

GRUMMAN AEROSPACE CORPORATION

FALCON 10
WITH
GRUMMAN THRUST REVERSERS

AIRPLANE FLIGHT MANUAL SUPPLEMENT NO. 1

The information in this document is FAA approved material which, together with the basic AFM No. DTM722 dated 17 October 1973 is applicable and must be carried in the basic manual when the airplane is modified by the installation of Grumman thrust reversers in accordance with STC SA1042EA dated November 8, 1976.

The information in this document supersedes the basic manual only where covered in the items contained herein. For limitations, procedures, and performance not contained in this supplement, consult the manual proper.

The information contained herein supplements the corresponding information in the AFM as follows:

<u>AFM SECTION</u>	<u>SUPPLEMENT PAGE NUMBER</u>
Section 1 - Limitations	Page 3
Section 2 - Emergency Procedures	Pages 4 and 5
Section 3 - Abnormal Procedures	No change
Section 4 - Normal Procedures	Pages 6 through 10
Section 5 - Noise	No change
Section 6 - Performance Information	Page 11
Section 7 - Loading	Pages 12, 13 and 14

APPROVED: 

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LOG OF REVISIONS

Revision Number	Modified Pages	Subject	Approval/Date References
1	2, 3	Removed restriction for 2700 flights and 50% NL for speeds above 60 KTAS. Added Items 5 & 6.	February 11, 1977 [REDACTED] W. Olaszak Actg Chief, Eng. & Mfg Br., AEA-210
2	12	See Log of Revisions for Loading Section	
3	12, 13, 14	See Log of Revisions for Loading Section	
4	7, 10	Revised description of Thrust Reverser Operation and added Caution Note (6)	August 12, 1977 [REDACTED] Ralph L. Hare, Chief Eng. & Mfg. Br., AEA-210
5	3,5,7,8,10	Revised restriction on engine air-oil cooler fairing; added Grumman Service Bulletin No. GAC F10-78-013 which improves reliability of T/R and inflight warning horn operation.	[REDACTED] Ralph L. Hare Eng. & Mfg. Br. AEA210

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LOG OF REVISIONS

LOADING SECTION

Revision Number	Modified Pages	Subject	Approval/Date References
2	12	Revised weight and balance data to include Thrust Reverser door deflector plate and Pylon Heat Shield	June 6, 1977 Unapproved section
3	12	Restricted weight and balance information to S/N K1-K25	June 27, 1977 Unapproved section
	13	Added weight and balance information for S/N K26 and on and A/C with service bulletins GAC F10 T/R 78-002 through GAC F10 T/R 78-006	
	14	Added chart aircraft S/N to T/R S/N	

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SECTION 1

AIRPLANE FLIGHT MANUAL SUPPLEMENT NO. 1 LIMITATIONS

THRUST REVERSER LIMITATIONS

1. Operation of Reverse Thrust is Limited:
 - o To Ground Use Only with fuel control computer on
 - o To Takeoff with Horizontal Stabilizer set in Green Band (5-1/2 to 6-1/2 degrees)
 - o To 60 seconds of Continuous or accumulated time within a 30 minute period
 - o To idle Reverse N_1 for speeds below 60 KIAS and Taxi Operation
 - o To 50% N_1 for ground checks of Automatic Throttle Retarder
2. Asymmetric operation with reverse thrust is limited to dry runways when nose wheel steering is available.
3. Operation of Reverse Thrust to back up aircraft is not authorized.
4. Flight with Automatic Throttle Retarder inoperative is not authorized unless Thrust Reverser is bolted in the Stowed Position.
5. Service life of Thrust Reverser Installation is limited to 20,000 flight hours.
6. Service life of engine air-oil cooler fairing is:
 - (a) 7,000 flight hours with P/N 3072646-1
 - (b) 20,000 flight hours with P/N 3072751-1

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SECTION 2

AIRPLANE FLIGHT MANUAL SUPPLEMENT NO. 1 EMERGENCY PROCEDURES

THRUST REVERSER (T/R) INADVERTENT IN FLIGHT DEPLOYMENT

Indications: - TRANS or REV light ON

- Audible T/R warning horn
- Throttle on affected engine is automatically retarded to idle
- Aircraft nose pitch up and wing roll
- Abnormal buffeting and noise level

Take-off

①

- Initiate Immediate Action for Aircraft Control with
 - Pitch Full Nose Down
 - Roll and Yaw As Required
- Then immediately place emergency stow switch to STOW
- Follow Step ③

Climb - Cruise

②

- Maintain Aircraft Control As Required
- EMERGENCY STOW switch EMER STOW
- Airspeed less than 190 KIAS
- Confirm throttle on affected engine IDLE
- Follow Step ③

③

If Reverser Stows

- Leave in EMERGENCY STOW
- Engine Thrust as Required

If Reverser Does not Indicate Stow

- Leave in EMERGENCY STOW
- Land as soon as possible
- Shutdown of affected engine is optional, but idle power reverse thrust will decrease aircraft performance
- Follow AFM one engine approach and landing procedures except:

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SECTION 2

AIRPLANE FLIGHT MANUAL SUPPLEMENT NO.1 EMERGENCY PROCEDURES

THRUST REVERSER (T/R) INADVERTENT IN FLIGHT DEPLOYMENT

CONTINUED

3

If Reverser Does not Indicate Stow (Continued)

- o Maintain $S + 15^{\circ}$ Flaps at VREF + 20 Knots
- o During descent delay gear down until final approach
- o When committed to landing, $S + 30^{\circ}$ flaps

NOTE: With engine at idle reverse thrust and at high weight, the extension of the flaps to 15 Degrees may result in insufficient performance to maintain level flight.

To shut off the warning horn, pull the T/R system L & R IND CB 5 circuit breaker. This will also deactivate thrust reverser indicator lights. Do not attempt to use thrust reversers for landing under this condition.

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SECTION 4

AIRPLANE FLIGHT MANUAL SUPPLEMENT NO. 1 NORMAL PROCEDURES

THRUST REVERSER OPERATION

SYSTEM OPERATION

Thrust Reverser throttles are located immediately in front of main throttles with a pair of release latches slightly below. Movement of reverse thrust levers is prevented with latches engaged.

Left and Right Thrust Reverser (T/R) operation is obtained by moving throttles to idle position, followed by grasping reverse thrust levers and latches, lifting latches and moving reverse throttle levers slightly aft (approximately $\frac{1}{2}$ inch) to T/R idle position. Further aft movement of reverse throttles increase reverser power.

Movement from full reverse to idle reverse is obtained by forward movement of the T/R lever until reaching the reverse idle stop. At this position, doors are still deployed with idle power. Raising latch and moving T/R lever slightly forward allows the latch to go over the reverse idle stop into the stow position allowing the reverser doors to stow.

Included in T/R system is an automatic throttle retarding device. This device automatically returns the levers to idle should an inadvertent deployment occur with the throttle levers not set at idle position or an inadvertent stow with T/R levers set in the power range.

An annunciator panel for the T/R is located on the pilots instrument panel directly above the Attitude Deviation Indicator. The panel consists of two pair of indicator lights, one above the other. The upper pair consists of left and right amber colored **TRANS** lights that when illuminated signify T/R doors are unlocked and not fully deployed. The lower set illuminate with green **REV** lights when the thrust reversers are fully deployed. Caution is recommended in not moving the T/R levers beyond reverse idle until the **REV** illuminates.

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AIRPLANE FLIGHT MANUAL SUPPLEMENT NO. 1

NORMAL PROCEDURES

THRUST REVERSER OPERATIONSYSTEM OPERATION

Located on either side of the T/R annunciator panel are two guarded EMERGENCY STOW switches for the Left & Right T/R. With guards down, switches in the NORMAL position and T/R control is through the reverse throttle lever position. With guard up and switch in the EMERGENCY STOW position, the basic T/R actuating system is bypassed and Hydraulic pressure is ported directly to the actuator thus stowing the T/R.

A warning horn is also incorporated in the T/R system which sounds any time a disagreement between the T/R door and the throttle position exist, i.e., main throttles forward and doors deployed or reverse throttle levers in power range with T/R doors in stow position. A push to test button is located slightly below the left T/R Emergency Stow Switch.

The Electrical power to the T/R system is from "A" 28 Vdc bus through the following circuit breakers, located on the Auxiliary CB panel:

L CONT	CB 1	2A
R CONT	CB 2	2A
L PWR	CB 3	7.5A
R PWR	CB 4	7.5A
L & R IND	CB 5	1A

All above circuit breakers must be engaged, the left main landing gear squat switch actuated and the Battery #1 switch placed in the "ON" position to obtain T/R operation. The aforementioned squat switch is actuated whenever weight is on the wheels.

NOTE: Battery switch #1 is not required when Avions Marcel Dassault Service Bulletin No. F10 24 006, AMD-BA F10 0154 is complied with since A/C power is now provided to the T/R system from the Main Bus.

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SECTION 4

NORMAL PROCEDURES

THRUST REVERSER OPERATION

PRE-TAKE OFF

- Audible Warning Horn.....(Push to Test).... CHECKED
- Left and Right Thrust Reverser Automatic Throttle Retarder and Emergency Stow System Check.
 - o Main throttles.....IDLE
 - o Reverser throttles.....UNLATCHED, 5% ABOVE IDLE
 - o Reverser lights.....**TRANS** ON then OFF, **REV** ON
 - o EMERGENCY STOW switch.....EMER STOW
 - o Reverser throttle.....AUTOMATICALLY RETARDED to IDLE
 - o Reverser lights.....EXTINGUISHED
 - o Reverser throttles.....STOW POSITION
 - o **WARNING HORN RELAY CHECK**
 - Reverser Throttle Unlatched, 5% above idle
 - Warning Horn Audible
 - Reverser Throttle Stow Position
 - o EMERGENCY STOW switch guard.....DOWN

NOTE

The audible warning horn will sound only if there is a mismatch between throttle position (Main and Reverser) and Thrust Reverser Door Position. Mismatch conditions are:

- Main Throttles Forward and Doors Deployed
- Reverser Throttles in Power Range and Doors Stowed

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SECTION 4

AIRPLANE FLIGHT MANUAL SUPPLEMENT NO. 1 NORMAL PROCEDURES

THRUST REVERSER OPERATION ...

LANDING

- Perform descent-approach and landing checklists
- Emergency Stow Switch Guards DOWN
- Thrust reverser lights OFF
- Make a normal landing with main throttles at idle after touch down followed by airbrakes extension
- Holding nosewheel firmly on the runway, smoothly pull the reverser throttles to idle, checking the **TRANS** lights ON then OFF followed by the green **REV** lights ON.
- Smoothly pull the thrust reverser throttles to the desired power
- Initiate power reduction to idle at 60 KIAS
- Before stopping place thrust reverser throttles to stow

NOTE

- (1) A slight nose up tendency may be perceived as the thrust reversers deploy. This may be counteracted with additional forward elevator application.
- (2) Under cross wind landing conditions, the aircraft has a tendency to turn away from the wind direction when the thrust reversers are deployed.
- (3) Thrust reversers are operational from the accumulator if there is loss of No. 2 hydraulic system provided malfunction is not due to fluid loss in the reverser system.
- (4) Main throttles cannot be moved to fuel cut-off position until reverser throttle is returned to stow position.

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SECTION 4

AIRPLANE FLIGHT MANUAL SUPPLEMENT NO. 1

NORMAL PROCEDURES

THRUST REVERSER OPERATION ...

LANDING

(Continued)

CAUTION

- (1) Do not apply reverse thrust without the **REV** light on indication
- (2) Maintaining power above idle reverse at speeds below 60 knots may result in re-ingestion of engine exhaust gases.
- (3) To avoid possible pitch up, reverse thrust should not be used with the stabilizer mistrimmed nose up.
- (4) Reverse Thrust is not available in case of complete electrical distribution failure.
- (5) Use of reverse thrust with loss of both hydraulic systems may result in marginal directional control.
- (6) If the Battery No. 1 switch is in the "OFF" position, reverse thrust system becomes inoperative.

NOTE: Battery switch # 1 is not required when Avions Marcel Dassault Service Bulletin No. F10 24 006, AMD-BA F10 0154 is complied with since aircraft power is now provided to the Thrust Reverser system from the Main Bus.

- (7) The associated warning horn will sound for any mismatch between engine throttle position and reverser door position when Grumman Service Bulletin No. GAC F10 T/R-78-013 is complied with.

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SECTION 6

AIRPLANE FLIGHT MANUAL SUPPLEMENT NO. 1

PERFORMANCE

THRUST REVERSER OPERATION

THRUST REVERSER OPERATION

Symmetrical operation of the Thrust Reversers has been tested in crosswinds of 15 kts. Asymmetrical operation on dry runways has been tested in crosswinds of 10 kts. The maximum crosswind value has not been established.

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AIRPLANE FLIGHT MANUAL SUPPLEMENT NO. 1

SECTION 7

LOADING

THRUST REVERSER INSTALLATION

WEIGHT AND BALANCE INFORMATION

FOR T/R SN K-1 THROUGH K-25
SEE NOTE *

The following weight and balance data are nominal values and the actual installed weight should be used for operational use.

- Total thrust reverser change	+ 261.0 lb
- Horizontal arm	387.0 in
- Horizontal moment	+10099 $\frac{1}{2}$ in lb
- Vertical arm	107.4 in
- Vertical moment	+ 28036 in lb

NOTE

Horizontal locations are expressed in inches from the aircraft nose.

Vertical locations are expressed in inches with respect to "reference horizontal fuselage" datum line.

NOTE * See chart on Page 14 for A/C to T/R
Serial Number correlation

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LOADING

THRUST REVERSER INSTALLATION

WEIGHT AND BALANCE INFORMATION

FOR T/R SN K-26 AND ON

SEE NOTE *

The following weight and balance data are nominal values and the actual installed weight should be used for operational use.

- Total thrust reverser change	+ 261.9 lb
- Horizontal arm	386.1 in
- Horizontal moment	+101111 in lb
- Vertical arm	107.4 in
- Vertical moment	+ 28121 in lb

NOTE

Horizontal locations are expressed in inches from the aircraft nose.

Vertical locations are expressed in inches with respect to "reference horizontal fuselage" datum line.

NOTE *

This page effective for T/R Serial Numbers below S/N K-26 which have the following service bulletins incorporated

GAC	F10	T/R	-78-002
GAC	F10	T/R	78-003
GAC	F10	T/R	78-004
GAC	F10	T/R	78-005
GAC	F10	T/R	78-006

See chart on Page 14 for A/C to T/R Serial Number Correlation

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LOADING

THRUST REVERSER INSTALLATION

WEIGHT AND BALANCE INFORMATION

Thrust Reverser Serial No. to Aircraft Serial No. listing.

K-2 ... 63	K-8 80	K-14 ... 25	K-20 ... 66
K-3 ... 28	K-9 59	K-15 ... 48	K-21 ... 67
K-4 ... 42	K-10 ... 91	K-16 ... 36	K-22 ... 64
K-5 ... 82	K-11 ... 49	K-17 ... 10	K-23 ... 52
K-6 ... 33	K-12 ... 58	K-18 ... 54	K-25 ... 29
K-7 ... 37	K-13 ... 19	K-19 ... 44	K-1 Unassigned
			K-24 ... Unassigned