MADE IN SPAIN

Part III: Aeronautical Research, and the Aerotecnica Helicopters

By C. M. LAMBERT

The equivalents of the research and development tasks carried out in England by the R.A.E., Farnborough, and the A. and A.E.F., Boscombe Down, are performed in Spain by IN.T.A. (Instituto Nacional de Técnica Aeronáutica) at Torrejón, about 12 miles from Madrid. The full name of the Institute commemorates its founder, Esteban Terrada. In pleasantly laid out grounds a complete research establishment is being built up, with accommodation for laboratories, workshops, test houses, and equipment which is among the most comprehensive and elaborate in the country. Test and development flying are also carried out here, and the adjoining airfield has its own 4,000 yd runway to serve the large American base which is being built on the other side of the airfield.

The Institute is divided into sections dealing with engines, aerodynamics, materials, equipment, weapons and flight testing; and an aeronautical engineering school is attached to the organization. A Spanish Air Force squadron, administered by the Air Force but working exclusively for the Institute, takes care of all flying work, both at Torrejón and at a number of small out-stations such as that at Tablada airfield, just outside Seville. The squadron also does the official homologation flying of new prototypes for the issue of certificates of airworthiness.

The activities of the Institute are directed by a committee which allocates a government annual grant in accordance with requirements stated by the various departments. The work is thus commendably free from political influence. General Vigon, the president of the committee, died recently, however, and the post was still vacant at the time of my visit. Other posts are as follows: director-general, Col. A. Nuñez; technical director, Col. A. P. Marin; aerodynamics department, Col. D. Oliver; equipment and armament, Col. J. M. Pison; materials, Col. R. Calvo; flight test squadron, Col. J. Murcia.

At the moment the largest department is that devoted to research on materials of many kinds, from paints, oils and fuels to metals and plastics. Metals are being tested and evaluated, chemically, mechanically, and by X-ray, for composition, elasticity, hardness, strength and fatigue properties; and work of this kind is also being done for car companies and other non-aeronautical concerns.

Strength tests of airframes and components required for powerplant investigations are also made at IN.T.A., and, when I was shown around, portions of the Dornier Do25 and of the Aerotecnia AC-12 helicopter were in the test-rig department. There, also, was an almost-finished Druine Turbulent—the well-known French "build it yourself" ultra-light—which was being constructed by members of the engineering school. In a tall rig, festooned with weights, was the cast main casing of the new Spanish jet engine. A complete example was also undergoing bench tests elsewhere.

The equipment department deals with radio and instruments and has recently developed, among other things, a new pattern of back-type parachute for use by airborne troops. The weapons section is in the process of investigating its range suitable for both guns and air-to-ground rockets. A tiered rail installation was developed some time ago for the HA.1112 (the Spanish Me109) and was later used for the nose of a C.A.S.A. 2.111 (Spanish He111). No guided-weapon work is being done by IN.T.A., though I believe that some research in this field is being carried out by I.N.I., the national industrial institute.

I.N.I. is co-operating with IN.T.A., and perhaps also with Hispano, in the development of a medium-thrust jet engine, designated the I.N.I. 11. I was shown a prototype of this engine which had just completed a test-run in an open-ended test house. This particular prototype appeared to be rather heavy, but later versions are to be considerably lightened. I was not allowed to know any technical details except that it will have a thrust in the region of 4,500 lb. It appeared to have a fairly small-diameter axial compressor of perhaps up to a dozen stages combined with an annular combustion system and probably one turbine stage. The tail-pipe was short, and a fairly large central bolt protruded beyond it. Engine accessories were mounted on top of the compressor casing and apparently driven from the after end of the compressor spool. The housing of the combustion section of the engine was cast.

In another part of the engine department I was shown test facilities for combustion systems, and a section of the new engine's combustion chamber which had been tested. There were also several piston-engine test cells, modern and well-equipped. Here I saw a Lycoming 6-320, 150 h.p. flat-four engine being calibrated for installation in the Aerotecnia AC-12 helicopter. In one of the big cells there was one of the new E.N.M.A.S.A. Sirio radial engines of about 500 h.p., running part of its type test. A certain amount of trouble was being experienced with the Sirio, it was said, due to difficulties in obtaining special metals in the small quantities required for an engine of this kind. The unit is, however, destined to become the standard powerplant for the C.A.S.A. 201 Albatros. The engine department of the Institute is also undertaking some research into droplet formation on behalf of the American Air Research and Development Command's agency in Brussels.

The aerodynamics department has three wind tunnels, two of which are standard low-speed units with large, open working sections suitable for low-speed model tests of new aircraft or equipment. Both of these were powered by electric fans providing a flow velocity of a little over 49 ft/sec. The third tunnel was an intermittent-flow, supersonic unit with a working section measuring 6 in by 6 in and a working time of up to 40 sec. Only the housing is yet complete, and the machinery is awaited from Germany. Initially the maximum working speed will be equal to about 2.5 Mach, but, when heaters are added later, velocities equivalent to Mach 4 should be attainable.

At the time of my visit the flight-test squadron had a number of aircraft on its charge. There was a selection of HA.1109s, C.A.S.A. 2.111s and C.A.S.A.-built Ju526, all used for a variety of purposes, from aerial photography for the equipment section to powerplant test-bed flying. In the hangar was a Ju52 with an E.N.M.A.S.A. Sirio seven-cylinder radial engine mounted in the nose of the standard Elizalde Beta. The airscrew was a metal four-blade constant-speed unit specially designed by the de Havilland Propeller company. The Ju52 is in some ways an excellent aircraft for powerplant test-bed work.

Elsewhere in the hangar were a number of A.I.S.A. 1-11B aircraft; the first prototype of the A.I.S.A. AVD-12 liaison aircraft; the first prototype of C.A.S.A.'s Dornier Do25; and a series of aircraft designed for A.I.S.A. by Huarte Mendicino of C.A.S.A.