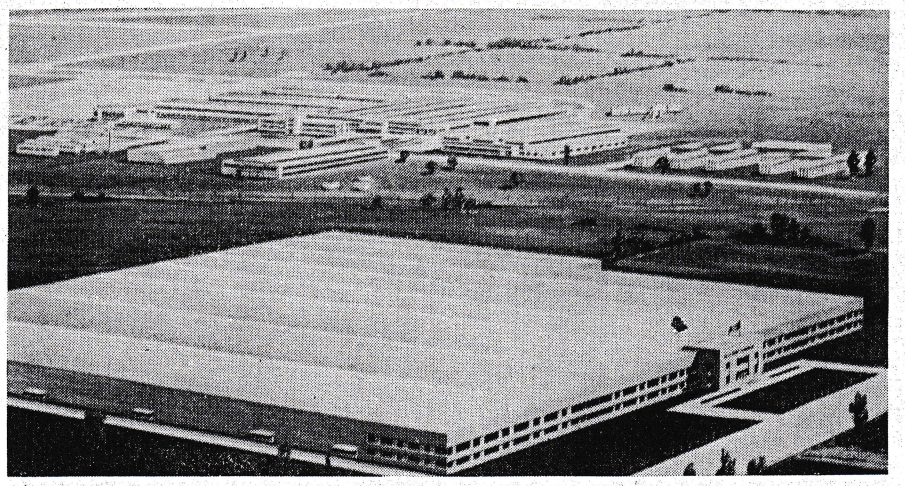

LEFT—The new Avro Canada gas turbine plant is seen as it will look when built later this year. In the background is the present plant and Malton Airport. Facilities and land are available for doubling the presently-planned floor area of some 400,000 square feet if necessary.

VAST INDUSTRIAL EFFORT SPARKED BY AVRO PLANS

WHILE THE crucial Orenda jet engine project, to be housed in a new Malton plant illustrated above, begins to take form, observers are just beginning to realize the industrial implications of a task of this magnitude. A survey of Avro Canada subcontractors has revealed that some 400 Canadian plants are involved in the Orenda and CF-100 fighter programs.

In addition, U. S. suppliers are supporting the effort with their materials and experience. An outstanding example of the latter phase is the Steel Improvement & Forge Company of Cleveland which has organized a Canadian subsidiary to forge the critical turbine and compressor blades for the engine in a new 41,000-sq. ft. plant. It will be known as Canadian Steel Improvements Ltd. The plant, expected to employ 180 people, to be completed this year, will be at Long Branch, near Toronto.

Estimated cost of the new plant is $2 millions, to be borne by the Canadian Government. Initial one-shift production rate will be 50 engine sets a month, although it is considered that Avro's ultimate requirements may justify two-shift operation of the plant.

Cyril J. Luby, former experimental works manager for the Bristol Aeroplane Co., will be general manager of the new firm.

Officials of the Cleveland company report they have for some time considered Canada as a logical field for the expansion of their activities. The company has given special attention in recent years to improvements in the methods of producing precision forgings of high heat-resisting material, a line of work which is now not being done in Canada. Needs of the rapidly expanding air-defense program on both sides of the border, particularly for the production of jet-propelled planes have created great demand for such forgings.

In its present plant, however, Steel Improvement has a backlog of over $10 millions in defense orders and could not continue to give help to Canada without increasing its facilities. The decision was therefore made to increase facilities by establishment of the Canadian plant.

Steel Improvement and Forge Co. was established in 1913 as a heat-treating plant, it went into the forging field two years later.

Other New Plants — Other companies who will be working in new plants include:

Canadian Acme Screw and Gear Ltd., in New Toronto; Light Alloys Ltd., at Renfrew, Ont.; Dowty Equipment of Canada Ltd., at Ajax, Ont.; Sir George Godfrey & Partners (Canada) Ltd., at Montreal; and Rotax Canada Ltd., (the Canadian counterpart of Joseph Lucas and Company), at Malton.

Other large companies are affected. They are MacDonald Bros. Aircraft Ltd., at Winnipeg; the Cockshutt Plow Co. Ltd., at Brantford, Ont.; Paulite Products at Galt; the Deloro Smelting & Refining Co. Ltd., Deloro, Ont.; Atlas Steels Ltd., of Windsor; the Coleman Lamp and Stove Co. Ltd., of Toronto; Shawinigan Chemicals Ltd., Montreal; Aluminum Company, Kingston; Hayes Steel, of Merritton, Ont.; Atlas Steel, of Welland, Ont.; Canada Foundries & Forgings, of Welland, Ont.; A. H. Tallman Bronze Co. Ltd., of Hamilton; Robert Mitchell Co. Ltd., of Montreal; Light Alloys Ltd., of Renfrew, Ont.; Dominion Rubber Co. Ltd., of Kitchener, Ont.; Crystal Glass & Plastics, of Toronto; Duplate Canada, of Toronto; Cresswell Roll Forming Ltd., of Montreal; and Best Weatherstrip Co. Ltd., of Hamilton.

The following firms are actively engaged in the manufacture of **jigs, fixtures and cutting tools** for Avro Canada: A. C. Wickman (Canada) Ltd., of Toronto; Firth Brown Tools (Canada) Ltd., of Toronto; Peerless Engineering Ltd., of Toronto; Standard Machine and Tool Co. Ltd., of Windsor; Pratt & Whitney of Canada Ltd., of Toronto; Canadian Car & Foundry Co. Ltd., of Montreal; Harrington Tool & Die Co. Ltd., of Lachine; O'Neill European Machine Co., of Montreal; Canadian General Electric Co. Ltd., of Toronto; Shanfield Industries, of Toronto.

Wright Industries, of Toronto; Canadian Machinery Corp., of Galt, Ont.; Joy Manufacturing Co. Canada Ltd., of Toronto; United Shoe Machine Co. of Canada Ltd., of Montreal; Canada Illinois Tool Co., of Toronto; Goodyear Tire & Rubber Co. Ltd., of New Toronto.

Carbide Tool Company, of Toronto; Kennametal Tool and Manufacturing Co., of Toronto; Butterfield Division, Union Twist Drill Co., of Toronto; Modern Tool Works, of Toronto; Canadian Chromalax Co. Ltd., of Toronto; Lakeshore Gauge Works, of Toronto; Bawden Machine & Tool Co., of Toronto; Colonial Tool Ltd., of Walkerville, Ont.; Stokes Rubber Co., Thermoid Division, of Welland, Ont.; Mercury Cycle & Tool Co., of Toronto; Lightning Fastener Co. Ltd., of St. Catharines.

Fisher Gauge Works of Peterborough; Oshawa Engineering Co., of Oshawa; Windsor Tool & Die Co. Ltd., of Windsor; Glen Purvis Tool

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ALTITUDE PERFORMANCE

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Airframe Limitations—

1. Normal stall which limits low speed flight. **Suggested solutions**—a. high lift flaps; b. leading edge slots; c. lower wing loading;

2. Mach Number limitations on high speed flight. **Suggested solutions**—a. Swept wing and tailplane to increase critical Mach Number; b. Very thin wings and tail to increase critical Mach Number; c. Generally cleaner aircraft to reduce onset of buffet; d. Lower wing loading to avoid high angles of attack under G loading;

Engine Limitations—

3. Reduction in power available occuring with increasing altitude. **Suggested solutions**—a. Fitting larger engines; b. Reheat installation on present engines; c. Fitting booster rockets—same effect as reheat.

From the foregoing it is seen that the problems of designing and fighting a fighter aircraft to intercept a high-flying jet bomber are many. Although the bomber may start out with a lower speed than the fighter it will have the big advantage of being able to fly relatively straight and level under loadings of one G whereas the fighter will almost certainly be compelled to manoeuvre to intercept.

BIG AVRO PROGRAM

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Co., of Chatham; Nicholson Tool & Die Co., of Windsor; Geo. W. Crothers Ltd., of Toronto; Viceroy Manufacturing Co. Ltd., of Toronto; Flash Fastener Co. Ltd., of Toronto.

Orders have been placed with the following firms for **machine shop work:** Aero Tool Works Ltd., of Toronto; Canadian Car & Foundry Co. Ltd., of Montreal; Coleman Lamp & Stove Co. Ltd., of Toronto; Corman Engineering Co. Ltd., of Toronto; Geo. W. Crothers Ltd., of Toronto; Dairy-Brewery Equip. & Engineering, of Toronto; Doherty Industries Ltd., of Toronto; Etched Name Plates Ltd., of Toronto; Heroux Machine Parts Ltd., of Montreal; International Aeronautical Corp. Ltd., of Toronto; Phoenix Engineered Products Ltd., of Toronto; John Inglis Co. Ltd., of

Toronto; Wright Industries Ltd., of Toronto.

Special machine tools built by the following companies have been designed according to Avro specifications: Modern Tool Works Ltd., of Toronto; Standard Machine and Tool Co., Windsor; John Bertram & Sons Ltd., of Toronto; Canadian Machinery Corp., of Galt, Ont.

The main suppliers of bought-out parts are: Canadian General Electric Co. Ltd., of Toronto; Ontario Hughes-Owens Co. Ltd., of Ottawa; Prenco Progress Engineering, of Toronto; Canadian Hose Line Co. Ltd., of Brampton; Walter Kidde Co. of Canada Ltd., of Toronto; Minneapolis-Honeywell Regulator Co. Ltd., of Toronto; Cannon Electric Ltd., of Toronto; Northern Electric Ltd., Toronto; Fairey Aviation Co. of Canada Ltd., of Eastern Passage, N.S.

UNITED NATIONS OF THE AIR

(Continued from page 36)

became known were on the basis 3:2:2, with ABA, Sweden the largest investor. OSAS did not own any planes or personnel, but rented same from the three national airlines. All profits, costs and deficits were shared in relation to the investment made.

In January 1948, ESAS (European SAS) was formed for the Scandinavian air routes to Europe, the Near East and Africa. The agreement covered pooling of ticket offices, ground services and other similar activities in order to cut down expenses, but there was no pooling of traffic or airplanes. However, it was recommended that, as far as possible, all traffic should be distributed 3:2:2 for the Swedish, Danish and Norwegian airlines, based on air kilometers flown.

Gross incomes were pooled for redistribution to each company on the basis of actual air kilometers flown with the intention of functioning as a kind of equalizer for the difference in passenger density on different routes. However, the system proved to have some very serious disadvantages as well.

But the greatest handicap to smooth co-operation was the fact that each country continued to have its own airline system, and the formation of OSAS and ESAS added to the administrative complexity by producing five boards of directors instead of previously three. In the summer of 1949 the three Scandinavian airlines decided to try to find a better formula for co-operation, and after a series of meetings in Stockholm, Oslo and Copenhagen in 1950, a solution, as represented by the new SAS was finally worked out and agreed upon by both the Governments and the airlines concerned.

Scandinavian co-operation has not been limited to the airlines. Twice a year the Air Transport Boards of the three countries have met to discuss aviation problems of mutual interest. There are many technical and economical committees—permanent as well as temporary—of joint Scandinavian setup. Internationally this is demonstrated at the ICAO headquarters in Montreal, where a Scandinavian secretariat is functioning.

The new SAS will accentuate this kind of co-operation still further, and it is suggested that any one of the air transport boards in the Scandinavian countries may be given authority to decide in routine questions, with decisions binding for the other two countries as well. This is regarded of high importance to assure SAS fast action on problems concerning the service.

COTTON SPRAYING IN THE SUDAN

(Continued from page 46)

ranging from as little as 10 acres to as much as 210, extending on both banks of the White Nile for a distance of about 100 miles. The aircraft were used under very difficult conditions, no hangarage being available, in excessive dust and damp, and it speaks highly of the aircraft that the task was completed without major difficulties.

Except for the home base on Abba Island, where a 300-yard strip was levelled, the landing strips were selected as close to the work as possible, and were used without any special levelling. Altogether 24 strips were used, and despite the fact that the aircraft were taking off and landing five or six times an hour five hours a day they gave complete satisfaction in every respect.

Birds provided the most serious hazards to the aircraft. One caused a hole in the leading edge of a wing, and a dent in another. One pilot reported having killed at least 14 large birds during the operation.

Experience showed that air conditions were most favorable in the early morning. Spraying therefore began at first light, and continued until either the area scheduled for the day was completed or pilot fa-