These engines have become a byword for reliability and it may be assumed that, so long as there are any piston aero-engines, there will be Gipsies at work.

In 1941 Major Halford, the company's chairman, began work on the H.1, or Goblin, turbojet, tailoring it to the projected Vampire fighter. Since that date, thousands of Goblins have been made, together with the H.2 (Ghost) which first ran in September 1945. The H.3, a delightful little 500-h.p. turboprop, was not proceeded with. The company's latest turbojet, the mighty Gyron, is just at the beginning of its career. The company is actively engaged in the development of various types of rocket motor, none of which have been announced as a.t.o.

**Gipsy Major.** Following vast wartime production of Majors in several parts of the world, a post-war Major 10 appeared in 1946 on a slightly larger cylinder size. On the last British engines to retain a venturi-type carburettor, the Major 10 Mk 2 powers the 1,000-odd British-built Chipmunks. Development proceeds, and a new Major is not far away.

**Gipsy Queen.** Thousands of wartime Gipsy Sixes and Queen HIs are still in use, but the most important six-cylinder Gipsies are the Queen Mk 2 and 30 Mk 2. The former, illustrated, powers the Dove; it is the most powerful of all present D.H. piston engines and runs at 9,000 r.p.m. than the earlier 70/4. A recent modification is the fitting of hollow-head exhaust valves. The Queen 30 is ungeared and unsupercharged, and has a venturi carburettor. Unlike the 70, it is not made up into the form of an engine-change unit or self-contained power plant. It powers the Heron.

**Goblin.** Although of 1941 conception the Goblin has remained unchanged in basic form for 13 years and is likely to remain in large-scale production for some time to come—an extraordinary testimony to Maj. Halford's unerring basic precepts. In January 1945 a Goblin gained Approval Certificate No. 1 under the then-new M.o.S. gas-turbine type test; four years ago a Goblin completed 1,000 hr of simulated combat sorties without attention, and can fairly claim to be the world's most reliable turbojet.

The original R.A.F. Goblin 2 had a maximum thrust of 3,100 lb at 10,200 r.p.m.; the present Goblin 3 has a Lucas fuel system, diffuser cascades, and is up-rated to 3,550 lb by increasing r.p.m. to 10,750; the Mk 35 export engine, which is the engine in big-assorted production, runs at high power, but has a smaller nozzle and so runs hotter to give 3,500 lb thrust.

**Ghost.** Following the Goblin in layout in that it has a single-sided, direct-entry centrifugal compressor, the Ghost has a considerably greater mass flow and pressure-ratio. Two unusual features of the engine are the manner in which the ten cans are fed by twenty diffuser outlet ducts, and the fact that the fan system works at no less than 2,000 lb/sq in.

The Ghost was the first turbojet to receive an A.R.B. civil certificate, and has flown over 100,000 hr in Comets, with a B.O.A.C. overhaul period of 750 hr. The civil Ghost 50 exists in four forms: Mk 1 without water/methanol injection; Mk 2 with water/methanol injection; Mk 3 rated at 5,050 lb thrust; Mk 2 as illustrated; Mk 3 with a higher wet rating of nearly 6,000 lb; and Mk 4 as Mk 2 without water/methanol injection. The engine most commonly found in service is the Ghost 103, virtually identical with the Ghost 48 described under the Italian Fiat company. Compared with the single-intake Ghost, the Ghost 48 and 103 have a slightly reduced rating of 4,850 lb. There are very considerable detail differences between the civil and military Ghosts, and some 60 per cent of the original engine was redesigned to fit it for extended service on the airlines, at which hours are logged far more rapidly than in fighter service.

Afterburning Ghosts can give up to 30 per cent augmentation, so that supersonic ram-pressure lowers the optimum compression ratio so that a simpler compressor can be used, albeit at some low-speed penalty. But it has also been stated that the Gyron鬼 like its bigger, and these considerations would not apply to the latter aircraft. Initially a private venture, the Gyron is being developed against an M.o.S. contract.