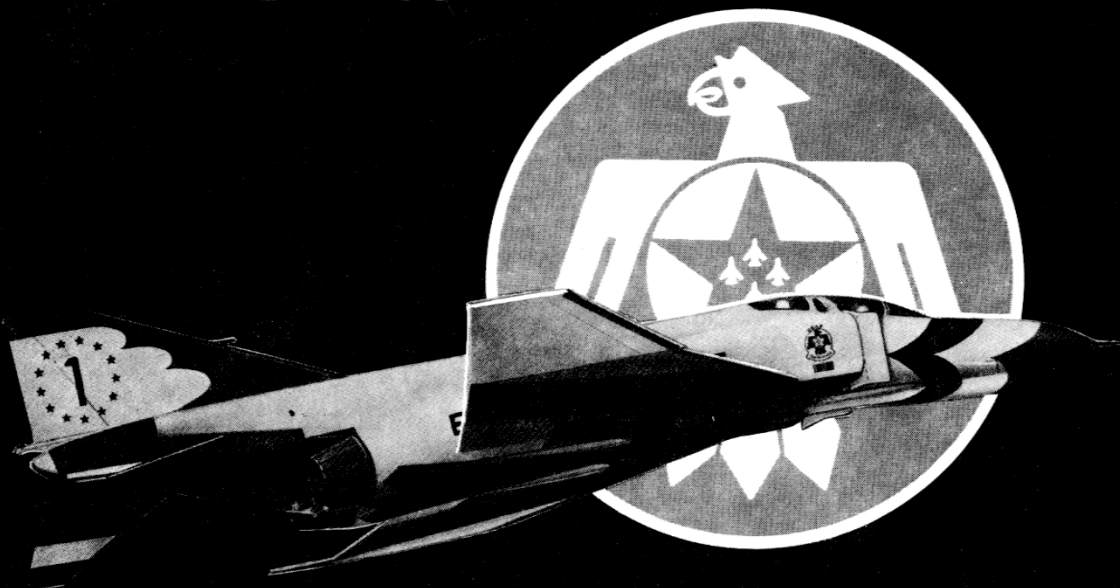


# FLIGHT OPERATING DIFFERENCE/SUPPLEMENTAL DATA



## USAF SERIES F-4E AIRCRAFT

MCDONNELL DOUGLAS  
F34(601)-68-A-2919  
N00019-70-A-0001

# THUNDERBIRD CONFIGURATION

Commanders are responsible for bringing this publication to the attention of all affected personnel.

THIS PUBLICATION IS INCOMPLETE WITHOUT T.O. 1F-4C-1

Basic and all changes have been merged  
to make this a complete publication.

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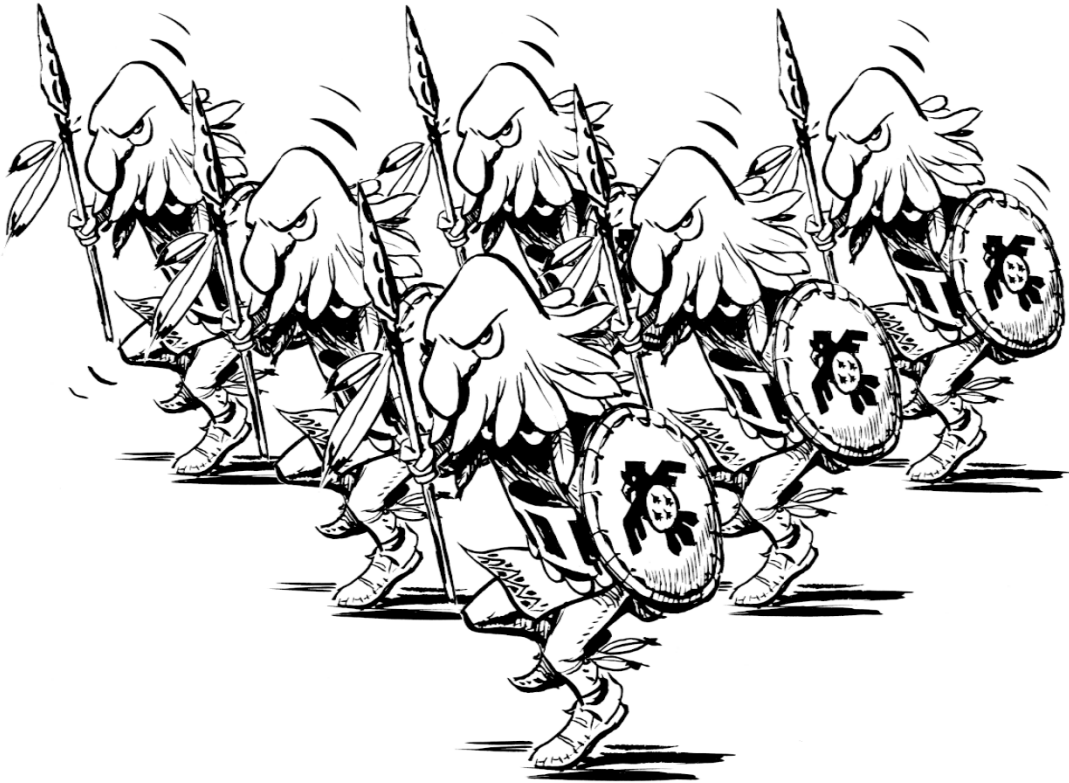
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Original . . 0 . . 1 Apr 69  
 Change . . 1 . . 1 Sep 69  
 Change . . 2 . . 15 Dec 70

Total number of pages in this manual is **44** consisting of the following:

Page No.	# Change No.	Page No.	# Change No.	Page No.	# Change No.
Title . . . . .	2				
A . . . . .	2				
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F4TB-AG

## SCOPE

This manual supplements T.O. 1F-4C-1 Flight Manual. It is the intent of this manual to present difference/supplemental data between the production F-4E

and the Flight Demonstration Aircraft. The format contained herein is the same format contained in the F-4E Flight Manual, however, only those sections, parts, and/or paragraphs that are different or supplementary are presented.



**SECTION I****DESCRIPTION****TABLE OF CONTENTS**

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**AIRCRAFT**

The Thunderbird F-4E demonstration aircraft is a slightly modified version of the standard Air Force operational F-4E fighter. It is powered by two J79-GE-17 turbojet engines with a modified afterburner control and modified variable area exhaust nozzle pumps. Additional changes affecting the power plant are a starter exhaust duct and throttle quadrant switch changes. A gaseous oxygen system supplements the liquid oxygen system. Additional VHF and low frequency navigation aids in the aircraft include a VHF comm, a VHF navigation system and a low frequency ADF system. The weapons delivery system and missile control system, have been removed. A smoke system has been added to enable the pilot to generate smoke into the airstream. Further modifications, and deletions to the aircraft are reflected in the cockpit, control stick, and throttle grip, as well as provisions for carrying personal gear.

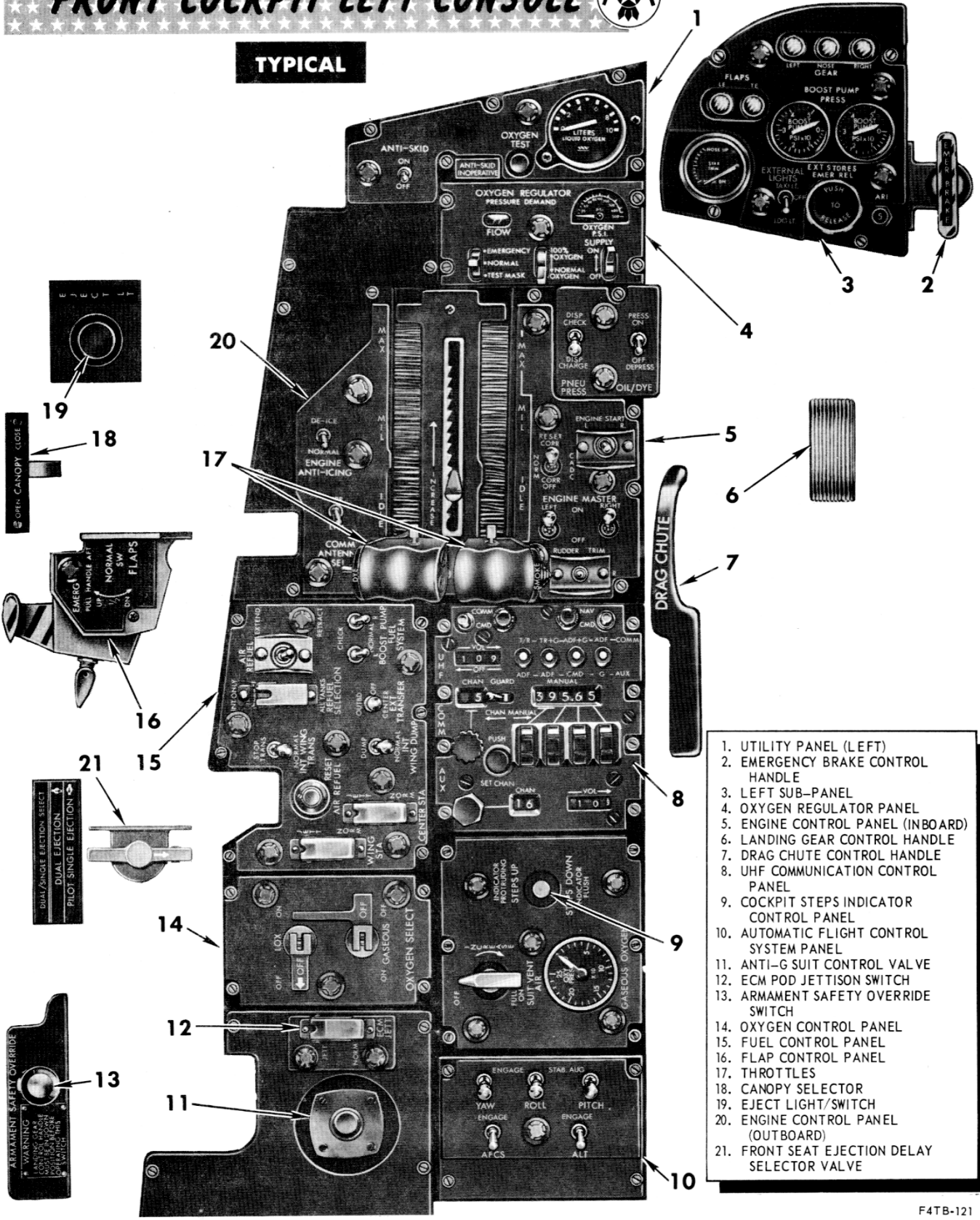
**COCKPIT ARRANGEMENT****Instruments and Consoles**

The front cockpit instrument control panel and consoles have been rearranged to accommodate additional equipment. The main instrument panel radar scope and optical sight unit has been removed and replaced by a BDHI indicator, accelerometer, and VOR/ILS indicator. The missile status panel, missile control panel, weapons release mode panel, and accelerometer has been removed and a miscellaneous switch panel, VHF COMM/NAV panel, and LF/ADF control panel inserted in its place. Next to the fuel quantity indicator, a ground speed indicator has been added. The weapons control panel (pedestal), has been replaced with an ICS control panel. The left console has the following changes; the AFCS panels have been moved aft next to the anti-G suit valve. Also, the UHF COMM panel is now located next to the fuel control panel, and the steps indicating panel and oxygen gage are now integrated and located next to the oxygen control panel. On the right console; the compass control panel, navigation computer control panel, navigation control panel (TACAN), IFF panel, and the inertial navigator control panel are now located in sequence aft from the generator control panel. An AB INITIATION circuit breaker has been added to the right console circuit breaker panel, and the instrument ground power switch is now located on the right console; aft, next to the exterior lights panel. Refer to figures 1-4 thru 1-7 for the aft cockpit instrument panel, consoles, and circuit breaker panels.

# FRONT COCKPIT LEFT CONSOLE



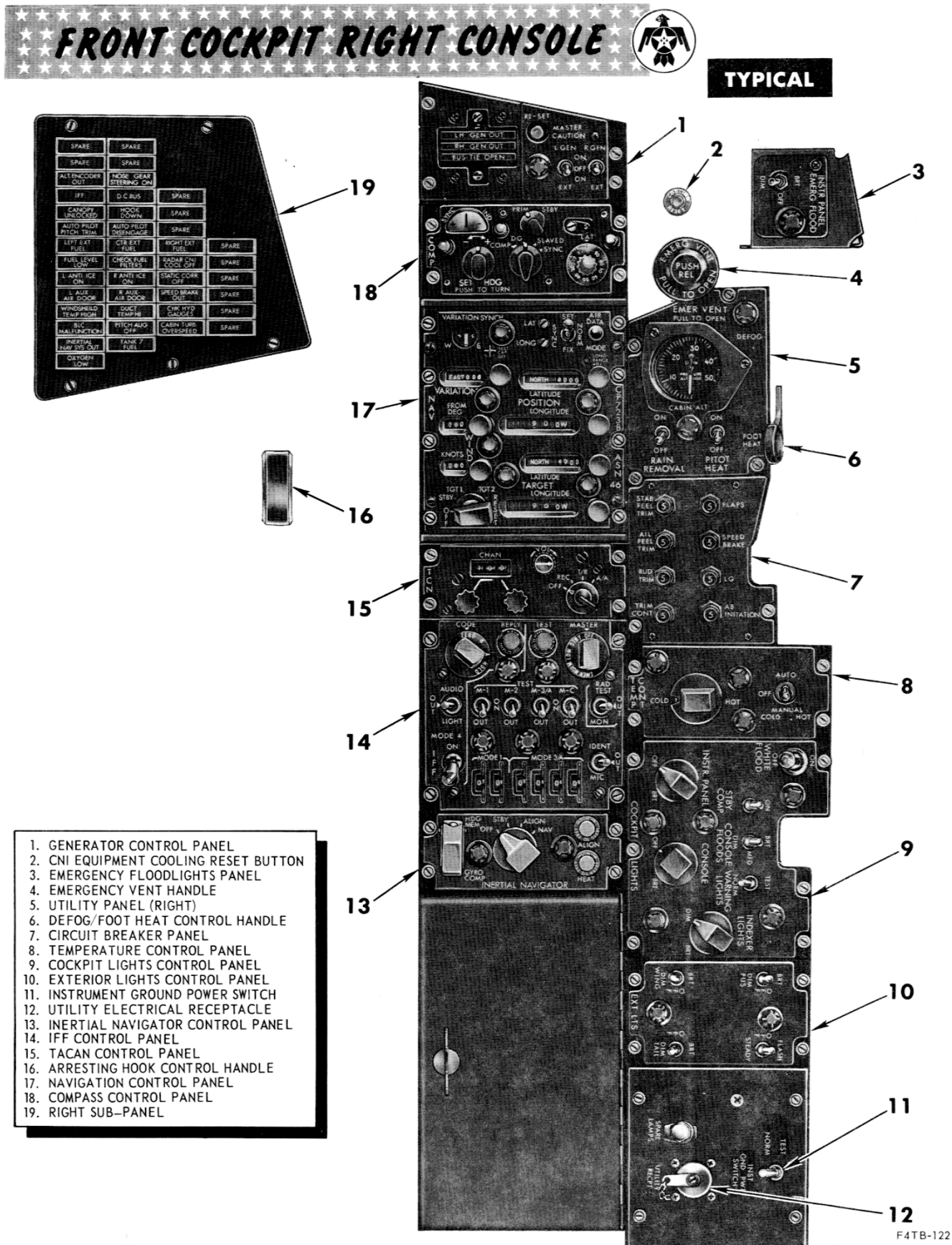
**TYPICAL**



1. UTILITY PANEL (LEFT)
2. EMERGENCY BRAKE CONTROL HANDLE
3. LEFT SUB-PANEL
4. OXYGEN REGULATOR PANEL
5. ENGINE CONTROL PANEL (INBOARD)
6. LANDING GEAR CONTROL HANDLE
7. DRAG CHUTE CONTROL HANDLE
8. UHF COMMUNICATION CONTROL PANEL
9. COCKPIT STEPS INDICATOR CONTROL PANEL
10. AUTOMATIC FLIGHT CONTROL SYSTEM PANEL
11. ANTI-G SUIT CONTROL VALVE
12. ECM POD JETTISON SWITCH
13. ARMAMENT SAFETY OVERRIDE SWITCH
14. OXYGEN CONTROL PANEL
15. FUEL CONTROL PANEL
16. FLAP CONTROL PANEL
17. THROTTLES
18. CANOPY SELECTOR
19. EJECT LIGHT/SWITCH
20. ENGINE CONTROL PANEL (OUTBOARD)
21. FRONT SEAT EJECTION DELAY SELECTOR VALVE

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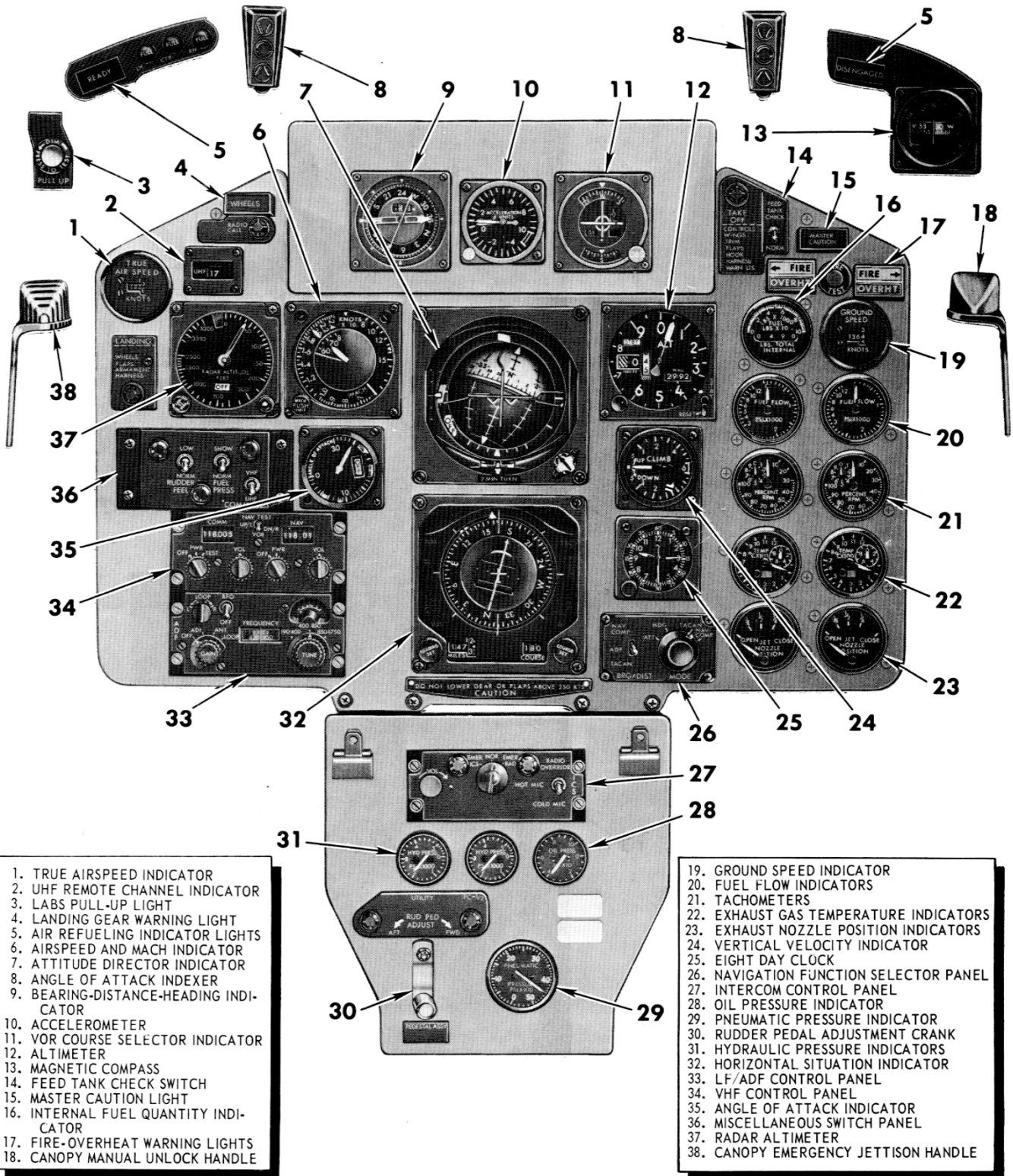
Figure 1-1



1. GENERATOR CONTROL PANEL
2. CNI EQUIPMENT COOLING RESET BUTTON
3. EMERGENCY FLOODLIGHTS PANEL
4. EMERGENCY VENT HANDLE
5. UTILITY PANEL (RIGHT)
6. DEFOG/FOOT HEAT CONTROL HANDLE
7. CIRCUIT BREAKER PANEL
8. TEMPERATURE CONTROL PANEL
9. COCKPIT LIGHTS CONTROL PANEL
10. EXTERIOR LIGHTS CONTROL PANEL
11. INSTRUMENT GROUND POWER SWITCH
12. UTILITY ELECTRICAL RECEPTACLE
13. INERTIAL NAVIGATOR CONTROL PANEL
14. IFF CONTROL PANEL
15. TACAN CONTROL PANEL
16. ARRESTING HOOK CONTROL HANDLE
17. NAVIGATION CONTROL PANEL
18. COMPASS CONTROL PANEL
19. RIGHT SUB-PANEL

Figure 1-2

# FRONT COCKPIT INSTRUMENT PANEL



1. TRUE AIRSPEED INDICATOR
2. UHF REMOTE CHANNEL INDICATOR
3. LABS PULL-UP LIGHT
4. LANDING GEAR WARNING LIGHT
5. AIR REFUELING INDICATOR LIGHTS
6. AIRSPEED AND MACH INDICATOR
7. ATTITUDE DIRECTOR INDICATOR
8. ANGLE OF ATTACK INDEXER
9. BEARING-DISTANCE-HEADING INDICATOR
10. ACCELEROMETER
11. VOR COURSE SELECTOR INDICATOR
12. ALTIMETER
13. MAGNETIC COMPASS
14. FEED TANK CHECK SWITCH
15. MASTER CAUTION LIGHT
16. INTERNAL FUEL QUANTITY INDICATOR
17. FIRE-OVERHEAT WARNING LIGHTS
18. CANOPY MANUAL UNLOCK HANDLE

19. GROUND SPEED INDICATOR
20. FUEL FLOW INDICATORS
21. TACHOMETERS
22. EXHAUST GAS TEMPERATURE INDICATORS
23. EXHAUST NOZZLE POSITION INDICATORS
24. VERTICAL VELOCITY INDICATOR
25. EIGHT DAY CLOCK
26. NAVIGATION FUNCTION SELECTOR PANEL
27. INTERCOM CONTROL PANEL
28. OIL PRESSURE INDICATOR
29. PNEUMATIC PRESSURE INDICATOR
30. RUDDER PEDAL ADJUSTMENT CRANK
31. HYDRAULIC PRESSURE INDICATORS
32. HORIZONTAL SITUATION INDICATOR
33. LF/ADF CONTROL PANEL
34. VHF CONTROL PANEL
35. ANGLE OF ATTACK INDICATOR
36. MISCELLANEOUS SWITCH PANEL
37. RADAR ALTIMETER
38. CANOPY EMERGENCY JETTISON HANDLE

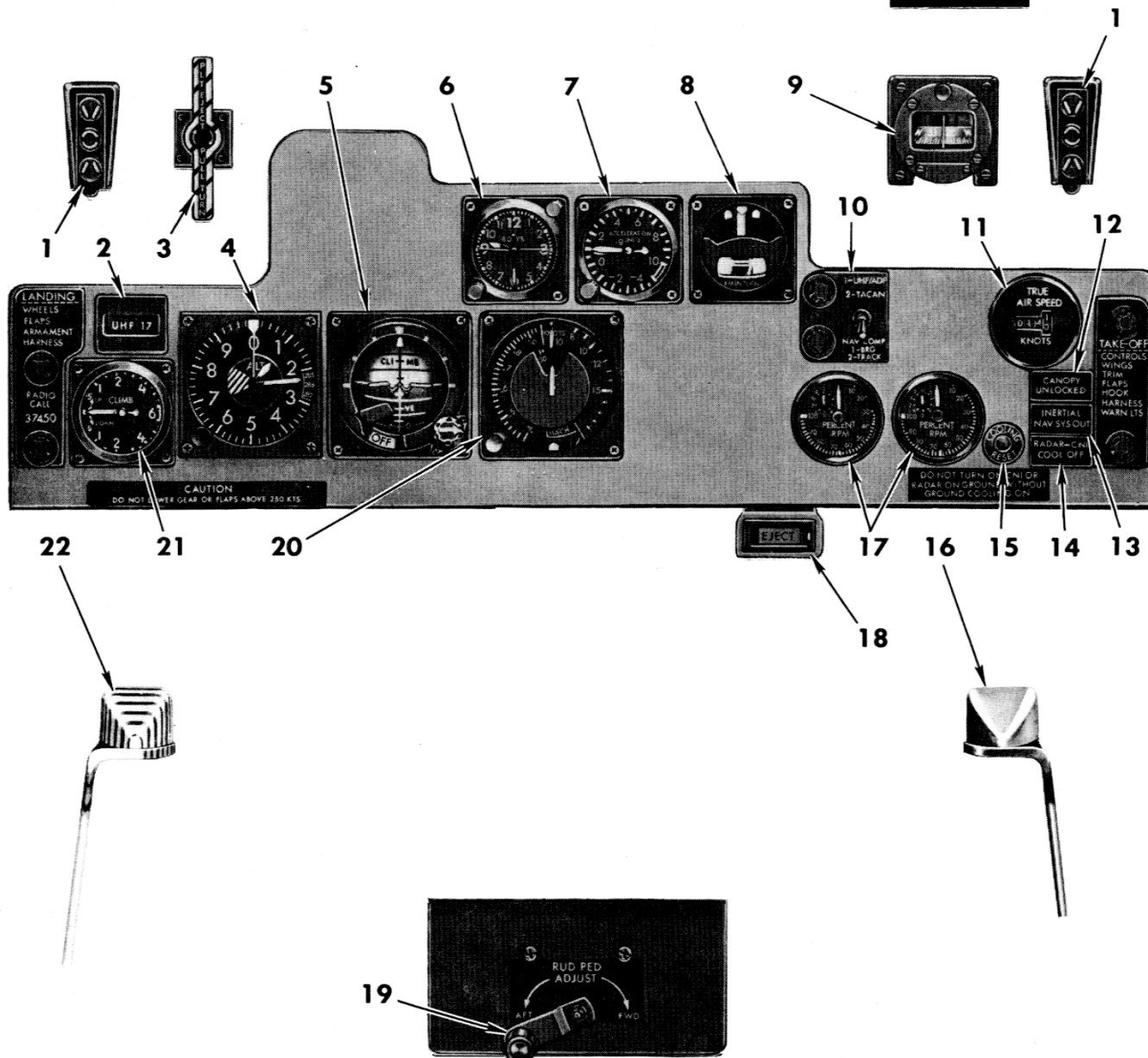
Figure 1-3



# REAR COCKPIT INSTRUMENT PANEL

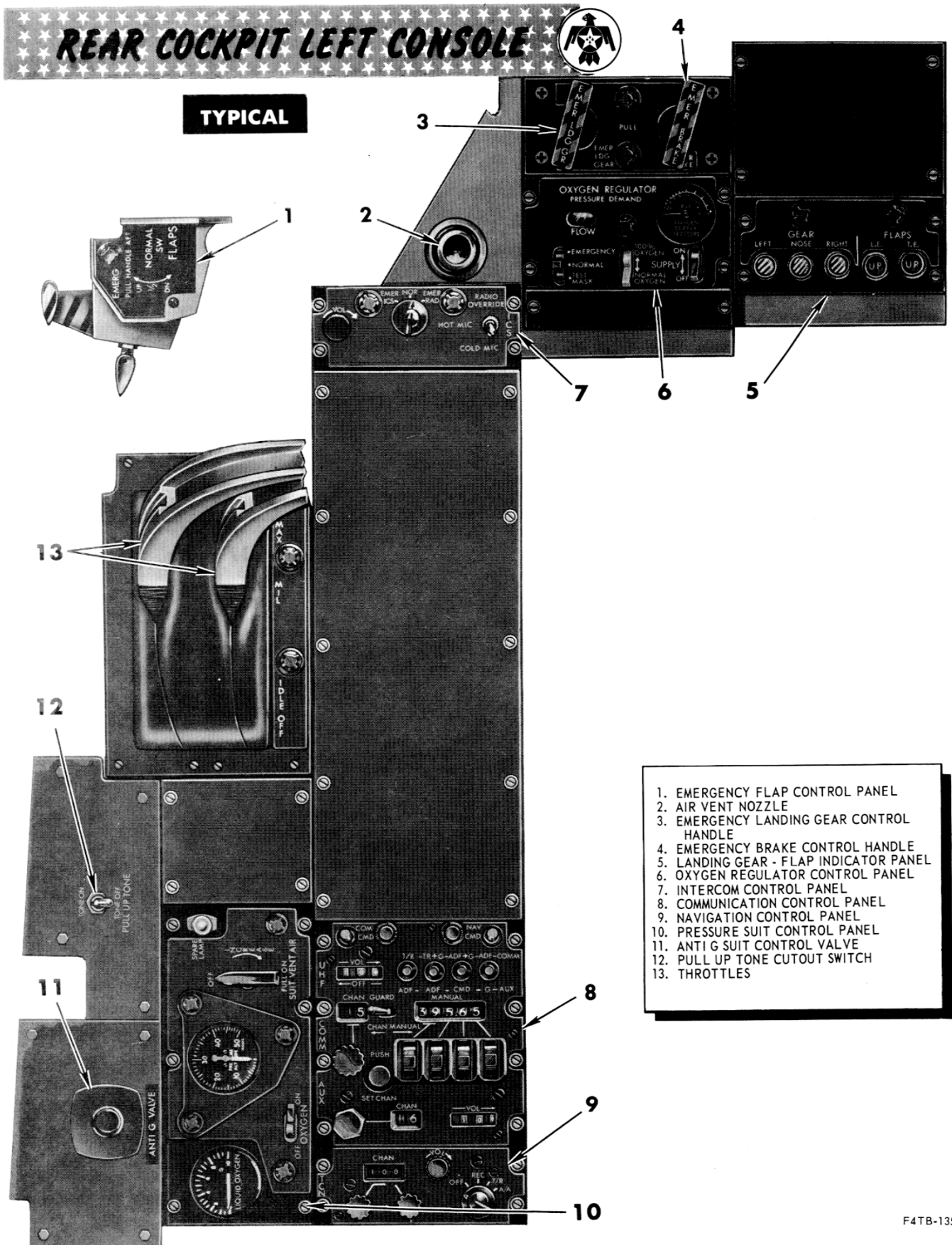


**TYPICAL**



- |   |                                      |
|---|--------------------------------------|
| 1. ANGLE OF ATTACK INDEXER                | 14. RADAR-CNI COOL OFF WARNING LIGHT |
| 2. UHF CHANNEL REMOTE INDICATOR           | 15. RADAR-CNI COOLING RESET BUTTON   |
| 3. COMMAND SELECTOR VALVE                 | 16. CANOPY MANUAL UNLOCK HANDLE      |
| 4. ALTIMETER                              | 17. TACHOMETERS                      |
| 5. ATTITUDE INDICATOR                     | 18. EJECT LIGHT                      |
| 6. EIGHT DAY CLOCK                        | 19. RUDDER PEDAL ADJUSTMENT CRANK    |
| 7. ACCELEROMETER                          | 20. AIRSPEED-MACH INDICATOR          |
| 8. TURN AND SLIP INDICATOR                | 21. VERTICAL VELOCITY INDICATOR      |
| 9. STANDBY MAGNETIC COMPASS               | 22. CANOPY EMERGENCY JETTISON HANDLE |
| 10. NAVIGATION FUNCTION SELECTOR PANEL    |                                      |
| 11. TRUE AIRSPEED INDICATOR               |                                      |
| 12. CANOPY UNLOCKED WARNING LIGHT         |                                      |
| 13. INERTIAL NAVIGATION OUT WARNING LIGHT |                                      |

Figure 1-4



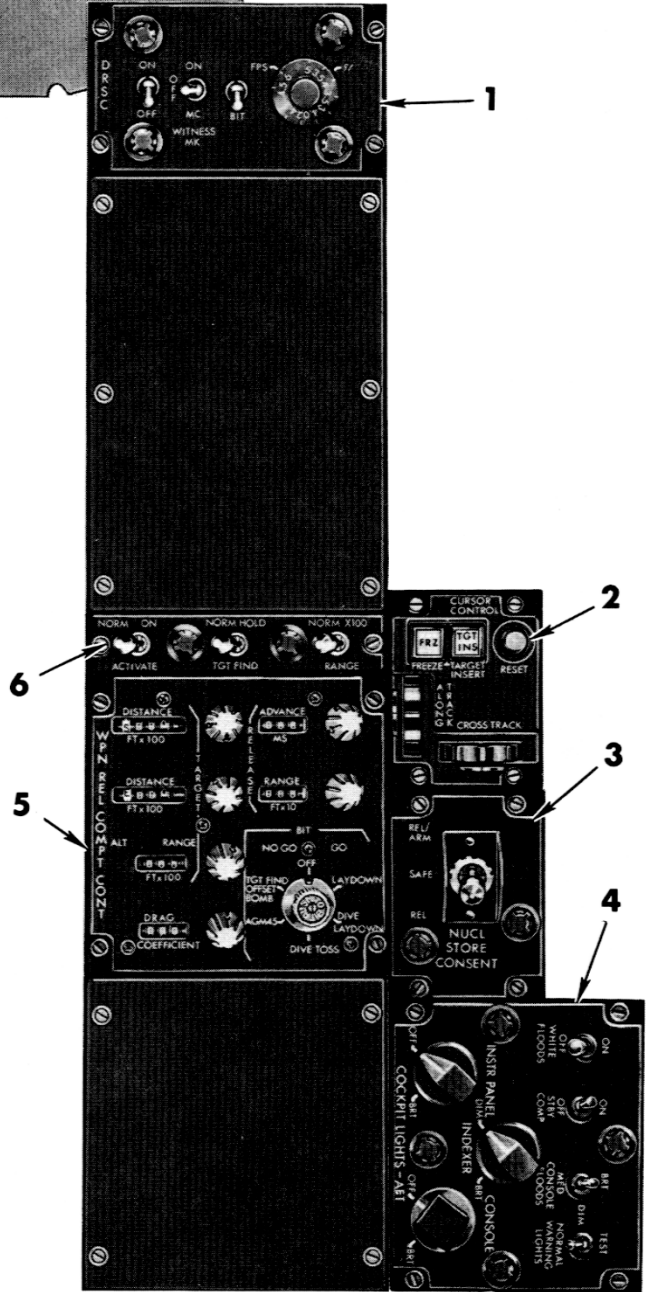
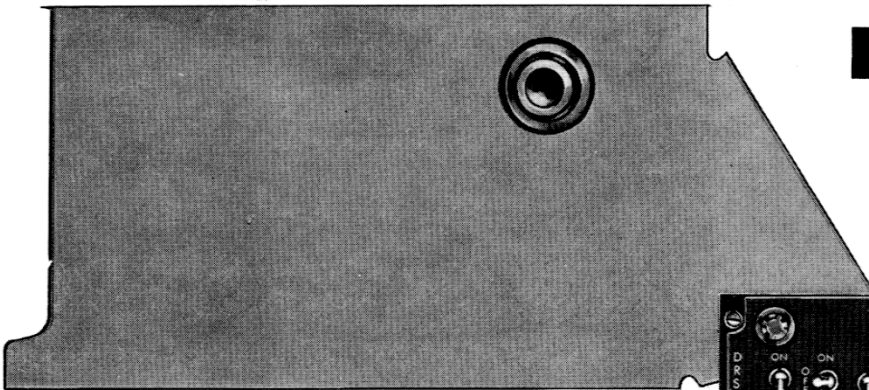
1. EMERGENCY FLAP CONTROL PANEL
2. AIR VENT NOZZLE
3. EMERGENCY LANDING GEAR CONTROL HANDLE
4. EMERGENCY BRAKE CONTROL HANDLE
5. LANDING GEAR - FLAP INDICATOR PANEL
6. OXYGEN REGULATOR CONTROL PANEL
7. INTERCOM CONTROL PANEL
8. COMMUNICATION CONTROL PANEL
9. NAVIGATION CONTROL PANEL
10. PRESSURE SUIT CONTROL PANEL
11. ANTI G SUIT CONTROL VALVE
12. PULL UP TONE CUTOUT SWITCH
13. THROTTLES

Figure 1-5

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# REAR COCKPIT RIGHT CONSOLE

**TYPICAL**



1. DIRECT RADAR SCOPE CAMERA CONTROL PANEL
2. CURSOR CONTROL PANEL
3. NUCLEAR STORE CONSENT SWITCH
4. COCKPIT LIGHTS CONTROL PANEL
5. WEAPONS RELEASE COMPUTER CONTROL PANEL
6. WEAPON DELIVERY PANEL

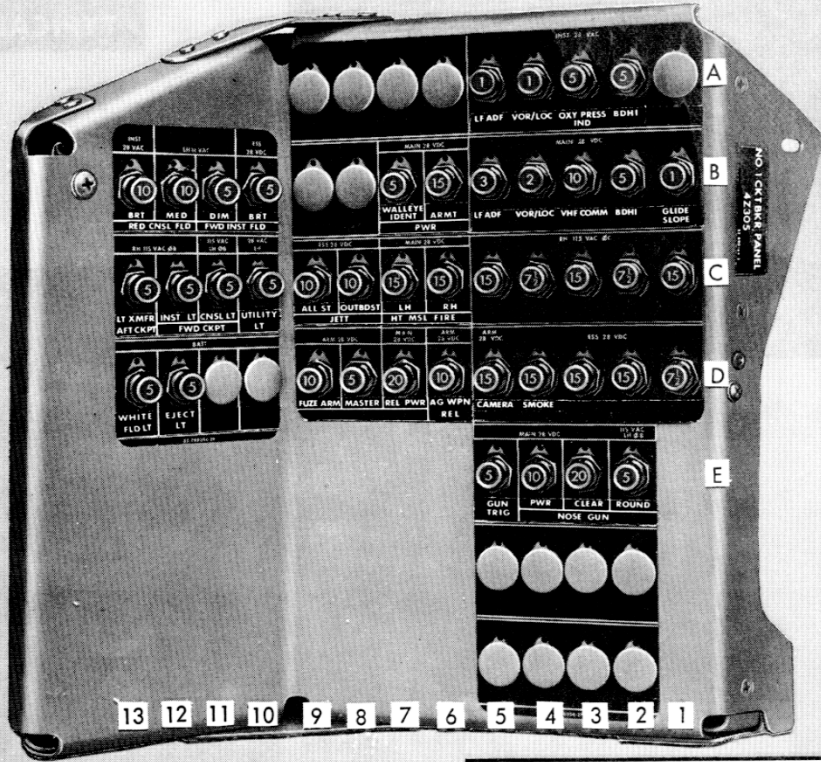
F4TB-136

Figure 1-6

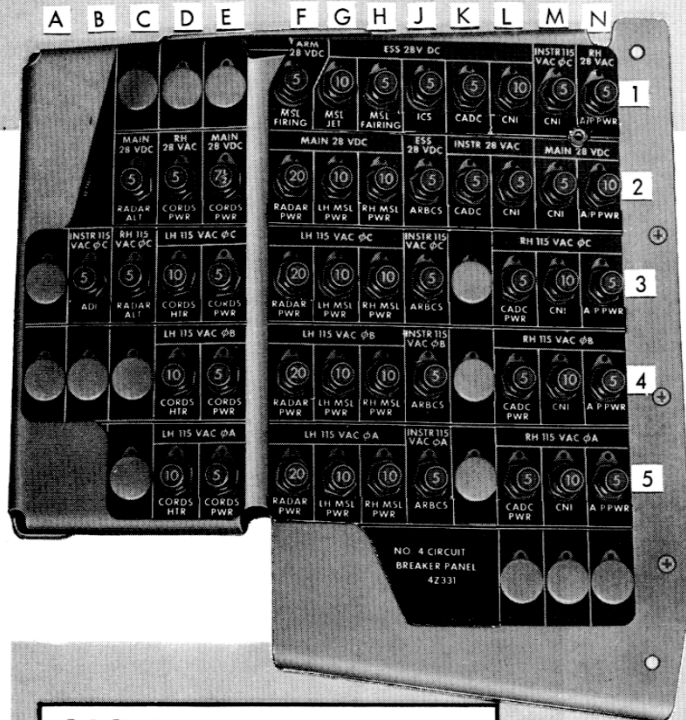
# CIRCUIT BREAKERS-REAR COCKPIT



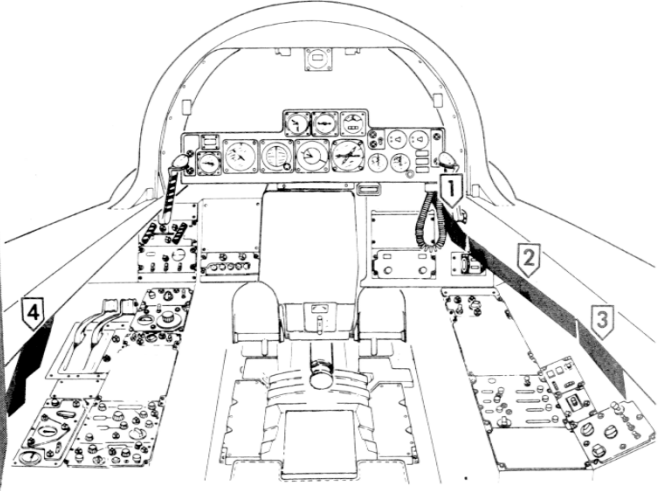
**TYPICAL**



**CIRCUIT BREAKER PANEL NO. 1**

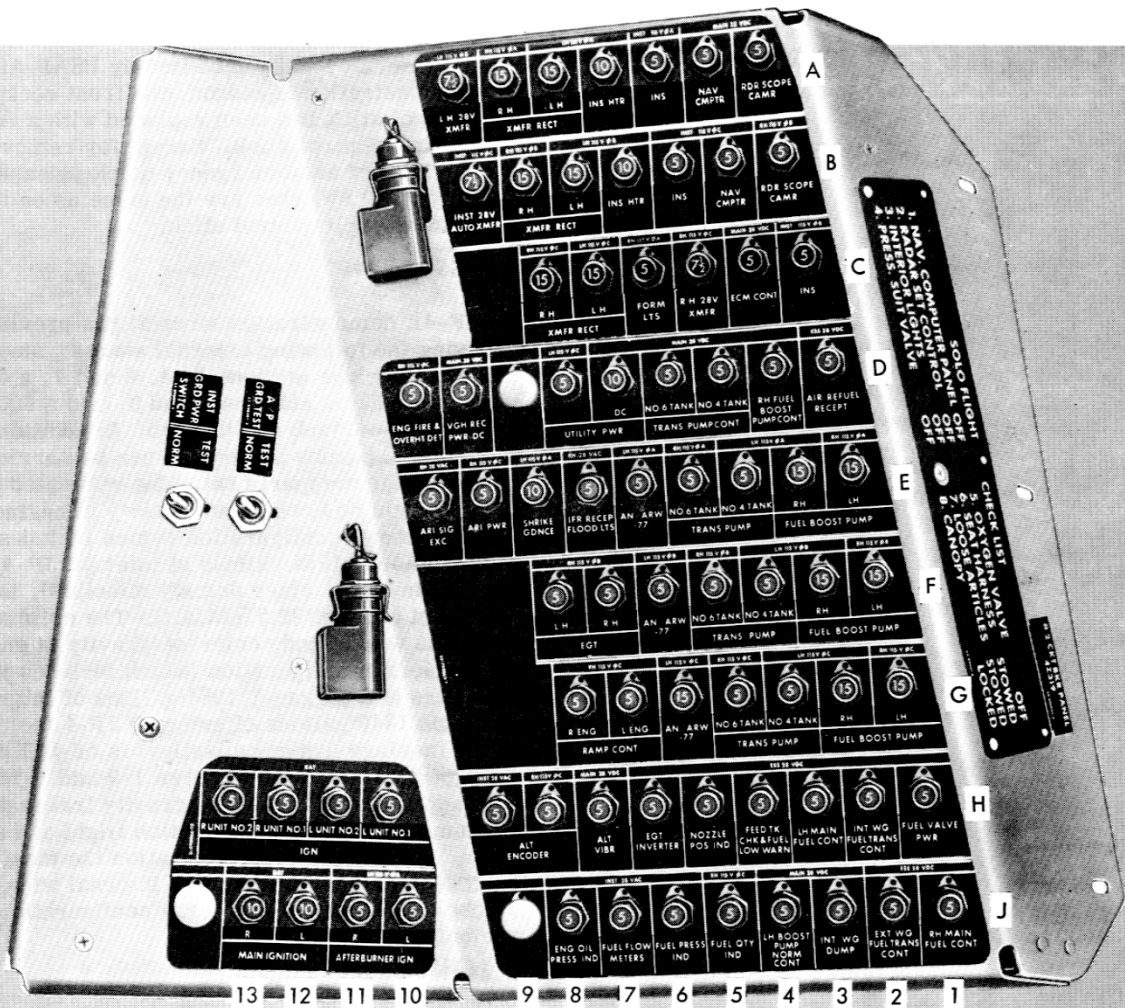


**CIRCUIT BREAKER PANEL NO. 4**

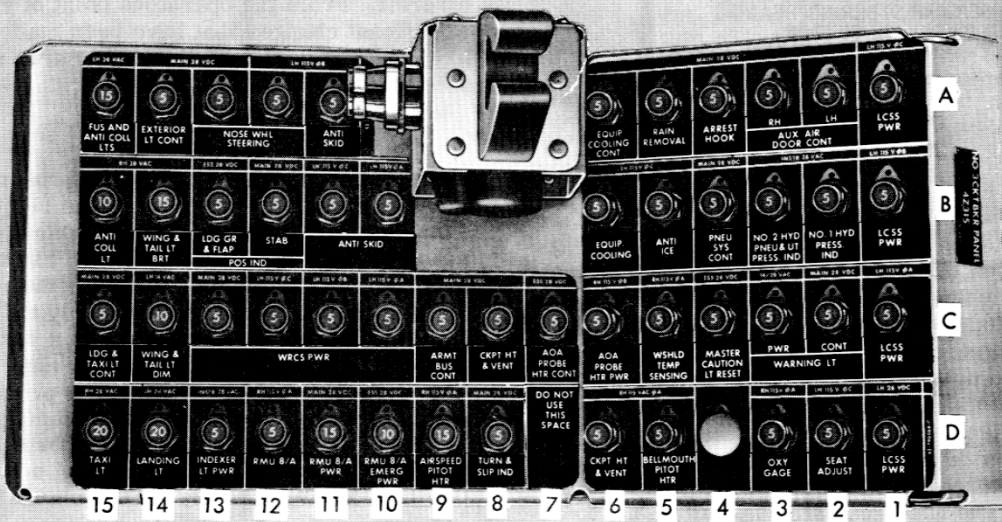


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Figure 1-7

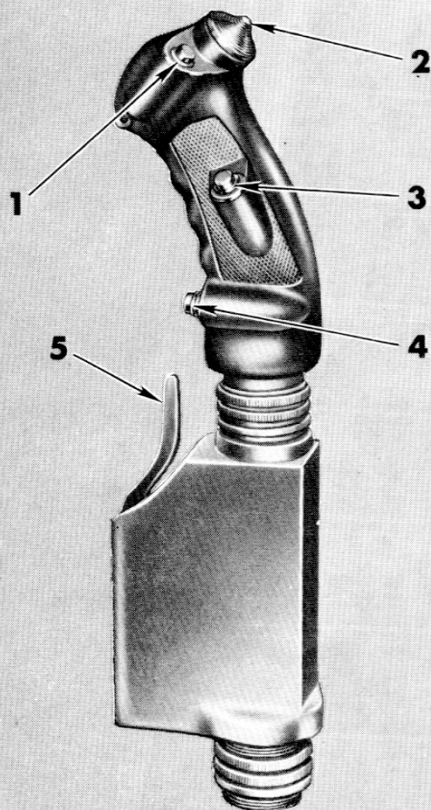


CIRCUIT BREAKER PANEL NO. 2



CIRCUIT BREAKER PANEL NO. 3

# CONTROL STICK



1. AIR REFUELING RELEASE BUTTON
2. TRIM SWITCH
3. UHF/VHF MICROPHONE BUTTON
4. NOSE GEAR STEERING/HEADING HOLD RELEASE BUTTON
5. EMERGENCY QUICK RELEASE LEVER

F4TB-119

Figure 1-8

## Control Stick

The control stick (figure 1-8) consists of a stick grip and motional pickup (force) transducer. It contains four AC operated control switches; a VHF/UHF mic button, a nose gear steering/heading hold release button, a four-way trim switch, and an air refueling release button. The control stick also has an emergency quick release lever; when actuated, interrupts electrical power to the anti-skid system, the automatic flight control system, and the aileron-rudder interconnect. The nose gear steering button also serves as a heading hold release for the automatic flight control system while airborne. The motional pickup transducer in conjunction with the automatic flight control system allows the flight control system to disengage if the AC exerts a force on the stick which exceeds the AFCS limits.

## Note

On aircraft locally modified by USAF Air Demonstration Squadron, the front cockpit control stick has been replaced with a rear cockpit control stick. Except for removal of the trigger and emergency quick release lever, all switches are the same as on the front cockpit control stick.

## GROSS WEIGHT

The F-4E demonstration aircraft has provisions for carrying the following external stores: smoke oil tanks on fuselage stations 3, 4, 6 and 7, a 370 gallon wing fuel tank on stations 1 and 9, and a 600 gallon centerline fuel tank on station 5. In addition, a maximum of 140 pounds of baggage can be carried in a nose baggage compartment. The estimated takeoff gross weight and center-of-gravity at engine start for the "show" configuration (which includes one crewmember, 1984 gallons of internal JP-4 fuel plus oil in the fuselage dummy missiles), is 46,175 pounds at a CG of 32.5% M.A.C. The estimated takeoff gross weight and center-of-gravity at engine start for the ferry configuration (which includes two crewmembers and baggage, 1984 gallons of internal JP-4 fuel plus 1340 gallons of external JP-4 fuel, plus oil in the fuselage dummy missiles) is 56,341 pounds at a CG of 32.3% M.A.C. Figures 1-9 and 1-10 indicate approximate center-of-gravity travel due to fuel consumption for a demonstration flight and a ferry flight. In the "show" configuration the most forward center-of-gravity occurs with internal wing fuel-smoke oil retained. The ferry configuration shows normal fuel sequencing.

## ENGINES

The F-4E demonstration aircraft is powered by two General Electric J79-GE-17 engines. This engine is essentially the same engine that is used in the F-4E aircraft. From the operators point of view, the only significant changes that have been made are in the area of AB selection and variable area exhaust nozzle pump operation.

## AFTERBURNER SELECTION

In the demonstration aircraft, afterburner can be initiated at 89% rpm by moving the right (inboard) throttle into the afterburner (outboard) detent. This not only gives AB operation on the right engine, but will also initiate AB on the left engine regardless of left engine throttle position. If only the right throttle is subsequently advanced in AB to a position corresponding to approximately 100% rpm, the left engine will come out of burner. The production AB system remains in the aircraft and afterburner can be initiated individually by either throttle by shifting the throttles outboard at mil thrust and advancing the throttles forward toward the max AB position.

## Note

To terminate 89% AB if normal procedure is unsuccessful, pull AB initiation circuit breaker, located on essential circuit breaker panel.

# CG TRAVEL DUE TO FUEL CONSUMPTION

**APPROXIMATE**

**SHOW CONFIGURATION**

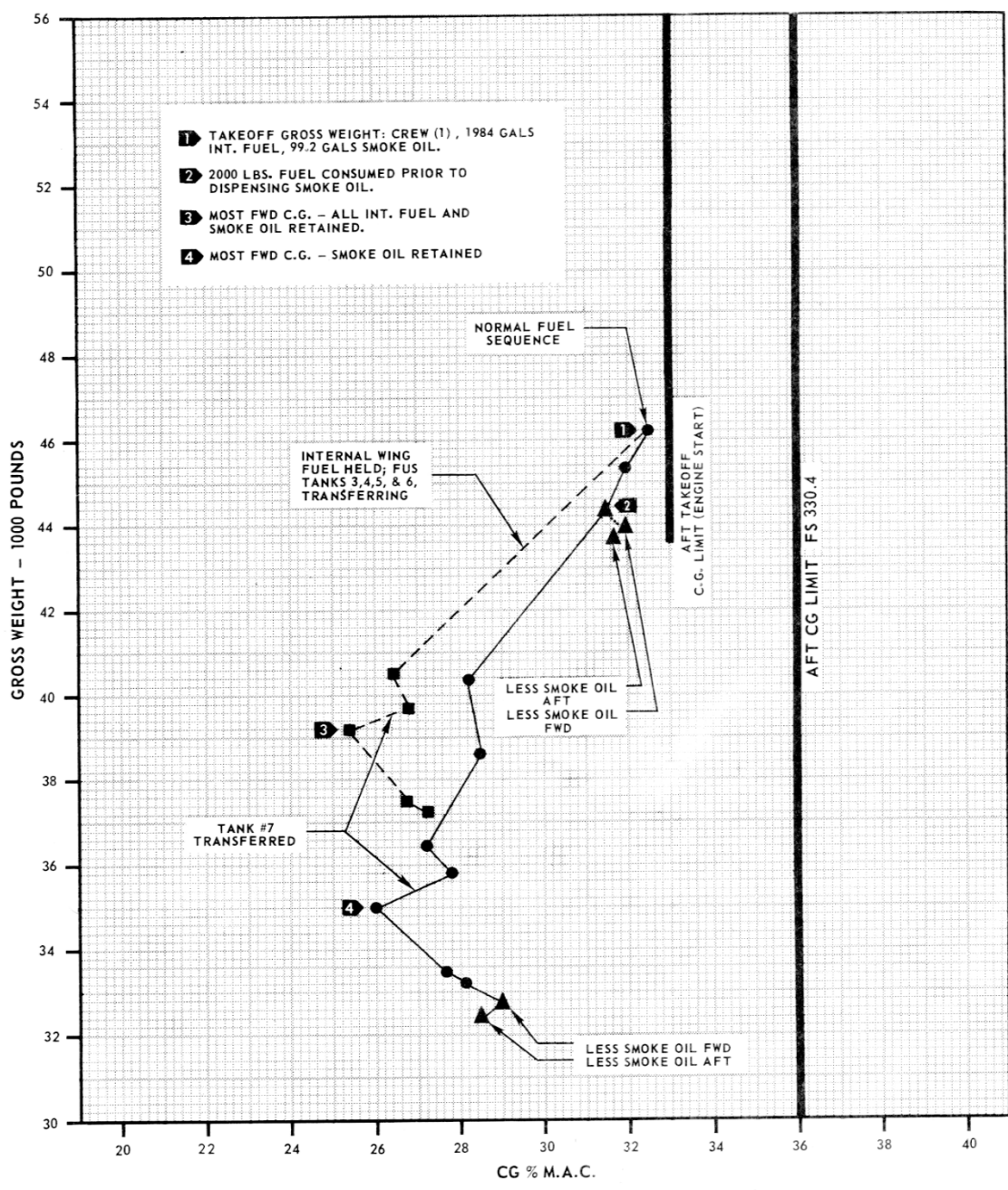


Figure 1-9

# CG TRAVEL DUE TO FUEL CONSUMPTION



**APPROXIMATE**

**FERRY CONFIGURATION**

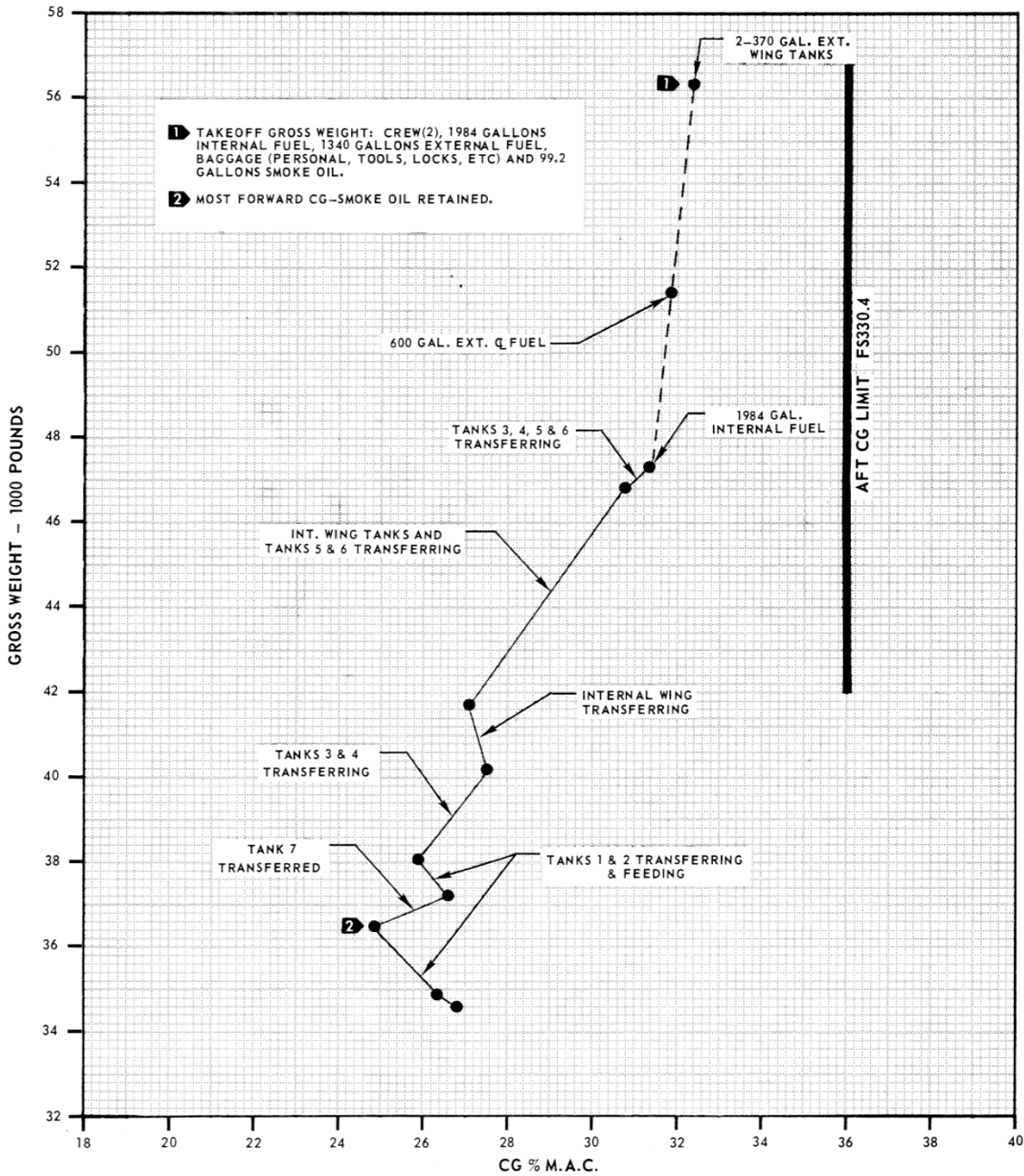


Figure 1-10



## VARIABLE AREA EXHAUST NOZZLE PUMPS

A modified variable area exhaust nozzle pump is incorporated on each engine. The modified pump gives the nozzle the capability of operating as long as 50 seconds during negative G flight.

## AIRCRAFT FUEL SYSTEM

### FUEL TANK PRESSURIZATION

The basic fuel system is the same as the F-4E except for the following: during normal inflight or ground pressurization system operation, the fuselage fuel cells can be depressurized by pilot selection when the FUS FUEL CELL PRESS switch is placed in SHOW position. Placing the switch in SHOW completes an electrical circuit to the fuselage cells pressure regulator, energizing the regulator closed and allowing the fuselage cells to depressurize. When the FUS FUEL CELL PRESS switch is placed in NORM, the pressurization system functions in the normal manner.

## ELECTRICAL POWER SUPPLY SYSTEM

The demonstration aircraft contains the same electrical system as the F-4E aircraft with T.O. 1F-4-789 incorporated. However, there are circuit breaker differences. The demonstration aircraft circuit breakers are shown on their appropriate buses in figure 1-11. In addition, the instrument ground power switch is relocated from No. 1 circuit breaker panel to the rear of the spare lamps panel on the right console in the front cockpit.

## PNEUMATIC SYSTEM

The pneumatic system is the same as the F-4E, except for the addition of two 1300 cubic inch air bottles and associated plumbing which supply the air for pressurization of the smoke generation system. Refer to Smoke System, this section.

## SMOKE SYSTEM

A smoke generation system (figure 1-12) is provided to emit white smoke into the airstream. Smoke generation is created by ejecting oil into the engine exhaust wake. System components include four 24.8 gallon tanks (22.4 usable); two 1300 cubic inch air bottles; an oil/dye pressurization switch; a smoke generation switch; and a dye expulsion switch. The four tanks are dummy missiles mounted on the four fuselage missile stations. The two 1300 cubic inch air bottles are located in the vacated radar compartment and are used to pressurize the oil tanks.

Normal operation of the smoke generation system is controlled by three switches. Selecting oil/dye pressurization ON energizes the oil pressurization shutoff valve and allows the oil storage tanks to be pressurized by two air bottles in the radar compartment. After the tanks are pressurized smoke generation can be initiated. Placing the smoke generation switch ON energizes the smoke generation shutoff valve, and the oil flows from the tanks through the oil ejection orifice into the engine exhaust wake.

### OIL/DYE PRESSURIZATION SWITCH

The OIL/DYE pressurization switch, above the in-board engine control panel, controls an oil/dye pressurization solenoid shutoff valve. Switch positions are PRESS ON and DEPRESS OFF. The PRESS ON position, energizes the shutoff valve open and allows regulated air pressure to pressurize the oil tanks. The PRESS ON position must be selected prior to selecting smoke generation ON. When DEPRESS OFF is selected, the shutoff valve closes. The tanks may be pressurized on the ground and subsequent oil dump will occur if the smoke generation switch is placed in the ON position. The tanks may be depressurized manually by the ground crew, or by placing OIL/DYE pressurization switch to ON and the smoke generation switch to ON until the air supply is depleted. The latter method of depressurizing the oil tanks results in oil spillage if used on the ground, and is recommended for inflight use only.

### SMOKE GENERATION SWITCH

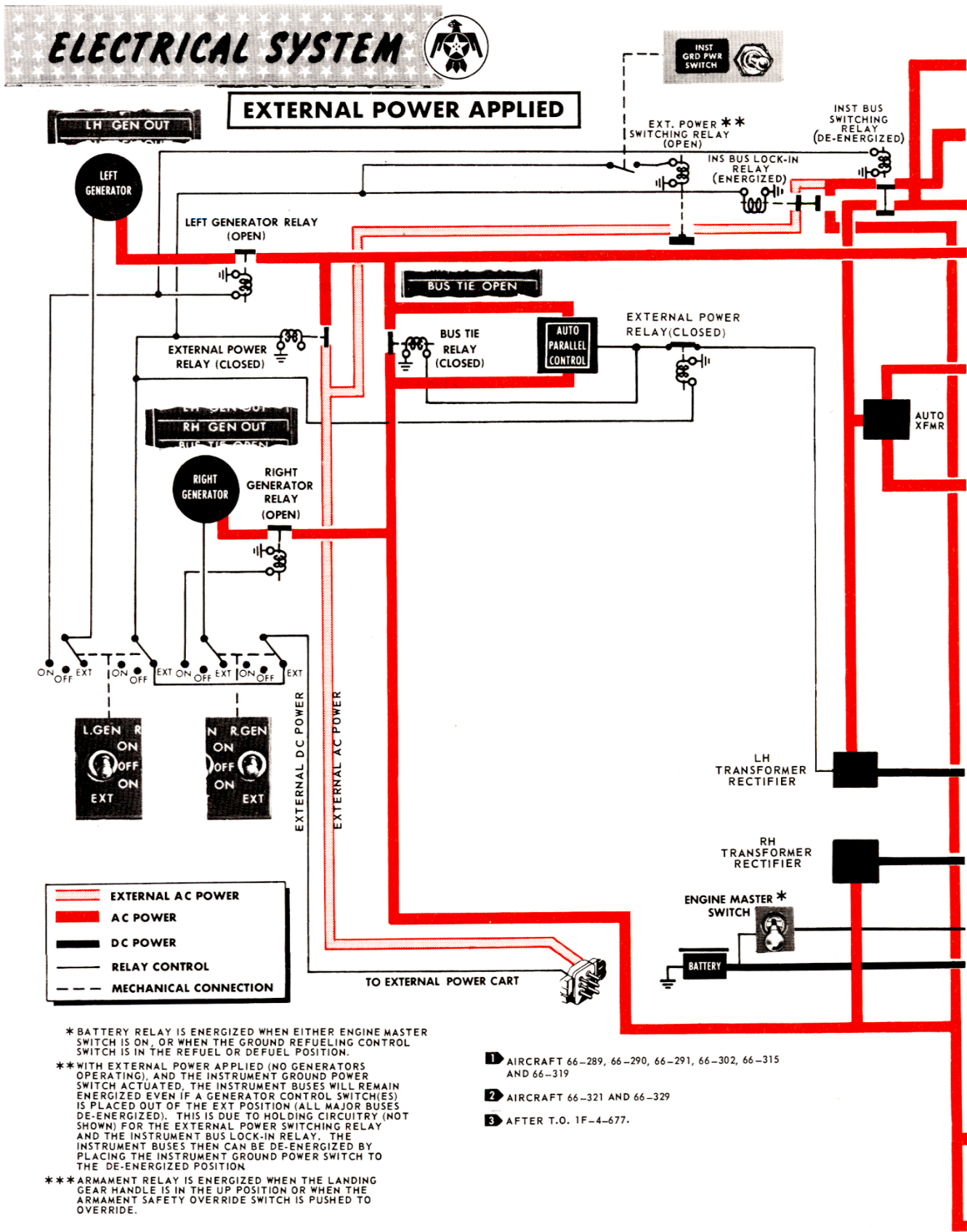
The smoke generation switch is a two position (up & down) toggle switch on the right engine throttle. With the system pressurized, placing the switch to ON opens the smoke generation shutoff valve allowing oil to flow through the valve and ejection orifices into the engine exhaust wake. The smoke generation OFF position deenergizes the valve and stops oil flow but does not depressurize the oil storage tanks.

### DYE EXPULSION SWITCH

The dye expulsion switch, as well as the dye system, is presently inoperative. Information will be supplied when the system becomes operational.

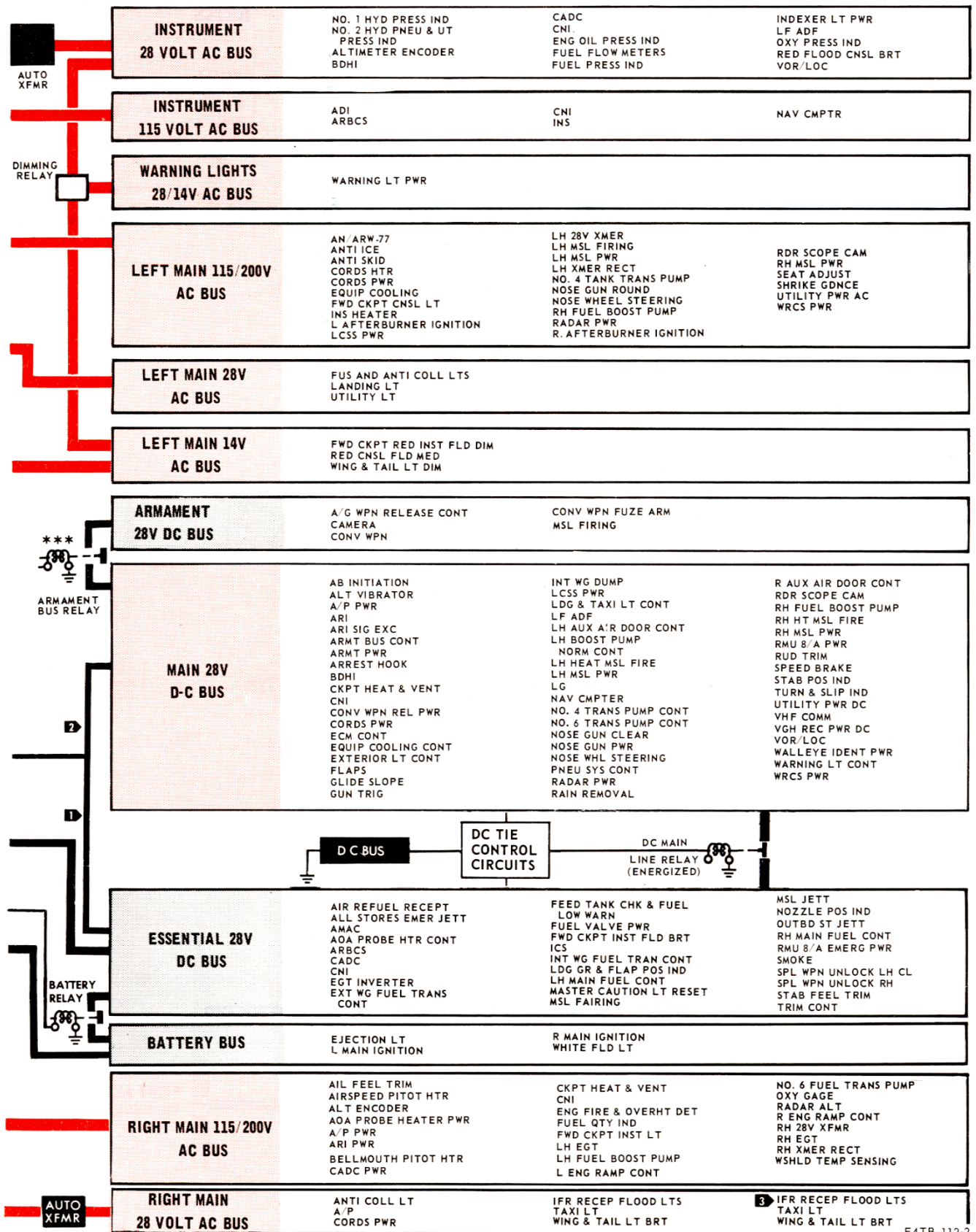
## FLIGHT CONTROLS

The rudder feel airspeed switch has been supplemented by a two position toggle switch on the main instrument panel, labeled LOW and NORM. The NORM position functions exactly the same as the F-4E rudder feel system, i.e., rudder feel is dependent upon airspeed. In the demonstration aircraft, the LOW position acts as an override switch and provides one condition only: 2.6 pounds of pedal force per degree of rudder deflection, regardless of airspeed.

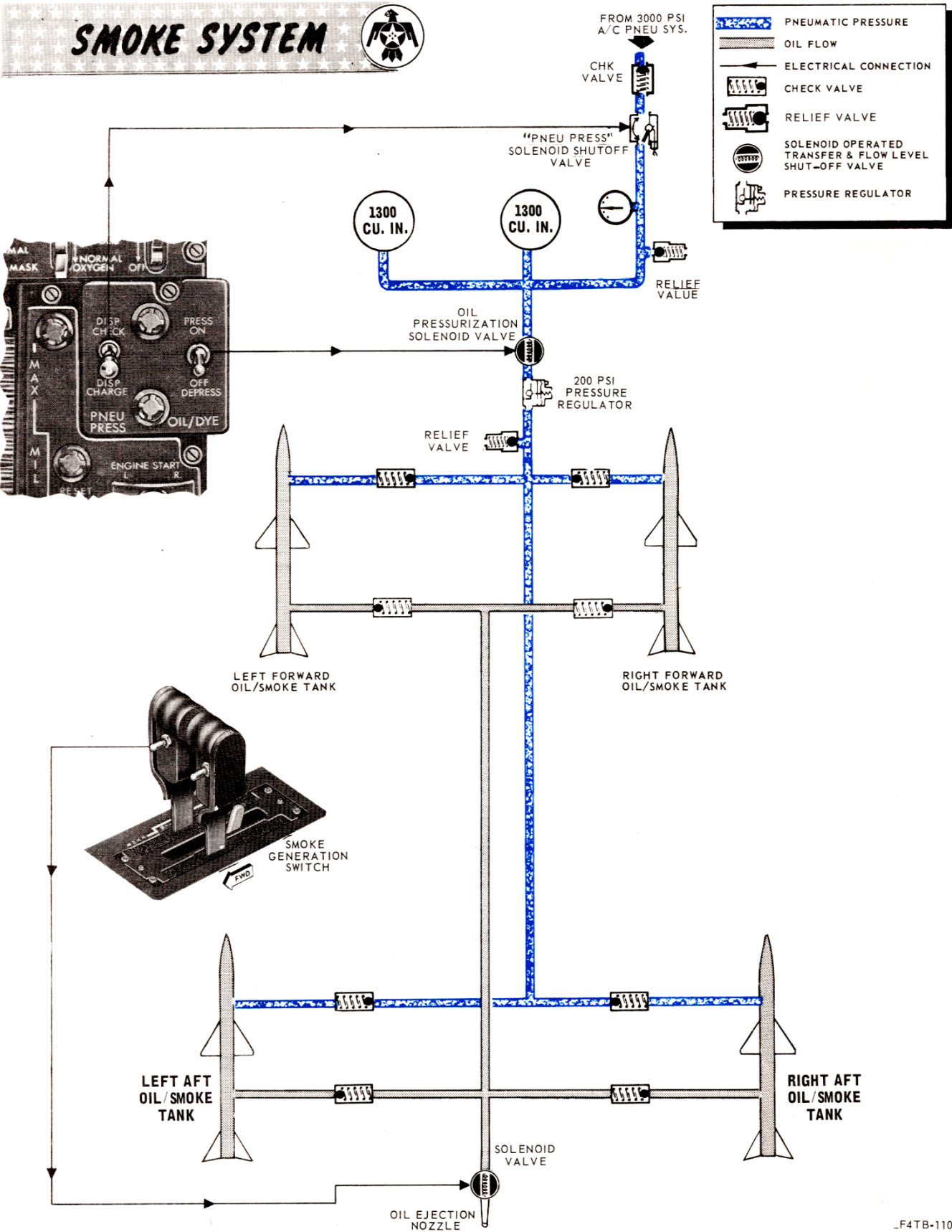


F4TB-112-1  
R

Figure 1-11



F4TB-112-2  
R



-F4TB-110  
B

Figure 1-12

## COMMUNICATION-NAVIGATION-IDENTIFICATION SYSTEM

The communication-navigation-identification systems described in T.O. 1F-4C-1 are also contained in this aircraft, however, three new systems have been added to this aircraft for communication and navigation. These systems are the VOR/instrument landing system, VHF communications system, and the LF/ADF set AN/ARN-83.

### VOR/INSTRUMENT LANDING SYSTEM

The navigation system of the VOR (VHF omnidirectional range) and ILS (instrument landing system) consists of a course selector indicator, VHF comm/nav control panel and a BDHI (bearing distance heading indicator). The course selector indicator (figure 1-3) combines the functions of manual omni-bearing selection (OBS), VOR/LOC course deviation, glide slope deviation, warning flags and separate VOR TO-FROM indication. The left side of the VHF comm/nav control panel provides the controls and indicators for the communications system and the right side contains the controls and indicators for the navigation system. At the top center of the control panel is the NAV TEST switch for localizer and VOR test operations. The BDHI combines the functions of ADF and VOR ground tracking through utilization of the single bar pointer and double bar pointer.

### COURSE SELECTOR INDICATOR

The course selector indicator consists of the omni-bearing selector knob, VOR/localizer needle, glide slope needle, to/from indicator, course index, reciprocal course index, VOR/localizer and glide slope warning flags. The course selector indicator (figure 1-3) in the front cockpit, main instrument panel, receives VOR, localizer, and glide slope signals from ground radio transmitters. These signals provide a visual presentation of VOR tracking and VOR/ILS approach display as deviation from selected course or

localizer course, glide slope deviation, to/from indication, glide slope and localizer flag indication.

#### Note

The OFF flag on the BDHI will show continuously, however, this is no indication of system status.

### Omni-Bearing Selector Knob

The OBS knob, when rotated manually, drives the course card for selection of any desired course under the course index.

### Course Index

The course index at the top center of the course selector indicator remains stationary to indicate the selected course.

### Reciprocal Course Index

The reciprocal course index at the bottom of the face on the course selector indicator gives the pilot an instant indication of reverse course heading should a 180° turn in the opposite direction be desired.

### Course Card

The course card is calibrated in degrees and can be rotated manually by the OBS knob for selection of a desired radial or course.

### VOR/Localizer Needle

The VOR/localizer needle moves through a standard 5-dot deflection to indicate deviation and degree of deviation from selected VOR radial or localizer path. The needle centers to show when the aircraft is on a proper localizer path or when the aircraft is on the selected radial or its reciprocal. Needle deviation is directional with direct sensing and when inbound on the front course or outbound on the back course. In

other words, fly towards the needle. With reverse sensing, outbound on the front course or inbound on the back course, needle deviation is non-directional. This means fly "away" from the needle.

#### **To-From Indicator**

The TO-FROM indicator indicates whether direction to VOR station is within the semicircle centered about the course index direction (TO indication) or within the semicircle centered about the reciprocal course index direction (FROM indication).

#### **Glide Slope Flag**

The red glide slope flag appears when the glide slope signal is unreliable: a malfunction develops in the glide slope receiver, and after approximately 20 seconds of NAV TEST operation.

#### **Glide Slope Needle**

The glide slope needle moves through a standard 5-dot deflection to indicate position of the aircraft in relation to the glide path. Upper deflection indicates a fly-up condition while lower deflection indicates a fly-down condition.

#### **Localizer Flag**

The localizer flag appears when the VOR or localizer signal is unreliable: a malfunction develops in the navigation receiver, and after approximately 20 seconds of NAV TEST operation.

#### **Note**

This flag is the only indication of proper VOR operation.

### **VHF COMM/NAV CONTROL PANEL**

The VHF comm/nav control panel in the front cockpit, main instrument panel (figure 1-3) provides control for the VHF navigation and communications systems. The navigation controls and indicators on the right side of the control panel consists of a navigation power control knob, a volume control knob, a MegaHertz and Hertz selector knob, and a frequency indicator. At top center of the unit is a NAV TEST toggle switch for localizer, glide slope and VOR TEST operation. The navigation system contains 180 channels which provide a navigation frequency range of 108.00 to 117.95 MHz in 50 kHz steps. The VHF comm/nav control panel operates within a range of 116.00 to 151.95 MHz.

#### **MegaHertz Selector Knob**

VOR navigation and localizer/glide slope frequencies are selected on the frequency indicator by the MegaHertz selector knob in one MegaHertz steps.

#### **Power Control Knob**

The power control knob, concentrically mounted around the MegaHertz selector knob, has two posi-

tions - OFF and PWR. Selecting PWR activates the VHF navigation receivers.

#### **KiloHertz Selector Knob**

The kiloHertz selector knob selects the VOR navigation and localizer/glide slope frequencies in 50 kiloHertz steps.

#### **Volume Control Knob**

The volume control knob, concentrically mounted around the kiloHertz selector knob is used to adjust the audio gain of the VHF navigation receiver.

#### **Frequency Indicator**

The selection of a VHF navigation frequency appears on the frequency indicator in the upper right segment of the VHF comm/nav control panel. The navigation frequency is selected by the MegaHertz and kiloHertz selector knobs below the frequency indicator. The numbers to the left of the decimal point are selected by the MegaHertz selector knob. The numbers to the right of the decimal point are selected by the kiloHertz selector knob.

#### **Nav Test Switch**

The NAV TEST switch at top center of the VHF comm/nav control panel is used to test the accuracy of the ILS and VOR operation. The NAV TEST switch is three position toggle switch with positions UP/L, VOR, DN/R. The switch is spring loaded to the center position, which turns the test function off. The ILS test is performed when the navigation frequency indicator is set to an odd frequency within the 108.1 to 111.9 MHz range and the NAV TEST toggle switch is held in the UP/L or DN/R position. A corresponding deflection of the localizer and glide slope needles should be noted. With the above frequency selected, and the NAV TEST switch held in the UP/L position, the glide slope needle deflects upward and the localizer needle deflects to the left. For a VOR test, select the published VOT (VHF Omm Test, if available) or an even frequency on the NAV frequency indicator. The double bar bearing pointer of the BDHI should indicate 180°. With the OBS knob set to 180° a TO indication appears on the TO-FROM indicator and the VOR/localizer needle should center. The maximum permissible indicated bearing error is plus or minus 4°. With the OBS knob set to 0° the TO-FROM indicator indicates FROM and the VOR/localizer needle should again center within plus or minus 4°. The VOR test can also be used as an airborne check. An airborne test has a maximum permissible bearing error of plus or minus 6°.

### **NORMAL OPERATION OF THE VOR/ILS SYSTEM**

#### **VOR Operation**

a. Flying From a VOR Station. VOR tracking to any specified destination when its position is known in relation to a VOR station is accomplished by selecting the proper VOR frequency on the navigation frequency

indicator and rotating the course card so that the desired radial (course) away from the station is beneath the course index. Fly in the general direction to the destination and when the to/from indicator reads FROM, fly in the direction which centers the VOR/localizer needle. When the VOR needle is centered the aircraft is tracking outbound on the selected radial from the VOR station towards its destination. By maintaining this direction, and keeping the needle centered, the aircraft will proceed to its destination.

b. Flying Direct to a VOR Station. To fly directly to a VOR station, tune to the station and rotate the course card until the TO-FROM indicator reads TO and the VOR needle is centered. Turn to a heading which is similar to the course read beneath the course index and keep the VOR needle centered.

c. Flying on a Selected Inbound Radial. Tune to the station and rotate the course card to select an inbound course (beneath course index). Observe a TO indication on the TO-FROM indicator and fly in the general direction of the selected radial (course). Turn in the general direction in which the VOR/localizer needle deviates. As the needle centers, turn to a heading of the selected inbound radial and proceed inbound keeping the needle centered.

d. Position Finding With VOR. A pilot can fix his position by taking bearings from two VOR stations and plotting them on a map. When taking bearings, it is preferable to center the VOR/localizer needle with the TO-FROM indicator showing FROM since this provides the easiest method of plotting the bearings on the chart. Tune to a VOR station and rotate the course card until the VOR/localizer needle is centered and the TO-FROM indicator reads FROM. Read the bearing beneath the course index and plot this bearing from the station on the map. Tune to the second VOR station and repeat the procedure. The intersection of these two lines mark the aircraft position.

e. VOR-ILS Approach. Tune to the VOR station and set the course card to the published radial or a convenient inbound radial and fly towards the station, keeping the VOR/localizer needle centered. Upon reaching the VOR station set the course card to the published VOR-to-final approach fix radial. Turn to and get established on this radial. The TO-FROM indicator should give a FROM indication. Before reaching the approach fix, switch the navigation frequency indicator to the localizer frequency. The to/from indicator, at this time, is blanked and the course card has no effect on the localizer. As the approach fix is reached, the VOR/localizer needle centers and the final approach course to the runway is intercepted. When reaching the approach fix turn to the published reciprocal of the final approach and keep the VOR/localizer needle centered. The VOR/localizer needle normally deviates toward the proper

path (directional), but when outbound on the localizer front course (or inbound on the localizer back course) the deviation is reversed or away from the proper path. Therefore, when flying outbound on the front course, fly away from the needle in order to keep it centered. After flying outbound from the approach fix for a specified elapsed time make a 45° left turn by compass. Fly on this heading for 45 seconds and then make a 180° right turn by compass. Maintain this heading until the VOR/localizer needle centers, indicating that the final approach course has been intercepted, and turn inbound on the published final approach course. Fly in the direction toward which the VOR/localizer and glide slope needles deviate. The aircraft is on the proper glide path and localizer path when the VOR/localizer and glide slope needles are centered across the reference dots.

f. VOR Approach. The VOR approach is for the purpose of landing on the desired runway when it does not have ILS facilities. Tune to the VOR station and fly direct, on the published radial, or as directed in the approach clearance. Upon station arrival, report and proceed outbound executing the procedure turn. Set final approach course under course index and proceed inbound to the final approach fix, arriving at the minimum altitude specified. After passing final approach fix, report and begin immediate descent to the appropriate minimum altitude. After landing clearance has been received, execute the final approach to landing or missed approach procedure, as appropriate.

## VHF COMMUNICATIONS SYSTEM

The VHF communications system provides two way voice communications in the frequency range of 116.00 to 151.975 MHz. The system can operate on any of 720 channels which are spaced 50 kHz apart. The controls and indicators for the VHF comm system are on the VHF comm/nav control panel in the front cockpit on the right console. This panel combines the controls for the VHF comm system and the VOR/ILS system. The communication controls which are on the left side of the panel include a power control knob, a volume control knob, a MegaHertz selector knob, a kiloHertz selector knob, and a frequency indicator.

### NORMAL OPERATION OF VHF COMMUNICATIONS SYSTEM

To operate the VHF communications system, place the power control knob to PWR and the COMM select switch to VHF. Use the MegaHertz and kiloHertz selector knobs to set in the operating frequency. This frequency is displayed on the frequency indicator on the control panel. Adjust the audio level with the

volume control knob. To check for receiver operation, place the power control knob to the TEST position. This disables the squelch circuitry and receiver background noise will be heard. To transmit, depress the microphone button on the inboard throttle to the UHF position or depress the stick grip microphone button.

### **MegaHertz Selector Knob**

This knob is used to select VOR navigation and localizer frequencies in 1 MHz steps. The frequency selected is displayed on the frequency indicator.

### **Power Control Knob**

The power control knob, which is concentric with the MegaHertz selector knob, has positions of OFF, PWR, and TEST. When the knob is placed to PWR or TEST the system is activated. In TEST, the receiver squelch circuitry is disabled so that receiver background noise is heard when the receiver is operating.

### **KiloHertz Selector Knob**

The kiloHertz selector knob is used to select the VHF communications frequency in 50 kHz steps. This frequency is displayed on the frequency indicator on the control panel.

### **Volume Control Knob**

The volume control knob, which is concentric with the kiloHertz selector knob, adjusts the audio level of the receiver signal.

### **Frequency Indicator**

The communication frequency indicator displays the frequency set in with the MegaHertz and kiloHertz selector knobs. The MegaHertz selector knob selects the digits to the left of the decimal point, and the kiloHertz selector knob selects the digits to the right of the decimal point.

### **COMM Select Switch**

The COMM select switch is a two position toggle switch on the front cockpit main instrument panel, with positions of UHF and VHF. Placing the switch to VHF selects VHF communication system operation.

### **Microphone Button**

The microphone button, on the inboard throttle grip and on stick grip, connects the microphone outputs to the VHF communication transmitter, when the COMM select switch is in the VHF position.

## **AUTOMATIC DIRECTION FINDER SET (ADF) AN/ARN-83**

The automatic direction finder set is an airborne automatic direction finder which operates within the frequency range of 190 to 1750 kHz. The set provides

both visual and aural facilities for ADF homing, radio range navigation, and position fixing. The set is used as a navigational radio aid to continuously and visually indicate the magnetic bearing of a radio station while providing aural reception of audio transmissions from the station. The azimuth or bearing of a radio station is displayed on the BDHI in the front cockpit on the main instrument panel. The system is operated by a control panel in the front cockpit on the right console (figure 1-2).

### **ADF CONTROL PANEL**

The ADF control panel contains the controls for selecting the frequency range, tuning the receiver, and selecting all ADF operating modes. The panel also contains a frequency indicator and a tuning indicator.

#### **Frequency Indicator**

The frequency indicator displays the frequency selected. This frequency is shown in kiloHertz.

#### **Tuning Indicator**

The tuning indicator provides a visual display of the received signal strength. When the function selector knob is in ADF or ANT positions, the frequency tuning knob is adjusted for maximum indication on the tuning indicator.

#### **Loop Antenna Positioning Knob**

The loop antenna positioning knob is used to electrically position the loop antenna to determine bearing, or used when utilizing aural null for homing or position fixing.

#### **BFO Switch**

The BFO switch has positions of BFO and OFF. Placing the switch to BFO allows zero beat tuning to the carrier or center frequency of weak voice or range station signals. The beat frequency oscillator also provides audio for continuous-wave (cw) signals. Placing the switch to OFF removes power to the beat frequency oscillator.

#### **Function Selector Knob**

The function selector knob has positions of OFF, ADF, ANT, and LOOP. Placing the knob to OFF deactivates the ADF system. The ADF position is used for homing or position fixing. The ANT position is used for range navigation, maximum tuning indication, or for radio broadcast monitor. The LOOP position is used in conjunction with the loop antenna position knob for aural null homing and manual direction finding.

#### **Gain Control Knob**

The gain control knob adjusts the audio level to the headsets.



### Frequency Range Control Knob

The frequency range control knob, which is concentric with the frequency tuning knob, selects one of the three frequency ranges available. The ranges are 190 to 400, 400 to 850, and 850 to 1750 kHz.

### Frequency Tuning Knob

The frequency tuning knob adjusts the receiver frequency within the band or frequency range selected by the frequency range control knob.

## NORMAL OPERATION OF AUTOMATIC DIRECTION FINDER SET AN/ARN-83

The function selector knob on the ADF control panel enables the selection of three operating modes: ADF, ANT, and LOOP.

### ADF Operation

a. Homing to radio station. Place the function selector knob to ADF and allow a warm-up period of approximately 5 minutes. Select the frequency of a radio range station, outer marker, or a broadcast station. The frequency selected appears in the frequency indicator. Rotate the frequency tuning knob for maximum signal level on the tuning indicator (meter pointer swings to the right). The single bar pointer on the BDHI indicates the bearing to the radio station. If audio is desired, rotate the gain control knob to adjust for a comfortable sound level. If radio station transmission is a continuous wave, place the BFO switch to the BFO position. Maneuver the aircraft so that the single bar pointer is under the lubber index of the BDHI and fly on this heading toward the radio station. In the event of a crosswind, check the bearing of the wind and correct for magnetic heading.

b. ADF position fix. For a position fix, at least two radio stations are required; however, for maximum accuracy, a third station should also be used. Place the function selector knob to the ADF position and allow a 5 minute warmup period. Place the BFO switch to OFF. Select the three radio station frequencies to be used and tune each station successively, starting with the lowest frequency. As each station is tuned for maximum indication on the tuning indicator, record the magnetic bearing FROM the station, noting the time the bearing was taken. The bearing FROM the station is indicated by the end of the single bar pointer opposite from the arrow. Correct each bearing for local variation and plot from the station. At the time noted for the last bearing taken, the triangular intersection of lines on the map plot indicates the position of the aircraft.

c. ADF for landing field approach. A landing field approach procedure includes aircraft heading, distance, and time to landing field touchdown, using homing techniques, the outer marker, or other radio facilities available. Place the function selector knob to ADF and home in on the radio facility. While flying inbound on the final heading to the radio station, allow sufficient time to correct for crosswind. When flying to the radio station (inbound), the single bar

pointer on the BDHI points to the station. After passing over the station, the pointer rotates 180°. Use this heading to fly outbound.

d. Computing time or distance to radio station. Place the function selector knob to ADF. Place the frequency range control knob to the frequency range to be used and tune the station for maximum indication on the tuning indicator. The single bar pointer indicates the bearing to the radio station. Maneuver the aircraft so that the radio station is at a relative bearing of 20° on either side of the nose of the aircraft. Record this bearing and the time it was taken. Maintain a constant heading until the bearing has doubled from 20° to 40° and record the time. The time required to fly to the radio station is equal to the time required for doubling the bearing from 20° to 40°. The distance is equal to the distance covered while doubling the bearing angle.

### Antenna Operation

When the function selector knob is placed to ANT position, the direction finder set can be used either for reception of radio broadcast stations or radio range navigation stations. In this mode, the single bar pointer on the BDHI is inoperative.

a. Radio broadcast reception. Place the function selector knob to ANT position. Place the frequency range control knob to the frequency range of the desired radio station and tune in the station for maximum indication on the tuning indicator. Adjust the gain control knob for the desired sound level.

b. Radio range navigation. Place the function selector knob to the ANT position. Place the frequency range control knob to the frequency range of the radio range station. While tuning the station in, adjust the gain control knob for minimum audio output and tune for maximum indication on the tuning indicator. As the range station is approached, the audio output will increase. Maneuver the aircraft to the nearest inboard bisector heading while listening for an increase or decrease of audio level in the headset. To identify the radio beam, make a 180° turn to the right after passing through the on-course signal area. If a beam is intercepted before completing the 180° turn, the aircraft has intercepted the beam forming the left quadrant. If a beam is intercepted after completing the turn, this means the beam forming the right quadrant has been intercepted. After the beam has been identified, fly on the leg the inboard or outboard heading of which is nearest the desired heading.

### Manual Loop Operation

This mode of operation is used for aural null homing and manual direction finding. Aural null homing is useful when automatic direction finding bearings are unreliable because of weather, or when another radio station is causing hunting or oscillation of the ADF bearing pointer on the BDHI. For aural null homing, place the function selector knob to the ANT position, and the frequency range control knob to the frequency range of the radio station to be used. Place the BFO switch to the BFO position and adjust the gain control

knob for minimum audio output. Tune for zero beat on the radio station and then place the BFO switch to OFF. Place the function selector knob to the LOOP position. Using the loop antenna positioning knob, rotate the antenna to a null (no sound in the headset). The single bar pointer will stop on this null point. The true null and direction to the radio station may be indicated by either end of the pointer. Maneuver the aircraft for a null indication off the wings rather than ahead or behind the aircraft. Fly on this null heading to determine in which direction the null moves. The null that moves toward the tail surfaces is the true null. Maneuver the aircraft to place the true null end of the single bar pointer under the lubber index and fly on this heading.

## OXYGEN SYSTEM

In addition to the liquid oxygen system, a gaseous oxygen system has been added to provide an alternate breathing oxygen system for the crewmember. The system is designed to store, regulate pressure, and supply oxygen to the crewmember upon demand. Oxygen supply in the demonstration aircraft is controlled by the appropriate valve on the oxygen control panel, left console, figure 1-1. When the gaseous oxygen lever is ON the liquid oxygen lever is OFF, and when the liquid oxygen lever is ON the gaseous oxygen lever is OFF. Oxygen supply to the aft cockpit requires selection of either gaseous or liquid oxygen in the front cockpit. The major components of the system consist of gaseous oxygen storage cylinders, pressure gages, pressure regulator, pressure transmitter, on/off valve, and related plumbing. The components are mounted in the gun compartment with the exception of the on/off valve and pressure indicator, which are in the forward cockpit.

## EJECTION SEATS

The F-4E demonstration aircraft contain MK-H7 rocket assist ejection seats with T.O. 13A5-32-503 incorporated, (the new Koch survival kit with seat mounted emergency oxygen) and T.O. 13A5-32-502 (the addition of thigh restraint line garters and the slower restraint line withdrawal rate). After T.O. 1F-4E-544, the auto sequencing system (figure 1-13)

has a front seat ejection delay selector valve above the left console in the front cockpit. See figure 1-1. The purpose of the valve is to allow the pilot to bypass the front seat 0.75 second ejection delay when ejecting during solo flight. The valve has two positions, one for the normal dual ejection sequence and the other for ejecting in less time than dual ejection. In the second position, which is only used during solo flight, the rear seat will not eject.

### Front Seat Ejection Delay Selector Valve Handle

The front seat ejection delay selector handle has a white arrow valve on it to indicate which ejection mode is selected. With the arrow in the DUAL EJECTION (vertical) position, normal dual ejection is selected. With the arrow in the PILOT SINGLE EJECTION (horizontal) position, the 0.75 second time delay is bypassed and only the front seat will eject. A placard above the valve displays the two handle positions with their corresponding ejection sequences.

### WARNING

Valve must be in DUAL EJECTION position for dual flight, since in the PILOT SINGLE EJECTION position only the front seat will eject if ejection is performed from front cockpit and simultaneous ejection of both seats will occur if dual ejection is performed from rear cockpit.

## STORES JETTISON SYSTEMS

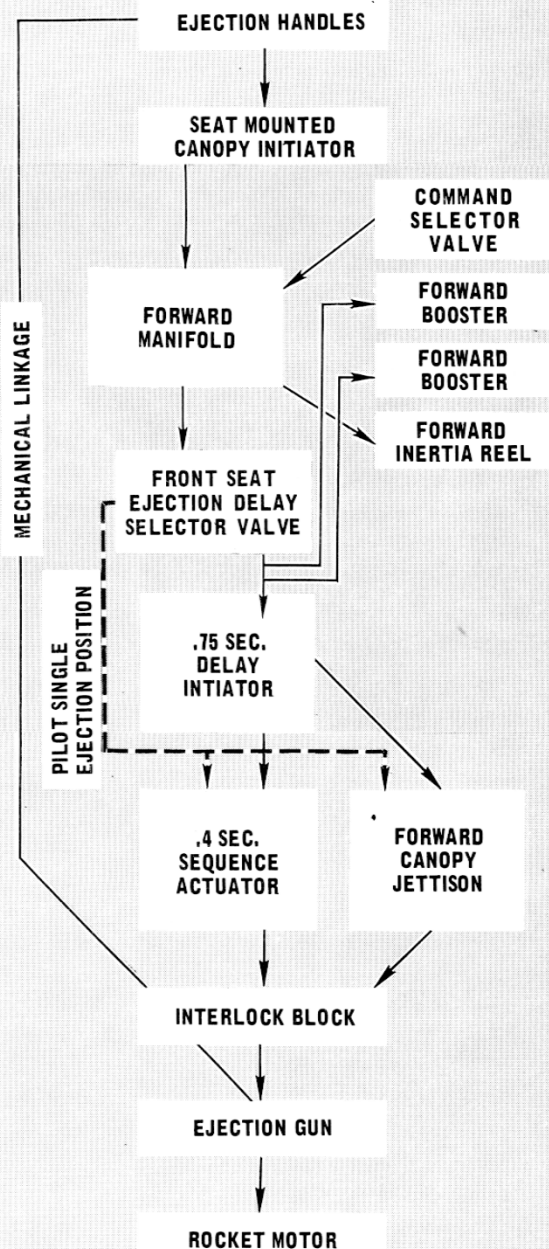
On the F-4E demonstration aircraft only the following jettison switches are operative: the external stores emergency release switch, the wing station jettison switch, and the center station jettison. They operate in the same manner as the F-4E aircraft. The missile jettison switch is removed on the F-4E demonstration aircraft and the special weapon jettison circuits are inoperative. The ECM jettison switch, although installed, is not operative. See figure 3-2 for jettison procedures.

# AUTOMATIC SEQUENCING SYSTEM



**H7 SEAT**

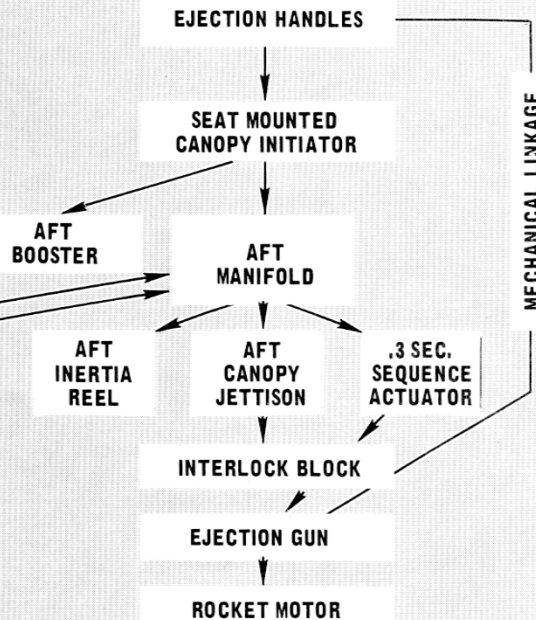
## FORWARD COCKPIT



**Note**

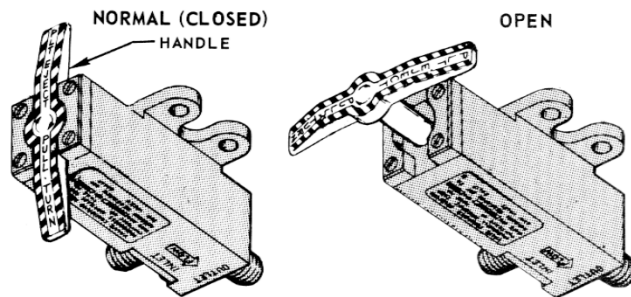
ELAPSED TIME TO EJECTION GUN FIRING - 1.392 SECONDS.

## REAR COCKPIT

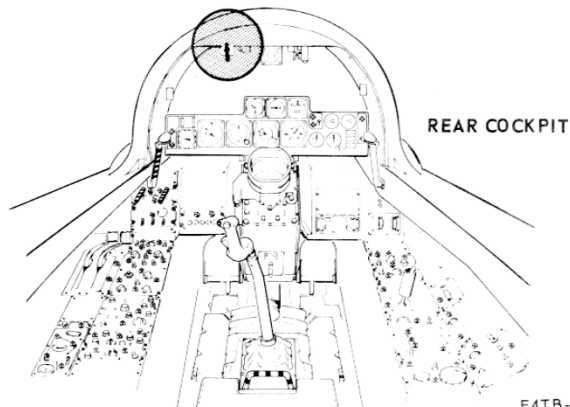


**Note**

ELAPSED TIME TO EJECTION GUN FIRING - 0.54 SECONDS.



COMMAND SELECTOR VALVE



REAR COCKPIT

F4TB-104

Figure 1-13



**SECTION II****NORMAL PROCEDURES****TABLE OF CONTENTS**

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**PREFLIGHT CHECK**

1. Check Form 781 for aircraft status and release.

**Note**

If a battery start is to be made, those checks requiring electrical power will have to be performed after the engines have been started.

**BEFORE EXTERIOR INSPECTION (FRONT COCKPIT)**

1. Check ejection gun and face curtain safety pins installed and lower ejection handle guard up.
2. Generator switches - OFF
3. Wing station jettison switch - NORMAL

**CAUTION**

The external wing tanks can be jettisoned by the external wing tank jettison switch any time electrical power is on the aircraft and the external tanks safety pins are removed.

4. Center station jettison switch - NORMAL
5. Internal wing dump switch - NORMAL

**CAUTION**

With electrical power applied to the aircraft, wing fuel will be dumped any time the internal wing dump switch is in the DUMP position.

6. Eject light - CHECK
7. Throttles - OFF
8. Engine master switches - OFF
9. External stores emergency release - CHECK
10. Landing gear handle - DOWN
11. Pitot heat - OFF
12. Publications and flight data - CHECK
13. Generator switches - EXT ON

**CAUTION**

Do not place the generator control switches to EXT ON until external power has been connected and has reached rated voltage and frequency (400 Hz), 115/200 volts ac.

- o\*14. Transformer rectifiers - CHECK

o Aircraft 66-321 and 66-329

\* Cannot be performed when battery start is made

**BEFORE EXTERIOR INSPECTION (FRONT COCKPIT) CONTINUED**

**Note**

Both transformer-rectifiers are operating if the landing gear indicators indicate gear down with the generator switches in EXT and the instrument ground power switch in NORMAL. Also, immediately following this check, the instrument ground power switch is actuated at which time the right and left generator indicator lights illuminate.

15. Inertial navigation set gyro compass or heading memory alignment - AS DESIRED  
Gyro compass alignment:
  - a. Align mode switch - GYRO COMP
  - b. Power control knob - STBY
  - c. When HEAT light is out, power control knob - ALIGN
  - d. After the ALIGN light has cycled from off to steady, and then to flashing, power control knob - NAV

**Note**

◦ If an INS No Go indication occurs during engine start and/or generator cycling, momentarily switch the power control knob back to OFF and repeat the alignment procedure on aircraft power.

- e. After the ALIGN light has cycled from off to steady, recycle the power control knob to STBY for approximately 30 seconds and back to align.

**Note**

Cycling the power control knob from ALIGN to STBY and back to ALIGN too rapidly can cause a system No-Go.

- f. After the ALIGN light has again cycled from off to steady, and then to flashing, power control knob - NAV

Heading Memory Alignment:

**Note**

Prior to heading memory alignment, a normal gyro compass alignment must have been performed through the flashing of the ALIGN light. While the align light is flashing, place the Align Mode switch to the heading memory position and position the power control knob to OFF. Do not move aircraft.

- a. Align mode switch - HDG MEM
- b. Power control knob - ALIGN
- c. After the ALIGN light begins flashing, power control knob - NAV

**Note**

The inertial navigation alignment will be erroneous if the aircraft is moved while in the ALIGN mode.

Steps 16 thru 29 pertain to rear cockpit check for solo flight.

16. (MK-H7) Command selector valve handle - VERTICAL (closed).
17. Canopy initiator safety pin (bulkhead mounted) - REMOVED  
With the initiator safety pin installed, the front canopy cannot be jettisoned by means of the canopy jettison lanyard.
18. Ejection seat and canopy safety pins - INSTALLED
19. Lap belt, leg restraints, and harness assembly - SECURED

◦ Aircraft 66-321 and 66-329

20. Communication-navigation control panel - SET
  - a. Communication function selector knob - T/R + G
  - b. Communication channel control knob/Mode Selector Switch - GUARD
  - c. Navigation function selector knob - T/R
  - d. Navigation channel control knob - AS REQUIRED
  - e. Function selector knob - COLD MIC
21. Emergency flap handle - FORWARD
22. Oxygen supply selectors - OFF
23. Emergency gear handle - IN AND SECURE
24. Emergency brake handle - IN AND SECURE
25. Circuit breakers - IN
26. Cockpit light switches - OFF
27. All loose items - SECURE
28. All other equipment - AS REQUIRED
29. Canopy - CLOSED

### EXTERIOR INSPECTION

1. Landing gear ground locks - REMOVED
2. Intake and refrigeration ducts - CLEAR
3. External stores - CHECK (if installed)
4. Inflight pylon unlock pins - INSTALLED

**WARNING**

In no way, without the pylon unlock pins installed, can the stores on the right outboard pylon be jettisoned.

5. Centerline rack access panels (inside aux air door areas) - SECURE
6. Protective covers - REMOVED
7. Drag chute pin - REMOVE
8. Arresting hook lock - REMOVED

### BEFORE ENTERING FRONT COCKPIT

1. Canopy condition - CHECK  
Check for cracks in the canopy and windshield plexiglass. Check condition of the canopy pressure seals.

**CAUTION**

The center mirror on the forward canopy can be tilted sufficiently to prevent canopy closing; therefore, ensure that the mirror will clear the windshield bow before closing canopy.

2. Canopy safety strut - REMOVED
3. Ejection seat - CHECK  
Refer to figure 2-2, T.O. 1F-4C-1.

**WARNING**

The rocket motor and igniter sear are located under the seat. Do not use this area for stowage, and exercise extreme caution when performing any function in the vicinity of the rocket pack: e.g., pulling rocket motor safety pin, adjusting leg restraint lines, etc.

**BEFORE ENTERING FRONT COCKPIT CONTINUED****CAUTION**

Exercise caution regarding hand movements in the vicinity of the airplane mounted canopy initiator linkages. Also, do not stow flight equipment or personal items in this area. Failure to comply could result in inadvertent jettisoning of the canopy.

- a. All pins except face curtain and catapult gun firing mechanism - REMOVED
- b. Top latch mechanism - CHECK

**WARNING**

If the plunger is not flush, the seat is not locked into position and inadvertent ejection could result.

- c. Guillotine passage - CHECK
- d. Personnel parachute safety pin line - CHECK ROUTED THROUGH ALIGNMENT RING AND NOT ROUTED THROUGH GUILLOTINE  
To see proper routing of line through alignment ring, it may be necessary to lift up the parachute restraint strap.
- e. Withdrawal line disconnect - CONNECTED
- f. Drogue gun piston shear pin - IN
- g. Drogue chute withdrawal line - CHECK ROUTED OVER ALL OTHER LINES
- h. Drogue gun trip rod - CONNECTED (Top and Bottom)
- i. Guillotine hose - CHECK CONDITION AND SECURITY
- j. Bulkhead mounted canopy initiator - CHECK PIN REMOVED
- k. Upper block disconnect - LOCKED
- l. Harness assembly - CHECK
- m. Emergency oxygen - CHECK
- n. Rocket motor ignitor - CHECK PIN REMOVED AND LANYARD SECURED
- o. Emergency harness release handle - CHECK DOWN AND ENGAGED WITH SEAR.
- p. Survival kit handle - DOWN AND SECURE
- q. Time release trip rod - CHECK CONNECTED TOP AND BOTTOM
- r. Interlock block - CHECK INSTALLED
- s. Seat mounted canopy initiator - LINKAGE CONNECTED
- t. Banana links - CHECK ENGAGED IN MAIN SEAR
- u. Scissors - CHECK LOCKED ON TO SHACKLE AND TIED DOWN
- v. Emergency oxygen actuation knob and linkages - CHECK  
Check knob not actuated. If actuated, knob is tilted approximately 45° from vertical. Check security of shear pin in cable to linkage connection by applying light tension on cable.
- w. Survival kit selector switch - AUTO

**FRONT COCKPIT INTERIOR CHECK**

- 1. Rudder pedals - ADJUST
- 2. Oxygen, communications and anti-G lines - CONNECT
- 3. LOX and gaseous oxygen - CHECK  
Turn LOX selector on, put mask on, check normal breathing. Turn LOX off, check no breathing. Repeat check using gaseous oxygen. Check oxygen gages for system pressure.
- 4. Intercom control panel - SET
  - a. Volume control - AS DESIRED
  - b. Amplifier selector knob - NOR
  - c. Function selector switch - HOT MIC
- 5. Stick grip - CHECK  
Check that the stick grip is firmly attached to the stick.
- 6. Leg restraint lines - BUCKLED AND SECURED  
Check restraint lines buckled and properly adjusted. Route restraint lines first through lower garters (double D-rings) then through thigh garters (single D-ring) before the lock pins are inserted in the snubber boxes. Check that lines are secured to seat and floor and not twisted. Check that the leg restraint line locked pins are threaded through hold-down strap lugs on survival kits. Check that the survival kit-to-seat retention straps are attached to the leg restraint line lock pins at the lock pin attachment points.



**WARNING**

- The leg restraint lines must be buckled at all times during flight to ensure that the legs will be pulled back upon ejection. This will enhance seat stability and will prevent leg injury by keeping the legs from flailing following ejection.
  - Failure to route the restraint lines properly through the garters could cause serious injury during ejection.
7. Harnessing and personal equipment leads - FASTEN  
Attach the parachute riser-shoulder harness fittings to the integrated harness lower buckles. Attach and firmly adjust the survival kit straps. Secure and firmly adjust the lap belt. Connect oxygen and communication leads. Check the operation of the shoulder harness locking mechanism.

**WARNING**

To prevent the upper block assembly of the composite disconnect from becoming entangled during emergency evacuation of the cockpit, the oxygen and communication leads from the composite disconnect should be routed between the crewmember and the lumbar pad.

8. Ejection seat height - ADJUST  
9. Face curtain and ejection gun safety pins - CHECK REMOVED

**WARNING**

Exercise extreme caution after the ejection gun safety pin has been removed. Avoid dislodging the canopy interlock block and putting forward pressure on the ejection gun firing linkage at the top rear of the seat. After personnel leads have been fastened, remove the face curtain safety pin and stow.

10. AFCS - DISENGAGED  
11. Boarding steps position indicator - PROTRUDING  
12. Fuel control panel - SET  
a. Wing station jettison switch - NORM

**CAUTION**

The external wing tanks can be jettisoned by the external wing tank jettison switch any time electrical power is on the aircraft and the external tanks safety pins are removed.

- b. Center station jettison switch - NORM  
c. Internal wing transfer switch - NORMAL  
d. Internal wing dump switch - NORM  
e. Refuel selection switch - AS REQUIRED

**CAUTION**

With electrical power applied to the aircraft, wing fuel will be dumped any time the internal wing dump switch is in the DUMP position.

**FRONT COCKPIT INTERIOR CHECK CONTINUED**

- f. External transfer switch - AS REQUIRED
- g. Air refuel switch - RETRACT
- \*13. Boost pumps and engine fuel shutoff valve - CHECK  
Actuate the left boost pump check switch and observe that the left boost pump pressure indicator reads  $30 \pm 5$  psi. Also, note that zero fuel flow is registered on the left fuel flow indicator. Allow 3 seconds after release of left switch, then repeat the procedure using the right boost pump check switch.

**Note**

Ensure boost pump check switches return to the NORMAL position after actuation. Failure of the switches to return to NORMAL will cause an interruption of electrical power to the fuel valve and could result in engine fuel starvation at start. Zero fuel flow reading is an indication that the fuel shutoff valves are closed.

- 14. Smoke switch - OFF (DOWN)
- 15. Speed brake switch - IN
- 16. Throttle friction lever - SET AS DESIRED
- 17. Pneumatic pressure switch - NORM
- 18. OIL/DYE switch - PRESS OFF
- 19. Front seat ejection delay selector valve - PILOT SINGLE EJECTION (SOLO FLIGHT) or DUAL EJECTION (DUAL FLIGHT)

**WARNING**

- Valve must be in PILOT SINGLE EJECTION position for solo flight to bypass the 0.75 second ejection delay.
- Valve must be in DUAL EJECTION position for dual flight. Only the front seat will eject if ejection is performed from front cockpit, simultaneous ejection of both seats will occur if dual ejection is performed from the rear cockpit.

- 20. Drag chute control handle - DOWN AND SECURE
- 21. Flaps switch - UP
- 22. Emergency flap handle - FORWARD
- 23. Engine anti-icing switch - NORMAL
- 24. Communication antenna selector switch - UPR
- 25. Oxygen (LOX or gaseous) - ON
- 26. Oxygen supply selector (on oxygen regulator panel) - CHECK SAFETY WIRED ON
  - a. Oxygen diluter selector - AS DESIRED
  - b. Oxygen mode selector - NORMAL
  - c. Oxygen pressure gage - CHECK
- 27. Oxygen quantity gages - CHECK  
Check that the oxygen quantity is sufficient for the intended mission, the OFF flap on gage face is not visible, and the OXYGEN LOW light is extinguished. Press oxygen test button and check OXYGEN LOW light and Master Caution light illuminate at 1 liter.
- 28. Anti-skid switch - OFF
- 29. Landing and taxi lights switch - OFF
- 30. Flap position indicators - UP
- 31. Landing gear position indicators - GEAR DOWN INDICATION
- 32. Aileron rudder interconnect circuit breaker - IN
- 33. Emergency brake handle - IN AND SECURE
- 34. Canopy emergency jettison handle - FORWARD
- 35. Rudder feel switch - AS DESIRED
- 36. Fuel pressure switch - AS DESIRED
- 37. Comm select switch - AS DESIRED
- 38. VHF Comm/Nav panel - SET (AS BRIEFED)
- 39. Accelerometer - SET

\* Cannot be performed when a battery start is made.

**FRONT COCKPIT INTERIOR CHECK CONTINUED**

40. Altimeter - SET (field elevation)
41. ADI - SET
42. Clock - SET
43. Navigation function selector panel - SET (AS DESIRED)
  - a. Bearing distance selector switch - AS DESIRED
  - b. Mode selector knob - AS DESIRED
44. Fire warning lights - TEST  
Check that fire and overheat warning lights illuminate when the fire warning lights test button is depressed.
45. Fuel quantity gage - CHECK  
Actuate and hold feed tank check switch to check fuel quantity (counter and tape) in feed tank.
46. Canopy manual unlock handle - FORWARD
47. Arresting hook - UP
48. Emergency vent knob - IN
49. Compass control panel - AS REQUIRED
  - a. Latitude compensator - SET
  - b. Reference system selector knob - PRIMARY



- c. Mode control knob - SLAVED
- d. Synchronization indicator - CHECK
- 50. Rain removal switch - OFF
- 51. Defog-foot heat control handle - AS DESIRED
- 52. Pitot heat switch - OFF
- 53. Circuit breakers - CHECK IN
- 54. Nav Computer panel - AS DESIRED
- 55. IFF/SIF control panel - STBY
- 56. Temperature control panel - SET
  - a. Temperature control knob - SET
  - b. Mode selector switch - AUTO
- 57. Cockpit lights control panel - AS REQUIRED
  - a. White floodlight switch - OFF
  - b. Instrument panel lights control knob - AS REQUIRED
  - c. Console lights control knob - AS REQUIRED
  - d. Standby compass light switch - AS REQUIRED
  - e. Console flood light switch - AS REQUIRED
  - f. Indexer lights control knob - AS REQUIRED
- 58. Warning and indicator lights - TEST
 

Actuate the warning lights test switch to test and note that all warning and indicator lights illuminate. With the switch held to TEST, rotate the instrument panel lights knob from OFF to BRT to OFF. All warning lights should dim and then revert to bright.
- 59. Exterior lights control panel - AS REQUIRED
  - a. Fuselage lights switch - AS REQUIRED
  - b. Wing lights switch - AS REQUIRED
  - c. Tail lights switch - AS REQUIRED
  - d. Exterior lights flasher switch - AS REQUIRED
- 60. Communication-navigation control panel - SET (AS DESIRED)
  - a. Communication frequency control knobs - AS REQUIRED
  - b. Communication channel control knob - AS REQUIRED
  - c. Mode select switch - AS REQUIRED
  - d. Communication volume control knob - AS REQUIRED
  - e. Auxiliary channel control knob - AS REQUIRED
  - f. Auxiliary volume control knob - AS REQUIRED
  - g. Communication function selector knob - T/R + G
  - h. Navigation channel control knobs - AS REQUIRED
  - i. Navigation volume control knobs - AS REQUIRED
  - j. TACAN function selector knob - T/R
  - k. Communication command button - AS DESIRED
  - l. Navigation command button - AS DESIRED
- 61. VOR/ILS Nav test - CHECK
 

Refer to section I, CNI system

## BEFORE TAKEOFF

- 1. Stab aug switches - ENGAGE
- 2. Flight controls - UNRESTRICTED
- 3. Stabilator trim - TWO UNITS NOSE DOWN
- 4. Canopy - CLOSE, CHECK WARNING LIGHT OUT AND STRIPES ALIGNED
  - a. Operate engines at idle rpm.

### CAUTION

Attempted canopy closure with engine rpm above idle may result in canopy not fully locked due to back pressure caused by the aircraft pressurization system.

- b. Close forward canopy; check CANOPY UNLOCK lights out.

### CAUTION

The center mirror on the forward canopy can be tilted sufficiently to prevent canopy closing; therefore, ensure that the mirror will clear the windshield bow before closing canopy.

**BEFORE TAKEOFF CONTINUED**

- c. Check that alignment tape on canopy lock push rod aligns with the alignment mark on the bracket hanging from the left canopy sill. On aircraft that do not have alignment marks incorporated, assure locking rollers have engaged canopy hooks by observing approximately one-inch aft travel of push-pull rod.

**Note**

During the canopy closing cycle of the front cockpit, the pilot will observe the front canopy actuator shear pin for integrity.

**WARNING**

If a canopy malfunction occurs during the closing cycle or if either the front or aft CANOPY UNLOCKED light remains on after attempted closure, refer to Canopy Malfunction, Section III, T.O. 1F-4C-1.

**CAUTION**

To ensure canopy retention during flight, the canopy control handle must be retained in the closed (full forward detent) position.

5. Lower ejection handle safety guard - CLEAR  
Rotate the lower ejection handle safety guard to the down (horizontal) position.

**WARNING**

The lower ejection handle safety guard, when lowered, can rebound to the safe position if it is lowered too rapidly.

6. IFF/SIF - AS REQUIRED
7. Fuel quantity - CHECK
8. Engines - CHECK
  - a. Idle fuel flow - CHECK
  - b. Left throttle - MIL

Allow the engine rpm to stabilize and observe that the EGT, exhaust nozzle position, fuel flow, oil pressure, hydraulic pressure and pneumatic pressure gages are within their normal operating ranges; and that the rpm, EGT and fuel flow on the idling engine remain stable.

**WARNING**

During engine run-up, with flaps full up, a rise in rpm above 67.5 percent, a drop in EGT of more than 20°C, or a drop of more than 50 pph in fuel flow on the idling engine indicates a defective bleed air check valve on that engine and constitutes an abort. This check performed with the flaps in any position other than full up is of no significance.

- c. Left Throttle - CHOP TO IDLE

Check that the fuel flow does not drop below a minimum of 425 pph on engines without cool start fuel control cams, and does not drop below 225 pph on engines with cool start fuel control cams.

**WARNING**

- If the fuel flow drops below 425 pph on engines without cool start fuel control cams, or 225 pph on engines with cool start fuel control cams, but the engine recovers to original rpm, proceed with the flight. However, do not snap decelerate these engines below 10,000 feet.
- If engine rpm fails to recover to the original idle rpm value, regardless of the fuel flow reading, the flight should be aborted.

**CAUTION**

Check the engines individually as the engines develop enough thrust to slip the tires on their rims if both engines are checked together and maximum braking is applied.

**Note**

It is mandatory that a Form 781 entry be made on all engines which drop below the minimum fuel flow on snap decelerations and/or fail to recover to the original idle rpm.

- d. Check right engine after left engine stabilizes at idle rpm.

**Note**

Fuel consumed during the engine check is approximately 50 pounds per engine.

9. Smoke system - CHECK
  - a. Pneumatic pressure switch - NORM
  - b. OIL/DYE switch - PRESS ON
  - c. Smoke switch - ON (UP) HOLD MOMENTARILY
  - d. Smoke switch - OFF
10. Variable area inlet ramp - CHECK FULLY RETRACTED
11. Internal wing transfer switch - NORMAL
12. External transfer switch - CENTER or OUTBD

**WARNING**

If external tanks are installed, and the external transfer switch is positioned to OUTBD or CENTER, internal wing fuel will not transfer even though the internal wing transfer switch is positioned to NORMAL.

13. Flaps - 1/2

**CAUTION**

Do not operate either or both engines at military thrust with the wing flaps extended, for a period longer than one minute. Ground operations in excess of one minute will cause the boundary layer control bleed air to overheat the leading edge wing rib.

14. Anti-ice - AS REQUIRED
15. Anti-skid - ON, LIGHT OUT
16. Pitot heat - AS REQUIRED
17. Warning lights - CHECK
18. Inertia reel - AS DESIRED





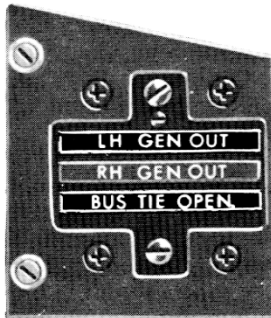
**SECTION III****EMERGENCY PROCEDURES****GENERAL**

The emergency procedures for the F-4E demonstration aircraft are the same as for the F-4E aircraft except for differences in the emergency power distribution chart and the external stores jettison chart. The emergency power distribution chart is shown in figure 3-1. There are two jettison switches in the F-4E demonstration aircraft, the external tanks jettison switch on the fuel control panel and the external stores emergency release button on the left vertical panel in the front cockpit. The external tanks jettison switch jettisons external stores from the outboard wing stations (stations 1 and 9). The switch is

"hot" at all times with electrical power on the aircraft, and the stores are jettisoned by placing the switch from the NORM to the JETT position. The external stores emergency release button simultaneously jettisons external stores from the outboard wing stations (stations 1 and 9), and the centerline station (station 5). External stores on the four fuselage missile stations are retained since no jettison cartridges are installed. The button becomes "hot" whenever the landing gear control handle is placed to the up position or the weight of the aircraft is off the landing gear. The external stores are jettisoned by depressing the button.

**INOPERATIVE EQUIPMENT**

**LH Gen Out-Bus Tie Open**

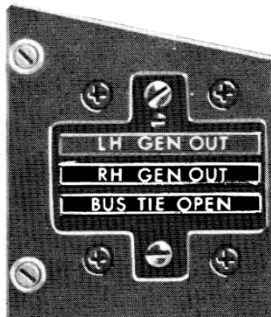


ANTI-ICE  
 ANTI-COLLISION LT (ONE FILAMENT)  
 ANTI-SKID  
 EQUIP COOLING  
 FUS LTS  
 FWD CKPT CONSOLE LTS  
 FWD CKPT RED INST FLOODS DIM  
 INS HEATER  
 L AFTERBURNER IGNITION  
 LANDING LT  
 LH 28V TRANSFORMER

LH TRANSFORMER RECTIFIER  
 NO. 4 ELEC FUEL TRANS PUMP  
 NOSE WHEEL STEERING  
 RED CONSOLE FLOODS MED  
 RH FUEL BOOST PUMP  
 R AFTERBURNER IGNITION  
 SEAT ADJUST  
 UTILITY LT  
 UTILITY PWR AC  
 WARNING LTS DIM  
 WING AND TAIL LT DIM

**INOPERATIVE EQUIPMENT**

**RH Gen Out-Bus Tie Open**



ADF (UHF)  
 AILERON FEEL TRIM  
 AILERON RUDDER INTERCONNECT  
 AIRSPEED PITOT HTR  
 ALTITUDE ENCODER  
 ANGLE OF ATTACK PROBE HTR PWR  
 ANTI COLLISION LT (ONE FILAMENT)  
 AUTO PILOT  
 AUX RECEIVER  
 BELLMOUTH PITOT HTR  
 CADC  
 CKPT HT AND VENT  
 ENGINE FIRE AND OVERHT DET  
 FUEL QUANTITY INDICATOR  
 FWD CKPT INSTRUMENT LTS  
 IFF

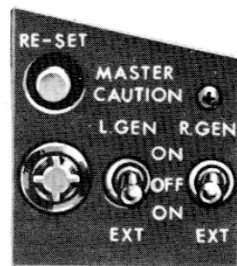
IFR RECEP FLOOD LTS  
 LH EGT  
 LH FUEL BOOSTER PUMP  
 L ENGINE RAMP CONT  
 NO. 6 ELEC FUEL TRANS PUMP  
 OXYGEN GAGE (LOX)  
 RADAR ALTIMETER  
 RIGHT ENGINE RAMP CONT  
 RH 28V TRANSFORMER  
 RH EGT  
 RH TRANSFORMER RECTIFIER  
 TACAN  
 TAXI LT  
 UHF RADIO  
 WINDSHIELD TEMP SENSING  
 WING AND TAIL LT BRT

F4TB-315-1

Figure 3-1

**INOPERATIVE EQUIPMENT**

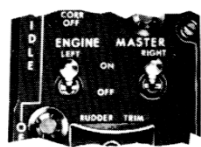
**Main 28 Volt DC Bus Out-"DC Bus"  
Light Illuminated**



- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>A/B INITIATION (89%)</li> <li>ADF (UHF)</li> <li>AILERON RUDDER INTERCONNECT</li> <li>ALTIMETER VIBRATOR</li> <li>ARRESTING HOOK (UP OPERATION)</li> <li>AUX AIR DOORS</li> <li>AUX RECEIVER</li> <li>CKPT HEAT AND VENT</li> <li><b>2</b> ENG VARIABLE BELLMOUTH</li> <li>EQUIP COOLING CONTROL</li> <li>FLAPS</li> <li>FUSELAGE, ANTI COLLISION AND TAIL LTS</li> <li>INTERNAL WING DUMP</li> <li>LANDING GEAR</li> <li>LANDING AND TAXI LTS</li> <li>LF ADF</li> <li>LH FUEL BOOST PUMP</li> </ul> | <ul style="list-style-type: none"> <li>NAV COMPUTER</li> <li>NO. 4 ELEC FUEL TRANS PUMP</li> <li>NO. 6 ELEC FUEL TRANS PUMP</li> <li>NOSE WHEEL STEERING</li> <li>PNEUMATIC COMPRESSOR</li> <li>RAIN REMOVAL</li> <li>RH FUEL BOOST PUMP</li> <li>RUDDER TRIM</li> <li>SPEED BRAKE</li> <li>STABILATOR POSITION INDICATOR</li> <li>TACAN</li> <li>TURN AND SLIP INDICATOR</li> <li>UTILITY POWER D-C</li> <li>VGH RECEIVER POWER D-C</li> <li>VHF COMM</li> <li>VHF NAV</li> <li>WARNING LIGHTS DIM</li> </ul> |
|--|--|

**OPERATIVE EQUIPMENT**

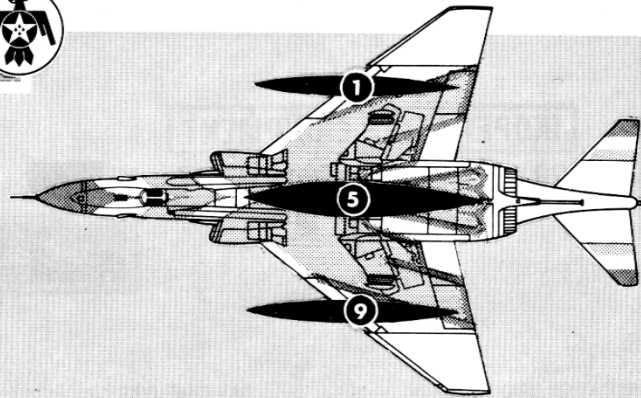
**RH and LH Gen Out-Battery  
Power Only**



- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>AIR REFUEL RECEPTACLE</li> <li>ALL STORES EMER JETT</li> <li>ANGLE OF ATTACK INDICATOR</li> <li>EGT INVERTER</li> <li>EJECTION LIGHT</li> <li>EXTERNAL WING FUEL TRANSFER CONTROL</li> <li>FEED TANK CHECK AND FUEL LOW WARNING</li> <li>FLAP POSITION INDICATOR</li> <li>FUEL CONTROL</li> <li>FUEL VALVE POWER</li> <li>FWD CKPT INST FLOODS BRT</li> </ul> | <ul style="list-style-type: none"> <li>INTERCOM</li> <li>INTERNAL WING FUEL TRANSFER CONTROL</li> <li>LANDING GEAR POSITION INDICATOR</li> <li>LEFT AND RIGHT MAIN IGNITION</li> <li>MASTER CAUTION LT RESET</li> <li>NOZZLE POSITION INDICATOR</li> <li>OUTBOARD STATION JETT</li> <li>SMOKE GENERATION SYSTEM</li> <li>STABILATOR FEEL TRIM</li> <li>TRIM CONTROL</li> <li>WHITE FLOODLIGHT</li> </ul> |
|--|--|

**1** AIRCRAFT BLK 34 AND UP, AND ALL OTHERS AFTER T.O. 1F-4-677.  
**2** AIRCRAFT BLK 35 AND UP, AND ALL OTHERS AFTER T.O. 1F-4E-517.

# JETTISONING CHART



\* WEIGHT MUST BE OFF GEAR

	STORES	STATION	GEAR HANDLE POSITION		METHOD	NOTES
			FRONT <2	REAR <2		
<b>FUEL TANKS</b>	OUTBOARD WING AND $\mathcal{C}$	1, 5, & 9	UP or DOWN*	IN	External Stores Emergency Release Button - <b>PUSH</b>	
	OUTBOARD WING	1 and 9	UP or DOWN	IN or OUT	Wing Station Jettison Switch - <b>JETT</b>	1
	$\mathcal{C}$	5	UP or DOWN*	IN	Center Station Jettison Switch - <b>JETT</b>	

## WARNING

- 1 Wing station jettison switch is "hot" at all times with external or generator power on the aircraft, or with a master switch or ground refueling switch on to connect battery power to the essential dc bus.
- 2 The safety function of the aft gear handle switch, the forward gear handle switch and the left main gear scissors switch can be overridden by depressing the armament safety override switch. Should it be desired to jettison stores protected by the above switches, depress the armament safety override switch and then perform normal jettison procedures.

F4TB-312