

READYING FOR FLIGHT. Burning the midnight oil, crews at Canadair put company's first Forty Four turboprop transport out. Aircraft made its inaugural flight Nov. 15, a two hour and 10 minute effort which was described as satisfactory in every

The F104G Challenge

Competition — the New Look

The Canadian aviation industry has taken some of its hardest knocks in the past 12 months, the year in which the nation marked the Golden Anniversary of powered flight in Canada.

Cancellation of the CF-105 Arrow weapons system was a body blow the effects of which are still being felt throughout the industry.

Broadly stated, the government decision to cut off the Arrow program was a move to relieve Canada's taxpayers of what Cabinet members decided was the too heavy burden of financing design, development and production of complete airborne weapons systems for the apparent exclusive use of Canadian forces.

Under the new policy, Canada's forces are to be equipped with proven weapons designed and developed by its defence partners and produced under license in Canada. Further, there is to be an extension of existing co-ordination in military operations under

the North American Air Defence Command arrangement to include integration in industrial activity through a defence production sharing plan with the United States.

How is the Canadian aviation industry making out under this new policy? What are the prospects for its future?

To get this story first hand, Canadian Aviation's editors have spent the past several weeks visiting plants and talking with management. Following is their report.

The most immediate over-all impression is that despite the continuing seriousness of the situation in some individual instances, the industry as a whole is not inclined to roll over and play dead.

Companies have had varying degrees of success under the new policy, and there are a number who have grave doubts as to their ability to survive in anything resembling adequate

fashion on aviation business alone in the altered procurement climate. But all, some to a greater degree than others, have at least made efforts to adjust to the situation.

Arrow Aftermath

Although there is no desire here to conduct a wake into the Arrow program it is impossible to undertake any meaningful assessment of industry's present position without some reference to the repercussions which shut-off of government spending on the project brought.

These were three-fold:

- The idling and drainage of skilled manpower.
- The virtual mothballing of a number of recently established highly specialized facilities.
- The wiping out of substantial business backlogs.

On manpower, it is conservatively estimated that some 15,000 workers



through its ground trials at a brisk rate after its October roll-respect. Commercial Forty Four is strong air cargo contender.

Sharing in U.S. defense programs, subcontracts on F-104 production are the stakes in the industry's adjustment to full competition. Canadian companies are digging in hard to take up the challenge.

By Ernie Hemphill

and

Peter Brannan

for Industry

were displaced from their jobs when the Arrow program was canceled. A portion of these have since been re-absorbed, but these are in the minority. A good number, particularly those with specialized skills have been permanently lost to the Canadian production team, having secured jobs in the United States and Britain.

For example, one company which employed 250 on aviation work just prior to cancellation of the Arrow (and was anticipating an additional 125 or so when full scale production began) has since reduced to 85, with the vast majority on overhaul and repair work and only a literal skeleton staff on production work.

On facilities, a visit to plants reveals several million dollars worth of valuable equipment, much of it installed specifically in connection with the Arrow program, standing idle. Because of the special application of this equipment, many firms are ex-

periencing great difficulty in finding another area in which it can be efficiently and economically utilized, let alone put to a particular task.

On backlog business, assessment is difficult, but it is reasonable to assume that the Arrow in production would have meant several hundred million dollars in contracts to Canadian firms. While companies had varying amounts in contracts actually on the books at the time of cancellation, all were anticipating a substantial increase in business, which has of course not developed. In a number of instances, the effects of lop off on Arrow backlog is just now being felt with facilities and employees scheduled to work into the CF-105 program now coming open.

While the Arrow program, or the lack of it, received the bulk of attention from those outlining the problems faced by industry in the past 12 months, its cancellation was not the

sole source of the rather lean months through which we celebrated our 50th anniversary of powered flight. The fact is that at about the time the government was moving toward its painful decision on the supersonic all-weather interceptor, a number of other programs which had kept Canadian aviation workers busy at their benches during good production runs were phasing out.

At Avro the last of the CF-100 run came off the line late in 1958 and a short time before that Canadair turned out the last of its Sabres. The end of production on these two airframes brought Orenda to the end of production on the highly successful powerplant which bears the company name.

At de Havilland of Canada production on CS2F-1 Trackers for the RCN went into its last stages during this year, and while Beaver and Otter lines

continued to move the company began adjusting for a lessening demand on one of Canada's most successful programs. Caribou sales, while recognized as a good future prospect, are not yet brisk enough to demand stepped up production.

The above is not a particularly robust picture, but it is, we believe, a fair assessment of the effect which cancellation of the Arrow program, coupled with the phase out of other production, had on firms which were major participants in the project.

This was the climate in which the government's altered procurement policy was introduced, although the groundwork for defence production sharing was in fact being laid for some months prior to actual cancellation of the Arrow.

Competitive Contracts

Defence production sharing and the F-104G production program are at the present time the prime sources from which industry must seek its business.

Both of these items reflect the new circumstances under which industry must operate — that of competitive bidding. The trend toward competitive awarding of contracts has in fact permeated beyond the production regime and has been mentioned, although not yet as a matter of policy, as a possibility in the overhaul and repair field where the last few months have seen final preparations for replacement of cost plus contracts with various types of fixed fee arrangements.

Production Sharing

What is industry's reaction and experience in its new climate?

As might be expected, there are variations.

On defence production sharing, a number of firms which went into the program with serious doubts are now enthusiastic about possibilities of the arrangement. The majority, however, remain clearly skeptical about the extent to which the program as it is presently set up will provide sufficient volume of suitable work for Canadian companies.

Here are samplings of opinion from discussions with management:

- We have the facilities and abilities to develop business in the U. S. defence market and we are determined to take advantage of our position. We've worked out our approach to this market on a long-term basis and have a five-year program, which in fact predates the defence production sharing arrangement. We have made some inroads, but nothing like what we hope to be able to accomplish. So

far, our U. S. work has in the main been confined to subcontract and machining work which we look upon as a feeling out of our ability. What we are aiming for is engineering, prototype and development work. We don't see U. S. companies or procurement agencies jumping to take advantage of our facilities, but then we didn't expect they would. We are prepared to invest in this market and take a loss at first. We've budgeted to get something out of defence production sharing. We have to, if we want to stay in the aviation business (and they want to) because we see very little aviation business in Canada for us after the F-104G program. How can we forecast on Canadian business. We have no indication what long-term policy will be.

- We're frankly skeptical the way the program is presently established. There are a number of factors which mitigate against a Canadian company securing substantial U. S. business. The letting of production contracts in the U. S. is closely tied in with engineering and development on any given item. If we are going to get anything worthwhile we have to get it on the ground floor, at the engineering and development level, and this we have found it is difficult to do. There are problems discerning the areas in which we can secure development support from the Canadian government. Production sharing can work if there is an arrangement under which Canada will take over a specific defence mission, to be treated as our sole effort, supported by the major portion of our budget and from U. S. procurement in this particular defence area.

- Canada can and will compete successfully in the U. S. defence market if there is goodwill on both sides — and there is every evidence that this is the case. But we have to go after the business. It means going to prospective contract sources and selling them on our capability and ability to deliver the goods competitively.

- We have tried defence production sharing. We have done a selling tour and had our facilities inspected. We received a fine reception and lots of compliments — but no business. There are problems, to be sure, not the least of which is that U. S. producers themselves are finding their own market increasingly uncertain. We may get some business, but the indications are that we will get the small difficult orders which U. S. contractors don't want to bother with. We can understand their position. They don't know us well. Why should they move from a source of supply with which they have experience and background to someone they don't know,

with uncertainties as to delivery and acceptability. Switching sources means they have to go through the whole process of testing out components from the new production source; an additional expense which we either put into our price, which then becomes non-competitive, or write off as investment in the hopes of making it up on additional contracts. We can do the job, but we might not get a chance.

- We were doing business in the United States prior to the official defence production sharing arrangement. There's no question the program has eased some of our problems in connection with dealing across the line, particularly with regard to trans-border shipments. But quite frankly, we have not been able to increase our business any since defence production sharing, and we have made a determined effort to do so. We've knocked on doors, we've shown our facility, we've confined our efforts to the fields in which we consider ourselves competent and capable, we've made detailed proposals (a costly business) — but we can't honestly claim any new business. We don't get invitations to bid on anything really substantial. I'm frankly pessimistic — but we are going to keep trying, we've got to.

- We started out skeptical, but we're not any longer. We have encountered considerable goodwill on the part of the U. S. firms with which we've dealt. Our defence production sharing business has been substantial in relation to what we thought it would be. And we look on this as just the beginning. Our facilities have been tried out and we've been able to do the job.

- I'm afraid I must be skeptical. The design study and development is not being done here. The tin bashing we can do competitively, but we must get the engineering work also if we are to get worthwhile contracts. And I must confess that our parent company is not particularly anxious to have us competing in the U. S. defence market. We were established in Canada to serve the Canadian market.

- Production sharing in our view represents our future in the aviation business. It has got to work. And we think eventually it will work because the Canadian industry requires such a comparatively minor portion of overall U. S. defence contracts to achieve adequate volume. We should be able to attain a reasonable level of U. S. business as long as their government does not undertake drastic cuts in the defence budget. But it is not easy. It is difficult to say how long it will take us to establish in the U. S. market. As far as we are concerned it has al-

ready taken us longer than we want it to take us, but we are not in a position to say that this is too long. Some U. S. firms have spent years getting established. If all you are selling is a simple, established product you should expect early returns for efforts. If what you are selling is facilities and a talent in specific fields, it is more complicated. There is a big step between interest, of which there has been plenty, and the signing of a contract. We sense a general feeling through some segments of the industry that there must be an allocation of definite areas of responsibility in the defence field to Canada. A number of firms don't feel they can wait much longer to break into the market at something better than the bites and nibbles they've had so far.

DDP Effort Lauded

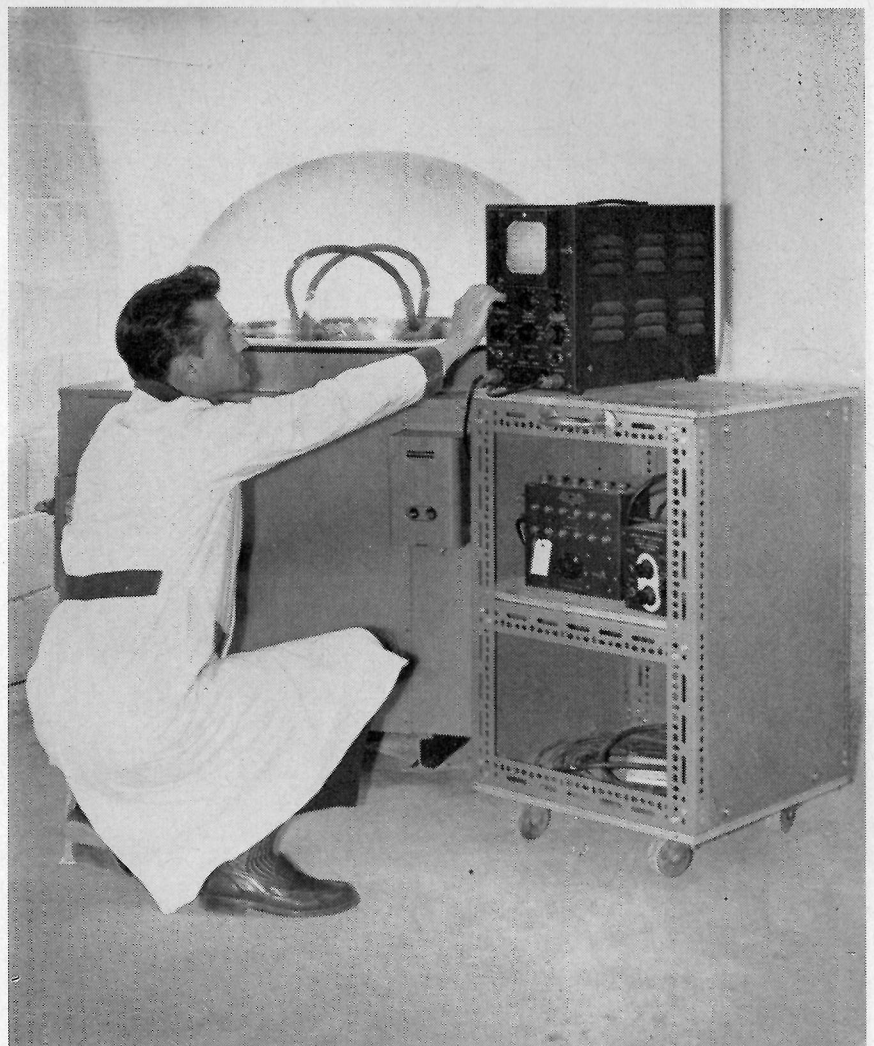
On one point at least there is general agreement as to the defence production sharing program. The Department of Defence Production and its representatives have done a more than adequate job in breaking down barriers and setting up lines of communication with American contracting sources. If DDP blood, sweat and tears alone could bring business to Canada, the aviation industry would have little to worry about.

The dollar total on U. S. defence business placed in Canada under the production sharing program is a figure open to a variety of interpretations — with attendant fluctuations. There is no general agreement as to its usefulness, at this stage, as a yardstick to the success of production sharing.

The latest totals announced by the government place over-all Canadian contracts on U. S. defence work at something like \$80,000,000, of which some \$45,000,000 is in prime contracts and about \$35,000,000 is sub-contract work. This is said to be better than 50 percent above the amount placed last year, when the defence production sharing arrangement affected only the last few months of the year.

A yardstick of success?

As a measure of the short-term return on what is generally recognized as a long-term program, the totals are seen as encouraging. A number of companies (and this is to some degree the view of government officials) look upon these first several months — and perhaps even years — of production sharing as a sounding out period during which U. S. procurement agencies and prime contractors will be feeling out the Canadian capability. If they are satisfied with what they find, they



HYDRAULIC TESTING. Part of facilities at Aeroquip (Canada) Ltd. is sinusoidal impulse tester with glass dome (left), being used here with Aeroquip Hydrauliscopes. Canadian company's equipment gets much use on test programs for U. S. parent firm.

can be expected to buy in quantity.

There are others who judge the production sharing totals in their relation to the amount of business the Arrow program would have generated — particularly with respect to their own order books — and draw the too little, or if more later, too late, conclusion.

Assessment of the totals is further complicated by the claim of some in industry that government figures are not an accurate reflection of defence production sharing since they include business which firms would have been doing in the U. S. under any circumstances, defence production sharing or no. DDP for its part maintains that there are a number of firms which do not report promptly on business which they receive in the U. S. thus making accurate assessment of progress a difficult task.

Whatever the interpretation, or value, one puts on production sharing dollar totals, there is no denying the program has brought business to the Canadian aviation industry. And another item on which the government

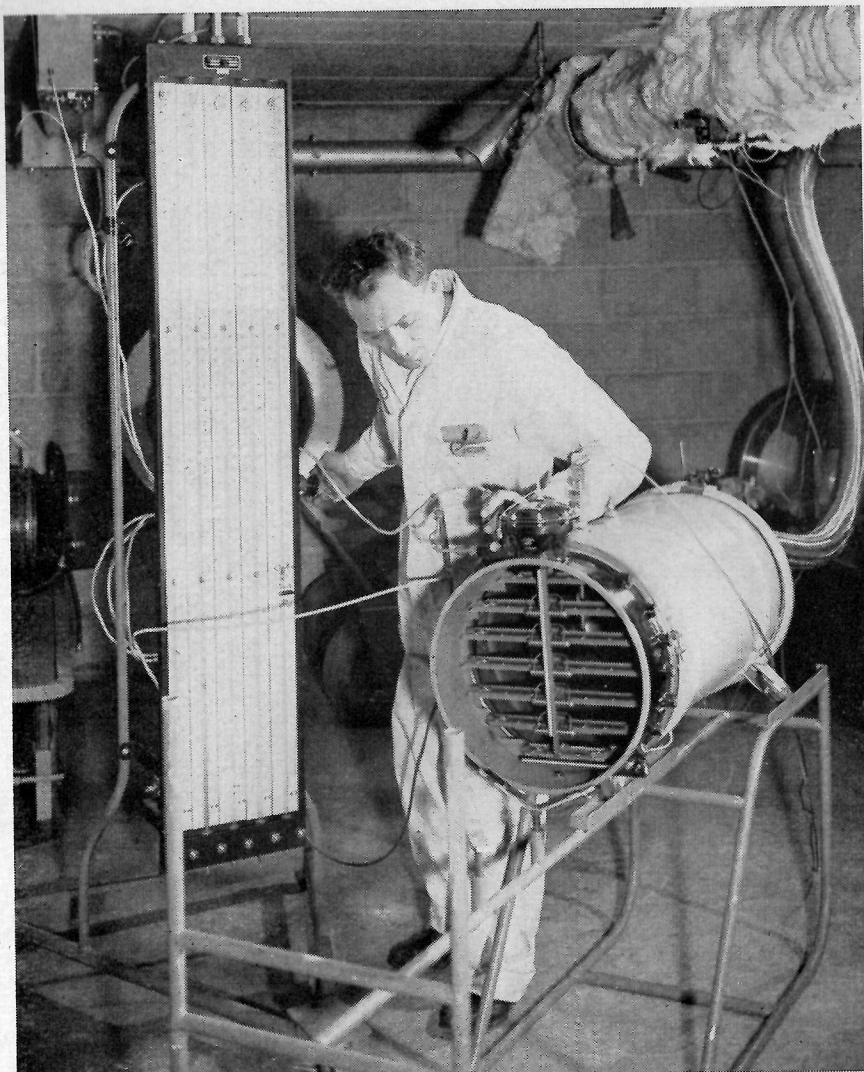
leaves no doubt, and industry can be under no illusion, is Ottawa's determination to leave no avenue untried in its effort to make the scheme work.

The preliminaries are over, the barriers are down. Now comes the task of mutual education—of U. S. sources on the changes in regulations which give Canadian companies competitive access to the American market; of Canadian companies on the programs in which they are most likely to achieve successful bids.

In prospect is definition of specific areas in which Canadian engineering and development capability can be best put to use.

And this latter, in the view of many in industry, is the most important phase of the program. For unless Canada is able to make use of its research and engineering talents and facilities, there is little to be gained from production sharing.

If there is uncertainty and divergence of opinion on the extent to which defence production sharing will fill the production gap in Canada's



ARGUS PART ON TEST. A 15 in. diameter air valve, used to control the flow of hot air in the wing and tail anti-icing system of the CL-28 Argus, is seen being tested at the Toronto plant of Garrett Manufacturing Ltd., subsidiary of the Garrett Corp.

aviation industry, there is a feeling of growing challenge on the amount of business which will be generated in Canada by the F-104G program.

Initial announcement of the prospective \$400,000,000 order for the RCAF's NATO Sabre replacement was received with a fairly audible sigh of relief by industry. Here was the program which could well provide the buffer needed in adjusting to new government policy.

At press time there were industry sources, and they were widespread, which owned to grave doubts as to the amount of business they could expect to pull on the F-104G program.

Fast off the mark with a rush demand for competitive proposals from the country's three major airframe manufacturers and Orenda's turbojet production team, the Canadian Starfighter project gives every indication of having bogged down somewhat since acceptance in August of Canadair's bid on the airframe and Orenda's program on the J-79 engine. The

value of the two production programs on the basis of the proposals has been placed at \$91,500,000 for airframe and \$80,000,000 on engines.

Both prices, it has been indicated, are competitive with what it would have cost to place orders with Lockheed and General Electric in the United States.

In this situation, potential Canadian subcontractors are concerned that they will be unable to compete effectively on accessories and equipment with U. S. sources of supply which have the advantage of established production lines and earlier production runs on which to write off tooling and set up costs.

Unless the government is prepared to pay a premium for Canadian production (and it is estimated that 30% is an economically sound premium to pay for making certain taxpayers' dollars are spent in Canada) it is feared that a substantial portion of F-104G subcontracts will be lost to Canadian industry. So far there has been no

official indication of a required minimum Canadian content on the program.

While the above fears are very real ones, they have not deterred subcontractors in their preparations for prospective F-104G business. There has been wide investigation of the aircraft and its system, followed by contact of U. S. sources of supply on items of specific interest to particular firms.

There are some who recognize the ironies of the situation in which they find themselves. On the one hand they are knocking hard on U. S. doors and pressing for every advantage in the quest for American defence business. On the other hand they fear that unless there is some device which will give Canadian sources of production an advantage over U. S. competitors they may lose out on business in their own backyard.

Whatever the eventual arrangements on the F-104G program and the degree of success achieved in defence production sharing, there is no evidence of general withdrawal from the aviation field. Cutbacks and consolidation there may well be; diversification and a lessening percentage of aviation activity in individual firms is not only inevitable but a fact of efficient survival.

There is, if anything, a grim determination to hang on in the aviation field; to do everything possible to maintain facilities and capabilities.

The manner in which individual firms are tackling their specific problems is summarized briefly in the items below. There will be further reports in the next issue.

Garrett Manufacturing Ltd., Rexdale, Ont.

Formerly known as the Garrett Mfg. Corp. of Canada Ltd., this company, a subsidiary of the Garrett Corp., Los Angeles, Calif., was a leading supplier on the Avro Arrow program. Items supplied by them included the pilot's engine performance presentation system, and totaled about \$100,000 worth of equipment on each aircraft. Following the cancellation of the Arrow, employment at the plant was cut from a peak of over 100 down to a staff of 75.

Confident in the future of the aviation industry in Canada, the company was reluctant to dispense with its engineering people and has engaged in measures to keep them employed. Garrett has even hired key people released by other Canadian companies following the Arrow cancellation and sent these temporarily to the parent

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company in the U. S. for interim employment.

Current aviation work in the plant includes components of systems on the Canadair Forty-Four: air conditioning, cabin pressurization and temperature control, wing spoiler actuating systems, etc., involving various valves, heat exchangers, actuators and controls. An original item designed and manufactured for the Canadair transport is the galley refrigerator which is of lightweight design and forms an integral part of the airplane galley. Garrett is also engaged in work on Canadair's Argus, the 540, and CL-41 utility jet.

The company has hopes of a substantial amount of work in connection with the F-104 program.

Garrett Manufacturing has actively supported the defense-sharing concept and recently sponsored a visit by parent company personnel to a number of Canadian facilities who could participate in such a program. It is hoped that as a result of this tour, orders will be placed in Canada with some of these manufacturers.

Dowty Equipment Ltd., Ajax, Ont.

Diversification measures adopted by Dowty Equipment over the past five years helped to soften the blow of the cancellation of the Avro Arrow, but the company still had to retrench and make staff reductions. Belief in the future of the aviation industry in Canada and intensification of sales efforts has brought results and the picture today is a much happier one. The company has secured three orders from the Boeing Airplane Company which it regards as trial orders, and reports very good co-operation from DDP in the defence production sharing field.

Dowty has hopes of participation in the F-104 program, the liquid spring shock absorber of the main landing gear being a patent of the English parent company, and has other irons in the fire.

Current work includes repair and overhaul of the CF-100 gear, production of a number of items on the Canadair Forty Four, including the wheels, brakes, anti-skid device, rigid pipelines, actuators, etc., actuators on the CL-41, and flap actuators on the de Havilland Caribou. The company also maintains service support on the Fairchild F-27 main gear in North America, and on Dowty and Dunlop equipment in use by TCA and Canadian Pacific Air Lines.



TAXIING TESTS of the Avian 2/180 Gyroplane were made at the end of last month, with TCA pilot Ron Peterson at the controls. In rear Avian president, Peter Payne.

Company has stepped up its industrial activities, producing hydrostatic transmissions for industrial and agricultural vehicles, and has also launched a marine division with plans for large-scale production of a turbine-driven family size speedboat.

Avian Industries Ltd., Georgetown, Ont.

This company owes its existence to the cancellation of the Avro Arrow program, having been formed in March this year by a group of former Avro engineers. Employed on a twin-engined VTOL project at Avro Aircraft, these men proceeded to design a light VTOL two-seat business/utility aircraft (the Avian 2/180) around a single 180 hp Lycoming power plant. The prototype was scheduled to fly at about the time this issue went to press.

Attempts to obtain Canadian Army orders, or support from the Defence Research Board for the project, have so far proved fruitless, though Peter R. Payne, president of the company, says that both the Canadian and U. S. Army have been impressed with the Avian 2/180's potential capabilities. From the numerous (about 400) enquiries received from prospective purchasers to date, the company is reported confident of a substantial market for the aircraft. About 20 people are currently employed.

Martin-Baker Aircraft Co., Ltd., Collingwood, Ont.

Cancellation of the Arrow contracts had no effect on the Collingwood plant of Martin-Baker, although if the program had continued there would possibly have been spares provision, repair, and overhaul work involved.

Company is currently modifying

RCAF seats to Issue 10 status and is in full production on an explosive canopy jettison system for the CF-100, approved by the RCAF in October this year. This work promises to keep the plant "very busy" until the latter part of 1960.

Selection of a seat for the F-104 is currently under discussion and the West German and Canadian air forces are attempting to standardize on this and other equipment for the aircraft. The Germans carried out a technical evaluation of both British and American seats and selected the Martin-Baker 5 seat; they are also converting their T-33 and F-86 aircraft to Martin-Baker seats. However, the RCAF appears to favor the Lockheed C2 seat, designed for the F-104.

W. Farrance, manager of the Collingwood company, pointed out that the survival pack developed for the Arrow Mark 5 seat could be utilized in the F-104. In addition, manufacturing techniques already established in Canada to handle the Martin-Baker seats could be easily adapted to the Mark 5 seat. The first 60 F-104 fuselages produced at Canadair, for the West Germans, will have been modified to take the Martin-Baker Mark 5 seat, he said.

Burndy Canada Ltd., Scarborough, Ont.

Having supplied terminals and other electrical wiring devices for the Arrow program, Burndy Canada Ltd. indicate that the gap left by its cancellation has been partially filled by recent encouraging developments within the industry. Such programs as the CL-66, CL-44, CL-28 and CF-111 at Canadair and the Caribou at de Havilland are expected to provide the necessary markets to bring sales back to the precancellation level.

Servomechanisms (Canada) Ltd., Toronto 15, Ont.

With 95 percent of its activity in the aviation field, Servomechanisms (Canada) Ltd., has suffered considerably from the vagaries of the defence planners. Participation in Velvet Glove, Sparrow II, the fire control system of the CF-100 Mark 6, and Astra, gave the company a succession of blows with the cancellation of these programs. This necessitated a staff cutback from a peak employment of 150 down to 40, the latter figure including the company's skilled engineering personnel, but today a sufficient backlog of orders has been built up to enable a staff expansion program.

The company has continued to receive small development contracts from DDP, but its mainstay has been the manufacture of range servos for the RCAF and the U.S. The Canadian company is now the sole source of this item, originally developed by the parent company. Fitted to the CF-100, the F-84 and F-86, these have also been supplied to Australia, South Africa, Germany and Japan.

Under production sharing, Servomechanisms has received several orders from the parent company for jobs normally subcontracted to U.S. firms. These are now open to tender from Canadian sources owing to the removal of the Buy American restrictions. Another recent filip was the award of a \$534,443 contract by DDP for radio set control systems for the RCAF.

Future aviation prospects include hopes for participation in the F-104 fire control and bombing systems as subcontractor, and bids in on components for the Canadair Forty Four. Company is considering manufacture of all breadboard servo components produced by the Mechatrol Division of the parent company on increasing sales in Canada to universities, schools and private firms. Present Canadian line covers servo amplifiers and power supplies only.

The precise nature of the company's products has made it difficult for it to find work outside of the aviation industry, but attempts are being made to diversify by the production of industrial servos and controls, and commercial items. The aim is to diversify, but not to dilute the quality of the products. It is estimated that the company will derive the majority of its income from the aviation field for the next three or four years, but that within five years, 50 percent of the company's business will be outside aviation.

Canadian Flight Equipment (Cobourg) Ltd., Cobourg, Ont.

Completion of an RCAF cartridge actuated device retrofit program contract simultaneous with the cancellation of the Avro, placed Canadian Flight Equipment in dire straits. Employment was cut from almost 50 down to 27, but with increasing prospects the staff is now being built up once again. In September the company received its first order as a preferred source of the U. S. government for the modification and overhaul of cartridge actuated devices—for ejection seats and similar equipment.

Company is also doing repair and overhaul work on cartridge actuated devices for the Canadian government, and has a contract from Canadair for the manufacture of aircraft seats for the Canadair 540. Participation in the F-104 program is hoped for, and depending upon which type of ejection seat is selected for the aircraft, Canadian Flight Equipment may land a substantial contract. If the American type seat, as fitted to the present F-104's, is chosen, the company may manufacture "a large piece" of the seat itself, and the associated cartridge actuated devices.

York Gears Ltd., Toronto 19, Ont.

A company which at the height of Korean crisis production employed about 1,220 people, York Gears Ltd., is today down to a payroll of about 200. This low figure was reached after a 40 percent staff reduction following the Avro Arrow cancellation. Company nevertheless has confidence in the future of the aviation industry in Canada and in its own ability to sell quality precision engineering both inside and outside this country. Current work includes overhaul of gear boxes originally supplied to the RCAF for the Canadair Argus, and the CF-100, as well as for the Lockheed Neptune. Manufacturing activity includes production of control gear boxes for the Canadair Forty Four and the CL-28 Argus, as well as intricate assemblies for the U. S. production-sharing program.

Future prospects have brightened with a subcontract from Orenda for the transmissions and take-offs for the General Electric J-79 engines to be produced for the Canadair-built Lockheed F-104's. Company hopes to make other precision machine parts for the interceptor also. At present negotiations are in final stage for production of transmissions for major U. S. aircraft manufacturer.

Parmatic Engineering Ltd., Toronto 18, Ont.

One of the firms for whom bankruptcy was predicted when the Arrow axe fell, Parmatic Engineering was still showing signs of life last month, although the firm's operations have shrunk considerably. Heavily committed on the Arrow, Sparrow and Iroquois projects, in the supply of filters, pressure switches, etc., Parmatic was left with \$10,000 worth of orders on its books following the cancellation—and a weekly payroll of more than half this amount. The 8,000 sq. ft. plant at Owen Sound, Ont., was closed down almost immediately, and the number of employees cut from 60 to about a dozen. The remaining staff was transferred with a limited amount of machinery to a small plant in Etobicoke.

Parmatic has increased its representation of U. S., U. K. and European industrial filter manufacturers, and has also set up an American subsidiary, Parmatic Aero Products Inc., with a view to facilitating its building into American markets.

Raytheon Canada Ltd., Waterloo, Ont.

During the past year, two scan converters designed and built by Raytheon Canada Ltd., for the Department of Transport, have been delivered for use at Ottawa and Winnipeg and one has been provided for its parent company in the U. S., for demonstration purposes. These provide a great improvement in display for air traffic control purposes, giving the operator a bright and lasting picture of the traffic situation. This equipment won the 1959 Design Award when displayed at the recent Canadian Convention of the Institute of Radio Engineers. Award is presented by the Canadian Region of the IRE for what they adjudge to be the best product designed and made in Canada on display at the exhibition.

The bright display radar has wide application providing considerable potential business for the company in Canada and abroad.

Company was not affected by the Avro Arrow cancellation; manufactures and sells electronic tubes and other equipment to the aviation industry. It has designed, manufactured and installed the 15 heavy radars used at key airports throughout Canada by the DOT for approach/departure and en-route control. Radar display equipment used by the FAA in its en-route radars was also designed and manufactured at Raytheon Canada.

Canadian SKF Co. Ltd., Scarborough, Ont.

Three quarters of a million dollars worth of business was lost to Canadian SKF with the cancellation of the Iroquois engine, and hopes of recouping some of this by subcontracting to Orenda on the J-79 for the F-104 can be realised only if full Canadian manufacture of the engines is achieved.

Company manufactures precision ball and roller bearings, and about one fifth of its business is in the aviation field. A considerable amount of work is currently being done under contract to Canadian Pratt and Whitney, providing bearings for the latter company's piston engine production program, which now serves all North America. Attempts to participate in defense production sharing have so far proved fruitless.

In immediate outlook, the company's aviation representatives are only "mildly optimistic," but in the long term they see a considerable potential in civil aviation in Canada.

Cannon Electric Canada Ltd., Toronto 16, Ont.

One of the few companies that has increased its volume of business since "Black Friday"—day of the cancellation of the Arrow program—is Cannon Electric Canada Ltd. Company lost about one third of its business with the termination of Arrow contracts, but has recouped completely and stands to increase its volume by about 10 percent in the current year compared with 1958. Furthermore, company officials anticipate a 25 percent further increase in 1960.

The Arrow gap was filled by orders from Canadair for electronic plugs for the CL-44, work for Canadian General Electric on its U.S. ground radar contract, and by U.S. orders gained through defense production sharing. The company's representatives are enthusiastic about the plan and about the assistance rendered by DDP in paving the way, by negotiating relaxation of tariff and other restrictions.

Roughly 85 percent of company's business lies in the aviation and allied electronics field, and about half of that portion is military. Future hopes and prospects include a reasonable participation in the F-104 production program, and these are enhanced by the fact that there are a number of plugs produced by the U.S. parent company on the Lockheed aircraft.



BRITANNIA TEST STAND. Set up for checking instrument system of Canadian Pacific Air Lines' Britannias, this test stand is part of the facilities of S. Smith and Sons (Canada) Ltd. Company also has dustproof instrument lab at Don Mills, Ont., plant.

Vokes Canada, Div. of Douglas Engineering Co. Ltd., Toronto 19, Ont.

Little or no hope is held by this company for future participation in military aviation business, although still filling contracts for filter spare requirements for the CF-100s. Other aviation work includes the supply of air intake filters to de Havillands for the Beaver, Otter and Caribou, and the company is involved in the supply of water stripper fuel filtration equipment. Company content to allow aviation items to fill a diminishing portion of its order book.

Collins Radio Co., of Canada Ltd.

Not seriously affected by the Arrow cancellation, Collins Radio Company of Canada Ltd., is presently engaged in the manufacture of the AN/ARC 552 UHF airborne transceiver for retrofit to aircraft of the RCAF. This is Collins' main aviation program, and the company has hopes of supplying a repackaged version of the AN/ARC 552 for the F-104. Another prospect in the aviation field is the manufacture of a TACAN system required by the RCAF for both the F-104 and for retrofit to other aircraft. As regards production sharing, Collins of Canada is concentrating principally upon negotiation on programs that the parent company, Collins Radio Company, Cedar Rapids, Iowa, is conducting for the U. S. military.

S. Smith and Sons (Canada) Ltd., Don Mills, Ont.

The Aviation Division of the above company was formed only about three and a half years ago, and consequently did not become involved in the Avro Arrow program. Since its formation, as the Canadian subsidiary of the parent group of Aviation companies in the U. K. (Smiths Aircraft Instruments, Kelvin and Hughes, K.L.G., and Waymouth Gauges Ltd.) the division has concentrated on civil aviation business and has continued to expand.

Company engages in the sale and overhaul of the products of the parent group of companies, and expects to set up in the manufacture of components and the simpler instruments in the near future. Current work includes servicing the instrument systems of CPA's Britannia aircraft, and overhaul work for operators as far afield as Mexico, Vancouver, Cuba, and Venezuela.

At present, aviation work represents about a third of the Canadian company's business, and while not over-optimistic about increasing their volume of aviation business in the near future, the officers of the division are confident that civil aviation particularly is going to expand enormously in years to come. Meanwhile, the present volume is a worthwhile contribution to the company's operation.

Their confidence is reflected in the aviation section of the company's modern new Toronto plant, which includes an instrument laboratory with test, research and development capability. An additional facility was recently established at Vancouver.