

## EXECUTIVE JET GENERATION . . .

2,300ft and the distance to clear a 50ft obstacle on one engine 5,200ft. Like the CL-329, it is designed for an ultimate loading of 4g.

Northrop, Temco and McDonnell are also reported to be interested in the executive jet market. The McDonnell project Model 246 has undergone wind tunnel tests, *Aviation Week* reports, and the Temco project is reputed to be a high-wing twin-jet design for the U.S. Navy, only informal approaches having been made to the U.S.A.F. Northrop have so far released no information upon their work. Cessna's approach has been to develop the T-37A jet trainer (powered by two 920-lb J69s) into a long-range four-seater equipped with tip tanks for a possible sale to the Navy. The T-37A in trainer form weighs 6,100 lb and has a cruising speed of about 400 m.p.h.

The remaining contender for the U.S.A.F. order is offered by Beech, who have a wide background experience of executive

aircraft. Their champion is an adopted Frenchman, the Morane Saulnier MS-760 Paris. With twin Turboméca Marboré 2s of 883-lb-thrust and four seats, and a gross weight of 7,480 lb, it falls into a similar category to the four-seater T-37A development. Its maximum range is 930 m at 340 m.p.h. and 23,000ft, and the maximum speed is 405 m.p.h. The fuselage is pressurized to 4.28 lb/sq in and, with a take-off distance over 50ft of 3,550ft, it will be able to operate out of the smallest airports contemplated for the jet executive field.

Here then is the jet family for the businessmen of 1960. Their potential performance represents a very marked jump ahead from the vast majority of executive types available today and their manufacturers will make strenuous efforts to enhance their appeal by providing inviting interiors and planning exciting individual colour schemes. The market is likely to remain predominantly a U.S. one, if for none other than geographical reasons, but there seems little reason why—with an engine foothold already established—imaginative designs from Europe should not break through.

## NEW COSSOR SURVEILLANCE RADAR

FIRST shown in prototype form at the S.B.A.C. display last year, the Cossor CR.21 primary surveillance radar is now under M.T.C.A. evaluation at Blackbushe, Hants. Very successful official Service trials have been completed; and units for civil use have been sold to Australia (for Sydney and Melbourne airports) and to New Zealand and Rhodesia. Further orders should shortly be announced, while a demonstration unit is touring Europe.

The CR.21 can be completely housed, with two display consoles, in a roadable trailer weighing five tons; or the aerial unit can be set up on the ground, on a roof or on a tower, the displays being removed to the control room. In addition to performance which is claimed to be "second to none," the CR.21 offers circular polarization, for removing rain clutter, and adjustable moving target indication to eliminate ground returns. Operating frequency is in the S-band, at 2,960-2,980 Mc/s. Peak power is 500 kW, with a pulse length of 1 microsecond at 770 pulses/sec. Rate of scan is either 12 or 20 r.p.m. Secondary radar for radar beacon operation may be added where required.

The aerial unit has a 16ft x 16ft 9in reflector made up of plastic honeycomb structure which offers a continuous reflecting surface and a 45-deg top angle. The scan has a cosecant squared vertical pattern. Circular polarization is achieved by interposing a quarter-wave plate between horn and reflector by means of a remotely controlled servomotor. The display tubes are of 12in diameter and a fixed-coil deflection system is used. Ranges of 10, 25, 50 and 100 nautical miles can be selected, combined respectively with range markers at 1, 5, 10 and 20 mile intervals. There is a full complement of tube controls; and the M.T.I. facility is superimposed progressively in range and intensity over the normal presentation. Safety, metering and monitoring facilities are provided.

A standard I.C.A.O. 15 sq m target can be "seen" at ranges of



In operation at Blackbushe during M.T.C.A. trials; the Cossor CR.21 surveillance radar in its mobile version.

at least 70 miles and heights of over 40,000ft. The electronic units can be serviced from the front during operation. In the trailer installation, the aerial unit is detached from the trailer chassis and held firmly on outriggered jacks to give simple but sure stability. Four people can be accommodated in the trailer.

### VENTILATED-TREAD TYRE

A NEW tread pattern, called Sinewave, has been added to a tubeless tyre designed to give increased resistance to wear and tear during high-speed take-off and landing. It was developed by B. F. Goodrich Aviation Products and the first aircraft so fitted is the Lockheed F-104.

The Sinewave tread allows heat to flow uniformly from the tyre. Spacious grooves between the ribs circulate cooling air to eliminate formation of local hot-spots. Equal distribution of tread rubber is achieved and multiple plies of nylon cord also give increased resistance to tread cutting and penetration. The cord acts like a floating shield imbedded in the tyre to repel both blunt and sharp objects. The type used on the F-104 measures 26 x 6.6in, has a 14 ply rating and is inflated to 175 lb/sq in.

### TAIL CAP AERIAL FOR DOUGLAS DC-8

AFTER checking the characteristics of several types of communications radio aerial in its DC-8, the Douglas Aircraft Company has decided to adopt a tail-cap system—an integral aerial formed by electrically isolating the tip of fin and rudder.

The company has already applied this type of aerial to several different military aircraft and it was considered from the start that it would best suit the DC-8. Nevertheless, investigations were made into the performance of conventional wire aerials, short low-drag wire aerials, shunt feed applied to wing or tail, and a 15ft probe on the tail cone. All of these methods were rejected, it is stated, on the score of poor pattern-coverage; inferior impedance characteristics; vulnerability to lightning; maintenance problems; and detail inefficiency.

The tail-cap aerial uses a portion of the structure of the aircraft

isolated from the remainder by a broad band of insulating plastic skin and spar sections. The isolation is bridged by special aerial coupling units and a lightning arrester element. Epoxy-Fiberglas laminates have been adopted for the insulation because they combine strength with lightness. Douglas state that they manufacture their own plastic parts for these aerials and can therefore exercise stringent quality control to ensure high-quality laminated parts. Static and fatigue testing, it is said, have shown the plastic isolation structure to be stronger than the metal parts it replaces. The Lightning and Transients Research Institute in Minneapolis is testing the complete aerial system for lightning protection.

### INERTIAL-SYSTEM GYROSCOPE

DESCRIBING it as a "major breakthrough in the field of gyro technology," the Massachusetts Institute of Technology has developed a completely free-floating gyroscope, sealed in a "four-inch cylinder," which can provide the attitude control for an inertial-guidance system reported to have been flown in a B-29 from Boston to Los Angeles.

The gyro wheel spins at only 12,000 r.p.m., is pivoted on virtually frictionless sapphire bearings, and is suspended in a fluid. Though three gyros are generally thought to be used for an inertial system stable platform, only one gyro is mentioned in connection with this particular system. The equipment is described as being able to navigate aircraft, missiles, ships or submarines. It has also been applied to fire- and flight-control, as well as to navigation. No indication of the accuracy obtained with this M.I.T. equipment, or of its size and operating requirements, has been released. The essentials of inertial guidance were described in *Flight* for April 12.