

Chapter II

DUPLÉ BURNER, TYPE BA.40560

BA 73397 (AL41)

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INTRODUCTION

1. To ensure suitable combustion characteristics at all fuel flows, the burner is designed with two independent metering orifices, a main and a primary, each of which emits a separate spray of atomized fuel. The small, primary orifice maintains an atomized fuel spray at very low fuel flows, thus facilitating combustion at low r.p.m. and ensuring satisfactory starting and relighting at altitudes. The main fuel circuit is inoperative until the pressure in the fuel system has risen sufficiently to ensure efficient atomization at the higher fuel flows through the main orifice. With this arrangement, the main orifice can be made large enough to satisfy the maximum fuel demand at a lower maximum pressure, thus reducing stresses in the high pressure system.

2. The operation of the burner in relation to the complete fuel system is described in the relevant engine Air Publication.

DESCRIPTION

General

3. The complete burner assembly, illustrated in fig. 1, consists of a single support arm and a burner head which is designed for central location in the mouth of the flame tube.

Burner support arm

4. The burner support arm is a light alloy casting, secured to the compressor outlet casing by a flange and four setscrews and

drilled to convey fuel from the external distributor block to the burner head. Attachment of the support arm to the fuel distributor manifold is by two setscrews with necks machined to fit within slotted flanges on the inlet boss of the support arm. The burner head is located within the flame tube by the main swirl vane support ring.

5. The primary passage through the support arm delivers fuel to the burner head through the central orifice in the feed arm elbow. The main supply of fuel feeds through two adjacent smaller holes into the annular groove around the central orifice. An external thread on the feed arm accommodates the burner shroud, which secures the burner parts to the boss. Five axial slots cut in the periphery of the boss together with spanner slots in the burner locating sleeve, provide alternative anchorage for the tabs of a vernier type locking ring.

Burner head

6. The burner head houses the primary and main fuel atomizers, which perform the function of metering and atomizing the fuel.

7. Primary fuel from the centre orifice of the feed arm passes through a cylindrical brass insert containing a gauze filter. Two small holes in the wall of the cylinder are provided to assist extraction of the filter assembly during reconditioning. A swirl plug, located in a perforated distance

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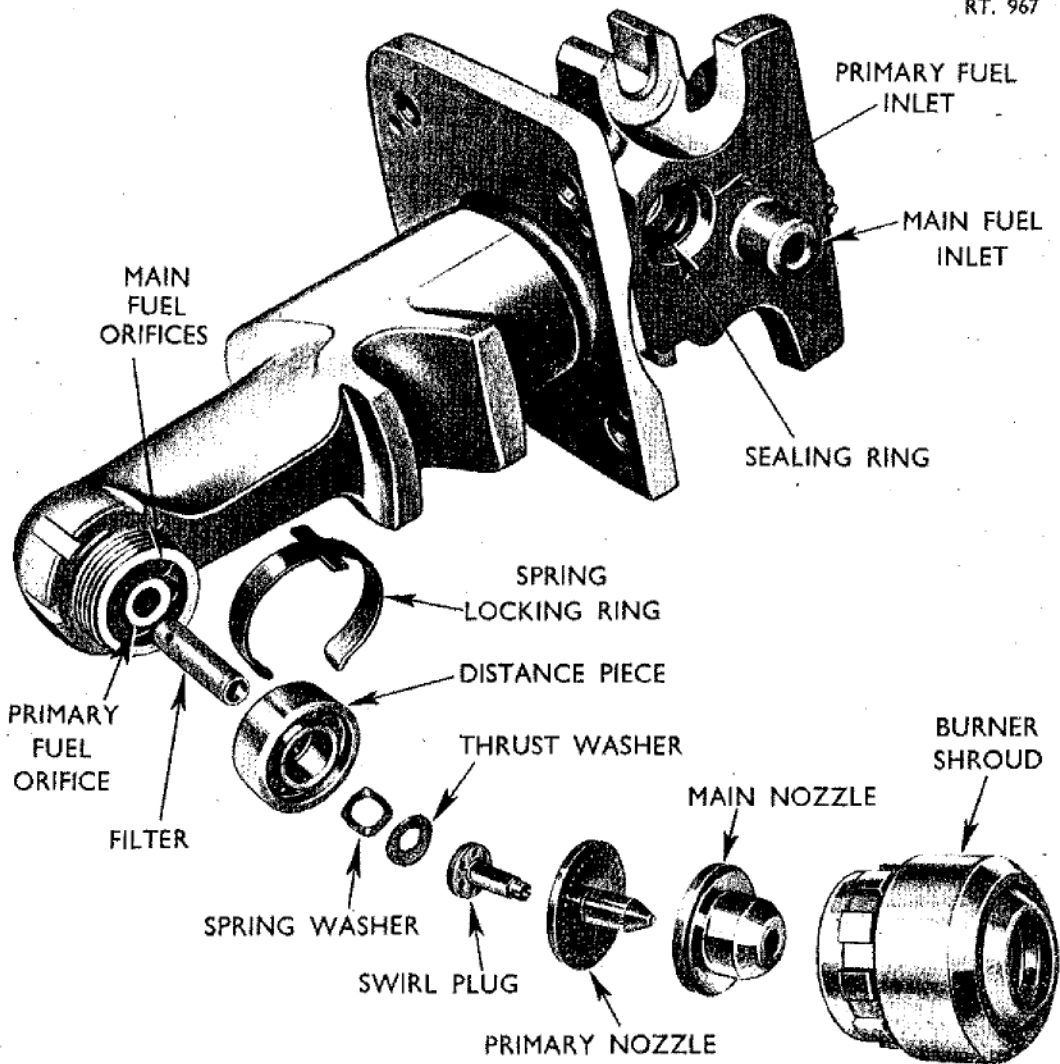


Fig. 1. Duple burner

piece by a spring washer and flat thrust washer, directs the fuel through two minute tangential slots in the downstream tip of the plug to the pilot swirl chamber and thence to the primary discharge nozzle. Swirl is thus imparted to the fuel, producing a finely-atomized cone-shaped spray from the nozzle.

8. Main fuel enters the burner head from the feed arm through a ring of holes in the distance piece and is filtered by passing through a ring of fine drillings in the flange of the primary nozzle component. Swirl is initiated by tangential slots cut into the

face of a small annular land on the rear face of the nozzle, and is accentuated by further passage through the conical swirl chamber. The swirl causes the fuel to atomize into very minute droplets on leaving the discharge orifice.

9. The rate of swirl, together with the size of the orifice, determines the cone angle of the fuel sprays. This produces controlled sprays of atomized fuel which mix rapidly with air in the correct proportion for efficient combustion.

10. Accurate mating of all contact faces prevents fuel leakage between the primary

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and main flows, and both discharge orifices are manufactured to very close limits to finally meter the fuel sprays.

11. To minimise carbon formation on the burner head, caused by rich burning in the stagnant area around the apexes of the fuel sprays, air is admitted and caused to blow into the stagnant areas. The air enters the burner head through a ring of slots in the shroud and passes into the annular space between the shroud and the inner locating sleeve. By apportioning the air accurately between two concentric orifices surrounding the fuel nozzles, two air flow patterns are achieved, some of the air passing through the main passages being diverted through annular drillings into the secondary annular orifice.

INSTALLATION

12. Installation of the burners is as described in A.P.4481A, Vol. 6, Part 1, Section 2.

SERVICING

13. No routine servicing of the burners is necessary. Any attempt to remove carbon from the metering orifices may result in damage, with consequent alteration of the burner calibration. To ensure the maximum combustion efficiency throughout the engine, burners are calibrated as a set, and the units should not be disturbed.

STORAGE

14. Before storing, the burners must be flushed through with oil OM-13 (Stores Ref. 34B/43), a protective cover must be fitted over the end of the shroud to protect the atomizers, and blanking attachments fitted to the fuel inlets.

Warning.—*Particular care must be taken to avoid damage to the atomizers; the protective cover must be fitted to the shroud at all times whenever the burner head becomes exposed.*

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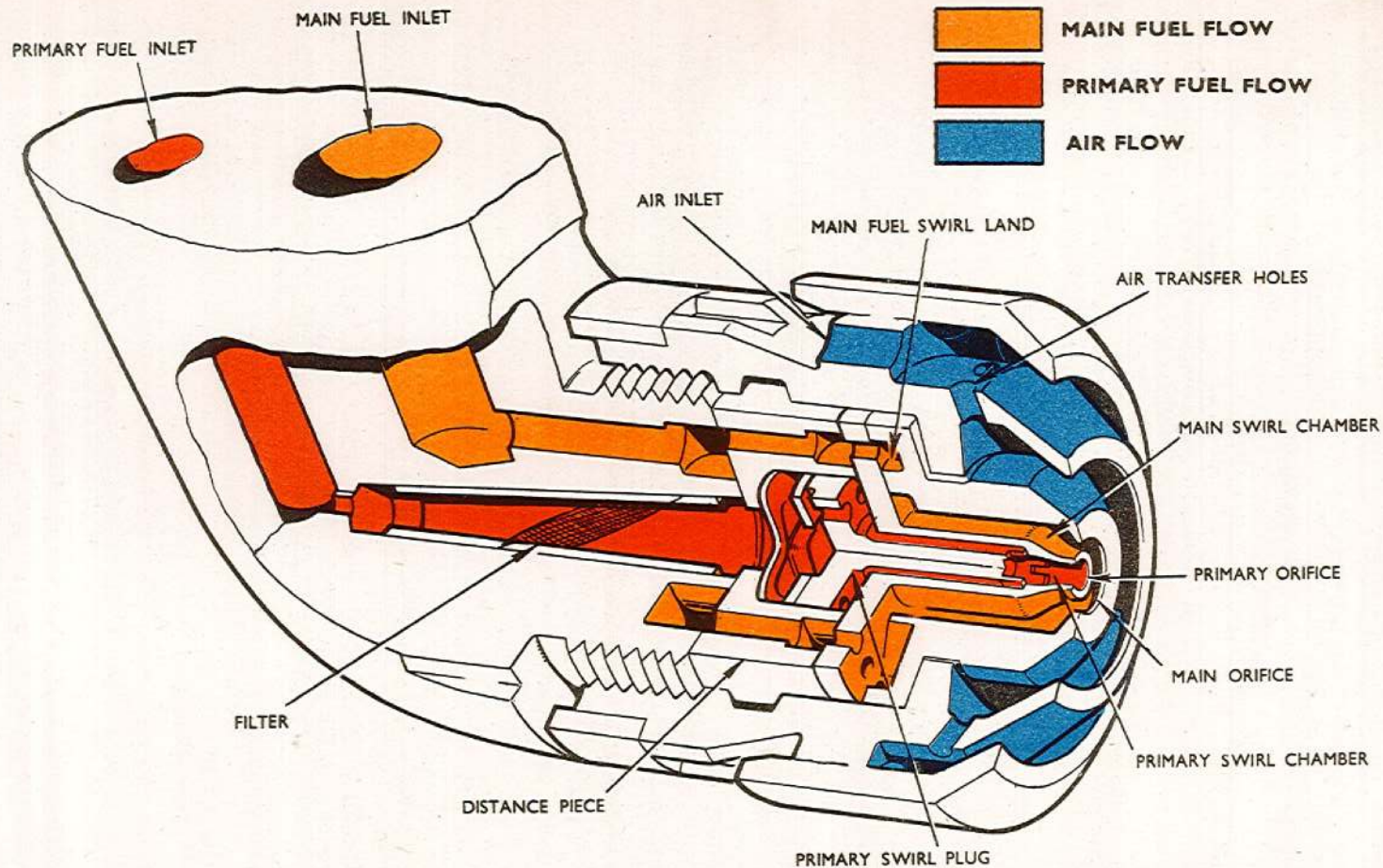


Fig. 2 Duple burner - cut-away showing flows

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