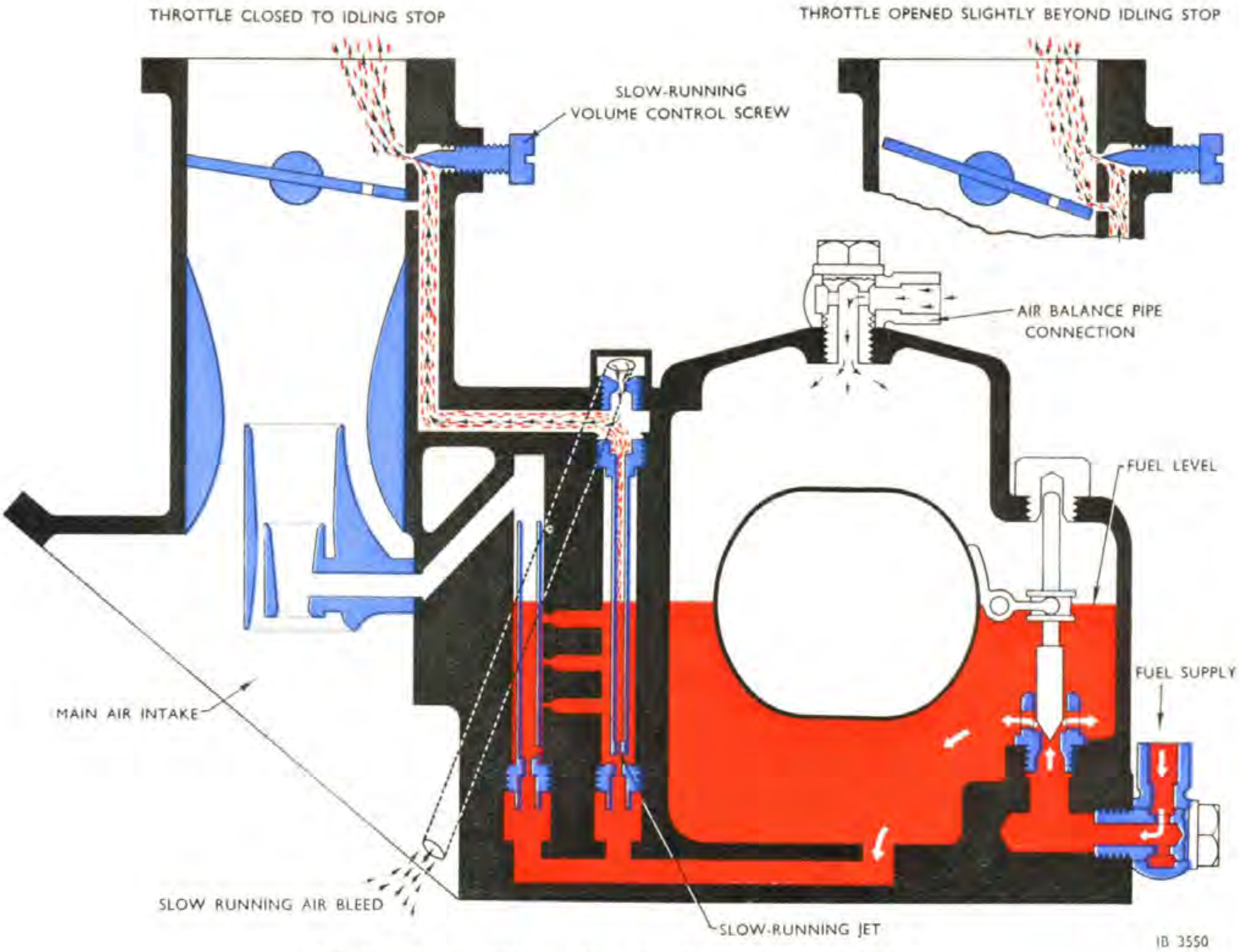

Fig. 18—Carburetter—diagram of slow-running circuit

In the meantime, however, a steadily increasing flow of air will pass through the venturi area, the speed of flow being governed by the piston speed of the engine, and the depression will be transferred to the outlet of the main jet discharge port in the venturi area.

It is a well-known fact that the laws governing the flow of liquids and gases differ. The flow of fuel from the main jet discharge port will increase out of proportion to the weight of air being drawn past the venturi area. As the speed of the air through the waisted portion of the venturi increases so the depression around the main discharge port increases, causing more and more fuel to flow, but the weight of air taken in by the engine will not increase to the same extent.

This would result in an incorrect mixture were it not for the compensator circuit.

From Fig. 19 it will be seen that the fuel wells for the main supply and the slow-running and compensator supply are connected by three transverse passages at different heights and with progressively increasing diameter of hole (reading from the lower passage to the top) at their junction with the main jet well. These are known as progression bleed holes, their positions and outlet diameters being determined by the carburetter manufacturer for the particular engine for which the carburetter is required.

In the early stages of the throttle opening, fuel will be drawn from the main jet well faster than the main jet can replace it, but as the level falls, fuel from the compensator well will flow through the topmost and largest of the three progression holes to compensate for the loss of fuel level in the main well and so provide a slightly enriched mixture to prevent a flat spot during the initial period of change-over from the slow-running position.

As the throttle is further opened and the drain on the main jet well and compensator increases, the fuel flow from the compensator will be transferred to the second and slightly smaller progression hole. The upper progression hole which has now ceased to function as a source of fuel supply to the main well will, in effect, become an air bleed (the upper end of the compensator well is connected to an air supply passage) to the main fuel supply, thereby correcting any tendency towards an over-rich mixture.

The same procedure will follow as the throttle is opened towards its limit ; the second and third progression holes will alternately feed fuel in a decreasing volume (the progression holes decreasing in size from No. 1 (top) to No. 3 (bottom)) and in turn acting as additional air-bleeds up to the limit of air supply to the compensator well.

If the throttle is closed again, reverse action will take place in the compensator circuit until the fuel

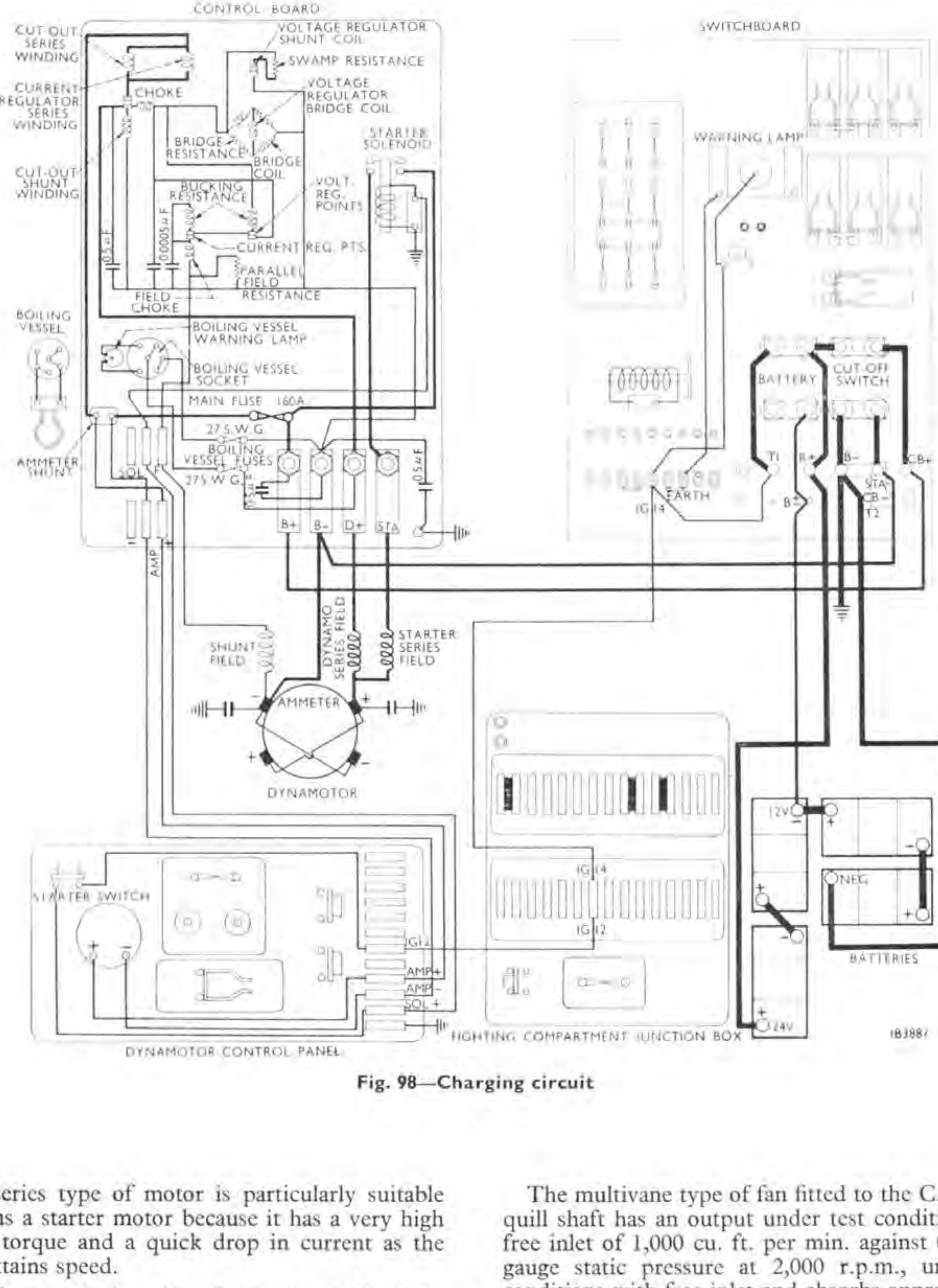

Fig. 98—Charging circuit

The series type of motor is particularly suitable for use as a starter motor because it has a very high starting torque and a quick drop in current as the motor attains speed.

The dynamotor is spigot flange mounted to the engine flywheel housing. An additional support is provided by a Silentbloc mounting which is secured to the top of the dynamotor yoke and to the engine compartment cover support.

The dynamotor armature is driven by a quill shaft located in the armature hub and splined to it at its commutator end (C.E.). The quill shaft is of sufficient length to provide a resilient drive and to damp out torsional oscillations.

Splined to the end of the quill shaft is a driving gear which engages the internal teeth of a coupling bolted to the engine flywheel.

The multivane type of fan fitted to the C.E. of the quill shaft has an output under test conditions with free inlet of 1,000 cu. ft. per min. against 0.8 water gauge static pressure at 2,000 r.p.m., under test conditions with free inlet and absorbs approximately 0.5 h.p.

Yoke and field coil assembly

The circular cast-iron yoke has the D.E. shield cast integrally with it. The flange of the shield incorporates a spigot to fit the engine flywheel housing to which the flange is bolted. On the top, at the D.E., the yoke is flanged up to make a seating for the Silentbloc mounting.

Air apertures, protected by steel wire mesh, are cast in the C.E. of the yoke and in the face of the D.E. shield.

battery is broken. As the dynamo speeds up, the generated voltage is increased and the current through the shunt coil of the cut-out is increased until the resultant magnetic flux is sufficient to attract the armature and close the contacts.

The auxiliary contacts close first and complete the charging circuit through the cut-out throw-out coil (now acting as a limiting resistance), the series winding and the parallel current regulator series winding. The resulting magnetizing force, due to the current flowing through the cut-out series and throw-out windings, is in the same direction as that due to the shunt winding and helps to complete the movement of the cut-out armature. As the armature movement is completed the main contacts close, the throw-out coil is short-circuited and the magnetizing effect of the current through the series coil helps to hold the armature in position. As the dynamo speed drops, the generated voltage falls below that of the battery and current commences to flow in the opposite direction, i.e., from the battery to the dynamo. The magnetizing effect of this reverse current through the cut-out series winding now opposes that of the weakened current through the shunt winding and reduces the pull on the armature until the force exerted by the armature pressure spring is sufficient to pull the armature from the core and so open the contacts. The main contacts open first, the throw-out winding is brought into circuit, helping the series winding to throw-out the armature and so break the dynamo circuit.

When the cut-out closes, a proportion of the dynamo current (1/3 approx.) flows through the series coil of the current regulator (*Fig.* 108). As the dynamo output increases due to discharged batteries and/or a heavy vehicle load, the magnetizing force produced by the current flowing through this coil is sufficient to attract the armature and thereby open the current regulator contacts. As the contacts open the bucking winding is inserted in series with the dynamo field coils so weakening the dynamo field and reducing the current output and hence the magnetizing force of the current regulator series winding is reduced. The armature is released and the contacts close, thus short-circuiting the bucking winding and again giving the dynamo full field strength. The bucking winding, which opposes the series winding, quickens the throw-off of the regulator armature. The current again rises to the predetermined value and the cycle of operations is repeated. This cycle is repeated at approximately 100 times per second and so limits the dynamo output. The current regulator is set to operate at 100±1.0A, 27V, 2,500 r.p.m.

While the battery is being charged, its voltage and the dynamo terminal volts rise steadily until a predetermined figure (29—29.5V) is reached, when the voltage across the regulator shunt winding (*Fig.* 109) is sufficient to so energize the coil that the armature is attracted and the voltage regulator contacts open. As the contacts open, the bucking winding is inserted in series with the dynamo field coils so weakening the dynamo field and causing the generated voltage to fall. The voltage regulator then functions in a similar manner to the current regulator. Further rise of the dynamo voltage is thus prevented and, as a result, the charging rate commences to fall and the current is insufficient to operate the current regulator contacts. The current regulator, therefore, goes out of action and the dynamo is controlled by the voltage regulator. As the battery becomes more and more fully charged the current falls until a condition of trickle charge is reached.

As stated, a low resistance temperature co-efficient swamp resistance is connected in series with the voltage regulator shunt coil. Due to its high resistance the greater part of the applied voltage is absorbed in the swamp resistance with approximately no increase in resistance due to temperature rise and, therefore, the total resistance of this circuit remains approximately constant. Consequently, the operation of the shunt coil is approximately constant.

The bridge coil also compensates for changes due to temperature variations. At normal temperatures all resistances are of equal value and no current flows through the bridge coil. At high temperatures the resistance of the copper coils rise, the resistance of

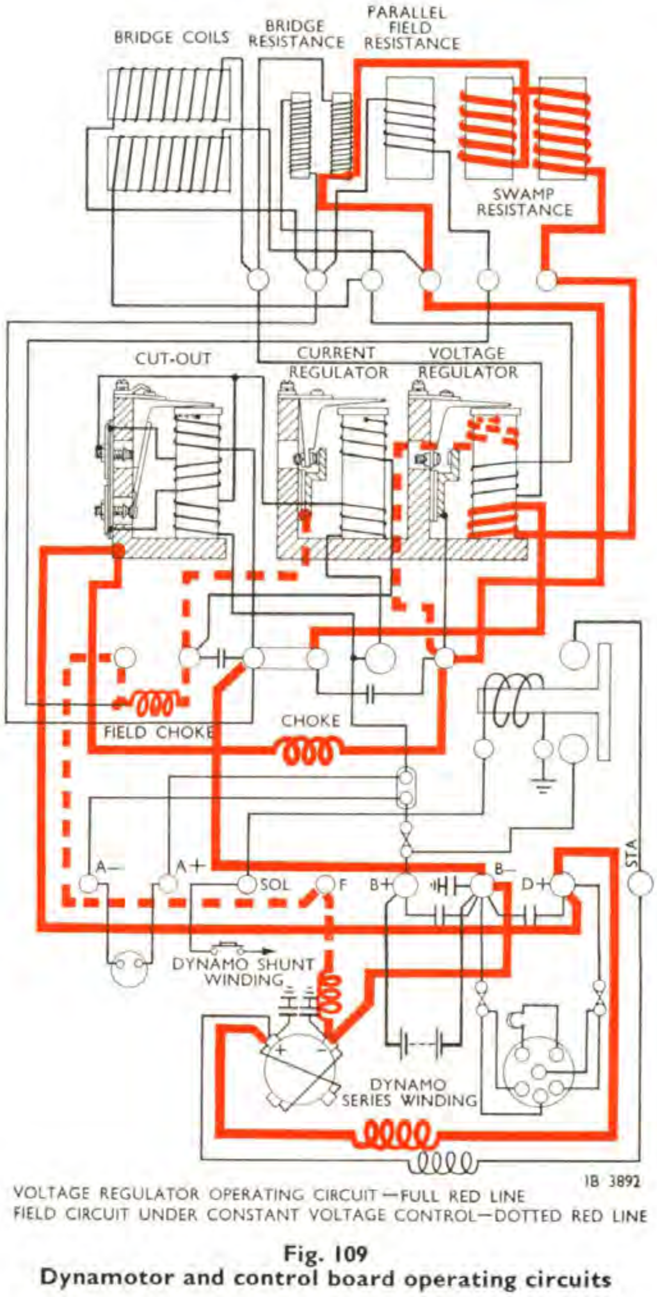

Fig. 109
Dynamotor and control board operating circuits

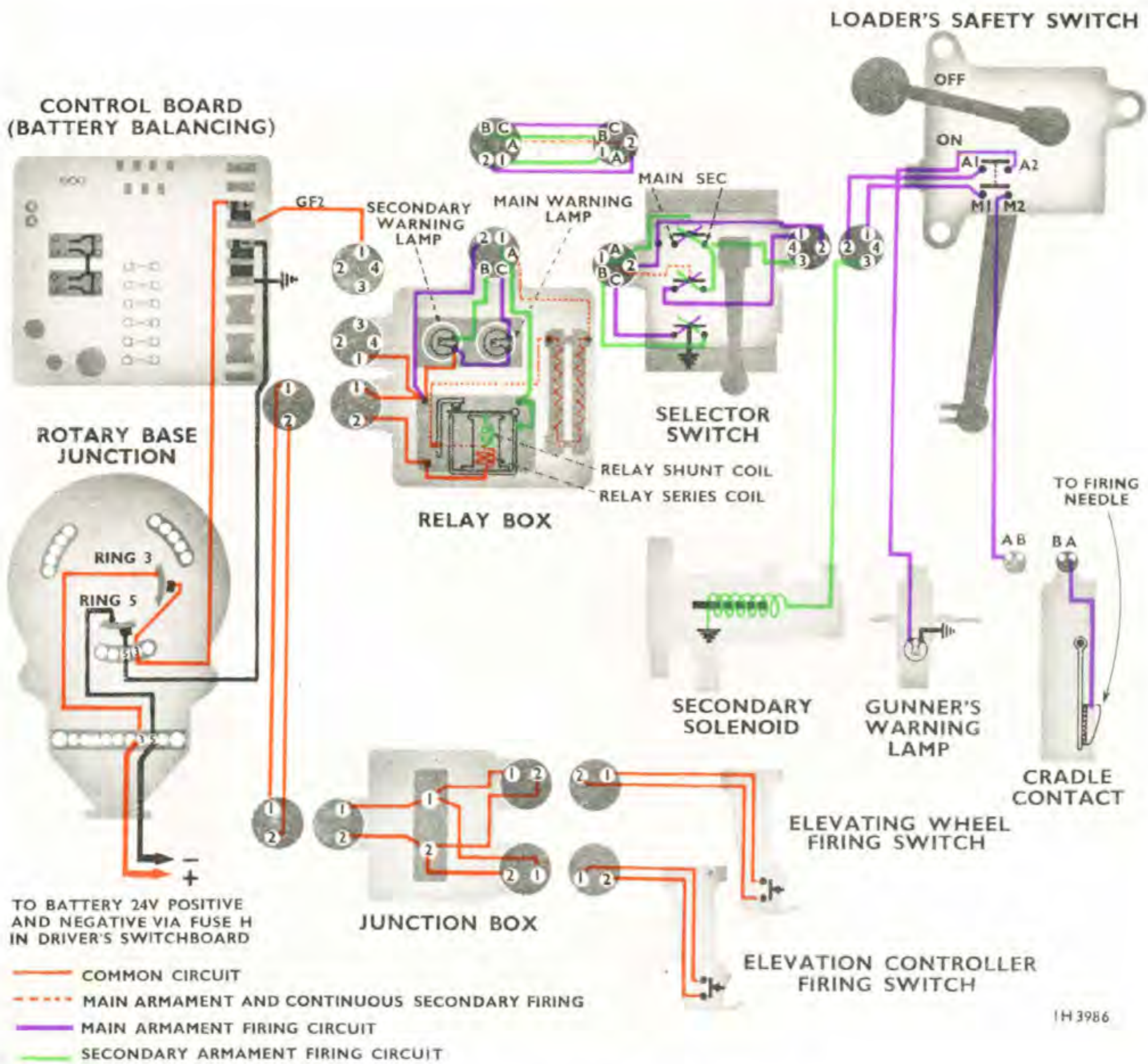

Fig. 322—Gunfiring circuit, 20-pr. mounting

Operation

When the gun is depressed beyond 2 deg. 30 min., the switch bracket is tilted forward through the medium of the chain connecting the bracket to the cradle.

If, when traversing the turret, the depressed barrel approaches the rear of the vehicle, the roller on the mechanism encounters the cam rail bolted to the turret, forces the switch lever rearwards and depresses the switch plunger. This breaks the traverse motor circuit, causing the turret to cease rotation, except under stabilized control (see E.M.E.R. Instruments and Searchlights K.122).

GUNFIRING EQUIPMENT

GENERAL

The main armament firing mechanism is normally operated electrically but the 17-pr. (Centurion Mks. 1 and 2), in the event of current failure, can be operated mechanically.

All secondary armament firing mechanism may be operated either electrically or mechanically.

The electrical equipment on all present marks of vehicle consists of the following components, viz., selector switch, relay box, loader's safety switch, index finger firing switch, main armament solenoid (17-pr. equipments only), secondary armament solenoid and a warning lamp.

The 17-pr. (Centurion Mk. 2) and 20-pr. (Centurion Mk. 3) may be fired from two positions, depending on whether the mounting is being operated by power or hand, i.e., by the firing switch on the elevation controller when operating at POWER or the switch on the elevating gear handwheel at HAND.

The electrical units are connected by cables housed in flexible metallic conduits. The supply is 24V, earth-return, taken from the control board (battery balancing). The circuits (*Figs.* 321 *and* 322) are protected by fuse H (2 strands of No. 27 S.W.G. tinned copper wire) located in the driver's switchboard.

Crankcase sump	Engine inverted
Timing case and timing gears	
Camshaft	
Oil pump, filter and pressure relief valve	
Pistons and connecting rods	
Crankshaft and flywheel ...	

COOLANT PUMP BELT AND MECHANICAL GOVERNOR

With C spanner, Pt. No. 34935T, loosen the lock-nut of the adjustable pulley of the coolant pump and unscrew the outer flange of the pulley until the driving belt can be removed.

Detach the rod linking the governor arm to the control bracket, loosen the bolt of the strap retaining the governor to its bracket and remove the governor.

Remove the four setscrews and spring washers securing the governor base to the engine mounting bracket and remove the base complete with strap.

IGNITION UNITS

The most practical method of removing the ignition units is to remove the leads from the sparking plugs, release the outer pair of screws (captive in the head) which secure the distributor head to the body and remove the head. Remove the L.T. connection to the contact breaker.

Remove the nuts securing the coil and filter bracket to the cylinder head, together with the setscrew securing the small support bracket to the flywheel housing. The bracket, together with the coil, filter unit, distributor head and leads may then be removed as a unit.

Remove the setscrew and washer securing the distributor clamp plate to the cylinder head and lift out the distributor.

With a suitable box spanner, remove the sparking plugs.

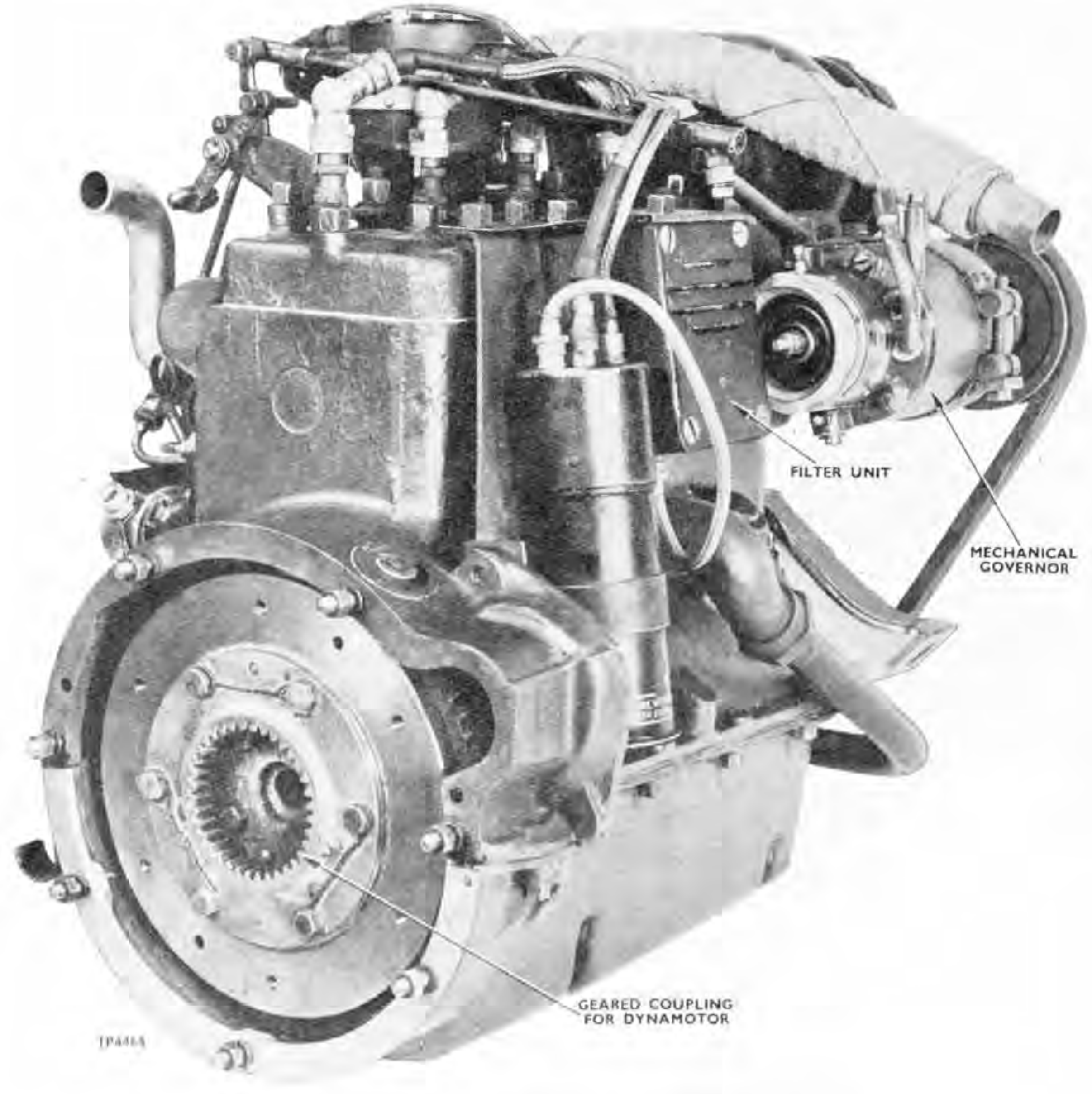

Fig. 724—Generating set engine—three-quarter rear view