ARMY TM 5-6675-308-34

MARINE CORPS TM 08837A-34/2

TECHNICAL MANUAL

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

FOR

POSITION AND AZIMUTH DETERMINING SYSTEM AN/USQ-70

PART NO. 880500-1

NSN 6675-01-071-5552

This manual supersedes TM 5-6675-308-34, 15 December 1981.

HEADQUARTERS, DEPARTMENTS OF THE ARMY ANO THE NAVY

24 JULY 1985

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CHANGE

No. 7

HEADQUARTERS
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WASHINGTON, D.C., 30 December 1993

Direct Support and General Support
Maintenance Manual
for

POSITION AND AZIMUTH DETERMINING
SYSTEM AN/USQ-70
PART NO. 880500-1
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TM 5-6675-308-34
TM 08837A-34/2

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AN/USQ-70
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Direct Support and General Support
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– – –	3–63 through 3–66
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I–7 and I–8	I–7 and I–8

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WASHINGTON, D.C., 24 June 1988

Direct Support and General Support Maintenance Manual

for

POSITION AND AZIMUTH DETERMINING SYSTEM AN/USQ-70

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4-127 and 4-128	4-127 and 4-128

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POSITION AND AZIMUTH DETERMINING SYSTEM AN/USQ-70

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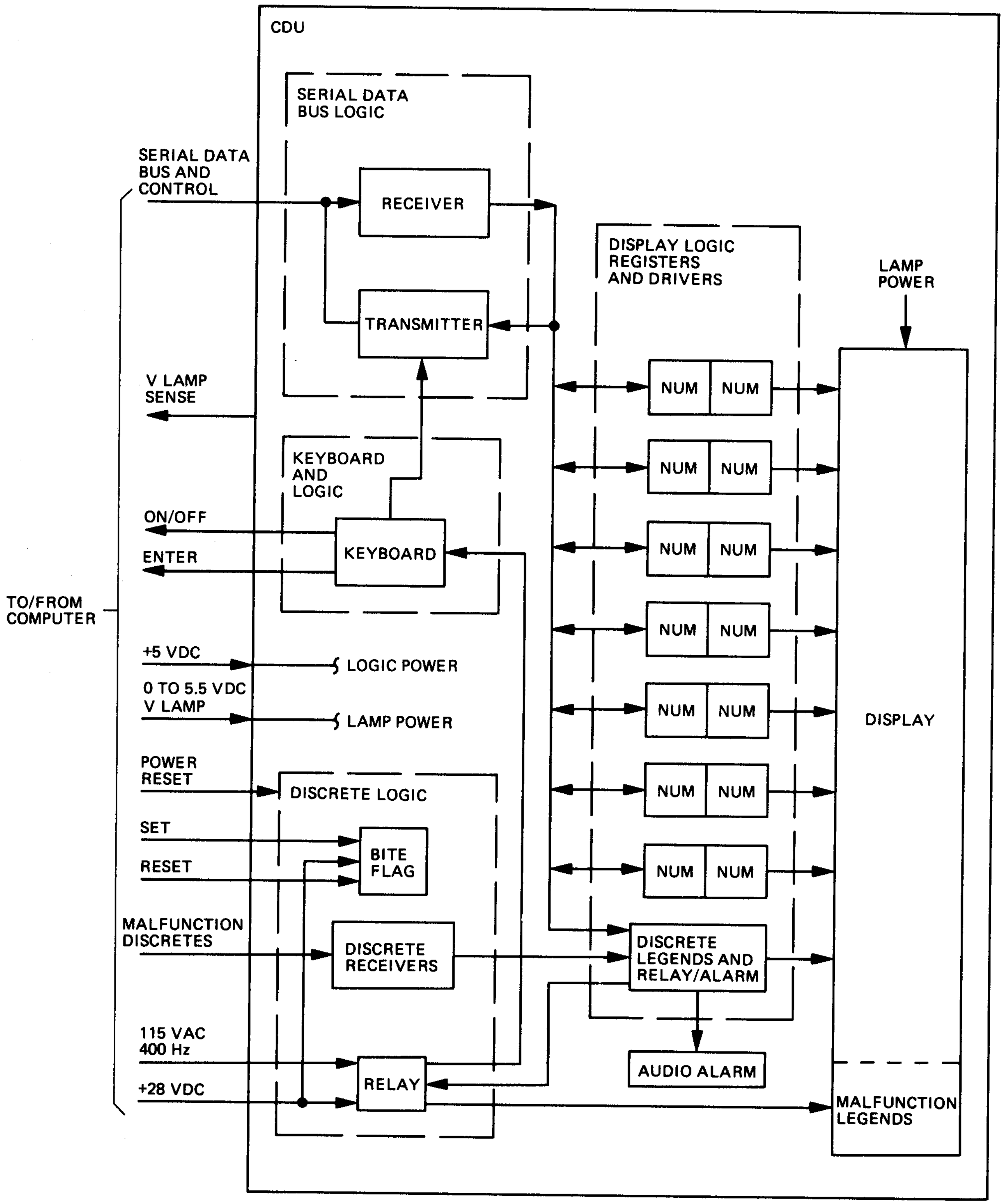

Figure 2-1. CDU Functional Block Diagram

WARNING

The power supply contains 115 volts ac. DEATH OR SERIOUS INJURY may result from contact with 115 volts ac. Be careful when performing the power supply testing and troubleshooting procedure.

WARNING

The computer power supply contains 115 volts ac. DEATH OR SERIOUS INJURY may result from contact with 115 volts ac. Be careful when performing the computer power supply testing and troubleshooting procedure.

WARNING

The tapes used in testing and operating the PADS are electrically conductive. DEATH OR SERIOUS INJURY, as well as damage to the tapes may result if the tapes are allowed to come into contact with 115 VAC.

WARNING

Do not be mislead by the terms "low voltage" or "28 VDC." DEATH OR SERIOUS INJURY can result under certain conditions if the 28 VDC amperage is high enough. Use EXTREME CAUTION when working around ANY hot circuits.

WARNING

Isopropyl alcohol is flammable and gives off harmful vapors, Use only in well-ventilated area away from open flames and sparks. Avoid prolonged or repeated inhalation of vapors.

TECHNICAL MANUAL
No. 5-6675-308-34 (ARMY)
No. 08837A-34/2 (MARINE CORPS)

DEPARTMENT OF THE ARMY AND
HEADQUARTERS U.S. MARINE CORPS
WASHINGTON, D. C., 24 July 1985

Direct Support and General Support
Maintenance Manual

POSITION AND AZIMUTH DETERMINING SYSTEM AN/USQ-70

PART NO. 880500-1
NSN 6675-01-071-5552 (EIC:YOA)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in back of this manual direct to: Commander, US Army Aviation and Troop Command, ATTN: AMSAT–I–MP, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. A reply will be furnished to you.

Marine Corps' users shall submit NAVMC Forms 10772 (Recommended Changes to Technical Publics tions). Send to: Commanding General, Marine Corps Logistics Base (Code 850), Albany GA 31704–5000.

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CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope. This manual contains information required to maintain, test, troubleshoot, and repair the Position and Azimuth Determining System AN/ USQ-70 (PADS) at the direct support and general support levels. Functional descriptions, block diagrams, tools and material lists are provided to support these functions as dictated by the Maintenance Allocation Chart (Appendix D of TM 5-6675-308-12). Marine Corps users shall refer to Appendix .4 of TM 08837A-12/1. Repair parts and special tools required are listed in TM 5-6675-308-24P. Marine Corps users shall refer to TM 08837A-24P/3.

1-2. Maintenance Forms and Records. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, the Army Maintenance Management System (TAMMS)Marine Corps personnel will prepare and maintain records and report forms as prescribed by TM-4700-15/1, Equipment Record Procedures.

1-3. Destruction of Army Material to Prevent Enemy Use. Refer to TM 750-244-3 for procedures for destruction of this equipment to prevent enemy use.

1-4. Administrative Storage. Refer to TM 740-90-1 for procedures, forms, records, and inspections required during administrative storage of the PADS. Marine Corps users shall refer to MCO 4450.7 for this information.

1-5. Calibration. Refer to Chapter 4 for the PADS Inertia] Measurement Unit MX-9832/USQ-70 (IMU) alignment procedure.

1-6. Reporting Equipment Improvement Recommendations (EIR). EIRs can and must be submitted by anyone who is aware of an unsatisfactory condition with the equipment design or use. It is not necessary to show a new design or list a better way to show a new design or list a better way to perform a procedure, just tell why the design is unfavorable or why a procedure is difficult. Army users may submit EIRs on SF (Standard Form) 368 (Quality Deficiency Report) to:

Commander, U.S. Army Troop
Support Command
ATTN: AMSTR-MOF
4300 Coodfellow Blvd.
St. Louis, MO 63120-1798

Marine Corps users shall submit EIR's in accordance with MCO 1650.17. They shall submit Quality Deficiency Reports in accordance with MCO 4855.10. Mail directly to:

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Marine Corps Logistics Base (P840)
Albany, CA 31704-5000

Marine Corps users shall submit NAVMC Form 10772 eporting Errors and Recommending Improvementsto:

Commandant of the Marine Corps
Headquarters, Marine Corps
Code LMA-1
Washington, DC 20380

A reply will be sent directly to you.

Section II. DESCRIPTION AND DATA

1-7. Description. Description of PADS is contained in TM 5-6675-308-12. Marine Corps users shall refer to TM 08837A-12/1.

1-8. Tabulated Data. PADS performance data and items comprising an operable equipment are tabulated in TM 5-6675-308-12. Marine Corps users shall refer to TM 08837A-12/l.

1-9. Auxiliary Equipment. Auxiliary equipment used at direct support and general support maintenance consists of five standardized electrical components cases (transit cases) illustrated in figure 1-1 anti listed in table 1-1. These transit cases are used for transportation of the inertial measurement unit, control and display unit, computer power supply, and power supply. A transit case is provided with each spare unit.

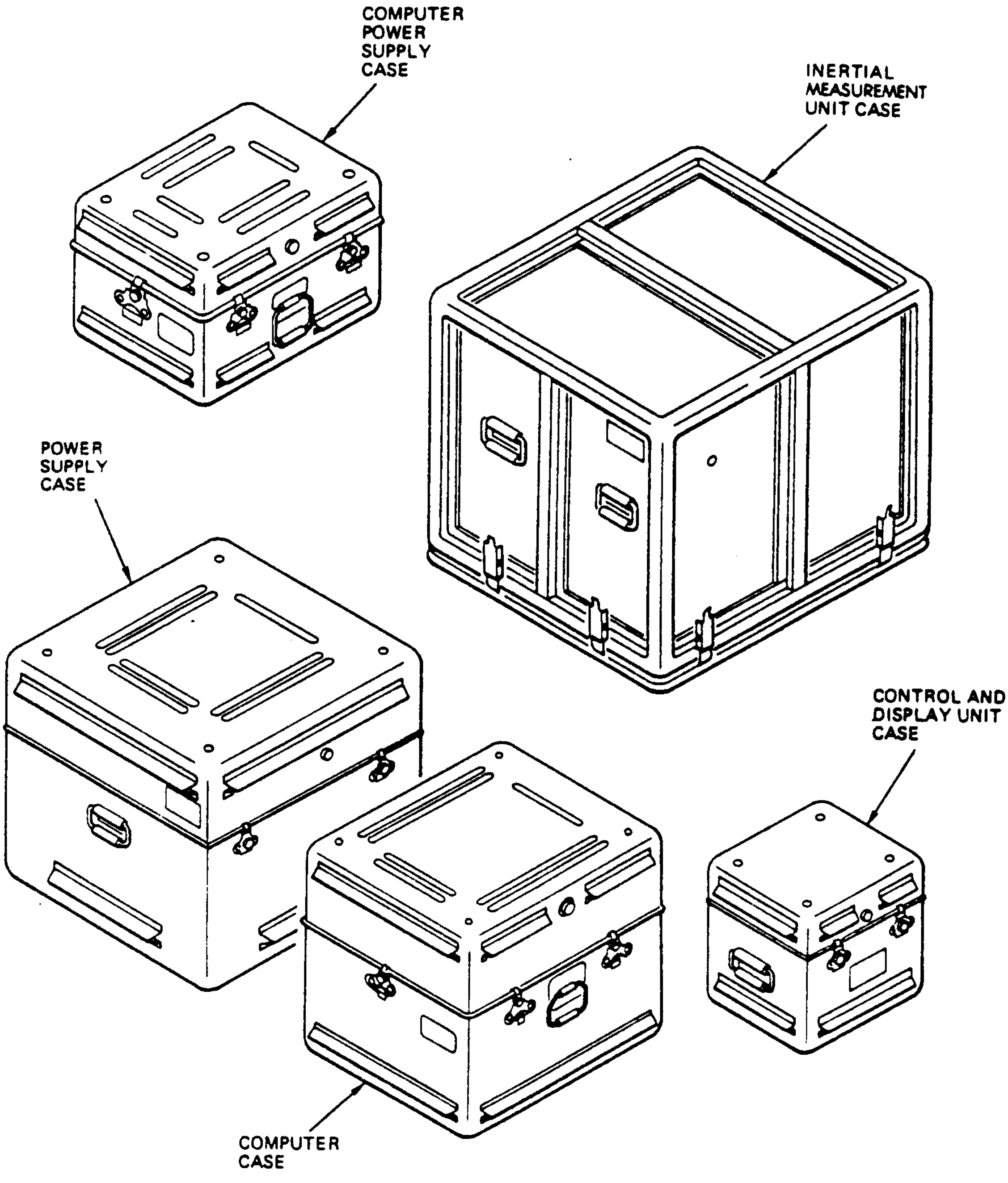


Figure 1-1. Auxiliary Equipment

Table 1-1. Auxiliary Equipment

NSN	Item	Qty	Dimensions mm (in.) Ht	Dp	Wd	Wt Kg (lbs)
	Inertial Measurement Unit Case CY-7605/USQ-70	1	609.6 (24.0)	609.6 (24.0)	711.2 (28.0)	34.0 (75.0)
	Computer Case CY-7606/USQ-70	1	431.8 (17.0)	431.8 (17.0)	368.3 (14.5)	13.2 (29.0)
	Control and Display Unit Case CY-7608/USQ-70	1	317.5 (12.5)	304.8 (12.0)	292.1 (11.5)	8.6 (19.0)
	Power Supply Case CY-7607/USQ-70	1	533.4 (21.0)	533.4 (21.0)	533.4 (21.0)	22.9 (50.5)
	Computer Power Supply Case	1	273.1 (10.75)	469.9 (18.5)	381.0 (15.0)	9.8 (21.7)

CHAPTER 2

FUNCTIONING OF EQUIPMENT

2-1. General. This chapter contains functional descriptions for the Position and Azimuth Determining System (PADS) and its major units. Depth of coverage is based on the requirement to support direct and general support maintenance. Functional descriptions for the following major units of PADS are included:

Inertial Measurement Unit (IMU)

Control and Display Unit (CDU)

Computer

Power Supply (PS)

A block diagram of the PADS is shown in figure FO-1.

2-2. IMU Functional Description, The IMU contains the key survey sensors mounted on a stable platform. The platform is isolated from IMU case rotations by a set of four motor-driven gimbals. Gyroscopes mounted on the stable element sense rotational rates. The gyroscope outputs are amplified to drive the gimbal motors so the stable platform is always level and pointed north.

a. Three accelerometers mounted on the stable element sense change in motion in the north, east, and vertical directions. This information is processed by the computer to determine the present position of the system.

b. The gyroscopes and accelerometers are very sensitive to temperature variations. Therefore, temperatures inside the IMU are tightly controlled. Temperature sensors provide control signals to the computer and power supply. Electrical resistance heaters and thermal-electric coolers are powered by the PS to maintain the desired IMU temperatures,

c. Synchros and resolvers in the gimbal set allow the computer to determine the orientation of the stable element with respect to the IMU case,

d. The various sensors provide both analog and digital outputs. The IMU accepts several digital control signals.

e. A porro prism, which is in a known mechanical alignment to the stable element, is used to transfer azimuth out of PADS using a standard surveyor's theodolite.

f. Because the gimbal assembly is a precision mechanical device which is protected by a dry nitrogen atmosphere, the IMU is hermetically sealed and is not repairable at the direct support or general support levels. The IMU has many calibration parameters which are applied as correction factors in the computer program. Many of these parameters can be recalibrated at general support using the PADS test set and a special diagnostic computer program. The diagnostic program also checks those terms which must be recalibrated at the depot level. A punched tape of the calibration data is provided with each IMU.

g. Items which do not affect the integrity of the IMU seal maybe replaced.

h. Porro prism replacement requires recalibration of the IMU.

2-3. CDU Functional Description. The CDU provides for operator communication and interaction with the PADS. The CDU functional block diagram is shown in figure 2-1 and consists of four functional elements as follows:

Serial data bus (SDB) logic

Display logic registers and drivers

Keyboard and associated logic

Discrete logic

a. ***Serial Data Bus Logic.*** The SDB logic provides for serial data communication between the CDU and the computer. The signals associated with SDB operation are address envelope, data envelope, serial address/data, and 250-kHz clock.

(1) The CDU contains eight 16-bit storage registers with associated drivers. Each of these registers may be loaded via the SDB by first addressing the appropriate register with an address word and then transmitting the appropriate data word.

(2) Depending on the contents of the address word, the CDU will either accept data or transmit data. Received data is stored in one of the eight 16-bit storage registers as designated by bits 5, 6, and 7 of the address word. Two types of data words are transmitted by the CDU as follows:

(a) The first type is the keyboard word which indicates when a keyboard pushbutton switch is pressed (keyboard data valid – bit 2) and the pushbutton switch code (bits 3 thru 7). Bits O and 1 indicate that an address or data word transmitted from the computer was received with a parity error. After the computer

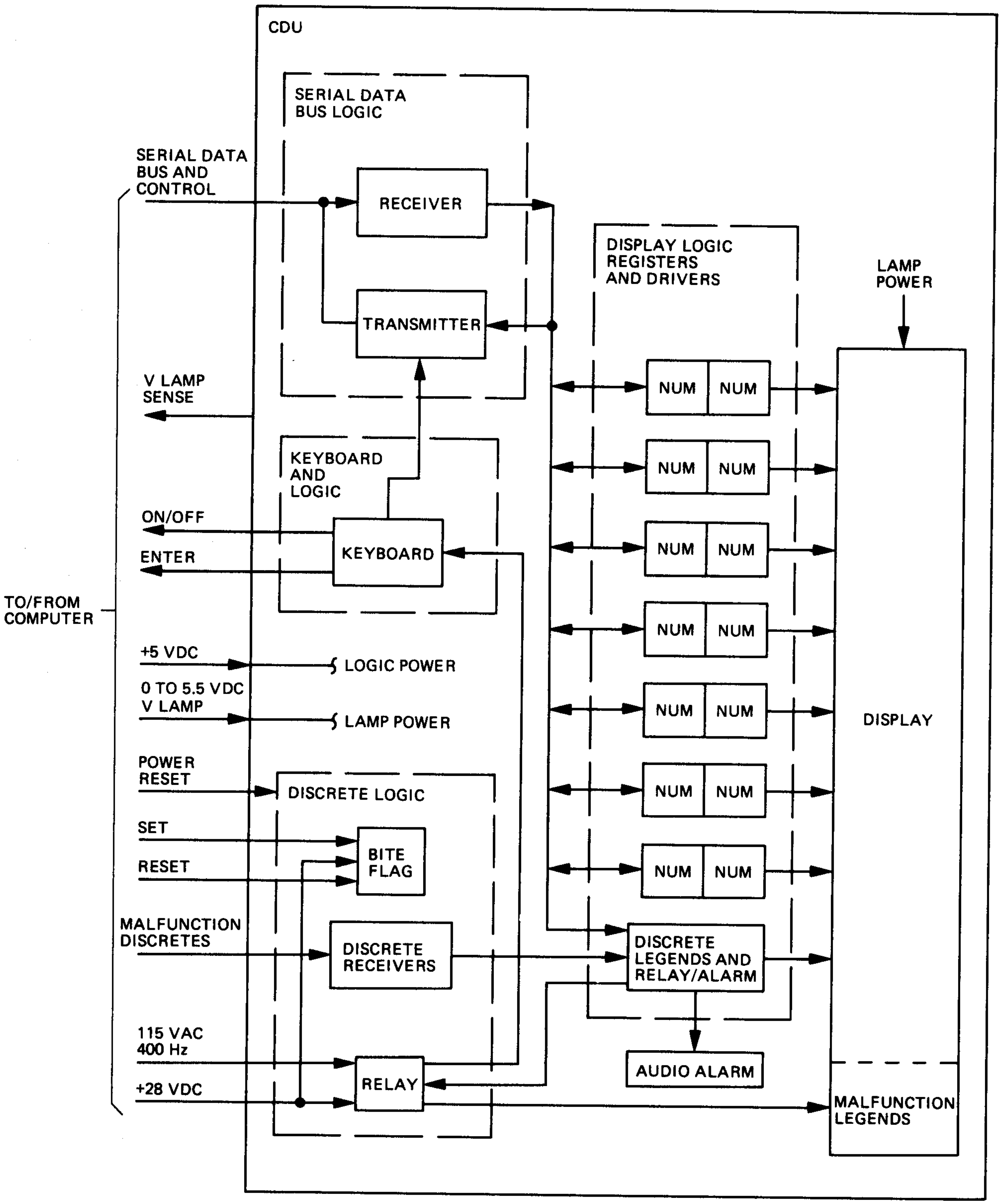


Figure 2-1. CDU Functional Block Diagram

reads the keyboard word, the parity status flip-flops are reset. A long loop serial bus self-test function is provided in the CDU by wrapping around bits 8 through 15 of the address word as bits 8 thru 15 of the keyboard word. There is no restriction on the bit patterns used on these bits.

(b) The second type of CDU word provides an additional self-test feature for the CDU. This allows the computer to read the contents of any of the eight display registers without destroying the contents of the register or affecting the appearance of the display. To read a register, the same sequence as reading the keyboard word is followed except that the self-test bit 4 is (on) and the subaddress code bits 5 thru 7 must be used to identify the display register contents desired by the computer.

b. ***Display Logic Registers and Drivers.*** Eight 16-bit data registers are movided for the storage of display data. Each of these registers can be loaded or read by the computer as described in paragraph a. Data contained in these registers control the various front panel displays, electroluminescent lighting control relay, and audible alarm. Lamp drivers and keep-warm resistors are employed to minimize lamp current surges.

c. Keyboard and Associated Logic. The CDU employs a keyboard consisting of a row-column switch matrix. Scanning logic sequentially examines the status of each key and stops scanning when a key is pressed. The resultant key code (which corresponds to the scanned address) is inserted into the keyboard word transmitted from the CDU as described in paragraph a. Since there is no register within the CDU to hold the key code, the keyboard word must be requested by the computer often enough to preclude the possibility of missed keyboard actuations.

d. ***Discrete Logic.*** The CDU receives and transmits the following discrete signals.

(1) Received discrete signals.

(a) Power reset, sets internal logic to initial state.

(b) Bit flag set, sets CDU bit flag.

(c) Bit flag reset, resets CDU bit flag.

(d) Malfunction; computer, battery, charging, and IMU malfunction discrete signals light respective indicators,

(2) Transmitted discrete signals,

(a) ON/OFF controls power to the PADS.

(b) ENTER enables a power off sequence to the PADS.

(c) CDU Power Requirements. The following CDU power is received via the computer,

+ 5V ±2% logic power,

O to + 5.5V lamp power.

+ 24V ±20% at 120 ma maximum, fault indicator power.

115 VAC ±l0%, 400 Hz ±5% at 60 ma maximum, panel lighting.

2-4. Computer Functional Description. The computer consists of three major functional sections; the central processing unit (CPU) and memory, input/output (I/0) section, and computer power supply. The computer is functionally illustrated in figure FO-2. The CPU and memory are the computational and storage element of the computer. The 1/0 section provides interface between the CPU and memory unit, IMU, and CDU. A 16-bit bidirectional data bus provides a common path for transferring instructions and operands from memory to the CPU for processing. It also provides for transferring addresses and data generated by the CPU to the memory. The bidirectional data bus also provides a path for bidirectional data between the CPU and memory and the 1/0 section. A power supply, the third major section, provides regulated power for the computer. The following paragraphs describe each functional section of the computer.

a. ***Central Processing Unit.*** The CPU consists of two sections; the data section and the control section.

(1) Data section. The data section comprises the arithmetic unit and its associated data registers. Both addresses and data are generated in the data section. The data section is contained on the 16-bit data circuit card assembly and consists of the following major elements:

Accumulator

Random access memory (RAM)

Memory register

Adder unit

A-switch

B-switch

Output switch

Holding register

(a) ***Accumulator.*** The 16-bit accumulator is the main arithmetic register in the CPU. The results of most arithmetic operations are held in the accumulator, including any residual remainder after a divide operation.

(b) ***Random access memory.*** The RAM consists of sixteen 16-bit registers. Since each RAM register has a unique address, the contents of any register can be accessed.

1. The program counter, one of the RAM registers, is a 16-bit register that holds the next instruction to be accessed into memory. As each instruction is executed, the program counter contents are incremented by one, thus providing the address of the next instruction. The program counter is also used as a reference register for addressing operands into memory.

2. The seven 16-bit index registers, also RAM registers, are generally used as reference registers for memory address operations.

3. The RAM 16-bit extension accumulator is an extension of the accumulator. During instructions where the operand is 32 bits in length, the extension accumulator register is linked with the accumulator to provide a 32-bit accumulator. The extension accumulator always contains the 16 least significant bits of data in double-precision operations.

4. The RAM 16-bit quotient register is used to hold the quotient (result) when the CPU executes a divide operation.

5. The RAM 16-bit base register is used primarily as a reference register for loading and storing the index registers.

6. Three RAM addresses are provided for interrupts. These include external service requests (service interrupt address), internal error (internal interrupt address), and power failure or program trace operations (priority interrupt address). The contents of these three addresses can be modified.

(c) ***Memory register.*** **The** 16-bit memory register is used to receive information from memory via the SDB for execution during a CPU operation. The information may be either a command or an operand.

(d) ***Adder unit.*** **The** function of the adder unit is to operate logically on data under control of a CPU instruction and to generate a result. The computation occurring in the adder unit results in an address modification or an execution of the instruction.

(e) ***A-switch.*** **The** A-switch controls flow of data into the adder unit from either the accumulator or the random access memory.

(f) B-switch. The B-switch controls data flow into the adder unit from the memory register, status register, and arithmetic counter.

(g) Output switch. **The** output switch feeds the adder unit output onto the data bus for memory addressing, data storage, or input/output device communication.

(h) ***Holding register.*** The 16-bit holding register temporarily holds the adder unit outputs that are destined for random access memory storage.

(2) ***Control section.*** The control section decodes instructions and generates the necessary microcommands and timing to control data flow through the data section. The control section is contained on no. 1, no, 2, and no. 3 control circuit card assemblies and consists of the following major elements:

Instruction register

Control logic

Status register

Arithmetic counter

Clock generator

Direct memory access (DMA) controls

Bus and switch controls

(a) ***Instruction register.*** **The** 16-bit instruction register no. 1 control circuit card assembly receives the instruction accessed from memory via the data bus. The output from the instruction register is routed to the RAM controls and includes the instruction decode logic. The RAM controls are used to address a RAM register in accordance with the decoded instructions. The output from the instruction decode logic is used to control the balance of the CPU.

(b) Control logic. The control logic consists of the state counter and state control logic. The state counter, located on no. 3 control circuit card assembly, is used primarily for execution of all CPU instructions. As each state is entered, controls are set to enable portions of the instruction cycle to occur. The state counter is controlled by the decode of the instruction to be executed. Additional means for instruction execution are provided by the state control logic. The logic and circuitry are located on no. 2 control circuit card assembly.

(c) ***Status register.*** **The** 8-bit status register on no. 3 control circuit card assembly contains three indicator bits and three interrupt bits. The remaining two bits are not used. The results of arithmetic computations are used to set the condition indicators on the status register. The occurrence of interrupts causes the interrupt bits to be set. Output from the status register is routed to the output switch.

(d) ***Arithmetic counter.*** **The** arithmetic counter located on no. 3 control circuit card assembly, is used during execution of multioperation instructions such as multiply, divide, shift and normalize operations.

(e) Clock ***generator.*** The CPU operates with synchronous control from a 4-MHz clock signal generated on no. 3 control circuit card assembly,

(f) ***Direct memory access control*** Direct memory access (DMA) occurs when the CPU, I/O Section or a test device needs to store data into memory or read data from memory. The DMA operation is controlled by no. 3 control circuit card assembly, and has priority over normal instruction execution.

1. ***Memory input.*** To store information in the memory unit, the request ing device generates a memory initiation request and the memory address input. The initiation request is sent to the CPU where the CPU control logic determines access to the data bus. When the request is accepted, the data to be stored in memory is loaded on the SDB and stored in the addressed memory location.

2. ***Memory output.*** To read information from the memory unit, the requesting device generates an initiation request and a memory address input in the same manner as for memory input transfer. When the request is accepted, the data from the addressed memory location is loaded on the SDB and sent to the requesting device.

(g) Interrupt control The interrupt control logic mechanizes three separately addressable independent hardware interrupt functions. Three interrupt discretes, priority interrupt, service interrupt, and internal interrupt, cause the next instruction to be taken from specifically related RAM address locations containing previously stored 16-bit addresses. The internal interrupt aids the CPU to diagnose and interrupt operation in the event of an arithmetic overflow or divide fault. The service interrupt is normally associated with an external device. The priority interrupt may be associated with a power (failure) condition. For more information on the interrupts, refer to the 1/0 section description.

(h) ***Bus and switch controls.*** The bus and switch controls provide the switching for the DMA and interrupt control, The output of the bus and switch controls is routed to the output switch for switching onto the SDB.

b. ***Core Memory.*** The core memory contains the timing and registers required for storing data in the core stack assembly. The data loop circuit card assembly, drive circuit card assembly, and core stack assembly make up the memory. The memory consists of the following major elements:

Memory buffer register

Memory address register

Sense inhibit functions

Core stack assembly

(1) ***Memory buffer*** register. The memory buffer register is used to store the output of the memory during read operations and holds the input to memory storage during write operations. The memory buffer register is 16 bits to handle a 16-bit operand or instruction. Two memory cycles are required for 32-bit operands.

(2) ***Memory address register.*** The memory address register contains the address of the requested location in memory. The address may be an instruction address, an operand address, or an indirect address. The contents of the memory location addressed in turn may contain an instruction, operand or another address.

(3) ***Sense inhibit functions.*** Data storage and retrieval are accomplished by the inhibit drivers and sense amplifiers. When data is to be accessed from an addressed location, the contents of the selected location are sensed via the sense inhibit wire and applied to the sense amplifiers. The sense amplifiers then feed the information into the memory buffer register. One group, of 16 bits, of the memory address register is then enabled and the data is sent to the CPU or input/output section via the SDB. When data is to be stored into an addressed location, the contents of the SDB (from the CPU or I/O section) are strobed into the memory buffer register. The selected 16 bits of the memory address register are then fed to the inhibit drivers and the data is written into the addressed location.

(4) ***Core stack assembly.*** The core stack assembly is organized in a conventional 3-wire coincident current manner with a storage capacity of 32,768 words. The memory word length is 16 bits.

b.1 ***So/id State Memory.*** The solid state memory contains the timing and registers required for storing data. The single card assembly memory consists of the following major elements:

Memory buffers

Memory address register

Memory

(1) ***Memory buffers.*** Separate input and output buffers are used, each 16 bits wide. The input buffer holds data at the memory during write cycles and the output buffer drives memory data onto the data bus during read cycles. A 16-bit operand or instruction takes a single cycle while 32-bit operands require two.

(2) ***Memory address register.*** The memory address register contains the address of the requested location in memory. The address is latched at the beginning of a cycle and held stable while the memory is being accessed. The location addressed can contain an instruction, operand or another address.

(3) ***Memory.*** The memory is partitioned in 48K words of nonvolatile EEPROM and 16K words of static ram. The EEPROM retains program instructions and constants when power is removed and can be updated by the computer within the system. The ram provides a read/write scratchpad for data.

c. ***Data Flow Orientation.*** A common bidirectional data and address bus is used to establish orderly communication between the memory CPU, I/O section, and test devices. Each device on the bus is controlled by the CPU. Top priority is given to the I/O section in order to enhance DMA. When the memory is in use, the CPU is still able to execute instructions which do not require continuous memory access, such as the multiply, shift and divide instructions.

(1) Operation within the data section revolves around use of a central adder unit. The inputs to the adder unit are from the B-switch and the A-switch. The output of the adder unit services all registers. In addition, the adder unit also services the memory address register and memory buffer register in the memory. For the memory registers, the adder unit supplies both the effective addresses and data to be stored on the same 16 lines of the output switch to the memory.

(2) During an instruction fetch cycle, the instruction is received from the memory buffer register through the common bus and strobed into the instruction register. In a memory reference instruction, the D field modifies the address contained in the register designated by the R field code, and the augmented address is sent to the memory address register via the output switch for the operand fetch cycle.

(3) Assuming that a single length load accumulator instruction is in the instruction register, the operand fetch results in 16 bits of data being placed in the memory registers from the memory buffer register. The

contents of the memory register are then presented to the adder unit input through the B-switch along with no input (zero) from the A-switch. The output of the adder unit, representing the operand is then strobed into the accumulator. For the case where a 32-bit transfer is executed, two 16-bit operands are sequentially strobed into the memory register. Upon completion of two memory cycles, a full 32-bit operand is loaded into the accumulator.

d Input/Output Section The I/O section provides an interface between the CPU and memory and devices external to the computer. The I/O section is contained on I/O controller card assembly, data buffer circuit card assembly, I/O discrete circuit card assembly, analog-to-digital (A/D) converter circuit card assembly, and platform I/O circuit card assembly, and consists of the following major elements:

Programmed input/output control

DMA control

Interrupt control and masks

Real-time counter

Data bus buffer

Time-out counter

A/D converter

Platform I/O logic

Serial data bus

I/O discrete, lamp dimmer control, and on/off control

(1) ***Programmed input/output control.*** Programmed I/O refers to the communication of information between the CPU and the various external devices and is initiated by the operational program. Programmed I/O is performed by the execution of instructions which input to or output from the CPU accumulator. The four-bit device address field in these instructions enables direct communication with 16 devices. Address decoding and control signal generation for the external devices is performed by the I/O controller card assembly.

(2) ***DMA control*** DMA control provides a transfer of data between the memory and an external device with CPU involvement. In this mode of operation, memory cycles are obtained from the CPU by the external device which generates the address for the memory location to be a accessed on a request-response basis. The computer contains logic for eight DMA channels but only one is used. Channel two is used for the A/D conversion.

(3) ***Interrupt control and masks.*** The interrupt control and masks provide interface between the CPU and I/O section for the three separately addressable and independent hardware interrupts. These interrupt funcions are priority, service, and internal. No dedicated addresses in memory are required for these interrupts, thereby allowing complete relocatibility of the associated subroutines. When an interrupt signal occurs, other interrupts are logically inhibited or masked out. The interrupt control and masks are contained on the I/O controller card assembly.

(a) ***Priority interrupt.*** A priority interrupt is generated by the time-out counter and just prior to power shutdown. The time-out counter will oveflow if it is not reset at least once every 125 milliseconds, The overflow will generate a priority interrupt. A priority interrupt is generated one millisecond prior to computer power shutdown to permit the software to save any required data.

(b) ***Service interrupt.*** A service interrupt is generated when the real-time counter overflows.

(c) ***Internal interrupt.*** The internal interrupt is generated by an overflow or divide fault condition and is associated with the status register. Bit position 0 of the status register identifies an overflow and bit 1 a divide fault.

(4) ***Real-time counter.*** *The* real-time counter is a hardware counter loadable and readable by the CPU; it aids the program in determining the time between events. In addition the real-time counter has an overflow function that is used to generate the service interrupt. The real-time counter is contained on the I/O controller card assembly.

(5) ***Data bus buffer.*** The data bus buffer provides buffering of the data bus between the I/O section and CPU. This buffering is required because of the loading in excess of the drive capability provided by the CPU, The data bus buffer is contained on the data buffer circuit card assembly.

(6) ***Time-out counter.*** The time-out counter is a four-bit counter which generates a priority interrupt when it overflows. This counter is periodically reset by the software so that a software failure is indicated if an overflow does occur and the bit indicator is set.

(7) ***Analog-to-digital*** converter. All analog signals are routed through the A/D converter before processing by the CPU. The A/D converter converts analog signals from the I MU into digital signals for subsequent processing. The A/D converter generates its basic timing reference from positive-going crossovers of the 400-Hz reference. Each crossover initiates a timing frame in which all the DC-to-digital signals and one of the resolver or synchro signals is converted. The synchro or resolver signal is the first conversion within the frame and is then followed by all the dc signals. Conversion of the resolver or synchro signal occurs at the time frame which compensates for the phase shift for that particular signal. In this manner, conversions occur at the signal peaks and quadrature effects are minimized. After each signal is converted, a DMA cycle is initiated and the converted value is stored into memory. After eight

frames, during three of which no synchro or resolver conversions are made, the entire sequence repeats itself. The A/D converter is contained on the A/D converter circuit card assembly.

(8) *Platform input/output logic.* The platform 1/0 logic accumulates the AV pulses from the platform and generates gyro torquing pulses ^{w}x, w_Y, and w_z for the platform. The platform I/O logic is contained on the platform circuit card assembly.

(a)Δ *V accumulation.* Three AV accumulation channels are provided. Each channel has an eight-bit, up/down counter for the accumulation of velocity pulses. Accumulation is provided by strobing each channel at the 2.4-kHz quantizer clock rate into its individual flip-flop, thereby providing a one-bit sample for each channel. Synchronization to the basic CPU clock is implemented to eliminate any hazardous logic condition before sampling. Special logic is implemented to inhibit counters from toggling during a program input command of any accumulated velocity data. The leading edge of the quantizer clock initiates the one-bit accumulation process. The contents of the AV counters are read under software control.

(b) *Gyro torguing.* The platform I/O provides three channels of gyro torquing pulses. Each gyro channel has its own eight-bit up/down counter and is individually loaded with torque data under software control and then is either increased or decreased at gyro torque rate, providing full rate torquing. Periodic update under software control updates each counter.

(9) *Serial data bus. The* SDB functions as a bidirectional communications link between the computer and various external devices. The SDB consists of a data envelope, address evelope, bidirectional data line, and a continuous 250-kHz clock. All serial communications are completely under programmed I/O control. To initiate a serial transfer, an address word is transmitted to all devices using an OUT 12 instruction. All address words contain a device code (bits 0-2), a transmit/ receive bit (bit 3), and a self-test bit (bit 4). The balance of the 16 bits in the address word are a unique function of each device. Data is transmitted to a device using an OUT 11. Data is transmitted from a device to the computer using an INP 11 to command a serial transfer into the I/O shift register. This INP 11 results in the accumulator receiving the complement of the previously transmitted computer word and can be used as a short-loop self-test feature. A second INP 11 transfers the contents of the shift register to the CPU. A minimum delay of 84 microseconds is required between program commands to the serial I/O. A discrete bit may be read by the computer to determine the results of a parity test on received words and the serial bus logic may be checked for its busy state. The serial data bus logic is contained on the data buffer circuit card assembly.

(10) *Input/output discrete, lamp dimmer control, and on/off control.*

(a) *Input discretes.* The following inputs are received and made available for program access: IMU ready, accelerometer coarse heater on, gyro coarse heater on, gyro float to temperature, and IMU spares no. 1, 2, and 3. In addition, the IMU fail discrete is received for processing but is not available to the software.

(b) *Output discretes.* The following outputs are processed by the computer from software for subsequent transmission to other system elements: PS flag set, CDU flag set, IMU flag set, computer flag set, reset all flags, XY gyro fast slew, and Z gyro fast slew. A power-on-reset signal is also made available.

(c) *Lamp dimmer control.* The lamp dimmer control is a four-bit non-linear digital/analog converter whose outputs, under software control, are used to control the lamp voltage to the CDU. For each of ten binary codes, a unique analog voltage is generated.

(d) *On/off control.* Computer tumon occurs when + 24V input power is applied. Power turnoff control has three modes of operation. Each of these modes generates an off command to the power supply and a power off interrupt to the CDU. An overtemperature condition in the computer will generate an off command. The software is also capable of generating an off command. Normal shutdown occurs when the on/ off input is activated and is followed by an enter command.

e. Computer Power Supply. The computer power supply receives unregulated + 24V from the power supply and generates + 5V, + 15V, and –15V for computer operation. See figure 2-2 for a functional block diagram of the computer power supply. In addition, the computer power supply supplies a variable voltage for the CDU display lamps and necessary control signals for the PS and computer. The computer power supply consists of the following major elements:

+ 5V switching regulator

O to + 5V switching regulator

+ 15V switching regulator

Dc-todc converter

+ 15V precision supply

–15V precision supply

Control and monitor section

(1) +5 V switching regulator. The + 5V switching regulator is located on the 5V power supply circuit card assembly. The + 5V switching regulator develops + 5V with input variations of +20 to + 30V and with load variations of 3 to 18 amps. In addition to the filtered + 24V unregulated input power, the + 5V

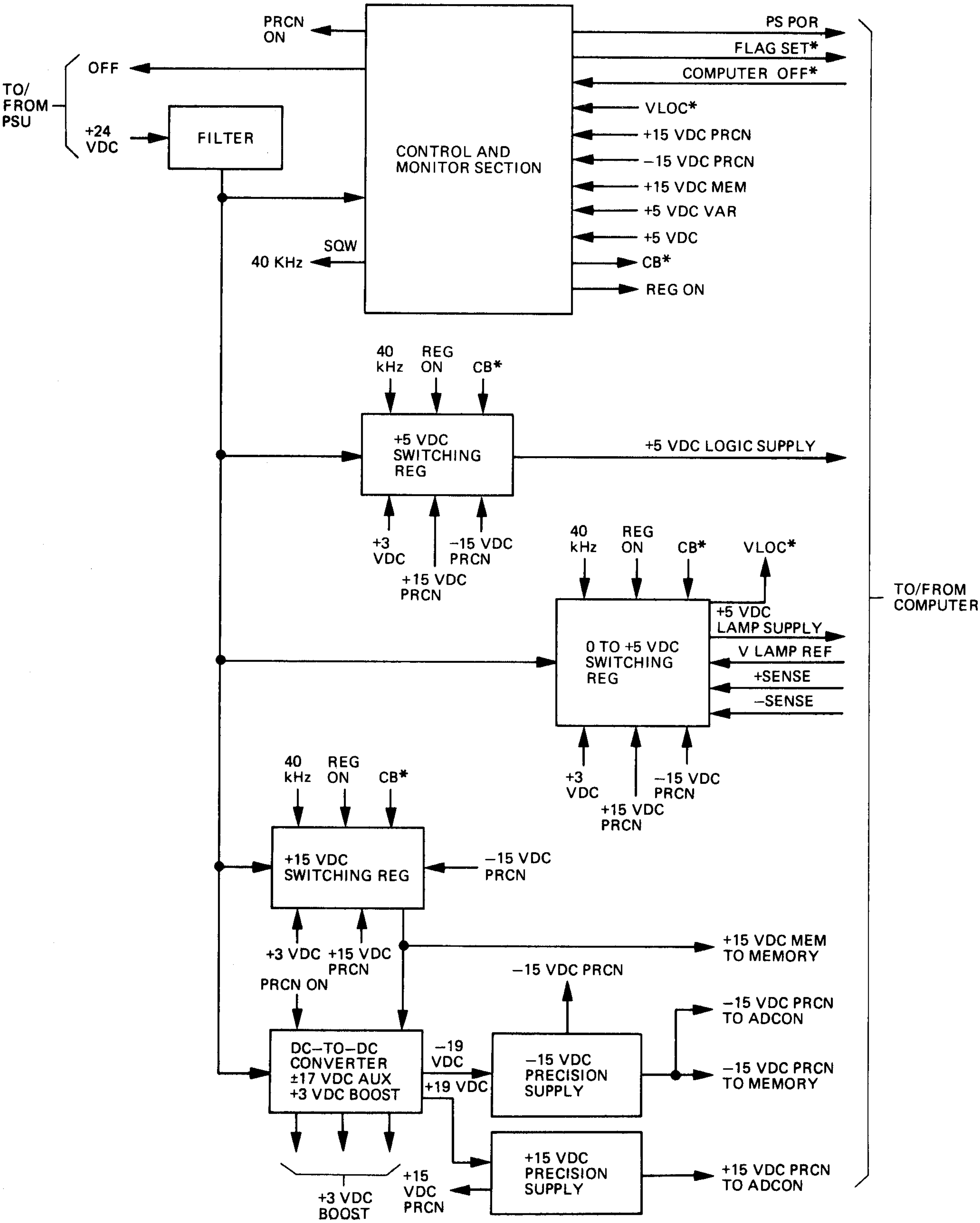


Figure 2-2. Computer Power Supply Functional Block Diagram

switching regulator requires + 15 and — 15V for its operational amplifiers and a 40-kHz square wave signal for its pulse width modulation section. The normal control signal for the + 5V switching regulator is regulator-on. When any one of the computer power supplies five output voltages exceeds its maximum allowable limit, or when more than 8 amps is drawn from the O to + 5V switching regulator, the crowbar signal (CB°) goes to O volts and initiates an emergency power supply shutdown. This emergency shutdown is accomplished by firing a silicon controlled rectifier (SCR) which shorts the output of the + 5V switching regulator and simultaneously causes the regulator-on signal to go low.

(2) ***0 to + 5V switching regulator.*** The O to + 5V switching regulator is located on the 15V power supply circuit card assembly. This regulator is commanded by an analog reference signal (V lamp ref) which originates in the computer. The output of the regulator follows the V lamp reference signal. The regulator supplies O to + 5V with input variations of +20 to + 30V and load variations of 0 to 5 amps. Operation of the 0 to + 5V switching regulator is similar to the + 5V switching regulator. In addition to current limiting at 8 amps, a power supply shutdown signal (VLOC°) is sent to the control and monitor circuitry when the load current exceeds 8 amps. Asterisk denotes negative logic. The O to + 5V switching regulator responds to the regulator-on and CB° signals in the same manner as the + 5V switching regulator.

(3) ***+25 V switching regulator.*** The + 15V switching regulator is located on the 15V power supply circuit card assembly. This regulator supplies + 15V with input variations of +20 to + 30V and load variations of 1 to 6 amps. The operation of the + 15V switching regulator is similar to the + 5V switching regulator.

(4) ***DC-to-dc converter.*** The dc-to-dc converter is located on the 5V power supply circuit card assembly. The converter receives its input from a + 12V supply at turn-on and then from the + 15V switching regulator during normal operation. The converter switches at approximately 28 kHz and generates square waves of O to + 20V on a secondary winding of the converter transformer. These square waves are rectified and filtered and supply +19 and –19V to the 15V precision supplies. The converter transformer has two additional secondary windings. The square waves on these windings are again rectified and filtered, producing a floating +3V which is used as a boost voltage for the two switching regulators.

(5) *+15 V precision supply.* The + 15V precision supply is located on the 5V power supply circuit card assembly. The + 15V precision supply is a linear series-pass type regulator with an input voltage of + 19V from the DC-to-DC converter and an output voltage of + 15V with load variations of 40 to 260 mA.

(6) ***–15 V precision supply.*** The –15V precision supply is located on the 5V power supply circuit card assembly. The —15V precision supply is a linear series-pass type regulator with an input voltage of –19V from the DC-to-DC converter and an output voltage of –15V with load variations of 0.1 to 1.2 amps.

(7) ***Control and monitor section.*** The control and monitor section consists of MOS logic and voltage comparators and is located on the 15V power supply circuit card assembly. The monitor portion consists of voltage comparators and their associated precision resistor dividers, All the computer power supply output voltages are compared in the monitor circuit to separate high and low voltage references. If any output voltage is below the low reference, the low voltage (LV) signal goes high. If any output voltage goes above the high reference, the crowbar (CB) signal goes high. When either of these signals goes high, the computer power supply will shut down. The control portion contains logic that controls the tumon and turnoff of the computer power supply. This circuitry initiates tumon when the + 24V input from the power supply goes above + 21V. For the first second after initial tumon, a high signal (PS POR) is sent to the computer for initialization of the computer and its memory. The +15 and –15V precision supplies are enabled first, When the ouput of these supplies reach greater than + 10V, the three switching regulators are turned on. During the time the PS POR is high, only an overvoltage (CB°) or the computer command (PS 0FF°) can shut down the computer power supply. During normal operation, a low voltage (LV), overvoltage (CB°), or the computer command (PS Off° can turn off the computer power supply. Anytime the CB° or LV signals initiate the shutdown, a built-in-test magnetic latching indicator will be set by the flag set’ control signal. The power for the monitor and control section is supplied by an auxiliary + 5V regulator that operates directly from the + 24V input power. In addition to the control and voltage monitoring functions, this section also contains an oscillator that generates a + 30V peak-to-peak, 40-kHz square wave.

2-5. Power Supply Functional Description. The power supply assembly converts +20 to + 30V vehicle or PADS battery power to the following outputs:

115V RMS, 0° phase, 400 Hz, square wave, unregulated

115V RMS, 90° phase, 400 Hz, sine wave, regulated

26V RMS, 90° phase, 400 Hz, sine wave, regulated

±28V, regulated

+ 28V, battery charge, regulated

Figure FO-3 illustrates the power supply assembly functional Mock diagram. The circuit assemblies within the power supply assembly are as follows:

RFI filters

±28V power supply

Ambient temperature control DC power supply

DC-to-AC sine wave inverter

DC-to-AC square wave inverter

Power supply monitor and control

Battery charger

Battery monitor and control

a. ***RFI Filters.*** Two RFI filters make up this assembly. The first is located at vehicle input power and smooths current transients when input power is switched between vehicle power and PADS. The second filter attenuates current ripple that is felt by the input power source due to pulse currents drawn by DC regulators and AC inverters.

b. ***±28V Power Supply.*** The ±28V power supply is a 25-kHz switching regulator. This circuit supplies ±28, +2, ±20, and ± 14V for the assembly control circuits and + 3V boosting voltages for three switching regulators. The + 28V is sensed and compared to a reference voltage at the error amplifier input. The error amplifier output voltage is fed into a pulse width modulator that controls the on-off duty cycle of the power switching transistor in the switching regulator. The switching regulator output voltage is sensed by the power supply monitor and control circuit. If the output voltage of the switching regulator or DC-to-DC converter exceeds the specifed amplitude, the on/off control is turned off and shuts down the switching regulator,

c. ***Ambient Temperature Control DC Power Supply.*** The ambient temperature control DC power supply consists of a 40-kHz switching regulator and temperature control circuit. The operation of the switching regulator is similar to that described for ±28V power supply except that the reference voltage to the error amplifier equals the absolute value of the ambient temperature error signal from the IMU. The ambient temperature error signal, therefore, determines the output voltage level of the switching regulator. The regulator output voltage is connected to the heater through relay K3. When the ambient temperature error signal is negative, signifying an increase in internal IMU temperature, relay K3 is energized, switching the regulator output voltage to the IMU thermoelectric coolers to reduce the internal temperature. When system power is turned on, the control circuit applies power to the transient heaters through relay K1. When the IMU internal temperature reaches a given level, this control circuit deenergizes relay Kl, removing power from the transient heaters. A gain and polarity sensing circuit checks the power supply voltage gain and the heater-cooler relay connection. If the gain or polarity is not proper, the checking circuit signals the power supply monitor and control circuit to turn the power supply off.

d. ***DC-to-AC Sine Wave Inverter.*** The inverter, a class B push-pull amplifier, produces 26V and 115V, 400 Hz sine waves and is driven by a 400-Hz constant amplitude sine wave oscillator. Voltage feedback. is from the 26 VAC output terminal. An overcurrent protection circuit senses the DC current into the center tap and each leg of the inverter transformer primary and controls the DC driving signal level to prevent transformer saturation.

e. ***DC-to-AC Square Wave Inverter.*** The inverter produces a 115V, 400-Hz square wave unregulated output. This square wave voltage lags the sine wave inverter 26 VAC is differentiated to provide the 90-degree phase shift and clipped to form a square wave. The driving signal is passed through a two-pole filter to increase the rise time of the output square wave and minimize EMI. The rest of the driving circuit is the same as described for the sine-wave inverter.

f. ***Power Supply Monitor and Control.*** This circuit senses and controls power supply output voltages. When the outputs exceed specified limits, the on/off control circuit shuts down all power supplies and the power fault indicator is operated. If a power supply fails and bus voltage is below + 20V, the battery fault indicator is also operated. Overvoltage or undervoltage signal (IMU inhibit) causes the power supplies to shut down.

g. **Battery Charger.** This circuit charges the PADS batteries via the vehicle power. A DC-to-DC converter boosts the vehicle power by + 6V. The voltage is then regulated to + 28V to charge the PADS battery. Charging current is sensed and controlled to 6 amps maximum by the battery monitor and control circuit on the sequence monitor circuit and assembly.

h. ***Battery Monitor and Control*** This circuit turns the power supply assembly on or off, and controls the battery charge and SCR firing circuits.

(1) ***Power Supply On-Off Circuit.*** The power supply assembly operates when either circuit breaker CB1 or CB2 is closed and when the CDU ON-OFF switch-indicator is set to ON. After a delay, power relay K2 is energized and the power supplies are turned on. The power supply assembly is shut off when the CDU ON-OFF switch-indicator is set to OFF, or upon detection of an overvoltage or overcurrent condition or presence of an IMU overtemperature signal.

(2) ***Battery Charger Control*** This circuit senses bus voltage levels, SCR current levels, circuit breakers CB1 and CB2 on-and-off conditions, and controls battery charging current. If the SCR current falls below 0.5 amps, a power transistor is turned on and vehicle power is applied to the charger converter. Charging of the PADS battery will be initiated if all the following conditions are met:

PADS battery is connected.

CB1 and CB2 are both switched on.

Current in SCR is below 05 amps.

Vehicle battery voltage is higher than + 24V for M151 or + 25V for OH-58.

PADS battery voltage is below + 28V.

The charging current is limited to 6.0 amps, maximum. A charging' signal will light the CDU CHRG display indicator when charging current is equal to, or greater than 2 amps. A battery° signal will light the CDU BATT display indicator when any of the following conditions OCCUr

Any one circuit breaker open.

PADS battery cable disconnected.

SCR conducting power from PADS battery.

The CDU BATT display indicator will begin to flash if input power drops below + 20V at the main bus.

(3) ***SCR Firing Circuit.*** This circuit runs on the SCR connecting the PADS battery to the power bus under the following conditions:

K1 power relay is closed.

Bus voltage is below + 21.5V.

CHAPTER 3

DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

Section I. GENERAL

3-1. Scope. Direct support maintenance includes repair of the computer and CDU by circuit card replacement, and replacement of computer, computer power supply, IMU, power supply, CDU, and cables. Failed units are forwarded to general support maintenance.

a. The normal test procedure is to operate PADS and obtain the built-in-test malfunction indications. The malfunction symptoms should be furnished by the operator but can be obtained or verified by maintenance personnel. Additional testing includes continuity checks and voltage measurements.

b. Repairs are verified by operating PADS for a period of time with no malfunctions.

c. The test sequence is summarized in table 3-1 which references more detailed descriptions of the various procedure. The system responses are given. When an abnormal condition is indicated, troubleshoot in accordance with paragraph 3-9 and perform the specified repairs. Electrical connections for testing are shown in figure 3-1.

3-1.1. Program Description. The PADS has two unique memory modules. The older version (core) which is presently in the process of being phased out and a new version (solid state) is being phased in. The memory capacity of the core memory is 32768 (32k) words and the solid state memory is 65536 (64k) words. During the past few years, the software has evolved per the user's request to the point where the new programs are no longer compatible between the two memory types. The user willhoweverberequired to use both memory types until such time as the core memories have been completely phased out. This will require the manuals to describe both memory types. The latest version to the software includes NAVSTAR GLOBAL POSITIONING SATELLITE (GPS) cueing to the operator. This version also increases the spheroid repertoire and changes the order of spheroids. Refer to TM 54675-308-12 for a more detailed description of the newer software. This newer software is available in the solid state memory only. Caution must be exercised in spheroid selection between the two memory modules.

3-2. Test Setup.

WARNING

The primary pallet weight exceeds the normal two-person lift capability. Use three persons to carry primary pallet into the work area.

CAUTION

The system must not move during testing. Place the primary pallet firmly on a solid workbench, floor, or stable ground outside the van.

a. Check that +28V power source is off.

b. Check that PADS BATTERY and VEHICLE circuit breakers CB1 and CB2 are OFF.

c. After PADS has been placed in the work area, check that the primary pallet components are interconnected as shown in figure 3–1 and the CDU is connected to the computer by cable W1.

d. Check that the cooling system and isolator platform are not blocked.

e. Connect battery cable assembly W6 to power supply connector 3J2.

CAUTION

Check that the polarity of connections to +28V power source are correct.

f. Connect power supply connector 3J4 to +28V power source with cable assembly W211.

g. The CDU may be removed from the computer bracket and placed at a convenient spot on the workbench.

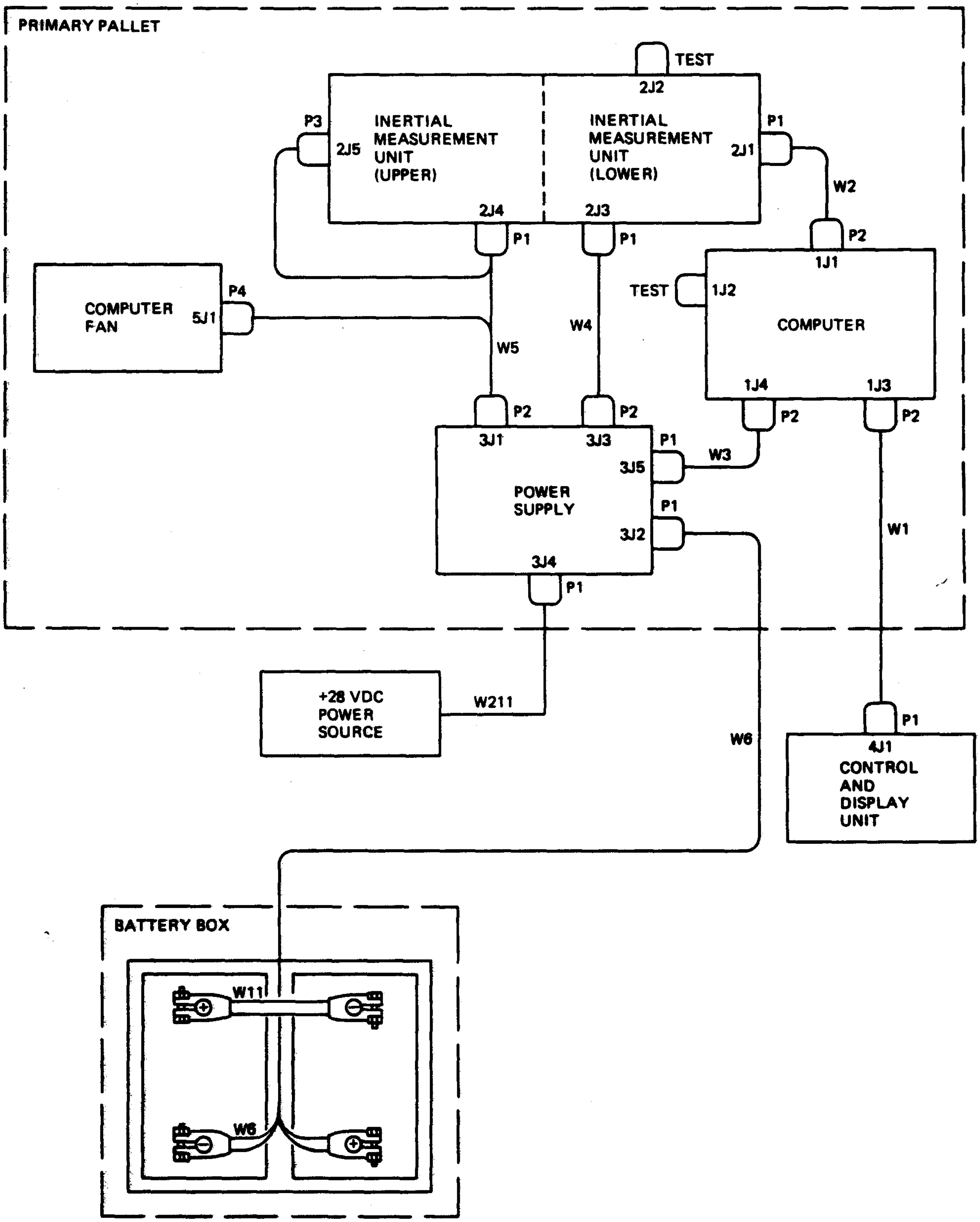


Figure 3-1. Electrical Connections for Test

3-3. Turn On/Turn Off

CAUTION

To prevent damage, do not move PADS for at least 2 minutes following shutdown.

a. Turn on +28V power source.

b. Power is applied to PADS by setting PS BATTERY and VEHICLE circuit breakers CB1 and CB2 to ON. Activate the system by pressing CDU ON/OFF. The display cues for spheroid for core memory, or GPS C-E for solid state memory.

c. If PADS is on, pressing ON/OFF initiates shutdown. Systems with a core memory cue OFF C-E on the CDU display. To turn off press ENT Systems with a solid state memory first cue SAVE C-E. If a save of mission data or a spheriod 200 series alignment (Z gyro bias) align next data is desired, ENT should be pressed (recommended at all times). The CDU display will indicate SAVE for 15 to 20 seconds then cue "OFF" -E. At this time OFF is pressed then ENT The system will shut down. In the event that the operator elects to continue system operation he should press CLR when cued with OFF C-E (core memory), or CLR when cued with SAVE C-E, then when cued with OFF C-E, he should press OFF then CLR. The system will revert to the last display and continue operation.

d If the operator continues with the OFF mode, set PS BATTERY and VEHICLE circuit breakers CB1 and CB2 to OFF once the CDU has turned off.

3-4. Intensity Setting/Lamp Test.

a Dim. Press and hold LAMP to dim CDU lights. All lamps light and the intensity slowly deereases. At full dark, no further change will occur. Release LAMP when desired intensity is reached. The display returns to previous indication at the new intensity.

Table 3-1. Direct Support Test Procedure

Step no.	Operator action	CDU Data display	Status indicators	Reference
	NOTE This table summarizes PADS operational sequences. More detailed descriptions are in the paragraphs listed in the Reference column.			
	a. CDU pushbuttons are underlined e.g., press STOP.			
	b. A lighted status indicator is shown in Status Indicators column and remains lighted until extinguished.	e.g.	GO	
	e. An extinguished status indicator is boxed in.	e.g.	$\boxed{\text{STOP}}$	
	.d Flashing displays are enclosed in quotation marks.	e.g.	"GO"	
	These conventions are used throughout this manual.			
1.	Set up equipment as shown in figure 3-1			Para 3-2
2.	Turn on +21V power source and set BATTERY and VEHICLE circuit breakers CB1 and CB2 to ON			Para 3-3
3.	Press ON/OFF	"SPH" 1 or "GPS C-E"	STOP, ENT	Note 1
4.	Perform lamp test	(All lamps light.) **NOTE** All fault indicators set white when LAMP is pressed and reset black when LAMP is released.	(All lamps light.)	Para 3-4
5.	Set lamp intensity	"SPH" 1 or "GPS C-E"	STOP, ENT	Para 3-4
5.1	Enter CLR (for solid state memory only)	"ss SPH"		
6.	Enter spheroid	"PAUSE" (for solid state memory only)		Para 3-5
7.	When "PAUSE" extinguishes, PADS cues for a vehicle entry. The cue will be the last vehicle that had been used. Press ENT	"HUM" 1		Para 3-5

Table 3-1. Direct Support Test Procedure - Continued

Step no.	Operator action	CDU Data display	Status indicators	Reference
8.	Enter spheroid; PADS cues for easting	"E"	.0	Para 3-5
9.	Enter zone and casting PADS cues for northing	"N"	.0	Para 3-5
10.	Enter northing PADS cues for elevation	"EL"	.0	Para 3-5
11.	Enter elevation; alignment continues	MODE O	ENT CAL MON	Para 3-5
		MODE 1		Note 2
		MODE 2	Z-VEL	Para 3-6
		MODE 3		
		MODE 4		
		MODE 5		
		MODE 6		
		MODE 7		
12.	Alignment ends	MODE 8	CAL STOP "GO"	
13.	Press <u>ON/OFF</u>	OFF C-E or SAVE G E		Note 4
14.	Press <u>ENT</u>. PADS shuts down			
15.	Disconnect equipment			
	TEST COMPLETE			

Note 1. BATT may light for a few minutes. If it stays lighted verify connections to + 28V power and battery box and that BATTERY and VEHICLE circuit breakers CBl and CB2 are ON. CHRC may light throughout the mission.

Note 2. The display may initially show MODE 0, 1, 2, or 3 depending on the speed of coordinate entry. Time since turnon may be displayed by pressing <u>TIME.</u> The mode may be recalled by pressing <u>MON.</u>

Note 3. MON will extinguish when any other function k selected. No display functions can be selected by the operator until the survey data has been entered

Note 4. If ON/OFF is pressed and CDU d lay indicates SAVE C-E the computer contains a solid state memory instead of a core memory and tbe following turn off steps must be performed:

a. Press <u>ON/OFF.</u> Display indicates SAVE C-E

b. Press <u>ENT.</u> Display indicates PAUSE.

c. In approximately 20 seconds the display will indicate "OFF" E.

d. Press <u>ON/OFF.</u> Display indicates OFF "E".

e. Press <u>ENT.</u> System will turn Off.

b. *Brighten.* To brighten the display press LAMP; release for 2 to 6 seconds; press and hold LAMP. All lamps light and the intensity slowly increases. At full brilliance, ALARM DS3 sounds. Release LAMP when desired intensity is reached. The display returns to previous indication at the new intensity.

c. *Lamps Test.* Set display to full brilliance and hold LAMP. Observe that all status indicators light, all data display segments and punctuation light, ALARM DS3 sounds, and computer, power supply, and CDU fault indicators turn white. Release LAMP and note that display returns to previous indication ALARM DS3 turns off, and fault indicators turn black.

3-5. Data Entry/Display.

NOTE

Successful completion of the test requires entry of the following survey parameters:

Spheroid
Vehicle
UTM Zone
Easting (±100 meters)
Northing (±100 meters)
Elevation (± 10 meters)

Erroneous entry of these parameters, except vehicle, may result in an IMU failure indication.

a. Certain data is required to be entered by the operator. The operator must have a specific knowledge of the PADS requirements and the program in use. Certain inputs are cued by a flashing display; generally related to a specific CDU pushbutton which must be pressed followed by a numeric entry. Other inputs will be displayed on a non-flashing CDU display, and will merely require the operator to press ENT, signifying the operator concurs with that data.

b. The operator recognizes a cue by pressing the pushbutton corresponding to the flashing symbol. The displayed symbol stops flashing and the zero(s) go blank. Enter data with the numeric pushbuttons. Each numeral enters the display at the extreme right and moves one space to the left when a new digit is entered.

c. If a wrong number is entered press CLR to clear the display. When all numbers are entered check that the data is entered correctly. If possible, use a second person to check the entry. Press ENT to enter the data into the system. The display will show a new message.

d. The PADS is programmed to survey in any of the following spheroids. Refer to spheroid numbers and specific memory type as follows:

SPH No.	Core	Solid State
1	Clarke 1866	Clarke 1866
2	Clarke 1880	International
3	International	Clarke 1880
4	Bessel	Everest
5	Everest	Bessel
6	Malayan	Spare
7	Australian National	Spare
8	Spare	Australian GRS 67
9	Spare	GRS 1980 WGS 84
10	Spare	Airy
11	--	Modified Airy
12	-	Modified Everest
13	--	WGS 72
14	. .	Hough
15	.-	User Defined
16	. .	User Defined

For SPH entries to operate in geographic coordinate system, refer to TM 5-6675-308-12/TM 08837A-12/l.

e. At turn on, PADS displays GPS C-E for the solid state memory. Press CLR to bypass the GPS mode. From this point the CDU displays cueing that is basically the same for the initialization phase of operation. "SPH followed by the number of the last spheroid used (and saved for the solid state) is displayed. Refer to the preceding paragraph for the spheroid number versus spheroid in use. The user will then press SPH and the desired spheroid number, then press ENT The display then cues for vehicle immediately with core memory and after a 15 to 20 second PAUSE with the solid state memory.

e.1. The PADS program contains seven standard U.S. Army vehicles and has the capability of having the operator add lever arm information for up to three nondefined vehicles. The standard vehicles in the order of selection and CDU display follow. The program will display the last vehicle entered during the initialization, i.e., if the OH-58 had been selected before the system was turned off, the CDU at turnon would indicate OH–58 5.

CDU QUE	Vehicle	Plumb Bob or Sight Location
1. HUM 1	HMMWV	Left side driver sight/plumb bob
2. CUV 2	CUCV	Pintle mounted plumb bobs.nd forward mounted system (ii place of rear seat)

3.	SUV 3	Susv	Left side driver sight/plumb bob
4.	M151 4	Jeep	Pintle mounted plumb bob
5.	OH-58 5	OH-58 Helicopter	PADS mounted plumb bob arm
6.	UH-1 6	UH-1 Helicopter	PADS mounted plumb bob arm
7.	PLMB 7	M151 Jeep	PADS mounted plumb bob arm

e.2 The operator presses CDU ±/2 or -/8 to advance or decrement the vehicle selection until the correct vehicle has been displayed then presses ENT. The vehicle selection may be changed at any time during operation which allows vehicle to vehicle transfer while the system is operational.

e3. If the system has been installed in a vehicle which is not defined as one of the seven standard vehicles, or has not had the lever arms previously entered the operator must enter any choice of vehicles in order to proceed with the initialization. The procedure for selecting and inserting data for the nondefined vehicle is as follows:

(1) While PADS is aligning or preferably after alignment is complete, the operator may insert up to three nonstandard vehicle selections after determining the X, Y, Z, and V lever arm dimensions using figure 3-1.1 as an example. All lever arm entries and displays must be in meters to the nearest millimeter.

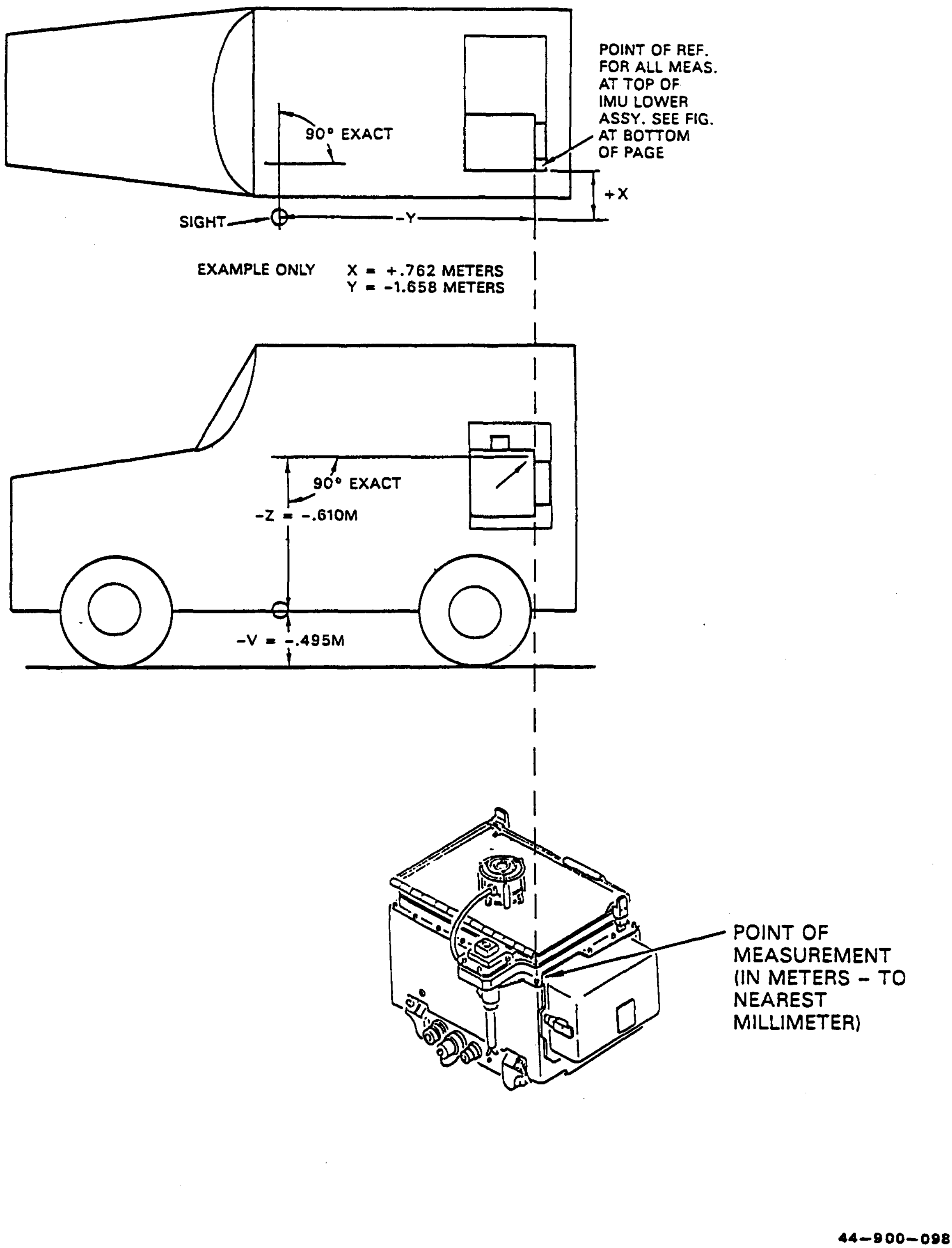


Figure 3-1.1. Nonstandard Vehicle Example

OPERATOR ACTION	DATA DISPLAY	
Press MON, ID, 5, 1, ENT	Vehicle initially entered	
Press CLR	51E	"8-10"
Press 8, ENT	51X	.
Press ±, 7, 6, 2	51+	.762
Press ENT	51Y	.
Press –, 1, 6, 5, 8, ENT	51Z	.
Press –, 6, 1, 0, ENT	51V	.
Press –, 4, 9, 5, ENT	SEL 1	8

Press - to scan ID's 50, 49, 48, and 47 to verify the entered values are correct. Above operator action must be repeated if a change is to be made.

(2) In the event more than one nonstandard vehicle is to be entered into memory, repeat above operator action making sure that when performing third step, a number other than the one previously entered is used, i.e., 9, or 10. If the number 8 were entered again, X, Y, Z, and V dimensions previously entered would be cleared from memory. A save routine at shutdown will store all nonstandard vehicle selections which have been entered.

(3) In the event a vehicle selection change is necessary during a mission, the new vehicle lever arms may be selected by returning to the monitor table and proceeding as follows:

OPERATOR ACTION	DATA DISPLAY	
Press ID, 5, 1, ENT	Vehicle previously selected	
When number of selected vehicle is displayed, press ENT.		
Press MON, 1	HUM 1	
Press MON, 2	CUV 2	
Press MON, 3	SUV 3	
Press MON, 4	M151 4	
Press MON, 5	OH-58 5	
Press MON, 6	UH-1 6	
Press MON, 7	PLMB 7	
Press MON, 8	SEL 1 8	Only displayed if entered per non-standard vehicle procedure
Press MON, 9	SEL 2 9	
Press MON, 10	SEL 3 10	

f. A display showing "E" 0: .0, means PADS wants the universal transverse mercator (UTM) zone and casting coordinate entered. Zone is entered first and will eventually appear to the left of the colon. The coordinate must have 7 digits and be entered to the nearest tenth of a meter.

Example Enter an casting value of 246789.7 for zone 12.

OPERATOR ACTION	DATA DISPLAY	
(PADS cue)	"E" 0:	.0
Press E.	E :	
Press 1.	E :	.1
Press 2.	E :	1.2
Press 2.	E :	12.2
Press 4.	E :	122.4
Press 6.	E :	1224.6
Press 7.	E :	12246.7
Press 8.	E :	122467.8
Press 9.	E :	224678.9
Press 7.	E 12:	246789.7

Check that data is correct before entering.

Press ENT. "N" .0

The cues for the other parameters are:

"N" .0	UTM northing - entered to nearest tenth of a meter. For southern hemisphere, press N twice. Display will change from N to S.
"EL" .0	Elevation – entered to nearest tenth of a meter. When EL is pressed PADS will display ±EL. For an elevation above mean sea level press ±2. For an elevation below mean sea level, press -8. Then enter the numerical value.

g. Data maybe displayed by pressing the key corresponding to the parameter desired. However. the operator cannot select a data display until the initial survey data has been entered.

h. It is possible to speed entry of survey data to examine malfunction codes (refer to table 3-4) by entering a one-digit coordinate for each entry (e.g., 0.1 meter). However, an IMU failure will be indicated if alignment is allowed to proceed past MODE 4.

3-6. Alignment. PADS starts to align itself at tumon and automatically continues alignment after the survey data is entered (paragraph 3-5). Alignment takes 30 to 40 minutes. During this period the data display will show a sequence of alignment MODES O thru 8 when the MON function is selected. MODE 8 signifies completion of alignment.

a. Movement of the IMU must be avoided during alignment. Do not move or jar the system. If excessive movement is experienced during alignment, the ATTN indicator will light and the CAL indicator extinguish, or the STOP indicator may extinguish and GO flash. If this occurs, turn PADS off and restart the initialization procedure.

b. The system should be level to ±5 degrees. If not, the display will show LEVEL starting in monitor MODE 3. The LEVEL display locks out the monitor mode unless a malfunction occurs, If possible, move PADS to a more level surface and restart the test. If this is not possible, PADS will continue to align with possible degraded accuracy.

c. Zero-velocity corrections are needed for accurate surveying. One begins automatically during alignment. After alignment and system movement, PADS requests zero-velocity correction stops by flashing the GO and STOP indicators and beeping ALARM DS3 30 seconds before the next correction. The operator has 30 seconds to stop the vehicle and press STOP. If he does not, the GO indicator extinguishes, STOP indicator continues to flash, ALARM DS3 sounds steadily, and data display reads STOP. A zero-velocity stop should not be requested during test under normal circumstances.

3-7. Cable Testing/Connector Adjustment (see figure 3-2).

a. Inspect cables for bent or broken connector pins; locking ring, connector shell, backshell, or cable clamp; and cut or tom sheath. Replace if any of these defects are found. Return cables with bent or broken pins to general support maintenance for repair.

b. Carefully inspect connectors with right angle backshells for rotation in excess of ±10 degrees. Adjust as necessary as follows:

(1) Remove safety wire securing retaining ring to backshell.

(2) Mate connector to its fixed counterpart and tighten retaining ring using a strap wrench.

(3) Rotate backshell for proper cable clearance.

(4) Secure retaining ring to backshell with safety wire.

c. Test cables for correct continuity between pins and backshell. Wiring diagrams are shown in figure FO-4.

Section II. TOOLS AND EQUIPMENT

3-8. General. Tools and materials required for direct support maintenance are listed in table 3-2. Repair parts are listed in TM 5-6675-308-24P, or Marine Corps TM 08837A-24P/3.

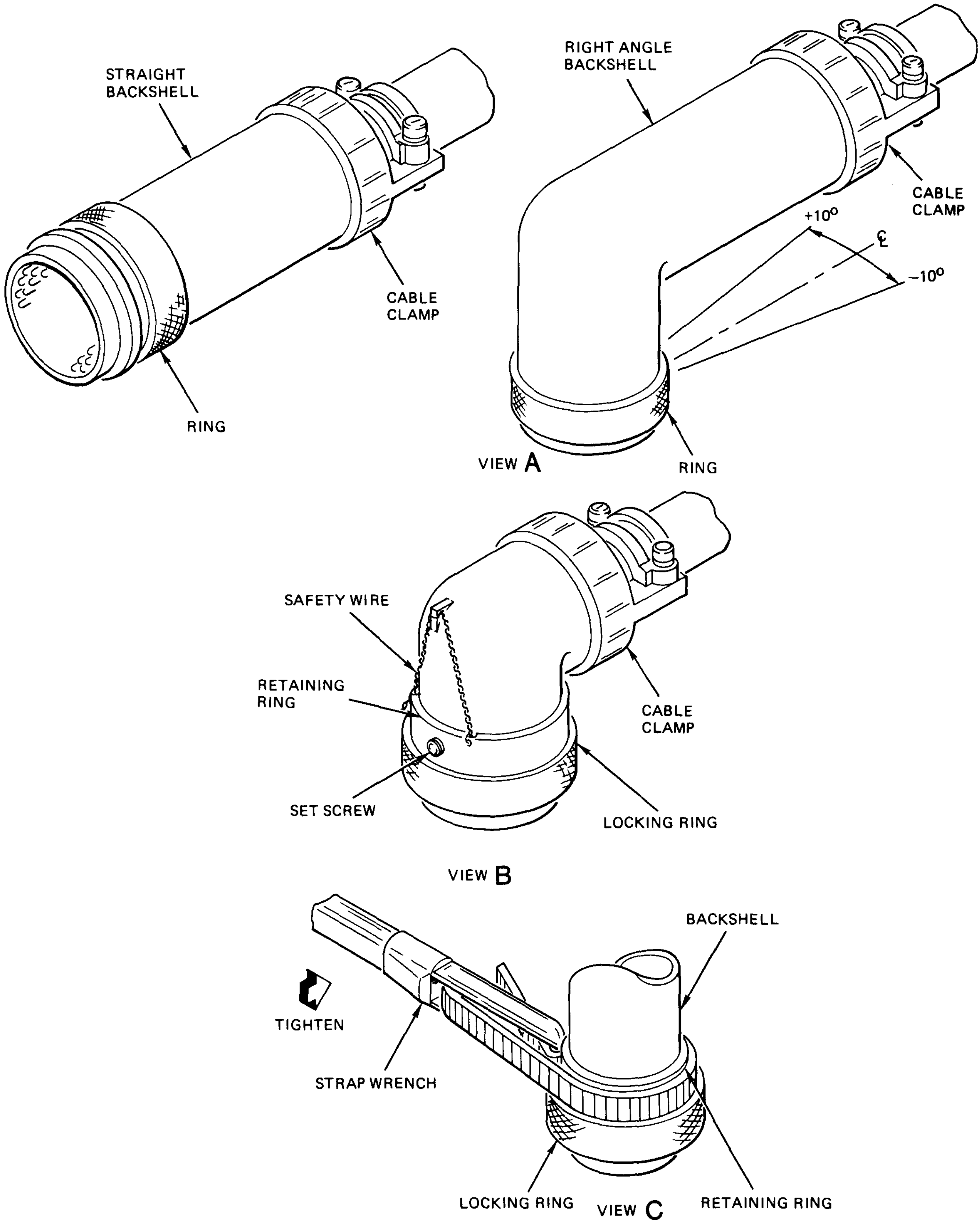


Figure 3-2. Cable Testing/Connector Adjustment

Table 3-2. *Tools and Materials Required for Direct Support Maintenance*

Item	Purpose	NSN or specification
Adhesive, silicone, room temperature curing	Used to bond IMU cover, computer cover, and computer/computer power supply RFI gaskets	RTV 156 (72799) or 30-079 (71984)
Adhesive, silicone RTV, non-corrosive	Used to bond IMU thermostatic switch capacitors, and porro prism cover and circuit breaker covers gaskets	MIL-A-46146, Type 1
Alcohol, isopropyl TT-I-735	Used in cleaning of surfaces	6810-00-753-4993
Battery Box CY-7560 USQ 70	Used for storage of batteries for testing	880530-3 (06481)
Cable, power, W211	Used to connect + 28V to power supply	880534-4 (06481)
Carrier, battery	Used in removal and replacement of battery	5120-00-529-4124 or 5120-00-223-8455
Cloth, lint free	Used in cleaning surfaces when replacing gaskets	
Compound, sealing	Used for bonding IMU bolt assembly retainer and IMU guide pin	MIL-S-22473, Grade C
Compound, sealing	Used for bonding mounting base subassembly slide strip screws	MIL-S-22473, Grade H
Crimping tool, battery terminal	Used in the replacement of the power cable lugs	5120-00-293-0463
Drill, electric, 1/4-inch	Used in installation of winterization kit. Also in removal of rivets	5130-00-889-8994
Drill set, twist, range 60 to 1	Used in installation of winterization kit. Also in removal of rivets	5130-00-449-6775
Drill, electric, 1/2-inch	Used for first time installation of PADS in HMMV and SUSV	
Drill, twist, 7/16-inch dia.	Used for first time installation of PADS in HMMV	
Drill, twist, 9/32-inch dia.	Used for first time installation of PADS in SUSV	
Drill, twist, 11/32-inch dia	Used in removal of subfloor inserts	5133-00-227-9664
Enamel, alkyd, camouflage color, forest green MIL-E-52798	Touch-up paint	8010-00-111-7937
Extractor, circuit card	Used for removal of memory and circuit cards from computer	875435-1 (06481)
Extractor, circuit card	Used for removal of circuit cards from CDU	877490-1 (06481)
Extractor, screw no. 5	Used in removal of subfloor inserts	Part of set 5120-00-610-1888
Frame, hand hacksaw and blades	Used in the repair of cables and the installation of the winterization kit	5110-00-289-9657 or 5110-00-277-4589
Hammer, ballpeen, 4 oz.	Used in the removal of the power supply captive screws	5120-00-243-2985

Table 3-2. Tools and Materials Required for Direct Support Maintenance – Continued

Item	Purpose	NSN Or Specification
Hexhead driver, 7/64-inch for 1/4-inch drive	Used in conjunction with torque wrench to torque covers on computer, CDU, and computer power supply to computer	5120-00-761-2015
Hexhead driver, 3/16-inch for 1/4-inch drive	Used in conjunction with torque wrench to torque the mounting bolt assemblies to IMU mounts	5120-00-935-4612
Installation tool, insert TD 524L	Used in the replacement of inserts in subfloor plate	
Insulation sleeving, electrical, heat shrinkable, polyolefin, flexible, crosslinked	Used on component leads in power supplies	MIL-I-23053/5A
Key, sockethead, L-type handle 7/64-inch	Used in removal of computer and CDU covers	5120-00-889-2162
Key, sockethead, L-type handle, 7/64-inch	Used in removal of computer power from computer	5120-00-951-6589
Knife, pocket	Used in scraping excess adhesive from gaskets and unit involved	5110-00-240-5943
Lubricating oil, general purpose 0-196	Used to lubricate clamping and strike catches	
Magnet	Used to reset unit malfunction	5120-00-5454268
Mirror, inspection	Used to view obstructed components	5120-00-596-1098
Multirneter AN/USM-223	Used for testing and troubleshooting	6625-00-999-7465
Pliers, slip-joint, 6-inch	Used in repair of captive screws	5120-00-224-1567
Pliers, long-nose, 6-or 6-1/2 inch	Used in removal and replacement of components and computer power supply guide pins	5120-00-247-5177 or 5120-00-293-3481
Pliers, diagonal-cutting, 4-1/2 inch	Used in cutting and trimming of wire	5110-00-240-6209
Power supply, 28 VDC MH 28-200rS (Christie)	Used for primary power during testing. Minimum of 100 amps at 28 VDC required	6310-00-947-9670
Primer, thread sealant	Used to apply prior to applying sealing compound MIL-S-22473, Grades C and H	MIL-S-22473
Punch, center	Used in the installation of the CDU mounting bracket in winterization M151 series vehicle	5120-00-293-3512
Saw, hole, 1.00-inch O.D.	Used for first time installation of cable W7 in HMMV and CUCV	
Screwdriver, cross-tip, no. O, 4-inch	Used in removal and replacement of the elapsed time indicator and the CDU front panel assembly	5120-00-060-2004

*Table 3-2. **Tools and Materials Required for Direct Support Maintenance — Continued***

Item	Purpose	NSN or specification
Screwdriver, cross-tip, no. 1, 3-inch	Used in removal and replacement of CDU bracket, strip slide, guide pins, vibration and support mounts, protection cover, thermostat switch, heat exchange cover, computer cover and air flow deflector, power supply air deflector and circuit breakers, and installation of the winterization kit	5120-00-240-8716
Screwdriver, cross-tip, no. 2, 4-inch	Used in removal and replacement of vibration and support mount, and power supply captive screws	5120-00-234-8913
Screwdriver, flat-tip, 1/4-inch, 4-inch	Used in removal and replacement of computer power supply, captive screw assembly, and power supply circuit breakers	5120-00-222-8852
Screwdriver, blade, 1/4-inch by 0.032-inch for 1/4 -inch drive	Used in conjunction with the torque wrench in torquing power supply cover	5120-00-316-9228
Soldering/desoldering set	Used in removal and replacement of IMU thermostatic switch	3439-00-460-7198
Solder, rosin core	Used in soldering	3439-00-555-4629
Stripper, wire	Used to strip wires and component leads in preparing for soldering	5120-00-278-2423
Tissue, lens, NNP40, Type 1, Class 1	Used in cleaning of photo diode assembly in tape reader and porro prism assembly	6640-00-597-6745
Voltmeter, Digital AN/GSM-64B	Used in testing and troubleshooting	6625-00-022-7894
Wire, insulated, stranded: 12, 16, 20, 22, and 28 AWG	Used to replace and repair existing wiring	MIL-W-16878
Wire, safety	Used in replacing safety wire when connector is repaired or wire is broken	MS 20995C-20
Wrench, combination, 7/16-inch	Used in removal and replacement of CDU bracket, vibration and support mount, and installation of the winterization kit	5120-00-228-9505
Wrench, combination, 9/16-inch	Used in repair of battery box	5120-00-228-9507
Wrench, open end, fixed, 3/8-inch and 7/16-inch	Used in removal and replacement of IMU mounting attachment and mounting bolts, and the CDU front panel assembly	5120-00-277-2342
Wrench, open end, fixed, 5/8-inch and 9/16-inch	Used in removal and replacement of CDU utility bracket	5120-00-187-7126
Wrench, open end, fixed, 3/4-inch and 7/8-inch	Used in removal and replacement of vibration and support mount	5120-00-240-5609
Wrench, torque, screwdriver, 1/4-inch square drive	Used in torquing covers of computer, power supply, and IMU mounts	5120-00-890-7816
Wrench, strap TG-70	Used in removal and replacement of connector shells	

Section III. TROUBLESHOOTING

3-9. Troubleshooting. Troubleshooting actions for a series of malfunctions are listed in table 3-3. The probable causes of a malfunction are listed in order of most likely occurrence or most logical troubleshooting procedure. Troubleshooting steps should be performed in the order given.

a. Software built-in-test features provide additional diagnostic capability when the CDU and computer are operating at least partially. Troubleshooting procedures using this capability are given in table 3-4.

b. The system should be inspected for physical damage which would prevent proper operation. A broken porro prism assembly or one with a damaged mirror surface requires replacement of the IMU and memory unit.

WARNING

Isopropyl alcohol is flammable and gives off harmful vapors. Use only in well-ventilated area away from open flames and sparks. Avoid prolonged or repeated inhalation of vapors.

CAUTION

Do not remove top cover to IMU. The IMU is a sealed unit and is to be returned to depot for repair.

c. If a unit is opened for repair, inspect for water penetration and/or corrosion. Carefully clean off corrosion products with isopropyl alcohol and a soft brush. Inspect gaskets and other sealing devices and tighten or replace as necessary, If a circuit card is removed, inspect for bent or broken connector pins. Carefully straighten bent pins. Broken pins are replaced at depot.

Table 3-3. Direct Support Troubleshooting

Malfunction	Probable cause	Troubleshooting/corrective action

NOTE

Fault indicators are normally black. Before applying power, inspect CDU, computer, and PS for set (white) fault indicators and record for troubleshooting. Change fault indicators from white to black by pressing LAMP after power has been applied.

If a malfunction occurs, recycle power and restart the test to verify. If more than one fault indicator is set, the most likely defective unit (in priority order) is PS, computer, CDU, and IMU. Cables are also suspect.

Because a computer memory module contains calibration data for a specific IMU, the memory module and IMU must be replaced as a matched set. To check the serial number of the IMU a particular memory is programmed for, press MON, ID,1,8, ENT. The dis-day should read 18 M, XXX, where XXX represents the IMU serial number. The Julian date of the calibration data is in MON ID location 17.

Malfunction	Probable cause	Troubleshooting/corrective action
1. BATTERY circuit breaker CB1 and/or VEHICLE circuit breaker CB2 do not stay ON	a. Defective circuit breaker	Replace PS. Refer to para 3-13d
	b. Short in PS	Replace PS. Refer to para 3-13d
2. When the ON/OFF button is pressed to turn system on, the system shuts down when the button is released or PADS does not turn on when ON/OFF button is pressed, but BATTERY and VEHICLE circuit breakers CB1 and CB2 stay ON and no malfunction flags are set	a. Power source not on or improper test set up	Check electrical connections as shown in figure 3-1
	b. Defective PS	Replace PS. Refer to para 3-13d
	c. Defective cable W 1 or W3	Check cables. Refer to para 3-7. Replace as necessary
	d. Defective CDU	Replace CDU. Refer to para 3-13a
	e. Defective computer	Replace computer. Refer to para 3-13b
3. PADS stays on momentarily after release of ON/OFF button or shuts down with no fault indicator set	a. PADS overheated	a. Let system cool down
		b. Check fan operation. Refer to steps 4, 5, and 6
		c. Clean cooling system. Refer to TM 5-6675-308-12 and/or TM 08837A-12/l
	b. Defective IMU overtemp thermostat	a. Turn PADS off and disconnect W5P2 from PS connector 3J1
		b. Measure resistance between pins G and H of W5P2
		c. If resistance is less than 100 kilohm, replace IMU. Refer to para 3-13c
		d. Reconnect W5
	c. Defective PS	Replace PS. Refer to para 3-13d

Table 3-3. Direct Support Troubleshooting — Continued

Malfunction	Probable cause	Troubleshooting/corrective action
4. PS fan does not operate continuously	a. Defective fan	**WARNING** Fan voltage is 115 VAC which can be lethal. Use extreme care in measuring it. a. Disconnect PS fan b. Measure voltage between pins A and B and A and C of connector J6 c. If both voltages are between 105 and 125 VAC, replace PS fan. Refer to TM 5-6675-308-12 and/or TM 08837-12/1
	b. Defective PS	If either voltage is out-of-tolerance, replace PS. Refer to para 3-13d
5. Both IMU and computer fan do not operate (at temperatures above 20°C (73°F))	a. Defective IMU ambient temperature thermostat	a. Turn PADS off and disconnect W5P1 from IMU connector 2J4 b. Measure resistance between pins K and N of 2J4 c. If resistance is greater than 3 ohms, replace IMU ambient temperature thermostat. Refer to para 3-18c
	b. Defective cable W5	a. Disconnect W5P2 from PS connector 3J1. Turn on PADS b. Measure voltage between pins K and A, K and N, and K and U of 3J1 c. If all voltages measure between 105 and 125 VAC, replace cable W5. Refer to TM 5-6675-308-12 and/or TM 08837A-12/1
	c. Defective PS	If any voltage is out of tolerance, replace PS. Refer to para 3-13d
6. Either IMU or computer fan does not operate (at temperature above 20°C (73°F))	a. Defective fan	a. Disconnect W5P3 or W5P4 from non-operating fan b. Measure voltage between pins A and B, and A and C of W5P3 for IMU or W5P4 for computer

Table 3-3. *Direct Support Troubleshooting — Continued*

Malfunction	Probable cause	Troubleshooting/corrective action
		c. If both voltages are between 105 and 125 VAC, replace fan. Refer to TM 5-6675-308-12 and/or TM 08837A-12/1
	b. Defective cable W5	See step 5b above
	c. Defective PS	See step 5c above
7. PADS shuts down with PS FAIL fault indicator DS2 white	Defective PS	Replace PS. Refer to para 3-13d
8. PADS shuts down with computer fault indicator white	a. Computer overtemperature shutdown	Allow system to cool down. If system operates for a short period, check operation of computer fan. Refer to steps 5 and 6. Repair as necessary
	b. Defective computer thermostat	Measure resistance across computer thermostatic switch S1 (Refer to para 3-15c to separate computer power from computer subassembly to gain access to switch S1 (30, figure 3-7). If less than 300 ohms, disconnect one lead from switch S1. If resistance is still less than 300 ohms, replace computer
	c. Defective computer power supply	Replace computer power supply. Refer to para 3-15c
	d. Defective computer	Replace the circuit cards below, listed in order of probable malfunction. Refer to para 3-15a
		(1) I/O Discrete card A9
		(2) Data buffer card A6
		(3) Computer
		(4) Memory module A1 and IMU
9. PADS on but all CDU lights are dark (fan(s) operate)	a. Intensity set dim	Perform lamp test. Refer to para 3-4
	b. Defective cable W1	Check W1. Refer to para 3-7. Replace as necessary
	c. Defective computer supply	If fault indicators do not set white and then reset black during lamp test, replace computer power supply. Refer to para 3-15c
	d. Defective CDU	Replace CDU. Refer to para 3-13a
	e. Defective computer	Replace computer. Refer to para 3-13b

Table 3-3. Direct Support Troubleshooting - Continued

Malfunction	Probable cause	Troubleshooting/corrective action
10. Not all CDU lamps light on lamp test	a. Burned out bulbs	Replace bulbs. Refer to TM 5-6675-308-12 and/or TM 08837A-12/1
	b. Defective CDU	a. Reverse CDU display register cards A1 and A2. Refer to para 3-17a
		b. If different lamps remain dark on lamp test, replace defective card by substitution
		c. Replace A3 card
		d. Replace CDU. Refer to para 3-13a
11. CDU lights but intensity does not vary or varies sporadically	Defective computer	Replace computer I/O Discrete card A9. Refer to para 3-15a
12. CDU malfunction flag is white	Defective CDU	a. If CDU functions, attempt diagnosis. Refer to table 3-4
		b. Replace CDU. Refer to para 3-13a
13. CDU COMP indicator lights and/or computer malfunction flag is white	Defective computer	a. If CDU functions, attempt diagnosis. Refer to table 3-4
		b. Replace computer. Refer to para 3-13b
		c. If fault not corrected, replace memory unit A1 (para 3-15b) and IMU. Refer to para 3-13c
14. CDU IMU indicator lights	Defective IMU or computer	a. Diagnose. Refer to table 3-4
		b. Replace IMU (para 3-13c) and memory unit A1. Refer to para 3-15b
15. CDU CAL indicator lights after alignment is completed	IMU out of calibration	a. Perform IMU 30-day calibration, Refer to table 4-1, TM 5-6675-308-12 and/or TM 08837A-12/1
		b. Replace IMU (para 3-13c) and memory unit. Refer to para 3-15b
16. CDU CHRG indicator lights continuously	a. Defective battery	Check batteries. Refer to TM 9-6140-200-14
	b. Shorted cable W6	Check W6. Refer to para 3-7. Replace as necessary
	c. Defective PS	With PADS operating and VEHICLE CB2 circuit breaker set to on, the voltage between pins A (+ lead) and F(– lead) of PS connector 3J2 should be + 27 to + 29V. If not, replace PS. Refer to para 3-13d

Table 3-3. Direct Support Troubleshooting – Continued

Malfunction	Probable cause	Troubleshooting/corrective action
17. PS BATT FAIL fault indicator DS 1 shows white	a. Batteries are low, have failed, are disconnected, or fuse in cable W11 is open	a. Check connections to cable assemblies W6 and W11
		b. Replace cable W1 1 if fuse is open. Refer to TM 5-6675-308-12 and/or TM 08837A-12/1
		c. Check that PS VEHICLE circuit breaker CB2 is ON
		d. Test batteries and perform battery maintenance. Refer to TM 9-6140-200-14
	b. Defective PS	Replace PS. Refer to para 3-13d
18. CDU ALARM DS3 fails to sound during lamp test	a. ALARM DS3 failure	a. Measure voltage between the ALARM DS3 leads during lamp test. Observe polarity marked on ALARM DS3 or lead color code (red, +; black, -)
		b. If voltage is greater than +4 V, replace CDU. Refer to para 3-13a
	b. CDU failure	Replace CDU. Refer to para 3-13a

Table 3-4. Troubleshooting with Bit Malfunction Words

Digit	Value	Malfunction	Probable cause/troubleshooting	Reference

NOTE

When PADS is operating, but with a fault indicator showing white or malfunction status indicator lighted, obtain further diagnostic infonnation as follows:

a. Press MON, ID, 1, ENT. Display should show 1 MAL XXXXXX. Record complete display if nonzero.

b. Repeat step a for MON ID numbers 2 and 5. Pressing +2 or -8 will sequence the monitor ID number up or down.

Attempt to clear the malfunction as follows:

a. If MAL 1 or 2 are not zero, select that display function and hold CLR until display zeros.

b. Press LAMP, then release.

c. The malfunction indicator (COMP, IMU) should go out, but may light again. (Note and record if COMP or IMU indicator clears briefly when LAMP is released.)

d. If the malfunction remains cleared, continue with the test.

Table 3-4. Troubleshooting with Bit Malfunction Words — Continued

Digit	Value	Malfunction	Probable cause/troubleshooting	Reference

e. If a malfunction indicator lights again, record which one lights and record the nonzero contents of monitor ID 1 or 2.

f. If the malfunction does not clear, turn system off and realign.

g. If the malfunction does not repeat, continue with the test.

h. If the malfunction still exists, perform the following steps as applicable.

The malfunction word structure is ID MAL ABCDEF where:

ID represents the ID number of the particular malfunction word. ABCDEF represents the 6 digits in the malfunction word. The numerical value of a digit designates a particular malfunction. The table identifies the malfunction and gives the probable cause and additional troubleshooting instructions.

Example: 02 MAL 000006 means digit F of ID 2 malfunction word has a value of 6. This indicates two malfunctions: Time-out counter inoperative; and time-out counter interrupt invalid.

ID 1 MAL

Digit	Value	Malfunction	Probable cause/troubleshooting	Reference
A	Not used			
B	1,2,3,4,5,6 or 7	Checksum error	Replace memory A1 and IMU, computer and computer power supply	Para 3-13b Para 3-15c Para 3-15b Para 3-13c
C	1 or 3	Discrete party fail	Replace computer discrete I/O A9	Para 3-15a
	2 or 3	Op code test fail	Replace computer control no. 1 card A3	Para 3-15a
	4,5,6, or 7	Memory test fail	a) **Reseat computer memory A1, and tighten memory wedge locks**	Para 3-15b
			b) Replace computer, keeping old memory A1 and IMU	Para 3-15b
			c) Replace memory A1 and IMU	Para 3-13c
D	1	Platform I/O short loop fail	Replace computer platform I/O card A8	Para 3-15a
	2	Computer serial data bus fail	Replace computer I/O controller card A7	Para 3-15a
	4	A/D short loop fail	Replace computer A/D card A11	Para 3-15a
E	4	CDU serial data bus	Refer to ID 5 MAL	
F	Not used			

Table 3-4. Troubleshooting with Bit Malfunction Words — Continued

Digit	Value	Malfunction	Probable cause/troubleshooting	Reference
			ID 2 MAL	
A	1	IMU input discrete fail	Replace IMU and computer memory A 1	Para 3-13c Para 3-15b
B	1,2,3,4,5,6, or 7	Excessive synchro rates	a) Replace computer A/D card A 11	Para 3-15a
			b) Replace IMU and computer memory A 1	Para 3-13c Para 3-15b
C	1	Alignment failure	a) Replace computer platform I/O card A8	Para 3-15a
			b) Replace IMU and computer memory A 1	Para 3-13c
	2,3,4,5,6, or 7	IMU temperature test fail or IMU discrete test fail	a) Check IMU fan operation	Table 3-3, steps 5 and 6
			b) Check cables to IMU	
			c) Replace computer A/D card A 11	
			d) Replace IMU and computer memory A 1	
D	1,3,5, or 7	Not used		
	2	IMU interpolator fail	Replace IMU and computer memory A1	Para 3-13c Para 3-15b
	4 or 6	Excessive motion	a) Reinitialize system	Table 3-1
			b) Replace IMU and computer memory A 1	Para 3-13c
E	1,3,5, or 7	Real-time clock failure	Replace computer I/O controller card A7	Para 3-15a
	2,3,4,5,6, or 7	Pitch or roll greater than 5° during alignment	a) Move vehicle to level surface and reinitialize	Table 3-1
		OR	b) Replace IMU and computer memory A1	Para 3-13c
		System update error	**NOTE**	Para 3-15b
			To display pitch, use ID 27; to display roll, use ID 28	
F	1	Computer overtemperature		Table 3-3, step 8
	2,3,4,5,6, or 7	Time-out counter interrupt	a) Replace computer I/O discrete card A9	Para 3-15a
		OR	b) Replace computer control card no. 3 A5	
		Time-out counter failure	c) Replace computer I/O control card A7	

Table 3-4. Troubleshooting with Bit Malfunction Words – Continued

Digit	Value	Malfunction	Probable cause/troubleshooting	Reference
			ID 5 MAL	
A	1	Serial data bus error detected (CDU to computer)	Replace computer Data Buffer Card A6	Para 3-15a
B	1,2,3,4,5,6, or 7			
C	1,2,3,4,5,6, or 7	Serial data bus error (computer to CDU)	Replace control card A3	Para 3-17a
D	1,2,3,4,5,6, or 7	CDU display register error	Replace CDU display register card A 1	Para 3-17a
E	1,2, or 3	CDU display register error	Replace CDU display register card A2	Para 3-17a
	4	CDU display register error	Replace CDU display register card A 1	Para 3-17a
	5,6, or 7	CDU display register error	Replace CDU display register cards A1 and A2	Para 3-17a
F	1,3,5,7	Not used		
	2,4,6	CDU display register error	Replace CDU display register card A2	Para 3-17a

Section IV. MAINTENANCE OF PADS

3-10. General. Direct support maintenance of PADS includes replacement of the IMU, CDU, computer, computer power supply, and power supply, and repairs to those units as well as the mounting base subassembly, battery box, installation kit, transit case, and winterization kit.

a. Torquing is required to ensure proper sealing of the computer, CDU and power supply, and mounting of the IMU. General torquing procedures are given in paragraph 3-11,

3-11. Torquing.

a. ***Use of Torque Wrench.*** *(See* figure 3-3.)

(1) Place desired driver on torque wrench.

(2) Set dial so main power is on zero.

(3) Set follow-up pointer to zero.

(4) Tighten fastener, with an uninterrupted rotary motion, to the desired torque value. The follow-up pointer will indicate the maximum torque applied, Make sure the driver is perpendicular to the fastener head at all times.

b. ***Torquing Sequence.*** To provide consistent sealing, fasteners must be torqued in a specified pattern with progressively increasing torque values. First, all fasteners are torqued to 1/3 the specified maximum value. Next, all fasteners are torqued 2/3 the specified value, Finally, the fasteners are torqued to the specified value. The torque patterns for the various units are shown in figure 3-4.

3-12. Removal and Replacement of IMU in Transit Case. This paragraph describes the removal and replacement of the IMU in the transit case. Figure 3-5 shows the IMU installed in the transit case.

a. *Removal.*

(1) Release latches securing cover to transit base.

(2) Press pressure relief valve until air pressure is equalized.

(3) Lift off transit case cover.

(4) Check humidity indicator. Take the action shown on the indicator.

(5) Loosen IMU retaining bolts.

(6) Remove IMU.

(7) Loosen memory unit compartment cover screws.

(8) Remove cover.

(9) Loosen memory unit wedgelock screws.

(lo) Remove memory unit.

(11) Inspect transit case shock and vibration isolator mounts. Replace if frayed, broken, or loose.

b. ***Replacement.***

(1) Insert memory unit in compartment and tighten wedgelock screws.

(2) Secure cover to memory unit compartment.

(3) Install IMU in transit case and torque IMU retaining bolts to 50 inch-pounds.

(4) Carefully place cover on transit case and secure with latches.

3-13. Unit Replacement. This paragraph describes procedures for the removal and replacement of the CDU. computer, computer power supply, IMU, and power supply. Figure 3-1 shows PADS interconnections and figure 3-6 is an exploded view of the primary pallet.

a. ***CDU.*** Remove and replace CDU (4, figure 3-6) as follows:

(1) Removal.

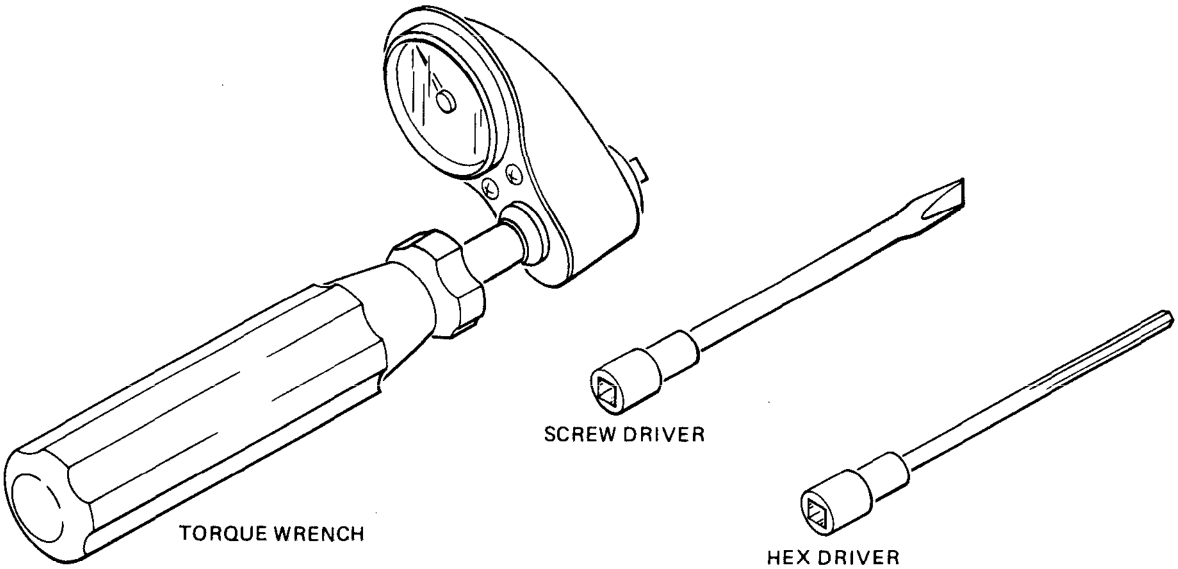


Figure 3-3. Torque Wrench Set

(a) Disconnect cable assembly W 1 conector W1P1 from CDU (4) connector 4J1.

(b) Release clamping catches securing CDU (4) to computer (5) if CDU is being stored on top of computer. If CDU is mounted on utility truck dashboard, release clamping catches securing CDU to CDU bracket.

(2) ***Replacement.***

(a) Secure CDU (4) to top of computer (5) or to CDU bracket on utility truck dashboard.

(b) Connect cable assembly W 1 connector W1P1 to CDU (4) connector 3J1.

b. Computer. Remove and replace computer (5, figure 3-6 with computer power supply (6) as follows:

(1) ***Removal.***

(a) See figure 3-1 and disconnect cables from computer as follows:

1. Disconnect cable assembly W 1 connector W1P1 from computer connector 1J3.

2. Disconnect cable assembly W2 connector W2P2 from computer connector lJ1.

3. Disconnect cable assembly W3 connector W3P2 from computer connector 1J4.

NOTE

If CDU (4) is being stored on top of computer, remove as described in previous paragraph.

(b) Loosen four captive screws (3) securing computer power supply (6) to computer mounting base (12). Remove computer (5) with computer power supply (6).

(2) ***Replacement.***

(a) Place computer (5) with computer power supply (6) on computer mounting base (12). Align mounting holes.

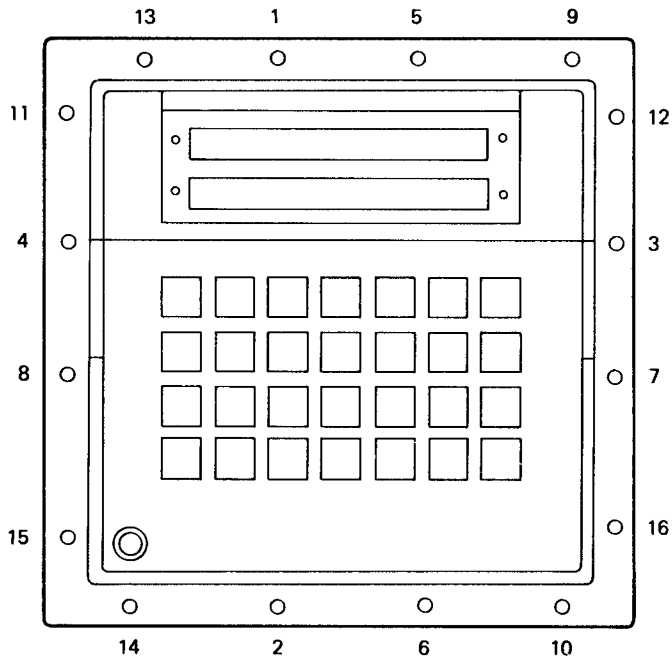
(b) Tighten four captive screws (3) securing computer power supply (6) to computer mounting base (12).

(c) See figure 3-1 and connect cables to computer as follows:

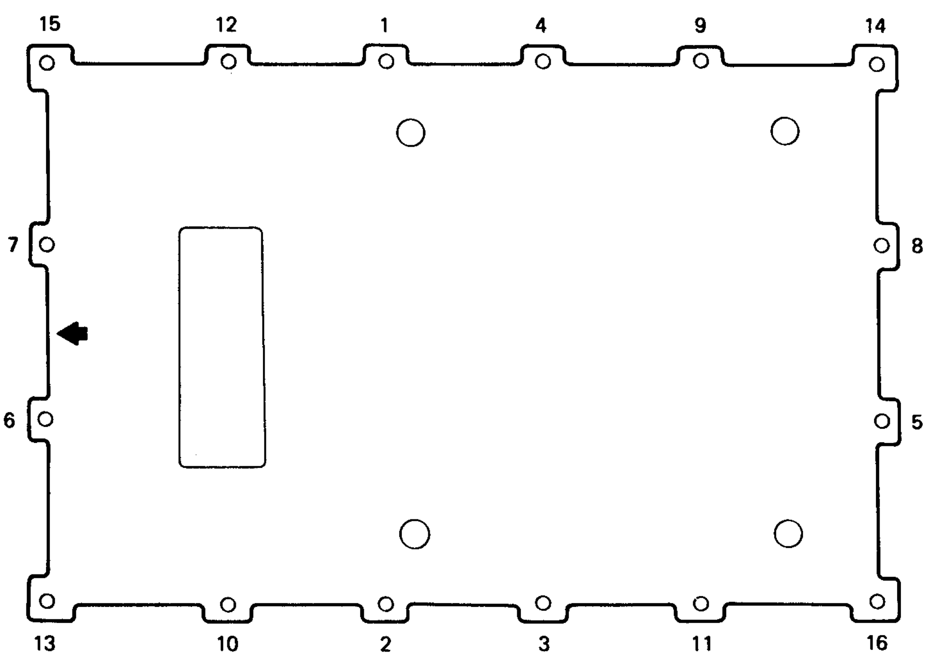
1. Connect cable assembly W 1 connector W 1P2 to computer connector 1J3.

2. Connect cable assembly W2 connector W2P2 to computer connector lJ1.

3. Connect cable assembly W3 connector W3P2 to computer connector 1J4.

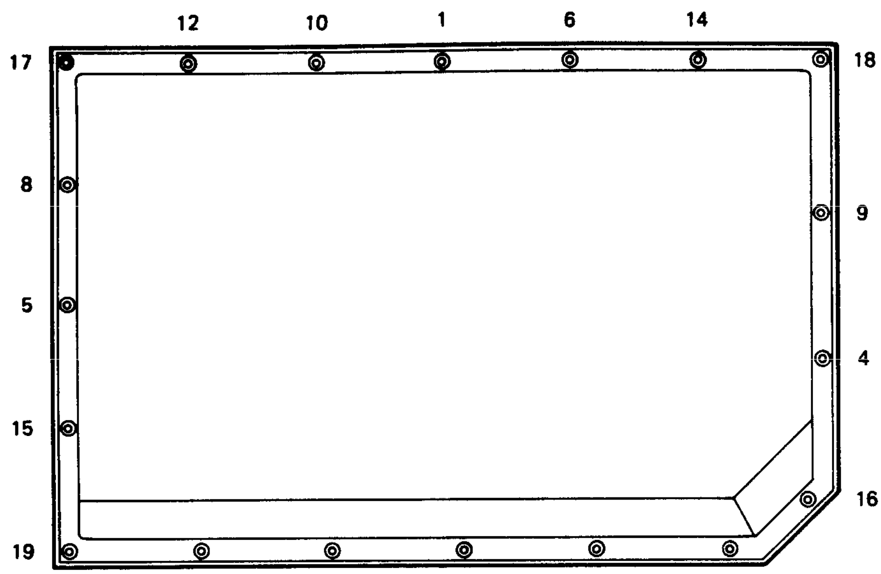


CDU FRONT PANEL
5 INCH–POUND MAX

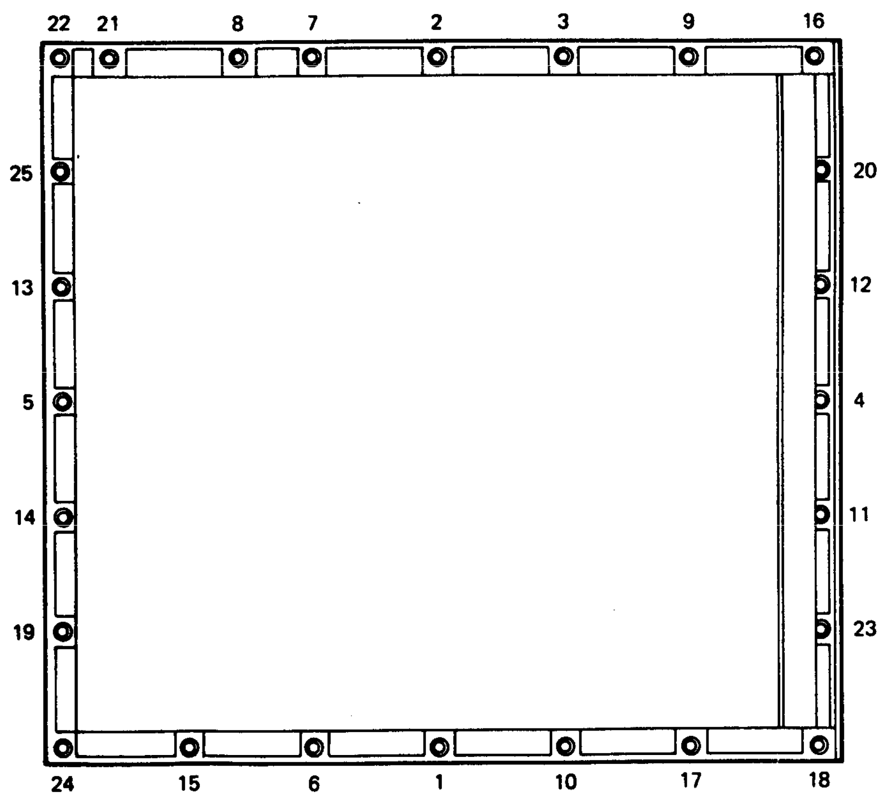


COMPUTER COVER AND COMPUTER
POWER SUPPLY
16 INCH–POUND MAX

Figure 3-4. Torquing Sequence Patterns (Sheet 1 of 2)



POWER SUPPLY
SIDE COVER
9 INCH–POUNDS MAX



POWER SUPPLY
BOTTOM COVER
9 INCH–POUNDS MAX

Figure 3-4. Torquing Sequence Patterns (Sheet 2 of 2)

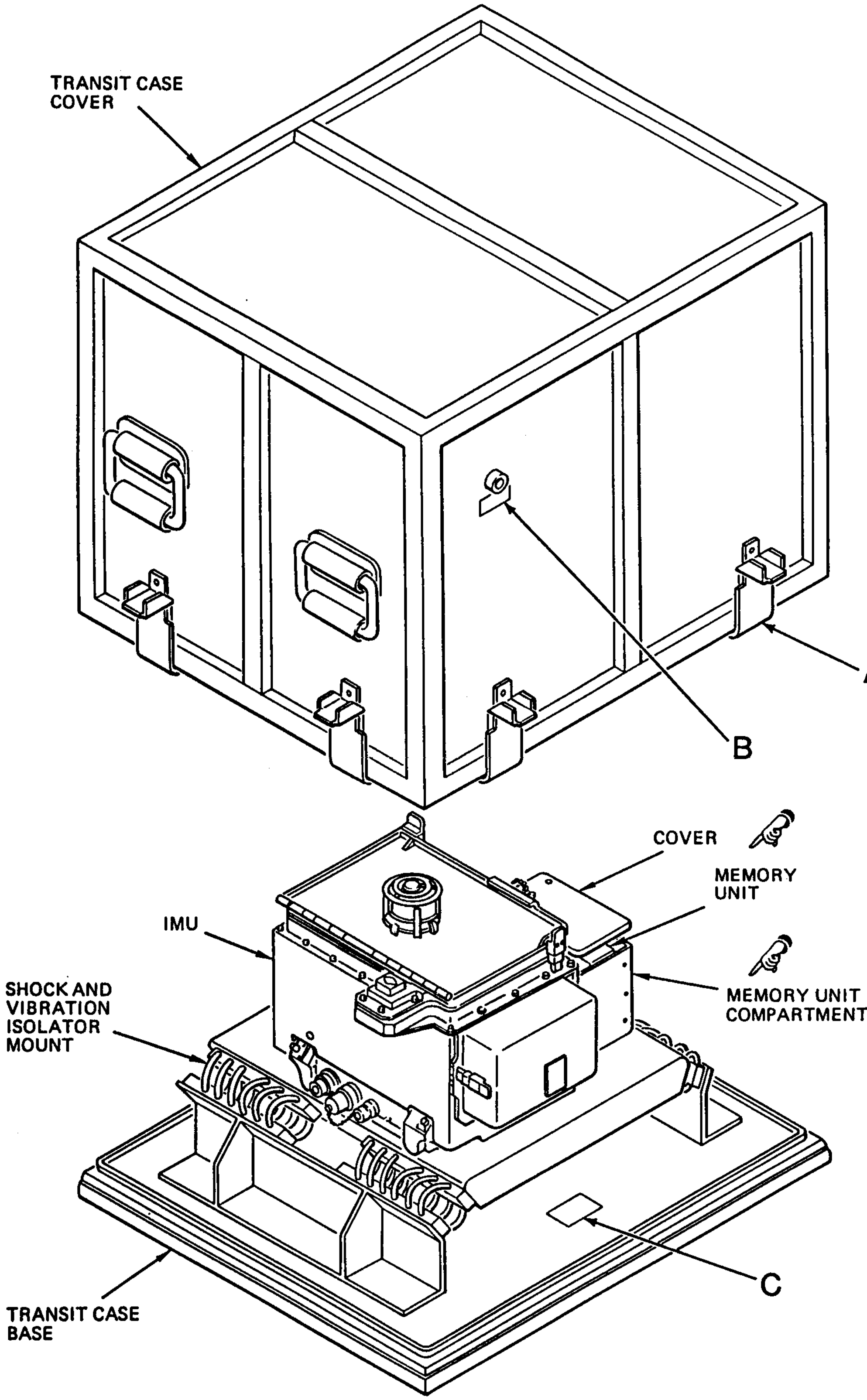


Figure 3-5. IMU Installed in Transit Case (Sheet 1 of 2)

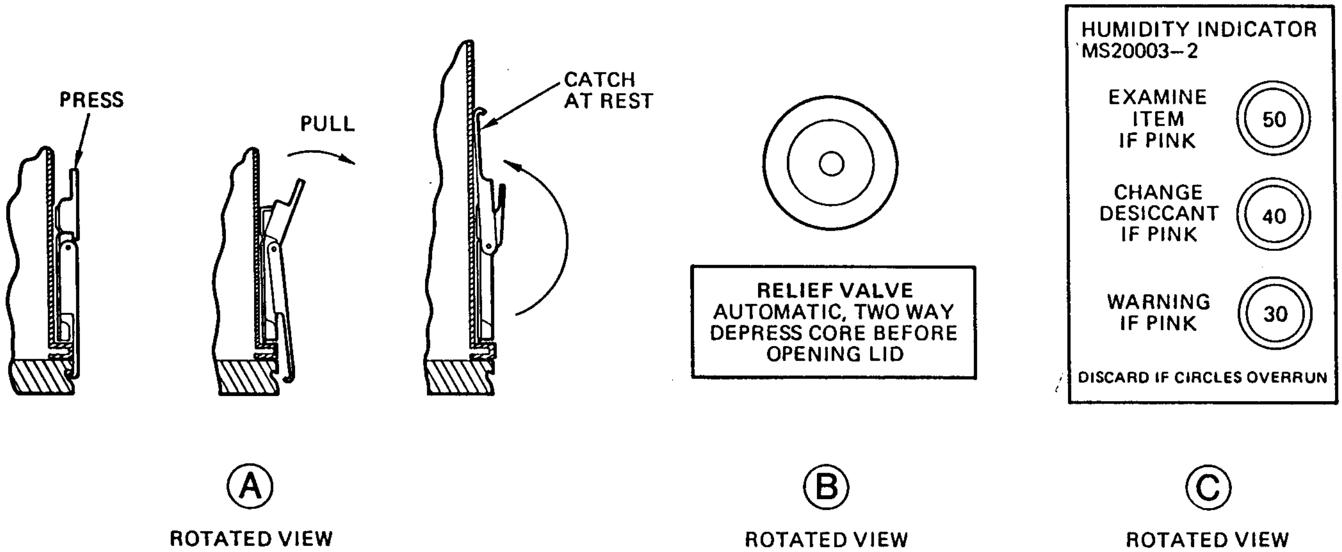


Figure 3-5. IMU Installed in Transit Case (Sheet 2 of 2)

c. *IMU.* Remove and replace IMU (9, figure 3-6) as follows:

CAUTION

IMU mounting bolt heads are secured to the bolts by shear pins to prevent overtightening. Use torque wrench to torque the bolts to prevent breakage. If a cap is broken off, unscrew the bolt with a flat-tip screw driver.

NOTE

Memory unit Al (7 or 7.1. figure 3-7) and IMU (9, figure 3-6) are supplied as a matched set in the IMU transit case (figure 3-5). When IMU is replaced, matching memory unit Al must be installed in computer.

(1) ***Removal.***

(a) See figure 3-1 and disconnect cables from IMU as follows:

1. Disconnect cable assembly W2 connector W2P1 from IMU connector 2J1.

2. Disconnect cable assembly W4 connector W4P1 from I MU connector 2J3.

3. Disconnect cable assembly M5 connector W5P1 from IMU connector 2J4.

4. Disconnect cable assembly W5 connector W5P3 from IMU connector 2J5.

(b) Swing plum bob arm (7, figure 3-6) out to provide clearance.

(c) Loosen two bolt assemblies (10) securing IMU (9) to IMU mounts (8) and pull IMU (9) back to disengage guide pin (11) from computer mounting base (12).

(cl) Lift IMU (9) out through side of mounting base frame (13) opposite the plumb bob arm (7)

(2) ***Replacement.***

(a) Install IMU (9) through side of mounting base frame (13).

(h) Engage guide pin (11) in hole provided in computer mounting base (12).

(c) Engage and torque to 25 inch-pounds two bolt assemblies (10) securing IMU (9) to IMU mounts (8).

(d) Check IMU foot contact.

(e) Increase torque to 50 inch-pounds for the two bolt assemblies (10).

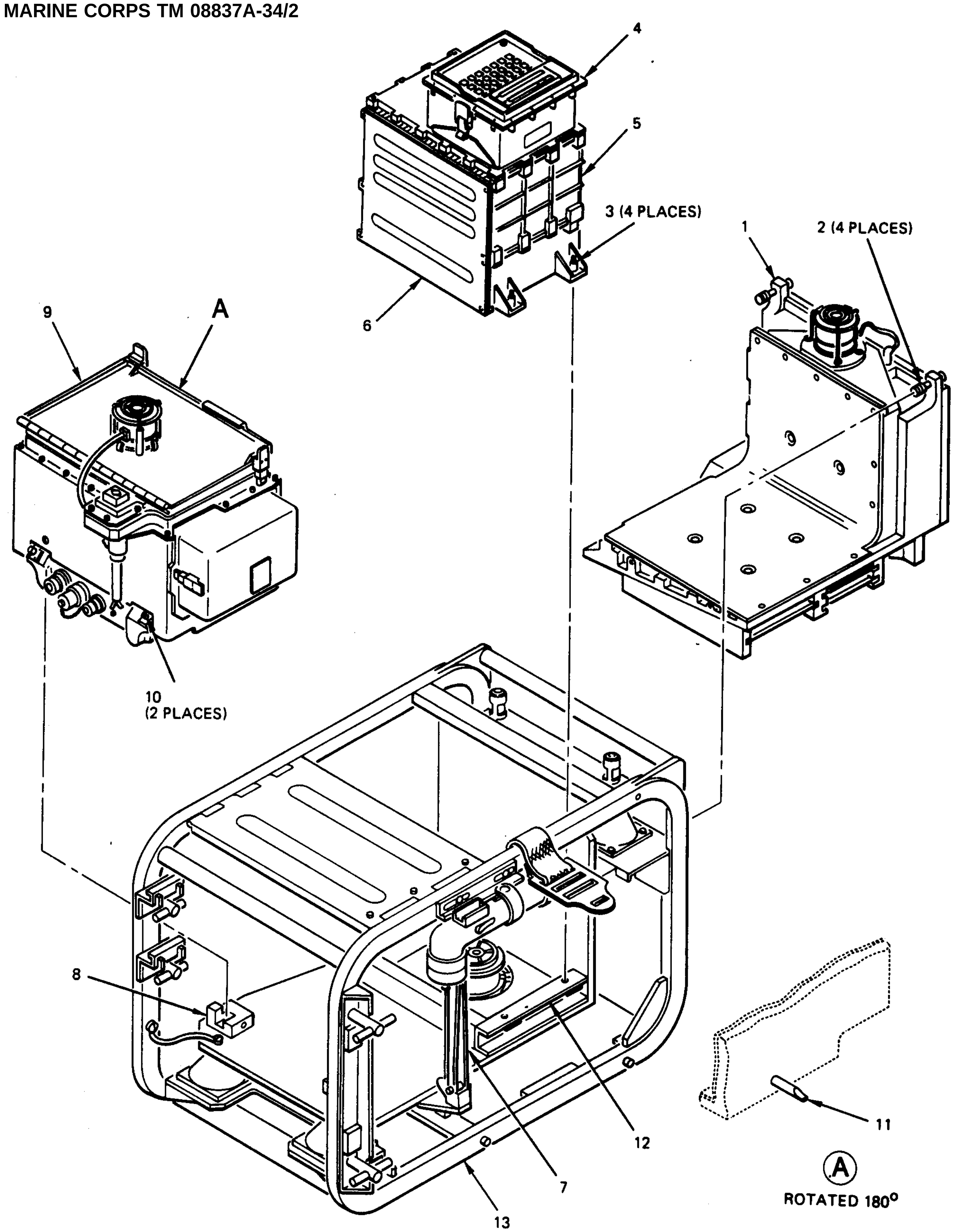


Figure 3-6. Primary Pallet Exploded View

Legend for Figure 3-6

1. Power supply	8. IMU mount
2. Captive screw	9. IMU
3. Captive screw	10. Bolt assembly
4. CDU	11. Guide pin
5. Computer	12. Computer mounting base
6. Computer power supply	13. Mounting base frame
7. Plumb bob arm	

(f) Swing plumb bob arm (7) up to stowed position.

(g) See figure 3-1 and connect cables to IMU as

1. Connect cable assembly W3 connector W2P1 to IMU connector 2J1.
2. Connect cable assembly W4 connector W4P1 to IMU connector 2J3.
3. Connect cable assembly W5 connector W5P1 to IMU connector 2J4.
4. Connect cable assembly W5 connector W5P3 to IMU connector 2J5.

d. *Power Supply.* Remove and replace power supply (1, figure 3-6) as follows:

(1) *Removal.*

(a) See figure 3-1 and disconnect cables from power supply as follows:

1. Disconnect cable assembly W6 connector W6P1 from power supply connector 3J2.
2. Disconnect cable assembly W211 connector W21lP1 from power supply connector 3J4.
3. Disconnect cable assembly W3 connector W3P1 from power supply connector 3J5.
4. Disconnect cable assembly W4 connector W4P2 from power supply connector 3J3.
5. Disconnect cable assembly W5 connector W5P2 from power supply connector 3J1.

(b) Loosen' four captive screws (2, figure 3-6) securing ower supply (1) to mounting base frame (13). Remove power supply (l).

(2) *Replacement.*

(a) Place ower supply (1) in mounting base frame (13). Align mounting holes.

(b) Engage and tighten four captive *screws (2)* secuirng ower supply (1) to mounting base frame (13).

(c) See figure 3-1 and connect cables to power supply as follows:

1. Connect cable assembly W3 connector W3P1 to power supply connector 3J5.
2. Connect cable assembly W4 connector W4P2 to power supply connector 3J3.
3. Connect cable assembly W5 connector W5P2 to power supply connector 3J1.
4. Connect cable assembly W211 connector W21lP1 to power supply connector 3J4.
5. Connect cable assembly W6 connector W6P1 to power supply connector 3J2.

3-14. Gasket Replacement. Gaskets on the IMU cover, porro prism cover, computer top cover, computer/ computer power supply, computer power supply end plate, circuit breaker covers, and power supply bottom cover and side cover are replaced using the same general procedure.

a. Peel old gasket from mounting surface.

b. Carefully scrape off old adhesive from mounting surface. Do not remove the metal protective finish by sanding, etc.

c. Clean-the mounting surface by wiping with isopropyl alcohol and a lint-free cloth.

WARNING

Isopropyl alcohol is flammable and gives off harmful vapors. Use only in well ventilated area away from open flames and sparks. Avoid prolonged or repeated inhalation of vapors.

NOTE

Use silicone adhesive (RTV 156 or 30-079) on IMU cover, computer cover, computer/computer power supply, computer power supply end plate, and power supply bottom cover and side cover gaskets.

Use silicone adhesive (MIL-A-46146, Type I) on circuit breaker covers and porro prism cover gaskets.

d. Apply a thin, even coat of silicone to mounting surface.

e. Install gasket on mounting surface. Align holes.

f. Apply sufficient pressure to gasket to provide a good bond and force out excess adhesive. Remove excessive adhesive.

g. Mate the subassembly to its counterpart, Tighten the screws with moderate, even pressure, Do not torque to final value until adhesive has cured for 24 hours.

3-15. Computer Maintenance. Repair of the computer consists of removal and replacement of circuit cards, memory unit, computer power supply, and radio frequency interference (RF1) gasket, and repair of the mount bracket, Figure 3-7 is an exploded view of the computer.

a. *Circuit Card Assembly.* Remove and replace circuit card assemblies A2 through A9 and All (20, thru 28, figure 3-7) as follows:

CAUTION

When removing, replacing, or handling A/D converter card assembly All, do not touch connector pins or components on face of card as damage to the assembly may result.

Ensure that assembly A11 is transported in conductive bag with CAUTION label identifying its contents as static-sensitive device.

Prior to removal of assembly from packaging, operator should discharge static electricity by making arm contact with an earth ground.

NOTE

Computer may remain in primary pallet for card replacement.

(1) *Removal*

(a) Loosen 16 captive screws (2) and washers (1) securing computer cover (3) to computer subassembly (10); remove cover.

(b) Use card extractor to remove circuit card assemblies (20 thru 28) as shown in figure 3-8.

(2) *Replacement.*

NOTE

Circuit card assembly connectors are keyed to prevent insertion of circuit card assemblies in wrong connectors, Inspect mating connectors for bent or broken pins before inserting a new card.

(a) Install circuit card assemblies (20 thru 28, figure 3-7) as follows:

1. Insert card into card guide and carefully guide it into place. If card jams, use card extractor to pull it back out, Refer to table 3-5 for card identification,

2. Just before the connectors mate, verify card is free in its guides and its top edge is parallel to the computer top surface.

3. Seat the card by applying moderate, even pressure at both sides. The top should be flush with the computer top surface. If excessive insertion force is required or the card extends above the computer, pull the card out and inspect for bent or broken connector pins.

(b) Inspect RFI gasket (29). Replace if cracked, broken, loose or excessively compressed.

(c) Place computer cover (3) on computer subassembly (10); align mounting holes.

(d) Engage 16 screws (2) and washers (1) securing com uter cover (3) to computer subassembly (10) and torque to 16 inch-pounds using procedures described in paragraph 3-11.

b. ***Memory Unit.*** Remove and replace memory unit Al (7 or 7,1, figure 3-7) as follows:

CAUTION

When removing, replacing, or handling solid state memory unit A1 (7), do not touch connector pins or components on face of card as damage to the memory may result.

Ensure that the memory is transported in conductive bag with CAUTION label identifying its contents as static-sensitive device.

Prior to removal of the memory from packaging, operator should discharge static electricity by making arm contact with earth ground.

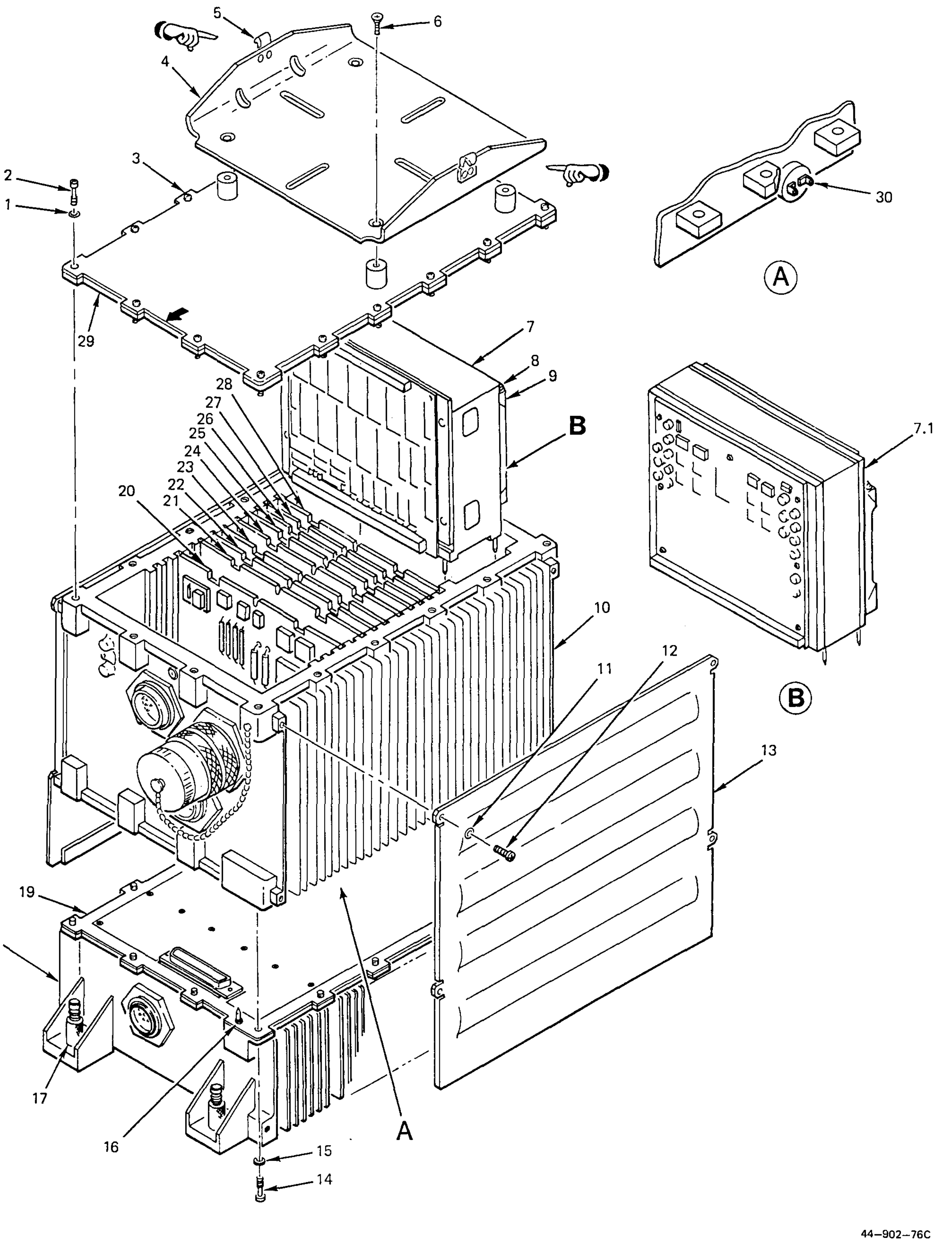


Figure 3-7. Computer Exploded View

Legend for Figure 3-7

1.	Washer	16.	Guide pin
2.	Screw	17.	Captive screw assembly
3.	Computer cover	18.	Computer power supply
4.	CDU Mount bracket	19.	RFI gasket
5.	Catch strike	20.	A/D converter circuit card assembly Al1
6.	Screw	21.	I/O discrete circuit card assembly A9
7.	Solid state memory unit Al	22.	Platform I/O circuit card assembly A8
7.1	Core memory unit Al	23.	I/O controller circuit card assembly A7
8.	Screw	24.	Data buffer circuit card assembly A6
9.	Wedgelock	25.	Control no. 3 circuit card assembly A5
10.	Computer subassembly	26.	Control no. 2 circuit card assembly A4
11.	Washer	27.	Control no. 1 circuit card assembly A3
12.	Screw	28.	16-bit data circuit card assembly A2
13.	Air deflector	29.	RFI gasket
14.	Screw	30.	Thermostatic switch S1
15.	Washer		

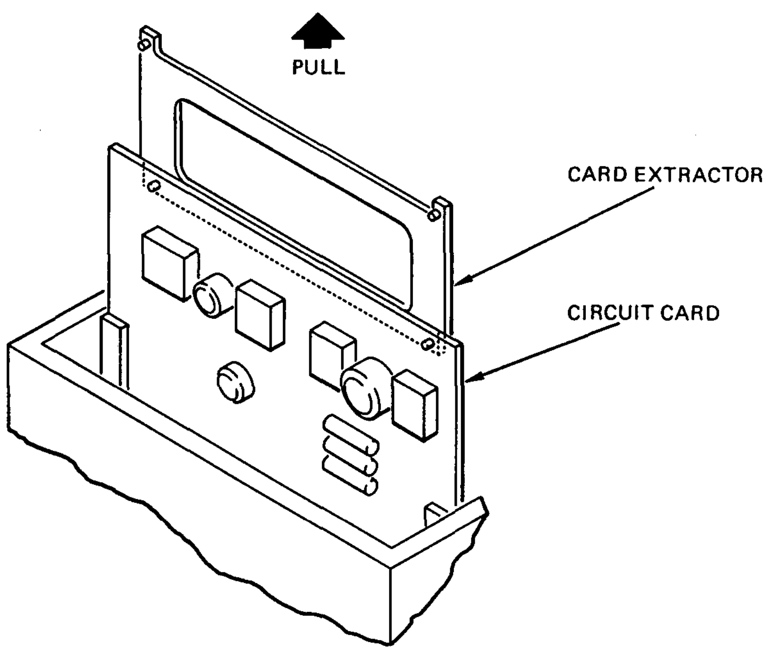


Figure 3-8. Typical Circuit Card Assembly Removal

NOTE

Memory unit and IMU are supplied as a match set. When a memory unit is replaced, the matching IMU must be installed.

(1) *Removal.*

NOTE

Computer may remain in primary pallet for core memory unit replacement.

(a) Loosen 16 captive screws (2) and washers (1) securing computer cover (3) to computer subassembly (10); remove computer cover.

Table 3-5. Computer Circuit Card Assembly Identification

Figure 3-7 index no.	Card Part no.	Cards nomenclature and reference designator	Part no. location on card
20	880788–3 (preferred) 880788–1, 880788–2, and 880735-3 (alternate)	A/D converter circuit card assembly A11	Near top edge (opposite connector end) on component side
21	880740-4 (preferred) 880740-2 (alternate)	I/O discrete circuit card assembly A9	Along side edge about middle of board on component side
22	880778–3 (preferred) 880730-3, 880730-4, 880778–1, and 880778–2 (alternate)	Platform I/O circuit card assembly A8	Near top edge (opposite connector end) on component side
23	880745-2	I/O controller circuit card assembly A7	Near top edge (opposite connector end) on component side
24	880748-1 (preferred) 880705-2 (alternate)	Data buffer circuit card assembly A6	Near top edge (opposite connector end) on component side
25	880795-1	Control no. 3 circuit card assembly A5	Near top edge (opposite connector end) on component side
26	880785-1	Control no. 2 circuit card assembly A4	Along side edge near top edge (opposite connector end) on component side
27	880775-1	Control no. 1 circuit card assembly A3	Near top edge (opposite connector end) on component side
28	880755-1	16-bit data circuit card assembly A2	Along side edge near top edge (opposite connector end) on component side

(b) Loosen (turn counterclockwise) two screws (8) securing wedgelock (9) until memory unit (7 or 7. 1) is free.

NOTE

It may be necessary to loosen the wedges if they become frozen. This can be done by simply tapping the wedge screws downward until the bottom wedges become loose. The top wedges may be loosened by placing a 1/8-inch straight-slot screw driver between the memory upper wedge and the computer outside case, prying the wedge inward until loose.

(c) Use card extractor to remove memory unit

(2) *Replacement.*

NOTE

Inspect mating connectors for bent or broken pins before installing a memory unit.

(a) Install memory unit (7 or 7.1) as follows:

1. Insert memory unit into slot in computer with wedge-locks facing to the rear of computer and carefully guide it into place.

2. Just before the connectors mate, check that the memory unit is free in its guides and its top edge is parallel to the computer top surface.

3. Seat the memory unit by applying moderate, even pressure at both sides. The top should be flush with the computer top surface. If excessive insertion force is required or the memory unit extends above the computer, pull the memory out and inspect for bent or broken connector pins.

(b) Tighten two screws (8) in wedgelock (9) until wedge is tight against edge of slot.

(c) Inspect RFI gasket (37). Replace if cracked, broken, loose, or excessively compressed.

(d) Place computer cover (3) on computer subassembly (10); align mounting holes.

(e) Torque 16 screws (2) and washers (1) securing com uter cover (3) to computer subassembly (10) to 16 inch-pounds using procedures described in paragraph 3-11.

c. Computer Power Supply and Computer Subassembly. Remove and replace computer power supply (18, figure 3-7) or computer subassembly (10) as follows:

(1) *Removal.*

(a) Remove six screws (12) and washers (11) securing each of two air deflectors (13) to computer subassembly (10). Remove two air deflectors,

(b) Loosen 16 captive screws (14) and washers (15) securing computer subassembly (10) to computer power supply (18). Remove computer power supply.

(2) *Replacement.*

(a) Inspect guide pins (16). Replace if bent or broken.

(b) Inspect connectors. Replace computer subassembly if pins are bent or broken.

(c) Inspect RFl gasket (19). Replace if cracked, broken, loose, or excessively compressed.

(d) Inspect captive screw assembies (17). Replace if broken or threads are damaged.

(e) Place computer power supply (18) on computer subassembly (10).

(f) Ti hten 16 captive screws (14) and washers (15) securing computer power supply (18) to computer subassembly (10). Torque to 16 inch-pounds using procedures described in paragraph 3-11.

(g) Place two air deflectors (13) against computer subassembly (10); align mounting holes.

(h) Install six screws (12) and washers (11) securing each of two air deflectors (13) to n computer subassembly (10).

d. ***CDU Mount Bracket Repair.*** Repair of the CDU mount bracket (4, figure 3-7) consists of replacing the catch strikes (5). Repair mount bracket as follows:

(1) Remove four screws (6) securing CDU mount bracket (4) to computer cover (3); remove bracket.

(2) Remove swa ed portion of two rivets securing catch strike (5) to mount bracket (4) by drilling or other suitable means. Remove rivet and catch strike.

(3) Place catch strike (5) in position on mount bracket (4).

(4) Secure catch strike (5) to mount bracket (4) with rivets. Swage rivets in place.

(5) Install mount bracket (4) on computer cover (3) and secure with four screws (6).

3-16. Computer Power Supply Maintenance. Repair of the computer power supply consists of removal and replacement of guide pins, captive screws, and RFI gaskets.

a. *Guide Pins.*

(1) ***Removal.*** Unscrew guide in (16, figure 3-7) from power supply chassis (18).

(2) ***Replacement.*** Screw guide pin (16) into power supply chassis (18).

b. ***Captive Screw.***

(1) ***Removal.*** Unscrew captive screw (17, figure 3-7) from retainer nut on bottom surface of power supply chassis (18).

(2) ***Replacement.***

WARNING

Isopropyl alcohol is flammable and gives off harmful vapors. Use onlv in well-ventilated areas away from open flames and sparks. Avoid prolonged or repeated inhalation of vapors.

(a) Clean internal threads of captive screws (17) and external threads of retainer nut using isopropyl alcohol (TT-I-735).

(b) Apply sealing compound primer (MIL-S-22473) to male threads of retainer nut.

(c) After primer has dried, apply sealing compound (MIL-S-22473, Grade C) to male threads of retainer nut. Sealing compound shall cover the full engaging length of one of the mating components; assemble parts.

3-17. CDU Maintenance. CDU repair consists of removal and replacement of circuit card assemblies. Figure 3-9 is an exploded view of the CDU.

a. Display Logic Circuit Card Assemblies Al and A2 and Keybord and Control Circuit Card Assembly A3. Remove and replace display logic circuit card assembly Al or A2 (4 or 5, figure 3-9) or keyboard and control circuit card assembly A3 (6) as follows:

(1) *Removal.*

(a) Remove 16 screws (1) and washers (2) securing control and display panel (3) to control and display unit cover (7). Separate control and display unit cover (7) and control and display panel (3) to provide access to circuit card assemblies,

(b) Using card extractor, remove display logic circuit card assembly Al (4), A2 (5), or keyboard and control circuit card assembly A3 (6) as applicable.

(2) Replacement.

(a) Insert card into guide and carefully guide it into place. If card jams, pull it back out with card extractor. Refer to table 3-6 for card identification.

(b) Just before the connectors mate, check that card is free in its guides and its top edge is parallel to the CDU top surface.

(c) Seat card by applying moderate even pressure at both sides. If excessive insertion force is required or the card is not fully seated, remove the card and inspect for bent or broken connector pins.

(d) Inspect gasket (8). Replace if cracked, tom, loose, or excessively compressed.

(e) Place control and display panel (3) against control and display unit cover (7). Secure control and display panel (3) to control and display unit cover with 16 screws (1) and washers *(2)* and torque to 5 inch-pounds using procedures described in paragraph 3-11.

3-18. IMU Maintenance. Repair of the IMU consists of removal and replacement of bolt assemblies, guide pin, thermostatic switch, and repair of the IMU cover and porro prism cover. Figure 3-10 is an exploded view of the IMU.

a. Bolt *Assembly.* Remove and replace bolt assembly (21, figure 3-10) as follows:

(1) *Removal.*

(a) Remove retainer nut (19) securing bolt assembly (21) to lower IMU subassembly (13).

(b) Remove bolt assembly (21). Retain two washers (20) for reassembly.

(2) ***Replacement.***

WARNING

Isopropyl alcohol is flammable and gives off harmful vapors. Use only in well-ventilated area away from open flames and sparks. Avoid prolonged or repeated inhalation of vapors.

(a) Clean bolt assembly (21) threads using isopropyl alcohol and clean, lint-free cloth; wipe dry.

(b) Place washers (20) on bolt assembly (21); insert bolt assembly (21) through mounting hole.

(c) Apply sealing compound primer (MIL-S-22473) to bolt assembly (21) threads; allow to dry.

(d) Apply sealing compound (MIL-S-22473, Grade C) to bolt assembly (21) threads,

(e) Install retainer nut (19) securing bolt assembly (21) to lower IMU subassembly (13). Torque retainer nut 10 to 12 inch-pounds.

b. *Guide Pin.* Remove and replace guide pin (14, figure follows:

(1) *Removal.* Unscrew guide pin (14) from lower IMU subassembly (13).

(2) *Replacement.*

WARNING

Isopropyl alcohol is flammable and gives off harmful vapors. Use only in well-ventilated area away from open flames and sparks. Avoid prolonged or repeated inhalation of vapors.

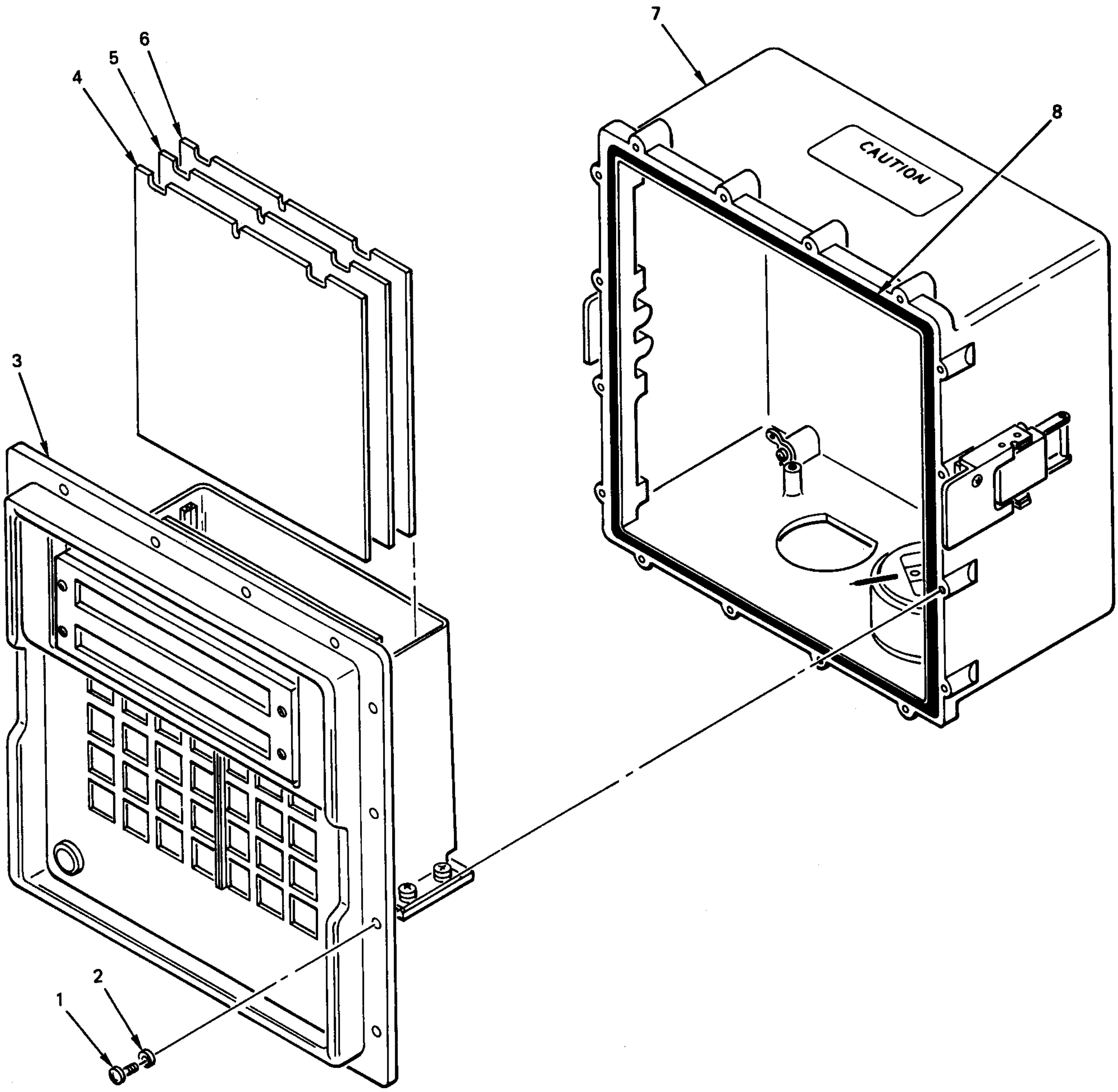


Figure 3-9. CDU Exploded View

Legend for Figure 3-9

1. Screw	5. Display logic circuit card assembly A2
2. Washer	6. Keyboard and control circuit card assembly A3
3. Control and display panel	7. Control and display unit cover
4. Display logic circuit card assembly A1	8. Gasket

Table 3-6. CDU Circuit Card Assembly Identification

Figure 3-9 index no.	Card part no.	Card nomenclature and reference designator	Part no. location on card
4,5	880805-1	Display logic circuit card assembly A1 and A2	On one end of connector on component side
6	880815-1	Keyboard and control circuit card assembly A3	Near top edge (opposite connector end) on component side

(a) Clean guide pin (14) threads using isopropyl alcohol and clean, lint-free material; wipe dry.

(b) Apply sealing compound primer (MIL-S-22473) to guide pin (14) threads; allow to dry.

(c) Apply sealing compound (MIL-S-22473, Grade C) to guide pin (14) threads.

(d) Install guide pin (14) in lower IMU subassembly (13). Torque guide pin 90 to 100 inch-pounds.

c. *Ambient Temperature Thermostatic Switch.* Remove and replace thermostatic switch (4, figure 3-10) as follows:

(1) *Removal.*

(a) Remove two screws (l), washers (2), and cover plate (3) securing thermostatic switch (4) to upper IMU subassembly (12). Remove thermostatic switch (4) far enough to provide access to soldered connections.

(b) Tag and unsolder all wires connected to thermostatic switch (4). Remove thermostatic switch and gasket (7).

Lagend for Figure 3-10

1. Screw	12. Upper IMU subassembly
2. Washer	13. Lower IMU subassembly
3. Cover plate	14. Guide pin
4. Thermostat switch S3	15. Porro prism cover
5. Capacitor C3	16. Screw
6. Capacitor C4	17. Washer
7. Gasket	18. Clamping catch
8. Screw	19. Retainer nut
9. Clamping catch	20. Washer
10. Washer	21. Bolt assembly
11. Nut	22. IMU cover

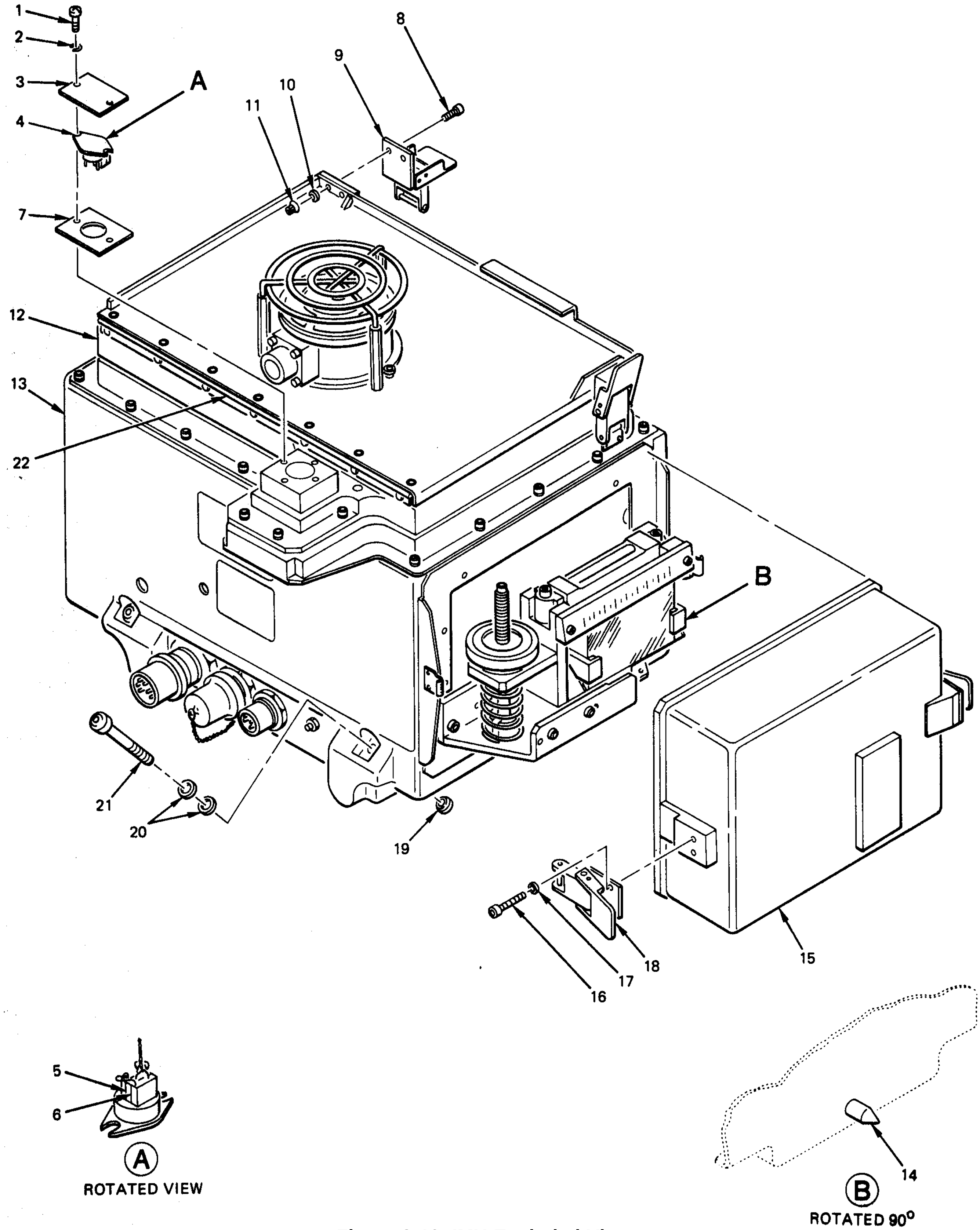


Figure 3-10. IMU Exploded View

(c) Remove capacitors C3 and C4 (5 and 6) from thermostatic switch (4).

(2) *Replacement.*

WARNING

Isopropyl alcohol is flammable and gives off harmful vapors. Use only in well-ventilated area away from open flames and sparks. Avoid prolonged or repeated inhalation of vapors.

(a) Clean mountin surfaces of capacitors C3 and C4 (5 and 6) and thermostatic switch (4) using isopropyl alcohol and lint-free material.

(b) Apply adhesive (MIL-A-46146, Type 1) to mounting surfaces of capacitors C3 and C4 (5 and 6) and thermostatic switch (4). Mount capacitors. C3 and C4 (5 and 6) on thermostatic switch (4).

(c) Cure adhesive for 72 hours minimum.

(d) Install gasket (7).

(e) Prepare and solder wires connecting thermostatic switch (4) and capacitors C3 and C4 (5 and 6) using standard shop practices. Clean solder joint; remove excess flux.

(f) Install two screws (l), washers (2), and cover plate (3) securing thermostatic switch (4) to upper IMU subassembly (12).

d. ***IMU Cover Repair.*** Repair of the IMU cover (22, figure 3-10) consists of replacing the clamping catch(es) (9). Remove and replace the clamping catch(es) as follows:

(1) *Removal.*

(a) Release clamping catch (9) from catch strike.

(b) Remove two screws (8), washers (10), and nuts (11) securing clamping catch (9) to IMU cover (22). Remove clamping catch.

(2) *Replacement.*

(a) Secure clamping catch (9) to IMU cover (22) with two screws (8), washers (10), and nuts (11).

(b) Latch clamping catch (9) to catch strike.

e. Porro Prism Cover Repair. Repair of the porro prism cover (15, figure 3-10) consists of replacing the clamping catch(es) 18). Remove and replace the clamping catch(es) as follows:

(1) *Removal.*

(a) Release two clamping catches (18) and remove porro prism cover (15) from IMU.

(b) Remove two screws (16) and washers (17) securing clamping catch (18) to porro prism cover (15). Remove clamping catch.

(2) *Replacement.*

(a) Secure clamping catch (18) to porro prism cover (15) with two screws (16) and washers (17).

(b) Fit porro prism cover to IMU and secure with two clamping catches.

3-19. Installation Kit Maintenance. Maintenance of the installation kit consists of repairing the sub-floor plate, subfloor mounting bracket, and the control display unit bracket.

a. *Subfloor Plate.* Repair of the subfloor plate consists of replacing threaded inserts, repairing broken welds on strap tiedowns and stud, and removing dents.

(1) *Threaded Insert.* Remove and replace threaded inserts in accordance with figure 3-11.

(2) *Strap tie-downs.* Repair broken welds per MIL-W-8611.

(3) *Stud.* Repair broken welds per MIL-W-8611.

b. *Subfloor Mounting Bracket.* Repair of the subfloor mounting bracket consists of replacing nut plates and removing dents.

(1) *Nut plate.* Remove and replace nut plate as follows:

(a) *Removal.* Remove rivets securing nut plate by drilling or other suitable means. Remove nut place.

(b) *Replacement.*

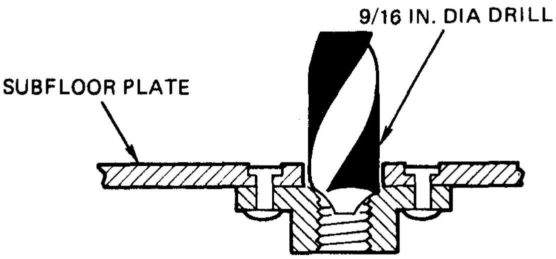
1. Secure nut plate in position with rivets.
2. Swage rivets in place.

3-20. Electrical Equipment Mounting Base Maintenance. Maintenance of the electrical equipment mounting base consists of replacing upper and lower vibration mounts, support strips, rear retainers, and plumb bob assembly, and repair of the plumb bob assembly. Figure 3-12 is an exploded view of the electrical equipment mounting base.

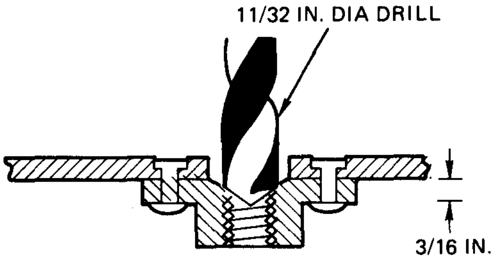
a. *Vibration Mounts.* Remove and replace upper and lower vibration mounts (7, or 26, figure 3-12, sheet 2) as follows:

(1) Removal.

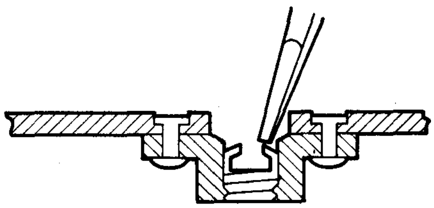
(a) Remove stop (2, upper) or screw *(32,* lower), and washer (3, upper or 31, lower) securing spacer (6, upper or 29, lower) to mounting



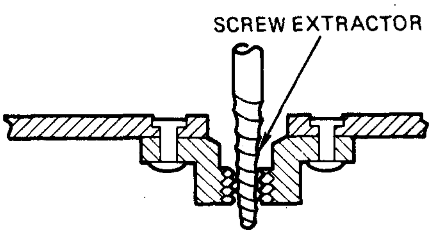
1. THIS STEP REQUIREDONLYWHEN REPLACING AN INSERT THE FIRST TIME. ENLARGE HOLE IN SUBFLOOR PLATE WITH 9/16 IN. DRILL BIT. BE CAREFUL TO DRILLJUSTTHRU SUBFLOOR PLATEANDMINIMIZE REMOVALOF MATERIAL FROM BLOCK.



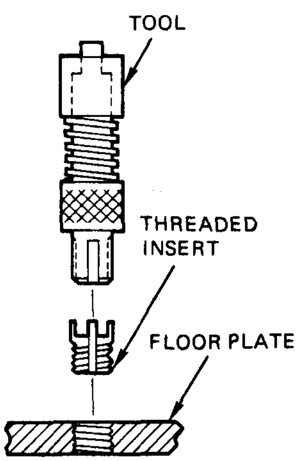
2. DRILL INSERT WITH 11/32 IN. BIT TO A DEPTH OF 3/16 IN. TO EXPOSE KEES.



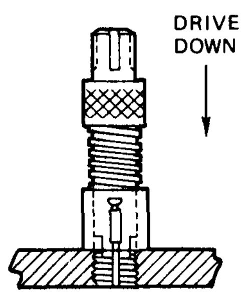
3. DEFLECT KEES INWARD AND BREAK OFF.



4. REMOVE THREADED INSERT WITH SCREW EXTRACTOR.



5. SLIDE INSERT ONTO INSERTION TOOL AND THREAD INSERT INTO BLOCK UNTIL BOTTOM EDGEOFKEESCONTACT THE COUNTERSINK IN THE BLOCK.



6. INVERT TOOL OVER KEES. TAP TOP OF TOOL WITH HAMMER UNTIL KEES ARE DRIVEN FLUSH WITH TOP OF INSERT. REMOVE TOOL.

Figure 3-11. Threaded Insert Removal and Replacement

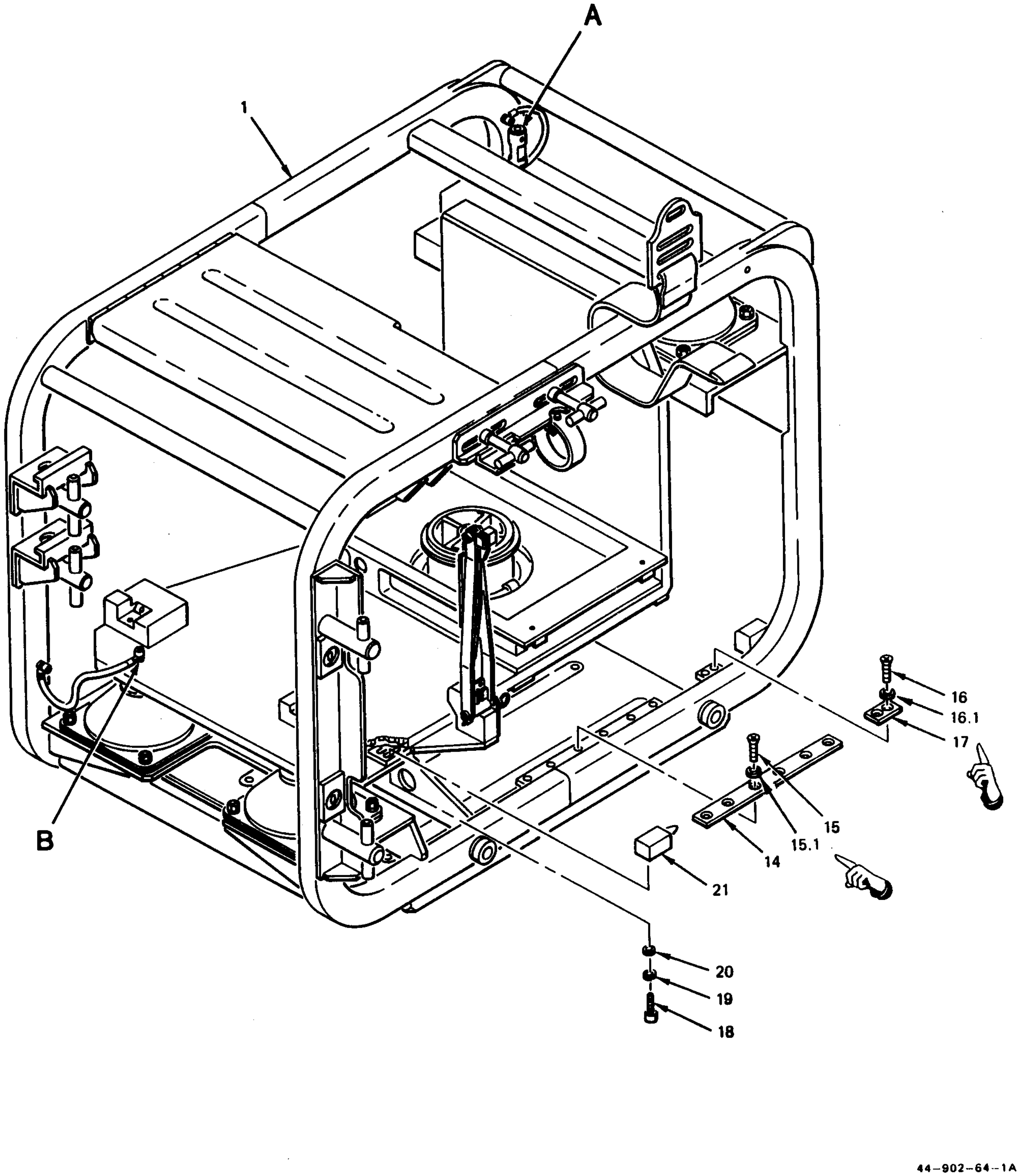


Figure 3-12. Electrical Equipment Mounting Base Exploded View (Sheet 1 of 2)

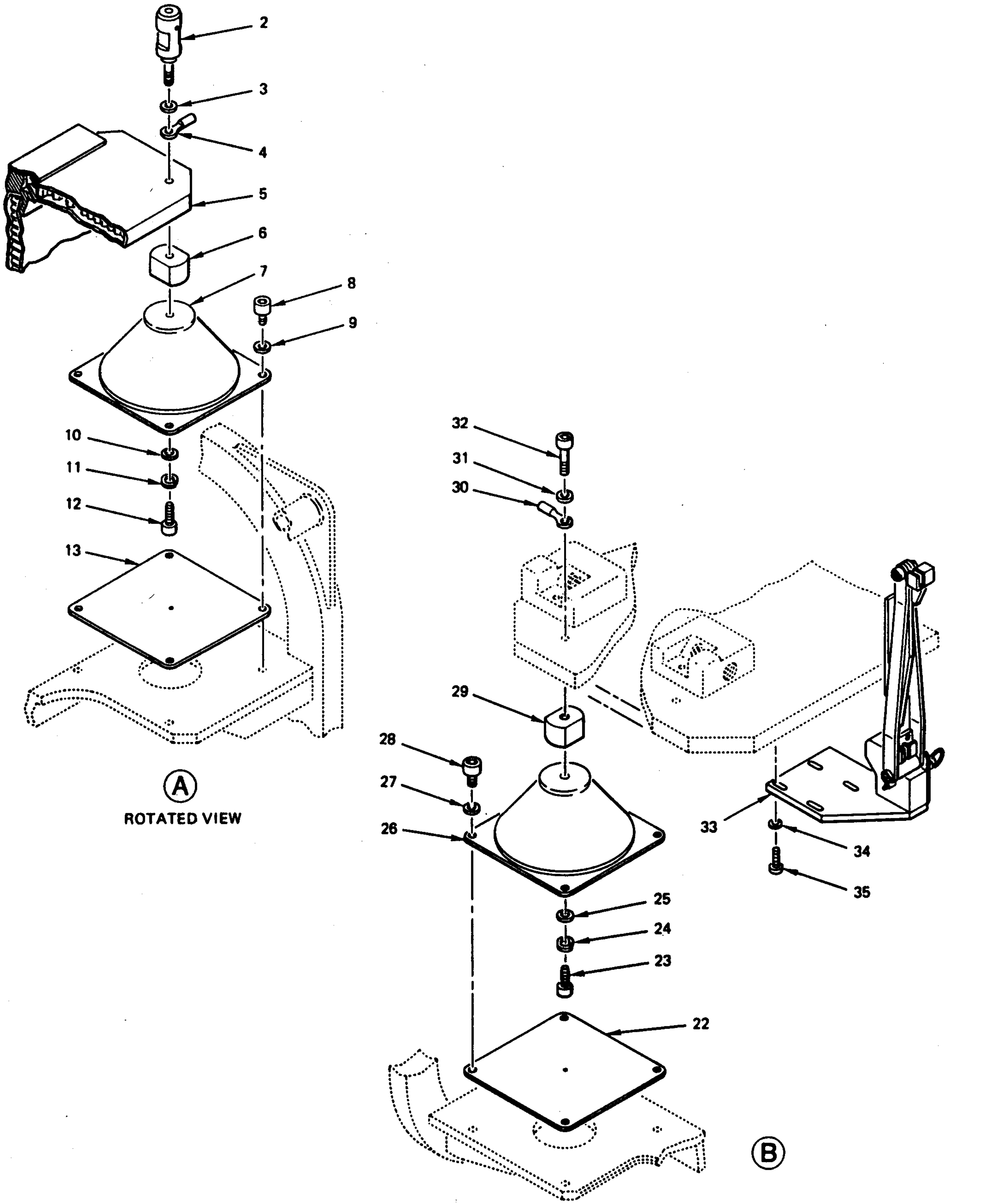


Figure 3-12. Electrical Equipment Mounting Base Exploded View (Sheet 2 of 2)

Legend for Figure 3-12

1. Mounting base frame	18. Screw
2. Stop	19. Lockwasher
3. Washer	20. Washer
4. Jumper	21. Retainer
5. Mounting plate	22. Orifice
6. Spacer	23. Screw
7. Upper vibration mount	24. Lockwasher
8. Screw	25. Washer
9. Washer	26. Lower vibration mount
10. Washer	27. Washer
11. Lockwasher	28. Screw
12. Screw	29. Spacer
13. Orifice	30. Jumper
14. Support strip	31. Washer
15. Screw	32. Screw
15.1 Washer	33. Plumb bob assembly
16. Screw	34. Washer
16.1 Washer	35. Screw
17. Support strip	

plate (5). Remove jumper (4, upper or 30, lower).

(b) Remove four screws (8, upper or 28, lower) and washers (9, upper or 27, lower) securing vibration mount assembly to mounting base frame (1).

(c) Remove vibration mount (7, upper or 26, lower) and orifice F13, upper or 22, lower).

(d) Remove screw (12, upper or 23, lower), washer (10, upper or 25 lower), and lockwasher (11, upper or 24, lower) securing spacer (6, upper or 29, lower).

(2) *Replacement.*

CAUTION

Upper vibration mounts differ from lower vibration mounts in strength and load range. Check that correct replacement part (check part number on vibration mount) is used.

(a) Secure spacer (6, upper or 29, lower) to vibration mount (7, upper or 26, lower) with screw (12, upper or 23, lower), lockwasher (11, upper or 24, lower), and washer (10, upper or 25, lower).

(b) Place orifice (13, upper or 22, lower) and vibration mount (7, upper or 26, lower) in position on mounting base frame (1).

(c) Install four screws (8, upper or 28, lower) and four washers (9, upper or 27, lower).

(d) Inspect jumper. Replace if frayed.

(c) Install stop (2, upper) or screw (32, lower), washer (3, upper or 31, lower), and jumper (4, upper or 30, lower) to mounting plate (5). Use a wrench to prevent spacer (6, upper or 29, lower) from turning.

b. *Support Strips.* Remove and replace support strips (14, rear strip, or 17, forward strip, figure 3-12, sheet 1) as follows:

(1) ***Removal.*** Remove six screws (15, rear strip) and washers (15.1) or two screws (16, forward strip) and washers (16.1) securing strip to mounting base frame (1); remove strip.

(2) *Replacement.*

WARNING

Isopropyl alcohol is flammable and gives off harmful vapors. Use only in well–ventilated area away from open flames and sparks. Avoid prolonged or repeated inhalation of vapors.

(a) Clean screw (15 or 16) threads using isopropyl alcohol and clean, lint-free material; wipe dry.

(b) Apply sealing compound primer (MIL-S-22473) to screw (15 or 16) threads; allow to dry.

(c) Apply sealing, compound (MIL-S-22473, Grade H), to screw (15 or 16) threads.

(d) Install six screws (15, rear) and washers (15.1) or two screws (16, forward) and washers (16.1) securing support strip (14, rear or 17, forward) to mounting base frame.

c. ***Retainer.*** Remove and replace retainer (21, figure 3-12, sheet 1) as follows:

(1) ***Removal.*** Remove four screws (18), four lockwashers (19), and four washers (20) securing retainer (21); remove retainer.

(2) Replacement.

(a) Place retainer (21) in position on mounting base frame (l).

(b) Install four screws (18), lockwashers (19), and washers (20) securing retainer to mounting base frame.

d. ***Plumb Bob Assembly.*** Remove and replace plumb bob assembly (33, figure 3–12, sheet 2) as follows:

(1) Removal. Remove four screws (35) and four washers (34) securing plumb bob assembly (33) to mounting plate (5). Remove plumb bob assembly.

(2) Replacement.

(a) Place plumb bob assembly (33) on mounting plate (5).

(b) Install four screws (35) and four washers (34) securing plumb bob assembly to mounting plate (5).

e. *Plumb Bob Assembly Maintenance.*

(1) Pivot block detent screw adjustment replacement. See figure 3–13 and perform pivot block (5) detent screw (6) adjustment/replacement as follows:

(a) Hold extension arms (3 and 8) in the stowed (vertical) position. If arm will not move to the vertical position, loosen (turn counterclockwise) the detent screw (6).

(b) Tighten (turn clockwise) detent screw (6) until it is just snug. Do not overtighten.

(c) Loosen the detect screw (6) 1/8 turn.

NOTE

If detent screw (6) does not stay in adjustment, replace the detent screw and adjust as above. (The plastic locking device on the detent screw prevents vibration from turning the screw.)

(2) *Plumb bob locking extension arm detent screw adjustment/replacement.* *See* figure 3-13 and perform plumb bob locking extension arm (8) detent screw (10) adjustment/replacement as follows:

(a) Hold plumb bob extension arm (3) in the operational position. If arm will not move to that position, turn (counterclockwise) the detent screw (10).

(b) Tighten (turn clockwise) detent screw (10) until it is just snug. Do not overtighten.

(c) Loosen the detent screw 1/8 turn.

NOTE

If detent screw (10) does not stay in adjustment, replace the detent screw and adjust as above. (The plastic locking device on the detent screw prevents vibration from turning the screw.)

(3) ***Plumb bob arm replacement.*** *See* figure 3-13 and replace plumb bob arm (1) as follows:

(a) *Removal.*

1. Extend plumb bob arm (1)

2. Remove nut (9).

3. Remove shoulder screw (2) securing plumb bob arm (1) to the extension arms (3 and 8); remove plum bob arm.

(b) Replacement.

1. Apply sealing compound primer (MIL-S-22A73) to nut (9) threads; allow to dry.

2. Apply sealing compound (MIL-S-22473, Grade C) to nut (9) threads.

3. Insert plumb bob arm (1) between the extension arms (3 and 8) and secure with shoulder screw (2).

4. Install nut (9) and tighten to secure shoulder screw (2).

(4) *Plumb bob extension arm replacement.* See figure 3–13 and replace plumb bob extension arm (3) or plumb bob locking extension arm (8) as follows:

(a) Removal.

1. Remove plumb bob arm (1) in accordance with paragraph 3-20e(3)(a).

2. Remove shoulder screw (4 or 7) securing plumb bob extension arm (3) or plumb bob locking extension arm (8) to pivot block (5); remove arm.

(b) Replacement

1. Secure plumb bob extension arm (3) or plumb bob locking extension arm (8) to pivot block (5) with shoulder screw (4 or 7). Apply sealing compound (MIL-S-22473, Grade C) to screw threads.

2. Replace plumb bob arm (1) in accordance with paragraph 3-20e(3)(b).

3.21. Battery Box Maintenance. Maintenance of the battery box consists of replacing damaged riveted hardware.

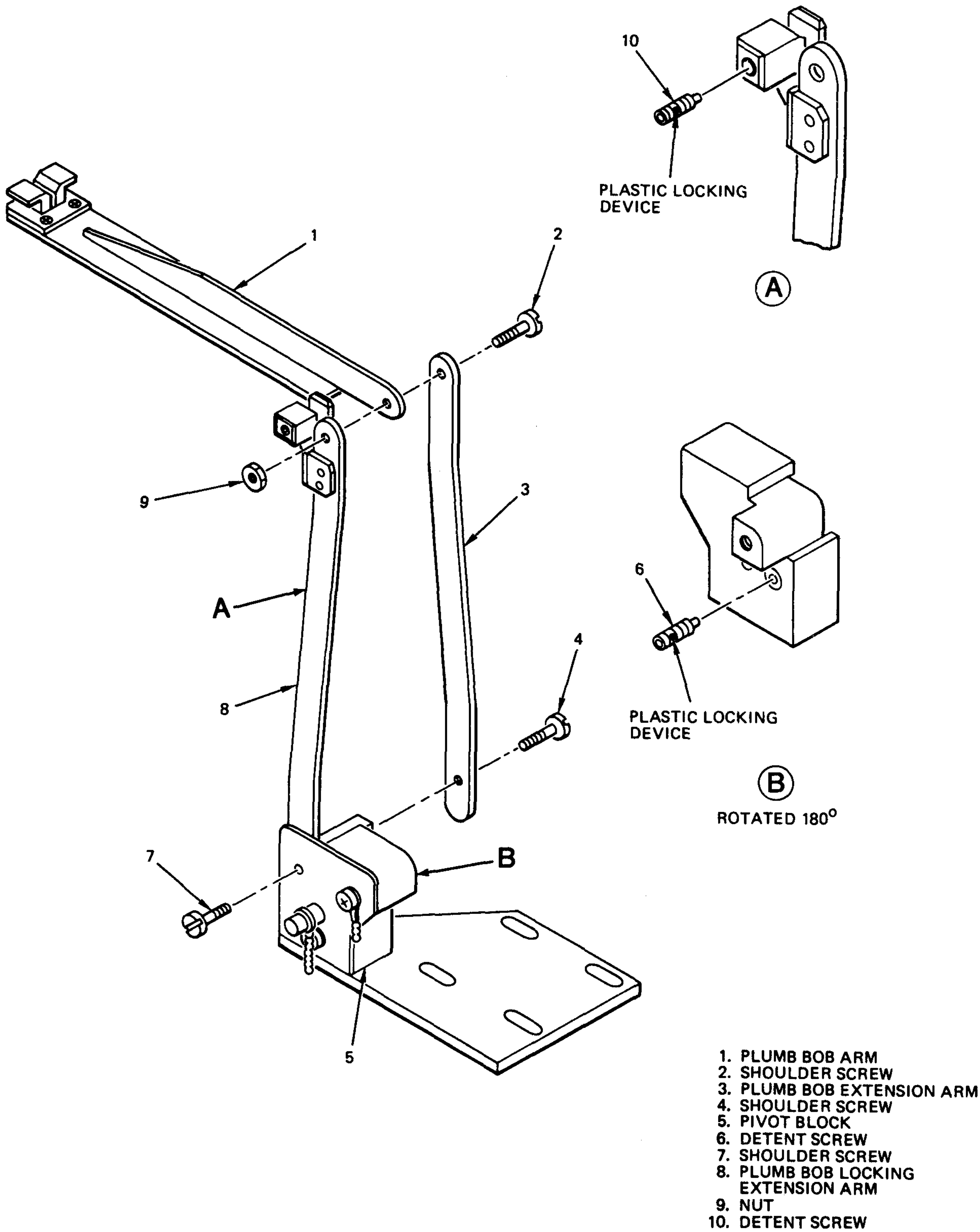


Figure 3-13. Plumb Bob Assembly Exploded View

a. ***Removal.*** Remove rivets securing part by drilling or other suitable means; remove part.

b. ***Replacement.***

(1) Secure part in position with rivets.

(2) Swage rivets in place.

3-22. PADS Transit Case Maintenance. Maintenance of the PADS transit case consists of replacing the shock and vibration isolator mounts (8, figure 3-14).

a. ***Removal.***

(1) Release latches and remove cover (l).

NOTE

Pin housing (5) must be removed to replace two of the shock and vibration isolator mounts.

(2) Remove two screws (2), lockwashers (3), and washers (4) securing pin housing (5) to pallet mounting base (12); remove pin housing.

(3) Place a block under the pallet mounting plate (12) to prevent it from tiltin when a shock and vibration isolator mount (8) is removed.

(4) Remove four bolts (6), washers (7), screws (9), washers (11), and lockwashers (10) securing shock and vibration isolator mount (8) to pallet mounting base (12); remove mount.

b. ***Replacement.***

(1) Secure shock and vibration isolator mount (8) to pallet mountin base (12) with four screws (9), lockwashers (10), washers (11), bolts (6), and washers (7).

(2) Remove block from under pallet mounting plate (12).

(3) Secure pin housing (5) to pallet mountin base (12) with two screws (2), lockwashers (3), and washers (4).

(4) Replace cover (1) and secure with latches.

3-23. IMU Transit Case Maintenance. Maintenance of the IMU transit case consists of replacing the shock and vibration isolator mounts (5, figure 3-15).

a. ***Removal.***

(1) Release latches and remove cover (1).

(2) Place a block under the mounting chassis (10) to prevent it from tiltin when a shock and vibration isolator mount (5) is removed.

(3) Remove 8 screws (2 and 7) and 16 washers (3, 4, 8, and 9) securing shock and vibration isolator mount (5) to base (6) and mounting chassis (10); remove mount.

b. ***Replacement.***

(1) Secure shock and vibration isolator mount (5) to base (6) and mounting chassis (10) with 8 screws (2 and 7) and 16 ‘washers (3, 4, 8, and 9).

(2) Remove block from under mounting chassis

(3) Replace cover (1) and secure with latches.

3-24. Winterization Kit. Installation of the winterization kit consists of removing heater air intake system, removing rear panel, installing side and bottom mounting plates on rear panel, installing angle bracket on rear panel, installing nut plates on vehicle body, cutting out rear panel to install door and frame, installing door frame, installing porro prism door on rear panel, installing transition joint and flexible heater hose, installing the CDU winter mounting bracket, and installing rear panel in vehicle.

a. ***Remove Heater Air Intake System.***

(1) Remove four sheet metal screws securing air intake pipe to heater flange and air intake duct. (See figure 3-16, sheet 1).

(2) Remove four bolts, washers, and nuts securing air intake duct to rear panel.

(3) Remove air intake pipe and duct. Return them to the supply system.

(4) Reinstall the four bolts, washers, and nuts removed in step (2) above in the holes in the rear panel.

b. ***Remove Rear Panel.***

(1) Remove spare tire and fuel can from utility truck.

(2) Remove 18 bolts, washers, and nuts securing rear panel to utility truck body; remove rear panel and place protective cloths on electrical equipment.

CAUTION

Exercise care to prevent damage to gasket cemented around periphery of panel.

(3) Clean any caulking compound from edges of rear panel and utility truck body.

c. ***Install (Left and Right) Side Mounting Plates, 880524-1 and -2, Plate 880526-1, and Handles on Rear Panel.***

(1) Place side mounting plate 880524-1 (7, figure 3-16, sheet 2) on right side of outer surface of rear panel. Locate side mounting plate so that

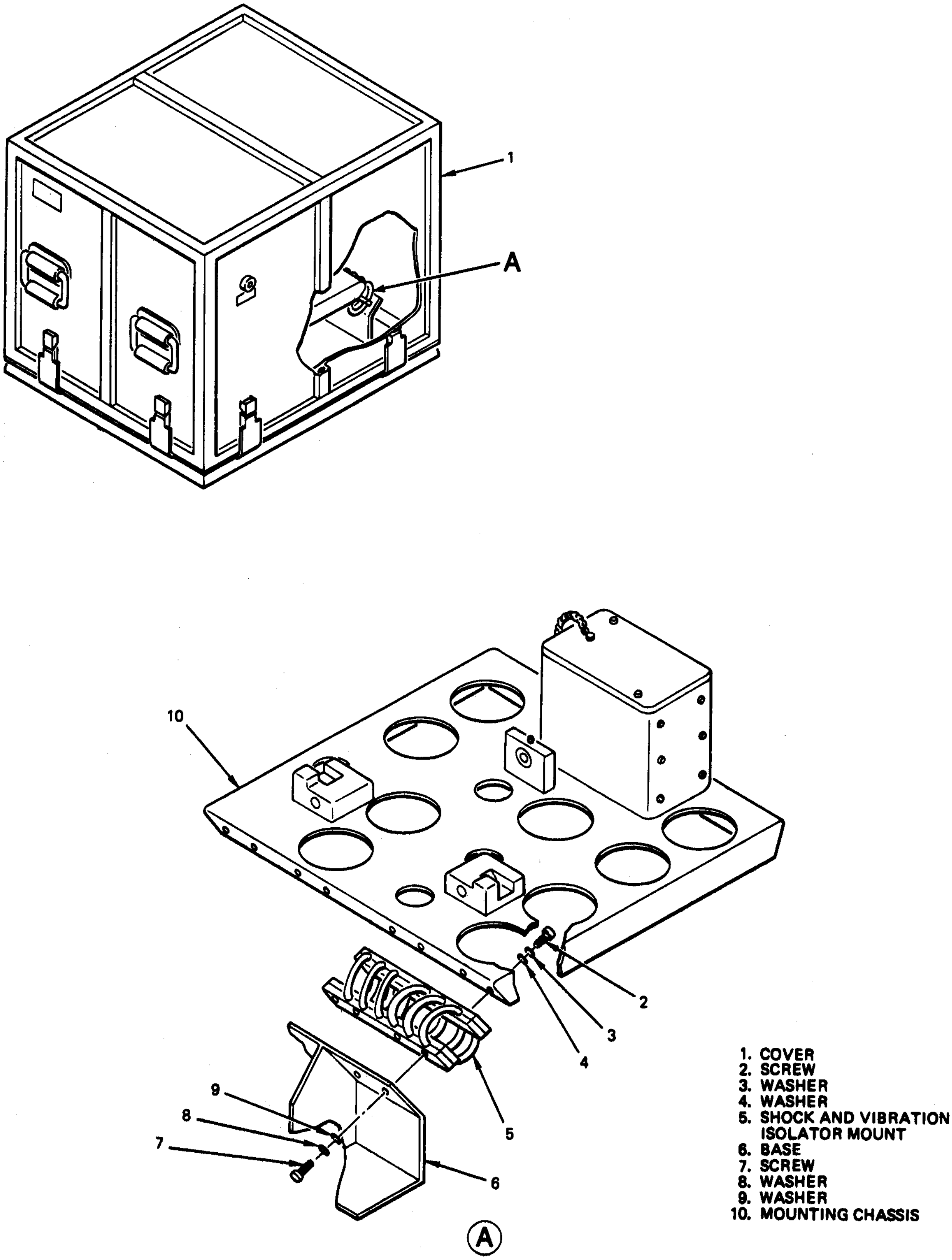


Figure 3-15. IMU Transit Case Exploded View

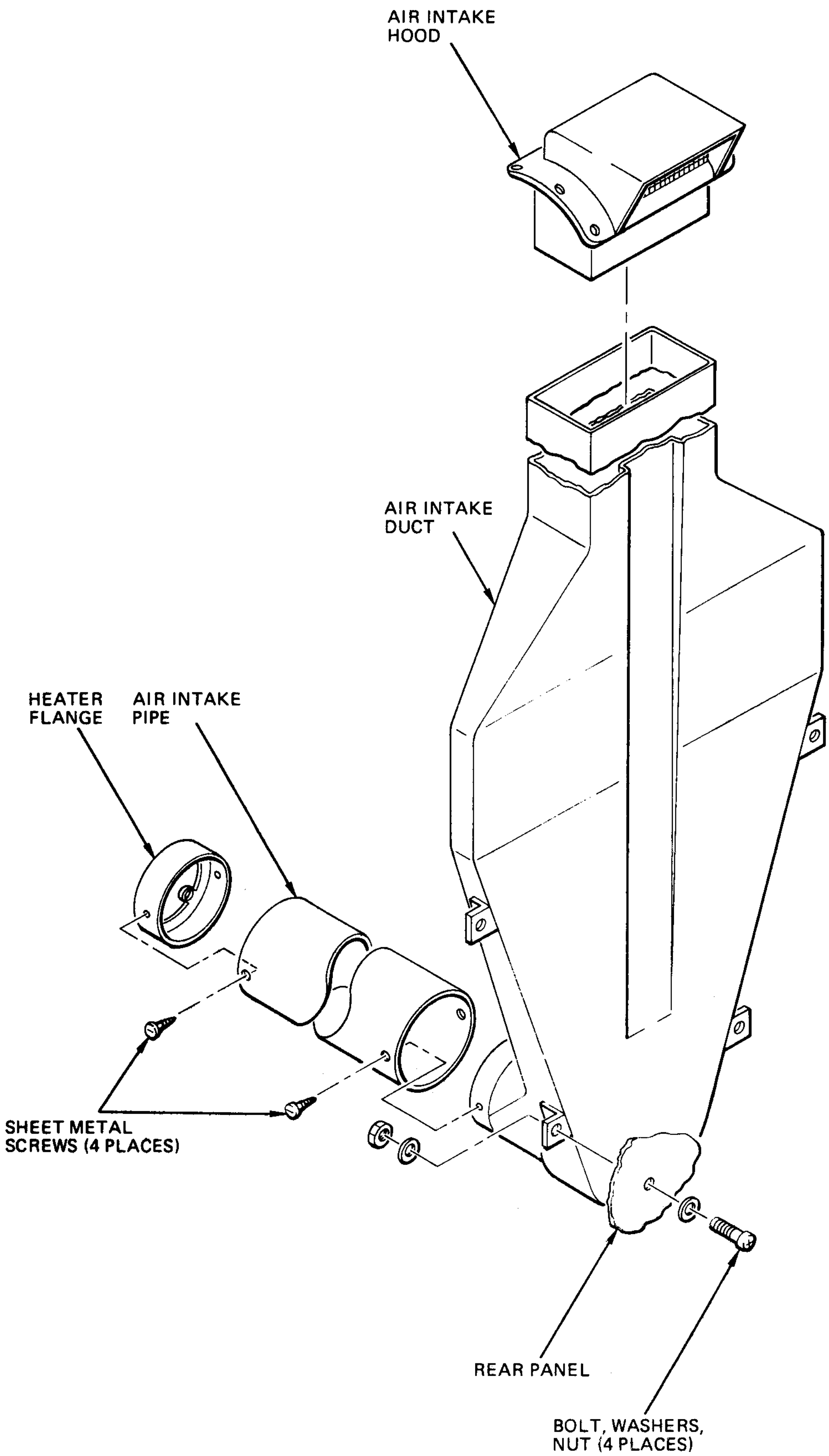
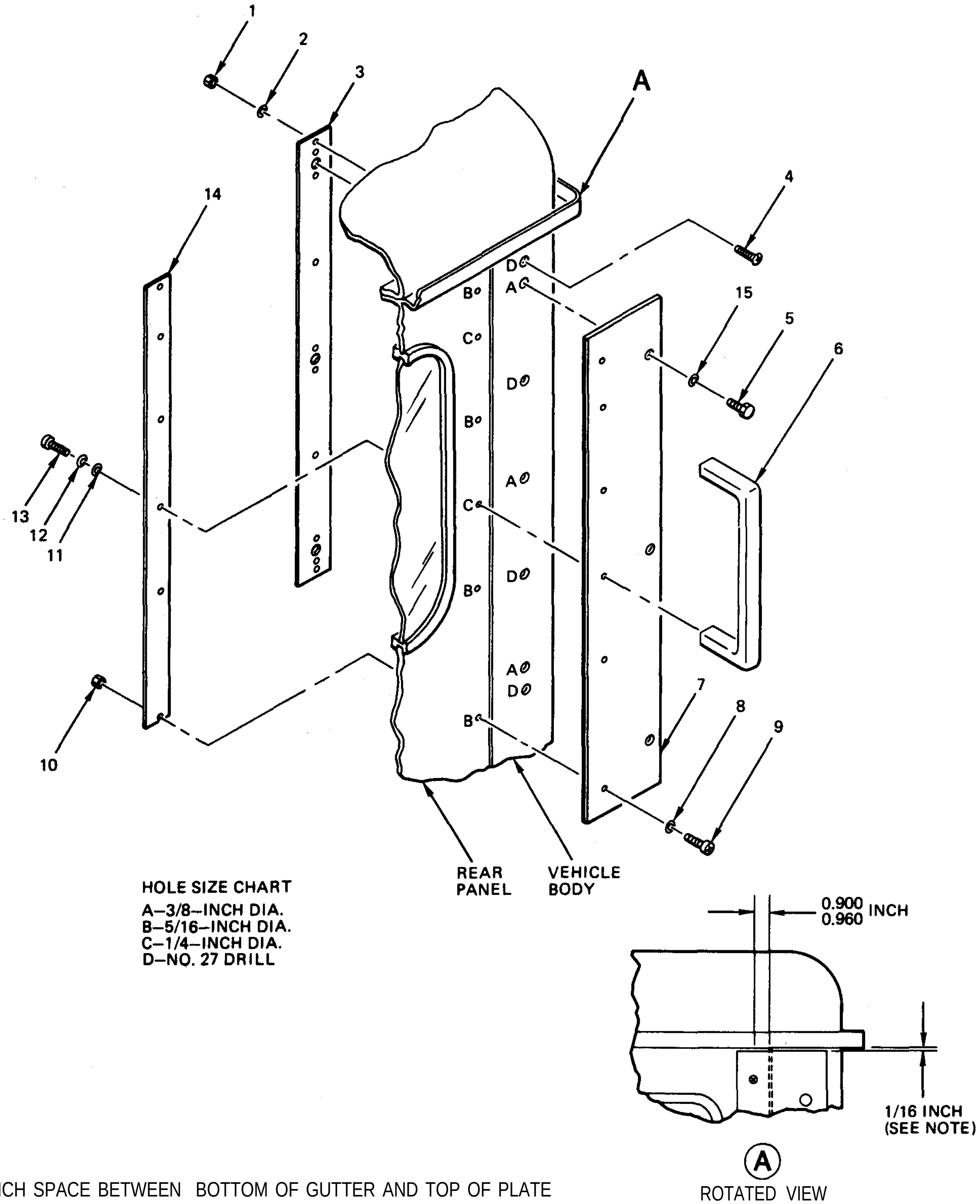


Figure 3-16. Utility Truck Winterization Kit Installation Diagram (Sheet 1 of 9)



NOTE:

1/16-INCH SPACE BETWEEN BOTTOM OF GUTTER AND TOP OF PLATE

Figure 3-16. Utility Truck Winterization Kit Installation Diagram (Sheet 2 of 9)

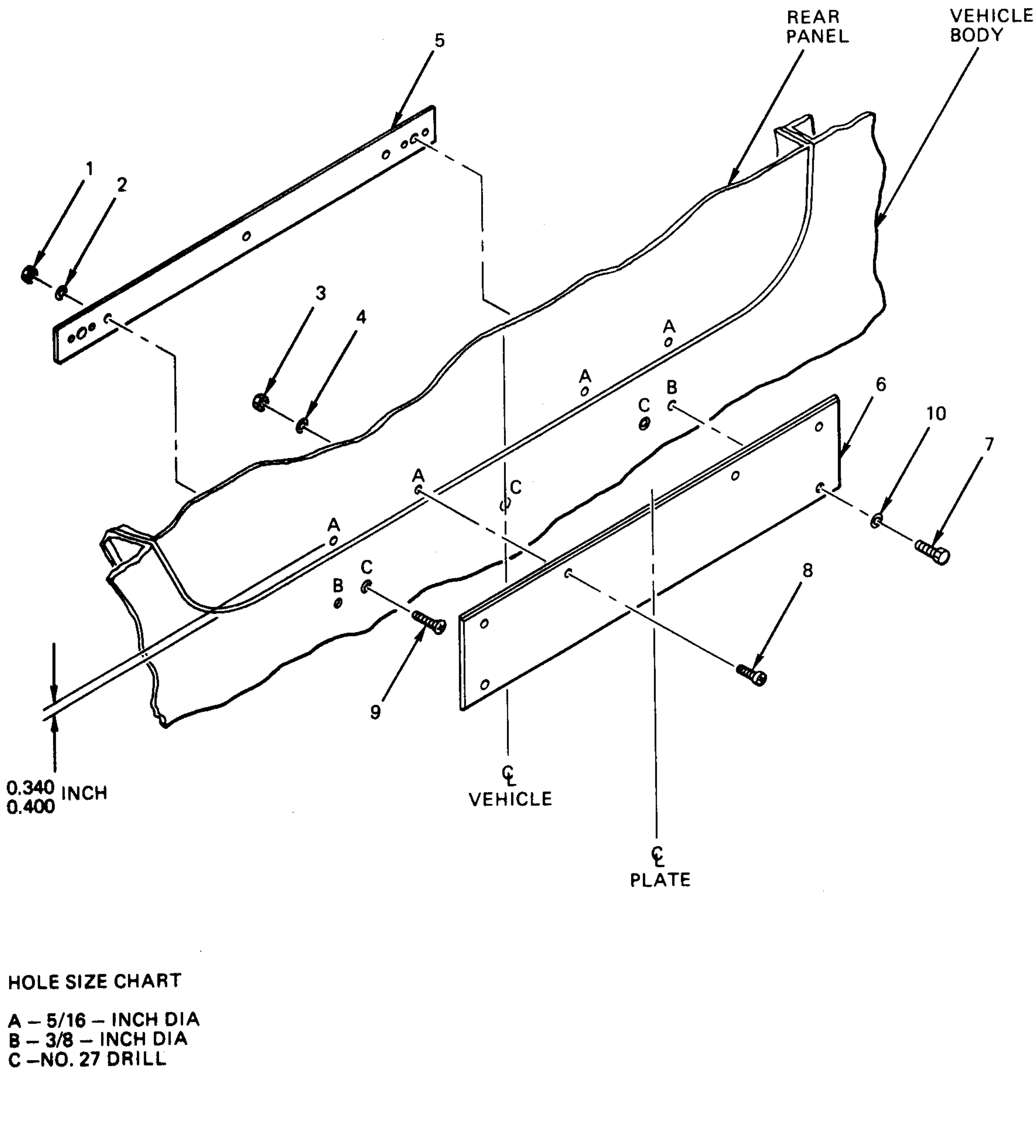


Figure 3-16. Utility Truck Winterization Kit Installation Diagram (Sheet 3 of 9)

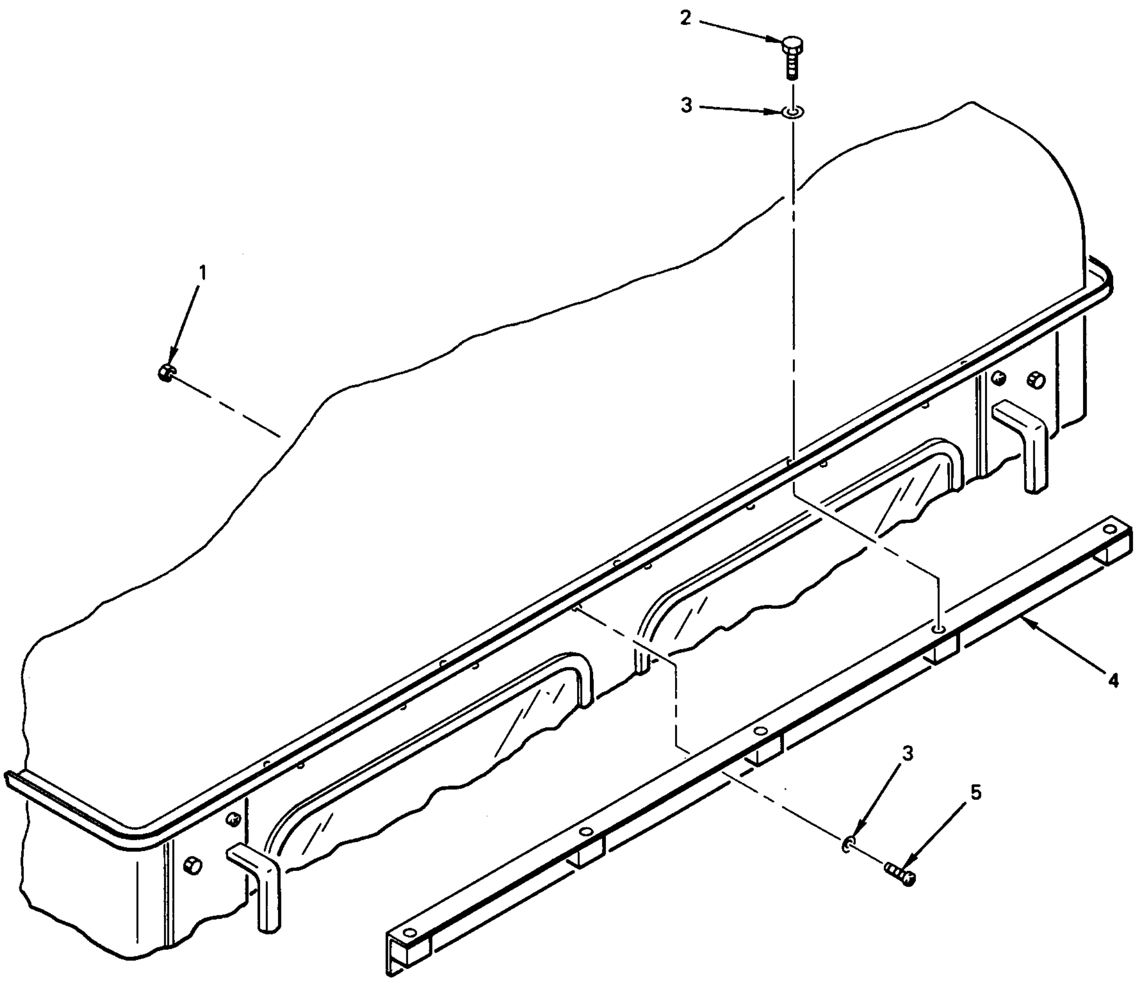


Figure 3-16. Utility Truck Winterization Kit Installation Diagram (Sheet 4 of 9)

Table 4-6. Computer Diagnostic/Alignment Program - Continued

Test procedure	Normal indication	Malfunction indication/corrective action
2b. Press EXECUTE switch-indicator to on	EXECUTE switch-indicator lights TTY prints out: PADS SOLID STATE DIAGNOSTIC ALIGNMENT PROGRAM PROGRAM CHECKSUM XXXXXX SELECT TEST MODE This indicates solid state memory. Select test mode per table 4-7 step 2b, 4-11 step 2d, or 4-14 step 2c. Bypass further loading procedures unless a new program load is required. If a new program load is desired proceed to table 4-6.2 No TTY response This indicates either core memory requiring diagnostic alignment tape loading or solid state memory unloaded. If memory is unknown or core, proceed to step 2c. If memory is solid state, proceed to table 4-6.2	EXECUTE switch-indicator flashes. Replace cards in sequence given: Control no. 3 circuit card assembly A5 I/O discrete circuit card assembly A9 Control no. 2 circuit card assembly A4 Control no. 1 circuit card assembly A3 16-bit data circuit card assembly A2 If incorrect checksum, continue with step 2c
2c. Press EXECUTE switch-indicator to off to halt computer	EXECUTE switch-indicator goes off	EXECUTE switch-indicator remains on Same card replacement as step 2b
2d. Install part 1 (of 2) of PADS diagnostic alignment tape number 877418-X on tape reader. Do not tape program tape to tskeup reel. Manually advance tape beyond readable tape leader		
2e. Set tape reader SPOOLING switch to ENABLE		
2f. Press MEMORY LOAD switch-indicator to on	MEMORY LOAD switch-indicator lights. Tape reader reads first tape section and stops in approximately 1 minute	

Table 4-6. Computer Diagnostic/Alignment Program - Continued

Test procedure	Normal indication	Malfunction indication/corrective action
NOTE Press MEMORY LOAD switch-indicator off and back on if a stop code is reached prior to tape data beii loaded		
2g. Press MEMORY LOAD switch-indicator to off	MEMORY LOAD switch-indicator goes off	
2h. Press VERIFY switch-indicator to on to check next tape section against memory contents. (First two tape sections are identical)	VERIFY switch-indicator lights. Tape reader reads next tape section and stops in approximately 1 minute	VERIFY ERROR switch-indicator lights and tape reader stops during read indicating improper memory load or memory failure

Table 4-6. Computer Diagnostic/Alignment Program — Continued

Test procedure	Normal indication	Malfunction indication/ corrective action
		Press verify switch-indicator to off. Press PADS ON/OFF and ENTER switch-indicators to turn computer off. Check tape reader and tape for dirt. Clean as required. (Rewind tape and repeat test from beginning before proceeding)
NOTE Press VERIFY switch-indicator off and back on if a stop code is reached prior to tape data being verified.		Replace cards in sequence given and reattempt memory load after each card replacement Memory unit Al 16-bit data circuit card assembly A2 Control no. 2 circuit card assembly A4 Control no. 3 circuit card assembly A5 Control no. 1 circuit card assembly A3
2i. Press VERIFY switch-indicator to off	VERIFY extinguishes	
2j. Press EXECUTE switch-indicator to on to start diagnostic program no. 1	EXECUTE switch-indicator lights TTY prints out: PADS CPU TEST, TYPE CHARACTER SET (carriage return) NOTE The above printout indicates memory type is core. Continue with diagnostic program load, step 2k. TTY prints out: PADS SOLID STATE CPU TEST, TYPE CHARACTER SET (carriage return) **NOTE** The above printout indicates memory type is solid state. Continue with diagnostic program load step 2k.	1. EXECUTE switch-indicator flashes. Same card replacement as step 2b 2. No or incorrect print-out. Verify TTY is on. Repeat steps 2c through 2j. If the second attempt gives the same results, replace cards in sequence given: 16-bit data circuit card assembly A2 Control no. 2 circuit card assembly A4 Control no. 3 circuit card assembly A5 Control no. 1 circuit card assembly A3 Memory unit Al

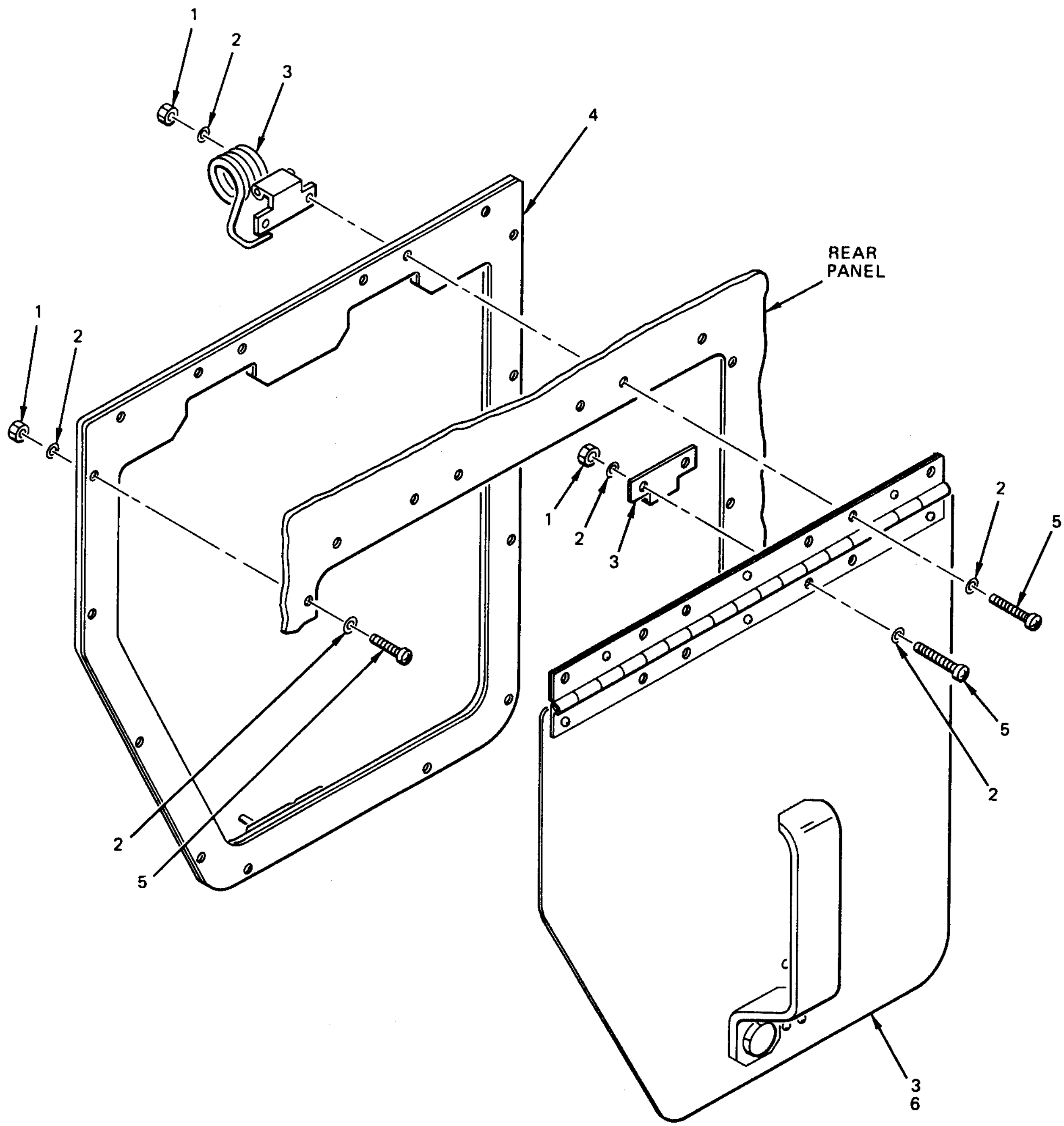


Figure 3-16. Utility Truck Winterization Kit Installation Diagram (Sheet 6 of 9)

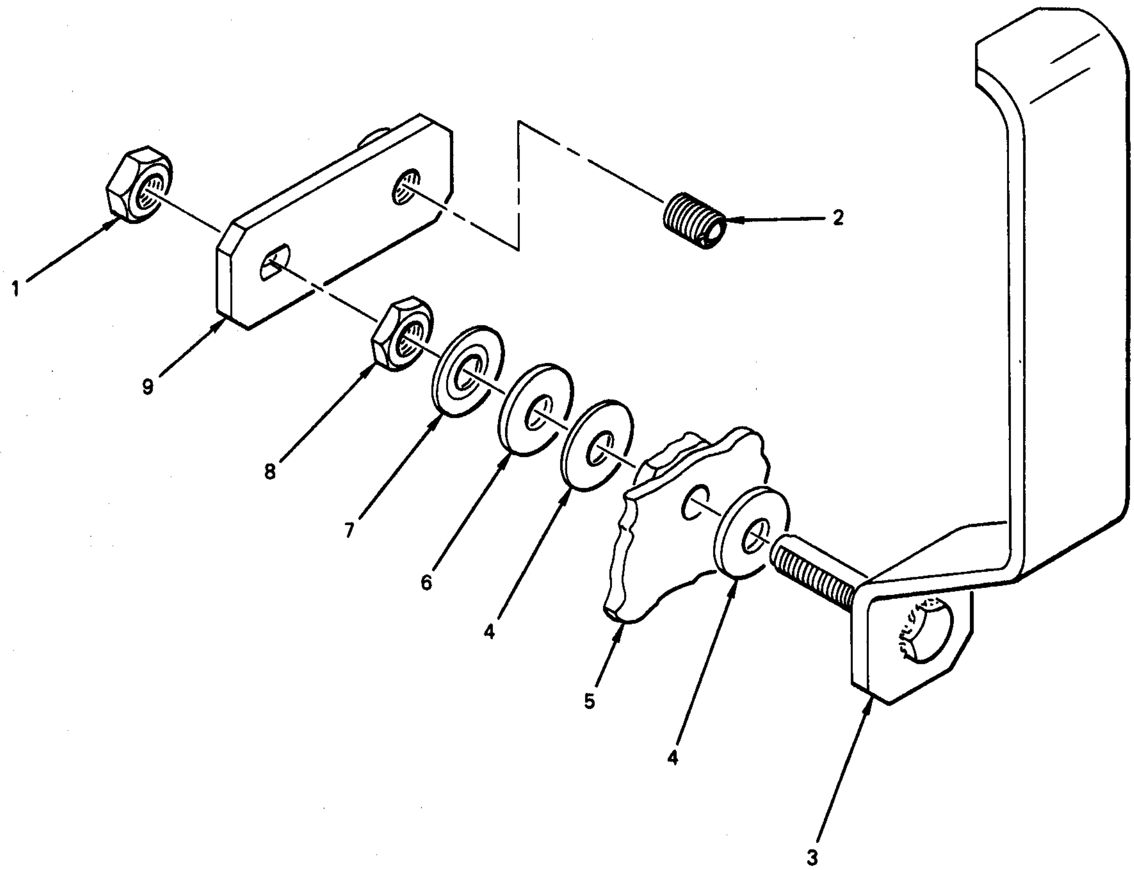
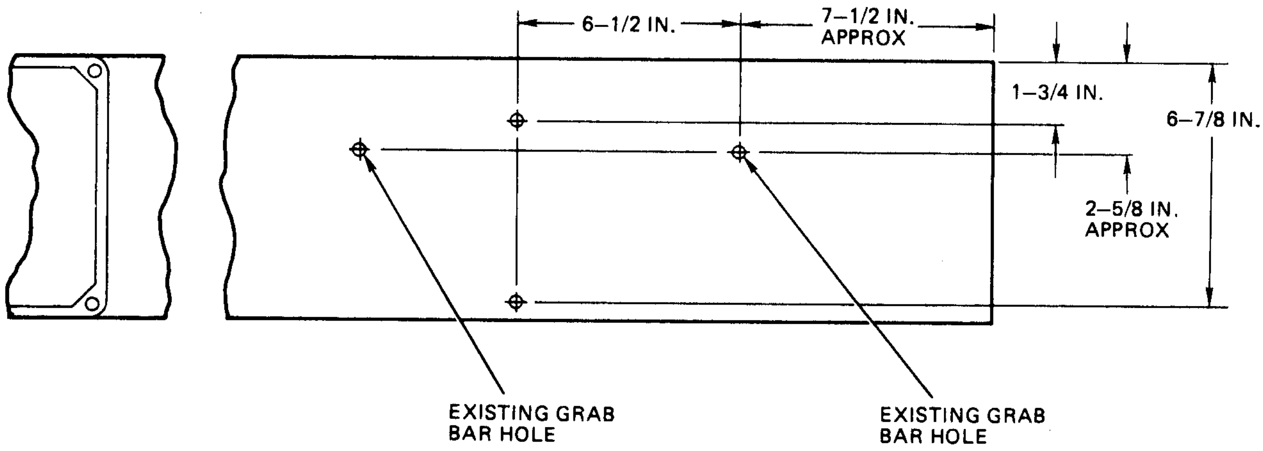
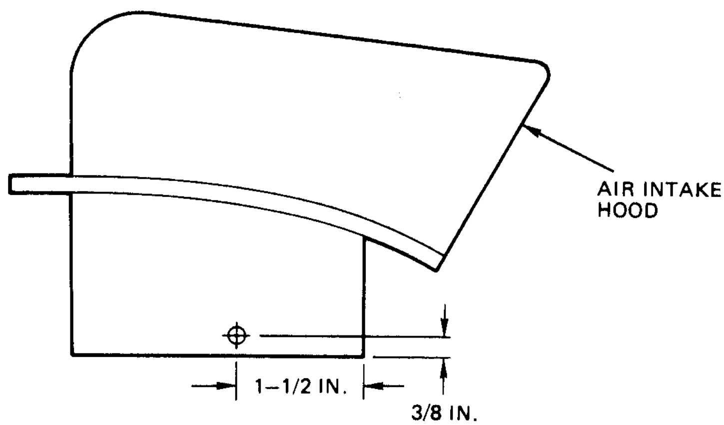


Figure 3-16. Utility Truck Winterization Kit Installation Diagram (Sheet 7 of 9)





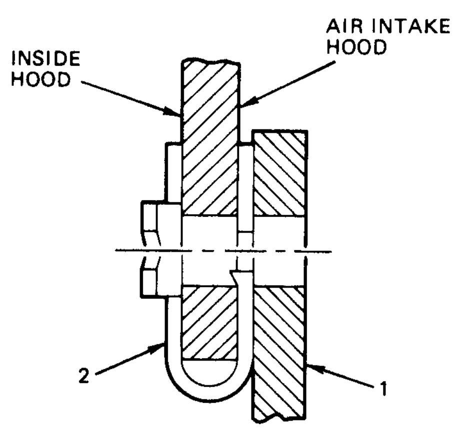


Figure 3-16. Utility Truck Winterization Kit Installation Diagram (Sheet 8 of 9)

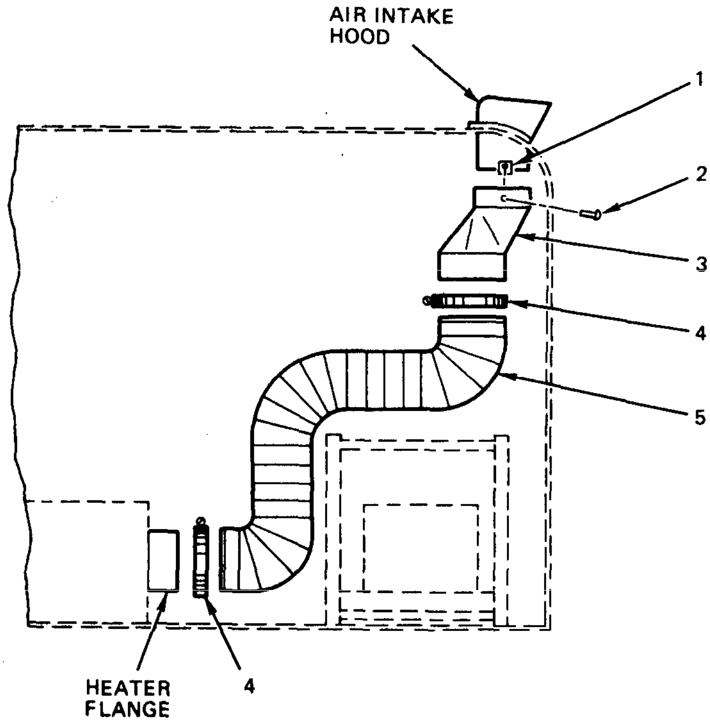


Figure 3-16. Utility Truck Winterization Kit Installation Diagram (Sheet 9 of 9)

centerline of the six screw holes (four 5/18-inch diameter holes and two 1/4-inch diameter holes) are aligned within 0.900 to 0.960 inch from outboard edge of rear panel. Locate top edge of side mounting plate 1/16 inch below top edge of rear panel.

(2) Using side mounting plate as a template, center punch the screw hole locations in rear panel, Remove side mounting plate.

(3) Drill the screw holes through rear panel to the diameters shown in figure 3-16, sheet 2. Use l/4-inch and 5/M-inch drills, as applicable.

(4) Place mounting plate 880528-1 (14) on inner surface of rear panel and side mounting plate 880524-1 (7) on outer surface of rear panel.

(5) Align the screw holes in the plates with the screw holes in rear panel.

(6) Install the four 1/4-28 X 3/4-inch screws (9), washers (8) and locknuts (10) and tighten.

(7) Place handle (6) in position on side mounting plate and secure with two 10-32 X 3/4-inch screws (13), lockwashers (12), and washers (11).

(8) Repeat steps (1) through (7) for left side using 880524-2 side mounting plate.

d. ***Install Bottom Plate 88052S (6, figure 3-16, sheet 3) on Rear Panel.***

(1) Locate centerline of rear panel near its bottom edge and mark location.

(2) Place top of plate (6) parallel to bottom edge of rear panel.

(3) Center the bottom plate about the centerline of the rear panel and locate centerline of the top screw holes 0.340 to 0.400 inch from rear panel bottom edge.

(4) Using bottom plate (6) as a template, center punch the four top screw holes. Remove bottom plate.

(5) Drill four 5/16-inch screw holes through rear panel.

(6) Install four 1/4-28 X 3/4-inch screws (8), flat washers (4), and locknuts (3) and secure bottom plate to rear panel.

e. ***Install Angle Bracket 880523 (4, figure 3-16, sheet 4).***

(1) Place angle bracket (4) at top of rear panel. Align top of 3/4-inch lip even with top edge of rear panel and edges of 1 1/4-inch lip equidistant between inner edges of left and

Legend for figure 3-16, sheet 6

Item No.	Description	Part No.
1.	Nut	MS21083C08
2.	Washer	MS15795-807
3.	Spring	880520-98
4.	Door frame	80522-1
5.	Screw 8-32 x 3/4-inch	MS51957-47
6.	Porro prism door	880521-1

Legend for figure 3-16, sheet 7

Item No.	Description	Part No.
1.	Locknut 1 /2-20	MS21083C8
2.	Plunger ball	952089-19
3.	Handle	880544-1
4.	Nylon washer 1/2-inch	MS51859-10
5.	Door	880521-1
6.	Washer 1/2-inch	MS I 5795-818
7.	Spring washer	952066-15
8.	Jam nut 1 /2-20	NAS1423C8
9.	Pawl	880543-1

Legend for figure 3-16, sheet 8

Item No.	Description	Part No.
1.	Air pipe	880546-1
2.	Tinnerman nut	MS90724-42

Legend for figure 3-16, sheet 9

Item No.	Description	Part No.
1.	Tinnerman nut	MS90724-42
2.	Sheet metal screw	MS51861-66C
3.	Air pipe	880546-1
4.	Clamp	MS35842-16
5.	Flex hose	951495-1

right side mounting plates. Hold 1 1/4-inch lip flat against rear panel.

(2) CenterPunch the eight screw hole locations in the middle of the slots in the rear panel.

(3) Drill the eight 5/16-inch screw holes in rear panel,

(4) Place angle bracket against rear panel and align screw holes,

(5) Secure angle bracket to rear panel usin eight 1/4-28 X 3/4-inch screws (5), washers (3), and locknuts (l).

f. Place rear panel in vehicle body and place the side mounting plates and bottom plate snugly against vehicle body.

g. Using side and bottom plates as templates, locate and centerpunch the outer screw hole locations (three on each side and two on bottom) in. vehicle body,

h. Loosen the eight screws in angle bracket and butt the 3/4-inch lip against bottom of vehicle gutter. Tighten the screws sufficiently to maintain this position.

i. Using the angle bracket as a template, mark centerline of the five inserts on the gutter. Centerpunch these locations.

j. Remove rear panel.

k. Drill the five 5/16-inch screw holes marked in gutter.

l. ***Install Nutplates 880541-1 (3, figure 3-16, sheet 2) and Nutplate 880542-1 (5, figure 3-16, sheet 3).***

(1) Drill the 3/8-inch screw holes marked in each side of vehicle body,

(2) Drill the 3/8-inch screw holes marked in lower portion of vehicle body.

(3) Place left and right nutplates 880541-1 (3, figure 3-16, sheet 2) on inside of vehicle body, Align nuts with the 3/8-inch screw holes drilled in vehicle body.

(4) Install two 5/16-24 X 3/4-inch screws (5) and secure each nutplate to vehicle body.

(5) Using nutplates as templates, centerpunch 4-40 screw hole locations in vehicle body.

(6) Remove the two 5/16-inch screws securing each nutplate; remove nut plates.

(7) Drill (no. 27) the four 4-40 screw holes (each side) through vehicle body.

(8) From exterior of vehicle, countersink the screw holes 100° x 0.225-inch diameter (width of screw head).

(9) Place nutplates (3) in position and secure each nutplate with four 4-40 x 7/16-inch screws (4), washers (2), and locknuts (l).

(10) Place nutplate 880542-1 (5, figure 3-16, sheet 3) in position on lower inner surface of vehicle body.

(11) Install two 5/16-24 X 3/4-inch screws (7) and secure nutplate to vehicle body.

(12) Using nutplate as a template, center-punch the three 4-40 screw hole locations in vehicle body.

(13) Remove the two 5/16-inch screws and remove nutplate.

(14) Drill (no. 27) the three 4-40 screw holes through vehicle body.

(15) From exterior of vehicle, countersink the screw holes 100° x 0.225-inch diameter (width of screw head).

(16) Place nutplate (5) in position and secure with three 4-40 x 7/16-inch screws (9), washers (2), and locknuts (l).

m. ***Cut Out Hole In Rear Panel for Porro Prism Door Installation (See-figure 3-16, sheet 5).***

(1) Using figure 3-16, sheet 5, locate dimemsion and cut out lines. Begin datum line -A- 0.450 – 0.490 inches from edge of vertical hat section. This line establishes vertical edge.

(2) Begin datum line -B- 0.970 – 1.02 inches from edge of horizontal hat section. This line establishes horizontal edge.

(3) Mark cutout lines and radii on rear panel and make cutout maintaining these lines and radii.

(4) Mark horizontal line 0.500 inch from top of cutout (datum -B-). Extend this line from one vertical edge to the other.

(5) Locate centerpoint of six screw holes along this line to the dimensions shown in figure 3-16, sheet 5, keeping the holes symmetrical about the cutout. CenterPunch the screw holes.

(6) Drill the six 7/32-inch top screw holes.

n. ***Drill Holes for Door Fmme Attachment (See figure 3-16, sheets 5 and 6).***

(1) Place door frame 880522-1 on inner surface o rear panel where cutout was made.

(2) Align the six top screw holes with holes drilled in rear panel and temporarily install 8-32 x 3/4-inch screws, washers, and nuts to door frame (4) to rear panel. Adjust door.

frame so that the same amount of frame (approximately 0.5-inch) is viable on both left and right side of cutout.

(3) Using door frame as template, locate and centerpunch the ten side die and bottom screw holes. Remove the six 8-32 screws, washers, and nuts; remove door frame.

(4) Drill the ten 3/16-inch screw holes.

o. ***Install Door Frame 880522-1 (4, figure 3-16, sheet 6).***

(1) Place door frame (4) in position and align the screw holes with holes in rear panel.

(2) Install the ten side and bottom 8-32 X 3/4-inch screws (5), washers (2), and nuts (l).

NOTE

The six top screws are installed when door is installed.

p. ***Install Porro Prism Door 880521-1 (6, figure 3-16, sheet 6).***

(1) Place porro prism door (6) against outer surface of rear panel and align top screw holes in door hinge with screw holes in rear panel.

(2) Install 8-32 X 3/4-inch screws (5), washers (2), and nuts (1) in each corner location.

(3) Attach the four spring retainers (3) to upper and lower hin e halves usin four 8-32 X 3/4-inch screws (5), washers (2), and nuts (l). Engage springs (3) in spring retainers before tightening the screws.

q. ***Install Latching Mechanism on Door (See figure 3-16, sheet 7).***

(1) Slide l/2-inch nylon washer (4) onto bolt of door handle (3).

(2) Insert door handle bolt through door (5) and butt nylon washer against door panel.

(3) Slide 1/2-inch nylon washer (4) onto door handle bolt and butt against doubler on back side of door panel.

(4) Slide 1/2-inch washer (6) onto door handle bolt and butt against nylon washer.

(5) Slide spring washer (7) onto door handle bolt and butt against washer (hollow side against washer).

(6) Install 1/2-20 jamnut (8) on door handle bolt and butt against spring washer. Tighten jamnut only until handle operates smoothly.

(7) Install plunger ball (2) in pawl (9) and tighten.

(8) Place pawl (9) onto door handle bolt and butt against jamnut.

(9) Install 1/2-inch locknut (1) on door handle bolt.

(10) Close door and make sure that it closes securely, Adjust plunger ball (2) as required.

r. ***Install Air Pipe 880546 (Transition Joint) and Flex Hose 880520-59 (See figure 3-16, sheets 8 and 9).***

(1) Mark and drill 1/4-inch diameter holes in both sides of the air intake hood as shown in figure 3-16, sheet 8.

(2) Slide two Tinnerman nuts (2) over the hole drilled in air intake hood. Make sure the smooth side faces outside the hood.

(3) Slide the air pipe (1) over the air intake hood and secure with two sheet-metal screws (2, figure 3-16, sheet 9).

(4) Slide the two clamps (4) onto the flex hose (5) and sli the hose over the heater flange and air pipe (3) base.

(5) Route the flex hose (5) to clear installed equipment and tighten clamps.

s. ***CDU Mounting Bracket Installation.*** Drill holes for CDU mounting bracket on dashboard as follows:

(1) Remove passenger grab bar from dashboard.

(2) Using sheet 8 of figure 3-16 as a guide, mark mounting hole locations on dashboard.

(3) Center punch and drill two 5/16-inch diameter holes through dashboard. If vehicle does not have holes for a grab bar, drill the right grab bar hole also.

(4) Secure mounting hardware (three 10-32 screws, lockwashers, washers, and nuts) to the dashboard for later use by the PADS crew.

t. *Install Rear Panel in Vehicle.* Install rear panel as follows:

(1) Place rear panel in position in vehicle.

(2) Install the five 1/4-20 X l/2-inch cap screws and washers securing angle bracket to vehicle rain gutter. Tighten the screws.

(3) Install three 5/16-24 X 3/4-inch screws and washers on each side and secure side mounting plates to vehicle body.

(4) Install two 5/16-24 X 3/4-inch screws and washers and secure bottom plate to vehicle body.

u. ***Removal of Rear Panel After Installation of Winterization Kit.***

(1) Remove the five cap screws and washers securing angle bracket to vehicle gutter. Retain for future use.

(2) Remove the screws and washers securing side mounting and bottom plates to vehicle body: remove rear panel. Retain the screws for future use.

3-25. **Modification of OH-58C Helicopter Pallet.** The OH-58C helicopter pallet must be modified before the PADS can be installed in the helicopter. The modification consists of drilling four new holes and installing four sleeves and plugs. Sce figure 3-17 and modify the OH-58C helicopter as follows:

a. Drill four new holes in pallet locations shown in figure 3-17, Hole diameter is shown in figure 3-17.

b. Install sleeves and plugs in new holes. Sleeves and plugs from existing holes in pallet can be **used.**

3-26. Modification of Commercial Utility Cargo Vehicle (CUCV), Series M1OO9. The CUCV must be modified before the PADS can be installed in the vehicle. The modification consists of drilling three holes in the vehicle firewall to allow power cable W7 to be routed through for connection to terminal boxes mounted in the engine compartment. See figure 3-18 and modify the vehicle as follows:

a. Cut through insulation and backing to the vehicle firewall to the approximate dimensions shown in figure 3-18.

b. Drill three holes through the vehicle firewall where shown in figure 3-18, using a l/2-inch electric drill and a l-inch diameter hole cutter. Install rubber grommets in new holes.

3-27. Modification of High-Mobility Multi-Purpose Wheeled Vehicle (HMMWV), Series M998. "The HMMWV must be modified before the PADS can be installed in the vehicle. The modification consists of drilling two holes in the vehicle transmission tunnel to allow power cable W7 to be routed to the vehicle battery compartment. See figure 3-19 and modify the vehicle as follows:

a. Locate and mark the two holes, centered in the flat area of the transmission tunnel adjacent to the existing radio cable and grommet. Space the holes as shown in figure 3-19.

b. Drill two holes using a V2-inch electric drill and a l-inch hole cutter. Install rubber grommets in new holes.

3-28. Modification of Subfloor Plate. The subfloor plate must be modified before it can be mounted in the HMMWV for pads installation. The modification consists of drilling two holes, located as shown in figure 3-20. Use a l/2-inch electric drill and a 7/16-inch drill bit.

3-29. **Modification of Small Utility Support Vehicle (SUSV), Series M973.** The SUSV must be modified before the PADS can be installed in the vehicle. The modification consists of drilling a hole through the inner vehicle body for insertion of the battery vent tubing and modification of the vehicle wiring harness, proceed as follows:

a. At right rear of vehicle, using a pencil and a scale from shop supplies, extend a line from bottom edge of the seat belt bracket forward 2.00 inches. Mark with an X. See figure 3-21.

b. Using a ½-inch electric drill and a 9/32-inch diameter bit, drill a hole through the inner vehicle body at the marked point. The hole is for the battery vent tubing.

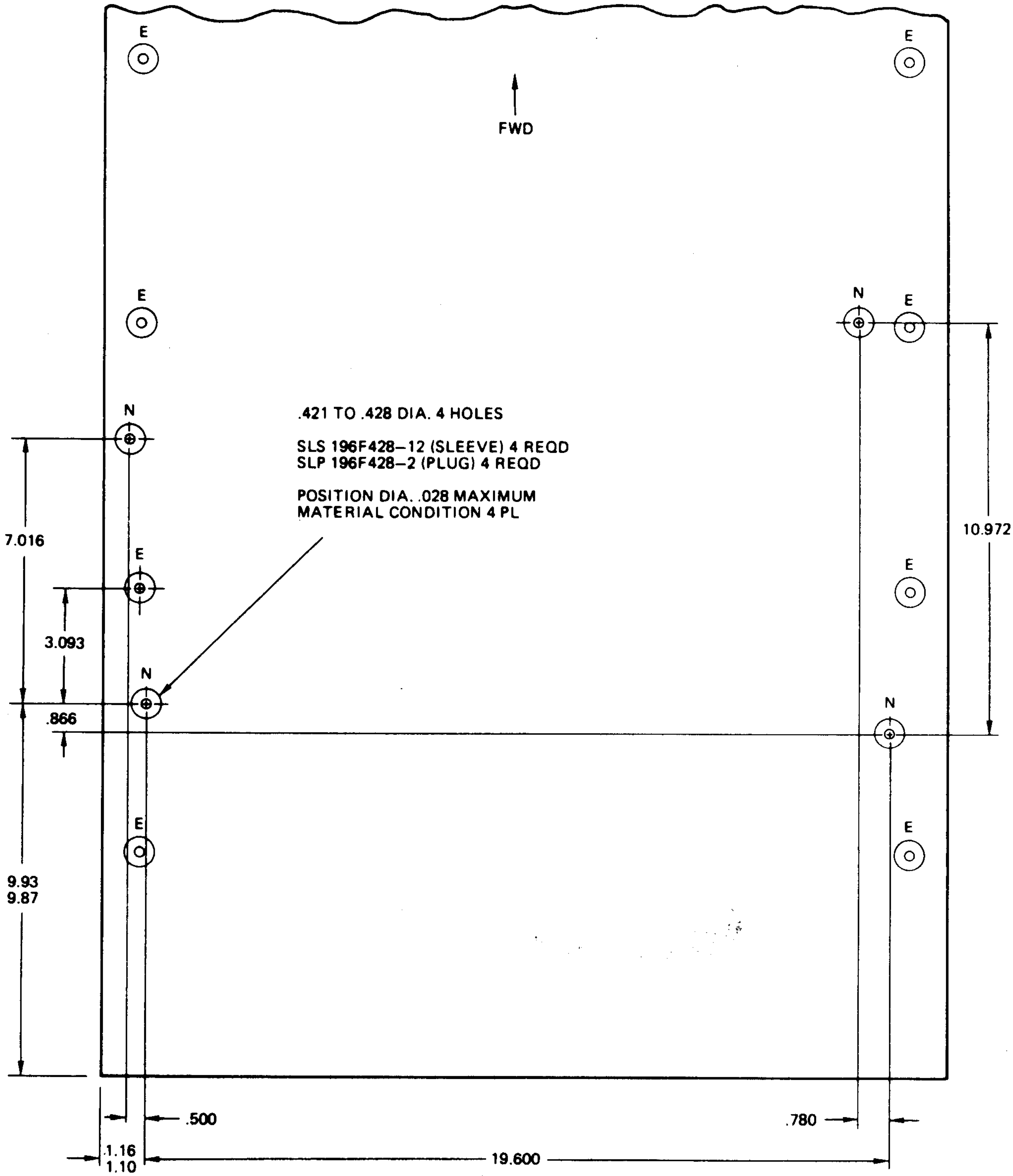
c. At left rear of vehicle, using shop knife, cut plastic tie wraps holding the harness that contains connector P42 to the negative battery terminal.

d, Loosen clamp located behind the battery to free. connector P42.

e. Locate wire no, 8K in connector P42, male pin 2.

f. Using a pair of wire cutters, cut wire no. 8K about 3 inches from connector P42. Strip both cut ends about 1/4 inch, using wire strippers.

g. Obtain cable assembly 97403-13222E2492 and splice from installation kit. Splice cable assembly to wire no. 8K as shown in figure 3-22. Crimp both ends of splice.



NOTE:

1. N DENOTES NEW INSERT
2. E DENOTES EXISTING INSERT
3. ALL DIMENSIONS ARE IN INCHES

Figure 3-17. Modification of OH-58C Helicopter Pallet

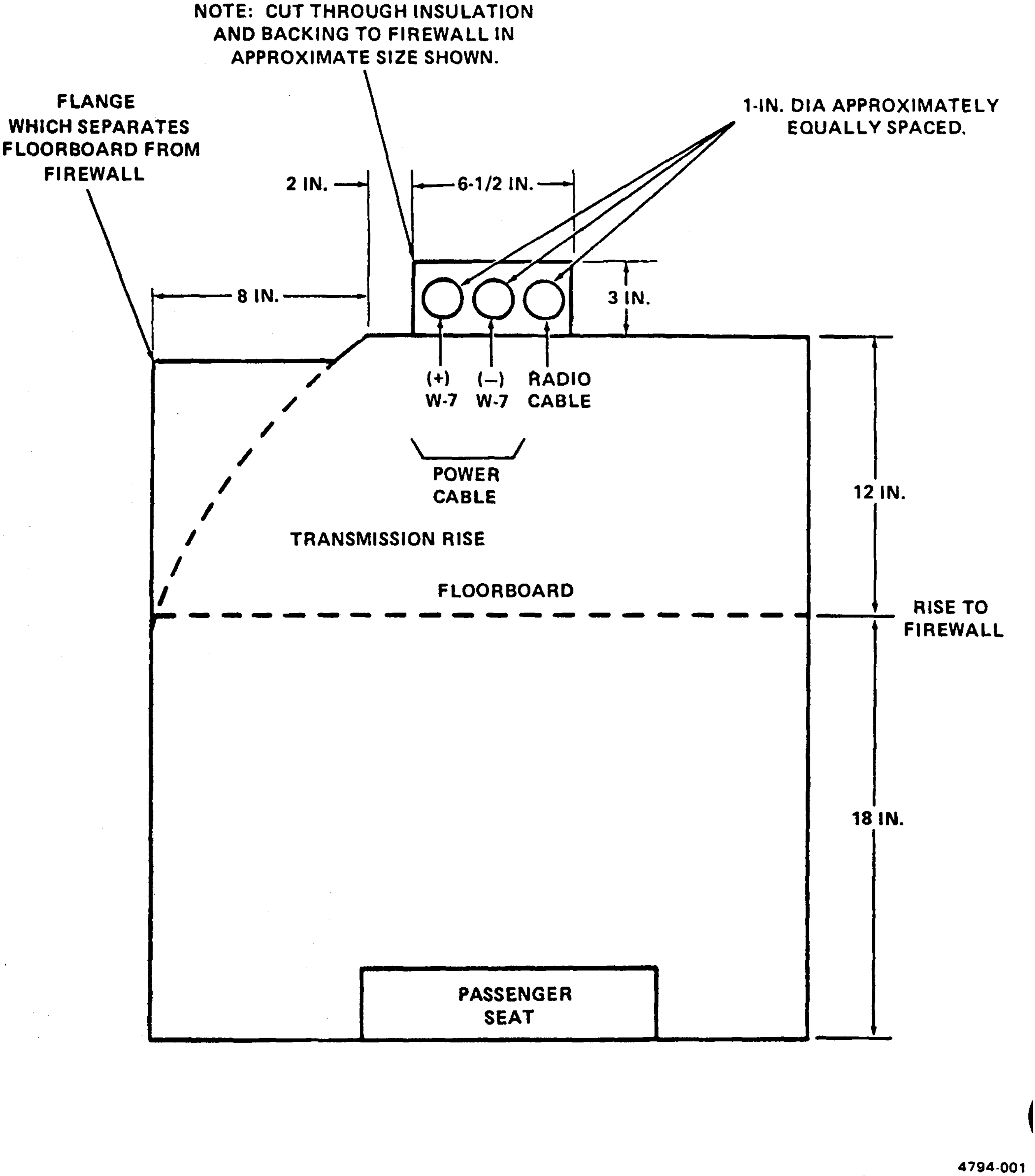


Figure 3-18. Installation of Cables Holes in CUCV Firewall

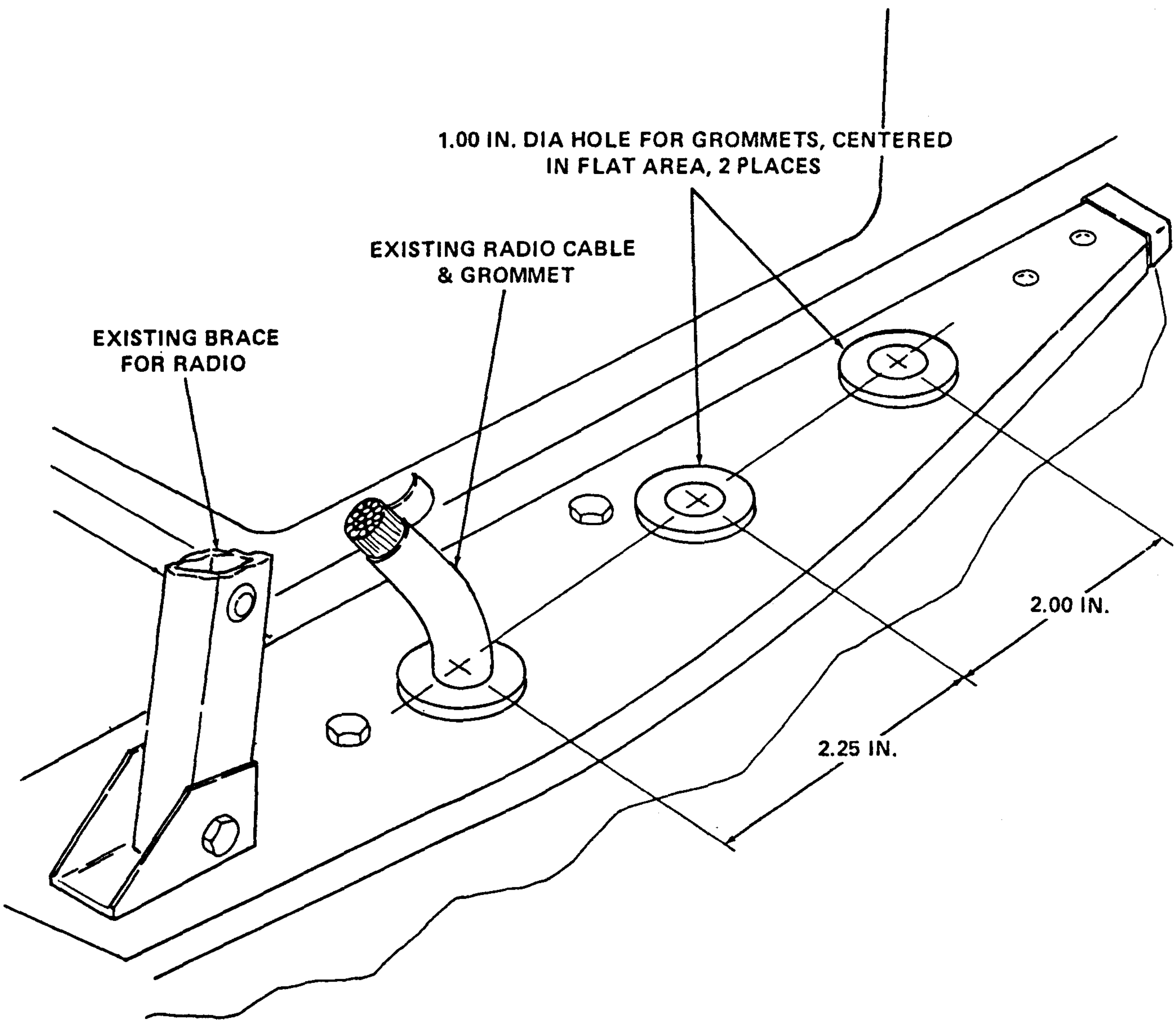


Figure 3-19. Installation of Cables Holes in HMMWV Transmission Tunnel

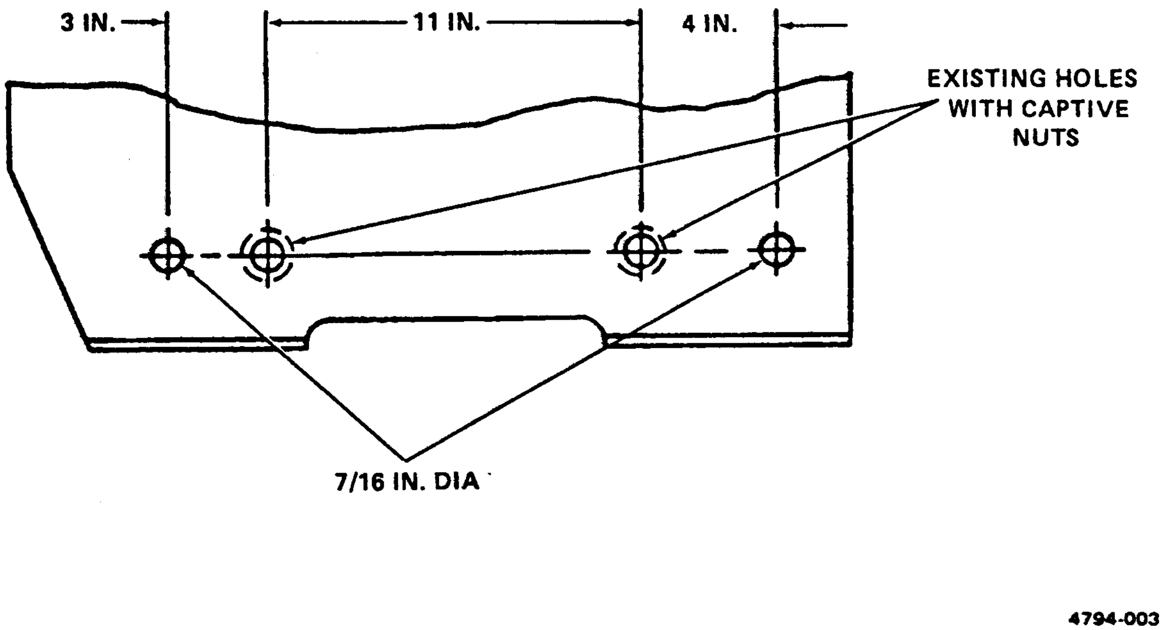


Figure 3-20. Modification of Subfloor Plate

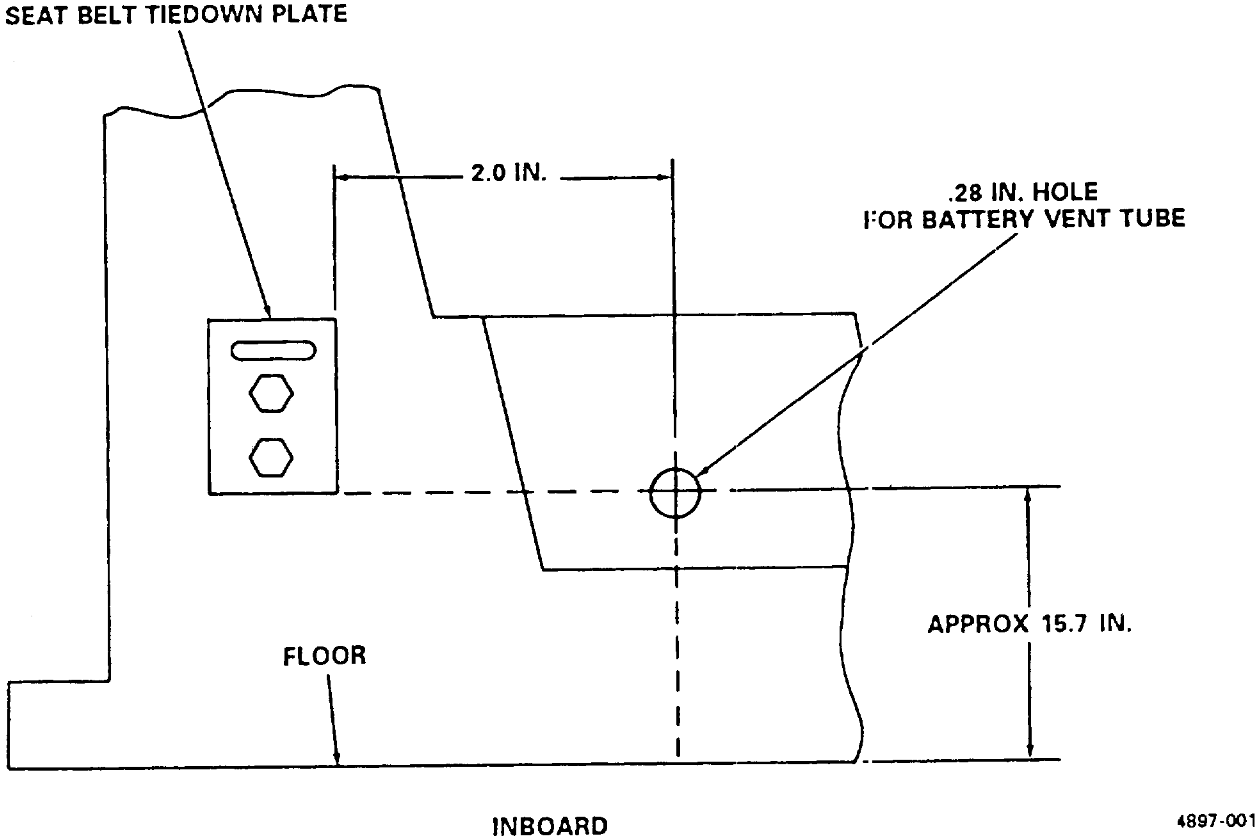


Figure 3-21. Locating Battery Vent Tube Hole

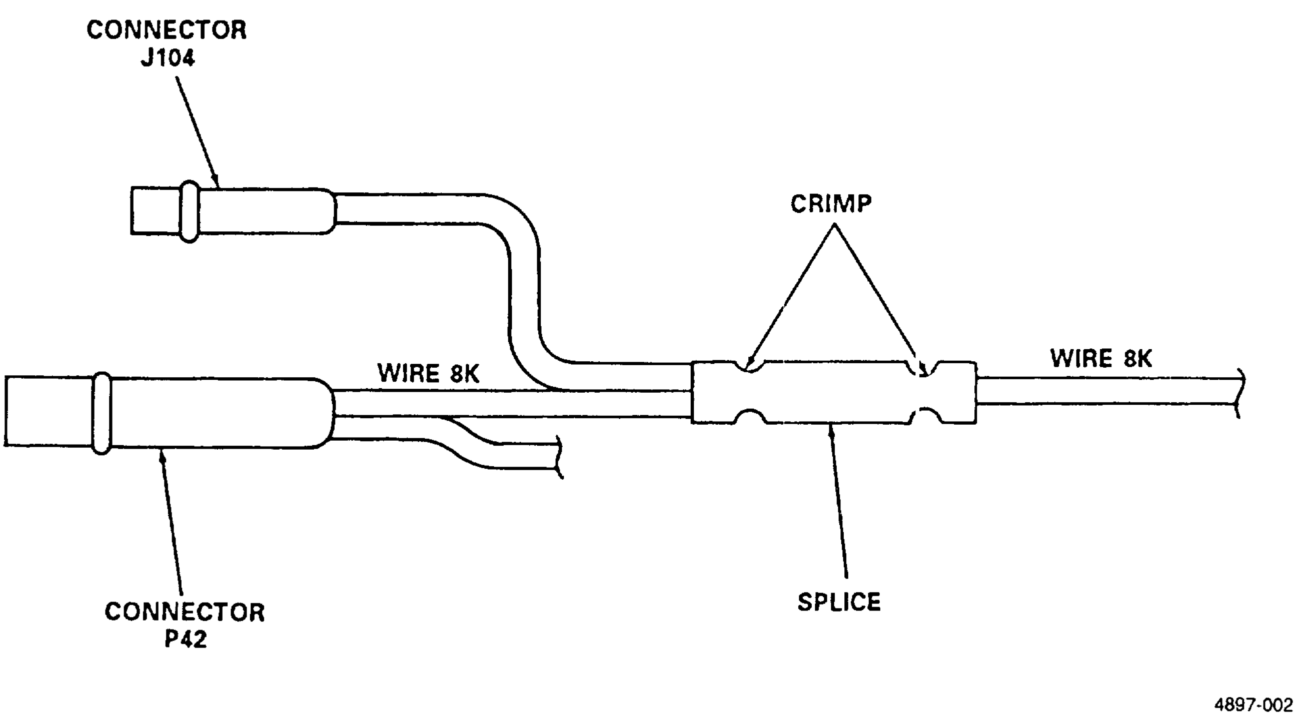


Figure 3-22. SUSV Wiring Harness Modification

Section V. DIRECT SUPPORT TESTING PROCEDURES

3-30. General. Direct support testing procedures are given in table 3-1.

3-31. Performance Standards. To be returned to service, a PADS must:

a. Be complete.

b. Pass the test of table 3-1 with no malfunction.

c. Have no visually observed physical defects which may prevent normal operation or allow water to enter a unit.

d. Have no corrosion inside any units which were opened.

c. Have no defective gaskets in any units which were opened.

f. Have covers torqued to the specified values on any units which were opened.

g. Have a smooth, shiny mirror finish on at least 80 percent of the porro prism surface area.

CHAPTER 4

GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

Section 1. GENERAL

4-1. Scope. This section describes bench testing of the computer, computer power supply, CDU, and power supply.

4-2. Computer Bench Testing. Bench testing of the computer consists of performing continuity checks when broken or shorted wires are suspected of causing a failure during performance of the self-test procedure. A computer wire list (table 4-1) is provided for bench testing. Refer to paragraph 4-6 for an explanation of wire list format and notations. Figure 4-1 identifies connector pins and terminal points on the computer.

4-3 Computer Power Supply Bench Testing. Bench testing of the computer power supply consists of performing continuity checks when broken or shorted wires are suspected of causing a failure during performance of the self-test procedure. A schematic diagram of the computer power supply (figure FO-5) and wiring data (figure 4-16 and table 4-20) are provided for bench testing.

4-4. CDU Bench Testing. Bench testing of the CDU consists of performing continuity checks when broken or shorted wires or failing switch or relay contacts are suspected of causing a failure during performance of the self-test procedure. A CDU wire list (table 4-2) is provided for bench testing. Refer to paragraph 4-6 for an explanation of wire list format and notations. Figure 4-2 identifies CDU connector pins and terminal points.

4-5. Power Supply Bench Testing. Bench testing of the power supply consists of performing continuity checks when broken wires or failing switch or relay contacts are suspected of causing a failure during performance of the self-test procedure. A schematic diagram (figure FO-6) and wire lists (tables 4-3 and 4-4) are provided for bench testing. Refer to paragraph 4-6 for an explanation of wire list format and notations.

4-6. Wire List Format and Notations. Tables 4-1 through 4-4 contain wire lists for the computer, CDU, power supply, and power supply harness assembly. The following paragraphs define wire list format and notations.

a. ***Wire List Format.*** Information contained in the wire list by column heading is described below:

Column	Definition
Signal	Numbers and letters appearing in this column are signals and logic terms and describe circuit functions when practicable.
From Component Pin	Entries in this column denote point of origin.
To Component Pin	Entries in this column denote point of termination for items in the From Component Pin column.
Ref	A unique suffix letter A, B, C, etc. identifies each wire in a multiwire connection. The suffix letter S defines the shield of wire connected to this pin, not the pin connection.
AWG	All wires, except those indicated, are etched circuitry. Standard wire size for table 4-3 is 22 AWG, except as noted.
Type	Symbols in this column specify configuration of a wire or wires. In the absence of a specific symbol, stranded insulated wire is intended. For flexible printed wiring, this column is not applicable.
Color	Standard wire color is white for table 4-3 except as specifically color-coded. Numbers are coded to a color as follows:

Number	Color
0	Black
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Blue
7	Violet

Table 4-14.1 IMU Testing, Alignment, and Troubleshooting Using Tape Reader, Part No. 877406-2 – Continued

Test procedure	Normal indication	‘Malfunction indication/corrective action
	SELECT TEST MODE	
2b. Compare printed checksum written on the front of the punched tape in use	Checksums are equal	Checksum is incorrect Refer to step 3k of table 4-6.1 or step 2v of table 4-6.3
2c. Type IMU to select IMU automatic alignment and test sequence	TTY prints out: IMU SER NO XXXX DATE XXXX CHECKSUM XXXXXX MOVE IMU TO APPROX 45 DEC HEADING WHEN DONE TYPE: RDY	**NOTE** From this step forward, the TTY may print out any of the malfunction messages listed in table 4-17, Take the corrective action shown in table 4-17.
2d. Verify that the printed serial number matches the’ serial number of the IMU under test and the checksum matches the checksum on the IMU alignment data tape	Data matches	Reload IMU alignment data tape
2e. Type RDY when 45° (±10°) heading request has been completed	TTY prints out: RDY ENTER LATITUDE: (DEG) (MIN) (SEC) RDY	**NOTE** The program will accept all data on one line, thus if the operator makes a mistake prior to typing RDY while entering data via the TN, he should hit the carriage return key and reenter the data. If the diagnostic program does not recognize the entry as valid, the TTY prints out: IMPROPER DATA ENTRY. The operator should reenter the data.

Table 4-1. Computer Wire List

Signal	From Componen	From Pin	From Ref	To Componen	To Pin	To Ref	AWG	Type	Color	Group	Route	Note	Remarks	Rev
P+024VAUX	DS01	001		DS01	004		24		666					
DPUFLGSET*	DS01	002		E207			24		999					
DPUFLGRST*	DS01	003		E209			24		999					
P+024VAUX	DS01	004		E211	---		24		666					
P+024VAUX	DS01	004		DS01	001		24		666					
DMAREQ*CPU	E001	---		J002	016									
PSPOR	E002	---		J002	044									
PRIINT*CPU	E003	---		J002	009									
SVCINT*CPU	E004	---		J002	003									
MCUTOCINH*	E005	---		J002	070								TOCRST	
P+005V	E006	---		J002	063									
P+005V	E006	---		J002	063		26		222					
P+005V	E006	---		J002	073									
P+005V	E006	---		J002	083									
P+005V	E006	---		J002	084									
BITFLAG*	E007	---		J002	062									
XAA*	E008	---		J002	064									
CLKENABLE	E009	---		J002	089									
CYCLEINIT	E010	---		J002	061									
UNGATEDCLK	E011	---		J002	041									
M*	E012	---		J002	065									
(RE/IN)*CP	E013	---		J002	045									
DAB12	E014	---		J002	021									
DAB13	E015	---		J002	022									
DAB14	E016	---		J002	023									
DAB08	E017	---		J002	014									
DAB07	E018	---		J002	013									
DAB06	E019	---		J002	012									
DAB05	E020	---		J002	011									
DAB04	E021	---		J002	010									
GATEDCLOCK	E022	---		J002	069									
STATE3	E023	---		J002	068									
MEMBUSY	E024	---		J002	056									
ENT*	E028	---		J003	014									
DPUFAIL*	E029	---		J003	015									
B/SLDEN	E030	---		J003	029									
B/SLDEN*	E031	---		J003	022									
ADR/DTA*	E032	---		J003	003									
ADR/DTA	E033	---		J003	008									
ADDRENV*	E034	---		J003	009									
ADDRENV	E035	---		J003	016									
P+024VAUX	E036	---		J003	039									
ON/OFF*	E037	---		J003	023									
IMU*	E038	---		J003	030									
DATAENV	E039	---		J003	024									
DATAENV*	E040	---		J003	031									
RS232INR*	E041	---		J003	037									
RS232INR	E042	---		J003	044									
FLAGSET*	E043	---		J003	038									
FLAGRST*	E044	---		J003	045									
SBPOR*	E045	---		J003	046									
SBPOR	E046	---		J003	052									
250KHZ*	E047	---		J003	051									
250KHZ	E048	---		J003	055									
P+005V	E049	---		J003	010									
P+005V	E049	---		J003	017									
P+005V	E049	---		J003	018									
P+005V	E049	---		J003	019									
P+005V	E049	---		J003	025									
P+005V	E049	---		J003	026									
P+005V	E049	---		J003	027									
PGND	E050	---		J002	017		26		000					
PGND	E050	---		W001	---		20		000					
CPUDMAACK*	E051	---		J002	057									
MCURELEASE	E052	---		J002	002									
CPUI/OCMD	E053	---		J002	059									
DMAINT*	E054	---		J002	050									

Table 4-1. Computer Wire List - Continued

Signal	From			To			AWG	Type	Color	Group	Route	Note	Remarks	Rev
		Pin	Ref		Pin	Ref								
CPUPORMS*	E055	---		J002	090									
DMAACKEN	E056	---		J002	042									
TRACE*	E057	---		J002	066									
PGND	E058	---		J002	053		26		000					
PGND	E058	---		W001	---		20		000					
PGND	E059	---		J002	081		26		000					
PGND	E060	---		J002	097		26		000					
PGND	E060	---		J002	100									
PGND	E060	---		W001			20		000					
PGND	E061	---		W001	---		20		000					
DAB11	E062	---		J002	020									
DAB15	E063	---		J002	024									
DAB09	E064	---		J002	015									
DAB03	E065	---		J002	007									
DAB02	E066	---		J002	006									
DAB01	E067	---		J002	005									
DAB00	E068	---		J002	004									
DAB10	E069	---		J002	019									
RESET*CPU	E070	---		J002	001									
PGND	E088	---		J003	001									
PGND	E090	---		J003	002									
PGND	E092	---		J003	004									
PGND	E094	---		J003	005									
PGND	E094	---		J003	006									
PGND	E096	---		J003	011									
PGND	E096	---		J003	012									
SPARE1	E102	---		J00	041									
SPARE1*	E103	---		J00	015									
HDGX32S6	E104	---		J00	052									
HDGX32S8	E105	---		J00	068									
SPARE2*	E106	---		J00	013									
SPARE2	E107	---		J00	039									
ZQUANTDC	E108	---		J00	027									
ZQUANTDCR`	E109	---		J00	050									
YQUANTDC	E110	---		J00	026									
YQUANTDCRT	E111	---		J00	049									
XQUANTDC	E112	---		J00	025									
XQUANTDCRT	E113	---		J001	048									
MDVY	E114	---		J001	067									
MDVY*	E115	---		J001	076									
GYRFLTTOTP	E116	---		J001	064									
LWGYRTEMP	E117	---		J001	023									
IMUREADY*	E118	---		J001	046									
UPGYRTEMP	E119	---		J001	022									
GYRCRSHTON	E120	---		J001	045									
ACLCRSHTON	E121	---		J001	021									
IMUFLGRST*	E122	---		J001	063									
DWZ	E123	---		J001	019									
IMUFLGSET	E124	---		J001	062									
DWY*	E125	---		J001	018									
DWX	E126	---		J001	017									
PDVZ*	E127	---		J001	016									
HDGX1S4	E128	---		J001	073									
PITCHX1S3	E130	---		J001	059									
PDVX	E131	---		J001	014									
MDVZ	E132	---		J001	079									
MDVX*	E133	---		J001	012									
ROLLX1S4	E134	---		J001	058									
PDVY	E135	---		J001	011									
2.4KHZ	E136	---		J001	010									
ZGYRFTSLW*	E137	---		J001	009									
XYGYFSTSL*	E138	---		J001	008									
26VAC90RTN	E139	---		J001	056									
SPARE3*	E140	---		J001	034									
ROLLX8S6	E142	---		J001	005									
ROLLX8S5	E143	---		J001	004									
ROLLX1S1	E144	---		J001	053									

Table 4-1. Computer Wire List - Continued

	From			To										
Signal	Component	Pin	Ref		Pin	Ref	AWG	Type	Color	Group	Route	Note	Remarks	Rev
HDGX1S1	E145	---		J001	003									
HDGX32S5	E146	---		J001	002									
AMBTEMP	E147	---		J001	006									
PGND	E151	---		J001	024									
PGND	E160	---		J001	029									
PGND	E170	---		J001	028									
IMUFLGRS*	E171	---		J001	075									
DWZ*	E172	---		J001	020									
IMUFLGSE *	E173	---		J001	074									
DWY	E174	---		J001	044									
DWX*	E175	---		J001	043									
PDVZ	E176	---		J001	042									
HDGX1S2	E177	---		J001	061									
PITCHX1S1	E179	---		J001	060									
PITCHX1S2	E180	---		J001	072									
PDVX*	E181	---		J001	040									
MDVZ*	E182	---		J001	077									
MDVX	E183	---		J001	038									
ROLLX1S2	E184	---		J001	057									
PDVY*	E185	---		J001	037									
2.4KHZ*	E186	---		J001	036									
ZGYRFSTSLW	E187	---		J001	035									
XYGYFSTSL	E188	---		J001	007									
26VAC90	E189	---		J001	070									
SPARE3	E190	---		J001	055									
ROLLX8S8	E191	---		J001	033									
ROLLX8S7	E192	---		J001	032									
ROLLX1S3	E193	---		J001	054									
HDGX1S3	E194	---		J001	031									
HDGX32S7	E195	---		J001	030									
IMUFAIL*	E196	---		J001	001									
P+005V	E201	---		J002	085		24		555					
P+005V	E201	---		W002			22		555					
P+005V	E202	---		W002			22		555					
P+005V	E203	---		W002			22		555					
P+005V	E204	---		W002			22		555					
P+005V	E205	---		W002			22		555					
P+005V	E206	---		W002	---		22		555					
DPUFLGSET*	E207	---		DS01	002		24		999					
DPUFLGSET*	E207	---		XPS1	041		24		999					
DPUFLGRST*	E209	---		DS01	003		24		999					
PSPOR	E210	---		XPS1	038		24		999					
P+024VAUX	E211	---		DS01	004		24		666					
P+024VAUX	E213	---		XPS1	026		22		666					
COMPOFF*	E214	--		XPS	020		24		999					
PGND	E216	---		W00			24		000					
PGND	E217	---		W00			24		000					
PGND	E218	---		W00			24		000					
PGND	E219	---		W00			24		000					
PGND	E220	---		W00			24		000					
PGND	E221	---		W00			24		000					
PGND	E222	---		W001	---		24		000					
VLAMPREFRT	E231	---		XPS1	023		24	T2	000	TG006				
VLAMPREF	E232	---		XPS1	022		22	T2	999	TG006				
PSUFLGSET*	E233	---		XPS1	005		24		999					
PSUFLGRST*	E234	---		XPS1	006		24		999					
26VAC90RTN	E240	---		XPS1	040		24	T2	989	TG999				
26VAC90	E241	---		XPS1	039		24	T2	888	TG999				
ON/OFF*	E243	---		XPS1	021		24		999					
P+015VAD	E244	---		XPS1	003		22		666				RTNON XPS1-7	
P-015VAD	E245	---		XPS1	004		22		444				RTNON XPS1-7	
IMUFAIL*	J001	001		E196										
HDGX32S5	J001	002		E146										
HDGX1S1	J001	003		E145										
ROLLX8S5	J001	004		E143										
ROLLX8S6	J001	005		E142										
AMBTEMP	J001	006		E147										

Table 4-1. Computer Wire List - Continued

Signal	From			To			WG	ype	olor	Group	Route	lote	Remarks	Rev
	omponent	Pin	Ref	omponent	Pin	Ref								
XYGYFSTSL	J001	007		E188	- - -									
XYGYFSTSL*	J00	008		E138	- - -									
ZGYRFTSLW*	J00	009		E137	- - -									
2.4KHZ	J00	010		E136	- - -									
PDVY	J00	011		E135	- - -									
MDVX*	J00	012		E133	- - -									
SPARE2*	J00	013		E106	- - -									
PDVX	J00	014		E131	- - -									
SPARE1*	J00	015		E103	- - -									
PDVZ*	J00	016		E127	- - -									
DWX	J00	017		E126	- - -									
DWY*	J001	018		E125	- - -									
DWZ	J001	019		E123	- - -									
DWZ*	J001	020		E172	- - -									
ACLCRSHTON	J001	021		E121	- - -									
UPGYRTEMP	J001	022		E119	- - -									
LWGYRTEMP	J001	023		E117	- - -									
PGND	J001	024		E151	- - -									
PGND	J001	024		W001	- - -		22		000		DIR*			
XQUANTDC	J001	025		E112	- - -									
YQUANTDC	J001	026		E110	- - -									
ZQUANTDC	J001	027		E108	- - -									
PGND	J001	028		E170	- - -									
PGND	J001	029		E160	- - -									
HDGX32S7	J001	030		E195	- - -									
HDGX1S3	J001	031		E194	- - -									
ROLLX8S7	J001	032		E192	- - -									
ROLLX8S8	J001	033		E191	- - -									
SPARE3*	J001	034		E140	- - -									
ZGYRFSTSLW	J001	035		E187	- - -									
2.4KHZ*	J001	036		E186	- - -									
PDVY*	J001	037		E185	- - -									
MDVX	J001	038		E183	- - -									
SPARE2	J001	039		E107	- - -									
PDVX*	J001	040		E181	- - -									
SPARE1	J00	041		E102	- - -									
PDVZ	J00	042		E176	- - -									
DWX*	J00	043		E175	- - -									
DWY	J00	044		E174	- - -									
GYRCRSHTON	J00	045		E120	- - -									
IMUREADY*	J00	046		E118	- - -									
	J00	047		SPARE										
XQUANTDCRT	J00	048		E113	- - -									
YQUANTDCRT	J00	049		E111	- - -									
ZQUANTDCRT	J00	050		E109	- - -									
	J00	051		SPARE										
HDGX32S6	J001	052		E104	- - -									
ROLLX1S1	J001	053		E144	- - -									
ROLLX1S3	J001	054		E193	- - -									
SPARE3	J001	055		E190	- - -									
26VAC90RTN	J001	056		E139	- - -									
ROLLX1S2	J001	057		E184	- - -									
ROLLX1S4	J001	058		E134	- - -									
PITCHX1S3	J001	059		E130	- - -									
PITCHX1S1	J001	060		E179	- - -									
HDGX1S2	J001	061		E177	- - -									
IMUFLGSET	J001	062		E124	- -									
IMUFLGRST*	J001	063		E122	- - -									
GYRFLTTOTP	J001	064		E116	- - -									
	J001	065		SPARE										
	J001	066		SPARE										
MDVY	J001	067		E114	- - -									
HDGX32S8	J001	068		E105	- - -									
	J001	069		SPARE										
26VAC90	J001	070		E189	- - -									
	J001	071		SPARE										
PITCHX1S2	J001	072		E180	- - -									

Table 4-1. Computer Wire List - Continued

	From			To										
Signal	Component	Pin	Ref	Component	Pin	Ref	AWG	Type	Color	Group	Route	Note	Remarks	Rev
HDGX1S4	J001	073		E128	- - -									
IMUFLGSET*	J001	074		E173	- - -									
IMUFLGRST	J001	075		E171	- - -									
MDVY*	J001	076		E115	- - -									
MDVZ*	J001	077		E182	- - -									
	J001	078		SPARE										
MDVZ	J001	079		E132	- - -									
RESET*CPU	J002	001		E070	- - -									
MCURELEASE	J002	002		E052	- - -									
SVCINT*CPU	J002	003		E004	- - -									
DAB00	J002	004		E068	- - -									
DAB01	J002	005		E067	- - -									
DAB02	J002	006		E066	- -									
DAB03	J002	007		E065	- - -									
PGND	J002	008		J002	017									
PRIINT*CPU	J002	009		E003	- - -									
DAB04	J002	010		E021	- - -									
DAB05	J002	011		E020	- - -									
DAB06	J002	012		E019	- - -									
DAB07	J002	013		E018	- - -									
DAB08	J002	014		E017	- - -									
DAB09	J002	015		E064	- - -									
DMAREQ*CPU	J002	016		E001	- - -									
PGND	J002	017		J002	018									
PGND	J002	017		J002	008									
PGND	J002	017		E050	- - -		26		000					
PGND	J002	018		J002	026									
PGND	J002	018		J002	017									
DAB10	J002	019		E069	- - -									
DAB11	J002	020		E062	- - -									
DAB12	J002	021		E014	- - -									
DAB13	J002	022		E015	- - -									
DAB14	J002	023		E016	- - -									
DAB15	J002	024		E063	- - -									
REQGEN*	J002	025		XA01A1-	023		28	S2		SG0(1				
PGND	J002	025	S	J002	026		28	SL	000	SG0(1			REQGENRTN	
PGND	J002	026		J002	032									
PGND	J002	026		J002	018									
PGND	J002	026		J002	025	S	28	SL	000	SG0(1			REQGENRTN	
	J002	027		SPARE										
	J002	028		SPARE										
	J002	029		SPARE										
	J002	030		SPARE										
	J002	031		SPARE										
PGND	J002	032		J002	034									
PGND	J002	032		J002	026									
	J002	033		NC										
PGND	J002	034		J002	051									
PGND	J002	034		J002	032									
	J002	035		SPARE										
	J002	036		SPARE										
	J002	037		SPARE										
	J002	038		SPARE										
	J002	039		SPARE										
	J002	040		SPARE										
UNGATEDCLK	J002	041		E011	- - -									
DMAACKEN	J002	042		E056	- - -									
	J002	043		NC										
PSPOR	J002	044		E002	- - -									
(RE/IN)*CP	J002	045		E013	- - -									
	J002	046		SPARE										
	J002	047		SPARE										
	J002	048		SPARE										
	J002	049		SPARE										
DMAINT*	J002	050		E054	- - -									
PGND	J002	051		J002	052									
PGND	J002	051		J002	034									

Table 4-1. Computer Wire List - Continued

Signal	From Component	From Pin	From Ref	To Component	To Pin	To Ref	AWG	Type	Color	Group	Route	Note	Remarks	Rev
PGND	J002	052		J002	053									
PGND	J002	052		J002	051									
PGND	J002	053		J002	055									
PGND	J002	053		J002	052									
PGND	J002	053		E058			26		000					
	J002	054		NC										
PGND	J002	055		J002	058									
PGND	J002	055		J002	053									
MEMBUSY	J002	056		E024										
CPUDMAACK*	J002	057		E051	- - -									
PGND	J002	058		J002	060									
PGND	J002	058		J002	055									
CPUI/OCMD	J002	059		E053	- - -									
PGND	J002	060		J002	067									
PGND	J002	060		J002	058									
CYCLEINIT	J002	061		E010										
BITFLAG*	J002	062		E007										
P+005V	J002	063		E006										
P+005V	J002	063		E006			26		222					
XAA*	J002	064		E008										
M*	J002	065		E012										
TRACE*	J002	066		E057	- - -									
PGND	J002	067		J002	071									
PGND	J002	067		J002	060									
STATE3	J002	068		E023										
GATEDCLOCK	J002	069		E022										
MCUTOCINH*	J002	070		E005	- - -								TOCRST	
PGND	J002	071		J002	074									
PGND	J002	071		J002	067									
	J002	072		NC										
P+005V	J002	073		E006	- - -									
PGND	J002	074		J002	075									
PGND	J002	074		J002	071									
PGND	J002	075		J002	076									
PGND	J002	075		J002	074									
PGND	J002	076		J002	077									
PGND	J002	076		J002	075									
PGND	J002	077		J002	078									
PGND	J002	077		J002	076									
PGND	J002	078		J002	080									
PGND	J002	078		J002	077									
	J002	079		NC										
PGND	J002	080		J002	081									
PGND	J002	080		J002	078									
PGND	J002	081		J002	082									
PGND	J002	081		J002	080									
PGND	J002	081		E059	- - -		26		000					
PGND	J002	082		J002	091									
PGND	J002	082		J002	081									
P+005V	J002	083		E006										
P+005V	J002	084		E006										
P+005V	J002	085		E201			24		555					
	J002	086		NC										
	J002	087		NC										
	J002	088		NC										
CLKENABLE	J002	089		E009										
CPUPORMS*	J002	090		E055	- - -									
PGND	J002	091		J002	093									
PGND	J002	091		J002	082									
	J002	092		NC										
PGND	J002	093		J002	094									
PGND	J002	093		J002	091									
PGND	J002	094		J002	096									
PGND	J002	094		J002	093									
	J002	095		NC										
PGND	J002	096		J002	097									
PGND	J002	096		J002	094									

Table 4-1. Computer Wire List - Continued

Signal	From			To										
	omponent	Pin	ef	omponent	Pin	ef	WG	Type	olor	Group	Route	ote	Remarks	ev
PGND	J002	097		J002	098									
PGND	J002	097		J002	096									
PGND	J002	097		E060	- - -		26		000					
PGND	J002	098		J002	099									
PGND	J002	098		J002	097									
PGND	J002	099		J002	098									
PGND	J002	100		E060										
PGND	J003	001		E088										
PGND	J003	002		E090										
ADR/DTA*	J003	003		E032										
PGND	J003	004		E092										
PGND	J003	005		E094										
PGND	J003	006		E094	- - -									
VLAMP	J003	007		J003	040		24		999					
ADR/DTA	J003	008		E033										
ADDRENV*	J003	009		E034										
P+005V	J003	010		E049										
PGND	J003	011		E096										
PGND	J003	012		E096	- - -									
VLAMPRET	J003	013		J003	047		24		000					
ENT*	J003	014		E028										
DPUFAIL*	J003	015		E029										
ADDRENV	J003	016		E035										
P+005V	J003	017		E049										
P+005V	J003	018		E049										
P+005V	J003	019		E049	-									
115VAC	J003	020		M001	A		20	T2	888	TG008				
	J003	021		NC										
B/SLDEN*	J003	022		E031										
ON/OFF*	J003	023		E037										
DATAENV	J003	024		E039										
P+005V	J003	025		E049										
P+005V	J003	026		E049										
P+005V	J003	027		E049										
	J003	028		NC										
B/SLDEN	J003	029		E030										
IMU*	J003	030		E038										
DATAENV	J003	031		E040	- - -									
VLAMP	J003	032		XPS1	030		22	T2	999	TG996		7		
VLAMP	J003	033		XPS1	029		22	T2	999	TG995		7		
VLAMPRE	J003	034		XPS1	015		24	T2	000	TG993				
115VACR	J003	035		M001	E		20	T2	989	TG008				
	J003	036		NC										
RS232INR*	J003	037		E041										
FLAGSET*	J003	038		E043										
P+024VAUX	J003	039		E036	- - -									
VLAMP	J003	040		XPS1	031		22	T2	999	TG994		7		
VLAMP	J003	040		J003	007		24		999					
VLAMPRET	J003	041		XPS1	028		22	T2	000	TG996		8		
VLAMP	J003	042		XPS1	014		24	T2	999	TG993				
	J003	043		NC										
RS232INR	J003	044		E042										
FLAGRST*	J003	045		E044										
SBPOR*	J003	046		E045										
VLAMPRET	J003	047		XPS1	027		22	T2	000	TG995		8		
VLAMPRET	J003	047		J003	013		24		000					
VLAMPRET	J003	048		XPS1	011		22	T2	000	TG994		8		
BATTERY*	J003	049		XPS1	045		24		999					
	J003	050		NC										
250KHZ*	J003	051		E047										
SBPOR	J003	052		E046										
CHASSGND	J003	053		W003			22		000		DIR*			
CHASSGND	J003	053		W001			22		000					
CHARGE*	J003	054		XPS1	040		24		999					
250KHZ	J003	055		E048	- -									
115VAC	M001	A		XPS1	01		20	T2	888	TG009				
115VAC	M001	A		J003	02		20	T2	888	TG008				

Table 4-1. Computer Wire List - Continued

Signal	From			To			AWG	Type	Color	Group	Route	Note	Remarks	Rev
	Component	Pin	Ref	Component	Pin	Ref								
115VACRT	M001	B		XPS1	012		20	T2	989	TG009				
115VACRT	M001	B		J003	035		20	T2	989	TG008				
PGND	S001	001		W001	---		24	T2	000	TG988			DISCIN09R	
DISCIN09	S001	002		XA09	003		24	T2	999	TG988				
CHASSGND	W001			J003	053		22		000		DIR*			
PGND	W001			S001	001		24	T2	000	TG988			DISCIN09R	
PGND	W001			E050			20		000					
PGND	W001			E058			20		000					
PGND	W001			E060			20		000					
PGND	W001			E061			20		000					
PGND	W001			E216			24		000					
PGND	W001			E217			24		000					
PGND	W001			E219			24		000					
PGND	W001			E220			24		000					
PGND	W001			E221			24		000					
PGND	W001			E222			24		000					
PGND	W001			E218	---		24		000					
PGND	W001			J001	024		22		000		DIR*			
PGND	W001			XPS1	001		22		000					
PGND	W001			XPS1	002		22		000					
PGND	W001			XPS1	018		22		000					
PGND	W001			XPS1	019		22		000					
PGND	W001			XPS1	034		22		000					
PGND	W001			XPS1	035		22		000					
P+005V	W002			XPS1	016		22		555					
P+005V	W002			E201			22		555					
P+005V	W002			E202			22		555					
P+005V	W002			E203			22		555					
P+005V	W002			E204			22		555					
P+005V	W002	--		E205			22		555					
P+005V	W002			E206	---		22		555					
P+005V	W002			XPS1	017		22		555					
P+005V	W002			XPS1	032		22		555					
P+005V	W002			XPS1	033		22		555					
P+005V	W002			XPS1	047		22		555					
P+005V	W002			XPS1	048		22		555					
CHASSGND	W003	--		J003	053		22		000					
P+015VMEM	XA01A1-	001		XPS1	009		20	T2	666	TG001				
P+015VMEM	XA01A1-	001		XA01A1-	047		24	B						
PSF OPT	XA01A1-	002		XA01A1-	087									
MODE1	XA01A1-	003		XA01A1-	050									
MODE2	XA01A1-	004		XA01A1-	048									
P+005V	XA01A1-	005		XPS1	049		20	T2	555	G004				
P+005V	XA01A1-	005		XA01A2-	088		20	T2	555	G989				
PGND	XA01A1-	007		XPS1	036		20	T2	000	G004		5	DATA RTN	
PGND	XA01A1-	007		XA01A1-	009									
PGND	XA01A1-	007		XA01A2-	040								ADD RTN	
PGND	XA01A1-	007		XA01A2-	086								DATA RTN	
PGND	XA01A1-	007		XA01A2-	087		20	T2	000	G989			+5VRTNN	
DAB01	XA01A1-	008		XA01A1-	054									
DAB01	XA01A1-	008		XA02	081									
DAB01	XA01A1-	008		XA01A2-	039									
PGND	XA01A1-	009		XA01A1-	011								DATA RTN	
PGND	XA01A1-	009		XA01A1-	007									
DAB05	XA01A1-	010		XA01A1-	056									
DAB05	XA01A1-	010		XA02	082									
DAB05	XA01A1-	010		XA01A2-	037									
PGND	XA01A1-	011		XA01A1-	015								DATA RTN	
PGND	XA01A1-	011		XA01A1-	009								DATA RTN	
DAB06	XA01A1-	012		XA01A1-	058									
DAB06	XA01A1-	012		XA01A2-	035									
DAB06	XA01A1-	012		XA02	083									
NB*	XA01A1-	013		XA01A2-	073									
DAB04	XA01A1-	014		XA01A1-	060									
DAB04	XA01A1-	014		XA02	084									
DAB04	XA01A1-	014		XA01A2-	033									
PGND	XA01A1-	015		XA01A1-	017								DATA RTN	

Table 4-1. Computer Wire List - Continued

Signal	From			To											
		Pin	Ref		Pin	Ref		ype	olor	Group	Route	ote	Remarks	ev
PGND	XA01A1-	015		XA01A1-	011								DATA RTN	
DAB03	XA01A1-	016		XA01A1-	062									
DAB03	XA01A1-	016		XA02	085									
DAB03	XA01A1-	016		XA01A2-	031									
PGND	XA01A1-	017		XA01A1-	019								DATA RTN	
PGND	XA01A1-	017		XA01A1-	015								DATA RTN	
DAB07	XA01A1-	018		XA01A1-	064									
DAB07	XA01A1-	018		XA02	086									
DAB07	XA01A1-	018		XA01A2-	029									
PGND	XA01A1-	019		XA01A1-	025								DATA RTN	
PGND	XA01A1-	019		XA01A1-	017								DATA RTN	
DAB00	XA01A1-	020		XA01A1-	066									
DAB00	XA01A1-	020		XA02	089									
M-5VB	XA01A1-	021		XA01A2-	075									
DAB14	XA01A1-	022		XA01A1-	068									
DAB14	XA01A1-	022		XA02	087									
DAB14	XA01A1-	022		XA01A2-	061									
REQGEN*	XA01A1-	023		J002	025		28	S2		SG001				
PGND	XA01A1-	023	S	XA01A1-	025		28	SL	000	SG001			REQGENRTN	
DAB02	XA01A1-	024		XA01A1-	070									
DAB02	XA01A1-	024		XA02	088									
DAB02	XA01A1-	024		XA01A2-	023									
PGND	XA01A1-	025		XA01A1-	027								DATA RTN	
PGND	XA01A1-	025		XA01A2-	024								REQGENRTN	
PGND	XA01A1-	025		XA01A1-	019								DATA RTN	
PGND	XA01A1-	025		XA01A1-	023	S	28	SL	000	SG001			REQGENRTN	
DAB12	XA01A1-	026		XA01A1-	072									
DAB12	XA01A1-	026		XA02	090									
DAB12	XA01A1-	026		XA01A2-	021									
PGND	XA01A1-	027		XA01A1-	033								DATA RTN	
PGND	XA01A1-	027		XA01A1-	025								DATA RTN	
DAB15	XA01A1-	028		XA01A1-	074									
DAB15	XA01A1-	028		XA02	091									
DAB15	XA01A1-	028		XA01A2-	019									
DAB15	XA01A1-	028		XA01A2-	063									
DAB09	XA01A1-	030		XA01A1-	076									
DAB09	XA01A1-	030		XA02 -	092									
DAB09	XA01A1-	030		XA01A2-	017									
DAB13	XA01A1-	032		XA01A1-	078									
DAB13	XA01A1-	032		XA02	093									
DAB13	XA01A1-	032		XA01A2-	015									
PGND	XA01A1-	033		XA01A1-	035								DATA RTN	
PGND	XA01A1-	033		XA01A2-	014									
PGND	XA01A1-	033		XA01A1-	027								DATA RTN	
DAB10	XA01A1-	034		XA01A1-	080									
DAB10	XA01A1-	034		XA02	094									
DAB10	XA01A1-	034		XA01A2-	013									
PGND	XA01A1-	035		XA01A1-	037								DATA RTN	
PGND	XA01A1-	035		XA01A1-	033								DATA RTN	
DAB08	XA01A1-	036		XA01A1-	082									
DAB08	XA01A1-	036		XA02	095									
DAB08	XA01A1-	036		XA01A2-	011									
PGND	XA01A1-	037		XA01A1-	041								DATA RTN	
PGND	XA01A1-	037		XA01A1-	086									
PGND	XA01A1-	037		XA01A2-	008									
PGND	XA01A1-	037		XA01A1-	035								DATA RTN	
DAB11	XA01A1-	038		XA01A1-	084									
DAB11	XA01A1-	038		XA02	096									
DAB11	XA01A1-	038		XA01A2-	009									
MEMBUSY	XA01A1-	039		XA02	019									
MEMENABLE*	XA01A1-	040		XA02	018									
PGND	XA01A1	041		XA01A1-	086									
PGND	XA01A1-	041		XA01A1-	037								DATA RTN	
P+005V	XA01A1-	042		XPS1	05(		2(	T2	555	TG0)				
P+005V	XA01A1-	042		XA01A2-	051		2(	T2	555	TG9)				
DOSTREN*	XA01A1-	044		XA01A1-	088							[	ATA OUT EN*	
P+015VMEM	XA01A1-	04(		XPS1	01(		2(	T2	66(	TG0)				

Table 4-1. Computer Wire List - Continued

Signal	From Component	From Pin	From Ref	To Component	To Pin	To Ref	AWG	Type	Color	Group	Route	Note	Remarks	Rev
P+015VMEM	XA01A1-	046		XA01A1-	092		24	B						
P+015VMEM	XA01A1-	047		XA01A1-	001		24	B						
MODE2	XA01A1-	048		XA01A1-	004									
P015VMEMRT	XA01A1-	049		XPS1	024		20	T2	000	TG001		6		
MODE1	XA01A1-	050		XA01A1-	003									
CYCLEINIT	XA01A1-	052		XA02	016									
(RE/IN)*CP	XA01A1-	053		XA02	017								MODE IN	
DAB01	XA01A1-	054		XA01A2-	039									
DAB01	XA01A1-	054		XA02	081									
DAB01	XA01A1-	054		XA01A1-	008									
ADDSTROBE1	XA01A1-	055		XA01A2-	084									
DAB05	XA01A1-	056		XA01A2-	037									
DAB05	XA01A1-	056		XA02	082									
DAB05	XA01A1-	056		XA01A1-	010									
XSR*	XA01A1-	057		XA01A2-	082									
DAB06	XA01A1-	058		XA01A2-	035									
DAB06	XA01A1-	058		XA02	083									
DAB06	XA01A1-	058		XA01A1-	012									
XYSW*	XA01A1-	059		XA01A2-	080									
DAB04	XA01A1-	060		XA01A2-	033									
DAB04	XA01A1-	060		XA02	084									
DAB04	XA01A1-	060		XA01A1-	014									
ADDSTROBE2	XA01A1-	061		XA01A2-	078									
DAB03	XA01A1-	062		XA01A2-	031									
DAB03	XA01A1-	062		XA02	085									
DAB03	XA01A1-	062		XA01A1-	016									
A14	XA01A1-	063		XA01A2-	076								A14 (A13)	
DAB07	XA01A1-	064		XA01A2-	029									
DAB07	XA01A1-	064		XA02	086									
DAB07	XA01A1-	064		XA01A1-	018									
M-5VA	XA01A1-	065		XA01A2-	074									
DAB00	XA01A1-	066		XA02	089									
DAB00	XA01A1-	066		XA01A1-	020									
XDR*	XA01A1-	067		XA01A2-	072									
DAB14	XA01A1-	068		XA01A2-	061									
DAB14	XA01A1-	068		XA02	087									
DAB14	XA01A1-	068		XA01A1-	022									
YSR*	XA01A1-	069		XA01A2-	070									
DAB02	XA01A1-	070		XA01A2-	023									
DAB02	XA01A1-	070		XA02	088									
DAB02	XA01A1-	070		XA01A1-	024									
BIN1	XA0 A1-	071		XA01A2-	068									
DAB12	XA0 A1-	072		XA01A2-	021									
DAB12	XA0 A1-	072		XA02 -	090									
DAB12	XA0 A1-	072		XA01A1-	026									
VREFINHIB	XA0 A1-	073		XA01A2-	066									
DAB15	XA0 A1-	074		XA01A2-	019									
DAB15	XA0 A1-	074		XA01A2-	063									
DAB15	XA0 A1-	074		XA02	091									
DAB15	XA0 A1-	074		XA01A1-	028									
VRFINHBRTN	XA0 A1-	075		XA01A2-	067									
DAB09	XA0 A1-	076		XA01A2-	017									
DAB09	XA0 A1-	076		XA02	092									
DAB09	XA0 A1-	076		XA01A1-	030									
PCS*	XA0 A1-	077		XA01A2-	062								PCS* (XCSR*)	
DAB13	XA0 A1-	078		XA01A2-	015									
DAB13	XA0 A1-	078		XA02	093									
DAB13	XA0 A1-	078		XA01A1-	032									
ADDSTR2*	XA0 A1-	079		XA01A2-	060									
DAB10	XA0 A1-	080		XA01A2-	013									
DAB10	XA0 A1-	080		XA02	094									
DAB10	XA0 A1-	080		XA01A1-	034									
XYDW*	XA0 A1-	081		XA01A2-	058									
DAB08	XA0 A1-	082		XA01A2-	011									
DAB08	XA01A1-	082		XA02	095									
DAB08	XA01A1-	082		XA01A1-	036									
NCS*	XA01A1-	083		XA01A2-	056									

Table 4-1. Computer Wire List - Continued

Signal	From Component	From Pin	From Ref	To Component	To Pin	To Ref				Group	Route	Note	Remarks	Rev
DAB11	XA01A1-	084		XA01A2-	009									
DAB11	XA01A1-	084		XA02	096									
DAB11	XA01A1-	084		XA01A1-	038									
YDR*	XA01A1-	085		XA01A2-	054									
PGND	XA01A1-	086		XA01A2-	008								ADD RTN	
PGND	XA01A1-	086		XA01A1-	037									
PGND	XA01A1-	086		XA01A1-	041									
PSF OPT	XA01A1-	087		XA01A1-	002									
DOSTREN*	XA01A1-	088		XA01A1-	044							D	ATA OUT EN*	
PGND	XA01A1-	089		XPS1	037					TG0(5		6		
PGND	XA01A1-	089		XA01A2-	052					TG9[illegible]1				
P015VMEMRT	XA01A1-	090		XPS1	025					TG0[illegible]2		6		
P+015VMEM	XA01A1-	091		XA01A2-	045							9	ETCH	
P+015VMEM	XA01A1-	092		XA01A1-	046									
P-015VMEM	XA01A2-	001		XA01A2-	002							9	ETCH	
P-015VMEM	XA01A2-	001		XA01A2-	047							9	ETCH	
P-015VMEM	XA01A2-	002		XA01A2-	048							9	ETCH	
P-015VMEM	XA01A2-	002		XA01A2-	001							9	ETCH	
P-15VRTN	XA01A2-	003		XA01A2-	004							9	ETCH	
P-15VRTN	XA01A2-	003		XA01A2-	049							9	ETCH	
P-15VRTN	XA01A2-	004		XA01A2-	050							9	ETCH	
P-15VRTN	XA01A2-	004		XA01A2-	003							9	ETCH	
P+005V	XA01A2-	005		XA01A2-	006									
P+005V	XA01A2-	005		XA01A2-	051							9	ETCH	
P+005V	XA01A2-	006		XA01A2-	005									
PGND	XA01A2-	007		XA01A2-	053								+5VRTN	
PGND	XA01A2-	008		XA01A1-	037									
PGND	XA01A2-	008		XA01A1-	086								ADD RTN	
DAB11	XA01A2-	009		XA02	096									
DAB11	XA01A2-	009		XA01A1-	038									
DAB11	XA01A2-	009		XA01A1-	084									
PGND	XA01A2-	010		XA01A2-	012								ADD RTN	
DAB08	XA01A2-	011		XA02	095									
DAB08	XA01A2-	011		XA01A1-	036									
DAB08	XA01A2-	011		XA01A1-	082									
PGND	XA01A2-	012		XA01A2-	014								ADD RTN	
PGND	XA01A2-	012		XA01A2-	010								ADD RTN	
DAB10	XA01A2-	013		XA02	094									
DAB10	XA01A2-	013		XA01A1-	034									
DAB10	XA01A2-	013		XA01A1-	080									
PGND	XA01A2-	014		XA01A2-	016								ADD RTN	
PGND	XA01A2-	014		XA01A1-	033									
PGND	XA01A2-	014		XA01A2-	012								ADD RTN	
DAB13	XA01A2-	015		XA02	093									
DAB13	XA01A2-	015		XA01A1-	032									
DAB13	XA01A2-	015		XA01A1-	078									
PGND	XA01A2-	016		XA01A2-	018								ADD RTN	
PGND	XA01A2-	016		XA01A2-	014								ADD RTN	
DAB09	XA01A2-	017		XA02	092									
DAB09	XA01A2-	017		XA01A1-	030									
DAB09	XA01A2-	017		XA01A1-	076									
PGND	XA01A2-	018		XA01A2-	020								ADD RTN	
PGND	XA01A2-	018		XA01A2-	016								ADD RTN	
DAB15	XA01A2-	019		XA01A2-	063									
DAB15	XA01A2-	019		XA02	091									
DAB15	XA01A2-	019		XA01A1-	028									
DAB15	XA01A2-	019		XA01A1-	074									
PGND	XA01A2-	020		XA01A2-	022								ADD RTN	
PGND	XA01A2-	020		XA01A2-	018								ADD RTN	
DAB12	XA01A2-	021		XA02 -	090									
DAB12	XA01A2-	021		XA01A1-	026									
DAB12	XA01A2-	021		XA01A1-	072									
PGND	XA01A2-	022		XA01A2-	024								ADD RTN	
PGND	XA01A2-	022		XA01A2-	020								ADD RTN	
DAB02	XA01A2-	023		XA02	088									
DAB02	XA01A2-	023		XA01A1-	024									
DAB02	XA01A2-	023		XA01A1-	070									

Table 4-1. Computer Wire List - Continued

Signal	From Component	From Pin	From Ref	To	To Pin	To Ref	AWG	Type	Color	Group	Route		Remarks	Rev
PGND	XA01A2-	024		XA01A2-	028								ADD RTN	
PGND	XA01A2-	024		XA01A1-	025								REQGENRTN	
PGND	XA01A2-	024		XA01A2-	022								ADD RTN	
PGND	XA01A2-	028		XA01A2-	030								ADD RTN	
PGND	XA01A2-	028		XA01A2-	024								ADD RTN	
DAB07	XA01A2-	029		XA02	086									
DAB07	XA01A2-	029		XA01A1-	018									
DAB07	XA01A2-	029		XA01A1-	064									
PGND	XA01A2-	030		XA01A2-	032								ADD RTN	
PGND	XA0 A2-	030		XA01A2-	028								ADD RTN	
DAB03	XA0 A2-	031		XA02	085									
DAB03	XA0 A2-	031		XA01A1-	016									
DAB03	XA0 A2-	031		XA01A1-	062									
PGND	XA0 A2-	032		XA01A2-	034								ADD RTN	
PGND	XA0 A2-	032		XA01A2-	030								ADD RTN	
DAB04	XA0 A2-	033		XA02	084									
DAB04	XA0 A2-	033		XA01A1-	014									
DAB04	XA0 A2-	033		XA01A1-	060									
PGND	XA0 A2-	034		XA01A2-	036								ADD RTN	
PGND	XA01A2-	034		XA01A2-	032								ADD RTN	
DAB06	XA01A2-	035		XA02	083									
DAB06	XA01A2-	035		XA01A1-	012									
DAB06	XA01A2-	035		XA01A1-	058									
PGND	XA01A2-	036		XA01A2-	038								ADD RTN	
PGND	XA01A2-	036		XA01A2-	034								ADD RTN	
DAB05	XA01A2-	037		XA02 -	082									
DAB05	XA01A2-	037		XA01A1-	010									
DAB05	XA01A2-	037		XA01A1-	056									
PGND	XA01A2-	038		XA01A2-	040								ADD RTN	
PGND	XA01A2-	038		XA01A2-	036								ADD RTN	
DAB01	XA01A2-	039		XA02	081									
DAB01	XA01A2-	039		XA01A1-	008									
DAB01	XA01A2-	039		XA01A1-	054									
PGND	XA01A2-	040		XA01A2-	086								ADD RTN	
PGND	XA01A2-	040		XA01A1-	007								ADD RTN	
PGND	XA01A2-	040		XA01A2-	038								ADD RTN	
P+005V	XA01A2-	041		XA01A2-	042		24	B						
P+005V	XA01A2-	042		XA01A2-	088		24	B						
P+005V	XA01A2-	042		XA01A2-	041		24	B						
P015VMEMRT	XA01A2-	043		XA01A2-	044		24	B				9	ETCH	
P015VMEMRT	XA01A2-	043		XA01A2-	089		24	B				9	ETCH	
P015VMEMRT	XA01A2-	044		XA01A2-	090		24	B				9	ETCH	
P015VMEMRT	XA01A2-	044		XA01A2-	043		24	B				9	ETCH	
P+015VMEM	XA01A2-	045		XA01A2-	046		24	B				9	ETCH	
P+015VMEM	XA01A2-	045		XA01A1-	091		20		666			9	ETCH	
P+015VMEM	XA01A2-	045		XA01A2-	091		24	B				9	ETCH	
P+015VMEM	XA01A2-	046		XA01A2-	092		24	B				9	ETCH	
P+015VMEM	XA01A2-	046		XA01A2-	045		24	B				9	ETCH	
P-015VMEM	XA01A2-	047		XA01A2-	048		24	B				9	ETCH	
P-015VMEM	XA01A2-	047		XA01A2-	001		24	B				9	ETCH	
P-015VMEM	XA01A2-	048		XA01A2-	002		24	B				9	ETCH	
P-015VMEM	XA01A2-	048		XA01A2-	047		24	B				9	ETCH	
P-015VMEM	XA01A2-	048		XPS1	008		20	T2	444	TG007				
P-15VRTN	XA01A2-	049		XA01A2-	050		24	B				9	ETCH	
P-15VRTN	XA01A2-	049		XA01A2-	003		24	B				9	ETCH	
P-15VRTN	XA01A2-	049		XPS1 -	042		20	T2	000	TG007		6		
P-15VRTN	XA01A2-	050		XA01A2-	004		24	B				9	ETCH	
P-15VRTN	XA01A2-	050		XA01A2-	049		24	B				9	ETCH	
P+005V	XA01A2-	051		XA01A1-	042		20	T2	555	TG991				
P+005V	XA01A2-	051		XA01A2-	005		24	B				9	ETCH	
PGND	XA01A2-	052		XA01A1-	089		20	T2	000	TG991				
PGND	XA01A2-	052		XA01A2-	053		24	B					+5VRTN	
PGND	XA01A2-	053		XA01A2-	007		24	B					+5VRTN	
PGND	XA01A2-	053		XA01A2-	052		24	B					+5VRTN	
YDR*	XA01A2-	054		XA01A1-	085									
NEGCS	XA01A2-	055		XA01A2-	057									
NCS*	XA01A2-	056		XA01A1-	083									

Table 4-1. Computer Wire List - Continued

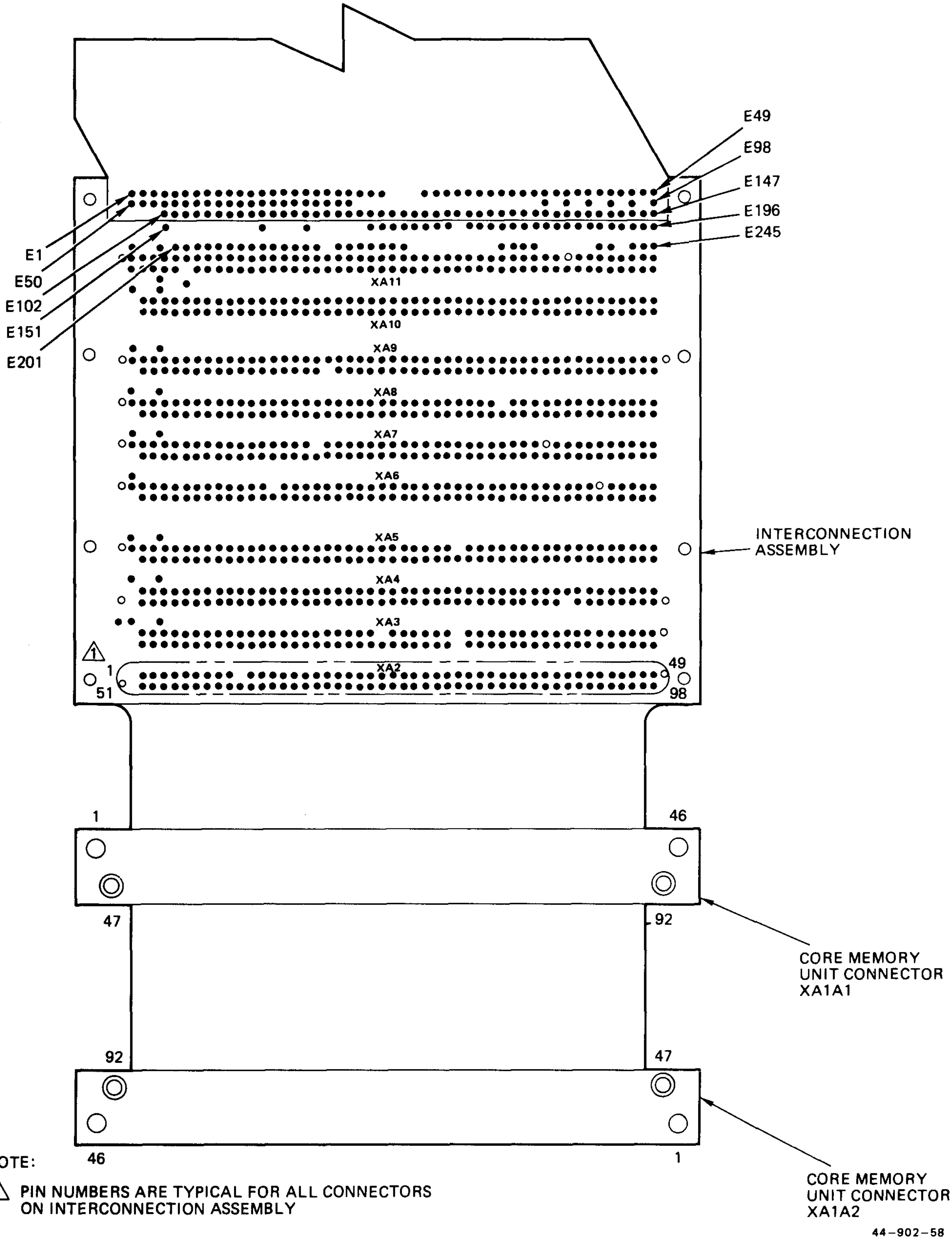
Signal	From			To			AWG	Type	Color	Group	Route	Note	Remarks	Rev
	Component	Pin	Ref	Componen	Pin	Ref								
NEGCS	XA01A2-	057		XA01A2-	055									
XYDW*	XA01A2-	058		XA01A1-	081									
P015VMEMR	XA01A2-	059		XA01A2-	090		20		000			9	ETCH	
ADDSTR2*	XA01A2-	060		XA01A1-	079									
DAB14	XA01A2-	061		XA02	087									
DAB14	XA01A2-	061		XA01A1-	022									
DAB14	XA01A2-	061		XA01A1-	068									
PCS*	XA01A2-	062		XA01A1-	077								PCS* XCSR*)	
DAB15	XA01A2-	063		XA02	091									
DAB15	XA01A2-	063		XA01A1-	028									
DAB15	XA01A2-	063		XA01A1-	074									
DAB15	XA01A2-	063		XA01A2-	019									
VREF	XA01A2-	064		XA01A2-	065								VREF IN/OUT	
VREF	XA01A2-	065		XA01A2-	064								VREF IN/OUT	
VREFINHIB	XA01A2-	066		XA01A1-	073									
VRFINHBRTN	XA01A2-	067		XA01A1-	075									
BIN1	XA01A2-	068		XA01A1-	071									
YSR*	XA01A2-	070		XA01A1-	069									
XDR*	XA01A2-	072		XA01A1-	067									
NB*	XA01A2-	073		XA01A1-	013									
M-5VA	XA01A2-	074		XA01A1-	065									
M-5VB	XA01A2-	075		XA01A1-	021									
A14	XA01A2-	076		XA01A1-	063								A14 (A13)	
PFA*	XA01A2-	077		XA02	013									
ADDSTROBE2	XA01A2-	078		XA01A1-	061									
XYSW*	XA01A2-	080		XA01A1-	059									
XSR*	XA01A2-	082		XA01A1-	057									
POSCS	XA01A2-	083		XA01A2-	085								POSCS IN	
ADDSTROBE1	XA01A2-	084		XA01A1-	055									
POSCS	XA01A2-	085		XA01A2-	083								POSCS IN	
PGND	XA01A2-	086		XA01A1-	007								DATA RTN	
PGND	XA01A2-	086		XA02	080								BANK SEL*	
PGND	XA01A2-	086		XA01A2-	040								ADD RTN	
PGND	XA01A2-	087		XA01A1-	007		20	T2	000	TG989			+5VRTNN	
P+005V	XA01A2-	088		XA01A1-	005		20	T2	555	TG989				
P+005V	XA01A2-	088		XA01A2-	042		24	B						
P015VMEMRT	XA01A2-	089		XA01A2-	043		24	B				9	ETCH	
P015VMEMRT	XA01A2-	089		XA01A2-	090		24	B				9	ETCH	
P015VMEMRT	XA01A2-	090		XA01A2-	089		24	B				9	ETCH	
P015VMEMRT	XA01A2-	090		XA01A2-	059		20		000			9	ETCH	
P015VMEMRT	XA01A2-	090		XPS1	044		20	T2	000	TG003		6		
P015VMEMRT	XA01A2-	090		XA01A2-	044		24	B				9	ETCH	
P+015VMEM	XA01A2-	091		XPS1	043		20	T2	666	TG003				
P+015VMEM	XA01A2-	091		XA01A2-	045		24	B				9	ETCH	
P+015VMEM	XA01A2-	091		XA01A2-	092		24	B				9	ETCH	
P+015VMEM	XA01A2-	092		XA01A2-	091		24	B				9	ETCH	
P+015VMEM	XA01A2-	092		XA01A2-	046		24	B				9	ETCH	
PFA*	XA02	013		XA01A2-	077									
CYCLEINIT	XA02 -	016		XA01A1-	052									
(RE/IN)*CP	XA02	017		XA01A1-	053								MODE N	
MEMENABLE*	XA02 -	018		XA01A1-	040									
MEMBUSY	XA02	019		XA01A1-	039									
PGND	XA02	080		XA01A2-	086								BANK SEL*	
DAB01	XA02	081		XA01A1-	008									
DAB01	XA02 -	081		XA01A1-	054									
DAB01	XA02	081		XA01A2-	039									
DAB05	XA02	082		XA01A1-	010									
DAB05	XA02	082		XA01A1-	056									
DAB05	XA02	082		XA01A2-	037									
DAB06	XA02 -	083		XA01A1-	012									
DAB06	XA02	083		XA01A1-	058									
DAB06	XA02 -	083		XA01A2-	035									
DAB04	XA02 -	084		XA01A1-	014									
DAB04	XA02 -	084		XA01A1-	060									
DAB04	XA02	084		XA01A2-	033									
DAB03	XA02	085		XA01A1-	016									
DAB03	XA02	085		XA01A1-	062									

Table 4-1. Computer Wire List - Continued

Signal	From			To			AWG	Type	Color	Group	Route	Note	Remarks	Rev
	Component	Pin	Ref	Component	Pin	Ref								
DAB03	XA02	085		XA01A2-	031									
DAB07	XA02 -	086		XA01A1-	018									
DAB07	XA02	086		XA01A1-	064									
DAB07	XA02	086		XA01A2-	029									
DAB14	XA02 -	087		XA01A1-	022									
DAB14	XA02	087		XA01A1-	068									
DAB14	XA02 -	087		XA01A2-	061									
DAB02	XA02	088		XA01A1-	024									
DAB02	XA02 -	088		XA01A1-	070									
DAB02	XA02	088		XA01A2-	023									
DAB00	XA02 -	089		XA01A1-	020									
DAB00	XA02	089		XA01A1-	066									
DAB12	XA02	090		XA01A1-	026									
DAB12	XA02 -	090		XA01A1-	072									
DAB12	XA02 -	090		XA01A2-	021									
DAB15	XA02 -	091		XA01A1-	028									
DAB15	XA02	091		XA01A1-	074									
DAB15	XA02	091		XA01A2-	019									
DAB15	XA02 -	091		XA01A2-	063									
DAB09	XA02	092		XA01A1-	030									
DAB09	XA02	092		XA01A1-	076									
DAB09	XA02	092		XA01A2-	017									
DAB13	XA02	093		XA01A1-	032									
DAB13	XA02	093		XA01A1-	078									
DAB13	XA02	093		XA01A2-	015									
DAB10	XA02	094		XA01A1-	034									
DAB10	XA02	094		XA01A1-	080									
DAB10	XA02	094		XA01A2-	013									
DAB08	XA02	095		XA01A1-	036									
DAB08	XA02 -	095		XA01A1-	082									
DAB08	XA02 -	095		XA01A2-	011									
DAB11	XA02	096		XA01A1-	038									
DAB11	XA02	096		XA01A1-	084									
DAB11	XA02 -	096		XA01A2-	009									
DISCIN09	XA09	003		S001	002		24	T2	999	TG988				
P015VADRTN	XA11 -	046		XA11	095		24	B						
P015VADRTN	XA11	046		XPS1	007		22		000					
P015VADRTN	XA11	095		XA11	046		24	B						
PGND	XPS1 -	001		W001			22		000					
PGND	XPS1 -	002		W001			22		000					
P+015VAD	XPS1	003		E244			22		666				R NON XPS1-7	
P-015VAD	XPS1	004		E245			22		444				R NON XPS1-7	
PSUFLGSET*	XPS1	005		E233			24		999					
PSUFLGRST*	XPS1	006		E234	---		24		999					
P015VADRTN	XPS1	007		XA11	046		22		000					
P-015VMEM	XPS1	008		XA01A2-	048		20	T2	444	TG007				
P+015VMEM	XPS1	009		XA01A1-	001		20	T2	666	TG001				
P+015VMEM	XPS1	010		XA01A1-	046		20	T2	666	TG002				
VLAMPRET	XPS1	011		J003	048		22	T2	000	TG994		8		
115VACRT	XPS1	012		M001	B		20	T2	989	TG009				
115VAC	XPS1	013		M001	A		20	T2	888	TG009				
VLAMP	XPS1	014		J003	042		24	T2	999	TG993				
VLAMPRET	XPS1	015		J003	034		24	T2	000	TG993				
P+005V	XPS1	016		W002			22		555					
P+005V	XPS1	017		W002			22		555					
PGND	XPS1	018		W001			22		000					
PGND	XPS1	019		W001			22		000					
COMPOFF*	XPS1	020		E214			24		999					
ON/OFF*	XPS1	021		E243			24		999					
VLAMPREF	XPS1	022		E232			22	T2	999	TG006				
VLAMPREFRT	XPS1	023		E231	---		24	T2	000	TG006				
P015VMEMRT	XPS1	024		XA01A1-	049		20	T2	000	TG001		6		
P015VMEMRT	XPS1	025		XA01A1-	090		20	T2	000	TG002		6		
P+024VAUX	XPS1	026		E213	---		22		666					
VLAMPRET	XPS1	027		J003	047		22	T2	000	TG995		8		
VLAMPRET	XPS1	028		J003	041		22	T2	000	TG996		8		
VLAMP	XPS1	029		J003	033		22	T2	999	TG995		7		

Table 4-1. Computer Wire List - Continued

	From			To										
Signal	Component	Pin	Ref	Component	Pin	Ref	AWG	Type	Color	Group	Route	Note	Remarks	Rev
LAMP	XPS1	030		J003	032		22	T2	999	TG906		7		
LAMP	XPS1	031		J003	040		22	T2	999	TG904		7		
+005V	XPS1	032		W002	---		22		555					
+005V	XPS1	033		W002	---		22		555					
GND	XPS1	034		W001	---		22		000					
GND	XPS1	035		W001	---		22		000					
GND	XPS1	036		XA01A1-	007		20	T2	000	TG004		5	DATA RTN	
GND	XPS1	037		XA01A1-	089		20	T2	000	TG005		6		
SPOR	XPS1	038		E210	---		24		999					
6VAC90	XPS1	039		E241	---		24	T2	888	TG999				
6VAC90RTN	XPS1	040		E240	---		24	T2	989	TG999				
PUFLGSET*	XPS1	041		E207	---		24		999					
-15VRTN	XPS1	042		XA01A2-	049		20	T2	000	TG007		6		
+015VMEM	XPS1	043		XA01A2-	091		20	T2	666	TG003				
015VMEMRT	XPS1	044		XA01A2-	090		20	T2	000	TG003		6		
ATTERY*	XPS1	045		J003	049		24		999					
HARGE*	XPS1	046		J003	054		24		999					
+005V	XPS1	047		W002	---		22		555					
+005V	XPS1	048		W002	---		22		555					
+005V	XPS1	049		XA01A1-	005		20	T2	555	TG004				
+005V	XPS1	050		XA01A1-	042		20	T2	555	TG005				



NOTE:

⚠1 PIN NUMBERS ARE TYPICAL FOR ALL CONNECTORS ON INTERCONNECTION ASSEMBLY

Figure 4-1. Computer Test Point Identification

Table 4-2. CDU Wire List

Signal	From			To			AWG	Type	Color	Group	Route	Note	Remarks	Rev
		Pin	Ref		Pin	Ref								
+28VDC	DS02 -	001		DS02 -	004		24		999					
+28VDC A	DS02	001		E007	---		24		999					
FLAGSET* A	DS02	002		E012 -	---		24		999					
FLAGRST* A	DS02 -	003		E013	---		24		999					
+28VDC	DS02 -	004		DS02 -	001		24		999					
ALARM* A	DS03 -	---		E014 -	---		26	FL	000					
P+005V A	DS03 -	---		E015 -	---		26	FL	222					
P+005V	E003 -	---		P001 -	011		24	FL	999		*DIR			
P+005V	E003	---		XA03 -	081		28	B	222		*DIR			
SPARE 2	E004 -	---		P001 -	019		26	FL	999					
SW1-1 NO	E005 -	---		P001	018		26	FL	999					
SW1-1 RET	E006 -	---		P001 -	003		26	FL	999					
+28VDC A	E007 -	---		DS02 -	001		24		999					
+28VDC B	E008 -	---		K001 -	X1		22		999					
RELAY* A	E011 -	---		K001 -	X2		22		999					
FLAGSET* A	E012 -	---		DS02 -	002		24		999					
FLAGRST*	E013 -	---		J001 -	045		ET	CH					FLEX	
FLAGRST* A	E013	---		DS02 -	003		24		999					
ALARM*	E014 -	- -		E017	---		ET	CH					FLEX	
ALARM* A	E014 -	---		DS03 -	---		26	FL	000					
P+005V	E015	---		J001 -	010		ET	CH					FLEX	
P+005V A	E015 -	---		DS03 -	---		26	FL	222					
SHLDRET	E016 -	---		J001	053		ET	CH					FLEX	
ALARM*	E017 -	---		E014 -	---		ET	CH					FLEX	
RELAY*	E018	---		E055 -	---		ET	CH					FLEX	
BATTERY*	E020 -	---		J001	049		ET	CH					FLEX	
IMU*	E021 -	---		J001 -	030		ET	CH					FLEX	
VLAMP	E022 -	---		E023 -	---		ET	CH					FLEX	
VLAMP	E022 -	---		J001 -	042		ET	CH					FLEX	
VLAMP	E023 -	---		E024 -	---		ET	CH					FLEX	
VLAMP	E023 -	---		E022 -	---		ET	CH					FLEX	
VLAMP	E024 -	---		E025 -	---		ET	CH					FLEX	
VLAMP	E024 -	---		E023 -	---		ET	CH					FLEX	
VLAMP	E025 -	---		E026 -	---		ET	CH					FLEX	
VLAMP	E025	---		E024 -	---		ET	CH					FLEX	
VLAMP	E026 -	---		E027 -	---		ET	CH					FLEX	
VLAMP	E026 -	---		E025	---		ET	CH					FLEX	
VLAMP	E027	---		E026 -	---		ET	CH					FLEX	
VLAMPRET	E028 -	---		J001 -	048		ET	CH					FLEX	
DPUFAIL*	E034 -	---		J001 -	015		ET	CH					FLEX	
PGND	E035 -	---		E036 -	---		ET	CH					FLEX	
PGND	E036 -	---		E037 -	---		ET	CH					FLEX	
PGND	E036 -	---		E035 -	---		ET	CH					FLEX	
PGND	E037 -	---		E038 -	---		ET	CH					FLEX	
PGND	E037 -	---		E036 -	---		ET	CH					FLEX	
PGND	E038 -	---		E039 -	---		ET	CH					FLEX	
PGND	E038 -	---		E037	---		ET	CH					FLEX	
PGND	E039	---		E040 -	---		ET	CH					FLEX	
PGND	E039 -	---		E038	---		ET	CH					FLEX	
PGND	E040 -	---		E039 -	---		ET	CH					FLEX	
P+005V	E041 -	---		E042 -	---		ET	CH					FLEX	
P+005V	E041	---		J001 -	027		ET	CH					FLEX	
P+005V	E042	---		E043 -	---		ET	CH					FLEX	
P+005V	E042	---		E041 -	---		ET	CH					FLEX	
P+005V	E043 -	---		E042 -	---		ET	CH					FLEX	
P+005V	E044 -	---		E045 -	---		ET	CH					FLEX	
P+005V	E045	---		E046 -	---		ET	CH					FLEX	
P+005V	E045 -	---		E044 -	---		ET	CH					FLEX	
P+005V	E046	---		E045 -	---		ET	CH					FLEX	
FLAGSET*	E047	---		J001 -	038		ET	CH					FLEX	
+28VDC	E048 -	---		J001 -	039		ET	CH					FLEX	
CHARGE*	E049 -	---		E098 -	---		ET	CH					FLEX	
CHARGE*	E049 -	---		J001 -	054		ET	CH					FLEX	
ADDRENV*	E050 -	---		XA03 -	012		ET	CH					FLEX	
ADDRENV*	E050 -	---		J001 -	009		ET	CH					FLEX	
MON	E051 -	---		XDS06-	C		ET	CH					D210*FLEX	
BATTERY*	E052 -	---		XDS04-	C		ET	CH					FLEX	

Table 4-2. CDU Wire List - Continued

	From			To										
Signal	Component	Pin	Ref	Component	Pin	Ref	AWG	Type	Color	Group	Route	Note	Remarks	Rev
IMU*	E053 -	---		XDS03-	D		ET	CH					FLEX	
ND11B	E054 -	---		XA02	076		ET	CH					ND6B FLEX	
RELAY*	E055	---		E018	---		ET	CH					FLEX	
RELAY*	E055	---		XA01	077		26		222					
DP11	E056 -	---		XA02	075		ET	CH					DP715*FLEX	
ND09B	E057 -	---		XA02	071		ET	CH					ND5B FLEX	
ND07B	E058 -	---		XA02	066		ET	CH					ND4B FLEX	
ND07D	E059 -	---		XA02	065		ET	CH					ND4D FLEX	
DP08	E060 -	--		E061 -	---		ET	CH					ND2F FLEX	
DP08	E061 -	---		E060	---		ET	CH					ND2F FLEX	
DP06	E062 -	---		XDS15-	J		ET	CH					ND2D FLEX	
ADL	E063 -	---		XDS11-	M		ET	CH					ADDL FLEX	
ADM	E064 -	---		XDS11-	N		ET	CH					ADEM FLEX	
ADP	E065 -	---		E093	---		ET	CH					ADHP FLEX	
ND02F	E066 -	---		XDS10-	E		ET	CH					ND1B FLEX	
VLAMP	E067 -	---		E068 -	---		ET	CH					FLEX	
VLAMP	E067 -	---		XDS01-	LC		ET	CH					FLEX	
VLAMP	E068	---		E096	---		ET	CH					FLEX	
VLAMP	E068 -	---		E067	---		ET	CH					FLEX	
Z-VEL	E069 -	---		XDS08-	C		ET	CH					FLEX	
ENT	E070	---		XDS08-	D		ET	CH					D412*FLEX	
ND11B	E071 -	---		XDS20-	B		ET	CH					ND6B FLEX	
ND11A	E072 -	---		XDS20-	A		ET	CH					ND6A FLEX	
ND11D	E073 -	---		XDS20-	D		ET	CH					ND6D FLEX	
DP11	E074 -	---		XDS20-	H		ET	CH					DP715*FLEX	
DP10	E075 -	---		XDS20-	J		ET	CH					ND2G FLEX	
DP08	E076 -	---		XDS18-	H		ET	CH					ND2F FLEX	
ND08E	E077	---		XA01	070		ET	CH					ND5E FLEX	
ND07D	E078	---		XDS16-	D		ET	CH					ND4D FLEX	
DP15	E079 -	---		XA02	057		ET	CH					SPSEG2FLEX	
DP13	E080	---		XDS16-	H		ET	CH					SPSEG2FLEX	
ND07G	E081 -	---		XDS16-	G		ET	CH					ND4G FLEX	
ATTN	E082 -	---		XDS04-	D		ET	CH					D109*FLEX	
ND05G	E083 -	---		XDS14-	G		ET	CH					ND2G FLEX	
ND05B	E084 -	---		XDS14-	B		ET	CH					ND2B FLEX	
ND04D	E085 -	---		XDS13-	D		ET	CH					ND3D FLEX	
ND04C	E086 -	---		XDS13-	C		ET	CH					ND3C FLEX	
DP05	E087 -	---		XDS14-	H		ET	CH					DP614*FLEX	
ND04F	E088 -	---		XDS13-	F		ET	CH					ND3F FLEX	
ND04A	E089 -	---		XDS13-	A		ET	CH					ND3A FLEX	
ADK	E090	---		XDS11-	L		ET	CH					ADCK FLEX	
ADJ	E091	---		XDS11-	K		ET	CH					ADBJ FLEX	
ADI	E092 -	---		XDS11-	J		ET	CH					ADAI FLEX	
ADP	E093 -	---		E065 -	---		ET	CH					ADHP FLEX	
ADP	E093	---		XDS11-	S		ET	CH					ADHP FLEX	
ND02C	E094	---		XDS10-	B		ET	CH					ND1E FLEX	
ND02G	E095 -	---		XDS10-	G		ET	CH					ND1G FLEX	
VLAMP	E096 -	---		E097	---		ET	CH					FLEX	
VLAMP	E096 -	---		E068 -	---		ET	CH					FLEX	
VLAMP	E097	---		E096 -	---		ET	CH					FLEX	
CHARGE*	E098 -	---		XDS05-	C		ET	CH					FLEX	
CHARGE*	E098 -	---		E049	---		ET	CH					FLEX	
DPUFAIL*	E099 -	---		XDS03-	C		ET	CH					FLEX	
ND11E	E100	---		XDS20-	E		ET	CH					ND6E FLEX	
ADZ	E101	---		XDS05-	D		ET	CH					D109*FLEX	
ND09B	E102 -	---		XDS18-	B		ET	CH					ND5B FLEX	
DP15	E103 -	---		XDS18-	J		ET	CH					SPSEG1FLEX	
DP14	E104	---		XDS17-	J		ET	CH					SPSEG1FLEX	
ND08F	E105 -	---		XDS17-	F		ET	CH					ND5F FLEX	
ND07B	E106 -	---		XDS16-	B		ET	CH					ND4B FLEX	
ND08E	E107 -	---		XDS17-	E		ET	CH					ND5E FLEX	
DP07	E108 -	---		XDS17-	H		ET	CH					ND2E FLEX	
ND07E	E109	---		XDS16-	E		ET	CH					ND4E FLEX	
ND05A	E110 -	---		XDS14-	A		ET	CH					ND2A FLEX	
ND05C	E111 -	---		XDS14-	C		ET	CH					ND2C FLEX	
ND05D	E112 -	---		XDS14-	D		ET	CH					ND2D FLEX	
ND05F	E113	---		XDS14-	F		ET	CH					ND2F FLEX	

Table 4-2. CDU Wire List - Continued

	From			To										
Signal	Componen	Pin	Ref		Pin	Ref	AW(	Type	Color	Group	Route			Rev
DP04	E114 -			XDS14 -			ET	CH					DP614*FLEX	
ND04B	E115 -			XDS13 -	E		ET	CH					ND3B FLEX	
ND04E	E116			XDS13 -	E		ET	CH					ND3E FLEX	
DP03	E117			XDS13 -	H		ET	CH					ND2C FLEX	
ADA	E118 -	--		XDS11 -	A		ET	CH					ADAI FLEX	
ADC	E119 -			XDS11 -	C		ET	CH					ADCK FLEX	
ADN	E120 -	---		XDS11 -	P		ET	CH					ADFN FLEX	
ADO	E121 -			XDS11 -	R		ET	CH					ADGO FLEX	
GO	E122 -			XDS02 -	C		ET	CH					FLEX	
ND02D	E123 -			XDS10 -	A		ET	CH					ND1D FLEX	
ND02E	E124 -	---		XDS10 -	F		ET	CH					ND1C FLEX	
ND02B	E125 -	---		XDS10 -	C		ET	CH					ND1F FLEX	
PGND	J001 -	001		J001 -	002		ET	CH					FLEX	
PGND	J001 -	002		J001 -	004		ET	CH					FLEX	
PGND	J001 -	002		J001 -	001		ET	CH					FLEX	
ADR/D' A*	J001 -	003		XA03 -	008		ET	CH					FLEX	
PGND	J001	004		J001	005		ET	CH					FLEX	
PGND	J001 -	004		J001	002		ET	CH					FLEX	
PGND	J001 -	005		J001 -	006		ET	CH					FLEX	
PGND	J00	005		J001 -	004		ET	CH					FLEX	
PGND	J00	006		J001 -	011		ET	CH					FLEX	
PGND	J00	006		J001 -	005		ET	CH					FLEX	
VL AMP	J00	007		J001 -	040									
ADR/DTA	J00	008		XA03 -	049		ET	CH					FLEX	
ADDRENV*	J00	009		E050	---		ET	CH					FLEX	
P+005V	J00	010		J001	017		ET	CH					FLEX	
P+005V	J00	010		E015 -	---		ET	CH					FLEX	
PGND	J00	011		J001 -	012		ET	CH					FLEX	
PGND	J00	011		J001 -	006		ET	CH					FLEX	
PGND	J00	012		P001	002		26	FL	999					
PGND	J00	012		J001 -	011		ET	CH					FLEX	
VLAMPRET	J00:	013		J001 -	047									
ENT*	J00:	014		P001	014		26	FL	999					
DPUFAIL*	J001 -	015		E034 -	---		ET	CH					FLEX	
ADDRENV	J001 -	016		XA03	053		ET	CH					FLEX	
P+005V	J001 -	017		J001 -	018		ET	CH					FLEX	
P+005V	J001 -	017		J001	010		ET	CH					FLEX	
P+005V	J001 -	018		J001 -	019		ET	CH					FLEX	
P+005V	J001 -	018		J001 -	017		ET	CH					FLEX	
P+005V	J001 -	019		J001 -	025		ET	CH					FLEX	
P+005V	J001	019		J001 -	018		ET	CH					FLEX	
115VAC	J001 -	020		K001 -	B2		22		000					
B/ SLDEN*	J001 -	022		NC			ET	CH					NO CONNEC'	
ON/OFF*	J001 -	023		P001 -	016		26	FL	999					
DATAENV	J001 -	024		XA03 -	054		ET	CH					FLEX	
P+005V	J001 -	025		J001 -	026		ET	CH					FLEX	
P+005V	J001 -	025		J001 -	019		ET	CH					FLEX	
P+005V	J001 -	026		J001 -	027		ET	CH					FLEX	
P+005V	J001 -	026		J001 -	025		ET	CH					FLEX	
P+005V	J001 -	027		E041	---		ET	CH					FLEX	
P+005V	J001 -	027		J001	026		ET	CH					FLEX	
B/SLDEN	J001 -	029		NC			ET	CH					NO CONNEC	
IMU*	J001 -	030		E021	---		ET	CH					FLEX	
DATAENV*	J001 -	031		XA03	013		ET	CH					FLEX	
/L AMP	J001 -	032		J001 -	033		ET	CH					FLEX	
/ LAMP	J001 -	033		J001 -	040		ET	CH					FLEX	
/L AMP	J001 -	033		J001 -	032		ET	CH					FLEX	
/LAMPRET	J001 -	034		J001 -	041		ET	CH					FLEX	
115 VACRT	J001 -	035		P001 -	021		22	FL	999					
RS232INR*	J001 -	037		NC									NO CONNEC'	
FLAGSET*	J001 -	038		E047 -			ET	CH					FLEX	
+28VDC	J001 -	039		E048 -	---		ET	CH					FLEX	
/ L AMP	J001 -	040		J001 -	042		ET	CH					FLEX	
/ LAMP	J001 -	040		J001	033		ET	CH					FLEX	
/L AMP	J001 -	040		J001 -	007									
/LAMPRET	J001 -	041		J001 -	047		ET	CH					FLEX	
/LAMPRET	J001 -	041		J001 -	034		ET	CH					FLEX	

Table 4-2. CDU Wire List - Continued

Signal	From			To										
	Componen	Pin	Ref	Componen	Pin	Ref	AWG	Type	Color	Group	Route	Note	Remarks	Rev
VL AMP	J001 -	042		E022	---		ET	CH					FLEX	
VLAMP	J001	042		J001	040		ET	CH					FLEX	
RS232INR	J001 -	044		NC									NO CONNEC	
FLAGRST*	J001 -	045		E013	---		ET	CH					FLEX	
SBPOR*	J001 -	046		XA03	001		ET	CH					FLEX	
VLAMPRET	J001 -	047		J001	048		ET	CH					FLEX	
VLAMPRET	J001 -	047		J001 -	041		ET	CH					FLEX	
VLAMPRET	J001 -	047		J001 -	013									
VLAMPRET	J001 -	048		E028	---		ET	CH					FLEX	
VLAMPRET	J001 -	048		J001	047		ET	CH					FLEX	
BATTERY*	J001 -	049		E020	---		ET	CH					FLEX	
250KHZ*	J001 -	051		XA03	005		ET	CH					FLEX	
SBPOR	J001 -	052		XA03 -	042		ET	CH					FLEX	
SHLDRET	J001 -	053		E016 -			ET	CH					FLEX	
SHLDRET A	J001 -	053		W001			22		999					
CHARGE*	J001 -	054		E049	---		ET	CH					FLEX	
250KHZ	J00	055		XA03	046		ET	CH					FLEX	
115VAC	K00	B2		J001 -	020		22		000					
115VAC	K00	B2		TB01	002		22		000					
+28VDC B	K00	X1		E008			22		999					
RELAY* A	K00	X2		E011	---		22		999					
COL 7	P00	001		XA03 -	079		26	FL	999					
PGND	P00	002		P001 -	010		ET	CH					ETCH IN KEYBD	
PGND	P00	002		J001	012		26	FL	999					
SW1-1 RET	P00	003		E006	---		26	FL	999					
COL 6	P00	004		XA03	036		26	FL	999					
COL 5	P00	005		XA03	076		26	FL	999					
COL 4	P00	006		XA03 -	080		26	FL	999					
COL 3	P00	007		XA03	039		26	FL	999					
COL 2	P00	008		XA03	038		26	FL	999					
COL 1	P00	009		XA03 -	078		26	FL	999					
PGND	P00	010		XA01	041		26	FL	999					
PGND	P00	010		P001 -	002		ET	CH					ETCH IN KEYBD	
P+005V	P00	011		E003	---		24	FL	999		*DIR			
ROW 1	P00	012		XA03	037		26	FL	999					
ROW 3	P001 -	013		XA03	072		26	FL	999					
ENT*	P001 -	014		J001	014		26	FL	999					
ROW 4	P001 -	015		XA03 -	031		26	FL	999					
ON/OFF*	P001 -	016		J001 -	023		26	FL	999					
ROW 2	P001 -	017		XA03	077		26	FL	999					
SW1-1 NO	P001 -	018		E005	---		26	FL	999					
SPARE 2	P001 -	019		E004	---		26	FL	999					
115VAC	P001 -	020		TB01	001		22	FL	999					
115VACRT	P001 -	021		J001 -	035		22	FL	999					
115VAC	TB01 -	001		P001 -	020		22	FL	999					
115VAC	TB01 -	002		K001 -	B2		22		000					
SHLDRET A	W001 -	---		J001	053		22		999					
ND01A	XA01 -	002		XDS09-	D		ET	CH					ND1A FLEX	
ND01G	XA01 -	003		XDS09-	G		ET	CH					ND1G FLEX	
ND01F	XA01 -	004		XDS09-	E		ET	CH					ND1B FLEX	
DP12	XA01 -	005		XDS15-	H		ET	CH					SPSEG1FLEX	
ADD	XA01 -	006		XDS11-	D		ET	CH					ADDL FLEX	
ADB	XA01 -	008		XDS11-	B		ET	CH					ADBJ FLEX	
ADH	XA01 -	009		XDS11-	H		ET	CH					ADHP FLEX	
ADF	XA01 -	010		XDS11-	F		ET	CH					ADFN FLEX	
ND05E	XA01 -	013		XDS14-	E		ET	CH					ND2E FLEX	
STOP	XA01 -	015		XDS01-	C		ET	CH					STPGO*FLEX	
ATTN	XA01 -	017		XDS04-	P		ET	CH					FLEX	
ND03F	XA01 -	020		XDS12-	F		ET	CH					ND3F FLEX	
ND03E	XA01 -	021		XDS12-	E		ET	CH					ND3E FLEX	
ND03G	XA01 -	022		XDS12-	G		ET	CH					ND3G FLEX	
ND06F	XA01 -	025		XDS15-	F		ET	CH					ND4F FLEX	
ND06A	XA01 -	026		XDS15-	A		ET	CH					ND4A FLEX	
ND06E	XA01 -	027		XDS15-	E		ET	CH					ND4E FLEX	
1NS340	XA01 -	028		XA03	028		ET	CH					NS340FLEX	
ND08A	XA01 -	029		XDS17-	A		ET	CH					ND5A FLEX	
ND08D	XA01 -	030		XDS17-	D		ET	CH					ND5D FLEX	

Table 4-2. CDU Wire List - Continued

Signal	From Component	From Pin	To Component	To Pin	Ref	AWG	Type	Color	Group	Note	Remarks
ND08C	XA01 -	032	XDS17-	C		ET	CH				ND5C FLEX
ND10C	XA01 -	035	XDS19-	C		ET	CH				ND6C FLEX
ND10D	XA01 -	036	XDS19-	D		ET	CH				ND6D FLEX
ND10E	XA01 -	037	XDS19-	E		ET	CH				ND6E FLEX
ND10G	XA01 -	038	XDS19-	G		ET	CH				ND6G FLEX
1SPDSC1	XA01 -	039	NC								NO CONNECT
P+005V	XA01 -	040	XA01	081		ET	CH				FLEX
PGND	XA01 -	041	XA01 -	082		ET	CH				FLEX
PGND	XA01 -	041	P001 -	010		26	FL	999			
ND01B	XA01 -	043	XDS09-	C		ET	CH				ND1F FLEX
ND01C	XA01	044	XDS09-	B		ET	CH				ND1E FLEX
ND01D	XA01 -	045	XDS09-	A		ET	CH				ND1D FLEX
ND01E	XA01 -	046	XDS09-	F		ET	CH				ND1C FLEX
ADG	XA01 -	049	XDS11-	G		ET	CH				ADGO FLEX
ADE	XA01 -	051	XDS11-	E		ET	CH				ADEM FLEX
ADDAT	XA01 -	055	XA02 -	056		ET	CH				ASO FLEX
ND03C	XA01 -	059	XDS12-	C		ET	CH				ND3C FLEX
ND03A	XA01 -	060	XDS12-	A		ET	CH				ND3A FLEX
ND03D	XA01 -	061	XDS12-	D		ET	CH				ND3D FLEX
ND03B	XA01 -	062	XDS12-	B		ET	CH				ND3B FLEX
ND06D	XA01 -	065	XDS15-	D		ET	CH				ND4D FLEX
ND06B	XA01 -	066	XDS15-	B		ET	CH				ND4B FLEX
ND06C	XA01 -	067	XDS15-	C		ET	CH				ND4C FLEX
ND06G	XA01 -	068	XDS15-	G		ET	CH				ND4G FLEX
ND08E	XA01 -	070	E077	- - -		ET	CH				ND5E FLEX
ND08B	XA01 -	071	XDS17-	B		ET	CH				ND5B FLEX
ND08G	XA01 -	072	XDS17-	G		ET	CH				ND5G FLEX
1NS560	XA01 -	074	XA03	074		ET	CH				NS560FLEX
DP09	XA01 -	075	XDS19-	H		ET	CH				DP715*FLEX
ND1 0B	XA01 -	076	XDS19-	B		ET	CH				ND6B FLEX
RELAY*	XA01 -	077	E055 -	- - -		26		222			
ND10A	XA01	078	XDS19-	A		ET	CH				ND6A FLEX
ND10F	XA01 -	079	XDS19-	F		ET	CH				ND6F FLEX
CAL	XA01 -	080	XDS07-	C		ET	CH				D311*FLEX
P+005V	XA01 -	081	XA02 -	040		ET	CH				FLEX
P+005V	XA01 -	081	XA01 -	040		ET	CH				FLEX
PGND	XA01 -	082	XA02 -	041		ET	CH				FLEX
PGND	XA01 -	082	XA01 -	041		ET	CH				FLEX
ND02A	XA02 -	002	XDS10 -	D		ET	CH				ND1A FLEX
2NS120	XA02 -	014	XA03 -	015		ET	CH				NS120FLEX
DP02	XA02 -	016	XDS10 -	J		ET	CH				ND2B FLEX
DP01	XA02	019	XDS09-	J		ET	CH				ND2A FLEX
ND04G	XA02 -	022	XDS13-	G		ET	CH				ND3G FLEX
UPDT	XA02 -	024	XDS06-	D		ET	CH				D210*FLEX
ND07F	XA02 -	025	XDS16-	F		ET	CH				ND4F FLEX
ND07A	XA02 -	026	XDS16-	A		ET	CH				ND4A FLEX
ND09A	XA02 -	029	XDS18-	A		ET	CH				ND5A FLEX
ND09D	XA02 -	030	XDS18-	D		ET	CH				ND5D FLEX
ND09F	XA02 -	031	XDS18-	F		ET	CH				ND5F FLEX
ND09C	XA02 -	032	XDS18-	C		ET	CH				ND5C FLEX
ND11 C	XA02 -	035	XDS20-	C		ET	CH				ND6C FLEX
ND11 G	XA02 -	038	XDS20-	G		ET	CH				ND6G FLEX
2SPDCS1	XA02 -	039	NC								NO CONNECT
P+005V	XA02 -	040	XA02 -	081		ET	CH				FLEX
P+005V	XA02 -	040	XA01 -	081		ET	CH				FLEX
PGND	XA02 -	041	XA02 -	082		ET	CH				FLEX
PGND	XA02 -	041	XA01 -	082		ET	CH				FLEX
ASO	XA02 -	055	XA03 -	055		ET	CH				ASO FLEX
ADDAT	XA02 -	056	XA01 -	055		ET	CH				ASO FLEX
DP15	XA02 -	057	E079 -	- -		ET	CH				SPSEG2FLEX
ND07D	XA02 -	065	E059 -			ET	CH				ND4D FLEX
ND07B	XA02 -	066	E058 -	- - -		ET	CH				ND4B FLEX
ND07C	XA02 -	067	XDS16-	C		ET	CH				ND4C FLEX
ND09E	XA02 -	070	XDS18-	E		ET	CH				ND5E FLEX
ND09B	XA02 -	071	E057 -	- - -		ET	CH				ND5B FLEX
ND09G	XA02 -	072	XDS18-	G		ET	CH				ND5G FLEX
DP11	XA02 -	075	E056 -			ET	CH				DP715*FLEX

Table 4-2. CDU Wire List - Continued

Signal	From			To			AWG	Type	Color	Group	Route	Note	Remarks	Rev
		Pin	Ref	Component	Pin	Ref								
ND11B	XA02 -	076		E054 -	---		ET	CH					ND6B FLEX	
ND11F	XA02 -	079		XDS20-	F		ET	CH					ND6F FLEX	
MARK	XA02 -	080		XDS07-	D		ET	CH					D311*FLEX	
P+005V	XA02 -	081		XA03 -	040		ET	CH					FLEX	
P+005V	XA02 -	081		XA02 -	040		ET	CH					FLEX	
PGND	XA02 -	082		XA02 -	041		ET	CH					FLEX	
SBPOR*	XA03 -	001		J001 -	046		ET	CH					FLEX	
250KHZ*	XA03 -	005		J001 -	051		ET	CH					FLEX	
ADR/DTA*	XA03 -	008		J001 -	003		ET	CH					FLEX	
ADDRENV*	XA03 -	012		E050	---		ET	CH					FLEX	
DATAENV*	XA03 -	013		J001	031		ET	CH					FLEX	
2NS120	XA03 -	015		XA02 -	014		ET	CH					NS120FLEX	
1NS340	XA03 -	028		XA01 -	028		ET	CH					NS340FLEX	
ROW 4	XA03 -	031		P001 -	015		26	FL	999					
COL 6	XA03 -	036		P001 -	004		26	FL	999					
ROW 1	XA03 -	037		P001 -	012		26	FL	999					
COL 2	XA03 -	038		P001 -	008		26	FL	999					
COL 3	XA03 -	039		P001 -	007		26	FL	999					
P+005V	XA03 -	040		XA03 -	081		ET	CH					FLEX	
P+005V	XA03 -	040		XA02	081		ET	CH					FLEX	
SBPOR	XA03 -	042		J001 -	052		ET	CH					FLEX	
250KHZ	XA03 -	046		J001	055		ET	CH					FLEX	
ADR/DTA	XA03 -	049		J001 -	008		ET	CH					FLEX	
ADDRENV	XA03 -	053		J001 -	016		ET	CH					FLEX	
DATAENV	XA03 -	054		J001 -	024		ET	CH					FLEX	
ASO	XA03 -	055		XA02	055		ET	CH					ASO FLEX	
ROW 3	XA03 -	072		P001 -	013		26	FL	999					
1NS560	XA03 -	074		XA01	074		ET	CH					NS560F EX	
COL 5	XA03 -	076		P001 -	005		26	FL	999					
ROW 2	XA03 -	077		P001	017		26	FL	999					
COL 1	XA03 -	078		P001	009		26	FL	999					
COL 7	XA03 -	079		P001	001		26	FL	999					
COL 4	XA03 -	080		P001	006		26	FL	999					
P+005V	XA03 -	081		E003 -	---		28	B	222		*DIR			
P+005V	XA03 -	081		XA03 -	040		ET	CH					F EX	
STOP	XDS01-	C		XDS01	D		ET	CH					FLEX	
STOP	XDS01-	C		XA01	015		ET	CH					STPGO*FLEX	
STOP	XDS01-	D		XDS01-	G		ET	CH					FLEX	
STOP	XDS01-	D		XDS01 -	C		ET	CH					FLEX	
STOP	XDS01-	G		XDS01 -	H		ET	CH					FLEX	
STOP	XDS01-	G		XDS01-	D		ET	CH					FLEX	
STOP	XDS01-	H		XDS01-	J		ET	CH					FLEX	
STOP	XDS01	H		XDS01-	G		ET	CH					FLEX	
STOP	XDS01-	J		XDS01-	K		ET	CH					FLEX	
STOP	XDS01-	J		XDS01-	H		ET	CH					FLEX	
STOP	XDS01-	K		XDS01-	N		ET	CH					FLEX	
STOP	XDS01-	K		XDS01-	J		ET	CH					FLEX	
STOP	XDS01-	N		XDS01-	P		ET	CH					FLEX	
STOP	XDS01 -	N		XDS01-	K		ET	CH					FLEX	
STOP	XDS01 -	P		XDS01 -	N		ET	CH					FLEX	
VLAMP	XDS01-	LC		XDS02-	LC		ET	CH					FLEX	
VLAMP	XDS01 -	LC		E067 -	---		ET	CH					FLEX	
GO	XDS02-	C		XDS02-	D		ET	CH					FLEX	
GO	XDS02-	C		E122 -	---		ET	CH					FLEX	
GO	XDS02-	D		XDS02-	G		ET	CH					FLEX	
GO	XDS02-	D		XDS02-	C		ET	CH					FLEX	
GO	XDS02-	G		XDS02-	H		ET	CH					FLEX	
GO	XDS02-	G		XDS02-	D		ET	CH					FLEX	
GO	XDS02-	H		XDS02-	J		ET	CH					FLEX	
GO	XDS02-	H		XDS02-	G		ET	CH					FLEX	
GO	XDS02-	J		XDS02-	K		ET	CH					FLEX	
GO	XDS02-	J		XDS02-	H		ET	CH					FLEX	
GO	XDS02-	K		XDS02-	N		ET	CH					FLEX	
GO	XDS02-	K		XDS02-	J		ET	CH					FLEX	
GO	XDS02-	N		XDS02-	P		ET	CH					FLEX	
GO	XDS02-	N		XDS02-	K		ET	CH					FLEX	
GO	XDS02-	P		XDS02-	N		ET	CH					FLEX	

Table 4-2. CDU Wire List - Continued

	From			To										
Signal	Component	Pin	Ref	Component	Pin	Ref	AWG	Type	Color	Group	Route	Note	Remarks	Rev
VLAMP	XDS02-	LC		XDS03-	LC		ET	CH					FLEX	
VLAMP	XDS02-	LC		XDS01-	LC		ET	CH					FLEX	
DPUFAIL*	XDS03-	C		XDS03-	H		ET	CH					FLEX	
DPUFAIL*	XDS03-	C		E099 -	---		ET	CH					FLEX	
IMU*	XDS03-	D		XDS03-	G		ET	CH					FLEX	
IMU*	XDS03-	D		E053	---		ET	CH					FLEX	
IMU*	XDS03-	G		XDS03-	N		ET	CH					FLEX	
IMU*	XDS03-	G		XDS03-	D		ET	CH					FLEX	
DPUFAIL*	XDS03-	H		XDS03-	J		ET	CH					FLEX	
DPUFAIL*	XDS03-	H		XDS03-	C		ET	CH					FLEX	
DPUFAIL*	XDS03-	J		XDS03-	K		ET	CH					FLEX	
DPUFAIL*	XDS03-	J		XDS03-	H		ET	CH					FLEX	
DPUFAIL*	XDS03-	K		XDS03-	J		ET	CH					FLEX	
IMU*	XDS03-	N		XDS03-	P		ET	CH					FLEX	
IMU*	XDS03-	N		XDS03-	G		ET	CH					FLEX	
IMU*	XDS03-	P		XDS03-	N		ET	CH					FLEX	
VLAMP	XDS03-	LC		XDS04-	LC		ET	CH					FLEX	
VLAMP	XDS03-	LC		XDS02-	LC		ET	CH					FLEX	
BATTERY*	XDS04-	C		XDS04-	H		ET	CH					FLEX	
BATTERY*	XDS04-	C		E052	---		ET	CH					FLEX	
ATTN	XDS04-	D		XDS04-	G		ET	CH					FLEX	
ATTN	XDS04-	D		E082	---		ET	CH					D109*FLEX	
ATTN	XDS04-	G		XDS04-	N		ET	CH					FLEX	
ATTN	XDS04-	G		XDS04-	D		ET	CH					FLEX	
BATTERY*	XDS04-	H		XDS04-	J		ET	CH					FLEX	
BATTERY*	XDS04-	H		XDS04-	C		ET	CH					FLEX	
BATTERY*	XDS04-	J		XDS04-	K		ET	CH					FLEX	
BATTERY*	XDS04-	J		XDS04-	H		ET	CH					FLEX	
BATTERY*	XDS04-	K		XDS04-	J		ET	CH					FLEX	
ATTN	XDS04-	N		XDS04-	G		ET	CH					FLEX	
ATTN	XDS04-	P		XA01 -	017		ET	CH					FLEX	
VLAMP	XDS04-	LC		XDS05-	LC		ET	CH					FLEX	
VLAMP	XDS04-	LC		XDS03-	LC		ET	CH					FLEX	
CHARGE*	XDS05-	C		XDS05-	H		ET	CH					FLEX	
CHARGE*	XDS05-	C		E098	---		ET	CH					FLEX	
ADZ	XDS05-	D		XDS05-	G		ET	CH					FLEX	
ADZ	XDS05-	D		E101 -	---		ET	CH					D109*FLEX	
ADZ	XDS05-	G		XDS05-	N		ET	CH					FLEX	
ADZ	XDS05-	G		XDS05-	D		ET	CH					FLEX	
CHARGE*	XDS05-	H		XDS05-	J		ET	CH					FLEX	
CHARGE*	XDS05-	H		XDS05-	C		ET	CH					FLEX	
CHARGE*	XDS05-	J		XDS05-	K		ET	CH					FLEX	
CHARGE*	XDS05-	J		XDS05-	H		ET	CH					FLEX	
CHARGE*	XDS05-	K		XDS05-	J		ET	CH					FLEX	
ADZ	XDS05-	N		XDS05-	P		ET	CH					FLEX	
ADZ	XDS05-	N		XDS05-	G		ET	CH					FLEX	
ADZ	XDS05-	P		XDS05-	N		ET	CH					FLEX	
VLAMP	XDS05-	LC		XDS06-	LC		ET	CH					FLEX	
VLAMP	XDS05-	LC		XDS04-	LC		ET	CH					FLEX	
MON	XDS06-	C		XDS06-	H		ET	CH					FLEX	
MON	XDS06-	C		E051 -	---		ET	CH					D210*FLEX	
JPDT	XDS06-	D		XDS06-	G		ET	CH					FLEX	
JPDT	XDS06-	D		XA02	024		ET	CH					D210*FLEX	
JPDT	XDS06-	G		XDS06-	N		ET	CH					FLEX	
JPDT	XDS06-	G		XDS06-	D		ET	CH					FLEX	
MON	XDS06-	H		XDS06-	J		ET	CH					FLEX	
MON	XDS06-	H		XDS06-	C		ET	CH					FLEX	
MON	XDS06-	J		XDS06-	K		ET	CH					FLEX	
MON	XDS06-	J		XDS06-	H		ET	CH					FLEX	
MON	XDS06-	K		XDS06-	J		ET	CH					FLEX	
JPDT	XDS06 -	N		XDS06-	P		ET	CH					FLEX	
JPDT	XDS06-	N		XDS06-	G		ET	CH					FLEX	
JPDT	XDS06-	P		XDS06-	N		ET	CH					FLEX	
VLAMP	XDS06-	LC		XDS07-	LC		ET	CH					FLEX	
VLAMP	XDS06-	LC		XDS05-	LC		ET	CH					FLEX	
CAL	XDS07-	C		XDS07-	H		ET	CH					FLEX	
CAL	XDS07 -	C		XA01 -	080		ET	CH					D311*FLEX	

Table 4-2. CDU Wire List - Continued

Signal	From Component	From Pin	From Ref	To Component	To Pin	To Ref	AWG	Type	Color	Group	Route	Note	Remarks	Rev
MARK	XDS07-	D		XDS07-	G		ET	CH					FLEX	
MARK	XDS07-	D		XA02 -	080		ET	CH					D311*FLEX	
MARK	XDS07-	G		XDS07-	N		ET	CH					FLEX	
MARK	XDS07-	G		XDS07-	D		ET	CH					FLEX	
CAL	XDS07-	H		XDS07-	J		ET	CH					FLEX	
CAL	XDS07-	H		XDS07-	C		ET	CH					FLEX	
CAL	XDS07-	J		XDS07-	K		ET	CH					FLEX	
CAL	XDS07-	J		XDS07-	H		ET	CH					FLEX	
CAL	XDS07-	K		XDS07-	J		ET	CH					FLEX	
MARK	XDS07-	N		XDS07-	P		ET	CH					FLEX	
MARK	XDS07-	N		XDS07-	G		ET	CH					FLEX	
MARK	XDS07-	P		XDS07-	N		ET	CH					FLEX	
VLAMP	XDS07-	LC		XDS08-	LC		ET	CH					FLEX	
VLAMP	XDS07-	LC		XDS06-	LC		ET	CH					FLEX	
Z-VEL	XDS08-	C		XDS08-	H		ET	CH					FLEX	
Z-VEL	XDS08-	C		E069 -	---		ET	CH					FLEX	
ENT	XDS08-	D		XDS08-	G		ET	CH					FLEX	
ENT	XDS08-	D		E070 -	---		ET	CH					D412*FLEX	
ENT	XDS08-	G		XDS08-	N		ET	CH					FLEX	
ENT	XDS08-	G		XDS08-	D		ET	CH					FLEX	
Z-VEL	XDS08-	H		XDS08-	J		ET	CH					FLEX	
Z-VEL	XDS08-	H		XDS08-	C		ET	CH					FLEX	
Z-VEL	XDS08-	J		XDS08-	K		ET	CH					FLEX	
Z-VEL	XDS08-	J		XDS08-	H		ET	CH					FLEX	
Z-VEL	XDS08-	K		XDS08-	J		ET	CH					FLEX	
ENT	XDS08-	N		XDS08-	P		ET	CH					FLEX	
ENT	XDS08-	N		XDS08-	G		ET	CH					FLEX	
ENT	XDS08-	P		XDS08-	N		ET	CH					FLEX	
VL AMP	XDS08-	LC		XDS09-	LC		ET	CH					FLEX	
VL AMP	XDS08-	LC		XDS07-	LC		ET	CH					FLEX	
ND01D	XDS09-	A		XA01 -	045		ET	CH					ND1D FLEX	
ND01C	XDS09-	B		XA01 -	044		ET	CH					ND1E FLEX	
ND01B	XDS09-	C		XA01 -	043		ET	CH					ND1F FLEX	
ND01A	XDS09-	D		XA01 -	002		ET	CH					ND1A FLEX	
ND01F	XDS09-	E		XA01 -	004		ET	CH					ND1B FLEX	
ND01E	XDS09-	F		XA01 -	046		ET	CH					ND1C FLEX	
ND01G	XDS09-	G		XA01 -	003		ET	CH					ND1G FLEX	
DP01	XDS09-	J		XA02 -	019		ET	CH					ND2A FLEX	
VLAMP	XDS09-	LC		XDS10-	LC		ET	CH					FLEX	
V L AMP	XDS09-	LC		XDS08-	LC		ET	CH					FLEX	
ND02D	XDS10-	A		E123 -	---		ET	CH					ND1D FLEX	
ND02C	XDS10-	B		E094 -	---		ET	CH					ND1E FLEX	
ND02B	XDS10-	C		E125 -	---		ET	CH					ND1F FLEX	
ND02A	XDS10-	D		XA02 -	002		ET	CH					ND1A FLEX	
ND02F	XDS10-	E		E066	---		ET	CH					ND1B FLEX	
ND02E	XDS10-	F		E124 -	---		ET	CH					ND1C FLEX	
ND02G	XDS10-	G		E095 -	---		ET	CH					ND1G FLEX	
DP02	XDS10-	J		XA02 -	016		ET	CH					ND2B FLEX	
VL AMP	XDS10-	LC		XDS11-	LC		ET	CH					FLEX	
VLAMP	XDS10-	LC		XDS09-	LC		ET	CH					FLEX	
ADA	XDS11-	A		E118 -	---		ET	CH					ADAI FLEX	
ADB	XDS11-	B		XA01 -	008		ET	CH					ADBJ FLEX	
ADC	XDS11-	C		E119 -	---		ET	CH					ADCK FLEX	
ADD	XDS11-	D		XA01 -	006		ET	CH					ADDL FLEX	
ADE	XDS11-	E		XA01 -	051		ET	CH					ADEM FLEX	
ADF	XDS11-	F		XA01 -	010		ET	CH					ADFN FLEX	
ADG	XDS11-	G		XA01	049		ET	CH					ADGO FLEX	
ADH	XDS11-	H		XA01 -	009		ET	CH					ADHP FLEX	
ADI	XDS11-	J		E092 -	---		ET	CH					ADAI FLEX	
ADJ	XDS11-	K		E091 -	---		ET	CH					ADBJ FLEX	
ADK	XDS11-	L		E090 -	---		ET	CH					ADCK FLEX	
ADL	XDS11-	M		E063 -	---		ET	CH					ADDL FLEX	
ADM	XDS11-	N		E064 -	---		ET	CH					ADEM FLEX	
ADN	XDS11-	P		E120 -	---		ET	CH					ADFN FLEX	
ADO	XDS11-	R		E121 -	---		ET	CH					ADGO FLEX	
ADP	XDS11-	S		E093 -	---		ET	CH					ADHP FLEX	
VL AMP	XDS11-	LC		XDS12-	LC		ET	CH					FLEX	

Table 4-2. CDU Wire List - Continued

Signal	From			To			AWG				Route	Note	Remarks	Rev
		Pin	Ref	Component	Pin	Ref								
VLAMP	XDS11 -	LC		XDS10-	LC		ET	CH					FLEX	
ND03A	XDS12-	A		XA01	060		ET	CH					ND3A FLEX	
ND03B	XDS12-	B		XA01	062		ET	CH					ND3B FLEX	
ND03C	XDS12-	C		XA01 -	059		ET	CH					ND3C FLEX	
ND03D	XDS12-	D		XA01 -	061		ET	CH					ND3D FLEX	
ND03E	XDS12-	E		XA01	021		ET	CH					ND3E FLEX	
ND03F	XDS12-	F		XA01 -	020		ET	CH					ND3F FLEX	
ND03G	XDS12-	G		XA01 -	022		ET	CH					ND3G FLEX	
VLAMP	XDS12-	LC		XDS13-	LC		ET	CH					FLEX	
VLAMP	XDS12-	LC		XDS11-	LC		ET	CH					FLEX	
ND04A	XDS13-	A		E089 -			ET	CH					ND3A FLEX	
ND04B	XDS 3-	B		E115 -			ET	CH					ND3B FLEX	
ND04C	XDS 3-	C		E086 -			ET	CH					ND3C FLEX	
ND04D	XDS 3-	D		E085 -			ET	CH					ND3D FLEX	
ND04E	XDS 3-	E		E116			ET	CH					ND3E FLEX	
ND04F	XDS 3-	F		E088	- - -		ET	CH					ND3F FLEX	
ND04G	XDS 3-	G		XA02 -	022		ET	CH					ND3G FLEX	
DP03	XDS 3-	H		E117	- - -		ET	CH					ND2C FLEX	
VLAMP	XDS 3-	LC		XDS14-	LC		ET	CH					FLEX	
VLAMP	XDS 3-	LC		XDS12-	LC		ET	CH					FLEX	
ND05A	XDS 4-	A		E110			ET	CH					ND2A FLEX	
ND05B	XDS 4-	B		E084 -			ET	CH					ND2B FLEX	
ND05C	XDS 4-	C		E111 -			ET	CH					ND2C FLEX	
ND05D	XDS 4-	D		E112	- - -		ET	CH					ND2D FLEX	
ND05E	XDS 4-	E		XA01 -	013		ET	CH					ND2E FLEX	
ND05F	XDS 4-	F		E113			ET	CH					ND2F FLEX	
ND05G	XDS 4-	G		E083			ET	CH					ND2G FLEX	
DP05	XDS 4-	H		E087 -			ET	CH					DP614*FLEX	
DP04	XDS 4-	J		E114	- - -		ET	CH					DP614*FLEX	
VLAMP	XDS 4-	LC		XDS15-	LC		ET	CH					FLEX	
VLAMP	XDS 4-	LC		XDS13-	LC		ET	CH					FLEX	
ND06A	XDS 5-	A		XA01 -	026		ET	CH					ND4A FLEX	
ND06B	XDS 5-	B		XA01 -	066		ET	CH					ND4B FLEX	
ND06C	XDS 5-	C		XA01	067		ET	CH					ND4C FLEX	
ND06D	XDS 5-	D		XA01 -	065		ET	CH					ND4D FLEX	
ND06E	XDS 5-	E		XA01	027		ET	CH					ND4E FLEX	
ND06F	XDS 5-	F		XA01	025		ET	CH					ND4F FLEX	
ND06G	XDS 5-	G		XA01	068		ET	CH					ND4G FLEX	
DP12	XDS 5-	H		XA01 -	005		ET	CH					SPSEG1FLEX	
DP06	XDS 5-	J		E062	- - -		ET	CH					ND2D FLEX	
VLAMP	XDS 5-	LC		XDS16-	LC		ET	CH					FLEX	
VLAMP	XDS 5-	LC		XDS14-	LC		ET	CH					FLEX	
ND07A	XDS 6-	A		XA02	026		ET	CH					ND4A FLEX	
ND07B	XDS 6-	B		E106	- - -		ET	CH					ND4B FLEX	
ND07C	XDS 6-	C		XA02 -	067		ET	CH					ND4C FLEX	
ND07D	XDS 6-	D		E078			ET	CH					ND4D FLEX	
ND07E	XDS 6-	E		E109 -	- - -		ET	CH					ND4E FLEX	
ND07F	XDS 6-	F		XA02	025		ET	CH					ND4F FLEX	
ND07G	XDS 6-	G		E081 -			ET	CH					ND4G FLEX	
DP13	XDS 6-	H		E080 -	- - -		ET	CH					SPSEG2FLEX	
VLAMP	XDS 6-	LC		XDS17-	LC		ET	CH					FLEX	
VLAMP	XDS 6-	LC		XDS15-	LC		ET	CH					FLEX	
ND08A	XDS 7-	A		XA01	029		ET	CH					ND5A FLEX	
ND08B	XDS 7-	B		XA01 -	071		ET	CH					ND5B FLEX	
ND08C	XDS 7-	C		XA01 -	032		ET	CH					ND5C FLEX	
ND08D	XDS 7-	D		XA01 -	030		ET	CH					ND5D FLEX	
ND08E	XDS 7-	E		E107 -			ET	CH					ND5E FLEX	
ND08F	XDS 7-	F		E105 -	- - -		ET	CH					ND5F FLEX	
ND08G	XDS 7-	G		XA01 -	072		ET	CH					ND5G FLEX	
DP07	XDS 7-	H		E108 -	- -		ET	CH					ND2E FLEX	
DP14	XDS 7-	J		E104	- - -		ET	CH					SPSEG1FLEX	
VLAMP	XDS 7-	LC		XDS18-	LC		ET	CH					FLEX	
VLAMP	XDS 7-	LC		XDS16-	LC		ET	CH					FLEX	
ND09A	XDS 8-	A		XA02 -	029		ET	CH					ND5A FLEX	
ND09B	XDS 8-	B		E102 -	- - -		ET	CH					ND5B FLEX	
ND09C	XDS18-	C		XA02 -	032		ET	CH					ND5C FLEX	
ND09D	XDS18-	D		XA02 -	030		ET	CH					ND5D FLEX	

Table 4-2. CDU Wire List - Continued

Signal	From Component	From Pin	From Ref	To Component	To Pin	To Ref	AWG	Type	Color	Group	Route	Note	Remarks	Rev
ND09E	XDS18-	E		XA02 -	070		ET	CH					ND5E FLEX	
ND09F	XDS18-	F		XA02 -	031		ET	CH					ND5F FLEX	
ND09G	XDS18-	G		XA02 -	072		ET	CH					ND5G FLEX	
DP08	XDS18-	H		E076 -	---		ET	CH					ND2F FLEX	
DP15	XDS18-	J		E103 -	---		ET	CH					SPSEG1FLEX	
VLAMP	XDS18-	LC		XDS19-	LC		ET	CH					FLEX	
VL AMP	XDS18-	LC		XDS17-	LC		ET	CH					FLEX	
ND10A	XDS19-	A		XA01 -	078		ET	CH					ND6A FLEX	
ND10B	XDS19-	B		XA01 -	076		ET	CH					ND6B FLEX	
ND10C	XDS19-	C		XA01 -	035		ET	CH					ND6C FLEX	
ND10D	XDS19-	D		XA01 -	036		ET	CH					ND6D FLEX	
ND10E	XDS19-	E		XA01 -	037		ET	CH					ND6E FLEX	
ND10F	XDS19-	F		XA01 -	079		ET	CH					ND6F FLEX	
ND10G	XDS19-	G		XA01 -	038		ET	CH					ND6G FLEX	
DP09	XDS19-	H		XA01 -	075		ET	CH					DP715*FLEX	
VL AMP	XDS19-	LC		XDS20-	LC		ET	CH					FLEX	
VLAMP	XDS19-	LC		XDS18-	LC		ET	CH					FLEX	
ND11A	XDS20-	A		E072 -	---		ET	CH					ND6A FLEX	
ND11B	XDS20-	B		E071 -	---		ET	CH					ND6B FLEX	
ND11C	XDS20-	C		XA02 -	035		ET	CH					ND6C FLEX	
ND11D	XDS20-	D		E073 -	---		ET	CH					ND6D FLEX	
ND11E	XDS20-	E		E100 -	---		ET	CH					ND6E FLEX	
ND11F	XDS20-	F		XA02 -	079		ET	CH					ND6F FLEX	
ND11G	XDS20-	G		XA02 -	038		ET	CH					ND6G FLEX	
DP11	XDS20-	H		E074 -	---		ET	CH					DP715*FLEX	
DP10	XDS20-	J		E075 -	---		ET	CH					ND2G FLEX	
VL AMP	XDS20-	LC		XDS19-	LC		ET	CH					FLEX	

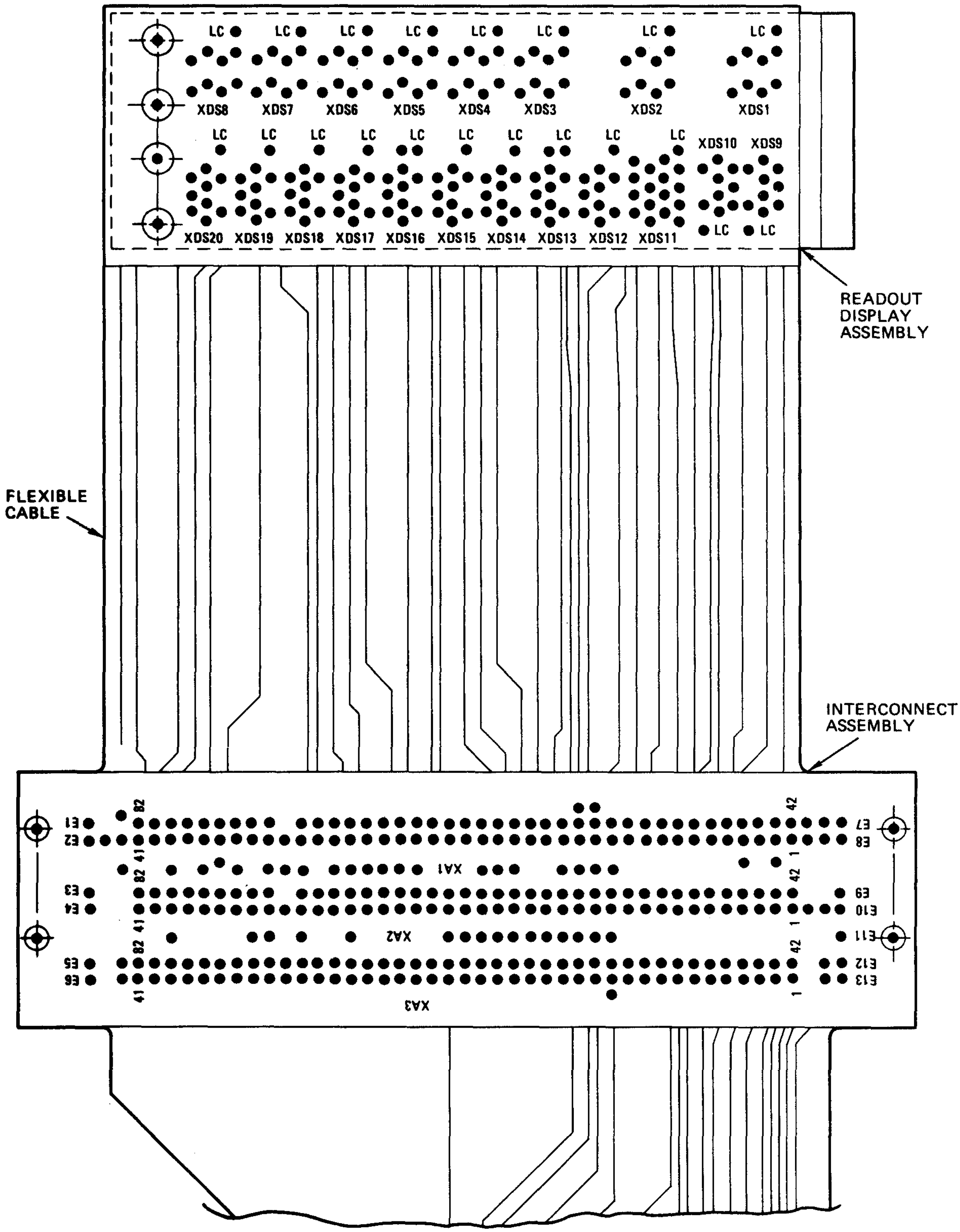


Figure 4-2. CDU Test Point Identification

Table 4-3. Power Supply Wire List

Signal	From			To										
		Pin	Ref	Component	Pin	Ref	AWG	Type	Color	Group	Route		Remarks	Rev
MAINBUSRTN	A08 -	E01		A6J1 -	023			T3	000	TG001				
MAINBUSRTN	A08 -	E01		A6A1 -	E07	B	12		111					
MAINBUS 3	A08 -	E02		A6T2 -	001		12		222					
17VRTN	A08 -	E05		A6A1	E02	B	12		000					
+17V	A08 -	E06		A6T1 -	003		12		666					
-20V	A08 -	E23		A6J1 -	022			T3	444	TG001				
+20V	A08 -	E24		A6J1 -	021			T3	666	TG001				
26VACSINE	A09 -	E09	B	A6J1 -	020			S2	000	SG004				
SHIELD	A09 -	E09	BS	A09 -	E26	B		SL	000	SG004				
26VSINERTN	A09 -	E10	B	A6J1 -	019			S2		SG004				
PSFRESET*	A09 -	E11	B	DS01 -	003									
K2B2	A09 -	E12	B	K002 -	B02		14		222					
115VSRTN	A09 -	E13	B	A6J1 -	038			S4		SG005				
K2A2	A09 -	E15	B	K002 -	A02		14		222					
115VSQ	A09 -	E16	B	A6J1	008			S4	000	SG003				
115VSQ	A09 -	E16	B	A6J1 -	027			S4		SG003				
115VSQRTN	A09 -	E17	B	A6J1 -	010			S4	222	SG003				
115VSQRTN	A09 -	E17	B	A6J1 -	029			S4	555	SG003				
SHIELD	A09 -	E17	BS	A09 -	E27	B		SL	000	SG003				
115VSINE 3	A09 -	E18	B	A6J1 -	035			S4	000	SG005				
AUX24	A09 -	E20	B	W004 -	---		12		222					
GND	A09 -	E23	B	FL01 -	002		12		111					
SHIELD	A09 -	E26	B	A09 -	E09	BS		SL	000	SG004				
SHIELD	A09 -	E27	B	A09 -	E17	BS		SL	000	SG003				
SHIELD	A09 -	E28	B	A09	E29	BS		SL	000	SG005				
115VSPHSH2	A09 -	E29	B	E036 -	---			S4	555	SG005				
SHIELD	A09 -	E29	BS	A09 -	E28	B		SL	000	SG005				
115VSPHSH1	A09	E30	B	E037 -	---			S4	222	SG005				
MAINRLYCHI	A09 -	E31		K001	X02				222					
AUX24	A4 -	E01		W004	---		6		222				L1-2/L2-2	
GND	A4 -	E02		FL01 -	002		6		111					
+12LOGIC	A5J2 -	001		A7J1 -	010				666					
SIGRETN	A5J2 -	003		S001 -	002				111					
9.1REFRETN	A5J2 -	005		A6J1 -	039			S2	000	SG001				
9.1VREF	A5J2 -	006		A6J1 -	040			S2		SG001				
SHIELD	A5J2 -	006	S	A5J2 -	007			SL	000	SG001				
SHIELD	A5J2 -	007		A5J2 -	006	S		SL	000	SG001				
SIGRTN	A5J2 -	013		A7J1	015				000					
SIGRTN	A5J2 -	014		A6J1	003				000					
GND	A5J2 -	018		W002	---				111					
+14V	A5J2 -	019		A6J1 -	005				666					
-14V	A5J2 -	020		A6J1 -	004				444					
PSFLAG*	A5J2 -	023		DS02 -	002									
BATTFLAG*	A5J2 -	024		DS01 -	002									
SCRGATE	A5J2 -	025		CR03 -	G									
BACKUPBAT1	A5J2 -	026		A7J1 -	022				222					
SHIELD	A5J2 -	027		A5J2 -	056	S		SL	000	SG002				
VEHBATT	A5J2 -	028		CR03	C				222					
CURRSENSE1	A5J2 -	029		T001 -	001			S2		SG002				
OVERTEMP*	A5J2 -	033		S001 -	001									
TRHTRRYCLO	A5J2 -	035		K002 -	X02									
VEH.BATT 1	A5J2 -	036		A7J1 -	003				222					
CURR.CNTL	A5J2 -	042		A7J1 -	030									
AUX24	A5J2 -	044		K001 -	A02				222					
CHGCURSNLO	A5J2 -	045		A7J1 -	025				222					
CB2CLOSED*	A5J2 -	053		CB02 -	003									
VEH.DETECT	A5J2 -	054		FL01 -	003									
CURRSENSE2	A5J2 -	056		T001 -	002			S2	000	SG002				
SHIELD	A5J2 -	056	S	A5J2 -	027			SL	000	SG002				
SINEOSCON	A5J2 -	057		A6J1	001									
CB1CLOSED*	A5J2 -	059		CB01 -	003									
INTERLOCK*	A5J2 -	060		3J02 -	V									
MAINRLYCLO	A5J2 -	062		K001	X01									
BCHGON/OFF	A5J2 -	065		A7J1 -	014									
RINVON/OFF	A5J2 -	069		A6J1 -	002									
17VRTN	A6A1 -	E02	B	A08 -	E05		12		000					
MAINBUSRTN	A6A1 -	E07	B	A08 -	E01		12		111					

Table 4-3. Power Supply Wire List - Continued

	From			To										
Signal	Component	Pin	Ref	Component	Pin	Ref	AWG	Type	Color	Group	Route	Note	Remarks	Rev
SINEOSCON	A6J1	001		A5J2	057									
RINVON/OFF	A6J1	002		A5J2	069									
SIGRTN	A6J1	003		A5J2	014				000					
-14V	A6J1	004		A5J2	020				444					
+14V	A6J1	005		A5J2	019				666					
MAINBUS 1	A6J1	006		A7J1	008				222					
115VSQ	A6J1	008		A09	E16	B		S4	000	SG003				
115VSQRTN	A6J1	010		A09	E17	B		S4	222	SG003				
SHIELD	A6J1	012		A6J1	029	S		SL	000	SG003				
115VACSINE	A6J1	014		M001	A				888					
115VSINE	A6J1	015		E038	--				888					
115V SINE	A6J1	016		3J06	C				888					
115VSINERN	A6J1	018		S002	002				998					
26VSINERTN	A6J1	019		A09	E10	B		S2		SG004				
26VACSINE	A6J1	020		A09	E09	B		S2	000	SG004				
SHIELD	A6J1	020	S	A6J1	031			SL	000	SG004				
+20V	A6J1	021		A08	E24			T3	666	TG001				
-20V	A6J1	022		A08	E23			T3	444	TG001				
MAINBUSRTN	A6J1	023		A08	E01			T3	000	TG001				
MAINBUS 2	A6J1	025		K002	X01				222					
115VSQ	A6J1	027		A09	E16	B		S4		SG003				
115VSQRTN	A6J1	029		A09	E17	B		S4	555	SG003				
SHIELD	A6J1	029	S	A6J1	012			SL	000	SG003				
SHIELD	A6J1	031		A6J1	020	S		SL	000	SG004				
115VSINE 1	A6J1	033		E038					888					
115VSINE 2	A6J1	034		E038	---				888					
115VSINE 3	A6J1	035		A09	E18	B		S4	000	SG005				
115VSINERT	A6J1	037		M001	B				998					
115VSRTN	A6J1	038		A09	E13	B		S4		SG005				
9.1REFRETN	A6J1	039		A5J2	005			S2	000	SG001				
9.1VREF	A6J1	040		A5J2	006			S2		SG001				
+17V	A6T1	003		A08	E06		12		666					
MAINBUS 3	A6T2	001		A08	E02		12		222					
VEH.BATT 2	A7J1	001		TB01	006				222					
VEH.BATT 2	A7J1	002		TB01	006				222					
VEH.BATT 1	A7J1	003		A5J2	036				222					
BACKUPBAT2	A7J1	005		TB01	007				229					
BACKUPBAT2	A7J1	006		TB01	007				229					
MAINBUS 4	A7J1	007		DS01	001				222					
MAINBUS 1	A7J1	008		A6J1	006				222					
+12LOGIC	A7J1	010		A5J2	001				666					
BCHGON/OFF	A7J1	014		A5J2	065									
SIGRTN	A7J1	015		A5J2	013				000					
GND	A7J1	016		W002	---				111					
VEH.BATT 3	A7J1	019		TB01	002				222					
VEH.BATT 3	A7J1	020		TB01	002				222					
BACKUPBAT1	A7J1	022		A5J2	026				222					
BACKUPBAT3	A7J1	023		TB01	003				229					
BACKUPBAT3	A7J1	024		TB01	003				229					
CHGCURSNLO	A7J1	025		A5J2	045				222					
MAINRLYCHI	A7J1	028		K001	X02				222					
CURR.CNTL	A7J1	030		A5J2	042									
GND	A7J1	033		W002					111					
GND	A7J1	034		W002	---				111					
BACKUPBAT5	CB01	001		K002	A01		14		222					
BACKUPBAT5	CB01	001		TB01	008		12		222					
CB1CLOSED*	CB01	003		A5J2	059									
GND	CB01	004		W002	---				111					
GND	CB01	004		CB02	004				111					
VEH.BATT 4	CB02	001		K002	B01		14		222					
VEH.BATT 4	CB02	001		TB01	001		12		222					
VEH.BATT 4	CB02	001		CR02	A		6		222					
CB2CLOSED*	CB02	003		A5J2	053									
GND	CB02	004		CB01	004				111					
GND	CB02	004		FL01	004				111					
VEH.BATT 4	CR02	A		CB02	001		6		222					
VEHBATT	CR02	C		K001	A01			FL	222					

Table 4-3. Power Supply Wire List - Continued

Signal	From Component	From Pin	From Ref	To Component	To Pin	To Ref	AWG	Type	Color	Group	Route	Note	Remarks	Rev
VEHBATT	CR03 -	C		K001	A01		6		222				BACKUPBATT	
VEHBATT	CR03 -	C		A5J2 -	028				222					
SCRGATE	CR03 -	G		A5J2 -	025									
MAINRLYCLO	CR04 -	A		K001	X01			FL						
MAINRLYCHI	CR04	C		K001 -	X02			FL						
AUX24	CR05 -	C		W003 -	---		12		222					
TRHTRRYCLO	CR06 -	A		K002 -	X02			FL						
MAINBUS 2	CR06 -	C		K002 -	X01			FL						
BATTFLAG*	CR08 -	A		DS01	002			FL						
MAINBUS 4	CR08 -	C		DS01 -	001			FL						
PSFLAG*	CR09 -	A		DS02 -	002			FL						
MAINBUS 4	CR09 -	C		DS02 -	001			FL						
PSFRESET*	CR10 -	A		DS02	003			FL						
MAINBUS 4	CR10 -	C		DS02	004			FL						
115VSINE	C001 -	---		E038 -	---			FL						
115VSPHSH	C001 -	---		E035 -	---			FL						
115VSINE	C002 -	---		E038	---			FL						
115VSPHSH	C002 -	---		E037 -	---			FL						
115 VSINE	C003 -	---		E038 -	---			FL						
115VSPHSH	C003 -	---		E036 -	---			FL						
MAINBUS 4	DS01 -	001		DS01 -	004			B						
MAINBUS 4	DS01 -	001		A7J1 -	007				222					
MAINBUS 4	DS01 -	001		CR08 -	C			FL						
BATTFLAG*	DS01 -	002		A5J2 -	024									
BATTFLAG*	DS01 -	002		CR08 -	A			FL						
PSFRESET*	DS01 -	003		DS02 -	003									
PSFRESET*	DS01 -	003		A09 -	E11	B								
MAINBUS 4	DS01 -	004		DS02	001				222					
MAINBUS 4	DS01 -	004		DS01 -	001			B						
MAINBUS 4	DS02 -	001		DS02 -	004			B						
MAINBUS 4	DS02 -	001		CR09	C			FL						
MAINBUS 4	DS02 -	001		DS01 -	004				222					
PSFLAG*	DS02 -	002		A5J2	023									
PSFLAG*	DS02 -	002		CR09 -	A			FL						
PSFRESET*	DS02 -	003		CR10	A			FL						
PSFRESET*	DS02 -	003		DS01	003									
MAINBUS 4	DS02 -	004		CR10 -	C			FL						
MAINBUS 4	DS02 -	004		DS02 -	001			B						
115VSPHSH	E035 -	---		3J06	B		20		888					
115VSPHSH	E035 -	---		C001 -	---			FL						
115VSPHSH	E036 -	---		C003 -	---			FL						
115 VSPHSH2	E036 -	---		A09	E29	B		S4	555	SG005				
115VSPHSH	E037 -	---		C002	---			FL						
115VSPHSH1	E037 -	---		A09 -	E30	B		S4	222	SG005				
SHIELD	E037 -	---	S	E041 -	---			SL	000	SG005				
115 VSINE	E038 -	---		C001 -	---			FL						
115VSINE	E038 -	---		C002 -	---			FL						
115VSINE	E038 -	---		C003 -	---			FL						
115VSINE	E038 -	---		A6J1 -	015				888					
115 VSINE 1	E038 -	---		A6J1 -	033				888					
115VSINE 2	E038 -	---		A6J1 -	034				888					
SHIELD	E041	---		E037 -	---	S		SL	000	SG005				
GND	FL01 -	002		A09 -	E23	B	12		111					
GND	FL01 -	002		A4 -	E02		6		111					
VEH.DETECT	FL01 -	003		A5J2 -	054									
GND	FL01 -	004		CB02 -	004				111					
VEHBATT	K001 -	A01		CR02 -	C			FL	222					
VEHBATT	K001 -	A01		CR03 -	C		6		222				BACKUPBATT	
VEHBATT	K001 -	A01		TB01 -	010				222					
AUX24	K001 -	A02		W003 -	---		6		222					
AUX24	K001 -	A02		A5J2 -	044				222					
MAINRLYCLO	K001 -	X01		A5J2 -	062									
MAINRLYCLO	K001 -	X01		CR04	A			FL						
MAINRLYCHI	K001 -	X02		A09 -	E31				222					
MAINRLYCHI	K001 -	X02		A7J1 -	028				222					
MAINRLYCHI	K001 -	X02		CR04 -	C			FL						
BACKUPBAT5	K002 -	A01		CB01	001		14		222					

Table 4-3. Power Supply Wire List - Continued

Signal	From			To			AWG	Type	Color	Group	Route	Note	Remarks	Rev
	Component	Pin	Ref		Pin	Ref								
K2A2	K002	A02		A09	E15	B	14		222					
VEH. BATT 4	K002	B01		CB02	001		14		222					
K2B2	K002	B02		A09	E12	B	14		222					
MAINBUS 2	K002	X01		A6J1	025				222					
MAINBUS 2	K002	X01		CR06	C			FL						
TRHTRRYCLO	K002	X02		A5J2	035									
TRHTRRYCLO	K002	X02		CR06	A			FL						
115VACSINE	M001	A		A6J1	014				888					
115VSINERT	M001	B		A6J1	037				998					
INTERLOCK*	SPARE			3J02	V		14					5		
OVERTEMP*	S001	001		A5J2	033									
SIGRETN	S001	002		A5J2	003				111					
115VACRSW	S002	001		3J06	A				998					
115VSINERN	S002	002		A6J1	018				998					
VEH.BATT 4	TB01	001		CB02	001		12		222					
VEH.BATT 3	TB01	002		A7J1	019				222					
VEH.BATT 3	TB01	002		A7J1	020				222					
BACKUPBAT3	TB01	003		A7J1	023				229					
BACKUPBAT3	TB01	003		A7J1	024				229					
VEH.BATT 2	TB01	006		A7J1	001				222					
VEH.BATT 2	TB01	006		A7J1	002				222					
BACKUPBAT2	TB01	007		A7J1	005				229					
BACKUPBAT2	TB01	007		A7J1	006				229					
BACKUPBAT5	TB01	008		CB01	001		12		222					
VEHBATT	TB01	010		K001	A01				222					
CURRSENSE1	T001	001		A5J2	029			S2		SG002				
CURRSENSE2	T001	002		A5J2	056			S2	000	SG002				
BACKUPBAT4	W001			3J02	A		14		222					
BACKUPBAT4	W001			3J02	B		14		222					
BACKUPBAT4	W001			3J02	C		14		222					
BACKUPBAT4	W001			3J02	D		14		222					
BACKUPBAT4	W001			3J02	M		14		222					
BACKUPBAT4	W001			3J02	N		14		222					
BACKUPBAT4	W001			3J02	P		14		222					
BACKUPBAT4	W001			3J02	R		14		222					
GND	W002			A5J2	018				111					
GND	W002			A7J1	016				111					
GND	W002			A7J1	033				111					
GND	W002			A7J1	034				111					
GND	W002			CB01	004				111					
GND	W002			3J02	F		14		111					
GND	W002			3J02	G		14		111					
GND	W002			3J02	H		14		111					
GND	W002			3J02	J		14		111					
GND	W002			3J02	K		14		111					
GND	W002			3J02	L		14		111					
GND	W002			3J02	S		14		111					
GND	W002			3J02	T		14		111					
GND	W002			3J02	U		14		111					
AUX24	W003			CR05	C		12		222					
AUX24	W003			K001	A02		6		222					
AUX24	W004			A09	E20	B	12		222					
AUX24	W004			A4	E01		6		222				L1-2/L2-2	
BACKUPBAT4	3J02	A		W001			14		222					
BACKUPBAT4	3J02	B		W001			14		222					
BACKUPBAT4	3J02	C		W001			14		222					
BACKUPBAT4	3J02	D		W001			14		222					
GND	3J02	F		W002			14		111					
GND	3J02	G		W002			14		111					
GND	3J02	H		W002			14		111					
GND	3J02	J		W002			14		111					
GND	3J02	K		W002			14		111					
GND	3J02	L		W002			14		111					
BACKUPBAT4	3J02	M		W001			14		222					
BACKUPBAT4	3J02	N		W001			14		222					
BACKUPBAT4	3J02	P		W001			14		222					
BACKUPBAT4	3J02	R		W001			14		222					

Table 4-3. Power Supply Wire List - Continued

Signal	From Component	From Pin	From Ref	To Component	To Pin	To Ref	AWG	Type	Color	Group	Route	Note	Remarks	Rev
ND	3J02	S		W002	---		14		111					
ND	3J02	T		W002	---		14		111					
ND	3J02	U		W002	---		14		111					
NTERLOCK*	3J02	V		SPARE-			14					5		
NTERLOCK*	3J02	V		A5J2	060									
15VACRSW	3J06 -	A		S002	001				998					
15VSPHSH	3J06	B		E035	---		20		888					
15V SINE	3J06	C		A6J1	016				888					

Table 4-4. Power Supply Harness Assembly Wire List

Signal	From			To			AWG	Type	Color	Group	Route	Note	Remarks	Re
		Pin	Ref		Pin	Ref								
HT/COOLRTN	A08 -	E03		A09 -	E25	G	12		111					
K03B2	A08 -	E04		BUS2 -	- - -		12		666					
P017+	A08 -	E07		A09 -	E03	B	22		666					
P028-	A08 -	E08		A09 -	E14	B	18		444					
P028+	A08 -	E09		A09 -	E21	F	16		666					
P028 RTN	A08 -	E10		A09 -	E22	F	16		000					
IMU RTN	A08 -	E11		A09 -	E07	B	22		000					
AMBTEMPERR	A08 -	E12		3J03 -	002		22		999					
LAMP GND	A08 -	E13		3J05 -	034		22		000					
PSFLAGSET*	A08 -	E14		3J05 -	013		22		999					
OFF	A08 -	E15		3J05	029		22		999					
ON*	A08 -	E16		3J05 -	016		22		999					
BATTLAMP*	A08 -	E17		A09 -	E01	B	22		999					
CHRGELAMP*	A08	E18		A09 -	E02	B	22		999					
UNDERVOLT*	A08 -	E19		A09 -	E05	B	22		999					
OVERVOLT*	A08 -	E20		A09 -	E06	B	22		999					
IMUFGINBT*	A08 -	E21		A09 -	E08	B	22		999					
OVERTEMP*	A08 -	E22		3J01 -	G		22		999					
P014+	A08 -	E25		A09 -	E04	B	22		69					
K03C2	A08 -	E26		K003 -	C02		22		000					
TRNSTHTR2	A08 -	E27		A09 -	E15	A	22		222					
K03C1	A08 -	E28		K003 -	C01		22		000					
K03C3	A08 -	E29		K003 -	C03		22		000					
K03X2	A08	E30		K003 -	X02		22		999					
K03X1	A08 -	E31		K003 -	X01		22		222					
115VACSQ	A08 -	E32		A09 -	E16	C	22		91					
115VACSINE	A08 -	E33		A09 -	E18	C	22		888					
BATTLAMP*	A09 -	E01	A	3J05 -	014		22		999					
BATTLAMP*	A09 -	E01	B	A08 -	E17		22		999					
CHRGELAMP*	A09 -	E02	A	3J05 -	015		22		999					
CHRGELAMP*	A09 -	E02	B	A08 -	E18		22		999					
P017+	A09 -	E03	A	3J05 -	017		22		666					
P017+	A09 -	E03	B	A08 -	E07		22		666					
P014+	A09 -	E04	A	3J05 -	018		22		69					
P014+	A09 -	E04	B	A08 -	E25		22		69					
UNDERVOLT*	A09 -	E05	A	3J05 -	019		22		999					
UNDERVOLT*	A09 -	E05	B	A08 -	E19		22		999					
OVERVOLT*	A09 -	E06	A	3J05 -	020		22		999					
OVERVOLT*	A09 -	E06	B	A08 -	E20		22		999					
IMU RTN	A09 -	E07	A	3J03 -	016		22		000					
IMU RTN	A09 -	E07	B	A08 -	E11		22		000					
IMUFLGINH*	A09 -	E08	A	3J03 -	017		22		999					
IMUFGINBT*	A09 -	E08	B	A08 -	E21		22		999					
26VAC SINE	A09 -	E09	A	3J05 -	003		22		888					
26VSINERTN	A09 -	E10	A	3J05 -	004		22		98					
PSFLAGRST*	A09 -	E11	A	3J05 -	012		22		999					
TRNTHTR1HI	A09 -	E12	A	3J01 -	B		16		222					
115SINERTN	A09 -	E13	A	3J01 -	K		16		98					
115SINERTN	A09 -	E13	A	3J05 -	002		22		98					
115VSNERTN	A09 -	E13	A	3J03 -	021		22		98					
P028-	A09 -	E14	A	3J03 -	010		22		444					
P028-	A09 -	E14	B	A08 -	E08		18		444					
P028-	A09 -	E14	C	3J03 -	025		22		444					
TRNSTHTR2	A09 -	E15	A	A08 -	E27		22		222					
TRNSTHTR2	A09 -	E15	A	3J01 -	F		16		222					
TRNSTHTR2	A09 -	E15	A	3J01 -	T		16		222					
115 VACSQ	A09 -	E16	A	3J03 -	005		22		91					
115 VACSQ	A09	E16	A	3J03 -	006		22		91					
115VACSQ	A09 -	E16	A	3J03 -	007		22		91					
115VACSQ	A09 -	E16	C	A08	E32		22		91					
115VACSQRT	A09 -	E17	A	3J03 -	008		22		111					
115VACSQRT	A09 -	E17	A	3J03 -	022		22		111					
115VACSQRT	A09 -	E17	A	3J03 -	023		22		111					
115VACSINE	A09 -	E18	A	3J01 -	A		16		888					
115VACSINE	A09 -	E18	A	3J03 -	004		22		888					
115VACSINE	A09 -	E18	A	3J05	001		22		888					
115VACSINE	A09 -	E18	C	A08 -	E33		22		888					

Table 4-4. Power Supply Harness Assembly Wire List - Continued

Signal	From Componen	From Pin	From Ref	To Componen	To Pin	To Ref	AWG	Type	Color	Group	Route		Remarks	Rev
COOL	A09 -	E19	A	3J01 -	R		16		69					
K03B1	A09 -	E19	C	BUS1 -	---		12		69					
COOL	A09 -	E19	D	3J01 -	C		16		69					
24UNREG	A09 -	E20	A	3J05 -	006		22		222					
24UNREG	A09 -	E20	A	3J05 -	007		22		222					
24UNREG	A09 -	E20	C	3J05 -	022		22		222					
24UNREG	A09 -	E20	D	3J05 -	023		22		222					
P028+	A09 -	E21	A	3J03 -	011		22		666					
P028+	A09 -	E21	B	3J03 -	012		22		666					
P028+	A09 -	E21	C	3J03 -	013		22		666					
P028+	A09 -	E21	D	3J03 -	026		22		666					
P028+	A09 -	E21	E	3J03 -	027		22		666					
P028+	A09 -	E21	F	A08 -	E09		16		666					
P028 RTN	A09 -	E22	A	3J03	014		22		000					
P028 RTN	A09 -	E22	B	3J03 -	015		22		000					
P028 RTN	A09 -	E22	C	3J03 -	028		22		000					
P028 RTN	A09 -	E22	D	3J03 -	029		22		000					
P028 RTN	A09 -	E22	E	3J03 -	035		22		000					
P028 RTN	A09 -	E22	F	A08 -	E10		16		000					
24UNREGRTN	A09 -	E23	A	3J05 -	031		22		111					
24UNREGRTN	A09 -	E23	A	3J05 -	032		22		111					
24UNREGRTN	A09 -	E23	A	3J05 -	033		22		111					
24UNREGRTN	A09 -	E23	C	3J05 -	021		22		111					
24UNREGRTN	A09 -	E23	D	3J05	037		22		111					
HEAT	A09 -	E24	B	3J01 -	D		16		666					
HEAT	A09 -	E24	C	3J01 -	E		16		666					
HEAT	A09 -	E24	D	3J01 -	S		16		666					
HEAT	A09 -	E24	E	3J01 -	X		16		666					
K03A3	A09 -	E24	F	BUS3 -	---		12		666					
HT/CL RTN	A09 -	E25	A	3J01 -	H		16		111					
HT/CL RTN	A09 -	E25	B	3J01 -	J		16		111					
HT/CL RTN	A09 -	E25	C	3J01 -	L		16		111					
HT/CL RTN	A09 -	E25	D	3J01 -	P		16		111					
HT/CL RTN	A09 -	E25	E	3J01 -	V		16		111					
HT/CL RTN	A09 -	E25	F	3J01 -	W		16		111					
HT/COOLRTN	A09 -	E25	G	A08	E03		12		111					
CHASSIS	A09 -	E26	A	3J05 -	011		22		111					
SHIELD	A09 -	E26	A	3J05 -	009		22		111					
CHASSIS	A09 -	E27	A	3J03 -	030		22		111					
SHIELD	A09 -	E27	A	3J03 -	018		22		111					
SHIELD	A09 -	E28	A	3J01 -	M		16		111					
IMUBLOWER	A09 -	E29	A	3J01 -	U		16		888					
DPUBLOWER	A09 -	E30	A	3J01 -	N		16		888					
24AUX	A09 -	E31		3J05	005		22		222					
K03B1	BUS1 -	---		A09 -	E19	C	12		69					
K03B2	BUS2 -	---		A08 -	E04		12		666					
K03A3	BUS3 -	---		A09 -	E24	F	12		666					
CR7A	CR07 -	A		K003 -	X02			FL						
CR7K	CR07 -	K		K003 -	X01			FL						
K03A1	K003 -	A01		K003 -	B01		12	B					BUS 1	
K03A1	K003 -	A01		K003 -	C03		22		69					
K03A2	K003 -	A02		K003 -	B02		12	B					BUS 2	
K03A3	K003 -	A03		K003 -	B03		12	B					BUS 3	
K03A1	K003 -	B01		K003 -	A01		12	B					BUS 1	
K03A2	K003 -	B02		K003 -	A02		12	B					BUS 2	
K03A3	K003 -	B03		K003 -	A03		12	B					BUS 3	
K03B3	K003 -	B03		K003 -	C01		22		666					
K03B3	K003 -	C01		K003 -	B03		22		666					
K03C1	K003 -	C01		A08	E28		22		000					
K03C2	K003 -	C02		A08 -	E26		22		000					
K03A1	K003 -	C03		K003 -	A01		22		69					
K03C3	K003 -	C03		A08 -	E29		22		000					
CR7K	K003 -	X01		CR07 -	K			FL						
K03X1	K003 -	X01		A08 -	E31		22		222					
CR7A	K003 -	X02		CR07 -	A			FL						
K03X2	K003 -	X02		A08 -	E30		22		999					
115VACSINE	3J01 -	A		A09 -	E18	A	16		888					

Table 4-4. Power Supply Harness Assemblv Wire List - Continued

	From			To										
Signal	ompon	Pin	Ref	Componen	Pin	Ref	\WC	Type	Color	Group	Route		Remarks	Re
TRNTHTRIH1	3J01 -	B		A09 -	E12	A	16		222					
COOL	3J01 -	C		A09 -	E19	D	16		69					
HEAT	3J01 -	D		A09 -	E24	B	16		666					
HEAT	3J01 -	E		A09 -	E24	C	16		666					
TRNSTHTR2	3J01 -	F		A09 -	E15	A	16		222					
OVERTEMP*	3J01 -	G		A08 -	E22		22		999					
OVERTEMP*	3J01 -	G					22		999					
HT/CL RTN	3J01 -	H		A09 -	E25	A	16		111					
HT/CL RTN	3J01 -	J		A09 -	E25	B	16		111					
115 SINERTN	3J01 -	K		A09 -	E13	A	16		98					
HT/CL RTN	3J01 -	L		A09 -	E25	C	16		111					
SHIELD	3J01 -	M		A09 -	E28	A	16		111					
DPUBLOWER	3J01 -	N		A09 -	E30	A	16		888					
HT/CL RTN	3J01 -	P		A09 -	E25	D	16		111					
COOL	3J01 -	R		A09 -	E19	A	16		69					
HEAT	3J01 -	S		A09 -	E24	D	16		666					
TRNSTHTR2	3J01 -	T		A09 -	E15	A	16		222					
IMUBLOWER	3J01 -	U		A09 -	E29	A	16		888					
HT/CL RTN	3J01 -	V		A09 -	E25	E	16		111					
HT/CL RTN	3J01 -	W		A09 -	E25	F	16		111					
HEAT	3J01 -	X		A09 -	E24	E	16		666					
AMBTEMPERR	3J03 -	002		A08 -	E12		22		999					
115VACSINE	3J03 -	004		A09 -	E18	A	22		888					
115 VACSQ	3J03 -	005		A09 -	E16	A	22		91					
115VACSQ	3J03 -	006		A09 -	E16	A	22		91					
115VACSQ	3J03 -	007		A09 -	E16	A	22		91					
115VACSQRT	3J03 -	008		A09 -	E17	A	22		111					
P028-	3J03 -	010		A09 -	E14	A	22		444					
P028+	3J03 -	011		A09 -	E21	A	22		666					
P028+	3J03 -	012		A09 -	E21	B	22		666					
P028+	3J03 -	013		A09 -	E21	C	22		666					
P028 RTN	3J03 -	014		A09 -	E22	A	22		000					
P028 RTN	3J03 -	015		A09 -	E22	B	22		000					
IMU RTN	3J03 -	016		A09 -	E07	A	22		000					
IMUFLGINH*	3J03 -	017		A09 -	E08	A	22		999					
SHIELD	3J03 -	018		A09 -	E27	A	22		111					
115VSNERTN	3J03 -	021		A09 -	E13	A	22		98					
115VACSQRT	3J03 -	022		A09	E17	A	22		111					
115VACSQRT	3J03 -	023		A09 -	E17	A	22		111					
P028-	3J03 -	025		A09 -	E14	C	22		444					
P028+	3J03 -	026		A09 -	E21	D	22		666					
P028+	3J03 -	027		A09 -	E21	E	22		666					
P028 RTN	3J03	028		A09 -	E22	C	22		000					
P028 RTN	3J03 -	029		A09 -	E22	D	22		000					
CHASSIS	3J03 -	030		A09	E27	A	22		111					
P028 RTN	3J03 -	035		A09 -	E22	E	22		000					
115 VACSINE	3J05 -	001		A09 -	E18	A	22		888					
115SINERTN	3J05 -	002		A09 -	E13	A	22		98					
26VAC SINE	3J05 -	003		A09 -	E09	A	22		888					
26VSINERTN	3J05 -	004		A09 -	E10	A	22		98					
24AUX	3J05 -	005		A09 -	E31		22		222					
24UNREG	3J05 -	006		A09 -	E20	A	22		222					
24UNREG	3J05 -	007		A09 -	E20	A	22		222					
SHIELD	3J05 -	009		A09 -	E26	A	22		111					
CHASSIS	3J05 -	011		A09 -	E26	A	22		111					
PSFLAGRST*	3J05 -	012		A09 -	E11	A	22		999					
PSFLAGSET*	3J05 -	013		A08 -	E14		22		999					
BATTLAMP*	3J05 -	014		A09 -	E01	A	22		999					
CHRGELAMP*	3J05 -	015		A09 -	E02	A	22		999					
ON*	3J05 -	016		A08 -	E16		22		999					
P017+	3J05 -	017		A09 -	E03	A	22		666					
P014+	3J05 -	018		A09 -	E04	A	22		69					
UNDERVOLT*	3J05 -	019		A09 -	E05	A	22		999					
OVERVOLT*	3J05 -	020		A09 -	E06	A	22		999					
24UNREGRTN	3J05 -	021		A09 -	E23	C	22		111					
24UNREG	3J05 -	022		A09 -	E20	C	22		222					
24UNREG	3J05 -	023		A09 -	E20	D	22		222					

Table 4-4. Power Supply Harness Assembly Wire List - Continued

	From			To										
Signal	Component	Pin	Ref	Component	Pin	Ref	AWG	Type	Color	Group	Route	Note	Remarks	Re\
)FF	3J05 -	029		A08 -	E15		22		999					
!4UNREGRTN	3J05 -	031		A09 -	E23	A	22		111					
!4UNREGRTN	3J05 -	032		A09 -	E23	A	22		111					
!4UNREGRTN	3J05 -	033		A09 -	E23	A	22		111					
.AMP GND	3J05 -	034		A08 -	E13		22		000					
!4UNREGRTN	3J05 -	037		A09 -	E23	D	22		111					

Section II. TOOLS AND EQUIPMENT

4-7. General. Special test equipment used at the general support level is listed for MAC (TM 5-6675-308-12) and is described in TM 5-6675-238-14 and TM 5-6675-309-**14.** Marine Corps users shall refer to TM 08837A-12/1, TM 08839A-14/1, and TM 08840A-14/1, respectively. For repair parts, refer to TM 5-6675-308-24P. Marine Corps users shall refer to TM 08837A-24P/3. Table 4-5 lists tools and materials used at the general support level.

Table 4-5. Tools and Materials Required for General Support Maintenance

Item	Purpose	NSN or specification
Adapter, socket wrench, l/2-inch to 3/8-inch	Used in conjunction with l-inch socket nut for removal and replacement of rectifier and diode in the power supply	5120-00-240-8703
Adhesive, epoxy	Used to bond PS terminal lug nuts	EC 2216 B/A (04633)
Adhesive, epoxy	Used to bond thermostatic switch to PS chassis	163-4LVFF (21109)
Adhesive, silicone, room temperature curing	Used to bond computer power supply end plate and power supply bottom cover and side RFI gaskets	RTV 156 (72799) or 30-079 (71984)
Adhesive, silicone RTV, non-corrosive	Used to bond CDU fault indicator, computer fault indicator, and power supply fault indicators	MIL-A-46146, Type I
Adhesive, urethane	Used to bond capacitors to PS chassis	724-14C (21 109)
Alcohol, isopropyl TT-I-735	Used for cleaning of surfaces	6810-00-753-4993
Battery box CY-7560/USQ-70	Used for stand-by power during testing	880530-3 (06481)
Carrier, battery	Used to remove and replace battery	5120-00-529-4124 or 5120-00-223-8455
Cloth, lint-free	Used in cleaning the surfaces when replacing cover gaskets	
Compound, sealing	Used to bond screws	MIL-S-22473, Grade C
Compound, sealing	Used to bond screws	MIL-S-22473, Grade H
Compound, tamper detection	Used on porro prism assembly mounting screws	7526F (72799)
Computer CP-1283/USQ-70	Used in testing and troubleshooting	880700-X (06481)
Crimping tool MS3191-4	Used in crimping size 12, 16, and 20 connector pins	5120-00-165-3912
Crimping tool MS3198-1	Used in crimping size 22 connector pins	5120-00-165-3910
Crimping tool, battery terminal	Used to repair battery terminals	5120-00-293-0463
Drill, electric, l/4-inch	Used in installation of winterization kit	5130-00-889-8994
Drill set, twist, range 60 to 1	Used in installation of winterization kit	5130-00-449-6775
Drill, twist, 11/32-inch dia	Used in removal of inserts in subfloor plate	5133-00-227-9664
Enamel, alkyd, forest green, MIL-E-52798	used as touch up paint	8010-111-7937
Extractor, circuit card	Used in removal of memory unit and computer circuit cards	875435-1 (06481)
Extractor, circuit card	Used in removal of circuit cards from CDU	877490-1 (06481)

Table 4-5. Tools and Materials Required for General Support Maintenance – Continued

Item	Purpose	NSN or specification
Extractor, screw no. 5	Used for removal of inserts in subfloor plate	Part of set 5120-00-610-1888
Extraction tools	Used for connector repair	
MS27495R12		5120-00-103-9708
MS27495R16		5120-00-409-5206
MS27495R20		5120-00-177-6966
MS27495R22		5120-00-146-6557
Frame, hand hacksaw, and blades	Used for repair of power cables and installation of winterization kit	5110-00-298-9657 5110-00-2774589
Hammer, ball peen, 4-oz	Used for setting rivets	5120-00-243-2985
Hex head driver, 3/1 6-inch for 1/4-inch drive	Used in conjunction with the torque wrench to torque the mounting bolt assemblies to IMU mounts	5120-00-935-4612
Hex head driver, 7/64-inch for 1/4-inch drive	Used in conjunction with the torque wrench to torque computer PS cover, computer cover, and CDU front panel assembly	5120-00-761-2015
Insertion tools	Used for connector repair	
MS27495A12		5120-00-018-0531
MS27495A16		5120-00-018-0529
MS27495A20		5120-00-171-6967
MS27495A22		5120-00-137-9140
Installation tool. insert TC 524L	Used in replacement of inserts in subfloor plate	
Insulation sleeving, electrical heat shrinkable, polyolefin, flexible, crosslinked	Used on component leads in power supplies	MIL-I-23053/5A
Key, socket head, L-type handle. 7/64-inch	Used in removal and replacement of components in power supplies, CDU, and removal of memory module	5120-00-889-2162
Key, socket head, L-type handle. 7/64-inch	Used in removal of the computer power supply from computer	5120-00-9516589
Knife, pocket	Used in gasket removal and clean-up	5110-00-240-5943

Table 4-5. Tools and Materials Required for General Support Maintenance – Continued

Item	Purpose	NSN or specification
Lubricating oil, general purpose 0-196	Used to lubricate clamping catches	
Magnet	Used for resetting of unit malfunction indicators	S120-00-545-4268
Memory unit, core (computer)	Used in testing and troubleshooting	880880-X (06481)
Memory unit, solid state (computer)	Used in testing and troubleshooting	868180-X (06481)
Mirror, inspection	Used to view obstructed components	5120-00-596-1098
Mounting Base, Electrical Equipment, MT4877/USQ-70	Used in testing and troubleshooting	875499-1 (0648 1)
Oscilloscope AN/USM-281A AN/USM-273	Used in testing and troubleshooting	6625-00-228-2201 6625-00-930-6637
Pliers, slip-joint 6-inch	Used in removal and replacement of components in power supplies, repair of connectors, and replacement of CDU housing cover	5120-00-224-1567
Pliers, diagonal cutting, 4-1/2.inch	Used to cut and prepare wires and components leads	5110-00-240-6209
Pliers, long-nose, 6- or 6-1/2-inch	Used in removal and replacement of various components in computer PS, PS, and CDU	5120-00-247-5177 5120-00-293-3481
Positioner, crimping tool MS3191-9T	Used with crimping tool MS3191-4	5120-00-016-7582
Positioner, crimping tool MS3198-6P	Used with crimping tool MS3198-1	5120-00-017-3809
Power supply PP-7352/USQ-70	Used in testing and troubleshooting	880600-2 (06481)
Power supply, O to 40 VDC HP 6268A	Used in testing and troubleshooting	
Power supply, 28 VDC MH 28-200RS (Christie)	Used in testing and troubleshooting and supplying primary power	6310-00-947-9670
Primer, bonding	Used in repair of flexible harnesses	A4094 (71984)
Primer, thread sealant	Used to apply prior to applying sealing compound MI L-S-22473, Grades C and H	MIL-S-22473
Punch, center	Used in installation of winterization kit	5120-00-293-3512
Screwdriver, cross-tip, no. O, 4-inch	Used in removal and replacement of various components	5120-00-060-2004

Table 4-5. Tools and Materials Required for General Support Maintenance – Continued

Item	Purpose	NSN or specification
Screwdriver, cross-tip, no. 1, 3 -inch	Used during various removal and replacement procedures in computer PS and PS	5120-00-240-8716
Screwdriver, cross-tip, no. 1, 8-inch	Used in removal and replacement of resistors and thermostat	5120-00-529-3101
Screwdriver, cross-tip, no. 2, 4-inch	Used in removal and replacement of components in computer PS and PS	5120-00-234-8913
Screwdriver, cross-tip, offset, no. 1 and 2	Used in removal and replacement of components in computer PS and PS	5120-00-892-5931
Screwdriver, flat-tip, 3/32-inch, 3-inch long	Used in removal and replacement of various components	5120-00-720-4969
Screwdriver, blade, l/4-inch by 0.032-inch for l/4-inch square drive	Used with torque wrench to torque PS cover	5120-00-316-9228
Screwdriver, flat-tip, 3/16-inch, 8-inch long	Used in removal and replacement of various components	5120-00-2604837
Screwdriver, flat-tip, l/4-inch, 4-inch long	Used in removal and replacement of various components	5120-00-222-8852
Soldering/desoldering set	Used to solder and unsolder components	3439-00-460-7198
Solder, rosin core	Used in soldering	3439-00-555-4629
Stripper, wire	Used to prepare wires and component leads	5120-00-278-2423
Target set	Used in alignment of PADS porro prism	6675-00.065-7502
Teletypewriter TT-100/FG	Used as input/output device for PADS test set	5815-00-503-2763
Test Set, PADS, AN/USM427	Used in testing and troubleshooting computer, IMU, and CDU	6675-01-081-9198
Test Set, Power Supply, AN/USM-428	Used in testing and troubleshooting power supply and computer power supply	6675-01-075-4033
Theodolite. T-2 Direct .002 MIL, 30 PORM, 28 PWR LIN **W07701**	Used in alignment of PADS porro prism	6675-00-684-5171
Tissue, lens NNNP 40, Type 1, Class 1	Used in cleaning of porro prism assembly	6640-00-597-6745
‘Tripod	Used with the odolite	
Tweezers, 6l/2-inch	Used for removal and replacement of components	5120-00-293-0149

Table 4-5. Tools and Matarials Raquired for General Support Maintenance – Continued

Item	Purpose	NSN or specification
Voltmeter, Digital HP 3465	Used in testing and troubleshooting	6625-01-039-7922
Watch, stop	Used in testing and troubleshooting	
Wire, insulated, stranded: 12, 16,20,22, and 28 AWG	Used for repair cables and wire harnesses	MIL-W-16878
Wire, safety	Used to prevent loosening of hardware	MS20995C20
Wrench, adjustable, 6-inch	Used in removal and replacement of various components	5120-00-264-3795
Wrench, combination, 5/32-inch	Used in removal and replacement of various components	S 120-00-132-0492
Wrench, combination, 5/16-inch	Used in removal and replacement of various components	5120-00-228-9503
Wrench, combination, 7/16-inch	Used in removal and replacement of components in computer PS and PS	5120-00-228-9505
Wrench, combination, 9/16-inch	Used in removal and replacement of components in computer PS	5120-00-228-9507
Wrench, combination, 3/4-inch	Used in removal and replacement of pushbutton switches	5120-00-228-9510
Wrench, open end, fixed, 3/16-inch and l/4-inch	Used in removal and replacement of various components	5120-00-228-9527
Wrench, open end, freed, 3/8-inch and 7/16-inch	Used in removal and replacement of various components	5120-00-277-2342
Wrench, open end, fixed, l/2-inch and 7/16-inch	Used in removal and replacement of various components	5120-00-187-7123
Wrench, open end, fixed, 5/8-inch and 9/16-inch	Used in removal and replacement of CDU mounting bracket	5120-00-187-7126
Wrench, open end, fixed, 3/4-inch and 7/8-inch	Used in removal and replacement of vibration and support mounts	5120-00-240-5609
Wrench, single socket spinner, 5/32-inch	Used in removal and replacement of parts on computer and power supply	5120-00-585-2149
Wrench, single socket, spinner, l/4-inch	Used in removal and replacement of various components	5120-00-241-3188
Wrench, strap TG-70	Used in removal and replacement of connector shells	
Wrench, torque, screwdriver, 1/4-inch square drive	Used to torque cover screws on computer, power supply, CDU, and computer PS. Also used to torque IMU bolt assemblies to mounts and computer to computer PS	5120-00-890-7816

Section III. TESTING AND TROUBLESHOOTING

4-8. General.

NOTE

The computer is the primary tester for the CDU and IMU. Perform the computer test to verify proper computer operation before testing a CDU or IMU.

a. General support troubleshooting of the PADS consists of performing testing and troubleshooting of the computer, CDU, PS, and computer power supply as outlined on tables 4-6, or 4-6.1, 4-7, 4-11, 4-19, and 4-20, and IMU testing, alignment, and troubleshooting, as outlined in table 4-14 or 4-14.1. Tables 4-6 and 4-14 use PADS test set punched tape reader, part no. 877406-1, and tables 4-6.1 and 4-14.1 use punched tape reader, part no 877406-2. The equipment setup and program load sequence described in table 4-6, 4-6.1, 4-6.2 and 4-6.3 is common for the computer, CDU, or IMU. It should be noted that if an IMU dedicated memory is used for the testing, the alignment data is lost. Therefore, the IMU calibration tape must be reloaded into the dedicated memory. If only computer or CDU testing is to be performed, use a spare memory instead of the IMU dedicated memory. If an IMU is being tested, the IMU dedicated memory must be installed in the computer. The procedures in the tables are arranged in three columns. The first column contains the test operation procedures to be performed. The second column contains the normal indication to be observed when the procedure has been performed. The third column contains the corrective action to be taken if the normal indication is not obtained. If a corrective action is not given where a normal indication is given, this normal indication is a function of the test equipment, and if abnormal, the applicable technical manual should be referred to for test equipment malfunctions. Whenever a corrective action has been taken, the complete testing and troubleshooting procedures must be followed in the sequence given. All PADS equipment must be installed in the primary pallet during testing and troubleshooting.

b. There are two types of memory units available for the computer; a core or a solid state memory. The determination of the memory type is important because the program loading instructions are different for each memory. The memory type, if unknown, can be determined by following the steps in table 4-6 or 4-6.1.

c. The core memory contains only one program at a time, either the diagnostic alignment program or the operational program. Follow instructions in table 4-6 or 4-6.1 for diagnostic alignment program loading.

d. The solid state memory contains both the diagnostic alignment and operational programs. Loading of the solid state memory for diagnostic alignment and the reloading for operation is not necessary. Only IMU calibration constants need be loaded when the memory is to be dedicated to a different IMU. Refer to table 4-18, steps aa thru ba or table 4-18.1 steps ab through bd for IMU calibration constants loading. In the event that the solid state memory must be reloaded with the solid state program, refer to table 4-6.2 or 4-6.3 for loading instructions.

WARNING

The tapes used in testing and operating the PADS are electrically conductive. DEATH OR SERIOUS INJURY, as well as damage to tapes may result if the tapes are allowed to come into contact with 115 VAC.

CAUTION

When removing, replacing or handling the solid state memory, do not touch connector pins or components on face of assembly as damage to the memory may result.

Ensure that the solid state memory is transported in conductive bag with CAUTION label identifying its contents as static-sensitive device.

Prior to removal of the solid state memory from packaging, operator should discharge static electricity by making arm contact with earth ground.

4-9. Computer Testing and Troubleshooting Procedure.

a. *Test Equipment and Materials.*

(1) PADS test set consists of the signal processor unit (SPU) punched tape reader (tape reader), buffer unit, interconnecting cables, and auxiliary equipment.

(2) Teletypewriter.

NOTE

The 100-wpm motor worm gear must be installed prior to use. Refer to TM 11-5815-200-12.

(3) PADS power supply, pallet frame, and battery box.

(4) + 28V power source.

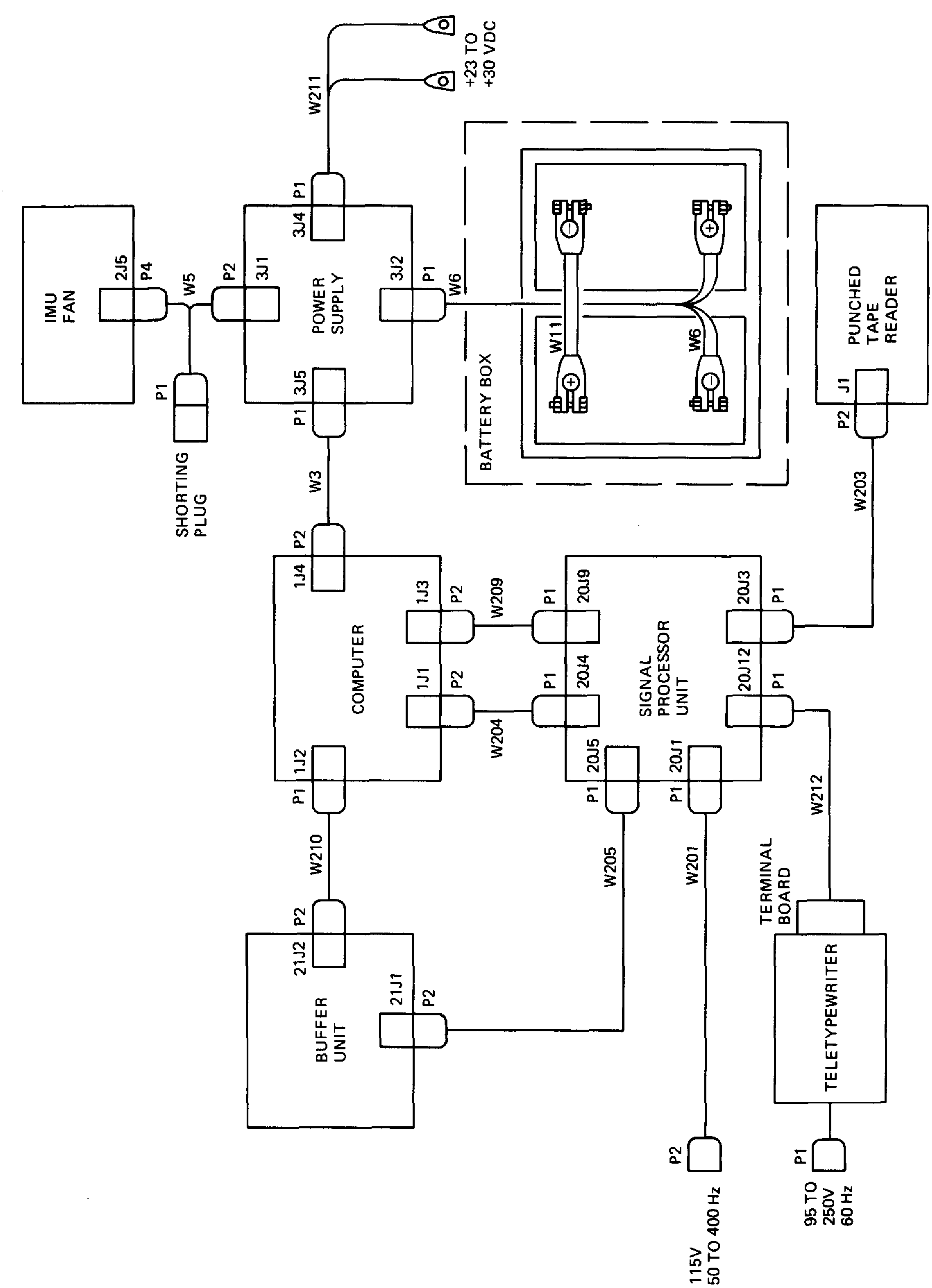


Figure 4-3. Computer Testing and Troubleshooting Interconnection Diagram

b. ***Procedure.*** Perform computer testing and troubleshooting in accordance with table 4-6 or 4-6.1 and 4-7. The interconnections are shown in figure 4-3. Table 4-8 is a sample printout of the computer test.

Table 4-6. Computer Diagnostic/Alignment Program

Test procedure	Normal indication	Malfunction indication/corrective action

NOTE

This procedure uses tape reader, part no. 877406-1.

The test procedure column contains the test operation to be performed. The Normal Indication column contains the desired test set or teletype response to the test operation. The malfunction indication(s) and corrective action(s) are listed in the third column

All switches, switch-indicators, and indicators called out in the procedure are located on the SPU, unless otherwise indicated.

To change a computer card assembly, perform the following in order given:

a. Press EXECUTE switch-indicator to off.

b. Press ON/OFF and ENTER switch-indicators.

c. Set PS BATTERY and VEHICLE circuit breakers CB1 and CB2 to off.

NOTE

If memory unit is replaced, reloading with proper program may be necessary.

d. Change card assembly or memory unit. (Refer to paragraphs 3-15a or 3-15b.)

e. Set BATTERY and VEHICLE circuit breakers CB1 and CB2 to ON.

f. Press PADS/OFF switch-indicator to ON.

g. Repeat the test.

Check that tape reels are not deformed and that tape runs smoothly through tape reader head.

Test procedure	Normal indication	Malfunction indication/corrective action
1. TEST SETUP		
1a. Mate computer to an operational power supply as necessary		
NOTE For memory, CDU, and IMU testing, use the general support dedicated computer. For computer testing, use the suspected defective computer.		
1b. Install memory unit in computer as necessary		

Table 4-6. Computer Diagnostic/Alignment Program -- Continued

Test procedure	Normal indication	Malfunction indication/corrective action
NOTE For computer and CDU testing, use the memory unit from the general support dedicated test computer. If a memory unit failure is suspected from direct support troubleshooting (checksum error, memory test fail, or computer does not operate) use the suspected defective memory unit. For IMU testing, use the memory unit which will be dedicated to that IMU.		
1c. Install computer on pallet frame as necessary		
1d. Check that + 28V power source and PS BATTERY and VEHICLE circuit breakers CB1 and CB2 are OFF		
le. Connect equipment as shown in figure 4-3 and the following checklist:		

Cable	Unit
W5P1	Shorting Plug
W5P2	PS 3J1
W5P4	IMU Fan 2J5
W3P1	PS 3J5
W3P2	Computer PS 1J4
W 6	Battery Box
W6P1	PS 3J2
W211	+28V
W211P1	Ps 3J4
W210P2	Buffer Unit 21J2
W210P1	Computer 1J2
W205P2	Buffer Unit 21J1
W205P1	SPU 20J5
W204P2	Computer lJ1
W2C4P1	SPU 20J4
W209P2	Computer 1J3
W209P1	SPU 20J9
W203P2	Tape Reader J1
W203P1	SPU 20J3

Table 4-6. Computer Diagnostic/Alignment Program — Continued

Test procedure	Normal indication	Malfunction indication/corrective action
W212 — TTY W212P1 — SPU 20J12 TTY Power — 115 VAC W201P1 — SPU 20J1 W201P2 — 115 VAC		
1f. Check that W4P1 is not connected to IMU connector 2J3		
lg. Set tape reader SPOOLING switch to DISABLE		
lh. Press SPU ON switch-indicator to on. Press to extinguish all SPU lighted switch-indicators except SPU ON and PADS OFF	SPU ON and PADS OFF switch-indicators light. COMP FAIL indicator may light. All lamps pressed extinguish	
li. Turn TTY printer MOTOR switch to ON		
lj. Press and hold LAMP TEST switch. Release after verifying lamps light properly	All SPU lamps light except LAMP TEST and ENTER and FAILURE/ACTION indicator remains blank for at least 1.5 seconds	If no lamps light, press and release SELF TEST switch and press LAMP TEST switch again
	FAILURE/ACTION indicator sequentially displays the following within 15 seconds after pressing and releasing LAMP TEST switch: Indication Blank 30 20 Blank 88 Blank 32 Blank 77	If lamps are partially lighted, replace in accordance with TM 5-6675-238-14 and/or TM 08839A-14/1 **NOTE** For abnormal indication, verify equipment is connected as shown in figure 4-3. Check connectors for bent or broken pins. Troubleshoot PADS test set in accordance with TM 5-6675-238-14 and/or TM 08839A-14/1.

Table 4-6. Computer Diagnostic/Alignment Program - Continued

Test procedure	Normal indication	Malfunction indication/corrective action
1k. Turn on + 28V power source		
1l. Set PS BATTERY and VEHICLE circuit breakers CB1 and CB2 to ON		
2. CPU TEST **NOTE** If any card assembly is replaced during this test, repeat the test from step 1h.		
2a. Press PADS ON/OFF switch-indicator to on	PADS ON/OFF switch-indicator lights. PARITY ERROR indicator may light	PADS ON/OFF switch-indicator does not light: Computer power supply malfunction. Remove and troubleshoot in accordance with table 4-20
	IMU FAIL indicator lights. COMP indicator may light	Defective computer: Measure resistance, with multimeter on 10 kilohm scale across computer thermostatic switch S1. If less than 500 ohms, disconnect lead going to E23. If resistance is still less than 500 ohms, replace thermostatic switch S1. Refer to paragraph 4-16c(3). If not, check for wire harness short between E23 and E50. If shorted, repair or replace as required If resistance is greater than 500 ohms, replace I/O discrete card A9, then data buffer card A6 If resistance is greater than 2,000 ohms, check continuity between E23, XA6-007, and XA9-003. Repair if open
	Comma in computer time totalizing meter M1 oscillates	If comma does not oscillate, measure the voltage across the time totalizing meter. If greater than 105 VAC, replace time totalizing meter. If less than 105 VAC, check wiring
NOTE The following step will be an aid in determining memory unit type if unknown.		

Table 4-6. Computer Diagnostic/Alignment Program - Continued

Test procedure	Normal indication	Malfunction indication/corrective action
2b. Press EXECUTE switch-indicator to on	EXECUTE switch-indicator lights TTY prints out: PADS SOLID STATE DIAGNOSTIC ALIGNMENT PROGRAM PROGRAM CHECKSUM XXXXXX SELECT TEST MODE	EXECUTE switch-indicator flashes. Replace cards in sequence given: Control no. 3 circuit card assembly A5 I/O discrete circuit card assembly A9 Control no. 2 circuit card assembly A4
	This indicates solid state memory. Select test mode per table 4-7 step 2b, 4-11 step 2d, or 4-14 step 2c. Bypass further loading procedures unless a new program load is required	Control no. 1 circuit card assembly A3 16-bit data circuit card assembly A2 If incorrect checksum, continue with step 2c
	No TTY response: This indicates either core memory requiring diagnostic alignment tape loading or solid state memory unloaded. Proceed to step 2c	
2c. Press EXECUTE switch-indicator to off to halt computer	EXECUTE switch-indicator goes off	EXECUTE switch-indicator remains on: Same card replacement as step 2b
2d. Install part 1 (of 2) of PADS diagnostic alignment tape number 877418-5 on tape reader. Do not tape program tape to takeup reel. Manually advance tape beyond readable tape leader		
2e. Set tape reader SPOOLING switch to ENABLE		
2f. Press MEMORY LOAD switch-indicator to on	MEMORY LOAD switch-indicator lights. Tape reader reads first tape section and stops in approximately minute	
NOTE Press MEMORY LOAD switch-indicator off and back on if a stop code is reached prior to tape data being loaded.		
2g. Press MEMORY LOAD switch-indicator to off	MEMORY LOAD switch-indicator goes off	
2h. Press VERIFY switch-indicator to on to check next tape section against memory contents. (First two tape sections are identical)	VERIFY switch-indicator lights. Tape reader reads next tape section and stops in approximately 1 minute	VERIFY ERROR switch-indicator lights and tape reader stops during read indicating improper memory load or memory failure

Table 4-6. Computer Diagnostic/Alignment Program – Continued

Test procedure	Normal indication	Malfunction indication/corrective action
NOTE Press VERIFY switch-indicator off and back on if a stop code is reached prior to tape data being verified.		Press verify switch-indicator to off. Press PADS ON/OFF and ENTER switch-indicators to turn computer off. Check tape reader and tape for dirt. Clean as required. (Rewind tape and repeat test from beginning before proceeding) Replace cards in sequence given and reattempt memory load after each card replacement Memory unit A1 16-bit data circuit card assembly A2 Control no. 2 circuit card assembly A4 Control no. 3 circuit card assembly A5 Control no. 1 circuit card assembly A3
2i. Press VERIFY switch-indicator to off	VERIFY extinguishes	
2j. Press EXECUTE switch-indicator to on to start diagnostic program no. 1	EXECUTE switch-indicator lights TTY prints out: PADS CPU TEST, TYPE CHARACTER SET (carriage return) **NOTE** The above printout indicates memory type is core. Continue with diagnostic program load, step 2k. TTY prints out: PADS SOLID STATE CPU TEST, TYPE CHARACTER SET (carriage return) **NOTE** The above printout indicates memory type is solid state. Continue with diagnostic program load, step 2k.	1. EXECUTE switch-indicator flashes. Same card replacement as step 2b 2. No or ir correct print-out. Verify TTY is on. Repeat steps 2c through 2j. If the second attempt gives the same results, replace cards in sequence given: 16-bit data circuit card assembly A2 Control no. 2 circuit card assembly A4 Control no. 3 circuit card assembly A5 Control no. 1 circuit card assembly A3 Memory unit A1

Table 4-6. Computer Diagnostic/Alignment Program – Continued

Test procedure	Normal indication	Malfunction indication/corrective action
2k. Type TTY character set	Each character typed is printed	Same as step 2j
2l. Press LTRS key		
2m. Press TTY CAR RET key to terminate test	TTY prints out: CPU OP-CODE TEST PASS MEMORY TEST PASS CPU TEST PASS **NOTE** Memory clear routing will begin automatically. When completed, TTY will print out: LOAD NEXT TAPE SECTION.	No printout within 2 seconds or TTY prints out: CPU OP-CODE TEST FAIL Same card replacement as step 2b TTY prints out: MEMORY TEST FAIL Same card replacement as step 2h
2n. Press EXECUTE switch-indicator to off to halt computer	EXECUTE switch-indicator goes off	EXECUTE switch-indicator remains on: Same card replacement as step 2b
NOTE For core memory diagnostic program loading, proceed to step 3a. If memory type is solid state, proceed to step 2o.		
2o. Press REVERSE switch-indicator to on	REVERSE switch-indicator lights. Tape rewinds and stops at beginning of reel	
2p. Press REVERSE switch-indicator to off	REVERSE switch-indicator goes off	
2q. Set tape reader SPOOLING switch to DISABLE		
2r. Remove tape from tape reader		
2s. Refer to table 4-6.2 for solid state memory loading instructions		
3. <u>DIAGNOSTIC PROGRAM LOAD (Core Memory Only)</u>		
3a. Press MEMORY LOAD switch-indicator to on to load main diagnostic program	MEMORY LOAD switch-indicator lights. Tape reader reads next tape section and stops after first reel has been read	Tape stops before end of tape: Replace tape

Table 4-6. Computer Diagnostic/Alignment Program - Continued

Test procedure	Normal indication	Malfunction indication/corrective action
NOTE Press MEMORY LOAD switch-indicator off and back on if a stop code is reached prior to tape data being read.	NOTE Ignore PARITY ERROR switch-indicator light unless tape stops.	
3b. Press MEMORY LOAD switch-indicator to off	MEMORY LOAD switch-indicator goes off	
3c. Press REVERSE switch-indicator to ON	REVERSE switch-indicator lights. Tape rewinds and stops at beginning of reel	
3d. Press REVERSE switch-indicator to off	REVERSE switch-indicator goes off	
NOTE Tape will stop near the beginning of the reel. Repeat steps 3c and 3d until tape stops at end of readable leader.		
3e. Set tape reader SPOOLING switch to DISABLE		
3f. Remove part 1 and load part 2 (of 2) of PADS diagnostic alignment tape number 877418-5 on tape reader		
3g. Set tape reader SPOOLING switch to ENABLE		
3h. Press MEMORY LOAD switch-indicator to on	MEMORY LOAD switch-indicator lights. Tape reader reads next tape section and stops at end of reel	
3i. Press MEMORY LOAD switch-indicator to OFF	MEMORY LOAD switch-indicator goes off	
3j. Press EXECUTE switch-indicator to on	EXECUTE switch-indicator lights TTY prints out: PADS DIAGNOSTIC ALIGNMENT PROGRAM PROGRAM CHECKSUM XXXXXX SELECT TEST MODE	

Table 4-6. Computer Diagnostic/Alignment Program — Continued

Test procedure	Normal indication	Malfunction indication/corrective action
3k. Compare printed checksum to checksum written on the front of the PADS diagnostic-alignment tape number 877418-5	Checksums are equal	Checksum is incorrect: Inspect tape reader photocell assembly and tape for dirt. Clean as required Reload complete diagnostic program If new checksum is correct, continue with test. If new checksum is same as the old (wrong) checksum: Perform PADS test set self-test and take indicated corrective action Replace computer card assemblies in the order shown in step 2h and reload tape after each card is replaced If new checksum differs from the old (wrong) checksum: Adjust tape reader and reload tape. Thoroughly clean or replace tape
	NOTE You may continue performing the test while the tape is rewinding. If a computer test is not required: press EXECUTE switch-indicator to off; sequentially press PADS ON/OFF switch-indicator and ENTER switch to turn off computer; and go to table 4-11 or 4-14 to perform a CDU or IMU test, respectively.	
3l. Press REVERSE switch-indicator to on	REVERSE switch-indicator lights. Tape rewinds and stops at beginning of reel	
3m. Press REVERSE switch-indicator to off	REVERSE switch-indicator goes off	
3n. Set tape reader SPOOLING switch to DISABLE		
3o. Remove tape from tape reader		

Table 4-6.1. Computer Diagnostic/Alignment Program Using Tape Reader, Part No. 877406-2

Test procedure	Normal indication	Malfunction indication/corrective action

NOTE

The Test Procedure column contains the test operation to be performed. The Normal Indication column contains the desired test set or teletype response to the test operation. The malfunction indication(s) and corrective action(s) are listed in the third column.

All switches, switch-indicators, and indicators called out in the procedure are located on the SPU, unless otherwise indicated.

To change a computer card assembly, perform the following in order given:

a. Press EXECUTE switch-indicator to off.

b. Press ON/OFF and ENTER switch-indicators.

c. Set PS BATTERY and VEHICLE circuit breakers CB1 and CB2 to OFF.

NOTE

If memory unit is replaced, reloading with proper program maybe necessary.

d. Change card assembly or memory unit. (Refer to paragraphs 3-15a or 3-15b.)

e. Set BATTERY and VEHICLE circuit breakers CB1 and CB2 to ON.

f. Press PADS ON/OFF switch-indicator to ON.

g. Repeat the test.

Check that tape reels are not deformed and that tape runs smoothly through tape reader head.

Test procedure	Normal indication	Malfunction indication/corrective action
1. <u>TEST SETUP</u>		
1a. Mate computer to an operational power supply as necessary		
NOTE For memory, CDU, and IMU testing, use the general support dedicated computer. For computer testing, use the suspected defective computer.		
1b. Install memory unit in computer as necessary		
NOTE For computer and CDU testing, use the memory unit from the general support dedicated test computer, If a memory unit failure is suspected from direct support troubleshooting (checksum error, memory test fail, or computer does not operate) use the suspected defective memory unit. For IMU testing, use the memory unit which will be dedicated to that IMU.		

Table 4-6.1. Computer Diagnostic/Alignment Program Using Tape Reader, Part No. 877406-2

Test procedure	Normal indication	Malfunction indication/corrective action
1c. Install computer on pallet frame as necessary		
1d. Check that + 28V power source and PS BATTERY and VEHICLE circuit breakers CB1 and CB2 are OFF		
1e. Connect equipment as shown in figure 4-3 and the following checklist:		

Cable	Unit
W5P1	Shorting Plug
W5P2	PS 3J1
W5P4	IMU Fan 2J5
W3P1	PS 3J5
W3P2	Computer PS 1J4
W6	Battery Box
W6P1	PS 3J2
W211	+ 28V
W211P1	PS 3J4
W210P2	Buffer Unit 21J2
W210P1	Computer 1J2
W205P2	Buffer Unit 21J1
W205P1	SPU 20J5
W204P2	Computer 1J1
W204P1	SPU 20J4
W209P2	Computer 1J3
W209P1	SPU 20J9
W203P2	Tape Reader J1
W203P1	SPU 20J3
W212	TTY
W212P1	SPU 20J12
TTY Power	115 VAC
W201P1	SPU 20J1
W201P2	115 VAC

1f. Check that W4P1 is not connected to IMU connector 2J3

Table 4-6.1. Computer Diagnostic/Alignment Program Using Tape Reader, Part No. 877406-2 — Continued

Test procedure	Normal indication	Malfunction indication/corrective action
1g. Ensure that tape reader SPL/LOOP switch is set to LOOP		
1h. Press SPU ON switch-indicator to on. Press to extinguish all SPU lighted switch-indicators except SPU ON and PADS OFF	SPU ON and PADS OFF switch-indicators light. COMP FAIL indicator may light. All lamps pressed extinguish	
1i. Turn TTY printer MOTOR switch to ON		
1j. Press and hold LAMP TEST switch. Release after verifying lamps light properly	All SPU lamps light except LAMP TEST and ENTER and FAILURE/ACTION indicator remains blank for at least 1.5 seconds	If no lamp light, press and release SELF TEST switch and press LAMP TEST switch again
	FAILURE/ACTION indicator sequentially displays the following within 15 seconds after pressing and releasing LAMP TEST switch: Indication Blank 30 20 Blank 88 Blank 32 Blank 77	If lamps are partially lighted, replace in accordance with TM 5-6675-238-14 and/or TM 08839A-14/1 **NOTE** For abnormal indication, verify equipment is connected as shown in figure 4-3. Check connectors for bent or broken pins. Troubleshoot PADS test set in accordance with TM 5-6675-238-14 and/or TM 08839A-14/1.
1k. Turn on + 28V power source		
1l. Set PS BATTERY and VEHICLE circuit breakers CB1 and CB2 to ON		
2. CPU TEST/MEMORY CLEAR **NOTE** If any card assembly is replaced during this test, repeat the test from step 1i.		

Table 4-6.1. Computer Diagnostic/Alignment Program Using Tape Reader, Part No. 877406-2 - Continued

Test procedure	Normal indication	Malfunction indication/corrective action
2a. Press PADS ON/OFF switch-indicator to on	PADS ON/OFF switch-indicator lights. PARITY ERROR indicator may light	PADS ON/OFF switch-indicator does not light: Computer power supply malfunction. Remove and troubleshoot in accordance with table 4-20
	IMU FAIL indicator lights. COMP indicator may light	Defective computer: Measure resistance, with multimeter on 10 kilohm scale across computer thermostatic switch S1. If less than 500 ohms, disconnect lead going to E23. If resistance is still less than 500 ohms replace thermostatic switch S1. Refer to paragraph 4-16c(3). If not, check for wire harness short between E23 and E50. If shorted, repair or replace as required
		If resistance is greater than 500 ohms, replace I/O discrete card A9, then data buffer card A6
		If resistance is greater than 2,000 ohms, check continuity between E23, XA6-007, and XA9-003. Repair if open
	Comma in computer time totalizing meter M1 oscillates	If comma does not oscillate, measure the voltage across the time totalizing meter. If greater than 105 VAC, replace time totalizing meter. If less than 105 VAC, check wiring
NOTE The following step will be an aid in determining memory unit type if unknown.		
2b. Press EXECUTE switch-indicator to on	EXECUTE switch-indicator lights	EXECUTE switch-indicator flashes. Replace cards in sequence given:
	TTY prints out:	Control no. 3 circuit card assembly A5
	PADS SOLID STATE DIAGNOSTIC ALIGNMENT PROGRAM	I/O discrete circuit card assembly A9
	PROGRAM CHECKSUM XXXXXX	Control no. 2 circuit card assembly A4
	SELECT TEST MODE	Control no. 1 circuit card assembly A3
	This indicates solid state memory. Select test mode per table 4-7 step 2b, 4-11 step 2d, or 4-14.1 step 2c. Bypass further loading procedures unless a new program load is required. If a new program load is desired, proceed to table 4-6.3	16-bit data circuit card assembly A2
		If incorrect checksum, continue with step 2c

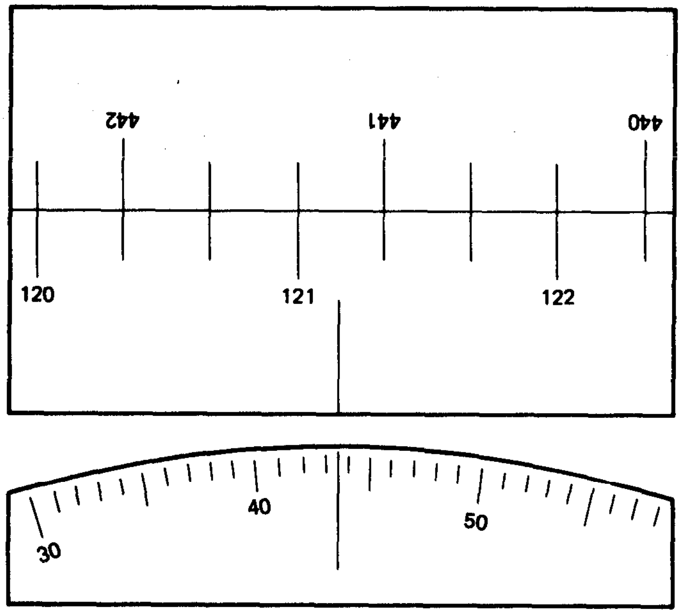


Figure 5-3. Horizontal Circle Readings

e. Read the horizontal circle. The reading should be 0.150 (within ±0.100 roil), With care, a circle may be set to an accuracy of 0.010 mil.

5-7. Pointing the Theodolite.

a. Release the horizontal and vertical clamping screws.

b. Aim the telescope on the target. Focus as necessary.

c. When the telescope crosshairs are on the target, tighten the horizontal and vertical clamping screws.

d Use the telescope focusing ring to bring the image into sharp focus.

e. Use the horizontal and vertical tangent screws to exactly center the intersection of the horizontal and vertical crosshairs over the target. If the target is a vertical line, like a pole, the same point on the target must be used for each sighting.

5-8. Autoreflection. (See figure 5-4.)

NOTE

To increase visibility, color the theodolite sight white with typewriter correction fluid. At night, illuminate the sight with the theodolite handlamp.

a. Level the porro prism using the level adjust knob and level vial. The level adjustment can accommodate slopes up to ±20 degrees.

b. Aim the theodolite so the horizontal crosshair lies along the centerline of the prism.

c. Increase the telescope focus towards infinity until the reflected image of the front of the telescope is visible.

d Adiust the theodolite so the reflected image of the theodolite sight is centered on the vertical crosshair. See figure 5-5. Lock the clamping screws and readjust as necessary.

5-9. Measuring Horizontal Angles. (See figure 5-6.)

a. With the telescope in the direct (D) (sight on top) position, point the telescope on the azimuth target.

b. Set the horizontal circle to approximately 0.150 roil.

Table 4-6.1 Computer Diagnostic/Alignment Program Using Tape Reader, Part No. 877406-2—Continued

Test procedure	Normal indication	Malfunction indication/corrective action
	NOTE The above printout indicates memory type is solid state. Continue with diagnostic program load, step 2K.	
2k. Type TTY character set	Each character typed is printed	Same as step 2j
2l. Press TTY LTRS key		
2m. Press TTY CAR RET key to terminate test	TTY prints out: CPU OP-CODE TEST PASS MEMORY TEST PASS CPU TEST PASS NOTE Memory clear routing will begin automatically. When completed, TTY will print out: LOAD NEXT TAPE SECTION	No printout within *2* seconds or TTY prints out: CPU OP-CODE TEST FAIL Same card replacement as step 2b TTY prints out: MEMORY TEST FAIL Same card replacement as step 2h
2n. Press EXECUTE switch-indicator to off to halt computer	EXECUTE switch-indicator goes off	EXECUTE switch-indicator remains on: Same card replacement as step 2b
NOTE For core memory diagnostic program loading, proceed to step 3a. If memory type is solid state, proceed to step 2o.		
2o. Set tape reader FAST/SLOW switch to FAST		
2p. Press REVERSE switch-indicator to on	REVERSE switch-indicator lights. Tape rewinds and stops at beginning of reel	
2q. Press REVERSE switch-indicator to off	REVERSE switch-indicator goes off	
2r. Lift tape reader read head cover and remove tape from tape reader		
2s. Refer to table 4-6.3 for solid state memory loading instructions		
3. DIAGNOSTIC PROGRAM LOAD (Core Memory Only)		

Table 4-6.1. Computer Diagnostic/Alignment Program Using Tape Reader, Part No. 877406-2 — Continued

Test procedure	Normal indication	Malfunction indication /correct ive action
3a. Press MEMORY LOAD switch-indicator to on to load main diagnostic program	MEMORY LOAD switch-indicator lights. Tape reader reads next tape section and stops after first reel has been read	Tape stops before end of tape: Replace tape
NOTE Press MEMORY LOAD switch-indicator off and back on if a stop code is reached prior to tape data being read.	NOTE Ignore PARITY ERROR switch-indicator light unless tape stops.	
3b. Press MEMORY LOAD switch-indicator to off	MEMORY LOAD switch-indicator goes off	
3c. Set tape reader FAST/SLOW switch to FAST		
3d. Press REVERSE switch-indicator to ON	REVERSE switch-indicator lights. Tape rewinds and stops at beginning of reel	
3e. Press REVERSE switch-indicator to off	REVERSE switch-indicator goes off	
NOTE Tape will stop near the beginning of the reel. Repeat stem 3d and 3e until tape stops at end of readable leader.		
3f. Lift read head cover and remove part 1 and load part 2 (of 2) of PADS diagnostic alignment tape number 877418-5 on tape reader. Gently lower read head cover	No. 10 LED indicator lights steady	
3g. Set tape reader FAST/SLOW switch to SLOW		
3h. Press MEMORY LOAD switch-indicator to on	MEMORY LOAD switch-indicator lights. Tape reader reads next tape section and stops at end of reel	
3i. Press MEMORY LOAD switch-indicator to OFF	MEMORY LOAD switch-indicator goes off	
3j. Press EXECUTE switch-indicator to on	EXECUTE switch-indicator lights TTY prints out: PADS DIAGNOSTIC ALIGNMENT PROGRAM PROGRAM CHECKSUM XXXXXX	

Table 4-6.1. Computer Diagnostic/Alignment Program Using Tape Reader, Part No. 877406-2 – Continued

Test procedure	Normal indication	Malfunction indication/corrective action
	SELECT TEST MODE	
3k. Compare printed checksum to checksum written on the front of the PADS diagnostic alignment tape number 877418-5	Checksums are equal	Checksum is incorrect: Inspect tape reader and tape for dirt. Clean as required Reload complete diagnostic program If new checksum is correct, continue with test. If new checksum is same as the old (wrong) checksum: Perform PADS test set self-test and take indicated corrective action Replace computer card assemblies in the order shown in step 2h and reload tape after each card is replaced If new checksum differs from the old (wrong) checksum: reload tape, Thoroughly clean or replace tape
	NOTE You may continue performing the test while the tape is rewinding. If a computer test is not required: press EXECUTE switch-indicator to off; sequentially press PADS ON/OFF switch-indicator and ENTER switch to turn off computer; and go to table 4-11 or 4-14.1 to perform a CDU or IMU test, respectively.	
3l. Set tape reader FAST/SLOW switch to FAST		
3m. Press REVERSE switch-indicator to on	REVERSE switch-indicator lights. Tape rewinds and stops at beginning of reel	
3n. Press REVERSE switch-indicator to off	REVERSE switch-indicator goes off	
3o. Lift tape reader read head cover and remove tape from tape reader		

Table 4-6.2. Solid State Memory Loading

Test procedure	Normal indication	Malfunction indication/corrective action
NOTE This procedure uses tape reader, part no. 877406-1.		
1. PRELIMINARY PROCEDURE		
la. Istall part 1 (of 3) of PADS solid state program tape number 868182-X on tape reader. Do not tape program tape to takeup reel. Manually advance tape beyond readable tape leader		
lb. Set tape reader SPOOLING switch to ENABLE		
lc. Ensure that PADS ON/OFF switch-indicator is pressed on		
ld. Press MEMORY LOAD switch–indicator to on	MEMORY LOAD switch–indicator lights. Tape reader reads first tape section and stops in approximately 1 minute	
NOTE Press MEMORY LOAD switch–indicator off and back on if a stop code is reached prior to tape data being loaded		
le. Press MEMORY LOAD switch-indicator to on. When header has been loaded press MEMORY LOAD switch-indicator to off	MEMORY LOAD switch-indicator goes on, then off	
lf. Press EXECUTE switch–indicator to on to start preliminary tests and memory clear routine	TTY prints out PADS SOLID STATE CPU TEST, TYPE CHARACTER SET	1. EXECUTE switch–indicator flashes. Replace cards in sequence given: Control no. 3 circuit card assembly A5 I/O discrete circuit card assembly A9 Control no. 2 circuit card assembly A4 Control no. 1 circuit card assembly A3 16-bit data circuit card assembly A2 2. No or incorrect printout, replace cards in sequence given: M-bit data circuit card assembly A2 Control no. 2 circuit card assembly A4 Control no. 3 circuit card assembly A5 Control no. 1 circuit card assembly A3 Memory unit Al
lg. Type TTY character set	Each character typed is printed	Same as step 1f
lh. Press LTRS key		
li. Press TTY CAR RET key to terminate reset	TTY prints out CPU OP-CODE TEST PASS MEMORY TEST PASS CPU TEST PASS	No printout within 2 seconds or TTY pMts out CPU OP-CODE TEST FAIL Replace cards in sequence given: Control no. 3 circuit card assembly A5

Table 4-6.2. Solid State Memory Loading- Continued

Test procedure	Normal indication	Malfunction indication/corrective action
		I/O discrete circuit card assembly A9 Control no. 2 circuit card assembly A4 Control no. 1 circuit card assembly A3 16-bit data circuit card assembly A2
	NOTE Memory clear routing will begin automatically. When completed, TTY will print out LOAD NEXT TAPE SECTION	TTY prints out: MEMORY TEST FAIL Replace cards in sequence given: Memory unit Al 16-bit data circuit card assembly A2 Control no. 2 circuit card assembly A4 Control no. 3 circuit card assembly A5 Control no. 1 circuit card assembly A3
lj. Press EXECUTE switch-indicator to off to halt computer	EXECUTE switch-indicator goes off	EXECUTE switch-indicator remains on: Same card replacement as step 1i
2. SOLID STATE PROGRAM LOAD		
2a. Press MEMORY LOAD switch-indicator to on to load program	MEMORY LOAD switch-indicator lights. Tape reader reads tape and stops after first reel has been read	Tape stops before end of tape. Replace tape or rerun clear memory routine and attempt to load again
NOTE Press MEMORY LOAD switch-indicator off and back on if a stop code is reached prior to taped data being read.	NOTE Ignore PARITY ERROR switch-indicator light unless tape stops.	
2b. PressMEMORYLOAD switch–indicator to off	MEMORY LOAD switch-indicator goes off	
2c. Press REVERSE switch-inicator to on	REVERSE switch-indicator lights. Tape rewinds and stops at beginning of reel	
2d. Press REVERSE switch-indicator to off	REVERSE switch-indicator goes off	
NOTE Tape will stop near the beginning of the reel. Repeat steps 2c and 2d until tape stops at end of readable leader.		
2e. Set tape reader SPOOLING switch to DISABLE		
2f. Remove part 1 and load part 2 (of 3) of PADS solid state program 868182-X on tape reader		
2g. Set tape reader SPOOLING switch to ENABLE		
2h. Press MEMORY LOAD switch-indicator to on	MEMORY LOAD switch-indicator lights. Tape reader reads tape and stops at end of reel	

Table 4-6.2. Solid State Memory Loading- Continued

Test procedure	Normal indication	Malfunction indication/corrective action
2i. Press MEMORY LOAD switch-indicator to off	MEMORY LOAD switch-indicator goes off	
2j. Press REVERSE switch–indicator to on	REVERSE switch-indicator lights. Tape rewinds and stops at beginning of reel	
2k. Press REVERSE switch–indicator to off	REVERSE switch-indicator goes off	
2l. Set tape reader SPOOLING switch to DISABLE		
2m. Remove part 2 and load part 3 (of 3) of PADS solid state program tape number 868182–X on tape reader		
2n. Set tape reader SPOOLING switch to ENABLE		
2o. Press MEMORY LOAD switch–indicator to on	MEMORY LOAD switch-indicator lights. Tape reader reads tape and stops at end of reel	
2p. Press MEMORY LOAD switch–indicator to off	MEMORY LOAD switch-indicator goes off	
2q. Press REVERSE switch-indicator to on	REVERSE switch-indicator lights. Tape rewinds and stops at beginning of reel	
2r. Press REVERSE switch-indicator to off	REVERSE switch-indicator goes off	
2s. Remove tape from tape reader		
2t. Press EXECUTE switch–indicator to on to start diagnostic program	EXECUTE switch–indicator lights TTY prints out: PADS SOLID STATE DIAGNOSTIC ALIGNMENT PROGRAM PROGRAM CHECKSUM XXXXXX SELECT TEST MODE	
2u. Compare printed checksum to checksum written on the front of the PADS solid state program tape number 868182-X	Checksums are equal **NOTE** If a computer testis required, go to table 4-7. If a computer test is not required: press EXECUTE switch–indicator to off sequentially press PADS ON/OFF switch-indicator and ENTER switch to turn off computer; and go to table 4-11 or 4-14 to perform a CDU or IMU test, respectively.	Checksum is incorrect: Inspect tape reader photocell assembly and tape for dirt. Clean as required Reload complete solid state program If new checksum is correct, continue with test. If new checksum is same as the old (wrong) checksum: Perform PADS test set self-test and take indicated corrective action Replace computer card assemblies in the order shown instep If and reload tape after each card is replaced If new checksum differs from the old (wrong) checksum: Adjust tape reader and reload tape. Thoroughly clean or replace tape

Table 4-6.3. Solid State Memory LoadingUsing Tape Reader Part No.877406-2

Test procedure	Normal indication	Malfunction indication/corrective action
1. PRELIMINARY PROCEDURE		
1a. Install part 1 (of 3) of PADS solid state program tape number 868182-X on tape reader as follows: Lift read head cover to up position Clean tape reader head, if necessary Load tape on left side, thread tape through read head, ensuring tape is between LED's and read head, and sprocket teeth are aligned on both sides Manually move tape until arrows on tape are past mad head		
Gently lower read head cover	No. 10 LED indicator lights steady	
NOTE Do not tape program tape to takeup red. Manually advance tape beyond readable tape leader.		
lb. Set rape reader SPL/LOOP switch to SPL and FAST/SLOW switch to SLOW		
lc. Ensure that PADS ON/OFF switch-indicator is pressed on		
1d. Press MEMORY LOAD switch-indicator to on	MEMORY LOAD switch-indicator lights. Tape reader reads first tape section and stops in approximately 1 minute	
NOTE Press MEMORY LOAD switch-indicator off and back on if a stop code is reached prior to tape data being loaded.		
le. Ross MEMORY LOAD Switch-indicator to on. When header has been loaded, press MEMORY LOAD switch-indicator to off	MEMORY LOAD switch-indicator goes on, then off	
1f. Press EXECUTE switch-indicator to on to start preliminary tests and memory clear routine	TTY prints out: PADS SOLID STATE CPU TEST, TYPE CHARACTER SET	1. EXECUTE switch-indicator flashes. Replace cards in sequence given: Control no. 3 circuit card assembly A5 I/O discrete circuit card assembly A9 Control no. 2 circuit card assembly A4

Table 4-6.3. Solid State Memory Loading Using Tape Reader Part No. 877408-2- Continued

Test procedure	Normal indication	Malfunction indication/corrective action
		Control no. 1 circuit card assembly A3 16-bit data circuit card assembly A2 2. No or incorrect printout, replace cards in sequence given 16-bit data circuit card assembly A2 Control no. 2 circuit card assembly A4 Control no. 3 circuit card assembly A5 Control no. 1 circuit card assembly A3 Memory unit Al
lg. Type TN character set	Each character typed is printed	Same as step 1f
lh. Press LTRS key		
li. Press TN CAR RET key to terminate test	TTY prints out: CPU OP-CODE TEST PASS MEMORY TEST PASS CPU TEST PASS	No printout within 2 seconds or TTY pMts out CPU OP-CODE TEST FAIL Replace cards in sequence given Control no. 3 circuit card assembly A5 I/O discrete circuit card assembly A9 Control no. 2 circuit card assembly A4 Control no. 1 circuit card assembly A3 16-bit data circuit card assembly A2
	NOTE Memory clear routing will begin automatically. When completed, TTY will print out: LOAD NEXT TAPE SECTION	TTY prints out: MEMORY TEST FAIL Replace cards in sequence given: Memory unit Al K-bit data circuit card assembly A2 Control no. 2 circuit card assembly A4 Control no. 3 circuit card assembly A5 Control no. 1 circuit card assembly A3
lj. Press EXECUTE switch–indicator to off to halt computer	EXECUTE switch–indicator goes off	EXECUTE switch-indicator remains on: Same card replacement as step li
2. <u>SOLID STATE PROGRAM LOAD</u>		
2a. Press MEMORY LOAD switch-indicator to on to load main diagnostic program	MEMORY LOAD switch-indicator lights. Tapereaderreads tape and stops after first reel has been read	Tape stops before end of tape. Replace tape or remn clear memory routine and attempt to load again
NOTE Press MEMORY LOAD switch–indicator off and back on if a stop code is reached prior to tape data being read.	**NOTE** Ignore PARITY ERROR switch–indicator light unless tape stops.	
2b. Press MEMORY LOAD switch-indicator to off	MEMORY LOAD switch–indicator goes off	

Table 4-6.3. Solid State Memory Loading Using Tape Reader, Part No. 877406 -2- Continued

Test procedure	Normal indication	Malfunction indication/corrective action
2c. Set tape reader FAST/SLOW switch to FAST		
2d Press REVERSE switch-indicator to on	REVERSE switch-indicator lights. Tape rewinds and stops at beginning of reel	
2c. Press REVERSE switch-indicator to off NOTE Tape will stop near the beginningof the reel. Repeat steps 2d and 2e until tape stops at end of readable leader.	REVERSE switch-indicator goes off	
2f. Lift tape reader read head cover and remove part 1 and load part 2 (of 3) of PADS solid state program 868182-X on tape reader. Gently lower read head cover.	No. 10 LED indicator lights steady	
2g. Set tape reader FAST/SLOW switch to SLOW		
2h. Press MEMORY LOAD switch-indicator to on	MEMORY LOAD switch-indicator lights. Tape reader reads tape and stops at end of reel	
2i. Press MEMORY LOAD switch-indicator to off	MEMORY LOAD switch-indicator goes off	
2j. Set tape reader FAST/SLOW switch to FAST		
2k. Press REVERSE switch-indicator to on	REVERSE switch-indicator lights. Tape rewinds and stops at beginning of reel	
2f. Press REVERSE switch-indicator to off	REVERSE switch-indicator goes off	
2m. Lift tape reader read head cover and remove part 2 and load part 3 (of 3) of PADS solid state program tape number 868182-X on tape reader. Gently lower read head cover	No. 10 LED indicator lights steady	
2n. Set tape reader FAST/SLOW switch to SLOW		
2o. Press MEMORY LOAD switch-indicator to on	MEMORY LOAD switch-indicator lights. Tape reader reads tape and stops at end of reel	
2p. Press MEMORY LOAD switch-indicator to off	MEMORY LOAD switch-indicator goes off	
2q. Set tape reader FAST/SLOW switch to FAST		

Table 4-7. Computer Testing and Troubleshooting

Test procedure	Normal indication	Malfunctiion indication/corrective action
1. TEST SETUP		
Check that the diagnostic alignment program is loaded into the computer memory and that the computer is functional in accordance with table 4-6 or 4-6.1		
2. COMPUTER DIAGNOSIC TEST		

NOTE

During this test, any failure message listed in table 4-10 maybe printed. Perform corrective actiion specified in table 4-10. If a memory is replaced, repeat the entire test from step 1l (table 4-6) or step 1l(table 4-6.1). After replacing any other card, repeat the diagnostic test from step 2a (table 4-7). If the checksum is incorrect, reload the diagnostic-alignment program.

Test procedure	Normal indication	Malfunctiion indication/corrective action
2a. Press EXECUTE switch-indicator to on to start diagnostic program	EXECUTE switch-indicator lights TTY prints out: PADS DIAGNOSTIC ALIGNMENT PROGRAM PROGRAM CHECKSUM XXXXXX SELECT TEST MODE	
2b. Type character set CMP (selects computer automatic test mode)	TTY prints out: CMP COMPUTER AUTOMATIC TEST MODE	TTY prints out: XXX TEST FAIL Refer to table 4-10 for corrective action. Type STS and refer to table 4-9
2c. PADS test set is now in the computer automatic test mode and requires no operator control for approximately 15 minutes **NOTE** Perform step 2d immediately after last TTY printout.	TTY prints out at less than 8 minute intervals: XXX TEST CYCLES PASS Where XXX is a number of passes through test program After approximately 15 minutes TTY prints out: DEPRESS OFF, ENT. PADS POWER SHOULD REMAIN ON	**NOTE** If TTY prints out: XXX TEST FAIL; press PADS ON/OFF switch-indicator and ENTER switch. Wait 2 to 3 minutes, then turn PADS on, press EXECUTE switch-indicator, and return to step 2a, table 4-7.

Table 4-6.3. Solid State Memory Loading Using Tape Reader, Part No. 877406-2 - *Continued*

Test procedure	Normal indication	Malfunction indication/corrective action
2r. Press REVERSE switch-indicator to on	REVERSE switch-indicator lights. Tape rewinds and stops at beginning of reel	
2s. Press REVERSE switch-ii-dicator to off	REVERSE switch-indicator goes off	
2t. Lift tape read head cover and remove tape from tape reader		
2u. Press EXECUTE switch-indicator to on to start diagnostic program	EXECUTE switch-indicator lights TTY prints out: PADS SOLID STATE DIAGNOSTIC ALIGNMENT PROGRAM PROGRAM CHECKSUM XXXXXX SELECT TEST MODE	
2v. Compare printed checksum to checksum written on the front of the PADS solid state program tape number 868182-X	Checksums are equal NOTE If a computer test is required go to table 4-7. If a computer test is not required press EXECUTE switch-indicator to off, sequentially press PADS ON/OFP switch-indicator and ENTER switch to turn off computer; and go to table 4-11 or 4-14.1 to perform a CDU or IMU test, respectively.	Checksum is incorrect: Inspect tape reader and tape for dirt. Clean as required Reload complete solid state program If new checksum is correct, continue with test. If new checksum is same as the old (wrong) checksum Perform PADS test set self-test and take indicated corrective action Replace computer card assemblies in the order shown in step Ii and reload tape after each card is replaced If new checksum differs from the old (wrong) checksum Adjust tape reader and reload tape. Thoroughly clean or replace tape

Table 4-7. Computer Testing and Troubleshooting

Teat procedure	Normal indication	Malfunction indication/correctie action
1. **TEST SETUP**		
Check that the diagnostic alignment program is loaded into the computer is memory and that the computer is functional in accordame with table 4-6, 4-6.1, 4-6.2, or 4-63.		
2. COMPUTER DIAGNOSTIC TEST		

NOTE

During this test, any failure message listed in table 4-10 maybe printed. Perform corrective action specified in table 4-10. If a memory is replaced, operate and reload per tables 4-6 through 4-6.3 dependent upon memory and reader tapes. After replacing any other card, repeat the diagnostic test from step 2a (table 4-7). If the checksum is incorrect, reload the diagnostic-alignment program for core memory, or main program for solid state memory.

Teat procedure	Normal indication	Malfunction indication/correctie action
2a. Press EXECUTE switch-indicator go on to start diagnostic program	EXECUTE switch-indicator lights TTY printa out: PADS DIAGNOSTIC ALIGNMENT PROGRAM or PADS SOLID STATE DIAGNOSTIC ALIGNMENT PROGRAM PRoGRAM CHECKSUM XXXXXX SELECT TEST MODE	
2b. Type character set CMP (selects computer automatic test mode)	TTY prints out: **CMP** COMPUTER AUTOMATIC TEST MODE	TTY prints out XXX TEST FAIL Refer to table 4-10 for corrective action. Type STS and refer to table 4-9
2c. PADS teat set is now in the computer automatic teat mode and requires no operator control for approximately 15 minutes	TTY prints out at leas than 8 minute intervals XXX TEST CYCLES PASS Where XXX is a number of passes through test program	NOTE If TTY prints out: XXX TEST FAIL press PADS ON/OFF switch-indicator and ENTER switch. Wait 2 to 3 minutes then turn PADS on, press EXECUTE switch-indicator, and return to step 2a, table 4-7.

Table 4-7. Computer Testing and Troubleshooting - Continued

Test procedure	Normal indication	Malfunction indication/corrective action
	After approximately 15 minutes TTY prints out: DEPRESS OFF, ENT. PADS POWER SHOULD REMAIN ON	
NOTE Perform step 2d immediately after last TTY printout.		
2d. sequentially press PADS ON/OFF switch-indicator and ENTER switch allowing at least 1 second between switches	Computer power should remain on. PADS ON/OFF stays illuminated	Computer power turns off. PADS ON/OFF switch-indicator goes off: Replace 1/0 discrete circuit card assembly A9
2e. Press EXECUTE switch-indicator to off	EXECUTE switch-indicator goes off. Computer fault indicator DS1 is white	
2f. Press EXECUTE switch-indicator to on	EXECUTE switch-indicator lights. Computer fault indicator DS1 is set to white and then reset to black	Fault indicator DS1 does not set or reset Replace computer fault indicator DS1
2g. Press EXECUTE switch-indicator to off	EXECUTE switch-indicator goes off	
2h. Sequentially press PADS ON/OPF switch-indicator and ENTER switch to turn off power to the computer	PADS ON/OPP switch-indicator goes off	PADS ON/OFF switch-indicator remains on: Replace circuit cards in sequence shown and reattempt PADS ON/OFF indicator switch test after each replacement I/O discrete circuit card assembly A9 data buffer circuit card assembly A6
NOTE If operational tape is to be loaded for core memory only, go to table 4-18 or 4-18.1. The solid state memory already contains the operational program therefore will not require a reload. If a CDU or IMU test is to be performed, go to table 4-11 or 4-14 (or 4-14.1), respectively. If operational memory is to be installed, proceed to step 2i.		
2i. Set PS BATTERY and VEHICLE circuit breakers CB1 and *CB2* to OFF		

Table 4-7. Computer Testing and Troubleshooting - Continued

Test procedure	Normal indication	Malfunction indication/corrective action
2j. Turn TTY printer MOTOR switch to OFF		
2k. Press SPU ON switch-indicator to OFF	SPU ON switch-indicator goes off	
2l. Disconnect computer from PADS test set		
2m. Install operational memory, if required. Refer to paragraph 3-15b		

TEST COMPLETED

Table 4-8. TTY Printout of Computer Test

```
  PADS CPU TEST, TYPE CHARACTER SET
QWERTUIOPASDFGHJKLZXCVRNM1234567890
CPU OP-CODE TEST PASS
MEMORY TEST PASS
CPU TEST PASS, LOAD NEXT TAPE SECTION

LOAD NEXT TAPE SECTION

PADS DIAGNOSTIC ALIGNMENT PROGRAM
or
PADS SOLID STATE DIAGNOSTIC ALIGNMENT PROGRAM
PROGRAM CHECKSUM XXXXXX
SELECT TEST MODE
CMPCMP
COMPUTER AUTOMATIC TEST MODE
PLATFORM IO FAIL
PLATFORM IO FAIL
STSSTS
NO ALIGNMENT ACTIVITY
  000104 000000 CMP FAILURE
  000000 000000 000000 000000
  000000 000000 000000 000000
  000000 000000 000000 000000
  000000 000000 000000 000000
PLATPORM IO FAIL
PLATFORM IO FAIL

PADS DIAGNOSTIC ALIGNMENT PROGRAM

PADS SOLID STATE DIAGNOSTICALIGNMENT PROGRAM
PROGRAM CHECKSUM XXXXXX
SELECT TEST MODE
CMPCMP

COMPUTER AUTOMATIC TEST MODE
 5 TEST CYCLES PASS
 6 TEST CYCLES PASS
 7 TEST CYCLES PASS
 8 TEST CYCLES PASS
 9 TEST CYCLES PASS
10 TEST CYCLES PASS
11 TEST CYCLES PASS
DEPRESS OFF ENT (PADS POWER SHOULD REMAIN ON)
```

Table 4-9. PADS Diagnostic/Alignment Program Malfunction Words

Bit Location	Malfunction
	GMALF
0	Not used
1	Program instruction/data checksum
2	Subroutine entrance checksum
3	IMU calibration data checksum
4	Variable data memory test
5	CDU instruction/register test
6	Output discrete word parity
7	A/D converter self test
8	Computer serial data bus
9	Platform 1/0 short loop test
10	CDU serial data bus/display register
11	Not used
12	Serial data bus long loop test (SPU)
13	Platform 1/0 long loop test (SPU)
14	1/0 discrete long loop test (SPU)
15	A/D converter long loop test (SPU)
	GMALF + 1
0	IMU hardware no-go
1	Heading synchro rate test
2	Roll synchro rate test
3	Pitch synchro rate test
4	IMU temperature test
5	IMU discrete test
6	Alignment timing error
7	Alignment quality error
8	Synchro/accelerometer
9	Not used
10	Not used
11	Not used
12	Not used
13	Time out counter inoperative
14	Time out counter interrupt invalid
15	Computer over-temp at power dwn int
	BOFAIL (OP CODE)
0	Or of following bits
1	LDA, STA, SUB, SKZ
2	CPY
3	LBP, SBP
4	LXB, SXB LXP, SXP, LXL
5	DLA, DSA, LAL
6	SNZ, TPA, TMA, TAL, TRR, TIX
7	DAD, DSB
8	MPY
9	DIV

Table 4-9. PADS Diagnostic/Alignment Program Malfunction Words – Continued

Bit Location	Malfunction
10	AAL
11	AXL
12	DAC
13	ANA, ORA
14	DAL, DAR
15	NRM
	BAFAIL (A/D SELF TEST)
0	Not used
1	
2	
3	
4	
5	
6	
7	
8	TAN +2.5V out of tol
9	
10	OVDC out of tol (±150 mV)
11	
12	TAN +2.5V no update
13	
14	OVDC no update
15	
	BAFAIL 1 (A/D LONG LOOP D/DC TEST)
0	
1	
3	
4	
5	D/DC channel no update (l-6)
6	DMA locations 77740,77741,77742,77744, 77745,
7	77746
8	
9	D/DC channel out of tol (1-6)
10	
11	
12	
13	Output test value that failed
14	Tol test (1-30₈) table (BDDCDT)
15	
	BAFAIL 2 (A/D LONG LOOP D/R, D/S TEST)
0	
1	D/R, D/S channel no update (l-5)
2	DMA locations 1 = 77733, 1 ROLL Xl
3	2 = 77753,1 ROLL X8

Table 4-9. PADS Diagnostic/Alignment Program Malfunction Words - Continued

Bit Location	Malfunction		
	3 =77713,1 HDG Xl		
	4 = 77723,1 HDG X32		
	5 = 77763,1 PITCH		
4	D/R, D/S channel		
5	out of tol (1 -5)		
6	100 sample avg		
7		O=O DEG	4 = 180
8	Angle that failed	1=45	5 = 225
9	100 sample avg (O-7)	2=90	6 = 270
		3 = 135	7-315
10	D/R, D/S channel		
11	out of tol (l-5)		
12	Single angle conversion		
13			
14	Angle that failed		
15	Single angle conversion (O-7)		
	BAFAIL 3 (A/D LONG LOOP CDU VLAMP)		
0			
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11	DMA location 77746 no update		
12			
13	Dimming code out of tol		
14	(6-178)		
15			
	BDF AIL (DISCRETE LONG LOOP TEST)		
0			
1			
2			
3	IMU ready		
4	Accelerometer coarse heater on		
5	Gyro coarse heater on		
6	Gyro float to temperature		
7	IMU spare 1		
8	IMU spare 2		
9			
10			

Table 4-9. PADS Diagnostic/Alignment Program Malfunction Words - Continued

Bit Location	Malfunction
11	IMU spare 3
12	
13	
14	
15	
	BDFAIL 1 (DISCRETE LONG LOOP TEST) (OUTPUT LINE FAILED "0" or "1")
o	Not used
1	Not used
2	Not used
3	IMU flag set (to IMU)
4	CDU flag set
5	IMU flag reset
6	CDU flag reset
7	X, Y gyro fast slew
8	
9	Not used
10	
11	Z gyro fast slew
12	
13	
14	
15	
	BDFAIL 2 (DISCRETE LONG LOOP TEST) (OUTPUT LINE FAILED "0" or "1")
0	
1	
2	
3	
4	
5	POR to CDU (Power on Reset)
6	Charge to CDU
7	Batt to CDU
8	
9	
10	
11	Computer Flag Set (to CDU)
12	
13	
14	
15	

Table 4-9. PADS Diagnostic/Alignment Program Malfunction Words – Continued

Bit Location	Malfunction
	BDFAIL 3 (DISCRETE LONG LOOP TEST) (OUTPUT LINE FAILED "O" or "l")
o	
1	
2	
3	IMU Flag Set (to CDU)
4	+5 VDC
5	115 VAC
6	
7	+24 VDC
8	
9	
10	
11	
12	
13	
14	
15	
	BUFAIL (CDU TEST)
o	Serial data bus busy too long G.T. 90 usec
1	SDB parity error – short loop
2	SDB data error – short loop
3	SDB parity error CDU to computer
4	SDB parity error computer to CDU (ADR)
5	SDB parity error computer to CDU (data)
6	SDB long loop data error (KYBD word)
7	Display Reg. 1 contents incorrect
8	2
9	3
10	4
11	5
12	6
13	7
14	8
15	
	BUFT (SDB LONG LOOP TEST – SPU)
0	SDB busy too long G.T. 90 usec
1	SDB parity error – short loop
2	SDB data error – short loop
3	SDB parity error computer to SPU
4	SDB parity error SPU to computer
5	SDB data error – long loop
6	SDB parity error discrete L.C.
7	SDB parity error D/R, D/S L.C.
8	SDB parity error D/DC L.C.

Table 4-9. PADS Diagnostic/Alignment Program Malfunction Words - Continued

Bit Location	Malfunction
9	
10	
11	
12	
13	
14	
15	
	BPFAIL (PLAT I/O TEST)
0	Test incomplete at IMU ready
1	DVZ fail to count (inactive)
2	DVY fail to count (inactive)
3	DVX fail to count (inactive)
4	DVZ fail to reset on read
5	DVY fail to reset on read
6	DVX fail to reset on read
7	DWZ 3 MSB count down error
8	DWY 3 MSB count down error
9	DWX 3 MSB count down error
10	DVZ count up/down error
11	DVY count up/down error
12	DVX count up/down error
13	DWZ/DVZ error long loop – SPU
14	DWY/DVY error long loop – SPU
15	DWX/DVX error long loop – SPU
	BIFAIL T (IMU TEMPERATURE TEST)
0	Ambient temp. time between 110°, 120° G.T. 1.5 min
1	Ambient too low LT 30° at 5 min or LT 120° at 20 min
2	Ambient too high GT 126° at 20 min
3	Ambient overheat was below 126° now GT 140°
4	Upper gyro temp too low LT 150°
5	Upper gyro temp too high GT 160°
6	Lower gyro temp too low LT 150°
7	Lower gyro temp too high GT 160°
8	
9	
10	
11	
12	
13	
14	
15	

Table 4-9. PALIS Diagnostic/Alignment Program Malfunction Words - Continued

Bit Location	Malfunction
	BIFAIL D (IMU DISCRETE TEST)
o	IMU not ready at 4 min
1	Gyro float not to temp at 14 min
2	Gyro coarse htr on at 14 min
3	Accel coarse htr on at 14 min
4	
5	AV clock not present
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
NOTE: No 9 MAL or 10 MAL used.	
	BIFAIL S (IMU SYNCHRO/ACCEL TEST)
o	
1	
2	
3	
4	
5	
6	X interpolate saturated ±10 VDC
7	Y interpolate saturated ±10 VDC
8	Z interpolate saturated ±10 VDC
9	
10	
11	
12	
13	
14	
15	

Table 4-10. Computer Automatic Test Mode Malfunction Teletypewriter Messages

Teletypewriter malfunction message	Corrective action
	NOTE
	Replace cards in sequence given
Absence of XXX TEST CYCLES PASS message at approximately 2-minute intervals or CPU OP-CODE TEST FAIL	16-bit data circuit card assembly A2
	Control no. 2 circuit card assembly A4
	Control no. 3 circuit card assembly A5
	Control no. 1 circuit card assembly A3
	Memory unit Al
MEMORY TEST FAIL	Reseat memory unit Al and check wedgelocks for tightness
	Memory unit Al
	16-bit data circuit card assembly A2
	Control no. 2 circuit card assembly A4
	Control no. 3 circuit card assembly AS
	I/O controller card assembly A7
	Data buffer circuit card assembly A6
PRIORITY INTERRUPT TEST FAIL	I/O controller card assembly A7
	Data buffer circuit card assembly A6
	I/O discrete circuit card assembly A9
	Control no. 3 circuit card assembly A5
SERVICE INTERRUPT TEST FAIL	I/O controller card assembly A7
	Data buffer circuit card assembly A6
	Control no. 3 circuit card assembly ASI
DISCRETE I/O TEST FAIL	I/O discrete circuit card assembly A9
	Data buffer circuit card assembly A6
	I/O controller card assembly A7
	Computer power supply PS1
PLATFORM I/O TEST FAIL	Platform I/O circuit card assembly A8

Table 4-10. Computer Automatic Test Mode Malfunction Teletypewriter Massages – Continued

Teletypewriter malfunction message	Corrective action
	Data buffer circuit card assembly A6
	I/O controller card assembly A7
SERIAL DATA I/O TEST FAIL	Data buffer circuit card assembly A6
	I/O controller card assembly A7
ANALOG DATA I/O TEST FAIL	A/D converter circuit card assembly A11
	I/O controller card assembly A7
	Data buffer circuit card assembly A6
	Control no. 3 circuit card assembly A5

4-10. CDU Testing and Troubleshooting.

a. Test Equipment and Materials.

(1) PADS test set consisting of the signal processor unit (SPU), punched tape reader (tape reader), buffer unit, interconnecting cables, and auxiliary equipment.

(2) Teletypewriter. The 100-wpm motor-worm gear must be installed prior to use. Refer to TM 11-5815-200-12.

(3) PADS power supply, computer, pallet frame, and battery box.

(4) + 28V power source,

b. Procedure. Shown in figure 4-4 is a schematic diagram of the CDU chassis. A test setup interconnection diagram is shown in figure 4-5. Testing and troubleshooting procedures are provided in table 4-11. Figure 4-6 relates the button position on the keyboard to the wiring harness connectors for troubleshooting malfunctioning keys. Table 4-12 contains a sample TTY printout for the CDU test, Refer to table 4-13 for CDU automatic test mode malfunctions.

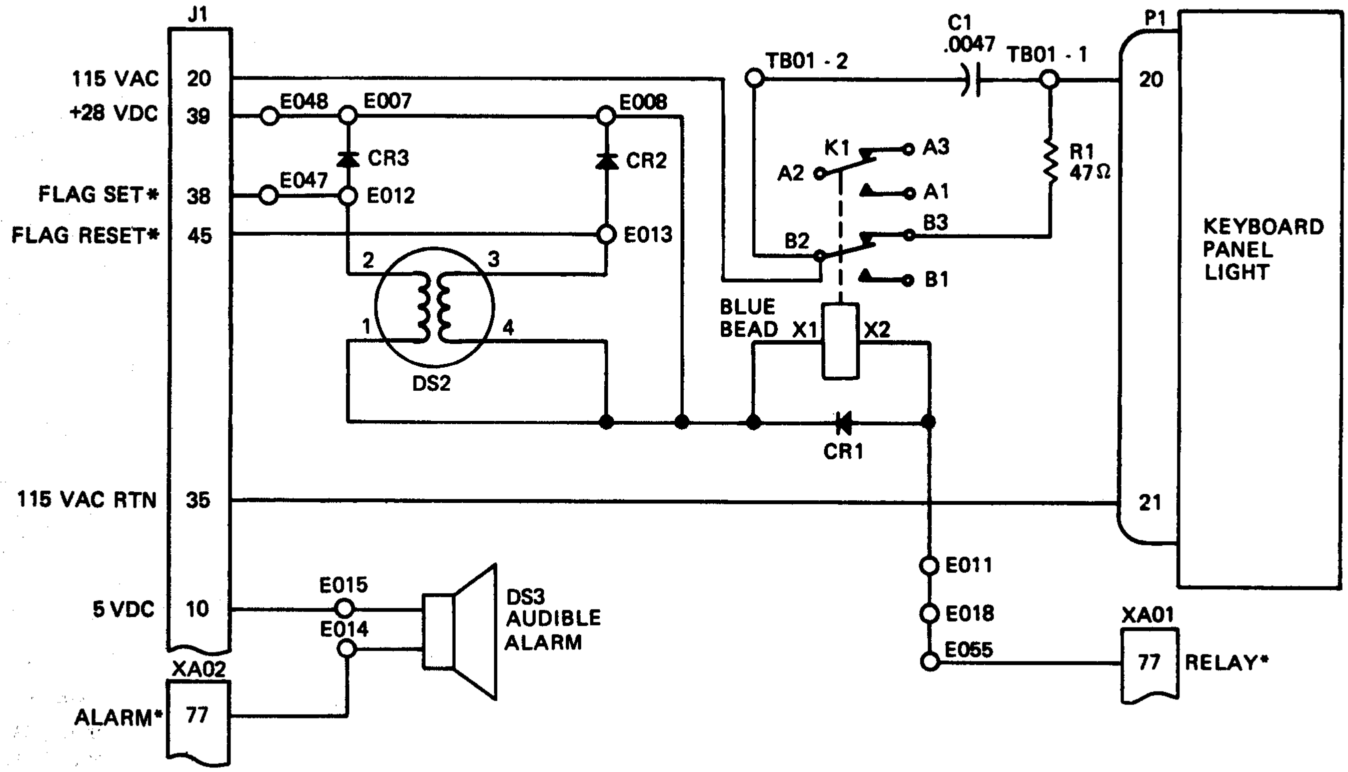


Figure 4-4. CDL) Chassis Schematic Diagram

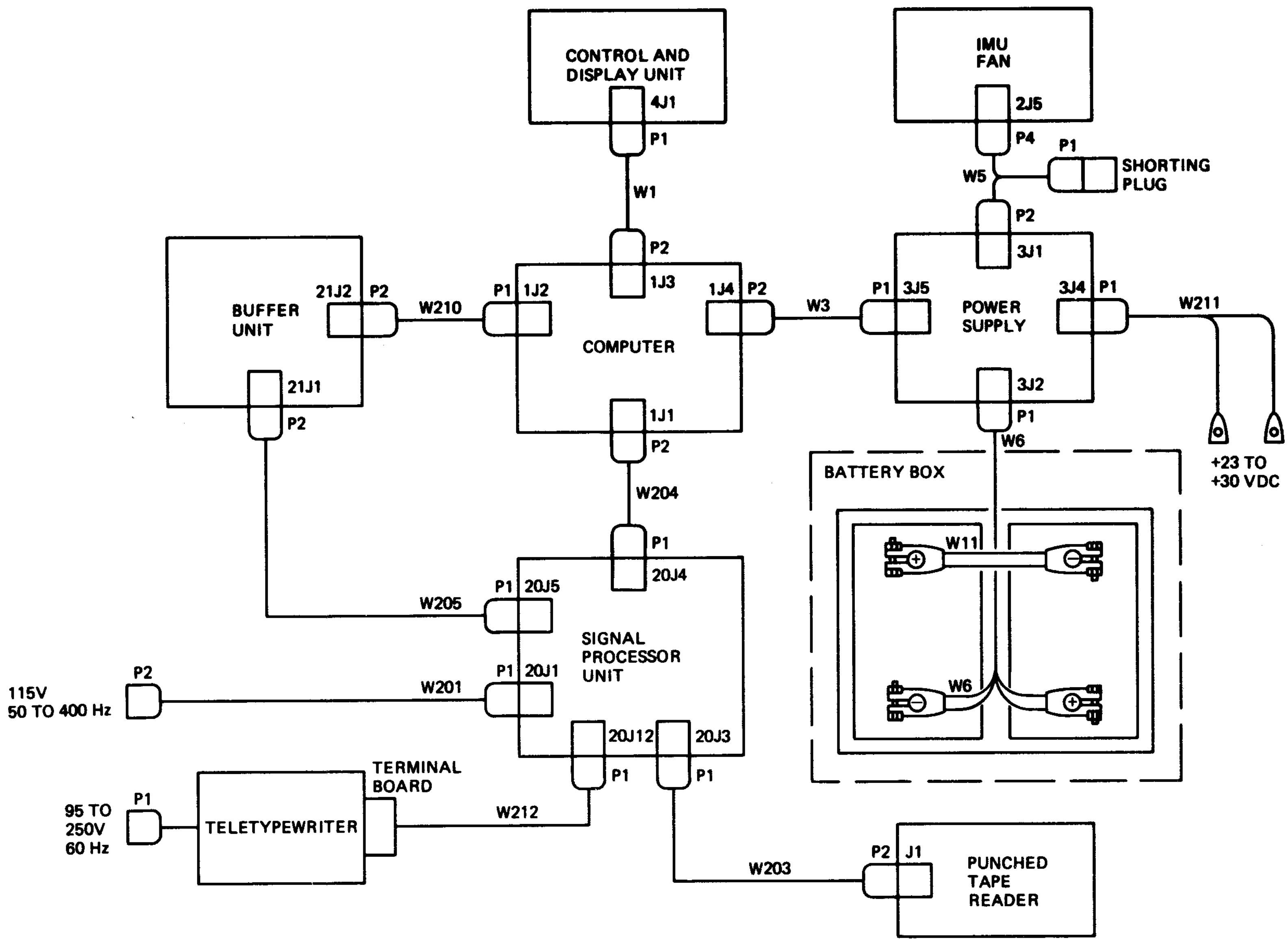
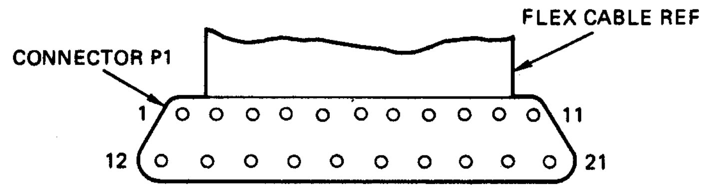


Figure 4-5. CDU Testing and Troubleshooting Interconnection Diagram

	COL 1	COL 2	COL 3	COL 4	COL 5	COL 6	COL 7
ROW 1	STOP	LAMP	TIME	E	1	+ 2	3
ROW 2	MARK	MON	ID	N	4	5	6
ROW 3	UPDT	ADZ	DIST	EL	7	– 8	9
ROW 4	ON / OFF	SPH	∠	GAZ / TAZ	CLR	0	ENT



CONNECTOR P1 PIN	FUNCTION	TO
1	COL 7	XA3–79
2	COL 7, ROW 4	J1–12
3	COL 1, ROW 1	E6
4	COL 6	XA3–36
5	COL 5	XA3–76
6	COL 4	XA3–80
7	COL 3	XA3–39
8	COL 2	XA3–38
9	COL 1	XA3–78
10	COL 1, ROW 4	XA1–41, P1–2
11	VCC	E3
12	ROW 1	XA3–37
13	ROW 3	XA3–72
14	COL 7, ROW 4	J1–14
15	ROW 4	XA3–31
16	COL 1, ROW 4	J1–23
17	ROW 2	XA3–77
18	COL 1, ROW 1	E5
19	SPARE	E4
20	115 VAC	E9, K1–B3
21	115 VAC	J1–35

Figure 4-6. Keyboard Interconnection

Table 4-11. CDU Testing and Troubleshooting

Test procedure	Normal indication	Malfunction indication/corrective action

CAUTION

Before taking any corrective action or conducting any repairs, make certain that PS BATTERY and VEHICLE circuit breakers CB1 and CB2 are in OFF positions or damage to the equipment may result.

NOTE

The Test Procedure column contains the test operation to be performed. The Normal Indication column contains the desired test set or teletype response to the test operation. The malfunction indication(s) and corrective action(s) are listed in the third column.

All switches, switch-indicators, and indicators called out in the procedure are located on the SPU, unless otherwise indicated.

To change a CDU card assembly, perform the following in order given:

a. Press EXECUTE switch-indicator to off

b. Press ON/OFF and ENTER switch-indicators

c. Set PS BATTERY and VEHICLE circuit breakers CB1 and CB2 to OFF

d. Change card assembly. (Refer to paragraph 3-17a)

e. Set BATTERY and VEHICLE circuit breakers CB1 and CB2 to ON

f. Press PADS ON/OFF switch-indicator to ON

g. Repeat the test

Check that tape reels are not deformed and that tape runs smoothly through tape reader head.

Test procedure	Normal indication	Malfunction indication/corrective action
1. <u>TEST SETUP</u>		
1a. Check that the diagnostic alignment or solid state program is loaded into computer memory and that the computer is functional in accordance with table 4-6, 4-6.1, 4-6.2, or 4-6.3		
lb. If EXECUTE switch-indicator is lighted press it to off		

Table 4-11. CDU Testing and Troubleshooting - Continued

Test procedure	Normal indication	Malfunction indication/correctiw action
1c. If PADS ON/OFF switch-indicator is lighted, sequentially press PADS ON/OFF switch-indicator and ENTER switch to turn off power to the computer		
1d. Check that PS BATTERY and VEHICLE circuit breakers CB1 and CB2 are set to OFF		
1e. Check that TTY printer MOTOR switch is set to OFF		
1f. If SPU ON switch-indicator is lighted, press it to off		
1g. Connect equipment as shown in figure 4-5 and in the following checklist:		

Cable	Unit
W5P1	Shorting Plug
W5P2	PS 3J1
W5P4	Computer Fan 5J1
W3P1	PS 3J5
W3P2	Computer PS 1J4
W6	Battery Box
W6P1	PS 3J2
P211P1	PS 3J4
W211	+28V
W210P1	Computer 1J2
W210P2	Buffer Unit 21J2
W205P1	SPU 20J5
W205P2	Buffer Unit 21J1
W204P1	SPU 20J4
W204P2	Computer 1J1
W203P1	SPU 20J3

Table 4-11. CDU Testing and Troubleshooting – Continued

Test procedure	Normal indication	Malfunction indication/corrective action
Cable — Unit		
W203P2 — Tape Reader J1		
W212P1 — SPU 20J 12		
W212 — TTY		
W201P1 — SPU 20J 1		
W201P2 — 115VAC		
TTY Power — 115VAC		
WIP1 — CDU 4J1		
W1P2 — Computer 1J3		
lh Check that W4P 1 is not connected to IMU connector 2J3		
1i. Press SPU ON switch-indicator to on		
lj. Set TTY printer MOTOR switch to ON		
lk. Turn on +28V power source and set PS BATTERY and VEHICLE circuit breakers CB1 and CB2 to ON		
2. CDU TEST		
2a. Press CDU ON/OFF switch	PS fan activates Various CDU indicators may light	PS fan does not turn on: Check that system properly connected and power and battery and VEHICLE circuit breakers CB1 and CB2 are ON Check cable W 1 and continuity between Jl-12and Pl-2and Pi-10, and J1-23 and P1-16 Repair as required If wiring is good, replace front panel assembly

Table 4-11. CDU Testing and Troubleshooting — Continued

Test procedure	Normal indication	Malfunction indication/corrective action
2b. Press EXECUTE switch-indicator to on	EXECUTE switch-indicator lights TTY prints out: (For core memory only) PADS DIAGNOSTIC ALIGNMENT PROCRAM PROGRAM CHECKSUM XXXXXX SELECT TEST MODE	
2b-1. For solid state memory press CDU keys SPH 800 ENT'	TTY prints out: PADS SOLID STATE DIAGNOSTIC ALIGNMENT PROCRAM PROCRAM CHECKSUM XXXXXX SELECT TEST MODE	
2c. Compare printed checksum to checksum written on either the front of the diagnostic-alignment tape or solid state program tape	Checksums are equal	Checksum is incorrect See step 3j of table 4-6 or step 3k of table 4-6.1
2d. Type TTY character set CDU (selects CDU automatic test model)	TTY prints out: CDU CDU AUTOMATIC TEST	From this step to completion of test, a TTY CDU failure message listed in table 4-13 may occur, Perform corrective action specified in table 4-13
	MODE	No CDU display
	CDU numeric displays 0 thru 9 at 2-second intervals. Alha module displays alternately □,, +, and x	Replace cards in sequence given: Keyboard and control circuit card assembly A3 Display logic circuit card assembly Al Display logic circuit card assembly A2
NOTE Before proceeding, check that TTY has printed XXX CYCLES PASS.		
2e. Press CDU LAMP button and release within 2 seconds, Repeat if necessary to observe indicators	CDU numeric module displays all 8's Alpha module displays . All display indicators are lighted	No change in display function: Check wire harness continuity from P1 Replace front panel assembly All lamps do not light Replace defective lamps

Table 4-11. CDU Testing and Troubleshooting — Continued

Test procedure	Normal indication	Malfunction indication/corrective action
		Check continuity between lamp sockets and applicable pins of XA01 and XA02. Repair as required

Table 4-11. CDU Testing and Troubleshooting – Continued

Test procedure	Normal indication	Malfunction indication/corrective action
2f. Press each CDU button and observe TTY printout	TTY printout corresponds to push-button pressed Example: CDU KEY DIST	No or incorrect TTY printout: Replace keyboard and control circuit card assembly A3; check wire harness continuity from P 1; replace front panel assembly Measure voltage between K1-X1 (+lead) and KI-X2 (-lead). If greater than +20V: Check C 1; replace K1. If less than +20V: Check CR1; check continuity between K1-XI and J1-39 and K1 -X2 and XA01 -77; replace display logic circuit card A 1 Pushbutton backlight does not light at full bright intensity: Set display intensity to full bright and measure voltage between P1 -20 and PI -21 If greater than 105 VAC, replace front panel assembly. If less than 105 VAC, measure voltage between K1-X1 (+lead) and KI-X2 (-lead). If greater than +20V, replace display logic circuit card Al. If less than +20V, check: Kl; R1; continuity between J 1-35 and P1-21, E017 and P1-20, and J1-20 and K1-B2. Repair as necessary

NOTE **NOTE**

“L” comes out HA on TTY. “TAZ” CDU LAMP will not print out.
does not print. “OFF” does not print.

Test procedure	Normal indication	Malfunction indication/corrective action
2g. Press CDU LAMP button and hold. Release LAMP pushbutton control to hold desired display brightness level	Same as step 2e for first 2 seconds. Display then blacks out and slowly increases in intensity in 9 steps (approximately 1 see/step)	Intensity does not vary: Replace computer power supply Audible alarm does not sound: Measure voltage between EO 15 (+lead) and E014 (-lead). If it is about +5V momentarily during each intensity cycle, replace audible alarm. If not, check continuity between EO 14 and XA02-77 and E015 and J1-10. Repair as required. Replace display logic circuit card A2

Table 4-11. CDU Testing and Troubleshooting – Continued

Test procedure	Normal indication	Malfunction indication/corrective action
	ALARM DS3 sounds for 1/2 second. The cycle repeats as long as LAMP pushbutton is held	ALARM DS3 sounds continuously: Check for shorts between E014 and and ground Replace display logic circuit card A2
2h. Press EXECUTE switch-indicator to off	EXECUTE "switch-indicator goes off	
2i. Sequentially press CDU ON/OFF switch-indicator and ENTER switch	PS fan goes off	
2j. Turn off PS BATTERY and VEHICLE circuit breakers CB1 and CB2		
2k. Turn off TTY		
2l. Press SPU ON switch-indicator to off	SPU ON switch-indicator goes off	
2m. Disconnect CDU from computer		
TEST COMPLETED		

Table 4-12. TTY Printout of CDU Test

```
PADS DIAGNOSTIC ALIGNMENT PROGRAM
 or
PADS SOLID STATE DIAGNOSTIC ALIGNMENT PROGRAM
PROGRAM CHECKSUM XXXXXX
SELECT TEST MODE
CDUCDU
CDU AUTOMATIC TEST MODE
   16     TEST CYCLES PASS
CDU KEY STOP
CDU KEY MARK
CDU KEY UPDT
CDU KEY ON/
CDU KEY MON
CDU KEY ADZ
CDU KEY SPH
CDU KEY TIME
CDU KEY ID
CDU KEY DIST
CDU KEY HA
CDU KEY E
CDU KEY N
CDU KEY EL
CDU KEY GAZ/
CDU KEY 1
CDU KEY 4
CDU KEY 7
CDU KEY CLR
CDU KEY 2
CDU KEY 5
CDU KEY 8
CDU KEY 0
CDU KEY 3
CDU KEY 6
CDU KEY 9
CDU KEY ENT
   30     TEST CYCLES PASS
   47     TEST CYCLES PASS
   65     TEST CYCLES PASS
```

Table 4-13. CDU Automatic Test Mode Malfunction Teletypewriter Messages

Teletypewriter malfunction message	Corrective action
	NOTE
	Replace cards in sequence given
CDU SERIAL DATA FAIL	Keyboard and control circuit card assembly A3
	Display logic circuit card assembly A1
	Display logic circuit card assembly A2
CDU DISPLAY A FAIL	Display logic circuit card assembly A1
	Display logic circuit card assembly A2
	Keyboard and control circuit card assembly A3
CDU DISPLAY B FAIL	Display logic circuit card assembly A2
	Display logic circuit card assembly A1
	Keyboard and control circuit card assembly A3

4-11. IMU Testing, Alignment, Troubleshooting, and Memory Matching Procedure.

a. *General.* The IMU test and alignment procedure is a lengthy (about 8 hours) test sequence which thoroughly checks out the IMU and recomputes many of the software calibration parameters if no hardware malfunctions are found. Most of the testing is performed automatically under computer control. The maintenance technician is required to reposition the system and measure angles with a theodolite to calibrate the porro prism. Care must be taken to site the system so it remains motionless during the test and is properly oriented. The system must be provided with survey coordinates so it can properly compute the calibration constants. The computer memory used for the test becomes matched to the IMU.

b. ***Test Equipment and Materials.***

(1) PADS test set consisting of the signal processor unit (SPU), punched tape reader (tape reader), buffer unit, interconnecting cables and auxiliary equipment.

(2) *Teletypewriter.* The 100-wpm motor-worm gear must be installed prior to use. Refer to TM 11-5815-200-12.

(3) PADS power supply, computer, pallet frame, batter box, and CDU.

(4) +28V power source.

c. *Survey Requirements.* The survey parameters for a test site will be provided by an engineer survey unit. The parameters required are:

(1) Latitude, in degrees, minutes, and seconds, accurate to 5 arc-seconds.

(2) Elevation, in feet, accurate to 30 feet.

(3) Geodetic azimuth, in roils, accurate to 0.02 roil.

d. The azimuth orienting line must be located so the maintenance technician's theodolite is between 6 and 16 meters from the IMU porro prism and the technician can autoreflect on the porro prism. The porro prism will be oriented approximately 45 degrees to the cardinal headings. (See figure 4-9.)

e. If only UTM coordinates, elevation in meters, and/or grid azimuth are available, the system can be used to translate them to the proper quantities as follows:

(1) With the operational program installed in memory, perform the test shown in table 3-1. Use the correct values for casting, northing, and elevation.

(2) After elevation is entered, press: MON, ID, 3,0, ENT. Record the displayed latitude in degrees, minutes, and seconds.

(3) Press +2 twice to get to ID 32. Record the elevation in feet.

(4) To obtain the geodetic (true) azimuth for a grid azimuth:

(a) Press GAZ/TAZ. Record GAZ.

(h) Press GAZ/TAZ again. Display will show TAZ C-E.

(c) Press ENT. Record TAZ.

(d) Subtract GAZ from TAZ.

(e) Add the grid azimuth of the orienting line to the difference to obtain the geodetic azimuth.

Example:	TAZ	3902.61
	GAZ	-3903.15
		-0.54
Orienting line grid azimuth		+ 1245.23
Geodetic (true) azimuth of orienting line		1244.69

f. *Siting.* The system must be on a level, stable surface which will not move during the test. Surfaces which are unacceptable include: maintenance van floor or workbench, wooden floors, mud, snow, ice, loosely packed sand, slippery clay, etc. Acceptable surfaces include: concrete, dry packed earth, etc. Hot blacktop may allow the system to sink slightly. Distribute the load on blacktop and surfaces such as packed sand and gravel by placing the system on the base of a transit case or a four foot square of 3/4-inch-thick plywood or similar material. The surface must be smooth enough so the system does not rock. A surface which can be constructed to permit drainage of rainwater is shown in figure 4-7. Pack the gravel to provide a firm base. Use sand to fill the gravel voids and provide a smooth level surface.

g. Normally, the alignment surface will be outside a maintenance van. It must be close enough so the cables from the test equipment will reach the system while the test equipment remains in the van. The alignment surface must be situated so the porro prism can be observed from the orienting line (refer to paragraph 4-11c.).

h. *Test Procedure.* Perform the test in accordance with table 4-14 or 4-14.1. Table 4-14 uses PADS test set tape reader, part no. 877406-1 and table 4-14.1 uses tape reader, part no, 877406-2. Table 4-15 is a sample printout from an IMU test. An interconnection diagram is provided in figure 4-8.

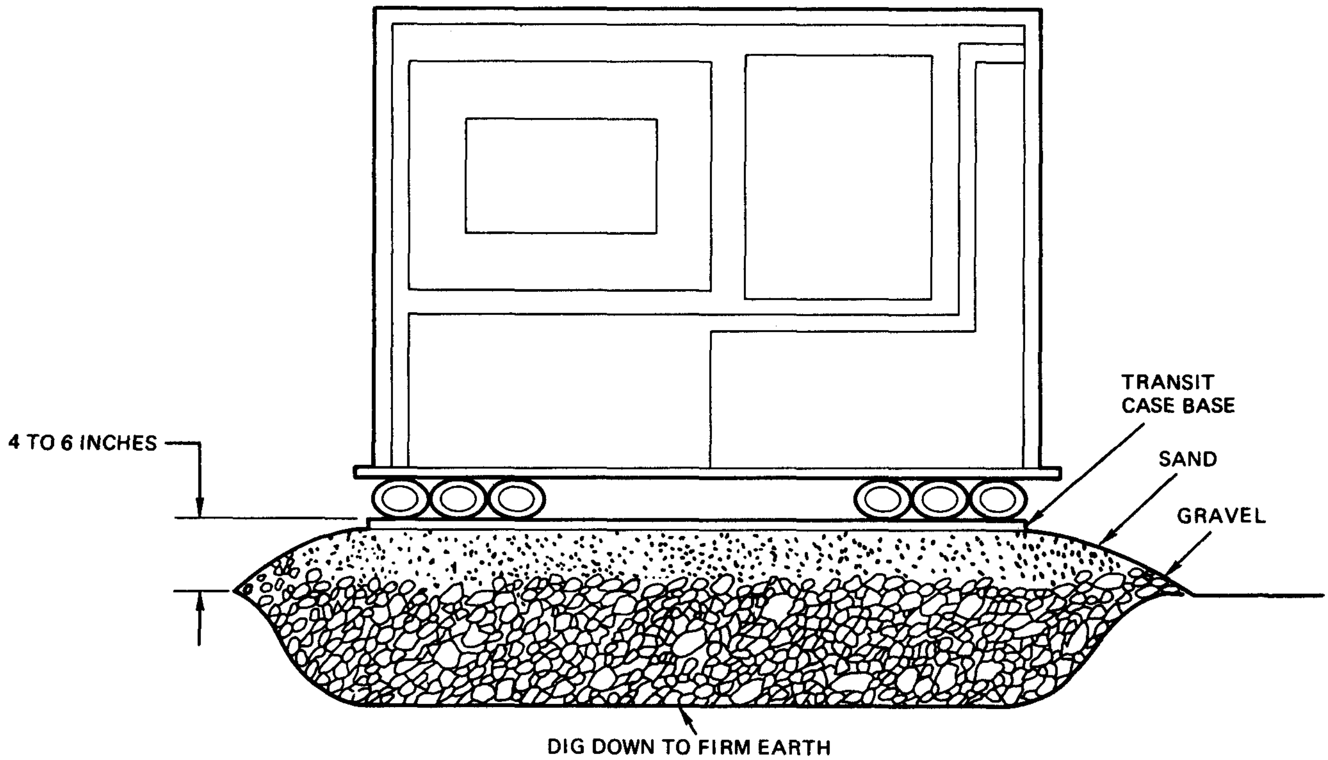


Figure 4-7. Alignment Surface

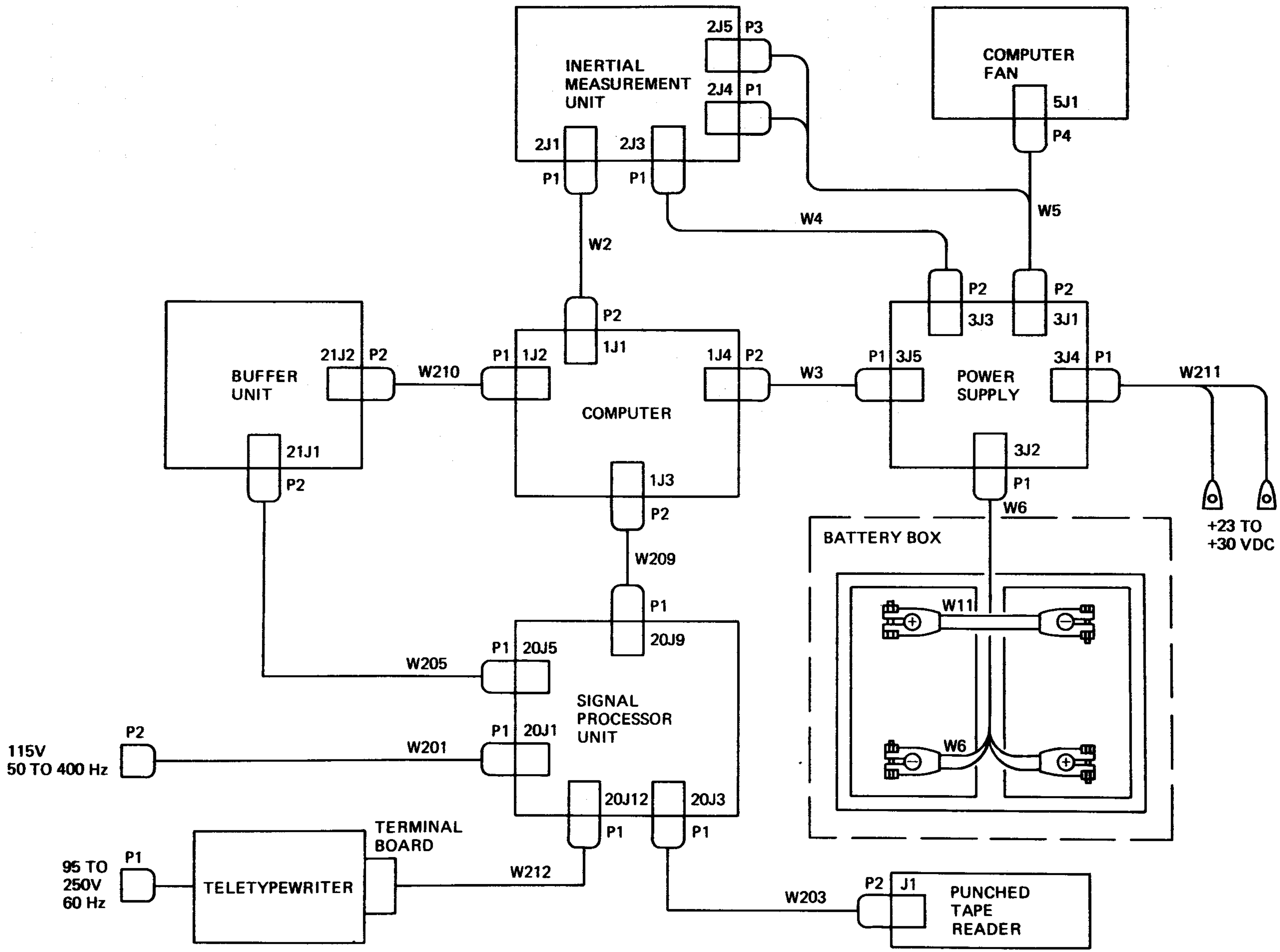
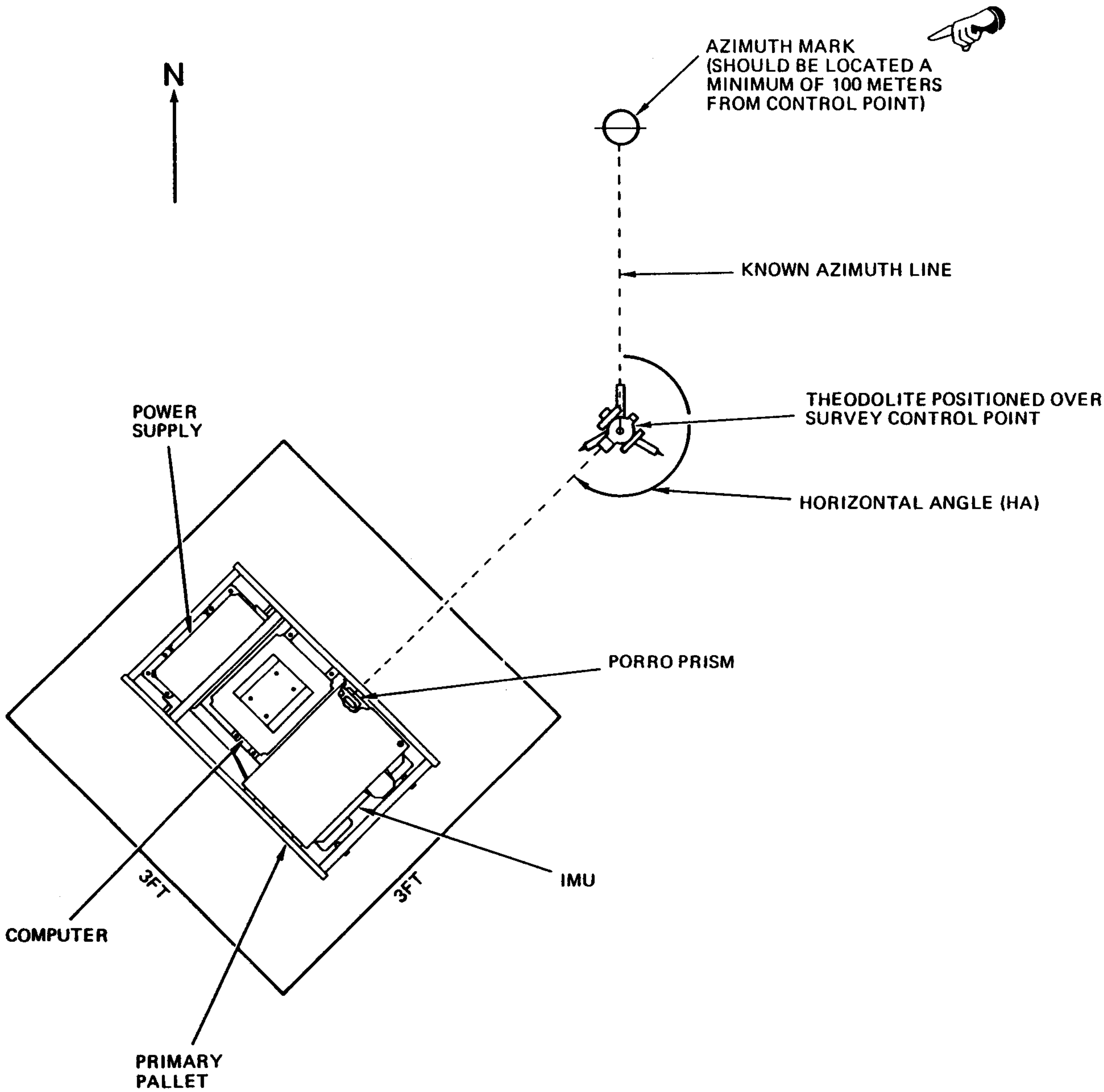


Figure 4-8. IMU Testing Interconnection Diagram



NOTE:

1. LOCATE PADS 6 TO 16 METERS FROM SURVEY CONTROL POINT
2. OR IENT PADS SO THAT PORRO PRISM FACES 45° (±10°) TO ANY CARDINAL HEADING
3. ADJUST PADS ORIENTATION FOR PROPER AUTOREFLECTION FROM THE THEODOLITE

44-902-16C

Figure 4-9. Angle Measurement

Table 4-14. IMU Testing, Alignment, and Troubleshooting

Test procedure	Normal indication	Malfunction indication/corrective action

NOTE

This procedure uses tape reader, part no. 877406-1.

The Test Procedure column contains the test operation to be performed. The Normal Indication column contains the desired test set or teletype response to the test operation. Malfunction indication(s) and corrective action(s) are listed in the third column.

All switches, switch-indicators, and indicators called out in the procedure are located on the SPU, unless otherwise indicated.

The memory unit installed in the computer must be the one which is to be dedicated to the IMU being calibrated. If the memory unit is used for other testing after the alignment is completed, the calibration data will be destroyed and the IMU must be realigned.

Check that tape reels are not deformed and that tape runs smoothly through tape reader head.

1. TEST SETUP

NOTE

Steps 1a thru 1u may be performed with the PADS on the workbench or on the alignment surface, depending on the previous setup.

1a. Check that the diagnostic alignment program is loaded into computer memory and that the computer is functional in accordance with table 4-6 or 4-6.2

1b. Check that the equipment is connected for computer testing in accordance with figure 4-3

1c. Check that EXECUTE switch-indicator is lighted. Press it as required

1d. Check that TTY printer MOTOR switch is set to ON

1e. Check that + 28V power source and PS BATTERY and VEHICLE circuit breakers CB1 and CB2 are ON

1f. Check that PADS ON/OFF switch-indicator ON is lighted. Press it as required

1g. Press EXECUTE switch-indicator to off

1h. Check that tape reader SPOOLING switch is set to DISABLE

Table 4-14. IMU Testing, Alignment, and Troubleshooting – Continued

Test procedure	Normal indication	Malfunction indication/corrective action
1i. Install IMU alignment data tape, for IMU being tested, on tape reader. Tape is located in storage container on IMU connector 2J2. Be careful not to tangle the coiled tape		
1j. Set tape reader SPOOLING switch to ENABLE		
1k. Press MEMORY LOAD switch-indicator to on	MEMORY LOAD switch-indicator lights. Tape reader reads tape and stops at end of tape	Tape stops in middle or does not stop at end: Rewind tape and reload. Make sure tension is applied to the front of the tape to ensure the sprocket wheel is properly engaged
1l. Press MEMORY LOAD switch-indicator to off	MEMORY LOAD switch-indicator goes off	
1m. Press REVERSE switch-indicator to on	REVERSE switch-indicator lights. Tape rewinds and stops near beginning	
1n. Press REVERSE switch-indicator to off	REVERSE switch-indicator goes off	
1o. Press VERIFY switch-indicator to check tape against memory contents	VERIFY switch-indicator lights. Tape reader reads tape and stops at end of tape	Tape does not stop at end: Rewind tape and verify Tape stops before end and VERIFY ERROR indicator lights: Rewind tape, reload and verify
1p. Press VERIFY switch-indicator to off	VERIFY switch-indicator goes off	
1q. Set tape reader SPOOLING switch to DISABLE		
lr. Remove tape from tape reader and store in container on IMU connector 2J2		
1s. Press PADS ON/OFF switch-indicator, then ENTER	PADS ON/OFF switch-indicator goes off PADS turn off	
1t. Set PS BATTERY and VEHICLE circuit breakers CB1 and CB2 to OFF. Set TTY MOTOR switch to OFF		
lu. Press SPU ON switch-inidcator to OFF	SPU ON switch-indicator goes off	

Table 4-14. IMU Testing, Alignment, and Troubleshooting – Continued

Test procedure	Normal indication	Malfunction indication/corrective action
WARNING The fully loaded primary pallet weight exceeds the two person lift criteria. The weight may be reduced by removing the power supply while the pallet is being moved.		
NOTE Leaving CDU connected in lieu of SPU, enter SPH 800 to communicate with printer.		
1v. If the system is not on the alignment surface, disconnect the test equipment and place the system on the alignment surface. The porro prism should point 45 (±10) degrees to any cardinal heading (Refer to paragraphs 4-11c and 4-11d)		
1w. Install the IMU in the primary pallet frame		
1x. Connect equipment as shown in figure 4-8 and the following checklist		

Cable	Unit
W5P1	IMU 2J4
W5P2	PS 3J1
W5P3	IMU 2J5
W5P4	Computer Fan 5J1
W3P1	PS 3J5
W3P2	Computer PS 1J4
W6	Battery BOX
W6P1	PS 3J2
W211	+28V
W211	PS 3J4
W210P1	Computer 1J2
W210P2	Buffer Unit 21J2

Table 4-14. IMU Testing, Alignment, and Troubleshooting — continued

Test procedure	Normal indication	Malfunction indication/corrective action
Cable — Unit		
W205P1 — SPU 20J5		
W205P2 — Buffer Unit 21J1		
W209P1 — SPU 20J9		
W209P2 — Computer 1J3		
W203P1 — SPU 20J3		
W203P2 — Tape Reader J1		
W212 — TTY		
W212P1 — SPU 20J12		
W201P1 — SPU 20J1		
W201P2 — 115 VAC		
TTY Power — 115 VAC		
W4P1 — IMU 2J3		
W4P2 — PS 3J3		
W2P1 — IMU 2J1		
W2P2 — Computer lJ1		
ly. Press SPU ON switch-indicator to on	SPU ON switch-indicator lights	
1z. Set TTY printer MOTOR switch to ON		
1aa. Turn on + 28V power source and set PS BATTERYand VEHICLE circuit breakers CB1 and CB2 to ON		
lab. Press PADS ON/OFF switch-indicator to on	PADS turns on	
2. IMU TEST AND ALIGNMENT		
NOTE The IMU test program requires entry of data via the TTY. Data definitions and formats are shown in table 4-16. Operator commands to check test status and halt or initiate various printouts are also given. Use of the theodolite to measure horizontal angles is described in chapter 5.		
2a. Press EXECUTE switch-indicator to on	EXECUTE switch-indicator lights	
	TTY prints out:	

Table 4-14. IMU Testing, Alignment, and Troubleshooting – Continued

Test procedure	Normal indication	Malfunction indication/corrective action
	PADS DIAGNOSTIC ALIGNMENT PROGRAM or PADS SOLID STATE DIAGNOSTIC ALIGNMENT PROGRAM PROGRAM CHECKSUM XXXXXX SELECT TEST MODE	
2b. Compare printed checksum written on the front of the diagnostic-alignment tape or solid state program tape	Checksums are equal	Checksum is incorrect: Refer to step 3k of table 4-6 or step 2U of table 4-6.2
2c. Type IMU to select IMU automatic alignment and test sequence	TTY prints out: IMU SER NO XXXXX DATE XXXXX CHECKSUM XXXXXX MOVE IMU TO APPROX 45 DEG HEADING WHEN DONE TYPE: RDY	NOTE From this step forward, the TTY may print out any of the malfunction messages listed in table 4-17. Take the corrective action shown in table 4-17.
2d. Verify that the printed serial number matches the serial number of the IMU under test and the checksum matches the checksum on the IMU alignment data tape	Data matches	Reload IMU alignment data tape
2e. Type RDY when 45° (±10°) heading request has been completed	TTY prints out: **RDY** **ENTER LATITUDE: (DEG) (MIN) (SEC) RDY**	NOTE The program will accept all data on one line, thus if the operator makes a mistake prior to typing RDY while entering data via the ‘M’Y, he should hit the carriage return key and reenter the data. If the diagnostic program does not recognize the entry as valid, the TTY prints out: IMPROPER DATA ENTRY. The operator should reenter the data.

Table 4-14. IMU Testing, Alignment, and Troubleshooting – Continued

Test procedure	Normal indication	Malfunction indication/corrective action
NOTE Do not move PADS again until instructed to do so.	**NOTE** TEST NUMBER X IN PROGRESS 000000. 000000 will print out periodically during test to indicate the start of a subtest. The time since start may also be printed. If a failure occurs, the number will be nonzero and IMU, CMP, or PSU FAILURE will print. A set of failure. subcodes will then be printed which provide useful information for depot repair of the IMU and computer. Replace or repair the computer or power supply as appropriate. Return a failed IMU to depot with a copy of the TTY printout.	
2f. Type XXX XX XX.X RDY for degrees, minutes, and seconds of latitude. Leave a space between each numerical grouping	TTY prints out: RDY ENTER ELEVATION: (FT) RDY	
2g. Type XXX.X RDY for correct elevation in feet	TTY prints out: RDY ENTER DATE: (JULIAN) RDY	
2h. Type XXXX RDY for correct Julian data	TTY prints out: RDY ENTER SER NO: (DIGITS) RDY	
2i. Type correct IMU serial number in format XXXX RDY **NOTE** The theodolite is always required for IMU calibration. If a hard IMU failure is suspected, the theodolite is not required for diagnosis.	TTY prints out: RDY ALIGNMENT PROCEEDING IF THEODOLITE WILL NOT BE USED, TYPE: BYP	TTY prints out: SERIAL NO INCORRECT: Load correct IMU alignment data tape
2j. Type BYP if theodolite will not be used	TTY prints out: BYP	

NOTE

There are 10 subtests, but one or more will be deleted depending on the use of the theodolite.

At the end of a subtest, data may be printed out. The message AT LEAST ONE OUT-OF-CAL IN TEST NUMBER X means an out-of-tolerance parameter was recalibrated. It is not a failure message and no operator action is required.

Table 4-14. IMU Testing, Alignment, and Troubleshooting – Continued

Test procedure	Normal indication	Malfunction indication/corrective action
2k. If the theodolite is to be used, set it up to autoreflect on the porro prism and measure the horizontal angle from the target to the porro prism as shown in figure 4-9. Refer to chapter 5 for operation of theodolite. If theodolite is not used, go to step 2s at completion of test (approximately 8 hours)	In approximately 45 minutes, TTY prints: THEODOLITE TEST (TO ABORT AT ANY TIME TYPE: BYP) MOVE IMU TO 0 DEGREES PITCH 0 DECREES ROLL WHEN DONE TYPE: RDY ALIGNMENT HALTED	
2l. Move primary pallet to 0 degrees pitch and 0 degrees roll		
2m. Remove porro prism cover and level porro prism. Verify theodolite can autoreflect on porro prism	Autoreflection achieved	Theodolite does not autoreflect: Adjust primary pallet orientation until autoreflection achieved
2n. Type RDY	TTY prints out: RDY ENTER THEODOLITE READING: (MILS) RDY ALIGNMENT HALTED	TTY prints out: RDY X.XX DEGREES PITCH X.XX DEGREES ROLL ATTITUDE: NOT WITHIN 2 DECREES OF REQUESTED MOVE IMU TO X DEGREES PITCH X DECREES ROLL WHEN DONE TYPE: RDY ALIGNMENT HALTED Repeat steps 2l and 2m adjusting pitch and roll as necessary
2o. Measure horizontal angle from the target to the porro prism. (Refer to chapter 5)		
2p. Enter horizontal angle in format XXXX.XX RDY	TTY prints: RDY XXX.XXXX DECREES PITCH 10-SEC AV XXX.XXXX DECREES ROLL 10-SEC AV XXX.XXXX DECREES AZ 10-SEC AV MOVE IMU TO X DEGREES PITCH X DECREES ROLL WHEN DONE TYPE: RDY	

Table 4-14. IMU Testing, Alignment, and Troubleshooting — Continued

Test procedure	Normal indication	Malfunction indication/corrective action
	ALIGNMENT HALTED	
NOTE Obtain the desired pitch and roll angles by placing blocks under the primary pallet frame. Make sure the system cannot rock on the blocks. Level porro prism.		
2q. Repeat steps 2m thru 2p for the following pitch and roll angles:	After data for last position entered, TTY prints:	

PITCH	ROLL	RAISE	Normal indication
			ENTER TAZ:(MIL) RDY
0°	+8°	PS end 4 in.	ALIGNMENT HALTED
0°	−8°	IMU end 4 in.	
+0°	0°	None	
+8°	0°	Porro prism side 2.5 in.	
−8°	0°	Computer connector side 2.5 in.	
0°	0°	None	

Test procedure	Normal indication	Malfunction indication/corrective action
CAUTION Do not move or disturb primary pallet after last position is reached. Make sure pallet is firmly blocked in level position.		
2r. Enter geodetic (true) azimuth of target in mils in format XXXX.XX RDY	TTY prints: RDY Alignment continues	TTY prints: TAZ OR IMU HEADING INCORRECT MOVE TO APPROX 45 DEG HDG WHEN DONE TYPE: RDY ALIGNMENT HALTED:

Table 4-14. IMU Testing, Alignment, anti Troubleshooting — Continued

Test procedure	Normal indication	Malfunction indication/corrective action
		Ensure IMU is oriented to 45 ±10 degrees to any cardinal heading and the azimuth is correct. Type RDY. TTY will request a new measurement of the last horizontal angle followed by azimuth entry TTY prints: TYPE ONE OF: ACC REP BYP ALIGNMENT HALTED: Type REP and repeat theodolite test. If test fails a second time, replace the porro prism assembly TTY prints: THEODOLITE READING INCONSISTENT TYPE ONE OF: REP,BYP Before using the theodolite readings to calculate the porro prism calibration constants, several feasibility checks will be run on the readings. If one or more readings were in error, these checks will detect an inconsistency and give the operator the option of repeating the readings or bypassing the test. If an inconsistency is detected for three consecutive sets of readings, the system will assume that PADS is in error and will print out an IMU failure. Return I MU to depot if any lines 1020 thru 1025 indicate a failure. If only line 101 or 102 indicates a failure, replace the porro prism assembly. Return IMU to depot if following test 9, TTY prints: NEED DEPOT CAL
	NOTE A complete table of calibration parameters, including the cal data checksum, will print during subtest 10. A failure table will print after test 10 results. OK means the parameter was within tolerance; OOC means the parameter was out of tolerance but has been recalibrated; FAIL means the parameter was out of tolerance and must be corrected at the depot level. At end of test, TTY prints: ALIGNMENT COMPLETED ooOOOoooOOOo	
Press EXECUTE switch-indicator to off	EXECUTE switch-indicator goes off	
Sequentially press PADS ON/OFF switch-indicator and ENTER switch	PADS ON/OFF switch-indicator goes off System shuts down	

Table 4-14. IMU Testing, Alignment, and Troubleshooting - Continued

Test procedure	Normal indication	Malfunction indication/corrective action
2u. Set PS BATTERY and VEHICLE circuit breakers CB1 and CB2 to OFF		
2v. Set TTY printer MOTOR switch to OFF		
2w. Press SPU ON switch-indicator to off	SPU ON switch-indicator goes off	
2x. Disconnect equipment		
2y. Record IMU alignment checksum, date of alignment, and IMU serial number and store in IMU tape compartment		
2z. Remove and save IMU alignment TTY printout		
2aa. Proceed to paragraph 4-12		
TEST COMPLETED		

Table 4-14.1 IMU Testing, Alignment, and Troubleshooting Using Tape Reader, Part No. 877406-2

Test procedure	Normal indication	Malfunction indication/corrective action

NOTE

The Test Procedure column contains the test operation to be performed. The Normal Indication column contains the desired test set or teletype response to the test operation. Malfunction indication(s) and corrective action(s) are listed in the third column.

All switches, switch-indicators, and indicators called out in the procedure are located on the SPU, unless otherwise indicated.

The memory unit installed in the computer must be the one which is to be dedicated to the IMU being calibrated. If the memory unit is used for other testing after the alignment is completed, the calibration data will be destroyed and the IMU must be realigned.

Check that tape reels are not deformed and that tape runs smoothly through tape reader head.

1. TEST SETUP

NOTE

Steps la thru lu may be performed with PADS on the workbench or the alignment surface, depending on the previous setup.

la. Check that the diagnostic alignment program is loaded into computer memory and that the computer is functional in accordance with table 4-6.1 or 4-6.3

1b. Check that the equipment is connected for computer testing in accordance with figure 4-3

lc. Check that EXECUTE switch-indicator is lighted. Press it as required

1d. Check that TTY printer MOTOR switch is set to ON

1e. Check that + 28V power source and PS BATTERY and VEH1-CLE circuit breakers CB1 and CB2 are ON

lf. Check that PADS ON/OFF switch-indicator ON is lighted. Press it as required

1g. Press EXECUTE switch-indicator to off

1h. Set tape reader SPL/LOOP switch to LOOP and FAST/ SLOW switch to SLOW

Table 4-14.1. IMU Testing, Alignment, and Troubleshooting Using Tape Reader, Part No. 877406-2 - Continued

Test procedure	Normal indication	Malfunction indication/corrective action
1i. Lift tape reader read head cover; install IMU alignment data tape, for IMU being tested, on tape reader. Tape is located in storage container on IMU connector 2J2. Be careful not to tangle the coiled tape. Gently lower read head cover	No. 10 LED indicator lights steady	
1j. Ensure that tape reader FAST/SLOW switch is set to SLOW		
1k. Press MEMORY LOAD switch-indicator to on	MEMORY LOAD switch-indicator lights. Tape reader reads tape and stops at end of tape	Tape stops in middle or does not stop at end Rewind tape and reload. Make sure tension is applied to the front of the tape to ensure the sprocket wheel is properly engaged
1l. Press MEMORY LOAD switch-indicator to off	MEMORY LOAD switch-indicator goes off	
1m. Deleted		
1n. Press REVERSE switch-indicator to on	REVERSE switch-indicator lights. Tape rewinds and stops near beginning	
1o. Press REVERSE switch-indicator to off	REVERSE switch-indicator goes off	
1p. Press VERIFY switch-indicator to check tape against memory contents	VERIFY switch-indicator lights. Tape reader reads tape and stops at end of tape	Tape does not stop at end: Rewind tape and verify Tape stops before end and VERIFY ERROR indicator lights: Rewind tape, reload and verify
1q. Press VERIFY switch-indicator to off	VERIFY switch-indicator goes off	
1r. Lift tape reader read head cover and remove tape from tape reader and store in container on IMU connector 2J2		
1s. Press PADS ON/OFF switch-indicator, then ENTER	PADS ON/OFF switch-indicator goes off PADS turn off	
1t. Set PS BATTERY and VEHICLE circuit breakers CB1 and CB2 to OFF. Set TTY MOTOR Switch to OFF		
1u. Press SPU ON switch-indicator to OFF	SPU ON switch-indicator goes off	

Table 4-14.1 IMU Testing. Alignment. and Troubleshooting Using Tape Reader. Part No. 877406-2 - Continued

Teat procedure	Normal indication	Malfunction indication/corrective action
WARNING The fully loaded primary pallet weight exceeds the two person lift criteria. **NOTE** If the CDU is used in lieu of the SPU, enter SPH 800 to communicate with the printer.		
1v. If the system is not on the align. ment surface, disconnect the test equipment and place the system on the alignment surface. The porro prism should point 45 (±10) degrees to any cardinal heading (Refer to paragraphs 4-11 c and 4-11d)		
1w. install the IMU in the primary pallet frame if not already installed		
1x. Connect equipment as shown in figure 4-8 and the following checklist		

Cable	Unit
W5P1	IMU 2J4
W5P2	PS 3J1
W5P3	IMU 2J5
W5P4	Computer Fan 5J1
W3P1	PS 3J5
W3P2	Computer PS1J4
W6	Battery Box
W6P1	PS 3J2
W211	+28V
W211	PS 3J4
W210P1	Computer 1J2
W210P2	Buffer Unit 21J2
W205P1	SPU 20J5
W205P2	Buffer Unit 21J1
W209P1	SPU 20J9
W209P2	Computer 1J3

Table 4-14.1 IMU Testing, Alignment. and Troubleshooting Using Tape Reader, Part No. 877406-2 – Continued

Test procedure		Normal indication	Malfunction indication/corrective action
W203P1	SPU 20J3		
W203P2	Tape Reader J1		
W212	TTY		
W212P1	SPU 20J12		
W201P1	SPU 20J1		
W201P2	115 VAC		
TTY Power	115 VAC		
W4P1	IMU 2J3		
W4P2	PS 3J3		
W2P1	IMU 2J1		
W2P2	Computer 1J1		
1y. Press SPU ON switch-indicator to on		SPU ON switch-indicator lights	
1z. Set TTY printer MOTOR switch to ON			
1aa. Turn on + 28V power source and set PS BATTERY and VEHICLE circuit breakers CB1 and CB2 to ON			
1ab. Press PADS ON/OFF switch-indicator to on		PADS turns on	
2. <u>IMU TEST AND ALIGNMENT</u>			
NOTE The IMU test program requires entry of data via the TTY. Data definitions and formats are shown in table 4-16. Operator commands to check test status and halt or initiate various printouts are also given. Use of the theodolite to measure horizontal angles is described in chapter 5.			
2a. Press EXECUTE switch-indicator to on		EXECUTE switch-indicator lights TTY prints out: PADS DIAGNOSTIC ALIGNMENT PROGRAM or PADS SOLID STATE DIAGNOSTIC ALIGNMENT PROGRAM PROGRAM CHECKSUM XXXXXX	

Table 4-14.1 IMU Testing, Alignment, and Troubleshooting Using Tape Reader, Part No. 877406-2 – Continued

Test procedure	Normal indication	'Malfunction indication/corrective action
	SELECT TEST MODE	
2b. Compare printed checksum written on the front of the punched tape in use	Checksums are equal	Checksum is incorrect Refer to step 3k of table 4-6.1 or step 2v of table 4-6.3
2c. Type IMU to select IMU automatic alignment and test sequence	TTY prints out: IMU SER NO XXXX DATE XXXX CHECKSUM XXXXXX MOVE IMU TO APPROX 45 DEC HEADING WHEN DONE TYPE: RDY	**NOTE** From this step forward, the TTY may print out any of the malfunction messages listed in table 4-17, Take the corrective action shown in table 4-17.
2d. Verify that the printed serial number matches the' serial number of the IMU under test and the checksum matches the checksum on the IMU alignment data tape	Data matches	Reload IMU alignment data tape
2e. Type RDY when 45° (±10°) heading request has been completed	TTY prints out: RDY ENTER LATITUDE: (DEG) (MIN) (SEC) RDY	**NOTE** The program will accept all data on one line, thus if the operator makes a mistake prior to typing RDY while entering data via the TN, he should hit the carriage return key and reenter the data. If the diagnostic program does not recognize the entry as valid, the TTY prints out: IMPROPER DATA ENTRY. The operator should reenter the data.

Table 4- 14.1 IMU Testing, Alignment, and Troubleshooting Using Tape Reader, Part No. 877406-2 - Continued

Test procedure	Normal indication	Malfunction indication/corrective action
NOTE Do not move PADS again until instructed to do so.	**NOTE** TEST NUMBER X IN PROGRESS 000000 000000 will print out periodically during test to indicate the start of a subtest. The time since start also may be printed. If a failure occurs, the number will be nonzero and IMU, CMP, or PSU FAILURE will print. A set of failure subcodes will then be printed which provide useful information for depot repair of the IMU and computer. Replace or repair the computer or power supply as appropriate. Return a failed IMU to depot with a copy of the TTY printout.	
2f. Type XXX XX XX.X RDY for degrees, minutes, and seconds of latitude. Leave a space between each numerical grouping	TTY prints out: RDY ENTER ELEVATION: (FT) RDY	
2g. **Type XXX.X** RDY for **correct** elevation in feet	TTY prints out: RDY ENTER DATE: (JULIAN) RDY	
2h. Type XXXX RDY for correct Julian data	TTY prints out: RDY ENTER SER NO: (DIGITS) RDY	
2i. Type correct IMU serial number in format XXXX RDY	TTY prints out: RDY ALIGNMENT PROCEEDING IF THEODOLITE WILL NOT BE USED, TYPE: BYP	TTY prints out: SERIAL NO INCORRECT: Load correct IMU alignment data tape
2j. Type BYP if theodolite will not be used	TTY prints out: BYP	

NOTE

There are 10 subtests, but one or more will be deleted depending on the use of the theodolite.

Table 4-14.1 IMU Testing, Alignment, and Troubleshooting Using Tape Reader, Part No. 877406-2 -- Continued

Test procedure	Normal indication	Malfunction indication/corrective action
At the end of a subtest, data may be printed out. The message AT LEAST ONE OUT-OF-CAL IN TEST NUMBER X means an out-of-tolerance parameter was recalibrated. It is not a failure message and no operator act ion is required.		
2k. If the theodolite is to be used, set it up to autoreflect on the porro prism and measure the horizontal angle from the target to the porro prism as shown in figure 4-9. Refer to chapter 5 for operation of theodolite. If theodolite is not used, go to step 2s at completion of test (approximately 8 hours)	In approximately 45 minutes, TTY prints: THEODOLITE TEST (TO ABORT AT ANY TIME TYPE: BYP) MOVE IMU TO O DECREES PITCH O DECREES ROLL WHEN DONE TYPE: RDY ALIGNMENT HALTED	
2l. Move primary pallet to O degrees pitch and O degrees roll		
2m. Remove porro prism cover and level porro prism. Verify theodolite can autoreflect on porro prism	Autoreflection achieved	Theodolite does not autoreflect: Adjust primary pallet orientation until autoreflection is achieved
2n. Type RDY	TTY prints out: RDY ENTER THEODOLITE READING (MILS) RDY ALIGNMENT HALTED	TTY prints out: RDY X.XX DECREES PITCH X.XX DECREES ROLL ATTITUDE NOT WITHIN 2 DEGREES OF REQUESTED MOVE IMU TO X DECREES PITCH X DECREES ROLL WHEN DONE TYPE: RDY ALIGNMENT HALTED Repeat steps 2l and 2m adjusting pitch and roll as necessary
20. Measure horizontal angle from the target to the porro prism. (Refer to chapter 5)		
2p. Enter horizontal angle in format XXXX.XX RDY	TTY prints out: RDY XXX.XXXX DEGREES PITCH 10-SEC AV XXX.XXXX DECREES ROLL 10-SEC AV XXX.XXXX DECREES AZ 10-SEC AV	

Table 4-14.1 IMU Testing, Alignment, and Troubleshooting Using Tape Reader, Part No. 877406-2 – Continued

Test procedure	Normal indication	Malfunction indication/corrective action
	MOVE IMU TO X DEGREES PITCH X DEGREES ROLL WHEN DONE TYPE: RDY ALIGNMENT HALTED	
NOTE Obtain the desired pitch and roll angles by placing blocks under the primary pallet frame. Make sure the system cannot rock on the blocks. Level porro prism		
2q. Repeat steps 2m thru 2p for the following pitch and roll angles: PITCH ROLL RAISE 0° +8° PS end 4 in. 0° −8° IMU end 4 in. 0° 0° None +8° 0° Porro prism side 2.5 in. −8° 0° Computer connector side 2.5 in. 0° 0° None	After data for last position entered, TTY prints out: ENTER TAZ (MIL) RDY ALIGNMENT HALTED	
CAUTION Do not move or disturb primary pallet after last position is reached. Make snre pallet is firmly blocked in level position.		
2r. Enter geodetic (true) azimuth of target in roils in format XXXX.XX RDY	TTY prints out: RDY Alignment continues	TTY prints out: TAZ OR IMU HEADING INCORRECT MOVE TO APPROX 45 DEG HDG

Table 4-14.1. IMU Testing, Alignment, and Troubleshooting Using Tape Reader, Part No. 877406-2 — Continued

Test procedure	Normal indication	Malfunction indication/corrective action
		WHEN DONE TYPE: RDY ALIGNMENT HALTED: Ensure IMU is oriented to 45 ±10 degrees to any cardinal heading and azimuth is correct. Type RDY. TTY will request a new measurement of the last horizontal angle followed by azimuth entry TTY prints out: TYPE ONE OF: ACC REP, BYP ALIGNMENT HALTED: Type REP and repeat theodolite test. If test fails a second time, replace the porro prism assembly TTY prints out: THEODOLITE READING INCONSISTANT TYPE ONE OF: REP, BYP Before using the theodolite readings to calculate the porro prism calibration constants, several feasability checks will be run on the readings, If one or more readings were in error, these checks will detect an inconsistancy and give the operator the option of repeating the readings or bypassing the test. If an inconsistency is detected for three consecutive sets of readings, the system will assume that PADS is in error and will print out an IMU failure. Return IMU to depot if any lines 1020 thru 1025 indicate a failure. If only line 101 or 102 indicates a failure, replace the porro prism assembly.
	NOTE A complete table of calibration parameters, including the cal data checksum, will print during subtest 10. A failure table will print after test 10 results, OK means the parameter was within tolerance; OOC means the parameter was out of tolerance but has been recalibrated; FAIL means the parameter was out of tolerance and must be corrected at the depot level.	
	At end of test, TTY prints out: ALIGNMENT COMPLETED 000000 000000	Return IMU to depot if following test 9, TTY prints out: NEED DEPOT CAL
2s. Press EXECUTE switch-indicator to off	EXECUTE switch-indicator goes off	
2t. Sequentially press PADS ON/OFF switch-indicator and ENTER switch	PADS ON/OFF switch-indicator goes off System shuts down	

Table 4-14.1. IMU Testing, Alignment, and Troubleshooting Using Tape Reader Part No. 877408-2-Continued

Test procedure	Normal indication	Malfunction indication/corrective action
2u. Set PS BATTERY and VEHICLE circuit breakers CB1 and CB2 to OFF		
2v. Set TTY printer MOTOR switch to OFF		
2w. Press SPUON switch-indicator to off	SPU ON switch–indicator goes off	
2x. Disconnect equipment		
2y. Record IMU alignment check-sum, date of alignment and IMU serial number and stem in IMU tape compartment		
2z. Remove and save IMU alignment TTY printout		
2aa. Proceed to paragraph 4-12		
TEST COMPLETED		

Table 4-14.1. IMU Testing, Alignment, and Troubleshooting Using Tape Reader, Part No. 877406-2 - Continued

Test procedure	Normal indication	Malfunction indication/corrective action
2u. Set PS BATTERY and VEHICLE circuit breakers CB1 and CB2 to off		
2y. Set TTY printer MOTOR switch to OFF		
2w. Press SPU ON switch-indicator to off	SPU ON switch-indicator goes off	
2x. If there were no IMU failures at end of test, load operational program in accordance with table 4-18.1		
2y. Disconnect equipment		
2z. Record IMU alignment check-sum, date of alignment, and IMU serial number and store in IMU tape compartment		
2aa. Remove and save IMU alignment TTY printout		
TEST COMPLETED		

Table 4-15. TTY Printout of IMU Test

```
PADS DIAGNOSTIC ALIGNMENT PROGRAM
  OR
PADS SOLID STATE DIAGNOSTIC ALIGNMENT PROGRAM
PROGRAM CHECKSUM XXXXXX
SELECT TEST MODE

IMUIMU
SER NO 0002   DATE 7312 CHECKSUM 003256
MOVE IMU TO APPROX 45 DEG HEADING
WHEN DONE TYPE: RDY

RDYRDY
ENTER LATITUDE: (DEG) (MIN) (SEC) RDY
38 44 24.6NRDYRDY
ENTER ELEVATION: (FT)RDY
52.5RDYRDY
ENTER DATE: (JULIAN) RDY

7314RDYRDY
ENTER SER NO: (DIGITS)RDY

0002RDYRDY
ALIGNMENT PROCEEDING
IF THEODOLITE WILL NOT BE USED, TYPE: BYP

TEST NUMBER 1 IN PROGRESS
  000000 000000

     1001        -1.152 OK    PULSES/SEC
     1002         4.004 OK    PULSES/SEC
     1003        -0.027 OK    PULSES/SEC
     1004        55.879 OK    PULSES/SEC
     1005       -76.180 OK    PULSES/SEC
     1006       -11.230 OK    PULSES/SEC
     1007       -82.195 OK    PULSES/SEC
     1008        58.992 OK    PULSES/SEC
     1009       -13.352 OK    PULSES/SEC

  000000 000000

TEST NUMBER 2 IN PROGRESS STARTED 1 MINUTE AGO
  000000 000000

THEODOLITE TEST
(TO ABORT AT ANY TIME TYPE: BYP)
MOVE IMU TO 0 DEGREES PITCH 0 DEGREES ROLL
WHEN DONE TYPE: RDY
ALIGNMENT HALTED
RDYRDY
ENTER THEODOLITE READING: (MILS) RDY
ALIGNMENT HALTED
2865.00RDYRDY

   -0.0624 DEGREES PITCH 10-SEC AVRGE
   -0.4487 DEGREES ROLL 10-SEC AVRGE
   44.3051 DEGREES AZ 10-SEC AVRGE
```

Table 4-15. TTY Printout of IMU Test - Continued

```
MOVE IMU TO O DEGREES PITCH 8 DEGREES ROLL
WHEN DONE TYPE: RDY
ALIGNMENT HALTED
RDYRDY
      -0.18 DEGREES PITCH
       335 DEGREES ROLL
ATTITUDE NOT WITHIN 2 DEGREES OF REQUESTED
MOVE IMU TO O DEGREES PITCH 8 DEGREES ROLL
WHEN DONE TYPE: RDY
ALIGNMENT HALTED
RDYRDY
ENTER THEODOLITE READING: (MILS) RDY
ALIGNMENT HALTED
2865 .16RDYRDY
      -0.0424 DEGREES PITCH 10-SEC AVRGE
       9.2626 DEGREES ROLL IO-SEC AVRGE
      443142 DEGREES AZ 10-SEC AVRGE
MOVE IMU TO O DEGREES PITCH -8 DEGREES ROLL
WHEN DONE TYPE: RDY
ALIGNMENT HALTED
RDYRDY
ENTER THEODOLITE READING: (MILS) RDY
ALIGNMENT HALTED
2873 .07RDYRDY
      -0.4400 DEGREES PITCH 10-SEC AVRGE
      -9.0762 DEGREES ROLL IO-SEC AVRGE
      44.7500 DEGREES AZ IO-SEC AVRGE
MOVE IMU TO O DEGREES PITCH O DEGREES ROLL
WHEN DONE TYPE: RDY
RDYRDY
ENTER THEODOLITE READING: (MILS) RDY
ALIGNMENT HALTED
2868.59 RDYRDY
      -0.4698 DEGREES PITCH 10-SEC AVRGE
      -0.5757 DEGREES ROLL 10-SEC AVRGE
      44.4982 DEGREES AZ 10-SEC AVRGE
MOVE IMU TO 8 DEGREES PITCH O DEGREES ROLL
WHEN DONE TYPE: RDY
ALIGNMENT HALTED
RDYRDY
ENTER THEODOLITE READING: (MILS) RDY
ALIGNMENT HALTED
2865 .94RDYRDY
       7.8630 DEGREES PITCH 10-SEC AVRGE
      -0.5081 DEGREES ROLL 10-SEC AVRGE
      443393 DEGREES AZ 10-SEC AVRGE
MOVE IMU TO -8 DEGREES PITCH O DEGREES ROLL
WHEN DONE TYPE: RDY
ALIGNMENT HALTED
RDYRDY
ENTER THEODOLITE READING: (MILS) RDY
ALIGNMENT HALTED
2861 .48RDYRDY
      -8.8762 DEGREES PITCH 10-SEC AVRGE
      -1.0314 DEGREES ROLL IO-SEC AVRGE
      44.0957 DEGREES AZ 10-SEC AVRGE
```

Table 4-15. TTY Printout of IMU Test – Continued

```
MOVE IMU TO 0 DEGREES PITCH 0 DEGREES ROLL
WHEN DONE TYPE:  RDY
ALIGNMENT HALTED
RDYRDY
ENTER THEODOLITE READING:  (MILS)  RDY
ALIGNMENT HALTED
2866.45RDYRDY
    -0.4275  DEGREES PITCH 10-SEC AVRGE
    -0.4892  DEGREES ROLL 10-SEC AVRGE
    44.3715  DEGREES AZ 10-SEC AVRGE
ENTER TAZ: (MILS) RDY
ALIGNMENT HALTED
1126.21RDYRDY
      101       0.0       -65.6     OK            ARC SEC     DG/ROLL POR PR CORR
      102       0.0       115.8     OK            ARC SEC     HDG/PICH POR PR CORR
      1020      0.0       OK        ARC SEC
      1021     -0.0       OK        ARC SEC
      1022     -0.0111    OK        DEG/HR
      1023     -0.0062    OK        DEG/HR
      1024     -2.1       OK        ARC SEC
      1025     -10.1      OK        ARC SEC
  000000 000000
TEST NUMBER 3 IN PROGRESS
  000000 000000
     4    -24.3       -15.4       OK    MICRO G    X ACCEL PERM BIAS
     5     89.6        97.1       OK    MICRO G    Y ACCEL PERM BIAS
     6   1619.4      1623.5       OK    MICRO G    Z ACCEL PERM BIAS
    10     0.532       0.599      OK    PERCENT    X Q INT SCL FCT CHNG
    11     0.019       0.019      OK    PERCENT    X QUANT SCL FCT CHNG
    12     0.724       0.767      OK    PERCENT    Y Q INT SCL FCT CHNG
    13     0.034       0.034      OK    PERCENT    Y QUANT SCL FCT CHNG
    14    -0.254       0.841      OOC   PERCENT    Z Q INT SCL FCT CHNG
    15     0.025       0.026      OK    PERCENT    Z QUANT SCL FCT CHNG
AT LEAST ONE OUT-OF-CAL IN TEST NUMBER 3
  000000 000000

TEST NUMBER 4 IN PROGRESS STARTED 2 MINUTES AGO
  000000 000000
     1     0.0930     0.0932    OK    DEG/HR     X GYRO PERM BIAS
     2    -0.3912     0.3980    OK    DEG/HR     Y GYRO PERM BIAS
     3     0.6799     0.6746    OK    DEG/HR     Z GYRO PERM BIAS
     7     0.043      0.057     OK    PERCENT    X GYRO SCL FCT CHNG
     8     0.036      0.028     OK    PERCENT    Y GYRO SCL FCT CHNG
    92    -20.7      -19.9      OK    ARC SEC    AZ X GMBL/ACC MSLNMT
    93     54.8       48.4      OK    ARC SEC    AY Y GMBL/ACC MSLNMT
   103    -0.2124    -0.3641    OK    DEGREES    ROLL RESOLVER BIAS
   104     0.6275     0.0024    OK    DEGREES    PITCH RESOLVER BIAS
  1010    -2.5        OK        MICRO G
  1011    -2.4        OK        MICRO G
  1012    -0.3        OK        MICRO G
  1013    -50.3       OK        ARC SEC
  1014     21.4       OK        ARC SEC
  1015    -0.4115     OK        MILLIRADIANS
  1016    -0.0005
  000000 000000
```

Table 4-15. TTY Printout of IMU Tast – Continued

```
TEST NUMBER 5 IN PROGRESS STARTED 3 MINUTES AGO
  000000 000000
   100      0.1758     0.1741    OK        DEGREES     HDG RESOLVER BIAS
   102      0.0        44.6      OK        ARC SEC     HDG/PICH POR PR CORR
  1017      5.6        OK        ARC SEC
  1018     -0.0014     OK        DEG/HR
  1019     -0.0077     OK        DEG/HR

TEST NUMBER 6 IN PROGRESS STARTED 2 MINUTES AGO
  000000000000
     3      0.6799     0.6742    OK        DEG/HR      Z GYRO PERM BIAS
     9     -0.024     -0.020     OK        PERCENT     Z GYRO SCL FCT CHNG
  000000000000

TEST NUMBER 8 IN PROGRESS
  000000000000
    82      69.2       122.6     Ooc       ARC SEC     Z X ACCEL MISALNMNT
    83      122.7      106.9     OK        ARC SEC     Z Y ACCEL MISALNMNT
AT LEAST ONE OUT-0F-CAL IN TEST NUMBER 8
  000000000000

TEST NUMBER 9 IN PROGRESS
  000000000000
    80      132.2      132.2     OK        ARC SEC     X Z ACCEL MISALNMNT
    81      107.0      107.0     OK        ARC SEC     Y Z ACCEL MISALNMNT
   200     -25.2      -39.0      OK        ARC SEC     Y ACC MSLMNT REL X
  000000000000

TEST NUMBER 10 IN PROGRESS
  000000000000

ALIGNMENT CONSTANTS.

   1   122136   000074     0.0932   DEG/HR     X GYRO PERM BIAS
   2   157662   177402    -0.3890   DEG/HR     Y GYRO PERM BIAS
   3   135504   000666     0.6742   DEG/HR     Z GYRO PERM BIAS
   4   146030   177757   -15.4      MICRO G    X ACCEL PERM BIAS
   5   014570   000146    97.1      MICRO G    Y ACCEL PERM BIAS
   6   052364   003253  1623.5      MICRO G    Z ACCEL PERM BIAS
   7   121600   001122     0.057    PERCENT    X GYRO SCL FCT CHNG
   8   167500   000442     0.028    PERCENT    Y GYRO SCL FCT CHNG
   9   136500   177462    -0.020    PERCENT    Z GYRO SCL FCT CHNG
  10   150554   000610     0.599    PERCENT    X Q INT SCL FCT CHNG
  11   071200   000306     0.019    PERCENT    X QUANT SCL FCT CHNG
  12   107504   000766     0.767    PERCENT    Y Q INT SCL FCT CHNG
  13   015100   000546     0.034    PERCENT    Y QUANT SCL FCT CHNG
  14   073274   001047     0.841    PERCENT    Z Q INT SCL FCT CHNG
  15   132100   000414     0.026    PERCENT    Z QUANT SCL FCT CHNG
  16   000000   000000     0.0      MICRO G    Z ACC H-S BIAS          0.0
  17   000000   177777    -1.0      MICRO G    Z ACC H-S BIAS         22.5
  18   000000   000002     1.9      MICRO G    Z ACC H-S BIAS         45.0
  19   000000   000003     2.9      MICRO G    Z ACC H-S BIAS         67.5
  20   000000   000005     4.8      MICRO G    Z ACC H-S BIAS         90.0
  21   000000   000002     1.9      MICRO G    Z ACC H-S BIAS        112.5
  22   000000   177776    -1.9      MICRO G    Z ACC H-S BIAS        135.0
  23   000000   177773    -4.8      MICRO G    Z ACC H-S BIAS        157.5
```

Table 4-15. TTY Printout of IMU Test – Continued

24	000000	177773	-4.3	MICRO G	Z ACC H-S BIAS	180.0
25	000000	177776	-1.9	MICRO G	Z ACC H-S BIAS	202.5
26	000000	000003	2.9	MICRO G	Z ACC H-S BIAS	225.0
27	000000	000012	9.5	MICRO G	Z ACC H-S BIAS	247.0
28	000000	000007	6.7	MICRO G	Z ACC H-S BIAS	270.0
29	000000	000003	2.9	MICRO G	Z ACC H-S BIAS	292.5
30	000000	000004	3.8	MICRO G	Z ACC H-S BIAS	315.0
31	000000	000000	0.0	MICRO G	Z ACC H-S BIAS	337.5
32	000000	000000	0.0000	DEG/HR	X GYR H-S BIAS	0.0
33	000000	000000	0.0000	DEG/HR	X GYR H-S BIAS	22.5
34	000000	177777	-0.0015	DEG/HR	X GYR H-S BIAS	45.0
35	000000	000000	0.0000	DEG/HR	X GYR H-S BIAS	67.5
36	000000	000000	0.0000	DEG/HR	X GYR H-S BIAS	90.0
37	000000	000000	0.0000	DEG/HR	X GYR H-S BIAS	112.5
38	000000	177777	-0.0015	DEG/HR	X GYR H-S BIAS	135.0
39	000000	177776	-0.0031	DEG/HR	X GYR H-S BIAS	157.5
40	000000	177776	-0.0031	DEG/HR	X GYR H-S BIAS	180.0
41	000000	177776	-0.0031	DEG/HR	X GYR H-S BIAS	202.5
42	000000	177776	-0.0031	DEG/HR	X GYR H-S BIAS	225.0
43	000000	000000	0.0000	DEG/HR	X GYR H-S BIAS	247.5
44	000000	177777	-0.0015	DEG/HR	X GYR H-S BIAS	270.0
45	000000	177776	-0.0031	DEG/HR	X GYR H-S BIAS	292.5
46	000000	177776	-0.0031	DEG/HR	X GYR H-S BIAS	315.0
47	000000	177774	-0.0061	DEG/HR	X GYR H-S BIAS	337.5
48	000000	000000	0.0000	DEG/HR	Y GYR H-S BIAS	0.0
49	000000	000000	0.0000	DEG/HR	Y GYR H-S BIAS	22.5
50	000000	177777	-0.0015	DEG/HR	Y GYR H-S BIAS	45.0
51	000000	000000	0.0000	DEG/HR	Y GYR H-S BIAS	67.5
52	000000	000001	0.0015	DEG/HR	Y GYR H-S BIAS	90.0
53	000000	000000	0.0000	DEG/HR	Y GYR H-S BIAS	112.5
54	000000	000000	0.0000	DEG/HR	Y GYR H-S BIAS	135.0
55	000000	000000	0.0000	DEG/HR	Y GYR H-S BIAS	157.5
56	000000	000000	0.0000	DEG/HR	Y GYR H-S BIAS	180.0
57	000000	000000	0.0000	DEG/HR	Y GYR H-S BIAS	202.5
58	000000	000000	0.0000	DEG/HR	Y GYR H-S BIAS	225.0
59	000000	000001	0.0015	DEG/HR	Y GYR H-S BIAS	247.5
60	000000	000000	0.0000	DEG/HR	Y GYR H-S BIAS	270.0
61	000000	177777	-0.0015	DEG/HR	Y GYR H-S BIAS	292.5
62	000000	177776	-0.0031	DEG/HR	Y GYR H-S BIAS	315.0
63	000000	000000	0.0000	DEG/HR	Y GYR H-S BIAS	337.5
64	000000	000000	0.0000	DEG/HR	Z GYR H-S BIAS	0.0
65	000000	177777	-0.0015	DEG/HR	Z GYR H-S BIAS	22.5
66	000000	000000	0.0000	DEG/HR	Z GYR H-S BIAS	45.0
67	000000	177775	-0.0046	DEG/HR	Z GYR H-S BIAS	67.5
68	000000	177774	-0.0061	DEG/HR	Z GYR H-S BIAS	90.0
69	000000	177777	-0.0015	DEG/HR	Z GYR H-S BIAS	112.5
70	000000	000000	0.0000	DEG/HR	Z GYR H-S BIAS	135.0
71	000000	000000	0.0000	DEG/HR	Z GYR H-S BIAS	157.5
72	000000	000000	0.0000	DEG/HR	Z GYR H-S BIAS	180.0
73	000000	000000	0.0000	DEG/HR	Z GYR H-S BIAS	202.5
74	000000	000002	0.0031	DEG/HR	Z GYR H-S BIAS	225.0
75	000000	177777	-0.0015	DEG/HR	Z GYR H-S BIAS	247.5
76	000000	177776	-0.0031	DEG/HR	Z GYR H-S BIAS	270.0
77	000000	000000	0.0000	DEG/HR	Z GYR H-S BIAS	292.5
78	000000	000000	0.0000	DEG/HR	Z GYR H-S BIAS	315.0
79	000000	177775	-0.0046	DEG/HR	Z GYR H-S BIAS	337.5

Table 4-15. TTY Printout of IMU Test – Continued

```
TEST NUMBER 6 IN PROGRESS STARTED 2 MINUTES AGO
   000000  000000
      3        0.6799      0.6742      OK        DEG/HR        Z GYRO PERM BIAS
      9       -0.024      -0.020       OK        PERCENT       Z GYRO SCL FCT CHNG
   000000  000000

TEST NUMBER 8 IN PROGRESS
   000000  000000
     82       69.2        122.6        OOC       ARC SEC       Z X ACCEL MISALNMNT
     83      122.7        106.9        OK        ARC SEC       Z Y ACCEL MISALNMNT
AT LEAST ONE OUT-OF-CAL IN TEST NUMBER 8
   000000  000000

TEST NUMBER 9 IN PROGRESS
   000000  000000
     80      132.2        132.2        OK        ARC SEC       X Z ACCEL MISALNMNT
     81      107.0        107.0        OK        ARC SEC       Y Z ACCEL MISALNMNT
    200      -25.2        -39.0        OK        ARC SEC       Y ACC MSLMNT REL X
   000000  000000

TEST NUMBER 10 IN PROGRESS
   000000  000000

ALIGNMENT CONSTANTS.

      1    122136    000074      0.0932     DEG/HR      X GYRO PERM BIAS
      2    157662    177402     -0.3890     DEG/HR      Y GYRO PERM BIAS
      3    135504    000666      0.6742     DEG/HR      Z GYRO PERM BIAS
      4    146030    177757    -15.4        MICRO G     X ACCEL PERM BIAS
      5    014570    000146     97.1        MICRO G     Y ACCEL PERM BIAS
      6    052364    003253   1623.5        MICRO G     Z ACCEL PERM BIAS
      7    121600    001122      0.057      PERCENT     X GYRO SCL FCT CHNG
      8    167500    000442      0.028      PERCENT     Y GYRC SCL FCT CHNG
      9    136500    177462     -0.020      PERCENT     Z GYRO SCL FCT CHNG
     10    150554    000610      0.599      PERCENT     X Q INT SCL FCT CHNG
     11    071200    000306      0.019      PERCENT     X QUANT SCL FCT CHNG
     12    107504    000766      0.767      PERCENT     Y Q INT SCL FCT CHNG
     13    015100    000546      0.034      PERCENT     Y QUART SCL FCT CHNG
     14    073274    001047      0.841      PERCENT     Z Q INT SCL FCT CHNG
     15    132100    000414      0.026      PERCENT     Z QUANT SCL FCT CHNG
```

All data on page 4-96 has been deleted.

Table 4-15. TTY Printout of IMU Test – Continued

80	000000	005200	132.2	ARC SEC	X Z ACCEL MISALNMNT
81	000000	004200	107.0	ARC SEC	Y Z ACCEL MISALNMNT
82	000000	002600	69.2	ARC SEC	Z X ACCEL MLSALNMNT
83	000000	004700	122.7	ARC SEC	Z Y ACCEL MISALNMNT
84	000000	000000	0.0	ARC SEC	Y X ACCEL MISALNMNT
85	000000	000000	0.0	ARC SEC	X Y ACCEL MISALNMNT
86	000000	000000	0.0	ARC SEC	Z Y GYRO MISALNMNT
87	000000	000000	0.0	ARC SEC	Z X GYRO MISALNMNT
88	000000	000000	0.0	ARC SEC	Y Z GYRO MISALNMNT
89	000000	000000	0.0	ARC SEC	Y X GYRO MISALNMNT
90	000000	000000	0.0	ARC SEC	X Y GYRO MISALNMNT
91	000000	000000	0.0	ARC SEC	X Z GYRO MISALNMNT
92	115000	177152	-19.9	ARC SEC	AZ X GMBL/ACC MSLNMT
93	14100	001727	48.4	ARC SEC	AZ Y GMBL/ACC MSLNMT
94	000000	000000	0.0000	DEG/HR/G	Y X UPR GYRO MS UNB
95	000000	000000	0.0000	DEG/HR/G	Z X UPR GYRO MS UNB
96	066200	011003	0.1112	DEG/HR/G	Y Z UPR GYRO MS UNB
97	162000	004357	0.0552	DEG/HR/G	X Z UPR GYRO MS UNB
98	001200	017704	0.1961	DEG/HR/G	Y Z LWR GYRO MS UNB
99	015000	005664	0.0723	DEG/HR/G	X Z LWR GYRO MS UNB
100	074060	177775	-0.0139	DEGREES	HDG RESOLVER BIAS
101	033600	171761	-607.2	ARC SEC	HDG/ROLL POR PR CORR
102	024033	147230	-2488.0	ARC SEC	HDG/PICH POR PR CORR
103	053132	177731	-0.2124	DEGREES	ROLL RESOLVER BIAS
104	036420	000162	0.6275	DEGREES	PITCH RESOLVER BIAS
105	000000	000000	0.000	ARC SEC	X ACC MSLMNT REL X
106	000000	000000	0.000	ARC SEC	Y ACC MSLMNT REL Y
200	160000	176346	-39.0	ARC SEC	Y ACC MSLMNT REL X

SER NO 0002 DATE 7314 CHECKSUM 164332

TEST 10 RESULTS

94	0.0000	0.0000	OK	DEG/HR/G	Y X UPR GYRO MS UNB
95	0.0000	0.0000	OK	DEG/HR/G	Z X UPR GYRO MS UNB
96	0.1112	0.1112	OK	DEG/HR/G	Y Z UPR GYRO MS UNB
97	0.0552	0.0552	OK	DEG/HR/G	X Z UPR GYRO MS UNB
98	0.1961	0.1961	OK	DEG/HR/G	Y Z LWR GYRO MS UNB
99	0.0723	0.0723	OK	DEG/HR/G	X Z LWR GYRO MS UNB

FAILURE TABLE

1	OK	2	OK	3	OK	4	OK
5	OK	6	OK	7	OK	8	OK
9	OK	10	OK	11	OK	12	OK
13	OK	14	OOC	15	OK	80	OK
81	OK	82	OOC	83	OK	92	OK
93	OK	94	OK	95	OK	96	OK
97	OK	98	OK	99	OK	103	OK
104	OK	200	OK	1001	OK	1002	OK
1003	OK	1004	OK	1005	OK	1005	OK
1007	OK	1008	OK	1009	OK	1010	OK
1011	OK	1012	OK	1013	OK	1014	OK
1015	OK						

ALIGNMENT COMPLETED
000000 000000

Table 4-16. Definitions of Teletypewriter Input Messages

Teletypewriter input message	Definition
TTY REQUEST:	DATA ENTRY :
LATITUDE	Latitude of the test site referenced to Clark 1866 spheroid. Degrees, minutes, seconds (separated by a space) to nearest second. For southern latitude, put a minus sign in front of degrees
ELEVATION	Elevation of this site in feet, referenced to Clark 1866 spheroid, to nearest foot
DATE	4-digit Julian date
SER NO	IMU serial number found on unit nameplate
THEODOLITE READING	Horizontal angle measured from the azimuth mark to the porro prism in a clockwise manner in Army roils to nearest 0.01 mil
	Refer to Chapter 5 for correct reading procedure
TAZ	True azimuth of target in Army roils to nearest 0.01 mil
OPERATOR ENTRY :	DEFINITION :
IMU	Start IMU alignment
RDY	Acknowledges requested action
BYP	Bypass theodolite test
N1, N2 CAL	Print alignment data table N1 is number of first parameter to be printed, N2 the last (e.g., 1200 CAL causes all data to print)
SER	Print serial number, data and IMU cal tape memory checksum number
STS	Print status
SUM	Print failure table summary
TST	Print list of completed tests
HLT	Stop table print
REP	Repeat present table

Table 4-17. IMU Automatic Test Mode Malfunction Teletypewriter Messages

Teletypewriter malfunction message	Corrective action
IMPROPER DATA ENTRY	Data must be reentered Program did not recognize data entry
ALIGN TIMING IMU FAIL	Reasonability test fail Program cannot advance. Shut down equipment and return IMU to depot*
NEED DEPOT CAL	Certain alignment constants are out of tolerance and cannot be determined without a depot alignment, Shut down equipment and return IMU to depot*
ALIGN QUALITY IMU FAIL	Certain alignment constants are out of specification and cannot be calibrated. Return IMU to depot*
TEMPERATURE IMU FAIL	
DISCRETE IMU FAIL	IMU failures. Return IMU to depot*
SYNCHRO ACCEL. IMU FAIL	
SYNCHRO RATE FAIL	
MEMORY TEST FAIL	
OP CODE TEST FAIL	Built-in-test indicates a computer failure while aligning IMU
PRIORITY INTERRUPT FAIL	Repair computer and recalibrate IMU. See table 4-10 for corrective action
SERVICE INTERRUPT FAIL	
SERIAL DATA I/O FAIL	
ANALOG DATA I/O FAIL PLATFORM I/O FAIL	

● Send copy of TTY diagnostic print-outback to depot with faulty IMU.

4-12. Operational Program Loading. (Core memory only.)

a. *General.* The PADS operational program must be loaded into memory after the diagnostic program has been run. Usually, this will be after the IMU alignment. If it is known that memory contents were altered by a problem external to the memory and the IMU calibration constants checksum is correct, the operational program may be reloaded without performing an IMU alignment.

NOTE

Do not attempt to reload the solid state memory at this time as the operational program already resides in the solid state memory and will automatically be defaulted to or activated at turnon.

b. *Test Equipment and Materials.*

(1) PADS test set, consisting of SPU, tape reader, buffer unit, interconnecting cables, and auxiliary equipment.

(2) Teletypewriter. The 100-wpm motor-worm gear must be installed prior to use. Refer to TM 11-5815-200-12.

(3) PADS operational program tape.

(4) PADS power supply, computer, pallet frame, and battery box.

(5) + 28V power source.

c. *Test Procedure.* Perform the test in accordance with table 4-18 or 4-18.1. Table 4-18 uses PADS test set tape reader, part no. 877406-1 and table 4-18.1 uses tape reader, part no. 877406-2.

4-13. Power Supply Testing and Troubleshooting.

a. *Test Equipment and Materials.*

(1) Power supply test set (PSTS)

(2) Digital Voltmeter AN/GSM-64B

(3) Multimeter AN/USM-223

b. *Procedure.*

NOTE

When circuit cards are removed during the troubleshooting process, be sure to note the serial number of the original card so it will not be confused with any new replacements.

Perform PS testing and troubleshooting in accordance with table 4-19. See figure 4-10 for a testing interconnection diagram. See figure 4-11 for circuit card adjustment locations. See figures 4-19 and 4-20 for location of circuit cards and components. See figure 4-20, sheets 4 and 6, for relay terminal locations. When the test procedure has been interrupted or aftter a repair action has been taken, the complete test (part 2 of table 4-19) should be performed.

NOTE

Table 4-19 calls for performing various test subroutines wherever a malfunction is indicated. These test subroutines are independent procedures and may be performed in any sequence. The tests most likely to find the fauls will be listed first. Some types of faults will prevent the first routines from working. The operator should then choose another routine from the recommended list or from the total list below. The names of the subroutines listed below should aid in choosing an appropriate routine for the circuit area. In the case where a component is visibly destroyed, it usually is productive to perform the routine that has that component in its list.

c. *PS Test Subroutines.*

	Paragraph
(1) Input Power Short and 4 Continuity Checks	-13d
(2) Bus Power Short and 1 Continuity Checks	-13e
(3) Relay Checks 4	-13f
(4) AUX 24V, and + 12V Checks 4	-13g

Table 4-18. Operational Program Loading

Test procedure	Normal indication	Malfunction indication/corrective action

NOTE

This procedure uses tape reader, part no. 877406-1.

The Procedure column contains the operation to be performed. The Normal Indication column contains the desired test set response to the operation. The malfunction indication(s) and corrective action(s) are listed in the third column.

All switches, switch-indicators, and indicators called out in the procedure are located on the SPU, unless otherwise indicated.

a. If PADS ON/OFF switch-indicator ON is lighted, sequentially press PADS ON/OFF switch-indicator and ENTER switch to turn off system

b. Check that PS BATTERY and VEHICLE circuit breakers CB1 and CB2 are set to OFF

c. Check that TTY printer MOTOR switch is set to OFF

d. If SPU ON switch-indicator is lighted, press it to off

e. Connect equipment as shown in figure 4-3 and the following checklist:

NOTE

TTY does not have to be connected for operational program loading.

Cable	Unit
W5P1	Shorting plug
W5P2	PS 3J1
W5P4	IMU fan 2J5
W3P1	PS 3J5
W3P2	Computer PS 1J4
W6	Battery box
W6P1	PS 3J2
W211P1	PS 3J4
W211	+ 28V
W210P1	Computer 1J2
W210P2	Buffer unit 21J2
W205P1	SPU 20J5
W205P2	Buffer unit 21J1

Table 4-18. Operational Program Loading — Continued

Test procedure		Normal indication	Malfunction indication/corrective action
W204P1	SPU 20J4		
W204P2	Computer 1J1		
W209P1	SPU 20J9		
W209P2	Computer 1J3		
W203P1	SPU 20J3		
W203P2	Tape reader J1		
W212	TTY		
W212P1	SPU 20J12		
W201P1	SPU 20J1		
W201P2	115 VAC		
TTY power	115 VAC		
f. Check that W4P1 is not connected to IMU connector 2J3			
g. Set tape reader SPOOLING switch to DISABLE			
h. Press SPU ON switch-indicator to on. Press to extinguish all SPU lighted switch-indicators except SPU ON and PADS OFF		SPU ON switch-indicator and PADS OFF indicator lights. All other lamps pressed extinguish	
i. Press and hold LAMP TEST switch. Release after verifying lamps light properly		All SPU lamps light except LAMP TEST and ENTER and FAILURE/ACTION indicator remains blank for at least 1.5 seconds	See step 1j of table 4-6
		FAILURE/ACTION indicator sequentially displays the following within 15 seconds after pressing LAMP TEST switch:	
		<u>Indication</u>	
		Blank	
		30	
		20	
		Blank	
		88	
		Blank	
		32	
		Blank	
		77	

Table 4-18. Operational Program Loading — Continued

Test procedure	Normal indication	Malfunction indication/corrective action
j. Install PADS operational program tape number 877419-X on tape reader. Do not tape program tape to take-up reel. Manually advance tape beyond readable tape leader		
k. Turn on + 28V power source		
l. Set PS BATTERY and VEHICLE breakers CB1 and CB2 to ON		
m. Press PADS ON/OFF switch-indicator to on	PADS ON switch-indicator lights	See step 2a of table 4-6
	PARITY ERROR indicator may illuminate	
m.1. Press EXECUTE switch-indicator to on		
n. Set tape reader SPOOLING switch to ENABLE		
n.1. Press EXECUTE switch-indicator to off		
o. Press MEMORY LOAD switch-indicator to on	MEMORY LOAD switch-indicator lights	
	Tape reader reads first tape section and stops in less than 1 minute	
NOTE Press MEMORY LOAD switch-indicator off and back on if a stop code is reached prior to tape data being loaded.		
p. Press MEMORY LOAD switch-indicator to off	MEMORY LOAD switch-indicator goes off	
q. Press VERIFY switch-indicator to on	VERIFY switch-indicator lights	VERIFY ERROR switch-indicator lights and tape stops: Refer to 2h of table 4-6
NOTE Press VERIFY switch-indicator off and back on if a stop code is reached prior to tape data being loaded.	Tape reader reads second section of tape and stops at end	
r. Press VERIFY switch-indicator to off	VERIFY switch-indicator goes off	
s. Press EXECUTE switch-indicator to on	EXECUTE switch-indicator lights	

Table 4-18. Operational Program Loading — Continued

Test procedure	Normal indication	Malfunction indication/corrective action
t. Wait 15 seconds and press EXECUTE switch-indicator to off	EXECUTE switch-indicator goes off	
u. Press MEMORY LOAD switch-indicator to on	MEMORY LOAD switch-indicator lights	
	Tape reader reads rest of tape and stops at end of reel	
v. Press MEMORY LOAD switch-indicator to off	MEMORY LOAD switch-indicator goes off	
w. Press REVERSE switch-indicator to on	REVERSE switch-indicator lights	
	Tape rewinds and stops near beginning	
x. Press REVERSE switch-indicator to off	REVERSE switch-indicator goes off	
NOTE Repeat steps w and x to completely rewind tape.		
y. Set tape reader SPOOLING switch to DISABLE		
z. Remove tape from reader		
NOTE Normally, the IMU calibration data already is in memory because an IMU alignment was performed. If this is the case, proceed to step a1. If an IMU alignment tape is to be loaded, continue with step aa. It is easier to handle the alignment tape if it is installed on a reel.		
aa. Install IMU alignment tape on tape reader		
ab. Set tape reader SPOOLING switch to ENABLE		
ac. Press MEMORY LOAD switch-indicator to on	MEMORY LOAD switch-indicator lights	
	Tape reader reads tape and stops near end	
ad. Press MEMORY LOAD switch-indicator to off	MEMORY LOAD switch-indicator goes off	

Table 4-18. Operational Program Loading – Continued

Test procedure	Normal indication	Malfunction indication/corrective action
ae. Press REVERSE switch-indicator to on	REVERSE switch-indicator lights	
	Tape rewinds and stops at beginning	
af. Press REVERSE switch-indicator to off	REVERSE switch-indicator goes off	
ag. Press VERIFY switch-indicator to on	VERIFY switch-indicator lights Tape reader reads tape and stops at end	VERIFY ERROR switch-indicator lights and tape stops: Refer to step 2h of table 4-6
ah. Press VERIFY switch-indicator to off		
ai. Press REVERSE switch-indicator to on	REVERSE switch-indicator lights	
	Tape rewinds and stops near beginning	
aj. Press REVERSE switch-indicator to off	REVERSE switch-indicator goes off	
ak. Set tape reader SPOOLING switch to DISABLE		
al. Remove IMU alignment tape from tape reader and store in IMU compartment		
am. Press EXECUTE switch-indicator to on		
am.1. Wait 15 seconds and press EXECUTE switch-indicator to off		
an. Sequentially press ON/OFF switch-indicator and ENTER switch	System turns off	
ao. Set BATTERY and VEHICLE circuit breakers CB1 and CB2 to OFF		
ap. Press SPU ON switch-indicator to off	SPU ON switch-indicator goes off	
aq. Disconnect W204 from computer and connect CDU cable W1 to computer		
ar. Turn on PADS via CDU and advance to monitor mode **NOTE** Zeros may be entered for values of survey parameters		

Table 4-18. Operational Program Loading — Continued

Test procedure	Normal indication	Malfunction indication/corrective action
as. After elevation is entered, press MON, ID, 1, 4, ENT pushbuttons	Data display shows: 14 MCS XXXXX (checksum)	
at. Compare CDU checksum readout to the program checksum written on front of the operational program tape	Checksums are equal	Checksums are not the same: Reload operation 1 program
au. Press + 2 button	Data display shows: 15 MCS XXXXX	
av. Compare CDU checksum readout to the subroutine entrance checksum written on front of the operational program tape	Checksums are equal	Checksums are not the same: Reload operation 1 program
aw. Press + 2 button	Data display shows: 16 MCS XXXXX	
ax. Compare CDU checksum readout to checksum at end of IMU alignment printout or beginning of IMU alignment tape, as applicable	Checksums are equal	Checksums are not the same: Repeat IMU alignment or reload IMU alignment tape, as applicable
ay. Press ON/OFF and ENT buttons	System shuts down	
az. Set PS BATTERY and VEHICLE circuit breakers CB1 and CB2 to OFF		
ba. Reconnect PADS as shown in figure 3-1.		

NOTE

Loading of the operational program is complete and has been verified. The equipment can be reconfigured as required. If an IMU has just been recalibrated; the memory unit normally is removed from the computer and stored with the IMU in an IMU transit case.

Table 4-18.1. Operational Program Loading Using Tape Reader, Part No. 877406-2

Test procedure	Normal indication	Malfunction indication/corrective action

NOTE

The Procedure column contains the operation to be performed. The Normal Indication column contains the desired test set response to the operation. The malfunction indication(s) and corrective action(s) are listed in the third column.

All switches, switch-indicators, and indicators called out in the procedure are located on the SPU, unless otherwise indicated.

a. If PADS ON/OFF switch-indicator ON is lighted, sequentially press PADS ON/OFF switch-indicator and ENTER switch to turn off system

b. Check that PS BATTERY and VEHICLE circuit breakers CB1 and CB2 are set to OFF

c. Check that TTY printer MOTOR switch is set to OFF

d. If SPU ON switch-indicator is lighted, press it to off

e. Connect equipment as shown in figure 4-3 and following checklist:

NOTE

TTY does not have to be connected for operational program loading.

Cable	Unit
W5P1	Shorting plug
W5P2	PS 3J1
W5P4	IMU fan 2J5
W3P1	PS 3J5
W3P2	Computer PS 1J4
W6	Battery box
W6P1	PS 3J2
W211P1	PS 3J4
W211	+ 28V
W210P1	Computer 1J2
W210P2	Buffer unit 21J2
W205P1	SPU 20J5
W205P2	Buffer unit 21J1
W204P1	SPU 20J4

Table 4-18.1. Operational Program Loading Using Tape Reader, Part No. 877406-2 – Continued

Test procedure		Normal indication	Malfunction indication/corrective action
W204P2	Computer 1J1		
W209P1	SPU 20J9		
W209P2	Computer 1J3		
W203P1	SPU 20J3		
W203P2	Tape reader J1		
W212	TTY		
W212P1	SPU 20J12		
W201P1	SPU 20J1		
W201P2	115 VAC		
TTY Power	115 VAC		
f. Check that W4P1 is not connected to IMU connector 2J3			
g. Press SPU ON switch-indicator to on. Press to extinguish all SPU lighted switch-indicators except SPU ON and PADS OFF		SPU ON switch-indicator and PADS OFF indicator lights. All other lamps pressed extinguish	
h. Press and hold LAMP TEST switch. Release after verifying lamps light properly		All SPU lamps light except LAMP TEST and ENTER and FAILURE/ACTION indicator remains blank for at least 1.5 seconds	See step 1j of table 4-6.1
		FAILURE/ACTION indicator sequentially displays the following within 15 seconds after pressing LAMP TEST switch:	
		<u>Indication</u>	
		Blank	
		30	
		20	
		Blank	
		88	
		Blank	
		32	
		Blank	
		77	
i. Set tape reader SPL/LOOP switch to LOOP and FAST/SLOW switch to SLOW			

Table 4-18.1. Operational Program Loading Using Tape Reader, Part No. 877406-2 — Continued

Test procedure	Normal indication	Malfunction indication/corrective action
j. Lift tape reader read head cover and install PADS operational program tape number 877419-X on tape reader. Do not tape program tape to take-up reel. Manually advance tape beyond readable tape leader. Gently lower read head cover	No. 10 LED indicator lights steady	
k. Turn on + 28V power source		
l. Set PS BATTERY and VEHICLE breakers CB1 and CB2 to ON		
m. Press PADS ON/OFF switch-indicator to on	PADS ON switch-indicator lights PARITY ERROR indicator may light	See step 2a of table 4-6.1
n. Press EXECUTE switch-indicator to on		
o. Set tape reader SPL/LOOP switch to SPL		
p. Press EXECUTE switch-indicator to off and press MEMORY LOAD switch-indicator to on	MEMORY LOAD switch-indicator lights Tape reader reads first tape section and stops in less than 1 minute	
NOTE Press MEMORY LOAD switch-indicator off and back on if a stop code is reached prior to tape data being loaded.		
q. Press MEMORY LOAD switch-indicator to off	MEMORY LOAD switch-indicator goes off	
r. Press VERIFY switch-indicator to on	VERIFY switch-indicator lights Tape reader reads second section of tape and stops at end	VERIFY ERROR switch-indicator lights and tape stops: Refer to 2h of table 4-6.1
NOTE Press VERIFY switch-indicator off and back on if a stop code is reached prior to tape data being loaded.		
s. Press VERIFY switch-indicator to off	VERIFY switch-indicator goes off	
t. Press EXECUTE switch-indicator to on	EXECUTE switch-indicator lights	

Table 4-18.1. Operational Program Loading Using Tape Reader, Part No. 877406-2 – Continued

Test procedure	Normal indication	Malfunction indication/corrective action
u. Wait 15 seconds and press EXECUTE switch-indicator to off	EXECUTE switch-indicator goes off	
v. Press MEMORY LOAD switch-indicator to on	MEMORY LOAD switch-indicator lights	
	Tape reader reads rest of tape and stops at end of reel	
w. Press MEMORY LOAD switch-indicator to off	MEMORY LOAD switch-indicator goes off	
x. Set tape reader FAST/SLOW switch to FAST		
y. Press REVERSE switch-indicator to on	REVERSE switch-indicator lights	
	Tape rewinds and stops near beginning	
z. Press REVERSE switch-indicator to off	REVERSE switch-indicator goes off	
NOTE Repeat steps y and z to completely rewind tape.		
aa. Lift tape reader read head cover and remove tape from reader		
NOTE Normally, the IMU calibration data already is in memory because an IMU alignment was performed. If this is the case, proceed to step ao. If an IMU alignment tape is to be loaded, continue with step ab. It is easier to handle the alignment tape if it is installed on a reel.		
ab. lift tape reader read head cover and install IMU alignment tape on tape reader. Gently lower read head cover	No. 10 LED indicator lights steady	
ac. Set tape reader FAST/SLOW switch to SLOW		
ad. Press MEMORY LOAD switch-indicator to on	MEMORY LOAD switch-indicator lights	
	Tape reader reads tape and stops near end	

Table 4-18.1. Operational Program Loading Using Tape Reader, Part No. 877406-2 — Continued

Test procedure	Normal indication	Malfunction indication/corrective action
ae. Press MEMORY LOAD switch-indicator to off	MEMORY LOAD switch-indicator goes off	
af. Deleted		
ag. Press REVERSE switch-indicator to on	REVERSE switch-indicator lights	
	Tape rewinds and stops at beginning	
ah. Press REVERSE switch-indicator to off	REVERSE switch-indicator goes off	
ai. Deleted		
aj. Press VERIFY switch-indicator to on	VERIFY switch-indicator lights Tape reader reads tape and stops at end	VERIFY ERROR switch-indicator lights and tape stops: Refer to step 2h of table 4-6.1
ak. Press VERIFY switch-indicator to off		
al. Deleted		
am. Press REVERSE switch-indicator to on	REVERSE switch-indicator lights	
	Tape rewinds and stops near beginning	
an. Press REVERSE switch-indicator to off	REVERSE switch-indicator goes off	
ao. Lift tape reader read head cover and remove IMU alignment tape from tape reader and store in IMU compartment		
ap. Press EXECUTE switch-indicator to on		
aq. Wait 15 seconds and press EXECUTE switch-indicator to off		
ar. Sequentially press ON/OFF switch-indicator and ENTER switch	System turns off	
as. Set PS BATTERY and VEHICLE circuit breakers CB1 and CB2 to OFF		
at. Press SPU ON switch-indicator to off	SPU ON switch-indicator goes off	
au. Disconnect W204 from computer and connect CDU cable W1 to computer		

Table 4-18.1. Operational Program Loading Using Tape Reader, Part No. 877406-2 – Continued

Test procedure	Normal indication	Malfunction indication/corrective action
av. Turn on PADS via CDU and advance to monitor mode		
NOTE Zeros may be entered for values of survey parameters.		
aw. After elevation is entered press MON, ID, 1, 4, ENT pushbuttons	Data display shows: 14 MCS XXXXX (checksum)	
ax. Compare CDU checksum readout to the program checksum written on front of the operational program tape	Checksums are equal	Checksums are not the same: Reload operational program
ay. Press +2 button	Data display shows: 15 MCS XXXXX	
az. Compare CDU checksum readout to the subroutine entrance checksum written on front of the operational program tape	Checksums are equal	Checksums are not the same: Reload operational program
ba. Press +2 button	Data display shows: 16 MCS XXXXX	
bb. Compare CDU checksum readout to checksum at end of IMU alignment printout or beginning of IMU alignment tape, as applicable	Checksums are equal	Checksums are not the same: Repeat IMU alignment or reload IMU alignment tape, as applicable
bc. Press ON/OFF and ENT buttons	System shuts down	
bd. Set PS BATTERY and VEHICLE circuit breakers CB1 and CB2 to OFF		
be. Reconnect PADS as shown in figure 3-1		

NOTE

Loading of the operational program is complete and has been verified. The equipment can be reconfigured as required . If an IMU has just been recalibrate the memory unit normally is removed from the computer and stored with the IMU in an IMU transit case.

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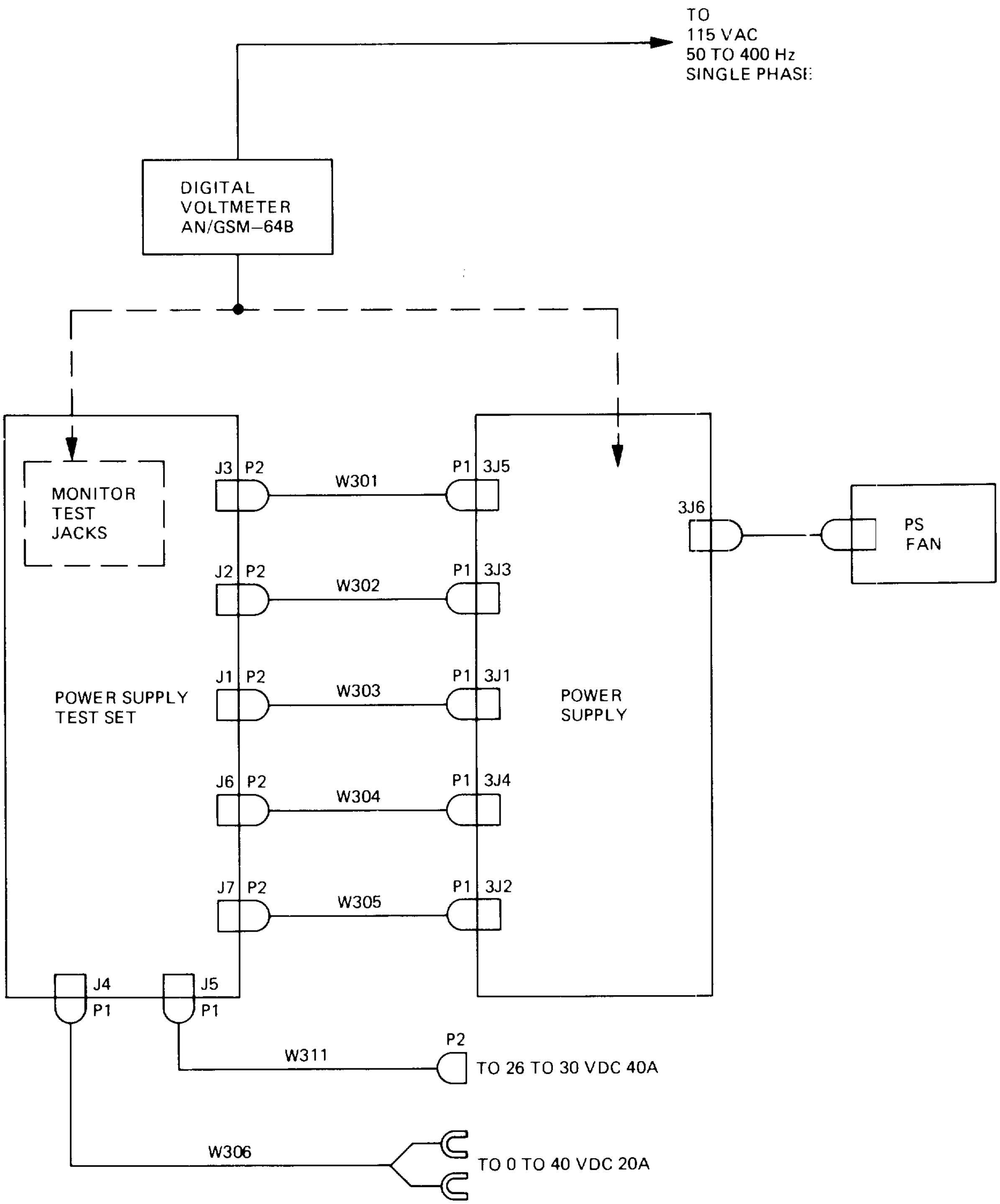


Figure 4-10. Power Supply Testing Interconnection Diagram

Table 4-19. PS Testing and Troubleshooting

Test procedure	Normal indication	Malfunction indication/corrective action

WARNING

The PS contains 115 volts ac. DEATH OR SERIOUS INJURY may result from contact with 115 volts ac. Be careful when performing the PS testing and troubleshooting procedure.

DEATH OR SERIOUS INJURY may result if power is not turned off before removing covers, unsoldering wires, or measuring resistance. Be sure to disconnect cable assemblies W304 and W305.

NOTE

All controls, indicators, switches, switch-indicators, and test jacks called out in the testing and troubleshooting procedure are located on the PSTS, unless otherwise indicated.

After the PS shuts down, wait at least 5 seconds before turning the PS on.

1. TEST SETUP.

la. Perform PSTS self-test in accordance with TM 5-6675-309-14. Marine Corps users shall refer to TM 08840A-14/l

lb. Check that PSTS INPUT POWER switch is OFF

lc. Adjust current limit of variable power supply to 5 amperes

ld. Connect equipment as shown in figure 4-10 and the following checklist:

Cable	Unit
W301P1	PS 3J5
W301P2	PSTS J3
W302P1	PS 3J3
W302P2	PSTS J2
W303P1	PS 3J1
W303P2	PSTS J1

NOTE

Refer to figure 4-19 for Power Supply printed circuit card locations.

Table 4-19. PS Testing and Troubleshooting – Continued

Test procedure	Normal indication	Malfunction indication/corrective action
Cable / Unit W304P1 — PS 3J4 W304P2 — PSTS J6 W305P1 — PS 3J2 W305P2 — PSTS J7 W311P1 — PSTS J5 W311P2 — *+28V* W306P1 — PSTS J4 W306 — o to +40V Oscilloscope power — 115VAC Digital voltmeter (DVM) power — 115VAC		
le. Disconnect power supply fan cable from connector J6		
2. PS TESTINGS		
2a. Set switches as follows: Switch / Setting SELF TEST — OFF INPUT POWER UUT — OFF INPUT POWER PSTS — OFF MODE — OVERLOAD FUNCTION — PS +28V REFERENCE AMB TEMP — O VDC POWER SUPPLY VEHICLE SENSE — ON POWER SUPPLY INTER LOCK — ON POWER SUPPLY IMU OVERTEMP — OFF		

Table 4-19. PS Testing and Troubleshooting – Continued

Test procedure	Normal indication	Malfunction indication/corrective action
Switch / Setting: POWER SUPPLY FLAG — OFF; COMP PS — OFF		
2b. Set CB1 and CB2 circuit breakers to off		
2c. Turn on external +28V power source and adjust to +28V (l)V		
2d. Turn on external O to +40V power source and adjust to +0.5 (0 .25)V. Adjust the current limit for 5 to 7 amps		
2e. Set switches in order as follows:		
Switch / Setting: INPUT POWER PSTS — ON; POWER SUPPLY TEST SET — ON; MODE — NO LOAD; INPUT POWER UUT — ON		
2f. Set PS battery and vehicle CB1 and CB2 to ON. Check that fan is disconnected from J6		
2g. Connect DVM test leads to POWER SUPPLY PWR IN and PWR RTN test jacks		
2h. Slowly increase O to +40V external power source to +5V or 5 amp current limit. If no current limit occurs, continue increasing voltage to +24 (~0 .5)V at POWER SUPPLY PWR IN and PWR RTN test jacks	Current drawn from O to +40V extemal power source is less than 1 amp	If current is greater than 1 amp indicating a short, perform subroutine 1, then repeat steps 2a thru 2h. If current is still greater than 1 amp, perform subroutine 2 and recheck step 2h
2i. Press POWER SUPPLY ON switch	PS ON indicator lights. Current drawn from O to +40V external power source is 1 to 6 amps	Use oscillsocope to determine which particular output is missing when the switch is recycled. Look for outputs in order of +14V (+14V is on +INV DR jack), +28V, -28V, +17V, 400-Hz sinewave, 400-Hz square wave by selecting proper FUNCTION switch positions

Table 4-19. PS Tasting and Troubleshooting – Continued

Test procedure	Normal indication	Malfunction indication/corrective action
		If all voltages are present, replace sequence monitor circuit card assembly AS
		If +14 or ±28V is missing, replace 28V converter-regulator circuit card assembly A3
		If +17V is missing, replace +17V converter-regulator circuit card assembly A 1 and/or power inverter assembly A6
		If 400-Hz sine wave is missing, replace power inverter assembly A6
		If unit does not stay on for 0.5 second or more, perform subroutines 1,2,3 and 4. If no faults are found, replace sequence monitor circuit card assembly A5
2j. Connect DVM test leads to POWER SUPPLY +28V and PWR RTN test jacks	DVM indicates +26 to +30V	If voltage is out of tolerance, adjust A3R4
2k. Connect DVM test leads to POWER SUPPLY -28V and PWR RTN test jacks	DVM indicates -26 to -30V	If voltage is out of tolerance, replace 28V converter-regulator circuit card assembly A3
21. Connect DVM test leads to POWER SUPPLY +17V and PWR RTN test jacks	DVM indicates +16.9 to +17.1V	If voltage is +16 to +18.3V adjust AR36. Otherwise replace +17V converter-regulator circuit card assembly A 1
2m. Connect DVM test leads to POWER SUPPLY + INV DR and PWR RTN test jacks	DVM indicates +12.5 to +14.OV	If voltage is out of tolerance, replace 28V converter-regulator circuit card assembly A3
2n. Connect DVM test leads POWER SUPPLY +24 AUX and PWR RTN test jacks	DVM indicates +21 to +24.5V	Check input power. If voltage is missing, check continuity from main relay KI-A2 to 3J5-5
20. Set DVM to DC volts and connect DVM test leads to POWER SUPPLY +24V UNREG and PWR RTN test jacks	DVM indicates +21 to +24.5V	Same as step 2n
2p. Connect DVM test leads to POWER SUPPLY AMB PWR HEAT and PWR RTN test jacks	DVM indicates 0 (±0.9) VDC	Replace +20V converter-regulator circuit card assembly A2, then sequence monitor circuit card assembly A5
2q. Connect DVM test leads to POWER SUPPLY AMB PWR COOL and PWR RTN test jacks	DVM indicates 0 (±0.9) VDC	Same as step 2p

Table 4-19. PS Testing and Troubleshooting – Continued

Test procedure	Normal indication	Malfunction indication/corrective action
2r Connect DVM test leads to POWER SUPPLY HTR 1 and PWR RTN test jacks	DVM indicates 0 (±0.9) VDC	Measure voltage between K2-X1 and K2-X2. If less than 10V, replace K2; if greater than 10V, replace sequence monitor circuit card assembly A5
2s. Connect DVM test leads to POWER SUPPLY HTR 2 and PWR RTN test jacks	DVM indicates 0 (±0.9) VDC	Same as 2r
2t. Set multimeter to AC volts and connect test leads to POWER SUPPLY 115V /0 and PWR RTN test jacks	Multimeter indicates 85 to 115 VAC	If incorrect, replace power inverter assembly A6
2u. Connect multimeter test leads to POWER SUPPLY 115V /90 and PWR RTN test jacks	Multimeter indicates 100 to 121 VAC	Same as step 2t
2v. Connect multimeter test leads to POWER SUPPLY COMP BLO and PWR RTN test jacks	Multimeter indicates 45 to 65 VAC	If incorrect, replace power inverter assembly A6, then C2
2w. Connect multimeter test leads to POWER SUPPLY IMU BLO and PWR RTN test jacks	Multimeter indicates 45 to 65 VAC	If incorrect, replace power inverter assembly A6, then C3
2x. Connect multimeter test leads to POWER SUPPLY 26V /90 and PWR RTN test jacks	Multimeter indicates 25.5 to 28.4 VAC	If the voltage is out of tolerance, replace power inverter assembly A6
2y. Disconnect multimeter PSTS and press POWER SUPPLY OFF switch; then set MODE switch to FULL LOAD		
2z. Press POWER SUPPLY ON switch. Set DVM to DC volts and connect DVM to POWER SUPPLY +28V and PWR RTN test jacks	DVM indicates +26 to +30V	Voltage out of tolerance; replace 28V converter-regulator circuit card assembly A3
2aa. Press POWER SUPPLY OFF switch, set FUNCTION switch to -28V, press POWER SUPPLY ON switch, and connect DVM to POWER SUPPLY -28V and PWR RTN test jacks	DVM indicates -24V to -28V	Same as step 2z
2ab. Disconnect DVM from PSTS		
2ac. Set multimeter to AC volts. Press POWER SUPPLY OFF switch, set FUNCTION switch to 115V /0, press POWER SUPPLY ON switch, and connect multimeter to POWER SUPPLY 115V /0 and PWR RTN test jacks	Multimeter indicates 95 to 125 VAC NOTE If voltage is out of tolerance, check input power before taking corrective action, step 2c.	Voltage out of tolerance; replace power inverter assembly A6

Table 4-19. PS Testing and Troubleshooting – Continued

	Test procedure	Normal indication	Malfunction indication/corrective action
2ad.	Press POWER SUPPLY OFF switch, set FUNCTION switch to 115 /90, press POWER SUPPLY ON switch, and connect multimeter to 115V /90 and PWR RTN test jacks	Multimeter indicates 100 to 121 VAC	Use oscilloscope to determine if +17.0V remains on. If it does not, replace +17V, converter-regulator circuit card assembly A 1. If the +17 is present, replace power inverter assembly A6
2ae.	Disconnect multirneter from PSTS		
2af.	Press POWER SUPPLY OFF switch, set FUNCTION switch to PS AMB PWR		
2ag.	Set REFERENCE switch to AMB TEMP +8V		
2ah.	Set DVM to DC volts. Press POWER SUPPLY ON switch		
2ai.	Connect DVM test leads to POWER SUPPLY AMB PWR HEAT and PWR RTN test jacks	DVM indicates +16.0 to +18.8V	If the voltage is out of tolerance or the PS shuts off, replace +20V converter-regulator circuit card assembly A2, then sequence monitor circuit card assembly AS, then K3
2aj.	Press POWER SUPPLY OFF switch and set REFERENCE switch to AMB TEMP V LAMP-5 VDC		
2ak.	Press POWER SUPPLY ON switch		
2a1.	Comect DVM test leads to POWER SUPPLY AMB PWR COOL and PWR RTN test jack	DVM indicates +10.0 to +11.8V	If the voltage is out of tolerance or the PS shuts off, replace sequence monitor circuit card assembly AS, then +20V converter-regulator circuit card assembly A2
2am.	Press POWER SUPPLY OFF switch		
2an.	Set REFERENCE switch AMB TEMP +8 VDC		
2ao.	Press POWER SUPPLY ON switch		
2ap.	Connect DVM test leads to POWER SUPPLY HTR 1 and PWR RTN test jacks	DVM indicates +25 to +29V	Voltage out of tolerance: Replace sequence monitor circuit card assembly AS, then K2
2aq.	Connect DVM meter test leads to POWER SUPPLY HTR 2 and PWR RTN test jacks	DVM indicates +24 to +28V	Voltage out of tolerance: Replace K2

Table 4-19. PS Testing and Troubleshooting – Continued

	Test procedure	Normal indication	Malfunction indication/corrective action
2ar.	Set REFERENCE switch to AMB TEMP V LAMP -1 VDC	DVM indicates 0 (±0.1) VDC	Voltage out of tolerance: Replace sequence monitor circuit card assembly A5, then K2
2as.	Disconnect DVM from PSTS		
2at.	Press POWER SUPPLY OFF switch		
2au.	Set MODE switch to +RECT LOAD		
2av.	Set multimeter to AC volts. Set FUNCTION switch to PS 115V ∠0, press POWER SUPPLY ON switch and connect multimeter to POWER SUPPLY 115V ∠0 and PWR RTN test jacks	Multimeter indicates 100 to 130 VAC	Voltage out of tolerance: Replace power inverter assembly A6
2aw.	Set MODE switch to -RECT LOAD	Voltage should be same as reading in step 2av, -1-10 volts	Same as 2av
25x.	Momentarily set POWER SUPPLY FLAG switch to RESET; then, to SET	CHARGE/BATTERY indicator lights when set. PS BATT FAIL and PS FAIL fault indicators DS 1 and DS2 reset to black and then set to white	If either fault indicator fails to activate, disc onnect PS, remove sequence monitor circuit card assembly A5, apply 24 VDC between chassis (-) X45- I 2. Then a momentary ground to A5J2-23 or A5J12-24 should activate the indicator. A ground to 3J5-12 should clear both indicators. If this doesn’t work, check for broken wires; if no broken wires are found, DS 1 and/or DS2 are faulty and should be replaced. Reinstall sequence monitor circuit card assembly A5
2ay.	Set MODE switch to OVERLOAD		
2az.	Set POWER SUPPLY FLAG switch to RESET	PS BATT FAIL and PS FAIL fault indicators DS1 and DS2 to black	
2ba.	Set FUNCTION switch to PS +28V		
2bb.	Press INITIATE switch	PS ON indicator goes off PS FAIL fault indicator DS2 goes to white	OVERLOAD FAIL indicator lights: Replace sequence monitor circuit card assembly A5, then 28V converter-regulator circuit card assembly A3, then +20V converter-regulator circuit card assembly A2, if required
2bc.	Press POWER SUPPLY ON switch	PS ON indicator lights	

Table 4-19. PS Testing and Troubleshooting – Continued

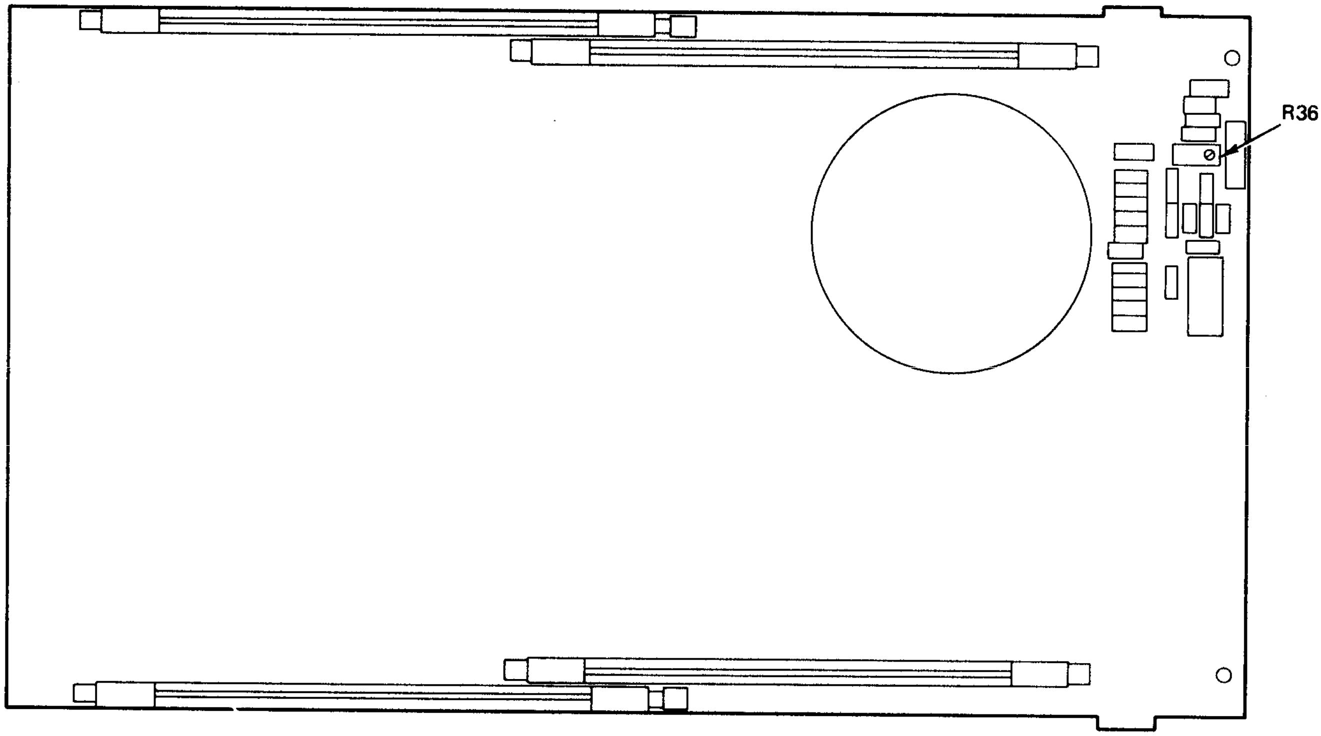
Test procedure	Normal indication	Malfunction indication/corrective action
2bd. Set FUNCTION switch to PS 115V ∠90		
2be. Set POWER SUPPLY FLAG switch to RESET	PS FAIL fault indicator DS2 goes black	
2bf. Press INITIATE switch	PS ON indicator goes off PS FAIL fault indicator DS2 goes white	OVERLOAD FAIL indicator lights: Replace power inverter assembly A6, then sequence monitor circuit card assembly AS
2bg. Set FUNCTION switch to PS AMB PWR and MODE switch to OVERVOLT		
2bh. Press POWER SUPPLY ON switch	PS ON indicator lights	
2bi. Set POWER SUPPLY FLAG switch to RESET	PS FAIL fault indicator DS2 goes black	
2bj. Press INITIATE switch	PS ON indicator goes off PS FAIL fault indicator DS2 goes white	OVERLOAD FAIL indicator lights: Replace sequence monitor circuit card assembly A5
2bk. Press POWER SUPPLY ON switch	PS ON indicator lights	
2bl. Momentarily set POWER SUPPLY FLAG switch to RESET	PS FAIL fault indicator DS2 goes black	Same as step 2ax
2bm. Momentarily set POWER SUPPLY IMU OVERTEMP switch to ON	PS ON indicator goes off PS FAIL fault indicator DS2 goes white	PS ON indicator remains on: Replace sequence monitor circuit card assembly A5
2bn. Set MODE switch to NO LOAD		
2bo. Press POWER SUPPLY ON switch	CHARGE and BATTERY indicators do not light	Indicator(s) does not light: Replace sequence monitor circuit card assembly A5
2bp. Set POWER SUPPLY FLAG switch to RESET	PS FAIL fault indicator DS2 goes black	
2bq. Set POWER SUPPLY INTER LOCK switch to OFF	BATTERY indicator lights	Battery indicator does not light: Replace sequence monitor circuit card assembly A5
2br. Set POWER SUPPLY INTER LOCK switch to ON	BATTERY indicator goes off	
2bs. Adjust 0 to +40V external power source to +19.0 (±0.5)V. Measure power supply voltage at POWER SUPPLY PWR IN and PWR RTN test jacks	BATTERY indicator flashes on and off	BATTERY indicator does not flash off and on: Replace sequence monitor circuit card assembly A5

Table 4-19. PS Testing and Troubleshooting – Continued

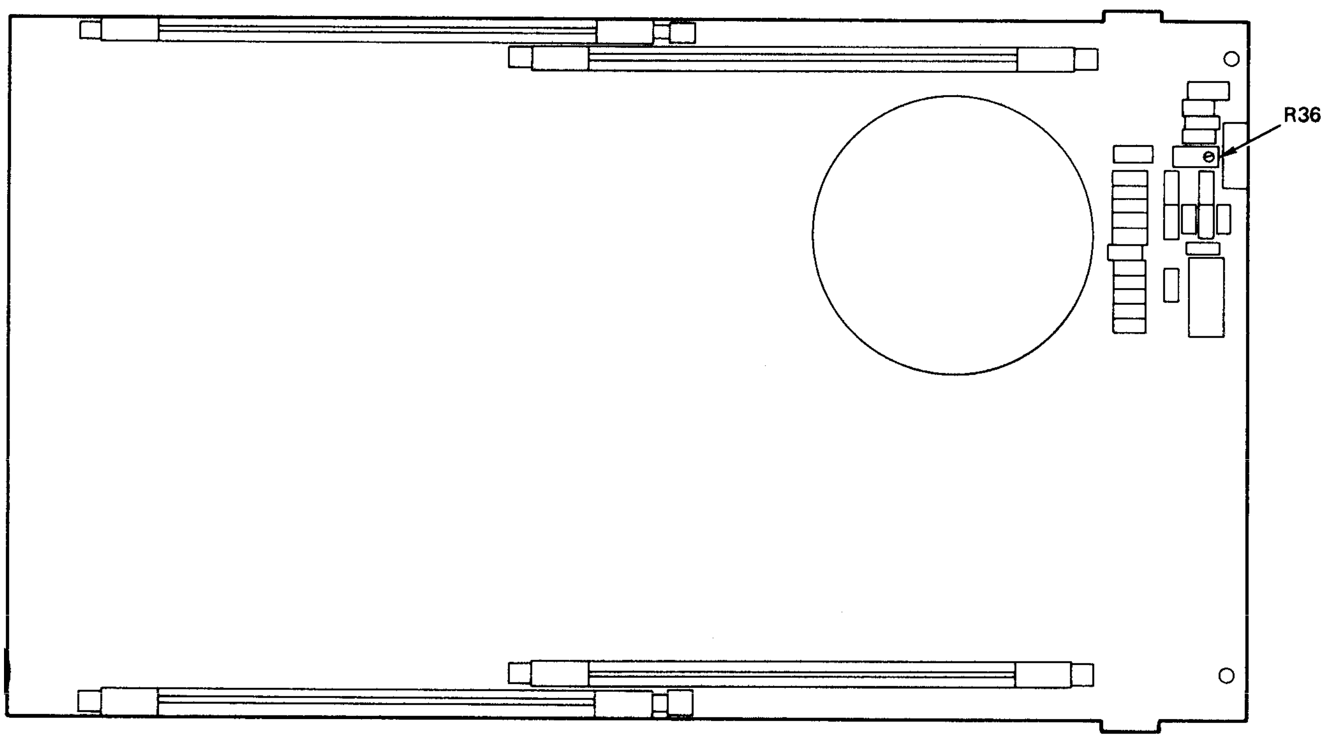
Test procedure	Normal indication	Malfunction indication/corrective action
2bt. Adjust 0 to +40V external power source to +28, then to +24 (±0.5)V. Measure power supply voltage at POWER SUPPLY PWR IN and PWR RTN test jacks	BATTERY indicator goes off	BATTERY indicator lights: Replace sequence monitor circuit card assembly A5
2bu. Set PS VEHICLE circuit breaker CB2 to off	BATTERY indicator lights	BATTERY indicator dots not light: Replace sequence monitor circuit card assembly A5
2bv. Set PS VEHICLE circuit breaker CB2 to on	BATTERY indicator goes off	If shutdown occurs, replace sequence monitor circuit card assembly A5. If shutdown prevails, replace diode CR3
2bw. Press POWER SUPPLY OFF switch. Set MODE switch to BATT SIM 1A. Set POWER SUPPLY INTERLOCK switch to OFF. Connect DVM test leads to POWER SUPPLY BATT and PWR RTN test jacks	DVM indicates +22 to +25V	Voltage out of tolerance: Check R4. Replace sequence monitor circuit card assembly A5, then battery charger circuit card assembly A7
2bx. Set POWER SUPPLY INTERLOCK switch to ON (wait approximately 14 seconds)	DVM indicates +26.9 to +29.1V. CHARGE indicator flashes on then remains off	If voltage is within tolerance but CHARGE indicator stays on, replace sequence monitor circuit card assembly A5 If voltage is out of tolerance, replace sequence monitor circuit card assembly A5, then battery charger circuit card assembly A7
2by. Set MODE switch to BATT SIM 4A	DVM indicates +26.9 to +29.1V CHARGE indicator lights	If voltage is within tolerance but CHARGE indicator does not light, replace sequence monitor circuit card assembly A5 If voltage is out of tolerance, replace battery charger circuit card assembly A7, then sequence monitor circuit card assembly A5
2bz. Connect DVM test leads to POWER SUPPLY PWR IN and PWR RTN test jacks		
2ca. Slowly decrease +28V power source until CHARGE indicator goes off	DVM indicates +24 to +25V	Same as step 2by
2cb. Set POWER SUPPLY VEHICLE SENSE switch to OFF. Increase external +28V power source to +28V	CHARGE indicator lights	If CHARGE indicator does not light, replace sequence monitor circuit card assembly A5, then battery charger circuit card assembly A7

Table 4-19. PS Testing and Troubleshooting - Continued

Test procedure	Normal indication	Malfunction indication/corrective action
2cc. Slowly decrease external +28V power source until CHARGE indicator goes off	DVM indicates +22.5 to +24V	Same as step 2by
2cd. Set MODE switch to NO LOAD. Set PS VEHICLE circuit breaker CB2 to OFF. Press POWER SUPPLY ON switch ON	PS ON indicator lights. BATTERY indicator goes	If power supply does not turn on, replace sequence monitor circuit card assembly AS
2ce. Set PS BATTERY circuit breaker CB1 to OFF		
2cf. Press POWER SUPPL TEST SET ON switch-indicator to off		
2cg. Set INPUT POWER PSTS circuit breaker to OFF. Disconnect PS from PSTS		
2ch. Increase external +28V power source to +28V		
2ci. Reconnect power supply fan connector to J6		
2cj. Adjust 0 to +40V external power source to 0V		
TEST COMPLETED		



+17V CONVERTER – REGULATOR CIRCUIT
CARD ASSEMBLY A1



+20V CONVERTER – REGULATOR CIRCUIT
CARD ASSEMBLY A2

Figure 4-11. Power Supply Circuit Card Adjustment Locations (Sheet 1 of 2)

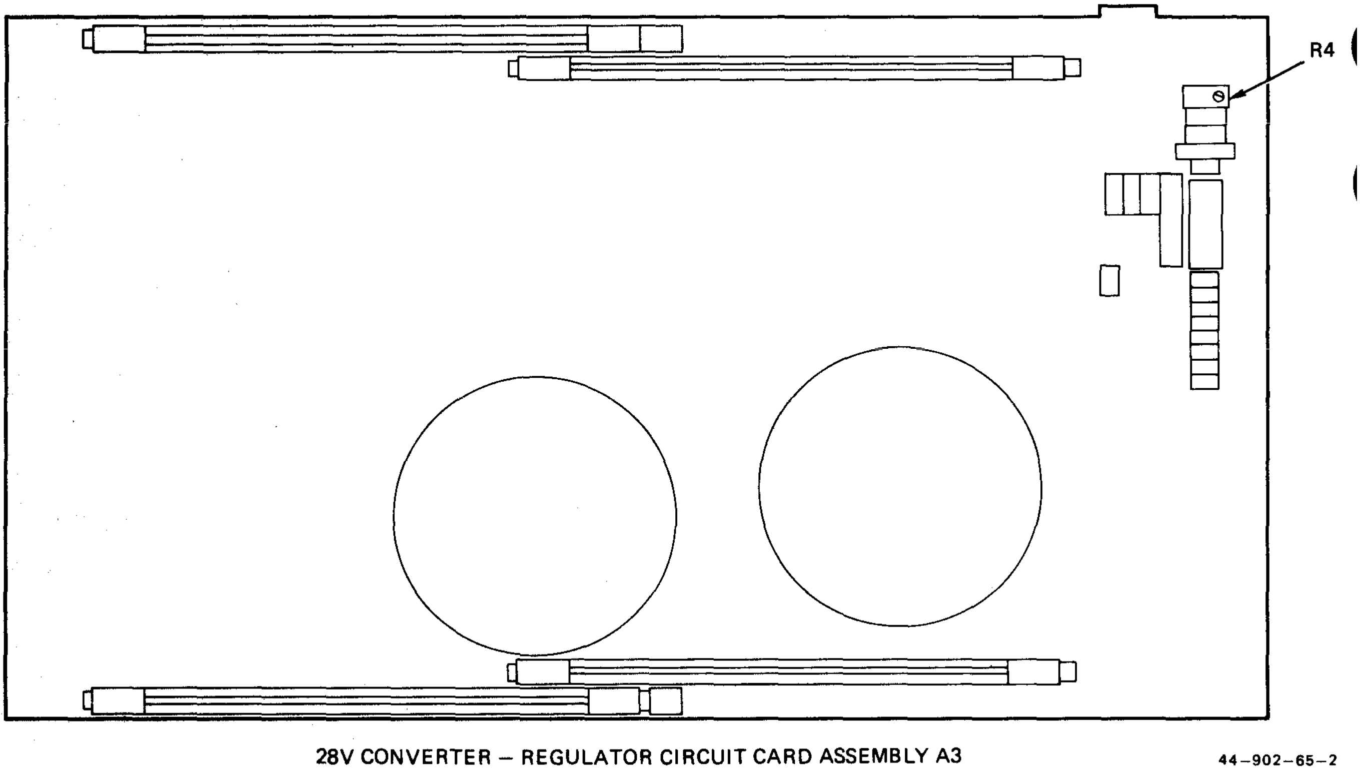


Figure 4-11. Power Supply Circuit Card Adjustment Locations (Sheet 2 of 2)

d. PS Troubleshooting Subroutine No. 1 - Input Power Short and Continuitv Checks. This subroutine checks the circuits that carry the + 24v input power ahead of the main relay K1. The power supply runs on + 24V from either the vehicle battery at 3J4 or the backup battery at 3J2. The normal mode of operation is to use only the vehicle power through filter FL1, vehicle circuit breaker CB2, and power diode CR2 to the main relay K1. When the system draws more ower than the normal path can supply (60 to 100 amps, or if the normal path is intermpted, sequence monitor circuit card assembly A5 will turn on controlled rectifier CR3. This allows the backup battery to maintain a continuous flow of power to the system, When controlled rectifier CR3 is turned on to connect backup power to the main relay Kl, it will stay on as long as a current flows through it, The flow of current from the backup battery is sensed by a change in inductance of T1. This is done to keep the battery charger off while CR3 is conducting. Controlled rectifier CR3 will stop conducting and turn off when the vehicle voltage recovers enough to support the total load. When CR3 is not conducting, the battery charger will keep the backup battery at + 28V, Power diode CR2 keeps backup power from flowing out 3J4 to the vehicle if the vehicle battery is low or if the vehicle starter is engaged. FL1 removes 40 kHz ripple that would otherwise be placed on the vehicle battery. Perform subroutine no. 1 as follows:

(1) Set BATTERY and VEHICLE circuit breakers CB1 and CB2 to OFF.

(2) If 0 to + 40V input power source still indicates greater than 1 amp, the short remains: replace filter FL1.

(3) If short is removed, check from filter FL1-1 to ground for + 5V.

(4) If + 5V is not present, replace filter FL1.

(5) Set PSTS INPUT POWER UUT circuit breaker to OFF.

(6) Set INPUT POWER PSTS circuit breaker to OFF.

(7) Set 0 to + 40V input power source to off.

(8) Remove battery char er circuit card assembly A7 (paragraph 4-19b(7)) far enough to disconnect connector A7P1. Leave transistors A706 and A7Q7 installed. Secure circuit card with one screw.

(9) Set PSTS INPUT POWER PSTS circuit breaker to ON.

(lo) Set INPUT POWER UUT circuit breaker to ON.

(11) Set 0 to + 40V input power source to on.

(12) Set BATTERY and VEHICLE circuit breakers CB1 and CB2 to ON.

(13) If short is removed, replace battery charger circuit card assembly A7.

(14) Set BATTERY and VEHICLE circuit breakers CB1 and CB2 to OFF.

(15) Set PSTS INPUT POWER UUT circuit breaker to OFF.

(16) Set INPUT POWER PSTS circuit breaker to OFF.

(17) Set 0 to + 40V input power source to off.

(18) Reinstall battery charger circuit card assembly A7.

(19) Set PSTS INPUT POWER PSTS circuit breaker to ON.

(20) Set INPUT POWER UUT circuit breaker to ON.

(21) Set 0 to + 40V input power source to on.

(22) Set BATTERY circuit breaker CB1 to ON.

(23) If short is present, set BATTERY circuit breaker CB1 to OFF.

(24) Set PSTS INPUT POWER UUT circuit breaker to OFF.

(25) Set INPUT POWER PSTS circuit breaker to OFF.

(26) Set 0 to + 40V input power source to off.

(27) Check diode CR3 anode to ground for short.

(28) If short exists, check diode CR3 anode terminal lug and insulator for damage. Repair or replace as necessary.

(29) If diode CR3 mode is not shorted, set BATTERY circuit breaker CB1 to ON and check BATTERY circuit breaker CB1-3 to ground for short.

(30) If short is not present, replace BATTERY circuit breaker CB1.

(31) Set PSTS INPUT POWER PSTS circuit breaker to ON.

(32) Set INPUT POWER UUT circuit breaker to ON.

(33) Set 0 to + 40V input power source to on.

(34) Check diode CR3 anode to ground for + 5V.

(35) If + 5V is not present, check BATTERY circuit breaker CB1-1 to ground for + 5V.

(36) If + 5V is not present, replace BATTERY circuit breaker CB1.

(37) Set BATTERY circuit breaker CB1 to OFF.

(38) Set VEHICLE circuit breaker to CB2 to ON.

(39) If short is present, set VEHICLE circuit breaker CB2 to OFF and check diode CB2 anode to ground for a short.

(40) If short is present, check diode CR2 anode terminal lug and insulator for damage. Repair or replace as necessary.

(41) Set VEHICLE circuit breaker CB2 to ON and check VEHICLE circuit breaker CB2-3 to ground for a short.

(42) If short is not present, replace VEHICLE circuit breaker CB2.

(43) Check diode CR2 anode to ground for + 5V.

(44) If + 5V is not present, check VEHICLE circuit breaker CB2-1 to ground for + 5V.

(45) If + 5V still is not present, redate VEHICLE circuit breaker CB21

NOTE

If subroutine 1 is done for step 2h of table 4-19, voltage indications will be approximately +24 volts.

e. PS Troubleshooting Subroutine No. 2 – Bus Power Short and Continuity Checks. This subroutine checks that the DC input power can be applied to the circuits when main relay K1 is turned on: ‘Before it is closed, only the battery charger and sequence monitor is active. When K1 closes, some of the + 24V power is sent directly to connector 3J5-6 for use by the system computer. Most of the remaining current flows to the input filter board, In the switching regulator section of the chassis, this current is then divided to the three regulators. The most probable failures are shorted transistors and shorted capacitors. These are found by removing assembles. Perform subroutine no. 2 as follows:

(1) Set BATTERY circuit breaker CB1 to OFF.

(2) Check that standoff terminal El is shorted to standoff terminal E2. Standoff terminal E2. Standoff terminals El and E2 are located on filter circuit card assembly A4 where terminal lugs are connected.

(3) Pull filter circuit card assembly A4 away from intercomection assembly by loosening wedgelocks and heat sink captive screws.

(4) If short between standoff terminals El and E2 is removed, reinstall filter circuit card assembly A4.

(5) If short between standoff terminals El and E2 remains, replace filter circuit card assembly A4.

(6) Start removing one at a time, until short is removed, the power inverter assembly A6, 28V converter-regulator circuit card assembly A3, + 17V converter-regulator circuit card assembly Al, + 20V converter-regulator circuit card assembly A2, and sequence monitor circuit card assembly A5, Monitor standoff terminals El and E2 until short disappears.

(7) Reinstall all circuit card assemblies except one which is determined to have caused short and verify that no other shorts exist.

(8) Replace suspected malfunctioning circuit card assembly.

(9) If short between standoff terminals El and E2 still exits' with disconnection of filter circuit card assembly A4, disconnect standoff terminal El and see if short is removed from between standoff terminals El and E2.

(l0) If short remains, replace filter circuit card assembly A4.

(11) If short is removed, check diode CR5 and the output filter circuit card assembly A9.

f. ***PS Troubleshootfng Subroutine No. 3- Relay Check.*** This subroutine checks the function of relay K1. Relay K1 is the main system on-off relay. It connects the + 24V input power from either vehicle or the backup battery, or both, to the power bus leading to the regulators and inverters. Coil K1-X2 is connected to the + 24V power by diodes on the battery charger circuit card assembly A7, The other side of coil K1-X1 is connected to ground to energize the relay by the sequence monitor circuit card assembly A5. Perform subroutine no. 3 as follows:

(1) Set BATTERY and VEHICLE circuit breakers CB1 and CB2 to OFF.

(2) Remove lead from standoff terminal E1 (on filter circuit card assembly A4).

(3) Check from lead to ground for O VDC.

(4) Set BATTERY and VEHICLE circuit breakers CB1 and CB2 to ON.

(5) Ground relay K1-XL

(6) Voltage between lead removed from terminal El and ground should be +23 to + 29V.

(7) If less than + 23V, check diode CR5 for short. If not shorted, replace relay K1.

(8) Reinstall lead on standoff terminal El.

g. ***PS Troubleshooting Subroutine No. 4 - A UX +24V and +12V and +12V Check.*** *This* subroutine checks the functioning of the internal voltages AUX +24V and the + 12V. The power supply generates for internal use the two voltages called AUX + 24V, and + 12V. The AUX + 24V starts at A7-J-11 and is called main relay coil high, This point is supplied by a diode from either the vehicle power or the backup power. This means that AUX + 24V will exist if only one of the power sources is available. The AUX + 24V is protected from vehicle voltage transients to 50 volts. This protected AUX + 24V is sent to the computer power supply on 3J5-5 and is used to drive relay K1. The + 12V is generated from the AUX + 24V to turn the system on. The + 12V is used on 28V converter-regulator circuit card assembly A3 to power the switching regulator circuits until the + and –14V is available. The + 12V is also used on the sequence monitor circuit card assembly A5. Perform subroutine no. 4 as follows:

(1) Measure AUX + 24V at relay K1-X2.

(2) If AUX + 24V is not present, set BATTERY and VEHICLE circuit breakers CB1 and CB2 to OFF.

(3) Set PSTS INPUT POWER UUT circuit breaker to OFF.

(4) Set INPUT POWER PSTS circuit breaker to OFF.

(5) Set O to + 40V input power source to off.

(6) Replace battery charger circuit card assembly A7.

(7) Set PSTS INPUT POWER PSTS circuit breaker to ON.

(8) Set INPUT POWER UUT circuit breaker to ON.

(9) Set O to + 40V input power source to on.

(l0) Set BATTERY and VEHICLE circuit breakers CB1 and CB2 to ON.

(11) Check for + 12V at sequence monitor circuit card assembly A5 connector P2-1.

(12) If + 12V is not present, the fault is in one of three assemblies; 28V converter-regulator circuit card assembly A3, sequence monitor circuit card assembly A5, or battery charger circuit card assembly A7.

(13) Set BATTERY and VEHICLE circuit breakers CB1 and CB2 to OFF.

(14) Set PSTS INPUT POWER UUT circuit breaker to OFF.

(15) Set INPUT POWER PSTS circuit breaker to OFF.

(16) Set O to + 40V input power source to off.

(17) Remove 28V converter-regulator circuit card assembly A3.

(18) Set PSTS INPUT POWER PSTS circuit breaker to ON.

(19) Set INPUT POWER UUT circuit breaker to ON.

(20) Set 0 to + 40V input power source to on,

(21) Set BATTERY and VEHICLE circuit breakers CB1 and CB2 to ON.

(22) Check for + 12V at sequence monitor circuit card assembly AS connector P2-1.

(23) If + 12V is present, perform the following steps:

(a) Set BATTERY and VEHICLE circuit breakers CB1 and CB2 to OFF.

(b) Set PSTS INPUT POWER UUT circuit breaker to OFF.

(c) Set INPUT POWER PSTS circuit breaker to OFF.

(d) Set 0 to + 40V input power source to off.

(e) Replace 28V converter-regulator circuit card assembly A3.

(24) If + 12V is not present, perform the following steps:

(a) Reinstall 28V converter-regulator circuit card assembly A3.

(b) Disconnect connector A5 J2 from sequence monitor circuit card assembly A5.

(c) Set PSTS INPUT POWER PSTS circuit breaker to ON.

(d) Set INPUT POWER UUT circuit breaker to ON.

(e) Set 0 to + 40V input power source to on,

(f) Set BATTERY and VEHICLE circuit breakers CB1 and CB2 to ON,

(g) Check for + 12V at sequence monitor circuit card assembly A5 connector P2-1.

(h) If + 12V is present, set BATTERY and VEHICLE circuit breakers CB1 and CB2 to OFF.

(i) Set PSTS INPUT POWER UUT circuit breaker to OFF.

(j) Set INPUT POWER PSTS circuit breaker to OFF.

(k) Set 0 to + 40V input power source to off,

(1) Replace sequence monitor circuit card assembly A5.

(m) If + 12V is not present, replace battery charger circuit card assembly A7.

(n) Reconnect connector A5T2 to sequence monitor circuit card assembly A5.

4-14. Computer Power Supply Testing and Troubleshooting.

a. *Test Equipment and Materials.*

(1) Power supply test set (PSTS)

(2) Digital Voltmeter AN/GSM-46B

(3) Multimeter AN/USM-223

(4) Oscilloscope AN/USM-281A or AN/USM-273

b. *Procedure.*

NOTE

When card Al, A2, or A3 is removed during the troubleshooting process, be sure to note the serial number of the original card so it will not be confused with any new replacements and installed inadvertently,

Perform computer PS testing and troubleshooting in accordance with table 4-20, Figure 4-12 contains the test setup interconnection diagram. See figure 4-13 for circuit card adjustment locations, See figure 4-15 to locate circuit cards in the computer power supply. After a repair action has been taken, the complete test (part 2 of table 4-20) should be performed. In any test where more than one circuit card has been replaced, circuit cards other than the last circuit card changed shall be replaced and the step repeated.

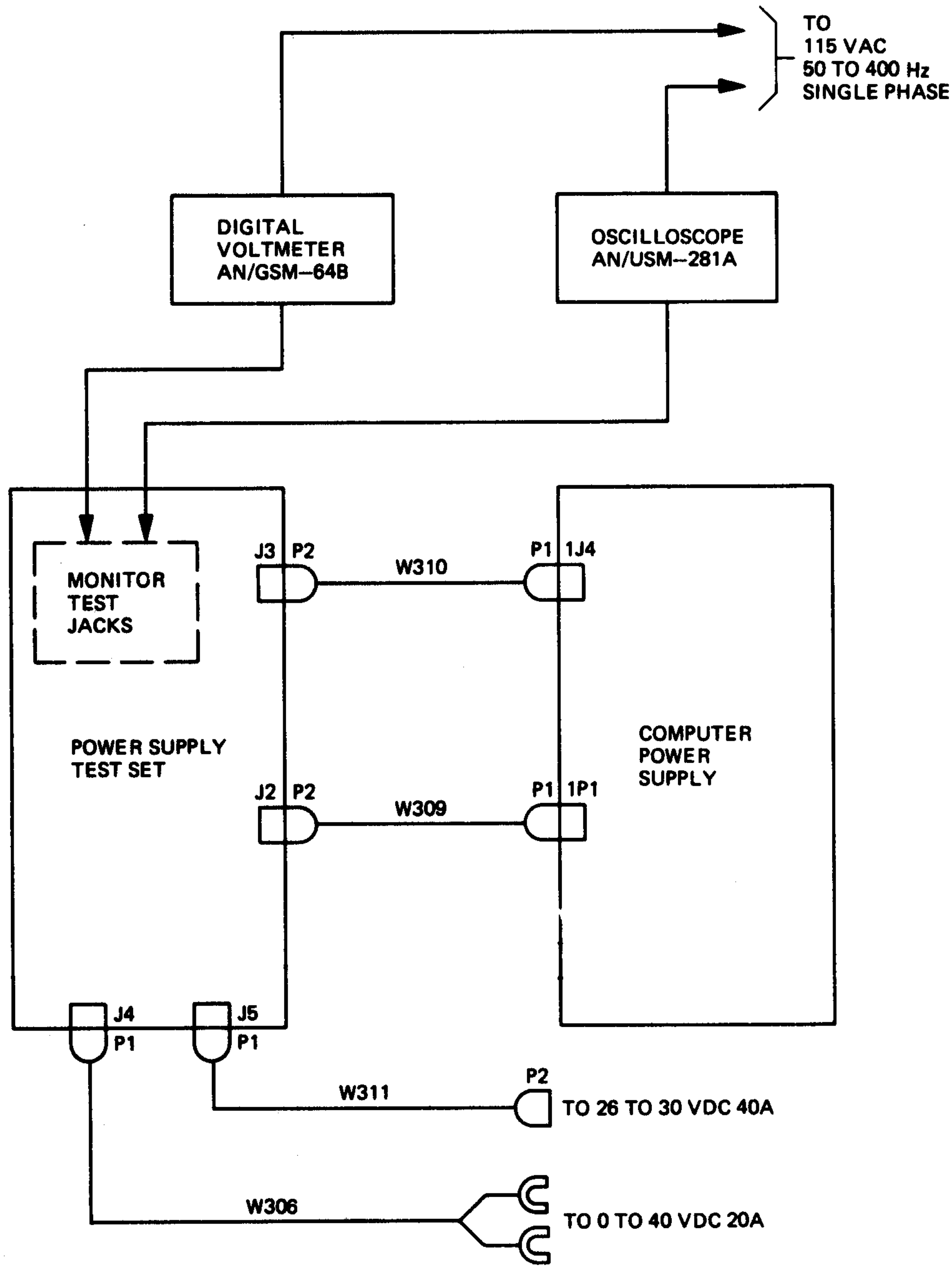
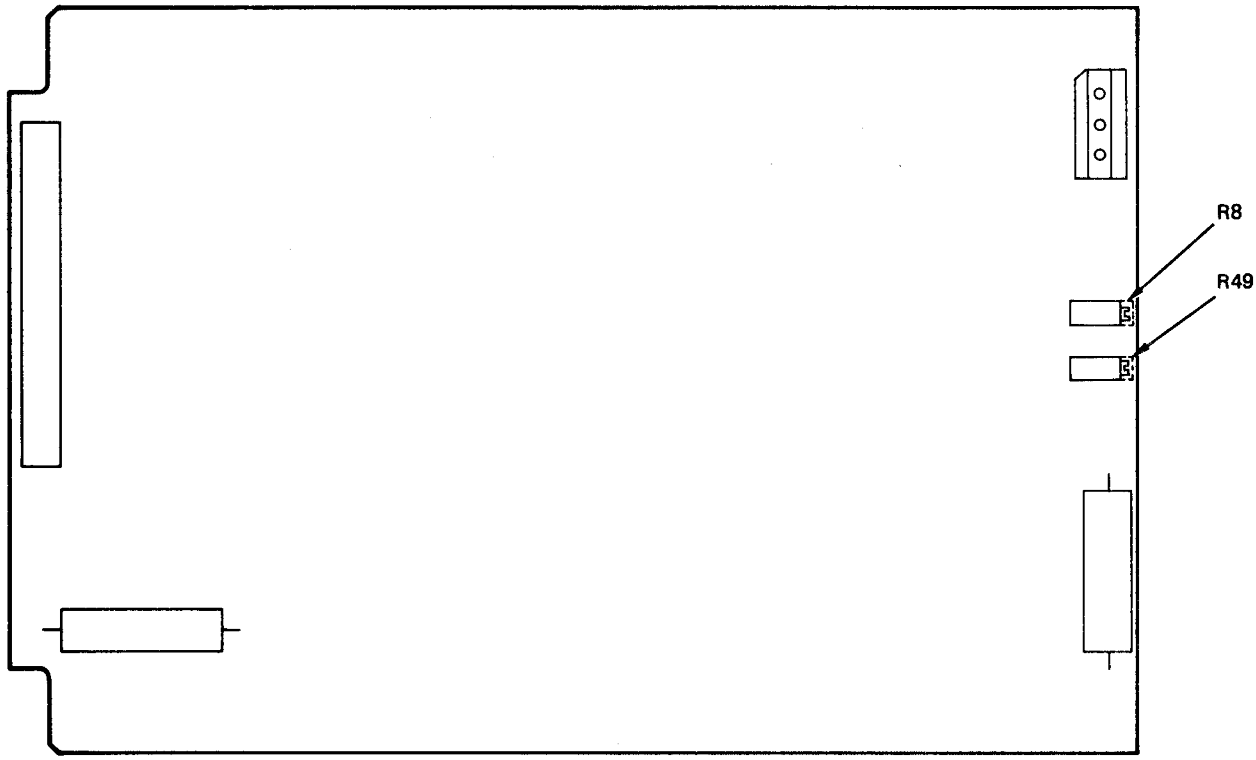
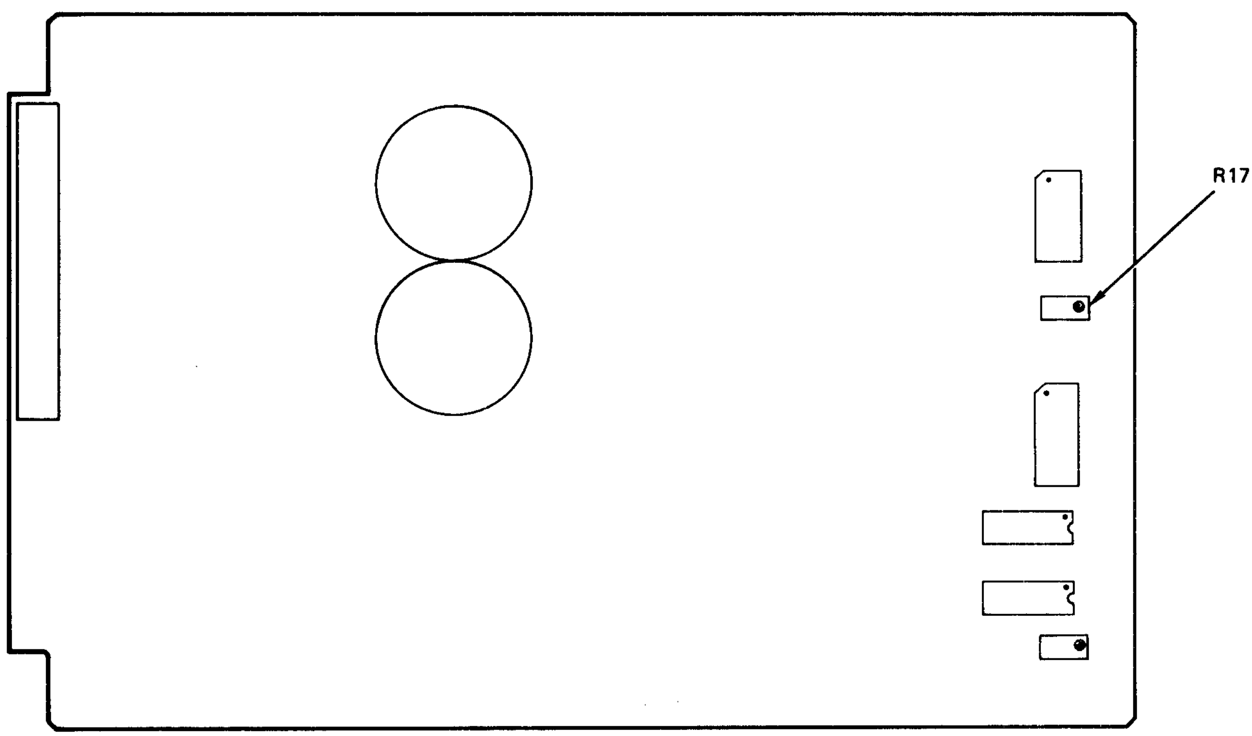


Figure 4-12. Computer Power Supply Testing and Troubleshooting Interconnection Diagram



5V POWER SUPPLY CIRCUIT CARD ASSEMBLY A1



15V POWER SUPPLY CIRCUIT CARD ASSEMBLY A2

44-902-59A

Figure 4-13. Computar Power Supply Circuit Card Adjustment Locations

Table 4-20. Computer Power Supply Testing and Troubleshooting

Test procedure	Normal indication	Malfunction indication/corrective action

CAUTION

Before removing covers or circuit cards, disconnect power from the power supply by setting COMP PS switch and INPUT POWER UUT circuit breaker to OFF or damage to equipment may result.

NOTE

AU controls, indicators, switches, switch indicators, and test jacks called out in the testing and troubleshooting procedure are located on the PSTS, unless otherwise indicated.

1. TEST SETUP.

1a. Perform PSTS self test in accordance with TM 5-6675-309-14 and/or TM 08840A-14/1

1b. Check that INPUT POWER PSTS circuit breaker is OFF

1c. Connect equipment as shown in figure 4-12 and in the following checklist:

Cable	Unit
W310P1	CPS 1J4
W310P2	PSTS J3
W309P1	CPS 1P1
W309P2	PSTS J2
W311P1	PSTS J5
W311	+28V power supply
W306P1	PSTS J4
W306	Variable power supply
Oscilloscope power	115 VAC
Digital voltmeter (DVM) power	115 VAC

Table 4-20. Computer Power Supply Testing and Troubleshooting - Continued

Test procedure	Normal indication	Malfunction indication/corrective action
2. <u>COMPUTER POWER SUPPLY TEST.</u>		
2a. Set switches as follows: <u>Switch</u> — <u>Setting</u> COMP PS — OFF INPUT POWER PSTS — OFF INPUT POWER UUT — OFF MODE — OVERLOAD FUNCTION — COMP PS + 5V REFERENCE AMB TEMP V LAMP — 0 VDC SELF TEST — OFF		
2b. Turn on external +28V power source		
2c. Turn on external 0 to +40V power source and adjust to 0V. Set current limit to 10 amps		
2d. Set INPUT POWER PSTS circuit breaker to ON	PSTS fan comes on	
2e. Press POWER SUPPLY TEST SET ON switch-indicator. Set MODE switch to NO LOAD.	POWER SUPPLY TEST SET ON switch-indicator goes on	
2f. Set INPUT POWER UUT circuit breaker to ON		
2g. Set COMPT PS switch to ON. Gradually increase external 0 to +40V power source to +24 (±0.5)V. Measure voltage at COMPUTER POWER SUPPLY PWR IN and PWR RTN test jacks	Current drawn from 0 to +40V external power source is less than 7 amps and COMP PS ON indicator lights	If a short is indicated, exchange 5V power supply circuit card assembly A1, then 15V power supply circuit card assembly A2, then wiring harness A3
2h. Set COMP PS switch to OFF, then to ON	COMPS PS ON indicator goes off, then lights	If indicator light does not go off when COMP PS switch is set to OFF, replace 15V power supply circuit card assembly A2 If indicator does not stay on when COMP PS switch is set to ON, try replacing 5V power supply circuit card assembly A1, or 15V power supply circuit card. assembly A2, or wiring harness A3

Table 4-20. Computer Power Supply Testing and Troubleshooting—Continued

Test procedure	Normal indication	Malfunction indication/corrective action
2i. Connect DVM test leads COMP PWR SPLY +15V MEM and PWR RTN test jacks	DVM indicates +14.85 to +15.15V	Voltage out of tolerance: Adjust A2R17. If unsuccessful, replace 15V power supply circuit card assembly A2
2j. Connect DVM test leads to COMP PWR SPLY PREC +15V and PWR RTN test jacks	DVM indicates +14.925 to +15.075V	Voltage out of tolerance: Adjust A1R49 to +15.00 (±0.01)V. If unsuccessful, replace 5V power supply circuit card assembly A1
2k. Connect DVM test leads to COMP PWR SPLY PREC −15V and PWR RTN test jacks	DVM indicates −14.925 to −15.075V	Voltage out of tolerance: Replace 5V power supply circuit card assembly A1
2l. Connect DVM test leads to COMP PWR SPLY +5V and PWR RTN test jacks	DVM indicates +5.00 to +5.15V	If voltage is +4.8 to +5.5V, adjust A1R8. If adjustment is unsuccessful, try 5V power supply circuit card assembly A1
2m. Connect DVM test leads to COMP PWR SPLY V LAMP and PWR RTN test jacks		
2n. Set REFERENCE AMB TEMP V LAMP switch to −5 VDC	DVM indicates +4.7 to +5.3V	Voltage out of tolerance: Replace 15V power supply circuit card assembly A2
2o. Set REFERENCE AMB TEMP V LAMP switch to 0 VDC		
2p. Set COMP PS switch to OFF	COMP PS ON indicator goes off	
2q. Set FUNCTION switch to COMP PS +15V MEM		
2r. Set MODE switch to FULL LOAD		
2s. Set COMP PS switch to ON	COMP PS ON indicator lights	
2t. Connect DVM test leads to COMP PWR SPLY +15V MEM and PWR RTN test jacks	DVM indicates +14.8 to +15.5V	If the voltage is out of tolerance, replace 15V power supply circuit card assembly A2
2u. Set FUNCTION switch to COMP PS V LAMP		
2v. Set REFERENCE AMB TEMP V LAMP switch to −5 VDC		
2w. Connect DVM test leads to COMP PWR SPLY V LAMP and PWR RTN test jacks	COMP PS ON indicator remains lighted. DVM indicates +4.5 to +5.5 VDC	If the voltage is out of tolerance, replace 15V power supply circuit card assembly A2

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Table 4-20. Computer Power Supply Testing and Troubleshooting – Continued

Test procedure	Normal indication	Malfunction indication/corrective action
2x. Set COMP PS switch to OFF	COMP PS ON indicator goes off	
2y. Set REFERENCE AMB TEMP V LAMP switch to O V		
22. Set FUNCTION switch to COMP PS +15V PREC		
2aa. Set COMP PS switch to ON	COMP PS ON indicator lights	
2ab. Connect DVM test leads to COMP PWR SPLY PREC + 15V and PWR RTN test jacks	DVM indicates +14.8 to +15.2V	If the voltage is out of tolerance, replace 5V power supply circuit card assembly A1
2ac. Set COMP PS switch to OFF	COMP PS ON indicator goes off	
2ad. Set FUNCTION switch to COMP PS -15V PREC		
2ae. Set COMP PS switch to ON	COMP PS ON indicator lights	
2af. Connect DVM test leads to COMP PWR SPLY PREC -1 5V and PWR RTN test jacks	DVM indicates -14.7 to -15.3V	If the voltage is out of tolerance, replace 5V power supply circuit card assembly A1
2ag. Set COMP PS switch to OFF	COMP PS ON indicator goes off	
2ah. Set FUNCTION switch to COMP PS +5V		
2ai. Set COMP PS switch to ON	COMP PS ON indicator lights	
2aj. Connect DVM t est leads to COMP PWR SPLY +5V and PWR RTN test jacks	DVM indicates +4.8 to +5.2V	If the voltage is out of tolerance, replace 5V power supply circuit card assembly A1
2ak. Disconnect DVM from PSTS		
2al. Set COMP PS switch to OFF	COMP PS ON indicator goes off	
2am. Set MODE switch to NO LOAD		
2an. Connect oscilloscope to POR* and PWR RTN test jacks		
2ao. Adjust oscilloscope vertical sensitivity to 2 volts/division and center trace, then set to DC coupling		

Table 4-20. Computer Power Supply Testing and Troubleshooting – Continued

Test procedure	Normal indication	Malfunction indication/corrective action
2ap. Set COMP PS switch to ON	Oscillsocope trace rises to +3 to +6V when switch is set and then drops to 0 to 0.5 VDC after 0.5 to 1.5 seconds and remains at this level	If the voltage is out of tolerance, replace 15V power supply circuit card assembly A2
2aq. Connect the oscilloscope to OFF and PWR RTN test jacks. Turn COMP PS switch to OFF	OFF signal should be +3 to +6 VDC	Replace 15V power supply circuit card assembly A2 if off signal is not +3 to +6 VDC
2ar. Turn COMP PS switch to ON	Off signal should be 0 to 0.5 VDc	Replace 15V power supply circuit card assembly A2 if off signal is not 0 to 0.5 VDC
2as. Turn COMP PS switch to OFF		
2at. Set INPUT POWER UUT circuit breaker to OFF		
2au. Press POWER SUPPLY TEST SET ON switch-indicator	Switch-indicator light goes off	
2av. Set INPUT POWER PSTS circuit breaker to OFF		
2aw. Disconnect computer power supply from PSTS		
NOTE Before turning off 0-40V power supply, adjust to 0 volts.		
2ax. Disconnect all test equipment		
TEST COMPLETED		

Section IV. MAINTENANCE OF PADS

4-15. General.

a. Maintenance of PADS allocated to general support by MAC consists of testing and repair of computer, computer power supply, control and display unit, inertial measurement unit, and power supply.

4-16. Computer Maintenance. Computer maintenance consists of computer and computer power supply testing and repair.

a. ***Computer Testing.*** Testing is performed using the PADS test set as described in paragraph 4-9.

b. ***Computer Power Supply Testing.*** Testin is performed using the power supply test set (PSTS as described in paragraph 4-14.

c. ***Computer Repair.*** Computer repair consists of replacing circuit card assemblies, memory unit, computer power supply, RFI gasket, fault indicator, elapsed time indicator and thermostatic switch, and repair of flexible harness assembly. See figure 4-14 for an exploded view of the computer. Refer to table 3-5 for circuit card identification.

NOTE

Removal and replacement of circuit cards, memory unit, and computer power supply are described in paragraph 3-15. Torquing procedures are given in paragraph 3-11.

(1) ***Fault indicator DS1.*** Remove and replace fault indicator DS1 (21, figure 4-14) as follows:

(a) ***Removal.***

1. Remove 16 screws (2) and washers (1) securing computer cover (3) to computer subassembly (10). Remove computer cover.
2. Tag and unsolder wires connected to fault indicator DS1 (21).
3. Remove nut (23) and lockwasher (22) securing fault indicator DS1 (21) to computer subassembly (10). Remove fault indicator DS1.

(b) ***Replacement.***

WARNING

Isopropyl alcohol is flammable and gives off harmful vapors. Use only in well-ventilated area away from open flames and sparks. Avoid prolonged or repeated inhalation of vapors.

1. Clean shoulder of fault indicator DS1 (21) where it contacts computer subassembly (10) using isopropyl alcohol and clean, lint-free cloth. Repeat at least three times using clean cloth each time. When clean, wipe dry.
2. Apply adhesive (MIL-A-46146, Type 1) 0.010- to 0.030-inch thick on fault indicator shoulder contact surface. Install fault indicator DS 1 (21) in computer subassembly (10) within 5 minutes after applying adhesive.
3. Install nut (23) and lochwasher (22) securing fault indicator DS 1 (21) to computer subassembly (lo) and tighten nut (23) sufficiently to hold but not enough to reduce the adhesive thickness to less than ().()1() inch.
4. Prepare and solder tagged wires to fault indicator DS1 (21). Clean solder joints.
5. Place computer cover (3) on computer subassembly (10); align mounting holes.
6. Torque 16 screws (2) and washers (1) securing computer cover (3) to computer subassembly (l0) 16 inch-pounds using procedures described in paragraph 3-11.

(2) *Elasped time indicator M1* Remove and replace elapsed time indicator M1 (25, figure 4-14) as follows:

(a) *Removal.*

1. Remove 16 screws (2) and washers (1) securing computer cover (3) to computer subassembly (10). Remove computer cover.
2. Tag and unsolder wires connected to elapsed time indicator M1 (25).
3. Remove two screws (27), spacers (26), and one terminal lug (24) securing elapsed time indicator M1 (25) to computer subassembly (10). Remove elapsed time indicator Ml.

(b) *Replacement.*

1. Install two screws (27), spacers (26), and one terminal lug (24) securing elapsed time indicator Ml (25) to computer subassembly (10).

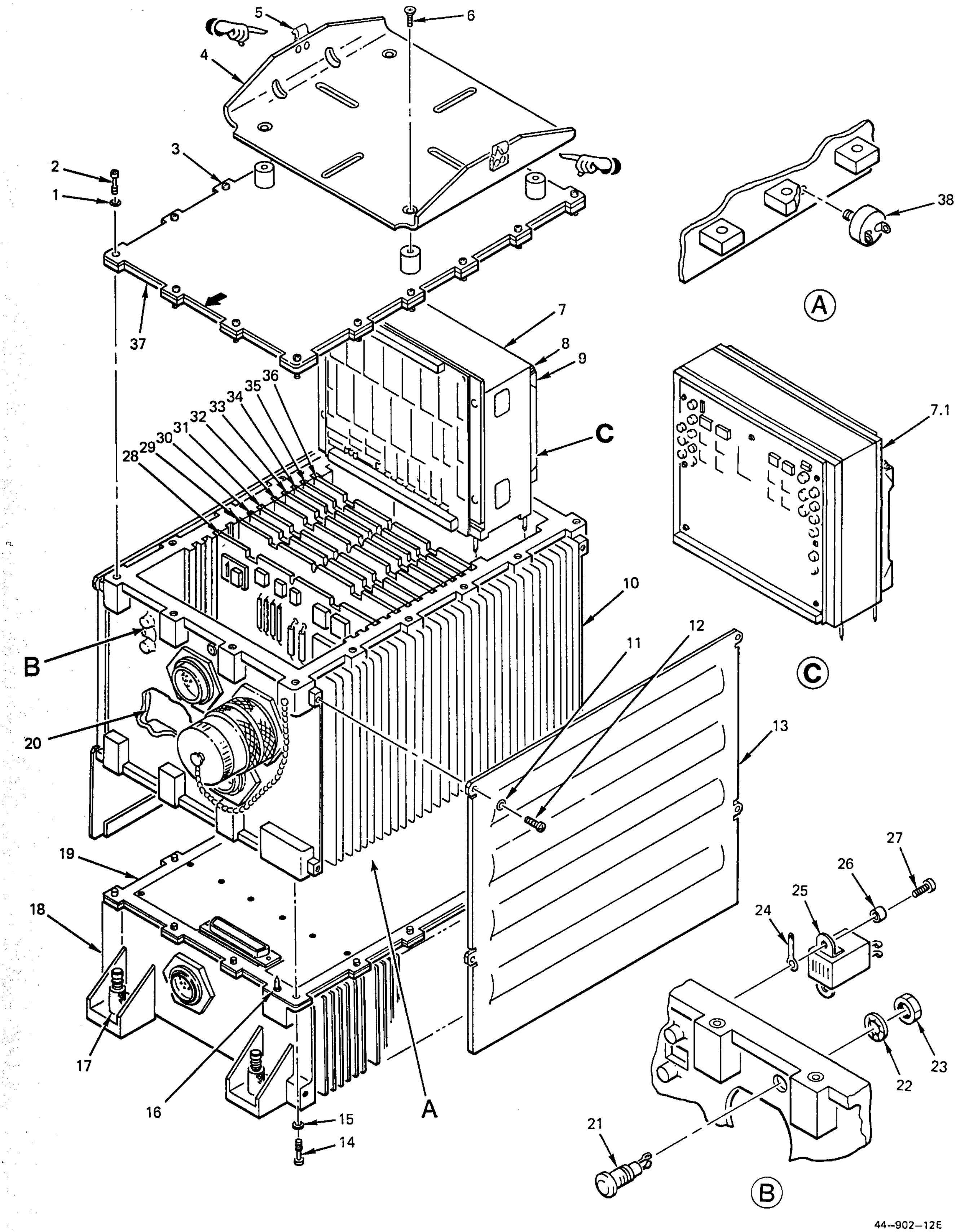


Figure 4-14. Computer Exploded View

Legend for Figure 4-14

1. Washer	20. Flexible harness assembly
2. Screw	21. Fault indicator DS1
3. Computer cover	22. Lockwasher
4. CDU mount bracket	23. Nut
5. Catch strike	24. Terminal lug
6. Screw	25. Elapsed time indicator M1
7. Solid state memory unit A1	26. Spacer
7.1 Core memory unit A1	27. Screw
8. Screw	28. A/D converter circuit card assembly A11
9. Wedgelock	29. I/O discrete circuit card assembly A9
10. Computer subassembly	30. Platform I/O circuit card assembly A8
11. Washer	31. I/O controller circuit card assembly A7
12. Screw	32. Data buffer circuit card assembly A6
13. Air deflector	33. Control no. 3 circuit card assembly A5
14. Screw	34. Control no. 2 circuit card assembly A4
15. Washer	35. Control no. 1 circuit card assembly A3
16. Guide pin	36. 16-bit data circuit card assembly A2
17. Captive screw assembly	37. RFI gasket
18. Computer power supply	38. Thermostatic switch S1
19. RFI gasket	

2. Prepare and solder tagged wires to elapsed time indicator M1 (25). Clean solder joints.

3. Place computer cover (3) on computer subassembly (10); align mounting holes.

4. Torque 16 screws (2) and washers (1) securing computer cover (3) to computer subassembly (10) 16 inch-pounds using procedures described in paragraph 3-11.

(3) ***Thermostatic switch S1.*** Remove and replace thermostatic switch S1 (38, figure 4-14) as follows:

(a) ***Removal.***

1. Tag and unsolder wires connected to thermostatic switch S1 (38).

2. Remove thermostatic switch S1 (38) by unscrewing from chassis.

(b) ***Replacement.***

WARNING

Isopropyl alcohol is flammable and gives off harmful vapors. Use only in well-ventilated area away from open flames and sparks. Avoid prolonged or repeated inhalation of vapors.

1. Clean thermostatic switch S1 (38) threads and engaging threads in chassis using isopropyl alcohol. Use clean lint-free cloth to apply alcohol and to wipe parts.

2. Apply sealing compound (MIL-S-22473, Grade H) to threads of thermostatic switch S1 (38).

3. Install thermostatic switch S1 (38) by screwing into threaded mounting hole in chassis.

4. Prepare and solder tagged wires to thermostatic switch S1 (38). Clean solder joints.

(4) ***Computer flexible harness assembly repair.*** Damaged printed circuitry on the computer flexible harness assembly (20, figure 4-14) shall be repaired by splicing with haywires. Repair flexible harness assembly (20) as follows:

(a) Remove 16 screws (2) and washers (1) securing computer cover (3) to computer subassembly (10). Remove computer cover.

(b) Remove circuit card assemblies (28 thru 36).

(c) Remove memory unit (7 or 7.1).

Cut length of 28 AWG stranded insulated wire long enough to connect termination points of damaged circuitry. Strip insulation for a length of 1/8 inch at each end of wire.

Solder wire to terminations using standard shop practices.

Tack wire to flexprint at one-inch-intervals as follows:

Isopropyl alcohol is flammable and gives off harmful vapors. Use only in well-ventilated area away from open flames and sparks. Avoid prolonged or repeated inhalation of vapors.

1. Clean wire and flexprint tack points using isopropyl alcohol.
2. Apply bonding primer (A4094) to tack points on flexprint. Allow to air dry.
3. Apply adhesive (RTV 156 or 30-079) to tack points on flexprint and wire, apply sufficient pressure to ensure good bond.

(g) Replace memory unit (7 or 7.1).

(h) Replace circuit card assemblies (28 thru 36).

(i) Torque 16 screws (2) and washers (1) securing computer cover (3) to computer subassembly (10) 16 inch-pounds using procedure described in paragraph 3-11.

d. ***Computer Power Supply Repair.*** Computer power supply repair consists of removal and replacement of circuit card assemblies, guide pins, captive screws, RFI gasket, and repair of the wiring harness. Replacement of the guide pins and captive screws are described in paragraph 3-15. Replacement of RFI gaskets is described in paragraph 3-13. See figure 4-15 for an exploded view of the computer power supply. Refer to table 4-21 for circuit card identification. Replacement of the circuit card assemblies and repair of the wiring harness is described in the following paragraph.

(1) ***5V power supply circuit card assembly Al and F&tier supply circuit card assembly A 2.*** Remove and replace 5V ower supply circuit card assembly A1 (15, figure 4-15) or 15V power supply circuit card assembly A2 (22) as follows:

(a) ***Removal.***

NOTE

Removal of 5V power supply circuit card assembly Al (15) and 15V power supply circuit card assembly A2 (22) are identical, therefore, only 5V power supply circuit card assembly Al will be covered.

1. Loosen 10 captive screws (20) securing end plate (19) to chassis (10); remove end plate.

2, Loosen two screws (17) securing wedgelocks (16) until 5V ower supply circuit card assembly Al (15) is free.

NOTE

It may be necessary to loosen the wedges if they become frozen. This can be done by simply tapping the wedge screws downward until the bottom wedges become loose.

3. Loosen three captive screws (18) securing 5V power supply circuit card assembly Al (15) heat sink to chassis (10).
4. Use a card extractor to remove 5V power supply circuit card assembly Al (15).

(b) *Replacement.*

NOTE

Replacement of 5V power supply circuit card assembly Al (15) and 15V power supply circuit card assembly A2 (22) are identical; therefore, only 5V power supply circuit card assembly Al will be covered.

1. Insert 5V power supply circuit card assembly Al (15) into slot in chassis (10) and carefully guide it into place.
2. Just before the connectors mate, check that 5V power supply circuit card assembly Al (15) is free in its guides and its top edge is parallel to the chassis (10) top surface.
3. Seat 5V power supply circuit card assembly Al (15) by applying moderate, even pressure at both corners. The top should be flush with the chassis top surface. If card does not readily seat, pull card out and inspect for bent or broken connector pins.
4. Tighten three captive screws (18) securing 5V power supply circuit card assembly Al (15) heat sink to chassis (10).

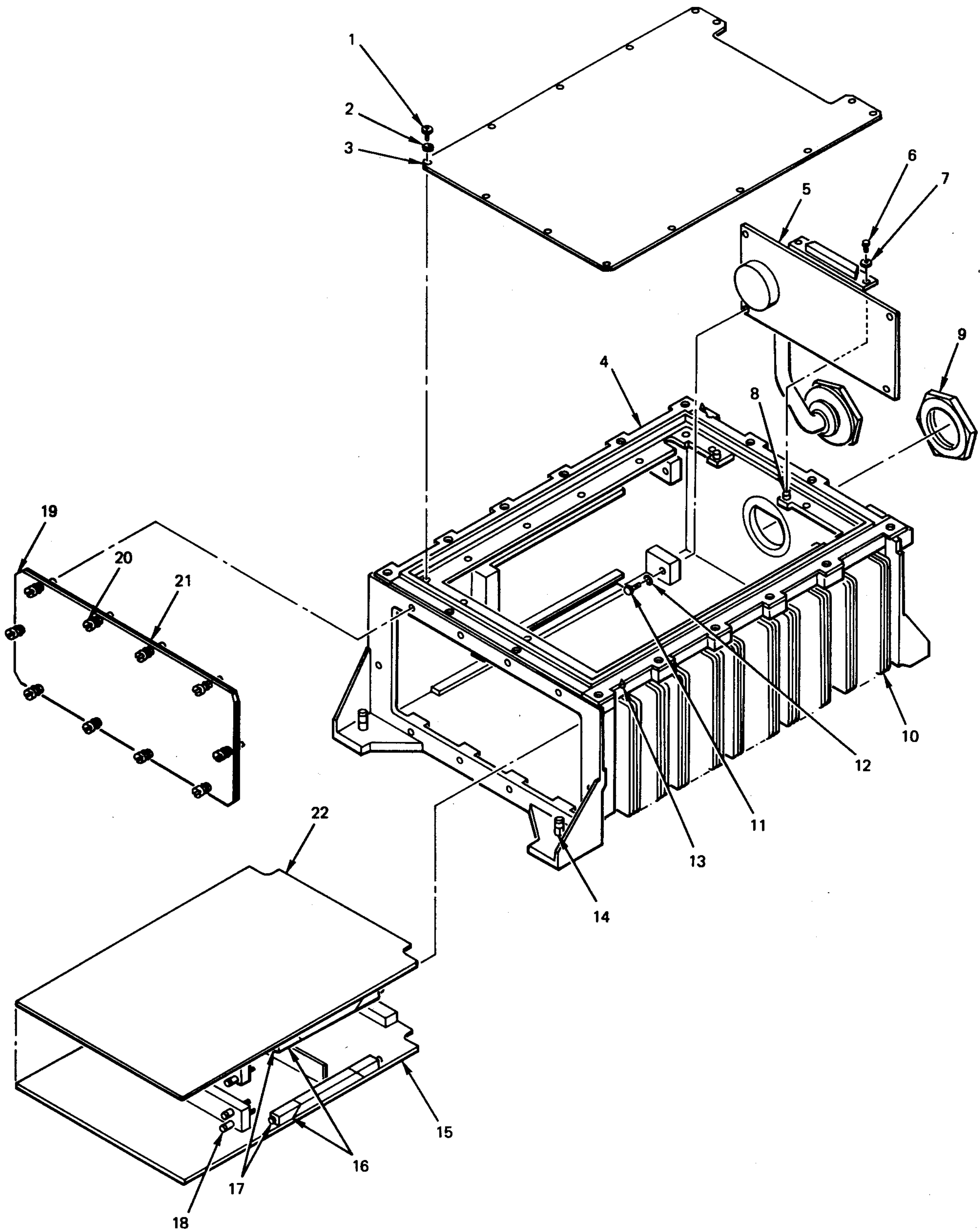


Figure 4-15. Computer Power Supply Exploded View

Legend for Figure 4-15

1. Screw
2. Washer
3. Cover
4. RFI gasket
5. Wiring harness A3
6. Screw
7. Washer
8. Spacer
9. Nut
10. Chassis
11. Screw
12. Washer
13. Guide pin
14. Captive screw
15. 5V power supply circuit card assembly Al
16. Wedgelock
17. Screw
18. Captive screw
19. End plate
20. Captive screw
21. Gasket
22. 15V power supply circuit card assembly A2

Table 4-21. Computer Power Supply Circuit Card Assembly Identification

Figure 4-15 index no.	Card part no.	reference designator	Part no. location on card
15	880595-6 (preferred) 8805954:880595-5, 880770-7,880770-8, 880770-9, and 880770-11 (alternates)	5V power supply circuit card assembly Al	Near top (opposite connector end) along side edge on component side
22	880598-1 (preferred) 880780-14,880793-3, 8807934,880793-5, and 880793-6 (alternates)	15V power supply circuit card assembly A2	Near top (opposite connector end) along side edge on component side
5	880753-2	Wiring harness A3	In middle on side that wire harnesses connects

5. Tighten two screws (17) in wedgelocks (16) until wedges are tight against edge of slots.

6. Inspect gasket (21) on end plate (19). Replace if cracked, tom, or excessively compressed.

7. Secure end plate (19) to chassis (10) with 10 captive screws (20).

(2) Wiring harness A3 Remove. repair. and replace wiring harness A3 (5, figure 4-15) as follows:

(a) *Removal.*

1. Loosen 10 captive screws (20) securing end plate (19) to chassis (10); remove end plate.

2. Loosen four screws (17) securing wedgelocks (16) until 5V ower supply circuit card assembly Al (15) and 15V power supply circuit card assembly A2 (22) are free.

NOTE

It may be necessary to loosen the wedges if they become frozen. This can be done by simply tapping the wedge screws downward until the bottom wedges become loose.

3. Loosen six captive screws (18) securing 5V ower supply circuit card assembly A1 (15) and 15V power supply circuit card assembly A2 (22) heat sinks to chassis (10).

4. Use a card extractor to remove 5V power supply circuit card assembly A1 (15) and 15V power supply circuit card assembly A2 (22).

5. Remove 14 screws (1) and washers (2) securing cover (3) to chassis (10); remove cover.

6. Remove two screws (6), washers (7), and spacers (8), four screws (11) and washers (12), and nut (9) securing wiring harness A3 (5) to chassis (9); carefuly remove wiring harness A3.

(b) ***Repair.*** Repair of the wiring harness A3 (5) consists of replacing damaged wires and components. See figure 4-16 and table 4-22 and replace damaged wiring and components using standard shop practices.

(c) ***Replacement.***

1. Install wiring harness A3 (5) in chassis (10) and loosely attach with four screws (11) and washers (12).

2. Insert 5V power supply circuit card assembly A1 (15) into slot in chassis (10) and carefully guide it into place.

3. Just before the connectors mate, check that 5V power supply circuit card assembly A1 (15) is free and its guides and its top edge is parallel to the chassis (10) top surface.

4. Seat 5V power supply circuit card assembly A1 (15) by applying moderate, even pressure at both corners. The top should be flush with the chassis top surface. If card does not readily seat, pull the card out and inspect for bent or broken connector pins.

5. Tighten two screws (17) in wedgelock (16) until wedge is tight against edge of slot. Allow wiring harness A3 (5) to seek its optimum position when wedgelocks are tightened 4 to 5 inch-pounds.

6. Tighten top two screws (11) securing wiring harness (5) to chassis (10) while holding card (15).

7. Loosen two screws (17) securing wedgelocks (16) until 5V power supply circuit card assembly A1 (15) is loose.

8. Use a card extractor to remove 5V power supply circuit card assembly A1 (15).

9. Tighten remaining two screws (11) securing wiring harness (5) to chassis (10).

10. Finish securing wiring harness A3 (5) to chassis (10) with two screws (6), washers (7), and spacers (8), and nut (9). Apply sealing compound (MIL-S-22473, Grade C) to threads of screws (6). Tighten nut 110 to 120 inch-pounds. Check electrical bonding between nut and chassis (10) with an ohmmeter. Resistance should be 2.5 milliohms maximum.

11. Insert 5V power supply circuit card assembly A1 (15) and 15V power supply circuit card assembly A2 (22) into their respective slots in chassis (10) and carefuly guide them into place.

12. Just before the connectors mate, check that 5V power supply circuit card assembly A1 (15) and 15V power supply circuit card assembly A2 (22) are free in their respective guides and top edges are parallel to the chassis (10).

13. Seat 5V power supply circuit card assembly A1 (15) and 15V power supply circuit card assembly A2 (22) by applying moderate, even pressure at both corners of each card. The top should be flush with the chassis top surface. If 5V power supply circuit card assembly A1 (15) or 15V power supply circuit card assembly A2 (22) does not readily seat, pull the card out and inspect for bent or broken connector pins.

14. Tighten six captive screws (18) securing 5V power supply circuit card assembly A1 (15) and 15V power supply circuit card assembly A2 (22) heat sinks to chassis (10).

15. Tighten four screws (17) in wedgelocks (16) of 5V power supply circuit card assembly A1 (15) and 15V power supply circuit card assembly A1 (22) until wedge is tight against edge of slot.

16. Inspect gasket (21) on end plate (19). Replace if cracked, torn, or excessively compressed.

17. Secure end plate (19) to chassis (10) with 10 captive screws (20).

18. Secure cover (3) to chassis (10) with 14 screws (1) and washers (2).

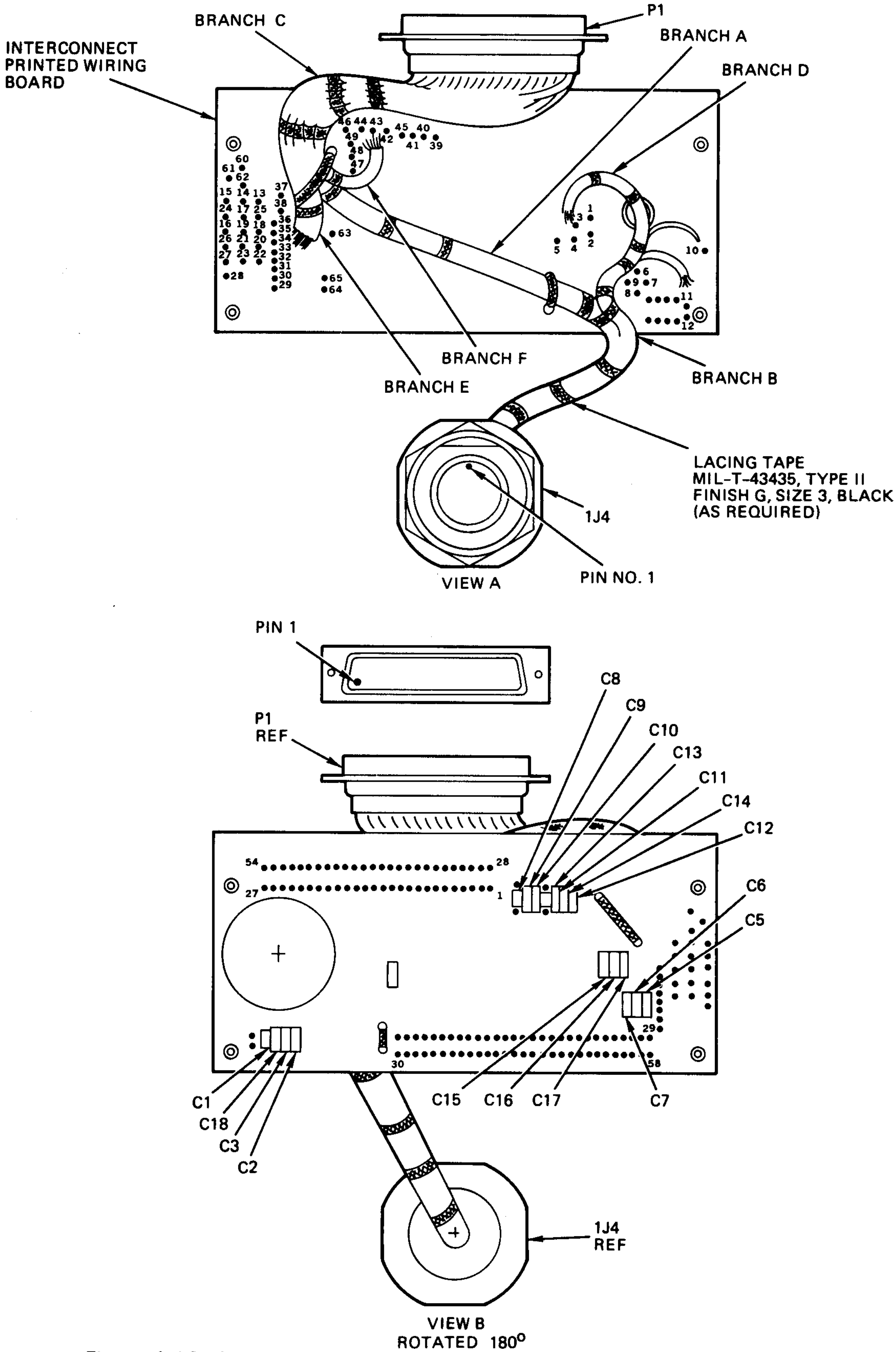


Figure 4-16. Computer Power Supply Wiring Harness A3 Parts Location Diagram

Table 4-22. Computer Power Supply Wiring Harness A3 Wiring Data

From	To	Branch	Color
1J4-1	P1-13	B,A,C	Gray
1J4-3	P1-30	B,A,C	Gray
1J4-12	P1-6	B,A,C	White
1J4-13	P1-5	B,A,C	White
1J4-14	P1-45	B,A,C	White
1J4-15	P1-46	B,A,C	White
1J4-16	P1-21	B,A,C	White
1J4-2	P1-12	B,A,C	White/gray
1J4-4	P1-40	B,A,C	White/gray
A2-30 far side	A2-31 far side		
A3-12	P1-26	D,A,C	Red
A3-60	1J4-34	E,A,B	Black
A3-61	1J4-11	E,A,B	Black
A3-62	1J4-9	E,A,B	Black
A3-13	P1-1	E,C	Black
A3-14	P1-2	E,C	Black
A3-15	P1-18	E,C	Black
A3-16	P1-19	E,C	Black
A3-17	P1-34	E,C	Black
A3-18	P1-35	E,C	Black
A3-19	P1-36	E,C	Black
A3-20	P1-37	E,C	Black
A3-21	P1-11	E,C	Black
A3-22	P1-27	E,C	Black
A3-23	P1-28	E,C	Black
A3-24	P1-7	E,C	Black
A3-25	P1-24	E,C	Black
A3-26	P1-25	E,C	Black
A3-27	P1-44	E,C	Black
A3-28	P1-42	E,C	Black
A3-38	P1-15	E,C	Black
A3-37	P1-23	E,C	Black
A3-64	P1-8	E,C	Yellow
A3-65	P1-4	E,C	Yellow
A3-29	P1-50	E,C	Green
A3-30	P1-49	E,C	Green
A3-31	P1-48	E,C	Green
A3-32	P1-47	E,C	Green
A3-33	P1-33	E,C	Green
A3-34	P1-32	E,C	Green
A3-35	P1-17	E,C	Green
A3-36	P1-16	E,C	Green
A3-63	P1-3	E,C	Blue
A3-42	P1-31	F,C	Blue
A3-43	P1-30	F,C	Blue
A3-44	P1-29	F,C	Blue
A3-47	P1-43	F,C	Blue
A3-48	P1-10	F,C	Blue
A3-49	P1-9	F,C	Blue

Table 4-22. Computer Power Supply Wiring Harries A3 Wiring Data-Continued

From	To	Branch	Color
A3-39	P1-38	F,C	White
A3-40	P1-20	F,C	White
A3-41	P1-41	F,C	White
A3-45	P1-22	F,C	White
A3-46	P1-14	F,C	White
A3-1	1J4-21	D,B	Brown
A3-2	1J4-31	D,B	Brown
A3-3	1J4-32	D,B	Brown
A3-4	1J4-33	D,B	Brown
A3-5	1J4-37	D,B	Brown
A3-6	1J4-6	D,B	Red
A3-7	1J4-7	D,B	Red
A3-8	1J4-22	D,B	Red
A3-9	1J4-23	D,B	Red
A3-11	1J4-5	D,B	Red
A3-10	1J4-29	D,B	White

NOTES

1. All wire is MIL-W-16878/4, Type E-22, 19 strands, except wire between A2-30 and A2-31 which is uninsulated, type S, 22 AWG, solid, soft, tinned.
2. Termination points A3-1, etc, are located on interconnect printed wiring board as shown on figure 4-16.

4-17. CDU Maintenance.

a. ***CDU Testing.*** Testing is performed using the PADS test set as described in paragraph 4-10.

b. ***CDU Repair.*** CDU repair consists of removal and replacement of circuit card assemblies, chassis-mounted components, cover, panel, gasket, and repair of the flexible harness, Figure 4-17 is an exploded view of the CDU, Refer to table 3-6 for circuit card identification. Replacement of circuit cards are described in paragraph 3-7.

CAUTION

Before conducting any repairs or performing any disassembly procedures, make certain, that PS BATTERY CB1 and VEHICLE CB2 circuit breakers are in OFF position or damage to equipment may result.

(1) Control and display unit cover. Remove and replace control and display unit cover (12, figure 4-17) as follows:

(a) *Removal*

1. Remove 16 screws (29), and washers (30) securing control and display panel (31) to control and display unit cover (12). Separate control and display unit cover (12) and control and display panel (31) to permit access to electrical and mechanical connections.
2. Remove screw (17) securing terminal lug (16) to control and display unit cover (12).
3. Remove hvo screws (35) and four fiber washers (33 and 34) securing wiring harness (36) to control and display unit cover (12).
4. Tag and unsolder wires connected to audible alarm DS3 (13).

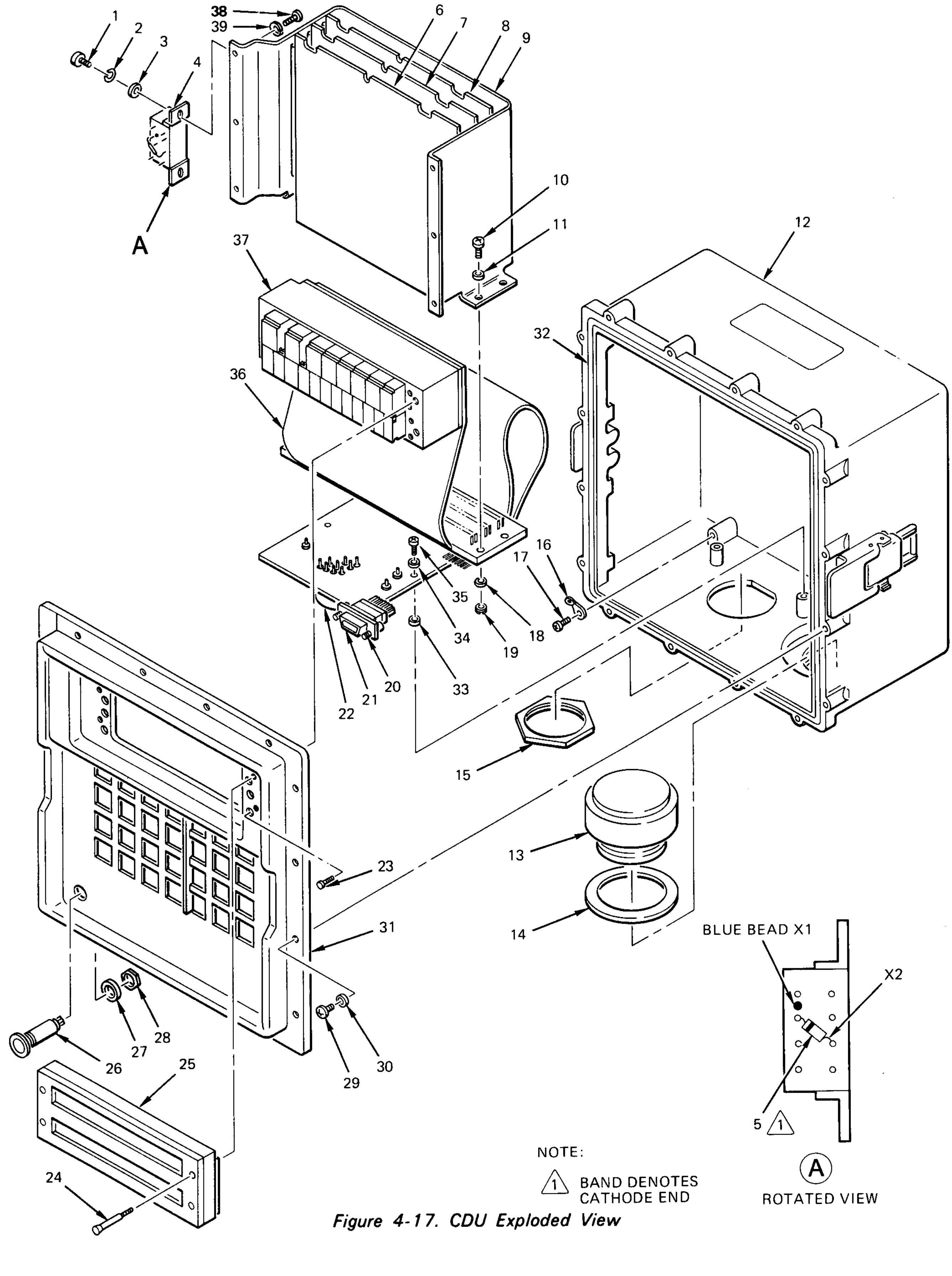


Figure 4-17. CDU Exploded View

Legend for Figure 4-17

1.	Screw	21.	Connector PI
2.	Lockwasher	22.	Connector 4J1
3.	Washer	23.	Screw
4.	Relay K1	24.	Screw
5.	Diode CR1	25.	Bezel
6.	Display logic circuit card assembly Al	26.	Fault indicator DS2
7.	Display logic circuit card assembly A2	27.	Washer
8,	Keyboard and control circuit card assembly A3	28.	Nut
9.	Control display unit holder	29.	Screw
10.	Screw	30.	Washer
11.	Washer	31.	Control and display panel
12.	Control and display unit cover	32.	Gasket
13.	Audible alarm DS3	33.	Fiber washer
14.	Audible alarm gasket	34.	Fiber washer
15.	Nut	35.	Screw
16.	Terminal lug	36.	Flexible harness assembly
17.	Screw	37.	Display unit DS1
18.	Washer	38.	Screw
19.	Nut	39.	Washer
20.	JacksCrew		

5. Unscrew audible alarm DS3 (13) from control and display unit cover (12).

6. Remove audible alarm gasket (14) from control and display unit cover (12).

7. Remove nut (15) securing connector 4J1 (22) to control and display unit cover (12).

8. Remove control and display unit cover (12).

(b) *Replacement.*

1. Install screw (17) securing terminal lug (16) to control and display unit cover (12).

2. Secure wiring harness (36) to control and dis lay unit cover (12) with two screws (35) and four fiber washers (33 and 34).

3. Install audible alarm gasket (14) in audible alarm mounting hole in control and display unit cover (12).

4. Screw audible alarm DS3 (13) in mounting bole in control display unit cover (12).

5. Prepare and solder two tagged wires that connect audible alarm DS3 (14) to terminals (+ lead to E15, - lead to E14). Clean solder joint to remove flux.

6. Install connector 4J1 (22) in D-hole provided in control and display unit cover (12) and secure with nut (1 5). Apply sealing compound (MIL-S-22373, Grade C) to threads of nut. Torque nut 65 to 75 inch-pounds. Check electrical bonding between nut and cover with an ohmmeter. Resistance should be 5 milliohms maximum.

7. Inspect gasket (32). Replace if cracked, tom, loose, or excessively compressed.

8. Position control and display panel (31) against control and display unit cover (12). Torque 16 screws 29 and washers (3) securing control and display panel (31) to control and display unit cover (12) 5 inch-pounds using procedures described in paragraph 3-11.

(2) *Relay K1.* Remove and replace relay K1 (4, figure 4-17) as follows:

(a) *Removal.*

1. Remove 16 screws (29) and washers (30) securing control and display panel (31) to control and display unit cover (12). Se arate control and display unit cover (12) and control and display anel (31) to permit access to relay K1 (4).

2. Remove two screws (l), lockwashers (2), and washers (3) securing relay K1 (4) to

control display unit holder (9). Move relay K1 (4) away from holder far enough to permit access to wires.

3. Tag and unsolder wires connected to relay K1 (4); remove relay.

4. Unsolder and remove diode CR1 (5).

(b) *Replacement.*

1. Prepare and install plastic tubing on diode. Solder diode CR1 leads to relay terminals observing polarity and note of figure 4-17.

2. Solder tagged wires to terminals of relay K1 (4).

3. Install relay K1 (4) and secure to control display unit holder (9) with two screws (l), lockwashers (2) and washers (3). To ensure proper orientation blue bead must be located as shown in figure 4-17.

4. Inspect gasket (32). Replace if cracked, torn loose, or excessively compressed.

5. Position control and display panel (31) against control and dis la unit cover *(12).* Torque 16 screws (29) and washers (30) securing control and display panel (31) to control and display unit cover (12) 5 inch-pounds using procedures described in paragaph 3-11.

(3) *Control and display panel.* Remove and replace control and display panel (31, figure 4-17) as follows:

(a) *Removal.*

1. Remove 16 screws (29) and washers (30) securing control and display panel (31) to control and display unit cover (12). Separate control and display panel (31) and control and display unit cover (12) to permit access to front panel mechanical and electrical connections.

2. Remove eight screws (24) securing bezel *(25)* to control and display panel (13).

3. Remove four screws (23) securing display unit DS1 (37) to control and display panel (31).

4. Disconnect connector (21) from control and display panel (31) by turning two jackscrews (20).

5. Tag and unsolder wires connected to fault indicator DS2 (26).

6. Remove nut (28) and washers (27) securing fault indicator DS2 (26) to control and display panel (31) and remove fault indicator DS2 (26).

7. Remove six screws (38) and washers (39) securing control display unit holder (9) to display and control panel (31). Remove control and display panel (31).

(b) *Replacement.*

WARNING

Isopropyl alcohol is flammable and gives off harmful vapors. Use only in well-ventilated area away from open flames and sparks. Avoid prolonged or repeated inhalation of vapors.

1. Clean shoulder of indicator DS2 (26) where it contacts display and control panel (31) using isopropyl alcohol and clean lint-free cloth. Repeat at least three times using clean cloth each time. When clean, wipe dry using lint-free material.

2. Apply adhesive (MIL-A-46146, Type I) 0.010- to 0.030-inch thick on shoulder contact surface. Install in control and display panel (31) within 5 minutes after applying adhesive.

3. Install nut (28) and washer (27) that secure indicator DS2 (26) to control and display panel (31) and tighten nut (28) sufficiently to hold but not enough to reduce adhesive thickness to less than 0.010 inch.

4. Cure adhesive for 72 hours minimum.

5. Secure control display unit holder (9) to control and display panel (31) with six screws (38) and washers (39).

6. Prepare and solder tagged wires to indicator DS2 (26).

7. Connect connector (21) to control and display panel (31) by engaging and turning two jackscrews (20).

8. Secure indicator DS1 (37) to control and display panel (31) with eight screws (23).

9. Secure bezel (25) to control and display panel (31) with four screws (24).

10. Inspect gasket (32). Replace if cracked, torn, loose, or excessively compressed.

11. Position control and display panel (31) against control and dis la unit cover (12). Torque 16 screws (29) and washers

(30) securing control and display unit panel (31) to control and display unit cover (12) 5 inch-pounds using procedures described in paragraph 3-11.

(4) *Fault indicator DS2.* Remove and replace fault indicator DS2 (26, figure 4-17) as follows:

(a) *Removal.*

1. Remove 16 screws (29) and washers (30) securing control and display panel (31) to control and display unit cover (12). Separate control and display panel (31) and control and display "unit "cover (12) to permit access to front panel mechanical and electrical connections.

2. Tag and unsolder wires connected to indicator DS2 (26).

3. Remove nut (28) and washer (27) securing indicator DS2 (26) to control and dis la panel (31) and remove indicator DS2 26.

(b) *Replacement.*

WARNING

off harmful vapors. Use only in well-ventilated area away from open flames and sparks. Avoid prologned or repeated inhalation of vapors.

1. Clean shoulder of indicator DS2 (26) where it contacts display and control panel (31) using isopropyl alcohol and clean, lint-free cloth. Clean area on control and display panel where indicator makes contact. Repeat at least three times using clean cloth each time, When clean, wipe dry using lint-free cloth.

2. Apply adhesive (MIL-A-46146, Type I) 0.010- to 0.030-inch thick on shoulder contact surface. Install in control and display panel (31) within 5 minutes after applying adhesive.

3. Install nut (28) and washer (27) that secure fault indicator DS2 (26) to control and display panel (31). Tighten nut (28) sufficiently to hold but not enough to reduce adhesive thickness to less than 0,010 inch.

4. Cure adhesive for 72 hours minimum.

5. Pre are and solder tagged wires to fault indicater DS2 (26).

6. Inspect gasket (32). Replace if cracked, tom, loose, or excessively compressed.

7. Position control and display panel (31) against control and dis la unit cover (12). Torque 16 screws (29) and washers (30) securing control and display panel (31) to control and dispaly unit cover (12) 5 inch-pounds using procedures described in paragraph 3-11.

(5) *Audible alarm DS3.*

(a) *Removal.*

1. Remove 16 screws (29) and washers (30) securing control and display panel (31) to control and display unit cover (12). Separate control and display unit cover 12 and control and display panel (31) to permit access to audible alarm DS3 and its connecting wires.

2. Tag and unsolder wires connected to audible alarm DS3 (13).

3. Unscrew audible alarm gasket (14) from control and display unit cover (12).

4. Remove audible alarm gasket (14) from control and display unit cover (12).

(b) *Replacement.*

1. Install audible alarm gasket (14) in audible alarm mounting hole in control and display unit cover (12).

2. Screw audible alarm DS3 (13) in mounting hole in control display unit cover (12).

3. Prepare and solder two wires that connect audible alarm DS3 (13) using tagged wires from removed audible alarm as a guide (+ lead to E15, – lead to E14). Clean solder joint to remove flux.

4. Inspect gasket (32). Replace if cracked, tom, loose, or excessively compressed.

5. Position control and display panel (31) against control and dis la unit cover (12). Torque 16 screws (29) and washers (30) securing control and display panel (31) to control and display unit cover (12) 5 inch-pounds using procedures described in paragaph 3-11.

(6) *Control and display unit flexible harness assembly.* Damaged printed circuitry on the control display unit flexible harness assembly (36, figure 4-17) shall be repaired by splicing with haywires. Repair flexible harness assembly (36) as follows:

(a) *Removal.* Remove display logic circuit card assemblies Al (6), A2 (7), and keyboard and control circuit card assembly A3 (8) following procedures described in 3-17a(l).

(b) *Repair.*

1. Cut length of 28 AWG stranded insulated wire long enough to connect termination points of darnaged circuitry. Strip insulation for a length of 1/8 inch at each end of wire.

2. Solder wire to termination using standard shop practices.

3. Tack wire to flexprint at one-inch-intervals in accordance with the following steps.

WARNING

Isopropyl alcohol is flammable and gives off harmful vapors. Use only in well-ventilated area away from open flames and sparks. Avoid prolonged or repeated inhalation of vapors.

4. Clean wire and flexprint tack points using isopropyl alcohol,

5. Applying bonding primer (A4094) to tack points on flexprint. Allow to air dry.

6. Apply adhesive (RTV 156 or 30-079) to tack points on flexprint and wire. Apply sufficient pressure to ensure good bond.

(c) Replacement. Install display logic circuit card assemblies Al (6) and A2 (7) and keyboard and control circuit card assembly A3 (8) and reassemble control display unit following procedures described in 3-17a(2).

4-18. IMU Maintenance.

a. IMU *Testing.* Testing is performed using PADS test set as described in paragraph 4-11.

b. IMU *Repair.* IMU repair allocated to general support by the MAC consists of replacing the porro prism. Alignment of porro prism after replacement is described in paragraph 4-11. Figure 4-18 is an exploded view of the IMU.

(1) *Porro prism assembly.* Remove and replace porro prism assembly (19, figure 4-18) as follows:

(a) *Removal.*

1. Release two clamping catches (18) securing porro prism cover (15). Remove cover.

NOTE

The tilt of the porro prism assembly must be adjusted to gain access to the screws.

2. Remove three screws (21) and washers (20) securing porror prism *assembly* (19). Remove porro prism assembly.

(b) *Replacement.*

1. Position porro prism assembly (19) against mounting surface, align mounting holes.

2. Install three screws (21) and washers (20) securing porro prism assembly (19). A ply tamper detection compound (7526F) to screw heads.

3. Align IMU following procedures described in paragraph 4-11.

4. Fit porro prism cover (15) to IMU and secure with two clamping catches (18).

4-19. Power Supply Maintenance.

a. *Power Supply Testing.* Testing is performed using the PSTS as described in paragraph 4-13.

b. *Power Supply Repair.* Power supply repair consists of removal and replacement of circuit card assemblies, chassis-mounted ‘components, gaskets, and hardware. Figure 4-19 and 4-20 are exploded views of the power supply and power supply subassembly, respectively. Refer to table 4-23 for circuit card identification.

CAUTION

When removing, replacing, or handling sequence monitor circuit card assembly A5, power inverter assembly A6, or battery charger circuit card assembly A7, do not touch connector pins as damage to the assembly may result. Check that circuit card(s) is transported in conductive bag with CAUTION label identifying its contents as static sensitive device.

Prior to removal of assembly from packaging, operator should discharge static electricity by making arm contact with an earth ground.

(1) *+ 17V converter-regulator circuit card assembly A1.* Remove and replace + 17V converter-regulator circuit card assembly Al (52, figure 4-19, sheet 3) as follows:

(a) *Removal.*

1. Loosen 25 captive screws (43) and washers (44) securing bottom cover (45) and

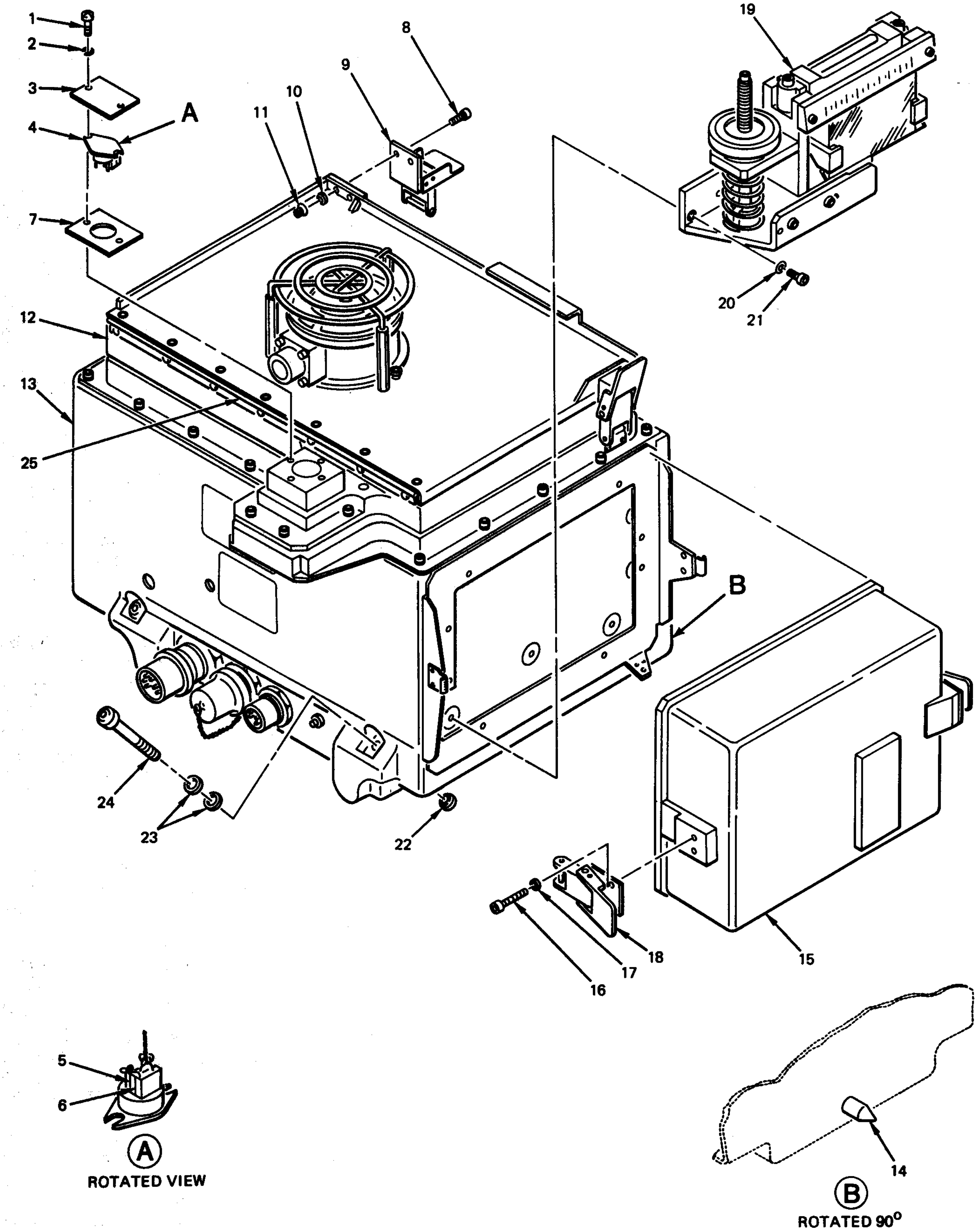


Figure 4-18. IMU Exploded View

Legend for Figure 4-18

1. Screw	14. Guide pin
2. Washer	15. Porro prism cover
3. Cover plate	16. Screw
4. Thermostatic switch S3	17. Washer
5. Capacitor C3	18. Clamping catch
6. Capacitor C4	19. Porro prism
7. Gasket	20. Lockwasher
8. Screw	21. Screw
9. Clamping catch	22. Retainer nut
10. Washer	23. Washer
11. Nut	24. Bolt assembly
12. Upper IMU subassembly	25. IMU cover
13. Lower IMU subassembly	

gasket (46) to chassis (22); remove cover and gasket.

2. Loosen four captive screws (51) securing + 17V converter-regulator circuit card assembly Al (52) to chassis (22).

3. Loosen four screws (53) securing wedgelocks (54) until + 17V converter-regulator circuit card assembly Al (52) is free.

NOTE

It may be necessary to loosen the wedges if they become frozen, This can be done by simply tapping the wedge screws downward until the bottom wedges become loose,

4. Remove + 17V converter-regulator circuit card assembly Al (52) from chassis (22).

(b) *Replacement.*

1. Insert + 17V converter-regulator circuit card assembly Al (52) into slot in chassis (22) and carefully guide it into place.

2. Just before the connectors mate, check that + 17V converter-regulator circuit card assembly Al (52) is free in its guides and its top edge is parallel to the chassis (22) top surface.

3. Seat + 17V conveter-regulator circuit card assembly Al (52) by applying moderate, even pressure at both comers. If card does not readily seat, pull the card out and inspect for bent or broken connector pins.

4. Tighten four captive screws (51) securing card (52) to chassis (22).

5. Ti hten four screws (53) in wedgelocks (54) until wedges are tight against edge of slots.

6. Secure bottom cover (45) and gasket (46) to chassis (22) with 25 captive screws (43) and washers (44). Torque screws to 9 inch-pounds using procedures described in paragraph 3-11.

(2) + *20V converter-regulator circit card assembly A2.* Remove and replace + 20V converter-regulator circuit card assembly A2 (50, figure 4-19, sheet 3) as follows.

(a) *Removal.*

1. Loosen 25 captive screws (43) and washers (43) securing bottom cover (45) and gasket (46) to chassis (22); remove cover and gasket.

2. Loosen four captive screws (49) securing + 20V converter-regulator circuit card assembly A2 (50) to chassis (22).

3. Loosen four screws (48) securing wedgelocks (47) until + 20V converter-regulator circuit card assembly A2 (50) is free.

NOTE

It may be necessary to loosen the wedges if they become frozen. This can be done by simply tapping the wedge screws downward until the bottom wedges become loose.

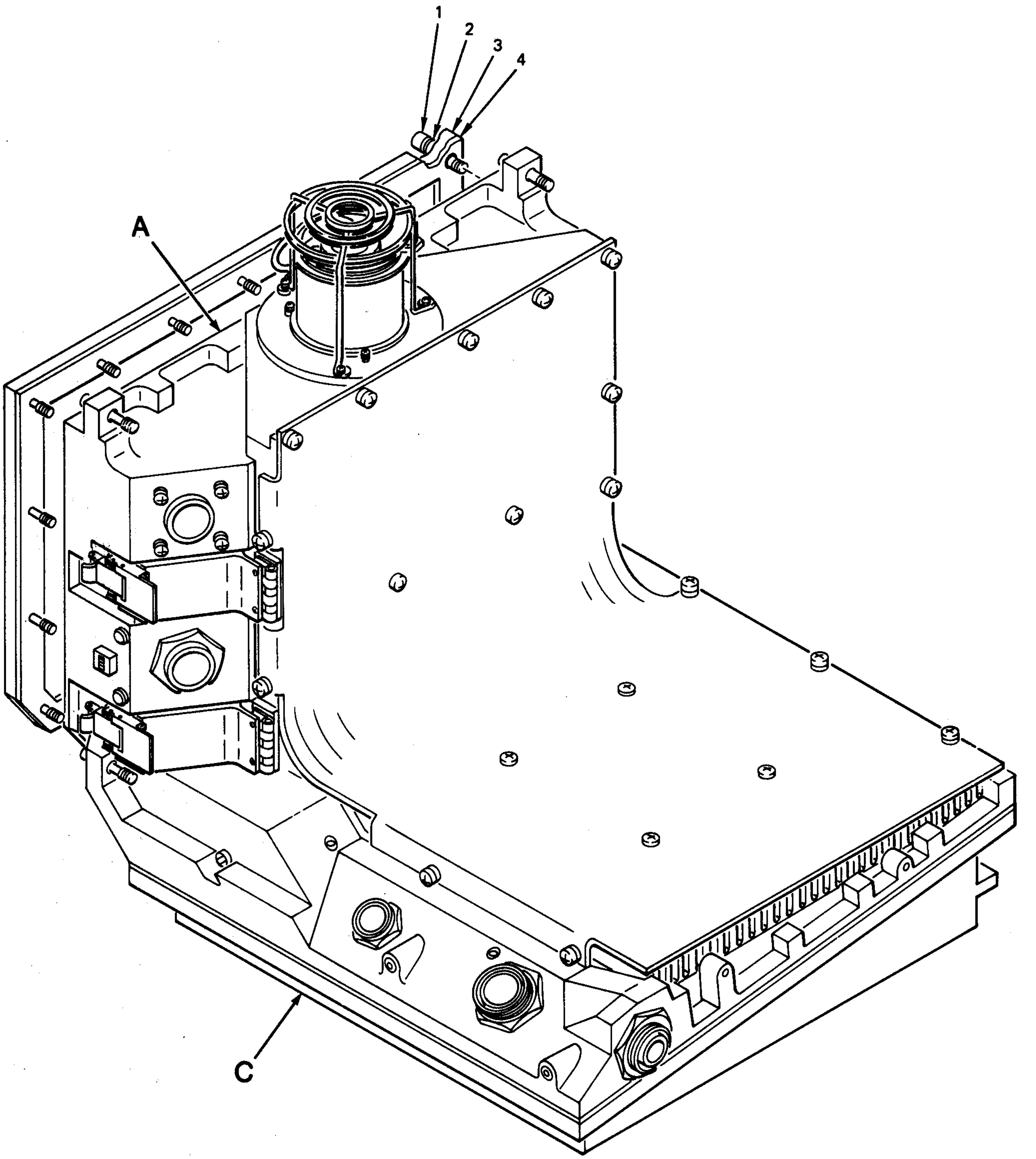


Figure 4-19. Power Supply Exploded View (Sheet 1 of 3)

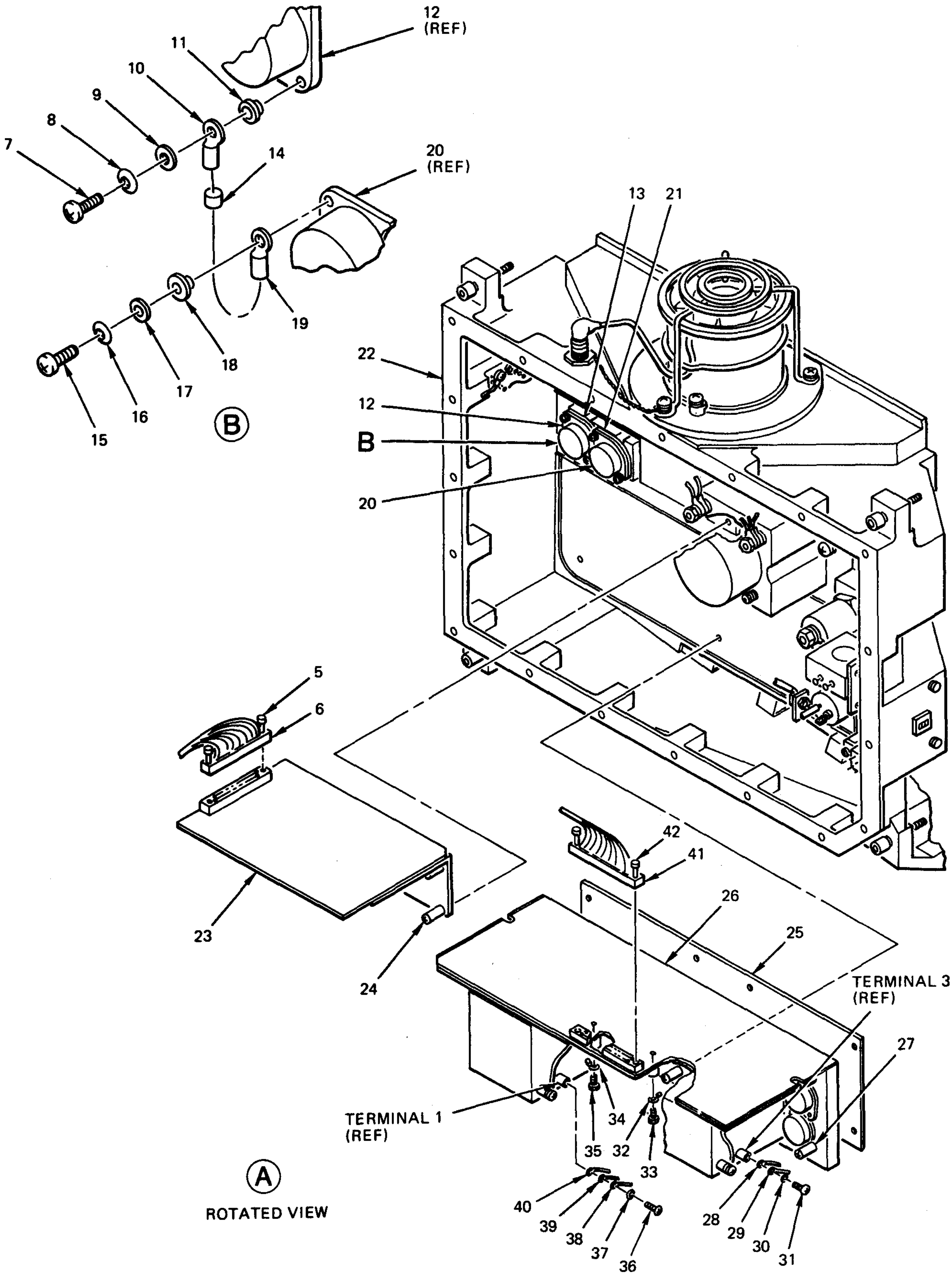


Figure 4-19. Power Supply Exploded View (Sheet 2 of 3)

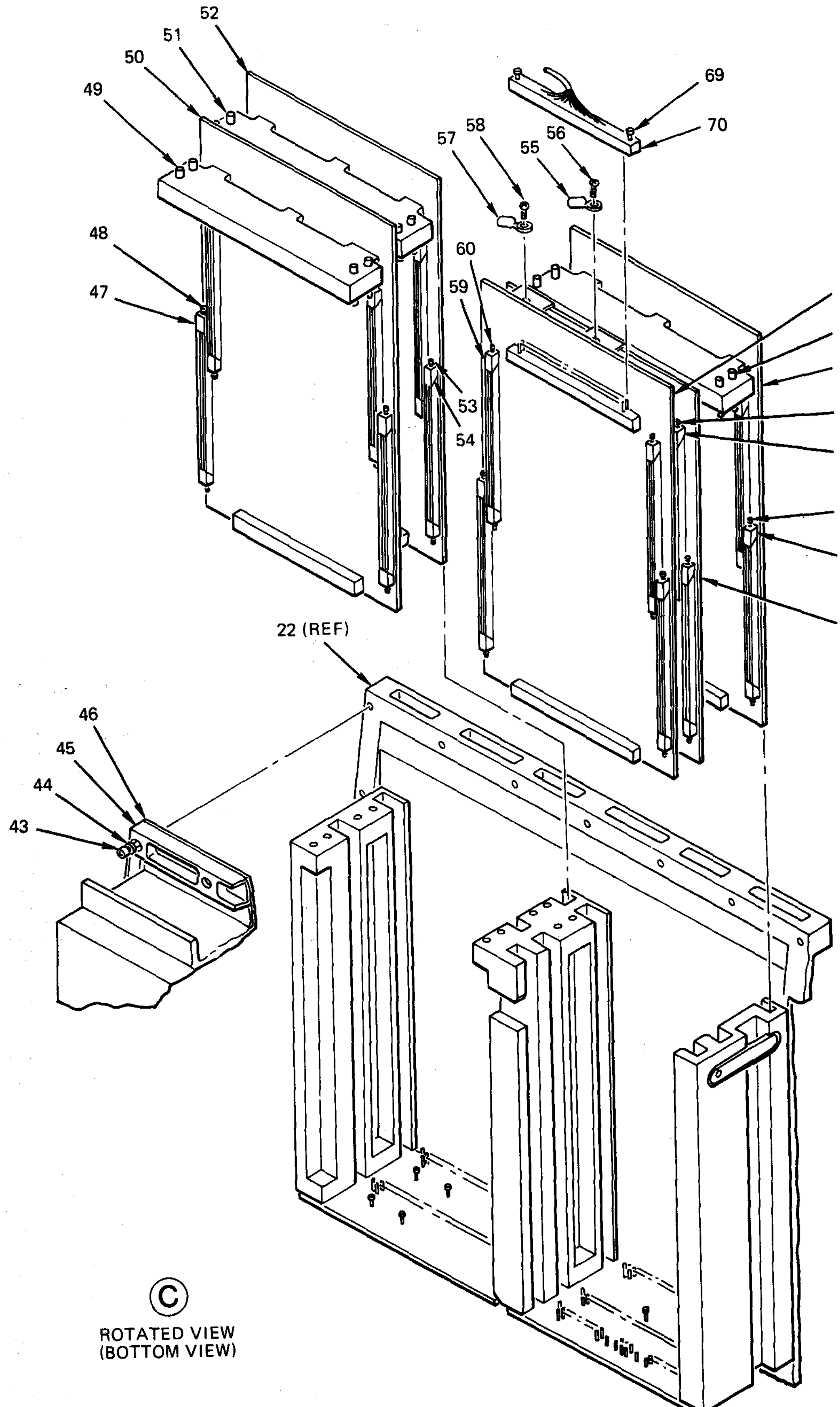


Figure 4-19. Power Supply Exploded View (Sheet 3 of 3)

Legend for Figure 4-19

1. Captive screw
2. Washer
3. Side cover
4. Gasket
5. Jackscrew
6. Connector A7P1
7. Screw
8. Washer
9. Washer
10, Terminal lug
11. Shouldered washer
12. Transistor A7Q6
13. Thermal pad
14. Capacitor A7C3
15. Screw
16. Washer
17. Washer
18. Shouldered washer
19. Terminal lug
20. Transistor A7Q7
21. Thermal pad
22. Chassis
23. Battery charger circuit card assembly A7
24. Captive screw
25. Thermal pad
26. Power inverter assembly A6
27. Captive screw
28. Terminal lug
29. Terminal lug
30. Lockwasher
31. Screw
32. Terminal lug
33. Screw
34. Terminal lug
35. Screw
36. Screw
37. LockWasher
38. Terminal lug
39. Terminal lug
40. Terminal lug
41. Connector A6P1
42. Jackscrew
43. Captive screw
44. Washer
45. Bottom cover
46. Gasket
47. Wedgelock
48. Screw
49. Captive screw
50. +20V converter-regulator circuit card assembly A2
51. Captive screw
52. +17V converter-regulator circuit card assembly A1
53. Screw
54. Wedgelock
55. Terminal lug
56. Screw
57. Terminal lug
58. Screw
59. Wedgelock
60. Screw
61. Sequence monitor circuit card assembly A5
62. Captive screw
63. 28V converter-regulator circuit card assembly A3
64. Screw
65. Wedgelock
66. Screw
67. Wedgelock
68. Filter circuit card assembly A4
69. Jackscrew
70. Connector A5P2

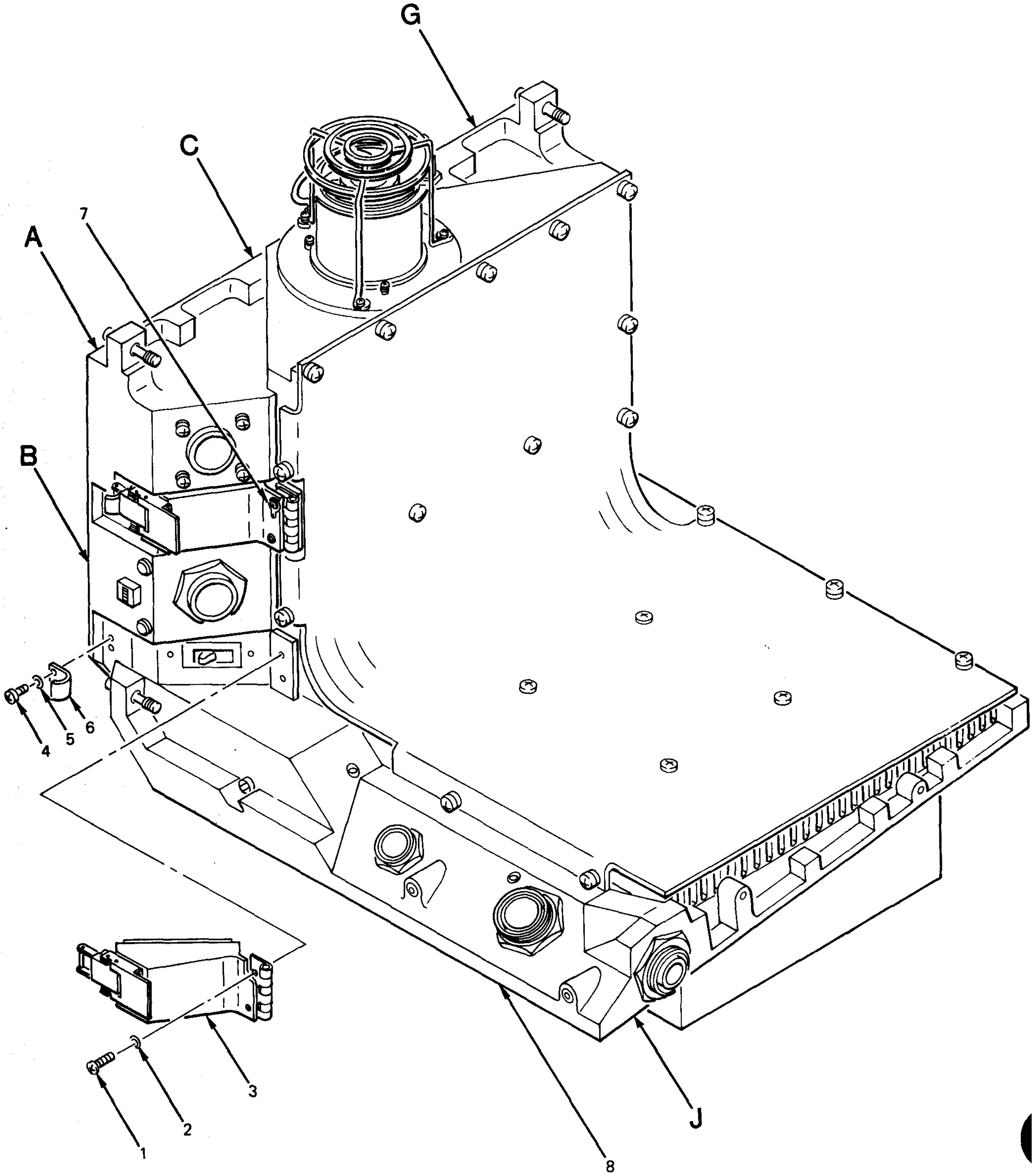


Figure 4-20. Power Supply Subassembly Exploded View (Sheet 1 of 6)

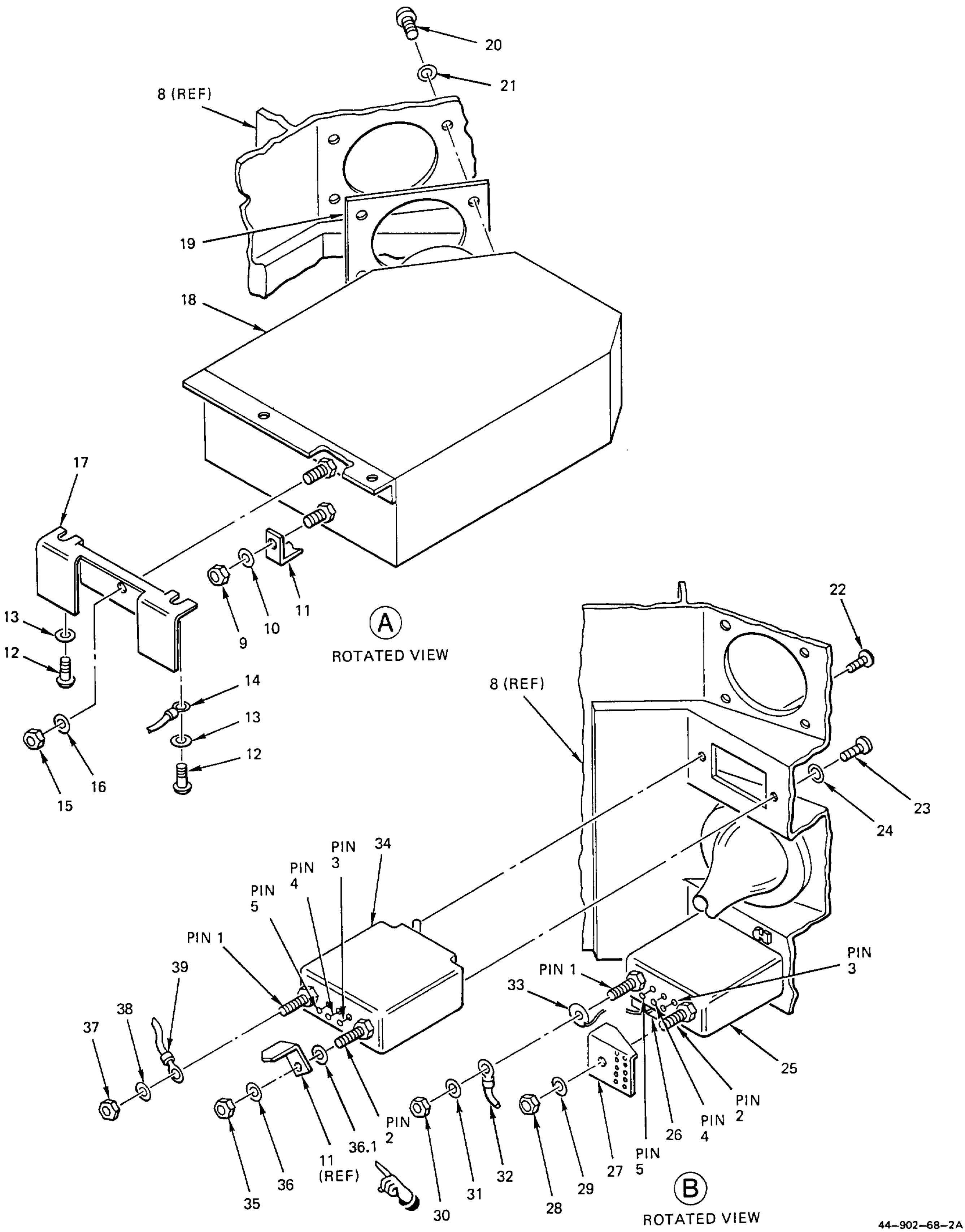


Figure 4-20. Power Supply Subassembly Exploded View (Sheet 2 of 6)

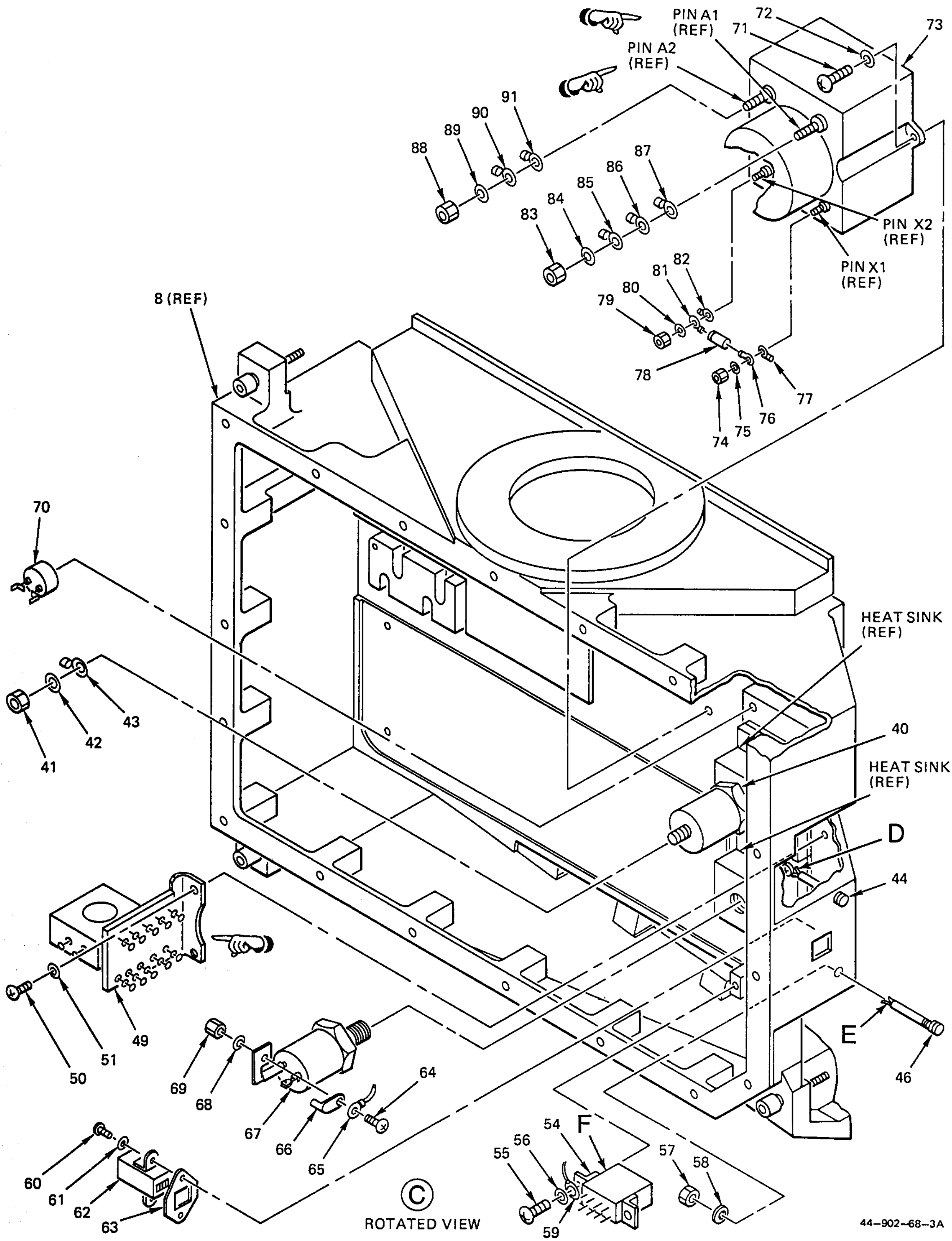
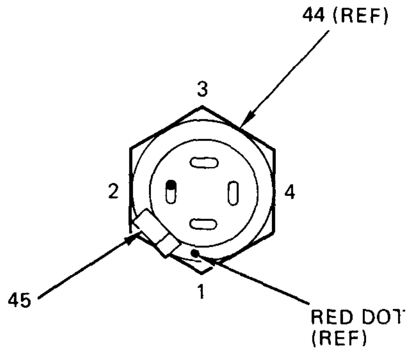
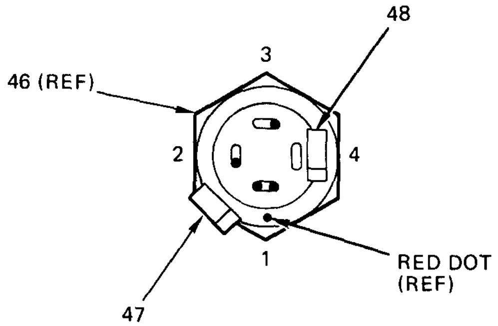


Figure 4-20. Power Supply Subassembly Exploded View (Sheet 3 of 6)



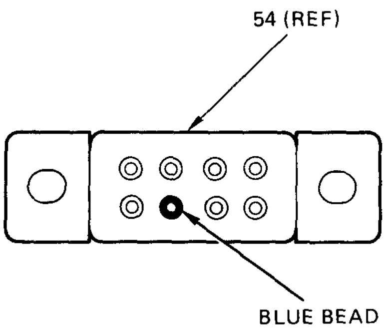
D

ROTATED VIEW



E

ROTATED VIEW



F

ROTATED VIEW

Figure 4-20. Power Supply Subassembly Exploded View (Sheet 4 of 6)

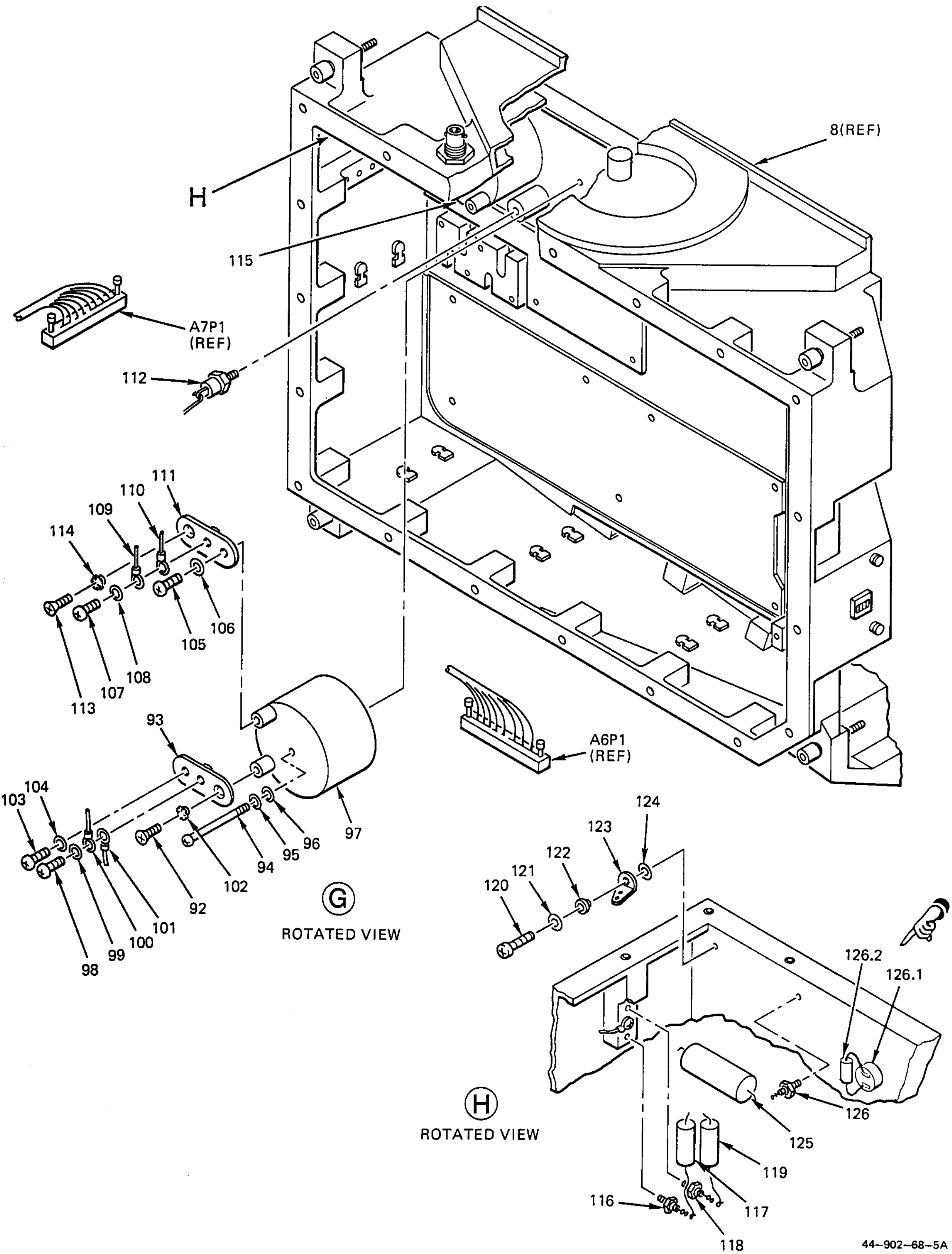


Figure 4-20. Power Supply Subassembly Exploded View (Sheet 5 of 6)

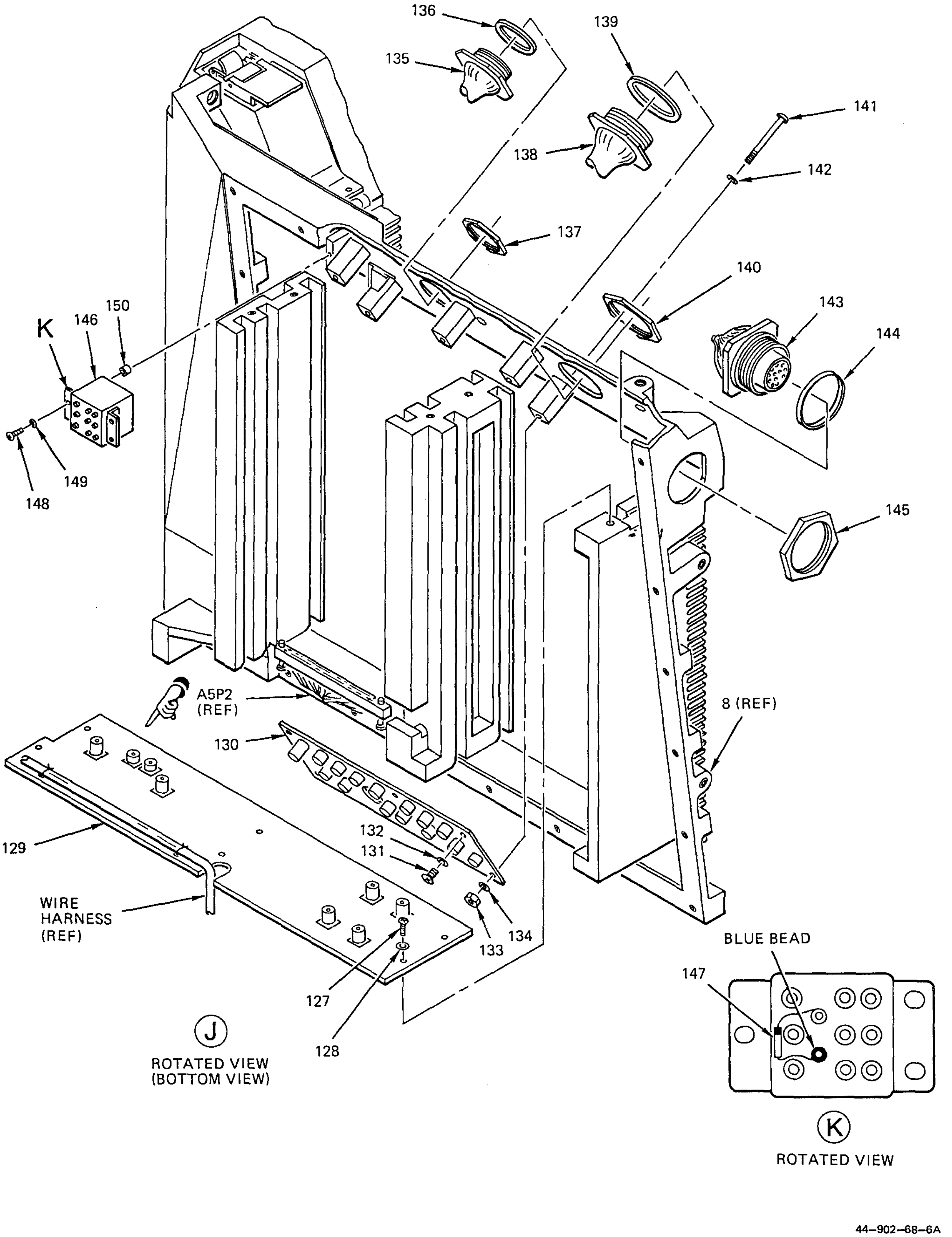


Figure 4-20. Power Supply Subassembly Exploded View (Sheet 6 of 6)

Legend for Figure 4-20

1. Screw
2. Washer
3. Circuit breaker cover
4. Screw
5. Washer
6. Catch strike
7. Terminal lug
8. Chassis
9. Self-locking nut
10. Washer
11. Bus bar W5
12. Screw
13. Washer
14. Terminal lug
15. Self-locking nut
16. Washer
17. Bus bar W2
18. Filter FL1
19. Gasket
20. Screw
21. Washer
22. Screw
23. Screw
24. Washer
25. Circuit breaker CB1
26. Capacitor C4
27. Bus bar W1
28. Self-locking nut
29. Washer
30. Self-locking nut
31. Washer
32. Terminal lug
33. Terminal lug
34. Circuit breaker CB2
35. Self-locking nut
36. Washer
36.1 Washer
37. Self-locking nut
38. Washer
39. Terminal lug
40. Diode CR2
41. Nut
42. Washer
43. Terminal lug
44. Fault indicator DS1
45. Diode CR8
46. Fault indicator DS2
47. Diode CR9
48. Diode CR10
49. Terminal board TB1
50. Screw
51. Washer
52. Deleted
53. Deleted
54. Relay K2
55. Screw
56. Washer
57. Nut
58. Lockwasher
59. Terminal lug
60. Screw
61. Washer
62. Elapsed time indicator M1
63. Gasket
64. Screw
65. Terminal lug
66. Terminal lug
67. Rectifier CR3
68. Washer
69. Nut
70. Thermostatic switch S1
71. Screw
72. Washer
73. Relay K1
74. Nut
75. Washer
76. Terminal lug
77. Terminal lug
78. Diode CR4
79. Nut
80. Washer
81. Terminal lug
82. Terminal lug
83. Self-locking nut
84. Washer
85. Terminal lug
86. Terminal lug
87. Terminal lug
88. Self-locking nut
89. Washer
90. Terminal lug
91. Terminal lug
92. Screw
93. Bus bar W3
94. Screw
95. Washer
96. Washer
97. Reactor L2
98. Screw
99. Washer
100. Terminal lug
101. Terminal lug
102. Countersunk lockwasher
103. Screw
104. Washer
105. Screw
106. Washer
107. Screw
108. Washer
109. Terminal lug
110. Terminal lug
111. Bus bar W4
112. Diode CR5
113. Screw
114. Countersunk lockwasher

Legend for Figure 4-20 – Continued

115. Reactor L1
116. Standoff terminal E37
117. Capacitor C2
118. Standoff terminal E36
119. Capacitor C3
120. Screw
121. Washer
122. Shoulder washer
123. Terminal lug
124. Washer
125. Capacitor Cl
126. Standoff terminal E35
126.1 Thermostatic switch S2
126.2 Capacitor C5
127. Screw
128. Washer
129. Interconnection assembly A8
130. Output falter circuit card assembly A9
131. Screw
132. Washer
133. Nut
134. Washer
135. Connector 3J5
136. Ring
137. Nut
138. Connector 3Jl
139. Ring
140. Nut
141. Screw
142. O-ring
143. Connector 3J3
144. Ring
145. Nut
146. Relay K3
147. Diode CR7
148. Screw
149. Washer
150. Spacer

Table 4–23. Power Supply Circuit Card Assembly Identification

Figure no. and index no.	Card part no.	Card nomenclature and reference designator	Part no. location on card
4-19, 52 (sheet 3)	880665-11 (preferred) 880665-5, 880665-6, 880665-7, 880665-8, 880665-9, and 880665-10 (alternates)	+17V converter–regulator circuit card assembly A1	Near connector and side edge on component side
4-19, 50 (sheet 3)	880660-10 (preferred) 880660-5, 880660-6, 880660-7, 880660-8, and 880660-9 (alternates)	+20V converter–regulator circuit card assembly A2	Near connector and side edge on component side
4-19, 63 (sheet 3)	880670-14 (preferred) 880670-13 and 880670-12 (alternate)	28V converter-regulator circuit card assembly A3	Near connector and side edge on component side
4-19, 68 (sheet 3)	880640-1	Filter circuit card assembly A4	Near side (opposite connector end) on component side
4-19, 61 (sheet 3)	8806904 (preferred) 880645-15, 880645-16, 880695-2, 880695-3, and 880690-3 (alternates)	Sequence monitor circuit card assembly A5	Near top edge on component side
4-19, 26 (sheet 2)	880654-10 (preferred) 880654-7, 880654-8, and 880654-9 (alternates)	Power inverter assembly A6	On board with cutout near cutout
4-19, 23 (sheet 2)	880592-1 (preferred) 880650-7, 880650-8, 880688-1, and 880688-2 (alternates)	Battery charger circuit care assembly A7	On large board near corner that is cut at an angle
4-20, 129 (sheet 6)	880635-4	Interconnection assembly A8	Along side near cutout
4-20, 130 (sheet 6)	880675-3	Output filter circuit card assembly A9	Near one comer opposite side of capacitor C22 on component side

4. Remove + 20V converter-regulator circuit card assembly A2 (50) from chassis (22).

(b) ***Replacement.***

1. Insert + 20V converter-regulator circuit card assembly A2 (50) into slot in chassis *(22)* and carefully guide it into place.
2. Just before the connectors mate, check that the + 20V converter- regulator circuit card assembly A2 (50) is free in its guides and its top edge is parallel to the chassis (22) top surface.
3. Seat + 20V converter-regulator circuit card assembly A2 (50) by applying moderate, even pressure at both corners. If card does not readily seat, pull the card out and inspect for bent or broken connector pins.
4. Tighten four captive screws (49) securing card (50) to chassis (22).
5. Ti hten four screws (48) in wedgelocks (47) until wedges are tight against edge of slots.
6. Secure bottom cover (45) and gasket (46) to chassis (22) with 25 screw; (43) and washers (44). Torque screws to 9 inch-pounds using procedures described in paragraph 3-11.

(3) ***28V converter-regulator circuit card assembly A3.*** Remove and replace 28V converter-regulator circuit card assembly A3 (63, figure 4-19, sheet 3) as follows:

(a) ***Removal.***

1. Loosen 25 captive screws (43) and washers (44) securing bottom cover (45) and gasket (46) to chassis (22); remove cover and gasket.
2. Remove two screws (56 and 58) securing terminal lugs (55 and 57) to filter circuit card assembly A4 (68); tag and remove terminal lugs.
3. Loosen four captive screws (62) securing 28V converter-regulator circuit card assembly A3 (63) to chassis (22).
4. Loosen four screws (66) securing wedgelocks (67) until 28V converter-regulator circuit card assembly A3 (63) is free.

NOTE

It maybe necessary to loosen the wedges if they become frozen. This can be done by simply tapping the wedge screws downward until the bottom wedges become loose.

5. Remove 28V converter-regulator circuit card assembly A3 (63) from chassis (22).

(b) ***Replacement.***

1. Insert 28V converter-regulator circuit card assembly A3 (63) into slot in chassis (22) and carefully guide it into place.
2. Just before the connectors mate, check that the 28V converter-regulator circuit card assembly A3 is free in its guides and its top edge is parallel to the chassis (22) top surface.
3. Seat 28V converter-regulator circuit card assembly A3 (63) by applying moderate, even pressure at both corners. If card does not readily seat, pull the card out and inspect for bent or broken connector pins.
4. Tighten four captive screws (62) securing card (63) to chassis (22).
5. Tighten four screws (66) in wedgelocks (67) until wedges are tight against edge of slots.
6. Reinstall two terminal lugs (55 and 57) to filter circuit card assembly A4 (68) with screws (56 and 58).
7. Secure bottom cover (45) and gasket (46) to chassis (22) with 25 captive screws (43) and washers (44). Torque screws to 9 inch-pounds using procedures described in paragraph 3-11.

(4) ***Filter circuit card assemblv A4.*** Remove and replace filter circuit card assembly A4 (68, figure 4-19, sheet 3) as follows:

(a) ***Removal.***

1. Loosen *25* captive screws (43) and washers (44) securing bottom cover (45) and gasket (46) to chassis (22); remove cover and gasket.
2. Remove two screws (56 and 58) securing terminal lugs (55 and 57) to filter circuit card assembly A4 (68); tag and remove terminal lugs.
3. Loosen four screws (64) securing wedgelocks (65) until filter circuit card assembly A4 (68) is free.

NOTE

It may be necessary to loosen the wedges if they become frozen. This can be done by simply tapping the wedge screws

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downward until the bottom wedges become loose.

4. Remove filter circuit card assembly A4 (68) from chassis (22).

(b) ***Replacement.***

1. Insert filter circuit card assembly A4 *(68)* into slot in chassis (22) and carefully guide it into place.
2. Just before the connectors mate, check that the filter circuit card assembly A4 (68) is free in its guides and its top edge is parallel to the chassis (22) top surface.
3. Seat filter circuit card assembly A4 (68) by applying moderate, even pressure at both comers. If card does not readily seat, pull the card out and inspect for bent or broken connector pins.
4. Ti hten four screws (64) in wedgelocks (65) until wedges are tight against edge of slots.
5. Reinstall two terminal lugs (55 and 57) to filter circuit card assembly A4 (68) with screws (56 and 58).
6. Secure bottom cover (45) and gasket (46) to chassis (22) with 25 captive screws (43) and washers (44). Torque screws to 9 inch-pounds using procedures described in paragraph 3-11.

(5) Sequence monitor card assembly AS. Remove and replace sequence monitor circuit card assembly A5 (61, figure 4-19, sheet 3) as follows:

(a) ***Removal.***

1. Loosen 25 captive screws (43) and washers (44) securing bottom cover (45) and gasket (46) to chassis (22); remove cover and gasket.
2. Loosen two jackscrews (69) securing connector A5P2 (70) to sequence monitor circuit card assembly A5 (61) connector; disconnect connectors.
3. Loosen four screws (60) securing wedgelocks (59) until sequence monitor circuit card assembly A5 (61) is free.

NOTE

It may be necessary to loosen the wedges if they become frozen. This can be done by simply tapping the wedge screws downward until the bottom wedges become loose.

4. Remove sequence monitor circuit card assembly AS (61) from chassis (22).

(b) ***Replacement.***

1. Insert sequence monitor circuit card assembly A5 (61) into slot in chassis (22) and carefully guide it into place.
2. Just before the connectors mate, check that se uence monitor circuit card assembly A5 61) is free in its guides and its top edge is parallel to the chassis (22) top surface.
3. Seat sequence monitor circuit card assembly A5 (61) by applying moderate, even pressure at both corners. If card does not readily seat, pull the card out and inspect for bent or broken connector pins.
4. Ti hten four screws (60) in wedgelocks (59) until wedges are tight against edge of slots.
5. Mate connector A5P2 (70) with sequence monitor circuit card assembly A5 (61) connector and secure with two jackscrews (69).
6. Secure bottom cover (45) and gasket (46) to chassis (22) with 25 captive screws (43) and washers (44). Torque screws to 9 inch-pounds using procedures described in paragraph 3-11.

(6) ***Power inverter assembly A6.*** Remove and replace power inverter assembly A6 (26, figure 4-19, sheet 2) as follows:

(a) ***Removal.***

NOTE

Tag all wires before removal,

1. Loosen 19 captive screws (1, figure 4-19, sheet 1) and washers (2) securing side cover (3) and gasket (4) to chassis (22, figure 4-19, sheet 2); remove cover and gasket.
2. Loosen two jackscrews (42) securing connector A6P1 (41) to power inverter assembly A6 (26) connector; disconnect connectors.
3. Remove screw (31) and lockwasher (30) securing terminal lugs (28 and 29) to power inverter assembly A6 (26); remove terminal lugs.
4. Remove screws (33) securing terminal lug (32) to power inverter assembly A6 (26); remove terminal lug.
5. Remove screw (35) securing terminal lug (34) to power inverter assembly A6 (26); remove terminal lug.

6. Remove screw (36) and lockwasher (37) securing terminal lugs (38, 39 and 40) to power inverter assembly A6 (26); remove terminal lugs.

7. Loosen seven captive screws (27) securing power inverter assembly (26) and thermal pad (25) to chassis (22); remove power inverter assembly and thermal pad.

(b) ***Replacement.***

1. Install power inverter assembly A6 (26) and thermal pad (25) into chassis (22) and secure with seven captive screws (27).
2. Secure terminal lugs (38, 39, and 40) to power inverter assembly A6 (26) with screw (36) and lockwasher (37).
3. Secure terminal lug (34) to power inverter assembly A6 (26) with screw (35).
4. Secure terminal lug (32) to power inverter assembly A6 (26) with screw (33),
5. Secure terminal lugs (28 and 29) to power inverter assembly A6 (26) with screw (31) and lockwasher (30).
6. Mate connector A6P1 (41) with power inverter assembly A6 (26) connector and secure with two jackscrews (42).
7. Secure side cover (3, figure 4-19, sheet 1) and gasket (4) to chassis (22, figure 4-19, sheet 2) with 19 captive screws (1, figure 4-19, sheet 1) and washers (2). Torque screws to 9 inch-pounds using procedures described in paragraph 3-11.

(7) Battery charger circuit card assembly A 7. Remove and replace battery charger circuit card assembly A7 (23, figure 4-19, sheet 2) as follows:

(a) ***Removal.***

1. Loosen 19 captive screws (1, figure 4-19, sheet 1) and washers (2) securing side cover (3) and gasket (4) to chassis (22 figure 4-19, sheet 2); remove cover and gasket.
2. Loosen two jackscrews (42) securing connector A6P1 (41) to power inverter assembly A6 (26) connector; disconnect connectors.
3. Remove two screws (7), four washers (8 and 9), two terminal lugs (10), with one end of capacitor A7C3 (14) connected to one of the terminal lugs, and two shouldered washers (11) securing transistor A7Q6 (12) and thermal pad (13) to chassis (22); remove transistor A7Q6 and thermal pad (13) to chassis (22); remove transistor A7Q6 and thermal pad. Do not disconnect wires from transistor, Allow transistor to hang down with wires connected to battery charger circuit card assembly A7 *(23).*
4. Remove two screws (15), four washers (16 and 17), two shouldered washers (18), and two terminal lugs (19), with other end of capacitor A7C3 (14) connected to one of the terminal lugs, securing transistor A7Q7 (20) and thermal pad (21) to chassis *(22);* remove transistor, capacitor C3, and thermal pad. Do not disconnect wires from transistor. Allow transistor to hang down with wires connected to battery charger circuit card assembly A7 (23).
5. Loosen four captive screws (24) securing battery charger circuit card assembly A7 (23) to chassis (22). Pull battery charger circuit card assembly A7 and transistors far enough out of chassis to gain access to jackscrews (5) on connector A7P1 (6).
6. Loosen two jackscrews (5) securing connector A7P1 (6) to battery charger circuit card assembly A7 (23) connector; disconnect connectors,
7. Remove battery charger circuit card assembly A7 (23) ‘from chassis (22).

(b) ***Replacement.***

1. Slide battery charger circuit card assembly A7 (23) part way into chassis (22) and mate connector A7P1 (6) with battery charger circuit card assembly A7 connector and secure with two jackscrews (5).
2. Secure battery charger circuit card assembly A7 (23) to chassis (22) with four captive screws (24).

CAUTION

When installing transistors A7Q6 and A7Q7, make sure they are isolated from the chassis by centering on the shouldered washer. Check with ohmmeter to be sure.

3. Secure transistor A7Q7 (20) and thermal ad (21) to chassis (22) with two screws (15), four washers (16 and 17), two shouldered washers (18), and two terminal lugs (19), with one end of capacitor A7C3 (14) attached to one of the terminal lugs.
4. Secure transistor A7Q6 (12) and thermal ad (13) to chassis (22) with two screws (7), four washers (8 and 9), two terminal lugs (10), with other end of capacitor

A7C3 (14) attached to one of the terminal lugs, and shouldered washer (11).

5. Mate connector A6P1 (41) with power inverter assembly A6 (26) connector and secure with two jackscrews (42).

6. Secure side cover (3) and gasket (4) to chassis (22) with 19 captive screws (1) and washers (2). Torque screws to 9 inch-pounds using procedures described in paragraph 3-11.

(8) ***Interconnect and output jilter wiring harness.*** The interconnect and output filter wiring harness consists of interconnection assembly A8 (129, figure 4-20, sheet 6), output filter circuit card assembly A9 (130), connectors (135, 138, and 143), and relay (146). Remove and replace interconnect and output filter wiring harness as follows:

(a) ***Removal.***

1. Loosen 25 captive screws (43, figure 4-19, sheet 3) and washers (44) securing bottom cover (45) and gasket (46) to chassis (22); remove cover and gasket.

2. Remove + 17V converter-regulator circuit card assembly Al (52) in accordance with paragraphs 4-19b(l)(a)2 thru 4-19b(l)(a)4.

3. Remove + 20V converter-regulator circuit card assembly A2 (50) in accordance with paragaphs 4-19b(2)(a)2 thru 4-19b(2)(a)4.

4. Remove 28V converter-regulator circuit card assembly A3 (63) in accordance with paragraph 4-19b(3)(a)2 thru 4-19b(3)(a)5.

5. Remove filter circuit card assembly A4 (68) in accordance with paragraphs 4-19b(4)(a)2 thru 4-19b(4)(a)4.

6. Remove sequence monitor circuit card assembly A5 (61) in accordance with paragraph 4-19b(5)(a)2 and 4-19b(5)(a)4.

7. Remove nut (145, figure 4-20, sheet 6) securing ring (144) and connector 3J3 (143) to chassis (8); remove connector and ring.

8. Remove three screws (131) and washers (132) securing output filter circuit card assembly A9 (130) to chassis (8).

9. Remove two nuts (133), two washers (134), two O-rings (142), and two screws (14 1) securin output filter circuit card assembly A9 (130) to chassis (8). Carefully lift card away from chassis to gain access to nuts (137 and 140).

10. Remove nut (140) securing rin (139) and connector 3J1 (138) to chassis 8); remove ring and connector.

11. Remove nut (137) securing rin (136) and connector 3J5 (135) to chassis 8); remove ring and connector.

12. Remove three screws (148), washers (149), and spacers (150) securing relay K3 (146) to chassis (8); remove relay.

13. Release wire harness from interconnection assembly A8 (129).

14. Remove six screws (127) and washers (128) securing interconnection assembly A8 (129) to chassis (8). Carefully remove interconnect and output filter wiring harness.

(b) ***Replacement.***

1. Carefully install interconnect and output filter wiring harness on chassis (8) and route connectors and relay to their respective mounting positions on the chassis.

2, Secure relay K3 (146) to chassis (8) with three screws (148); washers (149), and spacers (150).

3. Secure interconnection assembly A8 (129) to chassis (8) with six screws (127) and washers (128).

NOTE

After installation of connectors 3J5, 3J1, and 3J3, the resistance between chassis and connector must not exceed 0.005 ohm.

4. Secure connector 3J5 (135) and ring (136) with nut (137).

5. Secure connector 3J1 (18) and ring (139) with nut (140).

6. Secure connector 3J3 (143) and ring (144) with nut (145).

7. Attach wire harness to interconnection assembly A8 (129).

8. Secure output filter circuit card assembly A9 (130) to chassis (8) with three screws (131), three washers (132), two screws (141), two washers (134), two O-rngs (142), and two nuts (133).

9. Install + 17V converter-regulator circuit card assembly Al (52, figure 4-19, sheet 3) in accordance with paragraphs 4-19b(l)(b)l thru 4-19b(1)(b)5.

10. Install + 10V converter-regulator circuit card assembly A2 (50) in accordance with paragraphs 4-19b(2)(b)l thru 4-19b(2)(b)5.

11. Install 28V converter-regulator circuit card assembly A3 (63) in accordance with paragraphs 4-19b(3)(b)l thru 4-19b(3)(b)6.

12. Install filter circuit card assembly A4 (68) in accordance with paragraphs 4-19b(4)(b)l thru 4-19b(4)(b)5.

13. Install sequence monitor circuit card assembly A5 (61) in accordance with paragaphs 4-19b(5)(b)l thru 4-19b(5)(b)5.

14. Secure bottom cover (45) and gasket (46) to chassis (22) with 25 screws (43) and washers (44). Torque screws to 9 inch-pounds using procedures described in paragraph 3-11.

(9) ***Chassis-mounted component removal and replacement.*** The following procedures describe removing and replacing of chassis-mounted components. Some components can be replaced using standard shop practices and are not covered here. When self-locking nuts are removed, replace with new self-locking nuts. Remove side cover (3, figure 4-19, sheet 1) or bottom cover (45, figure 4-19, sheet 3) to gain access to components when applicable. After component is replaced, secure cover and torque screws to *9* inch-pounds using procedures described in paragraph 3-11.

(a) ***Circuit breaker cover removal***

1. Release circuit breaker cover (3, figure 4-20, sheet 1) clamping catch from strike (6).

NOTE

When removing other circuit breaker cover, also remove terminal lug (7).

2. Remove two screws (1) and washers (2) securing circuit breaker cover (3) to chassis (8); remove circuit breaker cover.

(b) ***Circuit breaker cover replacement.***

1. Inspect circuit breaker cover (3) gasket for darnage and replace if required.

NOTE

When replacing other circuit breaker cover, also secure terminal lug (7).

2. Secure circuit breaker cover (3) to chassis (8) with two screws (1) and washers (2).
3. Secure circuit breaker cover (3) clamping catch to strike (6).

(c) ***Circuit breaker CB1 removal.***

1. Remove self-locking nut (28, figure 4-20, sheet 2) end washer (29) securing bus bar W1 (27) to circuit breaker CB1 (25); remove bus bar W 1,
2. Remove self-locking nut (30) and washer (31) securing terminal lugs (32 and 33) to circuit breaker CB1 (25); remove terminal lugs.
3. Remove screw (55) and washer (56) securing terminal lug (59) to relay K2 (54); remove terminal lug.
4. Tag and unsolder wires from terminals on circuit breaker CB1 (25).
5. Open circuit breaker cover and remove two screws (22 and 23) and washer (24) securing circuit breaker CB 1 (25) to chassis (8); remove circuit breaker CB1.
6. Remove capacitor C4 (26) from circuit breaker CB1 (25).

(d) ***Circuit breaker CB1 replacement.***

NOTE

Discard hardware supplied with new circuit breaker except flat washers,

1. Bond capacitor C4 (26) to circuit breaker (25) using urethane adhesive (960278-4).
2. Secure circuit breaker CB1 (25) to chassis (8) with two screws (22 and 23) and washer (24). Close circuit breaker cover.
3. Secure terminal lugs (32 and 33) to circuit breaker CB1 (25) with self-locking nut (30) and washer (31).
4. Secure bus bar W1 (27) to circuit breaker CB1 (25) with self-locking nut (28) and washer (29).
5. Solder wires to terminals on circuit breaker CB1 (25).
6. Secure terminal lug (59) to relay K2 (54) with screw (55) and washer (56).

(e) Circuit breaker CB2 removal.

1. Remove self-locking nut (35, figure 4-20, sheet 2) and two washers (36 and 36.1) securing bus bar W5 (1 1) to circuit breaker CB2 (34); remove bus bar W5.
2. Remove self-locking nut (37) and washer (38) securing terminal lug (39) to circuit breaker CB2 (34); remove terminal lug.
3. Tag and unsolder wires from terminals on circuit breaker CB2 (34).

4. Open circuit breaker cover and remove two screws (22 and 23) and washer (24) securing circuit breaker to chassis (8); remove circuit breaker CB1.

(f) ***Circuit breaker CB2 replacement.***

NOTE

Discard hardware supplied with new circuit breaker except flat washers.

1, Secure circuit breaker CB2 (34) to chassis (8) with two screws (22 and 23) and washer (24). Close circuit breaker cover.

2. Secure terminal lug (39) to circuit breaker CB2 (34) with self-locking nut (37) and washer (38).

3. Secure bus bar W5 (11) to circuit breaker CB2 (34) with self-locking nut (35) and two washers (36 and 36. 1).

4. Solder wires to terminals on circuit breaker CB2 (34).

(g) ***Filter FL1 removal.***

1. Remove two screws (12, figure 4-20, sheet 2), two washers (13), self-locking nut (15), and washer (16) securing terminal lug (14) and bus bar W2 (17) to filter FL1 (18); remove terminal lug and bus bar W2.

2. Remove self-locking nut (9) and washer (10) securing bus bar W5 (11) to filter FL1 (18); remove bus bar W5.

3. Remove four screws (20) and washers (21) securing filter FL1 (18) and gasket (19) to chassis (8); remove filter FL1 and gasket.

(h) ***Filter FL1 replacement.***

1. Inspect gasket (19) for darnage and replace if required.

2. Secure filter FL1 (18) and gasket (19) to chassis (8) with four screws 20) and washers (21).

3. Secure bus bar W5(11) to filter FL1 (18) with self-locking nut (9) and washer (10).

4. Secure bus bar W2 (17) and terminal lug (14) to filter FL1 (18) with two screws (12), two washers (13), self-locking nut (15), and washer (16).

(i) ***Relay K3 removal.***

1. Remove three screws (148, figure 4-20, sheet 6), washers (149), and spacers (150) securing relay K3 (146) to chassis (8). Pull relay away from chassis far enough to gain access to wires soldered to relay.

2. Tag and unsolder wires and diode CR7 (147) from relay K3 (146); remove relay

(j) ***Relay K3 replacement.***

1. Prepare and solder tagged wires and diode CR7 (147) to relay K3 (146).

2. Secure relay K3 (146) to chassis (8) with three screws (148), washers (149), and spacers (150).

(k) ***Fault indicators DS1 or DS2 removal.***

NOTE

Fault indicators DS1 (44, figure 4-20, sheet 3) and DS2 (46) removal is similar, therefore, only fault indicator DS2 will be covered.

1. Tag and unsolder wires connected to fault indicator DS2 (46).

2. Unsolder diodes CR9 (47, figure 4-20, sheet 4) and CR10 (48) from fault indicator DS2 (46, figure 4-20, sheet 3).

3. Remove nut (57) and lockwasher (58) securing fault indicator DS2 (46) to chassis; remove fault indicator DS2.

(1) ***Fault indicators DS1 and DS2 replacement.***

WARNING

Isopropyl alcohol is flammable and gives off harmful vapors. Use only in well-ventilated area away from open flames and sparks. Avoid prolonged or repeated inhalation of vapors.

NOTE

Fault indicator DS1 (44) and DS2 (46) replacement is similar, therefore, *only* fault indicator DS2 will be covered.

1. Clean shoulder of fault indicator DS2 (46) where it contacts chassis (8) using isopropyl alcohol and clean, lint-free cloth. Clean area on chassis where fault indicator makes contact. Repeat at least three times using a clean cloth each time. When clean, wipe dry using lint-free cloth.

2. Apply adhesive (MIL-A-46146, Type I) 0.010- to 0.030-inch thick on shoulder contact surface of fault indicator DS2 (46); install in chassis (8) within 5 minutes after applying adhesive.

3. Secure fault indicator DS2 (46) with nut (57) and lockwasher (58). Tighten nut sufficiently to hold but not enough to reduce adhesive thickness to less than 0,010 inch.

4. Cure adhesive for 72 hours minimum.

5. Prepare and solder tagged wires and diodes CR9 (47, figure 4-20, sheet 4) and CR10 (48) to fault indicator DS2 (46, figure 4-20, sheet 3)

(m) ***Relay K2 removal.***

1. Remove two screws (55, figure 4-20, sheet 3) and washers (56) securing relay K2 (54) to chassis (8). Pull relay K2 far enough out of chassis to gain access to wires.

2. Tag and unsolder wires connected to relay K2 (54); remove relay K2.

(n) ***Relay K2 replacement.***

L Prepare and solder tagged wires to relay K3.

2. Secure relay K2 (54) to chassis (8) with two screws (55) and washers (56).

(o) ***Elasped time indicator Ml removal.***

L Tag and unsolder wires connected to elapsed time indicator M 1 (62, figure 4-20, sheet 3).

2. Remove two screws (60) and washers (61) securing elapsed time indicator M 1 (62) and gasket (63) to chassis (8); remove elapsed time indicator and gasket.

(p) Elapsed time indicator Ml replacement.

1. Inspect gasket (63) for damage and replace if required.

2. Secure elapsed time indicator Ml (62) and gasket (63) to chassis (8) with two screws (60) and washers (61).

3. Prepare and solder tag ed wires to elapsed time indicator Ml (62).

(q) Diode CR2 removal.

1. Remove nut (41, figure 4-20, sheet 3) and washer (42) securing terminal lug (43) to diode CR2 (40).

2. Using socket wrench, remove diode CR2 (40) from heat sink,

(r) Diode CR2 replacement.

WARNING

Isopropyl alcohol is flammable and gives off harmful vapors. Use only in well-ventilated area away from open flames and sparks. Avoid prolonged or repeated inhalation of vapors.

1. Clean diode CR2 (40) and heat sink mounting surfaces using isopropyl alcohol. Use lint-free cloth to apply alcohol and to wipe parts.

2. Apply sealing compound (MIL-S-22473, Grade C) to diode CR2 (40) threads.

3. Install diode CR2 (40) in heat sink and tighten with socket wrench.

4. Secure terminal lug (43) to diode with nut (41) and washer (42) .

(s) Rectifier CR3 removal.

1. Remove nut (69, figure 4-20, sheet 3), washer (68), and screw (64) securing two terminal lugs (65 and 66) to rectifier CR3 (67); remove terminal lug.

2. Tag and unsolder wires connected to rectifier CR3 (67).

3. Usin socket wrench, remove rectifier CR3 (67) from heat sink.

(t) Rectifier CR3 replacement.

WARNING

Isopropyl alcohol is flammable and gives off harmful vapors. Use only in well ventilated area away from open flames and sparks. Avoid prolonged or repeated inhalation of vapors.

1. Clean rectifier CR3 (67) and heat sink mounting surfaces using isopropyl alcohol. Using lint-free cloth to apply alcohol and to wipe parts.

2. Apply sealing compound (MIL-S-22473, Grade C) to rectifier CR3 (67) threads.

3. Install rectifier CR3 (67) in heat sink and tighten with socket wrench.

4. Prepare and solder tagged wires to rectifier CR3 (67).

5. Secure two terminal lugs (65 and 66) to rectifier CR3 (67) with screw (64), nut (69), and washer (68).

(u) ***Relay K1 removal.***

1. Tag all wires connected to relay K1 (73, figure 4-20, sheet 3).
2. Remove nut (74) and washer (75) securing terminal lug (76) with one end of diode CR4 (78) and terminal lug (77) to relay K1 (73); remove terminal lugs.
3. Remove nut (79) and washer (80) securing terminal lug (81) with other end of diode CR4 (78) and terminal lug (82) to relay K1 (73); remove terminal lugs and diode CR4.
4. Remove nut (88) and washer (89) securing terminal lugs (90 and 91) to relay K 1 (73); remove terminal lugs.
5. Remove nut (83) and washer (84) securing terminal lugs (85, 86, and 87) to relay K1 (73); remove terminal lugs.
6. Remove two screws (7) and washers (72) securing relay K1 (73) to chassis (8); remove relay K1.

(v) ***Relay K1 replacement.***

NOTE

Discard lockwashers supplied with new relay.

1. Secure relay K1 (73) to chassis (8) with two screws (71) and washers (72).

NOTE

In steps 2 thru 5, apply epoxy adhesive (EC 2216 B/A) to nuts.

2. Secure terminal lugs (85, 86, and 87) to relay K1 (73) with nut (83) and washer (84).
3. Secure terminal lugs (90 and 91) to relay K1 (73) with nut (88) and washer (89).
4. Secure terminal lug (81) with one end of diode CR4 (78) and terminal lug (82) to relay K1 (73) with nut (79) and washer (80).
5. Secure terminal lug (76) with other end of diode CR4 (78) and terminal lug (77) with nut (74) and washer (75).

(w) ***Reactors L1 and L2 removal.***

NOTE

Reactors L1 (1 15, figure 4-20, sheet 5) and L2 (97) removal is similar, therefore, only reactor L2 will be covered.

1. Remove screw (98) and washer (99) securing terminal lugs (100 and 101) to bus bar W3 (93); tag wires and remove terminal lugs.
2. Remove screw (107) and washer (108) securing two terminal lugs (109 and 110) to bus bar W4 (111); tag wires and remove terminal lugs.
3. Remove screw (92) and countersunk lockwasher (102) securing bus bar W3 (93) to reactor L2 (97).
4. Loosen screw (103) and move bus bar \V3 (93) away from reactor L2 (97).
5. Remove screw (105) and washer (106) securing bus bar W4 (111) to reactor L2 (97).
6. Loosen screw (113) and move bus bar W 4 (11 1) away from reactor L2 (97).
7. Remove screw (94) and two washers (95 and 96) securing reactor L2 (97) to chassis (8); remove reactor L2.

(x) ***Reactors L1 and L2 replacement.***

NOTE

Reactors L1 (115) and L2 (97) replacement is similar, therefore, only reactor L2 will be covered.

1. Secure reactor L2 (97) to chassis (8) with screw (94) and two washers (95 and 96).
2. Secure bus bar W4 (1 11) to reactor L2 (97) with screw (105) and washer (106).
3. Tighten screw (113).
4. Secure bus bar W3 (93) to reactor L2 (97) with screw (92) and countersunk lockwasher (102).
5. Tighten screw (103).
6. Secure two terminal lugs (109 and 110) to bus bar W4 (1 11) with screw (107) and washer (108).
7. Secure terminal lugs (100 and 101) to bus bar W3 (93) with screw (98) and washer (99).

(y) ***Capacitors Cl, C2, and C3 removal.***

NOTE

Capacitors Cl (125, fi re 4-20, sheet 5), C2 (117), and C3 (119 removal is similar.

1. Tag wires connected to standoff terminals where capacitor is connected that is to be removed.

2. Remove screw (120), washer (121), and shoulder washer (122) securing terminal lug (123) to chassis (8).

3. Unsolder capacitor terminal lug (123); remove capacitor.

(z) ***Capacitors C1, C2, and C3 replacement.***

1. Clean old adhesive from area on chassis (8) where capacitor is to be installed.

2. Prepare and solder capacitor and tagged wires to standoff and terminal lug.

3. Secure terminal lug (123) to chassis (8) with screw (120), washer (121), and shoulder washer (122).

4. Bond capacitor to wail of chassis (8) using urethane adhesive (724-14C).

(aa) Capacitor C5 and thermostatic switch S2 removal.

1. Tag and unsolder wires connected to capacitor C5 (126.2) and thermostatic switch S2 (126.1)0. Remove capacitor.

2. Remove thermostatic switch.

(ab) Capacitor C5 and thermostatic switch S2 replacement.

1. Clean old adhesive from area on chassis (8) where thermostatic switch is to be installed.

2. Bond thermostatic switch to wall of chassis (8) using epoxy adhesive (163-4LVFF).

3. prepare and solder capacitor and tagged wires to thermostatic switch. Place insulation sleeving (MIL-1-22129) on capacitor leads.

4. Bond capacitor to wall of chassis (8) using urethane adhesive (724-14C).

(ac) Connectors 3J1, 3J2, 3J3, 3J5, and J6.

1. When replacing connectors 3J1, 3J2. and 3J3, torque mounting nut 90 to 95 inch-pounds.

2. When replacing connector 3J5, torque mounting nut 85 to 90 inch-pounds.

3. Check electrical bonding between 3J1, 3J2, 3J3, 3J5. and J6 mounting nuts and chassis with an ohmmeter. Resistance should be 5 milliohms maximum.

(10) ***Output filter circuit card assembly A9 repair.*** Repair of the output circuit card assembly A9 (130, figure 4-20, sheet 6) consists of replacing defective components. See figure 4-21 for a parts location diagram and repair output filter circuit card assembly A9 using standard shop practices.

(11) ***Wire harness repair.*** Repair of the wire harness consists of replacing broken or burned wires. Refer to wires listed in table 4-4 and repair wiring using standard shop practices.

4-20. Cable and Connector Repair.

a. ***General.*** Cable repair consists of connector pin replacement, terminal lug replacement, and repair of broken wires by substituting wires. Connectors are repaired by pin replacement.

(1) Connector pins are replaced from the connector rear. Remove the appropriate covers and panels to obtain access to chassis-mounted connectors. The backshell must be disassembled for cable connectors.

(2) After access is obtained, remove the defective pin and cut off the wire. Prepare the wire and crimp a new pin on the wire. If the newly prepared wire is too short, there are usually spare wires in cables. Insert the new pin into the connector and reassemble the equipment.

(3) Procedures for backshell disasssembly/assembly, pin removal and replacement, crimping tool operation, and lug replacement are given below.

CAUTION

Use a strap wrench (figure 4-22) to loosen or tighten backshell components which do not have wrench flats. Use of pliers, pipe wrench, etc., may damage the connectors.

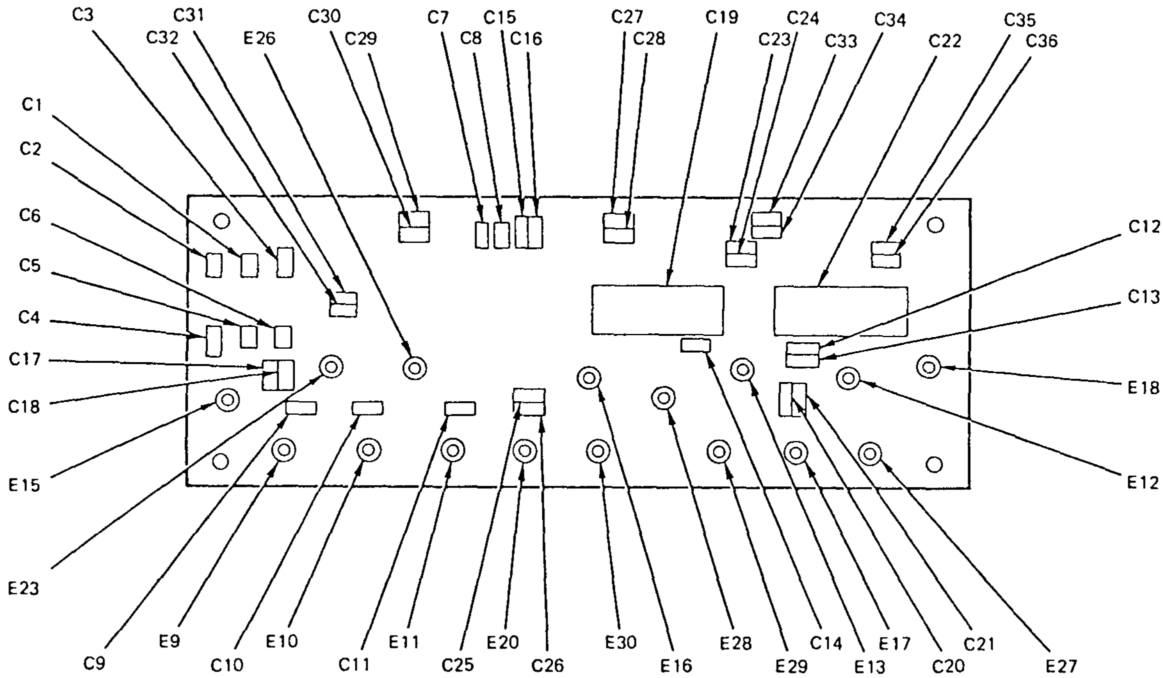


Figure 4-21. Output Filter Circuit Card Assembly A9 Parts Location Diagram

NOTE

To loosen or tighten backshell components. mate the connector to a chassis-mounted connector. Use of the strap wrench is shown in figure 4-22.

b. Backshell Disassembly/Assembly. Several styles of backshells are used with PADS cables and are illustrated in figures 4-23 and 4-24. Cables may differ in minor details such as use of shields, etc. Adapt the procedure as appropriate for the particular connection.

(1) Straight backshell disassembly. See figure 4-23 and disassemble backshell as follows:

(a) Slide cable marker away from connector to allow clearance for disassembly.

(b) Loosen two screws securing cable clamps to cable. Remove any tape, etc., which may prevent ring from sliding.

(c) Unscrew cable clamp ring from backshell. Slide cable clamp ring away from connector.

(d) Carefully pull O-ring, grommet, and environmental ring out of backshell and slide away from connector.

Different shield terminations are used with different backshells. Do not damage shield.

(e) Carefully manipulate the shield and slide the RFI ring away from connector.

(f) Unscrew backshell from adapter ring and slide away from connector.

(2) Straight backshell assembly. See figure 4-23 and assemble backshell as follows:

(a) Screw backshell onto connector.

(b) Slide RFI ring into backshell.

NOTE

Shields originally terminated differently than shown may be regerminated as they were originally or as shown.

There may be ground wires from the connector which must be terminated with the shield.

Different shield terminations are shown for the different RFI sleeves and rings.

The shield should be spot tied around the RFI sleeve or cable as appropriate.

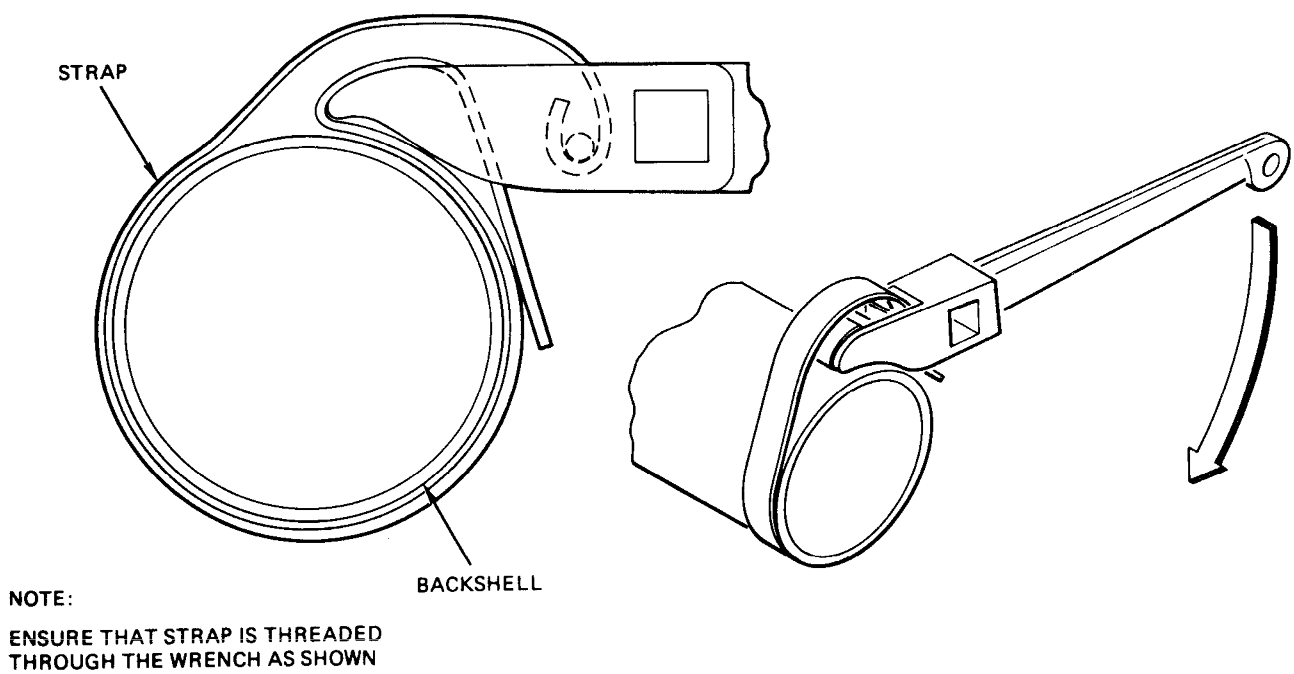


Figure 4-22. Backshell Strap Wrench

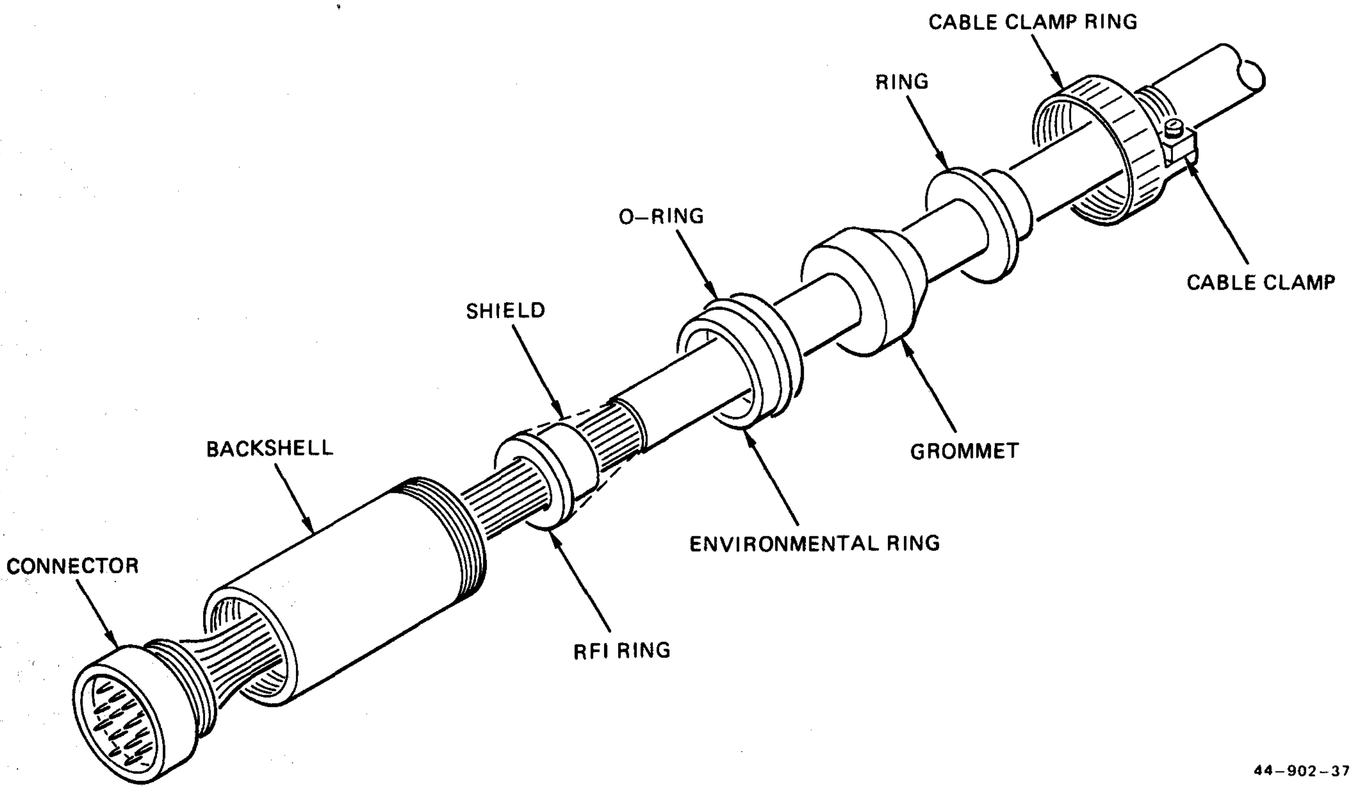


Figure 4-23. Straight Backshell Disassembly/Assembly

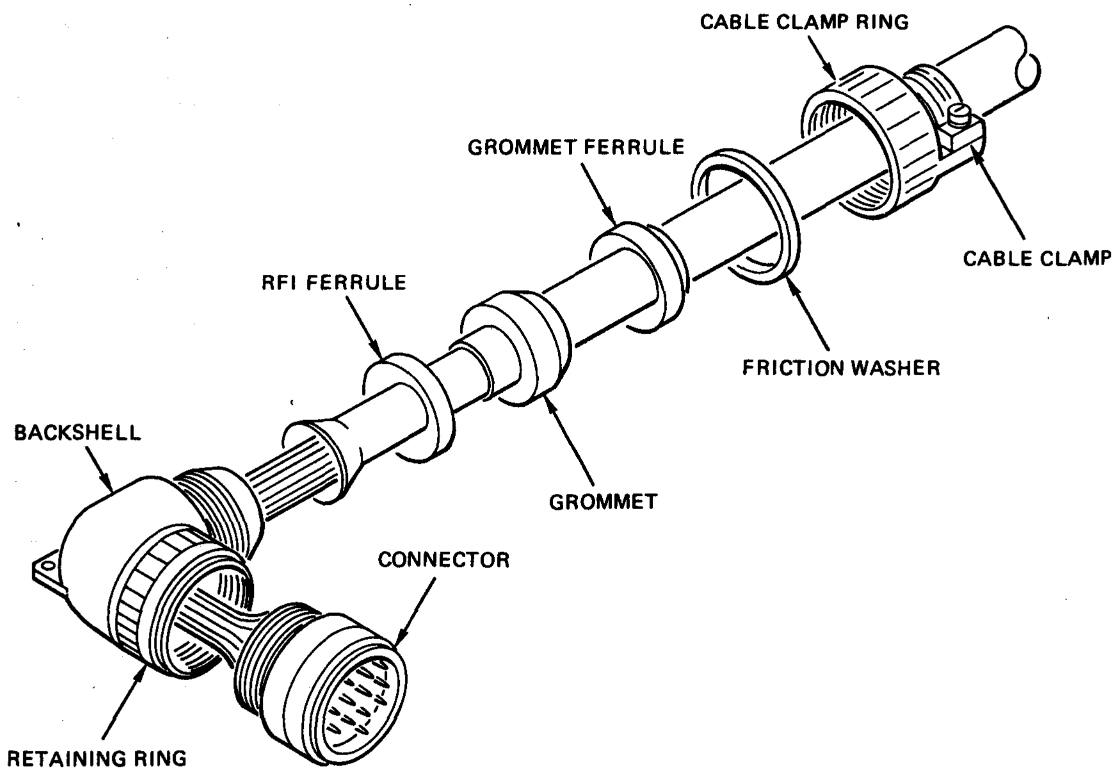


Figure 4-24. Right Angle Backshell Disassembly/Assembly

(c) Flare shield and terminate against RFI ring.

(d) Slide environmental ring, grommet, and grommet ring into end of backshell.

(e) Screw cable clamp ring onto rear of backshell. Tighten enough to compress grommet.

(f) Tighten screws to tighten cable clamp around cable.

(3) *Right angle backshell disassembly.* See figure 4-24 and disassemble backshell as follows:

(a) Slide cable marker away from connector to allow clearance for disassembly.

(b) Loosen two screws securing cable clamps to cable. Remove any tape, etc., which may prevent ring from sliding.

(c) Unscrew cable clamp ring from backshell. Slide cable clamp ring, friction washer, grommet ferrule, grommet, and RFI ferrule away from connector.

(d) Carefully manipulate the shield so backshell can slide over it.

(e) Remove wire securing backshell to retaining ring.

(f) Unscrew retaining ring from connector, taking care to not twist wires. Slide backshell away from connector. The connector rear is now exposed for pin replacement.

(4) *Right angle backshell assembly.* See figure 4-24 and assemble backshell as follows:

WARNING

Isopropyl alcohol is flammable and gives off harmful vapors. Use only in well-ventilated area away from open flames and sparks. Avoid prolonged or repeated inhalation of vapors.

(a) Clean threads of connector and retaining ring with isopropyl alcohol.

CAUTION

Application of excess thread sealant may prevent future disassembly of the connector.

(b) Apply one drop, only, of sealing compond (MIL-S-22473. Grade C) to threads of all connectors except for the threads of connectors on cables 880515-1 (W7) and 880531-1 (W6) which require Grade A sealing compound.

(c) Screw and tighten retaining ring to connector.

(d) Turn backshell to the proper orientation and secure to retaining ring with set screws.

NOTE

Shields originally terminated differently than shown may be reterminated as they were originally or as shown.

There may be ground wires from the connector which must be terminated with the shield.

Some shields may be terminated with a wire and terminal lug which is connected to a cable clamp screw.

(e) Flare shield and terminate against rear of backshell with RFI ferrule.

(f) Slide grommet, grommet ferrule, friction washer, and cable clamp ring against RFI ferrule. Screw cable clamp ring onto adapter.

(g) Tighten screws securing cable clamps to cables.

(h) Secure backshell to retaining ring with safety wire.

c. Pin Removal/Insertion.

(1) *Tools and contact pins.* Refer to table 4-24 for correct size insertion and removal tools. The contact pins and two types of insertion and removal tools are shown in figure 4-25.

CAUTION

Use of wrong size insertion or removal tool may damage the connector beyond repair.

(2) *Removal.*

NOTE

Bent pins must be straightened before removal.

(a) Clip removal tool around wire connected to pin to be removed. See figure 4-26.

(b) Slide tool down wire until it enters the connector grommet.

(c) Carefully work the tool over the contact barrel until it hits the contact shoulder.

(d) Simultaneously pull the tool and wire out the rear of the connector.

Table 4-24. Cable and Connector Tooling and Contact Identification

Cable	W	Conn ref	Connector part no.	Contact part no.	Crimping tool	Positioner	Insertion tool	Extraction tool
880561-2	W1	P1	MS27484T16B35SB	MS27491-22D	MS3198-1	MS3198-6P	MS27495-A22	MS27495-R22
		P2	MS27484T16B35P	MS27493-22D				
880562-2	W2	P1	MS27484T20B35SC	MS27491-22D				
		P2	MS27484T20B35PA	MS27493-22D				
880563-2	W3	P1	MS27484T14B35PA	MS27493-22D				
		P2	MS27484T14B35SC	MS27491-22D				
880564-3	W4	P1	MS27484T14B35S	MS27491-22D				
		P2	MS37484T14B35PB	MS27493-22D	MS3198-1	MS3198-6P	MS27495-A22	MS27495-R22
880565-3	W5	P1	MS27484T22B21S	MS27491-16	MS3191-4	MS3191-9T	MS27495-A16	MS27495-R16
		P2	MS27484T22B21PB	MS27493-16	MS3191-4	MS3191-9T	MS27495-A16	MS27495-R16
		P3	MS3126F8-33S	NOT REPAIR-ABLE				
		P4	MS3126F8-33S	NOT REPAIR-ABLE				
880531-4	W6	P1	MS27467T25B19S	MS27491-12	MS3191-4	MS3191-9T	MS27495-A12	MS27495-R12
880515-3	W7	P1	MS27484T24B24S	MS27493-16,-12			MS27495-A16,A12	MS27495-R16,R12
880532-2	W8	P1	MS27484T24B24S	MS27493-16			MS27495-A16	MS27495-R16
				MS27493-12			MS27495-A12	MS27495-R12
		P2	MS27484T24B24P	MS27493-16			MS27495-A16	MS27495-R16
				MS27493-12			MS27495-A12	MS27495-R12
880533-2	W9	P1	MS27484T24B24S	MS27493-16,-12	MS3191-4	MS3191-9T	MS27495-A16,A12	MS27495-R16,R12
		P2	SG3106E2B-66PSR		THIS END NOT REPAIRABLE			
		1J4	MS27474T14B35PC	MS27493-22D	MS3198-1	MS3198-6P	MS27495-A22	MS27495-R22
		3J1	MS27474T22B21SB	MS27491-16	MS3191-4	MS3191-9T	MS27495-A16	MS27495-R16
		3J2	MS27468T23B19P	MS27493-12	MS3191-4	MS3191-9T	MS27495-A12	MS27495-R12
		3J3	MS27474T14B35SB	MS27491-22D	MS3198-1	MS3198-6P	MS27495-A22	MS27495-R22
		3J5	MS274T14B35SA	MS27491-22D	MS3198-1	MS3198-6P	MS27495-A22	MS27495-R22
		3J6	MS3124E8-33S	NOT REPAIRABLE				

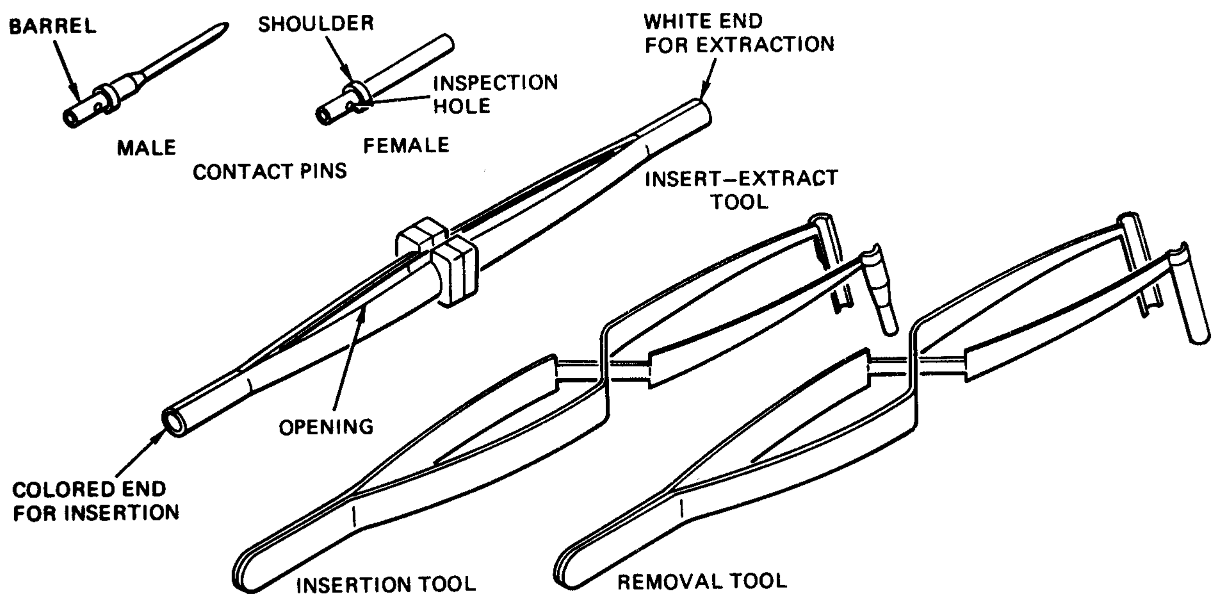


Figure 4-25. Contact Pins and Insertion and Removal Tools

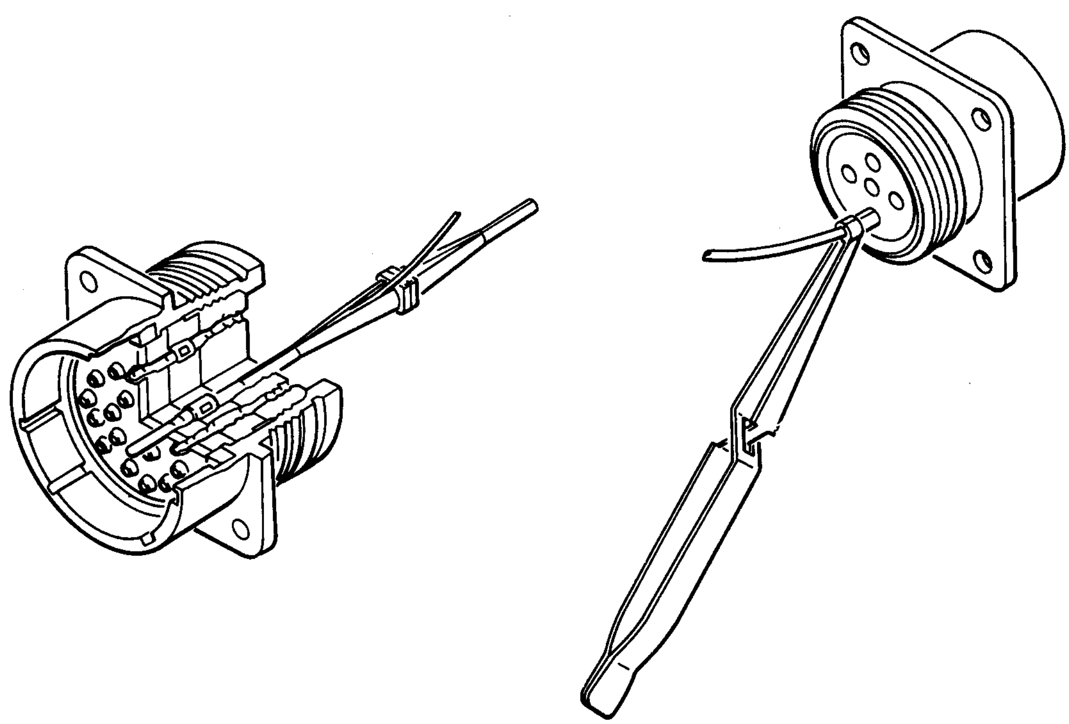


Figure 4-26. Contact Pin Removal

(e) Disengage the tool from the contact pin.

(3) ***Insertion.***

(a) Clip insertion tool around wire and slide tool against contact shoulder. See figure 4-27, view A.

(b) Guide the contact into the correctly numbered grommet hole in the rear face of the insert and feed the contact carefully into the hole, See figure 4-27, view B.

(c) Push the tool straight in at right angles to the grommet surface, until contact is fully seated and you feel the contact retention clip snap into place on the contact with a slight audible click.

CAUTION

Do not attempt to reseat a contact once the insertion tool has been removed. Remove contact and start over again.

(d) Withdraw the tool, keeping it perpendicular to the grommet face. Check the contact by pulling on wire lightly to assure contact is firmly locked,

d. ***Crimping Tool Operation.***

(1) General. Two types of crimping tools and positioners are used depending on the contact pin size. (See figures 4-28 and 4-29,) Refer to table 4-24 for the correct contact size, crimping tool, and positioner.

(2) ***Crimping tool MS3198-1 and positioner MS3198-6P assembly.***

NOTE

The tool handles must be fully opened when inserting the positioner, and when changing the selector positioner.

(a) To install the positioner, place positioner in bayonet socket at the back of the tool.

(b) Push positioner in and rotate 90 degrees clockwise until locked in position.

(3) ***Crimping tool MS3198-4 and positioner MS3191-9T assembly.***

NOTE

The tool handle must be fully opened when inserting the positioner, and when changing the selector position.

(a) To install the positioner, press the trigger to release turret to the indexing position,

(b) Position the positioner over the retaining ring on the back of the tool, Make certain the positioner is seated on the tool; then secure the 9/64-inch socket head screws with a sockethead screw key. Turret should now index easily without binding.

(c) Press trigger and spring-loaded turret will snap out to indexing position.

(d) The turret has three posiitons which are color coded and marked with the applicable contact size. Rotate the turret until the correct position is lined up with the index mark on the positioner.

(e) Push the turret into the positioner until it snaps into the locked position.

(4) ***Crimping.*** See figure 4-30 and perform crimping operation as follows:

(a) Tool must be in open position. Close handles to trip ratchet and then release pressure.

(b) Remove safety clip wire from selector control.

(c) Turn selector control in complete revolutions until correct selector number is visible in the selector number window.

(d) Tool is now ready for use. Replace safety clip wire.

(e) Insert the stripped wire into the contact until end of wire can be seen through the inspection hole. Turn the tool around so the front is facing you then insert wire and contact through the indentor opening until it bottoms in the positioner.

(f) Squeeze handles together until the positive stop is reached. Tool will then release the return to fully open position. Remove crimped contact and wire. Make sure the wire strands are visible through the inspection hole in the contact.

e. ***Lug Replacement. Large*** terminal lugs, used on the ends of power cables, etc., ma be replaced using crimping tool MY28-4 (figure 4-31 and the following procedure.

(1) Remove any insulating tubing from terminal and use hacksaw to cut off old lug at the point where cable just enters lug barrel.

(2) Strip cable insulation to the depth of the lug barrel. Clean cable as required. See figure 4-32.

(3) See figure 4-31 and adjust crimping tool as follows:

(a) Loosen nest die lock screw.

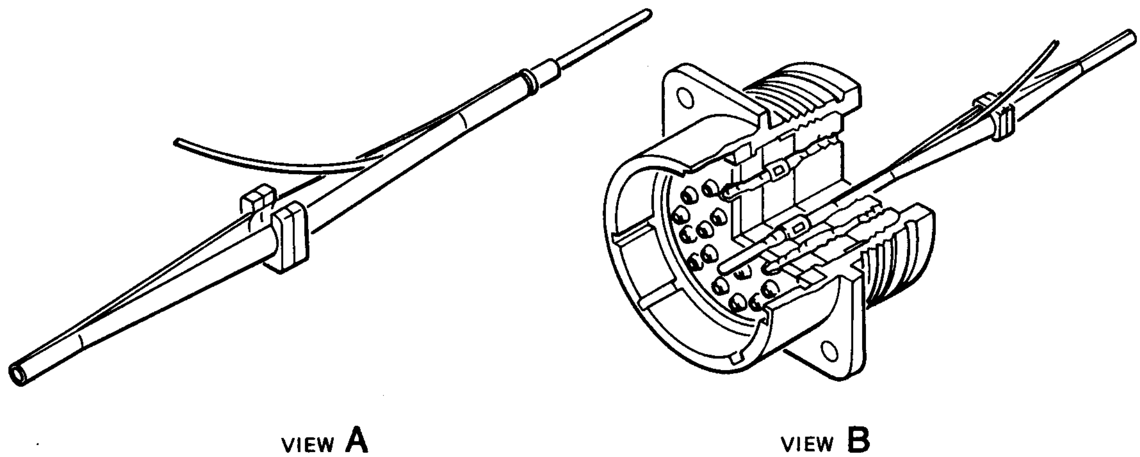


Figure 4-27. Contact-Pin Insertion-Tool Loading

(b) Turn knurled screw until index line on nest die is aligned with proper cable size on cable scale.

(c) Lock nest die by tightening nest die lock screw.

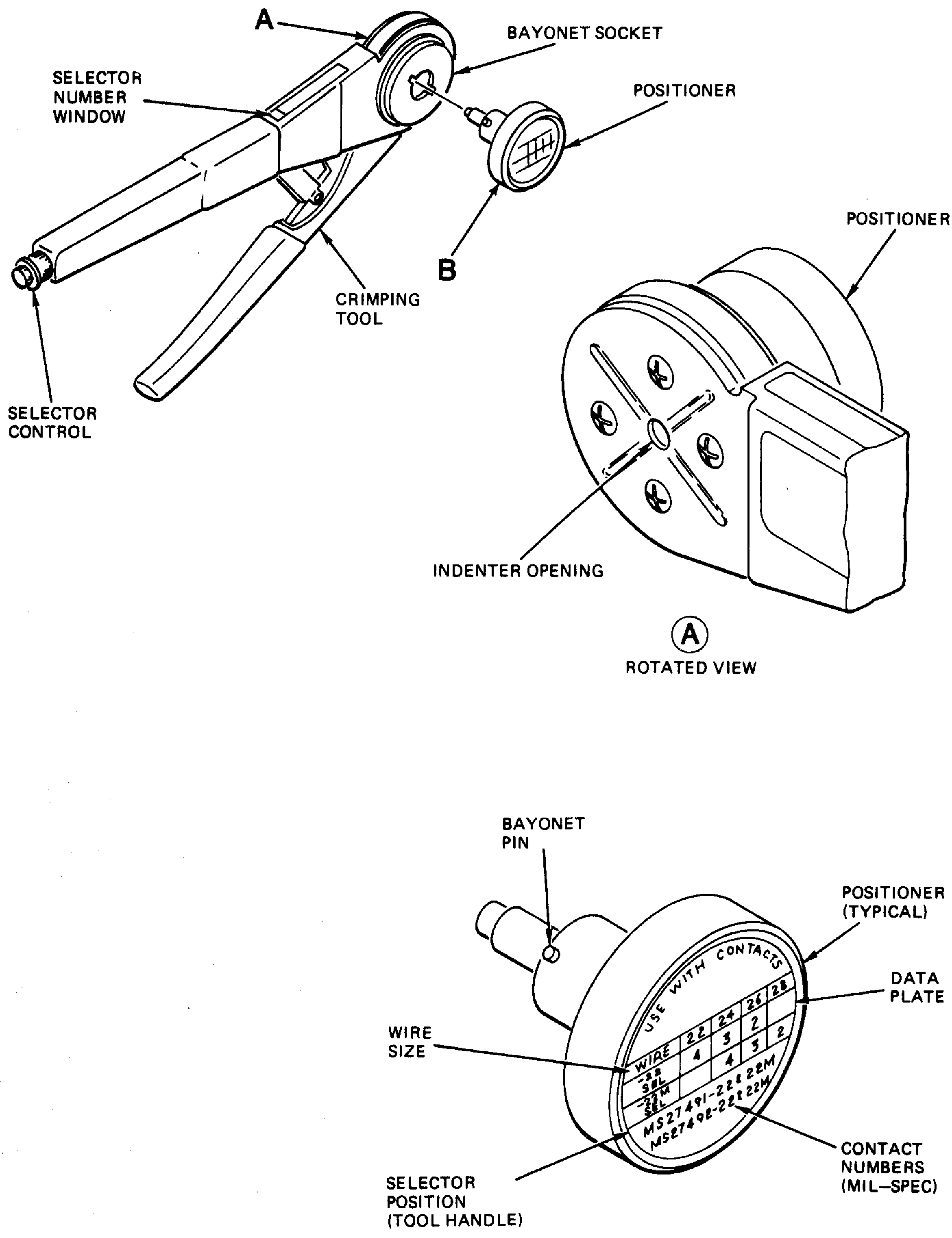
(4) Insert stripped end of cable into lug barrel.

(5) Insert cable and terminal assembly into the open nest die so the terminal barrel is centered in the die. See figure 4-33.

(6) Close crimping tool handles until stop hits the other handle.

(7) Open crimping tool handles and remove crimped terminal. Tug on terminal to make sure it is firmly crimped.

(8) Replace insulating tubing as required.

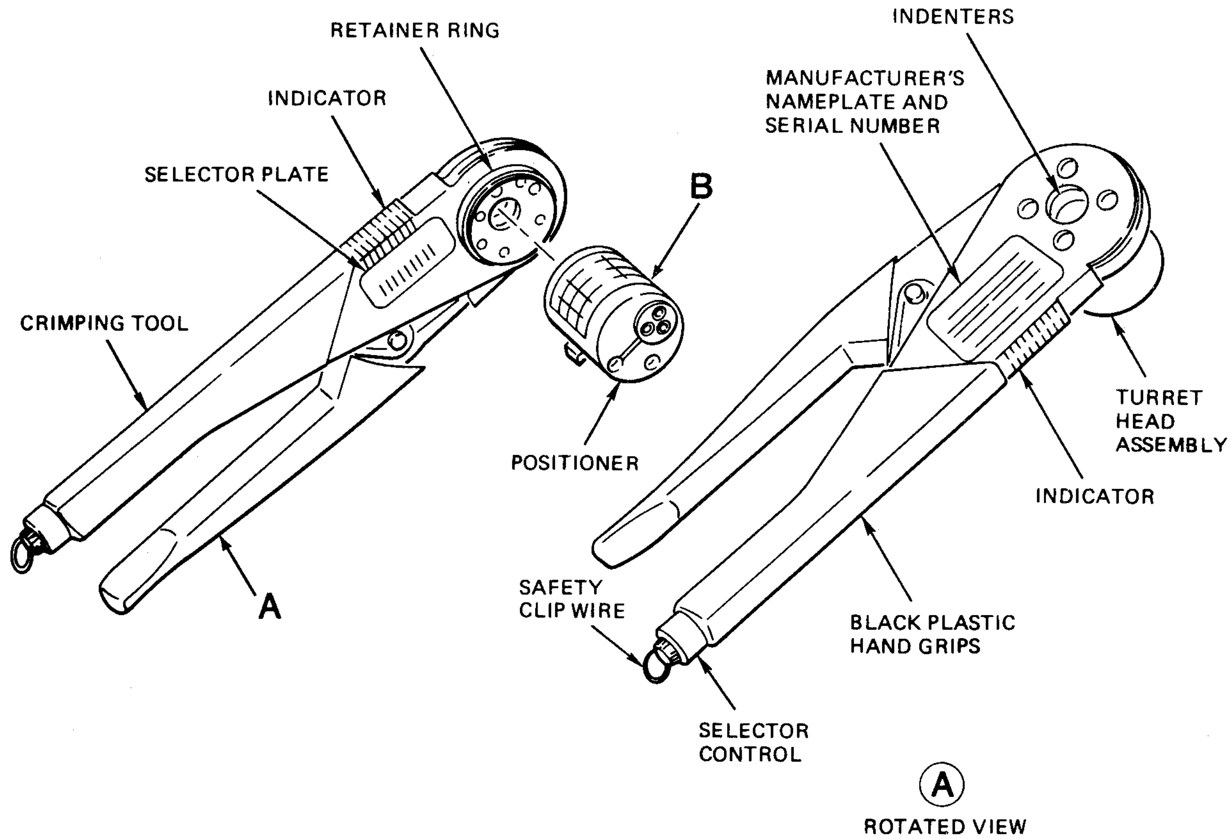


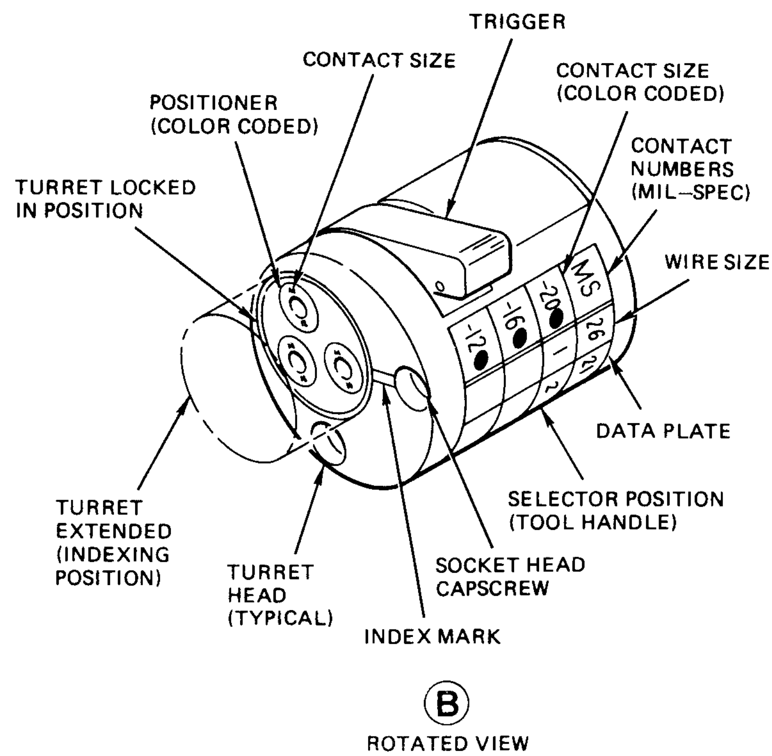
NOTE:

1. CONTACT PIN SIZE 22.
   SELECTOR NUMBER 4

2. THE TOOL HANDLES MUST BE FULLY OPENED WHEN INSERTING THE POSITIONER AND WHEN CHANGING THE SELECTOR POSITION

Figure 4-28. Crimping Tool MS3198-1 with Positioner MS3198-6P





NOTE:

1. **CONTACT PIN SIZES**

   12

   16

   20

2. **SELECTOR NUMBER DEPENDS ON CONTACT SIZE AND WIRE SIZE. SEE CHART ON POSITIONER**

Figure 4-29. Crimping Tool MS3191-4 with Positioner MS3191-9T

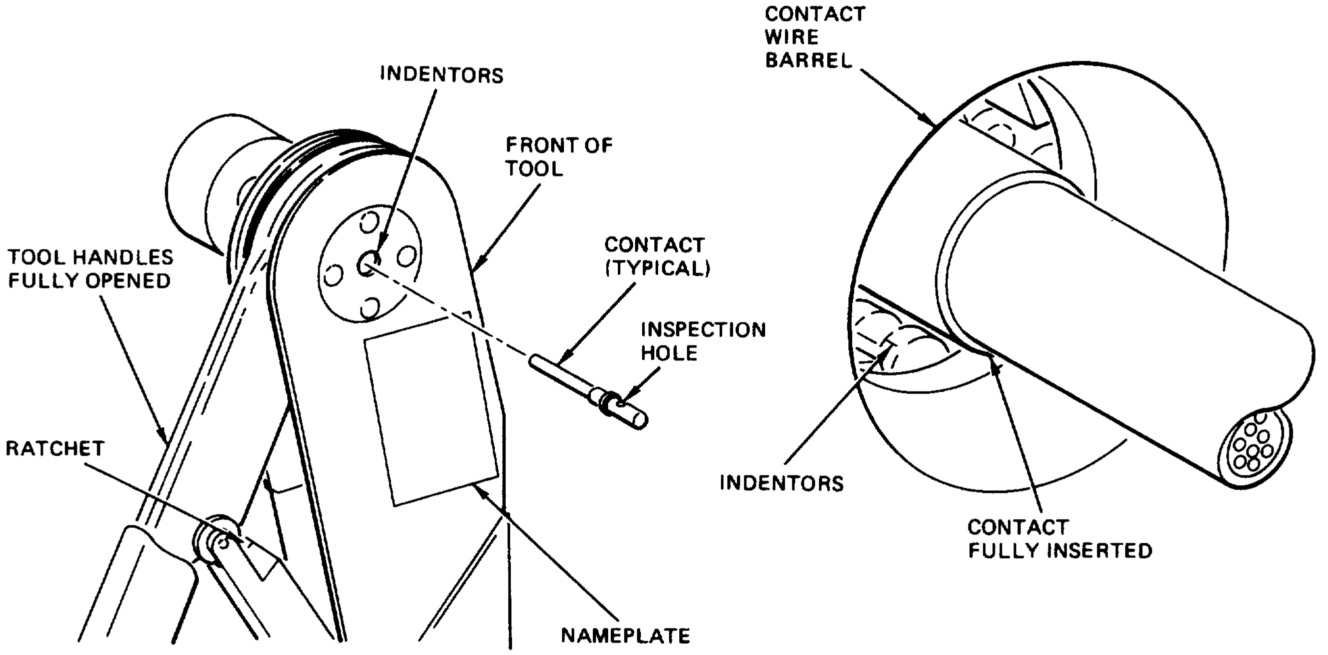


Figure 4-30. Contact Pin Crimping Tool Operation

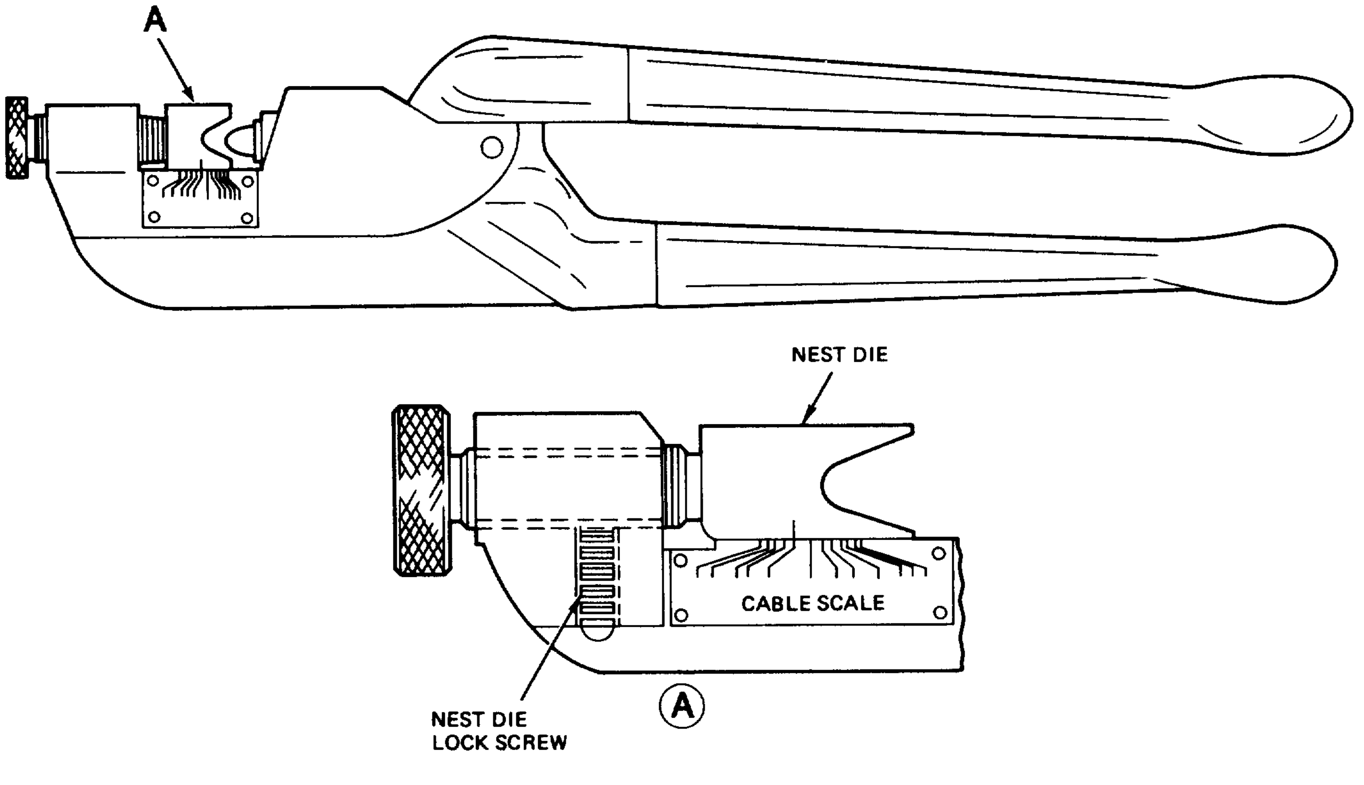


Figure 4-31. Crimping Tool MY28-4

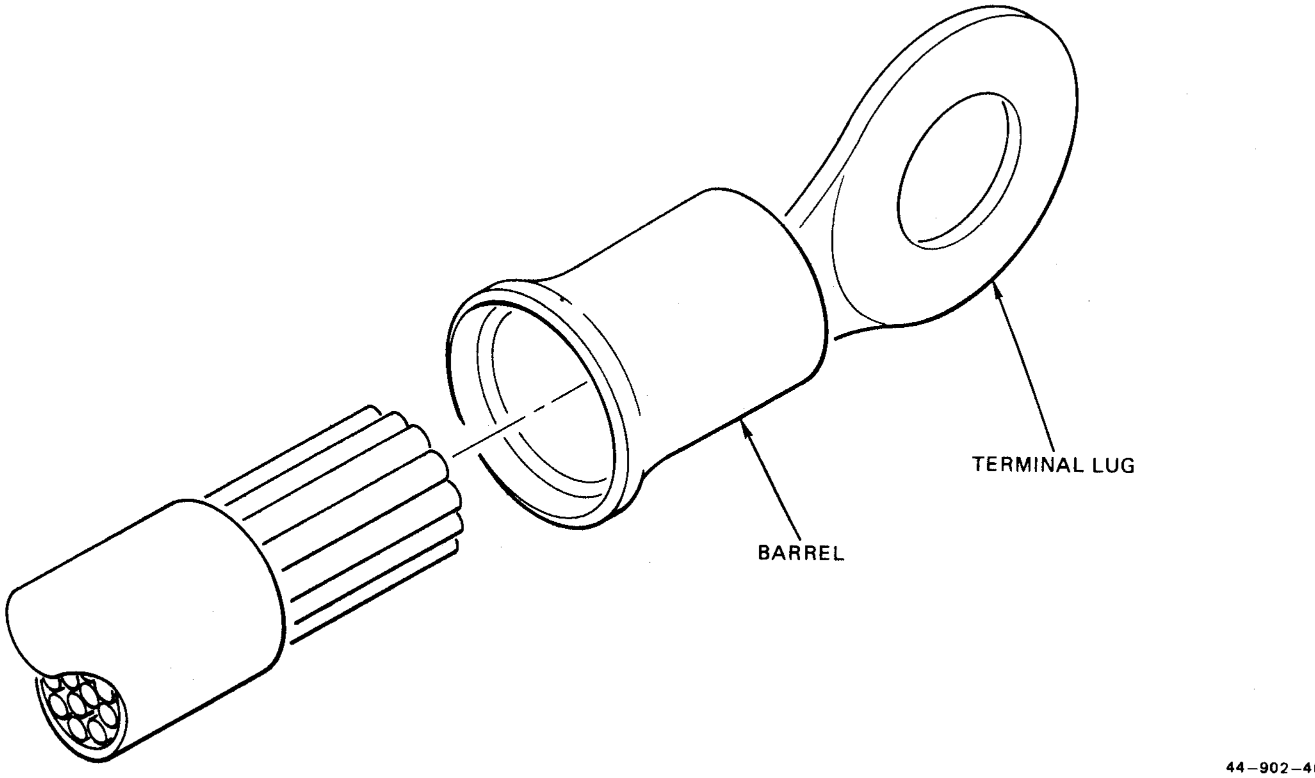


Figure 4-32. Terminal Lug and Wire Preparation

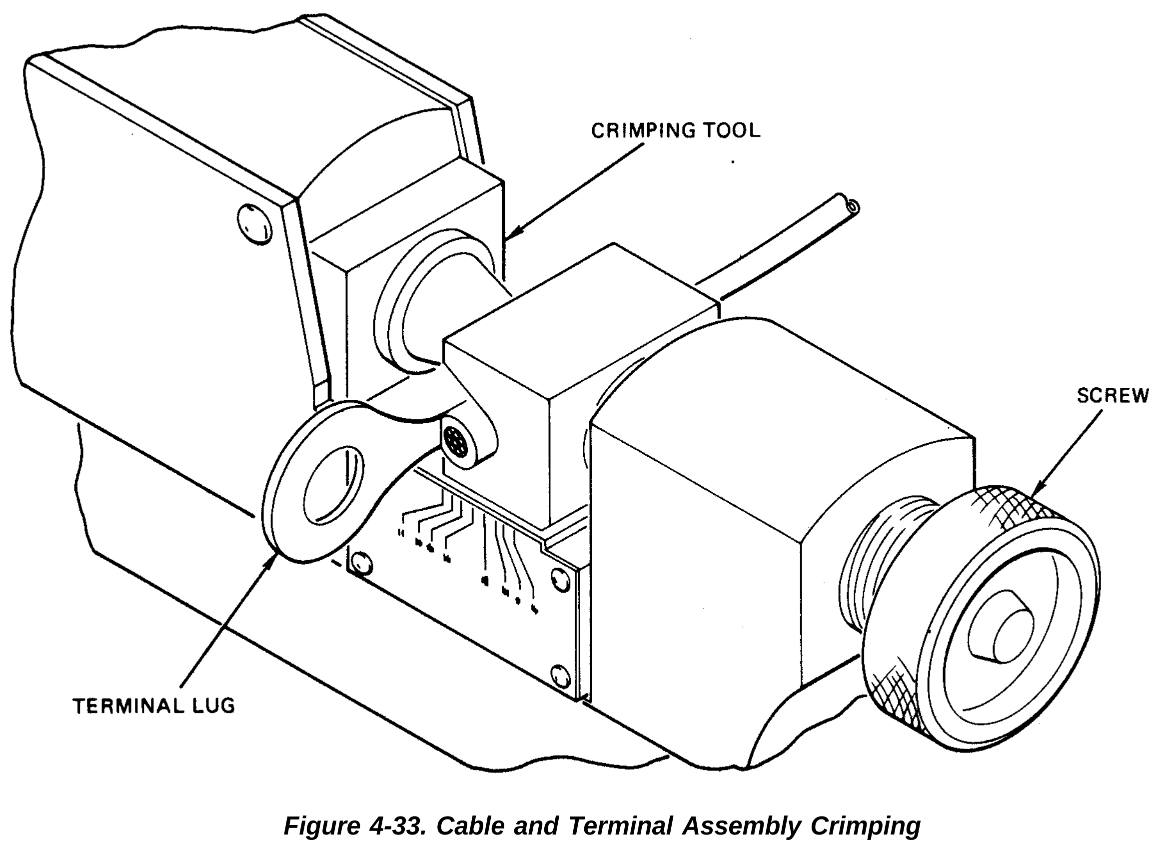


Figure 4-33. Cable and Terminal Assembly Crimping

CHAPTER 5

MATERIEL USED IN CONJUNCTION WITH MAJOR ITEM

5-1. General. The Position and Azimuth Determining System Test AN/USM-427 is used to test the PADS computer, CDU, and IMU. Its operation is described in TM 5-6675-238-14. Marine Corp users shall refer to TM 08839A-14/1

a. The Power Supply Test Set AN/USM-428 is used to test the PADS power supply and computer power supply. Its operation is described in TM 5-6675-309-14. Marine Corp users shall refer to TM 08840A-14/1.

b. A Wild theodolite T-2 and target set are required for IMU alignment. Their operation is described below.

5-2. Theodolite T-2

a. The theodolite T-2, roil-graduated, is used to measure angles for PADs alignment. The theodolite, ving only one spindle, is a direction-type instrument. t has interior scales which are read by a built-in optical system. The scales, graduated in roils, are readable directly to 0.002 mil and by estimation to the nearest 0.001 roil. The scales may be illuminated by sunlight or by a built-in wiring system using artificial light. All components of the instrument which can be seriously damaged by dust or moisture are enclosed.

b. The theodolite is used with a canvas accessory case containing diagonal eyepieces for the telescope and reading microscope, a sun filter, a jeweler's screwdriver, two adjusting pins, a camel's-hair brush, a plastic instrument head cover, two lamp fittings for artificial illumination a battery case containing lighting devices and spare bulbs, and a universal tripod with a plumb bob, plug-in sleeve, and tripod key in a leather pouch attached to the tripod. The accessories of some models of the theodolite are stored in the base of the carrying case.

c. Nomenclature of the Theodolite T-2. (*See* figure 5-1, sheets 1 and *2.)*

(1) *Ttibach.* *The* tribrach is that part of the theodolite which contains the three leveling screws and e circular level. The leveling screws are enclosed and dustproof. On models manufactured subsequent to 1956, the tribrach is detachable. On these models, the tribrach is secured to the theodolite by three tapered locking wedges controlled by the tribrach clamp lever. An optical plumb system is located in the tribrach for accurately centering the theodolite over a station.

(2) *Horizontal circle housing.* The horizontal circle housing contains the horizontal circle, the vertical axis assembly, prisms for illuminating and reading the horizontal circle, contacts and connections for electric illumination, and three spike feet for securing the theodolite to the tribrach. The following items are located on the horizontal circle housing:

(a) *Circle-setting knob and cover.* The circle-setting knob, which is located on the side of the horizontal circle housing, is used to rotate the horizontal circle to any desired position. The cover of the circle-setting knob is provided to prevent the operator from disturbing the orientation of the horizontal circle by an accidental touch. The cover should be closed at all times except when the horizontal circle is being oriented.

(b) *Horizontal circle illumination mirror.* A hinged, tilting mirror to illuminate the horizontal circle is located on the lower portion of the horizontal circle housing. The intensity of the light on the horizontal circle can be adjusted by rotating and tilting the mirror until the circle is properly lighted. For artificial illumination, this mirror is removed and replaced by a plug-in lamp.

(c) *Instrument support lugs.* Three rectangular-shaped instmmment support lugs uniformly spaced around the base of the horizontal circle housing. These lugs are used to secure the theodolite to the base of the carrying case. The plug-in socket, which received the battery box cable for artificial illumination, is located immediately above one of the lugs.

(3) *Alidade.* The alidade is the upper (rotating) part of the theodolite. It includes the telescope and microscope assemblies and the two standards that support them, the vertical circle housing, and the horizontal clamp assembly. Located on the alidade are the following

(a) *U-standard assembly.* The U-standard assembly forms the' support for all the components making up the upper part of the instrument and includes the horizontal circle axle and flange, the circle selector knob and prism, and the horizontal axis prism.

(b) Levels. The theodolite has a plate level and, a vertical circle level (split bubble) in addition to the circular level on the tribrach. The plate level is located at the bottom of the opening between the standards and is graduated to aid the operator in the precise leveling

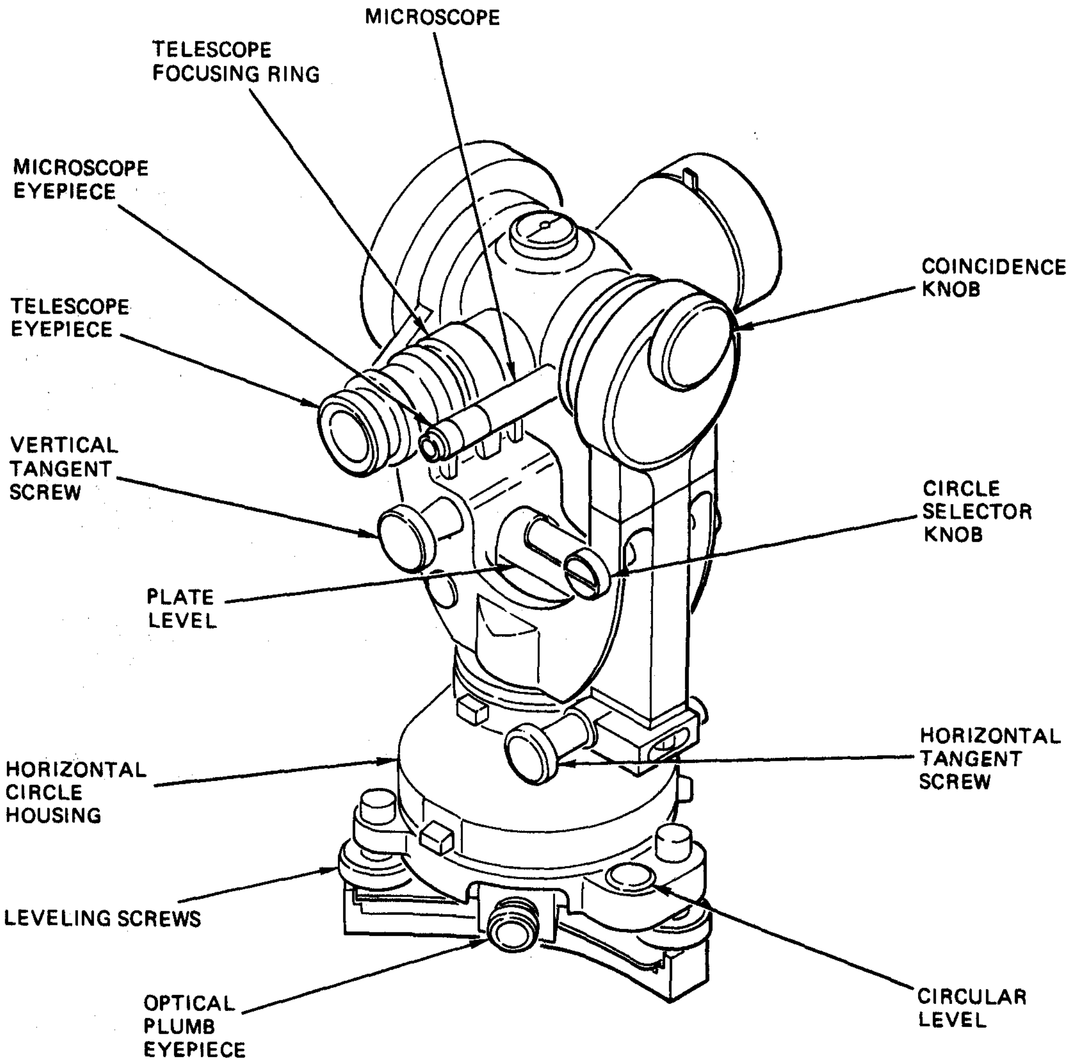


Figure 5-1. Nomenclature of Theodolite T-2 (Sheet 1 of 2)

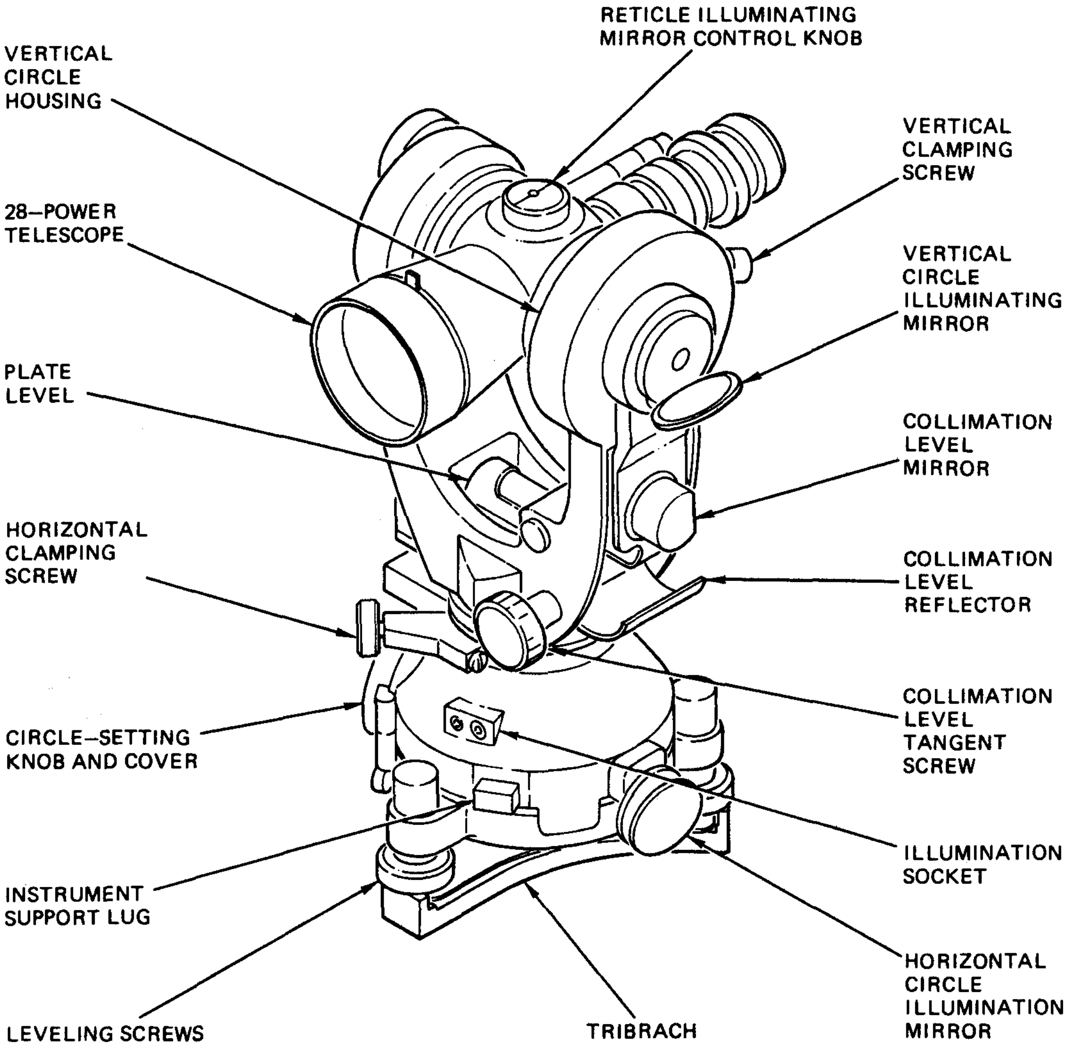


Figure 5-1. Nomenclature of Theodolite T-2 (Sheet 2 of 2)

of the instrument. The vertical circle level is completely built-in and is located adjacent to the vertical circle.

(c) *Collimation level tangent screw.* The collimation level tangent screw is located below the vertical circle and on the same standard. This control is used for precise leveling of the vertical circle level (split bubble) by bringing the images of the ends to the bubble into coincidence. A collimation level mirror on the side of the standard is provided for viewing the position of the bubble. Below the collimation level mirror, a hinged collimation level reflector is rotated outward to provide illumination of the vertical circle level.

(d) *Telescope.* The 28-power telescope of the theodolite can be rotated vertically about the horizontal axis of the theodolite. Objects appear inverted when viewed through the telescope. The reticle of the telescope is etched on glass and consists of horizontal and vertical crosslines and stadia lines. The reticle crosslines are focused by rotating the eyepiece; the image, by rotating the knurled focusing ring. Three adjusting screws are provided for correcting the horizontal collimation error. A reticle illuminating mirror control knob located on top of the telescope controls a small mirror inside the telescope for illuminating the reticle when electric illumination is used.

(e) *Circle selector knob.* The circle selector knob is located immediately above the trademark inscription “Wild’. The knob is inscribed with a heavy black line which indicates whether the image of the horizontal or the vertical circle is visible in the circle-reading microscope. When the line is horizontal, the horizontal circle may be viewed; when the line is vertical, the vertical circle may be viewed.

(f) *Microscope.* Attached to the telescope is a microscope for viewing the horizontal and vertical circles. The circle to be viewed is selected by turning the circle selector knob to either the horizontal or the vertical position, The field of view of the microscope appears to contain two small windows. The upper window contains images of two diametrically opposite portions of the horizontal or vertical circle. One of the images of the circle is inverted and appears above the other image, The lower window contains the image of a portion of the micrometer scale. The image of the scale is brought into focus by rotating the knurled microscope eyepiece.

(g) Coincidence knob. The coincidence knob on the side of the right standard is used to obtain readings for either the horizontal or vertical circle in conjunction with the micrometer scale. It operates the micrometer scale to bring the vertical or horizontal circle graduations into coincidence.

(h) *Vertical circle illumination mirror.* A tilting mirror for illuminating the vertical circle is located on the side of the standard at the center of the vertical circle. This mirror is identical with the mirror on the horizontal circle in construction and use.

(i) *Horizontal clamping screw.* The horizontal clamping screw is located on the right front portion of the instrument imemdiately above the horizontal circle housing. This control is used to lock the alidade in any desired position on its vertical axis.

(j) *Horizontal tangent screw.* The horizontal tangent screw is located on the right rear portion of the instrument immediately above the horizontal circle housing. This control enables precision adjustment in the horizontal positioning of the telescope.

(k) *Vertical clamping screw.* The vertical clamping screw is located adjacent to the vertical circle. This control permits the telescope to be rotated vertically about its axis or to be locked in a fixed vertical position.

(l) *Vertical tangent screw.* *The* vertical tangent screw is immediately below the vertical clamping screw. This control permits precision adjustment in the vertical position of the telescope.

(4) *Carrying case.* The carrying case for the theodolite consists of a base plate and steel dome-shaped hood. When the theodolite is placed on the base plate, it rests on three supports and is secured to the support by three clamps. A padded wooden box is also furnished for transporting the theodolite in its carrying case.

(5) *Electric illumination device.* The theodolite contains a built-in wiring system for illuminating the circles, the micrometer scale, and the telescope reticle. Two bulb holders are in the base of the carrying case or in the accessory case. Each of the circle-illuminating mirrors can be replaced by pulling a mirror off the instrument and inserting a bulb holder in its place. A battery case is attached to one of the tripod legs, and the wiring from this case leads to an illumination socket located in the tribrach. A second wire from the battery case leads to a hand lamp that is used for general illumination around the instrument. A rheostat is provided on the battery case for adjusting the intensity of light, Telescope reticle illumination is adjusted by turning the reticle illumination knob on top of the telescope to rotate a small mirror located at the horizontal axis in the telescope.

(6) *Tripod.* The universal tripod is issued with the theodolite. This tripod has extension legs and accessory case. The overall length of the closed tripod is 3 feet; the etended length is 5.2 feet. The accessory case is made of leather and is mounted on the tripod. The case contains a plumb bob with a plug-in sleeve and a wrench for the tripod legs. The head of the tripod is covered with a screw-on protector cap.

5-3. Target Set. (See figure 5-2). The target set includes a target, tribrach, and artificial illumination device. The tribrach is the same that is used with the theodolite and is provided with leveling screws and an optical plumb. The target is black on white to provide a sharp aiming point. It rotates on its base and has a level vial for use in leveling, The target may be backlighted with the illumination device, which is connected to the theodolite battery box.

5-4. Setting Up the Theodolite and Target Set. The theodolite and target set are mounted on tripods and plumbed and leveled over the primary and azimuth survey markers, respectively.

a. ***Setting Up the Tripod.*** The procedure for setting up the tripod is as follows:

(1) Upend the tripod and place the tripod head on the toe of the shoe. Unbuckle the restraining strap and secure the strap around the leg to which it is attached.

(2) Loosen the leg clamp wing screws and extend the tripod legs to the desired length. Tighten the leg clamp wing screws.

(3) Turn the tripod to its upright position and test the adjustment of each tripod leg by elevating each leg, in turn, to a horizontal position and then releasing it, If the leg is properly adjusted, it should fall to about 45 degrees and stop. If it does not, the tripod leg should be adjusted by tightening or loosening the tripod clamping nut. The test should be repeated until successful.

(4) Spread the legs and place the tripod over the station to be occupied, with one leg approximately bisecting the angle(s) to be measured. The head of the tripod should be set up at a height which will place the telescope at a convenient height for the operator.

(5) Insert the plug-in sleeve of the plumb bob into the instrument-fixture screw and extend the plumb bob so that it will hang about an inch above the station. Center the tripod approximately over the station.

(6) Firmly embed the tripod legs, making sure that the plumb bob is within one-half inch (laterally) of being centered over the station and that the tripod head is approximately level when the legs are embedded.

(7) Remove the tripod head cover and secure it to the tripod leg.

b. ***Removing the Theodolite from its Case.*** To remove the theodolite from its case:

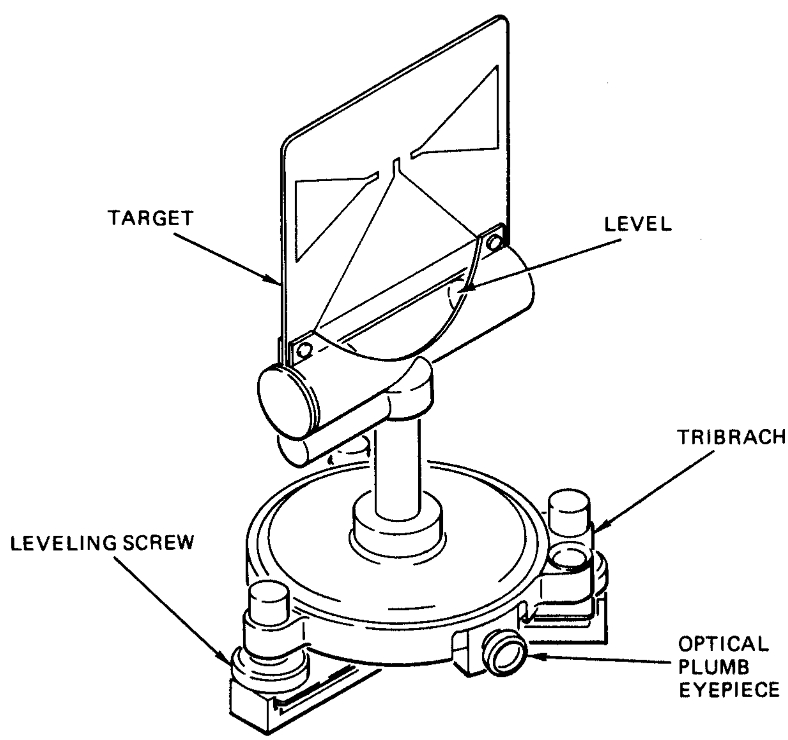


Figure 5-2. Tripod and Target Set

(1) Grasp the carrying strap with both hands just above the two clamping levers and pull outward to release the clamping levers from the base assembly.

(2) Lift the dome-shaped cover directly off the instrument and lay it to one side,

(3) Release the three clamps which secure the theodolite to the case base. Grasp the theodolite by the standard that has the trademark inscribed on it and lift the theodolite off the base.

(4) Attach the instrument to the tripod head by screwing the fixing screw snugly into the base of the tribrach.

(5) Replace the cover on the base of the case to prevent dust and moisture from entering the case.

c. plumbing and Leveling the Theodolite. The proocedure. for plumbing and leveling the theodolite is as follows:

(1) Loosen the fixing screw slightly and carefully move the instrument around on the head of the tripod until the point of the plumb bob is centered exactly over the station.

(2) Tighten the instrument to the tripod head, making sure that the point of the plumb bob remains centered over the station.

CAUTION

Excessive tightening of the fixing screw will bend the slotted arm and damage the tripod head.

(3) Loosen the leveling screws to expose sufficient thread (3/8 to 1/2 inch) on the three screws to permit the instrument to be leveled. Rotate the instrument until the axis of the tubular level is parallel to any two of the three leveling screws. Center the bubble by using these two leveling screws. Grasp the leveling screws between the thumb and forefinger of each hand and turn the screws simultaneously so that the thumbs of both hands move either toward each other or away from each other at the same time. This movement tightens one screw as it loosens the other. The bubble always moves in the same direction as the left thumb.

(4) Rotate the instrument 1,600 roils; this places one end of the plate level over the third leveling screw. Using this screw, center the bubble,

(5) Return the instmment to the first position ((3) above) and again center the bubble.

(6) Return the instrument to the second position ((4) above) and again center the bubble.

(7) Repeat (5) and (6) above until the bubble remains centered in both positions,

(8) Rotate the instrument 3,200 roils from the first position. If the bubble remains centered in this position, rotate the instrument 3,200 roils from the second position. If the bubble remains centered in this position, rotate the instrument throughout 6,400 roils. The bubble should remain centered; if it does, the instrument is level.

(9) If the bubble is not centered when the instrument is rotated 3,200 roils from the first position ((8) above), the level vial is out of adjustment. To compensate, move the bubble halfway back to the center of the level vial, using the same leveling screws that were used for the first position. Rotate the instrument 3,200 roils from the second position and move the bubble halfway back to the center of the level vial, using the one remaining leveling screw. The instrument is now level, and the bubble will come to rest in its vial at the same off-center position regardless of the direction in which the instrument is pointed. The level vial should be adjusted at the first opportunity.

(10) After the instrument is leveled, check the optical plumb to ensure that the instrument is centered exactly over the station. If it is not, center the instrument over the station by shifting it on the tripod head, and again check the level of the instrument. If necessary, repeat the leveling process and again check the optical plumb. Repeat this process until the instrument is level and centered over the station,

d. *Focusing the Telescope to Eliminate Parallax.* Before a theodolite is used for measuring angles, the telescope must be focused to eliminate parallax by bringing the focus of the eyepiece and the focus of the objective lens to the plane of the reticle (crosslines). This is accomplished as follows: Point the telescope toward the sky or a neutral background and rotate the knurled ring on the telescope eyepiece until the reticle crosslines are sharp, distinct lines. (In doing this, the observer should be very careful to focus his eye on the crosslines, not the sky). Next, point the telescope toward a well-defined distant point and, still focusing the eye on the crosslines, bring the point into a clear, sharp image by rotating the knurled focusing ring on the telescope. Use the horizontal tangent screw to center the vertical crossline on the point. To check for elimination of parallax, move the eye horizontally back and forth across the eyepiece. If the parallax has been eliminated, the crossline will remain fixed on the object as the eye is moved. If all parallax has not been eliminated, the crossline will appear to move back and forth across the object. To eliminate any remaining parallax, change the focus of the eyepiece slightly to bring the crosslines into sharper focus, and refocus the telescope accordingly until there is no apparent motion, Each time an angle is to be measured, the telescope should be focused to eliminate parallax, since accurate pointings with the instrument are not possible if parallax exists.

e. ***Setting Up the Target Set.*** The procedure for setting up the target set is as follows:

(1) Remove the tribrach and target from the case.

(2) Secure the target to the tribrach.

(3) Attach the target to the tripod by screwing the fixing screw snugly into the base of the tribrach.

(4) Plumb and level the target in a manner similar to paragraph 5-4c.

(5) Rotate the target so it faces the theodolite.

5-5. Horizontal Circle Readings. (See figure 5-3.) On the roil-graduated theodolite, the main scale (upper window) is graduated in 2-mil increments. Each fifth graduation is numbered, omitting the unit digits; e.g., 10 roils appear as 1; 250 roils as 25; and 3,510 roils as 351. The micrometer scale (lower window) is graduated from 0.000 mil to 1.000 roil. Each 0.002 mil is marked with a graduation, and each fifth graduation is numbered (hundredth of a roil). The scale may be read to 0.001 mil by interpolation. To determine a reading on the horizontal circle:

a. Rotate the circle selector knob until the black line on the face of the knob is horizontal.

b. Adjust the horizontal circle illuminating mirror so that both windows in the circle reading microscope are uniformly lighted. If there is insufficient light, replace the mirror with a lamp assembly.

c. Focus the microscope eyepiece so that the graduations of the circle and micrometer scale are sharply defined.

d. Observe the images in the microscope. Bring the circle graduations into coincidence at the center of the upper window by turning the coincidence knob, When the knob is turned, the images of the opposite sides of the circle appear to move in opposite directions across the upper window in the circle-reading microscope. The image of the micrometer scale in the lower window also moves. The graduations of the circle (upper window) are brought into coincidence so that they appear to form continuous lines across the dividing line. The center of the field of view in the upper window is marked by a fixed vertical index line. The final coincidence adjustment should be made between circle graduations in the vicinity of this index line, The line is not used in reading the circle, The final motion of the coincidence knob must be clockwise.

e. Determine the first erect numbered graduation to the left of the index line that marks the center of the upper window. This numbered graduation indicates the value of the circle reading in tens of roils. In figure 5-3, this value is 121.

f. Locate on the inverted scale the graduation for the number diametrically opposite 121 (the number +320). This number is 441 (viewed Ɩᔭᔭ). The inverted number is always to the right of the index line which marks the center of the field of view. When the unit roils of the circle reading is zero, coincidence is obtained with the circle reading and its diametrically opposite number in coincidence with each other in the immediate vicinity of the index line, Both values always end in the same number — in this case, the number 1.

g. Count the number of spaces between graduations from 121 to the inverted 441. There is one space, representing 1 roil. Each of these spaces represents 1 roil.

h. Convert 121, which is tens of roils, to 1,1210 roils, and to this value, add the unit roils determined in c above (1,210 + 1 = 1,211 roils, the angular value obtained from the main scale).

i. On the micrometer scale (lower window), the index line that marks the center of the field also indicates the value to be read from the micrometer scale. This value is 0.403 roil.

j. Add the values determined in h and i above (1,211 + 0.403) = 1,211.403 roils, the angular value displayed in figure 5-3.

5-6. Setting the Horizontal Circle. The horizontal circle can be set to read a given value with the telescope ointed at a target. The initial circle setting of 0.150 ±0. 100 mil) is used as an example.

a. Point the instrument at the target.

b. Using the coincidence knob, place a reading of 0.150 on the micrometer scale.

c. Using the scale-setting knob, zero the main scale as accurately as possible, insuring that the numbered lines, which are 3,200 roils apart (the erect 0 graduation and the inverted 320 graduation), are touching each other.

d. With the coincidence knob, bring the main scale graduations into a more precise coincidence.

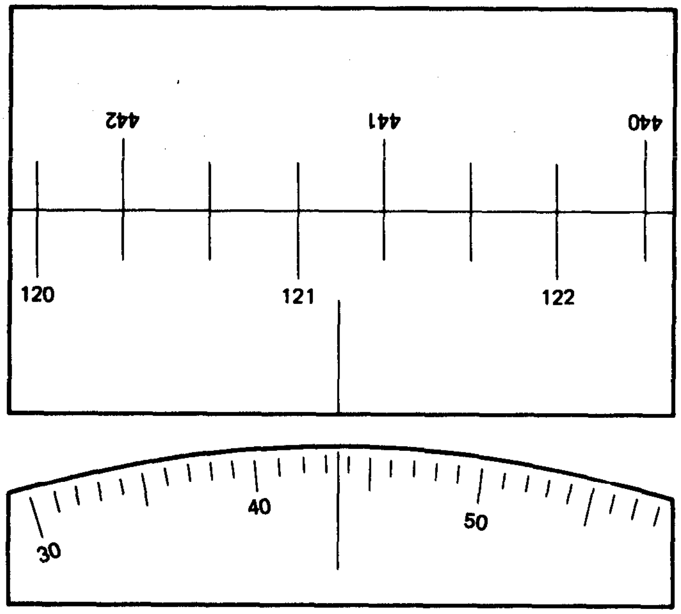


Figure 5-3. Horizontal Circle Readings

e. Read the horizontal circle. The reading should be 0.150 (within ±0.100 roil), With care, a circle may be set to an accuracy of 0.010 mil.

5-7. Pointing the Theodolite.

a. Release the horizontal and vertical clamping screws.

b. Aim the telescope on the target. Focus as necessary.

c. When the telescope crosshairs are on the target, tighten the horizontal and vertical clamping screws.

d Use the telescope focusing ring to bring the image into sharp focus.

e. Use the horizontal and vertical tangent screws to exactly center the intersection of the horizontal and vertical crosshairs over the target. If the target is a vertical line, like a pole, the same point on the target must be used for each sighting.

5-8. Autoreflection. (See figure 5-4.)

NOTE

To increase visibility, color the theodolite sight white with typewriter correction fluid. At night, illuminate the sight with the theodolite handlamp.

a. Level the porro prism using the level adjust knob and level vial. The level adjustment can accommodate slopes up to ±20 degrees.

b. Aim the theodolite so the horizontal crosshair lies along the centerline of the prism.

c. Increase the telescope focus towards infinity until the reflected image of the front of the telescope is visible.

d Adiust the theodolite so the reflected image of the theodolite sight is centered on the vertical crosshair. See figure 5-5. Lock the clamping screws and readjust as necessary.

5-9. Measuring Horizontal Angles. (See figure 5-8.)

a. With the telescope in the direct (D) (sight on top) position, point the telescope on the azimuth target.

b. Set the horizontal circle to approximately 0.150 roil.

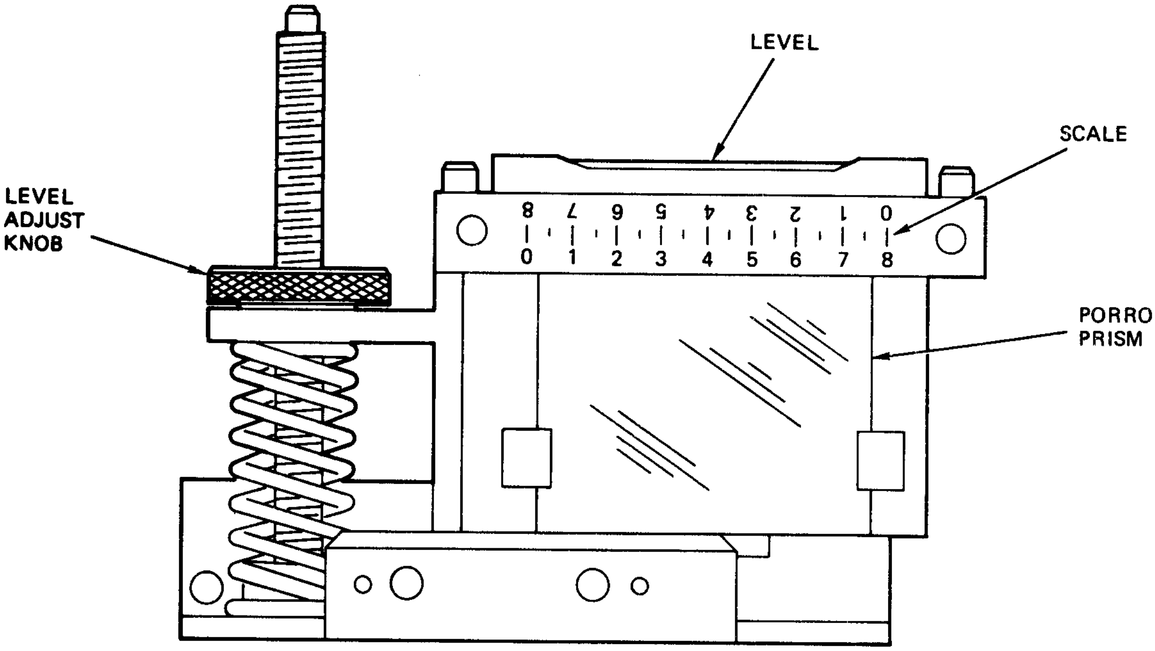


Figure 5-4. Leveling the Porro Prism

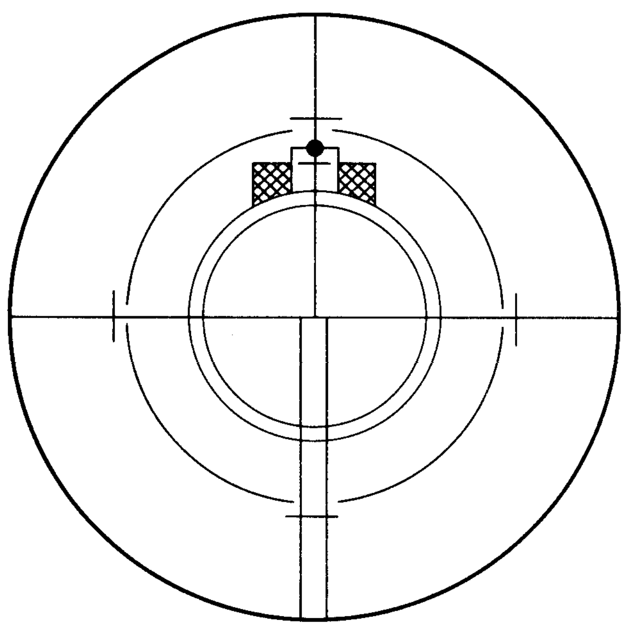


Figure 5-5. Theodolite Reflected Image

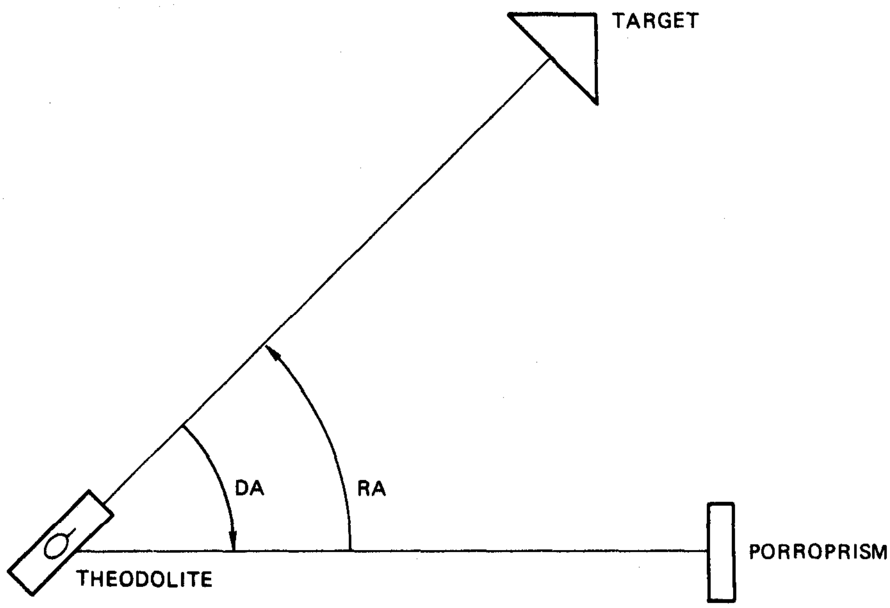


Figure 5-6. Measuring Horizontal Angles

c. Verify the telescope is properly pointed on the target and record the horizontal circle reading (0.158 mil).

d. With the telescope in the direct (D) position, turn it in a clockwise direction and autoreflect on the porro prism. Record the horizontal circle reading (824.376 mils).

Plunge the telescope to the reverse (R) (sight on bottom) position.

Autoreflect on the porro prism and record the horizontal circle reading (4024.372).

g. With the telescope in the reverse (R) position, point on the azimuth target, Record the horizontal circle reading (3200.156).

h. Subtract the direct reading on the target from the direct reading on the porro prism to obtain the direct angle (DA).

824,376
-0.158
DA = 824.218

i. Subtract the reverse reading on the target from the reverse readin on the porro prism to obtain the reverse angle (RA).

4024.372
-3200.156
RA = 824.216

j. If DA and RA differ by more than 0.1 mil, check the plumb and level of the theodolite and target and remeasure the angles, If there is a consistent error, adjust the instrument in accordance with paragraph 5-14.

k. Mean DA and RA to obtain the horizontal angle (HA).

824.218
+824.216
1648.434
÷2
HA = 824.217

5-10. Taking Down the Theodolite. When observations are completed at a station, the theodolite and tripod are taken down as follows:

a. Place the telescope in a vertical position with the objective lens down and tighten the vertical clamping screw.

b. Turn each leveling screw to the same height.

c. Position the horizontal clamping screw directly over one of the leveling screws and tighten it.

d. Grasp the instrument by its right standard and unscrew the instrument-fixing screw. Lift th theodolite from the tripod and secure it in the carrying case. Replace the dome-shaped cover.

e. Replace the tripod head cover. collapse the tripd, and strap the tripod legs together.

5-11. Care of the Theodolite. The theodolite is a delicate instrument, and care must be taken not to drop it or bump it against any object. If the instrument gets wet, it must be dried before it is returned to the carrying case. As soon as possible, the instrument should be placed in a dry room or tent. It should be removed from the carrying case so that it may dry completely. If left in the closed carrying case, it will absorb the humidity in the air if there is an increase in temperature. Should the temperature drop afterwards, the moisture will condense on the interior of the instrument, A man on foot may carry the instrument, mounted on the tripod, with the tripod under one arm and a hand supporting the theodolite itself. All motions should be clamped with the telescope in the vertical position. When the theodolite is carried over rough terrain, the instrument should be transported in its carrying case. When transported in a vehicle, the theodolite should be in the dome-shaped carrying case, and the case should be in the padded box. For short distances, the carrying case may be held in an upright position on the lap of the instrument operator.

5-12. Cleaning the Theodolite. The theodolite must be kept clean and dry. During use, as necessary, and after use, the instrument should be cleaned as follows:

a. Painted surfaces should be wiped with a clean cloth.

b. The lenses should be cleaned only with a camel's-hair brush and lens tissue. The lens should be cleaned first with the brush to remove any dust or other abrasive material and then with the lens tissue. Any smudge spots remaining after the lens tissue is used can be removed by slightly moistening the spot and again cleaning with the lens tissue. Care should be taken not to scratch the lens or remove the coating. The coating reduces glare for the observer.

c. All metal parts of the tripod should be cleaned with a cloth moistened with an approved cleaning solvent and wiped dry. The wooden parts should be cleaned with a soft cloth moistened with water and then dried thoroughly. The leather strap should be cleaned with a suitable leather cleaner.

5-13. Repair of the Theodolite. Adjustment (except as explained in paragraphs 5-15 through 5-20) and repair of the theodolite must be performed by qualified instrument repair personnel. Theodolites in need of adjustment or repair should be turned in to the engineer unit responsible for providing maintenance service. TM 5-6675-286-12 and/or TM 08837A-12/1 outlines the categories of maintenance.

5-14. Adjustment of the Theodolite.

a. The theodolite must be kept in correct adjustment if accurate results are to be obtained. There are five tests and adjustments of the theodolite that should be made periodically. These tests should be performed in the sequence in which they are discussed in paragraphs 5-15 through 5-19, When a test indicates that an adjustment is necessary, this adjustment should be made and the instrument tested for accuracy before the next test is performed.

b. The five tests and adjustments of the theodolite are made with the instrument mounted on its tripod and accurately leveled. For these tests and adjustments, the instrument should be set up in the shade on firm ground with the head of the tripod as nearly level as possible. The theodolite should also be protected from the wind.

5-15. Plate Level Adjustment.

a. ***Purpose.*** The purpose of the plate level adjustment is to make the vertical axis of the theodolite truly vertical when the bubble of the plate level is centered in its vial.

b. ***Test.*** To test the adjustment of the plate level, place the axis of the plate level parallel to two of the three leveling screws. With these two leveling screws, center the bubble of the plate level. Rotate the instrument 1,600 mils and again center the bubble, using the third leveling screw. Repeat these steps until the bubble remains centered in both positions. Carefully center the bubble in the first position and then rotate the instrument 3,200 mils. If the bubble does not remain centered, adjustment is required; the discrepancy noted in the position of the bubble is the apparent error, or twice the actual error, of the plate level.

c. ***Adjustment.*** To adjust the plate level, remove one-half of the apparent error (the actual error) by turning the capstan adjusting screw located below the collimation level illuminator. The adjusting pin is used to turn the capstan adjusting screw. Repeat the test to detect any error remaining in the adjustment of the plate level and adjust, if necessary.

5-16. Optical Plumb Adjustment.

a. **Purpose.** of the optical plumb adjustment is to make the vertical axis of the theodolite pass through the station mark when the theodolite is properly leveled and the station mark is centered in the reticle of the optical plumb.

b. ***Test.*** To test the optical plumb, suspend the plumb bob from the leveled instrument and mark a point on the ground exactly under the point of the plumb bob. Remove the plumb bob from the instrument and check to insure that the instrument is accurately leveled (i.e., the vertical axis is truly vertical). Look into the eyepiece of the optical plumb. If it is in correct adjustment, the mark on the ground will be centered in the reticle.

c. ***Adjustment.*** If the point on the ground is not centered in the optical plumb reticle, center the point by means of the three capstan adjusting screws located near the optical plumb eyepiece. Two of these adjusting screws are located on opposite sides of the eyepiece, and the third adjusting screw is located below the eyepiece opposite a sprint-loaded plunger. The bottom adjusting screw is locked in place by a capstan retaining nut, which is located immediately above the head of the adjusting screw. With an adjusting pin, loosen the retaining nut and raise or lower the reticle by turning the bottom adjusting screw to move the reticle image along the axis of the optical plumb in the same direction that the screw travels. The two side adjusting screws are used to move the image of the reticle in the opposite direction from their travel. If it is necessary to use these screws, they should be rotated an equal amount in opposite directions, It is usually necessary to loosen the screw below the eyepiece slightly to adjust the screws on the side and vice versa. To make the adjustment, loosen one of the two opposed screws and the retaining nut slightly. The spring-opposed adjusting screw should be used for necessary adjustments, and the opposed adjusting screws should be used to complete these adjustments. When the adjustment is complete, the two opposed adjusting screws must be faily tight. Lock the bottom adjusting screw in place by tightening the retaining nut.

5-17. Verticality Adjustment.

a. ***Purpose.*** The purpose of the verticality adjustment is to make the vertical crossline of the reticle lie in a plane perpendicular to the horizontal axis of the telescope.

b. ***Test.*** To test the verticality of the vertical crossline, select a well-defined distant point as near as possible to the horizontal plane of the instrument and center the vertical crossline on the selected point. With the vertical tangent screw, elevate and depress the telescope. If the vertical crossline continuously bisects the point, the adjustment is correct.

c. ***Adjustment.*** There are three adjusting screws on the telescope, a horizontal screw on the left side and two slant screws on the right side. If the vertical line does not continuously bisect the sighted point, turn the two slant screws an equal amount in opposite directions to rotate the reticle until the vertical crossline does bisect the point throughout the elevation and depression of the telescope.

5-18. Horizontal Collimation Adjustment.

a. ***Purpose.*** The purpose of the horizontal collimation adjusting is to make the line of sight perpendicular to the horizontal axis of the telescope.

b. ***Test.*** To test the horizontal collimation, select a well-defined point at least 100 meters from the instrument and at approximately the same relative height. With the telescope in the direct position, center the vertical crossline on the selected point. Set the horizontal circle to any reading less than 3,200 mils, close the cover on the circle-setting knob, and record the reading. Plunge the telescope to the reverse position and take a second reading on the same point. The instrument operator should repeat both readings to insure that no error was made in reading the instrument. These two readings should differ by 3,200 mils. Assuming no error in the pointings or readings, any discrepancy between actual difference in the two readings and 3,200 mils is the apparent error, or twice the horizontal collimation error. If this discrepancy exceeds plus or minus 0.100 mil (20”), the horizontal collimation adjustment should be performed.

c. ***Adjustment.*** For the purpose of illustration assume that the horizontal circle reading in the direct position is 0000.200 mil and in the reverse position is 3,200.800 mils. With the telescope in the direct position, use the coincidence knob to set the mean value (0.500) on the micrometer scale. Using the horizontal tangent screw, bring the main scale into coincidence with a value of 0 mil on the scale. In doing this, the vertical crossline is moved off the point by the amount of the horizontal collimation error. The vertical crossline is then aligned on the selected point by lateral movement of the reticle within the telescope. To move the reticle, loosen (tighten) the two adjusting screws in the slant position on the right side of the telescope equally, and tighten (loosen) the single adiusting screw on the left side of the telescope. For moving the reticle, the adjusting screw(s) should be loosened before the screw(s) on the opposite side of the telescope is tightened. Repeat the test and adjustment procedure until the difference between the direct and reverse points is less than 0.05 mil (10”). When this adjutment is completed, repeat the verticality test to insure that the vertical crossline is still perpendicular to the horizontal axis of the tele. scope.

NOTE

This adjustment can also be made with the telescope in the reverse position, using the mean value for the reverse pointing, i.e., 3,200.500.

5-19. Vertical Collimation Adjustment.

a. ***Purpose.*** The purpose of the vertical collimation justrnent is to make the line of sight horizontal when the vertical circle reads 1,600 mils with the telescope in the direct position (4,800 mils with the telescope in the reverse position) and the ends of the collimation level bubble are in alignment.

b. ***Test.*** To test the vertical collimation, select a well-defined point at least 100 meters from the instrument. With the telescope in the direct position take a vertical circle reading on the point, making sure that the collimation level bubble is precisely aligned. Plunge the telescope to the reverse position and again take a vertical circle reading to the same point. The collimation level bubble must be precisely aligned before, and checked after, each vertical circle reading. Repeat these two measurements to insure that no error was made. The sum of the two readings should equal 6,400 mils. Assuming no error in the pointings or readings, any difference between the sum of the two readings and 6,400 mils is the apparent (index) error, or twice the collimation level error. If the difference exceeds plus or minus 0.150 mil (30”), the vertical collimation level should be adjusted.

c. ***Adjustment.*** To adjust the vertical level, compute the correct vertical circle reading by applying one-half of the index error of the vertical circle to the direct heading. If the sum of the two readings is greater than 6,400 mils, subtract one-half the index error from the direct reading; if the sum is less than 6,400 mils, add one-half the index error to the direct reading. Place the instrument in the direct position and accurately sight on the point. Using the coincidence knob, set the fractional part of the correct vertical circle reading on the micrometer scale, and then obtain coincidence on the main scale at the correct vertical circle reading by using the collimation level tangent screw. With the telescope sighted on the point and the correct reading on the vertical circle, the ends of the collimation level bubble will not be aligned. Align the images of the ends of the collimation level bubble by using the two capstan adjusting screws located immediately below the collimation level. When adjusting the bubble, rotate both screws the same amount in opposite directions. After making the adjustment, tighten the screws by rotating the screws slightly in opposite directions, being careful not to change the alignment of the ends of the bubble. Repeat the test and adjustment procedure until the collimation level error is less than 0.05 mil (10”).

Example:

Vertical circle reading for direct pointing		1,544.400
Vertical circle reading for reverse pointing		4,856.098
	Sum	6,400.498

Apparent index error = 6,500,498 – 6,400 = 100.498 mil

Collimation error = 100.498 – 2 –0.249 mil

Correct vertical circle reading (direct) = 1,544.400 – 0.249 = 1.544.151

With the telescope in the direct position, accurately sight on the point. Set the fractional portion of the correct scale reading on the micrometer scale by using the coincidence knob, and then obtain coincidence on the main scale at the correct vertical circle reading (1,544.151) by using the collimation level tangent screw. Bring the split bubble into coincidence by turning its adjusting screws.

NOTE

This adjustment can also be made with the telescope in the reverse position, using the mean value for the reverse pointing, i.e., 4,856.098 – 0.249 = 4,855.849 roils.

5-20. Other Adjustments. Other adjustments to the theodolite that ‘may be required periodically are as follows:

a. ***Leveling Screws.*** The three leveling screws must turn smoothly and with moderate ease and without any shake or backlash. To tighten or loosen the movement of the leveling screw, use the capstan adjusting screw located immediately above each leveling screw.

b. *Tangent Screws.* The tangent screws must turn easily and smoothly, without backlash, throughout their travel. A capstan adjusting ring is located immediately behind each tangent screw, To adjust the tangent screws, rotate the adjusting ring with an adjusting pin.

c. *Circle-Setting Knob.* To adjust the circle-setting knob, turn the knob until three screws can be seen through the three holes in the face of the knob, Carefully loosen these screws enough to press the knob upward or downward to loosen or tighten the movement.

d. ***Tripod.*** There should be no play at the junction of the wood and metal parts of the tripod. If play exists, tighten the hexagon nuts on the foot plates and on the extensions of the tripod head, The legs, when released from the horizontal position, should fall to an angle of about 45 degrees and remain there. Cheek the movement of the legs and, if necessary, tighten the clamping screws under the head of the tripod.

APPENDIX A
REFERENCES

A-1. Painting

TM 43-0139	Painting Instructions for Field Use

A-2. Shipment and Storage

TB 740-97-2 or TM 740-90-1	Preservation of USAMECOM Mechanical Equipment for Shipment and Storage
TM 740-90-1	Administrative Storage of Equipment
MCO 4450.7	Marine Corps Warehousing Manual

A-3. Maintenance

DA PAM 738-750 or TM 4700-15/1 Marine Corps	The Army Maintenance Management System (TAMMS)
TM 5-6675-308-24P or TM 08837A-24P/3 Marine Corps	Organization, Direct Support and General Support, Repair Parts and Special Tools List, Position and Azimuth Determining System AN/USQ-70
TM 5-6675-238-14 or TM 08839A-14/1	Operator's, Organizational Direct Support, and General Support Maintenance Manual for Test Set, Position and Azimuth Determining System AN/USM-427
TM 5-6675-238-24P or TM 08839A-24P/2	Organizational, Direct Support, General Support and Depot Maintenance Repair Parts and Special Tools List for Test Set, Position and Azimuth Determining System AN/USM-427
TM 5-6675-308-12 or TM 08837A-12/1	Operator's and Organizational Maintenance Manual for Position and Azimuth Determining System AN/USQ-70
TM 5-6675-309-14 or TM 08840A-14/1	Operator's, Organizational, Direct Support, and General Support Maintenance Manual for Test Set, Power Supply, PADS AN/USM-428
TM 5-6675-309-24P or TM 08840A-24P/2	Organizational, Direct Support, General Support, and Depot Maintenance Repair Parts and Special Tools List for Test Set, Power Supply AN/USM-428

A-4. Demolition

TM 750-244-3	Destruction of Army Materiel to Prevent Enemy Use

A-5. Forms

NAVMC Form 10772	Recommended Changes to Technical Publications
DA Form 2028	Recommended Changes to Publications and Blank Forms
DA Form 2028-2	Recommended Changes to Equipment Technical Publications
DA Form 12-25A	Requirements for Technical Publications for Army Mobility Support Equipment
DD Form 6	Packaging Improvement Report
SF 361	Discrepancy in Shipment Report (DISREP)
SF 368	Quality Deficiency Report
CTA 50-970	Expendable/Durable Items (Except: Medical, Class V, Repair Parts, and Heraldic Items)
MCO 1650.17	Marine Corps Military Incentive Awards Program
MCO P4610.19C	Discrepancy in Shipment
MCO 4855.10	Quality Deficiency Report

DA Pam 750-10 SL l-2/SL 1-3	U.S. Army Equipment Index of Modification Work Orders
700-20	Army Adapter/Other Items Selected for Authorization List of Portable Items
TM 4700-15/1	Equipment Record Procedures
TM 9-6140-200-14	Operator's, Organizational, Direct Support, and General Support Maintenance Manual for Lead-Acid Storage Batteries.

GLOSSARY

Section I. DEFINITIONS OF SPECIAL TERMS

A

ACCELEROMETER – Electric transducer used to measure linear acceleration.

AUTOREFLECTION – A method of directing a straight line by projecting an image of theodolite sight to a reflecting plane and then back to the telescope.

AZIMUTH – Horizontal angle measured clockwise from true north (true azimuth), or from grid north (grid azimuth), to a line through an observed or designated point.

B

BIT – A built-in-test; normally, a test for proper functioning.

BITE – Built-in-test equipment; components within an equipment which are used to conduct built-in tests.

E

EARTH RATES – Forces generated by earth's rotation that affect inertial measurement system accuracy. Corrections are applied by computer to compensate for the effect of these forces.

EASTING – The east-west distance of a location from the central meridian of a grid.

F

FAULT INDICATOR – An indicator which allows an observer to see that the system concerned is functioning properly (black color), or malfunctioning (white color).

G

GYROSCOPE – A device, based about a wheel, so mounted that its spinning axis is free to rotate about either of tsvo other axes perpendicular to itself and to each other.

GYROCOMPASSING – A capability of advanced inertial measurement systems (included PADS) whereby the system, after startup and receiving position information, will align itself with true north.

L

LOCAL VERTICAL – Coincident with gravity vertical.

M

MIL – A unit of angular measurement equal to 1/6400 of 360°, or approximately 0° 03.4' of arc; approximately equal to 1/1000 of the range,

N

NORTHING – A designation for the distance a position lies in a north-south direction from a designated latitude line; in UTM grid, the equator is zero for points in the northern hemisphere; the equator carries an artificial label of 10,000 kilometers north for points in the southern hemisphere.

0

OPTICAL AZIMUTH TRANSFER – Transfer of orienting line angle information from PADS to a survey control point by autoreflecting a theodolite on PADS porro prism.

P

PORRO PRISM – A prism that has two reflecting surfaces orthogonal to each other.

R

RESOLVER – Senses synchro error signal and drives torquer to remove angular orientation difference between stable element and vehicle.

S

SPHEROID – An earth spheroid model used for computing geodetic positions. There are seven spheroid systems which PADS can accommodate. These are:

(1) Clarke 1866

(2) Clarke 1880

(3) International

(4) Bessel

(5) Everest

(6) Malayan

(7) Australian Net

STABLE ELEMENT - Part of inertial measurement unit that contains gyros and accelerometers,

SYNCHRO - A device that senses any differences in angular orientation between the stable element and the vehicle,

T

TARGET SET - A target, usually mounted on a tripod, marking the distant end of an orienting line; usually capable of being lighted so that the orienting line may be viewed at night.

TWO-POSITION AZIMUTH TRANSFER – A method whereby PADS lays out an azimuth (orienting) line by taking departure from one point, driving the utility truck to a second point, marking the second point, and automatically computing the azimuth from first to second point.

TORQUERS – Motors that process the gyro axes to maintain the stable element in a locally level north-point attitude.

U

UPDATE – As applied to PADS, a correction of PADS position or azimuth data. The correction is a transfer of position and azimuth data from that which has been accurately determined by a higher order survey, such as celestial,

UTM – Universal Transverse Mercator – the name of a grid system where meridians (longitude lines) and parallels (latitude lines) of the earth are represented on a plane in the same manner as a rectangular coordinate system.

Z

ZERO-VELOCITY CORRECTION – A method by which PADS navigating errors are minimized. With the vehicle stopped, the PADS computer checks to see if the system calculates a stop, or is indicating movement. If movement is being indicated, the computer performs a biasing procedure to cause the system to indicate a stop. The biasing computation is then used to correct navigation data computed since the previous correction or update.

ZONE NUMBER – The number assigned to UTM to identify each of the 60 UTM zones (each 6° of longitude). Zones are numbered consecutively eastward from the 180th meridian.

SECTION II. NONSTANDARD ABBREVIATIONS

A/D – Analog-to-digital

CDU – Control and display unit

COMP – Computer

CPU – Central processing unit

CUCV – Commercial utility cargo vehicle

CUV – Commercial utility cargo vehicle

D/DC – Digital-to-dc

DMA – Direct memory access

D/R – Digital-to-resolver

D/S – Digital-to-synchm

EIR – Equipment improvement recommendations

ENT – Enter

HMMWV - High-mobility multipurpose wheeled vehicle

HUM – High-mobility multipurpose wheeled vehicle

ID – Identification

IMU - Inertial measurement unit

I/O - Input/output

MAC - Maintenance allocation chart

M151 - Standard U.S. Army jeep with pintle mount

OH-58 - Helicopter

PADS - Position and azimuth determining system

PLMB - Standard U.S. Army jeep with PADS plumb bob arm

POR - Power on reset

PS - Power supply

PSTS - Power supply test set

SCR - Silicone controlled rectifier

SDB - Serial data bus

SEL - User selected data

SPH - Spheroid

SPU - Signal processor unit

SUSV - Small unit service vehicle

SUV - Small unit service vehicle

UART - Universal asynchronous receiver/transmitter

UH-1 - Helicopter

UTM - Universal Transverse Mercator

SECTION III. SYMBOLS

ΔV - Incremental velocity

$\Delta\omega$ - Incremental angular motion

ΔV_X - Incremental velocity in the north-south direction; along the x-axis

ΔV_Y - Incremental velocity along the east-west direction; along the y-axis

ΔV_Z - Incremental vertical velocity; along the z-axis

ω_X - Angular velocity about the x-axis; gyro y-axis torquing signal

ω_Y - Angular velocity about the y-axis; gyro x-axis torquing signal

ω_Z - Angular velocity about the z-axis; gyro x-axis torquing signal

$\Delta\omega_X$ - Incremental angular velocity about the x-axis; gyro y-axis torquing signal

$\Delta\omega_Y$ - Incremental angular velocity about the y-axis; gyro x-axis torquing signal

$\Delta\omega_Z$ - Incremental angular velocity about the z-axis; gyro y-axis torquing signal

• - Asterisk denotes negative logic

$\angle$ – Horizontal angle

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INDEX - Continued

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INDEX – Continued

Subject	Paragraph Figure, Table, Number

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Subject	Paragraph, Figure, Table, Number

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INDEX – *Continued*

*U.S. GOVERNMENT PRINTING OFFICE: 1990- 754-029/20148

PIN: 050237-004

INDEX — Continued

Figure FO-1. PADS Functional Block Diagram

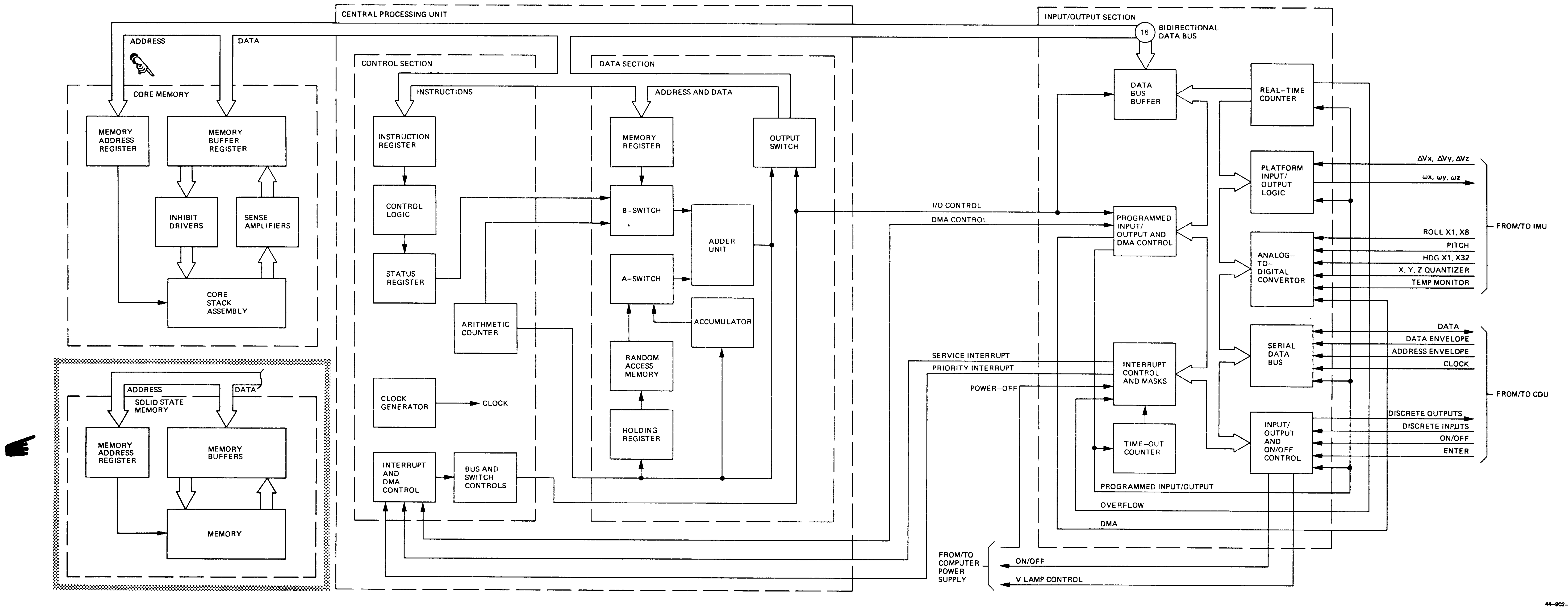


Figure FO-2. Computer Functional Block Diagram

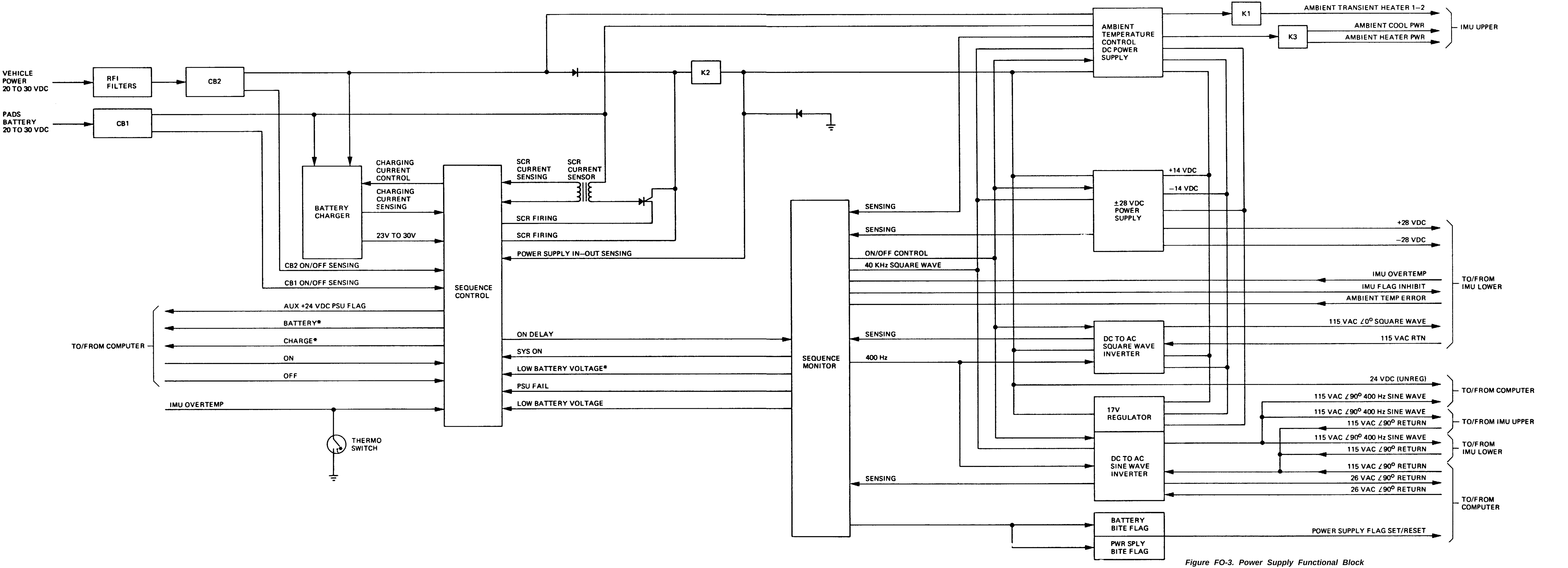


Figure FO-3. Power Supply Functional Block Diagram

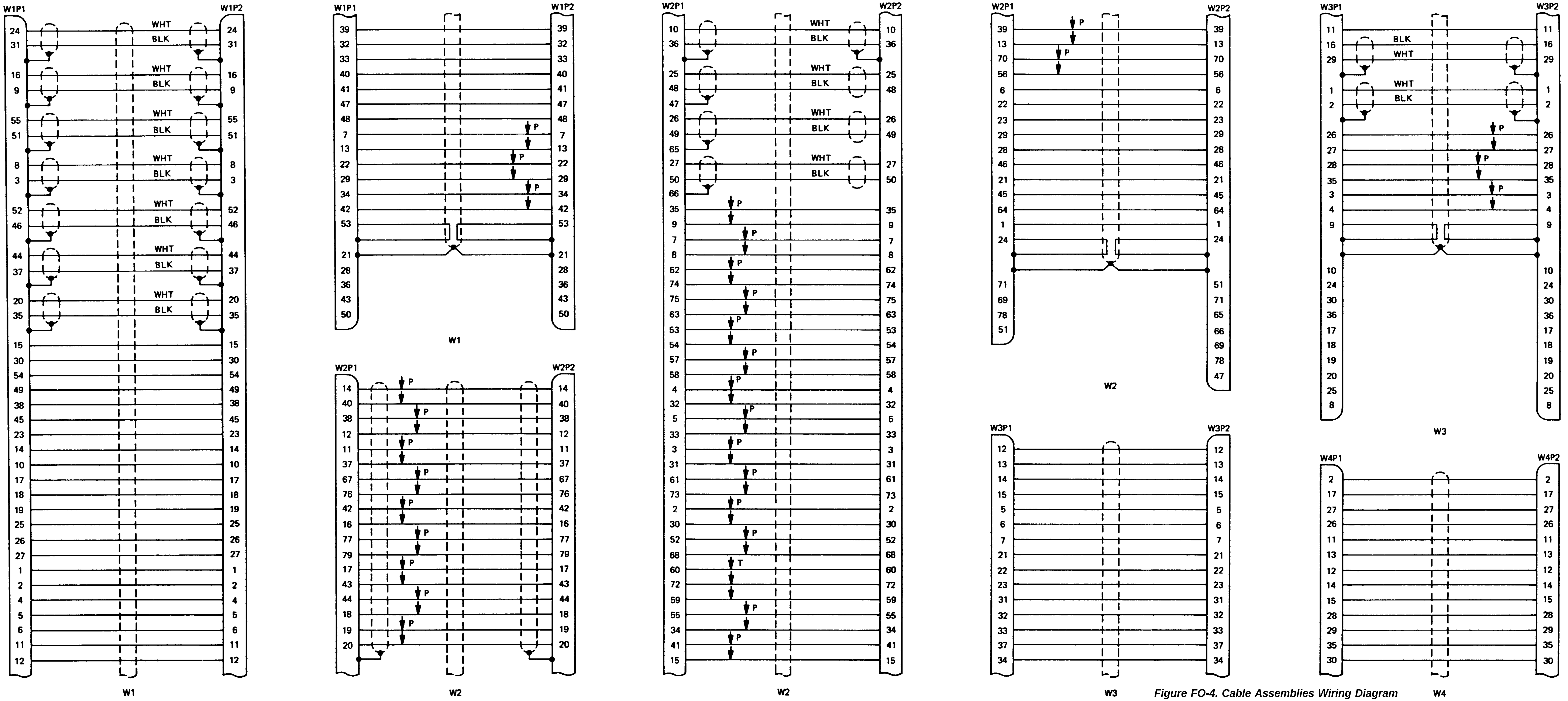


Figure FO-4. Cable Assemblies Wiring Diagram
(Sheet 1 of 2)

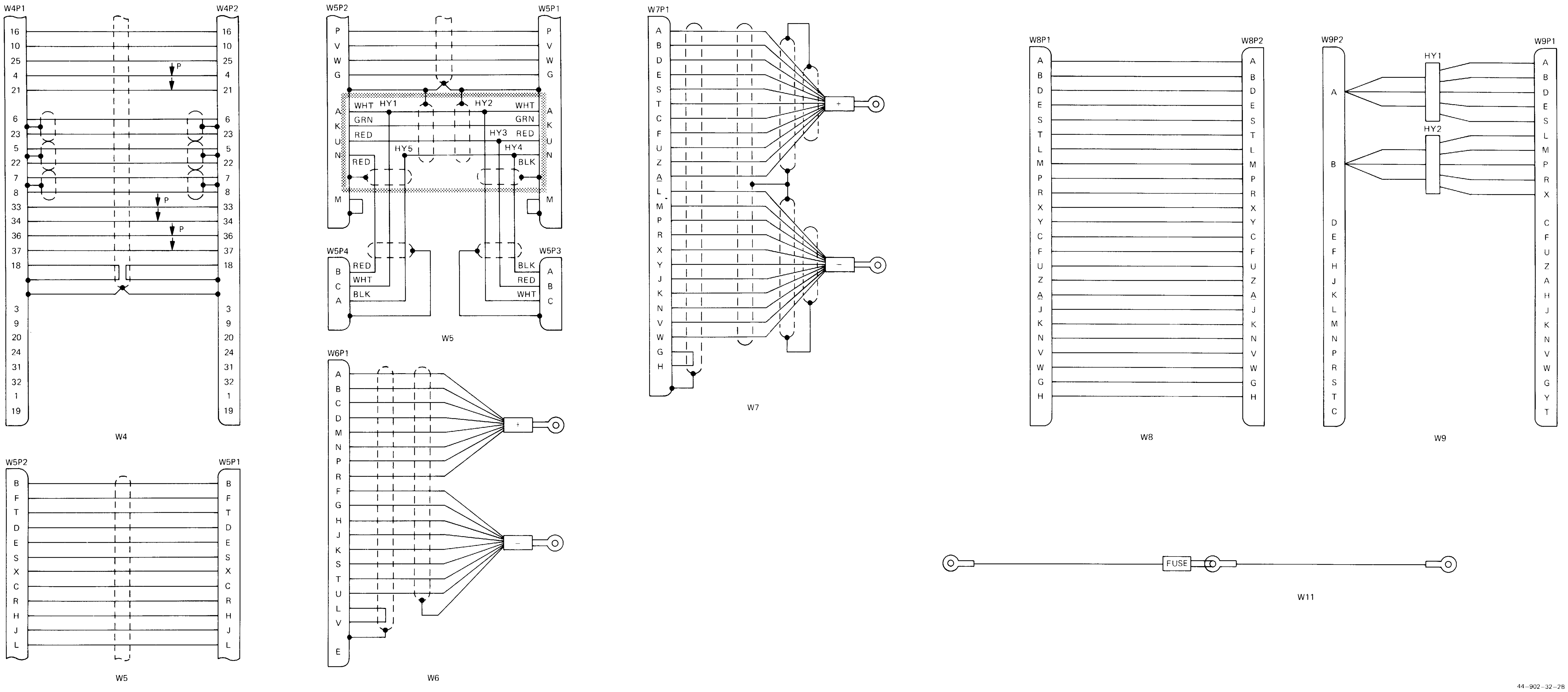
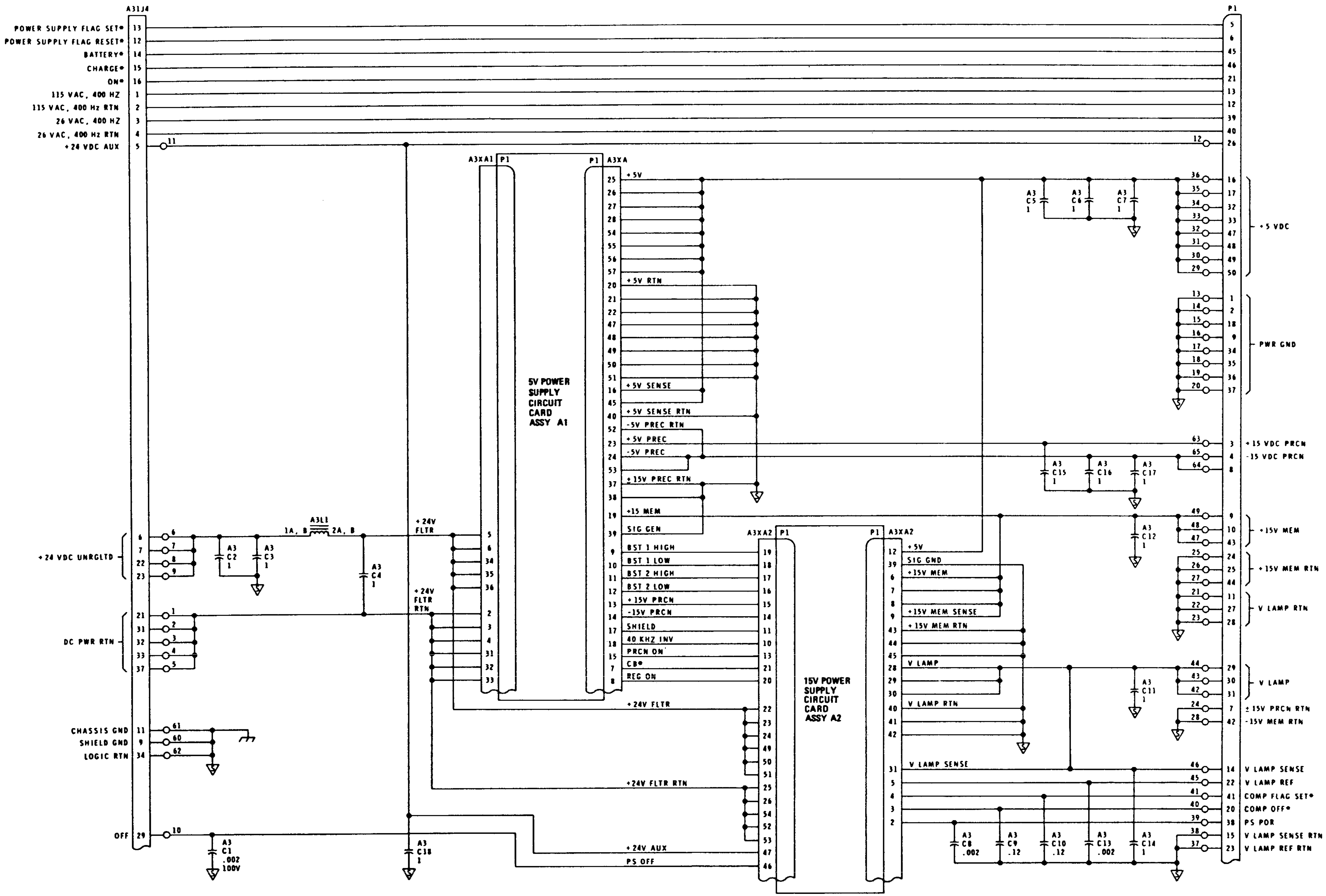


Figure FO-4. Cable Assemblies Wiring Diagram (Sheet 2 of 2)



NOTE

1. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE DESIGNATION WITH UNIT NUMBER, ASSEMBLY, OR SUBASSEMBLY DESIGNATION, AS APPLICABLE
2. CAPACITANCE VALUES ARE IN MICROFARADS.

Figure FO-5. Computer Power Supply Schematic Diagram

TABLE I

A	B			C		D	E	F	G
3	3	39	77	6	52	2	35	2	10
7	5	43	79	8	54	4	36	3	24
9	7	45		10	56	18	37	4	25
28	9	47		12	58	22	38	5	26
29	11	49		14	60	36	39	42	27
30	13	51		16	62	38	70	43	28
31	15	53		20	64		71	44	29
68	17	55		24	66		72	45	30
69	19	57		26	68		73	46	31
70	21	59		28	70		74	47	32
71	23	61		30	72		75	48	33
	25	63		32	74		76	49	34
	27	65		34	76		77	50	65
	29	67		42	78		78	51	66
	31	69		44			79	52	67
	33	71		46			80		68
	35	73		48			81		69
	37	75		50					

H	J	K	L
10	7	19	2
11	8	20	3
12	9	25	4
50	47	27	5
51	48	29	23
52	49	31	37
		33	38
		35	39
		36	43
		66	44
		67	45
		68	74
		69	75
		70	76
			77
			78
			79
			80

TABLE II

3J1	3J2	3J3	3J4	3J5
	E	1		8
		3		10
		9		24
		19		25
		20		26
		24		27
		31		28
		32		30
		33		35
		34		36
		36		
		37		

12. SPARE PINS ARE SHOWN IN TABLE II
11. ABBREVIATIONS PER MIL-STD-12. NONSTD ABBREVIATIONS ARE
    IMU - INERTIAL MEASUREMENT UNIT
    PSU - POWER SUPPLY UNIT
    SCR - SILICON CONTROLLED RECTIFIER
10. SYMBOL △ INDICATES MULTIPLE PIN CONNECTIONS. SEE TABLE I FOR PIN NUMBERS.
9. SYMBOL * INDICATES SIGNAL IS IN ITS TRUE STATE WHEN IT IS LOW.
8. INDIVIDUALLY UNDERLINED LETTERS TO BE CONSTRUED AS LOWERCASE.
7. REFERENCE DESIGNATIONS NOT USED: CR1, E1 THROUGH E34, E39, E40, J1 THROUGH J5.
6. LAST REFERENCE DESIGNATION USED: A9, B1, C5, CB2, CR10, DS2, E41, FL1, 3J5, J6, K3, L2, M1, S2, T1, TB1, W4.
5. INDUCTANCE VALUES ARE IN MICROHENRIES.
4. CAPACITANCE VALUES ARE IN MICROFARADS, ±10%, 400V.
3. RESISTANCE VALUES ARE IN OHMS, ±1%, 2W.
2. PARENTHETICAL NOTES AT END OF INTERRUPTED LINES DENOTE LOCATION OF CONNECTION POINT. FIRST LETTER INDICATES THE GENERAL AREA. NUMBER AND SECOND LETTER INDICATE THE GRID LOCATION WITHIN THAT AREA.
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR COMPLETE DESIGNATION, PREFIX WITH UNIT NUMBER, OR SUBASSEMBLY DESIGNATION(S).

NOTES: UNLESS OTHERWISE SPECIFIED

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Figure FO-6. Power Supply Schematic Diagram

Figure FO-1. PADS Functional Block Diagram

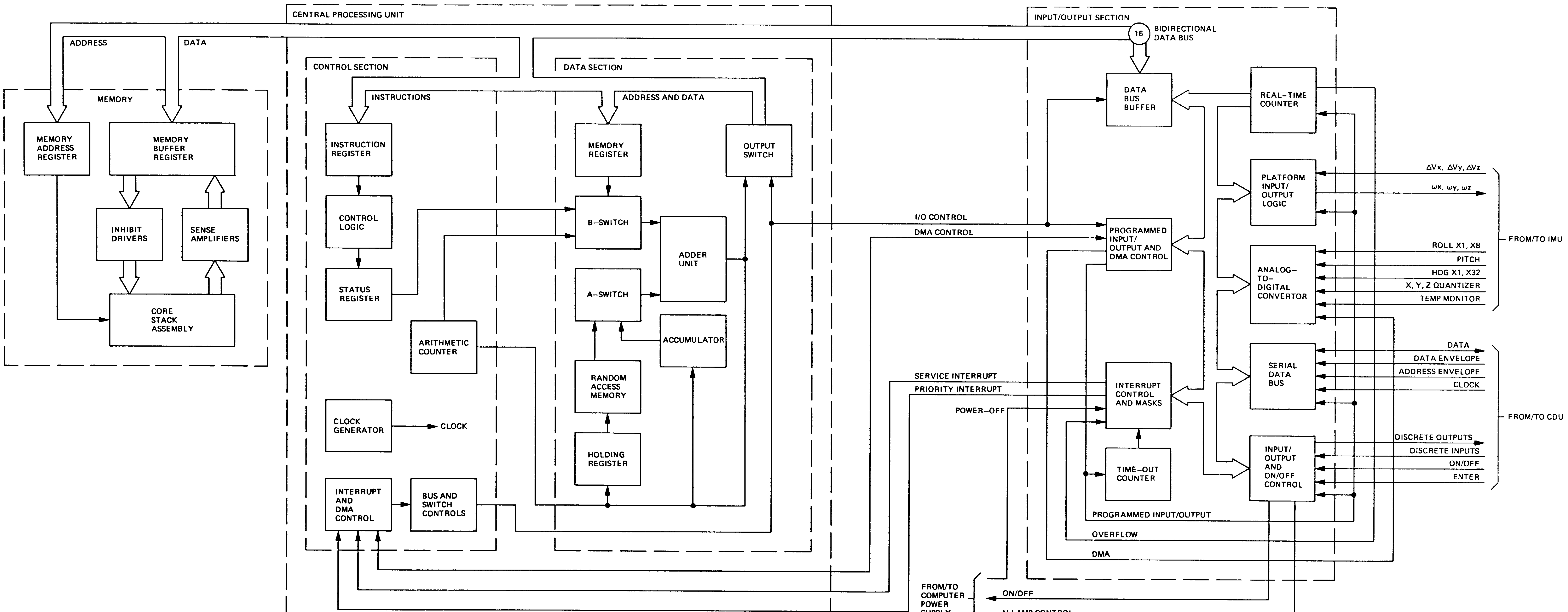


Figure FO-2. Computer Functional Block Diagram

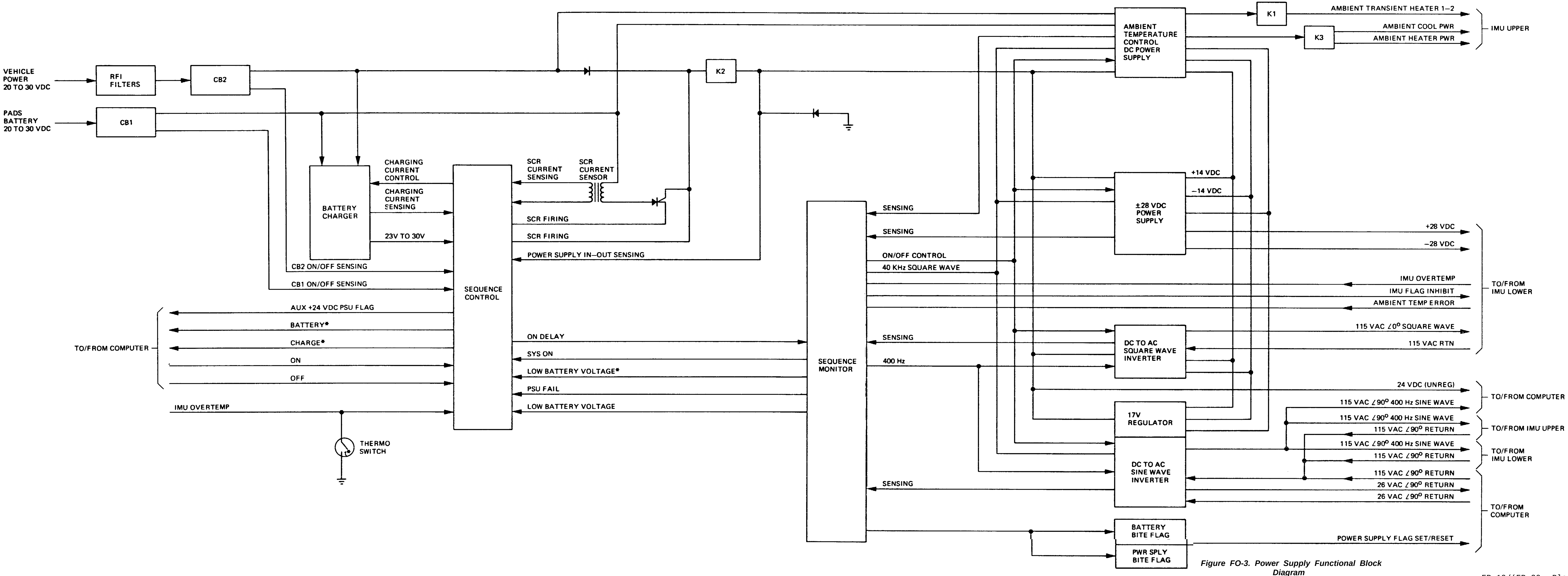


Figure FO-3. Power Supply Functional Block Diagram

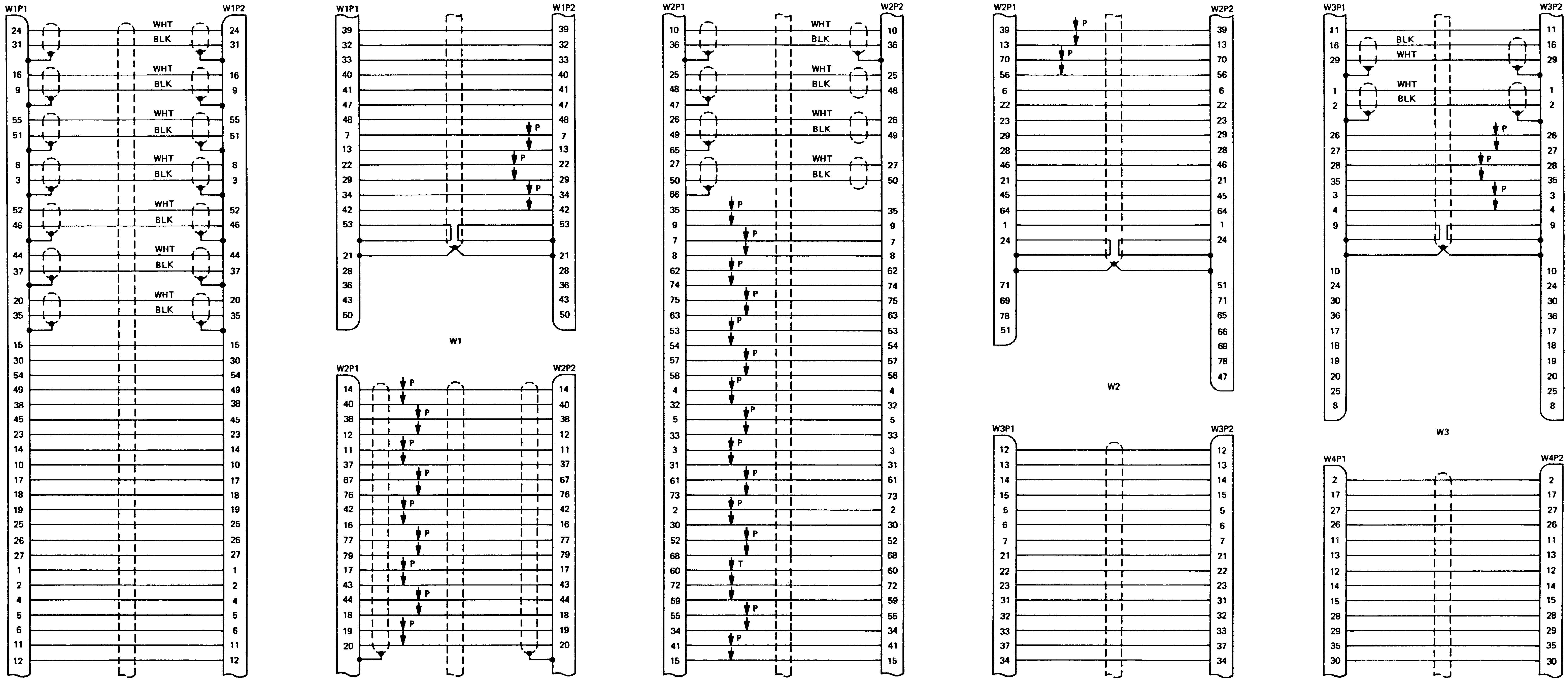


Figure FO-4. Cable Assemblies Wiring Diagram (Sheet 1 of 2)

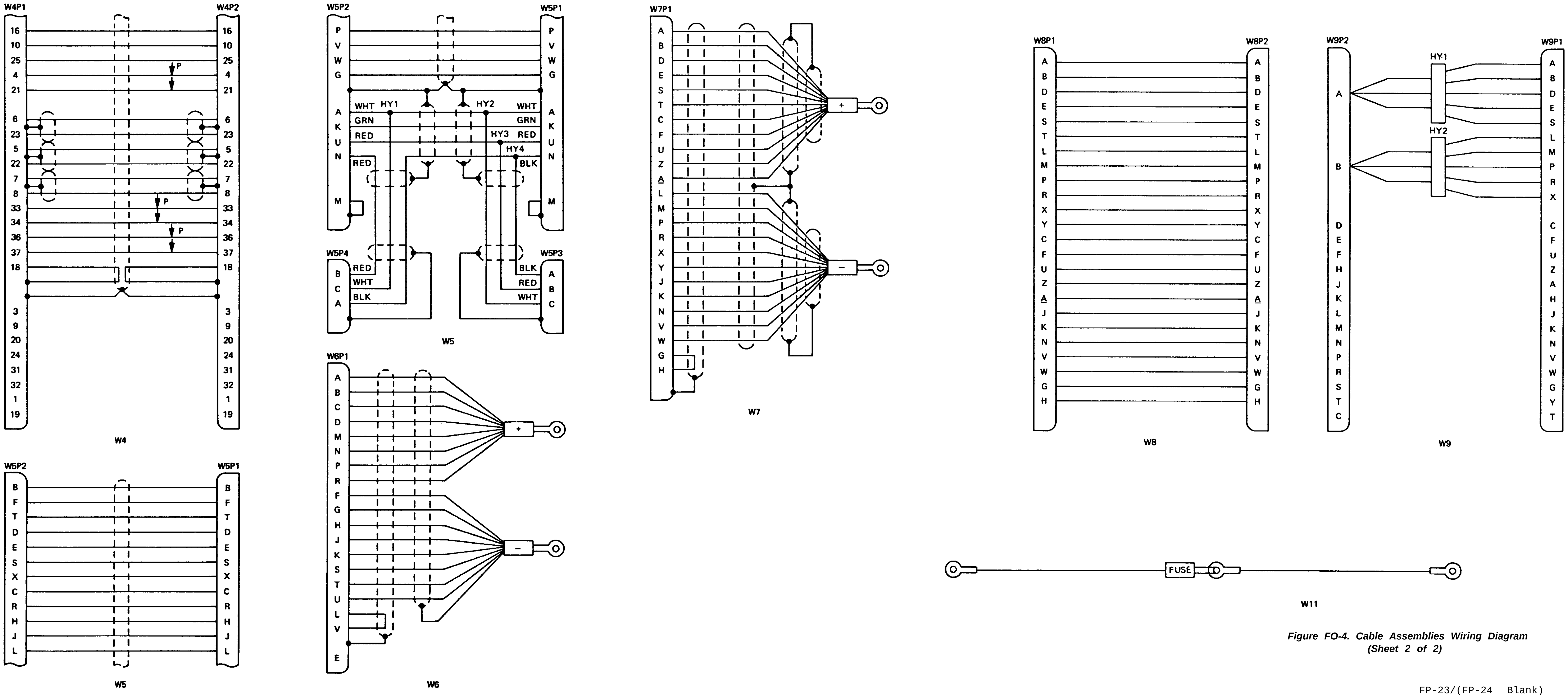
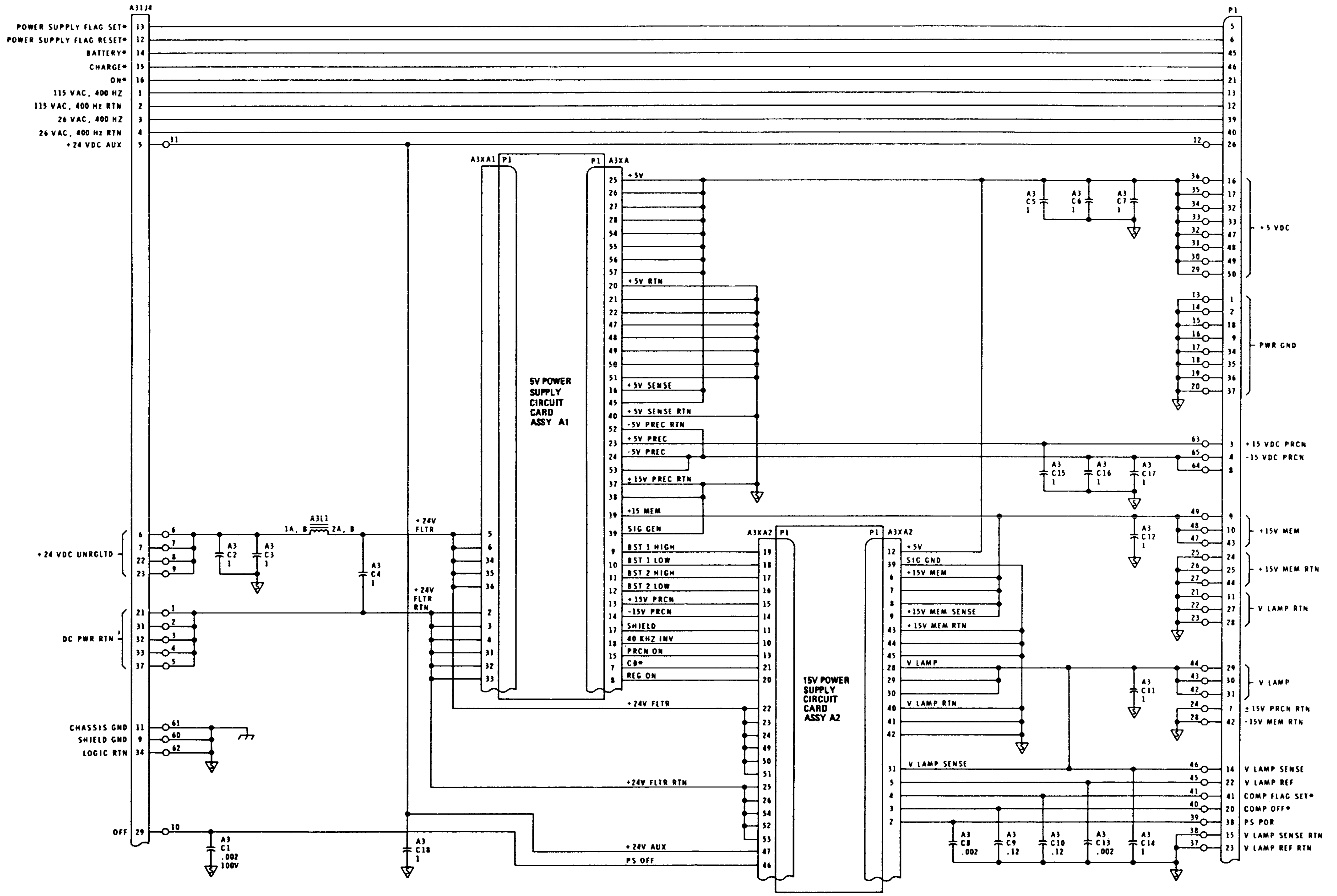


Figure FO-4. Cable Assemblies Wiring Diagram
(Sheet 2 of 2)



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A	B			C		D	E	F	G
5	3	39	77	6	52	2	35	2	18
7	5	43	79	8	54	4	36	3	24
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20	9	47		12	58	22	38	5	26
29	11	49		14	60	36	39	42	27
30	13	51		16	62	38	70	43	28
31	15	53		20	64		71	44	29
68	17	55		24	66		72	45	30
69	19	57		26	68		73	46	31
70	21	59		28	70		74	47	32
71	23	61		30	72		75	48	33
	25	63		32	74		76	49	34
	27	65		34	76		77	50	65
	29	67		42	78		78	51	66
	31	69		44			79	52	67
	33	71		46			80		68
	35	73		48			81		69
	37	75		50					

H	J	K	L
10	7	19	2
11	8	20	3
12	9	25	4
50	47	27	5
51	48	29	23
52	49	31	37
		33	38
		35	39
		36	43
		66	44
		67	45
		68	74
		69	75
		70	76
			77
			78
			79
			80

TABLE II

J31	J32	J33	J34	J35
	E	1		8
		3		10
		9		24
		19		25
		20		26
		24		27
		31		28
		32		30
		33		35
		34		36
		36		
		37		

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4. CAPACITANCE VALUES ARE IN MICROFARADS, ±10%, 400V.

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Figure FO-6. Power Supply Schematic Diagram

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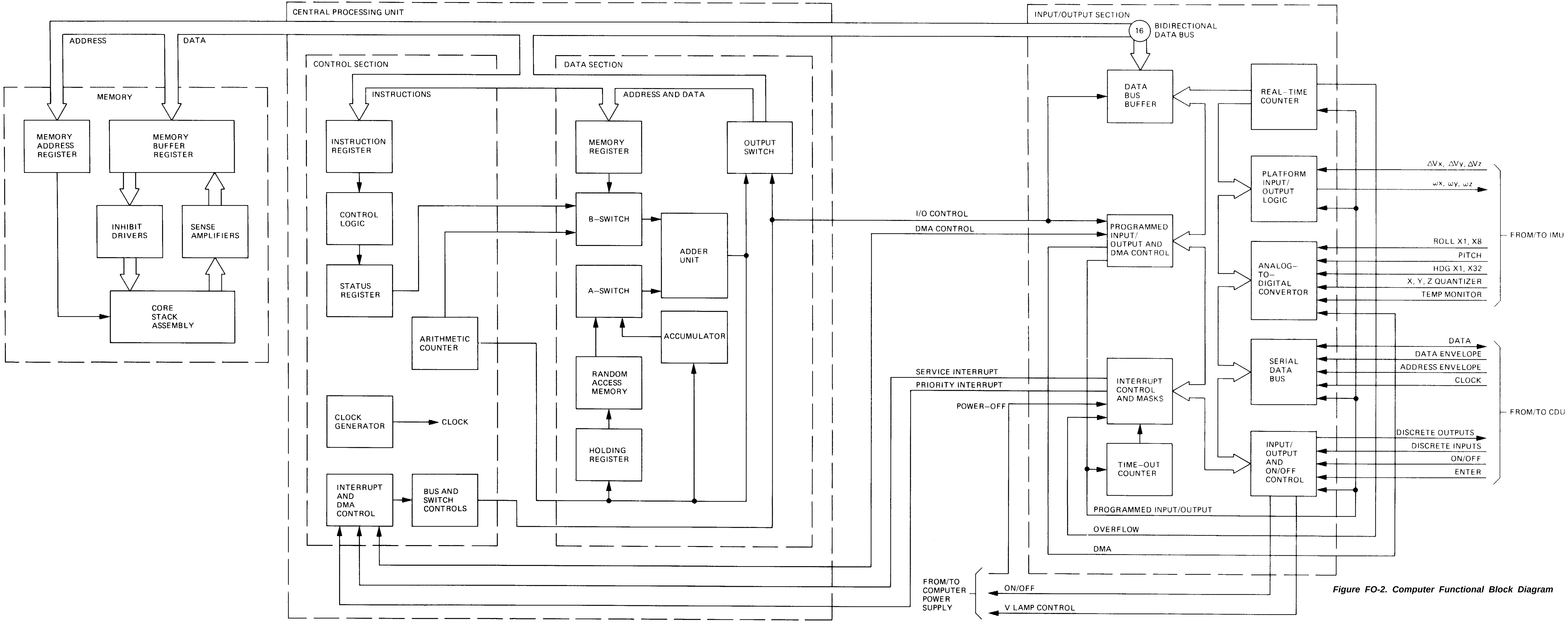


Figure FO-2. Computer Functional Block Diagram

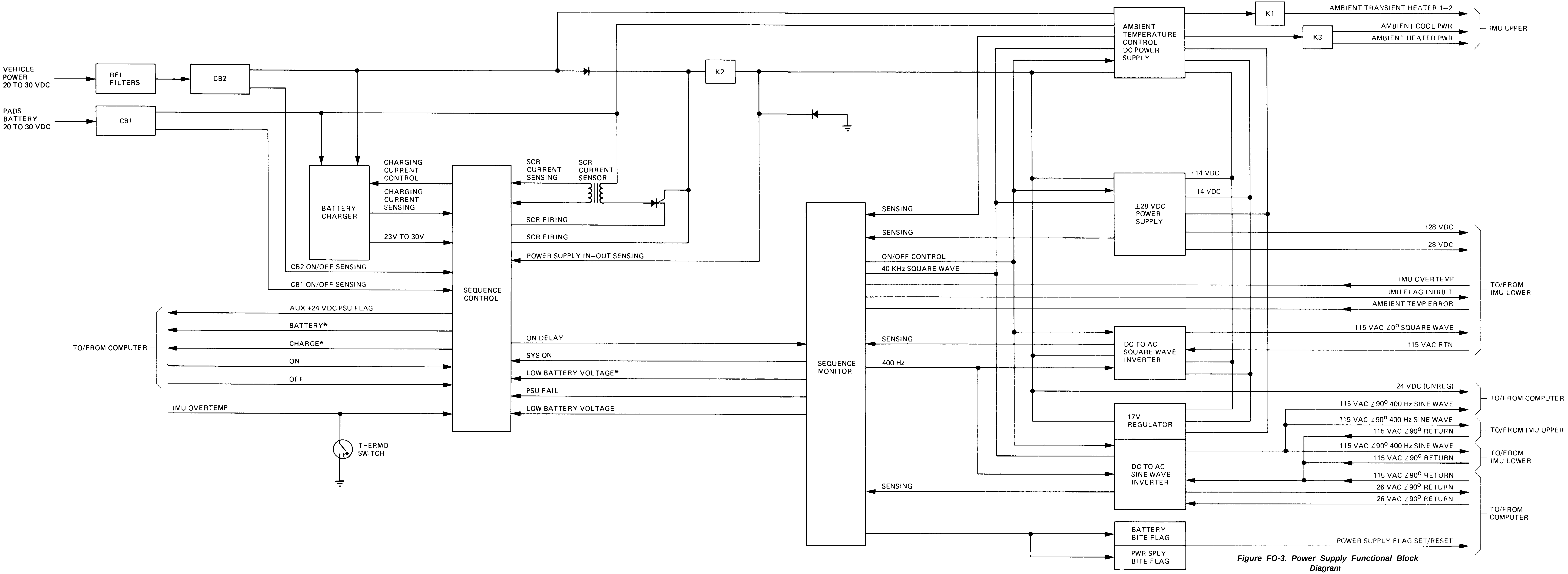
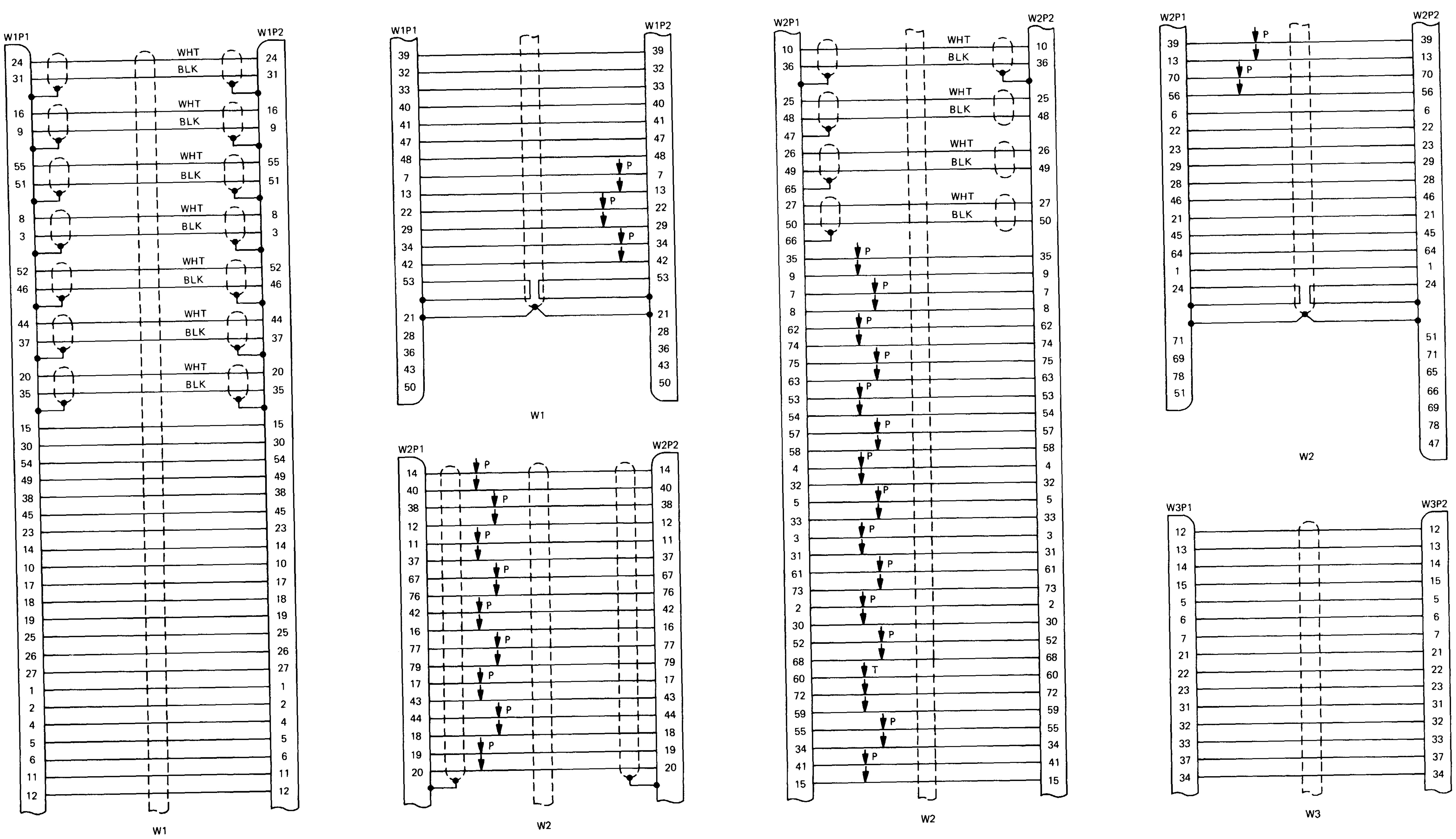


Figure FO-3. Power Supply Functional Block Diagram



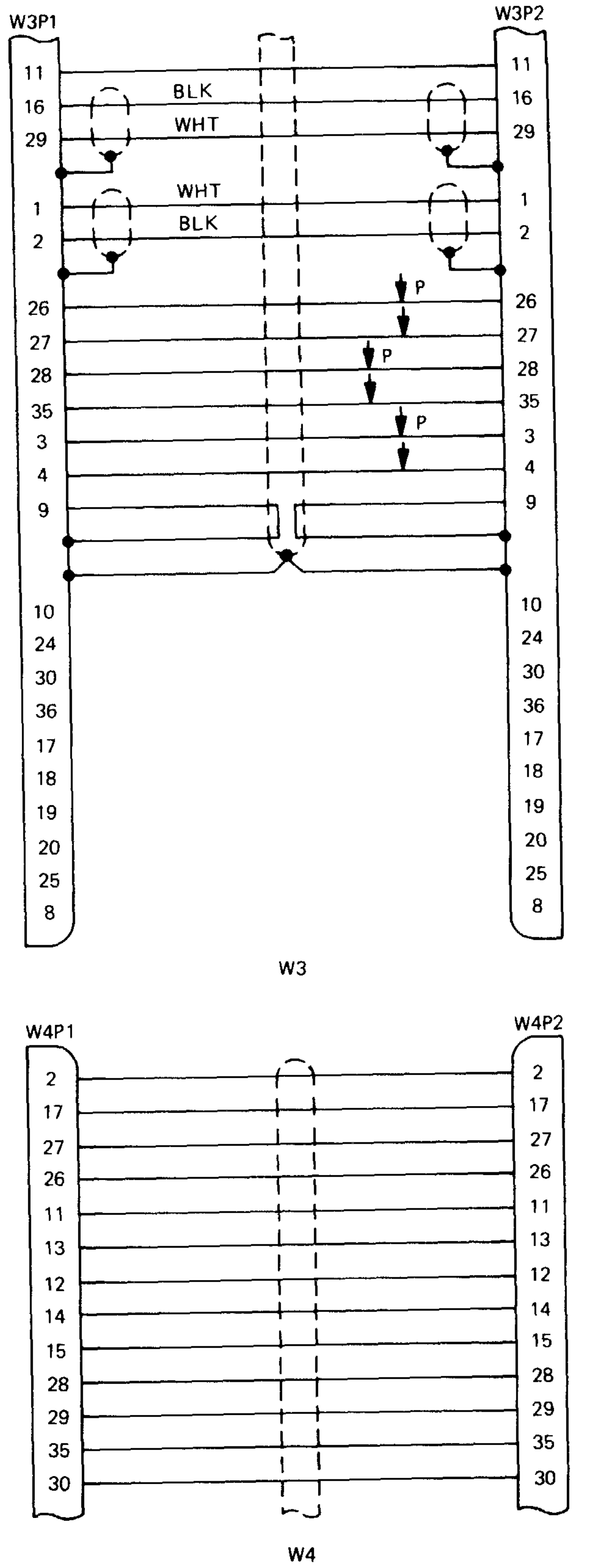
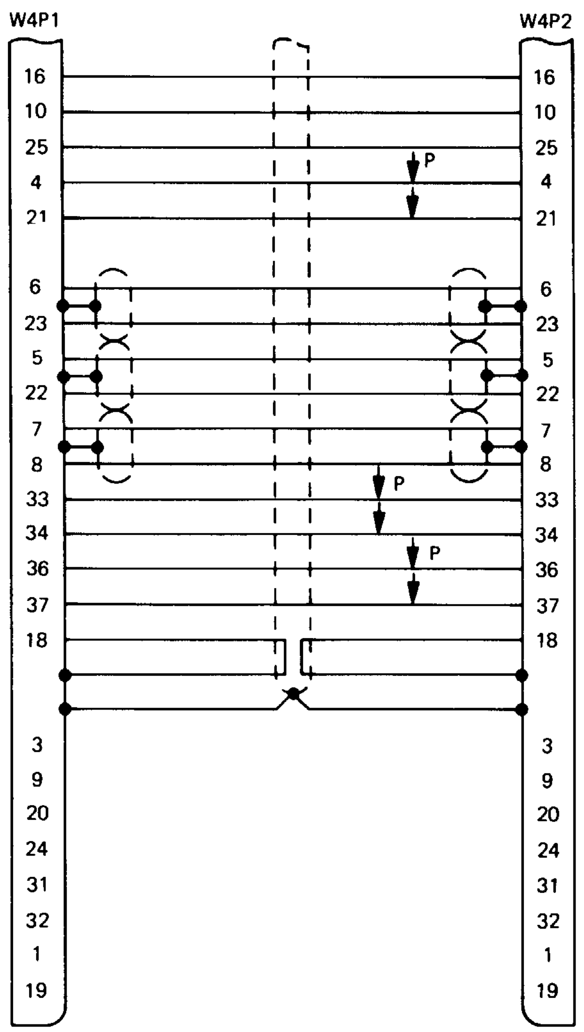


Figure FO-4. Cable Assemblies Wiring Diagram (Sheet 1 of 2)



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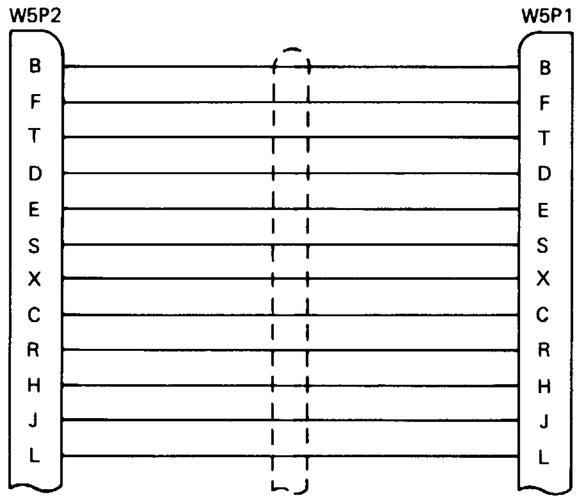

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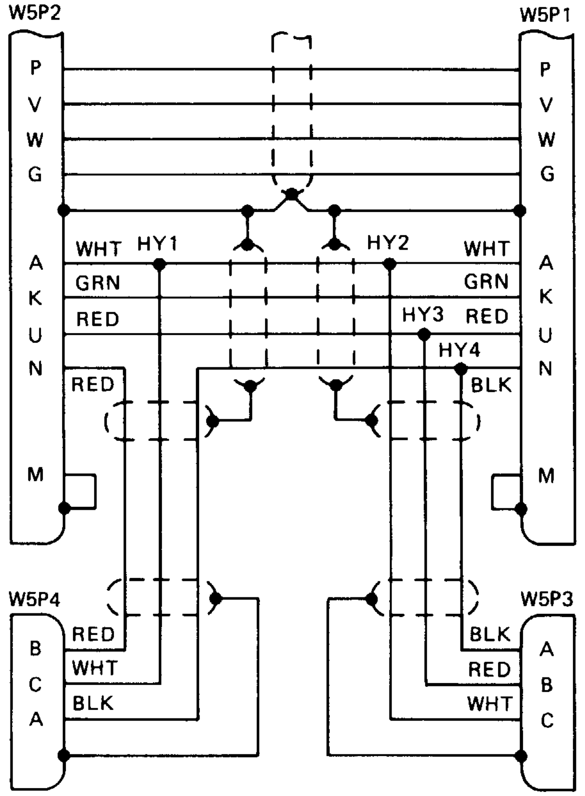

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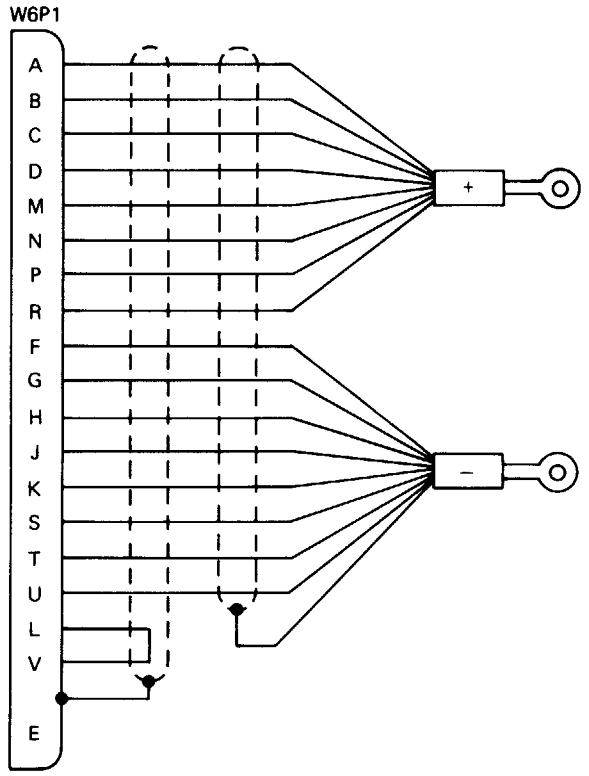
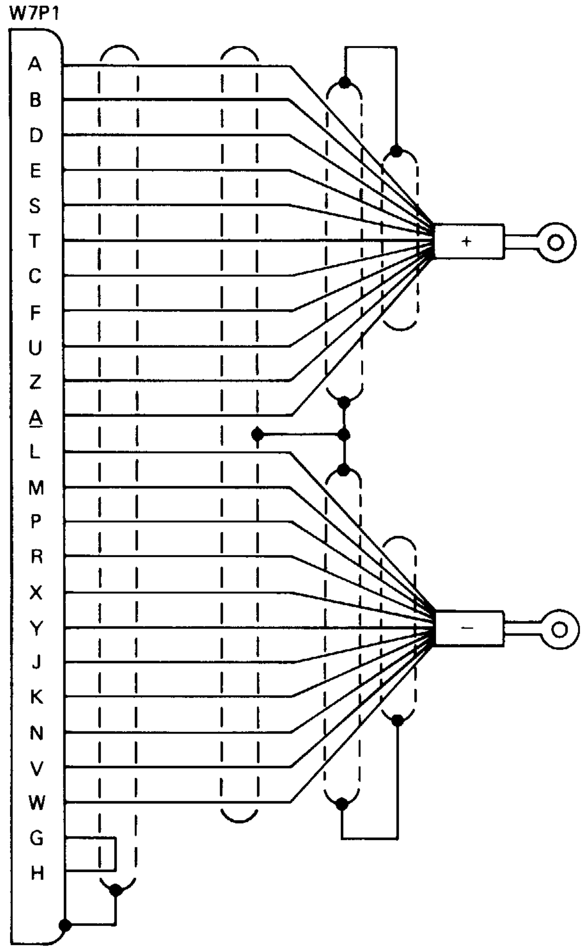
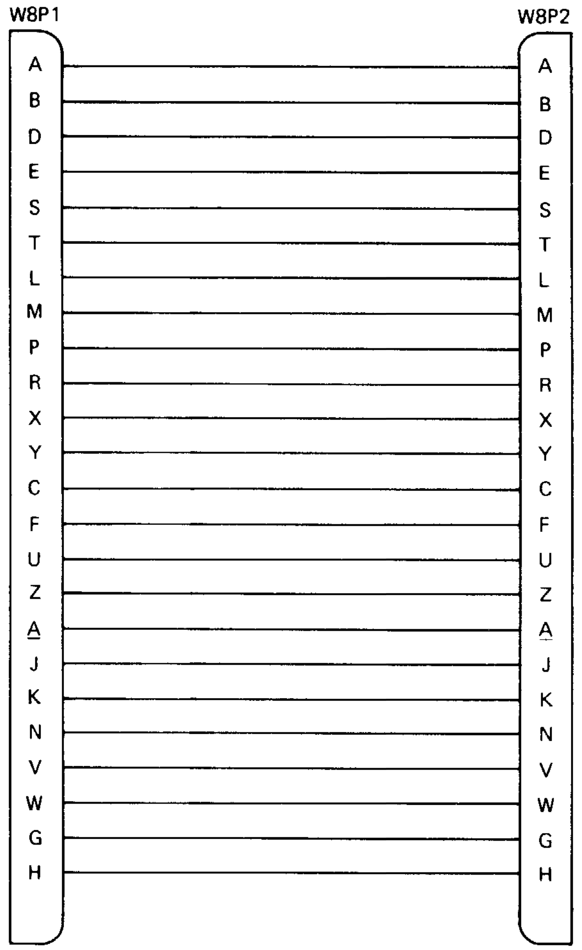


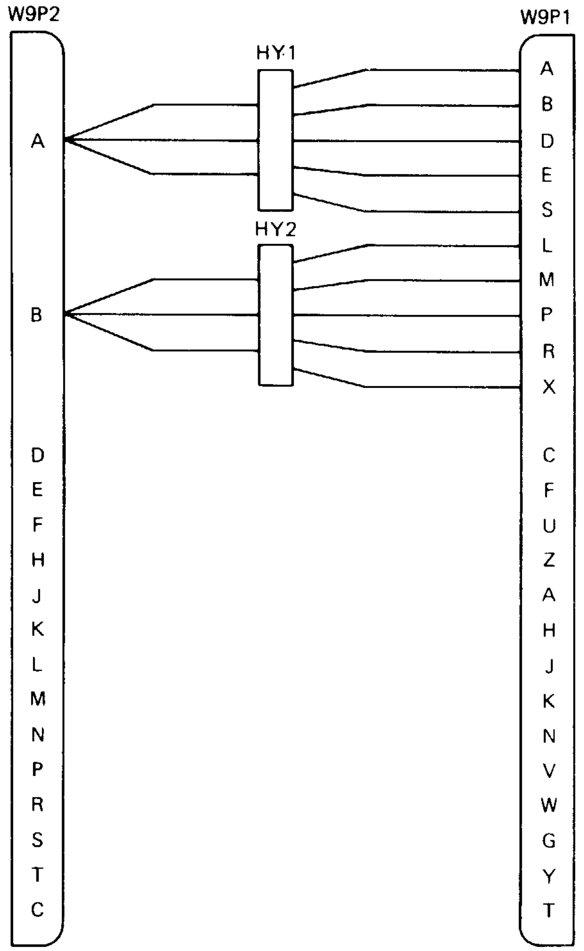
W6



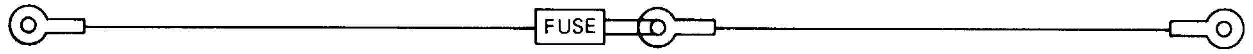
W7



W8

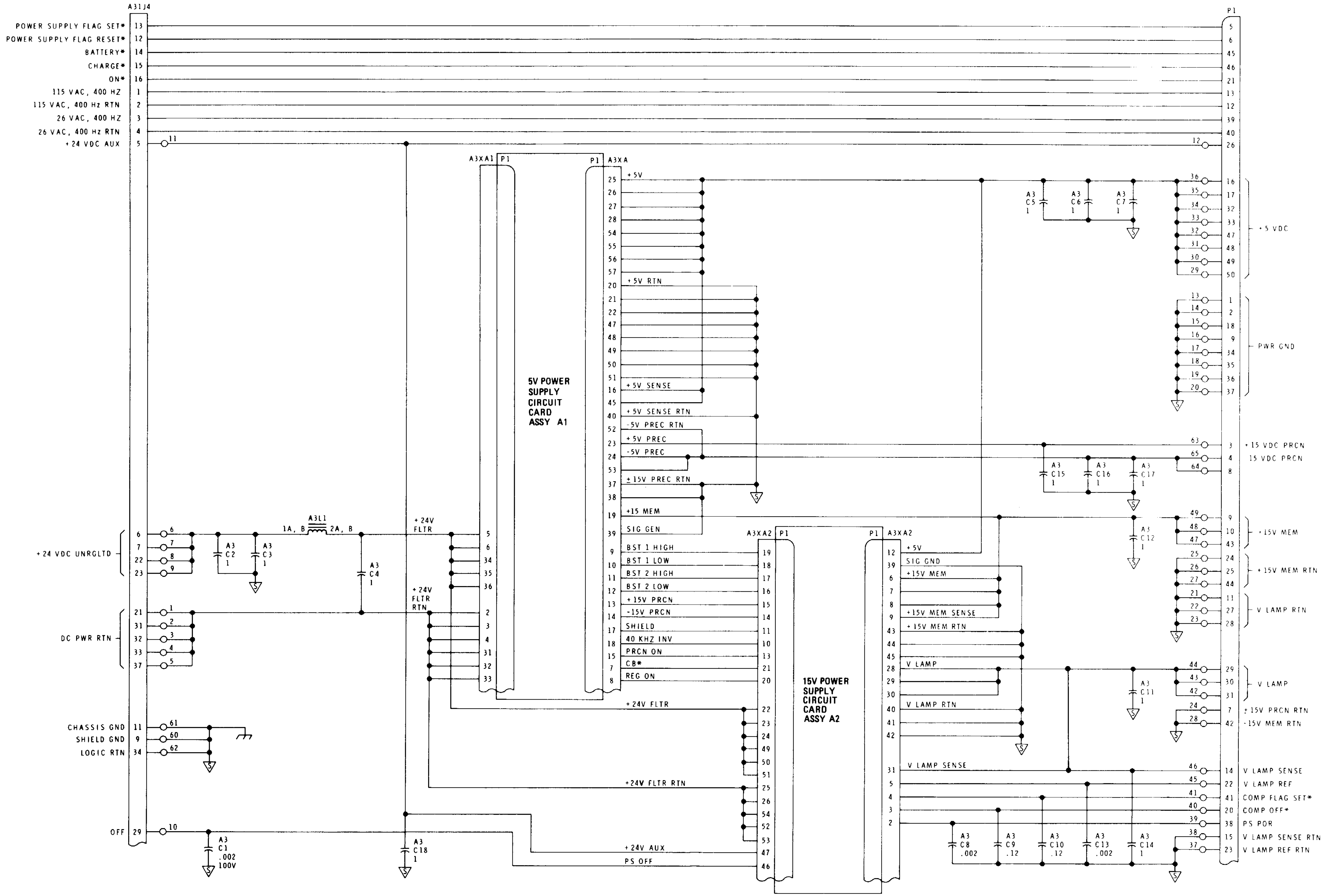


W9



W11

Figure FO-4. Cable Assemblies Wiring Diagram (Sheet 2 of 2)



NOTE:

1. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE DESIGNATION WITH UNIT NUMBER, ASSEMBLY, OR SUBASSEMBLY DESIGNATION, AS APPLICABLE
2. CAPACITANCE VALUES ARE IN MICROFARADS.

Figure FO-5. Computer Power Supply Schematic Diagram

TABLE I

A	B			C		D	E	F	G
3	3	39	77	6	52	2	35	2	10
7	5	43	79	8	54	4	36	3	24
9	7	45		10	56	18	37	4	25
28	9	47		12	58	22	38	5	26
29	11	49		14	60	36	39	42	27
30	13	51		16	62	38	70	43	28
31	15	53		20	64		71	44	29
68	17	55		24	66		72	45	30
69	19	57		26	68		73	46	31
70	21	59		28	70		74	47	32
71	23	61		30	72		75	48	33
	25	63		32	74		76	49	34
	27	65		34	76		77	50	65
	29	67		42	78		78	51	66
	31	69		44			79	52	67
	33	71		46			80		68
	35	73		48			81		69
	37	75		50					

H	I	K	L
10	7	19	2
11	8	20	3
12	9	25	4
50	47	27	5
51	48	29	23
52	49	31	37
		33	38
		35	39
		36	43
		66	44
		67	45
		68	74
		69	75
		70	76
			77
			78
			79
			80

TABLE II

3J1	3J2	3J3	3J4	3J5
	E	1		8
		3		10
		9		24
		19		25
		20		26
		24		27
		31		28
		32		30
		33		35
		34		36
		36		
		37		

12. SPARE PINS ARE SHOWN IN TABLE II
11. ABBREVIATIONS PER MIL-STD-12. NONSTD ABBREVIATIONS ARE
    - IMU - INERTIAL MEASUREMENT UNIT
    - PSU - POWER SUPPLY UNIT
    - SCR - SILICON CONTROLLED RECTIFIER

$\boxed{10}$ SYMBOL △ INDICATES MULTIPLE PIN CONNECTIONS. SEE TABLE I FOR PIN NUMBERS.

9. SYMBOL * INDICATES SIGNAL IS IN ITS TRUE STATE WHEN IT IS LOW.
8. INDIVIDUALLY UNDERLINED LETTERS TO BE CONSTRUED AS LOWERCASE.
7. REFERENCE DESIGNATIONS NOT USED: E1 THROUGH E34, E39, E40, J1 THROUGH J5.
6. LAST REFERENCE DESIGNATION USED: A9, B1, C4, CB2, CR10, DS2, E41, FL1, 3J5, J6, K3, L2, M1, R1, S1, T1, TB1, W4.
5. INDUCTANCE VALUES ARE IN MICROHENRIES.
4. CAPACITANCE VALUES ARE IN MICROFARADS, ±10%, 400V.
3. RESISTANCE VALUES ARE IN OHMS, ±1%, 2W.
2. PARENTHETICAL NOTES AT END OF INTERRUPTED LINES DENOTE LOCATION OF CONNECTION POINT. FIRST LETTER INDICATES THE GENERAL AREA. NUMBER AND SECOND LETTER INDICATE THE GRID LOCATION WITHIN THAT AREA.
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR COMPLETE DESIGNATION, PREFIX WITH UNIT NUMBER, OR SUBASSEMBLY DESIGNATION(S).

NOTES: UNLESS OTHERWISE SPECIFIED

Figure FO-6. Power Supply Schematic Diagram

By Order of the Secretaries of the Army and the Navy:

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Genera1, United States Army
Chief of Staff

Official:

DONALD J. DELANDRO
Brigadier Genera1, United States Army
The Adjutant General

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* U.S. GOVERNMENT PRINTING OFFICE: 1985-564-030/20079

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)
PFC JOHN DOE
CO A, 3d ENGINEER BN
FT. LEONARDWOOD, MO 63108

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 5-6675-308-34	24 Jul 85	Position and Azimuth Determining System AN/USQ-70

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
6	2-1 a			In line 6 of paragraph 2-1a the manual states the engine has 6 cylinders. The engine on my set only has 4 cylinders. Change the manual to show 4 cylinders.
81		4-3		Callout 16 on figure 4-3 is pointing at a bolt. In key to figure 4-3, item 16 is called a shim. Please correct one or the other.
125	line 20			I ordered a gasket, item 19 on figure B-16 by NSN 2910-00-762-3001. I got a gasket but it doesn't fit. Supply says I got what I ordered, so the NSN is wrong. Please give me a good NSN.

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
JOHN DOE, PFC (268) 317-7111

SIGN HERE: John Doe
JOHN DOE

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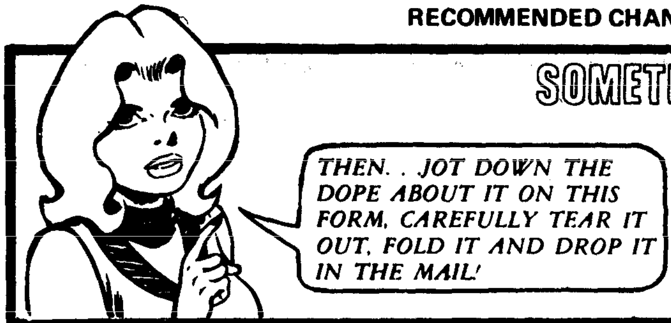

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The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*
inches	centimeters	2.540
feet	meters	.305
yards	meters	.914
miles	kilometers	1.609
square inches	square centimeters	6.451
square feet	square meters	.093
square yards	square meters	.836
square miles	square kilometers	2.590
acres	square hectometers	.405
cubic feet	cubic meters	.028
cubic yards	cubic meters	.765
fluid ounces	milliliters	29,573
pints	liters	.473
quarts	liters	.946
gallons	liters	3.785
ounces	grams	28.349
pounds	kilograms	.454
short tons	metric tons	.907
pound-feet	newton-meters	1.356
pound-inches	newton-meters	.11296

To change	*To*	*Multiply by*
ounce-inches	newton-meters	.007062
centimeters	inches	.394
meters	feet	3.280
meters	yards	1.094
kilometers	miles	.621
square centimeters	square inches	.155
square meters	square feet	10.764
square meters	square yards	1.196
square kilometers	square miles	.386
square hectometers	acres	2.471
cubic meters	cubic feet	35.315
cubic meters	cubic yards	1.308
milliliters	fluid ounces	.034
liters	pints	2.113
liters	quarts	1.057
liters	gallons	.264
grams	ounces	.035
kilograms	pounds	2.205
metric tons	short tons	1.102

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C