

Since the procedure for timing and fitting is not standard for all engines, reference must be made to the engine manufacturer's handbook before carrying out this work. In an emergency however, and if the timing marks are clearly marked on the engine and the pump mounting flange, most pumps can be fitted as follows:—

1. Turn the pump drive shaft so that the master spline is in alignment with the master spline on the engine coupling.
2. Enter the drive shaft into the engine coupling as the pump is pushed on to the securing studs.
3. Push the pump hard against the mounting face and secure lightly with the three holding nuts.
4. Rotate the pump on the retaining studs until the timing mark scribed on the edge of the pump mounting flange is accurately aligned with the timing mark on the engine.
5. Tighten the retaining nuts.
6. Connect and tighten the back-leakage pipe.
7. Connect and tighten the fuel pipe to the inlet connection on the pump end plate.
8. Connect the "shut off" lever on the pump to the control linkage and ensure that the lever has a full range of movement when the control is operated.
9. Connect the throttle lever on the pump with the throttle control linkage, and ensure that the lever has a full range of movement when the control is operated. When on a vehicle, **set the control stops so that pressure on the accelerator pedal is not transmitted to the maximum speed stop on the pump.** Setting instructions should be contained in the manufacturer's handbook.

Note—No attempt must be made to start the engine until the pump has been filled and primed in accordance with the following instructions.

When a pump has been timed by the "emergency" method, an early opportunity should be taken of checking the setting by the manufacturer's instructions.

PRIMING AND STARTING

The following priming sequence is applicable to the typical fuel systems shown in Figs. 4 and 5. When a particular fuel system varies from that shown in the illustrations refer to the vehicle manufacturer's handbook.

Priming

Priming is necessary on initial installation of the fuel injection system, after any subsequent removal, and if the system should be drained by running out of fuel.

Before priming and venting, ensure that the outside of the vent screws and surrounding area is thoroughly clean to prevent dirt and foreign matter entering the system.

Carry out operations 1 and 2 whilst operating the fuel system priming lever.

1. Slacken the filter outlet (A), or the fuel pump inlet connection (B) whichever is the higher, and allow fuel to flow until free of air. Tighten connections.

Note—Filters of the four boss type must also be vented at the plugged boss; this must be done irrespective of the height of the filter in the system.

2. Slacken the vent valve fitted on one of the two hydraulic head locking screws (C), and the vent screw (D) on the governor housing. When fuel free from air flows from the vents, tighten the housing vent screw and then the governor vent screw.
3. Slacken any two injector high pressure pipe unions at the injector end. Set the accelerator to the fully open position and ensure that the stop control is in the "run" position. Turn the engine until fuel free from air flows. Tighten unions.
4. Start engine.

For priming procedure after changing a filter element, carry out the operations detailed in paragraph 1 above.

Starting procedure

Where special starting aids are provided, refer to the vehicle manufacturer's handbook, otherwise proceed as follows:—

1. Ensure that the "shut off" control is in the "RUN" position.
2. Set the engine control in the full throttle position.
3. Press the starter button, and when the engine is firing evenly return the throttle control to the idling position when the governor will take over control.
4. Where a manually operated start retard device has been used, it must be released after starting, otherwise the pump will be retarded throughout the speed range of the engine.

Note—If a new or reconditioned pump has been fitted the idling stop must be adjusted and the maximum governed speed set according to the engine manufacturer's instructions.

Failure to start

Starting difficulties are not always attributable to faulty fuel injection equipment and may result from poor compression caused by cylinder wear, "gummed up" rings, sticking or badly seated valves, or from insufficient tappet clearance. When no starting aid is fitted, difficulty may be experienced when starting in extremely cold weather.

1. Ensure that there is fuel in the tank and that the fuel cock is turned on. If the tank has run dry, the pump must be filled and primed in accordance with the instructions on page 12, after the tank has been refilled.
2. Check the position of the "shut off" control.
3. Inspect for oil leaks at the injector pipe connections and tighten as necessary.
4. Fill and prime the pump to remove all air from the system. See page 12.
5. Inspect the filter element and replace if clogged. Prime the system after reassembling the filter. See page 12.
6. Remove each injector in turn and after reconnecting the high pressure injector pipe with the nozzle directed away from the engine, turn the engine and ensure that fuel passed through the injector is correctly sprayed and atomised. Replace any faulty injectors.

FAULT RECTIFICATION

Possible causes of rough running, together with appropriate remedies are listed below.

1. Faulty injectors

Remove each injector in turn, reconnect the high pressure pipe with the injector nozzle pointing away from the engine, and while turning the engine ensure that fuel passing through the injector is correctly sprayed and atomised. Replace faulty injectors.

2. Leaking injection pipe unions

Inspect all unions for signs of oil leakage and tighten as necessary.

3. Clogged filter

Remove and replace the paper filter element, and prime in accordance with instructions on page 12.

4. Air in the pump

Slacken each injector pipe coupling in turn (at the injector end) while the engine is running, and re-tighten when oil, free from air bubbles, leaks past the union threads. If engine running does not improve, fill and prime the pump in accordance with the instructions on page 12.

5. Water in fuel

When the presence of water in the fuel is suspected, the filter bowl should be drained daily until the amount of water so removed indicates that less frequent draining will be adequate to prevent water from entering the fuel injection pump. If more than a teacupful of water is drained off, the source of ingress must be found or else the filter bowl must be drained at more frequent intervals.

If rough running persists after the above tests have been made, the advice of the nearest C.A.V. agent should be sought.

MAINTENANCE

Apart from periodic replacement of the filter element and servicing of injector nozzles, a fuel system incorporating a DPA type fuel injection pump requires no maintenance. If the necessary care is given to the cleanliness of fuel, both in the fuel system and the bulk storage installation, the pump will give many thousands of hours of trouble-free service.

INHIBITING

When the vehicle is to remain idle for long periods as, for example, while in storage or in transit overseas, the pump and fuel injection system must be protected from corrosion in the following manner.

Each particular installation must be dealt with as the fuel layout demands. In general, the principle to be observed is that existing fuel should be drained as far as possible from the tank, the filter and pipework, and the injectors. The whole system must then be refilled with a non-corrosive fuel, the pump filled and primed, and the engine then run for a period sufficient to ensure that the whole system has been inhibited. Detailed instructions for any vehicle, tractor or installation should be given in the manufacturer's handbooks, and should be followed closely.

Further information and literature on inhibiting and storage of fuel oils, is available from all C.A.V. agents and depots.