

## Section 2.

# ENGINE DETAILS.

### (1) MOUNTING.

The A.E.C. engine is bolted up in one unit with the clutch and Meadows 22 type gearbox. The engine is carried in the hull by a single resilient mounting at its front end and by similar mountings on each side of its clutch housing at the rear. In addition the bevel box is bolted to the gearbox and supported by trunnions (one either side of bevel box).

### (2) CRANKCASE, CRANKSHAFT AND CYLINDERS.

The crankcase houses the crankshaft and camshaft, the crankshaft being carried in seven lead bronze and white metal bearings and having hollow pins and journals to form oil passage.

Outside the crankcase there are two unions for the oil pumps, also one for the oil pressure gauge and one for an oil relief valve. An overflow pipe is taken from the oil canister to the timing case cover. The breather pipe leads from the timing case cover to the air intake pipe from the bulkhead.

The cylinder block is fitted with liners which are frozen into position and the block is secured to the crankcase by means of special lock nuts; these can be used again after removal. Two large detachable plates on the off side give access to the overhead valve push rods and two small plates on the near side to the interior of the water jackets.

The two detachable cylinder heads each enclose three cylinders, the joints being made by copper and asbestos gaskets. The exhaust valve seats are of the integral type.

The sump is bolted to the crankcase, the front set bolt being prevented from falling down after it has been unscrewed, by a small set screw in the front of the sump. The two sump wells are each fitted with a drain plug.

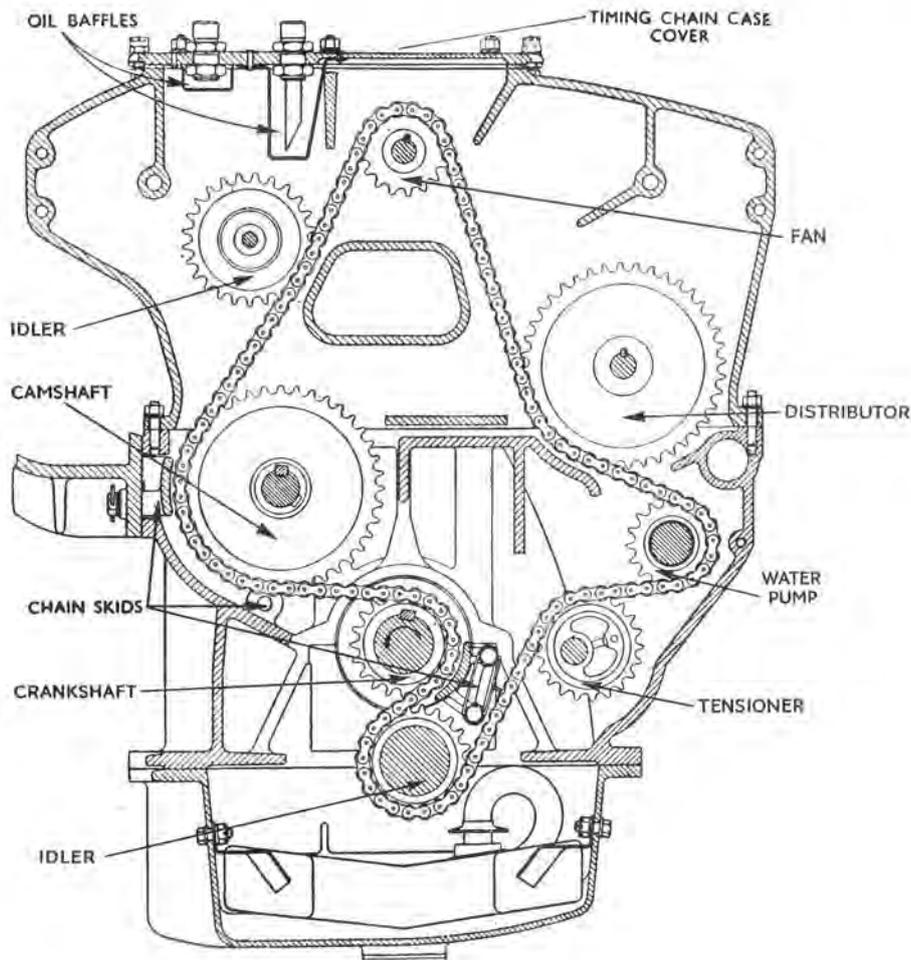


Fig. 1. Timing Gears.

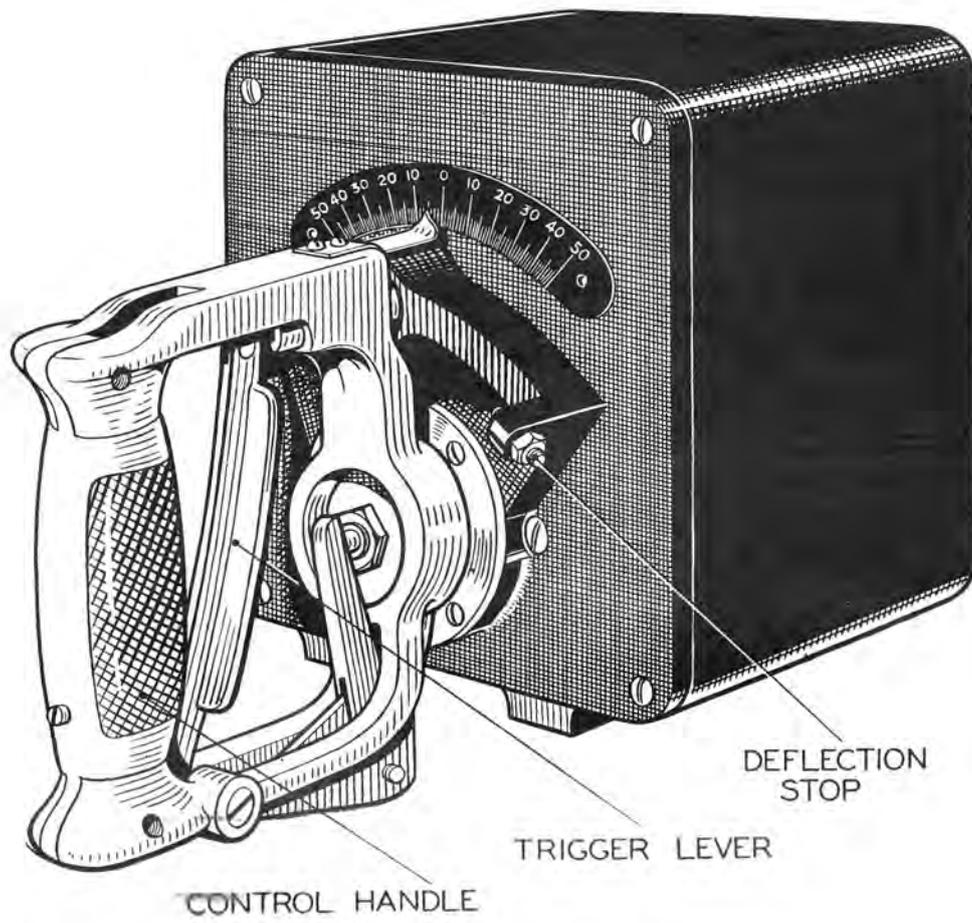


Fig. 17. Control Unit.

(13) **POWERED TRAVERSE OF TURRET.**

(a) Test hand rotation.

(b) Run engine and turn turret, using both hand and powered traverse. Note easy operation at slow and fast speeds, correct action of "change over" lever, absence of undue play in controls.

## **Section 46. FUEL SYSTEM.**

### **TO ELIMINATE AIR FROM THE FUEL SYSTEM.** (See Fig. 4, page 7).

To ensure a constant air-free fuel supply when operating on gradients, a pressure feed tank is incorporated in the system. This pressure tank must be airtight and the filler plug "A" and drain cock "B" are wired in position to prevent accidental opening. Tap "C" is wired "open." It must only be closed when changing the injection pump.

It is essential for all air to be removed from the fuel system, as even air bubbles will interfere with the regularity of the fuel injection. If fuel does not flow on opening vent cock "D," operate the hand primer until fuel flows without bubbles, then close the vent cock.

To remove water from the pressure feed tank open cock "B" until water is cleared and then lock with wire. The engine should accelerate rapidly and without hesitation if the system is free of air. If not, with the engine idling, slack off each injector union in turn just sufficiently to allow the fuel to seep out and watch for air bubbles between the pipe and the union nut. Should bubbles be detected, leave the nut slack until air-free fuel appears.

Treat each union in turn in this manner. It is a wise precaution to do this even though the acceleration test indicates that all air has been removed.

**N.B.**—If the union nuts are slacked off more than just enough to allow the oil to seep out, the force with which the oil issues from the pipe will produce a froth even if no air is present in the pipe.

After running for a few minutes, open the vent cock on the pump for a few moments to make sure that the pump chamber is full of fuel.

If either the pump or the fuel pipe connecting the pressure tank to the pump has been removed, the procedure detailed above should be employed as air will certainly have entered the pump chamber.

If the engine is run with the fuel cock closed, any air which has been dissolved in the fuel will be released and will either collect in the pump chamber, when its presence may prevent one or more of the plungers from delivering fuel, or it may be passed into the fuel pipes and interfere with the uniformity of the injection. It may sometimes happen that no trouble will follow, but in all cases, after having opened the cock, restart the engine and vent the fuel pump until the fuel flows freely. When the engine is hot apply the acceleration test already described above. As a rule, opening the pump vent cock for a few seconds is all that is required.

**It is a good plan to vent the pump periodically, while the engine is running, and thus make sure that the system is kept free of air at all times.**

If an injector has been removed, the fuel pipe should be vented as described above, before finally tightening the union.

## **Section 47. FIRE DRILL.**

In the event of a fire occurring, the Commander will issue orders as necessary. The principles to be observed in putting out a fire are—to engage the fire with extinguishers—and to exclude air from seat of the fire. The Commander has a "push down" engine stop control situated at the N.S. rear of the fighting compartment so that he can switch off the engine.

The Commander should consider the best way of dealing with any fire which may occur on his tank and should inform the crew of his probable actions in such an event.

The following procedure is suggested in the case of a fire in the engine compartment.

- (1) The driver will first switch off. He will then evacuate the machine through the driver's aperture, remove the Pyrene from the rear N.S. track guard, will cover up the air louvres over the engine, using coat, blankets, waterproof sheets, etc., as available. He will then squirt Pyrene liquid into small aperture to smother the fire.
- (2) The loader will close up the aperture between the engine and fighting compartment and evacuate the machine through the top door, then assist the driver.
- (3) The Commander will apply Pyrene liquid to the fire through the air grille in engine bulkhead keeping this as small as possible. If it is impossible to close the aperture, or if the heat is too intense, he will evacuate the machine and order all doors, flaps and apertures in the driving and fighting compartment to be shut tight and the air louvres in the turret to be covered.

## CHAPTER III.

# INSTRUCTIONS FOR LUBRICATION, MAINTENANCE, RUNNING AND INSPECTION.

### Section 40. TO START ENGINE.

#### (1) TEMPERATURES ABOVE ZERO.

Check that gear lever is in neutral.

Press heater plug button for 30 seconds.

Keep finger on heater button and fully depress accelerator pedal and press starter button.

The engine should fire almost immediately, and the starter and heater buttons should be released the moment the engine is running.

**NOTE.**—On no account should the heater button be kept pressed while the engine is running, as the combustion heat added to the electrical heat will quickly destroy the heater elements.

**N.B.** An auxiliary starter socket is provided on the N.S. of the driver for using an external source of electrical supply should the tank batteries be run down.

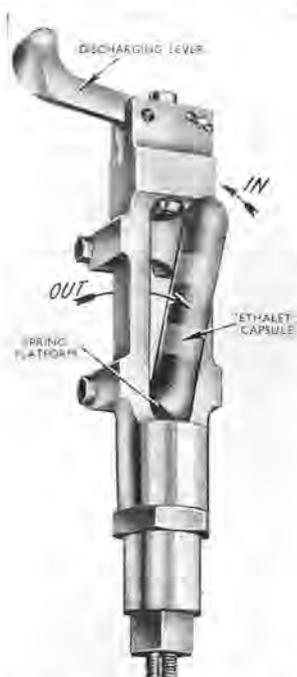


Fig. 20. "Ethalet" Tool.

#### (2) TEMPERATURES BELOW ZERO.

With atmospheric temperatures approaching or below zero, starting will be facilitated by using the ether starting device fitted to the engine.

Lift the lever of the puncturing tool (fitted in fighting compartment) and place neck of "Ethalet" capsule in recess provided. Discharge ether contents by pressing discharger lever smartly (Fig. 20).

Close starting butterfly (lever in fighting compartment).

Press heater button for about 30 seconds.

Fully depress accelerator pedal (keeping finger on heater button) and press starter button.

After engine has been firing for 10—30 seconds gradually open starting butterfly.

If there is a tendency for the engine to stop, immediately re-close butterfly.

Gradually allow accelerator pedal to rise until engine idles satisfactorily.

#### (3) WHEN HOT.

Depress accelerator pedal.

Press starter button.

### Section 41. RUNNING INSTRUCTIONS.

#### (1) STARTING OFF.

Ensure that both steering levers are fully forward. They require pressure to put them into position.

Start off in 2nd gear unless on a steep gradient or on very heavy ground.

#### (2) RUNNING NOTES.

Move the catch on the gate to get reverse gear.

Move the catch on the gear lever to 5th, or top gear. This is an "overdrive" gear.

Oil pressure should not drop below 35/42lbs. per sq. in. except when the engine is idling.

The charging rate of the dynamo will vary with the state of charge of the battery, i.e.—practically no charge will be shown on the ammeter when the battery is fully charged; when run down, a heavy charge will be shown.

## Section 6. FUEL INJECTION PUMP.

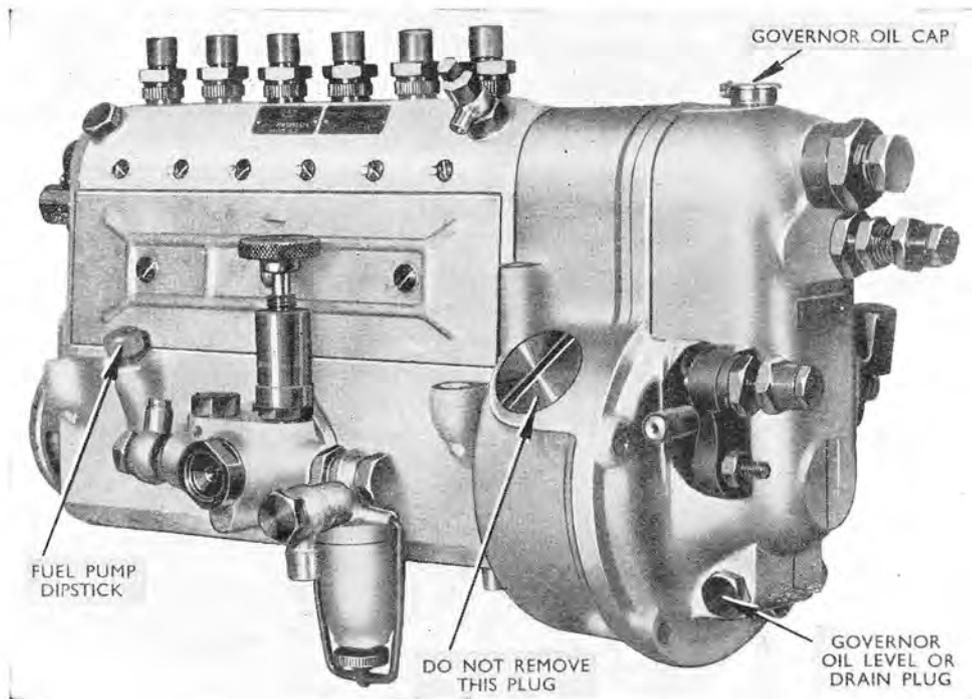


Fig. 5. C.A.V. Fuel Injection Pump.

The fuel injection pump fitted to the A.190 engine is not interchangeable as a unit with any other pump used on other types of A.E.C. engines. Fuel injection pumps of both C.A.V. and Simms manufacture are fitted to the A.190 engine.

The C.A.V. and Simms injection pump and injector are interchangeable as units, i.e. C.A.V. pump (Fig. 5) can be replaced by Simms pump (Fig. 6) and vice versa, also C.A.V. injectors can be replaced by Simms injectors either singly or grouped. No change of fuel piping is required.

**NOTE.—On no account should the injection pump be adjusted by untrained personnel.**  
(For fuel pump maintenance and timing see Engine Instruction Book).

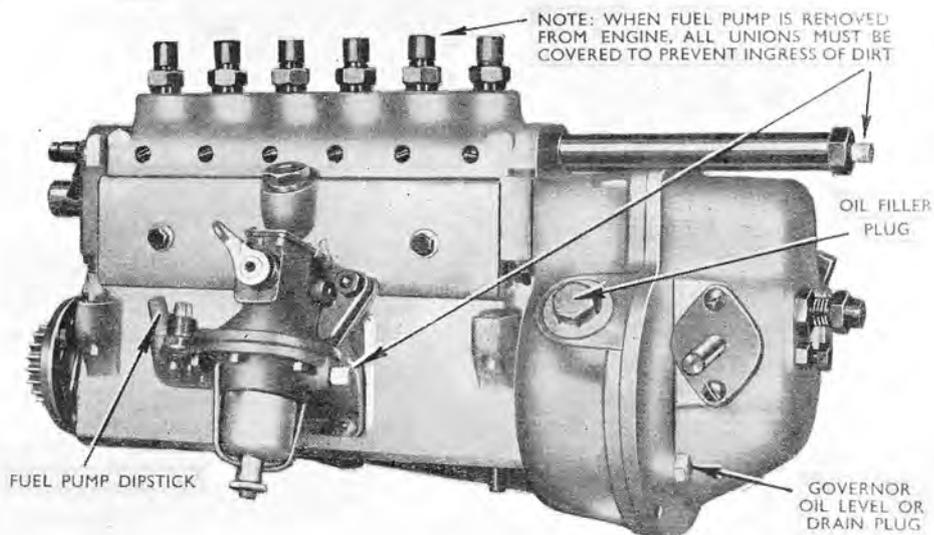


Fig. 6. Simms Fuel Injection Pump.