Table of Contents

List of Figures

List of Tables

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SECTION 3. OPERATION

3.1. GENERAL

This section addresses the operation of the FTDs from the maintenance technician's point of view. This section covers only those phases of operation that a technician would be concerned with for operation of the FTDs. For more information on the operation of the FTDs from the Instructor Operator point of view, consult the Instructor's Positional Handbook for the Flight Training Device. The Digital Acquisition System II (DAS II) is discussed in a separate supplement.

3.2. CONTROLS AND INDICATORS

The following is a description of the operational and maintenance controls and indicators located on each of the subsystem components for the FTDs. DAS II is addressed in a separate supplement. The subsystems include:

- Power Distribution System
- Host Computer
- Aural Cue System
- Digital Remote Interface System
- Digital Acquisition System
- Electric Control Loading/Motion Seat
- Flight Deck I/O
- Instructor Operator Station (IOS)
- Student Station
- Fire Detection

3.2.1. Power Distribution System

The power distribution system consists of many components that contain both operational and maintenance controls and indicators. These components include:

- AC Power Controller Assembly
- 9A1A2 Patch Assembly
- Uninterruptible Power Supply
- Remote Digital Servo Power Controller
- Visual Projector Remote Power Controller (OFT only)

The following paragraphs describe the controls and indicators used for the general operation of the Power Distribution System.

3.2.1.1. AC Power Controller (9A1A1)

The AC Power Controller provides a central distribution point and overload protection for the simulator AC branch circuits and the voltages for the simulator Emergency Power Off circuit and indicators. The AC Power Controller controls and indicators include:

- Main Power Circuit Breaker
- Main Power Indicators
- 24VAC Power Circuit Breaker
- MAIN CONTROL START Switch
- MAIN CONTROL STOP Switch
- EMERGENCY STOP Switch
- Main Power Branch Circuit Breakers
- ELAPSED TIME Meter

Figure 3-1 shows the location of the controls and indicators.

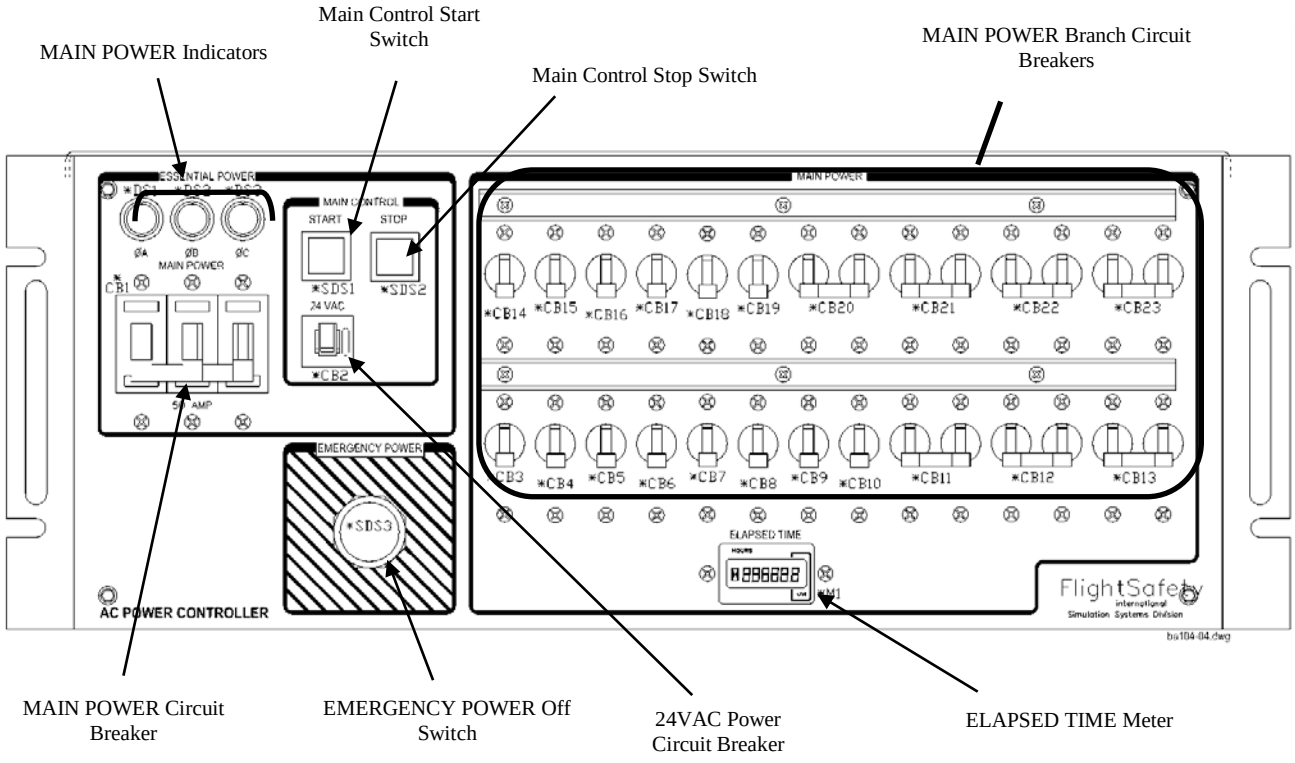


Figure 3-1. AC Power Controller Controls and Indicators

3.2.1.1.1. Main Power Circuit Breaker (CB1)

The Main Power Circuit Breaker is a three-pole, 50-amp, switchable circuit breaker located in the top left portion of the AC Power Controller. CB1 provides fault protection for each of the three phases (ØA, ØB, and ØC) of the input power to the AC Power Controller from the facility power.

3.2.1.1.2. Main Power Indicators

The Main Power indicators are located above the MAIN POWER circuit breaker. The three indicators illuminate green when each of the three phases (ØA, ØB, and ØC) of facility power is available to the system.

3.2.1.1.3. Main Control Start Switch (SDS1)

The AC Power Controller Main Control Start switch is located in the top left portion of the AC Power Controller adjacent to the Main Power indicators. It is a single-pole, single-throw, normally open, momentary switch that, when pressed, energizes the main power bus contactor (K1) and controls the IOS Start circuit and the elapsed time indicator M1.

3.2.1.1.4. Main Control Stop Switch (SDS2)

The AC Power Controller Main Control Stop switch is located in the top left portion of the AC Power Controller adjacent to the Main Control Start switch. It is a single-pole, single-throw, normally closed, momentary switch that, when pressed, removes power from the main power bus contactor (K1) and deactivates the IOS Start circuit and the elapsed time indicator M1.

3.2.1.1.5. 24 VAC Circuit Breaker

The 24VAC circuit breaker is located in the top left portion of the AC Power Controller below the Main Control Start switch. It is a ¾-amp, single-pole, thermal circuit breaker that provides fault protection for the 24VAC transformer (T1) and the simulator Emergency Power Off circuit. When an overload occurs, the breaker opens and a white indicator extends for a visual trip indication.

3.2.1.1.6. Emergency Power Off Switch (SDS3)

The Emergency Power switch is a red, illuminated, push-button switch located in the bottom left portion of the AC Power Controller. When pressed, it removes all AC power from the simulator and equipment cabinets.

3.2.1.1.7. Main Power Branch Circuit Breakers (CB3-CB23)

The Main Power branch circuit breakers are single- and double-pole switchable circuit breakers located in the middle section of the AC power controller. These 277V, 50/60Hz magnetic circuit breakers are rated for 15 amps of service with a manual reset-only function. They provide overload protection for the various simulator subsystems. Single-pole circuit breakers protect subsystems that require one phase of 120VAC. Double-pole circuit breakers protect subsystems that require 208VAC. Each single- or double-phase system circuit breaker will trip even when the handle is forcibly held in the ON position. Legend plates above the breakers identify each circuit breaker function.

3.2.1.1.8. Elapsed Time Meter (M1)

The solid-state elapsed time meter is located below the Main Power branch circuit breakers. It only counts time with the main control start switch ON. The readout is primarily useful for maintenance records and is not intended as a “time of day” clock.

3.2.1.2. 9A1A2 Patch Assembly

The 9A1A2 Patch assembly in the 9A1 Equipment cabinet provides a central distribution point for AC and DC power to the various simulator systems. It contains components for control (relays), fault protection (circuit breakers and fuses), and power conversion (power supply and reference generator). The controls and indicators found on the Patch assembly are listed below and are discussed in the following paragraphs.

- Circuit Breakers
- Fuses
- ±10V Reference Generator

Figure 3-2 shows the location of the components.

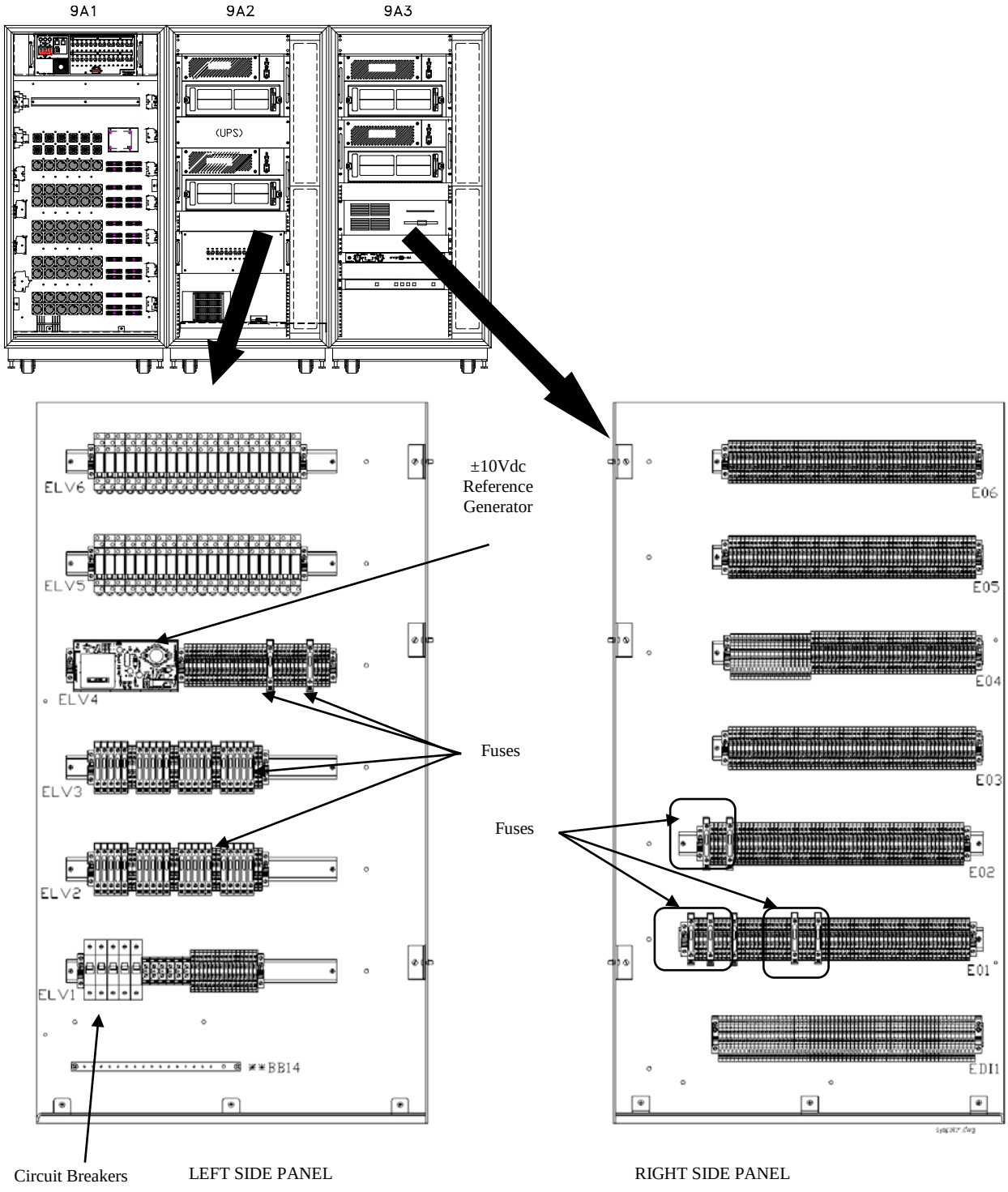


Figure 3-2. 9A1A2 Patch Assembly

3.2.1.2.1. Circuit Breakers

The 20-amp circuit breakers located on the ELV1 component mounting DIN rails provide fault protection for various simulator systems. Figure 3-3 is an illustration of the circuit breakers.

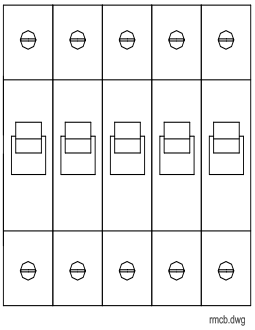


Figure 3-3. Rail-mounted Circuit Breakers

3.2.1.2.2. Fuses

The fuses are located on the E01, E02, ELV2, ELV3, and ELV4 component-mounting DIN rails. Fuse holders are rail-mounted and allow for fuses with various ampere ratings of service to be used. They provide fault protection for the various simulator systems. Figure 3-4 is an illustration of the fuses.

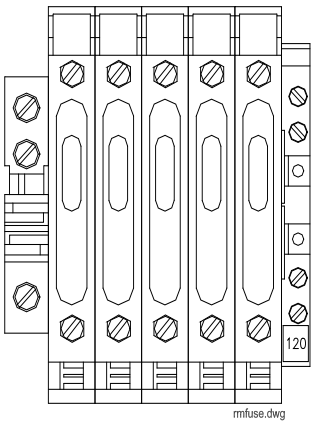


Figure 3-4. Rail-mounted Fuses

Table 3-1. 9A2A1 System Patch Fuse Listing

FUSE #	SYSTEM	DRAWING #
F01	A1 Main Panel Lighting Power Supply	AGL002-1
F02	Trim Position Indicator	AGE002-12
F03	Master Battery “ON” - DI	AFG002-2
F04	A4Battery Bus Dimmer	AGL008-1
F05	Standby Compass and Angle of Attack Indicator	AGA001-1 & 2
F06	Accelerometer and Standby Airspeed Indicator	AGA002-3 & 4
F07	Standby Horizon and Standby Altimeter	AGA002-5 & 6
F08	Discrete Input Pull-ups and Cockpit lamps	ACK002-2
F10	Master Generator “ON” - DI	AFG002-2
F11	(K09) Clock	AGA002-16
F12	(K10) ADI Display	AGA023-1
F13	(K11) HSI Display	AGA023-1
F14	(K12) Primary Display	AGA031-1
F15	(K13) Engine Fluid Data Display	AGA032-1
F16	(K14) Secondary Engine Display	AGA033-1
F17	(K15) TA/Vertical Velocity Indicator	AGA041-1
F18	(K16) Airspeed Indicator	AGA042-1
F19	(K17) Altitude Indicator	AGA043-1
F20	(K18) GPS Control Panel	AGA052-1
F21	Radio Management Unit, RMU DC/DC Converter Oxygen Regulator Panel Lighting	AGA063-2 AGF002-4
F22	(K21) Standby UHF Control Panel	AGA064-1
F23	(K03) A3 Emergency Light Dimmer	AGL004-1

F24	Instructors Console EL BRT/DIM Knob	ABE095-8
F25	PCL Control Driver (Particle Brake NOT USED)	ABE095-8
F26	Relay Coil Power K01 – K31	AGK002-10
F27	+/- 10V Reference Power Supply PS2	AGK002-5
F28	Circuit Breaker Panel Circuit Card 1A5A8	AGE002-10
F29	Circuit Breaker Panel Circuit Card 1A5A8	AGE002-10
F30	Input to PS2 +/-15V Power Supply	AGK002-5
F31	6A5A1A2 RS-232/RS-422 Converter for PCL Motor	ABE095-8
F32	Circuit Breaker Panel Circuit Card 1A6A7	AGF002-5
F33	Inclinometer	AGA002-2
F34	EFIS Control Panel, Seat Restraint Connection	AGA021-2, ACJ412-9
F35	Pilot Stick Shaker	AGH002-2
F36	NOT USED	
F37	Circuit Breaker Panel Circuit Card 1A6A7	AGF002-5
F38	Circuit Breaker Panel Circuit Card 1A6A7	AGF002-5
F39	Seat Restraint Connection	ACJ412-9
F40-F55	NOT USED	
F56	+ 15 V output from +/- 15V Power Supply	
F57	- 15 V output from +/- 15V Power Supply	

3.2.1.2.3. ±10V Reference Generator

The ±10VDC Reference Generator is located on the 9A1A2 ELV4 component-mounting rail. It is a rail-mounted, DC-to-DC converter that converts ±28VDC to ±10VDC. It has three LEDs and three fuses. The three LEDs show when the input voltage and output voltages are available. The fuses consist of one 500mA and two 300mA, re-settable fuses. When the device undergoes a large, abrupt increase in resistance due to an over-current situation, or when high temperature heats it above the threshold, the device will trip. Once it has cooled, it will reset automatically.

DS1 – illuminates green when input voltage is available

DS2 – illuminates green when +10VDC output voltage is available

DS3 – illuminates green when -10VDC output voltage is available

F1 – provides over-current protection for the Reference Generator

F2 – provides fault protection at the +10VDC output of the Reference Generator for devices requiring +10VDC.

F3 – provides fault protection at the -10VDC output of the Reference Generator for devices requiring -10VDC.

Figure 3-5 is an illustration of the rail-mounted reference generator.

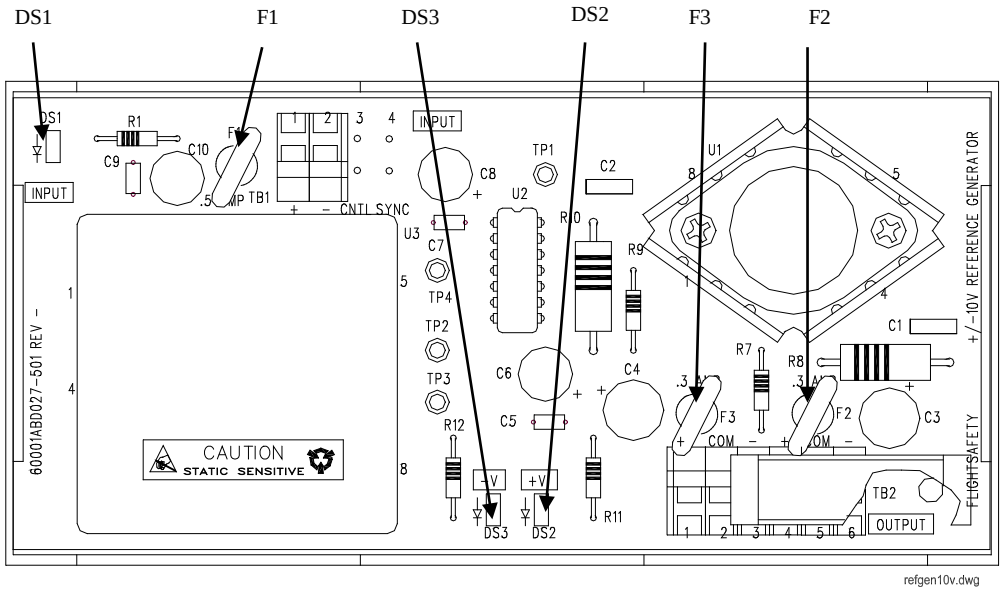


Figure 3-5. ±10V Reference Generator

3.2.1.3. Uninterruptible Power Supply (UPS) (9A2A2)

The UPS provides power to the ECL Computer, FDK I/O Computer, Host Computer, IOS Computer, Aural Cue System Computer, Visual Control Equipment, Sound Amplifier, DAS (or DAS II), and CompuSwitch (mouse and keyboard switch) if there is a site power failure. Figure 3-6 shows the location. The controls and indicators for the power supply are listed below and are discussed in the following paragraphs.

Front Panel Controls and Indicators

Rear Panel Controls and Indicators

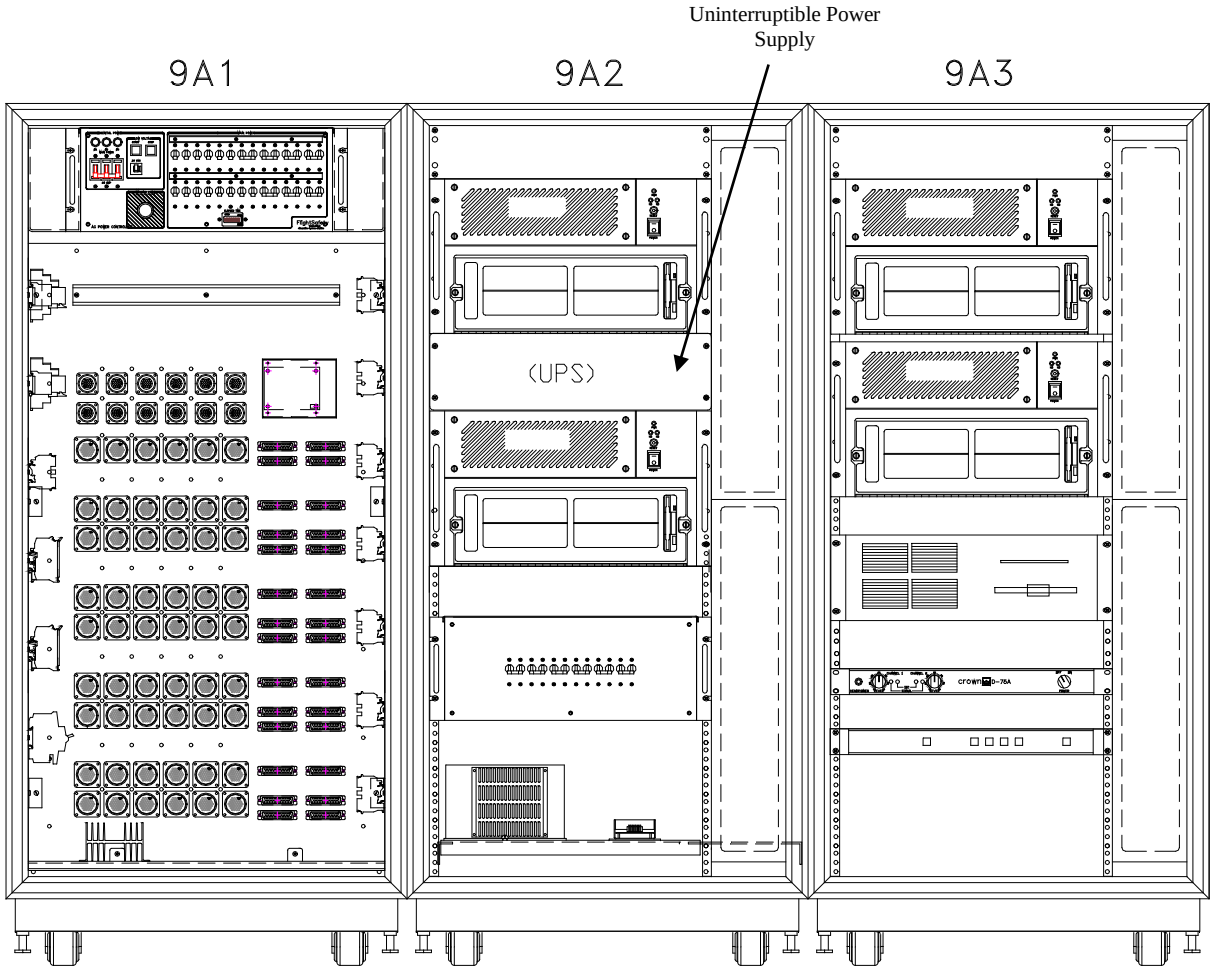


Figure 3-6. Uninterruptible Power Supply Location

3.2.1.3.1. Front Panel Controls and Indicators

Several controls and indicators on the UPS front panel provide information on its status. See Figure 3-7.

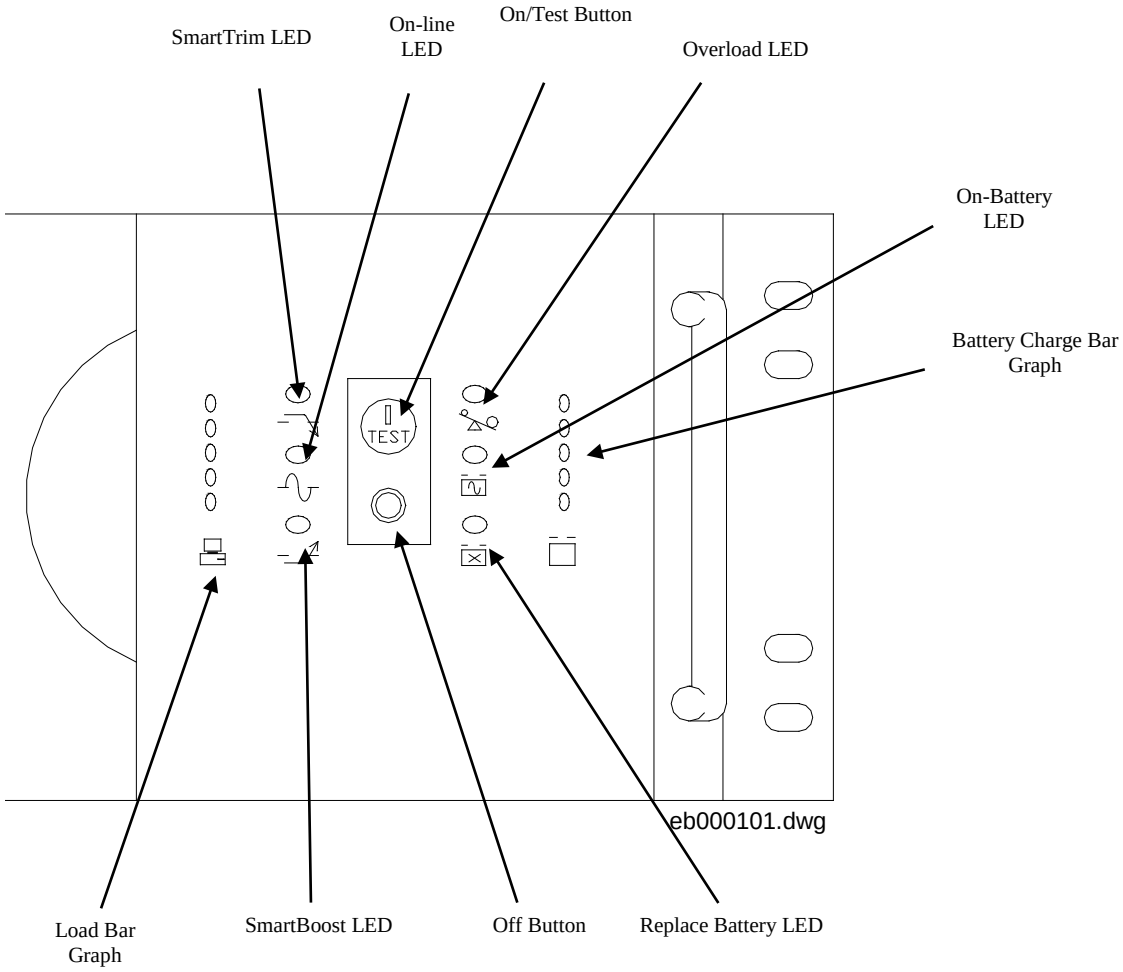


Figure 3-7. UPS Front Panel Controls and Indicators

Load Bar Graph

The 5-LED display on the left shows the power drawn from the UPS. See Figure 3-7 and Figure 3-8. The display indicates the percentage of the UPS' rated capacity. For example, if three LEDs are lit, the load is drawing between 50% and 67% capacity. If all five LEDs illuminate, thoroughly test your complete system to make sure that the UPS will not become overloaded.

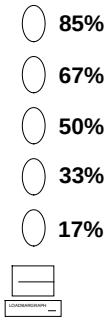


Figure 3-8. Load Bar Graph

SmartTrim LED

The SmartTrim LED illuminates to indicate that the UPS is compensating for a high voltage.

On-line LED

The On-line LED illuminates when the UPS is supplying utility power to the loads.

SmartBoost LED

The SmartBoost LED illuminates to indicate that the UPS is compensating for a low voltage.

On/Test Button

This button powers up the UPS. With the UPS plugged in, press and release the On/Test button to supply power to the loads. The loads immediately power while the UPS performs a self-test.

This button can also initiate a self-test. The UPS performs a self-test at power-up and every two weeks thereafter by default. During the self-test, the UPS briefly operates the loads on-battery. If the UPS passes the self-test, it returns to on-line operation. If the UPS fails the self-test, it immediately returns to on-line operation and lights the Replace Battery LED.

Loads are not affected by a failed test. Recharge the battery overnight and perform the self-test again. If the Replace Battery LED is still on, replace the battery. Refer to Section 5 of this manual for battery replacement procedures.

Off Button

The Off button turns off power to the loads. Press and release the button to remove power.

Overload LED

The Overload LED is located to the right of the On/Test button. When loads exceed UPS capacity, the overload LED illuminates, the UPS emits a sustained tone, and the input circuit breaker located on the UPS rear panel may trip. The alarm remains on until the overload is removed. Disconnect nonessential load equipment from the UPS to eliminate the overload. If AC power exists and the circuit does not trip during overload, the loads are still powered. If the circuit breaker trips and the UPS attempts to go on-battery, the output AC will shut down.

On Battery LED

The On-Battery LED is the middle indicator located to the right of the On/Test button. During on-battery operation, the On-Battery LED illuminates and the UPS sounds an audible alarm consisting of four beeps every 30 seconds. The alarm stops when the UPS is returned to on-line operations.

Replace Battery LED

The Replace Battery LED is the bottom indicator located to the right of the On/Test button. If the battery fails a self-test, the UPS will emit short beeps for one minute and the Replace Battery LED will illuminate. The UPS repeats the alarm every five hours. Perform the self-test procedure to confirm replace battery conditions. The alarm stops when the battery passes the self-test.

Battery Charge Bar Graph

The 5-LED display on the right of the front panel shows the present charge of the UPS' battery as a percentage of the battery's capacity. See Figure 3-9. When all five LEDs illuminate, the battery is fully charged. The top LED is extinguished whenever the battery is not 100% charged. When the LEDs are flashing, the battery can supply less than the "low battery warning interval" time for the load.

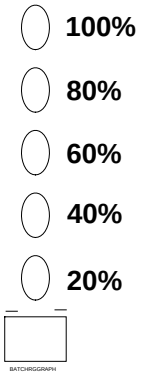


Figure 3-9. Battery Charge Bar Graph

Utility Voltage Bar Graph

The 5-LED display on the right of the front panel, when in the diagnostic mode, displays the utility voltage. With the UPS plugged into the normal utility power, press and hold the On/Test button for approximately four seconds to illuminate the utility voltage bar, the 5-LED display on the right of the front panel showing the utility input voltage. See Figure 3-10 for the voltage reading.

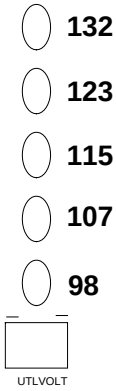


Figure 3-10. Utility Voltage Bar Graph

The display indicates that the voltage is between the displayed value from the list and the next higher value (e.g., three LEDs lit (98, 107, and 115)), the input voltage is between 115 and 123VAC. If no LEDs illuminate and the UPS is plugged into a working AC power outlet, the line voltage is extremely low. If all five LEDs illuminate, the line voltage is extremely high and should be checked by an electrician.

3.2.1.3.2. Rear Panel Controls and Indicators

Several controls and indicators on the UPS rear panel provide information on the UPS status. See Figure 3-11 for their location.

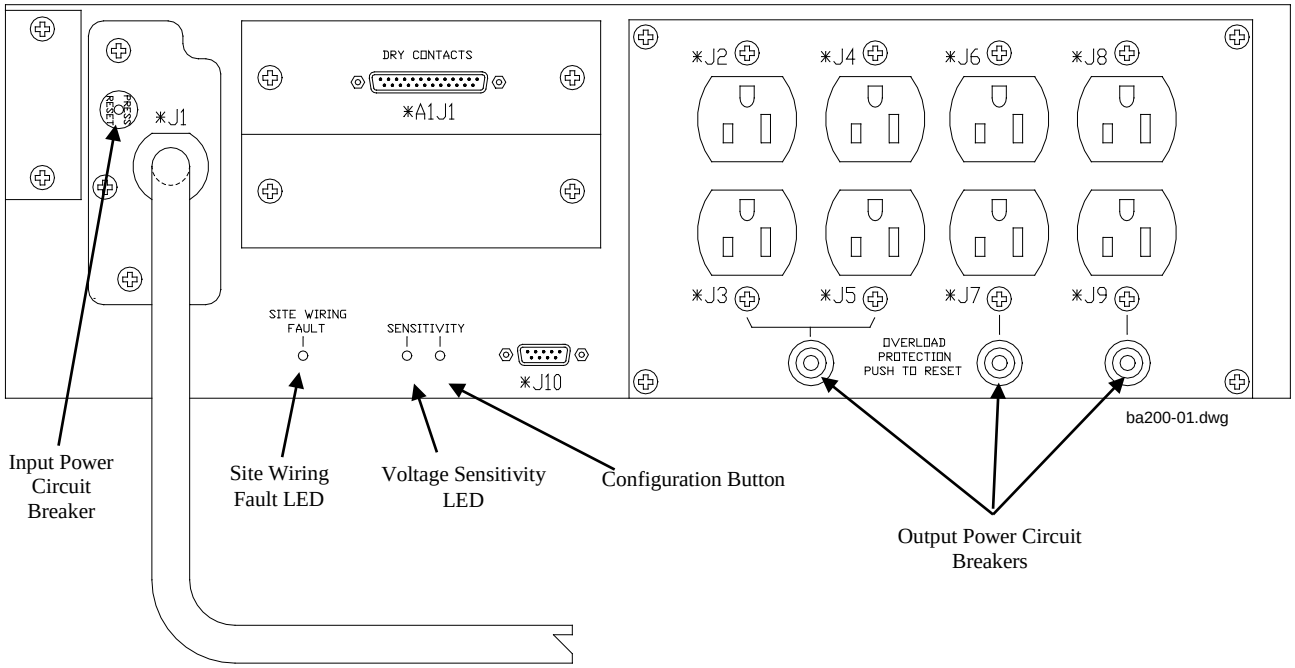


Figure 3-11. UPS Rear Panel Controls and Indicators

Input Power (J1) Circuit Breaker

A re-settable circuit breaker is installed at the input of the UPS power to protect the UPS from power surges.

Site Wiring Fault Indicator

The Site Wiring Fault LED illuminates red when there is a problem with the site wiring. If the site wiring fault indicator illuminates, contact a facility electrician.

Voltage Sensitivity Configuration Button and Indicator

The UPS Voltage Sensitivity can be adjusted using the configuration button. To reduce UPS sensitivity, press the configuration button on the rear panel using a pointed object such as a pen. Press it once to reduce the UPS' sensitivity. Press it again to set the sensitivity to low. Press the button a third time to reset normal sensitivity.

When the UPS is set to normal sensitivity, the green Voltage Sensitivity LED is brightly lit. When it is set to reduced sensitivity, the LED is dimly lit. When it is set to low sensitivity, the LED is off.

J2 through J9 Overload Protection

Three re-settable circuit breakers are installed at the output of the UPS. One circuit breaker provides overload protection J2 through J5 output, one is for J6 and J7, and the last is for J8 and J9.

3.2.1.4. Digital Servo Remote AC Power Controller (9A2A5)

The Digital Servo Remote AC Power Controller provides a central distribution point and overload protection for the primary controls and the seat. The controls and indicators found on the AC Power Controller include six circuit breakers located on the front panel of the power controller and a rail-mounted fuse and switch located on the inside of the power controller box.

3.2.1.4.1. Circuit Breakers (CB1 through CB6)

Six circuit breakers are located on the front panel of the Digital Servo Remote AC Power Controller. See Figure 3-12 for the location. Two-pole, 20-amp, magnetic, switchable circuit breakers provide fault protection for the elevator, aileron, rudder, left and right toe brake, and the seat servo amplifiers. The circuit breakers are assigned as follows.

CB1	Elevator
CB2	Aileron
CB3	Rudder
CB4	Left Toe Brake
CB5	Right Toe Brake
CB6	Seat (not used in UTD)

NOTE

CB6 typically protects the Seat servo amplifier circuit.

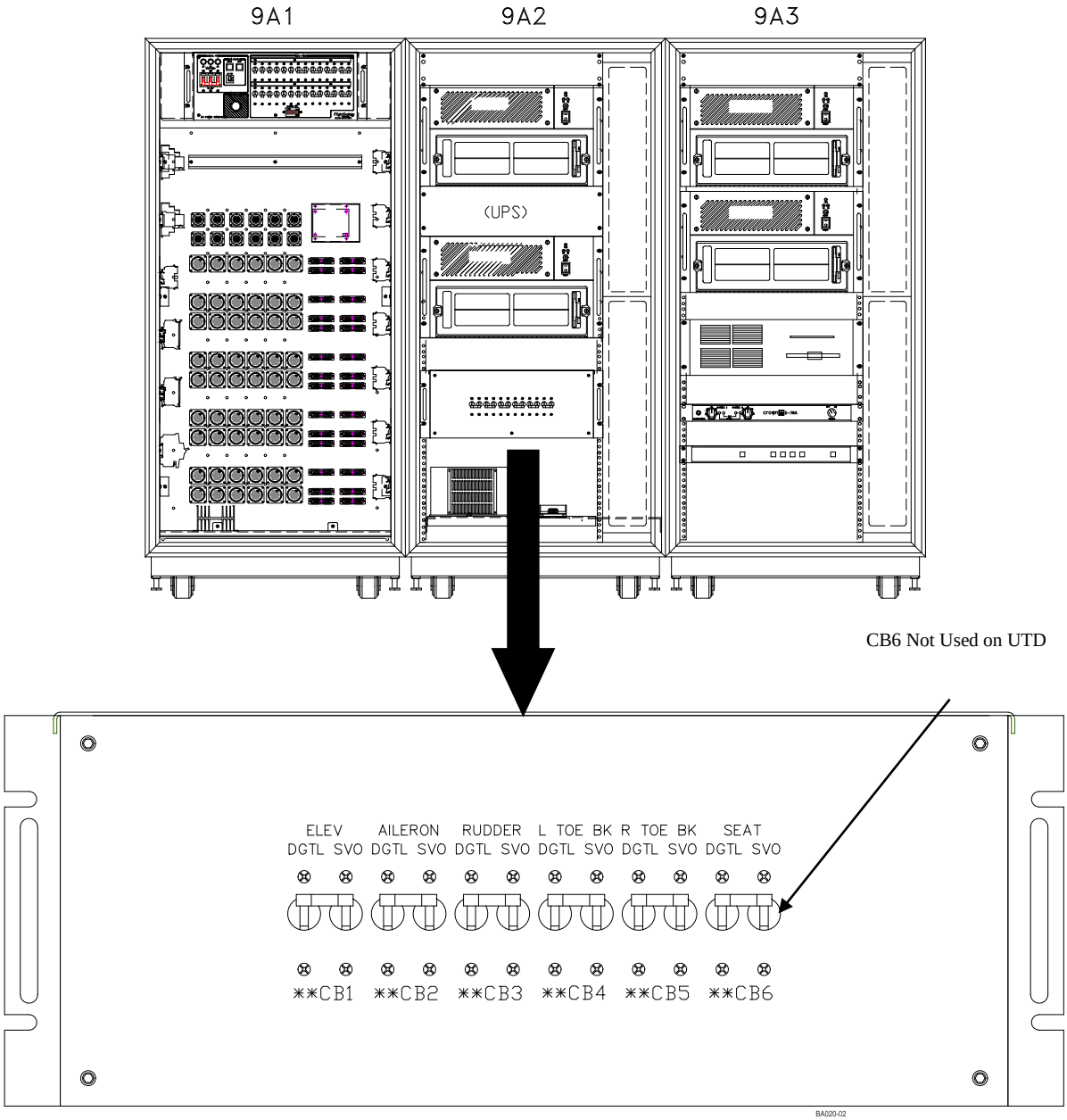
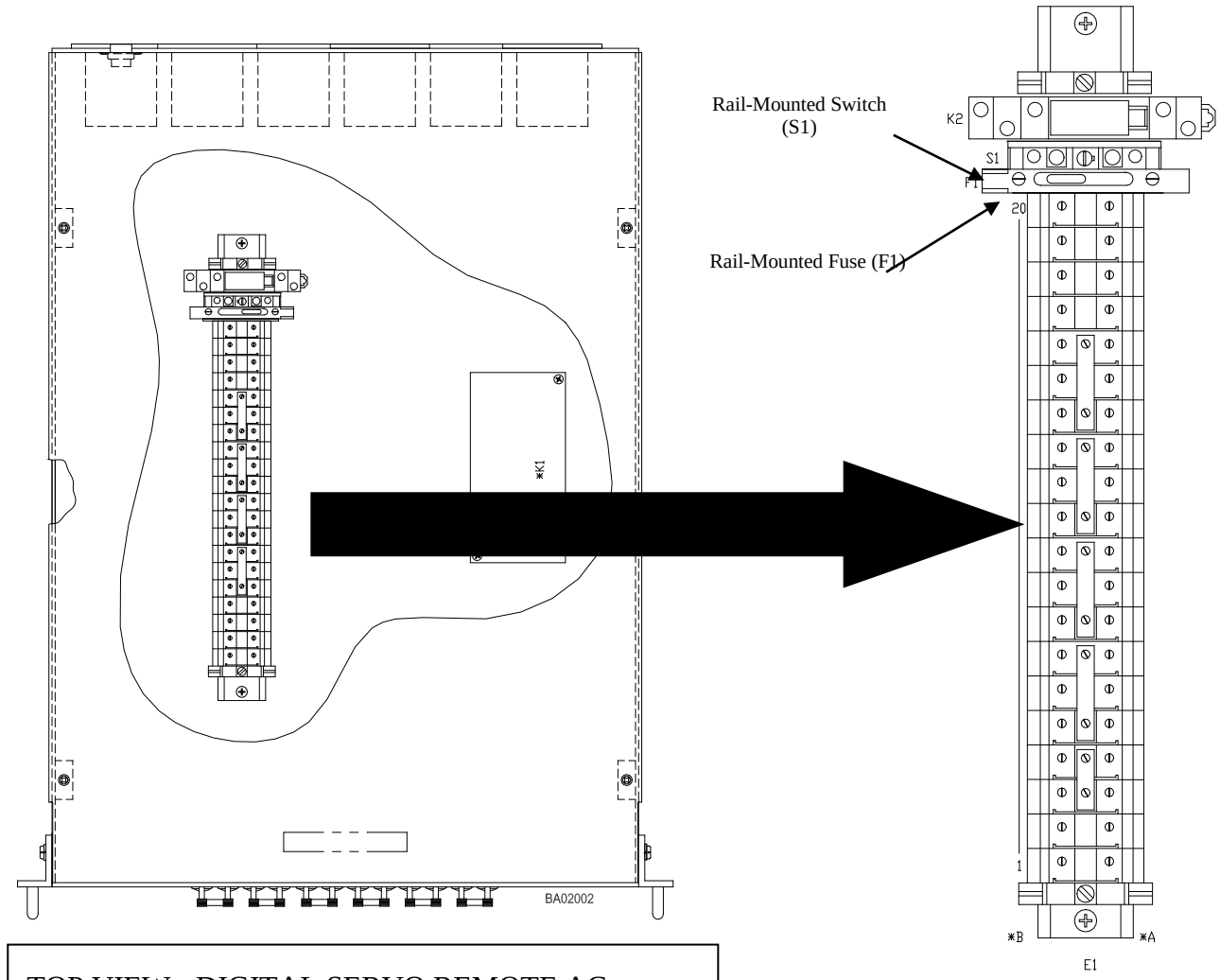


Figure 3-12. Digital Servo Remote AC Power Controller (Front Panel)

3.2.1.4.2. Fuse

Fuse F1 is located inside the power controller on the E1 component-mounting rail. The fuse holder is rail-mounted and has a 1-ampere, Slo-Blo fuse installed. It provides fault protection for the power controller control circuit. See Figure 3-13.



TOP VIEW - DIGITAL SERVO REMOTE AC POWER CONTROLLER (COVER REMOVED FOR CLARITY)

Figure 3-13. Digital Servo Remote AC Power Controller (Inside View)

3.2.1.4.3. Switch

The switch S1 is a single-pole, single-throw switch located inside the power controller on the E1 component-mounting rail. The rail-mounted switch is disconnects and tests the K1 contactor and circuitry to the digital servos. This S1 switch must be open for normal operation. Refer to Figure 3-13.

3.2.1.5. Visual Projector Remote Power Controller (OFT only)

The Visual Projector Remote Power Controller (10A0A1) is only used on the OFT and is located on the top cap of the visual dome. See Figure 3-14 for the location of the power controller. It provides a central distribution point and overload protection for the visual projectors power. The controls and indicators found on the Power Controller include five rail-mounted circuit breakers, a rail-mounted fuse, and a rail-mounted switch located on the inside of the power controller box. Figure 3-15 shows the location of the components.

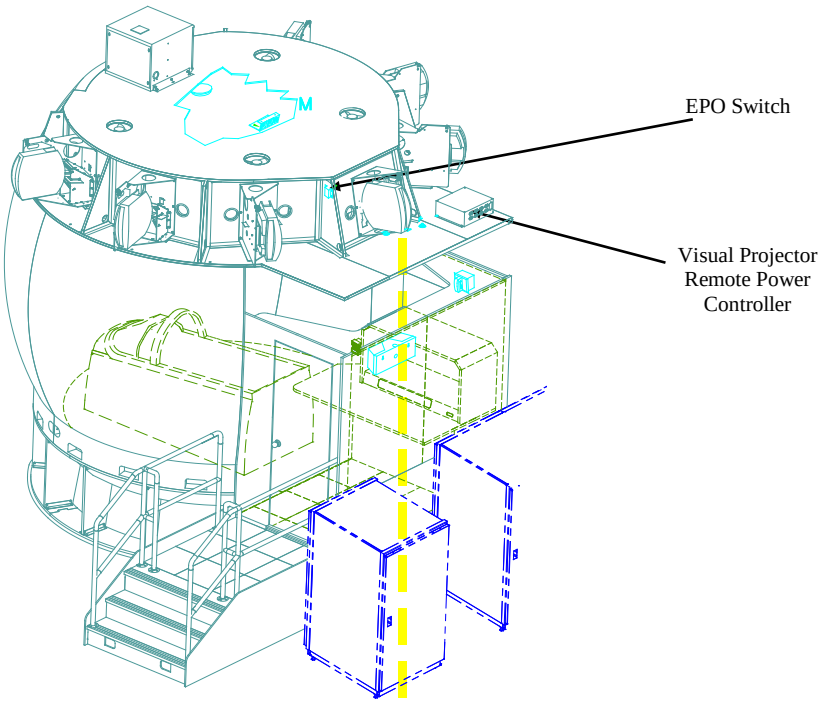


Figure 3-14. Visual Projector Remote Power Controller Location

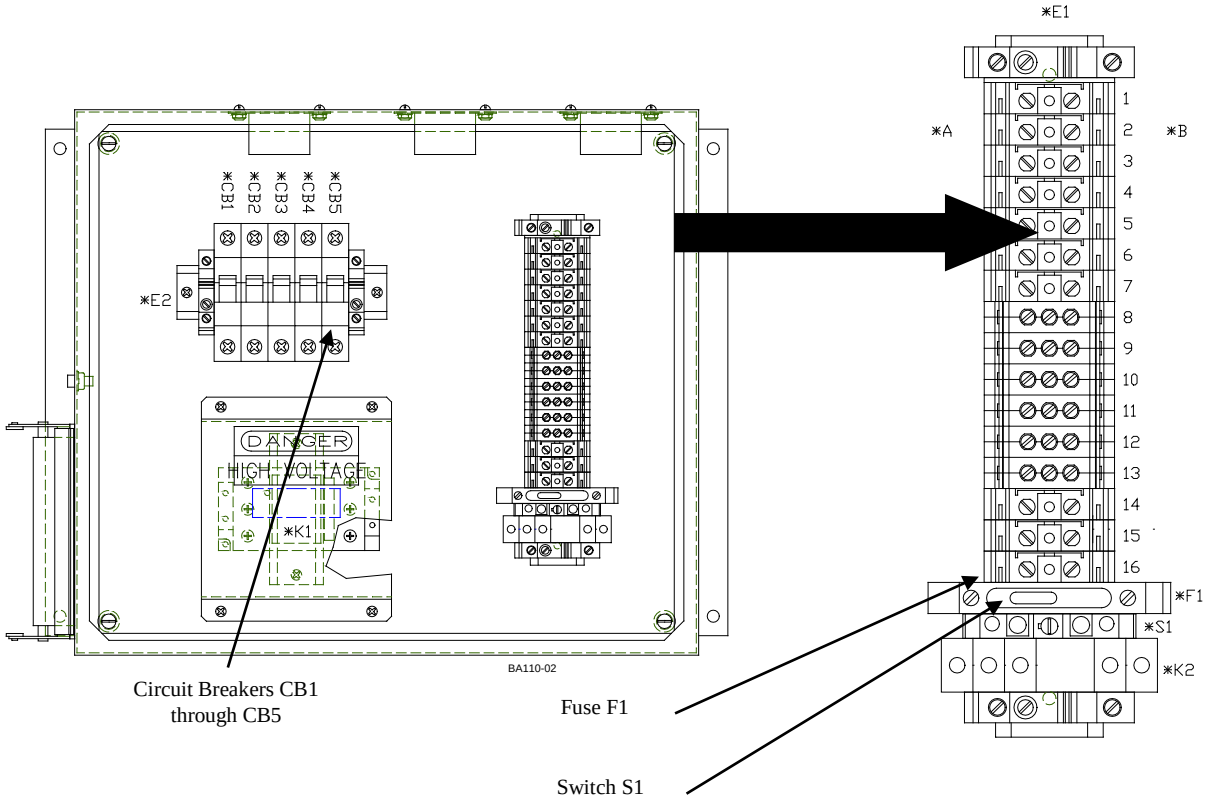


Figure 3-15. Visual Projector Remote Power Controller Controls and Indicators

3.2.1.5.1. Circuit Breakers (CB1 through CB5)

Five circuit breakers are located on the E2 component rail on the inside of the controller box. They are miniature 10-amp, single-pole, rail-mounted circuit breakers that provide fault protection for the visual projectors.

3.2.1.5.2. Fuse

Fuse F1 is located inside the power controller on the E1 component-mounting rail. The fuse holder has a 1-ampere, Slo-Blo fuse installed. It provides fault protection for the power controller control circuit.

3.2.1.5.3. Switch

The switch S1 is a single-pole, single-throw switch located inside the power controller on the E1 component-mounting rail. The switch is used as the disconnect switch for the E1 terminal block. It is also used for testing the K1 contactor and control circuitry for the visual projectors. This S1 switch must be open for normal operation.

3.2.2. Host Computer Controls and Indicators (9A3A1)

The Host Computer has controls and indicators both on the front and on the rear of the chassis.

3.2.2.1. Host Computer Front Panel

Figure 3-16 shows the front view of the Host Computer chassis. The front of the chassis has an AC power switch with a green indicator showing when power is ON. Two HD indicators below the power indicator show when the hard drives are in operation. The push button reset switch, when depressed, will reboot the Host computer.

A 3.5-inch floppy disk drive is installed in the computer chassis. It has an LED that illuminates when the disk drive is being accessed and a push button to eject the disk.

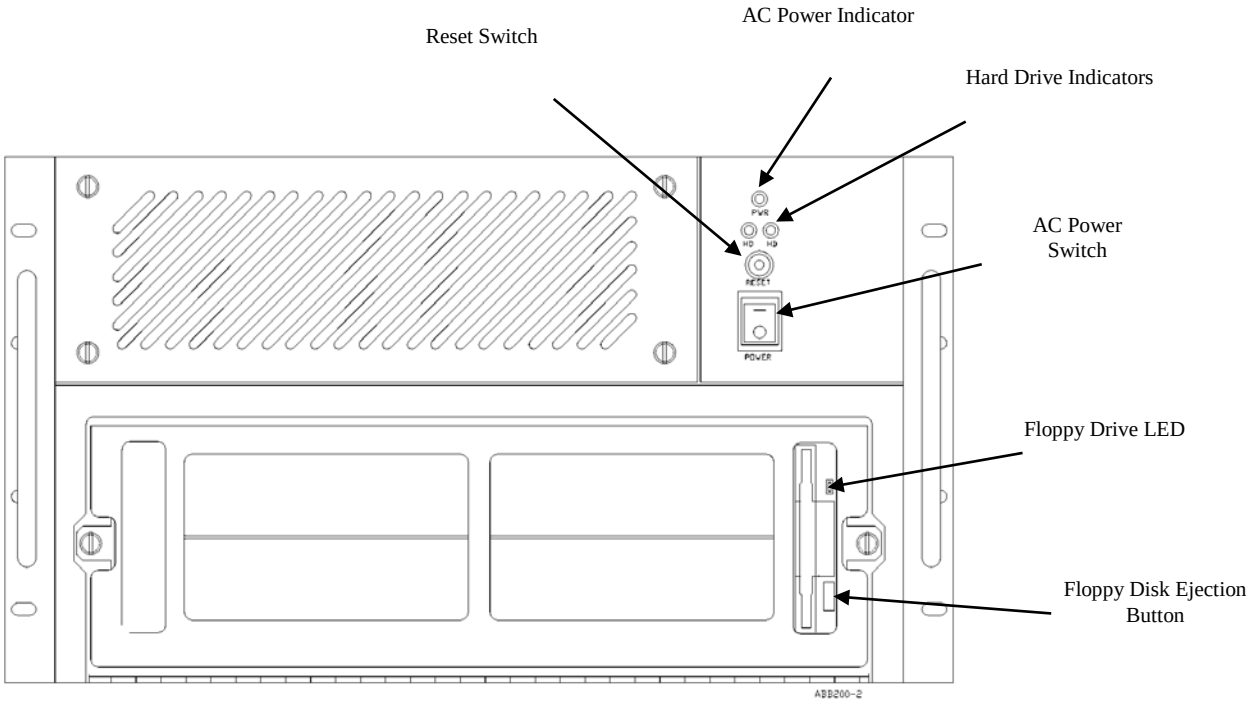


Figure 3-16. Host Computer Chassis Controls and Indicators (front view)

The Navy T-6A Host Computer differs greatly and will not be covered in this manual.

3.2.2.2. Host Computer Rear Panel

The rear of the chassis contains controls and indicators for the power supplies and the circuit cards that are installed in the chassis.

3.2.2.2.1. Power Supplies Controls and Indicators

Two hot-swappable, 300-watt power supplies are located in the Host Computer chassis. Each has a power on/off switch and a green LED indicating that the power supply is on. Between the two power supplies are two LEDs that illuminate green to indicate the operational status of the power supplies. When there is a power supply failure an audible alarm sounds. The push button below the lights will turn off the alarm. See Figure 3-17 for the location.

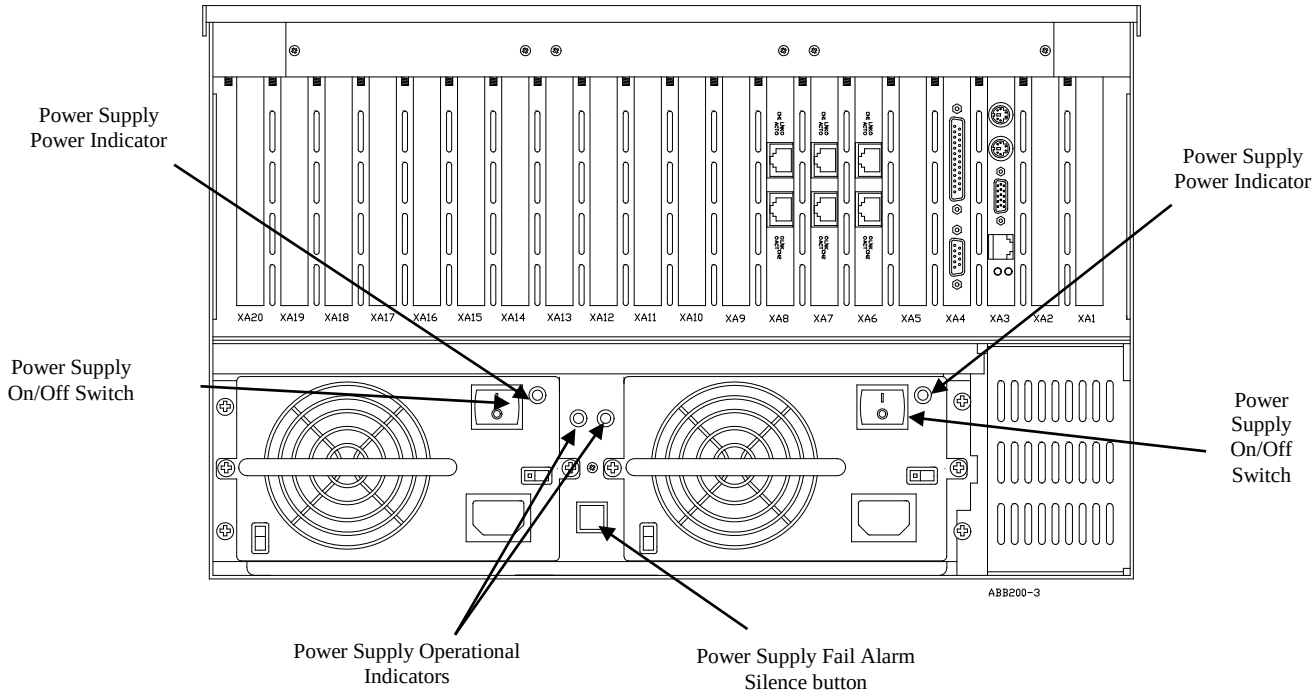


Figure 3-17. Host Computer Power Supplies Controls and Indicators

3.2.2.2.2. Circuit Card Controls and Indicators

Two circuit cards in the host computer, the PCI Bus Single Board Computer circuit card, and the Network Interface circuit (NIC) card have status indicators. Figure 3-18 shows the location of each card in the host computer chassis.

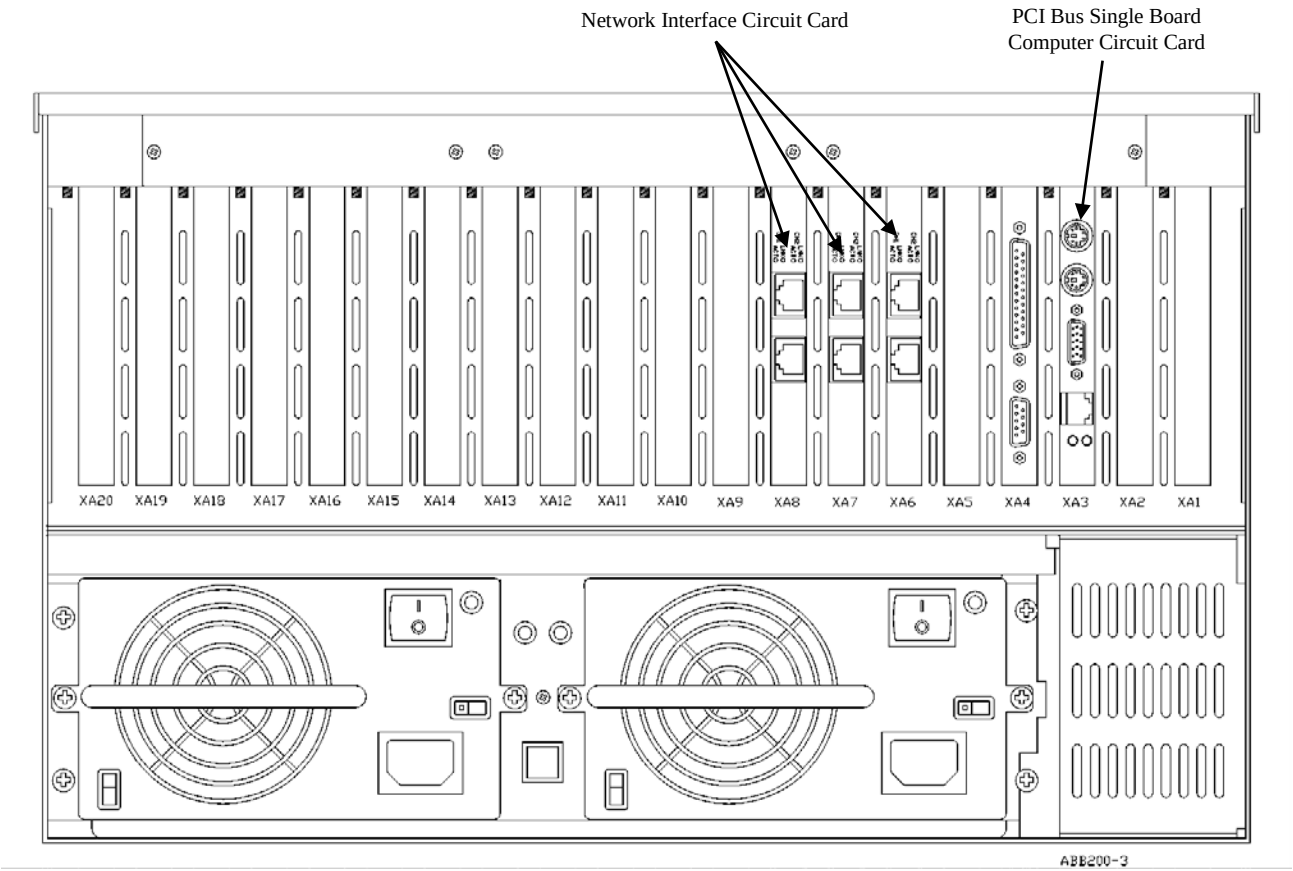


Figure 3-18. Host Computer Circuit Card Location

PCI Bus Single Board Computer Circuit Card

The PCI Bus Single Board Computer circuit card has two LEDs for status indication of the Ethernet interface. See Figure 3-19.

Link Status LED – This is a green LED that indicates the link status.

On – The Ethernet interface has a valid link on the network connection and is ready for normal operation.
Off – The Ethernet interface did not find a valid link on the network connection. Transmit and receive are not possible.

Activity LED – This is a red LED that indicates transmit or receive activity for the 10Base-T or 100Base-TX network connection.

On – A packet is being transmitted or received.
Off – There is no network activity.

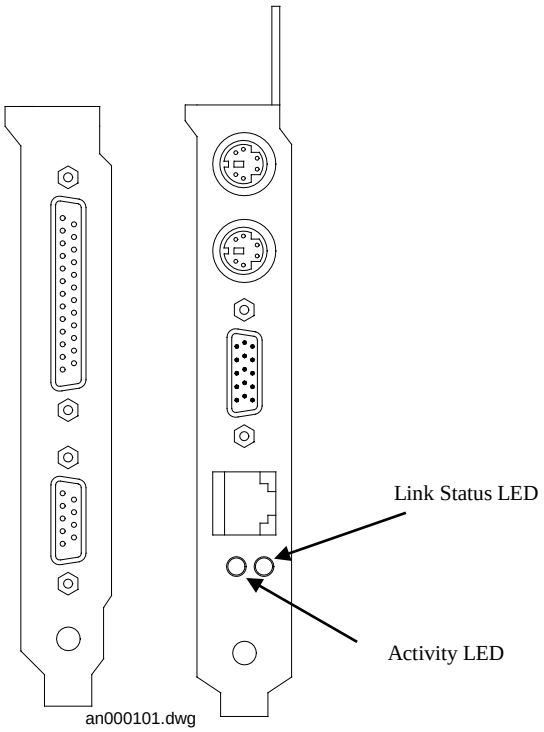


Figure 3-19. PCI Bus Single Board Computer Indicators

Network Interface Circuit Card

The NIC card has four LEDs for operational status of the fast Ethernet channel on the card. See Figure 3-20.

Link (LNK) – This is a green LED that illuminates when an active network link between the adapter port and the device exists. This should always be ON.

Activity (ACT) – This amber LED illuminates only when transmitting or receiving data.

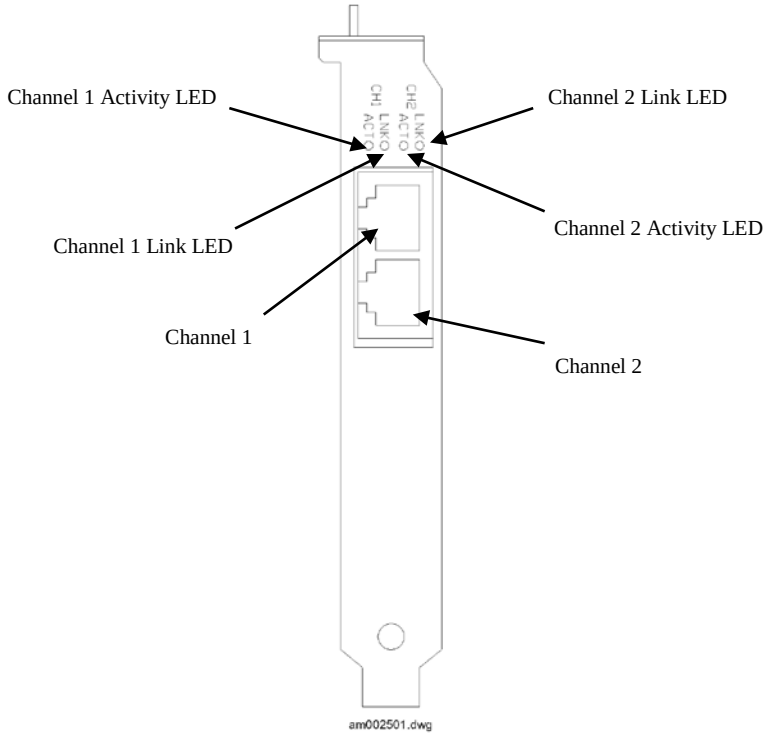


Figure 3-20. Network Interface Circuit Card Indicators

3.2.3. Aural Cue System (ACS) Controls and Indicators

The ACS consists of a Sound Computer and the Audio Processing System unit located in the 9A3 equipment cabinet and a power amplifier located just below the Sound Computer chassis.

The power amplifier has five indicators and three controls on its front panel. See Figure 3-21.

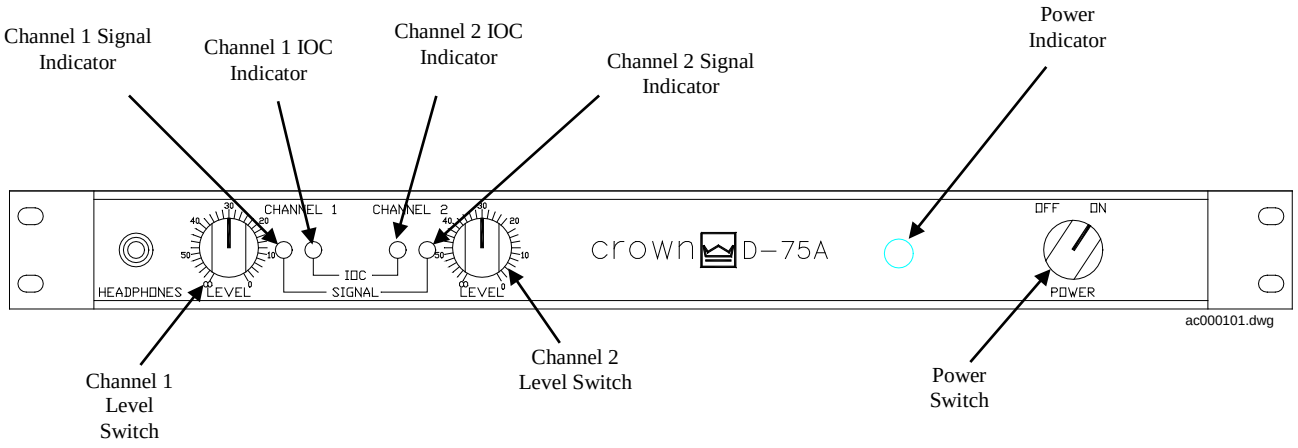


Figure 3-21. Power Amplifier Controls and Indicators

Power Indicator

The power indicator is located next to the amplifier power switch on the right side of the panel. It is located behind the front panel and becomes visible when the unit is turned on and has power.

Signal Indicators

Two signal indicators are on the amplifier front panel, one for each channel. They are located between the level control switches on the left side of the panel. The signal indicator flashes when output from the amplifier for that channel exists.

IOC Indicators

Two IOC (input/output Comparator) indicators on the amplifier front panel, one for each channel. They are located between the level control switches on the left side of the panel. The IOC indicators work like sensitive distortion meters and flash when the amplifier causes any distortion of 0.05% or more. The IOS indicators typically glow for about one minute after the AC power is turned off.

Power Switch

The power switch is located on the right side of the panel. This knob turns the amplifier on and off.

Level Control Switches

Two level control switches are on the amplifier's front panel, one for each channel. These knobs are located on the left side of the amplifier front panel and are used to adjust the desired output level of the amplifier.

3.2.4. Sound System Computer (9A3A3)

The Sound System Computer has several front panel controls and indicators. Their function and indications are listed in the following paragraphs.

3.2.4.1. Beep Codes

Whenever a recoverable error occurs during the power-on self-test (POST), the BIOS sounds a beep code. One long tone followed by two short tones during POST indicates video configuration failure (a faulty video controller) or an expansion card not functioning correctly. One short beep indicates the BIOS will boot the operating system as no error was found.

The full list of beep codes can be found in the Beep Code table in the vendor documentation.

A PCI expansion card (for example, a RAID controller) can also issue audible errors by itself, usually consisting of one long tone followed by a series of short tones. For more information on the beep codes issued, check the vendor documentation for the RAID controller.

3.2.4.2. Front Panel Controls and Indicators

See Figure 3-22 for the following controls and indicators:

- CD-ROM Access Indicator - Illuminates when the CD-ROM is accessed by the CPU.
- CD-ROM Eject Push Button - The CD-ROM Eject push button, when depressed, will open or close the CD slide tray to load or remove a CD.

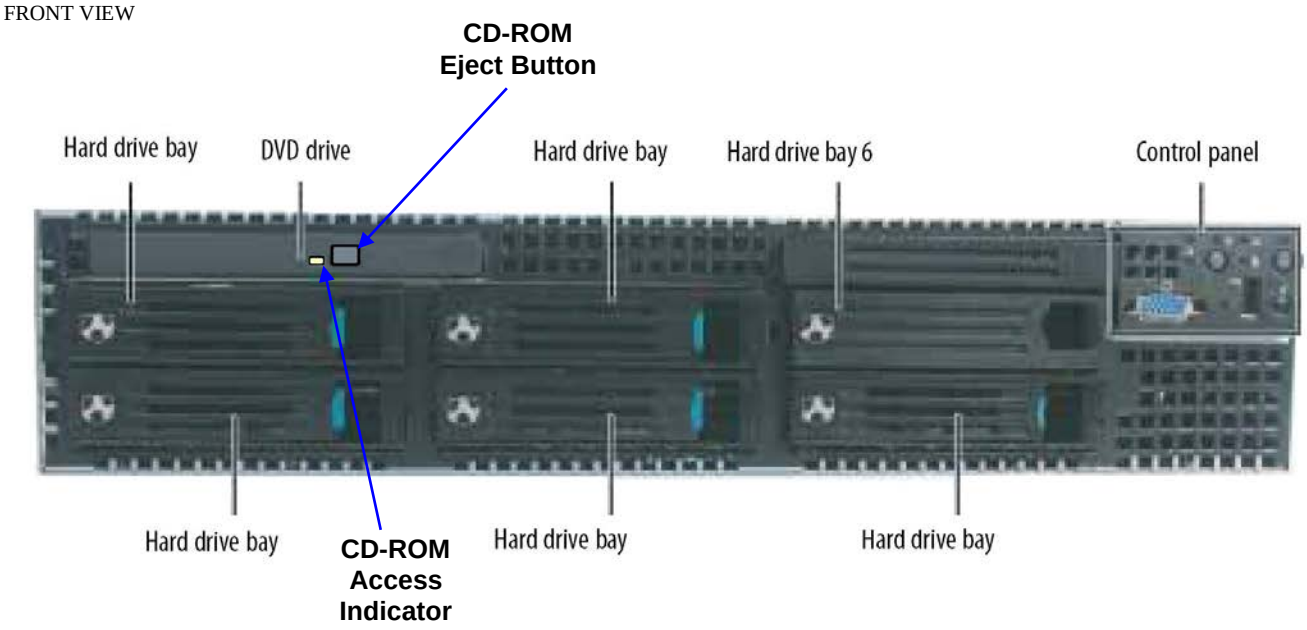


Figure 3-22. Front Panel Controls and Indicators

3.2.4.3. Control Panel Controls and Indicators

See Figure 3-23 for the following controls and indicators.

- LAN 1 activity indicator - Flashes when network activity is present.
- LAN 2 activity indicator - Flashes when network activity is present.
- Power/sleep LED - Illuminates when the AC power is applied to the CPU assembly.
- System status LED - Illuminates to indicate a fault in the CPU assembly.
- Hard drive activity LED - Illuminates when the hard drive is accessed by the CPU.
- System ID LED - Illuminates when the System ID push button has been pressed.
- Power button - Applies or removes AC power to the CPU assembly.
- Non-maskable interrupt button (recessed) - This button is not used in this application.
- Reset button - Resets the CPU and causes a reboot of the CPU assembly.
- System ID button - Turns on the blue System ID LED on the front and the back of the computer. Used to identify a server from the back side of the cabinet.

FRONT VIEW

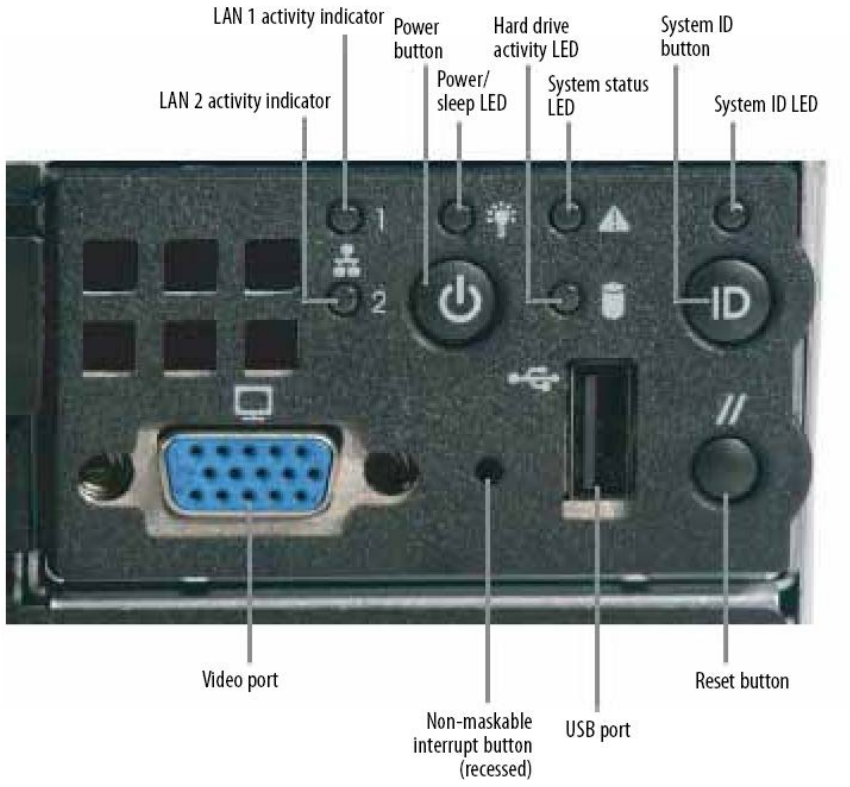


Figure 3-23. Control Panel Controls and Indicators

3.2.4.4. Rear Panel Controls and Indicators

See Figure 3-24 for the following controls and indicators.

- Diagnostic LEDs – Illuminate green, red, or orange indicating the status of the CPU system. For information on the diagnostic codes, refer to the Post Code table in the vendor documentation.
- System ID LED - Illuminates when the System ID push button has been pressed.

REAR VIEW

Figure 3-24. Rear I/O Panel Controls and Indicators

3.2.5. Audio Processing System (APS) Unit (9A3A7)

The following is a description of the controls and indicators used in the general operation of the APS unit. See Figure 3-25. The APS has no serviceable parts inside.

Power Indicator - The MAIN POWER indicator is located on the left side of the unit. The indicator illuminates blue when power is applied. The power switch for the APS unit is located on the back near the right hand side of the unit.

LCD Display - The LCD display located on the front left of the APS unit provides a display for status, maintenance menu, etc.

Menu Control Buttons - Six control buttons are on the front of the APS unit. One is designated MENU, one is designated SELECT, and four are used to scroll up, down, left, or right. Pressing the up, left, and right buttons at the same time will cause the ACS PC to reboot. Maintenance personnel wearing headphones use the four directional buttons for troubleshooting.

Input LEDs - The input LEDs indicate signal strength on each channel:

- Green - Indicates signal is within range and is not clipping.
- Orange - Indicates signal is close to clipping.
- Red - Indicates a clipped signal.

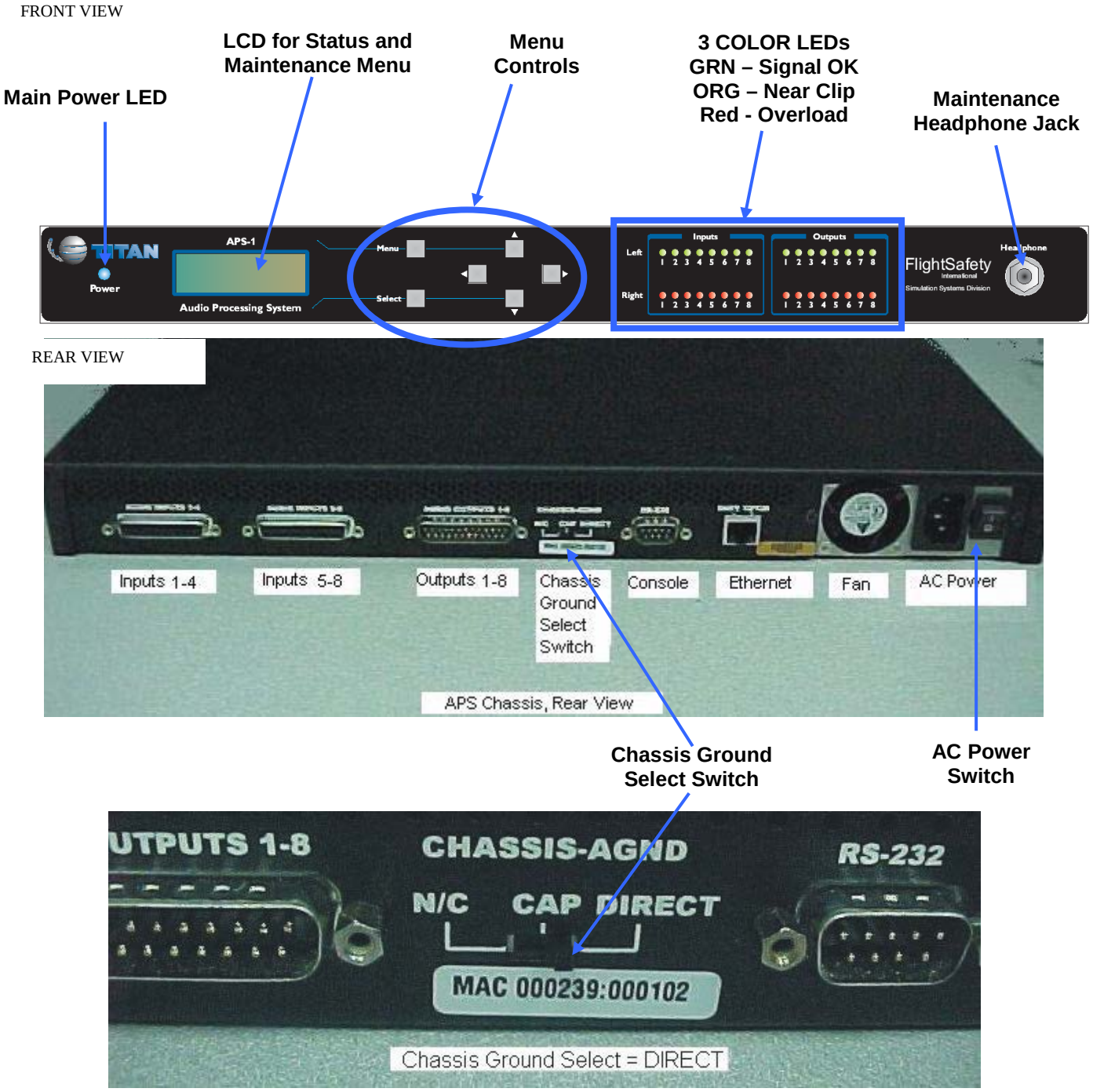


Figure 3-25. Audio Processing System Controls and Indicators

Output LEDS - The Output LEDs indicate signal strength on each channel:

- Green - Signal is within range and is not clipping.
- Orange - Signal is close to clipping.
- Red - Signal is clipped.

Chassis Ground Select Switch - Three settings for the connection between the analog ground signal are on the main board (AGND) and the chassis ground: no connection, via a 0.1µf capacitor, and a direct connection. Refer to Figure 3-25.

- N/C - No Connection
- CAP - Capacitive coupled ground via 0.1µf capacitor
- Direct - Direct Connection

The default setting for the APS is DIRECT and is the setting used in this application.

AC Power Switch - Turns power on or off to the APS unit.

3.2.6. Electronic Control Loading System (ECLS) Controls and Indicators

The ECLS consists of the ECLS computer chassis, two Digital Remote Interface (DRI) platform assemblies, a patch panel, and five or six digital servo amplifiers (UTD has five; IFT and OFT have six each). For ECL systems with DAS, the main differences in configuration and operation are the DAS platform resides in the equipment cabinet 9A3 and replaces the two DRI platform assemblies. DAS II is similar to DAS. The computer chassis is located in the equipment cabinets and the rest of the components are located in the cockpit frame. The DRI components are discussed in 3.2.6.2; DAS in 3.2.6.3. DAS II is addressed in a separate supplement.

3.2.6.1. ECLS Computer Chassis (9A2A1)

The ECLS Computer has controls and indicators both on the front of the chassis and on the rear of the chassis. Figure 3-26 shows the location of the ECLS Computer chassis.

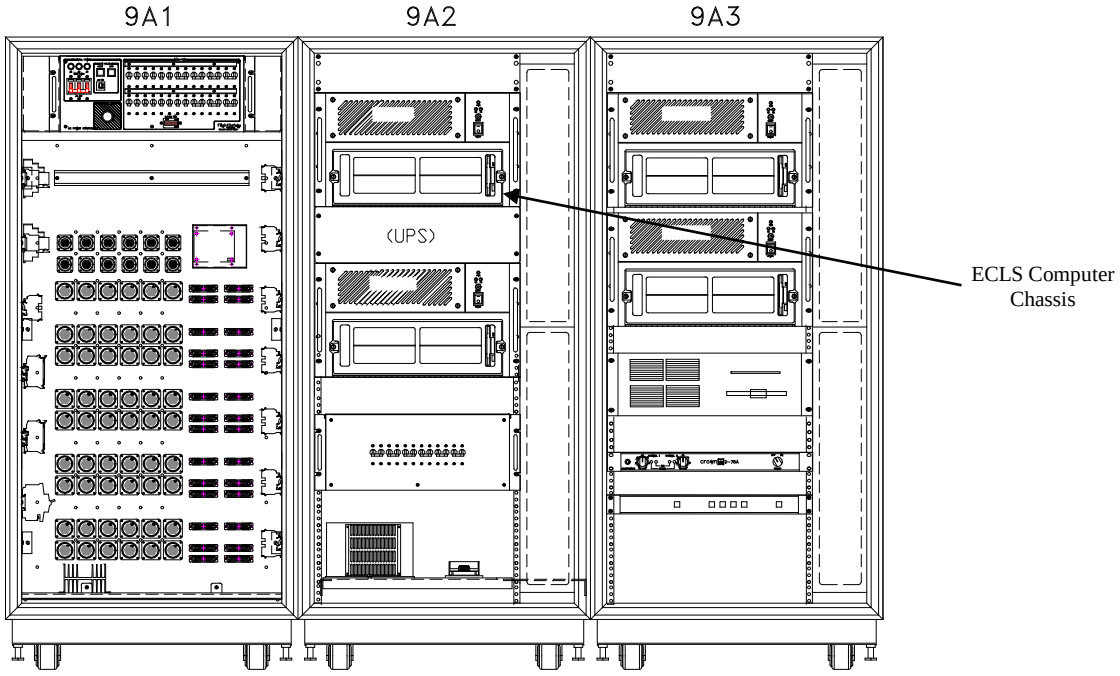


Figure 3-26. ECLS Computer Location

3.2.6.1.1. ECLS Computer Front Panel

Figure 3-27 shows the front view of the ECLS Computer chassis. The front of the chassis has an AC power switch with a green indicator showing when power is ON. Two HD indicators below the power indicator illuminate when the hard drives are in operation. The push button reset switch, when depressed, will reboot the ECLS computer.

A 3.5-inch floppy disk drive is installed in the computer chassis. It has an LED that illuminates when the disk drive is being accessed and a push button to eject the disk.

The Navy T-6A devices use a different computer.

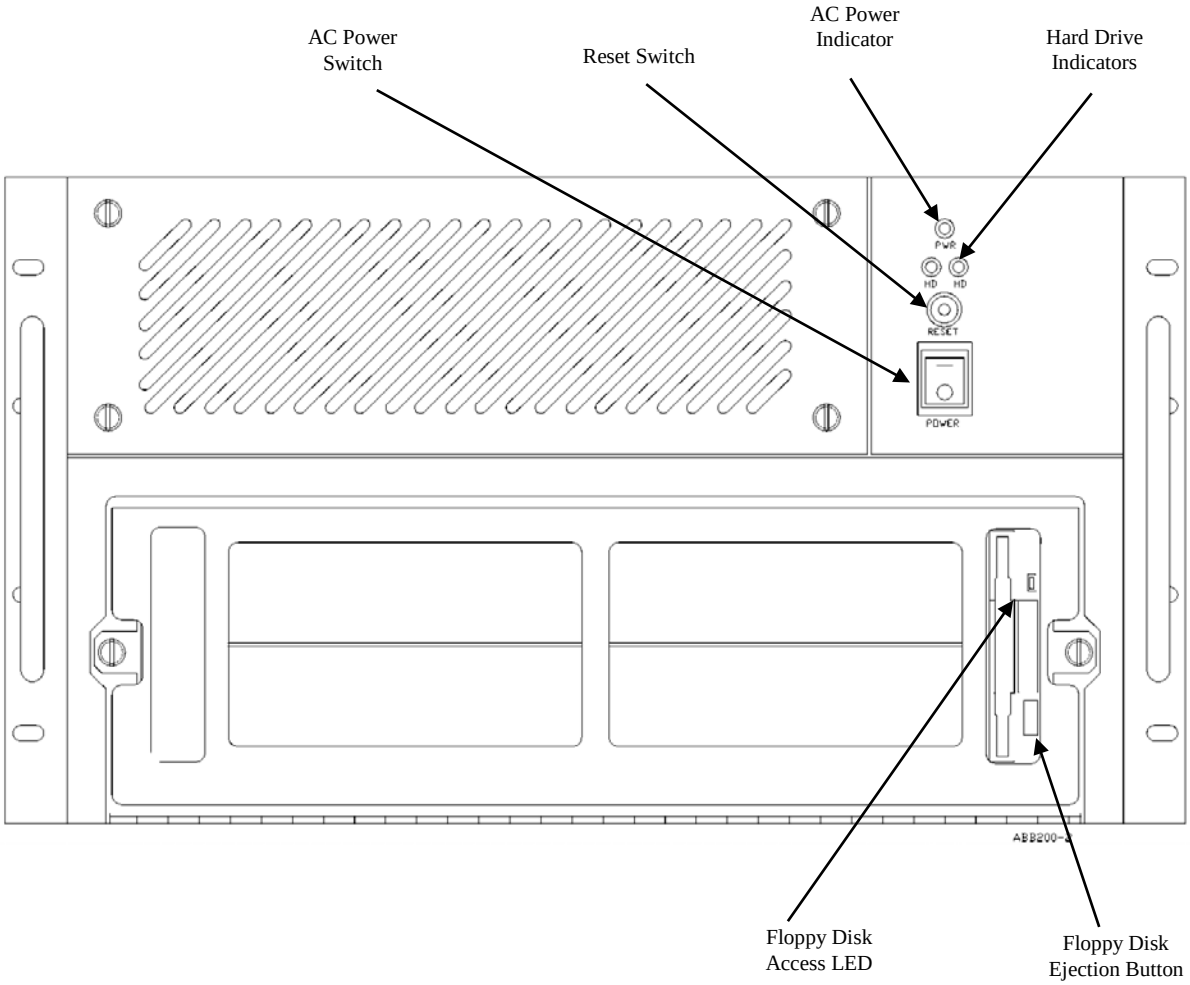


Figure 3-27. ECLS Computer Chassis Controls and Indicators (front view)

3.2.6.1.2. ECLS Computer Rear Panel

The rear of the chassis contains controls and indicators for the power supplies and the circuit cards that are installed in the chassis.

3.2.6.1.2.1. Power Supplies Controls and Indicators

Two hot-swappable, 300-watt power supplies are located in the ECLS Computer chassis. Each has a power on/off switch and a green LED indicating that the power supply is on. Between the two power supplies are two LEDs that illuminate green to indicate the operational status of the power supplies. When a power supply failure occurs and an audible alarm sounds, the push-button switch below the lights will silence the alarm. See Figure 3-28.

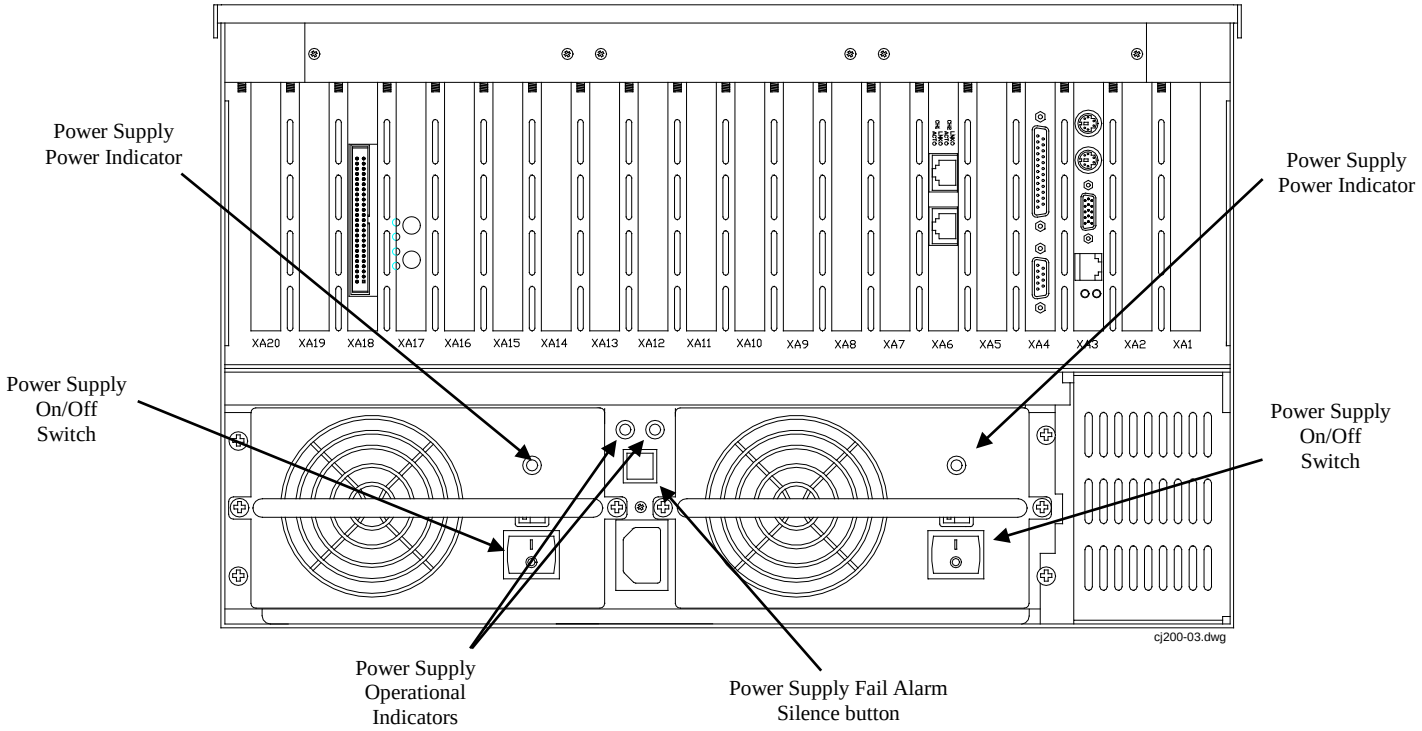


Figure 3-28. ECLS Computer Power Supplies Controls and Indicators

3.2.6.1.2.2. Circuit Card Controls and Indicators

Three circuit cards in the ECLS computer (the PCI Bus Single Board Computer circuit card, the NIC card, and the GSnet Transceiver IP) have indicators that show the operational status of the cards. See Figure 3-29.

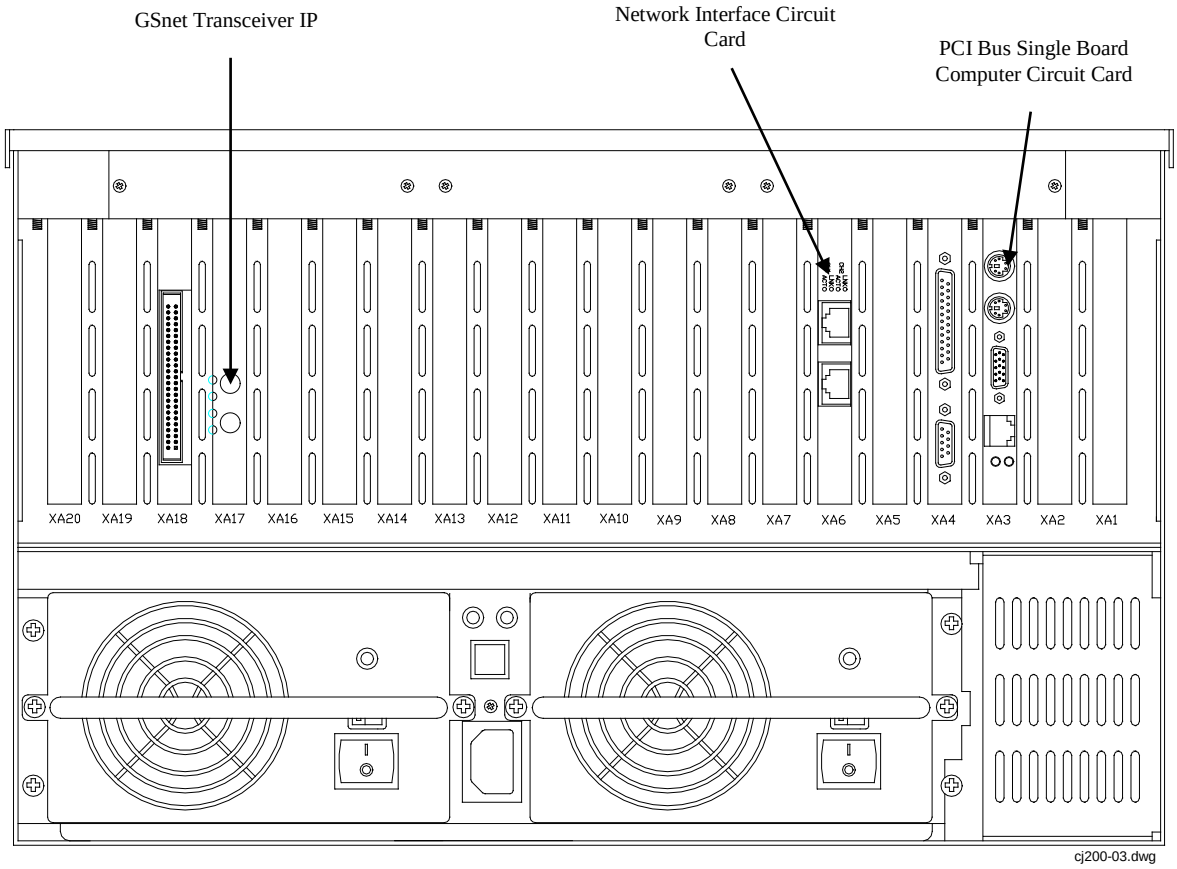


Figure 3-29. ECLS Computer Circuit Card Location

PCI Bus Single Board Computer Circuit Card

The PCI Bus Single Board Computer circuit card has two LEDs for status indication of the Ethernet interface. See Figure 3-30.

Link Status LED – This green LED indicates the link status.

On (solid) – The Ethernet interface has a valid link on the network connection and is ready for normal operation.
Off – The Ethernet interface did not find a valid link on the network connection. Transmit and receive are not possible.

Activity LED – This red LED indicates transmitting or receiving activity for the 10Base-T or 100Base-TX network connection.

On (flashing) – A packet is being transmitted or received.
Off – There is no network activity.

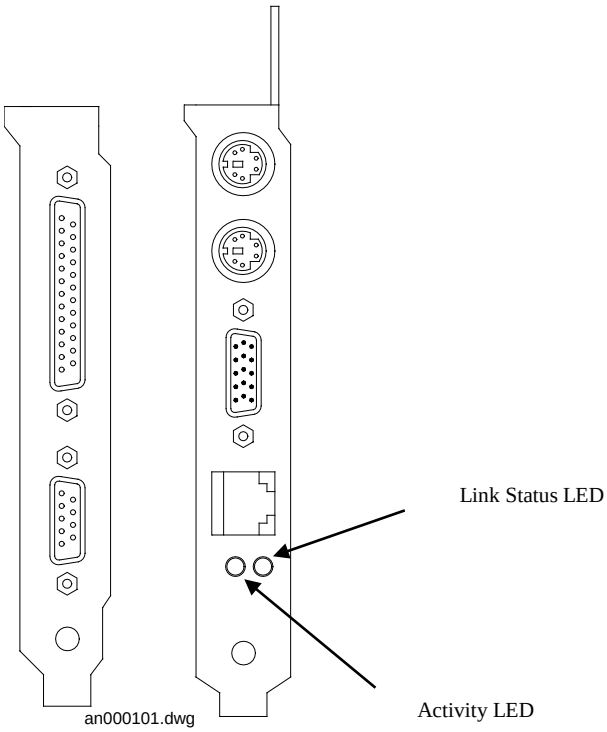


Figure 3-30. PCI Bus Single Board Computer Indicators

Network Interface Circuit Card

The NIC card has four LEDs for operational status of the fast Ethernet channel on the card. See Figure 3-31.

Link (LNK) – This green LED illuminates when an active network link between the adapter port and the device exists. This should always be ON.

Activity (ACT) - This amber LED illuminates only when transmitting or receiving data.

The Navy T-6A devices use a different card.

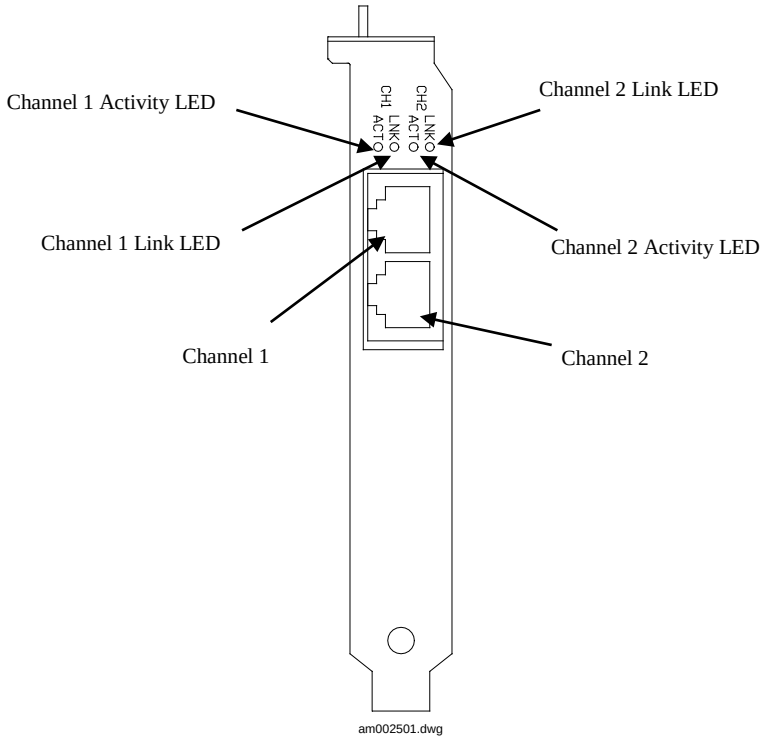


Figure 3-31. NIC Card Indicators

GSnet Transceiver IP

The operating status of the GSnet Fiber Optic Transceiver IP module installed on the IP carrier can be determined by observing the LED 1, LED 2, LED 3, and LED 4 indicators on the GSnet IP. See Figure 3-32.

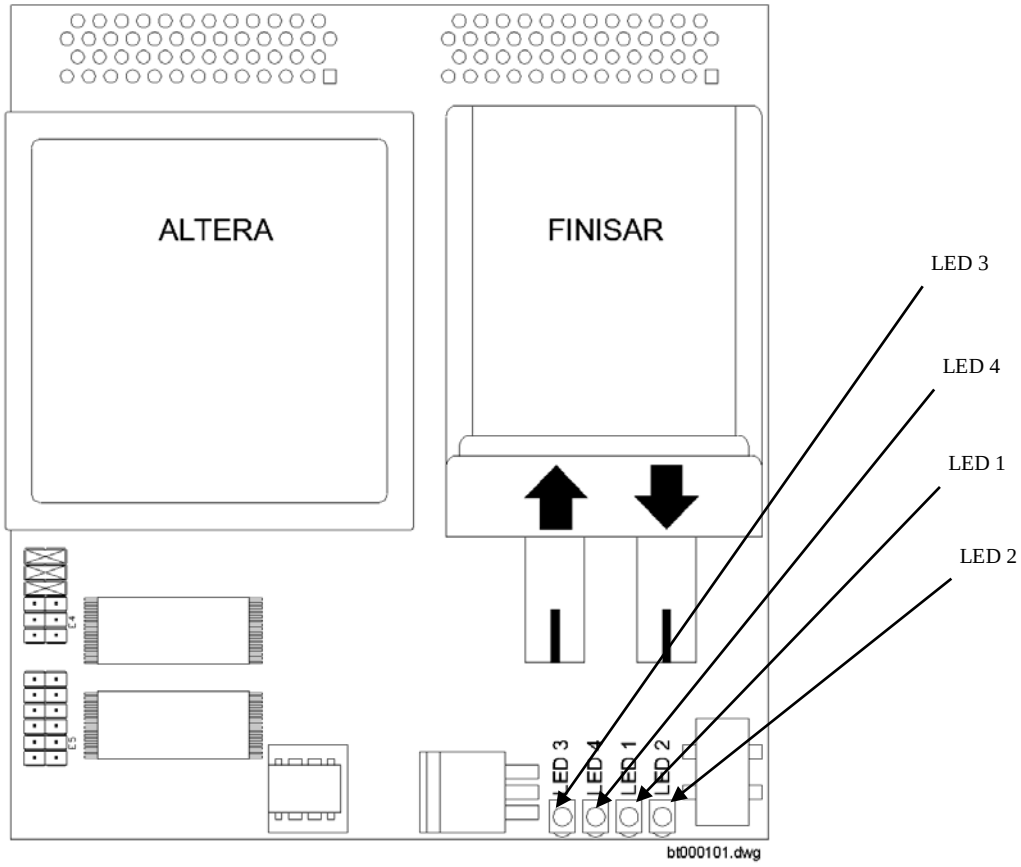


Figure 3-32. GSnet Transceiver IP Indicators

The indicators on the GSnet Transceiver are:

LED 1 – Green – System OK. Blinks at 1 Hz if optical transceiver is OK.

LED 2 – Green – Light Present. On if light is being received by the optical transceiver.

LED 3 – Green – Received good message. Flashes if a good message was received.

Red – Received bad message. Flashes if a bad message was received.

LED 4 – Green – Message Sent. Flashes if this node sends good message.

Red – Online. On if this node is Online.

3.2.6.2. Digital Remote Interface (DRI) Platform Assemblies

The DRI Platform assemblies are located in the cockpit frame. Each DRI Platform Assembly consists of two boards, a Platform332 board and a Power Supply/Signal Conditioning board (PSSCB). Only the Platform332 board has operational controls and indicators installed. Figure 3-33 shows the location of the Platform assemblies.

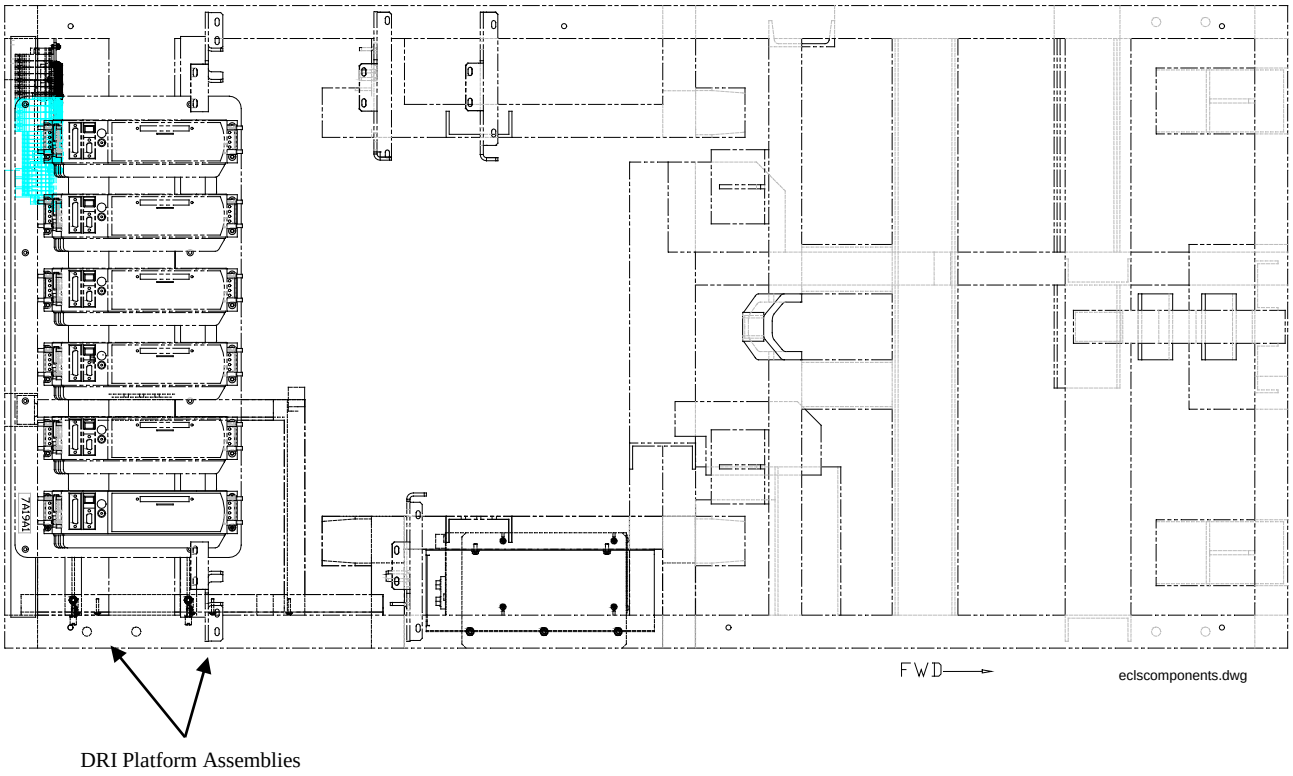


Figure 3-33. DRI Platform Assembly Location

3.2.6.2.1. Platform332 Board Controls and Indicators

The operating status of each DRI Platform can be determined by observing the LED 1 and LED 2 indicators on the Platform332 Board. Figure 3-34 shows the location of the controls and indicators on the Platform332 Board.

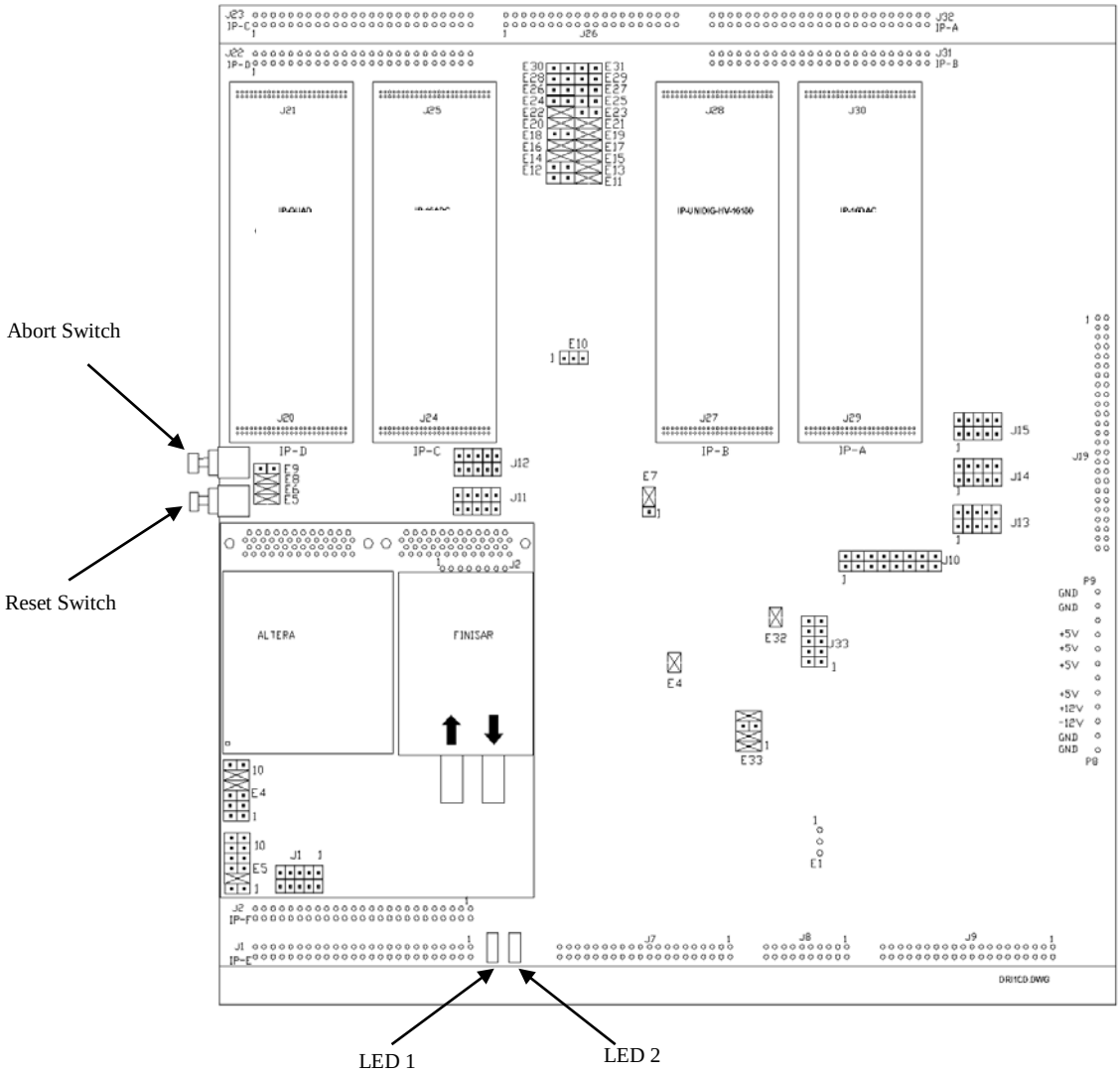


Figure 3-34. Platform332 Board Controls and Indicators

The controls and indicators on the Platform332 Board are:

Controls

Abort Switch - Momentarily halts DRI Platform operation and reboots the program

Reset Switch - Halts the DRI program and readouts

Indicators

LED 1 - Run Indicator - Steady Green

LED 2 - Flash Access - Flashing Green

3.2.6.2.2. GSnet Transceiver Indicators

On each Platform332, a GSnet Fiber Optics Transceiver IP module is installed in slots E and F. It is the same type of IP module that is installed on the IP carrier in the ECLS computer. Refer to paragraph 3.2.6.1.2.2., IP GSnet, for information on the indicators.

3.2.6.3. DAS (9A3A6)

The DAS assembly consists of a CPU main board, a PCI-Master and a PCI-Slave carrier board, a PSSCB, a power supply module and three cooling fans. Figure 3-36 depicts the location of these components except for the CPU main board which is located beneath the PCI slave board. The AC power switch is located on the lower left side on the back of the chassis. The power indicator illuminates green and is located in the upper right corner of the front panel of the chassis.

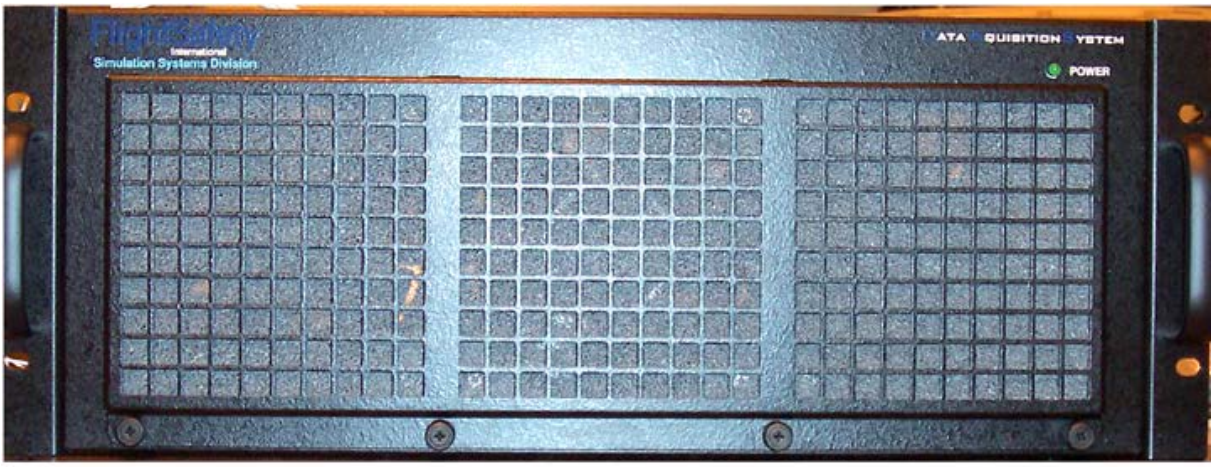


Figure 3-35. DAS Chassis – Front

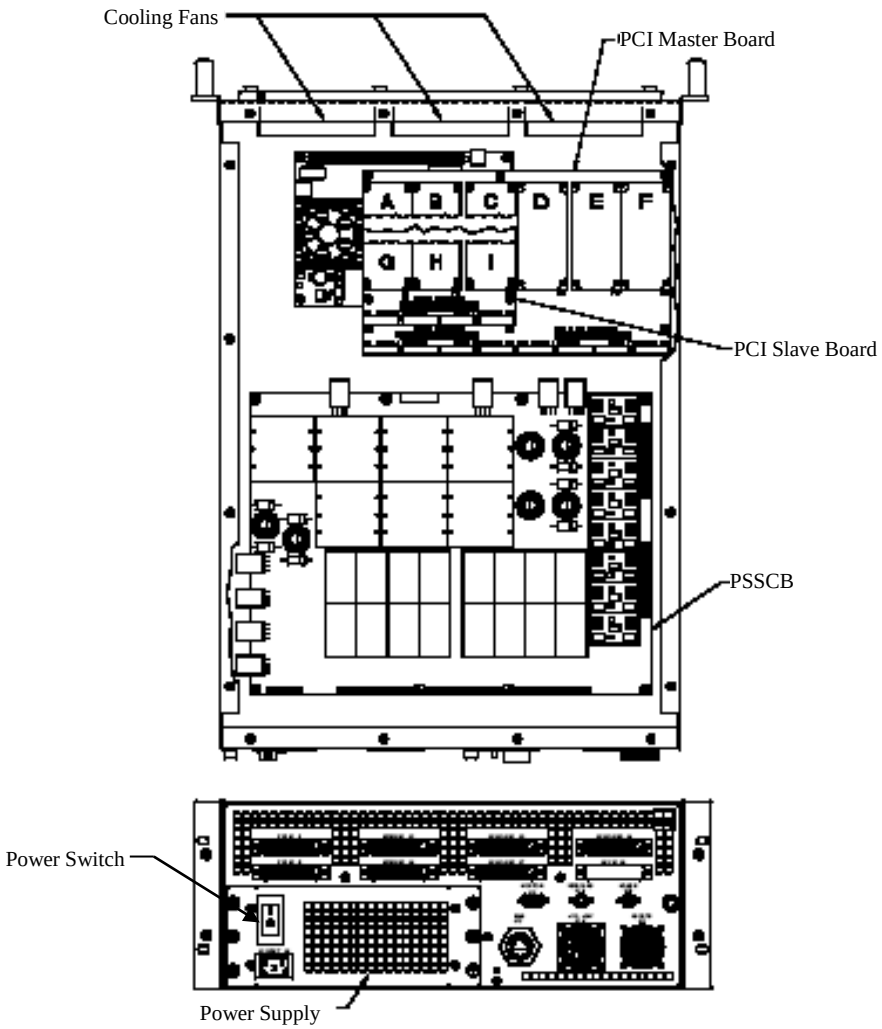


Figure 3-36. DAS Components

3.2.6.4. Patch Panel

The Patch Panel for the DRI platforms is located in the cockpit frame at the 7A2 location. See Figure 3-33. It provides a central distribution point for DC power to DRI Platform assemblies. It contains components for control (relays) and fault protection (fuses). The fuses are mounted in holders that allow for ready identification of a blown fuse. Figure 3-38 shows the location of the fuses.

The Navy T-6A device panel is located in 7A1 and differs from the Air Force panel.

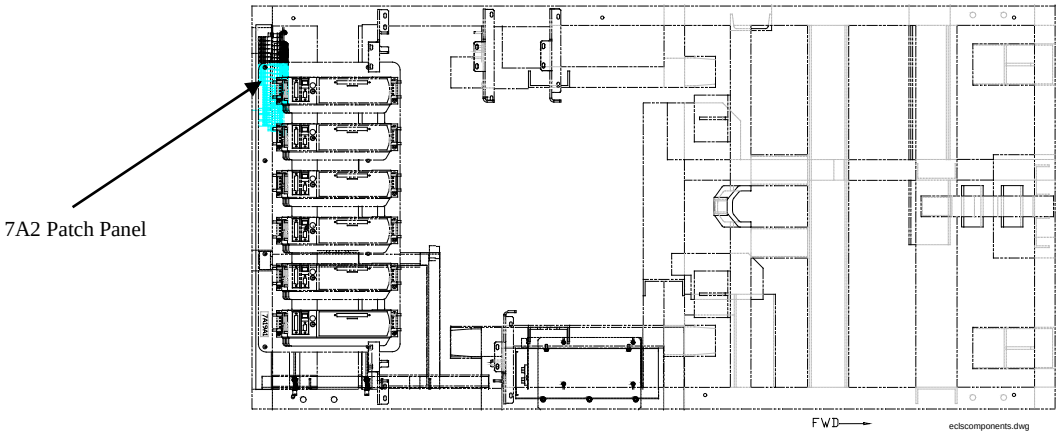


Figure 3-37. Patch Panel Location

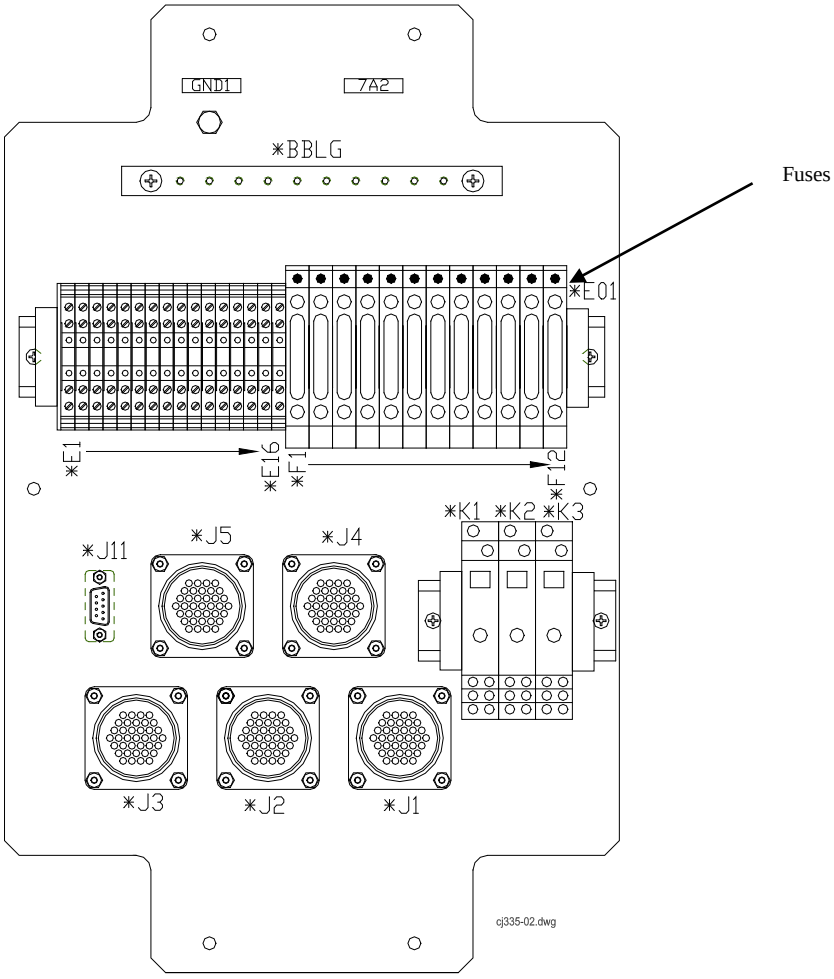


Figure 3-38. 7A2 C/L Patch Panel Fuse Location

Table 3-2. 7A2 C/L Patch Fuse Listing

FUSE #	SYSTEM	DRAWING #
F01	Utility Abort Power (NOT USED)	ACJ412 –2 & 5
F02	Utility PSSCB	ACJ412 –2 & 5
F03	CLS – 1 Abort Power	ACJ412 – 5 ACJ411 - 2
F04	CLS – 1 PSSCB	ACJ411 – 2 ACJ412 - 5
F11	9A9A1 K1 Training Light	ACJ421 - 3

3.2.6.5. Digital Servo Amplifiers

The Digital Servo Amplifiers are located on the upper, rear portion of the cockpit frame. The OFT and IFT use six amplifiers, one for each of the primary controls: elevator (7A5A1), aileron (7A6A1), rudder (7A7A1), left toe brake (7A12A1), right toe brake (7A13A1), and seat (7A19A1). The UTD uses five amplifiers, one for each of the primary controls minus the seat servo amplifier. Figure 3-39 shows the location of the servo amplifiers.

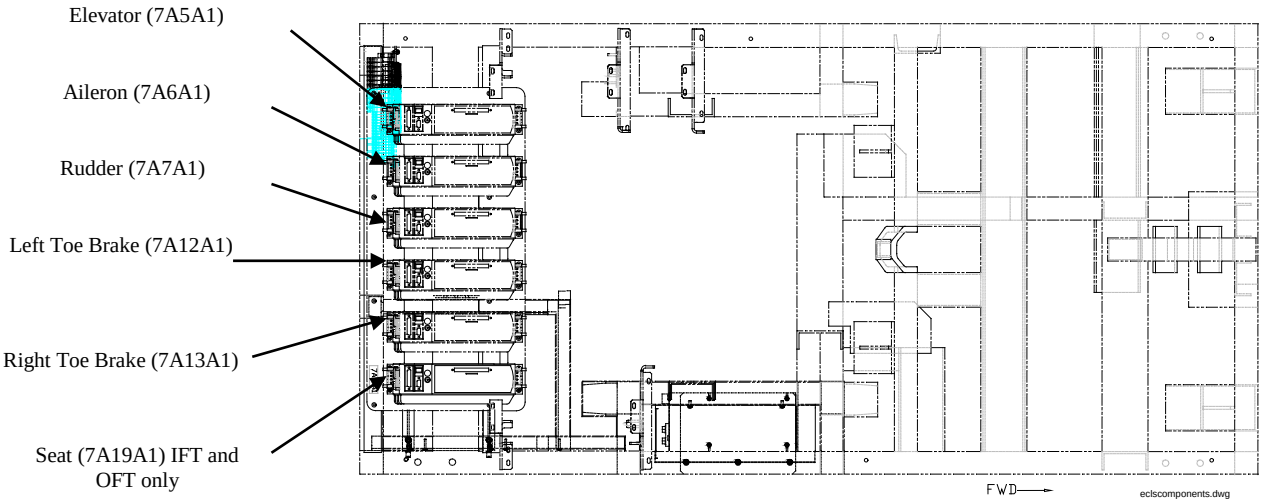


Figure 3-39. Servo Amplifier Location

The servo amplifiers have controls and indicators that show the operational status of the amplifier and the system that it controls. The following paragraphs describe the controls and indicators on the servo amplifiers. See Figure 3-40 for the location.

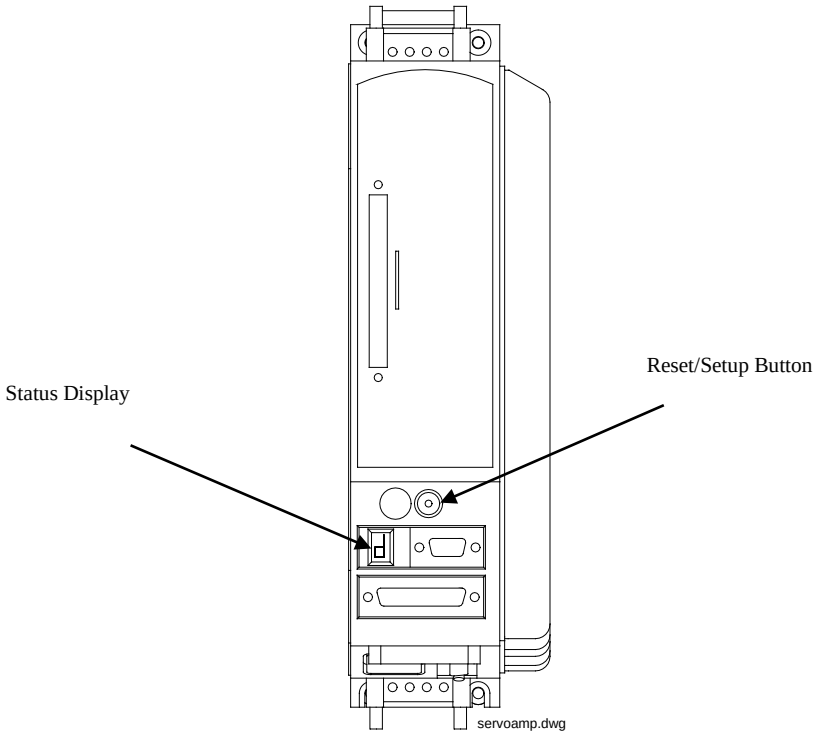


Figure 3-40. Servo Amplifier Controls and Indicators

Reset/Setup Button

The Reset/Setup button, located on the front of the Servo Amplifier, is a dual-purpose button. Its primary function is fault condition reset. It can also be used to select a number of predefined setups. However, the predefined setups are not used and go to the default setup (0). Section 5 of this manual provides procedures on how to configure the Servo Amplifiers.

Status Display

The status display on the front of the drive shows the drive status and fault codes. When a fault condition occurs, the fault code will be displayed, overriding the status code.

Status Codes

Table 3-3 shows the Diagnostic Display status codes. The decimal point displays when the drive is enabled and the stop input is inactive. This indicates that the drive is ready to receive commands and any motion command will cause motion.

Table 3-3. Diagnostic Display Status Codes

Display Indication	Status	Description
b	Brake Engaged (output off)	Motor brake is mechanically engaged.
d	Disabled	Power Stage is disabled
P	Position	Waiting for command (Pulse Mode)
V	Velocity	Velocity mode operation
T	Torque	Torque mode operation
(·) decimal point	Ready to Run	Drive enabled, no Stop input

Fault Codes

Diagnostic and fault detection circuits are incorporated to protect the drive. Some faults, such as over voltage and amplifier or motor over temperature, can be reset with the Reset/Setup button. Cycling power off and on (wait until the display turns off) is the only other means to reset other faults, such as logic supply fault.

The drive tracks rotor position during fault conditions. For example, if there is a “Low DC Bus” fault where the bridge is disabled, the drive will continue to track the rotor’s position provided the logic power is not interrupted.

The CW/CCW Limit faults automatically clear when the fault condition is removed. Table 3-4 lists all of the fault codes in priority order from highest to lowest. If two faults are active, the higher priority fault will be displayed. The paragraphs following the table describe each of the faults.

Table 3-4. Display Fault Codes

Display	Fault	Action to Reset	Bridge Disabled
W	Watchdog timer	Button	Yes
I	Power-up self test failure	Power	Yes
N	Non-volatile memory invalid	Button	Yes
U	Invalid configuration	Power	Yes
Z	Power stage fault	Button	Yes
H	High DC bus fault	Button	Yes
U	Low DC bus fault	Button	Yes
P	Encoder State	Power	Yes
E	Encoder line fault	Power	Yes
M	Motor over temperature fault	Button	Yes
S	RMS shunt power fault	Button	Yes
O	Overspeed fault	Button	Yes
F	Following error fault (position mode)	Button	Yes
L	CW/CCW limit (velocity or torque)	Auto	No

Watchdog Timer - The drive contains a watchdog timer to ensure that the firmware is operating normally. If the firmware fails to reset this timer every 10 milliseconds, the drive hardware will reset, all inputs and outputs will clear (off), and a Watchdog Timer fault is generated.

Power Up Self-Test Failure – This fault indicates that the power-up self-test has failed.

Non-volatile Memory Invalid – At power-up, the drive tests the integrity of the non-volatile memory. This fault occurs if the contents of the non-volatile memory are invalid.

Invalid Configuration – This fault code should not normally occur when using an MG-series motor.

Power Stage Fault – This fault is generated when a power stage over-temperature, over-current, or under-voltage gate supply occurs. This can be the result of a motor short to ground, a short in the motor windings, a motor cable short, or the failure of a switching transistor.

High DC Bus Fault – This fault occurs whenever the voltage on the DC bus exceeds 440VDC. The most likely cause of this fault is an open shunt fuse, a high AC line condition, or an application that requires an external shunt.

Low DC Bus Fault – This fault occurs whenever the voltage on the DC bus drops below 96 VDC. The most likely cause of this fault is a reduction (or loss) of the AC power. A 50ms debounce time exists with this fault to avoid faults caused by intermittent power disruption.

Encoder State – Certain encoder states and state transitions are invalid and cause the drive to report an encoder state fault. This is usually the result of noisy encoder feedback caused by poor shielding.

Encoder Line Fault – If any pair of encoder lines is in the same state, an encoder line fault occurs. The most likely cause is a missing or bad encoder connection.

Motor Over-Temperature Fault – This fault is generated when the motor thermal switch is open due to motor over-temperature or improper wiring.

RMS Shunt Power Fault – This fault is generated when RMS shunt power dissipation is greater than the design rating of the internal shunt.

Over Speed Fault – This fault occurs in any of three circumstances:

- When the actual motor speed exceeds 150% of the maximum motor speed. This maximum overspeed value is not dependent on the applied AC voltage parameter.
- When the actual motor speed exceeds the user entered overspeed limit parameter. This parameter can be changed with the PowerTools software.
- In pulse mode operation, when the frequency input actually received generates a motor command speed in excess of 13,000 RPM. The input frequency that will cause this is dependent on the command pulse-per-motor revolution setting.

Following Error Fault – This fault is generated when the following error exceeds the following error limit (default error limit is .2 revs). This is typical for pulse follower mode.

CW/CCW Limit – This fault is caused when either the CW (+) or CCW (-) [Travel] Limit input function is active.

All On (*) – This is a normal condition during power up of the drive. It will last for less than one second. If this display persists, call Control Techniques for service advice. All segments dimly lit when power is “Off” is normal when an external signal is applied to the encoder inputs (motor or master) or serial port from an externally powered device. The signals applied to the inputs cannot exceed 5.5V level required to drive logic common or drive damage will occur.

3.2.7. Flight Deck I/O (FDKIO) Computer (9A2A3)

The FDKIO Computer has controls and indicators both on the front and rear of the chassis. Figure 3-41 shows the location of the Flight Deck I/O Computer chassis.

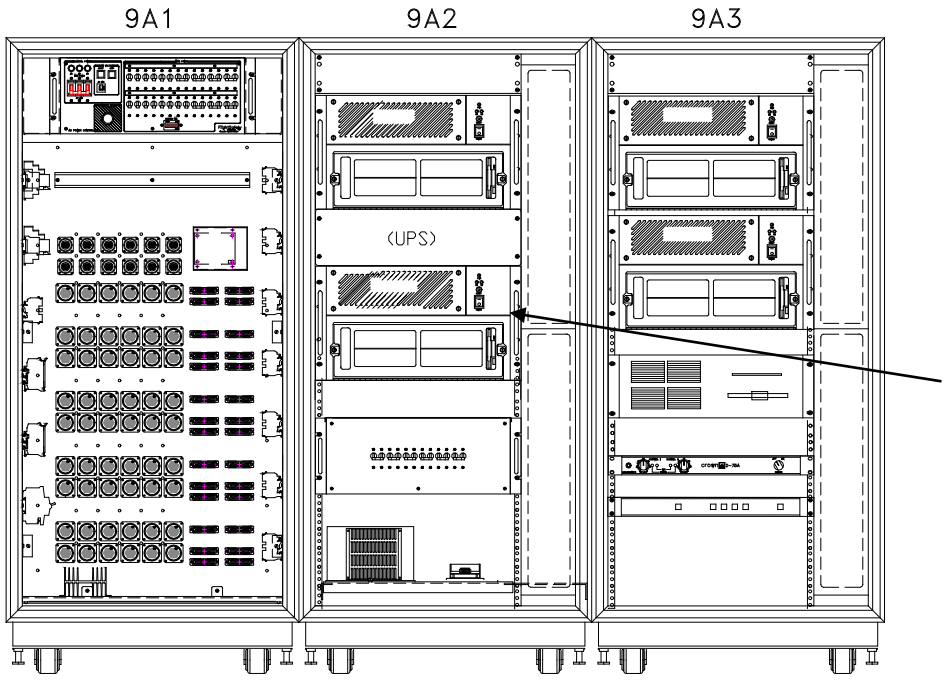


Figure 3-41. Flight Deck I/O Computer Location

3.2.7.1. FDKIO Computer Front Panel

Figure 3-41 shows the front view of the FDKIO Computer chassis. The front of the chassis has an AC power switch with a green indicator showing when power is ON. Two HD indicators below the power indicator show when the hard drives are in operation. The push button reset switch, when depressed, will reboot the FDKIO computer.

A 3.5-inch floppy disk drive is installed in the computer chassis. It has an LED that illuminates when the disk drive is being accessed and a push button to eject the disk.

The Navy T-6A devices use a different FDKIO computer.

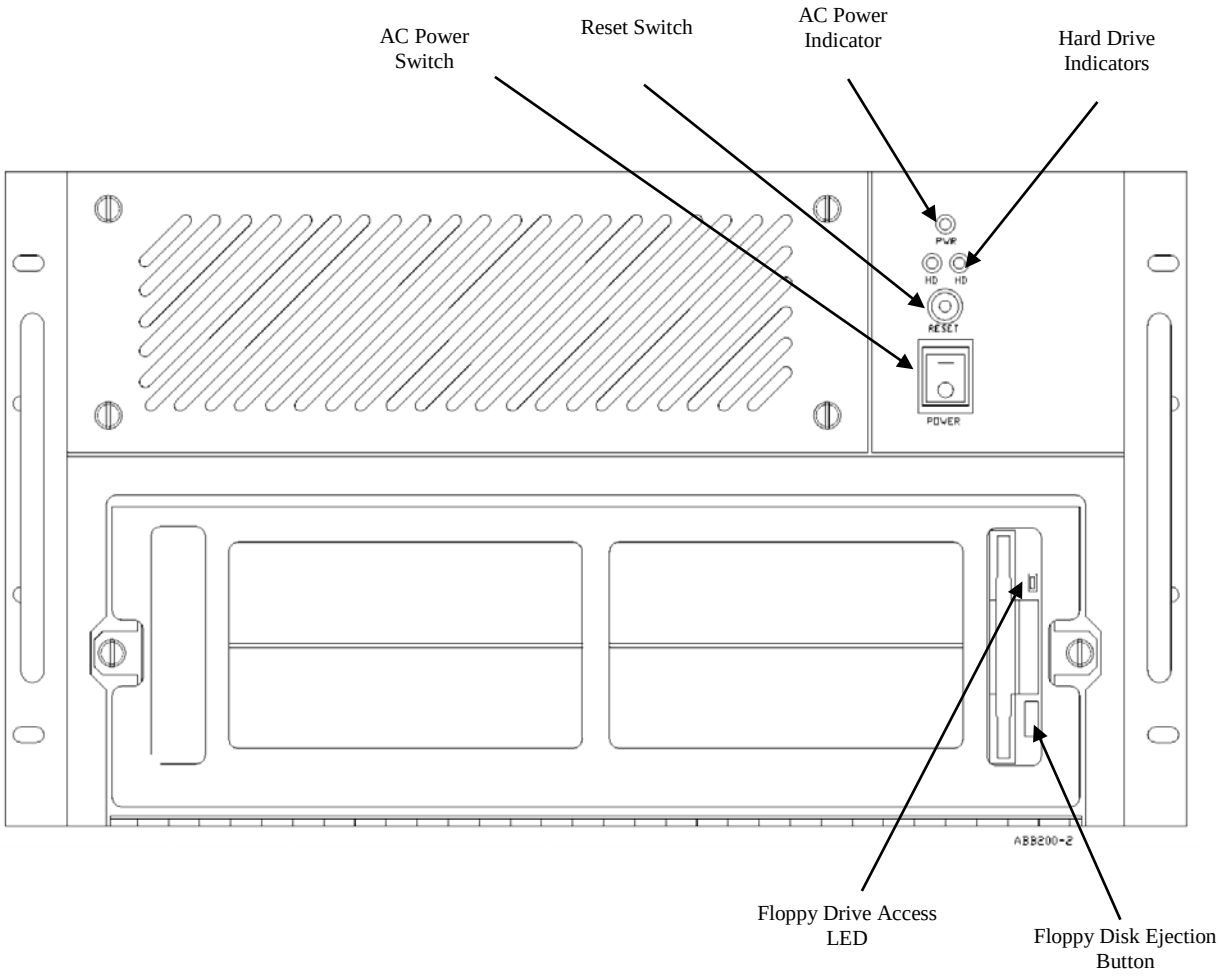


Figure 3-42. Flight Deck I/O Computer Chassis Controls and Indicators (front view)

3.2.7.2. FDKIO Computer Rear Panel

The rear of the chassis contains controls and indicators for the power supplies and the circuit cards that are installed in the chassis.

3.2.7.2.1. Power Supplies Controls and Indicators

Two hot-swappable, 300-watt power supplies are located in the Flight Deck I/O Computer chassis. Each has a power on/off switch and a green LED indicating that the power supply is on. Between the two power supplies are two LEDs that illuminate green to indicate the operational status of the power supplies. When there is a power supply failure and an audible alarm sounds, the pushbutton switch below the lights will turn off the alarm. Figure 3-43 shows the location of the power supplies controls and indicators.

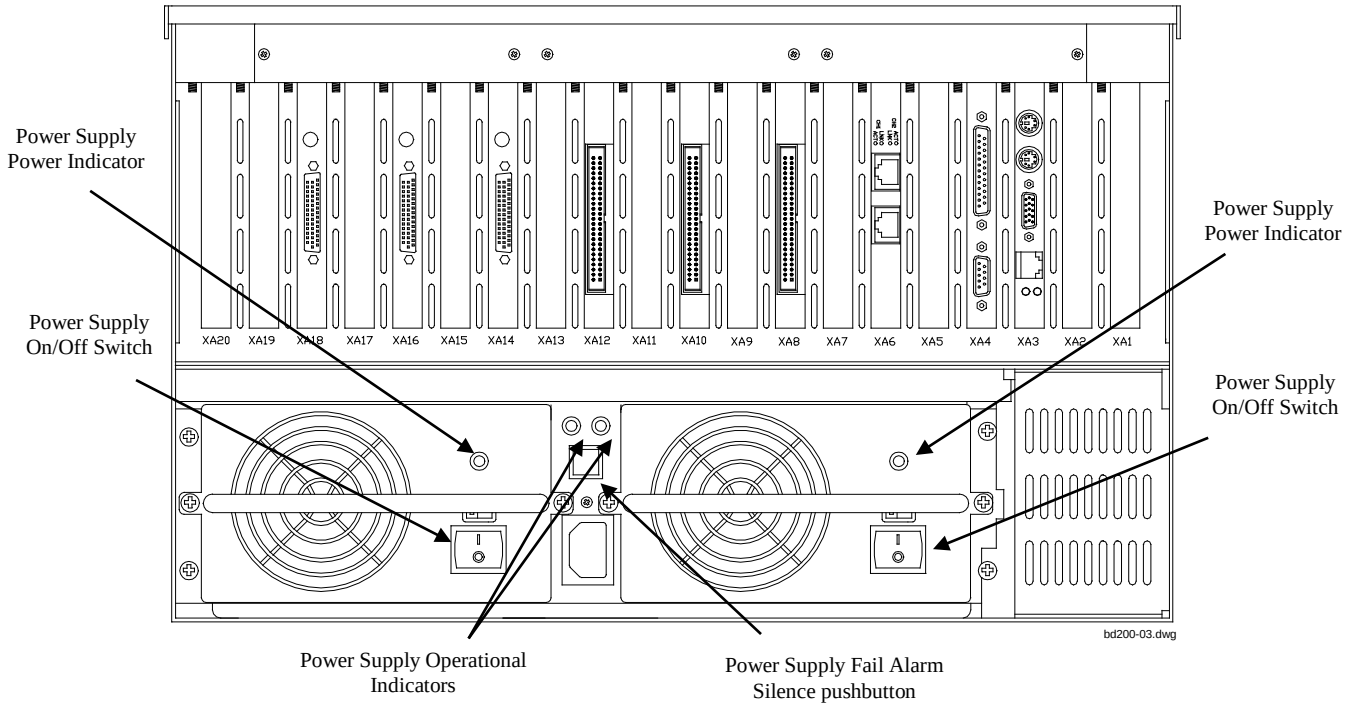


Figure 3-43. Flight Deck I/O Computer Power Supplies Controls and Indicators

3.2.7.2.2. Circuit Card Controls and Indicators

Three circuit cards in the FDKIO Computer, the PCI Bus Single Board Computer circuit card, the NIC card, and the ARINC 429 circuit card, have indicators that show the operational status of the cards. Figure 3-44 shows the location of each card in the Flight Deck I/O computer chassis.

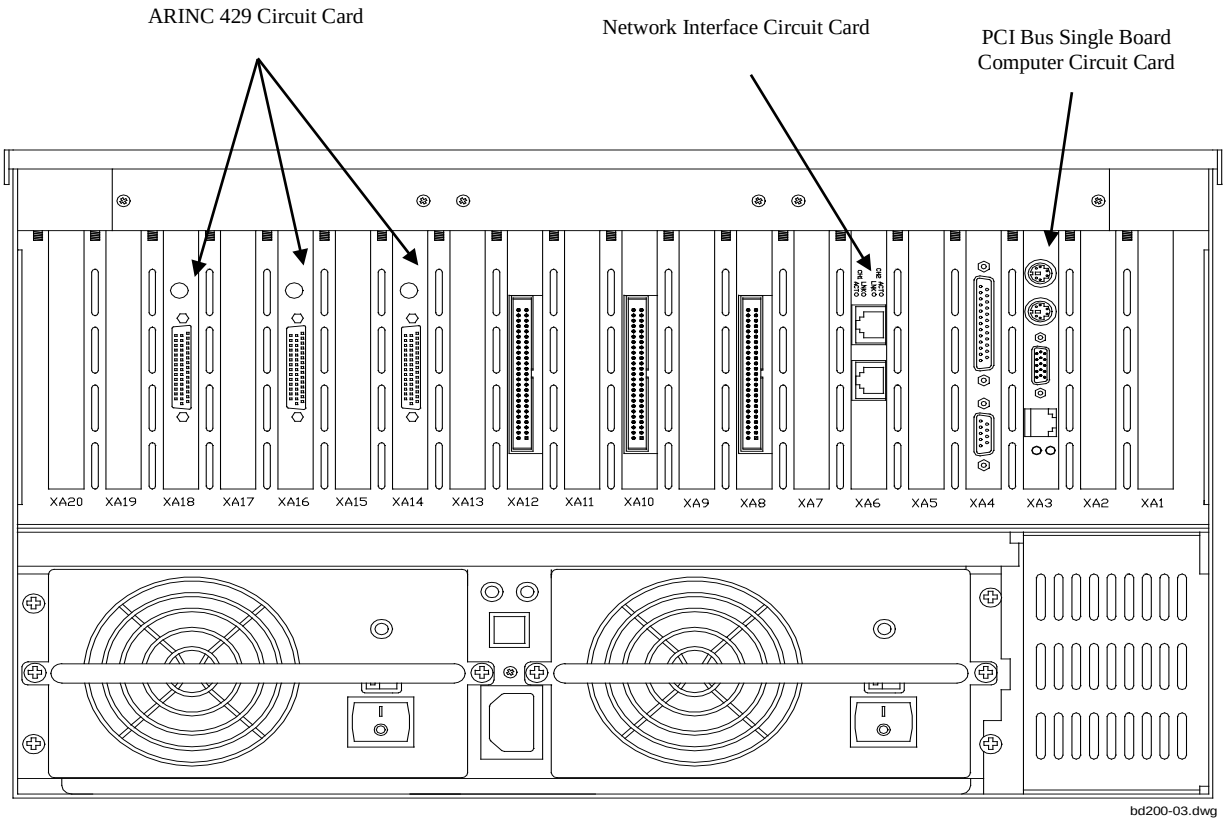


Figure 3-44. Flight Deck I/O Computer Circuit Card Location

PCI Bus Single Board Computer Circuit Card

The PCI Bus Single Board Computer circuit card has two LEDs for status indication of the Ethernet interface. Figure 3-45 shows the location of the indicators.

Link Status LED – This is a green LED that indicates the link status.

On (solid) – The Ethernet interface has a valid link on the network connection and is ready for normal operation.

Off – The Ethernet interface did not find a valid link on the network connection. Transmit and receive are not possible.

Activity LED – This red LED indicates any transmit and receive activity for the 10Base-T or 100Base-TX network connection.

On (flashing) – A packet is being transmitted or received.
Off – There is no network activity.

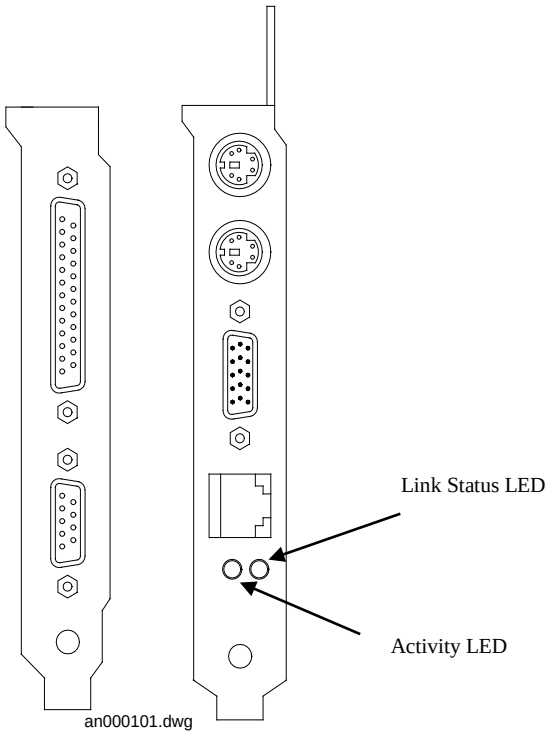


Figure 3-45. PCI Bus Single Board Computer Indicators

Network Interface Circuit Card

The NIC card has four LEDs for operational status of the fast Ethernet channels on the card. Figure 3-46 shows the location of the indicators.

Link (LNK) (solid) – This green LED illuminates when an active network link between the adapter port and the device exists. This should always be ON.

Activity (ACT) (flashing) – This LED illuminates only when transmitting or receiving data.

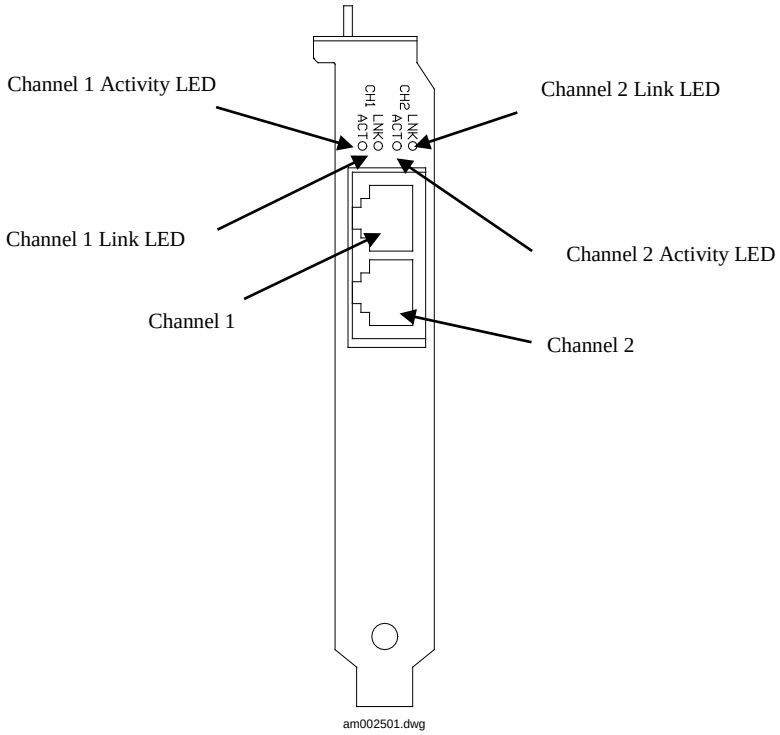


Figure 3-46. Network Interface Circuit Card Indicators

ARINC 429 circuit card

The ARINC 429 circuit card has two LEDs for operational status of the card. Figure 3-47 shows the location of the indicators.

LED 1 – This green LED illuminates when hardware configuration loading is complete. It is located inside the computer chassis and is not visible unless the inside of the chassis is exposed. This LED should always be ON.

LED 2 – This LED has three mode indications:

Off indicates that there is no bus activity.

Red indicates a bus error on any channel, (stays red for 130 mseconds).

Green indicates normal bus activity.

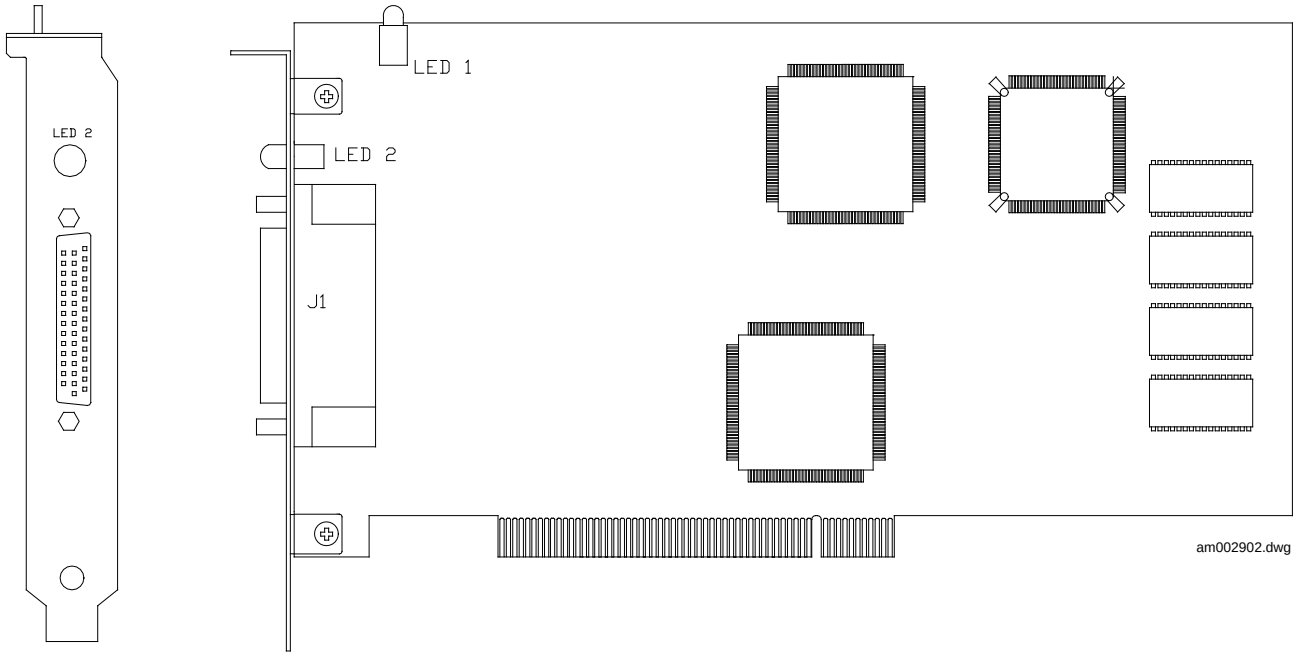


Figure 3-47. ARINC 429 Circuit Card Indicators

3.2.8. Instructor Operator Station (IOS)

The Instructor Operator System is made up of a computer chassis located in the equipment cabinets and the IOS located adjacent to the student station. The IOS is used to control certain aspects of simulation through the control panel, monitors, keyboard and mouse. The controls and indicators for the computer can be found in the following paragraphs. The controls and indicators for the IOS can be found in the Instructor's Positional Handbook.

3.2.8.1. IOS Computer (9A3A2)

The IOS Computer has controls and indicators both on the front of the chassis and on the rear of the chassis. See Figure 3-48.

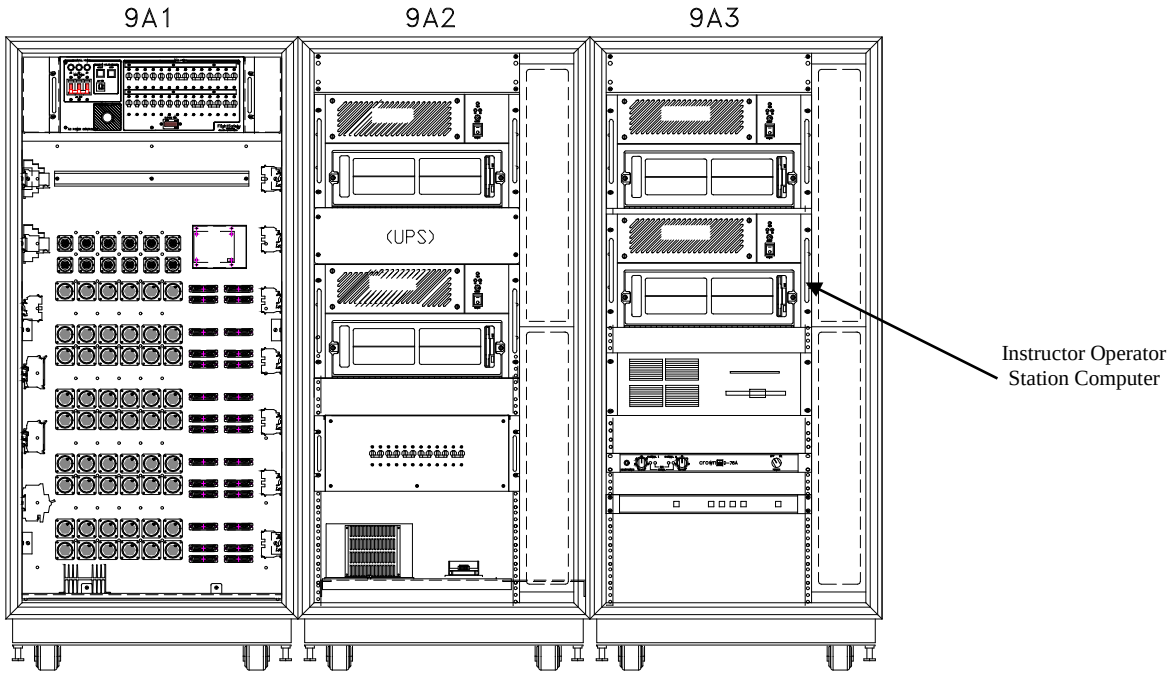


Figure 3-48. Instructor Operator Station Computer Location

3.2.8.2. IOS Computer Front Panel

Figure 3-49 shows the front view of the IOS Computer chassis. The front of the chassis has an AC power switch with a green indicator showing when power is ON. Two HD indicators below the power indicator illuminate when the hard drives are in operation. The push button reset switch, when depressed will reboot the IOS computer.

A CD-ROM and a 3.5-inch floppy disk drive are installed in the computer chassis. There are controls and indicators associated with each device to control volume, to eject the CD or floppy disk, and to show when the device is being accessed. It has an LED that illuminates when the disk drive is being accessed and a push button to eject the disk.

The Navy T-6A devices use a different IOS computer.

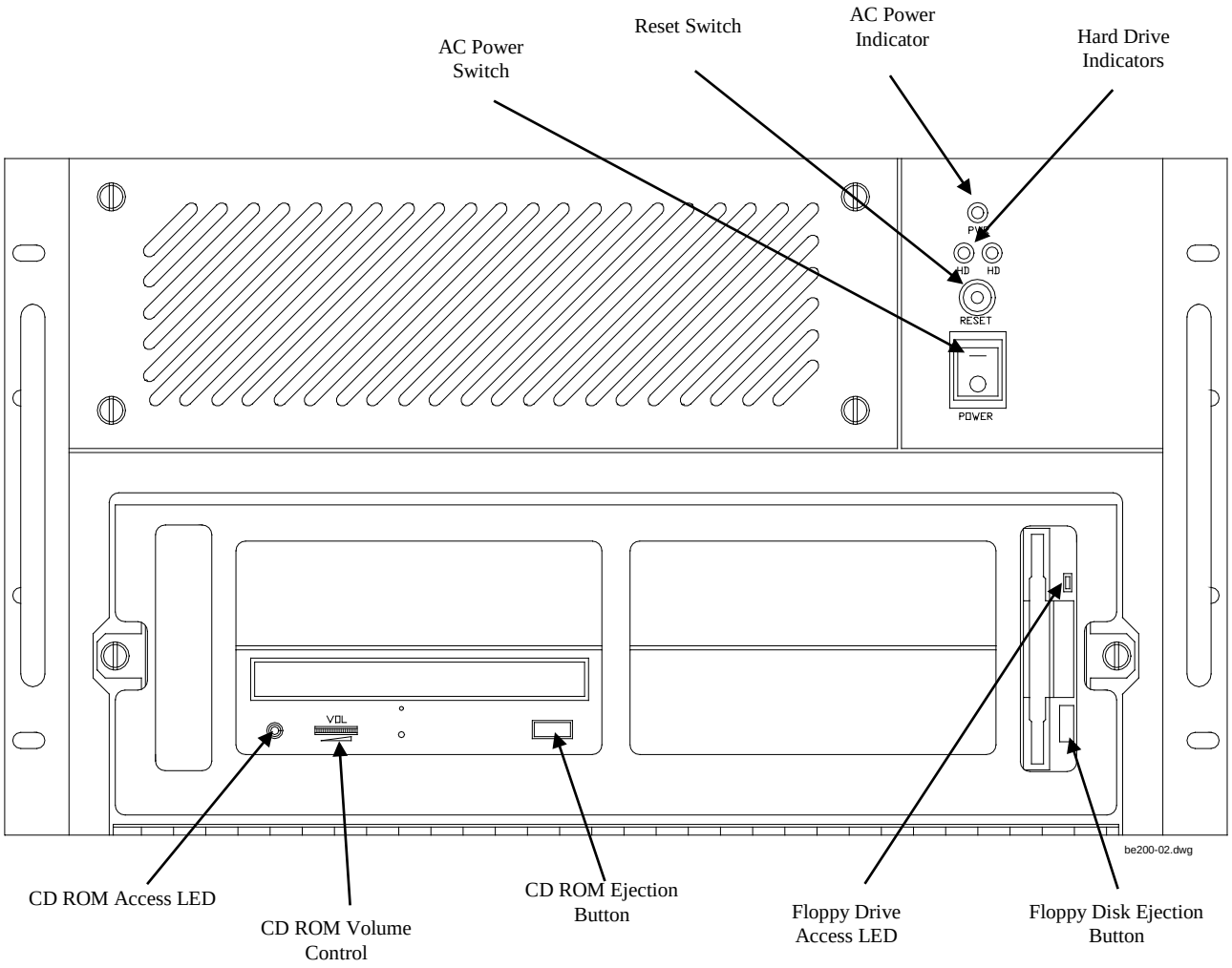


Figure 3-49. IOS Computer Chassis Controls and Indicators (front view)

3.2.8.3. IOS Computer Rear Panel

The rear of the chassis contains controls and indicators for the power supplies and the circuit cards that are installed in the chassis.

3.2.8.3.1. Power Supplies Controls and Indicators

Two hot-swappable, 300-watt power supplies are located in the IOS Computer chassis. Each has a power on/off switch and a green LED indicating that the power supply is on. Between the two power supplies are two LEDs that illuminate green to indicate the operational status of the power supplies. When a power supply failure occurs and an audible alarm sounds, the push button switch below the lights will turn off the alarm. See Figure 3-50.

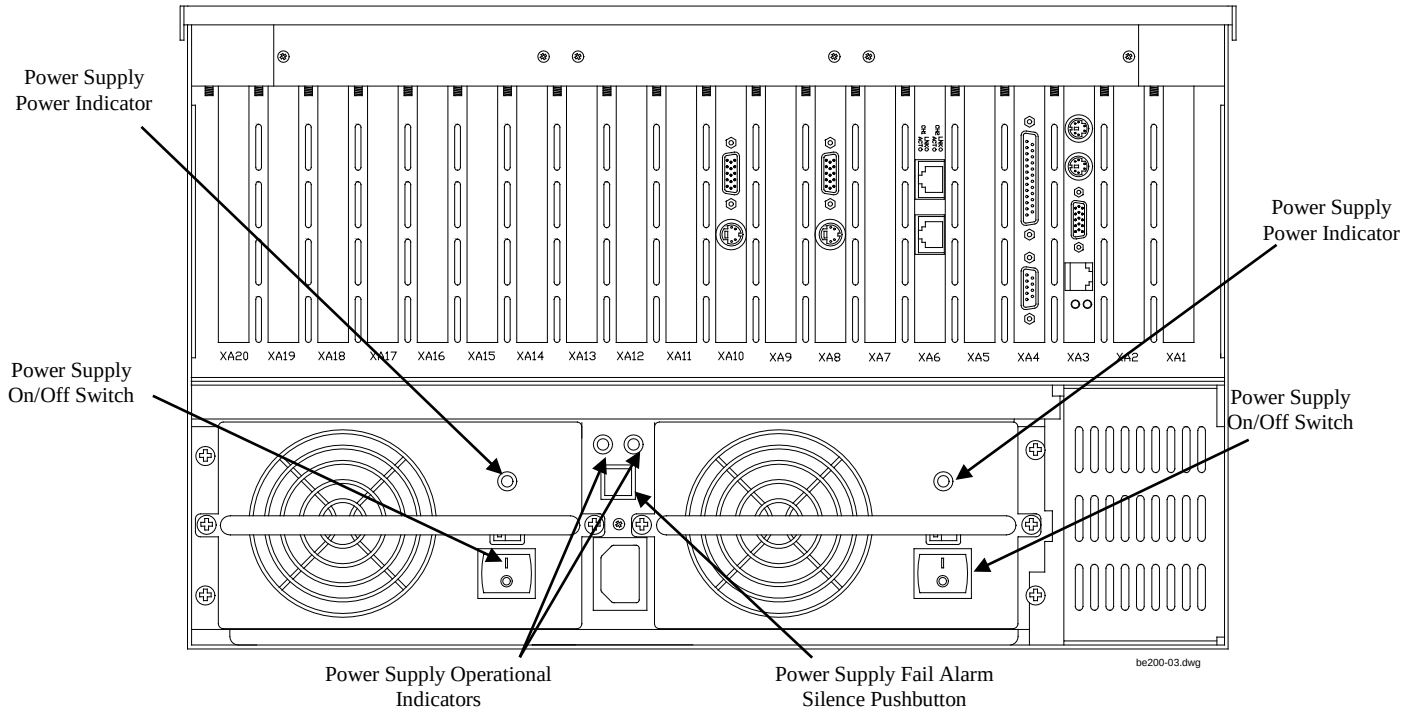


Figure 3-50. IOS Computer Power Supplies Controls and Indicators

3.2.8.3.2. Circuit Card Controls and Indicators

Three circuit cards in the IOS computer, the PCI Bus Single Board Computer circuit card, and the NIC card have indicators that show the operational status of the cards. Figure 3-51 shows the location of each card in the Flight Deck I/O computer chassis.

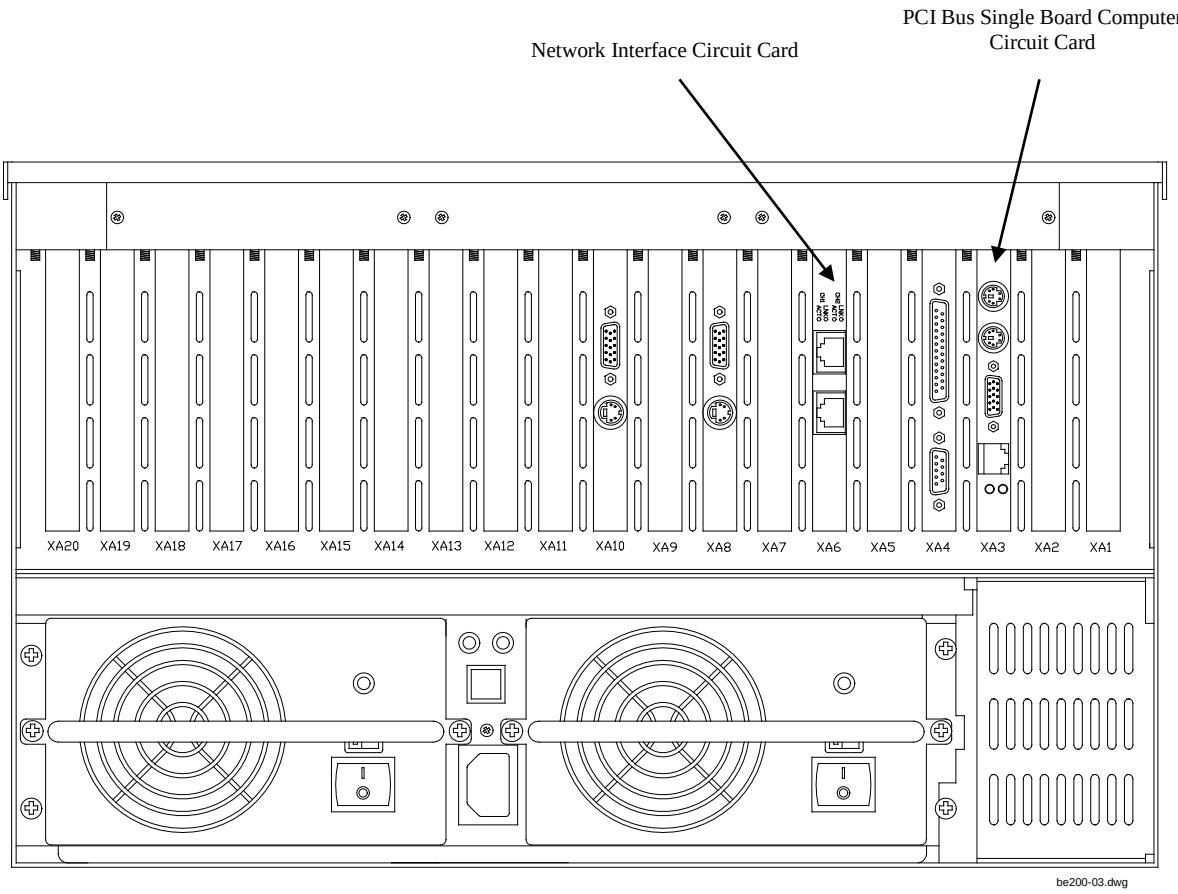


Figure 3-51. IOS Computer Circuit Card Location

PCI Bus Single Board Computer Circuit Card

The PCI Bus Single Board Computer circuit card has two LEDs for status indication of the Ethernet interface. Figure 3-52 shows the location of the indicators.

Link Status LED – This green LED indicates the link status.

On (solid) – The Ethernet interface has a valid link on the network connection and is ready for normal operation.

Off – The Ethernet interface did not find a valid link on the network connection. Transmit and receive are not possible.

Activity LED – This red LED indicates transmit or receive activity for the10Base-T or 100Base-TX network connection.

On (flashing) – A packet is being transmitted or received.
Off – There is no network activity.

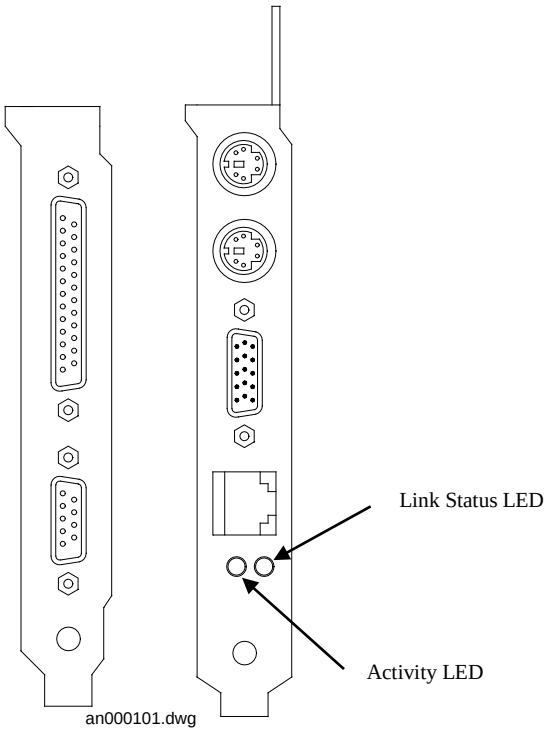


Figure 3-52. PCI Bus Single Board Computer Indicators

Network Interface Circuit Card

The NIC card has four LEDs for operational status of the fast Ethernet channels on the card. Figure 3-53 shows the location of the indicators.

Link (LNK) – This green LED illuminates when an active network link between the adapter port and the device exists. This should always be ON.

Activity (ACT) – This amber LED illuminates only when transmitting or receiving data.

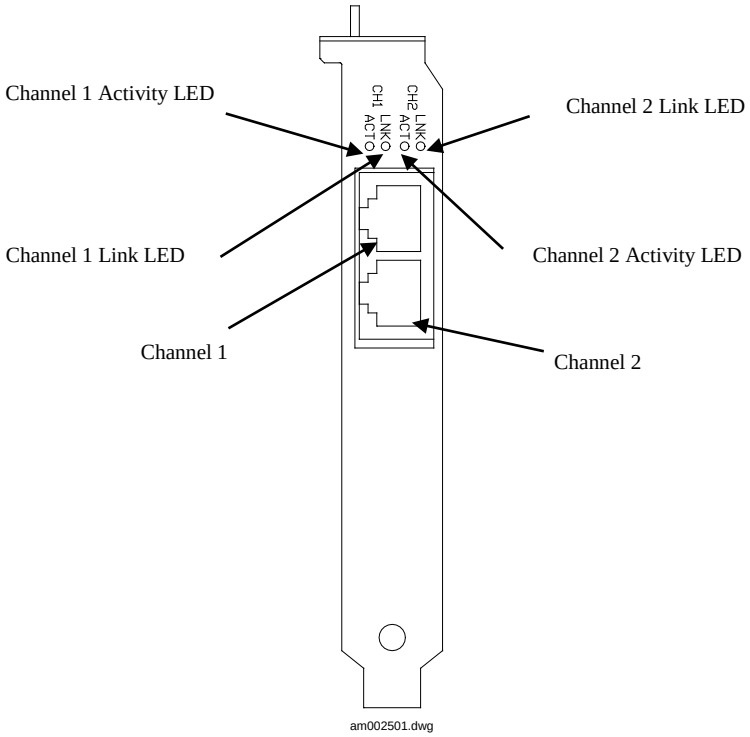


Figure 3-53. Network Interface Circuit Card Indicators

3.2.9. Fire Detection System Controls and Indicators

The Fire Detection system utilizes several indicators strategically located about the simulator area to alert personnel of hazardous conditions or trouble in the system circuits. Controls are also located in the area, which allow personnel to manually activate the alarm system.

3.2.9.1. Fire Detection Master Control Panel

The Fire Detection Master Control Panel is the heart of the Fire Protection System. It contains circuit boards which process alarm inputs and provide visible and audible alarm signals. Each circuit board has controls and indicators, which can inform personnel of the Alarm State of the system or trouble. Figure 3-54 shows the typical location of each circuit board.

3.2.9.1.1. Power Supply Card

The Power Supply Card is the primary power source of the system and is located in the top right portion of the Fire Detection Master Control Panel. It supplies the system with 4 amps of filtered and regulated DC power and contains a battery charger which float-charges the batteries. Failure of the primary power input, and/or the 24VDC-power supply output automatically transfers the unit to its standby batteries. Four LED indicators and one sonalert are located on the card to alert technicians to trouble in the system and the power supply. The AC POWER and SYSTEM TROUBLE indicators, when illuminated can be seen with the door of the control unit closed. See Figure 3-54 for the location of the controls and indicators.

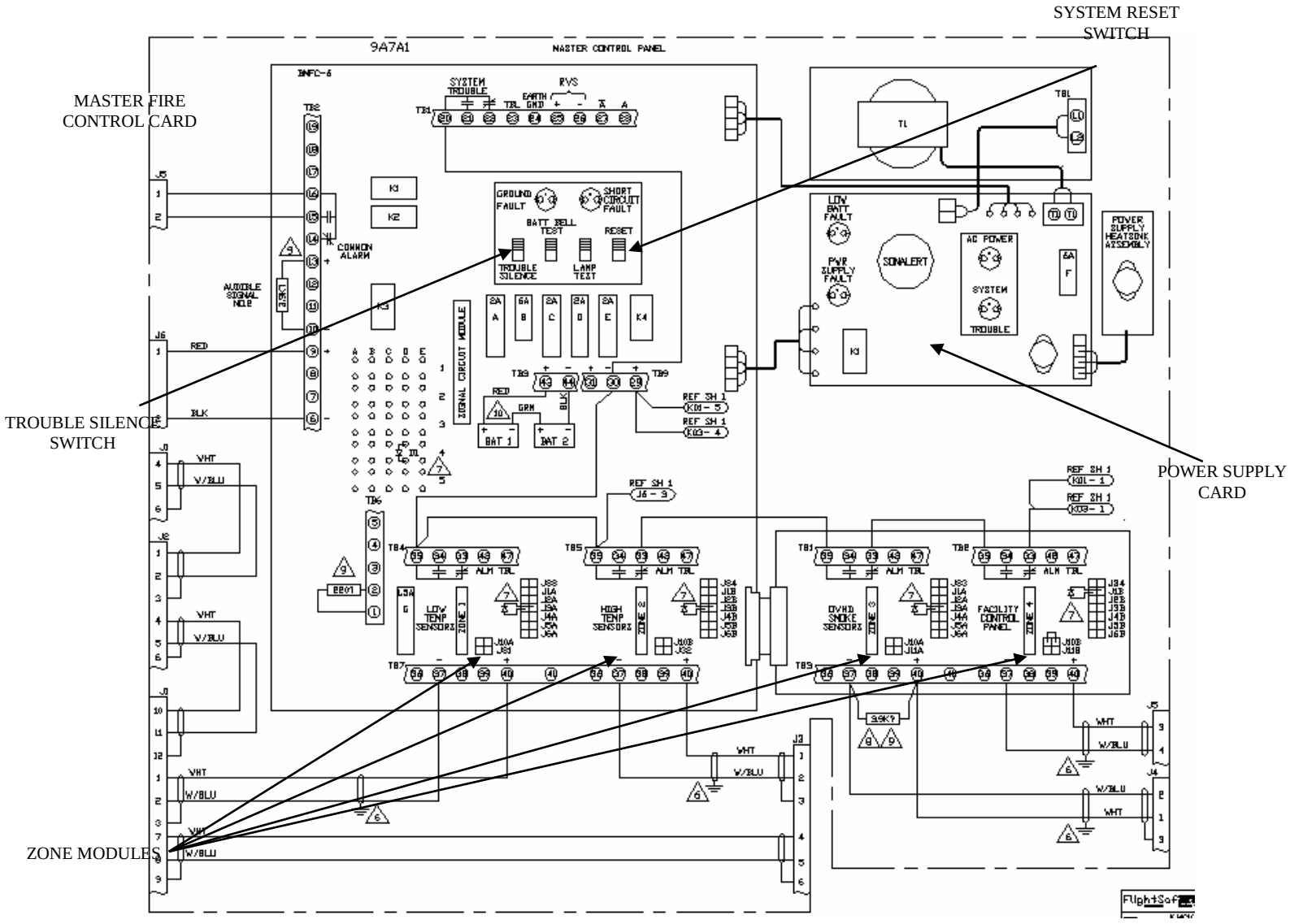


Figure 3-54. Master Control Panel

3.2.9.1.1.1. Low Batt Fault Indicator

The LOW BATT FAULT indicator is located in the top left corner of the power supply card. It illuminates yellow when the batteries are disconnected or deteriorate to 85% of their rated voltage.

3.2.9.1.1.2. Power Supply Fault Indicator

The PWR SUPPLY FAULT indicator is located below the low battery fault indicator. It illuminates yellow when a high voltage is detected due to a faulty power supply.

3.2.9.1.1.3. AC Power Indicator

The AC POWER indicator is an LED which illuminates green when primary input power, 110VAC, is available to the system. The LED is located at the top right side of the power supply card. When the control unit door is closed, it is visible through a small window of the door for easy identification.

3.2.9.1.1.4. System Trouble Indicator

The SYSTEM TROUBLE indicator is located directly below the AC POWER indicator and illuminates yellow when trouble is detected in the system. Failure of the primary power input, and/or the 24VDC power supply output causes the indicator to illuminate. It also illuminates any time an actuating circuit is shorted, open, or grounded. When the unit door is closed, it is visible through a small window of the door for easy identification.

3.2.9.1.1.5. System Trouble Sonalert

The System Trouble sonalert is located adjacent to the AC POWER and SYSTEM TROUBLE indicators. The audible alarm is associated with the SYSTEM TROUBLE indicator and sounds when the indicator activates.

3.2.9.1.2. Master Fire Control Card

The Master Fire Control Card is the nucleus of the Fire Control Unit. It distributes the alarm signals issued by the alarm-initiating modules and generates general alarm and trouble signals from the system. The circuit card has three yellow trouble LEDs and five functional switches. It also contains Zones 1&2 modules, which have two LEDs on each. Figure 3-55 shows the location of the circuit card switches and indicators. The indicators on the zone modules are the only components that show when the door of the Fire Control Unit is closed.

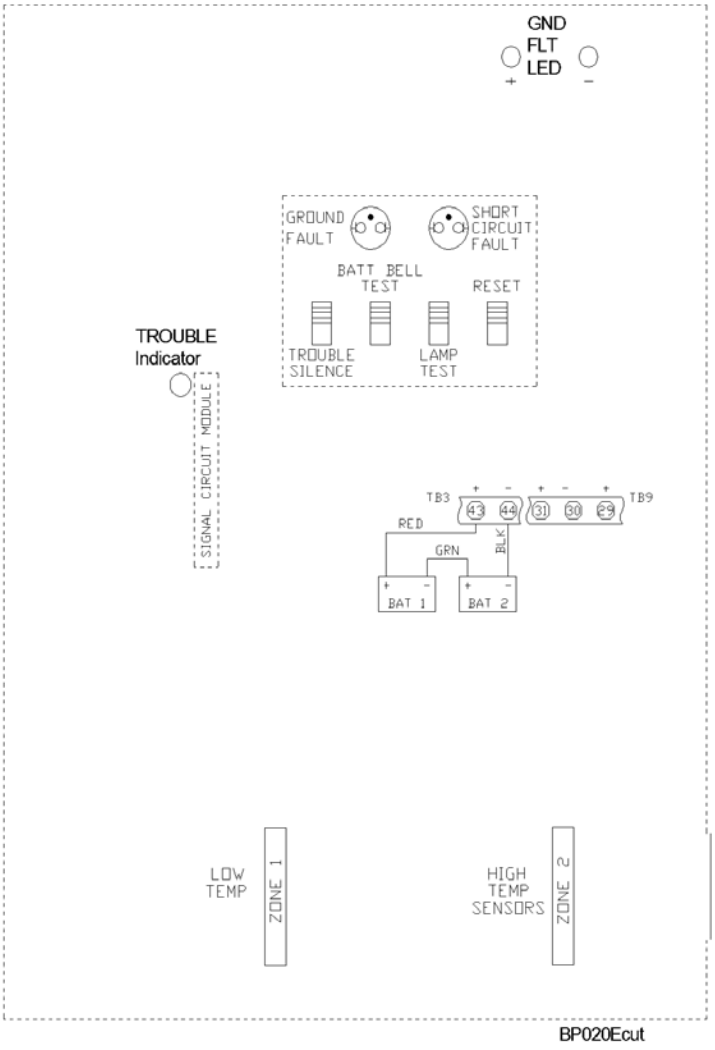


Figure 3-55. Master Fire Control Card

3.2.9.1.2.1. Ground Fault Indicators

Three GROUND FAULT indicators are located on the Master Fire Control card. One indicator is located at the top left portion of the small panel on the circuit board and is labeled GROUND FAULT. It illuminates yellow when a system ground fault is detected. Two separate LEDs, located above the panel, indicate whether the fault is in the positive or negative circuit.

3.2.9.1.2.2. Short Circuit Fault Indicator

The SHORT CIRCUIT FAULT indicator is located next to the GROUND FAULT indicator. It illuminates yellow when a short circuit in either of the two alarm-signaling circuits is detected.

3.2.9.1.2.3. Trouble Switch

The TROUBLE switch is located in the bottom left corner of the small panel on the circuit board. It is a two-position switch used to silence the sonalert when trouble is detected in the system. The positions for the switch are NORMAL and SILENCE. For general operation, the switch should be in the NORMAL position. If trouble is detected in the system and the sonalert sounds, the TROUBLE

switch may be put in the SILENCE position to interrupt the alarm. If subsequent circuit trouble is detected, the sonalert will sound again.

3.2.9.1.2.4. Batt/Bell Test Switch

The BATT/BELL TEST switch is located next to the TROUBLE switch. It is a momentary switch used to test the low battery warning system.

3.2.9.1.2.5. Lamp Test Switch

The LAMP TEST switch is located next to the BATT/BELL TEST switch. It is a momentary switch used to test the indicator lamps in the system to ensure they are functioning properly.

3.2.9.1.2.6. Reset Switch

The RESET switch is located next to the LAMP TEST switch. It is a momentary switch used to reset the system after an alarm situation has been corrected.

3.2.9.1.2.7. Signal Circuit Module TROUBLE Indicator

The Signal Circuit Module TROUBLE indicator illuminates yellow in case of opens, grounds, or loss of module supervision.

3.2.9.1.3. Zone Controls and Indicators

The Fire Protection system is divided into detection zones. These zones include:

Zone 1	Cockpit & IOS
Zone 2	Computer equipment cabinets
Zone 3	OVHD dome smoke sensor
Zone 4	Facility

The trouble by zone annunciation is accomplished using the Zone Detection Modules. Its own Detection Module monitors each zone. Each module contains a TROUBLE indicator, ALARM indicator, and SILENCE switch. The Master Fire Control Card and the Zone Mother Card have two modules each, which plug directly into the cards. The modules for Zones 1 & 2 plug into the Master Fire Control Card and the modules for Zones 3 & 4 plug into the Zone Mother Card. Refer to Figure 3-54 for the location.

3.2.9.1.3.1. Trouble Indicators

Each Zone Detection Module contains a circuit TROUBLE indicator. The indicators are LEDs, which illuminate yellow if the associated circuit is shorted, open, or grounded. They also illuminate when a circuit goes into an alarm condition. This also causes the SYSTEM TROUBLE indicator to illuminate and the audible alarm to sound. When the Fire Alarm Control Unit door is closed, the TROUBLE indicator shows through a small window of the door for easy identification.

3.2.9.1.3.2. Alarm Indicators

Each Zone Detection module also contains an ALARM indicator, which is located below each TROUBLE indicator. They are LEDs, which illuminate red when the associated circuit goes into an

alarm condition. When the Fire Alarm Control Unit door is closed, the ALARM indicator shows through a small window of the door for easy identification.

3.2.9.1.3.3. Silence Switch

A signal SILENCE switch is located on each zone module. If an alarm is activated in a particular zone, the indicators illuminate and the System Trouble sonalert sounds. Placing the associated module switch in the SILENCE position silences the alarm for that zone. Should another zone go into an alarm condition, the sonalert will reactivate. The zone silence switch affects only the System Trouble sonalert and not the visual indicators.

3.2.9.2. Photoelectric Smoke Detector Function LED

Smoke detectors are located strategically about the simulator. The detectors send a signal to the fire control panel where it is processed, activating the alarm system. An LED is visible on the smoke detector housing. Figure 3-56 is an illustration of the smoke detector. Under alarm condition, the LED lights continuously at full brilliance. Under normal condition, to assure that the detector is functioning, the LED pulses (four flashes per minute) allowing visual supervision of the detector. Absence of the LED indicates a nonfunctional detector or faulty wiring.

3.2.9.3. Heat Sensors

The heat sensors send a signal to the fire control panel where it is processed, activating the alarm system. There are two heat sensors: one for the upper trip point of 170°F and the other for the lower trip point of 140°F. When the lower trip point is reached, the system is put in a warning-type condition. When the upper trip point is reached, the system is shutdown. See Figure 3-57.

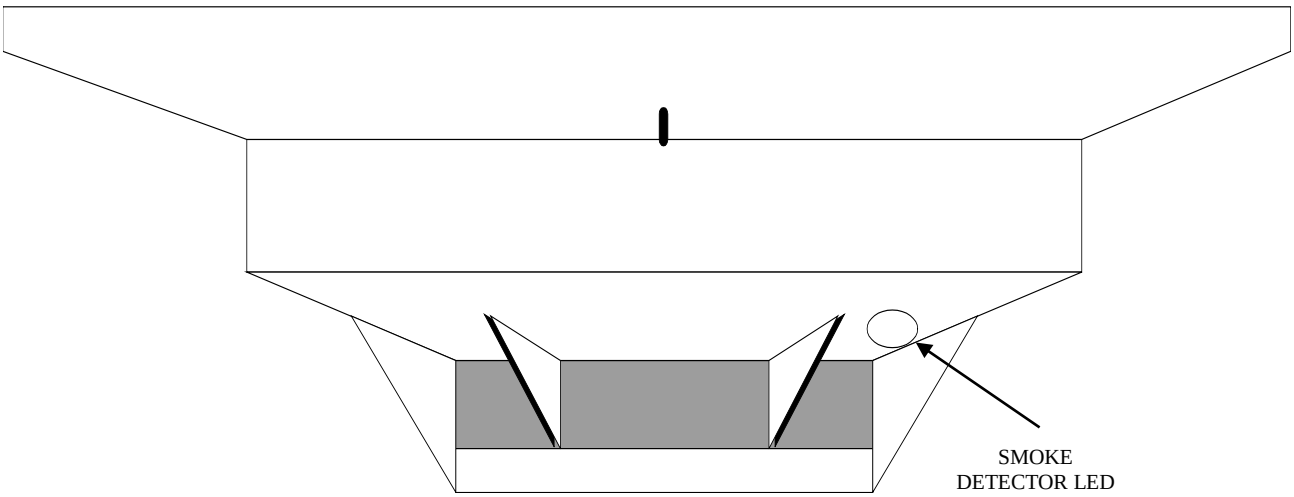


Figure 3-56. Smoke Detector

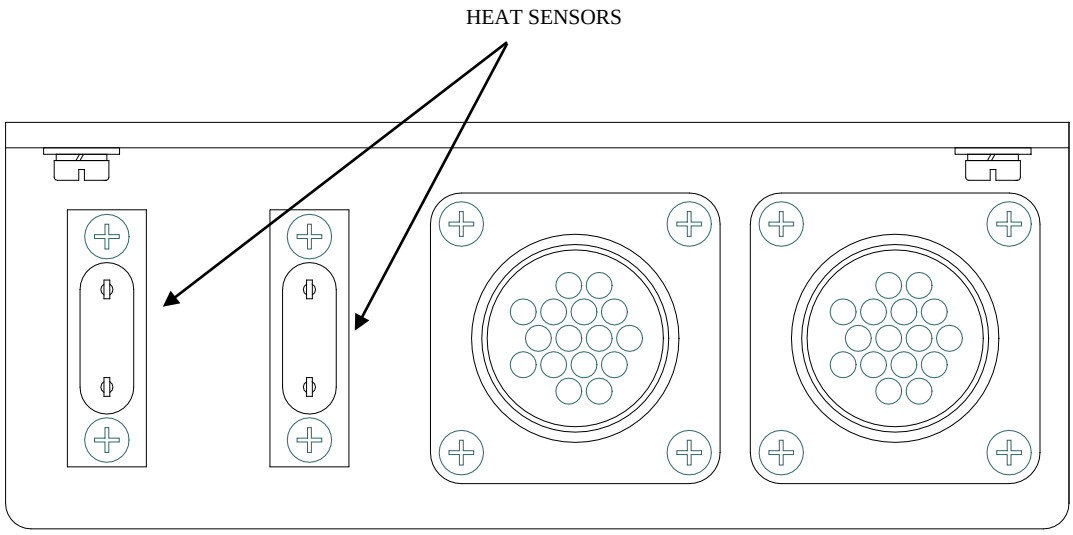


Figure 3-57. Heat Sensors

3.2.9.4. Alarm Horn/Strobe

The alarm horn and strobe unit is typically located in the facility, adjacent to the control unit. Figure 3-58 is an illustration of the alarm horn/strobe. The unit consists of a Lexan™ lens with the FIRE legend visible from three directions and a warning horn with a typical output of 95dB. When the fire alarm system is activated, the strobe flashes and the horn sounds.

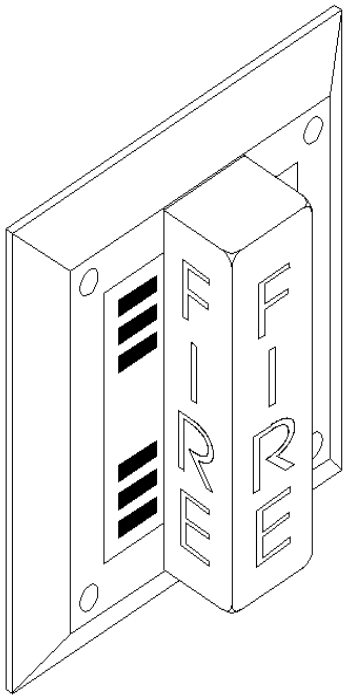


Figure 3-58. Alarm Horn/Strobe

3.2.9.5. Manual Alarm Pull Station / IOS

The Manual Alarm Pull Station is mounted on the left side of the IOS main instrument panel. Figure 3-59 is an illustration of the pull station. This station is used to manually activate the fire alarm system. When the switch is pulled, an alarm signal is sent to the Fire Alarm control unit activating the system.

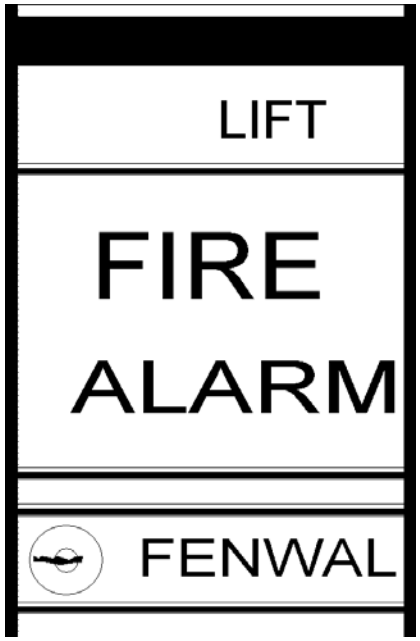


Figure 3-59. Manual Alarm Pull Station

3.3. STARTUP

The following start-up sequence of the simulator AC power assumes that all circuit breakers and switches are in the proper position and components are operating normally.

NOTE

During the power-up sequence, some fail indicators will illuminate, but should extinguish once all AC power is up. If a fail indicator does not extinguish, verify proper operation of that circuit.

The APS Sound System may be started up with the system console or the IOS computer. It is important that these instructions be followed in order.

NOTE

For initial start-up of the APS Sound System, verify IOS is booted and simulation is up and running before performing Automatic Boot Up.

3.3.1. Main Power Startup

CAUTION

ENSURE THERE ARE NO OPEN MISSION-CRITICAL/SAFETY WORK ORDERS.

NOTE

Check that the Fire Panel AC Power light is ON and all trouble and alarm lights are off. The red alarm lights typically have a faint red glow.

Turn PCL Friction knob to remove friction before booting computers.

1) Verify that facility power is available. There is one 208VAC/80Amp service for C/L servos and one 208VAC/50Amp service for the remainder of the simulator systems.
2) Visual systems also have a 208VAC/40Amp service for the IG, a 208VAC/30Amp service for the Projectors and a 120VAC/15Amp service for floodlights in the visual sim.
3) The AC Power Controller is at the top of the 9A1 equipment cabinet. Verify that the red, three-pole circuit breaker labeled “MAIN POWER” is closed (up position). The indicators, labeled ØA, ØB, and ØC, will illuminate, signaling the availability of three-phase AC power. See Figure 3-60.

4) Depress the green start button on the AC Power Controller. Listen for contactor closure and the equipment cabinet fans coming on.
5) Verify all white circuit breakers (CB3-CB23) located on the Power Controller are closed (up position). Normally, these will all be closed and will not need adjusting. See Figure 3-60.
6) The Smart UPS is in the 9A2A2 area. Turn on the UPS by depressing the larger of two buttons (labeled 1 or Test). The green LEDs on the UPS should illuminate and should indicate a fully charge battery. See Figure 3-61.

NOTE

If powering-up a Unit Training Device (UTD), skip 7) through 12).

7) Check that I.G. Cabinet is powered up with proper indications.
8) Power up the VCC computer.
9) After boot-up, Login.

NOTE

For security reasons, Login procedures will not be entered here.

10) The Vital control screen status bar will indicate, “Real-Time is not running.”
11) From Heading Bar select “Visual” – then select “TAP Start.”
12) Status Bar should now indicate “Real-Time is running.”

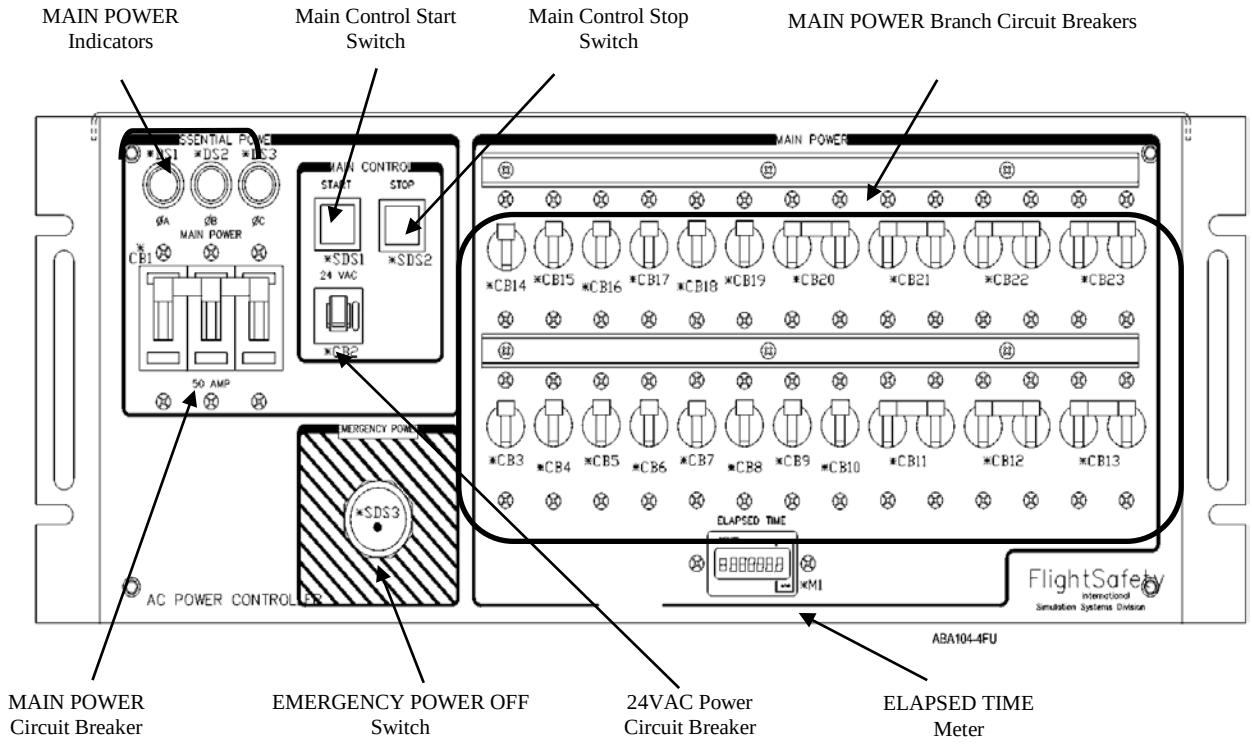


Figure 3-60. AC Power Controller

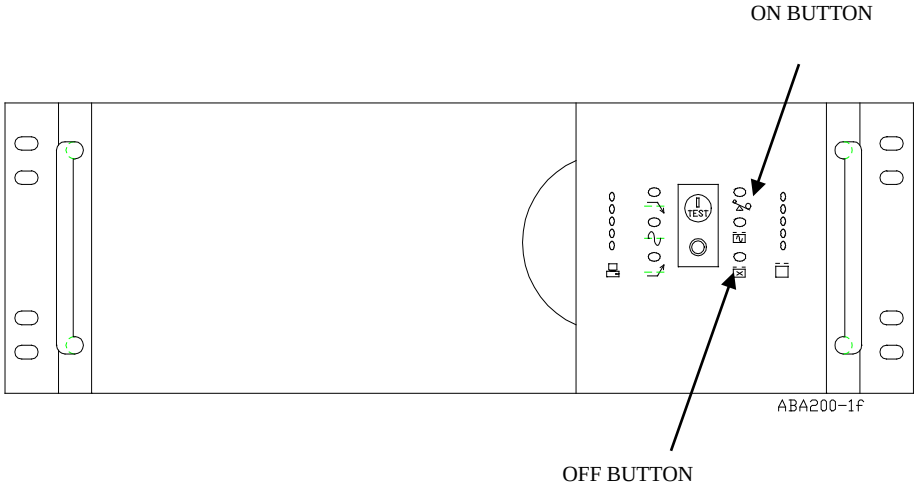


Figure 3-61. Uninterruptible Power Supply

13) Once the UPS is powered, the computers should turn on. Each computer has an AC power switch on each of its two rear-mounted power supplies and a DC power switch in the upper left corner of its front panel. Normally, all of these are left in the “on” positions. The green LED on each front panel should illuminate steady and the amber hard drive LEDs illuminate briefly and then extinguish.

14) While waiting for the computers to power up, verify the Digital Control Loading Servo circuit breakers are all closed (up position). They are located in the 9A2A3 area, just below the UPS and FDKIO computer.

15) Verify the Crown audio amplifier (9A3A4), near the bottom of the equipment cabinet, is powered and that Channels 1 and 2 are adjusted for about 20dB attenuation. Also, make sure the Raritan KVM (Keyboard, Video, Mouse) switch is turned on. The AC power switch is located on its rear panel.

16) Verify the DAS chassis is powered. If the green LED is not illuminated, check the AC power switch located on the back of the chassis.

3.3.2. Systems Startup for Training

See Figure 3-62 for Host, FDKIO, ECLS, and IOS chassis front panel controls and indicators.

1) At the Instructor Station, verify the display screens are on. Using the keyboard, press the "NUM LOCK" key twice in quick succession to activate the KVM switch menu. Use the arrow keys to select the ACS computer and press "Enter".

NOTE

Ensure SimSound TRAIN auto-start window is open and running.

"Running" icon is flashing.

2) Num Lock twice – Select FDKIO – Enter.

FDKIO should display FDKIO screen w/clock running.

3) Num Lock twice – Select IOS – Enter.

4) The IOS login window will default to username=runsim. During installation, simply type "runsim" for a password and press "Enter". Refer to the local site system Administrator for Site usernames, domains, and passwords. Once the correct username and password are entered, the Windows 2000 desktop will appear. Double click the icon labeled "Start IOS" to start the IOS application.

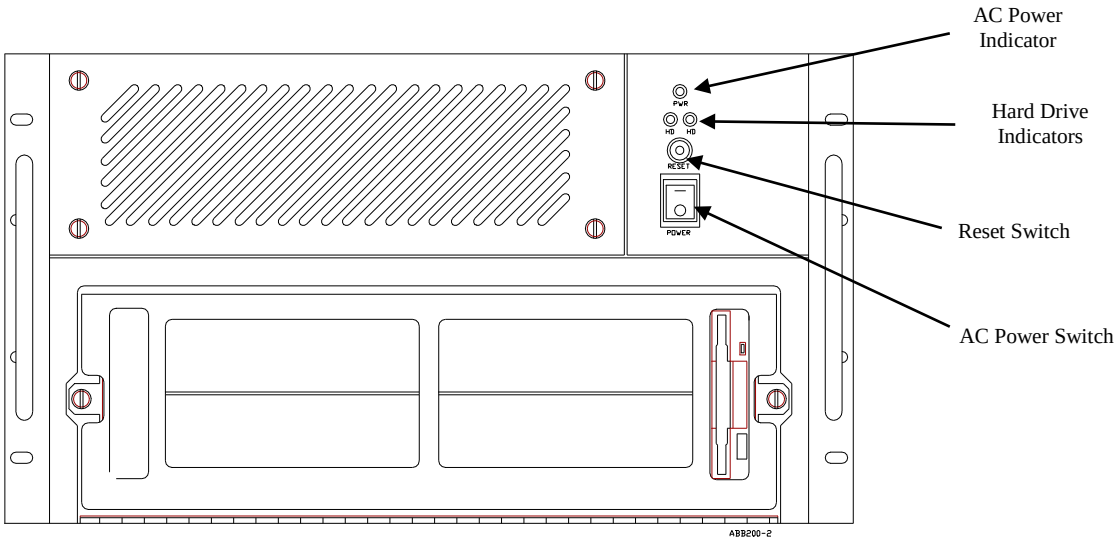


Figure 3-62. Host, FDKIO, ECLS and IOS Chassis Controls and Indicators

5) Num Lock twice – Select “HOST”.

At Host screen, Type: Reboot [space] 6 - Enter.

6) Host will scroll through several screens as it boots. IOS control panel switches should illuminate.

7) At the Instructor Station, watch the IOS computer screen. At the bottom middle of the screen, just under the elapsed time meter, is a counter. This counter will begin incrementing once the Host computer has started and is successfully communicating with the IOS. When the counter begins incrementing, you may start Control Loading.

8) At the simulator, on the left hand side below the seat, is a reset switch. Depress the switch. It should change from blinking amber to steady green.

9) At the Instructor Station panel, depress the button labeled “CONT LDG ARM”. It will illuminate steady green initially, then blink amber during calibration. When the controls calibration is complete, it will illuminate steady amber. It may take several minutes to complete the cycle.

10) At the Instructor Station, use the “NUM LOCK” key to enter the KVM menu and select the IOS display. The simulator is now Ready For Training (RFT).

11) Initialize the cockpit and apply power in accordance with the Instructor’s Positional Handbook.

3.3.2.1. Automatic Boot Up for APS Sound System

1) Turn on the APS unit by using the AC power switch on the back panel. It will continually attempt to boot while the Aural Cue System Computer initializes. Refer to Figure 3-25.

2) Using the System Console, set Screen Select to #5 (105 SND-PC).

3) If no LED activity appears on the front of the unit, press the ON button on the Sound System computer. It will auto-login as “snd”.

4) Verify the successful boot of both the APS Console Window and the SimSound auto-startup program. If not shown, click on the APS Console Icon.
5) Verify the IOS Volume Control is full CCW (OFF).
6) Turn on all Amplifiers. Verify the volume knobs are full CW (ON).
7) Check the Host Status on the Sound System page.

3.4. OPERATION

The Host and Flight Deck I/O do not require any operator intervention during normal operations. For IOS operations, except those involving the APS Sound System, consult the Instructor's Positional Handbook (IPH).

The instructor controls the APS Sound System at the IOS. The instructor can control and direct the aircraft communications through the COMM system using a headset, microphone, and control switches on the Instructor Station. The instructor can also control the simulator sound volume.

3.4.1. Electric Control Loading System Operation

The ECLS consists of a Digital Servo Remote Power controller, (9A2A5), a digital servo, and pushbutton controls. The digital servo is located in the back section of the cockpit. Pushbutton controls are located on the IOS console.

WARNING

KEEP STUDENT STATION CLEAR WHILE FLIGHT CONTROLS ARE COMING UP. DO NOT SIT IN SEAT UNTIL THE CONTROL LOADING LAMP STOPS FLASHING. STORED POWER CAN CAUSE INJURY TO PERSONNEL OR DAMAGE TO EQUIPMENT.

NOTE

Verify Gust Locks are off before arming flight controls; otherwise, the system will not calibrate.

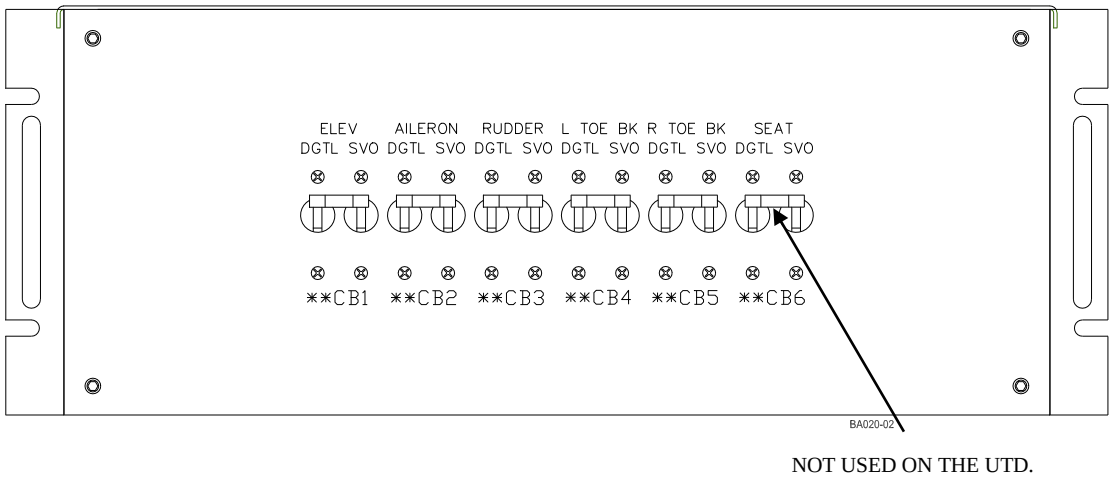
3.4.1.1. Arming the ECLS

1) Apply the Control Loading AC power by turning on the circuit breakers CB1-CB5. Only turn on CB6 for the OFT and IFT Dynamic Seat control. The UTD does not have a Dynamic Seat; therefore, it does not use CB6. See Figure 3-63.
2) Verify the ECLS computer boots.
3) From the IOS, arm the Control Loading by first pressing the MASTER POWER pushbutton followed by the CONT LDG ARM push button. If the Control Loading arm lamp does not flash amber when pressed, push the Control Loading Reset button on the simulator frame. See Figure 3-64.

NOTE

The following step for the Dynamic Seat control is for the OFT and the IFT only. The UTD does not incorporate the Dynamic Seat function.

4) If the Dynamic Seat Control is desired, after ensuring that the student is properly secured into the flight seat, press the DYN SEAT ARM pushbutton. If the Dynamic Seat arm lamp does not flash amber when pressed, push the Control Loading reset button on the simulator frame. See Figure 3-64.



NOT USED ON THE UTD.

Figure 3-63. Digital Servo Remote Power Controller, (9A2A5)

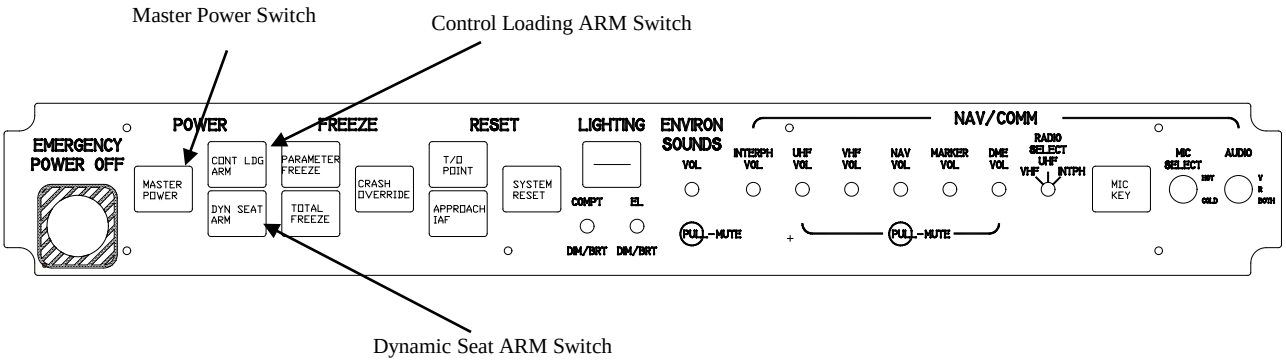


Figure 3-64. IOS Panel Control Loading Controls

3.4.1.2. Disarming the ECLS

1) Press the CONT LDG ARM pushbutton on the IOS control panel to disarm the Controls.
2) Press the DYN SEAT ARM pushbutton on the IOS control panel to disarm the seat.
3) To remove power totally from the Control Loading system, press the MASTER POWER pushbutton on the IOS control panel. Refer Figure 3-64.

3.4.2. Student Station

The Student Station has components which represent the aircraft controls and displays. These components include:

Main Instrument Panel

Left Side Console

Right Side Console

Controls

Lighting

Seat

Only the seat has simulator-unique controls which are covered in the manual. The aircraft controls and displays are covered in aircraft documents and other course materials.

3.4.2.1. Seat

The Seat has stature adjustment and vibration motion. The seat stature adjustment switch (1A5A3) on the left side console controls the seat stature position upward and downward through the seat actuator controller (1A9A1A1). The actuator controller accepts extension commands from the seat stature adjust switch (S1) until either the upper or lower external limit switch is actuated. The red power-on indicator will remain on with AC power input and DC power output. Rotating the emergency stop switch counterclockwise and releasing the switch can turn OFF the power to the seat.

The DRI controls the seat motion system through the CLS-1 platform (7A1), power amplifier (7A19A1), and seat encoder unit (7A19M1). In DAS- and DAS II-installed devices, the ECLS computer controls the seat motion system through the DAS/DAS II chassis (9A3A6), power

amplifier (7A19A1), and seat encoder unit (7A19M1). The seat dynamic motion is not used on the UTD. DAS II is discussed in a separate supplement.

3.4.3. Fire Detection System Operation

The Fire Detection System exists on the flight deck dome area, equipment cabinets, and Instructor station areas. This fire detection system is also wired to the facility's fire detection system, so either system may trigger the other in case of fire. The fire detection system consists of:

Fire Alarm Control Unit

Smoke Detectors

Battery Back Up System

Heat Sensors

Audible and Visible Alarms

The system is typically not operator interactive except for the manual pull station located on the left side of the IOS control panel. Since the system is not operator interactive, this section ties together the various components, including the manual pull station and how and when they activate. The following paragraphs describe the sequence of events for normal conditions (no alarm), basic alarm, and system reset.

3.4.3.1. Normal Conditions (No Alarm)

Under normal, non-alarm conditions, there is no operator interaction and the fire detection system appears as follows.

1) The LED in the smoke detectors flashes about four times per minute. A faster flash indicates the system is approaching alarm condition.
2) The green A/C POWER LED on the Fire Alarm Control unit is illuminated showing power is available to the system.
3) The trouble and alarm indicators on the Fire Alarm Control unit are not active.
4) No audible alarms are active.
5) The facility fire detection system is normal; no alarms.

3.4.3.2. Basic Alarm

When an alarm occurs, the appropriate red zone indicator illuminates at the Fire Alarm Control unit, the system alarm signals sound, and because of an abnormal circuit condition, the zone trouble indicator and SYSTEM TROUBLE indicator illuminate. Operating the individual zone silence switch on the Zone Detection Modules in the Fire Alarm Control unit will silence the alarms to a particular zone. This action allows the alarms to come on again should another zone be activated. The zone silence switch affects only the audible and not the visible alarms.

The activated zone module remains in the alarm mode until the actuated device is restored to normal and the Fire Alarm Control unit is manually reset. See paragraph 3.4.3.4 System Reset.

3.4.3.2.1. Alarm Sequence of Events

The system goes into an ALARM condition when any single heat or smoke detector is activated.

1) Alarm and trouble indicators illuminate on the appropriate zone module in the Fire Alarm Control unit. Also the SYSTEM TROUBLE indicator illuminates.
2) Audible and visible alarm devices operate steadily. These devices include control panel annunciators and the alarm horn and strobe on the high bay wall.
3) The zone indicator illuminates on the remote annunciator panel, indicating the zone in alarm.
4) An alarm signal is sent to the facility fire alarm panel.
5) END OF SEQUENCE

3.4.3.3. Open Circuits

Should an opening occur in the zone wiring, the appropriate zone trouble indicator, SYSTEM TROUBLE indicator, and the SYSTEM TROUBLE sonalert will activate on the master control panel.

3.4.3.4. System Reset

After correcting the cause of an alarm, reset the Fire Alarm Control Unit and the Facility Control Unit. Since the simulator fire detection system is tied into the facility, at least one of the first three zones and zone 4 (facility) illuminates in the alarm condition. Use the following procedure and Figure 3-65 to reset the system.

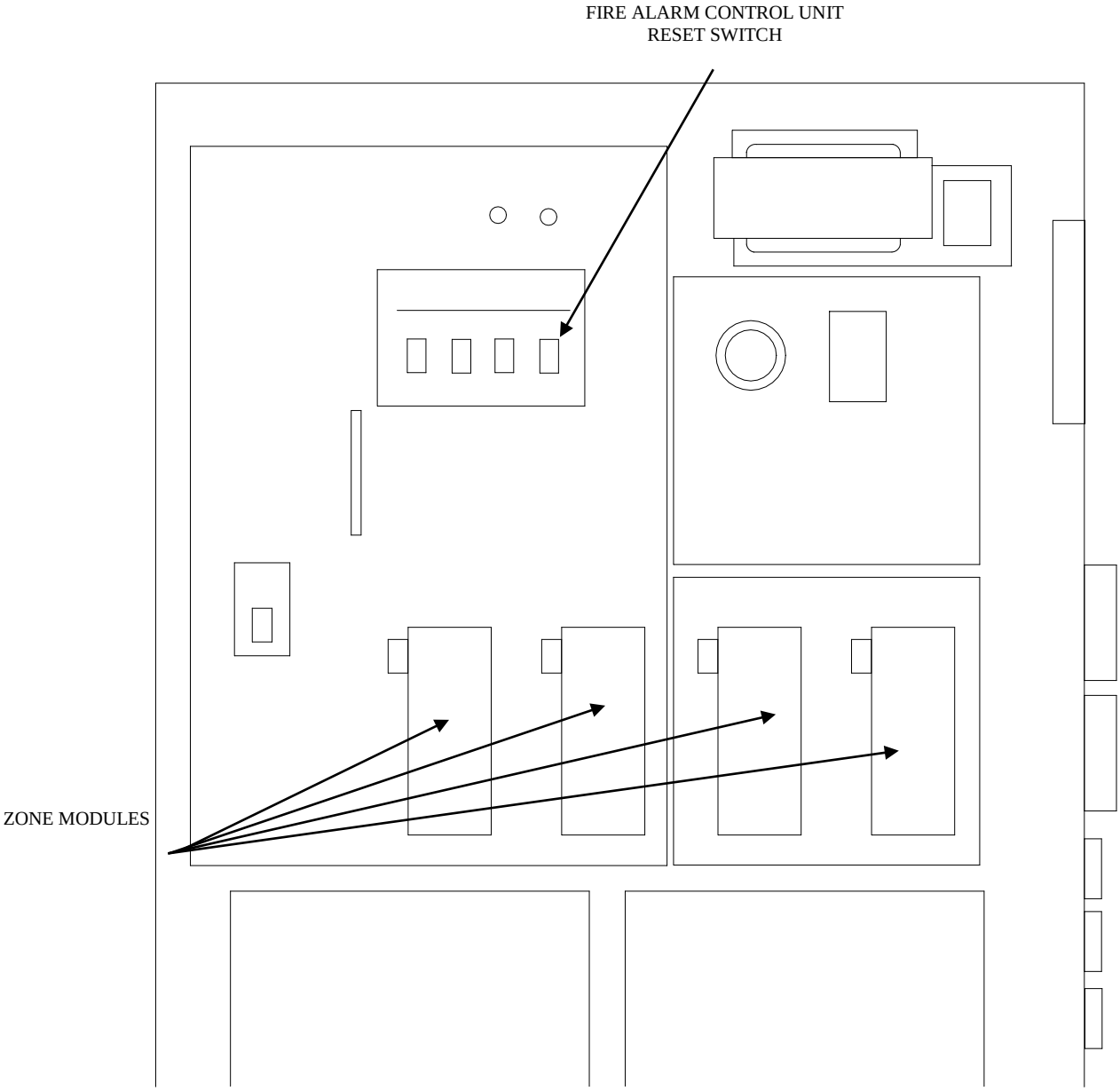


Figure 3-65. Fire Alarm Control Unit

Reset Zones 1-3

1) Reset the Fire Alarm Control Unit and check for alarm. The sonalert should sound and Zone 4 (FACILITY) should be lit.
2) Reset the Facility Control Unit and check for alarm. This should deactivate the Facility System alarm. The sonalert on the simulator should continue to sound and Zone 4 should still be lit.
3) Reset the Fire Alarm Control Unit and check for alarm. Both facility and simulator detection systems should be in the reset state.
4) If the reset procedure fails to silence the alarms, verify that the cause of the problem is corrected and repeat the reset procedure.

Reset Zone 4 (FACILITY)

1) Reset the facility master control panel and check for alarm. This should deactivate the Facility System alarm. The sonalert on the simulator should continue to sound and Zone 4 should be illuminated.
2) Reset the simulator master control panel and check for alarm. Both facility and simulator detection systems should be in the reset state.
3) If the reset procedure fails to silence the alarms, verify that the cause of the problem is corrected and repeat the reset procedure.

3.4.3.5. Manual Alarm Reset

The manual alarm pull station is a double-action unit that requires the outer door to be lifted to expose the actuation door. The actuation door is then pulled forward to operate the toggle switch. Once the door is pulled, it locks in the alarm position and must be reset. To reset the station, insert and turn the key ¼ turn clockwise. This opens the station. Closing the station resets the toggle switch automatically.

NOTE

The key must be used to reset the manual pull station. Simply pushing the panel in will not reset it.

3.5. SHUTDOWN

The main power circuits can be powered down without powering down the UPS. This enables work on most simulator systems without powering off any of the subsystem chassis. When powering down the entire system, it is always best to shutdown any Windows- or Unix-based system in a proper fashion to allow the operating system to perform those housekeeping routines which will ensure file system integrity.

3.5.1. Host/FDKIO/IOS/Aural/ECLS Systems Shutdown

FDKIO - Leave in the ON position; no procedure needed. A “soft” shutdown can be accomplished through a button on the IOS.

ECLS - Leave in the ON position; no procedure needed. A “soft” shutdown can be accomplished through a button on the IOS.

Host - Leave in the ON position; no procedure needed. A “soft” shutdown can be accomplished through a button on the IOS.

Aural Cue - Perform a Windows environment “Shutdown” through the IOS.

APS Sound System –

1) Perform a shutdown of the Sound System Computer.
2) Turn the amplifiers power switches off.
3) Shut down the APS by turning the power switch on the back OFF.
4) Turn off the Aural Cue System Computer by depressing the power-off switch on the back.

DAS - Leave in the ON position; no procedure needed. A “soft” shutdown can be accomplished through a button on the IOS. See DAS II supplement for DAS II procedures.

IOS - Exit the IOS program and perform a Windows environment “Shutdown”.

NOTE

Pressing the NUM LOCK (or SCROLL LOCK on replacement KVMs) key twice quickly on the keyboard will access a menu that will allow the technician to access any subsystem on the trainer network.

The following shutdown sequence of the simulator AC power assumes all precautions have been taken to properly power down or log off the subsystems.

CAUTION

Verify the host computer, Flight deck I/O, IOS, Aural cue and electric control loading systems are properly shut down before beginning these procedures.

CAUTION

Ensure simulators with Vital X visual system that visual computers are properly shut down before beginning these procedures.

3.5.2. Main Power Circuit Power Down

1) Press the Off switch on the UPS Chassis. Refer to Figure 3-61.
2) Press the MAIN CONTROL STOP switch on the Power Controller, followed by placing the MAIN POWER circuit breaker to the Off (down) position. Refer to Figure 3-60.

3.6. EMERGENCY CONDITIONS

In the event of fire or other serious malfunction, press the EMERGENCY POWER OFF (EPO) button and evacuate all personnel following established procedures. Refer to Figure 3-60 for the EPO button location on the AC Power Controller. See Figure 3-66 for the EPO button location on the IOS Control Panel. A third EPO switch is on the top cap of the visual dome on the OFT only. See Figure 3-67 for location of the Visual Top Cap EPO switch. Once the emergency conditions are under control, assess the damage to the FTD. DO NOT power on the FTD until all wiring and connectors have been checked for burns or melting. Once damaged equipment or wiring has been replaced, use the procedures in paragraph 3.6.1 for restarting the FTD after an emergency off condition.

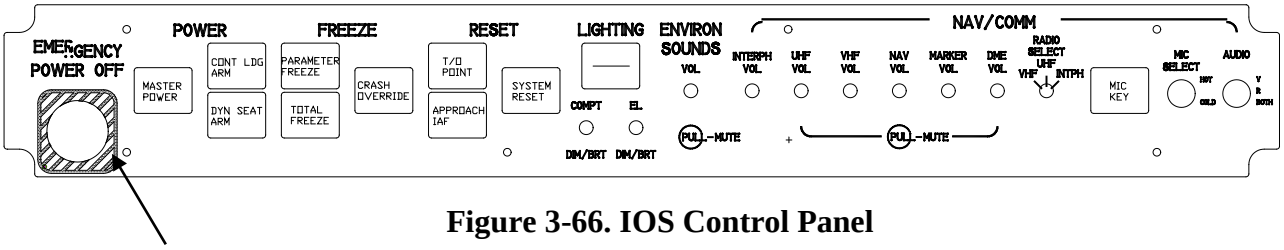


Figure 3-66. IOS Control Panel

EPO Switch

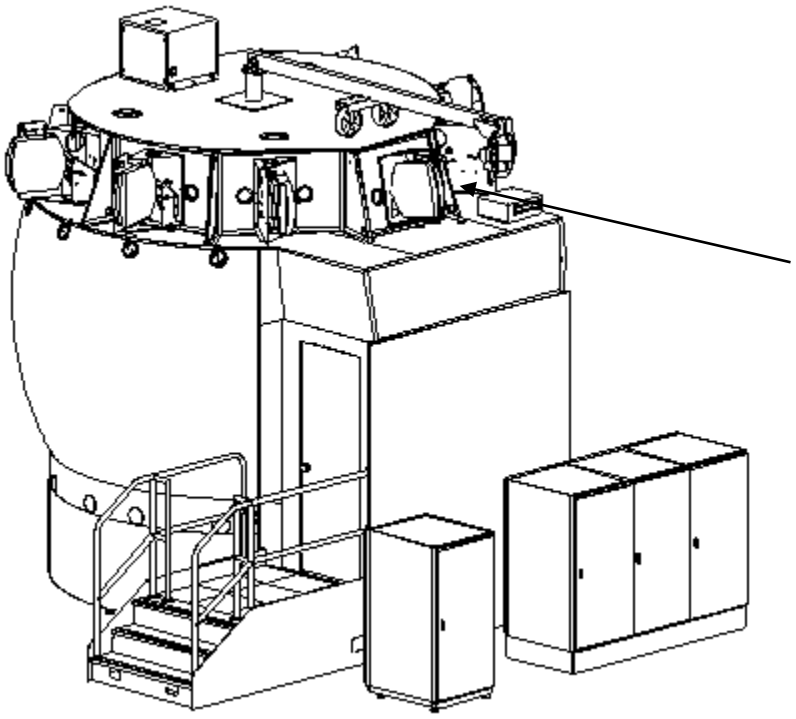


Figure 3-67 Visual Top Cap EPO Switch Location

3.6.1. EPO Recovery

After an EPO initiation, ensure that all circuit breakers and switches are placed back into a normal Off condition. Refer to the procedures under Paragraph 3.5.

WARNING

DO NOT RESTORE POWER UNTIL THE INSPECTION BELOW HAS BEEN PERFORMED AND APPLICABLE REPAIRS HAVE BEEN MADE.

1) Perform an inspection of all wiring, connectors, and components checking for burns and / or melting; repair as necessary.
2) Restart the FTD using the "STARTUP" procedures under Paragraph 3.3.

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