

## THE AMERICAN INDUSTRY...

Argo D-8 Journeyman will be used this autumn for NERV (Nuclear Emulsion Radiation Vehicle) measurements of the Van Allen radiation belts.

**Aeronutronic** (Division of Ford Motor Co), Newport Beach, California. This company is developing the Shillelagh lightweight close-support missile system for the US Army under a \$23m initial contract awarded in 1959. The weapon is expected to be operational in the mid-sixties.

**Aircooled Motors Inc**, Syracuse 8, New York. During the past year, this company has added to its range of Franklin flat-six piston-engines the vertically opposed turbosupercharged Model 6VS-335 used in the Bell Model 47G-3 helicopter. This engine maintains its full sea level rating of 225 b.h.p. up to 15,000ft. Other current models, for helicopter and fixed-wing applications, develop from 150 to 210 b.h.p.

**AiResearch Manufacturing Co of Arizona** (Division of The Garrett Corp), Phoenix, Arizona. AiResearch has manufactured more than 9,000 small gas-turbines in the 30-850 h.p. range since 1946, and can claim to be the world's largest producer of such equipment. Most have been used to provide ground or airborne auxiliary power for aircraft starting and other services, but McDonnell uses three AiResearch GTC85 gas-turbine compressors in parallel to provide compressed air for the pressure-jets of its Model 120 flying-crane helicopter.

**Allison Division of General Motors Corp**, Indianapolis 6, Indiana. Major production items by Allison are the T56 turboprop for the Lockheed C-130 Hercules transport and the Model 501-D13 commercial variant which is used in the Lockheed Electra airliner and in the Allison Super Convair conversion of Convair 340 and 440 transports. The US Navy's P3V-1 anti-submarine version of the Electra will have 4,585 c.s.h.p. T56-A-10Ws, and the twin-engined Grumman W2F-1 AEW radar picket is scheduled to have T56-A-8s. In many cases the T56 and Model 501 engines drive turbopropellers produced by GM's Aeroproducts division.

First application for the new 250 s.h.p. Model 250 (T63) turboprop/shaft-turbine engine will be in the experimental Bell HUL-2 utility helicopter. Under development to power air-launched target drones is the PD-37 Pyrodyne, a 60lb-thrust supersonic ramjet burning pyrophoric fuels which ignite spontaneously on exposure to the atmosphere. Allison also has a USAF contract for a Stirling-cycle solar power system that will operate unattended for two years as a power source for the instrumentation of satellites and probes.

**American Airmotive Corp**, Miami International Airport, Miami, Florida. As an offshoot to its main business of maintenance, overhaul and repair of aircraft and equipment, American Airmotive produces an extensively modified agricultural conversion of the Stearman 75 (Boeing Kaydet) biplane. Designated NA-75, this has new metal high-lift wings, quickly detachable metal fuselage skin panels and combined dust/spray gear. Modification kits are available to Stearman operators and more than 200 aircraft have been fitted with the new wings.

**Atlantic Research Corp**, Shirley Highway at Edsall Road, Alexandria, Virginia. Since 1958, this company has developed a series of three relatively simple solid-propellant high-altitude and meteorological sounding rockets. Arcas, supplied to all three US Services, carries a 12lb payload to a height of 40 miles. Arcon carries 40lb to 61 miles and Iris 100lb to 188 miles. Atlantic Research also produces small control rockets, which have been used for spin, de-spin, stage separation, vernier and related functions in almost all US satellite and space probe launchings.

**Beech Aircraft Corp**, Wichita, Kansas. Although Beech produced last year some 832 aircraft in the utility and executive category, with a combined value of \$37m, the greater part of its \$90m turnover came from products and services for military and scientific use. In current production for business use are four twin-engined types, comprising the eight-seat Super 18, seven-seat Queen Air, six-seat Twin-Bonanza in standard and supercharged versions and five-seat Travel Air. Single-engined types are the Bonanza and its low-price development, the Debonair, each with four seats. Mentor primary trainers are serving in the USA and ten foreign countries, and are licensed for production in the Argentine and Japan.

In addition to manufacturing the KDB-1 piston-engined target drone

for the US Army and Navy, Beech is developing the rocket-powered M2 KD2B-1 for service in 1962. Other military contracts cover production of the L-23F variant of the Queen Air, fuselage sections and ailerons for the Republic F-105, components for the McDonnell F-101, Lockheed F-104 and Convair F-106, external fuel tanks for the North American F-100, containers for the Polaris missile, and evaluation of the dependability of ICBM propellant system components. Employment totals about 7,000 at Wichita and branch divisions in Herington and Liberal, Kansas, and Boulder, Colorado.

**Bell Aerospace Corp** (Subsidiary of Textron Inc), Buffalo, New York. Bell Aerospace Corp came into being on July 2 this year, when Textron Inc of Providence, R.I., acquired all the defence business of the former Bell Aircraft Corp. It consists of three units: Bell Aerosystems Co (formerly Bell Aircraft's Niagara Frontier Division) at Buffalo; Bell Helicopter Co at Fort Worth, Texas; and Hydraulic Research and Manufacturing Co at Burbank, California.

Bell Aerosystems Company is engaged on VTOL/STOL research and design study, and is continuing production of Agena liquid-propellant rocket engines for the Discoverer satellite programme. Other space contracts include development and manufacture of reaction controls for the North American X-15 research aircraft, Mercury capsule, Centaur satellite vehicle and several classified projects, and the investigation of high-energy propellants and advanced structural materials. The company's Automatic All-Weather Landing System is in production for use on USN carriers and is being evaluated by the FAA and USAF. Other avionics work is concerned with radar countermeasures and visual surveillance devices.

Bell Helicopter Co has in production the commercial three-seat 47G-2 and 47G-3 Trooper and four-seat 47J-2 Ranger, and is developing the single-seat Air Scooter ground-effect vehicle. Delivery of the H-13H military version of the 47G-2 to the US Army continues and two prototypes of the Model 47J with 250 h.p. Allison YT63 shaft-turbines are being built for the US Navy under the designation HUL-2. Already in major production for the Army are the T53 turbine-powered six-seat HU-1A and eight-seat HU-1B Iroquois, with the more powerful twelve-seat HU-1D at the mock-up stage. Testing of the XV-3 tilting-rotor convertiplane continues. Helicopter production by Bell exceeds 2,600 since December 1946.

**The Bendix Corp**, Fisher Building, Detroit 2, Michigan. Through its various divisions, Bendix contributes to a high proportion of US missile and space programmes. It supplies electronic, guidance or hydraulic systems for the Atlas, Titan, Polaris, Thor and Pershing surface-to-surface weapons and Nike-Ajax, Nike-Hercules, Terrier and Tartar surface-to-air weapons. Its Products Division at Mishawaka, Indiana, is prime contractor for the Talos surface-to-air ramjet missile, with h.e. or nuclear warhead, which is operational on US Navy cruisers. The Bendix Systems Division at Ann Arbor, Michigan, is prime contractor for the Navy's important Eagle nuclear-warhead long-range air-to-air missile and for the communications system for the STEER communications satellite.

**Bensen Aircraft Corp**, Raleigh-Durham Airport, Raleigh, North Carolina. Complete rotorcraft of extremely simple design, and kits of parts and plans for amateur construction, are marketed by Bensen. From the original Gyro-Glider unpowered rotor-kite have been evolved the Hydro-Glider on floats, Gyro-Boat with a dinghy hull and Gyro-Copter powered autogyro. Latest products, not available for home construction, are the B-9 Little Zipster single-seat helicopter, with co-axial rotors, and B-10 Prop-Copter VTOL "flying jeep" prototype.

**Boeing Airplane Co**, Seattle 24, Washington. Since the acquisition of Vertol in March of this year, Boeing has had five major operating divisions. Today it is the largest single aeronautical firm in the world on most counts: its 1959 sales of \$1,612,153,000 give it the 19th position among US industrial companies, its net profit of \$12,436,000 represented 0.8 per cent of sales (6 per cent of invested capital) and its payroll is no fewer than 90,280, included in which is a superb team of research engineers and scientists numbering just over 10,000. Calculations show that Boeing have made a far greater weight of airframe than any other company, but this side of the business cannot carry on at its previous rate for more than two years at most.

The Aero-Space Division at Seattle is responsible for development and production of the IM-99 Bomarc long-range surface-to-air missile, assembly and testing of the SM-80 Minuteman second-generation ICBM and development of the Dyna-Soar manned "boost-glide" vehicle, which will have global range after being launched into orbit by a Titan booster.

The Industrial Products Division, also at Seattle, has built to date almost 1,000 of its 502 series of small gas turbines, including four helicopter and light aircraft shaft-turbines in the 240-360 s.h.p. range, an air compressor and a 265lb-thrust turbojet. Latest applications of the 502 series are in the Radioplane RP-77D target drone and Gyrodyne DSN-3 anti-submarine drone helicopter. Under development, with first flight trials scheduled for this autumn, is the 430 s.h.p. T60 turbo-prop/shaft-turbine.

Boeing's great Transport Division at Renton, Washington, is fulfilling orders for 245 Model 707 and 720 jet transports, of which 140 had been delivered by the end of last month, and expects soon to announce a contract for the all-cargo version. In parallel production is the military KC-135A tanker-transport, with deliveries around the 400 mark and at least another 100 to come.

Wichita Division is devoted to manufacture of the B-52 Stratofortress bomber, of which 704 have been ordered and at least 500 delivered. Present production version is the B-52G, armed with Hound Dog and Quail, with the turbofan B-52H scheduled to follow in 1961.

The newly acquired Vertol Aircraft Division at Morton, Pennsylvania, brings to Boeing a promising rotary-wing production item in the shape of the civil Model 107 turbine-powered tandem-rotor 25-seat transport helicopter, ordered by New York Airways, and its much larger military counterpart the YHC-1 Chinook, ordered by the US Army. Nor is this the limit of recent diversification, for Boeing announced in June the



Although North American Aviation will make only one XB-70—or possibly two—the development of this machine has already cost many millions of dollars. Its structure is largely of stainless-steel honeycomb, and here a panel is being end-milled on a large horizontal boring mill