Aermacchi MB.339

for Microsoft Flight Simulator

FLIGHT MANUAL
Version 1.4.2 — May 2023

Published by IndiaFoxtEcho Visual Simulations

CHANGE LOG

04-May-2023
Version 1.4.2
Minor fixes
- Minor Fix to Pony 1 "100 Anni" special livery
- Fixed incorrect helmet assignment for MLU variant
- Fixed incorrect helmet assignment for PAN backseat figure
- Fixed regression causing external tanks not to work on PAN variant

30-Mar-2023
Version 1.4.1
HOTFIX
- Fixed bug causing the elevator trim needle not to work

29-Mar-2023
Version 1.4.0

100 ANNI UPDATE
- Added 100 Anni Special Livery
- Added working backseat
- Reworked external lights rendering
- Fixed minor animation glitch on pilot stick naimation
- Fixed minor glitch in oxygen dilution control
- Fixed minor glitch in gear silencer
- COM1, COM2, TACAN and VOR/ILS Volume Knob are now functional
- Flood, instruments and formation lights can be adjusted
- Nav lights can be dimmed
- Reworked smoke effect colors
- Solved minor bugs in AHRS/GPS display
- Added flaps and rudder to cockpit model
- Redone glass material

12-Dec-2022
Version 1.3.9

Minor update and new liveries:
- Fixed minor bug preventing GEN switches from working with joypad
- Fixed minor bug causing missing texture in VC
- Minor fix to Peruvian Air Force livery
- Minor fix to Malayisian Air Force livery
- Minor fix to UAE livery
- Added Nigerian Air Force livery
- Added Ghana Air Force livery
- Added Italia Air Force Special Color “Ab Initio”
- Minor tweaks to flight model (higher MOIs, tweaked control effectiveness) for smoother flight behavior
- RECOMPILED WITH SU11 TOOLS

03-Oct-2022
Version 1.3.8

Minor update
- Fixed bug introduced in 1.3.7 preventing NAV distance to show on HSI
- Fixed minor bug in HSI behavior
- Reworked fuel system to overcome limitations in sim GUI:
Wingtip tanks will appear as Auxiliary tanks in the interface, but at least External tanks appear correctly and can be loaded.
- Implemented CDI for pure TACAN (non-VORTAC) stations

28-Sep-2022
Version 1.3.7
Minor update

RECOMPILED FOR SU10
- Fixed wingtip fuel quantity in MLU model
- Fixed minor text misalignment in DATA 2 GPS page
- General optmization of virtual cockpit code
- Rework of virtual cockpit code to solve minimal incompatibility with SU10
- Basic support of Tacan-only stations (bearing/range only if the station is not a VORTAC)
- Moved flight manual to "Docs" folder, as opposed to a SimObject subfolder
- Draft implementation of external tanks functionality:
By setting a load of 150 lbs on STA2 and STA5, it is now possible to load fuel on EXTERNAL1 and EXTERNAL2 tanks.

09-Jan-2022
Version 1.3.6 – 1.3.5 – Quick fix to solve throttle control problems introduced by MSFS update 1.21.18.0 and minor mistake preventing wingtip tanks to show in virtual cockpit.
- Added reference to Asobo Common Template to solve the throttle not working if the user had a physical control bound to THROTTLE LEVER AXIS
- Fixed wingtip tanks visibility introduced in 1.3.5

19-Dec-2021
Version 1.3.4 – Flight model improvements, new livery and other minor fixes
- Improvements to high speed roll rate
- High speed drag is now more realistic (resulting in higher speeds)
- Fixed minor bug in GEN1 and GEN2 needles animation
- Fixed minor bug in the behavior of the gear handle warning light
- Redone smoke effects to fix problems due to SU6 and SU7 changes
- Linked IFF mode knob to MSFS transponder state
- Removed custom high G breathing sound (using default sounds now)
- Implemented canopy defrost command
- Added 214mo Gruppo Special Color
- Cockpit shadowing improvements

15-Sep-2021
Version 1.3.3 – Minor improvements and new liveries
- Added special color liveries for 60th Anniversary of the Frecce Tricolori
- Added older Frecce Tricolori livery
- Fixed bug causing smoke tanks to appear in Virtual Cockpit on A variant
- Changed token weight of pylons to 50 lbs (more realistic value)

- Changed token weight of external fuel tanks to 150 lbs (more realistic value)
- Fixed incorrect A-MLU engine configuration
- Fixed incorrect A-MLU fuel quantity
- Fixed minor glitch in armament panel animation

08-Sep-2021
Version 1.3.2 – Minor improvements and new liveries
- Changed RPM indicator reference variables, as the previous ones did not work as intended after SU5
- Added Pony 0 Special Color for Frecce Tricolori 60th Anniversary
- Added "Al Fursan" livery for aerobatic version
- Added blue smoke for Al Fursan livery
- Added Peruvian Air Force livery
- Increased special effects visibility distance and persistance

27-Aug-2021
Version 1.3.1 – Miscellaneous fixes for Marketplace release
- Fixed bug causing landing/taxi light switch animation not to work
- Fixed bug causing incorrect interaction while pressing the G-Valve test pushbutton
- Fixed reversed animation in Cabin Press switch
- Fixed incorrect material assignment in ejection handle base
- Improved mouse interaction with some knobs (altimeter setting, HDG and CRS)
- Fixed missing description localization for A-MLU version

18-Aug-2021
Version 1.3.0 – NOTE: starting from this version, release numbering will follow the three digit format of the Microsoft Marketplace

- Fixed glitch causing heat blur effect to disappear in certain conditions
- Internal reorganization of 3D models (nodes and hierarchy)
- Added high altitude contrail effect
- Added Sim Update V landing special effects
- Redone ADI and backup ADI animation
- Repackaged to Sim Update V standards
- Improved fuel flow indications, consumption and range*
- Minor improvements to flight model
- Implemented Sim Update V cockpit interface (necessary for XBox)
- Restored Mouse Drag functionality on many controls
- Fixed minor misalignment of ADI bank needle
- Fixed glitch preventing proper placement of HSI lubber line
- Fixed several minor glitches in virtual cockpit model
- Fixed several minor glitches in external models
- Copilot figure is now optional: will disappear if copilot weight is set to 70lbs or less
- Added backup ADI setting and mouse area
- Added Marker Sensitivity Switch
- Cabin Press switch now functional, also cabin press indications are now more realistic
- VOR and TACAN power switches must noe be set to ON to get readings on the HSI
- Added several animations in the cockpit (cosmetic only, may receive proper implementation in future)

- Armament will now display "TANK" if a tank is loaded on a pylon on A and AMLU variants
- Added smoke system (white and colored)**
- Added PAN model variants loaded with green and red smoke

*** NOTE: it seems that there still a problem with fuel flow vs. altitude vs. Mach no. dependency in MSFS. This new version implements a new formula to calculate fuel flow indication, which should provide values closer to the real aircraft in many conditions. However, actual fuel consumption (and range) is calculated differently by the sim engine: this is set to provide the best range in most conditions, so actual range of the aircraft can be now overestimated at low altitudes (but should be correct and medium and high altitudes).**

**** NOTE: the smoke system is implemented to work as in real life, that is, in order to operate it:**
- SMOKE switch must be set to ON (this is the master power switch for the smoke system)
- WHITE switch must be set to ON (this is the power switch for the white tank)
- COLOR switch must be set to ON (this is the power switch for the color tank)
...then, to activate the smoke, you will need to use the following toggle switches (you may want to assign them to stick buttons):

WING LIGHT TOGGLE -> WHITE SMOKE
RECOGNTION LIGHT TOGGLE -> COLOR SMOKE

When the system is working, the relevant advisory lights will illuminate.
The default PAN model has white smoke on both tanks.
Red and Green smoke variants are available as "repaints".
NOTE: due to a simulator bug, effects may not show if activated in the internal views in certain conditions.

12-Apr-2021
Version 1.22
- Updated localization file for World Update IV
- Fixed minor glitch in cockpit view canopy relfection
- Fixed minor glitch causing gunsight to appear on PAN external model

27-Mar-2021
Version 1.21
- Added A-MLU Model (as separate aircraft)
- Improved internal engine sounds (jet whine volume increased)
- Rear pilot figure of MB-339 pan has now HGU-55 helmet and olive drab suit (as most commonly seen IRL)

14-Mar-2021
Version 1.20
Quality of Life improvements:
- remastered all external textures with higher detail
- changed HSI DME last digit animation (now continuous)
- fixed landing gear extraction and damaging speeds
- fixed bug that caused deletion of panel cover if gunsight is removed from A model
- decreased FD vertical bar sensitivity

- changed rule of GS engagement from GS ARM
- improved engine dynamics
- redone Wwise engine sounds, based on real world samples
- fixed minor bug in Tacan/Frequency conversion
- fixed minor bug in RDU display not showing the correct frequencies for COM1 in some case
- added indication of X/Y Tacan channel
- improved cockpit self shadowing
- rear view mirror are now foldable
- added gear warning sound and silencer
- added streamers and covers if the aircraft is parked
- added underwing pylons to A model (add any weight to the relevant load station)
- added external fuel tanks to A model (add at least 51lbs to releval station - cosmetic only)
- fixed VR cockpit collisions
- fixed external light bug introduced by Sim Update 3
- fixed external views HUD
- added g-stain sound
- fixed minor inaccuracies in warning test switch behavior
- fixed minor bug preventing fine adjustment of OBS in some cases
- GPS number keys can now be used to select waypoints (1 to 10)

1-Dec-2020
Version 1.13
Hotfix for vesion 1.12 ADI/GS problem

***** IMPORTANT! STARTING FROM VERSION 1.12 THE PACKAGE HAS BEEN RENAMED TO “indiafoxtecho-mb339” - PLEASE DELETE THE OLDER VERSION AND REPLACE IT WITH THIS NEW ONE ******

- Fixed bug in ADI GS animation
- Fixed bug in FD GS needle animation
- Reduced sensitivity of FS ALT HOLD
- Implemented additional check to engage FD GS from GS ARM

30-Nov-2020
Version 1.12
Quality-of-life update and further refinements to flight model

***** IMPORTANT! STARTING FROM THIS VERSION THE PACKAGE HAS BEEN RENAMED TO “indiafoxtecho-mb339” - PLEASE DELETE THE OLDER VERSION AND REPLACE IT WITH THIS NEW ONE ******

- Fixed misalignment of control stick geometry
- Fixed bug preventing TACAN Channel Selection on PAN variant
- Fixed bug preventing TACAN Channel numbering stop at 99X
- Fixed behavior of ADI GS Flag
- Added ADI GS animation
- Fixed orientation of NAV lights
- Added checklists courtesy of Lucas Aulen aka Laulenture
- Fixed minor smoothing artifacts in geometry

- Light Effects redone
- Fixed bug preventing beacon to show correctly in some cases
- Added timer function
- Further tweaks to flight model, with better pitch behavior and low speed characteristics
- Package renamed due to new naming restrictions
- Fixed bug preventing beacon switch from working
- Added possibility to remove gunsight from A model (just click on the gunsight)
- Canopy scratch effect redone

15-Nov-2020
Version 1.10
Flight model upgrade and miscellaneous fixes and improvements:
- complete remake of the flight model in order to fix Modern flight model instability and Legacy model compatibility
- adjustmentst to flap, gears and speed brake cycle time
- improvements to HGU-33 helmet geometry
- added animation to rear pilot figure
- fixed DME not working for Tacan (NAV 2)
- fixed bug preventing correct DME behaviour in some cases
- fixed ADI glideslope indicator not working correctly in some cases
- fixed incorrect behavior of ADI indexer
- fixed miscellaneuos geometry issues
- fixed miscellaneyos geometry smoothing issues
- improved altimeter animations
- fixed bug preventing GSARM to work with VOR/ILS
- cleaned up canopy textures
- WWise sound configuration courtesy of Christophe de Bortoli (Erkin)

18-Oct-2020
Flight manual update only:
- clarified installation instructions
- clarified “modern” flight model implementation

17-Oct-2020
INITIAL RELEASE

WELCOME

The Aermacchi MB-339 is a military jet trainer and light attack aircraft designed and manufactured by Italian aviation company Aermacchi.
The MB-339 was developed during the 1970s in response to an Italian Air Force requirement that sought a replacement for the service's existing fleet of Aermacchi MB-326. Its design was derived from that of the MB-326, rather than a new design, and thus the two aircraft share considerable similarities in terms of their design. Aermacchi had found that the MB-339 was capable of satisfying all of the specified requirements while being the most affordable option available. The maiden flight of the MB-339 took place on 12 August 1976; the first production aircraft were delivered two years later.
Roughly half of all MB-339s entered service with the Italian Air Force, while the remainder have been sold to various export customers. As well as being used for training, the type is also flown by the Frecce Tricolori aerobatic display team. The type has been used in combat by both the Eritrean Air Force during the Eritrean–Ethiopian War of 1998-2000 and the Argentine Naval Aviation during the Falklands War of 1982. In both conflicts, the MB-339 was typically flown as an attack aircraft.

MINIMUM HARDWARE REQUIREMENTS

Due to the high-detail model and textures, we suggest to use the MB-339 on systems that meet or exceed the following requirements:

CPU: 3.5GHz dual core processor or better
GPU: at least 4Gb dedicated memory, Nvidia 960 or better recommended
RAM: 4.0Gb minimum
Hard Disk: 1.8Gb required for installation

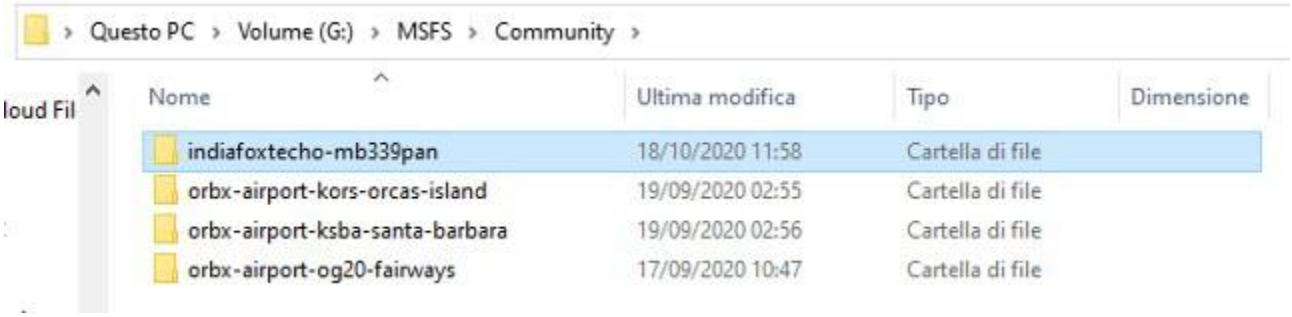
INSTALLATION

IMPORTANT – IF YOU ARE UPGRADING YOUR PACKAGE FROM A PREVIOUS VERSION, PLEASE DELETE THE PREVIOUS VERSION FIRST!

This package is distributed both on the Microsoft Marketplace and by external vendors.

If you have purchased the package though the Marketplace and you have followed the on-screen instructions, no further action is required from your end. The plane should be available in the aircraft selection menu as the other default planes.

If you have purchased the package from an external vendor and the aircraft is provided as a .zip file without any installer, just unzip the content of the file into your COMMUNITY folder. The exact location of the folder will depend on your selection when you have installed Microsoft Flight Simulator. Once you have indicated where your COMMUNITY folder is, just follow the on-screen instructions. The picture below shows the case in which the MSFS files are located in the G: drive in the MSFS folder – the MB-339 is highlighted in LIGHT BLUE.



If you have purchased the package from an external vendor and the product comes with an .exe installer, just follow the instructions on the screen. You will be asked to locate the COMMUNITY folder. The exact location of the folder will depend on your selection when you have installed Microsoft Flight Simulator. Once you have indicated where your COMMUNITY folder is, just follow the on-screen instructions.

If you have purchased the package from an external vendor with automatic install (e.g. Orbx Direct)

the file should be automatically installed and available the next time you start the simulator.

The aircraft will be available in the aircraft selection menu next time you start Flight Simulator. If Flight Simulator was running during the install process, you need to close it and restart it for the aicraft to appear.

NOTE: If you do not know where the community folder is located, you can follow this procedure:

Go to Options / General.

1.Click on "Developers" which you will find at the bottom of the list on the left.
2.Switch Developers Mode on.
3.On the Dev Menu select Tools / Virtual File System.
4.The community folder location can be found under "Watched Bases"

NOTE: If the copying the folder in the Community folder fails because of the fact that files names are too long you can proceed as follows:

1. Extract the package folder on your desktop or in any known and easily acceptable location.

2. Rename the package folder from "indiafoxtecho-indiafoxtecho-mn339pan" to anything short and recognizeable such as "339" or just "3"

3. Place the renamed package folder in the Community folder

IMPORTANT NOTE ON THE FLIGHT MODEL

Please note that the MB-339 flight model is designed to work with the new Flight Simulator flight model (Options->General->Flight Model->MODERN) . This is the default option for Microsoft Flight Simulator and it should be your setting unless you have changed it.

However, some users may have changed the flight model to "LEGACY" in order to use older FSX-derived add-on planes.
Starting from version 1.10 there is a limited support to the LEGACY model too, but we still suggest you use the MODERN one.

With the modern flight model, the MB-339 should behave well and be quite stable and easy to fly within the regular flight envelope (90 to 400 kts) – although it may exhibit some instability in extreme flight or weather conditions.

CREDITS

Frecce Tricolori Virtuali.....3d modeling, texturing, flight modeling and testing.
(FTV Development team: Giuseppe Didiano, Camillo Perniciolo, Nicolò Carraro, Fabio Grasso, Erik Dattilo, Roberto Scolari)

Wwise sound configuration.....Christophe de Bortoli (Erkin)

Dino Cattaneo …..conversion to Flight Simulator, 3D animation, system and avionics programming, project management and project lead.

We'd like to thank the Beta testing Team and everyone who supported this project and IndiaFoxtEcho.

For questions, support and contact please write an email to indiafoxtecho@gmail.com or contact us on Facebook https://www.facebook.com/Indiafoxtecho-594476197232512/

ABOUT THIS MANUAL

This manual is partially based on the real world flight manual for the MB-339 but it has been vastly cut and edited to reflect the Microsoft Flight Simulator rendition.
Sections *blue italics* apply only to the simulated version of the aicraft.

THIS MANUAL SHALL NOT BE CONSIDERED A SOURCE FOR REAL-WORLD INFOMATION OR OPERATION OF THE MB-339 AIRCRAFT!

UPDATES

We will try our best to keep the product updated and squash significant bugs as soon as possible. Our update policy is as follows:

- major updates, which either require a new installer or a major changes to a significant number of files, are typically deployed as new installers and will be available from your distributor.

- minor updates or quick-fixes will be typically deployed as patches for manual installation on our blog indiafoxtecho.blogspot.com

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AIRCRAFT

The MB-339A is a single-engine, two-seat subsonic aircraftmanufactured by Alenia Aermacchi S.p.A. in Venegono S. (Varese). The aircraft primary role is basic and advanced training. Its features, including external armament stores, allow it to fulfill the operational training and ground attack roles. The aircraft is powered by a 17.8 kN (4000 lbf) thrust Rolls-Royce Viper MK632-43 turbojetengine, andcan takeoff and land with amass up to 5900 kg (13000 lb).

AIRCRAFT DIMENSIONS

The maximum dimensions of the aircraft, under normal conditions of mass, shock-absorber compression and tire inflation, are as follows:

wing span (aircraft fitted with elliptic tip tanks) . . . . . 10.86 m

wing span (aircraft fitted with cylindrical tip tanks) . . . . . 11.22 m

wing span (configuration with no tip tanks) . . . . . 10.23 m

fuselage length . . . . . 10.97 m

height at the top of the fin . . . . . 3.53 m

AIRCRAFT GROSS MASS

The aircraft basic mass with JP8 fuel is approx. 3225 kg with elliptic tip tanks and approx. 3280 kg with cylindrical tip tanks (this includes hydraulic fluid, unusable engine oil and unusable fuel).

The aircraft basic mass in a configuration without wing tip tanks and with 4 underwing pylons is approx.3295kg (this includes hydraulic fluid,unusable engine oil and unusable fuel).

The aircraft gross mass in some typical configurations is as follows:

Flight training

(two pilots plus internal fuel) . . . . 4530 kg (A)
4875 kg (B)

Flight training in a configuration with no wing tip tanks (two pilots, internal fuel and 4 underwing pylons) . . . . . 4072 kg

Air-to-ground firing training (two pilots plus internal fuel, 2 machine gun pods of 12.7 mm and 1 rocket and bomb container with 2 rockets and 4 MK 106 bombs) . . 4915 kg (A)
5265 kg (B)

Ferry mission (crew of two, plus internal and external fuel) . . 5115 kg (A)
5505 kg (B)

The above mass data are based on calculated averages and are therefore given for reference only.

NOTE

Masses marked with letter A refer to the aircraft with elliptic tanks. Masses marked with letter B refer to the aircraft with cylindrical tanks.

GENERAL AIRCRAFT ARRANGEMENT

The fuselage is built in two sections to permit engine removal.
Theforward section contains the nose landing gear and the electronic equipment compartment, the two cockpits, the two-cell fuel tank, a dorsal compartment for the installation of additional electronic equipment, the speedbrake in the fuselage underside and the engine bay.
The cockpits are enclosed by a canopy hinged to the fuselage right side, and are fitted with ejection seats which are staggered in height to ensure maximum visibility from the rear cockpit. Each cockpit is equipped with an instrument panel and side consoles,a throttle lever andcontrol stick.
The central equipment compartment, located below the rear cockpit, contains the cockpit air conditioning heat exchanger unit. The aft section, to which the horizontal and vertical stabilizers are attached, contains the jet pipe. Bays for the retracted main landing gear and four oxygen cylinders are provided in the wings, and underwing stations are fitted for the attachment of six pylons designed to carry armament stores or jettisonable fuel tanks.
Non-droppable fuel tanks of 320 l or cylindrical tip tanks of 500 l each capacity are mounted at thewing tips.

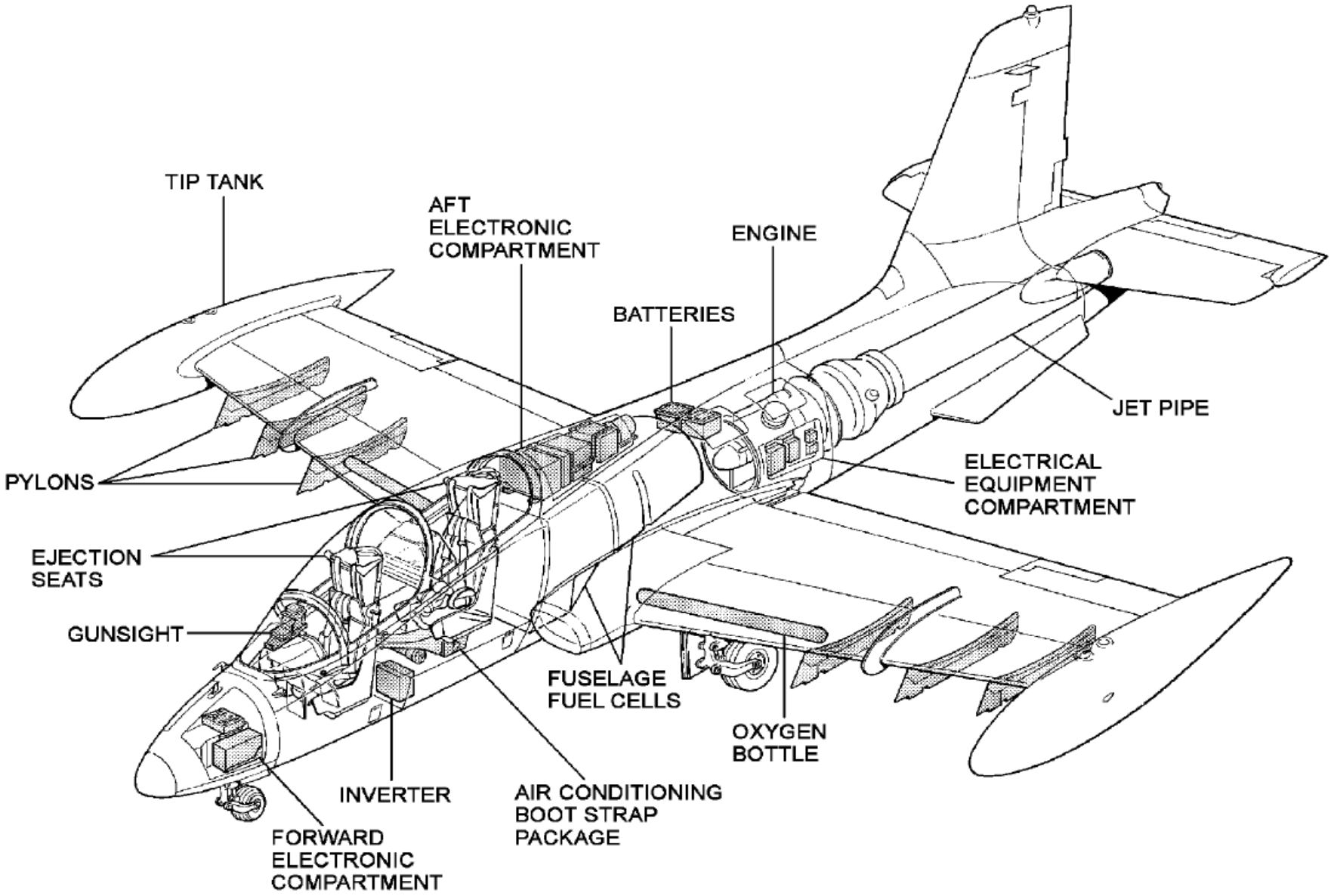
SIMULATION NOTE:

The Flight Simulator rendition covers two MB-339 configurations: the MB-339A (with tiptanks and no external loads) and the MB-339PAN (special aerobatic version) with no tiptanks but with mixed smoke/fuel underwing tanks. These two models have separate flight models with different fuel capacity and different aerodynamics.

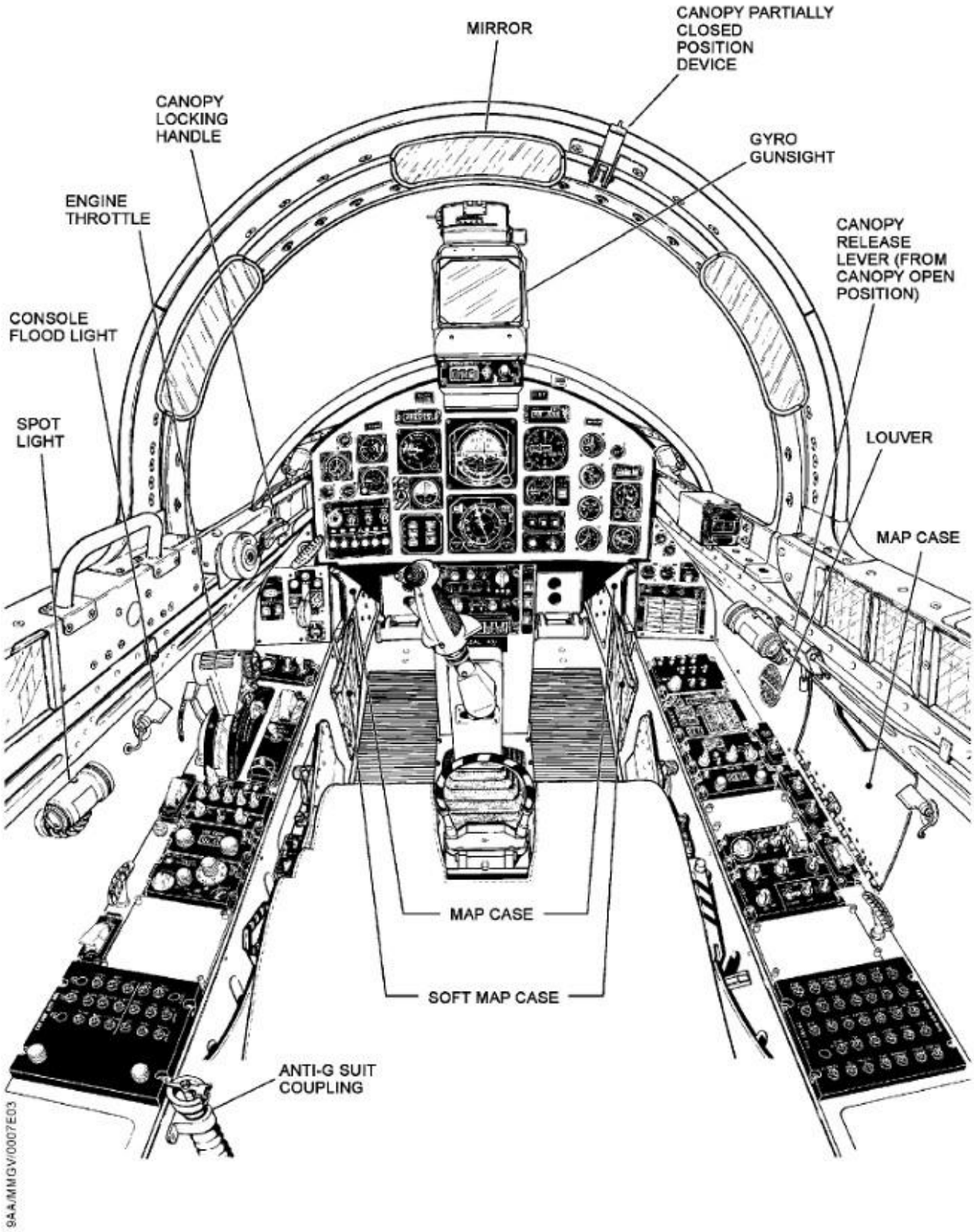
Note: the PAN external model is depicted in the Mid-Life Update (MLU) configuration, while the A model is the legacy version. However, for both models, the cockpit is depicted in the MLU configuration.

Note: only the front cockpit is depicted in the simulation.

GENERAL ARRANGEMENT

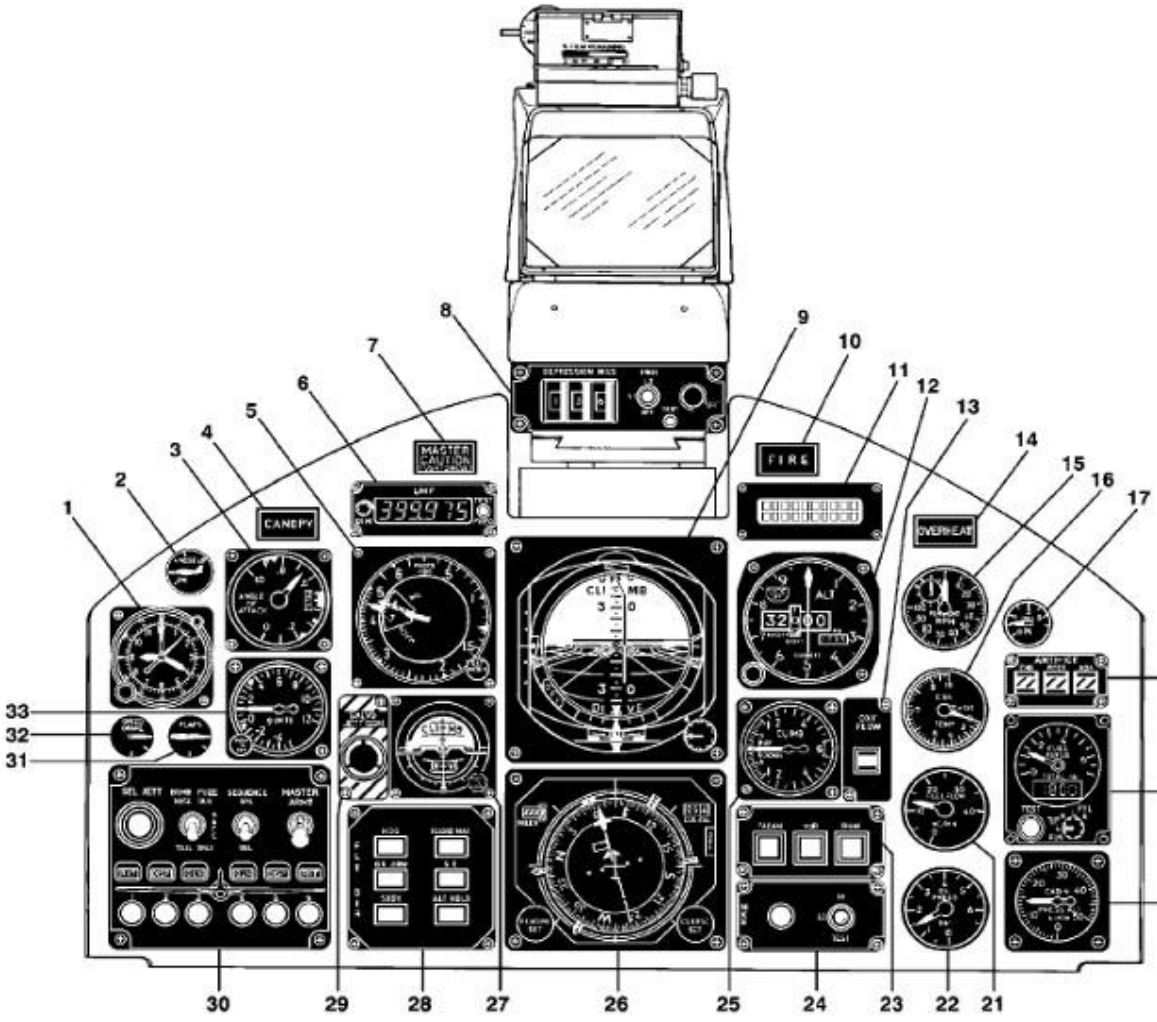


FRONT CREW STATION TYPICAL

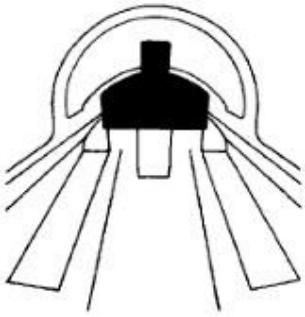


FRONT INSTRUMENT PANEL

CENTRAL PANEL



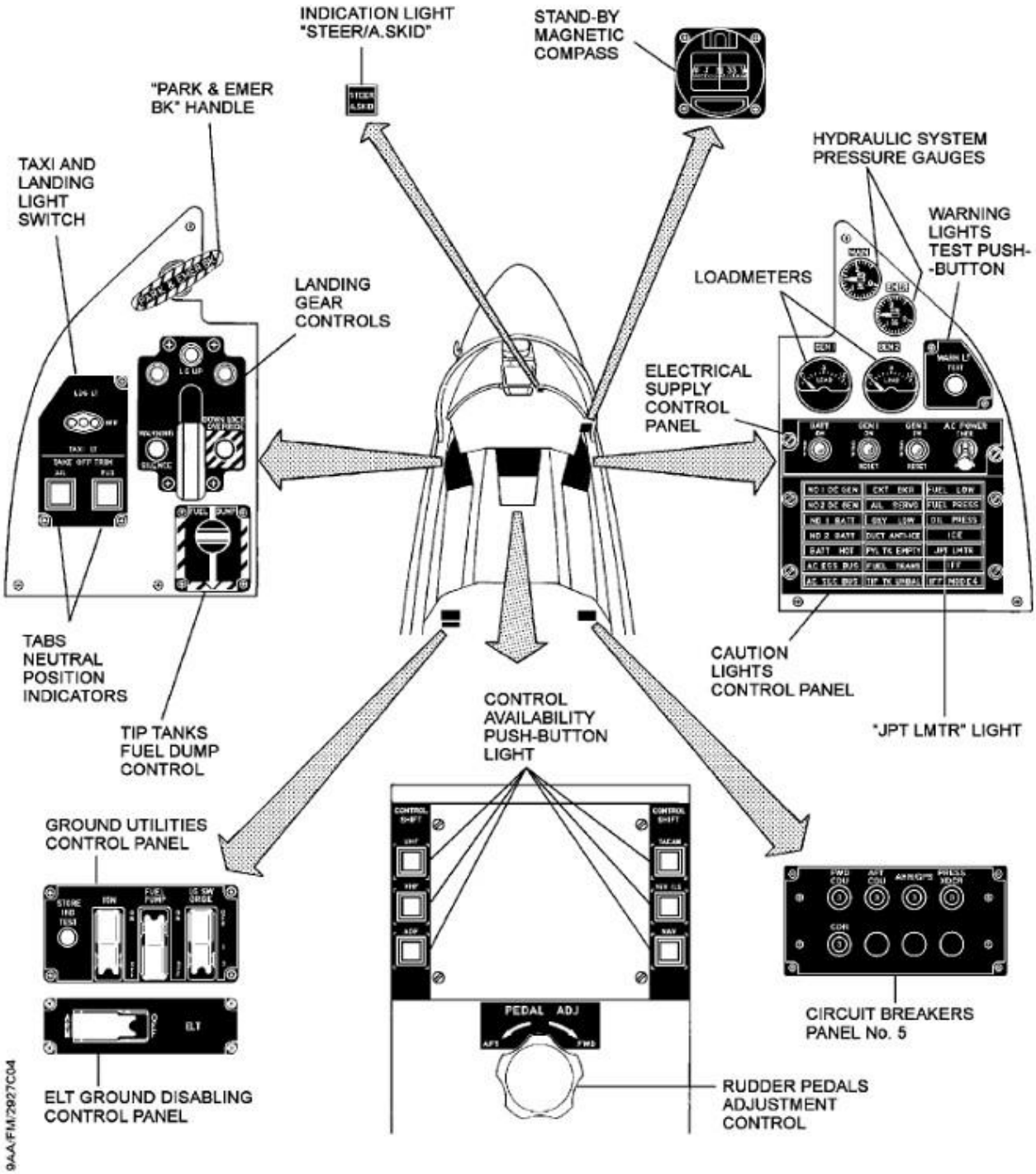
1. CLOCK
2. LONGITUDINAL TRIM INDICATOR
3. ANGLE-OF-ATTACK INDICATOR
4. "CANOPY" WARNING LIGHT
5. MACH-AIRSPEED INDICATOR
6. UHF FREQUENCY INDICATOR
7. "MASTER CAUTION" LIGHT
8. GUNSIGHT CONTROL PANEL
9. ATTITUDE DIRECTOR INDICATOR (ADI)
10. "FIRE" WARNING LIGHT
11. REMOTE DISPLAY UNIT (RDU)
12. ENCODER ALTIMETER
13. OXYGEN FLOW INDICATOR
14. "OVERHEAT" CAUTION LIGHT
15. TACHOMETER
16. JET PIPE TEMPERATURE INDICATOR
17. OXYGEN PRESSURE GAUGE



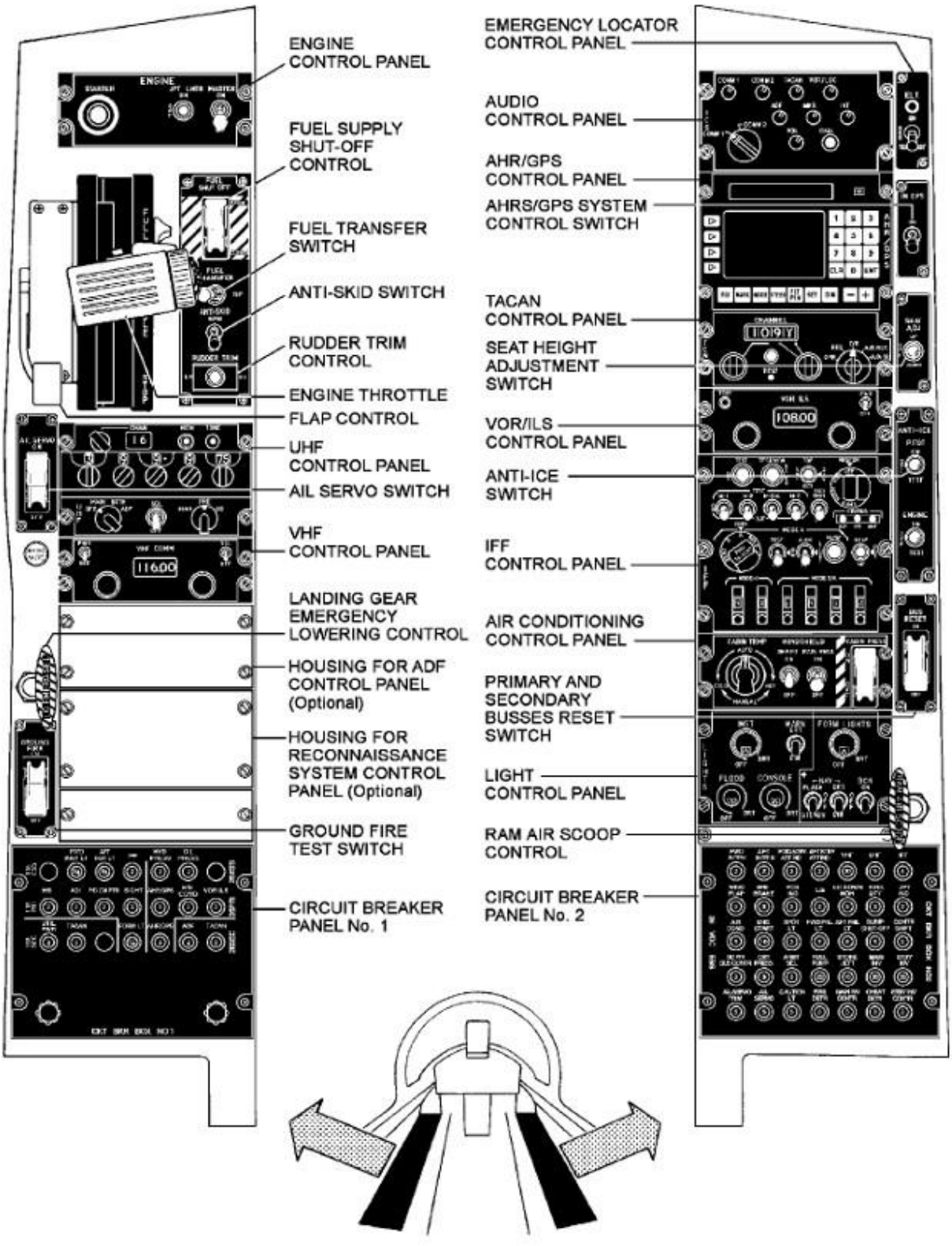
18. ANTI-ICE INDICATORS
19. FUEL QUANTITY INDICATOR
20. CABIN ALTIMETER
21. FLOWMETER
22. ENGINE OIL PRESSURE GAUGE
23. HSI CONTROL PANEL
24. MARKER BEACON CONTROL PANEL
25. VERTICAL VELOCITY INDICATOR
26. HORIZONTAL SITUATION INDICATOR (HSI)
27. STAND-BY ATTITUDE INDICATOR
28. "FLIGHT DIRECTOR" CONTROL PANEL
29. EXTERNAL STORES RELEASE PUSH-BUTTON
30. ARMAMENT CONTROL PANEL
31. FLAP POSITION INDICATOR
32. SPEED BRAKE POSITION INDICATOR
33. ACCELEROMETER

FRONT INSTRUMENT PANEL

LATERAL PANEL AND CENTERSTAND



FRONT CONSOLES



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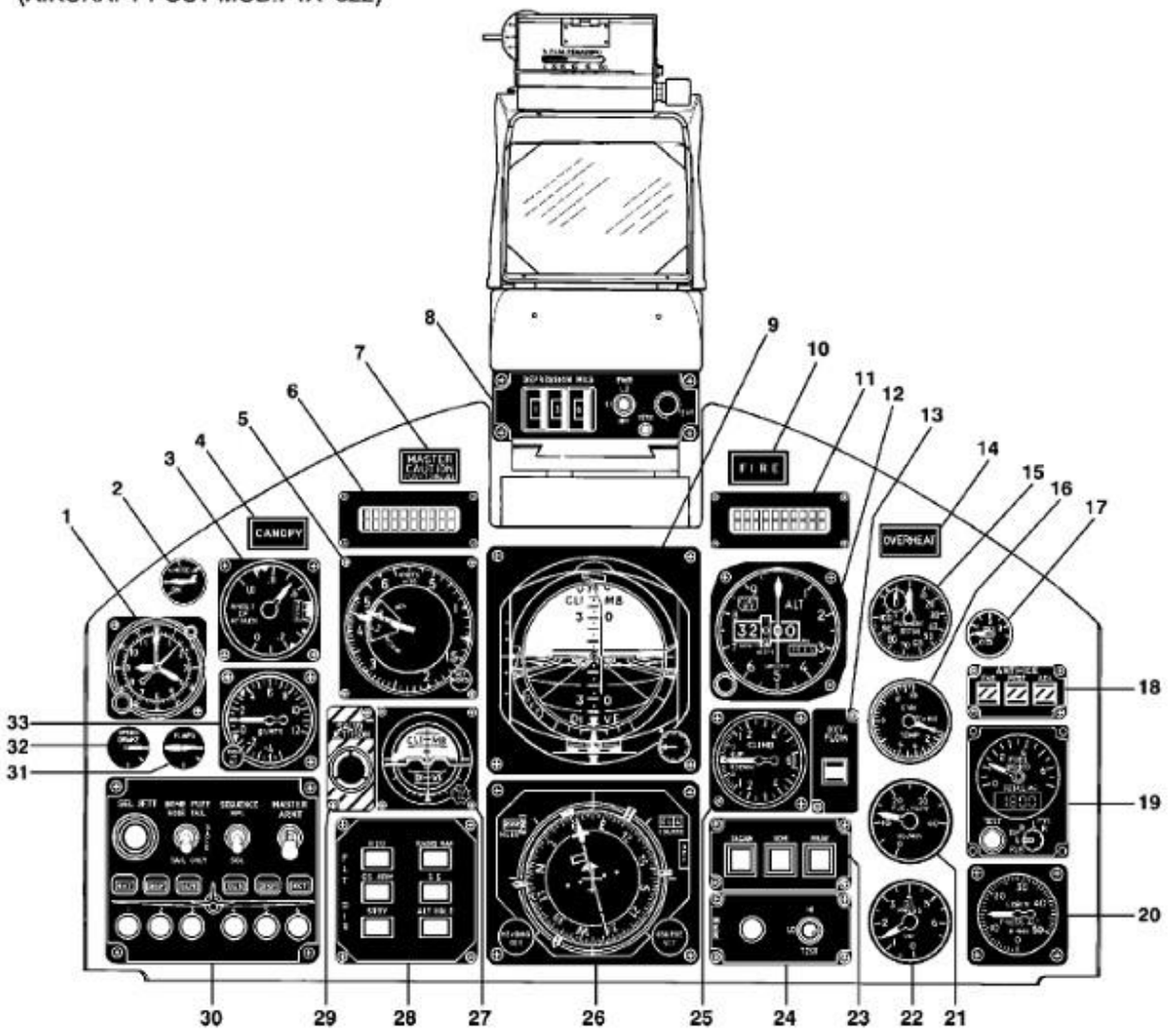
FRONT INSTRUMENT PANEL

CENTRAL PANEL

(AIRCRAFT POST-MOD.PTA -322)



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3. ANGLE-OF-ATTACK INDICATOR
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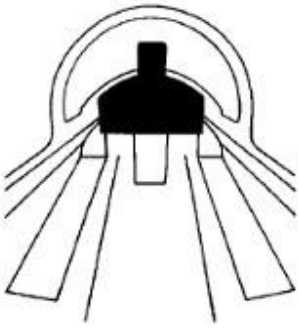
5. MACH-AIRSPEED INDICATOR
6. RADIO FREQUENCY INDICATOR (COMM1 & COMM2)
7. "MASTER CAUTION" LIGHT
8. GUNSIGHT CONTROL PANEL
9. ATTITUDE DIRECTOR INDICATOR (ADI)
10. "FIRE" WARNING LIGHT
11. REMOTE DISPLAY UNIT (RDU)
12. ENCODER ALTIMETER
13. OXYGEN FLOW INDICATOR
14. "OVERHEAT" CAUTION LIGHT
15. TACHOMETER
16. JET PIPE TEMPERATURE INDICATOR
17. OXYGEN PRESSURE GAUGE



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33. ACCELEROMETER

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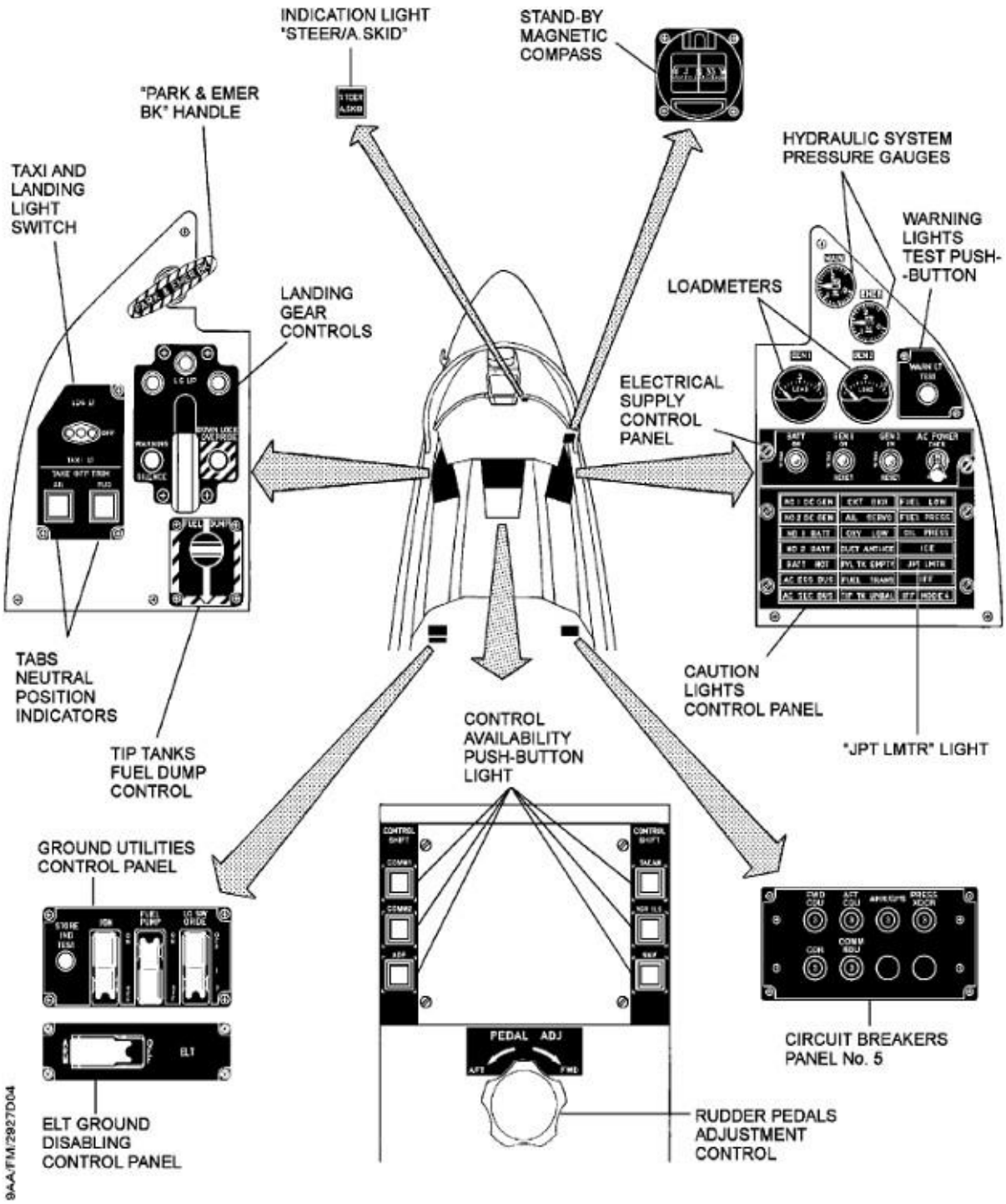
FRONT INSTRUMENT PANEL

LATERAL PANEL AND CENTERSTAND

(AIRCRAFT POST-MOD. PTA -322)



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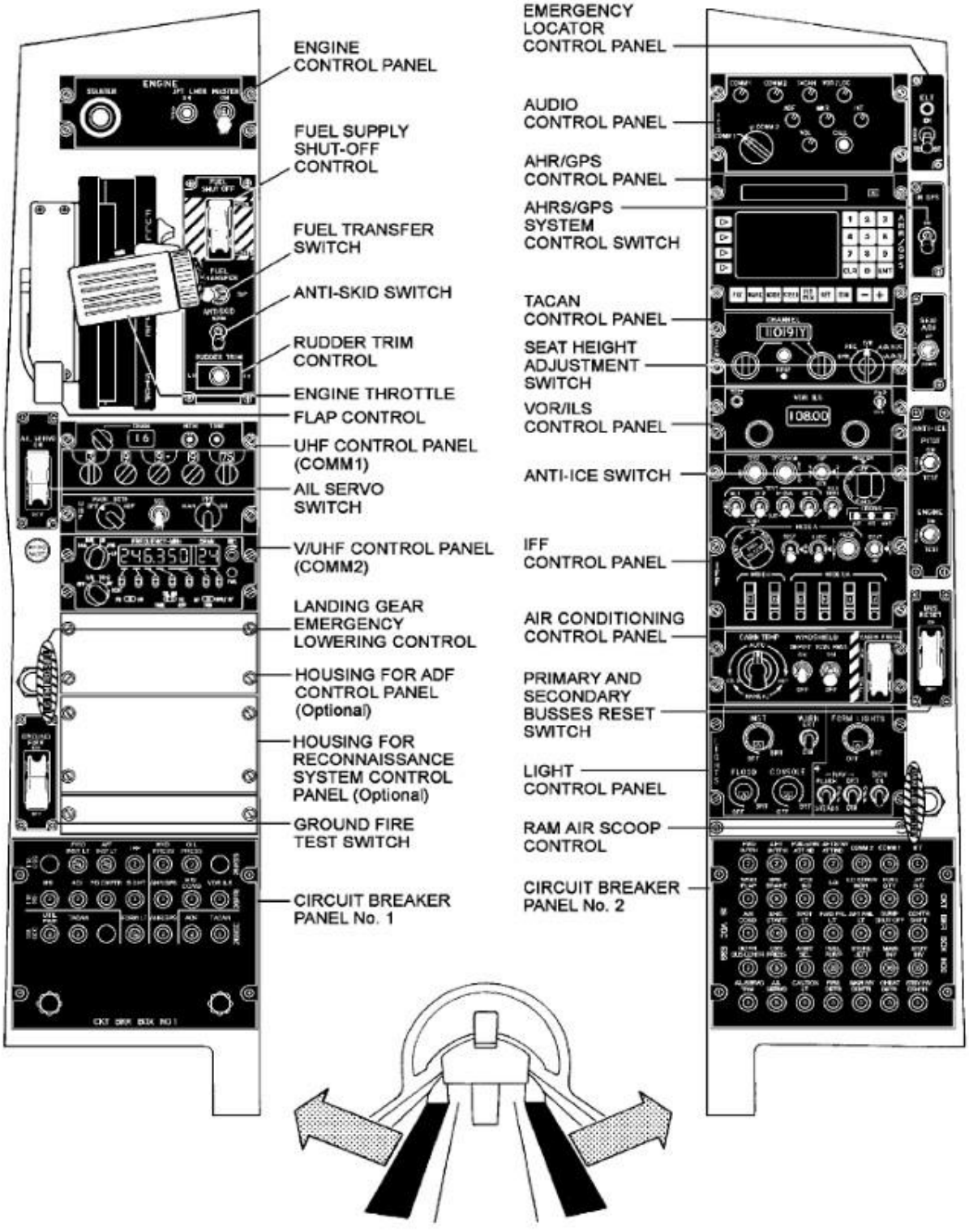
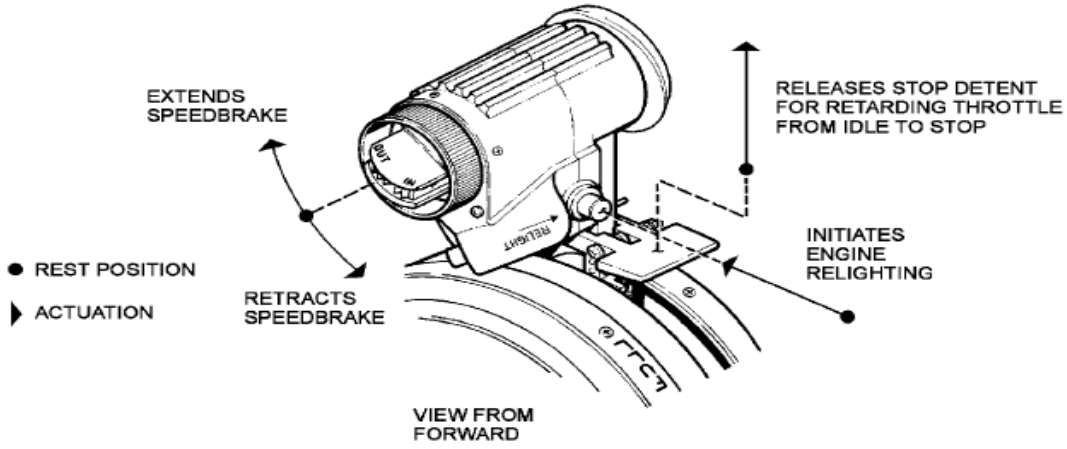
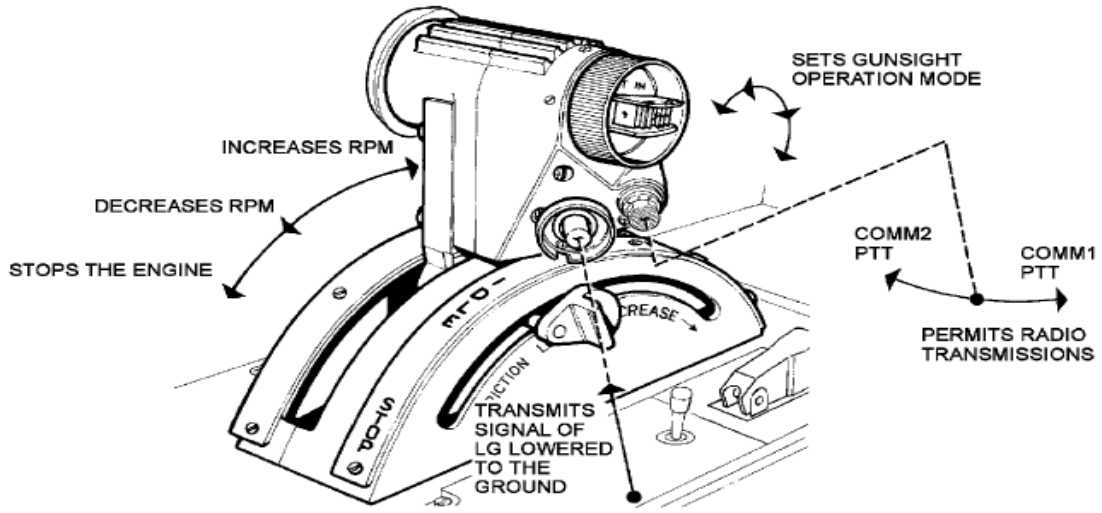
FRONT CONSOLES

(AIRCRAFT POST-MOD.PTA -322)

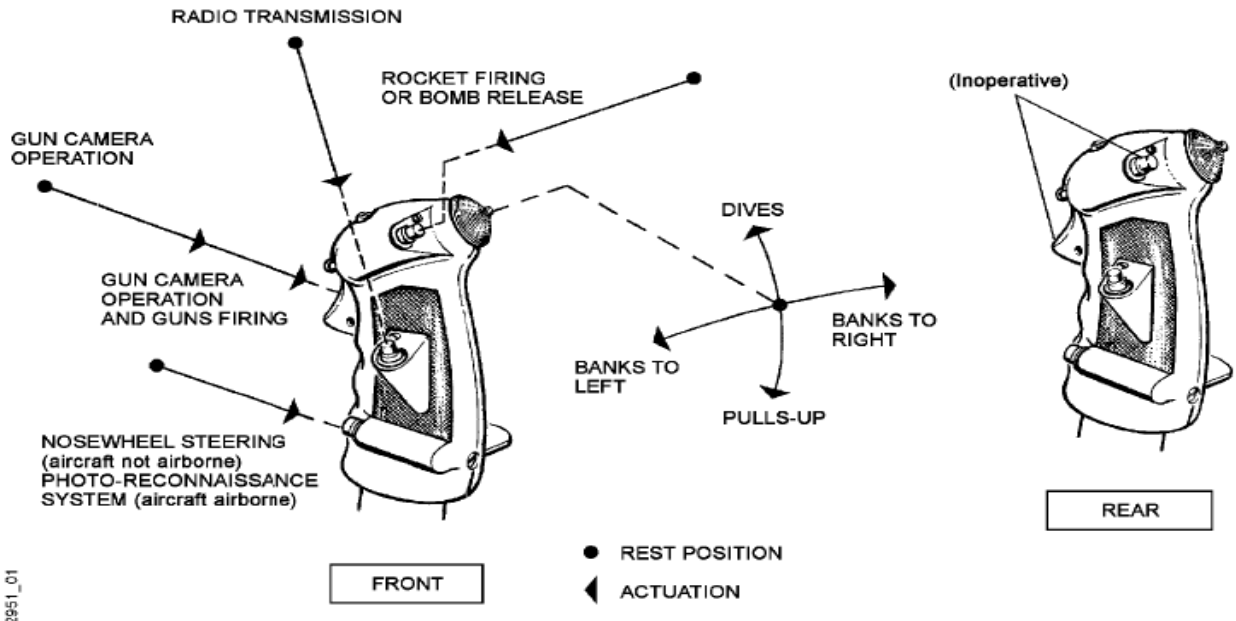


ENGINE THROTTLE



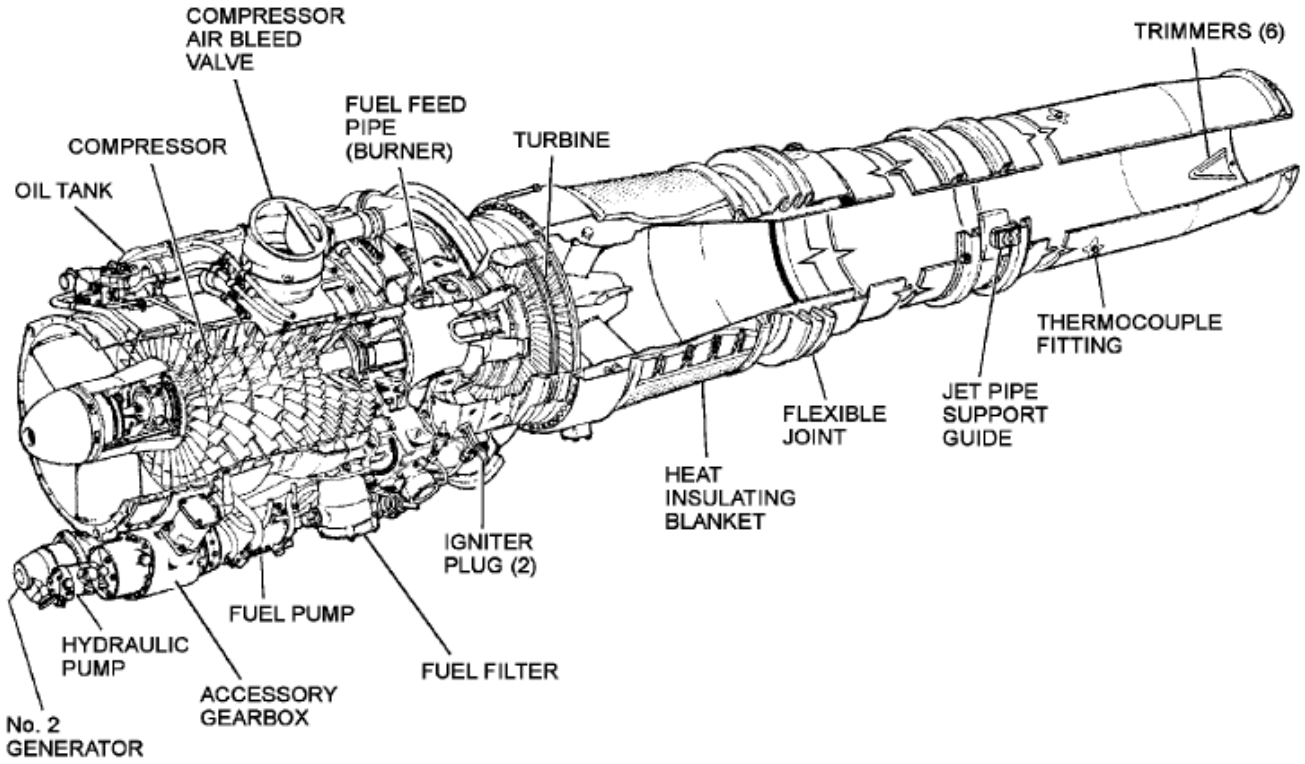


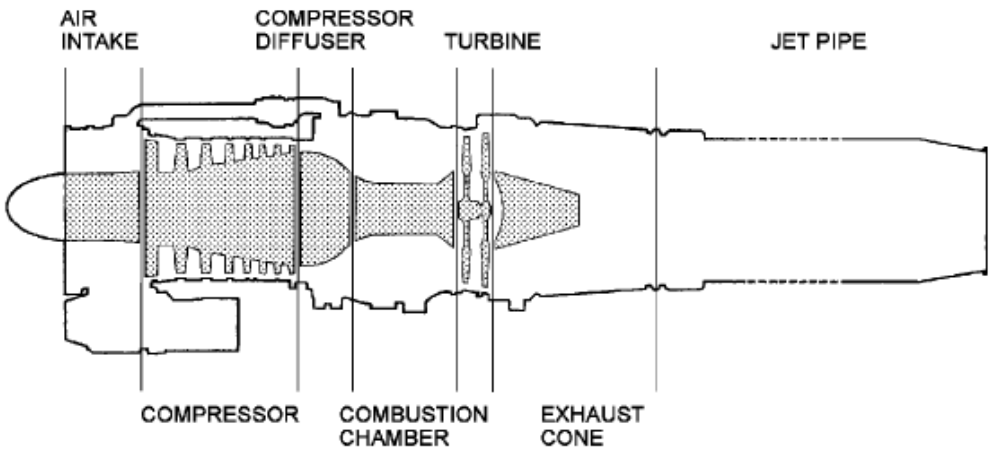
CONTROL STICKS



9AA/FM/2951_01

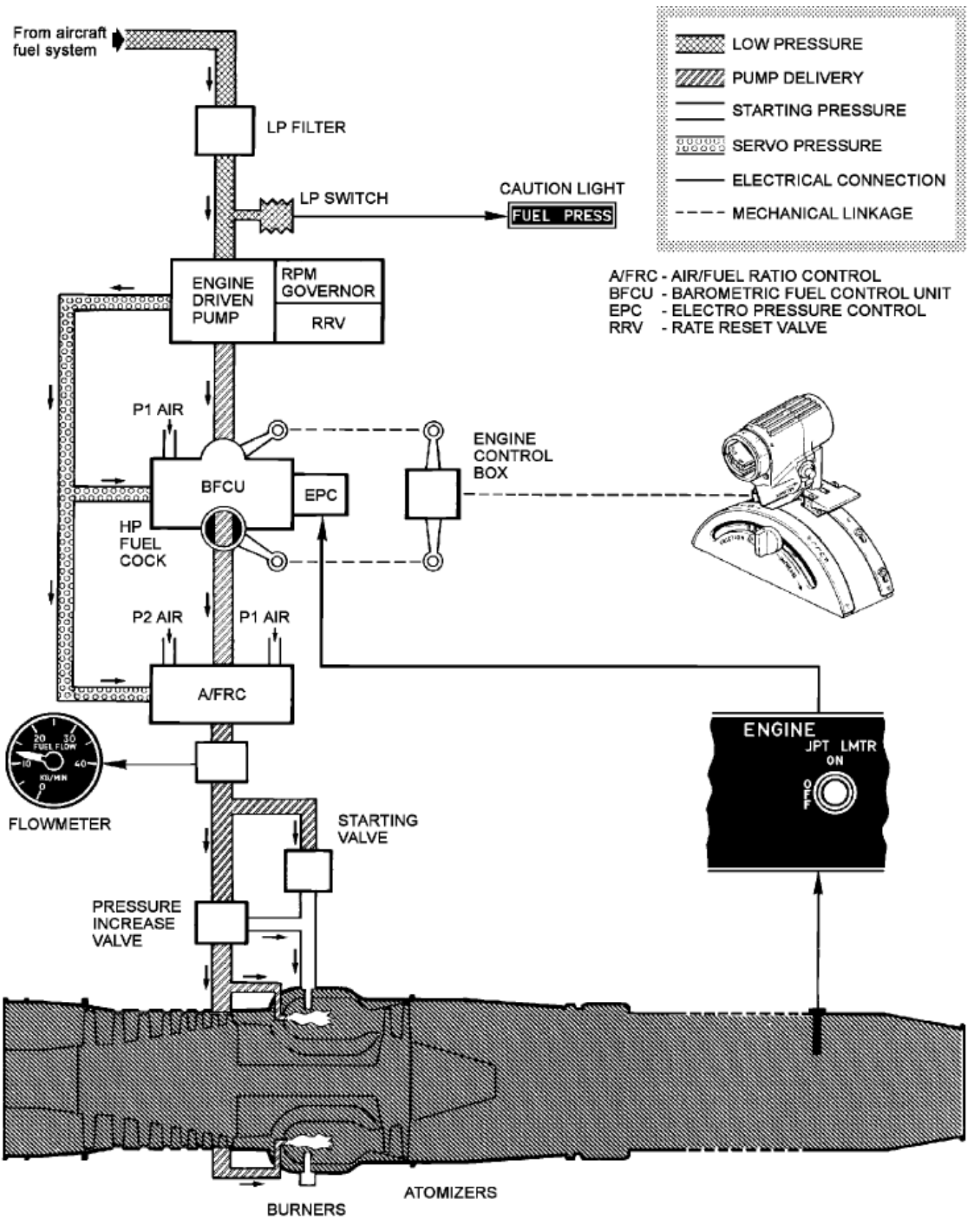
VIPER MK 632-43 ENGINE





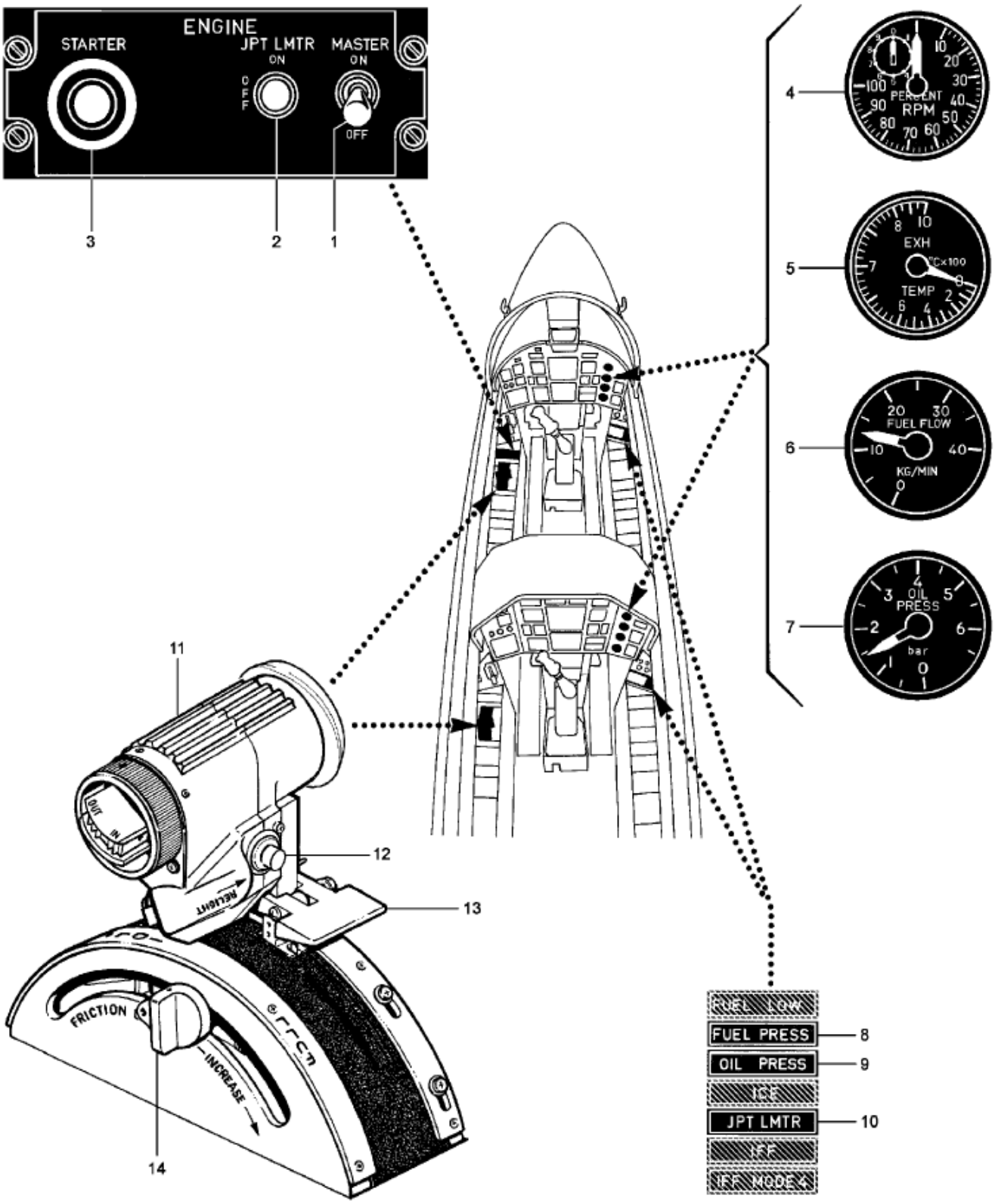
9CD/FM/0064_03

ENGINE FUEL SYSTEM

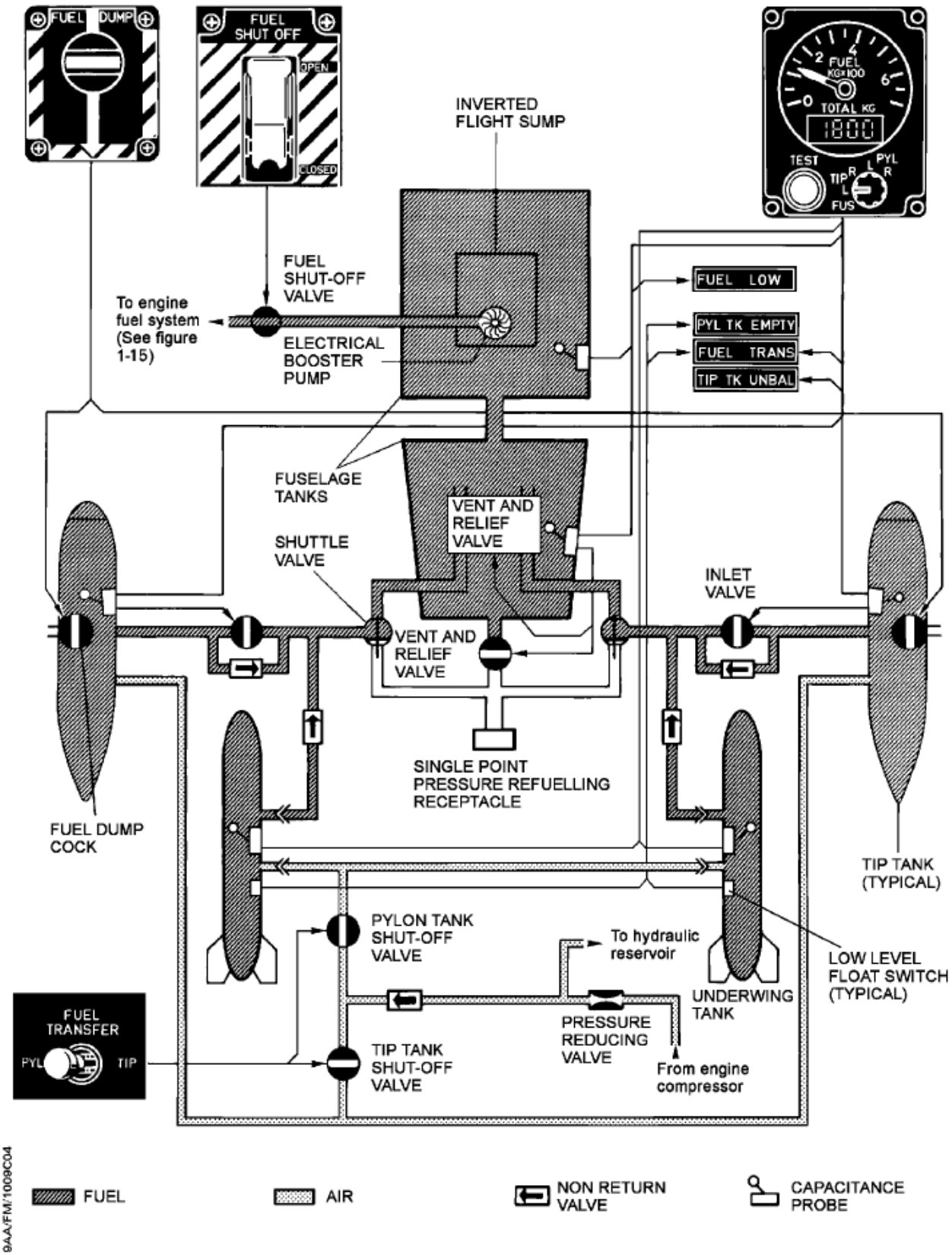


9AA/MMGV/1976_02

ENGINE CONTROLS AND INDICATORS



AIRCRAFT FUEL SYSTEM



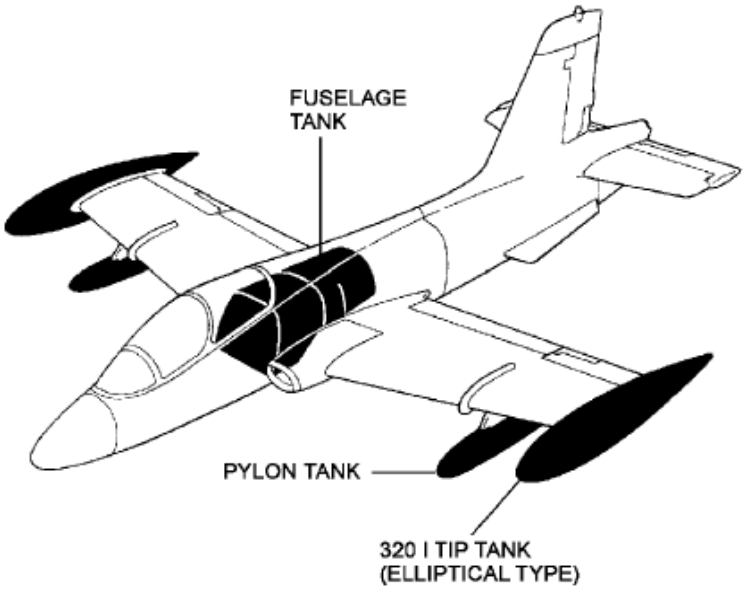
9AA/FM/1009C04

FUEL TANKS LOCATION AND USABLE FUEL

AIRCRAFT FITTED WITH 320 l TIP TANKS

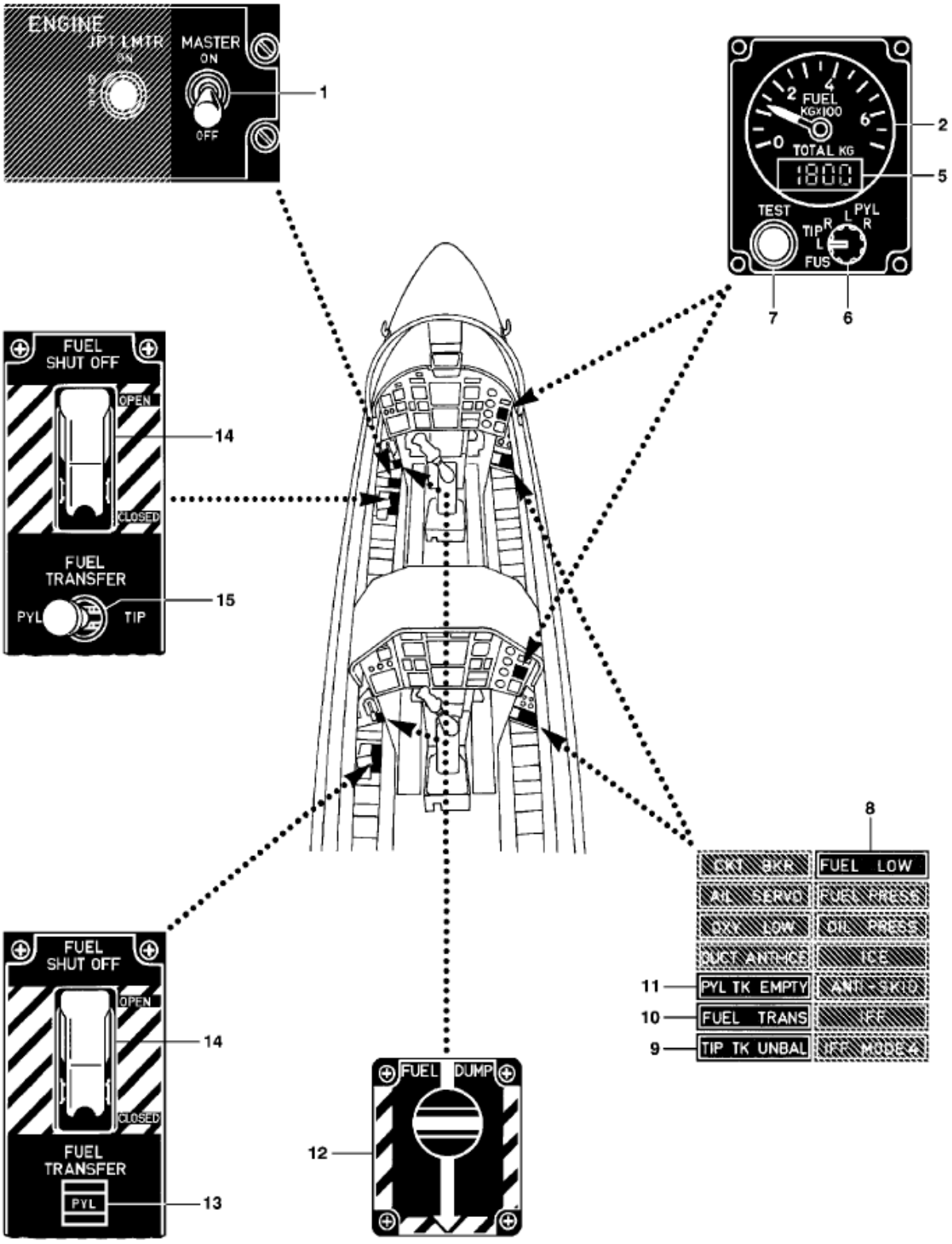
NOTE

- Figures are estimates only. The mass of the fuel is based on a fuel density of 0.803 Kg/dm³ (nominal density).
- Density of F-34 fuel can change from 0.775 to 0.840 Kg/dm³.
- See para "Correct interpretation of Fuel Quantity Indicator Readings".



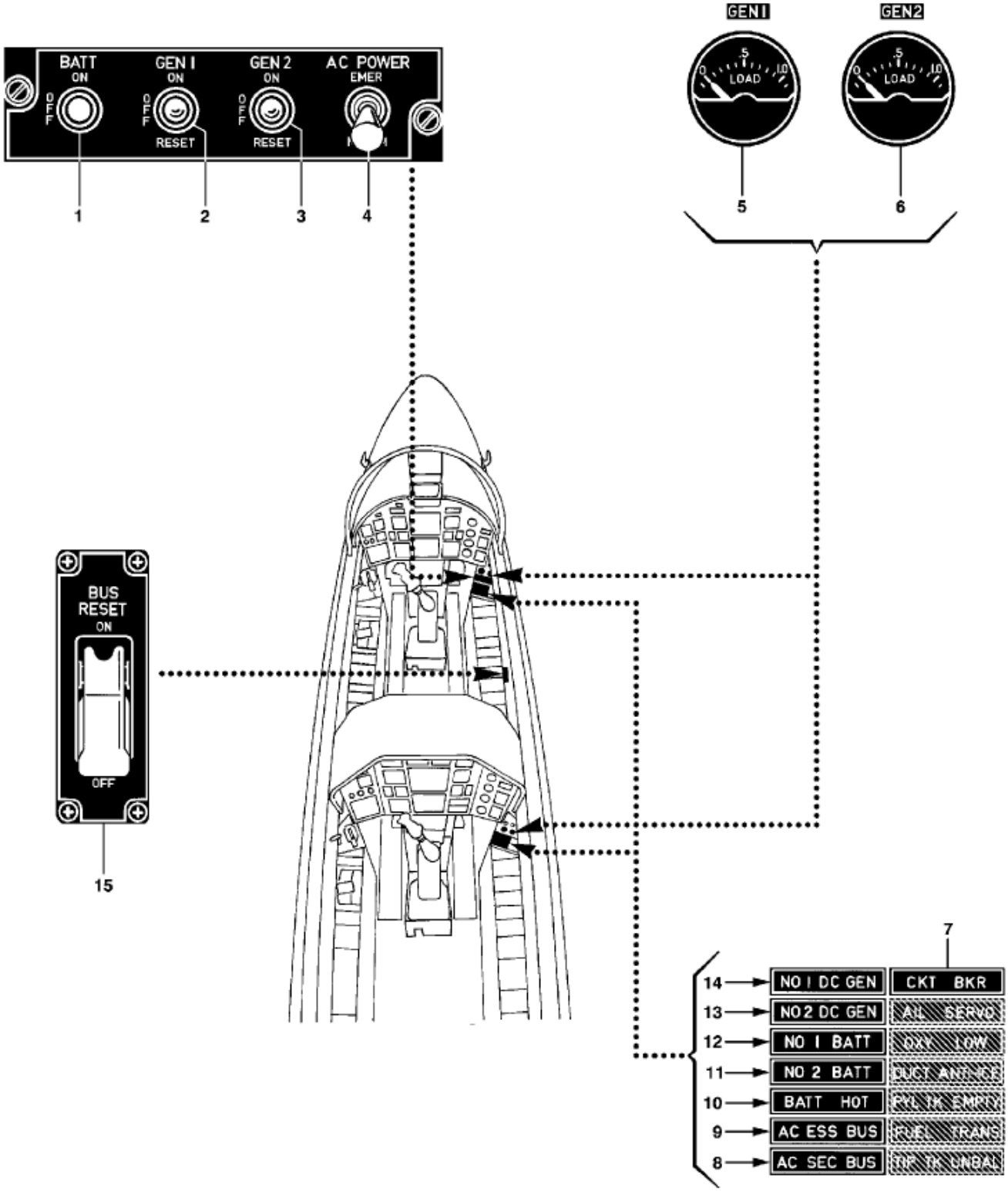
TANKS	USABLE FUEL	
	VOLUME	QUANTITY NATO F-34 (JP8) (0.803 kg/dm³)
	litres	kg
MAIN FUSELAGE TANK	**780**	**626**
TIP TANKS (2)	**640**	**514**
TOTAL	**1420**	**1140**
PYLON TANKS (2)	**660**	**530**
TOTAL	**2080**	**1670**

FUEL SYSTEM CONTROLS AND INDICATORS

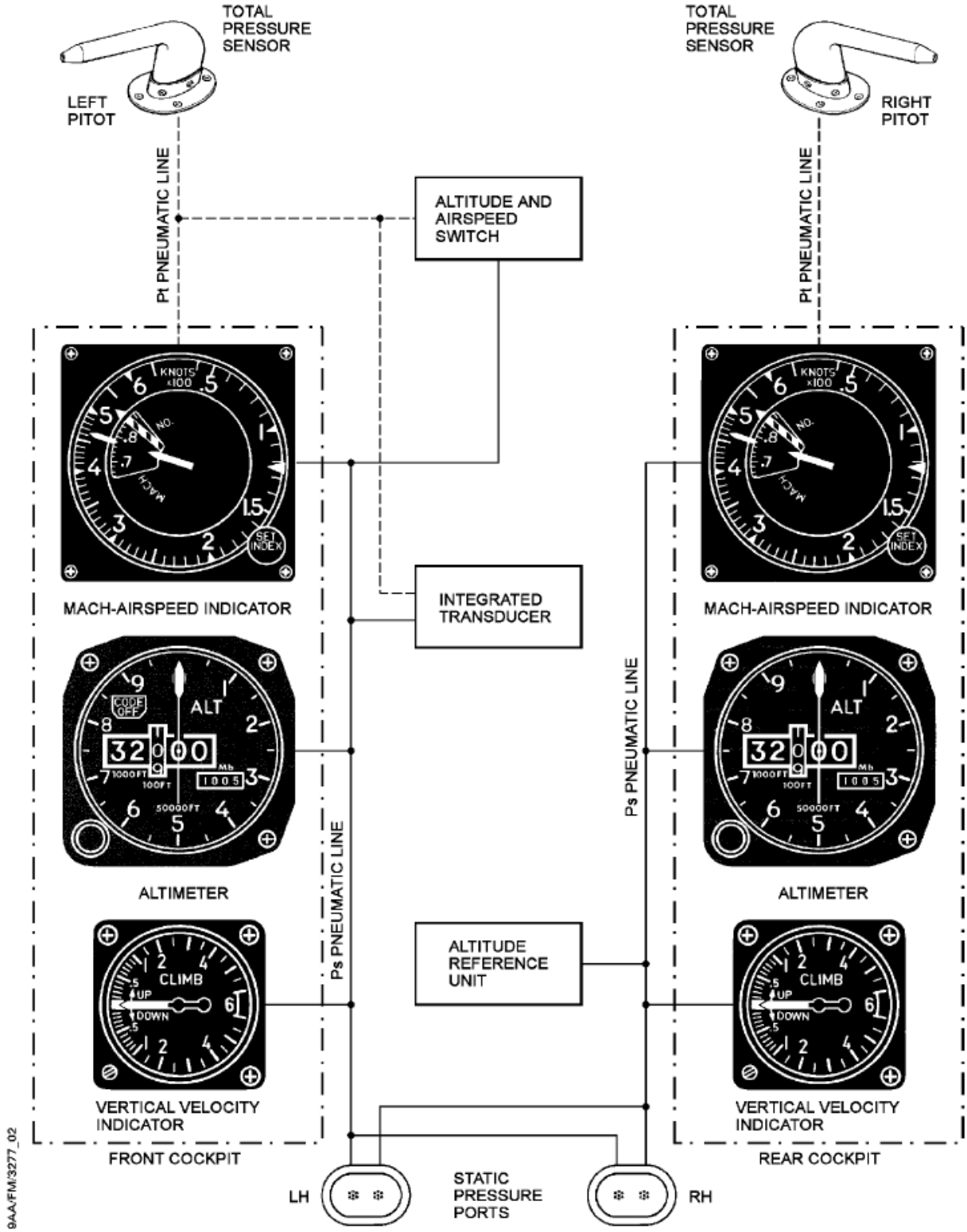


9AA/FM/1040D01

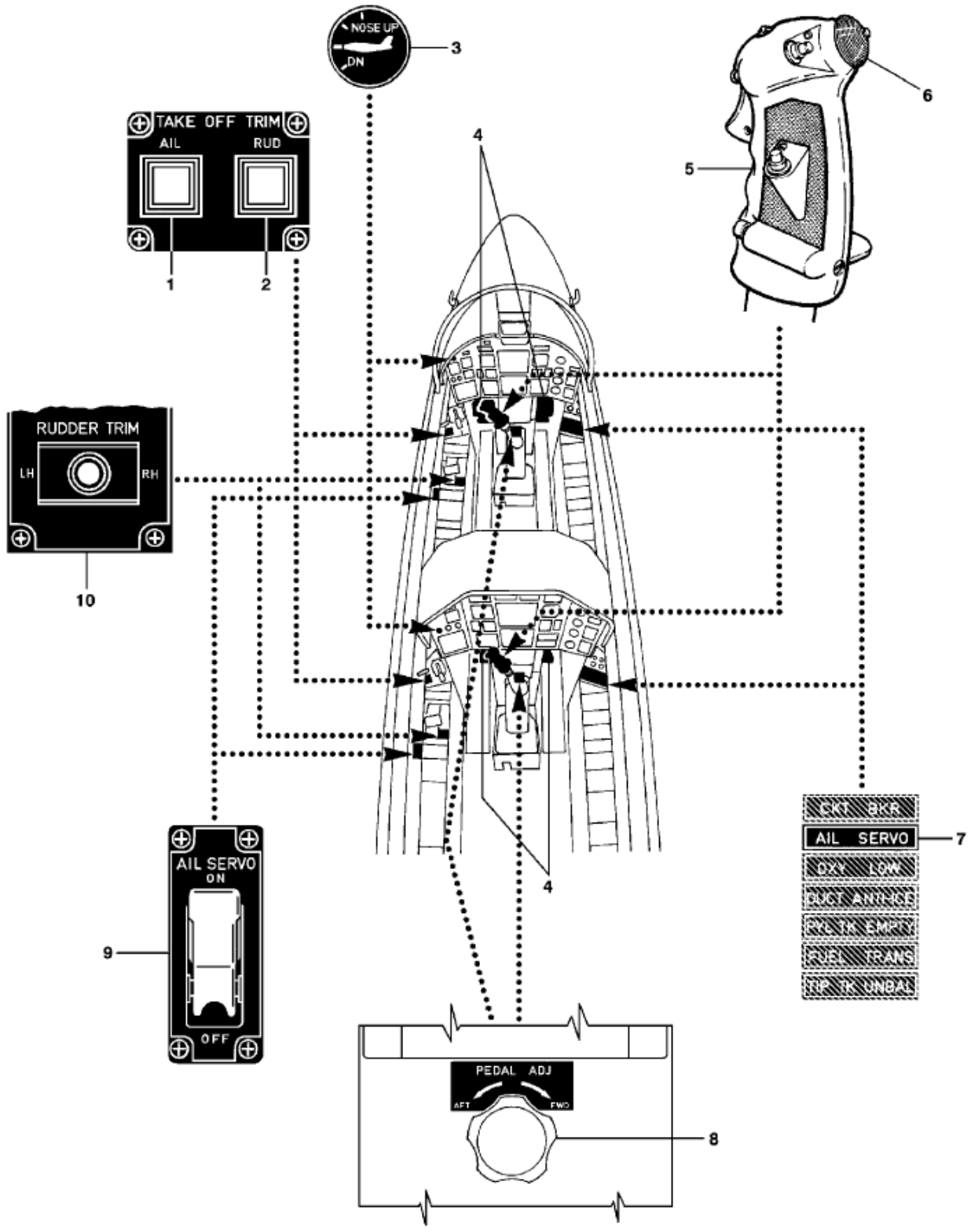
ELECTRICAL SYSTEM CONTROLS AND INDICATORS



PITOT-STATIC SYSTEM

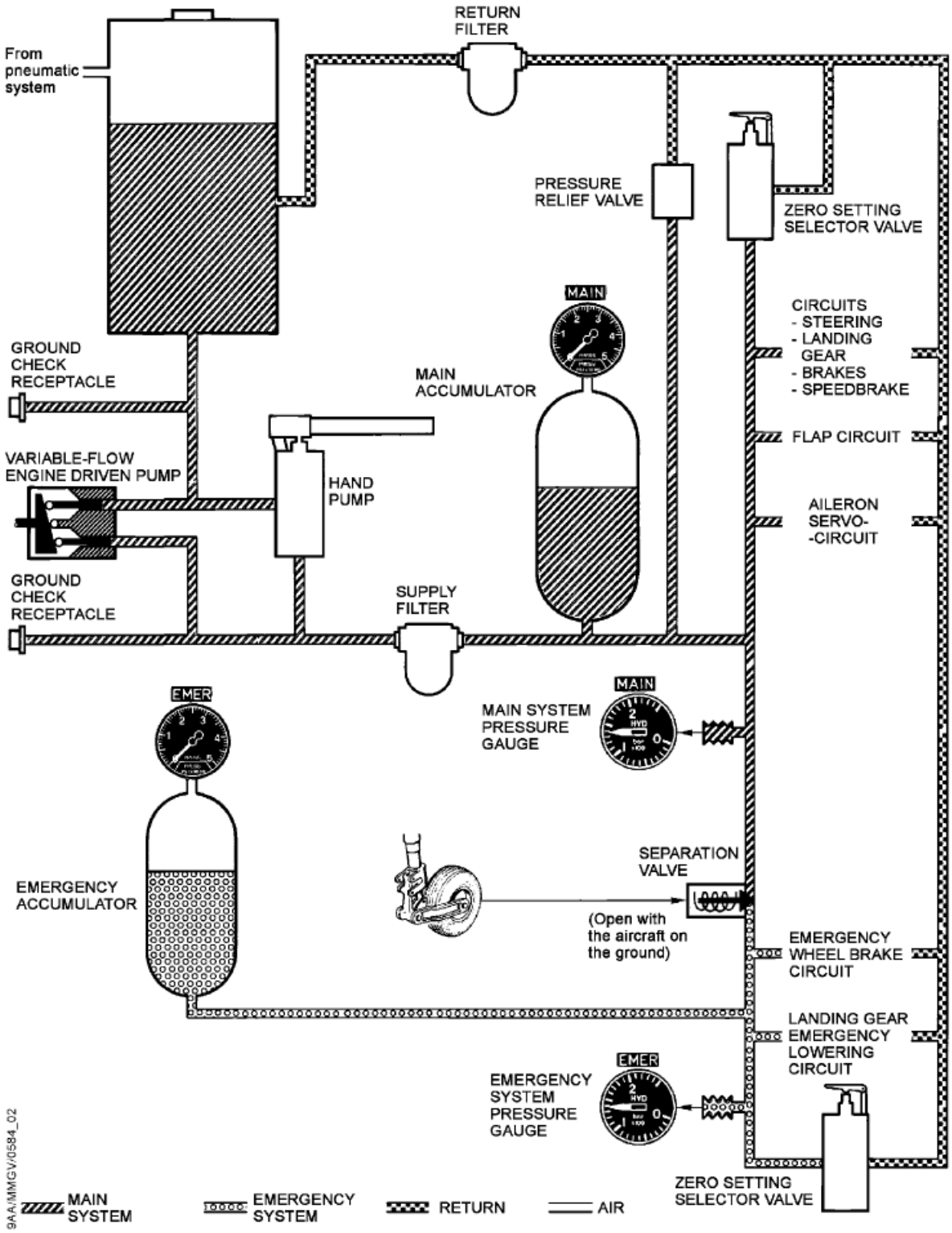


PRIMARY AND SECONDARY FLIGHT CONTROLS AND INDICATORS



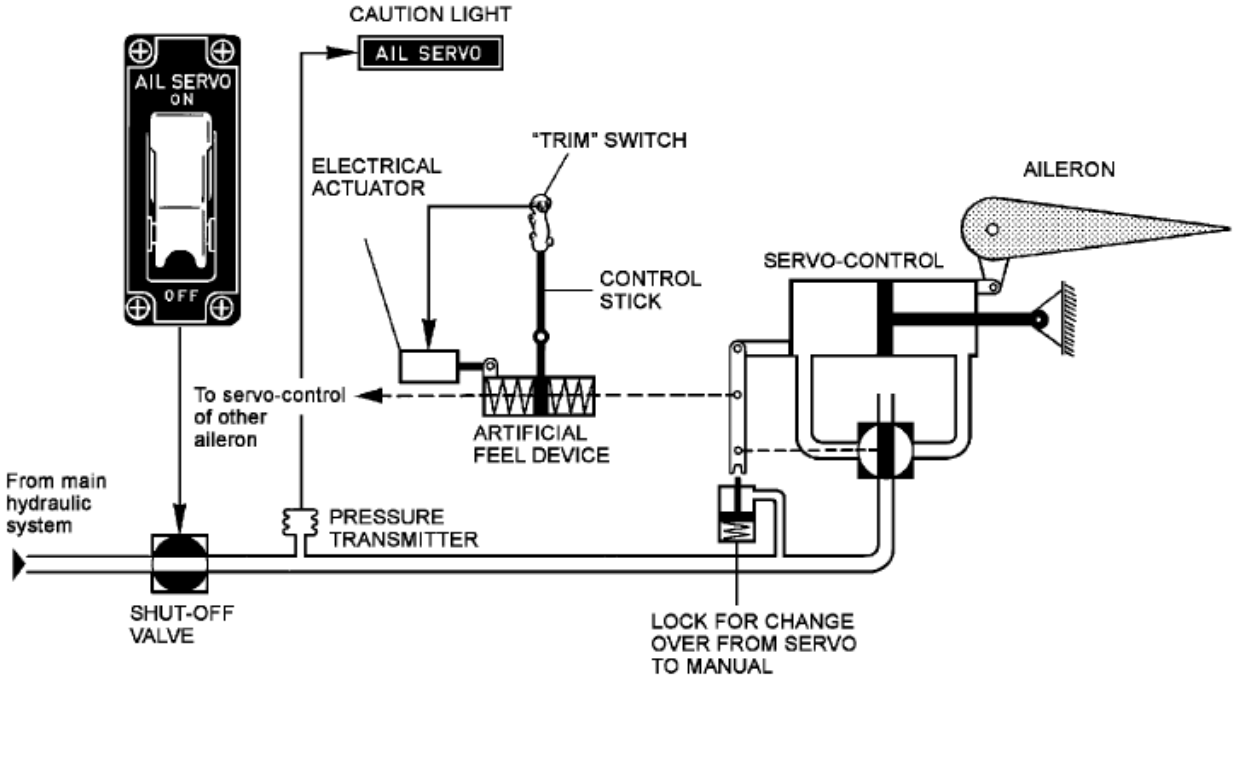
9AA/FM/0052C01

HYDRAULIC POWER SYSTEM

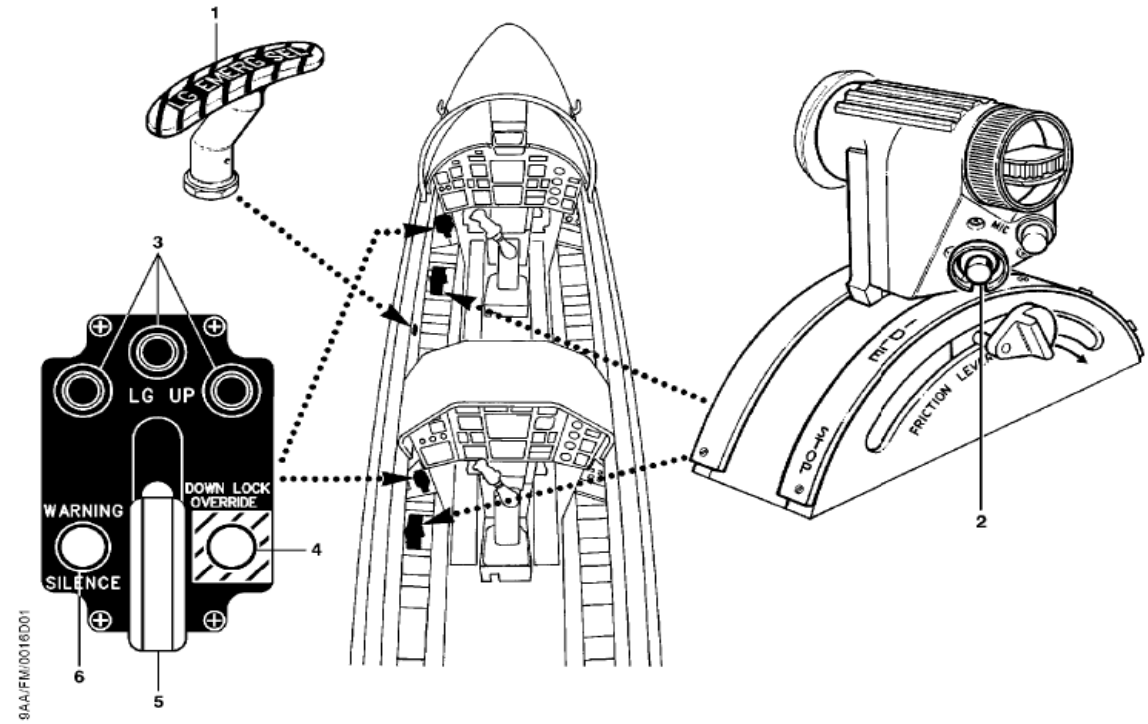


9AA/MMGV/0584_02

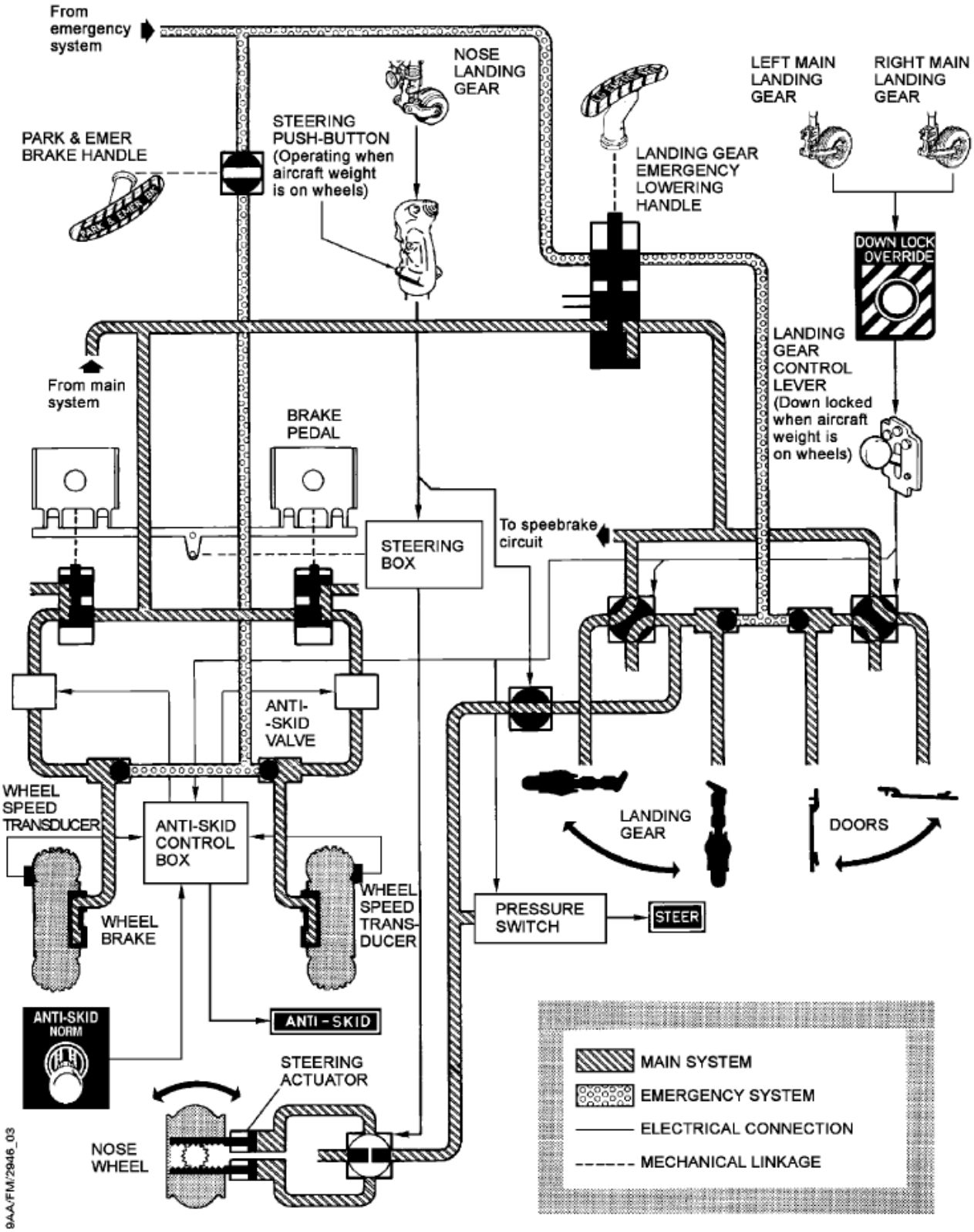
AILERON CONTROL SYSTEM



LANDING GEAR CONTROLS AND INDICATORS



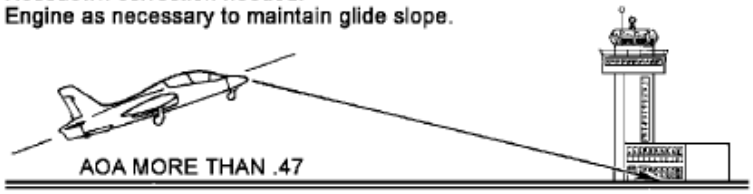
LANDING GEAR SYSTEM



ANGLE-OF-ATTACK INDICATION DURING APPROACH PHASE

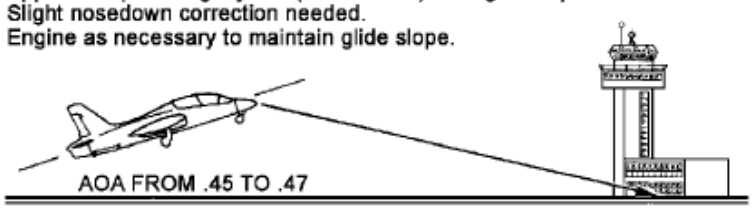
Pointer well above upper edge of approach index marker

Approach speed too low (more than 5 knots) as regards optimum.
Nosedown correction needed.
Engine as necessary to maintain glide slope.



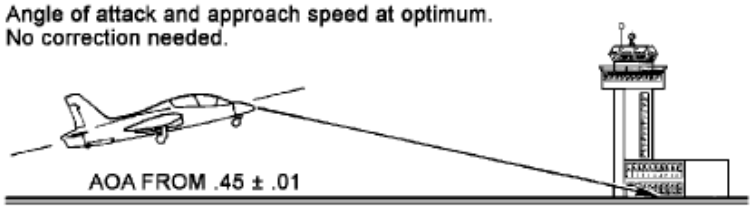
Pointer just above center of approach index marker

Approach speed slightly low (3 to 5 knots) as regards optimum.
Slight nosedown correction needed.
Engine as necessary to maintain glide slope.



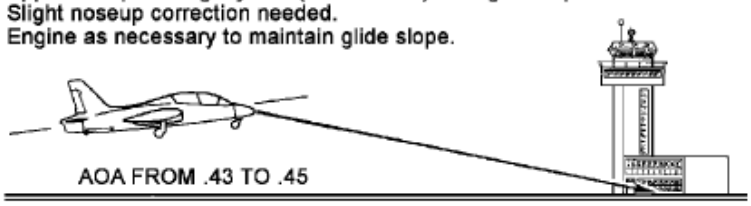
Pointer near center of approach index marker

Angle of attack and approach speed at optimum.
No correction needed.



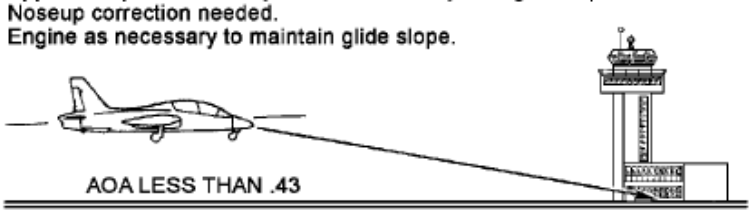
Pointer just below lower edge of approach index marker

Approach speed slightly fast (3 to 5 knots) as regards optimum.
Slight noseup correction needed.
Engine as necessary to maintain glide slope.



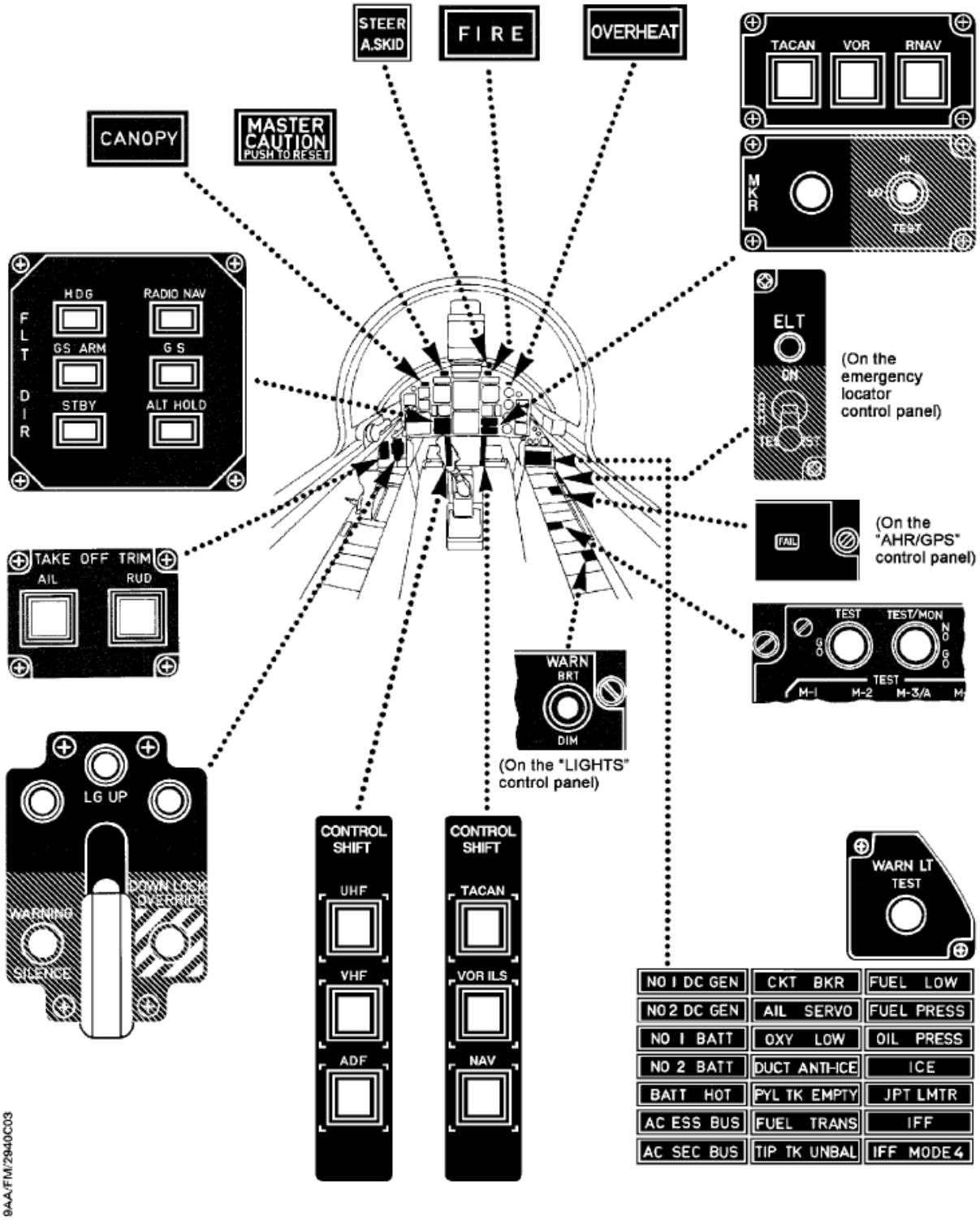
Pointer well below lower edge of approach index marker

Approach speed too fast (more than 5 knots) as regards optimum.
Noseup correction needed.
Engine as necessary to maintain glide slope.



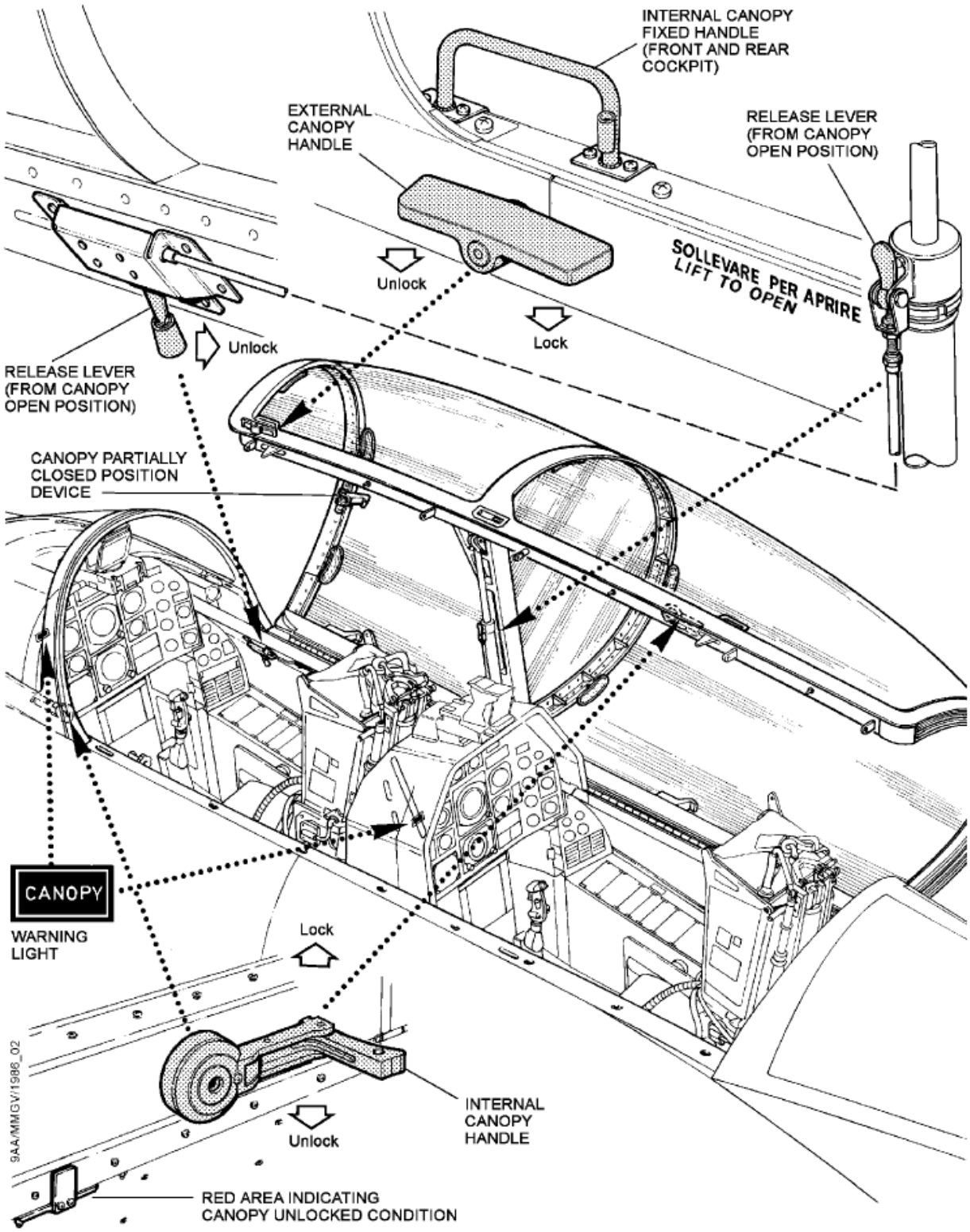
WARNING, CAUTION AND ADVISORY LIGHTS - FRONT COCKPIT

(AIRCRAFT PRE-MOD. PTA -322)

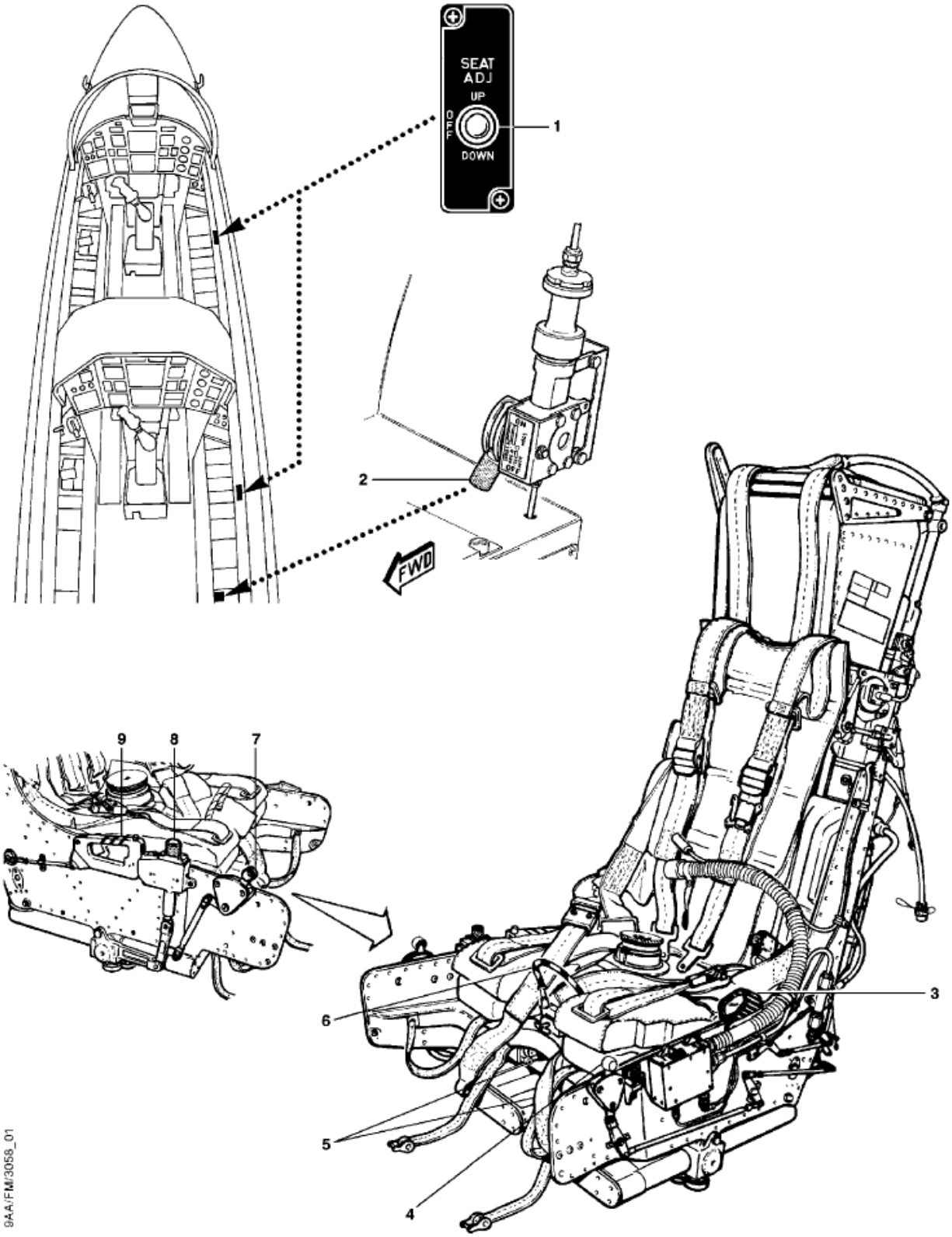


9AA/FM/2940C03

CANOPY CONTROLS



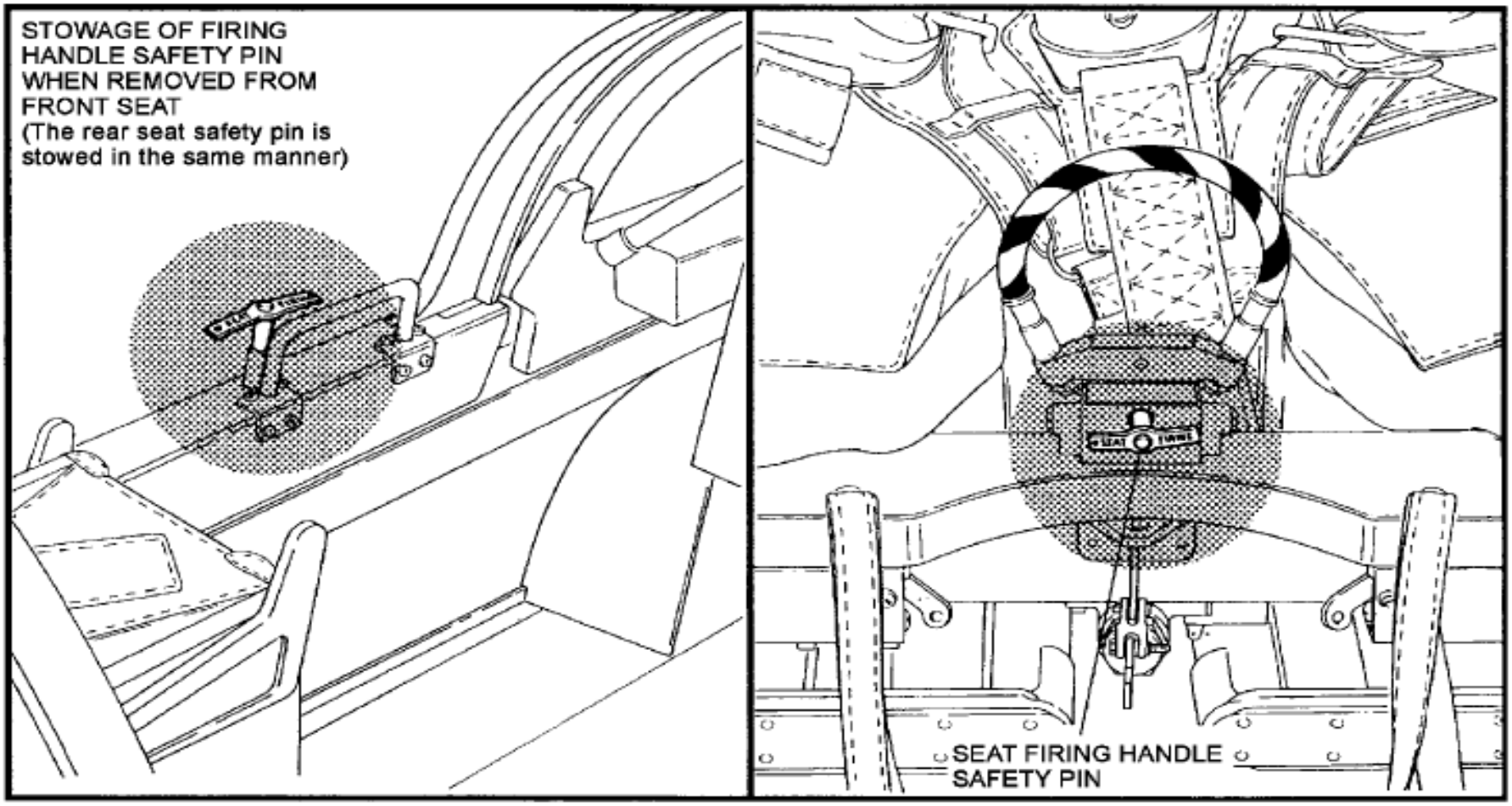
MK IT-10F EJECTION SEAT CONTROLS



94A/FM/3058_01

EJECTION SEAT SAFETY PINS

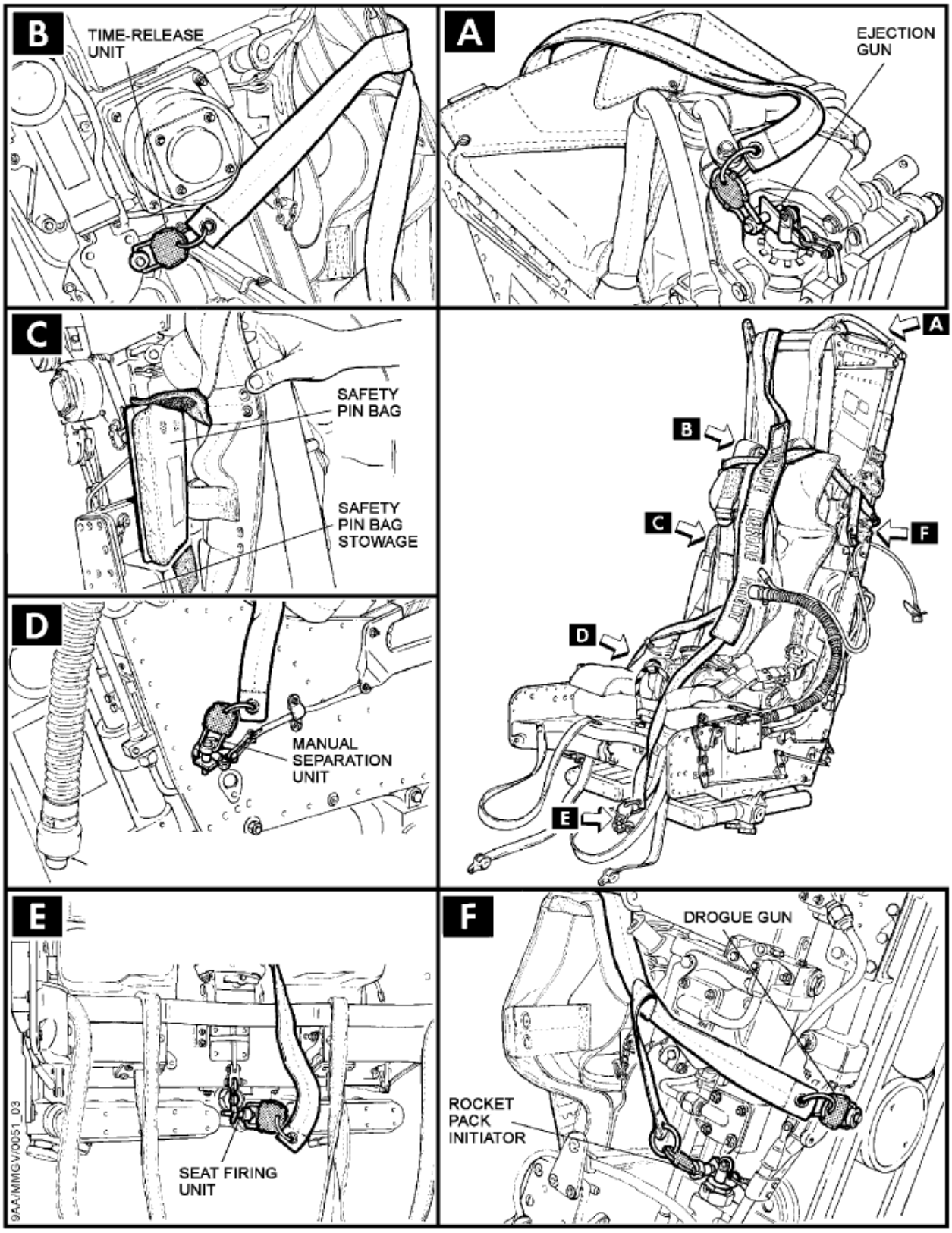
PARKING CONDITION



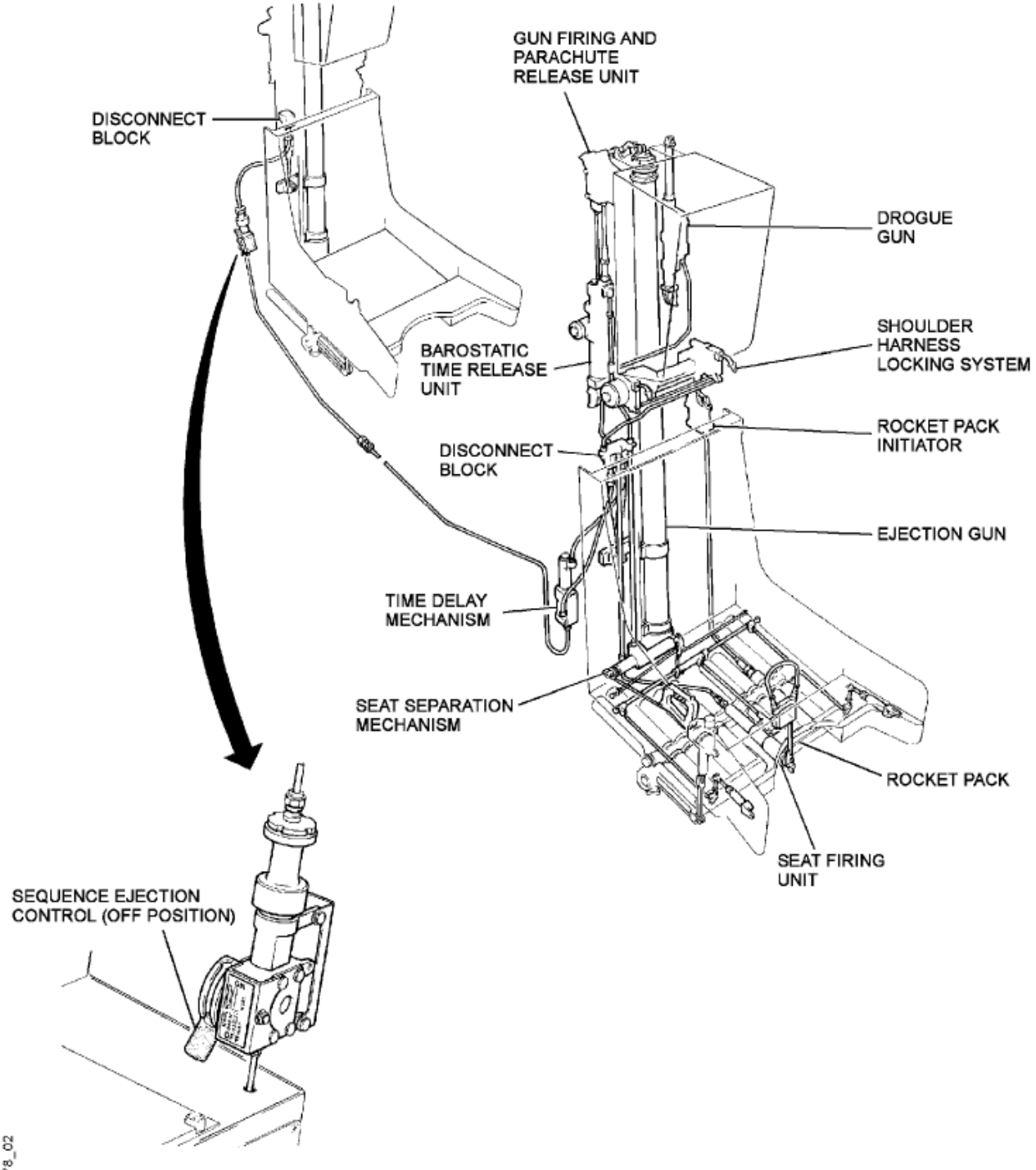
9AA/MMGV/0205A01

EJECTION SEAT SAFETY PINS

MAINTENANCE CONDITION

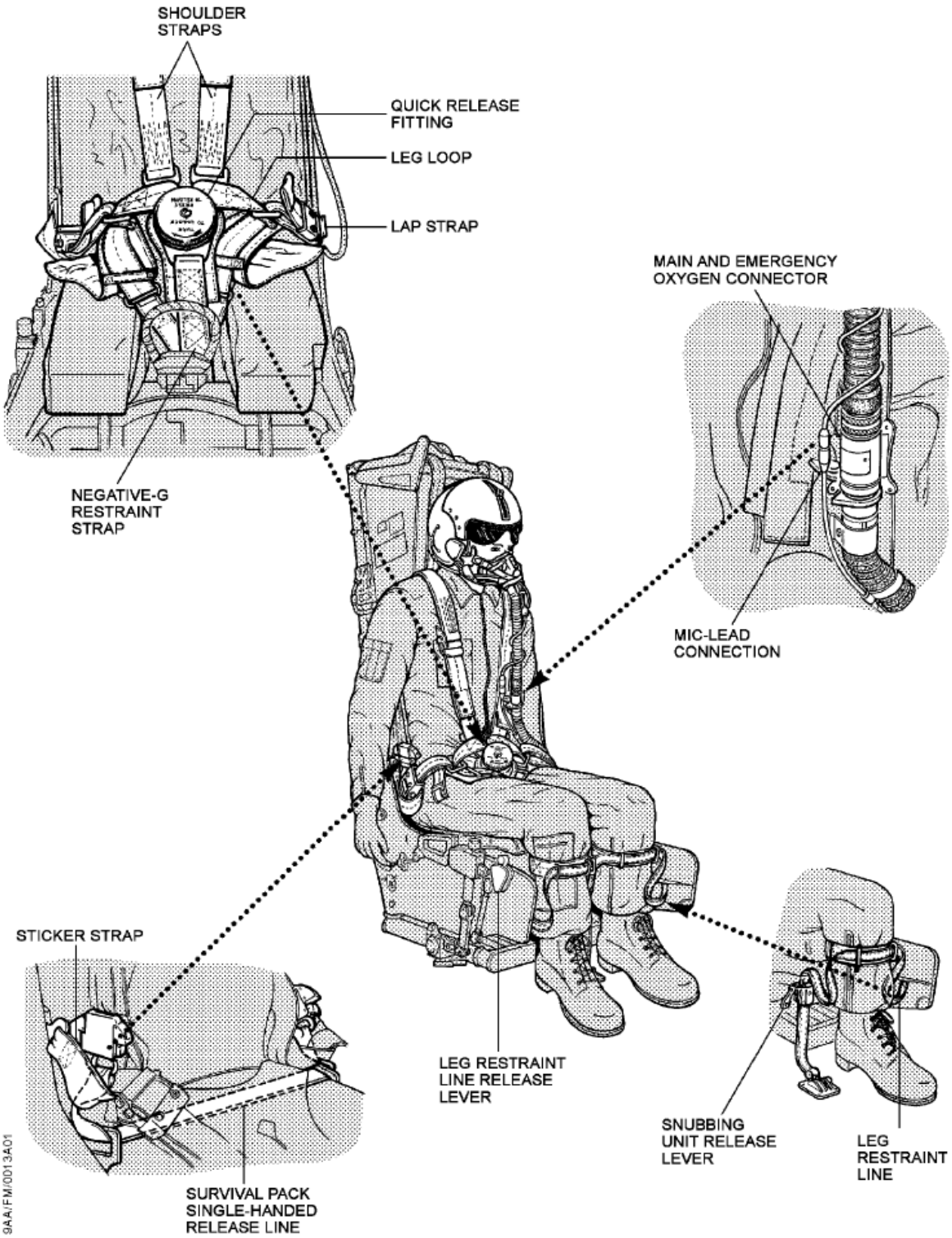


EJECTION SEAT FIRING SYSTEM



9AA/MMGV/1978_02

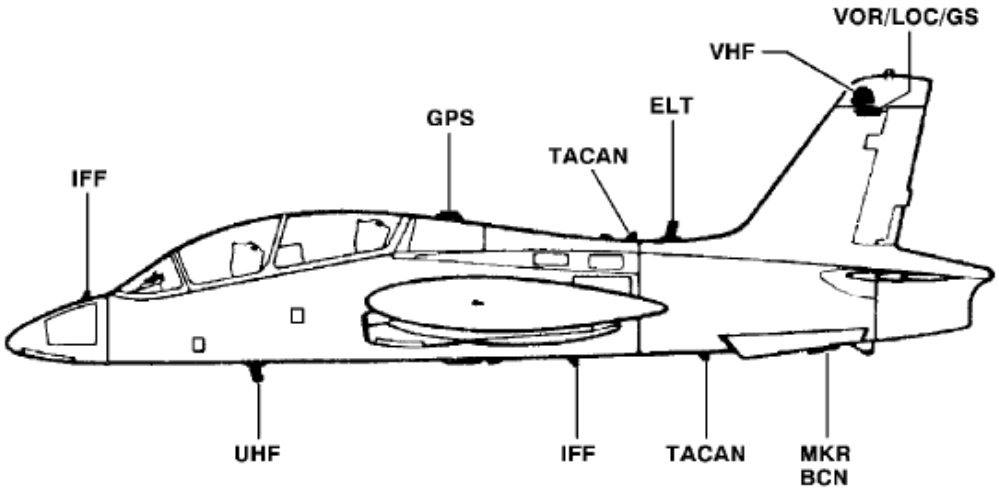
EJECTION SEAT EQUIPMENT



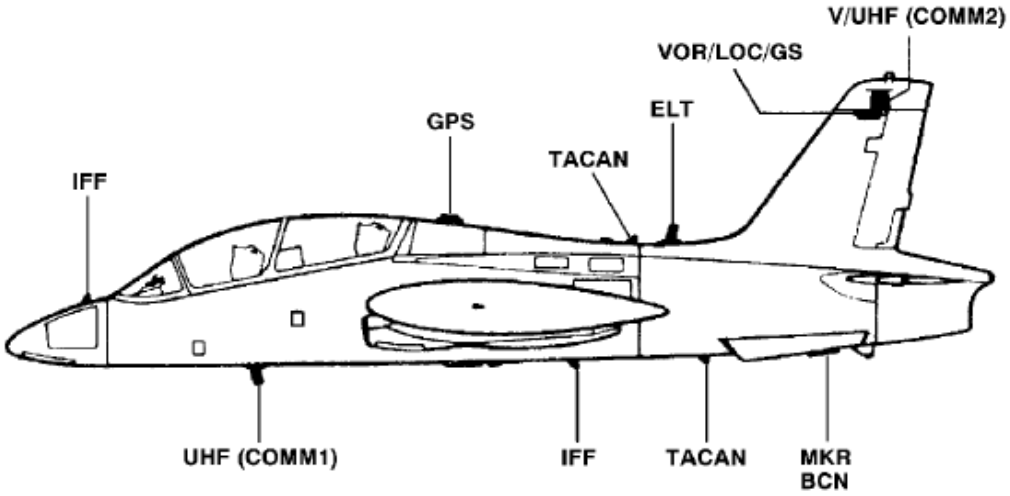
AVIONIC EQUIPMENT

ANTENNA LOCATION

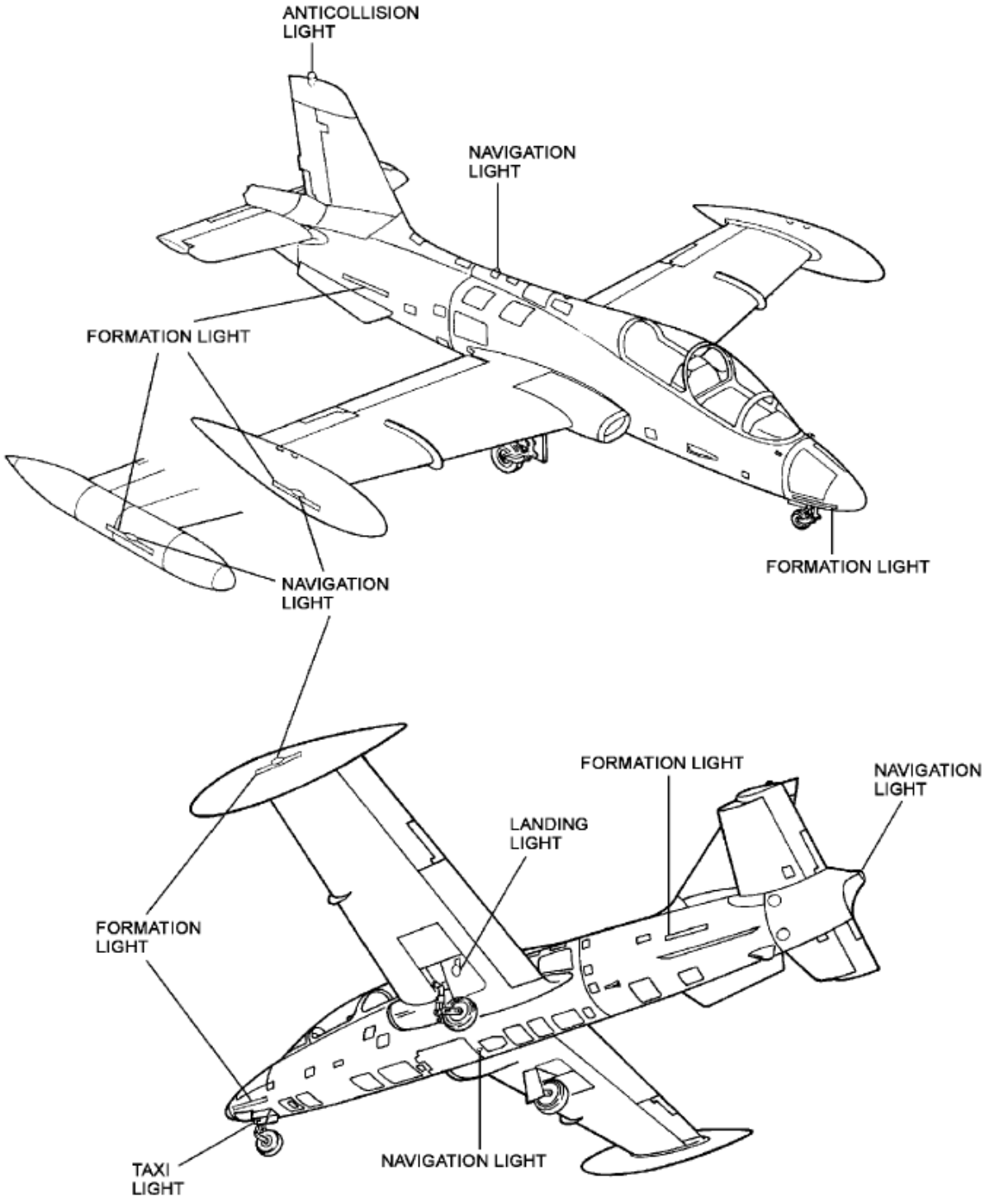
(AIRCRAFT PRE-MOD. PTA -322)



(AIRCRAFT POST-MOD. PTA -322)



EXTERIOR LIGHTS



9AA/FM/2936A02

PROCEDURES

The procedures described in this section are given in detail, where possible.
In some cases, the controls in the simulation have no effect on the aircraft behavior but are reported in the checklists for information – those actions are written in *italics*.

The following checklists have been kept as close as pratical to the real-world checklists.

CONTROL AVAILABILITY IN THE TWO COCKPITS
The procedures given in this section are relavant to the pilot in the front cockpit. The controls in the front cockpit are not fully duplicated and available in the rear cockpit. Therefore the rear pilot, when in control, must instruct the front pilot to actuate the following controls,available inthe front cockpit only:

--- Electrical power supply switches: “BATT”, “GEN 1”, “GEN 2”, “AC POWER”, “BUS RESET”.
--- Engine switches: “STARTER”, “JPT LMTR”, “MASTER”.
--- “FUEL TRANSFER” switch.
--- “IN GPS” switch.
--- Air-conditioning panel: “CABINTEMP” switch, “CABIN PRESS”, “WINDSHIELD/DEMIST” and “WINDSHIELD/RAIN RMVL” switches.
--- “NAV”, “BCN”, “LDG/LT/TAXI LT” light switches and “FORM LIGHTS” knob.
--- “IFF” panel.
--- Armament and gunsight controls.
--- “LG EMERG SEL” handle.
--- “MKR” panel.
--- “WARN LT TEST” push-button.
--- “RAM-AIR SCOOP” handle.
--- “ANTI-ICE/ENGINE” switch.
--- Engine throttle friction.
--- “MASTER CAUTION” “reset” control.
--- ELT switch.
--- “PARKING BRAKE” handle.

Note: only the front cockpit is depicted in the simulation.

PRE-FLIGHT CHECKS
BEFORE EXTERIOR INSPECTION, FRONT COCKPIT

1. In case of strong wind make sure the aircraft is heading into wind.

CAUTION
STRONG TAILWIND CAN CAUSE AN INCREASE IN THE JET PIPE TEMPERATURE AND WORSEN ANY FIRE SITUATION.

2. Check the aircraft log book for aircraft serviceability, servicing and inspections carried out.

3. Canopy - Locked fully open.

4. FUEL DUMP - White line horizontal.

5. Flight controls - Unlocked.

CAUTION
IN STRONG WIND,DO NOT UNLOCK THE FLIGHT CONTROLS UNTIL THE COCKPIT CHECKS ARE COMPLETED OR DAMAGE MAY RESULT TO THE CONTROL SURFACES AND ASSOCIATED CONTROL LINKAGES.

6. External power supply - As required.

7. Stand-by attitude indicator - Caged.

8. BATT - OFF.

9. GEN 1 - OFF.

10. GEN 2 - OFF.

11. AC POWER - NORM.

12. GROUND FIRE - OFF.

13. Ground utilities control panel:

a. IGN - Guard down.
b. FUEL PUMP - Guard down.
c. LG SW ORIDE - Guard down.

14. If necessary, insert the data card in the receptacle of the front “AHR/GPS” control panel.

EXTERIOR INSPECTION

The exterior inspection procedures are based on the assumption that maintenance personnel have performed all post-flight and pre-flight inspections specified in the applicable technical publications. The pilot is not required to repeat the same operations, except those which are flight critical. When performing exterior inspection, the pilot must check for the aircraft general conditions as indicated in figure.

REAR COCKPIT CHECKS FOR “SOLO” FLIGHTS

1. Ejection seat safety pin in place in the firing handle.

2. Make sure that the survival pack, seat belts, communication lead, normal and emergency oxygen hoses are fastened by means of the special cover assembly.

CAUTION
ONLY DURING FERRY FLIGHT IF A COVER ASSEMBLY IS NOT AVAILABLE, THE PARACHUTE AND SURVIVAL PACK MAY BE FASTENED BY MEANS OF THE SEAT BELTS OR OTHER FASTENING SYSTEM.

THE PILOT SHALL CHECK THAT FASTENING IS SECURE.

WARNING

AEROBATICS ARE FORBIDDEN WHEN THE COVER ASSEMBLY IS NOT INSTALLED ON THE REAR SEAT.

3. Oxygen regulator supply lever – OFF.

4. ANTI-SKID - NORM.

5. FUEL SHUT OFF - OPEN (guard down).

6. AIL SERVO - ON (guard down).

7. FUEL DUMP - White line horizontal.

8. FIRE (on the armament repeater panel) - ON (guard down).

9. Stand-by altitude indicator - CAGED.

10. All switches - OFF.

11. Circuit breaker panel - All circuit breakers in.

BEFORE ENTERING THE COCKPIT

1. Don the leg restraint garters (below the knees, rings forward, the buckle inward).

2. Carry out the following seat checks:

a. Safety pin in place in the seat firing handle.

b. Other safety pins stowed in the backrest.

c. Gun sear extraction link fitted and safety pin not fitted to the sear.

d. Leg restraint garters correctly attached to the cabin floor.

e. Manual override handle - Down and locked.

f. Manual override safety pin - Removed.

g. Time release unit control rod - Secured and safety pin removed.

h. Safety link of the “U” ring in the ejection parachute and every other visible link - Check for integrity.

i. Seat correctly locked on ejection gun. Make sure that the indicator spigot is flush with the threaded end of the latch plunger and that the latch plunger is level with or slightly below the housing face.

j. Parachute extraction rope secured to the drogue gun piston.

k. Drogue gun control rod - Bound to the crosspiece of the gun with safety pin removed.

l. Shoulder harness retraction trip lever - In rear position.

m. Rocket pack initiator safety pin -Removed.

n. Emergency oxygen cylinder - Indicator in the green.

o. Emergency oxygen handle - Lowered.

p. Secure fastening in the lock points of the belts.

q. Check connection between survival pack retain belt and parachute belts.

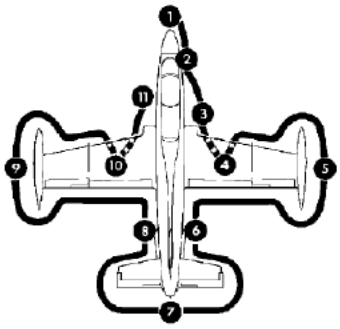
r. Sticker strap lugs engaged in clips.

3. Ejection sequence control (rear cockpit) - As required.

EXTERIOR INSPECTION

CONDITIONS:
- Flaps and speedbrake - Down
- Flight controls - Unlocked
- Covers - Removed
- Areas, free from objects that could be ingested by the engine
- Fire extinguisher - Available

GENERAL ITEMS:
- Damage, distortion, loose screws or rivets
- Damage to metal skins
- Incomplete fastening of panels or doors
- Fuel, oil and hydraulic fluid leakage



1. FUSELAGE NOSE
- Left and right Pitot - Unobstructed.
- Upper IFF antenna - Conditions.
- Formation lights - Check conditions.
- AOA transmitter - Unobstructed and free to rotate.

2. NOSE LANDING GEAR
- Landing gear door - Check conditions.
- Taxi light - Conditions and security.
- Shock-absorber - Check proper extension.
- Splash guard - Conditions and fastening.
- Tire - Conditions and inflation.
- Microswitch - Check conditions.

3. RIGHT FORWARD FUSELAGE
- Ram air intake - Closed.
- Windshield and canopy - Check conditions.
- Canopy severance external handle - Stowed.
- Air conditioning intake - Unobstructed.
- Engine air intake - Unobstructed and conditions.
- Speedbrake compartment - Check conditions.

4. RIGHT MAIN LANDING GEAR
- Landing gear door - Check conditions.
- Shock-absorber - Check proper extension.
- Landing gear locking strut - Removed.
- Wheel chock - As required.
- Tire - Conditions and inflation.
- Brake wear indicator pin - Protrusion dimension (> 0 mm, maximum 12 mm).
- Microswitch - Check conditions.

5. RIGHT WING
- Underwing fuel tank (if installed) - Check security, conditions, safety pin inserted and electrical cable connected.
- Luggage pod (if installed) - Security, conditions and safety pin inserted.
- Tip tank - Check conditions.
- Filler cap - Closed.
- Navigation light - Check conditions.
- Formation lights - Check conditions.
- Aileron and trim tab - Conditions, movement and free play.
- Flap - Conditions, free plays, grounding wire and actuating rods.

6. FUSELAGE (Right Aft side)
- GPS Antenna - Check conditions.
- Battery compartment:
--- Batteries condition.
--- Hydraulic reservoir cap tightening.
- Engine bay:
--- Oil tank cap for security.
--- Power relay box circuit breakers - IN.
- TACAN upper antenna - Check conditions.
- Top navigation light - Check conditions.
- Static port - Unobstructed.
- Engine bay cooling intake - Unobstructed.
- Strake - Check conditions.
- Formation light - Check conditions.
- ELT Antenna - Check conditions and security.

7. EMPENNAGES
- Rudder and trim tab - Conditions, movement and free play.
- Ice detector - Conditions and security.
- VOR/LOC/GS antenna - Conditions and security.
- Anti-collision light - Check conditions.
- Navigation light - Check conditions.
- Elevator and trim tabs - Conditions, movement and free play.
- Jet pipe - Dry and condition.
- Temperature sensor - Conditions and security.

8. LEFT AFT FUSELAGE
- Engine bay cooling intake - Unobstructed.
- Static port - Unobstructed.
- Formation light - Check condition.
- Strake - Check condition.
- MKR BCN antenna - Conditions and security.
- Lower TACAN antenna - Conditions and security.
- Lower IFF Antenna - Conditions and security.
- Electrical panel - Circuit breakers engaged.
- Engine bay - BOV unobstructed and clean.
- Battery compartment:
--- Batteries for condition.
--- Hydraulic accumulator pressure gauges for correct pressure indication (860 psi at +15 °C).

9. LEFT WING
- Flap - Conditions, free play, bonding and actuating rods.
- Aileron and trim tab - Conditions, movement and free play.
- Tip tank - Security and conditions.
- Filler cap - Closed.
- Navigation light - Check conditions.
- Formation light - Conditions.
- Underwing fuel tank (if installed) - Security, conditions
and safety pin inserted.
- Luggage pod (if installed) - Security, conditions and safety pin inserted.
- Landing light - Check conditions.

10. LEFT MAIN LANDING GEAR
- Landing gear door - Check conditions.
- Shock-absorber - Check proper extension.
- Landing gear locking strut - Removed.
- Wheel chock - As required.
- Tires - Conditions and inflation.
- Brake wear indicator pin - Protrusion dimension (> 0 mm, maximum 12 mm).
- Microswitch - Check conditions.

11. LEFT FORWARD FUSELAGE
- UHF antenna - Check condition.
- Navigation light - Check condition.
- Engine air intake - Unobstructed and conditions.
- Canopy severance external handle - stowed.
- Windshield and canopy - Check conditions.

NOTE

The position of the command ejection sequence lever is at pilot's discretion. However, for non-aircrew occupants, the lever must be set to OFF.

WARNING

WHEN ENTERING OR LEAVING THE COCKPIT, THE CREW MUST PAY ATTENTION TO THE HOOKS PROTRUDING FROM THE CANOPY LOWER EDGE.

IN THE COCKPIT

Once seated in the cockpit, proceed as follows:

1. Adjust the rudder pedal position by means of the “PEDAL ADJ” knob.

2. Connect the anti-g suit hose to the anti-g valve connector.

3. Adjust the rocket pack angle by setting the own weight in the relevant window.

4. Connect the personal survival pack lowering line to the flying suit, routing the lowering line outside the left console.

5. Route the leg restraint lines through the leg garters ring and engage the free ends in the lock located on the two side protections of the seat Adjust the lenght.

6. Make sure that the go-forward control lever is in locked position.

7. Place the quick-release fitting mounted to the negative-grestraintstraptothecenterposition.

NOTE

To insert the lugs into the quick-release fitting, turn the faceplate until the yellow line and dots on the plate are aligned with the line and the dots on the body.

8. Route the crotch straps in the D-rings of the straps.

9. Pass the shoulder straps down through the end loops of the crotch straps and secure the end lugs into the quick-release fitting.

10. Fully tighten the lap straps ensuring that the quick-release fitting remains central then tighten the shoulder straps.

11. Don the flying helmet and connect the connector fitted to the oxygen mask hose to the oxygen hose.

12. Connect the oxygenhose tohe socketon theleft shoulder strap.

13. Move the oxygen supply lever to ON and check the correct operation of the mask and of the oxygen system. Check that the “EMG” lever is pressed aft and the diluter lever is at N.

14. Connect the radio jack.

15. Move the go-forward control lever forward and check for freedom of movement.

16. Make sure that the safety pin of the canopy severance systemhandle is in the handle.

17. Underwing fuel tanks and luggage pod (if installed) - Safety pins removed.

INTERIOR INSPECTIONS

1. Flight controls - Unlocked.

CAUTION

DO NOT UNCAGE THE STAND-BY ATTITUDE INDICATOR BEFORE ELECTRICAL POWER HAS BEEN ENERGIZED TO THE “BATT” SWITCH.

2. “ENGINE” panel - JPT LMTR ON.

3. BATT - ON.

Initialization of the AHRS/GPS system

1. IN GPS - ON.

2. If required, load the data base from the data card.

3. Ensure that the AHRS/GPS system is set to AHR/GPS mode.

Left to right checks

LEFT CONSOLE

1. CKT BKR BOX No. 1 - All circuit breakers in.

2. GROUND FIRE - Check OFF (guard down).

3. LG EMERG SEL - Fully in and wirelocked.

4. AIL SERVO - ON (guard down).

5. VHF - (aircraft pre-mod. PTA -322) or V/UHF (COMM2) (aircraft post-mod. PTA -322) - As required.

6. UHF (COMM1) - As required.

7. Flap control lever -Match flaps actual position.

8. Engine throttle - Check for free movement, adjust the friction knob and move to STOP. Move forward to 90% RPM position and check for flashing of “CANOPY” warning light.

9. RUDDER TRIM - Set to neutral position.

10. ANTI-SKID - Check set to NORM.

11. FUEL TRANSFER - PYL (if underwing fuel tanksare installedandrefueled); otherwiseTIP.

12. FUEL SHUT OFF - OPEN (guard down).

13. “ENGINE” panel - MASTER check OFF.

LEFT QUARTER PANEL

1. Trim neutral position indicators - Both green.

2. LDG LT/TAXI LT - OFF.

3. Landing gear control panel:

a. Landing gear control lever - LG DOWN.

b. Landing gear position indicators (3) - On (green light).

4. PARK & EMER. BK handle - Out.

FRONT INSTRUMENT PANEL

1. Weapon control panel:

a. MASTER ARMT switch -Override(DOWN position).

b. Checks in accordance with armament configuration.

2. Speedbrake indicator: Extended (1st mark).

3. Flap indicator - Check. DOWN position.

4. Accelerometer - Check and reset.

5. Clock - Check.

6. Longitudinal trim indicator - Neutral.

7. ANGLE OF ATTACK - OFF flag out of view.

8. CANOPY warning light - ON (if the canopy is unlocked)

9. MASTER CAUTION - Press to reset.

10. Mach-airspeed indicator - Check and set index for the desired reading.

11. SALVO JETTISON - Check cover for integrity.

12. “FLT DIR” control panel - STBY light on.

13. Gunsight control panel - PWR switch - Check OFF.

14. STEER light - OUT.

15. FIRE warning light - OUT.

16. Altimeter - Set as required.

17. Vertical velocity indicator -Check for zero indication.

18. OVERHEAT light - OUT.

19. Tachometer - Check for zero indication.

20. Jet pipe temperature indicator - Outside air temperature.

21. Flow meter - Check.

22. Engine oil pressure gauge - Check.

23. “OXY” indicator - Check pressure.

24. “ANTI-ICE” indicator panel - All OFF.

25. “FUEL QTY” indicator - According to the fuel quantity on board.

26. Cabin altimeter - Check field baro pressure.

INSTRUMENT PANEL RIGHT SIDE

1. Hydraulic system pressure gauges -Conditions.

2. WARN LT TEST - Press to test and check for landing gear audible warning signal in the headsetandillumination of the followinglights:

a. “MASTER CAUTION”

b. “FIRE”

c. “OVERHEAT”

d. “STEER”

e. Landing gear control lever.

f. Caution light panel.

3. GEN 1 - ON.

4. GEN 2 - ON.

5. AC POWER - NORM.

6. MASTER CAUTION light - Press to RESET.

CENTER PEDESTAL

1. CONTROL SHIFT - Press the relevant pushbutton lights and check operation.

RIGHT CONSOLE

1. ICS panel - Set as necessary.

2. ELT switch - TEST/RST, then release. Check the light flashes three times simultaneously with the emission of the three audio signals.

3. “TCN” control panel – OFF.

4. SEAT ADJ - Adjust the seat pan height.

WARNING

SETTING THE SEAT PAN TOO HIGH MAY CAUSE INJURIES TO THE PILOT IN CASE OF EJECTION.

5. “VOR/ILS” panel – OFF.

6. “IFF” panel - Pre-select the mode and code; check that the “MASTER” selector is set to OFF.

7. ANTI-ICE/ENGINE - OFF.

8. ANTI-ICE/PITOT - TEST (“PITOT” and “AOA” indicators: ON) then OFF.

9. Cabin air-conditioning panel:

a. CABIN TEMP - AUTO, set to the desired temperature (normally to 12 o’clock).

b. WINDSHIELD/DEMIST - OFF.

c. WINDSHIELD/RAIN RMVL - OFF.

d. CABIN PRESS -ON (guard down).

10. “LIGHTS” control panel:

a. BCN - ON.

b. Other controls - As required.

11. BUS RESET - OFF (guard down).

12. RAM AIR SCOOP - Fully in (scoop closed).

13. CKT BKR BOX No. 2 - All circuit breakers IN.

PRE-START CHECKS

1. ENGINE/MASTER -ON. The “FUEL PRESS” light must go out. If the external power source is connected, check that the “No 1 BATT” and “No 2 BATT” lights go out.

CAUTION

- ENGINE STARTING IS PERMITTED ONLY IN PRESENCE OF THE FOLLOWING CONDITIONS:

--- GROUND TEMPERATURE BETWEEN ---26 °C AND + 50 °C WITH EXTERNAL POWER SOURCE.

--- GROUND TEMPERATURE BETWEEN ---15 °C AND + 45 °C WITH AIRCRAFT BATTERIES.
THESE LIMITATIONS ARE APPLICABLE ONLY TO THE AIRCRAFT THAT HAVE BEEN EXPOSED TO TEMPERATURES EXCEEDING THE SPECIFIED LIMITS FOR A LONG TIME.
IN ENVIRONMENTSWHERE THE TEMPERATURE IS BEYOND THE ABOVE LIMITS, AIRCRAFT CAN BE USED ONLY AFTER IT HAS BEEN PARKED IN AREAS WHERE THE TEMPERATURE IS WITHIN THE ABOVE LIMITS.

- IF, AFTER STARTING, THE OIL PRESSURE REMAINS BELOW THE MINIMUM LIMITS, THE ENGINE MUST BE SHUT DOWN AND THE CAUSE INVESTIGATED.

- THE JPT LIMITS MUST BE CAREFULLY COMPLIED WITH, ESPECIALLY DURING THE ENGINE STARTING AND RELIGHTING AS THE FLIGHT SAFETY AND THE ENGINE OVERHAUL LIFE MAY BE AFFECTED.

2. RELIGHT - Press to test. An irregular double sparking of the igniter plugs should be audible.

STARTING ENGINE WARNING

BEFORE STARTING THE ENGINE, MAKE SURE THAT THE DANGEROUS AREAS ARE CLEAR OF PERSONNEL AND EQUIPMENT.

1. Engine throttle – STOP.

2. STARTER and TIME hack -Press for 2 seconds and release.

3. When reaching 10% RPM - Engine throttle set to IDLE. The engine normally lights up within 4 to 12 seconds.

4. Flowmeter - Positive indication.

5. Jet Pipe Temperature - Check for normal increase.

6. Engine speed -Check for normalRPMincrease.

7. Oil pressure - Check for normal indication.

8. FIRE and OVERHEAT - OUT.

9. Hydraulic pressure - Increasing.

10. MASTER CAUTION - Check OUT.

11. Caution lights - OUT.

12. External power - Disconnected (if plugged in).

CAUTION

- IF THE JET PIPE TEMPERATURE RISES TOO QUICKLY AND APPROACHES THE MAXIMUM LIMIT, IMMEDIATELY MOVE THE THROTTLE TO STOP. ALLOW THE ENGINE TO STOPS AND COOLS, THEN INVESTIGATE THE CAUSE.

- IF THE TEMPERATURE EXCEEDS THE SPECIFIED LIMITS, REPORT THE OVER TEMPERATURE CONDITION AND TIME SINCE FLIGHT SAFETY AND ENGINE LIFE ARE AFFECTED.

- IF AFTER 15 SECONDS FROM MOVING THE THROTTLE TO IDLE THE ENGINE DOES NOT LIGHT UP (BY REFERENCE TO THE JET PIPE TEMPERATURE AND THE ENGINE SPEED), MOVE TH THROTTLE LEVER TO STOP AND THE “ENG MSTR” SWITCH TO OFF.

- MOVE THE AIRCRAFT IF THE GROUND BENEATH THE TAIL BECOMES SOAKED WITH FUEL.

- PRIOR TO ATTEMPTING A NEW START ALLOW AT LEAST 5 MINUTES FOR THE STARTER TO COOL AND THE ENGINE TO DRAIN; THEN CARRY OUT A DRY MOTORING CYCLE UNTIL EGT VALUES BELOW 200 °C ARE OBTAINED.

- IF THE ENGINE DOES NOT START AFTER THE SECOND ATTEMPT, INVESTIGATE THE CAUSE.

- IF THE “BATT HOT” CAUTION LIGHT COMES ON AFTER ENGINE STARTING, IMMEDIATELY DISCONNECT THE BATTERIES AND ABORT THE MISSION. DISCONNECTION OF BATTERIES IS CONFIRMED BY ILLUMINATION OF “BATT 1/2” CAUTION LIGHT.

NOTE

- In order to properly investigate the cause of the missed engine start, perform the starting procedure selecting the JPT LMTR switch to OFF.

- The “AIL SERVO” light goes out with a delay, i.e. when the hydraulic pressure exceeds 85 to 90 bar.

DRY CRANK

1. BATT - Check ON.

2. Engine throttle - Check to STOP.

3. FUEL SHUT OFF - OPEN (guard down).

4. IGN (ground utilities panel) -OFF (guard open and toggle down).

5. ENGINE MASTER - ON.

6. FUEL PRESS - OUT.

7. STARTER - Press for 2 seconds (the motoring cyclewill be automatically completed in 23 seconds).

CAUTION
AFTER THREE MOTORING CYCLES IN RAPID SUCCESSION, ALLOW 15 MINUTES, FOR THE STARTER TO COOL, BEFORE A FURTHER CYCLE.

8. IGN - ON (guard down).

CHECKS BEFORE TAXIING

NOTE
At ambient temperatures below 6° C and relative humidity above 50%engineicing conditions may be encountered. The most severe icing conditions will occur when operating in fogwith visibility less than 500meters. During ground runs in the above condition, it is necessary to move the “ANTI-ICE/ENGINE” switch to ON and reduce the taxiing time to a minimum, in particular when using engine RPM above IDLE.

1. Stand-by attitude indicator -Uncage andadjust the alignment.

2. “LOAD/GEN 1” loadmeter - Check for indication.

3. “LOAD/GEN2” loadmeter -Must indicate load values lower than those of the “LOAD/GEN 1” indicator.

NOTE
The two loadmeters provide identical indications only when engine RPM rise above 60%.

4. “TCN” control panel - Function selector as required.

5. “VOR/ILS” control panel - PWR.

6. “IFF” control panel - MASTER STBY.

7. CABIN PRESS -OFF (guard up and toggle aft) and check that the air flow from the pressurization outlets stops. Then, ON (guard down).

NOTE

- The above check can be carried out only before the first flight of the day.

- If required temporarily increase the engine RPM to ease checkaccomplishment.

8. ADI -Check that theOFF flag is out of view and the attitude indicator is aligned.

9. HSI - Compare the indication of the compass card to that of the stand-by compass. If required, set the alignment indicator on the compass panel AHRS to zero.

CAUTION

BEFORE CARRYING OUT THE TWO FOLLOWING OPERATIONS, INFORM THE CREW CHIEF ABOUT THE NEED TO ACTUATE THE SPEEDBRAKE AND THE FLAPS.

10. On crew chief's signal:

a. Speedbrake -Retracted: check the indicator and wait for the crew chief confirmation of speedbrake position.

b. Flaps - UP, then TAKE OFF. Check indicator andwait for the crewchief confirmation of flap position.

11. Hydraulic pressure -Check that the indications on both pressure gauges are within the limits.

12. Control stick - Free movement and correct response of elevator and ailerons.

13. Rudder pedals - Free movement and correct response of rudder.

14. Canopy -As necessary.Closed or partially open.

WARNING

THE BLIND FLYING HOOD, IF INSTALLED, MUST BE KEPT IN THE OPEN POSITION DURING TAKEOFF IN ORDER TO ENSURE SEAT SAFE EJECTION IN THE CASE OF AN EMERGENCY.

15. On aircraft with cylindrical tip tanks and with underwing fuel tanks:

a. FUEL TRANSFER - TIP. Check possible fuel leakages.

16. Remove the safety pin of the seat handle and plug it in the appropriate seat on the canopy frame.

17. Radio call - As required.

TAXIING

WARNING

IF DURING TAXIING THE CANOPY IS KEPT PARTIALLY OPEN, THE SAFETY PIN OF THE SEAT FIRING HANDLE MUST BE IN PLACE ON THE SEAT.

CAUTION

- DURING TAXIING, THE CANOPY MUST BE CLOSED OR OPEN AND LOCKED IN THE INTERMEDIATE POSITIONBUTNOTFULLYOPEN.

- MAKE SURE THAT THE AREA BEHINDTHEAIRCRAFTISCLEAR OF OBSTACLES, PERSONNEL OR OTHER AIRCRAFT.

- WHEN TAXIING BEHIND ANOTHER AIRCRAFT OF THE SAME CATEGORY, MAINTAIN A MINIMUM DISTANCE OF 25 METERS FROM THE EXHAUST BLAST TO PREVENT DAMAGETO THE CANOPY.

- NO PROBLEMS ARE EXPERIENCED WHEN TAXIING FIVE METERS LATERALLY APART FROM THE PATH OF THE PRECEDING AIRCRAFT.

- WITHTHECANOPYCLOSED,THE AIRCRAFT CAN CROSS THE BLAST OF ANOTHER AIRCRAFT OF THE SAME CATEGORY RUNNING AT IDLE, ATMINIMUM DISTANCE OF 15 METERS.

1. Have the wheel chocks removed.

2. Press the push-button for nose wheel steering engagement. Check for "STEER" light: ON.

3. PARK & EMER. BK - Release.

4. Brakes - Test for proper response.

5. Taxi at idle and at safe speed.

Approx. 60% RPMis required to start the aircraftmoving. Once the aircraft ismoving it can be taxied with the throttle at IDLE on a hard level surface at a safe speed.

NOTE

Fuel consumption is about 5 kg perminute with the engine at 40% RPM and 29 kg per minute at max RPM.

6. Maintain directional control of the aircraft by use of nosewheel steering.

CAUTION

- DO NOT STEER THE AIRCRAFT WITH BRAKES WITH NOSE WHEEL STEERING ENGAGED BECAUSE DAMAGE COULD BE CAUSED TO THE NOSEWHEEL STEERING SYSTEM.

- BE PREPARED TO DISENGAGE
THE NOSE WHEEL STEERING IN
CASE OF SYSTEM MALFUNCTION.

7. Oxygen diluter lever - As required.

CAUTION
IF COMBUSTION GASES CONTAMINATION
IS SUSPECTED DURING
GROUND OPERATION (IN CASE OF
TAXIING CLOSE TO ANOTHER AIRCRAFT
OR WHEN THE AIRCRAFT
IS STANDING IN STRONG TAIL
WIND), IT IS ADVISABLE TO USE
OXYGEN WITH THE DILUTER
LEVER AT 100%.

8. Flight and navigation instruments - Check.
Check the ADI, the stand-by attitude indicator andtheHSI for correctindicationsduringturns while taxiing.

9. PARK & EMER. BK - Check operation.

10. BCN - Temporarily to OFF, if required.

NOTE
At night, switch the “BCN” to off in proximity of other aircraft to avoid blinding effects.

PRE-TAKEOFF CHECKS

1. FUEL TRANSFER - PYL or TIP.

CAUTION
IF ALL TANKS ARE REFUELED,
THE CORRECT SEQUENCE TO BE
PERFORMED IS AS FOLLOWS:
1° - PYL (UNDERWING TANKS) UP
TO COMPLETE EMPTYING.
2° - TIP (TIP TANKS).

NOTE
To optimize the longitudinal attitude of aircraft fitted with 500 l cylindrical tip tanks, underwing fuel tanks and single pilot, the following tank selection sequence is suggested:

1° - PYL (underwing tanks) only during starting to check leakages.

2° - TIP (tip tanks). For take-off and the first climbing phase until the tip tank fuel residual quantity is approx. 300 kg (660 lb).

3° - PYL until underwing fuel tanks are empty.

4° - TIP.

2. LDG LT/TAXI LT - TAXI LT.

3. Aileron, rudder and longitudinal trim -Neutral position.

4. Flaps - TAKE OFF (Second mark).

5. Speedbrake - Fully retracted (First mark).

6. Canopy closed and locked (“CANOPY” light out).

7. Seat safety pin - Check that it is removed and put in the appropriate housing on the canopy.

8. Flight instruments - Check.

a. ADI - Check for correct indications and coherence with stand-by attitude indicator.

b. HSI - Check that indication is consistent with the runway magnetic heading.

9. Oxygen:

a. Pressure - Check.

b. OXY FLOW - Check fo correct “blinker” operation.

c. Oxygen diluter lever - As required.

10. Hydraulic systems - Pressures within the limits.

11. Caution and warning lights - OUT.

12. Interior and exterior lights - As required.

13. Safety checks:

a. Quick-release fitting for correct locking of the belts.

b. Shoulder harness for locking.

c. Helmet chin straps for correct locking.

d. Helmet visor in down position.

e. Gartersandleg restraint garters for correct position.

14. Take-off briefing.

15. IFF Master - NORM. Check codes entered.

TAKE-OFF

NORMAL TAKE-OFF

Engine test

1. With the engine throttle at IDLE, check that all warning and caution lights are out and engine oil pressure and idleRPMarewithin the limits.

2. Slam the engine throttle to FULL. The engine

must accelerate smoothly without any stall or surge phenomenon.

3. When the engine parameters are stabilized, check:

a. Engine RPM - Within limits.

b. JPT - Within limits.

c. Oil pressure - In normal range.

d. Warning and caution lights - OUT.

4. After a minimum time of 5 seconds with the engine throttle on FULL, chop (less than 1 second) to IDLE. The engine must decelerate without abnormal stall,undershoot,vibrations, roughness and noise.

System test

5. Engine throttle - 60% RPM.

6. “GEN1” and “GEN2” loadmeters - Check that the max difference between the two readings does not exceed 0.1.

7. ANTI-ICE/ENGINE - TEST (as required).

8. ANTI-ICE/PITOT - ON. Check “ANTI-ICE/ PITOT” ON.

9. Engine throttle - FULL.

Take-off

10. Disengage nosewheel steering - Check “STEER” indicator light is OUT.

11. Release the brakes.

12. Maintain directional control by differential braking. The rudder becomes effective at approximately 45 to 50 KIAS.

CAUTION

DO NOT RE-ENGAGE STEERING DURING THE TAKE-OFF RUN.

13. At approximately 10 KIAS below the calculated lift off speed, raise the nose.

14. After lift off and with positive rate of climb, proceed as follows:

a. Landing gear lever - LG UP. Check that the green landing gear position lights and the red light in the lever grip are out. Retraction of the landing gear requires approx. 5 seconds.

CAUTION

THE LANDING GEAR SHOULD BE COMPLETELY UP AND LOCKED BEFORE THE LIMIT AIRSPEED (175 KIAS) IS REACHED. EXCESSIVE AERODYNAMIC LOADS MAY DAMAGE THE LANDING GEAR DOORS AND PREVENT THEIR SUCCESSIVE OPERATION.

b. Flap control lever - UP. Between 120 and 175 KIAS. The trim change is negligible. Check for retraction.

CAUTION

TO PREVENT STRUCTURE OVERSTRESSING, THE FLAPS SHALL BE RAISED BEFORE THE AIRSPEED LIMIT (175 KIAS) IS EXCEEDED.

15. Hydraulic pressures - Check within limits.

16. Engine data readings - Check within limits.

CROSS-WIND TAKE-OFF

During a cross-wind take-off, use the same procedure as fornormal take-off. It ishowever recommended that the control stick be moved upwind and the nose wheel lifted off at the speed recommended in the “Performance Data” manual to improve aircraft control. During ground run the aircraft tends to weathervane. After the nosewheel leaves the ground, act as necessary on the rudder to remain along the centerline track during the take-off run and following take-off. After breaking ground, be prepared to counteract the aircraft drift.

WARNING

CROSSWIND EFFECT INCREASES AS A FUNCTION OF THE EXTERNAL STORES CONFIGURATION.

TAKE-OFF FROM WET RUNWAYS

Take-off from wet runways may result in compressor stalls or flame out due to ingestion of water splashed by the nose wheel into air intakes. To prevent such occurrences, following precautions should be taken:

A. Taxi at the lowest possible speed, avoiding puddles and water-covered areas.

B. During the take-off run and until lift-off, hold the “RELIGHT” push-button pressed.

C. Lift the nose wheel from the ground as soon as possible.

WARNING

CHECK THE INSTRUMENTS AND SHUT DOWN THE ENGINE TO

ABORT TAKE-OFF IF COMPRESSOR STALL IS SUSPECTED. THE SYMPTOMS OF A TYPICAL STALL ARE LOW FREQUENCY NOISE AND ENGINE VIBRATION, A CONSIDERABLE DECELERATION OF THE AIRCRAFT AND A POSSIBLE RAPID DROP OF ENGINE RPM TO 70 TO 80%, WITH JPT INCREASE AFTER APPROX. 1 SECOND.

INSTRUMENT TAKE-OFF

Carry out the normal take-off procedure up to the steering disengagement then proceed as follows:

1. With the “HEADING SET” knob of the HSI control panel, set a heading consistent with the aircraft heading when aligned for the take-off.

2. Press the “HDG” push-button light on the “FLT DIR” panel and check that the ADI vertical bar is centered.

3. Release the brakes.

4. Maintain direction by differential braking upt o approx. 50 KIAS using runway markings and lights.

5. At a speed of approximately 10 KIAS less than the calculated lift off speed, set a nose-up attitude of 7 degrees on the ADI.

6. Once lift off speed with 7 degrees nose up has beenreached, theaircraftwill becomeairborne. Maintain lateral and longitudinal control by using the ADI as main reference.

7. When the vertical velocity indicator indicates climb and the altimeter indicates altitude increase, retract the landing gear. Between 120 and 175 KIAS retract the flaps.

8. Maintain the attitude and allow the aircraft to accelerateup to 275 KIAS.Standard turns (max bankangle of 30 degrees) can be performedduring acceleration provided airspeed is above 150 KIAS and altitude is above 500 feet AGL.

CLIMB

Refer to the “Performance data” manual for the table of the climbing speeds, distances travelled in climb, times to climb and fuel consumptions.Maintain the best climb speed for minimum time to altitude.

1. Start climb at 275 KIAS: engine as required.

2. Altimeter setting - As required.

3. Engine readings - Within limits.

NOTE
The normal JPT Limiting System operation can be affected by temporary EGT overshoots during climbs at 100% RPM.
This phenomenon (EGT raise above the limit of 756°C without the illumination of the JPT LMTR caution) can be originatedby adverse combination of the operating tolerances of the JPT Limiting System components and is acceptable, provided that the EGT returns within the limits prescribed at section 5 in not more than 10 seconds, with EGT overshoot never exceeding the value of 790°C.

4. HSI - Correct indication.

5. ADI and stand-by attitude indicator - Correct operation.

6. Cabin pressurization - Check the cabin altimeter above 8000 ft (see fig. 1-59).

A brief check of the pressurization system can be carried out by checking the cabin altimeter and proceeding as follows:
--- From 8000 to 16000 ft (actual altitude), the cabin altimeter reading should remain almost constant at 8000 ft.
--- Between 16000 ft and 24000 ft the cabin altimeter should read half the aircraft altitude ± 500 ft.
--- Above 24000 ft the cabin altimeter should read half the aircraft altitude plus 1000 to 2000 ft.

7. Fuel transfer and quantity – Check.

8. Oxygen:

a. Pressure - Check.

b. OXY FLOW - Check operation.

c. OXY diluter level - As required.

9. Pitot and AOA heating - Check ON indication.

10. Hydraulic pressures - Within limits.

NOTE
The decrease of pressure of the emergency hydraulic system during a fast climb isnormal.This isdueto thecooling of the emergency accumulator resulting in a nitrogen pressure drop. The correct pressure is restored as soon as the aircraft reaches lower altitudes. In the event of a quick pressure drop in the emergency system in other flight conditions, the cause could be a nitrogen or hydraulic fluid leakage.

11. Electric loadmeters - Normal readings.

WARNING
IN ALL FLIGHT PHASES THE OPERATION OF THE ADI SHOULD

BE CROSS-CHECKED WITH THE STAND-BY ATTITUDE INDICATOR. IN CASE OF INCONSISTENT INDICATIONS IT IS OF THE UTMOST IMPORTANCE TO READ THE OTHER FLIGHT INSTRUMENTS IN ORDER TO DEFINE WHICH ONE PROVIDES THE CORRECT INDICATIONS.

12. LDG LT/TAXI LT – OFF.

CRUISE

The engine throttle, when necessary, can be slammed opento obtain a fast acceleration,but the engine life and characteristics will be maintained longer the throttle is operated slowly and abrupt RPM variations are kept to a minimum.

WARNING
DURING ENGINE RPM SETTING ENSURE THAT THE THROTTLE IS NOT MOVED BEYOND IDLE POSITION.

1. Every 10 to 15 minutes, check the following:

a. Engine instruments - Within limits.

NOTE
The normal JPT Limiting System operation can be affected by temporary EGT overshoots in level flight at high altitude, when gradually setting the throttle to 100% RPM.
This phenomenon (EGT raise above the limit of 756°C without the illumination of the JPT LMTR caution) can be originatedby adverse combination of the operating tolerances of the JPT Limiting System components and is acceptable, provided that the EGT returns within the limits prescribed at section 5 in not more than 10 seconds, with EGT overshoot never exceeding the value of 790°C.

b. Electric load meters - Check load.

c. Hydraulic pressures - Within limits.

d. Oxygen - Check.

e. Cabin pressurization - Within limits.

f. CABIN TEMP - As required.

NOTE
During flight with fixed throttle setting, changes of RPM may occur (RPMcreep) by varying speed and/or altitude. This phenomenon is an acceptable characteristic of the engine fuel system.

DESCENT
Refer to the “Performance Data” manual for the recommended descent speeds, time required, fuel consumed and distances travelled in descent. Refer to Section VI for the chart of altitude lost during dive recovery.

WARNING
DURING ENGINE RPM SETTING ENSURE THAT THE IDLE DETENT IS NOT ENGAGED AND THE THROTTLE IS NOT MOVED BEYOND IDLE POSITION.

1. WINDSHIELD/DEMIST – ON.

NOTE
To prevent the formation of misting on the windshield and canopy interior surfaces during rapiddescents fromhigh altitude, several minutes before to starting a descent adjust the cabin temp to maximum temperature by using the manual control.

2. ANTI-ICE/ENGINE - As required.

3. Navigations Systems - As required.

4. LDG LT/TAXI LT - As required.

5. ADI andHSI -Check for correct indicationsand compare to with the stand-by instruments.

6. Altimeter setting – Adjust.

7. ANTI-ICE/PITOT - Indication ON.

8. Fuel - Check quantity.

9. Hydraulic pressures - Check.

10. Shoulder harness - Locked.

11. MASTER ARMT – OFF.

CAUTION
AS NECESSARY, REVIEW THE APPROACH PROCEDURES AND CHECK FUEL REQUIRED TO ALTERNATE AIRFIELD.

INSTRUMENT APPROACH

HOLDING, PENETRATION AND TACAN APPROACH

Holding Pattern (Any Altitude)
1. Configuration - Cruise.

2. Speed - 180 KIAS.

3. Engine - 75% to 80% RPM.

Penetration descent and turn

4. Airspeed - 250 KIAS/.6 Mach.

5. Speedbrake - OUT.

6. Engine - 75% RPM.

Level-off

7. Below 175 KIAS:

a. Landing gear - LG DOWN.

b. Speedbrake - IN.

c. Flap - TAKE OFF position.

d. Airspeed - 140 KIAS.

e. Throttle - As required to maintain speed (approx. 80% RPM).

Final approach

8. Flaps - DOWN (when starting descent).

9. Airspeed -115KIASplus corrections (.45AOA).

10. Landing gear - Check DOWN (three green lights on).

11. Speedbrake - Check retracted.

12. Engine - As required (75% to 80% RPM).

Go-around

1. Engine throttle - FULL.

2. Speedbrake - IN.

3. Attitude - 7 degrees nose-up, wings level.

4. Landing gear - LG UP (with positive climb indications).

5. Flaps - UP between 120 and 150 KIAS.

6. Throttle - Retard as necessary approaching 200 KIAS. Maintain this speed to regain the missed approach altitude.

RADAR APPROACH

Downwind

1. Configuration - Cruise.

2. Speed - 200 KIAS.

3. Engine - 75% to 80% RPM.

4. Speedbrake - Retracted.

Base leg

5. Speedbrake - OUT.

6. At 175 KIAS:

a. Landing gear - LG DOWN.

b. Speedbrake - IN.

c. Flaps - TAKE OFF.

d. Airspeed - Reduce to 140 KIAS.

7. Engine - As required to maintain 140 KIAS (approx. 80% RPM).

Final turn

8. Airspeed - 140 KIAS.

9. Landing gear - Check DOWN (three green lights on).

10. Flaps - Check TAKE OFF.

11. Speedbrake - Check retracted.

12. Engine - As required to maintain 140 KIAS (approx. 80% RPM).

Final approach (Glideslope)

13. Flap - DOWN (starting descent).

14. Speed - 115 KIAS plus corrections (.45 AOA).

15. Landing gear - Check DOWN (three green lights on).

16. Speedbrake - Check IN.

17. Engine - As required to maintain the airspeed (75% to 80% RPM).

Go-around

1. Engine throttle - FULL.

2. Speedbrake - IN.

3. Attitude - 7 degrees nose-up, wings level.

4. Landing gear - LG UP (with positive climb indications).

5. Flaps - UP between 120 and 150 KIAS.

6. Throttle - Retard as required approaching 200 KIAS.Maintain this speed to regain the missed approach altitude.

ILS APPROACH

Approach to glideslope

1. Speedbrake - OUT.

2. At 175 KIAS:

a. Landing gear - LG DOWN.

b. Speedbrake - IN.

c. Flaps - TAKE OFF.

d. Airspeed - Reduce to 140 KIAS.

3. Throttle - As required to maintain 140 KIAS.

4. Maintain speed and configuration until the glideslope is intercepted.

Final approach (Glideslope)

5. Flaps - DOWN (starting descent).

6. Airspeed -115KIASplus corrections (.45AOA).

7. Landing gear - Check down (three green lights on).

8. Speedbrake - Check IN.

9. Engine -As required tomaintain airspeed (75% to 80% RPM).

Go-around

1. Engine throttle - FULL.

2. Speedbrake - IN.

3. Attitude - 7 degrees nose-up, wings level.

4. Landing gear - LG UP (with positive climb indications).

5. Flaps - UP between 120 and 150 KIAS.

6. Throttle - Retard as required attaining 200 KIAS.Maintain this speed to regain the missed approach altitude.

APPROACH AND LANDING
For a normal landing procedure refer to figure 2-9.

Entering pattern

1. Airspeed - 250 KIAS.

2. Altitude - 1500 ft AGL.

3. ANTI-ICE/ENGINE - As required.

Break

4. Engine - 60% RPM.

5. Speedbrake - OUT.

Downwind

6. Shoulder harness - Check locked.

7. Landing gear - LG DOWN (below 175 KIAS). Check that the three green lights are on.

NOTE
The illumination of the taxi light is conditional on the correct locking of the landing gear in the down position. To permit the control tower check for landing gear down, move the “LDG LT/TAXI LT” switch to TAXI LT.

8. Speedbrake - IN. Check the indicator.

9. Flap -TAKEOFF (below 175KIAS). Check the flap indicator for corresponding position.

10. Hydraulic pressures - Check.

CAUTION
ZERO PRESSURE INDICATION IN THE EMERGENCY HYDRAULIC SYSTEM MAY BE CAUSED BY A LEAK OF HYDRAULIC FLUID IN THE EMERGENCY SYSTEM. IN THE PRESENCE OF SUCH FAILURE CONDITION, AFTER CONTACT WITH RUNAWAY, IF A PRESSURE DECREASE HAPPENS ALSO IN THE MAIN HYDRAULIC SYSTEM, IT IS NECESSARY TO PERFORM A FULL STOP LANDING AS BEFORE THE TOTAL LOSS OF HYDRAULIC PRESSURE.

11. Engine - As required to maintain 140 KIAS.

Base turn - Final

12. Before starting base turn: flap DOWN (below: 150 KIAS). Check full extension of flaps on the indicator.

13. Base turn speed - Maintain 130 KIAS plus corrections.

NOTE

- On approach (until landing is assured) it is recommended that at least 60% RPM bemaintained in order to obtain optimum engine acceleration time in the event of go-around. The acceleration time increases by approx 0.5 second for every 5% RPM below 60%.

- The landing gear downpositioncanbe confirmed if requested from the control tower by operating the relevant push-button on the engine throttle.

14. Level wings at 400 ft AGL.

15. On final - Maintain 115 KIAS plus corrections (optimum AOA).

16. LDG LT/TAXI LT - As required.

WARNING

THE BLIND FLYING HOOD, IF INSTALLED,MUST BE KEPT INTHE OPEN POSITION IN ORDER TO ENSURE SEAT SAFE EJECTION IN THE CASE OF ANEMERGENCY.

17. Threshold speed - 110 KIAS plus corrections.

Flare

18. Engine throttle - IDLE.

19. Touchdown speed - 95 to 100 KIAS plus corrections.

NOTE

Increase standard speeds 1.5 KIAS every 100 kg in excess of 3700 kg.

NORMAL LANDING

CAUTION

THE ILLUMINATION OF THE "STEER" ADVISORY LIGHT WHEN THE LANDING GEAR CONTROL LEVER IS MOVED DOWN, INDICATES A FAILURE IN THE STEERING SYSTEM. IN THIS CASE, BEAR IN MIND THAT THE NOSE WHEEL COULD AUTOMATICALLY BE SLAVED TO THE RUDDER PEDALS.

During landing use the AOA indicator as the primary reference throughout the final approach phase.

If the runway length and conditions permit, aerodynamic braking may be carried out to conserve brakes and tires.To perform aerodynamic braking, increase the aircraftnose-up attitude after touch-down by gradually pulling the control stick back to the full aft position. Lower the aircraft nose and bring the nose-wheel in contact with the runway before the elevator becomes ineffective (at about 70 KIAS). Maintain directional control during the landing roll by use of rudder. Do not engage nose wheel steering. At a speed below 50 KIAS maintain directional control by differential braking. At the end of the landing run, engage the nose wheel steering ("STEER" indicator light on), then use the rudder pedals combined with this control.

WARNING

- PRIOR TO ENGAGING THE STEERING CONTROL, ENSURE THAT THE RUDDER PEDALS ARE CENTERED.
- BE PREPARED TO DISENGAGE THE NOSE WHEEL STEERING IN CASE OF SYSTEM MALFUNCTION.

CROSS-WIND LANDING

Cross-windlandingsmay beperformedby using the normal landing procedures. However, while using normal approach speeds, counteract drift by the crab method, by the wing down method or by a combination of both, to keep the aircraft track aligned with the runway, leveling the wings just before touchdown.

In case of strong crosswind and/or with gusty wind with possibility of wind shear, it is recommended to maintain the flaps in the TAKE OFF position during landing, to improve the aircraft lateral control and to obtain, if needed, a quicker increase of airspeed with engine thrust. After touchdown, keep the control stick upwind and lower the nose wheel smoothly to the runway as soon as practical, maintaining a centerline track with rudder and, if needed, moderate use of brakes.

NOTE

Refer to the cross-wind take-off and landing chart in the "PerformanceData" manual for effect of cross-winds.

LANDING AT HIGH MASS

When a landing at high mass must be performed, bear in mind that the maximum sinking speed at touchdown, in order not to effect the aircraft structural integrity, is much lower with increased weight than with normal landing weight (See limitations chart in Section V). A straight-in approach should therefore be flown at the airspeed specified in the "PerformanceData"manual, using power to control the sinking rate. Flare should be gradual and touchdown smooth. A stall prior to touchdown could result in an abrupt and incontrollable increase of the sinking speed with possibility of exceeding the permissible limits.

CAUTION

THE VERTICAL VELOCITY INDICATOR READINGS ARE SUBJECT TO LAG; THEREFORE THEY ARE RELIABLE DURING AN APPROACH UNDER CONSTANT CONDITIONS BUT NOT IN TRANSIENT PHASES SUCH AS FLARE AND TOUCHDOWN.

USE OF BRAKES WITH ANTI-SKID SYSTEM ON DRY RUNWAY

During a normal landing, the use of maximum aerodynamic braking and of the full lenght of the runway to stop the aircraft will conserve the wheel brakesandtire.However,whenaminimumlanding run is required, after touchdown, the nose wheel should be quickly lowered. Apply the brakes firmly and fully and allow the anti-skid system to provide the maximum deceleration. The anti-skid system willoperatetogivemaximumperformancebraking.

WARNING

- WHENEVER A NON CONTROLLED INTERRUPTION OF THE BRAKING ACTION OCCURS DURING DECELERATION AT AN APPROX SPEED OF 40 KIAS, APPLY THE PROCEDURE FOR FAILUREOF THE GROUNDSENSING CIRCUIT OF THE ANTI-SKID SYSTEM.

- MAXIMUM PERFORMANCE BRAKING AT HIGH MASS AND SPEED CAN CAUSE TIRE DEFLATION WHEN THE MAXIMUM ENERGY ABSORPTION LIMIT HAS BEEN EXCEEDED.

- IN CASE OF OVERHEATING (OR SUSPECTED OVERHEATING) OF THE BRAKE/WHEEL SYSTEM, THE AIRCRAFT SHOULD BE PARKED IN AN ISOLATED AREA AND PERSONNEL SHALL AVOID APPROACHING THE AIRCRAFT. THE AIRCRAFT SHOULD BE PARKED SO THAT WIND IS BLOWINGFROMTHERIGHTSIDE TO PREVENT ANY FUEL DRAIN (FROM LEFT WING) FROM GETTINGINCONTACTWITHTHE BRAKE/WHEEL SYSTEM.

- THE MAXIMUM TEMPERATURE OF THE BRAKE/WHEEL SYSTEM IS ATTAINED 5 TO 15 MINUTES AFTER BRAKING, IT IS THEREFORE NECESSARY TO WAIT AT LEAST 30 MINUTES FOR BRAKES AND TIRES TO COOL DOWN BEFORE PERFORMING ANY POST-FLIGHT AND PRE-FLIGHT OPERATIONS.

USE OF BRAKES WITHOUT ANTI-SKID SYSTEM ON DRY RUNWAY (ANTI-SKID DISCONNECTED OR INOPERATIVE)

In order to obtain optimal braking performance without anti-skid system, operate the brakes in a single smooth application with a constant increase of the pedal pressure. Extreme care should be used in applying brakes at high speed to prevent locking and skidding of the tires. When there is still a significant wing lift it is sufficient to apply a minimumbraking pressure to cause a tire skidding. If skidding occurs, momentarily release pressure and again gradually increase brake pressure. This procedurewill provide the shortest stop distance in the absence of the anti-skid system.

USE OF BRAKES WITH ANTI-SKID SYSTEM ON WET/ICY RUNWAY

The wet or icy runway landing technique is essentially the sameas a normal landing. As for anormal landing, reduce the engine speed to IDLE immediately after the contact, and lower the nose wheel to the ranway. Apply decisively the brakes when the nose wheel comes in contact with the ranway then gradually move the control stick fully backward to obtain themaximumbraking effect during landing run. The anti-skid system will avoid locking the wheels by efficiently producing the maximum possible deceleration in safe conditions depending on the existing conditions of the runaway. During the high-speed part of the landing run the deceleration obtained will be minimum as the braking capacity is very low. As the speed decreases, the braking effectiveness will consequently increase and the antiskid system will increase the deceleration.
In case of cross-wind use the technique recommended for this cases.

USE OF BRAKES WITHOUT ANTI-SKID SYSTEM ON WET/ICY RUNWAYS (ANTI-SKID DISCONNECTED OR INOPERATIVE)
In case of disconnected or inoperative anti-skid the braking on wet or icy runways will require further attentions. Themore effective technique is to apply the brakes in an intermittentway.When a skidding is perceived, the brakes must be momentarily releasedandre-applied.Thisprocedurewillprovide the shortest stop distance for brakingwith inoperative anti-skid system. In case of wet or icy runaway andwithout anti-skid systemthe wheels can be easily locked.

LANDING ON SHORT RUNWAYS WITHOUT ANTI-SKID SYSTEM

For landings on short runways,without anti-skid, the prescribed speed values for approach and touchdown shall be strictly adhered to. After touchdown, lower the aircraftnoseby bringing the nosewheel in contact with the runway and move flaps to UP position. Gradually operate the brakes, in a single application with a constant and progressive increase of the pedals pressing as the speed decreases, by avoiding the tire skidding. Gradually move the control stick fully backward to obtain the maximum braking effect during landing run.

GO-AROUND

BEFORE TOUCHDOWN

WARNING

IF NECESSARY, TAKE THE DECISION TO GO AROUND AS SOON AS POSSIBLE USING FULL POWER. IF CONDITIONS DO NOT ALLOW A GO AROUND, DO NOT TRY TO MAINTAINTHEAIRCRAFTOFFTHE

RUNWAY; CONTINUE TO FLIGHT
THE AIRCRAFT TO TOUCHDOWN
AND FOLLOW THIS PROCEDURE.

1. Engine throttle – FULL.

2. Speedbrake - IN, if extended.

NOTE

- Continue a normal approach (or the descent) until the engine is at the full throttle and the airspeed increases.

- If the touchdown is made, slightly lower the nose and accelerate to takeoff speed, then give the aircraft the take-off attitude and allow it to fly off the ground.

TOUCH AND GO

The following procedure is to be adopted when a normal landing has been attempted, the wheels are in contactwiththe runway and it is foundnecessary to take-off again immediately, before allowing the aircraft to stop:

1. Engine throttle - FULL.

2. Speedbrake - IN, if extended.

3. Engine instruments - Check.

4. Leave the flaps in the position selected for landing.

5. Accelerate to take-off speed then establish the take-off attitude.

AFTER TAKE-OFF

1. Landing gear - LG UP (with positive climb indications).

2. Between 120 KIAS and 150 KIAS - Flaps UP.

3. LDG LT/TAXI LT - OFF.

4. Check the landing gear, speedbrake and flaps indicators.

AFTER LANDING
After completion of the landing roll and when clear of the runway:

1. Flaps - UP.

2. Speedbrake - IN.

3. Hydraulic pressures - Within limits.

4. Trims - In neutral position.

5. Landing light - OFF (if ON).

6. Taxi light - As required.

7. Stand-by attitude indicator - Caged.

8. IFF - OFF.

9. TACAN - OFF.

10. VOR/ILS - OFF.

11. WINDSHIELD/DEMIST --- OFF.

12. ANTI-ICE/ENGINE and ANTI-ICE/PITOT - OFF.

13. Seat safety pin - In place.

14. Canopy - As required.

CAUTION

- IF CANOPY IS OPEN THE AND THERE IS STRONGWIND,FIRMLY HOLD THE CANOPY HANDLE, OPEN IT AND CHECK THAT IT IS LOCKED.

- DURING TAXIING, THE CANOPY MUST BE CLOSED OR OPEN AND LOCKED IN THE INTERMEDIATE POSITION BUT NOT FULLY OPEN.

ENGINE SHUT-DOWN

1. LDG LT/TAXI LT - OFF (if ON).

2. Parking brake - Applied.

CAUTION
AVOID APPLYING THE PARKING
BRAKES IF BRAKES ARE SUSPECTED
TO BE OVERHEATED.

3. On crew chief’s signal:

a. Speedbrake - OUT.

b. Flaps - DOWN.

4. Engine throttle - Approx. 60% RPM.

5. Engine throttle - STOP.

6. UHF (COMM1) and VHF (aircrafts pre-mod. PTA -322) or V/UHF (COMM2) (aircraft postmod. PTA -322) – OFF.

7. IN GPS - OFF.

8. Gunsight - OFF (if installed).

9. BCN - OFF.

10. When the engine stops:

a. ENGINE/MASTER - OFF.

b. GEN 1 and GEN 2 - OFF.

c. BATT - OFF.

CAUTION

KEEP CLEAR OF THE TAIL PIPE AND DO NOT MOVE THE AIRCRAFT INTO A HANGAR FOR AT LEAST 15 MINUTES AFTER SHUTDOWNBECAUSE OF THE POSSIBILITY OF EXPLOSION FROM FUEL VAPOR ACCUMULATION.

BEFORE LEAVING THE AIRCRAFT

CAUTION

WHEN PERFORMING THE FOLLOWING OPERATIONS, PAY ATTENTION TO AVOID PLACING BULKY MATERIAL ON THE INSTRUMENT PANEL COWLING NOT TO CAUSE SCRATCHES AND NICKS TO THE WINDSHIELD INTERIOR SURFACE.

1. Wheel chocks - In place.

2. PARK&EMERBK-Released, if previously set.

3. Check that the safety pin is in place in the seat firing handle.

4. Disconnect the following:

a. Oxygen supply line and mask.

b. Radio connection.

c. Anti-g suit hose.

NOTE

Fasten the oxygen hose end to the cabin side by using the relevant special snap fastener.

5. Move the oxygen supply lever to OFF.

6. Release the straps by rotating 90 degrees the quick-release fitting disc and by firmly pressing it. Move back the knob in locked position.

7. Operate the release lever of the leg restraint garters and slide the lines out of the garters.

8. Disconnect thesurvival packlowering linefrom the life jacket.

9. Leave the aircraft.

WARNING

- WHENRISING OUT OF THESEAT, PAY ATTENTION NOT TO BUMP WITH THE HEAD AGAINST THE HOOKSPROTRUDINGFROMTHE CANOPY FRAME.

- THE EXIT PROCEDURE FROM THE REAR COCKPIT MUST BE CARRIED OUT WITH FREE HANDS AND CAREFULLY.

10. If necessary, close and lock the canopy:

WARNING

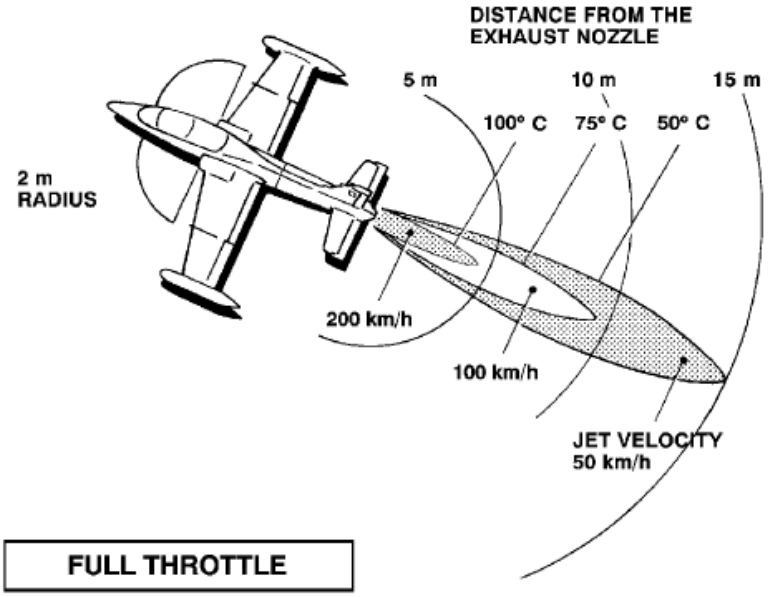
USE THE SPECIAL HANDLE WHEN CLOSING THE CANOPY FROM THE OUTSIDE TO AVOID THE RISK THAT PLACING THE HANDS ELSEWHERE MAY RESULT IN THEM BEING TRAPPED IN THE NARROW SPACE EXISTING BETWEEN THE SEAT LEFT RAM AND THE CANOPY FRAME.

11. Underwing tanks and luggage pod (if installed) - Check the safety pins are inserted.

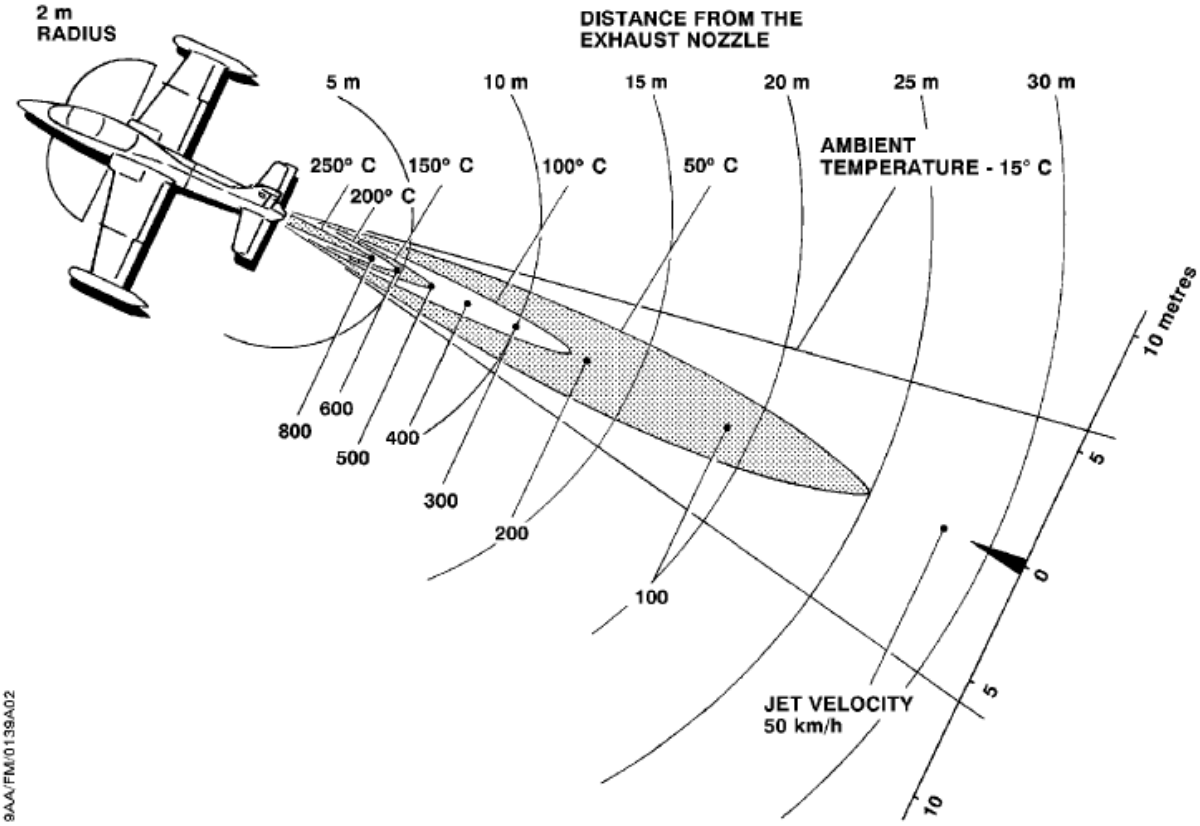
12. Report on the aircraft logbook the possible failures detected and the limitations exceeded during the flight.

DANGER AREAS | **TEMPERATURE AND VELOCITY**

ENGINE AT IDLE



FULL THROTTLE



9AA/FM/0139A02

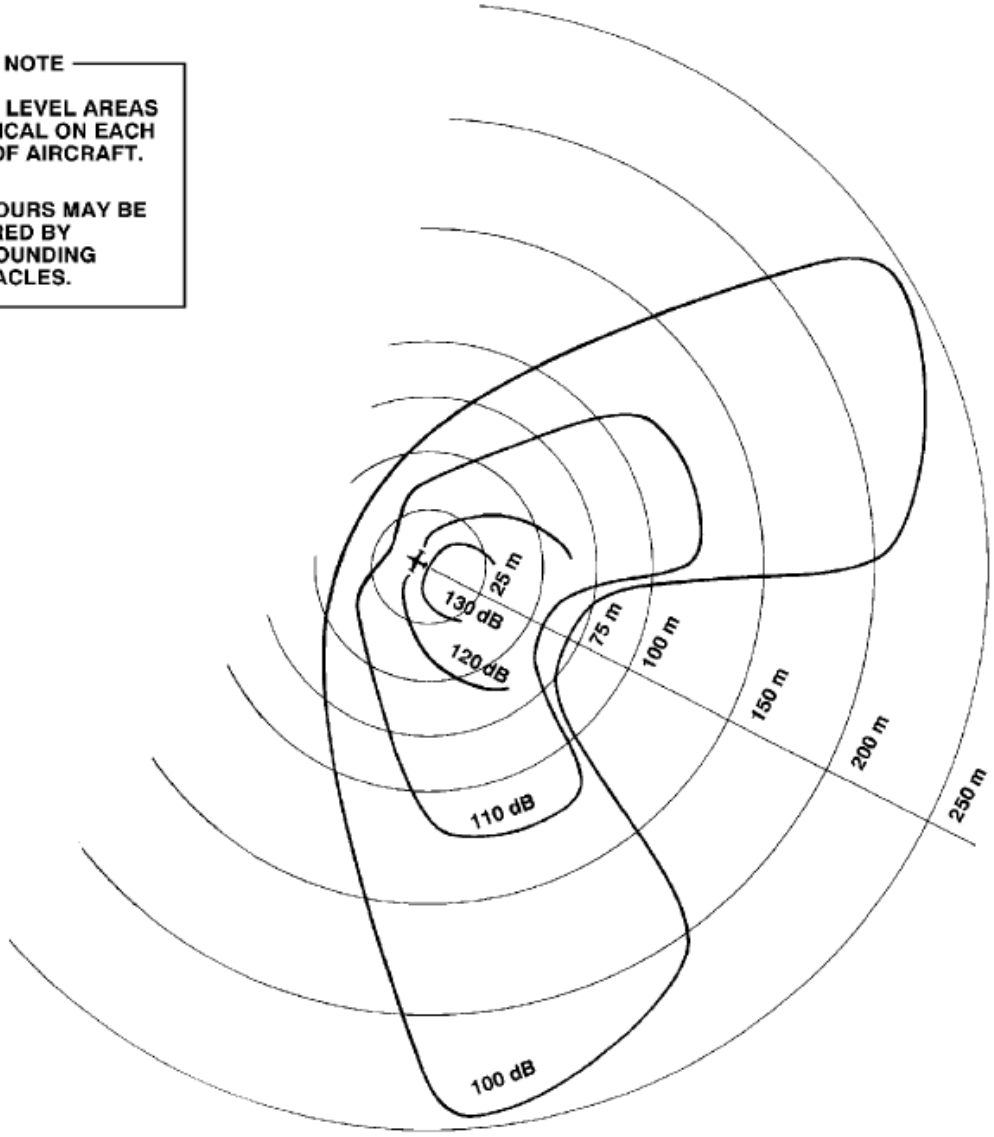
DANGER AREAS | **NOISE LEVEL**

NOISE PROTECTION REQUIREMENTS	
DECIBEL	**REQUIRED EAR PROTECTION**
0-85 dB	No protection required
85-120 dB	Ear muffs or ear plugs
120-135 dB	Ear muffs and ear plugs
135-145 dB	Ear muffs and ear plugs Limited time exposure
Above 145 dB	Prohibited

FULL THROTTLE

NOTE

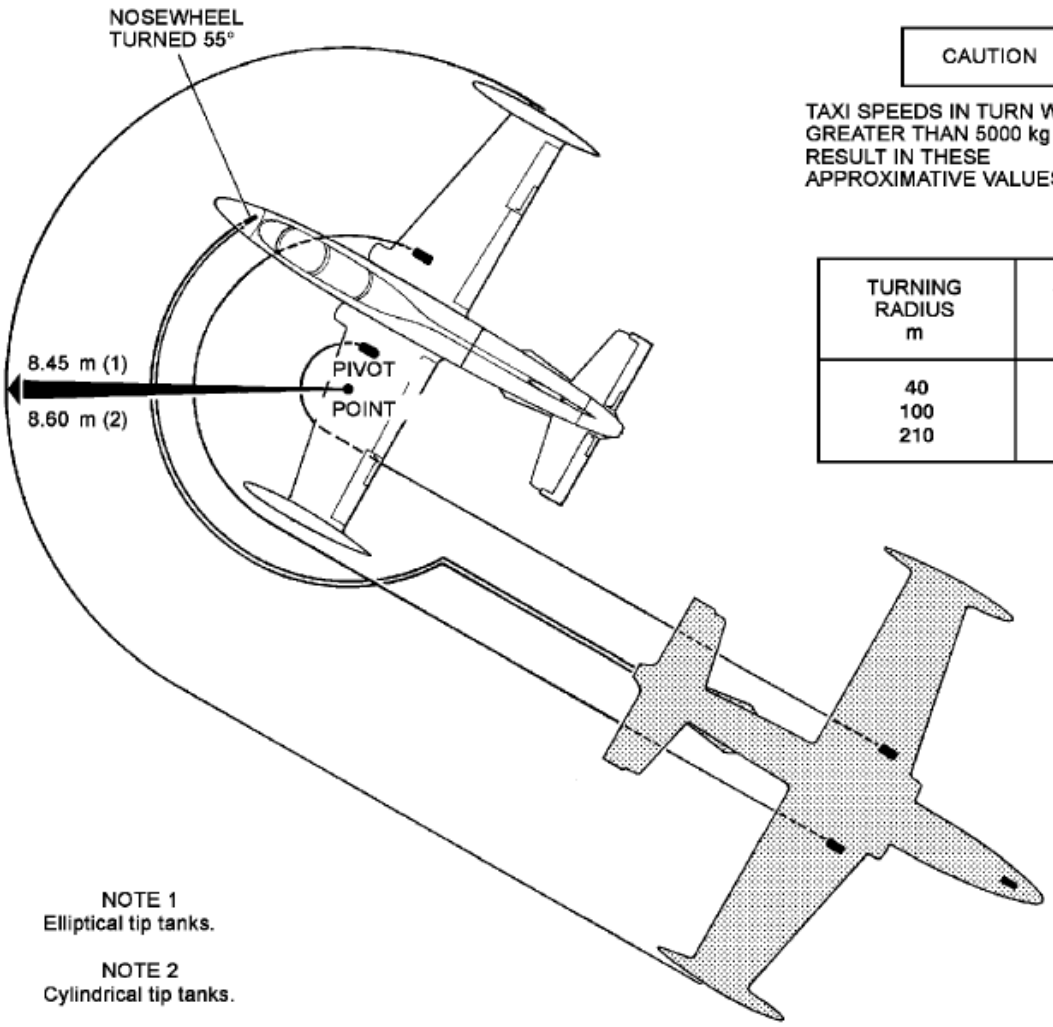
- NOISE LEVEL AREAS IDENTICAL ON EACH SIDE OF AIRCRAFT.
- CONTOURS MAY BE ALTERED BY SURROUNDING OBSTACLES.



9AA/FM/0138_02

TURNING RADIUS AND GROUND CLEARANCE

MINIMUM TURNING RADIUS



NOTE 1
Elliptical tip tanks.

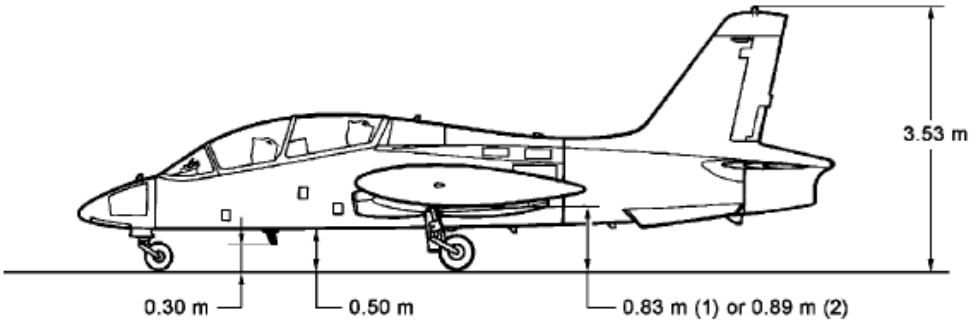
NOTE 2
Cylindrical tip tanks.

CAUTION

TAXI SPEEDS IN TURN WITH MASS GREATER THAN 5000 kg SHOULD RESULT IN THESE APPROXIMATIVE VALUES:

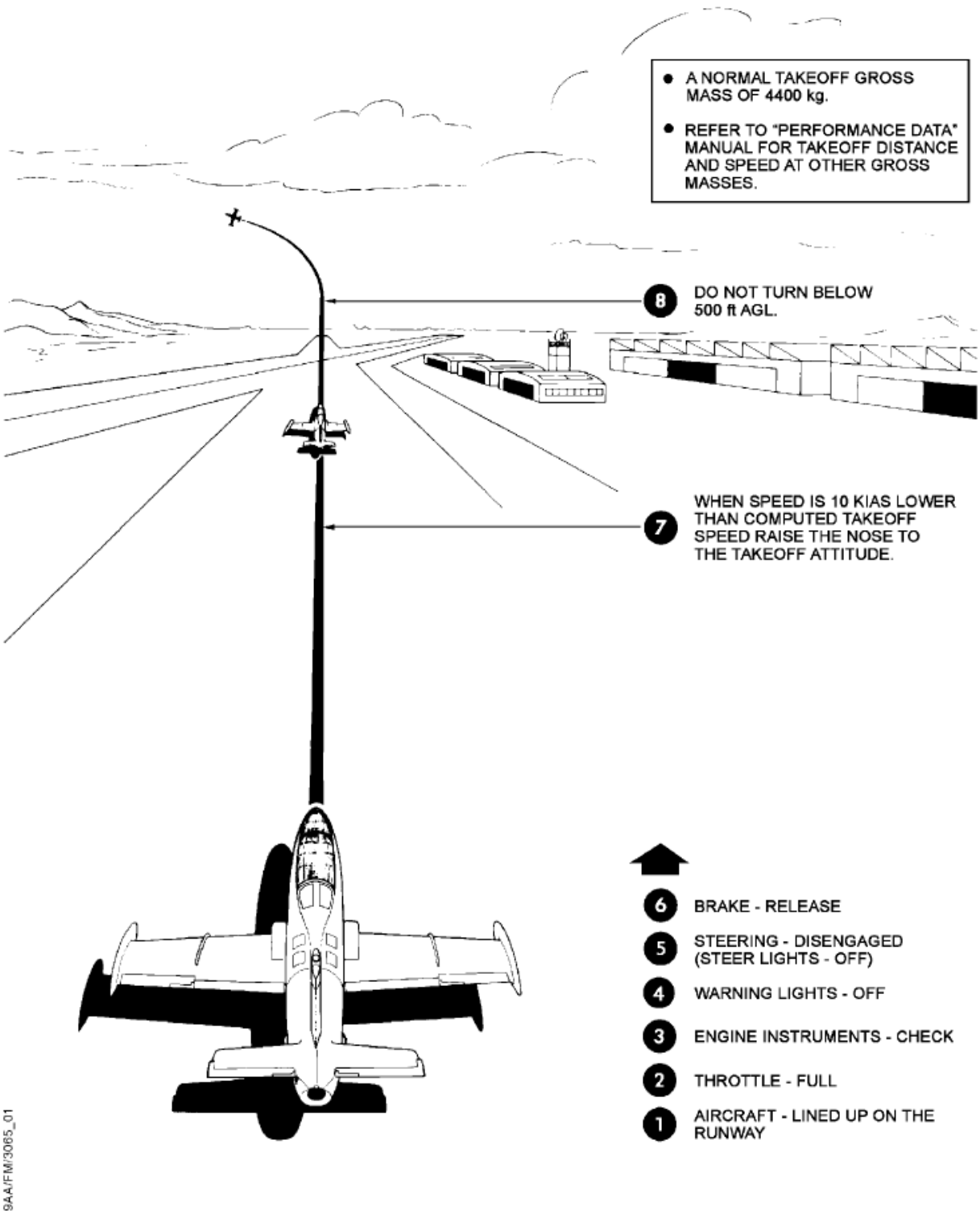
TURNING RADIUS m	SPEED kt
40	25
100	35
210	55

APPROXIMATE GROUND CLEARANCE



9AA/FM/2954_01

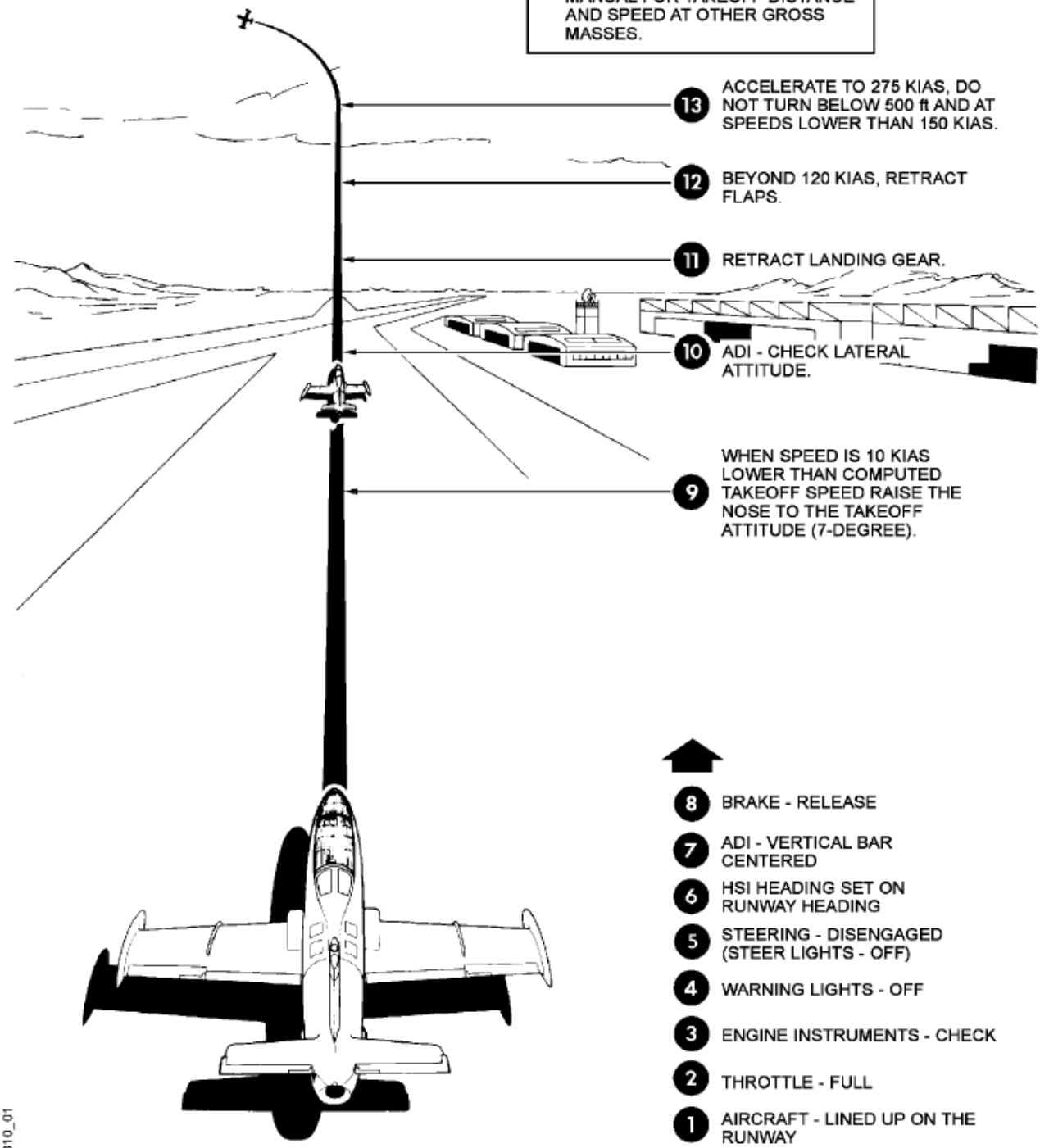
TAKEOFF (TYPICAL)



9AA/FM/3065_01

INSTRUMENT TAKEOFF (TYPICAL)

- NORMAL TAKEOFF GROSS MASS OF 4400 kg.
- REFER TO "PERFORMANCE DATA" MANUAL FOR TAKEOFF DISTANCE AND SPEED AT OTHER GROSS MASSES.

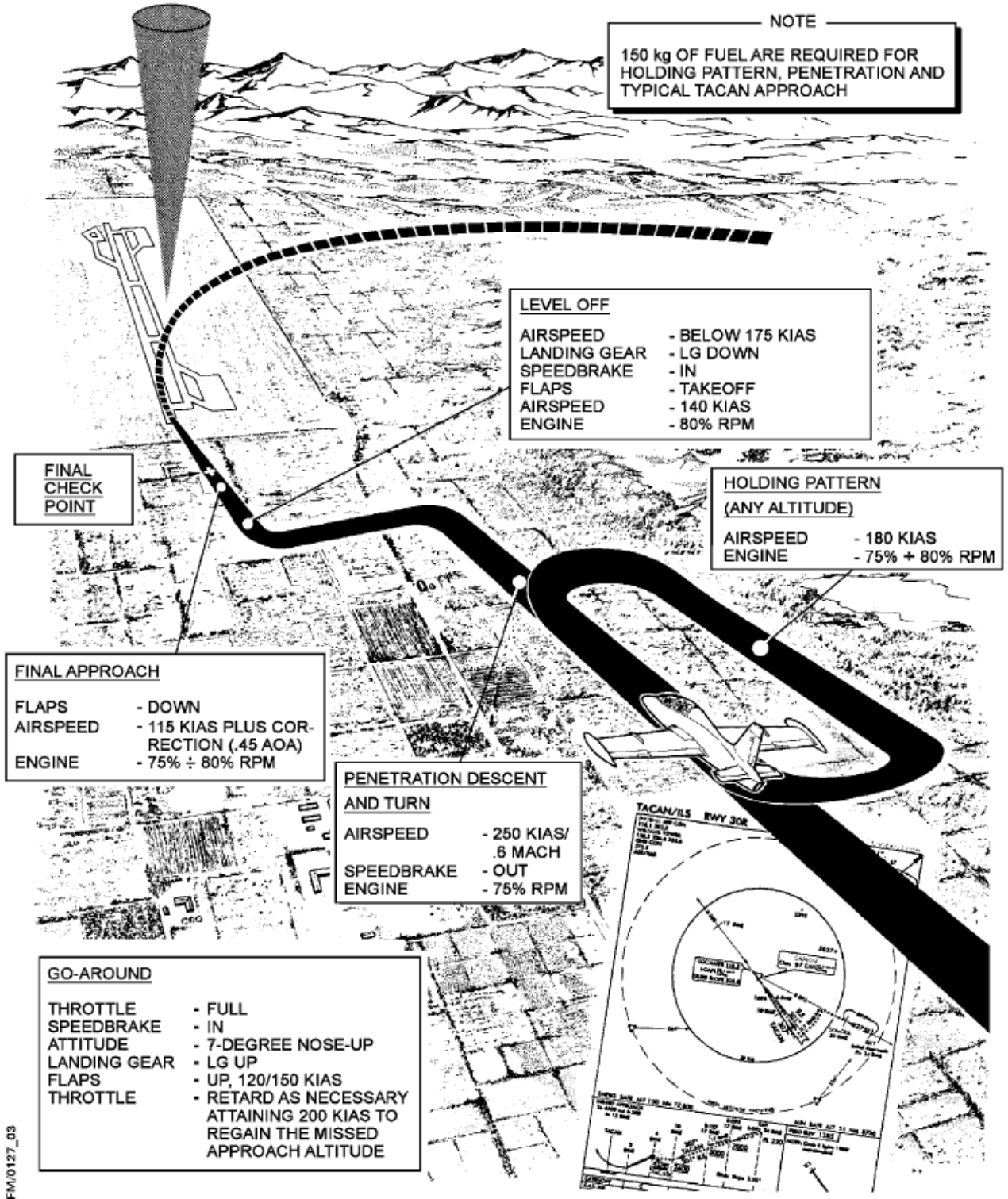


13. ACCELERATE TO 275 KIAS, DO NOT TURN BELOW 500 ft AND AT SPEEDS LOWER THAN 150 KIAS.
12. BEYOND 120 KIAS, RETRACT FLAPS.
11. RETRACT LANDING GEAR.
10. ADI - CHECK LATERAL ATTITUDE.
9. WHEN SPEED IS 10 KIAS LOWER THAN COMPUTED TAKEOFF SPEED RAISE THE NOSE TO THE TAKEOFF ATTITUDE (7-DEGREE).

8. BRAKE - RELEASE
7. ADI - VERTICAL BAR CENTERED
6. HSI HEADING SET ON RUNWAY HEADING
5. STEERING - DISENGAGED (STEER LIGHTS - OFF)
4. WARNING LIGHTS - OFF
3. ENGINE INSTRUMENTS - CHECK
2. THROTTLE - FULL
1. AIRCRAFT - LINED UP ON THE RUNWAY

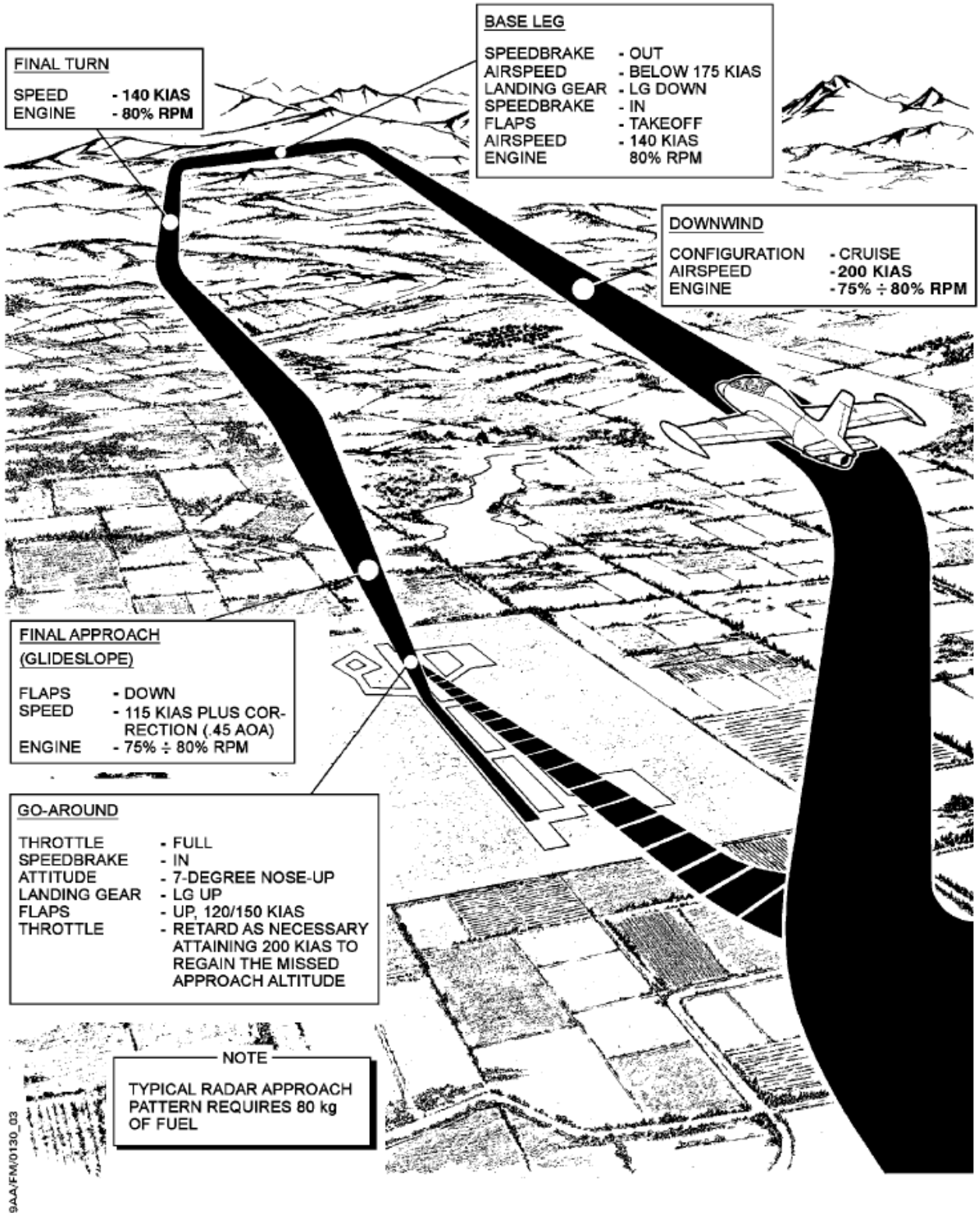
9AA/FM/0310_01

HOLDING, PENETRATION AND TACAN APPROACH (TYPICAL)

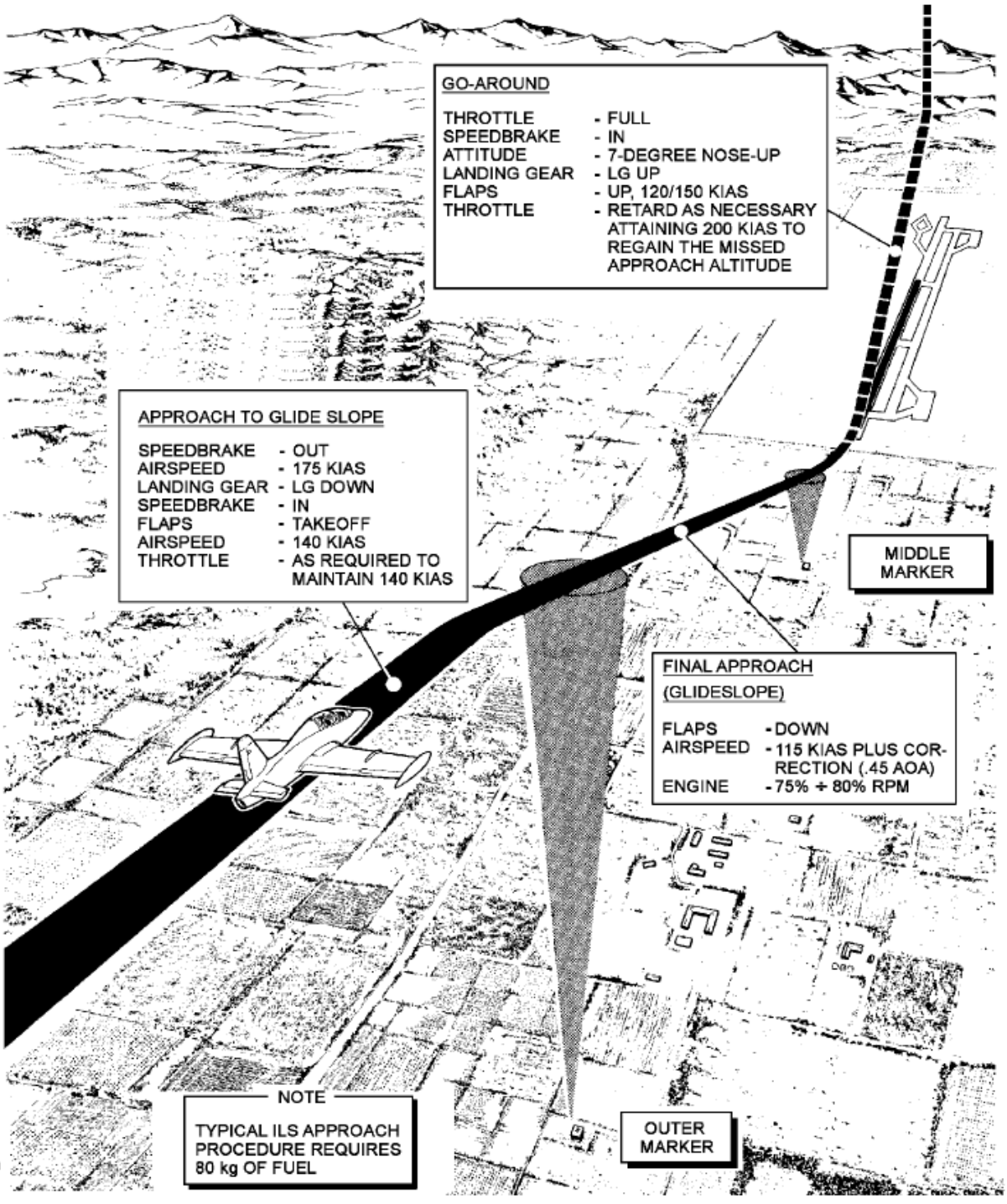


9AA/FM/0127_03

RADAR APPROACH (TYPICAL)

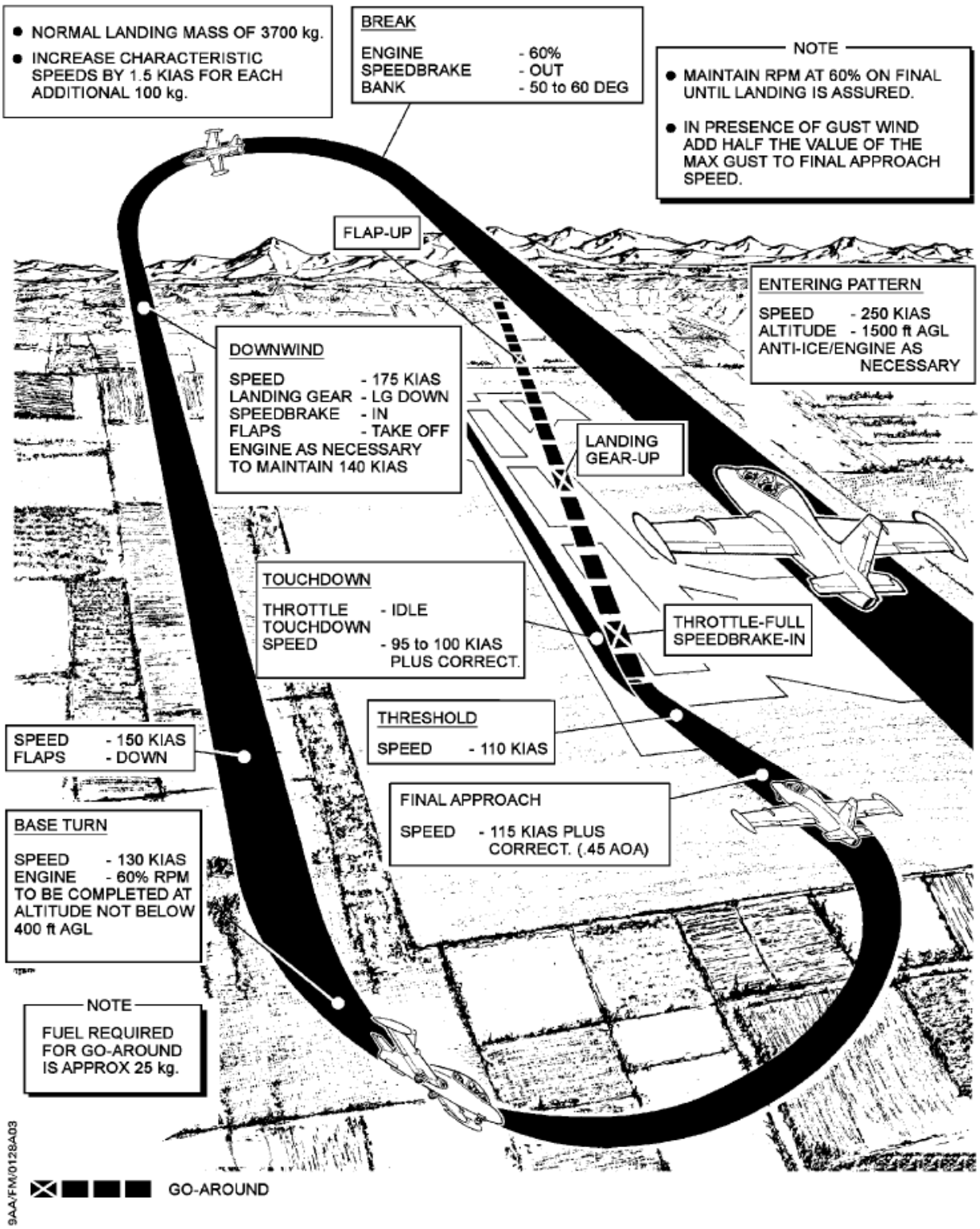


ILS APPROACH (TYPICAL)



9AA/FM/0129_02

LANDING AND GO-AROUND (TYPICAL)



9AA/FM/0128A03

SMOKE SYSTEM (BETA)

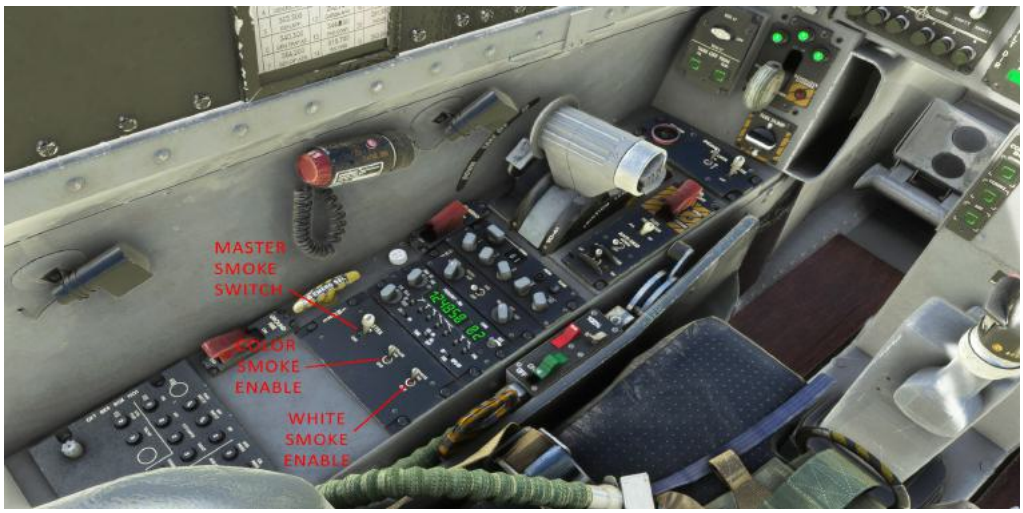
Starting from version 1.3.0, the MB-339 for MSFS implements a smoke system through the Visual Effects Editor (Beta) of the MSFS SDK.

In order to operate the smoke system, it is necessary to activate the smoke system switches in the Virtual Cockpit panel. These are:

- MASTER → Smoke system master switch

- WHITE → Energizes the WHITE smoke system

- COLOR → Energizes the COLOR smoke system



Once the switches are turned on, the smoke system is activated by toggling with wing and recogntion lights respectively (this was done since, in real life, the smoke system is associated to triggers on the stick).

WING LIGHT (toggle) will activate / deactivate WHITE smoke

RECOGNTION LIGHT (toggle) will activate / deactivate COLOR smoke

The color smoke is dependent on the aircraft selection: in the liveries selection, you can pick the default MB339PAN (white smoke loaded in the color tank), or variants with green or red smoke.

Two advisory lights are mounted on the MB-339PAN cockpit to indicate that the smoke system is currently working.

NOTE: The smoke system is only available on the MB.339PAN

NOTE: The smoke system will operate correctly only on external views (apparently due to a bug in MSFS) and may not work correctly in multiplayer.

NOTE: Since the Visual Effects Editor is still in Beta, there is a (limited) chance that the smoke system may not work correctly in future releases.

SPECIAL VISIBILITY CONDITIONS

The external visual model features some “special visibility” conditions provided as eye-candy only.

WHEELCHOKS AND “REMOVE BEFORE FLIGHT” RIBBONS
These will appear automatically when the Battery and Geneator Switches are off, with the aicraft stationary on the grond and engine RPM below 1% and the canopy is open. They will disappear if any of these conditions is not met.

BACKSEAT PILOT FIGURE

The backseat pilot figure is optional, but is present by default. It will disappear if the COPILOT weight is set to 0 in the FUEL and LOADOUT manager

PYLONS AND FUEL TANKS

Selecting any weight other than 0 for the PYLONs in the FUEL and LOADOUT manager will make the relevant pylon to appear (applies only to A and A-MLU models).

Selecting any weight greater or equalto to 150 lbs for PYL 2 and PYL 5 will make external fuel tanks to appear.

NOTE: If underwing fuel tanks are loaded (by applying a 150 lbs fuel load to PYL2 or PYL5) you can add fuel to EXTERNAL1 and EXTERNAL2 fuel tanks.
If the fuel tanks are not present, any fuel applied to those tanks will be immediately deleted.
At the moment, it is not required to use the fuel transfer pump to use that fuel.

LIST OF KNOWN BUGS AND INACCURACIES

These are the known bugs and inaccuracies at the moment of the initial release. We will try to fix these with updates in future, but at the moment we were either not able to find satisfactory solutions to the problems, or felt that the specific feature was not essential or was above the scope of the project:

PANEL BACKLIGHTING AT NIGHT ALWAYS ON

At the moment, the panel backlight will turn on automatically at night, regardless of the switches status and of the electrical power. Reason for this is that when we implemented the knob-controlled backlighting, we faced a number of visual glitches and anomalies in the cockpit that we were not able to solve completely. Backlighting documentation in the MSFS SDK is incomplete and subject to change, hence we preferred to leave it a is it is.

INVERTED FLIGHT

Like many jets, the real MB-339 has a limit to the the duration of the inverted flight due to its fuel system. Any negative-G flight longer than 25 seconds may cause an engine flameout due to absence of fuel. This is currently not simulated, as the fuel system in MSFS seems to have some malfunctions.

LOMCOVAK

The real MB-339 is one of the very few jets capable of this maneuvre – but at the moment it is not currently supported in the flight model.

CUSTOMIZABLE LOADOUTS AND WEAPONS

The real MB-339 can be and has been employed as a light attack fighter, and it is capable of carrying a variety of gun pods, rockets and bombs. At the moment these are not supported and the configuration is fixed. NOTE: MICROSOFT DOES NOT ALLOW WEAPONS (even non functional, graphic only models) TO BE REPRESENTED IN THE MARKETPLACE.

GPS FUNCTIONALITY

The GPS functionality is limited to the DATA mode at the moment.