

**Leduc 022.** Supersonic aircraft with integral ramjet. The body forms the duct for a supersonic ramjet, suitable for Mach numbers in excess of 2.0. In the centre is mounted an Atar 101 F turbojet with afterburner, which provides starting thrust and drives accessories. There are six concentric flameholders. Maximum thrust is estimated at 140,000 lb. This aircraft may fly at the end of this year.

IVA, results from a development programme in parallel with Rolls-Royce of an engine similar to the British Tay. The present engine, however, is more powerful than corresponding developments in Britain and America. An afterburning version has also been developed with a two-position nozzle fitted with upper and lower eyelids, but this did not go into production.

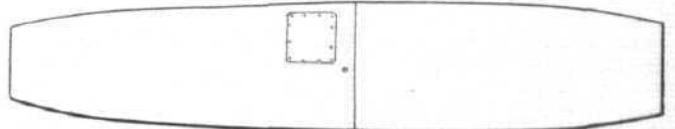
**LEDUC.** René Leduc et Fils, 158 Quai de Bezons, Argenteuil. For many years M. Leduc and his team have been progressing towards a most-advanced type of ramjet aircraft, in which the fuselage is replaced by the engine-duct, the crew and equipment being housed within an intake centre-body. The most recent design to have flown is the Leduc 021, the two examples of which have made over 200 air-launched flights since the middle of 1953.

Attention is now concentrated upon the supersonic Leduc 022, which it is intended shall ultimately be evolved as a fighting machine and has the financial support of the French government. Little is yet known of the 022 apart from the shape, and certain details which were publicly shown last year. Among the latter can be counted the accessory group driven by the turbojet mounted in the centre of the duct. The whole group takes 200 h.p., of which a substantial proportion must be swallowed up by the single, centrifugal ramjet fuel pump, which delivers up to 4.4 gal/sec (15,850 gal/hr) at 569 lb/sq in for a weight of only 37.5 lb. The general geometry of the 022 is shown alongside.

**NORD.** S.N.C.A. du Nord, 20 Rue Vernier, Paris 17e. This national group is now completely responsible for the aircraft-propulsion programme initiated by the Arsenal de l'Aéronautique and continued by S.F.E.C.M.A.S.

The work is carried out at Nord's facility at the Rue Béranger, Chatillon-sous-Bagneux, and involves pulsejets, ramjets and, more recently, rocket motors.

**Pulsejets.** For ten years the same team have been improving the original German powerplant mass-produced in World War 2 for the Fi103 (V.1) flying bomb. A large number of Type B pulsejets have been manufactured for the company's 5,501 target aircraft, which has been favourably evaluated by the Royal Navy. The life of the Type B is at



**S.N.C.A.N. ARS.600.** Subsonic ramjet, test-flown with Ju88G and Meteor N.F.11 aircraft. Direct pitot intake and two rings of fuel injectors, there being four nozzles on the upstream ring and eight on the other. Diameter, 23.6in; length, 127.9in; weight, 158.4 lb; net thrust at 621 m.p.h. at sea level, 1,100 lb, with consumption of 1.76 lb/sec (s.f.c., 5.75); net thrust at 560 m.p.h. at 39,360ft, 264 lb, with consumption of 0.42 lb/sec (s.f.c., 5.68).

employed S.F.E.C.M.A.S. ST.450 test vehicles, ramp-launched at a steep angle with rocket boost. Acceleration through the transonic zone is achieved solely on the thrust of the ramjet and the ultimate velocity reached normally exceeds 1,620 m.p.h. Several production applications exist for Nord ramjets but only the unit illustrated above (a subsonic engine) may be described.

**POTEZ.** Société des Avions et Moteurs Henry Potez, 46 Avenue Kléber, Paris 16e. Units in active status include air-cooled four-cylinder, six-cylinder and vee-8 units all employing a similar cylinder size and, as far as possible, other standard components. The most important unit is that illustrated.

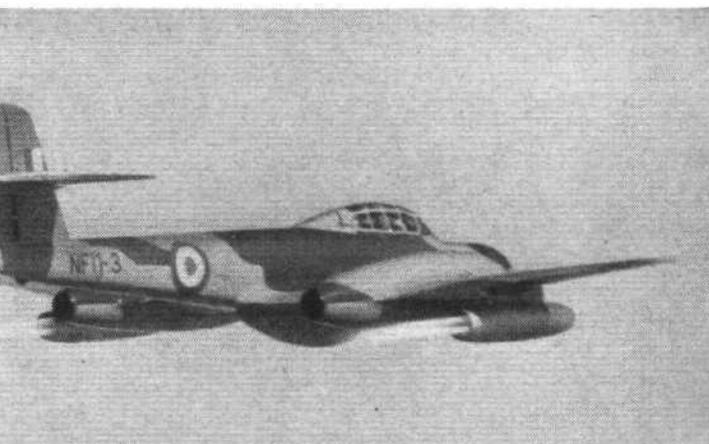
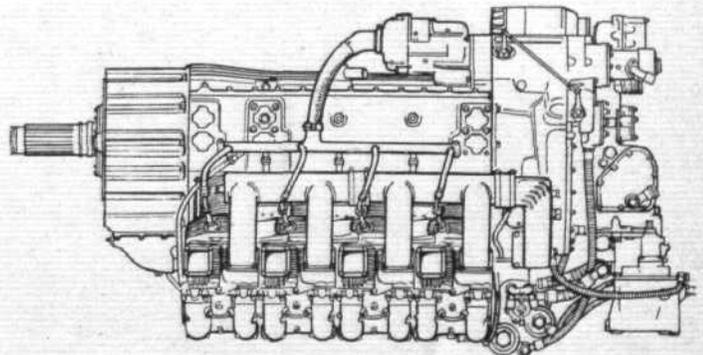
Last year a complete 8D 30 was fully type-tested with a take-off rating of 500 h.p. The general standard of engineering is of a high order and a considerable amount of flying has been done in the company's anti-tank aircraft, designated Potez 75. A projected application is the Italian Agusta-Zappata AZ-8 four-engined transport.

**SALMSON.** Société des Moteurs Salmson, 68 Rue Pierre-Charron, Paris. At the company's factory at Billancourt development, production and spares-manufacture is proceeding upon four basic models of piston engine. These comprise the 8 AS04 A, an inverted-vee-eight of 260 h.p. used in various light aircraft; the 9 NH 02, a nine-cylinder radial rated at 220 h.p. which is the only French engine certificated in a helicopter version; and the horizontally opposed four-cylinder 4 AH and six-cylinder 6 AH, of 100 and 145 h.p. respectively.

**S.E.P.R.** Société d'Etude de la Propulsion par Réaction, 37 Rue des Acacias, Paris. No further information is officially available on the work of this rocket-motor company to supplement that published on April 9th, 1954. It is known, however, that the company are committed to the development of propulsion systems for various missiles and piloted aircraft. The oxidant normally employed is nitric acid and the fuel has been variously aniline, alcohol, petrol or kerosene.

One of the most important installations is that for the forthcoming S.O. 9050 Trident supersonic fighter. The "high-speed" propulsion of this aircraft will be provided by a four-barrel motor with a total thrust

**Potez 8 D 30.** Piston engine. Inverted-vee unit with eight air-cooled cylinders, supercharger and reduction gear. Width, 31.3in; height, 31.6in; length, 63.7in; bore, 4.92in; stroke, 4.72in; swept volume, 719 cu in; dry weight, 745 lb; maximum rating, 500 h.p. at sea level at 2,650 r.p.m. with 11.1 lb/sq in boost.



**S.N.C.A. du Nord: Meteor N.F.11 flying with Type 600 ramjet.**

present some five hours under all conditions including recovery from the sea after each mission.

**Ramjets.** Development has been going ahead for five years under contract from the Service Technique Aéronautique, and is probably the largest single branch of the work of the Nord "propulseurs" department. Extensive trials have taken place with both subsonic and supersonic units involving free-flight ramjet-powered vehicles and conventional test-bed aircraft.

Most of the early flight development was carried out on pylon-mounted units slung under a Ju88G but the bulk of the recent work has been conducted by a Meteor N.F.11. Free-flight trials have frequently em-

**S.E.P.R. 251.** Bi-fuel rocket motor running on nitric acid and alcohol or petrol. Dimensions of chamber and weight of unit not available. Full-throttle thrust, approximately 3,000 lb. This single unit has been tested in S.O. 6025 and 6026 Espadons; a quadruple-barrel unit will power the S.O. 9050 Trident.

