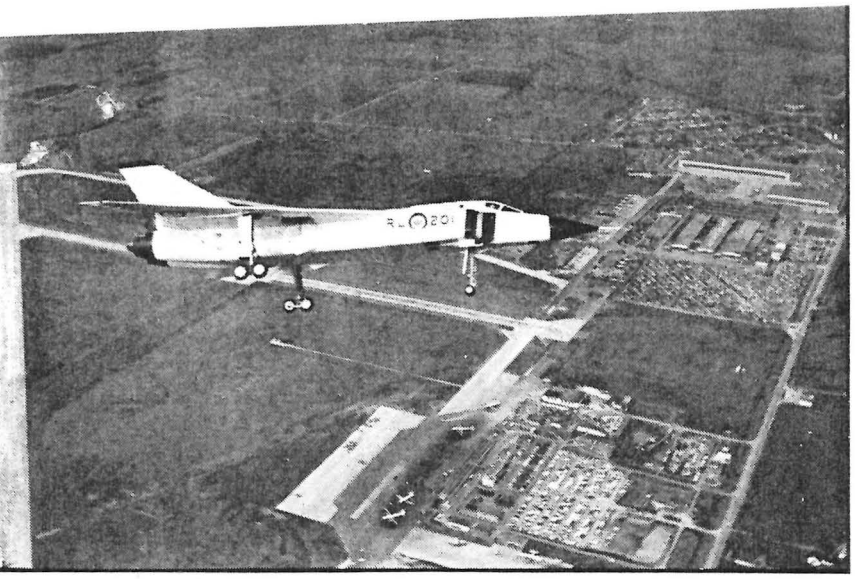
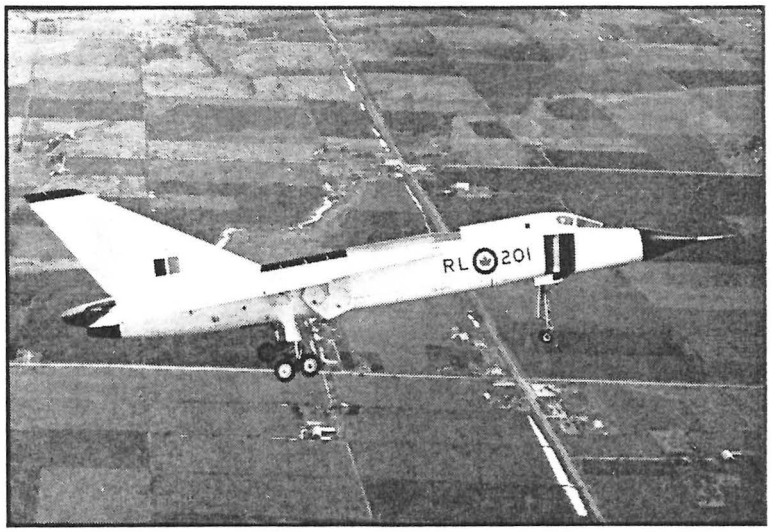
The Arrow Airborne

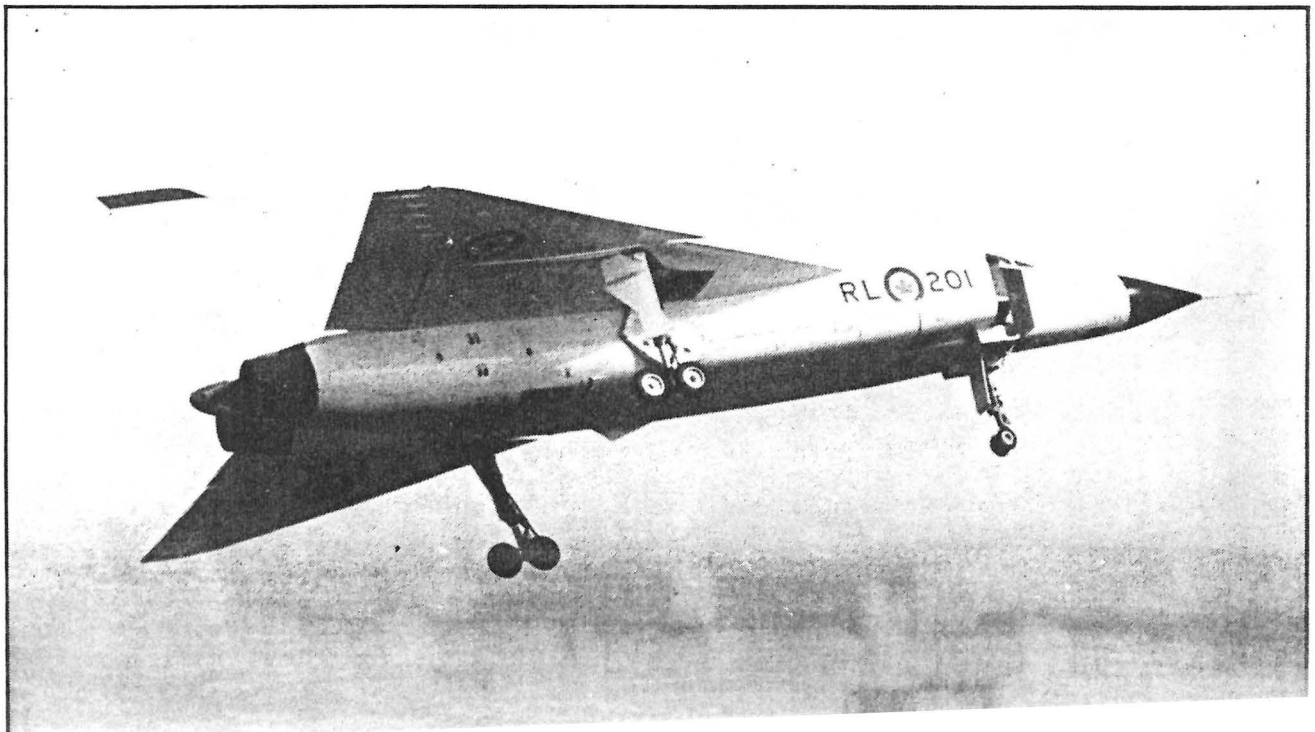


The Arrow turns over the Avro plant preparatory to landing.



Nose high, Arrow tools along over southern Ontario on first flight.

As Arrow rolls into a turn, faint outline of the big weapons bay, just behind the nose gear, becomes evident.



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Following successful completion of first flight, Avro Test Pilot Jan Zurakowski gets carried away by it all.

HE DID IT!

IT WAS TUESDAY, March 25, and though the hour was just 6 a.m. there was hustle and bustle aplenty at Avro Flight Test. The Malton, Ontario, company's big white CF-105 Arrow stood on the apron submitting to last minute checks and preparations. The hydraulic fluid leak —which on the previous Saturday had caused the aborting of the scheduled first flight at almost the very last minute—had been put right.

One by one the items on the long check lists were ticked off.

The story is told, probably apocryphal, that at dawn on Tuesday, an Avro soothsayer had examined the entrails of a freshly-killed chicken and, finding no sign of portentous events, declared the day auspicious for the Arrow to venture into the air.

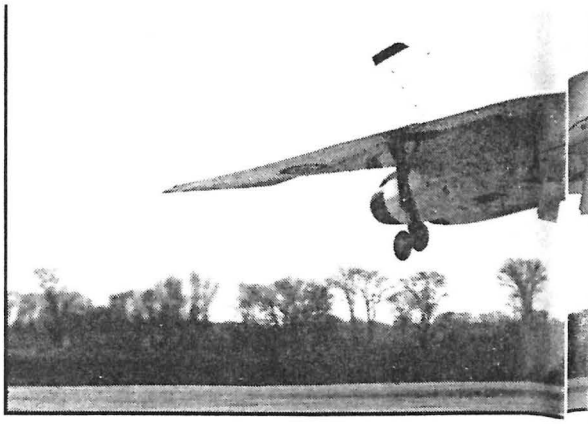
Shortly after 9 o'clock, Jan Zurakowski, Avro's chief engineering test pilot, unlocked the Arrow's brakes, cracked the throttles and taxied out to the button at the end of the 11,050 ft. Runway 32, Malton's longest. The final pre-flight check-off began. Meanwhile, the two chase-planes took off; one of these, a CF-100, was flown by "Spud" Potocki, Avro experimental test pilot, with Avro photographer Hugh Mackechnie holding down the back seat. The other chase-plane was a Sabre, piloted by Flight Lieutenant Jack Woodman, an RCAF resident test pilot at Avro. One of Woodman's duties was, if necessary, to fill in gaps in Mackechnie's photo coverage with a movie camera which was fitted atop his hard hat.

Runway 32 runs approximately NW. One of the best vantage points for viewing aircraft movements on it is a parking lot at the end of the service road which provides access to the hangar area on the south side of the airport. However, owing to a slight rise in the ground north of the first third of the runway, the observer from this point finds that his view of the first 3500 feet of 32 is obscured.

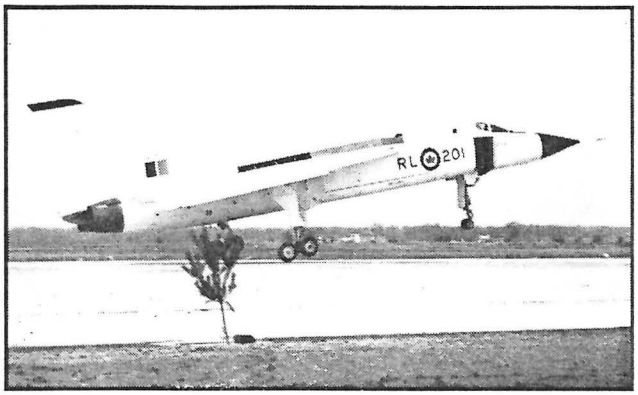
Between 9 and 10 a.m., there was a

(Turn to page 16)

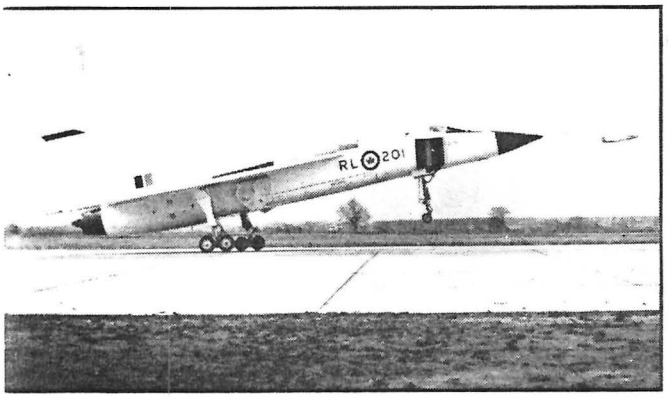
CF-100 chase-plane pilot Spud Potocki (L) fills in Avro President John Plant (R) on details of the Arrow's maiden flight.



The Arrow rounding out for first landing.



Airborne! "Avro 201 off at 9:51." 35 mins. were logged.



Nosewheel off, the Arrow roars down runway on take-off for first flight.

layer of 5/10 alto stratus at 14,000 feet and a broken layer of cirro stratus at an estimated 21,000 feet, a poor backdrop for an all-white airplane. The surface wind was generally from the NE at about nine mph. It was, in other words, primarily a crosswind, with some tendency to quarter by occasionally swinging more to ENE.

The two chase-planes circled tirelessly around the perimeter of the field at circuit height. As the hour entered its last quarter, they tightened their turns, closing in on the now-poised Arrow.

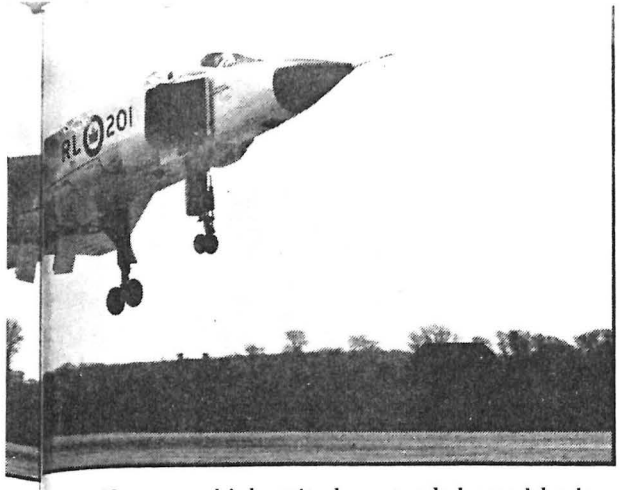
Though from *Aircraft's* observation point it was not possible to see the Arrow, the crescendo of engine noise signalled the start of the take-off run. Simultaneously, the two chase-planes straightened out, taking up courses low on either side of the runway, the CF-100 to the Arrow's right, the Sabre to the left.

Suddenly the Arrow burst into view from behind the view-obstructing rise in the ground. It was rolling along at a steep angle of attack, nosewheel already high off the runway. Then it simply flew off in one clean motion that was at once smoothly continuous, yet positive. Maintaining the same angle of attack, it flew just above and parallel to the runway momentarily before climbing away at an angle of about 35°, with faint trails of black J-75 smoke merging behind, perhaps symbolically marking in passing the course to the supersonic future.

Malton control tower laconically recorded the event: "Avro 201 off at 9:51 . . ."

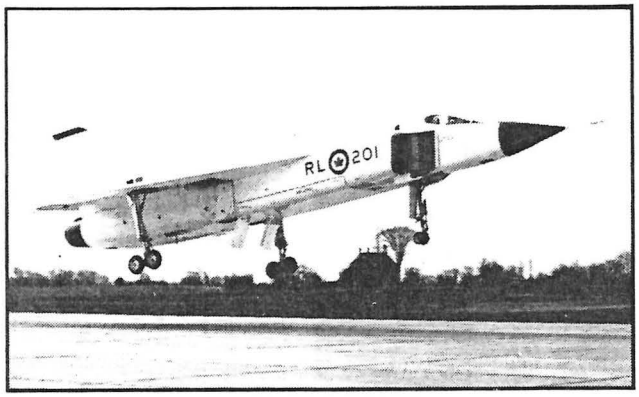
Possibly because the light wind was blowing away from the observation point, which was about 1,200 feet from the break-ground point, engine noise at take-off was not excessive. In fact it was not even particularly noticeable, never rising above a healthy rumble. Observers on the downwind side might, however, have a different story to tell.

Estimated take-off distance was something less than 4,000 feet. Initial rate of climb, according to post-flight remarks attributed to Jan Zurakowski, was 3,000 fpm. Exact take-off weight



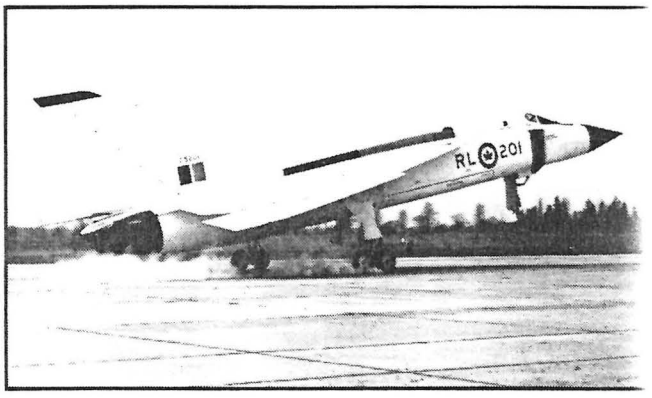
Note nose-high attitude, extended speed brakes.

F L Jack Woodman, Sabre chase-plane pilot, wearing special cine-helmet used to get flight movies for engineering studies.



As flying speed dies away, Arrow settles onto runway.

A puff of smoke and dust from the tires mark completion of the flight.



is not known, but Avro President & General Manager John Plant, in an interview some weeks before the actual flight, said the airplane would be flying at about 35,000 lbs. (Figures as high as 68,000 lbs. have been mentioned in connection with the Arrow's maximum gross weight).

The flight was uneventful, following in exact detail the flight plan, which was aimed mainly at giving Zurakowski a chance to get the feel of the aircraft and also obtaining engineering and publicity still photos and movies. Automatic instrumentation in the weapons bay relayed flight information to the Avro ground station to supplement the pilot's personal impressions. The stalky undercarriage remained down throughout most of the flight, being retracted only for a brief period at 5,000 feet, then extended again.

During the course of the 35-minute flight, which never went above 10,000 feet, the Arrow passed over Malton several times. It appeared to be flying at a relatively high angle of attack each time. This, and the extension of the gear throughout most of the flight, may be attributed to the fact the flight plan called for the entire flight to be made at speeds of something less than 350 kts. Maximum speed attained was, in fact, reported to be 300 kts.

When the flight was about half an hour old, the Arrow and its two buddies—the CF-100 flying abeam and the Sabre bringing up the rear—began to let down to get into the landing pattern. The approach and landing were apparently simple routine, being noteworthy only as an example of smooth handling of an unfamiliar aircraft in a crosswind that had by then freshened to 14 mph. The hold-off and landing were made in the nose-high attitude that is characteristic of delta wing aircraft.

A puff of smoke and dust from the tires signalled that the main gear had made contact with the runway (about 1,000 feet from the approach end). The brake chute popped and developed immediately, slowing the aircraft quickly almost to a dead stop by about the intersection with Runway 28, this point being approximately 6,000 feet from the approach end of 32. Zurakow-

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lands like a scared partridge. Performance figures put out by Piper say: cruise range normal of 960 miles in 6 hours, at 75% power, 160 mph at 8,000 ft. Cruising range optimum (i.e.: at as close to empty weight as possible): 7½ hours, 1100 miles. Absolute ceiling for the Comanche at 2,000 lbs. gross weight, is said to be 28,000 ft.

Power package consists of a Lycoming 0-360 A1A, 180 hp at 2700 rpm, driving a Hartzell variable pitch prop. Pitch is controlled by a push-pull lever in the cockpit, with a vernier screw system incorporated. For all normal changes of pitch, the vernier screw is ample. Trans Aircraft officials state that a souped-up Comanche with 250 hp engine will be available for delivery in Canada in June.

Features on the Comanche that rate a gold star from this writer are the electrically-operated undercarriage; the night flying instrument panel illumination; the auxiliary fuel pump and fuel tank selector lever on floor between seats. The items that could stand improvement in this opinion are: the windscreen defrost arrangement which is inadequate; and the miniature-size engine temp. and fuel quantity dials that are hard to read.

In the advice-to-new Comanche-owners column we have some suggestions. Provide yourself with the list of VHF frequencies installed in your bird and mount it in the cockpit. On cross-country flights, alternate on your fuel cells to avoid large changes in lateral trim. Thirdly: on exit from the Comanche, beware the curved upper contour of the door as you straighten up on the wing. Or do you want a barked beak like mine?

Sum-up on the C-munch: With the under-$20,000 price tag for Canadian consumption, Piper have a best-seller on their hands.

CESSNA 175

(Continued from page 36)

is unusable only when the aircraft is being operated at best angle of climb. Total fuel capacity is available for normal cross-country operation. Dimensions of the 175: length 36 ft.; span 24 ft.; height 8 ft. 6 inches. Wing area is 175 sq. ft.; wing loading 13.4 lbs. per sq. ft., and power loading is 13.4 lbs. per horsepower.

COMING EVENTS

April 28-30—IAS/USAF Office of Scientific Research Astronautics Symposium, Denver, Colorado.

May 4-8—National Industrial Production Show, Industry Bldg., Exhibition Park, Toronto.

May 19-22—Annual National Conference, Soc. of Aeronautical Weight Engineers, Belmont Plaza, New York City.

May 26-27—CAI Annual General Meeting, King Edward Hotel, Toronto.

May 31-June 1—Prince Edward Flying Club, Fly-In Fishing Weekend, Picton, Ont.

June 9-10—Canadian Conference for Computing and Data Processing, University of Toronto.

June 14—Air Force Day across Canada.

June 24-26—31st Meeting, Aviation Distributors & Mfrs. Assoc., Mt. Washington Hotel, Bretton Woods, N.H.

June 25-27—Air Transportation Conference, American Inst. of Electrical Engineers, Statler Hotel, Buffalo, N.Y.

July 8-11—IAS National Summer Meeting, Ambassador Hotel, Los Angeles, Calif.

September 8-13—First International Congress, International Council of the Aeronautical Sciences, Palace Hotel, Madrid, Spain.

September 29-October 3—SAE National Aeronautic Meeting, Aeronautic Production Forum and Aircraft Engineering Display, Ambassador Hotel, Los Angeles, Calif.

October 7-8—CAI/IAS 1958 Joint Meeting, Chateau Laurier, Ottawa.

October 8-10—IRE 1958 Convention & Exposition, Automotive Bldg., Exhibition Park, Toronto.

Float tests on the aircraft have been completed, and aircraft with float fittings were scheduled to be available for April delivery.

SAC MEETING

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ronto, Ottawa and Kingston as well as representatives from the Montreal area.

It was pointed out that the Tiger Moth aircraft, now used as tow-craft for sailplanes by the glider clubs, are obsolete and fast disappearing from the scene. It was noted also that under the current reserve pilot training program of the RCAF, the Chipmunk aircraft now is redundant. The meeting decided to write to the Air Force and make a strong plea that a number of Chipmunks be released to the gliding clubs for use as tow aircraft.

Paul Schweizer, vice president of the well-known sailplane manufacturing firm Schweizer Aircraft Corp., Elmira, N.Y., addressed the evening banquet. Mr. Schweizer, who spoke in his capacity as president of the Soaring Association of America, discussed the organizational set-up and growth of soaring clubs and the need for full-time staff as glider flying becomes more popular. It was felt that the time is opportune in Canada for a number of clubs to have full-time managerial assistance. This would follow the pattern set by the flying clubs.

AVRO ARROW

(Continued from page 17)

ski then jettisoned the brake chute and taxied back to Avro Flight Test.

The long-awaited first flight, almost anti-climactic in its realization, was over.

The two chase-planes made a low pass in front of the Malton passenger terminal building, Potocki in the CF-100 turning off to the left to join the circuit and Woodman in the Sabre following him after executing an exuberant victory roll.

SINCE THE initial flight, the Arrow has been airborne on several occasions. It made its first supersonic run on April 3, when it reputedly attained Mach 1.4 at 40,000 feet.

According to reports of this flight, Zurakowski followed up his supersonic excursion with low-level pass over the Avro plant, then pulled up into a steep climb which left the CF-100 and Sabre chase-planes staggering along behind. *Tempus fugit.*

Though little is known at this time about the flying characteristics of the Arrow, it is thought that they would be similar to others of the delta species. With any delta wing aircraft it is important to establish the take-off position quickly. Small movements of the stick are advised during the critical stages of the run.

The Arrow is believed to stall out at around 160 kts. The stall is gentle with the aircraft mushing straight ahead. Conventional spins can be induced in delta wing aircraft, but with considerable height loss. In the landing pattern, the Arrow drops its gear at some 240 kts. and comes around the corner at 180 kts. Across-the-button speed is 170 kts., with the braking chute being used for every landing.

Like some other delta types, the Arrow is reported to tend to some lateral instability at the trans-sonic stage. One solution to this problem, as applied to the F-102A for example,

has been to increase fin area (40% for the production on F-102A). However, the Avro approach was to incorporate a gyro-actuated damping system into the control system. So far, it has been indicated, this system appears adequate to control directional oscillation in the trans-sonic speed range.

DC-8

(Continued from page 32)

1959 and further courses will be held in September, which is the month when the airplane will don its TCA livery. Certification of TCA's DC-8 will take place in February of 1960 and it will be ready to begin service on trans-continental and trans-Atlantic service in mid-summer of the same year.

TCA notes that it called for few modifications to the DC-8. The airline examined some 180 proposed changes but actually adopted only 35 major modifications which were considered necessary to equip the aircraft properly for integration into TCA's fleet. These included changes to radio, electronics and instruments, interior, water systems, engine starting systems, cargo tie-down facilities, anti-skid braking, etc.

Conway Power: It will be recalled that TCA has specified Rolls-Royce Conway engines as powerplants for its DC-8's. All other purchasers of the airliner have so far specified Pratt & Whitney J-57's or J-75's, these being the engines originally selected for the airframe by Douglas.

There is a Conway mock-up at the Douglas plant now, and TCA has made certain suggestions which have been followed up by the manufacturer. A TCA team is scheduled to go to California to complete mock-up plans. Rolls-Royce reports that to date more than 1,000 hours of actual flight time have been accumulated by four Conways, plus several thousands of hours of test stand running. Development of the Conway is proceeding according to plan and the first copies of the engine are to be on hand at the Douglas plant in August of this year.

The first DC-8, which was to be rolled out around the end of last month, belongs to Douglas and will be used for test flying and certification of the type. Later it will be sold. The second aircraft will be delivered to United Air Lines. It might be mentioned that all of the first airplanes to be produced will be used in connection with the flight before being delivered to the airlines which have ordered them.

Manufacturing Facilities: More than 3,400 persons are working on DC-8 production in one of the largest aircraft manufacturing plants in the world, covering just over a million square feet of floor area spread out over 23 acres. Some $20,000,000 was spent on the construction of the plant alone, and millions more in tooling. The wing and fuselage of the first airplane were joined last October, only 18 months after ground was broken for the facility.

Actual assembly line production is being carried out at the Long Beach plant, while component parts and other equipment were built at the nearby Santa Monica division.

At the Douglas plant, TCA maintains a staff of four, headed by L. K. (Ken) Rutledge, contract representative. The others are Jim Fairchild, aircraft inspector; Jack Ryan, radio and electrical inspector; and a secretary, Miss Sharon Dietz.