

ARMSTRONG SIDDELEY SCREAMER...

As already described, the oxygen and fuel are fed to the back-plate manifolds and the water through the cooling-jacket to the injection holes around the head of the chamber.

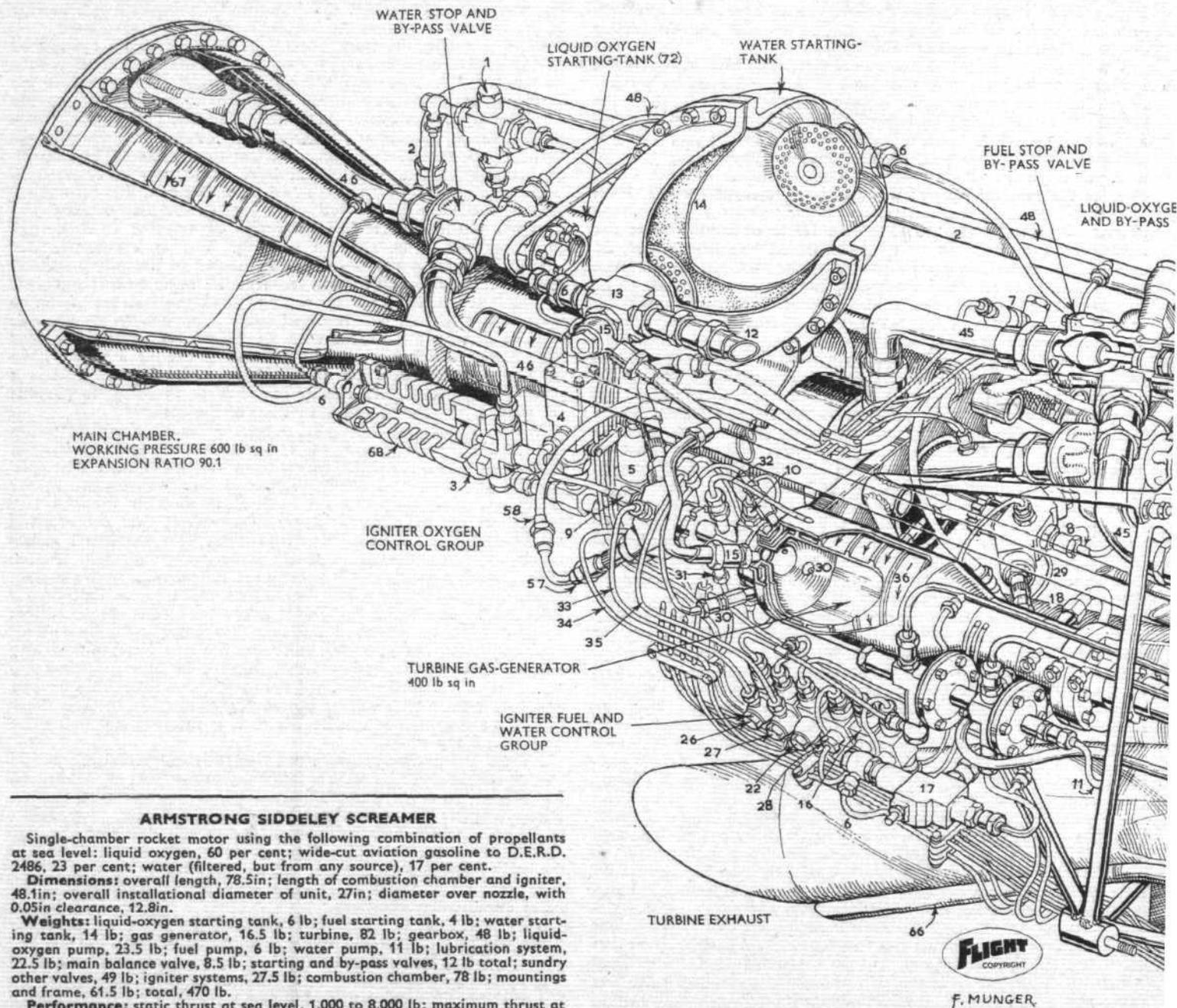
When the main chamber has lit, the combustion pressure de-energizes the change-over solenoid, which feeds the starting tanks and opens the filling valves so that the starting tanks can be recharged. The entire sequence from closing the starting switch to lighting the main chamber is complete within two-three sec. Propellants are fed from directly downstream of the pumps into the gas-generator lines; in the case of water and fuel, check valves are inserted, and the liquid oxygen passes through a change-over check valve and a remotely operated flow-control. The latter is a spring-loaded reducing valve which regulates turbine speed—and hence the thrust of the motor—by reducing the gas-generator oxygen pressure and hence also the pressures of fuel and water. To provide a variable thrust datum the loading of the spring

can be altered by the pilot. A safety switch shuts down the engine in the event of overspeeding of the turbine.

The complete Screamer is made up into a compact motor based on a framework of welded T.45 steel tubes. Thrust is transmitted to this frame through three bolts on a flange at the head-end of the chamber; in the centre of the unit is a main frame with four pick-up points bolted to the airframe. Most of the piping is made of austenitic steel.

Of the various dates associated with the development of the Screamer, the most important is probably March 1954, when the various components were first run together as an integral aircraft powerplant. In September of that year a development motor was first run at the ASSc.1-2 rating of 8,000 lb thrust. Although the first target for flight-clearance—in December 1955—was 2,000 to 4,000 lb, during the build and preparation for such clearance another Screamer logged a total of three hours' running at 8,000 lb and over. It was, in fact, found that operation at 8,000 lb was just as reliable as at lower ratings.

(Concluded on page 164)



ARMSTRONG SIDDELEY SCREAMER

Single-chamber rocket motor using the following combination of propellants at sea level: liquid oxygen, 60 per cent; wide-cut aviation gasoline to D.E.R.D. 2486, 23 per cent; water (filtered, but from any source), 17 per cent.

Dimensions: overall length, 78.5in; length of combustion chamber and igniter, 48.1in; overall installation diameter of unit, 27in; diameter over nozzle, with 0.05in clearance, 12.8in.

Weights: liquid-oxygen starting tank, 6 lb; fuel starting tank, 4 lb; water starting tank, 14 lb; gas generator, 16.5 lb; turbine, 82 lb; gearbox, 48 lb; liquid-oxygen pump, 23.5 lb; fuel pump, 6 lb; water pump, 11 lb; lubrication system, 22.5 lb; main balance valve, 8.5 lb; starting and by-pass valves, 12 lb total; sundry other valves, 49 lb; igniter systems, 27.5 lb; combustion chamber, 78 lb; mountings and frame, 61.5 lb; total, 470 lb.

Performance: static thrust at sea level, 1,000 to 8,000 lb; maximum thrust at 40,000ft, about 9,500 lb; gas generator mass flow, 1.5-2.0 lb/sec at full thrust; gas generator pressure, 400 lb/sq in at full thrust; gas generator temperature, 625 deg C; combustion chamber pressure, 600 lb/sq in at full thrust; combustion chamber temperature, 3,200 deg C; combustion chamber mass flow, 36.84 lb/sec at full thrust; specific impulse at sea level, 217 (206 overall); jet velocity, 7,000ft/sec; characteristic length of chamber, 14 in.

KEY TO MAIN DRAWING

- | | | | |
|---|--|--|--|
| 1 Liquid-oxygen starting-tank priming valve. | 6 Nitrogen pressure for valve operation. | 11 Oxygen pressure controlling gas-generator flow pressure-balance valves. | 17 Gas-generator water (diluent flow into gas stream) control. |
| 2 Liquid-oxygen starting-tank main filling. | 7 Main-chamber igniter oxygen control valve. | 12 Water starting-tank main filling. | 18 Gas-generator water (diluent flow) delivery. |
| 3 Liquid-oxygen control valve, starting tank to igniters. | 8 Oxygen delivery to main-chamber igniter. | 13 Water starting-tank filling and delivery valve. | 19 Gas-generator cooling-water return. |
| 4 Gas-generator oxygen control valve. | 9 Oxygen delivery to gas-generator igniter. | 14 Rubber diaphragm (water-expelled position). | 20 Filter in gas-generator water system. |
| 5 Main-chamber igniter oxygen control valve. | 10 Oxygen delivery to gas chamber (main). | 15 Water delivery. | 21 Water delivery to gas-generator pressure-control valve. |
| | | 16 Main-chamber igniter water control. | |