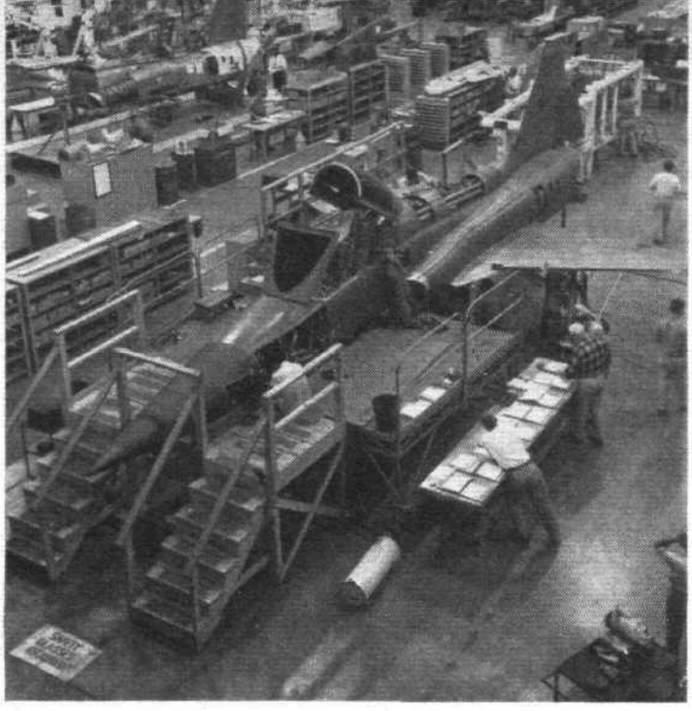

Northrop's Norair division at Hawthorne, California, is making a small number of N-156F Freedom Fighters, some of which are seen here in final assembly. The same plant makes the Talon trainer

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in October 1959 and has begun production deliveries. With a 180 b.h.p. Lycoming O-360 mounted on a pylon above the fuselage and driving a pusher propeller, the C-2 carries four people 500 miles at 130 m.p.h.

Lockheed Aircraft Corp, *Burbank, California.* Lockheed's aircraft and missile production is handled by three main divisions. California Division, at Burbank and Palmdale, produces the Electra commercial airliner, its P3V-1 naval anti-submarine derivative, the P2V-7 Neptune maritime patrol bomber and the F-104 Starfighter. Manufacture of the C-130 Hercules and JetStar transport aircraft, plus conversion of Stratojet bombers into QB-47 drones and much of the company's nuclear energy work, are centred in the Georgia Division, at Marietta, Atlanta and Dawsonville. Guided weapons and astronautics are the responsibility of the Missiles and Space Division, which has plants at Sunnyville, Palo Alto, Santa Cruz and Van Nuys, California.

Orders for a total of 172 Electras have been announced and 136 were in service by May of this year. Production of the P3V-1 submarine hunter-killer has begun, but deliveries of the Neptune will continue through 1961 to both the US and Dutch Navies, bringing total deliveries over the 1,000 mark. Current Starfighter production includes 66 single-seat F-104Gs and 70 two-seat F-104Ds and Fs for Germany, Japan and the Netherlands, to precede licence production in those countries. Canada and Belgium will also build F-104s, and the Neptune is in production in Japan.

An interesting new venture has been the design and prototype construction of the six-seat Model 60 utility monoplane (260 b.h.p. Continental TSIO-470) by Lockheed Georgia, so that the type can be made available in fully developed form for production abroad. Manufacturing rights have been granted to Lockheed-Azcarate SA in Mexico, Aviones Lockheed-Kaiser Argentina and Aeronautica Macchi SA in Italy, in all of which Lockheed Aircraft International has an interest.

By June, Lockheed had received commercial orders for 21 JetStars, plus an initial contract from the USAF for five, for use by the Airways and Air Communications Service. Versions of the Hercules delivered or still to be built comprise the C-130A (219 for USAF, 12 for RAAF), C-130B (85 for USAF, 10 for Indonesia, 4 for RCAF), SC-130B (6 for US Coast Guard), C-130BL ski-wheel model (4 for USN), C-130C boundary layer control test-bed (1 for USAF), C-130D wheel-ski model (12 for USAF), GC-130A drone launcher-director (2 for USAF), GV-1 tanker-transport (16 for Marines) and RC-130A (16 for Air Photographic and Charting Service, MATS). Some variants are conversions, included also in the standard C-130A and B figures: the total for all types is 355, of which all the As and more than 50 Bs had been delivered by mid-year.

Present commitments of the Missiles and Space Division include production of the Polaris FBMS, Kingfisher target drone, X-7 ramjet test vehicle, X-17 hypersonic research rocket and the Agena satellite. It is also prime contractor for the important Midas early-warning and Samos reconnaissance satellites. Through its half-interest in Grand Central Rocket Co, Lockheed features prominently in the missile propulsion business. Other subsidiaries cover a wide field, from electronics to ship-building and heavy construction.

The Lycoming Division of Avco Corp, *550 South Main Street, Stratford, Connecticut.* Lycoming's reputation as a manufacturer of small turboshaft engines promises to match soon its leadership in small piston-engines. The initial production versions of its T53 are entering service in ever-growing numbers as the 901 s.h.p. T53-L-1 shaft-turbine in the Bell HU-1A Iroquois and Kaman H-43B Huskie helicopters and as the 1,005 e.h.p. T53-L-3 turboprop in the Grumman AO-1 Mohawk. Others power the prototype Vertol Model 107 and a high proportion of America's VTOL research aircraft. More powerful versions, for the HU-1B and other types, are already running.

The scaled-up T55-L-5 has been uprated to 2,200 s.h.p. on completion of its 50hr preliminary flight rating test, and deliveries for the US Army's important Vertol YHC-1B Chinook helicopter are under way. Industrial and marine versions of both the T53 and T55 are planned, and the former already powers two US Navy hydrofoil boats.

Lycoming's Williamsport plant continues to find a growing market for its piston-engines, which range from the 108 b.h.p. four-cylinder O-235 to the 350 b.h.p. eight-cylinder SO-580, and now include a number of fuel-injection models.

Expanding activities in the missile field include production of re-entry vehicles for all three ICBMs, nosecones for Nike-Hercules and rocket chambers for Minuteman and Polaris.

McCulloch Corp, *6101 West Century Boulevard, Los Angeles 45, California.* Rapid growth of the demand for target drones has meant big business to McCulloch whose small two-stroke engines are used almost exclusively to power targets in the lower speed groups. Their reliability and good power/weight ratio is also ensuring a market as powerplants for light helicopters and autogyros. Current versions are the 72 b.h.p. Model 4318A and E, 110 b.h.p. Model 6318 and the turbosupercharged 120 b.h.p. Model TC6150, which gives 55 b.h.p. at 40,000ft.

McDonnell Aircraft Corp, *Lambert-Saint Louis Municipal Airport, Box 516, St Louis, Missouri.* Most spectacular of McDonnell's current commitments is the production of man-carrying satellite capsules for the Project Mercury man-in-space programme. Deliveries of these are under way and the programme is expected to progress by stages to a full-scale orbital attempt in the first half of 1961.

The main current production items are the two-seat F-101B Voodoo intercepter for the USAF, due to phase out late this year, and the F4H-1 Phantom II two-seat twin-engined all-weather fighter for the US Navy, which has already flown at M2.6 and should provide work for several years. The 519th and last F3H Demon was completed in November 1959. Under development are the 10/26-passenger Model 119 utility transport, powered by four Westinghouse J34 (later Pratt and Whitney JT12) turbojets, and the tiny Model 120 pressure-jet flying crane helicopter which is claimed to lift more than 1½ times its empty weight of 2,400lb.

Development of McDonnell's GAM-72 Quail decoy missile continues to go well and three were launched simultaneously from a B-52G recently. Other large missile contracts include production of airframes and integral ramjet engines for the Navy's Talos ship-to-air weapon and research into advanced versions of this missile under the name Typhoon.

McKinnon Enterprises Inc, *Box 520, Sandy, Oregon.* McKinnon has specialized in executive conversions of Grumman amphibians for the past seven years. Its 5/6-seat Super Widgeon, with two 270 b.h.p. Lycoming GO-480 engines, is now available with retractable wing-tip floats. The latest Goose conversion is the G-21D with four 340 b.h.p. Lycoming GSO-480s and 3ft bow extension, providing room for a crew of two and up to 15 passengers.

The Marquardt Corp, *16555 Saticoy Street, Van Nuys, California.* While continuing to manufacture ramjet engines for the Boeing Bomarc intercepter missile at its Ogden, Utah, works, Marquardt is developing more advanced types of power plant, including the Project Pluto nuclear ramjet for the SLAM missile and what it calls a Hyperjet. This consists of a combined rocket-ramjet engine in which the flame from a centrally-mounted liquid-propellant rocket is used to ignite the air/fuel mixture of the annular ramjet after launching. A small Hyperjet has been flown successfully on an X-7 test vehicle and a 36in Hyperjet has been statically tested at 100,000lb thrust.

Newly released facts on the RJ43-MA-3 ramjet in current production for Bomarc indicate that it is 14ft long, weighs 500lb, contains 670 components and has a compression ratio of 100 : 1 at M4.

The Martin Company, *Baltimore 3, Maryland.* Now virtually out of the piloted aircraft business, Martin is engaged on the design and production of a greater number of military missiles than any other manufacturer in the US. The most important of these is the great Titan ICBM, developed and built at the company's Denver, Colorado, plant. The Orlando, Florida, division is responsible for the Pershing solid-propellant replacement for the Army's Redstone bombardment missile, the Lacrosse tactical support weapon, Bullpup air-to-surface missile for the USAF and Navy, and the Missile Master air defence electronic control system. Production of the Mace "flying bomb" is centred at the original Baltimore plant, which is also the home of the company's Nuclear, Electronics and Weapons System Engineering Divisions.

All Martin missiles, except the small tactical Bullpup and Lacrosse, are flight-tested on the Atlantic Missile Range from Cape Canaveral, Florida, where the Cocoa Division was formed especially to conduct these operations.

Meyers Aircraft Company, *PO Box 90042, Airport Station, Los Angeles 45, California.* Deliveries of the Meyers 200 four-seat cabin monoplane have been proceeding on a small scale for well over a year. Construction is all-metal, with retractable tricycle undercarriage, and the 240 b.h.p. Continental O-470 gives a useful cruising speed of 180-200 m.p.h.

Minneapolis-Honeywell Regulator Company, *Military Products Group, 2600 Ridgway Road, Minneapolis 40, Minnesota.* Minneapolis-Honeywell is prime contractor for the Asroc anti-submarine weapon, which has just become operational with the US Navy to replace the more-primitive Rat. Scheduled for installation on 150 escort vessels, it consists of a standard homing torpedo or depth charge carried on the nose of a solid-propellant booster which gives it a range of about 10 miles, guided by the ship's fire-control system. A second prime contract is for the Wag Tail air-to-surface tactical support missile, which is reported to follow the contour of the terrain over which it travels.

A high proportion of all US missiles and space vehicles incorporate nuclear warheads, guidance equipment, gyros or other components supplied by Minneapolis-Honeywell.