

# THE INDUSTRY ON PARADE

## The Success of the Aircraft Program Depends on these Companies

*The Aircraft Industry, like any other, is made up of many vital component parts. Here, in brief form, are reviewed the activities of these parts.*

**A**VRO AIRCRAFT Ltd. is the former Aircraft Division of A. V. Roe Canada Ltd. and came into being as the result of the recently announced re-organization of Hawker Siddeley interests in Canada. Biggest of the three-company A. V. Roe Canada operating group (the other two: Orenda Engines Ltd.; Canadian Steel Improvement Ltd.), Avro Aircraft is vested with the responsibility for designing and producing the fighting machines around which Canada's home air defences are built.

In the field of production, during the past year the company turned out large numbers of Mk 4 versions of the CF-100 and it is understood that the total number of these all-weather fighters so far built now exceeds 350. However, delays in the formation of RCAF CF-100 squadrons and the desire to keep production lines operating at a reasonable level until work starts on the CF-100's successor, recently resulted in a Government slowdown order designed to stretch out Mk. 4 production. Government orders in hand cover a total of approximately 650 Mk. 4's (including those already delivered), but the RCAF's decision to convert four of its European Air Division squadrons to all-weather units flying CF-100's, plus

the possibility of shipments to NATO countries under Mutual Aid, may result in the boosting of orders.

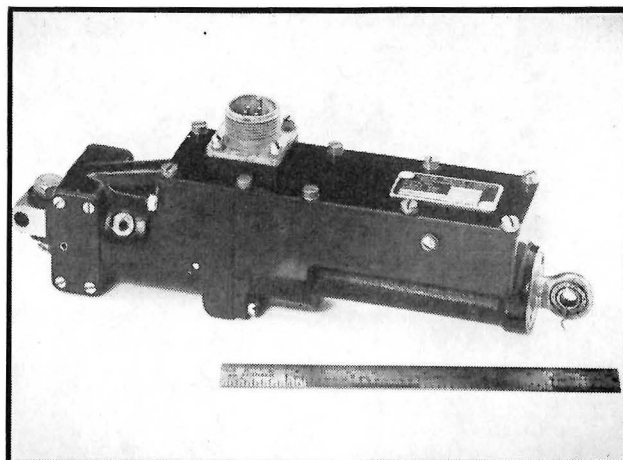
Avro Aircraft Engineering Vice-President J. C. Floyd recently said that . . . "I believe we are going to be in the CF-100 business for a long time . . ."

For the future, engineering work is proceeding apace on the CF-105, with the first of two prototypes expected to fly next year. Production aircraft probably will not be available until 1958 at the earliest. The CF-105 is an interesting project, to say the least, and according to Mr. Floyd: "We are making good progress on the CF-105, which is going to be a world-beater. It is ahead of anything in its class."

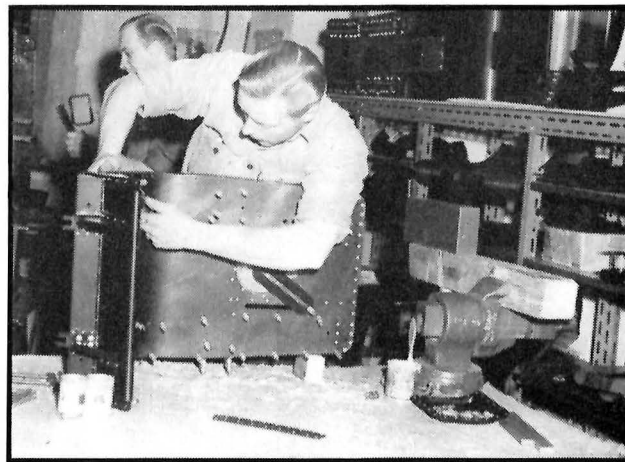
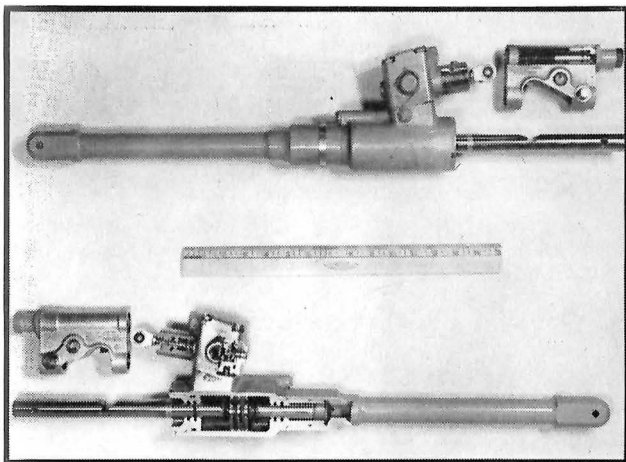
While all details on this fighter are



On opposite page are number of aircraft instrument components produced at Montreal by Sperry of Canada. Above, L, MacDonald Bros. officials show Viscount Swinton (with hat) Orenda hot end parts made in



Winnipeg plant; R, Lucas-Rotax linear actuator. Below, L, Fairey Hydro-Boosters, made in Nova Scotia for use in CF-100; R, at Canadian Flight Equipment's plant, assembling seat pan for Martin-Baker ejection seat.



highly secret, available information indicates that it is a big twin-engined delta fighter of over 50,000 lbs. gross weight, capable of Mach 2.0 speeds and having a very long range. The prototypes are being powered by U.S. engines, possibly either the Wright J-67 or the P & W J-75, both in the 15,000 lb. th. class. However, Avro Aircraft is anticipating that production models of the airplane will be powered by the big new PS-13 twin-spool turbojet of 18,000 lb. th., now under development by its associate company, Orenda Engines Ltd.

The CF-105 is well advanced, with the prototype airframes being built up and work already under way on production tooling. The program for this aircraft will require a \$5,000,000 expansion program, according to Avro Aircraft, including extra buildings, hangar, laboratory and office space, and new presses and machines.

This company is also active in the guided missile field, carrying out a

considerable amount of research and development work.

Employment, which was recently cut as a result of the Government's CF-100/4 stretch-out order, is now approximately 9,000. Facilities include 1,600,000 sq. ft. of engineering, manufacturing and hangar space.

#### Canadair

**T**HE ABATING appetite of the RCAF for Sabres and Silver Stars has brought about a reduction in output of these two aircraft to maintenance rates of production, with the result that manufacturing activity at Canadair Limited is currently at its lowest level in several years. Conversely, engineering activity is at a new high and the company is having some difficulty to get enough qualified technical personnel to fulfill its present program, even though the engineering staff now exceeds 700.

Engineering is devoting most of its attention to the CL-28 MR Britannia

project, which involves about 60% re-design of the airliner version of this aircraft. Another program in which Canadair's engineering department is playing a leading role is that for the development of guided missiles. This company has been participating in Canadian guided missile work for several years, but the tempo of activity in this highly-classified field is increasing.

Because of the slowdown in F-86 and T-33 production, the work force is down to a total of about 7,000, as compared to the peak of nearly 13,000 just before the cancellation of the USAF's T-36 contract about two years ago. It is expected that as an increasing number of CL-28 drawings are released to the shops by engineering, the production force will grow somewhat, though there is little likelihood of it reaching its former strength until such time as the RCAF decides on a replacement for the Sabre.

To date, more than 1,400 Sabres and

400 T-33's have been produced. This leaves approximately 175 more of the latter to go to complete the RCAF's original order. It has been frequently suggested that some T-33's may be turned over to Mutual Aid, which makes it at least possible that additional numbers of these jet trainers will be ordered. Current F-86 model in production is the Sabre 6, powered by the Orenda 14 of some 7,200 lbs. th. and it seems unlikely that the RCAF will be able to find use for many more than another 200 of these.

Because of the excellent performance of the Sabre 6, the RCAF is reported to have delayed the selection of a day-fighter replacement. The aircraft that were most favored in this respect a year ago, the North American F-100 and the Convair F-102, are now thought to be out of the running, since they do not have a sufficient performance edge on the Sabre 6 to justify the great expense of converting to a new type.

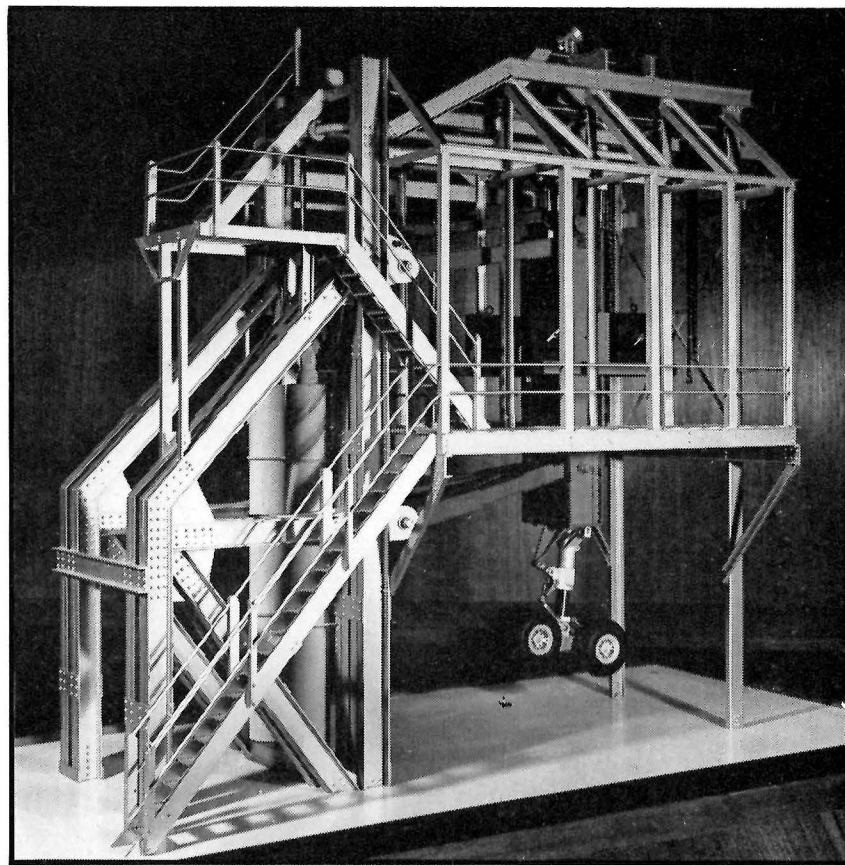
Strongest contender at the moment seems to be the Lockheed F-104, an "air superiority" fighter with a thin straight wing, which appears to have better growth possibilities than either the F-102 or the F-100.

With the growing number of Canadian-built military and civil aircraft in service all over the world, the supply of spares to operators makes up an increasingly important share of Canadian's business. For instance, in 1953, sales of spare parts rang up nearly \$27,000,000 on the company's cash register and last year this was topped.

Plant space has grown during the last year to 2,600,000 sq. ft. with the addition of two new buildings totalling 200,000 sq. ft. One of these is intended to broaden the scope of the company's engineering facilities and houses engineering test and laboratory equipment, including a structural instruments lab, a test machine room, and experimental flight test office, and a fuel test house. The other building is a tooling shop, which contains facilities for foundry, template, and pattern shops.

#### Canadian Car & Foundry

**A**S THE END of T-34 production grows nearer at the Fort William plant of Canadian Car & Foundry Co. Ltd.'s Aircraft Division, it is becoming apparent that this company may soon have to abandon its role as an aircraft prime contractor and devote all its attention to the less publicized



**NEARING COMPLETION** at Ajax, Ont., plant of Dowty Equipment of Canada is a new 175,000-lb. undercarriage drop test rig, shown above in model form.

but nevertheless equally vital task of turning out airframe components under sub-contract to other manufacturers.

At present, at least, there is no indication that there is anything in prospect to replace the T-34 on CanCar production lines. The USAF placed orders for 100 T-34A's, while the RCAF bought 25. Deliveries began just one year ago and a considerable proportion of the total ordered have now been completed. T-34 production could be extended if the USAF increased its order (possible) and the RCAF decided it had a place for the trainer in its curriculum (unlikely, now that it has decided to order 60 Chipmunks).

Thus, for the time being, CanCar's Aircraft Division will concentrate on: (1) production of CS2F-1 wing sets, including the folding mechanism, under sub-contract to de Havilland; (2) production of Otter wings and empennage, including all associated control surfaces, also on behalf of de Havilland; (3) production of spares for Harvard/Texan aircraft . . . CanCar holds world rights (excluding the U.S.) for the production and sale of this airplane and its parts. In the two years prior to last March, this company pro-

duced 555 of these trainers for USAF and the RCAF.

The Aircraft Division plant at the Lakehead covers 662,000 sq. ft. which includes a large assembly building of three bays with an area of 216,000 sq. ft.; a machine shop of 17,600 sq. ft.; a prefabricated building of 112,000 sq. ft. In addition, the company owns two hangars at the Municipal Airport, about 1½ miles away. One hangar has an area of 7,000 sq. ft., and the other, a double hangar, 40,320 sq. ft.

#### Canadian P & W

**T**HERE IS no slackening of the tempo at Canadian Pratt & Whitney Aircraft Co. Ltd., where, with the R-1340 still in series production, work is starting on a new engine manufacturing program, the cost of which exclusive of additional machinery, equipment, and tooling, is estimated at more than \$20,000,000 spread over five years.

Right now, the Jacques Cartier, P.Q., plant is busily tooling up for the production of the Wright Cyclone 9 R-1820-82, a 1,525 hp radial engine that will power the CS2F-1 being made by de Havilland. In addition, Canadian P &

W will manufacture the Hamilton Standard propellers fitted to this RCN anti-submarine aircraft.

Production of R-1340 Wasps has recently been reduced to spread work over the period required to commence production of Cyclones. As the company is today the only source of new Wasp engines and parts, however, it will continue to produce these for the world market for some years. Meanwhile, production of spare parts for a number of Pratt & Whitney engines other than the Wasp—including the R-985, the R-1830, and the R-2000—is being expanded to meet demands of the domestic and export markets.

In setting up its Manufacturing Division in 1950, the company purchased property and erected its own buildings (construction started in June, 1951), but the R-1340 production machinery was supplied by the Canadian Government. Negotiations were recently completed to purchase all of this machinery and equipment furnished by the Crown for the Wasp program. A large amount of new tooling will be needed for the new program, but all machinery and equipment in the plant will continue to be utilized.

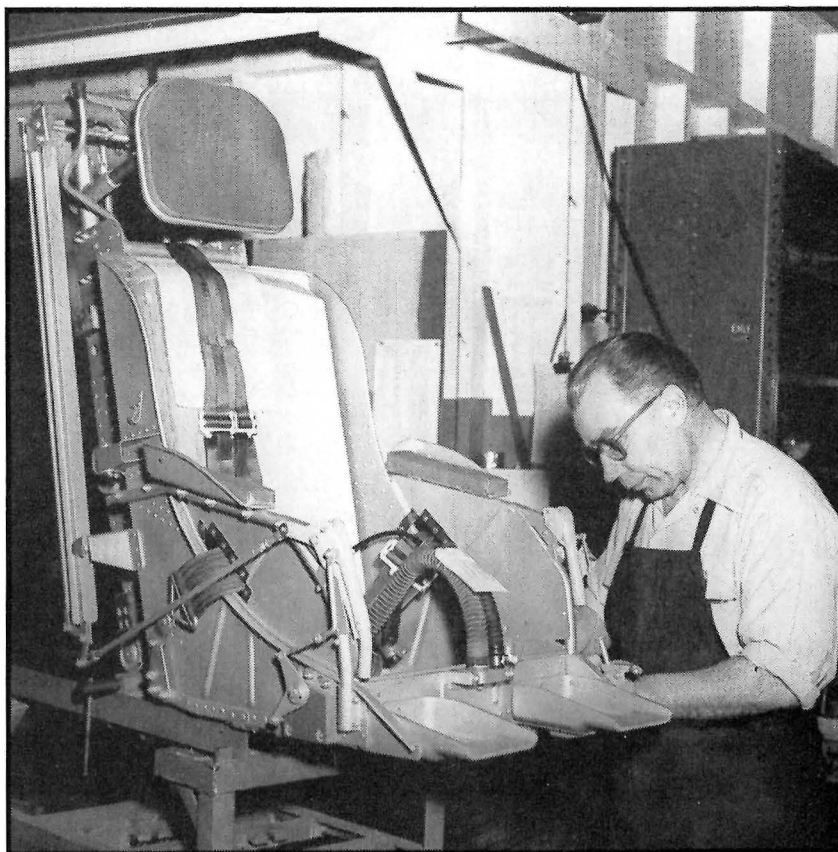
A pioneer of the aviation industry in Canada, Canadian P & W is now in its 26th year in business. A subsidiary of United Aircraft Corp. of East Hartford, Conn., it sells, services and overhauls P & W engines, Hamilton Standard propellers, and Sikorsky helicopters, produced by the various divisions of United Aircraft.

During 1954, the Canadian firm sold 11 S-55's, bringing the total number of Sikorsky helicopters operating in Canada to 25. To provide service for these machines, Canadian P & W has a helicopter hangar and overhaul shop adjacent to its Sikorsky heliport, which was the first licensed heliport in Eastern Canada.

Total plant area operated by this company is 420,000 sq. ft., which includes the 81,000 sq. ft. facilities of the Overhaul & Supply Division at Longueuil, about a mile from Jacques Cartier.

#### de Havilland Canada

**A**T HIGH tide are the fortunes of The de Havilland Aircraft of Canada Ltd., Downsview, Ont. With production orders for four entirely different types of aircraft in hand, three of them its own designs, this



**FINAL TOUCHES** are put on Sabre ejector seat at Etobicoke, Ont., plant of Thor-Canadian Co. Ltd., which has made over 2,000 T-33 and F-86 seats.

company certainly finds itself in a unique position.

During the early postwar years, DH Canada managed to maintain financial stability at a time when it was not unusual for an aviation concern to find itself in an uncontrolled dive. The fact that it was possible to do this with practically no assistance in the form of Canadian Government contracts is due entirely to a sagacious management, a clever and practical design staff, and an aggressive sales department. Now, after several years of hard plugging, which in itself can be a source of considerable satisfaction, de Havilland Canada is in the happy circumstance of having just about as much work as it can conveniently handle.

However, the company is sidestepping the need for any major plant expansion or employment build-up by sub-contracting work wherever possible, while retaining all final assembly operations for itself as prime contractor in each case. In this way, during the last several years violent fluctuations in employment, which now stands at about 2,600, have been avoided. Partly for this reason and partly because of the "one big happy family" atmosphere

that prevails, the company's employee/mangement relationship is one of the most unruffled in the Industry.

Major projects now on hand include:

- Orders from the U.S. Army for 90 Otters. Other machines of this type are being built for the RCAF and commercial operators in Canada and abroad.

- Orders from the RCAF for 60 Chipmunks.

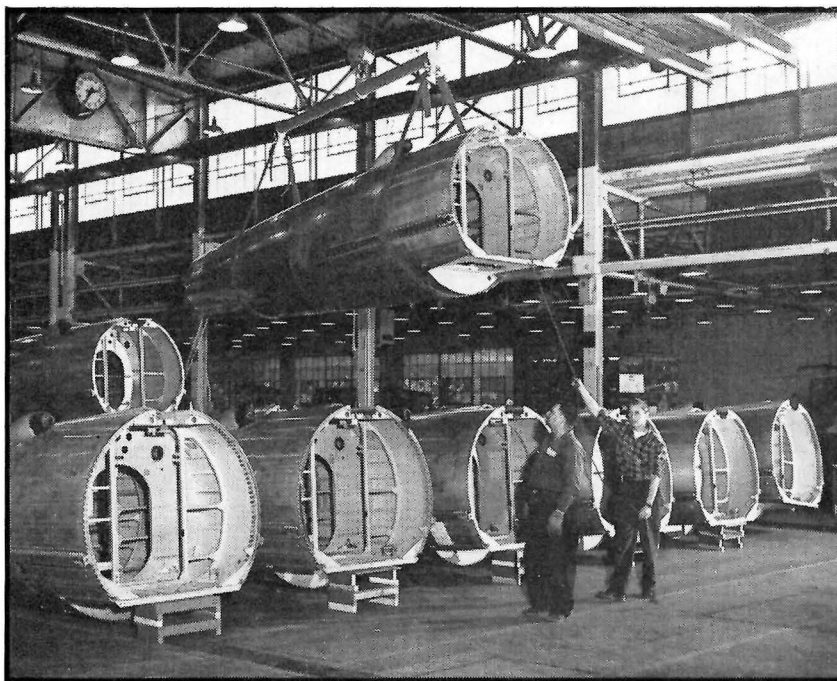
- Orders from the RCN for 100 CS2F-1 Sentinels, to be built under license from Grumman.

- Military and commercial orders assuring production of the Beaver/L-20 for some time to come.

At last report, 775 Beavers had been built, while the number of Otters turned out has now reached 60. Chipmunks were out of production for several years, of course, but more than 150 were built during the first production run. The first CS2F-1 is not scheduled to appear until around the end of this year.

De Havilland has also become involved in the Canadian guided missile program and now has a small department engaged in this field of endeavor.

Apart from the production program



**CF-100 FUSELAGE** centre rear sections are manufactured at Tilbury, Ont., by Chatco Steel Products, under sub-contract to Avro Aircraft Limited.

already noted, the firm is maintaining a comprehensive repair & overhaul schedule on both airframes and engines, mainly on behalf of the RCAF. On the airframe side, the aircraft passing through the overhaul shops regularly include such diverse types as Vampires, North Stars, Chipmunks, Beavers, and Doves. In addition, one of the RCAF's two Comets is being maintained in a state of flying readiness, pending an AFHQ decision on what it plans to do with them.

On the engine side, work is carried out on General Electric J-47's, Orendas, Goblins, and Ghosts, all turbojets, Reciprocating engines, mainly of British DH manufacture are also overhauled.

Two other interesting de Havilland projects area wheel/ski landing gear, now in production, and an amphibious float landing gear, the development of which has just been completed.

#### **Orenda Engines**

**O**RENDAL Engines Ltd., successor to the Gas Turbine Division of A. V. Roe Canada Ltd., is one of the two senior partners in the three-company operating group into which Hawker Siddeley interests in Canada have now been organized. Like Avro Aircraft Ltd., and Canadian Steel Improvement Ltd.—the other two partners in the group—Orenda Engines is a subsidiary of A. V. Roe Canada Ltd. Re-

organization of the engine firm, and the aircraft company, into separate entities, became official at the beginning of 1955.

Excitement is running high at Orenda Engines right now as the PS-13, "the big engine," advances in development. No official details on this powerful new turbojet have been released, but it is understood to incorporate a split compressor. The specification to which it has been designed reportedly calls for an output of approximately 18,000 lbs. st. th. (i.e., at least as powerful as anything projected anywhere in the world today). Weight has been estimated at 4,000 lbs., a target that, if attained in parallel with the thrust figure noted, will result in the very high thrust/weight ratio of better than 4.5:1. To help achieve such low weight, wide use is being made of titanium alloys.

The PS-13 was initiated about a year ago as a private venture, which it still is. The project is, however, being closely watched by the RCAF and undoubtedly, if the engine fulfils its promise, it will be adopted as the powerplant for the CF-105.

Up to now, more than 1,750 Orendas of all models have been produced. The current production models are the Orenda 11 for the CF-100 and the Orenda 14 for the F-86. Both these engines are rated at about 7,200 lbs. th.

Orenda Engines operates approxi-

mately 1,275,000 sq. ft. of plant area at Malton, where production facilities alone occupy 750,000 sq. ft., and at Nobel, Ont., on Georgian Bay, where a full scale test plant has been operated for several years for conducting aerodynamic and thermodynamic tests on engine main components.

Recently, a new gas turbine research laboratory was opened at Malton. Employing 100 engineers and technicians, the new \$500,000 facility incorporates a mechanical lab, a materials lab, an instrument lab, an aerodynamics lab, and a fuel systems lab.

Total employment at Orenda Engines is approximately 6,000.

#### **Aircraft Industries**

**A**IRCRAFT Industries of Canada Ltd. is situated 25 miles southeast of Montreal on the Municipal Airport at St. Johns, P.Q. Over 300 people are employed in this organization, primarily on overhaul & repair of aircraft for military and civilian operators, for which floor space totalling 85,000 sq. ft. is available.

The shops of AIC are completely set up in the specialized lines of sheet metal fabrication, radio and electrical, fabric, wood and paint, instruments, hydraulic, sandblasting, magnafluxing, magnaglo, cable swaging, and heat treating. These facilities, coupled with the services of an engineering department, fully equip the company to overhaul completely, convert or modify any type of aircraft to the customers' specifications and is one of the few shops in Canada where a "one stop" operation can be handled.

Repairs and complete overhauls of Canso, DC-3, and Harvard aircraft for the RCAF are currently in process. During the past year, commercial aircraft of all types have passed through its shops for conversion or overhaul. Several executive type airplanes have been processed for new interiors and complete exterior painting. The "hot spray" method has been most satisfactorily applied to the exterior finishes.

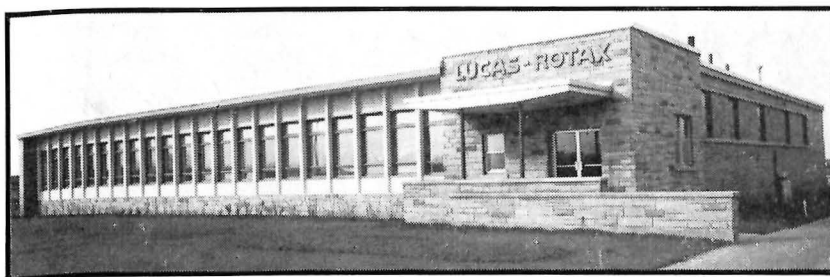
Salvage operations ranging from light airplanes to heavy twin-engined types, have been successfully completed in remote areas of the country.

#### **Aviation Electric**

**A**VIATION Electric Ltd. of Montreal probably has one of the most diversified line of activities in Canada's Aviation Industry, ranging from in-



**FUEL PUMPS** for Orenda engines are shown above being assembled at the Lucas-Rotax plant at Scarborough, Ont. Note fatigue-reducing arc-like arrangement of parts trays. Below is the Lucas-Rotax maintenance plant at Montreal.



strument manufacture through to repair & overhaul of wheel brakes.

During the past year, a variety of new test equipment and manufacturing machinery has been added to the company's existing facilities. Among these is the Bendix ultrasonic metal cleaner, the first of its type in Canada. A new electronic repair shop was completed during the year to handle all standard aircraft and communications equipment, including radio compasses.

Production shipments on Aviation Electric's line of aircraft instruments, most of them produced under license from Eclipse-Pioneer, continue to be made on schedule. The production list includes magnetic compasses, rate of climb indicators, accelerometers, etc. Production to AEL's original designs is also undertaken.

AEL is also responsible for co-ordination between Canadair, the RCAF, and Eclipse-Pioneer (who are represented in Canada by AEL) of the program in connection with the Eclipse-

Pioneer PB-20A Transistorized autopilot, which has been selected for use in the Canadair CL-28 MR Britannia.

Recently, the company's engineering staff has been supplemented by several additional engineers for work on instruments, hydraulic equipment and servo systems. Overall company employment is approximately 600.

On the west coast, an AEL subsidiary, Aviation Electric Pacific Ltd., operates an 8,000 sq. ft. plant at Vancouver International Airport, supplying Western Canada aviation concerns with sales & service and overhaul facilities for aircraft instruments and accessories.

The Montreal plant embraces more than 100,000 sq. ft. of space, including manufacturing, repair & overhaul, machine shop, design engineering, laboratory, and offices.

#### **Bristol Aero Engines**

**T**HE BRISTOL Aeroplane Co. of Canada Ltd. operates two aircraft engine overhaul & repair subsidiaries

in Canada, Bristol Aero Engines Ltd., and Bristol Aero Engines. (Western) Ltd. Bristol Aero Engines, by far the larger of the two companies, occupies a modern 150,000 sq. ft. plant in Montreal North which is entirely devoted to repair and overhaul work.

The main lines of activity taken by the 815 employees are the repair & overhaul of Rolls-Royce Merlin engines and powerplants for RCAF North Stars and Lancasters; Packard Merlins for RCAF Mustangs; Wright R-3350 Turbo Compound engines for TCA Super Constellations and RCAF Packets; Bristol Centaurus engines for RCN Hawker Sea Furies; Bristol Hercules engines for Bristol Freighters; Wright R-2600 engines for RCAF Mitchells and RCN Avengers.

Carburetion equipment for all the above engines is also overhauled in this plant.

The increased turnover of engines during the past year has resulted in the construction of additional testing facilities, including a new hangar cell, plus dynamometer installation. The new test cell is similar to the one officially opened a year ago, which is capable of handling engines up to 5,000 hp and is also adaptable for the testing of turbo-prop engines.

**Bristol Aero Engines (Western):** The associate company on the West Coast, Bristol Aero Engines (Western) Ltd., is a much smaller organization located on Vancouver International Airport, and employing approximately 80. It specializes in the repair & overhaul of a wide range of Wright and Pratt & Whitney reciprocating engines, as well as of propellers. Testing facilities are available for the most powerful reciprocating engines now in use in Canada, as well as for smaller types.

Work undertaken is devoted about 95% to military contracts and 5% to civil work.

#### **Canadian Aviation Electronics**

**A**LTHOUGH Canadian Aviation Electronics has plants and offices located across Canada, its activities in the aviation field are centred at Montreal, where nearly 65,000 sq. ft. of plant area are devoted to avionic work. Employment in this realm has almost doubled during the past year, having recently reached 300.

Major projects at CAE include repair, overhaul and modification of aviation and general electronic equipment of all

types, as well as the installation of radar defence circuits across the Canadian Arctic, fire control research, flight simulator work, communications installations in British Honduras and Indonesia.

Of paramount interest to the aviation industry, CAE has designed and is manufacturing the Curtiss-Wright Dehmel flight simulator for the CF-100/4. As Canadian licensee, CAE also produces in Canada, Sonotone sintered plate (nickel cadmium type) batteries, Lear L-5 and F-5 autopilots.

The company is sales representative for Ultra Electric's "Sarah", the recently developed homing device which is designed as a search & rescue aid.

### Canadian SKF

**B**EARING manufacture is a comparatively new and unpublicized industry in Canada and in fact, it was not until Canadian SKF Co. Ltd. established a production facility at Scarborough, Ont., near Toronto, that a Canadian source of supply came into being.

Although Canadian SKF—a subsidiary of SKF (Svenska Kullager Fabriken) of Sweden, whose name is synonymous with bearings—has been in existence as a sale & service organization since 1917, it was not until 1948 that it was decided to go into manufacturing. A factory was completed in 1950 and by mid-1951 deliveries of bearing had started.

About 35% of the effort expended at the 140,000 sq. ft. Scarborough plant is aimed at meeting orders in connection with Canada's aircraft engine program, for which bearings of both the ball and the roller varieties are made. Principal customers in this regard are Orenda Engines, Canadian Pratt & Whitney, Rolls-Royce and York Gears (the latter produces the Orenda gear box under sub-contract. Other production is on behalf of other components of the Canadian industrial machine.

### Canadian Steel Improvement

**J**UNIOR partner—in size, though not in importance—in the new A. V. Roe Canada Ltd. group of companies, is Canadian Steel Improvement Ltd.

Originally established in 1951 as a subsidiary of Steel Improvement & Forge Co. of Cleveland, Ohio, the Canadian firm was purchased in April of last year by the Hawker Siddeley Group, of which A. V. Roe Canada is a



**AT NORTHWEST Industries plant at Edmonton, repair and overhaul program on RCAF T-33AN Silver Stars is proceeding on a production basis.**

member. Later in the same year, CSI's assets were sold to A. V. Roe Canada and it thus became, along with Avro Aircraft Ltd. and Orenda Engines Ltd., a member of the A. V. Roe Canada Group.

CSI occupies a unique place in Canadian industry as the only complete Canadian producer of the most exacting forged components used in Canada today—blades, turbine and compressor, for Canadian-made turbojet engines. The bulk of production of these blades has been for Orendas and to a lesser degree, for Rolls-Royce of Canada. Since the beginning of operation in 1951, several million blades have been produced, in addition to which the company has also expanded into other fields calling for components in steel, high temperature alloys, aluminum, titanium and other non-ferrous alloys. Some 25 different designs of precision forgings of all types have been produced for Canadian industries.

Now nearing completion is a major expansion program which will effectively double the facilities of this organization. To the 60,000 sq. ft. plant in existence last year is being added a 73,000 sq. ft. foundry, with facilities for producing sand castings, pressure die castings and permanent mould castings in aluminum, and sand castings in magnesium. This foundry is scheduled for completion in August.

Of more immediate interest is the

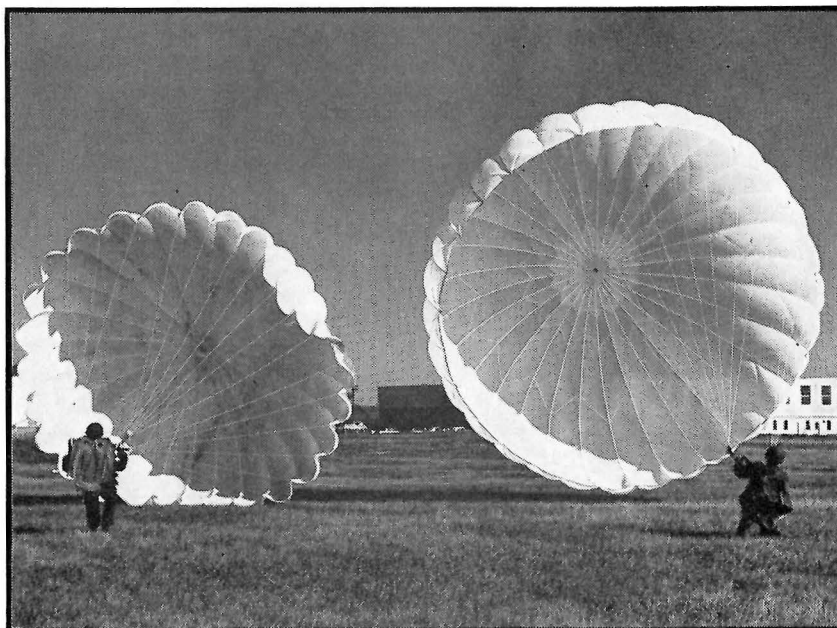
expansion of the office block, die shop and laboratory . . . now complete . . . and the extension to the forge plant, which will be completed next month. Range of forging equipment will be increased to include a ten-ton gravity drop hammer, as well as additional presses and hand forging facilities. Present forging equipment comprises Ceco air-drop hammers in the range of 1,500 to 3,000 lbs., and mechanical and hydraulic presses from 250 ton to 5,000 ton capacity.

With the new additions, CSI is now in a position to undertake large forgings in high-strength aluminum alloys and titanium for the aircraft industry.

### Dowty of Canada

**P**RODUCTION of CF-100 undercarriage and hydraulic components (about 60 different units in all), and the repair & overhaul of similar parts for a wide variety of Canadian aircraft, continue to be the main plant activities at Dowty Equipment of Canada Ltd., Ajax, Ont. However two outstanding projects of another sort, which are now well in hand—development of the main undercarriage for the CF-105, and the construction of an undercarriage drop test rig capable of catering for aircraft weights of up to 175,000 lbs.—are of particular interest.

Little can be said about the CF-105 undercarriage, except that each leg incorporates dual wheels arranged in tan-



**NEW PARACHUTE, the T-10, is shown at right. The T-10, which replaces the T-7 (left) in Canadian Army usage, is made by Irvin Air Chute of Canada.**

dem and is designed so that the bogie swivels as the gear retracts. It exists so far only in the form of a scale working model.

The drop test rig is now very close to completion, being housed in an extension to the company's South Plant. When complete, the rig will be able to simulate all types of forces encountered by an aircraft undercarriage during landing, including side loads imposed as a result of drift caused by crosswinds. The sudden acceleration applied to the stationary wheels of an aircraft when they first touch the runway, will be simulated by spinning the wheels of the undercarriage under test up to the appropriate rpm, just prior to making the drop. This rig is the only one of comparable size in existence in Canada.

In all, Dowty of Canada now occupies about 86,000 sq. ft. of plant and office space at Ajax, comprising two plants. The work force now stands at just over 400, which is about 50 greater than a year ago.

Most of the effort put forth at Dowty is in the production and development, phase, which represents about 80% of the total volume of business; a further 15% is made up by repair & overhaul activities, while the remaining 5% results from sales representation.

#### **Fairey of Canada**

**D**URING recent months, a new plant was opened on Patricia Bay Airport, near Victoria, B.C., by The

Fairey Aviation Co. of Canada Ltd., and like the main Fairey of Canada plant at Eastern Passage, N.S., this one will concentrate primarily on repair & overhaul and modification & conversion work for the RCN and the RCAF, as well as commercial operators. For the present, the West Coast establishment consists of a single ex-Air Force hangar and the staff is currently under organization.

The Eastern Passage plant now comprises 220,000 sq. ft. in which some 850 personnel are employed on the conversion of RCAF Lancasters to the latest MR specs, repair & overhaul of Sea Furies and Avengers for the RCN, and continued development of the Avenger as an anti-submarine aircraft for the RCN. In this regard, the latest version of the A/S Avenger recently made its initial flight.

Fairey will also be responsible for the repair & overhaul of the RCN's new Banshees and the RCAF's new Nep-tunes, when they come into service.

These repair & overhaul activities comprise about 75% of this company's business, but a highly important 15% is made up by the manufacture of Fairey Hydro Boosters, a system of aircraft power controls which is used on the CF-100 as well as some 20 other different types of aircraft in Britain and elsewhere. Work on these hydraulic control boost units is carried out in a machine shop which is entirely separate from the main machine shop.

The latter, said to be the most modern and best equipped machine shop in the Maritimes, is occupied chiefly with the manufacture of modification kits and aircraft spares and is equipped to perform all machining operations.

#### **Field Aviation**

**A**N ASSOCIATE company of Photographic Survey Corp. Ltd., Field Aviation Co. Ltd. carries out an extensive repair & overhaul business on behalf of both military and civilian customers, each of which is responsible for about 50% of this trade.

The military side involves the provision of routine servicing and maintenance for RCAF piston engine type aircraft from Trenton. The civil customers are mostly executive aircraft owners, plus Field's associate company, Kenting Aviation Ltd., which operates a considerable number of large aircraft in wide variety.

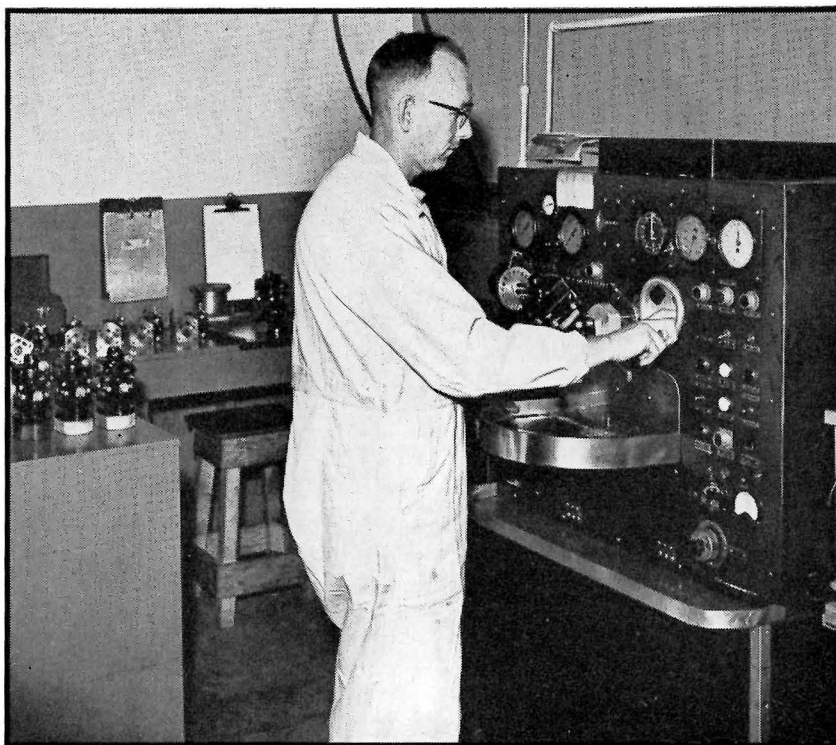
Ten different departments for machine work, tube bending, hydraulics, electrical, sheet metal, radio, paint & fabric, helicopter overhaul, instrument, and engineering & design, enable Field to offer a complete range of services. A subsidiary company at Calgary also offers repair & overhaul services to western operators and has DoT approval for all aircraft up to 30,000 lbs.

Located at the Municipal Airport at Oshawa, Ont., Field has about 35,000 sq. ft. of plant space and currently employs 190, down about 40 since this time last year.

#### **Fleet Manufacturing**

**T**HE SLOWING down of production lines at Canadair and Avro Aircraft is reflected in a reduced level of activity at Fleet Manufacturing Ltd., Fort Erie, Ont., though an extensive sub-contract program is still under way, with manufacturing work in progress for a number of Canadian prime contractors.

This work includes CF-100/4 components for Avro Aircraft, and components for the CS2F-1 aircraft being built at de Havilland. Much of the activity at Fleet now involves projects of a classified nature, but mention may be made of the Helio Courier and the Doman LZ-5, the former being manufactured for the sale by both Fleet and also by Helio Aircraft Corporation of Norwood, Mass. Six Couriers have been built—five for shipment to the U.S. The sixth is being kept in Canada



**PROPELLER** Governor test bench is shown at Western Propeller of Edmonton, which has one of the most modern plants in Canada for propeller work.

as a demonstrator and at last report was awaiting its C of A.

The LZ-5 is being manufactured under sub-contract to the Canadian licensee for this helicopter, Doman-Fleet Helicopters Ltd., which is a jointly-owned subsidiary of Fleet Manufacturing and of Doman Helicopters Inc., of Danbury, Conn. Flight of the first LZ-5 to be built in Canada is not due until April.

During 1954, Fleet completed its sub-contracts with Canadair, which have for the past several years formed a substantial part of the Fort Erie company's business.

A significant step taken during the past year was the completion of negotiations with the Canadian Government to purchase nearly half a million dollars worth of machine tools and equipment which had earlier been loaned to the company to carry out defence work.

Other contracts in progress involve the manufacture of aircraft tooling and research & development on a new ground power unit.

#### **Jarry Hydraulics**

**J**ARRY Hydraulics has been active in the manufacture of aircraft hydraulic components for the Canadian Industry for a number of years, but it was only slightly over a year ago that this firm, which is a division of Jarry Automobile

Ltd., of Montreal, set up its own engineering department to engage in design activities in this precise and demanding field. Since the formation of this new department, the company has been actively engaged in work for the whole Canadian Aircraft Industry.

Work now under way is as follows:

Production of the nose landing gear for the Canadair F-86, together with accumulators, compensators, actuators, locks, valves, etc., for this aircraft continues to be a major portion of Jarry's output. Both main and nose landing gears for the Canadair T-33 are being manufactured for spares.

Hydraulic test cylinders for Canadair's new structural test laboratory have been designed and built by Jarry. In preparation for the manufacture of the complete landing gear for the Canadair CL-28 Britannia, for which Jarry has been awarded a contract, work has been proceeding to convert the British drawings to North American standards. Many new units have to be designed specifically for this aircraft, and Jarry is submitting proposals on them.

For Avro Aircraft's new CF-105, Jarry has contracted to undertake the design, development, and manufacture of the nose landing gear, complete with steering system. Various other

units have already been designed and delivered to Avro, while more are being made.

Much of the hydraulic equipment in the Beaver and the Otter is in production for de Havilland by Jarry, including flap actuators and tail wheel struts. Recently, an oleo-pneumatic tail strut for the Otter was designed and built to replace the old strut, which utilized rubber blocks for shock absorption. This unit is now a standard fitment to production Otters, and is fully approved by both the RCAF and the DoT.

Jarry's contributions to the CS2F-1 program include the manufacture of the main landing gear, deliveries of which will commence late this summer to the prime contractor, de Havilland. On behalf of Canadian Car & Foundry, Jarry is producing various hydraulic units for the CS2F-1 wing, which CanCar is building at its Lakehead plant.

#### **Lucas-Rotax**

**O**VER 1,000 designers, engineers and manufacturing staff are now employed by Lucas-Rotax Ltd., manufacturers of fuel control, electrical systems, and hydraulics. Located in Scarborough, near Toronto, Lucas-Rotax has manufacturing floor space of 120,000 sq. ft., which is devoted to the design, development and manufacture of such components as the complete fuel control system for the Orenda and the Rolls-Royce Nene, electrical starters for the Nene, and many other fuel control and electrical parts for the Canadian Aircraft Industry.

Additional facilities are available in Montreal in the form of a 12,000 sq. ft. overhaul and maintenance plant at Dorval Airport. This plant is fully equipped for servicing fuel and electrical components.

One of the main production items at the Scarborough plant is the "C" size fuel pump, a major component of the Orenda fuel control system. A similar model of this pump is used on the Rolls-Royce Darts powering the Vickers Viscount.

For its weight and size, the "C" size pump is said to be capable of handling an extraordinarily high flow output and pressure. Other distinguishing features of this pump are: high volumetric efficiency at both high and low speeds, variable delivery, extreme sensitivity of delivery control and rapid

response to servo controls.

One of several new electrical components that have recently been developed by Lucas-Rotax is an alternator control & transformer control & transformer rectifier unit in one package. Apart from saving both weight and space, this arrangement enables cooling air to be ducted into one assembly instead of two separate units.

Designed to comply with MIL specifications, a typical unit may control an alternator of 20-30 KVA capacity to give an output voltage within plus or minus 2½% under any conditions of loading or environment, and also provide a controlled DC output of 3-6 KW. This is accomplished by means of static regulators and without the use of carbon piles.

#### MacDonald Bros. Aircraft

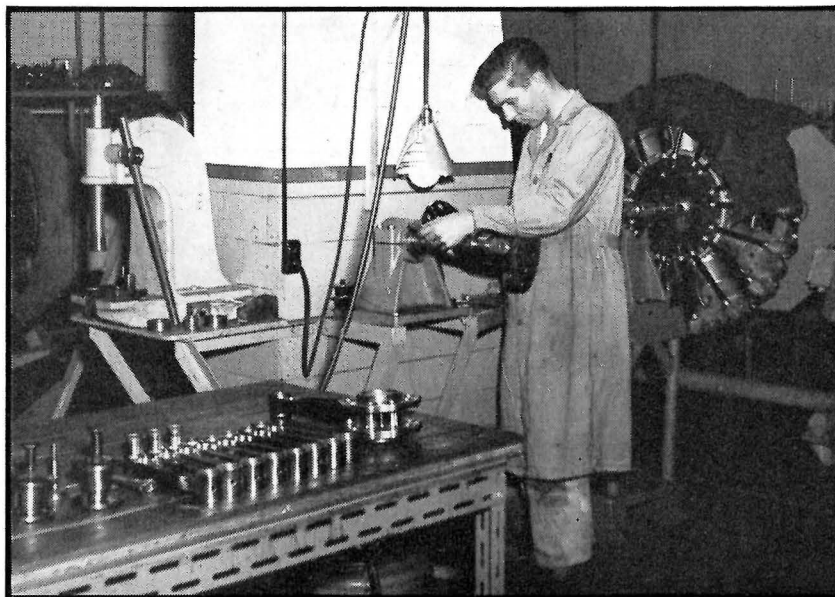
**A**T THE MIDDLE of 1954, MacDonald Bros. Aircraft Ltd. was acquired by the Bristol Aeroplane Company, a step that is expected to result in a considerable broadening of the scope of activities engaged in by this Winnipeg firm, which continues to operate under the MacDonald Bros. name.

Work for the past several years has been split almost evenly between manufacturing operations and repair & overhaul & modification.

In the latter line, during the past year the Expeditor and Mustang conversion programs have come to an end, though a similar program has been initiated in connection with RCAF Mitchells. A major modification program entails the conversion of all RCAF Mk. 3 CF-100's into dual control trainers. Fifty aircraft are involved. Repair & overhaul work is also still carried out on Expeditors, hundreds of which are in service in Western Canada, mainly at Winnipeg.

Manufacturing operations include the fabrication of Orenda "hot end" welded stainless steel components under sub-contract to Orenda Engines Ltd.; manufacture under license from Edo Corporation of Edo floats . . . a long-standing and thriving business; manufacture under license of parts for B-25 Mitchells and F-51 Mustangs.

About 95% of the activity at MacDonald Bros. is connected with military aviation. Current employment is just over 1,000, down slightly from a year ago. Total plant area at the disposal of the company takes in some 330,000 sq. ft.



**TYPICAL OF** number of small but efficient engine overhaul shops spotted across Canada is that operated by Aero Engineering Limited at Edmonton.

#### Northwest Industries

**O**NE OF THE biggest repair & overhaul plants in Canada is that operated at Edmonton by Northwest Industries Ltd., where over 600 personnel are engaged in work on RCAF T-33A's, C-119 Packets, C-47 Dakotas, and Harvards.

Work has been in process on programs for the repair, overhaul and modification of the latter three types for several years, but the T-33 program has been under way for only slightly over a year.

Bulk of Northwest Industries business is in connection with meeting military commitments, but a small amount of civil work is also carried out.

Facilities available are extensive and embrace about 272,000 sq. ft. of plant area, comprising three large hangars. The various shops and departments include a complete electronics department, instrument department, fabric shop, hydraulics, lines, cables and accessories department doing specialized work, a powerplant build-up, sheet metal shop, assembly shop carrying out the normal functions of overhaul and repair.

The company's modern instrument laboratory repairs all common types of flight instruments including magnetic compasses, altimeters, voltmeters, ammeters, pressure and suction gauges, artificial horizons, airspeed indicators, thermometers and temperature gauges, tachometers, rate of climb indicators, clocks and watches, directional gyros,

fuel gauges, and tanks units. Capacity is over 800 units a month.

#### Phoenix Engineered Products

**L**OCATED in Toronto, Phoenix Engineered Products Ltd. employs 300 personnel in a modern 71,000 sq. ft. plant specializing in the repair & overhaul of aircraft instruments and electronic apparatus.

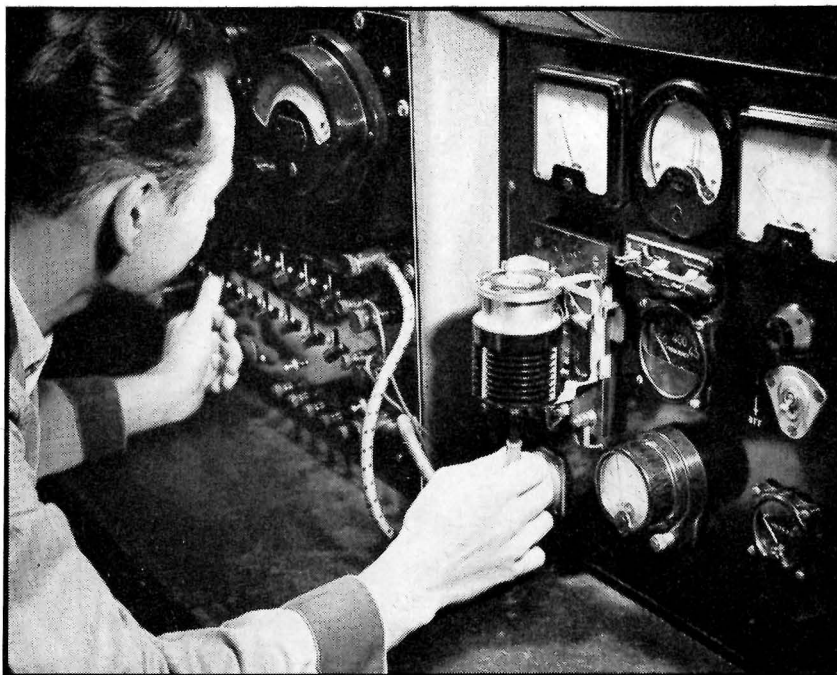
The plant is equipped and staffed to handle the overhaul of such units as airspeed indicators, Mach indicators, rate of climb indicators, artificial horizons, turn & bank indicators, automatic pilots, gyro gun sights and bomb sights, link apparatus, oxygen apparatus, electronic gyro pilots, boost gauges and other pressure instruments.

Associate companies specialize in the development and manufacture of such fuel apparatus as immersion pumps, fuel pumps, etc. A recent development for jet aircraft involves a pump capable of handling 8,000 gallons per hour of aviation kerosene at any altitude.

#### PSC Applied Research

**I**N THE NEWS recently as the developer of the RCAF's new R Theta Navigation Computer, PSC Applied Research Ltd. (an associated of Photographic Survey Corp.) actually has several other equally significant, but less-publicized, aviation developments to its credit.

Among these is an automatic icing detection & shedding control system, used on the CF-100 in conjunction with the Goodyear/NRC thermal anti-icing



**TECHNICIAN** checks Eclipse-Pioneer carbon pile voltage regulator on test stand in electrical overhaul shop at Aviation Electric in Montreal.

system with which the Avro all-weather fighter is fitted.

This growing company has 27,000 sq. ft. of plant area in Toronto and 250 employees engaged in development, engineering, production, and repair & overhaul on electronic, electro-mechanical, and optical equipment as follows: Aircraft Instrumentation — (1) automatic icing detection & shedding control system, (2) Type T-249 control intervalometer, (3) Type T-243 high speed air position indicator system, (4) R Theta navigation computer, (5) Type T-232 Mk. 6 instrumentation camera, (6) specialized armament controls, (7) specialized timing controls, (8) test equipment for any of the foregoing.

Other projects involve such survey equipment as the airborne profile recorder, airborne electromagnetic survey system, airborne radiation detector, Type T-232 positioning camera, automatic tri-film processor, and specialized plotting equipment.

Most of PSC Applied Research's work is in the manufacturing line, but about 20% is devoted to research & development, and another 5% to repair & overhaul.

#### **Sperry of Canada**

**O**NE OF THE main sources of supply of Canadian-built aviation instruments is Sperry Gyroscope Co. of Canada Ltd., which operates a 90,000

sq. ft. manufacturing plant just outside Montreal. A subsidiary, Sperry Gyroscope Ottawa Ltd., has an additional 30,000 sq. ft. in Ottawa where instrument repair & overhaul work is performed. Some 750 persons are employed on the Montreal operation, while another 250 work in Ottawa.

Sperry is the sole representative in Canada for Sperry Gyroscope Co., Great Neck, N.Y.; the Sperry Gyroscope Co. Ltd., of England; Kollsman Instrument Corp., New York. Among the products handled are Sperry aircraft instruments, engine analyzers, gyrosyn repeating compasses, automatic pilots and controls, Kollsman speed and altitude indicating instruments, tachometer indicators and other pressure sensitive and indicating devices.

Besides the manufacture of standard Sperry and Kollsman aircraft and marine equipment at Montreal, the company is engaged in engineering development work for the Government. Manufacture of parts requiring a high degree of accuracy, precision and adherence to close tolerances is also being conducted under sub-contract.

#### **Standard Aero Engine**

**S**TANDARD AERO Engine Ltd. of Winnipeg is engaged in overhauling aircraft engines and accessories for the RCAF, and in addition has a steadily expanding volume of work for commercial operators from coast to

coast. To keep abreast of the requirements, additional floor space has been added and new test equipment acquired to meet the demands of turbojet aircraft.

Established in 1937, the company employs 175 in two buildings covering more than 45,000 sq. ft. For the RCAF, Standard Aero is engaged in the overhaul of Gipsy, Continental and Pratt & Whitney engines, in addition to more than 200 types of accessories. For commercial and private operators, it overhauls Continental, Franklin, Lycoming, Jacobs, etc., all types which it is fully equipped to handle and with which it has long experience.

A new annex to the main hangar is nearing completion where complete facilities and new test equipment will be set up for the overhaul and testing of jet fuel control for the CF-100 and the F-86.

Standard Aero is the recognized distributor for Western Canada of Continental, Franklin, Lycoming, and Jacobs engine parts, Stromberg carburetors, Bendix landing gear, Scintilla and Eclipse-Pioneer parts and Champion spark plugs. A large and diversified stock of aircraft and accessory parts is carried at Winnipeg and at the company's branch offices at Vancouver and Edmonton.

Standard was recently appointed exclusive Canadian distributor for United Manufacturing Co. aircraft testing equipment, and as sales & service representative for New York Air Brake Co.'s Stratopower pumps.

#### **Thompson Products**

**B**ECAUSE most of the effort at the St. Catharines, Ont., plant of Thompson Products Ltd. is directed towards the production of aluminum compressor blades for U.S.-built turbojets, it is not generally realized how extensive in scope are the aviation activities of this company.

Several hundred persons are at work in the 150,000 sq. ft. plant forging aluminum blades for use in Wright J-65 Sapphires. All Thompson Products production of these blades, incidentally, is directed to the Oldsmobile division of G.M., which produces Sapphires for the USAF under sub-contract from Wright Aeronautical (which holds the U.S. license from Armstrong Siddeley).

Late last year, Thompson Products stamped out its millionth blade since the first one was produced in February

of 1953.

Besides blades, the St. Catharines firm produces other components for Orenda Engines and for Rolls-Royce of Canada. For Canadian Pratt & Whitney, engine valves are produced.

### York Gears

**W**ITH OUTPUT in many phases of Canada's aircraft production program now past the peak, the demands on the services of York Gears Ltd. of Toronto have slackened considerably, with the consequence that the work force is now 400, down about 40% from a year ago.

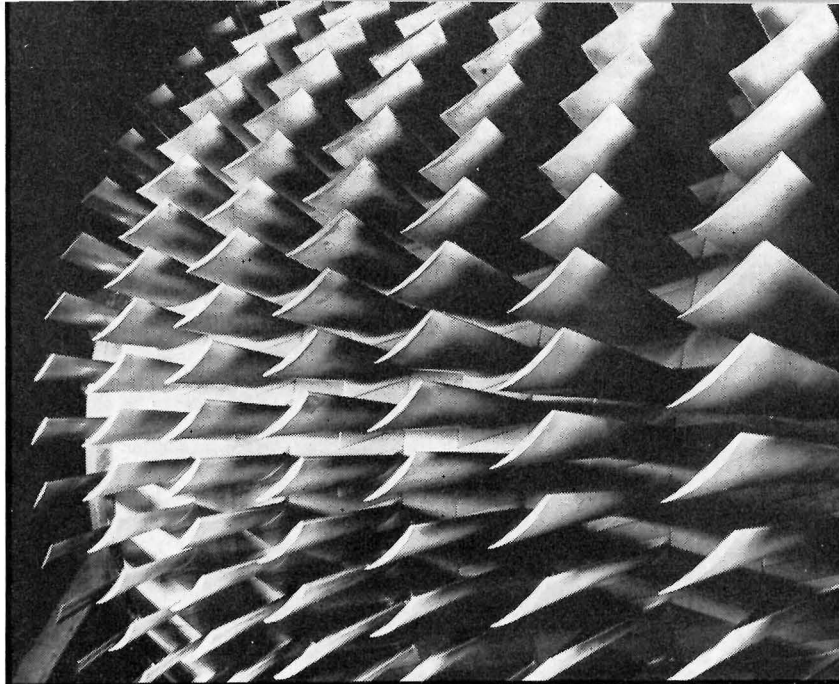
However, some 100,000 sq. ft. of plant is devoted to production and repair & overhaul services on behalf of aviation companies. Production includes complete gear boxes for Orenda engines and for CF-100 and F-86 aircraft, as well as overhaul & repair of these units.

Gears and miscellaneous parts and assemblies are made under sub-contract to Canadian P & W, Canadair, de Havilland, Fleet Manufacturing, Orenda Engines, Avro Aircraft, and Rolls-Royce of Canada.

### Other Companies

•**Aero Engineering Ltd.:** Located at Edmonton Municipal Airport, Aero Engineering employs 22, mainly on repair & overhaul of civil aircraft. Operations are carried out from two hangars: one of 19,200 sq. ft. is used for storage and servicing of commercial and executive aircraft up to DC-3 class; the other hangar is 29,020 sq. ft. in area and is used for repair & overhaul of aircraft up to 8,000 lbs., engines up to 600 h.p., and various accessories. The engine shop has been expanded recently to include overhauls of Franklin helicopter, and P & W R-985 and R-1340 engines.

•**Aircraft Appliances & Equipment Ltd.:** At present occupying 6,000 sq. ft. of plant space in Toronto, AAE plans soon to erect a new 20,000 sq. ft. building which will have provision for complete testing facilities for AC systems up to 120 KVA. For the past six years this company has been engaged in the repair & overhaul of generators, starters, inverters, control panels, actuators, relays, etc., mainly on behalf of military aviation. The company is Canadian distributor for Jack & Heintz Inc. and Hartman Electrical Mfg. Co. A similar arrangement has also recently been reached with Strong Electric Corp., covering the sale and repair & overhaul of this firm's searchlights. Manufacturing activity, which comprises about 25% of AAE's business, has involved the production of AAE's own designs of inverter test stands, phase indicators, breakdown testers and electrical power cars.



**ORENDA** compressor blades represent combined effort of several firms.

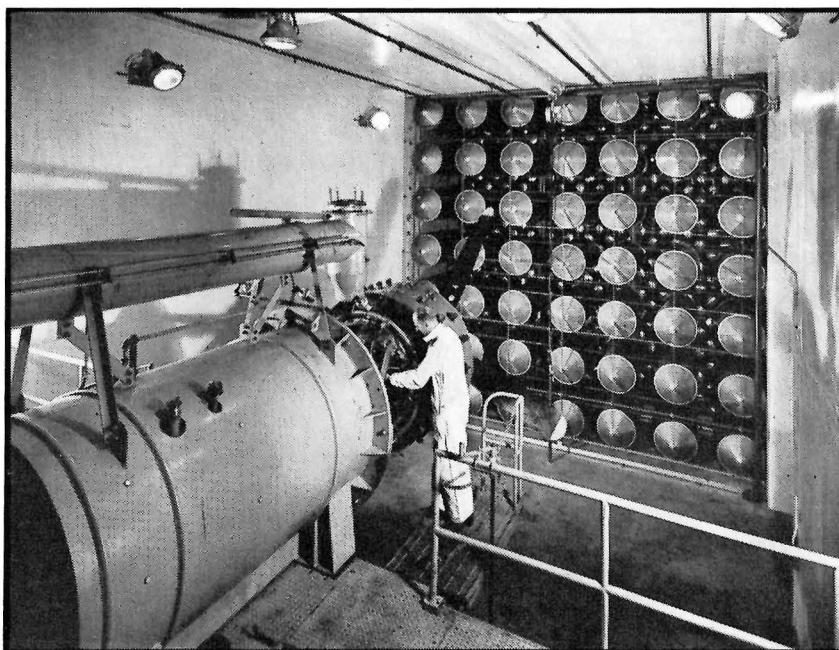
•**Aircraft Overhaul & Repairs Ltd.:** AOR specializes in repair & overhaul services for bush operators, offering one-stop service for change-over, repairs, and engine work, both minor and major. A considerable stock of parts, spares and materials is carried at the Lac a la Tortue, P.Q., base, which boasts a 3,500 ft. landing strip as well as full water facilities for seaplane handling. Two hangars are utilized and 14 personnel employed.

•**Arcan Corp. Ltd.:** This company was formerly known as Cub Aircraft Co. and is located in Hamilton, Ont., where it has 7,000 sq. ft. of plant space. Some 25 employees are engaged in the manufacture of front frames, struts, and torque tubes for the de Havilland Beaver, and tooling for the CS2F-1 program at DHC and CanCar.

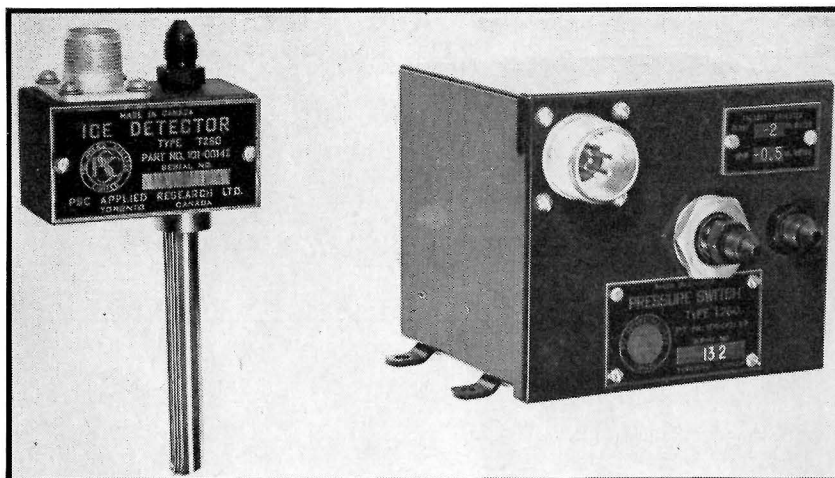
•**Aro Equipment of Canada Ltd.:** Now occupying a new plant in Toronto, of which 2,000 sq. ft. are devoted to aviation activities, including the sales, service and overhaul of aircraft oxygen regulator systems. Plans call for the production of these systems in Canada. At present, ten people are employed on Aro's aviation program.

•**Avionics Ltd.:** Located at Niagara-on-the-Lake, Ont., Avionics is a subsidiary of Genair Ltd., and has a 10,000 sq. ft. plant and a staff of 25 specializing in the production of printed wire circuits and miniaturization of components and in this respect are playing a part in Canada's guided missile program. Work also includes the repair of aircraft radio and radio installations.

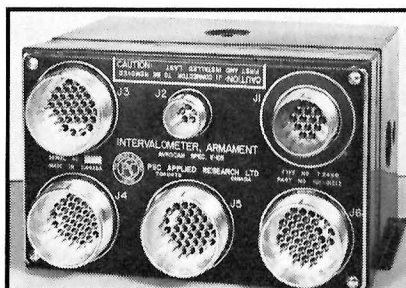
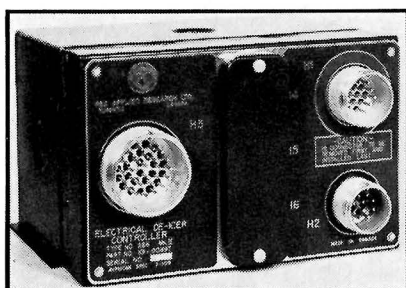
•**Aluminum Co. of Canada Ltd.:** A large part of Alcan's production is on behalf of



**THIS MODERN** engine test cell is operated by Bristol Aero Engines Ltd.



In production at PSC Applied Research is the first fully automatic Ice Detection & Shedding Control system. Parts of this system include the ice detector (upper left), the sensitive pressure switch (upper right) & the shedding area controller (lower left). At lower right is another Applied Research product, the rocket armament control intervalometer.



Canada's aircraft production program. At the firm's Kingston works, the extensive sheet rolling mills produce large quantities of high strength alloy sheet, while forging facilities at the same plant turn out such parts as compressor blades. At Arvida, P.Q., extrusion presses push out bar and forging stock; at Etobicoke, Ont., magnesium and aluminum die, sand and permanent mould castings are made for the industry.

•**Astrolante Instruments Ltd.:** This firm does repair & overhaul and recalibration of aircraft instruments, activities which represent some 90% of its aviation business. Located in the Toronto suburb of Weston, Astrolante has 1,000 sq. ft. of space and a staff of four.

•**Bata Engineering:** A division of Bata Shoe Co. of Canada Ltd., Batawa, Ont., this company specializes in the manufacture of precision machine parts. The main customer for its services is Dowty Equipment of Canada, for whom Bata carries out all machining operations on the forgings for the CF-100 undercarriage assembly. Production of hydraulic components for other equipment is also carried out, as is the manufacture of individual items for a number of the major aircraft companies. Employment in the 35,000 sq. ft. shop has dropped from 210 to 80 in the past year.

•**B.C. Propeller Co. Ltd.:** Based at Vancouver International Airport, this company has three employees and 1,500 sq. ft. of shop performing a complete repair & overhaul service for all makes of aircraft propellers.

•**Bendix-Eclipse of Canada Ltd.:** This company's newly-formed Aviation Products Division is based at Toronto. At present the new Division lacks operating facilities, but within a short time plans to go into production on a number of Bendix aviation products.

•**Canadian Marconi Co.:** The Aviation Dept. of Canadian Marconi, located in Montreal, offers repair & overhaul and manufacturing facilities to meet the aviation radio requirements of Canadian military and civil operators. With the idea of building up a line of Canadian-produced aviation products, Canadian Marconi is proceeding on the development of a number of projects, including a new lightweight radio compass with full air line performance. Another interesting project is an HF transmitter-receiver of medium power, 50 watts or more, with a limited number of channels, for use in smaller types of aircraft where multi-channel equipment is not required and weight is of primary importance. Study of aeronautical audio problems has produced the first model of a noise-cancelling microphone with built-in transistorized amplifier making it a direct replacement for the standard carbon microphone, but with far superior performance.

•**Cannon Electric Canada Ltd.:** This Toronto firm employs over 100 persons in a 19,000 sq. ft. plant engaged in the manufacture of patented electrical connectors for aircraft use. Some 90% of this production is to meet military requirements.

#### •Curtiss-Reid Manufacturing Co. Ltd.:

This firm is an associate of Curtiss-Reid Flying Service, with which it shares accommodation at Cartierville Airport, near Montreal. Until recently, it had been an active sub-contractor to Canadair, manufacturing and repairing such C-47 and C-54 components as fuel tanks, oil tanks, ailerons, elevators and rudders, etc., as well as producing small welded aluminum sub-assemblies for F-86's. Of interest is a project now in hand involving the assembly, in co-operation with Noorduyt Norseman Aircraft Ltd., of two completely new Norseman V's for spring delivery. As a result of the tapering off of the Canadair work, employment at Curtiss-Reid Mfg. is now down to 20.

•**Crystal Glass & Plastics Ltd.:** This Toronto firm has a modern, well-equipped plant, 12,000 sq. ft. of which are devoted to production for the aviation market. Some 25 persons are engaged in the fabrication of plastic components for aircraft. These include all types made from Plexiglass (cockpit canopies, etc.), as well as units of Fiberglass reinforced material and phenolic Bakelite materials.

•**Canadian Flight Equipment Ltd.:** Head office and main plant of this firm is located at Cobourg, Ont., but an additional plant is also operated at Campbellford, Ont. A total of about 20,000 sq. ft. of plant area is utilized and employment is now 80, double what it was last year. Now that production of the Martin-Baker Patent Automatic Ejector seat for the CF-100-4 is in full swing, Canadian Flight Equipment is entering the non-ejection military aircraft seat field, and also the commercial aircraft seat field. Manufacture of these seats will follow along similar lines to those for ejection seat production.

•**Chatco Steel Products Ltd.:** One of Avro Aircraft's major sub-contractors, Chatco is located at Tilbury, Ont., and employs about 200 on the fabrication of CF-100/4 rear centre fuselage sections, rear fuselage sections, upper fin and rudder, lower rudder, and elevators.

•**Cockshutt Aircraft Ltd.:** Main activity in this 107,000 sq. ft. plant at Renfrew, Ont., is the development, manufacture and repair of jet engine combustion systems, though a considerable volume of other aircraft work entailing similar manufacturing processes and skills is also put through the shops. About 280 are currently employed, down 50 from last year. Within recent weeks the plant, which was owned by the Canadian Government and operated by Cockshutt Aircraft (a subsidiary of Cockshutt Farm Equipment Ltd.), was sold to the Scottish firm of Aluminum Castings Co., which made the purchase on behalf of its subsidiary, Burnley Aircraft Products Ltd. A Canadian subsidiary is to be formed to take over the operation of the Cockshutt Aircraft business, probably by the end of this month.

•**Collins Radio Company of Canada Ltd.:** This well-known producer of communications equipment for the aviation and other fields, is currently in the process of establishing a manufacturing facility at Toronto.

### •Computing Devices of Canada Ltd.:

This Ottawa company has 20,000 sq. ft. of plant area and 100 employees engaged in work for the aviation market. Present activity involves research, development, and manufacture of specialized devices in the fields of aircraft navigation, simulation, and instrumentation. This equipment makes use of electronics and precision mechanical techniques, much of which is of a classified nature. Of these new devices, the company's position & homing indicator (PHI), now in production, is expected to be released for commercial use in the near future. Computing Devices also provides a data reduction and computation service. Data in the form of records or charts may be reduced to printed form, replotted or converted to tape or punched cards for computer use. Analogue and digital computers are available for the solution of customers' problems. In addition, Computing Devices offers sales & service of analogue and digital computers, data reduction devices, electronic instruments and components.

•CPAL (Repairs) Ltd.: This organization, a subsidiary of Canadian Pacific Air Lines, is engaged in the operation of the RCAF's Western Repair Depot. The firm's work entails the inspection, maintenance and repair of over 16 types of RCAF aircraft, including single and multi-engined types, flying boats, helicopters, and jets. In addition, certain special design projects for aircraft and ground equipment are carried out for Air Materiel Command. Extensive repair and salvage work is also carried out by the firm's Mobile Repair crews working out of Calgary. The Repair Depot, which is located on Currie Field, Calgary, has facilities which cover an area of over 120,000 sq. ft. and include radio, instrument, fabric, hydraulic, safety equipment, engine, airframe, sheet metal, and paint sections. The work force now numbers about 500.

•Doman-Fleet Helicopters Ltd.: This firm is Canadian licensee for the Doman LZ-5 helicopter and is a jointly-owned subsidiary of Doman Helicopters Inc. and Fleet Manufacturing Ltd. It has no production facilities of its own, but has contracted the job of building Canadian LZ-5's to Fleet Manufacturing.

•Dominion Magnesium Ltd.: Domal and its associate company, Light Alloys Ltd., claim to be Canada's largest suppliers of magnesium extruded sections and castings for the aircraft industry. Domal, which is located at Haley, Ont., produces extrusions in a range of alloys that includes all the standard magnesium alloys as well as the latest high strength zirconium and thorium alloys. Light Alloys, which has a plant at Renfrew, Ont., turns out a variety of magnesium and aluminum castings, and in this respect has been a major contributor to the success of the Orenda program.

•Enheat Aircraft: A division of Enamel & Heating Products Ltd. of Amherst, N.S., this firm reports increased activity which has resulted in the Enheat Aircraft Division's staff rising to 230 from 140 a year ago. Some 120,000 sq. ft. of plant is devoted to

## Aviation Exports from Canada: 1953 and 1954

(Does not include Mutual Aid shipments)

COUNTRY	AIRCRAFT		AIRCRAFT PARTS	
	1953—12 Mos. No. Value	1954—12 Mos. No. Value	1953 12 Mos.	1954— 12 Mos.
United States	341—\$23,609,243	221—\$11,222,578	\$12,906,162	\$13,900,336
Alaska	4— 147,232		2,894	2,015
United Kingdom	2— 90,141		1,518,453	674,596
Union of South Africa		1— 40,933	56,838	96,366
India			121,735	123,203
Pakistan	3— 112,977		44,811	11,575
Morocco			268	206,967
Mexico		3— 44,165	150	400
Ecuador	5— 42,975			
Norway		6— 667,701	22,663	153,271
French East Indies	2— 62,180	1— 35,446	4,811	4,984
Australia		4— 136,936	8,683	34,443
New Zealand	2— 60,628	3— 74,949	9,201	15,392
Arabia		2— 78,588	8,828	1,656
Brazil			166,943	158,299
Colombia	9— 327,960	4— 157,410	54,031	36,987
Japan	4— 137,955		36,904	
Other Countries	2— 54,860	7— 142,484	636,981	420,568
<b>TOTAL, All Countries</b>	<b>374—\$24,646,151</b>	<b>252—\$12,601,190</b>	<b>\$15,600,356</b>	<b>\$15,841,058</b>
<b>RE-EXPORTS*</b>	<b>18—\$ 313,559</b>	<b>13—\$ 979,820</b>	<b>\$ 4,825,410</b>	<b>\$ 3,309,303</b>
			<b>1953</b>	<b>1954</b>
<b>TOTAL EXPORTS, Aircraft and Parts</b>			<b>\$40,246,507</b>	<b>\$28,442,248</b>
<b>TOTAL RE-EXPORTS*, Aircraft and Parts</b>			<b>5,138,969</b>	<b>4,289,123</b>
<b>TOTAL, All aviation exports</b>			<b>\$45,385,476</b>	<b>\$32,731,371</b>

\*Re-exports concern foreign-made products which have, been imported to Canada and then, during the period under review, exported again.

aircraft component repair & overhaul and manufacturing work. Enheat is a major sub-contractor to de Havilland, being responsible for the production of CS2F-1 empennages. Other current work includes the production and/or repair & overhaul of Lancaster spares. Among the new equipment recently added to the plant is a stretch wrap former; a 10 ft. - 300 ton stretch press; a Cleerman Model 18/30 jig borer.

•Found Bros. Aviation Ltd.: Now engaged mainly in the manufacture of heat measuring devices (temperature bulbs, etc.), this company has 5,000 sq. ft. of plant space at Toronto's Malton Airport.

•Garrett Manufacturing Corp. of Canada Ltd.: Successor to Aero Sales Engineering Ltd., and now a subsidiary of The Garrett Corp. of Los Angeles, Calif., Garrett of Canada has recently moved from Ottawa to Toronto where it has set up test and overhaul facilities for the parent company's line of ancillary aircraft equipment and accessories, including heat exchangers, electrical actuators, auxiliary gas turbines, cabin pressurization equipment, refrigeration equipment, etc.

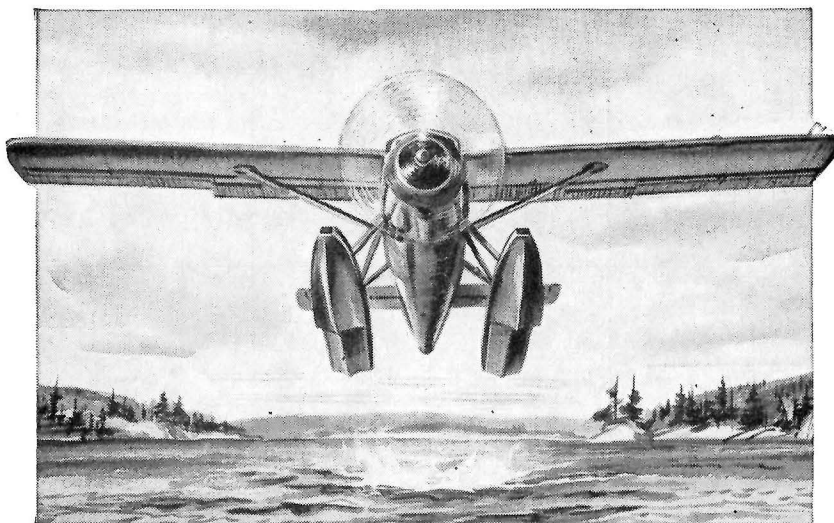
•Genaire Ltd.: This company has facilities at both Malton and St. Catharines, Ont. At St. Catharines, Genaire has a 26,000 sq. ft. hangar where repair, overhaul and conversion of RCAF airframe components and armament equipment is carried out. Such training aids as cutaway engines are also produced. At Malton, a 48,000 sq. ft. hangar is used for the storage and servicing of commercial aircraft. Total employment at the two locations is 100.

•Greer Hydraulics of Canada Ltd.: This newly-formed subsidiary of Greer Hydraulics Inc., has established a repair, maintenance and modification centre for Greer test equipment at Montreal. Ultimately, the company plans to produce aviation test equipment and hydraulic components in this country.

•Godfrey Engineering Co. Ltd.: Some 12,000 sq. ft. of Godfrey's Lachine, P.Q., plant are devoted to aviation work, which employs 35 personnel. This work embraces manufacturing (70%), as well as some repair & overhaul and research & development, for both military (75%) and civil (25%) customers. Godfrey claims to be the sole Canadian manufacturer of aircraft air conditioning systems, including cabin pressure blowers and refrigeration units. The company also specializes in aircraft ground servicing equipment and manufactures a wide range in this line, including oxygen servicing trailers, cabin pressure testing trolleys, etc.

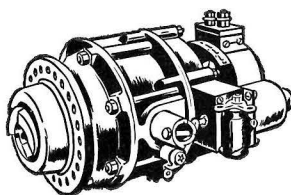
•Hussman Refrigerator Co.: Located at Brantford, Ont., this company was for some time active in the production under sub-contract to Canadair of 100 gal. underwing drop tanks for the Sabre and of 200 gal. wingtip tanks for the T-33, as well as F-86 tail pipe assemblies. However, work on these projects is now all but completed, and for the time being, at least, activity in the aviation field is at a low ebb.

•Irvin Air Chute Ltd.: Major production item at this Fort Erie, Ont., company's 20,000 sq. ft. plant is the G4B anti-G suit for aircrew, and the new troop parachute which the Canadian Army has recently



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adopted, the T-10. Other activities include the repair & overhaul of RCAF parachutes, and research & development on parachutes and related safety equipment, including pressure suits. Some 99% of production is for military customers. The plant now employs 75.

•**Laurentian Air Services Ltd.:** On behalf of the civil market, this Ottawa concern operates an airframe and engine overhaul service which comprises about half its business, the other half being provided by charter flying. Hangar and shop area totals 11,000 sq. ft. and there are 33 employees.

•**Lefebvre Freres Ltd.:** Located in Montreal, this firm has 3,000 sq. ft. of shop space and a staff of ten engaged in the subcontract manufacture of aircraft tooling, both for machining and assembly work; machined components, cast components and forged components; pattern making; sub-assembly and assembly work, and fabrication.

•**Precision Rubber Products (Canada) Ltd.:** A comparatively new firm, Precision Rubber has a 13,500 sq. ft production facility at Ste. Therese de Blainville, P.Q., where "O" ring gaskets and packings are produced to qualified specifications; types and sizes on which the Canadian firm is not yet qualified, or for which it does not have the proper tooling at this time, are obtained for Canadian customers through the U.S. parent company, Precision Rubber Products Corp., Dayton, Ohio. Manufacturing commenced in April, 1953, making the company the first Canadian source of "O" rings, which it still is. Current employment is approximately 30.

•**Piasecki Helicopter Co. of Canada Ltd.:** With ten employees and 41,000 sq. ft. of space at Arnprior, Ont., Piasecki is currently engaged in the manufacture of overhaul tools and spare parts for RCAF H-21A and RCN HUP-3 helicopters. Modification kits are also being manufactured and installed as required by the RCAF and RCN. Helicopter component, transmission, rotor head, and rotor blade overhaul work is to commence shortly.

•**Pioneer Parachute Co. of Canada:** This is a newly-organized company which is just now getting into production on parachutes. It is located at Smiths Falls, Ont.

•**Prencos Progress & Engineering Corp. Ltd.:** Long associated with the aviation business for its activities in the high pressure hydraulic hose field, this Toronto firm has recently sold all its assets in this regard to Aeroquip Corp. of Jackson, Mich., which has set up a new Canadian subsidiary, Prencos-Aeroquip Ltd., to carry on production and sale of flexible hose lines and self-sealing couplings. Meanwhile, Prencos Progress & Engineering will continue to be active in the aviation industry through its production, now started, of Koehler aircraft valves and special hydraulic fittings, for which the firm is Canadian licensee.

•**Spartan Air Services Ltd.:** Although Spartan is primarily an air survey company, the shops which it maintains for servicing its own fleet of aircraft and helicopters are utilized by the DDP for repair & overhaul of RCAF and RCN Bell helicopters.

## Aviation Imports to Canada: 1953 and First Ten Months of 1954

	UNITED KINGDOM		UNITED STATES		OTHER	
	1953—12 Mos. No. Value	1954—10 Mos. No. Value	1953—12 Mos. No. Value	1954—10 Mos. No. Value	1953—12 Mos. No. Value	1954—10 Mos. No. Value
<b>AIRCRAFT</b>						
Not over 1,500 lbs.			138—\$ 357,858	109—\$ 255,916		
1,501-3,000 lbs.			85— 737,358	57— 552,691	1—\$ 9,500	
3,001-7,500 lbs.	5—\$ 239,984		70— 3,793,756	17— 1,896,587	1— 5,541	
Over 7,500 lbs.	8— 2,421,804	1—\$ 87,596	80— 15,576,442	15— 8,469,468	2— 52,125	
<b>AIRCRAFT ENGINES</b>						
Up to 200 hp.			216—\$ 219,916	154—\$ 182,370		
201-500 hp.	20—\$ 139,915	8—\$ 32,160	274— 576,458	71— 157,178		
501-1,001 hp.	1— 9,863		48— 233,546	63— 516,169		
Over 1,000 hp.	366— 9,694,006	278— 6,518,378	329— 10,793,891	98— 4,393,844	14—\$ 83,565	
<b>AIRCRAFT PARTS</b>	\$ 4,950,271	\$ 3,237,841	\$ 82,527,323	\$ 68,637,167	\$130,718	\$ 64,481
<b>ENGINE PARTS</b>	\$ 6,243,004	\$ 4,230,493	\$ 18,381,992	\$ 14,125,379	\$ 20,967	\$ 2,994
<b>AVIATION GASOLINE</b>			79,861,231 gals. worth \$ 16,305,335	63,007,484 gals. worth \$ 12,921,284		303,703 gals. worth \$ 61,021
<b>TOTALS, by countries</b>	\$23,698,847	\$14,106,468	\$150,503,875	\$112,108,053	\$302,416	\$128,496

	1953 12 Months	1954 10 Months
<b>TOTALS, by classes</b>		
Aircraft .....	\$ 24,194,368	\$ 11,262,258
Aircraft Engines .....	21,751,160	11,800,099
Aircraft Parts .....	87,608,312	71,939,489
Engine Parts .....	24,645,963	18,358,866
Aviation Gasoline .....	16,305,335	12,982,305
<b>TOTAL, All aviation imports</b> .....	<b>\$174,505,138</b>	<b>\$126,343,017</b>

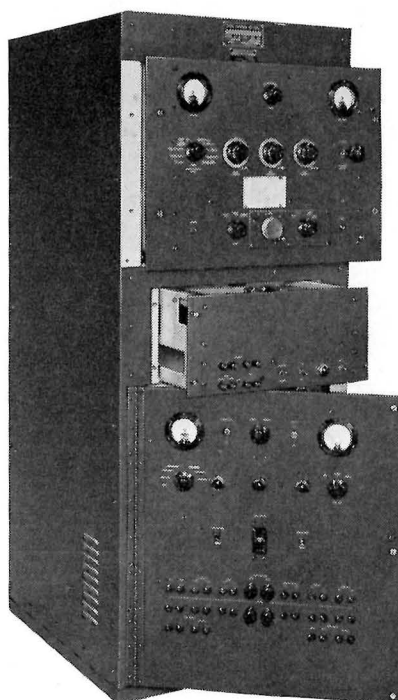
•**Standard Telephones & Cables Mfg. Co. (Canada) Ltd.:** This Montreal company has 47 employees and 65,000 sq. ft. of plant devoted mainly (60%) to the manufacture of aeronautical communications equipment. A considerable part (30%) of the overall effort in this field is related to research & development work. Most of the business is on behalf of the military services. Light-weight transceivers for military aircraft, including jets, are a specialty. ADF units in the VHF range, and search radar and complete GCA equipment are among the products of this company, which is a subsidiary of Standard Telephones & Cables of London, England.

•**Sanderson Aircraft Ltd.:** Though usually thought of as an aircraft service centre, this Malton, Ont., company is occupied to a considerable extent with sub-contract manufacturing work, this engaging some 80% of the total staff of 85. The sub-contract program involves the fabrication of Beaver flaps, ailerons, horizontal stabilizers and elevators, and vertical fin and rudder. Other activities at Sanderson, which occupies a 44,000 sq. ft. hangar, include the repair, overhaul, and maintenance of aircraft and engines on behalf of the operators of private, executive, and commercial aircraft.

•**Trans-Canada Air Lines:** The routine maintenance work that TCA has been carrying out at Winnipeg for the RCAF for the past few years is now coming to an end, and within a few weeks, the Air Force will have assumed responsibility for all its own aircraft maintenance work in the area. TCA took on the job at the request of the service during the big build-up, when there was a severe shortage of RCAF groundcrew. TCA has had 632 men employed on this work, and about half of these will be absorbed

into TCA's own maintenance staff, which is being built up as a result of the addition of the Viscounts to TCA's airliner fleet.

•**Technical Enterprises Ltd.:** Toronto's Malton Airport is the site of this specialist firm's modern 6,000 sq. ft. plant, which now employs 15 technicians on the manufacture of Anstat anti-precipitation static



**Standard Telephones & Cables Radio Beacon 500 watt transmitter, made in Montreal; range 200-530 kilocycles.**

antennae systems, repair & overhaul and service & maintenance, as well as installations, of airborne radio and electronic equipment.

•**H. I. Thompson Co. of Canada Ltd.:** At Guelph, Ont., the H. I. Thompson Co. employs 33 in a 10,000 sq. ft. plant that concentrates almost exclusively on the production of Refrasil High Temperature Insulation Blankets for turbojet engine installations, Thermo-Cousti Cabin Lining Insulation, and Fiberglass reinforced plastics for aircraft. Most of the work is for military applications.

•**Thor-Canadian Co. Ltd.:** Thor-Canadian has now built more than 2,000 crew ejector seats for the Sabre and the T-33A, under sub-contract to Canadair. Without exception, the Etobicoke, Ont., manufacturer (perhaps best known for its line of household appliances) has met all delivery schedules on time. The firm is also producing radar antennae in two sizes, as well as a number of parts for the Orenda engine. All tooling for these projects was manufactured in Thor's own shops at Etobicoke. Staff of the aircraft parts division—which occupies 15,000 sq. ft.—is now 35, down slightly from last year.

•**Vicom & Co. (Canada) Ltd.:** At Kingston's Norman Rogers Airport, this subsidiary of a well-known British firm has five people working on the manufacture and repair & overhaul of a number of lines in the radio and electronics field on behalf of the aviation industry. Its work, which is mainly for the civil market, includes the manufacture of multi-output Audio Amplifiers and matching units; manufacture of Terminal Boards; repair & overhaul of VHF equipment, radio compasses, and navigating equipment.

•**Weatherhead Co. of Canada Ltd.:** During the past year, Weatherhead has established a separate aviation division at its St. Thomas, Ont., plant. The division has its own stores, inspection facilities, and specially trained production personnel, and in conjunction with the separate aviation inspection department, separate statistical quality control has also been set up. A hydraulic laboratory has been installed to carry out complete production tests and is also to be used for development of newly designed products. The manufacturing program takes in the production of tube fittings to AN standards for use in hydraulic, pneumatic, and fuel systems; hose assemblies are also produced. The company is entering the field of quick-disconnect self-seal hydraulic couplings and in addition is now manufacturing, in Canada, flareless tube fittings, which are now being widely adopted in Canada's Aviation Industry. A variety of machine parts is also made for a number of Canadian aircraft and engine companies.

•**Western Propeller Co. Ltd.:** This specialist firm occupies 16,000 sq. ft. in Hangar 16 at Edmonton Municipal Airport and is equipped and staffed to overhaul and recondition practically any type of propeller and governor encountered in Canada. The size of propellers overhauled ranges from small wooden types for private aircraft to four-bladed C-119 Packet units. Western claims that it performs most of the propeller overhaul work available in Western Canada from commercial operators. In addition, it performs similar work on all RCAF propellers and governors in the entire mid-West area. Employment is over 50.

•**Leavens Bros. Ltd.:** There are few aircraft services which are not available from this Toronto company, which carries on a substantial aviation supply business backed up by overhaul facilities capable of rejuvenating airframes, engines, propellers, instruments, radio, etc. Aircraft modification is also undertaken.

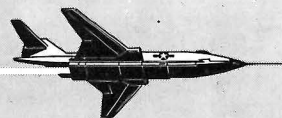
•**Inaerco Ltd.:** Now located at Perth, Ont., where it moved about a year ago, Inaerco operates an 18,000 sq. ft. plant, about half of which is devoted to aviation activities, these employing some 20 persons. Work for the aircraft industry includes the manufacture of aircraft hydraulic accessories, hose-lines, hose fittings, valves, specialty items, and screw machine products.

•**Bancroft Industries Ltd.:** During the past year Bancroft has formed a new instrument division. Located in Montreal, the division has staff and equipment for the overhaul of aneroid, electrical, capillary, and air driven flight and engine instruments, including directional gyros and artificial horizons. Work is now in hand for both military and civil operators.

•**Carriere & MacFetters:** With headquarters in downtown Toronto, this firm provides service and repair & overhaul of all varieties of aircraft electrical accessories, including some 350 different types. Most of the work is on behalf of the RCAF, but a considerable volume of civil equipment also passes through the shops.

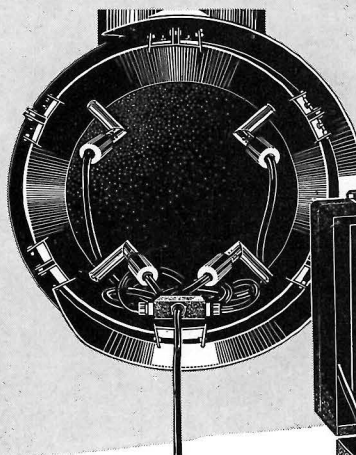
(Continued on page 117)

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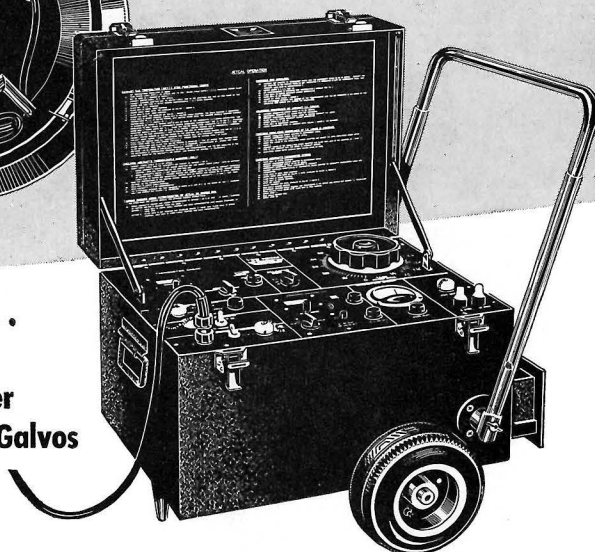
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5) Checks resistance of the EGT circuit without the EGT Indicator.

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7) Checks EGT Indicators (in or out of aircraft).

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9) Checks aircraft TACHOMETER system accuracy to within  $\pm 0.2\%$  between 95% to 100% RPM.

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ments of Weatherhead fittings are part of the spares program intended to support the operation of these aircraft.

The St. Thomas, Ont., firm has established the only Canadian manufacturing source for these fittings, and the shipments to the RAF are the first under Mutual Aid. Similar parts had previously been despatched by Weatherhead to the European maintenance centres of the RCAF squadrons.

## Silvaire Spares

Temco Aircraft Corporation of Dallas, Texas, has sold all rights, parts, tooling and engineering for the "Silvaire" line of personal aircraft to Otis T. Massey & Associates of Fort Collins, Colorado. A condition of the sale was that Massey would supply parts and service to owners of all existing Silvaire.

It will be recalled that the Silvaire was developed and built in two and four-place versions by Luscombe Airplane Company, which became a Temco subsidiary in 1950.

## A/C Engineers Meet

The Toronto Branch of the Society of Licensed Aircraft Engineers held its inaugural meeting February 23, thus bringing to two the number of branches of this organization now in operation in Canada. Last year, the first branch was started at Calgary.

Provisional chairman of the Toronto Branch is R. L. Annett, who pointed out at the inaugural meeting that the aim of the Society in Canada is to represent the Canadian engineer. Among the advantages of Society membership outlined by Mr. Annett were a choice of over 70 manufactur-

ers' courses, access to an extensive technical library, employment service, life insurance at low rates, and branch meetings featuring well-known speakers and technical aviation films.

The Society was first formed in the U.K. in 1943 and is recognized by both the British government and the British Aircraft Industry as the representative body for licensed aircraft engineers in technical and regulatory matters. It is now established on an international level, with affiliated organizations in 27 countries. These organizations have no trade union or political affiliations. Membership is open to all licensed maintenance engineers and/or licensed mechanics.

The next meeting of the Toronto Branch will take place March 30. Further details may be obtained from R. L. Annett, 33 Landseer Rd., Ion-dale Heights P.O., Ont., or C. Bealand, 8 Pember Dr., Weston, Toronto 15.

## ON PARADE

(Continued from page 89)

### Also Contributing

Goodyear Tire & Rubber Co. of Canada Ltd., New Toronto, Ont. (tires, tubes, de & anti-icing equipment, etc.); Stark Electronic Instruments Ltd., Ajax, Ont. (manufactures electronic test equipment, repair & overhaul of radio compasses, inverters, generators); R & M Bearings Ltd., Montreal (bearings of all kinds); Dunlop Canada Ltd., Toronto (tires, tubes, seals, rubber products of all kinds); McQuay-Norris Mfg. Co. of Canada Ltd., Toronto (sealing rings for turbojet engines); Kirk Dial Ltd., Toronto (instrument dial illuminizing); Radio Engineering Products Ltd., Montreal (radios and service); Aviquipo of Canada Ltd., Montreal and Toronto (aviation supplies); B. F. Goodrich Canada Ltd., Kitchener, Ont. (tires, tubes, de-icing equipment, etc.); Abercorn Aero Ltd., Montreal (aviation supplies); The

Babb Co. (Canada) Ltd., St. Johns, P.Q. (aviation supplies); C-H Engineering Co. Ltd., Toronto and Montreal (aviation supplies); Anthony Foster & Sons Ltd., Toronto (aviation supplies); Railway & Power Engineering Corp. Ltd., Montreal (aviation supplies); Victory Tool & Machine Co. Ltd., Montreal (aircraft parts and tools); Aircraft

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**B-47 TURBOPROP TEST BED:** This turboprop test vehicle is the Boeing XB-47D, a standard B-47B modified to flight test the Curtiss-Wright T-49 turboprop. Two T-49's are mounted in place of the four GE J-47 turbojet engines normally located at the inboard pod positions. The T-49 is a turboprop development of the J-67 (Wright version of the Bristol Olympus) and is rated at 12,000 eshp. During the test program, the XB-47D retains the two outboard J-47 turbojets of 6,000 lbs. th. each.

**Services (Western) Ltd.**, Winnipeg (aircraft repair & overhaul); **Decca Radar Canada Ltd.**, Toronto (radar and navigation equipment); **J. W. Lawrence (Canada) Ltd.**, Montreal (repair & overhaul of heat exchange equipment); **T. C. Chown Ltd.**, Montreal (seats, pressure switches, float valves, etc.); **Dominion Fasteners Ltd.**, Hamilton (fasteners of all kinds); **Simmonds Aerocessories of Canada Ltd.**, Montreal (extinguishing systems, pneumatic systems); **X-Ray & Radium Industries Ltd.**, Montreal and Toronto (dial illuminizing); **Aircraft Parts & Supplies Reg'd.**, Montreal (aviation supplies and equipment); **Monahan Supply Corp. Ltd.**, Toronto (ground handling equipment); **Lund Aviation (Canada) Ltd.**, Montreal (aviation supplies and equipment); **Parmenter & Bulloch Mfg. Co. Ltd.**, Ganoque, Ont. (Cherry rivets); **Drummond, McCall & Co. Ltd.**, Montreal, Toronto and Winnipeg (metals and alloys in all forms); **Bassick Div. of Stewart-Warner Corp. of Canada Ltd.**, Belleville, Ont. (casters); **Bach-Simpson Ltd.**, London, Ont. (aircraft instruments); **Redifon Canada Ltd.**, Montreal (flight simulators); **Canada Wire & Cable Co. Ltd.**, Toronto (wire and cable); **Pye Canada Ltd.**, Toronto (communications equipment); **Morrow Screw & Nut Co. Ltd.**, Ingersoll, Ont. (aircraft bolts and nuts of all kinds); **United Aircraft Products (Canada) Ltd.**, Longueuil, P.Q. (heat exchange equipment); **Joy Mfg. Co. (Canada) Ltd.**, Galt, Ont. (aircraft fans, connectors, pneumatic tools, air compressors); **Canadian General Electric Co. Ltd.**, Electronics Div. (Lear communications and navigation equipment); **Cossor (Canada) Ltd.**, Halifax (aviation communications, radar, radio & electronics repair & overhaul); **A. J. Campbell Co. Ltd.**, Montreal (Elastic stop nuts and associated products).

## INDUSTRY

(Continued from page 25)

"The better the results we obtain in respect of cost and quality, the more firmly the Industry becomes established, the greater the value received by the customer for the dollars he spends, the more the taxpayer benefits since his tax dollars are spent by our principal customer and, finally, we best apply our efforts in the common fight against those endeavoring to overthrow free enterprise and free government."

## DDP CONTRACTS

(Continued from page 54)

from the United States Government, particularly in cases where the entire output of a plant in the United States producing the required equipment is under the control of the U.S. Air Force, U.S. Navy or U.S. Army. This, of course, entails discussions and nego-

tiations with the U.S. Government for the delivery of this equipment.

**Other Purchases:** There must also be other purchases made by other branches of this Department under the requirements and funding of the main contract requisitions, i.e. specialized equipment, such as ground handling equipment, various electronic apparatus and so forth. These purchases are made by extracting funds from the main contract requisition and a strict budget control must be kept by the Aircraft Branch as these subsidiary orders may run, over the length of the program, into hundreds of separate purchase orders.

If there is to be any development work done by the company in connection with the production programs a separate contract may be written and, if it is, it will contain the provisions of Supplemental General Conditions, DDP-36, (Research and Development). Under this document all design rights arising out of or under such contracts, vest in the Crown.

The scheduling and expediting function of the Purchasing Section is an extremely important one and in particular, as can be readily seen, the scheduling of Defence Production Supplied Material and Government Furnished Equipment must be handled very carefully. All these supplies must reach the production lines at the right time and in the right quantities. Normally, as the production program gets under way, the discussions with respect to the basis and method of payment for the aircraft will probably result in an incentive target type arrangement. If this is the case, it is absolutely mandatory that all supplies reach the production line so that there will be no halt, because this would raise the cost of the production.

Extensive liaison, of course, must be carried out with the Chief Treasury Officer of the Department of National Defence, the Director of the Cost Inspection and Audit Division and other Government agencies to ensure that during the life of the program the contracts are properly invoiced, audited, etc.

**Surplus Disposal:** At the conclusion of the contract and in numerous instances during the life of the contract, certain Government-owned material may become redundant. This material must be declared surplus and disposal may be effected through

Crown Assets Disposal Corporation if such disposal is by sale, or the material may be transferred to other plants where a need for it exists. Machine Tools, production tooling and similar production equipment, if declared surplus by the contractor, are similarly disposed of by the Machine Tool Branch of this Department.

In connection with pricing, if a firm price cannot be established, a target or incentive type contract is preferred. This type of contract is ideal for production runs and encourages efficiency and hence lower production costs.

You now have a rough outline of what is involved in the administration of a defence contract and it may serve to illustrate, in some degree, the extent to which the Aircraft Branch and the Aircraft Industry work together in the interests of the defence of Canada.

## BRITANNIA

(Continued from page 49)

and structural, except where local modifications are necessary to accommodate the Wright R-3350 Turbo Compound engines which will replace the Bristol Proteus turboprops. The empennage will also be practically identical to the original, as will the undercarriage. Maximum gross take-off weight is expected to be 150,000 lbs. as compared to 155,000 lbs. for the 200-250-300 series Britannias.

**Homework:** Sub-contracting of the CL-28 is being held to a minimum: the undercarriage is to be made by Larry Hydraulics of Montreal; the engines will be supplied by Wright Aeronautical; the radio and electronics gear, and armament — much of which is still only in the development stage — will be supplied by the Government. Fabrication of all other major components, final assembly, and flight testing, will be carried out by Canadair.

Because the CL-28 is designed for low level reconnaissance, it will be unpressurized. This low level requirement is also the key to the switch from Proteus turboprops (which are at their most efficient at high altitudes) to Wright R-3350's. The latter will be able to make more economical use of the CL-28's 6,800 gal. fuel capacity on long flights (max. duration, 24 hrs.) over the water at low altitudes.