

..... A Cross Section View of Ca

Avro Aircraft

AVRO AIRCRAFT Limited is one of the Canadian Aircraft Industry's largest employers, with approximately 9,600 employees engaged on research, design, development and production. The Avro CF-105 Arrow, the company's current major project, has succeeded the CF-100 as the item that is taking most of the Engineering Division's time. The supersonic delta-wing interceptor is considered to be one of the most advanced fighters of this era.

Steady expansion has marked Avro's progress in the past year as the total personnel figure climbed by 800, and an increase in work area of some 31,500 sq. ft. boosted the Avro giant's working floor space to 1,700,000 sq. ft. for administration, engineering,

production, servicing, overhaul and repair facilities.

Avro Aircraft's major achievements, since being established in 1945, have been the design and development of three completely different types of aircraft. First, a commercial jet-powered airliner, known as the Avro Jetliner. Second, the CF-100 all-weather interceptor for the RCAF and with it, development of various systems such as armament (gun, rocket, guided missiles) and electronics. Third, the supersonic Avro Arrow which was unveiled to the public on Oct 4, 1957.

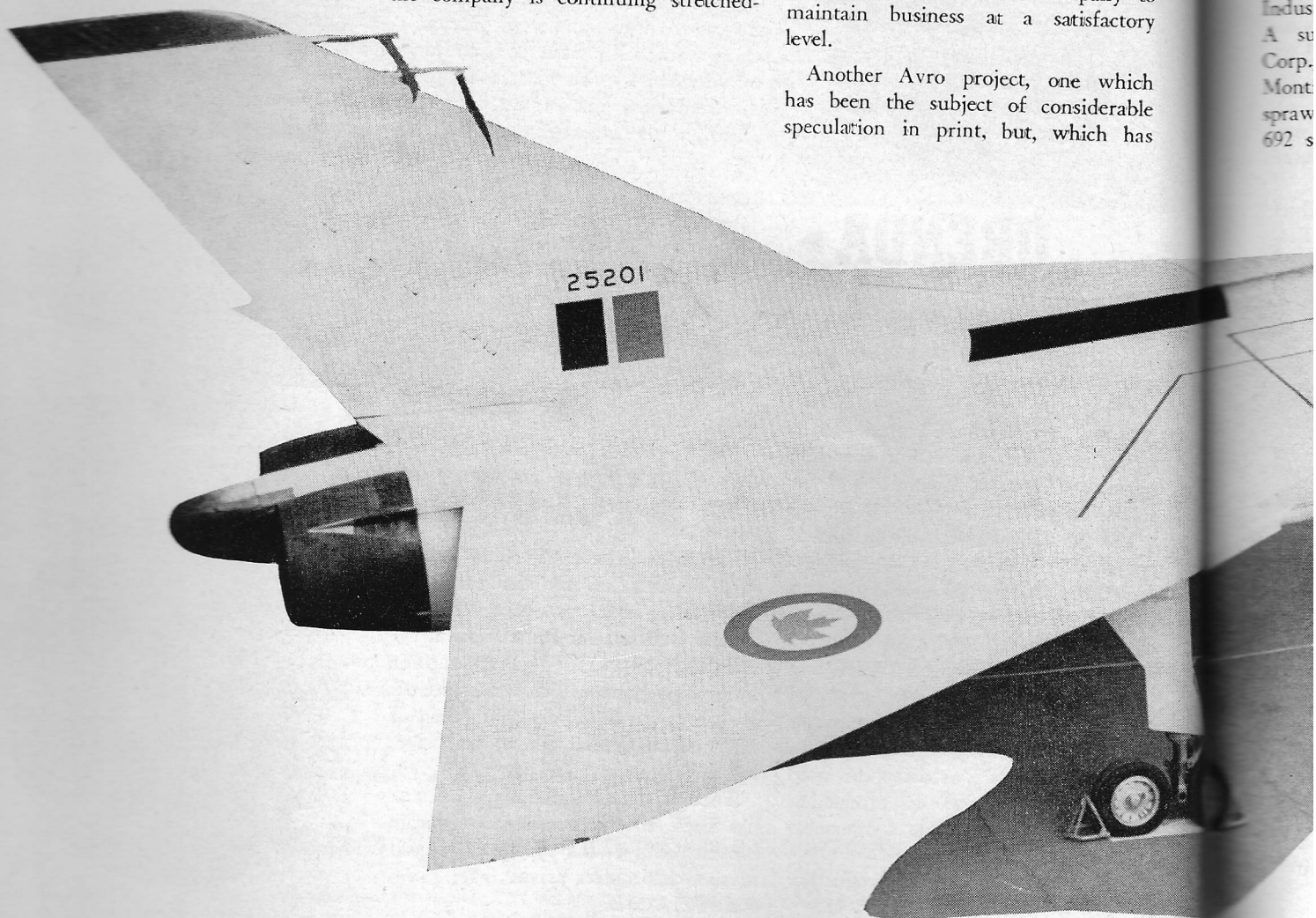
An important event of 1957 for Avro, was the Belgian government's selection of the CF-100 for its Air Force to meet a vital requirement for all-weather fighters.

Pending further development contracts and a government decision on long-term production for the Arrow, the company is continuing stretched-

out production of the Mark 5 version of the CF-100 for the RCAF. Present DDP contracts for the Arrow are reputed to call for 32-40 aircraft, which number includes five Arrow 1's and three Arrow 2's for test purposes. It is notable that these pre-production aircraft are being built by complete production tooling, a fact that assures a quick transition to volume production of the big fighter when government sources hand down the go signal.

Although the past year saw the cancellation of the Mark 6 CF-100 program, the continuation of the missile-firing development aspects of that program coupled with additional orders of Mark 5's for the RCAF minimized the impact of this cancellation. This fact plus the continuation of the Arrow development program, and Belgian order, allowed the company to maintain business at a satisfactory level.

Another Avro project, one which has been the subject of considerable speculation in print, but, which has



of Canada's Aircraft Industry

never been publicized by Avro is research into the VTO field. This program is sponsored by the USAF's Research & Development Command.

Canadair

AFTER SEVEN years of production, Canadair's bread-and-butter Sabre assembly line is scheduled to close down in October of this year. In that time, some 1,800 Sabre 2's, 4's, 5's and 6's have been produced for the RCAF, and the air forces of other countries. Canadair-built Sabres flew with the USAF in Korea; and with the RAF in Europe and the U.K.; others are presently in use with the West German Air Force, the South African Air Force, the Colombian Air Force, and several NATO countries, including Turkey and Greece.

At the present time, Canadair is the largest employer in Canada's Aircraft Industry with some 10,377 employees. A subsidiary of General Dynamics Corp., Canadair makes its home at Montreal's Cartierville Airport in a sprawling plant boasting some 3,177,692 sq. ft. of work area. In the past

year, the company has added 600 employees and 37,400 sq. ft. of floor space.

Although the greater proportion (72%) of Canadair's manufacturing contracts are of the government military variety, the company is growing increasingly active in the civil market. New projects along this line include the CL-66 Cosmopolitan, a twin-engine turboprop version of the Convair 440. Powered by Napier-Eland turbines, this aircraft, which is scheduled to go into production next year, will be offered for airline sale. Initially, the government has ordered ten of these Cosmopolitans for the RCAF's Transport Command.

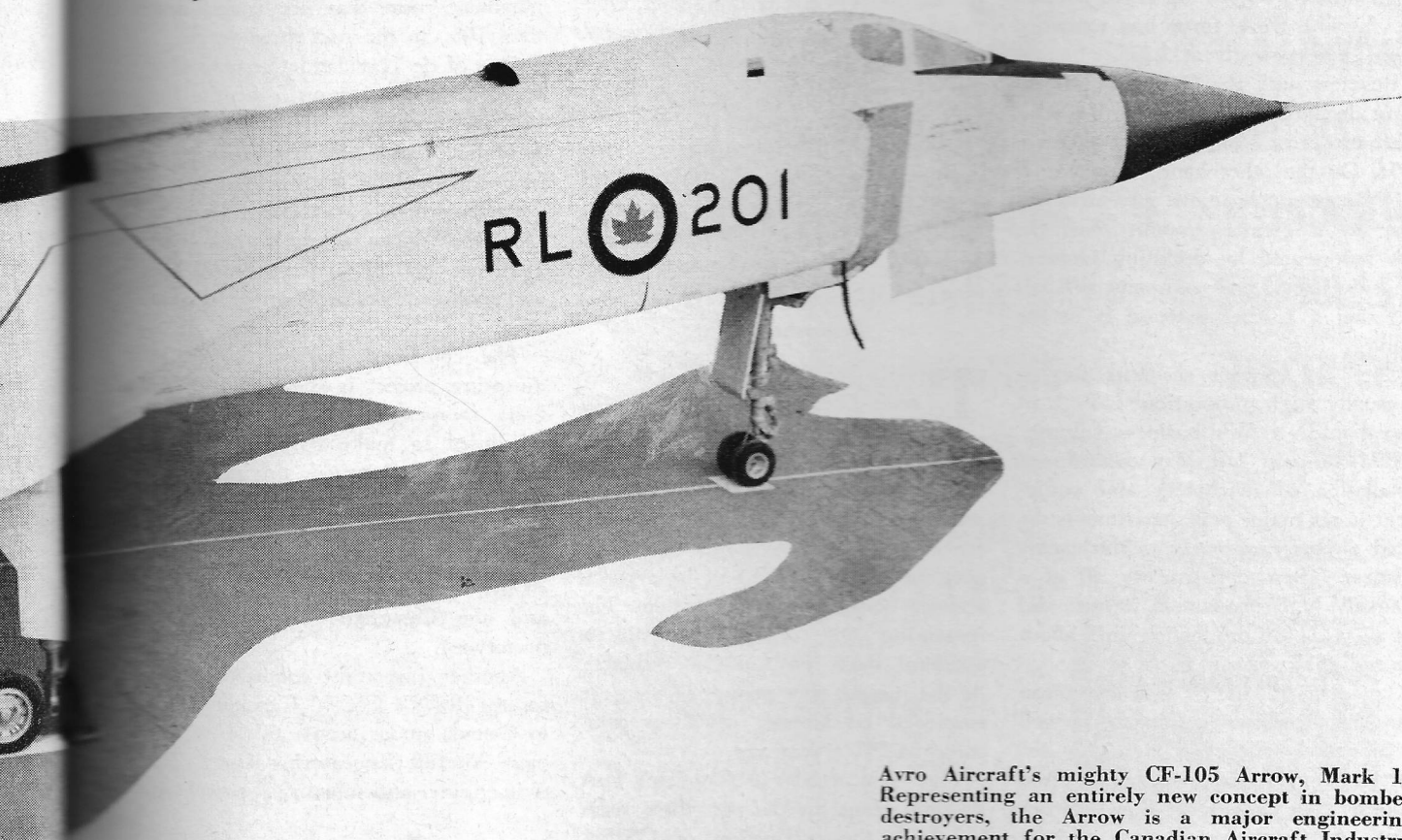
Another type of hardware for the RCAF's call-and-haul department is the CL-44, a turbine-powered version of the Bristol Britannia to be built by Canadair with first delivery slated for 1960. The company is currently conducting an aggressive promotion campaign to sell this aircraft on the world civil airline market. Present plans call

for both a passenger (123 to 154 persons) airliner, and a freighter (35-ton payload) version of the CL-44.

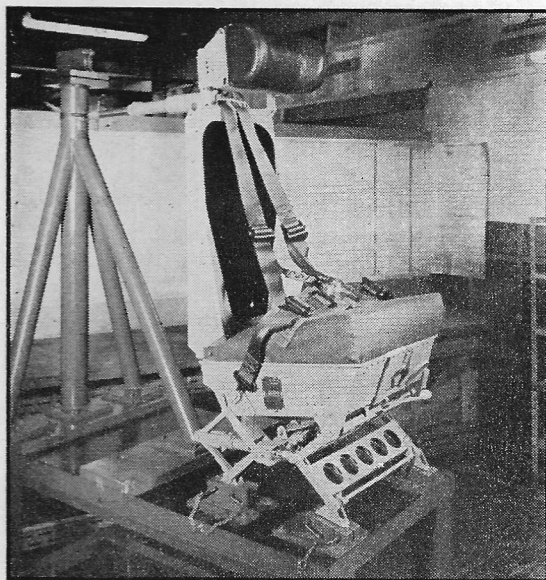
At the moment, Canadair's production facilities are chiefly engaged in turning out the CL-28 Argus maritime reconnaissance patrol aircraft. Around 50 of these big airplanes have been ordered for the RCAF's Maritime Air Command.

Other projects at Canadair include two prototypes of the CL-41 jet trainer, being built at company expense. These aircraft should be flying by next year. T-33 production for the RCAF has slowed down, indications being that no further orders will be received for the versatile trainer when present contracts expire this summer. The CL-41 Rat, a light tracked triphibious vehicle for duty in Canada's North — or similarly rough terrain — is being built.

Some nuclear and missile research and development is carried on at Cana-



Avro Aircraft's mighty CF-105 Arrow, Mark 1: Representing an entirely new concept in bomber destroyers, the Arrow is a major engineering achievement for the Canadian Aircraft Industry.



This is a crew seat made by Thor Industries Ltd. under subcontract to de Havilland Canada, for use in the Tracker.

lair, and the company is expected to play a large part in the production of the Sparrow 2 air-to-air guided missile.

Canadian P & W

LOCATED across the St. Lawrence river from Montreal, the Canadian Pratt & Whitney Aircraft Co. Ltd., sells, services and overhauls in Canada the products of United Aircraft Corp., its parent firm. Canadian P & W has expanded its facilities in the past year, increasing plant area by 95,000 sq. ft. to 846,000 sq. ft. The work force has remained more or less steady at 2,376.

Business with the Canadian government declined sharply during the year, with prospects of a further decline in 1958. On the other hand, Canadian P & W's export business increased last year by a greater amount than the loss represented by declining Government business, and company officials feel that a further increase is in the offing.

The civil market accounts for an unusually high proportion (65%) of Canadian P & W's business volume.

The company last May commenced installation of machinery and equipment in six major new departments devoted almost exclusively to the export business. These departments, all of a relatively high production nature, did not all reach full production until about the end of the year.

Canadian P & W sells Hamilton Standard propellers in Canada, as well as Sikorsky helicopters, and the aircraft accessories manufactured by Pesco Products Division of the Borg-Warner Corp. Although production of the

Pratt & Whitney Wasp R-1340 has been virtually phased out by now, some five or six of them are still being produced each month for export and for helicopter applications.

The chief project in engine production at Canadian P & W is still the Wright R-1820 Cyclone, for installation in the de Havilland Canada-built CS2F-1 Tracker. In connection with this, the company is also responsible for providing the Hamilton Standard model 43D51 hydromatic dural three-bladed propeller. The Longueuil, Que., firm manufactures all the components with the exception of the blades which are shipped in from Hamilton Standard.

The overhaul of aero engines, helicopters, propellers and aircraft accessories continues to provide a substantial flow of business. This year it amounted to 15% of the company's volume.

Canadian Car

THE AUTOMOTIVE and Aircraft Div. of Canadian Car Co. Ltd., Fort William, Ont., devotes some 230,000 sq. ft. of plant space to aviation activity, equal to 38% of total area. Aviation accounts for 42% of the Division's total business volume, with 94% of its aviation activity being in manufacturing. The remaining 6% represents repair & overhaul work on Can-Car products. At the present time some 324 men are employed on aircraft work, as compared to 255 a year ago.

The main activity at Can-Car's Fort William plant for the past three years has been the production of CS2F-1

Tracker components under sub-contract to de Havilland Aircraft Canada. The centre section and outer panel wing components of the Tracker comprise about 40% of the weight and value of the airframe. They also constitute the largest and most complex part of the airframe made by any sub-contractor.

In addition to the Tracker work, de Havilland chose Can-Car to manufacture Otter aircraft wing panels and empennage components. Coupled with the above sub-contracts, Can-Car manufactures and overhauls Harvard aircraft and a considerable volume of Harvard spares. With this aircraft dispersed throughout the world, Can-Car does a considerable export business in parts and spares.

De Havilland Canada

THE DE HAVILLAND Aircraft of Canada Ltd. is one of the largest exporters of single-engine STOL utility aircraft in the world today.

Located on the northern fringe of Toronto, de Havilland Canada increased its plant area last year by some 50,000 sq. ft., to a total of 882,374 sq. ft. Although employment figures are down slightly from last year to 3,725, it is notable that the company's employment roster has not varied more than 10% in the past three years.

One of de Havilland Canada's chief breadwinners continues to be the Beaver. In production since 1948, some 1,169 civil and military versions are in use throughout the world.

Otters which have been rolling off the Downsview assembly line since 1951, are now in service with military and civil operators in 20 different countries.

The company's current major engineering project is the DHC-4 Caribou twin-engine utility transport, scheduled to make its first flight in mid-summer. Limited production of the Caribou is planned for 1959 and volume production for 1960. At the present time, the U.S. Army has ordered five of the aircraft for test purposes, and the Canadian Army one (the prototype).

Another important contract is that for the RCN's CS2F-1 Trackers, built in Canada under license to the Grumman Aircraft Engineering Corp. The twin-engine, anti-submarine patrol air-

(Turn to page 43)

craft will continue in production for at least another year.

De Havilland Canada, in its recent annual report, said that net profit for the year ended Sept. 30, 1957, dropped about 61% below that reported for the previous year. Said P. C. Garratt, vice president & general manager: "The period under review reflects the unsettled international situation, the credit situation in Canada, and as far as we are concerned, substantial expenditures on our new Caribou."

Repair and overhaul is performed on all types of aircraft built by the firm over the years. The engine division last year processed some 310 Orenda engines from F-86 and CF-100 aircraft for the RCAF. Some 73 piston engines were overhauled, as well as 54 propellers and constant speed units.

Orenda Engines

PRE-PRODUCTION development of the Iroquois 20,000-plus lb. thrust turbojet is the foremost project presently going on at the Malton, Ont., plant of Orenda Engines Ltd.

One of the high-lights of Orenda's year was the seven-year agreement made with the Curtiss-Wright Corp. of the U.S. The American firm is under licence to manufacture and sell the Iroquois engine in the U.S. One American proposal for the engine is as the power-package for the North American F-108 supersonic fighter.

Meanwhile, at the Orenda plant near Toronto, work continues on both Orenda 11 and Orenda 14 engines for the CF-100's Sabres in production for or in service with the RCAF, the SAAF, and the West German Air Force, as well as the airforces of other countries. A steady flow of repair and overhaul engines is moving through the plant the year around. Over 3,500 Orenda engines are presently in use in Canadian-built aircraft.

It is indicative of Orenda's dynamic growth that a full 46% of the company's efforts are devoted to research and development projects.

Plant expansion during the past year of 40,000 sq. ft. has increased total plant area to 1,250,000 sq. ft. Total employment is down to 5,100 personnel from last year's 5,400.

Rolls-Royce of Canada

ROLLS-ROYCE of Canada Ltd., is a wholly-owned subsidiary of Rolls-Royce Ltd., of Derby, England. The Montreal factory is equip-

ped for the manufacture and assembly of jet engines, full overhaul, testing and manufacture of spare parts.

The facilities of the company devoted to the aviation market include 90,000 sq. ft. (an increase of 27,000 sq. ft. in the last year) of manufacturing, office and store space, together with modern jet engine test beds.

The company's initial project revolved around the \$33 million order for 900 Nene engines for the RCAF's T-33 trainers, for which deliveries were completed in 1955. A stipulation of the contract was that Rolls-Royce would create the facility to manufacture a number of these engines in Canada. Supplementing the original order for Nene engines, Rolls-Royce was given a contract from the DDP for the manufacture of spare parts for the Nene and the overhaul of engines from the RCAF. Later, with the introduction of the McDonnell Banshee into service with the RCN, facilities for the overhaul of the Westinghouse J34 turbojet engine were established at the Montreal plant.

The purchase of the Vickers Viscount by North American operators created the requirement for the establishment of technical services, and the provision of spare parts for the Rolls-Royce Dart turboprop engines which power this aircraft. A \$1 million extension has recently been constructed for overhaul and repair of all marks of Dart. A similar type of service has been maintained for the RCAF and TCA users of North Star aircraft which are powered by Rolls-Royce Merlin piston engines.

Aircraft Industries

LOCATED AT the Municipal Airport at St. Johns, Que., Aircraft Industries of Canada Ltd. is one of the largest firms in Canada

specializing in the overhaul, conversion and modification of all types of aircraft up to 35,000 lbs. gross weight.

Facilities offered by the company include sheet metal fabrication, radio and electrical systems installations, fabric, woodwork, and hydraulic overhaul. Other activities in the shop area which is contained in the 135,000 sq. ft. (an increase of 32,000 sq. ft. in a year) of space include instrument overhaul, painting, sandblasting, magnaflux, cable swaging, heat treating and cadmium plating. Total employment is approximately 400.

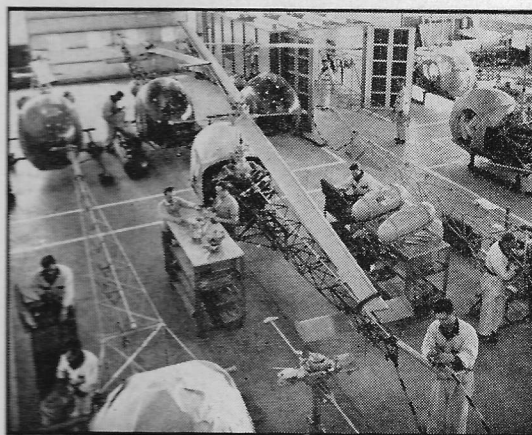
The company is presently engaged in overhaul work for the RCAF on such aircraft as Dakotas, Cansos and Harvards, as well as conversions and overhauls on various types of civil aircraft for executive and commercial operators.

Bristol

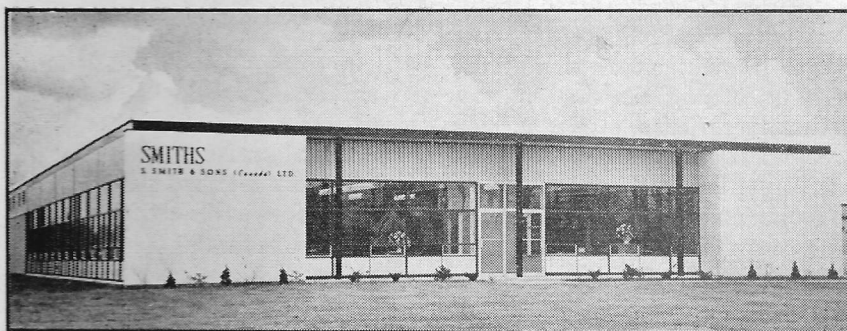
A WHOLLY-OWNED subsidiary of the British firm of the same name, The Bristol Aeroplane Co. of Canada Ltd., with headquarters in Montreal, controls four operating subsidiaries. Most recent of these to be added is Bristol De Mexico, S.A., which started operations in June 1957 as a piston engine overhaul centre for South America. The controlling company in Montreal is the sales executive branch of Bristol in Canada.

•**Bristol Aero Engines Ltd.:** This large (162,000 sq. ft.) and modern plant in North Montreal is equipped with the most up-to-date facilities available for the specialized processes, techniques and testing involved in the overhaul of engines.

Employing some 514, this plant handles the overhaul and reconditioning of Wright Turbo Compound engines for the RCAF C-119 and Neptune aircraft, and TCA Super Constellations. It also performs similar



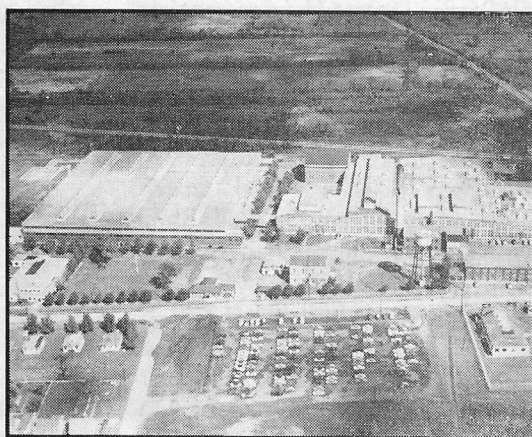
Spartan Air Services operates this modern 14,000 sq. ft. helicopter overhaul & repair plant at Ottawa's Uplands Airport.



In Smiths new plant in suburban Toronto, the firm's Aviation Div. operates a modern instrument laboratory.



Above is Canadian Pratt & Whitney Aircraft's expanded manufacturing plant at Jacques Cartier, P.Q.



Canadian P & W's 1957 expansion included taking over all Sorel Industries plant facilities (below).

In this Toronto plant, Servomechanisms designs & produces precision computation and control systems.



work on RCAF Merlin engines for Lancaster and North Star aircraft.

The repair and overhaul of Wright 18-cylinder Turbo Compound engines for both RCAF and TCA represents the company's major undertaking at the present time, with the overhaul of Meteor tank engines for the Canadian Army as a departure from aircraft engine work.

•Bristol Aero Engines (Western)

Ltd.: Is the Vancouver counter-part to the Montreal plant. At its modernized plant at the International Airport, the company carries out the overhaul of Pratt & Whitney and Wright engines for the RCAF, and for several commercial airlines operating in western Canada.

The Vancouver subsidiary plays a major part in the repair and overhaul of the Proteus engines of CPA's Britannia fleet. In addition to the above-mentioned activities, the repair of propellers, carburetors and fuel injection systems is an important function.

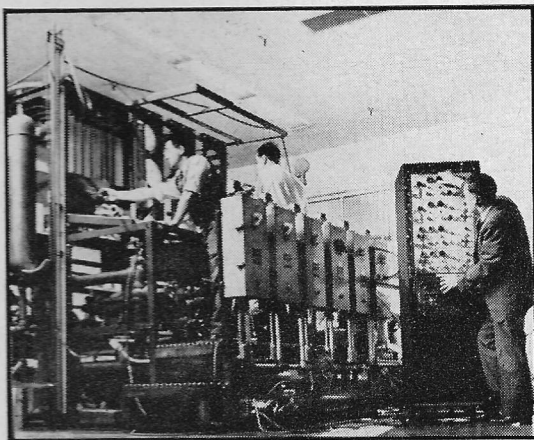
Rate of growth of the west coast company is evidenced by the increase in shop space by 12,000 sq. ft. to its present total of 68,000 sq. ft., and the employment figure of 132 which is a rise in the total figure of 114 a year ago.

•**Bristol Aircraft (Western) Ltd.:** Assumed the ownership of MacDonald Bros. Aircraft Ltd., of Winnipeg in 1954. The largest of Bristol interests in North America, this company occupies an area of 425,000 sq. ft., and is involved in a wide range of activities. These include the repair, overhaul and modification of RCAF Expeditor, Mitchell and CF-100 aircraft. Components for aircraft and jet engines are also manufactured at this plant, together with floats for land based and amphibious airplanes. The Winnipeg plant has a total of 1250 employees.

Aviation Electric

AVIATION Electric Ltd. has undergone steady expansion in the past year, both in personnel and work space. The Montreal firm has increased its work force from 729 to 839, and boosted its plant area from 115,000 sq. ft., to 150,000 sq. ft. Some 95% of its total manufacturing output is devoted to aviation products, mostly in the electronic field. The bulk of the company's activity is concerned with military contracts.

The stated purpose of Aviation Elec-



One of the Canadian Aircraft Industry's largest accessory manufacturers is Lucas Rotax. Photo shows fuel system test rig operated by the firm at its Scarborough, Ont., plant.

tric Ltd., is to sell, service and manufacture aviation products developed and marketed through the Bendix Aviation Corp., of which it is an affiliate. This includes the sales, service, repair and overhaul of aircraft instruments, accessories and ancillary equipment.

Aviation Electric runs a continuous program of research aimed at the design, development and manufacture of equipment required especially for Canadian aircraft and missile programs. The company's manufacturing operations are mainly devoted to instruments, fuel metering and hydraulic components.

Of interest is the 35,000 sq. ft. addition AEL made to its plant in the course of the past year. The new area houses an air-conditioned manufacturing machine shop and special test facilities for jet fuel controls, fuel flowmeters, and hydraulic and other equipment associated with highly inflammable liquids. The entire new section, which has been added to the existing plant in the form of a wing, has been equipped with air filtering, humidity and temperature control.

Canadian Applied Research

FORMERLY known as PSC Applied Research Ltd., this firm was acquired by the A. V. Roe Group in March 1957. One of Canada's leading designers and manufacturers of electro-mechanic instrument systems, CARL employs a staff of 400 and operates two plants in Toronto's east end with a total of 56,000 sq. ft. of space.

Current activities in the aviation field include engineering and production of R-Theta Navigation Computer Systems, automatic ice detection & shedding control systems, airborne profile recorders, armament intervalometers, microwave plumbing, auto-

matic tri-film processors, instrumentation and flight path positioning cameras, Gamble stereo plotters for aerial survey mapping.

CARL operates an environmental test laboratory service including an icing wind tunnel, and a complete technical publications service. Also, an RCAF-approved repair & overhaul facility is maintained.

Agency sales are handled in Canada for Kearfott Components and Systems, Robot Cameras, Transval Electronic Inverters and Power Supplies, and Sherman Fairchild Cameras.

CAE

CANADIAN Aviation Electronics Ltd., the Montreal company with the Horatio Alger story, is still moving ahead. With over 1,100 employees, it is one of the largest electronics firms in the country. CAE deals almost entirely with Department of Defence Production contracts, with the exception of its CPA contract for DC-6B simulators.

Of the large contract for 11 CF-100/4 flight and weapons system simulators, only a few remain in the large Montreal plant. More than half of the original order are presently in use with RCAF units, with others presently being installed at Air Defence Command bases. The RCAF recently ordered up a Mk.5 simulator which, it is expected, will ultimately be sent to the Belgian Air Force.

Other large RCAF orders for simulators include 12 general purpose trainers for twin-engine transport type flying; and a production contract for one CL-28 Argus flight trainer, as well as a design study of a CL-28 simulator complete with radar and weapons simulation.

CAE has two branch plants, one in Winnipeg and the other in Vancouver.

The Winnipeg operation has 240 employees working on the repair and overhaul of electronic equipment of the Pinetree Line. The smaller Vancouver plant employs some 56 technicians who are concerned with maintenance, repair and overhaul of radar units belonging to west coast RCAF units.

Canadian Steel Improvement

A MEMBER of the A. V. Roe Canada Group, Canadian Steel Improvement Ltd., has one of the most modern forge and foundry facilities in North America. Specifically designed to cater to the aircraft, aircraft engines, engineering and commercial industries, CSI has a roofed-in area of 180,000 sq. ft., and employs 450.

The expansion program completed last year by CSI was planned to offer new products such as large and medium sized aluminum forgings; large, medium and small titanium forgings; aluminum and magnesium sand castings; aluminum permanent mould castings; aluminum pressure die castings. Included are such service departments as a pattern shop; X-ray facilities; and large control and research laboratories.

The suburban Toronto company is divided into two divisions: the forging division, and the light metals casting division. In the first-mentioned is the light alloy forge, which is equipped with a battery of hammers of the Ceco-drop type, some of which are used for the precision forgings.

Furnaces of special design have been included in the layout for use in the manufacture of titanium forgings. Allied with these are the conditioning facilities, etching, anodizing and chromating baths. Found also in the forging division is the steel forge. This section, allied with the heavier equipment in the other forges, can produce turbine alloy, stainless steel and titanium die forgings to precision dimensions.

In the light metals casting division are the aluminum and magnesium sand foundries, the permanent mould and die cast foundry, the refinery and the ancillary shops.

Collins of Canada

IN AUGUST 1957, the Department of Defence Production awarded Collins Radio Co. of Canada Ltd. one of the largest contracts ever plac-

Northwest Industries is engaged in developing and perfecting modifications and improvements to aircraft, design studies and new developments. The Publications Section of this department is largely staffed by trained people brought to Canada from the U.K. This section is actively engaged in the preparation of Engineering Orders on the Fairchild C-119 Packet for the RCAF.

Raytheon Canada

RADAR AND other electronic products are the chief concern of Raytheon Canada Ltd., a subsidiary of the Raytheon Mfg. Co., Waltham, Mass. The Waterloo, Ont., firm has a staff of approximately 100, and is engaged in the design, development and manufacture of long range ground and surveillance radar, indicators and displays.

Current major project for the Canadian plant is the filling of an \$8,000,000 contract for the development and production of 15 surveillance radar systems, known as Airport & Airways Surveillance Radar, for the DoT. This contract, awarded in 1956, calls for the installation of the 15 radar units at civil airfields across Canada by 1959. The equipment will give Canada practically continuous civil radar coverage for internal air traffic control.

Recently it was announced that the DoT intends to duplicate the Raytheon AASR equipment at each installation, to meet any emergency involving breakdown of power supply or equipment.

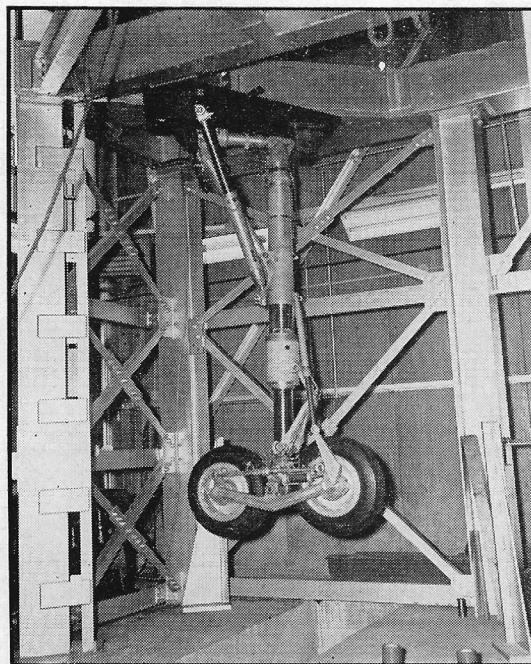
Sperry of Canada

SPERRY Gyroscope Co. of Canada Ltd. continues to design, develop and manufacture aeronautical equipment for the military and commercial requirements of Canada's air industry. The company's 75,000 sq. ft. plant is located at Montreal and employs 480. In addition to defence contracts in the past year, the company continued exports of equipment to NATO air forces and other foreign customers.

In the manufacturing field, large numbers of the Sperry Gyrosyn Compass, which is standard with the RCAF, RCN, TCA and CPA, are being produced.

New developments in the compass field include the Canadian designed Sperry LDG-1, Low Drift Gyro with a random drift rate of plus or minus 1° per hour. This high accuracy head-

This Dowty test rig is used to perform landing gear retraction, shock absorber closure, and fatigue tests on main gear for CF-105 Arrow.



ing reference is particularly suitable for polar navigation, and for use with the latest developments in precision navigation equipment. A logical further development of the LDG compass system is the Sperry-Canada Two Gyro Stable Platform, the prototype of which will be completed during 1958.

An associated development of the Gyrosyn Compass is the Roll Correction Computer, which provides by computation and correction an accurate compass heading at all times during varying aircraft attitudes of pitch and roll.

The Kollsman machmeter, airspeed indicator and altimeter continue to be manufactured for military use. A new development in this field is the Sperry-Canada Servo Altimeter which has completed laboratory tests and is scheduled for flight tests in the near future. This new instrument provides facilities for any desired type of presentation and more accurate performance than existing altimeters, as well as supplying a highly accurate source for air data information.

The Sperry A-4 Gun-Bomb Rocket Sight has continued in quantity production against military and overseas orders. Further development of a Sperry U.S. designed airborne radar was undertaken to meet specific Canadian needs and plans are well advanced to produce the equipment in Canada for a military requirement.

The new Sperry SU-30 Gyropilot has been specified by TCA for its DC-8 aircraft, and the Sperry SP-20 Gyro-

pilot by CPA and MCA on their DC-6 aircraft. A recent development in the flight control field has been the manufacture by Sperry-Canada, under sub-contract, of Missile Flight Control equipment.

Dowty of Canada

DOWTY EQUIPMENT of Canada Ltd., which has headquarters at Ajax, Ont., near Toronto, is a self-contained organization with a staff of some 350, and engaged in the design, development and manufacture of landing gear and hydraulic equipment mostly for military aircraft. The Ajax plant has a total of 60,000 sq. ft. of working space.

Current activity at Dowty involves the design and production of aircraft landing gear, electro-hydraulic and hydraulic equipment for the Avro Arrow, and CF-100, as well as for the de Havilland Caribou, CS2F Tracker, and Canadair Ltd.'s Argus and CL-44.

Under a licencing agreement with the Dunlop Canada Ltd., Dowty is involved in the manufacture, sales and service and repair of Dunlop wheels, brakes and related hydraulic and pneumatic equipment. The Canadian firm does repair and overhaul work as required for the RCAF and RCN.

Standard Aero Engine

LOCATED at Winnipeg's Stevenson field, Standard Aero Engine Ltd., provides a complete overhaul facility for aircraft engines (up to 1500 hp) and accessories. Engines currently being processed in the