

# ROOSA—MASTER

FUEL INJECTION PUMP

ASSEMBLY & DISASSEMBLY  
INSTRUCTIONS

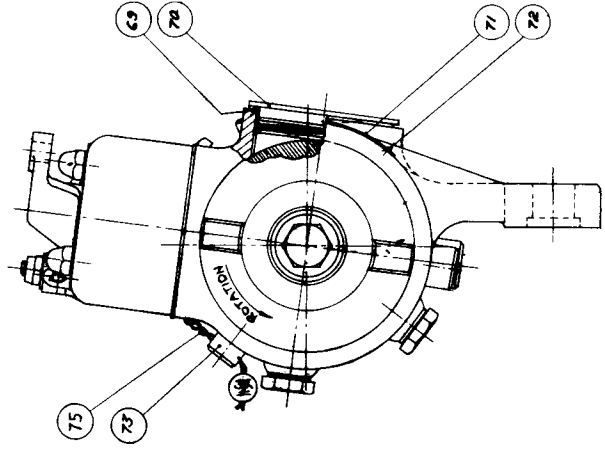
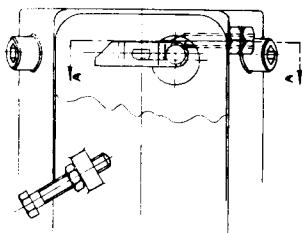
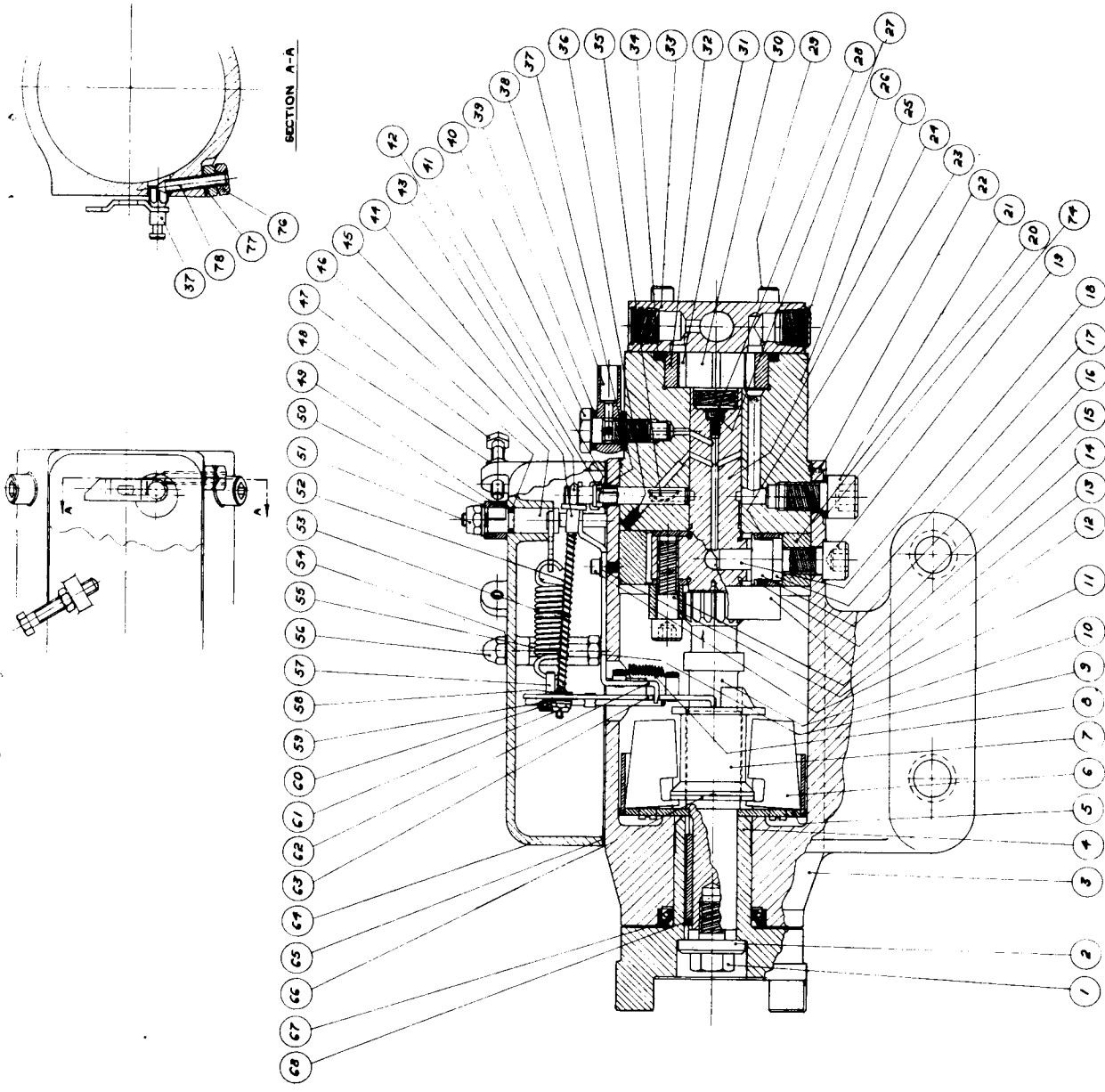
FOR MODEL NO.

GB-CC-L-631

HARTFORD MACHINE SCREW CO.

HARTFORD, CONN. U.S.A.

JULY 1952



# ROOSA-MASTER

FUEL INJECTION PUMP

MODEL No-GB-CC-4-631

RECOMMENDED PROCEDURE FOR THE DISASSEMBLY  
of the  
ROOSA-MASTER FUEL INJECTION PUMP

Before commencing the disassembly of the pump, all external grease and dirt must be removed. This can be accomplished best by filtered compressed air. It must be constantly borne in mind that dirt is the greatest enemy of the fuel injection pump. As an added precaution to keep dirt from entering the injection system while cleaning the pump, it is recommended that all openings be temporarily plugged. It is equally important to make sure the work bench is free from sources of dirt and impurities such as dirty and non-essential tools, rags, etc.

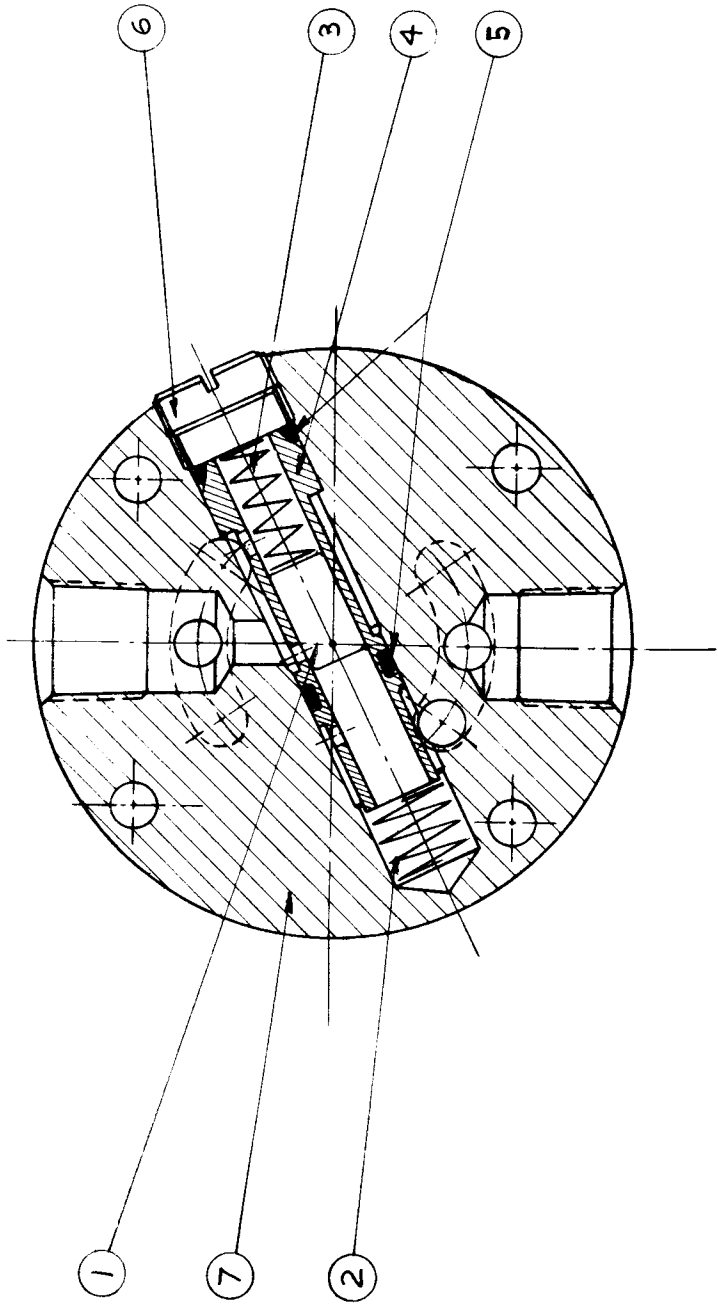
A clean pan should be available for the disassembled parts as well as a pan of clean fuel oil in which the parts may be washed.

(Numbers in steps 1-33 refer to cross sectional drawing of Roosa-Master Pump).

1. Place pump on bench, break the seals (75) and remove the adjusting hole plug (70) and adjusting hole seal (69). Then drain fuel oil from the pump.
2. With the drive of the pump to the left support the bracket of the housing (3) firmly in a vise making sure suitably soft material is used to mask the vise jaws. With a 3/8" open end wrench remove the throttle shaft lock nut (51) and throttle shaft washer (50) located on top of the throttle control arm (49). Then remove throttle control arm (49).
3. Again with a 3/8" open end wrench remove the two control cover hold-down nuts (56) and the control cover seal washers (54).
4. Remove governor control cover (64). In removing the cover first remove the throttle shaft assembly (45) by pushing down gently on the throttle shaft until it is free from its housing. It is not necessary to remove the throttle shaft seal (46) unless it is damaged.
5. It is not necessary to disturb the settings of the throttle arm adjusting screw (47) or the adjusting screw lock nut (48).
6. Remove control cover gasket (65) carefully. Again using the 3/8" open end wrench remove the two control cover studs (55) and cover stud lock washers (9). With a 1/8" socket wrench remove the governor bracket hold-down screw (11) and the hold-down screw lock washer (12).
7. Place the fingers of the right hand on the metering valve arm assembly (37) and with the fingers of the left hand placed on the governor arm assembly (63) carefully lift out entire governor linkage assembly.

8. Care must be exercised not to score or scratch the metering valve (35) when withdrawing the governor linkage assembly.
  9. It is not necessary to disturb the setting of the torque screw (78), torque screw nut (76) or seal (77).
  10. Invert the pump and clamp in vise with drive hub (4) end down.
  11. With a 5/16" socket wrench remove the head locating screw (21) and head locating screw washer (74). With a 7/32" socket wrench remove the two head locking screws (73).
  12. The entire hydraulic head assembly (25) can then be removed from the housing. Removal of this assembly can be accomplished most easily by a steady pull with a slight rotating motion. Do not remove hydraulic head seal (22) unless it is damaged. Extreme care must be exercised so that in removing this assembly it is not damaged by cocking and the cam rollers (17) are not allowed to fall out and become damaged.
  13. It is recommended that as soon as this assembly is withdrawn from the pump an elastic be placed around the periphery of the large end of the distributor rotor for assurance that the cam rollers will not fall out.
  14. With a 5/16" socket wrench remove the cam locating screw (19).
  15. By curling the fingers around the edge of the cam ring (20) remove it by exerting a steady pull. Do not force it.
  16. Return the pump to its original position in the vise.
  17. Hold the drive hub (4) firm and remove the drive hub screw (1) and drive hub washer (2).
  18. Then again reach into the housing, grasp the drive shaft (10) and gently withdraw it so that the governor weight retainer assembly (5) and governor weights (6) are removed at the same time.
  19. Remove the drive shaft (10) from the governor weight assembly. The governor weights (6), the governor thrust sleeve (7) and governor sleeve thrust washer (66) can then be removed.
  20. Remove the drive hub (4) with the drive hub key (68). It is not necessary to remove the drive shaft seal (67) unless it is damaged in which case it must be replaced with a new one.
  21. To disassemble the hydraulic head unit place it on the bench with the end plate assembly (33) facing upwards.
  22. With a 5/32" socket wrench remove the four end plate screws (29). Then remove the end plate assembly (33). It is not necessary to remove the end plate plug (26).
  23. With a slight rotating motion remove the transfer pump liner (32) and then the transfer pump blades (31). CAUTION: The transfer pump blades are made of a special graphite compound which will easily chip if not handled with extreme care.
-

24. Remove transfer pump seal (34).
25. Check the rotation of the pump which can be ascertained from the model number on the name plate (71). "CC" indicates counter-clockwise and "C" clockwise rotation. The transfer pump rotor (30) is threaded with a right hand thread for clockwise rotation and with a left hand thread for counter-clockwise rotation. Be sure you are certain of the rotation before attempting to remove the transfer pump rotor.
26. Remove the transfer pump rotor (30). Unequal torque or cocking of the tools will damage the transfer pump blade slots. It is suggested that a tool for this operation can be made from flat stock 1/8" thick, six inches long and approximately the width of the diameter of the rotor. It is also recommended that a flat box type wrench be placed on one drive plate screw (13) and the shank of the wrench against the other to hold the assembly steady while removing the end plate screws.
27. It is not necessary to remove the rotor plug screw (28) unless it is damaged. If it must be removed, however, it is absolutely essential to replace it and the rotor plug screw washer (27) with new ones. Extreme care should be exercised in the event that it is necessary to remove the rotor plug screw and washer to prevent damaging of the threads for the transfer pump rotor.
28. Slide the distributor rotor assembly (24) out of the hydraulic head (25) being very careful not to damage the shank of the rotor or the shank bore. Remove the bottom adjusting plate (23). A cardboard sleeve or other suitable protective material should be placed on the shank as soon as it is withdrawn from the hydraulic head to protect it from scratches. NOTE: The shank of the distributor rotor and its bore in the hydraulic head are lapped and mated and are not interchangeable.
29. Remove the cam rollers (17) and cam roller shoes (16). Care should be exercised to prevent the cam rollers from dropping or hitting each other in any way which may damage them.
30. The injection plungers (18) are now free and can be removed. Extreme care must be exercised to prevent any nicking or scratching of these plungers.
31. Note carefully the relationship between the serrations on the drive plate (14) and the notch on the top adjusting plate (15). This relationship must be maintained exactly in reassembly. It is recommended that the relationship be marked either with a dull scribe leaving a very light scratch or blueing in order to assure the same relationship. A more accurate check can be made by measuring the roller to roller dimension when the rollers are in the extreme outward position. This can be achieved by connecting air to one of the discharge holes and turning the rotor until registry with that port has been accomplished. This dimension must be maintained in assembly.



END PLATE ASSEMBLY

32. With a 7/32" socket wrench remove the two drive plate screws (13), the drive plate (14), and the top adjusting plate (15).
33. It is not necessary to remove the head plug screw (36) unless it is damaged.

(Numbers in steps 34-39 refer to cross sectional drawing of End Plate Assembly).

34. Remove the end plate plug (6) in the end plate (7).
35. With a dull scribe remove the o-ring (5).
36. Tip the hole into the hand allowing the regulating plunger spring (3) and the regulating piston (1) to fall into the palm of the hand.
37. With a small hook no larger than 1/8" in diameter hook into port orifice and with a slight twisting motion extract the regulating piston sleeve (4).
38. Remove the primer spring (2) noting that the coiled end is on top.
39. Do not remove the pin in the end plate.

RECOMMENDED PROCEDURE FOR THE CLEANING AND  
INSPECTION OF DISASSEMBLED UNITS

Cleanliness of the work area should again be emphasized, since dirt is the greatest enemy of the pump. A clean pan should be available in which the disassembled parts may be placed.

It is essential to have a small tank of filtered fuel oil (or other acceptable cleaning fluid) available in which the component parts must be thoroughly washed.

Abrasive materials such as crocus cloth, emery cloth and the like must not be used in the cleaning of pump parts. Similarly sharp tools such as scrapers should not be used.

**GENERAL** - In general the items to look for in the inspection of disassembled parts are signs of wear, scratches and nicks, signs of damage on seals, o-rings, etc., damage to threads on fittings, cracks or flaws on material surfaces.

**END PLATE** - Examine o-rings for signs of tears or abrasions. Be sure the piston slides freely in the sleeve and be sure there are no scratches, nicks or damage of any other nature on the surface of the piston. Examine spring ends for wear and chipping. Check the regulating valve plug for damaged threads and make sure it bottoms securely.

**HYDRAULIC HEAD** - Examine the hydraulic head seal for tears, cuts, etc. It is advisable to replace both copper washers on each connector screw each time the pump is disassembled. Examine center bore of head and metering valve bore for signs of wear, and varnishing and lacquering. If varnishing or lacquering is apparent, the part must be washed with a brush and solvent.

**TRANSFER PUMP** - Examine transfer pump liner for signs of wear and transfer pump blades for chipping and end wear. These blades are made from Graphitar, which in this application will outlast metal, however, they may chip on the edges so careful inspection for this is essential. Examine the transfer pump rotor for signs of wear and possible damage to threads.

**DISTRIBUTOR ROTOR** - Be sure the plungers slide freely in the cylinder and examine them for scratches or signs of wear. Be sure the cam rollers roll freely in the cam roller shoes. Inspect the ears on the shoes and the mating surface on the top adjusting plate for signs of wear. Examine the shank of the rotor for scratches, score marks and signs of wear. Examine the relief slot on the shank of the rotor for foreign matter. The distributor rotor and hydraulic head are mated parts and are, therefore, not interchangeable. Also check the splines in the drive shaft for signs of wear.

**DRIVE SHAFT and HOUSING** - It is advisable to replace the copper washer on the head locating fitting each time the pump is disassembled. The drive shaft should be checked for wear on the spline. All tapped holes and screw threads should be checked for damaged threads.

CONTROL COVER ASSEMBLY - Control cover gasket should be carefully inspected. It is important to replace it with a new one if any damage is suspected. Examine for scratches, set marks, dirt, etc. on the metering valve and also examine for wear. Check all springs and spring seats for wear.

Examine governor spring ends.

All parts should be thoroughly flushed in fuel oil before reassembly.

RECOMMENDED PROCEDURE FOR THE ASSEMBLY  
of the  
ROOSA-MASTER FUEL INJECTION PUMP

It will be of value to remember the order in which the pump was disassembled and merely reverse the procedure to reassemble it. It is further recommended that the parts be reinspected as they are reassembled.

(Numbers in steps 1-5 refer to cross sectional drawing of End Plate Assembly).

1. Place the priming spring (2) in the end plate (7) with the coiled end up, that is, away from the bottom of the hole. Make sure the spring is seated squarely.
2. Place the piston (1) in the sleeve (4) under fuel oil and with the thumb and forefinger over either end of the sleeve but not blocking the ends completely, rock it gently back and forth to insure free movement of the piston. If the piston fails to move back and forth freely, remove it, flush out the sleeve and repeat the process.
3. Replace the sleeve seal (5) on the sleeve (4) and insert the sleeve into the hole in the end plate with a slight rotating motion to prevent possible cutting and tearing of the seal. This operation should be performed with the end plate flat so that the piston will not fall through and become damaged as the sleeve is inserted. Be sure the sleeve is properly seated.
4. Insert the regulating spring (3) and the valve plug seal (5) on top of the sleeve. Make sure it is seated.
5. Assemble the end plate plug (6) making sure that it bottoms squarely.

(Numbers in steps 6-48 refer to cross sectional drawing of Roosa-Master Pump).

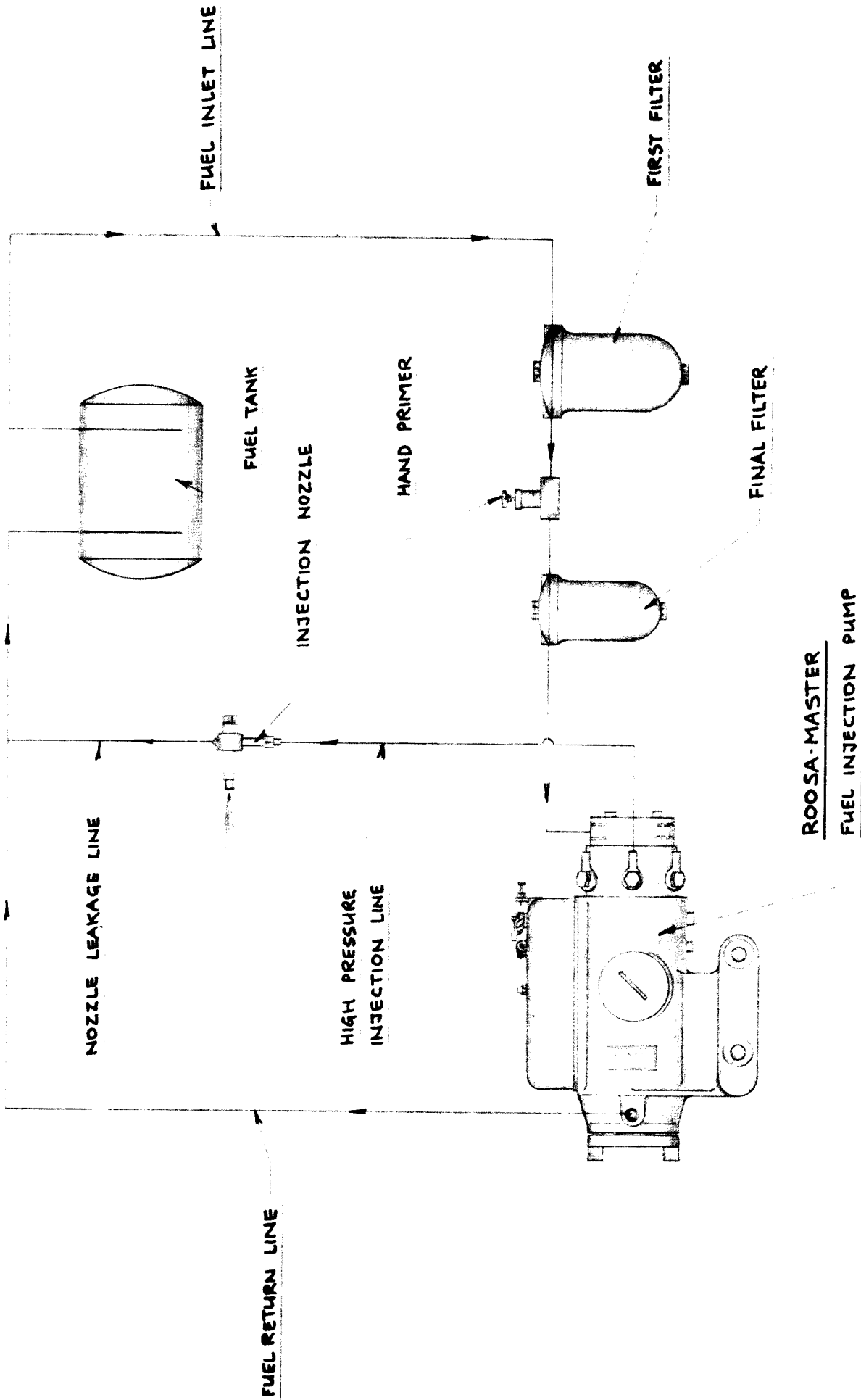
6. Flush the distributor rotor (24) thoroughly in the fuel oil bath and force a stream of fuel oil through all port holes.
7. Under oil carefully place the plungers (18) in the cylinder of the distributor rotor. With a piece of round brass .250 in diameter or less (or any suitably soft material) push the plungers gently in the cylinder from one side and then the other. This will aid in the detection of foreign matter. If the plungers feel gritty or too tight, remove them, flush out the cylinder and repeat the process. After assurance has been made that no foreign matter is present, block the opening of the plunger cylinders with the thumb and forefinger and gently rock the rotor back and forth to insure free movement of the cylinders. The slightest impurities will result in the sticking of the plungers. It may be necessary to "polish in" the plungers with rouge.

8. Place the top adjusting plate (15) over the top of the distributor rotor (24) so that the prongs are located in the milled slots. One of the two holes in the top of the distributor rotor is drilled  $3^{\circ}$  off center. Consequently there is only one way in which the top adjusting plate will fit correctly. To check its positioning turn top adjusting plate to both extremes with prongs in milled slots. The holes should line up correctly with the kidney shaped slots of the top adjusting plate. If they do not, lift top adjusting plate off, turn it  $180^{\circ}$ , replace and check again.
9. Place the drive plate (14) on top of the top adjusting plate with the arrow on top of the drive plate showing. The holes in the drive plate are also located off center. Consequently if the holes do not line up turn the drive plate  $180^{\circ}$ . It must also be remembered that in the disassembly special notice was taken of the relationship of the notch in the top adjusting plate and the serrations in the drive plate. This relationship must be retained accurately in the assembly. When the drive plate is in place, assemble the two drive plate screws (13) and tighten with torque wrench to 175-200 inch pounds.
10. Check freedom of movement of plungers again. Tightening of drive screws might conceivably bind the plungers.
11. Place the cam rollers (17) in the cam roller shoes (16) and check to assure freedom of rolling. Then fit shoes in their respective slots. Be sure the off-center radius of the shoe ear coincides with that of the retainer plate.
12. Place the bottom adjusting plate (23) over the shank of the distributor rotor with the hole having the coined radius down. Be very careful not to scratch, nick or in any way damage the shank. Check shoe movement in slots and observe that the radii mentioned in step 11 do coincide. An elastic should be placed on the rotor over the rollers to hold them in place.
13. Examine the hydraulic head seal (22) for signs of damage, replace if necessary.
14. Flush head, discharge holes and bore thoroughly in fuel oil bath. Also flush rotor assembly thoroughly. Insert the distributor rotor assembly (24) into the hydraulic head (25) under oil, using a slight rotary motion and again being careful not to scratch or damage in any way the shank or shank bore.
15. Check roller to roller dimension as determined in step 31 of disassembly instructions.
16. Before assembling the transfer pump rotor (30) check the rotation of the pump. Then using an offset screw driver, a piece of flat stock or any suitable expedient turn in the transfer pump rotor until it seats snugly. Do not use undue force. A torque wrench is recommended with a maximum of 75 inch pounds.

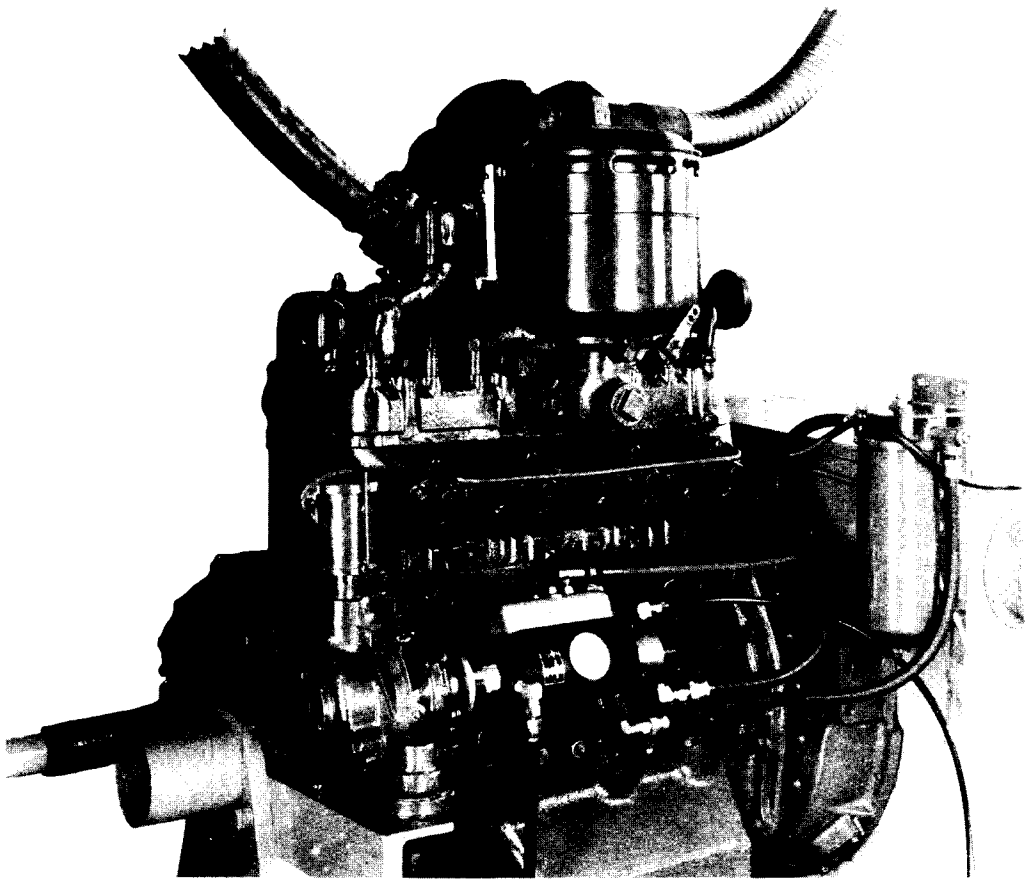
17. Slip the transfer pump liner (32) in place and then place the transfer pump blades (31) in the slots of the transfer pump rotor. The first blade should be dropped in place with its notch facing upwards and the other at 90° to the first with its notch facing downwards.
18. It is advisable at this point to check the action of the blades in the liner. Hold the hydraulic head in one hand with one finger preventing the transfer pump liner from rotating and with the transfer pump blades facing upwards turn the rotor. There should be a minimum of binding or sticking.
19. Place the transfer pump seal (34) in position.
20. To assemble the end plate (33) to the hydraulic head (25) hold it in one hand with the word "IN" on top. Bring the hydraulic head assembly up to it so that the pin in the end plate is located in the slot in the transfer pump liner. The top of the hydraulic head assembly is determined by the head plug screw notch (36) and by the metering valve hole (35). Then fasten with the four end plate screws (29).
21. Place the bracket of the housing (3) in the vise with the hub end facing to the left.
22. Place the governor weight retainer assembly (5) on the table with the retainers facing up and place two governor weights (6) in position on opposite sides.
23. Place the governor sleeve thrust washer (66) on the bottom of the governor thrust sleeve (7).
24. Lift one weight and place the governor thrust sleeve and washer in the milled slot of the weight. Lift the weight opposite and place the sleeve and washer in its slot. Lift the sleeve up high enough so that another weight may be placed in position and repeat until all six weights are in place.
25. Bring this assembly to eye level and sight across the tops of the weights. If they are all even, it will indicate that the governor sleeve thrust washer is located correctly in each slot.
26. Place the drive hub (4) with key (68) in the housing.
27. Place the drive shaft (10) in the governor thrust sleeve (7) and in the horizontal position slide carefully into the housing until the drive shaft is positioned in the drive hub (4) and the key (68) in the hub becomes engaged in the drive shaft keyway.
28. Assemble the drive hub washer (2) and drive hub screw (1) and tighten with torque wrench using 450-500 inch pounds. Check the rotation of the shaft to insure freedom of turning.
29. Invert the housing in the vise so that the drive hub end is down.

30. Rotation is determined by viewing from the drive hub end. Check the rotation of the cam ring (20) as determined by the arrows on the ring and on the end of the housing and slide it gently into position so that the hole in the cam ring lines up with the hole for the cam locating screw (19) in the housing.
31. Assemble the cam locating screw (19) and tighten.
32. Rotate drive shaft until arrow can be seen through the adjusting plug hole.
33. Remove the elastic, holding the cam rollers (17) in place. Position the hydraulic head so that the word "IN" on the end plate (33) faces upwards and the arrow on the drive plate (14) is 90° from the top and toward the assembler. Grasp the hydraulic head in both hands and insert very slowly in the housing taking every precaution to prevent cocking or binding. Gently rotate the head as it is inserted so that the hydraulic head seal (22) is not sheared. Be sure the arrow on the drive shaft mates with the arrow on the drive plate and continue to insert until the splined units become engaged. Fasten the hydraulic head to the housing with the head locating screw (21) and head locating screw washer (74).
34. Then assemble and tighten the two head locking screws (73).
35. Turn the pump in the vise so that the drive hub is to the left.
36. Check freedom of rotation again by turning the drive hub.
37. Check the metering valve (35) for freedom.
38. Grasp the governor arm assembly (63) in the left hand and the metering valve arm assembly (37) in the right hand. Drop the metering valve (35) in position first and then drop the governor arm assembly in place making sure the flat on the governor thrust sleeve is facing up. Insert the throttle shaft assembly (45) in position.
39. Move the governor arm assembly (63) back and forth to check action. Also check rotation of metering valve arm assembly (37).
40. With one finger holding the control bracket (62) as far to the right as possible assemble the control cover studs (55) and cover stud lock washers (9). Then assemble the governor bracket hold-down screw (11) and hold-down screw lock washer (12).
41. Again check the action of the metering valve arm assembly (37) and the governor arm assembly (63).
42. Examine and replace the control cover gasket (65).
43. Assemble the governor control cover (64) being careful not to shear the throttle shaft seal (46) in assembly.

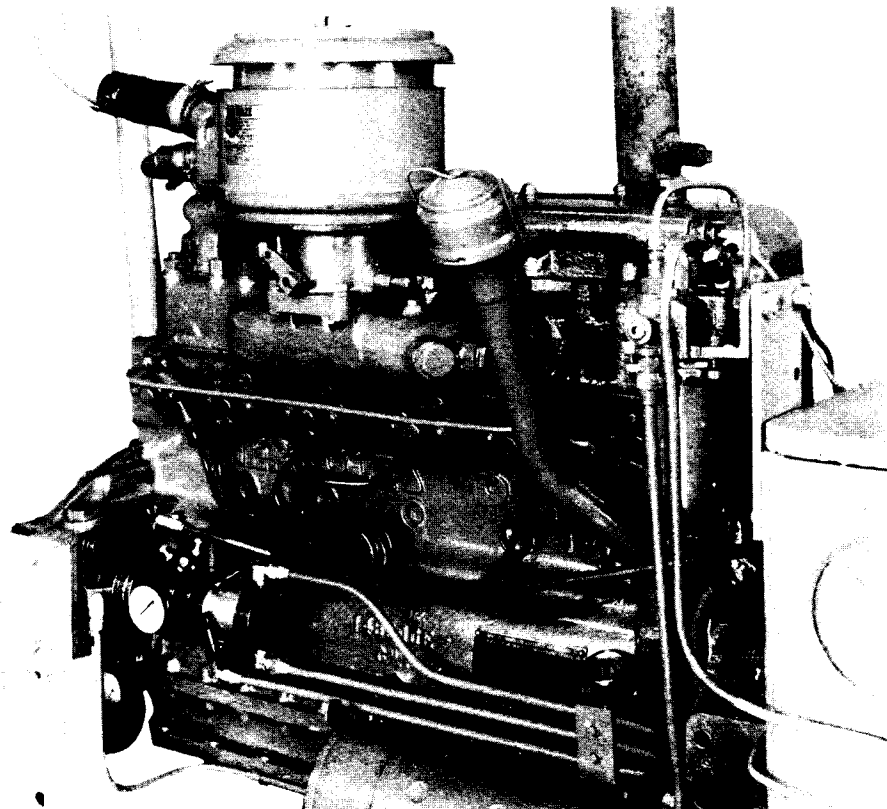
44. Assemble the throttle control arm (49), the throttle shaft washer (50) and the throttle shaft lock nut (51) and tighten.
45. Assemble the control cover seal washers (54) and control cover hold-down nuts (56) and tighten.
46. Check action of throttle arm.
47. Assemble the adjusting hole seal (69) and adjusting hole plug (70).
48. The pump is now completely reassembled.



ROOSA-MASTER  
FUEL INJECTION PUMP



**FOUR CYLINDER INDUSTRIAL INSTALLATION**



**SIX CYLINDER AUTOMOTIVE INSTALLATION**

The Hartford Machine Screw Company, Hartford, Connecticut, is pleased to warrant all Hartford products relative to the Roosa-Master Fuel Injection Pump under the following warranty. This warranty is subject to future amendment upon written advice from the manufacturer. The warranty is in lieu of any other warranty expressed or implied and supersedes any different warranty in customer's purchase orders.

#### W A R R A N T Y

- (a) Hartford warrants each new fuel injection pump sold by it to be free from defects in material and workmanship for 1,000 hours of operation or for six months, whichever event shall first occur, after delivery to the purchaser.
- (b) For three years after the end of the foregoing warranty period Hartford will repair or replace each pump originally sold by it at a nominal cost. But only one repair job or replacement will be made at this price on each pump originally sold.
- (c) After the end of said three year period Hartford will continue to supply, at its then prevailing rate of charge, repairs, or replacement parts for each model of pump as long as said model is in production, and if any model is discontinued, for five years after such discontinuance.
- (d) The warranty and agreements in the foregoing paragraphs (a), (b) and (c) shall apply only under the following conditions:
  1. Each pump or part claimed to be defective or to require repair shall be forwarded at purchaser's expense to Hartford's plant in Hartford, Connecticut, together with data as to its use and examination by Hartford shall disclose that said pump or part has been operated under normal conditions including installation, speed, fuel, lubrication and service;
  2. Hartford's obligations are limited to the furnishing at its plant of repairs or replacement which in Hartford's judgment are adequate. Each repaired or replacement pump shall be returned f.o.b. Hartford's plant;
  3. The foregoing warranty and agreements are in lieu of all other warranties express or implied and of all other obligations or liabilities of Hartford of every nature relating to the quality or performance of said pumps whether for indirect or consequential loss or otherwise. The above warranty and agreements extend only to the original purchaser of said pumps from Hartford. No variation of the foregoing is authorized except in writing by the President or Vice President of Hartford.

