

General Instructions—Fig. 4. Layout of CO₂ Equipment

Part 8 Bevel Gearbox

Immediately in front of the intermediate bulkhead is the bevel gearbox, on the top flange of which is mounted the electric starter motor. On the right-hand side of the casing, the service dynamo is driven through a geared coupling and clutch. A similar arrangement drives the traverse generator on the left-hand side.

1. Lubrication

Top up with engine oil to the correct level. To do this, remove the filler plug and the level plug, which is at the side of the front cover. **Do not fill above this level.**

The large plug at the top of the casing (in the starter-dog housing) is for inspection only, to check the meshing of the starter jaw.

(a) To Change the Oil in the Bevel Gearbox (1,500 Miles' Task)

Equipment required :—

$\frac{1}{4}$ in. spanner.	Coupler.	$1\frac{1}{4}$ pts. engine oil.
$\frac{7}{16}$ in. socket spanner.	6 in. ratchet handle.	Shallow container or cotton waste.

Traverse the turret to approximately 4 o'clock and remove the detachable boards in the turret platform so that the drain plug is accessible.

Remove the filler plug ($\frac{7}{16}$ in. spanner), drain plug ($\frac{7}{16}$ in. spanner) and level plug ($\frac{1}{4}$ in. spanner). The drain plug is situated at the bottom of the bevel box on the vehicle dynamo side.

Allow the oil to drain into the shallow container or on to a quantity of cotton waste.

After the oil has drained, replace the drain plug and refill to the correct level with approximately $1\frac{1}{4}$ pts. of engine oil.

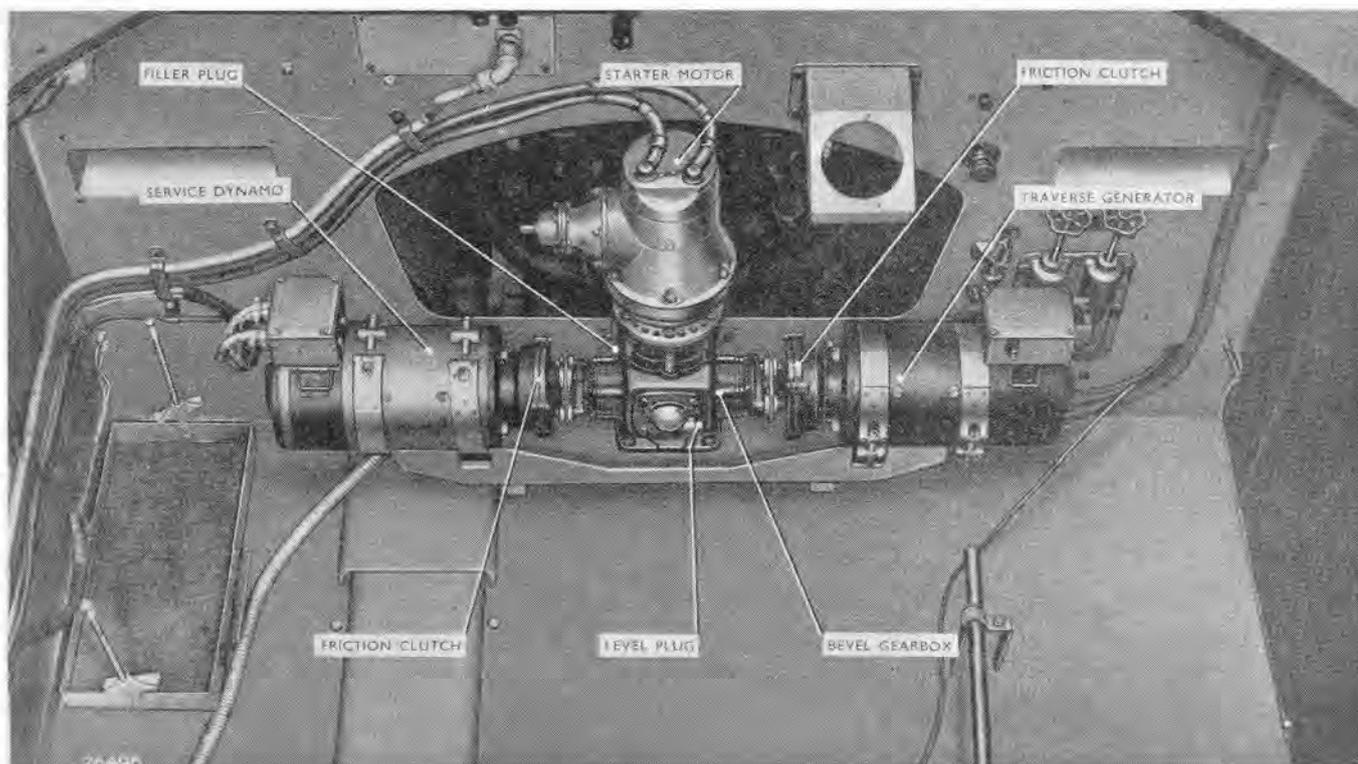
Replace the filler plug and level plug.

Wipe up any spilt oil.

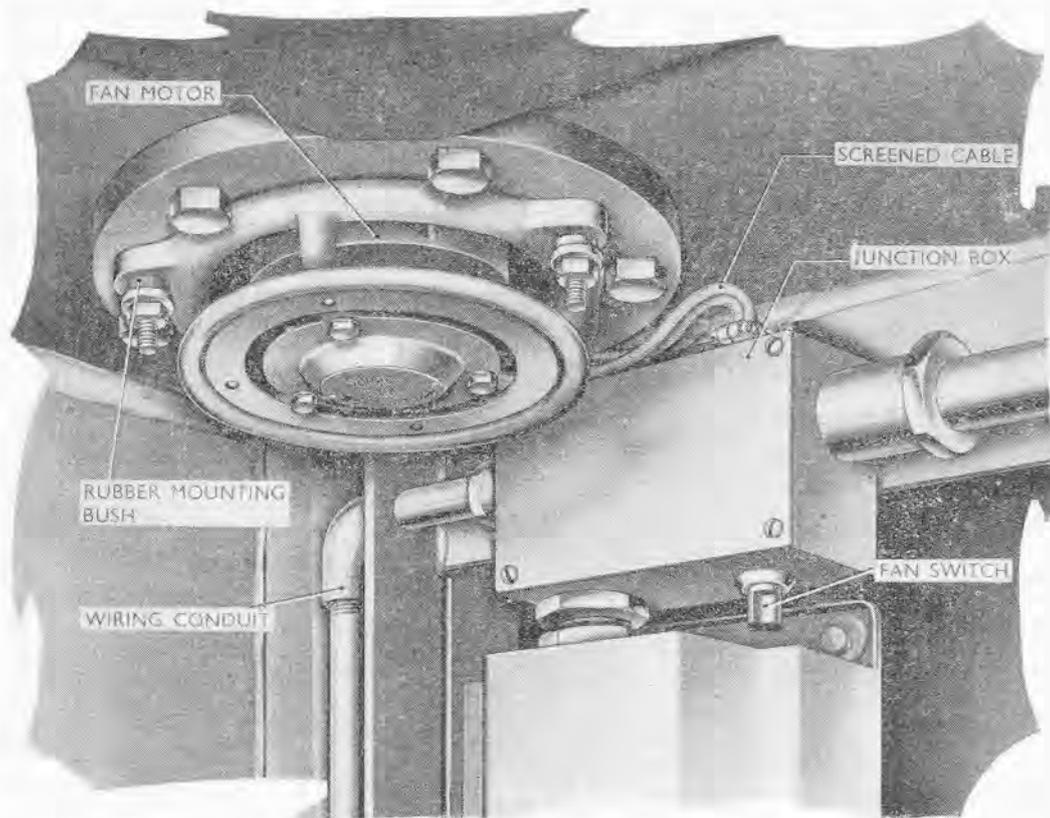
If an Injector, oil or petrol, is available from the gun kit, this may be used to drain and refill, where time does not permit the preceding method to be employed.

2. Maintenance

Check all nuts for tightness, both on the casing and the mounting bracket. Examine the casing for excessive oil leaks and if found, check up condition of oil seals. Do not remove these unless absolutely necessary, as they are difficult to replace without damage. It is usually necessary to renew the seal in such cases.



Chap. I A—Fig. II. Bevel Gearbox and Auxiliaries



Chap. V A—Fig. 10. Ventilating Fan and Switch

5. Convoy Light (see Fig. 8)

The portion of the lamp carrying the glass can be detached by unscrewing. Remove the bulb as under "Tail Lamp." When replacing the cover, be sure the joint-washer is in position. The bulb is 14 volt, 7 watt, double-contact.

6. Clinometer Lamp

To remove the body of the lamp, proceed as under "Tail Lamp." The bulb is 14 volt, 7 watt, double-contact.

7. Interior Lights (see Fig. 9)

The control switch is incorporated in the base of the lamp. The bulb is removed as under "Tail Lamp." The bulbs are 14 volt, 7 watt, double-contact.

8. Inspection Lamp

This has a flexible cable fitted with a two-pin plug, which is pushed into the supply socket when the lamp is used. The bulb is 14 volt, 7 watt, double-contact.

Four inspection lamp plug sockets are provided :—

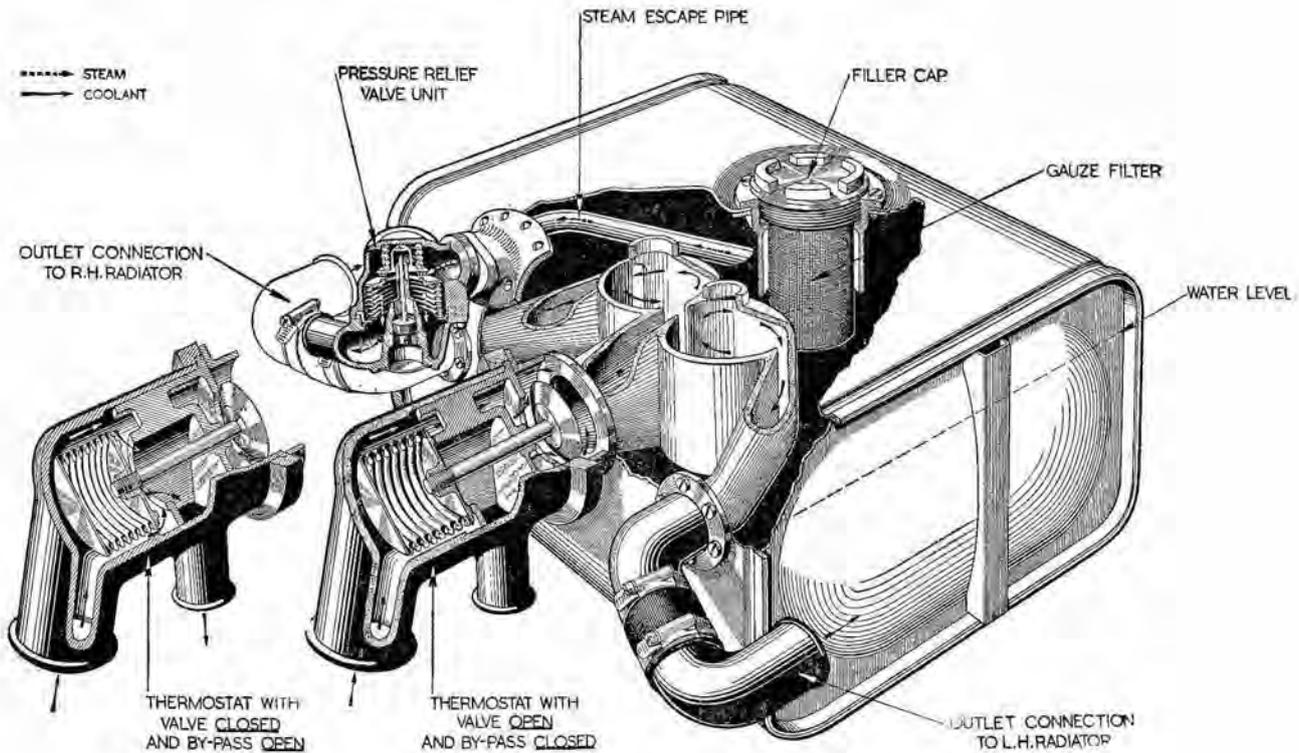
- (a) On the driver's instrument panel.
- (b) On the switchboard top face.
- (c) On junction box above left-hand air cleaner in fighting compartment.
- (d) On the side of the junction box mounted on the inside of the rear armour plate of the vehicle.

No switches are provided. It is only necessary to press the lamp-lead plug fully home.

9. Ventilating Fans

Two fans are fitted, one in the roof of the front gunner's compartment (see Fig. 10), and the other in the turret roof. The switches are of the rotary type and are mounted in the junction box nearest to each fan.

- (b) Two fin and tube matrix type radiators, clamped to the fan cowls by spring-loaded straps and supported at the bottom on felt pads. See Fig. 38.
- (c) Two engine-driven fans, mounted in the fan cowls which are bolted to the hull sides, see Fig. 38.
- (d) A coolant circulating pump, driven by and permanently mounted on the engine.
- (e) Baffles, fitted to ensure that the full air stream passes through the radiators.



Chap. I B—Fig. 36 Cut-away View of Header Tank

I. Header Tank

The whole system is sealed and so is air-tight. It permits of a pressure up to 5 lb. per sq. in. being generated, before the relief valve operates. The object of this pressure is to raise the boiling point, and so conserve the coolant.

A combined pressure and vacuum **relief valve** is fitted in the top of the header tank. This consists of two spring-loaded valves, one of which opens if the pressure in the system exceeds 5 lb. per sq. in. The other comes into operation if a vacuum below 3 lb. per sq. in. is formed. Both valves are incorporated in the same housing and communicate with the atmosphere through the same pipe. The setting of the valve must not be altered, unless there is a reliable means of checking the pressure.

The system is filled through the header tank filler (see Fig. 36). This tank is so designed that the maximum height of coolant which can be maintained is level with the bottom edge of the filler neck.

This leaves a considerable space at the top of the tank for water expansion (about $\frac{1}{2}$ cubic foot).

To prevent air locking, the header tank is connected to the base of the L.H. radiator by a balance pipe. This balance pipe arrangement is necessary, because the water circulated through the header tank when the engine is running is confined to the steam separator. The balance pipe serves to maintain the level of coolant in the system, and ensure that it can be completely filled.

A **thermostat body** is secured to the inlet of the header tank and houses a thermal-bellows-controlled valve which determines the direction of coolant flow. Under normal running conditions the bellows expand due to the heat of the coolant around it, so that the valve is opened and the by-pass passage is cut off, the moving face of the bellows sealing the entrance to the by-pass pipe. When the coolant is cold (as when starting the engine) the bellows will contract, thus closing the valve and opening the by-pass passage, through which the coolant passes via the by-pass pipe direct to the pump without having passed through either radiator.

The **steam separator** is mounted in the header tank opposite the hot water inlet pipe. As previously stated, the system can operate up to a maximum pressure of 5 lb. per sq. in. This means that when water is used as a coolant

WEAPONS

Part I Ordnance, Q.F. 77 mm., Mark 2

The gun is designed for use in armoured fighting vehicles. The breech mechanism is of the semi-automatic type with a vertical sliding block, a breech mechanism lever being provided to open the mechanism by hand. The firing mechanism is designed for percussion firing. Q.F. ammunition, i.e. rounds complete in one assembly are used.

In the description of the various parts of the gun, such terms as right, left, upper, lower, front, rear, inner and outer have reference to the position of the item being described when viewed from the rear looking toward the muzzle.

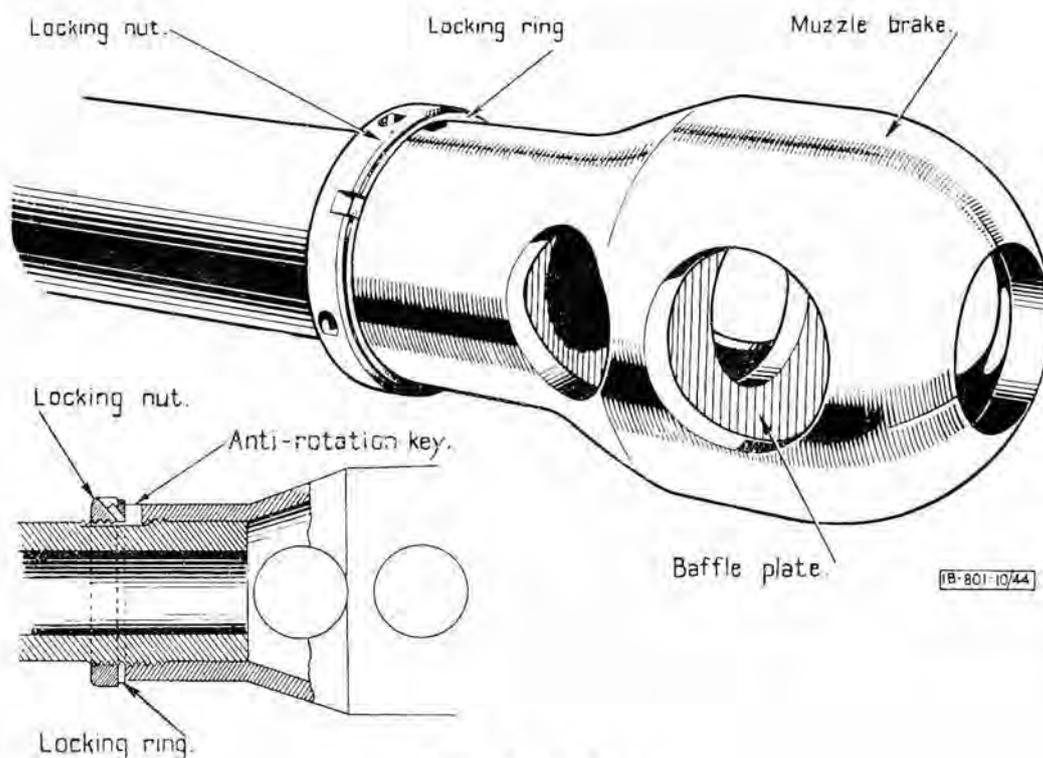
The **Mark 2 gun** consists of a barrel with a muzzle brake, breech ring and breech mechanism.

1. The **barrel** is a single tube forging. Externally it is parallel from the breech ring end providing a bearing surface to slide in the cradle. From the parallel portion it tapers steeply for a short distance and then more gently towards the muzzle, where it is prepared with left-hand threads for a muzzle brake and locking collar. An assembly line is engraved near the threads to enable the brake to be correctly positioned. Vertical and horizontal axis lines are cut on the muzzle face for use when testing sights without the brake in position. Stamped on the muzzle face are the Mark of rifling, steelmakers initials and the forging number.

The breech end is prepared externally with threads to receive a breech ring. A line is engraved on the face at this end to ensure correct assembly of the breech ring. A recess is prepared in the threads to accommodate the spigot end of a breech ring securing screw which secures the ring from movement after assembly.

Internally it is bored, rifled and prepared with a chamber.

Engraved on the face of the barrel at the breech end will be found the nature and Mark of the gun, registered number and contractor's initials.



Chap. IX B—Fig. 1
Muzzle Brake