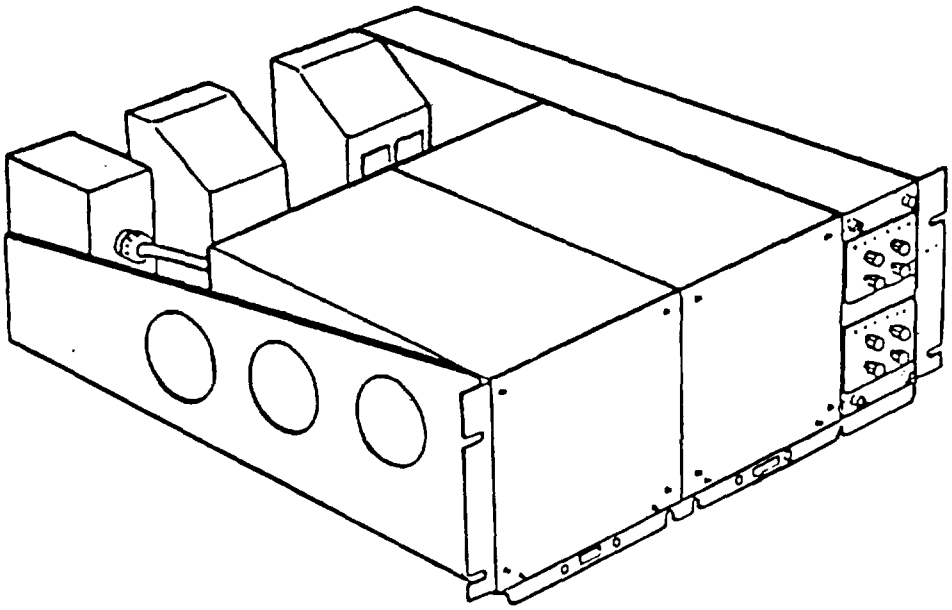
TM 11-5811-272-13&P

TECHNICAL MANUAL

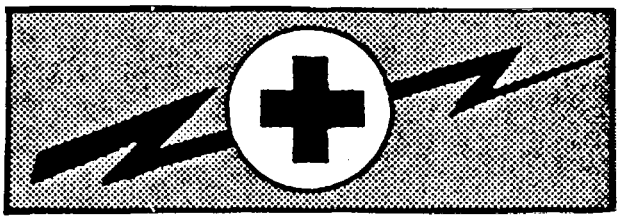
OPERATOR'S, UNIT, AND INTERMEDIATE DIRECT SUPPORT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)



FIXED PLANT ADAPTER OF-175/F
(NSN 5895-01-251-9506) (EIC: N/A)

HEADQUARTERS, DEPARTMENT OF THE ARMY
15 JANUARY 1992

WARNING



HIGH VOLTAGE

Is used In the operation of this equipment

DEATH ON CONTACT

may result If personnel fail to observe safety precautions

Never work on electronic equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid. When the technicians are aided by operators, they must be warned about dangerous areas.

Whenever possible, the power supply to the equipment must be shut off before beginning work on the equipment. Take particular care to ground every capacitor likely to hold a dangerous potential. When working Inside the equipment, after the power has been turned off, always ground every part before touching it.

Be careful not to contact high-voltage connections or 115 volt ac input connections when installing or operating this equipment.

Whenever the nature of the operation permits, keep one hand away from the equipment to reduce the hazard of current flowing through the body.

Warning: **Do not be misled by the term "low voltage." Potentials as low as 50 volts may cause death under adverse conditions.**

For Artificial Respiration, refer to FM 21-11.

WARNING

Compressed air is dangerous and can cause serious bodily harm if protective means or methods are not observed to prevent a chip or particle (of whatever size) from being blown into the eyes or unbroken skin of the operator or other personnel. Compressed air shall not be used for cleaning purposes except where reduced to less than 30 pounds per square inch gauge (30 psig) and then only with effective chip guarding and personnel protective equipment (industrial safety glasses and full faceshield). DO NOT use compressed air to dry parts when TRICHLOROTRI-FLOOROETHANE has been used.

WARNING

USE OF CLEANING SOLVENT

Adequate ventilation should be provided while using TRICHLOROTRIFLUOROE-THANE. Avoid prolonged breathing of vapor. The solvent should not be used near heat or flame; the products of decomposition are toxic and irritating. Since TRICH-LOROTRIFLUOROETHANE dissolves natural oils, avoid prolonged contact with skin. The use of chemical gloves (solvent resistant), chemical splash goggles and full faceshield are required when using TRICHLOROTRIFLUOROETHANE. DO NOT use compressed air to dry parts when TRICHLOROTRIFLUOROETHANE has been used. TRICHLOROTRIFLUOROETHANE is an ozone-depleting sub-

WARNING

If a circuit breaker does not stay in ON position when closed, do not attempt to close it repeatedly. That could create an overload situation hazardous to personnel and equipment. Instead, investigate cause of problem. Correct situation before attempting to close the breaker again

WARNING

Battery cables have high current on them when CB11 (bank 1) and or CB12 (bank 2) are ON,

WARNING

To prevent arcing, which may cause battery gases to explode. The battery terminal clamps must be disconnected in the following order: (1) Negative terminal of battery bank. (2) Positive terminal of battery bank. (3) Cable link between batteries of bank

For First Aid refer to FM21-11.

5 SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK

1 DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL

2 IF POSSIBLE, TURN OFF THE ELECTRICAL POWER

3 IF YOU CANNOT TURN OFF THE ELECTRICAL POWER, PULL, PUSH OR LIFT THE PERSON TO SAFETY USING A DRY WOODEN POLE OR A DRY ROPE OR SOME OTHER INSULATING MATERIAL

4 SEND FOR HELP AS SOON AS POSSIBLE

5 AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK, MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESUSCITATION

TECHNICAL MANUAL

No. 11-5811-272-13&P

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 15 January 1992

OPERATOR'S, UNIT, AND INTERMEDIATE DIRECT SUPPORT MAINTENANCE MANUAL INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST

FIXED PLANT ADAPTER OF-175/F (NSN 5895-01-251-9506)(EIC: N/A)

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 Communication-Electronics Command and Fort Monmouth, ATTN: AMSEL-LC-LM-LT, Fort Monmouth, NJ 07703-5000. In either case a reply will be furnished direct to you.

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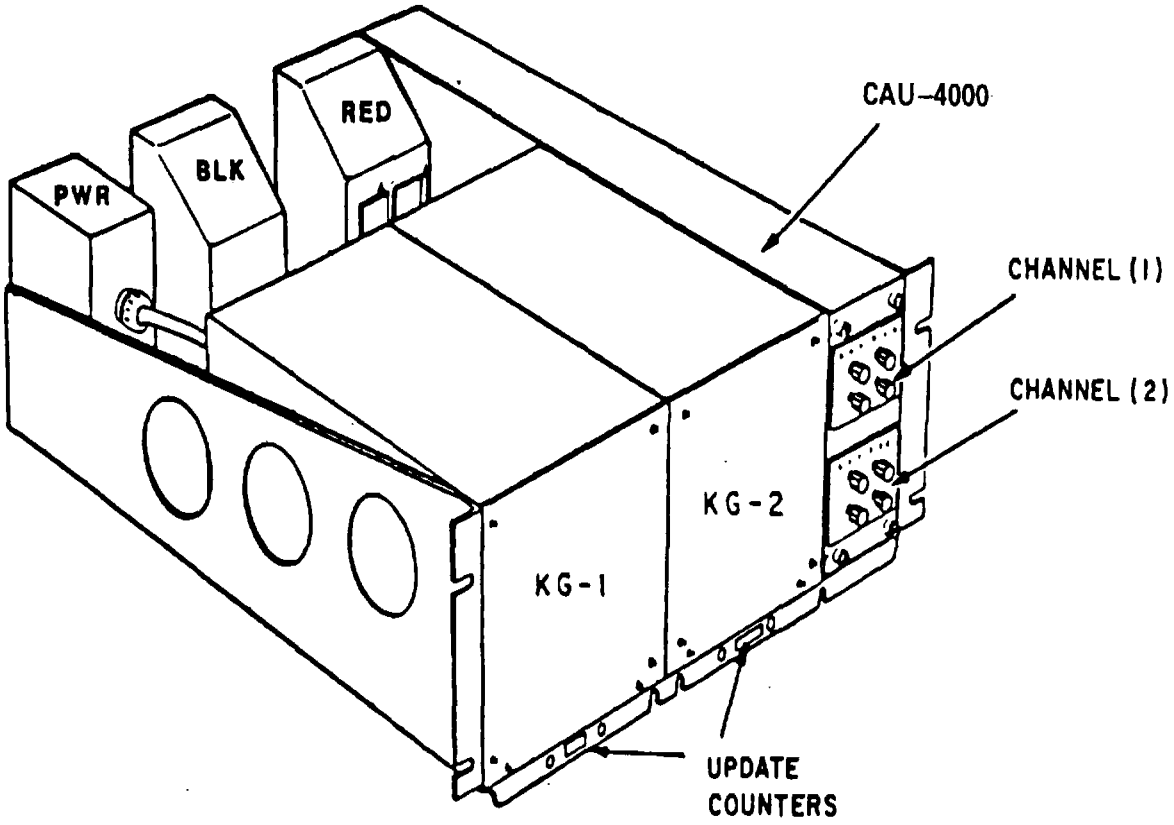


Figure 0-1. Adaptive Group Fixed Station OF-175/F

CHAPTER 0

INTRODUCTION

0-1. SCOPE.

This manual provides operator's, organizational and direct support maintenance information for the Fixed Plant Adapter (FPA) (Figure 0-1). The update counter is manufactured by Data Products, New England, Incorporated (DME). The DNE part number is 96790000-002. This manual contains the equipment description; unpacking and inspection; FPA/CAU installation guide; maintenance instructions; and repair parts and special tools list data.

0-2. CONSOLIDATED INDEX OF ARMY PUBLICATIONS AND BLANK FORMS.

Refer to the latest issue of DA Pam 25-30 to determine whether there are new additions, changes or additional publications pertaining to the equipment.

0-2.1. Maintenance Forms, Records, and Reports.

0-2.1.1. Reports of Maintenance and Unsatisfactory Equipment.

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750, as contained in Maintenance Management Update.

0-2.1.2. Reporting of Item and Packaging Discrepancies. Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140.55/SECNAVINST 4355.18/AFR 400-54/MCO 4430.3J.

0-2.1.3. Transportation Discrepancy Report (TDR) (SF 361). Fill out and forward Transportation Discrepancy Report (TDR) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33C/AFR 75-18/MCO P4610.19D/DLAR 4500.15.

0-2.2. Reporting Equipment Improvement Recommendations (EIR).

If your equipment needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Product Quality Deficiency Report). Mail it to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-ED-PH, Fort Monmouth, New Jersey 07703-5000. We'll send you a reply.

0-2.3. **Destruction of Army Electronics Materiel**. Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

0-2.4. **Administrative Storage**. Administrative storage of equipment issued to and used by Army activities will have Preventive Maintenance Checks and Services (PMCS) performed before storing. When removing the equipment from administrative storage, the PMCS checks should be performed to assure operational readiness. Disassembly and repacking of equipment for shipment or limited storage are covered in paragraphs 2-1, 2-2, and 3-] and 3-2 in the reverse of the order given.

0-3. NOMENCLATURE CROSS-REFERENCE LIST.

The nomenclature cross-reference list is provided below:

Common Name	Official Nomenclature
Fixed Plant Adapter (FPA) Station OF-175/F Update Counter	Adaptive Group Fixed

0-4. CALIBRATION.

The FPA does not require calibration.

0-5. LIST OF ABBREVIATIONS.

DNE	Dataproducts New England
FPA	Fixed Plant Adapter
SCD	Source Control Drawing

0-6. WARRANTY INFORMATION.

The Company (DATAPRODUCTS NEW ENGLAND, Incorporated) warrants to the Purchaser that the equipment to be delivered hereunder will be free from defects in material and workmanship for a period of one year from the date of shipment by DATAPRODUCTS NEW ENGLAND, Incorporated. Any equipment which fails to conform to specification or becomes defective by reason of material or workmanship during the Warranty period will be promptly repaired or replaced by DATAPRODUCTS NEW ENGLAND at its option. Equipments found not to be defective will be returned to the Purchaser, freight charges collect, and charges will be forwarded to the Purchaser for inspection and test time. Transportation charges for equipment found to be defective within the Warranty period will be paid by DATAPRODUCTS NEW ENGLAND, Incorporated to and from the original point of acceptance.

The liability of DATAPRODUCTS NEW ENGLAND, Incorporated to the Purchaser arising out of the supplying of the said equipment shall not in any case exceed the cost of correcting defects in the equipment as provided herein or the price paid to DATAPRODUCTS NEW ENGLAND, Incorporated by the Purchaser, whichever is less.

Upon expiration of Warranty period, all such Warranty liability shall terminate. The foregoing shall constitute the sole remedy of the Purchaser and the sole liability of DATAPRODUCTS NEW ENGLAND, Incorporated and shall be in lieu of any other Warranty, implied, statutory, or otherwise, including the Warranty of merchantability. DATAPRODUCTS NEW ENGLAND, Incorporated shall not be liable for (incidental, special, indirect or) consequential damages.

CHAPTER 1

1-1. PURPOSE AND USE.

The FPA provides physical mounting and electrical interconnection between the KG-84/KG-84A/KG-84C series crypto unit and fixed plant wiring in either a RED or BLACK environment. Mounting capabilities are also provided for two update counters and dual CAU 4000 used in conjunction with the KG-84's.

1-2. DESCRIPTION.

The FPA is designed to be mounted in a standard nineteen-inch rack. This rack can accommodate up to seven units (refer to Figure 1-1). The dual channel FPA provides mechanical mounting for two KG-84's, two update counters, and a dual CAU 4000. The FPA has RED, BLACK, and power compartments. These connect directly to the KG RED, BLACK and power connectors using shielded cables for maintaining RED/BLACKsignal separation. Figure 1-2 provides a block diagram of the basic FPA.

1-3. INTERFACES.

The FPA provides for both conduit and 2-1/2 inch duct cable runs. The rear of the FPA contains three compartments: RED, BLACK, and power. The RED and BLACK compartments house individual terminal interface boards and the power compartment contains a terminal block. These compartments provide a termination crossconnect between the FPA and the fixed plant wiring. Access to the terminal boards is via a removable rear panel on each compartment. This method allows ease of installation, and reconfiguration if required. Shielded cables with appropriate mating connectors are provided from the RED, BLACK, and power compartments for connection to the crypto units.

1-4. TOOLS AND TEST EQUIPMENT.

Table 1-1 lists the tools and test equipment needed to install and maintain the FPA.

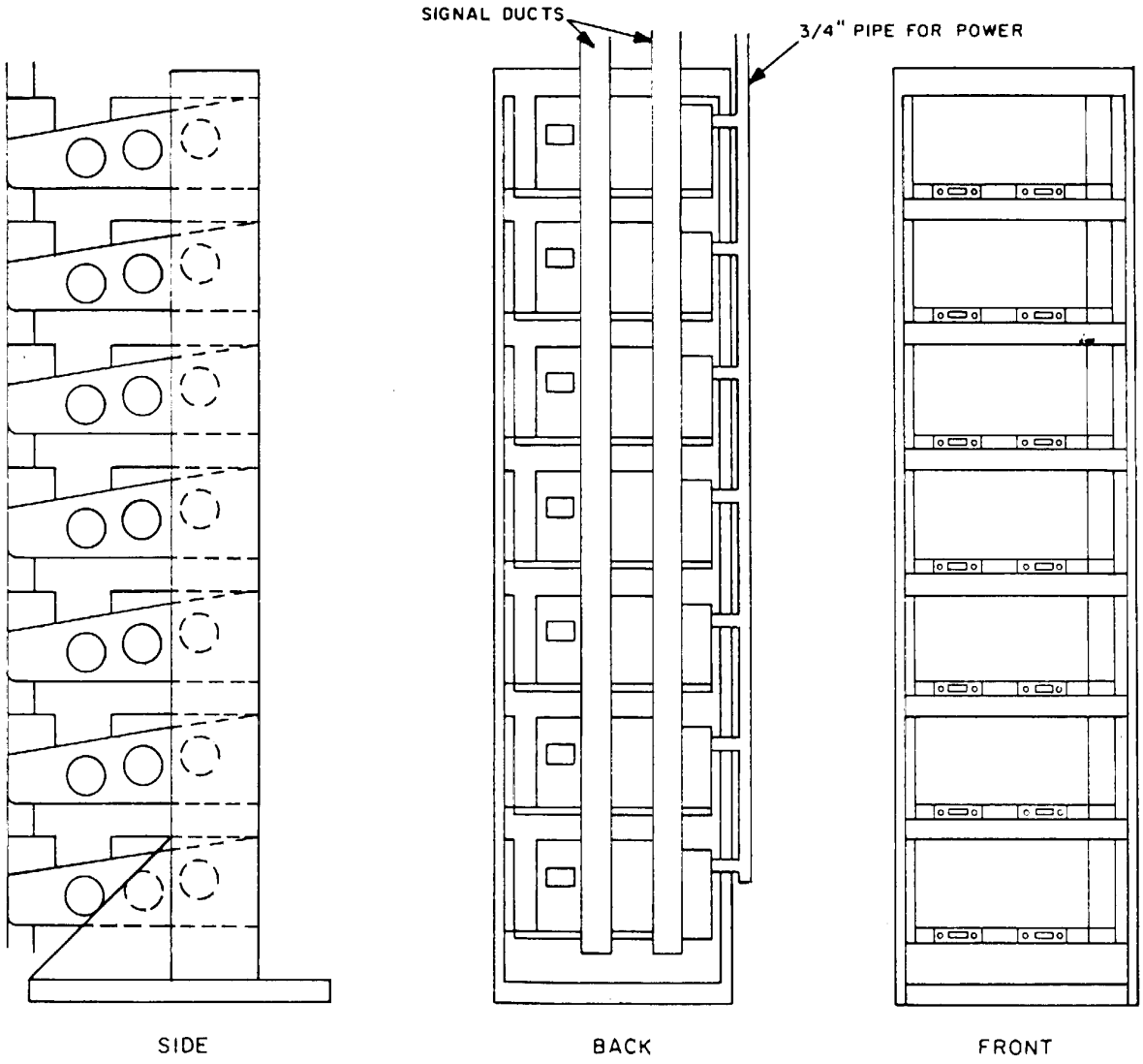


Figure 1-1. Standard typical Rack Mounted FPA's

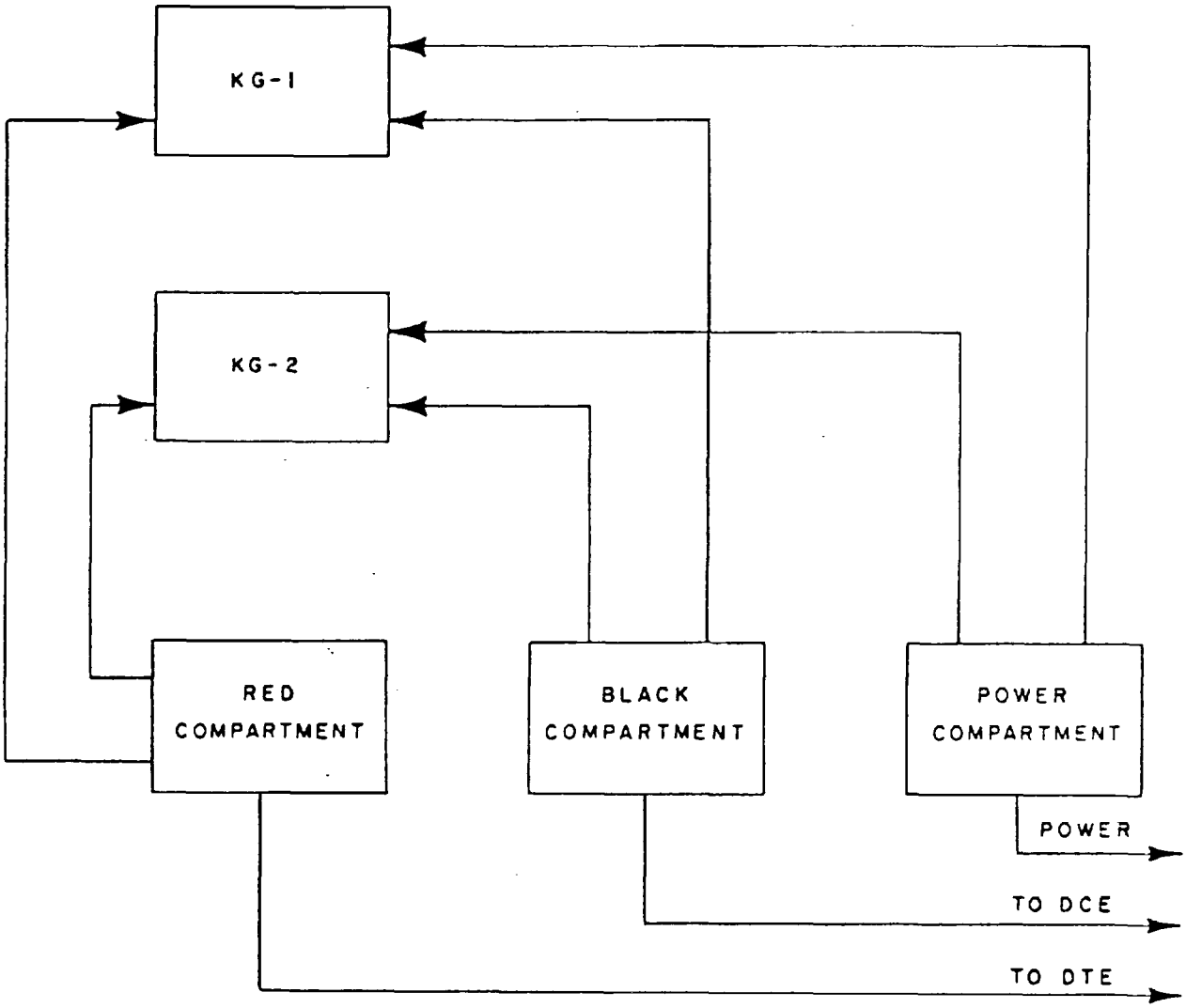


Figure 1-2. Basic FPA Block Diagram

Table 1-1. Tools and Test Equipment

Nomenclature	National Stock Number (NSN)
Barrel Terminal Wire Insertion Tool (AMP Part Number 552714-3) (DNE Part Number 32000239-000)	
Multimeter, AN/USM-16	6625-00-999-7465
or	
Multimeter, AN/PSM-45	6625-01-139-2512
or	
Multimeter, AN/USM-486/U	6625-01-145-2430
Stuffer Caps (DNE Part Number 55085175-000)	
Tool Kit, Elec. Equipment, TK-101/G	5180-00-064-5178

Table 1-2. Characteristics, Capabilities and Features

Dimensions:

8.75"H, 19.0"W, 21.62"D

Weight:

35 lbs. (without CAU or Cryptos)

Temperature:

0°C to 500C Operating
-620C to + 71 C Non-Operating

Altitude:

0 to 10,000 Feet Operating
0 to 40,000 Feet Non-Operating

Table 1-2. Characteristics, Capabilities and Features (Continued)

Humidity:
0 to 95% with no condensation
Shock:
Per MIL-STD-810 Method 516.2, Procedure 5
Power:
110/220 VAC, 50-60 Hz or 28 VDC
(Tempest Accredited to NACSIM 5100A)

CHAPTER 2

UNPACKING AND INSPECTION

2-1. UNPACKING.

No special instructions are required for unpacking items shipped in cartons or boxes.

2-2. INSPECTION.

Check equipment against packings lists, and report any damage which may have occurred during shipment.

Factory wired and tested FPA's are normally shipped with all KG cables wired to their respective compartments; two RED cables, two BLACK cables, and two power cables.

CAUTION

Avoid jarring or dropping electronic equipment, to prevent damage that might affect its operation.

CHAPTER 3

FPA INSTALLATION/INTERFACE

3-1. FPA INSTALLATION. The FPA can be mounted in a standard 19 inch rack by attaching eight screws (1) through the eight slots (2) on the front of the unit (see Figure 3-1).

NOTE

Refer to paragraph 3-3 of TM 11-5811-271-13&P to install the shunt connections.

NOTE

Ensure that retaining brackets (3) on the front of the FPA are loose.

3-2. KG INSTALLATION. Position one KG in the left slot and connect the cables as follows:

NOTE

Cables are bundled in sets. The left set as viewed from the front is for the left KG unit and the right set for the second KG unit.

a. Left Bundle

(1) Connect cable P3 RED to KG RED connector J3.
(2) Connect cable P2 BLACK to KG BLACK connector J2.
(3) Connect cable P1 PWR to KG PWR connector J1.

b. Slide the KG unit into the FPA and engage in the rear guides (two for each KG) and secure them by using the retaining brackets (3) on the front of the FPA.

c. Repeat steps a. and b. above for the right bundle.

3-3. USER INTERFACE.

a. The FPA is shipped with all cables wired to their respective terminal boards in the RED, BLACK, and POWER compartments.

b. Fixed plant wiring is at the rear of the RED, BLACK, and POWER compartments. The wiring is entered through a conduit or a 2-1/2 inch duct. Cutouts are punched for RED, BLACK, and POWER cabling.

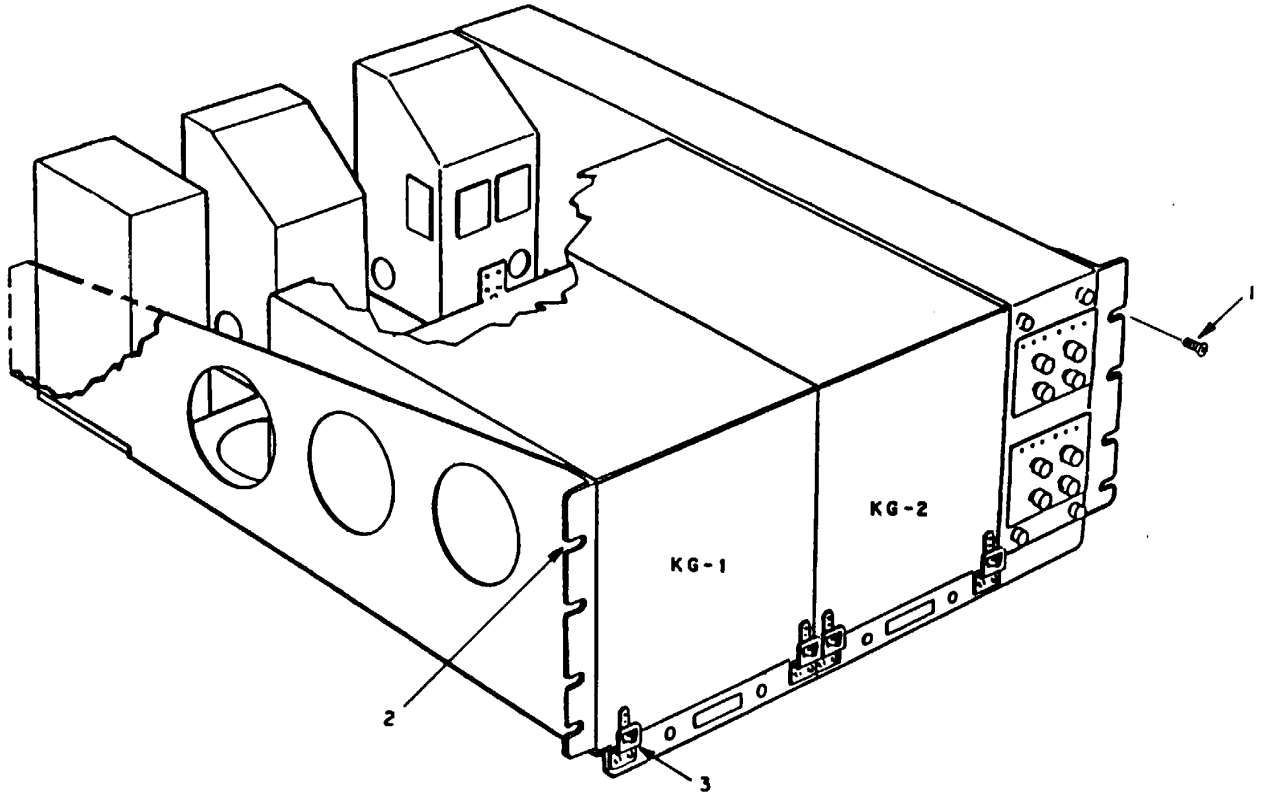


Figure 3-1. FPA Installation Diagram

3-3.1. Red Compartment Box Connections. Connect wiring to KG RED via the red compartment box terminal board (Figure 3-2) as follows:

NOTE

In the following steps, numbers in parenthesis ( ) refer to Figure 3-4 index numbers.

a. Using a Phillips head screwdriver, remove two pan head screws (1), lock washers (2), and flat washers (3) that secure red compartment box cover (4) to red compartment box. Remove cover.

b. Using Figure 3-2 and Table 3-1 as a guide, connect fixed plant wiring through cutouts to KG1 RED. Repeat for KG2. Terminal numbers match their corresponding KG RED connector pin numbers.

NOTE

For wire installation, use Phillips head screwdriver and stuffer cap or AMP- barrel terminal wire insertion tool, part number 552714-3. Refer to Figure 3-3.

c. Using a Phillips head screwdriver, secure red compartment box cover (4) to red compartment box with two pan head screws (1), lock washers (2), and flat washers (3).

3-3.2. Black Compartment Box Connections. Connect fixed plant wiring to KG BLACK via black compartment box terminal board (Figure 3-5) as follows:

NOTE

In the following steps, numbers in parenthesis ( ) refer to Figure 3-4 index numbers.

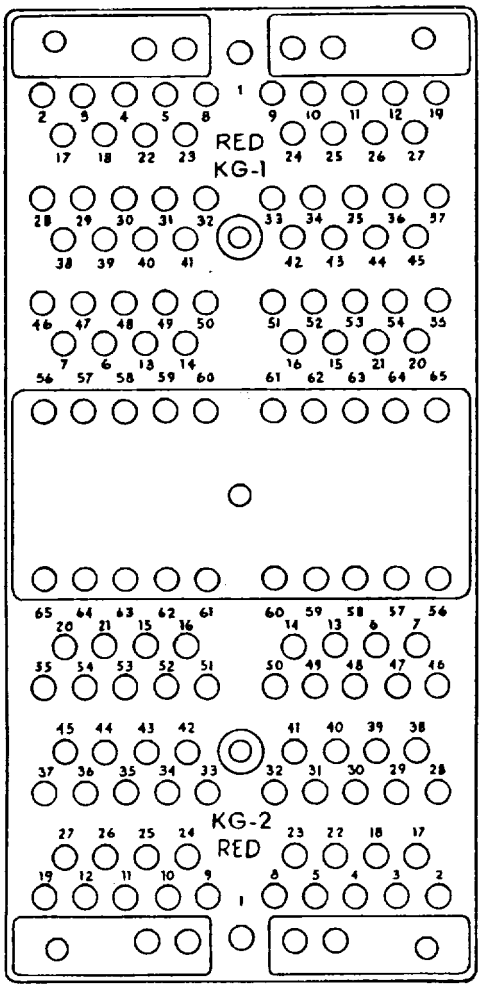


Figure 3-2. RED Terminal Board

Table 3-1. RED Interface Signal Connections

Term No.	Signal KG-84 Name	Term No.	Signal KG-84A Name	Term No.	Signal KG-84C Name
1	SIGNAL GROUND	1	SIGNAL GROUND	1	SIGNAL GROUND
2	FRAME GROUND	2	FRAME GROUND	2	FRAME GROUND
3	RED COM SIG RTN	3	RED COM SIG RTN	3	RED COM SIG RTN
4	-6V TIE OFF (R)	4	-6V TIE OFF (R)	4	-6V TIE OFF (R)
5	RMT ZEROIZE-N	5	RMT ZEROIZE-N	5	RMT ZEROIZE-N
6	RX DPT-N	6	RX DPT-N	6	RX DPT-N
7	RX DPT-P	7	RX DPT-P	7	RX DPT-P
8	SYNC CMD RX-P	8	SYNC CMD RX-P	8	SYNC CMD RP-P
9	SPARE	9	PTRS-N	9	TXRDYIND-P
10	PT MON-P	10	PT MON-P	10	PT MON-P
11	PTCA-P	11	PTRS-P	11	PTRS-P
12	SYNC CMD TX-P	12	SYNC CMD TX-P	12	SYNC XMTR-P
13	STEP PULSE-P	13	STEP PULSE-P	13	STEP PULSE-P
14	STP PUL-N	14	RED COM	14	TX COMMON GND
15	TX CLOCK-N	15	TX CLOCK-N	15	TX CLOCK-N
16	TX.CLOCK-P	16	TX CLOCK-P	16	TX CLOCK-P
17	TX DPT-N	17	TX DPT-N	17	TX DATA-N
18	TX DPT-P	18	TX DPT-P	18	TX DATA-P
19	TXRDY-P	19	PTCS-P	19	PTCS-P
20	RX CLOCK-N	20	RX CLOCK-N	20	RX CLOCK-N

Table 3-1. RED Interface Signal Connections (Continued)

Term No.	Signal KG-84 Name	Term No.	Signal KG-84A Name	Term No.	Signal KG-84C Name
21	RX CLOCK-P	21	RX CLOCK-P	21	RX CLOCK-P
22	SPARE	22	PTCS-N	22	RX RDY IND-P
23	SPARE	23	RED ALRM IND-P	23	ALARM IND.P
24	SPARE	24	RED PARITY IND-P	24	PARITY IND-P
25	MUX OR-N	25	MUX OR-N	25	MUX OR-N
26	SPARE	26	FSAO-P	26	FSAO-P
27	SPARE	27	FSBO-P	27	FSBO-P
28	SPARE	28	FSCO-P	28	FSCO-P
29	+6V TIE OFF (R)	29	+6V TIE OFF (R)	29	+6V TIEOFF (R)
30	FILL CLOCK	30	FILL CLOCK	30	FILL CLOCK-N
31	FILL DATA	31	FILL DATA	31	FILL DATA-N
32	REQUEST	32	REQUEST	32	FILL REQ-N
33	SPARE	33	SPARE	33	RADIO-P
34	MUX INSTRUCTION	34	MUX INSTRUCTION	34	FILL MUX-N
35	VUCTRUP-N	35	VUCTRUP-N	35	VUCTRUP-N
36	RESVUCTR-N	36	RESVUCTR-N	36	RESVUCTR-N
37	FILL COMMON	37	FILL COMMON	37	FI.LL COMMON
38	SPARE	38	PTTR-P	38	PTTR-P
39	SPARE	39	SYNC CMD RX-N	39	RPTBY-P

Table 3-1. RED Interface Signal Connections (Continued)

Term No.	Signal KG-84 Name	Term No.	Signal KG-84A Name	Term No.	Signal KG-84C Name
40	SPARE	40	PTRR-P	40	PTRR-P
41	SPARE	41	PTRR-N	41	UNBAL-P
42	SPARE	42	PTTT-P	42	PTTT-P
43	SPARE	43	PTTT-N	43	PTTT-N
44	SPARE	44	PTTM-P	44	PTTM-P
45	SPARE	45	PTIC-P	45	PTIC-P
46	SPARE	46	PTTR-N	46	PTTR/V-X-P
47	SPARE	47	SPARE	47	INVERT-P
48	SPARE	48	SPARE	48	RMTMUX-N
49	SPARE	49	SPARE	49	SPARE
50	SPARE	50	SPARE	50	RDINV-P
51	SPARE	51	PTDM-P	51	PTDM-P
52	SPARE	52	SPARE	52	BREAKIN-P
53	SPARE	53	PTDM-N	53	RESVU-RET
54	SPARE	54	SYNC CMD TX-N	54	CLEAR IND-P
55	SPARE	55	RP STBYR-N	55	RMT STBY-N

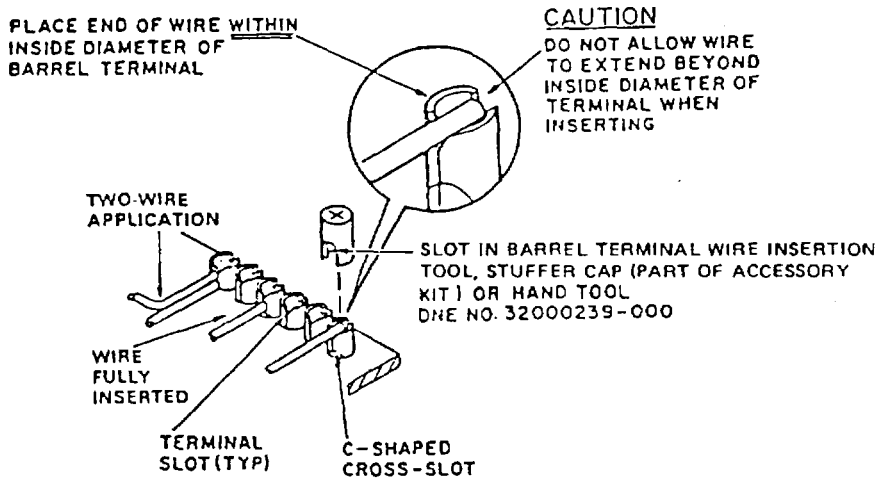


Figure 3-3. Installation of Wires on Barrel Terminals

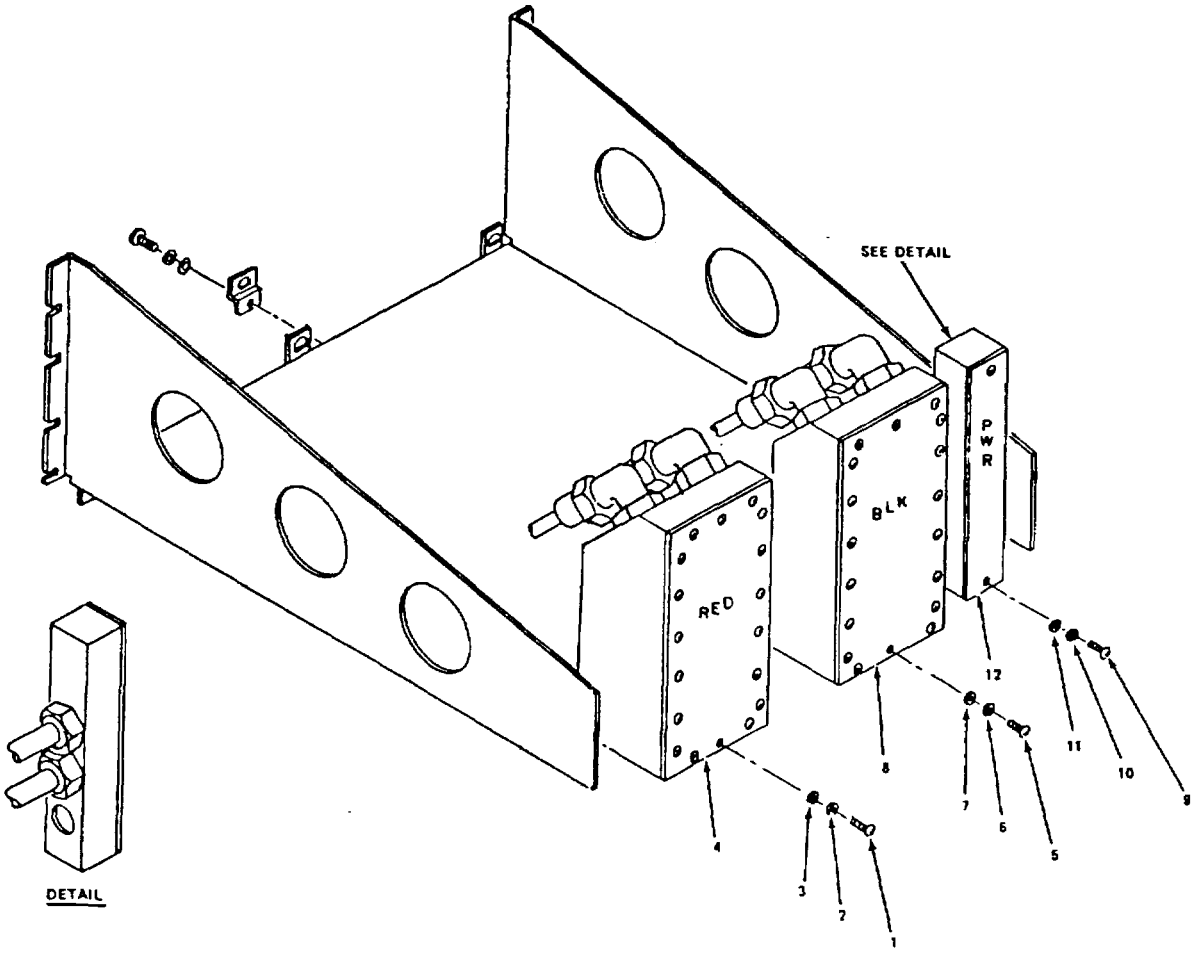


Figure 3-4. Fixed Plant Adapter

a. Using a Phillips head screwdriver, remove two pan head screws (5), lock washers (6), and flat washers (7) that secure black compartment box cover (8) to black compartment box. Remove cover.

b. Using Figure 3-5 and Table 3-2 as a guide, connect fixed plant wiring through cutout KG1 BLACK. Repeat for KG2. Terminal numbers match their corresponding KG BLACK connector pin numbers.

NOTE

For wire installation, use Phillips head screwdriver and stuffer cap or AMP-barrel terminal wire insertion tool, part number 552714-3. Refer to Figure 3-3.

c. Using a Phillips head screwdriver, secure black compartment box cover (8) to black compartment box with two pan head screws (5), lock washers (6), and flat washers (7). 3-3.3. Power Compartment Box Connections. KG power cables are prewired to the power compartment terminal block. Connect fixed plant power as follows:

NOTE

In the following steps, numbers in parenthesis ( ) refer to Figure 3-4 index numbers.

a. Using a Phillips head screwdriver, remove two pan head screws (9), lock washers (10), and flat washers (11) that secure power compartment box cover (12) to power compartment box and remove cover.

NOTE

Bottom entrance is for 1/2-inch conduit size while side entrance is for 3/4-inch conduit size.

b. Select side or bottom entrance for power.

c. Remove applicable hole cover.

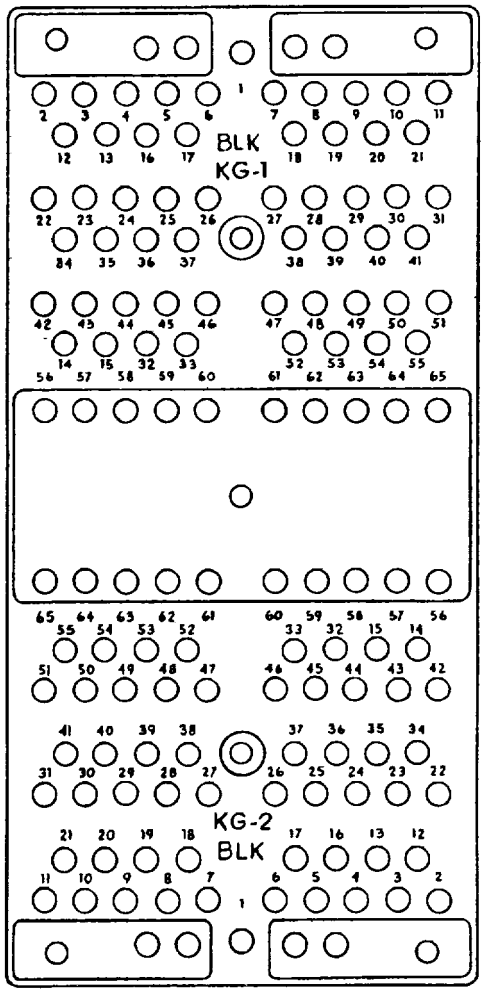


Figure 3-5. BLACK Terminal Board

Table 3-2. BLACK Interface Signal Connections

Term No.	Signal KG-84 Name	Term No.	Signal KG-84A Name	Term No.	Signal KG-84C Name
1	SIGNAL GROUND	1	SIGNAL GROUND	1	SIGNAL GROUND
2	FRAME GROUND	2	FRAME GROUND	2	FRAME GROUND
3	FRAME GROUND	3	FRAME GROUND	3	FRAME GROUND
4	WLT-P	4	WLT-P	4	WLT-P
5	WLT-N	5	WLT-N	5	WLT-N
6	+6V TIE OFF (B)	6	+6V TIE OFF (B)	6	+6V TIEOFF (B)
7	WLR-P	7	WLR-P	7	WLR-P
8	WLR-N	8	WLR-N	8	WLR-N
9	SIGNAL GROUND	9	SIGNAL GROUND	9	SIGNAL GROUND
10	SIGNAL GROUND	10	SIGNAL GROUND	10	SIGNAL GROUND
11	-5V TIE OFF (B)	11	-5V TIE OFF (B)	11	-5V TIEOFF (B)
12	ERCT-P	12	ERCT-P	12	ERCT-P
13	ERCT-N	13	ERCT-N	13	ERCT-N
14	ETCT-P	14	ETCT-P	14	ETCT-P
15	ETCT-N	15	ETCT-N	15	ETCT-N
16	-5V TIE OFF (B)	16	-5V TIE OFF (B)	16	-5V TIEOFF (B)
17	XMT CTRL-P	17	CTTR-P	17	CTTR-P
18	BLK I/O SIG COMM	18	BLK I/O SIG COMM	18	RCVR COMM GND
19	ERXC-P	19	ERXC-P	19	ERXC-P
20	ERXC-N	20	ERXC-N	20	ERXC-N
21	ETXC-P	21	ETXC-P	21	ETXC-P
22	ETXC-N	22	ETXC-N	22	ETXC-N

Table 3-2. BLACK Interface Signal Connections (Continued)

Term No.	Signal KG-84 Name	Term No.	Signal KG-84A Name	Term No.	Signal KG-84C Name
23	E32RXC-P	23	E32RXC-P	23	INV CONT-P
24	E32RXC-N	24	E32RXC-N	24	DIPHASE-P
25	E32TXC-P	25	E32TXC-P	25	UNBAL-P
26	E32TXC-N	26	E32TXC-N	26	UMTRDYIND-P
27	CTCB-P	27	CTCS-P	27	CTCS-P
28	CTCB-N	28	CTCS-N	28	DATA INV-N
29	CTCD-P	29	CTRS-P	29	CTRS-P
30	BLK TIM SIG RET	30	BLK TIM SIG RET	30	TX COMM GND
31	-5V TIE OFF (B)	31	-5V TIE OFF (B)	31	-5V TIEOFF (B)
32	TCTC-P	32	TCTC-P	32	TCTC-P
33	TCTC-N	33	TCTC-N	33	TCTC-N
34	CLKLK-N	34	CTRR-P	34	CTRR-P
35	CLKLK-P	35	CTRR-N	35	SPARE
36	SPARE	36	CTTM-P	36	CTTM-P
37	SPARE	37	CTTM-N	37	SPARE
38	SPARE	38	CTIC-P	38	CTIC-P
39	SPARE	39	CTIC-N	39	SPARE
40	SPARE	40	SPARE	40	PT IND-P
41	SPARE	41	TTSEL-P	41	TT SELECT-P
42	RMT PARITY IND	42	RMT PARITY IND	42	PARITY IND-P
43	RMT ALARM IND	43	RMT ALARM IND	43	ALARM IND-P
44	RMT FULL OP IND	44	RMT FULL OP IND	44	RCVRRDYIND-P

Table 3-2. BLACK Interface Signal Connections (Continued)

Term No.	Signal KG-84 Name	Term No.	Signal KG-84A Name	Term No.	Signal KG-84C Name
45	LPC-P	45	LPC-P	45	LPC-P
46	SPARE	46	CTRS-N	46	SPARE
47	SPARE	47	CTTR-N	47	PTT-RET
48	RMT-MUX-N	48	RMT/MUX-N	48	RMTUX-N
49	RMT/MUX-P	49	RMT/MUX-P	49	PTT-IN
50	-5V TIE OFF (B)	50	-5V TIE OFF (B)	50	-12V TIEOFF (B)
51	SPARE	51	CTDM-P	51	CTDM-P
52	+6V TIE OFF (B)	52	+6V TIE OFF (B)	52	+6V TIEOFF (B)
53	SPARE	53	CTDM-N	53	WIRE LINE-N
54	RMT-N	54	RMT-N	54	RMT-N
55	RP STBY-N	55	RP STBY-N	55	RMT STBY-N

NOTE

If side entrance is desired, top right mounting screw of terminal block mounting bracket must be removed so as to swing terminal bracket down to gain access.

d. Connect fixed plant power to terminal block shown in Figure 3-6 using the configuration chart of Table 3-3.

e. Using a Phillips head screwdriver, secure power compartment box cover (12) to power compartment box with two pan head screws (9), lock washers (10), and flat washers (11).

NOTE

The FPA is shipped prestrapped for 115 Vac. Check that a standard 3-wire, grounding type, 117 volt, 60 Hz power receptacle is available at the installation site; this receptacle should be fused to provide at least 4 amperes but not more than 6 amperes for each FPA.

WARNING

Voltage is present which might be hazardous to life and limb.

NOTE

The FPA is shipped prestrapped for 115 Vac. If optional input voltage is used, use existing straps to reconfigure terminal block. Figure 3-7 is the FPA 115 Vac source input wiring diagram.

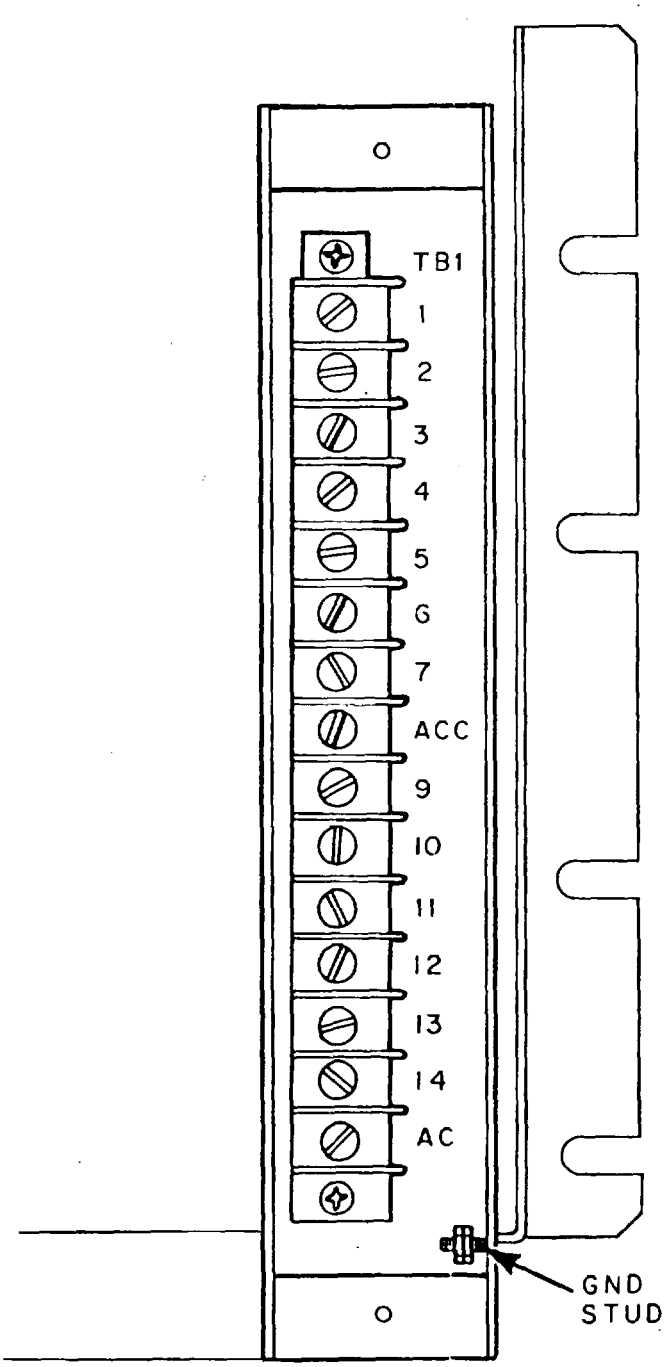


Figure 3-6. FPA Power Compartment Terminal Block

Table 3-3. Input Power Configuration

Fixed Plant Power	Lead	Connect To:	Strap TB1 Term:
115 VAC	AC IN (BLK) AC COM (WHT) GND (GRN)	AC ACC GND STUD	3-4, 5-6, 7-8-9 12-13, 10-11
220 VAC	AC IN (BLK) AC COM (WHT) GND (GRN)	AC ACC GND STUD	3-4, 6-7, 9-10, 12-13
24 VDC	DC + DC -	AC TB1-1	2-3, 13-14

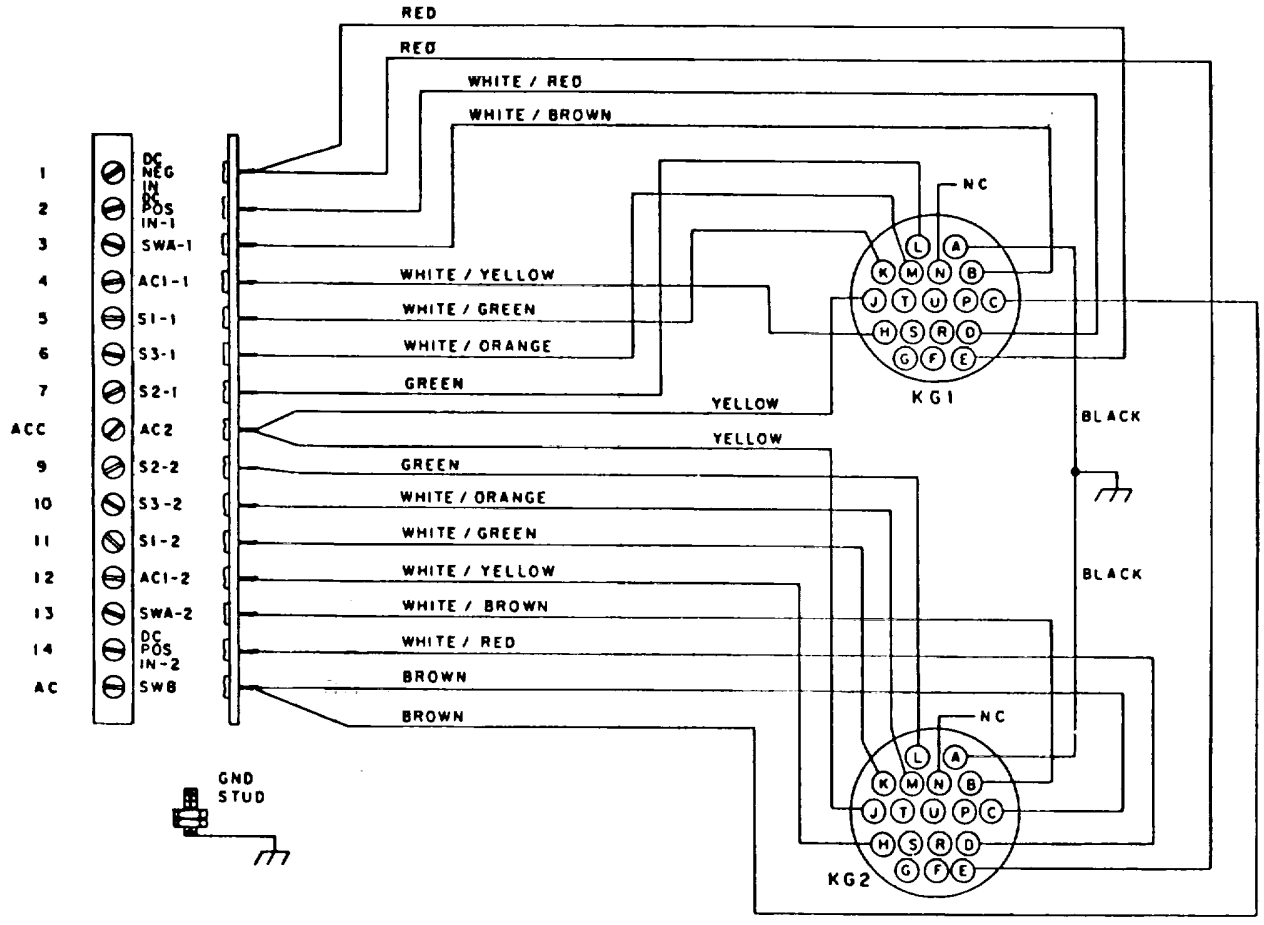


Figure 3-7. FPA 115V AC Source Input Wiring Diagram

CHAPTER 4

WAVESHAPING GUIDE AND WIRING DIAGRAMS

4-1. GENERAL.

The FPA has been made to provide waveshaping. The waveshaping can be attached to all KG-84 clock and data drivers. Waveshaping is used to control signal rise and fall times, which helps to control crosstalk.

Waveshaping is done by connecting a capacitor across data and clock driver circuits. If waveshaping is desired, select a capacitor value from Table 4-1.

Example: Waveshaping a 9.6K bps unbalanced circuit.

a. On Table 4-1, find 9.6K bps.

b. Choose 0.22 uF capacitor for data drivers.

c. Double data rate (2 x 9.6K bps = 19.2K bps).

d. On Table 4-1, find 19.2K bps.

e. Choose 0.1 uF capacitor for clock drivers.

These capacitors are then connected to the Red and/or Black FPA terminal boards. Additional terminals have been provided for this purpose and are shown in Figures 4-1 and 4-2. For a balanced interface, connect the capacitor across the (P) and (N) lead. For an unbalanced interface, connect the capacitor from the active lead to signal ground.

4-2. SIGNAL POLARITY.

If the KG-84A is to be connected for unbalanced data and clock, the (N) lead should be used for the data and the (P) lead for the clock. Unused sides of signal receivers should be tied to signal ground. Unused sides of drivers should not be grounded. A positive mark device may be connected by using the (P) lead of the data driver and receiver. The (N) side of the receiver is grounded.

4-3. INSTALLATION.

The following paragraphs provide normal installation information for a variety of applications.

Table 4-1. Waveshaping MIL-STD-188-114 Capacitor/Data Rates Selection Chart

UNBALANCED

DATA RATE KBPS			CAPACITOR VALUE		RXDPT-P RXDPT-N	(R-7) (R-6)	STEP PULSE-P STEP PULSE-N /REDCOM	(R-13) (R-14)	TXCLK-P TXCLK-N	(R-16) (R-15)	RXCLK-P RXCLK-N	(R-21) (R-20)	ETCT-P ETCT-N	(8-14) (9-15)	TCTC-P TCTC-N	(B-32) (8-33)
0	to	2.5	1.0	uF	X		X		X		X		X		X	
2.5	to	5.0	.47	uF	X		X		X		X		X		X	
5.0	to	10.0	.22	uF	X		X		X		X		X		X	
10.0	to	25.0	.10	uF	X		X		X		X		X		X	
25.0	to	50.0	.047	uF	X		X		X		X		X		X	
50.0	to	100.0	.022	uF	X		X		X		X		X		X	

BALANCED

DATA RATE KBPS			CAPACITOR VALUE		RXDPT-P RXDPT-N	(R-7) (R-6)	STEP PULSE-P STEP PULSE-N /REDCOM	(R-13) (R-14)	TXCLK-P TXCLK-N	(R-16) (R-15)	RXCLK-P RXCLK-N	(R-21) (R-20)	ETCT-P ETCT-N	(8-14) (8-15)	TCTC-P TCTC-N	(B-32) (B-33)
0	to	2.5	0.22	uF	X		X		X		X		X		X	
2.5	to	5.0	0.10	uF	X		X		X		X		X		X	
5.0	to	10.0	0.047	uF	X		X		X		X		X		X	
10.0	to	25.0	0.022	uF	X		X		X		X		X		X	
25.0	to	50.0	INT		X		X		X		X		X		X	
50.0	to	100.0	INT		X		X		X		X		X		X	

EXAMPLE: R-7 = RED Terminal #7
B-14 = BLACK Terminal #14

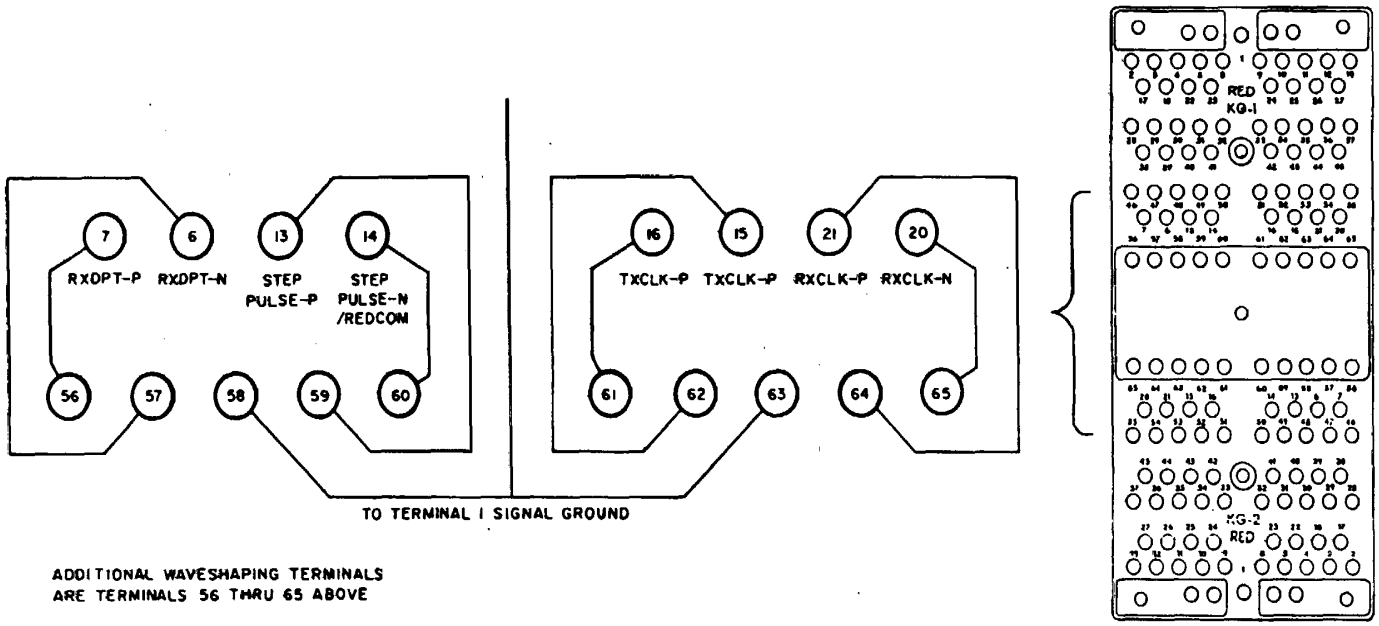


Figure 4-1. RED Terminal Block

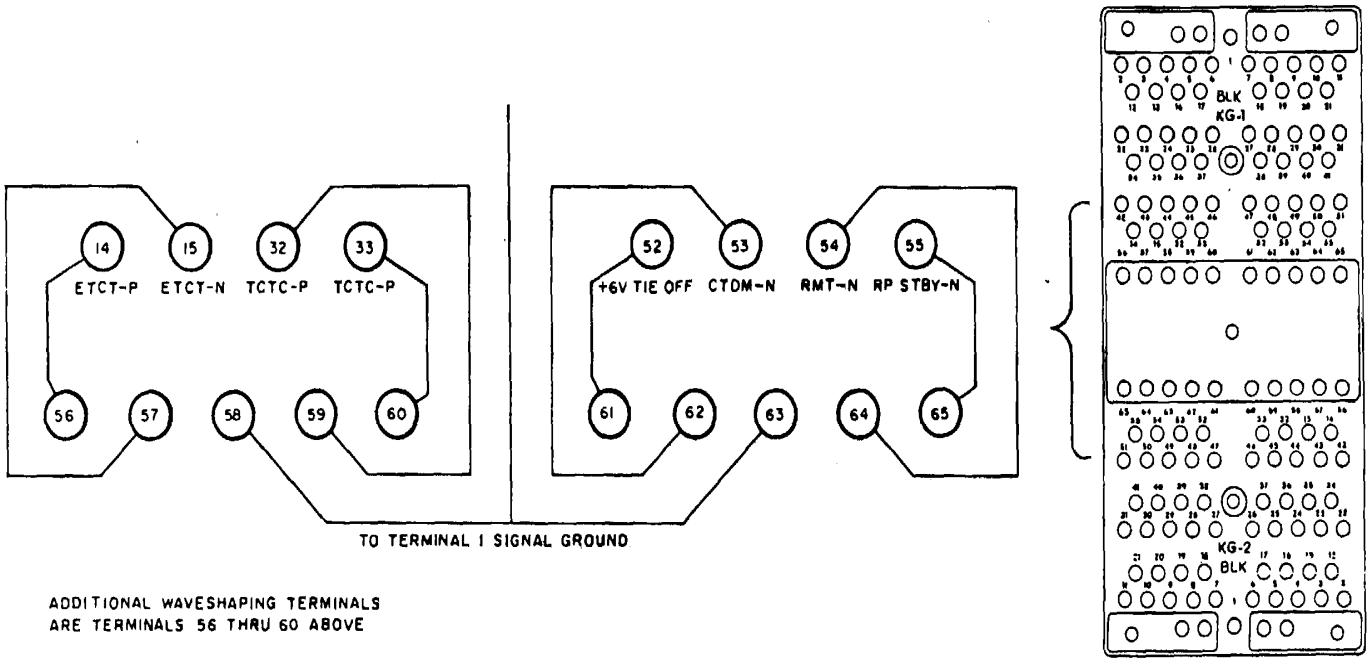


Figure 4-2. BLACK Terminal Block

4-3.1. Full Duplex Asynchronous Internal Clocks. Table 4-2 and Figure 4-3 are normal for a KG-84A, connected to a terminal using RS232-C on the RED side and a modem using RS232-C on the BLACK side. Both RED and BLACK sides are unbalanced. The terminal uses a NEGATIVE MARK. SYNCHRONOUS MODEMS ARE RECOMMENDED, ALTHOUGH SOME ASYNCHRONOUS MODEMS MAY BE USED WITH LOWER BAUD RATES.

Table 4-2. Full Duplex Asynchronous Internal Clocks

FRONT PANEL CONTROLS		
SETTING	LOCAL	DISTANT
CLOCK	1	2
DATA MODE	1, 2	SAME
RX RATE	DATA RATE	SAME
TX RATE	DATA RATE	SAME
STEP PULSE	NOT USED	SAME
TTY MODE	1	SAME
INTFC	1	SAME
DATA LENGTH	7, 8, 10, 11	SAME
SYNC MODE	1, 2, 3, 4	SAME
COMM MODE	1	SAME

4-3.2. Full Duplex Asynchronous Internal Clocks. Table 4-3 and Figure 4-4 are normal for a KG-84A, connected to a Military Teletype and a RS232-C MODEM. The KG-84A INTERFACE SWITCH has to be set to position 2. Both RED and BLACK DATA are unbalanced. The teletype uses a NEGATIVE MARK. SYNCHRONOUS MODEMS ARE RECOMMENDED, ALTHOUGH SOME ASYNCHRONOUS MODEMS MAY BE USED WITH LOWER BAUD RATES.

Table 4-3. Full Duplex Asynchronous Internal Clocks

FRONT PANEL CONTROLS		
SETTING	LOCAL	DISTANT
CLOCK	1	2
DATA MODE	1, 2	SAME
RX RATE	DATA RATE	SAME
TX RATE	DATA RATE	SAME
STEP PULSE	7, 8, 10, 11	SAME IF USED
TTY MODE	1	SAME
INTFC	2	2
DATA LENGTH	7, 8, 10, 11	SAME
SYNC MODE	1, 2, 3, 4	SAME
COMM MODE	1	SAME

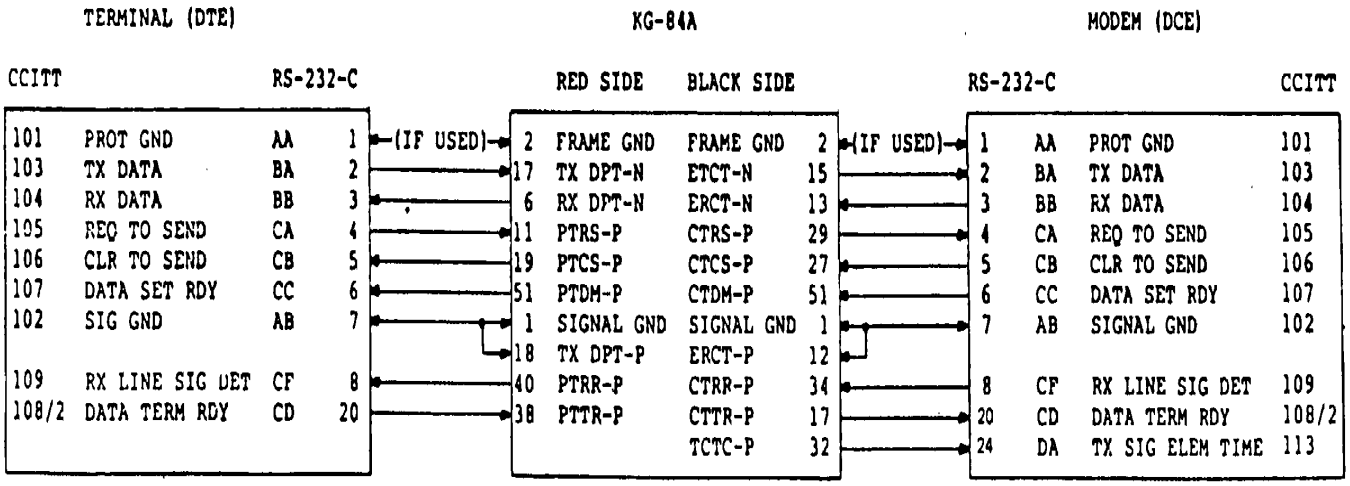


Figure 4-3. Wiring Diagram

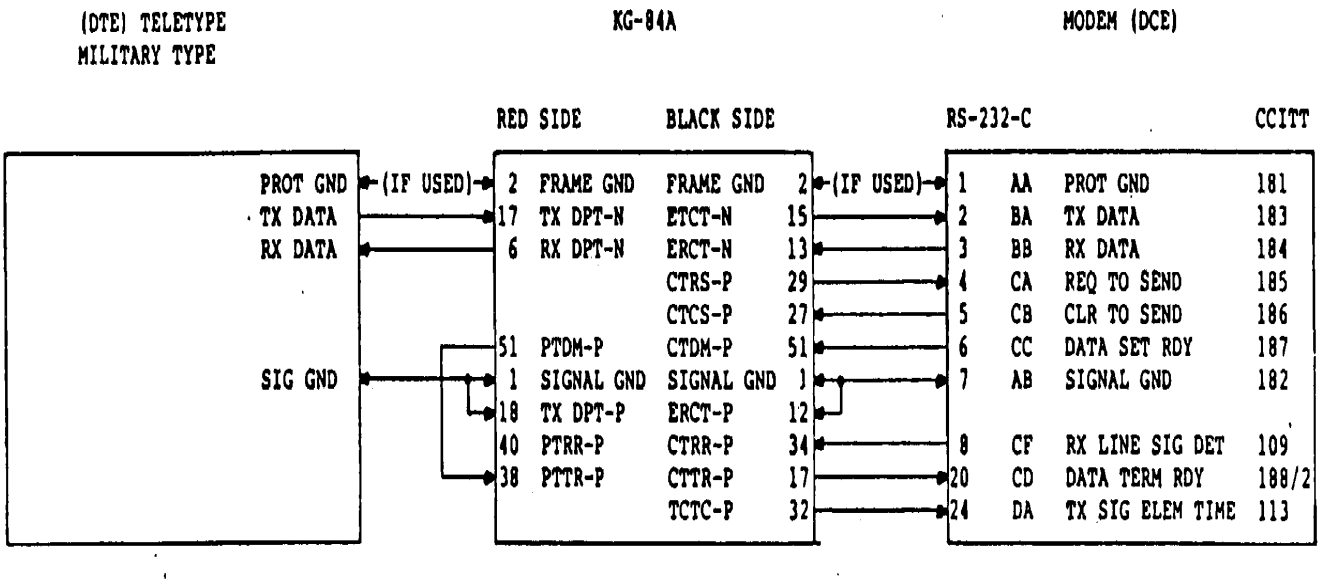


Figure 4-4. Wiring Diagram

4-3.3. Full Duplex Asynchronous Internal Clocks. Table 4-4 and Figure 4-5 are normal for a KG-84A, connected to a Military Teletype and MODEM. The KG-84A INTERFACE SWITCH has to be set to position 2. Both RED and BLACK DATA are unbalanced. The teletype uses a NEGATIVE MARK. SYNCHRONOUS MODEMS ARE RECOMMENDED, ALTHOUGH SOME ASYNCHRONOUS MODEMS MAY BE USED WITH LOWER BAUD RATES.

Table 4-4. Full Duplex Asynchronous Internal Clocks

FRONT PANEL CONTROLS		
SETTING	LOCAL	DISTANT
CLOCK	1	2
DATA MODE	1, 2, 3, 4, 5, 6	SAME
RX RATE	DATA RATE	SAME
TX RATE	DATA RATE	SAME
STEP PULSE	NOT USED	SAME IF USED
TTY MODE	1	SAME
INTFC	2	2
DATA LENGTH	7, 8, 10, 11	SAME
SYNCH MODE	1, 2, 3, 4	SAME
COMM MODE	1	SAME

4-3.4. Full Duplex Asynchronous Internal Clocks. Table 4-5 and Figure 4-6 are normal for a KG-84A strapped as a KG84. This configuration is for a Military teletype (unbalanced) using a POSITIVE MARK. The interface switch behind the hinged cover of the KG-84A has to be set to position 2. SYNCHRONOUS MODEMS ARE RECOMMENDED, ALTHOUGH SOME ASYNCHRONOUS MODEMS MAY BE USED WITH LOWER BAUD RATES.

Table 4-5. Full Duplex Asynchronous Internal Clocks

FRONT PANEL CONTROLS		
SETTING	LOCAL	DISTANT
CLOCK	1	2
DATA MODE	1, 2, 3, 4, 5, 6	SAME
RX RATE	DATA RATE	SAME
TX RATE	DATA RATE	SAME
STEP PULSE	7, 8, 10, 11	SAME IF USED
TTY MODE	1	SAME
INTFC	2	2
DATA LENGTH	7, 8, 10, 11	SAME
SYNC MODE	1, 2, 3, 4	SAME
COMM MODE	1	SAME

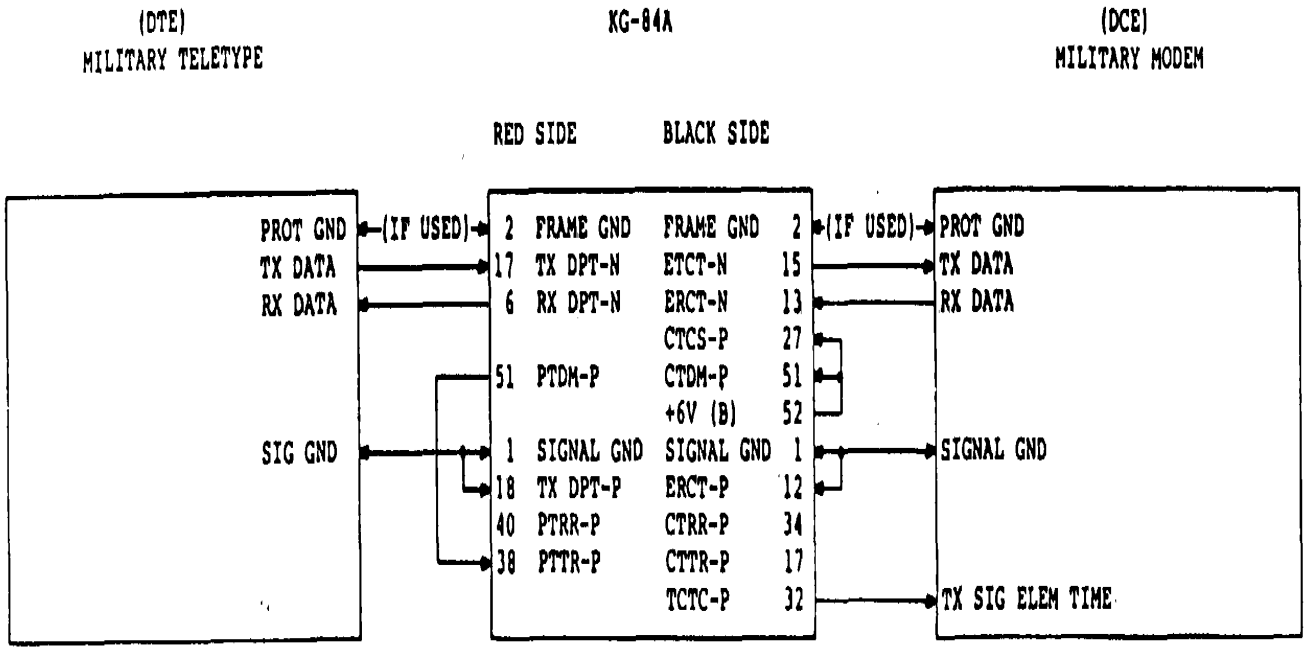


Figure 4-5. Wiring Diagram

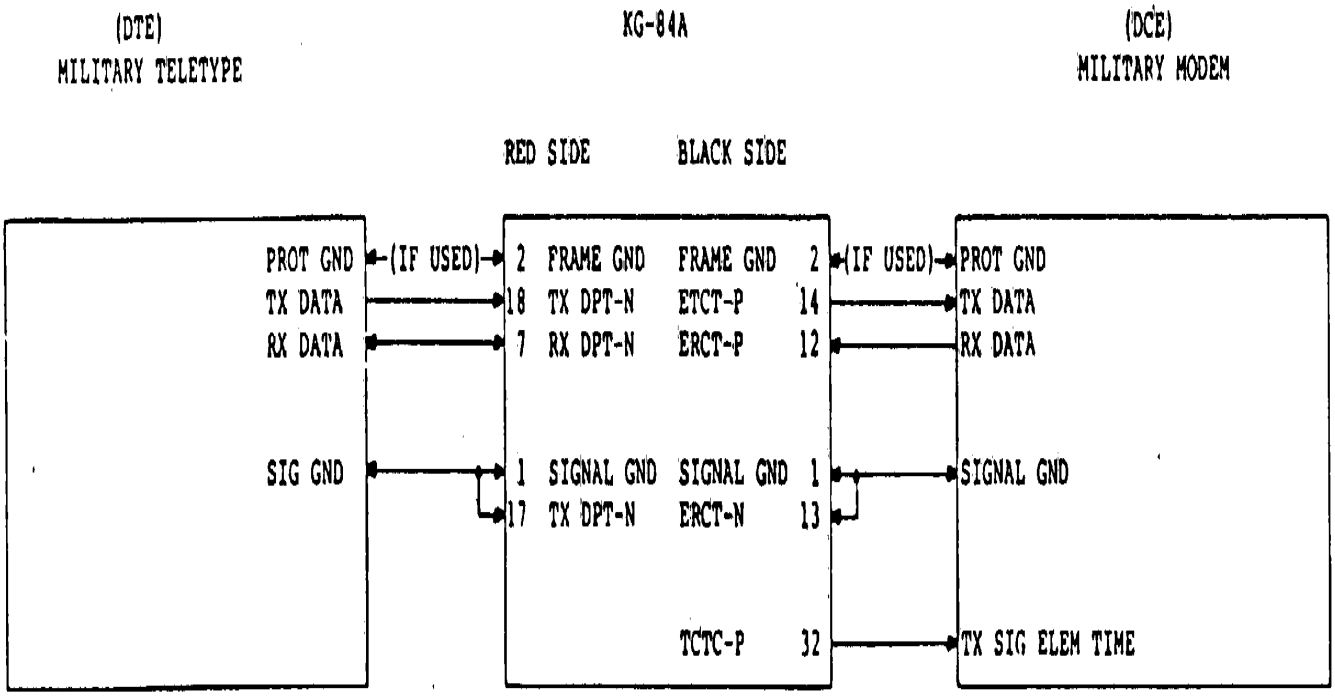


Figure 4-6. Wiring Diagram

4-3.5. Full Duplex Synchronous Internal Clocks. Table 4-6 and Figure 4-7 are normal for a KG-84A, configured for full duplex using unbalanced Synchronous Data with Internal Clocks.

Table 4-6. Full Duplex Synchronous Internal Clocks

FRONT PANEL CONTROLS		
SETTING	LOCAL	DISTANT
CLOCK	1	2
DATA MODE	1, 2	SAME
RX RATE	DATA RATE	SAME
TX RATE	DATA RATE	SAME
STEP PULSE	NOT USED	SAME
TTY MODE	1	SAME
INTFC	1	SAME
DATA LENGTH	SYNC	SAME
SYNC MODE	1, 2, 3, 4, 5	SAME
COMM MODE	1	SAME

4-3.6. Full Duplex Synchronous External Clocks. Table 4-7 and Figure 4-8 are normal for a KG-84A, configured for FULL DUPLEX using unbalanced SYNCHRONOUS DATA with External Clocks.
+

Table 4-7. Full Duplex Synchronous External Clocks

FRONT PANEL CONTROLS		
SETTING	LOCAL	DISTANT
CLOCK	1	1
DATA MODE	2	SAME
RX RATE	BB	SAME
TX RATE	BB	SAME
STEP PULSE	NOT USED	SAME
TTY MODE	1	SAME
INTFC	1	SAME
DATA LENGTH	SYNC	SAME
SYNC MODE	1, 2, 3, 4, 5	SAME
COMM MODE	1	SAME

* Can be used to resync system if pulsed true (minimum pulse width 10 microsec.)

** TX clock on DB should be strapped gated.

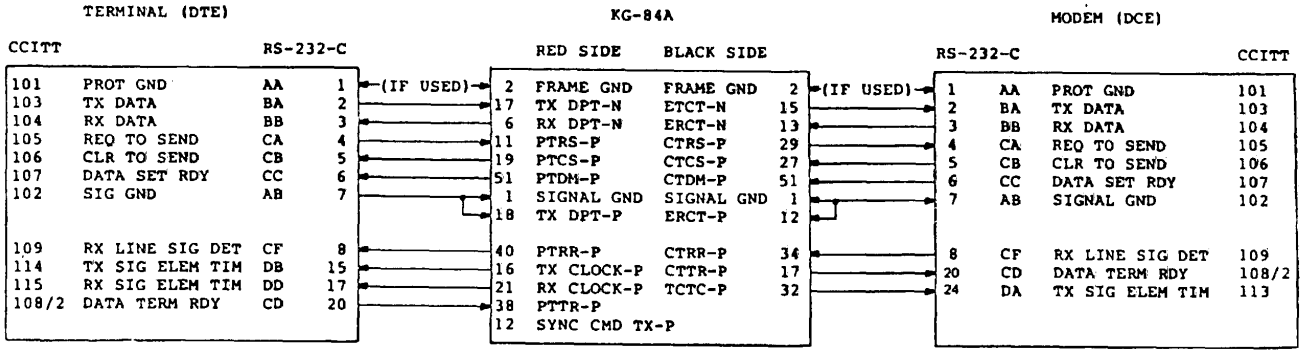


Figure 4-7. Wiring Diagram

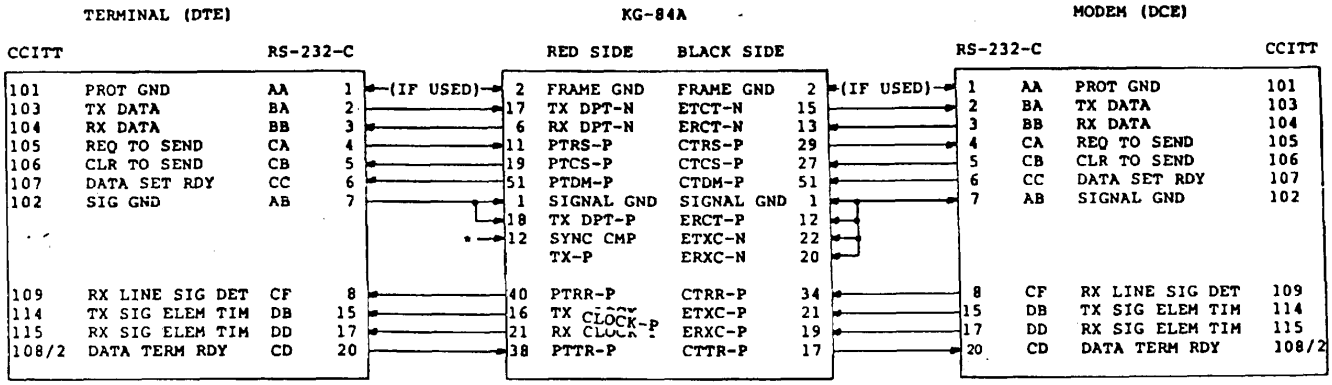


Figure 4-8. Wiring Diagram

4-3.7. Full Duplex Synchronous External Clock and Terminal Timing. Table 4-8 and Figure 4-9 are normal for a KG-84A, configured for FULL DUPLEX using unbalanced SYNCHRONOUS DATA with EXTERNAL CLOCK AND TERMINAL TIMING. (See para. 4-3.8.)

Table 4-8. Full Duplex Synchronous External Clock and Terminal Timing

FRONT PANEL CONTROLS		
SETTING	LOCAL	DISTANT
CLOCK	1	1
DATA MODE	2	SAME
RX RATE	BB	SAME
TX RATE	INTERNAL	DATA RATE
STEP PULSE	NOT USED	DATA RATE
TTY MODE	1	DATA RATE
INTFC	1	DATA RATE
DATA LENGTH	SYNC	DATA RATE
SYNC MODE	1, 2, 3, 4, 5	DATA RATE
COMM MODE	1	DATA RATE

4-3.8. TSEC/KG-84A Terminal Timing.

a. The KG-84A can only process SYNCHRONOUS BASEBAND data when in this mode.

b. The external RX CLOCK (ERXC-P) must be supplied from the DCE. The user should not loop the TCTC CLOCK back into the external RX CLOCK (ERXC) (see note). The RX Data Rate Switches behind the front panel hinged cover are set to (+8).

NOTE

The unit running Terminal Timing derives Clock TCTC from the PTTT Clock, however, if Clock TCTC is looped back into the External RX Clock input (ERXC), the Plain Text received data will not be in phase with the Plain Text received clock. Therefore, a TCTC loopback is not recommended.

c. Termining timing (TX Clock) must be supplied from the DTE. The TX Data Rate Switches on the front panel behind the hinged cover on the KG-84A must be set to one of the internal Data Rates. The Terminal Timing Clock must be within 118 parts per million (ppm) of the internal KG-84A TX Data Rate.

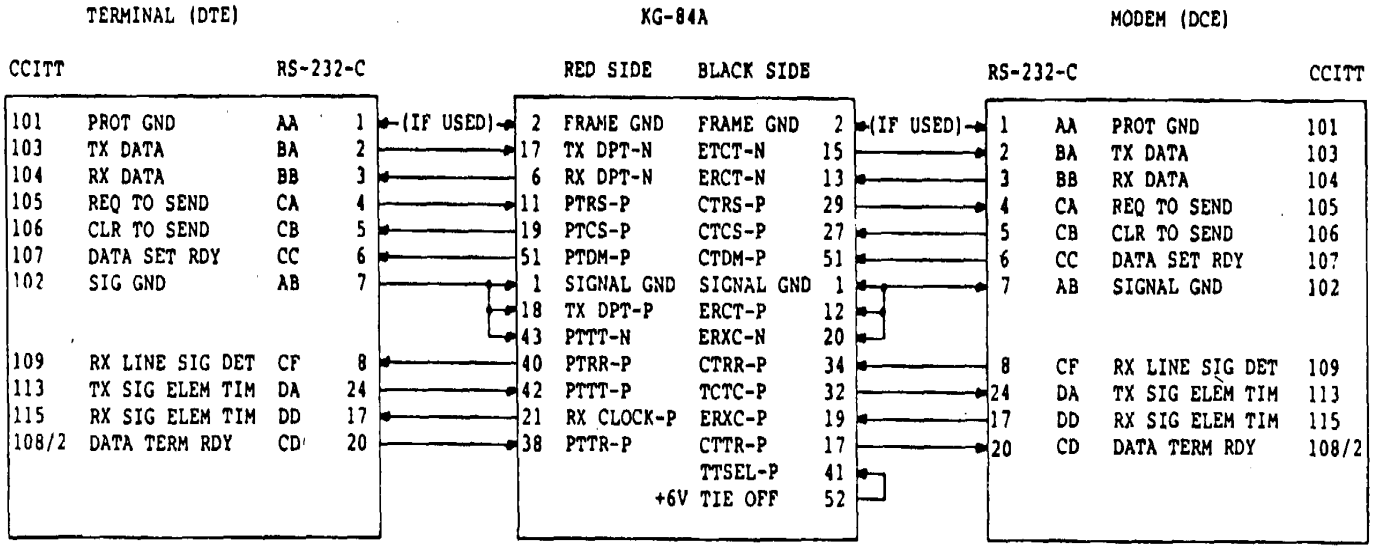


Figure 4-9. Wiring Diagram

d. TTSEL-P on the BLACK I/O must be tied TRUE (+6v). This allows the KG-84A to slave its internal TX clock to the incoming PTTT clock.

NOTE

TTSEL-P will not work correctly if its tied TRUE with the BLACK connector +6V tieoffs (pins 6 or 52), when there are other signals tied TRUE with these pins, such as Data Mode and Clear to Send. A maximum of (2) two signals can be tied TRUE with these pins.

e. The CLOCK MODE SWITCH must be in position 1.

4-3.9. RS-449 Balanced with External Clocks. Figure 4-10 is normal for a KG-84A, configured for FULL DUPLEX using balanced SYNCHRONOUS DATA with external clocks with or without TERMINAL TIMING. If TERMINAL TIMING is used, then TERMINAL TIMING SELECT (TTSEL-P) Pin 41 is tied "TRUE" on the BLACK connector and plain text transmit clock (PT TX CLK) pins 16 and 15 would be deleted from the RED connector. The front panel controls would be set as shown with terminal timing.

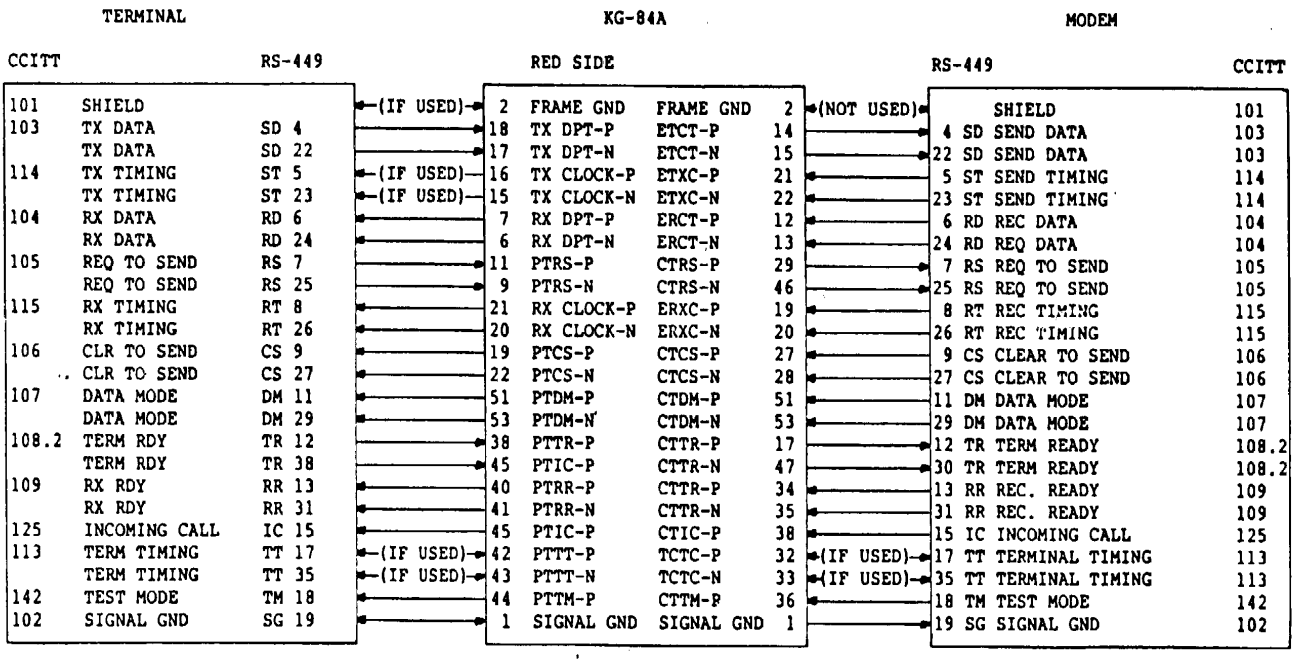


Figure 4-10. Wiring Diagram

CHAPTER 5

FPA/CAU INSTALLATION GUIDE

5-1. GENERAL.

This Chapter provides the procedures for installing a 4000 Series CAU into a 4200 Series Fixed Plant Adapter (FPA), part number 96790000-002. These units are referred to as CAU and FPA. The procedures include information for connecting the FPA to CAU power cable, the cable between the RED compartment and the CAU and the associated hardware to mount the CAU to the FPA. An after-installation check is also provided.

5-2. REQUIRED TOOLS AND TEST EQUIPMENT.

Refer to Table 1-1 for a list of required tools and test equipment.

NOTE

The terminal boards use insulation displacement terminals, use wire stuffer cap and Phillips head screwdriver or Amp-barrel terminal wire insertion tool part number 552714-3.

5-3. UNPACKING AND INSPECTION.

No special instructions are required for unpacking items shipped in cartons or boxes. Check equipment against packing list and report any damage which might have occurred during shipment. Factory wired and tested FPA's are normally shipped with terminal boards installed in the RED and BLACK compartments. The RED, BLACK, and power cables are factory wired to the installed terminal boards on one end and contain KG mating connectors on the other end. When shipped, the CAU with PC boards installed is wrapped in moisture-proof paper and packed in a corrugated carton. Unpack and check unit as follows:

a. Open corrugated carton and unwrap unit.

b. Inspect the unit for any parts that may have become loosened or damaged during shipment.

c. Check equipment against packing list.

d. Spare PC boards should be stored in a cool, dry place and covered to protect components from dust and dirt.

NOTE

Always handle modules on the edges to avoid damaging electrostatic sensitive devices.

5-4. CAU INSTALLATION INTO THE FPA.

5-4.1. General. This section includes instructions for preparing the CAU for installation, one-half inch bushing installation, CAU mounting, and CAU interface and power cable connections.

5-4.2. CAU Preparation for Installation. Before attempting the installation, check that the CAU-4000 Installation Kit, part number 21000573-000, contains all of the parts listed in Table 5-1.

5-4.3. Mechanical Installation.

a. Viewing the FPA from the rear (Figure 5-1, rear view), locate the RED compartment left side and using Phillips screwdriver, remove hole cover screws and two hole covers. Remove hole cover screw and hole cover from front of the RED compartment.

Table 5-1. CAU-4000 Installation Kit
(P/N 21000573-000) Part List

Part Number	Qty.	Description
75010659-000	1	Cable, PWR FPA/CAU
52090420-000	1	Spacer, CAU
63000037-000	2	Bushing, 1/2 IN
53000062-001	2	Locknut: 1/2 IN
50118321-006	4	SCR, PH, CR: 8-32 x 3/8
52022081-000	4	Washer, Split LK: MED 8
52013081-000	4	Washer, FL: HVY8 3/8 OD
56002313-001	3	Clip, CA, ADH: 1/8 DIA
75010671-002	1	CAU Interface Cable, Channel 2
75010671-001	1	CAU Interface Cable, Channel 1
62070643-000	1	AC Feedthru Block

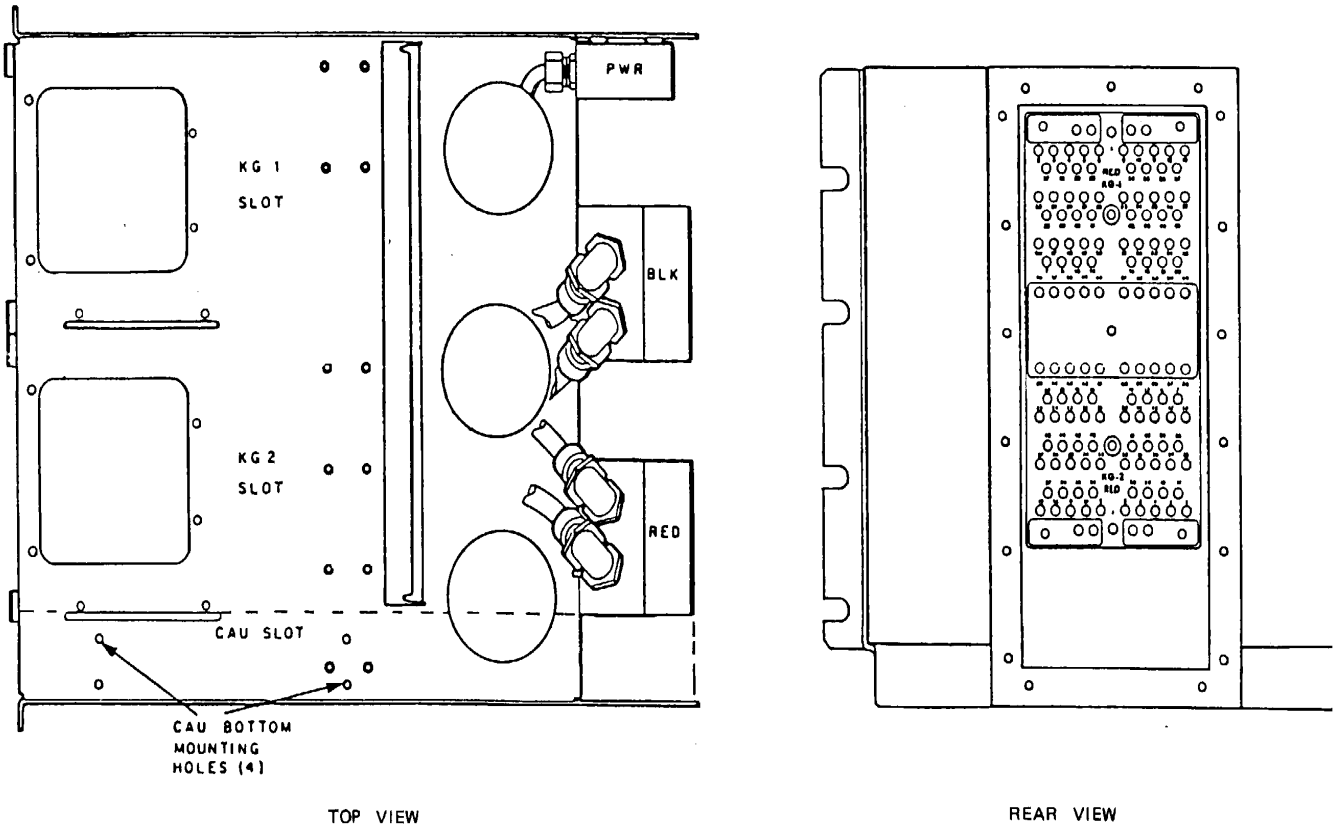


Figure 5-1. CAU/FPA Installation

b. View the CAU from the side. Remove the lower left cutout cover screw and the two cutout covers. The remaining three cutouts should be covered. The cutout nearest the bottom of the CAU is not covered and is the CAU power input. Remove the nylon grommet from this hole.

c. Place the CAU into the FPA (Figure 5-1, top view) next to the RED compartment. Make sure the RED compartment cutouts and the CAU cutouts, exposed in step b, coincide.

NOTE

At this time do not fasten the CAU to the FPA, otherwise CAU spacer installation will be impossible.

d. Remove the rear cover plate from the FPA RED compartment using a medium-size Phillips head screwdriver.

e. Remove the top two retaining screws from the RED terminal board and swing board down to gain access to top cutout.

f. From the rear of the RED compartment, install 1/2-inch cable bushing (part number 63000037-000) (Figure 5-2). Push through RED compartment cutout just far enough to slip CAU spacer (part number 52090420-000) over threaded portion of the bushing.

NOTE

CAU will have to be tilted away from RED compartment to ensure enough room to install spacer.

g. Tilt CAU towards the RED compartment. Inserting the 1/2-inch cable bushing into the CAU cutout. Reach through rear of CAU and install 1/2-inch locknut, part number 53000062-001, onto bushing. Do not tighten. Use the remaining 1/2-inch bushing to temporarily align the bottom hole in the spacer with the CAU and RED compartment.

h. Align the CAU over the four FPA bottom mounting holes (Figure 5-1, top view). Use a medium-size Phillips head screwdriver, fasten the CAU to the FPA. Use four 8/32 x 3/8 screws (part number 50118321-006) with flat washers (part number 52013081-000) and split washers (part number 52022081-000).

i. Reach in from the rear of CAU and tighten 1/2-inch bushing locknut, using 1/2-inch open end wrench.

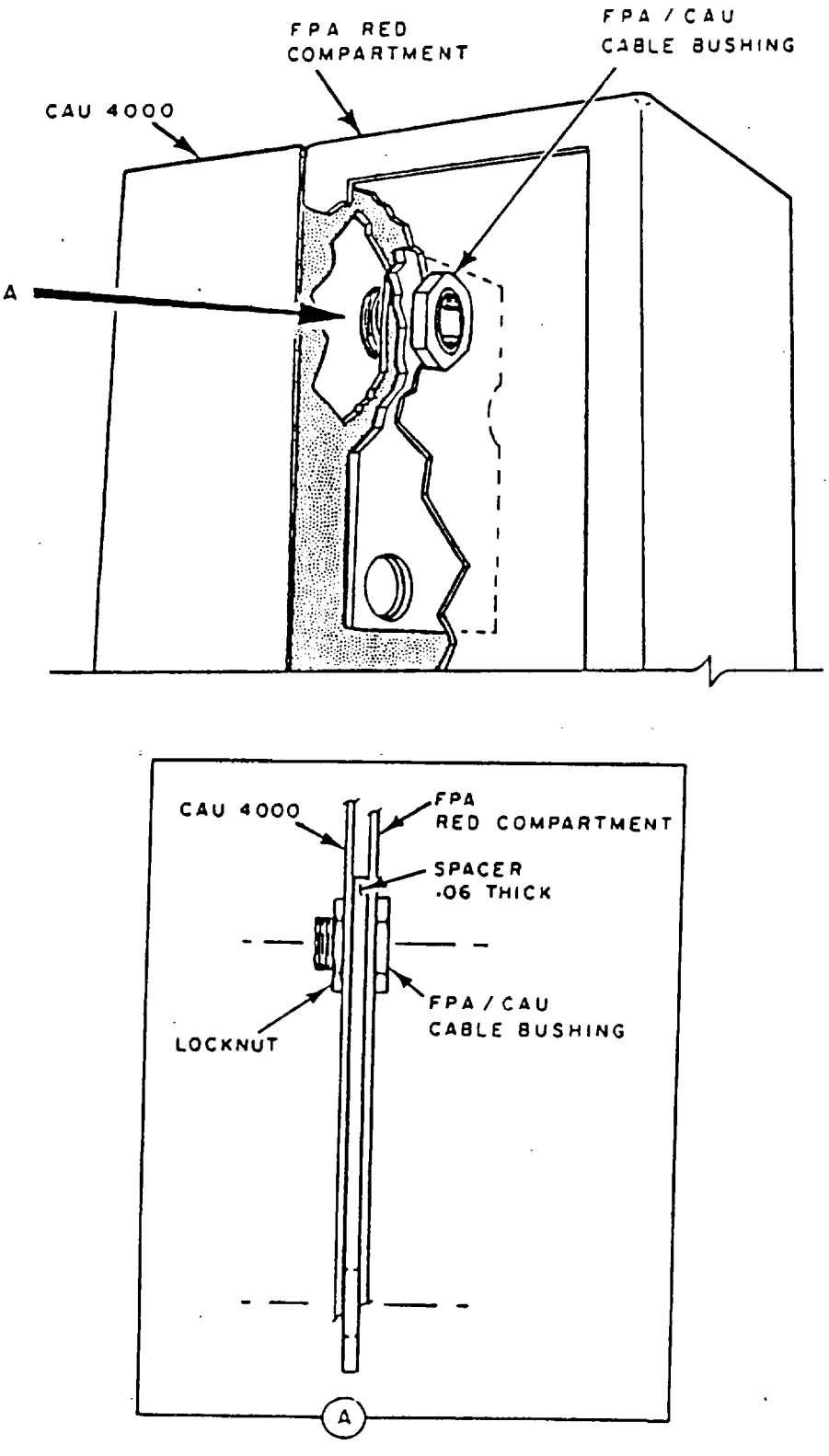


Figure 5-2. FPA/CAU Cable Bushing Installation

5-4.4. Electrical Installation - Interface Cable(s).

a. Fabricate interface cables from parts contained in installation kit (part number 75010671-001 for channel 1, part number 75010671-002 for channel 2) in accordance with Figures 5-3 and 5-4.

b. At the rear of the RED compartment, insert CAU interfacecable through 1/2-inch cable bushing, lug end towards CAU. Enough cable should appear to make connections to the CAU terminal block.

NOTE

For dual-channel FPA's, two CAU terminal block boards are required. Channel 1 is located on the bottom, channel 2 is located on the top.

c. Install CAU terminal block boards (from CAU accessory kit part number 21000385-000) but only far enough to allow access to the terminal block (TB1 through TB3) screws. Attach FPA/CAU interface cable lugs to TB1 through TB3 on terminal block board(s) in accordance with Figure 5-4. Insert each terminal block board fully into its appropriate connector.

d. Resecure terminal board back into the RED compartment by installing the two top screws.

CAUTION

Make certain cable ends are dressed neatly and not jammed between adjacent connectors.

e. On the RED compartment side, terminate cable in accordance with Figure 5-4 for channels 1 and 2, using wire insertion tool.

NOTE

Cables provided in kit connect CAU to FPA RED only. Connections from CAU to fixed plant wiring and from KG BLACK to fixed plant wiring are to be provided by the installing activity. See Figure

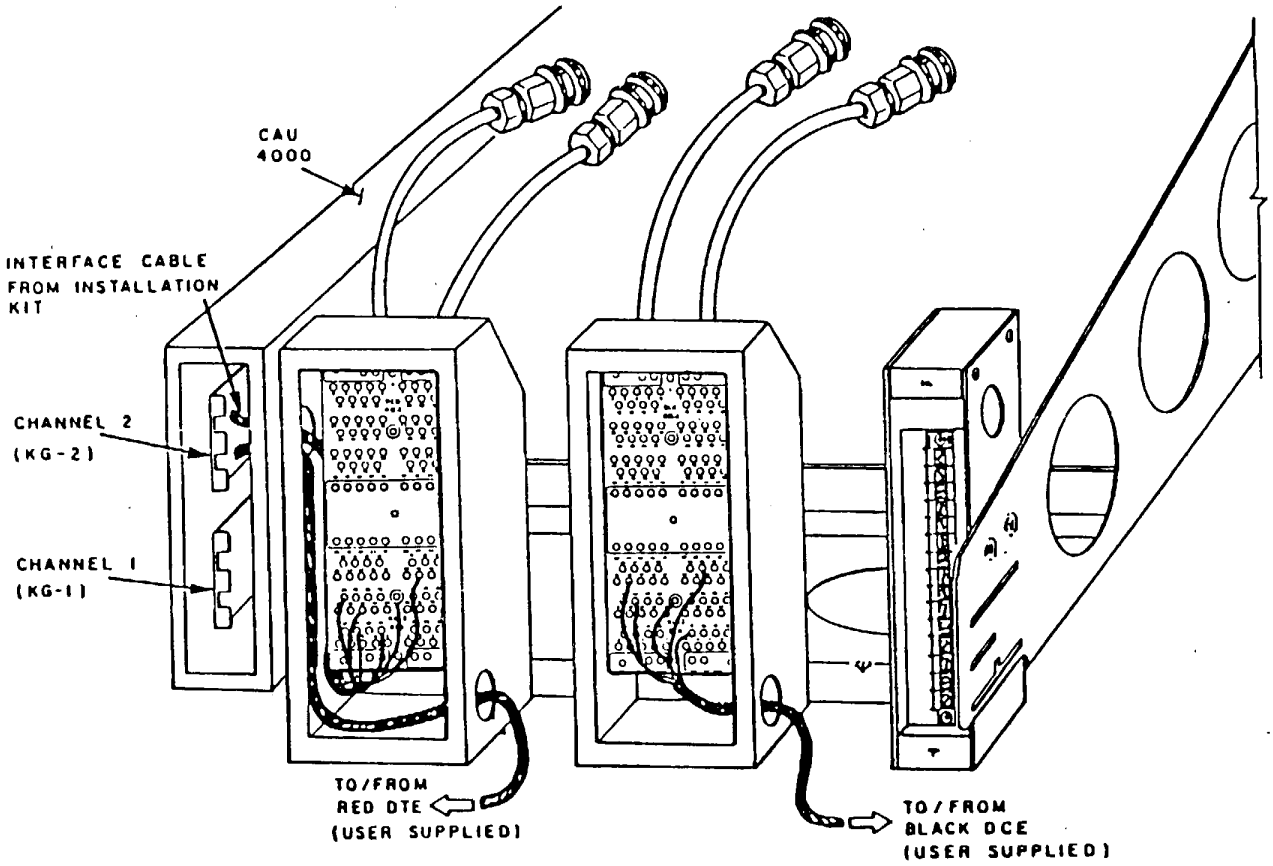
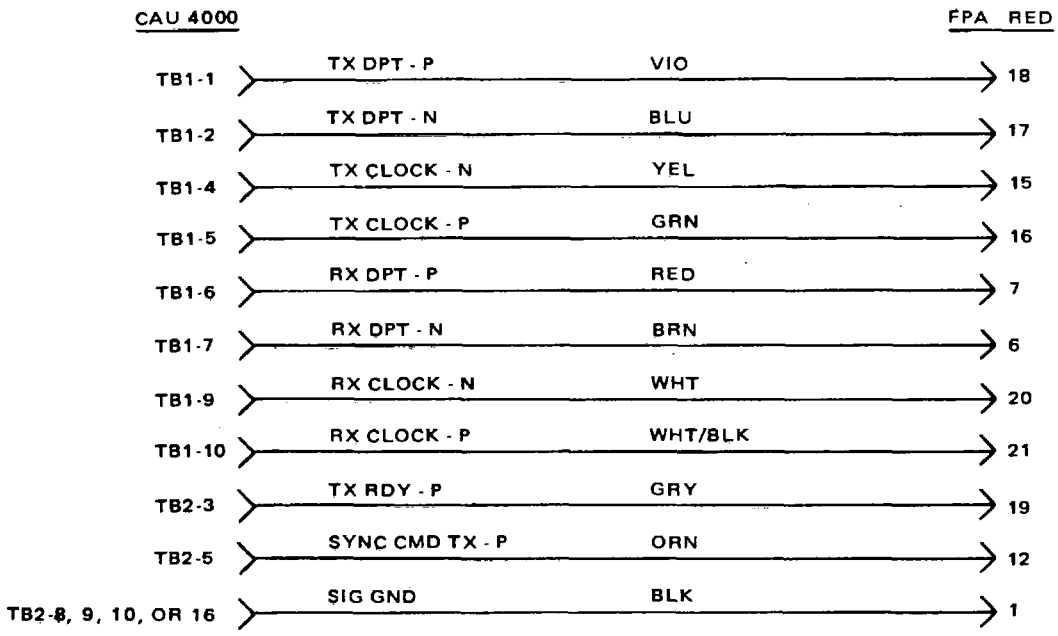
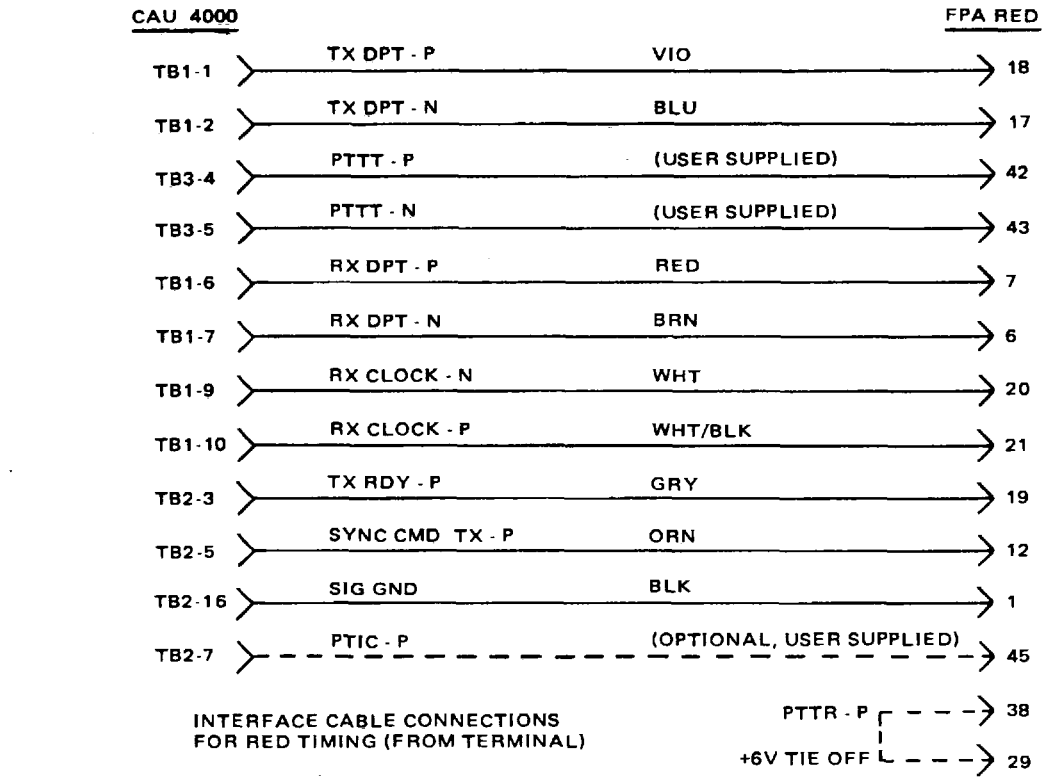


Figure 5-3. Interface Cable Installation



INTERFACE CABLE CONNECTIONS
FOR BLACK TIMING (FROM MODEM)



INTERFACE CABLE CONNECTIONS
FOR RED TIMING (FROM TERMINAL)

Figure 5-4. Interface Cable Connection

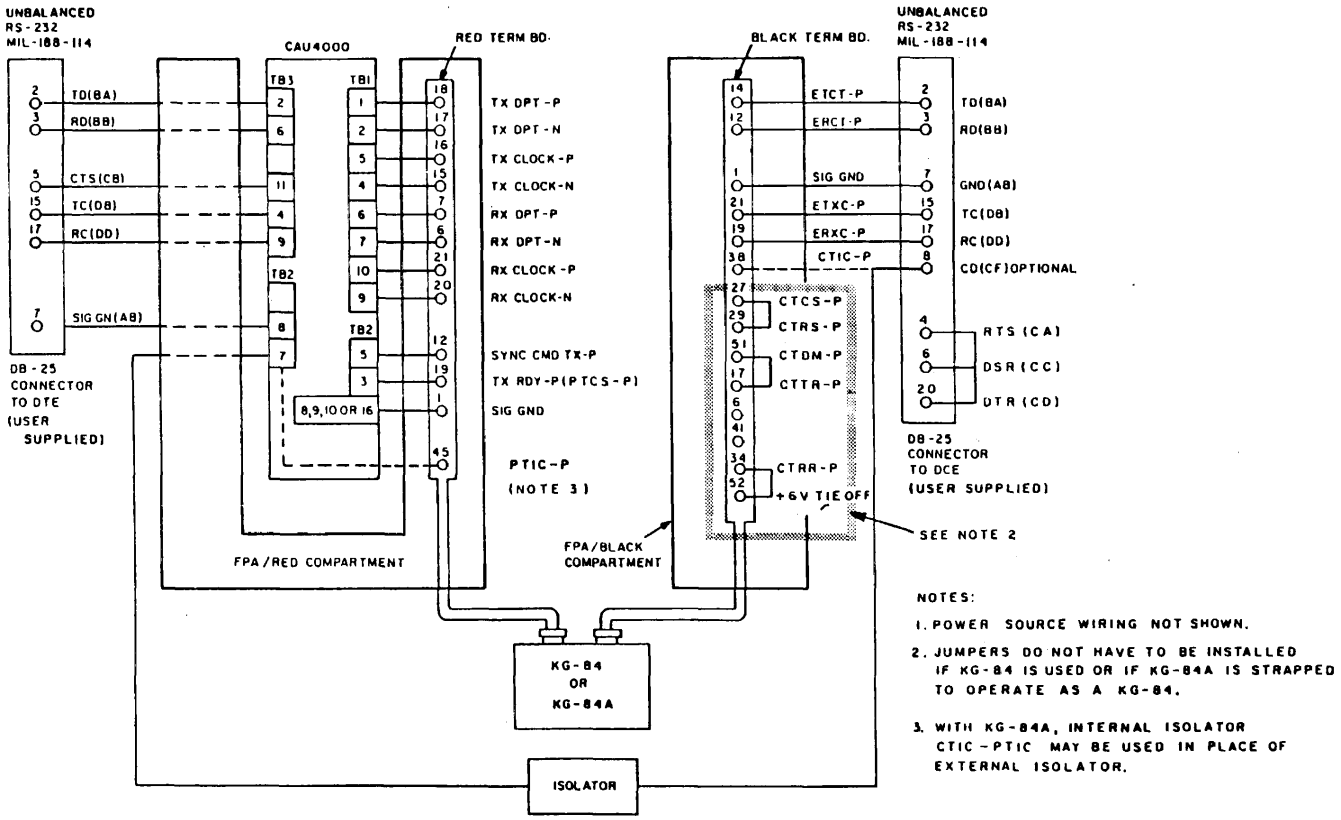


Figure 5-5. Complete Installation with Timing from BLACK Side (Sheet 1 of 2)

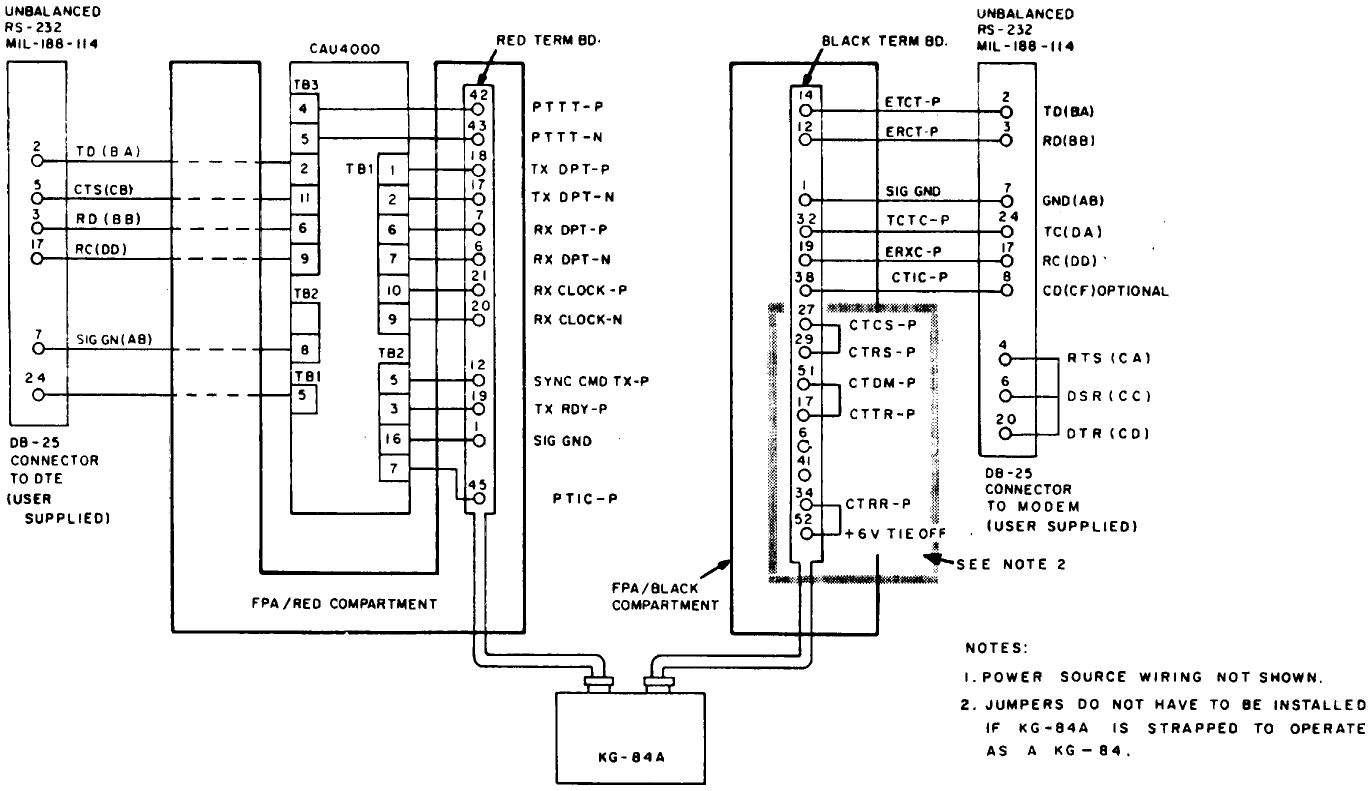


Figure 5-5. Complete Installation with Timing from RED Side (Sheet 2 of 2)

5-4.5. Electrical Installation - Power Cable.

a. Select the AC feedthru block (part number 62070643-000) from the installation kit and position in RED compartment as shown in Figure 5-6. Remove the AC terminal block bracket by removing screws on bottom of CAU. Refer to Figures 5-3 and 5-7.

b. Remove AC cover plate from rear of CAU by removing retaining screw. Secure feedthru block by installing bushing from kit (part number 63000037-000) through CAU, spacer, and through RED compartment.

c. Select CAU Power cable from kit (part number 75010659-000). Route wires (unterminated end of cable) through front of RED compartment, through feedthru block, and into CAU power compartment. Thread cable bushing into front of RED compartment.

NOTE

Entire cable assembly may have to be turned to prevent wires from kinking.

d. Remove cover plate from rear of FPA power compartment and remove hole cover from lowest front hole. Route power cable to FPA power compartment. Pass cable bushing through lower cutout and secure with locknut from kit (part number 53000062-001).

e. Secure cable to FPA chassis using 3 adhesive backed cable clips from kit (part number 56002313-001).

f. In FPA power compartment, connect BLACK wire to terminal AC and WHITE wire to terminal ACC. Connect RED wire with ringlug to chassis ground. See Figure 5-7.

NOTE

Be sure CAU is configured to operate on the same AC power as the KG units.

g. In CAU power compartment, connect WHITE wire to terminal marked ACC, BLACK wire to terminal marked AC and RED wire with ringlug to chassis ground.

h. Reinstall rear cover plates on FPA power compartment, RED compartment and CAU power compartment. Install CAU rear cover from CAU accessory kit (part number 21000385-000).

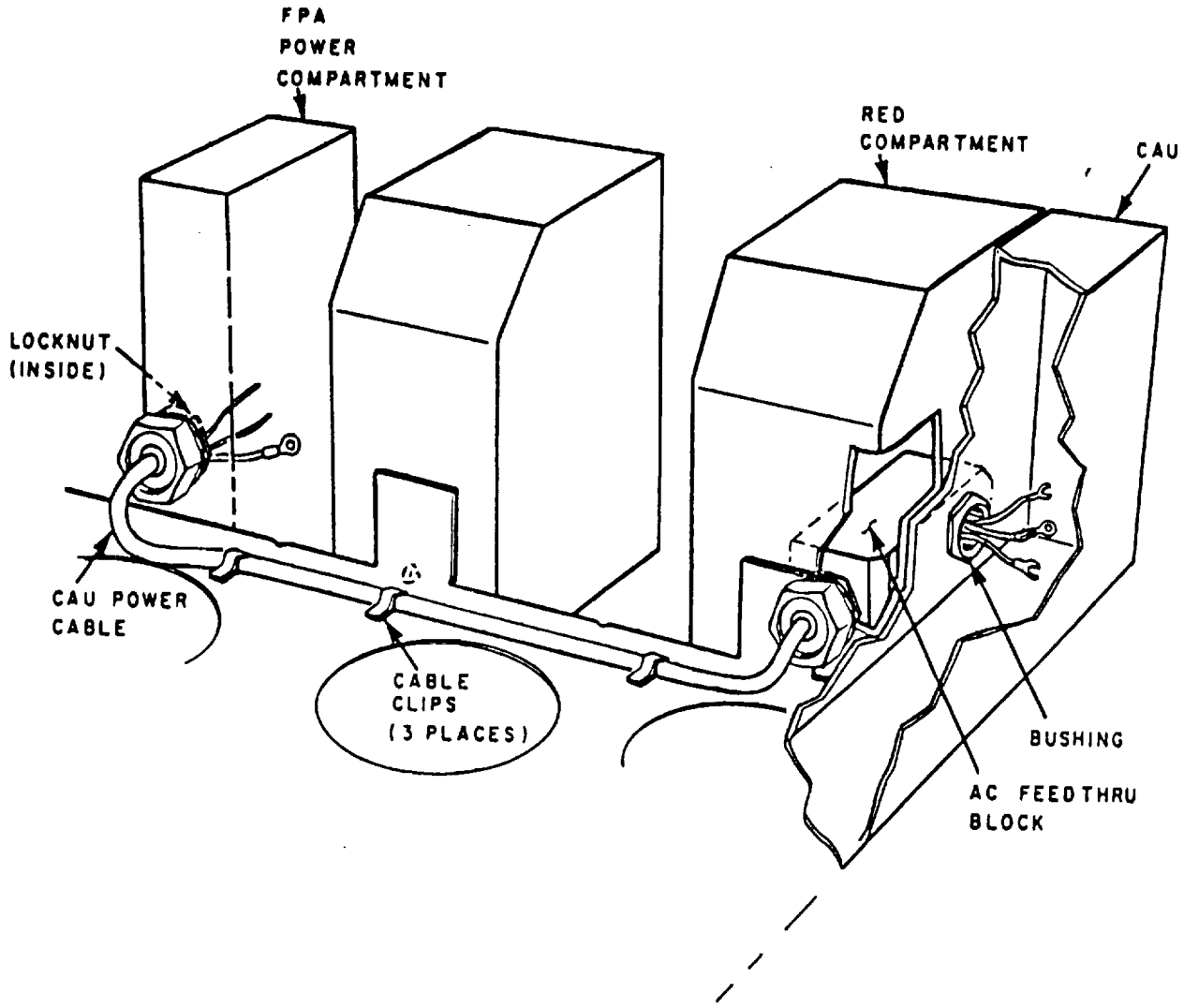


Figure 5-6. FPA/CAU Power Cable Installation Diagram

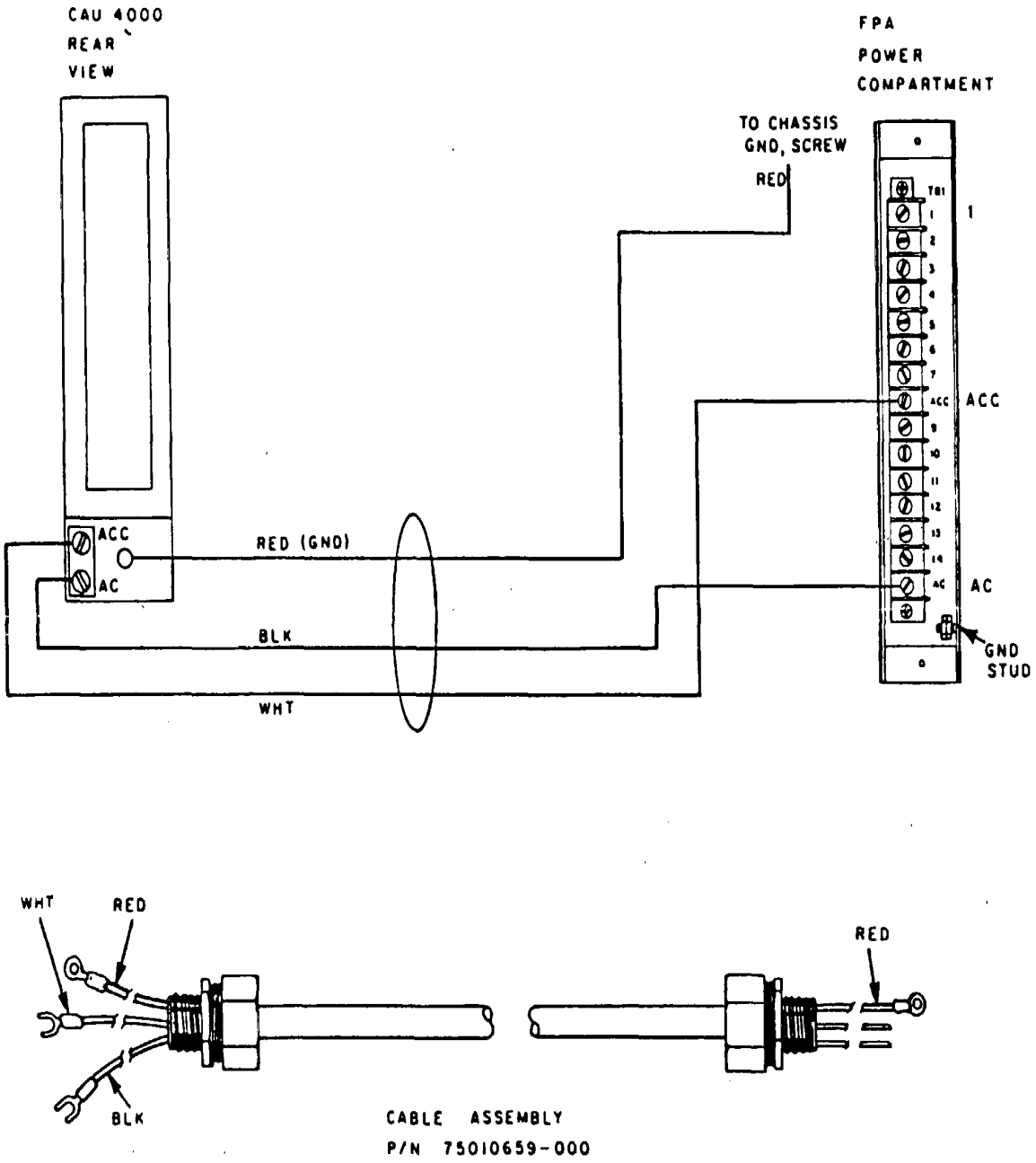


Figure 5-7. FPA/CAU Cable Wiring Diagram

5-5. FPA/CAU TURN-ON TEST.

The FPA CAU turn-on test consists of the following:

a. Ensure FPA is connected to plant wiring, and restore plant power.

b. Place CAU into operation as follows:

(1) Loosen four CAU front cover quick disconnect fasteners and carefully remove front cover far enough to gain access to front cover ribbon cables.

(2) Remove 14 pin ribbon cable connector from CAU front cover connector.

NOTE

Before installing front panel, ensure ribbon cable connector is seated firmly into its receptacle.

c. Indicator Check. Indicators may be checked by performing a reset (via LOC and EAR pushbuttons simultaneously or PWR/ON/ OFF switch) to cause all indicators to illuminate for approximately one second. The indicator check will cause a resync.

CHAPTER 6

MAINTENANCE INSTRUCTIONS

Section I. ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

6-1. ORGANIZATIONAL PREVENTIVE MAINTENANCE.

Organizational preventive maintenance consists of routine checks and services. Routine checks and services like cleaning, dusting, and checking for frayed cables should be performed as required.

6-2. TOUCHUP PAINTING.

Remove rust and corrosion from metal surfaces by lightly sanding with fine sandpaper. Brush two thin coats of paint on base metal to protect it from further corrosion. Refer to applicable cleaning and refinishing practices specified in TB 43-0118.

Section II. DIRECT PREVENTIVE MAINTENANCE

6-3. TOOLS AND TEST EQUIPMENT REQUIRED.

Refer to Maintenance Allocation Chart (MAC) for maintenance of the FPA.

6-4. DIRECT PREVENTIVE MAINTENANCE.

Direct preventive maintenance consists of systematic care, servicing and inspection of equipment to prevent the occurrence of trouble, reduce downtime, and assure that the equipment is performing to its maximum operational capability. Preventive maintenance includes inspection and checking of the equipment on a regularly scheduled basis.

6-5. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES.

The necessary direct preventive maintenance checks and services (PMCS) to be performed are listed and described in Table 6-1. These checks and services are used to maintain the FPA in good physical and operating condition. Routine checks and services like cleaning, dusting, touchup painting, and checking for frayed cables are not listed in the preventive maintenance checks and services chart. They are routine checks and services that should be performed as required. The item numbers indicate the sequence of minimum inspection requirements. If a defect is found that requires shutdown, it may be noted for future correction during periods of opportunity. Stop operation immediately if a deficiency is noted during operation which would damage the equipment. Report any deficiencies using the proper form (see DA PAM 738-750). WHEN YOU ARE DOING ANY PMCS OR ROUTINE CHECKS, KEEP IN MIND THE FOLLOWING NOTE.

NOTE

If the equipment must be kept in continuous operation, check and service only those items that can be checked and serviced without disturbing operation; make the complete checks and services when the equipment can be shut down.

6-6. PMCS PROCEDURES.

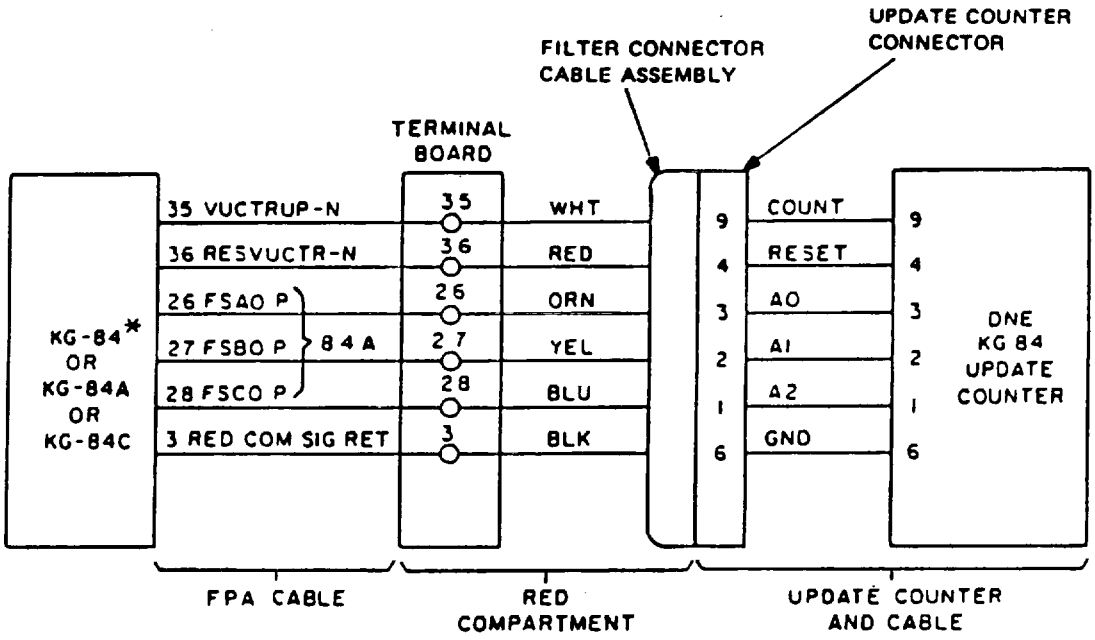
Perform the PMCS as shown in Table 6-1.

6-7. TROUBLESHOOTING.

Troubleshooting the FPA consists of using the multimeter to perform continuity checks of the FPA wiring and cabling. Refer to the applicable interface signal connection Tables and wiring diagrams located in Chapter 3 for wiring information, and Figure 6-1.

Table 6-1. Direct Preventive Maintenance Checks and Services Monthly Schedule

Item No.	Procedure	Corrective Action
1	Perform the update counter PMCS procedures (paragraph 6-6 of TM 11-5811-271-13&P).	Replace update counter. If replacing update counter does not correct problem, refer to paragraph 6-7, Troubleshooting.



*FOR KG-84, THE ADODRESS LINES (FSAO-FSCO) ARE NOT USED

Figure 6-1. FPA and Update Counter Wiring

APPENDIX A

REFERENCES

A-1. SCOPE.

This appendix lists all forms, field manuals, technical manuals and miscellaneous publications refewrenced in this manual.

A-2. FORMS.

DA Form 2028-2	Recommended Changes to Equipment Publications
DA Pam 25-30	Consolidated Index of Army Publications and Blank Forms
DA Pam 310-10	US Army Index of Modification Work Orders
DA Pam 738-750	The Army Maintenance Management System (TAMMS)

A-3. FIELD MANUALS.

Not applicable.

A-4. TECHNICAL MANUALS.

TM 750-244-2	Procedures for Destruction of Electronic Materiel to Prevent Enemy Use
TM 11-5811-271-13&P	Operator's Organizational and Direct Support Maintenance Manual with Repair Parts and Special Tools List for Fixed Plant Adapter OF-175/F

A-5. MISCELLANEOUS PUBLICATIONS.

TB 43-0118	Cleaning and Refinishing Practices

APPENDIX B

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

B-1. GENERAL.

This appendix provides a summary of the maintenance operations for the FPA OF-175/F. It authorizes categories of maintenance for specific maintenance functions on repairable items and assemblies and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

B-2. MAINTENANCE FUNCTION.

Maintenance functions will be limited to and defined as follows:

a. Inspect - To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.

b. Test - To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service - Operations required periodically to keep an item in proper operating condition, i.e., to clean (decontaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.

d. Adjust - To maintain, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.

e. Align - To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate - To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Install - The act of emplacing, seating, or fixing into position an item, part, module (component or assembly) in a manner to allow the proper functioning of the equipment or system.

h. Replace - The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

i. Repair - The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item or system.

j. Overhaul - That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild - Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc.) considered in classifying Army equipments/components.

B-3. COLUMN ENTRIES.

a. Column 1. Group Number - Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

b. Column 2. Components/Assembly - Column 2 contains the noun names of components, assemblies, subassemblies, and modules for which maintenance is authorizes.

c. Column 3. Maintenance Functions - Column 3 lists the functions to be performed on the item listed in column 2. When items are listed without maintenance functions it is solely for the purpose of having the group numbers in the MAC and RPSTL coincide.

d. **Column 4. Maintenance Category** - Column 4 specifies, by the listing of a "worktime" figure in the appropriate Subcolumn(s), the lowest level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number of complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate "worktime" figures will be shown for each category. The number of task-hours specified by the "worktime"l figure represents the average time required to restore an item (assembly, subassembly, component, module, end item or System) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. Subcolumns of column 4 are as follows:

UNIT

C Operator/Crew
O Organizational

INTERMEDIATE

F Direct Support
H General Support

DEPOT

D Depot

e. Column 5. Tools and Equipment - Column 5 specifies by code, those common tool sets, (not individual tools) and special tools, test and support equipment required to perform the designated function.

f. Column 6. Remarks - Column 6 contains an alphabetic code which leads to the remark in Section IV, Remarks, which is pertinent to the item opposite the particular code.

B-4. TOOLS AND TEST EQUIPMENT REQUIREMENTS (SECTION III).

a. Tool or Test Equipment Reference Code - The numbers in the column coincide with the numbers used in the tools and test equipment column of the MAC. The numbers indicate the applicable tool or test equipment for the maintenance functions.

b. Maintenance Category - The codes in this column indicate the maintenance category allocated the tool or test equipment.

c. Nomenclature - This column lists the noun name and nomenclature of the tools and test equipment required to perform the maintenance functions.

d. National/NATO Stock Number - This column lists the National/ NATO stock number of the specific tool or test equipment.

e. Tool Number - This column lists the manufacturer's part number of the tool followed by the Federal Supply Code for Manufacturers (5 digit) in parenthesis.

B-5. REMARKS (SECTION IV).

a. Reference Code - This code refers to the appropriate item in Section II, Column 6.

b. Remarks - This column provides the required explanatory information necessary to clarify items appearing in Section II.

SECTION III TOOL AND TEST EQUIPMENT REQUIREMENTS

FOR

FIXED PLANT ADAPTER OF-175/F

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) TOOLS AND EQPT	(6) REMARKS
00	FIXED PLANT ADAPTERL	Inspect		0.1					
	OF-175/F	Test			0.1			1	
		Replace			1.0			2	
		Repair			0.5				A,B

AMSEL-ME Form 6031. 1 Nov 85 (ed of 1 Jul 76 in obsolete) HISA-FM 98-86

SECTION III TOOL AND TEST EQUIPMENT REQUIREMENTS

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE Level	NOMENCLATURE	NATIONAL/ NATO STOCK NUMBER	TOOL NUMBER
1	0,F	Multimeter AN/USM-16, or	6625-00-999-7465	
		Multimeter AN/PSM-45, or	6625-01-139-2512	
		Multimeter AN/USM-486/U	6625-01-145-2430	
2	0,F	Tool Kit, Elec. Equipment TK-1011/G	5180-00-064-5178	
	NOTE:	Equivalent tools and Test Equipment may be substituted.		

SECTION IV. REMARKS

REFERENCE CODE	REMARKS
A	Repair by replacement of Update Counter Assembly (NSN-5895-01-277-7823.
B	When the Update Counter Assembly fails, refer to TM11-5811-271-13&P-for disposal.

B-7/(B-8 blank)

APPENDIX F

OPERATOR'S, ORGANIZATIONAL AND DIRECT SUPPORT MAINTENANCE
REPAIR PARTS AND SPECIAL TOOLS LIST

Section I. INTRODUCTION

F-1. SCOPE.

This manual lists spares and repair parts; special tools; special test, measurement, and diagnostic equipment (TMDE), and other special support equipment required for performance of operator's organizational, and direct support maintenance of the FPA. It authorizes the requisitioning and issue of spares and repair parts as indicated by the source and maintenance codes.

F-2. GENERAL.

This Repair Parts and Special Tools List is divided into the following sections:

F-2.1. Section II. Repair Parts List. A list of spares and repair parts authorized for use in the performance of maintenance. The list also includes parts which must be removed for replacement of the authorized parts. Parts lists are composed of functional groups in numeric sequence, with the parts in each group listed in figure and item number sequence. Bulk materials are listed in NSN sequence.

F-2.2. Section III. Special Tools List. There are no special tools, special TMDE, or other special support equipment required for the performance of maintenance.

F-2.3. Section IV. National Stock Number and Part Number Index. A list, in National item identification number (NIIN) sequence, of all National stock numbers (NSN), appearing in the listings, followed by a list in alphameric sequence of all part numbers appearing in the listings. National stock numbers and part numbers are cross-referenced to each illustration figure and item number appearance. This index is followed by a cross-reference list of reference designators to figure and item numbers.

F-3. EXPLANATION OF COLUMNS.

F-3.1. Illustration. This column is divided as follows:

F-3.1.1. Figure Number. Indicates the figure number of the illustration on which the item is shown.

F-3.1.2 . **Item Number**. The number used to identify item called out in the illustration.

F-3.2. **Source Maintenance and Recoverability (SMR) Codes.**

F-3.2.1. **Source Code**. Source codes indicate the manner of acquiring support items for maintenance, repair, or overhaul of end items. Source codes are entered in the first and second positions of the Uniform SMR Code format as follows:

Code	Definition
PA	Item procured and stocked for anticipated or known usage.
PB	Item procured and stocked for insurance purpose because essentially dictates that a minimum quantity be available in the supply system.
PC	Item procured and stocked and which otherwise would be coded PA except that it is deteriorative in nature.
PD	Support item, excluding support equipment, procured for initial issue or outfitting and stocked only for subsequent or additional initial issues or outfittings. Not subject to automatic replenishment.
PE	Support equipment procured and stocked for initial issue or outfitting to specified maintenance repair activities.
PF	Support equipment which will not be stocked but which will be centrally procured on demand.
PG	Item procured and stocked to provide for sustained support for the life of the equipment. It is applied to an item peculiar to the equipment which, because of probable discontinuance or shutdown of production facilities, would prove uneconomical to reproduce at a later time.
KD	An item of a deport overhaul/repair kit and not purchased separately. Depot kit defined as a kit that provides items required at the time of overhaul or repair.
KF	An item of a maintenance kit and not purchased separately. Maintenance kit defined as a kit that provides an item that can be replaced at organizational or intermediate levels of maintenance.

Code	Definition
KB	Item included in both a depot overhaul/repair kit and a maintenance kit.
MO	Item to be manufactured or fabricated at organizational level.
MF	Item to be manufactured or fabricated at the direct support maintenance level.
MH	Item to be manufactured or fabricated at the general support maintenance level.
MD	Item to be manufactured or fabricated at the depot maintenance level.
AO	Item to be assembled at organizational level.
AF	Item to be assembled at direct support maintenance level.
AH	Item to be assembled at general support maintenance level.
AD	Item to be assembled at depot maintenance level.
XA	Item is not procured or stocked because the requirements for the item will result in the replacement of the next higher assembly.
XB	Item is not procured or stocked if not available through salvage, requisition.
XC	Installation drawing, diagram, instruction sheet, field service drawing, that is identified by manufacturer's part number.
XD	A support item that is not stocked. When required, item will be procured through normal supply channels.

NOTE

Cannibalization or salvage may be used as a source of supply for any items coded above except those coded XA and aircraft support items as restricted by AR 700-42.

F-3.2.2. **Maintenance Code**. Maintenance codes are assigned to indicate the levels of maintenance authorized to USE and REPAIR support items. The maintenance codes are entered in the third and fourth positions of the Uniform SMR Code format as follows:

a. The maintenance code entered in the third position will indicate the lowest maintenance level authorized to remove, replace, and use the support item. The maintenance code entered in the third position will indicate one of the following levels of maintenance:

Code	Application/Explanation
C	Crew or operator maintenance performed within organizational maintenance.
O	Support item is removed, replaced, used at the organizational
F	Support item is removed, replaced, used at the direct support level.
H	Support item is removed, replaced, used at the general support level.
D	Support items that are removed, replaced, used at depot, mobile depot, or specialized repair activity only.

b. The maintenance code entered in the fourth position indicates whether the item is to be repaired and identifies the lowest maintenance level with the capability to perform complete repair (i.e., all authorized maintenance functions). This position will contain one of the following maintenance codes.

Code	Application/Explanation
O	The lowest maintenance level capable of complete repair of the support item is the organizational level.
F	The lowest maintenance level capable of complete repair of the support item is the direct support level.
H	The lowest maintenance level capable of complete repair of the support item is the general support level.
D	The lowest maintenance level capable of complete repair of the support item is the depot level.

Code	Application/Explanation
L	Repair restricted to (enter applicable designated specialized repair activity), Specialized Repair Activity.
Z	Nonreparable. No repair is authorized.
B	No repair is authorized. The item may be reconditioned by the adjusting, lubricating, etc., at the user level. No parts or special tools are procured for the maintenance of this item.

F-3.2.3. Recoverability Code. Recoverability codes are assigned to support items to indicate the disposition action on unserviceable items. The recoverability code is entered in the fifth position of the Uniform SMR Code format as follows:

Recoverability Codes	Description
Z	Non Reparable item. When unserviceable, condemn and dispose at the level indicated in position 3.
O	Reparable item. When uneconimically reparable, condemn and dispose at organizational level.
F	Reparable item. When uneconomically reparable, condemn and dispose at the direct support level.
H	Reparable item. When uneconomically reparable, condemn and dispose at the general support level.
D	Reparable item. When beyond lower level repair capability, return to depot. Condemnation and disposal not authorized below depot level.
L	Reparable item. Repair, condemnation, and disposal not authorized below depot/specialized repair activity level.
A	Item requires special handling or condemnation procedures because of specific reasons (i.e., precious metal content, high dollar value, critical material or hazardous material). Refer to appropriate manuals/directives for specific instructions.

F-3.3. National Stock Number. Indicates the National stock number assigned to the item and which will be used for requisitioning.

F-3.4. Part Number. Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government acitivity), which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items.

NOTE

When a stock numbered item is requisitioned, the item received may have a different part number than the part being replaced.

F-3.5. Federal Supply Code for Manufacturer (FSCM). The FSCM is a 5-digit numeric code listed in SB 708-42 which is used to identify the manufacturer, distributor, or Government agency, etc.

F-3.6. Description. Indicates the Federal item name and, if required, a minimum description to identify the item. The physical security classification of the item is indicated by the paenthetical entry (insert applicable physical security classification abbreviation, e.g., Phy Sec C1 (C)-Confidential, Pny Sec C1 (S)-Secret, Phy Sec C1 (T)-Top Secret). Items that are included in kits and sets are listed below the name of the kit or set with the quantity of each item in the kit or set indicated in the quantity incorporated in unit column. When the part to be used differs between serial numbers of the same model, the effective serial numbers are shown as the last line of the description. In the Special Tools List, the initial basis of issue (BO1) appears as the last line in the entry for each special tool, special TMDE, and other special support equipment. When denisty of equipments supported exceeds density spread indicated in the basis of issue, the total authorization is increased accordingly.

F-3.7. Unit of Measure (U/M). Indicates the standard of the basic quantity of the listed item as used in performing the acutal maintenance function. This measure is expressed by a two-character alphabetical abbreviateion (e.g., ea, in, pr, etc). When the unit of measure differs from the unit of issue, the lowest unit of issue that will satisfy the required units of measure will be requisitioned.

F-3.8. Quantitiy Incorporated In Unit. Indicates the quantity of the item used in the breakout shown on the illustration figure, which is prepared for a functional group, subfunctional group, or an assembly. A "V" appearing in this column in lieu of a quantity indicates that no specific quantity is applicable (e.g., shims, spacers, etc).

F-4. HOW TO LOCATE REPAIR PARTS.

F-4.1. When National Stock Number or Part Number is Not Known:

F-4.1.1. First. Identify the item on the illustration and note the illustration figure and item number of the item.

F-4.1.2. Second. Using the Repair Parts Listing, find the figure and item number noted on the illustration.

F-4.2. When National Stock Number or Part Number is Known:

F-4.2.1. First. Using the Index of national Stock Numbers and Part Numbers, find the pertinent National stock number or part number. This index is in NIIN sequence followed by a list of part numbers in alphameric sequence, cross-referenced to the illustration figure number and item number.

F-4.2.2. Second. After finding the figure and item number, locate the figure and item number in the repair parts list.

F-5. ABBREVIATIONS.

Abbreviations	Explanation
DNE	Data Products New England
SCD	Source Control Drawing

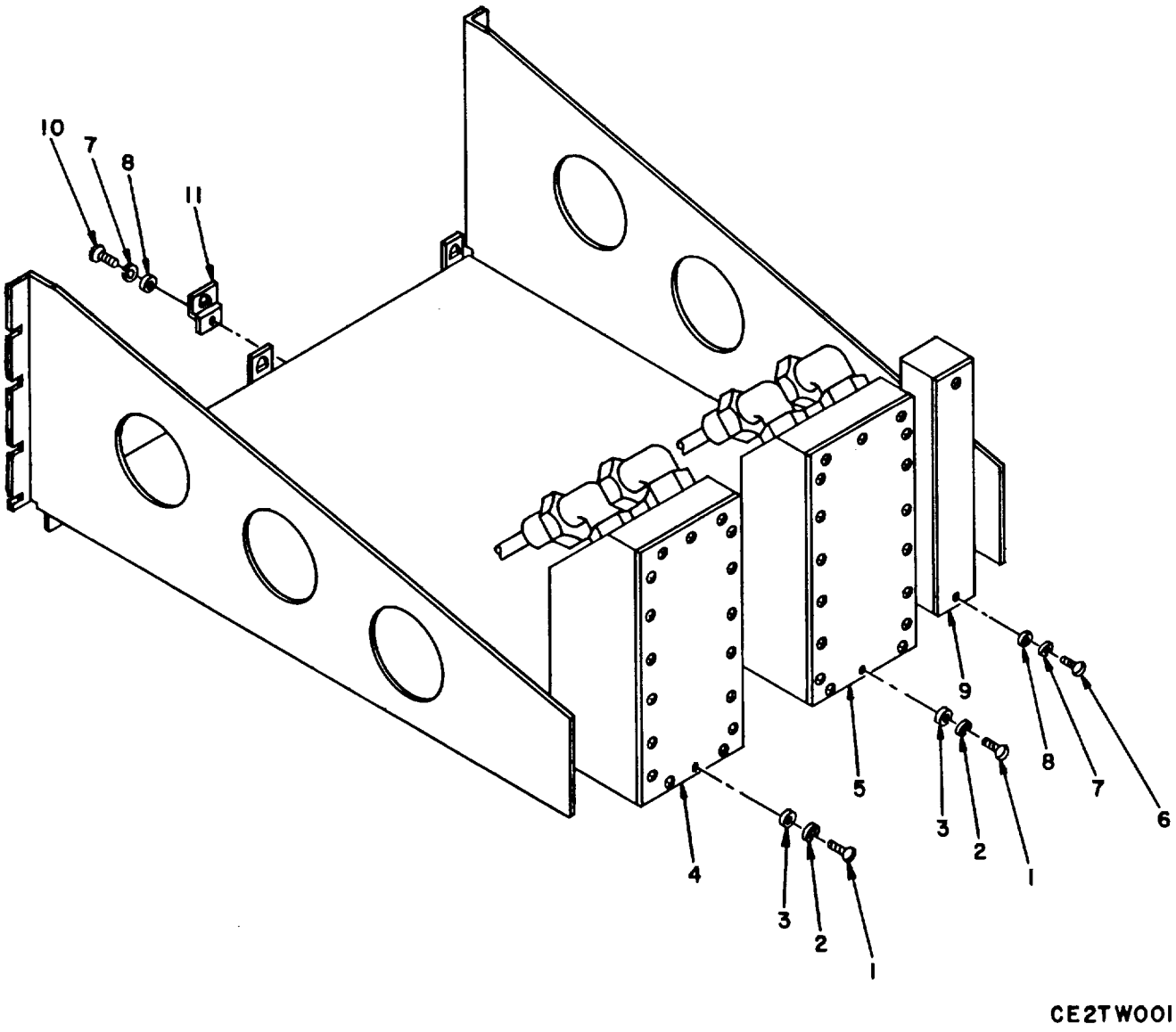


Figure F-1. Fixed Plant Adapter OF-175/F Parts location. *F-8*

GROUP 00 FIXED PLANT ADAPTER
OF-175/F PARTS LOCATION

FIGURE F-1

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODE (UOC)	(6) QTY
1	PAOZZ	96906	MS51957-27	SCREW, MACHINE	26
2	PAOZZ	96906	MS35338-136	WASHER, LOCK	3
3	PAOZZ	96906	MS15795-805	WASHER, FLAT	45
4	XBFZZ	96238	62041076-001	COVER, RED COMPT	1
5	XBFZZ	96238	62041081-001	COVER BLACK COMPT	1
6	PAOZZ	96906	MS51957-42	SCREW, MACHINE	2
7	PAOZZ	96906	MS35338-137	WASHER, LOCK	6
8	PAFZZ	96906	MS15795-807	WASHER, FLAT	6
9	XBFZZ	96238	62041077-00	COVER, POWER BOX	1
10	PAOZZ	96906	MS51957-47	SCREW, MACHINE	4
11	PAOZZ	96238	62023092-000	BRACKET RETAINING	4

END OF FIGURE

CROSS-REFERENCE INDEXES

NATIONAL STOCK NUMBER INDEX

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
5305-00-054-6651	F-1	1			
5305-00-054-6667	F-1	6			
5305-00-054-6672	F-1	10			
5310-00-722-5998	F-1	3			
5310-00-880-5978	F-1	8			
5310-00-929-6395	F-1	2			

CROSS-REFERENCE INDEX

PART NUMBER INDEX

CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
96906	MS15795-805	5310-00-722-5998	F-1	3
96906	MS15795-807	5310-00-880-5978	F-1	8
96906	MS35338-136	5310-00-929-6395	F-1	2
96906	MS35338-137		F-1	7
96906	MS51957-27	5305-00-054-6651	F-1	1
96906	MS51957-42	5305-00-054-6667	F-1	6
96906	MS51957-47	5305-00-054-6672	F-1	10
96238	62023092-000		F-1	11
96238	62041076-001		F-1	4
96238	62041077-00		F-1	9
96238	62041081-001		F-1	5

CROSS REFERENCE INDEXES

FIGURE AND ITEM NUMBER INDEX

FIG.	ITEM	STOCK NUMBER	CAGEC	PART NUMBER
F-1	1	5305-00-054-6651	96906	MS51957-27
F-1	2	5310-00-929-6395	96906	MS35338-136
F-1	3	5310-00-722-5998	96906	MS15795-805
F-1	4		96238	62041076-001
F-1	5		96238	62041081-001
F-1	6	5305-00-054-6667	96906	MS51957-42
F-1	7		96906	MS35338-137
F-1	8	5310-00-880-5978	96906	MS15795-807
F-1	9		96238	62041077-00
F-1	10	5305-00-054-6672	96906	MS51957-47
F-1	11		96238	62023092-000

SUBJECT INDEX

Subject Index (Continued)

SUBJECT INDEX (Continued)

By Order of the Secretary of the Army:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff

Official:

MILTON H. HAMILTON
Administrative Assistant to the
Secretary of the Army
00160

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TEAR ALONG PERFORATED LINE

THE METRIC SYSTEM AND EQUIVALENTS

'NEAR MEASURE

. Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

'VEIGHTS

Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 lb.
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

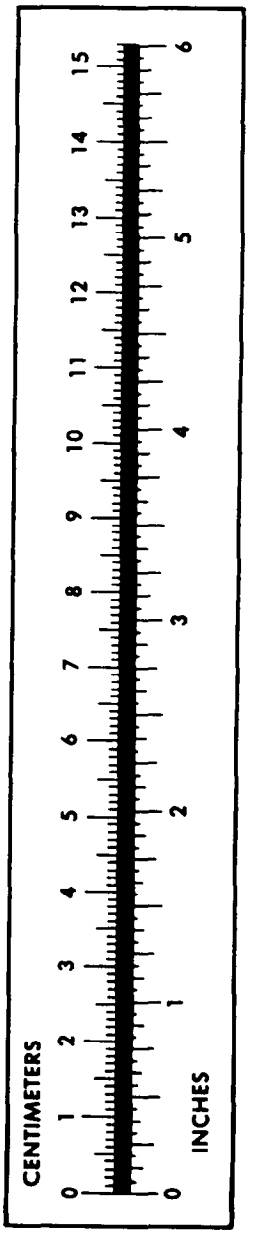
TEMPERATURE

5/9(°F - 32) = °C
212° Fahrenheit is evuivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5C° + 32 =°F

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
ıts	Liters	0.473
arts	Liters	0.946
allons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
ers	Gallons	0.264
ms	Ounces	0.035
ograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pounds-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
lometers per Liter	Miles per Gallon	2.354
meters per Hour	Miles per Hour	0.621



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