

PARTS MANUAL

Models

EH64, 20.5 hp Engine

EH65, 22.0 hp Engine

Welder Applications

(Onan Performer OHV220)

PUB-EP220W
Rev. 09/05

Robin
SUBARU

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HOW TO USE THIS MANUAL

Robin engines are identified by MODEL, SPECIFICATION, and CODE NUMBER. For each model there may be many different versions called specifications. Each specification will be unique in some way. The difference may only be the paint color or it may have a different type of PTO or some other significant difference.

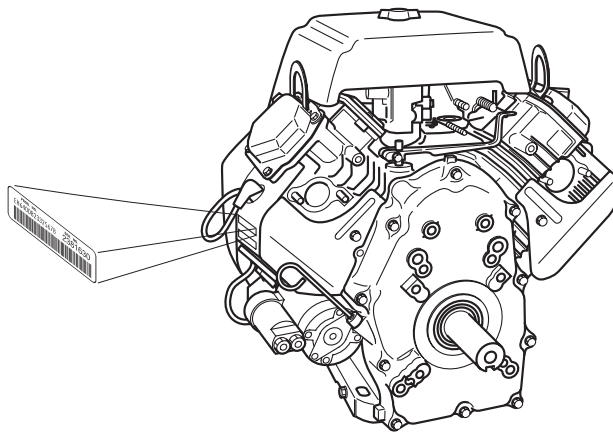
In order to identify the correct service part number, it is important to confirm the specification and code numbers for your engine. The specification and code number together are known as the PRODUCT NUMBER.

All Robin 4 cycle engines have a Product Number label similar to the label illustrated below.

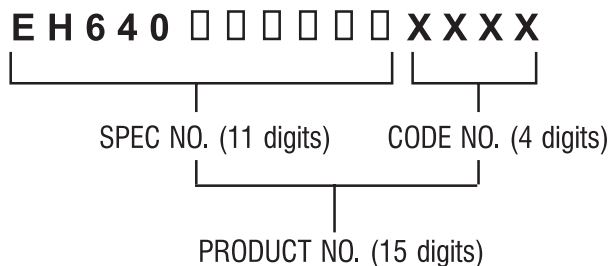
PRODUCT NUMBER LABEL



PRODUCT NUMBER LABEL LOCATION



The Product Number Label has a 15 digit alphanumeric string that consists of the SPECIFICATION (SPEC) number (11 digits) and the CODE number (4 digits). Please note the illustration below:



DESCRIPTION	ROBIN Engine Specification	ONAN Engine Specification
MILLER HOBART	EH650DB2322	P220GIOHV-786A
MILLER BOBCAT	EH650DB2341	P220GIOHV-2252A
MILLER TRAILBLAZER	EH650DB2390	P220GIOHV-2711A
LINCOLN ELECTRIC	EH650DB2332	P220GIOHV-1145A
MILLER BOBCAT	EH650DC2405	
MILLER TRAILBLAZER	EH650DC2415	
MILLER HOBART	EH650DC2420	

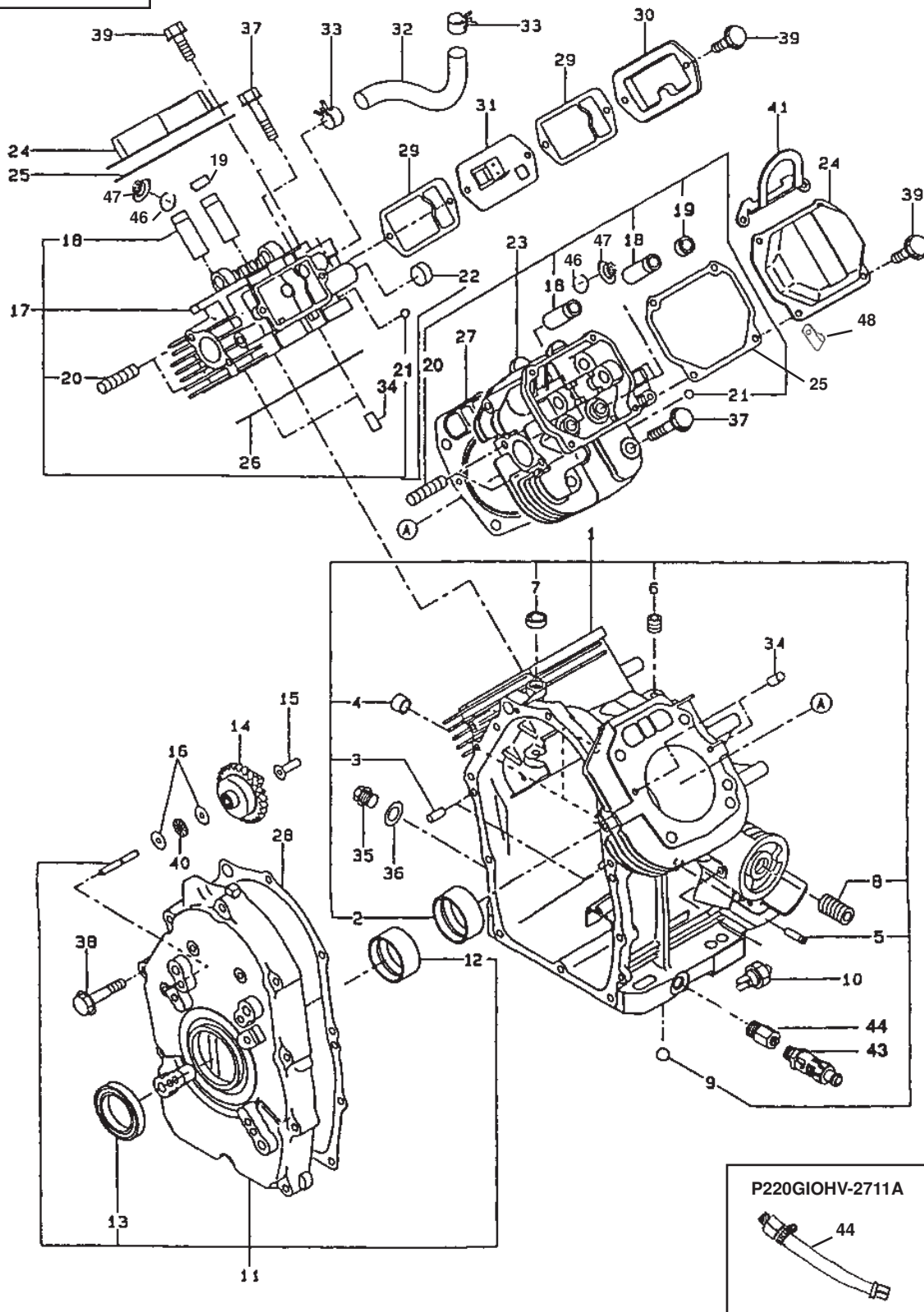
NOTE: Horsepower is as follows;
 EH650DB - 20.5hp
 EH650DC - 22hp

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SECTION 1 CRANKCASE GROUP - EH64, 20.5hp

FIG. 100

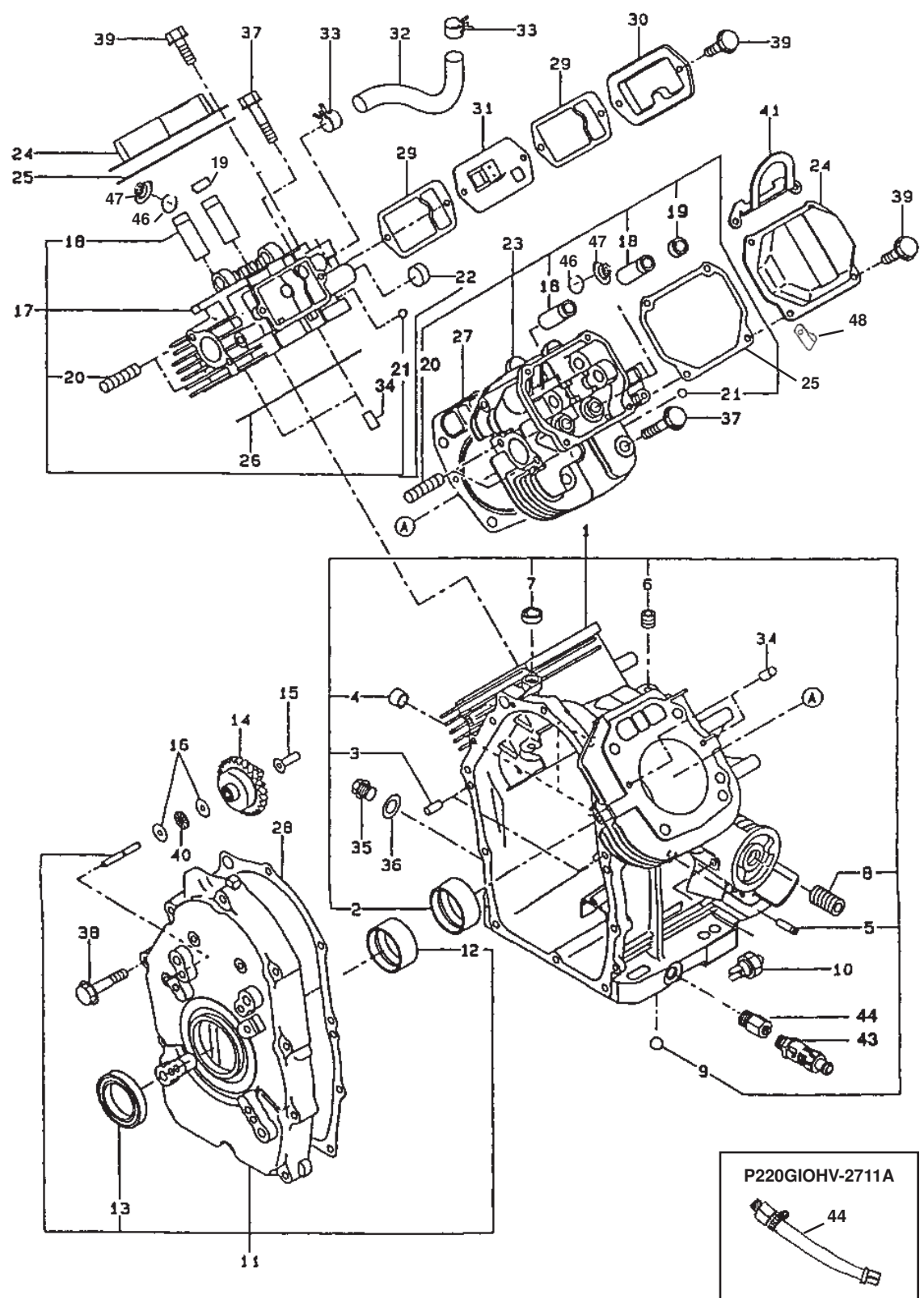


SECTION 1 CRANKCASE GROUP - EH64, 20.5hp

REF	ROBIN PART NUMBER	DESCRIPTION	QTY	REMARKS	ONAN PN
1	263-10102-B1	CRANKCASE CP	1		187-6000
2	263-15802-03	MAIN BEARING	1	STD	
	263-15803-03	MAIN BEARING	1	0.25mm Undersized	
	263-15804-03	MAIN BEARING	1	0.50mm Undersized	
3	X31-00800-80	DOWEL PIN	2		
4	142-55601-03	PIPE	2		187-6003
5	263-15701-01	PIPE, PULSE	1		
6	263-15911-A1	BLIND PLUG	1		
7	044-00800-10	OIL SEAL	1		187-6006
8	263-15901-03	UNION	1		187-6007
9	045-01200-10	STEEL BALL	1		187-6008
10	263-76001-A1	OIL PRESSURE SWITCH	1		187-6170
11	263-11103-D1	MAIN BEARING COVER, AY	1		
12	263-15802-03	MAIN BEARING	1	STD	
	263-15803-03	MAIN BEARING	1	0.25mm Undersized	
	263-15804-03	MAIN BEARING	1	0.50mm Undersized	
13	044-04200-30	OIL SEAL	1		187-6172
14	263-45001-C1	GOVERNOR GEAR, CP	1		
15	263-41901-03	GOVERNOR SLEEVE	1		187-6011
16	263-46214-A3	WASHER	2		187-6012
17	263-13001-21	CYLINDER HEAD 1, CP	1		187-6013
18	263-14211-03	VALVE GUIDE	4		187-6014
19	132-07AA0-50	INTAKE VALVE SEAL	2		187-6015
20	010-50802-90	STUD, intake/exhaust	8		187-6016
21	X45-00600-10	STEEL BALL	2		187-6017
22	263-16201-03	PLUG	1		187-6018
23	263-13101-21	CYLINDER HEAD 2, CP	1		187-6019
24	246-15501-01	ROCKER COVER, CP	2		187-6020
25	246-16002-13	ROCKER COVER GASKET	2		187-6021
26	263-15001-13	GASKET 1, CYLINDER HEAD	1		187-6022
27	263-15101-13	GASKET 2, CYLINDER HEAD	1		187-6023
28	263-16001-A3	MAIN BEARING COVER GASKET	1		187-6024
29	263-16006-03	BREATHER PLATE GASKET	2		187-6025
30	263-14301-03	BREATHER COVER	1		187-6026
31	263-14401-01	BREATHER PLATE	1		187-6027
32	263-18001-A3	RUBBER PIPE	1		187-6028
33	263-68511-03	HOSE CLAMP	2		187-6029
34	X31-00600-20	DOWEL PIN	4		187-6030
35	040-11400-30	PLUG	1		187-6031
36	021-11400-20	GASKET	1		187-6032
37	X11-01000-30	FLANGE BOLT	8		187-6033
38	X11-00802-20	FLANGE BOLT	10		187-6034
39	X11-00600-30	FLANGE BOLT	10		187-6035
40	263-46215-A3	THRUST BEARING	1		187-6036
41	263-19001-A3	LIFTING HOOK	2		187-6037

SECTION 1 CRANKCASE GROUP - EH64, 20.5hp

FIG. 100

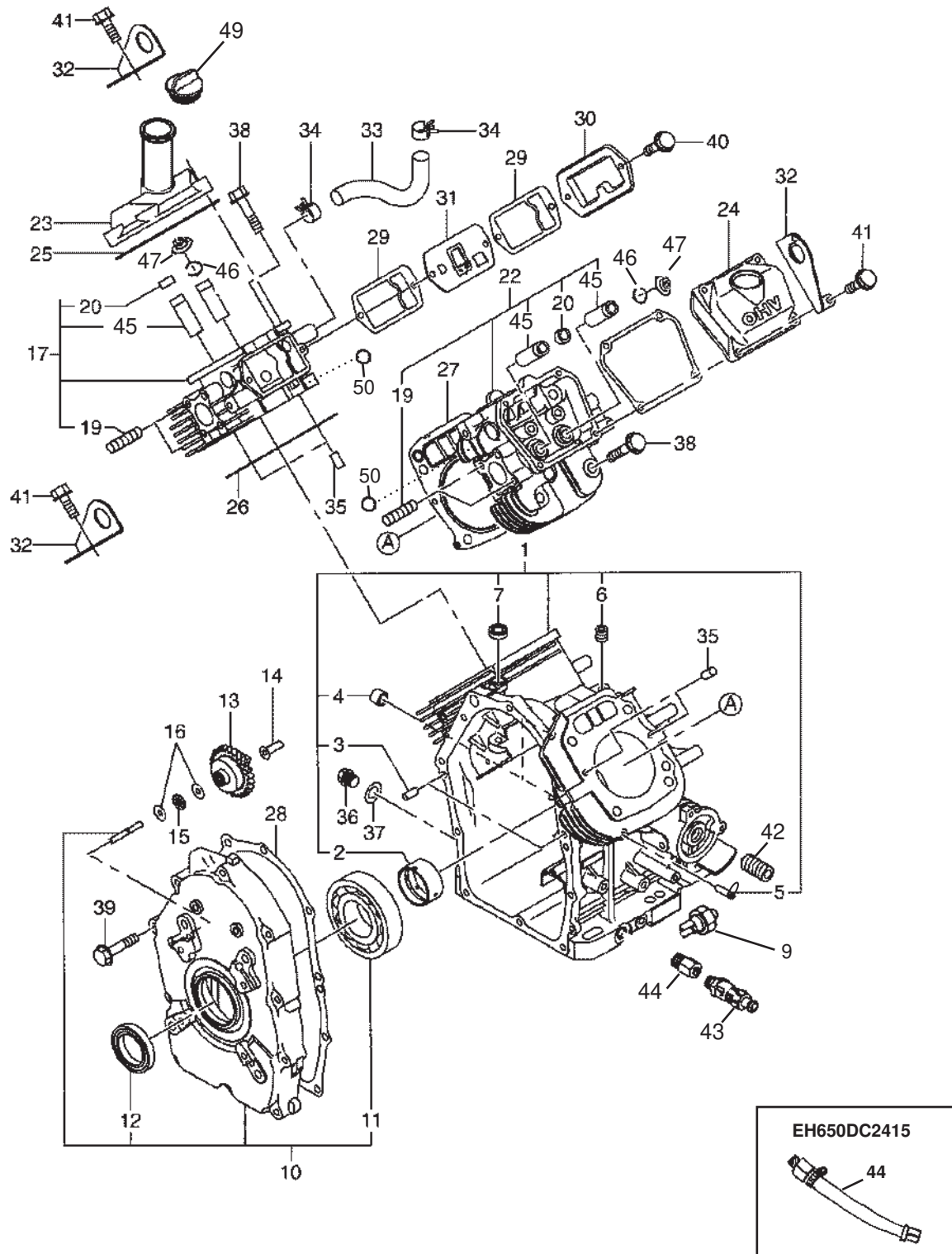


SECTION 1 CRANKCASE GROUP - EH64, 20.5hp

[illegible]

SECTION 1 CRANKCASE GROUP - EH65, 22.0hp

FIG. 100

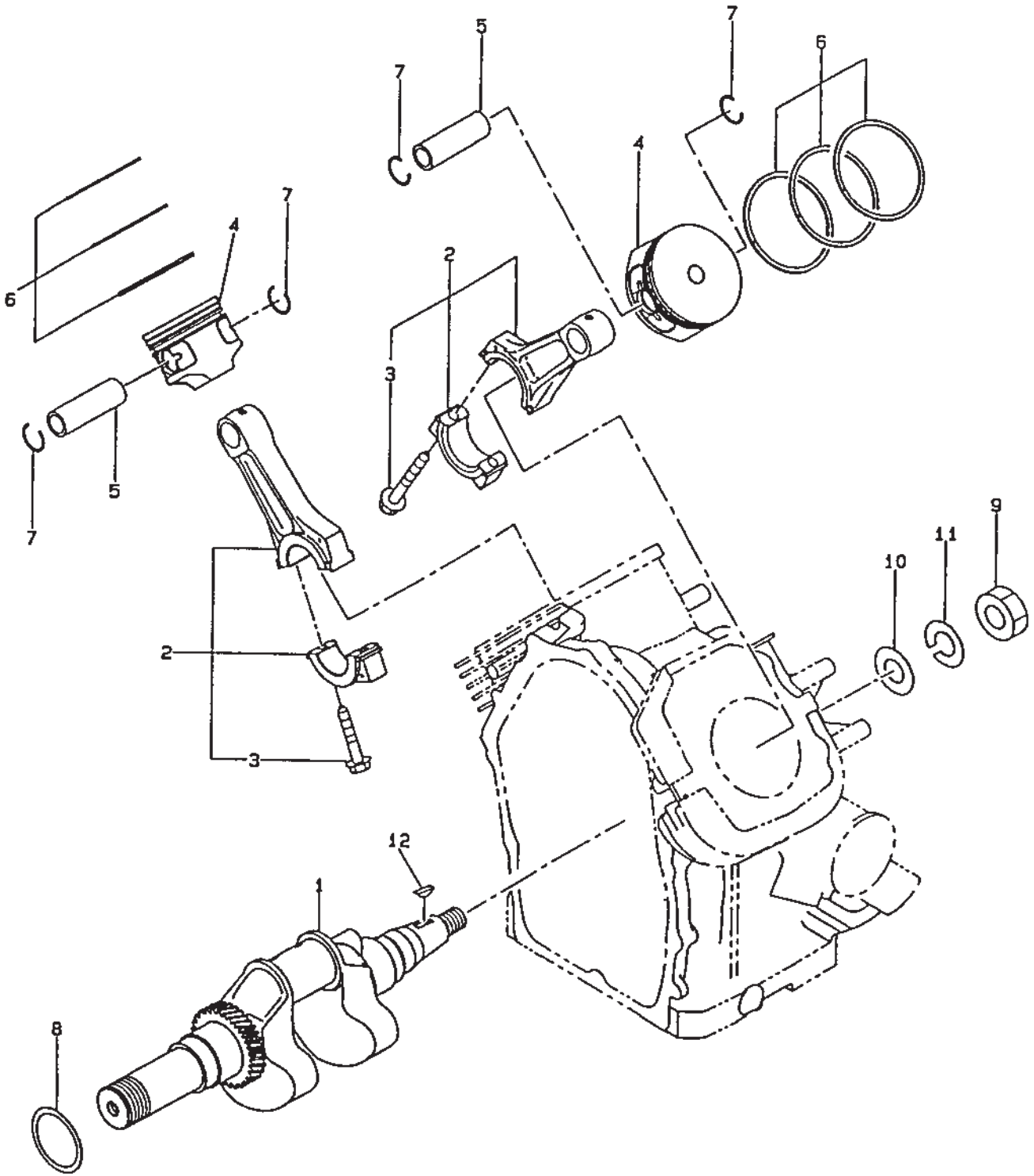


SECTION 1 CRANKCASE GROUP - EH65, 22.0hp

REF	ROBIN PART NUMBER	DESCRIPTION	QTY	REMARKS	ONAN PN
1	263-10112-A1	CRANKCASE	1		
2	263-15802-03	MAIN BEARING	1	STD	
3	X31-00800-80	DOWEL PIN	2		
4	142-55601-03	PIPE	2		187-6003
5	263-15701-01	PIPE, PULSE	1		
6	263-15911-A1	BLIND PLUG	1		
7	044-00800-10	OIL SEAL	1		187-6006
9	263-76001-A1	OIL PRESSURE SWITCH	1		187-6170
10	263-11103-E1	MAIN BEARING COVER	1		
11	263-15802-03	BALL BEARING	1		
12	044-04200-30	OIL SEAL	1		187-6172
13	263-45001-C1	GOVERNOR GEAR	1		
14	263-41901-03	GOVERNOR SLEEVE	1		
15	263-46215-A3	THRUST BEARING	1		187-6011
16	263-46214-A3	WASHER	2		187-6012
17	263-13211-A1	CYLINDER HEAD 1	1		
19	010-50802-90	STUD	8		187-6016
20	132-07AA0-50	SEAL, INTAKE VALVE	2		187-6015
22	263-13311-A1	CYLINDER HEAD 2	1		
23	263-15502-A3	ROCKER COVER w/ oil fill	1		
24	263-15501-A3	ROCKER COVER	1		
25	263-16101-A3	GASKET, ROCKER COVER	2		
26	263-15021-11	GASKET 1, CYLINDER HEAD	1		
27	263-15121-01	GASKET 2, CYLINDER HEAD	1		
28	263-16002-A3	GASKET, MAIN BEARING COVER	1		187-6024
29	263-16006-03	GASKET, BREATHER PLATE	2		187-6025
30	263-14301-03	BREATHER COVER	1		187-6026
31	280-14401-A1	BREATHER PLATE	1		
32	280-19001-A3	HOOK	2		
33	263-18003-03	RUBBER PIPE	1		187-6028
34	263-68511-03	HOSE CLAMP	2		187-6029
35	X31-00600-20	DOWEL PIN	4		187-6030
36	X40-11400-30	PLUG	1		187-6031
37	021-11400-20	GASKET	2		187-6032
38	X11-01000-70	FLANGE BOLT	8		187-6033
39	X11-00802-20	FLANGE BOLT	10		187-6034
40	X11-00600-30	FLANGE BOLT	2		187-6035
41	X11-00601-01	FLANGE BOLT	8		
42	263-15901-03	UNION	1		187-6007
43	263-65005-A3	OIL DRAIN VALVE	1		504-0186
44	263-65006-A3	ADAPTER	1	EH650DC2405, DC2420	187-6173
44	263-68101-B1	OIL DRAIN HOSE	1	EH650DC2415	
45	263-14211-03	VALVE GUIDE	4		187-6014
46	056-51000-50	CLIP	4		
47	263-35341-03	RETAINER PLATE	4		
49	280-63602-A1	OIL FILL CAP	1		
50	X45-00600-10	STEEL BALL	2		

CRANKSHAFT GROUP - EH64, 20.5hp & EH65, 22.0hp

FIG. 200

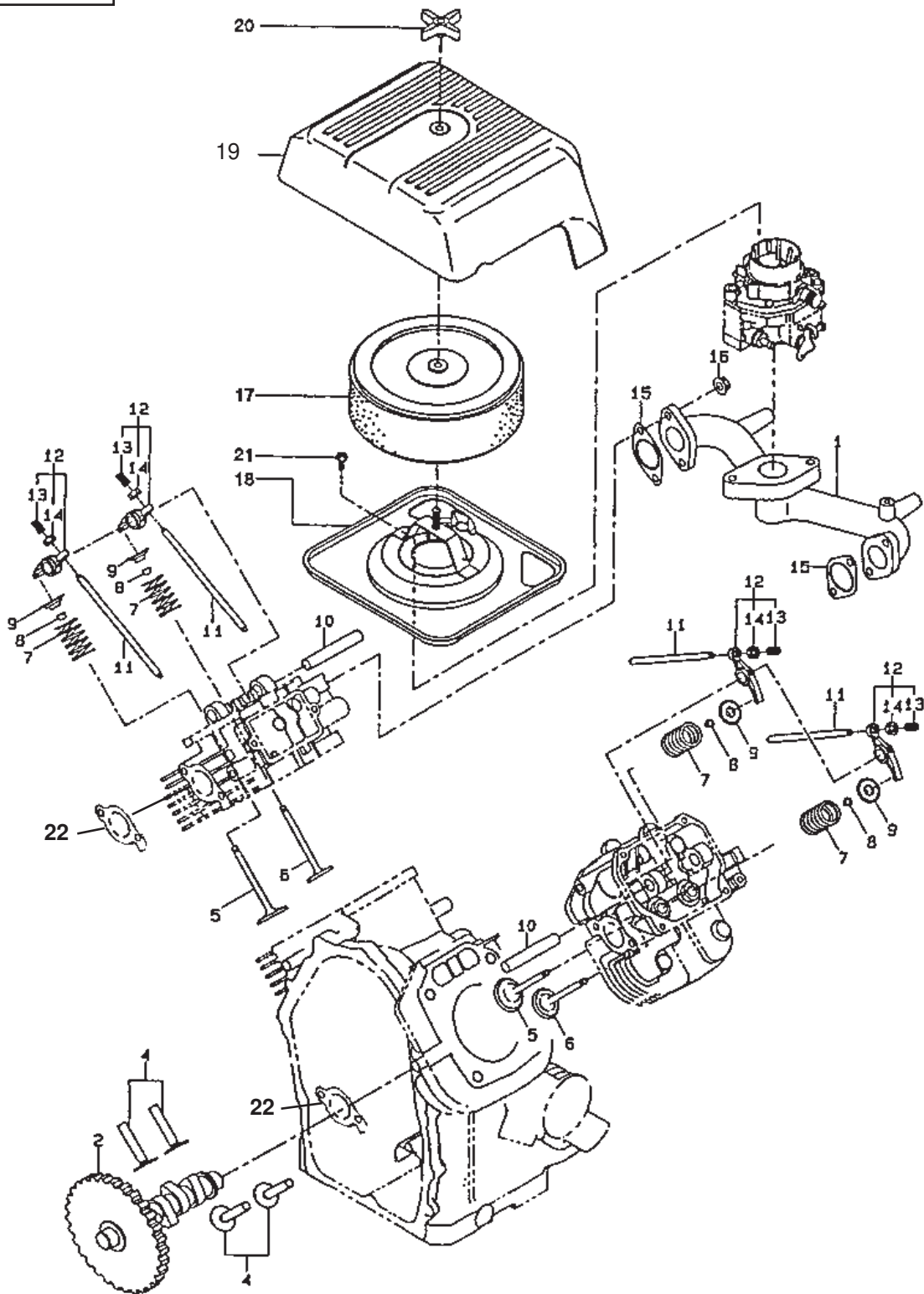


SECTION 2 CRANKSHAFT GROUP- EH64, 20.5hp & EH65, 22.0hp

[illegible]

SECTION 3 INTAKE and EXHAUST GROUP - EH64, 20.5hp

FIG. 300

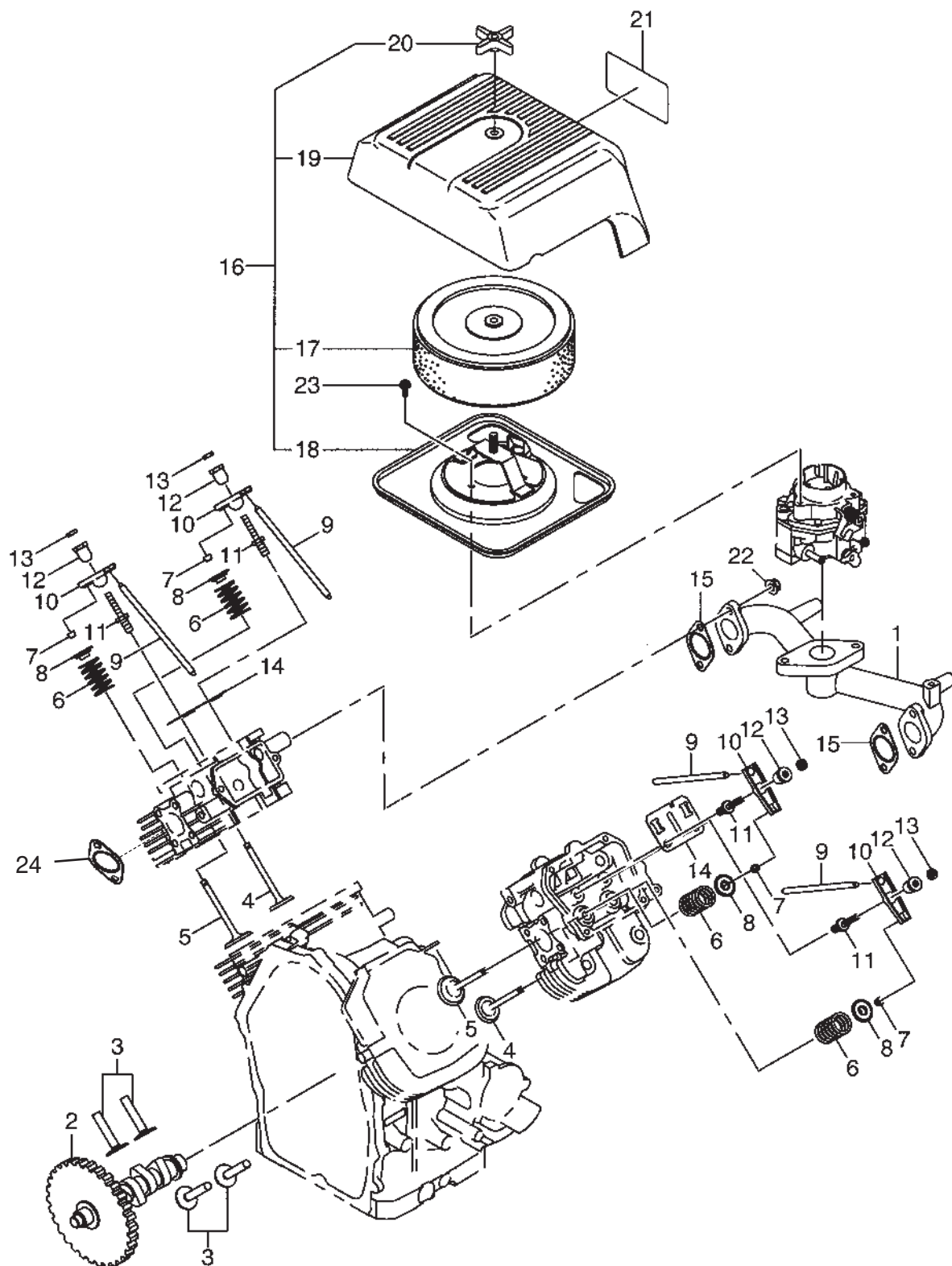


SECTION 3 INTAKE and EXHAUST GROUP - EH64, 20.5hp

[illegible]

SECTION 3 INTAKE and EXHAUST GROUP - EH65, 22.0hp

FIG. 300

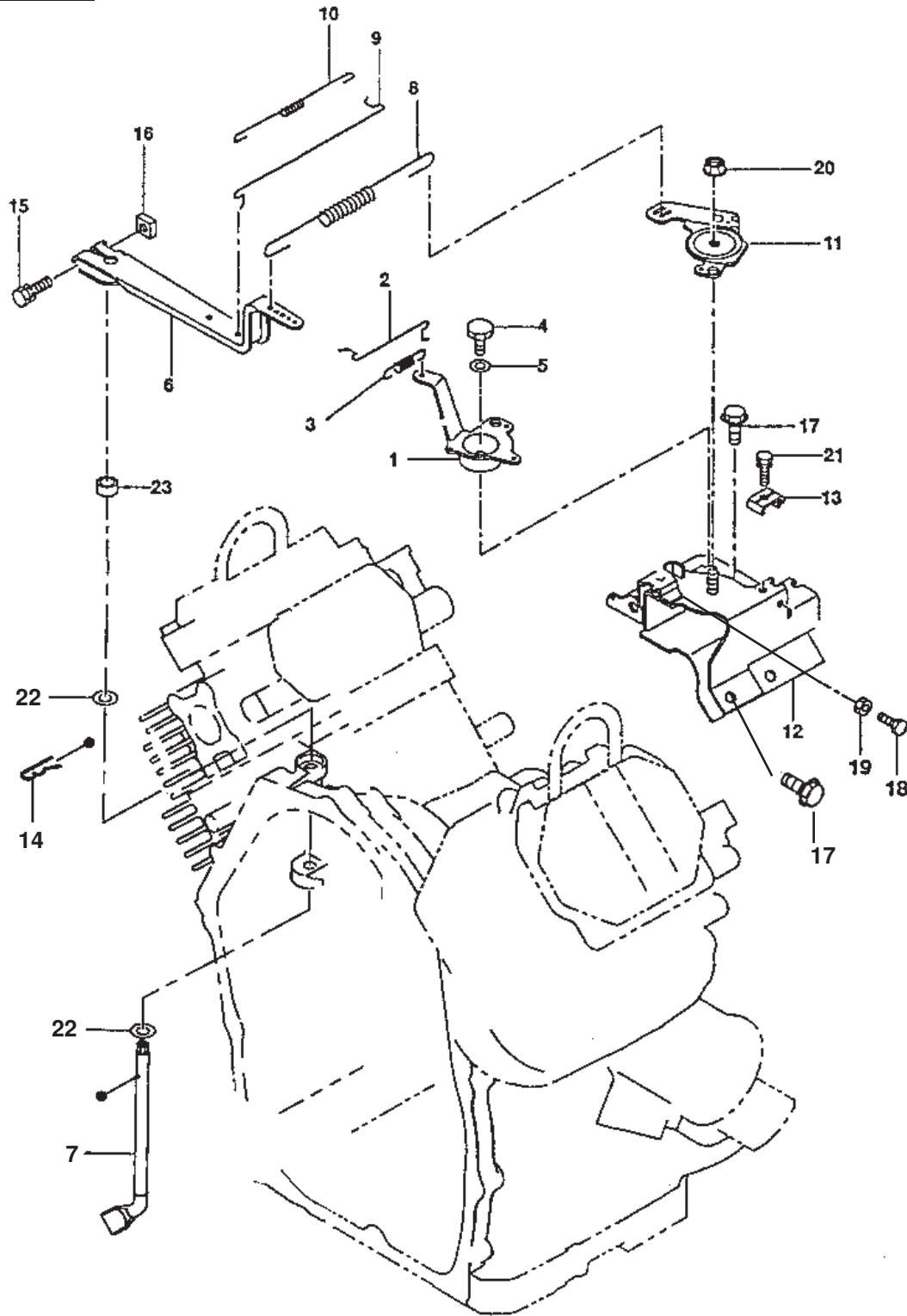


SECTION 3 INTAKE and EXHAUST GROUP - EH65, 22.0hp

[illegible]

SECTION 4 GOVERNOR GROUP- EH64, 20.5hp & EH65, 22.0hp

FIG. 400

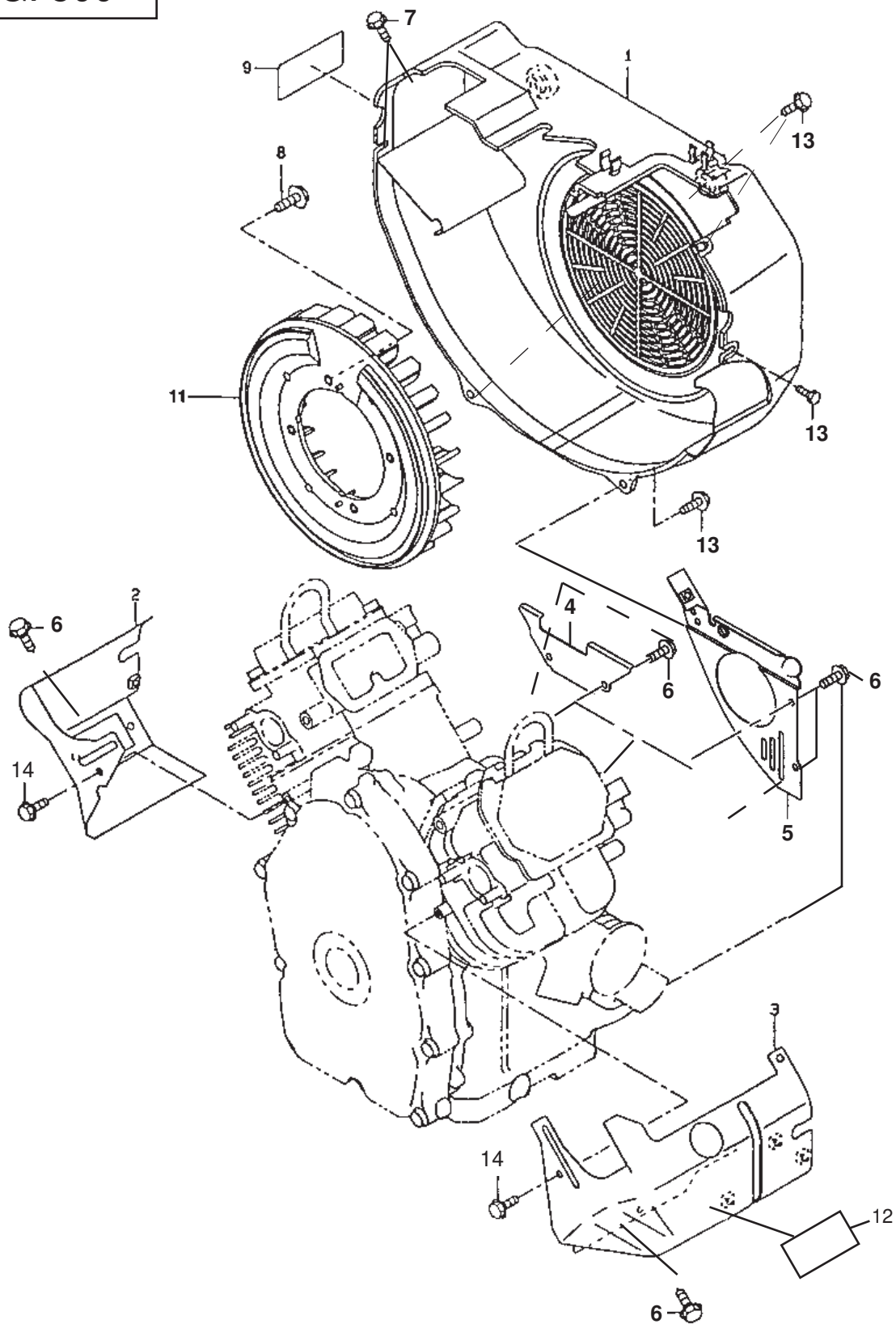


SECTION 4 GOVERNOR GROUP- EH64, 20.5hp & EH65, 22.0hp

[illegible]

SECTION 5 BLOWER HOUSING GROUP- EH64, 20.5hp & EH65, 22.0hp

FIG. 500

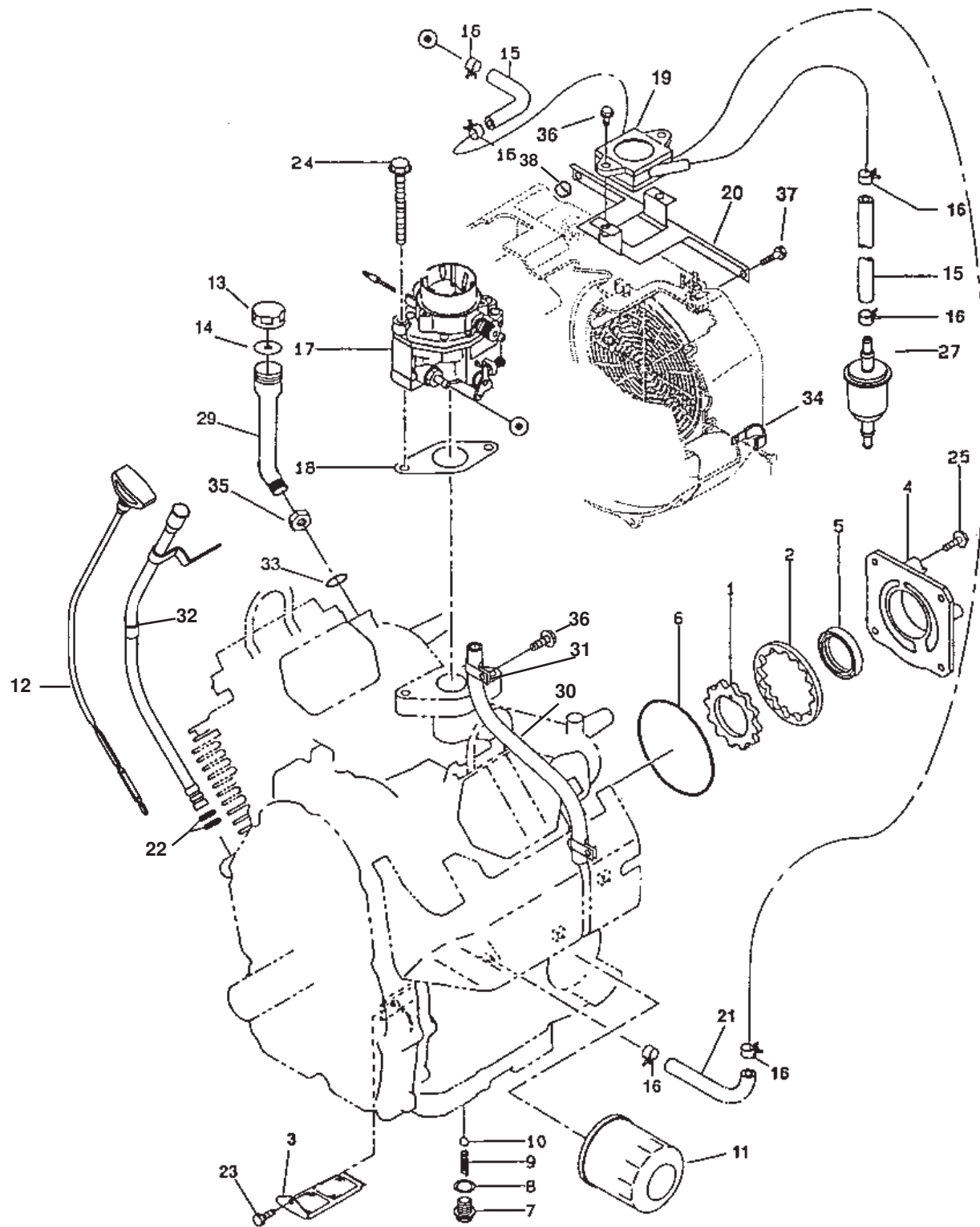


SECTION 5 BLOWER HOUSING GROUP- EH64, 20.5hp & EH65, 22.0hp

[illegible]

SECTION 6 FUEL and LUBRICANT GROUP- EH64, 20.5hp

FIG. 600

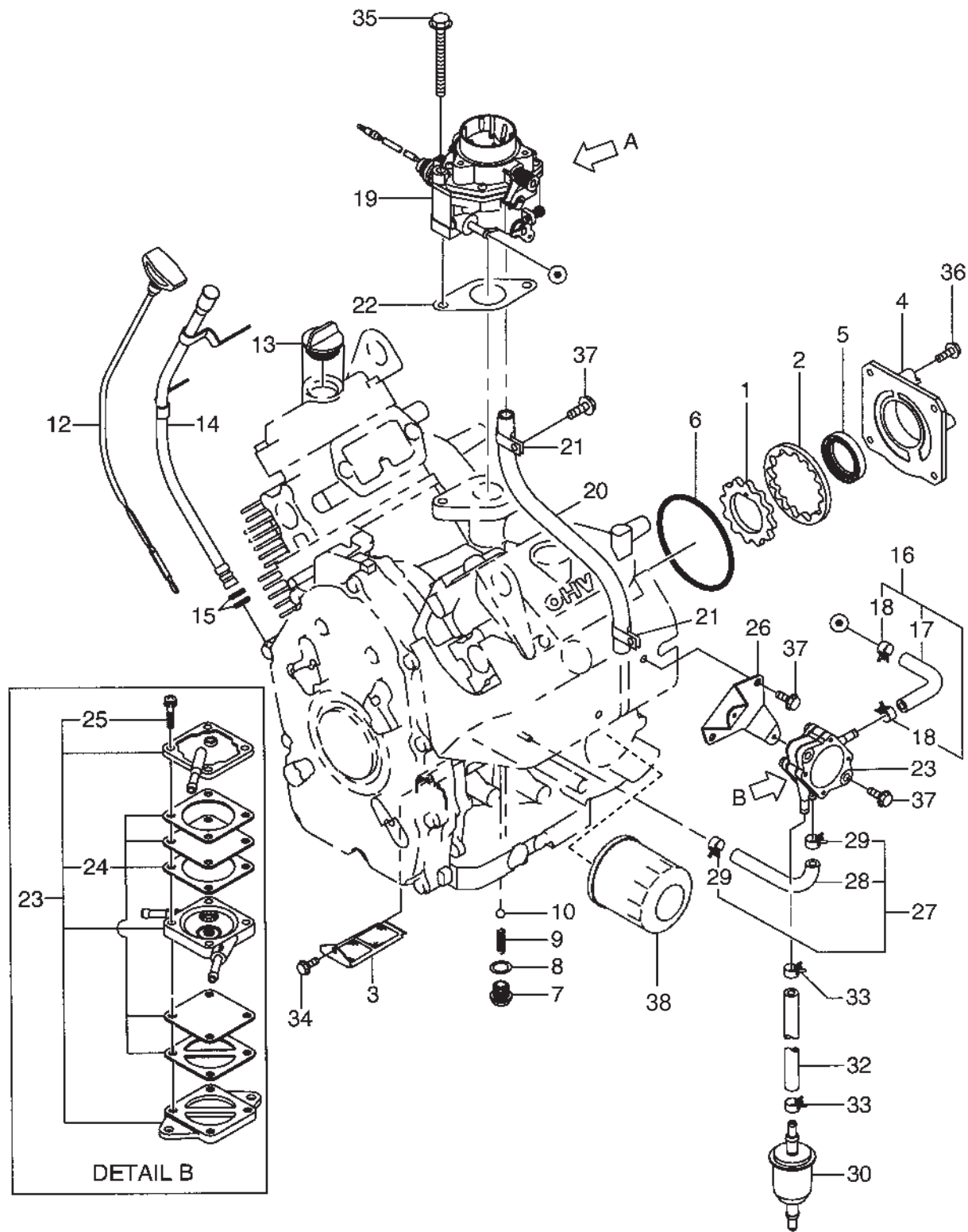


SECTION 6 FUEL and LUBRICANT GROUP - EH64, 20.5hp

[illegible]

SECTION 6 FUEL and LUBRICANT GROUP- EH65, 22.0hp

FIG. 600

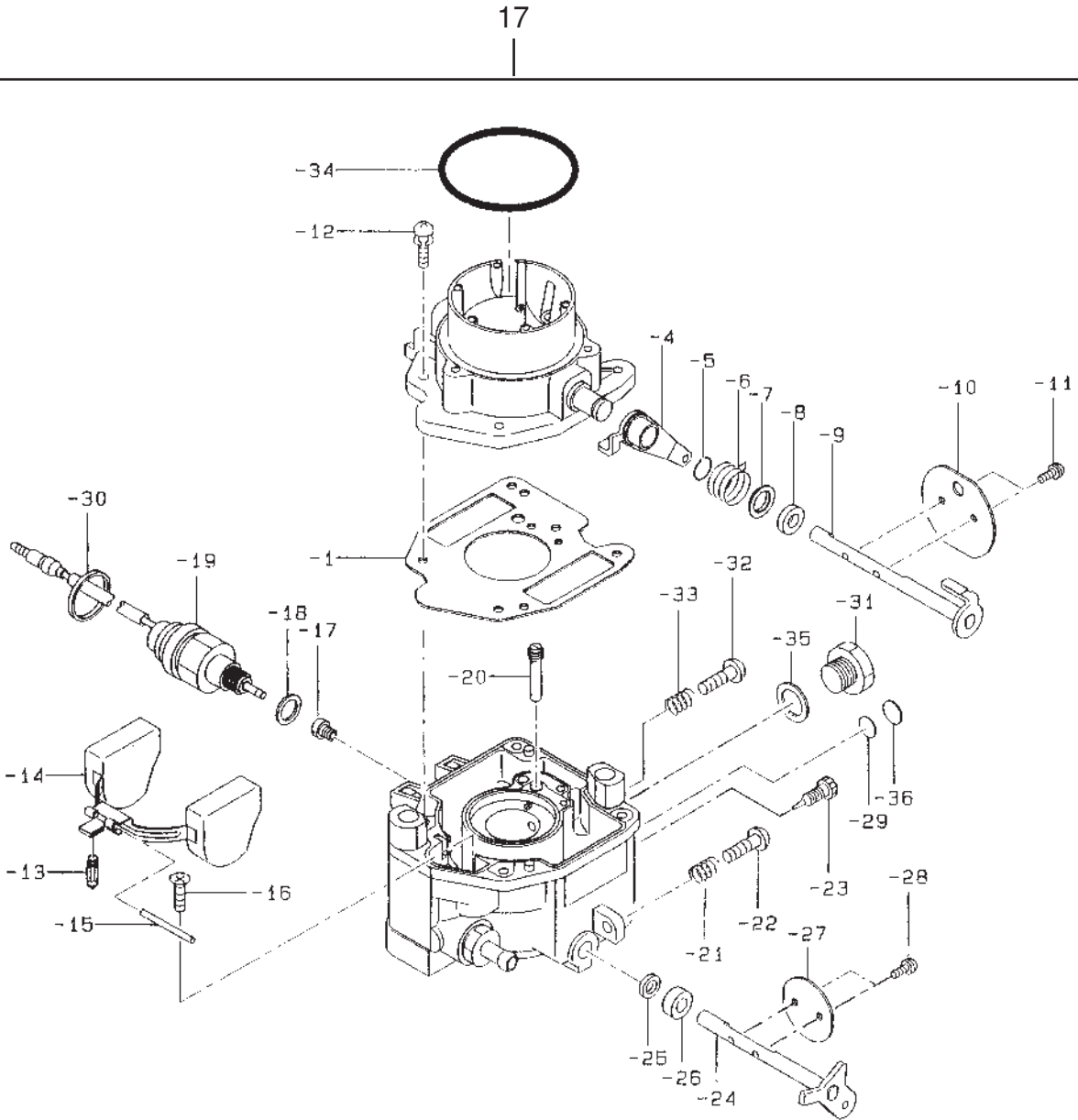


SECTION 6 FUEL and LUBRICANT GROUP - EH65, 22.0hp

[illegible]

FUEL and LUBRICANT GROUP - EH64, 20.5hp

FIG. 610

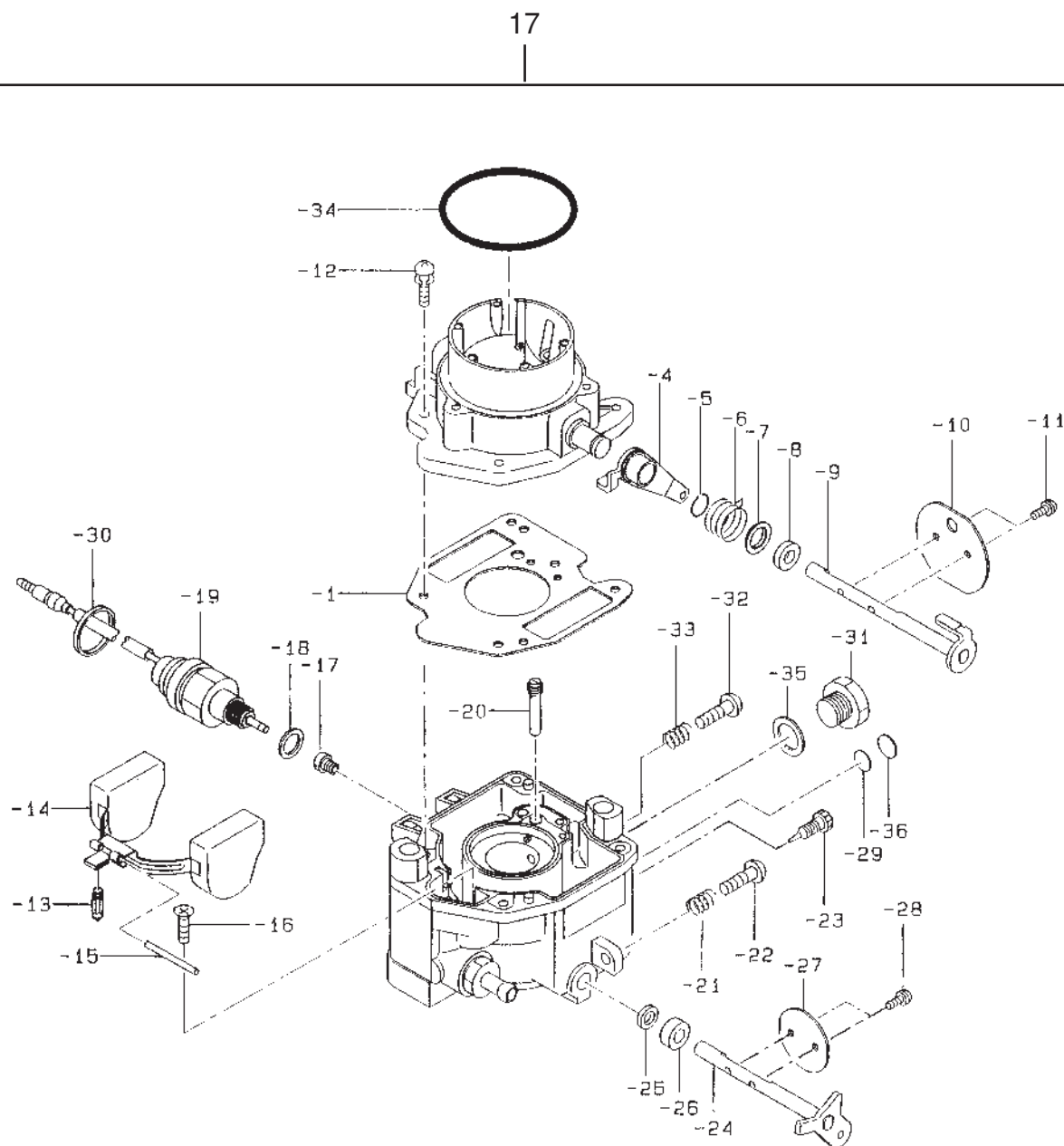


SECTION 6 FUEL and LUBRICANT GROUP - EH64, 20.5hp

[illegible]

SECTION 6 FUEL and LUBRICANT GROUP - EH65, 22.0hp

FIG. 610

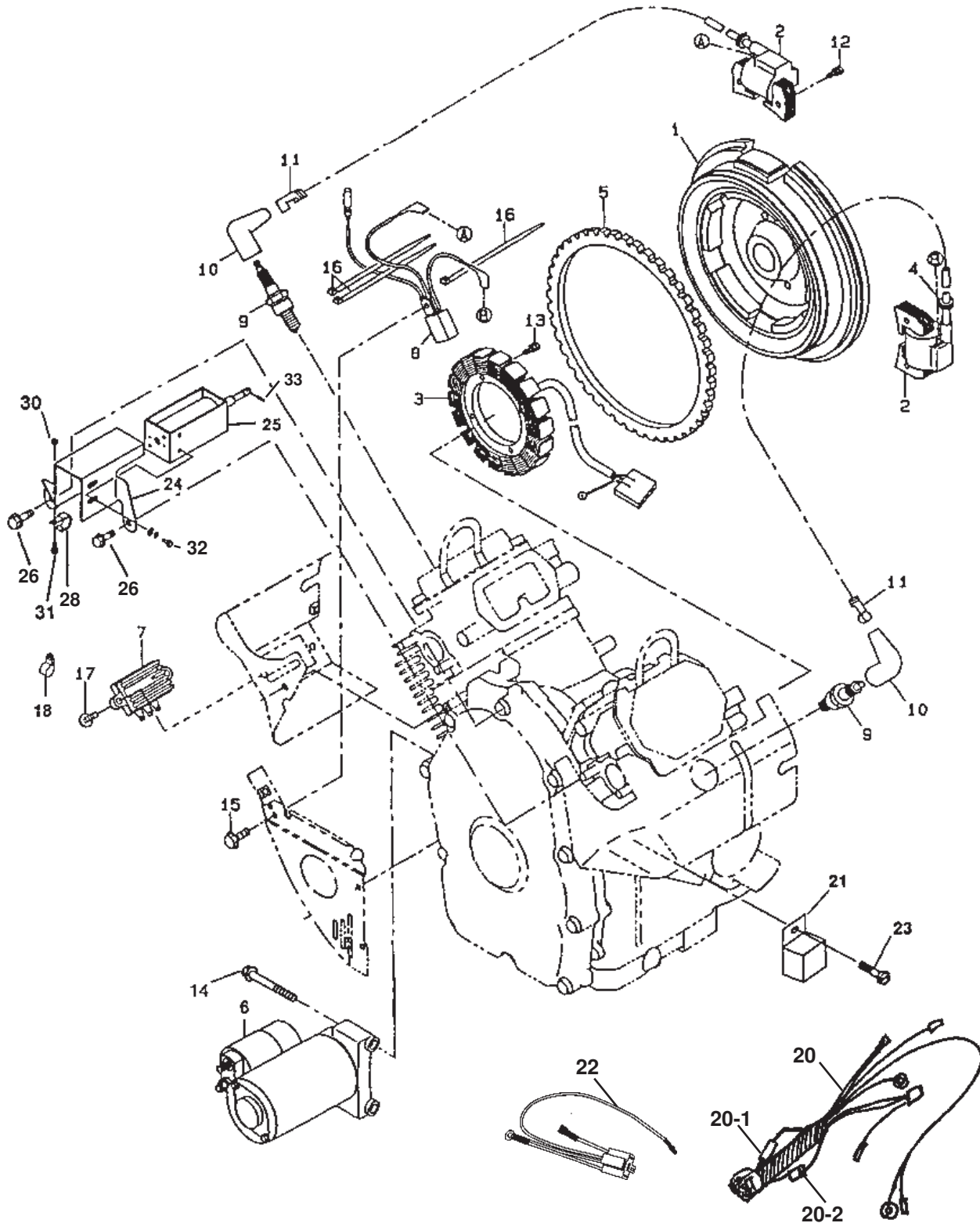


SECTION 6 FUEL and LUBRICANT GROUP - EH65, 22.0hp

[illegible]

SECTION 7 FLYWHEEL and STARTER GROUP - EH64, 20.5hp

FIG. 700

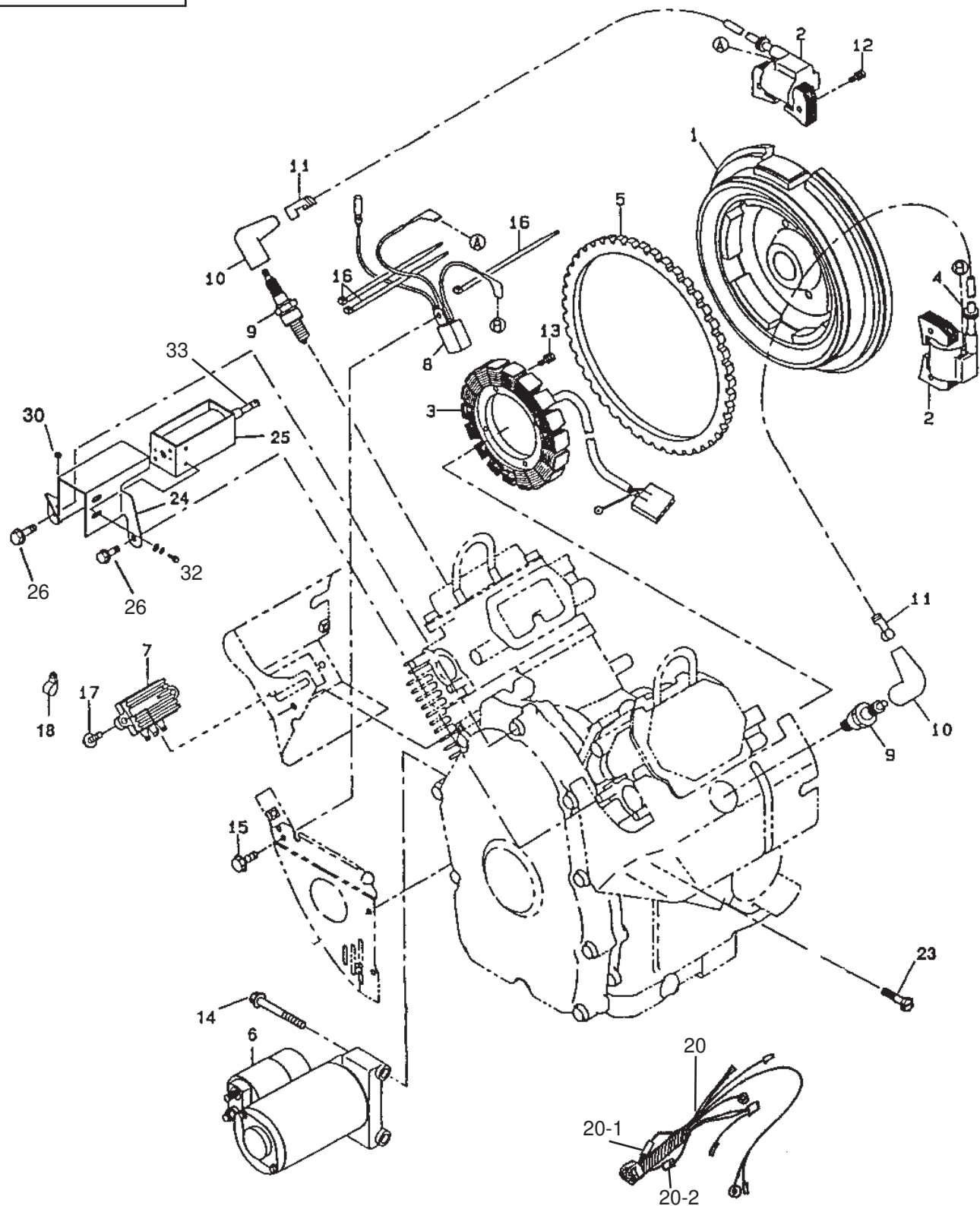


SECTION 7 FLYWHEEL and STARTER GROUP - EH64, 20.5hp

[illegible]

SECTION 7 FLYWHEEL and STARTER GROUP - EH65, 22.0hp

FIG. 700

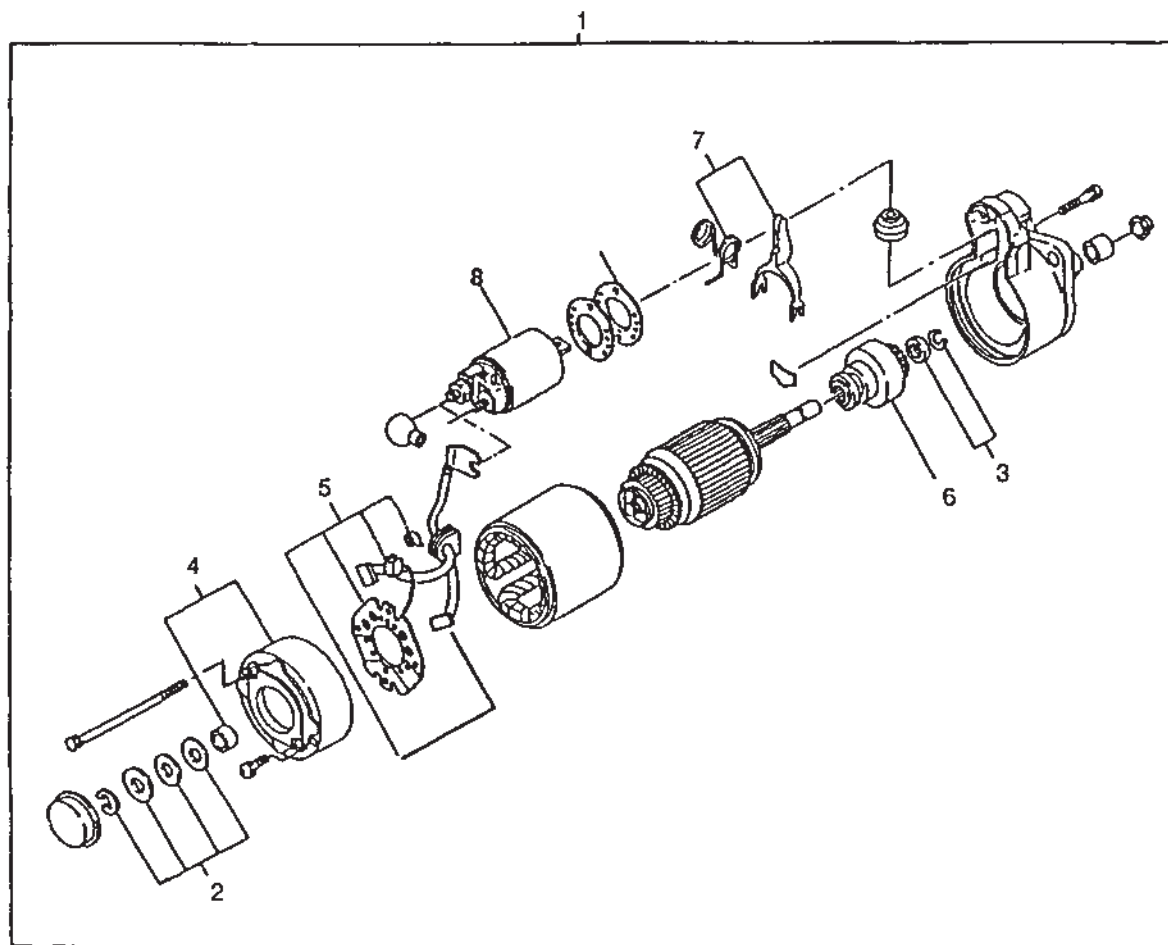


SECTION 7 FLYWHEEL and STARTER GROUP - EH65, 22.0hp

[illegible]

SECTION 8 STARTER COMPONENTS- EH64, 20.5hp & EH65, 22.0hp

FIG. 800



SECTION 8 STARTER COMPONENTS- EH64, 20.5hp & EH65, 22.0hp

[illegible]

CYLINDER HEAD DESIGN CHANGE - VALVE GUIDE CHANGE

Design Change - February 2003

The cylinder head design was changed in February 2003. The change effected the head design around the exhaust valve guide, valve guides and the exhaust valve retention design.

Valve Guide Change

A groove was added 8.5mm below the top of the valve guide to accept a "C" clip to retain the exhaust valve guide position.

Exhaust Valve Guide Retention

A valve retainer plate was added to the exhaust valve guide to prevent the guide from moving from its original position.

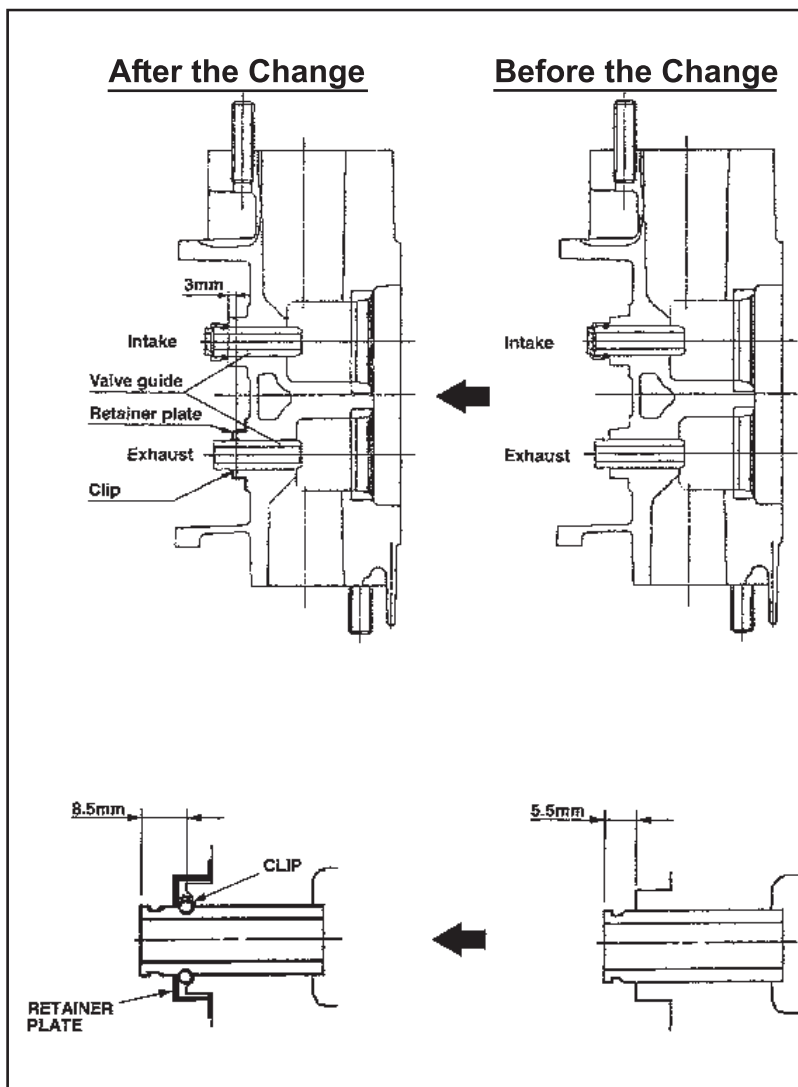
Cylinder Head Machining Change

The raised area around the exhaust valve guide was changed to lower the rise by 3mm and to add a bevel to accommodate the "C" clip.

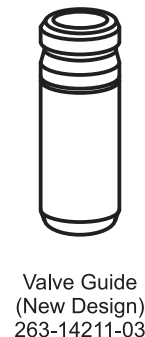
Service Note

Servicing Valve Guides on Original Design Heads

The valve guides may be replaced on the original head designs. However, the exhaust valve retention plate can not be used. The "C" clip may be placed on the top groove. A machine shop may also add knurling to the valve guide external surface to prevent guide movement.



New Valve Guide Parts



APPENDIX B

GOVERNOR SPRING AND ROD POSITIONS

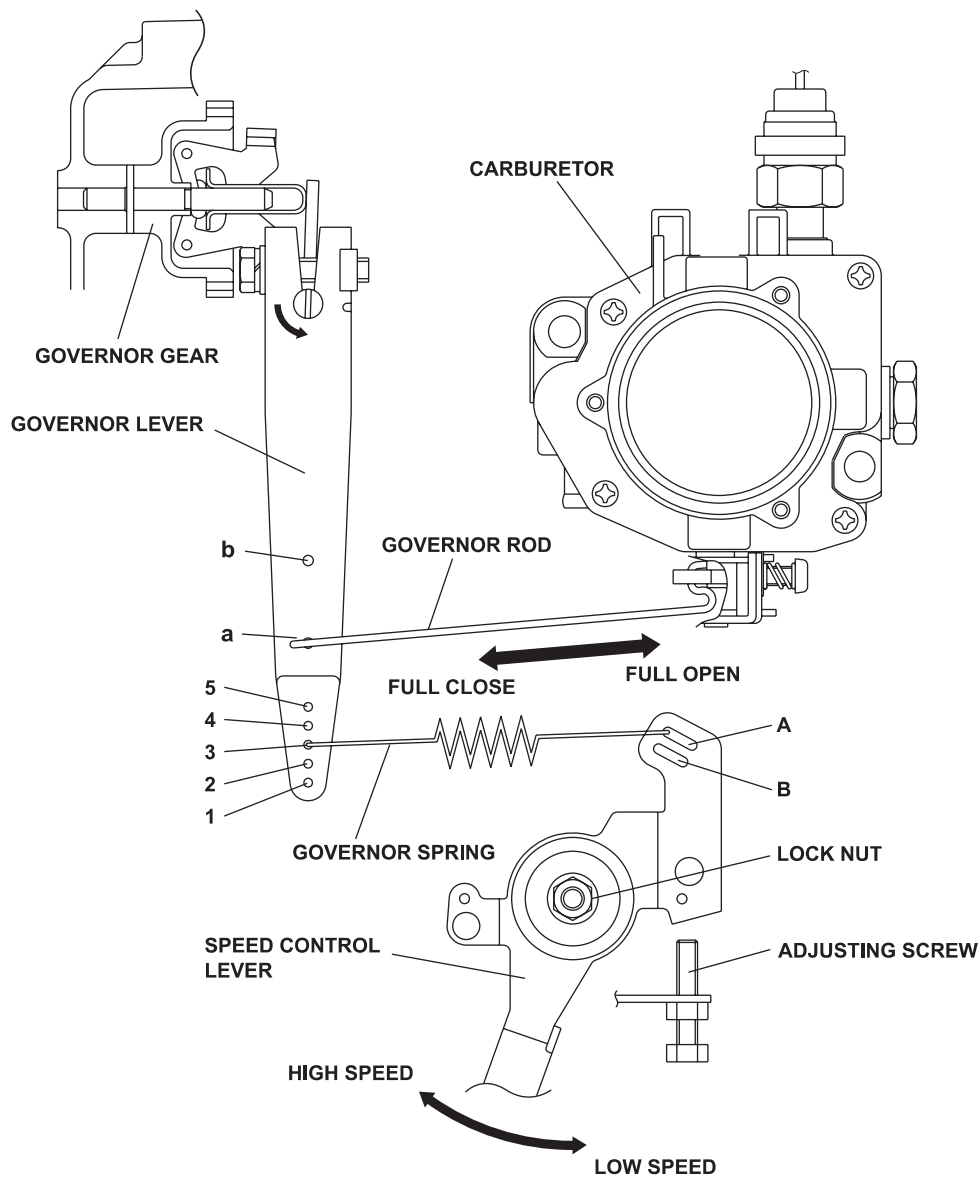


Fig. 5-45

WELDER	ROBIN SPEC.	ONAN SPEC.	GOVERNOR ROD POSITION	GOVERNOR SPRING POSITION
MILLER HOBART	EH650DB2322	P220GIOHV-786A	b	A - 5
MILLER HOBART	EH650DC2420		a	A - 2
MILLER BOBCAT	EH650DB2341	P220GIOHV-2252A	b	A - 1
MILLER BOBCAT	EH650DC2405		a	A - 3
MILLER TRAILBLAZER	EH650DB2390	P220IOHV-2711A	b	A - 1
MILLER TRAILBLAZER	EH650DC2415		a	A - 3
LINCOLN ELECTRIC	EH650DB2332	P220IOHV-1145A	b	A - 5

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Forward

The following three conditions must be fulfilled for satisfactory engine start

1. The cylinder filled with a proper fuel-air mixture.
2. Good compression in the cylinder.
3. Good spark, properly timed, to ignite the mixture.

The engine cannot be started unless these three conditions are met.

There are also other factors which make engine start difficult, e.g., a heavy load on the engine when it is about to start at low speed, and a high back pressure due to a long exhaust pipe.

The most common causes of engine troubles and solutions are given throughout the following pages.

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FUEL CUT-OFF SOLENOID

The fuel solenoid controls the flow of fuel from the float chamber into the main jet. When the engine is not running, the plunger will remain extended. During starting and operation, 12 volts DC is applied to the solenoid and the plunger is retracted. Fuel is then allowed to flow to the main jet.

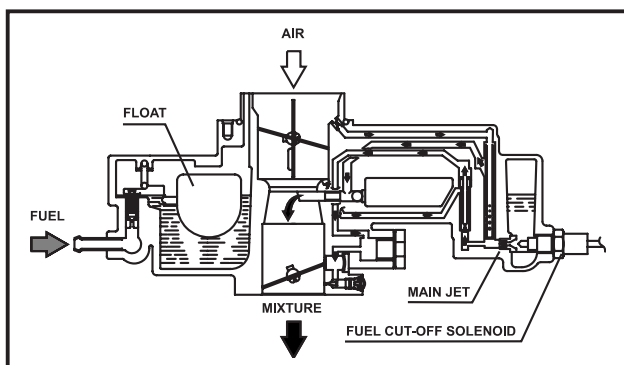


Fig. 1 - Carburetor cross section

PROBLEM

No Start. Engine cranks but does not start.

Stale fuel can cause gum deposits around the plunger in the solenoid not allowing the plunger to retract during starting. This stops the fuel supply to the main jet causing the engine not to start.

Verify the following:

- Spark at the spark plug - if dry see remedies
- Oil - Check oil level
- Fuel - Check fuel supply
- Crank Speed
- Battery

CORRECTIVE ACTION

Please follow in this order as necessary.

1. Tapping lightly on the side of the solenoid. This may free the plunger from any gum build up.

Turn the start switch to the "Start" position to energize the solenoid. The solenoid will make a "clicking" sound as the 12V DC power is applied. If no sound is heard, proceed to step number two. See figure 2.

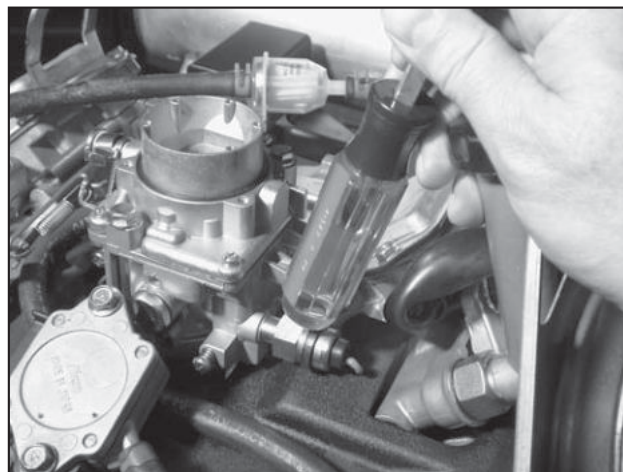


Fig. 2 - Tap the solenoid

2. Loosen the solenoid a few turns without removing the solenoid from the carburetor. This will extract the plunger from the main jet. Re-tighten the solenoid and test.

If solenoid does not function, proceed to step 3.

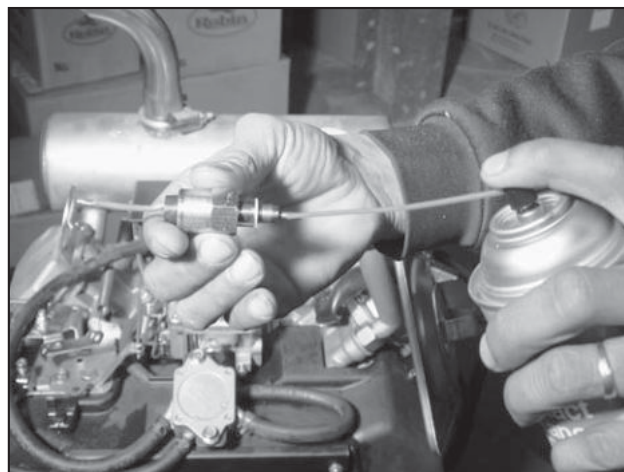


Fig. 3 - Clean the solenoid plunger

3. Remove solenoid from carburetor. Spray carburetor cleaner into the plunger end, as well as in the carburetor body. See Fig. 4. Gently manipulate plunger to loosen gum deposits.

Test the solenoid operation by turning the start switch to the "Start" position. The solenoid plunger will retract when 12V DC power is applied. Note: solenoid will need to be grounded when power is applied. If solenoid does not function after cleaning, proceed to step 4.

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! WARNING !

Remove solenoid only on cold engine.
When solenoid is removed from carburetor, any fuel in the float chamber will drain out.

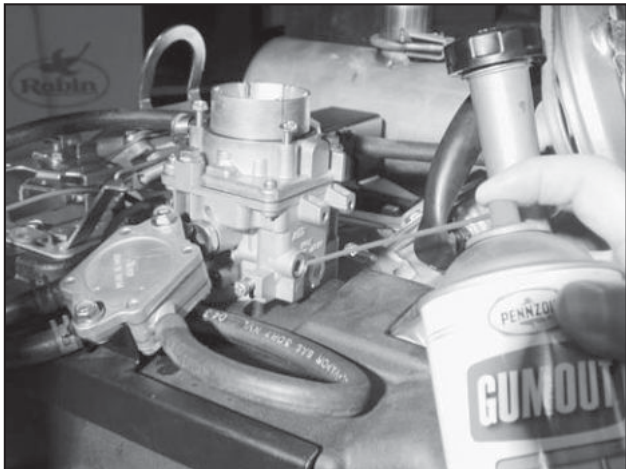


Fig. 4 - Clean the carburetor solenoid hole and main jet

4. If cleaning does not restore the solenoid operation, replace fuel solenoid (part no. 263-62556-08). To replace the solenoid, cut red wire close to the solenoid. Install the new solenoid and reconnect the wires using a crimp connector.

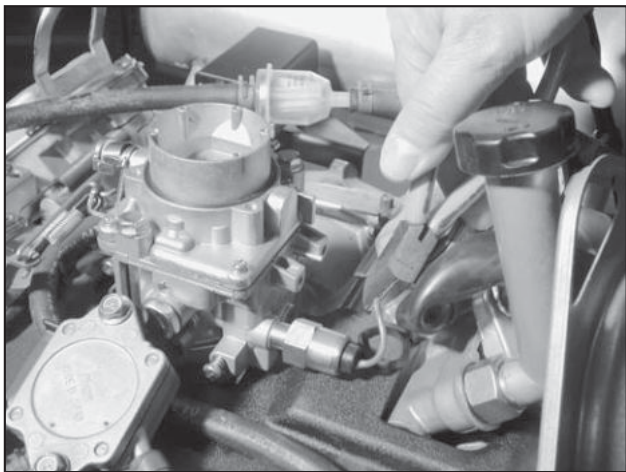


Fig. 5 - Cut the wire close to the solenoid when replacing

STOP DIODE

The stop diode serves to isolate each ignition coil while allowing one grounding lead to be used to ground both coils to stop the engine. It is located under the shroud, above the starter motor.

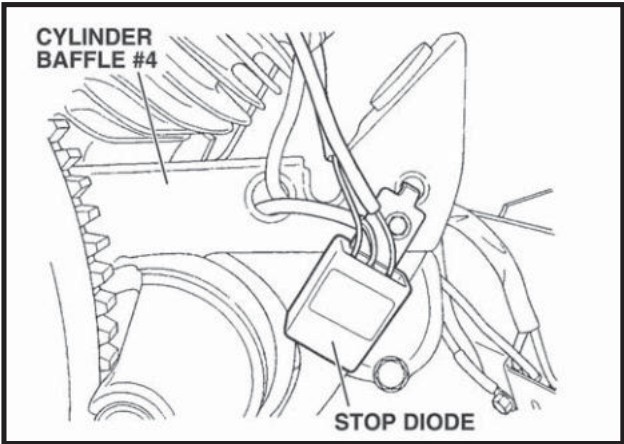


Fig. 4 - Stop diode mounted on engine

PROBLEM

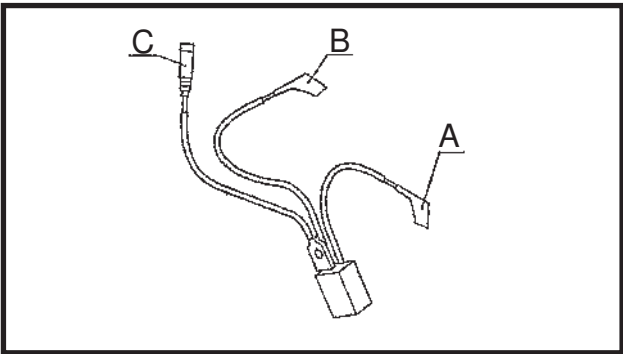
Engine cranks but does not start. The condition could be caused by a defective stop diode.

CORRECTIVE ACTION

- Measure the continuity between the wires.

	Black (-) needle			
		A	B	C
	Red (+) needle			
Red (+) needle	A		∞	∞
	B	∞		∞
	C	Continuity	Continuity	

(Continuity = Closed Circuit / ∞ = Open Circuit)



- Replace the stop diode if the actual value differs from the rated value.

Robin Subaru - V-Twin Service Update - Welder Applications

WIRING HARNESS

For Miller Electric and Hobart Welder Applications Only

The wiring harness on the Onan/Robin OHV engines for Miller Electric and Hobart, includes a diode and a Buss AGX 30 amp fuse. The purpose of the fuse is to protect the wiring harness should a short occur. Note: it is important that the correct fuse length (15/16 in.) be installed in the fuse holder.

The purpose of the bypass diode is to prevent feedback to the starter solenoid. If the diode is "shorted", the engine continues to crank after the start stop switch is released from the start position. If the diode is "open" the engine will crank, but will not start. An open diode will not allow the shutdown relay to energize and remove the ground from the ignition coils. The harness is located on the oil filter side of the engine.

PROBLEM

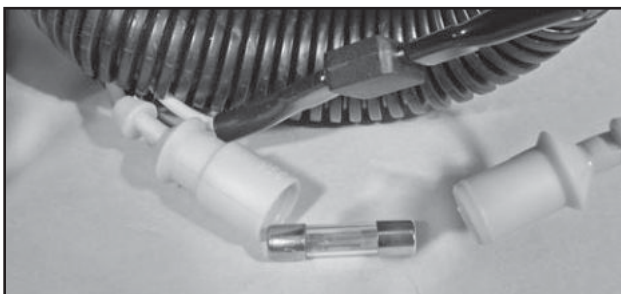
Engine will not crank or start.

Could be caused by either a blown fuse or faulty diode.

CORRECTIVE ACTION

- Split the harness open with your hands to reveal the diode and the fuse.

Replace the diode, part # EH65A0256.



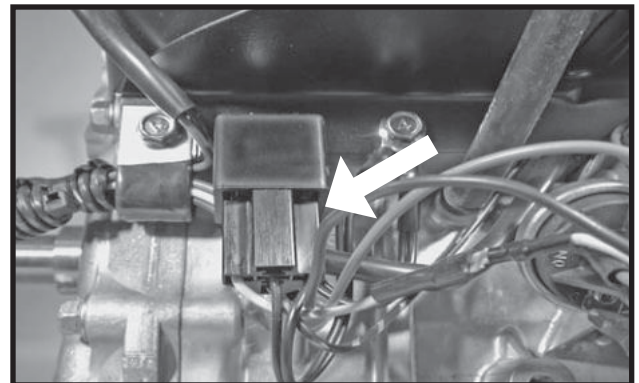
SHUTDOWN RELAY

For Miller Electric and Hobart Welder Applications Only - EH64, 20.5hp

The relay contacts are wired between the Stop Diode and Ground. The relay contacts are normally closed and ground the ignition coils (stop the engine). Please refer to the relay diagram and the wiring diagram.

The relay has two functions. During engine running the relay coil is energized by a 12V DC power signal controlled by the oil pressure switch. This removes the ignition ground and allows the engine to operate. If the oil pressure drops below the minimum pressure, the oil pressure switch will switch the power off the relay coil and the ignition coils will be grounded to turn off the engine.

The relay also has an important function during engine startup. At startup, the oil pressure will initially be low. During start-up the welder control system will provide 12V DC to the relay coil to remove the ignition coil ground and to by-pass the oil pressure switch. This allows the engine to start quickly.



PROBLEM

1. The engine will crank, but will not start.
2. The engine does not shut down immediately when the engine is turned off.

SYMPTOMS

1. Fuel to the spark plugs (plug wet) - OK
2. No spark
3. The Stop Diode tests good

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Note: If the engine wiring harness is disconnected from the welder, the engine will not start. Among other functions, the welder control system provides power to the relay during start-up to remove the ignition coil ground.

TEST PROCEDURES

Step 1

Remove the relay and unplug the wire connector. Check for continuity across the normally closed contacts, spade connectors #30 and #87A. If there is no continuity, the relay should be replaced.

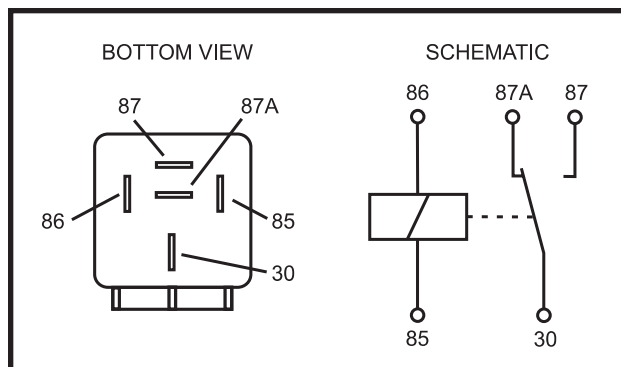
Step 2

Apply 9 - 12V DC across the relay coil on spade connectors #85 and #86 (brass colored). A "clicking" sound should be heard as the power is applied and removed. Proceed to step 3.

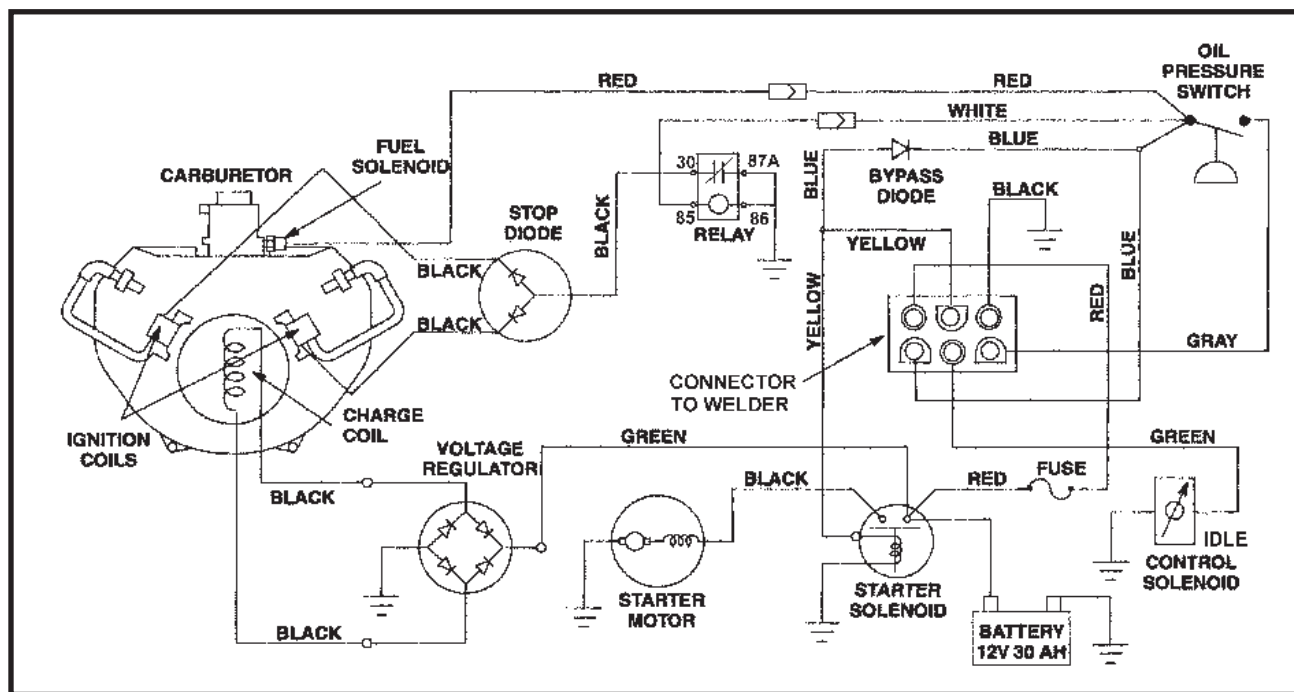
Step 3

Apply 9 - 12V DC across the relay coil on spade connectors #85 and #86 (brass colored). Check for continuity across the normally closed contacts, spade connectors #30 and #87A. With the relay coil energized, there should be no continuity (open circuit). If there is continuity while the coil is powered, the relay should be replaced.

Relay Diagram and Schematic



Wiring Diagram For Miller Electric and Hobart Welder Applications Only



Engine Specification Numbers: EH650DB2332
EH650DB2341
EH650DB2390

Robin Subaru - V-Twin Service Update - Welder Applications

IGNITION COILS - EH64, 20.5hp

The ignition coils have gone through two changes. The first being a vendor change. The second, to improve starting.

Figure 1 shows the original coil. These coils perform well and only be replaced upon coil failure.

Figure 2 shows the coil after the vendor change. If this coil is being used, we suggest that you update the coil to the one shown in figure 3.

Figure 3 shows the newest coil. This last change was made to improve startability. Please note the White dot identifies the current design from the previous coil (fig. 2).

PROBLEM

Hard starting, hard starting in cold temperature.

CORRECTIVE ACTION

1. Check the ignition coil. If the coils match the coil shown in figure 2, replace both coils and order (2) plug terminals #X65-91000-10. File a warranty claim.

2. Check the coil gap to the flywheel magnet.

The ignition coil air gap clearance is 0.3 mm or (0.012 - 0.015 in). This measurement is done with a thickness gauge between the ignition coils and flywheel.

Tighten the left bolt first, then the right bolt. Rotate the flywheel and recheck the clearance.

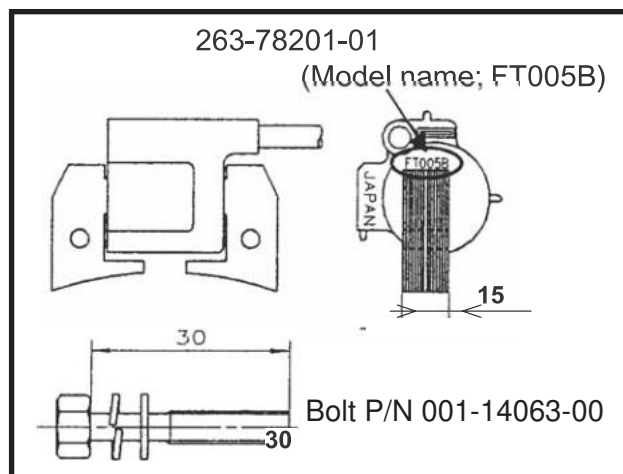
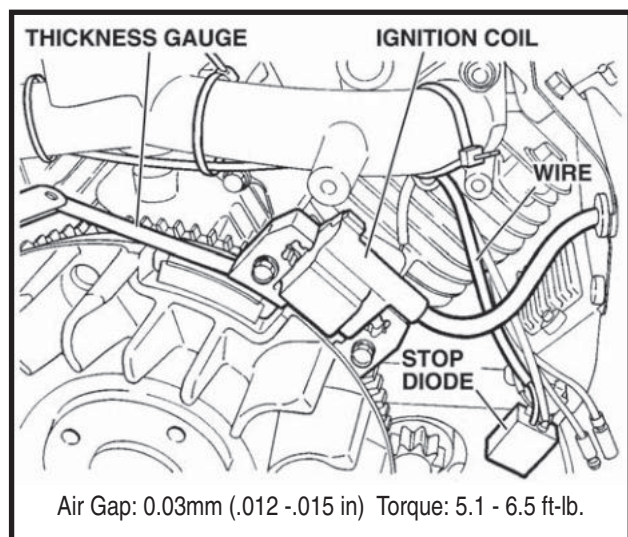


Fig 1 - Original Ignition Coil - Do Not Replace

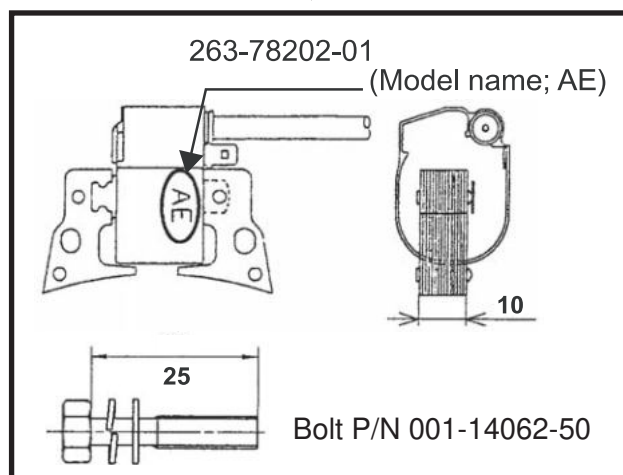


Fig 2 - New Design - After Vendor Change

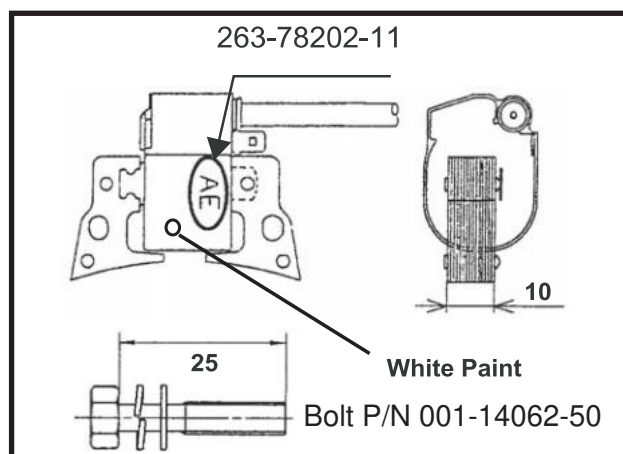


Fig 3 - Revised New Design - White Paint Mark

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HIGH ALTITUDE KITS

Installation of a high altitude kit will help increase engine performance and decrease exhaust emissions at higher altitudes.

PROBLEM

For operation of engine above 5,000 ft (1,500 meters), to avoid poor engine performance.

CORRECTIVE ACTION

Install a High Altitude kit. Please follow in this order.

1. Remove carburetor from engine. Unscrew the solenoid valve from the carburetor with a 19mm metric wrench.

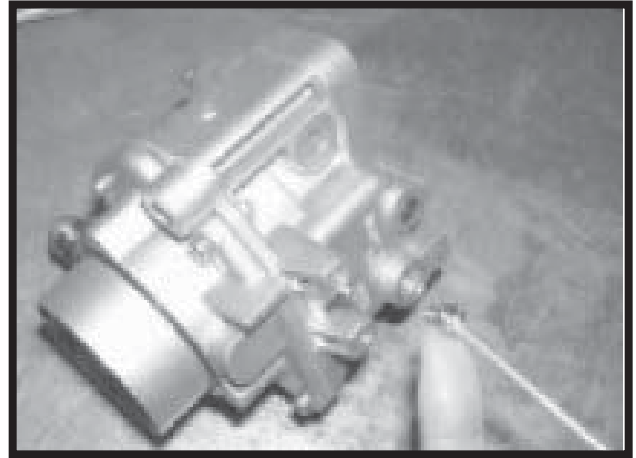


2. Unscrew the standard jet from carburetor using a flat head screw driver.



3. Install the high altitude jet into the carburetor using a flat head screw driver.

NOTE: DO NOT OVERTIGHTEN THE JET OR THE HEAD WILL STRIP



4. Replace solenoid valve, and reinstall carburetor on the engine.

Once the jets have been changed, the high altitude label should be affixed somewhere noticeable on the engine (shroud or air cleaner cover) and the owner's manual addendum is required to be given to the engine owner.

An engine which has been converted for high altitude use, cannot be run at lower altitudes. A high altitude converted engine running at lower altitude will run lean causing the engine to overheat leading to internal damage. The affixed high altitude label identifies which engines have been converted, and should be taken off when the engine is restored to its original factory specification.

Kit numbers:

92630024 - Used on EH64, 20.5hp

EH65, 22.0hp

92630025 - Used on EH72 25.0hp

Kits include the following:

1. Instructions and BOM
2. Warning label
3. Owner's Manual addendum
4. High altitude jet:

263-62463-08 - for EH64, 20.5hp

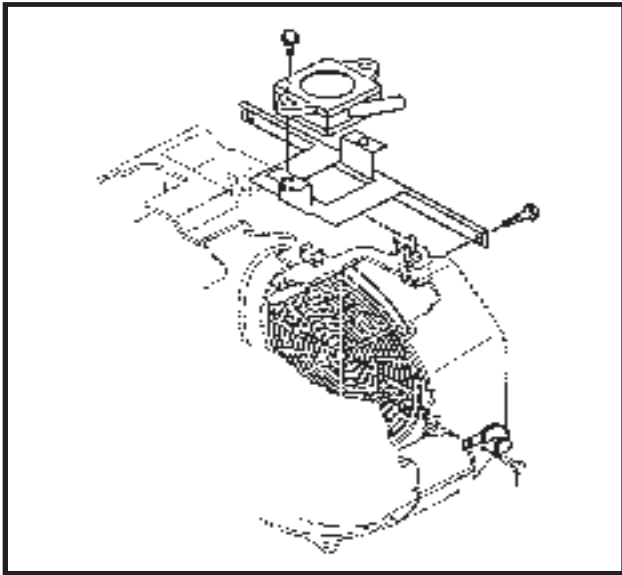
EH65, 22.0hp

263-62640-08 - for EH72 25.0hp

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FUEL PUMP

A diaphragm type fuel pump is located either in front of the engine below the aircleaner or on the oil filter side of the engine. The pump utilizes pressure changes in the crankcase to actuate a diaphragm to pump the fuel.



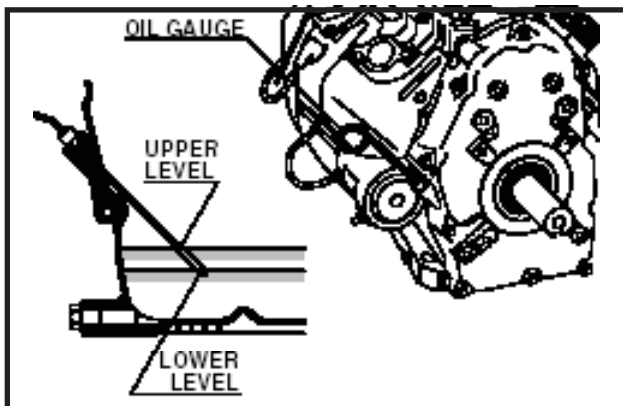
PROBLEM

Hard starting. Can not get fuel to carburetor. This condition could be caused by the following:

- Overfilling crankcase with oil
- High Ambient Temperatures
- High Altitude

CORRECTIVE ACTION

1. Check the oil level. Overfilling will block the fuel pump breather port.



Note:

Oil capacity: 53 oz. (1.55 Liters)

Use SAE #20, #30 or 10W-30 class SE or higher automobile engine oil.

Be certain it is not overfilled.

2. Check hose and hose connections for leaks. If cracked or damaged, replace.

3. Replace fuel pump using the new high lift pump.

Part number: 280-62201-00

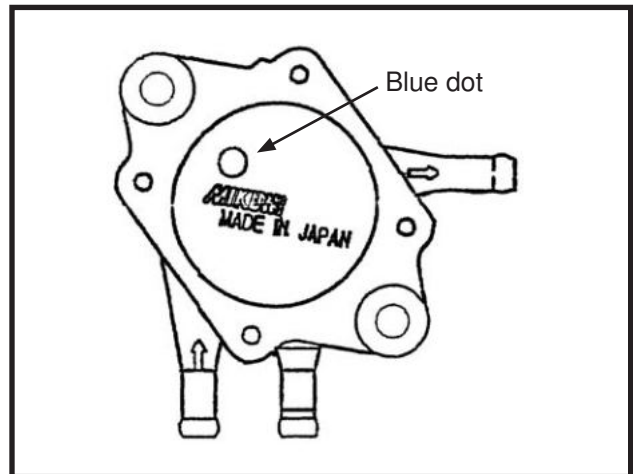


Fig 1 - Revised New Design - Blue Paint Mark

The new High Lift fuel pump can be identified by the Blue dot, as shown below in figure 1.

Note:

If operating above 5,000 feet, you may need to change the main jets when replacing the fuel pump. See High altitude section.

Robin Subaru - V-Twin Service Update - Welder Applications

SPARK PLUG

PROBLEM

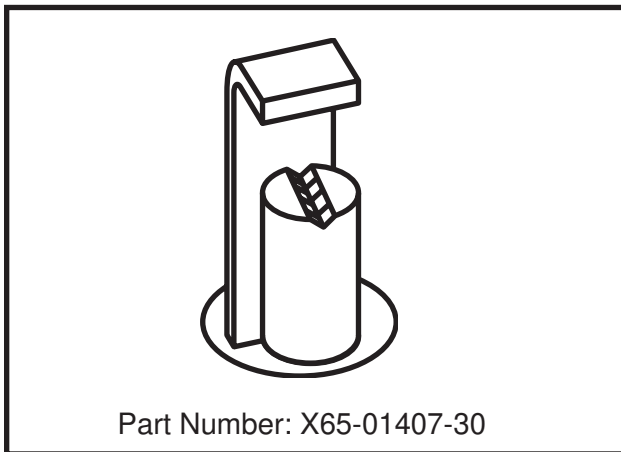
Hard starting when the engine is cold. The engine will run on one cylinder but is hard starting.

CORRECTIVE ACTION

Check for a fouled spark plug. The correct spark plug is NGK BPR4EY, Pro V. This plug has a split center electrode, called the V-Groove.

This forces the spark to the outer edge of the ground electrode, placing it closer to the air/fuel mixture. This allows the spark to more quickly ignite the mixture, providing more complete combustion.

The gap is set at 0.025 inches or .6 to .7mm.



ENGINE OPERATION WHILE DISCONNECTED FROM WELDER CONTROL BOARD

For Miller Electric and Hobart Welder Applications Only

Should you need to “hot-wire” the engine for testing purposes on the Miller Welder, the following wires need to be connected after the plug has been disconnected from the welder portion. This procedure may be required to test the engine separate from the welder start -stop circuit.

Note: plug is located behind side panel on the center support bracket.

Run Condition-Connect Red and Blue Wire (places power to the bypass relay and ungrounds the magneto and puts power to the fuel solenoid). The EH65, 20.0hp, does not use the bypass relay. However, wiring connection will be the same.

Crank Condition-Connect Yellow and Red Wire (cranks engine)

After engine starts, disconnect the Yellow and Red crank wire circuit.

Note: See the wiring diagram in the “Shutdown Relay” section.

Removal & Installation Procedures of the Onan by Robin (OHV) V-Twin Engine on the Miller Bobcat 225 & 250 Series Welders, as well as the Hobart Champion 10,000

Should it become necessary to remove and install the Onan by Robin Engine in the Miller Bobcat 225 & 250 series welder, as well as the Hobart Champion 10000, the steps on the following pages should be followed.

Note: This information is intended for a service professional. Follow all safety and operating procedures shown in the owners and service manuals.



Onan by Robin 22hp (side view)



Onan by Robin 22hp (back view)



Onan by Robin 20.5 hp (side view)

1. Remove the engine access doors and set aside.

Note: These doors are lifted “up and out” from the engine frame.

Note: Unless noted otherwise, the removal and installation procedures are similar for all models .



2. Remove the 8 bolts on the rear engine panel using a 3/8" wrench or socket.

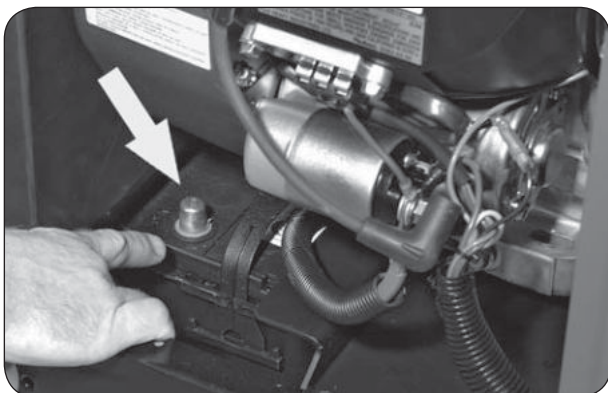


3. Lift the 'engine back panel' away from the engine & frame and set aside.

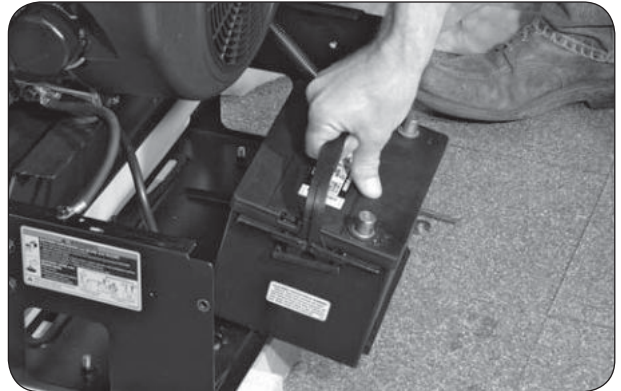


4. Disconnect the negative battery lead first using a 1/2" wrench.

Note: Always disconnect the spark plug wire before working on any part of the welder. This will prevent accidental starting of the unit.



5. After disconnecting the battery positive terminal with the 1/2" wrench, remove the battery hold down bracket using a 7/16" wrench. Then remove the battery from the unit and set aside.

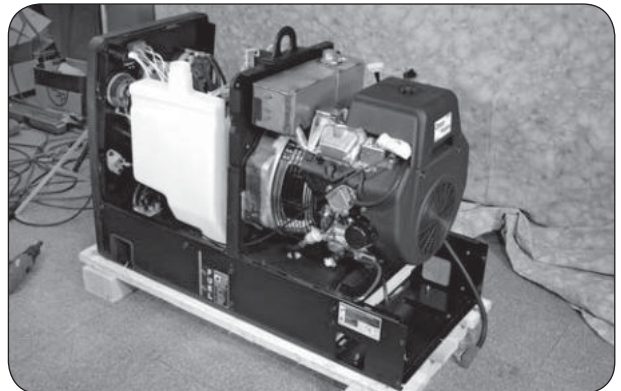


6. Remove the gas cap, exhaust pipe, and the 8 bolts that hold down the units top cover. Lift the cover off and set aside.



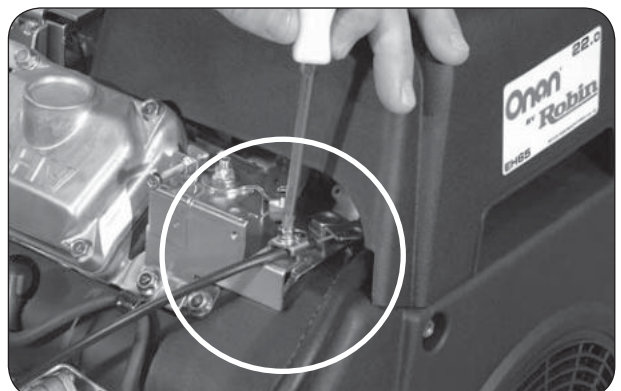
7. Remove the 2 bolts from each side panel. Lift the side panels out and set aside.

Note: After removing the bolts, be careful to lift the side panels 'up' and 'out' of the welder frame, being careful not to let the panel drop.



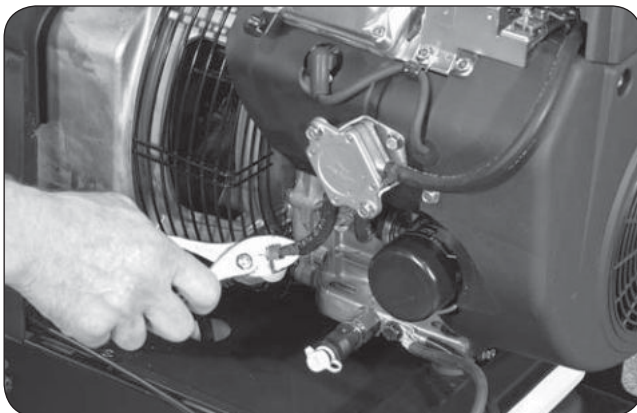
8. Remove the choke cable from the engine control bracket after loosening the hold down clamp with a Phillips screwdriver.

Note: Make sure to reinstall the bolt and top clamp bracket back into the control lever housing for later reinstallation.

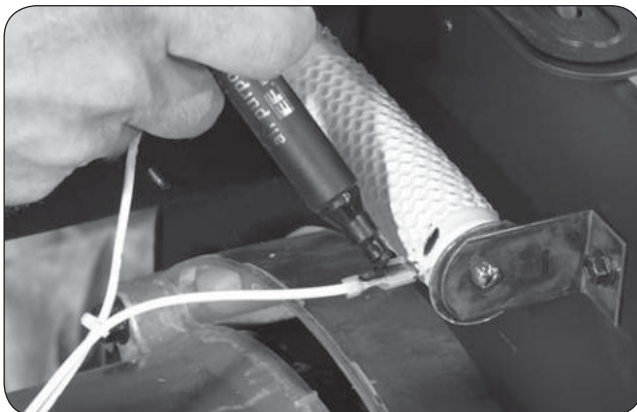


9. Remove the fuel line from the fuel pump.

Note: If the fuel **level** is higher than the gas line coming out of the fuel tank, **expect** fuel to spill out of the fuel line when it is removed from the fuel pump. Be prepared to siphon or pump fuel out of the tank until the level of fuel drops below the level of the 90 degree fitting coming from the tank before removing the fuel line. Also, A small amount of fuel will spill from the fuel pump until it runs dry.



10. Mark and remove the two wires that go to the large white resistor located above the stator housing.



11. Mark and disconnect the wires that go to the brush block assembly.

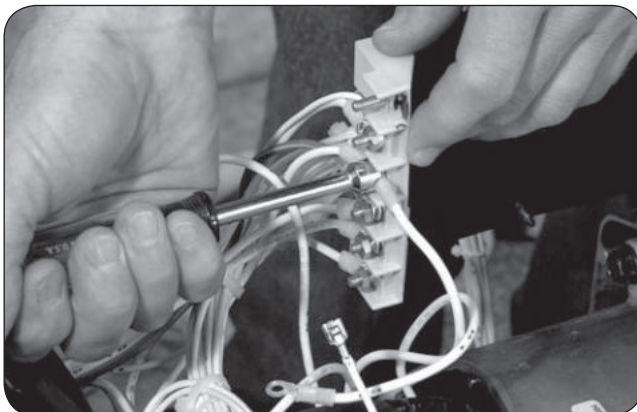
Note: Just remove the two white wires at this time. The brush block assembly will be removed in a later step.



12. Mark and disconnect the 4 auxiliary power (generator output leads) that go to terminal strip 1T. These leads are white in color.

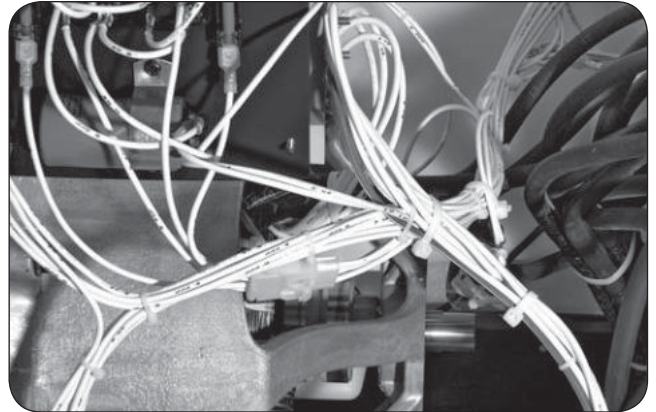
Bobcat 250---Leads-81A,90A,80A, & 82A
 Bobcat 225---Leads-81A,90A,80A, & 82A
 Champ 10K--Leads-51, 60, 52, & 53

Note: See Steps 19-a and 19-b for removal of generator output leads on the Hobart Champion 10000

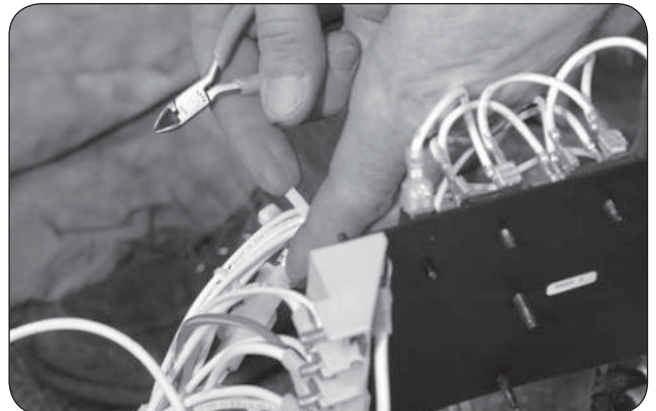


13. A number of cable ties are used to keep the wires from interfering with the rotating components on the welder. Take note of proper location and placement.

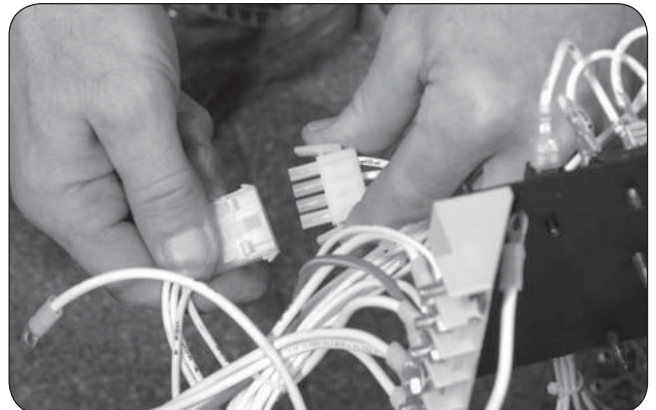
Note: To achieve original factory locations of wire ties, it might help by marking locations of wire ties with some type of marker pen. This will help in identifying original locations during reassembly.



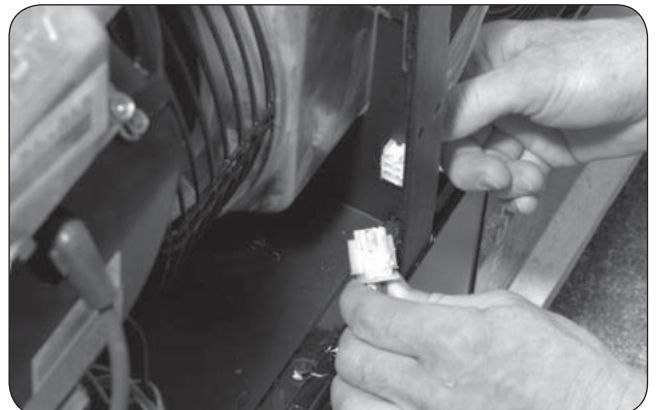
14. Cut only the necessary cable ties from the wiring harness.



15. Pull apart the 4-plug connector near the terminal strip.



16. Pull apart the 4 pin plug connector on the center upright housing.

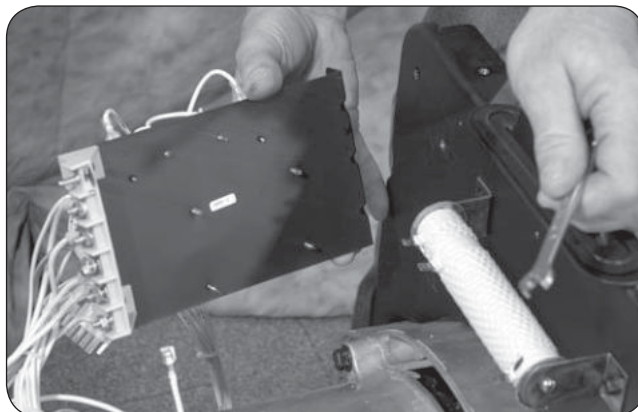


17. Remove the female plug connector from the center upright housing.



18. Remove the two bolts that hold the component panel from the center upright support, and set aside.

Note: Components and wiring do not need to be removed from the panel.



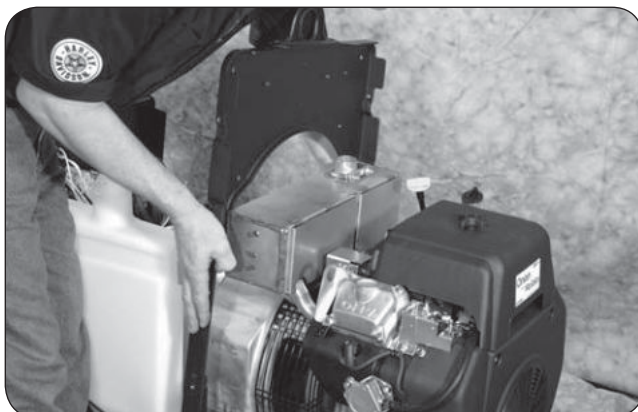
19. Hobart Champion Only

Note: The Hobart Champion 10000 generator auxiliary power output leads must be removed from the terminal strip shown in the picture.



20. Remove the 4 bolts that hold the center upright in position. Before lifting straight up and away from the unit, push the sides of the upright center mount together to push the pins out of holes in the base (these are locking pins).

Note: When reinstalling the center upright back into the frame, make sure the bottom edge of upright fits into the split tabs of the fuel tank cover.



21-a. Bobcat 250 Only

Remove the three thick black stator output leads that are attached to the Course-Range Switch, as well as the fourth thick black stator lead that goes through the red donut to the rectifier. Make sure to mark the wires for proper reassembly.

Lead 10--through the donut to the rectifier

Lead 11---to # 4 on Course Range Switch

Lead 12---to # 2 on Course Range Switch

Lead 13---to # 11 on Course Range Switch

Note: Make sure to torque to 9 ft lbs when reinstalling the welder leads.

21-b. Bobcat 225 Only

Remove the two thick black stator output leads that are attached to the Course-Range Switch as well as the third thick black stator lead that goes through the red donut to the rectifier. Make sure to mark the wires for proper reassembly.

Lead 10--through the donut to the rectifier

Lead 11---to # 6 on Course Range Switch

Lead 12---to # 11 on Course Range Switch

Note: Make sure to torque to 9 ft lbs when reinstalling the welder leads.

21 c. Hobart Champion 10000 Only

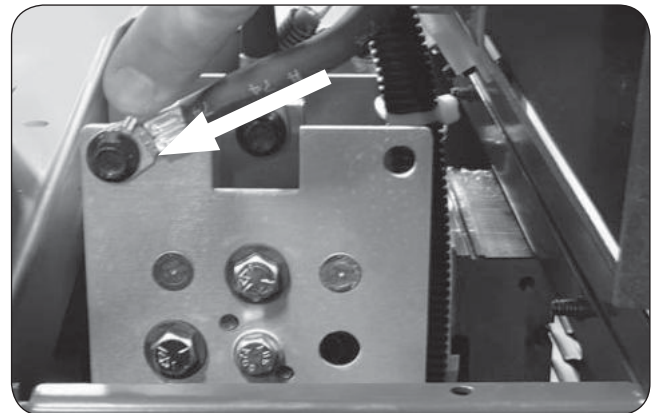
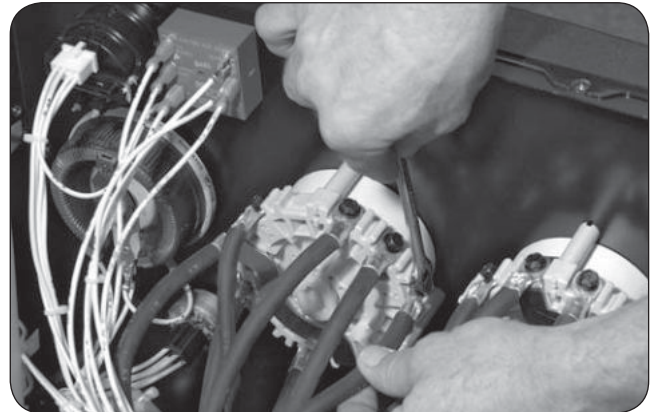
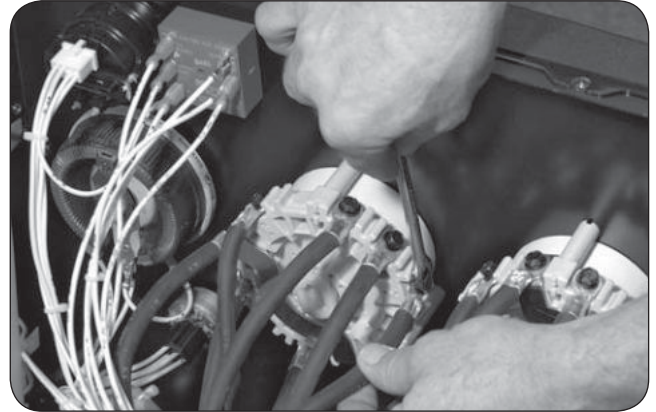
Remove the two thick black welder output leads (#s70 & 71) that go to the middle plate of the rectifier assembly.

Note: Lead 70 goes directly to the rectifier from the donut.

Note: Make sure to torque to 9 ft lbs when reinstalling the welder leads.

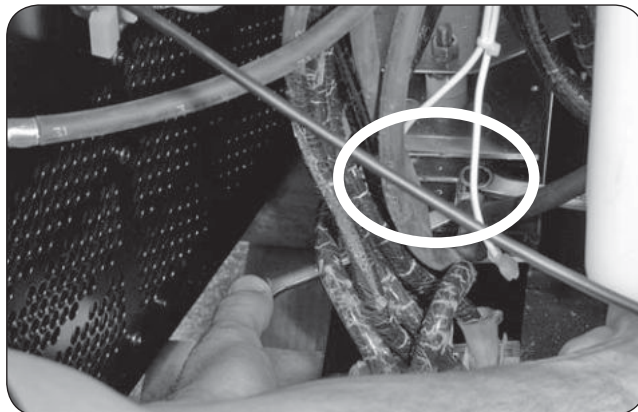
22. Remove the 4 bolts that hold the front control panel to the frame. Pull the front panel back about 1 or 2 inches.

Note: This will improve access to the leads that go to the rectifier assembly.

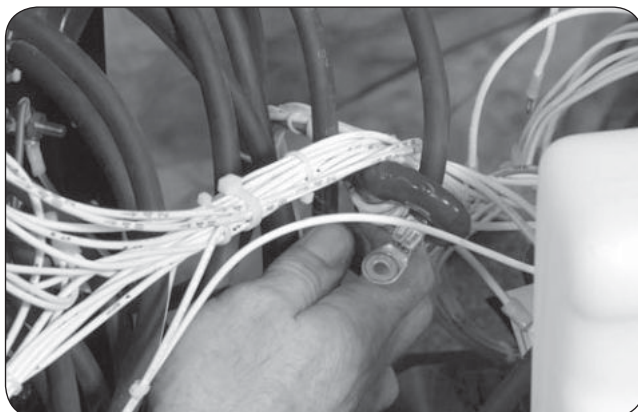


23. Using two wrenches, remove the nut that holds the thick black stator wire bolted to the rectifier on the stabilizer reactor assembly.
See Step 21-c for Hobart Champion instructions.

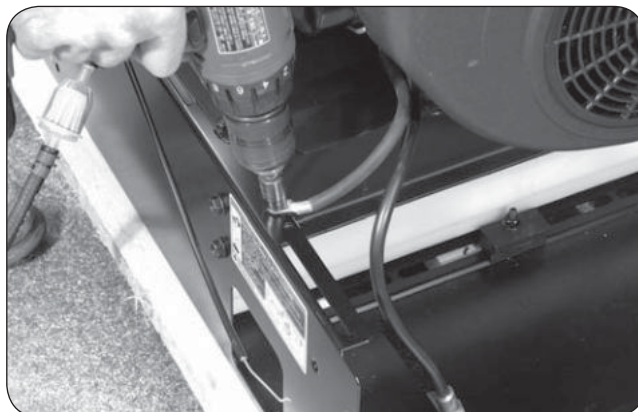
Note: Leave the bolt & nut in hole for later re-installation.



24. Pull the last thick black stator wire through the red donut.

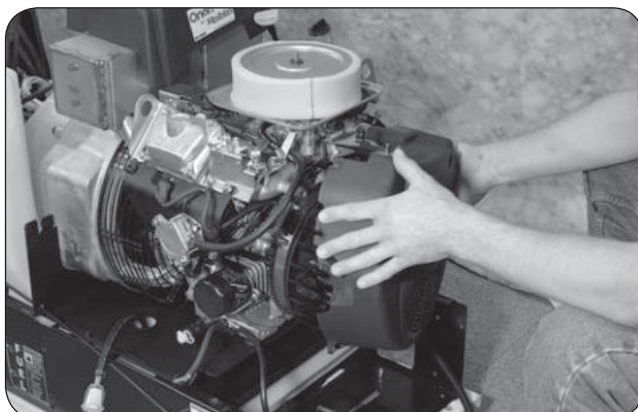


25. Remove the ground strap from the frame near the engine.



26. After removing the air cleaner cover, loosen, but do not remove the 4 upper blower housing bolts that holds the blower housing to the engine block. Next, remove the 2 bottom blower housing bolts from the engine block. After lifting the carburetor vacuum hose from the blower housing, pull the blower housing away from the engine and set aside.

Note: For the Champion 10000, the fuel pump and fuel pump bracket must be removed before the blower housing is removed. Take care not to loose the two spacers located behind the bracket bolts.

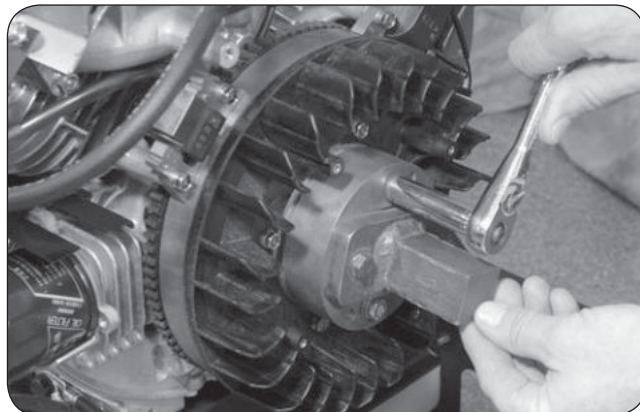


27. Should you have access to the Miller special tools that mounts on the flywheel, install them at this point in the disassembly.

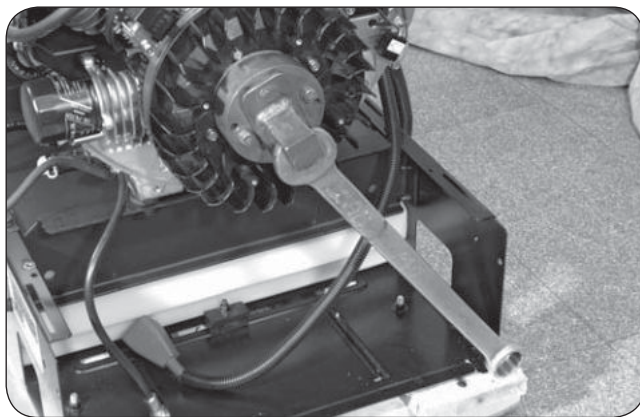
Rotor Removal Tool-Miller Part # 147551

Rotor Removal Tool Spacer-Miller Part # 177126

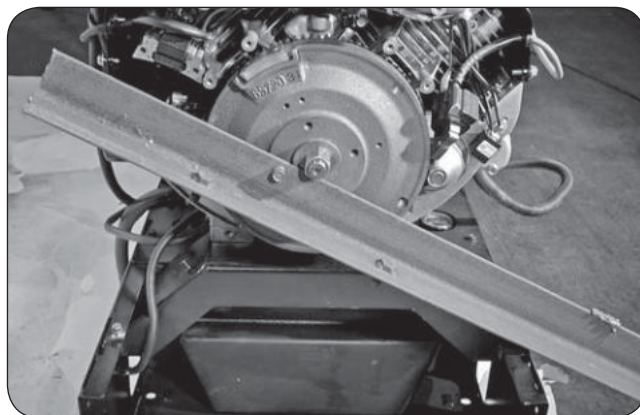
- Note:** If you do not have the Miller special tools go to step 29.



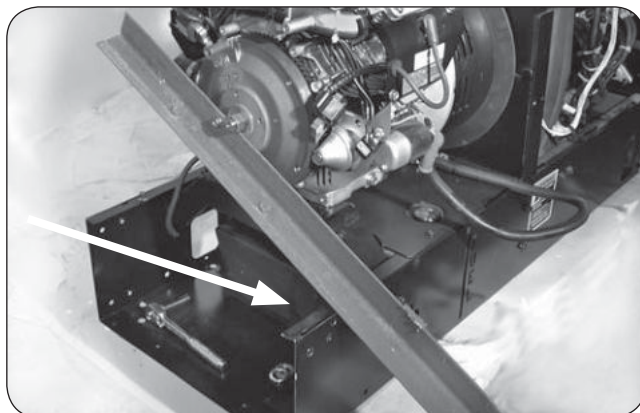
28. At this point it should be noted that the welder rotor must first be ***“broken loose”*** from the engine crankshaft before any further disassembly. This procedure entails holding the flywheel in a locked position. It must be noted that ***quite a bit of force*** will be needed to break the rotor loose. The rotor must be turned in a counterclockwise position. The threads on the engine crankshaft are threaded similar to a standard bolt.



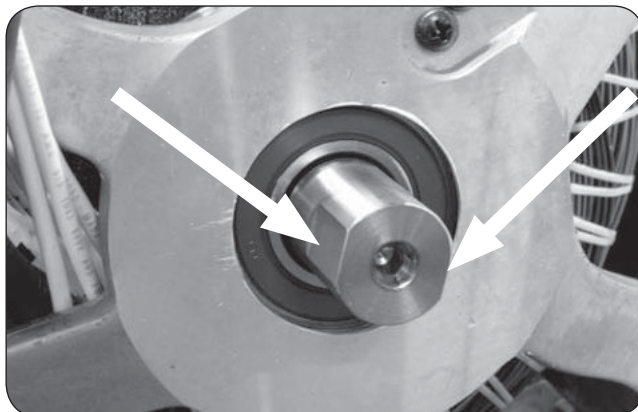
29. If you do not have the special Miller tools, then the procedure shown will also work for holding the flywheel.
First remove the 4 bolts & fan shroud that are attached to the flywheel and set aside.
Next, drill a hole in the angle iron for the bolt to attach the angle iron to the flywheel. Now, bolt the angle iron, or suitable mounting device to the flywheel as shown.



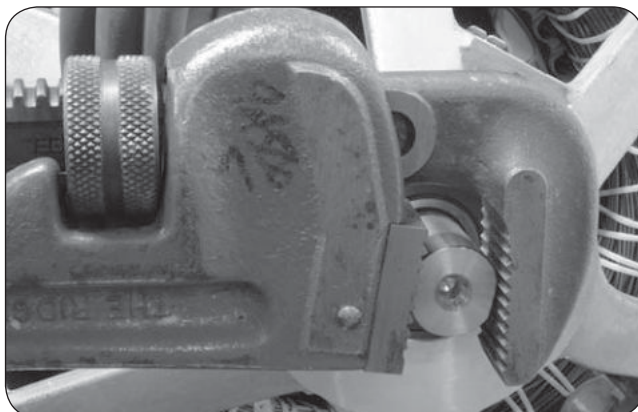
30. Place some type of protection between the angle iron and the welder frame to prevent scratching.



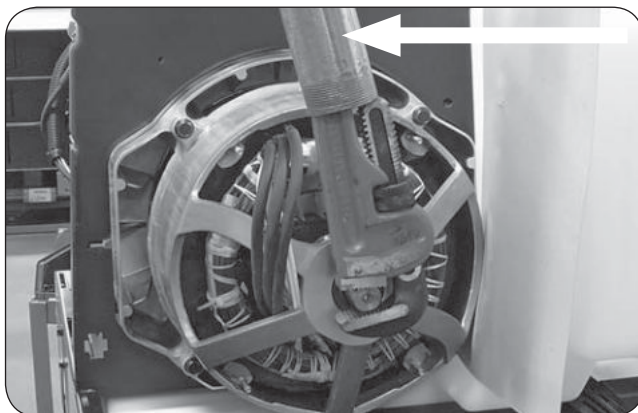
- 31.** A large pipe wrench must be placed over the rotor extension to loosen the rotor. The rotor extension has flats on each side of the shaft for the pipe wrench to grip.



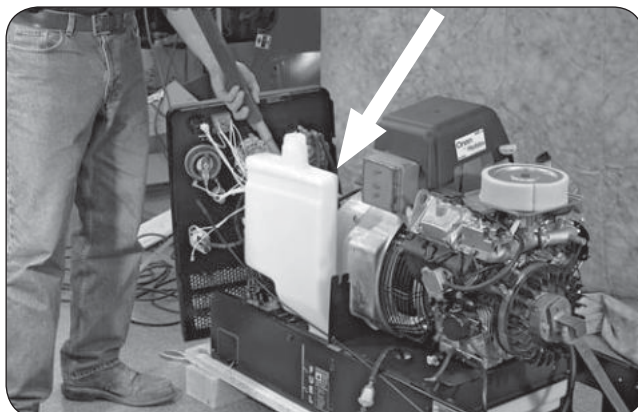
- 32.** To break the rotor loose from the threaded crankshaft, a fairly large pipe wrench must be placed over the rotor extension. Make sure all wires are out of the way before turning the wrench.



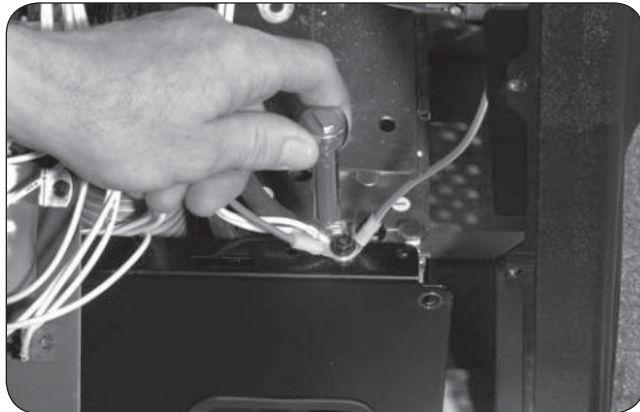
- 33.** It may become necessary to place a “cheater” pipe over the end of the wrench to “encourage” the loosening process. The pipe wrench will be turned in a counterclockwise position. When the rotor has begun to turn freely, turn a few more revolutions on the wrench to make sure it is loose.



- 34.** Be prepared to use force (turning in a counter clockwise position) to loosen the rotor from the crankshaft.



35. Loosen and remove the ground bolt from the frame of the unit using a 3/8" socket.

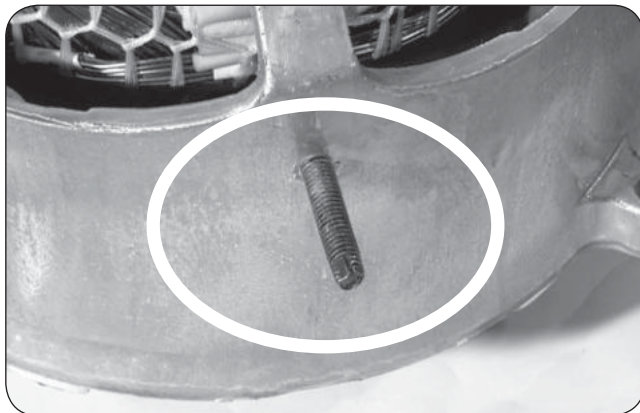
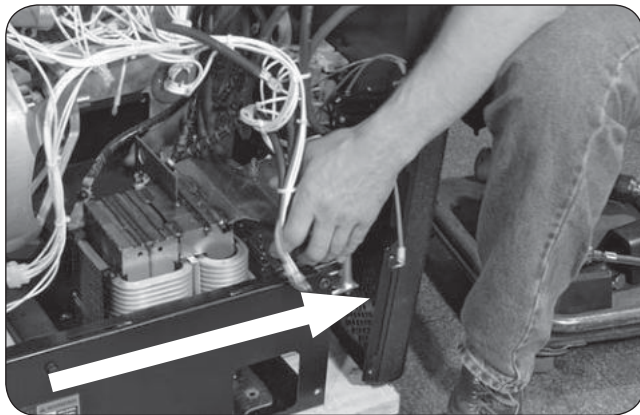


36. Loosen and remove the (3 bolts for the Hobart Champion), (5 bolts for the Bobcat) that hold the stabilizer reactor assembly to the base of the frame using a 1/2" socket and a long extension. After these bolts are removed, slide the entire assembly forward a couple of inches.

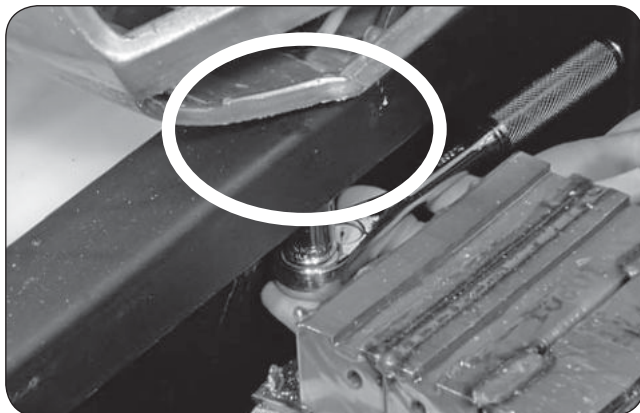
Note: This allows access to the stator mounting bolt shown in the next couple of steps.

Note: The stabilizer reactor bolts must be properly torqued to 175 inch lbs for reassembly.

37. The stator mounting bolt is shown for identification. Access to this bolt and nut is shown in Step 38.

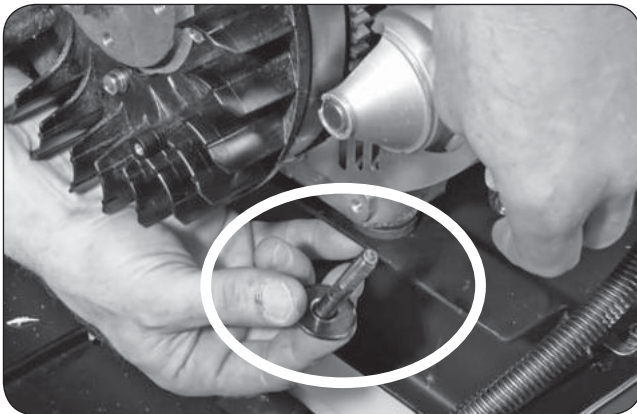


38. Reaching under the cross member of the welder frame, loosen and remove the nut that is attached to the bolt (shown in previous picture) which protrudes from the stator housing through the welder cross member frame.

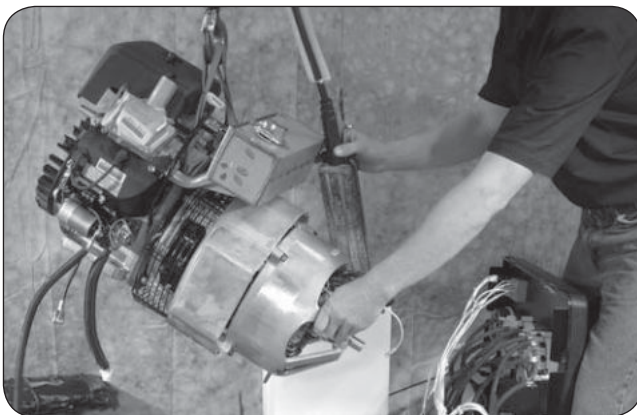


- 39.** Loosen and remove the two engine mounting bolts and nuts.

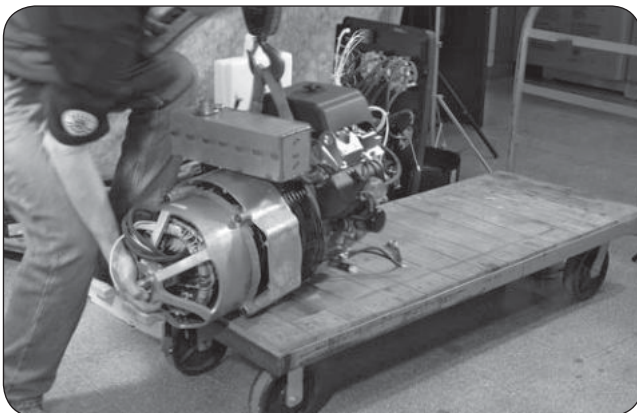
Note: The engine and stator are mounted to the frame with rubber mounts (two mounts on the engine side, one on the generator housing side). Should these mounts ever need to be removed, reinstallation is accomplished using water (or soapy water) applied to the rubber surface before reinstallation into the welder frame.



- 40.** Placing a strap between the engine and the generator assembly, lift upwards and away from the frame making sure no wires are left attached.

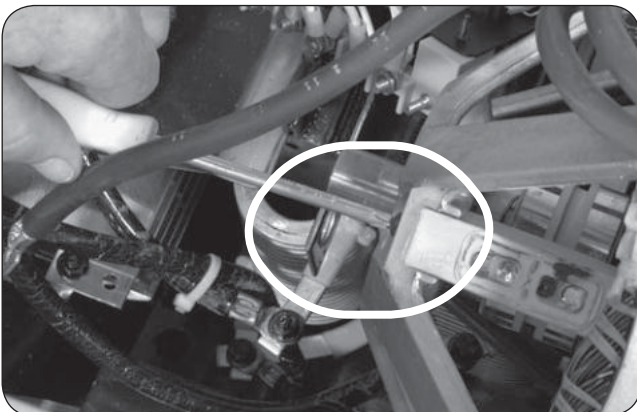


- 41.** Place entire unit on a bench or cart for further disassembly.



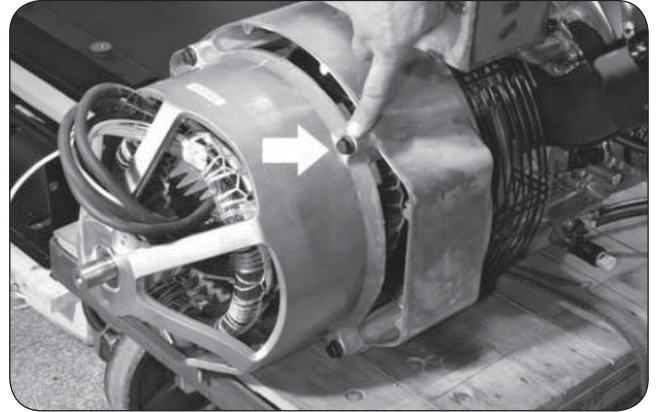
- 42.** Loosen and remove the brush block assembly from the rear of the stator housing.

Note: Be careful when pulling the brush block assembly away from the slip rings as to not damage the brushes.



43. Loosen and remove the four stator housing bolts using a 9/16" socket.

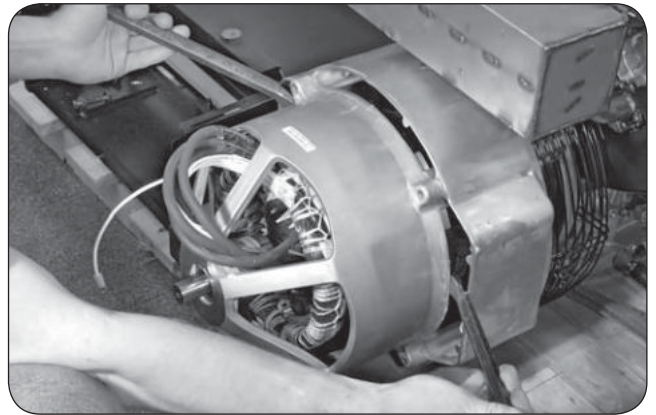
Note: Make sure to torque these bolts to 35 ft lbs when reassembly is done.



44. Using two pry bars, gently pry the stator assembly away from the engine adapter housing.

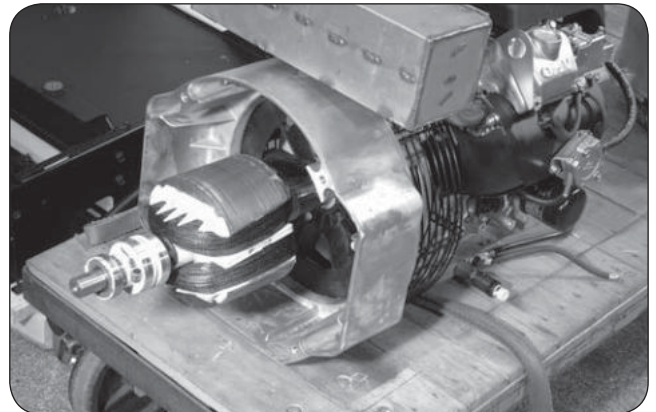
Note: Be careful, stator assembly is **heavy** (close to 100 lbs).

Note: Care must be taken not to damage the windings when removing. After removal, set aside being careful not damage stator windings when setting down.

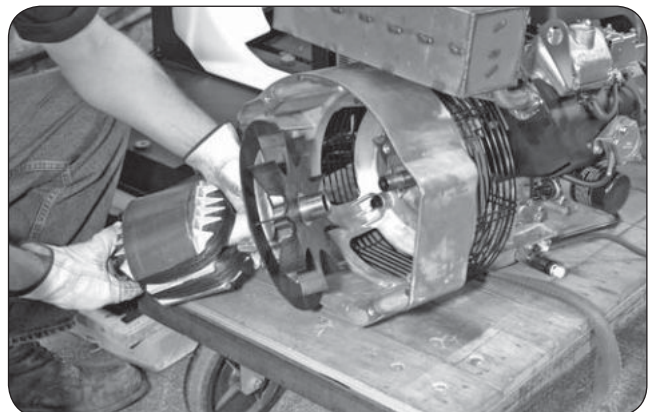


45. The rotor can now be turned off in a counter clockwise position. Lift slightly while turning to relieve tension on crankshaft.

Note: The rotor is also heavy. (50-60lbs)

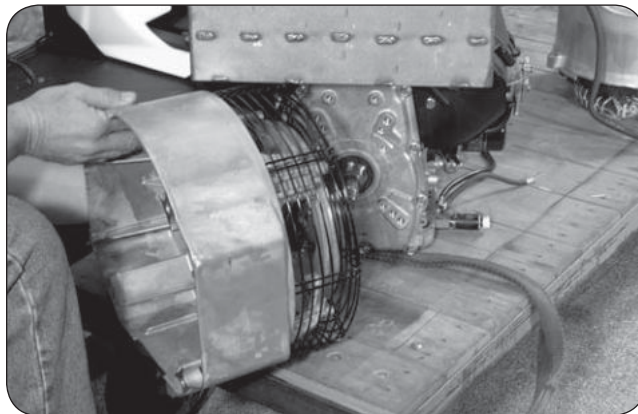


46. After removal of the rotor from the crankshaft, carefully set the rotor aside making sure not to damage the rotor windings.



47. Loosen and remove the 4 adapter housing bolts using a 5/8" socket before removing the housing from engine.

Note: Make sure to torque 40 ft lbs when reassembly is done.

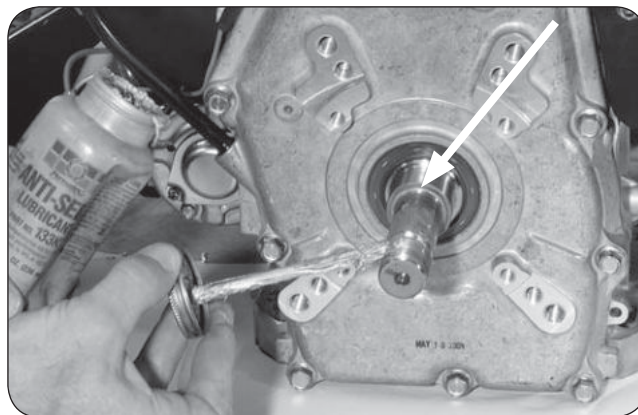


48. Should it become necessary for testing purposes to run the engine after removal from welder, follow the procedures on "hot-wiring" in the Robin/Onan service tips.

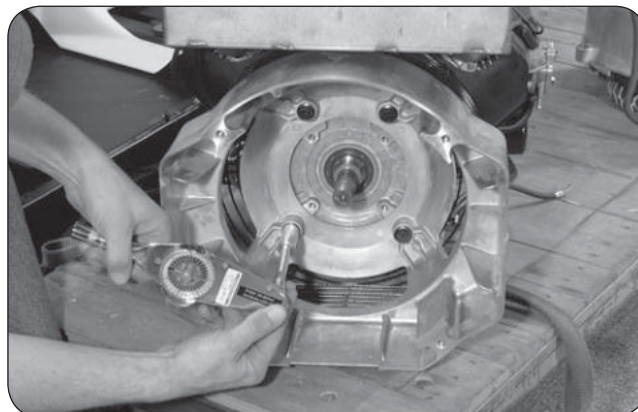


49. Before reassembly of rotor to crankshaft, make sure to apply anti-sieze compound to the threaded crankshaft.

Note: Also apply a very small amount to the crankshaft shoulder.

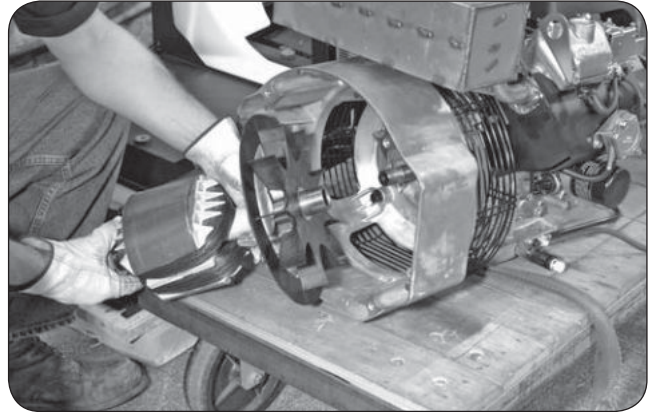


50. Reassemble generator parts in reverse order making sure to torque bolts as noted. Torque adapter housing bolts to 40 ft. lbs.



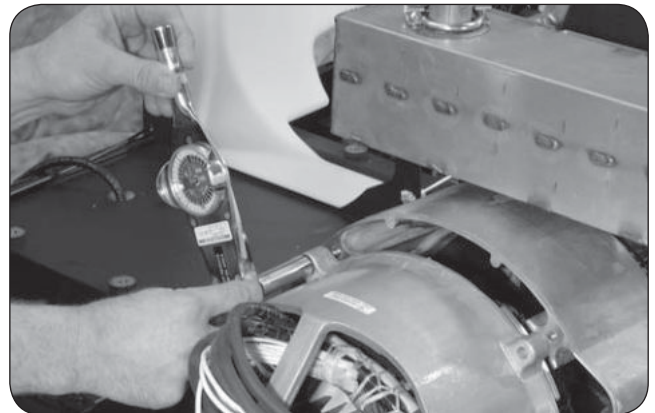
51. Turn the rotor on the crankshaft in a clockwise position.

Note: Spin the rotor assembly hand tight on the crankshaft.



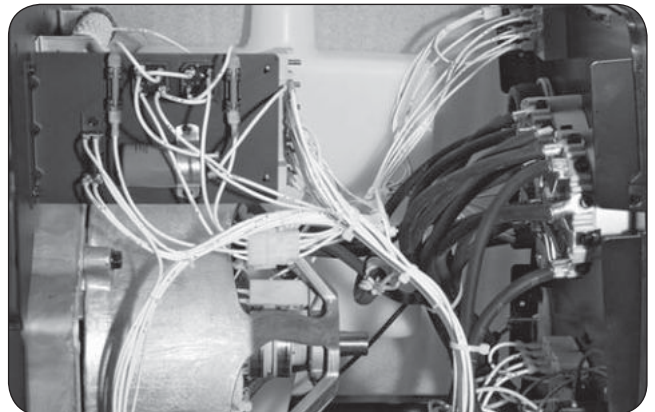
52. Carefully place the stator over the rotor, making sure not to scratch or rub against each other.

Note: Torque to 35 ft lbs after placing stator bolts into housing.

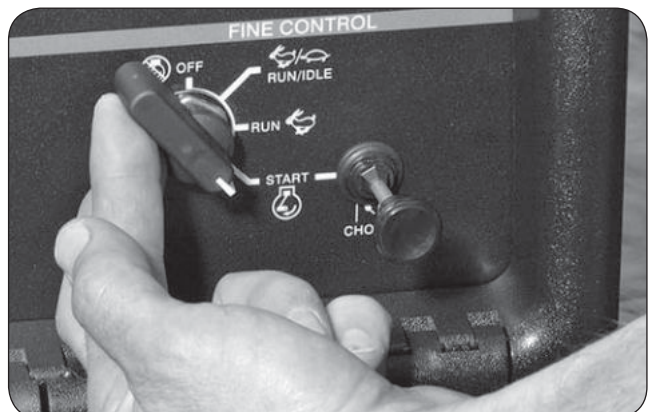


53. Always use cable ties when reassembling wiring harness wires. This will prevent wires from moving or rubbing against sharp objects.

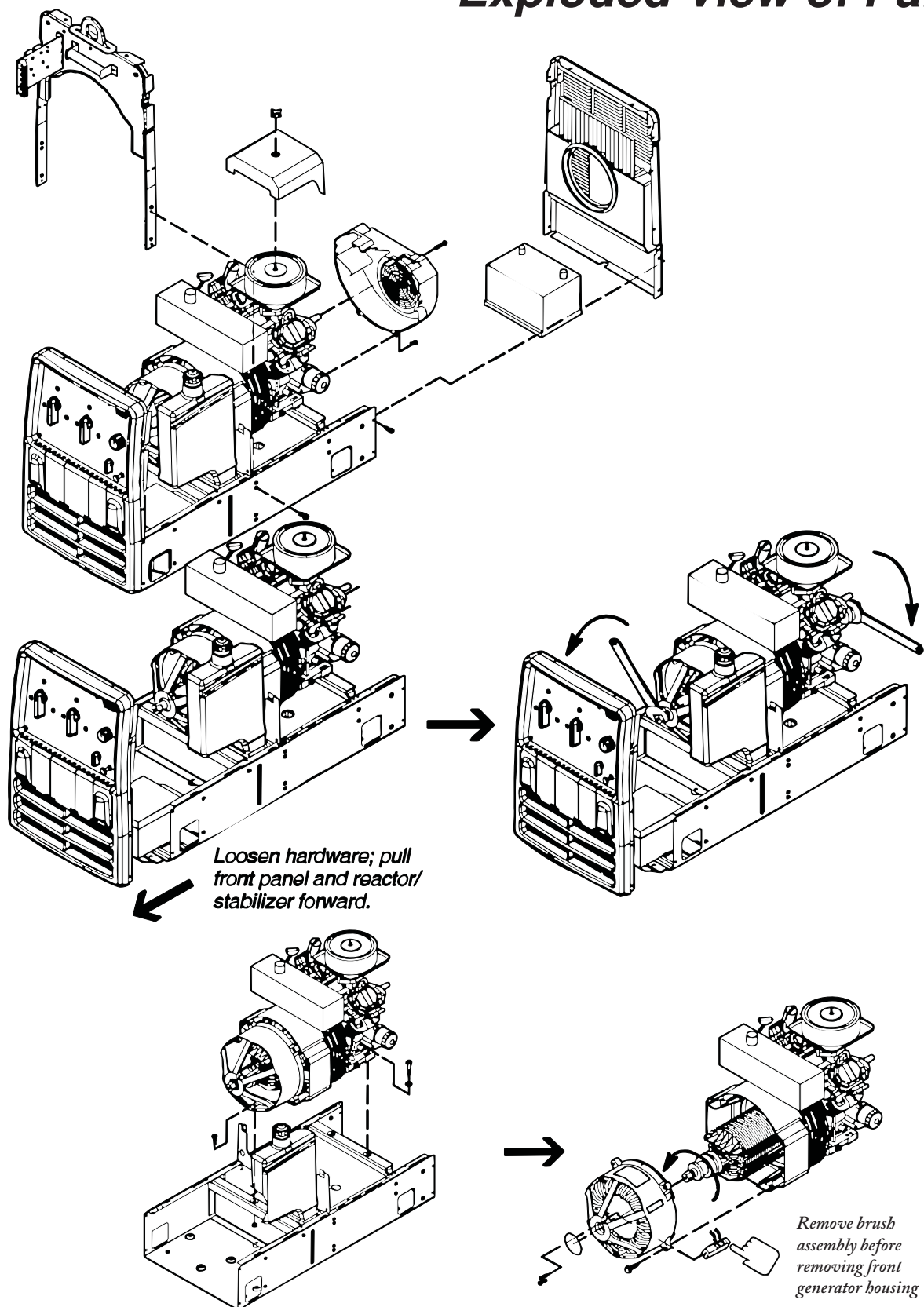
Note: Try to place as close to the original positions that came from the factory.



54. After adding oil and gas to the welder, make sure all connections are secure. Start and run the welder until operating temperature is achieved, checking for engine leaks or other possible reassembly issues.

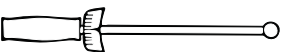


Exploded View of Parts



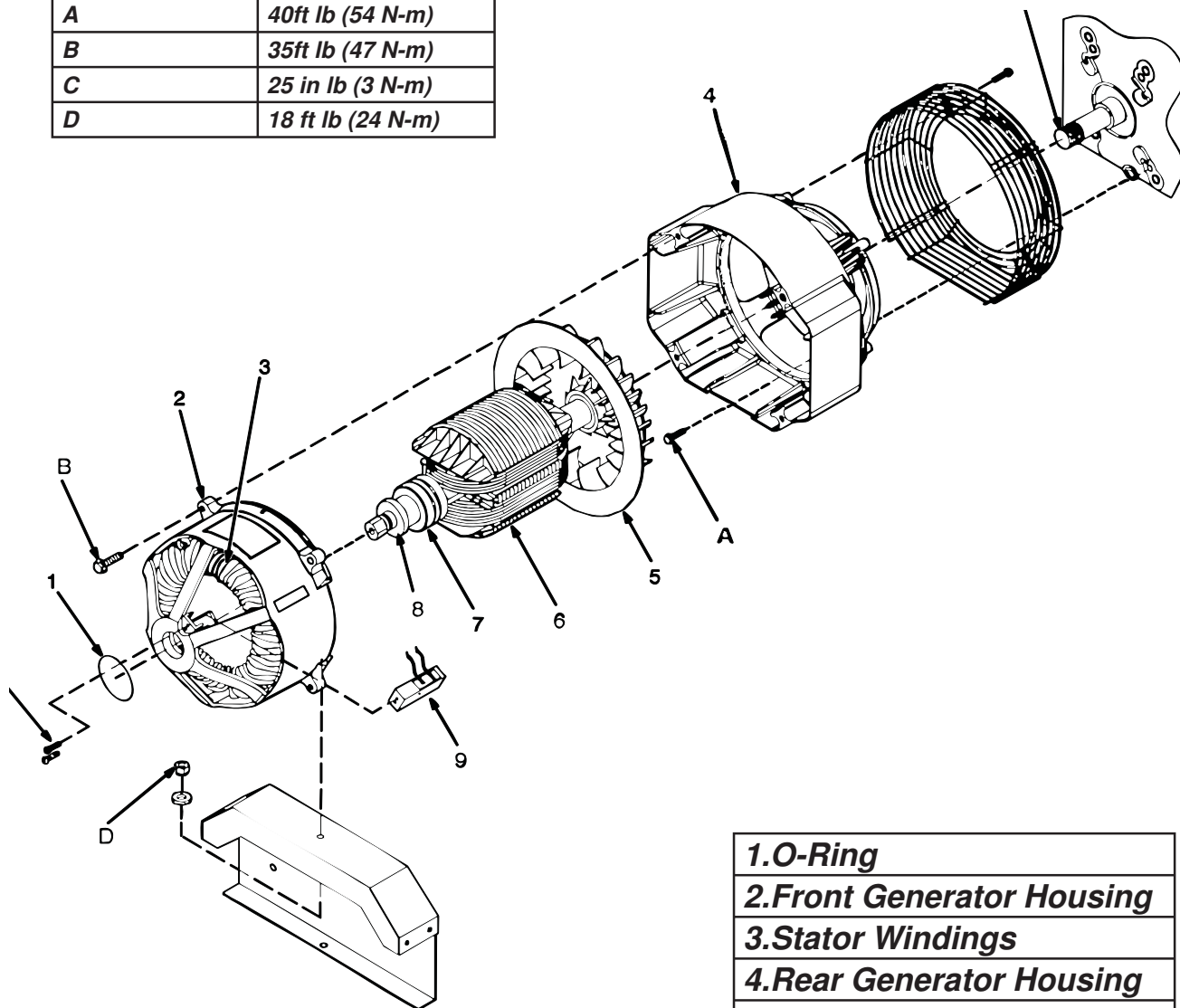
Generator Parts Identification

Torques:



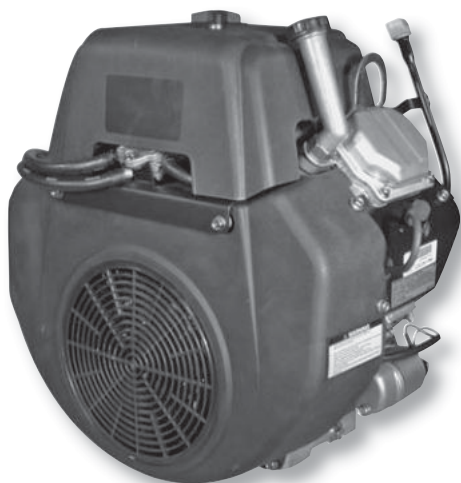
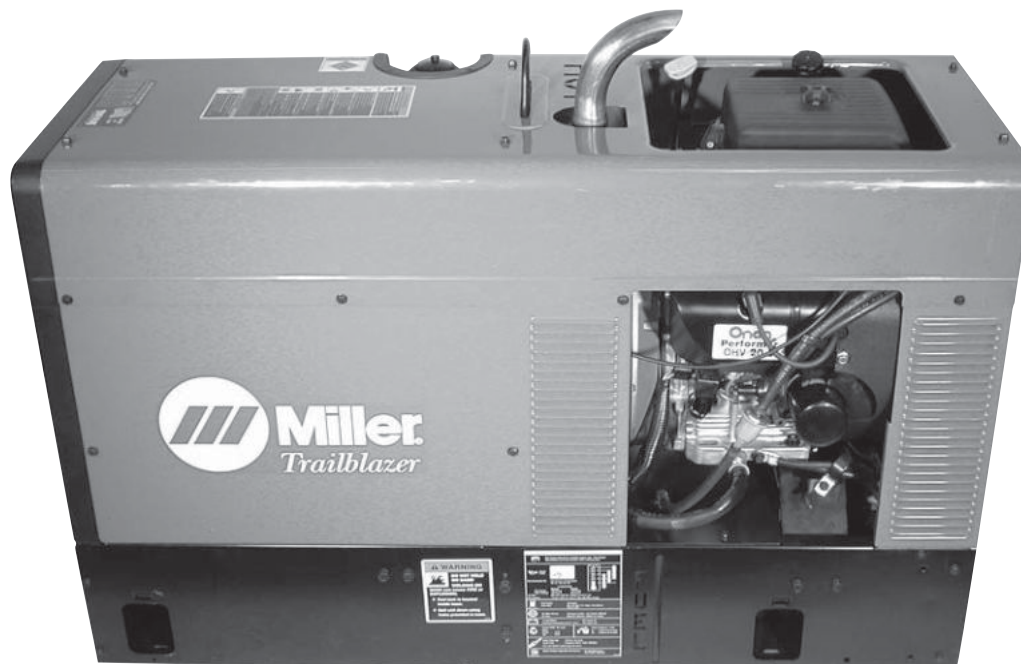
A	40ft lb (54 N-m)
B	35ft lb (47 N-m)
C	25 in lb (3 N-m)
D	18 ft lb (24 N-m)

Apply anti-seize compound (Loctite 76732) to all contacting surfaces between rotor and engine.

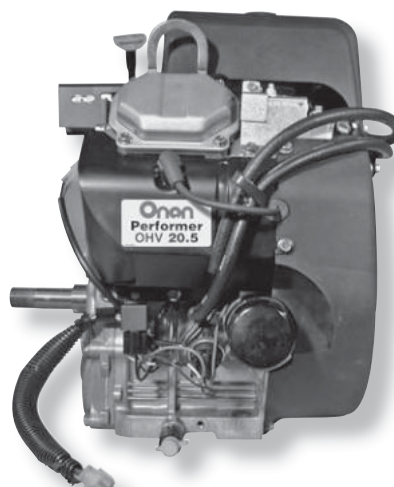


1.O-Ring
2.Front Generator Housing
3.Stator Windings
4.Rear Generator Housing
5.Generator Fan
6.Rotor
7.Slip Rings
8.Bearing
9.Brush Holder Assembly

Removal & Installation Procedure for the Onan Performer Engine (OHV) on Miller Trailblazer 301 G Welders



Onan by Robin 22hp (side view)



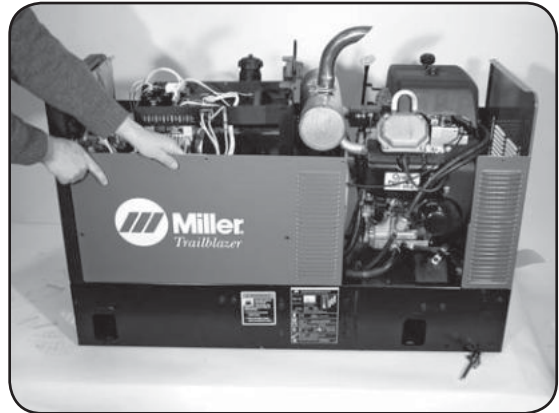
Onan by Robin 20.5 hp (side view)

1. Remove the 14 bolts from the top cover. Lift the cover off and set aside.

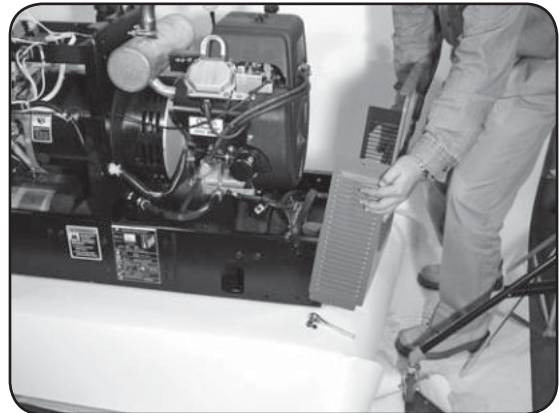
Note: The gas cap will need to be removed before lifting the cover off.



2. Next, remove the 4 bolts that hold the two side covers in place. Lift the side covers straight up and set aside.



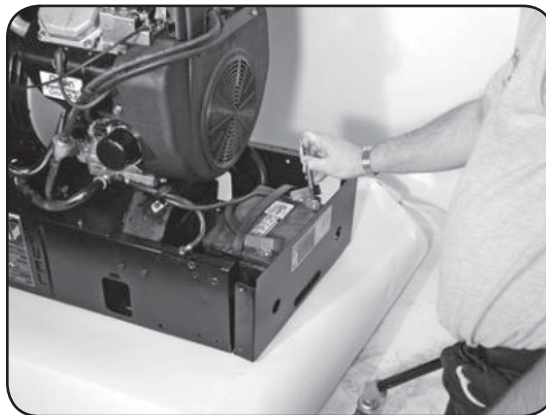
3. Remove the bolts from the welder engine cover. Lift the cover off and set aside.



4. Loosen and remove the 4 battery bracket bolts from the welder frame.



5. Loosen the battery connections. Always remove negative side first.



6. Slide the battery tray forward, and out of the frame, grabbing the battery case strap and setting aside.

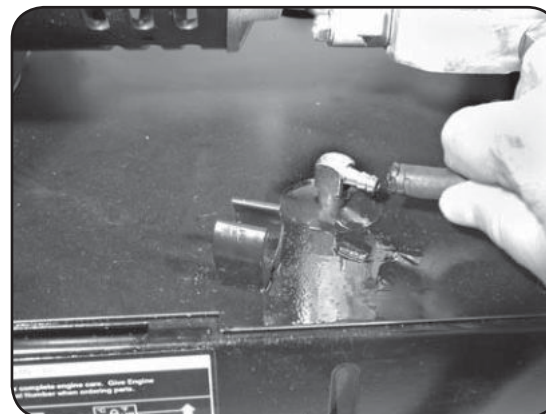


7. Remove the male engine wiring harness plug from the female portion, that is mounted in the middle stator support bracket.

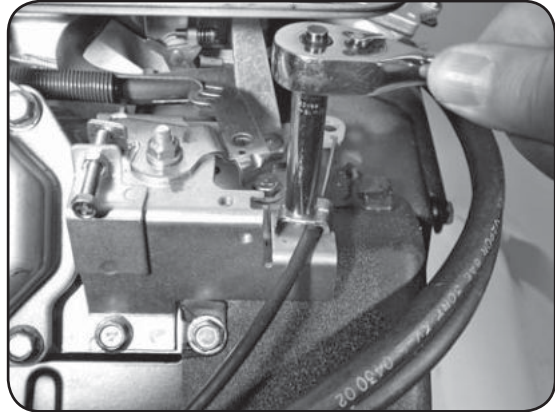


8. Remove the clamp and fuel hose from the gas tank male connection. Be aware that fuel will spill from fuel line.

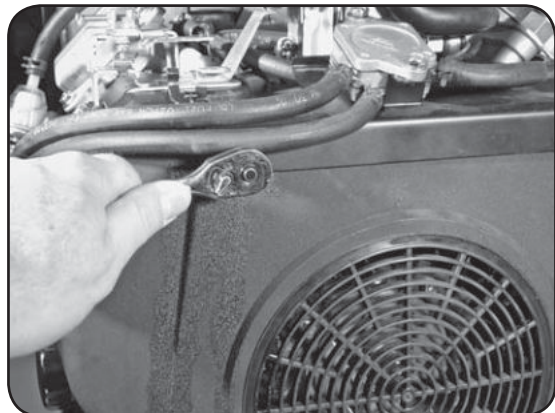
Note: Should the gas level be higher than the 90° elbow shown in the picture, (filled into neck of tank) gas will spill from the fitting until the level is even with the elbow. Be prepared to siphon or drain this extra fuel out of the tank before working on unit.



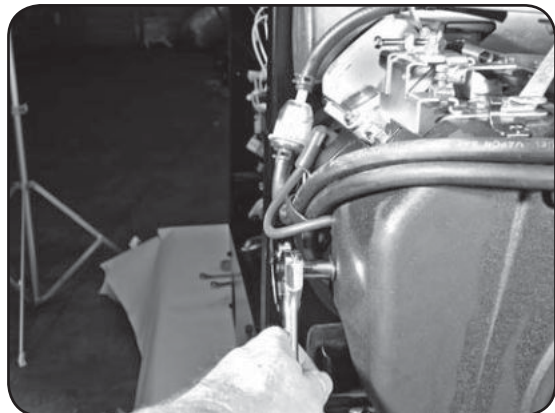
9. Loosen and remove the choke cable bracket from its seat. Un-hook and remove the cable from carburetor linkage. Replace hold down clamp and tighten loosely for later reassembly.



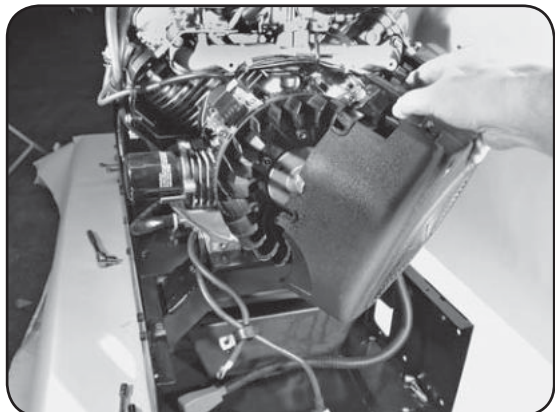
10. Loosen and remove the two bolts that hold the fuel pump support from the front engine cover. Be sure to save the two spacers over the bolts that are behind the angle iron bracket for later reassembly.



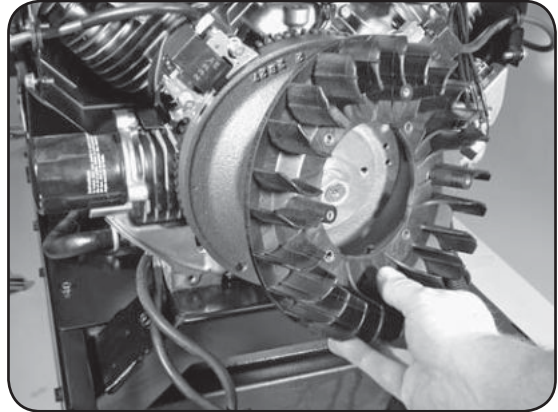
11. Loosen but do not remove the four engine shroud bolts that hold the cover to the engine. Loosen and remove the two bottom shroud bolts from the engine block.



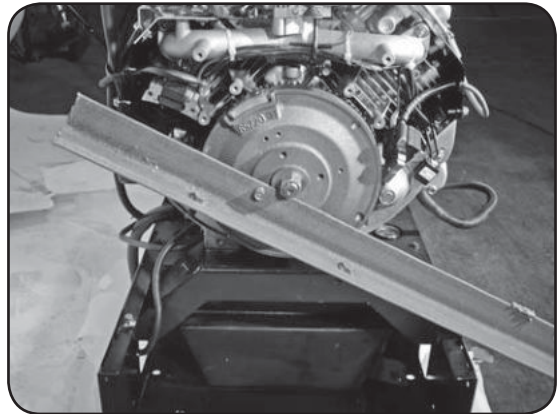
12. Remove the engine shroud cover and set aside.



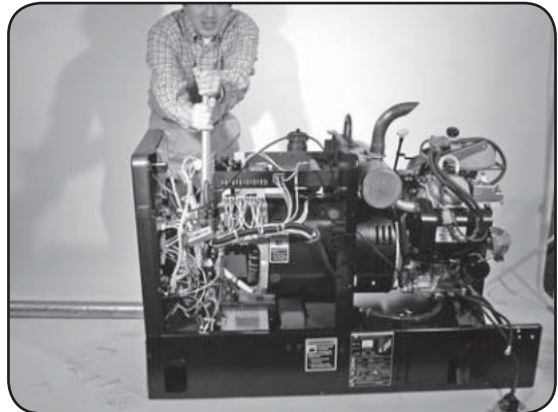
13. Loosen and remove the four flywheel fan blade bolts and remove from flywheel.



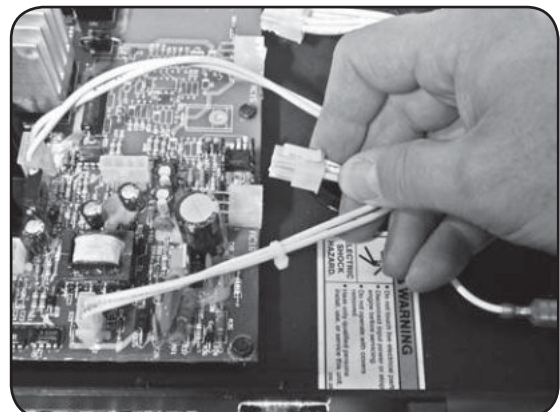
14. At this point it should be noted that the welder rotor must first be broken loose from the engine crankshaft before any further disassembly. This procedure entails holding the flywheel in a locked position. It must be noted that quite a bit of force will be needed to break the rotor loose. Shown in the picture is one way to hold the flywheel in position. It is simply a piece of angle iron with a hole drilled to mount a bolt to the flywheel. Special tools are also available for purchase for holding the flywheel from Miller Electric.



15. To break the rotor loose from the crankshaft, a fairly large pipe wrench must be placed over the rotor extension. The area around the rotor extension is surrounded by quite a few wires. Some of these wires should be moved aside for greater leverage. This is accomplished by removing wires from the circuit board and setting aside.



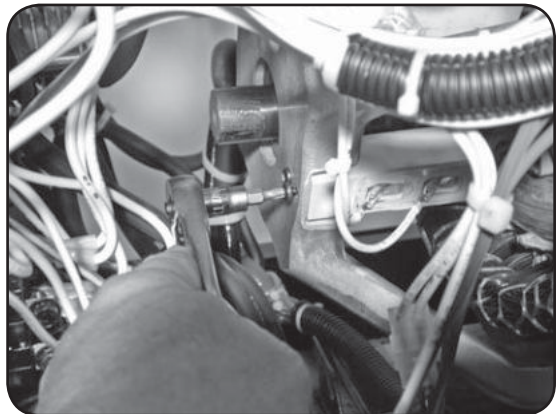
16. After removing these wires from the circuit board, pull them through the circuit board access hole and set aside.



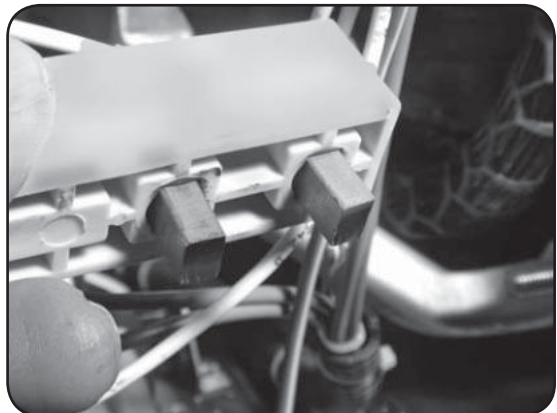
17. Shown to the right is a picture of the type of socket used on these brush holder screws. The brush holders might also use a Phillips type of screw head.



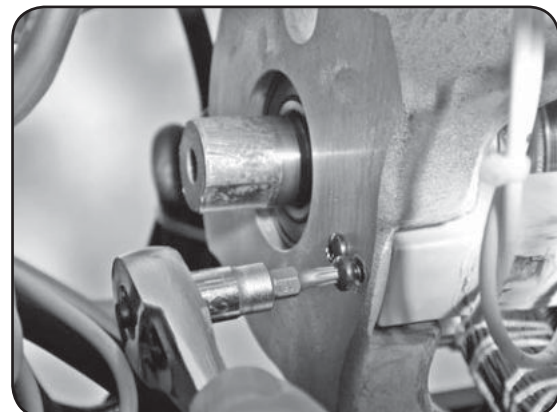
18. Loosen and remove the two special torx type head screws from the brush holder. (Note: there are two brush holders on each model)



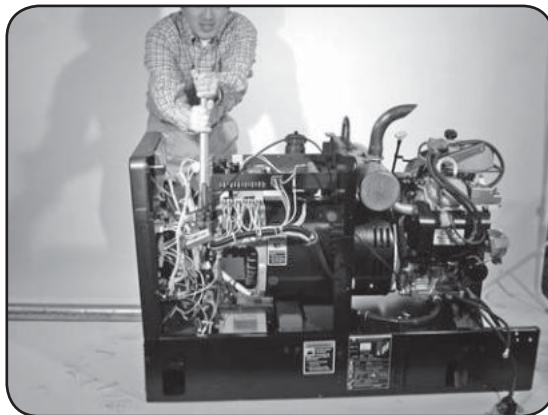
19. After removal of the screws, pull the brush holders out of the way.



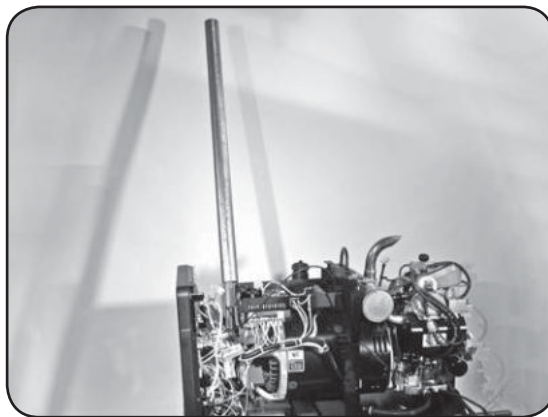
20. Shown the right is the special D-type rotor shaft that extends beyond the end of the end bracket housing. This is where the large pipe wrench will be attached to loosen the rotor from the engine.



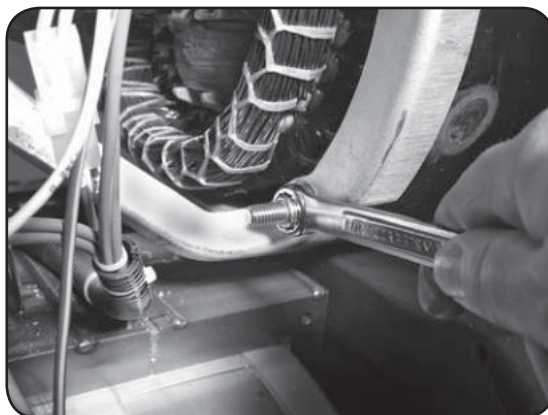
21. Carefully place the wrench between the wires on extended rotor shaft and turn counter clockwise to loosen the rotor from the crankshaft. When the rotor has begun to turn freely, turn a few more pulls on the wrench to make sure it is loose.



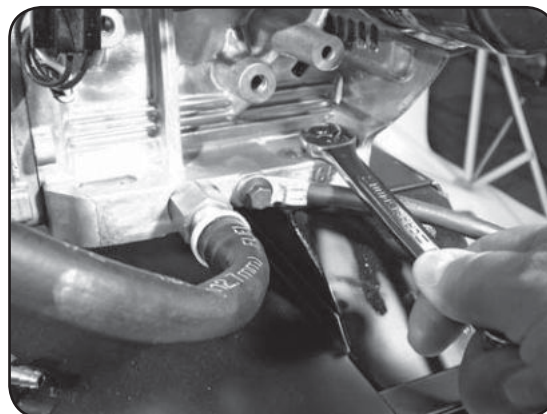
22. It may become necessary to place a cheater pipe on the end of the large pipe wrench to encourage the loosening process.



23. Loosen and remove the four stator though bolts that hold the end bracket housing to the stator shell.

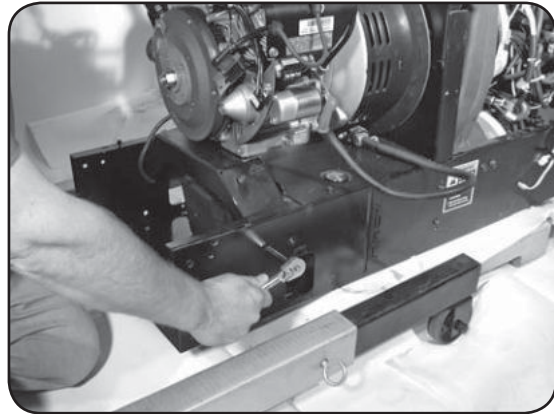


24. Loosen and remove the two bolts that hold the engine assembly to the engine frame bracket.

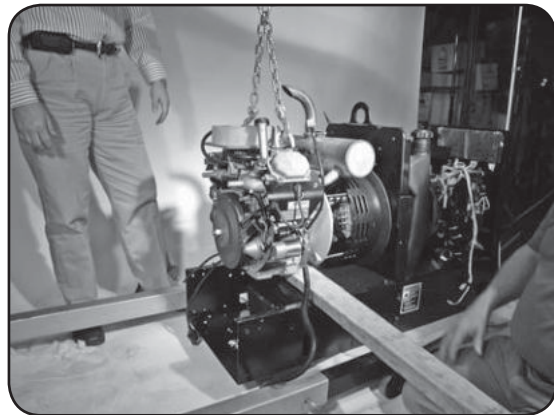


25. Loosen and remove the four engine cross member bolts.

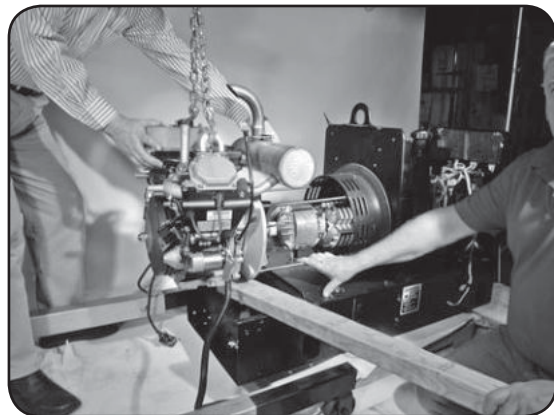
Note: Make sure the engine is supported by some type of overhead lift.



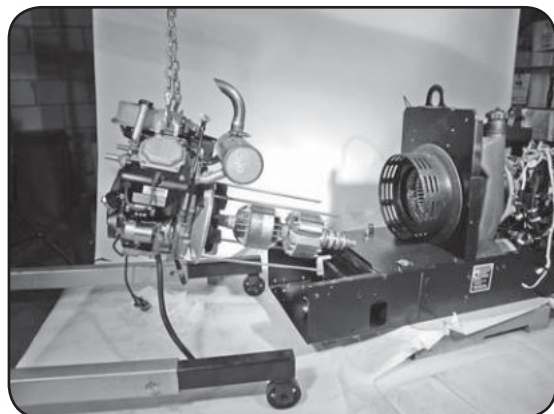
26. Support engine with chain hoist and a 2 x 4 before beginning to move forward.



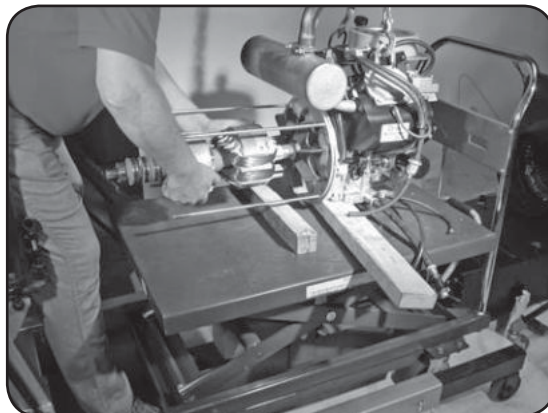
27. While supporting the engine with the 2 x 4, slowly pull engine and rotor forward making sure not to let rotor hit on the stator windings. It may be necessary to support rotor with board as it comes out.



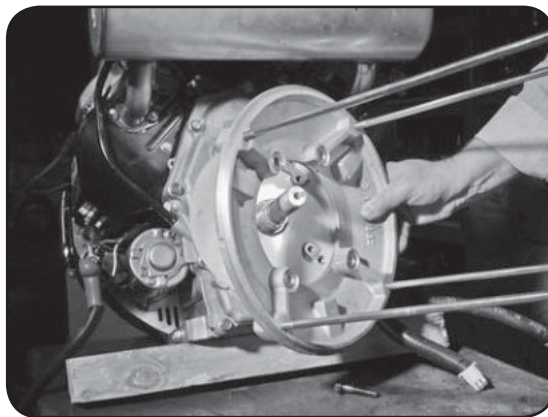
28. This is what the engine & rotor unit will look like when removed. Be careful not to let rotor hit against other objects.



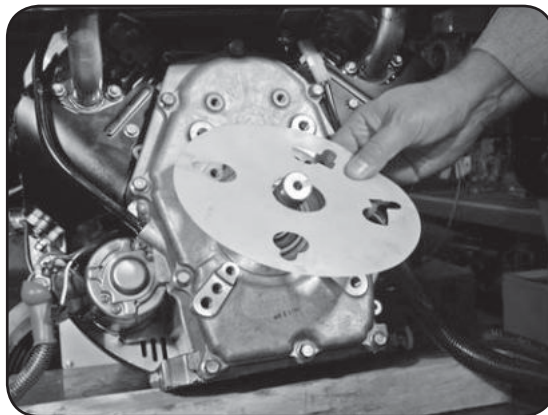
29. With the engine supported, turn rotor counter clock wise until un-threaded from crankshaft.



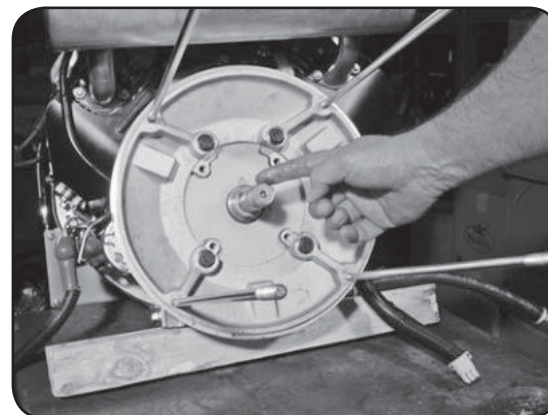
30. Remove the adapter plate and splash shield and set aside. The engine is now ready for service.



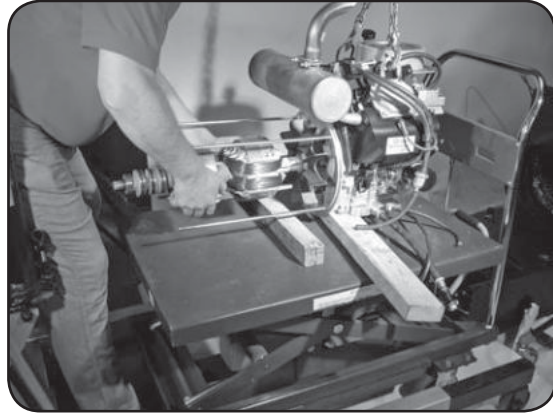
31. Re-installation requires that the splash shield be placed and the back of the engine.



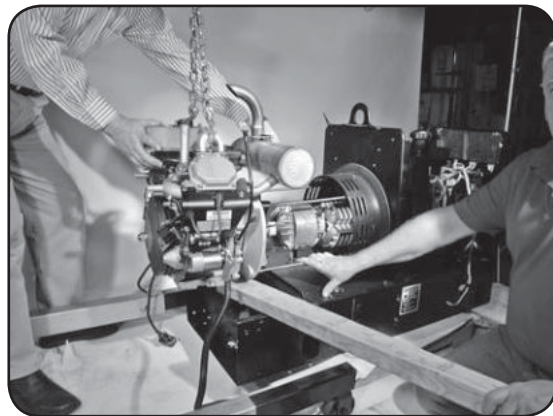
32. Before turning the rotor on the crankshaft make sure to wipe anti-sieze compound of the crankshaft threads.



33. When re-assembling the rotor to the engine crankshaft, turn the rotor clockwise hand tight until snug. The rotor will tighten itself completely the first time the engine is started.



34. Re-installation of the rotor and engine into the stator shell must be done with care. Keep supporting the rotor so as not to hit or scratch the stator windings. If needed, use the four stator bolt nuts to pull the engine and rotor into final position when the adapter bolts protrude through the stator end bracket. Re-install the remaining components, place gas and oil into the welder and test for proper operation.



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