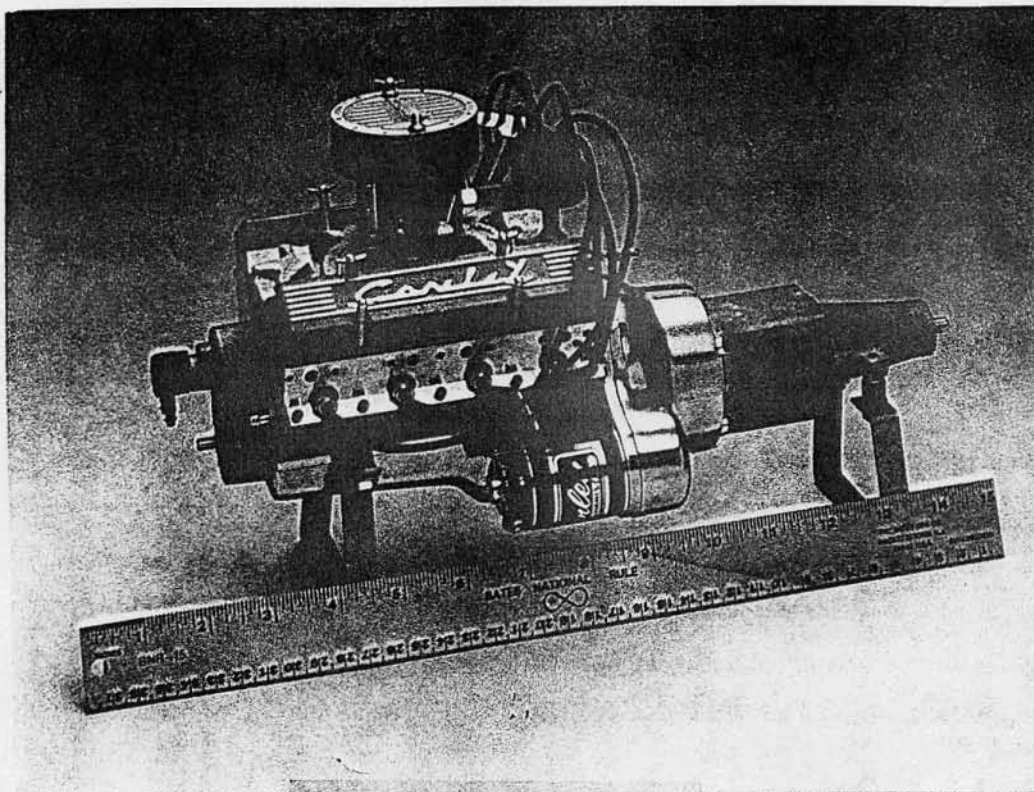


THE ULTIMATE MODEL ENGINE KIT

Congradulations!

You have purchased the world's smallest production V-8 engine. Please read and understand the instructions before attempting to assemble the engine. Pay particular interest in the section which deals with the crankshaft and bearing installation.



Conley
PRECISION ENGINES, INC.

"World Class Performance - Made in the U.S.A."

825 Duane Street
Glen Ellyn, Ill. 60137
Phone (708) 858-3190

IMPORTANT !!!! IMPORTANT !!!! IMPORTANT !!!! IMPORTANT

DO NOT REMOVE THE RINGS FROM THE CYLINDERS UNTIL YOU HAVE READ AND UNDERSTOOD THE INSTRUCTIONS !!!

Remember "If all else fails.....READ THE INSTRUCTIONS".

If for any reason the engine is returned for service and there is a defective part then Conley Precision Engines pays for parts and labor. If instructions were not followed, you will be required to pay for all repairs including, tear down, inspection, parts, and rebuild and test run !!!!!!!!!!!!!

Over the past two years, numerous suggestions have been submitted. Some have been for different options, while others have been on ways to improve the engine or improvement to the instructions. Each time someone offered constructive criticism, a note was made and if at all possible, the change was added or an improvement made. I am always looking for ways to improve construction and manufacturing.

Although many of you may have a knowledge and experience with engines, both model and full size, is important that the instructions be followed explicitly. Of the engines that have been delivered approximately 90% of the problems which occurred were because of not reading and following the instructions.

Of the engines which were returned because the customer said "I could not get the engine to run", almost without exception at least one and in some cases all of the following problem areas were observed and documented:

1. Valves not seated.
2. Ring end gap to large. (end gaps are now being preset at the factory, eliminating this problem)
3. Vacuum leak between intake manifold and heads.
4. Wrong batteries (the engine will not run with Duracell!!!!!!)
5. Too small of wire used from 2.4V battery pack.
6. Improper valve movement/adjustment

Before starting to assemble the engine you will need the following items:

- | | |
|---------------------------------|-----------------------------|
| * Assorted allen wrenches | * Lacquer thinner |
| * Needle nose pliers | * Small hammer |
| * Adjustable wrench | * Dremel tool or equivalent |
| * Variable speed drill | * Needle files |
| * Small screwdriver | * Clean rags |
| * Assorted grits abrasive paper | * Model fuel |
| * Two 1.2V 4000ma batteries | * Battery chargers |
| * One 4.8V battery pack | * One 12V battery (starter) |

CAUTION: SOME OF THE DIE CAST HAVE SHARP EDGES. BE VERY CAREFUL WHEN HANDLING.

Thank you for purchasing the Conley V-8 engine. A great deal of time and thought has gone into the design of the engine and the writing of these instructions.

!!!!!!!!!! READ ALL OF THE INSTRUCTIONS FIRST !!!!!!!!!!!

The engine has a bore of .875 and a stroke of .625 for a total displacement of 3.0 cubic inches or 50 cubic centimeters. The engine uses a glow plug ignition and is lubricated by the "blow-by" oil in the model fuel. It is recommended that a good grade of model fuel (K&B four cycle or equivalent) be used. This "blow-by" oil also serves as an upper cylinder lubricant. It will still be necessary to periodically lubricate the rocker arm assembly by manually placing a small drop of oil on all pivot points. Remember this engine operates as a modified diesel. Glow plugs are used to start the engine and as engine r.p.m. increases the glow plugs are turned off.

You will notice there are several numbered bags of parts. The last page of instructions will describe the contents of each bag. Although every effort is made to insure all parts are included, it is a good idea to check each bag and compare with the parts description. Before you start to assemble the engine you may want to think about the method of finishing the exterior surfaces. The recommended method is to use 600 wet/dry sand paper then buff until a chrome-like finish is achieved. The following points should be followed before trying to assemble the engine.

DO NOT REMOVE PROTECTIVE RED COVERING FROM SPLIT BEARING RACES
UNDER NO CIRCUMSTANCES SEPARATE ROLLERS OR REMOVE WAX COATING

1. DO NOT REMOVE THE ROD CAPS UNTIL YOU ARE READY TO INSTALL THE RODS ON THE CRANKSHAFT.
2. Pre-fit each part individually, prior to final assembly.
3. If you choose to glass bead or sand blast the engine make sure all screw holes are covered or place a screw in each hole. When finished thoroughly wash each part and use compressed air to remove any residue or abrasive which may have collected in small corners.
4. DO NOT DO ANYTHING TO THE TOPS OF EACH BANK OF CYLINDERS.
5. Leave the parts in each bag until they are called for.
6. Check to make sure there are the proper number of parts in each bag.
7. Make sure all parts are cleaned thoroughly.
8. Although not necessary, a 3/16" open end wrench will be very helpful when adjusting the rocker arms. These wrenches are commonly used for tune-ups and are available at most automotive stores and Sears.
9. Thoroughly clean engine after each running. This will be discussed at the end of the instructions.
10. Remove any flashing from die cast parts with file. On parts such as the transmission mounting plate, a needle file is very helpful for cleaning the small holes and slots.

***** SPECIAL NOTE *****

!!!RING END GAP PRESET AT FACTORY DO NOT ALTER !!!

One of the most critical areas in the performance of the engine is the ring end gap. Since there is only one compression ring per cylinder the end gap is critical for proper compression and efficient lubrication. Each ring is individually fitted to each cylinder. When removing the rings from each cylinder, carefully tape the ring to the paper sheet attached to the block. Make sure the rings are kept in the proper order.

CRANKSHAFT INSTALLATION

1. Thoroughly clean block.
2. Remove rods from bag #13 and remove any burrs with X-acto knife or small file.
3. Trial fit each rod individually to the crankshaft then remove rods and set aside.
4. From bag #17 remove the two solid bearing races and two sets of rollers in wax strips from bag #18.
5. Trial fit one solid race at each end of the block. This should be done by first removing the main cap, next, place race into radius in block and finally tighten down main cap. You should not be able to move the race. If you are able to rotate the race, remove the main cap and lightly sand the edges of the cap, then reinstall and recheck.
6. Once both races have been tested for tightness, carefully remove two of the wax strips of rollers from bag #18. Remove cardboard backing from the rollers and slowly wrap the strip of rollers around each end of the crankshaft. Slide solid race over rollers.
7. Set crankshaft into block and rotate by hand. If you notice any rubbing, lift out crankshaft and remove high point with Dremel tool or X-acto knife. Remove chips and try crankshaft again. Continue until crankshaft revolves smoothly. Try once again with the end main caps tightened.
8. Remove the crankshaft and set aside. From bag #18 take the three remaining strips of rollers and split races. Remove protective coating from each. At the point where each race is split you will notice either one, two, three, four vertical scribed lines or an "X" across the break. When installing the races it is important that these marks align. Carefully place one half of each race into number 2,3 and 4 main bearing recess in the block. Place mating race half on top and tighten down main cap. The races should align and no movement should be noticed. Once again, If you feel the race move then remove that cap and lightly sand the bottom edge and reinstall.
9. Once you are sure all races align and are snug, remove cardboard from the back of the wax strips of bearings and slowly curl the strips of rollers around the three center mains on the crankshaft. You will notice there is a small gap at the end. This is normal and will allow for the "blow-by" of engine oil to lubricate the main bearings.

10. Remove the three main caps and only the top half of the three races. Be very careful not to interchange the race halves. If you are in doubt remove the lower half and check the edges for the corresponding mark. Carefully set crankshaft onto races. Place upper half of each race on top of the rollers and place all five main bearing caps onto block and lightly tighten. MAKE SURE BOTH RACE HALVES ALIGN. Spin crankshaft and retighten main caps. Once the engine starts the fuel will dissolve the wax coating on the rollers.

11. Once crankshaft with rods and pistons are installed heavily oil crankshaft bearings and rods. Carefully tighten an electric drill to the front of crankshaft and spin. Start out very slow and gradually increase speed. Remember to oil cylinders from both the top and the bottom. This process is very important and will help when trying to start the engine for the first time.

CAMSHAFT INSTALLATION:

NOTE: Remove one lifter from bag 7 and push through each lifter hole into the camshaft gallery. You may notice a slight resistance at the bottom of each hole. Since the camshaft hole is reamed after the lifter holes were reamed, a small burr may be present at the bottom of the lifter hole. It may be necessary to apply light pressure to the lifter to remove this burr. Remove any small chips that may be present. Remove pump lifter from bag 15 and repeat the above process for the two pump holes, located at each end of the block, between the lifter holes.

1. Put 3/16" I.D. bearing (bag 9) into cam hole at clutch end of engine. It may be necessary to lightly tap outside edge of bearing with a wooden block and mallet. The bearing should be flush with end of engine.

2. Slide second 3/16" I.D. (bag 9) bearing onto front of camshaft and insert into front of block. Lightly tap bearing into place, until bearing is flush with front of block.

3. Find two button head 4/40 screws (bag 3). Put a small drop of Loctite on one screw and place below camshaft bearing. Tighten down and rotate camshaft and make sure no binding is felt. Make sure that when tightening the ball bearing on the opposite end is not being pressed out. Both screws go in front of engine to hold bearings in place. In some engines the screw may not tighten all the way against the block. This is perfectly normal. Remember, only tighten these screws until no binding is felt.

* BLOCK *

As you are looking at the front of the block, the small diameter of the crankshaft will be facing you. The cylinders to the right are numbered 1,3,5,7 and to the left 2,4,6,8. It may be helpful to use a felt tip pin and mark the block. Since the rods and caps are machined together it is important to mark one side of the rod where the cap joins the body. This can be done with a magic marker or scribe line.

Before putting the piston on the rod, remove the cap (one rod at a time) and trial fit on crankshaft. Make sure the rod bearing surfaces are clean. With rod body on crankshaft put cap on rod (make sure marks align) and snug down 4-40 button head cap screws. Rotate crankshaft to make sure no resistance is found. It may be necessary to loosen and retighten screws. If there is still friction between parts remove rod and check machined surfaces for small chips of metal.

INSTALLING RING ON PISTONS:

Ring installation is easily done by placing the piston in your left hand, with your index and middle finger on the bottom and your thumb on the top. Lay the ring on the top of the piston and drop the end gap over the edge until it is approximately the same level as the groove. While using your left thumb to hold the ring in that position take your right thumb and in a clockwise motion around the diameter, starting to the right of the end gap, gently expand the ring while applying light downward pressure until the ring is in the groove. DO NOT FORCE THE RING. IF YOU ENCOUNTER A PROBLEM REREAD ABOVE INSTRUCTIONS.

ROD AND PISTON INSTALLATION:

Once all rods have been fitted to the crankshaft, carefully number and remove (paying particular attention to direction rod faces) place piston on rod and put wrist pin through both. Insert a small teflon button on each side of the wrist pin. Remove rod cap from one rod and slide piston and rod assembly into the top of number one cylinder until ring rest on top of cylinder. While applying light pressure on the top of the piston gently press in on the side of the ring with a small screwdriver, starting at the end gap and working around the diameter of the ring. DO NOT FORCE. After the piston is in the cylinder, align the rod body with the crankshaft, and put the rod cap on, making sure cap is in the proper position. Snug the screws down and turn crankshaft. Once the crankshaft turns free loosen one screw at a time, apply a SMALL drop of Loctite 271 to the end of the threads and re-tighten. Do the same with the other screw. Once again turn crankshaft and make sure rods are free from binding. Continue this procedure until all rod-piston assemblies are installed. Hint: Putting large 96 tooth gear on crankshaft will help to rotate engine.

MANUAL BREAK-IN OF ENGINE:

After Loctite has set for two hours, oil all rod journals heavily and allow oil to penetrate. Also oil all cylinders both top and bottom. If you have a variable speed drill, carefully tighten chuck on 3/16" shaft on front of engine. With one bank of cylinders in a vertical position place a teaspoon of oil in each cylinder and slowly spin crankshaft for approximately three minutes. Rotate the engine until the other bank of cylinders is vertical and repeat the procedure.

PAN INSTALLATION:

Install pan using 4-40 x 1/4 inch socket head cap screws (bag 3). You will notice there are two different plugs for the pan. Both plugs have 6-40 threads. The first resembles a hex bolt and should be used for "show" only. The second is used to drain the pan and for injecting oil. This will be discussed in more detail later on in the instructions.

CAMSHAFT TIMING:

1. Take large timing gear (26 tooth-bag 6) and slide onto camshaft, (teeth should be facing the front of block) making sure back side of this gear does not touch button head screw. Allow about .010 clearance and tighten set screw against flat.

2. Install the 13 tooth gear (bag 6) in the same manner as the 26 tooth gear.

3. In some engines the interference fit of the teeth of the nylon gear is very tight. If this does occur please let me know and I will send you an offset adjustment screw to solve this problem.

4. At this time you can set the timing and install the idler gear. To set timing, turn camshaft until center punched mark on gear is pointing straight up. Rotate crankshaft until set screw in small gear on crankshaft is also pointing straight up. When the set screw is pointed straight up number one piston is at top dead center. Place 5-40 x 1/2" socket head cap screw (bag 3) through 1/8" steel spacer, through flanged side of ball bearing in idler gear, through steel 1/8" spacer and then into block. In some cases the 5-40 x 1/2" screw goes through the block and presses on the front crankshaft. If this occurs place a small washer below the head of the 5-40 screw and reinstall. Recheck timing marks. Temporarily install two lifters at number one cylinder. As you are looking at the engine from the front, the crankshaft rotates clockwise. Engine is in time when a slight movement is noticed in the INTAKE lifter (the second lifter from the front) of number one cylinder and crankshaft is 10 to 20 degrees after top dead center.

After you are sure timing is correct, remove one set screw from the 26 tooth gear and place a drop of Loctite on end of set screw and reinstall. Do the same with the 13 tooth gear. !!!!! DO NOT ROTATE THE ENGINE WITH EITHER SET SCREW REMOVED !!!!!

BACK PLATE INSTALLATION:

Install transmission mounting backplate onto clutch end of block using 4-40 x 1/4" socket head cap screws (bag 3). MAKE SURE REAR CAMSHAFT BEARING IS FLUSH WITH END OF BLOCK. You will notice there is a slot machined into the back of the block. This is for water transfer passage. Place a small bead of Loctite 510 around the outside perimeter of the milled slot. Put backplate into position and lightly tighten four screws. Remove four screws and backplate and carefully remove any sealant that may have been squeezed into the water passage. A flat toothpick is good for this. Put a small drop of Loctite 271 on each screw and tighten down.

STARTER MOTOR AND GEAR INSTALLATION:

1. Slide 96 tooth ring gear onto crankshaft (large hub on gear should be pointing away from engine block) followed by thrust washer (bag 10) then large diameter washer.

2. Remove clutch springs then shoes.

3. Clean threads with lacquer thinner and place two or three drops of Loctite 271 on threads.

4. Securely tighten clutch assembly onto crankshaft (flange side should be facing out). This can be done by holding the large ring gear with rag and placing an adjustable wrench on the square of the clutch.

5. Remove the hex nut from the idler gear assembly and put in slot on backplate. Screw in gear assembly. If face of gear does not align with 96 tooth ring gear remove or add brass washers until proper alignment is achieved. There should be one brass washer below the head of the 5-40 screw. Do not tighten at this time.

6. Place starter motor in backplate and secure with 4-40 x 3/8" socket head cap screws and brass washer (bag 3). Snug down screws, do not tighten at this time.

7. Clean electric motor shaft with lacquer thinner. Place a small drop of Loctite 271 on shaft and slide 8 tooth gear onto shaft. Place a small drop of Loctite 271 on 4-40 set screw, put into 8 tooth gear and TIGHTEN against flat on motor shaft. Make sure 8 tooth gear aligns with 18 tooth gear.

8. Loosen idler gear and slide up or down until there is no binding between gears. It may be necessary to loosen the 5-40 screw and put a small drop of Loctite 271 on very end of screw.

9. Loosen two 4-40 screws holding motor in place and slide motor until gears turn free and no binding is noticed. Tighten screws. At this time it is a good idea to apply a thin coat of grease to the teeth of the gears.

LIFTER INSTALLATION

Put 16 lifters (bag 7) in holes in center top of block and set block aside. In some cases it may be necessary to use some 600 wet/dry and remove the small tip on the bottom of the lifter.

* HEADS *

LAPPING VALVES:

1. Before starting to lap valves, get a small block of wood or a piece of styrofoam and make 8 holes the size of the valve stem and number 1 through 8. It is extremely important to keep the valves in the same hole to which they were lapped. Work on only one head at a time. You will also need a small wash tank to rinse the lapping compound from the head and a variable speed drill or variable speed Dremel tool.

2. The small bag with the gray powder is the lapping compound and should be placed in a small container and mixed with oil. Add only enough oil to form a thick slurry. Since the lapping compound is 600 grit it will take 2 to 5 minutes to lap each valve.

3. Starting from the left side of the head, with the bottom of the head facing up, put a small amount of oil on the valve stem and insert into the valve guide in the head. Using a clean cloth and alcohol wipe off the oil from the stem as it exits the valve guide on the top of the head. Remember, when lapping the valves, keep the combustion chamber of the head up at all times.

4. From bag 5, remove the small length of plastic tubing with the piece of 2-56 threaded rod in one end. Put about 1/2" of the threaded rod in the drill chuck and tighten. With a small screwdriver apply a small amount of lapping compound between the valve and head. While holding down the face of the valve with left thumb, slide the plastic tubing over the valve stem. Allow approximately 1/32" between the end of the plastic tubing and the top of the valve guide. Remember to use the slowest speed and keep the tubing as straight as possible. Turn the drill on and while using light pressure, pull the valve against the valve seat for a couple of seconds. Release the pressure and allow the valve to come off the seat and once again lightly pull against valve stem while running the drill or Dremel tool slow. Repeat this up-down motion for approximately two to three minutes. Keep track of how long it takes you to do one valve. Remove the valve and clean in wash tank until all residue of the lapping compound is gone. A small brush is helpful for this operation. Under a bright light or magnifying glass look at the valve seat in the head. There should be a satin finish around the entire diameter of the seat. Do not worry if the valve seat is wider on one side.

5. Continue to lap the remaining seven valves. Remember to keep the valves in order. It is easier to lap all eight valves, then remove and clean the head and valves, as opposed to doing each one individually. This also lessens the chances of getting lapping compound on the valve stems.

VALVE INSTALLATION:

Once you are satisfied the all valves are seated and heads are thoroughly washed out, the next step is to assemble the valves. Oil the valve stem and place the first valve in the head. While holding the valve against the seat put a valve spring over the valve stem, then an aluminum valve collet (grove side up). While depressing the spring and valve collet put a "E" clip into the groove in the valve stem and release the spring. This operation is best done on a large white sheet of paper or clean table top. Safety glasses should also be worn. Continue this operation until all eight valves are installed.

ROCKER ARM ASSEMBLY:

1. Remove the rocker arm shaft (3/32" x 4" rod), 2-56 x 1/2" socket head cap screws, and four shaft supports from bag 4. These supports are 1/4" diameter. x 3/4" long with a flat machined on both sides. Place a small drop of Loctite 271 on threads of 2-56 screw and put down through the center of the shaft supports and screw into the recessed areas on the top of the head. These areas are located just behind and between the valves. To insure the supports are straight, slide rocker arm shaft into the top hole of the end support, until it slides into the hole of the second support. Continue until the shaft easily slides into all the supports.

2. From bag 4, remove two "E" clips, brass washers rocker arms and 1/8" diameter. x 3/4" springs. Starting from the left, the rocker arm assembly should be put together, in the following sequence: "E" clip, brass washer, rocker arm, shaft support, rocker arm, brass washer, spring, brass washer, rocker arm, shaft support, rocker arm, washer, spring, brass washer etc. It may be necessary to place two washers on one end of the rocker arm shaft. The end rocker arms on the end should pivot without binding.

NOTE !!!!!!! Do not put the 5-40 set screws and jam nuts in the rocker arms at this time.

* HEAD TO BLOCK ASSEMBLY *

1. Remove ten, 4-40 x 5/8" socket head cap screws, ten brass washers, fourteen, 4-40 x 3/8" socket head cap screws from bag 3.

2. Wipe bottom of head and top of block with lacquer thinner. Also make sure the tapped holes for the head bolts are clean.

3. Place an "O" ring (bag 3) into the recessed area on the intake side of one head. Put intake manifold over "O" rings and lightly hold in place with 4-40 x 3/8" socket head cap screws (bag 3). Do the same with the other head.

4. The intake manifold screws should not be tight at this time. Take the ten, 4-40 x 5/8" (bag 3) socket head cap screws and put a brass washer on each. These screws are to be used in the upper holes in the heads.

5. Wipe out groove around each cylinder. Carefully place large "O" ring (bag 16) into eight grooves. Make sure "O" ring is all the way in the groove ("O" ring should extend above the surface of the cylinder approximately .015").

6. Carefully put the head-intake assembly onto the block and apply firm downward pressure on each head. As you are looking at the side of the engine block, with the transmission to the right, the head bolts are numbered as follows: starting from the top left and moving to the right 1,2,3,4,5. and starting from the lower left and moving to the right 6,7,8,9,10. Prior to tightening head bolts number 2 and 4 (on both heads) place a small amount of Loctite 510 on the bottom of the washer. The head bolts should be !! LIGHTLY !! tightened in the following order: 3,8,2,7,4,9,1,6,5,10 (fig. 1) Go to the other head and tighten in the same order. Tighten the intake manifold bolts. Return to the first head and repeat the tightening sequence, then do the same to the other head. Since there are no torque specifications, it is important not to overtighten the screws to the point of stripping the threads. Continue this process until both heads are flush with deck.

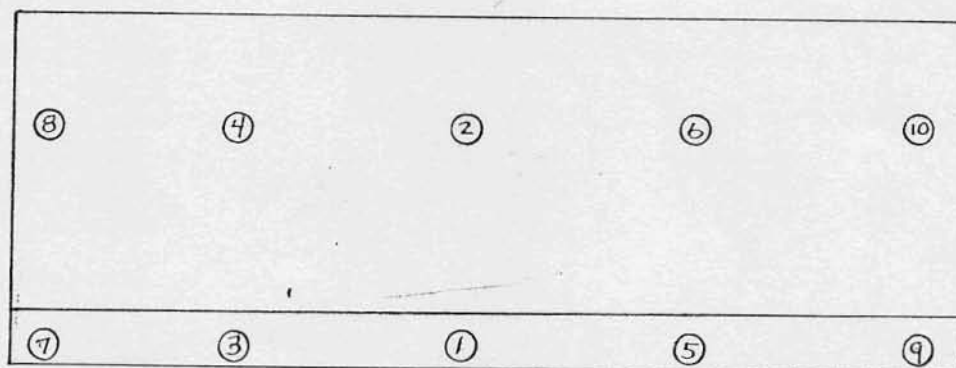


Figure 1

* PUSHROD AND ROCKER ARM *

1. Remove intake manifold.
2. Remove sixteen pushrods from bag 7, sixteen 5-40 x 3/8" set screws and 5-40 jam nuts from bag 4.
3. Starting from the left slide one push rod through the back of the rocker arm, through the hole in the head. Make sure the end of the push rod is seated in the recessed pocket in the lifter.
4. Screw the 5-40 allen set screw into the rocker arm just until it starts to come through the bottom. The allen end should be up. Place a 5-40 hex nut on the top of each screw.
5. Continue turning until the push rod is seated in the cup of the set screw.

ROCKER ARM ADJUSTMENT:

1. Rotate the engine counter clockwise until the lifter is at its lowest point. The clearance between the rocker arm and valve should be approximately .004 to .006.

2. Once this clearance adjustment has been made tighten the jam nut against the top of the rocker arm. Rotate engine two or three revolutions and recheck clearance.

3. With thumb and forefinger (with the lifter at its lowest point) pivot the rocker arm back and forth to get a sense of what .004 clearance feels like. This will be very helpful after you have run the engine and wish to randomly check valve clearance. Also, after the engine has run for a while the rocker arm surface will wear a slight amount or the end of the valve stem may wear at which point a feeler gauge may not be usable.

4. Continue this procedure until all rocker arms are adjusted on both heads.

INTAKE MANIFOLD INSTALLATION:

After lifters and pushrods have been installed and adjusted remove pump assembly from bag 15. Place spring into brass fitting (located between distributor and carburetor). Slide pump piston into brass housing (recess side should be towards block). Make sure piston moves freely. If piston seems to be tight, lightly polish outside diameter with 600 grit wet/dry emery paper. Put pump lifter into the reamed hole located at the rear center of the block (make sure that drilled end is up). For all of you Ford fans, the intake manifold can be turned around backwards and the pump will still operate. Just place the pump lifter in the hole nearest the front of the engine. Either pump lifter hole that is not used, serves as a crankcase breather. Connect a short length of fuel line tubing from the pressure fitting on the end of the carburetor to the fitting between the distributor and the carburetor. (The other fitting on the side of the carburetor goes to the fuel tank).

Thoroughly clean both surfaces of head and manifold with lacquer thinner. Clean "O" rings with alcohol. Place a small bead of silicone sealant in recess on head. Lightly press "O" ring into silicone and remove any excess from the interior of the port. Place another bead of silicone on the top of the "O" ring and reinstall intake manifold. Tighten four screws evenly. NOTE: When installing intake manifold, the pump piston can be held in place by oiling piston and compressing against spring then place your finger over fuel line.

* MISCELLANEOUS *

WATER PUMP AND TIMING COVER INSTALLATION:

1. Remove 4-40 x 3/4" socket head cap screws from bag 3 and insert in to the top and bottom holes of the timing cover.
2. Put water pump in front cover (make sure tab on water pump housing slides into slot on timing cover) and tighten set screw on side of cover. Do not overtighten. The set screw is used to keep the pump from rotating in the timing cover. Before putting timing cover onto engine make sure that the flat on the water pump drive dog aligns with slot in large timing gear. Do not force!!! Once the pump and gear align tighten two 4-40 x 3/4" socket head cap screws.

COOLING SYSTEM:

1. Remove brass water fittings from bag 3. Screw one in each hole in the front of the block.

2. As you are looking at the front of the engine, put a short length of silicone fuel line tubing (available at most hobby shops) from the right side of the pump to the right water fitting on the front of the block. The other side of the pump goes to the radiator or water reservoir. The pump intakes water from the left side and transfers water through the right bank of cylinders, through the transfer passage at the end of the block, through the left bank of cylinders and out the front, back into the radiator or holding tank. If you are planning to run the engine only for a short time, a small holding tank can be used to recirculate the water. If you plan to run the engine for an extended period of time, then a radiator must be made or a larger holding tank can be used.

THE COOLING SYSTEM MUST BE VENTED. DO NOT RUN THE ENGINE UNLESS THERE IS A VENT SOMEWHERE IN THE SYSTEM. PRESSURES CAN BUILD UP IN A CLOSED SYSTEM TO A LEVEL WHICH COULD BLOW OFF WATER LINES AND SPRAY HOT STEAM. EXCESSIVE PRESSURES COULD ALSO BREAK THE SEAL BETWEEN THE CYLINDER LINERS AND THE BLOCK.

TRANSMISSION ASSEMBLY

1. Attach transmission to bell housing with 4-40 x 3/8" socket head cap screws.

Slide clutch bell through large bearing in transmission and out through small bearing. Lightly tap center of clutch bell with a wooden block to insure bell flange is against bearing.

2. File flat on end of drive shaft. Slide universal joint over shaft and hold in place with two 8-32 set screws.

3. Place transmission and bell housing assembly onto backplate and secure with 4-40 x 3/8" socket head cap screws. Do not Loctite at this time.

MOTOR MOUNT INSTALLATION

1. Remove the four rubber motor mounts from bag 5. Screw two into the rear of the transmission housing. Before screwing the other two into the side of the block, put a small drop of Loctite 510 on the base of the threads and the top of the rubber.

WING NUT ASSEMBLY

1. Remove wing nut assemblies from bag 14. FIRST, REMOVE ALL FLASHING SURROUNDING EACH WING NUT with an X-acto knife. SECOND, carefully break wing nut from core assembly with smooth jawed pliers. Remember, there will be sharp edges, so it is a good idea to wear gloves for this operation. Once all wing nuts have been removed, clean-up any excess flashing with fine file. The shorter wing nuts are for the air cleaner. Remove the 4-40 x 3/8" set screws from bag 14. Put a small drop of Loctite 271 on the end of each and screw into the four valve cover holes on the top of each head. Allow screw to extend above the top of the head approximately 3/16". The wing nuts can now be screwed onto each stud.

AIR CLEANER:

1. Remove all parts from bag 2.
2. Attach large aluminum disc to top of carburetor with two 1/4" x 3/8" button head screws. Put a small drop of Loctite 271 on threads of 4-40 x 3/8" set screws and turn into the aluminum disc. Put two wing nuts through finned aluminum top, down through filter element and screw into aluminum base. Do not overtighten.

HEADERS:

1. Decide on a shape of the exhaust system. This is left up to each individual.
2. Silver solder each piece of tubing to the header flange.
3. The eight pieces of copper tubing can be bent into some very complicated shapes. The only thing that you must remember is to anneal the piece of tubing before you try to bend it. This is easily accomplished by heating (with a propane torch) until dull red and immediately dipping in water. This process makes the tubing very soft and easy to bend. You may need to repeat this step numerous times, depending on the complexity of the bend.
4. The best way to bend the tubing is to hold the header flange in a smooth jaw vise. Once you have made a bend, the copper tubing "work hardens" and must be re-annealed. This bending and annealing process may have to be done several times before the desired shape is achieved.

STARTER MOTOR-ELECTRICAL HOOK-UP:

1. The starter motor requires 12 volt at 1400 milliamp and should be fused. USE 16 GA. WIRE ON ALL LEADS GOING TO THE STARTER MOTOR.

2. A switch must be installed in the circuit. This can be operated manually or activated by the remote control.

3. It is recommended that a two pin plug (available at most hobby shops or electronic supply shops) be placed between the starter motor and battery pack.

IGNITION WIRING:

1. Remove eight glow plugs, eight small springs, distributor cap and base from bag 5.

2. Carefully screw all eight glow plugs into head.

3. Push a spring onto the top of each plug. You will notice the springs have a large and small end. If you wish to use glow plugs, other than the ones supplied in the kit, check to see which end of the spring fits the best.

4. Remove the screw in the center of the distributor cap and screw the base into the rear of the intake manifold.

5. From the wire supplied cut four lengths, eight inches long and four lengths, six inches long. Remove approximately 1/8" of insulation from one end of each wire. Solder the eight inch wires to the front two glow plug springs on each side of the engine. Do the same with the other four wires to the remaining springs.

6. With header exhaust attached (4-40 x 1/4"-bag 3) to the head, route the wire so it does not rest against the exhaust pipes. The wire separators in bag 14 will help in the alignment the wires in a pleasing and uniform shape.

7. For a more authentic look the wire can be places into the distributor cap in the proper firing order. The firing order in a Chevrolet engine is 1.8.4.3.6.5.7.2 and the distributor rotates counter clockwise. Once you have decided on how the top of the cap should look, slide the wires through the top and down through the base. Place four wires to each side of the base as they exit.

8. Once the wiring is finished, slide a short length of heatshrink over the spring and the end of the wire and carefully heat with a soldering iron or heat gun.

9. It is advisable to attach a nine pin plug (male-female available at Radio Shack) to the wires terminating from the distributor and going to the glow plug driver. This greatly simplifies removal of the engine from the model, should it be necessary. Eight of the pins are used for the glow plugs and the ninth is used for the connection to the block.

* ELECTRONIC GLOW DRIVER PLUG INSTRUCTIONS *

BEFORE ATTEMPTING TO HOOK-UP THE UNIT, READ AND UNDERSTAND INSTRUCTIONS AND WIRING DIAGRAM. MAKE A SPECIAL NOTE THAT THERE IS A POSITIVE (+) GROUND. IF THE UNIT IS NOT WIRED CORRECTLY INTERNAL DAMAGE WILL OCCUR.

It is important to understand there are two separate battery packs need for operate the glow plug driver. The first being two 4000ma, 1.2 volt batteries wired in series, not parallel. This is used to supply power to the glow plugs only. The glow plug driver automatically reduces the 2.4 volt input voltage to 1.2 volts for the glow plugs. THE WIRES FROM THE 2.4 VOLT BATTERY PACK SHOULD BE 16 GA. SOLDER AN EYELET TO THE POSITIVE SIDE OF BATTERY AND ATTACH SECURELY TO THE BLOCK. The second battery pack should be 4.8 volts. This battery pack is used to operate the glow plug driver only. If you are operating with a remote control the receiver battery is used to operate the glow plug driver. Since the engine operates as a diesel and there is no ignition timing it is necessary to be able to turn all the glow plugs on or off when needed. Without going into a long technical explanation of how the unit works I will just say that a random glow plug is turned on then off. This process is repeated on the next plug and so on. Once all eight glow plugs have been turned on and off, the entire procedure is repeated again. This is done thousands of times per minute. The batteries see only one glow plug, instead of eight. this allows the batteries a longer operating time. The electronic glow plug driver was especially designed for use with the V-8 engine and features:

- * Direct hook-up to receiver
- * LED indicator to tell when unit is on
- * Power to glow plugs can be turned on or off with transmitter
- * Infinitely adjustable,
- * Servo reversing capability
- * Manual operation, without use of remote control
- * Approximately 3 ounces (less batteries)

If you are installing in a model, it is advisable to put a nine pin plug (Radio Shack number 274-239 and 274-229) to the nine leads coming from the unit. For mounting purposes a small piece of Velcro can be placed on the back side of the aluminum box. You will need two, 4000 milliamp (4 amp hour) nicad batteries, wired in series. Sanyo batteries seem to work the best.

OPERATING WITH REMOTE CONTROL:

If you are planning to use the unit in conjunction with a remote control, a "Y" harness should be placed into the receiver throttle jack. One end of the "Y" harness should go to the throttle servo and the other end, to the glow plug driver. Turn on the transmitter and receiver and make sure throttle is in slow position. If LED is on, slowly increase throttle until light goes out. If LED does not go out, carefully place a small screwdriver into the large hole on side of aluminum box. Make sure screwdriver blade aligns with adjustable pot (refer to drawing). With throttle set at 1/4, slowly rotate pot to the right or left until LED does out. You may wish to experiment to determine just how long you wish to leave the glow plugs on. If the LED comes on at high throttle and goes off at low throttle, carefully remove two screws and slide the cover up. Refer to drawing and locate jumper wire (located directly to the left of the "C" in Conley) carefully lift up and place in the other socket hole. This procedure reverses the operation of the unit. Slide cover back into position, making sure the small piece of insulating paper is placed between the transistors and the case.

MANUAL OPERATION:

If you are planning to run the engine on a test stand, wire the unit as per instructions. Place an on-off switch between the red and black wires from the 4.8 volt battery pack to the glow plug driver. This allows the unit to be manually turned on or off while test running the engine.

CARBURETOR ADJUSTMENT:

On the side of the carb there are two adjustment screws, marked L and H. Lightly turn each until they are seated. Turn screw L (low speed) counter clockwise approximately 1 & 1/2 turns. Turn screw H (high speed) counter clockwise approximately 2 turns. Once the engine has started, turn in idle adjustment screw until engine runs at a fast idle. Slowly turn in screw L. You will notice the engine r.p.m. will increase. Lower engine idle. Once again slightly turn screw L. Lower engine idle. Continue this process until the lowest engine idle can be achieved. Once this point is found unscrew screw L 1/4 to 1/2 turn. You will notice the engine runs a little rough, this is to be expected.

STARTING:

NOTE: The power and performance of the engine is directly proportional to the quality and charge of the batteries supplying the glow plug driver. It cannot be overemphasized the importance of fully charged batteries.

1. Before trying to start the engine make sure the entire valve train is well oiled and all batteries are well charged.

2. If you have the engine in a model it is advisable to test run the engine on a bench test stand and make any adjustments before trying to power you model. Try to mount the fuel tank as close to the engine as possible.

3. The fuel required for operation should be a 4 cycle blend with 15% to 20% nitro-methane. This fuel is available at most hobby shops. NEVER ATTEMPT TO USE GASOLINE.

4. It is also helpful to remove the air cleaner for the initial starting. Depending on the position of your fuel tank, in relationship to the height of the carburetor, it may be necessary to place finger over top of carburetor to "choke" the engine, while activating the starter motor. Watch to see that fuel is being drawn through fuel line. After you have run the engine the choke can be activated, with the air cleaner assembly installed by simply pressing down on the finned aluminum top. This will compress the filter element and choke the engine.

5. If you are using a radio control make sure the throttle is set for low motor.

6. Turn on ignition and activate starter motor. Make sure small red light is on at the glow plug driver. DO NOT RUN STARTER MOTOR FOR MORE THAN FIVE SECONDS AT A TIME. A GOOD RULE TO FOLLOW IS TO ACTIVATE STARTER FOR 3 TO 5 SECONDS AND ALLOW TO COOL OR 20 SECONDS.

7. If the engine does not try to start, briefly choke while activating starter motor. You should see fuel moving through the fuel line.

8. If you "flood" the engine, remove the glow plugs and activate the starter motor for five seconds.

9. There will be a noticeable increase in the compression after the engine has run for a short period of time and will continue to increase until the rings have seated. Because of this increased compression it may be necessary to activate the starter motor before turning on the glow plugs.

10. When you are finished running the engine, remove the fuel line (while engine is running). This will allow the engine to drain any fuel which may still be in the carburetor. After the engine has stopped, place a few drops of oil (Marvel Mystery Oil is good for this purpose and can be found at most automotive or hobby stores) down through the carburetor, while activating the starter motor. Make sure the fuel line is disconnected. This dilutes any unburned fuel and reduces the amount of rust that can build-up on steel parts. It is also a good idea to put a couple of drops of this same oil into the inlet of the carburetor. Once again this should be done while activating the starter motor. If fuel is allowed to stand in the carburetor, the internal rubber parts can swell and makes the engine very difficult to adjust. If this happens;

- A. remove four screws at one end of carburetor
- B. remove metal cover
- C. allow to remain open overnight.

A small squeeze bulb can be used to remove any oil that has accumulated in the pan. Inject three to four ounces of the same oil through the pressure fitting on the pan and shake the engine, then drain. This process will also remove any unburned fuel. It is also a good idea to lubricate the rocker arm assemble periodically.

11. After the first fifteen minutes of running, check valve adjustment and engine for any loose nuts or screws. Remove pan and check all rod cap screws and main cap screws.

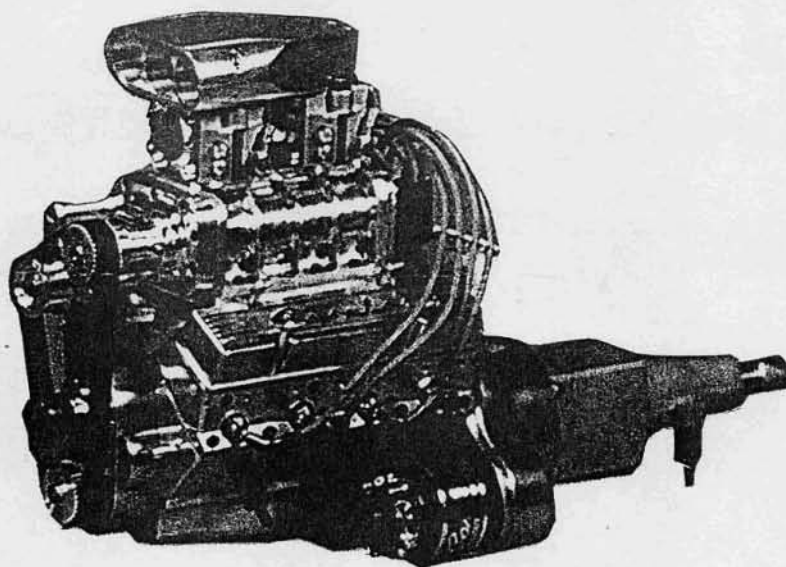
12. If there is ever a need to remove the gear from the camshaft or crankshaft, this can be easily accomplished by first removing the nylon idler gear and heating either of the metal gears with a propane torch.

13. Periodically remove fuel line from pump and place one drop of oil in piston assembly.



!!!!!! NEVER ATTEMPT TO RUN ENGINE WITHOUT PROTECTIVE AIR SCREEN AND FILTER INSTALLED.!!!!!!

Congratulations, you have purchased the smallest production, replica 6-71 style supercharger in the world. Extensive hours has gone into the design, testing and construction. UNDER NO CIRCUMSTANCES IS THE SUPERCHARGER HOUSING TO BE DISASSEMBLED OR ALTERED IN ANY WAY. DOING SO WILL VOID ANY AND ALL WARRANTIES. IF YOU SUSPECT A PROBLEM CALL CONLEY PRECISION ENGINES.

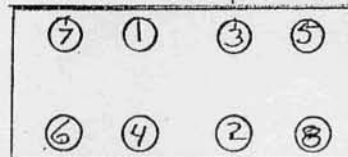


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ASSEMBLY INSTRUCTIONS

These instructions assume the engine to have one piece crankshaft installed, fuel pump lifter holes in block "O" ringed, ring end gap properly set, valves seated and engine in top mechanical condition.

1. Remove intake manifold and unscrew distributor.
2. Thoroughly clean intake surfaces and ports.
3. Install 4 "O" rings.
4. Install spring then fuel pump piston into brass housing with cupped side pointing toward pump lifter in block.
5. Carefully set new intake manifold onto heads making sure "O" rings remain in position.
6. Tighten 4 screws, securing manifold.
7. Tighten distributor offset bracket onto intake manifold with 1/4 - 28 socket head screw. Screw distributor into bracket.
8. Set supercharger onto new manifold and lightly tighten eight 4-40 socket head screws as per the following sequence.



9. Place an "O" ring into the two recesses on the top of the supercharger housing.
10. Place carburetors onto the top of the supercharger housing. The throttle cams should be to the right, as you are looking at the engine from the rear. The rear carb is held in place with the 10-32 x 1 1/4 inch screws. DO NOT OVERTIGHTEN.
11. Put the front carb in position, then place bottom half of the air scoop onto top of carb. Slide two 10-32 x 1 1/2 inch screws through holes in scoop and tighten.
12. Install air screen on bottom of scoop, then air filter. Align top of air scoop with base and tighten four screws.
13. Put pulley onto crankshaft and lightly tighten set screws.
14. Place straight edge between top pulley and bottom pulley. It may be necessary to slide either pulley in or out until proper alignment is achieved. Once aligned tighten both set screws on each pulley. Clearance between timing cover and pulley should be approximately 1/32 inch.
15. Remove transmission bellhousing.
16. Place toothed belt between upper and lower pulleys.
17. Align idler bracket so belt is center between pulleys. Rotate engine by hand to center belt on idler pulley. If belt is not centered, loosen idler bracket and move forward or backward to center belt. Rotate engine and check again.

*****The engine should be run on a test stand before installing in any model. When attempting to start engine remove the air scoop top, air filter and air screen. This allows the engine to be choked manually. Refer to engine starting procedures in engine assembly instructions. Do not activate the starter motor for more than ten seconds at a time.*****

PARTS LIST

- 1.....Assembled supercharger
- 1.....Intake manifold with mounting plate
- 1.....Idler bracket with pulley
- 1.....Air scoop
- 1.....Toothed belt
- 2.....Toothed pulleys

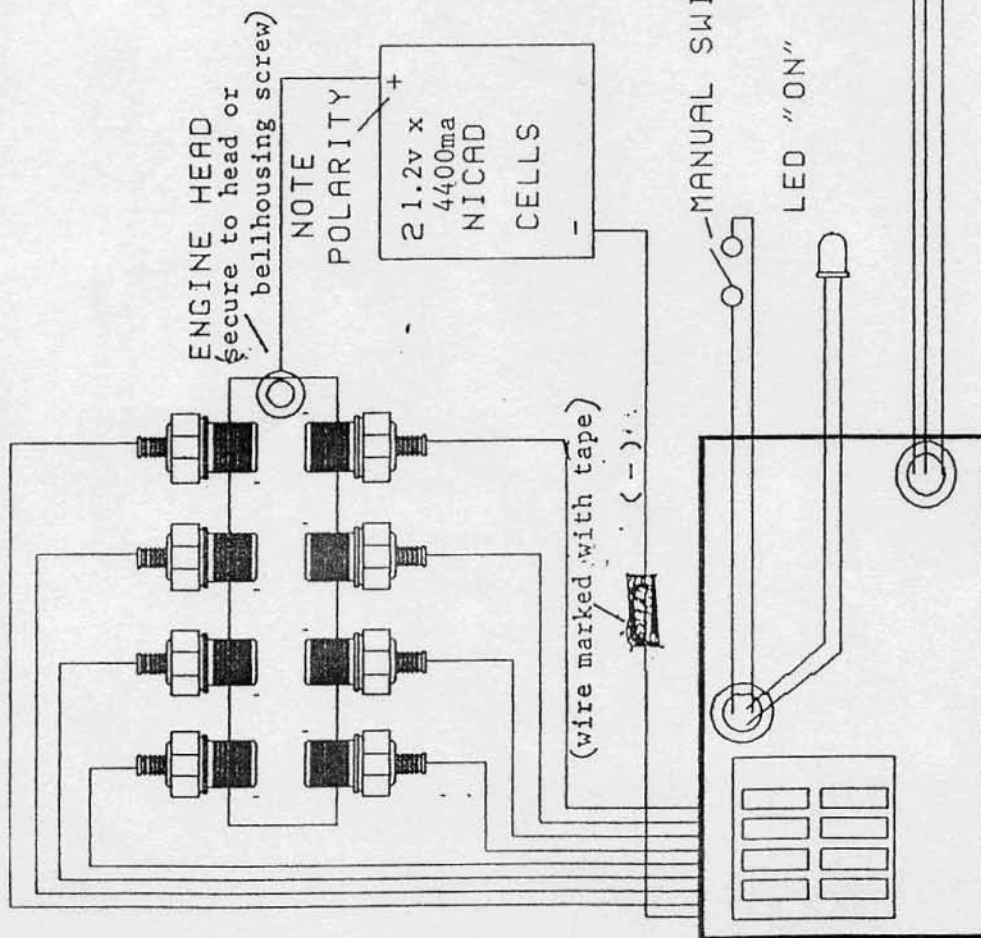
Parts bag #1

- 1.....Air filter element
- 1.....Air screen
- 1.....Distributor offset bracket
- 1.....1/4 - 28 x 3/8 inch SHCS
- 8.....4-40 x 3/8 inch SHCS (blower to manifold)
- 4.....4.4- x 3/8 inch SHCS (intake to heads)

Parts bag #2

- 2.....Carburetors
- 2....."O" rings
- 2.....10-32 x 1 1/4 inch SHCS
- 2.....10-32 x 1 1/2 inch SHCS

RADIO CONTROL CONNECTION



TITLE: GLO-DRIVER HOOKUP
COMPANY: CONLEY PRECISION
DATE: 5/29/91
PROJ: /
SCALE: /
DWG#

MANUFACTURERS #
CONLEY2.DC2

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Model Engines

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