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AVRO AIRCRAFT LIMITED

ARROW 2

TWIN ENGINE SUPERSONIC ALL-WEATHER
FIGHTER

STANDARD AIRCRAFT CHARACTERISTICS

ISSUE 2



MARCH 1958

UNCLASSIFIED

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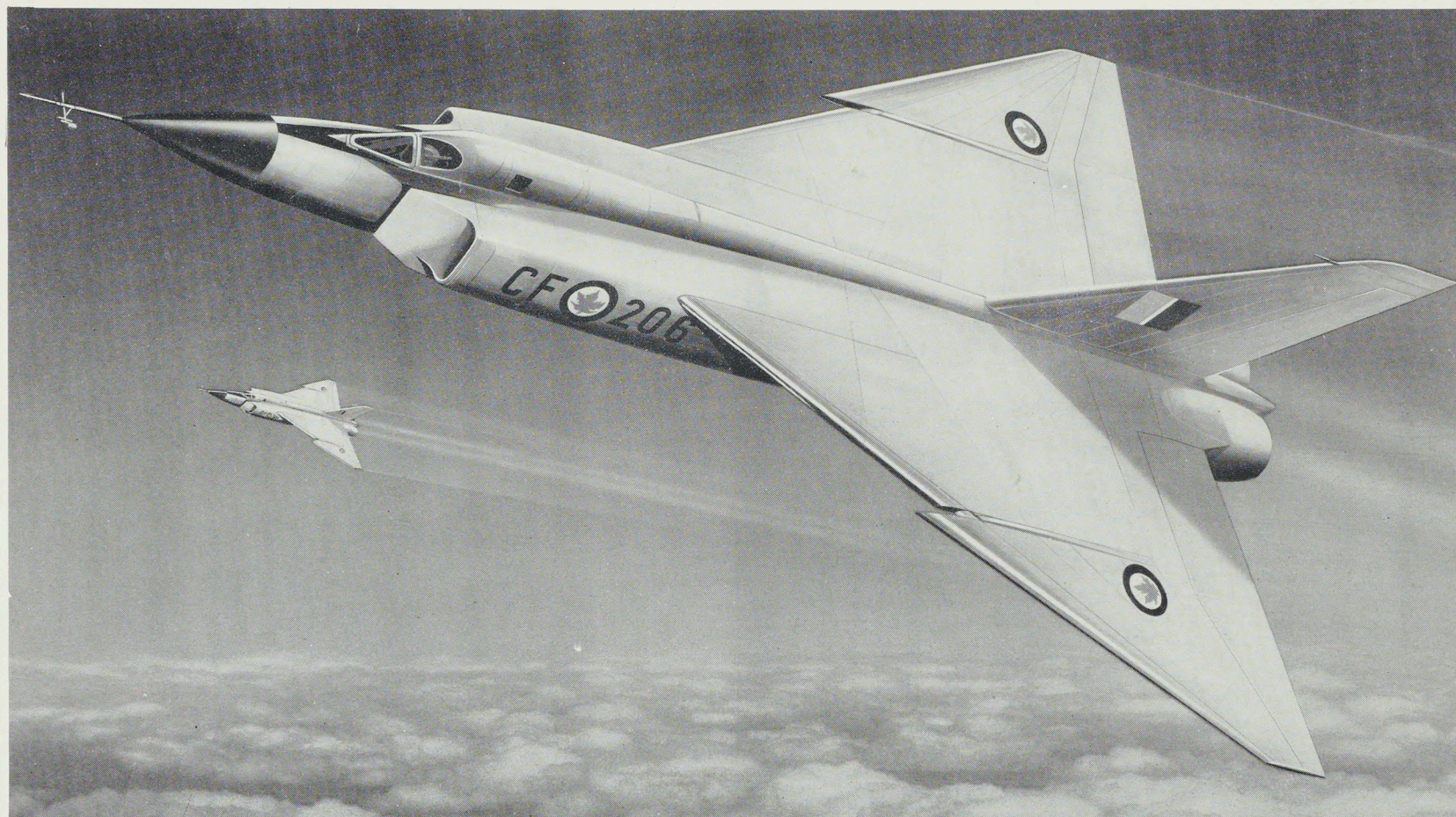
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Standard Aircraft Characteristics

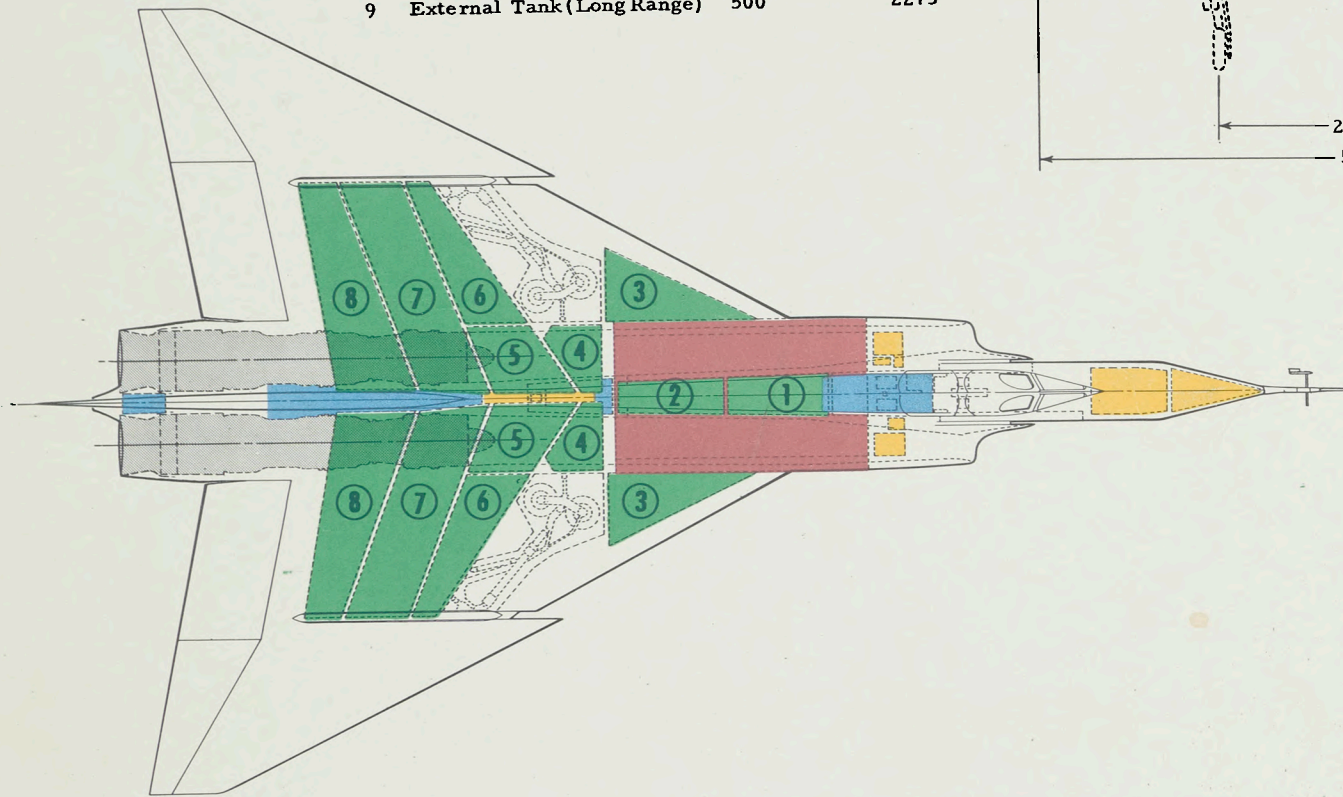
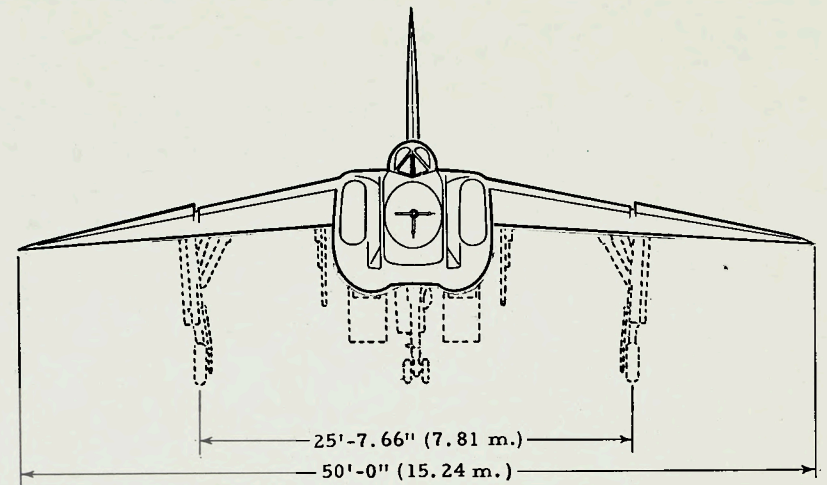
ARROW 2

AVRO AIRCRAFT LIMITED
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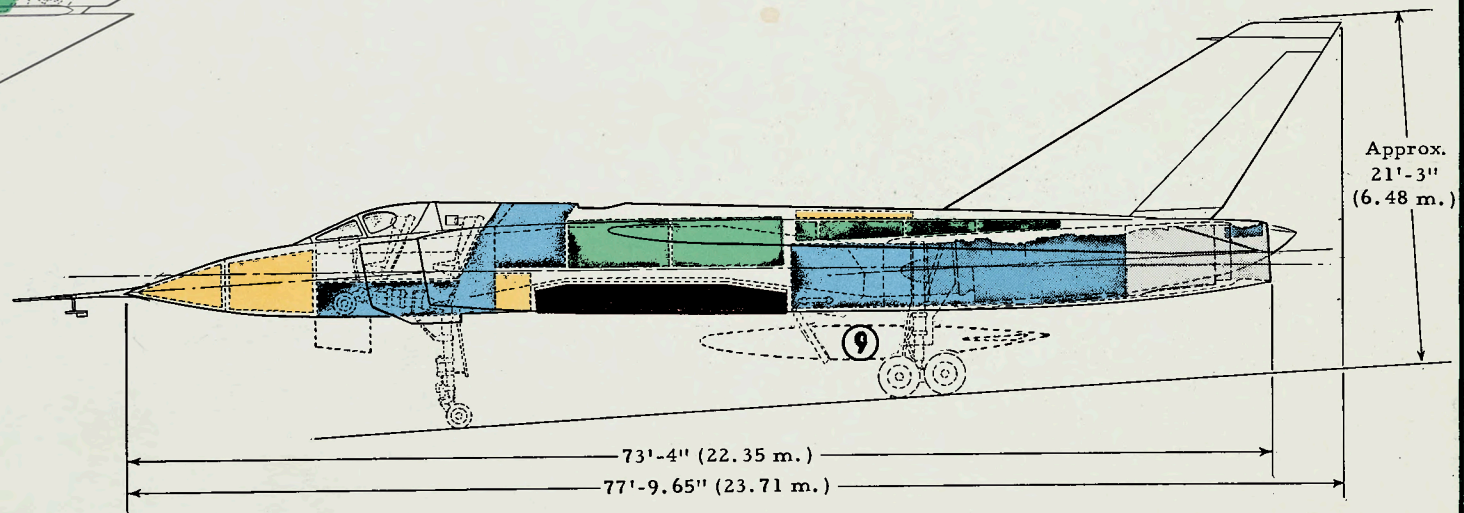
ISSUE 2

MARCH 1958

Tank	Location	Capacity	
		Imp.Gal.	Litres
1	Fuselage	252	1145
2	Fuselage	254	1155
3	Wing	151 each	686
4	Wing	90 each	409
5	Wing (collector)	146 each	664
6	Wing	154 each	700
7	Wing	279 each	1268
8	Wing	173 each	787
9	External Tank (Long Range)	500	2273



- AVIONICS
- ARMAMENT
- EQUIPMENT
- FUEL
- ENGINE



Mission and Description

The primary mission is high altitude, all-weather, long range, night and day interception and destruction of enemy bomber aircraft.

The secondary mission is similar, but performed at low altitudes.

A pilot and a navigator/radar operator are carried in the pressurized cockpit. Both crew members are provided with upward ejection seats.

The airframe is an all-metal stressed skin structure consisting of the following major sections; radar nose, front fuselage and air intakes, centre fuselage, duct bay, engine bay, rear fuselage, inner wings, outer wings and fin.

A hydraulic system provides power for the flying controls. A separate system provides for hydraulic operation of the landing gear, wheel brakes, speed brakes, nose wheel steering and missile launching gear. A high pressure nitrogen system permits extension of the landing gear in the event of hydraulic power failure. Emergency power for the wheel brakes is supplied by a hydraulic accumulator.

The tricycle landing gear has twin wheels at the nose leg and a two wheel bogie at each of the main legs. The nose gear retracts forward into the fuselage. The main gear retracts inward and forward into the wing.

Internal fuel is carried in integral wing tanks and bladder cell fuselage tanks. An external fuel tank can be carried underneath the fuselage for long range operation.

Automatic anti-icing systems to prevent ice accretion are provided for the radome, cockpit transparent panels, and engines and accessories. De-icing systems are provided to eliminate ice on the pressure heads and at the engine air intakes.

An air conditioning and pressurization system provides suitable pressure and temperature conditions in the cockpit and in equipment areas.

FEATURES

Two man crew

Twin engine reliability

Combat ceiling 60,500 feet (18,440 m.)

Time from engine start to 50,000 feet (15,240 m.) = 5.13 minutes

* Combat radius of action (50,000 feet (15,240 m.) Maximum range mission) 300 naut. miles.

* Long range ferry mission with full internal fuel and 500 gallon (2,273 litres) external tank 1279 naut. miles.

* Calculations based on 19,438 lb. (8,817 kg.) internal fuel (vide Periodic Performance Report No. 12)

Maximum level speed M = 2.0

ARMAMENT

4 - Sparrow 2 Mark 1 fully active guided missiles.

R. C. A. ASTRA I Electronic System.

Leading Particulars

POWER PLANT

Manufacturer: Orenda Engines Limited
 Model: Iroquois
 Type: Two spool, axial flow turbojet with integral afterburner.
 Diameter: 47 in. (1.193 m.)
 Length: 232 in. (5.89 m.) from intake front face to rear face of afterburner nozzle.

FUEL

	Imp. Gals.	Litres
Twelve Integral Wing Tanks (Internal)	1,986	9,028
Two Bladder Type Fuselage Tanks (Internal)	506	2,300
One Long Range Tank (External under fuselage)	500	2,273
	2,992	13,601

Fuel of Specific Gravity = 0.78 used for performance data.

DIMENSIONS

GENERAL		
Length	77'-9.65" (23.71m)	Anhedral 4 degrees
Height over Fin	21'-3" (6.48m)	Aspect Ratio 2.04
Height over Canopy	14'-6" (4.42m)	Area 1225 sq.ft. (113.8 sq.m.)
Tread	25'-7.66" (7.81m)	Section
		- Inner Wing, NACA 0003.5-6-3.7
		Modified Camber (Neg) .0075
		L.E. Droop 8 degrees
		- Outer Wing, NACA 0003.5-6-3.7
		0003.8-6-3.7
		Modified Camber (Neg) .0075
		L.E. Droop 4 degrees

WINGS		
Span	50'-0" (15.24m)	
Sweepback at 25% chord	55 degrees	
Incidence	0 degree	

* WEIGHTS

Take-off weight with external tank	68,847 lb.	(31,228 kg.)
Normal take-off weight - 200 nautical miles (371 km.) radius high speed mission	62,431 lb.	(28,318 kg.)
Operational weight empty (without external tank)	45,161 lb.	(20,485 kg.)
Combat Weight (Half fuel weight for 200 nautical miles radius high speed mission)	53,796 lb.	(24,401 kg.)

Load factors of 10.00 g ultimate and 7.33 g limit at 47,000 lb. (21,319 kg.) combat stressing weight.

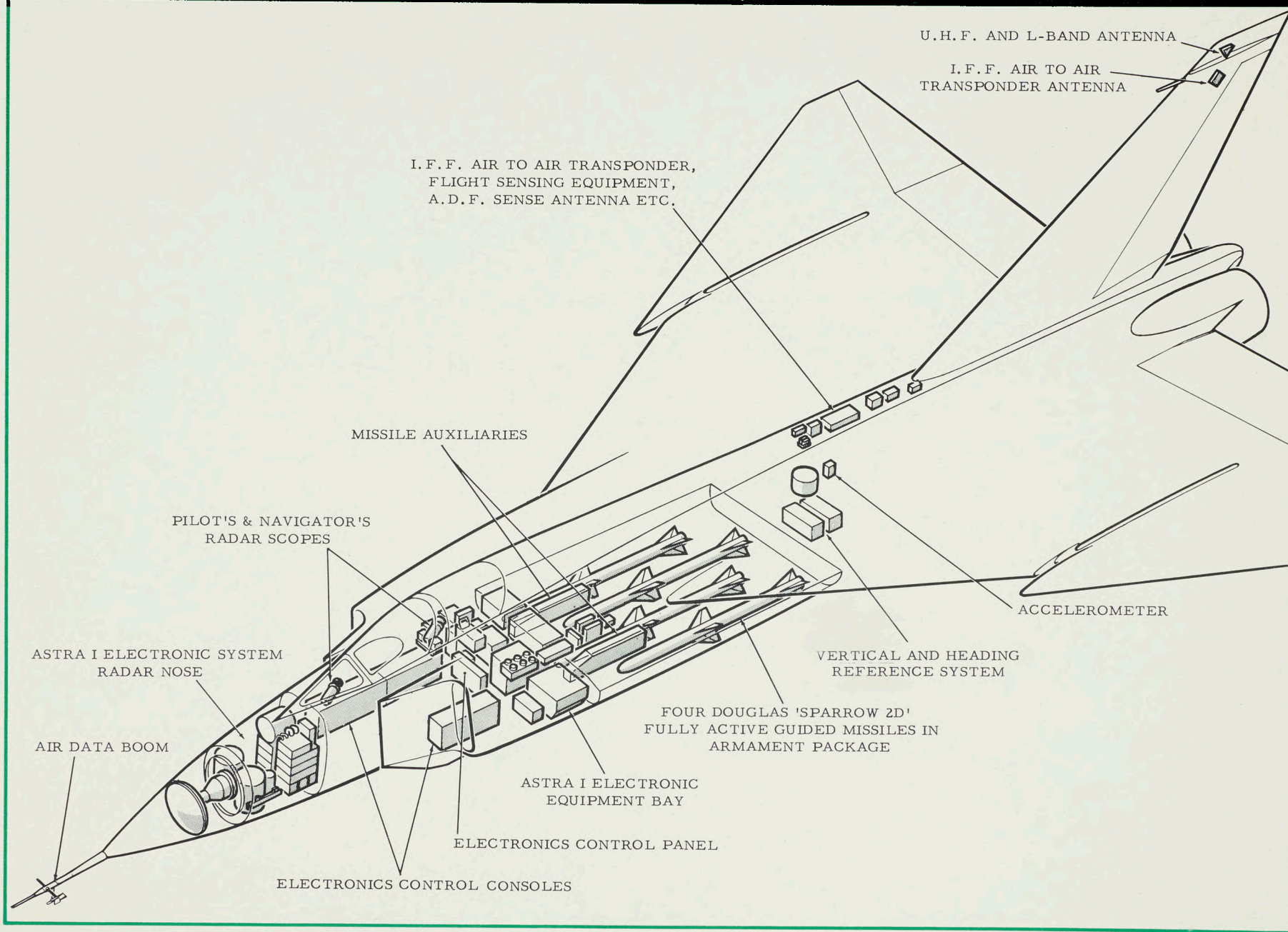
ENGINE RATINGS

Condition	I. C. A. O. Standard Sea Level Conditions		
	L. P. Compressor R. P. M.	Thrust - lb. (kg.)	S. F. C. lb/hr/lb. (kg/hr/kg)
Maximum with A/B	6,000	26,000 (11,793)	1.975
Maximum	6,000	19,250 (8,732)	1.03
Military	5,740	18,570 (8,423)	1.024
Normal	5,490	17,550 (7,960)	1.004

NOTES

*Weights quoted are those used as basis of Loading and Performance calculations (vide Periodic Performance Report No. 12)

Armament System



Loading and Performance

WEIGHT

Take-off Weight with 17,270 lb. (7,833 kg.) fuel	62,431 lb.	28,318 kg.
Maximum Take-off Gross Weight	68,847 lb.	31,228 kg.
Operational Weight Empty	45,161 lb.	20,485 kg.
Combat Weight	53,796 lb.	24,401 kg.
Normal Design Landing Gross Weight (as defined by Spec. AIR 7-4; MIL-S-5701) ..	47,743 lb.	21,656 kg.
Wing Loading at Normal Take-off Weight	50.9 lb./sq. ft.	248.5 kg./sq. m.
Power Loading at Normal Take-off Weight	1.42 lb./lb. thrust	1.42 kg./kg. thrust

SPEED

True Air Speed in Level Flight at Sea Level at Combat Weight		
Maximum Thrust (with afterburning)	* 700 knots	1,297 km./hr.
Maximum Thrust (without afterburning)	665 knots	1,232 km./hr.
True Air Speed in Level Flight at 50,000 ft. (15,240 m.) at Combat Weight		
Maximum Thrust (with afterburning)	* 1,147 knots	2,125 km./hr.

CEILING

Combat Ceiling at Combat Weight, Rate of Climb 500 ft./min. (2.54 m./sec.), Maximum Thrust at M = 2.0 (with afterburning)	60,500 ft.	18,440 m.
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RATE OF CLIMB

Steady Rate of Climb at Sea Level at Combat Weight		
Maximum Thrust at M = .92 (with afterburning)	44,500 ft./min.	226 m./sec.
Maximum Thrust at 527 knots (976 km./hr.) (without afterburning)	20,300 ft./min.	103 m./sec.
Steady Rate of Climb at 50,000 ft. (15,240 m.) at Combat Weight		
Maximum Thrust at M = 2.0 (with afterburning)	10,700 ft./min.	54 m./sec.

TIME TO HEIGHT

Time to 50,000 ft. (15,240 m.) M = 1.5 from Engine Start at Take-off Weight Maximum Thrust (with afterburning)	5.13 mins.	5.13 mins.
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MANOEUVRABILITY

Combat Load Factor at Combat Weight		
Maximum Thrust at M = 1.5 at 50,000 ft. (15,240 m.) (with afterburning)	1.56	1.56
Maximum Thrust at M = 1.8 at 50,000 ft. (15,240 m.) (with afterburning)	1.70	1.70

Performance under I. C. A. O. Standard Atmospheric Conditions to R. C. A. F. Specification AIR 7-4. *AIR 7-4 Placard Speed

Loading and Performance

TAKE-OFF DISTANCE

Take-off Distance over 50 ft. (15.24 m.) obstacle at Sea Level
at Take-off Weight = 62,431 lb. (28,318 kg.)

Maximum Thrust (with afterburning)	3,430 ft.	1,045 m.
Maximum Thrust (without afterburning)	5,600 ft.	1,707 m.
Maximum Thrust, Hot Day, (with afterburning)	3,780 ft.	1,152 m.
Maximum Take-off Gross Weight (with afterburning)	4,300 ft.	1,310 m.

LANDING DISTANCE

Landing Distance over 50 ft. (15.24 m.) obstacle at Sea Level at
Normal Design Landing Gross Weight

5,450 ft.	1,661 m.
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STALLING SPEED

True Stalling Speed in Landing Configuration at Normal Design Landing
Gross Weight at Sea Level

114 knots	211 km./hr.
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RANGE

Combat Radius of Action at 50,000 ft. (15,240 m.), Climb at M = .92
Accelerate to M = 1.5 at 30,000 ft. (9,144 m.), Climb at M = 1.5 to
50,000 ft. (15,240 m.), Cruise-out at M = 1.5 at 50,000 ft. (15,240 m.)
Combat for 5 minutes at M = 1.5, Cruise-back at M = .92, 15 min.
stack at 42,500 ft. (12,954 m.), 5 min. fuel reserve on landing.

High Speed Mission with 17,270 lb. (7,833 kg.) fuel	200 naut. miles	371 km.
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Combat Radius of Action at 50,000 ft. (15,240 m.) Mission as above
except Cruise-out at M = .92 at 37,500 ft. (11,430 m.)

Maximum Range Mission with 17,733 lb. (8,043 kg.) fuel	300 naut. miles	556 km.
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Ferry Range Mission at Economical Cruise Speed, Climb to 36,089 ft.
(11,000 m.) at 527 kts (976 km./hr.) T.A.S., Cruise Climb from
36,089 ft. (11,000 m.) to 40,000 ft. (12,192 m.) at M = .92, 15 mins.
stack at 40,000 ft. (12,192 m.), 5 mins. fuel reserve on landing.

Range with Full Internal Fuel and 500 gallons (2,273 litres) external tank (S.G. = 0.78)	1,279 naut. miles	2,370 km.
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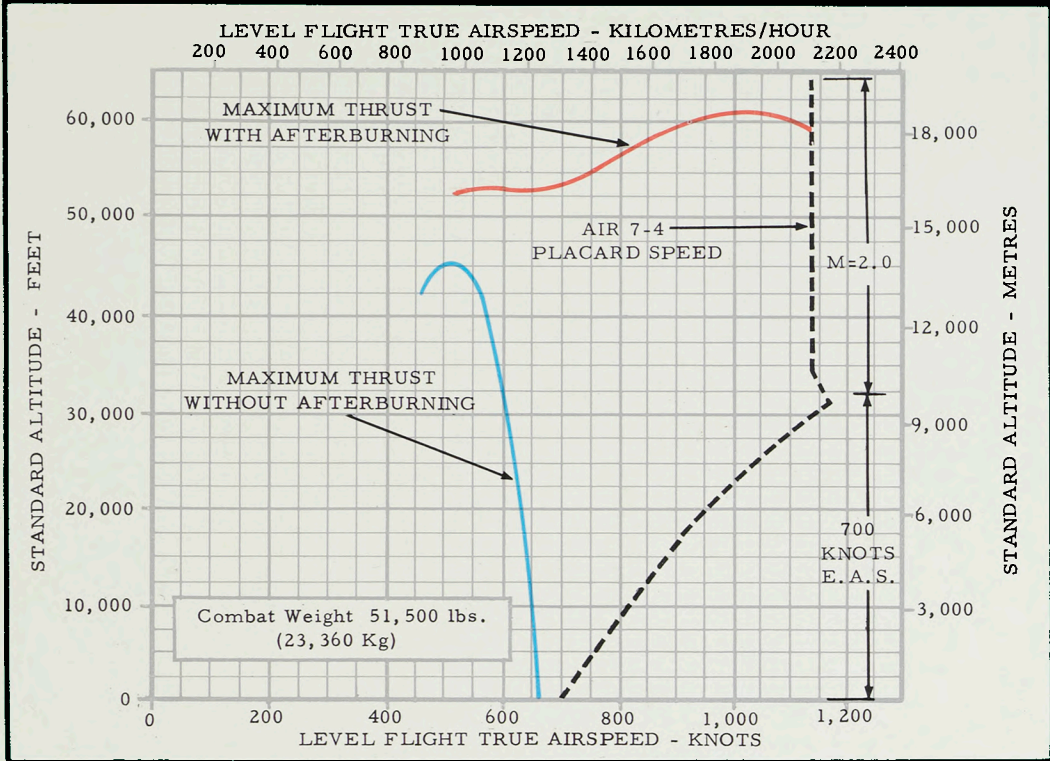
Using Jettisonable, Subsonic tail pipe inserts,

Range with above fuel, climbing to 33,000 ft. (10,058 m.) at
527 kts (976 km./hr.) T.A.S., Cruise climb to 39,000 ft.
(11,887 m.) at M = .90, stack 15 mins. at 39,000 ft. (11,887 m.)
5 mins. fuel reserve on landing

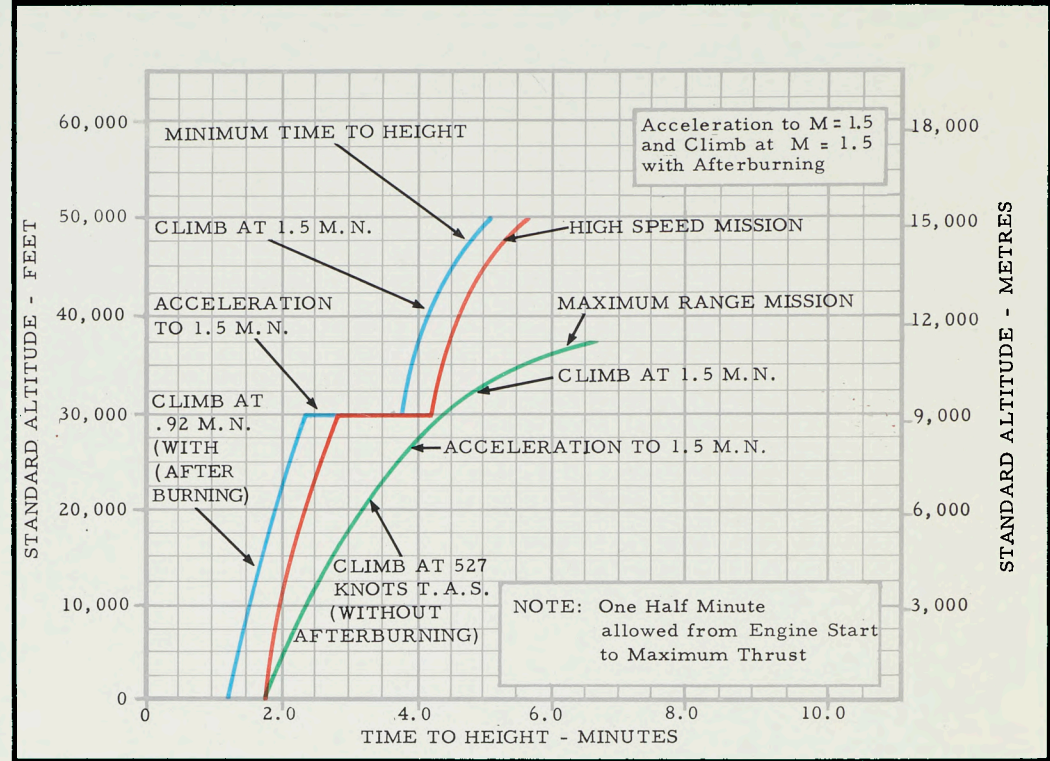
1,500 naut. miles	2,780 km.
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Performance under I. C. A. O. Standard Atmospheric Conditions to R. C. A. F. Specification AIR 7-4. (Vide Periodic Performance Report No. 12)

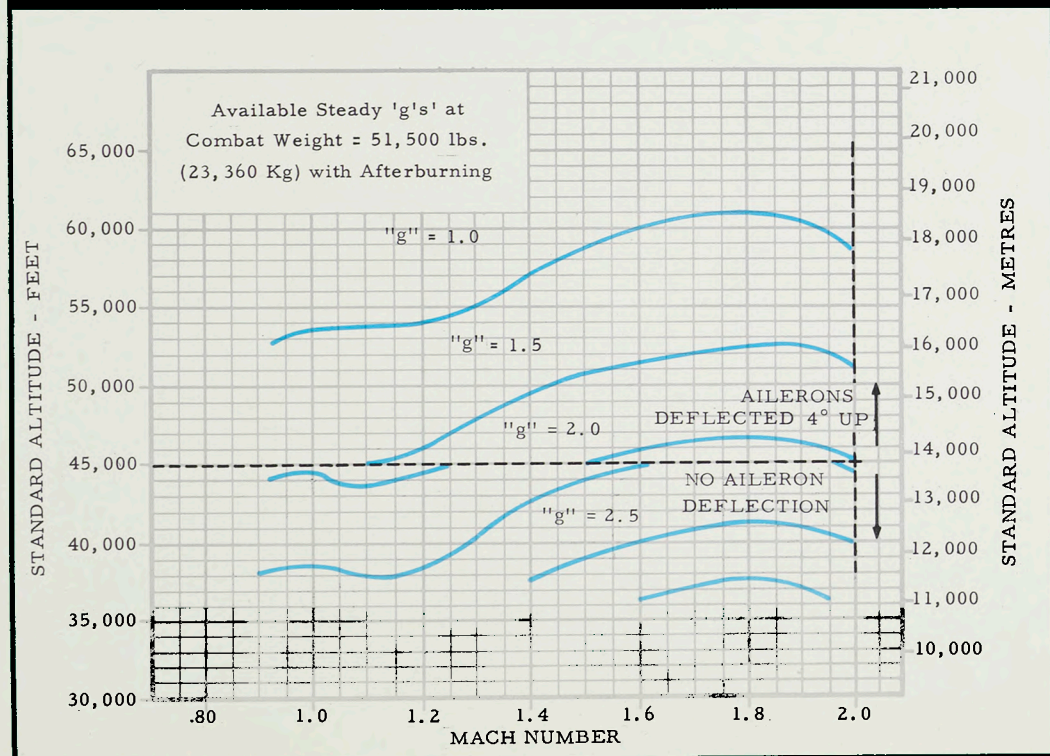
SPEED



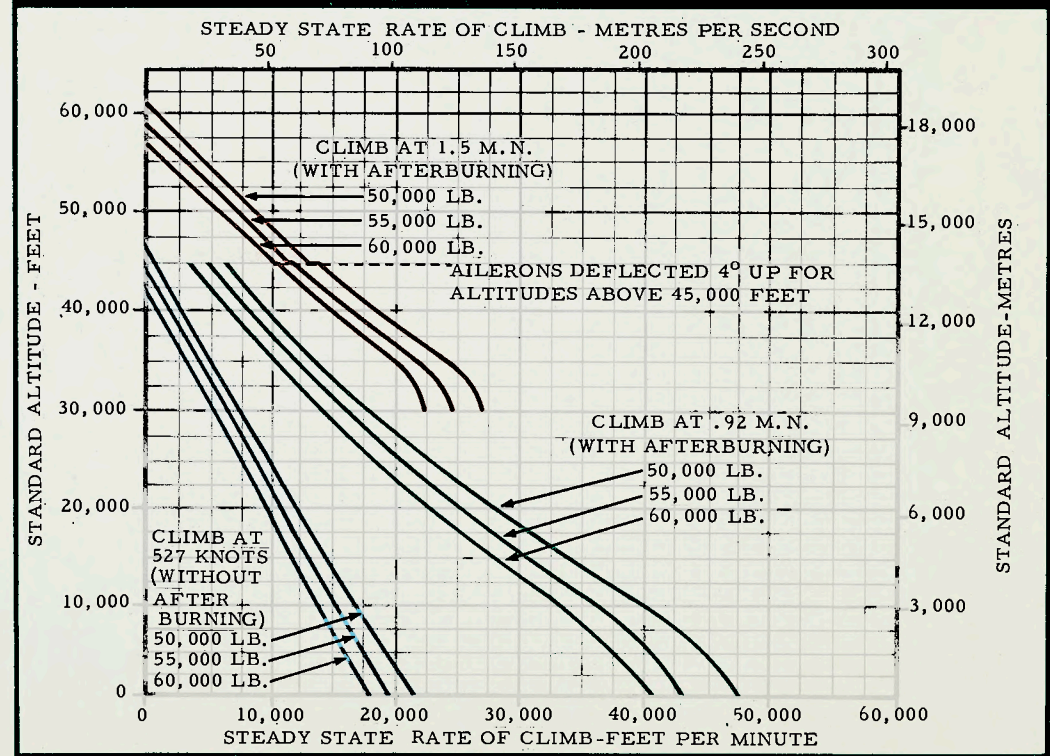
TIME TO HEIGHT



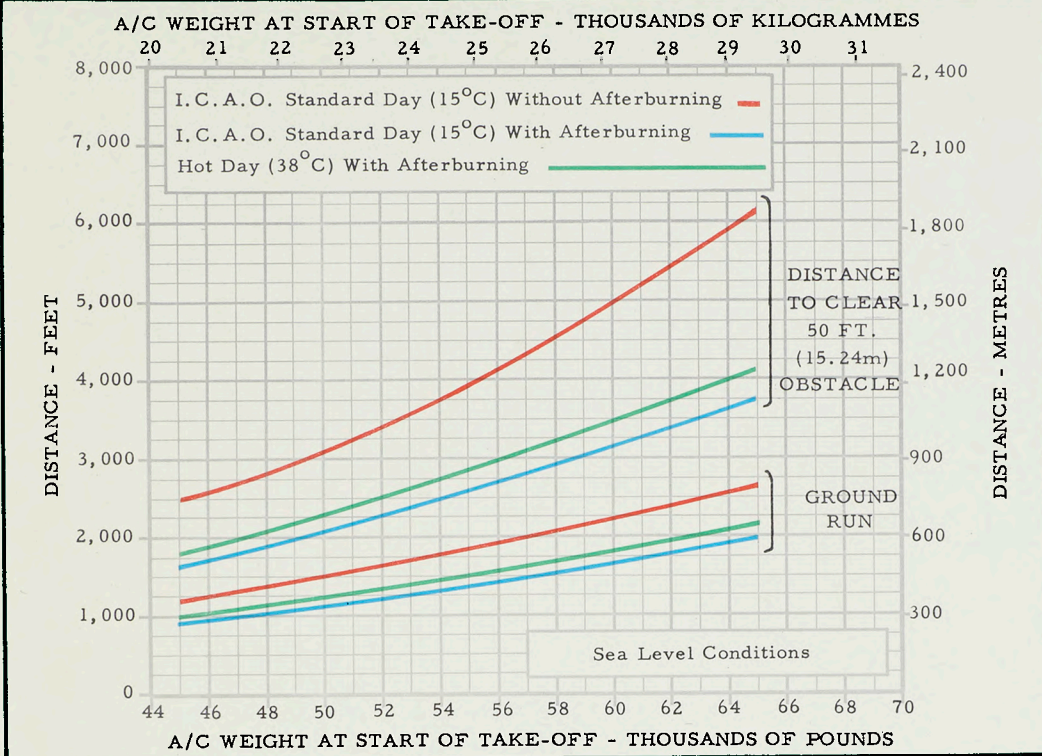
MANOEUVRABILITY



RATE OF CLIMB



TAKE-OFF DISTANCE



LANDING DISTANCE

