F/A-18A/C HORNET

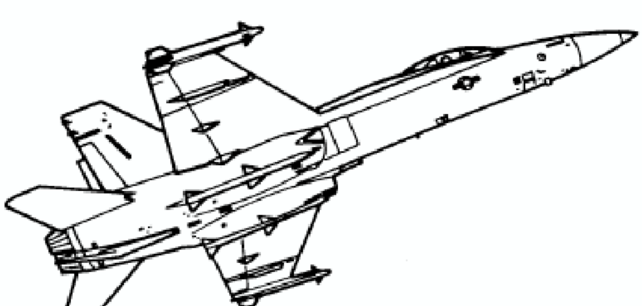
HUD INFO

NATOPS FLIGHT MANUAL
NAVY MODEL

F/A-18A/B/C/D
161353 AND UP
AIRCRAFT

McDonnell Douglas Corporation

THIS PUBLICATION IS INCOMPLETE WITHOUT A1-F18AC-NFM-200 AND A1-F18AC-NFM-210



2.13.4.7 Head-Up Display (HUD). The HUD is on the center main instrument panel. The HUD is used as the primary flight instruments, weapon status, and weapon delivery display for the aircraft under all selected conditions. The HUD receives attack, navigation, situation, and steering control information from the left or right DDI symbol generators (under mission computer control), and projects symbology on the combining glass for head-up viewing. The HUD is electrically interfaced with the UFC. On aircraft 163985 AND UP the HUD has been enhanced by adding NVG compatible raster display capability so as to allow it to display NFLR video. The most visible change to the HUD can be noticed on the HUD control panel (figure 2-23). The controls for the HUD are below the UFC and are described in the following paragraphs.

2.13.4.7.1 HUD Symbology Reject Switch. This three-position toggle switch has positions of NORM, REJ 1, and REJ 2. With the switch placed to NORM, the normal amount of symbology is provided for all HUD displays. Placing the switch to REJ 1 removes aircraft mach number, aircraft g's, bank angle and pointer, airspeed box, altitude box, peak positive g, and required ground speed cue from the HUD. Placing the switch to REJ 2 removes all REJ 1 symbology plus the heading scale, current heading indication (caret/T), command heading marker, NAV/TACAN range, and the ET, CD, or ZTOD timer.

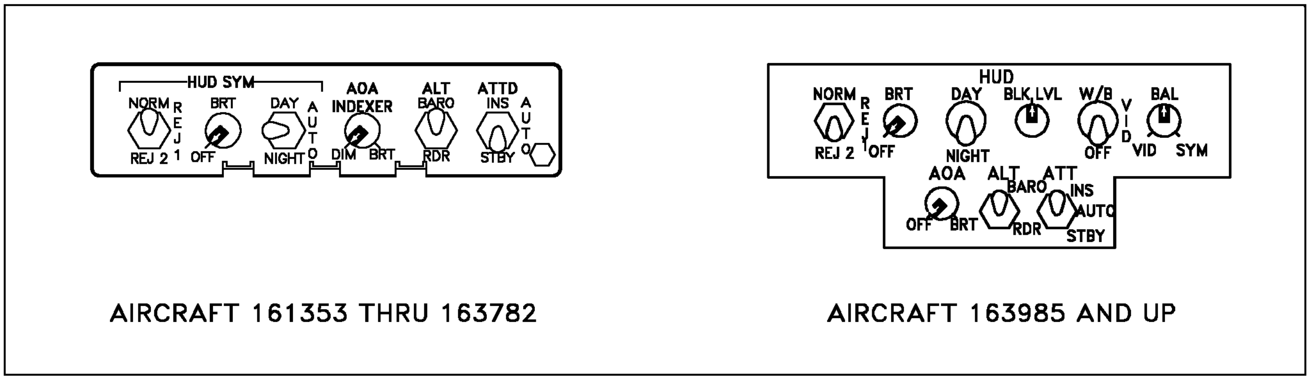


Figure 2-23. HUD Controls

2.13.4.7.2 HUD Symbology Brightness Control. This knob is used to turn on the HUD and then varies the display intensity.

2.13.4.7.3 HUD Symbology Brightness Selector Knob. This is a three-position toggle switch with positions of DAY, AUTO, and NIGHT. Placing the switch to DAY provides maximum symbol brightness in conjunction with the HUD symbology brightness control. Placing the switch to AUTO allows automatic control of the contrast by the automatic brightness control circuit. On aircraft 163985 AND UP the AUTO position is deleted. With the switch set to NIGHT, a reduced symbol brightness is provided in conjunction with the HUD symbology brightness control.

2.13.4.7.4 HUD Video Control Switch (Aircraft 163985 AND UP). The Video Control switch is a three position switch with positions of OFF, VID, and W/B. The Video Control switch enables NFLR video to be displayed on the HUD with selectable polarity (White hot/Black hot).

2.13.4.7.5 Black Level Control (Aircraft 163985 AND UP). The Black Level control knob adjusts the NFLR video plus or minus ½ a shade of gray per increment when rotated.

2.13.4.7.6 Balance Control (Aircraft 163985 AND UP). The Balance control adjusts the stroke brightness relative to the raster brightness. Rotating the switch from 12 o'clock towards the "VID" position holds the brightness of the video (as set by the Brightness control switch) and reduces the brightness of the stroke symbology. The opposite is true when rotating the switch toward the "SYM" position.

2.13.4.7.7 AOA Indexer Control. This knob controls the brightness of the indexer lights.

2.13.4.7.8 Altitude Switch. This is a two-position toggle switch with positions of BARO and RDR. This switch is used to select either radar altitude (RDR) or barometric altitude (BARO) for display on the HUD, and as the primary altitude source for the mission computer.

2.13.4.7.9 Attitude Selector Switch. This three-position toggle switch has positions of INS, AUTO, and STBY. Placing the switch to AUTO or INS selects filtered INS data as the primary source of attitude information. With the ASN-130 installed, the INS automatically reverts to attitude heading reference system (AHRS) using unfiltered data if its processor fails. The mission computer automatically selects the standby attitude reference indicator for attitude information if the INS fails completely. Placing the switch to STBY selects the standby attitude reference indicator as the source of attitude information for the mission computer and displays. With the ASN-139 or EGI installed, the INS automatically reverts to the standby attitude reference indicator. With the ASN-139 or EGI installed, a partial alignment may result in the gyro mode of the INS/EGI being activated. Selecting the attitude source on the EADI does not change the source of attitude data for the HUD.

2.13.4.7.10 Fault Indicator. The indicator displays unit operational status: white for failed and black for normal.

2.13.4.7.11 HUD Symbology. The following paragraphs describe HUD symbology as related to basic navigation, steering (direct great circle, courseline, and ILS), navigation target designation, advisories and landing, see figure 2-24. Refer to part VII for a description of how these symbols are integrated into the navigation system. Also, refer to part VII for unique ACL data link symbology. Refer to A1-F18AC-TAC-Series/(S), for symbology concerning the A/A and A/G master modes, weapons, RWR and the data link vector mode.

1. Heading. The aircraft magnetic/true heading is indicated by the moving 30° heading scale. The actual aircraft heading is directly above the caret/T symbol. The moving heading scale provides trend information during turns. As the aircraft turns right, the scale moves from right to left. Magnetic or true heading may be selected. Magnetic heading is indicated by a caret below the heading scale. True heading selection is indicated by a T appearing below the current heading.

2. Airspeed. Calibrated airspeed from the air data computer is provided in the box on the left side of the HUD. The tops of the airspeed and altitude boxes are positioned at the aircraft waterline (4° up from the optical center of the HUD).

3. Altitude. The altitude presented in the box on the right side of the HUD may be either barometric altitude or radar altitude depending on the setting of the altitude switch on the HUD control panel. When the altitude switch is in the BARO position, barometric altitude is displayed. When the altitude switch is in the RDR position, radar altitude is displayed and is identified by an R next to the altitude. If the radar altitude is invalid, barometric altitude is displayed and a B next to the altitude flashes to indicate that barometric altitude is being displayed rather than radar altitude. With MC OFP 91C, 09C, 11C, 13C, and 15C, if the barometric altitude source error correction is invalid, an X is displayed next to the uncorrected barometric altitude. The thousand and ten thousand digits are 150 percent size numbers. The hundred, ten, and unit digits are 120 percent size numbers, except that below 1,000 feet they are 150 percent size.

4. Barometric setting. The barometric setting used by the air data computer (ADC) is the value set in the standby altimeter. When the barometer setting is changed on the standby altimeter, the ADC barometric setting is presented below the altitude on the HUD to provide a head-up baro-set capability. The display remains for 5 seconds after the change is made. In addition, the baro-set value is displayed and flashed for 5 seconds when the aircraft descends below 10,000 feet at an airspeed less than 300 knots.

5. Angle of attack. True angle of attack in degrees is displayed at the left center of the HUD. The primary source for this information is the ADC. Should the ADC produce invalid AOA outputs, the MC uses FCC information to derive the AOA display. There is no pilot queuing when the MC switches AOA sources from ADC to FCC because both components get AOA information from the AOA probes. For lower AOA values, HUD AOA is an average of the AOA probe readings recieved by the ADC. Above 34° AOA, HUD AOA is estimated and provided by the INS.

6. Mach number. The aircraft mach number is displayed immediately below the angle of attack.

7. Aircraft g. Normal acceleration of the aircraft is displayed immediately below the mach number.

8. Peak aircraft g. A peak positive g indication is displayed on the HUD below the normal g anytime a threshold of 4.0 g is exceeded. The peak positive g display can be removed by cycling the clutter reject switch to one of the reject positions.

9. Bank angle scale. A bank angle scale and pointer are displayed at the bottom of the HUD for bank angle reference up to 45°. At

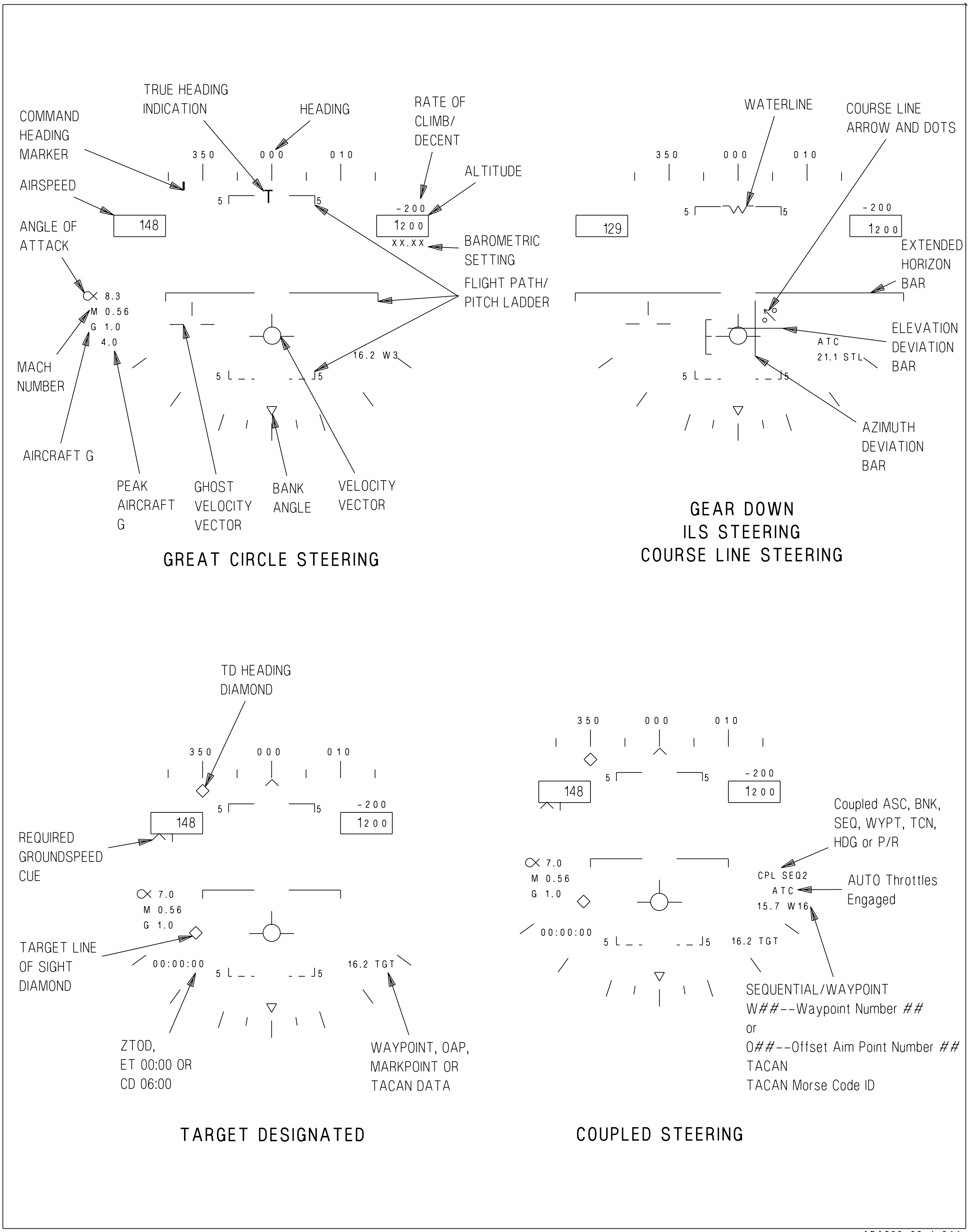


Figure 2-24. HUD Symbology (Sheet 1 of 2)

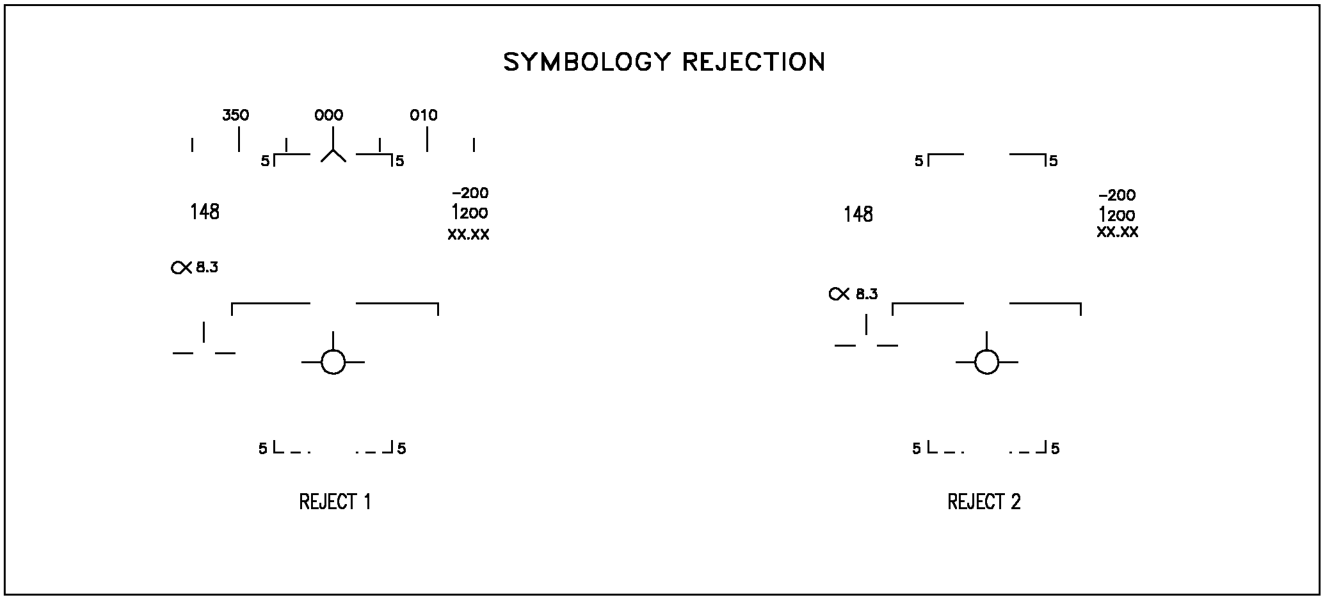


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Figure 2-24. HUD Symbology (Sheet 2 of 2)

bank angles in excess of 47°, the bank angle scale pointer is limited at 45° and flashed.

10. Velocity vector. The velocity vector provides the pilot with an outside world reference with regard to actual aircraft flight path. The velocity vector represents the point towards which the aircraft is flying (aircraft flight path). The position of the velocity vector is limited to an 8° radius circle centered at the HUD optical center. If the velocity vector reaches this limit during high angle of attack flight or large yaw and/or drift angles, then it flashes rapidly to indicate that it does not accurately indicate flight path. With GPS or EGI installed, if the INS velocity data becomes unreliable, the mission computer utilizes the GPS information. If INS velocity data becomes unreliable the mission computer utilizes air data computer information and the last available wind data to compute the velocity vector and this degraded velocity vector is indicated by a slow flashing of the symbol. In the NAV master mode, the velocity vector may be caged to the vertical center line of the HUD by the cage/uncage switch on the throttle. When it is caged, a ghost velocity vector is displayed at the true velocity vector position if that position is more than 2° from the caged position. The flight path/pitch ladder and steering information are referenced to the caged position. The ghost velocity vector flashes when limited. With MC OFP 09C, 11C, 13C, and 15C, the flight path/pitch ladder is referenced to the waterline symbol when the velocity vector is caged.

WARNING

Sustained climbs and descents can result in uncued vertical velocity placement errors and subsequent HUD velocity placement errors. Error magnitudes increase at slower airspeeds and lower altitudes. Errors of up to three degrees have been observed in the landing configuration. Three minutes of level flight may be required to allow the INS to correct the vertical velocity function.

11. Flight path/pitch ladder. The vertical flight path angle of the aircraft is indicated by the position of the velocity vector on the flight path/pitch ladder. The horizon and flight

path/pitch angle lines represent the horizon and each 5° of angle between plus and minus 90°. Positive pitch lines are solid and are above the horizon line. Negative pitch lines are dashed and are below the horizon line. The outer segments of the lines point toward the horizon. Each line is numbered and the numbers rotate with the lines so that inverted flight can easily be determined. To aid in determining flight path angle when it is changing rapidly, the pitch lines are angled toward the horizon at an angle half that of the flight path angle. For example, the 50° pitch line is angled 25° toward the horizon. In level flight, the pitch lines are not angled. The zenith is indicated by a circle and the nadir is indicated by a circle with an X in it. Aircraft pitch angle can be determined by comparing the tops of the altitude and airspeed boxes (which represent the aircraft waterline) with the pitch ladder when the wings are level. However, since the flight path/pitch ladder normally rotates about the velocity vector, determination of pitch angle may be difficult at high roll angles.

12. Vertical velocity readout. This value is displayed above the altitude box and indicates vertical velocity in feet per minute. This is only displayed in the NAV master mode. Descent is indicated with a minus sign.

13. HUD landing symbology. When any two landing gear are down, the Mach number, g, and peak g are deleted and, an AOA bracket, extended horizon bar, and waterline symbol appear. The center of the AOA bracket represents the optimum approach AOA. The bracket moves lower with respect to the velocity vector as AOA increases and moves higher as AOA decreases.

14. Waypoint/OAP, mark point, TACAN, or target data. Waypoint/OAP and mark data consists of range (horizontal), the steer to point identifier (W, O, or M), and number, located on the lower right corner of the HUD. TACAN data consists of slant range and a morse code identifier located on the lower right corner of the HUD. When a steer to point is designated, range remains displayed and the steer-to point identifier changes to TGT.

15. Coupled steering symbology. With MC OFP 91C, 09C, 11C, 13C, and 15C, while coupled steering is engaged CPL SEQ#, CPL WYPT, CPL TCN, CPL BNK or CPL ASL appear on the right side of the HUD display above the navigation data.

16. ILS symbology. When ILS steering is selected, an azimuth deviation bar (localizer) and elevation deviation bar (glideslope) appear on the HUD.

17. ZTOD, ET, and CD time. The ZTOD, ET, or CD time is displayed on the lower left corner of the HUD. These timers are mutually exclusive. Only one timer is available for display on the HUD at a time. Selecting any one automatically deselects the others. For F/A-18A/B aircraft, ZTOD must be set to be available for display. For F/A-18C/D aircraft, when the FIRAMS real time clock power up BIT passes, ZTOD does not need to be entered, but when the FIRAMS real time clock power up BIT does not pass, ZTOD must be entered. ET initializes to zero minutes and seconds. CD initializes to six minutes and zero seconds.

18. Command heading marker. When waypoint/OAP or TACAN direct great circle steering is selected, the command heading marker is displayed just below the heading scale.

19. Steering arrow and dots. When waypoint/OAP or TACAN course line steering is selected, the steering arrow and dots appear on the HUD.

20. Required ground speed cue. When steering is engaged to the target in a sequence, the required ground speed cue appears under the airspeed box.

21. Target designation symbology. When a target is designated, a target designation symbol (diamond) appears below the heading scale indicating target heading. Another target designation symbol (diamond) appears indicating the target line of sight (LOS).

2.13.4.7.12 HUD Symbology Degrades. The avionics suite has built-in redundancy with two mission computers for data management and two DDI for symbol generation. Likewise, if the attitude select switch is in the AUTO or INS position, back-up data sources are automatically selected to provide HUD symbology when specific failures are detected. Refer to figure 2-25, for the HUD displays discussed below.

2.13.4.7.13 INS Failure/HUD Symbology Degrades. When a failure occurs in the INS expect HUD bank angle, velocity vector, pitch ladder, and heading indications to be impacted. With GPS or EGI installed, the mission computer utilizes GPS information for the velocity vector. If INS attitude is valid but INS velocities are not valid, the mission computer automatically uses the INS attitude and GPS velocities to position a non-flashing velocity vector. With a degradation of the ADC, calibrated airspeed, barometric altitude, indicated Mach number, and vertical velocity indications may be impacted.

When the ASN-130 system reverts to the attitude heading reference system (AHRS) mode, the velocity vector flashes slowly indicating that the INS is still providing valid attitude information, but the ADC is now the data source for the velocity vector. An AHRS reversion can be the result of an INS BIT failure, or invalid INS velocity information. It is important to understand that AHRS is not an independent back-up platform, but actually a degraded INS system. In the AHRS mode, a very slight degrade in HUD attitude and velocity accuracy can be expected, warranting regular cross checks of the standby instrumentation. A reversion to AHRS is accompanied by the master caution light, tone, and POS/ADC caution, provided that the INS has been selected on the HSI display as the position-keeping source.

When the INS experiences a total shutdown (dump) with the attitude select switch in AUTO or INS, or if the attitude switch is deliberately placed in standby, a stationary waterline symbol replaces the velocity vector indicating that the standby attitude reference indicator is now providing attitude data. This failure is normally accompanied by the master caution light, tone, and INS ATT caution. Place the attitude select switch in the STBY position, crosscheck the HUD against standby instruments, and attempt an inflight alignment.

Due to the tendency of the standby attitude reference indicator to precess, it is suggested that flying in instrument meteorological conditions (IMC) using the ARI as a primary attitude reference be minimized. A partial IFA is always recommended whenever possible to recover the INS attitude platform.

2.13.4.7.14 ADC Failure/HUD Symbology Degrades. An ADC failure results in loss of associated data from the HUD display as shown in figure 2-25. An ADC failure also inhibits operation of cruise flight Automatic Throttle Control and disable the altitude signal used for IFF altitude reporting. An ADC failure may affect cabin air flow, cabin air temperature, and vent suit temperature.

Normal accurate air data and magnetic heading inputs that are supplied by the ADC to the mission computers are lost. However, Flight Aids Reversion Mechanization provides information to the pilot from the next best available source. (Figure 2-33). HUD airspeed and BARO altitude boxes are empty, unless aircraft altitude is less than 5,000 feet AGL with RADALT to HUD, aircraft altitude AGL will be displayed in the HUD altitude box. Failure of the Air Data Computer provides the pilot with the following indications:

IF GEAR UP -

1. Light in the gear handle and continuous beeping tone.
2. HUD airspeed box empty.
3. HUD altitude box empty if aircraft > 5000 feet AGL.
4. HUD altitude box displays AGL with RADALT to HUD and aircraft < 5000 feet AGL.
5. Standby instruments indicate correct altitude and airspeed.
6. BIT page indicates ADC - FAIL or NOT RDY

IF GEAR DOWN -

1. HUD airspeed box empty.
2. HUD altitude box empty if aircraft > 5000 feet AGL.
3. HUD altitude box displays AGL with RADALT to HUD.
4. AOA derived indication displayed on the HUD E-bracket.
5. Standby instruments indicate correct altitude and airspeed.
6. Internal/External AOA indexers inoperative

As the ADC degrades, loss of some or all of the following data from the HUD may occur:

1. Calibrated airspeed or barometric altitude. The loss of calibrated airspeed and/or barometric altitude data results in activation of the landing gear handle warning light and tone. First reference the applicable standby airspeed or altitude indicator, then silence the tone.

2. Angle of Attack. Loss of AOA requires no action on the part of the pilot, as the FCC automatically provides data for the HUD display. In fact, there is no indication provided to the pilot when this failure occurs.

3. Vertical velocity indicator. Upon loss of the vertical velocity indication, first check that the aircraft is in the NAV master mode and reference the standby vertical velocity indicator.

4. Mach number. Upon loss of the Mach number indication, reference the standby airspeed indicator.

The ADC can produce erroneous signals without cautions or advisories if the pitot tube or AOA probes receive damage. ADC inputs to the MC are used by the INS to help smooth or dampen pitch ladder and velocity vector position. A complete ADC failure does not immediately effect the pitch ladder/velocity vector, but these displays will eventually degrade. If subtle damage to the AOA probe is suspected, the pilot should make a cross check of airspeed with a wingman if possible. The standby airspeed indicator receives signals from the left pitot static probe, so it is accurate if only the right probe is damaged. AOA checks with a wingman should be made in landing configuration if a jammed AOA probe is suspected. Cross checking in cruise configuration may give a satisfactory crosscheck, but the probe may be bent in such a way that AOA anomalies are accentuated on landing configuration. Landing with automatic throttle control (ATC) may be affected. If damage is suspected, ATC during landing is not recommended.

With the exception of a single AOA probe jammed on takeoff with 10.5.1 PROM AND UP (see paragraph 15.32) if an AOA probe becomes jammed (does not move), the ADC and FCCs continue to receive valid signals until the pilot executes a maneuver that causes the reading between the AOA probes to differ more than 15°. At that time, the pilot receives a FLAP SCHED caution. HUD displayed airspeed may be inaccurate without pilot error indications if a pitot tube is damaged. Pilots should be alert for unannunciated pitot tube or AOA probe damage after bird strikes, icing conditions, or IFR basket impact during air refueling.

With MC OFP 09C, 11C, 13C, and 15C, the pilot can select through the FCS Status display either the left or the right probe to be the source of local AOA if an AOA failure has not been declared (probe positions differ by 15° or less). If an AOA failure has been declared (probe positions differ by more than 15°) AOA values are not displayed. GAIN ORIDE must be selected prior to single probe selection to neutralize the effect of inaccurate AOA input on the flight controls. For carrier landings, the pilot should advise the LSO that the approach light indications may be inaccurate.

2.13.4.7.15 HUD Advisory Data Symbology. The displays in figure 2-24 show some of the advisories that can appear on the HUD in the NAV master mode. The advisories are associated with nose wheel steering, and approach power compensator. Although the advisories are shown on the gear down display, most of them can appear on the basic HUD display. Refer to Part VII for description of data link system and advisories.

The automatic throttle control/nosewheel steering advisories are displayed above the distance display whenever the ATC or the NWS is engaged. If the ATC is disengaged by any means other than actuation of the ATC engage/ disengage switch, the advisory is flashed for 10 seconds before it is removed from the display or, if a pilot attempt to engage ATC is not successful, then ATC is flashed for 10 seconds then removed.

2.13.4.7.16 HUD BIT Checks. The HUD has two methods of built-in tests: manually initiated and automatic test. Refer to Status Monitoring Subsystem, figure 2-37 for the procedures and displays used for the HUD BIT checks.

2.13.4.8 Course Set Switch. The course set switch manually sets the desired course on the HSI display.

2.13.4.9 Heading Set Switch. The heading set switch manually sets the heading marker on the desired heading on the HSI display.

2.13.5 Upfront Control (UFC). The UFC (figure 2-26) is on the main instrument panel below the HUD. The UFC is used to select autopilot modes and control the IFF, TACAN, ILS, data link, radar beacon, UHF radios and ADF. The UFC is used in conjunction with the two DDIs and the HI/MPCD to enter navigation, sensor, and weapon delivery data. UFC option selections and inputs are primarily transmitted directly to the communication system control for discrete control of the CNI equipment or for routing to the mission computers. In aircraft 163985 AND UP the UFC is NVG compatible. A description of the UFC switches and displays follows. Refer to Section VII for operating instructions for CNI equipment.

2.13.5.1 Brightness Control Knob. The knob has positions of BRT (bright) and DIM. The brightness of the display increases as the knob is rotated clockwise toward BRT.

2.13.5.2 Emission Control Pushbutton. This pushbutton is labeled EMCON. Pushing the button inhibits IFF, tacan, radar, radar beacon, radar altimeter, two-way data link, and Walleye from transmitting. The letters E, M, C, O, and N are displayed in a vertical column in the five option windows when EMCON is selected. Pushing the button again permits the transmitters to radiate.

2.13.5.3 I/P Pushbutton. Pushing this momentary pushbutton causes the IFF to respond to mode 1, 2, and 3 interrogations with identification of position response (IDENT).

2.13.5.4 ADF Function Select Switch. Actuating this switch to the 1 position selects comm 1 for ADF operation. In the OFF position ADF is disabled. In the 2 position comm 2 is selected for ADF operation.

2.13.5.5 Option Select Pushbuttons. The five pushbuttons select or deselect the displayed options.

2.13.5.6 Pilot Cueing. A colon (:) is displayed when an option is selected. The colon disappears when an option is deselected.

2.13.5.7 Option Display Windows. The option display windows display five options of four alphanumeric characters each that are available for selection.

2.13.5.8 Scratchpad Window. The scratchpad window displays keyboard entries on a nine character readout. The first two characters are alphanumeric and the other seven are numeric.

2.13.5.9 Pushbutton Keyboard. The pushbutton keyboard contains alphanumeric pushbuttons, a CLR (clear) pushbutton, and an ENT (enter) pushbutton. Pressing the alphanumeric pushbutton enters a corresponding alphanumeric as digital information into the control converter. The number or letter of the pressed button is displayed on the right end of the scratchpad. The number or letter moves to the left as additional numbers are entered. The decimal point or degree/minute symbols are automatically displayed in correct position for information being entered. Trailing zeroes must be entered. Pressing the CLR pushbutton clears the scratchpad and/or the option display windows. Pressing the CLR pushbutton once clears the scratchpad, pressing it a second time clears the option display windows. Pressing the ENT pushbutton causes the keyboard entry displayed in the scratchpad to be sent to the control converter to change operation of selected equipment or to make data available to the mission computer. If entry via the keyboard is valid, the scratchpad display blinks once. If entry is invalid, the word Error appears and flashes in the scratchpad display until the scratchpad is cleared.

2.13.5.10 Function Selector Pushbuttons. The function selector pushbuttons for the equipment are mutually exclusive. When a particular function selector pushbutton is pressed, the control options for that equipment are displayed in the option windows (and in case of the autopilot switch, the autopilot is engaged). Then the ON-OFF switch is used to turn the selected equipment (except autopilot) on and off. When the equipment is on, the word ON is displayed in the first two alphanumerics of the scratchpad. The first two alphanumerics are blank when the equipment is off. Pressing the function selector pushbutton a second time clears the UFC display. The pressing of a function selector pushbutton, the pulling of a channel selector knob, or the receipt of a UFC mode command from the mission computer terminates all prior activity, with all previous entries retained, and presents the options for the newly selected mode.

2.13.5.11 Volume Controls. Turning the volume control to the OFF position turns off the corresponding radio. The comm 1 and comm 2 channel display windows illuminate if the respective radios are on. Out of the OFF position, the knob controls the audio volume for the corresponding radio.

2.13.5.12 Channel Selector Knobs. Rotating the knob selects channel 1 thru 20, manual (M), or guard (G). The channel is displayed in the corresponding comm 1 or comm 2 channel display window. Pulling the spring-loaded knob causes the selected channel and its frequency to be displayed in the scratchpad and enables the control converter to change the frequency of the selected channel via the keyboard entry.

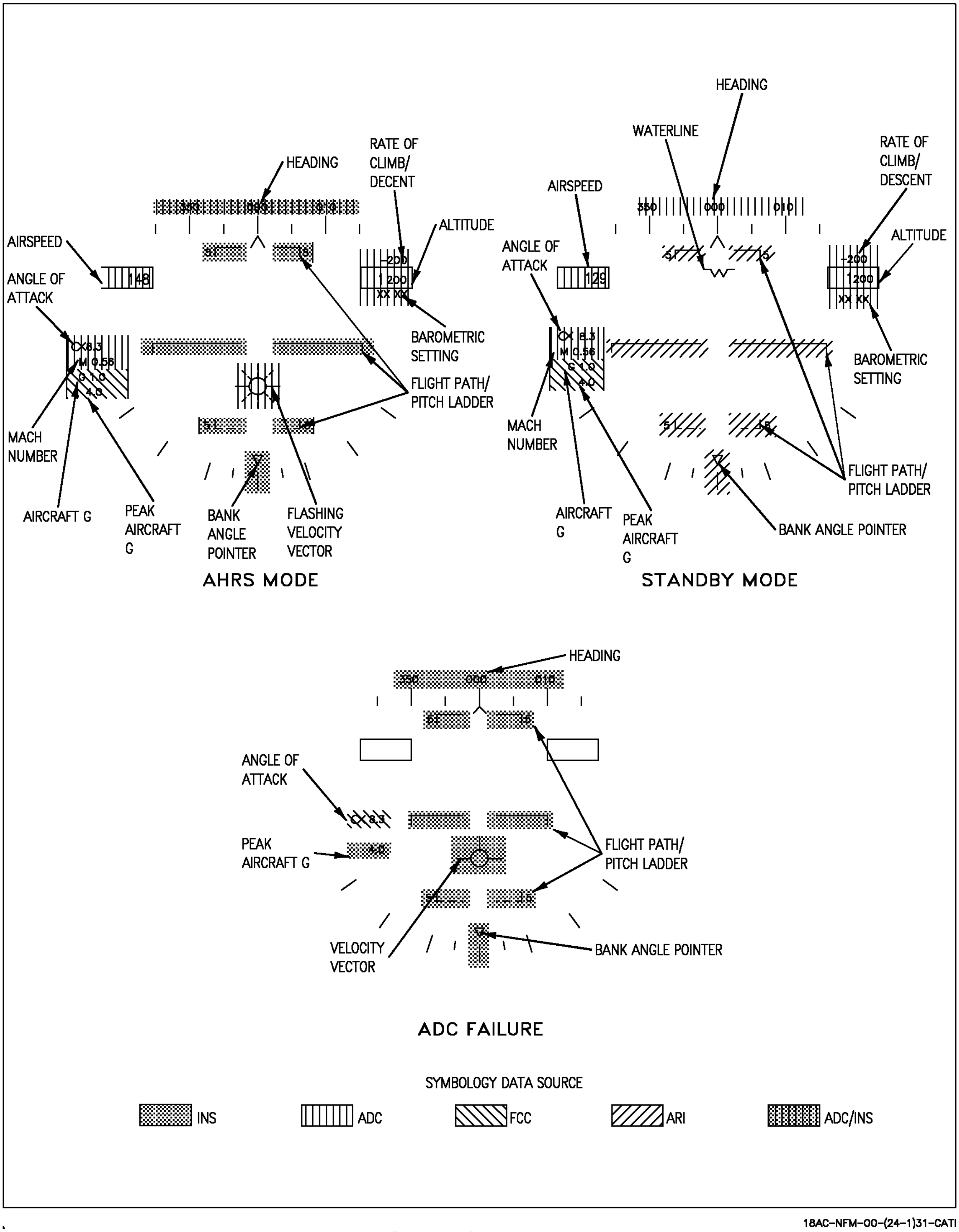

Figure 2-25. HUD Symbology Degrades

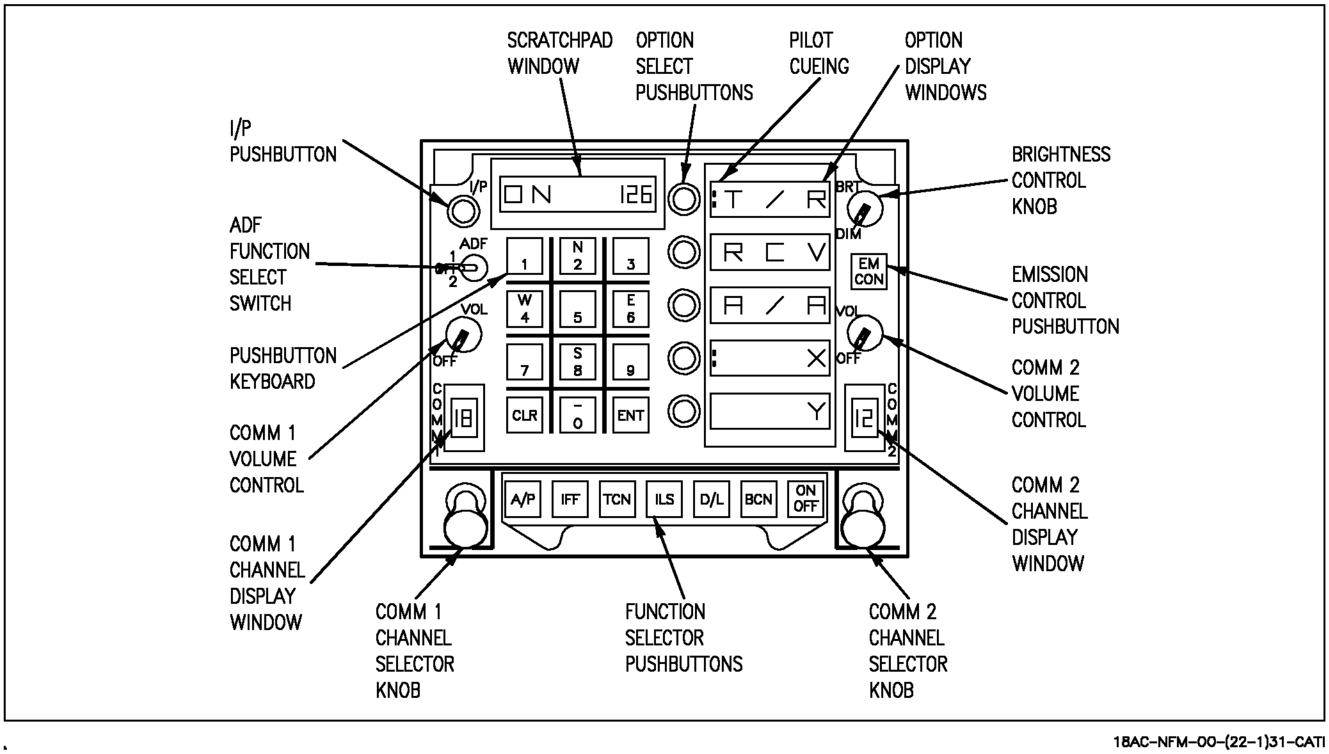

Figure 2-26. Upfront Control (UFC)

2.13.5.13 Channel Display Windows. When the corresponding radio is on, the selected channel (1-20, M or G) is displayed on the 16 segment alphanumeric display window. The diagonal display segment in the lower right quadrant of each display window illuminates whenever transmissions are received on comm 1 and comm 2, respectively.

2.13.6 Signal Data Computer (F/A-18C/D). The signal data computer (SDC), under mission computer control, records aircraft fatigue strain data, engine parameters when out of tolerance conditions occur, fuel information and aircraft and target parameters when targets are designated and weapons are delivered. It includes fuel transfer controls and gaging capabilities, incorporates ground support equipment fuel transfer and gaging fault isolation functions, and provides interface for multiple sensors and controls. It provides analog to digital conversion of aircraft parameters. In addition, BIT fail indications are stored in the SDC to be displayed by the maintenance status panel (MSP) for readout by maintenance personnel after the flight, or on the integrated fuel/engine indicator (IFEI) for readout during the flight.

The fuel format is available on any DDI by selection of the FUEL push button from the menu format, and the RESET SDC option is available from the fuel format. RESET SDC is used to reset the SDC by momentarily removing power to the SDC. When the push button is first depressed, the RESET portion of the button legend is boxed. The box is removed when the SDC reestablishes AVMUX communication or 15 seconds after the push button was depressed. The RESET SDC legend is removed from the fuel format if the CSC is not communicating on the AVMUX.

In aircraft equipped with GPS, it is important to manually load Zulu time as this aids in satellite acquisition. If local time is desired, it should be set after takeoff. The aircraft signal data computer is used to initialize GPS. At GPS power up, the SDC time and date are automatically sent to the GPS to aid it in the acquisition of satellites. Once the satellites are acquired for the first time, the GPS obtains a good satellite time. This time is then backloaded to the SDC, synchronizing the SDC with precise GPS time. The GPS is loaded with GPS precise time only once per cold start. Changing the SDC time or date with W on W reinitializes the GPS.

2.13.7 Video Tape Recording System (Aircraft 161353 THRU 164912 before AFC 207). The video tape recording system (VTRS) consists of a video tape recorder and a HUD video camera. In addition, the system utilizes other existing aircraft equipment.

2.13.7.1 DDI Video. Weapon video is provided by television or infrared sensors for display on the DDIs and for recording on the VTRS tape. Radar video is provided from the radar receiver for display on the DDI and for recording on the VTRS tape. The weapon and radar video recorded on the tape does not include the mission computer system symbology displayed on the DDI.

2.13.7.2 Video Tape Recorder. The video tape recorder accepts composite video from the HUD video camera or the left or right DDI along with headset audio, and provides a minimum of 30 minutes recording time on removable 3/4 inch U-matic tape cartridges. The headset audio is only available for recording when the KY-58 encryption function is inactive.

2.13.7.3 HUD Video Camera. The HUD black and white video camera (HVC) output of the HUD display superimposed on the image of the outside world is made available to the video tape recorder. The switches for operating the VTRS are on the HUD video camera control panel.

2.13.7.4 HUD Video Camera Control Panel. The HVC control panel contains a HUD/DDI selector switch, a mode selector switch, a BIT initiate pushbutton, and go/no-go indicators.

2.13.7.4.1 IFEI Brightness Control Knob. On aircraft 164865 AND UP, the IFEI brightness control knob provides variable IFEI lighting between OFF and BRT with the Mode switch on the interior light panel in either NITE or NVG position.

2.13.7.4.2 HUD/DDI Selector Switch. The HUD/DDI selector switch has positions of HUD, L DDI, and R DDI.

HUD	Head-up display imagery superimposed on the outside world is recorded.
L DDI	The radar or weapons video supplied to the left DDI is recorded.
R DDI	Information supplied to the right DDI same as left DDI and recorded.

2.13.7.4.3 Mode Selector Switch. The mode selector switch has positions of MAN, AUTO, and OFF.

MAN	In the manual mode the VTRS is recording continuously. The HUD/DDI selector switch can be set to the desired position for recording.
AUTO	If the aircraft is operating in the A/A or A/G master mode, the HUD video camera and the video tape recorder run continuously and records whatever is selected on the HUD/DDI selector switch. However, if the first detent on the trigger or the weapon release button is pressed, the VTRS automatically records the HUD display. If the A/G master mode is selected and the FLIR display is on either DDI, the VTR does not switch to record the HUD.
OFF	The VTRS is inoperative.

When the HUD video is being recorded as a result of a trigger switch or weapon release button actuation, the HUD video continues to be recorded for a preset overrun time after the control is released. For Sidewinder launches and gun firing, the overrun time is 5 seconds. For Sparrow launches and A/G weapon releases, the overrun time is 10 seconds.

2.13.7.4.4 BIT Initiate Pushbutton. The pushbutton is pressed to test the HUD video camera. The GO and NO GO balls are normally black. If the BIT test is good, the GO ball shows green. If the BIT test is not good the NO GO ball shows orange.

2.13.7.5 Event Mark. When the weapon release button is pressed, an event mark signal is supplied to the HUD video camera. At that time a black box is generated by the camera and appears in the upper left corner of the video signal going to the video tape recorder. When the trigger is actuated to the second detent position to launch a missile, the event mark is generated and recorded until the trigger is released.

2.13.7.6 Recorder On Light. The RCDR ON light, on the right warning/caution/advisory lights panel comes on when the recording system is recording.

2.13.8 Cockpit Video Recording System (Aircraft 164945 AND UP and Aircraft 163985 THRU 164912 after AFC 207). The Cockpit Video Recording System (CVRS) consists of three color auto aperture cameras, two electronic units (EUs), and two 8 mm video recorders. One camera records the HUD and the other two record the left and right DDIs in the front cockpit. One video recorder is dedicated to the RDDI while the other is switchable between the HUD and the LDDI. The DDI cameras, Video Sensor Heads (VSHs), are mounted on top of the canopy frame, one on each side, aft of the DDIs. An EU is mounted directly aft of each VSH.

2.13.8.1 DDI Video. Weapon video, provided by television or infrared sensors, and radar video, provided from the radar receiver, is available for display on the DDIs and recording on the CVRS tapes. The weapon and radar video recorded on the tape includes the mission computer system symbology displayed on the DDIs.

2.13.8.2 Video Tape Recorders. One video tape recorder accepts video from the HUD color video camera or the LDDI VSH, and the other video tape recorder accepts video from the RDDI VSH. Both recorders accept headset audio and each provides a minimum of 120 minutes recording time on removable video tape cartridges. The headset audio is only available for recording when the KY-58 encryption function is inactive.

2.13.8.3 HUD Video Camera. The HUD color video camera (HVC) output of the HUD display superimposed on the image of the outside world is made available to the video tape recorder.

2.13.8.4 CVRS Control Panel. The switches for operating the CVRS are on the HUD video camera control panel. The control panel contains an IFEI brightness control knob, a HUD/LDDI selector switch, and a mode selector switch.

2.13.8.5 IFEI Brightness Control Knob. The IFEI brightness control knob provides variable IFEI lighting between OFF and BRT with the Mode switch on the interior light panel in either NITE or NVG position.

2.13.8.6 HUD/LDDI Selector Switch. The HUD/LDDI selector switch has positions of HUD and LDDI.

HUD	Head-up display imagery superimposed on the outside world is recorded.
LDDI	The radar or weapons video supplied to the LDDI is recorded

2.13.8.7 Mode Selector Switch. The mode selector switch has positions of MAN, AUTO, and OFF.

MAN	In the manual mode, the CVRS is recording continuously. The HUD/LDDI selector switch can be set to the desired position for recording.
AUTO	If the aircraft is operating in the A/A or A/G master mode, the video tape recorders run continuously. Selection of the first detent of the trigger, or pressing the weapon release button, automatically records the HUD display regardless of the HUD/LDDI switch position. If in A/G master mode with the FLIR display on either DDI, the HUD is not recorded automatically.

OFF	The CVRS is inoperative.

When the HUD video is being recorded as a result of a trigger switch or weapon release button actuation, the HUD video continues to be recorded for a preset overrun time after the control is released; for Sidewinder launches and gun firing, the overrun time is 5 seconds; for Sparrow launches and A/G weapon releases, the overrun time is 10 seconds.

2.13.8.8 BIT Initiate Pushbuttons. The pushbutton on the HUD video camera or the pushbuttons on the EUs are pushed to BIT the HUD video camera and/or EU/VSH. The GO and NO GO Light Emitting Diodes (LEDs) are normally not illuminated. If the BIT test is good, the GO LED shows green. If the BIT test is not good, the NO GO led shows amber.

2.13.8.9 Event Marker. When the weapon release button is pressed, an event mark signal is supplied to the HUD video camera. At that time a black box is generated by the camera and appears in the upper left corner of the video signal going to the video tape recorder. When the trigger is pressed to the second detent position to launch a missile, the event marker is generated and recorded until the trigger is released.

2.13.8.10 Recorder On Light. The RCDR ON light, on the right warning/caution/advisory lights panel, comes on when the recording system is recording.

2.13.9 Armpit Camera System. The XC-75 is a monochrome video camera module. It uses a CCD (charge coupled device) solid state image sensor. The system is mounted in the aircraft in place of the forward night vision goggle (NVG) floodlight aft of the canopy control switch box. The camera system measures 1 3/4 X 1 3/16 X 3 5/8 inches , weighs approximately 5 ounces and is designed to operate in temperatures from -5 to 45 ° Celsius. The armpit camera is used to record information from the DDI.

2.13.10 ALE-39 Countermeasures Dispensing Set. The countermeasures dispensing set (CMDS) is used to dispense chaff, flares, and jamers for self protection against enemy radars and missiles. Refer to A1-F18AC-TAC series.

2.13.11 ALE-47 Countermeasures Dispensing Set. The countermeasures dispensing set (CMDS) uses information from various Electronic Warfare (EW) systems to generate countermeasures dispensing programs. Refer to A1-F18AC-TAC series.

2.13.11.1 ALE-47 Advisories. D LOW is displayed when any of the loaded categories' BINGO levels are reached. The dispense misfire D BAD advisory is displayed when a misfire has occurred.