

***TM 1-5855-265-T**

TECHNICAL MANUAL

AVIATION UNIT TROUBLESHOOTING MANUAL

**PILOT NIGHT VISION SENSOR
(PNVS) ASSEMBLY
AN/AAQ-11
(NSN 5855-01-120-7831)**

*This manual supersedes TM 1-5855-265-T dated 31 August 1992, including all changes.

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

AH-64A ATTACK HELICOPTER

**HEADQUARTERS, DEPARTMENT OF THE ARMY
6 AUGUST 2001**

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No. 1-5855-265-T

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(AH-64A ATTACK HELICOPTER)**

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS
You can help improve this manual. If you find any errors 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 the back of this manual directly to: Commander, U.S. Army Aviation and Missile Command, ATTN: AMSAM-MMC-MA-NP, Redstone Arsenal, AL 35898-5000. A reply will be furnished to you. You may also send in your comments electronically to our e-mail address: 2028@redstone.army.mil or FAX us at (256) 842-6546/DSN 788-6546. Instructions for sending an electronic 2028 may be found at the end of this TM immediately preceding the hard copy 2028.

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HOW TO USE THIS MANUAL

If you cannot find the information you are looking for, you cannot properly do your job. Take a few minutes to look through this manual. You will find it easier to use once you have become familiar with it.

Each chapter and section is set up to lead you through it step by step. For example:

1. On the chapter page, you will see a listing of the sections in that chapter. Listed under the section titles is a listing of the tasks for that section. Find the task (by title) that you have been assigned. Now, look across from the task title and you will find the paragraph and page number for the task. Notice that the chapter number forms part of the page number.
2. Now that you have located the page number, turn to that page and review the task requirements before starting the procedures.
3. Did you notice that each task or job begins with an initial setup?
 - a. INITIAL SETUP lists the configuration, test equipment, tools and special tools, materials/parts, military occupational specialty (MOS), references, safety instructions, condition equipment should be in, and general instructions for you to complete the task. FOLLOWUP lists the procedures to be performed after you have completed the basic task.
 - b. Now, what exactly does INITIAL SETUP mean to you? The term "INITIAL SETUP" means, "DO THIS FIRST BEFORE STARTING THE TASK." Review one of the initial setup tables and become familiar with the requirements.
4. An explanation of the initial setup headings is presented below.
 - a. Tools and Special Tools. Special tools needed to perform the task. Be sure to acquire all the tools before you start the task.
 - b. Materials/Parts. Materials and parts needed to perform the task. Materials can be found in Appendix C. Next to the name of the material listed in the initial setup you will find an item number. This number matches the item number in column (1) of Appendix C. Be sure to acquire all the materials and parts before you start the task.
 - c. Personnel Required. MOS required to do the task. This will also tell you the number of persons needed to perform the task.
5. You can also use the table of contents on page i of this manual to locate page number for chapters, sections, and the appendixes.
6. Let's see if you understand how to find a specific task. Suppose your supervisor wants you to replace a part or assembly.

Here's how you would find it:

 - a. Obtain the correct TM for the task and look up the procedure in the chapter covering the type of task you are to perform.
 - b. For example: Replacement is a maintenance task you can find located in the maintenance chapter.

HOW TO USE THIS MANUAL (cont)

- c. Looking at the section titles listed in the maintenance chapter index, you should have located the page number for the maintenance procedures. Going to that page you found the section index and located the paragraph and page number of the replacement task.
7. Another approach would be to look in the alphabetical index in the rear of the manual.

CHAPTER 1
INTRODUCTION

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Section I. GENERAL INFORMATION

1-1. SCOPE

This manual covers electrical component location and configuration (ECLC), theory of operation, power up, power down, maintenance operational checks (MOC), wiring interconnects, and fault isolation procedures (FIP) for PNVS system functions.

1-2. MAINTENANCE FORMS, RECORDS, AND REPORTS

Department of the Army forms and instructions for completing them are included in DA PAM 738-751, The Army Maintenance Management System-Aviation (TAMMS-A).

1-3. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

Destruction procedures are in TM 750-244-1-5.

1-4. PREPARATION FOR STORAGE OR SHIPMENT

Refer to TM 1-5855-265-20 for procedures regarding storage and shipment of line replaceable units (LRUs) and electrostatic discharge sensitive (ESDS) devices.

1-5. QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

Quality assurance information is explained in FM 1-511.

1-6. DEFICIENCY REPORTING

If your equipment needs improvement, let us know. Send us a Quality Deficiency Report (QDR). You, the user, are the only one who can tell us what you don't like about your equipment. Let us know what you don't like about the design. Tell us why a procedure is hard to perform. Put it on Standard Form (SF) 368 (Quality Deficiency Report). Mail it to us at:

Commander
U.S. Army Aviation and Missile Command
ATTN: AMSAM-MMC-MA-NM
Redstone Arsenal, AL 35898-5230

We'll send you a reply.

1-7. CORROSION PREVENTION AND CONTROL (CPC)

- a. Corrosion prevention and control (CPC) of Army material is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future items.
- b. While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of these materials may be a corrosion problem.
- c. If a corrosion problem is identified, it can be reported using SF 368, Quality Deficiency Report. Use of the key words such as "corrosion," "rust," "deterioration," or "cracking" will assure that the information is identified as a CPC problem. The form should be submitted to: Commander, U.S. Army Armament, Munitions and Chemical Command, ATTN: AMSAV-QF/Customer Feedback Center, Rock Island, IL 61299-6000.

1-8. WARRANTY INFORMATION

Refer to TM 1-5855-265-20.

Section II. TROUBLESHOOTING INFORMATION

1-9. MANUAL CONTENT AND ORGANIZATION

- a. Equipment descriptions and theory of operation for systems and functions are presented in chapter 2. Troubleshooting for the system and functions is presented in chapters 3 and 4. Each troubleshooting chapter presents only one system or function.
- b. Chapter contents are provided in the chapter index, located at the beginning of every chapter. Before troubleshooting, learn the content and organization of this manual and how it relates to other manuals. For more information on manual content and usage refer to HOW TO USE THIS MANUAL.

1-10. ELECTRICAL DATA

a. Electrical Units. Unless otherwise specified, the values indicated for electrical units in this manual are as follows:

- Phase (\emptyset)
- Resistance (R) in ohms
- Voltage (E) in volts (V)
- Current (I) in amperes (A)
- Frequency in Hertz (Hz)
- Power in watts (W)

b. Electrical Measurement Tolerances. Unless otherwise specified, tolerances for resistance and voltage are $\pm 10\%$.

c. Grounds. Except as otherwise indicated (such as chassis ground), all grounds are common AC, DC, and signal grounds.

d. DC Voltage Polarities. DC voltages are positive polarity (+28 VDC, etc.) unless otherwise specified.

e. AC Voltages. All indicated AC voltages are 3 \emptyset , 400 Hz.

f. Circuit Breakers. Circuit breakers are to be at closed (ON) position. Troubleshooting procedures for all circuit breakers and all electrical circuits supplying electrical power to circuit breakers are in TM 1-1520-238-T-6.

g. Signal Names, States, Conditions, and Values. Signal values shown exist for the conditions and states indicated by signal names.

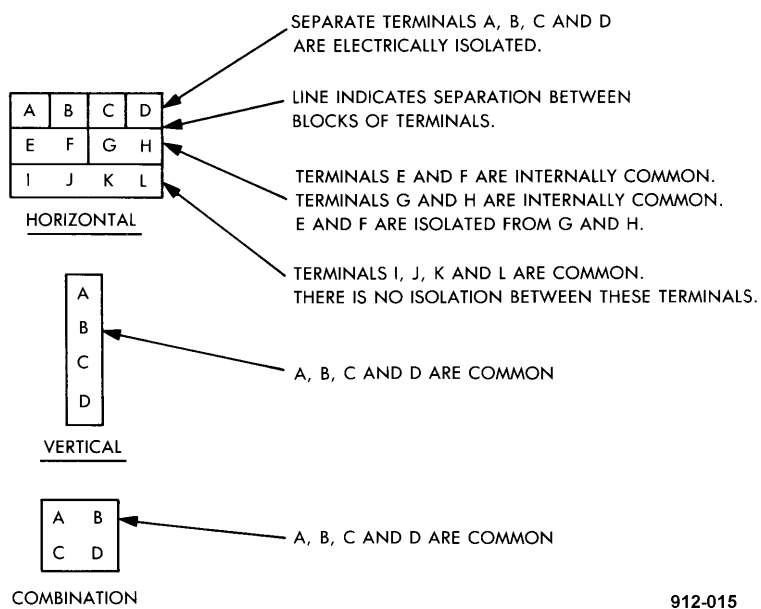
1-10. ELECTRICAL DATA (cont)

h. Coaxial Cable Resistance Measurements. When both ends of a coaxial cable are disconnected, resistance measurements from the shield to the center conductor shall indicate open.

i. Electrically Operated Devices. Relays, solenoids, and other electrically activated devices shown in the interconnect diagrams are shown in de-energized state.

j. Terminal Board Connections. Electrical connections at terminal boards are shown (fig. 1-1) as follows:

- Vertical and horizontal lines indicate electrical separation between terminals and blocks of terminals.
- Absence of lines indicates no separations.
- Terminal board connections may be illustrated horizontally, vertically, or a combination of both.



912-015

Figure 1-1. Typical Terminal Board Connections

1-11. WIRING INFORMATION

a. Interconnect diagrams in this manual are used for wiring checks. Helicopter reference designators for LRUs are shown in the lower right corner of the LRU on the diagrams. TADS and PNVS reference designators are shown after the LRU nomenclature in the upper left corner of the LRU. Electrical wiring repairs peculiar to the AH-64A are in TM 1-1520-238-23. Electrical wiring repairs not peculiar to the AH-64A are in TM 55-1500-323-24.

b. The wiring diagram volume, TM 1-1520-238-T-10, contains the following additional information:

(1) Part number index listing reference designator, item name, part number, and wiring harness.

(2) End view of all connectors.

(3) Wiring diagram of AH-64A wire harness including wire numbers, exact connector, terminal board, and ground stud locations, etc., in the helicopter.

1-12. WIRING CHECKS

Where repair or replace wiring or connections is specified, a check is to be made for short or open (as specified) for each wire segment, terminal board, connector pin, and connection over the entire length of wiring between pins or terminals indicated. The electrical interconnect diagram for the equipment being checked is used in making the wiring check. Instructions to repair wire(s) include repair or replacement of wires, connections at end of connector pins, terminals, etc. (all required end-to-end repair and replacement between wiring points specified). The component location and configuration illustration (for the equipment being checked) is used to locate wiring connectors and components in the helicopter.

Section III. TROUBLESHOOTING METHODS

1-13. FAILURE SYMPTOMS AND TROUBLESHOOTING

Troubleshooting begins with failure symptoms. Failure symptoms are organized by system/equipment in master failures symptoms TM 1-1520-238-T-2. Use the manual to locate what system(s) the failure is in and perform the appropriate FIPs as directed.

1-14. FAULT DETECTION/LOCATION SYSTEM (FD/LS) CHECK

The fault detection/location system (FD/LS) checks are located in TM 1-1520-238-T-1 along with a description of the FD/LS operating modes and power application.

1-15. MAINTENANCE OPERATIONAL CHECKS (MOC)

A maintenance operational check (MOC) is provided for each system or function as required. These checks test the system by using operator panel switches, controls, and indicators. When a desired result is not obtained, a reference is made to a FIP or to the multiplex read codes, TM 1-1520-238-T-3, as based on the failure symptom.

1-16. FAULT ISOLATION PROCEDURES (FIP)

The FIPs are referenced from the results of the MOC and depend on the switch control setting of the MOC.

1-17. STARTING TROUBLESHOOTING

NOTE

If faulty equipment is not known and a failure symptom exists, use failure symptom list in TM 1-1520-238-T-2 to determine what system/equipment has a malfunction.

- a. Refer to TM 1-1520-238-T-2 to determine the proper troubleshooting procedures.

1-17. STARTING TROUBLESHOOTING (cont)

- b. Select the chapter, section, and paragraph to use.
- c. For use of external power and ground service utility connectors, refer to TM 1-1520-238-23. If external power is not available, refer to TM 1-1520-238-T-1 for application of the auxiliary power unit (APU). Refer to TM 1-1520-238-23 and TM 55-1730-229-12 for application of external electrical and hydraulic power, and pressurized air. External power is preferred; however, the APU may be used. Refer to TM 1-5855-265-20 and check PNVS electronic unit fuses.
- d. If circuit breakers do not stay closed during power-up procedures, refer to TM 1-1520-238-T-2 to identify and correct the fault.
- e. If power is not available to the equipment during power-up procedures, refer to TM 1-1520-238-T-2 to troubleshoot the electrical system.
- f. First perform the FD/LS check in TM 1-1520-238-T-1. If the FD/LS check does not find the fault, do not perform the power-down procedure. Perform the MOC.
- g. If there is no FD/LS check, perform the MOC.
- h. Troubleshoot using the specific procedures in the selected paragraph.

1-18. DURING TROUBLESHOOTING

CAUTION

When making resistance, open, short, or other ohmmeter checks on circuits, always de-energize the circuit to avoid damage to the meter.

- a. Correct faults and repair any equipment where damage is obvious.

CAUTION

Make sure helicopter environmental control system (ECS) fans are operating while electrical power is applied to helicopter to prevent equipment damage.

- b. ALWAYS maintain required cooling of units while operating equipment.

1-18. DURING TROUBLESHOOTING (cont)**NOTE**

For information on cooling requirements, refer to the ECS in TM 1-1520-238-T-8.

c. If troubleshooting procedures indicate that an LRU is faulty, it is replaced a second time only under one of the following conditions:

(1) When a preexisting failure in the wiring or system caused the newly replaced LRU to fail and the preexisting failure has been corrected.

(2) The replacement LRU is known to be defective and the interconnecting wiring is known to be OK.

d. The LRU is not to be replaced under any of the following conditions:

(1) If the interconnecting wiring is not absolutely known to be OK.

(2) If the newly replaced LRU is not absolutely known to be defective.

(3) If, under any circumstances, the LRU has already been replaced a second time.

1-19. COMPLETING TROUBLESHOOTING

a. Prior to application of power -

- Connect items disconnected during troubleshooting.
- Reinstall or replace items removed during troubleshooting.

b. To make sure that trouble is corrected -

- If trouble is found and corrected using a FD/LS check, repeat the FD/LS check.
- If trouble is found and corrected using a MOC, repeat the MOC - then perform any applicable FD/LS check.

c. Secure all doors, panels, and opened areas.

Section IV. LRU TROUBLESHOOTING - OFF THE HELICOPTER**1-20. TROUBLESHOOTING LINE REPLACEABLE UNITS (LRUs) AND SHOP REPLACEABLE UNITS (SRUs) OFF THE HELICOPTER**

Troubleshooting beyond the scope of this manual for LRUs and shop replaceable units (SRUs) with built-in test equipment, is done with Electronic Equipment Test Facility (EETF) Van (TM 11-6625-3085-12) or at a depot repair facility.

Section V. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) INDEX

1-21. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC)

The ECLC index will help locate electrical components and their connectors on the AH-64A helicopter and PNVS, during troubleshooting. This index contains a list of connectors and wiring harness which is shown by component location. Component locations are shown from the helicopter's forward section to its aft sections by horizontal and vertical grid numbers. Connectors are listed numerically in **FROM/TO** columns of the index. Every connector is referenced to a grid area within the illustrations. Use the index to find connectors on the aircraft as follows:

- Locate the connector reference designator number in the **FROM Connector Ref Des** column of the index.
- Cross-reference the **FROM Connector Ref Des** column with the:
 - **FROM Component/Harness** column to locate the wiring harness number.
 - **TO Connector Ref Des** column to locate the mating connector number.
 - **TO Component/Harness** Column to locate the mating wiring harness number.
 - **Grid Area** Column to find the grid zone (within the illustration) depicting the location on the aircraft.

To locate connector P853 on the aircraft for example, find connector P853 in the **FROM Connector Ref Des** column, then refer to the **FROM Component/Harness** column. This column shows that P853 is part of component harness W255, and the **TO Connector/Ref Des** column shows that P853 connects to J3 on TADS TEU 3 (**TO Component/Harness** column). The **Grid Area** column indicates that P853 is shown at illustration grid zone 18D, and that **Access** to the connector is obtained through the L90 door. For detailed information about access, refer to TM 1-1520-238-23, TM 1-1270-476-20, and TM 1-5855-265-20.

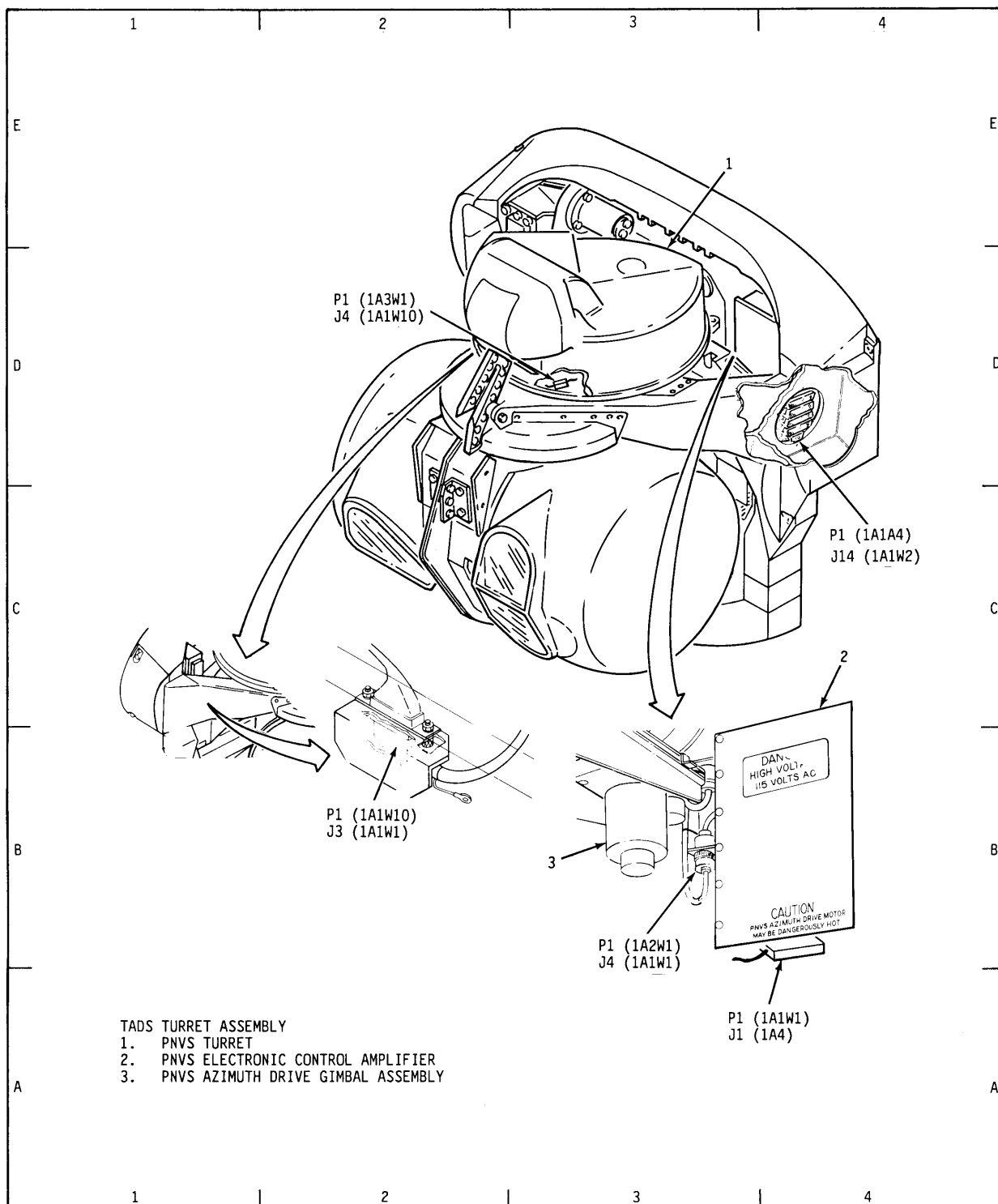
1-21. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) (cont)

FROM COLUMN		TO COLUMN		Grid Area	Access
Connector Ref Des	Component/Harness	Connector Ref Des	Component/Harness		
P1	1A1A4	J14	1A1W2	4D	TTA LEFT ACCESS COVER
P1	1A1W1	J1	1A4	4B	TTA
P1	1A1W10	J3	1A1W1	2B	TTA
P1	1A2W1	J4	1A1W1	3B	TTA
P1	1A3W1	J4	1A1W10	3D	NSSA
P418	W116	J418	W255	15A	R60 FAIRING
P631	W255	J1	A626	19A	L90 DOOR
P670	W255	J1	A61	10C	R40 COVER
P672	W116	J3	A62	15D	R60 FAIRING
P680	W116	J1	A62	15D	R60 FAIRING
P699	W255	J3	A61	10C	R40 COVER
P835	W255	J1	1A1W1	7B	R40 COVER
P836	W255	J2	1A1W1	7C	R40 COVER
P837	W255	J1	2	14A	R90 DOOR
P838	W255	J2	2	14A	R90 DOOR
P839	W255	J3	2	14A	R90 DOOR
P840	W255	J4	2	14B	R90 DOOR
P841	W255	J5	2	14A	R90 DOOR
P853	W255	J3	3	18D	L90 DOOR

1-21. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) (cont)

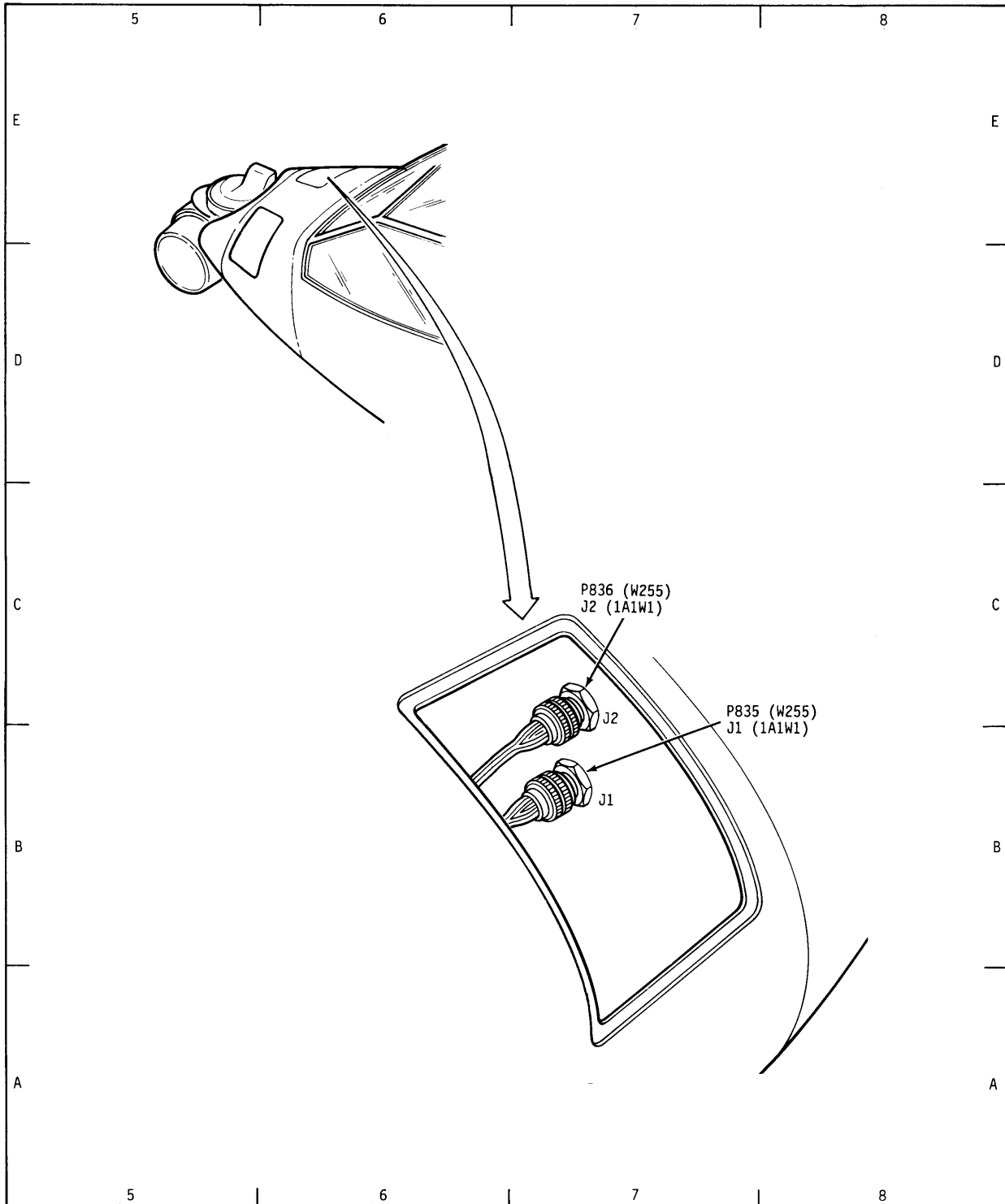
FROM COLUMN		TO COLUMN		Grid Area	Access
Connector Ref Des	Component/Harness	Connector Ref Des	Component/Harness		
P861	W255	J7	3	18D	L90 DOOR
P862	W255	J8	3	18D	L90 DOOR
P863	W255	J9	3	18D	L90 DOOR
P903	W255	J1	A613	14B	R90 DOOR

1-21. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) (cont)



912-083-1

1-21. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) (cont)



912-083-2