

A Tradition of Excellence  
**Since 1955**



**ARROW**  
**ENGINES**



C-46

C-66

C-96

C-101

C-106

# C-SERIES

PARTS, OPERATION, & MAINTENANCE

AEPBC AUG17





**A Tradition of Excellence  
Since 1955**



Arrow Engine Company was founded in 1955 as Arrow Specialty Company by Jeff Davis in Tulsa, Oklahoma, beginning a tradition of providing premium service and exceptional products to the oil & gas industry, as well as other industrial markets throughout the world. Arrow is a market-leading provider of natural gas powered engines and parts, as well as gas compressors, gas production equipment, meter runs, engine electronics and chemical pumps. Today, Arrow continues its tradition of focusing on producing the most reliable equipment, parts and extraordinary customer service in the industry.

Arrow is a part of IES Infrastructure, which operates as one of four divisions under IES Holdings, Inc. comprised of over 8,000 employees nationwide. IES Infrastructure provides electrical and mechanical apparatus services, custom steel fabrication, and custom power solutions including generator enclosures and bus systems to customers both in the United States and abroad.



# THANK YOU FOR SELECTING THE ARROW C-SERIES ENGINE!



## C-SERIES ENGINE

### STANDARD ARROW LIMITED WARRANTY VALIDATION CARD

**ARROW ENGINE COMPANY** warrants to the purchaser that any new engine manufactured by **ARROW** will be free of defects in both workmanship and materials for twelve (12) months from the date of initial startup or eighteen (18) months from the date of **ARROW** factory shipment, whichever occurs first.

Owner's Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Serial No \_\_\_\_\_ Date Purchased \_\_\_\_\_

Distributor's Name \_\_\_\_\_

Exact Engine Location \_\_\_\_\_

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FOR WARRANTY DETAILS SEE ARROW STANDARD LIMITED WARRANTY.  
Send this card to **ARROW** within 10 days after purchase for warranty validation.



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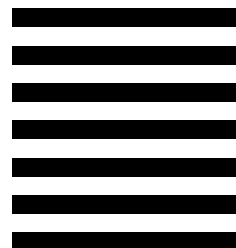
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## SAFE OPERATING PROCEDURES

# Arrow Stationary Engines

**DO NOT** operate this engine unless you have been instructed & trained in its safe use and operation.



Hard hat & safety glasses must be worn at all times while working on or around equipment.



Long and loose hair must be contained.



Protective footwear must be worn at all times.



Protective clothing must be worn at all times.



Hearing protection must be worn while working on or around equipment.



Rings and jewelry should not be worn while operating equipment.

### PRE-OPERATIONAL SAFETY CHECKS

1. The equipment must be used in accordance with manufacturer's instructions.
2. Ensure the area is clean and clear of grease, oil, and objects that may be a slip or trip hazard.
3. Familiarize yourself with and check all engine operations and controls.
4. Check all safety devices are in good working condition.
5. Ensure work area is well ventilated and free from exhaust fumes before operating.
6. Ensure all flammable materials are correctly stored or disposed of before operating.
7. Faulty equipment must not be used. Immediately report suspect equipment.

### OPERATIONAL SAFETY CHECKS

1. Engine must not be operated unless the person is qualified to operate the equipment.
2. Ensure work area around engine has been cleared of tools and debris before starting.
3. Be aware that during operation, parts of the engine or equipment are hot or rotating.
4. When performing any preventive maintenance or repairs on the engine or equipment ensure that the battery (if fitted) is disconnected, the fuel supply has been turned off and proper lock out/tag out procedures have been followed.

### POTENTIAL HAZARDS

- Hot components
- Entanglement hazards – rotating parts
- Fuel supply – LPG/NG vapors
- Exhaust fumes
- Confined space – trapping, tripping hazards
- Crushing hazards
- Fire
- Shock hazard

**Note: This SOP does not necessarily cover all possible hazards associated with the engine operation and should be used in conjunction with other PPE safety procedures.**







# C-SERIES

## PARTS, OPERATION & MAINTENANCE MANUAL

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# INTRODUCTION

## GENERAL DESCRIPTION

The Model C-46, C-66, C-96, C-101 and C-106 engines are especially designed for oil well pumping service, which normally requires continuous operation with a minimum of maintenance. The design of the engine allows oil to be added to the crankcase while the engine is running, which further cuts loss of operating time. Other manufactures of engines require the engine to be stopped while adding oil.

To meet continuous duty requirements, the engines operate at low speeds, lessening the wear of engine parts as well as wear of driven pumping equipment. The C-46, C-101 and C-106 have a maximum operating RPM of 800. The maximum operating RPM of the C-96 is 600 RPM. The C-66 has maximum RPM of 700.

The single cylinder Models C-46, C-66, C-96, C-101 and C-106 are valve-in-head engines with exhaust and suction valve seat inserts. With this type design the valve mechanism is readily accessible and easily serviced. The C-101 and C-106 engines also have domed combustion chambers for increased power.

The natural gas carburetors furnished as standard equipment on these engines are designed to operate on natural gas. When the Arrow engines are operated on gaseous fuels, it is very important to have a volume tank connected to the engine by the fuel line. This will provide sufficient low pressure volume of fuel to the engine. The Arrow gas volume tank Model #HBD-2459 is suggested to be used for this purpose on all Arrow single cylinder engines.

All bearings and moving parts are pressure lubricated by oil, fed through the engines from a positive displacement trochoidal gear oil pump. The oil is filtered

through a full flow oil filter cartridge. An oil level sight gauge indicates, at a glance, the oil level in the crankcase.

Arrow engines are furnished with an Arrow AF-603-RL ignition system. The standard cooling system on the C-46, C-66, C-96, C-101 and C-106 engines is the pressure condensing system.

The pressurized-condensing type of cooling system has an advantage of maintaining a more uniform high operating temperature in the engine. The higher operating temperature of the engine helps prevent contamination and sludging of the engine. A combination water level sight gauge and low water shut-down switch shows, at a glance, the coolant level in the cooling system. The proper water level in pressure condensing system is 1" – 2" below top of water hopper.



Additional standard features of the Arrow engines are: an air cleaner to assure uncontaminated air to the engine, a heavy duty power take-off clutch, low oil pressure and low water level safety switches, sub-base, and instruction/parts manual.

## **KNOW YOUR ENGINE**

Please familiarize yourself with the details of construction and operation of the engine before placing it in service. Never neglect routine service and lubrication.

Keep your engine clean inside and out. Frequent cleaning and regular oil changes will enable you to discover the beginning of troubles and enable you to prevent serious failures. Sturdiness, compactness, simplicity, and accessibility are stressed in the design of this engine. Intelligent care, and the operator's understanding of the engine, will aid in realizing the utmost performance.



# 1 OPERATION

## BEFORE STARTING

1. Fill the crankcase with the correct grade and type of oil to the proper level on the sight gauge. On new engines or newly rebuilt engines, use only a non-detergent, single viscosity motor oil for the first three (3) weeks of operation. That is, an SAE 20 or SAE 30 non-detergent oil. Multi-viscosity oils will not allow rings to seat properly during initial break-in period. After the first three (3) weeks of operation, a high grade 10 W 40 motor oil is recommended.



PURE ANTI-FREEZE IN THE COOLING SYSTEM AS THE ENGINE WILL OVERHEAT.

3. Be sure that there is an ample supply of gas and that the fuel lines are at least 1" in size and in good condition, with no leaks.
4. Push up the compression release lever to the start position, so that the intake valve is held open to relieve the compression for easier cranking.
5. Disengage the clutch before attempting to start the engine.

### C-101 and C-106 Catalyst Equipped Engines

Catalyst equipped engines are susceptible to elements in the oil contaminating or plugging the catalyst. Below are the maximum limits that are allowed in the lube oil for catalyst equipped engines:

CATALYST EQUIPPED ENGINES	
Phosphorous	Max. 0.09% by weight
Zinc	Max. 0.04% by weight
Ash	Max. 0.50% by weight
Oil Consumption	Less than 0.0015 lb/bhp-hr

2. Fill the cooling system with clean, soft water to proper level on sight gauge or one-two inches below the top of the water hopper. If the engine is to be operated in freezing temperatures, add a proper amount of anti-freeze. Prior to pouring into the engine, it is imperative to thoroughly mix anti-freeze and water. The engine cannot internally mix the water as it has no water pump. Also, it is imperative that at least 40% water is used. Usually a 50-50 mixture is very ample unless operating in Arctic temperatures. **NEVER ATTEMPT TO OPERATE ARROW ENGINES WITH**

## STARTING THE ENGINE

The engine may be started with a hand crank, the optional portable 12 Volt DC Arrow engine starter, or with a factory-installed ring gear starter.

### HAND CRANK STARTER

When using hand crank, proceed as follows:

1. Insert crank in position so that it engages the cranking jaw securely and can be turned freely. Be sure the end of the crankshaft, where the crank fits, is clean without rust or an accumulation of grime, so the crank will rotate freely on the shaft, and easily release itself when the engine fires.
2. Adjust governor speed setting so the throttle is at least half open. Reset low oil pressure shutdown switch.

3. Raise compression release lever all the way to relieve compression for easier cranking. Crank engine until approximate starting speed is reached.
4. Pull down compression release lever to running position, open the fuel supply and continue cranking for several revolutions or until the engine fires.

## ARROW PORTABLE ELECTRIC STARTER

When the optional Arrow starter is used, proceed as follows:

1. Slip the starter housing on the pin provided by the rim of the large flywheel near the base below the carburetor.
2. Connect the #4 welding cables (optional with the Arrow Starter) from the Arrow Starter to battery in the pumpers vehicle. Polarity does not matter. Adjust governor to half open.
3. After raising the compression release lever to the relieved position, pull on the Arrow Starter handle to engage the roller against the flywheel. Push the starter button on the handle and spin the flywheel to approximate cranking speed.
4. Pull down the compression release lever to running position. Open the fuel supply and continue spinning engine for several revolutions or until engine the fires.
5. After the engine starts, remove and disconnect the Arrow Starter.



**CAUTION:** Other starter brands may not contain an overspeed clutch to protect against harming the starter when engaged against a running engine.

6. Proceed with same steps as when hand cranking.

## RING GEAR STARTER

If the engine is equipped with Ring-gear starting, proceed as follows:

1. Connect the starter cables to the plugs in the bracket located adjacent to the oil pressure gauge and to the battery in the pumper's vehicle. Adjust governor to half open.
2. After raising the compression release lever to the relieved position, turn switch to the "start" position, and start spinning the flywheel to approximate cranking speed.
3. Pull down the compression release lever to running position, open the fuel supply and continue spinning engine for several revolutions or until the engine fires. Do not hold starter engaged for longer than 15 seconds at one time.
4. After engine starts, proceed with same steps as when hand cranking.

## STOPPING THE ENGINE

1. Disengage clutch and allow engine to idle for a few minutes.
2. Stop the engine by turning off the gas supply.

## SPEED ADJUSTMENT

Speed adjustments for this engine can be made by adjusting knob on the governor terminal lever. Accurate settings can be made with tachometer readings taken from the hour meter/tachometer. The governor is properly set at the factory for the speed range.

Should it become necessary to reset the governor, a definite procedure should be followed:

1. Disconnect the control rod to the carburetor.

2. Unhook the spring from the pin in the base of the governor, and with the governor lever all the way forward toward the carburetor, measure the distance from the center of the hole in the governor lever to the center of the spring pin. This distance should be exactly  $1\frac{3}{4}$ " on the C-46, C-66, C-81 and C-96 engines. On the C-101 and C-106 engines, the distance should be  $2\frac{1}{16}$ ". If the distance is not as specified above, loosen the allen head clamp bolt on the governor lever and set the lever for the correct distance specified. Tighten the clamp bolt securely.
3. Adjust the length of control rod so that the butterfly valve is all the way open but not against the stop, and the governor rod back to the position where the butterfly valve is just closed, but not jammed tight against the sides of the venturi. Then, adjust the Allen screw on top of the governor so the butterfly valve cannot close any further. Lock the allen screw with the jam nut.

If these adjustments are properly made, the maximum no-load speed will be 4%-5% above the speed shown in the specifications. It is advisable to frequently check the operating speed of the engine with the tachometer.

## CIRCULATION OIL

Oil is drawn from the oil sump through a fine screen by the oil pump; then pumped through an externally mounted full flow filter, into the camshaft base block to the camshaft bearing and to the valve lifter. An oil pressure regulating valve is located in the camshaft base block and is accessible without removing the camshaft Assy. Oil bypassed by the regulating valve is sprayed on the camshaft gear.

An additional oil bypass valve is located in the new trochoidal oil pump to protect the oil filter in extreme cold temperatures. Note

that all oil is filtered before going to any part of the engine. The oil filter also features a built-in bypass valve which opens in the event of a clogged filter allowing continued lubrication of the engine.

In the Arrow single cylinder engines, the oil travels via tubing from the drilled passage in the top of the base block to the governor. From a tee in the camshaft base block, oil travels to the oil collector flange on the crankshaft. Oil from the collector flange passes through a drilled passage in the crankshaft to lubricate the connecting rod bearing. Tubing, originating also at the camshaft base block, carries oil to the cylinder head and valve mechanisms.

## OIL SUMP

The crankcase serves as a reservoir for the engine oil supply. This large reservoir permits longer intervals between oil changes.

It is recommended that the oil reservoir be drained and refilled with new, clean oil at regular monthly intervals, or as required depending on site conditions. Because oil gradually accumulates small particles of dust, grit and corrosive material which cause unnecessary engine wear, it should be drained when the engine is hot, as this aids in the removal of sediments.

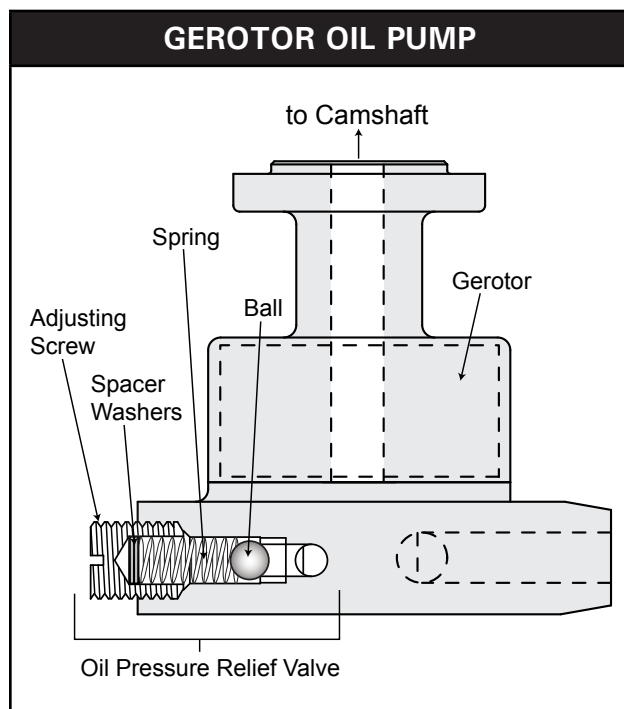
The formation of sludge in the oil is due in part to contamination caused by the gases, leaking by the piston rings, coming in contact with the oil and condensing. If, when draining, the oil appears to be thick and congealed, the oil sump should be cleaned thoroughly. Also, remove the oil pump strainer and clean.

The oil supply should be checked regularly, and replenished if necessary, to maintain the level at the sight gauge. Oil may be added to the engine while it is running through the ASP-1 Oil Filler. Overfilling should be avoided.

## OIL PUMP

A trochoidal or gerotor type oil pump supplies oil under pressure to the oil circulatory system. The oil pump is attached to, and driven by, the camshaft Assy. On current production engines an oil pressure relief valve bypass, set at 60-65 pounds pressure, is built into the oil pump Assy. This serves to protect the oil filter element during extremely cold temperatures.

The relief valve bypass is of the ball and spring design. Adjustment may be made by adding or removing spacer washers from beneath the oil relief valve adjusting screw. Add washers to increase the pressure and remove to lower pressure.



On older engines using the trochoidal type pump, a separate bypass valve is located in the oil line between the oil pump and the oil filter. This bypass is nonadjustable and factory set at 75-80 pounds.

On engines manufactured prior to 1983, an external gear type pump was used with no bypass between the pump and oil filter. The trochoidal oil pump with the bypass

valve will serve as an exact replacement on previous, older manufactured engines.

It should not be necessary to service oil pump except during overhaul when it should be disassembled, cleaned, inspected, and checked for wear. Severe sludging will require occasional disAssy to clean pump passages and the relief valve. Low oil pressure is a possible indication of clogged oil pump passages.

## OIL PRESSURE RELIEF VALVE

The oil pressure relief valve, which is located in the camshaft base block, provides proper oil pressure to all parts of the engine. If it is necessary to adjust oil pressure, adjustment can be made by inserting or removing washers in the spring retainer plug located behind the relief valve spring. This plug should always be screwed down tight. Oil pressure **SHOULD NOT** be regulated by loosening this plug.

To increase oil pressure, washers are added, and to decrease oil pressure, washers are removed. Normally, 4 or 5 washers will give 30-45 pounds oil pressure.

The oil pressure relief valve depends upon free movement of the ball to operate correctly. If erratic oil pressure is traced to the pressure relief valve, remove plug, pull out spring and ball, clean thoroughly, and inspect spring for correct length. The oil pressure is factory set at 55-65 pounds pressure on all engines with factory-installed oil filters.

On Climax engines manufactured prior to 1977 and not manufactured by Arrow Engine Company, normal oil pressure was 17-20 PSI. The bypass spring on older engines was lighter in tension than the current spring. By installing the current spring, Part #94-A, and installing the OFK-1-NS Oil Filter Kit, older model engines can be updated to current specifications.



## OIL FILTER

The standard oil filter is accessible on the outside of the engine base and is the full flow type. It has a built-in bypass valve that will allow the oil to continue to flow to the engine bearings, even though the filter element is clogged up. Also, the filter has an antisiphon valve built-in. **ALL OIL IS FILTERED BEFORE LUBRICATING THE WORKING PARTS.**

## GOVERNOR LUBRICATION

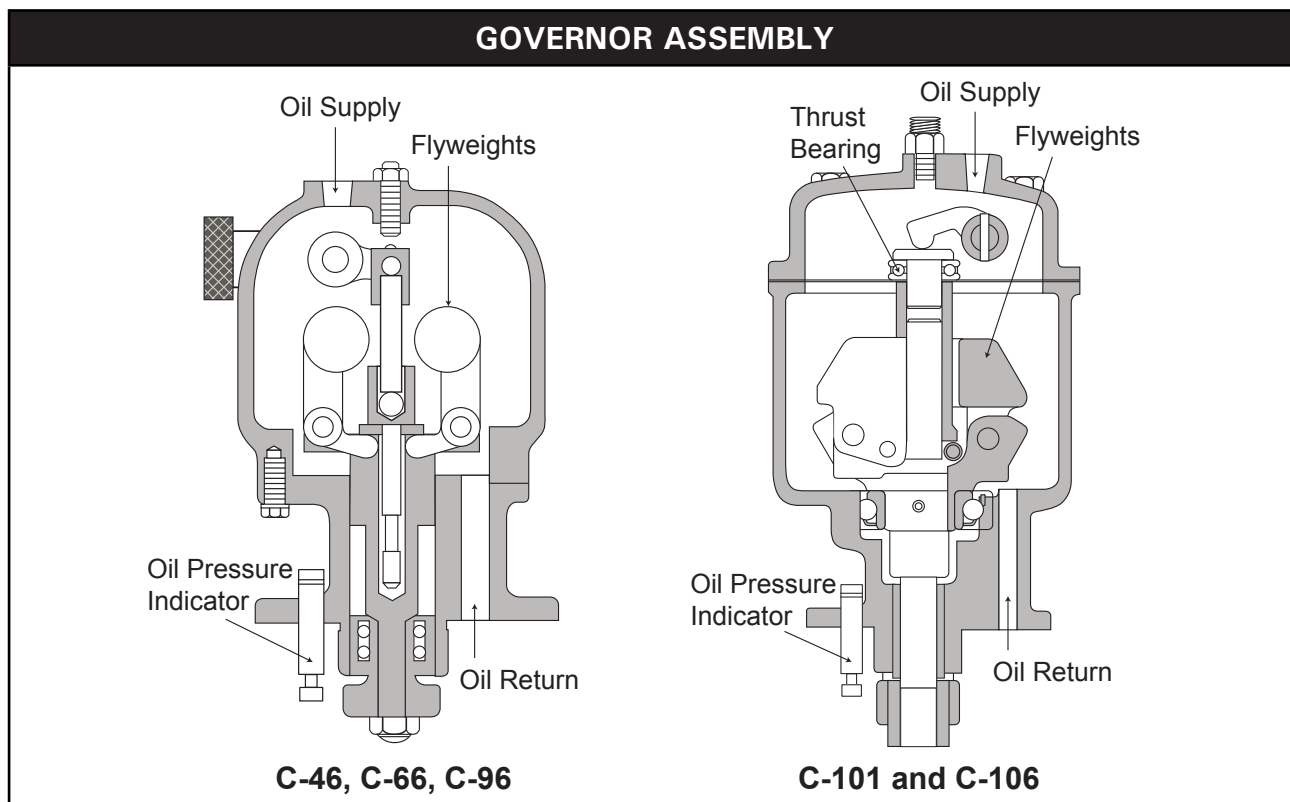
The governor is lubricated automatically from the engine oil supply, and requires no additional lubrication. However, an occasional drop of light oil on the throttle lever linkage to prevent binding and wear is a good idea. Periodically loosen the oil line fitting on top of the governor to be sure the line isn't clogged and that the governor is being lubricated.

## CLUTCH LUBRICATION

**Throw Out Collar** – Before starting, apply a small amount of lubricant through the fitting on the tapered part of the housing.

**Anti-Friction Bearings** – For clutches not supplied with permanently lubricated bearings, apply weekly a small amount of lubricant to pilot bearings through the hole in the clutch shaft; and to shaft bearings through the grease fitting located at the housing hub.

**Lubricant** – Any high grade, soda base short fiber grease may be used (which is recommended for anti-friction bearings), having operation temperatures of 200°F (93°C). A multi-purpose lithium base grease for high operating temperature is highly recommended. The C-96, C-101 and C-106 engines are furnished with a sealed, shielded pilot bearing in the twin disc clutch and requires no lubrication through the clutch shaft. The C-96 clutch shaft is normally a solid shaft with no grease fitting.



# Notes

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## 2 FUEL SYSTEM

### FUEL SYSTEM AND CARBURETOR

The engine normally operates on gaseous fuels. Proper fuel adjustments are important to assure efficient operation, full rated power, longer life and emission requirements. The carburetors, furnished as standard equipment on Arrow engines, are suitable for efficient operation on pipeline natural gas. For best results, the Arrow Gas Volume tank Model HBD-2459 should always be installed in the fuel system at a convenient location next to the engine, but not more than ten (10) feet away. The volume tank should have a minimum capacity of 100 cubic inches (1.6 M3) per horsepower (.75 KW).

### ARROW ENGINE NATURAL GAS SPECIFICATION

Arrow certified engines are certified on Commercial Quality Natural Gas (CQNG), sometimes referred to as Pipeline Quality Natural Gas, and also thought of as the quality of gas supplied by a utility to a customer. CQNG is not consistent and varies from countries, states and locally over time. Emissions certification is based on the fuel specified by the EPA test requirements, having a minimum of 70% methane by volume or have a gross calorific value between 950 and 1,100 British thermal units per standard cubic foot.

Other limits (Trace Gas, Temperature, Water, etc...):

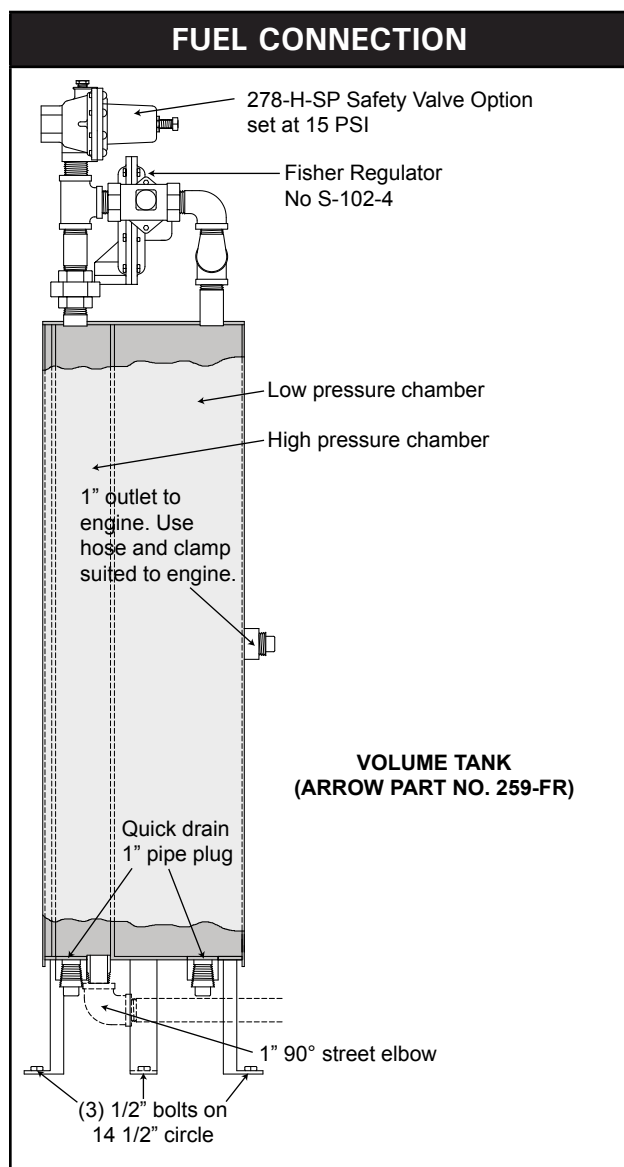
1. Maximum liquid hydrocarbons at the coldest expected engine mounted regulator fuel outlet is 2% or less by gaseous volume.
2. Maximum total organic halide content, as expressed as chloride concentration (TOHC1), is 60 micrograms/liter.
3. Maximum permissible sulfur bearing compounds (H<sub>2</sub>S, etc...) is 30 ppm total by volume.
4. Maximum Free hydrocarbon content is 12% by volume.
5. Maximum solid particle size is 5 microns.
6. No water/glycol is permitted into the engine via the fuel system at anytime.
7. Maximum total siloxanes allowed is 5 ug/l.
8. Due to emissions requirements/restrictions, no compressor oil carry over is allowed.
9. The fuel gas temperature at the inlet to the engine must be between -20°F (-29°C) and 130F (60°C).

#### STANDARD COMMERCIAL QUALITY NATURAL GAS

Methane Content	93% by Volume Maximum
Noncombustible inerts (N <sub>2</sub> , CO <sub>2</sub> , He, etc)	3% by Volume Maximum
Non-methane hydrocarbon mass fraction	0.15 Maximum
Liquid Hydrocarbon	2% by Volume Maximum
Oxygen	0.2% by Volume Maximum
Water Vapor	100% Relative Humidity
Saturated low heating value	900 BTU /cu ft (approx.)
Stoichiometric air/fuel ratio	16.08:1 by Mass (approx.)
Hydrogen/carbon ratio.	3.85:1 (approx.)

## FUEL CONNECTION

An extended line causes considerable loss of pressure when only ounces of pressure are available. Use at least a 1" I.D. minimum flexible hose from the volume tank to the carburetor with no restricted fittings such as street elbows or restricted globe or needle shut-off valves. If the volume tank must be placed some distance from the carburetor, use 1" (24.5 MM) to 1 1/4" (33.75 MM) pipe from the scrubber to within two or three feet of the carburetor with the remainder 1" flexible hose to absorb vibration.



A gas inlet tee at the carburetor, fitted with a 1/8" (3.175 MM) pipe plug for checking inlet pressure, is required. When starting the engine for the first time, turn the gas on in the line momentarily before fastening the flexible fuel hose to carburetor inlet

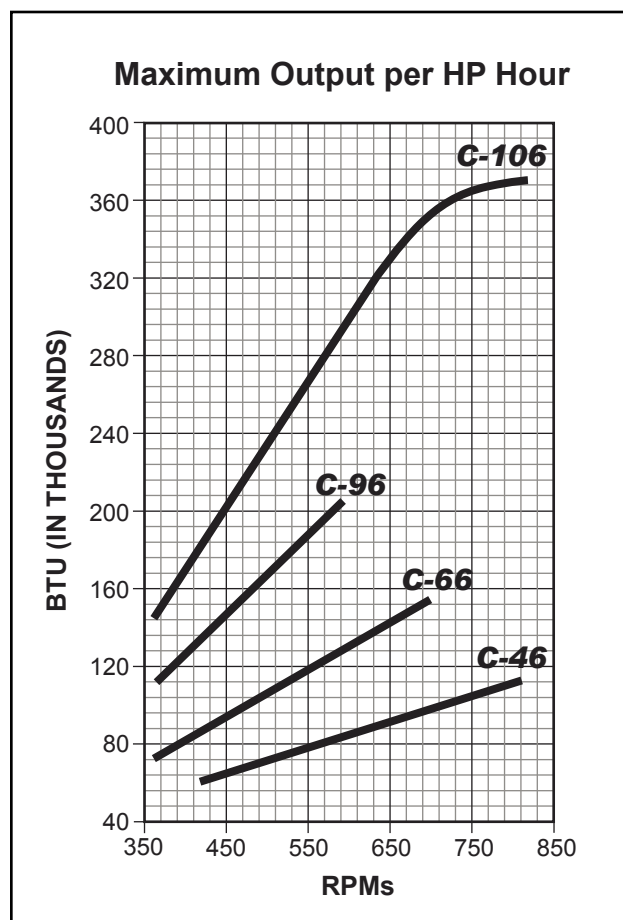
fitting. This will clear air and any foreign matter from the gas line and provide fuel for starting immediately.

## FUEL CONSUMPTION OF ARROW ENGINES

To arrive at the rate of fuel usage on Arrow engines, you must keep in mind all internal combustion engines are heat engines. This means that the fuel consumed furnishes the heat which in turn provides the increase in pressure in the cylinder to create the power impulses.

By using the BTU Rate Chart, you can determine the BTU rate for MAXIMUM HORSEPOWER at the RPM shown for each Arrow engine. The following is a typical example: What is the fuel consumption of a C-96 running around the clock at 570 RPM using refinery natural gas for fuel?

**BTU Rate Chart**





By looking at the BTU Rate Chart, you will see that the BTU requirement for the C-96 at 570 RPM is 200,000 BTU per hour.

The BTU Fuel Values Table shows that the BTU value of refinery natural gas is 1100 BTU/cu ft.

**BTU Fuel Values Table**

FUEL	BTU
Refinery Natural Gas	1100/cu ft
Artificial Gas	600/cu ft
Wellhead or Separator Gas	1000/cu ft*
Butane	21,000/lb. (98,700/Gal.)
Propane	21,500/lb (101,050/Gal.)
Gasoline	19,500/lb (120,000/Gal.)

\* An average BTU rating for well head gas is 1000/cu ft. The gas should be analyzed to get an accurate rating.

**Example:**

$$\frac{200000}{1100} = 181.81 \text{ cu ft per hour}$$

or

$$181.81 \times 24 = 4363.44 \text{ cu ft per 24 hour day}$$

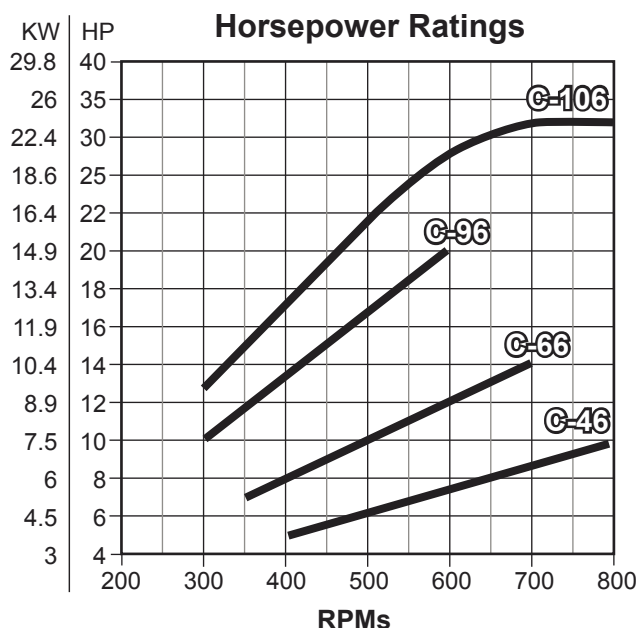
However, an engine producing less than maximum horsepower for a given RPM will use slightly less fuel.

The Horsepower Requirements Chart shows horsepower ratings on Arrow single cylinder engines at various RPMs.

**Example:**

$$\frac{14.25}{19.00} = 75\%$$

**Horsepower Requirements Chart**



C-96 at 570 RPM requires 200,000 BTU per hour or 200000 BTU – 2.02 gal butane per hour 98700 BTU per gal. Or 48.48 gal per 24 hour (2.02 x 24 = 48.48).

By using the Fuel Consumption Table, you can find the C-96 at 75% load uses 10.5 cu ft of 1100 BTU gas per horsepower hour or 149.6 cu ft per hour (10.5 x 14.25 = 149.6 cu ft per hour or 3591 cu ft per 24 hour).

**Fuel Consumption Table**

FUEL USED PER HP HR	100% LOAD	75% LOAD	50% LOAD
Natural Gas 1100 BTU/cu ft	9.5 cu ft	10.5 cu ft	11.4 cu ft
Butane 98,700 BTU/Gal 4.7 lbs/gal	.50 lbs	.56 lbs	.64 lbs
Gasoline 120,000 BTU/Gal 6.15 lbs/gal	.09 gal	.095 gal	.11 gal

If we use the same example, burning Butane instead of natural gas for fuel, we arrive at the following:

C-96 at 570 RPM requires 200,000 BTU per hour or 200,000 BTU - 2.02 gal butane per hour 98700 BTU per gal. or 48.48 gal. per 24 hour ( $2.02 \times 24 = 48.48$ ).

However, if we are only producing 14.25 HP or 75% of maximum load, we look at the Fuel Consumption Table and find we are using .56 lbs. of fuel per HP HR or 1.7 gal butane per hour (.56 lbs.  $\times$  14.25 HP = 7.98 lbs. 4.7 lbs per gal = 1.7 gal) or 40.8 gal per 24 hour ( $1.7 \times 24 = 40.8$  gal).

It should be pointed out that the above calculations and tables are based on engines in new or like-new condition. The general condition of an engine will have a large bearing on fuel consumption, that is the more wear an engine has, the poorer the fuel economy.

If your horsepower requirement is 14.25 HP, the C-96 is producing 75% of maximum power.

## ENGINE FUELS

Engine fuels are highly combustible and may ignite or explode. Fuels must be conducted to the engine with proper piping, free from leaks, and designed to resist breakage from vibration. If a gas engine has been cranked excessively without starting, or if the engine shutdown with fuel supply open, shut off the gas fuel supply and ignition. Then crank the engine to purge the cylinders, exhaust system, and crankcase of accumulated, unburned gas. If you fail to do this, a spark plug could ignite the gas and cause an explosion.

## POSITIVE FUEL SHUT-OFF

Some means of positive fuel shut-off should be provided for emergency use. Pressurized fuels (natural gas, liquefied petroleum gas, etc.) should have another shut-off valve, preferably automatic, other than those in the carburetor or gas pressure regulation equipment. It is the final responsibility of the engine owner to ensure that the installation is free from fuel or exhaust leakage, and such installation meets all applicable codes.

# 3 COOLING SYSTEM

## VAPOR PHASE SYSTEM

*(Used on old Climax and early Arrow engines.)*

The vapor phase system can be described as a cooling system where it is normal for water to boil in the radiator tank or hopper. The steam rises in to the radiator or condenser and is condensed by the cooling action of the fan.

In order for steam to rise into the radiator, air must escape. Provision for this escaping air is made in the front center tube of the radiator core. This tube only is closed at its bottom and open at its top end. The small holes can be seen near the bottom of the center tube at front of radiator. Be sure these holes are kept open for passage of air.

The coolant level should be maintained 1" – 2" below the bottom header plate of the condenser core. Do not allow coolant to be at a level high enough to rise in the condenser core, as this blocks the passage of steam, and will only force the water out the small bleed hole in the front center tube, lowering the coolant volume and cause overheating until the coolant gets down to the proper level.

When the engine is stopped, water may be added by removing the filler cap on the water hopper. The filler cap must be kept tight with a good gasket; otherwise, steam will escape, causing the engine to run dry of cooling water.

Under most conditions, (except severe sub-zero weather) the height to which steam rises in the radiator can be felt by placing your hand on the outside of the radiator core. If the radiator remains cold, and water continues to boil out of the water gauge, after two or three hours of operation, check to see if the air hole, near bottom of center tube, is open (mentioned above in this Radiator section).

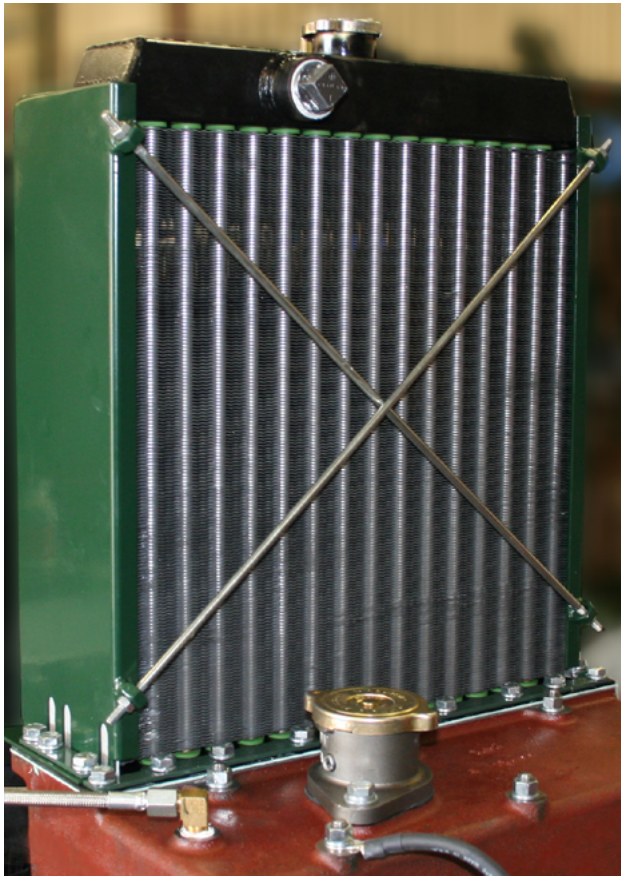
When operating in climates where freezing occurs, an anti-freeze solution should be used. Since this type cooling system cools by the water boiling, it is imperative that at least 40% water is mixed with the antifreeze. In other than arctic climates a 50-50 mixture is sufficient. Always thoroughly mix the water and anti-freeze before pouring into the system. Do not use pure anti-freeze as severe damage will result. Since pure anti-freeze will not boil and turn to steam, consequently it will not rise into the condenser and be cooled.

Manufacturers of anti-freeze change their formula from year to year. Some brands are not for vapor cooled engines. Please consult your dealer.

## PRESSURIZED-CONDENSING SYSTEM

The pressure-condensing cooling system is standard, is a closed type, operating at 4 pounds above atmospheric pressure. This system is advantageous when operated at higher altitudes. If operating at 3500 ft. above sea level or higher, it is advisable to use the pressure condensing system to keep up the boiling point temperature for better engine performance.

The pressure-condensing system cools in the same manner as the vapor system. Water boils in the water hopper with steam rising into the condenser core, where the cool air from the fan removes the heat, thus condensing the vapor; it falls back into the water hopper as a cool liquid. This system will control the engine temperature through a wide ambient temperature range.



Since this system operates at 4 pounds pressure, steam and water escape when the cap is removed. Do not remove the cap while the engine is running. Before stopping the engine, let it run a few minutes with the clutch disengaged to reduce pressure so the cap may be removed with safety.

The coolant level should be checked on a regular basis to be assured no leaks have occurred. The coolant level is 1" below the bottom header plate in the condenser core. Never fill the system so full that expansion causes the coolant to rise up in the condenser tubes. This will block the steam from rising in the tubes to be cooled. In turn, heating will occur until coolant is forced out the overflow on the pressure cap and coolant reaches the proper level.

**ALWAYS CHECK AND ADD COOLANT THROUGH THE FILLER CAP ON THE WATER HOPPER RATHER THAN THE PRESSURE CAP ON TOP OF THE CONDENSER.**

When the pressure-condensing cooling system is used in climates with freezing temperatures, a mixture of anti-freeze and water must be used. A good grade of anti-freeze should be mixed with water before pouring into the engine. Usually 50-50 mix is very sufficient. Never use less than 40% water in a pressure-condensing cooling system.

#### **WARNING:**

**DO NOT ATTEMPT TO FILL THE COOLING SYSTEM WHILE THE ENGINE IS RUNNING.**

## **PRESSURE RELIEF VALVE**

A pressure cap on the condenser prevents damaging pressure from developing. Do not use a pressure cap of greater than 4 pounds pressure as this only exerts excessive pressure on the cooling system.

During the warm-up period, air and slight amounts of vapor will be released from the pressure relief valve. If vapor is released under normal operation, after the engine is warmed up, check whether the condenser fins are clogged with dirt, which will restrict the air flow causing the engine to overheat. Inspect the condenser for this condition every week or so.

## **THERMAL-SIPHON**

**(Optional and older Climax and Arrow engines.)**

The thermal-siphon cooling system differs from the ebullient cooling system in that the radiator is filled with coolant 3/4 full. In the thermal-siphon system the core is actually a radiator rather than a condenser. A hose connects the radiator top tank to the water hopper. A sight glass is in the hose approximately 1/3 of the distance down from the top tank. The coolant level should be visible in this gauge glass at normal



level for the system to operate as a thermosiphon system. If the coolant level should fall below the bottom of the radiator, the system will function as an ebullient system and the low water level safety switch will protect the engine from overheating.

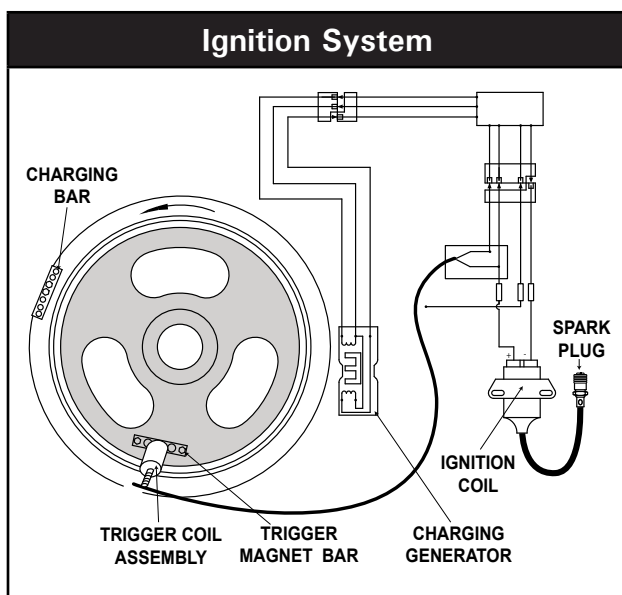
In some cases it is desirable to operate the system as an ebullient cooling system with the coolant level 1"-2" below the bottom header plate of the radiator during extreme cold temperatures. This in turn will allow the engine to run at a higher temperature helping to minimize sludging and condensation in the crankcase. When ambient temperatures rise to summer times levels, fill the system to a level visible in the gauge glass in the hose and operate as a thermal-siphon cooling system. This system operates at 4 pounds pressure just like the pressure condensing cooling system.

## Notes

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# 4 IGNITION SYSTEM

## MAGNETO-LOW TENSION



The Arrow AF-603RL low tension magneto is of the rotating magnet design. A high energy magnet is attached to the flywheel and passes by a permanently mounted generator coil facing the flywheel. Each time the magnet passes by the face of the generator coil, a capacitor is charged to peak voltage.

A trigger magnet is also mounted on the flywheel and faces off to a trigger coil located on the engine. The trigger coil is positioned so that the magnet will pass the trigger coil and cause the SCR to discharge the storage capacitor into the ignition transformer located near the spark plug.

The Arrow AF-603RL should provide long, maintenance free service because there are no moving parts. All electronic parts are encapsulated to protect against moisture and physical damage.

When spark test indicates unsatisfactory magneto performance, check the following:

1. **Electrical connections** – they could have become loose.

2. **Air gap** – the air gap between the EMG and magnet bar should be a nominal .030 inches, but no more than .080 inches.

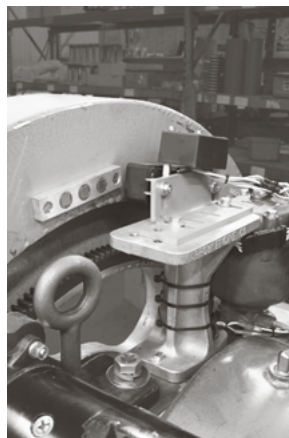
3. **Coil** – Check the coil on a reliable tester, or substitute a new identical coil in its place.

If trigger coil is moved, timing should be checked.

Start the engine. If desired, the timing may be checked with a timing light.

### CAUTION:

Be sure proper air gap is maintained between trigger coil and trigger magnet.



Generator



Trigger

## SPARK PLUG

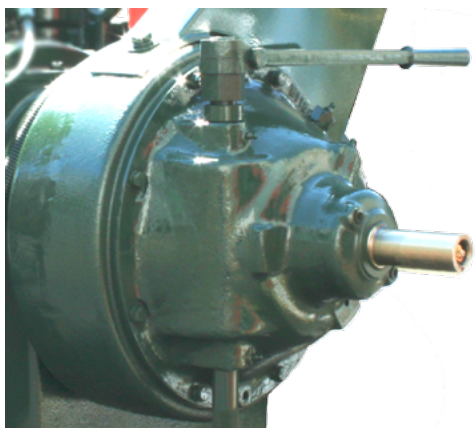
The spark plug supplied with the engine has been selected according to heat range, to give the longest service and most satisfactory performance, but peculiarities of actual operation may indicate a change from the factory selection. All Arrow engines are equipped at the factory with spark plugs with stainless steel electrodes. Only a small level of H<sub>2</sub>S in the fuel will cause a standard steel electrode plug to be short-lived.

For protection against enforced shutdown and difficult starting due to faulty spark plugs, it is advisable to inspect, clean, file the electrodes and regap the spark plug every few weeks of operation.

The low limit gap is recommended because when plug is used, the electrodes burn away to widen the gap. With the new solid state ignition, plug setting is .025".

## POWER TAKE-OFF CLUTCH

The clutch is a single plate dry disc type with cushion engagement and has sufficient capacity for transmitting the engine's power. The clutch is engaged by a hand lever, which may be mounted on either side of the clutch operating shaft. The clutch housing may also be rotated to any desired position to facilitate the lever operation and service. This clutch requires very little attention except for periodic checks and lubrication.

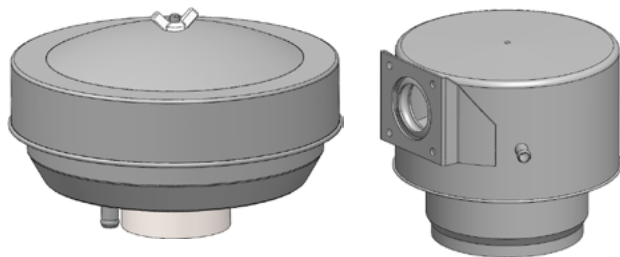


If the clutch does not pull, heats or the operating lever jumps out of the engaged position, an adjustment is required. To adjust the clutch, remove the hand hole plate on the clutch housing and turn the clutch until the adjusting lock pin can be reached. Pull out adjusting lock pin and turn adjusting yoke to the right, or clockwise, until the operating lever requires a distinct pressure to engage. If the adjusting yoke cannot be screwed up any tighter, this indicates the clutch driving plate is worn out and must be replaced.

**NOTE:** A new Power Take-Off generally requires several adjustments until the friction surfaces are worn in. When a new Power Take-Off has been installed on an engine, rap the shaft on the end to center the pilot bearing to relieve any excessive thrust due to resistance of the pilot bearing when being passed into the flywheel.

# 5 AIR CLEANING SYSTEM

## AIR CLEANER



The air cleaner with clean oil/element will protect the engine parts from abrasive dust and dirt in the air. Every month, depending upon the operating conditions, clean the air cleaner in solvent and refill with clean oil of the type used in the engine or paper element, whichever is applicable.

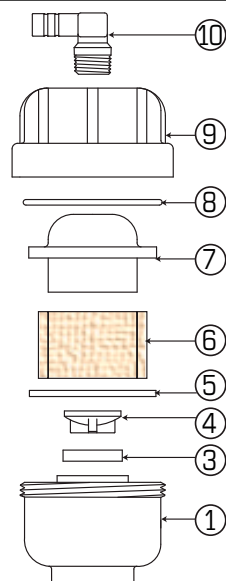
## CRANKCASE BREATHER



**NOTE:** This section does not address the EPA emissions compliant breather systems - please call Customer Service at 1-800-331-3662 if you have questions about this system.

The crankcase breather plays an important role in assuring Arrow engines perform with maximum efficiency. A simple poppet valve, in the body of the valve cover breather, allows crankcase pressure to be evacuated, and a secondary fitting is located in the crankcase top cover.

## VALVE COVER BREATHER Assy



Each time the piston goes back from the cylinder head, the piston compresses the air in the crankcase chamber. This pressure opens the poppet valve in the breather and, in turn, this pressure dissipates. When the piston travels back toward the head, the poppet valve closes and a light vacuum is created in the crankcase. Simultaneously, the smaller fitting located on the top cover allows a small flow of fresh air to enter the crankcase.

If excessive oil blows out either breather, usually the disc valve is worn or has stuck and should be replaced. A simple test of the crankcase breathing system is to unscrew the small fitting out of the crankcase top cover, plug the hose off the air filter and place your finger over the hole in the cover. If the breather is working properly, you feel a definite vacuum build up. If you don't feel a vacuum but a pressure build up, check the poppet valve in the breather on the valve cover.



The constant flow of fresh air in the crankcase will eliminate condensation of moisture and sludging in the crankcase. Also, the vacuum will eliminate oil seepage and leaks.

Do not plug the hole in the top crankcase cover instead of using the fitting. This will prevent any fresh air from entering the crankcase which can cause excessive moisture (condensation) to occur, along with rapid contamination of the lubricating oil.

In most cases when excessive oil is blown out of the crankcase breather, the cause can be traced to a faulty breather rather than excessive blow-by or more serious reasons.

When the crankcase breather is ordered as a spare part, it comes complete with a connecting hose and clamps. This allows the replacement breather to be used on older engines which do not have the tapped hole in the valve cover.

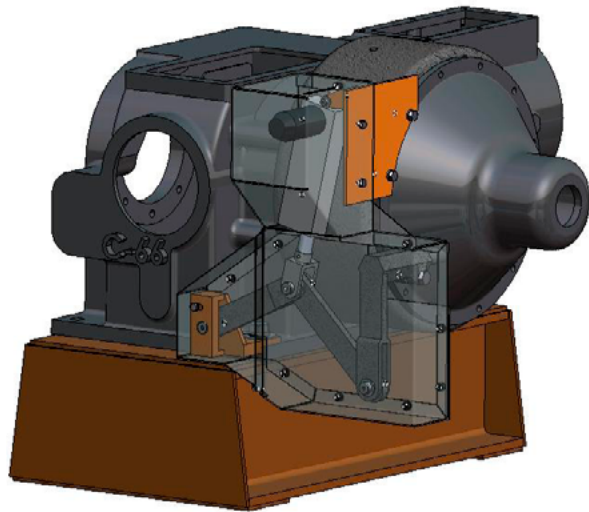
## PARTS INFORMATION

It is important to note that currently produced parts for new Arrow engines will fit exactly on all of the older model engines. Even though materials have been improved and, in some cases, slight design improvements have been made, ALL ARROW PARTS ARE RETROFITABLE TO THE VERY EARLIEST CLIMAX ENGINE MANUFACTURED AND STILL RUNNING.

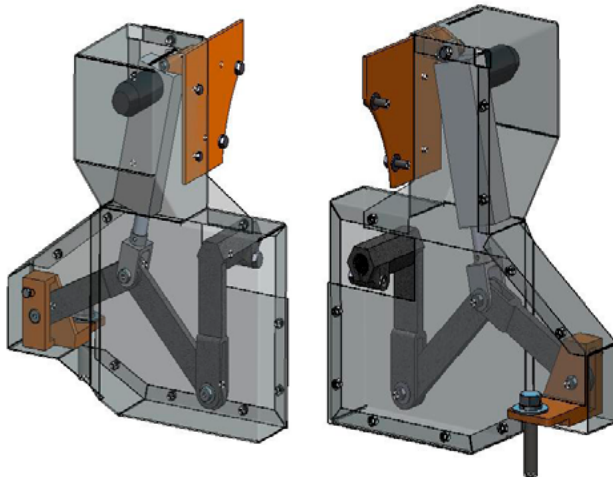
# 6 CLUTCH ACTUATOR

## NEW CLUTCH ACTUATOR ASSY & ADJUSTMENT INSTRUCTIONS

**Note:** Images shown represent a C-66 Engine. All C-series engines have a similar configuration and actuator components will assemble in the same manner as shown.

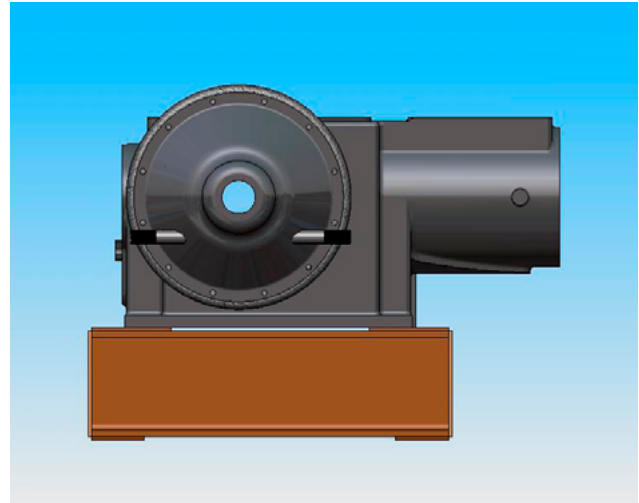


### Assy of Kit onto Engine



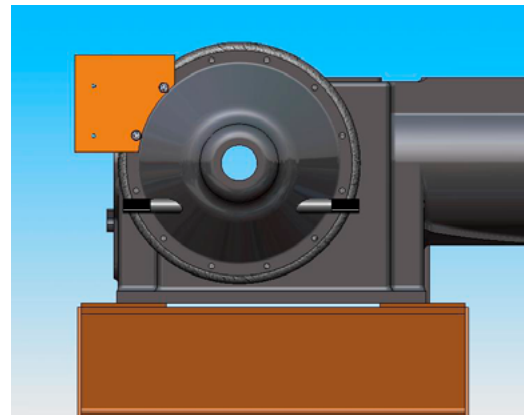
### 1. Clutch Orientation

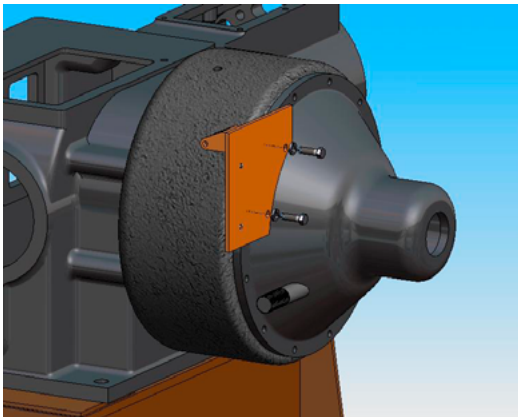
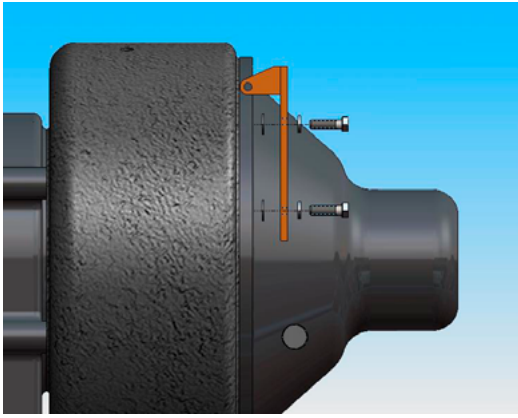
The clutch must be rotated so the operating shaft is oriented horizontally and toward the bottom of the engine as shown. This can be done by removing all of the bolts surrounding the clutch face, rotating the clutch in place, then replacing and retightening the bolts in the new location. Note: the clutch does not need to be removed from the flywheel housing in order to rotate it, only loosened.



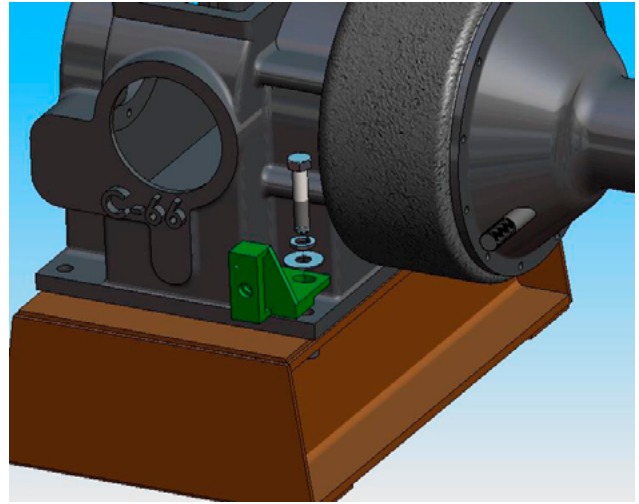
### 2. Main Component Attachment

The top bracket should be positioned as shown, using 2 (3/8 ID) flat washers between the bracket and the clutch housing for spacing, 2 (3/8 ID) split-lock washers and 2 (3/8-16x1.25) hex bolts as shown.

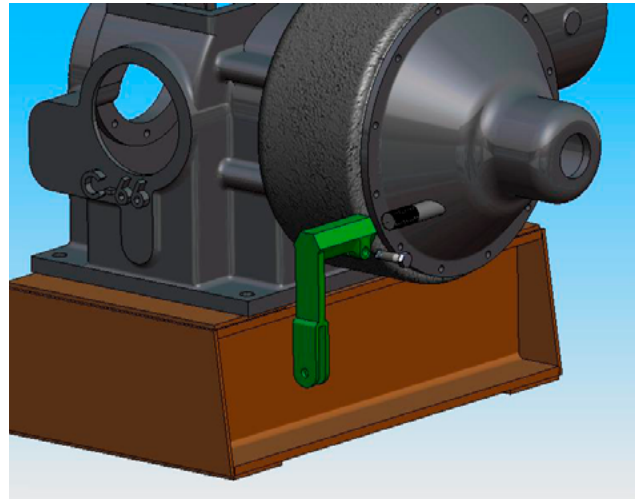


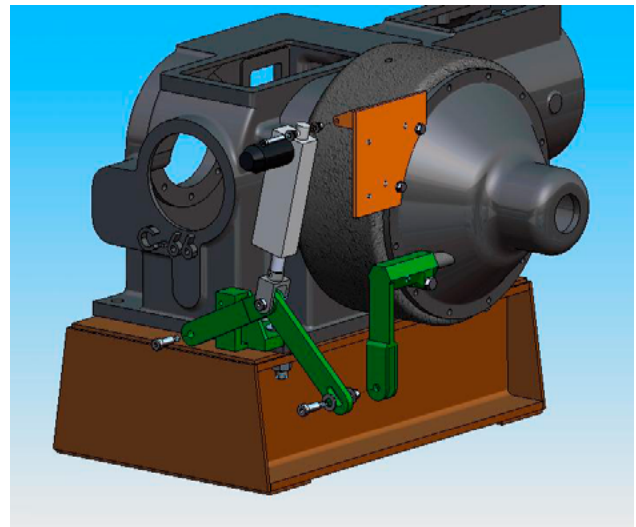
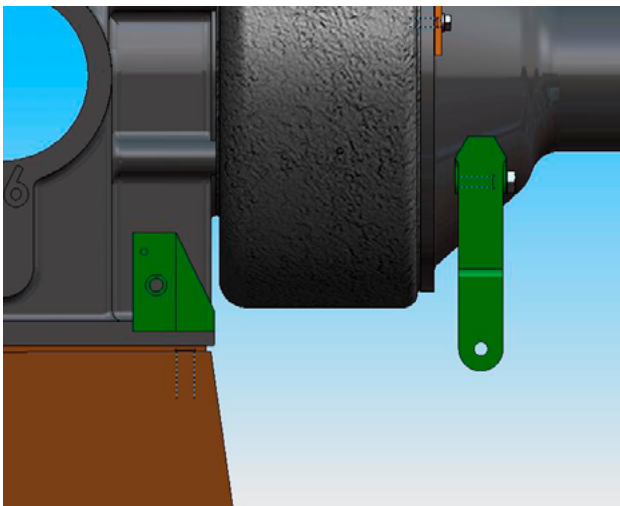
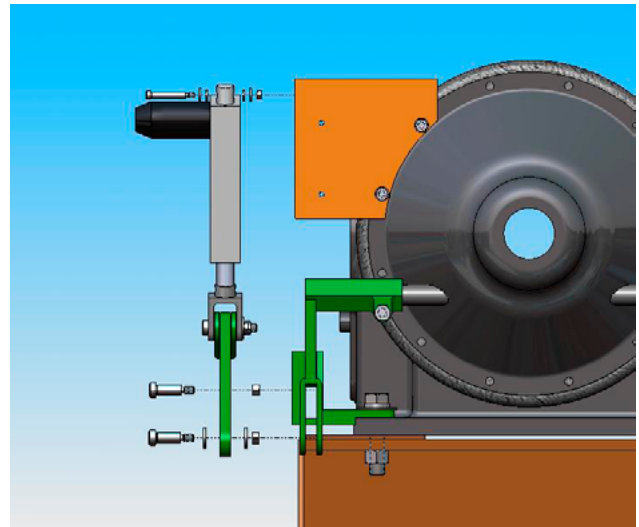
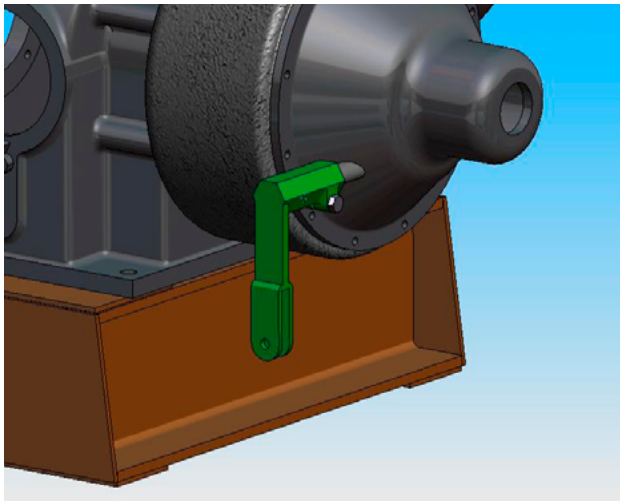


The base bracket should be positioned as shown. The existing bolt that secures the engine case to the base should be removed. The base bracket should be attached using 1 flat washer, 1 split-lock washer, and 1 hex bolt. (C46 and C66 engines will use a 3/4-10x3.5 bolt with 3/4 ID washers. C96 and C106 engines will use a 7/8-9x3.5 bolt with 7/8 ID washers.) Do not fully tighten the bracket to the engine base; further adjustment will be necessary.

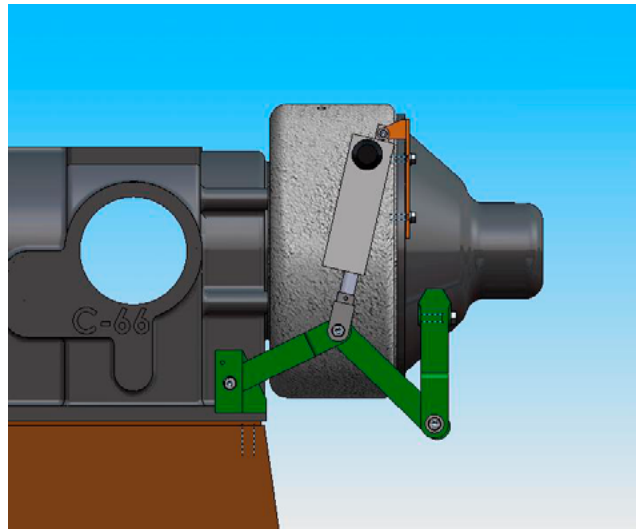


Slide the splined lever onto the operating shaft and secure in place with a 1/2-13x1.75 hex bolt. Position the lever so that it is as near vertical alignment as possible with the clutch operating shaft in the *disengaged* position. (Note: The splined lever may later have to be rotated either direction by one spline during adjustment.)

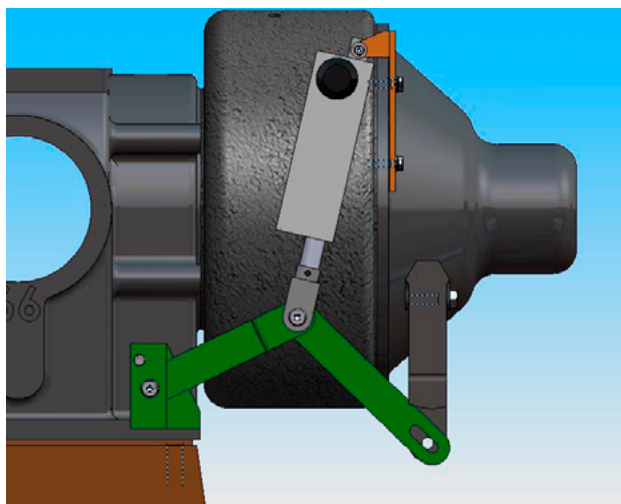
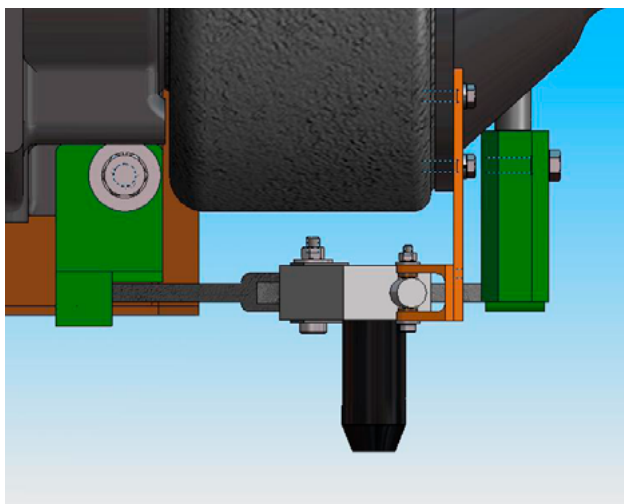




The assembled actuator unit (consisting of the linear actuator, clevis, 6mm rollpin, 1/2x1.75 long shoulder bolt, 1/2 ID flat washer, 3/8-16 locknut, base linkage bar, and slotted linkage bar) will attach to the three locations as shown. The linear actuator will attach to the top bracket using one 5/16x1.75 long shoulder bolt, two 5/16 ID flat washers, two 5/16 ID brass spacers, and one 1/4-20 locknut. The base linkage bar will attach to the base bracket using one 1/2x1.25 long shoulder bolt and one 3/8-16 locknut. The slotted linkage bar will attach to the splined lever using one 1/2x1.25 long shoulder bolt, two 1/2 ID flat washers, and one 3/8-16 locknut.



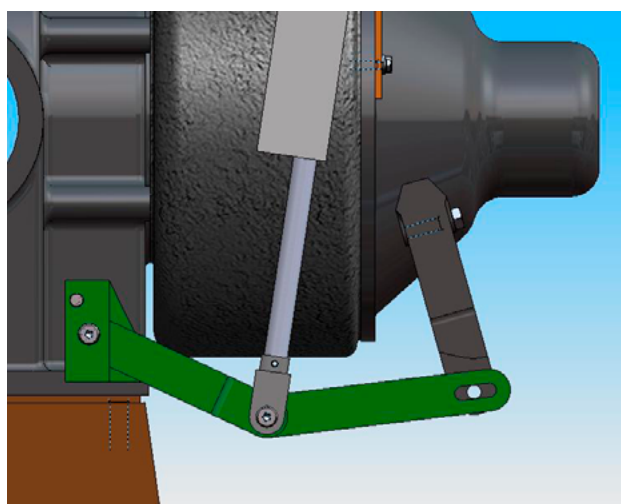




### 3. Adjustment

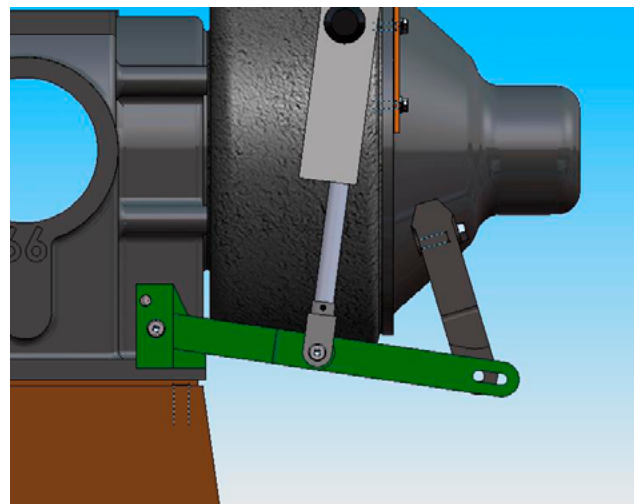
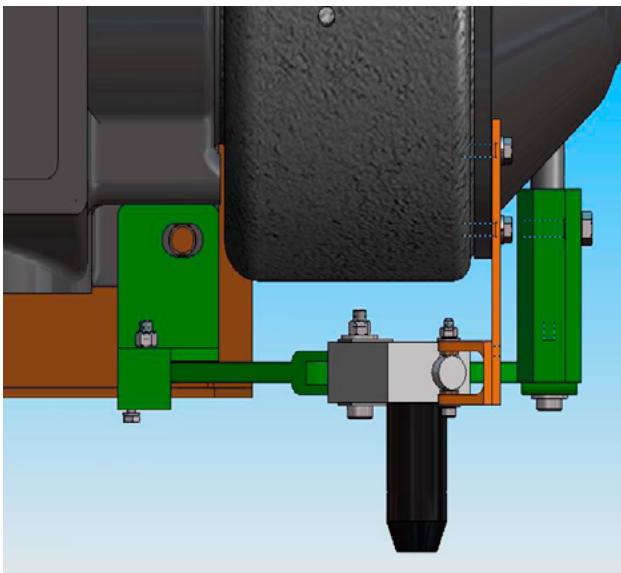
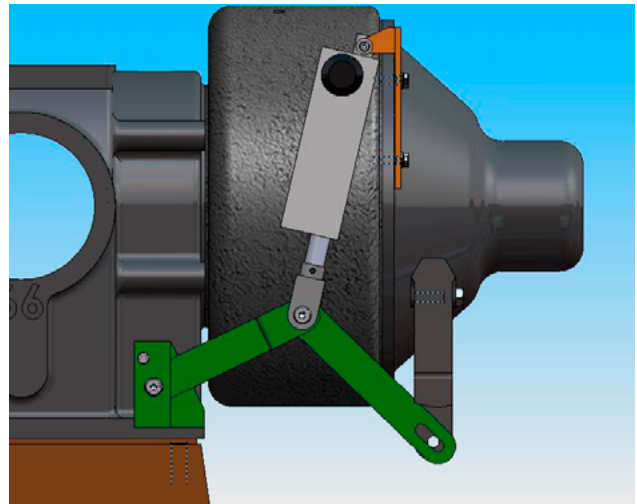
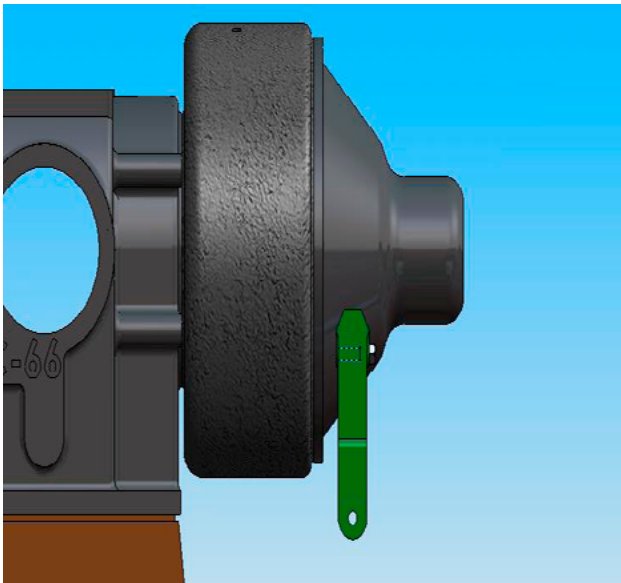
Proper adjustment of the clutch actuator is critical to operation and to ensure longevity of the clutch and actuator. The intent of the design and the goal of the adjustment process is for the clutch to engage when the actuator is on its outward stroke and the two linkage bars become in line with each other. (Excessive binding in the linkage can cause damage to the clutch and/or the actuator.) After the clutch engages, the actuator should continue to travel outward, allowing the slotted linkage to relieve the engagement pressure on the clutch.

While the actuator is in the fully retracted, disengaged position, the shoulder bolt in the splined lever joint should be approximately centered in the slot of the linkage bar. Once the actuator is fully extended and the clutch is in the engaged position, the shoulder bolt in the splined lever joint should, again, be approximately centered in the slot of the linkage bar (such that any force is removed from the clutch shaft).

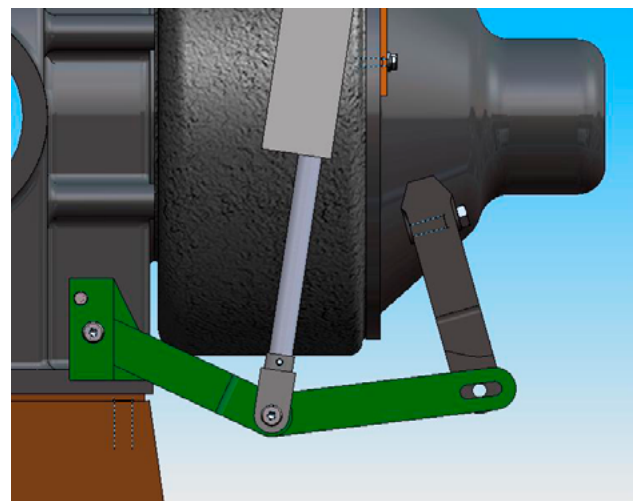


The splined lever should be positioned initially, as near vertical (pointed downward) as possible, with the clutch disengaged. The base bracket should begin with the bolt securing it to the base positioned approximately in the center of the slot and fully tightened so that the base bracket does not move during clutch engagement/disengagement (recommended 180-200 ft-lbs for  $\frac{3}{4}$  grade 5 fasteners; 250-270 ft-lbs for  $\frac{7}{8}$  grade 5 fasteners).

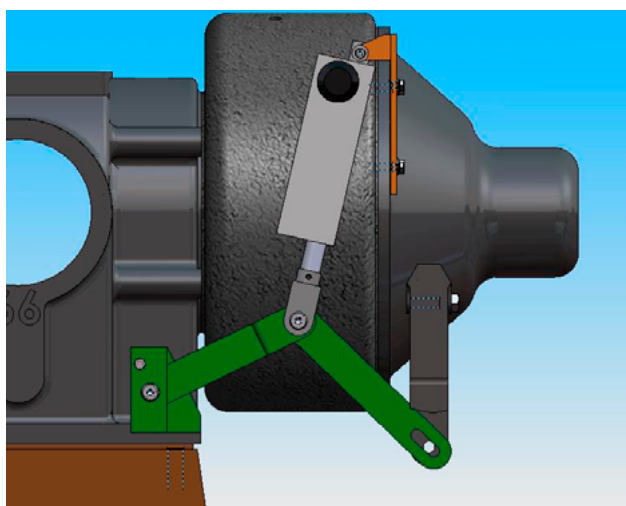
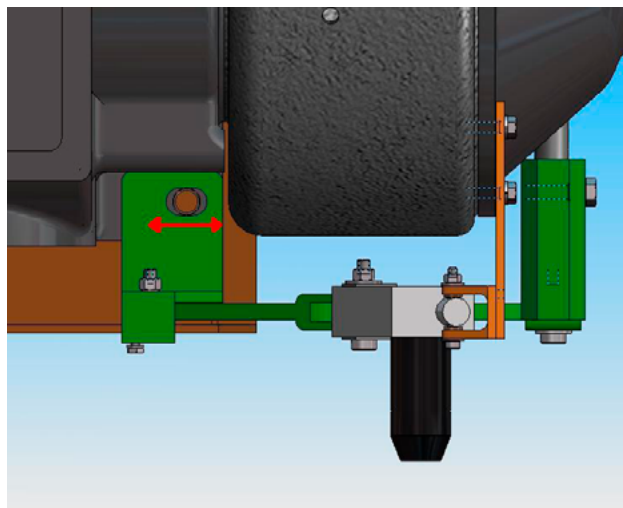
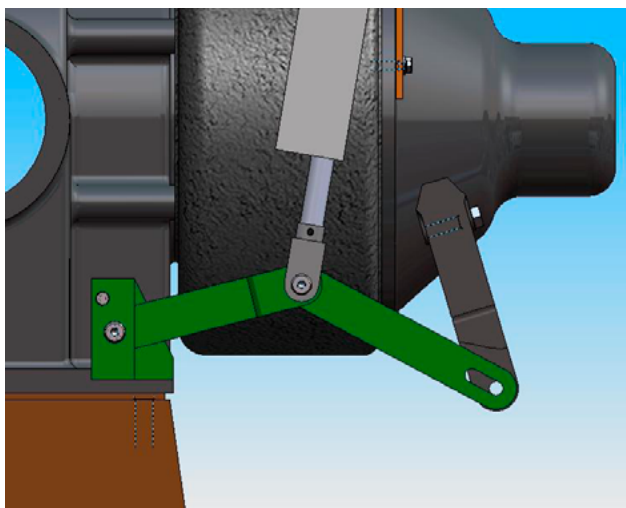




Extend the actuator (confirming that clutch engagement occurs) and check final position of the shoulder bolt in the slot (confirming that it is approximately centered and not applying any pressure to the clutch).

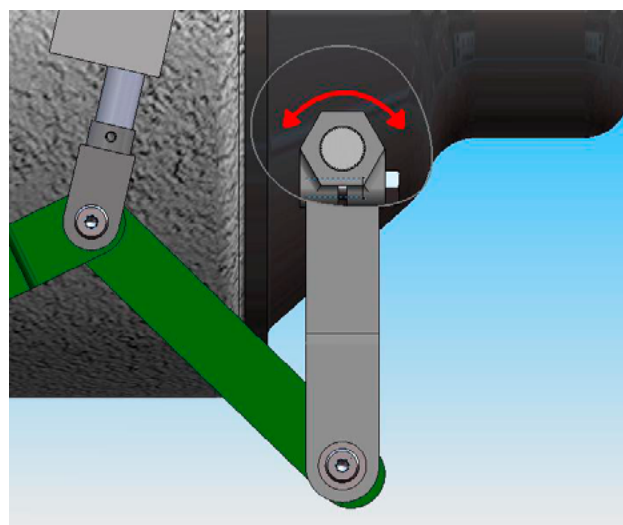


Retract the actuator (by reversing polarity to its leads), confirming that clutch disengagement occurs and the linkage returns to its starting position.



If during extension or retraction, the clutch is not fully engaged (or disengaged) or the shoulder bolt does not come to rest centered in the linkage bar slot, adjustments must be made as necessary. The two locations for adjustment are the base bracket and the splined lever. The first adjustment that should be made is to move the base bracket one direction or the other within the slot (depending on the direction needed for proper clutch engagement/disengagement, while maintaining a finished position with the bolt centered in the slot).

If proper adjustment cannot be reached by altering the position of the base bracket alone, the splined lever should be removed from the operating shaft and be repositioned, rotating it on the operating shaft by one (1) spline one direction or the other. (Do not rotate the splined lever more than one (1) spline rotation from vertical either direction when in the disengaged clutch position.)



A combination of fine adjustments in these two locations will ultimately, first, allow the clutch actuator system to fully engage the clutch, then release the applied pressure by centering the bolt in the linkage slot; then, second, allow the linkage to disengage the

clutch, returning the bolt to the center of the slot in the linkage.

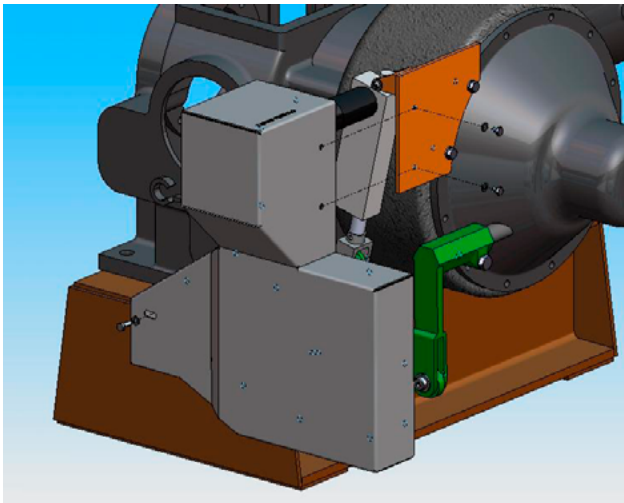
After the clutch has been properly adjusted for operation, all bolts should be checked and tightened as necessary.

If further adjustment assistance is necessary, please contact David Johnson at Arrow Engine Company. 1-800-331-3662.

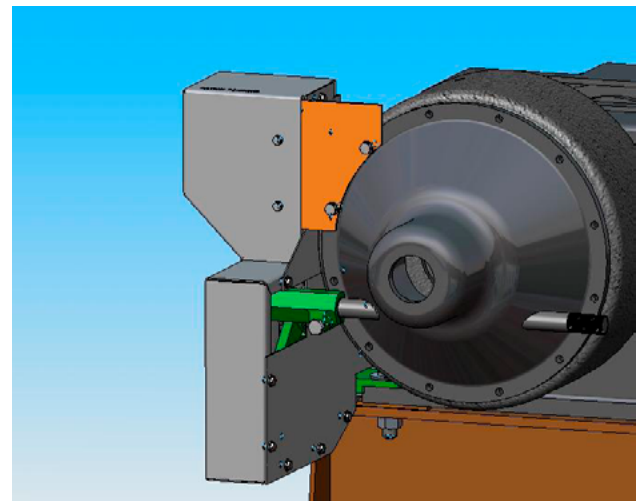
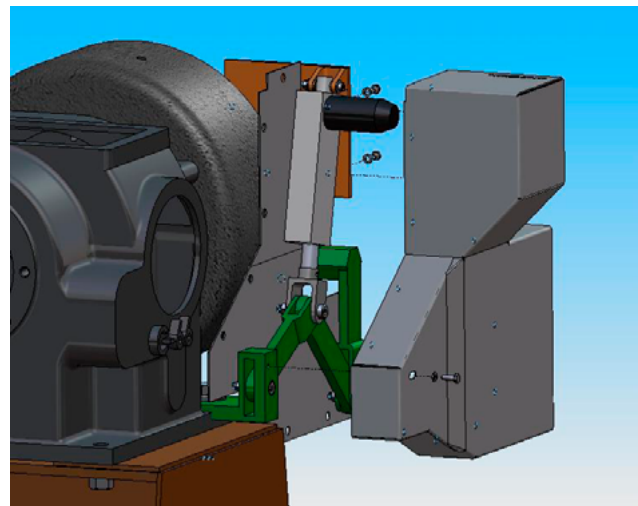
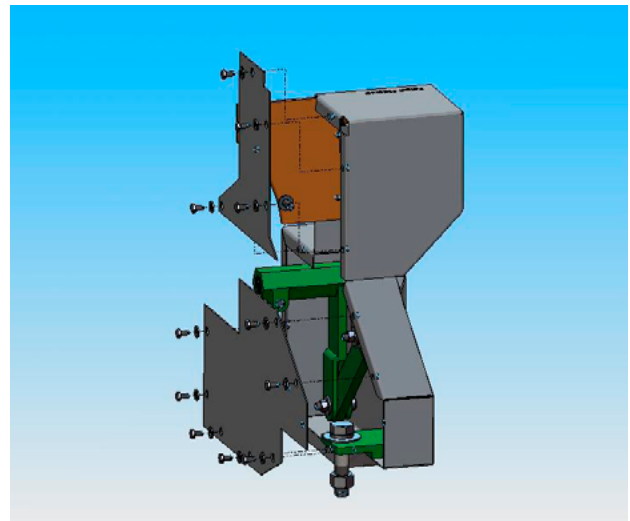
#### 4. Cover Attachment

After the clutch actuator linkage has been adjusted and correct operation has been verified, the protective cover can be attached.

The outer cover should be attached to the top bracket using two  $\frac{1}{4}$  flat washers and two  $\frac{1}{4}$ -20 x .625 bolts as shown. The outer cover should also be attached to the base bracket through the slot in the cover using one  $\frac{5}{16}$  flat washer and one  $\frac{5}{16}$ -18 x .625 bolt as shown.



The two-piece shield cover-plates install as shown, using  $\frac{1}{4}$ -20 x .625 bolts and  $\frac{1}{4}$  ID flat washers. The actuator wires should be positioned to exit the cover from the notch in the upper corner.



## Notes

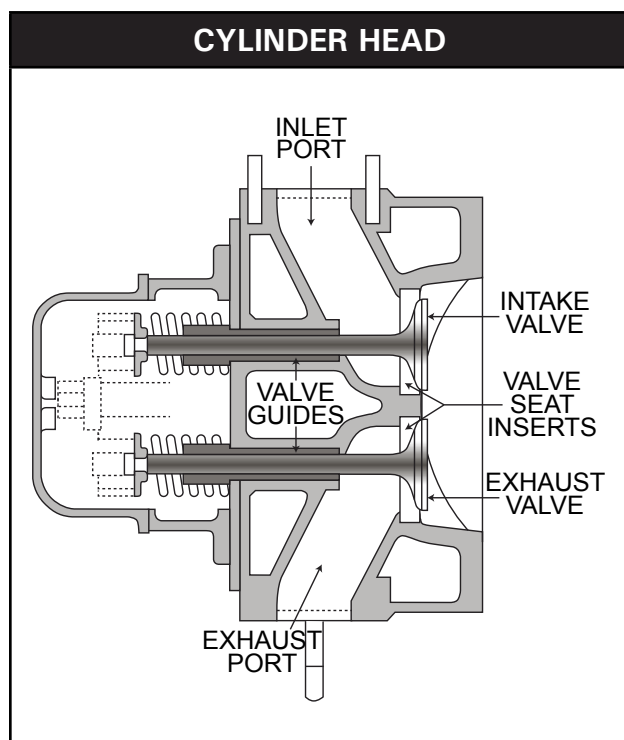
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# 7 ENGINE OVERHAUL

## CYLINDER HEAD

The cylinder head is an iron alloy casting with chrome nickel replaceable intake and exhaust valve inserts.

Maintenance service and adjustments can be readily performed, as the head can be easily removed without disturbing any other major engine parts. In the event the engine develops low compression, loss of power, is difficult to start, or has a combustion knock due to carbon deposits, the head should be removed for inspection.



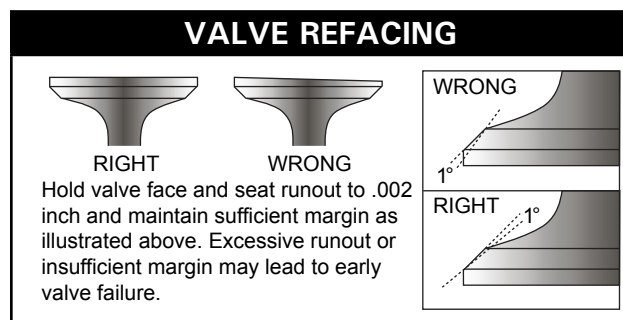
## DISASSEMBLY OF CYLINDER HEAD

1. Remove cylinder head cover. Disconnect fuel line from carburetor. Disconnect throttle rod at carburetor.
2. Remove cylinder head stud nuts and lift off the cylinder head. Place combustion chamber over a suitable block to hold valves in closed position.

3. With a suitable lever (a 3/8" U-shaped rod is satisfactory) under the rocker arm, depress the valve spring to release the valve spring lock retainers. The valve spring washers and valve springs can be removed.
4. Clean all parts in solvent or fuel oil to remove carbon, gum, and varnish deposits. If the valves or valve seats are severely burned, they should not be reground, since the metal behind the burn has probably lost its original properties. Valves that are warped or have reduced diameter at the valve stem should be discarded and replaced with new valves.
5. When refacing the valves, the maximum face runout in reference to the valve stems should not exceed .002" (total indicator readings) and only enough metal should be removed to produce a bright face and a continuous margin.

## REFACING THE VALVES

Valves should be ground to a 45° seat angle. Grind the seat with a 45° grinding wheel. Because the valve guide is used to pilot the grinder, this procedure must be attempted only when the valve guides are clean and in good condition.



Maintain a valve seat width of 7/64" to 1/8" by grinding the outer edge of the seat on a 75 degree angle. Do not grind the seat bore to narrow the seat, as this moves the center of the seat too near the valve edge. Discard valves that have been refaced to point where the edge of the valves become less than 3/64".



## REASSEMBLY OF CYLINDER HEAD

1. To reassemble the cylinder head parts, lubricate and insert valves in valve guides, and install valve springs and spring washers. Valve spring dampening coils (close wound) must be placed toward the cylinder head.
2. Depress the valve spring washers and replace the valve spring lock retainers.
3. Be sure that the surfaces of the cylinder head and block are absolutely clean. Always install a new head gasket. Do NOT use the old head gasket over again. It will more than likely not seal completely. Install the cylinder head Assy.
4. Snug the cylinder head studs evenly, and then tighten alternately with a torque wrench to specified torque for the engine model. Stud nuts must be re-torqued after engine is hot.
5. Hand crank the engine until the piston is top dead center on the compression stroke.
6. Loosen the rocker arm lock nut and insert a .020" feeler between the rocker arm and valve stem. Turn the rocker arm screw until proper clearance is obtained. Without further movement of the rocker arm screw, tighten the lock nut securely. Recheck the clearance with a feeler gauge.

## VALVE ADJUSTMENT

With the engine warm, reset both intake and exhaust tappet clearance to .020" (.508mm).

**NOTE:** Always reset valve tappet clearance after re-torquing cylinder head stud nuts.

## CYLINDER SLEEVE

This engine has a replaceable wet type cylinder sleeve of refined alloy chrome nickel iron, finely machined and honed for close piston clearances. The lower end of the sleeve has a large flat seal (C-66, C-96), or three sealing rings (C-46, C-101, C-106), installed to seal off the water jacket. The cylinder sleeve can be readily removed by using a suitable block of wood between the crankshaft throw and the sleeve, and bumping the block by turning the flywheel. Because the sleeve is replaceable, oversize pistons and rings or seals are not supplied. When the sleeve and piston become worn excessively, standard size parts are to be installed.

When installing the cylinder sleeve, spread a slight amount of o-ring lube over the sealing rings. Never use oil, grease, or white lead. The upper and lower contact surfaces of the cylinder block should be thoroughly cleaned before the cylinder sleeve is inserted. Care should be taken to push the sleeve straight in the block to avoid damage to the seal rings. To force the sleeve home to fully seated position, the cylinder head may be slipped over the cylinder head studs and used to tap sleeve into place.

On C-66 and C-96 engines the flat garter seal is installed in back end of the cylinder block, being sure it is in straight and not distorted. The sleeve is then inserted in the garter ring and tapped into place with the cylinder head.

On C-46, C-101 and C-106 engines, the o-ring type seals are installed in the grooves in the sleeve. Again, be positive the o-rings are not twisted or distorted. Then slide the sleeve with the rings on it into the cylinder block and drive home using the cylinder head as a battering ram.

When the sleeve is seated, the top of the sleeve should project approximately .005" above the top surface of the cylinder block to ensure a tight seal with the cylinder head gasket.

## PISTON

A cast iron piston with two compression rings, one scraper ring and one oil ring are used in the C-46 and the C-66 & C-96 have three compression rings, one scraper ring and one oil ring. The C-101 and C-106 has an aluminum alloy piston with two compression rings, one scraper ring, and one oil ring.

On the C-66, C-96, C-101 and C-106, the removal of the piston may be accomplished by taking off the cylinder head, the hand hole cover and the connecting rod bearing cap. Scrape the upper part of the cylinder sleeve to remove the carbon ridge. The connecting rod and piston may then be pushed towards the cylinder head end of the crankcase for removal.

The C-46 connecting rod and piston must be removed through the hand hole in the back of the engine. After the cylinder head and the hand hole cover have been removed, roll the large flywheel over until the connecting rod throw has reached its lowest point. Remove the connecting rod bearing cap and push the piston and connecting rod just far enough away from the crankshaft to be able to lift the connecting rod over it. The piston and connecting rod may then be pulled from the engine. Be sure to remove the carbon ridge from the cylinder sleeve.

While the piston is out of the engine, thoroughly soak it in solvent to remove the gum and varnish that adheres to the piston rings and grooves. Piston clearance in sleeve is checked by inverting piston and inserting it into sleeve, with a feeler gauge in place between piston skirt and cylinder wall, at 90° degrees from the piston pin holes.

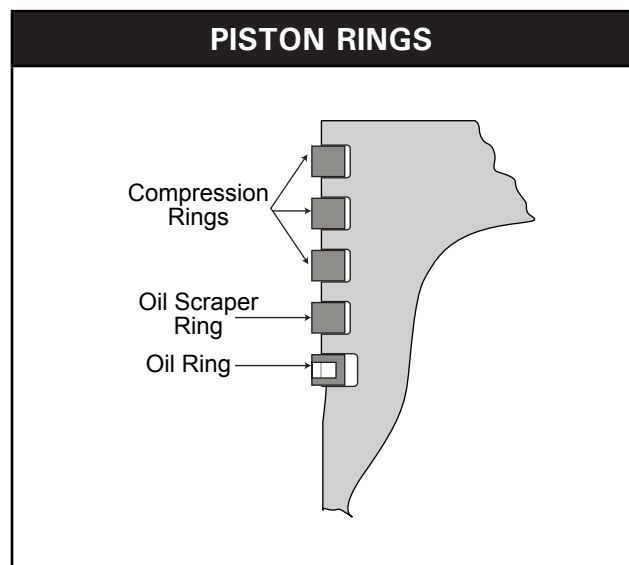
## PISTON PIN

The piston pin should be a light palm-push fit in the piston, and it is clamped in the connecting rod. Considerable care should be used to ensure proper fit of piston pin. An over-tight piston pin will result in binding and scoring, while a loose fit will cause knocking. C-46, C-66 and C-96 pistons have replaceable piston pin bushings. The C-101 and C-106 do not have bushings.

## PISTON RINGS

Two compression rings (the C-66 and C-96 have three compression rings), one scraper ring and one oil ring are assembled to the piston for a satisfactory seal of piston to cylinder sleeve and for controlling oil lubrication.

All piston rings should be selectively fitted to each individual ring groove and the cylinder sleeve. The rings should not be too loose in the groove, but should be sufficiently free to move under their own weight when the piston is rotated. Be careful not to distort piston rings when removing or installing.



## FITTING PISTON RINGS

1. Place the piston ring in the cylinder sleeve and square it up with the cylinder wall by inserting the piston and moving the ring slightly.
2. Measure the gap with a feeler gauge. If the gap is less than specified, remove the ring and dress the ends with a fine file until the proper clearance is obtained. With insufficient clearance, expansion from heat will cause the ring ends to but, resulting in warped rings and scored cylinder.

Assemble the piston ring in the proper grooves of the piston. Oil the rings generously when installing. It is desirable to lightly hone the cylinder walls to cut any glaze. This will cause the piston rings to seat better. The C-46 piston with connecting rod is installed easier if the piston rings are not assembled on the piston before installation. The piston rings are assembled on the piston after the piston has been inserted into the engine. To accomplish this, the piston and connecting rod must be pushed into the cylinder sleeve from the back of the engine and far enough that the top of the piston sticks out of the sleeve. The piston rings are then assembled on the piston.

## CONNECTING ROD

The connecting rod is machined for precision fit with the cap bored to accommodate aluminum precision shell bearings with shims. When installing shell bearings, the bearing back and bore surface must be absolutely clean and free of oil. The bearing face should be oiled to assure lubrication when the engine is first started.

**NOTE:** *Never scrape precision shell bearings, and DO NOT FILE the connecting rod parting surface to adjust the bearing. Install a new bearing.*

## TIMING CAMSHAFT

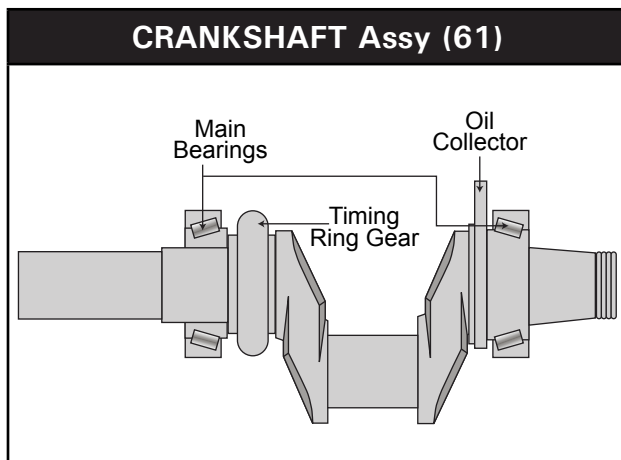
To obtain correct ignition and valve timing, it will be necessary to time the camshaft and crankshaft by meshing the gears correctly.

1. Insert camshaft Assy into crankcase, making sure the oil pressure plunger is in place.
2. Lift the camshaft Assy into position and insert the upper left hand screw through the cover plate. Catch the thread three or four turns.
3. Turn the engine to BOTTOM dead center (eye setting is close enough).
4. Rock the camshaft gear out of mesh by manipulating the lower end of the camshaft Assy.
5. Turn the camshaft gear until the hole in the upper drive gear is central in the hole in the top of the crankcase (under the governor), with the camshaft block forced against the cover plate, in the position it shall have when all screws are down tight.

To check, tighten the screw temporarily used to hold the camshaft block in place. Should this force the holes out of alignment, try changing the mesh of the gear by one tooth in the direction to bring the holes central. When the holes are central with the crank at outer dead center, the camshaft will be timed exactly right.

Next, loosen the single screw used to hold the camshaft Assy in place and insert and tighten the two small piloted screws. Then, secure the two larger screws and finally insert the central screw. Do not tighten the central screw too tightly, as it may distort the cover plate. It should only be tight enough to prevent oil leakage. Make the necessary oil connection on the inside of the crankcase and reassemble the parts removed.

## CRANKSHAFT



To remove crankshaft:

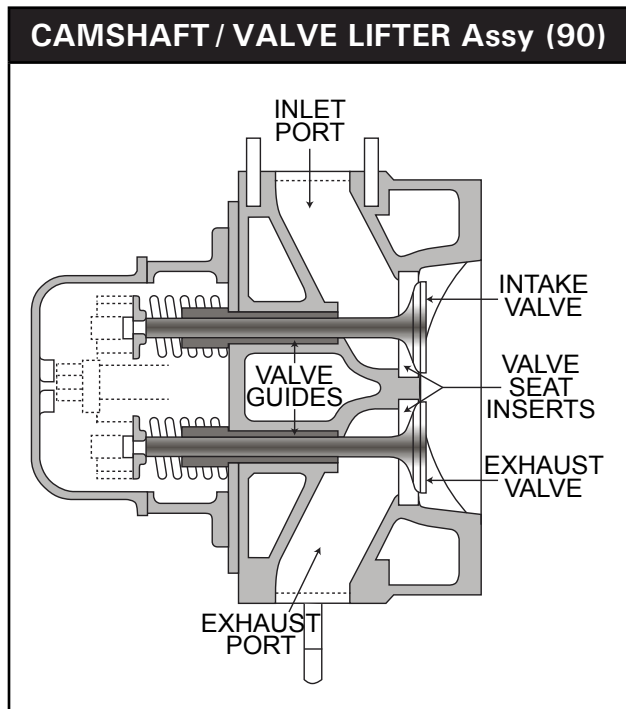
1. Disconnect connecting rod.
2. Remove large flywheel.
3. Remove clutch and small flywheel.
4. Remove small flywheel housing.
5. Remove the crankshaft through small flywheel housing opening.

## CAMSHAFT

The camshaft Assy is virtually the heart of the engine. It is so well made and so thoroughly lubricated that there is little occasion for its removal. If this should become necessary, proceed as follows:

1. Drain crankcase.
2. Remove strainer.
3. Remove top crankcase cover.
4. Remove magneto.
5. Remove governor.
6. Disconnect oil lines at camshaft block and oil pump.
7. Remove valve push rods.

8. Remove the five central screws from the rectangular cover plate behind the flywheel. These hold the camshaft Assy in place. Do NOT remove this cover plate. The camshaft Assy may now be lifted out of the crankcase. Attached to the camshaft Assy is the oil pump, which may be removed by removing two cap screws.



## FLYWHEELS

A large heavy flywheel provides smooth, even speed operation. This flywheel also carries the timing marks. A smaller light flywheel is mounted at the power take-off end and drives the clutch power take-off. It also acts as a counter balance to help reduce vibration.

## Notes

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# 8 TROUBLESHOOTING

## ENGINE WON'T START

### No Ignition Spark

1. Low oil pressure switch tripped – reset switch.
2. Low oil level – refill crankcase with proper motor oil to full level.
3. Low water level switch in shutoff position – refill cooling system with coolant to proper level.
4. Damaged ignition wire or terminals – replace.
5. Faulty Ignition
6. Faulty spark plug – remove and replace.

### No Fuel

1. Be sure the fuel gas is turned on at the main valve and that there is gasoline in the float bowl, if furnished.
2. Be sure the fuel hose is not kinked or stopped up, and is of sufficient size as to not restrict the flow of fuel gas.

### No Compression

1. Be sure compression release is in down position.
2. Stuck valve-remove valve cover and check valves to see that both are opening and closing while turning engine over. Often a stuck valve may be freed up by spraying with light oil and tapping with a small hammer. If this doesn't work, the head will have to be removed.
3. Valve adjustment backed off - readjust valves to .020 clearance.
4. Valve burned - remove head and recondition.

### Engine Flooded

1. Remove spark plug – turn engine over several times with compression release in down position to blow surplus fuel out cylinder – clean plug and reinstall.
2. Try cranking engine with fuel shut off to clear cylinder of remaining fuel.
3. Start engine in usual manner.

## CLUTCH WON'T PULL OR HEATS

Clutch
1. Check the adjustment to the point where clutch lever snaps in with a firm snap. Refer to clutch section of this Instruction Manual for clutch adjustment instructions.
2. If the clutch is properly adjusted, but still does not pull, remove the cover and check the clutch plates to assure that the teeth are not sheared off.
3. If the teeth are sheared off, install new clutch plates, refer to clutch section of this instruction manual.
4. Check the drive belt tension and alignment.
5. Be sure pilot bearing or clutch housing bearings are not worn. If necessary to replace, refer to clutch section of this instruction manual.

## ENGINE HEATS

Coolant Level
1. Check the coolant level, if low, fill to proper level 1" – 2" below inside top of the water hopper.
2. Check the condenser and the water hopper for signs of leaks, and correct if leaks are present.
3. On vapor phase condenser, be sure the bleed hole in the center tube of the condenser is open. On pressure condensing cooling system, check the cap on top of condenser to be sure the gasket seal is OK and the cap fits properly.
4. Make sure the antifreeze mixture is not too rich because of the addition of pure antifreeze. Premix the antifreeze and water to avoid hot spots. Do not use less than 40% water.
5. Check the engine overload.
Fan Belt
1. Check the fan belt tension – tighten if loose.

## ENGINE LOSES WATER WITHOUT VISIBLE LEAKS

### Leak Or Pinhole In Top Of Condenser

1. With engine full of coolant and at operating temperature, slowly move your hand up the face of the condenser starting at the water hopper. As your hand moves up the condenser the temperature should get cooler. This indicates a normal condition.
2. If the condenser is virtually the same temperature, top to bottom, this indicates a small pinhole at the top, allowing fluid to escape in the form of invisible vapor. Remove the condenser for repair.

### Cylinder Head Is Cracked

1. Coolant may be escaping into the exhaust valve port, and blowing out the exhaust.
2. To check this possible condition, remove the head and place it on a solid surface with the valve guides down.
3. Carefully fill the water jacket of head with kerosene or solvent and check for leaks. If leak is present, replace the head.

### Head Gasket Leaking

1. Shut down and cool the engine. The coolant will leak and be visible.
2. Replace head gasket.

## ENGINE BLOWS OIL OUT CRANKCASE OR VALVE COVER BREATHER INTO AIR FILTER

### Faulty Poppet Valve in Valve Cover Breather

1. Remove the breather and check to see the Poppet Valve is in place and not worn out. If it is, the breather should be replaced.
2. Check the fitting in top crankcase cover. There should not be more than 16" WC pressure upon running the engine.
3. Check the cap on the top of the oil filter Assy to be sure air is not leaking in. This leakage will allow too much air in the crankcase causing loss of vacuum.

## ENGINE FAILS TO OPERATE PROPERLY UNDER LOAD

### Improper Fuel Adjustment

1. Confirm fuel pressure is at the specified fuel pressure see "Emissions Set Points".

### Fuel Supply Restricted Or Valve Closed

1. Disconnect the lines and blow clear.
2. Check all fuel supply valves for operating condition.

### Fuel Lines Too Hot

1. Protect the fuel line from heat of the engine.
2. Move the fuel lines away from engine exhaust.

### Varying Fuel Supply Due To Faulty Regulator

1. Check the fuel pressure and reset the regulator.
2. Replace the regulator if adequate fuel pressure is not maintained when the engine is in operation.

### Optional Choke Partially Closed

1. The fuel setting should always be done with the choke wide open. The Impco carburetor does not need a choke.

### Volume Tank Full Of Liquid Or Trash

1. Clean and drain both high and low pressure chamber of volume tank.

### Fuel BTU Level Too Low

1. Adjust fuel level.

## ENGINE FAILS TO START

1. The carburetor diaphragm is oil soaked and stiff because of extremely cold weather. Replace with silicone diaphragm.
2. Incorrect fuel inlet pressure.
3. Damaged air and gas valve Assy and must be replaced.

# 9 Emissions

## COMPLIANT VERSUS CERTIFIED ENGINES

As of July 1, 2008 Arrow Engines rated under 25 HP will be sold as “certified” which means they meet the emissions standards (40 CFR 1054 and 40 CFR 60) set forth by the EPA effective July 1, 2008.

Arrow engines that are “compliant” engines means they are NOT certified coming out from the factory. Being “compliant” means that with the proper air fuel ratio controller and catalyst the engines are able to meet the EPA emission standards required as of July 1, 2008.

## ARROW CERTIFIED ENGINES

### CERTIFIED ENGINE EMISSIONS SET POINTS

C-46 Emission Set Points	
<b>RPM RANGE</b>	450 to 800 RPM
<b>MAX. HP RATING</b>	800 RPM @ 9 HP(6.71kW) 700 RPM @ 9 HP(6.71kW) 600 RPM @ 8 HP(5.97kW) 500 RPM @ 7 HP(5.22kW) 450 RPM @ 5 HP(3.73kW)
<b>GAS SUPPLY SETTINGS</b> <i>(Pressure measured at fuel inlet to carburetor)</i>	800 RPM @ 8" WC (20.3cm) 700 RPM @ 8" WC (20.3cm) 600 RPM @ 8" WC (20.3cm) 500 RPM @ 9" WC (22.9cm) *450 RPM @ 14" WC (35.6cm)

\*Set fuel pressure @ 6" WC (15.2 cm)  
for loads < 0.5kw

C-66 Emission Set Points	
<b>RPM RANGE</b>	350 to 700 RPM

<b>MAX. HP RATING</b>	700 RPM @ 11.8 HP(8.8kW) 600 RPM @ 11.3 HP(8.4kW) 500 RPM @ 8 HP(6.0kW) 350 RPM @ 5 HP(3.8kW)
<b>GAS SUPPLY SETTINGS</b> <i>(Pressure measured at fuel inlet to carburetor)</i>	700 RPM @ 5" WC (12.7cm) 600 RPM @ 8" WC (20.3cm) 500 RPM @ 11" WC (27.9cm) 350 RPM @ 12" WC (30.5cm)

C-96 Emission Set Points	
<b>RPM RANGE</b>	300 - 600 RPM
<b>MAX. HP RATING</b>	600 RPM @ 18 HP(13.6kW) 500 RPM @ 15.4 HP(11.5kW) 400 RPM @ 12.7 HP(9.5kW) 300 RPM @ 9.9 HP(7.4kW)
<b>GAS SUPPLY SETTINGS</b> <i>(Pressure measured at fuel inlet to carburetor)</i>	600 RPM @ 4" WC (10.2cm) 500 RPM @ 4" WC (10.2cm) 400 RPM @ 4" WC (10.2cm) 300 RPM @ 5.0" WC (12.7cm)

C-101 Emission Set Points	
<b>RPM RANGE</b>	400 - 800 RPM
<b>MAX. HP RATING</b>	800 RPM @ 25 HP(18.65kW) 700 RPM @ 24 HP(17.9kW) 600 RPM @ 23 HP(17.16kW) 500 RPM @ 22 HP(16.41kW) 400 RPM @ 19 HP(14.17kW)
<b>CARBURETOR SETTINGS</b>	Idle Screw - Plugged Mixture Valve - Full Rich Notch Locked
<b>GAS SUPPLY SETTINGS</b> <i>(Pressure measured at fuel inlet to carburetor)</i>	800 RPM @ 5" WC (12.7cm) 700 RPM @ 6" WC (15.2cm) 600 RPM @ 6" WC (15.2cm) 500 RPM @ 6" WC (15.2cm) 400 RPM @ 6" WC (15.2cm)



*All emission settings in the above tables are based on 1000 BTU Pipeline Natural Gas.*

This manual is intended to give the installer of this certified engine all of the information that is necessary to properly install the engine and related components. Failure to follow these instructions when installing a certified engine violates federal law (40CFR 1068.105(b)), subject to fines or other penalties as described in the Clean Air Act.

Use of the correct engine fuel supply pressure is essential. It is the responsibility of the installer to install a fuel pressure regulator upstream of the engine and to verify the correct fuel pressure specified by the manufacturer is supplied to the engine. After the fuel pressure has been set and verified it is the responsibility of the installer to protect the fuel pressure setting from any further adjustment or tampering.

Arrow cannot be held liable for any emissions noncompliance resulting from incorrect installation of this engine or failure to use the required settings.

## ALTITUDE ADJUSTMENTS

Below are the adjustments required to the inlet fuel pressure for the certified engines at various elevations to maintain the certified emissions, eg: C-101 running 800 RPM at 10,000' elevation the fuel pressure should be set at 3.5" WC, figured thusly - Standard fuel setting 5" WC + -1.5" WC = 3.5" WC

Engine	Elevation	300 RPM	350 RPM	400 RPM	500 RPM	600 RPM	700 RPM	800 RPM
K-6	2,000'	N/A	N/A	-0.6	-0.6	-0.6	-0.5	-0.4
	610M			-1.53	-1.53	-1.53	-1.27	-1.02
	4,000'	N/A	N/A	-1.17	-1.17	-1	-0.9	-0.8
	1,220M			-2.97	-2.97	-2.54	-2.29	-2.03
	6,000'	N/A	N/A	-1.7	-1.7	-1.5	-1.3	-1.1
	1,829M			-4.32	-4.32	-3.8	-3.3	-2.79
	8,000'	N/A	N/A	-2.16	-2.16	-1.9	-1.7	-1.4
	2,438M			-5.49	-5.49	-4.83	-4.32	-3.55
	10,000'	N/A	N/A	-2.7	-2.7	-2.4	-2.1	-1.8
	3,048M			-6.86	-6.86	-6.1	-5.33	-4.57

Engine	Elevation	300 RPM	350 RPM	400 RPM	500 RPM	600 RPM	700 RPM	800 RPM
<b>C-46</b>	2,000'	N/A	N/A	-0.84	-0.6	-0.6	-0.6	-0.6
	610M			-2.13	-1.53	-1.53	-1.53	-1.53
	4,000'	N/A	N/A	-1.56	-1.17	-1	-1	-1
	1,220M			-3.96	-2.97	-2.54	-2.54	-2.54
	6,000'	N/A	N/A	-2.28	-1.7	-1.5	-1.5	-1.5
	1,829M			-5.79	-4.32	-3.8	-3.8	-3.8
	8,000'	N/A	N/A	-2.88	-2.16	-1.9	-1.9	-1.9
	2,438M			-7.32	-5.49	-4.83	-4.83	-4.83
<b>C-66</b>	10,000'	N/A	N/A	-3.66	-2.7	-2.4	-2.4	-2.4
	3,048M			-9.3	-6.86	-6.1	-6.1	-6.1
	2,000'	N/A	-0.84	-0.82	-0.77	-0.6	-0.35	N/A
	610M		-2.13	-2.08	-1.96	-1.53	-0.89	
	4,000'	N/A	-1.56	-1.53	-1.43	-1	-0.65	N/A
	1,220M		-3.96	-3.89	-3.63	-2.54	-1.65	
	6,000'	N/A	-2.28	-2.23	-2.1	-1.5	-0.95	N/A
	1,829M		-5.79	-5.66	-5.33	-3.8	-2.41	
<b>C-96</b>	8,000'	N/A	-2.88	-2.82	-2.6	-1.9	-1.2	N/A
	2,438M		-7.32	-7.16	-6.6	-4.83	-3.05	
	10,000'	N/A	-3.66	-3.52	-3.3	-2.4	-1.5	N/A
	3,048M		-9.3	-8.94	-8.38	-6.1	-3.8	
	2,000'	-0.32	-0.3	-0.28	-0.2	-0.2	N/A	N/A
	610M	-0.81	-0.76	-0.71	-0.5	-0.5		
	4,000'	-0.59	-0.55	-0.52	-0.3	-0.3	N/A	N/A
	1,220M	-1.5	-1.4	-1.32	-0.76	-0.76		
<b>C-101</b>	6,000'	N/A	N/A	-0.76	-0.5	-0.5	N/A	N/A
	1,829M			-1.93	-1.27	-1.27		
	8,000'	N/A	N/A	-0.96	-0.72	-0.72	N/A	N/A
	2,438M			-2.44	-1.83	-1.83		
	10,000'	N/A	N/A	-1.2	-0.9	-0.9	N/A	N/A
	3,048M			-3.05	-2.29	-2.29		
	2,000'	N/A	N/A	-0.6	-0.6	-0.5	-0.4	-0.35
	610M			-1.53	-1.53	-1.27	-1.02	-0.89
<b>C-101</b>	4,000'	N/A	N/A	-1.17	-1	-0.9	-0.8	-0.65
	1,220M			-2.97	-2.54	-2.29	-2.03	-1.65
	6,000'	N/A	N/A	-1.7	-1.5	-1.3	-1.1	-0.95
	1,829M			-4.32	-3.8	-3.3	-2.79	-2.41
	8,000'	N/A	N/A	-2.16	-1.9	-1.7	-1.4	-1.2
	2,438M			-5.49	-4.83	-4.32	-3.55	-3.05
	10,000'	N/A	N/A	-2.7	-2.4	-2.1	-1.8	-1.5
	3,048M			-6.86	-6.1	-5.33	-4.57	-3.8

Water Column, inches

Water Column, centimeters

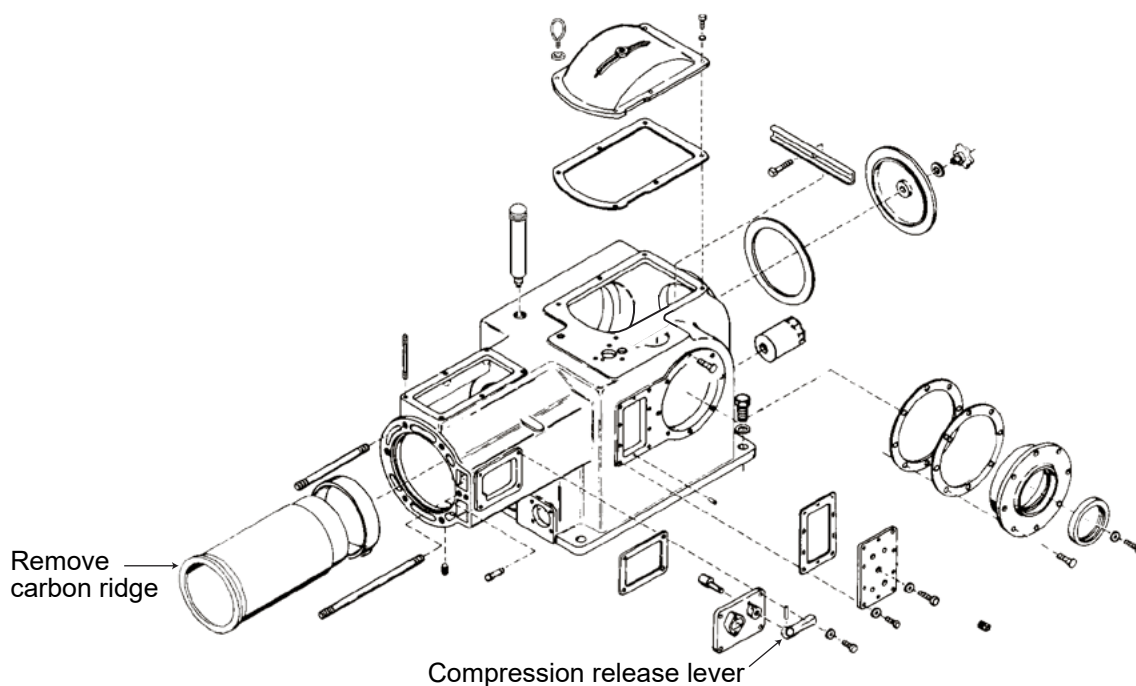


# 10 SPECIFICATIONS

MECHANICAL SPECIFICATIONS	C-46	C-66	C-96	C-101	C-106
<b>Engine Data</b>					
Valve Arrangement	In Head	In Head	In Head	In Head	In Head
Max Permissible Speed – RPM	800	700	600	800	800
Max Rating for Pumping – HP	9	13	19	24.5	32
Max Rating for Pumping – Kilowatt	6.7	9.7	14.2	18.3	23.9
<b>Valve Timing</b>					
Intake Opens: ATCD - DEG	7	7	8	8	8
Intake Closes: ABDC - DEG	26	26	28	40	40
Exhaust Opens: BBDC - DEG	23	23	40	40	40
Exhaust Closes: ATDC - DEG	15	15	8	8	8
<b>Wrench Torques</b>					
Cylinder Head Stud. – Foot-pounds	175	175	243	243	243
Cylinder Head Stud. – Newton-meters	273	273	330	330	330
Connecting Rod Bolts – Foot-pounds	92	92	175	175	175
Connecting Rod Bolts – Newton-meters	125	125	237	237	237
<b>Exhaust System</b>					
Flange NPT – Inches	1-1/2	2	2-1/2	2-1/2	2-1/2
Flange NPT – Millimeters	38.1	50.8	63.5	63.5	63.5
<b>Clutch</b>					
Shaft Diameter – Inches	1.437- 1.436	2.250- 2.249	2.250- 2.249	2.250- 2.249	2.250- 2.249
Shaft Diameter – Millimeters	36.5	57.1	57.1	57.1	57.1
<b>Shipping Weight</b>					
Pounds	1433	1811	2790	2975	2975
Kilograms	650	821	1266	1349	1349
<b>Capacities*</b>					
Water – Quarts	12	16	20	20	20
Water – Liters	11.4	15.1	18.9	18.9	18.9
Oil – Quarts	7+	7+	11+	11+	11+
Oil – Liters	6.6	6.6	10.4	10.4	10.4
<b>Oil Viscosity – Expected Air Temperature</b>					
SAE 30W or 10W40	Above 30°F (-1°C)				
SAE 20W or 10W30	10°F to 30°F (-23°C to -1°C)				
SAE 5W20	Below -10°F (23°C)				

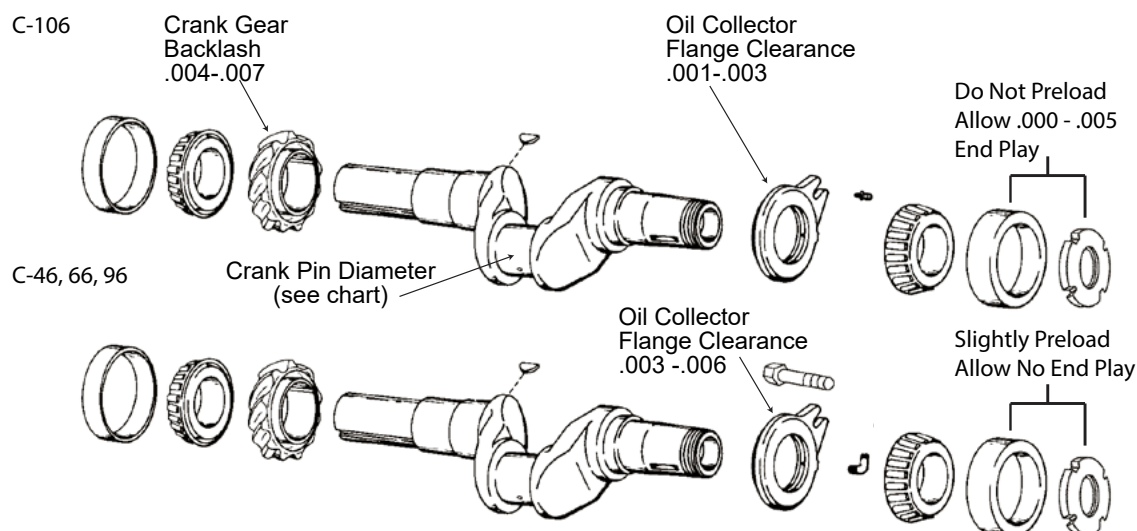
\* **All engine models:** When furnished with an outside oil filter, add one quart of oil to the amount shown above for the total capacity. **Oil capacity prior to Serial No. 201387** is 9 quarts (8.51L). When ARROW Crankcase 1-96 is used for replacement on engines prior to serial No. 201387, change the oil capacity on the instructions plate from 9 quarts (8.51L) to 11 quarts (10.4L).

## CLEARANCES AND TOLERANCES – CRANKCASE



Description	Unit	C-46	C-66	C-96	C-101/106
Cylinder Sleeve Bore	inch	4.999-5.001	5.749-5.7510	6.99-7.001	7.4995-7.5010
	mm	126.975-127.0	146.02-146.07	177.77-177.82	190.48-190.52

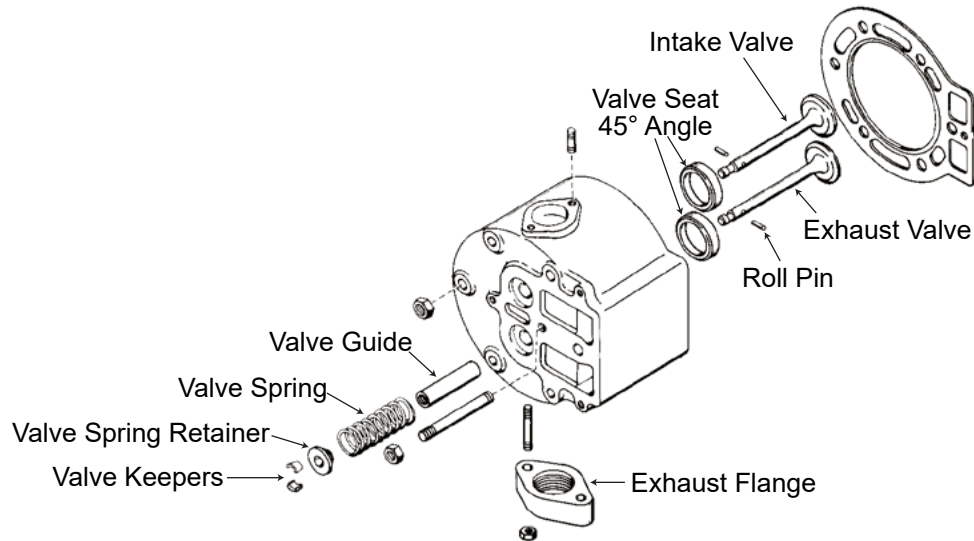
## CLEARANCES AND TOLERANCES – CRANKSHAFT



Description	Unit	C-46	C-66	C-96	C-101/106
Main Bearing Journal Diameter	inch	3.001-3.0015	3.001-3.0015	3.626-3.627	3.626-3.627
	mm	76.225-76.581	76.225-76.581	92.100-92.125	92.100-92.125
Crank Pin Diameter	inch	2.999-3.000	2.999-3.000	3.624-3.625	3.624-3.625
	mm	76.174-76.2	76.174-76.2	92.049-92.075	92.049-92.075

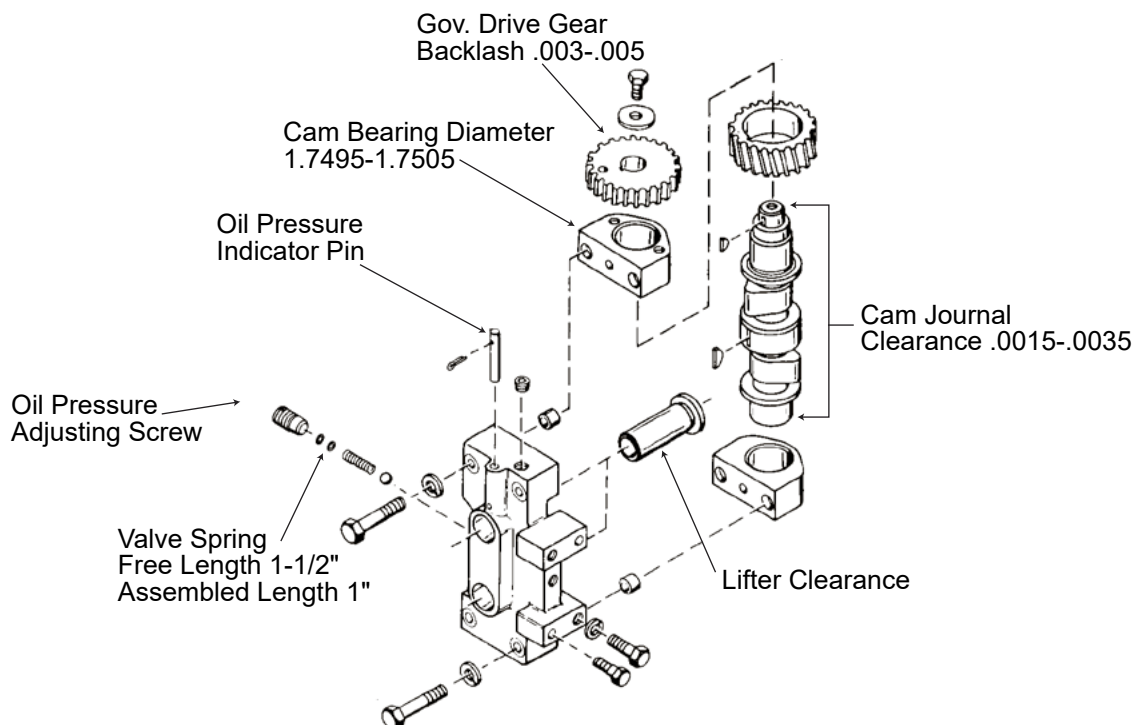


## CLEARANCES AND TOLERANCES – CYLINDER HEAD



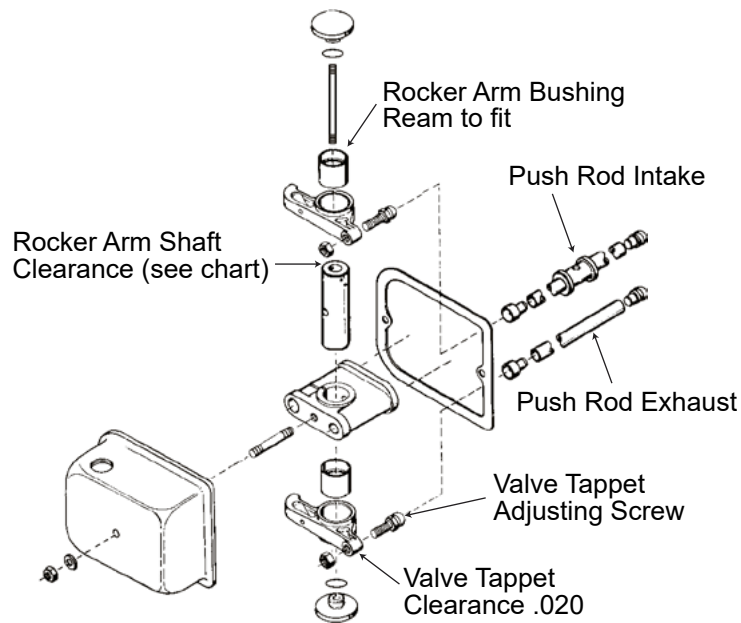
Description	Unit	C-46	C-66	C-96	C-101/106
Valve Stem Diameter (Intake)	inch	.3730-.3735	.5605-.5610	.5605-.5610	.5620-.5625
	mm	9.474-9.486	14.236-14.249	14.236-14.249	14.274-14.287
Valve Stem Diameter (Exhaust)	inch	.3720-.3725	.5595-.5600	.5595-.5600	.5615-.5620
	mm	9.448-9.461	14.211-14.224	14.211-14.224	14.262-14.274
Valve Guide Diameter Assembled in Head	inch	.3745-.3750	.5620-.5625	.5620-.5625	.5640-.5645
	mm	9.512-9.525	14.274-14.287	14.274-14.287	14.274-14.287
Valve Guide Outside Diameter	inch	.7515-.7525	.8755-.8765	.8755-.8765	.9380-.9385
	mm	19.088-19.113	22.237-22.263	22.239-22.263	23.825-23.837
Intake Valve to Guide Clearance	inch	.001-.002	.001-.002	.001-.002	.0015-.0025
	mm	.0254-.0508	.0254-.0508	.0254-.0508	.0381-.0635
Exhaust Valve to Guide Clearance	inch	.002-.002	.002-.003	.002-.003	.002-.003
	mm	.0508-.0508	.0508-.0762	.0508-.0762	.0508-.0762
Valve Spring Free Length	inch	4	4	4-11/16	4-11/16
	mm	101.6	101.6	119.06	119.06
Valve Spring Assembled Length	inch	3	3	3	3
	mm	76.2	76.2	76.2	76.2
Valve Spring Compressed Length	inch	2-1/2	2-1/2	2-1/2	2-1/2
	mm	63.5	63.5	63.5	63.5
Cylinder head Stud Nut Torque	ft-lbs	175	175	245	245
	mm	273	273	332	330
Exhaust Flange NPT	inch	1-1/2	2	2-1/2	2-1/2
	mm	38.1	50.8	63.5	63.5

## CLEARANCES AND TOLERANCES – CAMSHAFT



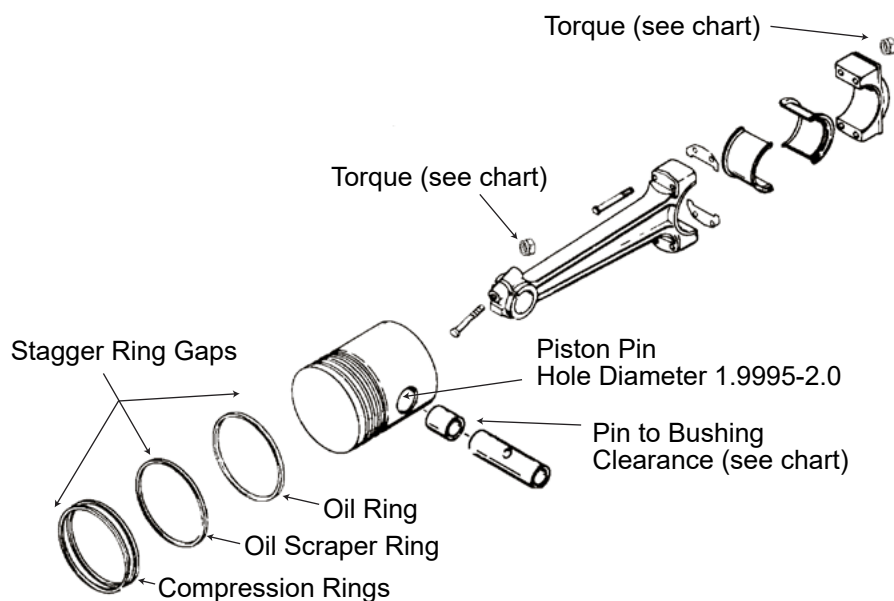
Description	Unit	C-46	C-66	C-96	C-101/106
Camshaft Bearing Journal	inch	1.747-1.748	1.747-1.748	1.747-1.748	1.747-1.748
	mm	44.373-44.399	44.373-44.399	44.373-44.399	44.373-44.399
Camshaft Bearing Diameter	inch	1.7495-1.7505	1.7495-1.7505	1.7495-1.7505	1.7495-1.7505
	mm	44.437-44.463	44.437-44.463	44.437-44.463	44.437-44.463
Camshaft to Bearing Clearance	inch	.0015-.0035	.0015-.0035	.0015-.0035	.0015-.0035
	mm	.0381-.0889	.0381-.0889	.0381-.0889	.0381-.0889
Gov. Drive Gear Backlash	inch	.003-.005	.003-.005	.003-.005	.003-.005
	mm	.0762-.127	.0762-.127	.0762-.127	.0762-.127
Valve Lifter Guide Diameter	inch	.9835-.9845	.9835-.9845	1.2495-1.2505	1.2495-1.2505
	mm	24.98-25.0	24.98-25.0	31.737-31.762	31.737-31.762
Valve Lifter Diameter	inch	.9818-.9828	.9818-.9828	1.2470-1.2480	1.2470-1.2480
	mm	24.937-24.963	24.937-24.963	31.673-31.699	31.673-31.699
Lifter to Guide Clearance	inch	.0007-.0027	.0007-.0027	.0015-.0035	.0015-.0035
	mm	.01778-.0685	.01778-.0685	.0381-.0889	.0381-.0889
Oil Pressure Spring Free Length	inch	1-1/2	1-1/2	1-1/2	1-1/2
	mm	38.1	38.1	38.1	38.1
Oil Pressure Spring Assembled Length	inch	1	1	1	1
	mm	25.4	25.4	25.4	25.4

## CLEARANCES AND TOLERANCES – ROCKER ARM



Description	Unit	C-46	C-66	C-96	C-101/106
Rocker Arm Shaft Diameter	inch	1.247-1.248	1.247-1.248	1.5605-1.5610	1.5605-1.5610
	mm	31.673-31.699	31.673-31.699	38.265-39.649	38.265-39.649
Rocker Arm Bushing Diameter Assembled	inch	1.249-1.250	1.249-1.250	1.562-1.563	1.562-1.563
	mm	31.724-31.75	31.724-31.75	39.674-39.000	39.674-39.700
Rocker Arm Shaft to Bushing Circumference	inch	.001-.003	.001-.003	.001-.0025	.001-.0025
	mm	.0254-.0762	.0254-.0762	.0254-.0635	.0254-.0635
Valve Tappet Clearance, Hot	inch	.020	.020	.020	.020
	mm	.508	.508	.508	.508

## CLEARANCES AND TOLERANCES – CONNECTING ROD & PISTON

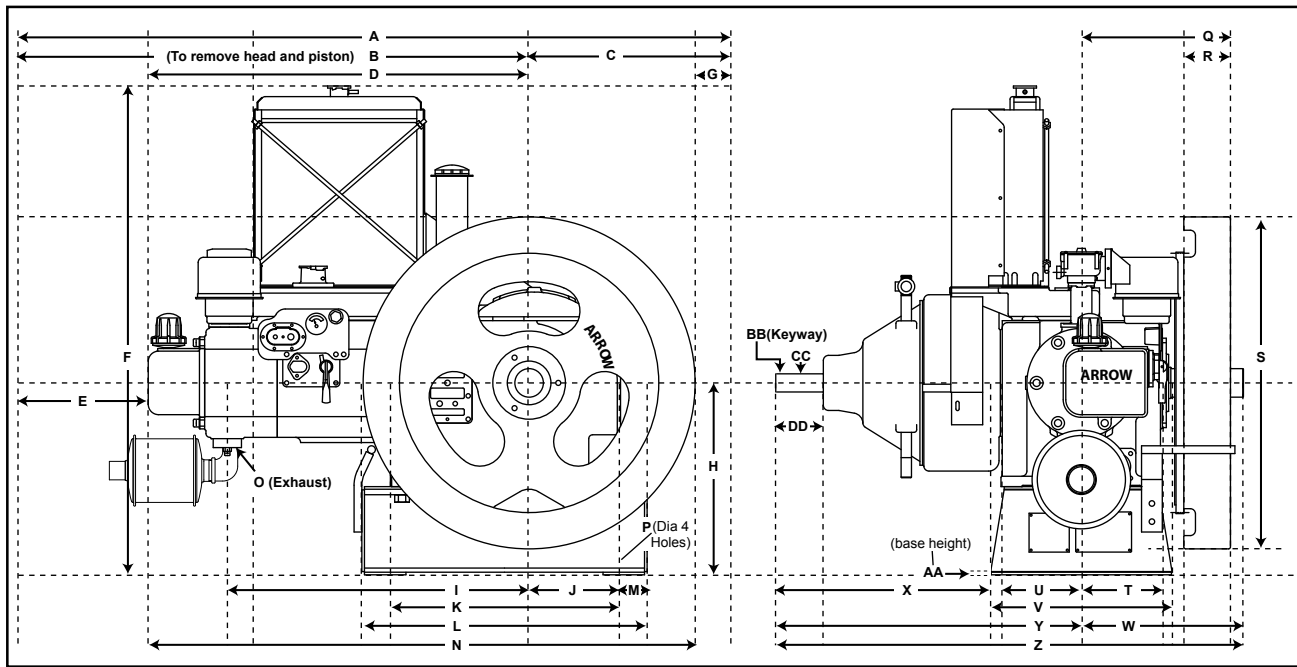


Description	Unit	C-46	C-66	C-96	C-101/106
Oil Pump Gr. to Body Clearance	inch	.001-.003	.001-.003	.001-.003	.001-.003
	mm	.0254-.0762	.0254-.0762	.0254-.0762	.0254-.0762
Oil Pump Gear Backlash	inch	.003-.005	.003-.005	.003-.005	.003-.005
	mm	.0762-.127	.0762-.127	.0762-.127	.0762-.127
Piston Dia. (at bottom of skirt)	inch	4.994-4.996	5.744-5.746	6.992-6.993	7.4905-7.4952
	mm	126.847-126.898	145.897-145.948	177.596-177.622	190.259-190.310
Piston to Cylinder Clearance	inch	.003-.007	.003-.007	.006-.009	.007-.0105
	mm	0.0762-.1778	0.0762-.1778	.1524-.2286	.1778-.2667
Piston Ring Groove Width	inch	.251-.252	.251-.252	.251-.252	.2515-.2525
	mm	6.375-6.400	6.375-6.400	6.375-6.400	6.388-6.413
Piston Ring Clearance in Groove	• Compression	inch	.002-.004	.002-.004	.002-.0035
		mm	.0508-.1016	.0508-.1016	.0508-.0889
	• Scraper	inch	.0015-.0035	.0015-.004	.0015-.004
		mm	.0381-.0889	.0381-.1016	.0381-.1016
	• Oil Control	inch	.002-.004	.002-.004	.002-.004
		mm	.0508-.1016	.0508-.1016	.0508-.1016
Piston Ring Gap	• Compression	inch	.010-.020	.010-.020	.027-.037
		mm	.254-.508	.254-.508	.685-.939
	• Scraper	inch	.010-.025	.010-.025	.015-.030
		mm	.254-.635	.254-.635	.381-.762
	• Oil Control	inch	.010-.020	.015-.025	.015-.025
		mm	.254-.508	.381-.635	.381-.635
Piston Pin Diameter	inch	1.4835-1.4840	1.4835-1.4840	1.9985-1.9990	1.9985-1.9990
	mm	37.680-37.693	37.680-37.693	50.761-50.774	50.761-50.774
Piston Pin Bushing Assembled Inside Diameter	inch	1.4845-1.4850	1.4845-1.4850	2.000-2.001	1.995-2.0005
	mm	37.706-37.719	37.706-37.719	50.8-50.825	50.7-50.8

Description	Unit	C-46	C-66	C-96	C-101/106
Pin to Bushing Clearance	inch	.0005-.0015	.0005-.0015	.0010-.0025	.0005-.0010
	mm	.0127-.0381	.0254-.0635	.0254-.0635	.0127-.0254
Connecting Rod. Bearing Inside Diameter	inch	3.003-3.004	3.003-3.004	3.628-3.629	3.628-3.629
	mm	76.216-76.301	76.216-76.301	92.151-92.176	92.151-92.176
Bearing to Crank Pin Clearance	inch	.002-.005	.002-.005	.003-.005	.003-.005
	mm	.0508-.127	.0508-.127	.0762-.127	.0762-.127
Connecting Rod Side Clearance	inch	.014-.020	.016-.022	.012-.018	.012-.018
	mm	.355-.508	.406-.5588	.3048-.457	.3048-.457
Connecting Rod Nut Torque	ft-lbs	92	92	175	175
	nm	125	125	273	273
Connecting Rod Piston Pin End Nut	ft-lbs	35	35	45	45
	nm	47	47	61	61



# DIMENSIONS



Descr	C-46		C-66		C-96		C-101/106	
	inch	mm	inch	mm	inch	mm	inch	mm
A	69	1753	76	1930	98	2489	95 1/2	2426
B	45	1143	50	1270	60	1524	57	1448
C	24	610	26	660	38	965	33 3/8	848
D	32 7/8	835	36 7/8	937	42 1/4	1073	43	1092
E	12	305	12	305	17	432	17	432
F	39	991	44 1/8	1121	50	1270	51 7/16	1307
G	10	254	10	254	18	457	18	457
H	15	381	18	457	22	559	22	559
I	24 7/8	632	29 1/8	740	33 3/4	857	36 3/4	933
J	6 3/8	162	10	254	15 3/8	391	15 3/8	391
K	18 1/2	470	24 3/4	629	36 3/4	933	36 3/4	933
L	21	533	26 3/4	679	39 3/4	1010	41	1041
M	1 1/4	32	1	25	1 1/2	38	2 1/8	54
N	47 5/8	1210	53 3/8	1356	63	1600	60 1/2	1537
O	1 7/16	36	2 1/4	57	2 1/4	57	2 1/2	64
P	25/32	20	13/16	21	1 1/16	27	1 1/8	29
Q	13 3/8	340	14 3/8	365	15 3/8	391	15 3/8	391
R	4	102	4 1/2	114	5	127	5	127
S	28	711	32	813	40	1016	40	1016
T	6 5/8	168	7 3/4	197	8 5/8	219	8 5/8	219
U	5 7/8	149	7 3/4	197	7 7/8	200	7 7/8	200
V	15	381	17 1/2	444	18 1/2	495	18 1/2	470
W	15 5/8	397	15 11/16	398	17 3/8	441	15 3/8	391
X	17 5/8 *	448	21 7/8	556	21 1/4	540	22 11/16	576
Y	22 1/8	562	29 7/16	748	29 1/8	740	31 9/16	802
Z	39 1/8 *	994	45 1/8	1146	46 1/2	1181	47	1194
AA	1 1/4	32	1/2	13	1/2	13	1 1/2	38
BB	3/8 x 3/16	10 x 5	5/8 x 5/16	16 x 8	5/8 x 5/16	16 x 8	5/8 x 5/16	16 x 8
CC	17/16	36	2 1/4	57	2 1/4	57	2 1/4	57
DD	3 1/2	89	5 1/2	140	5 1/2	140	6 1/2	165

\* Before S/N 115463: X=16 1/4", Z=37 3/4".

## ENGINE SPECIFICATIONS

Description	Unit	C-46	C-66	C-96	C-101/106
Rated Continuous HP @	KW	6.7	9.7	14.2	18.3/23.9
	HP	9	13	19	24.5/32
Max Continuous RPM	RPM	800	700	600	800
Bore & Stroke	inch	5" x 6¼"	5¼" x 7½"	7" x 8½"	7½" x 8½"
	mm	127 x 159	146 x 190.5	178 x 216	190.5 x 216
Displacement	CI	122.7	195	327	376
	liter	2	3.3	5.5	6.4
Compression Ratio		4.8:1	5.2:1	4.8:1	6.2:1
RPM RANGE	RPM	450-800	350-700	300-600	300-800
WR <sup>2</sup> (Spoke Flywheel)	Lb-Ft <sup>2</sup>	290	600	1600	1760
Moment of Inertia	Kg-M <sup>2</sup>	12.18	25.20	67.20	73.92
WR <sup>2</sup> (QD Flywheel)	Lb-Ft <sup>2</sup>			1850	1850
Moment of Inertia	Kg-M <sup>2</sup>			77.88	77.88
P.T.O. Shaft Size	inch	1 7/16"	2 1/4"	2 1/4"	2 1/4"
	mm	36.5MM	57.2MM	57.2MM	57.2MM
Oil Capacity *	quart	7	7	11	11
	liter	6.6	6.6	10.4	10.4
Water Capacity	quart	12	16	20	20
	liter	11.4	15.1	18.9	18.9
Spark Plug Size	mm	18	18	18	18
Exhaust Connection	up to 20'	1½"	2"	2½"	2½"
	up to 6M	38mm	50.8mm	63.5mm	63.5mm
	20'-30'	2"	2½"	3"	3"
	6-9M	50.8mm	63.5mm	76.2mm	76.2mm
Fuel Gas Pipe Size	NPT	3/8"	3/8"	½"	1/2"
Size Mounting Bolts (4 ea)	inch	¾"	¾"	1"	1"
Shipping Weight	lbs	1360	1640	2580	2690
	kg	617	744	1170	1220
Truck Load Qty	per 45 ft truck bed	24	22	16	16
Safety Controls Standard	Water Level, Oil Pressure & Overspeed				
Ignition	Capacity Discharge Ignition				
Fuel	Natural Gas				
Fuel System	Impco Type Carburetor				
Lubrication	Full Pressure				
Filtration-Oil	Replaceable Full Flow Filter				
Clutch-P.T.O.		C-107-SP-5	C-110-HP-4	C-110-HP-3	SP-111-HP-3
Starting Equipment	Ring Gear Standard				

\* For oil filter changes, add 1 Quart or .95 Liter.

FOR ADDITIONAL INFORMATION SEE INDIVIDUAL ENGINE PRODUCT SHEETS AND ENGINE ACCESSORY SHEETS.

## HORSEPOWER DERATES

Condition	Continuous Duty	Intermittent Duty
Altitude Naturally Aspirated	Deduct 3% for each 1,000' above 1,500'	Deduct 3% for each 1,000' above 500'
	Deduct 3% for each 305m above 457m	Deduct 3% for each 305m above 152m
Altitude Turbo Charged	Deduct 3% for each 1,000' above 3,000'	Deduct 3% for each 1,000' above 1,500'
	Deduct 3% for each 305m above 914m	Deduct 3% for each 305m above 457m
Temperature	Deduct 1% for every 10°F above 100°F	Deduct 1% for every 10°F above 85°F
	Deduct 1% for every 5.5°C above 38°C	Deduct 1% for every 5.5°C above 29°C
Duty Ratings & Standards	The load and speed that can be applied without interruption except for normal maintenance.	The highest load and speed that can be applied under specific conditions of varying load and/or speed.

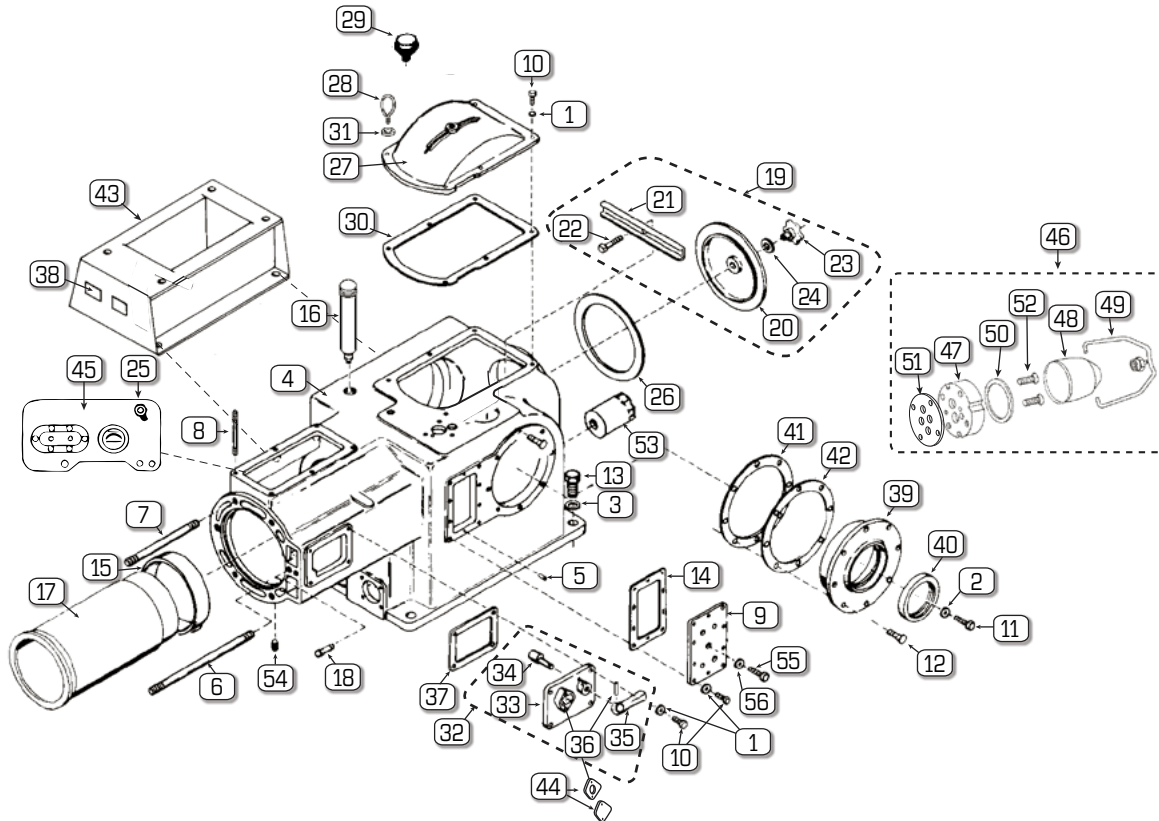
All ratings are corrected to 500' (152m) altitude, 29.38Hg (746mm), and a temperature of 85°F (29°C).

Natural Gas ratings are based on the use of 900 BTU (33.5 J/cm<sup>3</sup>) LHV gas. Propane ratings are based on the use of 2335 BTU HD-5 propane.



# 11 PARTS

## CRANKCASE ASSEMBLY



No.	Description	C-46		C-66		C-96		C-101/106	
		Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
1	Plated Lock Washer	1A-3/8	18	1A-3/8	18	1A-3/8	18	1A-3/8	18
2	Plated Lock Washer	1A-1/2	8	1A-1/2	8	1A-1/2	8	1A-1/2	8
3	Plated Lock Washer			1A-3/4	4	1A-7/8	4	1A-7/8	4
4	Crankcase Assy	1-46	1	1-66	1	1-96	1	1-106	1
5	Dowel Pin	2-46	2	2-46	2	2-46	2	2-46	2
6	Cylinder Head Stud-Long	3-46	1	3-66	1	3-96	1	3-106	1
7	Cylinder Head Stud-Short	4-46	5	4-66	5	4-96	5	4-96	5
8	Hopper Stud	6-46	6	6-46	6	5-96	6	5-96	6
9	Camshaft Plate	7-46	1	7-46	1	7-46	1	7-46	1
10	Capscrew Hex Head	7A-3/816x1	14	7A-3/816x1	14	7A-3/816x3/4	14	7A-3/816x3/4	14
11	Capscrew Hex Head	7A-1/213x11/4	1	7A-1/213x11/4	1	7A-1/213x11/4	1	7A-1/213x11/4	1
12	Capscrew Hex Head	7A-1/213x11/2	7	7A-1/213x11/2	7	7A-1/213x11/2	7	7A-1/213x11/2	7
13	Capscrew Hex Head			7A-3/410x3	4	7A-7/89x3	4	7A-7/89x3	4
14	Cover Gasket	8-46	1	8-46	1	8-46	1	8-46	1
15	Cyl Sleeve Gasket	12-46	2	12-66	1	12-A-96	1	12-106	3
16	Arrow Oil Filler	ASP-1	1	ASP-1	1	ASP-1	1	ASP-1	1
17	Cylinder Sleeve	13-46	1	13-66	1	13-96	1	13-106	1
18	Adapter Oil Line	14-46	1	14-46	1	14-46	1	14-46	1
19	<b>Cover &amp; Clamp Assembly</b>	<b>16-46</b>	<b>1</b>	<b>16-46</b>	<b>1</b>	<b>16-96</b>	<b>1</b>	<b>16-96</b>	<b>1</b>
20	• Hand Hole Cover	17-46	1	17-46	1	17-96	1	17-96	1
21	• Cover Clamp	18-46	1	18-46	1	18-96	1	18-96	1

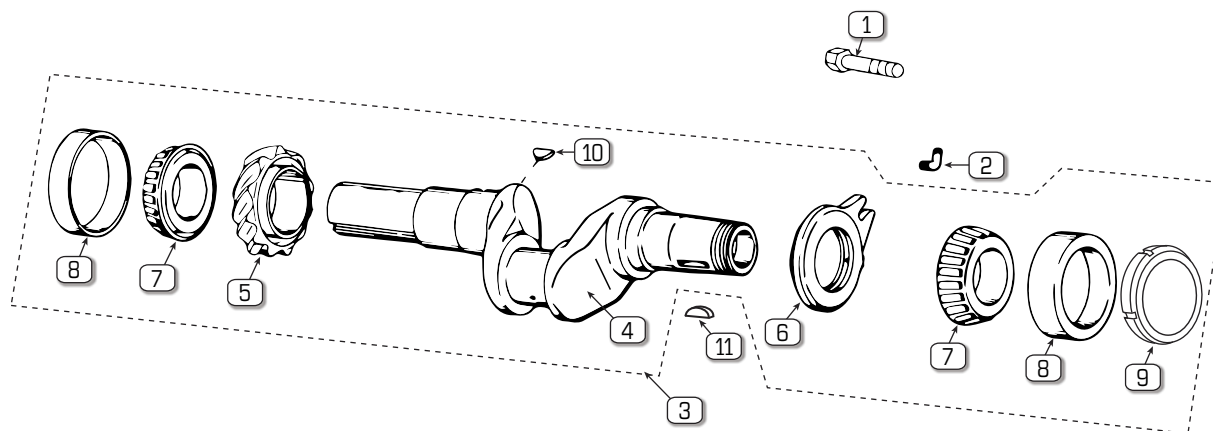


No.	Description	C-46		C-66		C-96		C-101/106	
		Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
22	● Hand Hole Cover Bolt	19-46	1	19-46	1	19-46	1	19-46	1
23	● Hand Hole Cover Nut	20-46	1	20-46	1	20-46	1	20-46	1
24	● Washer	21-46	1	21-46	1	21-46	1	21-46	1
25	Safety Switch	20-P-7	1	20-P-7	1	20-P-7	1	20-P-7	1
	Safety Switch w/ /Bracket	20-PM-27	1	20-PM-27	1	20-PM-27	1	20-PM-27	1
26	Cover Gasket	22-46	1	22-46	1	22-96	1	22-96	1
27	Top Cover	23-A-46	1	23-66	1	23-96	1	23-96	1
28	Eye Bolt	23-1A-46	1	23-1-46	1	23-1A-46	1	23-1A-46	1
						23-1A-96	1	223-1A-96	1
29	Breather Filter *	23-B-46	1	23-B-46	1	23-B-46	1	23-B-46	1
30	Top Cover Gasket	24-46	1	24-66	1	24-96	1	24-96	1
31	Nut Heavy Hex	25A-3/410	1	25A-3/410	1	25A-3/410	2	25A-3/410	2
<b>32</b>	<b>Cover Assembly</b>	<b>25-46</b>	<b>1</b>	<b>25-66</b>	<b>1</b>	<b>25-96</b>	<b>1</b>	<b>25-96</b>	<b>1</b>
33	● Cover	26-46-NA	1	26-46	1	26-96	1	26-96	1
34	● Intake Valve Lifter	28-46	1	28-46	1	28-46	1	28-46	1
35	● Intake Valve Lever	29-46	1	29-46	1	29-46	1	29-46	1
	● Washer	27-46	1	27-46	1	27-46	1	27-46	1
	● Washer Ex. Roller Rocker	59-118	2	59-118	2	59-118	1	59-118	1
	● Ring Gear Guard Painted	612-46	1						
36	● Roll Pin	41A-3/16x11/4	1	41A-3/16x11/4	1	41A-3/16x11/4	1	41A-3/16x11/4	1
37	Gasket	32-46	1	32-46	1	32-96	1	32-96	1
38	Instruction Plate	ANP-9	1	ANP-9	1	ANP-9	1	ANP-9	1
39	Bearing Housing	43-46	1	43-66	1	43-96	1	43-96	1
40	Oil Retainer	44-46	1	44-46	1	44-96	1	44-96	1
41	Shim (.015)	48-46	5	48-46	4	48-96	4	48-96	4
	Shim (.015) Brass *	48-B-46	1	48-B-46	1	48-B-96	1	48-B-96	1
42	Shim (.005)	50-46	3	50-46	4	50-96	4	50-96	4
	Shim (.005) Brass *	50-B-46	1	50-B-46	1	50-B-96	1	50-B-96	1
43	Base			58-66	1	58-96	1	58-96	1
44	Fuel Pump Gasket *	314-46	1	314-46	1	314-46	1	314-46	1
	Pump Cover Plate w/ Gasket *	314-P-46	1	314-P-46	1	314-P-46	1	314-P-46	1
45	Instrument Panel Zinc Plated	866-46	1	866-46	1	866-46	1	866-46	1
<b>46</b>	<b>Oil Level Gauge Assembly</b>	<b>ACE-400</b>	<b>1</b>	<b>ACE-400</b>	<b>1</b>	<b>ACE-400</b>	<b>1</b>	<b>ACE-400</b>	<b>1</b>
47	● Oil Level Gauge Base	ACE-401-A-46	1	ACE-401-A-46	1	ACE-401-A-46	1	ACE-401-A-46	1
48	● Sediment Bowl	ACE-402-46	1	ACE-402-46	1	ACE-402-46	1	ACE-402-46	1
	● Float Bowl w/ Hinge *	ACE-304-46	1	ACE-304-46	1	ACE-304-46	1	ACE-304-46	1
49	● Bail Assy	ACE-403-118	1	ACE-303-118	1	ACE-303-118	1	ACE-303-118	1
	● Bail Assy *	ACE-403-46	1	ACE-403-46	1	ACE-403-46	1	ACE-403-46	1
50	● Gasket	ACE-409-46-NS	2	ACE-409-46	2	ACE-409-46	2	ACE-409-46	2
	● Dial, Oil Level Gauge	298-118	1	298-118	1	298-118	1	298-118	1
51	● Gasket	36-46	1	36-46	1	36-46	1	36-46	1
52	● Machine Screw Flat, Soc	12D-3/816x1	2	12D-3/816x1	2	12D-3/816x1	2	12D-3/816x1	2
53	Oil Filter Element	OFK-1-E	1	OFK-1-E	1	OFK-1-E	1	OFK-1-E	1
	Pipe Fitting	PF5-3/8x1/2	1	PF5-3/8x1/2	1	PF5-3/8x1/2	1	PF5-3/8x1/2	1
54	Dial Cock	76400	1	76400	1	76400	1	76400	1
	Plug *	PF4-1/4	1	PF4-1/4	1	PF4-1/4	1	PF4-1/4	1
	Plug	PF4-1/2	1	PF4-1/2	1	PF4-1/2	1	PF4-1/2	1
55	Oil Line Connecting Screw *	115-46	1	115-46	1	115-46	1	115-46	1
56	Brass Washer	245-46	1	245-46	1	245-46	1	245-46	1

\* Not used in current production.

● Assembly Component

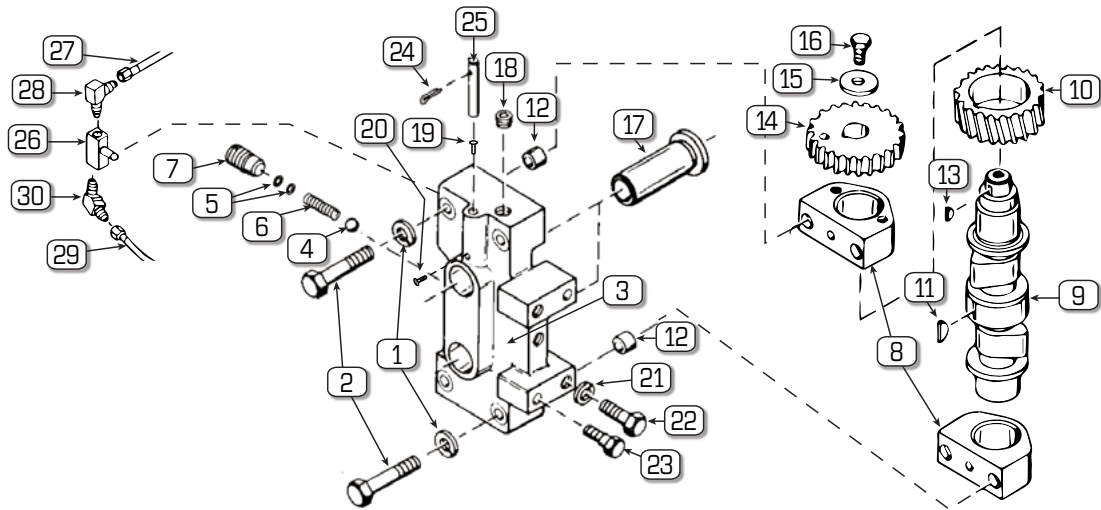
## CRANKSHAFT ASSEMBLY



No.	Description	C-46		C-66		C-96		C-101/106	
		Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
1	Capscrew Hex Head	7A-3/816x2	1	7A-3/816x2	1	7A-3/816x23/4	1	7A-3/816x23/4	1
2	90 Deg Ell	49x4	1	49x4	1	49x4	1	49x4	1
3	Crankshaft Assy	61-46	1	61-66	1	61-96	1	61-96	1
4	• Bare Crankshaft	62-46	1	62-66	1	62-96	1	62-96	1
5	• Crankshaft Timing Gear	63-46	1	63-46	1	63-96	1	63-96	1
6	• Oil Collector Flange	65-46	1	65-46	1	65-96	1	65-96	1
7	• Bearing Cone	68-46	2	68-66	2	68-96	2	68-96	2
8	• Bearing Cup	68-A-46	2	68-A-66	2	68-A-96	2	68-A-96	2
9	• SAE Nut	72-46	1	72-46	1	72-96	1	72-96	1
10	• Woodruff Key	104A-#25	1	104A-#25	1	104A-#25	1	104A-#25	1
11	Woodruff Key	104A-#V	1	104A-#V	1	104A-#36	1	104A-#36	1

- Assembly Component.

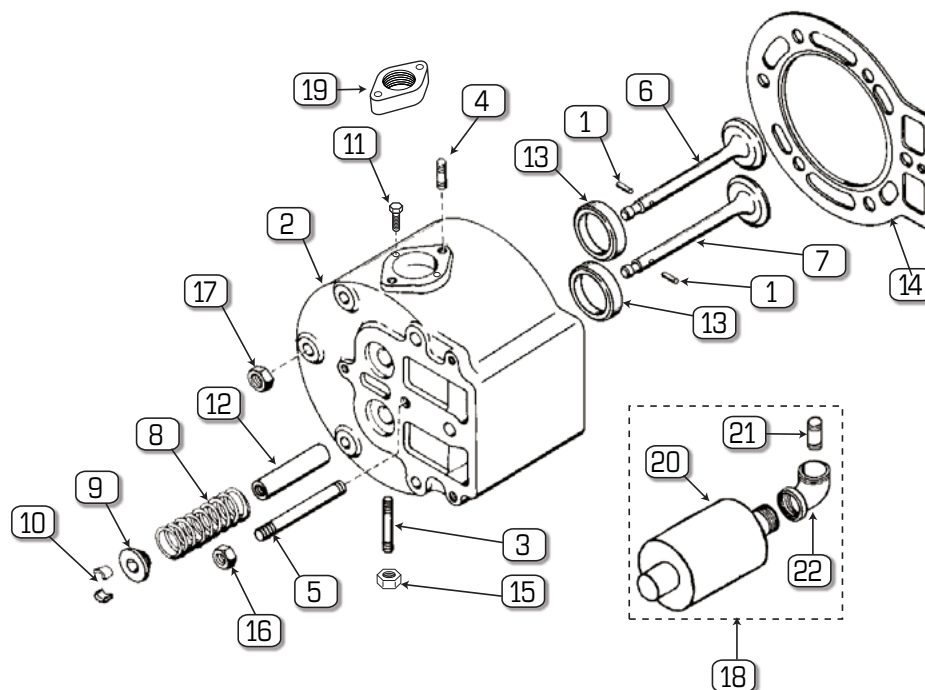
# CAMSHAFT ASSEMBLY



No.	Description	C-46		C-66		C-96		C-101/106	
		Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
	<b>Camshaft Assy</b>	<b>90-46</b>	<b>1</b>	<b>90-46</b>	<b>1</b>	<b>90-96</b>	<b>1</b>	<b>90-106</b>	<b>1</b>
1	● Internal Lock Washer	2C-1/2	4	2C-1/2	4	2C-1/2	4	2C-1/2	4
2	● Capscrew Hex Head	7A-1/213x3	4	7A-1/213x3	4	7A-1/213x3	4	7A-1/213x3	4
3	● Valve Lifter Guide	91-46	1	91-46	1	91-96	1	91-96	1
4	● 1/2" Hard Steel Ball	93-46	1	93-46	1	93-46	1	93-46	1
5	● #8 Flat Washer	93-A-46	2	93-A-46	2	93-A-46	2	93-A-46	2
6	● Oil Rel.Spring-New Style	94-A-46	1	94-A-46	1	94-A-46	1	94-A-46	1
7	● Oil Relief Valve Screw	95-46	1	95-46	1	95-46	1	95-46	1
8	● Camshaft Bearing Assy-Pr	97-46	1	97-46	1	97-46	1	97-46	1
9	● <b>Camshaft Assembly</b>	<b>98-46</b>	<b>1</b>	<b>98-46</b>	<b>1</b>	<b>98-96</b>	<b>1</b>	<b>98-106</b>	<b>1</b>
10	●● Camshaft Timing Gear	101-46	1	101-46	1	101-46	1	101-46	1
11	●● Woodruff Key	104A-#13	1	104A-#13	1	104A-#13	1	104A-#13	1
12	● Pilot Bushing	102-46	4	102-46	4	102-46	4	102-46	4
13	● Woodruff Key	104A-#6	1	104A-#6	1	104A-#6	1	104A-#6	1
14	● Governor Drive Gear	105-46	1	105-46	1	105-46	1	105-46	1
15	● Washer	107-46	1	107-46	1	107-46	1	107-46	1
16	● Gov Drive Gear Screw	108-46	1	108-46	1	108-46	1	108-46	1
17	● Valve Lifter	109-46	2	109-46	2	109-96	2	109-96	2
18	● Socket Head Pipe Plug	PF18-1/4	1	PF18-1/4	1	PF18-1/4	1	PF18-1/4	1
19	● Rivet, Button Head	AES-46	1	AES-46	1	AES-46	1	AES-46	1
20	● Screw, U-Drive	646-C-46	1	646-C-46	1	646-C-46	1	646-C-46	1
21	Plated Lock Washer	1A-1/2	2	1A-1/2	2	1A-1/2	2	1A-1/2	2
22	Capscrew Hex Head	7A-1/213x11/4	2	7A-1/213x11/4	2	7A-1/213x11/4	2	7A-1/213x11/4	2
23	Pilot Screw	112-46	2	112-46	2	112-46	2	112-46	2
24	Cotter Pin *	2A-3/32x5/8	1	2A-3/32x5/8	1	2A-3/32x5/8	1	2A-3/32x5/8	1
25	Oil Pressure Plunger *	110-46	1	110-46	1	110-96	1	110-96	1
26	Male Branch Tee 1/8	119-RG-46	1	119-RG-46	1	119-RG-46	1	119-RG-46	1
27	Cam Assy Crankcase Oil Line	OL-K-46	1	OL-K-46	1	OL-K-96	1	OL-K-96	1
28	● Elbow 90°	49x4	1	49x4	1	49x4	1	49x4	1
29	Rocker Cam Assy Line	OL-B-46	1	OL-B-66	1	OL-B-96	1	OL-B-96	1
30	● Elbow 45°	54x4	1	54x4	1	54x4	1	54x4	1

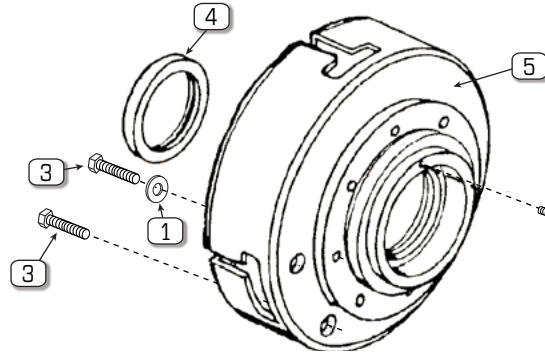
- \* Not used in current production  
 ● Assembly Component.  
 ●● Sub-Assembly Component.

## CYLINDER HEAD ASSEMBLY



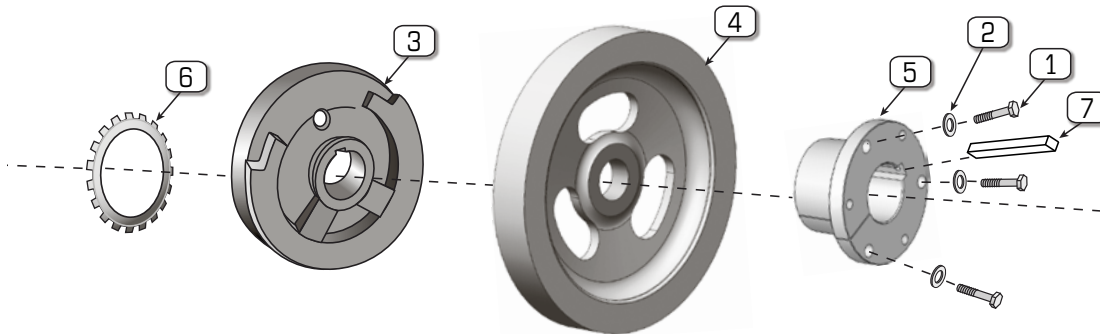
No.	Description	C-46		C-66		C-96		C-101/106	
		Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
	Cylinder Head Assy, Complete	222-46	1	222-66	1	222-96	1	222-106	1
	• Dowel Pin	2-46	1	2-46	2	2-46	1		
1	• Cotter Pin	2A-3/32x3/4	2	2A-3/32x3/4	2	2A-3/32x3/4	2		
2	• Cylinder Head	223-46	1	223-66	1	223-96	1	223-106	1
3	• Exhaust Flange Stud	225-46	2	225-66	2	225-66	2	225-66	2
4	• Intake Elbow Stud	226-46	2	226-46	2	226-46	2		
5	• Rocker Arm Bracket Stud	227-46	1	227-66	1	227-66	1	227-106	1
6	• Inlet Valve	229-46	1	229-66	1	229-66	1	229-106	1
7	• Exhaust Valve	230-46	1	230-66	1	230-96	1	230-106	1
8	• Valve Spring	232-46	2	232-46	2	232-96	2	232-96	2
9	• Valve Spring Retainer	233-46	2	233-66	2	233-66	2	233-66	2
10	• Valve Retainer Lock, Pair	234-46	2	234-66	2	234-66	2	234-66	4
11	• Setscrew, Socket Head	19A-3/816x3/4	2	19A-3/816x3/4	2	19A-3/816x3/4	2		
12	Valve Stem Guide	224-46	2	224-66	2	224-66	2	224-106	2
13	Exhaust Valve Seat Insert	228-A-46	2	228-A-66	2	228-A-96	2	228-A-106	2
14	Cylinder Head Gasket	238-46	1	238-66	1	238-96	1	238-106	1
	Grafoil Cyl Head Gasket	238-G-46	1	238-G-66	1	238-G-96	1	238-G-106	1
15	Finished Hex Nut	29A-1/213	2	29A-1/213	2	29A-1/213	2	29A-1/213	2
16	Finished Hex Nut	29A-5/818	1	29A-5/818	1	29A-5/818	1	29A-5/818	1
17	High Grd Nut #8	34A-5/818	6	34A-5/818	6	34A-3/416	6	34A-3/416	6
18	Muffler & Components	MUF-2-46	1	MUF-2-66	1	MUF-2-96	1	MUF-2-96	1
19	• Exhaust Flange	235-46	1	235-66	1	235-96	1	235-96	1
20	• Muffler	MUF-1	1	MUF-1	1	MUF-1	1	MUF-1	1
21	• Close Nipple	PF2-11/2	1	PF2-2	1				
22	• 90 Deg Street Elbow	PF10-21/2x11/2	1	PF10-21/2x2	1	PF5-21/2	1	PF5-21/2	1

## FLYWHEEL HOUSING ASSEMBLY



No.	Description	C-46		C-66		C-96		C-101/106	
		Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
1	Plated Lock Washer (inner ring only)	1A-1/2	8	1A-1/2	8	1A-1/2	8	1A-1/2	8
2	Capscrew Hex Head	7A-3/816x2	1	7A-3/816x2	1	7A-3/816x23/4	1	7A-3/816x23/4	1
3	Capscrew Hex Head	7A-1/213x11/2	8	7A-1/213x11/2	12	7A-1/213x11/2	8	7A-1/213x11/2	8
						7A-1/213x13/4	5	7A-1/213x13/4	5
4	Oil Retainer	44-46	1	44-46	1	44-46	1	44-46	1
						55-96	1	55-96	1
5	Flywheel Housing	51-46	1	51-66	1	51-96	1	51-106	1

## FLYWHEELS



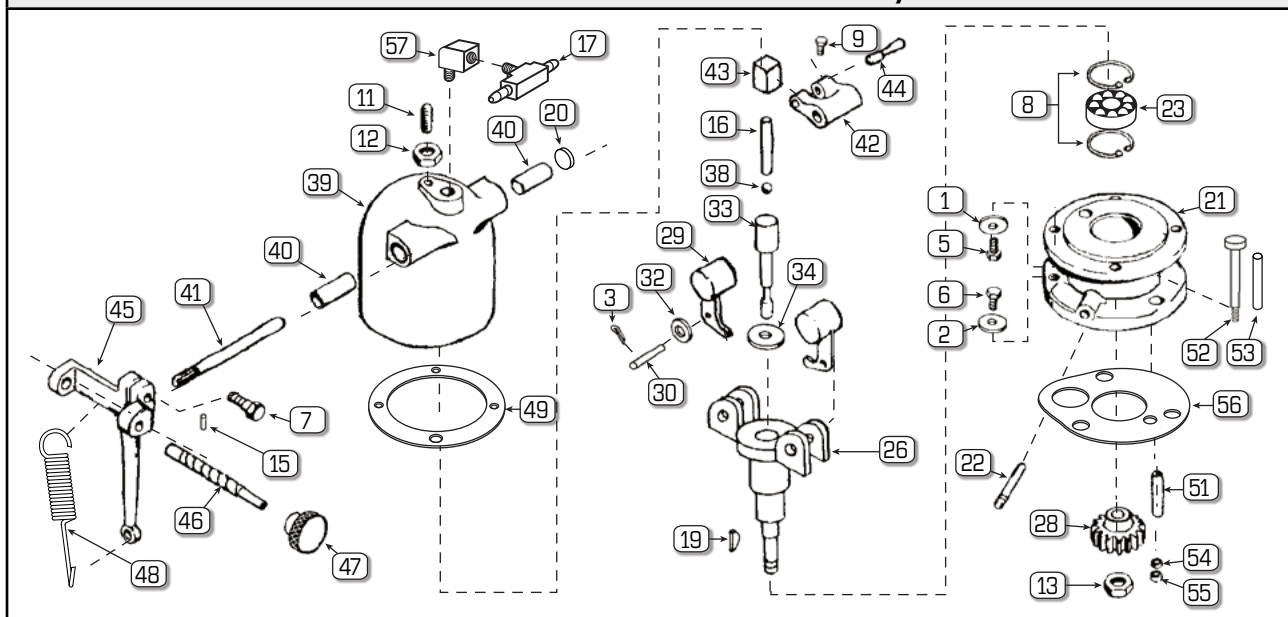
No.	Description	C-46		C-66		C-96		C-101/106	
		Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
1	Capscrew, Hex Head	368-9/1612x31/2	3	368-9/1612x31/2	3	368-5/811x31/2	3	368-5/811x31/2	3
2	Washer	1B-5/8	3	1B-5/8	3	1B-5/8	3	1B-5/8	3
3	Small Flywheel	367-46	1	367-66	1	367-96	1	367-106	1
4	Large Flywheel	368-46	1	368-66	1	368-96	1	368-106	1
5	Bushing	368-B-46 (F)	1	368-B-46 (F)	1	368-B-106 (J)	1	368-B-106 (J)	1
6	SAE Locking Washer	71-46	1	71-46	1	71-96	1	71-96	1
7	Flywheel Key	72-A-46	1	72-A-46	1	72-A-96	1	72-A-96	1
	Flywheel Guard, Aluminum	368-A-46	1	368-A-66	1	368-A-96	1	368-A-96	1
	Flywheel Guard, Plastic	368-ASE-46	1	368-ASE-66	1	368-ASE-96	1	368-ASE-106	
	Woodruff Key	104A-#V	1	104A-#V	1	104A-#36	1	104A-#36	1

- \* Not used in current production  
 ● Assembly Component.  
 ●● Sub-Assembly Component.

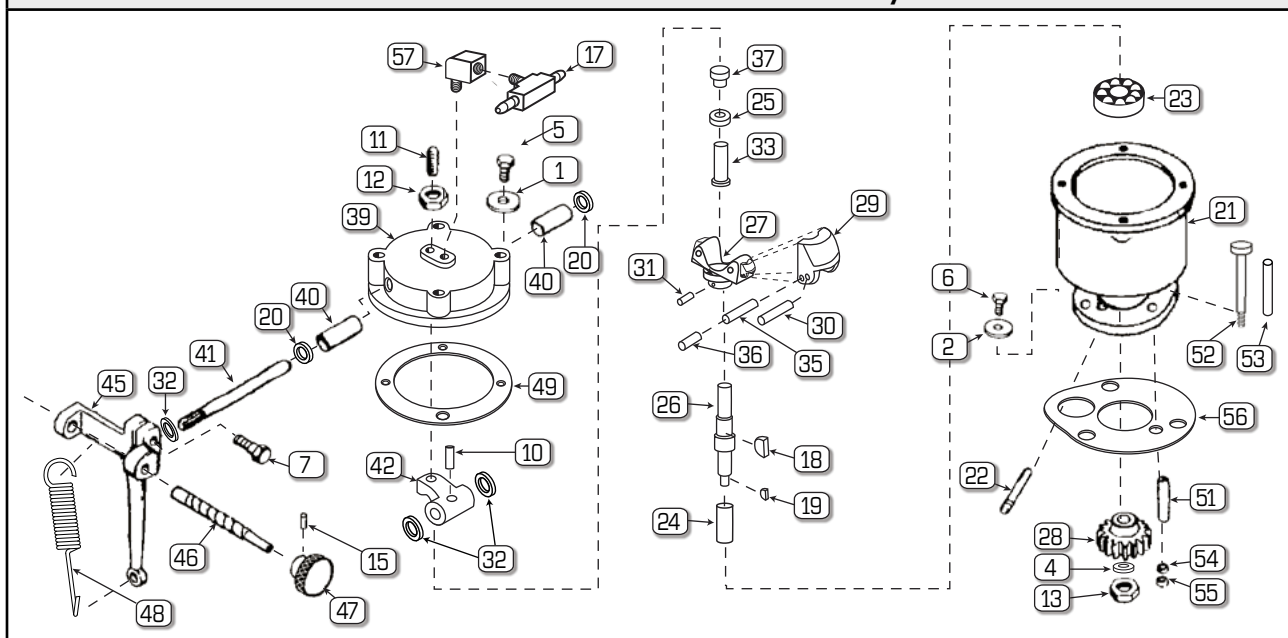


## GOVERNOR ASSEMBLY

## 176-46/66/96 Governor Assembly



## 176-101/106 Governor Assembly



No.	Description	C-46		C-66		C-96		C-101/106	
		Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
	Governor Assy Complete	176-46	1	176-46	1	176-46	1	176-106	
1	Plated Lock Washer	1A-1/4	4	1A-1/4	4	1A-1/4	4	1A-5/16	4
2	Plated Lock Washer	1A-3/8	3	1A-3/8	3	1A-3/8	3	1A-3/8	3
3	Cotter Pin	2B-1/16x3/8	4	2B-1/16x3/8	4	2B-1/16x3/8	4		
4	Internal Lock Washer							2C-1/2	1
5	Capscrew Hex Head	7A-1/420x5/8	4	7A-1/420x5/8	4	7A-1/420x5/8	4	7A-5/1618x2	2
6	Capscrew Hex Head	7A-3/816x1	3	7A-3/816x1	3	7A-3/816x1	3	7A-3/816x1	3
7	Capscrew Socket Head	9A-1/428x3/4	1	9A-1/428x3/4	1	9A-1/428x3/4	1	9A-1/420x1	1
8	Int Snap Ring	11A-N5000-118	2	11A-N5000-118	2	11A-N5000-118	2		

No.	Description	C-46		C-66		C-96		C-101/106	
		Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
9	Mach Screw Flat Slot	12C-1024x3/4	1	12C-1024x3/4	1	12C-1024x3/4	1		
10	Roll Pin							41A-3/16x7/8	1
11	Set Screw Socket Head	19A-1/420x11/4	1	19A-1/420x11/4	1	19A-1/420x11/4	1	19A-3/816x11/4	1
12	Jam Nut Heavy Hex	27A-1/420	1	27A-1/420	1	27A-1/420	1	27A-3/816	
13	Jam Nut Finished Hex	29D-3/824	1	29D-3/824	1	29D-3/824	1	29D-1/220	1
	Special Washer							27-46	1
15	Roll Pin	41A-3/32x3/4	1	41A-3/32x3/4	1	41A-3/32x3/4	1	41A-3/32x3/4	1
16	Steel Dowel Pin	41C-5/16x13/4	1	41C-5/16x13/4	1	41C-5/16x13/4	1		
17	Restricted Tee	45x4R	1	45x4R	1	45x4R	1	45x4R	1
18	Woodruff Key							104A-#2	1
19	Woodruff Key	104A-#1	1	104A-#1	1	104A-#1	1	104A-#6	1
20	Expansion Plug (Washer/C-106)	176-B-46	1	176-B-46	1	176-B-46	1	192-A-106	2
21	Lower Gov Housing Assy	177-46	1	177-46	1	177-46	1	177-106	1
22	Governor Spring Pin	178-46	1	178-46	1	178-46	1	178-106	1
23	Ball Bearing	179-46		179-46		179-46		179-106	1
24	Bushing							179-A-106	1
25	Thrust Bearing							179-B-106	1
26	Governor Shaft Assy	181-46	1	181-46	1	181-46	1	181-106	1
27	Governor Head							181-A-106	1
28	Governor Gear	182-46	1	182-46	1	182-46	1	182-106	1
29	Governor Weight	185-46	1	185-46	1	185-46	1	185-106	1
30	Governor Weight Pin	186-46	1	186-46	1	186-46	1	186-106	1
31	Roll Pin							41A-3/16x11/8	1
32	Washer	187-46	1	187-46	1	187-46	1	187-106	1
33	Governor Dash Pot Plunger	188-46	1	188-46	1	188-46	1	188-106	1
34	Governor Plunger Washer	189-46	1	189-46	1	189-46	1		
35	Sleeve							189-106	1
36	Pin							189-A-106	1
37	Thrust Plate							190-106	1
38	Steel Ball	190-46	1	190-46	1	190-46	1		
39	Governor Housing w/Bushing	191-46	1	191-46	1	191-46	1	191-106	1
40	Bushing	193-46	1	193-46	1	193-46	1	192-106	2
41	Governor Operating Shaft	196-46	1	196-46	1	196-46	1	196-106	1
42	Governor Operating Rod Lvr	197-46	1	197-46	1	197-46	1	197-106	1
43	Governor Rod End	198-46	1	198-46	1	198-46	1		
44	Governor Rod End Pin	199-46	1	199-46	1	199-46	1		
45	Governor Rod Lever Assy	202-46	1	202-46	1	202-46	1	202-106	1
46	Governor Adjusting Screw	204-46	1	204-46	1	204-46	1	204-106	1
47	Governor Adjusting Knob	205-46	1	205-46	1	205-46	1	205-46	1
48	Governor Spring	207-46 (red)	1	207-66 (wht)	1	207-96 (blu)	1	207-106 (blk)	1
49	Governor Housing Gasket	208-46	1	208-46	1	208-46	1	208-106	1
	Plated Bolt							209-A-106	2
51	Oil Press Gauge Tube *	211-46	1	211-46	1	211-46	1	211-46	1
52	Oil Pressure Gauge *	212-46	1	212-46	1	212-46	1	212-46	1
53	Pin, Dowel, .25" x .75" **	2-46	1	2-46	1	2-46	1	2-46	1
54	Oil Press Gauge Gasket *	213-46	2	213-46	2	213-46	2	213-46	2
55	Oil Press Gauge Nut	214-46	2	214-46	2	214-46	2	214-46	2
56	Governor Gasket	215-46	1	215-46	1	215-46	1	215-46	1
57	Elbow	ASA-578	1	ASA-578	1	ASA-578	1	ASA-578	1
	Governor Repair Kit	176-RK-46	1	176-RK-46	1	176-RK-46	1	176-RK-106	1

\* Not used in current production    \*\* For use with newer cam.

## 176-RK-46

## Governor Repair Kit, C-46, C-66 &amp; C-96

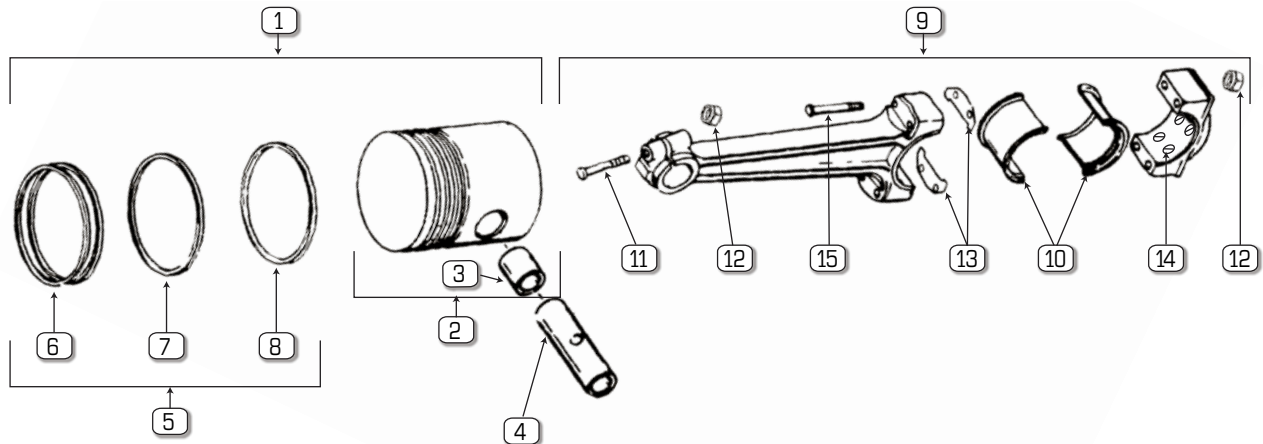
Description	Part #	Qty
Lockwasher, Plated	1A-1/4	4
Pin, Cotter	2B-1/16X3/8	4
Capscrew, Hex Head	7A-1/420X5/8	2
Ring, Retaining, Internal	11A-N5000-118	2
Screw, Flat Slot, Mach	12C-1024X3/4	1
Bearing, Ball	179-46	1
Shaft, Governor	181-46	1
Gear, Governor	182-46	1
Weight, Governor	185-46	2
Pin, Governor Weight	186-46	2
Governor Washer	187-46	4
Governor Dash Pot Plunger	188-46	1
Washer, Governor, Thrust	189-46	1
Ball, Steel	190-46	1
Shaft, Governor Opr	196-46	1
Lever, Governor Opr Rod	197-46	1
End, Governor Rod	198-46	1
Pin, Governor Rod End	199-46	1
Setscrew, Socket Head	19A-1/420X11/4	1
Gasket Governor Housing	208-46	1
Capscrew, Drilled Hex Head	209-A-46	2
Seal Governor	209-B-46	1
Nut Hex Jam Heavy	27A-1/420	1
Nut Hex Jam Finished	29D-3/824	1
Pin Dowel Steel Grind One End	41C-5/16X13/4	1
Key Woodruff	104A-#1	1
Plug Expansion	176-B-46	1

## 176-RK-106

## Governor Repair Kit, C-101 &amp; C-106

Description	Part #	Qty
Lockwasher Plated	1A-5/16	4
Washer	27-46	2
Lockwasher Internal	2C-1/2	1
Capscrew Hex Head	7A-5/1618X2	2
Bearing Thrust	179-B-106	1
Bearing Ball	179-106	1
Governor Weight Flange	181-A-106	1
Governor Shaft Assembly	181-106	1
Governor Wt	185-106	2
Pin Governor Weight	186-106	2
Spacer	187-106	3
Sleeve Governor	188-106	1
Pin	189-A-106	2
Sleeve	189-106	2
Thrust Plate	190-106	1
Shaft Governor Opr	196-106	1
Governor Rod Lvr Inner	197-106	1
Setscrew Socket Head	19A-3/816X11/4	1
Gasket Governor Housing	208-106	1
Bolt Plated 5/16	209-A-106	2
Seal, Governor	209-B-46	1
Nut Hex Finished	29A-3/816	1
Nut Hex Jam Finished	29D-1/220	1
Pin Roll	41A-3/16X7/8	1
Pin Roll	41A-3/16X11/8	1
Key Woodruff	104A-#2	1
Key Woodruff	104A-#6	1

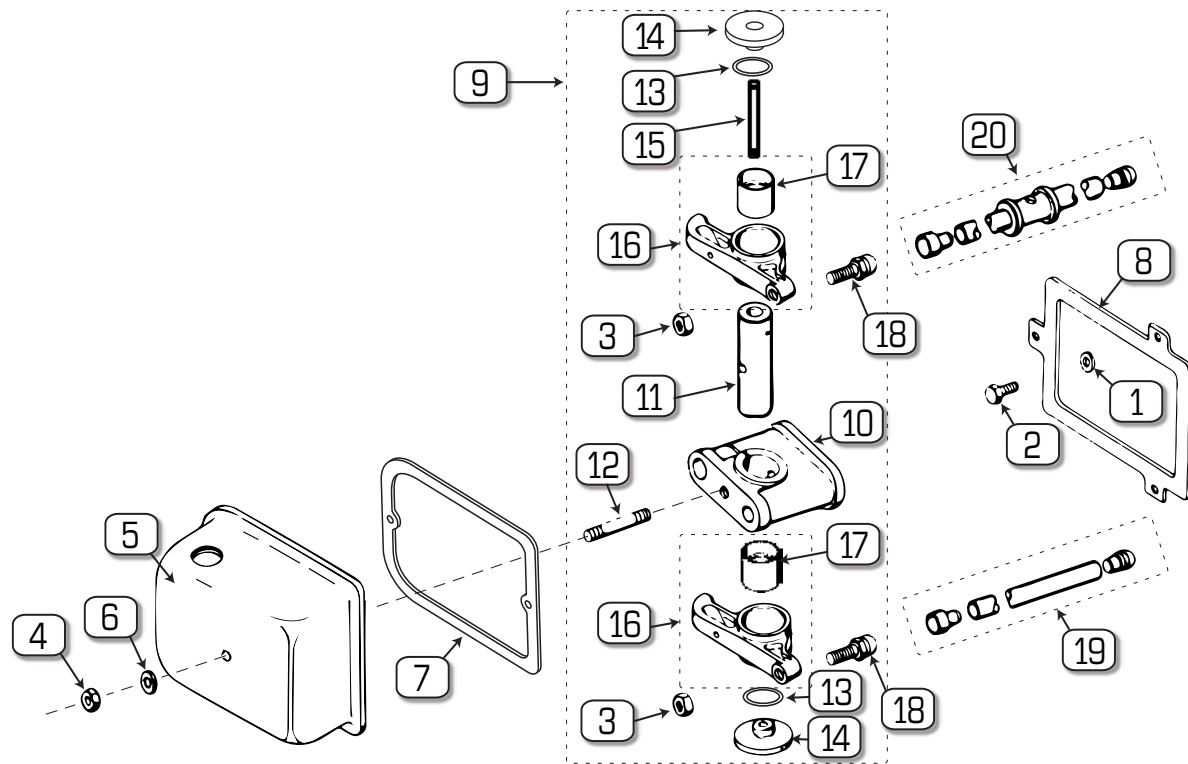
## CONNECTING ROD AND PISTON



No.	Description	C-46		C-66		C-96		C-101/106	
		Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
	<b>Piston and Rod Comp Assy</b>	<b>7682-46</b>	<b>1</b>	<b>7682-66</b>	<b>1</b>	<b>7682-96</b>	<b>1</b>	<b>7682-106</b>	<b>1</b>
<b>1</b>	<b>● Piston and Rings (items 2,4-5)</b>	<b>76-46</b>	<b>1</b>	<b>76-66</b>	<b>1</b>	<b>76-96</b>	<b>1</b>	<b>76-106</b>	<b>1</b>
2	●● Piston with Bushing	77-46	1	77-66	1	77-96	1	77-106	1
3	Piston Pin Bushing	78-46	2	78-66	2	78-96	2		
4	●● Piston Pin	79-46	1	79-66	1	79-96	1	79-106	1
<b>5</b>	<b>●● Ring Set (items 6-8)</b>	<b>905-46</b>	<b>1</b>	<b>905-66</b>	<b>1</b>	<b>905-96</b>	<b>1</b>	<b>905-106</b>	<b>1</b>
6	●●● Compression Ring	80-46	2	80-66	3	80-96	3	80-106	2
7	●●● Oil Scraper Piston Ring	80-S-46	1	80-S-66	1	80-S-96	1	80-S-106	1
8	●●● Piston Ring Oil Ring	81-46	1	81-66	1	81-96	1	81-106	1
<b>9</b>	<b>● Connecting Rod Assy (items 10-15 &amp; Connecting Rod)</b>	<b>82-46</b>	<b>1</b>	<b>82-66</b>	<b>1</b>	<b>82-96</b>	<b>1</b>	<b>82-96</b>	<b>1</b>
10	●● Con Rod Bushing-Pr (Brass)	83-46	1	83-66	1	83-96	1	83-96	1
	●● Con Rod Bushing-Pr (Alum)	83-A-46	1	83-A-66	1	83-A-96	1	83-A-96	1
11	●● Connecting Rod Clamp Bolt	86-46	1	86-46	1	86-96	1	86-96	1
12	●● Locknut, Hex Security, No Plating	87-46	5	87-46	5	87-96	5	87-96	5
13	●● Connecting Rod Shim	88-46	1	88-A-66	1	88-96	1	88-96	1
13	Connecting Rod Shim			88-66	1				
14	● Anchor Screw (as required) *	84-46		84-46					
15	● Connecting Rod Bolt	85-46	4	85-46	4	85-96	4	85-96	4

- \* Not used in current production.
- Assembly Component.
  - Sub-Assembly Component.
  - Sub-Sub-Assembly Component

## ROCKER ARM ASSEMBLY



No.	Description	C-46		C-66		C-96		C-101/106	
		Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
1	Plated Lock Washer							1A-3/8	3
2	Capscrew Hex Head							7A-3/816x11/4	3
3	Nut Finished Hex	29D-3/824	2	29D-3/824	2	29D-3/824	2	29D-3/824	2
4	Nut Finished Hex	29A-1/220	1	29A-1/220	1	29A-1/220	1	29A-1/220	1
5	Valve Cover	241-46	1	241-66	1	241-96	1	241-106	1
6	Copper Washer	245-46	1	245-46	1	245-46	1	245-46	1
7	Valve Cover Gasket	246-46	1	246-66	1	246-96	1	246-106 *	1
8	Inner Valve Cover Gasket							246-A-106	1
9	Rocker Arm Assy	247-46	1	247-66	1	247-96	1	247-106	1
10	● Rocker Arm Bracket	248-46	2	248-66	2	248-96	1	248-106	1
11	● Rocker Arm Shaft	249-46	1	249-66	1	249-96	1	249-96	1
12	● Valve Cover Stud	250-46	1	250-46	1	250-96	1	250-106	1
13	● O-Ring, Rocker Shaft Plug	251-A-46	2						
14	● Rocker Shaft Plug			251-A1-46	2	251-A1-46	2	251-A1-46	2
15	● Rocker Arm Pin Stud	252-A1-46	1	252-A1-66	1	252-A1-66	1	252-A1-66	1
16	● Valve Rocker Arm Assy	253-46	2	253-66	2	253-96	2	253-96	2
17	●● Rocker Arm Bushing	253-A-46	1	253-A-66	1	253-A-96	1	253-A-96	1
18	● Valve Adjusting Screw	254-46	2	254-46	2	254-96	2	254-96	2
19	Exhaust Push Rod Assy	256-46	1	256-66	1	256-96	1	256-106	1
20	Intake Push Rod Assy	257-46	1	257-66	1	257-96	1	257-106	1
	Conversion Kit, Rocker Arm *	247-CK-46	2	247-CK-66	2	247-CK-66	2	247-CK-66	2

\* Not used in current production.

- Assembly Component.
- Sub-Assembly Component.

## 247-CK-46

### Rocker Arm Repair Kit

Description	Part #	Qty
Stud Rocker Arm Pin	252-A1-46	1
Plug, Rocker Shaft with O-Ring	251-A-46	2

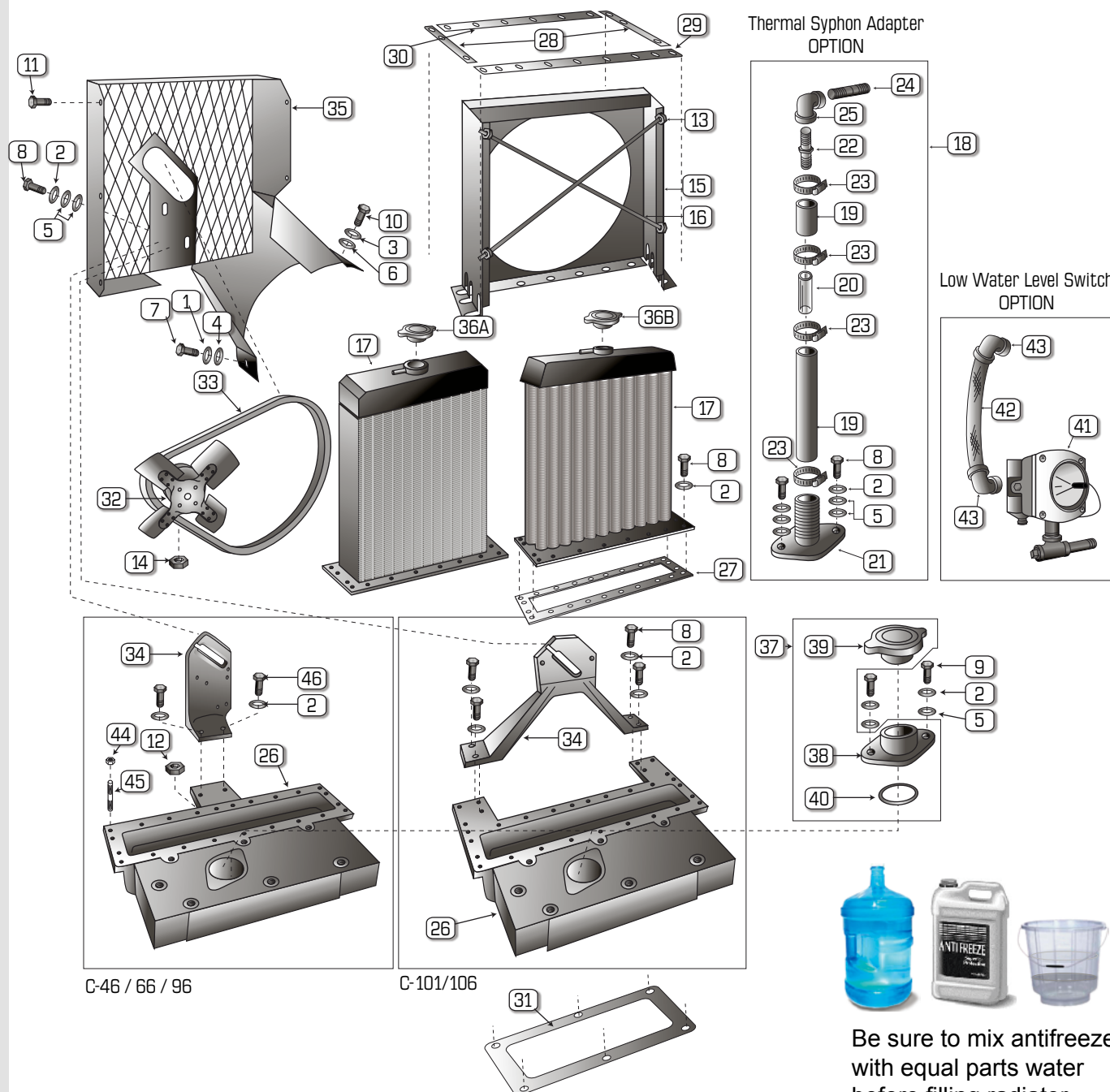
## 247-CK-66

### Rocker Arm Repair Kit

Description	Part #	Qty
Stud Rocker Arm Pin	252-A1-66	1
Plug, Rocker Shaft with O-Ring	251-A-46	2



# PRESSURE CONDENSING GROUP



No.	Description	C-46		C-66		C-96		C-101/106	
		Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
1	Plated Lock Washer	1A-1/4	1	1A-1/4	1	1A-1/4	1	1A-1/4	1
2	Plated Lock Washer	1A-3/8	29	1A-3/8	32	1A-3/8	32	1A-3/8	34
3	Plated Lock Washer	1A-1/2	1	1A-1/2	1	1A-1/2	1	1A-1/2	1
4	Flat Washer Standard	1B-1/4	1	1B-1/4	1	1B-1/4	1		
5	Flat Washer	1B-3/8	6	1B-3/8	6	1B-3/8	6	1B-3/8	6
6	Flat Washer Standard	1B-1/2	1	1B-1/2	1	1B-1/2	1	1B-1/2	1
7	Capscrew Hex Head	7A-1/420x5/8	1	7A-1/420x5/8	1	7A-1/420x5/8	1	7A-1/420x5/8	1
8	Capscrew Hex Head	7A-3/816x1	25	7A-3/816x1	25	7A-3/816x1	25	7A-3/816x1	27

No.	Description	C-46		C-66		C-96		C-101/106	
		Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
9	Capscrew Hex Head	7A-3/816x11/4	2	7A-3/816x11/4	2	7A-3/816x11/4	2	7A-3/816x11/4	2
10	Capscrew Hex Head	7A-1/213x3/4	1	7A-1/213x3/4	1	7A-1/213x3/4	1	7A-1/213x3/4	1
11	Screw Self Drill & Tap	12G-#10x3/4	6	12G-#10x3/4	7	12G-#10x3/4	7	12G-#10x3/4	8
12	Nut	29A-3/816	2	29A-3/816	2	29A-3/816	2	29A-3/816	4
13	Finished Hex Nut	29A-1/428	8	29A-1/428	8	29A-1/428	8	29A-1/428	8
14	Finished Hex Nut	29A-5/818	1	29A-5/818	1	29A-5/818	1	29A-5/818	1
15	Radiator Shell w/ Support Rod	332-A-46	1	332-A-66	1	332-A-66	1	332-A-106	1
16	Radiator Shell Support Rod	332-A1-46	2	332-A1-66	2	332-A1-66	2	310-96	2
	Radiator and Shell Assy.	332-FT-46	1	332-FT-66	1	332-FT-66	1	332-FT-106	1
17	Press Condenser Core w/Gasket & Cap	332-FTC-46	1	332-FTC-66	1	332-FTC-66	1	332-FTC-106	1
	J-Tube Radiator w/Gasket & Cap, Optional	332-FTCM-46	1	332-FTCM-66	1	332-FTCM-66	1	332-FTCM-106	1
	Vapor Phases Radiator Core w/ Gasket *	332-46	1	332-66	1	332-66	1		
18	Thermo Syphon Conversion Kit	332-TSK-46-1	1	332-TSK-46-1	1	332-TSK-46-1	1	332-TSK-46-1	1
2	• Plated Lock Washer	1A-3/8	2	1A-3/8	2	1A-3/8	2	1A-3/8	2
7	• Capscrew Hex Head	7A-3/816x1	2	7A-3/816x1	2	7A-3/816x1	2	7A-3/816x1	2
19	• TS Hose	332-TBH-66	1	332-TBH-66	1	332-TBH-66	1	332-TBH-66	1
20	• Sight Glass	332-TSD-46	1	332-TSD-46	1	332-TSD-46	1	332-TSD-46	1
	• Sight Glass, One(1) Inch	332-TSD-46-1	1	332-TSD-46-1	1	332-TSD-46-1	1	332-TSD-46-1	1
21	• Thermo Siphon Adapter	ASP-3-G	1	ASP-3-G	1	ASP-3-G	1	ASP-3-G	1
22	• Nipple KCN-1"	KCN-1	1	KCN-1	1	KCN-1	1	KCN-1	1
23	• Hose Clamp	HC-16	1	HC-16	1	HC-16	1	HC-16	1
24	• Nipple Pipe	PF1-1x21/2	1	PF1-1x21/2	1	PF1-1x3	1	PF1-1x3	1
25	• Elbow DMI 90 Deg	PF10-1	1	PF10-1	1	PF10-1	1	PF10-1	1
26	Water Hopper	333-46	1	333-66	1	333-96	1	333-106	1
27	Radiator Core Gasket	336-46	1	336-66	1	336-66	1	336-106	1
28	Flange Strap	337-46	1	337-46	1	337-46	1	337-106	1
29	Flange Strap Front	338-46	1	338-66	1	338-66	1	338-106	1
30	Flange Strap Rear	339-46	1	339-66	1	339-66	1	339-106	1
31	Gasket, Hopper	347-46	1	347-66	1	347-96	1	347-96	1
32	Fan Assy	356-A-46	1	356-A-66	1	356-A-66	1	356-A-106	1
33	Fan Belt	357-46	1	357-66	1	357-96	1	357-106	1
34	Fan Bracket-New Style	358-A-46	1	358-A-46	1	358-A-46	1	358-A-106	1
35	Fan & Belt Gd Assy	362-46	1	362-66	1	362-96	1	362-106	1
36A	Pressure Cond. Radiator Cap	500-4-46	1	500-4-46	1	500-4-46	1	500-4-46	1
36B	J-Tube Radiator Cap	500-J-46	1	500-J-46	1	500-J-46	1	500-J-46	1
37	Water Filler w/Cap	ASP-300-CL	1	ASP-300-CL	1	ASP-300-CL	1	ASP-300-CL	1
38	• Water Filler Body	ASP-3-J	1	ASP-3-J	1	ASP-3-J	1	ASP-3-J	1
39	• Fifteen (15) Lb Pressure Cap	ASP-3-K	1	ASP-3-K	1	ASP-3-K	1	ASP-3-K	1
40	• Water Filler Gasket	346-46	1	346-46	1	346-46	1	346-46	1
41	Low Water Level Switch	L-150	1	L-150	1	L-150	1	L-150	1
42	Water Line	OL-44	1	OL-E-66	1	OL-E-96	1	OL-E-96	1
43	• 90 Deg Ell	49x5x4	1	49x5x4	1	49x5x4	1	49x5x4	1
44	Hopper Stud Nut	29A-3/824	6	29A-3/824	6	29A-3/824	6	29A-3/824	6
45	Hopper Stud	6-46	6	6-46	6	5-96	6	5-96	6
46	Capscrew, Hex Head	7A-3/816x13/4	2	7A-3/816x13/4	2	7A-3/816x13/4	2	7A-3/816x13/4	4
	Pipe Plug Socket Head	PF18-1/4	1	PF18-1/4	1	PF18-1/4	1	PF18-1/4	1

\* Not used in current production.      • Assembly Component.

### 356-A-RK-46 Fan Repair Kit

Description	Part #	Qty
Lockwasher, Extrl	1C-5/8	1
Washer Flat SAE Plated	1N-5/8	1
Pin, Cotter	2A-3/32X1	2
Spindle, Fan New Style	356-2-46	1
Seal, Fan New Style (Rear)	356-5-46	1
Gasket, Fan Hub, Old Style	356-6-46	1
Nut, Hex, Slotted 5/8-18 Unf-2b	356-8-46	1
Thread Protector For Fan Assembly	356-G-46	1
Bearing Cup	6783-D-1	2
Bearing Cone	6783-D-2	2
Retainer, Grease	356-6A-46	1

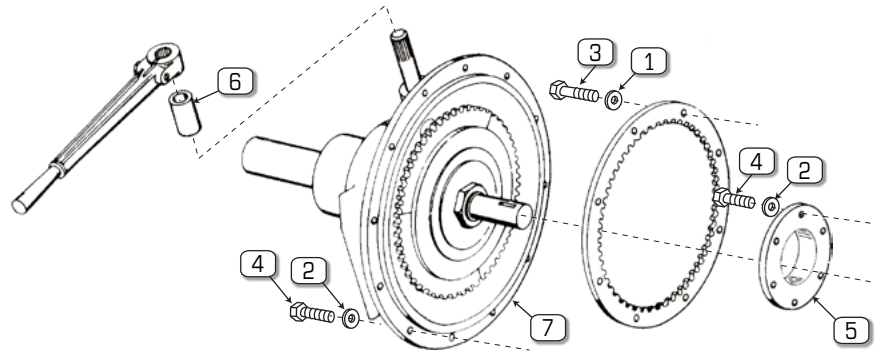
### 356-A-RK-66 Fan Repair Kit

Description	Part #	Qty
Lockwasher, Extrl	1C-5/8	1
Washer Flat SAE Plated	1N-5/8	1
Pin, Cotter	2A-3/32X1	2
Spindle, Fan	356-2-66	1
Seal, Fan New Style (Rear)	356-5-46	1
Retainer, Grease	356-6A-46	1
Gasket, Fan Hub, Old Style	356-6-46	1
Nut, Hex, Slotted 5/8-18 Unf-2b	356-8-46	1
Thread Protector For Fan Assembly	356-G-46	1
Bearing Cup	6783-D-1	2
Bearing Cone	6783-D-2	2

### 356-RK-46 Old Style Fan Repair Kit

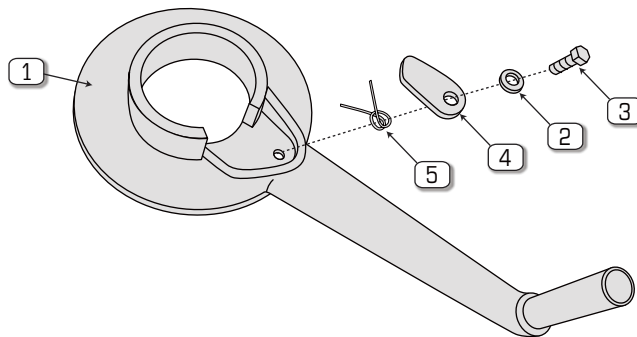
Description	Part #	Qty
Lockwasher, Plated	1A-5/8	1
Pin, Cotter	2A-1/8X11/4	2
Nut, Hex, Jam Finished	29D-5/818	1
Nut, Hex, Short Slotted Os	356-9-46	1
Gasket, Fan Hub	498-D	1
Retaining Seal For Fan Repair Kits	356-4-46	1
Washer	1202-D	2
Bearing Cup	6783-D-1	2
Spindle	8002-LD	1
Bearing Cone	6783-D-2	2

## POWER TAKE-OFF



No.	Description	C-46		C-66		C-96		C-101/106	
		Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
1	Plated Lock Washer	1A-5/16	8						
2	Plated Lock Washer	1A-3/8	10	1A-3/8	24	1A-3/8	18	1A-3/8	24
3	Capcrew, Hex Head	7A-5/1618x11/4	8	7A-3/816x11/2	8	7A-3/816x11/2	8	7A-3/816x11/2	8
4	Capcrew, Hex Head	7A-3/816x1	10	7A-3/816x1	18	7A-3/816x1	12	7A-3/816x1	18
5	Pilot Bearing Housing			367-A-66	1			367-A-106	1
6	Spacer					374-D-96	1	374-D-106	1
7	Clutch Assy	C-107-SP-5-DB	1	C-110-HP-4	1	C-110-HP-3	1	SP-111-HP-3	1

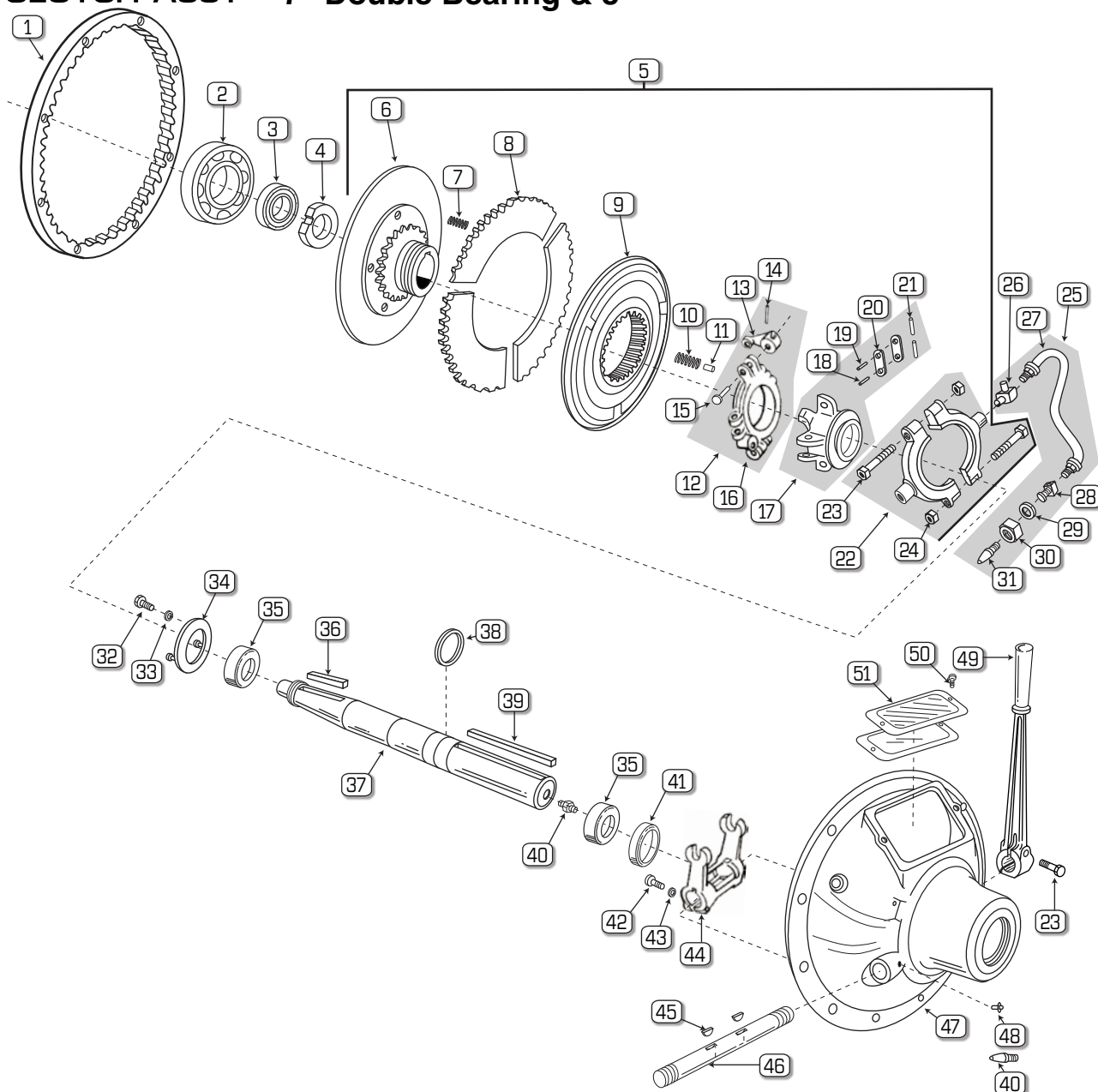
## STARTING CRANK ASSEMBLY



No.	Description	C-46		C-66		C-96		C-101/106	
		Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
1	Starting Crank Assy	437-46	1	437-46	1	437-96	1	437-96	1
2	• Flat Washer SAE	1N-3/8	1	1N-3/8	1	1N-3/8	1	1N-3/8	1
3	• Capscrew, Hex Head	7A-3/818x11/4	1	7A-3/818x11/4	1	7A-3/818x11/4	1	7A-3/818x11/4	1
4	• Starting Crank Pawl Assy	439-46	1	439-46	1	439-46	1	439-46	1
5	• Starting Crank Spring	440-46	1	440-46	1	440-46	1	440-46	1

- Assembly Component.

# CLUTCH ASSY 7" Double Bearing & 8"



No.	Description	C-46 (7")		C-66 (7")		C-66 (8")	
		Part No.	Qty	Part No.	Qty	Part No.	Qty
	<b>Complete Clutch Assembly</b>	<b>C-107-SP-5-DB</b>	<b>1</b>	<b>C-107-SP-5 *</b>	<b>1</b>	<b>C-107-SP-5 *</b>	<b>1</b>
1	Drive Ring	6661	1	6661	1	5805	1
2	Pilot Bearing	M-177	1	M-177	1	M-177	1
3	Hub Nut	2727	1	2727	1	2727	1
4	Lock Washer	A-1587	1	A-1587	1	A-1587	1
<b>5</b>	<b>Clutch Pack</b>	<b>XA-5060</b>	<b>1</b>	<b>XA-5060</b>	<b>1</b>	<b>XA-5079</b>	<b>1</b>
6	• Hub, Back Plate Assy	H-18	1	H-18	1	ZA-3177-C	1
7	• Release Spring	A-2286	6	A-2286	6	A-2286	6
8	• 3 Piece Drive Plate	A-5436-D	1	A-5436-D	1	6479-E	1
9	• Floating Plate	A-3087	1	A-2286	1	A-3169	1

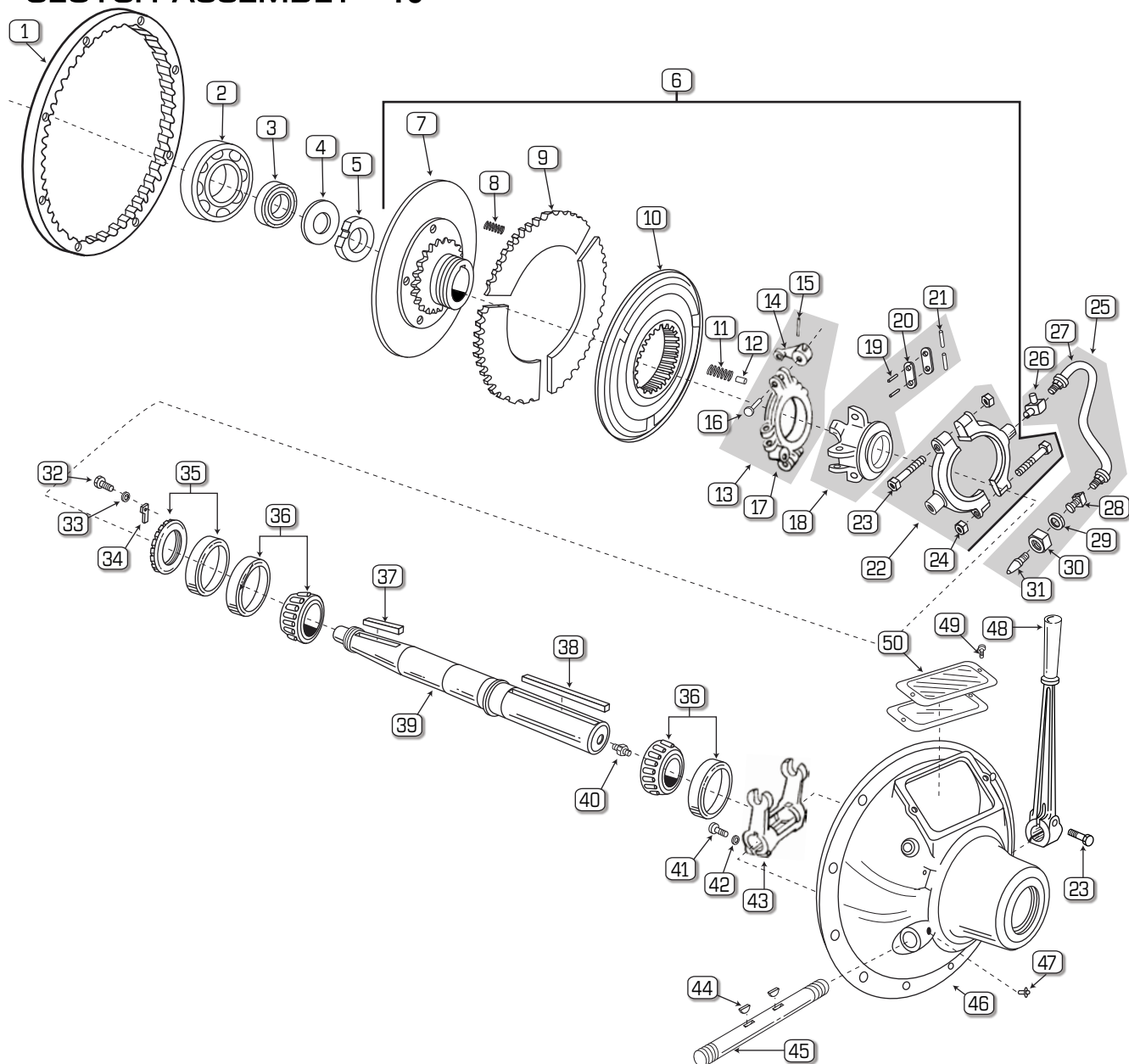
No.	Description	C-46 (7")		C-66 (7")		C-66 (8")	
		Part No.	Qty	Part No.	Qty	Part No.	Qty
10	● Adj. Lock Spring	1382	1	1382	1	115	1
11	● Adj Lock Pin	2042	1	2042	1	2042	1
12	● Adjustable Yoke Assy	A-16	1	A-16	1	1990	1
13	●● Finger Lever	2411	4	2411	4	2411	4
14	●● Tee Head Cotter Pin	2B-5/32x1/2	4	2B-5/32x1/2	4	2B-5/32x1/2	4
15	●● Finger Lever Pin	B-1537-A	4	B-1537-A	4	B-1537-D	4
16	●● Adjustable Yoke	1990	1	1990	1	1990	1
17	● Sliding Sleeve Assy	S-387	1	S-387	1	S-384	1
18	●● Lever Link Pin	B-1537-C	4	B-1537-C	4	B-1537-D	4
19	●● Lever Link Pin	B-1537-B	4	B-1537-B	4	B-1537-D	4
20	●● Lever Link	2968	1	2968	1	2968	1
21	●● Cotter Pin (Roll Pin)	2A-1/8x3/4	8	2A-1/8x3/4	8	2A-1/8x3/4	8
22	● Collar Assy	X-117-C8	1	X-117-C8	1	X-117-C8	1
23	●● Capscrew Hex Head	7A-1/213 x13/4	3	7A-1/213 x13/4	3	7A-1/213 x13/4	3
24	●● Locknut	32A-3/824	2	32A-3/824	2	32A-3/824	2
25	Hose Assy	A-1663	1	A-1663	1	A-1663	1
26	● Fitting	M-1284	1	M-1284	1	M-1284	1
27	● Flex Hose	M-1292-A	1	M-1292-A	1	M-1292-A	1
28	● Fitting	M-1283	1	M-1283	1	M-1283	1
29	● Internal Lock Washer	2C-5/8	1	2C-5/8	1	2C-5/8	1
30	● Jam Nut Finished Hex Head	29D-5/818	2	29D-5/818	2	29D-5/818	2
31	● Lube Fitting-Male	M-268	1	M-268	1	M-268	1
32	Capscrew Hex Head	7A-5/16x18x5/8	1	7A-5/16x18x5/8	1	7A-5/16x18x5/8	1
33	Internal Lock Washer	2C-5/16	1	2C-5/16	1	2C-5/16	1
34	Bearing Retainer Ring	A-1181	1	A-1181	1	A-1181	1
35	Bearing	M-141	1	M-141	1	M-141-A	1
	Bearing, Double Bearing Clutch	M-1590	2				
36	Key; Sq. Ends	6A-1/4x1/4x17/8	1	6A-1/4x1/4x17/8	1	6A-1/4x1/4x17/8	1
37	Hollow Shaft, 1 7/16" *			XA-3026	1		
	Hollow Shaft, 1 3/4" *	XA-3026-AN	1	XA-3026-AN	1	XA-3026-AN	1
	Shaft, Double Bearing Clutch	XA-3026-DB	1				
	Solid Shaft *			XA-3026-BE	1	XA-3026-BE	1
38	Snap Ring	A-1002	1	A-1002	1	A-1002	1
39	Key; Sq. Ends	6A-3/8x3/8x21/2	1	6A-3/8x3/8x21/2	1	6A-7/16x33/8	1
40	Shaft Fitting	M-287	1	M-287	1	M-287	1
41	Felt Packing	1561	1	1561	1	1561	1
42	Capscrew Hex Head	7A-3/816x11/2	2	7A-3/816x11/2	2	7A-3/816x11/2	2
43	Internal Lock Washer	2C-3/8	2	2C-3/8	2	2C-3/8	2
44	Throwout Yoke	X-1037	1	X-1037	1	X-1037	1
45	Woodruff Key	104A-#15	2	104A-#15	2	104A-#15	2
46	Operating Shaft	2757	1	2757	1	2757	1
47	Clutch Housing	7958	1	7957	1	7957	1
48	Grease Fitting Shaft	M-503	1	M-503	1	M-503	1
49	Hand Lever	X-3799E	1	X-3799E	1	X-3799E	1
50	Machine Screw Rd Head	12A-1/420x1/2	2	12A-1/420x1/2	2	12A-1/420x1/2	2
51	Spec Plate	ANP-21	1	ANP-21	1	ANP-21	1

\* Not used in current production.

● Assembly Component. ●● Sub-Assembly Component.



# CLUTCH ASSEMBLY 10"



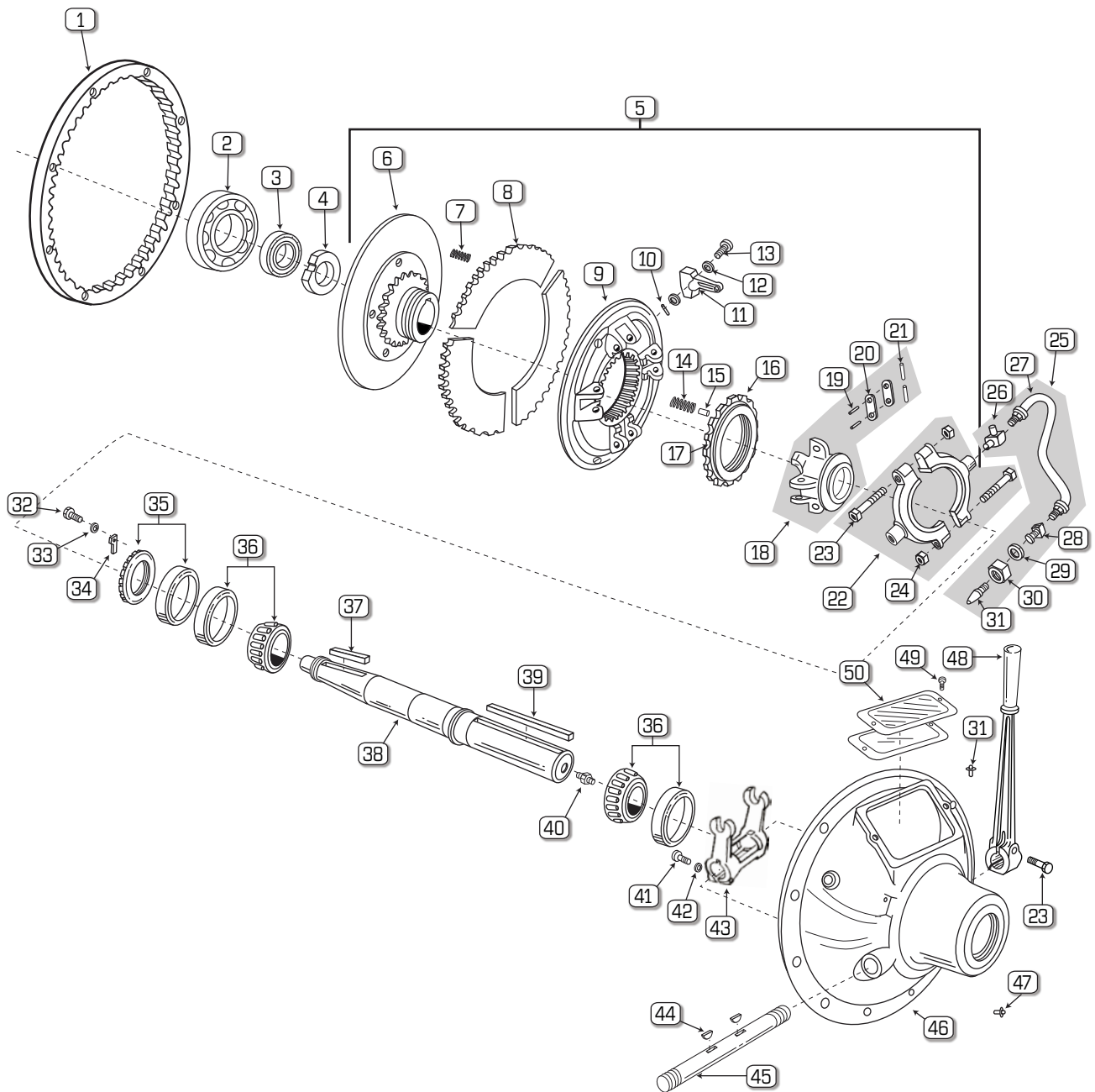
No.	Description	C-66 (10")		C-96 (10")	
		Part No.	Qty	Part No.	Qty
	Complete Assembly	C-110-HP-4	1	C-110-HP-3	1
1	Drive Ring	6187-A	1	6187-A	1
2	Pilot Bearing	M-167	1	M-2262-A	1
3	Hub Nut	1092-A	1	1092-A	1
4	Spacer			367-S-96	1
5	Lockwasher	A-1588	1	A-1588	1
<b>6</b>	<b>Clutch Pack</b>	<b>X-7876</b>	<b>1</b>	<b>X-7876</b>	<b>1</b>
7	• Hub, Back Plate Assy	6030	1	6030	1
8	• Release Spring	A-1069	6	A-1069	6

No.	Description	C-66 (10")		C-96 (10")	
		Part No.	Qty	Part No.	Qty
9	● 3 Piece Drive Plate	5878-G	1	5878-G	1
	● 1 Piece Drive Plate	5878-F	1	5878-F	1
	● 1 Piece Drive Plate, Aluminum	O-6314-A	1	O-6314-A	1
	● 1 Piece Drive Plate, SS	O-6314-F	1	O-6314-F	1
10	● Floating Plate	5752	1	5752	1
11	● Adj. Lock Spring	115	1	115	1
12	● Adj Lock Pin	2245	1	2245	1
13	● <b>Adjustable Yoke Assembly</b>	<b>A-60</b>	<b>1</b>	<b>A-60</b>	<b>1</b>
14	●● Finger Lever	103-F	1	103-F	1
15	●● Tee Head Cotter Pin	2B-5/32x1/2	4	2B-5/32x1/2	4
16	●● Finger Lever Pin	B-1538-D	4	B-1538-D	4
17	●● Adjustable Yoke	1990	1	1990	1
18	● <b>Sliding Sleeve Assy</b>	<b>S-384</b>	<b>1</b>	<b>S-384</b>	<b>1</b>
19	●● Lever Link Pin	B-1537-D	4	B-1537-D	4
20	●● Lever Link	119-B-2	1	119-B-2	1
21	●● Cotter Pin (Roll Pin)	2A-1/8x3/4	8	2A-1/8x3/4	8
22	● <b>Collar Assy</b>	<b>X-117-CB</b>	<b>1</b>	<b>X-117-CB</b>	<b>1</b>
23	●● Capscrew Hex Hd	7A-1/213x13/4	1	7A-1/213x13/4	1
24	●● Locknut	32A-3/824	2	32A-3/824	2
25	<b>Hose Assembly</b>	<b>A-1663</b>	<b>1</b>	<b>A-1663</b>	<b>1</b>
26	● Fitting	M-1284	1	M-1284	1
27	● Flex Hose	M-1292-A	1	M-1292-A	1
28	● Fitting	M-1283	1	M-1283	1
29	● Internal Lockwasher	2C-5/8	1	2C-5/8	1
30	● Jam Nut Finixed Hex Hd	29D-5/818	1	29D-5/818	1
31	● Lube Fitting-Male	M-268	1	M-268	1
32	Capscrew Hex Hd	7A-5/1618x5/8	1	7A-5/1618x5/8	1
33	Internal Lockwasher	2C-5/16	1	2C-5/16	1
34	Bearing Retainer Lock	1216-A	4	1216-A	4
35	Bearing Spacer	B-2147	1	B-2147	1
36	Bearing	M-207	2	M-207	2
37	Key; Sq. Ends	6A-1/4x1/4x21/8	1	6A-1/4x1/4x21/8	1
38	Key; Sq. Ends	6A-5/8x5/8x43/8	1	6A-5/8x5/8x43/8	1
39	Shaft, 1 7/16"	4879-AU	1	4879-AU	1
40	Shaft Fitting	M-287	1	M-287	1
41	Capscrew Hex Hd	7A-3/816x11/2	2	7A-3/816x11/2	2
42	Internal Lockwasher	2C-3/8	2	2C-3/8	2
43	Throwout Yoke	X-1037	1	X-1037	1
44	Woodruff Key	104A-#15	2	104A-#15	2
45	Operating Shaft	1144-F	1	1144-F	1
46	Clutch Housing	8879	1	8255	1
47	Grease Fitting Shaft	M-503	1	M-503	1
48	Hand Lever	X-3799E	1	X-3799E	1
49	Machine Screw Rd Head	12A-1/420x1/2	2	12A-1/420x1/2	2
50	Spec Plate	ANP-22-A	1	ANP-22-A	1

\* Not used in current production.

● Assembly Component. ●● Sub-Assembly Component.

## CLUTCH ASSEMBLY 11"



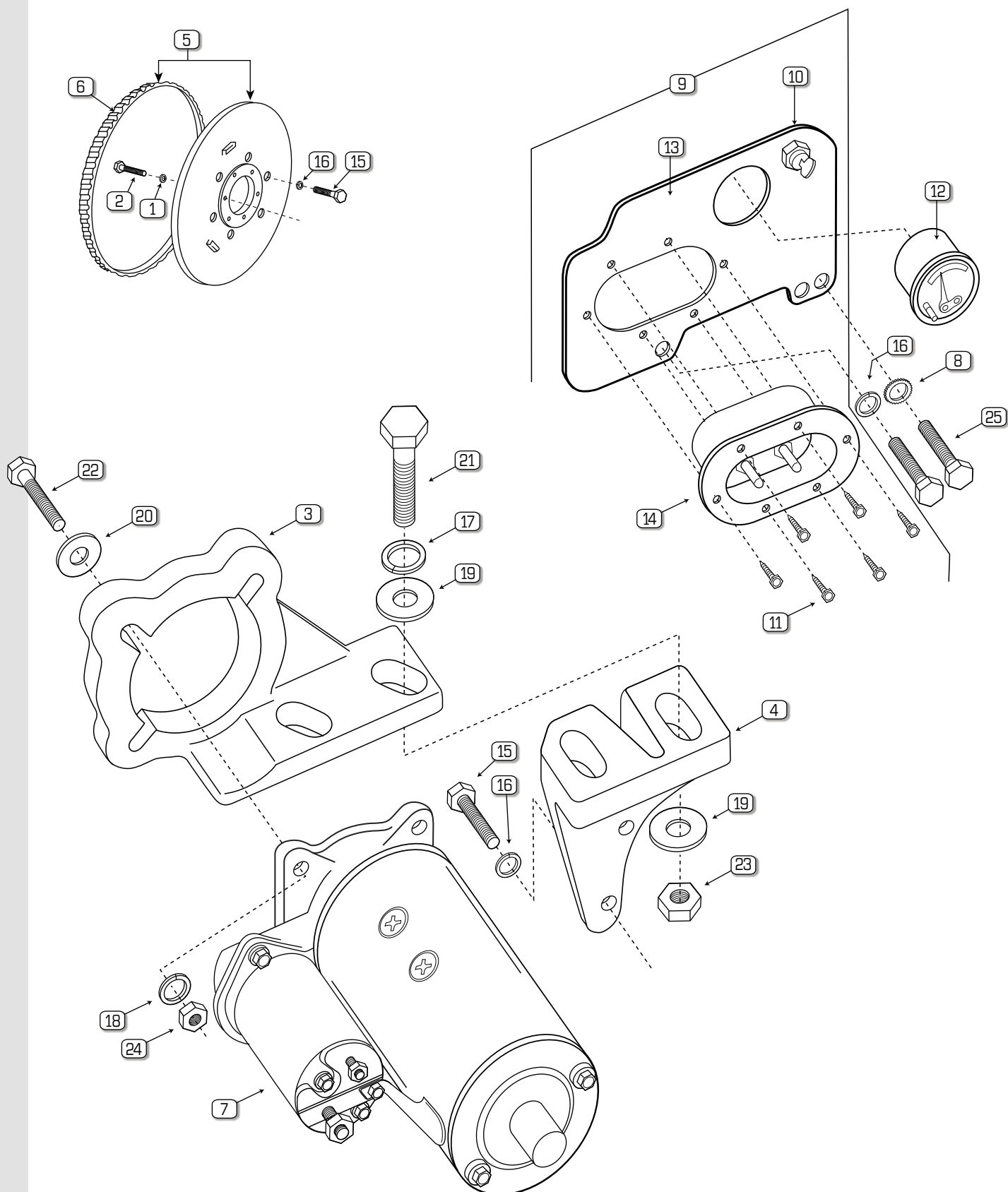
No.	Description	C-101/106 (11")	
		Part No.	Qty
	Complete Assembly	SP-111-HP-3	1
1	Drive Ring	6625-A	1
2	Pilot Bearing	M-167	1
3	Hub Nut	1092	1
4	Lockwasher	A-1588	1
<b>5</b>	<b>Clutch Pack</b>	<b>XA-6527</b>	<b>1</b>
6	● Hub, Back Plate Assy	ZA-6505-A	1
7	● Release Spring	A-1069	6
8	● 3 Piece Drive Plate	A-5579-E	1
	● 1 Piece Drive Plate, Aluminum	O-6310-J	1
	● 1 Piece Drive Plate, SS	O-6310-L	1
9	● Floating Plate	XB-2343	1
10	● Tee Head Cotter Pin	2B-5/32x1/2	4
11	● Finger Lever	B-1304	3
12	● Spring Washer	M-2115-D	8
13	● Finger Lever	B-1538-A	4
14	● Adj. Lock Spring	115	1
15	● Adj Lock Pin	B-1272	1
16	● Adj. Ring	A-4238	1
17	● Finger Lever Pin	B-1538-A	3
<b>18</b>	<b>● SI Sleeve Assy</b>	<b>S-601</b>	<b>1</b>
19	●● Lever Link Pin	B-1537-D	8
20	●● Lever Link	2617	1
21	●● Cotter Pin (Roll Pin)	41A-3/32x5/8	8
<b>22</b>	<b>● Collar Assy</b>	<b>X-117</b>	<b>1</b>
23	●● Capscrew Hex Head	7A-1/213x13/4	1
24	●● Locknut	32A-3/824	2
<b>25</b>	<b>Hose Assembly</b>	<b>A-1663-A</b>	<b>1</b>
26	● Fitting	M-1284	1
27	● Flex Hose	M-1292-B	1
28	● Fitting	M-1283	1
29	● Internal Lockwasher	2C-5/8	1
30	● Jam Nut Finished Hex Head	29D-5/818	2
31	● Lube Fitting-Male	M-268	2
32	Capscrew Hex Head	7A-5/1618x5/8	1
33	Internal Lockwasher	2C-5/16	1
34	Bearing Retainer Shaft	1216-A	1
35	Bearing Spacer	B-2147	1
36	Bearing	M-207	2
37	Key; Sq. Ends	6A-3/8x3/8x21/2	1
38	Shaft, 1 7/16"	A-5188	1
39	Key; Sq. Ends	6A-5/8x5/8x53/8	1
40	Shaft Fitting	M-287	1

No.	Description	C-101/106 (11")	
		Part No.	Qty
41	Capscrew Hex Head	7A-3/816x11/2	2
42	Internal Lockwasher	2C-3/8	2
43	Throwout Yoke	X-125-A	1
44	Woodruff Key	104A-#15	2
45	Operating Shaft	1144-F	1
46	Clutch Housing	8255	1
47	Grease Fitting Shaft	M-503	1
48	Hand Lever	X-3799E	1
49	Machine Screw Rd Head	12A-1/420x1/2	2
50	Spec Plate	ANP-22-A	1

\* Not used in current production.

● Assembly Component. ●● Sub-Assembly Component.

## RING GEAR, STARTER &amp; INSTRUMENT PANEL

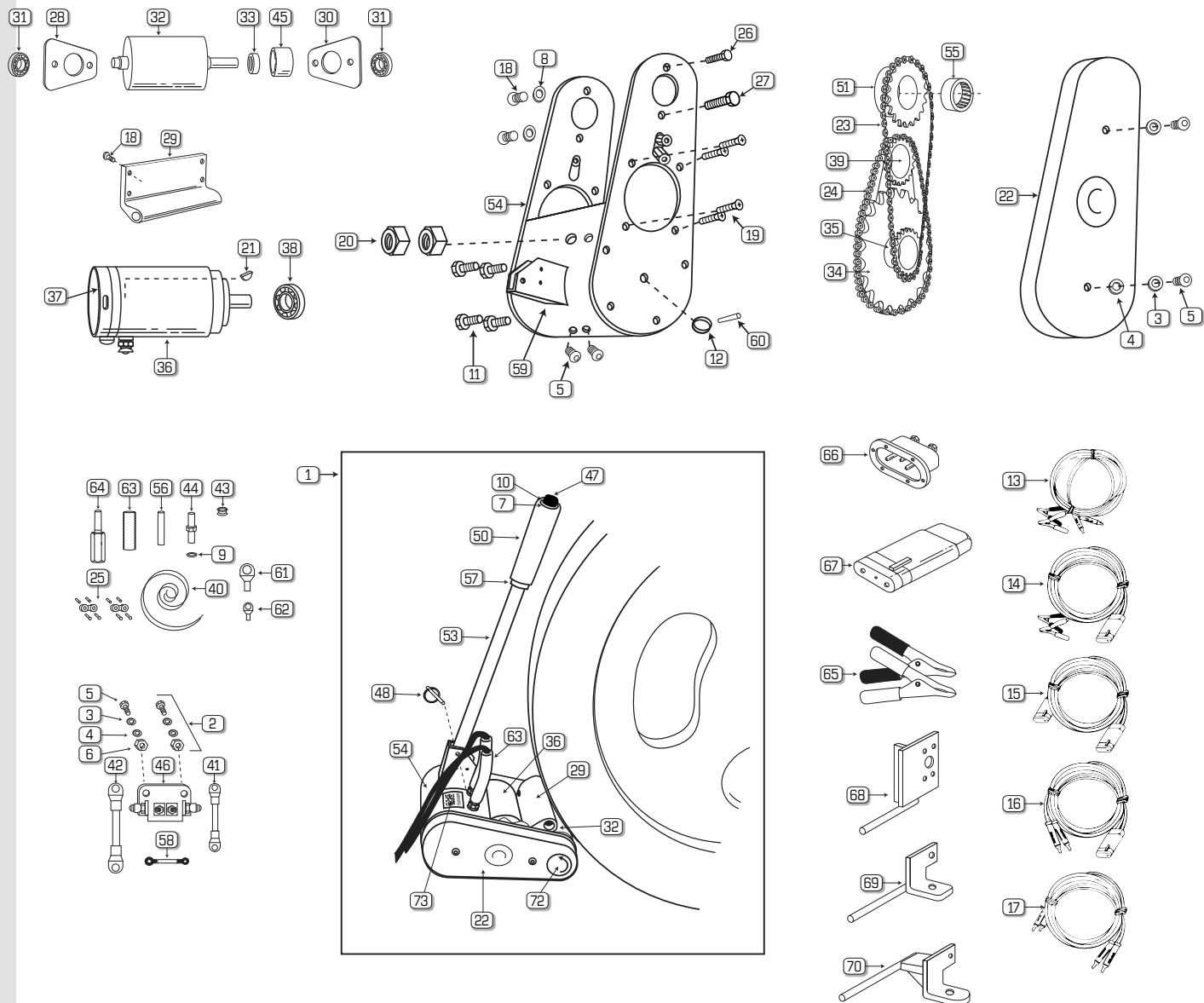


No.	Description	C-46		C-66		C-96		C-101/106	
		Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
	Ring Gear Starter Assy less Mag Bracket			600-66-LB	1	600-96-LB	1	600-96-LB	1
	Ring Gear Starter Assy	600-46	1	600-66	1	600-96	1	600-96	1
1	Plated Lock Washer	1A-1/2	6	1A-1/2	6	1A-1/2	6	1A-1/2	6
2	Capscrew, Hex Head	7A-1/213x13/4	6	7A-1/213x13/4	6	7A-1/213x13/4	6	7A-1/213x13/4	6
3	Starter Bracket	601-D1-46	1	601-D1-46	1	601-D1-46	1	601-D1-46	1
4	Starter Bracket	601-D2-46	1	601-D2-46	1				
5	Ring Gear Adapter Assy	604-66	1	604-66	1	604-66	1	604-66	1
6	● Ring Gear	603-66	1	603-66	1	603-66	1	603-66	1
7	Starter Motor	605-66	1	605-66	1	605-66	1	605-66	1
	Wiring Harness Bracket	607-66	1	608-66	1	608-66	1	608-66	1
	Starter Button	AES-43	1	AES-43	1	AES-43	1	AES-43	1
8	Washer, Star	1-1C-3/8	1	1-1C-3/8	1	1-1C-3/8	1	1-1C-3/8	1
	Mag Bracket	330-13A-46	1	330-13A-46	1	330-13A-46	1	330-13A-46	1
<b>9</b>	<b>Instrument Panel</b>	<b>609-46</b>	<b>1</b>	<b>609-46</b>	<b>1</b>	<b>609-46</b>	<b>1</b>	<b>609-46</b>	<b>1</b>
	● Instrument Panel Assy Less Wiring	609-46-1	1	609-46-1	1	609-46-1	1	609-46-1	1
	●● Push On Female -Blue	16-14 PUSH ON	2	16-14 PUSH ON	2	16-14 PUSH ON	2	16-14 PUSH ON	2
	●● Terminal, Ring, #10 -14-16 Ga	AES-66	1	AES-66	1	AES-66	1	AES-66	1
	●● Terminal Cole 3/8	608-C-66	2	608-C-66	2	608-C-66	2	608-C-66	2
	●● Wire Black 14 Gauge	14 AWG THHN-B	1'	14 AWG THHN-B	1'	14 AWG THHN-B	1'	14 AWG THHN-B	1'
	●● Cable	#4 CABLE	1'	#4 CABLE	1'	#4 CABLE	1'	#4 CABLE	1'
10	●● Switch, Rotary	868-A-255	1	868-A-255	1	868-A-255	1	868-A-255	1
11	●● Screw, Self Drill & Tap	12G-#10X3/4	6	12G-#10X3/4	6	12G-#10X3/4	6	12G-#10X3/4	6
	●● Elbow, Female, 90 Degree	50X4	1	50X4	1	50X4	1	50X4	1
12	●● Switch Safety Pm	20-P-7	1	20-P-7	1	20-P-7	1	20-P-7	1
13	●● Plate, Instrument	866-46	1	866-46	1	866-46	1	866-46	1
	●● Terminal	AES-84	1	AES-84	1	AES-84	1	AES-84	1
	●● Screw Round Head Mach	12A-832X1/4	1	12A-832X1/4	1	12A-832X1/4	1	12A-832X1/4	1
14	●● Cannon Receptacle	AES-72	1	AES-72	1	AES-72	1	AES-72	1
	● Wire Assembly For 609-46	609-46-2	1	609-46-2	1	609-46-2	1	609-46-2	1
	<b>Hardware Kit</b>	<b>600-66-HW</b>	<b>1</b>	<b>600-66-HW</b>	<b>1</b>	<b>600-66-HW</b>	<b>1</b>	<b>600-66-HW</b>	<b>1</b>
	● Lock Washer External	1C-3/8	1	1C-3/8	1	1C-3/8	1	1C-3/8	1
	● Nut Hex Finished Metric	29AM-5	1	29AM-5	1	29AM-5	1	29AM-5	1
15	● Capscrew Hex Head	7A-1/213X13/4	9	7A-1/213X13/4	9	7A-1/213X13/4	6	7A-1/213X13/4	6
16	● Lock Washer Plated	1A-1/2	9	1A-1/2	9	1A-1/2	6	1A-1/2	6
17	● Lock Washer Plated	1A-3/4	2	1A-3/4	2	1A-3/4	2	1A-3/4	2
18	● Lock Washer Plated	1A-3/8	3	1A-3/8	3	1A-3/8	3	1A-3/8	3
19	● Washer Flat Standard	1B-3/4	4	1B-3/4	4	1B-3/4	2	1B-3/4	2
20	● Washer Flat Standard	1B-3/8	3	1B-3/8	3	1B-3/8	3	1B-3/8	3
21	● Capscrew Hex Head	7A-3/410X3	2	7A-3/410X3	2	7A-3/410X3	1	7A-3/410X3	1
22	● Capscrew Hex Head	7A-3/816X21/4	3	7A-3/816X21/4	3	7A-3/816X21/4	3	7A-3/816X21/4	3
23	● Nut Hex Heavy	25A-3/410	2	25A-3/410	2				
24	● Nut Hex Finished	29A-3/816	3	29A-3/816	3	29A-3/816	3	29A-3/816	3
25	● Capscrew Hex Head	7A-3/816x11/4	2	7A-3/816x11/4	2	7A-3/816x11/4	2	7A-3/816x11/4	2

● Assembly Component. ●● Sub-Assembly Component.



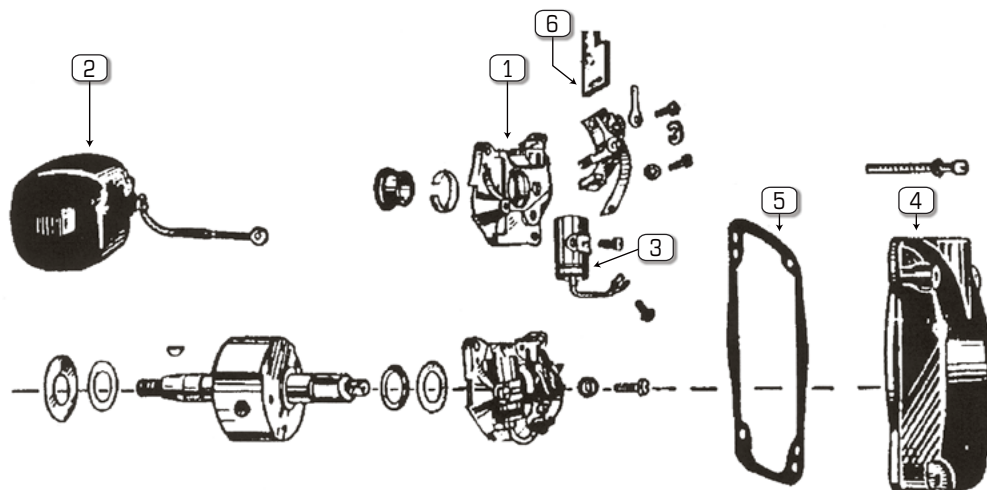
# ARROW PORTABLE ELECTRIC STARTER (990 STARTER)



No.	Description	For all C-Series Engines	
		Part No.	Qty
1	Portable Electric Starter	990	1
2	Screw, Nut & Washer Kit	AES-58	2
3	• Plated Lock Washer	1A-1/4	5
4	• Washer Flat SAE	1N-1/4	4
5	• Capscrew Button Head	12B-1/420x5/8	5
6	• Finished Hex Nut	29A-1/420	2
7	Washer Flat SAE	1N-5/8	1
8	Internal Lock Washer	2C-3/8	2
9	Internal Lock Washer	2C-1/2	2
10	Internal Lock Washer, Handle	2C-5/8	1
11	Capscrew Hex Head	7A-5/1618x5/8	4
12	External Retaining Ring	10A-5100-62	1
13	Alligator. Clips & Plugs	12' Cable-ACP	1
14	Cannon Plugs, Alligator. Clips	12' Cable-CPAC	1
15	Cannon Plug Both Ends	12' Cable-CPCP	1
16	Cannon Plug w/Plugs	12' Cable-CPP	1
17	Plugs w/Female Receptacle.	12' Cable-PP	1
18	Capscrew Button Head	12B-3/816x3/4	6
19	Mach. Screw Flat Soc	12D-3/824x3/4	4
20	Finished Hex Jam Nut	29D-1/220	5
21	Woodruff Key	104A-#9	1
22	Chain Drive Cover	AES-3	1
23	Roller Chain, not sold separately	AES-4-1	1
24	Drive Chain, not sold separately	AES-5-1	1
25	35-1 Chain Connecting Link	AES-6	2
26	Capscrew-Sm Head	AES-7-A	1
27	Capscrew-Lg Head	AES-7-B	1
28	Alum Brg Housing w/Brg	AES-9	1
29	Pivot Bracket	AES-10	1
30	Alum Brg Housing w/ Brg	AES-11	1
31	Bearing	AES-12	2
32	Roller with Key	AES-13	1
33	Sprocket Spacer	AES-22	1
34	Double Sprocket w/ Bushing	AES-23-1	1
35	Double Sprocket Bushing	AES-24	1
36	Electric Motor 12VDC	AES-27	1
37	Motor Brush Cover	AES-27-5	1
38	Bearing	AES-28	1
39	Sprocket-Motor	AES-31	1
40	Starter Button Wire	AES-33	2
41	Cable-Mtr-Solenoid	AES-34	1
42	Cable-Sol to Receptacle	AES-35	1
43	Insulated Washer	AES-40	2

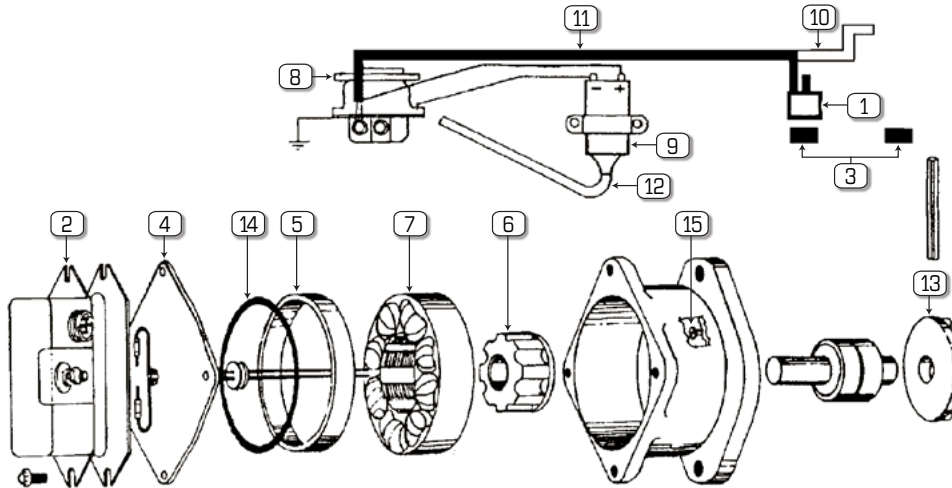
No.	Description	For all C-Series Engines	
		Part No.	Qty
44	1/2" Insulator	AES-40-1	1
45	Clutch Race	AES-41	1
46	Solenoid	AES-42	1
47	Starter Button	AES-43	1
48	Lock Pin	AES-45	1
49	Pin Handle Rivet	AES-46	1
50	Grip Cover	AES-48	1
51	Rlr Drive w/ Clutch	AES-49-1	1
52	Spacer	AES-49-2	1
53	Blank Handle, not sold separately	AES-50-1	1
54	Frame	AES-51-3	1
55	Clutch	AES-53	1
56	Receptacle, Brass	AES-55	2
57	Pin Handle Grip Sleeve	AES-56	1
58	Solenoid Wire	AES-57	1
59	Grommet for Starter	AES-59	1
60	Retainer Pin	AES-62	1
61	Large Hole Eyelet	AES-65	1
62	Small Hole Eyelet	AES-66	1
	Male Plug w/ Insulator Kit	AES-37	1
63	• Starter Cable Grips	AES-67	2
64	• Starter Cable Plugs	AES-68	2
65	Alligator Clips-Pair	AES-71	1
66	Cannon Receptacle	AES-72	1
	Cannon Receptacle. Repair Kit	AES-72-RK	1
67	Cannon Plug Assy	AES-73	1
	Cannon Plug Receptacle. Kit	AES-73-RK	1
68	Starter Bracket (C-46 Eng)	AES-79-46	1
69	Starter Bracket (C-66 Eng)	AES-79-66	1
70	Starter Bracket (C-96, C-101, C-106)	AES-79-96	1
71	Adapter Plug	AES-104	1
72	Rotation Decal	ANP-29	1
73	Warning, Release Roller	ANP-30	1

## MAGNETO – AMERICAN BOSCH ASSY (H-1415)



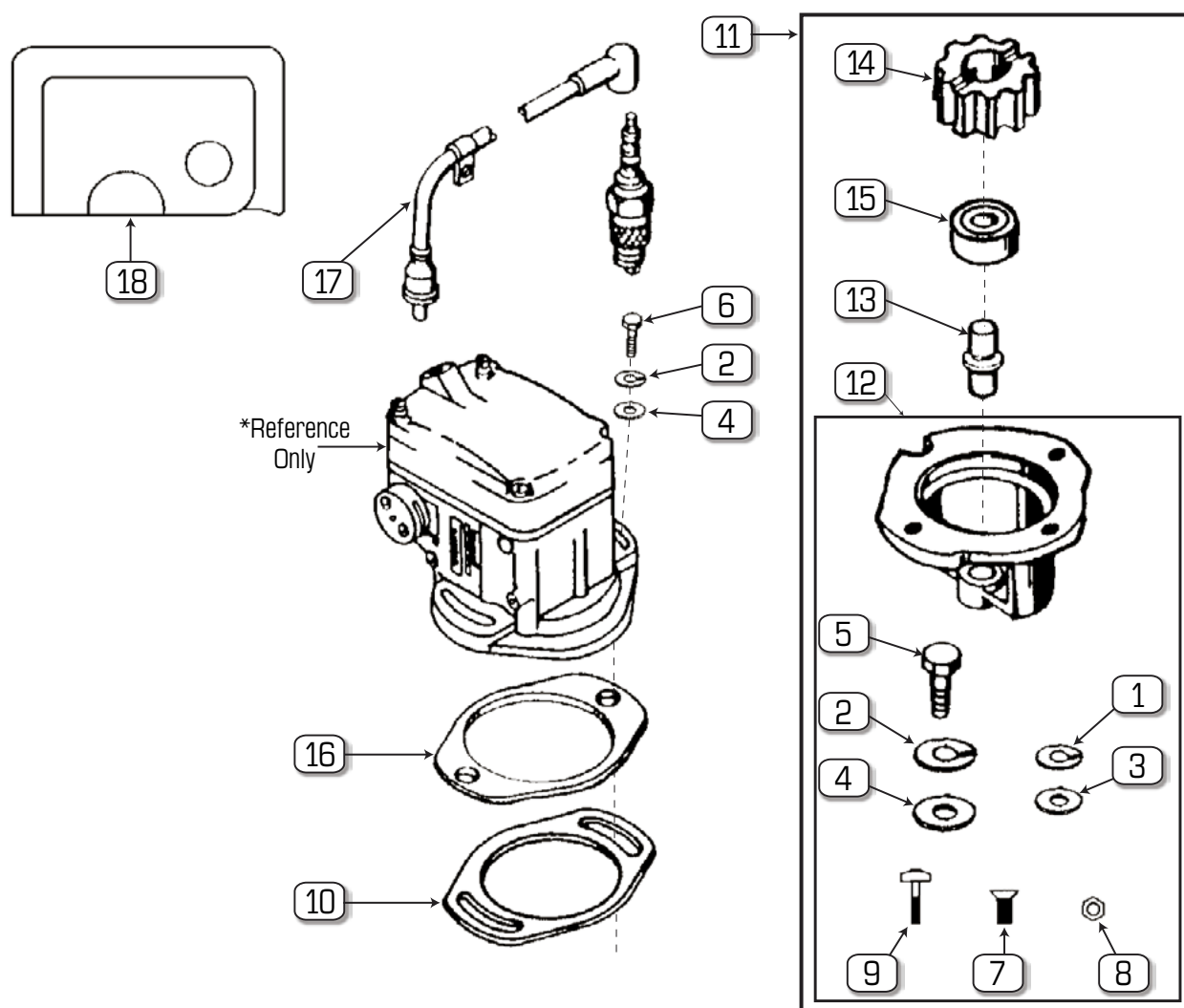
No.	Description	C-46		C-66		C-96		C-101/106	
		Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
1	Points	BK-52203	1	BK-52203	1	BK-52203	1	BK-52203	1
2	Coil-H-1415	CL-521043	1	CL-521043	1	CL-521043	1	CL-521043	1
3	Condenser-H-1415	CW-5279	1	CW-5279	1	CW-5279	1	CW-5279	1
4	Distrib Plt-H-1415	DP-52524	1	DP-52524	1	DP-52524	1	DP-52524	1
5	Distributor Gskt-H-1415	GA-5261	1	GA-5261	1	GA-5261	1	GA-5261	1
6	Cam Lub-Wick-Felt	WK-5263	1	WK-5263	1	WK-5263	1	WK-5263	1

## MAGNETO – ALTRONIC (D1-B-1)



No.	Description	C-46		C-66		C-96		C-101/106	
		Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
1	Pick Up Coil Assy	101-065	1	101-065	1	101-065	1	101-065	1
2	Electron. Cont Box	101-074	1	101-074	1	101-074	1	101-074	1
3	Magnet Set	102-051	1	102-051	1	102-051	1	102-051	1
4	Cover	110-452	1	110-452	1	110-452	1	110-452	1
5	Spacer	110-453	1	110-453	1	110-453	1	110-453	1
6	Mag Rotor	160-001	1	160-001	1	160-001	1	160-001	1
7	Stator	171-001	1	171-001	1	171-001	1	171-001	1
8	Altronic Unit	190-006	1	190-006	1	190-006	1	190-006	1
9	Coil	330-2-AI-46	1	330-2-AI-46	1	330-2-AI-46	1	330-2-AI-46	1
10	Magnet Pickup Bracket	330-5-AI-46	1	330-5-AI-66	1	330-5-AI-66	1	330-5-AI-66	1
11	Lead 84 In	501-144	1	501-144	1	501-144	1	501-144	1
12	Spark Plug Cable Assy	501-146	1	501-146	1	501-146	1	501-146	1
13	Coupling	510-454	1	510-454	1	510-454	1	510-454	1
14	O-Ring	510-462	1	510-462	1	510-462	1	510-462	1
15	Ventilator	510-541	1	510-541	1	510-541	1	510-541	1

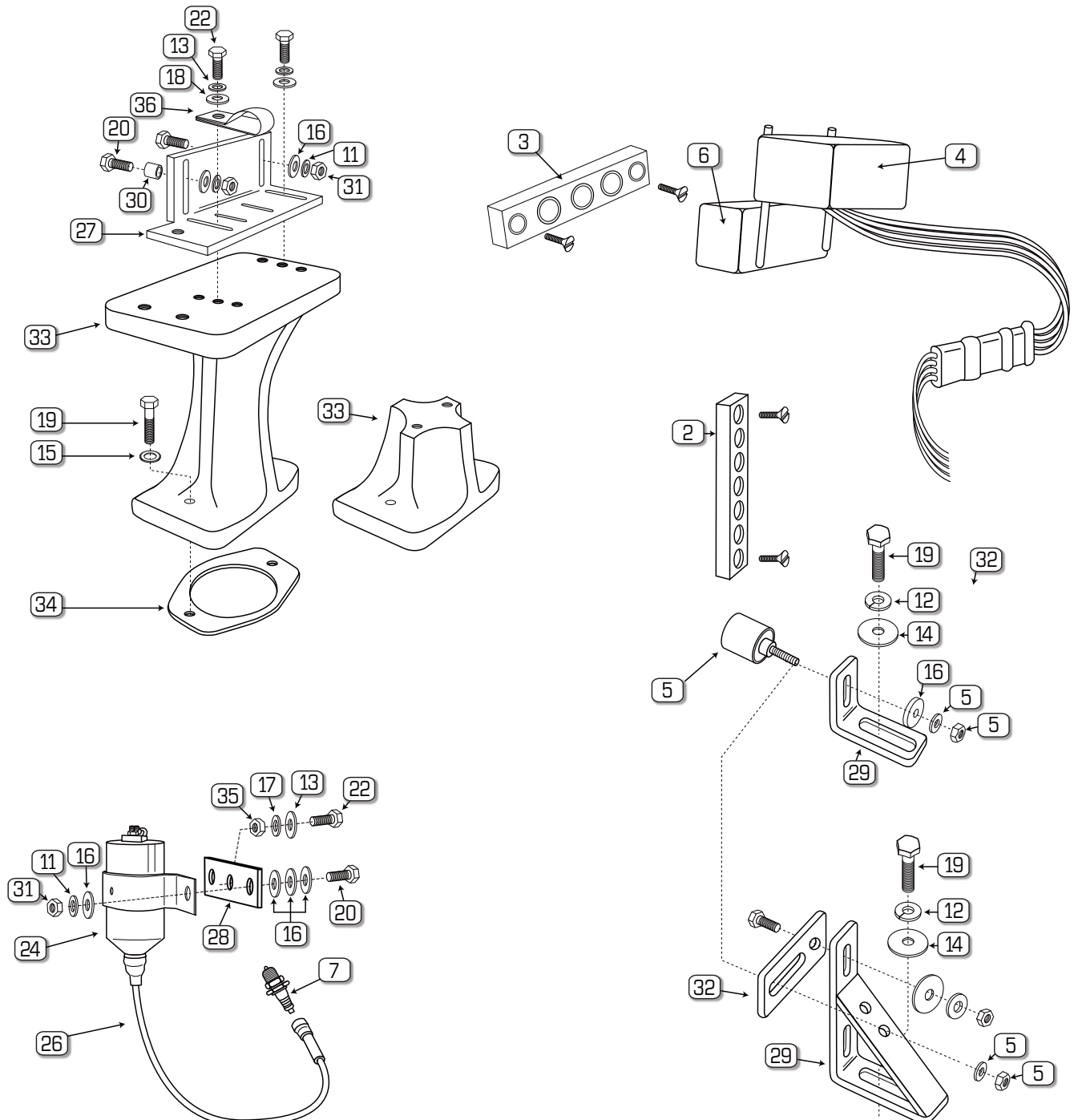
# MAGNETO ACCESSORIES



No.	Description	C-46		C-66		C-96		C-101/106	
		Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
1	Plated Lock Washer	1A-1/4	1	1A-1/4	1	1A-1/4	1	1A-1/4	4
2	Plated Lock Washer	1A-3/8	1	1A-3/8	1	1A-3/8	1	1A-3/8	3
3	Flat Washer SAE	1B-1/4	1	1B-1/4	1	1B-1/4	1	1B-1/4	1
4	Flat Washer Standard	1B-3/8	1	1B-3/8	1	1B-3/8	1	1B-3/8	1
	Flat Washer SAE	1N-3/8	1	1N-3/8	1	1N-3/8	1	1N-3/8	1
5	Capscrew Hex Head	7A-3/816x1	2	7A-3/816x1	2	7A-3/816x1	2	7A-3/816x1	2
6	Capscrew Hex Head	7A-3/816x11/2	2	7A-3/816x11/2	2	7A-3/816x11/2	2	7A-3/816x11/2	2
7	Mach. Screw Flat Soc	12D-3/816x1	2	12D-3/816x1	2	12D-3/816x1	2	12D-3/816x1	2
8	Nut Finished Hex	29A-1/420	1	29A-1/420	1	29A-1/420	1	29A-1/420	1
9	T-Bolt	330-8-A-46	1	330-8-A-46	1	330-8-A-46	1	330-8-A-46	1
10	Mag to Bracket Gasket	330-11-46	1	330-11-46	1	330-11-46	1	330-11-46	1
11	Mag Bracket Assy-New	330-12A-46	1	330-12A-46	1	330-12A-46	1	330-12A-46	1
12	Magneto Bracket w/HW	330-13A-46	1	330-13A-46	1	330-13A-46	1	330-13A-46	1
13	Shaft	330-14-46	1	330-14-46	1	330-14-46	1	330-14-46	1
14	Magneto Gear	330-15-46	1	330-15-46	1	330-15-46	1	330-15-46	1
15	Magneto Bearing	330-16-46	1	330-16-46	1	330-16-46	1	330-16-46	1
16	Gasket	330-17-46	1	330-17-46	1	330-17-46	1	330-17-46	1
17	Spark Plug Cable - Old Style	330-20-46	1	330-20-46	1	330-20-96	1	330-20-96	1
		330-20-AB-46	1	330-20-AB-46	1	330-20-AB-96	1	330-20-AB-96	1
18	Mag Cover-FM Eng	ASP-4-FM	1	ASP-4-FM	1	ASP-4-FM	1	ASP-4-FM	1
	Mag Cover-H-1415	ASP-5-CL	1	ASP-5-CL	1	ASP-5-CL	1	ASP-5-CL	1



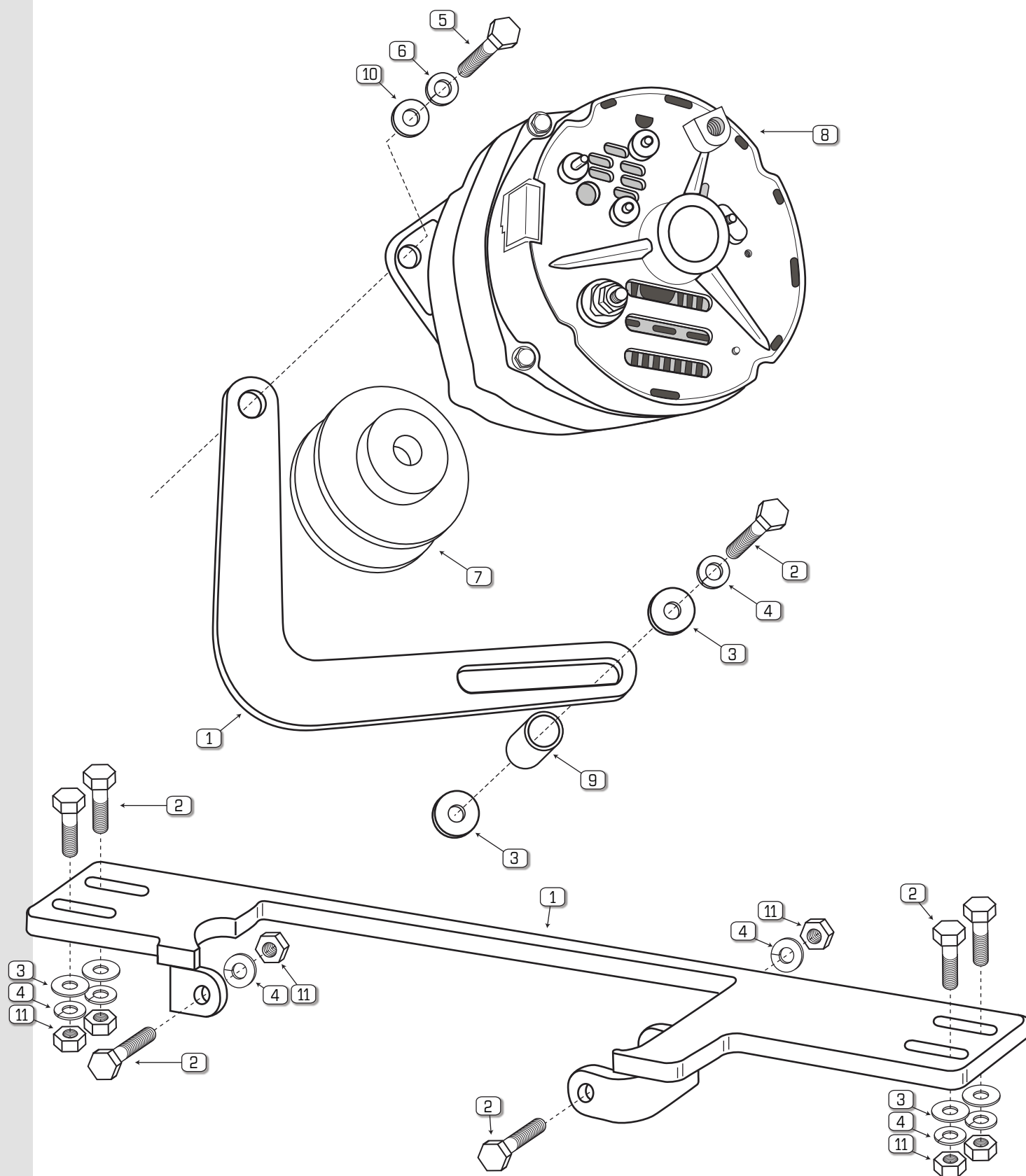
## IGNITION ASSEMBLY



No.	Description	C-46		C-66		C-96		C-101/106	
		Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
2	• Trigger Magnet Bar Assy	400A-8811	1	400A-8811	1	400A-8811	1	400A-8811	1
3	• Charging Magnet Bar Assy	400A-8813	1	400A-8813	1	400A-8813	1	400A-8813	1
4	• Electronic Ignition Module	A400A-8814	1	A400A-8814	1	A400A-8814	1	A400A-8814	1
5	• Trigger Coil/Harness Assy	400A-8817	1	400A-8817	1	400A-8817	1	400A-8817	1
6	• Charging Generator	A260D-8810	1	A260D-8810	1	A260D-8810	1	A260D-8810	1
7	Spark Plug	330-18-46	1	330-18-46	1	330-18-46	1	330-18-46	1
8	Ignition Kit w/ Brackets	SFI-46	1	SFI-66	1	SFI-66	1	SFI-66	1
9	• Push On, Female -Blue	16-14 PUSH ON	3	16-14 PUSH ON	3	16-14 PUSH ON	3	16-14 PUSH ON	3
10	• Push On, Male -Red	16-14 MALE PUSH	3	16-14 MALE PUSH	3	16-14 MALE PUSH	3	16-14 MALE PUSH	3
11	• Lock Washer, Plated	1A-1/4	8	1A-1/4	4	1A-1/4	4	1A-1/4	4
12	• Lock Washer, Plated	1A-3/8	3	1A-3/8	3	1A-3/8	3	1A-3/8	3
13	• Lock Washer, Plated	1A-5/16	3	1A-5/16	3	1A-5/16	3	1A-5/16	3
14	• Washer, Flat Standard	1B-3/8	1	1B-3/8	3	1B-3/8	3	1B-3/8	3
15	• Washer, Star	1C-3/8	2	1C-3/8	2	1C-3/8	2	1C-3/8	2
16	• Washer, Flat SAE Plated	1N-1/4	17	1N-1/4	14	1N-1/4	14	1N-1/4	14
17	• Washer, Flat SAE Plated	1N-5/16	1	1N-5/16	1	1N-5/16	1	1N-5/16	1
18	• Washer, Flat Standard	1B-5/16	2	1B-5/16	2	1B-5/16	2	1B-5/16	2
19	• Capscrew, Hx Head	7A-3/816X1	3	7A-3/816X11/4	2	7A-3/816X11/4	2	7A-3/816X11/4	2
20	• Capscrew, Hx Head	7A-1/420X11/4	4	7A-1/420X3/4	2	7A-1/420X3/4	2	7A-1/420X3/4	2
21	• Capscrew, Hx Head	7A-1/420X7/8	1	7A-3/816X7/8	1	7A-3/816X7/8	1	7A-3/816X7/8	1
22	• Capscrew, Hx Head	7A-5/1618X3/4	1	7A-5/1618X3/4	1	7A-5/1618X3/4	1	7A-5/1618X3/4	1
23	• Capscrew, Hx Head	7A-5/1618X1	2	7A-5/1618X1	2	7A-5/1618X1	2	7A-5/1618X1	2
24	• Coil, Ignition	330-2-AI-46	1	330-2-AI-46	1	330-2-AI-46	1	330-2-AI-46	1
25	• Gasket, Magneto Bracket	330-17-46	1	330-17-46	1	330-17-46	1	330-17-46	1
26	• Wire, Spark Plug	330-20-255	1	330-20-255	1	330-20-255	1	330-20-255	1
27	• Bracket, Chrg Gen, Adj	330-12B-CST-46	1	330-12B-CST-46	1	330-12B-CST-46	1	330-12B-CST-46	1
28	• Coil Brkt, Star Fire, Green	330-12C-CST-46	1	330-12C-CST-46	1	330-12C-CST-46	1	330-12C-CST-46	1
29	• Pick Up Coil Brkt, Green	330-12D-CST-46	1	330-12D-CST-46	1	330-12D-CST-96	1	330-12D-CST-96	1
	• Eyelet, Large Hole, OPTIONAL	AES-65	1	AES-65	1	AES-65	1	AES-65	1
	• Eyelet, Small Hole, OPTIONAL	AES-66	4	AES-66	4	AES-66	4	AES-66	4
	• Resistor, OPTIONAL	100 10 W	1	100 10 W	1	100 10 W	1	100 10 W	1
30	• Spacer	330-12A5-CST-46	2						
31	• Nut, Hex, Finished, Zinc	29A-1/420	3	29A-1/420	4	29A-1/420	4	29A-1/420	4
32	• Bracket, Magnet Bar	330-12E-CST-46	1	330-12E-CST-46	1				
33	• Bracket, Generator Stand	330-12A-CST-46	1	330-12A-CST-66	1	330-12A-CST-66	1	330-12A-CST-66	1
34	• Gasket	330-17-46	1	330-17-46	1	330-17-46	1	330-17-46	1
35	• Nut, Hex	25A-5/1618	1	25A-5/1618	1	25A-5/1618	1	25A-5/1618	1
36	Wire Clip	47141825	1						
	• Wire, 14 Gauge, Black, OPTIONAL	14 AWG THHN-B	5	14 AWG THHN-B	1	14 AWG THHN-B	1	14 AWG THHN-B	1
	• Wire, 14 Gauge, White, OPTIONAL	14 AWG THHN-W	3	14 AWG THHN-W	3	14 AWG THHN-W	3	14 AWG THHN-W	3
	• Wire, 14 Gauge, Yellow, OPTIONAL	14 AWG THHN-Y	3	14 AWG THHN-Y	3	14 AWG THHN-Y	3	14 AWG THHN-Y	3

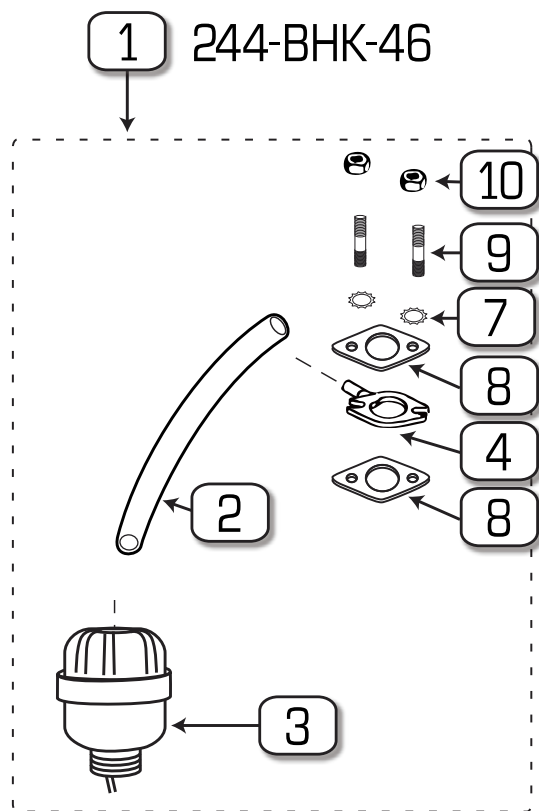
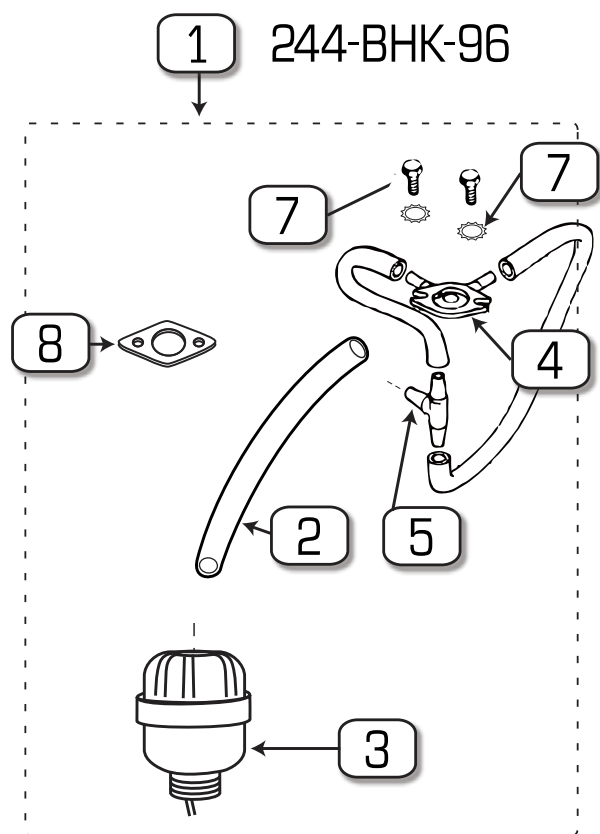
• Assembly Component.

# ALTERNATOR SYSTEM



No.	Description	C-46		C-66		C-96		C-101/106	
		Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
	<b>Alternator Assembly</b>	<b>ALT-46-OP</b>	<b>1</b>	<b>ALT-66-OP</b>	<b>1</b>	<b>ALT-66-OP</b>	<b>1</b>	<b>ALT-106-OP</b>	<b>1</b>
1	• Bracket	AS5A-3	1	AS5A-3	1	AS5A-3	1	AS5D-3	1
	• Nipple Pipe Brass, OPTION	118-B-96	1	118-B-96	1	118-B-96	1	118-B-96	1
	• Tee Branch Female 1/8, OPTION	64227561	1	64227561	1	64227561	1	64227561	1
2	• Capscrew Hex Head	7A-3/816X23/4	1	7A-3/816X23/4	1	7A-3/816X23/4	1	7A-3/816X23/4	7
3	• Washer Flat Standard	1B-3/8	2	1B-3/8	2	1B-3/8	2	1B-3/8	5
4	• Lock Washer Plated	1A-3/8	1	1A-3/8	1	1A-3/8	1	1A-3/8	7
5	• Capscrew Hex Head	7A-5/1618X1	1	7A-5/1618X1	1	7A-5/1618X1	1	7A-5/1618X1	1
	• Push On Female -Blue	16-14 PUSH ON	1	16-14 PUSH ON	1	16-14 PUSH ON	1	16-14 PUSH ON	1
	• Push On Male -Red	16-14 MALE PUSH	1	16-14 MALE PUSH	1	16-14 MALE PUSH	1	16-14 MALE PUSH	1
	• Eyelet Small Hole	AES-66	2	AES-66	2	AES-66	2	AES-66	2
	• Terminal	AES-84	1	AES-84	1	AES-84	1	AES-84	1
6	• Lock Washer Plated	1A-5/16	1	1A-5/16	1	1A-5/16	1	1A-5/16	1
7	• Alternator Pulley Machined	AS3-2-M	1	AS3-2-M	1	AS3-2-M	1	AS3-2-M	1
8	• Alternator 12-Volt	69753A	1	69753A	1	69753A	1	69753A	1
	• Belt For Alternator, OPTION	357-46	1	357-66	1	357-96	1	357-106-NS	1
	• Switch, OPTION	60356	1	60356	1	60356	1	60356	1
9	• Packing Gland 3/8 In	ASA-957	1	ASA-957	1	ASA-957	1		
	• Decal, Maintenance Key Cost Reduction	ANP-53	1	ANP-53	1	ANP-53	1		
	• Nameplate Lubrication	ANP-38	1	ANP-38	1	ANP-38	1		
10	• Flat Washer, 5/16"	1N-5/16	1	1N-5/16	1	1N-5/16	1		
11	• Nut							29A-3/816-96	6
	10 Gauge Wire	AWG THHN-W	4'	AWG THHN-W	4'	AWG THHN-W	4'	AWG THHN-W	4'
	Eyelet	A4027	1	A4027	1	A4027	1	A4027	1
	Eyelet	AWG12-10-TERM	1	AWG12-10-TERM	1	AWG12-10-TERM	1	AWG12-10-TERM	1

# BREATHER SYSTEM



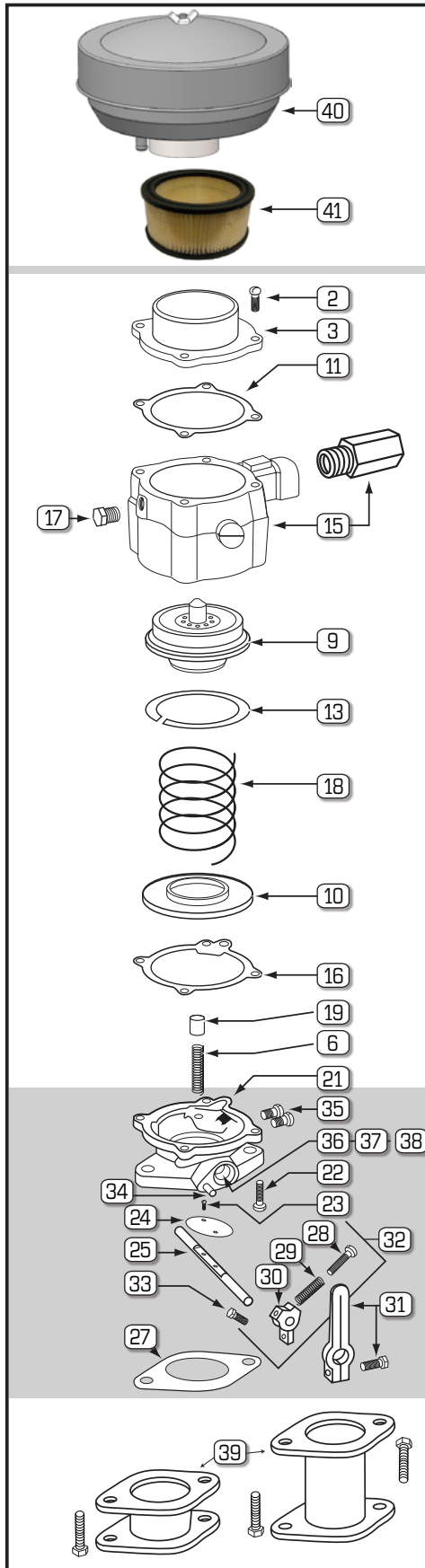
No.	Description	C-46		C-66		C-96		C-101/106	
		Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
1	Breather Hose Kit w/ Breather	244-BHK-46		244-BHK-46		244-BHK-46		244-BHK-46	
2	• Breather Hose	7/16 RUBBER HOSE	1'	7/16 RUBBER HOSE	1'	7/16 RUBBER HOSE	1'	27/16 RUBBER HOSE	1'
3	• Valve Cover Breather	244-BCP	1	244-BCP	1	244-BCP	1	244-BCP	1
4	• Adaptor for 100/110	244-PV-A	1	244-PV-A	1				
	• Adaptor for 200/210					244-PV-A2	1	244-PV-A2	1
	• Adaptor, Vacuum Plate, EPA Compliant Engines					244-PV-A2-E	1	244-PV-A2-E	1
5	• Tee 8 1/2"					29T-63/8	1	29T-63/8	1
6	• Capscrew, Hex Head					7A-3/816x11/4	2	7A-3/816x11/4	2
7	• Lock Washer, External	1C-3/8	2	1C-3/8	2	1C-3/8	2	1C-3/8	2
8	• Gasket, Carb to Elbow	261-46	2	261-46	2	216-96	2	261-106	2
9	• Stud, Intake, Elbow	226-46	2	226-46	2				
10	• Nut, Hex, Jam, Finished	29D-3/824	2	29D-3/824	2				
	Breather Hose Kit w/ /Fittings	244-HK-46	1	244-HK-46	1	244-HK-96	1	244-HK-96	1



# CARBURETORS FOR NEW STYLE ENGINES

C-46  
ASIC-5-ENG

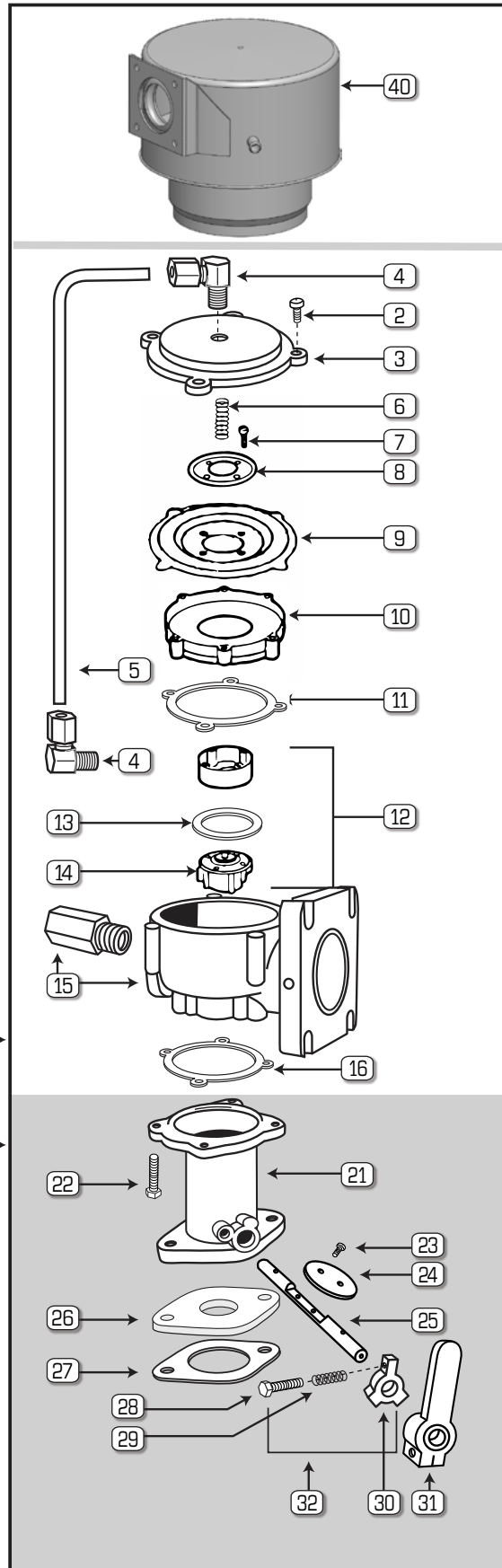
C-66  
ASIC-5-ENG-66



C-96  
ASIC-6-C-ENG

C-101  
ASIC-6-C-ENG-101

C-106  
ASIC-6-C-ENG-106

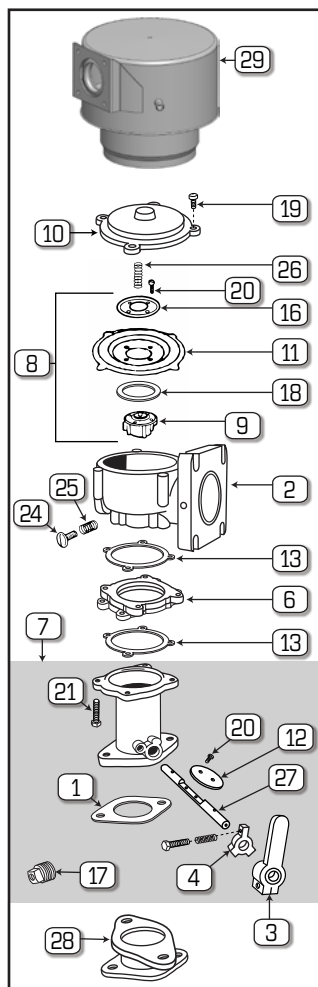


(For emissions compliant engines produced after July 1, 2008.)

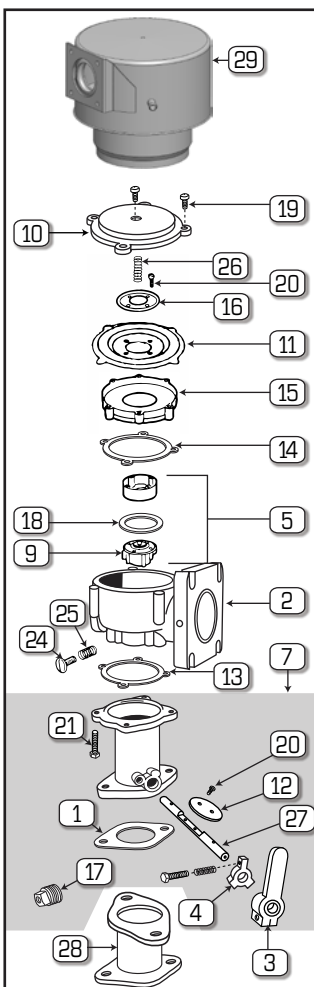
No.	Description	C-46		C-66		C-96		C-101		C-106	
		Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
1	Carburetor Assy	ASIC-5-ENG	1	ASIC-5-ENG-66	1	ASIC-6-C-ENG	1	ASIC-6-C-ENG-101	1	ASIC-6-C-ENG-106	1
2	• Screw	S1-3	4	S1-3	4	S1-3	4	S1-3	4	S1-3	4
3	• Inlet	A2-39	1	A2-39	1						
	• Cover					C1-24	1	C1-24	1	C1-24	1
4	• 90 Elbow					PF5-3/16	2	PF5-3/16	2		
5	• Copper Tubing					3/16"	12"	3/16"	12"		
6	• Spring	S2-44	1	S2-44	1	S2-13	1	S2-13	1	S2-13	1
7	• Screw					S1-12	6	S1-12	6	S1-12	6
8	• Backup Plate					P2-15	1	P2-15	1	P2-15	1
9	• Air Valve Assy	AV1-14925	1	AV1-14925	1	AV1-14-3-C	1	AV1-14-3-C	1	AV1-14-3-C	1
10	• Divider Plate	AP2-14700	1	AP2-14700	1	P2-14	1	P2-14	1	P2-14	1
11	• Gasket	G1-101	1	G1-101	1	G1-13	1	G1-13	1	G1-13	1
12	• Valve and Spacer Assy.					AS3-22	1	AS3-22	1	AS3-22	1
13	• Air Valve Sealing Ring	R1-14698	1	R1-14698	1	R1-19	1	R1-19	1	R1-19	1
14	• Valve					BV1-14	1	BV1-14	1	BV1-14	1
15	• Body Assy	AB1-38	1	Ab1-38	1	AB1-8-4	1	AB1-8-4	1	AB1-8-4	1
16	• Gasket, Throttle to Body	G1-92	1	G1-92	1	G1-11	1	G1-11	1	G1-11	1
17	• Plug, 1/8" Pipe	P3-13	1	P3-13	1						
18	• Spring, Air Valve	S2-45	1	S2-45	1						
19	• Piston, idle Cutoff	P4-1	1	P4-1	1						
20	Throttle Body Assy		1		1	AT2-4-1	1	AT2-4-1	1	AT2-4-1	1
21	Throat	T2-27	1	T2-27	1		1		1		1
22	Screw	S1-3	4	S1-3	4	S1-19	4	S1-19	4	S1-14	4
23	Screw	S1-22	2	S1-22	2	S1-12	2	S1-12	2	S1-12	2
24	Butterfly	F2-2	1	F2-2	1	F2-4	1	F2-4	1	F2-4	1
25	Throttle Shaft	S5-6	1	S5-6	1	S5-2	1	S5-2	1	S5-2	1
26	Restrictor Plate							ASIC-31	1		
27	Gasket	G1-18	1	G1-18	1	261-46	1	261-46	1	261-46	1
28	Stop Screw	S1-21	1	S1-21	1	S1-21	1	S1-21	1	S1-21	1
29	Spring, Stop Idle Screw	S2-15	1	S2-15	1	S2-15	1	S2-15	1	S2-15	1
30	Throttle Stop Lever	L1-8-1	1	L1-8-1	1	L1-8-2	1	L1-8-1-2	1	L1-8-2	1
31	Throttle Lever	AL1-7-1	1	AL1-7-1	1	AL1-7-1	1	AL1-7-1	1	AL1-7-1	1
32	Throttle Stop Assy	AL1-8-1	1	AL1-8-1	1	AL1-8-2	1	AL1-8-1-2	1	AL1-8-1-2	1
33	Screw Pin, Throttle Stop	S1-18	1	S1-18	1						
34	Pin, Throttle Stop	P1-5	1	P1-5	1						
35	Screw	S1-69	2	S1-69	2						
36	Bearing, Oilite	B2-11	2	B2-11	2						
37	Seal	S3-8	2	S3-8	2						
38	Ring, Seal Retainer	R1-9	2	R1-9	2						
39	Adaptor Plate	ASIC-16	1	ASIC-22	1						
40	Air Cleaner	SA-K6	1	SA-K6	1	SA-90		SA-90		SA-90	
41	Air Filter Element	SA-E-K6	1	SA-E-K8	1						
		SA-K6-NS	1	SA-K6-NS	1						

# CARBURETORS FOR OLD STYLE ENGINES

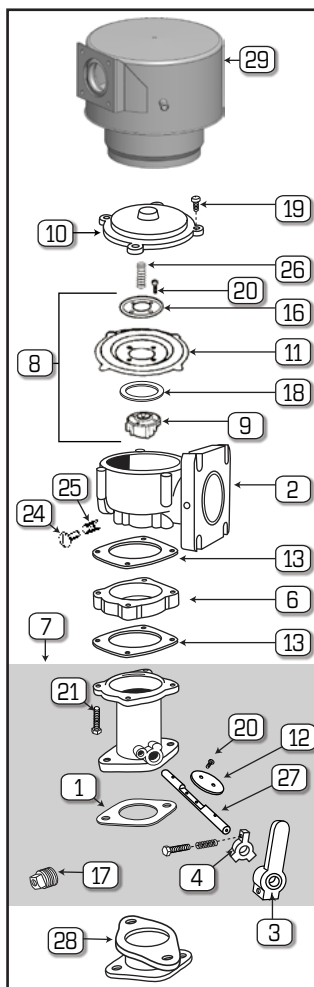
ASIC-6-A C-46



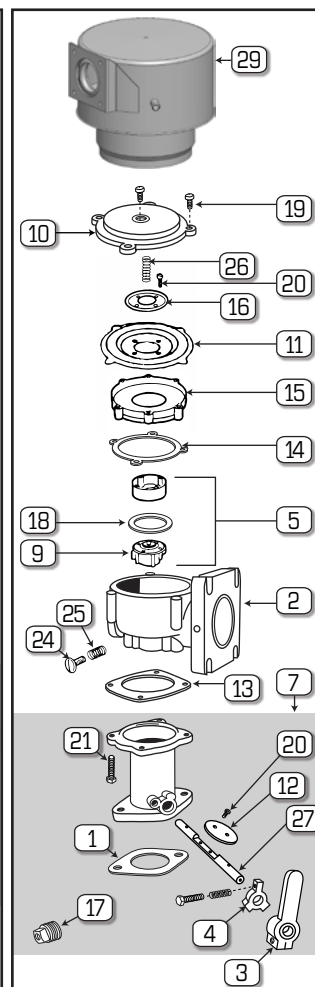
ASIC-6 C-66



ASIC-7 C-96



ASIC-8 C-106



Engine	Style	Part #	Includes Flange:	Req. Air Filter
ARROW C-46	100	ASIC-6-A	724	SA-60
	100	ASIC-6-B		
	110	ASIC-6-A-110	724	
	110	ASIC-6-110		
ARROW C-66	100	ASIC-6	818-L	SA-78
	100	ASIC-6-B		
	110	ASIC-6-110		
ARROW C-96	200	ASIC-7	727	SA-90
	200	ASIC-7-B		
	210	ASIC-7-210		
ARROW C-106	200	ASIC-8-B		SA-110
	210	ASIC-8-210		

(For engines produced before July 1, 2008.)

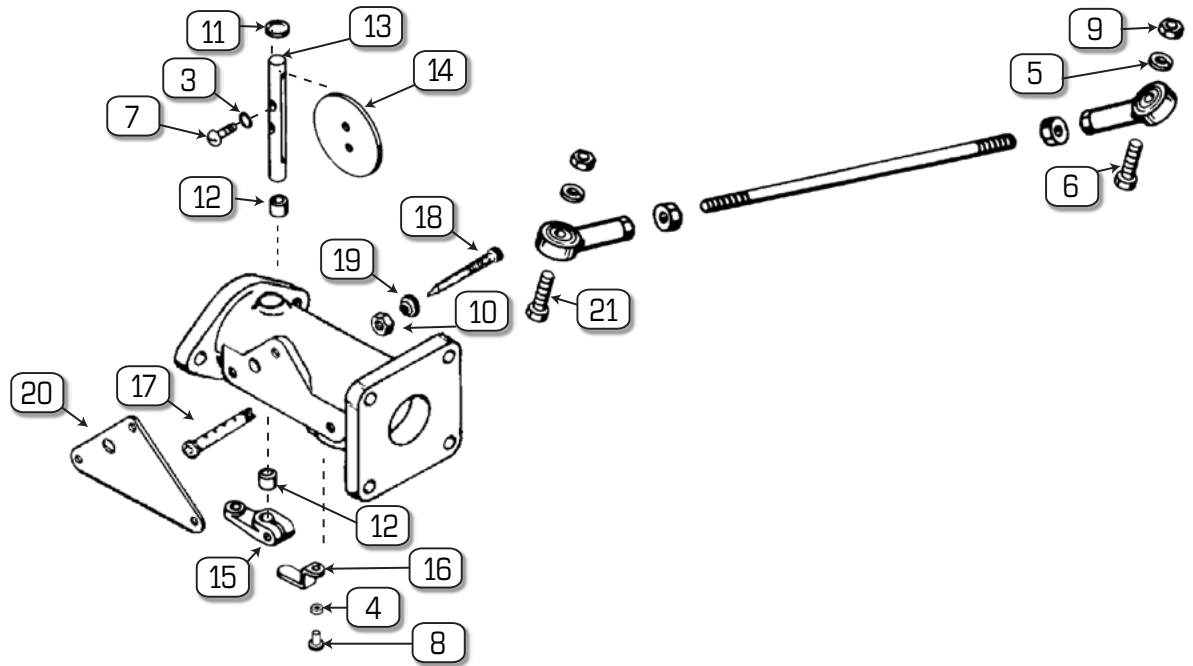
No.	Description	ASIC-6-A		ASIC-6		ASIC-7		ASIC-8	
		Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
1	Gasket, Carb to Elbow	261-46	1	261-46	1	261-96	1	261-106	1
2	Body Assy	AB1-8-4	1	AB1-8-4	1	AB1-11-2	1	AB1-11-2	1
3	Throttle Lever	AL1-7-1	1	AL1-7-1	1	AL1-9-1	1	AL1-9-1	1
4	Throttle Stop Assy	AL1-8-2	1	AL1-8-2	1	AL1-10	1	AL1-10	1
5	Valve & Spacer Assy	AS3-22	1	AS3-22	1	AS3-21	1	AS3-21	1
6	Spacer	AS3-10	2	AS3-10	2	AS3-45	2	AS3-45	2
7	Throttle Body Assy	AT2-4-1	1	AT2-4-1	1	AT2-5	1	AT2-6	1
8	Valve, Diaphragm Assy	AV1-14-3	1	AV1-14-3	1	AV1-12-2	1	AV1-12-2	1
9	Valve	BV1-14	1	BV1-14	1	BV1-12	1	BV1-12	1
10	Cover	C1-17	1	C1-24	1	C1-18	1	C1-23	1
11	Diaphragm	D1-17-2	1	D1-13-2	1	D1-16-2	1	D1-12-2	1
12	Butterfly	F2-4	1	F2-4	1	F2-5	1	F2-6	1
13	Throttle to Body Gasket	G1-11	2	G1-11	1	G1-21	2	G1-21	1
14	Plt to Body Gasket			G1-13	1			G1-20	1
15	Plate, Divider			P2-14	1			P2-12	1
16	Plate, Backup	P2-22	1	P2-15	1	P2-21	1	P2-13	1
17	1/8 Sq Head Pipe Plug	PF4-1/8	1	PF4-1/8	1	PF4-1/8	1	PF4-1/8	1
18	Air Valve Ring	R1-19	1	R1-19	1	R1-17	1	R1-17	1
19	Mach Screw Sems	S1-3	4	S1-3	4	S1-3	4	S1-3	4
20	Screw	S1-12	6	S1-12	6	S1-12	6	S1-12	6
	Screw	S1-17	1	S1-17	1	S1-17	1	S1-17	1
21	Screw	S1-19	4	S1-19	4	S1-19	4	S1-19	4
	Screw	S1-22	8	S1-22	8	S1-22	8	S1-22	8
	Screw	S1-24	4	S1-24	4	S1-24	4	S1-24	4
	Screw	S1-41	4	S1-41	4	S1-41	4	S1-41	4
24	Idle Screw	S1-74	1	S1-74	1	12E-3/816x11/4	1	12E-3/816x11/4	1
25	Idle Screw Spring	S2-88	1	S2-88	1	S2-16	1	S2-16	1
26	Spring	S2-85	1	S2-13	1	S2-17	1	S2-17	1
27	Butterfly Shaft	S5-2	1	S5-2	1	S5-3	1	S5-3	1
28	Cross Flange	724	1	818-L	1	727	1		
29	Air Filter	SA-60	1	SA-78	1	SA-90	1	SA-110	1

## 100-RK-46 Carburetor Repair Kit

Description	Part #	Qty
Bearing, Oilite	B2-12	2
Butterfly, 1 1/2" Impco	F2-4	1
Gasket, Throttle to Body	G1-11	1
Gasket, 1 1/2" SAE FI	G1-19	1
Retainer Seal	R1-9	2
Screw Sems Machine 10-24x5	S1-3	4
Screw	S1-12	2
Spacer-100, 90 Deg.	AS3-10	1
Spring 110 Air Valve	S2-13	1
Shaft, Butterfly, 5/16"	S5-2	1
Throttle Lever	AL1-7-1	1
Throttle Stop Assy, 5/16"	AL1-8-2	1
Valve, Diaphragm Assy.	AV1-14-3	1

## 100-RK-96 Carburetor Repair Kit

Description	Part #	Qty
Bearing, Oilite	B2-13	2
Diaphragm Sil .-210	D1-12-2	1
Butterfly, 1 3/4" Impco	F2-45	1
Plate, Gasket to Body	G1-20	1
Gasket, Throttle to Body	G1-21	1
Gasket	G1-23	1
O Ring	R1-8	2
Screw Sem Machine 10-24x5	S1-3	2
Screw	S1-12	6
Screw, 12-24x5/8	s1-19	4
Screw	S1-41	3
Spring	S2-17	1
Shaft Seal	S3-11	2
Seal, Internal	S3-20	1
Shaft, Butterfly	S5-3	1
Throttle Lever 200	AL1-9-1	1
Throttle Stop Assy. 3/8	AL1-10	1
Valve & Spacer Assy.	AS3-21	1

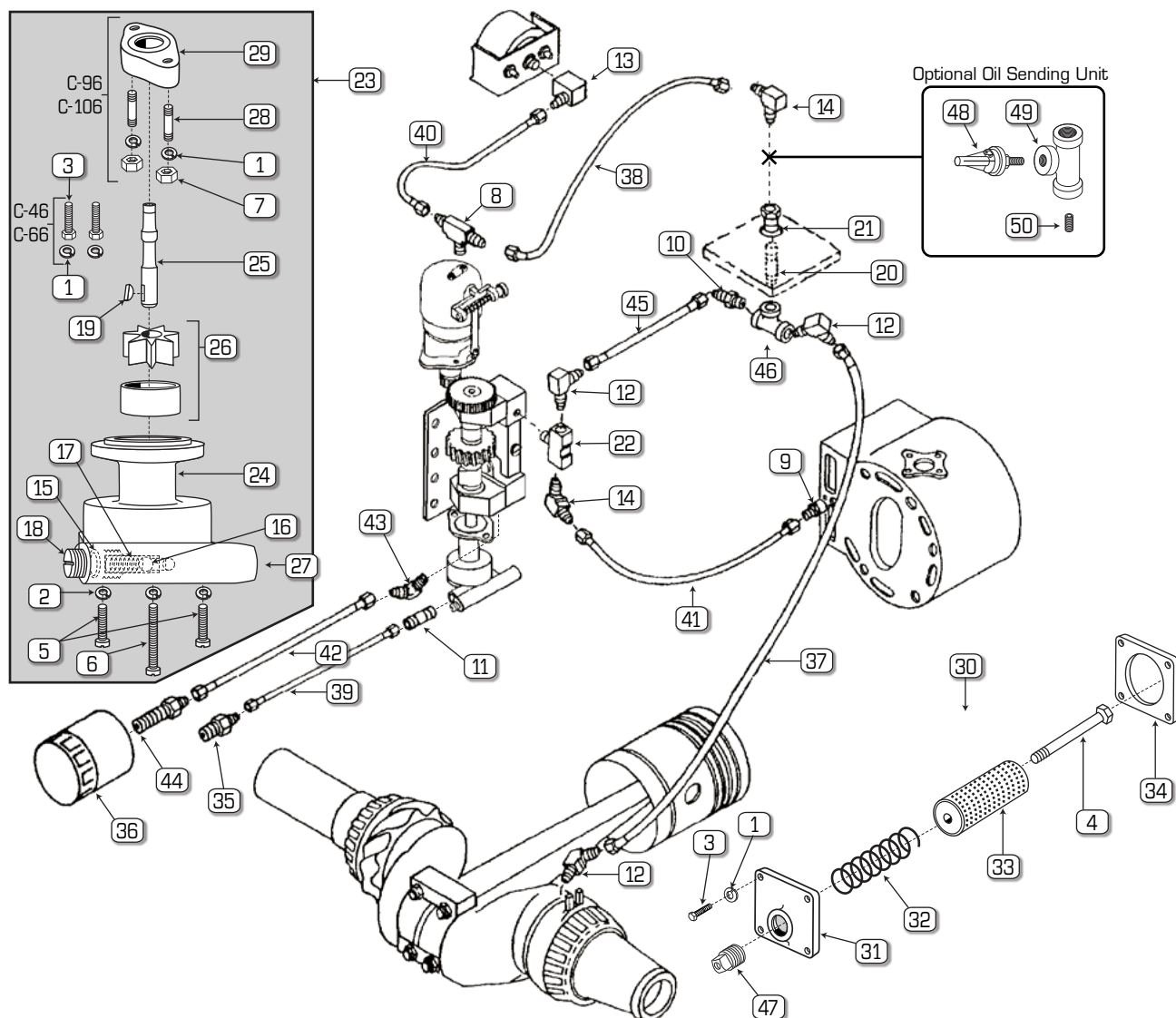


# OLD STYLE NATURAL GAS/GASOLINE CARBURETOR

(Shown below are legacy components not used in current production.)

No.	Description	C-46		C-66		C-96		C-106	
		Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
1	Inlet Manifold Repair Kit	262-RK-46	1	262-RK-66	1	262-RK-96	1	262-RK-106	1
	Inlet Manifold Repair Kit - LS			262-LS-RK-66	1	262-LS-RK-96	1		
2	Mini Manifold Repair Kit	262-MRK-46	1	262-MRK-66	1	262-MRK-96	1	262-MRK-106	1
	Mini Manifold Repair Kit - LS	262-MLSRK-46	1	262-MLSRK-66	1	262-MLSRK-96	1		
3	Plated Lock Washer	1A-#4	2	1A-#4	2	1A-#4	2	1A-#6	2
	Plated Lock Washer - LS	1A-#6	2	1A-#6	2	1A-#6	2		
4	Plated Lock Washer - Std & LS			1A-#8	1	1A-#8	1		
5	Plated Lock Washer - Std & LS	1A-1/4	1	1A-1/4	1	1A-1/4	1	1A-1/4	1
	Plated Flat Washer - Std & LS	1N-1/4	2	1N-1/4	2	1N-1/4	2	1N-1/4	2
6	Capscrew Hex Head - Std & LS	7A-1/420x1	1	7A-1/420x1	1	7A-1/420x1	1	7A-1/420x1	1
7	Machine Screw Rod Head	12A-448x1/4	2	12A-448x1/4	2	12A-448x1/4	2	12A-632x5/16	2
	Machine Screw Rod Head - LS	12A-632x5/16	2	12A-632x5/16	2	12A-632x5/16	2		
8	Machine Screw Rod Head - Std & LS	12A-832x3/8	1	12A-832x3/8	1	12A-832x3/8	1	12A-832x3/8	1
9	Heavy Hex Jam Nut - Std & LS	27A-1/420	1	27A-1/420	1	27A-1/420	1	27A-1/420	1
10	Hex Fin Nut-Brass - Std & LS	29B-3/824	1	29B-3/824	1	29B-3/824	1	29B-3/824	1
11	Expansion Plug	262-C-46	1	262-C-46	1	262-C-46 176-B-46	1	176-B-46	1
	Expansion Plug - LS	176-B-46	1	176-B-46	1	176-B-46	1		
12	Manifold Bushing	262-B-46	2	262-B-46	2	262-B-46	2	262-B-106	2
	Manifold Bushing - LS	262-BLS-96	2	262-BLS-96	2	262-BLS-96	2		
13	Throttle Control Shaft	263-46	1	263-46	1	263-96	1	263-106	1
	Throttle Control Shaft - LS	263-LS-46	1	263-LS-46	1	263-LS-96	1		
14	Carb Throttle Valve	264-46	1	264-66	1	264-96	1	264-106	1
	Carb Throttle Valve - LS	264-LS-46	1	264-LS-66	1	264-LS-96	1		
15	Throttle Lever Assy	267-46	1	267-46	1	267-46	1	267-106	1
	Throttle Lever Assy - LS	267-LS-96	1	267-LS-96	1	267-LS-96	1		
16	Throttle Shaft Retainer - Std & LS	269-46	1	269-46	1	269-46	1	269-46	1
17	Carburetor Jet - Std & LS	272-46	1	272-66	1	272-96	1	272-96	1
18	Carb Jet Needle - Std & LS	273-46	1	273-46	1	273-96	1	273-96	1
19	Locking Knob - Std & LS	275-46	1	275-46	1	275-46	1	275-46	1
20	Gasket - Std & LS	289-46	1	289-46	1	289-46	1	289-46	1
21	Ball Joint Rod End							312-106A	1
	Ball Joint Rod End - LS			312-106A	1	312-106A	1		

# OIL LINES, OIL PUMP, AND STRAINER ASSY



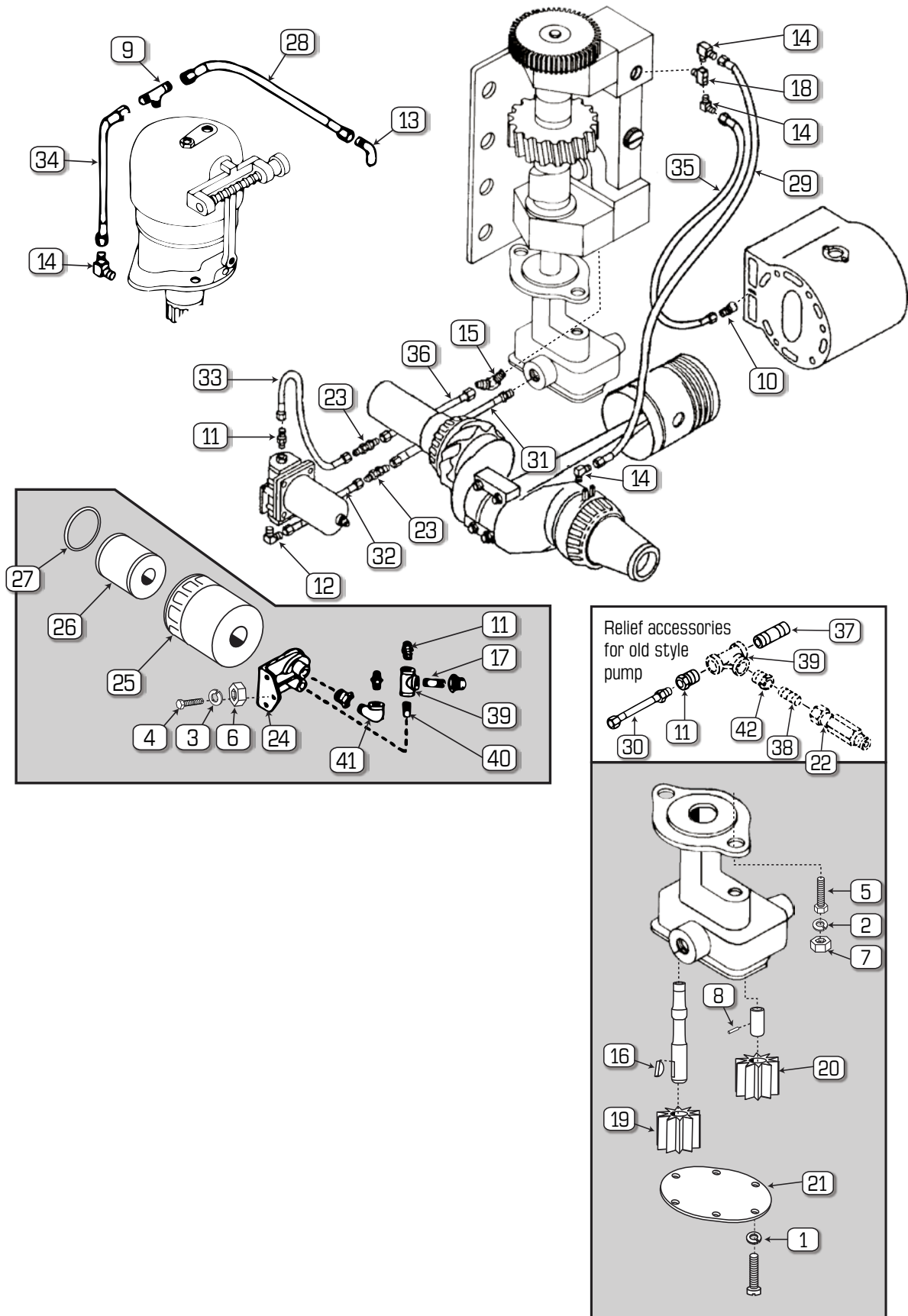
No.	Description	C-46		C-66		C-96		C-101/106	
		Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
1	Plated Lock Washer	1A-3/8	6	1A-3/8	6	1A-3/8	6	1A-3/8	6
2	Plated Lock Washer	1A-#10	3	1A-#10	3	1A-#10	3	1A-#10	3
3	Capscrew Hex Head	7A-3/816x1	6	7A-3/816x1	6	7A-3/816x1	4	7A-3/816x1	4
4	Capscrew	7A-3/816x21/4	1	7A-3/816x21/4	1	7A-3/816x21/4	1	7A-3/816x21/4	1
5	Mach. Screw Fillister	12E-1024x3/4	2	12E-1024x3/4	2	12E-1024x3/4	2	12E-1024x3/4	2
6	Mach. Screw Fillister	12E-1024x11/2	1	12E-1024x11/2	1	12E-1024x11/2	1	12E-1024x11/2	1
7	Finished Hex Nut					29A-3/824	2	29A-3/824	2
8	Restricted Tee	45x4R	1	45x4R	1	45x4R		45x4R	
9	Female Connection	46x4	1	46x4	1	46x4	1	46x4	1
10	Straight Fitting	48x4	1	48x4	1	48x4	1	48x4	1
11	Straight Connection	48x5x4	3	48x5x4	3	48x5x4	3	48x5x4	3



No.	Description	C-46		C-66		C-96		C-101/106	
		Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
12	90 Deg Ell	49x4	2	49x4	2	49x4	2	49x4	2
13	Female 90 Ell	50x4	1	50x4	1	50x4	1	50x4	1
14	Elbow	54x4	3	54x4	3	54x4	3	54x4	3
15	#8 Flat Washer	93-A-46	2	93-A-46	2	93-A-46	2	93-A-46	2
16	3/8 Ball Oil Pump Pas	93-B-46	1	93-B-46	1	93-B-46	1	93-B-46	1
17	Oil Relief Valve Adj Spring	94-A-46	1	94-A-46	1	94-A-46	1	94-A-46	1
18	Oil Relief Valve Adj Screw	95-A-46	1	95-A-46	1	95-A-46	1	95-A-46	1
19	Woodruff Key	104A-#3	1	104A-#3	1	104A-#3	1	104A-#3	1
20	Brass Pipe Nipple	118-B-96	1	118-B-96	1	118-B-96	1	118-B-96	1
21	Double Tapped Bushing	118-C-96	1	118-C-96	1	118-C-96	1	118-C-96	1
22	Branch Tee	119-RG-46	1	119-RG-46	1	119-RG-46	1	119-RG-46	1
23	Oil Pump Assy	124-A-46	1	124-A-46	1	124-A-96	1	124-A-96	1
24	Oil Pump Body	125-A-46	1	125-A-46	1	125-A-46	1	125-A-46	1
25	Oil Pump Shaft	128-A-46	1	128-A-46	1	128-A-96	1	128-A-96	1
26	Gerator Set	129-ST-46	1	129-ST-46	1	129-ST-46	1	129-ST-46	1
27	Oil Pump Plate (not shwn)	150-A-46	1	150-A-46	1	150-A-46	1	150-A-46	1
28	Stud					162-96	1	162-96	1
29	Oil Pump Spacer					163-A-96	1	163-A-96	1
30	Oil Strainer Assy	166-46	1	166-46	1	166-96	1	166-96	1
31	Oil Strainer Cover	167-46	1	167-46	1	167-46	1	167-46	1
32	Compression Spring	169-46	1	169-46	1	169-96	1	169-96	1
33	Oil Strainer Screen	171-46	1	171-46	1	171-46	1	171-46	1
34	Screen Cover Gasket	173-46	1	173-46	1	173-46	1	173-46	1
35	Sm. BlkHead Fitting	6400x5	1	6400x5	1	6400x5	1	6400x5	1
36	Oil Filter Element *	OFK-1-E	1	OFK-1-E	1	OFK-1-E	1	OFK-1-E	1
37	Crankcase Tee-Oil Col	OL-14	1	OL-A-66	1	OL-A-96	1	OL-A-96	1
38	Crankcase-Gov Tee	OL-24	1	OL-C-66	1	OL-C-96	1	OL-C-96	1
39	Pump-Bulkhead	OL-54	1	OL-F-66	1	OL-29	1	OL-29	1
40	Governor Tee-Gauge	OL-34	1	OL-D-66	1	OL-D-96	1	OL-D-96	1
41	Rocker-Cam Assy Tee	OL-B-46	1	OL-B-66	1	OL-B-96	1	OL-B-96	1
42	Cam Assy-Bulkhead	OL-I-46	1	OL-I-66	1	OL-N-96	1	OL-N-96	1
43	Oil Line Fitting	OL-I1-46	1	OL-I1-46	1	OL-I1-46	1	OL-I1-46	1
44	Bulkhead Fitting *	OL-I2-46	1	OL-I2-46	1	OL-I2-96	1	OL-I2-96	1
45	Crankcase Tee-Cam Assy	OL-K-46	1	OL-K-46	1	OL-K-96	1	OL-K-96	1
46	Pipe Tee	PF3-1/8	1	PF3-1/8	1	PF3-1/8	1	PF3-1/8	1
47	Sq Head Pipe Plug	PF4-3/4	1	PF4-3/4	1	PF4-3/4	1	PF4-3/4	1
48	Oil Sending Unit, OPTION	60356	1	60356	1	60356	1	60356	1
49	Tee, OPTION	64227561	1	64227561	1	64227561	1	64227561	1
50	Nipple, OPTION	118-B-96	1	118-B-96	1	118-B-96	1	118-B-96	1

\* For C-46 from Serial #115025 and for C-66 from Serial #86939.

# FLEXIBLE OIL LINES FOR OLD STYLE ENGINES

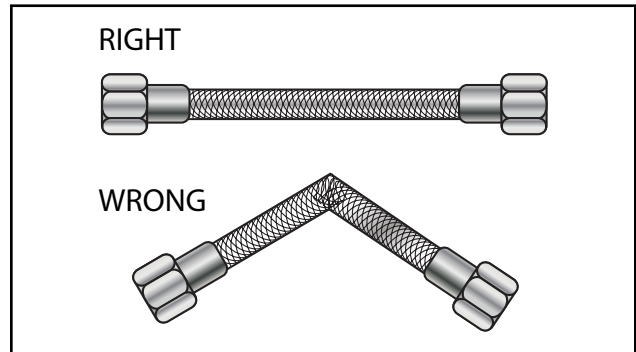


No.	Description	C-46		C-66		C-96		C-106	
		Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
1	Plated Lock Washer	1A-#8	6	1A-#8	6	1A-#8	6	1A-#8	6
2	Plated Lock Washer	1A-3/8	3	1A-3/8	3	1A-3/8	3	1A-3/8	3
3	Plated Lock Washer	1A-5/16	3	1A-5/16	3	1A-5/16	3	1A-5/16	3
4	Capscrew Hex Head	7A-5/1618x11/2	3	7A-5/1618x11/2	3	7A-5/1618x11/2	3	7A-5/1618x11/2	3
5	Capscrew Hex Head	7A-3/816x1	2	7A-3/816x1	2	7A-3/816x1	2	7A-3/816x1	2
6	Heavy Hex Nut	25A-5/1618	3	25A-5/1618	3	25A-5/1618	3	25A-5/1618	3
7	Finished Hex Nut	29A-3/824	1	29A-3/824	2	29A-3/824	2	29A-3/824	2
8	Roll Pin	41A-1/8x11/4	1	41A-1/8x11/4	1	41A-1/8x11/4	1	41A-1/8x11/4	1
9	Restricted Tee	45x4R	1	45x4R	1	45x4R	1	45x4R	1
10	Female Connection	46x4	1	46x4	1	46x4	1	46x4	1
11	Straight Connection	48x5x4	2	48x5x4	2	48x5x4	2	48x5x4	2
12	90 Deg Ell	49x5x4	1	49x5x4	1	49x5x4	1	49x5x4	1
13	Female 90 Deg Ell	50x4	1	50x4	1	50x4	1	50x4	1
14	Elbow	54x4	4	54x4	4	54x4	4	54x4	4
15	45 Deg Ell	54x5x4	1	54x5x4	1	54x5x4	1	54x5x4	1
16	Woodruff Key	104A-#3	1	104A-#3	1	104A-#3	1	104A-#3	1
17	Brass Pipe Nipple	118-B-96	1	118-B-96	1	118-B-96	1	118-B-96	1
18	Branch Tee	119-RG-46	1	119-RG-46	1	119-RG-46	1	119-RG-46	1
19	Oil Pump Gear Drive	129-46	1	129-46	1	129-46	1	129-46	1
20	Oil Pump Gear	130-46	1	130-46	1	130-46	1	130-46	1
21	Oil Pump Cover	150-46	1	150-46	1	150-46	1	150-46	1
22	Relief Valve	758-46	1	758-46	1	758-46	1	758-46	1
23	Bulkhead Fitting	2700x5	1	2700x5	1	2700x5	1	2700x5	1
24	Oil Filter Adapter Kit	OFK-1-A	1	OFK-1-A	1	OFK-1-A	1	OFK-1-A	1
25	Oil Filter Element	OFK-1-E	1	OFK-1-E	1	OFK-1-E	1	OFK-1-E	1
26	Oil Filter-Can Type	OFK-1-E-1	1	OFK-1-E-1	1	OFK-1-E-1	1	OFK-1-E-1	1
27	Oil Filter O-Ring			OFK-1-U	1	OFK-1-U	1	OFK-1-U	1
28	Governor Tee-Gauge	OL-D-46	1	OL-16	1	OL-D-96	1	OL-D-96	1
29	Oil-Col-Cam Assy Tee	OL-A-46	1	OL-56	1	OL-19	1	OL-19	1
30	Pump Tee-Bulkhead	OL-H-46	1	OL-26	1	OL-F-96	1	OL-F-96	1
31	Pump-Bulkhead	OL-54	1	OL-F-66	1	OL-29	1	OL-29	1
32	Canister-Bulkhead	OL-G-46	1	OL-36	1	OL-G-96	1	OL-G-96	1
33	Canister-Bulkhead	OL-F-46	1	OL-46	1	OL-H-96	1	OL-H-96	1
34	Governor Tee-Cam Plate	OL-C-46	1	OL-66	1	OL-C-96	1	OL-C-96	1
35	Rocker-Cam Assy Tee	OL-B-46	1	OL-B-66	1	OL-B-96	1	OL-B-96	1
36	Cam Assy-Bulkhead	OL-I-46	1	OL-I-66	1	OL-N-96	1	OL-N-96	1
37	Pipe Nipple-Sch 80			PF1-1/4x2-80	1	PF1-1/4x2-80	1	PF1-1/4x2-80	1
38	Close Nipple	PF2-1/4	1	PF2-1/4	1	PF2-1/4	1	PF2-1/4	1
39	Pipe Tee	PF3-1/4	1	PF3-1/4	1	PF3-1/4	1	PF3-1/4	1
40	Sq Head Pipe Plug	PF4-1/4	1	PF4-1/4	1	PF4-1/4	1	PF4-1/4	1
41	90 Deg Street Elbow	PF5-1/4	1	PF5-1/4	1	PF5-1/4	1	PF5-1/4	1
42	Pipe Bushing	PF9-3/8x1/4	1	PF9-3/8x1/4	1	PF9-3/8x1/4	1	PF9-3/8x1/4	1

# 12 Universal Oil Line Kits

## OIL LINE INSTALLATION INSTRUCTIONS




















1. When ordering universal oil line kits, all parts will arrive in one package. To identify each hose, the female fitting on the hose will be marked with a letter and a number or two numbers. For example, the line for assembly OL-A-46 will be marked A4; the line for assembly OL-54 will be marked 54, etc.
2. Universal oil line kits include parts that allow conversion for both old and new style engines. Follow instructions as noted to convert hoses and fittings appropriately.
3. **CAUTION:** Position hoses to be free of sharp bends so that lines will not kink and stop oil flow or crack teflon lines.

















4. **CAUTION:** Be sure hoses have ample clearance from all moving engine parts.

# OLK-U-46

## Complete Universal Oil Line Kit for C-46 Engines

OL-A-46				Old Style
54x4 45° Elbow	To Oil Collector	15"	To Cam Assy Tee	54x4 45° Elbow
				
OL-B-46				
46x4 Straight Female Connection	To Rocker Oil Adap	12¼"	To Cam Assy Tee	54x4 45° Elbow
				
OL-C-46				Old Style
45x4R Restricted Tee	To Gov Tee	15½"	To Cam Plate	49x4 90° Elbow
				
OL-D-46				Old Style
to 45x4R Restricted Tee	To Governor Tee	10¼"	To Oil Gauge	50x4 Female 90° Elbow
				
OL-F-46				Old Style
48x5x4 Straight Connection	To Oil Pump	9¼"	To Bulkhead	2700x5 Bulkhead Fitting
				
OL-G-46				Old Style
49x5x4 90° Elbow	To Oil Cannister	16½"	To Bulkhead	2700x5 Bulkhead Fitting
				
OL-H-46				Old Style
48x5x4 Straight Connection	To Oil Pump Tee	8½"	To Bulkhead	
				

OL-I-46				
54x5x4 45° Elbow	To Cam Assy	11"	To Bulkhead	(attaches to OLI-I2-46)
				
OL-K-46				
48x4 Straight Connection	To Crankcase Tee	5¼"	To Cam Assy Tee	49x4 90° Elbow
				
OL-14				
49x4 90° Elbow	To Crankcase Tee	8¾"	To Oil Collector	49x4 90° Elbow
				
OL-44				
49x5x4 90° Elbow	To Water Filler	18¼"	To Water Gauge	49x5x4 90° Elbow
				
OL-54				
48x5x4 Straight Connection	To Oil Pump	12"	To Bulkhead	6400x5 Sm Bulk- head Fitting
				























### Other Fittings













14-46	Adapter Oil Line	
OL-I2-46	Bulkhead Fitting	for OL-I-46 to Bulkhead
118-B-96	Brass Pipe Nipple	for Crankcase Tee
118-C-96	Dbl Tapped Bushing	for Crankcase Port
119-RG-46	Male Branch Tee	for Cam Assy Tee
PF1-1/4x2-40	Pipe Nipple	for Oil Pump to Tee
PF2-1/4	Close Nipple	for Relief Valve
PF3-1/8	Pipe Tee	for Crankcase Junction
PF3-1/4	Bulkhead Pipe Tee	for Relief on Pump Line
48x4	Straight Fitting	Convert OL-C-46 to OL-24
49x5x4	90° Elbow	Convert OL-44 to Old Style
ASA-578	1/8" Street Elbow	

Note: To make OL-24 (Governor Tee to Crankcase), use OL-C-46 and change fittings.  
To make OL-34 (Governor Tee to gauge panel on Crankcase), use OL-A-46 and change fittings.

## OLK-U-66

## Complete Universal Oil Line Kit for C-66 Engines

OL-A-66				
49x4 90° Elbow	To Crank- case Tee	10 1/4"	To Oil Collector	49x4 90° Elbow
				
OL-B-66				
46x4 Straight Female Connection	To Rocker Oil Adap	15"	To Cam Assy Tee	54x4 45° Elbow
				
OL-C-66				
45x4R Restricted Tee	To Gov Tee	15"	To Crankcase	54x4 45° Elbow
				
OL-D-66				
	To 45x4R Gov Tee	16"	To Oil Gauge	50x4 Female 90° Elbow
				
OL-E-66				
49x5x4 90° Elbow	To Water Filler	18"	To Water Gauge	49x5x4 90° Elbow
				
OL-F-66				
48x5x4 Straight Connection	To Oil Pump	15"	To Bulkhead	6400x5 Bulkhead Fitting
				
OL-I-66				
54x5x4 45° Elbow	To Cam Assy	18"	To Bulkhead	(attaches to OLI-I2-46)
				
OL-K-46				
48x4 Straight Connection	To Crankcase Tee	5 1/4"	To Cam Assy Tee	49x4 90° Elbow
				

OL-16				Old Style
to 45x4R Restricted Tee	To Governor Tee	12¼"	To Oil Gauge	
OL-26				Old Style
48x5x4 Straight Adapter	To Oil Pump Tee	11"	To Bulkhead	
				
OL-36				Old Style
49x5x4 90° Elbow	To Oil Canister	18"	To Bulkhead	2700x5 Bulkhead Fitting
				
OL-46				Old Style
48x5x4 Straight Adapter	To Oil Canister	11"	To Bulkhead	2700x5 Bulkhead Fitting
				
OL-56				Old Style
54x4 45° Elbow	To Cam Assy Tee	16"	To Oil Collector	54x4 45° Elbow
				





















## Other Fittings













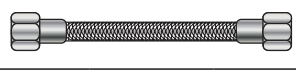
14-46	Adapter Oil Line	
OL-I2-46	Bulkhead Fitting	for OL-I-66 to Bulkhead
118-B-96	Brass Pipe Nipple	for Crankcase Tee
118-C-96	DbI Tapped Bushing	for Crankcase Port
119-RG-46	Male Branch Tee	for Cam Assy Tee
PF1-1/4x2-80	Pipe Nipple	for Oil Pump to Tee
PF2-1/4	Close Nipple	for Relief Valve
PF3-1/8	Pipe Tee	for Crankcase Junction
PF3-1/4	Bulkhead Pipe Tee	for Relief on Pump Line
49x4	90° Elbow	Convert OL-C-66 to OL-66
49x5x4	90° Elbow	Convert OL-E-66 to old style
ASA-578	1/8" Street Elbow	

Note: To make OL-66 (Governor Tee to Cam Plate), use OL-C-66 and change fittings.

## OLK-U-96

### Complete Universal Oil Line Kit for C-96, C101 and C-106 Engines

OL-A-96				
49x4 90° Elbow	To Crank- case Tee	10½"	To Oil Collector	49x4 90° Elbow
				
OL-B-96				
46x4 Straight Female Connection	To Rocker Oil Adap	18½"	To Cam Assy Tee	54x4 45° Elbow
				
OL-C-96				
45x4R Restricted Tee	To Gov Tee	15½"	To Crankcase	54x4 45° Elbow
				
OL-D-96				
	To 45x4R Gov Tee	20½"	To Oil Gauge	50x4 Female 90° Elbow
				
OL-E-96 Old Style				
49x5x4 90° Elbow	To Water Filler	20½"	To Water Gauge	49x5x4 90° Elbow
				
OL-F-96 Old Style				
48x5x4 Straight Connection	To Oil Pump Tee	11¾"	To Bulkhead	6400x5 Bulkhead Fitting
				
OL-G-96 Old Style				
49x5x4 90° Elbow	To Oil Canister	17½"	To Bulkhead	2700x5 Bulkhead Fitting
				

OL-H-96 Old Style				
48x5x4 Straight Connection	To Oil Canister	9½"	To Bulkhead	2700x5 Bulkhead Fitting
				
OL-K-96				
48x4 Straight Connection	To Crankcase Tee	10½"	To Cam Assy Tee	49x4 90° Elbow
				
OL-N-96				
54x5x4 45° Elbow	To Cam Assy	19"	To Bulkhead	(attaches to OLI-I2-46)
				
OL-19 Old Style				
54x4 45° Elbow	To Cam Assy Tee	17"	To Oil Collector	54x4 45° Elbow
				
OL-29				
48x5x4 Straight Connection	To Oil Pump	16"	To Bulkhead	
				

#### Other Fittings

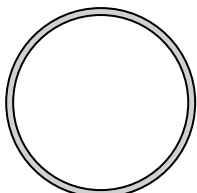
14-46	Adapter Oil Line	
OL-I2-96	Bulkhead Fitting	for OL-I-66 to Bulkhead
118-C-96	DbI Tapped Bushing	for Crankcase Port
119-RG-46	Male Branch Tee	for Cam Assy Tee
PF1-1/4x2-80	Pipe Nipple	for Oil Pump to Tee
PF1-1/8x2	Pipe Nipple	for Crankcase Tee
PF2-1/4	Close Nipple	for Relief Valve
PF3-1/8	Pipe Tee	for Crankcase Junction
PF3-1/4	Bulkhead Pipe Tee	for Relief on Pump Line
49x5x4	90° Elbow	Convert OL-E-96 to old style
ASA-578	1/8" Street Elbow	

Note: To make OL-39 (Governor Tee to Cam Plate), use OL-D-96 and change fittings.  
To make OL-49 (Governor Tee to gauge panel on hopper), use OL-C-96 and change fittings.

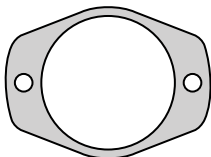


# 13 Gasket Sets

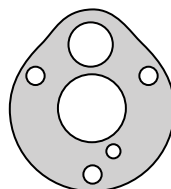
## C-46 COMPLETE GASKET SET GSC-46



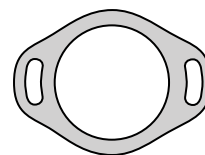
**12-46(2)**  
Cyl Sleeve Gasket  
Crankcase Assembly



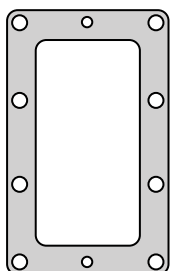
**330-17-46**  
Gasket  
Starfire Assembly



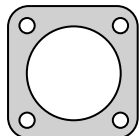
**215-46**  
Governor Gasket  
Governor Assembly



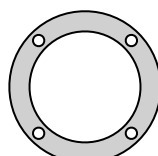
**330-11-46**  
Magneto to Bracket Gasket  
Magneto Accessories



**8-46**  
Cover Gasket  
Crankcase Assembly



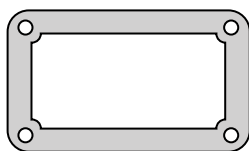
**173-46**  
Screen Cover Gasket  
Strainer Assembly



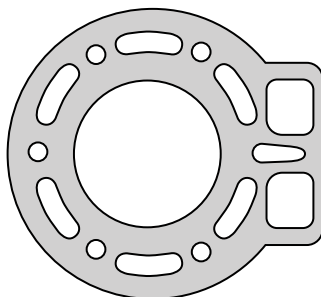
**208-46**  
Governor Housing Gasket  
Governor Assembly



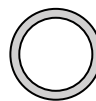
**261-A-46**  
Gasket  
Old Style Nat Gas Carb



**32-46**  
Gasket  
Crankcase Assembly



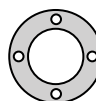
**238-G-46**  
Cylinder Head Gasket  
Cylinder Head Assembly



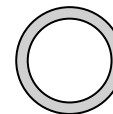
**ACE-409-46-NS**  
Gasket  
Oil Level Gauge Assy



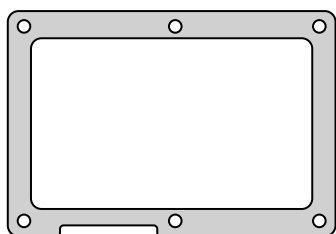
**41-46**  
Old Style Oil Indicator Gaske



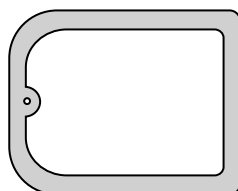
**ACE-415-46**  
Gasket  
Oil Level Gauge Assy



**346-46**  
Water Filler Gasket  
Pressure Cond Group



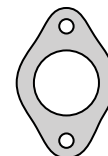
**24-46**  
Top Cover Gasket  
Crankcase Assembly



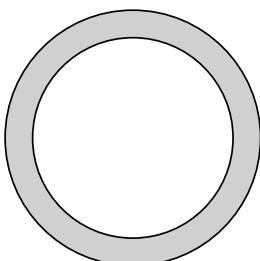
**246-46**  
Valve Cover Gasket  
Rocker Arm Assembly



**35-46**  
Gasket  
Oil Level Gauge Assy



**261-46**  
Carb to Eblow Gasket  
Carburetor Assembly



**22-46**  
Cover Gasket  
Crankcase Assembly



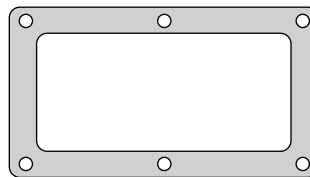
**2-206 (2)**  
O-Ring  
Rocker Arm  
Repair Kit



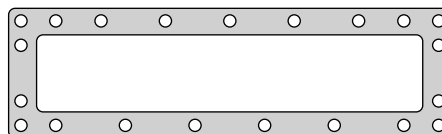
**213-46 (2)**  
Oil Press  
Gauge Gasket  
Gov Assembly



**314-46**  
Fuel Pump Gasket  
Crankcase Assembly

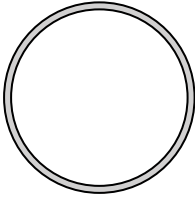


**347-46**  
Radiator Tank to Crankcase Gasket  
Pressure Condensing Group

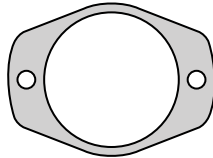


**336-46**  
Radiator Core Gasket  
Pressure Condensing Group

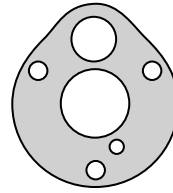
# C-66 COMPLETE GASKET SET **GSC-66**



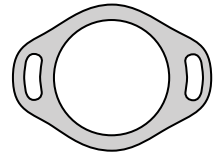
**12-66**  
Cyl Sleeve Gasket  
Crankcase Assembly



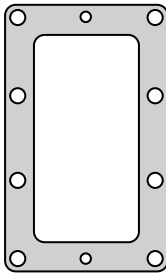
**330-17-46**  
Gasket  
Starfire Assembly



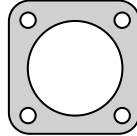
**215-46**  
Governor Gasket  
Governor Assembly



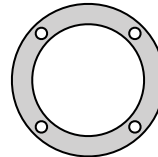
**330-11-46**  
Magneto to Bracket Gasket  
Magneto Accessories



**8-46**  
Cover Gasket  
Crankcase Assembly



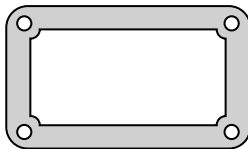
**173-46**  
Screen Cover Gasket  
Strainer Assembly



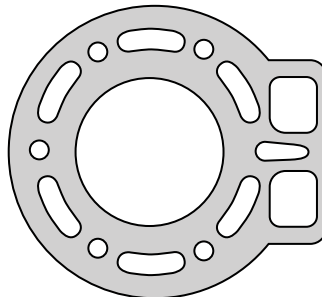
**208-46**  
Governor Housing Gasket  
Governor Assembly



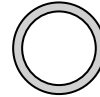
**41-46**  
Old Style Oil Indicator Gasket



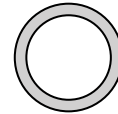
**32-46**  
Gasket  
Crankcase Assembly



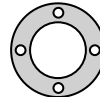
**238-G-66**  
Cylinder Head Gasket  
Cylinder Head Assembly



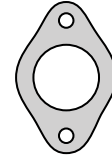
**ACE-409-46-NS**  
Gasket  
Oil Level Gauge Assy



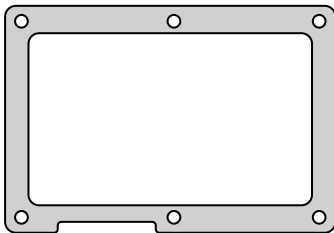
**346-46**  
Water Filler Gasket  
Pressure Cond Group



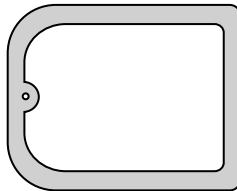
**ACE-415-46**  
Gasket  
Oil Level Gauge Assy



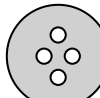
**261-46 (2)**  
Carb to Eblow Gasket  
Carburetor Assembly



**24-66**  
Top Cover Gasket  
Crankcase Assembly



**246-66**  
Valve Cover Gasket  
Rocker Arm Assembly



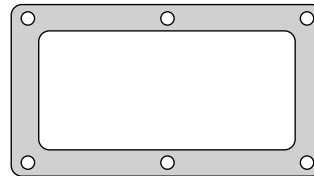
**35-46**  
Gasket  
Oil Level Gauge Assy



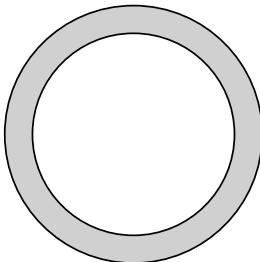
**2-206 (2)**  
O-Ring  
Rocker Arm  
Repair Kit



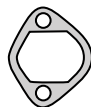
**213-46 (2)**  
Oil Press  
Gauge Gasket  
Gov Assembly



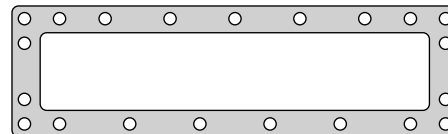
**347-66**  
Radiator Tank to Crankcase Gasket  
Pressure Condensing Group



**22-46**  
Cover Gasket  
Crankcase Assembly

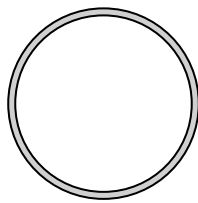


**314-46**  
Fuel Pump Gasket  
Crankcase Assembly

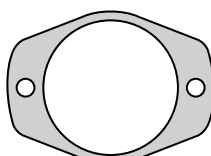


**336-66**  
Radiator Core Gasket  
Pressure Condensing Group

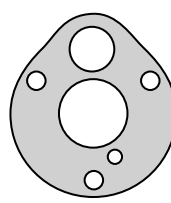
## C-96 COMPLETE GASKET SET **GSC-96**



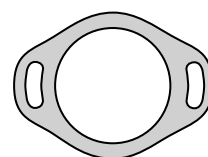
**12-96**  
Cyl Sleeve Gasket  
Crankcase Assembly



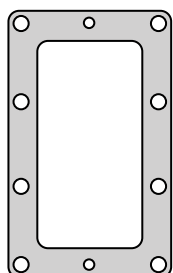
**330-17-46**  
Gasket  
Starfire Assembly



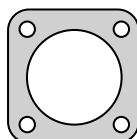
**215-46**  
Governor Gasket  
Governor Assembly



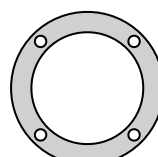
**330-11-46**  
Magneto to Bracket Gasket  
Magneto Accessories



**8-46**  
Cover Gasket  
Crankcase Assembly



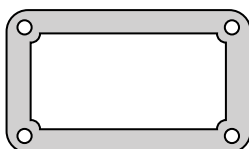
**173-46**  
Screen Cover Gasket  
Strainer Assembly



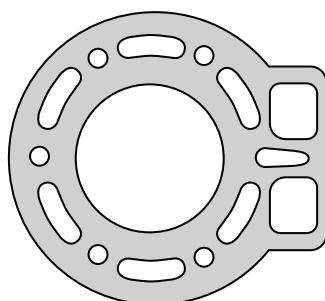
**208-46**  
Governor Housing Gasket  
Governor Assembly



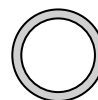
**41-46**  
Old Style Oil Indicator Gasket



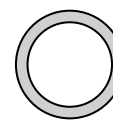
**32-96**  
Gasket  
Crankcase Assembly



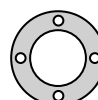
**238-G-96**  
Cylinder Head Gasket  
Cylinder Head Assembly



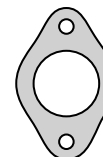
**ACE-409-46-NS**  
Gasket  
Oil Level Gauge Assy



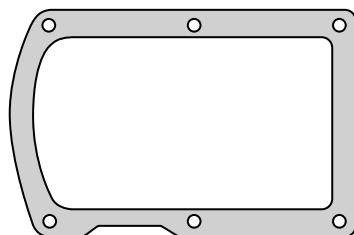
**346-46**  
Water Filler Gasket  
Pressure Cond Group



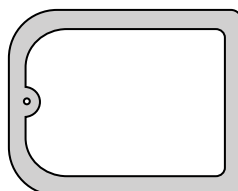
**ACE-415-46**  
Gasket  
Oil Level Gauge Assy



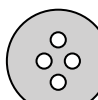
**261-96 (2)**  
Carb to Elbow Gasket  
Carburetor Assembly



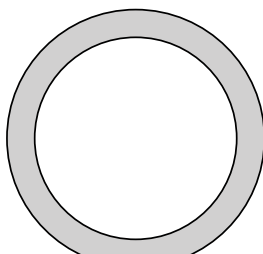
**24-96**  
Top Cover Gasket  
Crankcase Assembly



**246-96**  
Valve Cover Gasket  
Rocker Arm Assembly



**35-46**  
Gasket  
Oil Level Gauge Assy



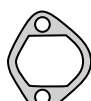
**22-96**  
Cover Gasket  
Crankcase Assembly



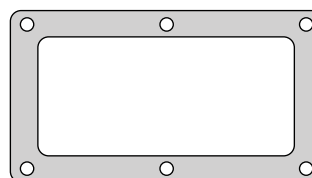
**2-206 (2)**  
O-Ring  
Rocker Arm  
Repair Kit



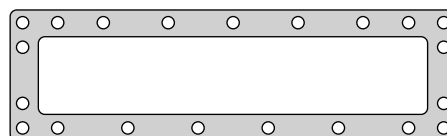
**213-46 (2)**  
Oil Press  
Gauge Gasket  
Gov Assembly



**314-46**  
Fuel Pump Gasket  
Crankcase Assembly

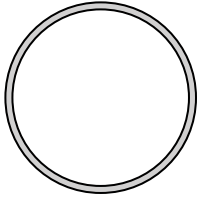


**347-96**  
Radiator Tank to Crankcase Gasket  
Pressure Condensing Group

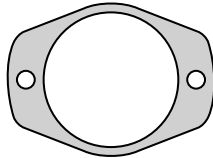


**336-66**  
Radiator Core Gasket  
Pressure Condensing Group

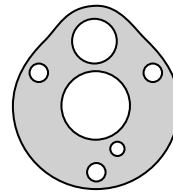
# C-101 & C-106 COMPLETE GASKET SET **GSC-106**



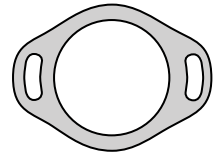
**12-106 (3)**  
Cyl Sleeve Gasket  
Crankcase Assembly



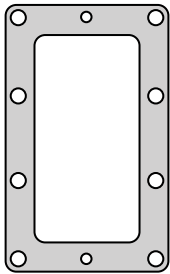
**330-17-46**  
Gasket  
Starfire Assembly



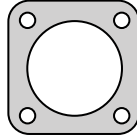
**215-46**  
Governor Gasket  
Governor Assembly



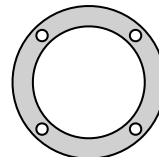
**330-11-46**  
Magneto to Bracket Gasket  
Magneto Accessories



**8-46**  
Cover Gasket  
Crankcase Assembly



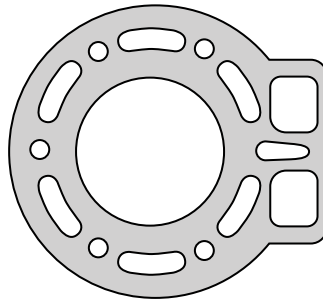
**173-46**  
Screen Cover Gasket  
Strainer Assembly



**208-106**  
Governor Housing Gasket  
Governor Assembly



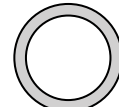
**41-46**  
Old Style Oil Indicator Gasket



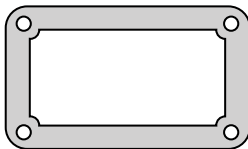
**238-G-106**  
Cylinder Head Gasket  
Cylinder Head Assembly



**ACE-409-46-NS(2)**  
Gasket  
Oil Level Gauge Assy



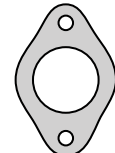
**346-46**  
Water Filler Gasket  
Pressure Cond Group



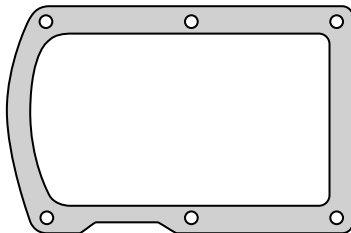
**32-96**  
Gasket  
Crankcase Assembly



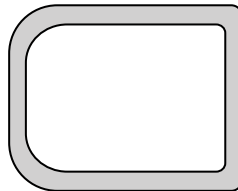
**336-A-106**  
Gasket  
Radiator Core



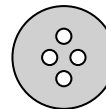
**261-106 (2)**  
Carb to Eblow Gasket  
Carburetor Assembly



**24-96**  
Top Cover Gasket  
Crankcase Assembly



**246-106**  
Outer Valve Cover Gasket  
Rocker Arm Assembly



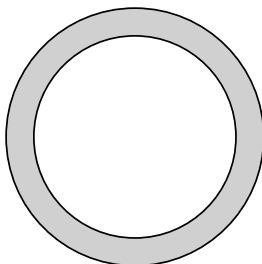
**35-46**  
Gasket  
Oil Level Gauge Assy



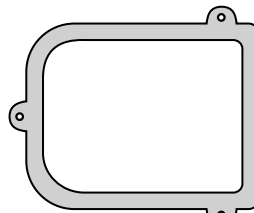
**2-206 (2)**  
O-Ring  
Rocker Arm  
Repair Kit



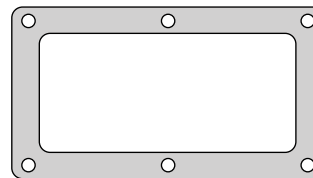
**213-46 (2)**  
Oil Press  
Gauge Gasket  
Gov Assembly



**22-96**  
Cover Gasket  
Crankcase Assembly



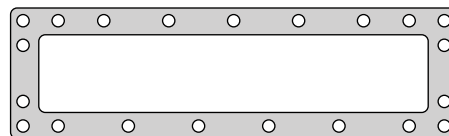
**246-A-106**  
Inner Valve Cover Gasket  
Rocker Arm Assembly



**347-96**  
Radiator Tank to Crankcase Gasket  
Pressure Condensing Group



**314-46**  
Fuel Pump Gasket  
Crankcase Assembly



**336-106**  
Radiator Core Gasket  
Pressure Condensing Group

# 14 Service & Maintenance Schedule

An easy, inexpensive way to reduce production costs on pumping wells is to properly maintain the pumping engine. Both the slow speed single and twin cylinder type engines are designed to operate unattended, continuously, for weeks at a time. However, periodic preventive maintenance will extend the life of the engines by two to three times, and substantially reduce repair costs.

Ignition systems head the list of recommendations for complete engine checkups. Because more production hours are lost due to moisture in the ignition system than any other reason, an adequate cover should be provided to keep rain and moisture off the magneto, or alternator, if a breakerless ignition system is used. Wires should be inspected for cracks in insulation; and connections should be tight and solid. On shielded or low-tension systems, ignition coils should be mounted with the spark plug connections pointed down so they don't collect moisture.

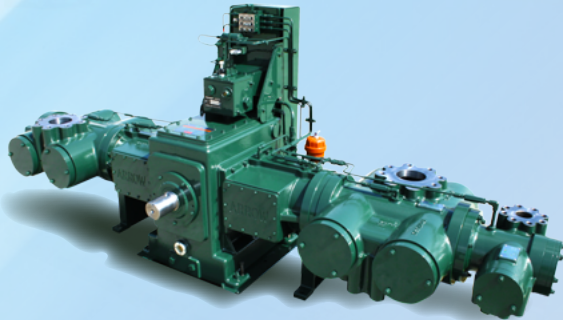
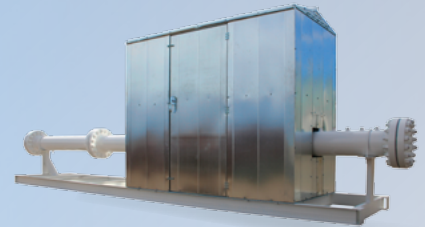
**Maintenance procedures may be needed more frequently depending on operating conditions.**

Service and Maintenance Schedule	
DAILY	Visually Check oil level
	Visually check water level.
WEEKLY	Visually check fan belt tension.
	Check clutch adjustment - clutch should snap in and out firmly.
	Visually inspect condenser fins for dirt and lint.
	Visually check drive belt tension - belts should not flop or slip, but pull load.
MONTHLY	Inspect ignition wiring.
	Clean and gap spark plug.
	Check governor lubrication – remove oil line at governor to ascertain flow.
	Clean air filter.
	Clean breathers.
	Change oil.
	Change oil filter.
3 MONTHS	Check valve clearance.
6 MONTHS	Lubricate clutch main bearing.
	Lubricate clutch release bearing-one or two shots with grease gun.
	Lubricate clutch pilot bearing - one or two shots with a grease gun.
ANNUALLY	Clean and flush cooling system.

DATES PERFORMED				
Oil change				
Filter change				
Clean air cleaner				
Clean & flush cooling system				
Install new clutch plates				
Clean engine exterior				



# Quality Products Engineered to Last





**ARROW  
ENGINES**



<b>C-SERIES</b>	C-46	C-66	C-96	C-101	C-106	C-255
<b>A-SERIES</b>	A-32	A-42	A-54	A-62 A-62 Turbo A-62 Genset	A-90 A-90 Turbo A-90 Genset	A-160 A-160 Turbo A-160 Genset
<b>K-SERIES</b>	K6					
<b>L-SERIES</b>	L-795					



**ARROW  
GAS PRODUCTS**

<b>GAS PRODUCTS</b>	Meter Runs Meter Skids	Volume Tanks Coalescers Structural Skids	2 & 3-Phase Separators Fuel Gas Cond. Skid	Heater Treater Indirect Heater H2S Scavenger Unit	Dehydration Unit Liquid Stabilizer
<b>CHEMICAL PUMPS</b>	10 Series (beam operated)	430 Series (electric)	12, 500, & 510 Series (pneumatic)	Solar Chemical Pumps	OEM & Aftermarket Spare Parts



**ARROW  
COMPRESSION**

<b>COMPRESSION PRODUCTS</b>	Compressor Frames VRC-2 VRS-2 VRS-4 (Coming Soon)	CNG Compressor Frames & Packages VRC-CNG	Vapor Recovery Units VRU-1 VRU-2	Gas Lift Packages Electric HP Gas Engine (VR, A-Series, Cat)	Custom Compression Packages
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2301 East Independence • Tulsa, Oklahoma 74110  
fax (918) 699-2202  
local (918) 583-5711

**(800) 331-3662**

[www.ArrowEngine.com](http://www.ArrowEngine.com)



**REPLACEMENT PARTS**

<b>CATERPILLAR®</b>	G379	G398	G399	G3304	G3306
<b>WAUKESHA®</b>	F2895 F3521 F5108	L5790 L7042	P9390	145G/F817 140G/F554	F18 H24 WAK/1197
<b>FAIRBANKS®</b>	ZC-118	ZC-208	ZC-503	ZC-739	ZC-346
<b>AJAX®</b>	5 × 6½	EA-22, 6½ × 8 CMA EA30, 7½ × 10 CMA EA-30, 7¼ × 8 CMA E-42, 8½ × 10 CMA		DP-60, 9½ × 10 CMA DP-115/230, 13½ × 16 DP-70/80/160, 11 × 14 CMA	

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