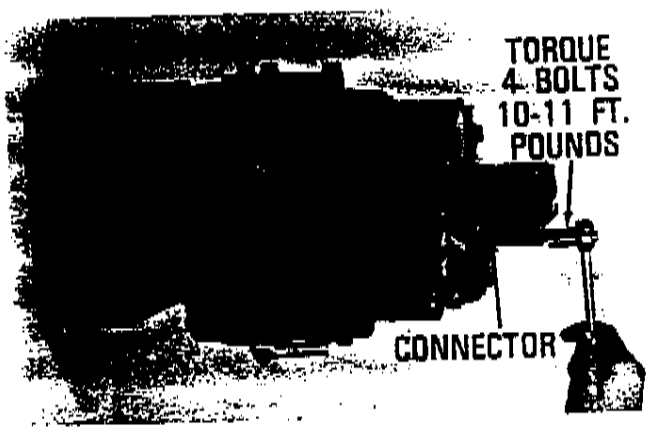


FIG. J

4. Install connector to charge pump. Torque 14-20 ft. lbs.

5. Install line from reservoir to connector on charge pump.

NOTE: *Excessive tightening may distort charge pump and cause leaks or malfunction.*

6. Check oil level in reservoir.

replacement of check valves

FIG. K

FIG. L

A. REMOVAL

1. Remove charge pump. See Section 3.

2. Using a drag link, unscrew check valve from end cap. See Figure K.

NOTE: *There are two check valves. It is advisable to replace both check valves when servicing unit. See Figure L.*

FIG. M

B. INSTALLATION

1. Prior to installation, inspect "O" rings for damage. See Figure M. Apply a light coat of oil.

On 20 through 23 series pumps, torque check valves 30-40 ft. lbs.

On 24 through 27 series pumps, torque check valves to 80-90 ft. lbs.

NOTE: *The checks must be below the face of the end cap. See Figure K.*

REPLACEMENT PROCEDURE
CHARGE PUMP CHECK VALVES

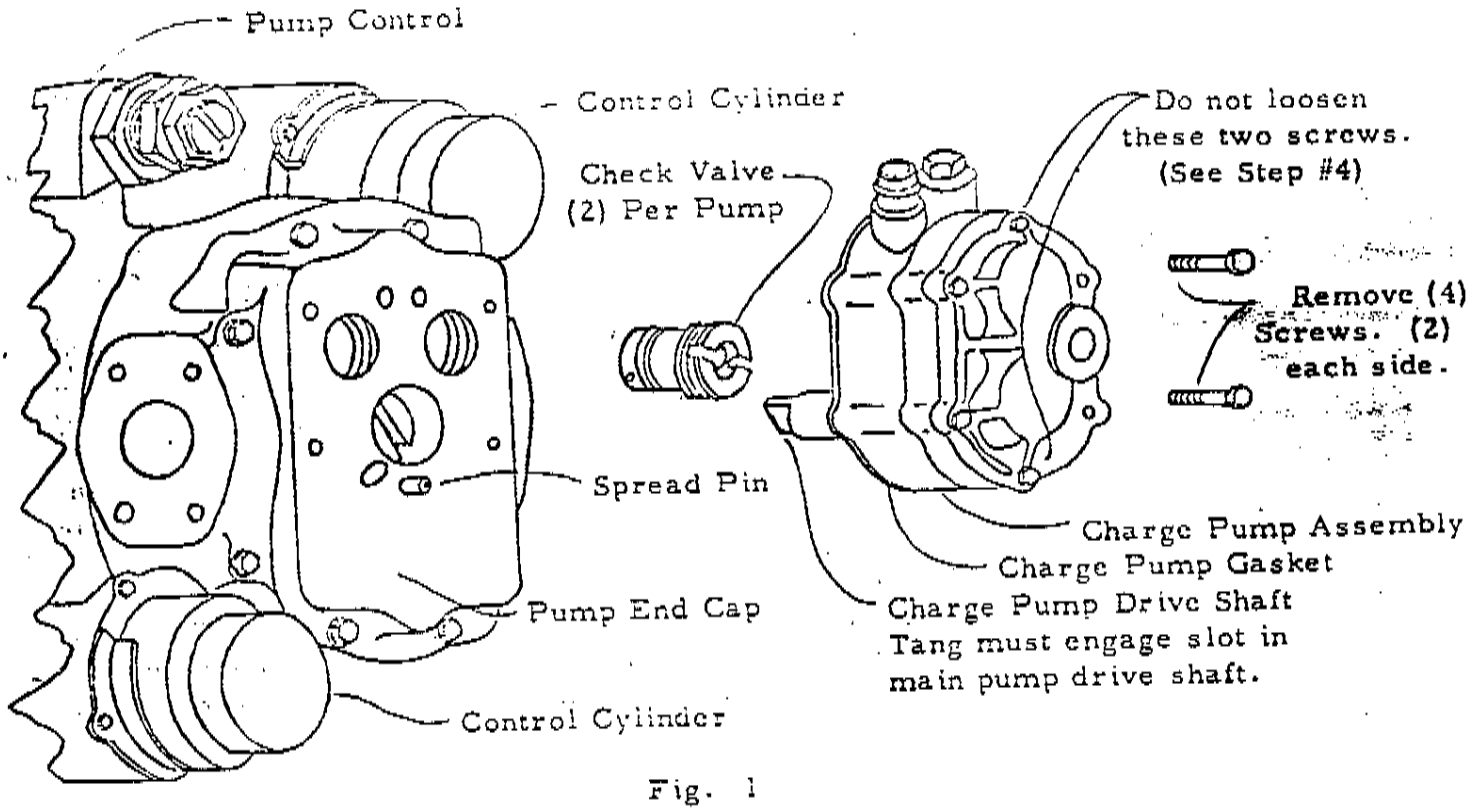


Fig. 1

Replacement Procedure

1. Wash all dirt from pump.

2. Disconnect the suction hose between the reservoir and charge pump at the charge pump. Raise the loose end as high as possible to minimize the loss of oil.

3. Disconnect the pump case drain hose (not the large high pressure hose) at the top case drain port in the pump. This is the hose running between the pump and the cooler or reservoir. Raise the loose end as high as possible to minimize the loss of oil. The high pressure hose is shown disconnected in Fig. 1 for clarity only.

4. Remove two 1/4-20 hex. head cap screws from each side of the charge pump. Do not loosen the two screws located one at the top and one at the bottom. These two screws are used to hold the charge pump together and are not attached to the end cap.

5. Remove the charge pump assembly. This assembly is located by a spread pin. It may be necessary to wiggle the charge pump to overcome the friction of this spread pin. Do not use a screwdriver or anyother tool to force the

(Over)

charge pump away from the main pump. NOTE: Note position of tang on charge pump shaft. If the shaft is then turned, it can be returned to its original position, making reassembly of the tang into the slot of the main pump drive shaft much easier.

6. Remove the two check valves. This can be done with a wide bladed screwdriver or flat piece of metal approximately 3/32" thick by 5/8" wide used as a screwdriver.

7. Install the two new check valves. Coat the "O" rings with light grease to prevent their being damaged as the valve is screwed into place. Make sure the valves are turned in tight.

8. Install the charge pump gasket. If the gasket is damaged in any way, it should be replaced.

9. Install the charge pump. Slip body onto the spread pin and tighten the four bolts. Torque the bolts to 70-75 inch pounds. NOTE: The tang on the charge pump drive shaft must be aligned with and engaged into the corresponding slot in the main pump drive shaft.

10. Reconnect hoses.

11. Replace lost oil.

12. Start vehicle engine at a slow idle for approximately two minutes. Check oil level to be sure its at the level called out in the vehicle specifications.

Sundstrand Hydro-Transmission
Bulletin #9422
January, 1965

replacement of displacement control valve

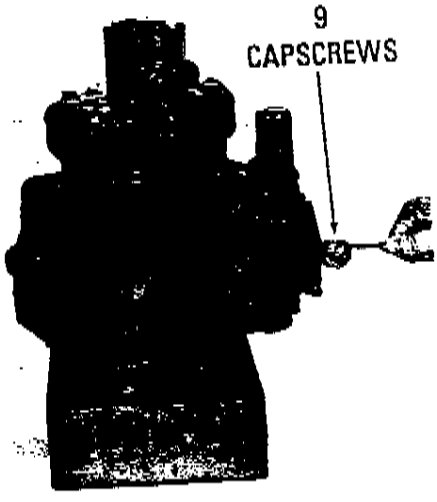


FIG. U

FIG. V

A. REMOVAL

1. Remove control linkage from Displacement Control Valve Assembly.

2. Remove the nine (9) capscrews holding valve to pump housing. See Figure U.

3. Lift Valve away from housing and remove cotter pin and washer. See Figure V. Remove pin from link in pump.

NOTE: *Caution must be exercised to prevent these parts from falling into pump.*

4. Remove orifice and "O" rings from control valve. See Figure W.

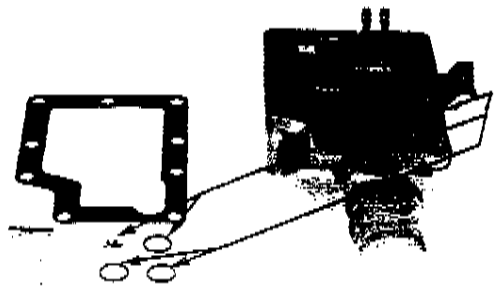


FIG. W

B. INSTALLATION

1. Install orifice, tip down, and new "O" rings in Control Valve.

2. Install new gasket on control valve dry.

3. Install pin in control valve links and pump link.

4. Place washer in pin, install cotter pin and spread.

NOTE: *Caution should be exercised during installation of these parts to prevent them falling into unit. Lightly coating parts with petroleum jelly (not grease) is advised.*

5. Install valve to pump and torque the nine (9) bolts 10-11 ft. lbs.

replacement of motor or pump shaft seal

BULLETIN 9482
SECTION 8

FIG. Y

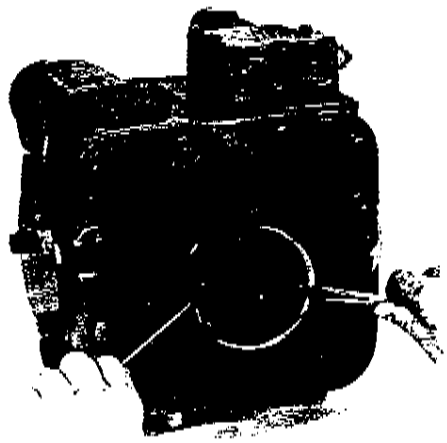


FIG. Z

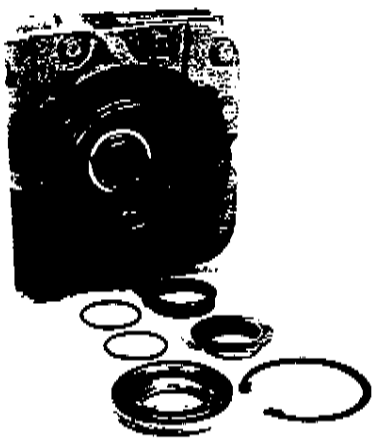


FIG. AA

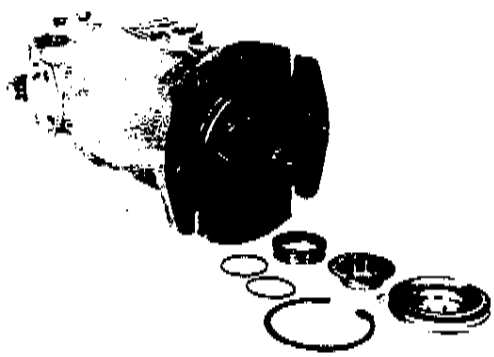


FIG. CC

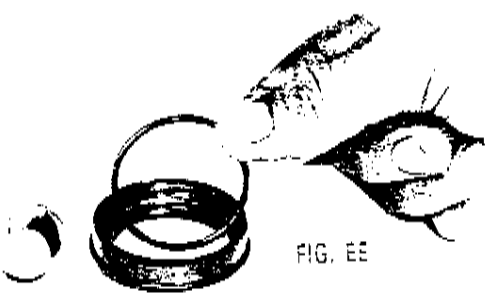


FIG. EE

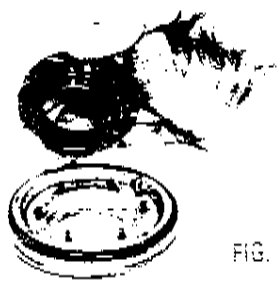


FIG. DD

A. REMOVAL

1. Remove unit from installation. See Section 1 or 2.

2. Insert Tru-Arc #7 pliers in snap ring holes, compress ring and roll out. See Figure Y.

3. Remove aluminum seal retainer with screwdriver. See Figure Z.

4. Remove steel stationary seal (This generally comes out with retainer). See Figure AA.

5. With fingers or two screwdrivers remove bronze rotating part of seal from drive shaft. See Figure FF.

6. See Figure CC and account for all the parts shown.

B. INSTALLATION

NOTE: *Always replace both stationary and rotating parts of seal. Do not mix old and new parts.*

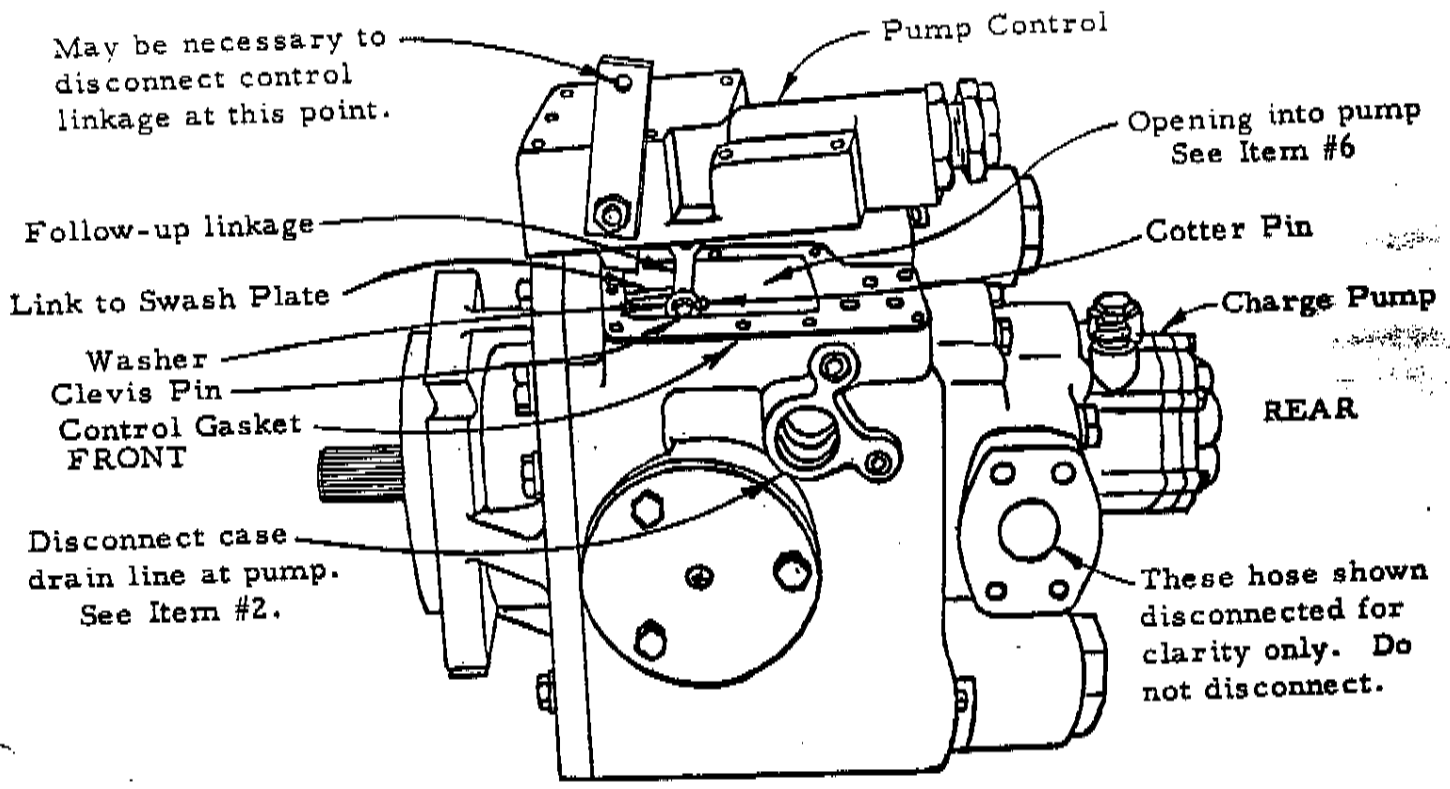
1. Wash and clean air dry new seal parts.

2. Install the seal springs into aluminum seal retainer. Install new "O" rings dry on stationary steel part of seal and place seal into retainer so notch is located in pin in retainer. See Figure DD.

3. Install large "O" ring on O.D. of retainer. See Figure DD.

4. Install new "O" ring in I.D. of bronze rotating part of seal. See Figure EE.

INSTALLATION PROCEDURE
ORIFICING PUMP CONTROL TO SLOW RESPONSE
CHANGING CONTROL OR CONTROL GASKET



1. Wash all dirt from top of pump.

2. Disconnect the case drain hose which runs between the pump and reservoir at the pump and raise as high as possible to keep loss of oil at a minimum.

3. Remove (9) 1/4"-20 screws.

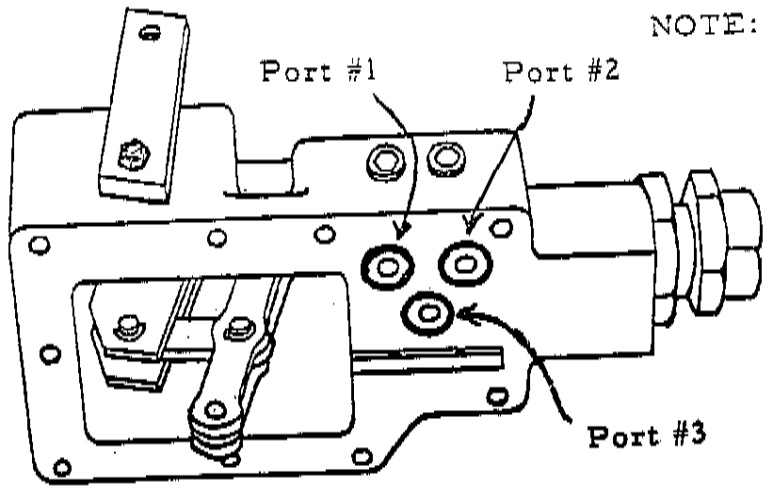
4. Raise pump control as high as possible and tilt toward front of pump. This should be done carefully to prevent damaging the pump control gasket and to make sure the three "O" rings remain in place and are not jarred loose to fall inside the pump. (See #2)

5. Inspect the control gasket and if it is damaged, it should be replaced.

6. Immediately cover the opening into the pump with a clean shop towel. This will prevent anything from falling into the internal parts of the pump while installing the orifice.

7. To replace the control valve or the control valve gasket take the following steps:

   (a) Cover the opening into the pump housing with a clean cloth.
   (b) Remove the orifice, if used, and the three "O" rings from the control valve housing.
   (c) Remove the small cotter pin.
   (d) Remove the small washer.



NOTE: All three ports contain an "O" ring.

Orifice plug pressed into and held by "O" ring in Port #3.

View of Underside of Pump Control
Fig 2

(e) Remove the clevis pin. NOTE: The clearance between this pin and the three holes it passes thru is very small. Wiggling the control valve from side to side as the pin is pulled will ease the job of removing it. Do not drive it out.

(f) Put the new gasket in place. Coating the gasket with light grease will help hold it in place.

(g) Place the link to the swash plate in the follow up linkage and push the clevis pin into place.

(h) Put the washer on the clevis pin.

(i) Put the cotter pin into place. Do not reuse the old cotter pin.

8. Place the three "O" rings into place in the control valve housing. It is recommended that the "O" rings be coated with light grease to hold them in place.

9. Insert the orifice plug into the I.D. of the "O" ring in Port #3 (See Fig. 2). NOTE: The orifice is provided with a small projection or guide on one side. This guide is designed to fit into the drilled hole in the control valve housing. The orifice plug is so designed that the slight press between it and the I.D. of the "O" ring will hold the orifice plug in place while the pump control is being bolted back down.

10. Remove the cloth covering the opening into the pump.

11. Swing the follow-up linkage as far as possible toward the rear of the pump and lower the pump control to its normal position.

12. Replace the (9) 1/4"-20 bolts, tightening them SNUGLY. Replace case drain hose

13. Replace lost oil and run system for a short period and recheck for proper oil level in reservoir.

14. Reconnect the linkage to the control and if necessary, readjust the mechanical "stops" so that the mechanism driven by the pump operates at the desired speed.

Sundstrand Hydro-Transmiss
Bulletin #9423
January, 1965

VARIABLE PUMP OR VARIABLE MOTOR DISASSEMBLY PROCEDURE

1. Remove pump from the installation or vehicle.

   A. If possible, the pump should be steam cleaned while still on the vehicle or installation and before any hose is disconnected. If a steam cleaner is not available, wash the pump, especially the fittings, with fuel oil or suitable solvent. Do not use paint thinner or acetone. Remove any dirt from the vehicle or installation which could be accidently dislodged and enter the pump during the reinstallation procedure.

   B. Disconnect all hose. In most cases, it is recommended that the oil be discarded and replaced with new oil when the system is again started.

   C. Remove the mounting bolts and set the pump on a clean work bench. A few minutes spent cleaning off a work bench before starting to work will save time later as the work progresses. Putting a drip pan approximately 18" square by 1" deep under the pump will help to keep the oil, that is still in the pump, off the work bench and floor.

2. Remove the shaft seal (Item 1).

   A. A few pumps are designed with a seal that is held in place with four cap screws. Most seals are held in place with a large snap ring (Item 45). Remove either the cap screws or the snap ring as the case may be.

B. In either case, once the bolts or snap ring is removed, the seal retainer can usually be removed without the use of tools. Due to the squeeze on the "O" ring (Item 1A), the seal retainer (Item 47) and the steel half of the seal (Item 1C), Items 1A, 1B and 1C will all be removed with the seal retainer. Set this group aside in a place where the seal cannot be damaged by a slip of a wrench.

NOTE: Unless the seal is going to be replaced, the lapped surface of the steel half of the seal (Item 1C) should be protected from damage at all times.

C. Remove the bronze half of the seal (Item 1D). This part is held in place by the squeeze on the "O" ring (Item 1F). It can usually be wiggled off the shaft with the fingers. A few seals incorporate a small spread pin in the drive shaft to "drive" the bronze half of the seal. In a very few cases, this pin may have worn a groove into the I. D. of the seal half. If so, hold the shaft stationary and rotate the seal half as far as it will go in the direction of shaft rotation. This will again line up the slot in the seal half with the drive pin and the seal half can be removed. However, once in awhile even after the drive pin is lined up with the slot, it may be necessary to pry the part loose by using two screw drivers. If this is necessary, make sure all pressure is applied against the sides of the seal half and that the lapped sealing surface is not damaged in any way.

3. Remove the charge pump (Item 22).

A. The charge pump is held in place by four bolts (Item 21) located along the straight sides of the charge pump. The other two bolts located on the top and bottom portion of the charge pump are used to hold the three main sections of the charge pump together when it is removed from the main pump.

B. The charge pump is "located" by a spread pin between it and the end cap of the main pump. Due to the drag of this pin, it may be necessary to "work" the charge pump up and down while pulling to separate it from the main pump. DO NOT PRY with a screw driver or other tools!

C. Remove and inspect the charge pump gasket (Item 20). If it is all right, lay is aside with the charge pump. If it is damaged in any way, it should be replaced.

4. Remove the two check valves (Item 24). The body of the check valve assembly is threaded. The whole check valve assembly can be removed by unscrewing it from the end cap. The check valves are turned in quite tight at the factory, and it may be necessary to use a small drag link socket or equivalent to remove them.

5. Remove the end cap.

A. The end cap is held by eight hex head bolts (Item 19) and is positioned by two dowel pins (Item 26). Usually as the last bolt is removed, the end cap will be pushed away from the housing a short distance. If this does not happen, it will be necessary to break it loose by the careful use of a plastic or babbit hammer. NOTE: Never force a screw driver or wedge between any two surfaces of any Sundstrand product.

B. The valve plate (Item 52) is loosely doweled (Item 51) to the end cap for position only. However, due to the extreme flatness of the face of the end cap and the mating surface of the valve plate, an oil seal will exist between these two parts causing the valve plate to cling to the end cap. On occasion, the brass bearing plate (Item 53) will, for the same reason, cling to the valve plate. Therefore, as the end cap is lifted, extreme caution should be exercised to prevent the valve plate from being damaged should it become loose and fall.

C. Set the end cap aside with the lapped surface up. The lapped surface should be protected from damage at all times.

6. Remove the end cap gasket (Item 15) and "O" ring (Item 17). If either is damaged, they should be replaced.

7. Remove the valve plate (Item 52). If the valve plate remained on the end cap, they can be separated by first washing both parts with clean fuel oil or solvent. This will break the oil seal and the parts can then be easily separated.

If the valve plate remained with the brass bearing plate in the pump, it can be removed by sliding it to one side off the valve plate and lifting.

8. Remove the brass bearing plate (Item 53). The material in this plate is relatively soft and can be easily scratched and damaged. Wash the plate with clean fuel oil or solvent to break the oil seal and lift the plate from the cylinder block (Item 55). There are drain slots milled into the back of the brass bearing plate running radially to the outside diameter.

As an aid in removing the brass bearing plate, a brass pry can be carefully inserted into one of these drain grooves and the bearing plate lifted. Do not force these two pieces apart at any other point other than at the drain slots.

9. Remove the rear bearing (Item 50). Use a standard bearing puller to pull the rear bearing. Be sure you can rotate bearing cage while pulling. Pull only on the inner race not the cage or rollers. The pump shaft should be protected from damage by placing a suitable piece of metal between the ram of the puller and the shaft. NOTE: The face of the cylinder block (Item 55) is a lapped surface and can be easily damaged by careless handling of the puller while assembling the jaws under the bearing.

10. Remove the spring guide (Item 72). This part is a sleeve type spacer and is not held in place by any mechanical tie.

11. Remove the cylinder block (Item 55). Place the pump housing (Item 39) in a horizontal position. Grasp the block with the fingers and pull. The piston assemblies (Item 56) and retainer (Item 63) usually stay in the housing and have to be removed later. However, if it is possible to remove the block with the pistons still in place, it simplifies the job.

12. Remove the slipper retainer guide (Item 62). If the pistons came out with the block as it was removed, this step has been taken care of. If it stays in the housing, rotate the guide slightly until the two splines are again lined up and slip it back down the shaft (Item 48) and out of the hous-

ing. A few pumps contain spacers located inside the guide and fitting between the guide and the neck of the cylinder block. They should be discarded and not returned to the pump during reassembly.

13. Remove the nine pistons (Item 56) and the slipper retainer (Item 65). If the pistons remained in the block as it was removed, this step has been taken care of. If they remained in the housing, insert your hand or hands, as space allows, into the housing and gather up all nine pistons. This will prevent their lodging against the sides of the housing hampering their removal. Some or all of the slippers may form an oil seal with the thrust plate (Item 64) making it necessary to pull on that piston individually to break it loose.

14. Remove the thrust plate (Item 64). This part is cradled in the swash plate (Item 61) with very little side clearance. If the pump is to be completely disassembled, it is easier to remove the thrust plate after the swash plate has been removed from the housing. If the swash plate is not going to be removed, a metal rod approximately 10" long with a small hook approximately 1/16" high on the end makes a good tool for removing the thrust plate. Two notches are provided in the I. D. of the swash plate on a plane parallel to the center line of the trunnions. These notches provide clearance behind the thrust plate permitting the engagement of the hook. By pulling first on one side and then the other, the thrust plate can be "worked" out of the swash plate and removed.

15. Remove the front cover (Item 43). The front cover is held in place by eight bolts (Item 2) and positioned by two dowel pins (Item 3). It may be necessary to jar the cover loose with a plastic or babbit hammer. Do not drive a screw driver or wedge between the cover and housing.

16. Remove the front cover gasket (Item 42). If necessary, scrape both the front cover and pump housing free of any particles of gasket material that might have remained on either.

17. Remove the drive shaft (Item 48). With the front cover removed, the shaft will easily slide out the front of the housing.

18. Remove the control valve assembly (Item 14).

A. Remove the eight cap screws (Item 13) which hold the control in place and lift the control assembly as high as possible.

B. Remove the small clevis pin (Item 9) which connects the two follow-up links on the control with the connecting link attached to the swash plate. If the control valve assembly (Item 14) is being removed without the rest of the pump being disassembled, it is strongly recommended that before removing the small cotter key (Item 10) used to hold the clevis pin, a long piece of tag wire or equivalent be run through the eye of the cotter key. This will prevent the cotter key from accidentally falling into the pump if dropped.

The clevis pin (Item 9) can now be removed. The clearance between the O. D. of the body of this pin and the I. D. of the three holes it passes through is very small; therefore, the pin does not slide out easily. Wiggling the control housing (Item 14) as you pull on the

clevis pin will make its removal easier. Here again, if the control valve assembly (Item 14) is being removed without the pump being disassembled, take care not to drop the clevis pin inside the pump housing. If you do and it cannot be fished out with a magnet, it will be necessary to disassemble the pump piece by piece until the clevis pin is found.

Lay the control valve assembly aside. Further disassembly of this valve is usually not necessary. It should be thoroughly washed and blown out with compressed air.

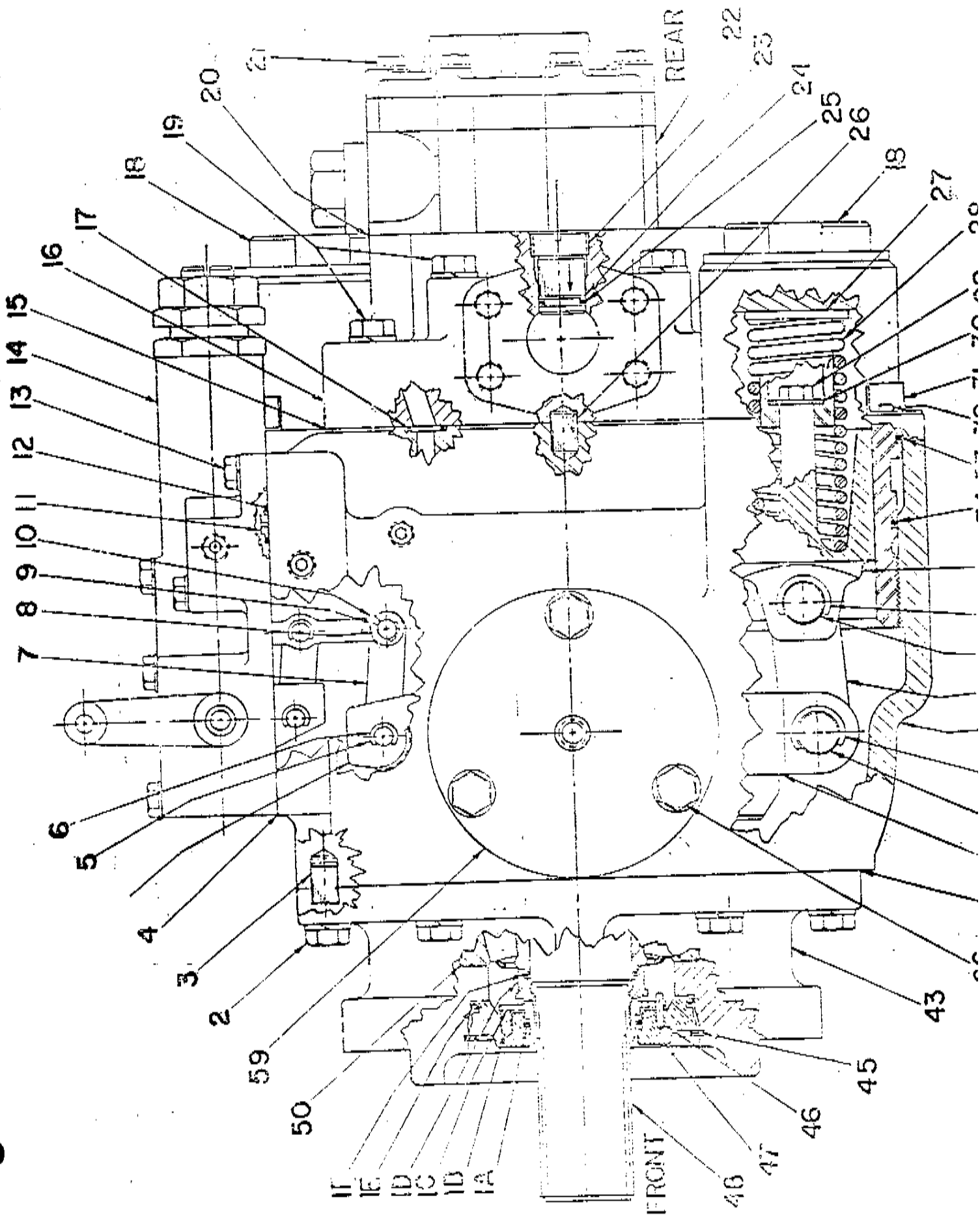
19. Remove the trunnions (Item 59). Remove the three bolts (Item 66) that hold each trunnion in place. Use a spanner wrench and rotate the trunnion back and forth with one hand as you push on the inside face of the trunnion with the other hand. It is necessary to overcome the drag of the "O" ring (Item 58) to remove the trunnion. The inner race of the trunnion bearing (Item 60) usually, but not always, comes out with the trunnion.

20. With the trunnions removed, it is now possible to lift the swash plate (Item 61) out of the housing.

The pump is now completely disassembled. All parts should be inspected. Those needing to be replaced should be replaced and those needing rework, reworked. Thoroughly wash all parts in clean solvent or fuel oil and then keep them clean. Wrap them in either clean rags or plastic. If the parts are to remain disassembled for any period of time,

they should be protected from rust and accidental damage. You can save yourself a lot of time and effort by not allowing any lapped surface to become scratched or nicked. The parts of any quality piece of hydraulic equipment do not have to be treated like the parts out of a watch; but on the other hand, due to the high pressures the pumps and motors are required to handle today, any abuse to the parts during the repair procedure will result in an inefficient or inoperative unit after it is assembled.

Sundstrand Hydro-Transmissic
Bulletin #9427
January, 1964
Revised: March, 1965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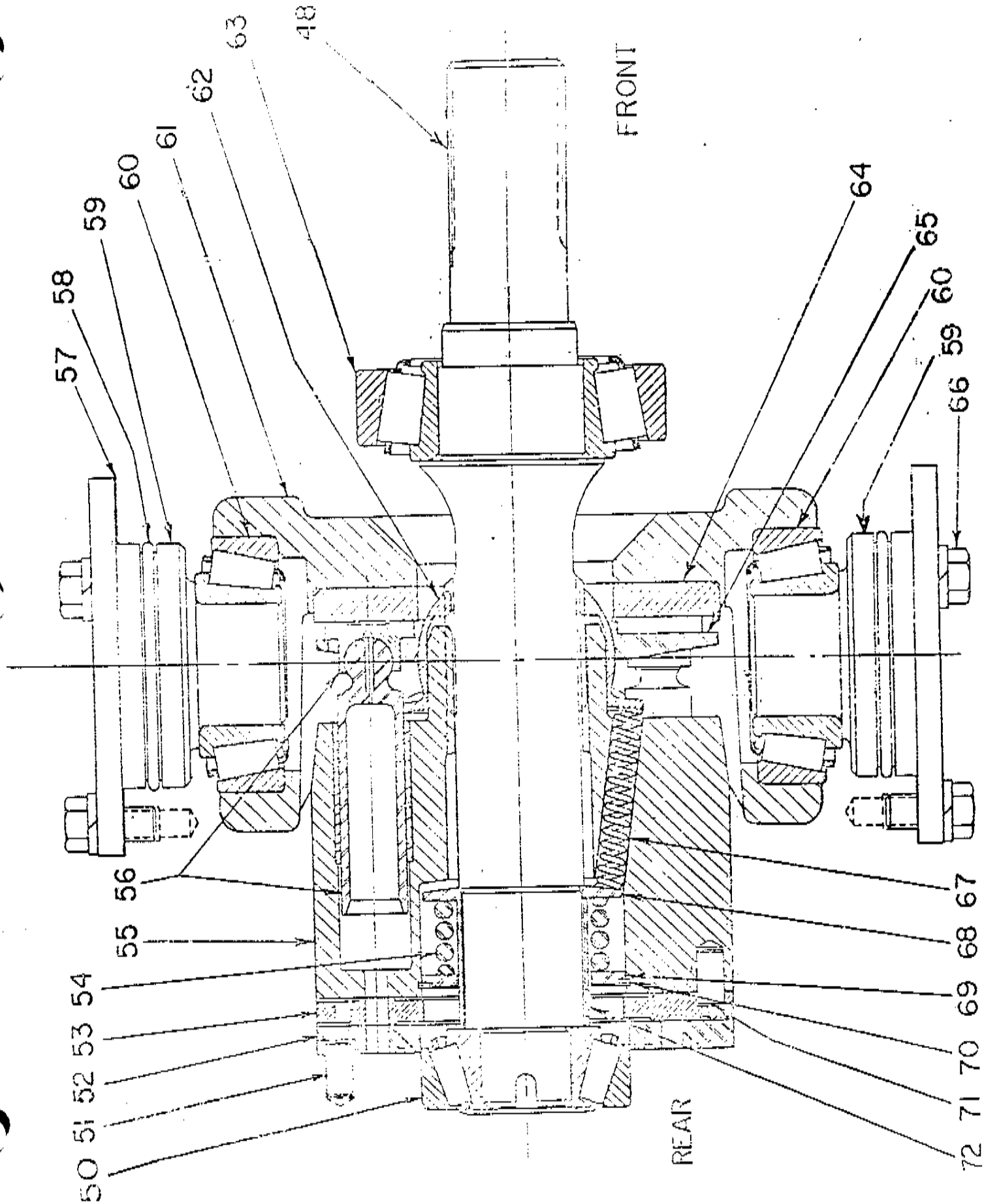
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PUMP REASSEMBLY

The primary thing to keep in mind when assembling any piece of hydraulic equipment is cleanliness. The same care and cleanliness should be extended to the parts of the pump that would be extended to the injectors of a diesel engine. Just prior to assembly, each part, old and new and especially those with lapped surfaces, should be carefully, but thoroughly, scrubbed to remove any trace of dirt or lapping compound. As the parts are assembled they should be liberally covered with the type oil the pump will eventually operate in. Never allow two unlubricated surfaces to move against each other.

The following is a step-by-step procedure to follow in reassembling the pump.

1. Replace Bearings, if necessary (Items #50, #60, #63).

   If necessary, replace any of the four tapered Bearings. This should be done with care. If possible they should be pressed rather than driven into place.

BEARING FITS

Bearing		Mating Part	Fit
Front Item #63	Cup*	Front Cover (Item #43)	Slip
	Cone	Drive Shaft (Item #46)	Press
Rear Item #50	Cup	End Cap (Item #16)	Slip
	Cone**	Drive Shaft (Item #46)	Press
Trunnion Item #60	Cup	Swash Plate (Item #61)	Press
	Cone	Trunnion (Item #59)	Slip

* See procedure for establishing shaft end play Step #3.

** Do not press the cone of the Rear Bearing onto the Shaft until the Cylinder Block is in place, see Step #19, or unless the drive shaft end play is to be checked, see Step #3.

2. Set preload on Trunnion Bearings (Item #60).

   If either a new Swash Plate (Item #61), Trunnion (Item #59), or Trunnion Bearings (Item #60) were replaced or if the plastic Trunnion Gaskets (Item #57) were lost, it will be necessary to establish the desired preload on the Trunnion Bearings as follows.

A. Remove the "O" Rings from the Trunnions.

B. Return the same thickness of Gasket (Item #57) to each Trunnion that was present when the pump was disassembled.

C. Slip the Trunnion Bearing Cones onto the Trunnions.

D. Place the Swash Plate (Item #61) in the Housing, lining up the bearing races with the Trunnion bores in the Housing (Item #39).

E. Insert the Trunnions, minus the "O" Rings, into the Housing and Swash Plate. The clearance between the Trunnions and their bores in the Housing is small, therefore, it is easy to bind the Trunnions as they are being put into place. A plastic hammer may be used to lightly tap the Trunnions as an aid in assembly.

F. Tighten one Trunnion Bolt (Item #66) on each Trunnion.

G. Attach a spring scale to either of the two bores for the Swash Plate Pin (Item #41). With the proper thickness of Trunnion Gaskets, it will require between 3 and 4 pounds pull to move the Swash Plate. Add or subtract Gaskets (Item #57) until this reading is obtained. Gaskets should be added or subtracted evenly to each side. The total thickness of Gaskets on one Trunnion should not exceed the total thickness of Gaskets on the other by more than .005".

H. When the proper preload is established, remove the Trunnions from the Housing.

3. Set Shaft end play. (Should be .003" to .013")

If a new Drive Shaft (Item #48), End Cap (Item #16), Front Cover (Item #43), and Front Bearing (Item #63) are used, the Shaft end play should be checked as follows.

A. Press the Cone of both the Front and Rear Bearings onto the Drive Shaft.

B. Install the End Cap Gasket (Item #15) and End Cap (Item #16).

C. Tighten two of the End Cap Bolts to 27-30 ft.lbs.

D. Put the Front Cover Gasket (Item #42) onto the Housing.

E. Place the Drive Shaft in the Housing with the Cone of the Rear Bearing in its Cup.

F. Place the Front Cover (Item #43) into place.

G. Tighten at least one bolt (centrally located) on each side to 27-30 ft. lbs.

H. The end play of the Shaft can now be checked and should be between .003" and .013".

4. Assemble the Servo Pistons (Item #35).

NOTE: If the old Swash Plate (Item #61), the two Servo Piston Assemblies (Items #27 thru #41), and the two Servo Sleeves (Item #17) are to be reused, they should all be returned to the same position they were removed from. See Step #13 for the correct procedure to follow to set the neutral position of the Swash Plate if any of these parts are replaced with new or if the parts have become mixed up.

A. Check the grooves on the O.D. of the Servo Piston (Item #35) making sure there are no burrs or foreign material present.

B. Place the Servo Control Spring (Item #28) in the I.D. of the Servo Piston (Item #35).

C. Insert the Spring Guide (Item #27) into the Servo Control Spring.

D. Insert the 1/4-20 screw (Item #29) into the Washer (Item #30) and drop both into the I.D. of the Spring Guide so the screw threads extend thru the hole in the end of the Guide.

E. Compress the Servo Control Spring until the 1/4-20 screw can be engaged and tightened into the Servo Piston.

F. Place the Servo Piston Link (Item #38) into the Clevis of the Servo Piston.

G. Insert the Servo Piston Pin (Item #37) into place, pinning the Link to the Swash Plate.

H. Fasten the Servo Piston Pin into place with two Snap Rings (Item #36).

I. Assemble the other Piston Assembly in the same manner.

5. Attach the Servo Piston Assemblies to the Swash Plate.

A. Lay the Swash Plate flat on the workbench and place the free end of the Servo Piston Links (Item #38) into the two Clevises provided on the Swash Plate. The joggle in the Servo Piston Link should be arranged so that the Pistons are "stepped" outward from the center line of the pump.

B. Insert the two Swash Plate Piston Pins (Item #41) thru the Clevis of the Swash Plate, pinning both Links to the Swash Plate.

C. Fasten the pin in place with two Snap Rings (Item #40).

6. Attach the Control Link (Item #7) to the Swash Plate.

A. Position the Control Link (Item #7) in the Clevis provided in the Swash Plate.

B. Insert the Clevis Pin (Item #6) into place pinning the Link to the Swash Plate.

C. Fasten the Pin in place with two small Snap Rings (Item #5).

7. Install the Swash Plate (Item #61).

A. Set the pump Housing on the bench with the Front Cover opening facing you and the opening for the Control upward.

B. Insert the Swash Plate with the Servo Piston Assemblies and Control Link attached into the Housing. As this is done, the two Servo Pistons should be placed into the openings provided for the Servo Sleeves. This should be done with care to prevent damage to the Pistons.

NOTE: Make sure the Swash Plate is positioned so that the Control Link (Item #7) is next to the opening provided in the Housing for the Control Assembly (Item #14). and pointing toward the End Cap (rear) end of the Housing.

8. Install the Trunnions.

A. Cover the Trunnion "O" Rings (Item #59) with grease and put them in place on the Trunnions. The grease is used to prevent the "O" Ring from being damaged as the Trunnion enters the Housing.

B. Place the Trunnions thru the bores in the Housing and into the Swash Plate. The clearance between the Trunnion and its bore is small and it is, therefore, easy to bind the two parts together. A plastic or babbit hammer may be used to lightly tap the Trunnion "home", if necessary.

C. Tighten the Trunnion Bolts (Item #66) to 27-30 ft. lbs.

9. Install the Servo Sleeves (Item #18).

A. Cover the "O" Rings (Items #33 and #34) with grease and put them in place on the Sleeves.

NOTE: "O" Ring (Item #34) is slightly smaller in O.D. than (Item #33) and goes in the groove toward the open end of the Sleeve.

B. Turn both Sleeves into the Housing until the scribed lines on the Sleeves and those on the Housing line up. These lines should have been scribed at the factory during the original assembly or at the time of disassembly. If the Swash Plate, all parts of the Servo Piston Assemblies and both of the Servo Sleeves are to be returned to the pump and not replaced with new parts, lining up the scribed marks will return the Swash Plate to its neutral position.

10. Setting neutral position of Swash Plate.

If any of the parts mentioned in Step #9B were replaced with new parts or as a check to make sure the Swash Plate is in absolute neutral, the following procedure should be used.

A. Turn both Servo Sleeves into the Housing as evenly as possible, until all angular play is taken out of the Swash Plate. This will happen when the Servo Sleeves are both just touching the Spring Guides (Item #27). Do not turn the Sleeves in beyond this point causing any compression of the Servo Control Spring (Item #28).

Using a depth mike measure from the machined surface of the Housing, which makes contact with the End Cap Gasket, to the machined surface of the Swash Plate. This is the surface against which the Thrust Plate bears. The measurement should be made at two points equally spaced from the center line of the pump and as near to the outside diameter of the machined recess as possible. Measure one side then the other. Note which side is low and back off (turn counterclockwise) the Servo Sleeve nearest this side 1/8 - 1/4 turn. Turn the other Sleeve in (clockwise) a like amount or until the angular free play is again removed from the Swash Plate. Repeat this process until the machined recess of the Swash Plate is absolutely parallel to the machined surface of the Housing which touches the End Cap Gasket and there is absolutely no angular free play in the Swash Plate.

C. Install the Sleeve Retainer (Item #31).

Use the Socket Head Set Screws (Item #32) previously removed. Use a screwdriver to set Retainer in slot in the Sleeve to prevent the sleeve rotation.

11. Install the Control Assembly (Item #14).

A. Put the Control Gasket (Item #4) in place.

B. Cover the three "O" Rings (Item #12) with grease to hold them in place and put them in the recesses provided in the Control Valve Housing.

C. If used, press the Orifice Plug (Item #11) into "O" Ring in the middle port in the Control Valve Housing.

D. Place the Swash Plate Link (Item #7) between the "Follow-Up" Linkage of the Control.

E. Put the small Snap Ring in the groove in the Clevis Pin (Item #9) and insert it thru the "Follow-Up" Links and the Swash Plate Control Link.

F. Place the small Washer (Item #8) on the Clevis Pin.

G. Insert the small Cotter Pin (Item #10) thru the Clevis Pin. Do not use the old Cotter Pin.

H. Fasten in place using the proper bolts (Item #13). Tighten to 85-90 in.lb. NOTE: Be sure to put the proper length bolt in the correct hole.

12. Install the Thrust Plate (Item #64).

Place the Thrust Plate into the machined recess in the Swash Plate. The chamfered side goes against the Swash Plate. The clearance between this Plate and its recess is small, therefore, care should be taken to insure it lies flat.

13. Install the Drive Shaft (Item #46).

If the Cone of the Rear Bearing was pressed onto the Drive Shaft to establish the shaft end play, it should be removed at this time. The cone of the Front Bearing should be in place. Slide the Shaft thru the I.D. of the Swash Plate from the Front Cover End taking care not to move the Thrust Plate out of position.

14. Install the Front Cover Gasket (Item #42).

15. Install the Front Cover (Item #43).

Tighten the bolts that hold it in place to 27-30 ft.lbs.

16. Assemble the Cylinder Block.

A. If a new Cylinder Block (Item #55) is used or if the old Block was completely disassembled, it will be necessary to assemble the Spring Seat (Item #68), the Block Spring (Item #54), the Spring Retainer (Item #69) and Retaining Ring (Item #70) into the Block as follows.

(1) Place the Spring Seat (Item #68) into the Block. The chamfered side of this part goes toward the spline end of the Block.

(2) Drop the Block Spring into the Block.

(3) Place the Spring Retainer (Item #69) on top of the Block Spring with the notched side toward the face of the Block.

(4) Secure a bolt at least approximately an inch longer than the Block. Slide a washer (or washers) with an O.D. larger than the I.D. of the Block Spline. Slide this bolt thru the Block and place a washer (or washers) on the other end that is slightly smaller in O.D. than the O.D. of the Spring Retainer (Item #69).

Tighten a nut onto the bolt until the Block Spring is compressed enough for the Spring Retainer to move past the groove for the Retaining Ring (Item #70).

(5) Assemble the Retaining Ring into the slot provided in the I.D. of the Block and remove the bolt and washers.

(6) Put nine (9) Slipper Retainer Springs (Item #67) into the Block. Place the Retainer Guide (Item #62) on the Block. The missing tooth of the spline in the Guide should be lined up with the missing tooth in the spline of the Block. Cover the Guide with oil.

(7) Place the nine (9) Piston Assemblies (Item #56) into the Slipper Retainer (Item #65).

(8) Assemble the nine (9) Pistons into the Block. This is easiest done by holding the Slipper Retainer over the Block so that the Pistons will barely enter the bores. When all nine (9) Pistons are started in the bores, lower the Slipper Retainer to the Retainer Guide and push all nine (9) Pistons down into the Block.

(9) Cover the Cylinder Block and Piston Assemblies liberally with clean oil.

17. Assemble the Cylinder Block Assembly into the Housing.

A. Lay the Housing on its side with the control up (Item #14).

B. Turn the Drive Shaft until the missing tooth in the spline is on top.

C. Pull the Drive Shaft as far as possible toward the front of the pump and clamp a collar or "C" clamp onto it to prevent it being bumped or pushed toward the rear of the pump as the assembly continues.

D. Pick up the Cylinder Block Assembly and slide it into the Housing and onto the Drive Shaft. It is necessary to line up the missing tooth on the Shaft with the missing tooth in the Retainer Guide and the Cylinder Block. Push the Block all the way "home".

18. Install the Spring Guide (Item #72).

This sleeve-like part is used as a spacer. It should slide freely onto the Shaft and into the Block. If it does not drop into place freely, the Block Spring is not concentrically positioned and should be moved into proper position with a screwdriver.

19. Press the cone of the Rear Bearing (Item #50) onto the Shaft.

This can either be done with an Arbor Press or a bearing puller. In either case, make sure the tool is clean and no dirt will fall into the pump. As the cone is pressed into position, the Retainer Springs (Item #67) will be compressed and the whole Cylinder Block Assembly will drop a quarter to three quarters of an inch, depending on the size pump, into the Housing.

20. Install the Bearing Plate (Item #53).

Set the pump Shaft downward on the block of wood used during disassembly.

NOTE: Do not bump or push the Shaft toward the rear of the pump. If this happens, the Shaft Spline can become disengaged with the Spline in the Retainer Guide and the two parts can then become out of phase. The Retainer Guide will, in this case, be extensively damaged as the End Cap is bolted in place.

Put the Dowel Pins (Item #71) into the Block. Make sure the face of the Cylinder Block and the Bearing Plate are absolutely free of any foreign material such as dirt, lint, etc. These two parts should lie absolutely flat against the other.

Cover the Bearing Plate liberally with oil.

21. Place the Valve Plate (Item ~~#51~~ 52a) on the End Cap (Item #16).

Put the Cup of the Rear Bearing (Item #50) and Dowel Pin (Item #51) in place in the End Cap. Make sure the End Cap and Valve Plate are free of any dirt or lint that would prevent the parts from laying absolutely flat against the other.

Cover the face of the End Cap with a thin, even coat of oil soluable grease such as vasoline. Put the Valve Plate (Item #52) into place and press it down into the grease.

22. Put the End Cap Gasket (Item #15), "O" Ring (Item #17), and Dowel Pins (Item #26) into place on the Housing. Coating the Gasket with a thin, even coat of light grease will make it easier to remove the Gasket should it be necessary to again service the pump in the future.

23. Install the End Cap (Item #16).

Carefully pick up the End Cap, with the Valve Plate in place, turn it over, and lower it in place until the Valve Plate touches the Bearing Plate. This should be done carefully so as not to dislodge the Valve Plate.

Tighten the End Cap Bolts to 27-30 ft.lbs.

24. Install the Charge Pump (Item #22).

A. Lay the pump on its side.

B. Place the Charge Pump Gasket in place, making sure the opening for the Charge Pressure Relief Valve of the Charge Pump is not covered. This Gasket can be put on in four different positions, three of which are wrong.

C. Make sure the Aluminum Spacer is in place over the Idler Shaft.

D. Line up the angle of the tang on the Charge Pump Shaft with the slot in the main pump Drive Shaft.

E. Insert the Charge Pump Drive Shaft into the main pump End Cap and the Charge Pump Body onto the Spread Pin used as a locator pin.

F. Tighten the four bolts that hold the Charge Pump in place to 85-90 in.lbs.

25. Install the Shaft Seal (Item #1).

A. Cover the Shaft Seal "O" Ring (Item #1F) with grease and put it in place in the I.D. of the Shaft Seal (Item #1D).

B. Check the end of the pump Drive Shaft for any burrs that would cut the Shaft Seal "O" Ring. Slide the Shaft Seal (Item #1D) onto the Shaft and press it into place with the exist lip against the inner race of the Front Bearing.

C. Place the Seal Springs (Item #1B) in place in the Seal Retainer (Item #1D). The Stop Pin (Item #46) should be driven securely into the Seal Retainer.

D. Cover the Housing Seal "O" Ring (Item #1A) with grease and put it in place on the skirt of the Housing Seal (Item #1C).

E. Press the Housing Seal (Item #1C) into the Retainer with the fingers, engaging the Stop Pin in the slot in the Housing Seal. Press down on the Housing Seal, compressing the Seal Springs. Release the pressure and make sure the Seal Springs push the Housing Seal back to its original position. This will insure an even pressure being maintained between the Seal halves.

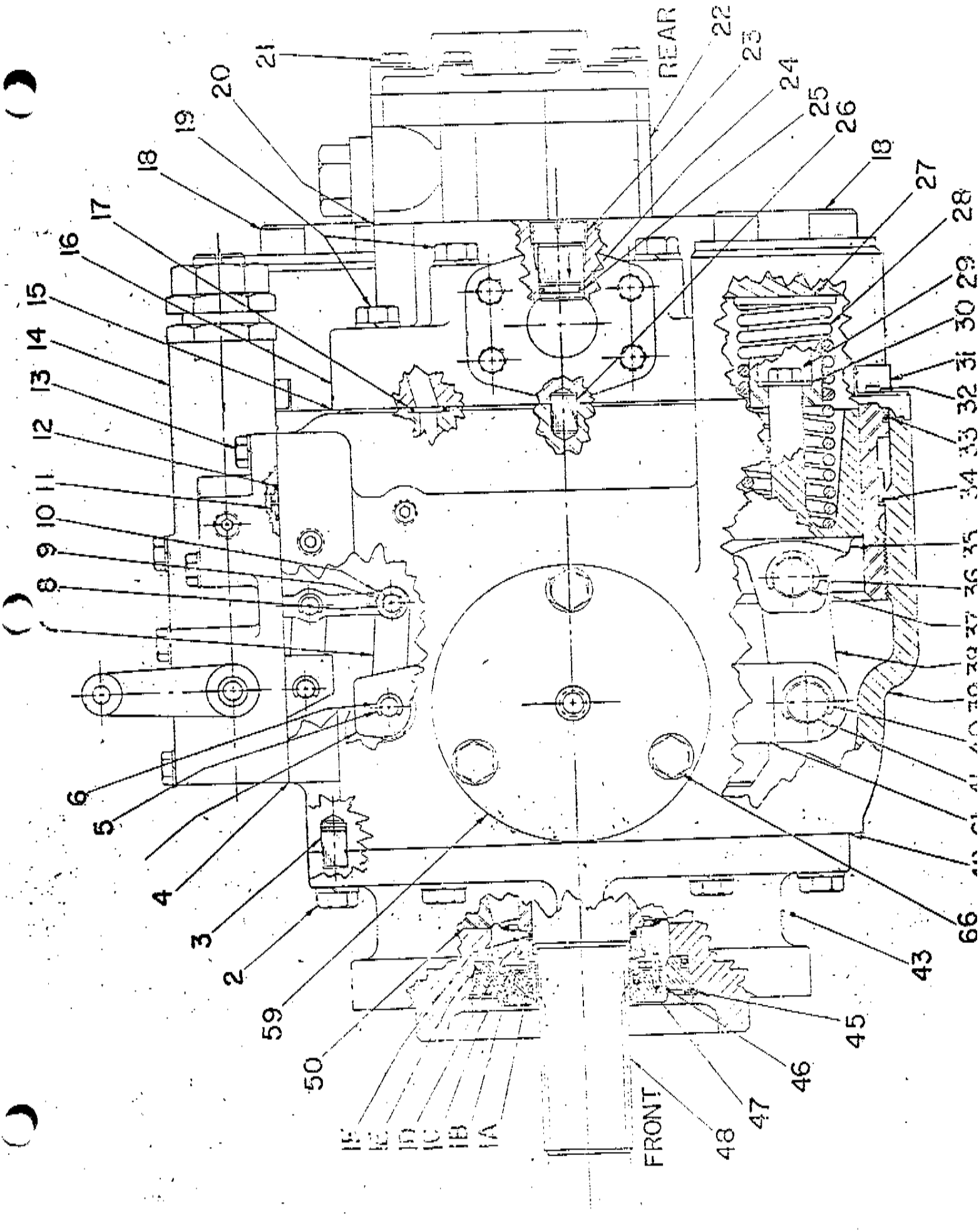
F. Cover the Retainer "O" Ring (Item #1E) with grease and put it in place on the O.D. of the Retainer.

G. Push the Retainer, as assembled in Steps D thru F, into the Housing far enough to allow the Snap Ring (Item #45) to be put in place.

H. Using a large set of Tru-Arc pliers, place the Seal Snap Ring (Item #47) in place.

26. Using a lever, such as a pair of Channel Locks, rotate the pump Shaft several revolutions by hand, making sure it turns fairly free.

If the pump is to be in storage for any length of time, it should be completely filled with oil and all ports plugged. Just prior to being installed on a vehicle, the Shaft should again be rotated several revolutions by hand.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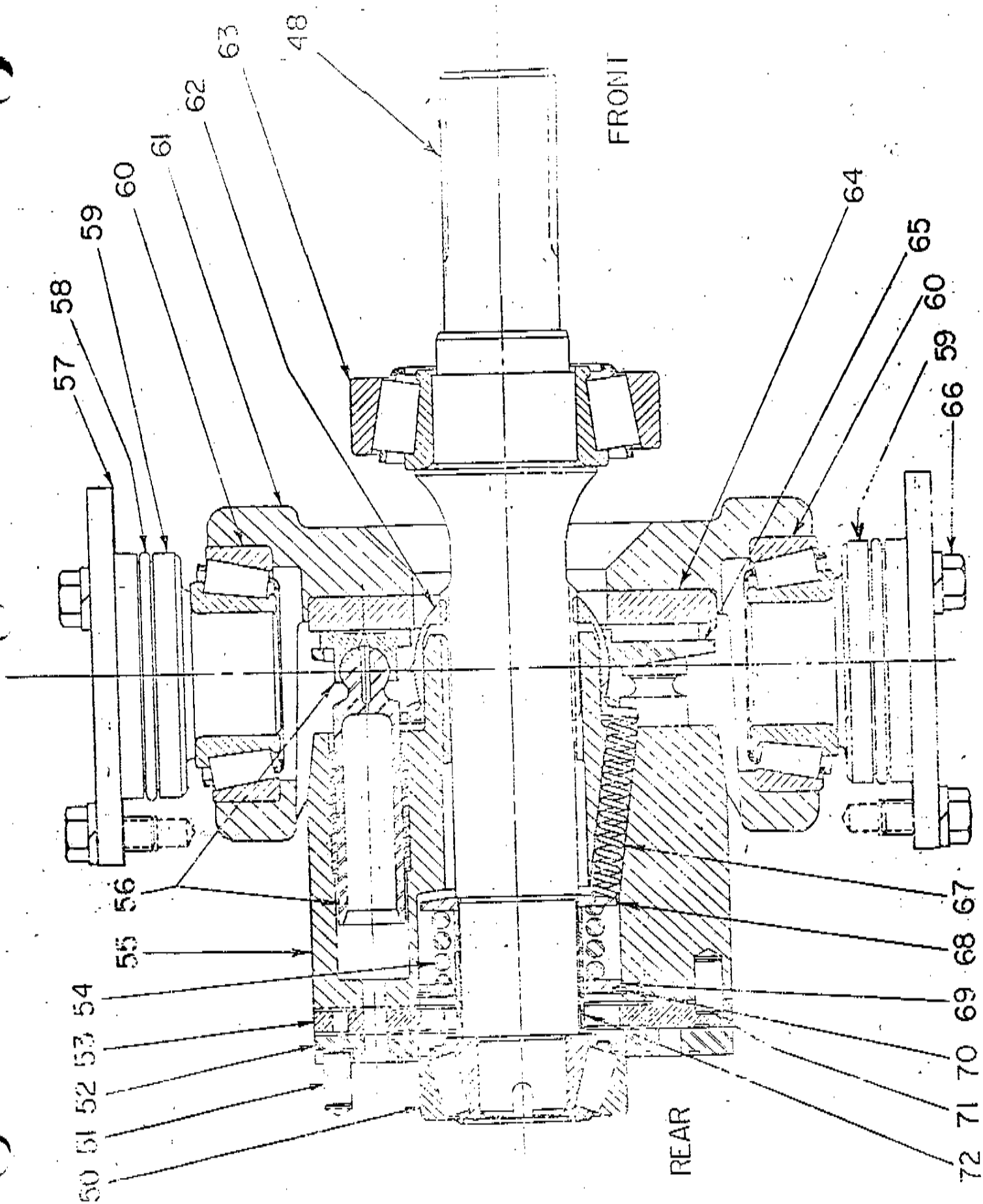
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SUNDSTRAND Sundstrand Hydro-Transmission
DIVISION OF SUNDSTRAND CORPORATION

Phone 815/224-1850 • LA SALLE, ILLINOIS 61301 • TWX 910-642-3949

IMPORTANT WARRANTY ANNOUNCEMENT

Sundstrand extends the warranty on all Heavy Duty Transmissions (Sundstrand Models 20 through 27) to 2 years from date of shipment from its plant in LaSalle, Illinois.

Effective with all transmissions shipped after December 31, 1966, Sundstrand now provides all Heavy Duty Transmissions are warranted to be free of defects in material and workmanship for a period of two years from date of shipment. This supersedes the time limitations stated in Warranty Bulletin 9545 dated September 1966. All remaining articles of the Warranty Bulletin continue in effect.

Rebuilt units will now carry a one year warranty period from date of shipment from the plant in LaSalle, Illinois.

For warranty consideration, model and serial numbers must be supplied to Sundstrand.

Bulletin 9566

HEAVY DUTY TRANSMISSION START-UP PROCEDURE

Before installing a transmission on a machine, inspect the transmission for damage in shipping or handling. All tools, pans, cans, plugs, etc., must be clean prior to use on the system. Never use drained oil.

(1) After the units have been installed, remove the threaded plug in the charge pressure port from the side of the main pump housing (See Figure 1). Install a 600 PSI gauge with a short section of hose to this port. The threaded plug may be either 1/8 NPT or 7/16-20 straight thread.

(2) Check all fittings to be sure they are tight.

(3) Loosen the charge pump line at the inlet to the charge pump (See Figure 1).

(4) Fill the pump case through the case drain opening with an approved oil (See last page for oils)

(5) Fill the reservoir with an approved oil. When oil appears at the loosened hose at the charge pump inlet, tighten the hose and continue filling the reservoir. Leave reservoir cap loose so air will escape.

NOTE: If gravity feed does not fill the line to the charge pump, it must be filled by hand.

(6) The pump must be in neutral. It is recommended that the control linkage be left disconnected until after initial start-up.

(7) With the coil wire removed or the rack closed, turn the engine over for fifteen seconds.

(8) Start the engine maintaining as low an idle as possible for five minutes. During start-up, pressure surges will be seen on the 600 PSI gauge. While running at low idle, charge pressure must be above 100 PSI. If it is not, shut down and trouble shoot - according to Bulletin 9454.

Cont. on Page 2

Cont. from Page 1

(9) Increase engine speed to approximately 1000 RPM. Charge pressure on the 600 PSI gauge should be 180-220 PSI.

(10) Shut down engine and connect linkage to displacement control.

(11) Check fluid level in reservoir and add an approved oil if necessary.

(12) Start engine and run at 1500 to 2000 RPM. Charge pressure should be 180-220 PSI.

(13) Move the directional control handle slightly to the forward and reverse position. Charge pressure will drop to 150-190 PSI when pump is in stroke.

(14) Should the charge pressure fall below 100 PSI during the start-up procedure discontinue start-up until trouble has been found. See trouble shooting Bulletin #9454.

(15) Shut down engine, remove gauge and replace plug in gauge port. Check reservoir oil level and tighten oil fill cap.

Machine is now ready for operation.

HEAVY DUTY VARIABLE DISPLACEMENT PUMP

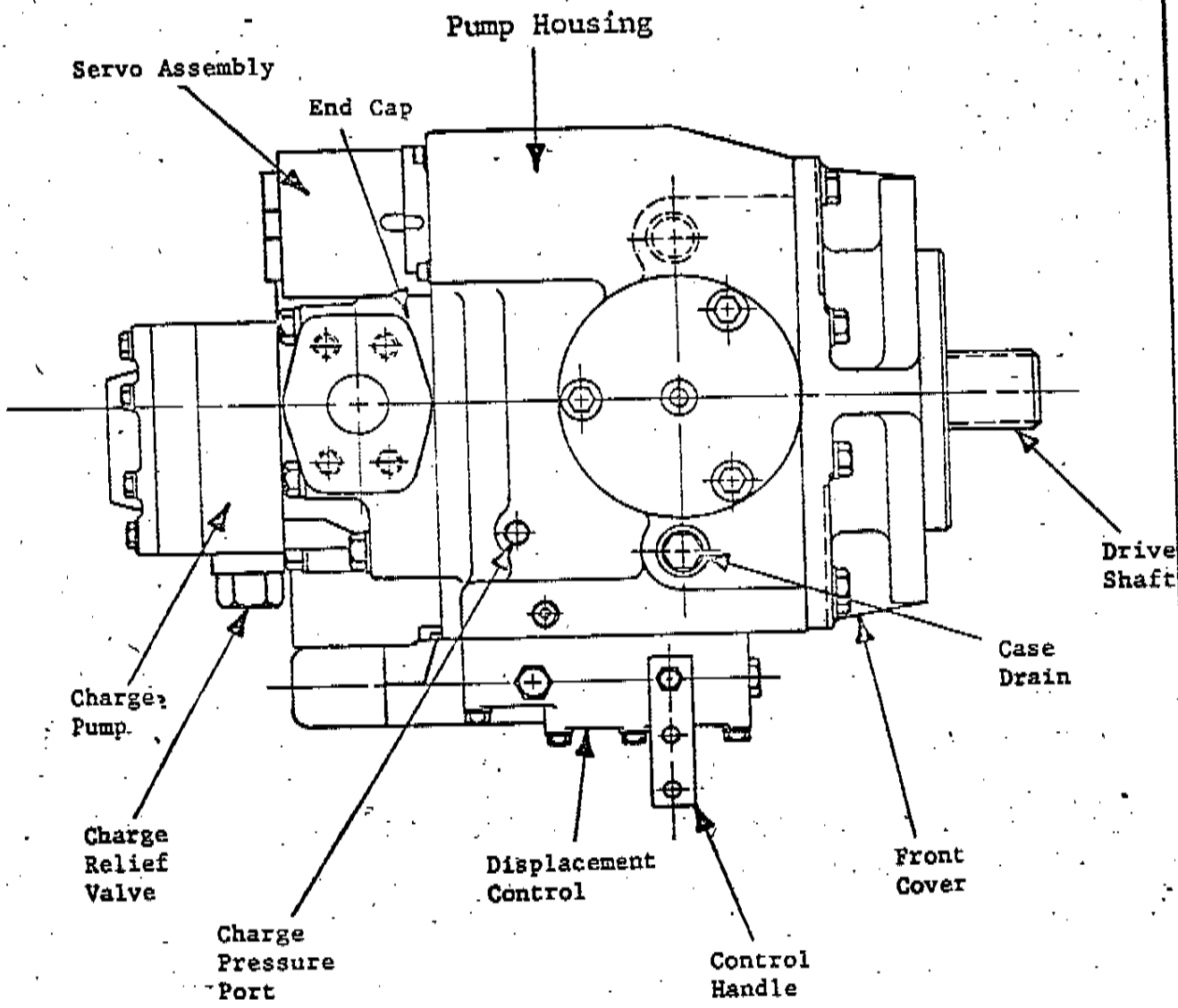

Figure I.

RECOMMENDED OILS

Approved oils for Use in Sundstrand Hydrostatic Transmissions

Approval has been given for the following oils for use in Sundstrand Hydrostatic Transmissions:

For operating temperatures above 10°F.

1. Mobilfluid 300 from the Mobil Oil Company.
2. Rykon Industrial Oil No. 21 or American Hydraulic Oil - All Weather from the American Oil Company.
3. Hy-Tran from International Harvester.

NOTE: For "make-up" in the field when the above oils are not available Type A - Suffix A automatic transmission fluid (Mobilfluid 200 from the Mobil Oil Company) may be added.

These oils may be mixed in any ratio to fill a system as they are compatible.

For operating temperatures below 10°F.

1. Mil-H-5606 Hydraulic Fluid.

SUNDSTRAND

Sundstrand Hydro-Transmission
DIVISION OF SUNDSTRAND CORPORATION

Phone 815/224-1850 • LA SALLE, ILLINOIS 61301 • TWX 910-642-3949

HEAVY-DUTY TRANSMISSION
(Sundstrand Models 20 Thru 27)

WARRANTY POLICY AND PROCEDURE

RELIABLE HYDROSTATIC TRANSMISSIONS FOR THE MOBILE EQUIPMENT INDUSTR

BULLETIN 954
September, 196

TECHNICAL PUBLICATIONS

An Operator's Manual and a Parts Catalog are packed and shipped with this machine for customer use. Additional technical publications are available for this machine, at a nominal cost, through your authorized International Construction Equipment distributor or dealer. This material includes Service Manuals and Technical Training Courses.

These additional publications are strongly recommended for the customer who performs his own maintenance and service on this equipment.

It is the policy of International Harvester Company to improve its products whenever it is possible and practical to do so. We reserve the right to make changes or add improvements at any time without incurring any obligation to make such changes on products sold previously.

UC-221 AND UC-263
ENGINES
AND
ATTACHMENTS

FORM
1 085 201 R1. Rev. 1
FEBRUARY, 1967

PRINTED IN UNITED STATES OF AMERICA

INTERNATIONAL®
ENGINES

OPERATOR'S MANUAL

UC-221 AND UC-263
ENGINES
AND
ATTACHMENTS

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1 085 201 R1. Rev. 1
FEBRUARY, 1967

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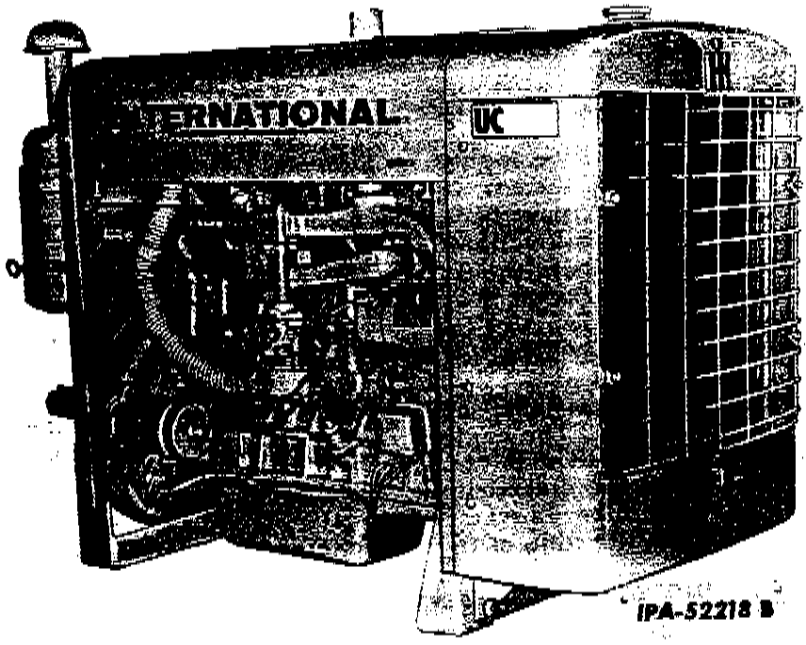
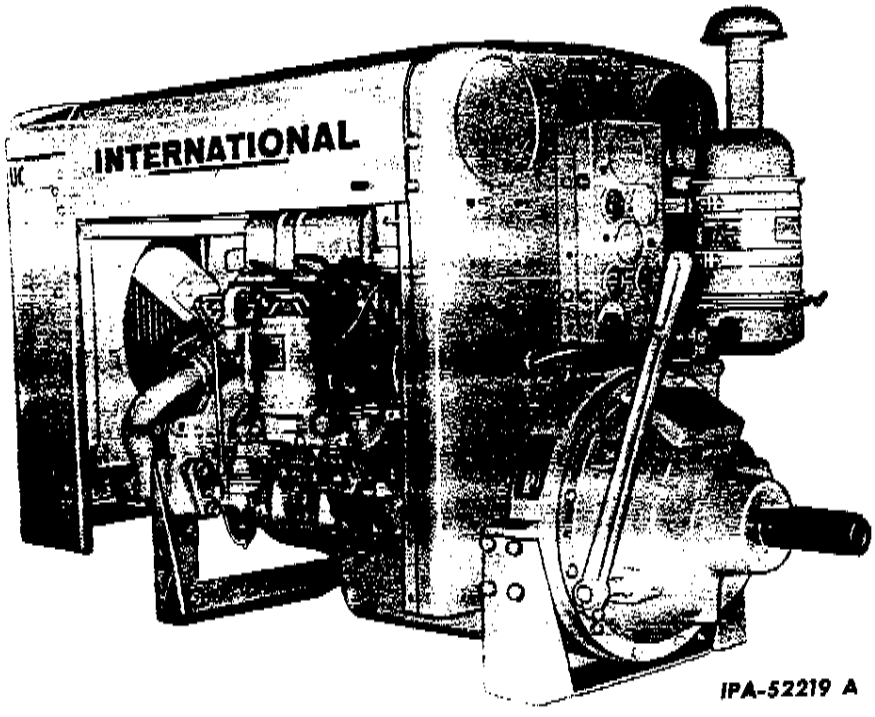


Illust. 1 Right Front View of the UC-221 and UC-263 Engines with Various Attachments.



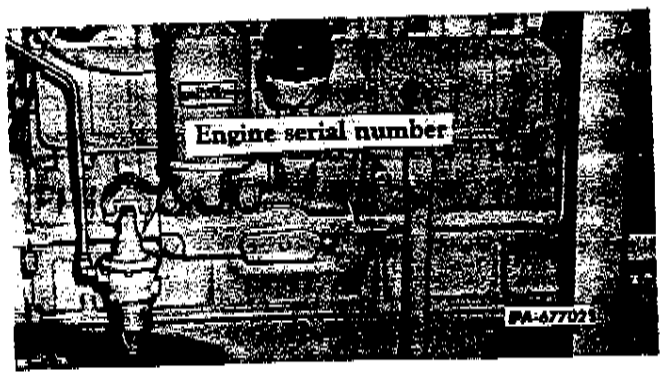
Illust. 2 Left Rear View of the UC-221 and UC-263 Engines with Various Attachments.

INTRODUCTION

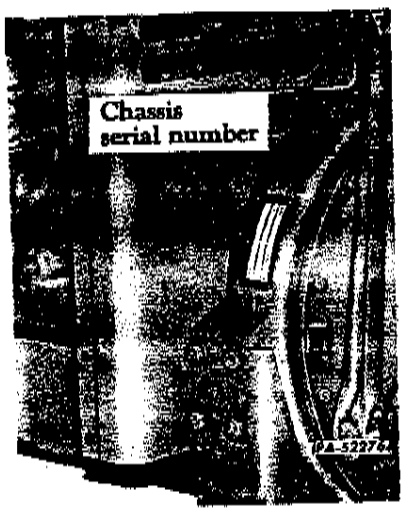
Instructions on operation, lubrication and maintenance for the basic engine and attachments are covered in this manual. Disregard any instructions on attachments that are not applicable to your engine.

Throughout this manual, the use of the terms "left," "right," "front" and "rear" must be understood to avoid confusion when following instructions. "Left" and "right" indicate the left and right sides of the engine when facing the engine from the flywheel end. The front of the engine is the fan drive pulley end.

When in need of parts, always specify the chassis and engine serial numbers. The engine serial number is stamped on the left side of the engine crankcase just below the distributor. (Illust. 3.) The chassis serial number is stamped on a name plate attached to the left side of the flywheel housing. (Illust. 4.)



Illust. 3
Engine Serial Number



Illust. 4
Chassis Serial Number

Engine Serial Number:

C-221 _____

C-263 _____

Chassis Serial Number:

UC-221 _____

UC-263 _____

VENTILATION FOR ENGINES INSTALLED INSIDE OF BUILDINGS

Engines installed inside buildings, sheds or cabs should be the open type; that is, with the engine hood and back panel removed to permit free circulation of fresh air around the engine, radiator, etc. Steps must be taken to carry the waste heat to the outside, or to change the air in the engine room rapidly.

The exhaust pipe should be arranged to provide the shortest possible length within the engine room. The part of the exhaust pipe inside the building should be surrounded with a light steel tube, sufficiently large to permit a two inch to four inch air space all around. This space should be ventilated to the outside. Another method of insulation is to cover the exhaust pipe completely with at least two inches of air-cell asbestos.

Ventilate the engine room thoroughly and install the engine so that air can flow freely through the radiator. An opening to the outside, in front of the radiator, is extremely desirable. Ducts should be provided between the radiator and the wall openings. On some installations, it may be necessary to provide a reverse-flow fan to blow the heated air out of the building.

Where the door or window area is restricted, galvanized ducts extending from the ceiling above the engine to the top of the building are recommended to carry off the hot air. Not less than two ducts, 24 x 24 inches in cross section, should be installed. At the same time, as many openings in the sides of the engine room as possible should be provided to let in cool outside air. Openings to a shaded side of the building are preferred.

SUGGESTED ENGINE AND FUEL TANK ARRANGEMENT

1. Anchor the engine securely to a level solid foundation, preferably concrete.

2. Mount the engine or driven equipment so that the belts may be removed or tightened.

INTRODUCTION

3. Do not support a long exhaust pipe on the exhaust manifold; instead, use a flexible pipe at the engine and support the rigid pipe from the ceiling or floor.

4. Use long-sweep elbows in exhaust pipes.

5. For every 12 feet of exhaust pipe, enlarge the diameter of the pipe one standard pipe size.

6. Install the flexible exhaust piping so the belting may be adjusted without disconnecting any pipes or lines.

7. Install flexible fuel lines between the pipes to the fuel tank and the engine and a fuel shut-off valve at the tank.

DESCRIPTION

SPECIFICATIONS AND CAPACITIES

Capacities (U.S. Measure)

Air cleaner oil cup (wet type)	2-3/4 pts
Cooling System:	
Radiator type	25 qts
Flo-matic type	69 qts
Crankcase oil pan:	
With filters drained	8 qts
With filters changed	9 qts
Transmission Case:	
Four speed selective sliding gear	5 pts
Four speed synchromesh	7 pts

The capacities which appear throughout this manual are specifically for these engines and their attachments.

Specifications

Engine

Cylinders	6
Bore	3-9/16 in.
Stroke:	
UC-221	3-11/16 in.
UC-263	4-25/64 in.
Carburetor:	
Gasoline	IH
LPG	American Bosch
Natural Gas	Ensign
Distributor:	
Point gap	.019 to .023 in.
Spark plug gap:	
Gasoline	.023 to .028 in.
LPG or natural gas	.015 to .020 in.
Fan belt tension	1/2 to 3/4 in.
Valve clearance:	
Engine cold	.030 in.
Electrical system	12 Volt, negative ground
Firing order	1, 5, 3, 6, 2, 4

Torques (Foot-Pounds)

Lubricating oil filter center tube	45 to 50
Radiator and air cleaner hose clamps	20 to 25 in-lbs
Spark plugs	27 to 34
Valve cover bolts	1-1/2 to 2-1/4
Oil pan drain plug	30 to 35

Continued on next page.

DESCRIPTION

Engine Speeds

Optional engine speeds are available. The high idle and full load governed speeds for which this engine is equipped and adjusted is stamped on the chassis serial number plate on the flywheel housing.

Dimensions and Weights (Approximate)

Length (overall less PTO): . . .	50-5/64 in.
Height (over-all)	38-1/2 in.
Width (over-all)	28 in.
Weight	1260 lbs

Fuel (Gasoline)

These engines are shipped with the ignition timing set for maximum power on the average regular grade of gasoline of 89 Research octane number as domestically available in the U.S.A. For fuels of lower Research octane number, the timing may require retarding (approximately one degree retard from factory setting for each decrease of one octane number). Overseas fuels may, in many areas, be considerably lower in Research octane number than regular grade fuels obtainable in the U.S.A. Clear, unleaded fuels should never be used. Advancing the timing beyond the initial factory setting is not recommended and may only result in adverse effects. There is no particular advantage in using a fuel having a higher anti-knock value than the engine requires.

Fuel (LPG)

NOTE: It is recommended that LP Gas fuel meeting the Natural Gas Processor's Association (NGPA) specification for Propane HD5 be used if available.

Specifications Subject to Change Without Notice

OPERATING CONTROLS AND INSTRUMENTS

The operator must thoroughly familiarize himself with the instruments and controls provided for operation of this engine. There are important differences between various engines; therefore, regardless of previous experience with other machines, the operator should fully understand what each control is for and how to use it before starting to operate the engine.

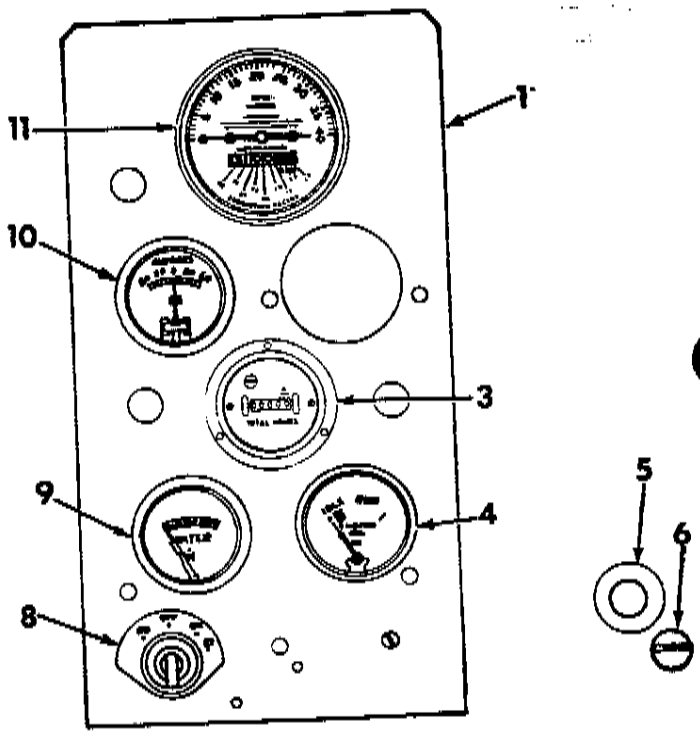
Safety shut-off gauges have been pre-set at the factory. If any of these gauges fail to operate properly, consult your authorized International Engine Distributor or Dealer.

Instruments (Illust. 6 or 7)

This section describes the purpose or function of each instrument. For detailed information on correct operating indications or ranges, refer to "Instrument Check" on page 13.

Hourmeter

The hourmeter indicates the actual hours of engine operation. Its range is from zero to 10,000 hours. When the hourmeter reaches 10,000 hours, it automatically starts again at zero.



CEA-84738

Illust. 6
Instrument Panel
(Regular Gauges).

1. PANEL, instrument.
3. HOURMETER.
4. INDICATOR, engine oil pressure.
6. BUTTON, choke control.
8. SWITCH, ignition and starter.
9. INDICATOR, heat.
10. AMMETER.
11. TACHOURMETER.

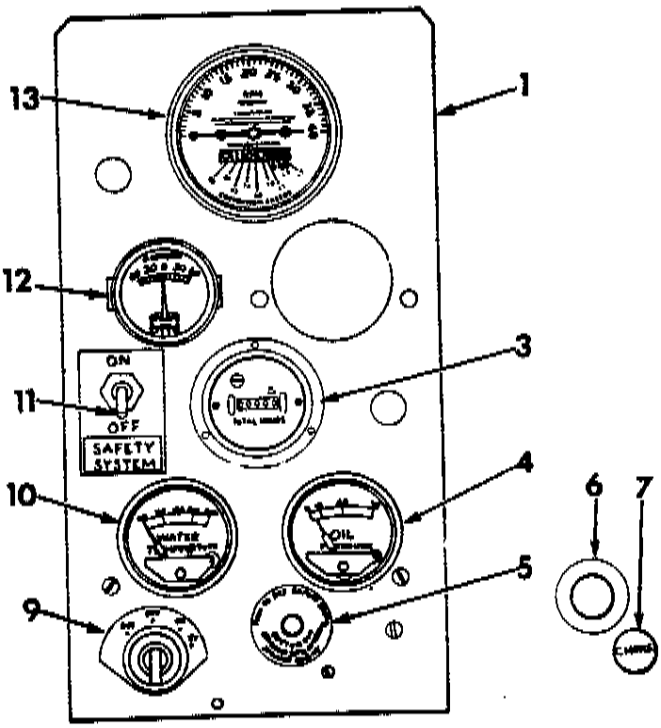
DESCRIPTION

Engine Oil Pressure Indicator

This instrument registers the pressure of the lubricating oil circulating through the engine.

Safety Engine Oil Pressure Indicator

This indicator is part of the instrument panel (safety gauges) attachment. The safety engine oil pressure indicator shows the pressure of the lubricating oil circulating through the engine. If the oil pressure drops below minimum operating pressure, the engine will automatically stop.



CEA-84739

Illust. 7
Instrument Panel (Safety Gauges).

1. PANEL, instrument.
3. HOURMETER.
4. INDICATOR, safety engine oil pressure.
5. SWITCH, ignition relay.
6. KNOB, governow control.
7. BUTTON, choke control
9. SWITCH, ignition and starter.
10. INDICATOR, safety heat.
11. SWITCH, safety control toggle.
12. AMMETER.
13. TACHOMETER.

Heat Indicator

The heat indicator shows the temperature of the coolant circulating in the engine.

Safety Heat Indicator

This indicator is part of the instrument panel (safety gauge) attachment. The safety heat indicator registers the temperature of the coolant circulating in the engine. If the temperature of the coolant reaches 195°F, the engine will automatically stop.

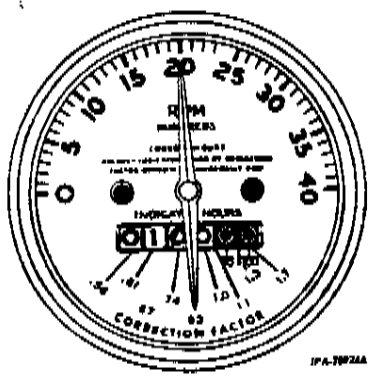
Ammeter

This instrument indicates the rate at which the battery is being charged or discharged.

Tachourmeter (Illust. 8)

The upper half of this indicator shows the engine rpm; the lower half of the indicator shows the indicated hours of engine operation.

This indicator has a correction factor to determine the actual hours of engine operation from the indicated hours. Refer to example following.



Illust. 8
Tachourmeter.

EXAMPLE:

Engine rpm - 2000

Indicated hours - 100

To determine the actual hours of operation, multiply the indicated hours (100) by the correction factor (.83). The actual hours: 83 hours.

Continued on next page.

DESCRIPTION

Controls (Illust. 6 or 7)

Ignition and Starter Switch

This switch has four positions: 1. Switch to the left ("ON" position) for accessories; 2. "OFF" position; 3. "ON" position to the right to energize the electrical system; 4. switch all the way to the right ("ST" position) for cranking the engine.

Ignition Relay Switch

This switch is part of the instrument panel (safety gauges) attachment. It is a push-button type switch.

Governor Control Knob

This knob controls the engine speed.

To obtain a specified engine rpm, depress the button in the center of the control knob and pull out on the knob until the approximate engine rpm is reached. Release the button and the knob will automatically lock in place. For a finer adjustment rotate the knob in a counterclockwise direction (to increase engine rpm) or clockwise (to decrease engine rpm).

Choke Control Button

The choke control button aids in starting a cold engine. On gasoline engines, the choke control button can be used to put the choke valve in intermediate positions.

On liquefied petroleum gas and natural gas engines, the choke control button puts the choke valve in two positions (all the way opened or all the way closed).

Safety Control Toggle Switch

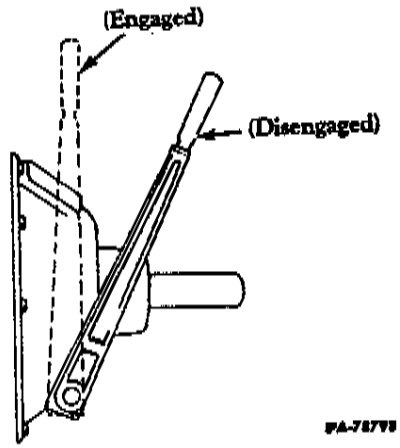
This switch is part of the instrument panel (safety gauges) attachment. The switch has an "OFF" and "ON" position. Before starting the engine, move the switch to the "OFF" position. When the engine has started and after the load is applied, move the switch to the "ON" position.

Power Take-Off Clutch Lever (Illust. 9)

This lever is used to engage or disengage the engine from the load.

Power Take-off Clutch Shaft Outer Bearing Housing Temperature Switch

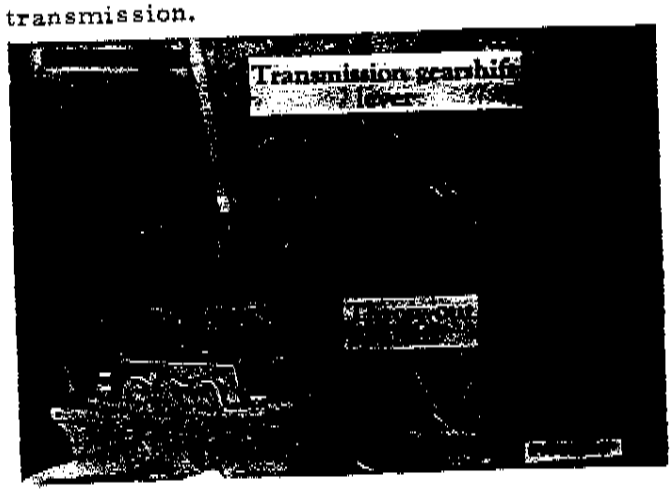
This switch is part of the power take-off attachment. The switch is located at the bottom of the clutch shaft outer housing. If the temperature of the lubricant in the housing reaches 250°F, the engine will automatically stop.



Illust. 9
Power Take-Off Clutch Lever Positions (Left Hand Lever Installation Shown).

Transmission Gearshift Lever (Illust. 10).

The transmission gear shift lever is used to select the various gear ratios provided in the transmission.



Illust. 10
Transmission Gearshift Lever.

OPERATION

BEFORE STARTING A NEW ENGINE

This engine has been given predelivery and delivery service by your distributor or dealer.

As an added precaution, the following steps must be observed.

1. Check the cooling system level and fill if necessary. (Refer to "Filling the Cooling System" on page 25.)

2. Check the oil in the engine crankcase, the air cleaner oil up (wet type - if equipped), power take-off (if equipped) and transmission (if equipped) to be sure they are filled to the correct levels with the proper grades of oil for the prevailing temperature. Refer to "LUBRICATION WHEN SHIPPED" on this page.

3. Service the battery as instructed on the tag attached to the battery. Connect the ground strap to the correct battery terminal. Connect the generator-to-regulator cable to the "F" terminal on the generator. Refer to the "Wiring Diagrams" on pages 39 and 40.

NOTE: Do not start the engine until the generator has been polarized to the battery. (Refer to "Polarizing the Generator" on page 36.)

4. Remove the spark plugs and put about one teaspoonful of engine oil into each cylinder. Install and tighten the spark plugs (refer to "Torques" on page 5) and crank the engine to distribute the oil over the cylinder walls.

NOTE: The lubrication procedure above is necessary only in starting a new engine or one that has been idle for a long time. For the procedure in starting an engine that has been removed from storage, refer to "PREPARING STORED ENGINE FOR SERVICE" on page 50.

5. Operate a new engine with light loads only for the first 20 to 30 hours at wide open throttle.

LUBRICATION WHEN SHIPPED

Engine

The crankcase was filled at the vactory with a break-in and preservative engine oil. This oil may be used on light and medium loads at temperatures below +80°F for the first 20 to 30 hours of operation. If the temperature is above +80°F, drain the oil from the crankcase. Refill the crankcase with the required amount of oil having the physical properties and proper viscosity grade suitable for the prevailing temperature. Refer to the "LUBRICATN SPECIFICATIONS AND CAPACITIES CHART" on page 17.

Air Cleaner

Wet Type (If Equipped)

The oil in the air cleaner (wet type only) may be used in 0°F to +90°F temperature range until the normal change period occurs. If the prevailing air temperature is above +90°F or below 0°F, change to the proper viscosity of oil specified in the "LUBRICANT SPECIFICATIONS AND CAPACITIES CHART" on page 17.

Dry Type (If Equipped)

DO NOT OIL THE AIR CLEANER ELEMENT.

Power Take-Off

Some engine power take-offs have a compartment of engine oil for lubrication of the clutch shaft outer bearing. If your power take-off has this compartment, use this lubricant until the normal change period occurs.

Transmission

The lubricant in the transmission can be used until the normal change period occurs.

Export

The preceding information applies, except: The air cleaner is drained before shipment, and must be filled before operation. Refer to the "LUBRICANT SPECIFICATIONS AND CAPACITIES CHART" on page 17.

PRECAUTIONS

General

Your engine is designed to operate on one of the following fuels: gasoline, liquefied petroleum or natural gas. Do not attempt to operate this unit on a fuel other than that for which it is equipped.

The power take-off clutch must be adjusted several times within the first 10 hours of operation. Refer to "Adjustment" on page 47 for the correct adjusting procedure.

Do not pour cold coolant into the radiator or expansion tank if the engine is very hot unless conditions make it absolutely necessary. Under such conditions, start the engine and let it idle while pouring the coolant slowly into the radiator or expansion tank. Tighten the cap securely.

Continued on next page.

OPERATION

Never operate the engine under load before it is thoroughly warmed up.

Never operate the engine at more than the rated governed speed shown on the serial number plate on the flywheel housing. Excessive speeds are harmful.

Do not attempt to adjust the governor. The governor is set at the factory. If the governor does not function properly, consult your authorized International Engine Distributor or Dealer for repair or replacement.

◆ CAUTION: FOR PERSONAL PROTECTION, OBSERVE THE FOLLOWING SAFETY PRECAUTIONS.

Never operate an engine in an enclosed building unless the exhaust is properly ventilated. Refer to "VENTILATION FOR ENGINES INSTALLED INSIDE OF BUILDINGS" on page 4.

Because of fire hazards and insurance regulations, do not use gasoline for cleaning parts, especially when service is performed inside buildings. A less flammable fluid, such as a commercial solvent or kerosine, should be used.

Never attempt to clean or oil the engine while the engine is operating.

Liquefied Petroleum Gas or Natural Gas Engines

◆ CAUTION: SAFETY PRECAUTIONS IN THE HANDLING OF BUTANE-PROPANE CANNOT BE OVER-EMPHASIZED. THERE ARE STATE, COUNTY OR CITY LAWS, ORDINANCES, AND FIRE REGULATIONS COVERING THE UTILIZATION OF LIQUEFIED PETROLEUM GAS OR NATURAL GAS. SUCH LAWS, ORDINANCES AND FIRE REGULATIONS ON THIS SUBJECT MUST BE ADHERED TO IN ADDITION TO THE SAFETY RULES GIVEN BELOW.

Where local rules are more stringent than these given, the local rules are to be given priority.

These rules apply to servicing any engine using liquefied petroleum gas (butane-propane) or natural gas for engine fuel regardless of the nature of the work to be performed.

Select a location for servicing these engines where there will be good air circulation. This is to avoid accumulation of gas-air mixtures in and about the engine caused by undetected leaks.

Such location must be as far as possible from steam cleaners, hot water cleaners, hot dip tanks, etc., and any other device operating with an open flame.

Shut off the main valves at the fuel tanks and allow the engine to run until all fuel in the system, from the tank to the engine, is exhausted. In the event the engine is inoperative, shut the valve at the tank. Vent the fuel system of liquefied petroleum or natural gas outside the building before moving the engine into the shop.

"DANGER" signs must be placed on both sides of the engine. There is to be no smoking in the vicinity. No work is to be performed on this engine or on others in a nearby zone involving open flames, such as cutting, welding, grinding, chiseling or any similar operation which may produce sparks.

A fire extinguisher (dry powder or carbon dioxide, CO_2) must be placed adjacent to the mechanic's working area, handy for immediate use. When liquefied petroleum gas ignites, it should be allowed to burn, if possible, until the source of fuel is shut off. Extinguishing the fire before this is accomplished can result in dangerous accumulations of gas which might cause a more serious flash or explosion.

After completing service work and before starting the engine, allow air to circulate around the engine to remove any possible gas accumulation.

Never use liquefied petroleum gas from the fuel tanks for cleaning parts. This is mentioned because inspections have revealed that operators have used it as a substitute for solvents and compressed air, not realizing the extreme danger of this practice.

Whenever the nature of service work requires any operation on the fuel system, the following must be observed:

a. All threaded connections should be treated with an insoluble lubricant (Permatex or aviation gasket maker). Replace worn or defective fittings.

b. After connecting the fuel system, check it for leaks. Leaks are not permissible. Odorants, which are strong smelling compounds (an odor similar to spoiled cabbage), are added to liquefied petroleum gas as warning agents to indicate the leakage of even small quantities of gas.

c. A lather of soap, brushed on with a soft brush, will indicate the presence of leaks, which are dangerous and wasteful. Never use an open flame to check for leakage.

Pay particular attention to short lengths of rubber hose used anywhere in the piping system to relieve stress and vibration.

OPERATION

Any necessary work on liquefied petroleum gas or natural gas fuel tanks must be performed by qualified concerns who normally service such containers and who are familiar with local regulations, inspections and tests after any repairs are made.

It is important to remember that all liquefied petroleum gas systems are pressurized. Be certain that the tank valves are tightly closed and all fuel has been exhausted from the lines before starting any repair work on the fuel system.

PREPARING THE ENGINE FOR EACH DAY'S WORK

Fuel System (Gasoline)

Fill the fuel tank. Use a gasoline conforming to the specifications as shown on page 5. DO NOT USE DIRTY FUEL.

◆ CAUTION: NEVER FILL THE FUEL TANK WHEN NEAR AN OPEN FLAME OR WHEN THE ENGINE IS OPERATING. KEEP THE FUNNEL OR HOSE NOZZLE, USED FOR POURING IN THE FUEL, IN CONTACT WITH THE METAL OF THE TANK TO AVOID THE POSSIBILITY OF AN ELECTRIC SPARK IGNITING THE GAS. DO NOT LIGHT MATCHES NEAR GASOLINE, AS THE AIR WITHIN A RADIUS OF SEVERAL FEET IS PERMEATED WITH A HIGHLY EXPLOSIVE VAPOR.

Cooling System

NOTE: Do not start the engine until the cooling system is filled with coolant.

Remove the radiator cap or the expansion tank filler cap and check to be sure the coolant comes to a level approximately one inch below the filler neck. Add coolant if necessary. Install the filler cap or the radiator cap and tighten it securely.

Lubrication

Check the air cleaner to be sure the oil is up to the "OIL LEVEL" bead marking on the inside of the oil cup.

Be sure that the oil level in the crankcase is up to the "FULL" mark on the crankcase oil level gauge. Refer to the "LUBRICATION GUIDE" on pages 18, 19, 20 and 21 for complete lubrication requirements.

OPERATING THE ENGINE

Starting the Engine

Read and observe the "PRECAUTIONS" on pages 9 to 11.

1. Open the shut-off valve on the fuel supply line.

2. POWER TAKE-OFF (IF EQUIPPED): Place the clutch lever in the "Disengaged" position (Illust. 9).

3. TRANSMISSION CLUTCH (IF EQUIPPED): Disengage the clutch.

4. TRANSMISSION (IF EQUIPPED): Place the transmission gearshift lever (Illust. 10) into "neutral" (N). Release the clutch release shaft lever.

5. GOVERNOR CONTROL KNOB (IF EQUIPPED): Move the knob until it is about one-quarter advanced.

NOTE: LIQUEFIED PETROLEUM AND NATURAL GAS ENGINES ONLY: Set the knob at one-half advanced.

6. GASOLINE ENGINES ONLY: Pull the choke control button out part way. (In cold weather pull it out all the way.)

LIQUEFIED PETROLEUM GAS AND NATURAL GAS ENGINES ONLY: Pull the choke control button out all the way.

7. INSTRUMENT PANEL (SAFETY GAUGES) (IF EQUIPPED):

   a. Move the safety control toggle switch to the "OFF" position.

   b. Push in the ignition relay switch.

8. Turn the ignition and starter switch all the way to the right to the "ST" position.

NOTE: Never operate the cranking motor for more than 30 seconds at one time. If the engine does not start, allow the cranking motor to cool two or three minutes before cranking again.

9. If the engine will not start in cold or damp weather, remove and dry the spark plugs. Check the spark plug gap. Refer to "SPECIFICATIONS" on page 5. Reinstall and tighten the plugs. Refer to "Torques" on page 5 for the specified torque.

10. GASOLINE ENGINES ONLY: After the engine starts, push the choke control button in to a point where the engine runs without missing and, as the engine warms up, gradually push the choke all the way in.

Continued on next page.

OPERATION

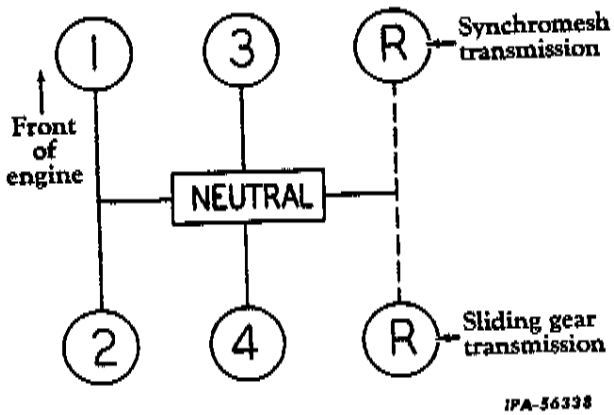
LIQUEFIED PETROLEUM GAS AND NATURAL GAS ENGINES ONLY: After the engine starts, allow warm-up periods as required to eliminate using the choke. After the engine warms up, push the choke control button all the way in.

11. GOVERNOR CONTROL KNOB (IF EQUIPPED): Adjust the knob to meet the load requirements.

12. POWER TAKE-OFF (IF EQUIPPED): Place the power take-off clutch lever in the "engaged" position (Illust. 9).

13. TRANSMISSION CLUTCH (IF EQUIPPED): Disengage the clutch.

14. TRANSMISSION (IF EQUIPPED): Move the transmission gearshift lever to the correct position for the speed desired (Illust. 11). Slowly release the clutch release shaft lever to pick-up the load.



Illust. 11
Transmission Gearshift Shift Pattern.

15. INSTRUMENT PANEL (SAFETY GAUGES) (IF EQUIPPED): Move the safety control toggle switch to the "ON" position.

16. Check all instruments for the proper readings. Refer to the "Instrument Check" on this page.

Transmission Gear Ratios

SPEED	REDUCTION
1st.	6.4 to 1
2nd.	3.1 to 1
3rd.	1.7 to 1
4th.	1.0 to 1
Rev.	7.8 to 1

Instrument Check

Check all indicators (Illust. 6 or 7) immediately after starting, again upon reaching operating temperature and at frequent intervals during operation to assure proper care through prompt detection of irregularities. If any of the indicators do not register properly; stop the engine, and locate and correct the cause immediately. If unable to find the cause consult your authorized International Engine Distributor or Dealer.

Ammeter

The ammeter should indicate "charge" whenever the engine is operating at a speed faster than low idle speed. If it indicates "discharge" or a high rate of "charge" continuously while the engine is operating at this speed, investigate the cause immediately.

Heat Indicator

The heat indicator pointer must be in the "RUN" range, after the engine is warmed up, for the most efficient operation.

Engine Oil Pressure Indicator

If the indicator pointer does not move into the "IDLE" range while idling or into the "RUN" range when the speed of the engine is increased, stop the engine and inspect the oil system to find the cause. If unable to find the cause, consult your authorized International Engine Distributor or Dealer.

Stopping the Engine

1. POWER TAKE-OFF (IF EQUIPPED): Place the clutch lever in the "disengaged" position (Illust. 9).

2. TRANSMISSION CLUTCH (IF EQUIPPED): Disengage the clutch.

3. TRANSMISSION (IF EQUIPPED): Place the transmission gearshift lever in neutral (N). Engage the transmission clutch.

4. INSTRUMENT PANEL (SAFETY GAUGES) (IF EQUIPPED): Move the safety control toggle switch to the "OFF" position.

5. GOVERNOR CONTROL KNOB (IF EQUIPPED): Move the knob to the "low idle" position.

Operate the engine at low idle for a minimum of three minutes to avoid excessive loss of coolant due to "afterboil" or heat surge.

OPERATION

NOTE: Serious damage can result to the engine if the above step is neglected.

6. Turn the ignition and starter switch to the "OFF" position.

Top Cylinder Oiler (If Equipped)

The Marvel Inverse Oiler is operated by vacuum in the intake manifold, but inversely to the vacuum.

When the vacuum in the manifold is high, such as when the engine is running at low idle (closed throttle) only a small amount of oil will feed. When the engine is placed under load (throttle opened), the manifold vacuum falls and the oiler automatically feeds more rapidly. The increase or decrease of the oil flow is in strict accordnance with the load demand on the engine.

Accelerating the engine without load will not affect oiler action. The engine must be pulling under load.

Avoid operating the oiler with the container empty, as this will cause the valve and seat to wear excessively. Use only the manufacturer's recommended oil.

Adjustment (Illust. 12).

1. Thoroughly warm up engine and oiler. After reaching proper operating temperature, be sure choke is open.

2. Remove duct cap (A) on the top of the oiler.

3. Increase the engine speed to full load governed speed and apply the normal operating load.

4. Count the number of drops of oil per minute passing the vision glass (D).

5. If necessary, turn the adjusting knob (C) to the right or left until the count is about four drops per minute for each 10 horsepower at the flywheel (refer to chart).

Engine	Maximum Flywheel HP at 2400 RPM		
	Gasoline	LPG	Nat. Gas.
UC-221	75	73	65
UC-263	95	89	80

6. Replace dust cap (A).

7. For accuracy, check oil drop count after about 10 hours of operation and readjust if necessary.

NOTE: Screw (B) is for factory calibration only and should not be opened on stationary engine applications.

Illust. 12
Top Cylinder Oiler.

A. CAP, dust.
B. SCREW.
C. KNOB, adjusting.
D. GLASS, vision.

SCHEDULED MAINTENANCE

Scheduled and periodic maintenance and inspections are very important functions which every owner and/or operator must follow to assure the maximum performance of the engine.

To assure mechanical efficiency, it is necessary that this engine be systematically inspected and maintained at the intervals outlined below.

SCHEDULED

Point of Inspection	Remarks
After Every 10 Hours of Operation	
*Air cleaner intake cap	Remove and clean. Refer to "Air Cleaner Intake Cap" on page 32.
*Air cleaner oil cup (wet type)	Check to be sure the oil is up to the "OIL LEVEL" mark on the oil cup. Clean and refill the oil cup when 1/2 inch of dirt has accumulated in the cup. Refer to "Cleaning the Oil Cup" on page 29.
Cooling system	Check the coolant level in the radiator. Refer to "Cooling System" on page 23.
Lubrication points	Refer to the "LUBRICATION GUIDE" on pages 18 and 21.
After Every 50 Hours of Operation	
*Air cleaner element (dry type)	Clean. Refer to "Filter Element Service" on pages 30 and 32.
Flexible rubber connections between air cleaner and intake manifold	Inspect for loose fit or damage.
Flo-matic control linkage	Apply two or three drops of oil to the Flo-matic control linkage.
Fan belt	Check the tension. Refer to "BELT" on page 28.
**Power take-off clutch	Check and adjust if necessary. Refer to "Adjustment" on page 45.
Radiator core	Clean the core. Refer to "Cleaning the Radiator Core" on page 25.
Lubrication points	Refer to the "LUBRICATION GUIDE" on pages 20 and 21.
After Every 125 Hours of Operation	
Automatic dust unloader (dry type air cleaner only)	Empty. Refer to "Automatic Dust Unloader" on page 30.
***Battery liquid level	Check. Refer to "Liquid Level" on page 36.
Spark plugs	Remove and clean. Check gap. Refer to "Spark Plugs" on page 35.
Lubrication points	Refer to the "LUBRICATION GUIDE" on pages 19, 20 and 21.

*When unusual dust or dirt conditions are encountered during operation, it may be necessary to service these points more frequently.

**This interval specified for clutch adjustment must be used only as a guide or reminder for checking the engagement. Experience will indicate if this adjustment can be checked less frequently.

***When the ambient temperature is continuously +90° F or higher, the liquid level must be checked every 50 hours.

SCHEDULED MAINTENANCE

Point of Inspection	Remarks
After Every 250 Hours of Operation	
*Crankcase breather	Remove and clean. Refer to "Crankcase Breather" on page 32.
Distributor contact points	Check the gap. Refer to "Checking the Breaker Chamber and Breaker Points" on page 36.
Electric fuel pump	Clean the filter screen. Refer to "Cleaning the Filter Screen" on page 43.
Fuel pump sediment bowl (mechanical fuel pump)	Remove and clean. Refer to "Cleaning the Fuel Pump Filter" on page 42.
Lubrication points	Refer to the "LUBRICATION GUIDE" on pages 19 and 20.
After Every 500 Hours of Operation	
Carburetor fuel screen (gasoline)	Remove and clean. Refer to "Carburetor" on page 40.
Cooling system	Clean. Refer to "Cleaning the Cooling System" on page 25.
Distributor cap	Remove and clean. Refer to "Distributor Cap" on page 36.
Engine valves	Check clearances. Refer to "Valve Clearance Adjustment" on page 34.
Lubrication points	Refer to "LUBRICATION GUIDE" on pages 19 and 21.
After Every 1000 Hours of Operation	
Lubrication points	Refer to "LUBRICATION GUIDES" on pages 18, 19, 20 and 21.

PERIODIC

Battery terminals	Clean the terminals. Refer to "Cleaning and Servicing the Battery" on page 36.
Fuel filter (LPG)	Change filter. Refer to page 36.
Oil pump screen	Clean this screen whenever the oil pan is removed.
Wiring	Check for worn, cracked or frayed insulation, broken wires, loose or corroded connections.

*When unusual dust or dirt conditions are encountered during operation, it may be necessary to service this point more frequently.

SCHEDULED MAINTENANCE

For information about the lubrication of a new engine, refer to "LUBRICATION WHEN SHIPPED" on page 9.

LUBRICATION

The life and performance of an engine depends on the care that it is given and proper lubrication is probably the most important maintenance service for your engine.

Thorough lubrication service performed at the scheduled intervals and according to an established routine will aid greatly in prolonging the life of the engine and in reducing operating expense.

The type of work being done, load and weather conditions are all factors to consider in the frequency of lubrication. The scheduled intervals of lubrication shown on the "LUBRICATION GUIDE" are approximate, being based on average operating conditions.

It may be necessary to lubricate after shorter working periods under severe operating conditions such as extremely dusty conditions, low engine temperatures, intermittent operation and excessively heavy loads with high oil temperatures. However, the time intervals between lubrication periods must never exceed those indicated in this manual.

Selection of Lubricants

The selection of the proper type (specification) and grade (weight or viscosity) of lubricant is not guess work. Many tests have been made to determine the correct lubricants for this engine and its equipment. For detailed information regarding lubricants, refer to "LUBRICANT SPECIFICATIONS AND CAPACITIES" on this page.

Lubricant Viscosities

During cold weather, base the selection of a crankcase lubricating oil viscosity on the lowest anticipated temperature for the day to make starting easier. For hot weather operation, base the selection on the highest anticipated temperature. Refer to "LUBRICANT SPECIFICATIONS AND CAPACITIES CHART" on page 17.

When the temperature changes, even though the regular interval of lubrication has not been reached, the lubricants must be altered to agree with the temperature.

NOTE: It is not necessary to change the lubrication in the different compartments when the temperature falls into a different range during a working day. For example: Grade-30 oil may be used instead of Grade-10 oil in temperatures below +32°F if no starting difficulty is experienced; Grade-10 oil, that is specified for use in temperatures of +32°F to -10°F, may be used in temperatures as high as +40°F, except when operating under continuously heavy loads.

Thinning the Crankcase Oil

In LPG or natural gas engines there may be a tendency for the oil in the crankcase, to gradually become thicker. In such cases, it may be desirable to use a lighter grade oil or in cold weather to add one quart of kerosine to the crankcase between specified oil changes in order to maintain easy cranking.

Precautions

After changing engine oil, operate the engine at low idle, without load, for at least five to ten minutes. This will allow the oil to work into the bearings and onto the cylinder walls.

LUBRICANT SPECIFICATIONS AND CAPACITIES

It is not the policy of the International Harvester Company to approve lubricants or to guarantee oil performance in service. The responsibility for the quality of the lubricant must remain with the supplier of the lubricant. When in doubt, consult your authorized International Engine Distributor or Dealer for information given in the latest service bulletin on crankcase lubricating oils or gear lubricants. The specified type and viscosity of lubricants recommended for use with this engine are shown in the "LUBRICANT SPECIFICATIONS AND CAPACITIES CHART" on page 17.

Continued on next page.

SCHEDULED MAINTENANCE

LUBRICANT SPECIFICATIONS AND CAPACITIES CHART (U.S. MEASURE)

LUBRICANT KEY: EO - Engine Oil
MPL - Multi-purpose Type Gear Lubricant
HTG - High Temperature Grease

Lubrication Point	Capacity	ANTICIPATED AIR TEMPERATURE				
		Above +32°F	+32°F to +10°F	+10°F to -10°F	-10°F to -20°F	Below -20°F
Crankcase		EO - MIL-L-2104B, DEF-2101C (Gasoline engines can also use Sup. 1 or Service "MS" (Δ)				
With Filter Drained	8 qts.	Grade-30	Grade-10 or SAE-10W-30 or SAE-20W	Grade-10 or SAE-10W-30	8 qts. Grade-10 diluted w/ 1 qt. kerosine	MIL-L-10295A
With Filter Changed	9 qts.					
Air Cleaner: Wet Type	2-1/2 pts.	Use the same type and grade lubricant as in the crankcase.				
Power Take-Off	Fill as instructed.	EO - MIL-L-2104B, Sup. 1, DEF-2101C, or Service "MS" Grade-30				
Transmission:		MPL - IH B-22 Grades 132H EP, 134H EP(*) or MIL-L-2105B				
Sliding Gear	5 pts.	Grade-90 (%)	Grade-80 (%)			MIL-L-10324A
Synchromesh	7 pts.					
All Lubrication Fittings	Fill as instructed.	HTG - MIL-L-3545 or MIL-G-3545A.				

(%) - A multi-grade 80-90 may be used at temperatures of -20°F to +90°F. A grade-140 may be used above +90°F.

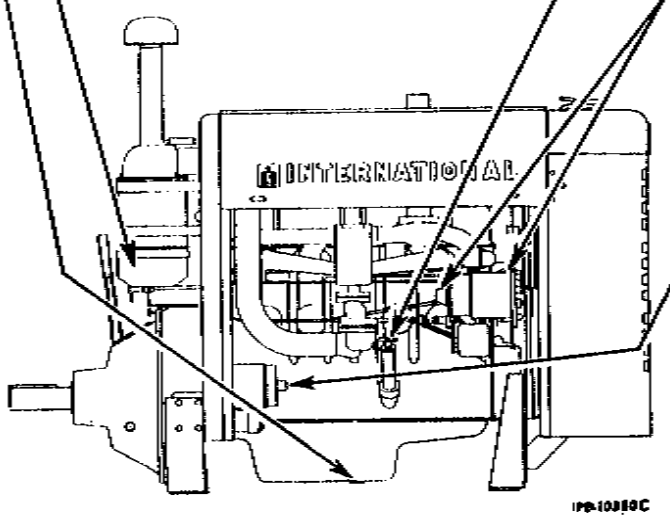
(*) - For specifications consult your authorized International Engine Distributor or Dealer.

(Δ) - If an oil for service "MS" is used, it should have been performance tested in accordance with the "Engine Operating Test Sequences for MS Service" as published in the current hand book of the SAE (Society of Automotive Engineers, Inc.). These sequences are sometimes referred to as the "ASTM G-IV Test Sequences." Oil so tested should have their containers marked with a closely related qualifying phrase.

Always use clean containers. Keep the lubricator clean. Wipe dirt from the fittings before installing fresh lubricant.

Occasionally apply a few drops of engine oil to the engine control linkage and flomatic control linkage.

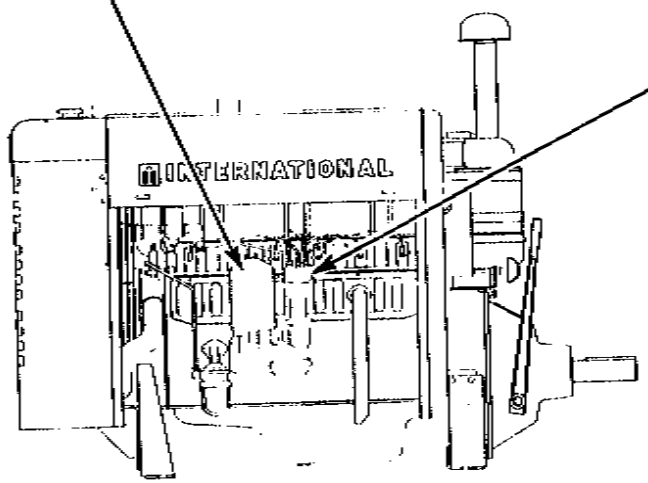
Point of Lubrication	Lubricant	Hours
Air cleaner. . . . . Check oil level. Clean and fill when 1/4 inch of dirt has accumulated or when oil will not flow freely.	EO	10
Crankcase drain . . . Remove the crankcase oil pan drain plug and drain completely while the oil is still warm. Install the drain plug and refill to the "FULL" mark on the oil level gauge. (On engines equipped with an oil level sight gauge, remove the crankcase drain (pipe plug) from the tee) (On LPG or natural gas engines, drain after 250 hours of operation.)	EO	125



Hours	Lubricant	Point of Lubrication
10	EO	Engine oil level gauge and crankcase filter with the engine stopped, unscrew the cap. Add oil up to the "FULL" mark on the oil level gauge. Install the cap.
125	EO	Generator Apply 8 to 10 drops of oil in each cup (two places).
1000	EO	Cranking motor Remove cranking motor from the engine. Remove the drive end housing plug and saturate wick with engine oil. Reinstall plug. Install cranking motor on engine.

SCHEDULED MAINTENANCE

Point of Lubrication	Lubricant	Hours
Lubricating oil filter . . . Drain the filter and replace the element. For the correct procedure, refer to "LUBRICATING OIL FILTER" in the "MAINTENANCE" Section. On LPG or natural gas engines, replace the filter element after 500 hours of operation.)		250



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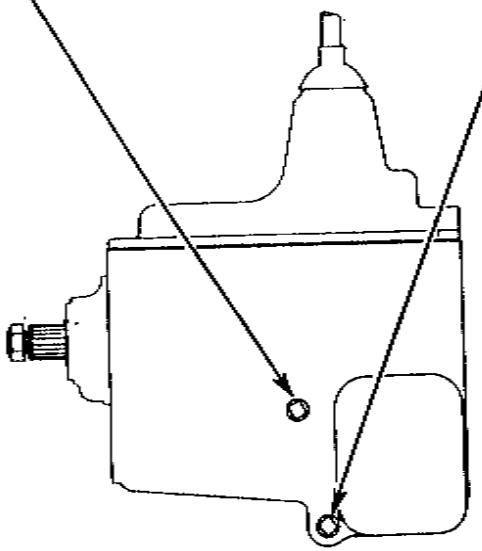
Hours	Lubricant	Point of Lubrication
125	EO	Distributor Breaker arm pivot post. Apply one drop of Grade-10W.
500	EO	Distributor rotor shaft Remove plug and fill with oil. Use sealing compound when replacing plugs.
500	HTG	Breaker arm rubbing block Pack a small quantity of high temperature grease back of the block.
500	EO	Distributor rotor Remove distributor cap and rotor. Apply two or three drops of oil to felt in the end of the rotor shaft.

SCHEDULED MAINTENANCE

LUBRICATION POINTS ON THE LEFT SIDE

Point of Lubrication	Lubricant	Hours
Transmission level . . Remove the filler and level plug. Check to be sure the level is at the bottom of the filler opening. Install the filler and level plug.	MPL	50
Transmission drain Remove the drain plug; also remove the filler and level plug while the lubricant is still warm. Drain and flush the transmission case. Install the drain plug. Fill to the bottom of the filler opening. Install the filler and level plug.	MPL	250

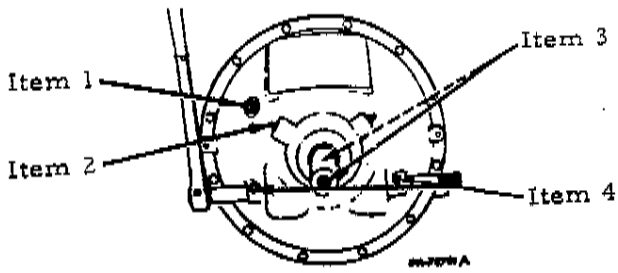


LUBRICATION POINTS FOR THE TRANSMISSION

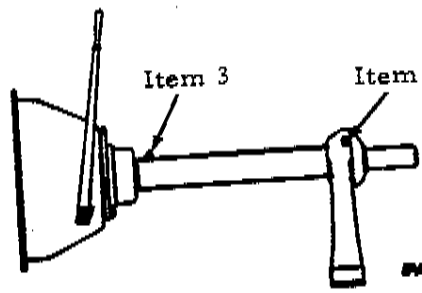
SCHEDULED MAINTENANCE

Points of lubrication are individually explained under "LUBRICATION INSTRUCTIONS" below.

ROCKFORD AND TWIN DISC

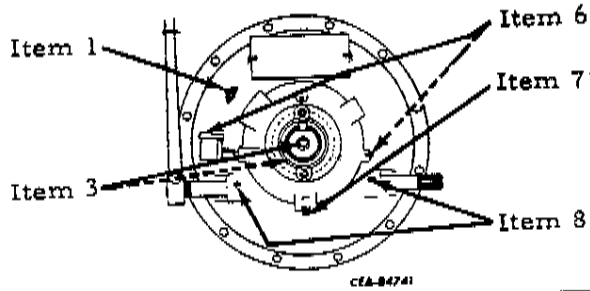


EXTENDED SHAFT AND OUTBOARD BEARING



TWIN DISC WITH OIL LUBRICATED OUTER BEARING

Single Plate Type



LUBRICATION INSTRUCTIONS

Item No.	Description	Lubricant	Hours
1	Clutch Throwout Bearing Over 10 engagements per day	HTG	10
	Less than 10 engagements per day	HTG	50
2	Clutch Shaft Outer Bearing (On some clutches, the fitting is located on the opposite side.) Apply two or three strokes of the lubricator.	HTG	125
3	Clutch Pilot Bearing Over 10 engagements per day	HTG	10
	Less than 10 engagements per day Apply two or three strokes of the lubricator. Refer to NOTE.	HTG	50
4	Clutch Lever Shaft Rockford or Borg and Beck Apply two or three strokes of the lubricator.	HTG	125
	Twin Disc Apply five or six drops of oil in each cup.	EO	125
5	Outboard Bearing Apply two or three strokes of the lubricator.	HTG	10
6	Clutch Shaft Outer Bearing Filler and Level Plugs Open the filler cap indicated by solid arrows and remove the level plug indicated by dotted arrows and fill until oil runs out of level hole. Reinstall the plugs.	EO	125
7	Clutch Shaft Outer Bearing Drain Plug Remove plug while lubricant is still warm. After allowing time for complete draining, reinstall plug and refill at filler.	EO	500
8	Clutch Lever Shaft. Apply two or three strokes of the lubricator.	HTG	125

NOTE: On applications where the end of the output shaft is covered with a universal joint or flexible coupling, transfer the lubrication fitting from the end of the shaft to the cross-drilled location (indicated by dotted arrow). Use the pipe plug removed from the cross-drilled hole to close the opening in the end of the output shaft. This fitting is the only means of lubricating the clutch pilot bearing.

MAINTENANCE

PREPARING FOR COLD WEATHER

In order to operate the engine in temperatures of +32°F or lower, observe the following instructions.

Fuel System

Use only a fuel conforming to the proper specifications as shown under fuel specifications on page 5.

GASOLINE ENGINES ONLY: Fill the fuel tank at the end of each day's work to prevent condensation of moisture in the tank.

Lubrication

Lubricate the engine completely with lubricants specified for operation below +32°F as outlined in the "LUBRICATION GUIDE" on pages 18, 19, 20 and 21.

Cooling System

When the air temperature is consistently at the freezing point (+32°F) or lower, install anti-freeze in the cooling system.

Before installing anti-freeze in the system, make the following check:

1. Check the system for leaks.

2. Inspect all hoses and tighten all hose clamps. Install new hoses if necessary.

3. Drain and clean the system. Refer to "Draining the Cooling System" and "Cleaning the Cooling System" on pages 24 and 25.

4. Check the operating condition of the thermostat. Refer to "Thermostat" on page 26.

5. Check the condition and tension of the fan belt. Replace the belt if necessary. Refer to "BELT" on pages 28 and 29.

6. Be sure all drain valves are closed, and all connections securely tightened.

7. Install the required amount of anti-freeze (refer to the following paragraph "Anti-Freeze Solutions") into the engine and fill the system with coolant as outlined under "Filling the Cooling System" on page 25.

8. Start the engine. After normal operating temperature has been reached, check the system to be sure there are no leaks.

Anti-Freeze Solutions

IH Premium anti-freeze (permanent type) is the recommended solution to be used in this engine. Do not use Menthanol or alcohol as an anti-freeze.

> NOTE: Do not mix solution. Mixed solutions make it impossible to determine if the cooling system has adequate protection against freezing.

Check the solution frequently to be sure the cooling system has sufficient protection against freezing.

> NOTE: When testing the solution be sure the system is at normal operating temperature. This is necessary to obtain an accurate reading.

The following table shows the percentage of anti-freeze solution required for the various temperatures.

Freezing Point (Fahrenheit)	USE IN COOLING SYSTEM
	IH Premium (Ethylene Glycol-Permanent Type)
+20°	15%
+10°	25%
0°	33-1/3%
-10°	40%
-20°	45%
-30°	50%
-40°	54%
-50°	58%
-60°	62%
-70°	65%

Battery

When the air temperature drops to +32°F or lower, the efficiency of the battery decreases rapidly. At temperatures of -20°F or lower, do not try to start the engine unless the battery has been heated. Immersion in warm water to

Continued on next page.

within an inch or two of the top of the battery case is a satisfactory means of warming a battery.

It is especially important to keep the battery at full charge for cold weather operation. Check the specific gravity of the battery electrolyte at frequent intervals, and keep the battery as fully charged as possible. Add distilled water to the battery in freezing temperatures only when the engine is to operate for several hours to thoroughly mix the water and the electrolyte, or damage to the battery will result from the water freezing.

◆ CAUTION: BATTERIES GIVE OFF HIGHLY INFLAMMABLE GAS. NEVER ALLOW SPARKS OR OPEN FLAME NEAR THE BATTERIES. AVOID SPILLING ANY ELECTROLYTE ON HANDS OR CLOTHING.

PREPARING FOR HOT WEATHER

Lubrication

Lubricate the engine completely with the lubricants specified for operation above +32°F as outlined in the "LUBRICATION GUIDE" on pages 18, 19, 20 and 21.

Fuel System

GASOLINE ENGINES ONLY: Fill the fuel tank at the end of each day's work to prevent condensation of moisture in the tank.

Battery

Inspect the battery frequently to be sure the electrolyte is at the correct level. (Refer to "Liquid Level" on page 36.)

Cooling System

To prevent overheating, these steps must be followed:

1. Clean and flush the internal parts of the cooling system. (Refer to "Cleaning the Cooling System" on page 26.) When filling the cooling system, follow the method described under "Filling the Cooling System" on page 25.

2. Insects and dirt must be cleaned from the external part of the radiator. (Refer to "Cleaning the Radiator Core" on page 25.)

3. Check the condition and tension of the fan belt. Replace the belt if necessary. Refer to "BELT" on page 28.

4. Check the operating condition of the thermostat. Refer to "Thermostat" on page 26.

COOLING SYSTEM

The following maintenance procedures cover two types of cooling systems; the radiator type and the Flo-matic type. These procedures are the same for both types except as indicated.

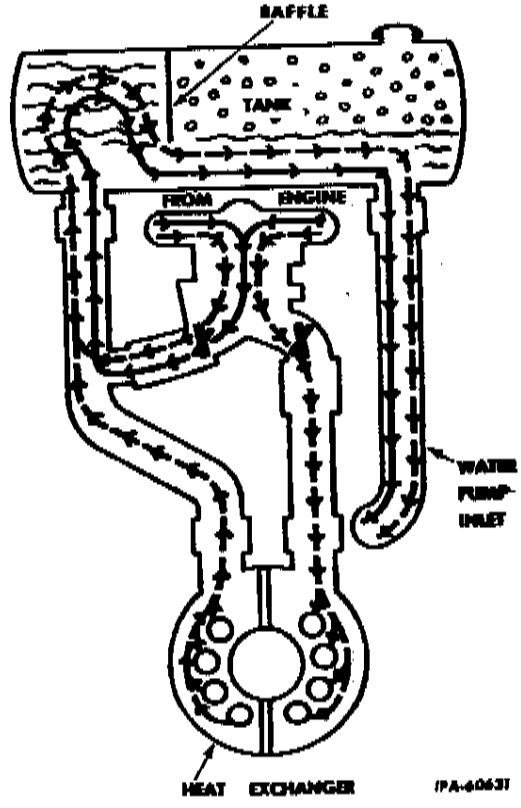
Radiator Type

The radiator type is a pressure-cooled system and will not operate properly unless the cooling system is tight. The filler cap must be properly tightened to the stop. The gasket surface of the cap must be in good condition. The system must not have loose connections or leaks. Unless these instructions are followed, pressure will not be maintained and loss of coolant and consequent overheating will result.

Flo-matic Type (Illust. 13)

The Flo-matic type cooling system automatically maintains the proper engine temperature under normal conditions of operation. A positive centrifugal pump circulates the coolant through the engine block, engine heads and expansion tank.

NOTE: This system is not a pressurized system and is equipped with a vented filler cap.



Illust. 13
Cooling System Circulation.

MAINTENANCE

When the coolant in the cooling system begins to get warm, the double acting Flo-matic valves direct coolant from the engine through the expansion tank and back to the engine. (Solid line).

As the coolant temperature rises, the valves function in unison. One valve starts to open and the other valve starts to close to permit the flow of greater amounts of coolant through the heat exchanger. (Dotted line).

After the engine warm-up, the Flo-matic control maintains coolant temperature automatically by modulating flow to the heat exchanger circuit while sustaining a full flow through the engine cooling system.

Care of the Cooling System

To keep the cooling system free of rust and sludge during warm weather operation, add a cooling system conditioner that is compatible with aluminum. Instructions for its use are printed on each container.

Radiator Cap

A regulating pressure valve, built into the radiator cap, is designed to open at a pressure of approximately 6-1/2 to 8 pounds per square inch.

REMOVAL

◆ CAUTION: THE PRESSURE TYPE CAP IS PROVIDED WITH A SAFETY STOP TO ALLOW THE PRESSURE OR ANY STEAM TO ESCAPE WHILE THE CAP IS BEING REMOVED, SHOULD THE ENGINE RUN VERY HOT.

Turn the cap to the left (counterclockwise) to the safety stop until pressure is released; then press down on the cap and continue to turn until the cap is free to be removed.

NOTE: Do not attempt to repair or replace any of the regulating valve parts. If the valve is faulty, replace it with a new radiator cap of the same type.

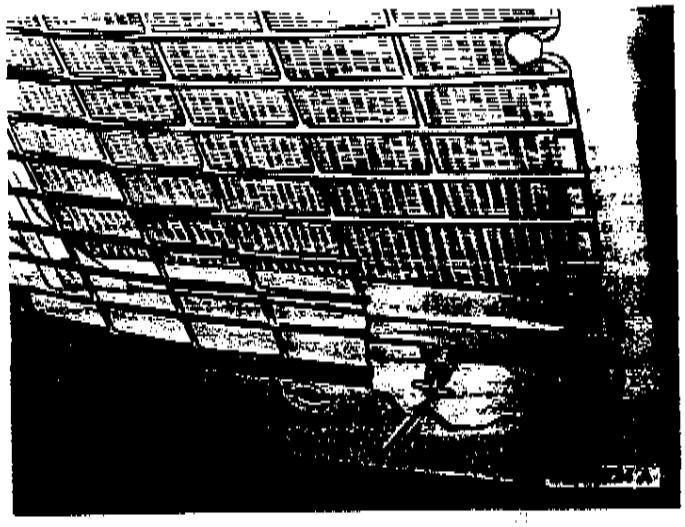
Draining the Cooling System

Drain the cooling system immediately after stopping the engine while most of the sediment is in suspension.

Radiator Type

1. Remove the radiator cap.

2. Open the radiator drain valve (Illust. 14) and the crankcase drain valve (Illust. 15).



Illust. 14
Radiator Drain Valve.

3. LIQUEFIED PETROLEUM GAS ENGINES: Open the water drain valve (2) (refer to Illust. 38).

4. Allow the system to drain completely. Be sure that the drain valves do not plug up during the draining.

5. Close all of the drain outlets.

Illust. 15
Crankcase Drain Valve

Flo-matic Type

Drain the cooling system immediately after stopping the engine while most of the sediment is in suspension.

1. Remove the expansion tank cap.

Continued on next page.

2. Open the flo-matic vent valve (Illust. 17) and the crankcase drain valve (Illust. 15). Open the drain valve on the underside of the water outlet tube and the drain valves on the heat exchanger.

3. LIQUEFIED PETROLEUM GAS ENGINES: Open the water drain valve (2) (refer to Illust. 38).

4. Allow the system to drain completely. Be sure the drain valves do not plug up during the draining.

5. Close all of the drain outlets.

Cleaning the Cooling System

Drain and thoroughly flush the cooling system twice a year or more often if necessary. The appearance of rust in the radiator, expansion tank or in the coolant is an indication that the inhibitor has become weakened and it is possible that some sludge has accumulated in the system. When this condition exists, proceed as follows:

1. Run the engine until it reaches normal operating temperature; then stop the engine and drain the cooling system (refer to "Draining the Cooling System" on page 24).

2. Close the drains. Fill the cooling system with clean coolant (refer to "Filling the Cooling System" on this page).

3. Add a flushing compound, that is compatible with aluminum, to the cooling system in accordance with the instructions furnished with the compound.

4. Start the engine and flush the system as directed by the instructions furnished with the compound.

5. After the system has been flushed and thoroughly cleaned of the compound, refill with clean coolant (refer to "Filling the Cooling System" on this page).

Cleaning the Radiator Core

Blow out insects and dirt from the radiator core air passages, using air or water under pressure. Engine overheating is often caused by bent or clogged radiator fins. When straightening bent fins, be careful not to injure the tubes or to break the bond between the fins and tubes.

Filling the Cooling System

Radiator Type

1. Close the drain valves.

2. Pour coolant into the radiator slowly until partly full.

3. Add a cooling system corrosion inhibitor (for warm weather operation) or IH anti-freeze (when the air temperature is consistently at the freezing point (+32°F) and lower) according to instructions printed on each container.

NOTE: Use only a corrosion inhibitor that is compatible with aluminum. Do not use inhibitors labeled as "acid neutralizers."

4. Continue to fill the radiator until the coolant reaches a level approximately one inch below the filler neck. Wait a few minutes to allow any air to escape, then add coolant if needed.

5. Install the radiator cap. Start and run the engine until the operating temperature is reached. Stop the engine, remove the radiator cap and recheck the level. Add coolant, if needed, to fill to the required one inch level below the filler neck. Install the radiator cap.

Flo-matic Type

1. Close the drain valves.

2. Pour or run coolant into the expansion tank slowly until partly full.

3. Add a cooling system corrosion inhibitor (for warm weather operation) or IH anti-freeze (when the air temperature is consistently at the freezing point (+32°F) and lower) according to instructions printed on each container.

NOTE: Use only a corrosion inhibitor that is compatible with aluminum. Do not use inhibitors labeled as "acid neutralizers."

4. Continue to fill the expansion tank until the coolant reaches a level approximately one inch below the bottom of the filler neck.

5. Open the vent valve (Illust. 17) to permit the escape of air. Close the vent valve, then add coolant if needed.

6. Install the expansion tank cap. Start and run the engine until operating temperature is reached. Stop the engine, remove the expansion tank cap and recheck the level. Add coolant if needed, to fill the required one inch level below the filler neck. Install the expansion tank cap.

Adding Coolant to an overheated Cooling System

Use caution when removing the radiator or expansion tank cap when adding coolant. Do not pour cold coolant into the radiator or the expansion tank if the engine is very hot, unless conditions make it absolutely necessary. In this case, start the engine and let idle; then slowly pour the coolant into the radiator or the expansion tank.

Thermostat (Radiator Type Only)

The thermostat is the nonadjustable type and is incorporated in the cooling system for the purpose of retarding or restricting circulation of coolant to achieve rapid engine warm-up. The thermostat operating range is +167°F to +172°F.

NOTE: Permanent type anti-freeze must be used with this thermostat.

Engine overheating and loss of coolant is sometimes due to an inoperative thermostat. When this condition exists, remove and check the thermostat. Refer to "Removing and Checking the Thermostat" on this page.

Removing and Checking the Thermostat (Illust. 16)

1. Remove the hood sheets and hood side doors (if equipped).

2. Drain the cooling system to a point below the housing (1).

3. Remove the cap screw with lock washer (3). Loosen the cap screw (4) and move the brace (5) down and away from the housing (1).

4. Loosen the clamp and remove the radiator inlet hose from the housing (1).

5. Unscrew the two cap screws (2) and remove the housing (1).

6. Remove the thermostat and housing gasket. Discard the gasket.

7. Clean the thermostat. If the thermostat is coated with scale, it must be replaced. Scale will not allow the thermostat to function correctly.

8. Check the thermostat for correct operation. This can be done by submerging the thermostat and a thermometer in water and heating the water. (Refer to "NOTE" below.) Check the temperature of the water when the thermostat starts to open (approximately +167°F) and the temperature of the water when it is fully open (approximately +192°F).

NOTE: When placing the thermostat and the thermometer in the water, be sure they do not touch the side or bottom of the container at any time.

9. If the thermostat does not function as stated above, it must be replaced with a new one. Refer to "Installing the Thermostat" which follows.

Installing the Thermostat (Illust. 16)

1. Clean the housing gasket surface on the cylinder head to assure proper sealing when reassembled.

2. Apply sealer to the gasket surface of the thermostat housing.

3. Install the new gasket and thermostat (valve end up) onto the cylinder head.

4. Position and secure the housing (1) to the cylinder head with the two cap screws (2) and lock washers.

5. Install the radiator inlet hose on the housing (1) and tighten the hose clamp. Refer to "TORQUES" on page 5 for specific torques.

6. With the cap screw (3) and lock washer connect the brace (5) to the housing (1). Tighten the cap screws (3 and 4) finger-tight.

7. Adjust the fan belt tension. Refer to "BELT" on page 28.

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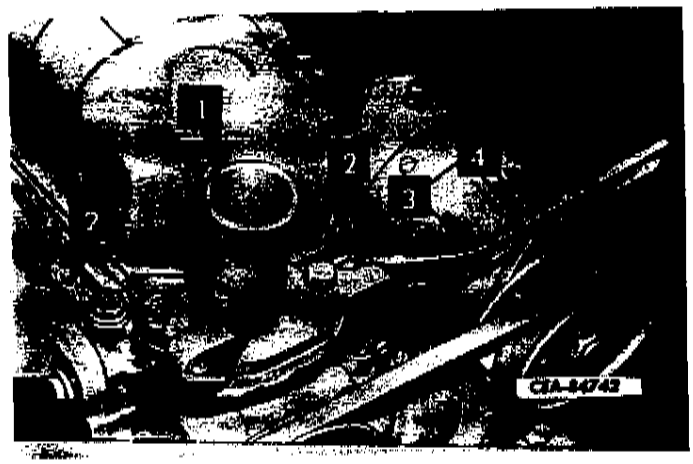


Illust. 16
Checking the Thermostat.

1. HOUSING, thermostat.
2. SCREW, cap.
3. SCREW, cap.
4. SCREW, cap.
5. BRACE, generator adjusting.

8. Fill the cooling system. Refer to "Filling the Cooling System" on page 25.

9. Operate the engine for correct thermostat performance and observe all cooling system hoses and points of connections for leaks. Correct all leaks, no matter how minor.

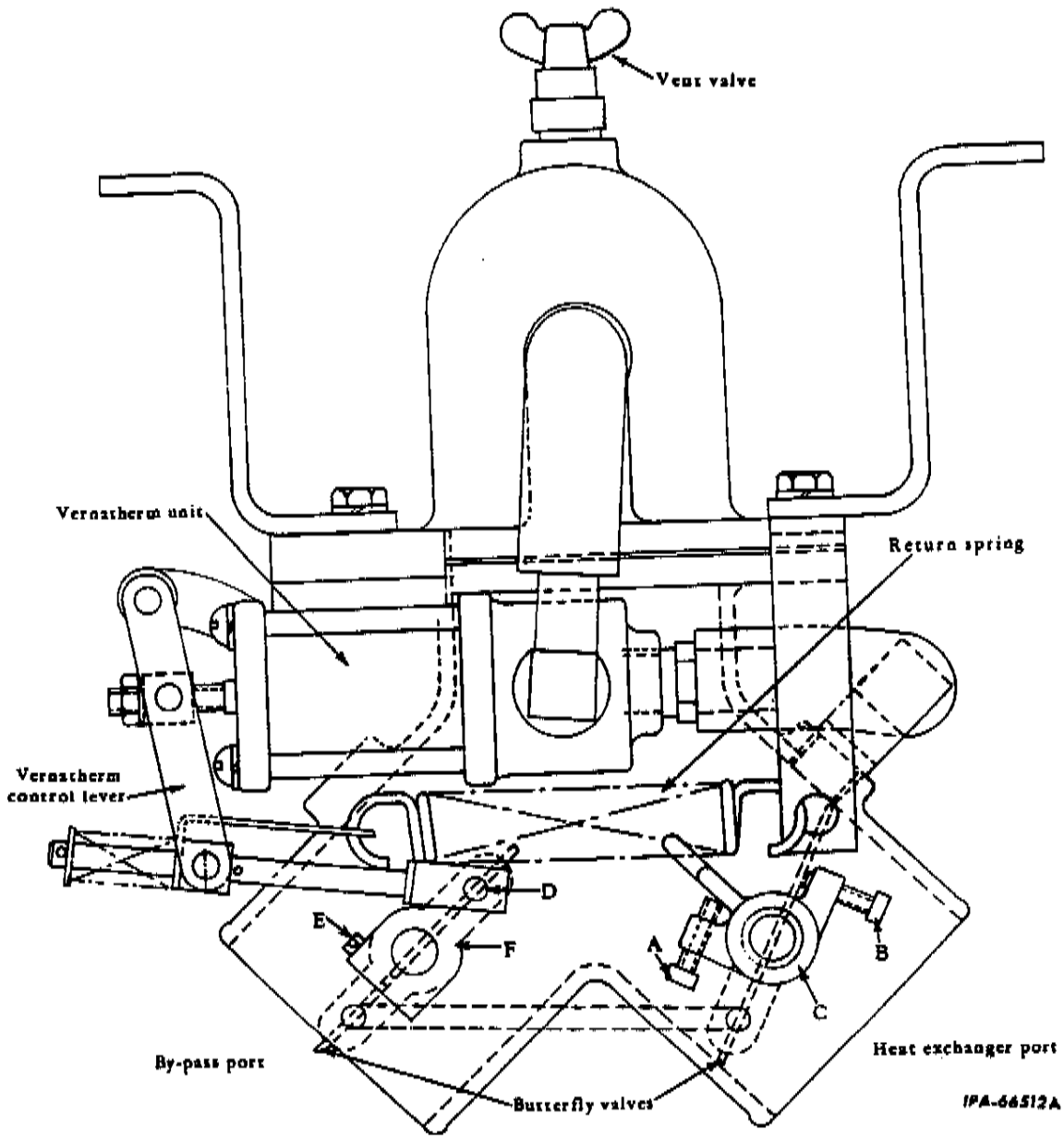
10. Install the hood sheets and hood side doors.

Water Pump

The water pump housing is packed with grease at the factory and requires no attention other than replacing the bearings when they show excessive looseness or if a water leak develops. which indicates that a damaged or badly worn seal needs replacement.

Flo-matic Valve

No adjustment can be made to the Vernatherm unit to increase or decrease operating temperatures. The following adjustments establish only the proper relationship of the Vernatherm control unit and the butterfly valves to provide full opening and complete closing of the by-pass and heat exchanger circuit.



Illust. 17
Flo-matic By-Pass Control Valve.

Flo-matic Valve Adjustment (Illust. 17)

1. Drain the cooling system. (Refer to "Flo-matic Type" under "Draining the Cooling System" on page 24.)

2. Remove the by-pass and heat exchanger hoses.

3. Remove Vernatherm return spring.

4. The purpose of the two set screws (A and B) on lever (C) is to prevent butterfly valves from binding and must just make contact with the stop as the valves reach full open and full closed positions. Adjust if required.

5. Remove the pin (D) holding the Vernatherm control lever in (toward Vernatherm control unit). The pin (D) must fall in place without binding. The by-pass port valve must be in full open position and the heat exchanger port valve must be fully closed. If correction is required, proceed as follows:

   a. Loosen the screw (E) on the lever (F).

   b. Position the lever (F) as outlined in Step 5.

   c. Tighten the screw (E) (40-45 inch pounds).

   d. Operate the valve assembly by hand, being sure all linkage operates freely.

   e. Install the Vernatherm control return spring.

6. Install the by-pass and heat exchanger hoses.

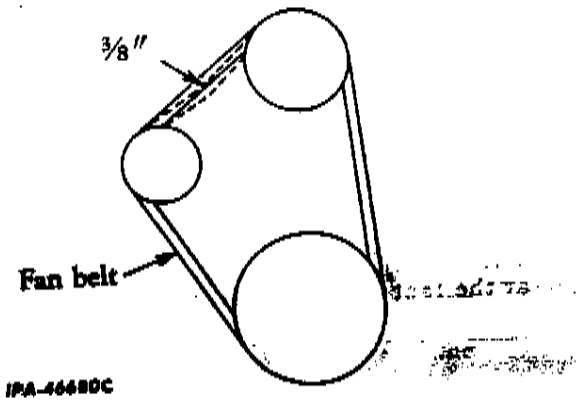
7. Fill the cooling system. (Refer to "Flo-matic Type" under "Filling the Cooling System" on page 25.

NOTE: If the above adjustments have been made and the satisfactory temperatures are not maintained, consult your authorized International Engine Distributor or Dealer.

BELT

Belt Tension (Illust. 18)

The tension is correct when the belt can be depressed, by the thumb (approx. 25 lb-load), approximately 3/8 inch midway between the two pulleys. If the belt is too tight or too loose adjust the belt.



Illust. 18
Correct Belt Tension.

Adjustment (Illust. 19)

Adjust the belt as follows:

1. Loosen the brace bolts (A and B) and the mounting bolts (C).

2. Move the generator away or toward the engine until the tension on the belt is 3/8 inch midway between the pulleys (Illust. 18).

NOTE: Under no circumstances should a pry bar be used on the generator to obtain belt tension as damage to the bearings will result.

3. Tighten the mounting bolts (C) and the brace bolts (A and B).

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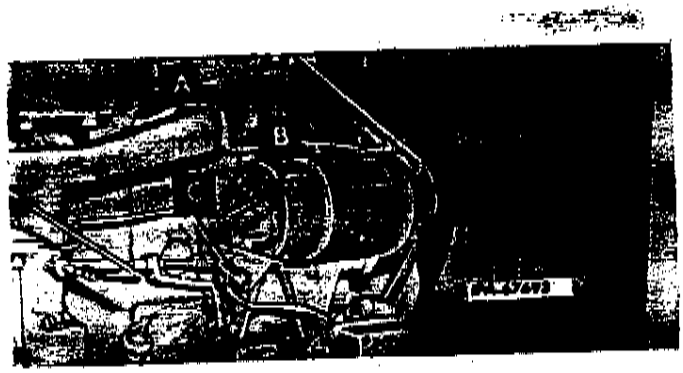


Illust. 19
Adjusting the Fan Belt.

Removing the Fan Belt (Illust. 19)

Replace the belt if it becomes soaked with grease or is so badly worn that the correct belt tension cannot be maintained.

1. Loosen the brace bolts (A and B) and mounting bolts (C).

2. Move the generator in toward the engine.

3. Slip the old belt over the fan blades and remove it.

Installing the Fan Belt

1. Work the new belt over the fan blades and over top of the fan pulley.

2. Slide the belt over the crankshaft pulley.

3. Push in on the generator, if necessary, and slide the belt over the generator pulley.

4. Adjust the belt tension. Refer to "Adjustment" on page 28.

AIR CLEANER (WET TYPE)

Precautions

Frequently inspect the flexible rubber hoses between the carburetor and the air cleaner. If they show any sign of deterioration, replace them.

All the joints between the air cleaner and the carburetor and between the manifold and the cylinders of the engine must be tight. All the gaskets must be in good condition and the bolts must be drawn up tight.

Cleaning the Oil Cup (Illust. 20)

1. Clean or wipe the outer surface of the body before removing the oil cup.

2. Loosen the wing nut assembled to the oil cup clamp and, with a downward movement, separate the cup from the body.

3. Pour out the old oil and thoroughly clean the inside of the oil cup with kerosine.

4. Fill the cup to the "OIL LEVEL" mark with the proper grade of oil. Refer to "LUBRICANT SPECIFICATIONS AND CAPACITIES CHART" on page 17.

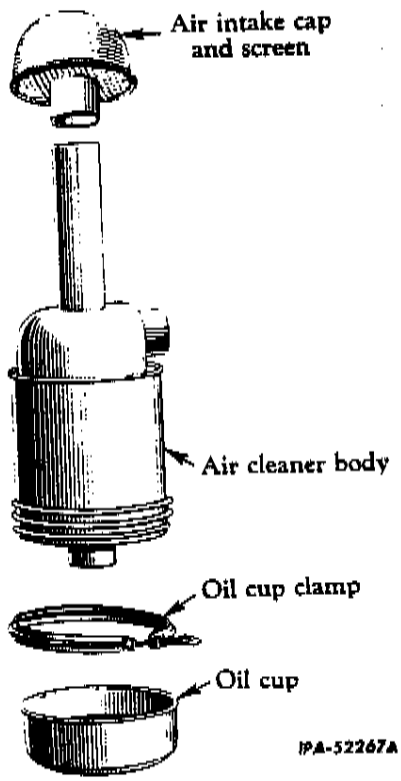
5. Lift the cup into place on the body. Place the clamp around the cup and the body. Tighten the wing nut assembly thumb tight.

Washing the Air Cleaner (Illust. 20)

1. Loosen the air pipe hose clamp and disconnect the hose from the air cleaner.

2. Loosen the wing nut assembled to the oil cup clamp, grasp the oil cup at the sides and with a downward movement, separate the oil cup from the air cleaner body.

3. Empty the oil from the cup, then clean the cup in kerosine.



Illust. 20
Air Cleaner Disassembled.

4. Remove and clean the air intake cap. Refer to "Air Intake Cap" on page 32.

5. Loosen the nut on each mounting bracket and remove the body.

6. Wash the body in kerosine or diesel fuel. Be sure to clean out the air intake pipe.

Installing the Air Cleaner Complete (Illust. 20)

1. Install the air cleaner body into the mounting brackets and tighten the nuts.

2. Fill the cup to the "OIL LEVEL" mark with the proper grade of oil. Refer to "LUBRICANT SPECIFICATIONS AND CAPACITIES CHART" on page 17.

3. Lift the cup into place on the body. Place the clamp around the cup and the body. Tighten the wing nut assembly thumb tight.

4. Install the air intake cap.

5. Install and secure the air pipe hose to the air cleaner with the hose clamp.

AIR CLEANER (DRY TYPE)

The air cleaner is the "dry-type" with replaceable filter element and automatic dust unloader features. The element may be cleaned several times before requiring replacement (additional information can be found in the following text).

Precautions

As an added precaution against dirt getting into the engine, frequently inspect the flexible pipe connection between the carburetor and the air cleaner. If it shows any sign of leakage, correct it.

To eliminate strain on the pipe connection, be sure the pipe lines up.

All the joints between the air cleaner and the carburetor and between the manifold and the cylinder of the engine must be tight. All the gaskets must be in good condition and the bolts must be drawn up tight.

Never operate the engine unless the filter element is in place in the air cleaner body and/or the dust unloader is in place.

Never remove the element from the air cleaner body while the engine is running.

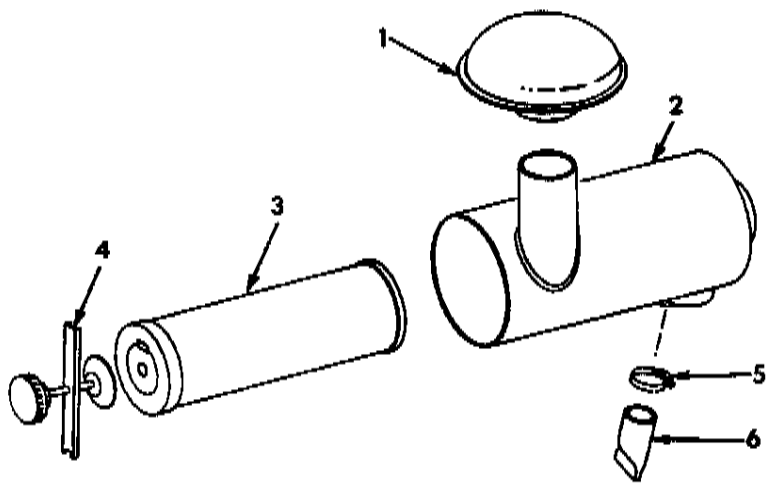
Automatic Dust Unloader

The dust unlaoder (6, Illust. 21) automatically allows the accumulated dirt in the air cleaner body to drop out when the weight of the dirt overcomes the vacuum that keeps the unloader lips closed. At the interval specified under "SCHEDULED MAINTENANCE" on page 14, stop the engine and squeeze the dust unloader lips to be sure they are not blocked.

Filter Element Service

The element can be cleaned by either of two methods; washing or compressed air.

Washing is the preferred method as it removes more dust and soot and restores the element to an almost new condition. The result being better performance and longer intervals between required element service. It is suggested that a spare element be available for use while the serviced element is drying. This will reduce engine down-time to only a few minutes and will allow sufficient time to service the restricted element properly. (Refer to "Washing" on page 31.)



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Illust. 21
Air Cleaner Components (Dry Type).

1. CAP, air intake.
2. BODY, air cleaner.
3. ELEMENT, air cleaner.
4. RETAINER, air cleaner element.
5. CLAMP, dust unloader.
6. UNLOADER, dust.

NOTE: A filter element must be replaced after six washings.

Cleaning the element with compressed air is not considered an entirely satisfactory method. Some dust will remain in the element causing more frequent servicing of the element. Use this method only as a temporary measure until sufficient time is available to clean the element by "Washing." (Refer to "Compressed Air" on this page.)

NOTE: After cleaning, if an element is to be stored for later use, place it in a plastic bag and store in an element shipping container to protect against dirt and damage.

Removal and Cleaning (Illust. 21)

1. Stop the engine. Wipe off any accumulation of dust from the element removal end of the body (2). Be careful not to dislodge dust from the dirty element into the clean air side or outlet of the air cleaner. (Any dust accidentally dislodged into the outlet or clean air side must be cleaned up before installing an element.)

2. Loosen the element lock nut and remove the element retainer (4). Remove the element (3).

NOTE: Inspect the "clean air side" of the element (3) and body (2) for unusual accumulation of dust. Dust accumulation on the "clean air side" of the element usually means a rupture in the paper and element must be discarded.

Washing

NOTE: Never wash elements in fuel oil, gas or solvent. DO NOT OIL ELEMENTS. Do not attempt to take elements apart.

1. Before washing, tap the side or end of the element against the palm of your hand to remove loose dust.

NOTE: Do not tap the element against a hard surface; this will damage the element.

2. Wash the element in clean, warm water (+70°F to +100°F). A small amount of non-sudsing detergent added to the water will facilitate the removal of soot.

3. Rinse the element in clear water (if a hose is used, do not exceed 40 psi). Shake the element carefully to remove excess water.

NOTE: Do not use compressed air to speed the drying of the element; the air pressure will rupture the wet element.

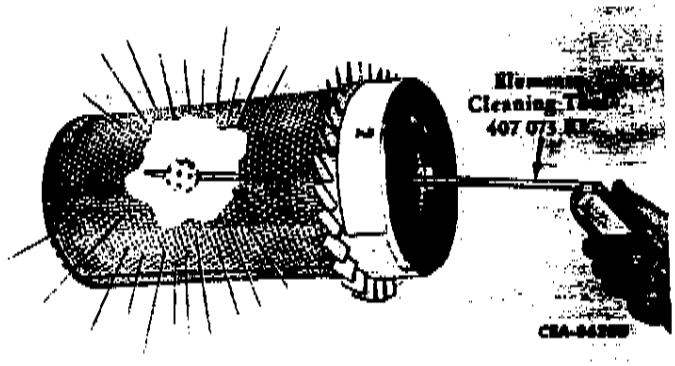
4. Lay the element on its side and allow it to air dry before reinstalling. Overnight drying is usually sufficient. When drying the element protect it from dirt and/or freezing.

NOTE: If no spare element is available, the wet element, after excess water has been shaken out, may be installed in the air cleaner and the engine operated at low idle for 10 minutes before operating.

5. Inspect for damage. Refer to "Inspection" on page 32.

Compressed Air

An element cleaning tool (IH Part No. 407 073 R1, Illust. 22) for use with compressed air, is available from your authorized International Construction Equipment distributor or dealer, and will do a faster and more efficient job of removing dust than a regular air gun or nozzle.



Illust. 22
Using Element Cleaning Tool.

NOTE: Do not tap the element against a hard surface; this will damage the element.

1. Carefully tap side or end of the element against the palm of your hand to remove loose dust.

2. Direct clean, dry compressed air up and down the pleats on the "CLEAN SIDE" of the element. Always direct the compressed air opposite the normal operating air flow through the element.

NOTE: Air pressure at the nozzle must not exceed 100 psi. Keep a reasonable distance between the air nozzle and the element.

3. Inspect the element for damage. Refer to "Inspection" as outlined in the following test.

Continued on next page.

Inspection

1. Inspect the filter element for leaks or damage by placing a bright light inside the element. Inspection of the element on the outside will disclose any holes where concentrated light shines through. The slightest rupture requires replacement of the filter element.

2. Inspect the contact surfaces of the element and the air cleaner body. If faulty or damaged gasket or surfaces are noted, correct these conditions immediately.

3. Remove all dirt from the inside of the air cleaner body with a damp cloth. A small amount of non-sudsing detergent added to the water will remove the soot.

4. Check the condition of the dust unloader (6, Illust. 21). If found faulty or damaged, replace it.

Installation (Illust. 21)

1. Install the open end of the element (3) into the body (2). Install the element retainer (4) and tighten the thumb screw in the retainer so that the element is air-tight.

NOTE: Under no circumstances, should the engine be operated without the element in the air cleaner and the dust unloader in place.

2. Clean the air intake cap screen. Refer to "AIR INTAKE CAP" on this page.

3. After the element has been installed, but before resuming operation, inspect and tighten all air cleaner and air induction system connections.

AIR INTAKE CAP
(Illust. 20 or 21)

Keep the air intake cap screen clean and free of all restrictions. A twist and an upward pull will remove the cap. Use compressed air to clean the screen. If compressed air is not available, wash in clean hot water or preferably water containing a small amount of non-sudsing detergent.

CRANKCASE BREATHER

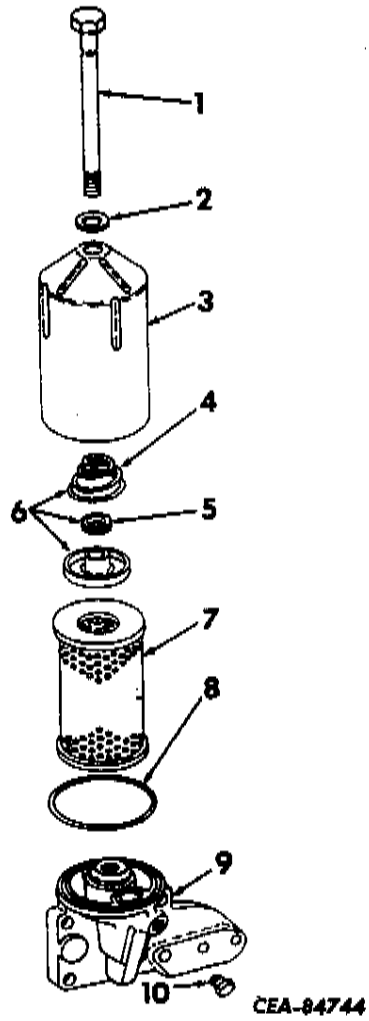
The crankcase breather elements are located in the push rod chamber cover on the left hand side of the crankcase. Normally, the elements need to be cleaned only at the time of a major engine overhaul. However, it may become necessary to clean the elements more frequently when the engine is operating under severe conditions, such as extreme dust or excessively heavy loads.

To clean the elements, remove the push rod chamber cover from the engine. Wash the cover and elements in kerosine or diesel fuel oil; then dry thoroughly. Check the breather pipe to be sure it is not plugged or restricted. Reinstall the elements, the push rod chamber cover and the breather pipe, using a new breather pipe gasket.

LUBRICATING OIL FILTER

Changing the Filter Element (Illust. 23)

1. Drain the oil immediatly after stopping the engine, when complete circulation has been established and while most of the sediment is in suspension.



Illust. 23
Exploded View of Oil Filter.

1. TUBE, center.
2. GASKET, center tube.
3. CASE, oil filter.
4. SPRING, element hold-down.
5. GROMMET.
6. RETAINER ASSEMBLY, element.
7. ELEMENT.
8. GASKET, oil filter case.
9. BASE, oil filter.
10. PLUG, drain.

2. Remove both the crankcase oil pan drain plug and filter base drain plug (10). Allow the system to drain completely. Install the crankcase oil pan drain plug.

3. Clean the outside of the filter case (3) to prevent dirt from dropping into the base (9).

4. Unscrew the center tube (1).

5. Lift up and remove the center tube (1) and case (3).

6. Remove the old element (7).

7. Wipe out the base (9) and case (3) with a cloth dampened with kerosine.

8. Install the new element (7) as follows:

a. Install the drain plug (10) in the filter base (9).

b. Install the new filter element (7).

c. Inspect the center tube (1) and make sure it is clean. Remove any dirt in the threaded center of the base.

d. Check that the case gasket (8) and center tube gasket (2) are in good condition. Replace with new ones if necessary. Refer to "Installing New Center Tube Gasket" on this page.

9. Fill the crankcase oil pan with new oil as instructed under the "LUBRICATION GUIDE" on pages 17 and 18.

Installing New Center Tube Gasket (Illust. 23)

1. Reach up inside the filter case (3) and remove the element retainer assembly (6) from the center tube (1).

2. Remove the center tube (1) from the case (3) and replace the gasket (2) with a new one.

3. Install the center tube (1) into the case (3).

4. Slide the element retainer assembly (6) onto the center tube (1) and push it up into the case (3).

NOTE: The rubber grommet (5) in the element retainer assembly (6) serves as an oil seal. The grommet must be in place in the retainer assembly and in good condition. Replace it with a new one if necessary.

5. Install the new element (7), center tube (1) and case (3) onto the base (9). Carefully screw the center tube into the base and tighten securely (refer to "Torques" on page 5).

HAND CRANKING

The starting crank is used for timing, adjustments and for starting the engine.

◆ CAUTION: WHEN HAND CRANKING THE ENGINE FOR ADJUSTMENT PURPOSES, DISCONNECT THE COIL-TO-DISTRIBUTOR CABLE (A, ILLUST. 30) FROM THE COIL TO PREVENT ACCIDENTAL STARTING OF THE ENGINE.

When starting the engine, crank with quick, upward, half strokes until the engine starts.

◆ CAUTION: THE OPERATOR MUST STAND IN A POSITION THAT WILL ELIMINATE ANY POSSIBILITY OF BEING STRUCK BY THE STARTING CRANK IF THERE IS A REVERSAL IN THE DIRECTION OF ENGINE ROTATION. DO NOT "SPIN" THE CRANK.

VALVE CLEARANCE ADJUSTMENT

The numbers in Illust. 24 are cylinder numbers. The exhaust valves are identified by the letter (E), and the intake valves by the letter (I). For valve clearance dimensions (lash), refer to "Specifications" on page 5. BE ACCURATE - USE A FEELER GAUGE WHEN ADJUSTING VALVE CLEARANCE.

NOTE: DO NOT ADJUST VALVES WITH THE ENGINE RUNNING.

1. Disconnect the coil-to-distributor cable.

2. Remove the valve cover.

3. Turn crankshaft clockwise (viewed from front) until No. 1 piston is on the compression stroke and the timing pointer on the crankcase front cover aligns with the "TC" mark on the fan drive pulley.

NOTE: Be sure the No. 1 piston is on the compression stroke by turning both push rods by hand. The valves are closed when the push rods are loose and can be turned easily.

4. Adjust the cylinder Nos. 1, 2 and 4 intake (I) valves, and the Nos. 1, 3 and 5 exhaust (E) valves. Refer to Illust. 24 and 25. Turn the adjusting screw in or out to get correct clearance; then tighten lock nut. Adjust and lock each valve before proceeding to the next.

5. Turn the crankshaft one complete revolution, and again align the "TC" mark with the timing pointer.

6. Adjust the cylinder Nos. 3, 5 and 6 intake (I) valves, and the Nos. 2, 4 and 6 exhaust (E) valves.

7. Install the gasket and valve cover. The gasket must provide an oil-tight seal.

8. Connect the coil-to-distributor cable.

Illust. 25
Adjusting the Valve Clearance.

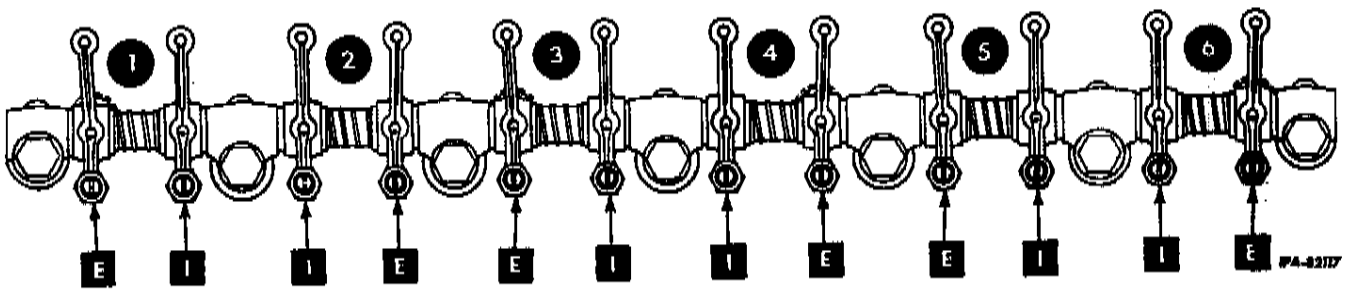
OIL LEVEL SIGHT GAUGE (Illust. 26)

To set the oil level sight gauge after changing the crankcase oil, proceed as follows:

1. Operate the engine until it is thoroughly warmed up.

2. Pull the governor control knob out until the normal operating engine rpm is reached.

3. Slide the marker on the level sight gauge up or down so that it is even with the level of the oil in the gauge.



Illust. 24
Engine Valve Rocker Arms.

MAINTENANCE

NOTE: To insure an accurate oil level sight gauge reading, the balance line connections and gauge fittings must be kept tight. An air leak, particularly at the upper side of the level gauge column or the balance line fittings, will result in a false level sight reading. Tighten all fittings periodically.

To check for possible air leaks, remove the oil filler cap and note the reaction of the oil column in the level sight gauge will change considerable. If the oil column falls more than 1/8 to 1/4 inch maximum, an air leak exists. Oil trapped in the balance line will also result in incorrect readings.

When there is no trapped oil in the balance line and no leak exists above the oil column, there is only a slight change, if any, in the oil column with the oil filler cap on or off.

ELECTRICAL SYSTEM

Precautions

◆ CAUTION: BEFORE WORKING ON ANY PART OF THE ELECTRICAL SYSTEM, DISCONNECT THE BATTERY GROUND CABLE UNTIL ALL ELECTEICAL WORK HAS BEEN COMPLETED.

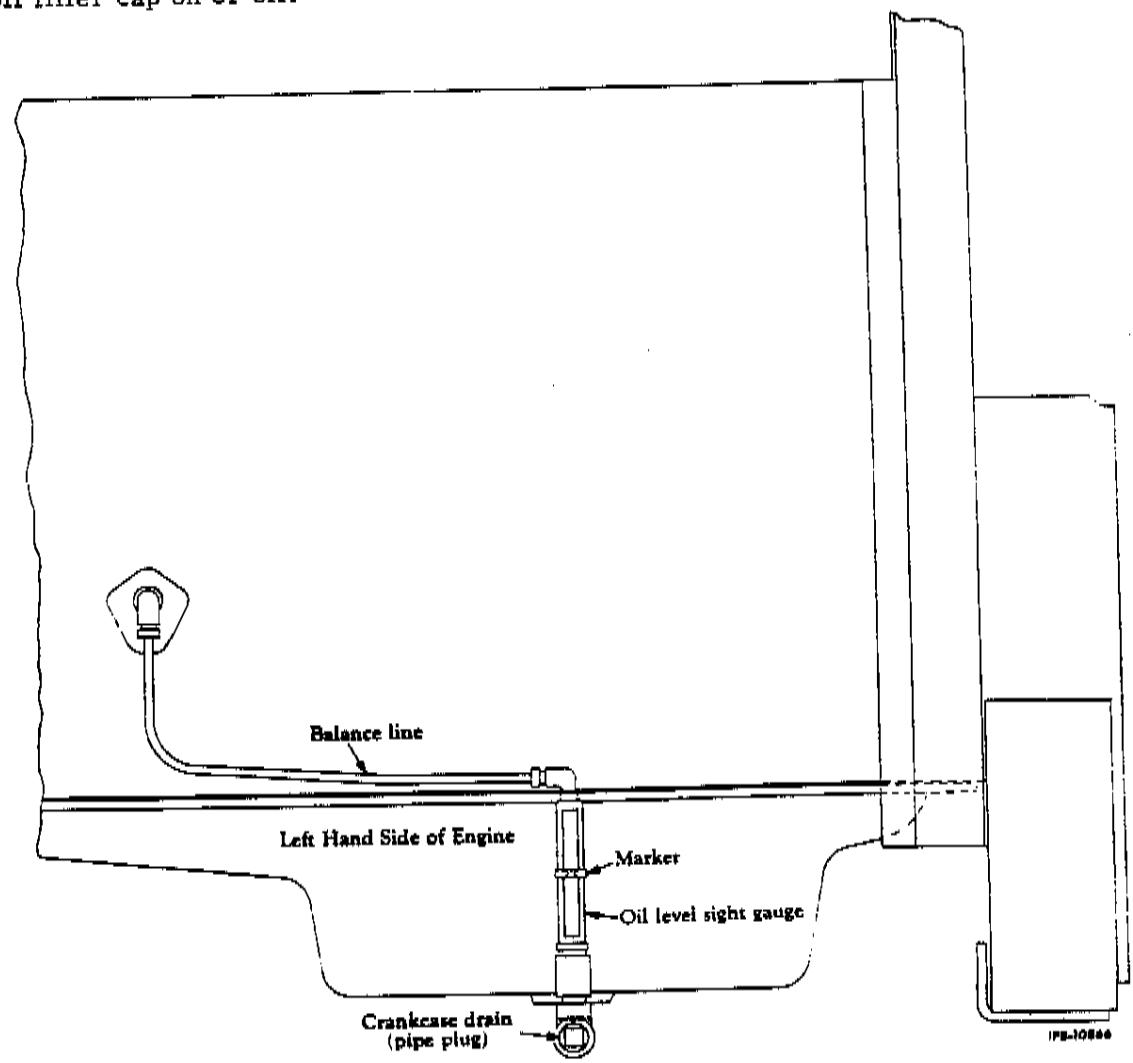
Repair or replace all broken wires immediately. All terminals must be clean and securely fastened; never paint connections.

BE CERTAIN the ground polarity is correct when:

a. Installing a new battery.

b. Connecting a battery charger.

c. Using a booster.



Illust. 26
Oil Level Sight Gauge.

NEVER use a fast charger as a booster to start the engine.

NEVER unhook a battery terminal while the engine is running.

The generator can be operated for short periods on an open circuit if the "F" terminal wire on the generator frame is disconnected. When reconnecting this wire, the generator must be polarized.

Regulator

The regulator is adjusted and sealed by the manufacturer. If the regulator fails to operate properly, consult your authorized International Engine Distributor or Dealer.

Generator

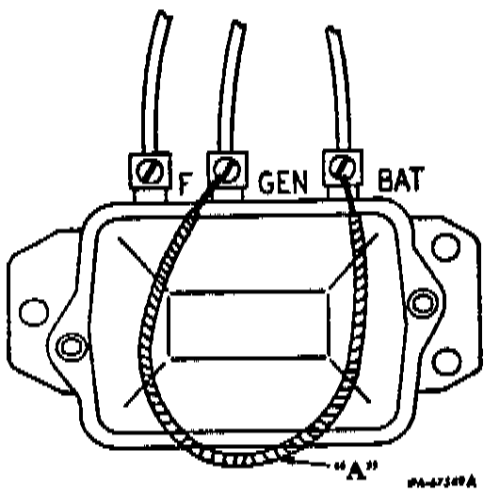
If the generator fails to operate properly, consult your authorized International Engine distributor or dealer.

Lubricate the generator at the interval shown on the "LUBRICATION GUIDE" on page 18.

Polarizing the Generator

If the generator or the regulator has been removed or the wires disconnected, polarize the generator. After the wires have been reconnected, but before the engine is started, proceed as follows: Place one end of the jumper wire (A) on the "BAT" terminal of the regulator and, with the other end, wipe across (flash) the "GEN" terminal of the regulator (Illust 27).

NOTE: Never place a jumper wire (A) between the "BAT" terminal and the "F" terminal on the regulator.



Illust. 27
Polarizing the Generator.

Cranking Motor

If the cranking motor fails to operate properly, consult your authorized International Engine distributor or dealer.

Lubricate the cranking motor at the interval shown on the "LUBRICATION GUIDE" on page 18.

Ignition Coil

The ignition coil does not require special service other than to keep all terminals and connections clean and tight.

Spark Plugs

For the recommended spark plugs, consult your authorized International Engine Distributor or Dealer.

USE ONLY A COMPLETE SET OF THE SAME TYPE OF SPARK PLUGS.

NOTE: Before removing a spark plug from the cylinder head, remove all dirt around the base of the plug.

Use a spark plug wrench to remove the plugs. After the plugs have been removed, remove each spark plug gasket. Do not re-use these gaskets.

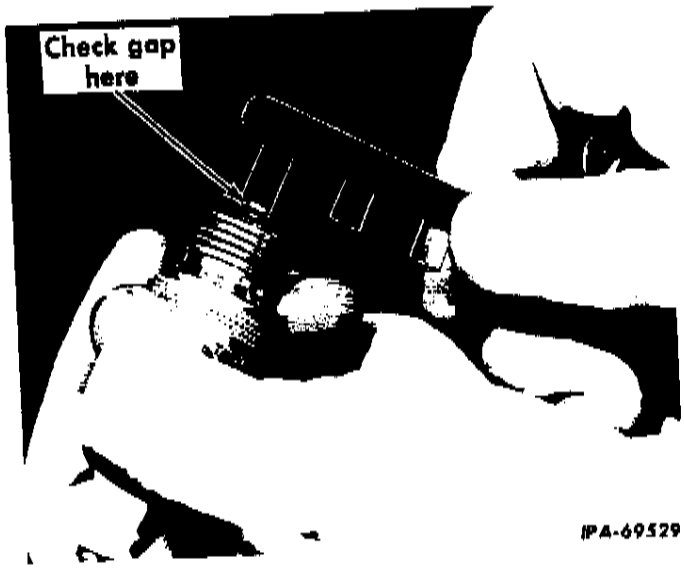
If the plugs are greasy or oily when removed, wash them with a petroleum solvent and dry them thoroughly. After drying the plugs, hard deposits can best be removed with an abrasive or by the use of a sand-blasting machine. DO NOT USE A WIRE BRUSH; wire brushing the spark plug electrodes will simply load the firing bore with electrically conductive metal particles from the brush and can cause misfiring when the plugs are reinstalled.

When cleaning spark plugs with a conventional sand-blasting machine, THE PLUG SHOULD NOT BE EXPOSED TO THE SAND BLAST FOR MORE THAN THREE OR FOUR SECONDS. If longer exposure is needed to clean the plug, the insulator will be damaged, rendering the plug either inoperative or very undependable. Use compressed air to remove any sand from inside the plug shell. Before setting the gap on a used plug, file the center electrode until it is flat.

If the center electrode is shorter than the shell skirt before or after filing or if the procelain is chipped, scratched or broken, replace the plug.

When adjusting the spark plug gap, bend the outer electrode only. Never bend the center electrode as this will damage the insulator. If the gap between the electrodes is too great

(refer to "Specifications" on page 5) due to improper setting or burning off the ends, the engine will misfire and will be hard to start.



Illust. 28
Checking Spark Plug Gap.

Ignition Requirements When Using Natural Gas

Ignition requirements are greatly increased on engine using straight natural gas as fuel. Because of the dry nature of the fuel, spark plugs run hotter and have a tendency to burn more rapidly. If missing or pre-ignition occurs when the engine is operating at low speeds and with heavy loads, reset the spark plug gap, as shown in "Specifications" on page 5. Inspect spark plugs regularly and maintain this gap setting.

Spark Plug Cables

If the spark plug cables are removed for any reason, note the position of each cable on the distributor (Illust. 30).

A minimum clearance of 1/4 inch between the spark plug cables and the cylinder head is recommended. By maintaining this clearance, shorting out the spark plugs will be prevented and the cable will be away from the heat of the cylinder head. If the cable touches the cylinder head, the heat will soon cause the rubber to become soft and will ruin the cable.

Storage Battery

Complete instructions for dry-charged batteries are included with the battery.

◆ CAUTION: BATTERIES GIVE OFF HIGHLY INFLAMMABLE GAS. NEVER ALLOW SPARKS OR OPEN FLAME NEAR THE BATTERIES. AVOID SPILLING ANY ELECTROLYTE ON HANDS OR CLOTHING.

Battery Installation

Never allow the battery to stand on the concrete, ground or a metal support unless proper insulation is provided. A wooden platform or board is sufficient insulation. Be sure the battery is fastened securely to avoid damage from vibration.

NOTE: If tightened excessively, the battery case could warp or break.

Cleaning and Servicing the Battery

If the top of the battery is dirty, it may be cleaned with a brush dipped in ammonia or soda solution. The vent plugs must be tightened to prevent any solution from getting into the battery cells. After the foaming stops, flush off the battery with clean water. Brighten the terminal contact surfaces with steel wool or a stiff brush.

Battery cable terminals must be kept clean and tight.

Check that the vent holes in the filler caps are not clogged. Replace unserviceable cables.

Liquid Level

The electrolyte in each cell should be above the plates at all times to prevent battery failure. Check the level of the electrolyte. When the electrolyte is below this level, pure distilled water should be added. Never use hydrant water or any water which has been in a metal container. Acid or electrolyte should never be added except by a skilled batteryman. Under no circumstances add any special battery "dopes." solutions or powders.

It is especially important to keep the battery at full charge for cold weather operation. Add distilled water to the battery in freezing temperatures only when the engine is to operate for several hours to thoroughly mix the water and the electrolyte, or damage to the battery will result from the water freezing.

Distributor

Distributor Cap

Remove the distributor cap and examine the inside. If any dust, moisture, or oil deposits are present, thoroughly clean and wipe dry. To assure long life of the distributor, care must be

Continued on next page.

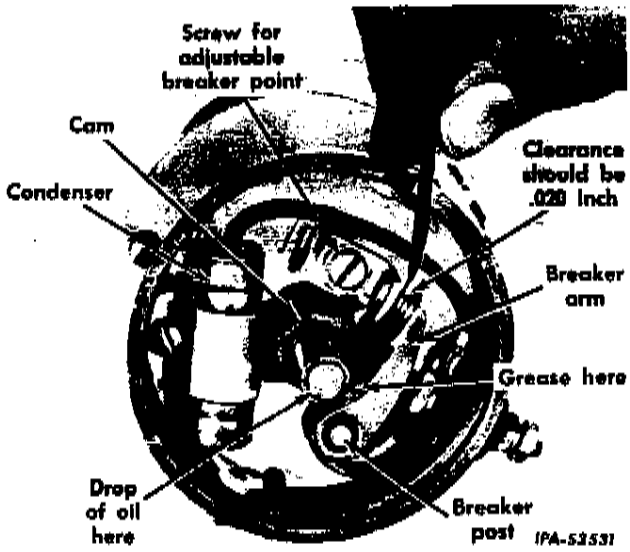
taken to keep the ventilator flats, at the inside edge of the distributor cap, open at all times. Keep the distributor rotor clean.

If the terminal nipples are removed, be sure the distributor cap terminals and coil terminal are clean and dry. The distributor is equipped with these nipples to prevent any external electrical leakage when the engine is operating under adverse conditions.

Checking the Breaker Chamber and Breaker Points

It is important that the breaker chamber be kept clean because oil on the breaker points will cause rapid burning. Remove the distributor cap, distributor rotor, and the breaker cover for breaker chamber inspection. Care must be taken, when removing the breaker cover, to prevent dirt from entering the breaker chamber. Be sure the chamber is clean and the breaker points are in good condition and have the proper opening.

Check the condition of the breaker points for build-up or lip formation. If present, the points must be dressed before the point opening can be checked or set. NEVER USE EMERY CLOTH OR SANDPAPER TO CLEAN THE POINTS. IF THE POINTS ARE WORN EXCESSIVELY, REPLACE BOTH POINTS. Check the opening between the breaker points with a feeler gauge when the rubbing block is on the high part of the cam. (Illust. 29.) (Refer to "Specifications" on page 5.) If the gap is not correct, adjust it by loosening the screw holding the adjustable point. Move the point toward or away from the breaker arm until the gauge slips snugly into the opening. After the adjustment has been made, tighten the screw.



Illust. 29
Adjusting Breaker Points.

Install the distributor cap to the housing with the tang in the cap in line with the slot in the distributor housing.

NOTE: If the cap is incorrectly positioned on the housing, it will usually result in a broken rotor when attempting to start the engine.

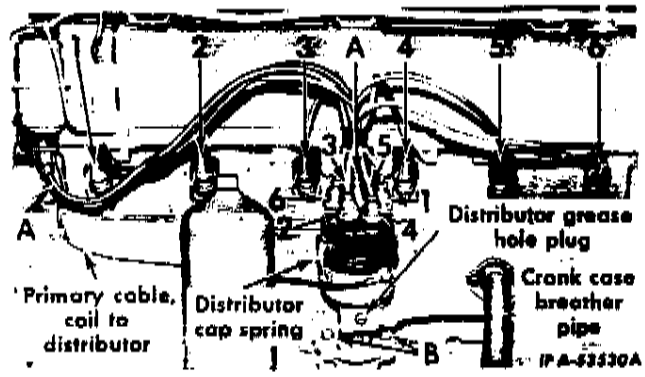
Ignition Timing

1. Be sure that the distributor cap is properly located on the distributor housing and that both bail clips are in place.

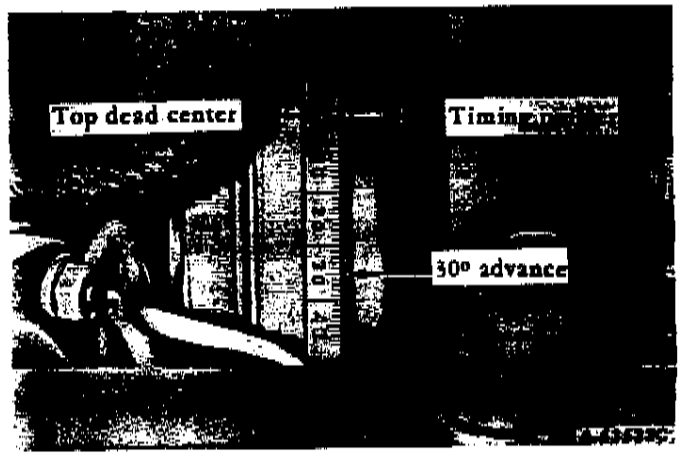
NOTE: If the distributor cap is incorrectly positioned on the distributor housing, it will usually result in a broken rotor when attempting to start the engine.

The firing order is 1, 5, 3, 6, 2, 4 (Illust. 30) and the spark plug cables must be assembled in the distributor cap in this order in a counterclockwise rotation.

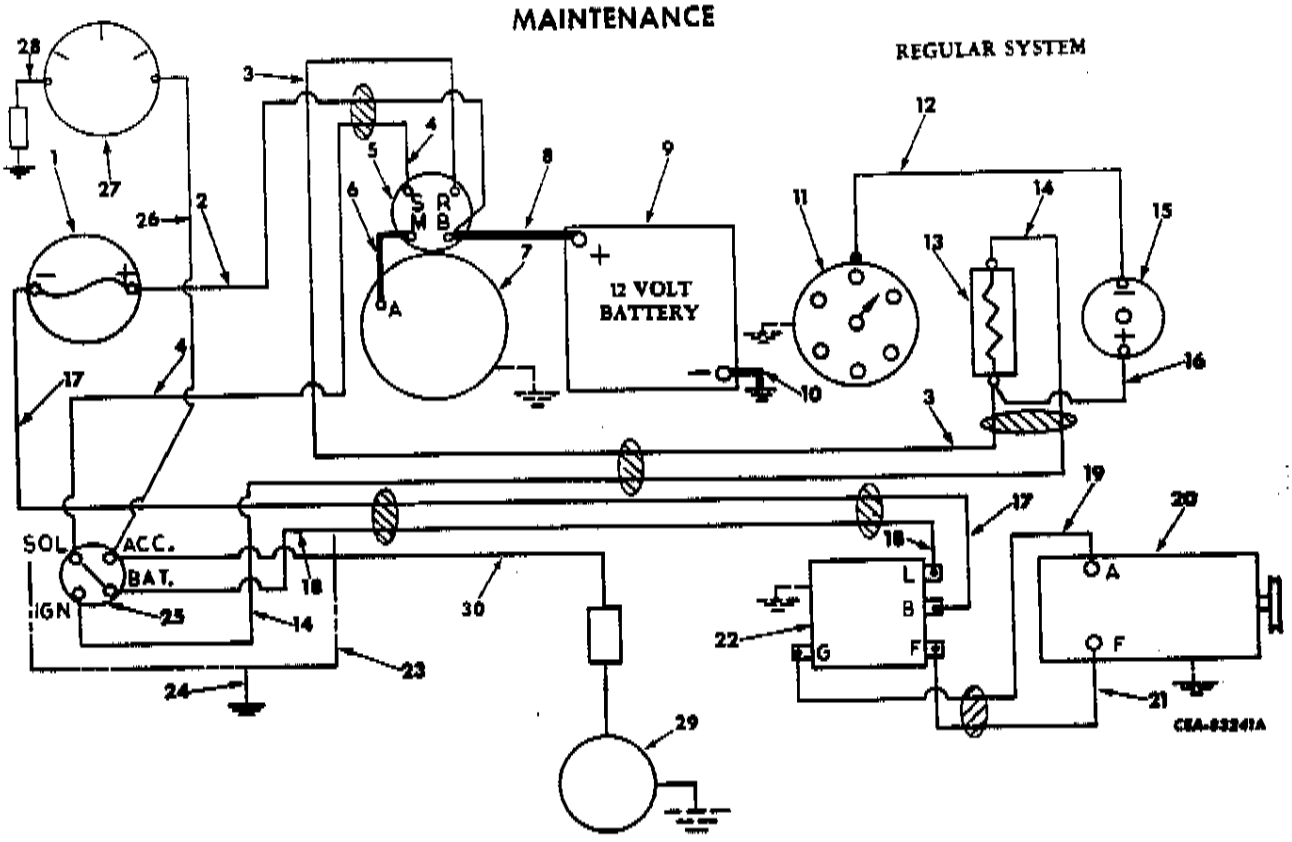
Continued on page 41.



Illust. 30
Spark Plug Wiring.



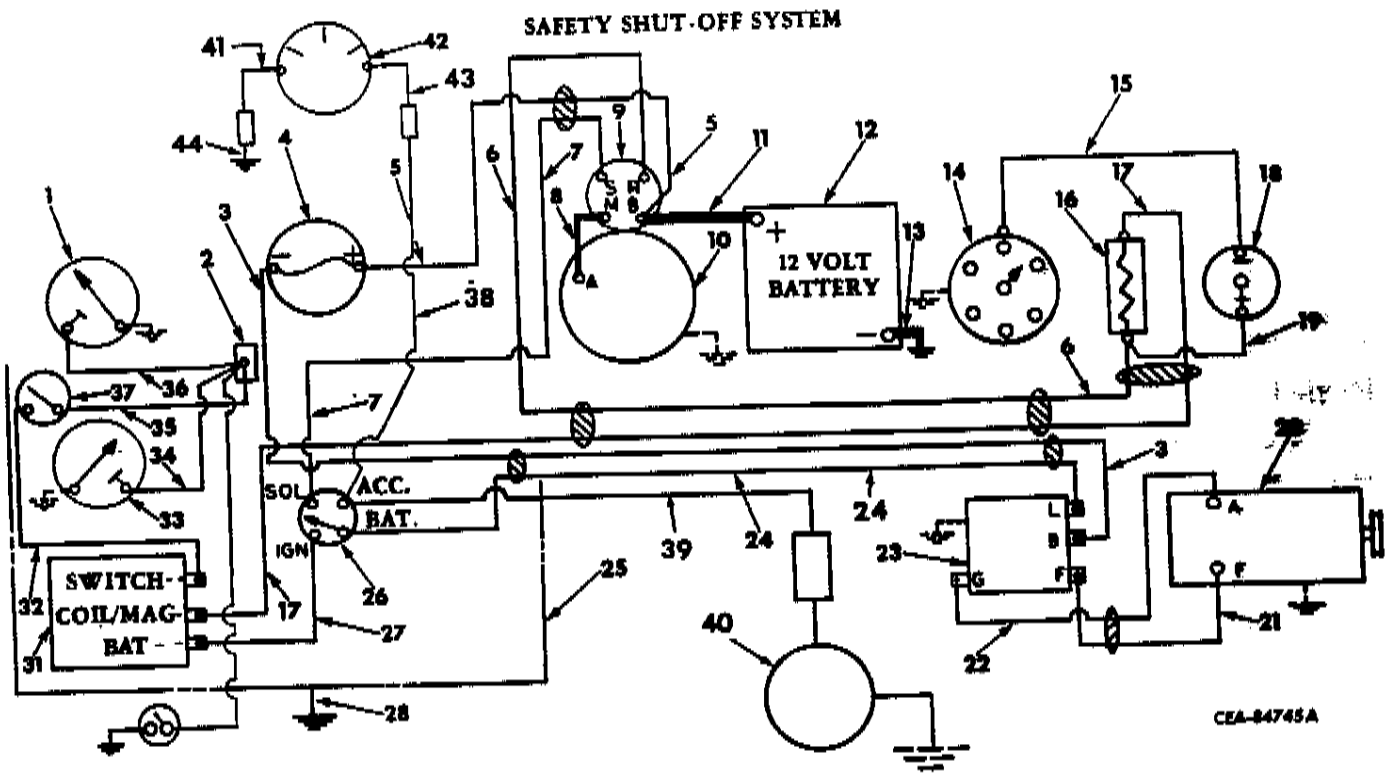
Illust. 31
Timing Pointer and Timing Marks on the Fan Drive Pulley.



Illust. 32
Wiring Diagram for Engines Equipped with Regular Gauges.

Ref. No.	Description
1.	AMMETER.
2.	CABLE, plus (+) on ammeter to "B" on solenoid (red).
3.	CABLE, "R" on solenoid to resistor (pink).
4.	CABLE, "S" on solenoid to "SOL" on ignition and starter switch (light green).
5.	SOLENOID.
6.	CONNECTOR, cranking motor to "M" on solenoid.
7.	MOTOR, cranking.
8.	CABLE, cranking motor to battery.
9.	BATTERY.
10.	CABLE, battery to ground.
11.	DISTRIBUTOR.
12.	CABLE, minus (-) on coil to distributor (red).
13.	RESISTOR, ignition coil.
14.	CABLE, resistor to "IGN" on ignition and starter switch (orange).
15.	COIL.
16.	CABLE, plus (+) on coil to resistor (red).
17.	CABLE, "B" on regulator to minus (-) on ammeter (violet).
18.	CABLE, "L" on regulator to "BAT" on ignition and starter switch (grey).
19.	CABLE, "G" on regulator to "A" on generator (yellow).
20.	GENERATOR.
21.	CABLE, "F" on regulator to "F" on generator.
22.	REGULATOR, voltage.
23.	PANEL, instrument.
24.	CABLE, instrument panel ground.
25.	SWITCH, ignition and starter.
26.	CABLE, hourmeter to "ACC" on ignition and starter switch.
27.	HOURMETER, electric.
28.	CABLE, hourmeter to ground.
29.	PUMP, electric fuel.
30.	CABLE, fuel pump to "ACC" on ignition and starter switch.
	HARNESS, cranking motor cable (consists of Ref. No's. 2 and 4).
	HARNESS, ignition cable (consists of Ref. No's. 3 and 14).
	HARNESS, regulator cable (consists of Ref. No's. 17 and 18).
	HARNESS, generator to regulator (consists of Ref. No's. 19 and 21).

MAINTENANCE



Illust. 33
Wiring Diagram for Engines Equipped with Safety Gauges.

Ref. No.	Description
1.	INDICATOR, safety oil pressure.
2.	BLOCK, junction.
3.	CABLE, "B" on regulator to minus (-) on ammeter (violet).
4.	AMMETER.
5.	CABLE, plug (+) on ammeter to "B" on solenoid (red).
6.	CABLE, "R" on solenoid to resistor (pink).
7.	CABLE, "S" on solenoid to "SOL" on ignition and starter switch (light green).
8.	CONNECTOR, cranking motor to "M" on solenoid.
9.	SOLENOID.
10.	MOTOR, cranking.
11.	CABLE, cranking motor to battery.
12.	BATTERY.
13.	CABLE, battery to ground.
14.	DISTRIBUTOR.
15.	CABLE, minus (-) on coil to distributor (red).
16.	RESISTOR, ignition coil.
17.	CABLE, resistor to "COIL/MAG" on relay (orange).
18.	COIL.
19.	CABLE, plus (+) on coil to resistor (red).
20.	GENERATOR.
21.	CABLE, "F" on regulator to "F" on generator.
22.	CABLE, "G" on regulator to "A" on generator (yellow).
23.	REGULATOR, voltage.
24.	CABLE, "L" on regulator to "BAT" on ignition and starter switch (grey).
25.	PANEL, instrument.
26.	SWITCH, ignition and starter.
27.	CABLE, "BAT" on relay to "IGN" on ignition and starter switch.
28.	CABLE, instrument panel ground.
29.	NOT USED.
30.	NOT USED.
31.	RELAY, automatic shut-off.
32.	CABLE, safety control toggle switch to "SWITCH" on relay.
33.	INDICATOR, safety heat.
34.	CABLE, Heat indicator to junction block.
35.	CABLE, safety control to toggle switch to junction block.
36.	CABLE, safety oil pressure indicator to junction block.
37.	SWITCH, safety control toggle.
38.	CABLE, hourmeter connector cable to "ACC" on ignition and starter switch.

Ref. No.	Description
39.	CABLE, fuel pump to "ACC" on ignition and starter switch.
40.	PUMP, electric fuel.
41.	CABLE, hourmeter connector.
42.	HOURMETER, electric.
43.	CABLE, hourmeter connector.
44.	CABLE, hourmeter connector cable to ground screw.
45.	CABLE, power take-off temperature switch to junction block.
46.	SWITCH, power take-off clutch shaft outer bearing housing temperature.
	HARNESS, generator to regulator (consists of Ref. No's. 21 and 22).
	HARNESS, cranking motor cable (consists of Ref. No's. 5 and 7).
	HARNESS, ignition cable (consists of Ref. No's. 6 and 17).
	HARNESS, regulator cable (consists of Ref. No's. 3 and 24).

2. Connect a timing light to the No. 1 spark plug.

NOTE: Follow the manufacturer's instructions on the use of the timing light.

3. Slowly crank the engine until the "TC" or "DC" on the fan drive pulley is in line with the pointer on the crankcase front cover (Illust. 31). White chalk or paint will highlight the timing mark for easier recognition.

4. Start the engine and check the timing light operation.

5. Rotate the throttle stop screw on the carburetor to reduce the idle speed of the engine to approximately 500 rpm for timing purposes.

6. Direct the light to the timing location on the fan drive pulley. Each light flash should be fast and accurate, and the timing marks should be readily seen.

7. Loosen the manual advance arm locking plate bolt on the distributor housing. Rotate the distributor housing until the timing mark is in alignment with the pointer (when the timing light flashes).

8. Tighten the manual advance arm locking plate bolt. Recheck to be certain that tightening the bolt did not disturb the timing setting.

9. Advance the governor control knob to the high idle position. At high idle, the timing light should flash on when the timing pointer and the 30 degree advance mark are in alignment.

10. Stop the engine. Disconnect the timing light.

FUEL SYSTEM (GASOLINE)

General

When excessive fuel consumption or inefficient engine performance is encountered, be careful in determining the exact cause before assuming the carburetor to be at fault. Consider engine compression, ignition timing, defective wiring, improperly gapped or fouled plugs, fuel pump. These are all factors in obtaining maximum fuel economy and must be within the limits specified by the manufacturer.

Due to the technical knowledge and skill required and the special equipment needed to make the necessary tests and corrections, we recommend the work be done by your authorized International Engine Distributor or Dealer.

Use clean fuel. The presence of dirt and water will disturb the functioning of the carburetor.

Carburetor

At the interval shown under "SCHEDULED MAINTENANCE" on page 14, disconnect the fuel supply lines at the carburetor and unscrew the fuel line fitting from the carburetor (Illust. 34). Clean the screen and reinstall it. Reconnect the fuel supply line.

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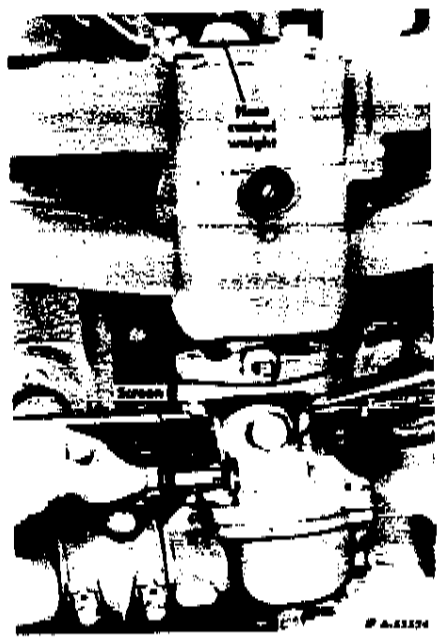


Illust. 34
Removing the Fuel Line Screen.

MAINTENANCE

The flange nuts which hold the carburetor to the intake manifold must be checked periodically for tightness.

Occasionally check the cover screws which fasten the fuel bowl to the fuel bowl cover. They should be kept tight to avoid any air leakage past the fuel bowl cover gasket.

Carburetor Adjustments

NOTE: The manifold is equipped with a heat control valve controlled by a spring thermostat. No adjustment is required but be sure the valve opens freely by moving the heat control weight back and forth. (Illust. 34.)

The engine and carburetor are correctly set when shipped from the factory. If this setting has been disturbed for any reason, proceed as follows:

Start the engine and allow it to operate until thoroughly warm before making any adjustments.

Adjusting the idle adjusting screw (Illust. 35)

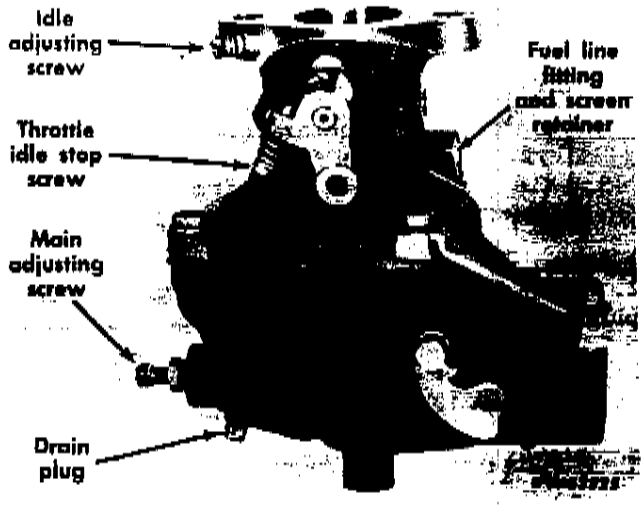
Close the idle adjusting screw to its seat by turning to the right (or in); then open one turn. Operate the engine at fast idling speed (without any load) until thoroughly warm.

While the engine is running at fast idle speed, it is advisable to screw in the throttle stop screw a few turns to prevent the engine from stopping when the throttle is closed. Now close the throttle by pushing the engine speed control knob all the way in. The engine will then be idling at a fairly high speed and the throttle stop screw can be backed out a little at a time until the desired idle speed is obtained. If the engine misses or rolls while backing out the throttle stop screw, the idle adjusting screw may be adjusted either in or out until the engine operates smoothly.

NOTE: Turning the adjusting screw in makes the idle mixture leaner. Speed up the engine for a few seconds; then recheck the idle adjustment. A slight adjustment in or out will give the smoothest idle.

Main fuel adjustment (Illust. 35)

The carburetor is equipped with a main fuel adjustment screw which can be used to reduce the amount of fuel going into the engine when under light load conditions. However, when heavy work is to be performed in which the FULL POWER of the engine IS REQUIRED, the fuel adjusting screw should be set five turns off its seat. The



Illust. 35
Gasoline Carburetor.

fuel adjusting screw seat in the gasoline carburetor has been calibrated to provide a full-power misture and should not be restricted by the use of the adjusting needle when the full power of the engine is required.

After adjusting the main fuel adjustment on the carburetor, recheck the idling speed as described under "Adjusting the Idle Adjusting Screw." If the engine is not receiving the correct mixture of fuel, it may be that the main jet adjusting screw has loosened. If necessary tighten the adjusting screw packing nut securely.

Fuel Pump and Filter

The fuel pump and filter are an integral unit. The sediment bowl and filter element are provided to prevent the entry of foreign materials into the carburetor and, thus, cause engine failure.

Do not attempt to disassemble the fuel pump diaphragm. If a sufficient amount of fuel is not being delivered to the carburetor, make a careful check for the cause. Usually the cause will be from such sources as bent, leaky or clogged fuel lines, loose fuel bowl, dirty ceramic filter or fuel bowl. If servicing these parts does not correct the problem, consult your authorized International Engine Distributor or Dealer.

Cleaning the Fuel Pump Filter (Illust. 36)

Disassemble and clean the filter as follows:

1. Loosen the screw (5) at the bottom of the bowl (6) to relieve the tension on the retainer (3).

2. Remove the bowl (6) from the filter head (1). Remove the filter (2) and the spring (4) from the bowl. Separate the spring from the filter. The old filter should not be re-used. Dump out the gasoline in the bowl.

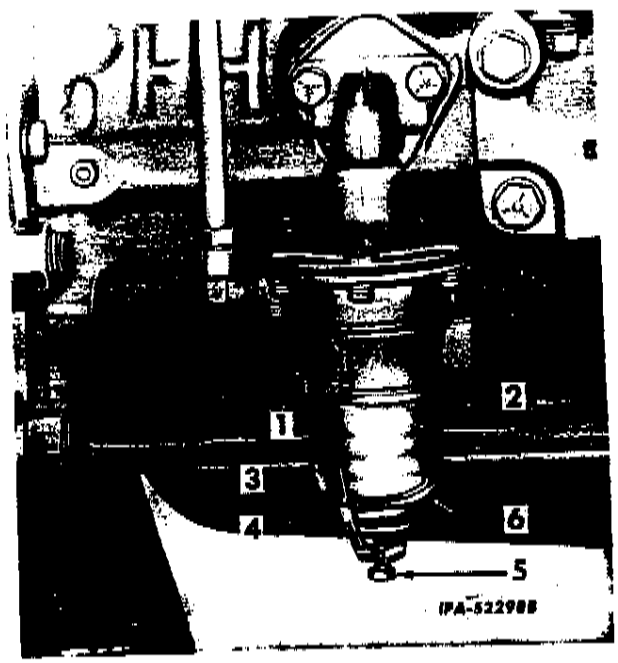
3. Remove the bowl gasket from the filter head. This gasket should not be re-used.

4. Wash the bowl (6) and the spring (4) in a commercial carburetor cleaning solvent.

5. Thoroughly dry these parts using compressed air.

6. Install the spring (4) in the bowl. Install a new ceramic filter (2) so the spring fits in the recess in the bottom of the filter.

7. Place a new bowl gasket in the filter head (1). Position the bowl (6) to the filter head. Be sure the bowl and the gasket make an air-tight seal at the filter head. Tighten the retainer screw (5) finger-tight.



Illust. 36
Fuel Pump and Filter.

1. HEAD, filter.
2. FILTER.
3. RETAINER, bowl (with screw).
4. SPRING, filter.
5. SCREW (part of retainer).
6. BOWL.

Fuel Pump (Electric)

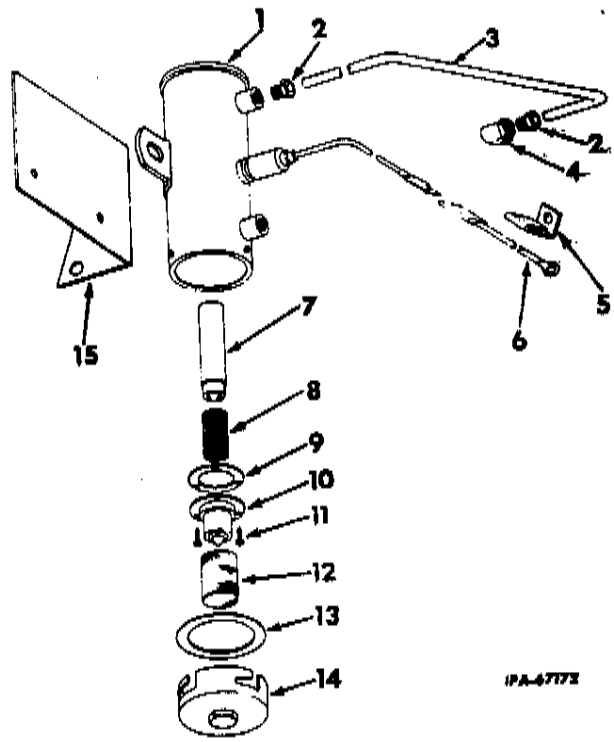
Engines operating on gasoline and equipped with a hydraulic pump have an electric fuel pump bracket mounted on the right hand front cover of the engine.

The electric fuel pump operates immediately when the ignition switch is turned to the right to the "ON" position.

Cleaning the Filter Screen (Illust. 37)

1. Using a wrench on the hex head underneath the cover (14), rotate and release the cover from the body (1).

Continued on next page.



Illust. 37
Electric Fuel Pump Components.

1. BODY, pump.
2. NUT.
3. TUBE, pump to carburetor
4. ELBOW.
5. CLIP.
6. CABLE.
7. PLUNGER, pump.
8. SPRING, plunger.
9. GASKET, spring cup.
10. CUP, plunger.
11. SCREW.
12. SCREEN, filter.
13. GASKET, cover.
14. COVER.
15. BRACKET, mounting.

2. Remove the gasket (13) from the body. If this gasket has taken a "set" or if it has become brittle or cracked, replace it with a new gasket.

3. Carefully remove the screen (12) from the cup (10). If the screen is damaged, replace it with a new screen. If the screen is not damaged, clean the screen by using compressed air or by washing in a commercial solvent or clean kerosine.

4. Use compressed air to thoroughly clean the magnet on the inside of the cover (14).

5. Install the gasket (13) in place on the inside of the cover (14). Center the screen (12) over the magnet on the inside of the cover. Install the cover on the pump body (1), being sure the inside diameter of the screen (12) does not bind on the outside diameter of the plunger cup (10).

6. Apply a 5/8 inch wrench on the cover hex head. Turn the cover (14) until the bayonet fittings on the body (1) are fully engaged in the cover slots.

FUEL SYSTEM (LIQUEFIED PETROLEUM GAS)

General

When excessive fuel consumption or inefficient engine performance is encountered, be careful in determining the exact cause before assuming the carburetor to be at fault. Consider engine compression, ignition timing, defective wiring, imporperly gapped or fouled plugs, distributor contact points, condenser, coil and fuel filter. These are all factors in obtaining maximum fuel economy and must be within the limits specified by the manufacturer.

Due to the technical knowledge and skill required and the special equipment needed to make the necessary tests and corrections, we recommend that the work be done by your authorized International Engine Distributor or Dealer.

Carburetor and Regulator

The regulator controls the flow of fuel to the carburetor.

The carburetor is used to mix accurately the correct proportion of fuel with air to satisfy the speed and load demand of the engine.

There are three fuel adjustments. These adjustments were correctly set at the factory and should require no alteration. However, if these adjustments have been disturbed in some manner, they can be correctly reset by the following instructions.

Adjusting the Carburetor and Regulator (Illust. 38)

1. With the engine stopped, open the supply valve from the fuel supply tank.

2. Open the adjusting screw (1) on the regulator (7) 1-1/2 turns.

3. Open the screw (3) on the carburetor (6) four turns.

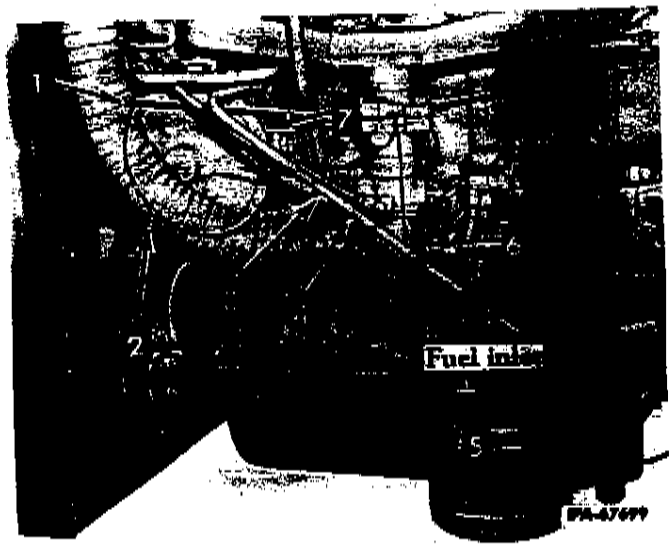
4. Open the screw (4) 1-1/4 turns.

NOTE: All three screws (1, 3 and 4) provide a leaner fuel mixture when turned in (clockwise) and a richer fuel mixture when turned out (counterclockwise).

5. Set the engine throttle control about 1/3 open.

6. Close the choke valve and start the engine.

7. When the engine starts; leave the choke closed and the throttle as set; then adjust the screw (4) for the highest rpm and lock the screw in position.



Illust. 38
Engine Equipped to Use Liquefied Petroleum Gas.

1. SCREW, idle adjusting.
2. VALVE, water drain.
3. SCREW, load adjusting.
4. SCREW, starting adjusting.
5. FILTER, fuel.
6. CARBURETOR.
7. REGULATOR, fuel.

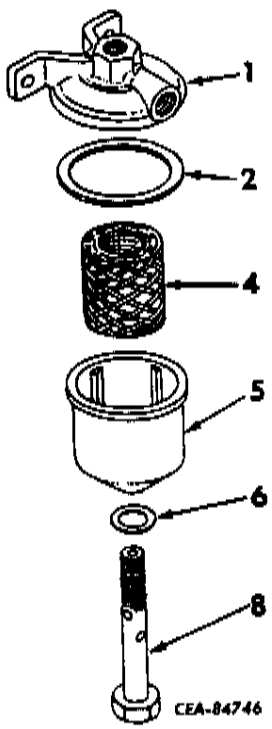
8. Open the choke valve, reduce the engine speed to idle and adjust the screw (1) for best idle operation. If the engine fails to respond when changing from starting to running position, open or close the screw (3) until the condition is overcome.

9. With the choke valve open and the engine throttle set to just under governed speed, adjust as follows:

Turn the screw (3) in (clockwise) until the engine loses speed; then out (counterclockwise) approximately 1/4 turn. These adjustments should give the approximate best performance and minimum gas consumption.

10. Adjust the screw (1) to give the best idle after the engine is warmed up and readjust throttle for the proper idle speed.

Fuel Filter (Illust. 39)



Illust. 39
Fuel Filter (Liquefied Petroleum Gas).

1. TOP, filter.
2. GASKET, filter top.
4. ELEMENT, filter.
5. BOWL, filter.
6. GASKET, filter bowl.
8. BOLT, filter bowl.

◆ CAUTION: THE PRECAUTIONS OUTLINED ON PAGES 10 AND 11 MUST BE CLOSELY FOLLOWED TO AVOID INJURY AND DAMAGE WHEN CHANGING THE FUEL FILTER.

The fuel filter element must be changed when it becomes clogged sufficiently to restrict the flow of fuel. A clogged filter element causes a pressure drop within the filter with consequent vaporization of the fuel which may cause freezing at the filter and engine starvation for fuel. Remove the filter as follows:

1. Close the valve on the supply line.

2. Hold the bowl (5) and unscrew the bolt (8).

3. Lower and remove the bowl (5) from the top (1). Remove and discard the old element (4).

4. Wipe out the bowl (5) with a cloth dampened in kerosine. Thoroughly clean the bolt (8) to remove any restrictions in the drilled passages.

5. Check the condition of the gasket (2). If there are any signs of wear or damage; replace it.

6. Install the gasket (2) in the top (1). Place the new element (4) in the bowl (5).

7. Secure the bowl (5) to the top (1) with the bolt (8) and gasket (6). Tighten the bolt.

FUEL SYSTEM (NATURAL GAS)

General

When excessive fuel consumption or inefficient engine performance is encountered, be careful in determining the exact cause before assuming the carburetor to be at fault. Consider engine compression, ignition timing, defective wiring, improperly gapped or fouled plugs, distributor contact points, condenser, coil and fuel pump. These are all factors in obtaining maximum fuel economy and must be within the limits specified by the manufacturer.

Due to the technical knowledge and skill required and the special equipment needed to make the necessary tests and corrections, we recommend that the work be done by your authorized International Engine Distributor or Dealer.

Carburetor and Regulator

The regulator controls the flow of fuel to the carburetor.

The carburetor is used to mix accurately the correct proportion of fuel with air to satisfy the speed and load demand of the engine.

Continued on next page.

MAINTENANCE

There are three fuel adjustments. These adjustments were correctly set at the factory and should require no alteration. However, if these adjustments have been disturbed in some manner, they can be correctly reset by the following instructions.

Adjusting the Carburetor and Regulator (Illust. 40)

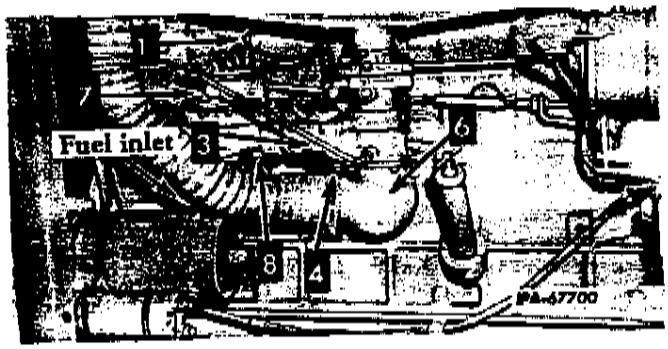
1. With the engine stopped, open the supply valve from the fuel supply tank.

2. Open the adjusting screw (1) on the regulator (7) 2 turns.

3. Open the screw (3) on the carburetor (6) 1-1/2 turns.

4. Open the screw (4) 1-1/2 turns.

NOTE: All three screws (1, 3 and 4) provide a leaner fuel mixture when turned in (clockwise) and a richer fuel mixture when turned out (counterclockwise).



Illust. 40
Engine Equipped to Use Natural Gas.

1. SCREW, idle adjusting.
3. SCREW, load adjusting.
4. SCREW, starting adjusting.
6. CARBURETOR.
7. REGULATOR, fuel.
8. PLUG, drain.

5. Set the engine throttle control about 1/3 open.

6. Close the choke valve and start the engine.

7. When the engine starts; leave the choke closed and the throttle as set; then adjust the screw (4) for the highest rpm and lock the screw in position.

8. Open the choke valve, reduce the engine speed to idle and adjust the screw (1) for best idle operation. If the engine fails to respond when changing from starting to running position, open or close the screw (3) until the condition is overcome.

9. With the choke valve open and the engine throttle set to just under governed speed, adjust as follows:

Turn the screw (3) in (clockwise) until the engine loses speed; then out (counterclockwise) approximately 1/4 turn. These adjustments should give the approximate best performance and minimum gas consumption.

10. Adjust the screw (1) to give the best idle after the engine is warmed up and readjust throttle for the proper idle speed.

MECHANICAL GOVERNOR (Illust. 41)

With the engine stopped, adjust the carburetor connecting rod as follows:

1. Disconnect the clevis (4) from the lever (5).

2. Place the levers (1 and 6) in the wide open throttle position.

3. Adjust the length of the rod (2) so that the hole in the clevis (4) is in line with the hole in the lever (5). Adjust the clevis one additional turn longer.

4. Connect the clevis to the lever with the pin (5).

5. Start and operate the engine until normal operating temperature is reached.

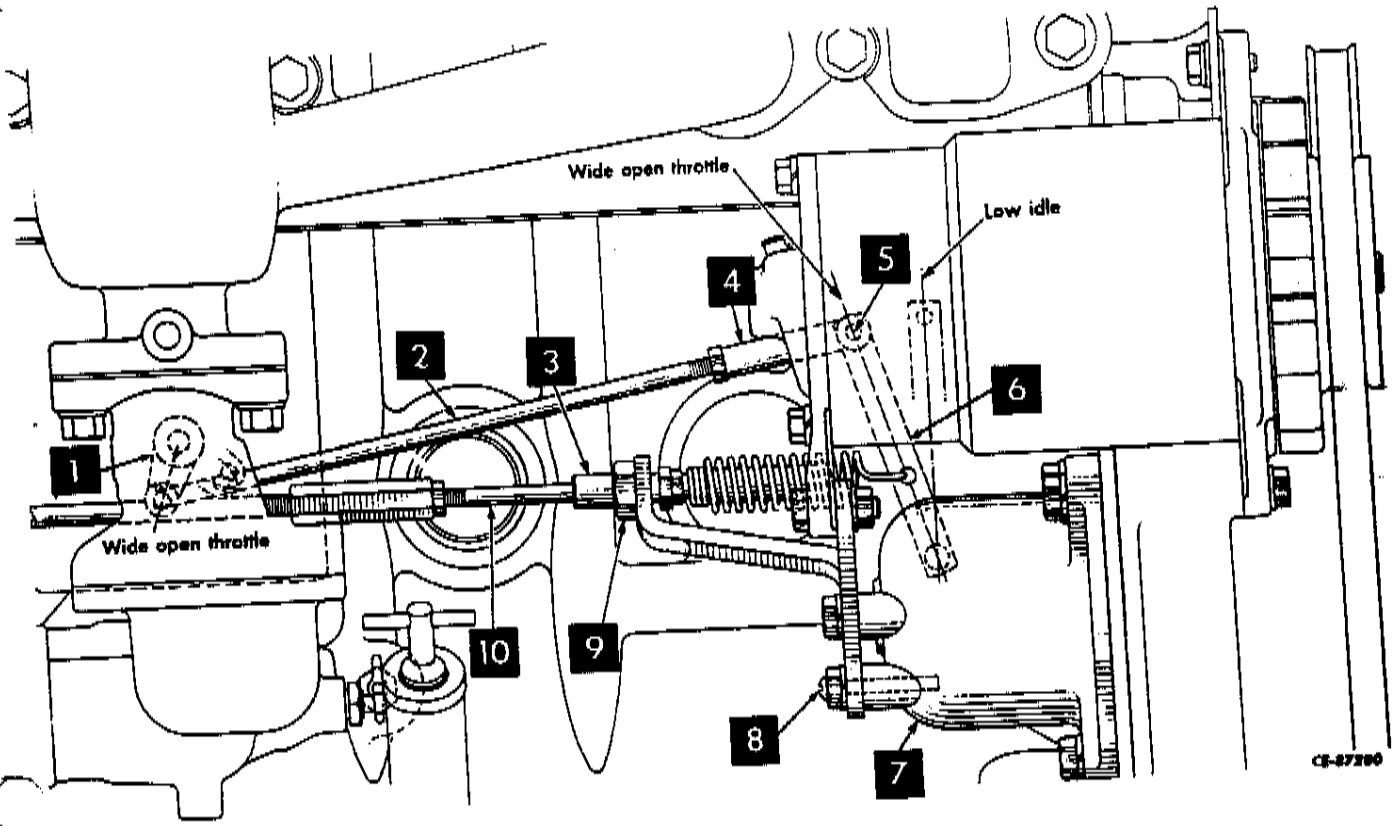
6. Pull the rod (10) back against the stop.

7. Loosen the nut (9).

8. Turn the adjuster (3) in or out to produce the required governor fast idle speed which is stamped on the nameplate attached to the left side side of the flywheel housing.

NOTE: Move the adjuster out (toward the rear) to increase engine speed and in (toward the front) to decrease engine speed.

9. Check the governor action by suddenly moving the rod (10) back against the stop. If the governor surges more than twice, turn in on the screw (8) just enough to stop excessive surging. Lock the screw with the jam nut.



Illust. 41
Governor Adjustment.

1. LEVER, carburetor throttle.
2. ROD, governor to carburetor.
3. ADJUSTER, governor spring.
4. CLEVIS.
5. PIN, clevis.
6. LEVER, governor control.
7. GOVERNOR.
8. SPRING, bumper.
9. NUT, governor spring adjuster lock.
10. ROD, governor spring retainer.

POWER TAKE-OFF CLUTCH

This over-center type clutch is designed to require a minimum of attention. Overlubrication is as detrimental to the clutch as under lubrication. It is important to follow the lubrication instructions as given in "LUBRICATION GUIDE" on page 20.

Adjustment

Adjustment is required when a diminished effort is required to "engage" the clutch.

Rapid wear of the clutch facings will result if slippage takes place while the engine is under heavy load.

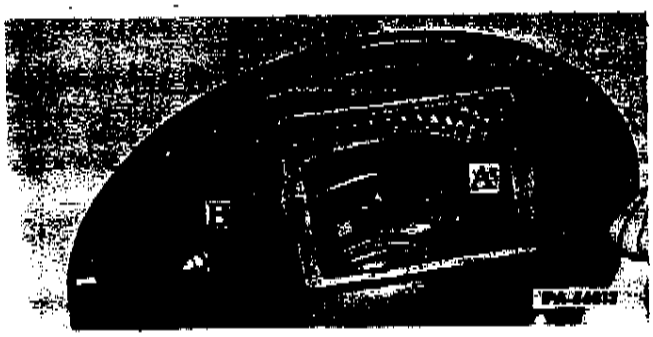
NOTE: New clutch facings have a series of high spots or feather edges which must be worn away before the lining is capable of transmitting its full torque capacity. Hence, clutch adjustment will be required several times within the first 10 hours of operation. These adjustments will avoid rapid clutch facing wear due to slippage and will allow the clutch to handle full engine power.

Adjust the clutch as follows:

1. Remove the clutch instruction plate.
2. Disengage the clutch and slowly crank the engine (refer to "HAND CRANKING" on page 33) until the adjusting points appear in the center of the opening.

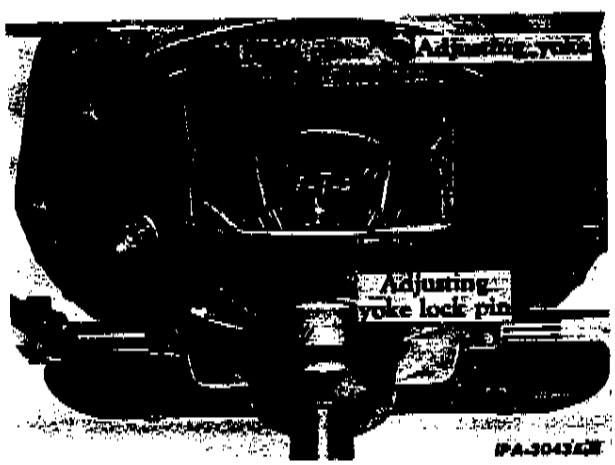
Continued on next page.

3. TWIN DISC CLUTCH (11-1/2 INCH): Depress the lock pin (A) and hold the power take-off shaft to keep the clutch from turning. Insert a pry bar in the notch in the adjusting yoke (B) and turn the yoke clockwise one notch at a time (Illust. 42).



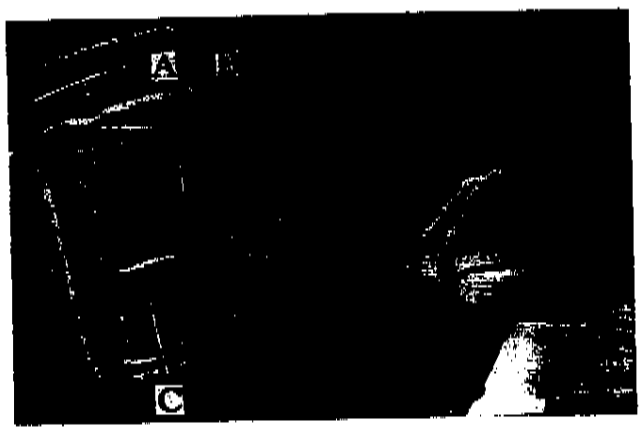
Illust. 42
Adjusting the Twin Disc 11½ inch Over-Center Clutch.

3. TWIN DISC CLUTCH (8 AND 10 INCH): Pull out the adjusting yoke lock pin so it is disengaged from the floating plate. Hold the power take-off shaft and turn the adjusting yoke clockwise (right); move it one notch or possibly two notches until the clutch hand lever requires a distinct pressure to engage (Illust. 43).



Illust. 43
Adjusting the Twin Disc 8 and 10 inch Over-Center Clutch.

4. ROCKFORD CLUTCH (8 INCH): Loosen the adjusting ring lock screw (A) with an offset screwdriver to free the lock (B). Hold the power take-off shaft to keep the clutch from turning and insert a pry bar into a notch in the adjusting ring (C) for leverage. Turn the ring a notch at a time in a counterclockwise direction (Illust. 44).



Illust. 44
Adjusting the Rockford 8 inch Over-Center Clutch.

4. ROCKFORD CLUTCH (10 AND 11-1/2 INCH): Loosen the adjusting ring lock screw "A" with an offset screwdriver to free the lock "B." Hold the power take-off shaft to keep the clutch from turning and insert a pry bar into a notch in the adjusting ring "C" for leverage. Turn the ring a notch at a time in a counterclockwise direction (Illust. 45).

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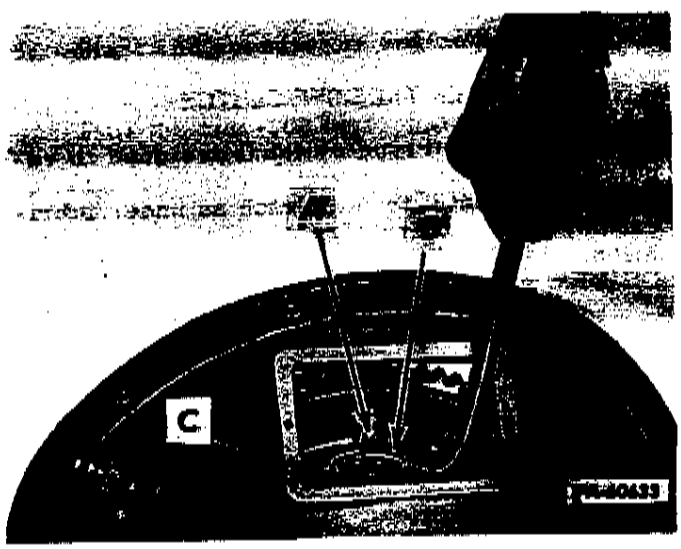
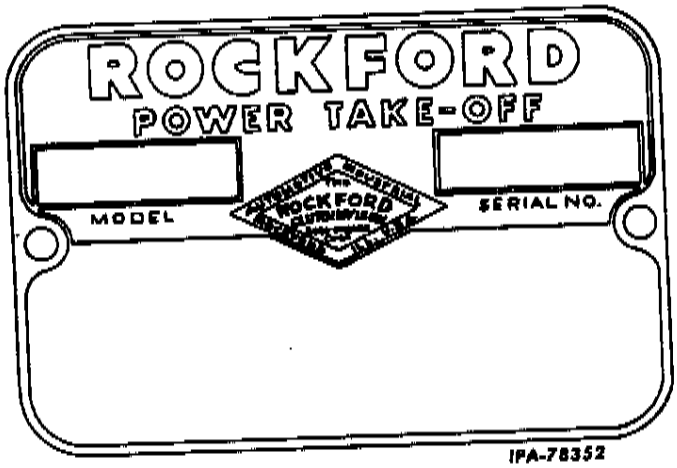
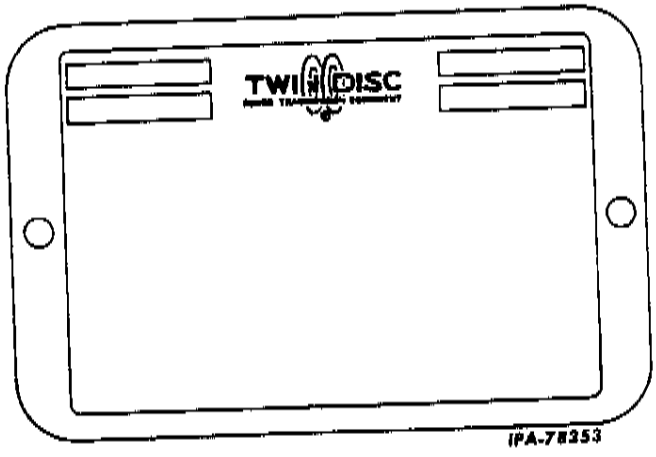


Illust. 45
Adjusting the Rockford 10 and 11½ inch Over-Center Clutch.

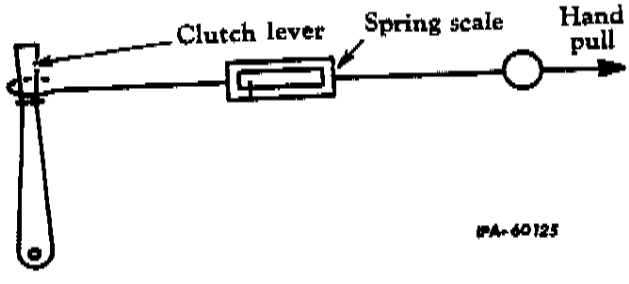
5. Be sure the clutch lever is in the "disengaged" position. To determine the correct amount of hand-pull effort for your engine refer to Illust.46 or 47 for the IH power take-off number on your engine.



Illust. 46
Rockford Instruction Plate.



Illust. 47
Twin-Disc Instruction Plate.



Illust. 48
Method of Checking Clutch Adjustment.

6. Engage the spring scale hook on the clutch lever as shown in Illust. 48 Refer to the chart on this page for the correct amount of hand-pull effort.

NOTE: These figures, shown in the charts below, are based on the clutch lever originally furnished with the power take-off.

ROCKFORD

IH Power Take-Off Part Number	Pounds of Effort
319 500 R91	50
319 503 R91	70
319 519 R91	75
319 524 R91	75

TWIN-DISC

IH Power Take-Off Part Number	Pounds of Effort
321 052 R91	80-90
321 054 R91	60-65
321 056 R91	70-80
321 057 R91	70-80
346 882 R91	110-120

7. ROCKFORD CLUTCH: Tighten the adjusting ring lock screw.

7. TWIN-DISC CLUTCH: Secure the adjusting lock pin.

8. Install the clutch instruction plate.

TRANSMISSION CLUTCH

This clutch is a non-adjustable, dry type and automatically compensates for clutch facing wear.

STORING THE ENGINE

Gasoline Engines

When the engine is not to be used for a period of time, it must be stored in a dry and protected place. Leaving equipment outdoors, exposed to the elements, will result in materially shortening its life.

The following procedure must be followed when the engine is place in storage for 30 days or more and the lubrication procedures repeated every six months.

MAINTENANCE

We recommend that caution be taken in starting an engine that has been in storage. Refer to the procedure shown under "PREPARING STORED ENGINE FOR SERVICE" on this page.

1. Thoroughly wash or clean the engine.

2. Run the engine long enough to warm the oil in the crankcase. Drain the crankcase, change the lubricating oil filter element (as described on page 32) and fill the crankcase. (Refer to the "LUBRICATION GUIDE" on page 17, for the correct viscosity of oil used for the prevailing temperature.)

3. Completely lubricate the rest of the engine as outlined in the "LUBRICATION GUIDE" on pages 18, 19, 20 and 21.

4. Drain the fuel from the fuel tank and carburetor and clean out the fuel pump filter. (Refer to "Cleaning the Fuel Filter" on page 43).

NOTE: Present-day grades of gasoline have a tendency to form gum; therefore, it is necessary that the gasoline tank and carburetor be completely drained of fuel when the engine is to be out of service for more than two weeks. These gum deposits can be dissolved with a mixture of one part alcohol and one part benzol, or with acetone.

5. Remove the spark plugs and pour one tablespoonful of Grade-50 lubricating oil into each cylinder. Crank the engine two or three times to distribute the oil over the cylinder walls; then reinstall the spark plugs.

6. Remove the valve housing cover and flush the valves, rocker arms and push rods with Grade-50 lubricating oil. (If any evidence of rust is found, remove it before lubricating.) Use a paint brush to coat the inside of the valve cover with Grade-50 lubricating oil. Install the valve housing cover.

7. Drain and clean the cooling system (refer to page 25). Install a "RADIATOR DRAINED" tag.

8. Remove the crankcase breather pipe from the valve cover and plug up the hole.

9. Completely service the air cleaner as outlined under "AIR CLEANER" on pages 29 and 30.

10. Remove the air cleaner intake cap and store it in a clean dry place. Cover or plug the exhaust pipe and the air cleaner pipe.

11. Remove the battery and store it in a cool, dry place above freezing (+32°F). The battery must be fully charged at the time of storage. Check the battery liquid level at least once a month for water level and specific gravity. (Refer to "Liquid Level" on page 37.) Never allow the battery to run down below 3/4 full charge while in storage.

Liquefied Petroleum and Natural Gas Engines

Follow the same procedure used for preparing the gasoline engines for storage, except as follows:

1. If the fuel lines are going to be disconnected from the engine; close the supply valve on the fuel line. Run the engine until it stops from lack of fuel, and proceed as follows:

LIQUEFIED PETROLEUM GAS ENGINES: Disconnect the fuel line at the fuel inlet (Illust. 38). Plug the fuel inlet. Cover the end of the fuel inlet line.

NATURAL GAS ENGINES: Disconnect the fuel line at the fuel inlet (Illust. 40). Plug the fuel inlet. Cover the end of the fuel inlet line.

2. Drain the fuel regulators of water as follows:

LIQUEFIED PETROLEUM GAS ENGINES: Open the valve (2, Illust. 38) and allow any accumulation of water to drain completely. Close the valve.

NATURAL GAS ENGINES: Remove the drain plug (headless, slotted) (8, Illust. 40) and drain off any accumulation of water. Install the plug.

3. Replace the fuel filter element on liquefied petroleum gas engines. (Refer to page 45.)

PREPARING STORED ENGINE FOR SERVICE

1. Install a fully charged battery and be sure the proper connections are made. (Refer to the wiring diagrams on pages 39 or 40.)

2. Remove the spark plugs and pour a mixture of one-half gasoline and one-half light lubricating oil into each cylinder; one ounce (two tablespoonfuls) per cylinder is enough.

3. Remove the valve housing cover and flush the valve and valve operating mechanism with the same mixture.

4. Crank the engine rapidly until the excess oil has been blown out of the spark plug holes. This operation will loosen any tight piston rings and wash old, gummy oil from valves and pistons.

Continued on next page.

5. Drain and flush out the crankcase with kerosine or flushing oil and fill with the specified lubricating oil. (Refer to the "LUBRICATION GUIDE" on page 18.) Be sure a new element has been installed in the lubricating oil filter.

6. Remove the exhaust pipe, crankcase breather and the air cleaner opening plugs and/or covers.

7. Install the exhaust pipe.

8. Clean the crankcase breather (refer to "CRANKCASE BREATHER" on page 33). Install the crankcase breather.

9. AIR CLEANER (WET TYPE): Remove and clean the oil cup. Refer to "Cleaning the Oil Cup" on page 29.

10. Install the air intake cap.

11. Install the spark plugs after cleaning and setting the gaps (refer to "Spark Plugs" on page 36).

12. Be sure the cooling system drains are closed and fill the cooling system. Check for leaks and loose connections. Remove the "RADIATOR DRAINED" tag.

13. If the fuel lines have been disconnected from the engine, remove the plugs from the fuel inlet. Remove the covers from the fuel inlet lines. Reconnect the fuel inlet lines being sure the connections are tight.

LIQUEFIED PETROLEUM GAS ENGINES: Check that a new fuel filter element has been installed as outlined on page 45.

14. Fill the fuel tank or tanks.

15. Start the engine and let it run slowly; observe if any valves are sticking. If so, pour a small quantity of kerosine on the valve stems until loose.

◆ CAUTION: DO NOT RUN THE ENGINE RAPIDLY OR OPERATE IT AT HIGH SPEED IMMEDIATELY AFTER STARTING. KEEP THE DOORS WIDE OPEN OR MOVE THE ENGINE OUTSIDE THE STORAGE ROOM IMMEDIATELY TO AVOID DANGER FROM EXHAUST GAS.

16. Install the valve housing cover. Tighten the valve cover bolts (refer to "Torques" on page 5).

17. After the engine has been run long enough to clean the excess oil out of the cylinders, the spark plugs should be removed and checked for oil fouling. If fouled, clean and reinstall them in the engine.

NOTE: When installing the spark plugs, refer to "Torques" on page 5 for the specified torque.

PARTS CATALOG

UC-221 AND UC-263
ENGINE AND ATTACHMENTS

FORM
PU-52C

September, 1965

(Supersedes PU-52, PU-52A, and PU-52B)

INTERNATIONAL®
ENGINES

INTERNATIONAL HARVESTER COMPANY
401 NORTH MICHIGAN AVENUE
CHICAGO, ILLINOIS 60611, U.S.A.

Due to a continuous program of research and development, some procedures, specifications and parts may be altered in a constant effort to improve machines.

Periodic revisions may be made to this publication and mailed automatically to distributors. It is recommended that customers contact their distributor or dealer for information on the latest revision.

(THIS CATALOG INCLUDES REVISIONS 1, 2 AND 3)

UC-221 AND UC-263
ENGINE AND ATTACHMENTS

FORM

PU-52C

September, 1965

(Supersedes PU-52, PU-52A, and PU-52B)

PRINTED IN UNITED STATES OF AMERICA

The Importance of ADEQUATE PARTS and SERVICE

The wise purchaser of a new machine gives consideration to the following factors:

1. *Original quality*
2. *Availability of service parts*
3. *Availability of adequate service facilities*

In many cases the machine becomes the only means of performing certain tasks that must be done in a limited period of time. Wear is to be expected and under extreme conditions even breakage of parts may occur. However, the user can still be assured of getting his work done on time if service parts and adequate service facilities are available.

Foresighted International Harvester distributors and dealers make every effort to provide good service and maintain a completely adequate stock of service parts.

When in need of parts, always give your authorized International Engine distributor or dealer your Chassis and Engine serial numbers. We suggest that you write these serial numbers in the spaces provided below, for ready reference when parts are required.

Chassis Serial No._____
(Stamped on plate on left side of flywheel housing)

Engine Serial No._____
(Stamped on left side of engine crankcase just below the distributor)

INSTRUCTIONS FOR ORDERING PARTS

(a) All parts orders should be sent to parts depot when so instructed. Give complete address, state the county and railroad station (when shipping point is different than post office), also whether shipment is to go by parcel post, express, truck, or freight.

(b) When ordering parts, give the IH part number, including suffix or prefix letters. To facilitate identification of these parts, "Complete Serial Numbers" (including letters and numerals) assigned to machines, if any, should be furnished.

(c) Parts should be ordered on the standard parts order blank. The parts should be arranged in sequence by part numbers to facilitate service on orders at the parts depot.

(d) Claims for shortage or error in the handling of an order for parts must be made upon receipt of goods.

It is the policy of International Harvester Company to improve its products whenever it is possible and practical to do so.

We reserve the right to make changes or add improvements in the design or construction of parts at any time without incurring the obligation to install such changes on products previously delivered.

INTRODUCTION

This catalog contains a list of service parts for the UC-221 and UC-263 engines and attachments. The UC-221 has a 3-9/16 x 3-11/16 inch six-cylinder carbureted engine and the UC-263 has a 3-9/16 x 4.390 six-cylinder carbureted engine.

Following is a brief summary of the system used in compiling this catalog. It is to your advantage to carefully study this summary.

This catalog is printed in a double column page format, and is divided into four sections---Introductory Pages, Indexes to Units, Illustrations and Parts Lists, and Numerical Index.

(1) INDEXES. Two types of indexes are used. The index to units alphabetically lists all of the units by page number. The numerical index at the back of the catalog lists all part numbers (excluding standard fasteners) giving the page number where the part is listed.

NOTE - Refer frequently to the Index to Units to save time in locating the proper unit.

(2) ILLUSTRATIONS. Parts in this catalog are illustrated by the "exploded view" method. Individual parts in each illustration are shown where they belong in relation to one another. Reference numbers only are shown in each illustration. These numbers correspond with numbers in the Reference Number column in the accompanying list of parts. Parts in illustrations without reference numbers are the same as duplicate parts with reference numbers.

CAUTION: Reference numbers should not be used when ordering parts. Always use IH part numbers or description when ordering.

(3) METHOD OF LISTING. The parts list of each classification is divided into units. Parts are listed in order according to reference number shown in the illustration, followed by a full description based upon the "noun first" method---i.e., the noun name of the parts is listed first then the modifying descriptive information which serves to specifically identify the item. For example: SHAFT w/two PLUGS ASSEMBLY, valve lever. Parts not shown in illustrations appear at end of list in alphabetical sequence by noun name. Parts listed will work on all units covered in this catalog unless a serial number or other qualifying designation is given for purpose of identification.

Throughout this catalog the term "Front" indicates the radiator end. Whenever the terms "Right" or "Left" are used it should be understood to mean from a rear position looking toward the radiator end.

MANUFACTURERS PART NUMBERS ARE LISTED IN BRACKETS FOLLOWING THE DESCRIPTION OF THE PART.

(4) NUMBER REQUIRED. In this new double-column catalog format the single "No. Req'd." column is eliminated and the quantity used of each item is shown in parenthesis (4) following the description of the item. Where no quantity is indicated it should be understood to mean that only one (1) is required.

In many parts lists it is possible to include more than one assembly or attachment. The assemblies or attachments are listed at the beginning of the parts lists with the letters A, B, C, etc., preceding the part number of the assembly or attachment. The number required information is shown in parenthesis following the description of the parts. When letters (A, B, C, etc.,) are shown without a quantity it should be understood to mean only one (1) is required. Parts without letters after the description indicate the part is used for all assemblies or attachments listed in the heading.

(5) ASSEMBLIES AND ATTACHMENTS. Wherever possible the component parts of assemblies or attachments are shown in the "exploded views" by use of boxes, brackets or arrows. Component parts of assemblies or attachments are listed by one of the following methods.

(a) The listings are fully covered by descriptions for simple assemblies and attachments.

(b) When four or more parts are contained in the assemblies or attachments the listing of components immediately follows the description with the wording "(Composed of-)."

(c) Assemblies or attachments consisting of many parts shows the assembly or attachment number at the beginning of the unit list, followed by the listing of the components.

Exceptions to the above methods are explained by footnotes in the text.

Individual parts of an assembly which are not available for service are marked with a symbol §. In some instances, such parts are listed with a notation giving the information which is to be used for ordering.

(6) MISCELLANEOUS PARTS. Standard bolts, screws, nuts, etc.---are not identified by a reference number. These parts are known as COMMON HARDWARE items and appear in abbreviated nomenclature and are shown indented under the major items with which they are used. They should be ordered as listed, since they are not component parts of the pieces they attach. Hardware parts identified with part numbers have

een designed for a specific usage. Standard rdware parts should not be substituted for em.

WARNING: Attaching parts especially made for their location should never be substituted with regular standard parts.

The following rules are established to govern the listing of attaching parts:

The part number for Common Hardware items is eliminated. However, Design Hardware items will continue to be listed by part number and description.

All Carriage, Machine and Plow BOLTS; NUTS; Cap, Machine and Set SCREWS, will be considered furnished with National Course Thread unless otherwise specified. The number of threads per inch will be eliminated.

All NUTS will be considered "hex." unless otherwise specified.

All WASHERS will be considered "Plain" unless otherwise specified. The "ID", "OD" and "No." identity will be eliminated. The inside dimension will be listed first, followed by the outside diameter and the thickness.

All lock WASHERS will be considered "Medium" type unless specified as "Light" or "Heavy."

All cotter PINS will be considered "Extended-Prong" type unless otherwise specified.

All groove PINS will be considered "Standard Groove" unless otherwise specified.

All common RIVETS will be considered "Annealed" unless otherwise specified.

All countersunk-head tubular RIVETS will be considered "Copper-Plated Steel" unless otherwise specified.

All oval-head tubular RIVETS will be considered "Brass."

Standard bolts used in International Harvester Products are manufactured under standards known as Unified National Coarse Thread (U.N.C. and Unified National Fine Thread (U.N.F.) with the number of threads per inch for various diameters as follows:

Diameter of Bolt	No. of Threads per inch (U.N.C.)	No. of Threads per inch (U.N.F.)
1/4"	20	28
5/16"	18	24
3/8"	16	24
7/16"	14	20
1/2"	13	20
9/16"	12	18
5/8"	11	18
3/4"	10	16
7/8"	9	14
1"	8	14
1-1/8"	7	12
1-1/4"	7	12
1-3/8"	6	12
1-1/2"	6	12

(7) ABBREVIATIONS. The abbreviations used in this catalog are explained in the list of abbreviations on page 3.

(8) SERIAL NUMBERS.

Models	Starting Engine Serial Number	Starting Chassis Serial Number
UC-221	C-221 6093	UC-221 501
UC-263	C-263 6682	UC-263 501

The engine serial numbers for the UC-221 and UC-263 are stamped on a pad on the left side of the engine crankcase just below the distributor.

The chassis serial numbers for these units are stamped on a name plate on the left side of the flywheel housing.

LIST OF ABBREVIATIONS

A period after the abbreviation is used only when the abbreviation form spells a common English word.

adj	adjustable
al	aluminum
ast	alloy steel
amp	ampere, amperes
anl	annealed
approx	approximately
assy	assembly
att	attachment
bd-hd	binding head
b-hd	button head
brg	bearing
brs	brass
brz	bronze
cd-pltd	cadmium plated
cd-pltd-stl	cadmium plated steel
C-Z	cadmium or zinc plated
cr-pltd	chromium plated
cr-pltd-stl	chromium plated steel
CI	cast iron
csk	countersunk
csk-hd	countersunk head
cl-rec-hd	clutch recess head
com	common
cone-pt	cone point
cont	continued
cop	copper
cpl	copper plated
cot.	cotter
c-pin	cotter pin
cres	corrosion-resistant-steel (stainless)
cr-rec-hd	cross recess head
cre	corrosion resisting
crg	carriage
cup-pt	cup point
cyl	cylinder, cylinders
deg	degree
dia	diameter
dld	drilled
dld-f/c-pin	drilled for cotter pin
dld-f/lkg-wire	drilled for locking wire
dog-pt	dog point
ext	external
f/	for
fem	female
fil-hd	fillister head
fin-nk	fin neck
f-csk-hd	flat countersunk head
f-fil-hd	flat fillister head
f-hd	flat head
f-pt	flat point
flex.	flexible
fltd	fluted
ft	foot, feet
ga	gauge
hd	head
hdls	headless
hex.	hexagon
hex-hd	hexagon head
hex-soc-hd	hexagon socket head
hp	horsepower
hv	heavy
hyd	hydraulic
ID	inside diameter
in.	inch, inches
int	internal
lb	pound, pounds
lentil-hd	lentil head
LH	left hand
lkg	locking
LP Gas	Liquefied Petroleum Gas
lub	lubrication
mach.	machine
med	medium
MI	malleable iron
NC	National Coarse (thread)
NF	National Fine (thread)
ni	nickel
ni-pltd-stl	nickel plated steel
No.	number
NPT	National pipe thread
OC	outside circumference
OD	outside diameter
O/S	oversize
ov-hd	oval head
oz	ounce, ounces
parkerized-stl	parkerized steel
pkg	package
pltd	plated
pt	point
PTO	power take-off
rd-end	round end
rd-hd	round head
rd-pt	round point
reg	regular
RH	right hand
RPM	revolutions per minute
SAE	Society of Automotive Engineers
sf	semi-finished
slt	slotted
slt-hd	slotted head
slt-bd-hd	slotted binding head
slt-fil-hd	slotted fillister head
slt-f-hd	slotted flat head
slt-hex-hd	slotted hexagon head
slt-pan-hd	slotted pan head
slt-rd-hd	slotted round head
slt-truss-hd	slotted truss head
sq	square
sq-hd	square head
sq-nk	square neck
std	standard
std-hd	standard head
stl	steel
str	straight
T	teeth
tap.	tapping
thd	thread
UNC	Unified Coarse (thread)
UNF	Unified Fine (thread)
U/S	undersize
unfin	unfinished
wb-hd	wagon box head
w/	with
w/brz	with bronze
w/hex.	with hexagon
w/o	without
zn	zinc
zn-ct	zinc coated
zn-pltd	zinc plated

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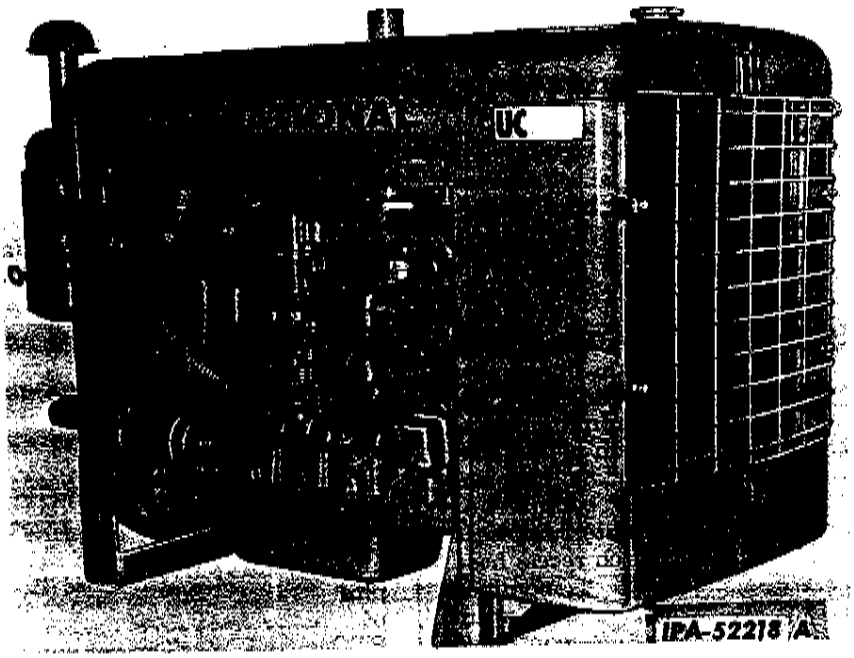
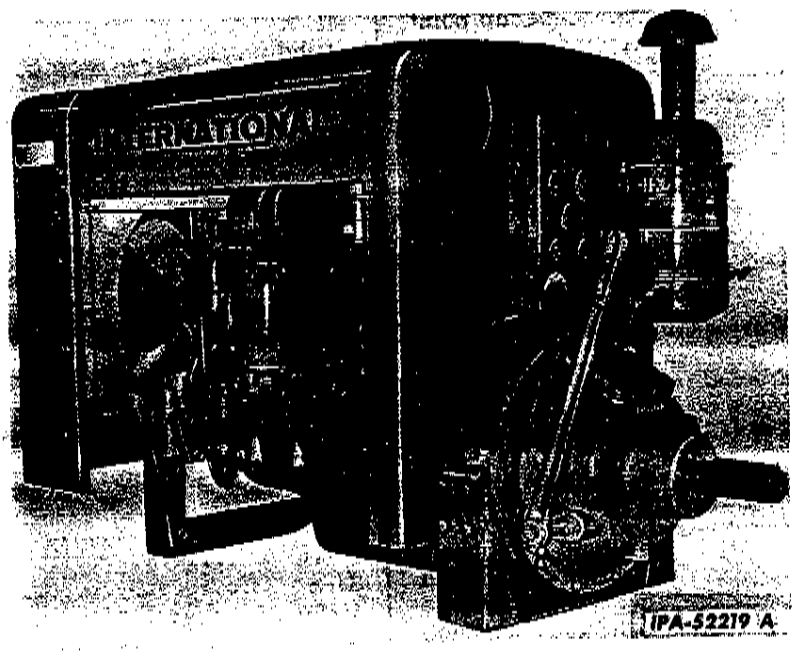


Right front view of the UC-221 and UC-263 Engine with Hood and Dash, Radiator Grille, Front and Rear Support and Air Cleaner Attachments.



Left front view of the UC-221 and UC-263 Engine with Hood and Dash, Front and Rear Support, Fan, Fan Guard, Instrument Panel, Power Take-off, Engine Controls and Air Cleaner Attachments.

INDEX TO UNITS

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MEMORANDA

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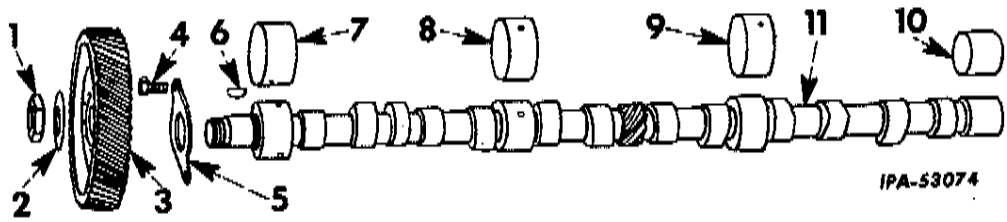
CAMSHAFT AND RELATED PARTS



REF. NO.	I.H. PART NUMBER	DESCRIPTION
1	16 026 DB	NUT, camshaft gear
2	16 025 D	LOCK, camshaft gear nut
3	312 500 R1	GEAR, camshaft (*)
3	367 240 R1	GEAR, camshaft (not *)
4	70 425 R1	BOLT, camshaft thrust plate (2)
5	35 650 HA	PLATE, camshaft thrust
6	127 559	KEY, camshaft gear (Woodruff No. 90)

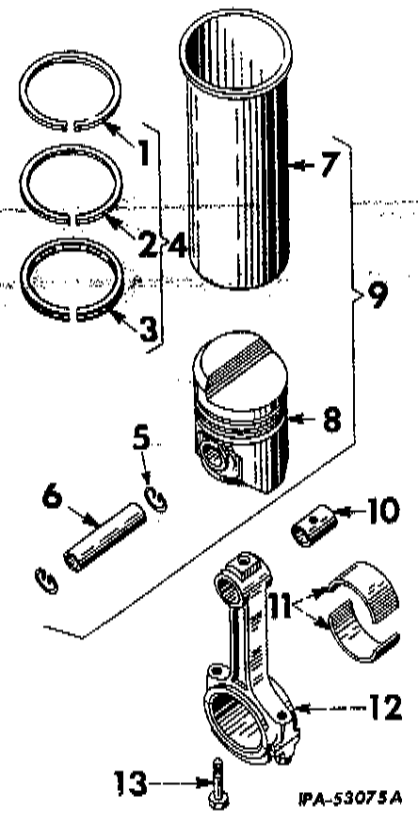
CAMSHAFT AND RELATED PARTS – CONTINUED

REF. NO.	I.H. PART NUMBER	DESCRIPTION
7	70 259 R2	BEARING, camshaft front (will work for 367 514 R1) (also listed with "Crankcase and Related Parts")
8	70 260 R1	BEARING, camshaft intermediate front (also listed with "Crankcase and Related Parts")
9	70 261 R2	BEARING, camshaft intermediate rear (also listed with "Crankcase and Related Parts")
10	70 262 R1	BEARING, camshaft rear (also listed with "Crankcase and Related Parts")
11	367 229 R1	CAMSHAFT

(*) - Used with Hydraulic Pump.

ENGINE

CONNECTING RODS, SLEEVES AND PISTONS
C-221 501 to 43020
C-263 501 to 56635



REF. NO.	I.H. PART NUMBER	DESCRIPTION
1	389 747 R1	RING, piston barrel compression (top groove) (3/32" chrome thick wall) (6)
2	389 751 R1	RING, piston taper face compression (second groove) (3/32" plain) (6)
3	388 355 R1	RING, piston oil regulating (third groove) (1/4" Perflon) (6)
4	367 649 R92	RING SET, piston (replacement) (consists of six chrome compression rings, six plain compression and six oil regulating rings) (6)
5	19 517 D	RING, piston pin retainer (12)
6	70 014 R1	PIN, piston (standard) (6) C-221 501 to 34717 (6) C-263 501 to 36027
6	278 271 R1	PIN, piston (standard) (6) C-221 34718 Up (6) C-263 36028 Up
6	70 015 R1	PIN, piston (.005" oversize) (6) C-221 501 to 34717 (6) C-263 501 to 36027
6	278 326 R1	PIN, piston (.005" oversize) (6) C-221 34718 Up (6) C-263 36028 Up

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ENGINE

REF. NO.	I.H. PART NUMBER	DESCRIPTION
		CONNECTING RODS, SLEEVES AND PISTONS — CONTINUED C-221 501 to 43020 C-263 501 to 56635
7		SLEEVE, cylinder (order sleeve assembly cylinder w/piston and rings) (6)
8		PISTON (order sleeve assembly cylinder with piston and rings) (6)
9	367 638 R92	SLEEVE w/PISTON and RINGS ASSY, cylinder (UC-221) (gasoline standard altitude) (6)
9	367 640 R92	SLEEVE w/PISTON and RINGS ASSY, cylinder (UC-263) (gasoline standard altitude) (6)
9	367 637 R92	SLEEVE SET, cylinder (consists of six SLEEVES w/PISTONS and RINGS, 367 638 R92) (UC-221) (gasoline standard altitude)
9	367 639 R92	SLEEVE SET, cylinder (consists of six SLEEVES w/PISTONS and RINGS, 367 640 R92) (UC-263) (gasoline standard altitude)
9	371 091 R92	SLEEVE w/PISTON and RINGS ASSY, cylinder (UC-221) (L.P. gas and natural gas) (6)
9	371 092 R92	SLEEVE w/PISTON and RINGS ASSY, cylinder (UC-263) (L.P. gas and natural gas) (6)
9	371 089 R92	SLEEVE SET, crankcase (consists of six SLEEVES w/PISTONS and RINGS, 371 091 R92) (UC-221) (L.P. gas and natural gas)
9	371 090 R92	SLEEVE SET, crankcase (consists of six SLEEVE w/PISTONS and RINGS, 371 092 R92) (UC-263) (L.P. gas and natural gas)
9	371 829 R92	SLEEVE SET, crankcase (consists of six SLEEVES w/PISTONS and RINGS, 372 082 R92) (UC-221) (gasoline-high altitude)
9	372 082 R92	SLEEVES w/PISTONS and RINGS ASSY (UC-221) (gasoline-high altitude) (6)
9	371 833 R92	SLEEVE SET, crankcase (consists of six SLEEVES w/PISTONS and RINGS, 372 084 R92) (UC-263) (gasoline-high altitude)
9	372 084 R92	SLEEVES w/PISTONS and RINGS ASSY, cylinder (UC-263) (gasoline-high altitude) (6)
10	364 913 R1	BUSHING, piston pin (6)
11	367 408 R11	BEARING, connecting rod (2 halves) (std) (6)
11	367 632 R11	BEARING, connecting rod (2 halves) (.002" undersize) (6)
11	376 666 R11	BEARING, connecting rod (2 halves) (.010" undersize) (6)
11	376 668 R11	BEARING, connecting rod (2 halves) (.020" undersize) (6)
11	367 631 R11	BEARING, connecting rod (2 halves) (.030" undersize) (6)
11	367 630 R91	BEARING SET, connecting rod (Consists of six BEARING, 367 408 R11) (standard)
11	377 285 R91	BEARING SET, connecting rod (Consists of six BEARING, 367 632 R11) (.002" under size)
11	376 665 R91	BEARING SET, connecting rod (Consists of six BEARING, 376 666 R11) (.010" under-size)
11	376 667 R91	BEARING SET, connecting rod (Consists of six BEARING, 376 668 R11) (.020" under-size)
11	372 443 R91	BEARING SET, connecting rod (Consists of six BEARING, 367 631 R11) (.030" under-size)
12	367 406 R12	ROD w/two BOLTS, 316 366 R1 and BUSHING, 364 913 R1, connecting (6)
13	316 366 R1	BOLT, connecting rod (12)

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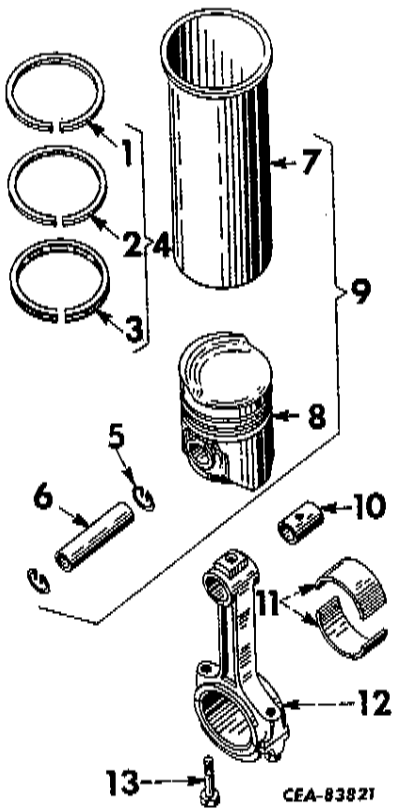
ENGINE

CONNECTING RODS, SLEEVES AND PISTONS
C-221 43021 Up
C-263 56636 Up



REF. NO.	I. H. PART NUMBER	DESCRIPTION
1	389 747 R1	RING, piston barrel compression (top groove) (3/32" chrome thick wall) (6)
2	389 751 R1	RING, piston taper face compression (second groove) (3/32" plain) (6)
3	388 355 R1	RING, piston oil regulating (third groove) (1/4" perflon) (6)
4	367 649 R92	RING SET, piston (replacement) (consists of six Chrome compression rings, six plain compression and six oil regulating rings)
5	19 517 D	RING, piston pin retainer (12)
6	70 014 R1	PIN, piston (standard) (6) C-221 501 to 34717 (6) C-263 501 to 36027
6	278 271 R1	PIN, piston (standard) (6) C-221 34718 up (6) C-263 36028 up
6	70 015 R1	PIN, piston (.005" oversize) (6) C-221 501 to 34717 (6) C-263 501 to 36027
6	278 326 R1	PIN, piston (.005" oversize) (6) C-221 34718 up (6) C-263 36028 up

ENGINE

REF. NO.	I. H. PART NUMBER	DESCRIPTION

CONNECTING RODS, SLEEVES AND PISTONS
C-221 43021 Up
C-263 56636 Up

CONNECTING RODS, SLEEVES AND PISTONS — CONTINUED

7		SLEEVE, cylinder (order sleeve assembly cylinder w/piston and rings) (6)
8		PISTON (order sleeve assembly cylinder w/Piston and rings) (6)
9	378 601 R94	SLEEVE w/PISTON and RING ASSY. cylinder (UC-221) (gasoline standard altitude) (6)
9	378 604 R95	SLEEVE w/PISTON and RINGS ASSY. cylinder (UC-263) (gasoline standard altitude) (6)
9	378 600 R94	SLEEVE SET, cylinder (consists of six sleeves w/PISTONS and RINGS, 378 601 R93) (UC-221) (gasoline standard altitude)
9	378 603 R95	SLEEVE SET, cylinder (consists of six sleeves w/PISTONS and RINGS, 378 604 R94) (UC-263) (gasoline standard altitude)
9	380 647 R94	SLEEVE w/PISTON and RING ASSY, cylinder (UC-221) (L.P. gas, natural gas, and gasoline high altitude) (6)
9	380 649 R95	SLEEVE w/PISTON and RING ASSY, cylinder (UC-263) (L.P. gas, natural gas and gasoline-high altitude) (6)
9	380 646 R94	SLEEVE SET, crankcase (consists of six SLEEVES w/PISTONS and RINGS, 380 647 R94) (UC-221) (L.P. gas, natural gas and gasoline-high altitude)
9	380 648 R95	SLEEVE SET, crankcase (consists of six SLEEVES, w/PISTONS and RINGS, 380 649 R95) (UC-263) (L.P. gas, natural gas and gasoline-high altitude)
10	364 913 R1	BUSHING, piston pin (6)
11	367 408 R11	BEARING, connecting rod (2 halves) (standard) (6)
11	367 632 R11	BEARING, connecting rod (2 halves) (.002" undersize) (6)
11	376 666 R11	BEARING, connecting rod (2 halves) (.010" undersize) (6)
11	376 668 R11	BEARING, connecting rod (2 halves) (.020" undersize) (6)
11	367 631 R11	BEARING, connecting rod (2 halves) (.030" undersize) (6)
11	367 630 R91	BEARING SET, connecting rod (Consists of six BEARING, 367 408 R11) (standard)
11	377 285 R91	BEARING SET, connecting rod (Consists of six BEARING, 367 632 R11) (.002" undersize)
11	376 665 R91	BEARING SET, connecting rod (Consists of six BEARING, 376 666 R11) (.010" undersize)
11	376 667 R91	BEARING SET, connecting rod (Consists of six BEARING, 376 668 R11) (.020" undersize)
11	372 443 R91	BEARING SET, connecting rod (Consists of six BEARING, 367 631 R11) (.030" undersize)
12	367 406 R21	ROD w/two BOLTS, 316 366 R1 and BUSHING 364 913 R1, connecting (6)
13	316 366 R1	BOLT, connecting rod (12)

CRANKCASE AND RELATED PARTS — Continued

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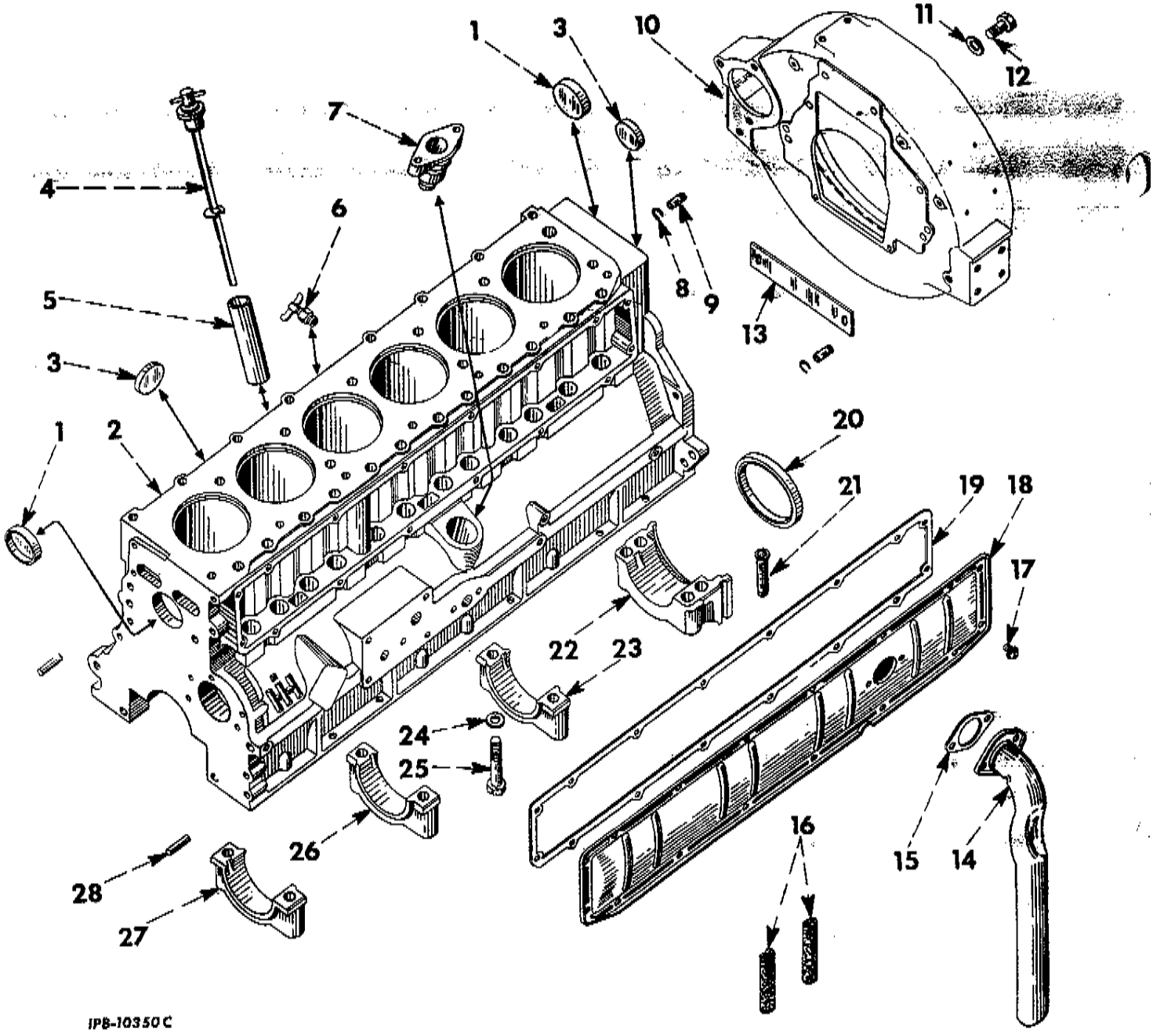
ENGINE

CRANKCASE AND RELATED PARTS — Continued



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ENGINE

REF. NO.	I. H. PART NUMBER	DESCRIPTION

CRANKCASE AND RELATED PARTS — CONTINUED

1	70 129 R1	PLUG, core hole (2)
2	367 512 R95	CRANKCASE ASSEMBLY (Composed of - 1 ADAPTER 367 513 R1; 10 BOLT 70 133 R1; 1 BEARING 70 259 R2; 1 BEARING 70 260 R1; 1 BEARING 70 261 R2; 1 BEARING 70 262 R1; §1 CAP; §1 CAP; §1 CAP; §1 CAP; 1 COCK 103 647; §1 CRANKCASE; 2 DOWEL 371 699 R2; 2 PIN 141 285; 2 PLUG 126 045; 6 PLUG 70 128 R1; 2 PLUG 70 129 R1; 3 PLUG 444 852; 2 RING 371 315 R1; 1 TUBE 378 102 R1; 10 WASHER 58 516 H)
3	70 128 R1	PLUG, core hole (6)
4	312 051 R91	GAUGE, oil level (for magneto ignition) (#) C-221 501 to 43020 C-263 501 to 56635
4	368 986 R91	GAUGE, oil level (for distributor ignition) C-221 501 to 43020 C-263 501 to 56635
4	387 347 R91	GAUGE, oil level (for distributor ignition) C-221 43021 Up C-263 56636 Up
5	312 052 R1	TUBE, oil filler (for magneto ignition) (#) C-221 501 to 43020 C-263 501 to 56635
5	368 985 R2	TUBE, oil filler (for distributor ignition) C-221 501 to 43020 C-263 501 to 56635
5	378 102 R1	TUBE, oil filler (for distributor ignition) C-221 43021 Up C-263 56636 Up
6	103 647	COCK, 1/4" drain (type C)
7	367 513 R1	ADAPTER, distributor mounting
8		NOT USED
9	371 699 R2	DOWEL, engine rear support (2)
9	376 353 R1	DOWEL, engine rear support (.030" oversize) (2)
10	304 440 R2	HOUSING, flywheel (part of Attachment 318 441 R91)
11		SCREW, 1/2 x 1-1/4" hex-hd. cap (2)
12		WASHER, 1/2" lock (6)
13	367 225 R1	SEAL, engine rear support dust (part of Attachment, 318 441 R91) 1/2" NUT (4) 5/16 x 5/8" hex-hd. cap SCREW (2) 1/2 x 2-1/4" hex-hd cap SCREW (4) 11/32 x 11/16" x .065" WASHER (2)
14	368 429 R21 375 612 R91	PIPE, breather SCREW w/WASHER, 1/4 x 1/2" slt-rd-hd (2)
15	369 981 R1	GASKET, breather pipe
16	369 442 R1	ELEMENT, breather pipe (used with COVER, 69 734 R11)

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ENGINE

REF. NO. | I. H. PART NUMBER | DESCRIPTION

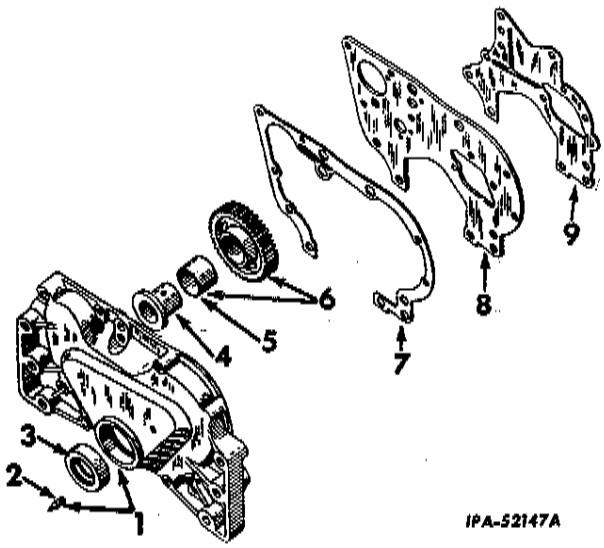
CRANKCASE AND RELATED PARTS — CONTINUED

16	315 849 R1	ELEMENT, breather pipe (used with COVER, 315 970 R91) (2)
17	375 612 R91	SCREW w/WASHER, 1/4 x 1/2", slt-rd-hd mach (16)
18	315 970 R91	COVER, w/two ELEMENT, 315 849 R1, valve push rod (will work for 69 734 R11)
19	369 982 R1	GASKET, valve push rod cover
20	393 180 R91	SEAL, crankshaft rear oil
21	310 665 R1	PLUG, rear bearing cap (will work for 1 738 Y) (2)
22		CAP, crankshaft rear bearing (not furnished separately) (order Crankcase Assembly)
23		CAP, crankshaft intermediate rear bearing (not furnished separately) (order Crankcase Assembly)
24	58 516 H	WASHER, bearing cap bolt (10)
25	70 133 R1	BOLT, crankshaft bearing cap (10)
26		CAP, crankshaft intermediate front bearing (not furnished separately) (order Crankcase Assembly)
27		CAP, crankshaft front bearing (not furnished separately) (order Crankcase Assembly)
28	141 285	PIN, 1/2 x 1-1/4" dowel, crankcase front plate and cover (2)
	318 441 R91	ATTACHMENT, flywheel housing (see NOTES 1 and 3) (Consists of - 2 DOWEL 371 699 R2; 1 HOUSING 304 440 R2; 1 SEAL 367 225 R1)
	70 259 R2	BEARING, camshaft front (will work for 367 514 R1) illustrated with "Camshaft and Related Parts")
	70 260 R1	BEARING, camshaft intermediate front (illustrated with "Camshaft and Related Parts")
	70 261 R2	BEARING, camshaft intermediate rear (illustrated with "Camshaft and Related Parts")
	70 262 R1	BEARING, camshaft rear (illustrated with "Camshaft and Related Parts")
	356 243 R1	COVER, fuel pump pad (*)
	46 923 D	DOWEL, engine rear support (1/2" dia) (part of Attachment, 318 441 R91) (when 7/16" dowel is required order 371 699 R2) (2)
	371 699 R2	DOWEL, engine rear support 7/16" (part of ATTACHMENT, 318 441 R91) (2) 1/2 x 2-1/4" hex-hd cap SCREW (4) 1/2" NUT (4)
	126 045	PIPE, 3/8" sq-soc (2)
	444 852	PLUG, 1/8" hex-soc-hd CI (crankcase drain) (optional with 444 853 and 444 854)
	444 853	PLUG, 1/8" hex-soc-hd MI (crankcase drain) (optional with 444 852 and 444 854)
	444 854	PLUG, 1/8" hex-soc-hd slt (crankcase drain) (optional with 444 852 and 444 853)

- Also Listed Under "Electric Wiring" for Magneto Ignition.
* - Used with hydraulic pump.
§ - Not Furnished Separately
NOTE 1 - Factory Application - Order On Machine Order Form.
NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

ENGINE

CRANKCASE FRONT COVER AND IDLER GEAR



IPA-52147A

REF. NO.	I.H. PART NUMBER	DESCRIPTION
1	372 499 R11	COVER w/POINTER, 367 572 R1 crankcase front (not *) 1/2 x 3" hex-hd cap SCREW (6) 1/2" lock WASHER (6)
1	312 505 R21 16 081 R1	COVER w/POINTER, 367 572 R1 crankcase front (*) BOLT, 1/2 x 3-1/8" (6) 1/2NF NUT (3) 1/2 x 1-1/4" hex-hd cap SCREW 1/2" lock WASHER
2	367 572 R1	POINTER, timing
3	357 672 R91	OIL SEAL, crankshaft (used w/DAMPER, 372 203 R2)
3	317 549 R91	OIL SEAL, crankshaft (used w/PULLEY, 371 574 R2 or DAMPER, 338 952 R91)
4	367 580 R11 141 150	SHAFT w/PIN, 141 150, idler gear PIN, 3/16 x 7/16" dowel 1/2 x 2-1/4" hex-hd. cap SCREW 1/2" lock WASHER
5	367 578 R1	BUSHING, idler gear
6	367 577 R11	GEAR w/BUSHING, 367 578 R1, idler
7	312 506 R1	GASKET, crankcase front cover (*)
7	367 574 R1	GASKET, crankcase front cover (not *)
8	316 155 R11	PLATE, crankcase front (*)
8	367 524 R1	PLATE, crankcase front (not *) 3/8 x 1/8" hex-hd. cap SCREW (6) 3/8" lock WASHER (6)
9	316 156 R1	GASKET, crankcase front plate (*)
9	367 570 R1	GASKET, crankcase front plate (not *)
	278 269 R1	COVER, governor gear (*) 5/16 x 5/8" hex-hd cap SCREW (5) 5/16" lock WASHER (5)
	278 270 R1	GASKET, governor gear cover (*)

(*) - Used with Hydraulic Pump.

MEMORANDA

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MEMORANDA

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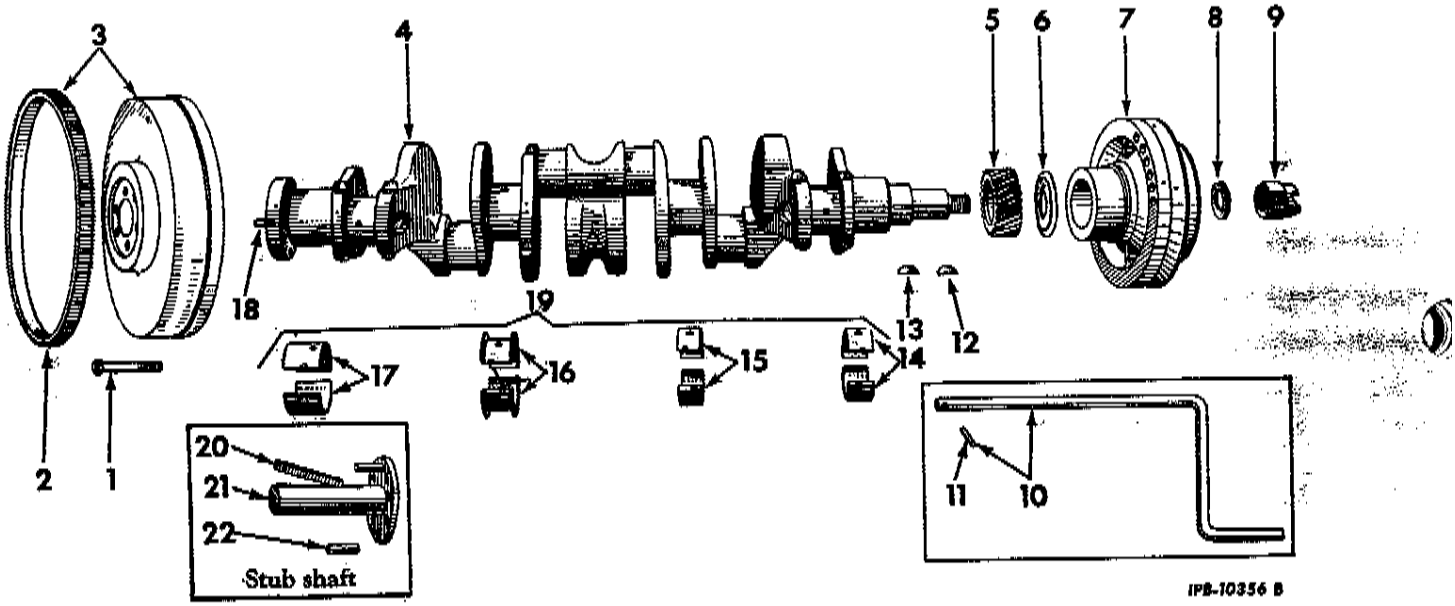
ENGINE

CRANKSHAFT, FLYWHEEL, BEARINGS, STUB SHAFT AND STARTING CRANK



IPB-10356 B

REF. NO.	I.H. PART NUMBER	DESCRIPTION
1	19 466 R1	BOLT, flywheel to crankshaft (Used with ATTACHMENTS, 305 189 R91, 312 571 R91 and 305 190 R91) (6)
1	9 409 049	BOLT, flywheel to crankshaft (Used with flywheel ATTACHMENT, 312 729 R91)
2	372 568 R1	GEAR, flywheel ring (159T)
3	312 563 R11	FLYWHEEL w/GEAR, 372 568 R1 (Used with flywheel ATTACHMENT, 312 571 R91)
3	312 728 R11	FLYWHEEL w/GEAR, 372 568 R1 (Used with flywheel ATTACHMENT, 312 729 R91)
3	318 053 R91	FLYWHEEL w/GEAR, 372 568 R1 (Used with flywheel ATTACHMENT, 318 051 R91)
3	372 567 R91	FLYWHEEL w/GEAR, 372 568 R1 (Used with flywheel ATTACHMENT, 305 189 R91)
3	372 569 R91	FLYWHEEL w/GEAR, 372 568 R1 (Used with ATTACHMENT, 305 190 R91)
4	367 268 R91	CRANKSHAFT ASSY (standard) (UC-221) C-221 501 to 35093 (Composed of - 1 BEARING SET 367 630 R91; 1 BEARING SET 367 275 R91; § 1 CRANKSHAFT; 1 PIN 82 970 R1)
4	382 355 R91	CRANKSHAFT ASSY (standard) (UC-221) C-221 35094 up (Composed of - 1 BEARING SET 367 630 R91; 1 BEARING SET 382 357 R91; § 1 CRANKSHAFT; 1 PIN 82 970 R1)
4	367 269 R91	CRANKSHAFT ASSY (standard) (UC-263) C-263 501 to 36693 (Composed of - 1 BEARING SET 367 630 R91; 1 BEARING SET 382 357 R91; § 1 CRANKSHAFT; 1 PIN 82 970 R1)

ENGINE

CRANKSHAFT, FLYWHEEL, BEARINGS, STUB SHAFT AND STARTING CRANK — Continued

REF. NO.	I.H. PART NUMBER	DESCRIPTION
4	382 356 R91	CRANKSHAFT ASSY (standard) (UC-263) C-263 36694 Up (Composed of - 1 BEARING SET 367 630 R91; 1 BEARING SET 382 357 R91; § 1 CRANKSHAFT; 1 PIN 82 970 R1)
4	367 270 R92	PACKAGE, crankshaft w/BEARINGS, field service (renewal) (undersize) (UC-221) (Consists of six connecting rod BEARINGS, four crankshaft BEARINGS, CRANKSHAFT and PIN, 82 970 R1)
4	367 271 R92	PACKAGE, crankshaft w/BEARINGS, field service (renewal) (undersize) (UC-263) (Consists of six connecting rod BEARINGS, four crankshaft BEARINGS, CRANKSHAFT and PIN, 82 970 R1)
5	367 272 R1	GEAR, crankshaft
6	71 763 R2	SLINGER, crankshaft oil
7	371 574 R2	PULLEY, fan drive (will work for 368 511 R1) (UC-221)
7	338 952 R91	DAMPER (standard on UC-263) (Furnished as required for the UC-221, in place of PULLEY, 371 574 R2)
8	70 109 R1	WASHER, starting crank nut
9	35 667 H	NUT, crankshaft
10	271 705 R91	CRANK w/PIN, 15 204 D, starting
11	15 204 D	PIN, starting crank
12	117 984	KEY, 5/16 x 1-3/8" (Woodruff No. 23) (damper and pulley)
13	103 462	KEY, 3/16 x 1" (Woodruff No. 13) (crankshaft gear)

ENGINE

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		CRANKSHAFT, FLYWHEEL, BEARINGS, STUB SHAFT AND STARTING CRANK — Continued
14	367 276 R91	BEARING, crankshaft front (2 halves) (standard)
14	367 300 R91	BEARING, crankshaft front (2 halves) (.002" undersize)
14	376 670 R91	BEARING, crankshaft front (2 halves) (.010" undersize)
14	376 683 R91	BEARING, crankshaft front (2 halves) (.020" undersize)
14	367 288 R91	BEARING, crankshaft front (2 halves) (.030" undersize)
15	367 279 R91	BEARING, crankshaft intermediate front (2 halves) (standard)
15	367 303 R91	BEARING, crankshaft intermediate front (2 halves) (.002" undersize)
15	376 673 R91	BEARING, crankshaft intermediate front (2 halves) (.010" undersize)
15	376 686 R91	BEARING, crankshaft intermediate front (2 halves) (.020" undersize)
15	367 291 R91	BEARING, crankshaft intermediate front (2 halves) (.030" undersize)
16	367 282 R91	BEARING, crankshaft intermediate rear (standard) (2 halves) C-221 501 to 35093 C-263 501 to 36693
16	332 267 R91	BEARING, crankshaft intermediate rear (standard) (2 halves) C-221 35094 Up C-263 36694 Up
16	367 306 R91	BEARING, crankshaft intermediate (.002" undersize) (2 halves) C-221 501 to 35093 C-263 501 to 36693
16	332 273 R91	BEARING, crankshaft intermediate (.002" undersize) (2 halves) C-221 35094 Up C-263 36694 Up
16	332 276 R91	BEARING, crankshaft intermediate rear (2 halves) (.010" undersize)
16	332 279 R91	BEARING, crankshaft intermediate rear (2 halves) (.020" undersize)
16	367 294 R91	BEARING, crankshaft intermediate (2 halves) (.030" undersize) C-221 501 to 35093 C-263 501 to 36693
16	332 270 R91	BEARING, crankshaft intermediate (2 halves) (.030" undersize) C-221 35094 Up C-263 36694 Up
17	367 285 R91	BEARING, crankshaft rear (2 halves) (standard)
17	367 309 R91	BEARING, crankshaft rear (2 halves) (.002" undersize)
17	376 679 R91	BEARING, crankshaft rear (2 halves) (.010" undersize)
17	376 692 R91	BEARING, crankshaft rear (2 halves) (.020" undersize)
17	367 297 R91	BEARING, crankshaft rear (2 halves) (.030" undersize)
18	82 970 R1	PIN, flywheel to crankshaft dowel
19	367 275 R91	BEARING SET, crankshaft C-221 501 to 35093 C-263 501 to 36693
19	382 357 R91	BEARING SET, crankshaft C-221 35094 Up C-263 36694 Up
19	382 359 R91	BEARING SET, crankshaft (.002" undersize)
19	382 360 R91	BEARING SET, crankshaft (.010" undersize)
19	382 361 R91	BEARING SET, crankshaft (.020" undersize)
19	372 444 R91	BEARING SET, crankshaft (.030" undersize) C-221 501 to 35093 C-263 501 to 36693

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ENGINE

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		CRANKSHAFT, FLYWEHHL, BEARINGS, STUB SHAFT AND STARTING CRANK — Continued
19	382 358 R91	BEARING SET, crankshaft (.030" undersize) C-221 35094 Up C-263 36694 Up
	312 729 R91	ATTACHMENT, flywheel (for use with light duty power take-off ATTACHMENTS, 273 020 R91 and 273 021 R91 and with 8" single plate overcenter drive ring type clutch (Rockford or Twin-Disc) (UC-221) (see NOTES 1 and 3) (Consists of six BOLT, 9 409 049 and one FLYWHEEL, 312 728 R11)
	305 189 R91	ATTACHMENT, flywheel (for use with light duty power take-off ATTACHMENTS, 273 017 R91 and 273 018 R91 and with 10" single plate overcenter drive ring type clutch (Rockford or Twin-Disc) (UC-263) (see NOTES 1 and 3) (Consists of six BOLT, 19 466 R1 and one FLYWHEEL, 372 567 R91)
	318 051 R91	ATTACHMENT, flywheel (for use with Funk Model TRC-D16A-T9 Torque Converter) (see NOTES 1 and 3) (Consists of - 1 BUSHING 318 049 R1 1 SPACER 312 562 R1 8 SPACER 318 050 R1 1 FLYWHEEL 318 053 R91)
	312 571 R91	ATTACHMENT, flywheel (for use with 12" clutch and controls ATTACHMENT, 312 837 R91 and transmission ATTACHMENT, 312 838 R91 or 312 839 R91) (see NOTES 1 and 3) (Consists of six BOLT, 19 466 R1, one FLYWHEEL, 312 563 R91 and one SPACER, 312 562 R2)
	305 190 R91	ATTACHMENT, flywheel (for use with 11-1/2" single plate overcenter drive ring type clutch (Rockford or Twin-Disc) (UC-263) (see NOTES 1 and 3) (Consists of six BOLTS, 19 466 R1 and one FLYWHEEL, 372 569 R91)
	318 049 R1	BUSHING, torque converter pilot (use with ATTACHMENT, 318 051 R91)
	312 562 R2	SPACER, cranking motor (used with ATTACHMENTS, 318 051 R91 and 312 571 R91) 3/8 x 2" hex-hd cap SCREW (3) 3/8" lock WASHER (3)
	318 050 R1	SPACER, mounting strap (used with ATTACHMENT, 318 051 R91) (5)

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		DIRECT CONNECTED STUB SHAFT ATTACHMENT
	305 698 R91	ATTACHMENT, stub shaft (direct connected) (see NOTES 1 and 3)
20	29 308 D	KEY, belt pulley
21	305 699 R91 18 646 R1	SHAFT w/DOWEL, 305 700 R1, stub BOLT, 7/16NF x 2-1/4" (type AA hex Lock) (6)
22	305 700 R1	DOWEL, stub shaft

NOTE 1 - Factory Application - Order On Machine Order Form.

NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

CYLINDER HEAD AND RELATED PARTS

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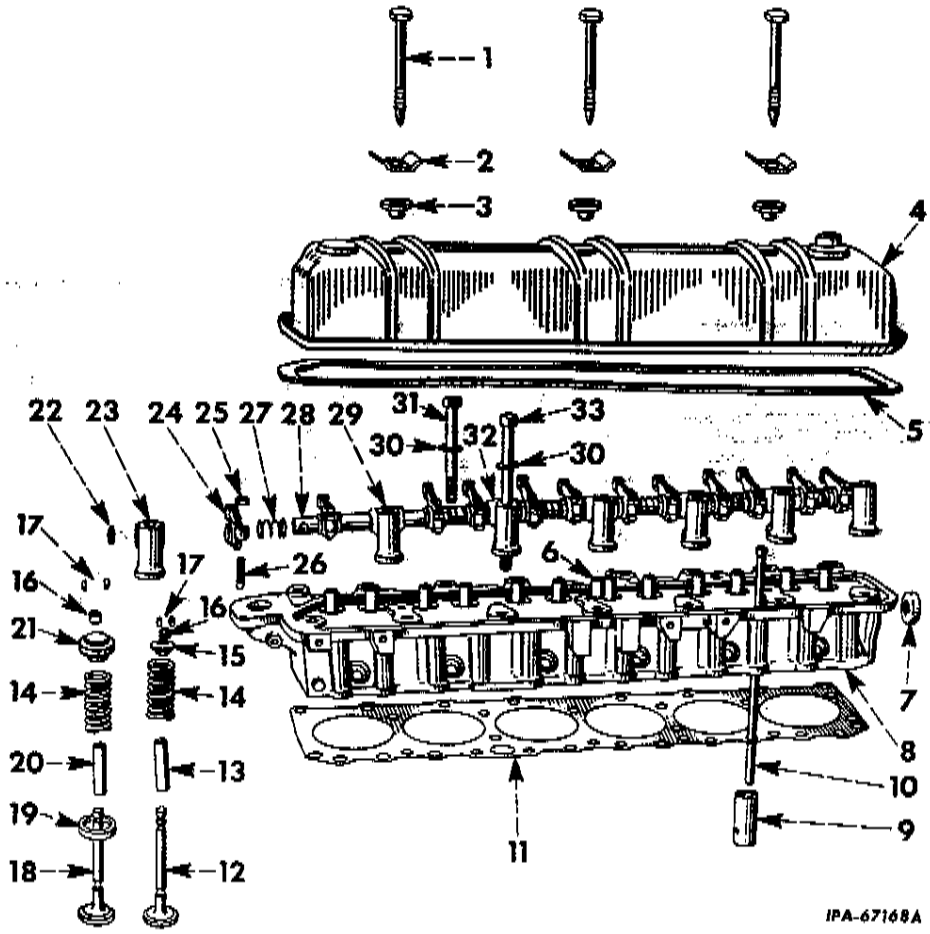
ENGINE

CYLINDER HEAD AND RELATED PARTS — Continued



IPA-67168A

REF. NO.	I. H. PART NUMBER	DESCRIPTION
1	168 144 R1	BOLT, valve cover (3)
2	370 208 R1	STIFFENER, valve cover (3)
3	164 420 R1	GROMMET, valve cover (3)
4	378 617 R91	COVER w/PLUG, 103 866 valve
	103 866	PLUG, 1/4" sq-hd pipe
5	369 983 R1	GASKET, valve cover
6	69 500 R1	DOWEL, valve lever shaft intermediate No. 2, No. 4 and No. 6 bracket (3)
7	70 128 R1	PLUG, core hole
8	372 615 R94	HEAD ASSY, cylinder (will work for 367 189 R93)
		C-221 501 to 43020
		C-263 501 to 56635
		(Composed of -
	1 HEAD	373 423 R21
	24 KEY	41 339 D
	6 RETAINER	151 167 R3
	6 ROTO-COIL	375 604 R91
	12 SEAL	866 834 R1
	12 SPRING	367 192 R1
	6 VALVE	234 275 R1
	6 VALVE	372 699 R2)

REF. NO.	I. H. PART NUMBER	DESCRIPTION
8	373 423 R21	HEAD ASSY, cylinder
		C-221 501 to 43020
		C-263 501 to 56635
		(Composed of -
	§ 1 HEAD	
	12 GUIDE	237 248 R1
	1 PLUG	70 128 R1
	1 PLUG	126 045
	1 PLUG	103 874
	6 SEAT	126 373 R1)
	5/16 x 1/2" hex-hd cap SCREW (2)	
8	382 098 R92	HEAD w/VALVE ASSY, cylinder
		C-221 43021 up
		C-263 56636 up
		(Composed of -
	12 SEAL	866 834 R1
	1 HEAD w/ GUIDES	383 665 R92
	24 KEY	41 339 D
	1 PLUG	70 128 R1
	6 RETAINER	151 167 R3
	6 ROTOCOIL	375 604 R91
	12 SPRING	367 192 R1
	6 VALVE	234 276 R1
	6 VALVE	372 699 R2)

§ - Not Furnished Separately

ENGINE

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		CYLINDER HEAD AND RELATED PARTS — Continued
8	383 665 R92	HEAD w/GUIDES ASSY, cylinder C-221 43021 Up C-263 56636 Up (Composed of - § 1 HEAD 12 GUIDE 237 248 R1 1 PLUG 70 128 R1 6 SEAT 126 373 R1) 5/16 x 1/2" hex-hd cap SCREW (2)
9	75 524 R3	TAPPET, valve (12)
10	164 436 R91	ROD, valve push (12)
11	164 418 R2	GASKET, cylinder head
12	234 275 R1	VALVE, intake (together with 866 834 R1 will work for 127 201 R1) (6) C-221 501 to 43020 (6) C-263 501 to 56635
12	234 276 R1	VALVE, intake (6) C-221 43021 Up (6) C-263 56636 Up
13	237 248 R1	GUIDE, intake valve stem (6)
14	367 192 R1	SPRING, valve (12)
15	151 167 R3	RETAINER, valve spring (6)
16	866 834 R1	SEAL, valve stem (12)
17	41 339 D	KEY, valve spring retainer (24)
18	367 191 R1	VALVE, exhaust (gasoline) (6)
18	372 699 R3	VALVE, exhaust (Stellite faced) (L.P. gas) (see NOTE) (6)
19	126 373 R1	SEAT, exhaust valve (6)
19	126 231 R1	SEAT, exhaust valve (.015" oversize) (6)
19	83 488 R2	SEAT, exhaust valve (.030" oversize) (6)
20	237 248 R1	GUIDE, exhaust valve stem (6)
21	375 604 R91	ROTOCOIL, exhaust valve (gasoline) (6)
21	76 950 R2	RETAINER, valve spring (L.P. gas and natural gas) (6)
22	109 544 R1	PLUG, rocker arm (2)
23	164 422 R1	BRACKET, valve lever shaft front and rear (2)
24	164 432 R91	LEVER w/SCREW, 16 067 DA and NUT, 133 093 R1, valve (12)
25	133 093 R1	NUT, valve lever adjusting screw (12)
26	16 067 DA	SCREW, valve lever adjusting (12)
27	35 619 H	SPRING, valve lever (6)
28	76 953 R3	SHAFT, valve lever (2)
	17 244 R1	PIN, 5/16 x 1-1/4" roll (optional with 19 790 R1) (2)
	19 790 R1	PIN, 5/16 x 1-1/4" roll (optional with 17 244 R1) (2)
29	164 423 R11	BRACKET w/DOWEL, 69 500 R1, valve lever shaft intermediate No. 2, No. 4 and No. 6 (3)
30	58 516 H	WASHER, cylinder head bolt (15)
31	69 722 R1	BOLT, cylinder head (short) (8)
32	164 425 R1	BRACKET, valve lever shaft, intermediate No. 3 and No. 5 (2)

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ENGINE

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		CYLINDER HEAD AND RELATED PARTS — Continued
33	367 190 R1	BOLT, cylinder head (long) (7)
	444 782	PLUG, 3/8" sq-soc pipe
	444 664	PLUG, 1/2" sq-soc pipe
	111 024 R1	SEAL, intake valve stem (used with VALVE, 127 201 R1) (6)

§ - Not Furnished Separately.
NOTE: Also Available For Service On Gasoline Engines If Desired.

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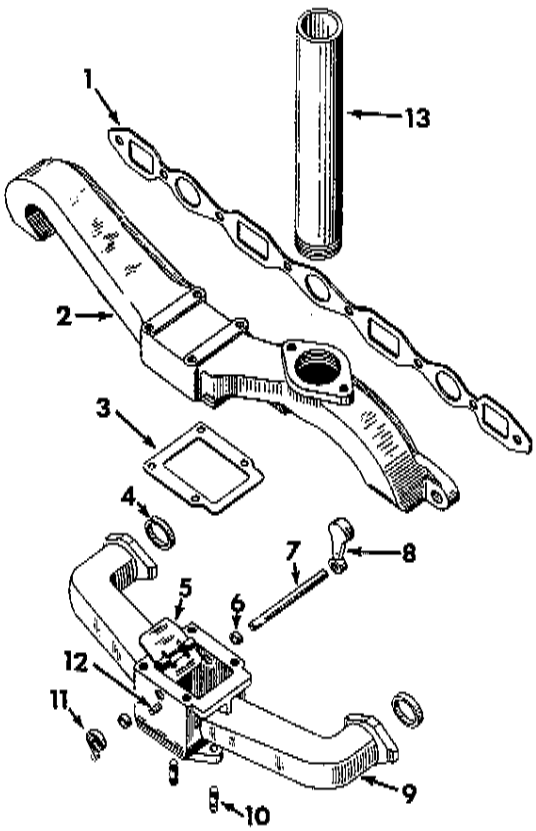
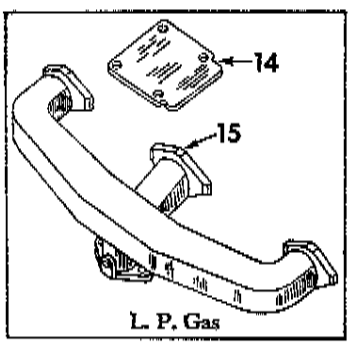
(REV. NO. 3 4-67)

INTAKE AND EXHAUST MANIFOLDS





IPA-52144A

REF. NO.	I. H. PART NUMBER	DESCRIPTION
1	69 752 R1	GASKET, intake and exhaust manifold
2	368 550 R11	MANIFOLD w/PLUG, 103 317, exhaust 3/16 x 1/2" taper groove PIN 3/8 x 3" hex-hd. cap SCREW (4) 3/8 x 1-1/4" hex-hd. cap SCREW (6) 3/8 x 1-1/2" hex-hd. cap SCREW (2) 13/32 x 7/8" x 7 ga. WASHER (8)
3	85 868 R1	GASKET, intake to exhaust manifold
4	98 573 HA	PILOT, intake manifold (2) C-221 501 to 43020 (2) C-263 501 to 56635

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		INTAKE AND EXHAUST MANIFOLDS — Continued
4	138 733 R1	PILOT, intake manifold (2) C-221 43021 Up (2) C-263 56636 Up
5	85 700 R1	VALVE, manifold heat control
6	69 443 R1	BUSHING, manifold heat control (2)
7	82 959 R1	SHAFT, manifold heat control valve
8	85 699 R1	WEIGHT, manifold heat control
9	318 445 R91	MANIFOLD ASSEMBLY, intake (*) C-221 501 to 43020 C-263 501 to 56635 (Composed of - 2 BUSHING 69 443 R1 1 PLUG 445 671 1 PIN 141 159 1 SHAFT 82 959 R1 1 SPRING 82 958 R2 2 STUD 57 714 D 1 VALVE 85 700 R1 1 WEIGHT 85 699 R1)
9	367 261 R11	MANIFOLD ASSEMBLY, intake (not *) (Composed of - 2 BUSHING 69 443 R1 1 PLUG 445 671 1 PIN 141 159 1 SHAFT 82 959 R1 1 SPRING 82 958 R2 2 STUD 57 714 D 1 VALVE 85 700 R1 1 WEIGHT 85 699 R1)
10	277 016 R1	STUD, carburetor (liquefied petroleum gas) (natural gas) (combination natural gas and gasoline) (2)
10	12 215 D	STUD, carburetor (2)
10	57 714 D	STUD, carburetor (part of carburetor adapter attachment) 312 057 R91) (2)
11	82 958 R2	SPRING, thermostat heat control valve
12	141 159	PIN, 3/16 x 1" dowel
13		PIPE, exhaust (2" standard black steel pipe 13" long obtain locally)
14	371 098 R1	COVER, exhaust manifold (L.P. gas) (natural gas) (combination natural gas and gasoline) 3/8" NUT (4) 3/8 x 3-1/8" hex-hd. cap SCREW (4)
15	371 097 R11	MANIFOLD w/PLUG, intake (L.P. gas) (combination natural gas and gasoline)
	445 671	PLUG, 1/8" sq-hd C.I. PIPE (optional with 445 864)
	445 864	PLUG, 1/8" sq-hd. (optional with 445 671)
	107 317	PLUG, exhaust manifold drain hole

(*) - For Use With Heavy Duty Magneto.

NOTE 1 - Factory Application - Order On Machine Order Form.

NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

MEMORANDA

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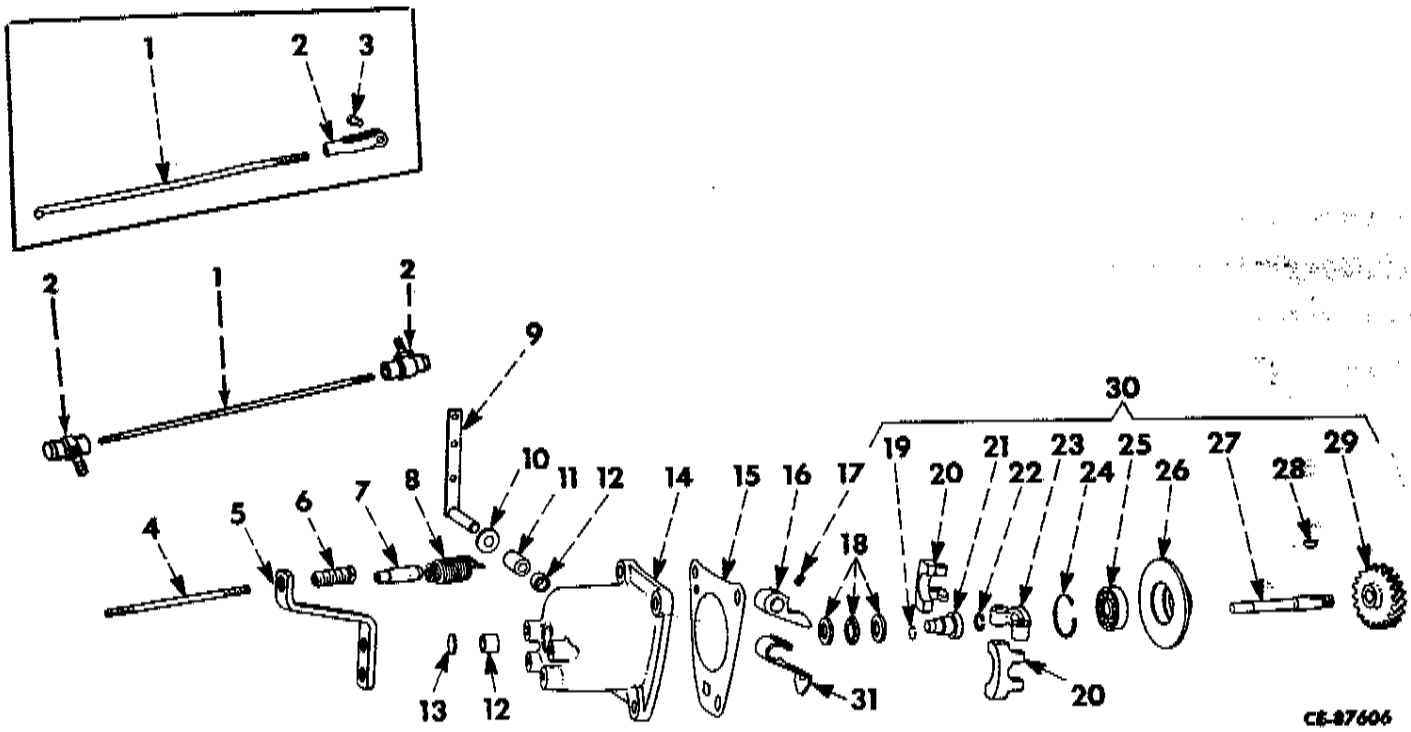
ENGINE

GOVERNOR AND RELATED PARTS
(I.H.) (for use with distributor ignition)



REF. NO.	I.H. PART NUMBER	DESCRIPTION
1	368 335 R1	ROD, governor to carburetor 1/16 x 7/16" cotter PIN 221 501 to 48022 263 501 to 77319
1	306 013 R1	ROD, governor to carburetor 1/4" NUT (3) 1/4" lock WASHER (2) 221 48023 Up 263 77320 Up
2	104 036	FORK, governor to carburetor rod 1/4" NUT 221 501 to 48022 263 501 to 77319
2	276 835 R91	JOINT, 1/4" ball 1/4" WASHER 221 48023 Up 263 77320 Up
3		PIN, 1/4 x 51/64" rod end (governor to carburetor rod fork) 1/16 x 7/16" cotter PIN 221 501 to 48022 263 501 to 77319
4	367 659 R1	ROD, governor spring retainer 1/4NF NUT
5	367 742 R1	BRACKET, governor spring 5/16 x 1" hex-hd cap SCREW (2) 5/16" lock WASHER (2)

ENGINE

GOVERNOR AND RELATED PARTS — CONTINUED
(I.H.) (for use with distributor ignition)

REF. NO.	I.H. PART NUMBER	DESCRIPTION
6	367 660 R1	ADJUSTER, governor spring 1/2NF jam NUT
7	367 740 R1	RETAINER, governor spring
8	372 709 R2	SPRING, governor (2400 RPM when used w/GOVERNOR ASSY, 372 708 R93 or 376 589 R92) (1500 to 1800 RPM when used w/GOVERNOR ASSY, 612 320 C91)
8	367 739 R2	SPRING, governor (2000 to 2200 RPM) (furnished as part of ATTACHMENT, 612 321 C91)
9	367 656 R12	LEVER, w/ROCKSHAFT
10	361 123 R91	OIL SEAL, governor rockshaft
11	369 593 R1	BEARING, governor
12	369 594 R1	BEARING, governor (2)
13	172 530	PLUG, 11/16" type No. 1 expansion
14	376 590 R11	HOUSING ASSY, governor (used w/GOVERNOR ASSY, 376 589 R92 (Composed of - 2 BEARING 369 594 R1 1 BEARING 369 593 R1 § 1 HOUSING 1 PLUG 172 530 1 OIL SEAL 361 123 R91)

§ - Not Furnished Separately.

REF. NO.	I. H. PART NUMBER	DESCRIPTION

GOVERNOR AND RELATED PARTS – CONTINUED
(I. H.) (for use with distributor ignition)

14	367 651 R21	HOUSING ASSY, governor (used w/GOVERNOR ASSY, 372 708 R93) (Composed of - 2 BEARING 369 594 R1 1 BEARING 369 593 R1 § 1 HOUSING 1 PLUG 172 530 1 OIL SEAL 361 123 R91) 3/8 x 1-1/2" hex-hd cap SCREW (3) 3/8" lock WASHER (3) 1/4NF x 1-1/2" slt-rd-hd mach SCREW 1/4NF jam NUT
15	367 669 R1	GASKET, governor housing
16	367 653 R1	FORK, governor thrust
17	368 938 R1	SCREW, governor thrust fork set
18	43 481 D	BALL BEARING, governor thrust C-221 501 to 19944 C-263 501 to 19080
18	374 794 R91	BALL BEARING, governor thrust C-221 19945 to 39301 C-263 19081 to 53276
18	393 405 R1	BALL BEARING, governor thrust C-221 39302 Up C-263 53277 Up
19	251 460 R1	RING, governor sleeve stop C-221 501 to 39301 C-263 501 to 53276
20	367 741 R1 17 053 R1	WEIGHT, governor (2) PIN, 1/4 x 3/8" Esna roll (2)
21	367 668 R2	SLEEVE, governor thrust C-221 501 to 39301 C-263 501 to 53276
21	387 878 R1	SLEEVE, governor thrust C-221 39302 Up C-263 53277 Up
22	369 477 R1	RING, snap
23	367 726 R1	CARRIER, governor weight
24	281 907 C1	RING, governor shaft bearing snap
25	ST 552	BALL BEARING, governor shaft
26	367 666 R1	RETAINER, governor bearing
27	367 665 R1	SHAFT, governor
28	452 560	KEY, governor gear (Woodruff No. 211)
29	367 664 R1	GEAR, governor 7/16" lock NUT (Type LLJ)
30	368 939 R93	GEAR w/WEIGHT ASSY, governor (Part of GOVERNOR ASSY, 372 708 R93 and 376 589 R92)
30	378 128 R92	GEAR w/WEIGHT ASSY, governor (Part of GOVERNOR ASSY, 612 320 C91)
31	374 795 R1	SPRING, bumper
	32 468 H	BODY, elbow (Used on Gasoline engines equipped w/Hydraulic Pump
	372 708 R93	GOVERNOR ASSY (order 376 589 R92) (2400 RPM) (Units not equipped w/Hydraulic Pump) 221 501 to 48022 263 501 to 77319 (Composed of - 1 BEARING 393 405 R1 1 FORK 367 653 R1 1 GEAR w/WEIGHT 368 939 R93 1 HOUSING 367 651 R21 1 LEVER 367 656 R12 1 SCREW 368 938 R1 1 SLEEVE 387 878 R1 1 SPRING 374 795 R1)

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ENGINE

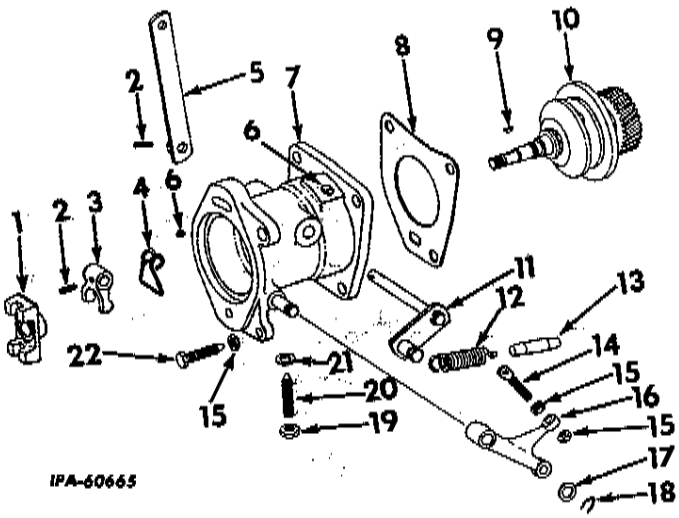
REF. NO.	I. H. PART NUMBER	DESCRIPTION

GOVERNOR AND RELATED PARTS – CONTINUED
(I. H.) (for use with distributor ignition)

376 589 R92	GOVERNOR ASSY (Units equipped w/Hydraulic Pump) (2400 RPM) 221 501 Up 263 501 Up (Units not equipped w/Hydraulic Pump) 221 48023 Up 263 77320 Up (Composed of - 1 BEARING 393 405 R1 1 FORK 367 653 R1 1 GEAR w/WEIGHT 368 939 R93 1 HOUSING 376 590 R11 1 LEVER 367 656 R12 1 SCREW 368 938 R1 1 SLEEVE 387 878 R1 1 SPRING 374 795 R1)
612 320 C91	GOVERNOR ASSY (furnished as part of ATTACHMENT, 612 319 C91) (Composed of - 1 BEARING 393 405 R91 1 FORK 367 653 R1 1 GEAR AND WEIGHT 378 128 R92 1 HOUSING 376 590 R11 1 LEVER 367 656 R12 1 SCREW SET 368 938 R1 1 SLEEVE 387 878 R1 1 SPRING 374 795 R1)
612 319 C91	ATTACHMENT, mechanical governor (Consist of GOVERNOR ASSY, 612 320 C91) (w/ or w/o Hydraulic Pump) (1500 to 1800 RPM) (10% regulation wide open throttle) (5% regulation 3/4 load) (See NOTES 1 and 3)
612 321 C91	ATTACHMENT, mechanical governor (Consist of SPRING, 367 739 R2) (w/ or w/o Hydraulic Pump) (2000 to 2200 RPM) (10% regulation wide open throttle) (5% regulation 3/4 load) (See NOTES 1 and 3)
19 983 R1	NUT, nylon (Used on Gasoline engines equipped w/Hydraulic Pump)
376 591 R1	TUBE, governor lubrication (Use on Gasoline engines equipped w/Hydraulic Pump)
386 010 R91	PACKAGE, governor field service (Composed of - 1 BEARING 369 593 R1 2 BEARING 369 594 R1 1 BEARING ST 552 1 BEARING 393 405 R91 1 FORK 367 653 R1 1 GASKET 367 669 R1 1 LEVER 367 656 R12 1 PLUG 172 530 2 PIN 17 053 R1 1 RING 281 907 C1 1 SCREW 368 938 R1 1 SLEEVE 387 878 R1 1 SPRING 374 795 R1 1 SEAL 361 123 R91 2 WEIGHT 367 741 R1)
444 852	PLUG, 1/8 Auto hex-soc-hd drain (optional w/444 853 or 444 854) (Used w/GOVERNOR ASSY, 376 589 R92)
444 854	PLUG, 1/8" Auto hex-soc-hd drain (optional w/444 852 or 444 853) (Used w/GOVERNOR ASSY, 376 589 R92)
444 853	PLUG, 1/8" Auto hex-soc-hd drain (optional w/444 852 or 444 854) (Used w/GOVERNOR ASSY, 376 589 R92)

NOTE 1 - Factory Application Order On Machine Order Form.
NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

MECHANICAL GOVERNOR
(Novi)



REF. NO.	I.H. PART NUMBER	DESCRIPTION
		Parts without letters after the description indicate the part is used for all mechanical governors listed below: Letters A through M are used to identify separate mechanical governors.
		FOR USE WITH MAGNETO IGNITION C-221 501 to 43020 C-263 501 to 56635
A		Service parts for mechanical governor For use with medium duty magneto ignition on gasoline, natural gas, LPG and combination gas - gasoline For use with heavy duty magneto ignition on natural gas, LPG and combination gas - gasoline Gasoline 1800 RPM to 2400 RPM - 10% regulation Natural gas, LPG and combination gas-gasoline 1800 RPM to 2200 RPM - 10% regulation 2400 RPM - 5% and 10% regulation
B		Service parts for mechanical governor For use with heavy duty magneto ignition on gasoline 1800 RPM to 2400 RPM - 10% regulation
C		Service parts for mechanical governor For use with medium duty magneto ignition on gasoline, natural gas, LPG and combination gas - gasoline For use with heavy duty magneto ignition on natural gas, LPG and combination gas-gasoline 1200 RPM to 1600 RPM - 10% regulation 1800 RPM - 5% regulation Natural gas, LPG and combination gas-gasoline 1200 RPM and 1400 RPM - 10% regulation 1600 RPM - 5% and 10% regulation 1800 RPM - 5% regulation

REF. NO.	I.H. PART NUMBER	DESCRIPTION
		MECHANICAL GOVERNOR — Continued (Novi)
		FOR USE WITH MAGNETO IGNITION - Continued C-221 501 to 43020 C-263 501 to 56635
D		Service parts for mechanical governor For use with medium duty magneto ignition Gasoline 2400 RPM - 5% regulation
E		Service parts for mechanical governor For use with heavy duty magneto ignition Gasoline 1200 RPM to 1600 RPM - 10% regulation 1800 RPM - 5% regulation
F		Service parts for mechanical governor For use with heavy duty magneto ignition Gasoline 2400 RPM - 5% regulation
		FOR USE WITH DISTRIBUTOR IGNITION
G		Service parts for mechanical governor Not used with hydraulic pump Gasoline 1800 RPM to 2400 RPM - 10% regulation Natural gas, LPG and combination gas-gasoline 1800 RPM to 2200 RPM - 10% regulation 2400 RPM - 5% and 10% regulation
H		Service parts for mechanical governor For use with hydraulic pump Gasoline 1800 RPM to 2400 RPM - 10% regulation
J		Service parts for mechanical governor Not used with hydraulic pump Gasoline 1200 RPM to 1600 RPM - 10% regulation 1800 RPM - 5% regulation Natural gas, LPG and combination gas-gasoline 1200 RPM and 1400 RPM-10% regulation 1600 RPM - 5% and 10% regulation 1800 RPM - 5% regulation
K		Service parts for mechanical governor For use with hydraulic pump Gasoline 1200 RPM to 1600 RPM-10% regulation 1800 RPM - 5% regulation
L		Service parts for mechanical governor Not used with hydraulic pump Gasoline 2400 RPM - 5% regulation
M		Service parts for mechanical governor Use with hydraulic pump Gasoline 2400 RPM - 5% regulation
1	313 998 R1	COUPLING (56418)
2	443 013	PIN, 1/8 x 5/8" groove (2)
3	277 161 R1	FORK (50023)
4	277 162 R1	SPRING, bumper (50306)
5	313 996 R91	LEVER w/BUSHING (56424 A)
6	103 883	PLUG, 1/8" headless sltd pipe (2)
7	313 984 R91	BODY w/two PLUG, 103 883 and SCREW, 313 988 R1 (56433A)
8	367 669 R1	GASKET, governor housing
9	452 560	KEY, 1/16 x 3/8" Woodruff

ENGINE

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		MECHANICAL GOVERNOR — CONTINUED (Novi)
10		CENTRIFUGAL UNIT (Not Furnished Separately) 3/8NF NUT 3/8" lock WASHER
11	313 989 R91	LEVER (56427A)
12	313 992 R1	SPRING, governor (56436)
13	313 990 R1	PLUNGER, spring (56428)
14	313 991 R1	SCREW, adjusting (53933-B)
15		NUT, 1/4"NF (3)
16	313 995 R1	LEVER, manual (56422)
17	277 169 R1	WASHER, manual lever (50129)
18	277 170 R1	CLIP, lever shaft (50130)
19		NUT, 3/8" NF
20	313 988 R1	SCREW, adjusting (56419)
21		WASHER, 3/8" lock
22	313 994 R1	SCREW, stop (52703-1)
	313 983 R91	BODY ASSY (Composed of - 1 BODY 313 984 R91 1 CLIP 277 170 R1 1 FORK 277 161 R1 1 LEVER 313 989 R91 1 LEVER 313 995 R1 1 LEVER w/BUSHING 313 996 R91 2 PIN 443 013 1 PLUNGER 313 990 R1 1 SCREW 313 991 R1 1 SCREW 313 994 R1 1 SPRING 313 992 R1 1 SPRING 277 162 R1 1 WASHER 277 169 R1)
	109 415	BALL, joint governor connecting rod (2) 1/4NF NUT (2) 1/4" lock WASHER (4)
	29 901 D	CONNECTOR, governor lubrication tube (in governor) (Mechanical Governor H and M)
	272 497 R1	COVER, magneto mounting (Mechanical Governor C, H, J, K, L and M) 3/8 x 7/8" hex-hd cap SCREW 3/8 x 1-1/4" hex-hd cap SCREW 13/32 x 13/16" x 16 ga. WASHER 3/8" lock WASHER
	313 492 R1	ELBOW, governor lubrication tube (Mechanical Governor H and M)
	310 840 R91	GOVERNOR ASSY (56385-A) (Mechanical Governor A, B, G and H) (Composed of - 1 BODY 313 983 R91 § 1 CENTRIFUGAL UNIT 1 COUPLING 313 998 R1 1 KEY 452 560) 3/8 x 1-1/4" hex-hd cap SCREW (3) 3/8" lock WASHER (3)
	338 343 R92	GOVERNOR ASSY (Mechanical Governor C, E, J and K) (*) 3/8 x 1-1/4 hex-hd cap SCREW (3) 3/8" lock WASHER (3)

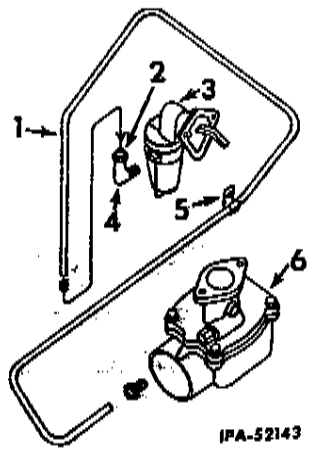
ENGINE

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		MECHANICAL GOVERNOR — CONTINUED (Novi)
	338 344 R91	GOVERNOR ASSY (Mechanical Governor D, F, L and M) (*) 3/8 x 1-1/4" hex-hd cap SCREW (3) 3/8" lock WASHER (3)
	19 984 R1	NUT, governor lubrication tube (2 for Mechanical Governor H and M)
	306 013 R1	ROD, governor connecting
	312 066 R1	ROD, governor connecting (Mechanical Governor B, E and F)
		SCREW, No. 8 x 1/4" pan-hd slt tapping
	995 061 R1	TUBE, governor lubrication (13" long, copper 1/4" OD #) (Mechanical Governor H and M)

§ - Not Furnished Separately.
* - Service Parts Will Be Furnished In The Next Revision Of This Catalog.
(#) - Part Number and Price Covers One Foot Of Tubing. Furnished Only In 50 Foot Rolls.

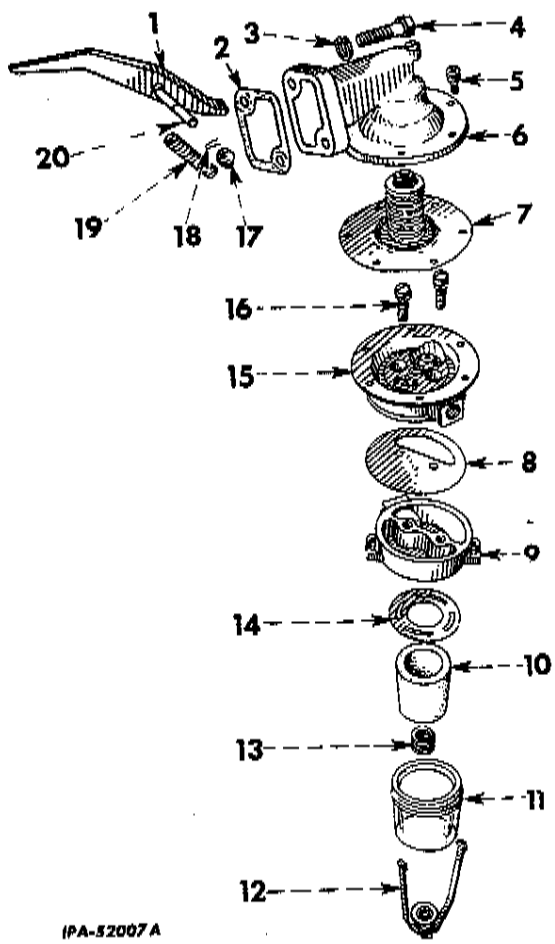
FUEL SYSTEM

FUEL PIPE AND CONNECTIONS
(Not used with Hydraulic Pump)



IPA-52143

FUEL PUMP
(Not used with Hydraulic Pump)



IPA-52007A

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FUEL SYSTEM

REF. NO.	I.H. PART NUMBER	DESCRIPTION
		FUEL PIPE AND CONNECTIONS — CONTINUED (Not used with Hydraulic Pump)
1	372 498 R1	PIPE, fuel
2	19 885 R1	NUT, coupling (2)
3	84 838 R93	PUMP ASSEMBLY, fuel (for components see list of parts under details of "Fuel Pump")
4	24 847 H	ELBOW (at fuel pump)
5	172 915 R1	CLIP, fuel pipe
6		CARBURETOR ASSEMBLY (for components see list of parts under details of "Carburetor")

REF. NO.	I.H. PART NUMBER	DESCRIPTION
		FUEL PUMP — CONTINUED (Not used with Hydraulic Pump)
	84 838 R93	PUMP ASSEMBLY, fuel
1	90 623 R1	LEVER, cam
2	612 293 C1	GASKET, pump to crankcase
3		WASHER, 5/16" lock (2)
4		SCREW, 5/16 x 1" hex-hd. CAP (2)
5	90 610 R91	SCREW, w/WASHER
6		Not Furnished Separately. (order 84 838 R93)
7	90 625 R91	DIAPHRAGM
8	90 626 R1	DIAPHRAGM, air dome
9	109 317 R1	COVER, filter and valve housing
10	967 640 R21	ELEMENT, filter, glazed ceramic
11	109 313 R11	BOWL, w/GASKET, 90 600 R1
12	109 315 R91	RETAINER, w/SCREW
13	90 606 R1	SPRING, filter
14	90 600 R1	GASKET, filter bowl
15	121 759 R91	HOUSING, valve
16	90 611 R91	SCREW, w/WASHER, valve housing to filter cover
17	90 598 R1	PLUG, cam lever shaft seal
18	90 619 R1	PIN, spring cam lever pin retainer
19	90 603 R1	SPRING, cam lever return
20	90 618 R1	PIN, cam lever
	109 318 R1	WASHER, filter bowl retainer

MEMORANDA

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MEMORANDA

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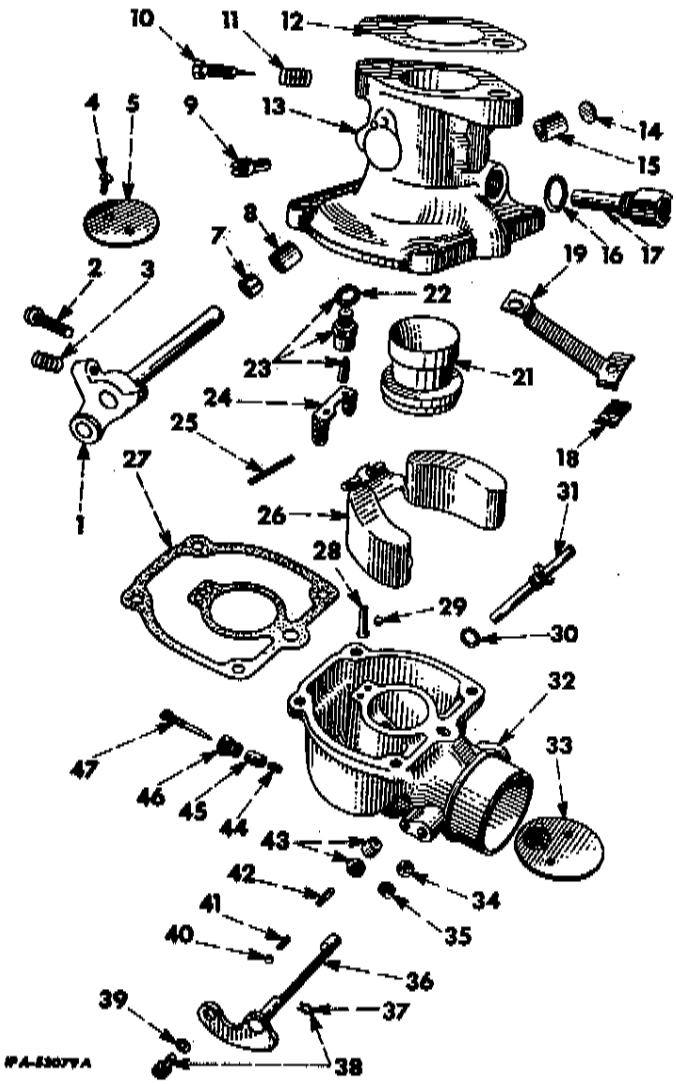
CARBURETOR
(Gasoline)



REF. NO.	I.H. PART NUMBER	DESCRIPTION
(X) - KEY TO UNITS -		
A -	367 258 R92	CARBURETOR ASSEMBLY, 1-1/4" I.H. updraft (order 374 325 R91) (UC-221)
B -	367 259 R92	CARBURETOR ASSEMBLY, 1-3/8" I.H. updraft (order 379 813 R92) (UC-263)
C -	374 325 R92	CARBURETOR ASSEMBLY, 1-1/4" I.H. updraft (will work for 367 258 R91) (UC-221)
D -	372 723 R92	CARBURETOR ASSEMBLY, 1-3/8" I.H. updraft (will work for order 379 813 R92) (UC-263) 3/8"NF NUT (2) 3/8" lock WASHER (2)

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FUEL SYSTEM

REF. NO.	I.H. PART NUMBER	DESCRIPTION
CARBURETOR - CONTINUED (Gasoline)		
E -	379 813 R92	CARBURETOR ASSEMBLY, 1-3/8" I.H. updraft (will work for 372 723 R92) (UC-263)
⊗ - Letters of these units correspond with those shown following the description of the parts in the list below and identifies the unit for which the part is used. Items without letters after the description indicates the part is used for all units.		
1	368 139 R91	SHAFT and LEVER w/PIN, 18 609 R1, and RETAINER, 24 484 D, throttle 3/32 x 11/16" Esna roll PIN
2		SCREW, throttle shaft adjusting
3	25 484 D	SPRING, idle throttle adjustment retainer
4	47 392 D	SCREW, throttle butter fly (2)
5	370 862 R1	BUTTERFLY, throttle (Units A, B and C)
5	54 489 D	BUTTERFLY, throttle (Units D and E)
7	379 598 R1	SEAL, throttle shaft dust (Units D and E)
8	47 390 D	BUSHING, throttle shaft
9	368 142 R1	PLUG, idle passage
10	362 528 R1	SCREW, idle adjusting
11	351 959 R1	SPRING, idle adjustment screw retainer
12	31 336 D	GASKET, carburetor (not furnished as part of carburetor ASSEMBLY)
13	368 147 R21	BODY ASSEMBLY, throttle (Units A, B and C (Composed of - 2 BUSHING 47 390 D 1 PIN 45 110 D 1 PLUG 57 956 D 1 SEAL 379 598 R1)
13	373 501 R21	BODY ASSEMBLY, throttel (Units D and E) (Composed of - 2 BUSHING 47 390 D 1 PIN 45 110 D 1 PLUG 57 956 D 1 SEAL 379 598 R1)
14	57 956 D	PLUG, throttle shaft expansion
15	47 390 D	BUSHING, throttle shaft
16	18 377 D	GASKET, strainer screen retainer
17	29 902 DX	RETAINER, strainer screen
18	32 596 D	CLAMP, starting shutter control No. 10NF x 5/8" fil-hd. mach. SCREW (cd. or zn-pltd.) No. 10NF NUT (cd. or zn-pltd.) No. 10 lock WASHER (cd. or zn-pltd)
19	368 146 R11	BRACKET w/CLAMP, 32 596 D, starting shutter control
20	45 110 D	PIN, throttle stop
21	368 143 R1	VENTURI, double (Units B and C)
21	368 148 R1	VENTURI, double (Unit A)
21	372 722 R1	VENTURI, double (Unit D)
21	47 407 R93	VENTURI, single (Unit E)
22	25 948 D	GASKET, needle valve cage
23	47 396 DAX40	CAGE w/GASKET, 25 948 D, needle valve
24	47 394 D	SUPPORT, float lever pivot No. 4 x 5/16" slt-rd-hd mach SCREW (cd or zn-pltd) (2) No. 4 lock WASHER (cd or zn-pltd) (2)

FUEL SYSTEM

CARBURETOR – CONTINUED
(Gasoline)

REF. NO.	I. H. PART NUMBER	DESCRIPTION
25	47 395 D	PIVOT, float lever
26	47 398 DX	FLOAT and LEVER
27	47 388 DA	GASKET, fuel bowl
28	49 798 D75	JET, idle metering No. 75
29	35 606 D55	BLEED, main air (No. 55) (Unit A)
29	35 606 D54	BLEED, main air (No. 54) (Unit B)
29	35 606 D52	BLEED, main air (No. 52) (Units C, D and E)
30	251 583 R1	GASKET, metering nozzle
31	368 150 R1	NOZZLE, metering (Unit A)
31	370 863 R1	NOZZLE, metering (Unit B)
31	374 328 R1	NOZZLE, metering (Units C and D)
31	379 065 R1	NOZZLE, metering (Unit E)
32	368 149 R91	BOWL ASSEMBLY, fuel (Unit A) (Composed of - 1 BLEED 35 606 D55; 1 PIN 351 588 R1; 1 PLUG 32 611 D; 1 RETAINER 45 148 D; 1 SEAT 56 611 DA; 1 SEAT 45 149 DA)
32	368 144 R91	BOWL ASSEMBLY, fuel (Unit B) (Composed of - 1 BLEED 35 606 D54; 1 PIN 351 588 R1; 1 PLUG 32 611 D; 1 RETAINER 45 148 D; 1 SEAL 45 149 DA; 1 SEAT 355 003 R1)
32	372 720 R12	BOWL w/PIN, 351 588 R1, RETAINER, 45 148 D and SEAL, 45 149 DA, fuel (Units C, D and E) 1/4 x 7/8" hex-hd cap SCREW; 1/4" lock WASHER
	117 243	PLUG, 1/8" sq-hd. stl. pipe (cd. or zn-pltd)
33	357 002 R12	SHUTTER, starting No. 6 x 1/4" slt-rd-hd mach SCREW (cd or zn-pltd) (2); No. 6 lock WASHER (cd. or zn-pltd) (2)
34	45 149 DA	SEAL, butterfly dust
35	45 148 D	RETAINER, dust seal
36	352 642 R91	SHAFT w/LEVER starting shutter
37	363 881 R1	RETAINER, starting shutter lever swivel No. 10NF x 5/8" fil-hd. mach. SCREW (cd. or zn-pltd.)
38	64 283 DBX	SWIVEL w/RETAINER, 363 881 R1, starting shutter lever
39	32 592 D	WASHER, starting shutter lever swivel
40	52 791 R1	BALL, friction spring
41	46 059 D	SPRING, starting shutter friction
42	351 588 R1	PIN, starting shutter stop (optional with 142 484)
42	142 484	PIN, starting shutter stop (optional with 351 588 R1)
43	60 947 D	PACKAGE, drip hole filler replacement
44	56 611 DA	SEAT, fuel adjustment screw - .046" (Unit A)
44	355 003 R1	SEAT, fuel adjustment screw - .051" (Unit B)
44	374 331 R1	SEAT, fuel adjustment screw - .051" (Unit C)
44	374 330 R1	SEAT, fuel adjustment screw - .060" (Unit D)
44	380 500 R1	SEAT, fuel adjustment screw - .063" (Unit E)
45	24 703 DA	PACKING, fuel adjusting screw - (optional with 67 266 DX) (*)
45	67 266 DX	PACKING, fuel adjusting screw (optional with 24 703 DA) (*)

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FUEL SYSTEM

CARBURETOR – CONTINUED
(Gasoline)

REF. NO.	I. H. PART NUMBER	DESCRIPTION
46	24 687 DA	NUT, fuel adjusting screw packing
47	47 404 DA	SCREW, fuel adjusting (Units A and B)
47	374 327 R1	SCREW, fuel adjusting (Units C, D and E) (*)
48	381 955 R1	GASKET, shut-off valve (Unit E)
49	384 818 R91	VALVE ASSY, fuel shut-off solenoid (Unit E) (Composed of - 1 GASKET 381 955 R1; 1 NEEDLE 384 822 R91; 1 O-RING 384 820 R1; 1 SCREW 384 819 R1; 1 SPRING 384 821 R1)
	387 454 R92	PACKAGE, carburetor gasket (Units C, D and E) (Consists of - 1 GASKET 31 336 D; 1 GASKET 18 377 D; 1 GASKET 25 948 D; 1 GASKET 47 388 D; 1 GASKET 251 583 R1; 1 GASKET 381 955 R1; 1 "O" RING 384 820 R1; 1 PACKAGE 60 947 D; 1 PACKING 24 703 DA; 1 SEAL 45 149 DA; 1 SEAL 379 598 R1)
	387 455 R92	PACKAGE, carburetor overhaul field service (Units C and D) (Consists of - 1 BALL 52 791 R1; 2 BUSHING 47 390 D; 1 CAGE 47 369 DAX40; 1 INSTRUCTIONS, installing 1 014 457 R1; 1 PIN 351 558 R1; 1 PIVOT 47 395 D; 1 PLUG 57 956 D; 1 RETAINER 25 484 D; 1 RETAINER 29 902 DX; 1 RETAINER 45 148 D; 2 SCREW 47 392 D; 1 SCREW 362 528 R1; 1 SCREW 374 327 R1; 1 SHAFT w/LEVER 368 139 R91; 1 SPRING 46 059 D; 1 SPRING 351 959 R1)
	387 458 R92	PACKAGE, carburetor overhaul (Unit E) (Consists of - 1 BALL 52 791 R1; 1 BUSHING 47 390 D; 1 CAGE 47 396 DAX40; 1 FLOAT 47 398 D; 1 PIN 351 588 R1; 1 PIVOT 47 395 D; 1 PLUG 57 956 D; 1 RETAINER 29 902 DX; 1 RETAINER 45 148 D; 1 SCREW 132 128; 1 SCREW 47 392 D; 1 SCREW 362 528 R1; 1 SCREW 374 327 R1; 1 SPRING 25 484 D; 1 SHAFT 368 139 R91; 1 SPRING 351 959 R1; 1 SPRING 46 059 D)
	368 137 R1	RETAINER, dust seal (Units A, B, and C)
	312 066 R1	ROD, governor connecting (Units A and B)
	312 065 R1	SPACER, carburetor (for use with heavy duty magneto) C-221 501 to 43020; C-263 501 to 56635

* - Used only on Carburetors w/o fuel shut-off.

PRINTED IN UNITED STATES OF AMERICA

FUEL SYSTEM

CARBURETOR
(American Bosch Arma Corp.) (Liquefied Petroleum Gas and Natural Gas)

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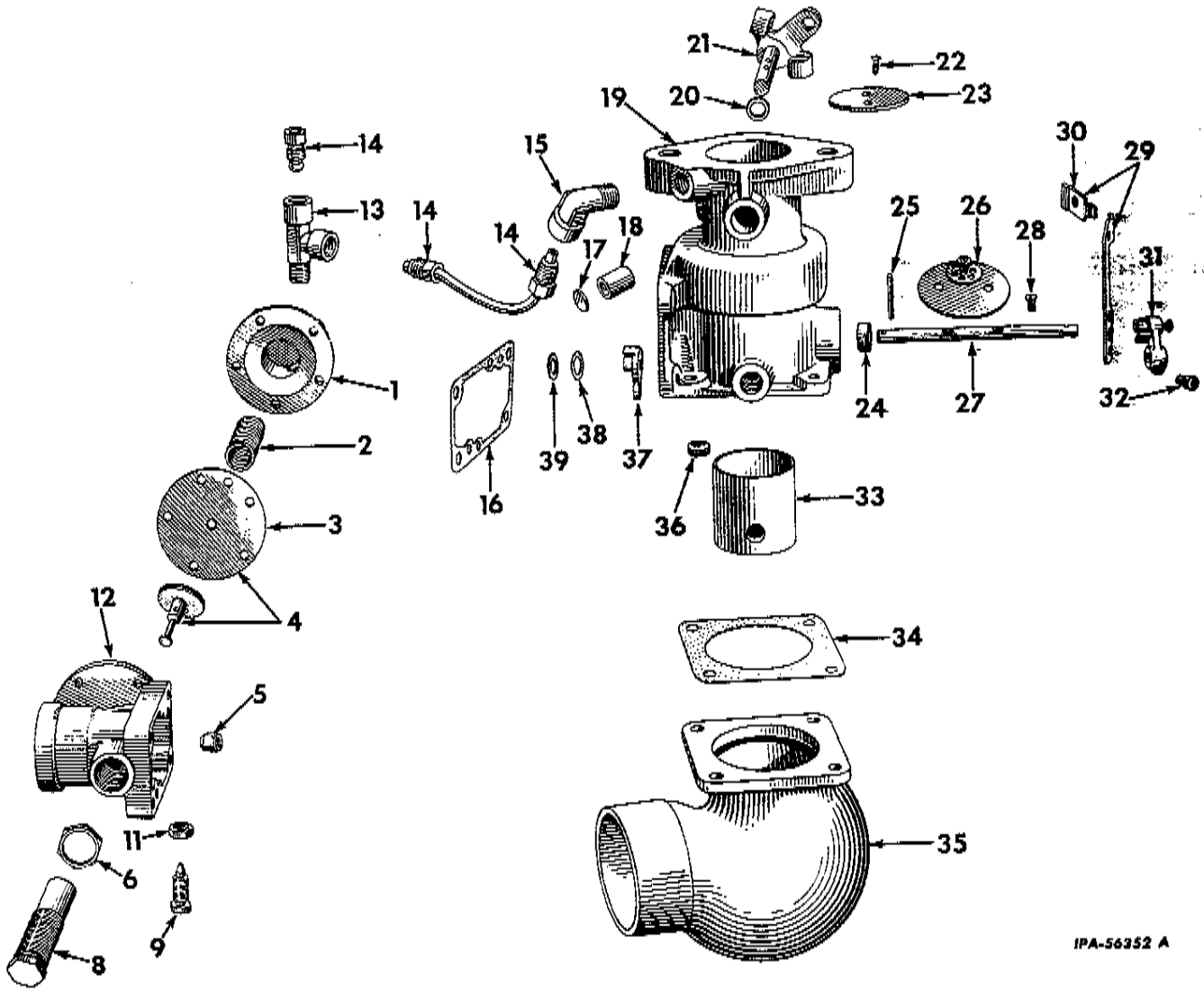
FUEL SYSTEM

CARBURETOR – CONTINUED
(American Bosch Arma Corp.) (Liquefied Petroleum Gas and Natural Gas)



REF. NO.	I. H. PART NUMBER	DESCRIPTION
	309 592 R91	CARBURETOR ASSEMBLY (Model No. 1-1/4" X G) (Ensign X C 9174) (Service parts will be furnished in next revision of this catalog) (order CARBURETOR, 371 088 R92)
	371 088 R92	CARBURETOR ASSEMBLY w/BLEED SCREW, 268 169 R1 (American Bosch Arma Corp. Model No. 1-CBX-125-A-136) (Will work for CARBURETOR, 309 592 R91)
		3/8 x 1-1/4" hex-hd. cap SCREW (2)
		3/8" lock WASHER (2)
1	359 623 R1	COVER, economizer (7944)
		No. 8 x 5/8" slt-fil-hd. cd-pltd. mach. SCREW (5)
		No. 8 cd-pltd. lock WASHER (5)
2	359 622 R1	SPRING, economizer (2120)

REF. NO.	I. H. PART NUMBER	DESCRIPTION
3	113 504 R1	DIAPHRAGM, economizer (7070)
4	359 621 R91	DIAPHRAGM ASSEMBLY, economizer (8324)
5	373 189 R1	SCREW, economizer bleed (not part of 359 618 R91) (7939-44)
6	56 430 D	NUT, fuel adjusting screw lock (4542)
8	56 429 D	SCREW, fuel adjusting (7C64G)
9	359 620 R1	SCREW, starting adjusting (8293)
11	113 506 R1	NUT, starting adjusting screw lock (7075)
12	307 977 R91	BODY, gas inlet and economizer
		No. 12 x 7/8" slt-fil-hd. cd-pltd. mach. SCREW (4)
		No. 12 cd-pltd. light lock WASHER (4)
13	19 272 R1	TEE, 1/8 x 90° two-way (for 3/16" tube)
14	371 215 R1	NUT, coupling (3)
15	32 468 H	ELBOW, 1/8 x 90° (for 3/16" tube)
16	359 624 R1	GASKET, inlet and economizer (8296)

FUEL SYSTEM

REF. NO.	I.N. PART NUMBER	DESCRIPTION
		CARBURETOR – CONTINUED (American Bosch Arma Corp.) (Liquefied Petroleum Gas)
17	47 856 H	PLUG, 1/2" brs. expansion (6-43-F)
18	37 024 D	BUSHING, throttle bearing (B-176 B)
19	374 862 R91	BODY and THROTTLE ASSEMBLY, partial (9365) (Composed of - 2 BUSHING 37 024 D; 1 DISC 359 611 R1; 1 NOZZLE 64 835 D; 1 PLUG 13 123 D; 1 PLUG 47 856 H; 2 SCREW 56 370 D; 1 SEAL 64 837 D; 1 SHAFT and STOP 373 187 R91)
20	64 837 D	OIL SEAL, throttle shaft (7037)
21	373 187 R91	SHAFT and STOP ASSEMBLY, throttle (9344) No. 10NF x 5/8" slt-fil-hd. cd-pltd. mach. SCREW (4298)
22	56 370 D	SCREW, throttle shaft (6733) (2)
23	359 611 R1	DISC, throttle (2320)
24	58 899 D	WASHER, dust (7036)
25	359 616 R1	PIN, valve lever (8289)
26	359 613 R91	DISC ASSEMBLY, spring loaded choke (2324)
27	359 612 R1	SHAFT, choke (2327)
28	56 365 D	SCREW, choke shaft (6732) (2)
29	58 889 D	SUPPORT w/CLAMP, 56 389 D, ASSEMBLY, choke tube No. 8 x 1/4" slt. binding hd-cd-pltd. mach. SCREW (7224) (2)
30	56 389 D	CLAMP, choke tube (U-357) No. 10NF NUT No. 10NF x 3/8" slt-fil-hd. cd-pltd. mach. SCREW
31	275 583 R91	LEVER w/SET SCREW, 36 756 D ASSEMBLY, choke No. 10NF x 1/2" hex-hd. mach. SCREW
32	36 756 D	SCREW, choke lever set
33	373 939 R1	VENTURI No. 12 x 3/4" slt-fil-hd. cd-pltd. mach. SCREW No. 12 cd-pltd. light lock WASHER
34	359 627 R1	GASKET, air intake elbow (8593)
35	373 190 R1	ELBOW, air intake (4303) No. 12 x 5/8" slt-fil-hd. cd-pltd. mach. SCREW (4) No. 12 cd-pltd. light lock WASHER (4)
36	13 123 D	PLUG, 3/16" brs. expansion (302)
37	359 614 R1	LEVER, valve (8288)
38	359 615 R1	WASHER, spring (1802)
39	37 183 D	WASHER, valve lever (6347)
	31 336 D	GASKET, carburetor (not furnished as part of Carburetor Assembly) (will work for 21 632 D)
	64 835 D	NOZZLE, balance tube (6395)

MEMORANDA

FUEL SYSTEM

- REGULATOR
(Ensign) (Liquefied Petroleum Gas)

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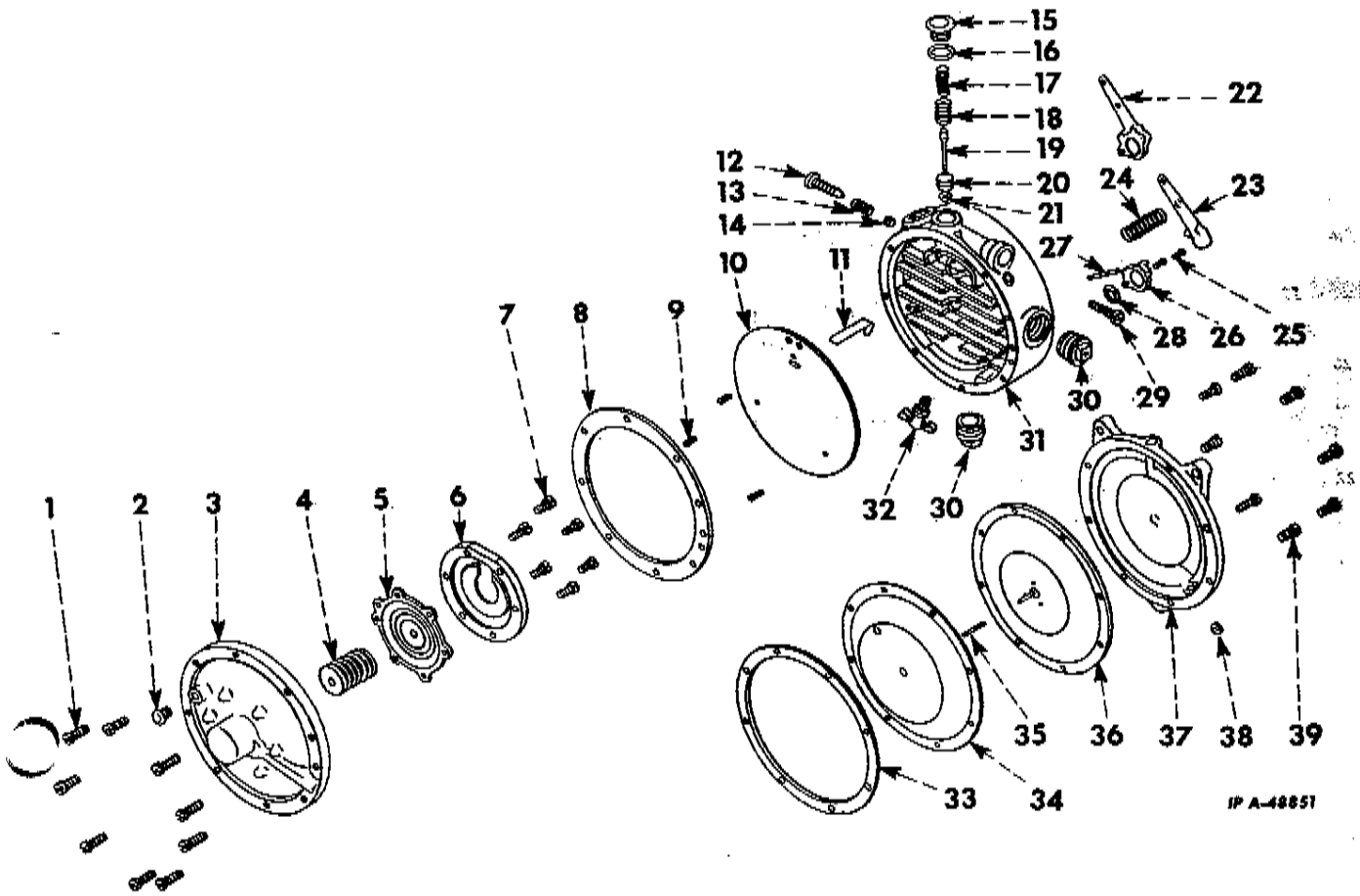
FUEL SYSTEM

FUEL REGULATOR – CONTINUED
(Ensign) (Liquefied Petroleum Gas)



REF. NO.	I. H. PART NUMBER	DESCRIPTION
	371 100 R91	REGULATOR ASSEMBLY, fuel (liquefied petroleum gas) (4391) 5/16 x 1-1/2" hex-hd. cap SCREW (2) 5/16 x 1-1/8" hex-hd. cap SCREW 5/16" lock WASHER
1	19 270 R1	SCREW, No. 10NF x 5/8" slt-fil-hd. cd-pltd. mach. w/lock WASHER (821-10S) (6)
2	444 814	PLUG, 1/8" pipe (in vaporizer cover) (5145)
3	277 195 R91	COVER, w/PLUG, 13 017 R1 ASSEMBLY, vaporizer (2991)
4	277 196 R91	SPRING ASSEMBLY, high pressure (2993)
5	277 370 R91	DIAPHRAGM ASSEMBLY, high pressure (3010)
6	277 197 R1	COVER, high pressure diaphragm (3019)
7	19 270 R1	SCREW, No. 10NF x 5/8 slt-fil-hd. cd-pltd. mach. w/lock WASHER (821-10S) (6)
8	277 198 R1	GASKET, vaporizer cover (3022)
	277 199 R1	SCREW, vaporizer partition plate (3048) (3)
10	277 350 R1	PLATE, vaporizer partition (2988)

REF. NO.	I. H. PART NUMBER	DESCRIPTION
11	277 351 R1	LEVER, high pressure valve (2989)
12	37 179 D	SCREW, idle adjusting (387-C)
13	14 526 D	SPRING, idle adjusting screw retainer (2ZZF)
14	277 352 R1	SCREW, bleed, "B" (4B60)
15	277 353 R1	RETAINER, high pressure valve spring (2719)
16	277 354 R1	GASKET, high pressure valve spring retainer (2689)
17	277 355 R1	SPRING, high pressure valve (2717)
18	277 356 R1	SPRING, high pressure valve seat retainer (2987)
19	277 357 R1	VALVE, high pressure (2985)
20	277 358 R91	SEAT w/SEAL, 359 600 R1 ASSEMBLY, high pressure valve (2979)
21	359 600 R1	SEAL, high pressure valve (8739)
22		VALVE ASSEMBLY, low pressure (not serviced separately - order 277 369 R91)
23	113 443 R91	LEVER ASSEMBLY, low pressure valve (8863)

FUEL SYSTEM

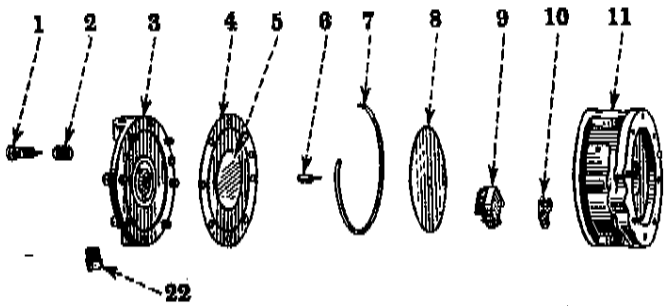
REF. NO.	I.H. PART NUMBER	DESCRIPTION
		FUEL REGULATOR – Continued (Ensign) (Liquefied Petroleum Gas)
24	277 360 R1	SPRING, low pressure valve (3033)
25	19 271 R91	SCREW w/lock WASHER ASSEMBLY, low pressure valve (771-7S) (2)
26	277 361 R1	SEAT, low pressure valve (3030)
27	277 362 R1	PIN, pivot (3119)
28	352 221 R1	SEAL, low pressure valve (3388)
29	113 434 R91	STRAINER ASSEMBLY, fuel inlet (8360)
30	113 186	PLUG, 3/4" pipe (1533)
31		BODY, regulator (Not Furnished Separately) (2976)
	103 885	PLUG, 3/8" pipe
32	59 708 D	VALVE, drain (621 J)
33	64 433 D	GASKET, low pressure partition plate (5181)
34	277 365 R1	PLATE, low pressure partition (3036)
35	277 366 R1	PIN, diaphragm push
36	277 367 R91	DIAPHRAGM w/PIN, 277 366 R1 ASSEMBLY, low pressure (3038)
37	277 368 R2	PLATE, support (3040)
38	118 831	PLUG, 1/8" slt-hd. pipe (3094)
39	19 270 R1	SCREW, No. 10NF x 5/8" slt-fil-hd. cd-pltd. mach. (support plate) (821-10-S) (8)
	373 174 R91	COMPENSATOR ASSEMBLY (4262-55)
	277 369 R91	KIT, fuel regulator overhaul (3141) (Composed of - 1 DIAPHRAGM 277 367 R91; 1 DIAPHRAGM 277 370 R91; 1 GASKET 64 433 D; 1 GASKET 277 354 R1; 1 GASKET 277 198 R1; 1 LEVER 277 351 R1; 1 SEAL 352 221 R1; 1 SEAL 359 600 R1; 1 SEAT 277 358 R91; 1 SCREW 37 179 D; 3 SCREW 277 199 R1; 23 SCREW 19 270 R1; 2 SCREW 19 271 R1; 1 SPRING 277 196 R91; 1 SPRING 277 355 R1; 1 SPRING 277 356 R1; 1 SPRING 277 360 R1; 1 STRAINER 113 434 R91; 1 VALVE 277 357 R1; § 1 VALVE)
	373 173 R1	RING, retaining (4245)

§ - Not Furnished Separately

MEMORANDA

FUEL SYSTEM

REGULATOR UNIT (AMERICAN BOSCH)
Natural Gas (C-221 501 Up)
(C-263 501 Up)
Combination Gas and Gasoline
(C-221 501 to 43020)
(C-263 501 to 56635)



REF. NO.	I.H. PART NUMBER	DESCRIPTION
	35 816D	REGULATOR UNIT (Model 1" Type B) (RUB100A1) 5/16 x 3/4" hex-hd. cap SCREW (2) 5/16" lock WASHER (2)
1	37 011 D	SCREW, idle adjusting (5C4619)
2	36 758 D	SPRING, idle adjusting screw retainer (SP4629)
	36 912DA	COVER, bowl (Not Furnished Separately) No. 10NF x 1/2" mach. fil-hd. cd-pltd. SCREW (5C24-8CA) (8) No. 10 lock WASHER (WA5-5CA) (8)
4	37 012 D	GASKET, upper diaphragm (ensign 5546)
5	36 909 D	DIAPHRAGM w/GASKET, 37 012 D, upper (DM4655A)
6	36 907 D	ROD, valve lever push (RD4612A)
7	36 910 D	WIRE, partition plate, locking (W1461)
8	36 911 D	PLATE, partition (PL467)
9	36 902 D	VALVE w/GASKET, 36 903 D, pilot (VA 4656 A) No. 6 x 7/16" fil-hd. cd-pltd. mach. SCREW (3) No. 6 lock WASHER (3)
10	36 903 D	GASKET, valve lever support (GA 4651)

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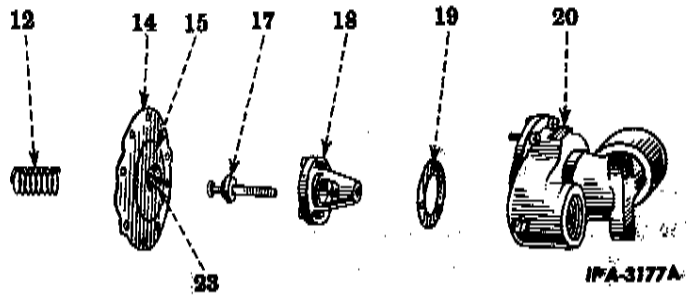
FUEL SYSTEM

REGULATOR UNIT (AMERICAN BOSCH) — CONTINUED
Natural Gas (C-221 501 Up)
(C-263 501 Up)
Combination Gas and Gasoline
(C-221 501 to 43020)
(C-263 501 to 56635)



REF. NO.	I.H. PART NUMBER	DESCRIPTION
11	268 201 R91	BOWL (ensign 6463)
12	37 010 D	SPRING, lower diaphragm (SP 4616)
14	324 797 R1	DIAPHRAGM, lower (DM-464)
14	42 331 D	DIAPHRAGM 324 797 R1 and PLATE, 42 333 D, lower (DM 4650 A)
15	42 333 D	PLATE, lower diaphragm (PL-4617) (2)
17	36 897 D	VALVE (VA46112A)
18	36 896 D	SEAT, valve (ensign 268-12) No. 10-32NF x 9/16" fil-hd. cd-pltd. mach. SCREW (SC 1900) (3)
19	36 895 D	GASKET, valve seat (GA4633)
20	36 894 D	BODY, regulator (Not Furnished Separately) No. 10-32NF x 1/2" fil-hd. cd-pltd. mach. SCREW (5C24-8CA) (8) No. 10 lock WASHER (WA5-5CA) (8)
22	37 009 D	PLUG, 1/8" balance tube (PG-1082)
23	42 334 D	SCREW w/PLATE, 268 207 R1 diaphragm (PL 4674A)
	118 831	PLUG, 1/8" pipe (PG 1088)
	37 009 D	PLUG, 1/8" pipe (pressure test hole plug) (PG 1082)
	268 207 R1	PLATE, diaphragm screw head

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MEMORANDA

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MEMORANDA

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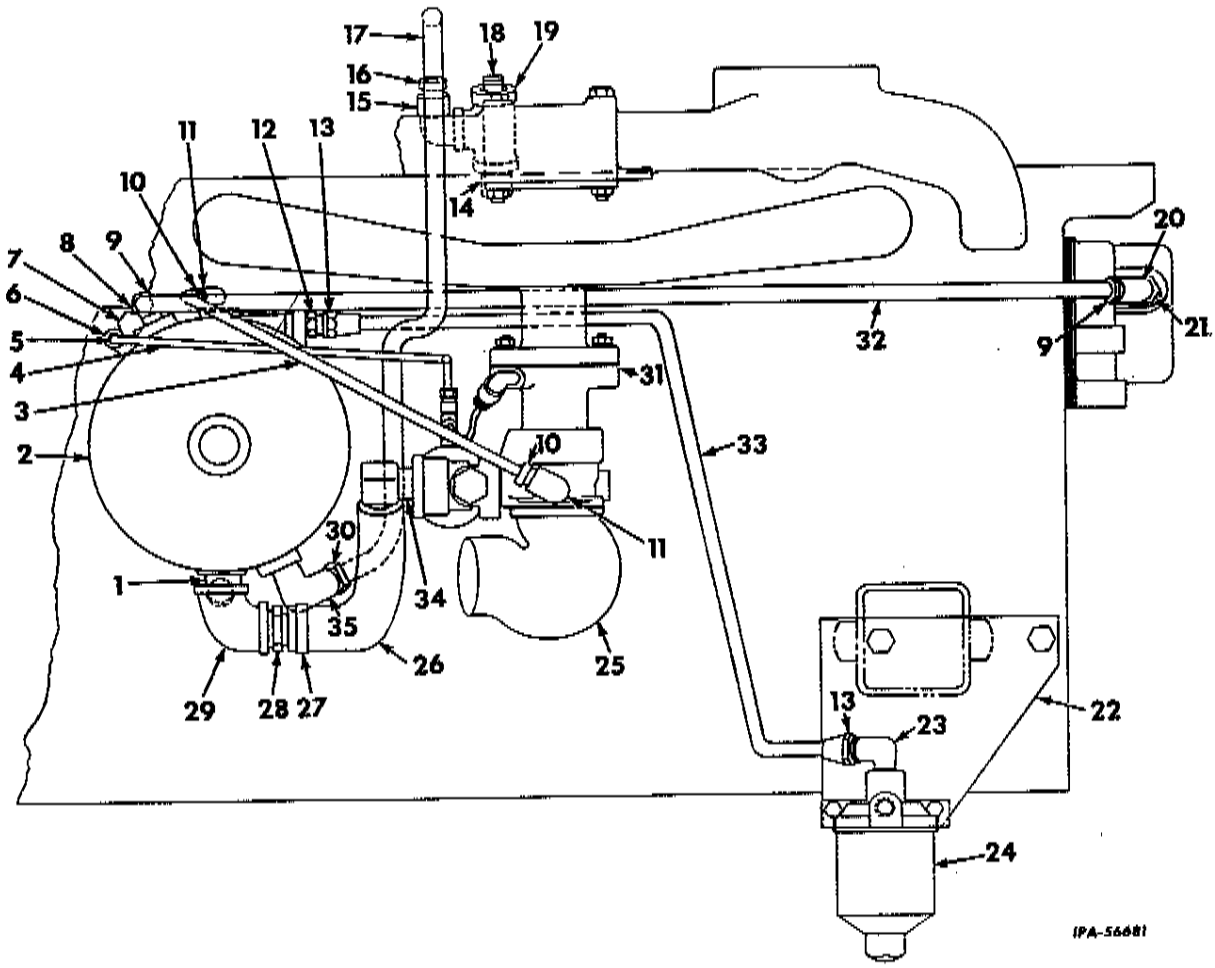
FUEL SYSTEM

FUEL PIPING AND CONNECTIONS
(Liquefied Petroleum Gas)



REF. NO.	I. H. PART NUMBER	DESCRIPTION
1	128 067	NIPPLE (3/4 x 1-1/2" pipe)
2	371 100 R91	REGULATOR ASSEMBLY, fuel (for components see list of parts under details of "Regulator")
3	371 103 R1	LINE, regulator to carburetor balance
4	371 104 R1	LINE, regulator to carburetor idle
5	19 983 R1	NUT, idle line (regulator end)
6	32 468 H	BODY, idle line (regulator end)
7	86 224-H	SPACER, fuel regulator (2)
8	68 134 D	ELBOW, 90° water inlet tube (in regulator)
9	19 987 R1	NUT, coupling water inlet tube (in regulator) (2)
10	19 985 R1	NUT, coupling balance line (2)
11	24 847 H	ELBOW, regulator to carburetor balance line (2)
12	118 755	ELBOW, 3/8" tube x 1/4" pipe
13	121 758	NUT, 3/8" fuel filter tube (2)
	144 610	NIPPLE, 1/2 x 1-3/8" close pipe

FUEL SYSTEM

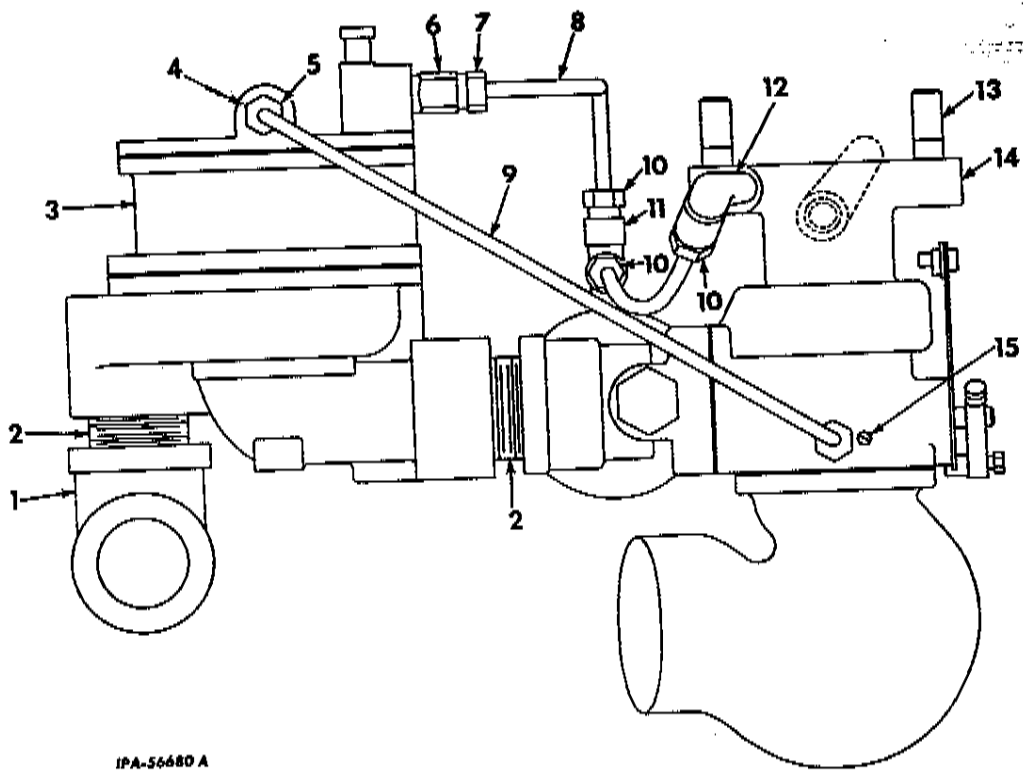
FUEL PIPING AND CONNECTIONS – CONTINUED
(Liquefied Petroleum Gas)

REF. NO.	I. H. PART NUMBER	DESCRIPTION
15	68 134 D	ELBOW, 90° water inlet
16	19 987 R1	NUT, (in cylinder head)
17	371 105 R1	TUBE, regulator water inlet (regulator to cylinder head)
18	219 199	PLUG, 1/2" sq-hd. pipe
19	138 105	TEE, 1/2" pipe water inlet tube (in cylinder head)
20	19 502 R1	ELBOW, 45° (in water pump)
21	142 269	BUSHING, 3/8 x 1/2" reducing pipe (in water pump)
22	308 322 R1	BRACKET, fuel filter and voltage regulator mounting
23	118 755	ELBOW, 3/8" tube x 1/4" pipe (in filter)
24	346 818 R91	FILTER ASSEMBLY (for components see list of parts under details of "Fuel Filter")
25	371 088 R92	CARBURETOR ASSEMBLY (for components see list of parts under details of "Carburetor")
26	371 102 R1	HOSE, fuel line
27	274 085 R91	CLAMP, fuel hose (2)

FUEL SYSTEM

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		FUEL PIPING AND CONNECTIONS – CONTINUED (Liquefied Petroleum Gas)
28	188 902 R1	NIPPLE (7/8 x 2-5/16") regulator end fuel hose
29	119 099	ELBOW, 3/4" x 90° pipe
30	19 987 R1	NUT, coupling water outlet (in regulator)
31	31 336 D	GASKET, carburetor (will work for 21 632 D)
32	371 106 R2	LINE, regulator water outlet (regulator to water pump)
33	308 335 R11	TUBE w/two NUTS, 121 758 fuel filter to regulator
34	188 897 R1	ELBOW, 7/8 x 1-3/4 x 1-3/8"
35	68 134 D	ELBOW, 90° water outlet tube (in regulator)
	266 199 R1	COVER, fuel pump opening 5/16 x 1/2" hex-hd. cap SCREW (2)
	76 950 R2	VALVE, spring retainer (6)
	33 700 DA	WIRE, choke control

FUEL PIPING AND CONNECTIONS
(Natural Gas)



IPA-56680 A

REF. NO.	I. H. PART NUMBER	DESCRIPTION
1	119 100	ELBOW, 1" x 90° pipe
2	127 874	NIPPLE, 1 x 1-1/2" pipe (2)
3	35 816 D	REGULATOR ASSEMBLY (Model "B" Ensign 5069) fuel (for components see list of parts under details of "Regulator") 5/16 x 3/4" hex-hd. cap SCREW (2) 5/16" lock WASHER (2)
4	36 521 D	CONNECTOR, balance tube
5	19 983 R1	NUT, coupling balance tube
6	36 521 D	CONNECTOR, idle tube
7	19 983 R1	NUT, coupling idle tube
8	308 326 R1	TUBE, idle
9	308 327 R1	TUBE, balance
10		NUT, coupling idle tube (furnished with CARBURETOR, 309 592 R91) (3)
11		TEE (furnished with CARBURETOR, 309 592 R91)
12		ELBOW (furnished with CARBURETOR, 309 592 R91)
13	277 016 R1	STUD, carburetor (2) (Used w/CARBURETOR. 309 592 R91)

FUEL SYSTEM

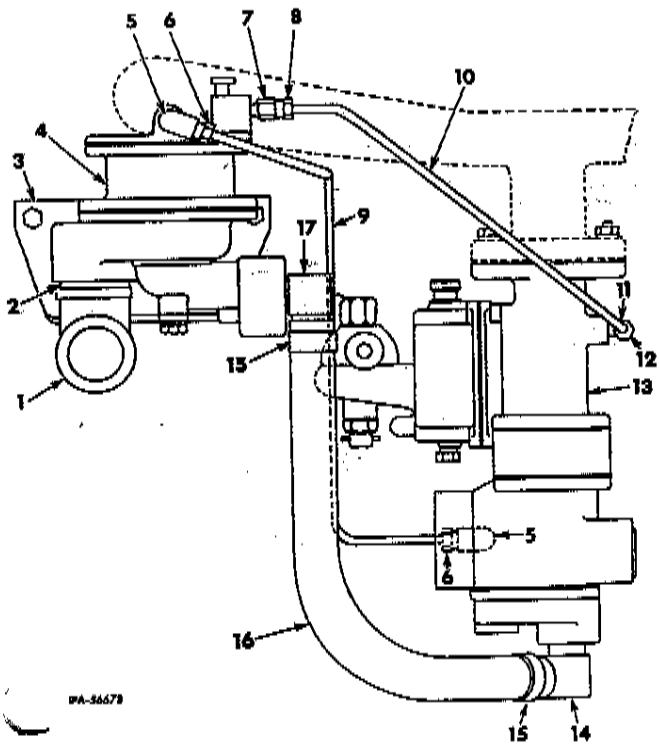
REF. NO.	I. H. PART NUMBER	DESCRIPTION
		FUEL PIPING AND CONNECTIONS – CONTINUED (Liquefied Petroleum Gas)

FUEL PIPING AND CONNECTIONS – CONTINUED
(Natural Gas)

REF. NO.	I. H. PART NUMBER	DESCRIPTION
13	12 215 D	STUD, carburetor (2) (Used w/CARBURETOR. 371 088 R92) 3/8" NUT (2) 3/8" lock WASHER (2)
14	309 592 R91	CARBURETOR (Model 1-1/4" X G) (Ensign X C 9174) (Service parts will be furnished in next revision of this catalog) (order CARBURETOR, 371 088 R92)
14	371 088 R92	CARBURETOR w/BLEED SCREW, 268 169 R1 (Model CBX-125-A-136) (American Bosch Arma Corp) (for components see list of parts under "CARBURETOR") (Will work for CARBURETOR, 309 592 R91)
15	268 169 R1	SCREW, bleed (Used with CARBURETOR. 371 088 R92)
	308 325 R1	BRACKET, fuel regulator support 5/16 x 3/4" hex-hd. cap SCREW 5/16" lock WASHER
	31 336 D	GASKET, carburetor (will work for 21 632 D)
	76 950 R2	VALVE, spring retainer (6)

FUEL SYSTEM

FUEL PIPING AND CONNECTIONS
(Combination Natural Gas and Gasoline)
C-221 501 to 43020
C-263 501 to 53635



REF. NO.	I. H. PART NUMBER	DESCRIPTION
1	119 100	ELBOW, 1" x 90° pipe
2	127 874	NIPPLE, 1 x 1-1/2" pipe
3	308 331 R11	BRACKET, fuel regulator mounting 5/16 x 3/4" hex-hd. cap SCREW (2) 5/16" lock WASHER (2)
4	35 816 D	REGULATOR ASSEMBLY (Model "B" Ensign 5069) (for components see list of parts under details of "Regulator") 5/16 x 3/4" hex-hd. cap SCREW (2) 5/16" lock WASHER (2)
5	32 468 H	BODY, balance tube (2)
6	371 215 R1	NUT, coupling balance tube (2)
7	36 521 D	BODY (fuel regulator end)
8	371 215 R1	NUT, coupling idle
9	308 334 R1	TUBE, balance
10	308 333 R1	TUBE, idle
11	32 468 H	BODY, idle (carburetor end)
12	371 215 R1	NUT, coupling
13	309 593 R91	CARBURETOR ASSEMBLY (Model 1-1/4" KGNI) 3/8NF NUT (2) 3/8" lock WASHER (2)

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FUEL SYSTEM

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		FUEL PIPING AND CONNECTIONS – Continued (Combination Natural Gas and Gasoline) C-221 501 to 43020 C-263 501 to 53635
14	171 815 R1	ELBOW, 3/4 x 1 x 1-3/8 x 90° hose (at carburetor)
15	274 085 R91	CLAMP, hose (2)
16	305 836 R1	HOSE, fuel inlet (regulator to carburetor)
17	171 817 R1	ELBOW, 1 x 1 x 1-3/8" x 90° hose (at regulator)
	11 177 V	GASKET, strainer cage
	36 997 V	GASKET, cover plate
	321 005 R1	GASKET, fuel bowl
	321 006 R1	GASKET, air horn
	321 004 R91	PACKAGE, carburetor field service (includes Jets, Valves, Pins and Miscellaneous Parts to service CARBURETOR, 309 593 R91)
	64 837 D	SEAL, dust
	76 950 R2	VALVE, spring retainer (6)

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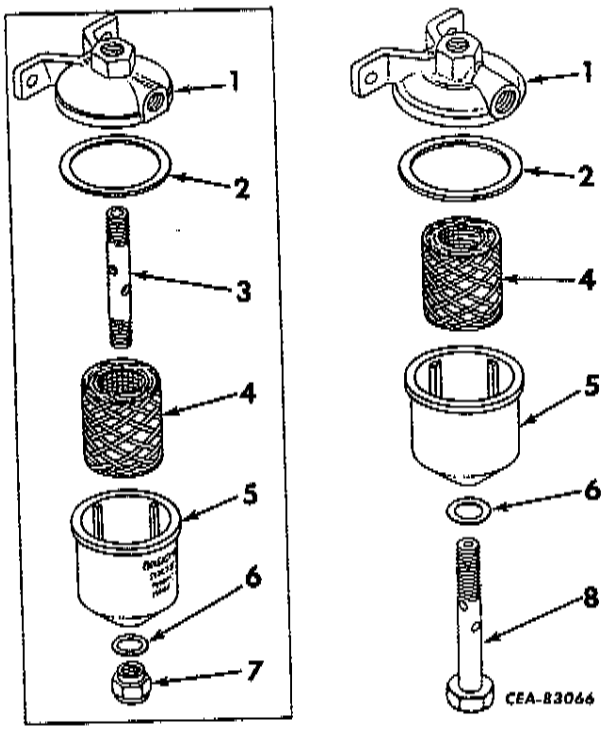
FUEL SYSTEM

FUEL FILTER
(Liquefied Petroleum Gas)

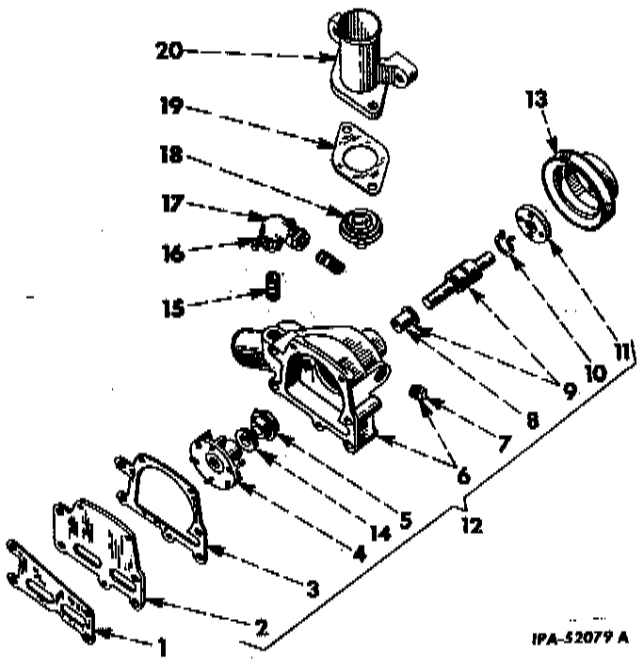


REF. NO.	I. H. PART NUMBER	DESCRIPTION
		Parts without letters after the description indicates the part is used for all filter assemblies listed below: Letters "A" and "B" are used to identify separate filter assemblies.
A	64 147 D	FILTER ASSY, fuel (order 346 818 R91)
B	346 818 R91	FILTER ASSY, fuel (will work for 64 147 D)
1		TOP, filler (order 346 818 R91)
2	64 399 D	GASKET, filler top to filter bottom
3	64 402 D	STUD, filter (Filter A)
4	64 400 DC	ELEMENT, w/GASKET, 64 399 D and GASKET, 64 401 D ASSY, filter
5		BOWL, filter (order 346 818 R91
6	64 401 D	GASKET, filter bowl
7	64 403 D	NUT, filter stud (Filter A)
8		BOLT, filter bowl (order 346 818 R91) (Filter B)

MEMORANDA

COOLING SYSTEM

WATER PUMP, THERMOSTAT AND RELATED PARTS



REF. NO.	I. H. PART NUMBER	DESCRIPTION
1	69 676 R1	GASKET, water pump
2	69 675 R1	PLATE, water pump 1/4 x 1/2" rd-hd. slt. mach. SCREW (cd. or zn-pltd.) (3)
3	69 674 R1	GASKET, water pump plate
4	387 931 R1	IMPELLER, water pump (together with SEAL, 265 164 R91, will work for 332 117 R1)
5	73 296 R92	SEAL, water pump
6	318 118 R21	BODY w/two PLUG, 103 868 and PLUG, 143 162 water pump
7	103 868	PLUG, 1/2" sq-hd CI pipe (3)
8	71 351 R1	SLINGER, water pump
9	ST 680	SHAFT and BEARING w/SLINGER, 71 351 R1, water pump
10	102 069 H	RETAINER, bearing
11	368 501 R2	HUB, pulley (optional with 392 713 R1)
11	392 713 R1	HUB, pulley (optional with 368 501 R2)
12	601 816 C91	PUMP ASSEMBLY, water 3/8 x 2-1/4" hex-hd. cap SCREW 3/8 x 2-1/2" hex-hd. cap SCREW (2) 3/8" lock WASHER (3)
13	304 435 R1	PULLEY, water pump (*)
13	368 502 R1	PULLEY, water pump (not *) 1/4NF x 1/2" hex-hd cap SCREW (used with HUB, 368 501 R2 and 392 713 R1) (4) 1/4" lock WASHER (4) 1/4 x 1/2" hex-hd cap SCREW (used with HUB, 368 501 R1) (4)
14	265 164 C91	RETAINER and SEAL ASSEMBLY, water pump

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(REV. NO. 1 10-68)

COOLING SYSTEM

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		WATER PUMP, THERMOSTAT AND RELATED PARTS — CONTINUED
15	169 193 R1	NIPPLE, water by-pass (2)
16	240 369 R91	CLAMP, hose (2)
17	169 192 R1	ELBOW, water by-pass
18	108 120 R91	THERMOSTAT, 167-172 degree opening temperature
19	368 505 R1	GASKET, water outlet
20	368 504 R1	OUTLET, water 7/16 x 1-1/4" hex-hd. cap SCREW 7/16 x 2-1/2" hex-hd. cap SCREW 7/16" lock WASHER (2)
	374 544 R93	PACKAGE, field service, water pump (Composed of - 1 GASKET 69 674 R1 1 GASKET 69 676 R1 1 IMPELLER 387 931 R1 1 RETAINER 102 069 H 1 RETAINER and SEAL 265 164 C91 1 SEAL 73 296 R92 1 SHAFT and BEARING ST-680)
	143 162	PLUG, 3/8" sq-soc-hd pipe

(*) - Used With Hydraulic Pump

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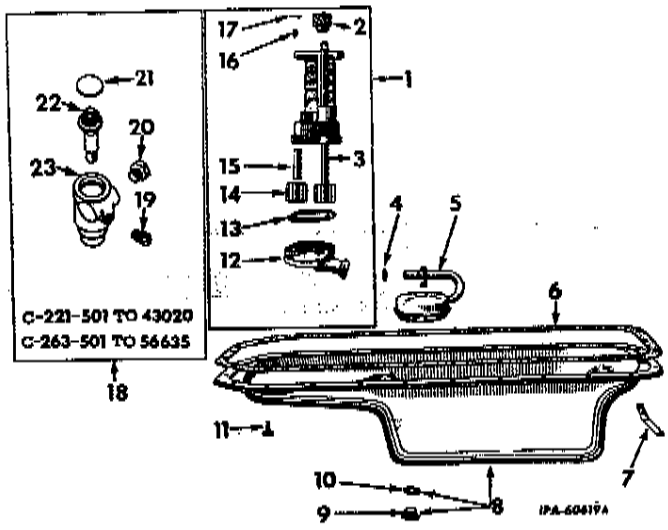
LUBRICATION SYSTEM

CRANKCASE OIL PAN AND OIL PUMP



REF. NO.	I. H. PART NUMBER	DESCRIPTION
1	230 421 R91	PUMP ASSEMBLY, oil (less screen) (will work for 367 811 R91) (Composed of - §1 BODY 1 COVER 169 679 R1 1 GASKET 69 607 R1 1 GEAR 69 608 R1 1 GEAR 227 713 R1 1 KEY 103 905 1 PIN 112 011 1 SHAFT 35 647 H 1 SHAFT and GEAR 230 409 R91) 5/16 x 1" hex-hd cap SCREW (2) 5/16" lock WASHER (2)
2	69 608 R1	GEAR, oil pump drive
3	69 606 R11	SHAFT w/GEAR, oil pump drive C-263 501 to 15879 C-221 501 to 14944
3	230 409 R91	SHAFT w/GEAR, oil pump drive C-263 15880 Up C-221 14945 Up
4	169 240 R1	"O" RING, 3/32 x 9/16 x 3/4" oil pump screen
5	367 812 R91	SCREEN, oil pump 1/8 x 1-1/4" cotter PIN (phosphate coated)
6	369 984 R1	GASKET, crankcase pan
7	114 869 R1	REINFORCEMENT, crankcase oil pan C-263 501 to 14924 C-221 501 to 14469
8	367 575 R92	PAN ASSY w/GASKET, 3 405 H and PLUG, 41 300 HA, crankcase oil
9	41 300 HA	PLUG, crankcase oil pan drain (optional with 359 875 R1)
9	359 875 R1	PLUG, crankcase oil pan drain (optional with 41 300 HA)
10	3 405 H	GASKET, oil pan drain plug

LUBRICATION SYSTEM

REF. NO.	I. H. PART NUMBER	DESCRIPTION

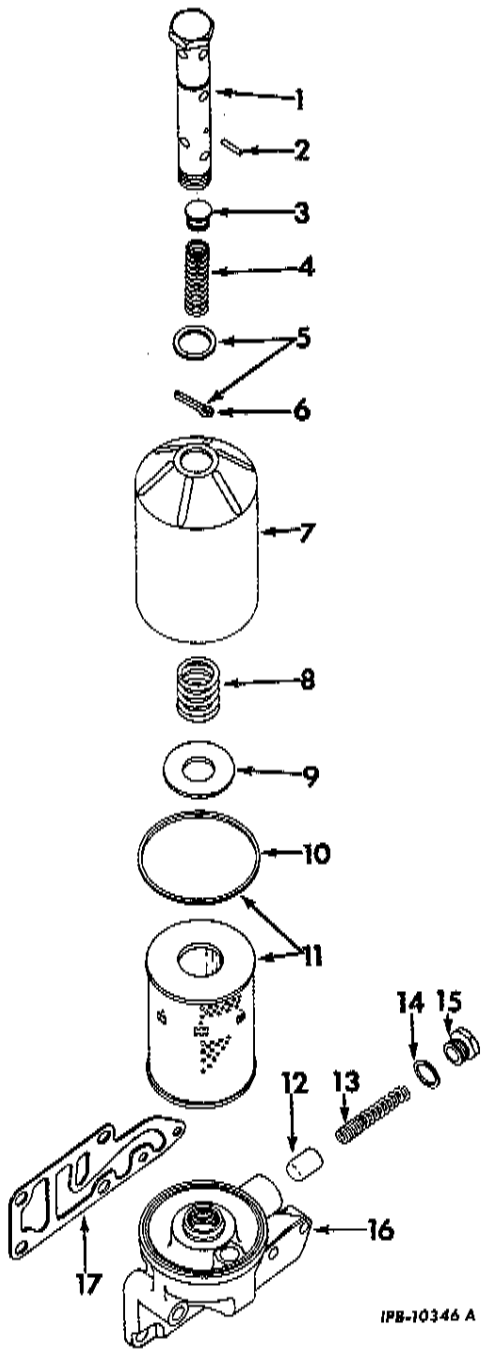
CRANKCASE OIL PAN AND OIL PUMP – Continued

11		SCREW, 5/16 x 3/4" hex-hd cap (25) 5/16" lock WASHER (20) 11/32 x 11/16" x 16 ga. WASHER (5)
12	169 679 R1	COVER, oil pump body 5/16 x 1" hex-hd cap SCREW (4) 5/16" lock WASHER (4)
13	69 607 R1	GASKET, oil pump cover
14	35 631 H	GEAR, pump body driven C-263 501 to 15879 C-221 501 to 14944
14	277 713 R1	GEAR, pump body driven C-263 15880 Up C-221 14495 Up
15	35 647 H	SHAFT, idler gear
16	103 905	KEY, oil pump drive gear (Woodruff No. 5)
17	112 011	PIN, 1/8 x 7/8" square end straight
18	312 157 R91	SUPPORT ASSY, oil pump shaft (will work for 278 375 R91) C-221 501 to 43020 C-263 501 to 56635 (Composed of - 1 FITTING 271 284 1 HOUSING 312 158 R1 1 PLATE 312 162 R1 1 PLUG 172 557 1 PLUG 369 013 R91 1 SHAFT 312 159 R11)
19	271 284	FITTING, lubrication (Alemite No. 1612B) (optional with 109 460) C-221 501 to 43020 C-263 501 to 56635
19	109 460	FITTING, lubrication (Lincoln No. 5300) (optional with 271 284) C-221 501 to 43020 C-263 501 to 56635
20	369 013 R1	PLUG, distributor housing C-221 501 to 43020 C-263 501 to 56635
21	312 162 R1	PLATE, thrust C-221 501 to 43020 C-263 501 to 56635
22	312 159 R11	SHAFT w/GEAR and WATER, support C-221 501 to 43020 C-263 501 to 56635
23	312 158 R1	HOUSING, oil pump shaft support C-221 501 to 43020 C-263 501 to 56635
	353 937 R1	CLAMP, oil pump shaft support (used with SUPPORT, 278 375 R91) (2) 5/16 x 7/8" hex-hd cap SCREW (2) 5/16" lock WASHER (2)
	353 936 R2	GASKET, oil pump shaft support (used with SUPPORT, 278 375 R91)
	143 992	PLUG, 1/4" stl-hd pipe
	172 577	PLUG, 1-3/16" x .083" housing expansion C-221 501 to 43020 C-263 501 to 56635

§ - Not Furnished Separately

LUBRICATION SYSTEM

OIL FILTER
C-221 501 to 43020
C-263 501 to 56635



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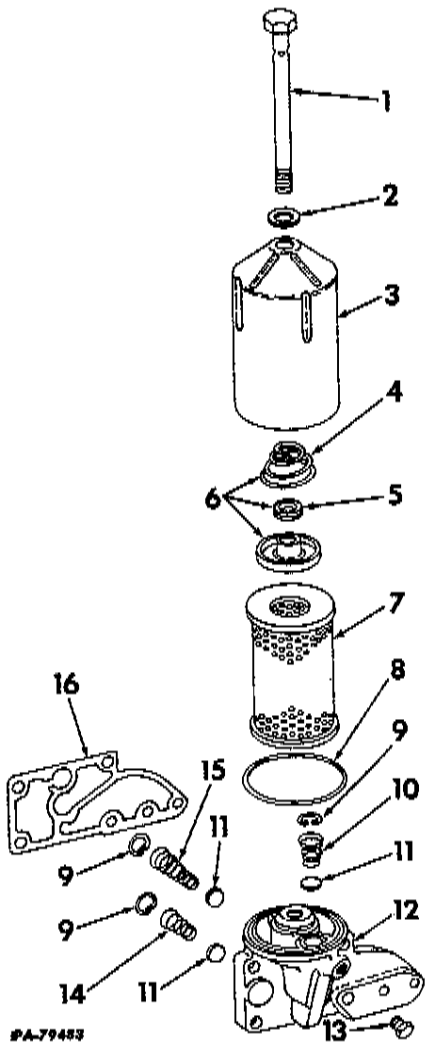
LUBRICATION SYSTEM

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		OIL FILTER — CONTINUED C-221 501 to 43020 C-263 501 to 56635
	371 236 R91	FILTER ASSEMBLY, oil (consists of the following parts)
1	304 005 R91	TUBE w/PIN, 17 141 R1, SPRING, 304 009 R1 and VALVE, 304 008 R1, oil filter center
2	17 141 R1	PIN, by-pass valve and spring retainer (5/32 x 1" Esna)
3	304 008 R1	VALVE, oil filter by-pass
4	304 009 R1	SPRING, oil filter by-pass valve
5	320 273 R91	PACKAGE, oil filter center tube
6		PIN, 1/16 x 1-1/16" cotter
7	303 998 R1	CASE, oil filter
8	304 011 R1	SPRING, oil filter element retaining
9	304 010 R1	WASHER, oil filter element retaining spring
10	304 854 R1	GASKET, oil filter case (will work for 193 527 R1)
11	323 827 R91	PACKAGE, oil filter element
12	61 261 VA	VALVE, oil pressure relief
13	49 946 HA	SPRING, oil pressure relief valve
14	3 405 H	GASKET, oil pressure relief valve cap
15	61 263 VA	CAP, oil pressure relief valve
16	371 237 R11	BASE ASSEMBLY, oil filter (Composed of - §1 BASE 1 CAP 61 263 VA 1 GASKET 3 405 H 1 PLUG 17 191 R1 1 SPRING 49 946 HA 1 VALVE 61 261 VA) 5/16 x 1-5/8" hex-hd cap SCREW (2) 7/16 x 1" hex-hd cap SCREW 7/16 x 1-1/4" hex-hd cap SCREW 7/16 x 2-3/4" hex-hd cap SCREW (2) 5/16" lock WASHER (2)
17	349 364 R1	GASKET, oil filter base (not furnished as part of 371 236 R91)
	17 191 R1	PLUG, 1/4" hex-hd pipe drain

§ - Not Furnished Separately.

LUBRICATION SYSTEM

OIL FILTER
C-221 43021 Up
C-263 56636 Up



REF. NO.	I.H. PART NUMBER	DESCRIPTION
	384 522 R92	FILTER ASSY, oil (Composed of - 1 BASE 384 523 R12; 1 CASE 384 529 R1; 1 ELEMENT 279 994 R91; 1 GASKET 304 854 R1; 1 GASKET 384 532 R1; 1 RETAINER 384 533 R91; 1 TUBE 384 530 R11)
1	384 530 R11	TUBE, oil filter center
2	384 532 R1	GASKET, center tube
3	384 529 R1	CASE, lubricating oil filter
4	384 536 R1	SPRING, element hold-down

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LUBRICATION SYSTEM

REF. NO.	I.H. PART NUMBER	DESCRIPTION
		OIL FILTER — Continued C-221 43021 Up C-263 56636 Up
5	384 535 R1	GROMMET, element retaining washer
6	384 533 R91	RETAINER ASSY, element (consists of GROMMET, 384 535 R1, SPRING, 384 536 R1 and WASHER)
7	279 994 R91	ELEMENT, oil filter
8	304 854 R1	GASKET, oil filter case
9	303 322 R1	RING, snap
10	384 525 R1	SPRING, check valve
11	384 528 R1	VALVE, lubricating oil filter base (3)
12	384 523 R12	BASE ASSY, oil filter (Composed of - § 1 BASE; 1 PLUG 397 299 R1; 3 RING 303 322 R1; 1 SPRING 384 525 R1; 1 SPRING 384 526 R1; 1 SPRING 384 527 R1; 3 VALVE 384 528 R1) 5/16 x 1-1/2" hex-hd cap SCREW (2) 7/16 x 1-1/4" hex-hd cap SCREW (3) 7/16 x 1-1/2" hex-hd cap SCREW 5/16" lock WASHER (2)
13	397 299 R1	PLUG, oil filter base (will work for 444 618)
14	384 526 R1	SPRING, pressure regulating
15	384 527 R1	SPRING, element by-pass
16	384 537 R2	GASKET, oil filter base

§ - Not Furnished Separately

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(REV. NO. 1 10-66)

MISCELLANEOUS

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		ORTED GASKET SETS
		ne)
	372 770 R93	GASKET SET, valve grinding includes 8 gaskets as follows -
	31 336 D	GASKET, carburetor
	164 418 R1	GASKET, cylinder head
	69 752 R1	GASKET, intake and exhaust manifold
	85 868 R1	GASKET, intake to exhaust manifold
	369 983 R1	GASKET, valve cover
	368 505 R1	GASKET, water outlet
	164 420 R1	GROMMET, valve cover
	111 024 R1	SEAL, intake valve stem
	866 834 R1	DEFLECTOR, intake and exhaust valve stem oil
	381 737 R92	GASKET SET, engine includes 21 gaskets as follows - (together with 372 770 R93 will work for GASKET SET 372 771 R91)
	369 981 R1	GASKET, breather pipe
	378 237 R1	GASKET, crankcase front cover
	367 574 R1	GASKET, crankcase front cover
	367 570 R1	GASKET, crankcase front plate
	369 984 R1	GASKET, crankcase pan
	353 936 R2	GASKET, distributor
	42 965 V	GASKET, filter drain plug
	612 293 C1	GASKET, fuel pump
	367 669 R1	GASKET, governor housing
	371 238 R1	GASKET, oil filter base
	304 854 R1	GASKET, oil filter case
	384 532 R1	GASKET, oil filter center tube
	3 405 H	GASKET, oil pan drain plug
	3 405 H	GASKET, oil pressure relief valve cap
	69 607 R1	GASKET, oil pump cover (2)
	369 982 R1	GASKET, valve push rod cover
	69 674 R1	GASKET, water pump plate
	69 676 R1	GASKET, water pump
	384 535 R1	GROMMET, element retainer washer
	352 221 R1	"O" RING, oil pump screen seal
	320 273 R91	PACKAGE, oil filter center tube gasket
	103 364	PIN, retaining spring washer 1/16 x 1-1/4" cotter PIN
	310 665 R1	PLUG, rear bearing cap (2)
	352 221 R1	SEAL, oil pump screen "O" ring

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MISCELLANEOUS

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		PRODUCT GRAPHICS
		The following identification and instructional Product Graphics are available for the UC-221 and UC-263 Engines:
	2 752 477 R1	PRODUCT GRAPHIC, air cleaner instructions (for units painted other than Red)
	2 752 478 R1	PRODUCT GRAPHIC, air cleaner instructions (for units painted red)
	2 751 188 R1	PRODUCT GRAPHIC, air cleaner instructions (for units painted other than Red)
	2 752 141 R1	PRODUCT GRAPHIC, air cleaner instructions (for units painted red)
	1 001 071 R2	PRODUCT GRAPHIC, generator warning
	2 752 048 R1	PRODUCT GRAPHIC, engine shut-down (for units painted other than Red)
	2 752 049 R1	PRODUCT GRAPHIC, engine shut-down (for units painted red)
	2 751 259 R1	PRODUCT GRAPHIC, "International" (2 for units painted other than Red)
	2 751 272 R1	PRODUCT GRAPHIC, "International" (2 for units painted red)
	2 752 149 R1	PRODUCT GRAPHIC, "I.H.C. of Canada" (for units painted other than Red)
	2 752 150 R1	PRODUCT GRAPHIC, "I.H.C. of Canada" (for units painted red)
	2 751 533 R1	PRODUCT GRAPHIC, flo-matic (for units painted other than Red)
	2 751 534 R1	PRODUCT GRAPHIC, flo-matic (for units painted Red)
	2 752 445 R1	PRODUCT GRAPHIC, control switch escutcheon
	2 753 190 R1	PRODUCT GRAPHIC, "Made in the United States of America"
	2 751 469 R1	PRODUCT GRAPHIC, model symbol "UC-221" (2 for units painted red)
	2 751 470 R1	PRODUCT GRAPHIC, model symbol "UC-221" (2 for units painted other than Red)
	2 751 475 R1	PRODUCT GRAPHIC, model symbol "UC-263" (2 for units painted red)
	2 751 476 R1	PRODUCT GRAPHIC, model symbol "UC-263" (2 for units painted other than Red)
	2 751 144 R1	PRODUCT GRAPHIC, oil filter instructions

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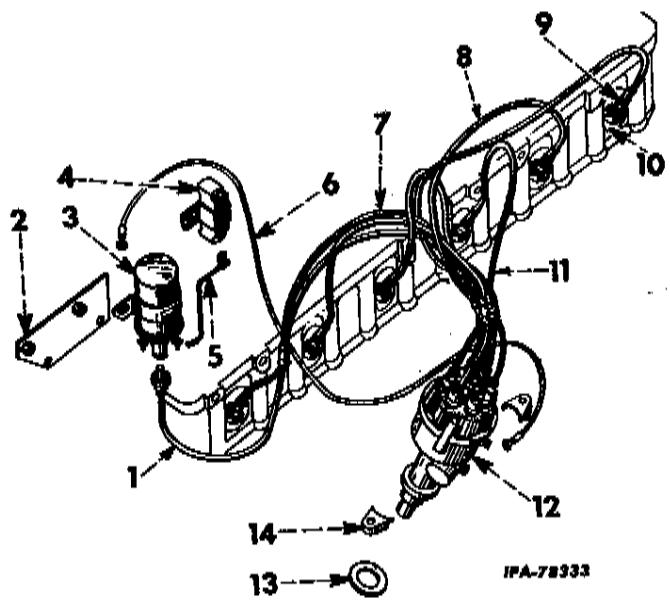
ELECTRICAL SYSTEM

SPARK PLUGS, COIL, CABLES AND DISTRIBUTOR
(Battery Ignition)



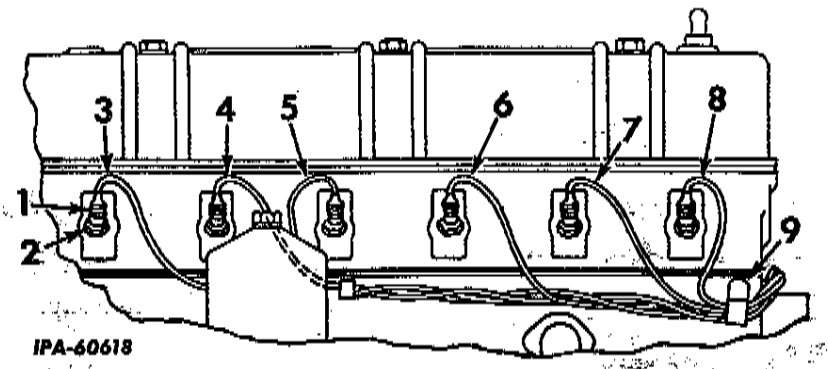
REF. NO.	I.H. PART NUMBER	DESCRIPTION
1	66 711 R92	CABLE, coil to distributor (high tension) (for use with COIL, Delco-Remy No. 1115098)
1	318 437 R91	CABLE, coil to distributor (high tension) (for use with COIL, Delco-Remy No. 1115082)
2	312 118 R11	BRACKET, ignition coil (for use with COIL, Delco-Remy No. 1115098) 5/16 x 5/8" hex-hd cap SCREW (2) 5/16" lock WASHER (2) 11/32" copper WASHER (2) 7/16 x 1/2" hex-hd cap SCREW (3) (assembled in left front of cylinder head) 15/32" copper WASHER (3) (assembled in left front of cylinder head)
2	370 534 R11	BRACKET, ignition coil (for use with COIL, Delco-Remy No. 1115082) 7/16 x 1/2" hex-hd cap SCREW (2) 7/16 x 7/8" hex-hd cap SCREW (2) 7/16" lock WASHER (2) (assembled in left front of cylinder head) 15/32" lock WASHER (2) (assembled in left front of cylinder)
3		COIL, ignition (Delco-Remy No. 1115082) No. 10NF cd-pltd NUT (2) 5/16 x 1/2" hex-hd cap SCREW (2) No. 10 cd-pltd lock WASHER (2) 11/32 x 11/16" x 16 ga. WASHER
3		COIL, ignition (Delco-Remy No. 1115098) 5/16 x 5/8" hex-hd cap SCREW 5/16" lock WASHER (2) 5/16 x 3/4" hex-hd cap SCREW
4		RESISTOR, ignition coil (Delco-Remy No. 1957154) (together with SPACER, 31 987 D, will work for resistor, Delco-Remy No. 1928016)
5	370 594 R91	CABLE, coil to resistor

ELECTRICAL SYSTEM

REF. NO.	I.H. PART NUMBER	DESCRIPTION
		SPARK PLUGS, COIL, CABLES AND DISTRIBUTOR – CONTINUED (Battery Ignition)
6	69 700 R91	CABLE, coil to distributor primary (for use with COIL, Delco-Remy No. 1115098)
6	368 267 R91	CABLE, coil to distributor primary (for use with COIL, Delco-Remy No. 1115082)
7	312 354 R91	CABLE, spark plug (No. 1 and 6) (2)
8	266 263 R91	CABLE, spark plug (No. 2 and 5) (2)
9		SPARK PLUG (Champion D-182) (light or moderate service) (*) (6)
9		SPARK PLUG, (Prestolite 18-82) (light or moderate service)* (6)
9		SPARK PLUG, (Champion D-16) (intermediate service)* (6)
9		SPARK PLUG, (Prestolite 18-81) (intermediate service)* (6)
9		SPARK PLUG, (Champion 8 com.) (normal service)* (6)
9		SPARK PLUG, (AC-85) (normal service)* (6)
9		SPARK PLUG, (Auto-Lite BT-8) (normal service)* (6)
9		SPARK PLUG, (Prestolite 18-8) (normal service)* (6)
9		SPARK PLUG, (Champion D-9) (severe service)* (6)
9		SPARK PLUG, (AC-C83) (severe service)* (6)
9		SPARK PLUG w/GASKET, 37 762 H (normal service) (Champion D-15Y) (6) %
9		SPARK PLUG, (Auto-Lite BT-4) (severe service)* (6)
9		SPARK PLUG, (Prestolite 18-3) (severe service)* (6)
9		SPARK PLUG, (Champion D-6) (extreme severe service)* (6)
9		SPARK PLUG, (AC-C81) (extreme severe service)* (6)
9		SPARK PLUG, (Auto-Lite BT-3) (extreme severe service)* (6)
9		SPARK PLUG, (Prestolite 18-2) (extreme severe service)* (6)
10	37 762 H	GASKET, spark plug (6)
11	318 056 R91	CABLE, spark plug (No. 3 and 4) (2)
12		DISTRIBUTOR ASSEMBLY (for components see list of parts under details of "Distributor"
13	353 936 R2	GASKET, distributor
14	353 937 R1	CLAMP, distributor (2) 5/16 x 7/8" hex-hd cap SCREW (2) 5/16" lock WASHER (2)
15	370 535 R1	CLIP, coil to distributor cable (for use with COIL, 1115082)
	324 460 R1	RETAINER, spark plug wire (2)
	31 987 D	SPACER (For use with resistor Delco-Remy No. 1957154 only)

(*) - For Use With Gasoline And Combination Gas Or Gasoline Engines.
(%) - For Use With Natural Gas And Liquefied Petroleum Gas Engines.

SPARK PLUGS AND CABLES
(Magneto Ignition)
C-[illegible] 501 to 43020
C-[illegible] 501 to 56635



REF. NO.	I. H. PART NUMBER	DESCRIPTION
1		SPARK PLUG (Champion D-23) (light or moderate service) (*) (6)
1		SPARK PLUG (AC-88S com.) (light or moderate service) (*) (6)
1		SPARK PLUG (Auto-Lite BT-10) (light or moderate service) (*) (6)
1		SPARK PLUG (Champion D-16) (intermediate service) (*) (6)
1		SPARK PLUG (Champion 8 com.) (normal service) (*) (6)
1		SPARK PLUG (AC-85S) (normal service) (*) (6)
1		SPARK PLUG (Auto-Lite BT-8) (normal service) (*) (6)
1		SPARK PLUG (Champion 5 com.) (severe service) (*) (6)
1		SPARK PLUG (AC-83S com.) (severe service) (*) (6)
1		SPARK PLUG (Auto-Lite BT-4) (severe service) (*) (6)
1		SPARK PLUG (Champion 4 com.) (extreme severe service) (*) (6)
1		SPARK PLUG (AC-81S com.) (extreme severe service) (*) (6)

SPARK PLUGS AND CABLES - CONTINUED
(Magneto Ignition)
C-221 501 to 43020
C-263 501 to 56635

REF. NO.	I. H. PART NUMBER	DESCRIPTION
1		SPARK PLUG (Auto-Lite BT-3) (extreme severe service) (*) (6)
1		SPARK PLUG (B.G. Corp RB-485) (long life) (%) (6)
1		SPARK PLUG (Champion D-6) (long life) (%) (6)
1		SPARK PLUG (AC-C-81) (long life) (%) (6)
1		SPARK PLUG (Auto-Lite BT-3) (long life) (%) (6)
2	37 762 H	GASKET, spark plug (6)
3	310 964 R91	CABLE, magneto high tension (cylinder No. 1)
4	310 965 R91	CABLE, magneto high tension (cylinder No. 2)
5	310 966 R91	CABLE, magneto high tension (cylinder No. 3)
6	310 967 R91	CABLE, magneto high tension (cylinder No. 4)
7	310 968 R91	CABLE, magneto high tension (cylinder No. 5)
8	310 969 R91	CABLE, magneto high tension (cylinder No. 6)
9	308 579 R1	CLIP, spark plug cable (2) 5/16 x 5/8" hex-hd cap SCREW 5/16" lock WASHER

(*) - For Use With Gasoline And Combination Gas Or Gasoline Engines.
(%) - For Use With Natural Gas And Liquefied Petroleum Gas Engines.

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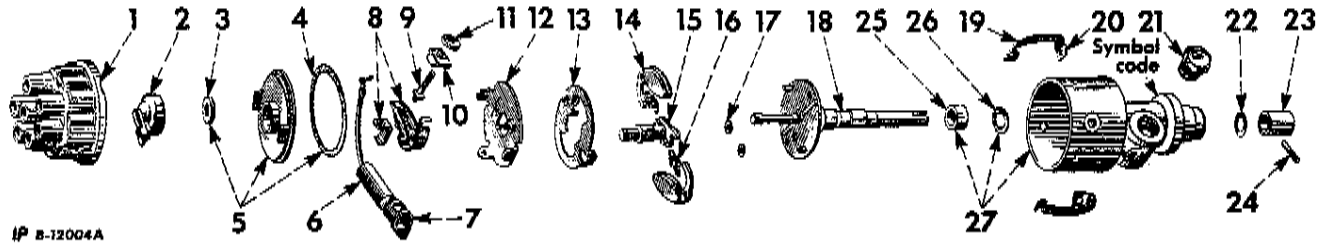
DISTRIBUTOR

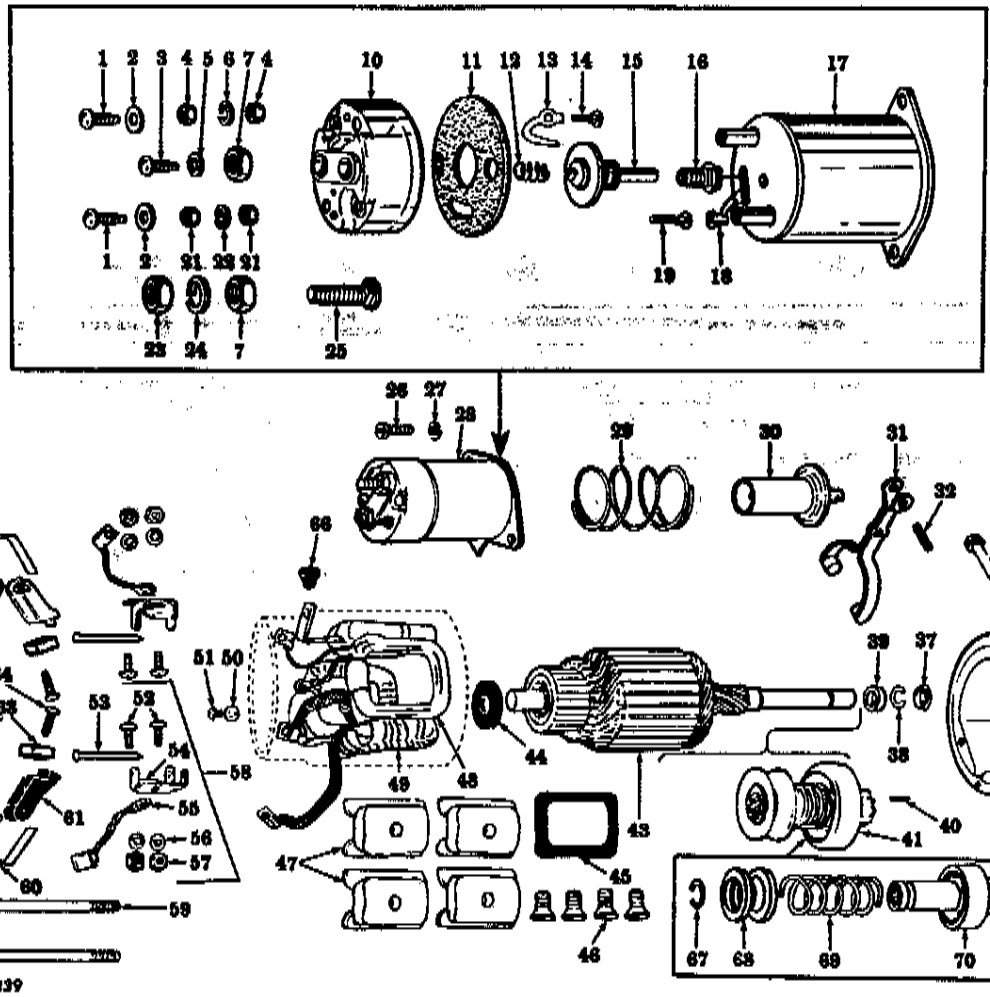


REF. NO.	I. H. PART NUMBER	DESCRIPTION
	367 839 R92	DISTRIBUTOR ASSY (order 372 867 R92) C-221 501 to 43020 C-263 501 to 56635
	372 867 R92	DISTRIBUTOR ASSY (will work for 367 839 R92) C-221 501 to 43020 C-263 501 to 56635
	383 177 R91	DISTRIBUTOR ASSY C-221 43021 Up
	388 592 R91	DISTRIBUTOR ASSY C-263 56636 Up
1	368 062 R91	CAP, distributor
2	353 896 R91	ROTOR, distributor
3	353 901 R2	SEAL, breaker cover felt
4	384 830 R1	GASKET, cover
5	384 831 R11	COVER w/SEAL, 353 901 R2 and GASKET, 384 830 R1, BREAKER
6	353 903 R92	CONDENSER
7	353 905 R1	CLAMP, condenser No. 8 x 3/16" slt-fil-hd. mach. SCREW No. 8 lock WASHER
8	353 172 R91	POINT SET, breaker arm and stationary (used with DISTRIBUTOR, 367 839 R92)
8	372 951 R91	POINT SET, breaker arm and stationary (used with DISTRIBUTOR, 372 867 R92, 383 177 R91 and 388 592 R91) No. 8 x 3/16" slt-pan-hd mach SCREW
	21 394 D	WASHER, stationary point terminal
9	353 907 R1	SCREW, terminal
10	353 906 R1	INSULATOR, spring anchor terminal
11	251 538 R1	WASHER, terminal insulating No. 8 type "F" NUT (3) No. 8 lock WASHER (3)
12	352 277 R11	PLATE, breaker (used with DISTRIBUTOR, 367 839 R92)
12	372 868 R11	PLATE, breaker (used with DISTRIBUTOR, 372 867 R92, 383 177 R91 and 388 592 R91) No. 8 x 3/8" rd-hd slt-mach SCREW No. 8 lock WASHER

DISTRIBUTOR — CONTINUED

REF. NO.	I. H. PART NUMBER	DESCRIPTION
13	353 920 R1	GUARD, governor weight No. 8 x 3/16" slt-fil-hd. mach. SCREW (2) No. 8 lock WASHER (2)
14	353 917 R91	ARM, weight (2)
15	356 192 R91	CAM
16	368 102 R91	SPRING, governor (set of two) (used with DISTRIBUTOR, 367 839 R92)
16	373 331 R91	SPRING, governor (set of two) (used with DISTRIBUTOR, 372 867 R92)
16	373 963 R91	SPRING, governor (set of two) (used with DISTRIBUTOR, 388 592 R91)
16	372 963 R91	SPRING, governor (set of two) (used with DISTRIBUTOR, 383 177 R91)
17	352 293 R1	SPACER, weight arm (4)
18	368 099 R91	SHAFT, distributor (used with DISTRIBUTOR, 367 839 R92 and 372 867 R92)
18	388 593 R91	SHAFT, distributor (used with DISTRIBUTOR, 388 592 R91)
18	383 178 R91	SHAFT, distributor (used with DISTRIBUTOR, 383 177 R91)
19	368 096 R1	SPRING, distributor cap (2)
20	353 895 R1	SUPPORT, distributor cap spring (2) No. 8 x 3/8" slt-rd-hd. mach. SCREW (2) No. 8 lock WASHER (2)
21	369 013 R1	PLUG, distributor housing (not used with TACHOURMETER ATTACMENT)
22	368 054 R1	WASHER, distributor thrust lower
23	368 053 R1	COLLAR, distributor shaft
24	354 552 R1	PIN, distributor shaft collar
25	368 057 R91	OIL SEAL, distributor shaft
26	368 055 R1	WASHER, distributor thrust upper
27	368 051 R11	HOUSING w/WASHER, 368 055 R1, and OIL SEAL, 368 057 R91, distributor
	125 947	PLUG, 1/8" slt-hdls. pipe
	355 460 R1	FELT, cam oil hole
	41 372 D	TUBE, of distributor grease

CRANKING MOTOR
(Delco-Remy)



REF. NO.	DELCO-REMY NUMBER	DESCRIPTION
	1107350	MOTOR ASSY, cranking 3/8" NUT No. 8 NUT No. 10NF NUT 3/8 x 1-1/4" hex-hd cap SCREW (3) 3/8" lock WASHER (3) 3/8" (cd or zn-pltd) lock WASHER No. 8 (cd or zn-pltd) lock WASHER No. 10 (cd or zn-pltd) lock WASHER
1		SCREW, No. 10NF x 7/16" slt-rd-hd (2)
2	1923935	WASHER, cover attaching screw (2)
3	1949653	SCREW, field lead attaching
4		NUT, No. 10NF ("R" terminal) (2)
5		WASHER, No. 10 internal lock
6	1946143	WASHER, lock
		NUT, 3/8" (2)

CRANKING MOTOR — Continued
(Delco-Remy)

REF. NO.	DELCO-REMY NUMBER	DESCRIPTION
10	1963525	COVER, switch
11	1950070	INSULATOR, cover
12	1853342	SPRING, contact return
13	1935645	CONTACT ("R" terminal)
14	1950069	STUD ("R" terminal) No. 10NF
15	1956226	CONTACT w/PUSH ROD
16	1950120	STUD, 3/8" terminal
17		Not Furnished Separately
18	1949538	CLIP ("S" terminal)
19	1950069	STUD ("S" terminal)
21		NUT, No. 10NF ("S" terminal) (2)
22	1946143	WASHER, lock

Always Give CRANKING MOTOR NUMBER When Ordering Parts.

ELECTRICAL SYSTEM

CRANKING MOTOR – Continued
(Delco-Remy)

REF. NO.	DELCO-REMY NUMBER	DESCRIPTION
23	1904419	NUT, 3/8" (2)
24		WASHER, 3/8" lock
25	1950061	STUD, 3/8" terminal
26		SCREW, 1/4 x 1/2" slt-rd-hd (2)
27		WASHER, 1/4" lock (2)
28	1114356	SWITCH ASSY
29	1958679	SPRING, plunger return
30	1953041	PLUNGER, solenoid switch
31	1932205	LEVER, shift
32	455106	PIN, shift lever
33	1932197	STUD, shift lever
34	1950306 1862383	HOUSING w/BUSHING, 1862383, drive BUSHING, drive end
35	1926640	NUT, shift lever stud
36		WASHER, 5/16" lock
37	1838568	COLLAR, drive end spacing
38	1928021	RING, pinion stop retainer snap (drive end)
39	1928022	COLLAR, pinion stop (drive end)
40	809593	PIN, dowel (drive end)
41	1946220	DRIVE ASSY, motor
43	1950307	ARMATURE
44	833602	WASHER, commutator end spacing
45	1927853	INSULATION, field coil (4)
46	1913960	SCREW, pole shoe (4)
47	1926616	SHOE, pole (4)
48	1935131	COIL, field shunt
49	1935128	COIL, field (3 coils)
50	1962276	WASHER, lock (center bearing attaching) (2)
51	132 900	SCREW, center bearing attaching (2)
52		SCREW, No. 11 x 1/2" slt-truss-hd (4)
53	1926600	PIN, support attaching (2)
54		SUPPORT (Not Furnished Separately)
55	1926605	LEAD, brush ground (2)
56		WASHER, No. 10 lock (4)
57		NUT, No. 10 (4)
58	1928015	KIT, brush holder support (2)
59	1939970	BOLT, thru (2)
60	1926622	SPRING, brush (2)
61	1926618	HOLDER, brush insulated (2)
62	1926617	HOLDER, brush ground (2)
63	1906945	BRUSH (4)

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ELECTRICAL SYSTEM

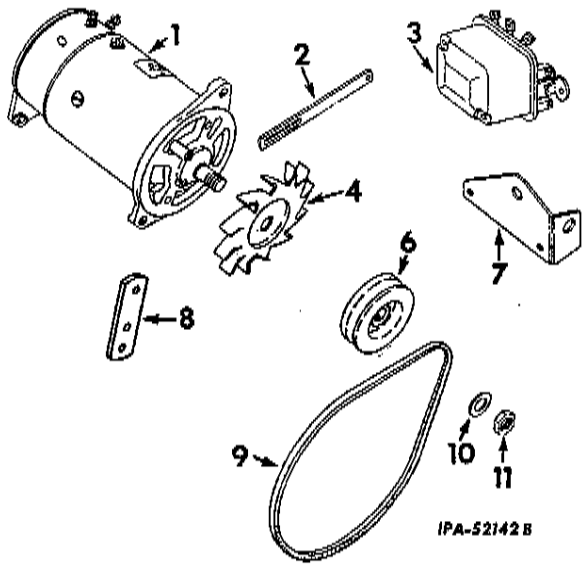
CRANKING MOTOR – Continued
(Delco-Remy)

REF. NO.	DELCO-REMY NUMBER	DESCRIPTION
64	1926648	SCREW, brush attaching (4)
65	1928966	FRAME, commutator end
66	1935168	GROMMET, lead (in field frame)
67	37521	RING, snap
68	1838436	COLLAR, motor drive
69	1931477	SPRING, motor drive
70		GEAR (Not Furnished Separately)
71	1873796	BUSHING, oilless
	820148	BUSHING, center bearing
	1952427	GASKET (between switch and housing)
	820149	PLATE, center bearing
	125947	PLUG, 1/8" pipe (drive end)
	821 453	WASHER (between center bearing and motor drive)
	1909560	WICK (drive end)

Always Give CRANKING MOTOR NUMBER When Ordering Parts.

ELECTRICAL SYSTEM

GENERATOR, VOLTAGE REGULATOR AND CONNECTIONS



REF. NO.	I. H. PART NUMBER	DESCRIPTION
1		GENERATOR ASSEMBLY (Delco-Remy No. 1102034) (12 volt) (for components see list of parts under details of "Generator") (*)
2	312 514 R1	BRACE, generator adjusting (*) 7/16 x 1-1/8" hex-hd cap SCREW 7/16" lock WASHER
2	312 068 R1 61 252 H	STRAP, generator adjusting (not *) SPACER, generator adjusting 7/16 x 3/4" hex-hd cap SCREW 7/16" lock WASHER
3		REGULATOR, voltage (Delco-Remy No. 1118999) (12 volt) (for components see list of parts under details of "Voltage Regulator") 1/4NF NUT (2) 1/4NF x 3/4" hex-hd cap SCREW (2) 1/4" lock WASHER (2)
4		FAN, generator (Delco-Remy No. 1944437)
6		PULLEY, generator (Delco-Remy No. 1946716)
7	315 722 R1	BRACKET, regulator (*) 1/2 x 1-3/8" hex-hd cap SCREW (2) 1/2" lock WASHER (2)
7	312 069 R1 277 006 R1	BRACKET, voltage regulator (not *) SPACER, voltage regulator 1/2 x 1-1/4" hex-hd cap SCREW 5/8 x 3/4" hex-hd cap SCREW 1/2" lock WASHER 5/8" lock WASHER
8	367 661 R1	BRACKET, generator (not *) 5/16 x 1" hex-hd cap SCREW (2) 5/16" lock WASHER (2)
8	318 024 R1	BRACKET, rear generator (*) 5/16 x 1" hex-hd cap SCREW 5/16" lock WASHER

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ELECTRICAL SYSTEM

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		GENERATOR, VOLTAGE REGULATOR AND CONNECTIONS — Continued
9	316 250 R1	BELT, water pump and generator fan (not *)
9	312 515 R1	BELT, fan (*)
10		WASHER, generator drive shaft lock
11		NUT, generator drive shaft
	318 434 R91	ATTACHMENT, generator and regulator (for use with hydraulic pump) (see NOTES 1 and 3) (Consists of - 1 BRACKET 315 722 R1 1 BRACE 312 514 R1 1 BRACKET 318 024 R1 1 CLIP 263 515 R1 1 FAN 312 515 R91 1 FAN (Delco-Remy No. 1944437) 1 GENERATOR (Delco-Remy No. 1102034) 1 HARNESS 265 191 R91 1 PULLEY (Delco-Remy No. 1946716) 1 REGULATOR (Delco-Remy No. 1118999)
	263 515 R91	CLIP, harness
	265 191 R91	HARNESS, generator to regulator

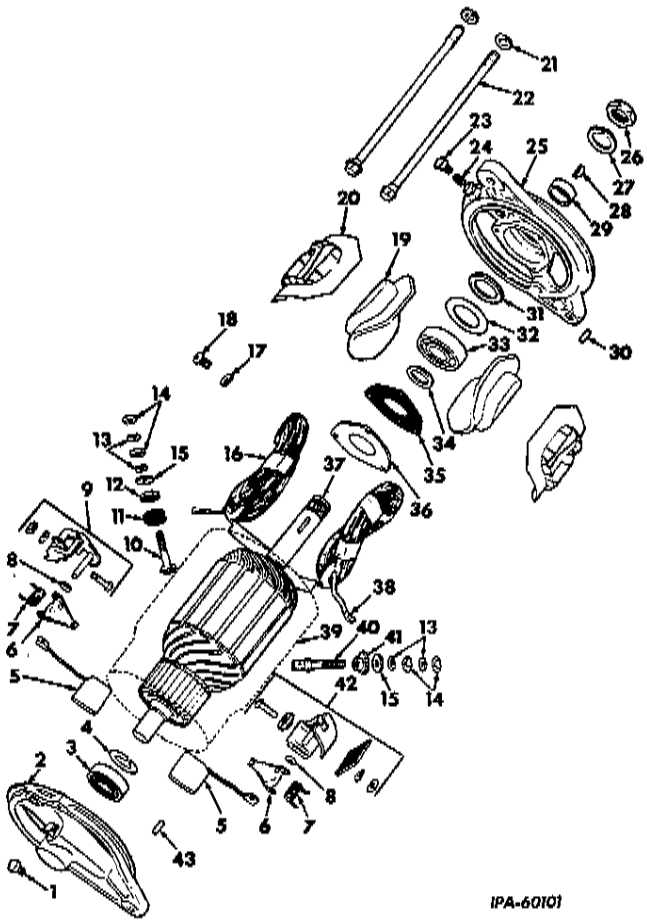
(*) - Used On Units Equipped With Hydraulic Pump.

NOTE 1 - Factory Application - Order On Machine Order Form.

NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

ELECTRICAL SYSTEM

GENERATOR
(Part of ATTACHMENT, 318 434 R91)
(Delco-Remy) (12 Volt) (Used with Hydraulic Pump)



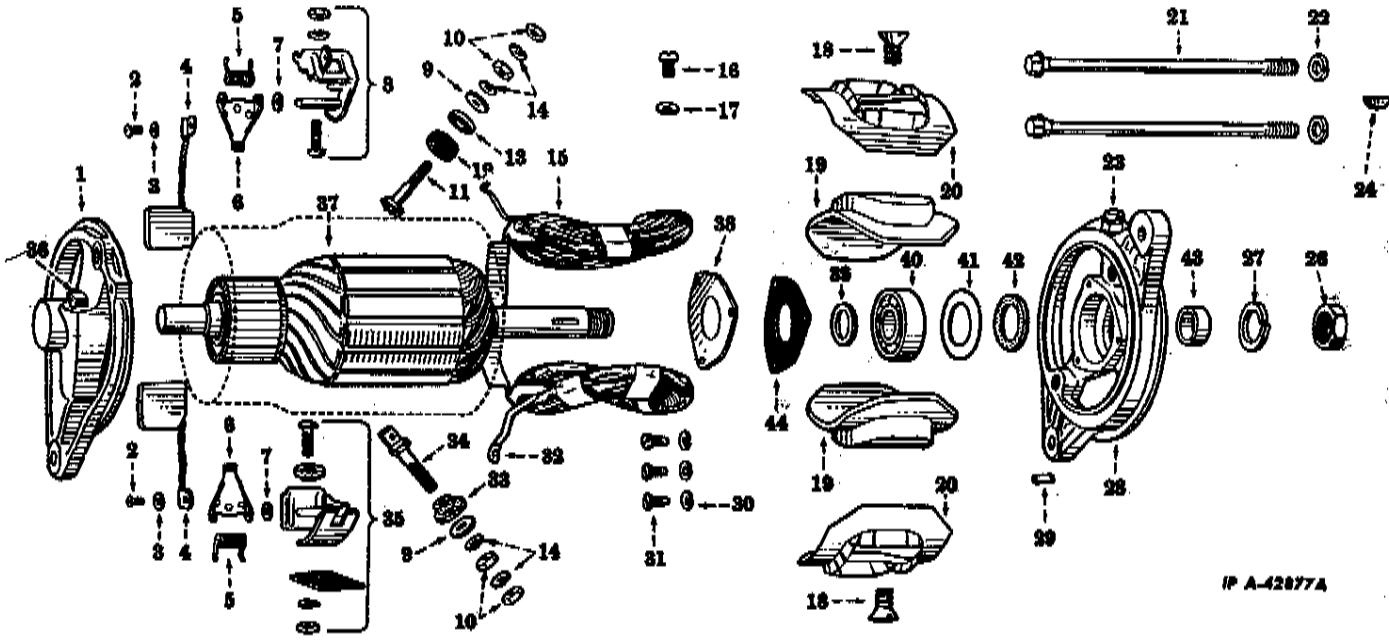
REF. NO.	DELCO-REMY NUMBER	DESCRIPTION
	1104034	GENERATOR ASSY (12 volt) 5/16" NUT 5/16 x 3/4" hex-hd cap SCREW 5/16 x 1" hex-hd cap SCREW 5/16 x 1-1/4" hex-hd cap SCREW 5/16" lock WASHER (3) 11/32 x 11/16" x 16 ga. WASHER (2)
1	125 609	OILER, commutator end
2	1925204	FRAME, commutator end
3	904751	BEARING, commutator end ball
4	1929959	RING, commutator end bearing
5	1923295	BRUSH (2)
	1904377	No. 6 x 1/4" rd-hd cap SCREW WASHER, lock
6	1978183	ARM, brush (2)
7	1908829	SPRING, brush (2)
8	1857414	WASHER, space (2)

ELECTRICAL SYSTEM

REF. NO.	DELCO-REMY NUMBER	DESCRIPTION
		GENERATOR – CONTINUED (Part of ATTACHMENT, 318 434 R91) (Delco-Remy) (12 Volt) (Used with Hydraulic Pump)
9	1966488	HOLDER, ground brush (package)
10	1921860	STUD, "F" terminal
11	1885090	BUSHING, insulating ("F" terminal)
12	1858753	WASHER, insulating ("F" terminal)
13	1904661	WASHER, terminal stud lock (4)
14		NUT, No. 12 (4)
15	1881409	WASHER, flat (2)
16	1922701	COIL, field
17		WASHER, 1/4" lock
18		SCREW, 1/4 x 3/8" fil-hd slt cap
19	1912725	SHOE, pole (2)
	1843646	SCREW, pole shoe (2)
20	1912073	INSULATOR, field coil
21		WASHER, 5/16" heavy lock (2)
22	809763	BOLT, thru
23	125609	OILER, drive end
24		NOT USED
25	1910404	FRAME, drive end
26	806915	NUT, drive end hex.
27	804000	WASHER, drive end nut lock
28	124545	KEY, Woodruff, 1/8 x 5/8"
29	1858603	COLLAR, spacing
30	809593	PIN, drive end dowel
31	809961	WASHER, drive end felt
32	819104	PLATE, drive end felt retainer
33	954378	BEARING, drive end ball
34	809945	WASHER, drive end inner space
35	1912008	GASKET, bearing retainer
36	1911263	PLATE, bearing retainer, drive end
	1904370	SCREW, retainer plate
	1880781	WASHER, lock
37	1925210	ARMATURE
38	200382	CLIP, terminal to brush
39		CASE (Not Furnished Separately)
40	1921369	STUD ("A" terminal)
41	1921362	BUSHING, insulating ("A")
42	192289	HOLDER, insulated brush (package)
43	809062	PIN, commutator end dowel

Always Give GENERATOR NUMBER When Ordering Parts.

ENERATOR
to-Remy) (Not used with Hydraulic Pump)



REF. NO.	DELCO-REMY NUMBER	DESCRIPTION
		KEY TO UNITS
A -	1100305	GENERATOR ASSEMBLY (12 volt) (order Delco-Remy No. 1100374)
B -	1100374	GENERATOR ASSEMBLY (12 volt) (will work for Delco-Remy No. 1100305) 5/16" NUT 5/16 x 1" hex-hd cap SCREW 5/16 x 9/16" hex-hd cap SCREW 5/16 x 1-1/8" hex-hd cap SCREW 11/32 x 11/16 x No. 16 ga. WASHER 5/16" lock WASHER (3)
		(X) - Letters of these units correspond with those shown following the description of the parts in the list below and identifies the unit for which the part is used. Items without letters after the description indicates the part is used for all units.
1	1939857	FRAME w/OILER, 125609, PIN and 809062, commutator end (Unit B)
1	1927451	FRAME w/OILER, 1880635, PIN, 809062, and WICK, 804080 (commutator end) (Unit A)
2	132688	SCREW, brush lead attaching (2)
3	1904377	WASHER, brush lead attaching lock (2)
4	1923295	BRUSH w/LEAD
5	1916324	SPRING, brush (2 for Unit A)
5	1908829	SPRING, brush (2 for Unit B)
6	1878183	ARM, brush (2)
7	1904368	WASHER, brush arm space (2 for Unit A)
7	1857412	WASHER, brush arm space (2 for Unit B)
8	1922288	HOLDER, ground brush

GENERATOR – CONTINUED
(Delco-Remy) (Not used with Hydraulic Pump)

REF. NO.	DELCO-REMY NUMBER	DESCRIPTION
9	1881409	WASHER, terminal stud plain (2)
10	121743	NUT, No. 12 terminal (4)
11	1921860	STUD, "F" terminal
12	1885090	BUSHING, "F" terminal insulating
13	1858753	WASHER, field terminal stud insulating
14	1904661	WASHER, terminal stud lock (4)
15	1923625	COIL w/CLIP, 200382, field (Unit A)
15	1953879	COIL w/CLIP, 200382, field (Unit B)
16	225577	SCREW, field frame ground (Unit B)
17	120380	WASHER, field frame ground lock (Unit B)
18	1843646	SCREW, pole shoe (2)
19	1914618	SHOE, pole (2)
20	1914491	INSULATOR, field coil (2)
21	815018	BOLT, thru (2)
22		WASHER, 5/16", thru bolt, lock
23	1880641	OILER (drive end)
24	124545	KEY, 1/8 x 5/8" (drive end) (Woodruff No. 5)
25		WASHER, 5/16", thru bolt lock
26	806915	NUT, shaft (drive end) (Unit A)
26	1911324	NUT, shaft (drive end) (Unit B)
27	804000	WASHER, shaft nut lock (drive end) (Unit A)
27	1888439	WASHER, shaft nut lock (drive end) (Unit B)

Always Give GENERATOR NUMBER When Ordering Parts.

REF. NO.	DELCO-RÉMY NUMBER	DESCRIPTION
		GENERATOR – Continued (Delco-Remy) (Not used with Hydraulic Pump)
28	1910404	FRAME w/OILER, 1880641 (drive end) (Unit A)
28	1871693	FRAME w/OILER, 1880641 (drive end) (Unit B)
29	809593	PIN, dowel (drive end)
30	1880781	WASHER, retainer plate lock (3)
31	1904370	SCREW, retainer plate (3)
32	200382	CLIP, terminal (to brush)
33	1921362	BUSHING, "A" terminal insulating
34	1921369	STUD, "A" terminal
35	1922289	HOLDER, insulated brush
36	1880635	OILER (commutator end) (Unit A)
36	125609	OILER (commutator end) (Unit B)
37	1946903	ARMATURE
37	817807	ARMATURE
38	1911263	PLATE, retainer (drive end)
39	809945	WASHER, inside space (drive end)
40	954378	BEARING, ball (drive end)
41	819104	PLATE, felt retainer (drive end)
42	809961	WASHER, felt (drive end)
43	1858603	COLLAR, space (drive end)
44	1912008	GASKET, bearing retainer
	904751	BEARING, ball (commutator end) (Unit B)
	1927448	CUP, felt retainer (commutator end) (Unit A)
	1948326	PLUG, bearing well (commutator end) (Unit B)
	809062	PIN, dowel (commutator end)
	1929959	RING, bearing clamp (commutator end) (Unit B)
	1927447	WASHER, felt (commutator end) (Unit A)
	804080	WICK, oil (commutator end) (Unit A)
	823551	WICK, oil (drive end)

VOLTAGE REGULATOR
(Delco-Remy)
Part of ATTACHMENT, 318 434 R91)
(For use with Negative Grounded Battery)

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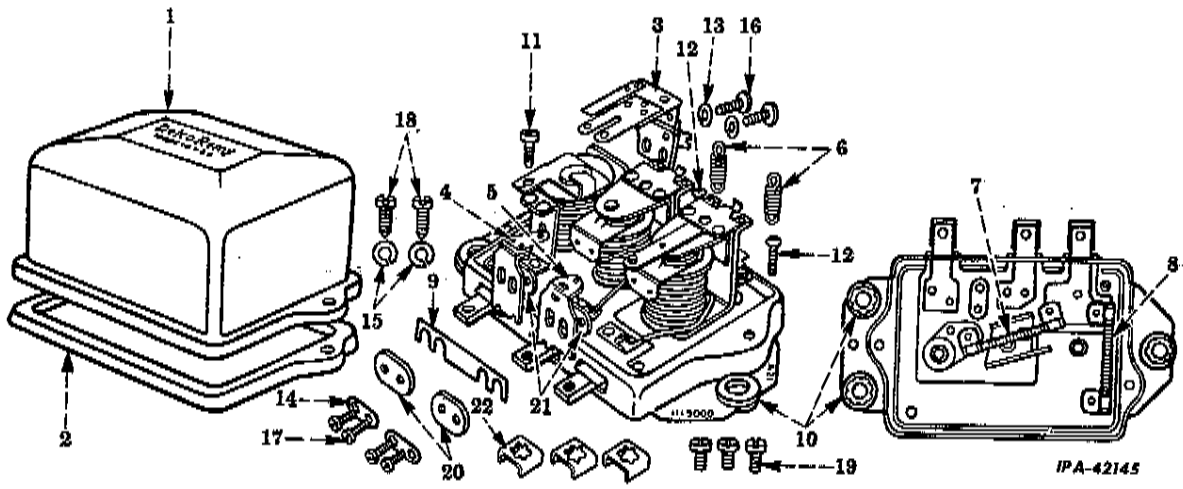
ELECTRICAL SYSTEM

VOLTAGE REGULATOR – CONTINUED
(Delco-Remy)
(Part of ATTACHMENT, 318 434 R91)
(For use with Negative Grounded Battery)



REF. NO.	DELCO-REMY NUMBER	DESCRIPTION
	1118999	REGULATOR, voltage 1/4NF NUT (2) 1/4NF x 1/2" hex-hd cap SCREW (2) 1/4" lock WASHER (2)
	1927980	COVER
2	1953902	GASKET, cover
3	1939646	ARMATURE, relay
4		NOT USED
5	1878493	CONTACT and SUPPORT, voltage regulator
6	1912176	SPRING, regulator armature (2)
7		NOT USED
8	1910174	RESISTOR, "F" terminal to ground
9		NOT USED
10		NOT USED
11	1912159	SCREW, adjusting, relay armature
12	1944590	SCREW, regulator armature adjusting (2)
13		NOT USED
14	1878505	WASHER, regulator contact attaching screw lock (2)
15	1935031	WASHER, cover screw lock (2)
16	1924764	SCREW, relay armature attaching (2)
17	1878516	SCREW, regulator contact attaching (2)
18	1927982	SCREW, cover (2)
19	1864099	SCREW, terminal (3)
20	1922599	INSULATOR, regulator contact attaching screw (2)
21	1878507	WASHER, insulator regulator contact attaching screw (2)
22	1868137	CLAMP, terminal (3)

Always Give VOLTAGE REGULATOR NUMBER When Ordering Parts.

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ELECTRICAL SYSTEM

VOLTAGE REGULATOR
(Delco-Remy)
(For use with Positive Grounded Battery)

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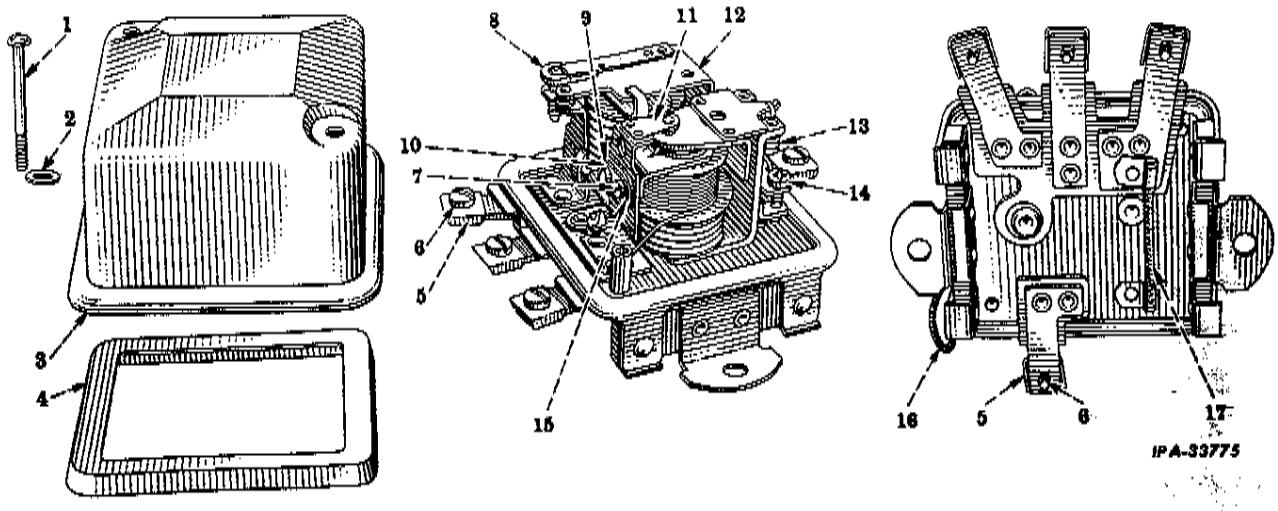
ELECTRICAL SYSTEM

VOLTAGE REGULATOR – CONTINUED
(Delco-Remy)
(For use with Positive Grounded Battery)



IPA-33775

REF. NO.	DELCO-REMY NUMBER	DESCRIPTION
	1118779	REGULATOR, voltage 1/4NF NUT (2) 1/4NF x 1/2" hex-hd cap SCREW (2) 1/4" lock WASHER (2)
1	1927982	SCREW, cover attaching (2)
2	1922996	WASHER, insulating cover attaching screw (2)
3	1927980	COVER
4	1927981	GASKET, cover
5	1868137	CLAMP, terminal (4)
6	1864099	SCREW, terminal (4)
7	1878516	SCREW, regulator contact attaching (2)
8	1912159	SCREW, adjusting relay armature
9	1878507	WASHER, insulating regulator contact attaching screw (2)
10	1878505	WASHER, regulator contact attaching screw lock
11	1878517	CONTACT and SUPPORT, regulator
12	1878780 454431 1904377	ARMATURE, relay SCREW, relay armature (2) WASHER, relay armature attaching screw lock (2)
13	1912176	SPRING, regulator armature
14	1922408	SCREW, regulator armature adjusting
15	1922599	INSULATOR, regulator contact attaching screw
16	1927975	LEAD, ground
17	1910174	RESISTOR, "F" terminal to ground

Always give VOLTAGE REGULATOR NUMBER When Ordering Parts.

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CTRIC WIRING
ery Ignition) (For units equipped with Instrument Panel
chment 305 191 R91 or Automatic Shut-Off Attachment
305 198 R91)

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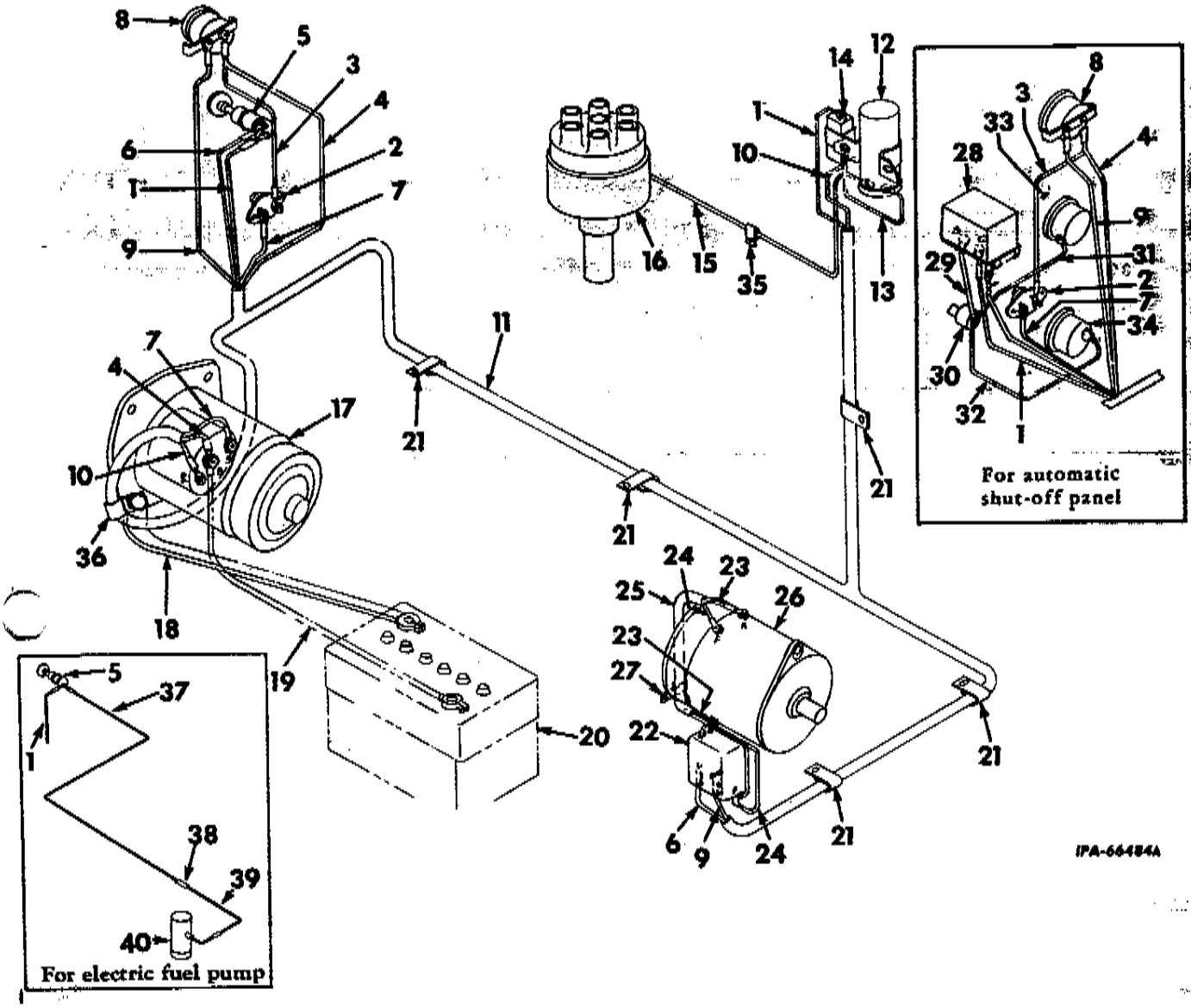
ELECTRICAL SYSTEM

ELECTRIC WIRING — Continued
(Battery Ignition) (For units equipped with Instrument Panel Attachment 305 191 R91 or Automatic Shut-Off Attachment 305 198 R91)



REF. NO.	I. H. PART NUMBER	DESCRIPTION
1		CABLE, ignition switch to resistor (orange) (order 305 192 R91) (†)
1		CABLE, "C" on relay to resistor (orange) (order 305 192 R91) (‡)
2	366 317 R91	SWITCH, starting (†) (‡) No. 10NF NUT (2) No. 10NF x 7/16" slt-rd-hd SCREW (2) No. 10 lock WASHER (2)
3		CABLE, minus (-) on ammeter to starting switch (positive ground) or plus (+) on ammeter to starting switch (negative ground) (red) (order 305 192 R91) (†) (‡)

REF. NO.	I. H. PART NUMBER	DESCRIPTION
4		CABLE, minus (-) on ammeter to "B" on solenoid (positive ground) or plus (+) on ammeter to "B" on solenoid (negative ground) (red) (order 305 192 R91) (†) (‡)
5	62 801 DC	SWITCH, ignition (†)
6		CABLE, ignition switch to "L" on voltage regulator (yellow) (order 305 192 R91) (†)
6		CABLE, "B" on relay to "L" on voltage regulator (yellow) (order 305 192 R91) (‡)
7		CABLE, starting switch to "S" on solenoid (green) (order 305 192 R91) (†) (‡)

ELECTRICAL SYSTEM

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		ELECTRIC WIRING — CONTINUED (Battery Ignition) (For units equipped with Instrument Panel Attachment 305 191 R91 or Automatic Shut-Off Attachment 305 198 R91)
8	269 103 R91	AMMETER (†) (‡)
9		CABLE, positive (+) on ammeter to "B" on voltage regulator (positive ground) or minus (-) on ammeter to "B" on voltage regulator (negative ground) (blue) (order 305 192 R91) (†) (‡)
10		CABLE, "R" on solenoid to resistor (brown) (order 305 192 R91) (†) (‡)
11	305 192 R91	HARNESS, cable (†) (‡)
12	165 518 R91	COIL, ignition (also illustrated with "Spark Plugs, Coil Cables and Distributor")
13	370 594 R91	CABLE, minus (-) on coil to resistor (positive ground) or plus (+) on coil to resistor (negative ground) (also listed with "Spark Plugs, Coil, Cables and Distributor")
14		RESISTOR (also listed with "Spark Plugs", Coil Cables and Distributor")
15	368 267 R91	CABLE, plus (+) on coil to distributor (positive ground) or minus (-) on coil to distributor (negative ground) (also listed with "Spark Plugs, Coil, Cables and Distributor")
16		DISTRIBUTOR, assembly (for components see list of parts under details of "Distributor")
17		MOTOR, cranking (for components see list of parts under details of "Cranking Motor")
18		CABLE, battery to ground (not furnished with power unit) (See "Battery and Cables")
19		CABLE, battery to cranking motor (not furnished with power unit) (See "Battery and Cables")
20		BATTERY (12 volt) - dry charged (not furnished with power unit) (See "Battery and Cables")
21	264 164 R91	CLIP, cable (‡) (†) (2)
22		REGULATOR, voltage (for components see list of parts under details of "Voltage Regulator")
23		CABLE, generator "A" to "Gen" on voltage regulator (red w/black tracer) (order 264 637 R93)
24		CABLE, generator "F" to "F" on voltage regulator (black w/red tracer) (order 264 637 R93)
25	265 191 R91	HARNESS, generator to regulator cable (*)
25	264 637 R93	HARNESS, generator to regulator cable (not *)
26		GENERATOR (for components see list of parts under details of "Generator")
27	263 515 R91	CLIP, generator cable
28	265 470 R91	RELAY (‡)

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ELECTRICAL SYSTEM

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		ELECTRIC WIRING — CONTINUED (Battery Ignition) (For units equipped with Instrument Panel Attachment 305 191 R91 or Automatic Shut-Off Attachment 305 198 R91)
29		CABLE, "S" on relay to stop switch (furnished as part of SWITCH, 265 471 R91)
30	265 471 R91	SWITCH, stop (‡)
31		CABLE, stop switch to oil pressure indicator (furnished as part of 268 542 R91)
32		CABLE, stop switch to water temperature gauge (furnished as part of 256 502 R91)
33	268 542 R91	INDICATOR w/WIRE, oil pressure (‡)
34	256 502 R91	INDICATOR w/WIRE, water temperature (‡)
35	370 535 R1	CLIP, coil to distributor cable
36	362 120 R1	CLIP, cranking motor harness
37		CABLE, ignition switch to fuel pump (black) (**)
38		CONNECTOR (furnished as part of ignition switch to fuel pump cable) (**)
39		CABLE, fuel pump to connector (furnished as part of fuel pump) (**)
40		PUMP, fuel (for components see list of parts under details of "Electric Fuel Pump") (**)

(†) - Part Of Instrument Panel Attachment, 305 191 R91.
(‡) - Part Of Automatic Safety Shut-Off Attachment, 305 198 R91.
(*) - Used On Units Equipped With Hydraulic Pump.
(**) - Part Of Electric Fuel Pump Attachment 316 151 R91

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ELECTRIC WIRING
(Magneto Ignition) (For units equipped with Instrument Panel Attachments, 312 062 R91 and 312 063 R91 or Automatic Shut-Off Attachments, 312 059 R91 and 312 060 R91)
C-221 501 to 43020
C-263 501 to 56635

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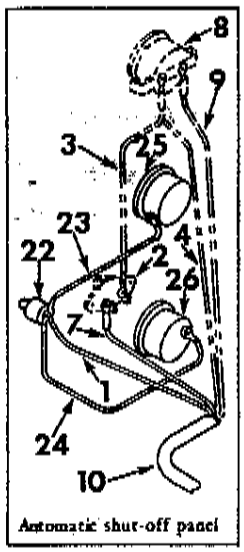
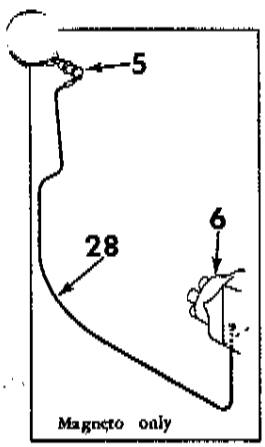
ELECTRICAL SYSTEM

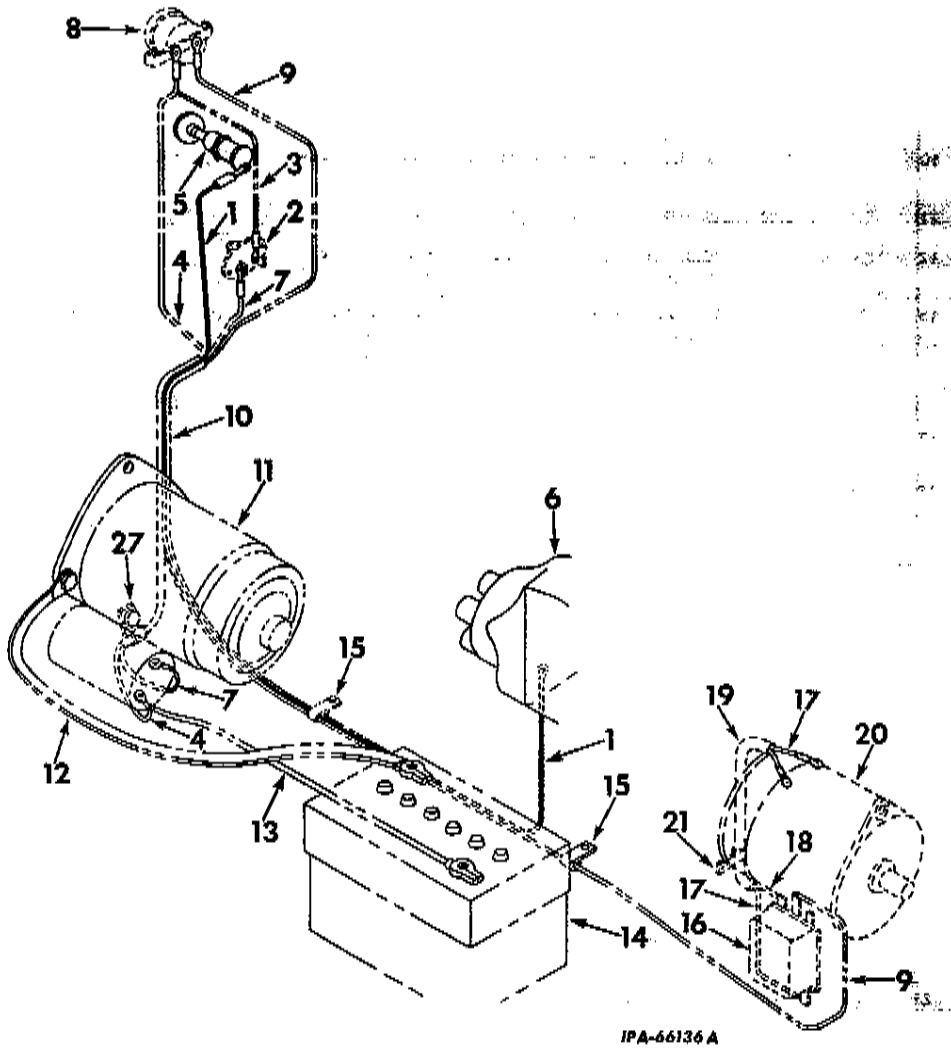
ELECTRIC WIRING — CONTINUED
(Magneto Ignition) (For units equipped with Instrument Panel Attachments, 312 062 R91 and 312 063 R91 or Automatic Shut-Off Attachments, 312 059 R91 and 312 060 R91)
C-221 501 to 43020
C-263 501 to 56635



Automatic shut-off panel



Magneto only



IPA-66136A

REF. NO.	I. H. PART NUMBER	DESCRIPTION
1		CABLE, ignition switch to magneto (orange) (order 312 061 R91) (+)
1		CABLE, stop switch to magneto (orange) (order 312 061 R91) (*)
2	366 317 R91	SWITCH, starting (+) (*)
3		CABLE, minus (-) on ammeter to starting switch (positive ground) or positive (+) on ammeter to starting switch (negative ground) (red) (order 312 061 R91) (+) (*)
4		CABLE, minus (-) on ammeter to "B" on solenoid (positive ground) or positive (+) on ammeter to "B" on solenoid (negative ground) (red) (order 312 061 R91) (+) (*)

REF. NO.	I. H. PART NUMBER	DESCRIPTION
5	54 207 DB	SWITCH, magneto (*)
6	310 962 R91	MAGNETO (American Bosch MRD-6A30Z) high tension (medium duty - tungsten points) (for components see list of parts under details of "Magneto")
6	310 963 R91	MAGNETO (American Bosch MRF-6A30Z) (high tension) (heavy duty - tungsten points) (for components see list of parts under details of "Magneto")

(+) - Part Of Instrument Panel Attachments 312 062 R91 And 312 063 R91.
(*) - Part Of Automatic Safety Shut-off Attachments 312 059 R91 and 312 060 R91.

ELECTRICAL SYSTEM

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		ELECTRIC WIRING – Continued (Magneto Ignition) (For units equipped with Instrument Panel Attachments 312 062 R91 and 312 063 R91 or Automatic Shut-Off Attachments 312 059 R91 and 312 060 R91) C-221 501 to 43020 C-263 501 to 56635
6	313 698 R91	MAGNETO (American Bosch MRF-6A33Z) (high tension) (heavy duty-platinum points) (for components see list of parts under details of "Magneto")
7		CABLE, starting switch to "S" on solenoid (green) (order 312 061 R91 (+) (*)
8	269 103 R91	AMMETER (+) (*)
9		CABLE, positive (+) on ammeter to "B" on voltage regulator (positive ground) (or negative (-) on ammeter to "B" on voltage regulator (negative ground) (blue) (order 312 061 R91) (+) (*)
10	312 061 R91	HARNESS, cable (used with Electric Starting) (+) (*)
11		MOTOR, cranking (for components see list of parts under details of "Cranking Motor")
12		CABLE, battery to ground (not furnished with power unit) (See "Battery and Cables")
13		CABLE, battery to cranking motor (not furnished with power unit) (See "Battery and Cables")
14		BATTERY (12 volt) - dry charged (not furnished with power unit) (See "Battery and Cables")
15	264 164 R91	CLIP, cable (+) (*) (2)
16		REGULATOR, voltage (for components see list of parts under details of "Voltage Regulator")
17		CABLE, generator "A" to "GEN" on voltage regulator (red w/black tracer) (order 264 637 R93)
18		CABLE, generator "F" to "F" on voltage regulator (black w/red tracer) (order 264 637 R93)
19	264 637 R93	HARNESS, generator to regulator cable
20		GENERATOR (for components see list of parts under details of "Generator")
21	263 515 R91	CLIP, generator cable
22	265 471 R91	SWITCH, stop (*)
23		CABLE, stop switch to oil pressure indicator (furnished as part of 313 067 R91)
24		CABLE, stop switch to heat indicator (furnished as part of 265 468 R91)
25	313 067 R91	INDICATOR w/WIRE, oil pressure gauge (*)
26	265 468 R91	INDICATOR w/WIRE, heat gauge (*)
27	362 120 R1	CLIP, cable harness
28	62 862 D	CABLE, ignition switch to magneto (not used with electric starting)
	312 055 R1	ARM, idler pulley adjusting (also listed and illustrated with "Fan Belt, Idler Pulley and Arm") 3/8 x 1" hex-hd cap SCREW 13/32 x 13/16 x 1/16" ga WASHER 3/8" lock WASHER

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ELECTRICAL SYSTEM

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		ELECTRIC WIRING – Continued (Magneto Ignition) (For units equipped with Instrument Panel Attachments 312 062 R91 and 312 063 R91 or Automatic Shut-Off Attachments 312 059 R91 and 312 060 R91) C-221 501 to 43020 C-263 501 to 56635
ST 633		BEARING, idler pulley shaft (also listed and illustrated with "Fan Belt, Idler Pulley and Arm")
305 177 R1		BELT, water pump and generator fan (also listed and illustrated with "Fan Belt, Idler Pulley and Arm")
310 964 R91		CABLE, magneto high tension (cylinder No. 1) (also listed and illustrated with "Spark Plugs and Cables")
310 965 R91		CABLE, magneto high tension (cylinder No. 2) (also listed and illustrated with "Spark Plugs and Cables")
310 966 R91		CABLE, magneto high tension (cylinder No. 3) (also listed and illustrated with "Spark Plugs and Cables")
310 967 R91		CABLE, magneto high tension (cylinder No. 4) (also listed and illustrated with "Spark Plugs and Cables")
310 968 R91		CABLE, magneto high tension (cylinder No. 5) (also listed and illustrated with "Spark Plugs and Cables")
310 969 R91		CABLE, magneto high tension (cylinder No. 6) (also listed and illustrated with "Spark Plugs and Cables")
308 579 R1		CLIP, spark plug cable (also listed and illustrated with "Spark Plugs and Cables") (2) 5/16 x 5/8" hex-hd cap SCREW 5/16" lock WASHER
109 461		FITTING, 1/8" lubrication (Lincoln 5000) (optional with 138 322 H)
138 322 H		FITTING, 1/8" lubrication (Alemite 1610BL) (optional with 109 461)
353 936 RZ		GASKET, oil pump shaft support (also listed and illustrated with "Crankcase Oil Pan and Oil Pump")
312 051 R91		GAUGE, oil level
312 054 R1		PULLEY, idler (also listed and illustrated with "Fan Belt, Idler Pulley and Arm")
143 992		PLUG, 1/4" slt-hd pipe (also listed and illustrated with "Crankcase Oil Pan and Oil Pump")
133 502 R1		RING, snap (also listed and illustrated with "Fan Belt, Idler Pulley and Arm") (2)
312 056 R1		SUPPORT, idler pulley adjusting arm (also listed and illustrated with "Fan Belt, Idler Pulley and Arm") 13/32 x 13/16 x 1/16" ga WASHER (2)
312 157 R91		SUPPORT, oil pump shaft (also listed and illustrated with "Crankcase Oil Pan and Oil Pump")
312 052 R1		TUBE, oil filler
		SCREW, 5/16 x 1" hex-hd cap (at front cover WASHER, 5/16" lock

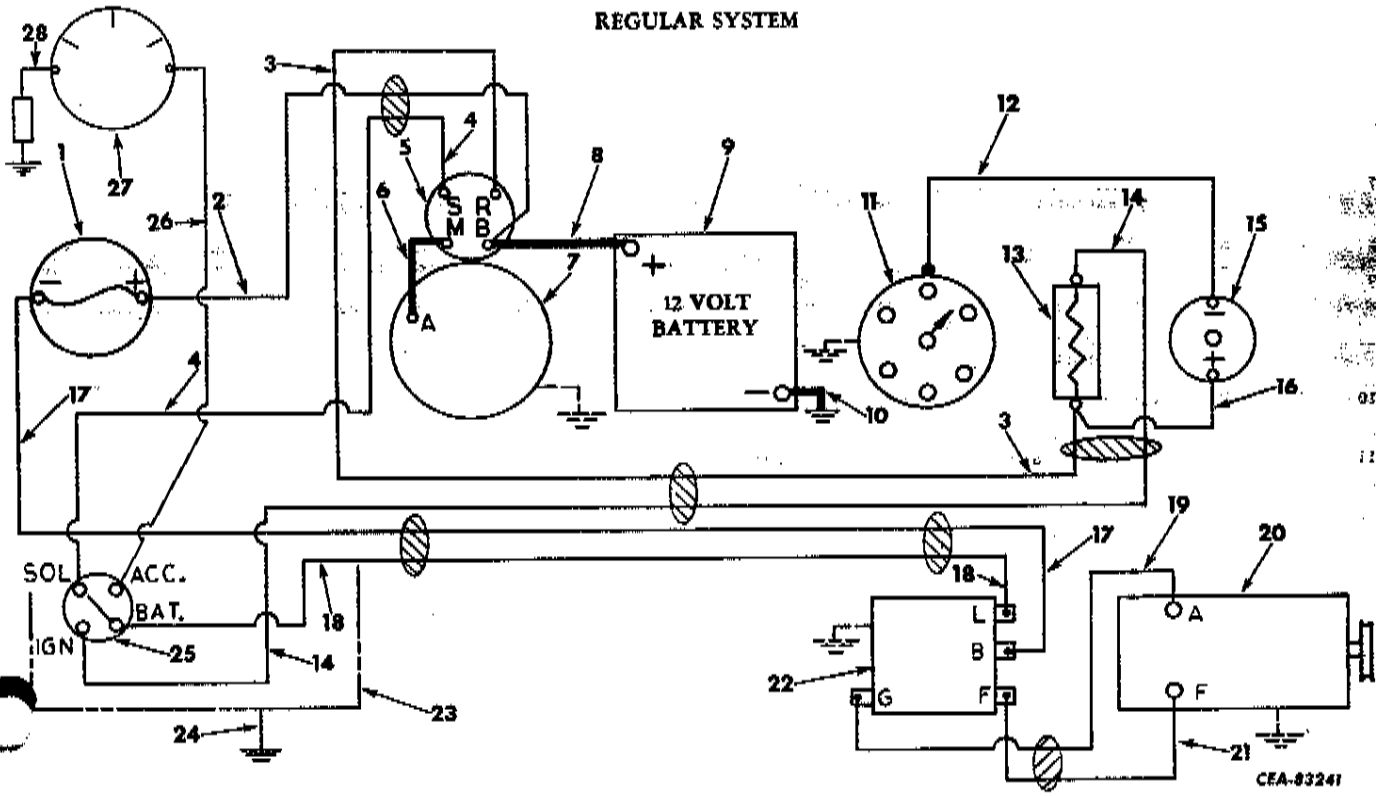
(+) - Part Of Instrument Panel Attachments 312 062 R91 And 312 063 R91.
(*) - Part Of Automatic Safety Shut-Off Attachments 312 059 R91 And 312 060 R91.

(REV. NO. 1 10-66)

ELECTRICAL SYSTEM

ELECTRIC WIRING
(Battery Ignition)
(For units with instruments and instrument panel (regular gauges)
Attachment, 349 132 R91)

REGULAR SYSTEM



CEA-83241

REF. NO.	I. H. PART NUMBER	DESCRIPTION
1	269 103 R91	AMMETER (part of ATTACHMENT, 349 132 R91)
2		CABLE, plus (+) on ammeter to "B" on solenoid (order 349 128 R91)
3		CABLE, "R" on solenoid to resistor (order 349 129 R91)
4		CABLE, "S" on solenoid to "SOL" on ignition and starter switch (order 349 128 R91)
5		SOLENOID (furnished as part of "Cranking Motor")
6		CONNECTOR, cranking motor to "M" on solenoid (furnished as part of "Cranking Motor")
7		MOTOR ASSY, cranking (for components see list of parts under details of "Cranking Motor")
8		CABLE, cranking motor to battery (not furnished with power unit) (See "Battery and Cables")
9		BATTERY (12 volt) (not furnished with power unit) (See "Battery and Cables")
10		CABLE, battery to ground (not furnished with power unit) (See "Battery and Cables")
		DISTRIBUTOR ASSY (for components see list of parts under details of "Distributor")

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ELECTRICAL SYSTEM

ELECTRIC WIRING — CONTINUED
(Battery Ignition)
(For units with instruments and instrument panel (regular gauges)
Attachment, 349 132 R91)

REF. NO.	I. H. PART NUMBER	DESCRIPTION
12		CABLE, minus on coil to distributor
13		RESISTOR, ignition coil (also listed and illustrated with "Spark Plugs, Coil, Cables and Distributor")
14		CABLE, resistor to "IGN" on ignition and starter switch (order 349 129 R91)
15		COIL w/CLAMP, ignition (also listed and illustrated with "Spark Plugs, Coil, Cables and Distributor")
16	370 594 R91	CABLE, plus (+) on coil to resistor (also listed and illustrated with "Spark Plugs, Coil, Cables and Distributor")
17		CABLE, "B" on regulator to minus (-) on ammeter (order 349 130 R91)
18		CABLE, "L" on regulator to "BAT" on ignition and starter switch (order 349 130 R91)
19		CABLE, "G" on regulator to "A" on generator (order 264 637 R93)
20		GENERATOR ASSY (for components see list of parts under details of "Generator")
21		CABLE, "F" on regulator to "F" on generator (order 264 637 R93)

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ELECTRICAL SYSTEM

REF. NO.	I.H. PART NUMBER	DESCRIPTION
		ELECTRIC WIRING – CONTINUED (Battery Ignition) (For units with isntruments and instrument panel (regular gauges) Attachment, 349 132 R91)
22		REGULATOR, voltage (12 volt) (for components see list of parts under details of "Voltage Regulator")
23	337 354 R3	PANEL, instrument (part of ATTACHMENT, 349 132 R91)
24		NOT USED
25	327 144 R91	SWITCH, ignition and starter (part of ATTACHMENT, 349 132 R91)
26		CABLE, tachourmeter to "ACC" on ignition and starter switch (furnished as part of hourmenter or tachourment)
27	338 595 R91	TACHOURMETER (part of ATTACHMENT. 349 134 R92)
27——		HOURMETER, electric (part of ATTACHMENT, 349 136 R91)
28		CABLE, tachourmeter to ground (furnished as part of hourmeter or tachourmeter)
	349 128 R91	HARNESS, cranking motor cable (part of ATTACHMENT, 349 127 R91)
	349 129 R91	HARNESS, ignition cable (part of ATTACHMENT, 349 127 R91)
	349 130 R91	HARNESS, regulator cable (part of ATTCHMENT, 349 127 R91)
	264 637 R93	HARNESS, generator to regulator

MEMORANDA

ELECTRICAL SYSTEM

CTRIC WIRING
ery Ignition)
units with instruments and instrument panel (safety gauges)
Attachment, 349 133 R91)

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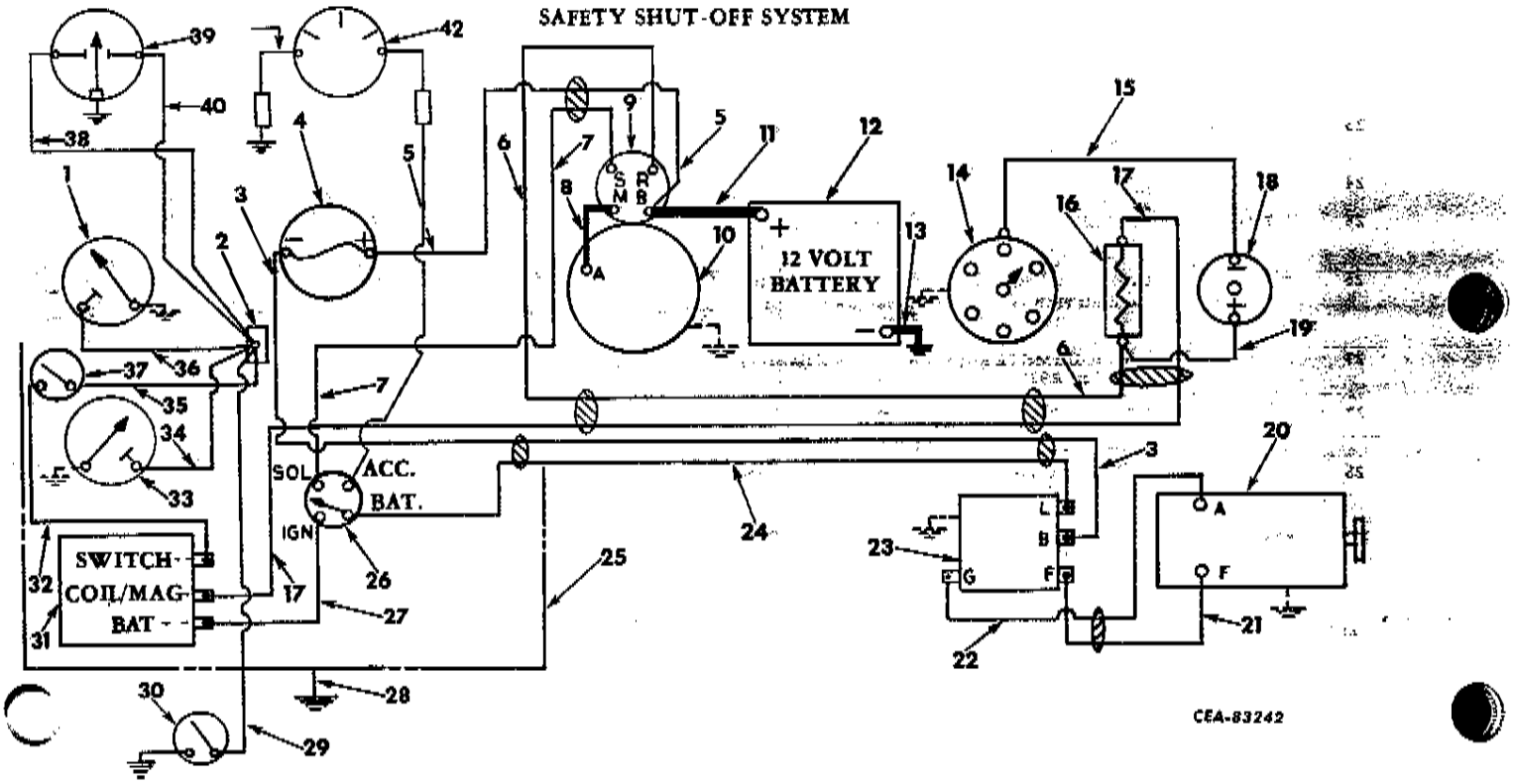
ELECTRICAL SYSTEM

ELECTRIC WIRING — Continued
(Battery Ignition)
(For units with instruments and instrument panel (safety gauges)
Attachment, 349 133 R91)



REF. NO.	I.H. PART NUMBER	DESCRIPTION
1	347 604 R91	INDICATOR, safety oil pressure (part of ATTACHMENT, 349 133 R91)
2	42 915 D	BLOCK, junction (part of ATTACHMENT, 349 133 R91)
2	42 917 D	BLOCK w/BLOCK, 42 915 D and BRACKET, 42 916 D, junction (optional with 352 110 R91) (part of ATTACHMENT, 349 133 R91)
2	352 110 R91	BLOCK w/BLOCK, 42 915 D and BRACKET, 42 916 D, junction (optional with 42 917 D) (part of ATTACHMENT, 349 133 R91) No. 8NF NUT (cd or zn-pltd) 3/8" NUT 3/8 x 1/2" hex-hd cap SCREW No. 8 int tooth lock WASHER 3/8" lock WASHER
3		CABLE, "B" on regulator to minus (-) on ammeter (order 349 130 R91)
4	269 103 R91	AMMETER (part of ATTACHMENT, 349 133 R91)
5		CABLE, plus (+) on ammeter to "B" on solenoid (order 349 128 R91)
		CABLE, "R" on solenoid to resistor (order 349 129 R91)

REF. NO.	I.H. PART NUMBER	DESCRIPTION
7		CABLE, "S" on solenoid to "SOL" on ignition and starter switch (order 349 128 R91)
8		CONNECTOR, cranking motor to "M" on solenoid (furnished as part of "Cranking Motor")
9		SOLENOID (furnished as part of "Cranking Motor")
10		MOTOR ASSY, cranking (for components see list of parts under details of "Cranking Motor")
11		CABLE, cranking motor to battery (not furnished with power unit) (See "Battery and Cables")
12		BATTERY (12 volt) (not furnished with power unit) (See "Battery and Cables")
13		CABLE, battery to ground (not furnished with power unit) (See "Battery and Cables")
14		DISTRIBUTOR ASSY (for components see list of parts under details of "Distributor")
15		CABLE, minus on coil to distributor
16		RESISTOR, ignition coil (also listed and illustrated with "Spark Plugs, Coil, Cables and Distributor")

ELECTRICAL SYSTEM

REF. NO.	I.H. PART NUMBER	DESCRIPTION
		ELECTRIC WIRING — CONTINUED (Battery Ignition) (For units with instruments and instrument panel (safety gauges) Attachment, 349 133 R91)
17		CABLE, resistor to "IGN" on ignition and starter switch (order 349 129 R91)
18		COIL w/CLAMP, ignition (also listed and illustrated with "Spark Plugs, Coil, Cables and Distributor")
19	370 594 R91	CABLE, plus (+) on coil to resistor (also listed and illustrated with "Spark Plugs, Coil, Cables and Distributor")
20		GENERATOR ASSY (for components see list of parts under details of "Generator")
21		CABLE, "F" on regulator to "F" on generator (order 264 637 R93)
22		CALBE, "G" on regulator to "A" on generator (order 264 637 R93)
23		REGULATOR, voltage (12 volt) (for components see list of parts under details of "Voltage Regulator")
24		CABLE, "L" on regulator to "BAT" on ignition and starter switch (order 349 130 R91)
25	337 354 R3	PANEL, instrument (part of ATTACHMENT, 349 133 R91)
26	327 144 R91	SWITCH, ignition and starter (part of ATTACHMENT, 349 133 R91)
27	63 713 DA	CABLE, "BAT" on relay to "IGN" on ignition and starter switch (part of ATTACHMENT, 349 133 R91)
28		NOT USED
29		NOT USED
30		NOT USED
31	606 069 C91	RELAY, automatic shut-off (part of ATTACHMENT, 349 133 R91)
32	274 747 R91	CABLE, safety control toggle switch to "Switch" on relay (part of ATTACHMENT, 349 133 R91)
33	347 602 R91	INDICATOR, safety heat (part of ATTACHMENT, 349 133 R91)
34		CABLE, heat indicator to junction block (order 347 602 R91)
35	274 747 R91	CABLE, safety control toggle switch to junction block (part of ATTACHMENT, 349 133 R91)

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ELECTRICAL SYSTEM

REF. NO.	I.H. PART NUMBER	DESCRIPTION
		ELECTRIC WIRING — CONTINUED (Battery Ignition) (For units with instruments and instrument panel (safety gauges) Attachment, 349 133 R91)
36		CABLE, safety oil pressure indicator to junction block (order 347 604 R91)
37	253 818 R91	SWITCH, safety control toggle (optional with 603 884 C91) (part of ATTACHMENT, 349 133 R91)
37	603 884 C91	SWITCH, safety control toggle (optional with 253 818 R91) (part of ATTACHMENT, 349 133 R91)
38		NOT USED
39		NOT USED
40		NOT USED
41		CABLE, tachourmeter to ground (furnished as part of hourmeter or tachourmeter)
42		TACHOURMETER (part of ATTACHMENT, 349 134 R92)
42		HOURMETER, electric (part of ATTACHMENT, 349 136 R91)
43		CABLE, tachourmeter to junction block (furnished as part of hourmeter or tachourmeter)
	42 916 D	BRACKET, junction block (part of ATTACHMENT, 349 133 R91) No. 10 NUT No. 10 x 1/2" slt-hd mach SCREW No. 10 lock WASHER
	264 637 R93	HARNESS, generator to regulator
	349 128 R91	HARNESS, cranking motor cable (part of ATTACHMENT, 349 127 R91)
	349 129 R91	HARNESS, ignition cable (part of ATTACHMENT, 349 127 R91)
	349 130 R91	HARNESS, regulator cable (part of ATTACHMENT, 349 127 R91)

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ELECTRICAL SYSTEM

MAGNETO
(Bosch) (High Tension)
C-221 501 to 43020
C-263 501 to 56635

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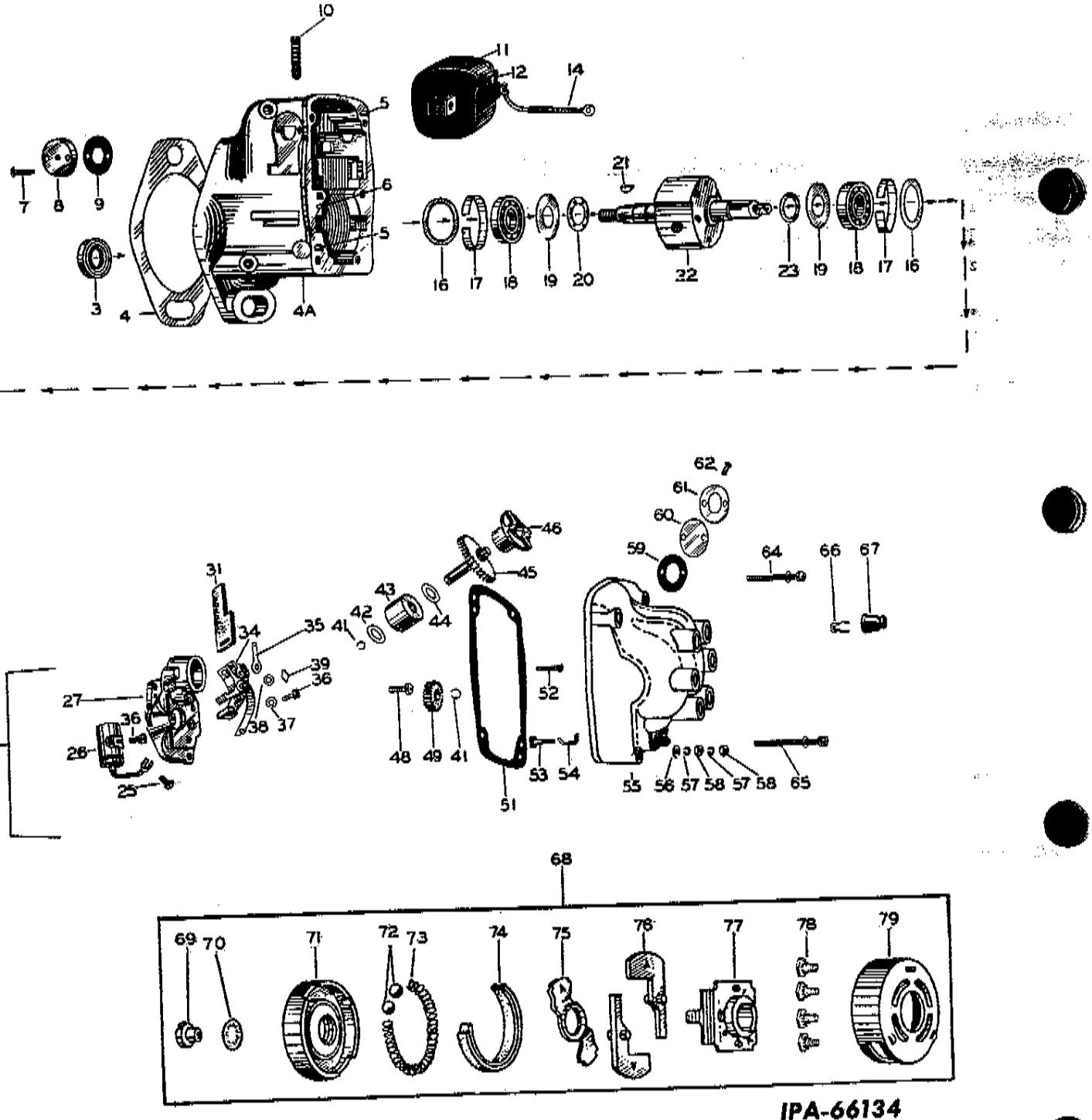
ELECTRICAL SYSTEM

MAGNETO
(Bosch) (High Tension)
C-221 501 to 43020
C-263 501 to 56635

MAGNETO — CONTINUED



IPA-66134

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ELECTRICAL SYSTEM

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		MAGNETO – Continued (Bosch) (High Tension) C-221 501 to 43020 C-263 501 to 56635
	310 962 R91	MAGNETO, high tension (Bosch MRD-6A-302) (Medium duty - tungsten points)
		3/8 x 1-3/8" hex-hd cap SCREW
		3/8 x 1-1/4" hex-hd cap SCREW
		3/8" lock WASHER (2)
	62 493 D	WASHER, magneto screw (2)
3		SEAL (NFS)
4		*GASKET
5		PIN (NFS)
6		PIN (NFS)
7		SCREW (NFS)
8		COVER (NFS)
9		*GASKET
10		SCREW (NFS)
11		COIL, includes Ref. No. 12 and 14 (NFS)
12		SPRING (NFS)
14		CABLE (NFS)
16		*WASHER
17		*STRIP
18		BEARING (NFS)
19		*WASHER
20		*WASHER
21		KEY (NFS)
22		ROTOR (NFS)
23		*WASHER (.012" thick)
23		*WASHER (.007" thick)
23		*WASHER (.004" thick)
23		*WASHER (.002" thick)
25		*SCREW and lock WASHER
26		*CONDENSER
27		PLATE (NFS)
31		WICK (NFS)
34		*BRACKET ASSEMBLY - includes Ref. No. 38 and 39
35		CLIP (NFS)
36		*SCREW and lock WASHER
37		*WASHER
38		*WASHER
39		*RING
41		*RING
42		WASHER (NFS)
43		BEARING (NFS)
44		WASHER (NFS)

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ELECTRICAL SYSTEM

REF. NO. | I. H. PART NUMBER | DESCRIPTION

MAGNETO – Continued (Bosch) (High Tension) C-221 501 to 43020 C-263 501 to 56635

45		GEAR (NFS)
46		ROTOR (NFS)
48		*SCREW and LOCKWASHER
49		*GEAR (NFS)
51		*GASKET
52		* BRUSH w/SPRING
53		STUD (NFS)
54		SPRING (NFS)
55		DISTRIBUTOR, plate assembly (includes Ref. Nos. 53, 54 and 56 to 62 (NFS)
56		WASHER (NFS)
57		WASHER (NFS)
58		NUT (NFS)
59		*GASKET
60		WINDOW (NFS)
61		WASHER (NFS)
62		SCREW (NFS)
64		*SCREW
65		*SCREW and lock WASHER
66		CLIP (NFS)
67		NIPPLE (NFS)
68		IMPULSE COUPLING ASSEMBLY - Includes Reference Nos. 69 to 79 (NFS)
69		NUT (NFS)
70		WASHER (NFS)
71		HOUSING (NFS)
72		BALL (NFS)
73		SPRING (NFS)
74		WICK (NFS)
75		CAM (NFS)
76		WEIGHT (NFS)
77		HUB (NFS)
78		SCREW and WASHER (NFS)
79		PLATE (NFS)
	317 835 R91	* PACKAGE, magneto field service

* - Furnished As Part Of Magneto Field Service Package 317 835 R91.
NFS - Not Furnished Separately.

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ELECTRICAL SYSTEM

GNETO
ch) (High Tension)
C-221 501 to 43020
C-263 501 to 56635

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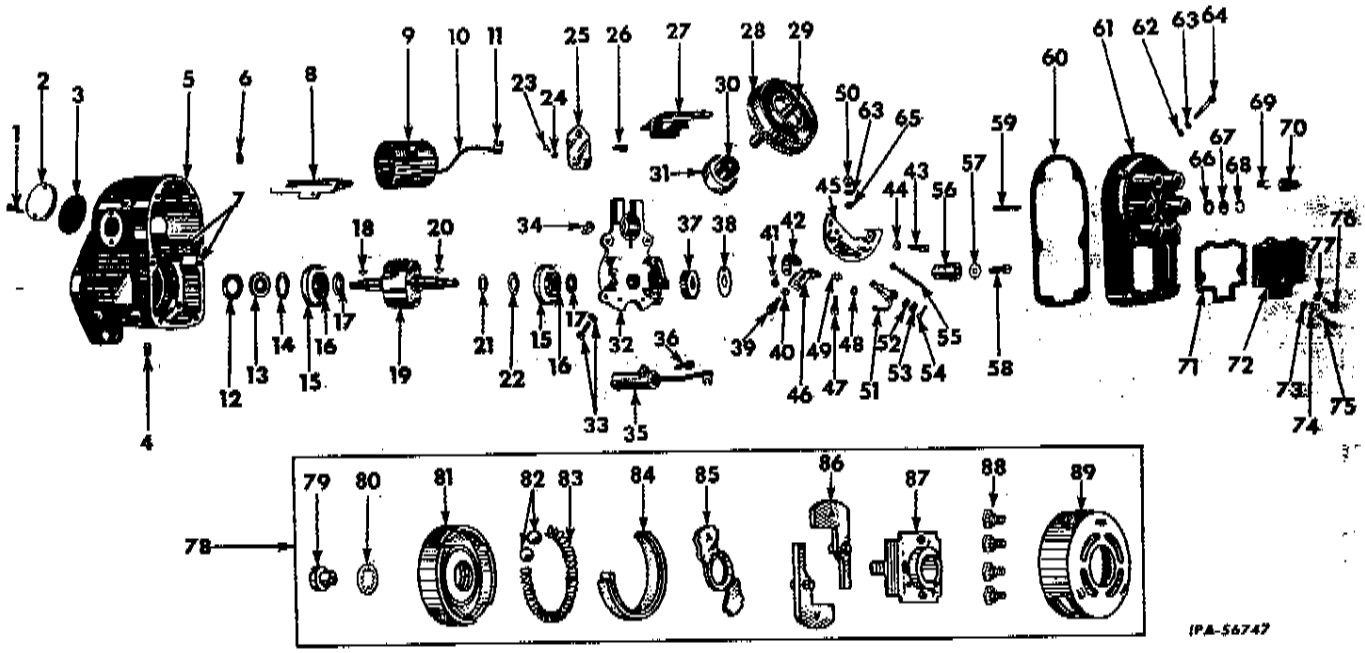
ELECTRICAL SYSTEM

MAGNETO – Continued
(Bosch) (High Tension)
C-221 501 to 43020
C-263 501 to 56635



REF. NO.	I. H. PART NUMBER	DESCRIPTION
	313 698 R91	MAGNETO, high tension (Bosch MRF-6A-332) (Heavy duty - platinum points)
	310 963 R91	MAGNETO, high tension (Bosch MRF-6A-302) (Heavy duty-tungsten points)
		3/8 x 1-3/8" hex-hd cap SCREW
		3/8 x 1-1/4" hex-hd cap SCREW
		3/8" lock WASHER (2)
	62 493 D	WASHER, magneto screw (2)
1		*SCREW and lock WASHER
2		COVER (NFS)
3		SCREW (NFS)
4		SCREW (NFS)
5		HOUSING (NFS)
6		SCREW (NFS)
7		PIN (NFS)
8		INSULATION (NFS)
9		COIL (NFS)
10		CABLE (NFS)
11		TERMINAL (NFS)
12		*WASHER
13		*SEAL
14		*WASHER
15		*STRIP (.009 thich)
15		*STRIP (.008 thick)
16		BEARING (NFS)
17		WASHER (NFS)

REF. NO.	I. H. PART NUMBER	DESCRIPTION
18		KEY (NFS)
19		ROTOR (NFS)
20		KEY (NFS)
21		*WASHER (.012" thick)
21		*WASHER (.007" thick)
21		*WASHER (.004" thick)
21		*WASHER (.002" thick)
22		*WASHER
23		SCREW (NFS)
24		WASHER (NFS)
25		INSULATION (NFS)
26		SCREW and lock WASHER (NFS)
27		CONDUCTOR (NFS)
28		GEAR AND ROTOR (NFS)
29		ROTOR (NFS)
30		BEARING (NFS)
31		SPACER (NFS)
32		BRACKET (NFS)
33		SCREW and lock WASHER (NFS)
34		CLIP (NFS)
35		*CONDENSER

* - Furnished As Part Of Magneto Field Service Package 317 834 R91.
NFS - Not Furnished Separately.

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ELECTRICAL SYSTEM

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		MAGNETO – Continued (Bosch) (High Tension) C-221 501 to 43020 C-263 501 to 56635
36		SCREW and lock WASHER (NFS)
37		GEAR (NFS)
38		WASHER (NFS)
39		SCREW and lock WASHER (NFS)
40		WASHER (NFS)
41		HOOK (NFS)
42		WICK (NFS)
43		SCREW and lock WASHER (NFS)
44		WASHER (NFS)
45		BREAKER PLATE (NFS)
46		*BRACKET
47		SCREW and lock WASHER (NFS)
48		WASHER (NFS)
49		WASHER (NFS)
50		NUT (NFS)
51		*LEVER
52		*WASHER
53		WASHER (NFS)
54		PIN (NFS)
55		*BRUSH
56		CAM (NFS)
57		WASHER (NFS)
58		SCREW w/lock WASHER (NFS)
59		*BRUSH w/SPRING
60		*GASKET
61		PLATE
62		*WASHER
63		*WASHER
64		*SCREW
65		WASHER
66		GASKET (NFS)
67		WINDOW (NFS)
68		RING (NFS)
69		TERMINAL (NFS)
70		NIPPLE (NFS)
71		*GASKET
72		CAP (NFS)
73		*WASHER
74		*WASHER
75		SCREW (NFS)
76		*SCREW

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ELECTRICAL SYSTEM

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		MAGNETO – Continued (Bosch) (High Tension) C-221 501 to 43020 C-263 501 to 56635
77		WASHER (NFS)
78		IMPULSE COUPLING ASSEMBLY - Includes Ref. Nos. 79 to 89 (NFS)
79		NUT (NFS)
80		WASHER (NFS)
81		HOUSING (NFS)
82		BALL (NFS)
83		SPRING (NFS)
84		WICK (NFS)
85		CAM (NFS)
86		WEIGHT (NFS)
87		HUB (NFS)
88		SCREW and WASHER (NFS)
89		PLATE (NFS)
		PLATE (NFS)
		PLATE (NFS)
		PLATE (NFS)
		*GASKET
	317 834 R91	*PACKAGE, magneto field service

* - Furnished as part of Magneto Field Service Package 317 834 R91.
NFS - Not Furnished Separately.

BATTERY AND CABLES

	BATTERY, dry-charged (12 volt) (Auto-Lite 12H-70-3)
356 062 R91	BOLT, battery terminal (X)
30 668 DB	CABLE, battery to cranking motor (positive grounded battery)
53 023 DA	CABLE, battery to cranking motor (negative grounded battery)
263 518 R91	CABLE, battery to ground (positive grounded battery)
30 668 DB	CABLE, battery to ground (negative grounded battery) 13/32 x 13/16 x No. 16 ga. WASHER 3/8" internal-external tooth lock WASHER

(X) - As Required.

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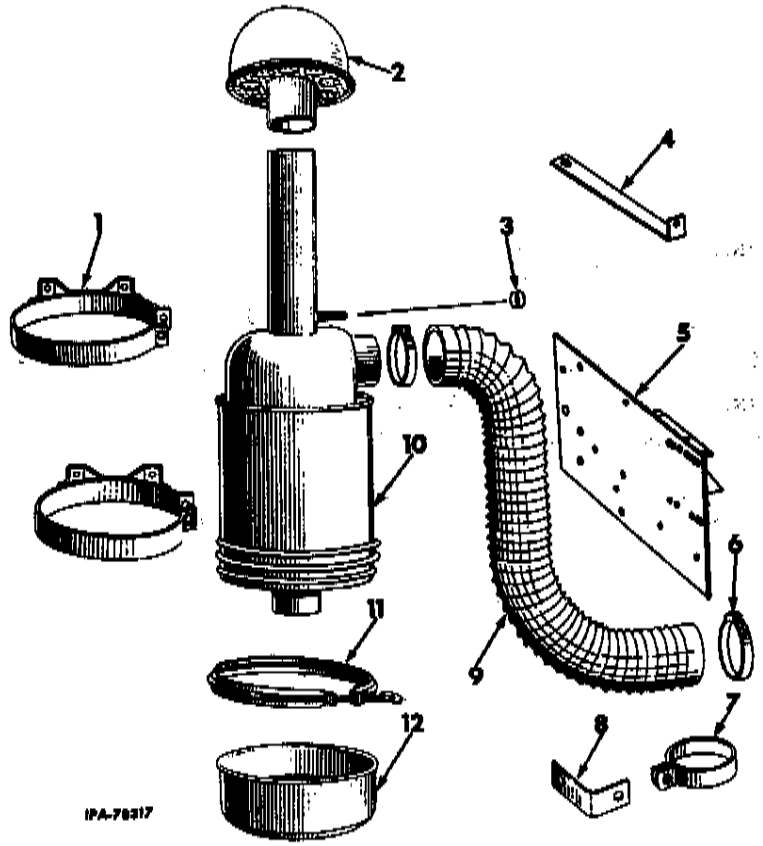
ATTACHMENTS

CLEANER
aldson) (Oil Bath Type)

ATTACHMENTS

AIR CLEANER — CONTINUED
(Donaldson) (Oil Bath Type)



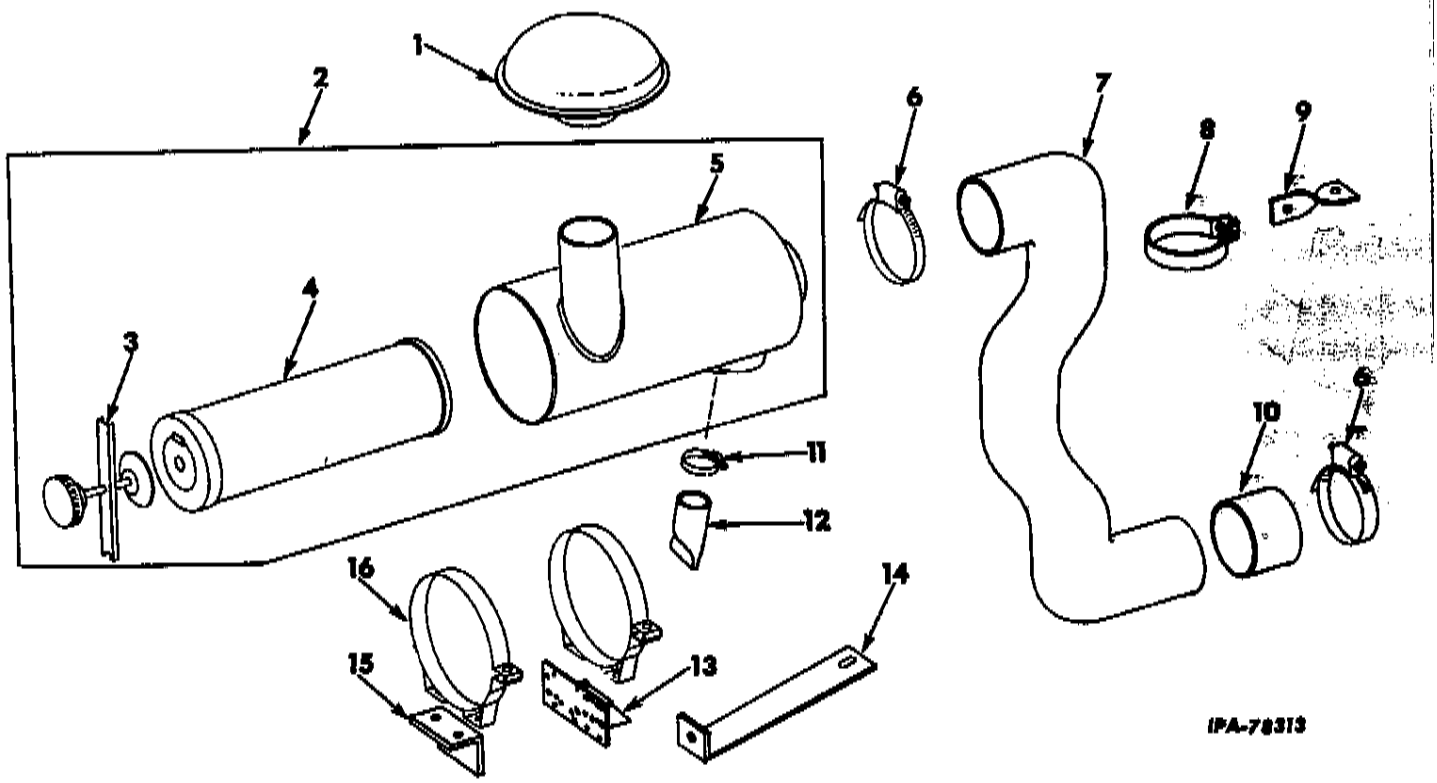
REF. NO.	I. H. PART NUMBER	DESCRIPTION
A -	305 180 R91	ATTACHMENT, air cleaner (*)
B -	349 144 R91	ATTACHMENT, air cleaner (see Notes 1 and 3)
		Parts without letters after the description indicates the part is used for all attachments listed below. Letters A and B are used to identify separate attachments.
1	55 804 DX	BRACKET, air cleaner (2 for Attachment A) 5/16" NUT (2) 3/8" NUT (4) 5/16 x 1-1/4" slt-fil-hd mach SCREW (2) 3/8 x 7/8" hex-hd cap SCREW 3/8 x 1-1/8" hex-hd cap SCREW 5/16" lock WASHER (2) 3/8" lock WASHER (4) 13/32 x 13/16" x 1/16" WASHER
1	55 804 DX	BRACKET, air cleaner (2 for attachment B) 3/8" NUT (4) 3/8 x 7/8" hex-hd cap SCREW (2) 3/8 x 1-1/8" hex-hd cap SCREW (2) 3/8" lock WASHER (4)
2	353 018 R92	CAP, air intake
3	265 331 R1	CAP, vent tube
4	318 140 R1	BRACE, air cleaner support (Attachment A)
4	349 141 R1	BRACE, air cleaner support (Attachment B) 3/8 x 3-1/4" hex-hd cap SCREW
	305 181 R13	SUPPORT, air cleaner (Attachment A)
	349 138 R91	SUPPORT, air cleaner (Attachment B)

REF. NO.	I. H. PART NUMBER	DESCRIPTION
6	274 088 R91	CLAMP, air pipe hose (2)
7	31 790 DA	BRACKET, air hose support 3/8" NUT 3/8 x 1" hex-hd cap SCREW 3/8" lock WASHER
8	305 886 R1	ANGLE, air hose support
9	305 885 R1	PIPE, air
10		BODY (Not Furnished Separately)
10	357 659 R92	CLEANER w/BODY, CLAMP, 54 269 D, CUP, 355 444 R92, ASSY, air (7") (FCAO7-1431) (Attachment A)
10	305 626 R91	CLEANER w/BODY, CLAMP, 54 269 D, CUP, 355 444 R92, ASSY, air (7") (FCAO7-1437) (Attachment B)
11	54 269 D	CLAMP, oil cup retaining (P-3009)
12	355 444 R92	CUP, oil (P-14844)

* - Attachment No Longer Available
Service Parts Only Will Be Furnished.
NOTE 1 - Factory Application - Order On Machine Order Form.
NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

ATTACHMENTS

AIR CLEANER AND CONNECTIONS
(United Specialties) (Dry type)



REF. NO.	I.H. PART NUMBER	DESCRIPTION
	349 137 R91	ATTACHMENT, air cleaner and connections (see NOTES 1 and 3)
1	353 018 R92	CAP, weather
2	338 887 R91	CLEANER, air
3	313 965 R91	RETAINER, air cleaner element (193B3K030)
4	317 702 R91	ELEMENT, air cleaner (250C4-S)
5		BODY, air cleaner (not Furnished Separately)
6	274 088 R91	CLAMP, air pipe (2)
7	347 598 R1	PIPE, air
8	112 030 H	CLAMP, air pipe support 3/8" NUT 3/8 x 1-1/8" hex-hd cap SCREW 3/8" lock WASHER
9	349 143 R1	SUPPORT, air pipe 3/8 x 3-1/4" hex-hd cap SCREW

ATTACHMENTS

AIR CLEANER AND CONNECTIONS — CONTINUED
(United Specialties) (Dry Type)

REF. NO.	I.H. PART NUMBER	DESCRIPTION
10	347 599 R1	SLEEVE, air pipe hose
11	122 316 R91	CLAMP, dust unloader
12	324 194 R1	UNLOADER, dust
13	349 138 R91	SUPPORT, air cleaner
14	349 141 R1	BRACE, air cleaner support 3/8 x 3-1/4" hex-hd cap SCREW
15	349 142 R1	BRACKET, air cleaner 3/8" NUT (4) 3/8 x 1" hex-hd cap SCREW (4) 3/8" lock WASHER (4)
16	341 373 R91	BRACKET, air cleaner mounting (2) 3/8" NUT (4) 3/8 x 3/4" hex-hd cap SCREW (4) 3/8" lock WASHER (4)
	Z 751 188 R1	PRODUCT GRAPHIC, decalcomania, air cleaner instruction

NOTE 1 - Factory Application - Order On Machine Order Form.
NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

MATIC SAFETY SHUT-OFF
hy Panel) (Not used on units equipped with Instruments
a anel Attachments 305 191 R91, 312 062 R91 and 312 063 R91)

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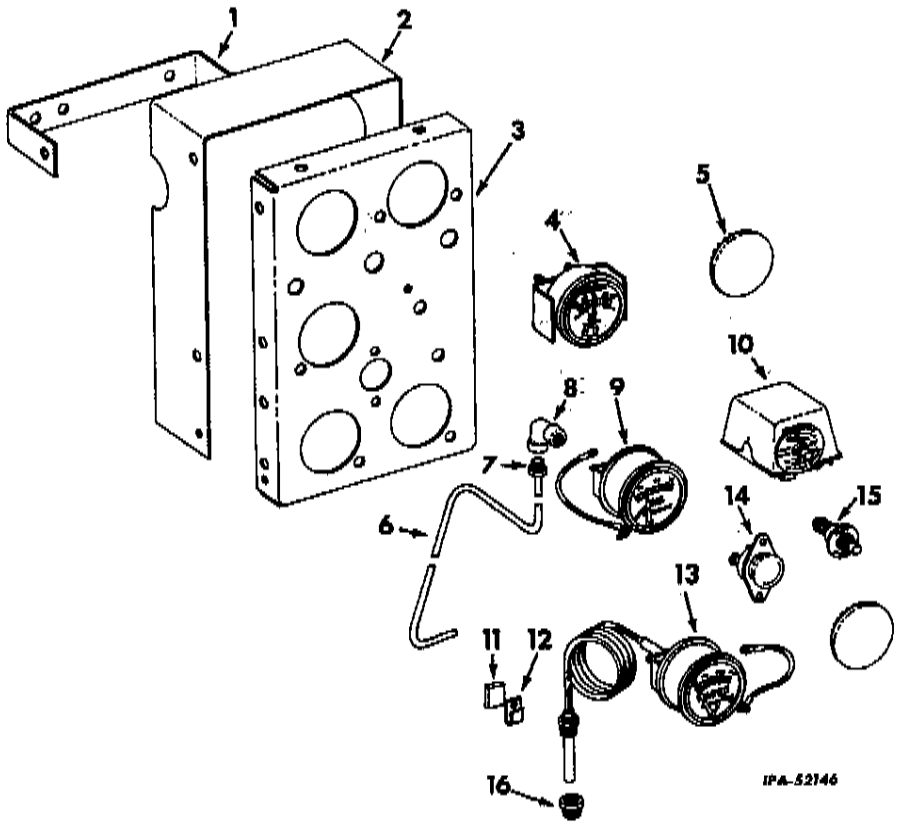
ATTACHMENTS

AUTOMATIC SAFETY SHUT-OFF - CONTINUED
(Murphy Panel) (Not used on units equipped with Instruments and panel attachments 305 191 R91, 312 062 R91 and 312 063 R91)



REF. NO.	I. H. PART NUMBER	DESCRIPTION
(X) - KEY TO UNITS		
A -	305 198 R91	ATTACHMENT, automatic safety shut-off (Murphy panel) (Battery ignition) (+)
B -	312 059 R91	ATTACHMENT, automatic safety shut-off (Murphy panel) (Magneto ignition) (For units equipped with Cranking Motor and Generator (+)
C -	312 060 R91	ATTACHMENT, automatic safety shut-off (Murphy panel) (Magneto ignition) (For units not equipped with Cranking Motor and Generator) (+)
(X) - Letters of these units correspond with those shown following the description of the parts in the list below and identifies the unit for which the part is used. Items without letters after the description indicates the part is used for all units.		
1	304 585 R11	BRACKET, instrument panel mounting (2) 3/8" NUT (2) 3/8 x 3/4" hex-hd cap SCREW (4) 3/8" lock WASHER (4)
2	304 586 R1	HOUSING, instrument panel
3	278 597 R2	PANEL, instrument 1/4 x 1/2" slt-rd-hd SCREW (4) 1/4" lock WASHER (4)
	269 103 R91	AMMETER (also listed with "Electric Starting") (Units A and B)

REF. NO.	I. H. PART NUMBER	DESCRIPTION
5	432 577	PLUG, instrument panel button (2 for Units A and B) (3 for Unit C)
6	304 587 R1	TUBE, oil pressure indicator
7	369 987 R1	NUT, tube (nylon) (2)
8	67 869 D	ELBOW, oil pressure indicator tube (in gauge)
9	268 542 R91	GAUGE, oil pressure (also listed with "Electric Starting") (Unit A)
9	313 067 R91	GAUGE, oil pressure (also listed with "Electric Starting") (Units B and C)
10	265 470 R91	RELAY (also listed with "Electric Starting")
11	26 242 D	FELT, heat indicator cable clip
12	254 275 R1	CLIP, heat indicator cable 3/8 x 3/4" hex-hd cap SCREW 3/8" lock WASHER
13	256 502 R91	INDICATOR, heat (also listed with "Electric Starting") (Unit A)
13	265 468 R91	INDICATOR, heat (also listed with "Electric Starting") (Units B and C)

+ - Attachment No longer Available.
Service Parts only will be furnished.

ATTACHMENTS

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		AUTOMATIC SAFETY SHUT-OFF – CONTINUED (Murphy Panel) (Not used on units equipped with instruments and panel attachments 305 191 R91, 312 062 R91 and 312 063 R91)
14	366 317 R91	SWITCH, starting (also listed with "Electric Starting")
15	265 471 R91	SWITCH, stop (also listed with "Electric Starting")
16	346 598 R1	ADAPTER, heat indicator
	62 862 D	CABLE, ignition switch to magneto (Unit C)
	29 901 D	CONNECTOR, oil pressure indicator tube (in crankcase)
	264 164 R91	CLIP, cable harness (illustrated with "Electric Starting") (2 for Units A and B) (Unit C)
	362 120 R1	CLIP, cable harness (illustrated with "Electric Starting") (Units B and C)
	305 192 R91	HARNESS, cable (illustrated with "Electric Starting") (Unit A)
	312 061 R91	HARNESS, cable (illustrated with "Electric Starting") (Unit B)

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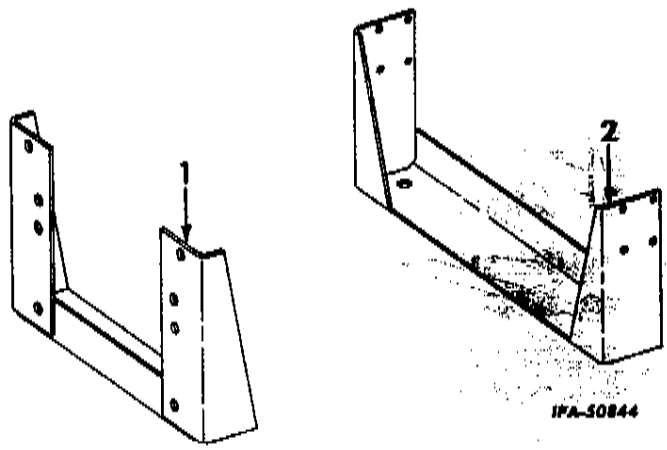
ATTACHMENTS

SUPPORTS

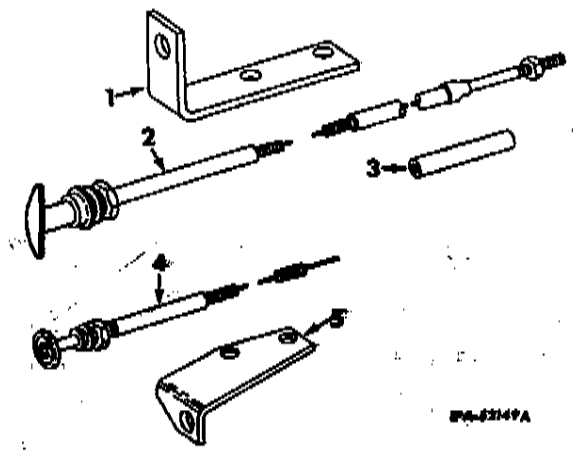


REF. NO.	I. H. PART NUMBER	DESCRIPTION
		⊗ - KEY TO UNITS
A -	305 296 R91	ATTACHMENT, front support (See NOTES 1 and 3)
B -	305 297 R91	ATTACHMENT, rear support (See NOTES 1 and 3)
		⊗ - Letters of these units correspond with those shown following the description of the parts in the list below and identifies the unit for which the part is used. Items without letters after the description indicates the part is used for all units.
1	304 546 R12	SUPPORT, front (Unit A) 5/8" NUT (4) 5/8 x 3-3/4" hex-hd. cap SCREW (4) 5/8" lock WASHER (4)
2	304 543 R11	SUPPORT, rear (Unit B) 1/2" x 1" hex-hd. cap SCREW (8) 1/2" lock WASHER (8)

NOTE 1 - Factory Application - Order On Machine Order Form.
NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

ATTACHMENTS

GINE CONTROLS
r engines with Mechanical Governor)



REF. NO.	I. H. PART NUMBER	DESCRIPTION
		Parts without letters after the description indicate the part is used for all attachments listed below: Letters A, B, C and D are used to identify separate attachments.
A	305 185 R92	ATTACHMENT, engine controls (for units equipped with Natural Gas, LPG and Combination Gas and gasoline engines and IH mechanical governor) (see NOTES 1 and 3)
B	312 064 R91	ATTACHMENT, engine controls (for units equipped with Natural Gas, LPG and combination gas and gasoline engines and Novi mechanical governor) (see NOTES 1 and 3)
C	323 826 R91	ATTACHMENT, engine controls (for units equipped with gasoline engines and Novi mechanical governor) (see NOTES 1 and 3)
D	323 862 R91	ATTACHMENT, engine controls (for units equipped with gasoline engines and I.H. mechanical governor) (see NOTES 1 and 3)
1	349 148 R1	BRACKET, governor control cable 3/8 x 7/8" hex-hd cap SCREW (2) 3/8" lock WASHER (2)
2	305 114 R92	CABLE, governor control (Attachments A and D)
2	313 069 R93	CABLE, governor control (Attachments B and C)
3	332 077 R1	COUPLING, governor control cable (Attachments A and D) 1/4"NF NUT
4	312 428 R91	WIRE, choke control (Attachments A and B)
4	312 199 R91	WIRE, choke control (Attachments C and D)
5	349 147 R1	BRACKET, choke control wire
	109 415	BALL JOINT, governor control cable (Attachment B and C) 1/4"NF NUT (2) 1/4" lock WASHER
	35 758 D	CLIP, governor control cable (mount on center oil pan bolt) (Attachments B and C) 1/4"NF NUT 1/4"NF x 1/2" hex-hd cap SCREW 1/4" lock WASHER 11/32 x 11/16 x 1/16" WASHER

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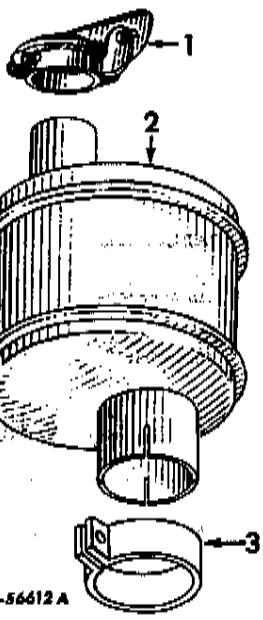
ATTACHMENTS

EXHAUST MUFFLER AND RAIN CAP
(Nelson Muffler Co.)



REF. NO.	I. H. PART NUMBER	DESCRIPTION
	332 516 R91	ATTACHMENT, exhaust rain cap (See NOTES 1 and 3)
	276 250 R91	ATTACHMENT, exhaust muffler (See NOTES 1 and 3)
1	281 424 R91	CAP, exhaust rain (optional with 338 576 R91) (part of ATTACHMENT, 332 516 R91)
1	338 576 R91	CAP, exhaust rain (optional with 281 424 R91) (part of ATTACHMENT, 332 516 R91)
2	313 847 R91	MUFFLER, exhaust (T6965) (part of ATTACHMENT, 276 250 R91)
3	31 790 DA	CLAMP, exhaust muffler (part of ATTACHMENT, 276 250 R91) 3/8" NUT 3/8 x 1-1/4" hex-hd cap SCREW 3/8" lock WASHER

NOTE 1 - Factory Application Order On Machine Order Form.
NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

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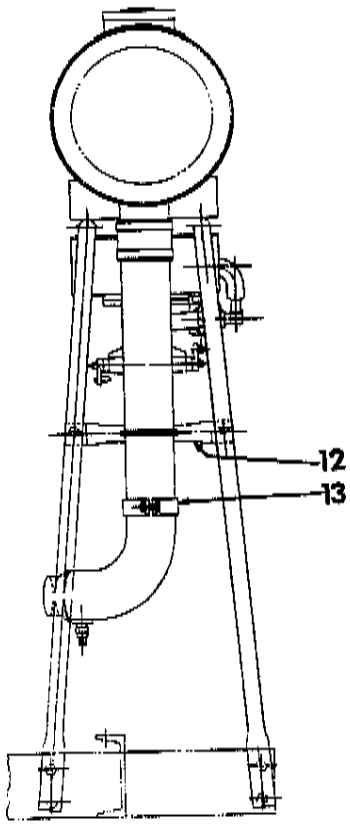
ATTACHMENTS

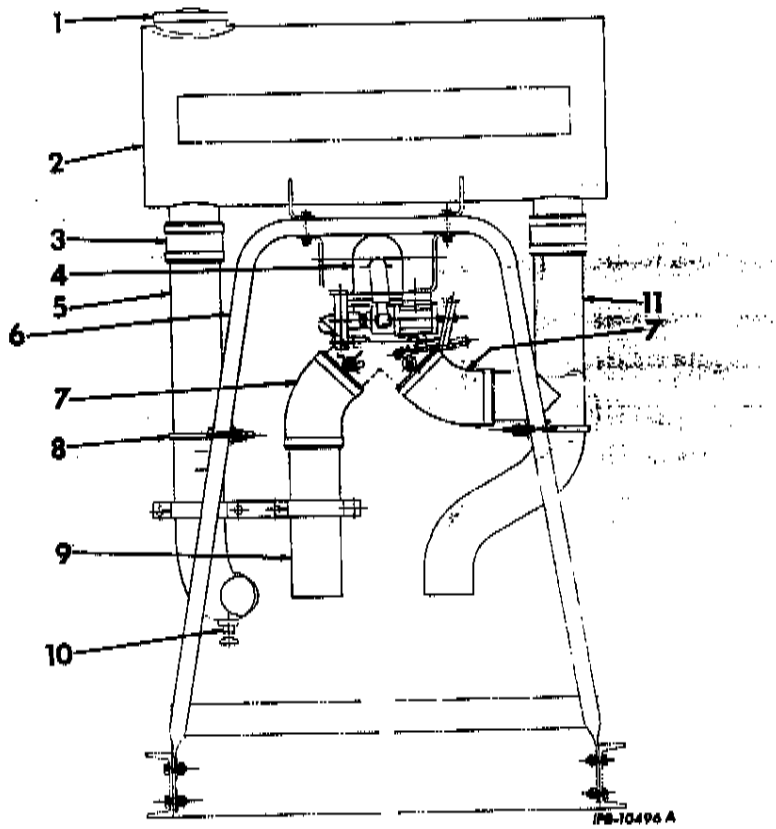
EXPANSION TANK AND CONNECTIONS



REF. NO.	I. H. PART NUMBER	DESCRIPTION
	332 181 R91	ATTACHMENT, expansion tank and connections (For use with flo-matic valve attachment and engine support attachment) (see NOTES 1 and 3)
1	317 654 R91	CAP, tank filler
2	316 029 R93	TANK, w/PLUG, 103 874, water expansion 5/16" NUT (4) 5/16 x 1-3/4" hex-hd cap SCREW (4) 5/16" lock WASHER
	103 874	PLUG, 1/2" pipe
3	346 611 R1	HOSE, 3" ID x 2-1/2" long inlet and outlet tube connector (*) (2)
	279 029 R91	CLAMP, hose (4)
4		VALVE, flo-matic (Not furnished as part of "Expansion Tank and Connections Attachments") (for components see list of parts under details of "Flo-Matic Valve")
5	316 040 R11	TUBE, water outlet
6	316 035 R1	SUPPORT, expansion tank (2) 3/8" NUT (8) 3/8 x 1" hex-hd cap SCREW (8) 3/8" lock WASHER (8) 7/16" lock WASHER (8)
7	316 058 R2	ELBOW, by-pass valve body (2)
	279 029 R91	CLAMP, hose (5)

ATTACHMENTS

EXPANSION TANK AND CONNECTIONS — Continued



REF. NO.	I. H. PART NUMBER	DESCRIPTION
8	316 039 R1	"U" BOLT, water tube (2) 5/16" NUT (6) 5/16" lock WASHER (4) 11/32 x 11/16" x No. 16 ga. WASHER (4)
9	316 059 R1	TUBE, water return
10	31 729 D	VALVE, drain
11	316 037 R11	TUBE, water inlet
12	316 036 R1	SUPPORT, tube (2) 5/16" NUT (4) 5/16 x 1-3/4" hex-hd cap SCREW (4) 5/16" lock WASHER (4) 11/32 x 11/16" x No. 16 ga. WASHER (4)
13	316 060 R1	SUPPORT, water return tube (2) 5/16" NUT (4) 5/16 x 1" hex-hd cap SCREW (4) 5/16" lock WASHER (4)
	332 182 R1	ELBOW, engine water outlet
	332 183 R1	ELBOW, engine water inlet
	279 026 R91	CLAMP, hose (3)

NOTE 1 - Factory Application - Order On Machine Order Form.

NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

*Make From Bulk Stock. Bulk Stock Furnished In 3 Foot Lengths. Part No. Is For 1 Foot Of Hose Only.

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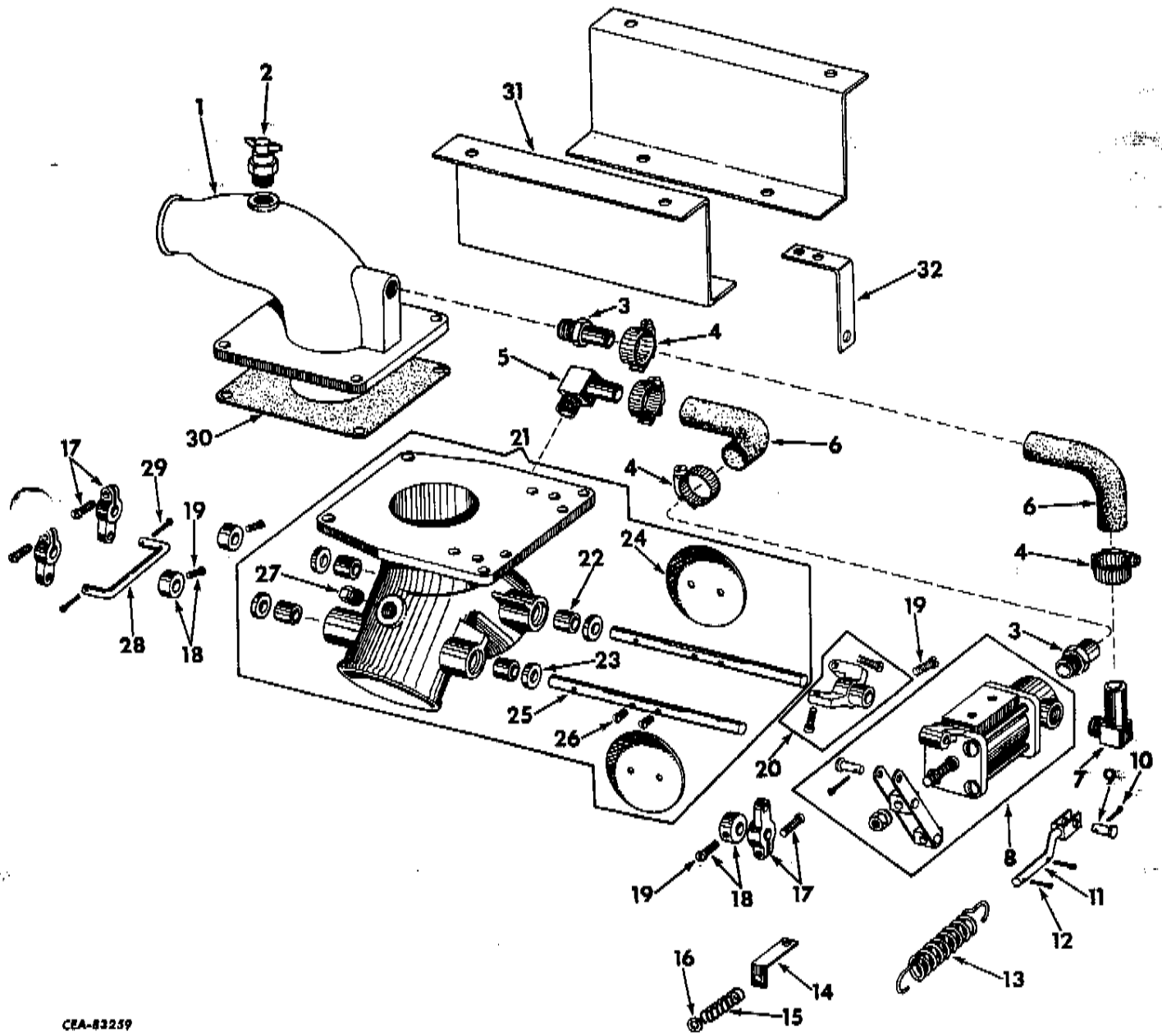
ATTACHMENTS

FLO-MATIC VALVE — Continued



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ATTACHMENTS

REF. NO.	I.H. PART NUMBER	DESCRIPTION
		FLO-MATIC VALVE – CONTINUED
	332 184 R91	ATTACHMENT, flo-matic valve (see NOTES 1 and 3)
1	316 253 R2	INLET, flo-matic valve
2	31 729 D	VALVE, 3/8" vent
3	171 819 R1	NIPPLE, 5/8 x 3/8" hose (2)
4	274 085 R91	CLAMP, hose (4)
5	171 807 R1	ELBOW, 5/8 x 3/8" x 90° hose (short)
6	169 192 R1	ELBOW, 90° x 5/8" rubber hose (2)
7	120 879 R1	ELBOW, 5/8 x 3/8" x 90° hose (long)
8	346 637 R91	CONTROL, vernatherm 1/4 x 5/8" hex-hd cap SCREW (2) 1/4" lock WASHER (2)
9	102 776 H	PIN, rod end
10	107 761	PIN, 1/16 x 3/4" cotter
11	316 063 R11	ROD w/CLEVIS, overtravel
12	103 373	PIN, 3/32 x 3/4" cotter (2)
13	61 635 D	SPRING, return
14	316 065 R1	CLIP, return spring
15	300 415 R1	SPRING, overtravel
16		WASHER, 9/32 x 5/8" x No. 16 ga. (2)
17	317 554 R91	LEVER ASSY, throttle shaft (3)
18	268 296 R91	COLLAR w/SCREW, 36 756 D, throttle shaft (3)
19	36 756 D	SCREW, set (4)
20	332 488 R91	STOP w/two SCREW, 11 189 V, throttle shaft
	11 189 V	SCREW, throttle stop adjusting (2)
21	316 046 R42	BODY ASSY, flo-matic valve (Composed of - § 1 BODY 4 BUSHING 347 001 R1 § 2 DISC 2 SHAFT 612 179 C1 4 SCREW 4 WASHER)
22	347 001 R1	BUSHING, throttle shaft (4)
23	321 881 R91	SEAL, water (4)
24		DISC, throttle (Not Furnished Separately)
25	612 179 C1	SHAFT, flo-matic valve (2)
26		SCREW, No. 6 x 7/16" slt-fil-hd (4) No. 6 lock WASHER (4)
27	103 879	PLUG, 3/8" sq-hd pipe
28	316 049 R1	LINK, throttle shaft lever
29	103 373	PIN, 3/32 x 3/4" cotter (2) 9/32 x 5/8" x No. 16 ga. WASHER (2)
30	316 048 R1	GASKET, flo-matic valve
31	323 847 R1	SUPPORT, flo-matic valve (2) 5/16" NUT (4) 5/16 x 1-1/2" hex-hd cap SCREW 5/16 x 1-1/4" hex-hd cap SCREW (3) 5/16" lock WASHER (4)

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ATTACHMENTS

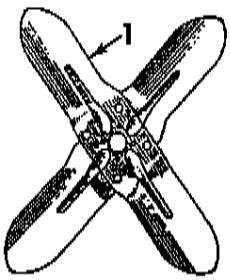
REF. NO.	I.H. PART NUMBER	DESCRIPTION
		FLO-MATIC VALVE – CONTINUED
32	323 850 R1	BRACKET, return spring 5/16" NUT 5/16 x 7/8" hex-hd cap SCREW 5/16" lock WASHER
	323 849 R92	VALVE ASSY, flo-matic (Composed of - 1 BODY 316 046 R42 1 BRACKET 323 850 R1 2 CLAMP 274 085 R91 1 CLIP 316 065 R1 3 COLLAR 268 296 R91 1 CONTROL 346 637 R91 1 ELBOW 169 192 R1 1 ELBOW 171 807 R1 3 LEVER 317 554 R91 1 LINK 316 049 R1 2 NIPPLE 171 819 R1 1 PIN 102 776 H 4 PIN 103 373 1 PIN 107 761 1 PLUG 103 879 1 ROD 316 063 R11 1 SCREW 36 756 D 4 SEAL 321 881 R91 1 SPRING 61 635 D 1 SPRING 300 415 R1 1 STOP 332 488 R91)

§ - Not Furnished Separately.
NOTE 1 - Factory Application - Order On Machine Order Form.
NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

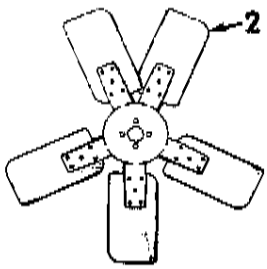
(REV. NO. 1 10-68)

ATTACHMENTS

FAN



Suction Fan Standard



Suction Fan Tropical

REF. NO.	I. H. PART NUMBER	DESCRIPTION
(X) - KEY TO UNITS -		
A -		Service parts for suction fan (standard cooling - 1800 to 2400 rpm)
B -	304 576 R91	ATTACHMENT, suction fan (tropical increased cooling - 1800 to 2400 rpm) (order 320 165 R91)
C -	304 549 R93	ATTACHMENT, blower fan (18-1/2" dia. 6 blade w/1.00" spacer) (See NOTES 1 and 3)
D -	316 168 R91	ATTACHMENT, blower fan (18" dia. 6 blade w/1.00" spacer) (for use with 48 H.P. Flexible coupling ATTACHMENT, 318 004 R91) (See NOTES 1 and 3)
E -	316 170 R91	ATTACHMENT, suction fan (18" dia. 6 blade w/1.38" spacer) (for use with 48 H.P. flexible coupling ATTACHMENT, 318 004 R91) (See NOTES 1 and 3)
F -	320 165 R91	ATTACHMENT, suction fan (18-1/2" dia. 6 blade w/1.38" spacer) (will work for 304 576 R91) (See NOTES 1 and 3)
G -	320 166 R91	ATTACHMENT, suction fan (18-1/2" dia. 6 blade w/1.62" spacer) (for use with 6.75" single "B" sheave auxiliary drive pulley ATTACHMENT, 318 002 R91) (See NOTES 1 and 3)
H -	323 768 R91	ATTACHMENT, blower fan (18-1/2" dia. 6 blade w/1.31" spacer) (for use with auxiliary drive pulley ATTACHMENTS, 318 001 R91, 318 002 R91 or 318 003 R91) (See NOTES 1 and 3)
(X) - Letters of these units correspond with those shown following the description of the parts in the list below and identifies the unit for which the part is used. Items without letters after the description indicates the part is used for all units.		
1	86 898 R91	FAN, suction (standard) (18-1/2" dia. 4 blades) (optional with 82 796 R91) (Unit A)
1	82 796 R91	FAN, suction (standard) (18-1/2" dia. 4 blades) (optional with 86 898 R91) (Unit A) 1/4 x 2-1/8" hex-hd cap SCREW (4) 1/4" lock WASHER (4)
2	267 450 R91	FAN, suction (tropical) (18-1/2" dia. 5 blades) (optional with 371 633 R91) (Unit B)
2	371 633 R91	FAN, suction (tropical) (18-1/2" dia. 5 blades) (optional with 267 450 R91) (Unit B) 1/4 x 2-1/8" hex-hd cap SCREW (4) 1/4" lock WASHER (4)

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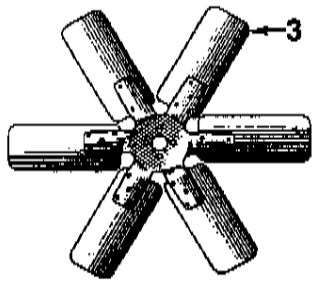
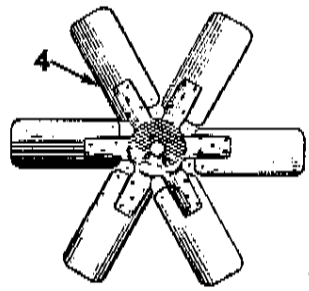
ATTACHMENTS

FAN - CONTINUED



Blower Fan



Suction Fan

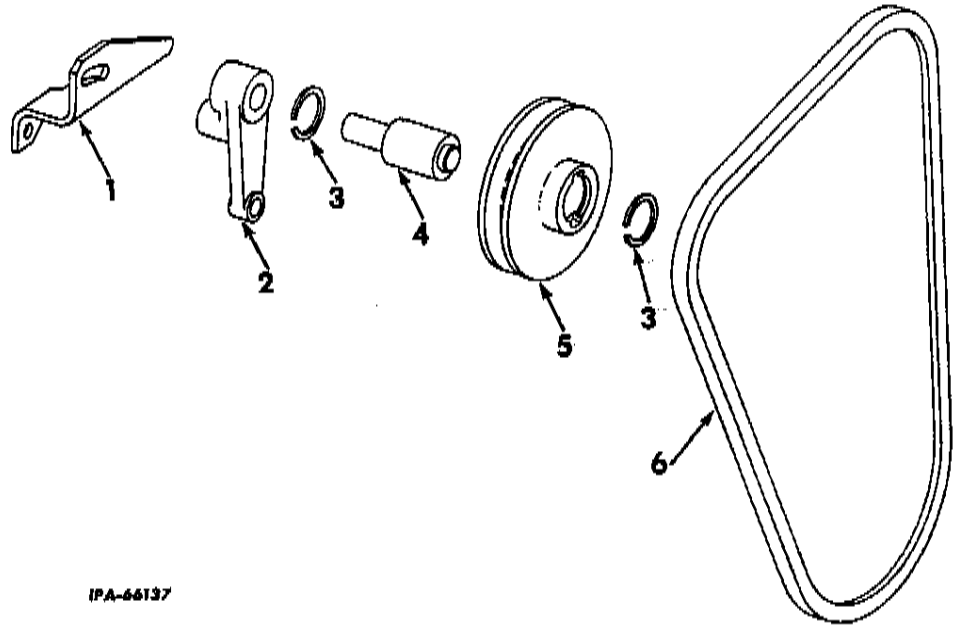
IPA-562878

REF. NO.	I. H. PART NUMBER	DESCRIPTION
3	306 355 R91	FAN, blower (18-1/2" dia. 6 blades) (Units C and H)
3	317 720 R91	FAN, blower (18" dia. 6 blades) (Unit D) 1/4NF x 1-5/8" hex-hd cap SCREW (4 for Unit D) 1/4NF x 2" hex-hd cap SCREW (4 for Unit H) 1/4NF x 2-1/4" hex-hd cap SCREW (4 for Unit C) 1/4" lock WASHER (4)
4	317 719 R91	FAN, suction (18" dia. 6 blades) (Unit E)
4	321 565 R91	FAN, suction (18-1/2" dia. 6 blades) (Units F and G) 1/4NF x 2" hex-hd cap SCREW (4 for Unit E) 1/4NF x 2-1/4" hex-hd cap SCREW (4 for Unit F) 1/4NF x 2-1/2" hex-hd cap SCREW (4 for Unit G) 1/4" lock WASHER (4)
	316 169 R1	SPACER, fan (1.00") (Units C and D)
	574 100 R1	SPACER, fan (1.31") (Unit H)
	304 575 R1	SPACER, fan (1.38") (Units B, E and F)
	304 575 R1	SPACER, fan (1.38") (Units B, E and
	318 008 R1	SPACER, fan (1.62") (Unit G)

NOTE 1 - Factory Application - Order On Machine Order Form.
NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

ATTACHMENTS

FAN BELT IDLER
(Not used with Generator)



IPA-66137

REF. NO.	I. H. PART NUMBER	DESCRIPTION
	312 959 R91	ATTACHMENT, fan belt idler (see Notes 1 and 3)
1	312 056 R1	SUPPORT, idler pulley adjusting arm 13/32 x 13/16 x 1/16" ga. WASHER (2)
2	312 055 R1	ARM, idler pulley adjusting 3/8 x 1" hex-hd cap SCREW 5/16 x 1" hex-hd cap SCREW 13/32 x 13/16 x 1/16" ga WASHER 3/8" lock WASHER 5/16" lock WASHER
3	133 502 R1	RING, snap
4	ST 633	BEARING, idler pulley shaft
5	312 054 R1	PULLEY, idler
6	305 177 R1	BELT, water pump and generator fan

NOTE 1 - Factory Application - Order On Machine Order Form.
NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

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ATTACHMENTS

FAN BELT IDLER – CONTINUED
(Not used with Generator)

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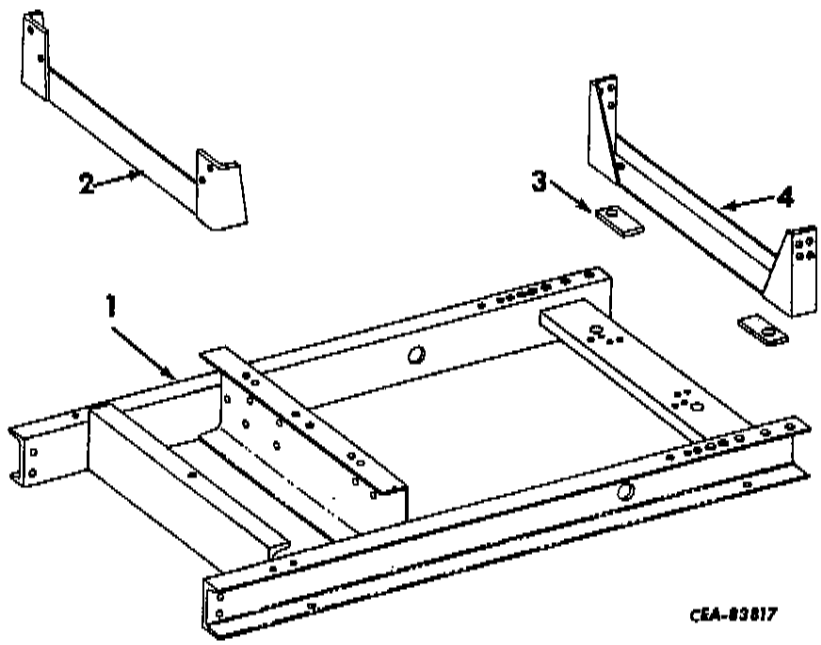
ATTACHMENTS

ENGINE SUPPORT
(Box Type Base)



CEA-83817

REF. NO.	I. H. PART NUMBER	DESCRIPTION
	332 190 R91	ATTACHMENT, engine support (for use with expansion tank and connections) (not used on gasoline and gasoline high altitude engines equipped with hydraulic pump) (see NOTES 1 and 3)
1	320 015 R93	BASE, box type
2	332 191 R11	SUPPORT, front 1/2" NUT (2) 5/8" NUT (4) 5/8 x 4-1/2" hex-hd cap SCREW (4) 1/2 x 1-3/4" hex-hd cap SCREW (2) 1/2" lock WASHER (2) 5/8" lock WASHER (4)
3	332 180 R1	SPACER, rear support (2) 3/4" NUT (2) 3/4 x 2-1/4" hex-hd cap SCREW (2) 3/4" lock WASHER (2)
4	304 543 R11	SUPPORT, rear 1/2 x 1" hex-hd cap SCREW (8) 1/2" lock WASHER (8)

NOTE 1 - Factory Application - Order On Machine Order Form.
NOTE 3 - Field Application - Order through Regular Service Parts Channels.

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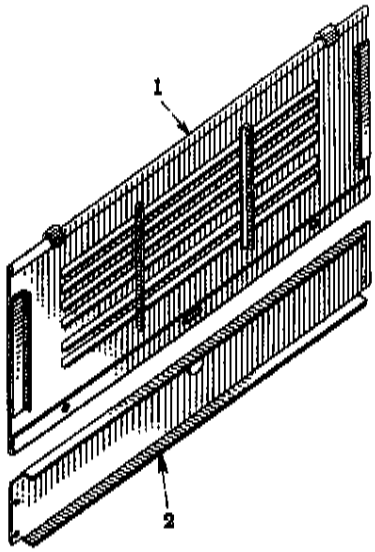
ATTACHMENTS

HOOD SIDE DOOR



REF. NO.	I. H. PART NUMBER	DESCRIPTION
	268 227 R91	ATTACHMENT, hood side doors (See NOTES 1 and 3)
1	268 228 R11	DOOR, hood side (2)

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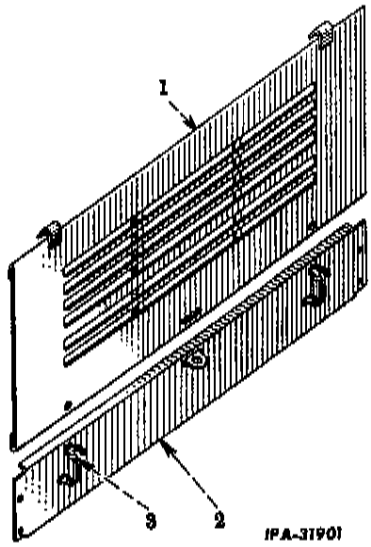
ATTACHMENTS

HOOD SIDE DOOR – CONTINUED

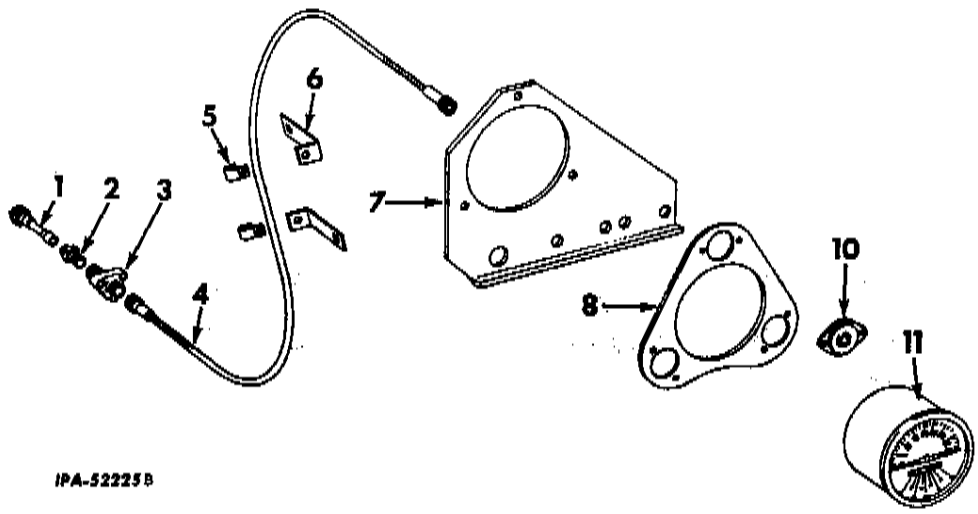


REF. NO.	I. H. PART NUMBER	DESCRIPTION
2	268 230 R11	SHEET, hood side (2) 3/8" NUT (8) 3/8 x 3/4" hex-hd. cap SCREW (8) 3/8" lock WASHER (8)
3	353 443 R91	LATCH, hood side door (4) 3/16 x 5/16" f-hd. RIVET (8)

NOTE 1 - Factory Application - Order On Machine Order Form.
NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

ATTACHMENTS

TACHOMETER AND TACHOURMETER



IPA-52225B

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		Parts without letters after the description indicate the part is used for all attachments listed below: Letters A, B and C are used to identify separate attachments and service parts list.
	306 686 R91	ATTACHMENT, tachometer (mechanical) (for units equipped with dash) (order 349 134 R92) (+)
B	306 687 R91	ATTACHMENT, tachometer (mechanical) (for units not equipped with dash) (order 349 134 R92) (+)
C	349 134 R92	ATTACHMENT, tachourmeter (mechanical) (combination tachourmeter and service meter with correction factor dial) (for use with Novi mechanical governor and instrument and instrument panel ATTACHMENTS, 349 132 R91 and 349 133 R91) (see NOTES 1 and 3)
1	368 245 R12	GEAR, tachometer or tachourmeter drive
2	368 246 R1	HOUSING, tachometer or tachourmeter connection
3	63 364 H	ADAPTER, box type (1.440 ratio)
4	306 394 R91	CABLE, tachometer or tachourmeter drive (optional with 306 398 R91)
4	306 398 R91	CABLE, tachometer or tachourmeter (optional with 306 394 R91)

ATTACHMENTS

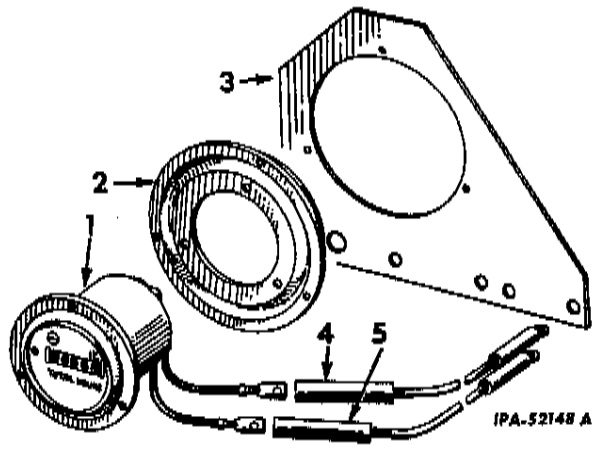
TACHOMETER AND TACHOURMETER — Continued

REF. NO.	I. H. PART NUMBER	DESCRIPTION
5	73 163 H	CLIP, tachometer or tachourmeter drive cable 1/4" NUT 1/4 x 1/2" hex-hd cap SCREW 1/4" lock WASHER
6	56 787 R1	EXTENSION, tachometer or tachourmeter drive cable clip
7	328 637 R1	BRACKET, tachometer mounting plate (Attachment B) 3/8" NUT (2) 3/8 x 1" hex-hd cap SCREW (2) 3/8" lock WASHER (2)
8	281 801 R11	PLATE w/three GROMMET, 281 802 R91, tachometer mounting (Attachments A and B) No. 8 NUT (3) No. 8 x 1" slt-rd-hd mach SCREW (3) No. 8 lock WASHER (3) 11/64 x 13/32" x 18 ga. WASHER (6)
10	281 802 R91	GROMMET, tachometer mounting (3 for Attachments A and B) 1/8 x 1/4" rd-hd solid RIVET (6)
11	338 595 R91	TACHOURMETER
	263 297 R2	CLAMP, tachometer or tachourmeter No. 10 NUT (2) No. 10 lock WASHER (2)

(+) - Attachment No Longer Available. Service Parts Only Will Be Furnished.
NOTE 1 - Factory Application - Order On Machine Order Form.
NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

ATTACHMENTS

HOURMETER



REF. NO.	I. H. PART NUMBER	DESCRIPTION
		Parts without letters after the description indicate the part is used for all attachments listed below: Letters A, B and C are used to identify separate attachments.
A	305 202 R91	ATTACHMENT, hourmeter (for units equipped with dash) (+)
B	305 203 R91	ATTACHMENT, hourmeter (for units not equipped with dash) (+)
C	349 136 R91	ATTACHMENT, hourmeter (for use with instrument and panel ATTACHMENTS, 349 132 R91 and 349 133 R91) (see NOTES 1 and 3)
1	310 820 R91	HOURMETER No. 6 x 5/16" slt-rd-hd mach SCREW (3) No. 6 lock WASHER (3)
2	264 674 R91	DAMPER, hourmeter vibration (Attachments A and B) No. 6 x 1/2" slt-rd-hd mach SCREW (3) No. 6 lock WASHER (3)
3	305 201 R1	PLATE, hourmeter mounting (Attachment B) 3/8" NUT 3/8 x 1" hex-hd cap SCREW 3/8" lock WASHER
4	305 199 R91	CABLE, hourmeter to ignition switch (Attachments A and B)
4	271 066 R92	CABLE, hourmeter (Attachment C)
5	267 807 R91	CABLE, hourmeter to ground screw 3/8" internal-tooth lock WASHER (Attachments A and B)

(+) - Attachments No Longer Available. Service Parts Only Will Be Furnished.
NOTE 1 - Factory Application - Order On Machine Order Form.
NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

MEMORANDA

ATTACHMENTS

INSTRUMENTS AND PANEL
(Not used with units equipped with Automatic Safety-Shut-Off)

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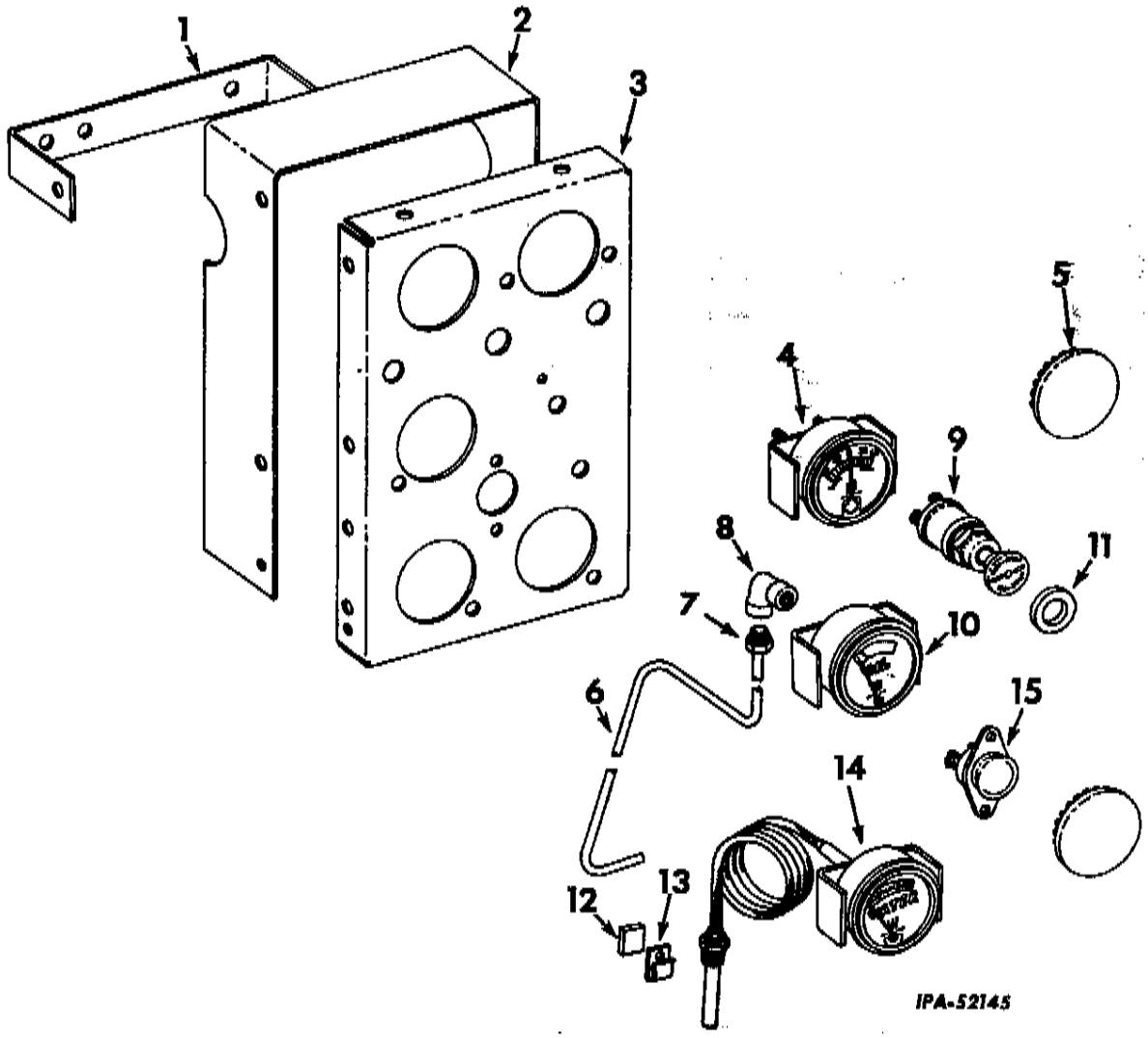
ATTACHMENTS

INSTRUMENTS AND PANEL – Continued
(Not used with units equipped with Automatic Safety-Shut-Off)



REF. NO.	I. H. PART NUMBER	DESCRIPTION
(X) - KEY TO UNITS -		
A -	305 191 R91	ATTACHMENT, instruments and panel (Battery Ignition) (+)
B -	312 062 R91	ATTACHMENT, instruments and panel (Magneto Ignition) (For units equipped with cranking motor and generator) (+)
C -	312 063 R91	ATTACHMENT, instruments and panel (Magneto Ignition) (For units not equipped with cranking Motor and generator) (+)
D -		Service parts for instruments and panel (Battery Ignition) (for units equipped with Hydraulic Pump)

(X) - Letters of these units correspond with those shown following the description of the parts in the list below and identifies the unit for which the part is used. Items without letters after the description indicates the part is used for all units.

REF. NO.	I. H. PART NUMBER	DESCRIPTION
1	304 585 R11	BRACKET, instrument panel mounting (2) 3/8" NUT (2) 3/8 x 3/4" hex-hd cap SCREW (4) 3/8" lock WASHER (4)
2	304 586 R1	HOUSING, instrument panel
3	278 597 R2	PANEL, instrument 1/4 x 1/2" rd-hd sltd SCREW (4) 1/4" lock WASHER (4)
4	269 103 R91	AMMETER (also listed with "Electric Starting") (Units A, B and D)

(+) - Attachment No Longer Available Service Parts Only Will Be Furnished.

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ATTACHMENTS

REF. NO.	J.H. PART NUMBER	DESCRIPTION
		INSTRUMENTS AND PANEL – CONTINUED (Not used with units equipped with Automatic Safety Shut-Off)
5	432 577	PLUG, instrument panel button (2 for Units A, B and D) (3 for Unit C)
6	304 587 R1	TUBE, oil pressure indicator
7	369 987 R1	NUT, tube (nylon) (2)
8	67 869 D	ELBOW, oil pressure indicator tube (in gauge)
9	62 801 DC	SWITCH, ignition (also listed with "Electric Starting") (Units A and D)
9	54 207 DB	SWITCH, ignition (magneto) (also listed with "Electric Starting") (Units B and C)
10	313 177 R91	INDICATOR, oil pressure (Units A, B and C)
10	313 177 R91	INDICATOR, oil pressure (Unit D)
11	59 109 D	SPACER, ignition switch
12	26 242 D	FELT, heat indicator cable clip (Units B, C and D)
13	254 275 R1	CLIP, heat indicator cable (Units B, C and D) 3/8" NUT 3/8 x 3/4" hex-hd cap SCREW 3/8" lock WASHER
14	273 602 R91	INDICATOR, heat (Units A, B and C)
14	67 136 D	INDICATOR, heat (Unit D)
15	366 317 R91	SWITCH, starting (also listed with "Electric Starting") No. 10NF sq NUT No. 10NF x 7/16" rd-hd sltd mach SCREW (2) No. 10 lock WASHER (2)
	62 862 D	CABLE, ignition switch to magneto (also listed with "Electric Starting") (Unit C)
	264 164 R91	CLIP, cable harness (also listed with "Electric Starting") (2)
	29 901 D	CONNECTOR, oil pressure indicator tube (in crankcase)
	305 192 R91	HARNESS, cable (Illustrated with "Electric Starting") (Unit A)
	312 061 R91	HARNESS, cable (Illustrated with "Electric Starting") (Unit B)
	316 160 R91	HARNESS, cable (Unit D)

MEMORANDA

ATTACHMENTS

INSTRUMENTS, INSTRUMENT PANEL AND INSTRUMENT PANEL MOUNTING

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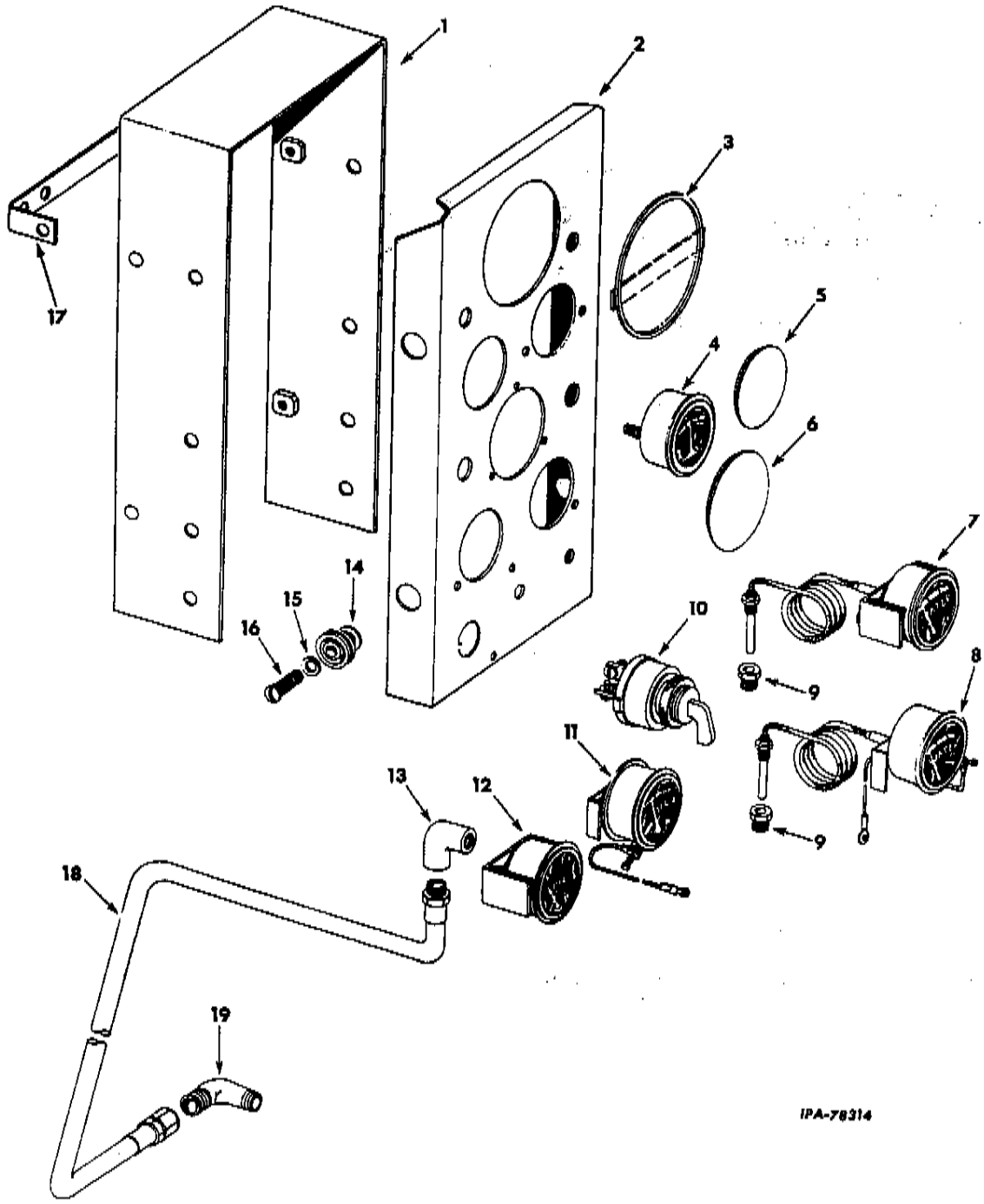
ATTACHMENTS

INSTRUMENTS, INSTRUMENT PANEL AND INSTRUMENT PANEL MOUNTING — CONTINUED



IPA-78314

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ATTACHMENTS

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		INSTRUMENTS, INSTRUMENT PANEL AND INSTRUMENT PANEL MOUNTING — CONTINUED
1		Parts without letters after the description indicates the part is used for all attachments listed below: Letters "A," "B," and "C" are used to identify separate attachments.
A	349 132 R91	ATTACHMENT, instruments and instrument panel (regular gauges) (for use on units equipped with Instrument Panel Mounting Attachment, 349 127 R91) Tachourmeter Attachment, 349 134 R92 or Hourmeter Attachment, 349 136 R91) (see NOTES 1 and 3)
B	349 133 R91	ATTACHMENT, instruments and instrument panel (safety gauges) (for use on units equipped with Instrument Panel Mounting Attachment, 349 127 R91, Tachourmeter Attachment, 349 134 R92 or Hourmeter Attachment, 349 136 R91) (see NOTES 1 and 3)
C	349 127 R91	ATTACHMENT, instrument panel mounting (for use on units equipped with Instruments and Instrument Panel Attachment, 349 132 R91 or Instruments and Instrument Panel Attachment, 349 133 R91) (see NOTES 1 and 3)
1	337 113 R11	FRAME, instrument panel (Attachment C) 3/8" NUT (4) 3/8 x 3/4" hex-hd cap SCREW (4) 3/8" lock WASHER (4)
2	337 354 R3	PANEL, instrument (Attachments A and B)
3	370 940 R11	COVER, tachometer opening (Attachments A and B) (Not used with Tachourmeter attachment)
4	269 103 R91	AMMETER (Attachments A and B)
5	432 577	PLUG, 2-3/32" button (attachments A and B)
6	432 582	PLUG, 2-1/4" button (Attachments A and B)
7	346 597 R91	INDICATOR, heat (Attachment A)
8	347 602 R91	INDICATOR, safety heat (Attachment B)
9	347 601 R1	ADAPTER, heat indicator (Attachment C)
10	327 144 R91	SWITCH, ignition and starting (Attachments A and B)
11	347 604 R91	INDICATOR, safety oil pressure (Attachment B)
12	313 177 R91	INDICATOR, oil pressure (Attachment A)
13	9 409 923	ELBOW, 1/8" x 90° (Attachments A and B)
14	336 419 R91	MOUNT, vibration (Attachments A and B)
15		WASHER, No. 10 lock (4 for Attachments A and B)
16		SCREW, No. 10 x 3/4" rd-hd mach (4 for Attachments A and B)
17	337 112 R1	BRACKET, instrument panel (2 for Attachment C) 3/8" NUT (4) 3/8 x 3/4" hex-hd cap SCREW (4) 3/8" lock WASHER (4)
18	346 592 R91	HOSE w/two FITTING, oil pressure indicator (HOSE, 19" ID x 17" long including FITTINGS (Attachment C)
19	118 753	ELBOW, 1/4" x 90° oil pressure hose (Attachment C)

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ATTACHMENTS

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		INSTRUMENTS, INSTRUMENT PANEL AND INSTRUMENT PANEL MOUNTING — CONTINUED
	42 915 D	BLOCK, junction (Attachment B) (%)
	42 917 D	BLOCK, w/BLOCK, 42 915 D and BRACKET, 42 916 D, junction (optional with 352 110 R91) (Attachment B) (%)
	352 110 R91	BLOCK w/BLOCK, 42 915 D and BRACKET, 42 916 D, junction (optional with 42 917 D) (Attachment B) (%) No. 8 NF NUT (cd or zn-pltd) 3/8" NUT 3/8 x 1/2" hex-hd cap SCREW No. 8 int tooth lock WASHER 3/8" lock WASHER
	42 916 D	BRACKET, junction block (Attachment B) (%) No. 10NUT No. 10 x 1/2" slt-hd mach SCREW No. 10 lock WASHER
	63 713 DA	CABLE, relay to ignition switch (Attachment B) (%)
	274 747 R91	CABLE, safety control to junction block (Attachment B) (%)
	274 747 R91	CABLE, relay to safety control switch (Attachment B) (%)
	264 164 R1	CLIP, regulator cable (Attachment C)
	327 071 R1	CLIP, capillary tube (Attachment C)
	263 308 R1	CLIP, cranking motor cable harness (Attachment C) (*)
	370 535 R1	CLIP, igaition cable (Attachment C)
	349 128 R91	HARNESS, cranking motor cable (Attachment C) (*)
	349 129 R91	HARNESS, ignition cable (Attachment C) (*)
	349 130 R91	HARNESS, regulator cable (Attachment C) (*)
2	752 445 R1	PRODUCT GRAPHIC, safety control switch escutcheon (Attachment B)
	606 069 C91	RELAY, ignition cutout (Attachment B) (%)
	603 884 C91	SWITCH, safety control toggle (optional with 253 818 R91) (Attachment B) (%)
	253 818 R91	SWITCH, safety control toggle (optional with 603 884 C91) (Attachment B) (%)

NOTE 1 - Factory Application - Order On Machine Order Form.

NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

% - Also Listed And Illustrated With "Electric Wiring (Safety Gauges)."

* - Also Listed And Illustrated With "Electric Wiring (Regular Gauges)."

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ER TAKE-OFF
kford)
C-221 Regular Duty) (UC-263 Light Duty)

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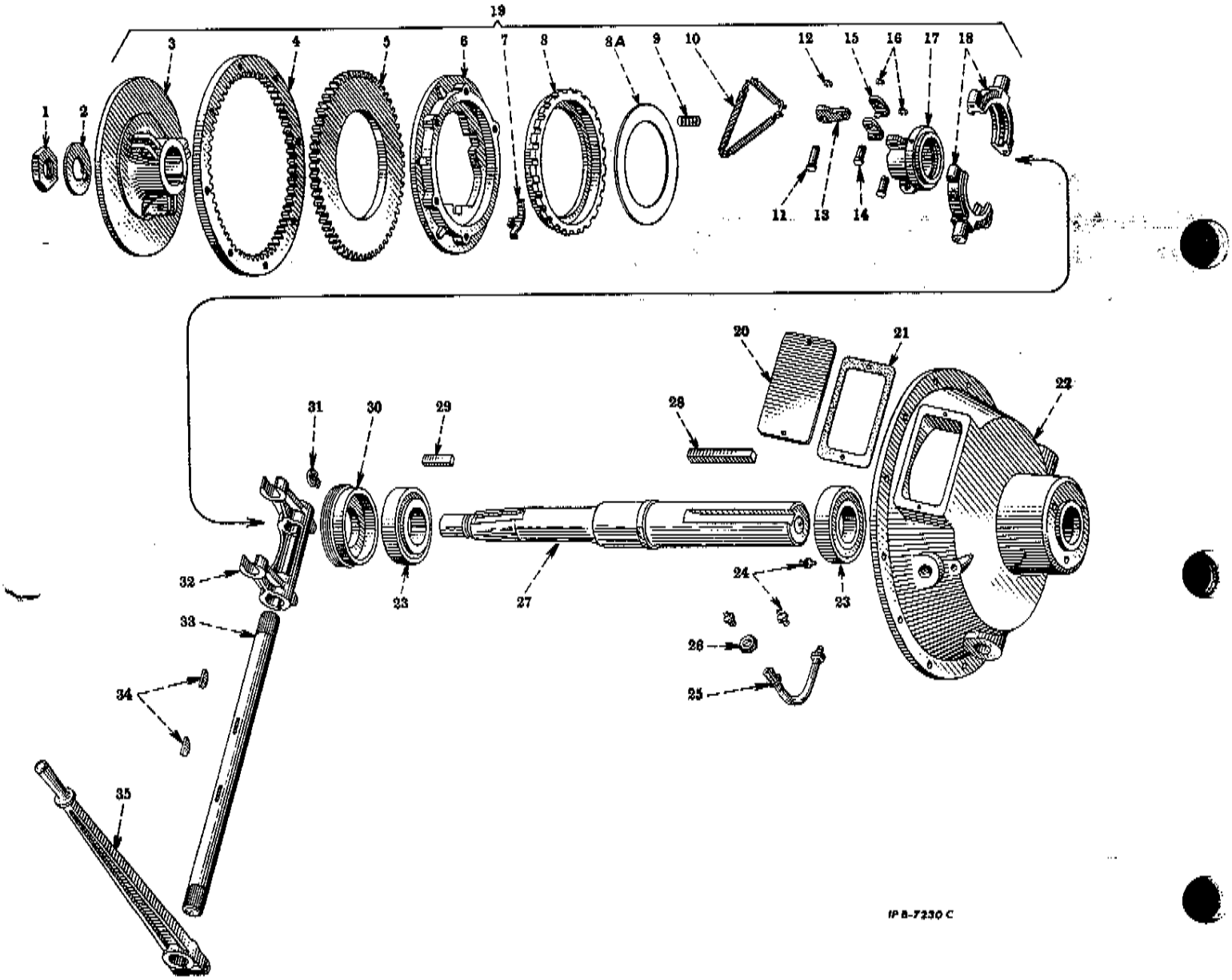
ATTACHMENTS

POWER TAKE-OFF – Continued
(Rockford)
(UC-221 Regular Duty) (UC-263 Light Duty)



REF. NO.	I. H. PART NUMBER	DESCRIPTION
	273 017 R91	ATTACHMENT, power take-off, 319 503 R91 w/BEARING, 305 861 R91 (UC-221 regular duty) (UC-263 light duty) (with 10" single plate over-center drive ring type clutch) (See NOTES 1 and 3)
		NOTE 1 - Factory Application - Order on Machine Order Form.
		NOTE 3 - Field Application - Order through Regular Service Parts Channels.

REF. NO.	I. H. PART NUMBER	DESCRIPTION
1	273 231 R1	NUT, hex. (PT-732-2)
2	273 230 R1	WASHER, lock (PT-733-3)
3	273 233 R1	BODY, clutch (CL-8490-10)
4	255 663 R1	RING, driving (CL-6951)
5	266 682 R1	FACING, clutch (CL-6952)

ATTACHMENTS

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		POWER TAKE-OFF – CONTINUED (Rockford) (UC-221 Regular Duty) (UC-263 Light Duty)
6	268 958 R91	PLATE w/LOCK, 268 869 R1, pressure (UCL-9520)
7	268 869 R1	LOCK, adjusting (CL-8516-1)
8	347 871 R1	NUT, adjusting (CL-8494-1)
8A	347 872 R1	PLATE, adjusting ring (CL-11361)
9	266 704 R1	SPRING, separator (CL-8541) (3)
10	268 865 R91	SPRING, lever (CL-9465)
11	266 697 R1	PIN, clevis (CL-8400) (6)
12	266 698 R1	RING, retaining (CL-7130) (6)
13	268 866 R1	LEVER (CL-8556-1) (3)
14	266 694 R1	PIN, clevis (CL-8484) (3)
15	266 696 R1	LINK, connecting (CL-8557) (6)
16	255 395 R1	RING, retaining (CL-7107) (3)
17	273 235 R1	SLEEVE, release (CL-8558)
18	273 236 R91	BEARING w/two NUT, 258 370 R1 and PLUG, 103 883, release (UCL-5-7392)
19	273 232 R91	CLUTCH ASSEMBLY, 10" (CLA-2174-27) (Composed of - 1 BODY 273 233 R1; 1 FACING 266 682 R1; 3 LEVER 268 866 R1; 1 LOCK 319 531 R1; 6 LINK 266 696 R1; 1 NUT 347 871 R1; 3 PIN 266 694 R1; 6 PIN 266 697R1; 1 PLATE 268 958 R91; 1 PLATE 347 872 R1; 3 RING 255 395 R1; 1 RING 255 663 R1; 6 RING 266 698 R1; 1 SCREW 19 559 R1; 1 SLEEVE w/BEARING 273 234 R91; 3 SPRING 266 704 R1; 1 SPRING 268 865 R91)
20	321 481 R1	PLATE, instruction (PT-1593)
21	266 656 R1	GASKET, cover (PT-770)
22	273 238 R1	HOUSING, clutch (PT-993-1)
23	13 396 DC	CONE, tapered roller bearing (390) (2)
23	13 390 D	CUP, tapered roller bearing (394A) (2)
24	109 461	FITTING, 1/8", plug pipe (Lincoln 5000) (3)
25	266 667 R91	TUBE, flexible (PT-1026-1)
26		NUT, 5/8NF
27	319 536 R1	SHAFT, drive (PT-1356-3)
	103 883	PLUG, 1/8" pipe
28	266 668 R1	KEY (PT-781)
29	266 678 R1	KEY (PT-884)
30	266 660 R1	RETAINER, bearing (PT-727)
31	266 661 R1	PLATE, lock (PT-44)
32	266 665 R91	YOKE, clutch (UPT-811)

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ATTACHMENTS

REF. NO. | I. H. PART NUMBER | DESCRIPTION

POWER TAKE-OFF – CONTINUED (Rockford) (UC-221 Regular Duty) (UC-263 Light Duty)

33	266 662 R1	SHAFT, yoke (PT-201)
34	124 553	KEY, (Woodruff, No. 15) (PT-351) (2)
35	266 666 R91	LEVER, shifting (UPT-87)
	305 861 R91	BEARING, clutch pilot (optional with 338 543 R91)
	338 543 R91	BEARING, clutch pilot (optional with 305 861 R91)
	273 255	FITTING, lubrication (Alemite 1743B) (2)
	258 370 R1	NUT, 5/16NF, elastic stop (Esna) (CL-7356) (2)
	319 531 R1	LOCK, positive (CL-9216-1)
	319 503 R91	POWER TAKE-OFF w/10" over-center clutch assembly (PTA-31036) (will work for 273 015 R91) (Composed of - 1 CLUTCH 273 232 R91; 2 CONE 13 396 DC; 2 CUP 13 390 D; 3 FITTING 109 461; 2 FITTING 273 255; 1 GASKET 266 656 R1; 1 HOUSING 273 238 R1; 2 KEY 124 553; 1 KEY 266 668 R1; 1 KEY 266 678 R1; 1 LEVER 266 666 R91; 1 NUT 273 231 R1; 1 PLATE 266 661 R1; 1 PLATE 321 481 R1; 1 RETAINER 266 660 R1; 1 SHAFT 266 662 R1; 1 SHAFT 319 536 R1; 1 TUBE 266 667 R91; 1 WASHER 273 230 R1; 1 YOKE 266 665 R91) 3/8 x 1-1/8" hex-hd. cap SCREW (12) 3/8 x 1-1/2" hex-hd. cap SCREW (8) 3/8" lock WASHER (20)
	103 883	PLUG, 1/8" slt-hd pipe
		SCREW, 1/4 x 3/8" rd-hd. mach. (2)
		SCREW, 1/4 x 3/8" fil-hd.
		SCREW, 3/8 x 1-1/4" hex-hd. cap (2)
		SCREW, 5/16 x 1/2" hex-hd. cap
		SCREW, 1/2 x 1-3/4" hex-hd. cap
		SCREW, 5/16NF x 1-3/4" hex-hd. cap (2)
		SCREW, 5/16 x 1/4" f-pt. set
	19 559 R1	SCREW, 1/4 x 3/8" hex-hd cap (CL-8807-1)
	273 234 R91	SLEEVE, 273 235 R1, w/release BEARING 273 236 R91 (UCL-3-8558)
		WASHER, 5/16" lock
		WASHER, 3/8" lock (2)
		WASHER, 1/2" lock
		WASHER, 1/4" (Shakeproof)

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ATTACHMENTS

WER TAKE-OFF WITH EXTENDED SHAFT
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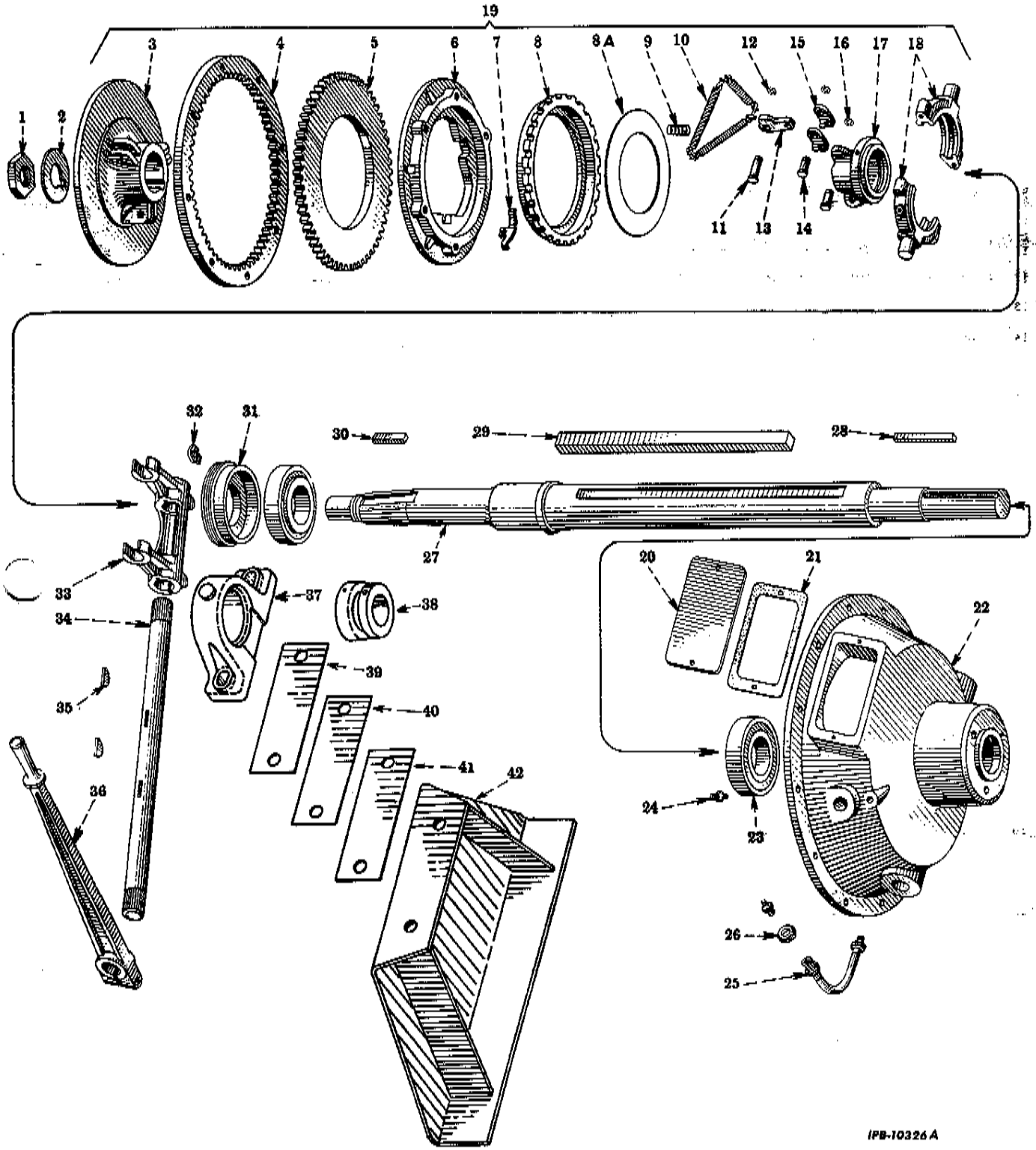
ATTACHMENTS

POWER TAKE-OFF WITH EXTENDED SHAFT – CONTINUED
(Rockford)



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ATTACHMENTS

REF. NO.	I.H. PART NUMBER	DESCRIPTION

POWER TAKE-OFF WITH EXTENDED SHAFT — CONTINUED
(Rockford)

	304 535 R91	ATTACHMENT, power take-off w/extended shaft (11-1/2" overcenter drive ring type clutch) (See NOTES 1 and 3) (Composed of - 1 BEARING 305 861 R91 1 BLOCK 304 485 R91 1 BRACKET 304 573 R11 1 POWER TAKE-OFF 319 519 R91 1 SPACER 266 636 R1 1 SHIM 304 539 R1 1 SHIM 304 540 R1 1 SHIM 304 541 R1)
1	266 681 R1	NUT, drive shaft (PT-732)
2	273 212 R1	WASHER, drive shaft lock (PT-733-4)
3	273 214 R1	BODY, clutch (CL-8498-7)
4	267 065 R1	RING, driving (CL-6950)
5	338 903 R1	FACING, clutch (CL-6953-52)
6	268 861 R91	PLATE, w/LOCK, 319 531 R1, pressure (UC-9518)
7	319 531 R1	LOCK, positive (CL-9216)
8	347 871 R1	NUT, adjusting (CL-8494-1)
8A	347 872 R1	PLATE, adjusting ring (CL-11861)
9	266 704 R1	SPRING, separator (CL-8541) (3)
10	268 865 R91	SPRING, lever (CL-9465)
11	266 697 R1	PIN, clevis (CL-8400) (6)
12	266 698 R1	RING, retaining (CL-7130) (6)
13	268 866 R1	LEVER (CL-8556-1) (3)
14	266 694 R1	PIN, clevis (CL-8484) (3)
15	266 696 R1	LINK, connecting (CL-8557) (6)
16	255 395 R1	RING, retaining (CL-7107) (3)
17	273 217 R1	SLEEVE, release (CL-8630-3)
17	273 216 R91	SLEEVE, 273 217 R1 w/BEARING, 273 218 R91) (UCL-2-8630-3)
18	273 218 R91	BEARING w/two NUT, 19 503 R1 and and one PLUG, 103 883, release (UCL-5-6979)
19	273 215 R91	CLUTCH ASSY, (11-1/2") (CLA-2181-37) (Composed of - 1 BODY 273 214 R1 1 FACING 338 903 R1 3 LEVER 268 866 R1 6 LINK 266 696 R1 1 NUT 347 871 R1 3 PIN 266 694 R1 6 PIN 266 697 R1 1 PLATE 268 861 R91 1 PLATE 347 872 R1 3 RING 255 395 R1 6 RING 266 698 R1 1 RING 267 065 R1 1 SLEEVE w/BEARING 273 216 R91 3 SPRING 266 704 R1 1 SPRING 268 865 R91)
20	321 481 R1	PLATE, instruction (PT-1593)

ATTACHMENTS

REF. NO.	I.H. PART NUMBER	DESCRIPTION

POWER TAKE-OFF WITH EXTENDED SHAFT — CONTINUED
(Rockford)

21	266 656 R1	GASKET, cover (PT-770)
22	273 240 R1	HOUSING, clutch (PT-817-2)
23	13 396 DC	CONE, tapered roller bearing (2)
23	13 390 D	CUP, tapered roller bearing (2)
24	109 461	FITTING, lubrication (3)
25	266 667 R91	TUBE, flexible (PT-1026-1)
26		NUT, 5/8NF (CL-4355)
27	273 209 R1	SHAFT, drive (PT-1466)
28	268 864 R1	KEY, 3/8 x 3/8 x 3-1/2" (PT-1307)
29	268 863 R1	KEY, 5/8 x 5/8 x 11-1/2" (PT-1308)
30	273 211 R1	KEY, 3/8 x 3/8 x 2-1/4" (PT-1363)
31	266 660 R1	RETAINER, bearing (PT-727)
32	266 661 R1	PLATE, lock (PT-44)
33	273 210 R91	YOKE, clutch (UPT-726-1)
34	266 663 R1	SHAFT, yoke (PT-822)
35	124 553	KEY (PT-351) (2)
36	266 666 R91	LEVER, shifting (UPT-87)
37	304 485 R91	BLOCK w/BEARING, 305 166 R91 and FITTING, 109 461, outboard bearing pillow (optional with 304 486 R91)
37	304 486 R91	BLOCK w/BEARING, 305 167 R91, outboard bearing pillow (Optional with 304 485 R91) 1/2" NUT (2) 1/2 x 2" hex-hd cap SCREW (2) 1/2" lock WASHER (2) 17/32 x 1-11/16" x 13 ga. WASHER (2)
38	305 166 R91	BEARING w/locking COLLAR
38	305 167 R91	BEARING w/locking COLLAR
39	304 539 R1	SHIM, outboard bearing (heavy)
40	304 540 R1	SHIM, outboard bearing (medium) (2)
41	304 541 R1	SHIM, outboard bearing (light) (x)
42	304 537 R11	BRACKET, outboard bearing
	305 861 R91	BEARING, clutch pilot (optional with 338 543 R91)
	338 543 R91	BEARING, clutch pilot (optional with 305 861 R91)
	273 355	FITTING, hydraulic lubricator (1/4" drive type) (2)
	19 503 R1	NUT, 5/16NF elastic stop (2)

NOTE 1 - Factory Application - Order On Machine Order Form.
NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

x - Four Or More As Required.

REF. NO.	I.H. PART NUMBER	DESCRIPTION

WER TAKE-OFF WITH EXTENDED SHAFT — CONTINUED
ockford)

319 519 R91 POWER TAKE-OFF w/extended SHAFT ASSY. (PTA-31140) (Willwood for 304 493 R91)

(Composed of -

1	CLUTCH	273 215 R91
2	CONE	13 396 DC
2	CUP	13 390 D
3	FITTING	109 461
2	FITTING	273 355
1	GASKET	266 656 R1
1	HOUSING	273 240 R1
1	KEY	268 863 R1
2	KEY	124 553
1	KEY	268 864 R1
1	KEY	273 211 R1
1	LEVER	266 666 R91
1	NUT	266 681 R1
1	PLATE	321 481 R1
1	PLATE	266 661 R1
1	RETAINER	266 660 R1
1	SHAFT	273 209 R1
1	SHAFT	266 663 R1
1	TUBE	266 667 R91
1	WASHER	273 212 R1
1	YOKE	273 210 R91)

3/8 x 1-1/8" hex-hd cap SCREW (12)
3/8 x 1-1/2" hex-hd cap SCREW (8)
3/8" lock WASHER (20)

103 883 PLUG, 1/8" slt-hd slt pipe (release bearing)

SCREW, 5/16NF x 2" hex-hd cap (release bearing) (2)

SCREW, 3/8 x 1-1/4" hex-hd cap (clutch yoke) (2)

SCREW, 1/4 x 3/8" fil-hd mach (pressure plate)

SCREW, 5/16 x 1/4" fl-pt set (clutch housing)

SCREW, 1/4 x 3/8" rd-hd mach (instruction plate) (2)

SCREW, 5/16 x 1/2" hex-hd cap (lock plate)

SCREW, 3/8 x 1-1/2" hex-hd cap (shifting lever)

265 636 R1 SPACER, clutch pilot bearing

WASHER, 3/8" lock (clutch yoke) (3)

WASHER, 1/4" (Shakeproof) (pressure plate)

WASHER, 5/16" lock (lock plate)

MEMORANDA

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MEMORANDA

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POWER TAKE-OFF
(Rockford)
(UC-263 Regular Duty)

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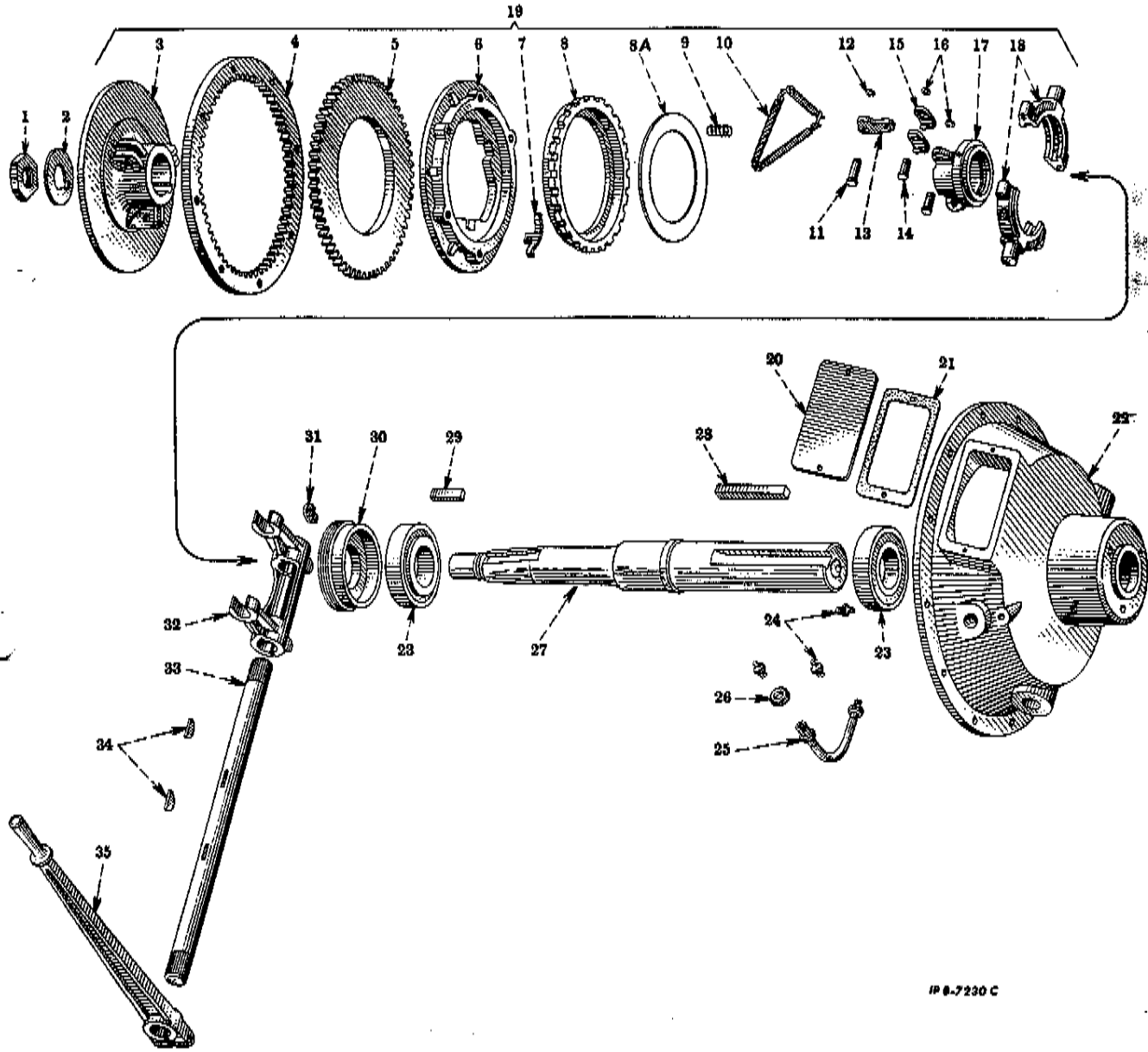
ATTACHMENTS

POWER TAKE-OFF — CONTINUED
(Rockford)
(UC-263 Regular Duty)



IP 8-7230 C

REF. NO.	I. H. PART NUMBER	DESCRIPTION
	273 019 R92	ATTACHMENT, power take-off, 319 524 R91, w/BEARING, 305 861 R91 and SPACER, 265 636 R1 (UC-263 Regular Duty) (with 11-1/2" single plate over-center drive ring type clutch operating at 2200 RPM or below) (See NOTES 1 and 3)
	266 681 R1	NUT, 2-3/16-12, hex. (PT-732)
2	273 212 R1	WASHER, lock (PT-733-4)
3	273 214 R1	BODY, clutch (CL-8498-7)
4	267 065 R1	RING, driving (CL-6950)

NOTE 1 - Factory Application - Order On Machine Order Form.
NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

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ATTACHMENTS

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		POWER TAKE-OFF – CONTINUED (Rockford) (UC-263 Regular Duty)
5	338 903 R1	FACING, clutch (CL-6953-52)
6	268 861 R91	PLATE w/LOCK, 319 531 R1, pressure (UCL-9518)
7	319 531 R1	LOCK, positive (CL-9216)
8	347 871 R1	NUT, adjusting (CL-8494-1)
8A	347 872 R1	PLATE, adjusting ring (CL-1186-1)
9	266 704 R1	SPRING, separator (CL-8541) (3)
10	268 865 R91	SPRING, lever (CL-9465)
11	266 697 R1	PIN, clevis (CL-8400) (6)
12	266 698 R1	RING, retaining (CL-7130) (6)
13	268 866 R1	LEVER (CL-8556-1) (3)
14	266 694 R1	PIN, clevis (CL-8484) (3)
15	266 696 R1	LINK, connecting (CL-8557) (6)
16	255 395 R1	RING, retaining (CL-7107) (3)
17	273 217 R1	SLEEVE, release (CL-8630-3)
18	273 218 R91	BEARING w/two NUT, 258 370 R1, and PLUG, 103 883, release (UCL-5-6979)
19	273 215 R91	CLUTCH ASSEMBLY (11-1/2") (CLA-2181-37) (Composed of - 1 BODY 273 214 R1 1 FACING 338 903 R1 3 LEVER 268 866 R1 6 LINK 266 696 R1 1 NUT 347 871 R1 3 PIN 266 694 R1 6 PIN 266 697 R1 1 PLATE 268 861 R91 1 PLATE 347 872 R1 3 RING 255 395 R1 6 RING 266 698 R1 1 RING 267 065 R1 1 SLEEVE w/BEARING 273 216 R91 3 SPRING 266 704 R1 1 SPRING 268 865 R91)
20	321 481 R1	PLATE, instruction (PT-1593)
21	266 656 R1	GASKET, cover (PT-770)
22	273 240 R1	HOUSING, clutch (PT-817-2)
23	13 396 DC	CONE, tapered roller bearing (390) (2)
23	13 390 D	CUP, tapered roller bearing (394A) (2)
24	109 461	FITTING, 1/8" pipe plug (Lincoln 5000) (PT-1012) (3)
25	266 667 R91	TUBE, flexible (PT-1026-1)
26		NUT, 5/8NF
27	319 946 R1	SHAFT, drive (PT-1357-3)
28	267 060 R1	KEY (PT-780)
29	273 211 R1	KEY, 1/2 x 1-7/8" (PT-1363)
30	266 660 R1	RETAINER, bearing (PT-727)
31	266 661 R1	PLATE, lock (PT-44)
32	273 210 R91	YOKE, clutch (UPT-726-1)

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ATTACHMENTS

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		POWER TAKE-OFF – CONTINUED (Rockford) (UC-263 Regular Duty)
33	266 663 R1	SHAFT, yoke (PT-822)
34	124 553	KEY (Woodruff No. 15) (PT-351) (2)
35	266 666 R91	LEVER, shifting (UPT-87)
	305 861 R91	BEARING, clutch pilot (optional with 338 543 R91)
	338 543 R91	BEARING, clutch pilot (optional with 305 861 R91)
	19 503 R1	NUT, 5/16NF, elastic stop (2)
	319 524 R91	POWER TAKE-OFF, w/11-1/2" over-center clutch assembly (PTA-31133) (will work for 273 016 R91) (Composed of - 1 CLUTCH 273 215 R91 2 CONE 13 396 DC 2 CUP 13 390 D 3 FITTING 109 461 1 GASKET 266 656 R1 1 HOUSING 273 240 R1 2 KEY 124 553 1 KEY 267 060 R1 1 KEY 273 211 R1 1 LEVER 266 666 R91 1 NUT 266 681 R1 1 PLATE 266 661 R1 1 PLATE 321 481 R1 1 RETAINER 266 660 R1 1 SHAFT 266 663 R1 1 SHAFT 319 946 R1 1 TUBE 266 667 R91 1 WASHER 273 212 R1 1 YOKE 273 210 R91) 3/8 x 1-1/8" hex-hd. cap SCREW (12) 3/8 x 1-1/2" hex-hd. cap SCREW (8) 3/8" lock WASHER (20)
	103 883	PLUG, 1/8" slt-hd. pipe (steel) (PT-989)
		SCREW, 1/4 x 3/8" rd-hd mach (2)
		SCREW, 1/4 x 3/8" fil-hd.
		SCREW, 3/8 x 1-1/4" hex-hd. cap (2)
		SCREW, 5/16 x 1/2" hex-hd. cap
		SCREW, 1/2 x 1-3/4" hex-hd. cap
		SCREW, 5/16NF x 2" hex-hd. cap (2)
		SCREW, 5/16 x 5/16" f-pt. set
	273 216 R91	SLEEVE, 273 217 R1, w/release BEARING, 273 218 R91, release (UCL-8630-3)
	265 636 R1	SPACER, clutch pilot bearing
		WASHER, 5/16" lock
		WASHER, 3/8" lock (2)
		WASHER, 1/2" lock
		WASHER, 1/4" (Shakeproof)

POWER TAKE-OFF
(Rockford) (UC-221 Light Duty)

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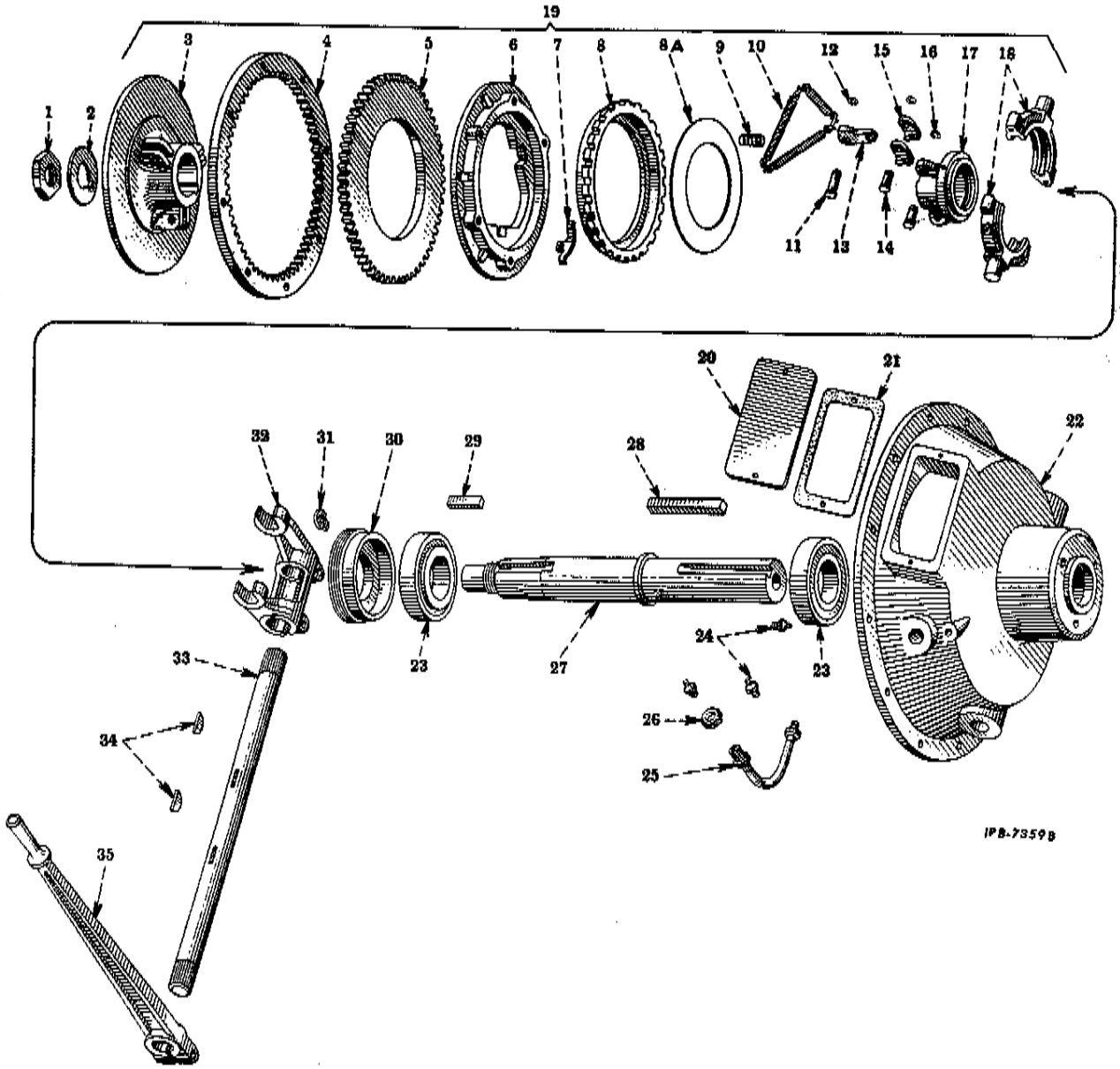
ATTACHMENTS

POWER TAKE-OFF – CONTINUED
(Rockford) (UC-221 Light Duty)



REF. NO.	I. H. PART NUMBER	DESCRIPTION
	273 020 R91	ATTACHMENT, power take-off 319 500 R91 w/BEARING, ST 301 (with 8" single plate over-center drive ring type clutch) (UC-221 light duty) (used with flywheel Attachment, 312 729 R91) (See NOTES 1 and 3)
1	258 671 R1	NUT, hex. (PT-706)
2	258 670 R1	WASHER, lock (PT-718-1)
3	269 110 R1	BODY, clutch (CL-8512-9)
	266 699 R1	RING, driving (CL-6965)

REF. NO.	I. H. PART NUMBER	DESCRIPTION
5	266 686 R1	FACING, clutch (CL-7039-1)
6	266 688 R1	PLATE (CL-8513-1)
7	266 690 R1	LOCK, adjusting (CL-8516-1)
8	347 766 R1	NUT, adjusting (CL-8515-1) (together with PLATE, 347 767 R1 will work for 266 689 R1)

NOTE 1 - Factory Application - Order On Machine Order Form.
NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

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ATTACHMENTS

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		POWER TAKE-OFF — CONTINUED (Rockford) (UC-221 Light Duty)
8A	347 767 R1	PLATE, adjusting ring (CL-11905) (together with NUT, 347 766 R1 will work for 266 689 R1)
9	266 687 R1	SPRING, separator (CL-8575) (3)
10	269 109 R91	SPRING, lever (CL-9464)
11	266 697 R1	PIN, clevis (CL-8400) (6)
12	266 698 R1	RING, retaining (CL-7130) (6)
13	268 866 R1	LEVER (CL-8556-1) (3)
14	266 694 R1	PIN, clevis (CL-8484) (3)
15	266 696 R1	LINK, connecting (CL-8557) (6)
16	255 395 R1	RING, retaining (CL-7107) (3)
17	266 700 R1	SLEEVE, release (CL-8611)
18	266 701 R91	BEARING w/two NUT, 19 503 R1 release (UCL-1-7392-1)
	19 503 R1	NUT, 5/16NF elastic stop (Esna-29E-054) (2)
		5/16NF x 1-3/4" hex-hd cap SCREW (2)
19	266 683 R92	CLUTCH ASSEMBLY, 8" (CLA-2175-A) (Composed of - 1 BODY 269 110 R1; 1 FACING 266 686 R1; 3 LEVER 268 866 R1; 6 LINK 266 696 R1; 1 LOCK 266 690 R1; 1 NUT 347 766 R1; 3 PIN 266 694 R1; 6 PIN 266 697 R1; 1 PLATE 266 688 R1; 1 PLATE 347 767 R1; 3 RING 255 395 R1; 1 RING 266 699 R1; 6 RING 266 698 R1; 1 SLEEVE w/BEARING 266 691 R91; 3 SPRING 266 687 R1; 1 SPRING 269 109 R91)
20	321 481 R1	PLATE, instruction (PT-1593)
21	266 656 R1	GASKET, cover (PT-770)
22	266 654 R2	HOUSING, clutch (PT-831-4)
23	62 923 R91	CONE, tapered roller bearing (2)
23	ST 977	CUP, tapered roller bearing (2)
24	271 409	FITTING, 1/8" plug pipe (Lincoln 5000) (3)
25	266 667 R91	TUBE, flexible (PT-1026-1)
26		NUT, 5/8NF
27	319 534 R1	SHAFT, drive (PT-833-4)
	103 881	PLUG, 1/8" pipe
28	266 669 R1	KEY (PT-835)
29	266 678 R1	KEY (1/4 x 1/4 x 2") (PT-884)
30	266 659 R1	RETAINER, bearing (PT-834)
31	266 661 R1	PLATE, lock (PT-44)
32	266 665 R91	YOKE, clutch (UPT-811)
33	266 662 R1	SHAFT, yoke (PT-201)
34	124 553	KEY (Woodruff, No. 15) (PT-351) (2)
35	266 666 R91	LEVER, shifting (UPT-87)
	ST 301	BEARING, clutch pilot

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ATTACHMENTS

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		POWER TAKE-OFF — CONTINUED (Rockford) (UC-221 Light Duty)
	319 500 R91	POWER TAKE-OFF w/8" over-center clutch assembly (PTA-3815) (will work for 265 814 R92) (Composed of - 1 CLUTCH 266 683 R92; 2 CONE 62 923 R91; 2 CUP ST 977; 3 FITTING 271 409; 2 FITTING 145 692; 1 GASKET 266 656 R1; 1 HOUSING 266 654 R2; 2 KEY 124 553; 1 KEY 266 669 R1; 1 KEY 266 678 R1; 1 LEVER 266 666 R91; 1 NUT 258 671 R1; 1 PLATE 266 661 R1; 1 PLATE 321 481 R1; 1 RETAINER 266 659 R1; 1 SHAFT 266 662 R1; 1 SHAFT 319 534 R1; 1 TUBE 266 667 R91; 1 WASHER 258 670 R1; 1 YOKE 266 665 R91)
		3/8 x 1-1/8" hex-hd cap SCREW (12)
		3/8 x 1-3/8" hex-hd cap SCREW (6)
		3/8" lock WASHER (18)
	103 883	PLUG, 1/8" sltd-hd pipe (PT-989)
		SCREW, 1/4 x 3/8" rd-hd mach (2)
		SCREW, 1/4 x 3/8" fil-hd
		SCREW, 3/8 x 1-1/4" hex-hd cap (2)
		SCREW, 5/16 x 1/2" hex-hd cap
		SCREW, 1/2 x 1-3/4" hex-hd cap
		SCREW, 5/16 x 1/4" f-pt set
	266 691 R91	SLEEVE, 266 700 R1, w/release BEARING, 266 701 R1 (UCL-1-8611)
		WASHER, 5/16" lock
		WASHER, 3/8" lock (2)
		WASHER, 1/2" lock
		WASHER, 1/4" (Shakeproof)

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ATTACHMENTS

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		POWER TAKE-OFF (Twin-Disc)
		Parts without letters after the description indicates the part is used for all attachments listed below. Letters "A" thru "F" are used to identify separate attachments.
A	266 818 R92	ATTACHMENT, power take-off w/standard shaft (11-1/2" single plate overcenter drive ring type clutch) (for light duty and sideload applications w/PTO speeds of 2200 rpm or below) (see NOTES 1 and 3)
B	304 536 R91	ATTACHMENT, power take-off w/extended shaft (11-1/2" overcenter drive ring type clutch) (see NOTES 1 and 3)
C	345 345 R91	ATTACHMENT, high speed power take-off w/11-1/2" single plate overcenter drive ring clutch, 2-1/4" dia. shaft w/sealed for life cartridge type pilot bearing - P.T.O. shaft has no rifle drill (for heavy duty clutch and side load applications w/ P.T.O. speeds above 2200 rpm) (UC-263) (See NOTES 1 and 3)
D	345 346 R91	ATTACHMENT, high speed power take-off w/11-1/2" single plate overcenter drive ring clutch, 2-1/4" dia. shaft w/sealed for life cartridge type pilot bearing - P.T.O. shaft has no rifle drill (for heavy duty clutch and side load-applications w/ P.T.O. speeds above 2200 rpm) (includes safety shut-off) (UC-263) (See NOTES 1 and 3)
E	273 018 R91	ATTACHMENT, power take-off 321 054 R91 w/bearing, 305 861 R91 (UC-221 regular duty) (UC-263 light duty) (with 10" single plate overcenter drive ring type clutch) (See NOTES 1 and 3)
F	273 021 R91	ATTACHMENT, power take-off, 321 052 R91 w/bearing, ST-301 (with 8" single plate overcenter drive ring type clutch) (UC-221 light duty) (Used with flywheel attachment 312 759 R91) (See NOTES 1 and 3)
	305 861 R91	BEARING, clutch pilot (optional with 338 543 R91) (Attachments A thru E)
	338 543 R91	BEARING, clutch pilot (optional with 305 861 R91) (Attachments A thru E)
	ST 301	BEARING, clutch pilot (Attachment F)
	308 610 R91	BLOCK w/BEARING, 305 167 R91, outboard bearing pillow (optional with 304 484 R91, 304 485 R91 and 304 486 R91) (Attachment B)
	304 484 R91	BLOCK w/BEARING, 305 165 R91, outboard bearing pillow (optional with 304 485 R91 or 304 486 R91 and 308 610 R91) (Attachment B)
	304 485 R91	BLOCK w/BEARING, 305 166 R91 and FITTING, 138 322 H, outborad bearing pillow (optional with 304 484 R91 or 304 486 R91 and 308 610 R91) (Attachment B)
	304 486 R91	BLOCK w/BEARING, 305 167 R91, outboard bearing pillow (optional with 304 484 R91 or 304 485 R91 and 308 610 R91) (Attachment B) 1/2" NUT (2) 1/2 x 2" hex-hd cap SCREW (2) 1/2" lock WASHER (2) 17/32 x 1-11/16" x 13 ga. WASHER (2)

ATTACHMENTS

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		POWER TAKE-OFF — CONTINUED (Twin-Disc)
	304 537 R11	BRACKET, outboard bearing (Attachment B)
	345 347 R91	CABLE, temperature switch to junction block (Attachment D)
	366 460 R1	CLIP, cable (mount on power take-off bolts) (2 for Attachment D)
	60 610 D	KEY, belt pulley short (Attachment B)
	60 614 D	KEY, belt pulley long (Attachment B)
	321 054 R91	POWER TAKE-OFF w/STANDARD SHIFT ASSY (Twin-Disc Spec. No. 23712) (Will work for 265 817 R91) (Attachment E) (*)
	321 052 R91	POWER TAKE-OFF w/STANDARD SHAFT ASSY (Twin Disc. Spec. No. 20665) (Will work for 265 816 R91 (Attachment F) (*)
	321 056 R91	POWER TAKE-OFF w/extended shaft ASSY. (Twin-Disc Spec. No. 26713) (Attachment B) (*)
	321 057 R91	POWER TAKE-OFF w/standard shaft ASSY (Twin-Disk Spec. No. 26769) (Attachment A) (*)
	346 882 R91	POWER TAKE-OFF w/standard shaft ASSY (Twin-Disc Spec. No. 30287) (Attachments C and D) (*) 3/8 x 1-1/8" hex-hd cap SCREW (12) 3/8 x 1-1/2" hex-hd cap SCREW (8) 3/8" lock WASHER (20)
	304 539 R1	SHIM, outboard bearing heavy (Attachment B)
	304 540 R1	SHIM, outboard bearing medium (2 for Attachment B)
	304 541 R1	SHIM, outboard bearing light (4 or more for Attachment B)
	265 636 R1	SPACER, clutch pilot bearing
	183 350 R91	SWITCH, temperature (250°) (Attachment D)

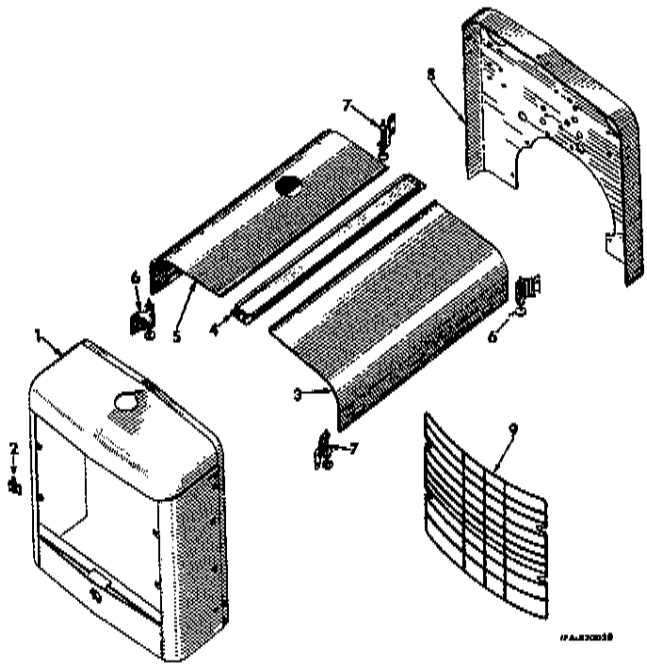
* - Order Detail Service Parts From Nearest Twin-Disc Distributor.

NOTE 1 - Factory Application - Order On Machine Order Form.

NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

ATTACHMENTS

GRILLE, HOOD AND DASH



REF. NO.	I. H. PART NUMBER	DESCRIPTION
		Parts without letters after the description indicate the part is used for all attachments listed below: Letters A, B, C and D are used to identify separate attachments.
A	304 581 R91	ATTACHMENT, hood and dash (+)
B	320 136 R91	ATTACHMENT, hi-flow radiator grille (not for use with readiator shutter) (see NOTES 1 and 3)
C	320 137 R91	ATTACHMENT, hi-flow radiator grille (for use with radiator shutter) (see NOTES 1 and 3)
D	349 145 R91	ATTACHMENT, hood and dash (see NOTES 1 and 3)
1	320 138 R1	HOUSING, radiator grille (Attachment B)
1	320 140 R91	HOUSING, radiator grille (Attachment C) 5/16 x 1/2" hex-hd cap SCREW (8) 5/16" lock WASHER (8)
2	275 194 R91 363 284 R2	EMBLEM, "IH" (Attachments B and C) FASTENER, "IH" emblem (2)
3	265 581 R1	HOOD, LH engine (Attachments A and D)
4	268 390 R11	STRIP, hood center (Attachments A and D) 3/8" NUT (4) 3/8 x 5/8" hex-hd cap SCREW (4) 3/8" lock WASHER (4)
5	304 582 R1	HOOD, RH engine (Attachments A and D)
6	265 586 R91	HOOK, RH hood clamp (2 for Attachments A and D) 5/16 x 1/2" hex-hd cap SCREW (4) 5/16" lock WASHER (4)

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ATTACHMENTS

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		GRILLE, HOOD AND DASH – CONTINUED
7	265 585 R91	HOOK, LH hood clamp (2 for Attachments A and D) 5/16 x 1/2" hex-hd cap SCREW (4) 5/16" lock WASHER (4)
8	304 583 R2	DASH (Attachment A)
8	349 146 R1	DASH (Attachment D) 3/8 x 3/4" hex-hd cap SCREW (5 for Attachment A) 3/8" lock WASHER (5 for Attachment A, 4 for Attachment D) 3/8 x 5/8" hex-hd cap SCREW (4 for Attachment D) 13/32 x 13/16" x 16 ga. WASHER (2 for Attachment A)
9	320 139 R1 321 719 R91 354 837 R1	GRILLE, hi-flow (Attachments B and C) BOLT, grille (4) WASHER, flat (4)
9	304 600 R91	GRILLE, radiator (order PACKAGE, 320 149 R91 or 320 163 R91)
	144 229	GROMMET (Attachment A)
	320 149 R1	PACKAGE, radiator grille field service (for units without radiator shuter) (Consists of - 4 BOLT 321 719 R91 1 GRILLE 320 139 R1 1 HOUSING 320 138 R11 4 WASHER 354 837 R1)
	320 163 R91	PACKAGE, radiator grille field service (for units with radiator shutter) (Consists of - 4 BOLT 321 719 R91 1 GRILLE 320 139 R1 1 HOUSING 320 140 R91 4 WASHER 354 837 R1)
		NUT, 3/8" (+) (2 for Attachment D)
		SCREW, 3/8 x 3/4" hex-hd cap (+) (2 for Attachment D)
		SCREW, 3/8 x 3/8" hex-hd cap (+) (2 for Attachment D)
		WASHER, 3/8" lock (+) (4 for Attachment D)

* - For Use With Dash When Instrument And Panel Attachment Is Not Rear Mounted.

NOTE 1 - Factory Application - Order On Machine Order Form.

NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

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DIATOR SHUTTER
tomatic) (Kysor Heater)

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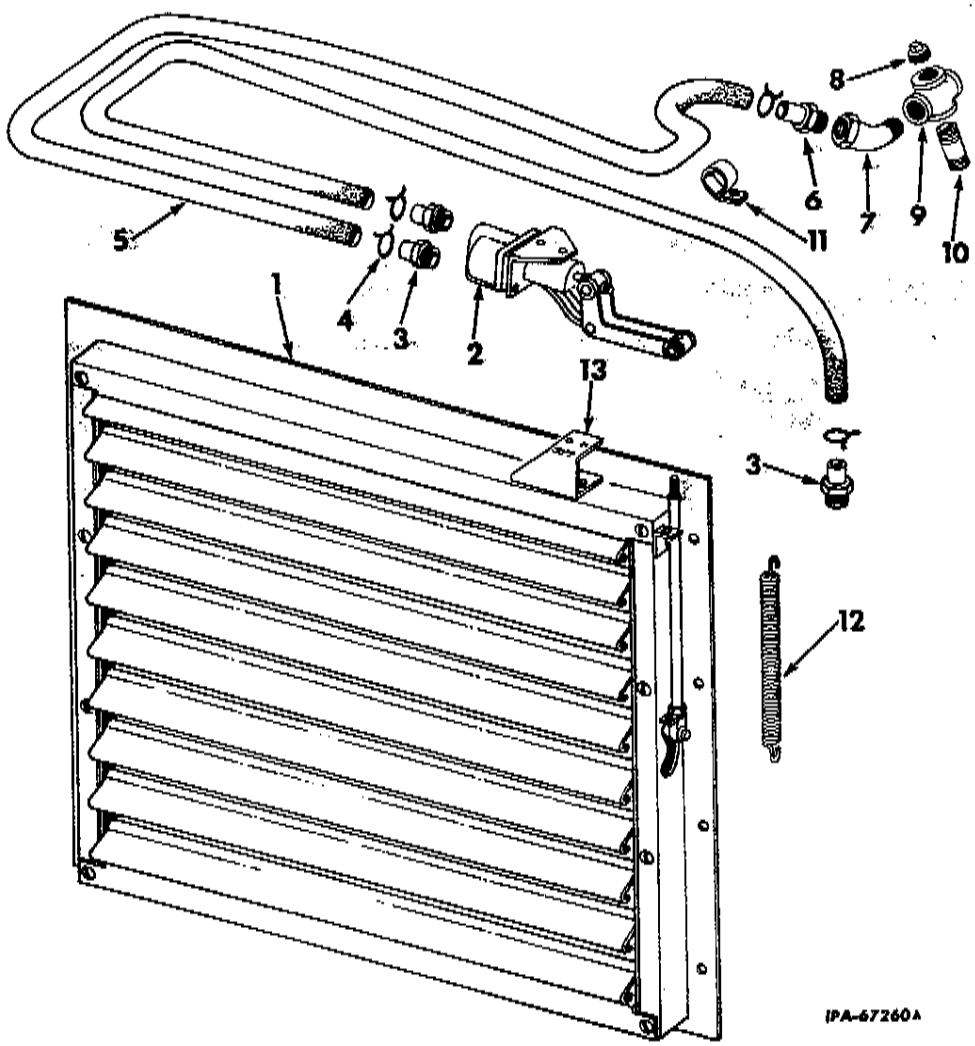
ATTACHMENTS

RADIATOR SHUTTER – CONTINUED
(Automatic) (Kysor Heater)

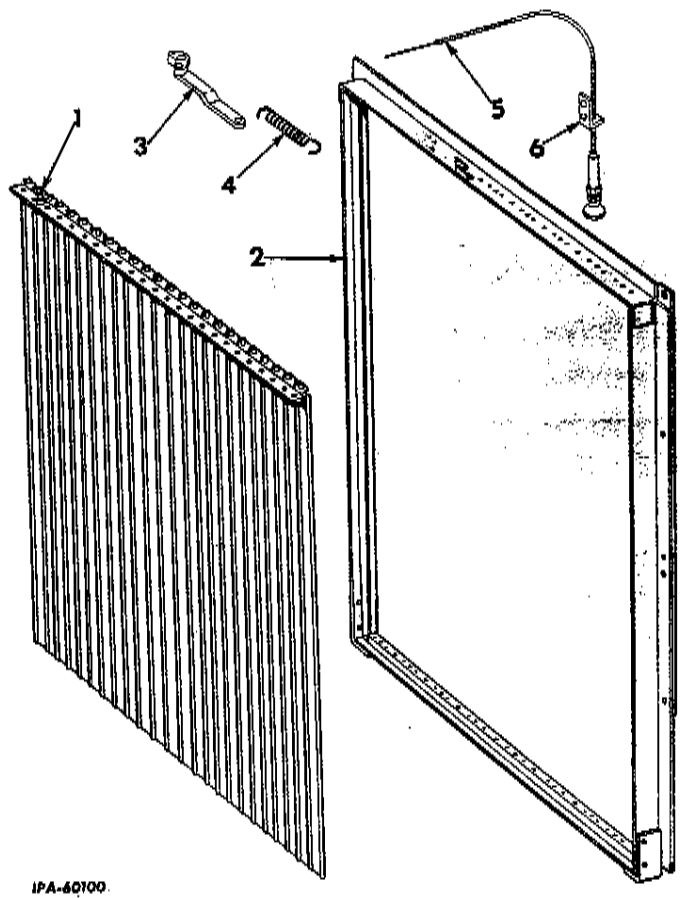


REF. NO.	I. H. PART NUMBER	DESCRIPTION
	318 021 R91	ATTACHMENT, radiator shutter (See NOTES 1 and 3)
1	313 326 R91	SHUTTER w/CONTROL, 615 236 C91, BRACKET, 615 237 C1, and SPRING, 317 785 R1, radiator (M1856) 5/16 x 1/2" hex-hd cap SCREW (8) 5/16" lock WASHER (8)
2	615 236 C91	CONTROL, vernatherm (C-16318-165) 1/4NF x 1/2" hex-hd cap SCREW (cd-pltd) (4) 1/4" lock WASHER (4)
3	171 819 R1	NIPPLE, hose (3)
4	112 700 R1	CLAMP, hose (4)
5	312 278 R1	HOSE, radiator to vernatherm (5/8 x 15/16 x 49") (2)
	171 820 R1	NIPPLE, hose

REF. NO.	I. H. PART NUMBER	DESCRIPTION
7	137 894	ELBOW, 1/2 x 45° street
8	438 159	PLUG, 1/2" pipe
9	142 340	CROSS, 1/2" pipe
10	144 610	NIPPLE, 1/2 x 1-3/8" pipe
11	301 819 R1	CLIP, hose
12	317 785 R1	SPRING, control rod (7785)
13	615 237 C1	BRACKET, control (C-23102)
	445 673	PLUG, 3/8" pipe
		WASHER, 5/16 x 3/4 x .065" (cd-pltd) 3/32 x 1/2" cotter PIN
		NOTE 1 - Factory Application - Order on Machine Order Form. NOTE 3 - Field Application - Order through Regular Service Parts Channels.

ATTACHMENTS

RADIATOR SHUTTER
(Manual) (Hardy Mfg. Corp.)



IPA-60100

REF. NO.	I. H. PART NUMBER	DESCRIPTION
	312 184 R91	ATTACHMENT, radiator shutter (See NOTES 1 and 3)
1	317 781 R91	SHUTTER w/operating BAR (27817) 1/4" NUT (4) 1/4 x 5/8" slt-rd-hd mach SCREW (4) 1/4" lock WASHER (4)
2		FRAME (Not Furnished Separately)
3	317 680 R91	BELLCRANK w/operating LINK (27811)
4	47 530 D	SPRING, bellcrank (15549)
5	313 224 R91	CONTROL, vernier 1/4NF x 1/2" ov-pt, hex-soc-hd, set SCREW 1/4NF NUT
6	312 185 R1	BRACKET, shutter control 3/8 x 1" hex-hd cap SCREW

ATTACHMENTS

RADIATOR SHUTTER – CONTINUED
(Manual) (Hardy Mfg. Corp.)

REF. NO.	I. H. PART NUMBER	DESCRIPTION
	313 225 R91	SHUTTER ASSEMBLY, manual (27745) (Composed of - 1 BELLCRANK w/LINK 317 680 R91 §1 FRAME 1 SHUTTER, w/BAR 317 781 R91 1 SPRING 47 530 D 1 WASHER 352 627 R1) 5/16 x 1/2" hex-hd cap SCREW (8) 5/16" lock WASHER (8)
		NUT, No. 10
		SCREW, No. 10 x 9/16" rd-hd mach
		WASHER, No. 10 internal-tooth lock
	352 627 R1	WASHER, .325 x 5/8" flat (13371) 3/32 x 5/8" cotter PIN

NOTE 1 - Factory Application - Order On Machine Order Form.
NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

RADIATOR AND CONNECTIONS AND FAN GUARD

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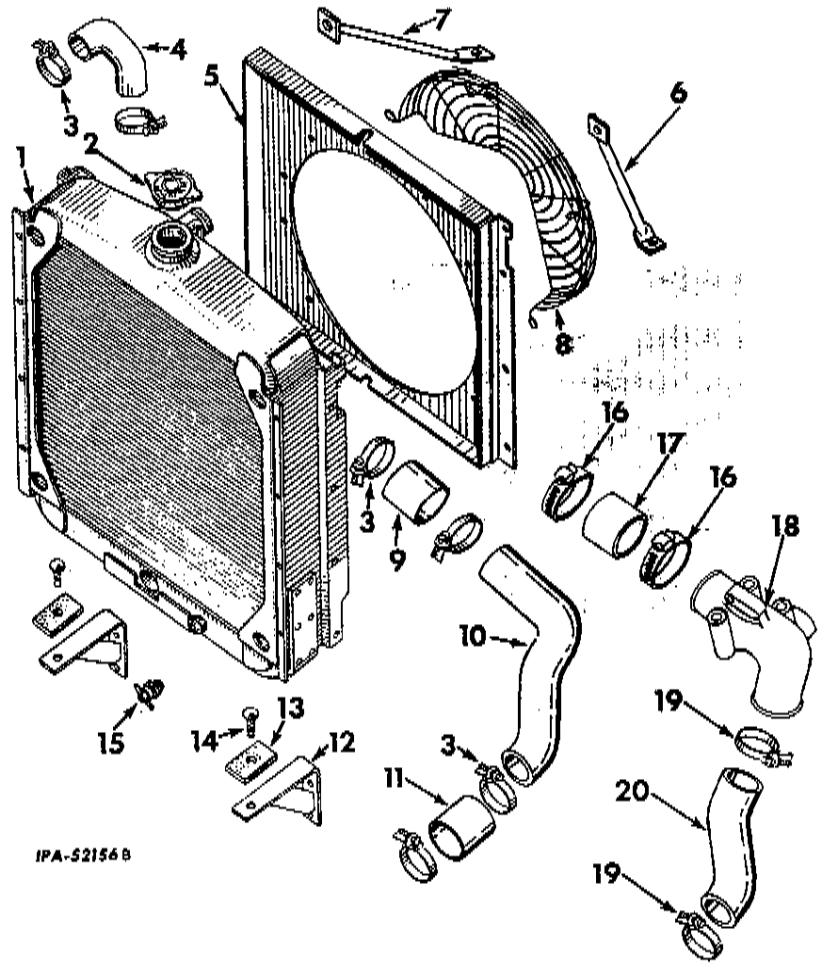
ATTACHMENTS

RADIATOR AND CONNECTIONS AND FAN GUARD — CONTINUED



REF. NO.	I. H. PART NUMBER	DESCRIPTION
(X) - KEY TO UNITS -		
A -	304 577 R91	ATTACHMENT, fan guard (UC-221 and (UC-263) (See NOTES 1 and 3)
B -	609 106 C91	ATTACHMENT, radiator and connections (for units equipped with Hydraulic Pump) (See NOTES 1 and 3)
C -	305 193 R92	ATTACHMENT, radiator and connections (for units not equipped with Hydraulic Pump) (UC-263) (See NOTES 1 and 3)
D -		Service parts for radiator and connections (for units equipped with Hydraulic Pump) (UC-221)
E -		Service parts for radiator and connections (for units equipped with Hydraulic Pump) (UC-263)
(X) - Letters of these units correspond with those shown following the description of the parts in the list below and identifies the units for which the part is used. Items without letters after the description indicates the part is used for all units.		
	265 595 R93	RADIATOR (will work for 304 608 R93)

REF. NO.	I. H. PART NUMBER	DESCRIPTION
2	361 705 R91	CAP, radiator (Units B, C, D and E)
3	Z74 088 R91	CLAMP, radiator elbow (4 for Unit B and 6 for Unit C; 2 for Units D and E)
4	304 596 R1	ELBOW, radiator inlet (Units B, C, D and E)
5	612 292 C1	SHROUD, fan (Unit B) 5/16 x 1/2" hex-hd cap SCREW (4) 5/16 x 3/4" hex-hd cap SCREW (2) 5/16" lock WASHER (6) 3/8 x 1/2" hex-hd cap SCREW (2) 3/8" lock WASHER (2)
5	304 590 R11	SHEET, fan housing (Units C, D and E) 5/16 x 1/2" hex-hd cap SCREW (6) 5/16" lock WASHER (6)
6	601 712 C1	BRACE, radiator LH (Units B, C, D and E) 3/8 x 3/4" hex-hd cap SCREW
		NOTE 1 - Factory Application - Order on Machine Order Form. NOTE 3 - Field Application - Order through Regular Service Parts Channels.

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ATTACHMENTS

REF. NO.	I.H. PART NUMBER	DESCRIPTION
		RADIATOR AND CONNECTIONS AND FAN GUARD — CONTINUED
7	601 713 C1	BRACE, radiator RH (Units B, C, D and E)
8	304 578 R91	GUARD, fan (Unit A) 5/16 x 1/2" hex-hd cap SCREW (4) 5/16" lock WASHER (4) 11/32 x 11/16 x 16 ga WASHER (4)
9	407 008 R1	HOSE, upper radiator outlet elbow (2 x 2-3/16 x 2-1/4" long) (Units B and C)*
10	305 197 R1	ELBOW, radiator outlet (Units B and C)
11	407 009 R1	HOSE, lower radiator outlet elbow (2-1/8 x 2-5/16 x 1-7/8" long) (Units B and C)*
12	310 336 R11	SUPPORT, radiator (2 for Units B, C, D and E) 5/8" NUT (4) 5/8 x 1-1/4" hex-hd cap SCREW (2) 5/8 x 1-1/2" hex-hd cap SCREW (2) 5/8" lock WASHER (4)
13	265 597 R1	PAD, radiator (2 for Units B, C, D and E)
14	15 024 R1	BOLT, radiator mounting (2 for Units B, C, D and E) 7/16" NUT (2) 7/16" lock WASHER (2) 15/32 x 59/64" x 16 ga. WASHER (2)
15	31 729 D	VALVE, radiator drain (Units B, C, D and E)
16	279 038 R1	CLAMP, hose (2 for Units D and E)
17	278 281 R1	HOSE, water inlet (2 x 2-3/8 x 1-3/4") (Units D and E)
18	312 501 R1	ELBOW, water inlet (Units D and E) 3/8 x 2-3/4" hex-hd cap SCREW (3) 3/8" lock WASHER (3)
19	274 088 R91	CLAMP, radiator outlet elbow hose (2 for Units D and E)
20	304 597 R1	ELBOW, radiator outlet (Units D and E)
	444 782	PLUG, water inlet (for condenser) (Unit C)
	445 673	PLUG, water inlet (for condenser) (Unit C)

*Make From Bulk Stock. Bulk Stock Furnished In 3 Foot Lengths. Part No. Is For 1 Foot Of Hose Only.

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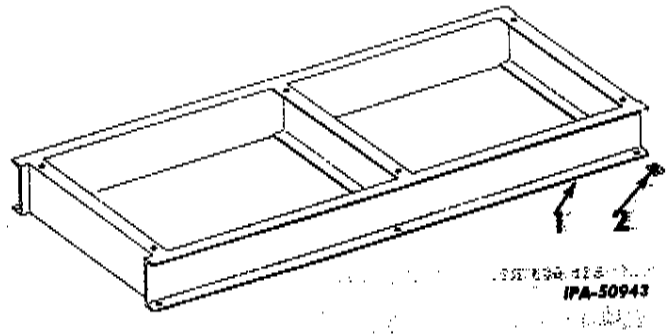
ATTACHMENTS

SUB-BASE
(For UC-263 Power Units equipped with Extended Shaft and Outboard Bearing Attachment)



REF. NO.	I.H. PART NUMBER	DESCRIPTION
	304 605 R91	ATTACHMENT, sub-base (UC-263) (See NOTES 1 and 3) (Consists of the following parts -
1	304 602 R91	SUB-BASE 5/8" NUT (6) 5/8 x 1-3/4" hex-hd cap SCREW (6) 5/8" lock WASHER (6)
2	51 811 D	WASHER, bevel (6)

NOTE 1 - Factory Application - Order On Machine Order Form.
NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

ATTACHMENTS

REF	J.H. PART NUMBER	DESCRIPTION

AUXILIARY DRIVE PULLEY

318 001 R91	ATTACHMENT, auxiliary drive pulley (6.75" OD single "A" sheave) (for use with suction fan ATTACHMENT, 320 165 R91 or blower fan ATTACHMENT, 323 768 R91) (See NOTES 1 and 3)
318 002 R91	ATTACHMENT, auxiliary drive pulley (6.75" OD single "B" sheave) (for use with suction fan ATTACHMENT, 320 166 R91 or blower fan ATTACHMENT, 323 768 R91) (18-1/2" dia. 5 blade w/1.62" spacer) (See NOTES 1 and 3)
318 003 R91	ATTACHMENT, auxiliary drive pulley (5.02" OD single "A" sheave (For use with suction fan ATTACHMENT, 320 165 R91 or blower fan ATTACHMENT, 323 768 R91 (See NOTES 1 and 3)
284 358 R1	PULLEY, auxiliary drive (part of ATTACHMENT, 318 001 R91)
9 409 030	BOLT, 3/8 x 1-1/4" (Type "AA" lock) (4)
318 007 R1	PULLEY, auxiliary drive (part of ATTACHMENT, 318 002 R91)
9 409 231	BOLT, 3/8 x 1-1/2" (Type "AA" lock) (4)
338 952 R91	PULLEY, auxiliary drive (part of ATTACHMENT, 318 003 R91)

FLEXIBLE COUPLING

318 004 R91	ATTACHMENT, flexible coupling (front power take-off (48 H.P. capacity) (for use with suction fan ATTACHMENT, 316 170 R91) (18" dia. 6 blade w/1.38" spacer) or blower fan ATTACHMENT, 316 168 R91 (18" dia. 6 blade w/1.00" spacer) (See NOTES 1 and 3)
318 005 R91	ATTACHMENT, flexible coupling (front power take-off) (20 H.P. capacity) (for use with blower fan ATTACHMENT, 304 549 R91 and suction fan ATTACHMENT, 320 165 R91) (See NOTES 1 and 3)
319 650 R91	COUPLING, flexible (part of ATTACHMENT, 318 005 R91)
319 651 R91	COUPLING, flexible (part of ATTACHMENT, 318 004 R91)
	3/8 x 7/8" soc-hd cap SCREW (4)
	NUT, 1"NF crankshaft jam

NOTE 1 - Factory Application - Order On Machine Order Form.

NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

MEMORANDA

ATTACHMENTS

TOOLS
(Owatonna Tool Company)

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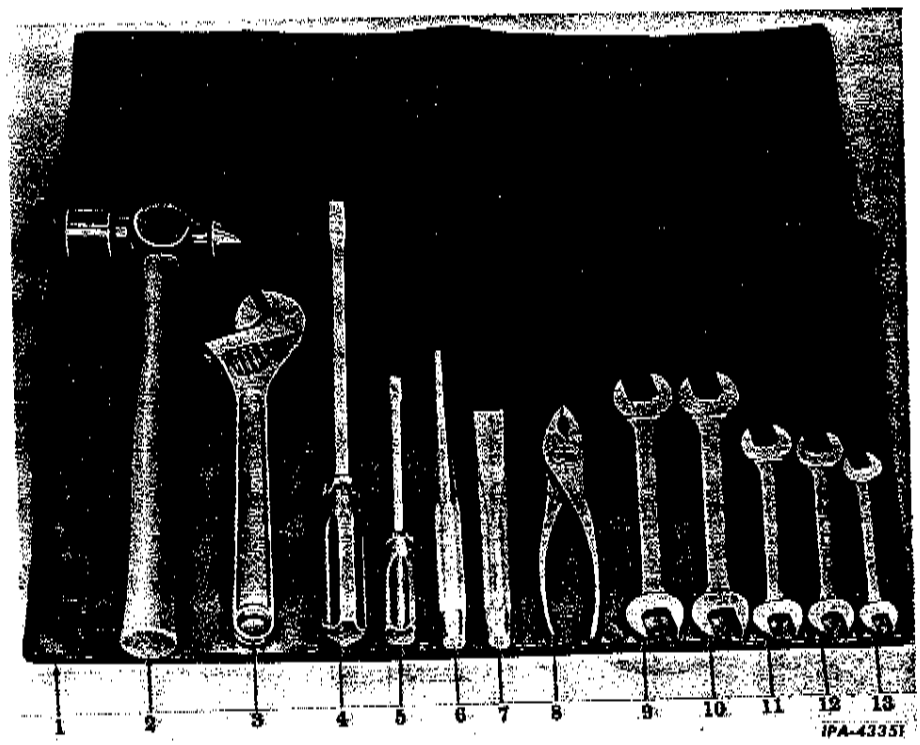
ATTACHMENTS

TOOLS – CONTINUED
(Owatonna Tool Company)



REF. NO.	MFR'S. NUMBER	DESCRIPTION
		TOOL SET (I.H. Part No. 276 822 R91) (order through regular service parts channels) (See NOTE)
1	ED-1133	ROLL, tool (leatherette)
2	BP-32	HAMMER (2 lb. - ball peen)
3	DA-12	WRENCH (adjustable - 12" long)
4	SS-123	SCREWDRIVER (3/8" shank)
5	SS-83	SCREWDRIVER (1/4" shank)
6	TP-24	PUNCH (10" long)
7	CC-24	CHISEL (8" long)
8	712-A	PLIERS (slip joint - 8" long)
9	E-2426	WRENCH, end (3/4 x 13/16")
10	E-2628	WRENCH, end (13/16 x 7/8")
11	E-2022	WRENCH, end (5/8 x 11/16")
12	E-1820	WRENCH, end (9/16 x 5/8")
13	E-1416	WRENCH, end (7/16 x 1/2")

NOTE - Order Individual Tools And Complete Tool Sets From Service Tools, Inc., 1923 South Indiana Avenue Chicago 16, Illinois.

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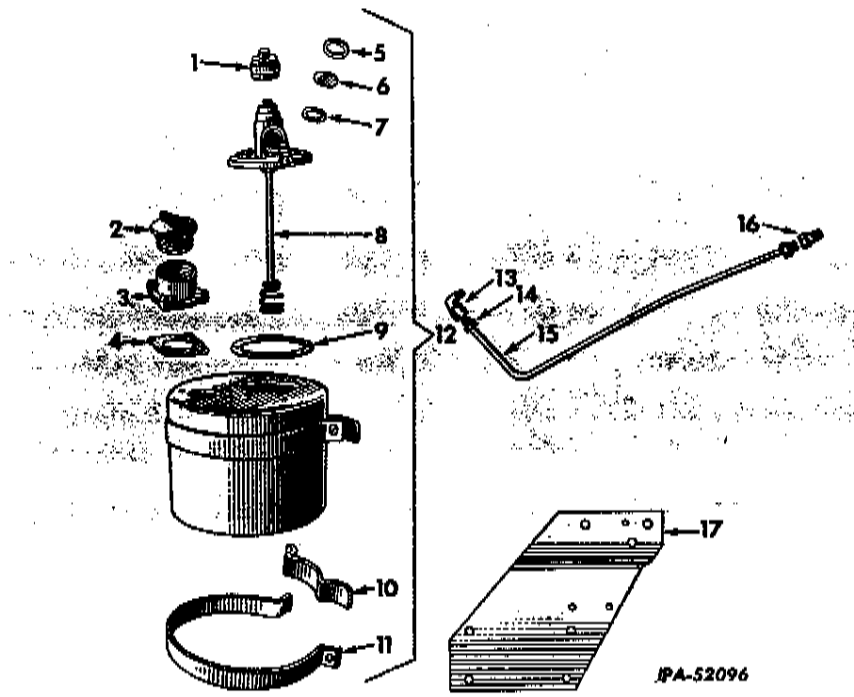
TOP CYLINDER OILER
(Emerol Manufacturing Company's Marvel" Oiler)

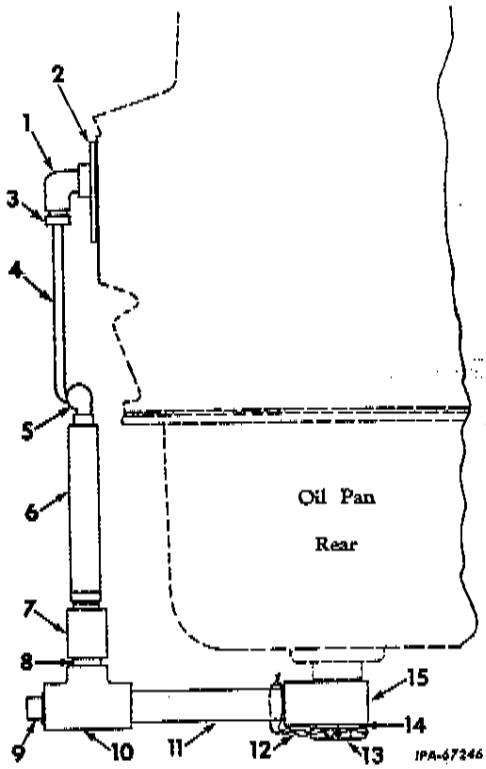


REF. NO.	I. H. PART NUMBER	DESCRIPTION
	305 883 R91	ATTACHMENT, top cylinder oiler (See NOTES 1 and 3)
1	38 976 D	CAP, head (T-5-1)
2	261 518 R1	PLUG, filler (T-56-6)
3	261 517 R1	BODY, filler (T-56-5) No. 8 x 5/8" slt-fil-hd. SCREW (4)
4	38 974 D	GASKET, filler body (T-16-33)
5	39 824 D	NUT, sight glass lock (T-81-10)
6	39 822 D	GLASS, sight (plastacele) (T-62-1)
7	39 823 D	GASKET, sight glass (T-16-5)
8	38 970 D	HEAD (T-10-510) No. 8 x 5/8" slt-fil-hd. SCREW (6)
9	38 975 D	GASKET, head to tank (T-18-10)
10	38 972 D	SADDLE (T-118-6) (2) No. 10NF x 1/2" slt-rd-hd. SCREW (4)
11	38 971 D	STRAP (T-118-5) (2)
12	36 087 DA	OILER, top cylinder (Emerol Company's "Marvel Inverse" Oiler) (Model "TU") (Composed of - 1 BODY 261 517 R1 1 CAP 38 976 D 1 GASKET 38 974 D 1 GASKET 38 975 D 1 GASKET 39 823 D 1 GLASS 39 822 D 1 HEAD 38 970 D 1 NUT 39 824 D 1 PLUG 261 518 R1 2 SADDLE 38 972 D 2 STRAP 38 971 D) No. 10 NUT (4) No. 10 slt-fil-hd. SCREW (4) No. 10 lock WASHER (4)
13	36 637 D	ELBOW, top cylinder oiler tube (at oiler)
14	36 092 D	NUT, top cylinder oiler tube coupling (2)
15	305 884 R1	TUBE, top cylinder oiler
16	59 939 D	CONNECTOR, male top cylinder oiler tube (at manifold)
17	305 708 R1	SUPPORT, top cylinder oiler 7/16 x 7/8" hex-hd. cap SCREW (2) 7/16" lock WASHER (2)
	103 865	PLUG, 1/8" sq-hd pipe (CI) (optional with 103 877) (assemble in tee)
	103 877	PLUG, 1/8" sq-hd steel pipe (optional with 103 865) (assemble in tee)
	444 236	TEE, 1/8-27 automotive pipe (CI) (optional with 444 238 and 444 132) (assemble in intake manifold)
	444 238	TEE, 1/8-27 automotive pipe (brass) (optional with 444 236 and 444 132) (assemble in intake manifold)
	444 132	TEE, 1/8-27 automotive pipe (brass) (optional with 444 236 and 444 238) (assemble in intake manifold)

NOTE 1 - Factory Application - Order On Machine Order Form.
NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

ATTACHMENTS

OIL LEVEL SIGHT GAUGE



REF. NO.	I. H. PART NUMBER	DESCRIPTION
	312 998 R91	ATTACHMENT, oil level sight gauge (for use on Natural Gas, Liquefied Petroleum Gas and Combination Gas or Gasoline engines) (Not Used On Units Equipped With Flo-Matic Valve Attachment) (See NOTES 1 and 3)
1	252 374 R1	ELBOW, 90° vent tube
2	312 948 R11	COVER, fuel pump pad
3	369 987 R1	NUT, 1/4" coupling (2)
4	312 999 R1	TUBE, vent
5	30 402 D	ELBOW, vent tube
6	279 689 R91	GAUGE, oil level
7	120 755	COUPLING, 3/8" pipe
8	120 207	NIPPLE, 3/8 x 1" pipe
9	103 868	PLUG, 1/2" pipe
10	143 166	TEE, 1/2 x 1/2 x 3/8" oil level gauge
11	190 702	NIPPLE, 1/2 x 5" pipe
12	261 505 R1	WIRE, bulk locking (16 ga.) (customer must specify length required)
13	332 174 R1	BOLT, oil pan drain retaining
14	3 405 H	GASKET, oil pan drain (2)
15	332 173 R1	UNION, oil pan drain (will work for 108 686)

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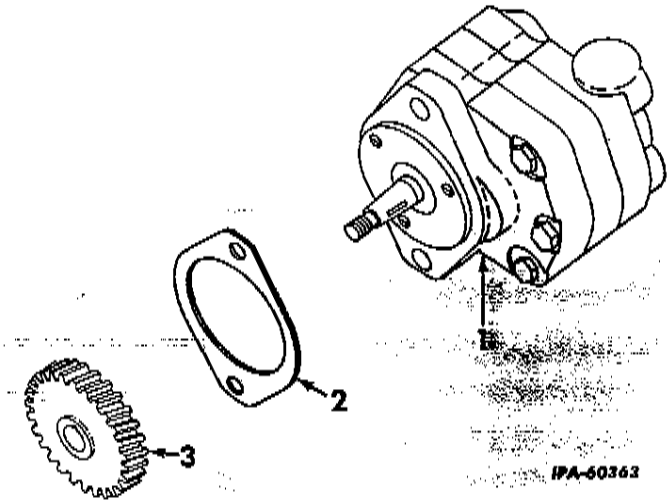
ATTACHMENTS

HYDRAULIC PUMPS AND RELATED PARTS



REF. NO.	I. H. PART NUMBER	DESCRIPTION
		(X) - KEY TO UNITS -
		A - Service parts for Hydraulic Pump (15 G. P. M.) (gasoline burning power units) (See NOTES 1 and 3) (*)
		B - Service parts for Hydraulic Pump (18 G. P. M.) (gasoline burning power units) (See NOTES 1 and 3) (*)
		C - Service parts for Hydraulic Pump (7 G. P. M.) (gasoline burning power units) (See NOTES 1 and 3) (*)
		D - Service parts for Hydraulic Pump (11 G. P. M.) (gasoline burning power units) (See NOTES 1 and 3) (*)
		(X) - Letters of these units correspond with those shown following the description of the parts in the list below and identifies the unit for which the part is used. Items without letters after the description indicates the part is used for all units.
1	588 368 R91	PUMP, hydraulic (Unit C) (+)
1	588 371 R92	PUMP, hydraulic (Unit A) (+)
1	588 370 R91	PUMP, hydraulic (Unit D) (+)
1	317 528 R91	PUMP, hydraulic (Unit B) (+) 3/8 x 1" hex-hd cap SCREW 3/8 x 1-3/8" hex-hd cap SCREW 3/8" lock WASHER (2)
2	312 453 R1	GASKET, hydraulic pump
3	312 452 R1	GEAR, hydraulic pump (27 T) 1/2NF NUT 1/2" internal-external-tooth lock WASHER

(*) - For Use With Electric Fuel Pump, 317 696 R91, Generator (Delco-Remy) No. 11102034), Mechanical Governor, 310 840 R91, Instrument Panel, 278 597 R2, Radiator 265 595 R92 And Fan, Attachment 304 576 R91.

(+) - For Components See List Of Parts Under Details Of "Hydraulic Pump.

NOTE 1 - Factory Application - Order On Machine Order Form.

NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

L LEVEL SIGHT GAUGE
ed with Flo-Matic Valve Attachment)

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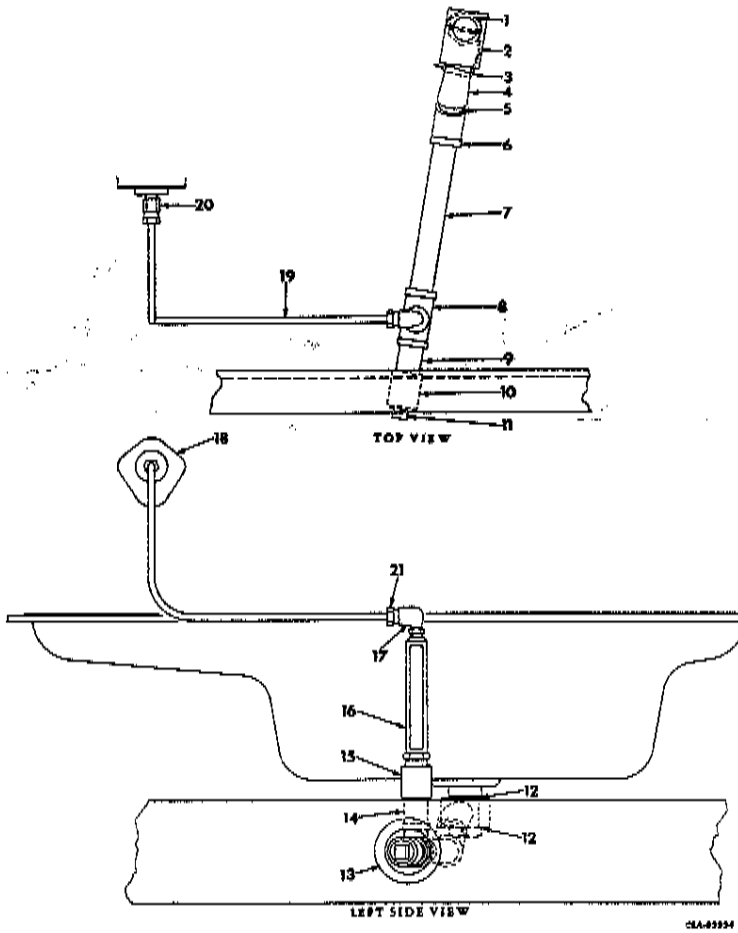
ATTACHMENTS

OIL LEVEL SIGHT GAUGE – CONTINUED
(Used with Flo-Matic Valve Attachment)



REF. NO.	I. H. PART NUMBER	DESCRIPTION
	332 471 R91	ATTACHMENT, oil level sight gauge (for use on natural gas, liquefied petroleum gas and combination gas or gasoline engines) (for use with Flo-Matic Valve Attachment) (See NOTES 1 and 3)
1	332 174 R1	BOLT, oil pan drain retainer
2	332 173 R1	UNION, oil pan drain
3	261 505 R1	WIRE, bulk locking (16 ga.) (customer must specify length required)
4	137 894	ELBOW, 1/2" x 45° street
5	144 610	NIPPLE, 1/2 x 1-3/8" pipe
6	119 094	ELBOW, 1/2" x 45° pipe
7	187 249	NIPPLE, 1/2 x 7" pipe
8	143 166	TEE, 1/2 x 1/2 x 3/8" pipe
9	140 537	NIPPLE, 1/2 x 2" pipe
10	187 397	COUPLING, 1/2" pipe
	103 868	PLUG, 1/2" pipe

REF. NO.	I. H. PART NUMBER	DESCRIPTION
12	3 405 H	GASKET, oil pan drain (2)
13	317 623 R1	GROMMET
14	173 001	NIPPLE, 3/8 x 1-3/4" pipe
15	120 755	COUPLING, 3/8" pipe
16	279 689 R91	GAUGE, oil level sight
17	30 402 D	ELBOW, vent tube
18	312 948 R1	COVER, fuel pump pad
19	995 061 R1	TUBE, vent (19-1/2" long, copper 1/4" OD (#))
20	59 730 H	CONNECTOR, vent tube
21	369 987 R1	NUT, 1/4" (2)

NOTE 1 - Factory Application - Order On Machine Order Form.
NOTE 3 - Field Application - Order Through Regular Service Parts Channels.
(#) - Part Number and Price Covers One Foot Of Tubing. Furnished Only In 50 Foot Rolls.

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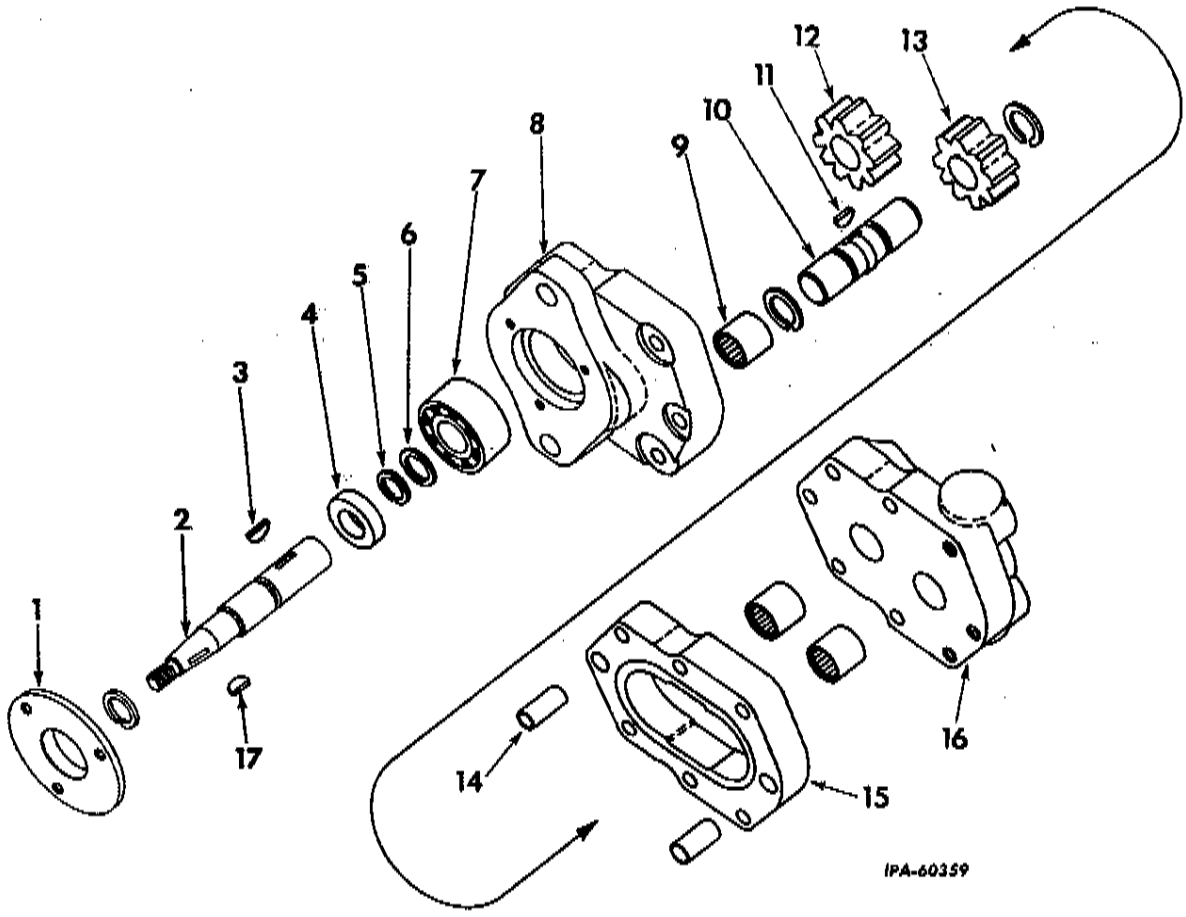
ATTACHMENTS

HYDRAULIC PUMP
(Webster Electric)



REF. NO.	I. H. PART NUMBER	DESCRIPTION
(X) - KEY TO UNITS -		
A -	588 371 R9Z	PUMP, hydraulic (15 G.P.M.)
B -	317 528 R91	PUMP, hydraulic (18 G.P.M.)
C -	588 568 R91	PUMP, hydraulic (7 G.P.M.)
D -	588 370 R91	PUMP, hydraulic (11 G.P.M.)
(X) -	Letters of these units correspond with those shown following the description of the parts in the list below and identifies the unit for which the part is used. Items without letters after the description indicates the part is used for all units.	
1	588 394 R1	PLATE, pilot (151-24845-3) No. 10 x 5/8" f-hd mach SCREW (3)
2	588 389 R1	SHAFT, drive (151-21075-2) (Unit C)
2	588 397 R1	SHAFT, drive (151-24806-1) (Unit D)
2	588 396 R1	SHAFT, drive (151-16848-5) (Unit A)
2	303 494 R1	SHAFT, drive (151-25202) (Unit B)
3	103 646	KEY, 1/8 x 3/4" (Woodruff No. 7) (Units A, B and D)
	427 261	KEY, 1/8 x 3/8" (Woodruff No. 213) (Unit C)

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ATTACHMENTS

HYDRAULIC PUMP – CONTINUED
(Webster Electric)

REF. NO.	I. H. PART NUMBER	DESCRIPTION
4	586 201 R91	OIL SEAL (Chicago Rawhide No. 501391)
5	188 287 R1	RING, retaining (4)
6	276 569 R1	WASHER, 49/64 x 59/64 x .030" flat (29602-132) (2)
7	8 521 T	BEARING, ball (5204 L1A)
8	588 391 R1	BODY, pump (151-13752-3) (Units A, C and D) 1/4 x 2" hex-hd cap SCREW (2) 1/4 x 2-1/4" hex-hd cap SCREW (Unit A and D) 5/16 x 1-5/8" hex-hd cap SCREW (2 for Unit C) 1/4" lock WASHER 5/16" lock WASHER (2)
8	303 495 R91	BODY w/BEARING, 276 574 R91, pump (150-16877-14) (Unit B) 1/4 x 2" hex-hd cap SCREW 5/16 x 2" hex-hd cap SCREW (2) 1/4" lock WASHER 5/16" lock WASHER (2)
9	276 574 R91	BEARING, needle (151-30621) (3)

ATTACHMENTS

REF. NO.	I.H. PART NUMBER	DESCRIPTION
		HYDRAULIC PUMP – CONTINUED (Webster Electric)
10	303 100 R1	SHAFT, idler (151-20795) (Unit B)
10	572 082 R1	SHAFT, idler (151-21986) (Unit D)
10	572 964 R1	SHAFT, idler (151-21073) (Unit C)
10	573 661 R1	SHAFT, idler (151-20794) (Unit A)
11	427 261	KEY, 1/8 x 3/8" (Woodruff No. 213)
12	276 579 R1	GEAR, drive (8 T) (151-21952-2) (Unit D)
12	303 102 R1	GEAR, drive (8 T) (151-20203-1) (Unit B)
12	572 959 R1	GEAR, drive (8 T) (151-21072-4) (Unit C)
12	573 693 R1	GEAR, drive (8 T) (151-20202-1) (Unit A)
13	276 570 R1	GEAR, idler (8 T) (151-21952-1) (Unit D)
13	303 074 R1	GEAR, idler (8 T) (151-20203-2) (Unit B)
13	572 960 R1	GEAR, idler (8 T) (151-21072-3) (Unit C)
13	573 694 R1	GEAR, idler (8 T) (151-20202-2) (Unit A)
14	573 655 R1	PIN, dowel (151-12555-15) (2 for Unit D)
14	303 073 R1	PIN, dowel (151-14001) (2 for Unit B)
14	572 937 R1	PIN, dowel (151-21074) (2 for Unit C)
14	573 657 R1	PIN, dowel (151-30619) (2 for Unit A)
15	303 072 R1	PLATE, gear (151-14471-6) (Unit B)
15	588 388 R1	PLATE, gear (151-21070-1) (Unit C)
15	588 393 R1	PLATE, gear (151-30615-3) (Unit A)
15	588 395 R1	PLATE, gear (151-22065-1) (Unit D)
16	317 670 R91	COVER w/two BEARING, 276 574 R91, pump (150-16751-49) (Unit B) 1/4 x 2-1/2" hex-hd cap SCREW 5/16 x 2-1/4" hex-hd cap SCREW (4) 1/4" lock WASHER 5/16" lock WASHER (4)
16	588 392 R1	COVER, pump (151-16876-43) (Units A, C and D) 1/4 x 2" hex-hd cap SCREW 1/4 x 2-1/4" hex-hd cap SCREW 5/16 x 1-5/8" hex-hd cap SCREW (4 for Unit C) 5/16 x 2" hex-hd cap SCREW (4 for Units A and D) 1/4" lock WASHER 5/16" lock WASHER (4)
17	124 548	KEY, 5/32 x 3/4" (Woodruff No. 8)
	364 145 R1	"O" RING, 2-1/8 x 2-5/16 x 3/32"

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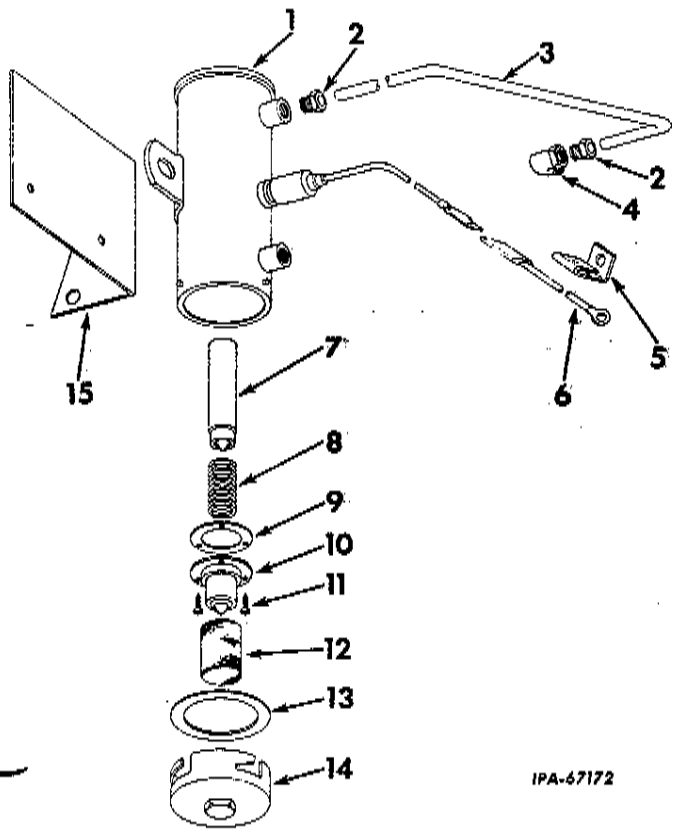
ATTACHMENTS

ELECTRIC FUEL TRANSFER PUMP
(12 Volt) (Eclipse Bendix) (Used with Hydraulic Pump)



REF. NO.	I. H. PART NUMBER	DESCRIPTION
	316 151 R91	ATTACHMENT, electric fuel pump (See NOTES 1 and 3)
	631 259 R91	PUMP ASSEMBLY, electric fuel transfer (480516) (Composed of - §1 BODY 1 COVER 936 492 R91 1 CUP 317 965 R91 1 GASKET 317 962 R1 1 GASKET 317 964 R1 1 PLUNGER 317 967 R91 1 SCREEN 317 963 R1 3 SCREW 19 714 R1 1 SPRING 936 493 R1) 1/4" NUT (2) 1/4 x 5/8" hex-hd cap SCREW (2) 1/4" lock WASHER (2)
1		BODY (order 317 696 R91)
2	369 989 R1	NUT, carburetor to pump tube (3)
3	316 159 R11	TUBE w/two NUT, 369 989 R1, carburetor to pump
4	24 847 H	ELBOW, carburetor to pump tube
5	263 515 R91	CLIP, cable (on oil pan bolt)
	267 806 R91	CABLE, fuel pump

ATTACHMENTS

REF. NO.	I. H. PART NUMBER	DESCRIPTION

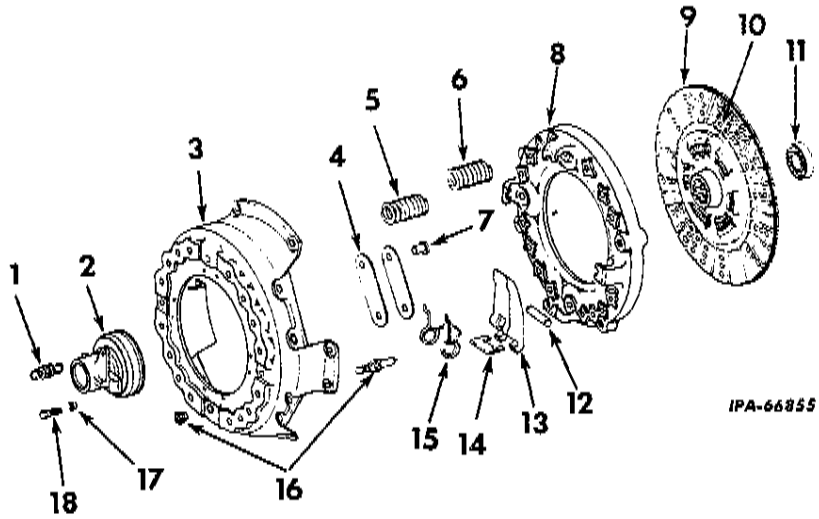
ELECTRIC FUEL TRANSFER PUMP - Continued
(12 Volt) (Eclipse Bendix) (Used with Hydraulic Pump)

7	317 967 R91	PLUNGER, pump (476474)
8	936 493 R1	SPRING, plunger (475127)
9	317 964 R1	GASKET, spring cup (475126)
10	317 965 R91	CUP, plunger (476364)
11	19 714 R1	SCREW, No. 4 x 1/4" pan-hd (490028) (3)
12	317 963 R1	SCREEN, filter (475634)
13	317 962 R1	GASKET, sediment cover (475594)
14	936 492 R91	COVER w/GASKET, 317 962 R1 (476563)
15	316 158 R1	BRACKET, pump mounting

§ - Not Furnished Separately.
NOTE 1 - Factory Application - Order On Machine Order Form.
NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

ATTACHMENTS

CLUTCH (BORG AND BECK) AND CONTROLS



REF. NO.	I. H. PART NUMBER	DESCRIPTION
	312 837 R91	ATTACHMENT, clutch and controls (See NOTES 1 and 3)
1	57 287 D	SPRING, clutch release sleeve return
2	267 814 R91	SLEEVE, clutch release
3	317 533 R91	COVER w/four RIVET, 317 535 R1 and eight STRAP, 317 534 R1 (11534)
4	317 534 R1	STRAP, driving (5296) (8)
5	317 542 R1	SPRING (3951) (8)
6	317 541 R1	SPRING (3814) (8)
7	317 535 R1	RIVET, driving strap (5099) (4)
8	317 543 R1	PLATE, pressure (5293)
9	313 771 R91	MEMBER w/FACING, 317 546 R91 driven (12208)
10	317 546 R91	PACKAGE, facing (12153)
11	ST 208 B	BEARING, clutch pilot ball
12	317 538 R1	PIN, eyebolt (3696) (4)

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ATTACHMENTS

CLUTCH (BORG AND BECK) AND CONTROLS – CONTINUED

REF. NO.	I. H. PART NUMBER	DESCRIPTION
13	317 540 R1	LEVER, release (6038) (4)
14	317 539 R1	STRUT, release lever (3695) (4)
15	317 536 R1	SPRING, anti-rattle (3258) (4)
16	317 537 R91	EYEBOLT and NUT (11509) (4)
17	317 545 R1	FERRULE, driving strap (5295) (4)
18	317 544 R1	SCREW, driving strap (5297) (4)
	313 772 R91	COVER, clutch (1219) (Composed of - 1 COVER and STRAP 317 533 R91; 4 EYEBOLT and NUT 317 537 R91; 4 FERRULE 317 545 R1; 4 LEVER 317 540 R1; 4 PIN 317 538 R1; 1 PLATE 317 543 R1; 4 SCREW 317 544 R1; 4 SPRING 317 536 R1; 8 SPRING 317 541 R1; 8 SPRING 317 542 R1; 4 STRUT 317 539 R1)
	73 092 R2	SCREW, clutch cover mounting (8) 3/8" lock WASHER (8)

NOTE 1 - Factory Application - Order On Machine Order Form.
NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

ATTACHMENTS

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		TRANSMISSION ATTACHMENTS
	312 838 R91	ATTACHMENT, transmission (four speed sliding gear) (See NOTES 1 and 3) (Consists of all parts listed under "TRANSMISSION (Four Speed Sliding Gear) (Warner)") (For use with 12" spring loaded clutch and controls ATTACHMENT, 312 837 R91 and FLYWHEEL, 312 563 R91) (UC-221)

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ATTACHMENTS

REF. NO.	I. H. PART NUMBER	DESCRIPTION
		TRANSMISSION ATTACHMENTS – Continued
	312 839 R91	ATTACHMENT, transmission (four speed synchromesh) (See NOTES 1 and 3) (Consists of all parts listed under "TRANSMISSION (Four Speed Synchromesh) (Warner)") (For use with 12" spring loaded clutch and controls ATTACHMENT, 312 837 R91 and FLYWHEEL, 312 563 R91)

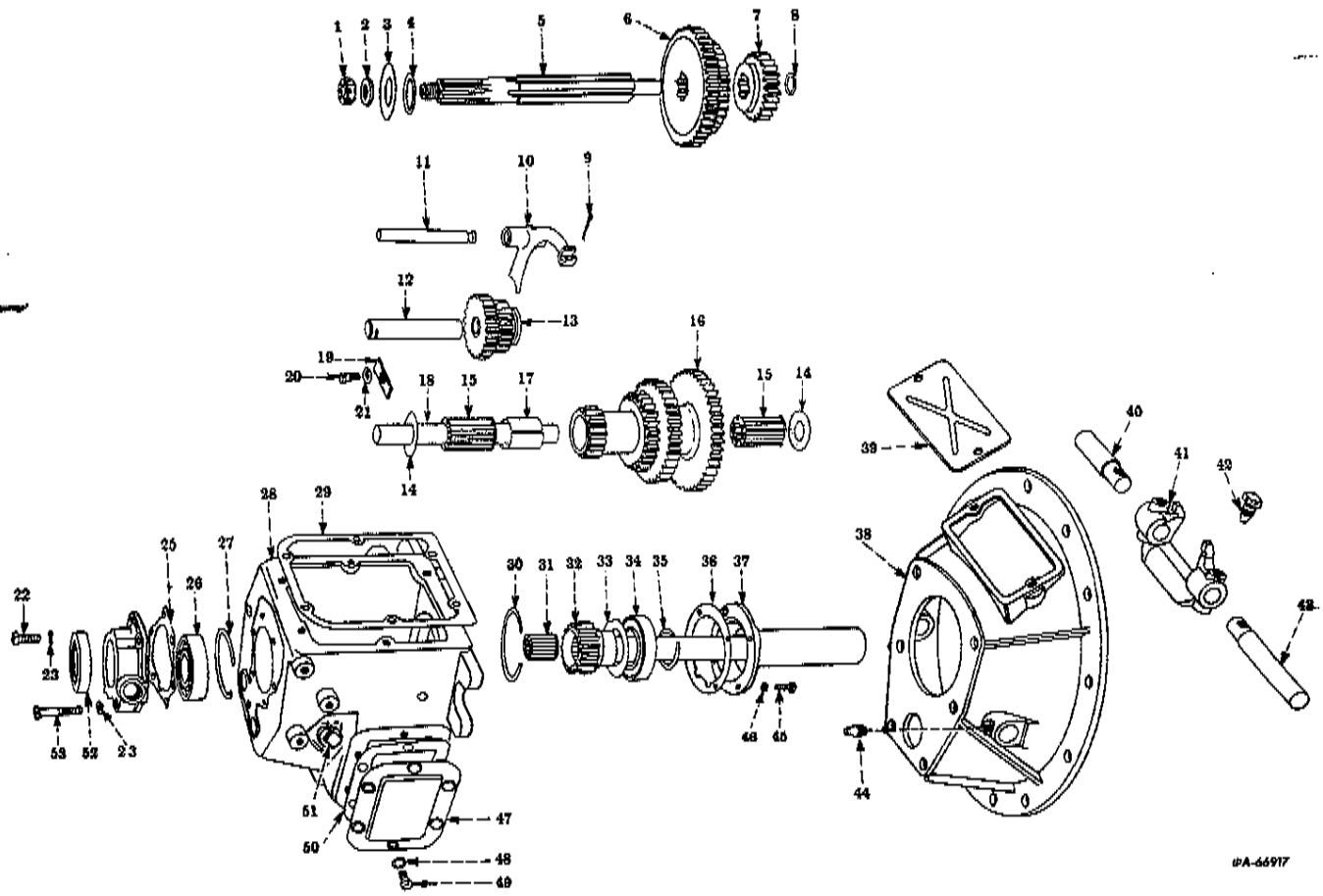
NOTE 1 - Factory Application - Order On Machine Order Form.
NOTE 3 - Field Application - Order Through Regular Service Parts Channels.

TRANSMISSION
(Four Speed Sliding Gear) (Warner)

TRANSMISSION CASE, GEARS, CLUTCH HOUSING AND RELATED PARTS

TRANSMISSION – Continued
(Four Speed Sliding Gear) (Warner)

TRANSMISSION CASE, GEARS, CLUTCH HOUSING AND RELATED PARTS - Continued



REF. NO.	I. H. PART NUMBER	DESCRIPTION
	313 740 R91	TRANSMISSION ASSEMBLY (AS-148-T9) (part of ATTACHMENT, 312 838 R91) 3/8 x 1-1/8" hex-hd cap SCREW (12) 3/8" lock WASHER (12)

REF. NO.	I. H. PART NUMBER	DESCRIPTION
1	106 058 H	NUT, main shaft (T9-50P)
2	60 192 H	WASHER, companion flange (T9-50-1/2C)
3	27 090 H	WASHER, mainshaft rear bearing oil (T8-137)

ATTACHMENTS

TRANSMISSION – CONTINUED
(Four Speed Sliding Gear) (Warner)

TRANSMISSION CASE, GEARS, CLUTCH HOUSING AND RELATED PARTS - Continued

REF. NO.	I. H. PART NUMBER	DESCRIPTION
4	27 088 H	WASHER, mainshaft rear bearing thrust (T69-137)
5	27 068 HB	SHAFT, main (T9-2G)
6	72 975 H	GEAR, mainshaft first and second (T9-12C)
7	62 899 H	GEAR, mainshaft third and direct (T9A-11)
8	27 087 H	RING, mainshaft pilot bearing spacer (T8-25)
9		PIN, 1/8 x 1-1/4" cotter
10	27 118 H	FORK, reverse speed shift (T8-51)
11	27 083 H	RAIL, reverse speed shift fork (T8-54)
12	27 079 H	SHAFT, reverse idler gear (T8-35)
13	62 902 H	GEAR, reverse idler (T9A-10)
14	95 854 H	WASHER, countershaft gear thrust (T9-30V) (2)
15	23 172 H	BEARING, countershaft gear roller (X4038) (2)
16	72 976 H	GEAR, countershaft (T8C-8A)
17	27 091 H	SPACER, countershaft gear bearing (T8-28A)
18	27 069 H	SHAFT, counter (T9-3P)
19	27 082 H	PLATE, reverse idler gear and countershaft lock (4501)
20		SCREW, 3/8 x 3/4" hex-hd cap
21		WASHER, 3/8" lock
22		SCREW, 3/8 x 1" hex-hd cap (4)
23		WASHER, 3/8" lock (5)
24	321 811 R1	RETAINER, mainshaft rear bearing (T9-7Z)
25	27 116 HA	GASKET, mainshaft rear bearing retainer (T9-145-1/2)
26	ST 200	BEARING, mainshaft rear
27	27 073 H	RING, mainshaft rear bearing snap (T8-7-1/2)
28	317 659 R1	CASE, transmission (T9-1TT)
29	27 122 H	GASKET, control lever mounting (T9-115)
30	27 071 H	RING, main drive gear bearing snap (inner) (T8-6-1/2)
31	27 009 H	BEARING, mainshaft pilot roller (X4044)
32	317 663 R1	GEAR, main drive (T9-16X)
33	27 089 H	WASHER, main drive gear oil retainer (T8-136)
34	ST 201	BEARING, main drive gear
35	27 086 H	RING, main drive gear bearing snap (outer) (4495)
36	27 110 H	GASKET, main drive gear bearing retainer (T9-145)
37	317 662 R1	RETAINER, main drive gear bearing (T9-6H)
38	317 666 R1	HOUSING, clutch (9-1-1/2A)
39	317 634 R1	COVER, hand hole (T9-74) 5/16 x 5/8" fil-hd SCREW (2) 5/16" lock WASHER (2)
40	317 635 R1	SHAFT, throw out (short) (T9-310)
41	317 637 R1	YOKE, throw out (T64J-360D)
42	317 638 R1	SCREW, lock (5573)
43	317 636 R1	SHAFT, throw out (long) (T9A-311M)
44	271 285	FITTING, 1/8" x 90° lubrication (Alemite 1613B) (optional with 109462) (2) (not part of Transmission ASSEMBLY, 313 740 R91)
44	109 462	FITTING, 1/8" x 90° lubrication (Lincoln 5400) (optional with 271 285) (2) (not part of Transmission ASSEMBLY, 313 740 R91)
45		SCREW, 5/16 x 3/4" hex-hd cap (4)
46		WASHER, 5/16" external lock (4)
47	23 045 H	COVER, power take-off opening (T53-160B)
48		WASHER, 3/8" lock (6)
49		SCREW, 3/8 x 3/4" hex-hd cap (6)
50	111 082 R1	GASKET, power take-off opening cover (T9-150)
51	143 968	PLUG, 3/4" sq-soc pipe (cd-pltd)
52	59 586 R91	OIL SEAL, mainshaft
53		SCREW, 3/8 x 2" hex-hd cap
	115 617 H	BOLT, 3/8 x 3/4" (X775) (3)
	2 750 059 R1	DECALCOMANIA, shifting diagram (not part of Transmission ASSEMBLY, 313 740 R91)
		SCREW, 1/2 x 1-1/4" hex-hd cap (6) 1/2" lock WASHER (6)

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ATTACHMENTS

TRANSMISSION – CONTINUED
(Four Speed Sliding Gear) (Warner)

TRANSMISSION CASE, GEARS, CLUTCH HOUSING AND RELATED PARTS - Continued

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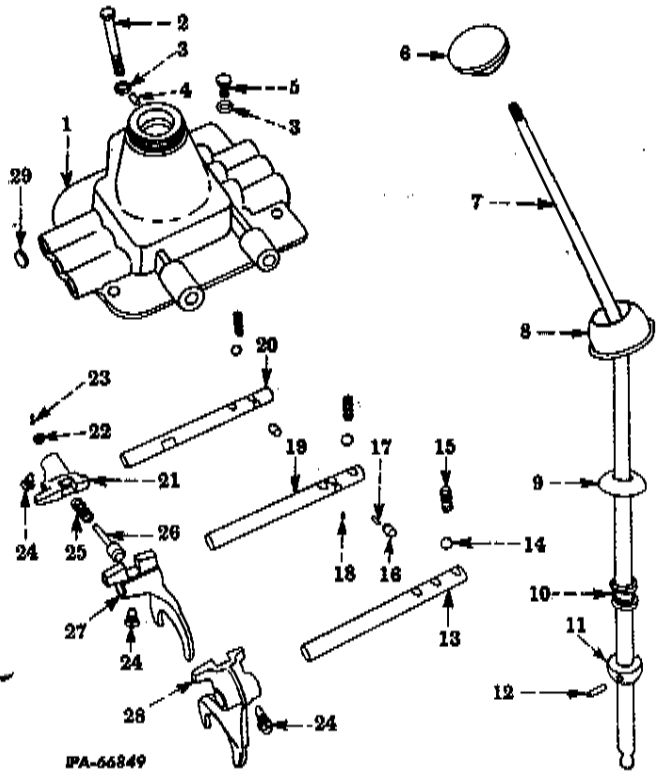
TRANSMISSION
(Four Speed Sliding Gear) (Warner)

TRANSMISSION CONTROL HOUSING AND LEVER



REF. NO.	I.H. PART NUMBER	DESCRIPTION
1	317 665 R1	HOUSING, control lever (T8G-148A)
2		SCREW, 3/8 x 4-7/8" hex-hd cap
3		WASHER, 3/8" lock (6)
4	27 085 HA	PIN, control lever locating (4499A)
5		SCREW, 3/8 x 7/8" hex-hd cap (5)
6	16 780 H	BALL, control lever hand (C37J-50A)
7	82 717 R11	LEVER, control (AC9A-2Y)
8	72 218 H	CAP, control lever (4496K)
9	72 219 H	WASHER, control lever spring (4497)
10	27 098 HA	SPRING, control lever (4498B)
11	83 780 R1	BALL, fulcrum (C8-2-1/2C)
12	113 163	PIN, fulcrum ball
13	27 119 HA	RAIL, shift (first and second) (T8A-21)
14	16 012 R1	BALL, 3/8" shift bar poppet (3)
15	23 074 H	SPRING, shift bar poppet (T8B-44) (3)

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ATTACHMENTS

REF. NO.	I.H. PART NUMBER	DESCRIPTION

TRANSMISSION – Continued
(Four Speed Sliding Gear) (Warner)

TRANSMISSION CONTROL HOUSING AND LEVER - Continued

16	27 096 H	PLUNGER, shift bar interlock (T8-86) (2)
17	27 104 H	PIN, shift bar interlock plunger (4446-A)
18	27 105 H	STOP, shift bar interlock plunger pin (4447)
19	27 120 HAX	RAIL w/PIN, shift (third and direct) (T8A-20)
20	27 121 HA	RAIL, reverse shift (T8-99A)
21	62 894 HB	END, reverse shift rail (T9A-37A)
22		NUT, 1/4NF slt
23		PIN, 1/16 x 1/2" cotter
24	23 079 H	SCREW, shift fork set (4418) (3)
25	62 892 HC	SPRING, reverse shift end plunger (T9A-39)
26	62 893 H	PLUNGER, reverse shift end (T98-40)
27	27 111 HA	FORK, shift (third and direct) (T8-23)
28	27 112 HA	FORK, shift (first and second) (T8-24)
29	103 892	PLUG, expansion (3)
	14 189 H	PLUG, speedometer opening (not part of Transmission ASSEMBLY, 313 740 R91)

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ATTACHMENTS

TRANSMISSION
(Four Speed Synchromesh) (Warner)

TRANSMISSION CASE, GEARS, CLUTCH HOUSING AND RELATED PARTS

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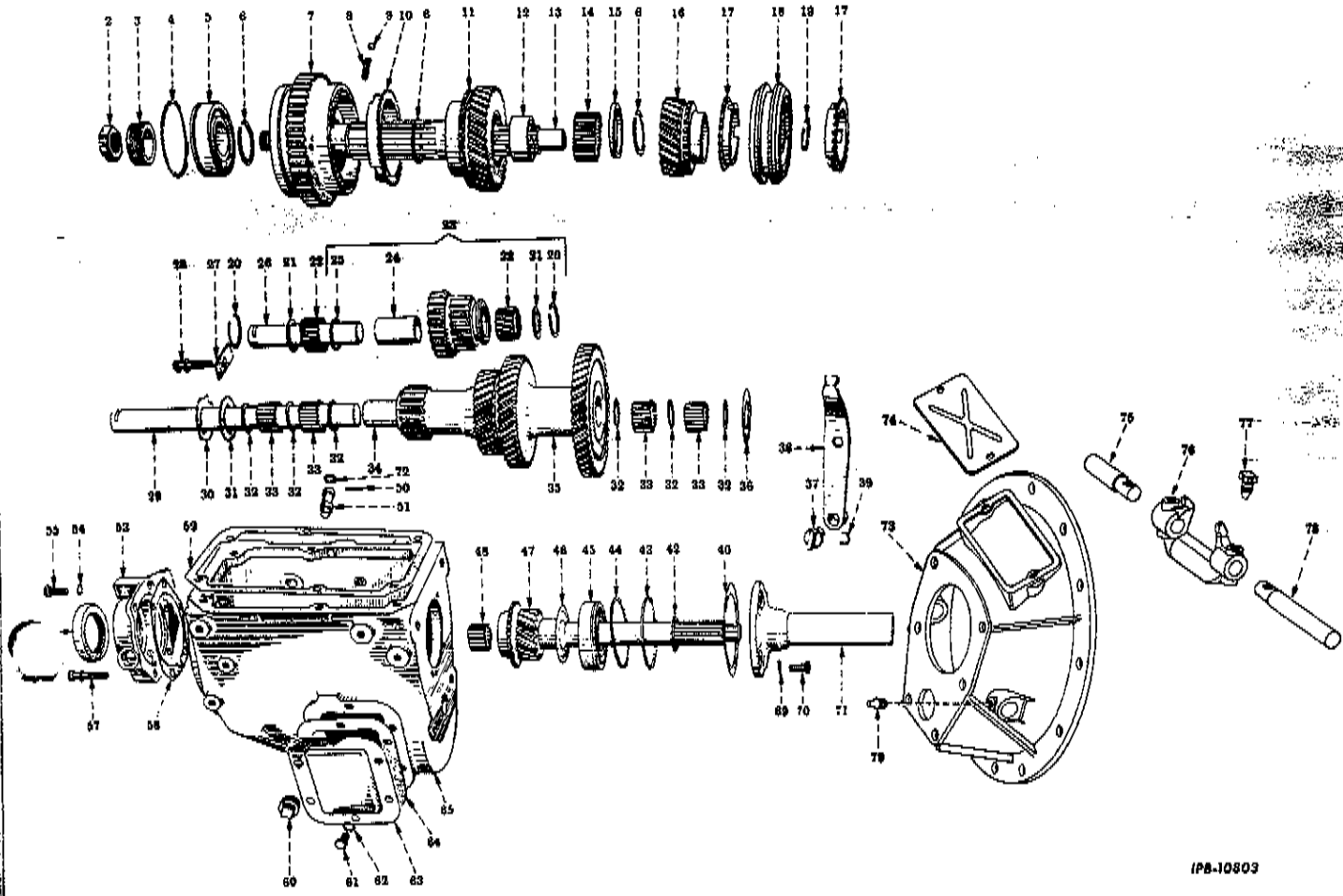
ATTACHMENTS

TRANSMISSION – CONTINUED
(Four Speed Synchromesh) (Warner)

TRANSMISSION CASE, GEARS, CLUTCH HOUSING AND RELATED PARTS - Continued



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REF. NO.	I. H. PART NUMBER	DESCRIPTION
	313 739 R91	TRANSMISSION ASSEMBLY (with CONTROL HOUSING) (AS-105-T98A) (part of ATTACHMENT, 312 839 R91) 3/8 x 1-1/8" hex-hd cap SCREW (12) 3/8" lock WASHER (12)
2	59 585 R1	NUT, mainshaft (J1-50)
3	317 627 R1	SPACER, speedometer drive gear (T98-75-1/4)
4	77 945 R1	RING, mainshaft snap (4745E)
5	ST 236	BEARING, main drive gear
6	71 843 R1	RING, mainshaft second speed gear snap (4745 D) (3)
7	82 092 R91	SYNCHRONIZER, low and second speed (AT98-80)
	73 298 R1	SPRING, low and second speed synchronizer (T87D-42) (3)

REF. NO.	I. H. PART NUMBER	DESCRIPTION
9	16 012 R1	BALL, 3/8" low and second speed synchronizer (3)
10	71 847 R1	RING, second speed synchronizer blocking (T98-83)
11	154 075 R1	GEAR, mainshaft second speed (T98A-31)
12	82 079 R1	SPACER, mainshaft second speed gear (T98-65)
13	71 834 R2	SHAFT, main (T98-2A)
14	71 846 R1	ROLLER, mainshaft second speed bearing (4741) (34)
15	71 842 R1	WASHER, mainshaft second speed gear thrust (T98-63)
16	154 076 R11	GEAR w/BUSHING, 72 202 R1, mainshaft third speed (AT98A-11)

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ATTACHMENTS

TRANSMISSION – Continued
(Four Speed Synchromesh) (Warner)

TRANSMISSION CASE, GEARS, CLUTCH HOUSING AND RELATED PARTS - Continued

REF. NO.	I. H. PART NUMBER	DESCRIPTION
17	71 840 R1	RING, third and high speed synchronizer blocking (T87D-14) (2)
18	71 835 R91	SYNCHRONIZER, mainshaft third and high speed clutch (1AT87D-2-1/2C)
19	71 841 R1	RING, third and high speed synchronizer hub snap (4747)
20	91 092 R1	RING, reverse idler gear snap (4757) (2)
21	91 091 R1	WASHER, reverse idler gear thrust (T98-84A) (2)
22	91 094 R1	ROLLER, reverse idler gear bearing (F1-42) (74)
23	91 089 R11	GEAR ASSEMBLY, reverse idler (AT-98-10A)
24	91 095 R1	SLEEVE, reverse idler gear bearing (T98-85A)
25	91 093 R1	SPACER, reverse idler gear bearing (T98-87A)
26	59 423 R1	SHAFT, reverse idler gear (T97-35)
27	317 628 R1	PLATE, countershaft reverse idler gear shaft lock (T97-48)
28		SCREW, 3/8 x 3/4" hex-hd cap (2) 3/8" lock WASHER (2)
29	71 860 R1	COUNTERSHAFT (T98-3)
30	71 859 R1	WASHER, countershaft rear thrust (outer) (T98-33)
31	154 078 R1	WASHER, countershaft rear thrust (inner) (T98A-32)
32	59 572 R1	WASHER, countershaft bearing spacer (T97-29) (6)
33	59 574 R1	ROLLER, countershaft gear bearing (T97-166) (88)
34	95 363 R1	SPACER, countershaft gear bearing (T98-28A)
35	154 077 R1	GEAR, countershaft (T98A-8)
36	71 857 R1	WASHER, countershaft thrust (T98-30)
37	91 090 R1	SHOE, reverse shifting (T98-51A)
38	147 922 R1	ARM, reverse shifting (T98-54N)
39	82 084 R1	WASHER, "C" shifting shoe (4747A)
40		GASKET, main drive gear bearing retainer
	77 946 R1	.009" thick (T98-145)
	77 947 R1	.0135" thick (T98-145A)
	77 948 R1	.018" thick (T98-145B)
	77 949 R1	.0225" thick (T98-145C)
42		RING, drive gear bearing snap (small)
	137 244 R1	.117" thick (4816)
	137 245 R1	.120" thick (4816A)
	137 246 R1	.123" thick (4816B)
	137 247 R1	.127" thick (4816C)
43	77 945 R1	RING, main drive gear bearing snap (large) (4745 E)
44	82 076 R1	RING, main drive gear bearing spacer (4774)
45	ST 236	BEARING, main drive gear ball
46	80 175 R1	BAFFLE, main drive gear oil (T90A-136A)
47	154 074 R1	GEAR, main drive (T98A-16G)

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ATTACHMENTS

TRANSMISSION – Continued
(Four Speed Synchromesh) (Warner)

TRANSMISSION CASE, GEARS, CLUTCH HOUSING AND RELATED PARTS - Continued

REF. NO.	I. H. PART NUMBER	DESCRIPTION
48	59 579 R1	ROLLER, mainshaft bearing (T97-26) (16)
50	103 565	PIN, reverse shifting arm screw
51	147 921 R1	PIN, reverse shifting arm pivot (T98-55N)
52	71 855 R1	GASKET, control lever housing (T98-115)
53	80 224 R11	RETAINER w/SLEEVE, 26 905 H (AT98-7A)
54		WASHER, 3/8" external lock (5)
55		SCREW, 3/8 x 1" hex-hd cap (5)
56	59 586 R91	OIL SEAL, mainshaft
57		SCREW, 3/8 x 2" hex-hd cap
58		GASKET, mainshaft rear bearing retainer
	80 225 R1	.010" thick (T98-145-1/2)
	80 226 R1	.015" thick (T98-145-1/2A)
	80 227 R1	.020" thick (T98-145-1/2B)
	80 228 R1	.025" thick (T98-145-1/2C)
60	103 881	PLUG, 3/4" sq-hd pipe (Steel) (optional with 219 301) (2)
60	219 301	PLUG, 3/4" sq-hd pipe (malleable iron) (optional with 103 881) (2)
61		SCREW, 3/8 x 5/8" hex-hd cap (6)
62		WASHER, 3/8" external lock (6)
63	23 045 H	COVER, power take-off opening (T53-160B)
64	111 082 R1	GASKET, power take-off opening cover (T9-150)
65	317 626 R1	CASE, transmission (T98-1N)
69		WASHER, 5/16" external lock (4)
70		SCREW, 5/16 x 7/8" hex-hd cap (4)
71	317 631 R1	RETAINER, main drive gear bearing (T98-6N)
72	147 920 R1	OIL SEAL, pivot pin (T89-108)
73	317 633 R1	HOUSING, clutch (T98-1-1/2C)
74	317 634 R1	COVER, hand hole (T9-74) 5/16 x 5/8" fil-hd SCREW (2) 5/16" lock WASHER (2)
75	317 635 R1	SHAFT, throwout (short) (T9-310)
76	317 637 R1	YOKE, throwout (T64J-360D)
77	317 638 R1	SCREW, lock (5573) (2)
78	317 636 R1	SHAFT, throwout (long) (T9A-311M)
79	271 285	FITTING, 1/8 x 90° lubrication (Alemite 1613B) (optional with 109 462) (2) (not part of Transmission ASSEMBLY, 313 739 R91)
79	109 462	FITTING, 1/8 x 90° lubrication (Lincoln 5400) (optional with 271 285) (2) (not part of Transmission ASSEMBLY, 313 739 R91)
	115 617 H	BOLT, 3/8 x 3/4" (X775) (2)
	72 202 R1	BUSHING, mainshaft third speed gear (T98-19)
	2 750 061 R1	DECALCOMANIA, shifting diagram (not part of Transmission ASSEMBLY, 313 739 R91)
	82 082 R1	RING, shift plate retaining (4773)
		SCREW, 1/2 x 1-1/4" hex-hd cap (6) 1/2" lock WASHER (6)
	26 905 H	SLEEVE, speedometer drive gear (T54A-172)

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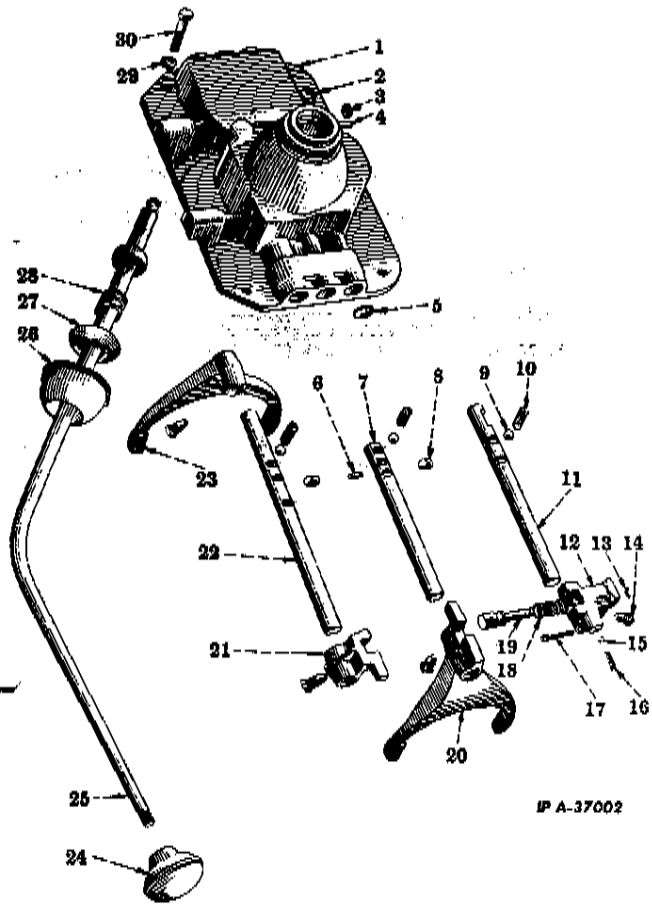
ANSMISSION
our Speed Synchromesh) (Warner)

TRANSMISSION CONTROL HOUSING AND LEVER



REF. NO.	I. H. PART NUMBER	DESCRIPTION
1	71 877 R1	HOUSING, control lever (T98-148A)
2	82 075 R91	BREATHER (T94-95)
3		NOT USED
4	103 736	PIN, control housing
5	103 892	PLUG, expansion (6)
6	59 412 R1	PIN, shift bar interlock plunger (T97-86)
7	71 879 R1	RAIL, third and direct speed shift (T98-60)
8	27 096 H	PLUNGER, shift bar interlock (T8-86) (2)
9	16 012 R1	BALL, 3/8" shift bar poppet (3)
10	23 074 H	SPRING, shift bar poppet (T8B-42) (3)
11	71 884 R1	RAIL, reverse speed shaft (T98-99)
	82 090 R1	END, reverse speed shift (T98-37)

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ATTACHMENTS

REF. NO.	I. H. PART NUMBER	DESCRIPTION

TRANSMISSION – CONTINUED
(Four Speed Synchromesh) (Warner)

TRANSMISSION CONTROL HOUSING AND LEVER - Continued

13	82 083 R1	WASHER, "C" reverse speed plunger (4/4/B)
14	23 079 H	SCREW, shift fork set (4418) (4)
15	16 008 R1	BALL, 1/4" reverse speed shift end plunger poppet
16	82 077 R1	SPRING, reverse speed shift end plunger poppet (4750)
17		PIN, 1/8 x 1" cotter
18	62 892 HC	SPRING, reverse speed shift end plunger (T9A-39)
19	82 086 R1	PLUNGER, reverse speed shift end (T98-40)
20	71 881 R1	FORK, third and direct speed shift (T98-23)
21	71 883 R1	END, low and second speed shift (T98-38)
22	71 880 R1	RAIL, low and second speed shift (T98-21)
23	71 882 R1	FORK, low and second speed shift (T98-24)
24	16 780 H	BALL, control lever (C37J-50A)
25	317 632 R1	LEVER, control
26	82 078 R1	CAP, control housing (4496L)
27	82 192 R1	WASHER, control lever spring (4497H)
28	27 098 HA	SPRING, control lever (4498 HA)
29		WASHER, 3/8" lock (6)
30		SCREW, 3/8 x 7/8" hex-hd cap (6)
	83 780 R1	BALL, fulcrum (C82-1/2C)
	14 189 H	PLUG, speedometer opening (not part of transmission ASSEMBLY, 313 739 R91)

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