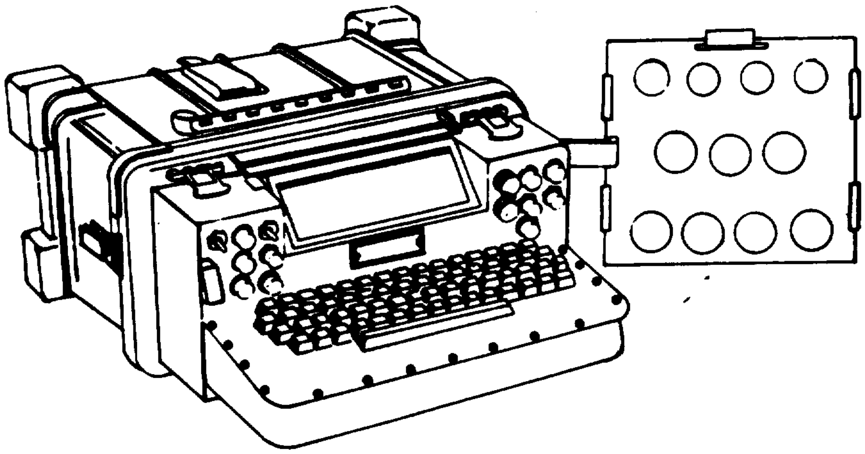
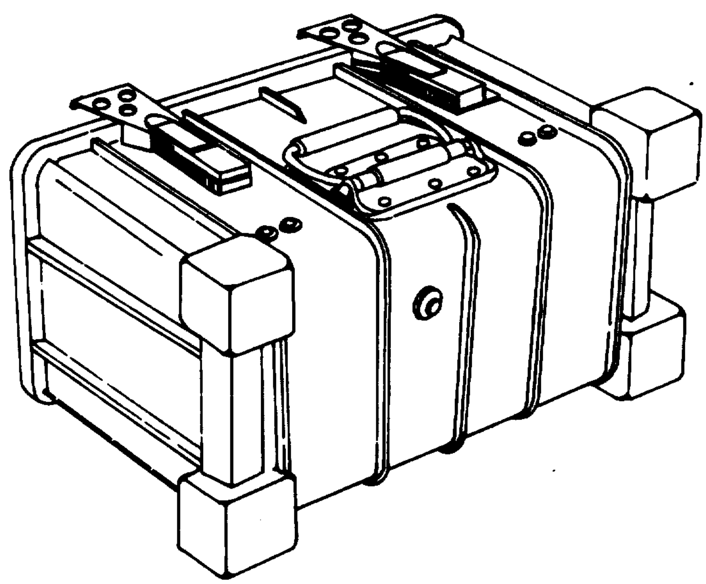
ARMY
NAVY
AIR FORCE
MARINE CORPS

TM 11-5815-602-24-1
EE 161-DT-OMI-020/
E110-UGC-74B&C(v)3
TO 31W4-2UGC74-12
TM08008C–24/2

UNIT, INTERMEDIATE DIRECT SUPPORT, AND INTERMEDIATE GENERAL SUPPORT MAINTENANCE MANUAL





TERMINAL, COMMUNICATIONS AN/UGC-74B(V)3 (NSN 5815-01-214-6237)
TERMINAL, COMMUNICATIONS AN/UGC-74C(V)3 (NSN 5815-01-211-4122)

DEPARTMENTS OF THE ARMY THE NAVY,
THE AIR FORCE, AND HEADQUARTERS, MARINE CORPS
15 SEPTEMBER 1987

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

1 DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL

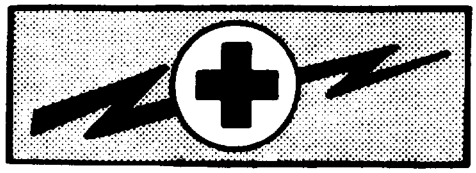
2 IF POSSIBLE, TURN OFF THE ELECTRICAL POWER

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

WARNINGS



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 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 power has been turned off, always ground every part before touching it.

Be careful not to contact high voltage input connections of 115/230 volts ac 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 vital organs of 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

Adequate ventilation should be provided while using TRICHLOROTRIFLUOROETHANE. Prolonged breathing of vapor should be added. The solvent should not be used near heat or open flame; the products of decomposition are toxic and imitating. Since TRICHLOROTRIFLUOROEIHANE dissolves natural oils, prolonged contact with the skin should be avoided. When necessary use gloves which the solvent cannot penetrate. If the solvent is taken internally, consult a physician immediately.

WARNING

Lithium organic batteries or cells are used in this equipment. They are potentially hazardous if misused or tampered with before, during, or after discharge. The follwing precautions must be strictly observed to prevent possible injury to personnel or equipment damage.

DO NOT heat, incinerate, crush, puncture, disassemble, or otherwise mutilate the batteries.

DO NOT short circuit, recharge, or bypass internal fuse.

DO NOT store equipment during long periods of nonuse in excess of 30 days.

TURN OFF the equipment immediately if you detect battery compartment becoming unduly hot, hear battery cells venting (hissing sound), or smell irritating sulphur dioxide gas. Remove and dispose of battery only after it is cool (30 - 60 minutes).

HOW TO USE THIS MANUAL

This manual tells how to install, perform unit maintenance, intermediate direct support maintenance, and intermediate general support maintenance of Communications Terminal AN/UGC-74B(V)3 and AN/UGC-74C(V)3. Information not identified to a particular model applies to the Model B. Information that applies to only the Model C is identified as MODEL C ONLY information, with Model C headings capitalized and underlined.

Some circuitry used in the Model A is also included in Models B and C, but is not used. This circuitry is identified as MODEL A ONLY, with Model A headings capItalized and underlined.

Location of Subjects in Manual

In this manual, paragraphs are numbered sequentially. If looking for specific information, use subject index at back of this manual to locate page where topic is described.

For rapid location of required subject, contents of chapter are listed alphabetically on the first page of each chapter.

See Appendix A, REFERENCES, for the complete title of forms, technical bulletins, technical manuals, and military specifications referenced in this manual.

See GLOSSARY in the back of this manual for a definition of abbreviations and unusual terms used in this manual.

See TM 11-5815-602-24P-1 for unit, intermediate direct support and intermediate general support maintenance repair parts and special tools lists (RPSTL) used with this manual.

Use of Manual for Task Performance

Be familiar with the entire maintenance procedure before beginning maintenance tasks.

Be familiar with operational capabilities of the terminal in order to properly perform maintenance tasks. See Operator's manual TM 11-5815-602-10-1 for this information.

Unit maintenance personnel should refer to Section I in Chapter 3 of this manual for a good understanding of how the major components of the terminal function.

After servicing equipment and before returning it to the user, all levels of maintenance personnel should refer to Section III in Chapter 2 and perform a complete operational check of terminal. This will ensure the user receives a 100 percent serviceable terminal.

Maintenance personnel must not perform maintenance tasks assigned to a maintenance level higher than they are authorized to perform. Chapters 1 through 4 can be used by all levels of maintenance personnel (except operator). Chapter 5 is used by intermediate direct and general support personnel only. Chapter 6 is used only by intermediate general support personnel.

TECHNICAL MANUAL
11-5815-602-24-1
TECHNICAL MANUAL
EE 161-DT-OMI-020/E110-UGC-74B&C(V)3
TECHNICAL ORDER
31W4-2UGC74-12
TECHNICAL MANUAL
08008C-24/2

DEPARTMENTS OF THE ARMY, THE NAVY,
THE AIR FORCE, AND HEADQUARTERS
MARINE CORPS

Washington, DC, 15 September 1987

UNIT, INTERMEDIATE DIRECT SUPPORT, AND INTERMEDIATE GENERAL SUPPORT MAINTENANCE MANUAL
TERMINAL, COMMUNICATIONS AN/UGC-74B(V)3 (NSN 5815-01-214-6237)
TERMINAL, COMMUNICATIONS AN/UGC-74C(V)3 (NSN 5815-01-211-4122)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find 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 Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-ME-MP, Fort Monmouth, New Jersey 07703-5007.

For Air Force, submit AFTO Form 22 (Technical Order System Publication Improvement Report and Reply) in accordance with paragraph 6-5, Section VI, T.O. 00-5-1. Forward direct to prime ALC/MST activity.

For Navy, mail comments to the Commander, Space and Naval Warfare Systems Command, ATTN: SPAWAR 8122, Washington, DC 20363-5100.

For Marine Corps Units, submit NAVMC 10772 (Recommended Changes to Technical Publications) to Commanding General, Marine Corps Logistics Base (Code 850), Albany, GA 31704-5000.

In either case, a reply will be furnished direct to you.

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CHAPTER 1

INTRODUCTION

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Section 1. GENERAL INFORMATION

Section II. EQUIPMENT DESCRIPTION AND DATA

Section III. PRINCIPLES OF OPERATION

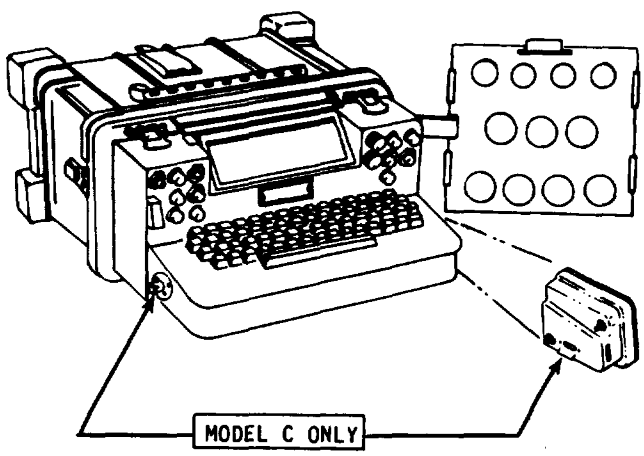


Figure 1-1. TERMINAL, COMMUNICATIONS AN/UGC-74B(V)3 or AN/UGC-74C(V)3 WITH COPYHOLDER

Section 1. GENERAL INFORMATION

1-1. SCOPE

TYPE OF MANUAL:	Unit, Intermediate Direct Support, and Intermediate General Support Maintenance
MODEL NUMBER AND EQUIPMENT NAME:	AN/UGC-74B(V)3 or AN/UGC-74C(V)3 Communications Terminal
PURPOSE OF EQUIPMENT:	Provides a full-duplex, asynchronous (ASCII or Baudot) communications capability with MIL-STD-188C and normal input keying (NIK) interfaces.

1-2. MAINTENANCE FORMS, RECORDS, AND REPORTS

a. Reports of Maintenance and Unsafisfactory Equipments. 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. Air Force personnel will use AFR 66-1 for maintenance reporting and TO-00-35D54 for unsatisfactory equipment reporting. Navy personnel will report maintenance performed utilizing the Maintenance Data Collection Subsystem (MDCS) IAW OPNAVINST 4790-2, Vol 3, and unsatisfactory material/conditions (UR submissions) IAW OPNAVINST 4790-2, Vol 2, chapter 17. Marine Corps personnel will use TM 4700-15/1, Equipment Record Procedures.

b. Report of Packaging and Handling Deficiencies. Fill out and forward SF 364, Packaging Improvement Report as prescribed in AR 735-11-2/DLAR 4140.55/NAVMATlNST 4355.73B/AFR 400-54/MC0 4430.3H.

c. Discrepancy in Shipment Report. Fill out and forward SF 361, Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33C/AFR 75-18/MCO P461O.19D/DIAR 4500.15.

d. Consolidated index of Army Publications and Blank Forms. Refer to the latest issue of DA Pam 25-30 to determine whether there are new editions, changes or additional publications pertaining to the equipment.

1-3. DESTRUCTION OF MATERIAL TO PREVENT ENEMY USE

Destruction of Army or Marine Corps material to prevent enemy use is described in TM 750-244-2.

1-4. ADMINISTRATIVE STORAGE

Administrative storage of equipment issued to and used by Army activities will have preventive maintenance performed in accordance with the PMCS charts before storing. When removing equipment from administrative storage, the PMCS should be performed to assure operational readiness. Disassembly and repacking of equipment for shipment or limited storage is covered in Chapter 4, Section V. Marine Corps personnel refer to MCO 4450.7 for preparation for storage.

1-5. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

a. *Army.* If your Terminal, Communications AN/UGC-74B(V)3 or AN/UGC-74C(V)3 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 the design. Put it on an SF 388 (Quality Deficiency Report). Mail it to Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-PA-MA-D, Fort Monmouth, NJ 07703-5000. We'll send you a reply.

b. *Air Force.* Air Force personnel are encouraged to submit EIRs in accordance with AFR 900-4.

c. *Navy.* Navy personnel are encouraged to submit EIRs through their local Beneficial Suggestion Program.

d. Marine Corps. Marine Corps personnel are encouraged to submit SF 388 in accordance with MCO P4855.10 Quality Deficiency Report manual. Submit to Commanding General, Marine Corps Logistics Base (Code 858) Albany, Georgia 31704-5000.

1-6. NOMENCLATURE CROSS-REFERENCE

Official nomenclature must be used when filling out report forms or looking up technical manuals.

COMMON NAME	OFFICIAL NOMENCLATURE
Terminal	Terminal, Communications AN/UGC-74B(V)3 or AN/UGC-74C(V)3

Section II. EQUIPMENT DESCRIPTION AND DATA

1-7. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

See Operator's manual TM 11-5815-602-10-1.

1-8. EQUIPMENT DATA

See Operator's manual TM 11-5815-602-10-1.

1-9. SAFETY, CARE, AND HANDLING

Observe all WARNINGS, CAUTIONS, and NOTES in this manual. This equipment can be extremely dangerous if instructions are not followed. Review WARNINGS in front of this technical manual before performing any maintenance on terminal.

Be careful when lifting terminal. Terminal weighs over 100 Ibs. When packed for shipment, terminal weighs approximately 120 Ibs. Use two people when moving this unit, and carry by handles at all times.

Section III. PRINCIPLES OF OPERATION

1-10. SYSTEM BLOCK DIAGRAM SIMPLIFIED

POWER

- Power input is either 115 or 230 Vac, 50, 60, or 400 Hz; or 26 Vdc.
- Power system consists of ac/dc filters and rectifiers, and several individual supplies of +5, +12, +18, and +26 Vdc.

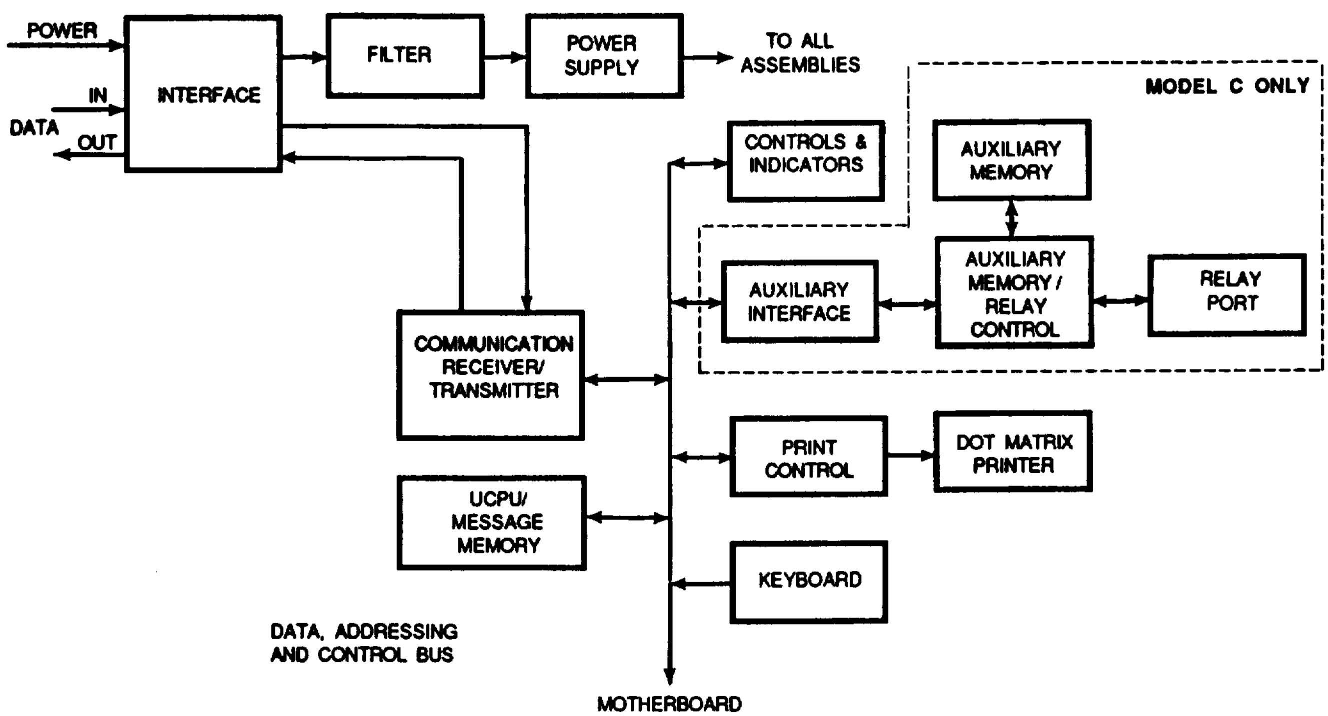
INTERFACE

- Receives/transmits data in accordance with MIL-STD-188-114; 20/60 milliamp neutral; NIK for use with TSEC/KW-7.
- Communications line in MIL-STD-188-144 is +6 V polar, nonreturn to zero (NRZ) or conditioned diphase.
- These signals are converted to and from internal logic level signals.

COMMUNICATIONS RECEIVER/TRANSMITTER

- Receiver decodes and converts serial input signals into parallel logic output.
- Transmitter encodes and converts parallel logic input levels into serial signals.
- Most of these operations are combined into one integrated circuit called a Universal Synchronous/Asynchronous Receiver/Transmitter (USART).

Operation is possible in ASCII or Baudot at speeds controlled by switch selection.



SYSTEM BLOCK DIAGRAM SIMPLIFIED

UNIVERSAL CENTRAL PROCESSING UNIT (Universal CPU)

- Contains timing, microprocessor, scratch pad, random access memory, read only memory, message memory, switch and lamp interface, and baud rate generator.

CONTROLS AND INDICATORS

- Provide a man-machine interface allowing manual inputs/operations and viewing of system status.

PRINT CONTROL

- Positions print head and initiates tiring of dots.
- Controls paper advance.

DOT MATRIX PRINTER

- Provides nine-pin dot matrix type characters to be printed from electrical signals.

KEYBOARD

- Consists of 63 keys.
- Standard 59 keys required by MIL-STD-1280 (Type 1, Class 1) and four additional editing keys.
- Keyboard is ASCII keyboard that is also Baudot compatible.
- Keyswitches Initiate character inputs to Universal CPU.

MODEL C ONLY

AUXILIARY INTERFACE

- Interfaces Universal CPU with auxiliary memory by use of a USART.

AUXILIARY MEMORY/RELAY CONTROL

- Controls message flow to and from auxiliary memory and relay port.

AUXILIARY MEMORY MODULE

- Contains a nonvolatile bubble memory so messages can be retained when power to the unit is removed.

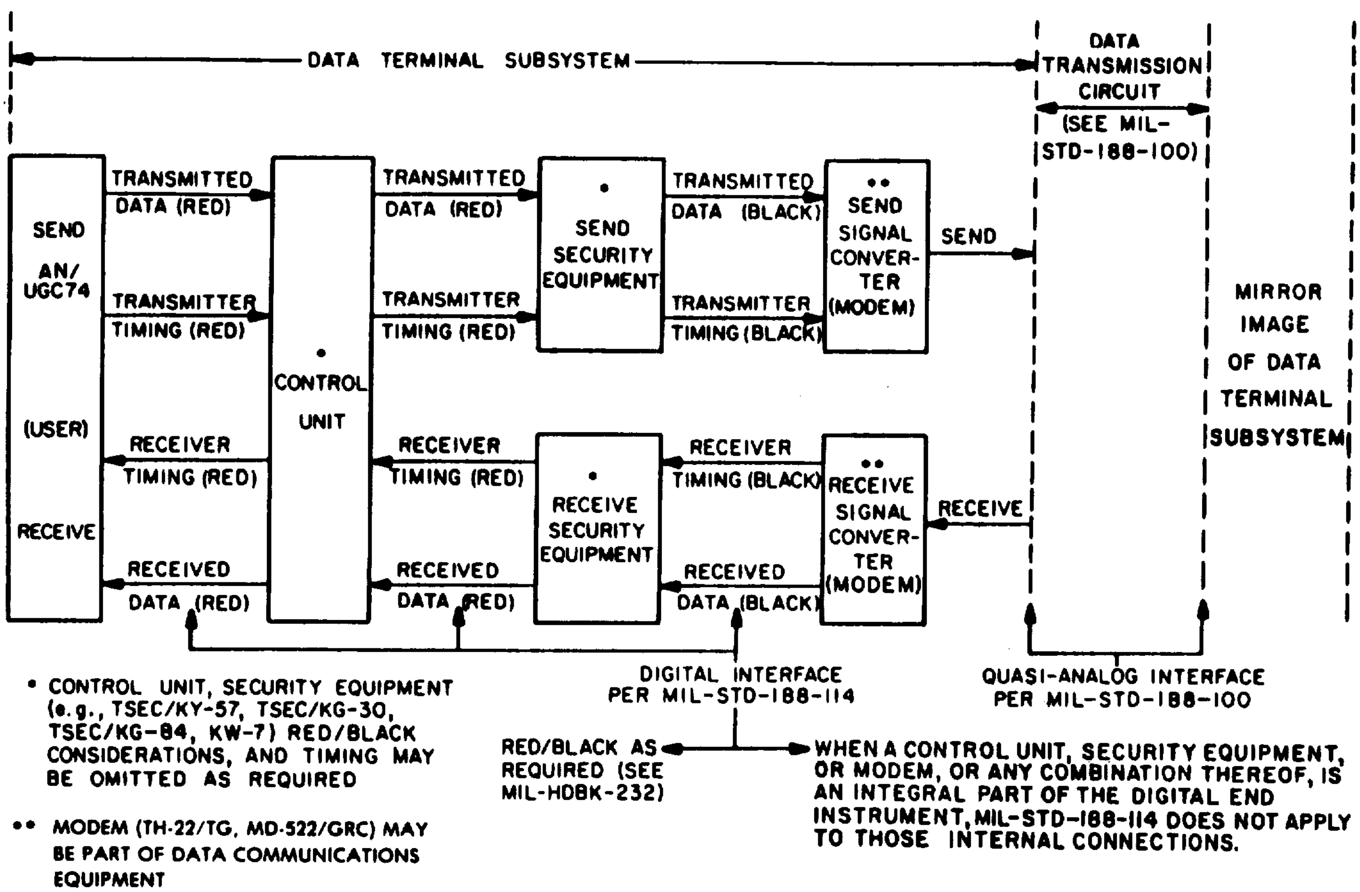
1-11. SYSTEM APPLICATION

The terminal may be used in the following system configurations:

- FULL-DUPLEX - Employs both the terminal transmit and receive capabilities and provides for simultaneous transmission and reception of data.

- HALF-DUPLEX - Utilizes only the terminal transmit and receive capabilities and provides for nonsimultaneous transmission and reception of data.

- SECURITY SUBSYSTEM - The following block diagram shows terminal installed in a security subsystem interfaced with a control unit, security equipment (send and receive), and a send and receive signal converter (modem).



SYSTEM APPLICATION BLOCK DIAGRAM

CHAPTER 2

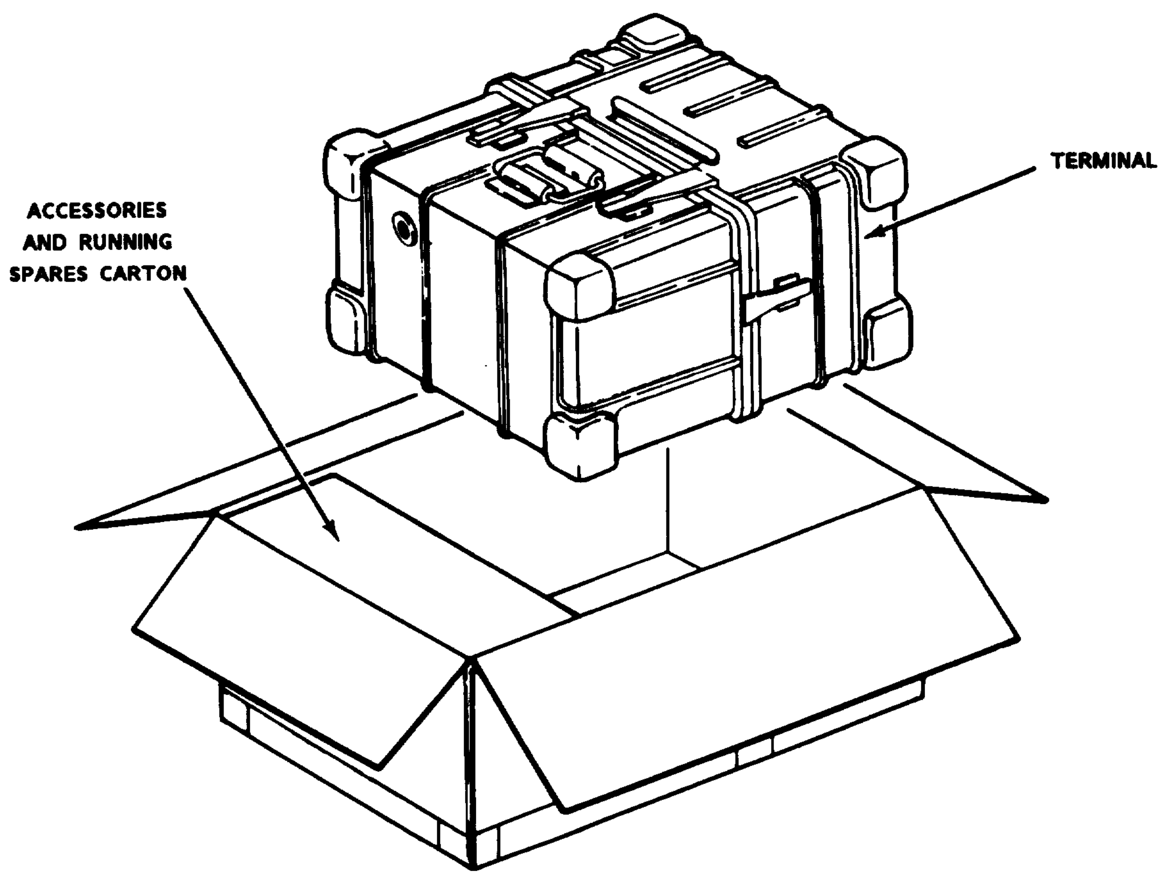
SERVICE UPON RECEIPT AND INSTALLATION

PAGE

Section 1. SERVICE UPON RECEIPT

Section II. INSTALLATION INSTRUCTIONS

Section III. PRELIMINARY SERVICING AND ADJUSTMENTS



TERMINAL PACKED FOR SHIPMENT

Section L SERVICE UPON RECEIPT

2-1. PACKAGING DATA

TERMINAL

When packaged for shipment, the terminal with ASCII keyboard attached is secured within combination case and placed in a fiberboard carton. The fiberboard is sealed with tape.

Table 2-1. SHIPMENT DIMENSIONS

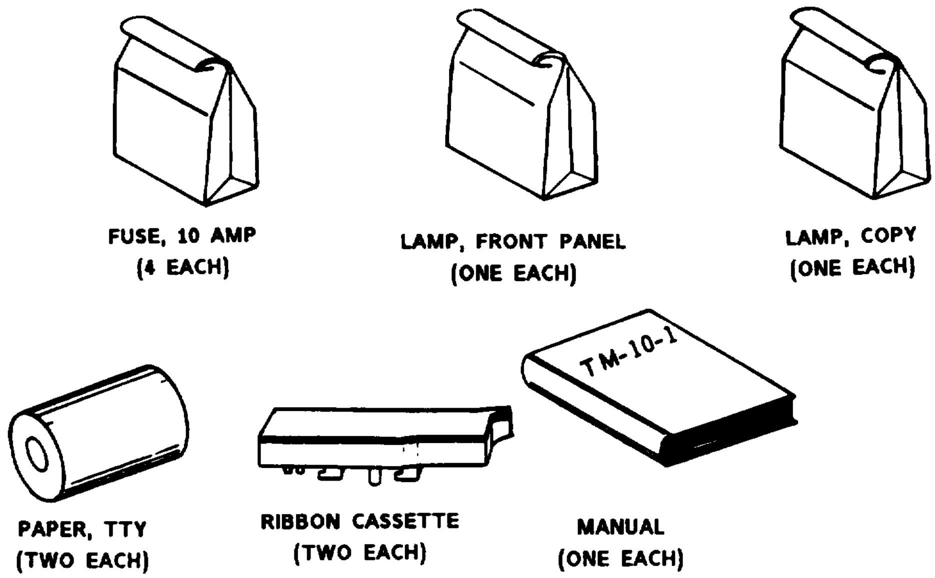
COMPONENT	LENGTH	WIDTH	HEIGHT	VOLUME	UNIT WEIGHT
Terminal/combination case in carton	27.25 in.	18.0 in.	10.375 in.	2.94 cu. ft.	110 lbs.
METRIC	69.21 cm.	45.72 cm.	26.35 cm.	.083 cu. m.	49.94 kg.
Unpacked	21.75 in.	17.5 in.	9.5 in.	2.09 cu. ft.	103 lbs.
METRIC	55.24 cm.	44.45 cm.	24.13 cm.	0.59 cu. m.	46.76 kg.

MODEL C ONLY SHIPMENT DIMENSIONS

COMPONENT	LENGTH	WIDTH	HEIGHT	VOLUME	UNIT WEIGHT
Terminal/combination case in carton	27.25 in.	18.0 in.	10.375 in.	2.94 cu. ft.	115 lbs.
METRIC	69.21 cm.	45.72 cm.	26.35 cm.	.083 cu. m.	52.21 kg.
AMM with protective cover attached	2.125 in.	5.25 in.	4.125 in.	.027 cu. ft.	5 lbs.
METRIC	5.4 cm.	13.34 cm.	10.48 cm.	755 cu. cm.	2.27 kg.

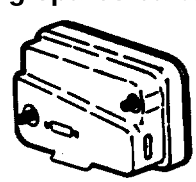
ACCESSORIES AND RUNNING SPARES

Copyholder is packed in case cover. All running spares are packaged separately but are shipped with terminal. Running spares are placed in a polyshroud bag and sealed, and placed within terminal shipping container. Fiberboard carton is sealed with tape.



MODEL C ONLY

Auxiliary Memory Module, with protective shipping cover attached, is packaged separately and placed in the running spares carton.



MODEL C ONLY
AUXILIARY MEMORY MODULE
(ONE EACH)

NOTE

Data, power, and battery backup cables are not issued with the equipment and must be ordered separately.

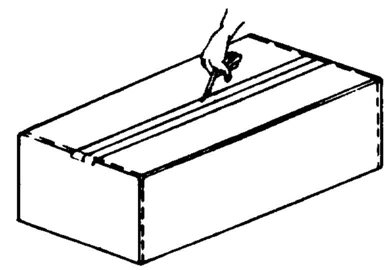
Table 2-2. POWER CABLES AND FUSES

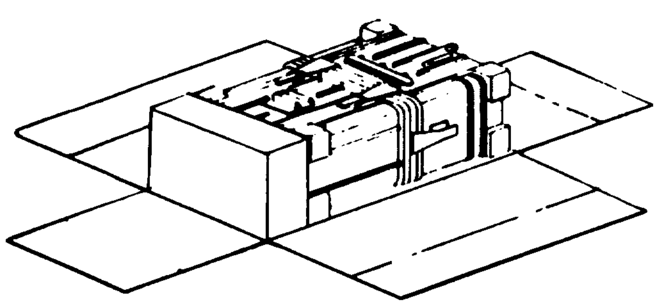
Power Source	Cable Number	Fuse Value F1 and F2
115 Vac	SM-D-764481	2 A
230 Vac	SM-D-764482	2 A
26 Vdc	SM-D-764480	10 A
12 Vdc	SM-D-915890	2 A (F3)

2-2. UNPACKING TERMINAL AN/UGC-74B(V)3 or AN/UGC-74C(V)3

See the following table.

Table 2-3. UNPACKING TERMINAL AN/UGC-74B(V)3 or AN/UGC-74C(V)3

ITEM	ACTION	REMARKS
1. Carton	• Inspect for evidence of damage.	See packaging diagrams below.
2. Terminal	• Unpack. **NOTE** When unpacking equipment be careful not to damage terminal or destroy carton. (1) Slit tape along dotted line. (2) Fold fiberboard carton flat. **WARNING** Terminal is compact and heavy (over 100 lbs). Use care in handling in order to protect personnel from serious injury and equipment from damage. Two-person lift required. Before lifting terminal, ensure all latches are securely fastened. (3) Grasp handle and rotate terminal on one end as shown.	



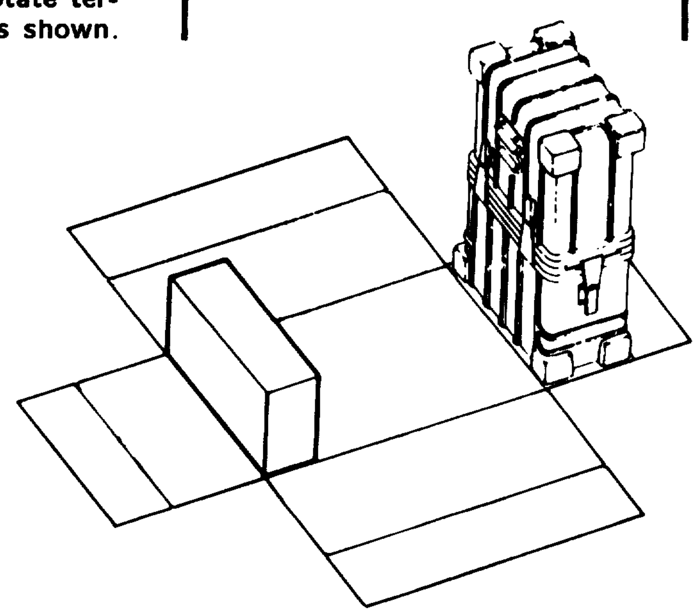


Table 2-3. UNPACKING TERMINAL AN/UGC-74B(V)3 of AN/UGC-74C(V)3 - Continued

ITEM	ACTION	REMARKS
2. Terminal - Continued	(4) Inspect for damage that may have been caused during shipment.	Report damage on Form SF 364, Packaging Improvement Report.
	(5) Compare with Packing List.	Ensure shipment is complete. Report any discrepancies on Form SF 361. If packing list is not available, check equipment against Components of End Item (COEI) in Appendix B of TM 11-5815-602-10-1. Report any shortages in accordance with AR 735-11-2.
	(6) Check for modifications.	Check on front panel near nomenclature plate for any modification work order (MWO) numbers. They will appear only if unit has been used or reconditioned. Current MWOs which apply to Terminal AN/UGC-74B(V)3 or AN/UGC-74C(V)3 are listed in DA Pam 25-30. Check to see if all currently applicable MWOs have been applied.
3. Carton	• Store.	Retain carton for storage purpose

Section II. INSTALLATION INSTRUCTIONS

2-3. TOOLS AND TEST EQUIPMENT

Tools and test equipment required for installation of the AN/UGC-74B(V)3 or AN/UGC-74C(V)3 are as follows:

Item	Model No.	Quantity
Multimeter	AN/PSM-45	1
Tool Kit	TE-50B	1

2-4. POWER SOURCES

Availability of at least one of the following fused power sources is required:

a. 115 volts ac ±15% at any of the following frequencies: 50 Hz ±5%, 60 Hz ±5%, or 400 Hz ±5%.

b. 230 volts ac ±15% at any of the following frequencies: 50 Hz *±5%, 60 Hz ±5%, or 400 Hz ±5%.

c. +22 to +30 volts dc.

2-5. ASSEMBLAGE MODIFICATION KITS

Modification kits have been developed for the assemblages listed below. Kits include cables, mounting adapter, and all other components necessary to install system. See DA Pam 25-30 for pertinent MWO numbers.

a. Radio Teletypewriter Sets AN/GRC-122 and AN/GRC-142.

b. Central Office Teletypewriter AN/TGC-30.

c. Terminal Telegraph AN/TSC-58.

d. Teletypewriter Central Office AN/MGC-17.

e. Telegraph Terminal AN/MSC-29.

f. Radio Teletypewriter Set AN/VSC-2.

g. Radio Teletypewriter Set AN/VSC-3.

NOTE

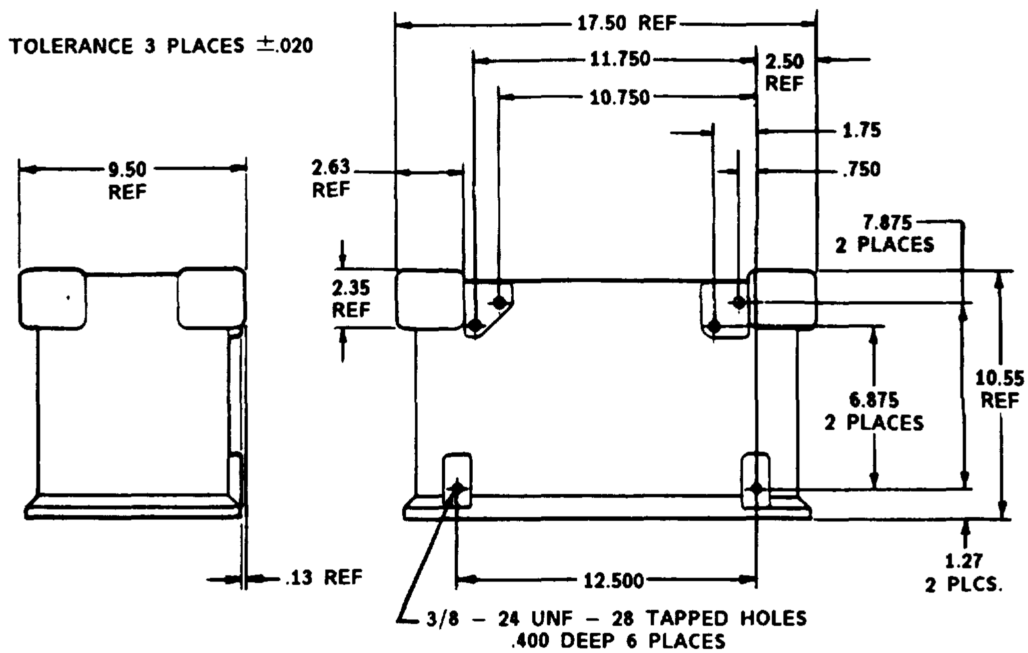
The AN/UGC-74B(V)3 or AN/UGC-74C(V)3 does not provide loop current. The 20 mA and 60 mA current, if required, must be supplied by external equipment.

2-6. INSTALLATION

Initial installation to be performed by technician or by MWO team only. See Table 2-4, Installation Instructions for Terminal AN/UGC-74B(V)3 or AN/UGC-74C(V)3.

Table 2-4. INSTALLATION INSTRUCTIONS FOR TERMINAL AN/UGC-74B(V)3 or AN/UGC-74C(V)3

ITEM	ACTION	REMARKS
1. Terminal	• Choosing a site.	Adequate lighting for both day and night operation should be provided for operating personnel.
	• All connections are made through a combination case door at rear of unit. • Allow at least 18 inches access space at rear of case for con– necting and disconnecting cables.	Access for operating and maintenance personnel should be convenient.
2. Mounting adapter	• Enables mounting of terminal on either a table or mounting shelf.	Mounting of terminal re- quires mounting adapter, to be supplied as part of an installation kit.
3. Installation diagram		



CAUTION

MOUNTING SCREWS SHALL NOT EXTEND MORE THAN 3/8 INCH ABOVE MOUNTING ADAPTER SURFACE.

ITEM	ACTION	REMARKS
4. Terminal mounting	a. TABLE MOUNTING (1) Aline terminal combination case mounting holes with holes in table top.	

Table 2-4. INSTALLATION INSTRUCTIONS FOR TERMINAL AN/UGC-74B(V)3 or AN/UGC-74C(V)3 - Continued

ITEM	ACTION	REMARKS
4. Terminal mounting - Continued	CAUTION Mounting screws must not enter mounting hole to a depth greater than 3/8 inch. Permanent damage will result if this depth is exceeded. (2) Secure terminal with hardware specified in MWO 11-5815-334-30-1. (3) Open four case latches and remove front outer cover. **NOTE** Outer cover and case have rubber seals in a groove on mating surface. If outer cover sticks to case when removed, both rubber seals require a spray application of fluorocarbon lubricant. This lubricant (Appendix C, item 9) has to be applied only once for life of the rubber seals. (4) Latch terminal package on left and right sides to case.	

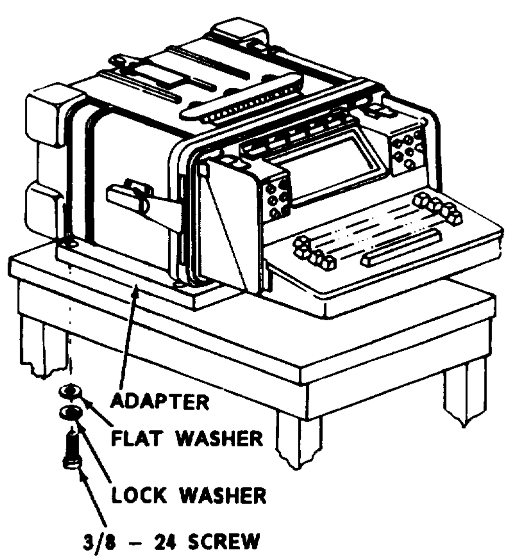


Table 2-4. INSTALLATION INSTRUCTIONS FOR TERMINAL AN/UGC-74B(V)3 or AN/UGC-74C(V)3 - Continued

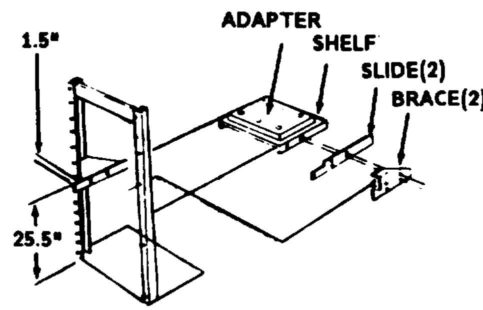
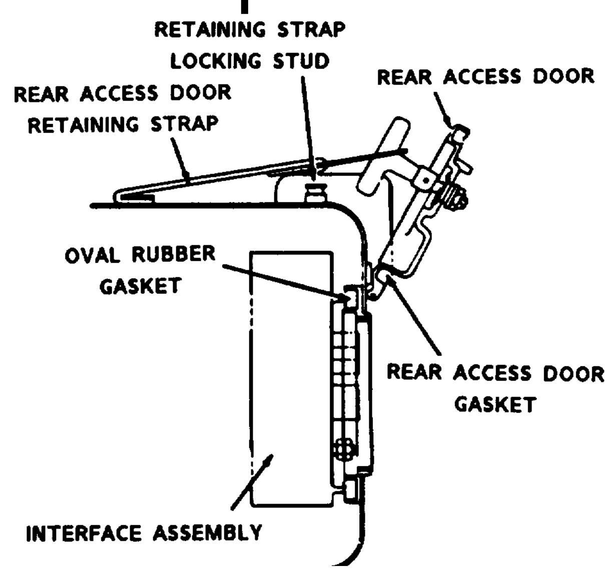
ITEM	ACTION	REMARKS
4. Terminal mounting - Continued	b. SHELF MOUNTING (1) Mount outer channels of each slide to brace with six 10-32 flathead screws and locknuts (outer channel should extend 11/2 inches beyond front edge of brace). (2) Aline each brace with holes in relay rack so that top of outer channel is 251/2 inches above floor (normal operating height for seated operator). Mount brace to rack with two 10-32 roundhead screws and lock washers. (3) Extend slides out so that inner slide mounting holes are accessible. (4) Aline mounting holes in inner slide with holes in shelf. (5) Mount shelf to inner slide with eight 10-32 flathead screws and locknuts (four screws per side). (6) Slide shelf in rack and lock into position. **CAUTION** 100 lbs. -- two-person lift required to avoid injury. **(7) Aline and secure terminal as directed for table mounting.**	For shelf mounting, at least 12 inches of free space should be provided above terminal for air circulation. 

Table 2-4. INSTALLATION INSTRUCTIONS FOR TERMINAL AN/UGC-74B(V)3 or AN/UGC-74C(V)3" - continued

ITEM	ACTION	REMARKS
5. Cable inter-connections	a. ACCESS (1) Pull door handle down into horizontal position and rotate it 1/4 turn to right. (2) Secure door in open position by unsnapping retaining strap from outer case cover and inserting rear door handle into retaining strap slot. NOTE Ensure sufficient slack remains in cables after they are connected to allow for extension of machine from case. Inspect cables after installing for crimping, severe bending, cuts and breaks. Cold weather can also affect cables.	All signal and power connections to terminal are made through three plugs which mate with connector receptacles located on rear of case.



	b. INTERCONNECTIONS (1) CHASSIS GROUND - Attach a grounding strap between chassis ground stud on connector panel (E1) to earth ground rod, or any low resistance ground connection.	

Table 2-4. INSTALLATION INSTRUCTIONS FOR TERMINAL AN/UGC-74B(V)3 or AN/UGC-74C(V)3 - Continued

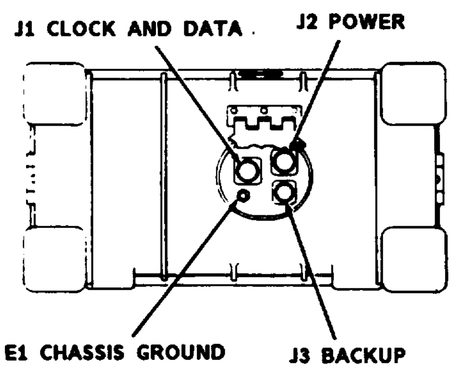
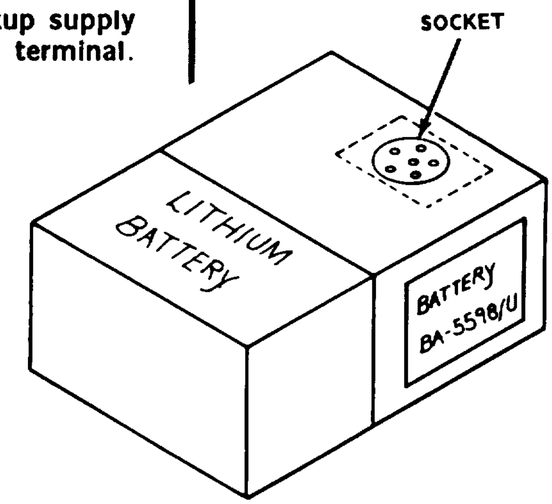
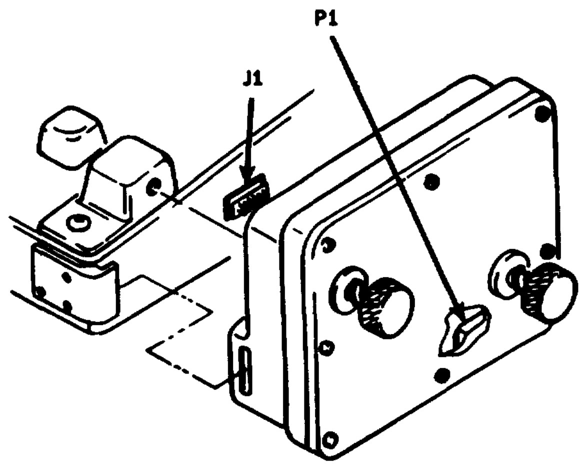
ITEM	ACTION	REMARKS
5. Cable inter-connections - Continued	**NOTE** See paragraph 3-22 for connector and receptacle illustrations. Ensure keys on connectors and receptacles aline.  (2) CLOCK and DATA - Connect one end of CLOCK and DATA cable to designated data and/or clock source. Mate other end of cable to J1 connector by pressing cable plug firmly against mating connector. With a ½ right-hand twist of twist-lock collar, lock securely in place. (3) POWER - Using appropriate power cable, connect it to mating terminal (J2) by pressing them firmly together. With a ½ right-hand twist of twist-lock collar, lock securely in place. (4) BATTERY BACKUP - Attach terminal end of 12 volt dc battery backup cable to mating connector (J3) by pressing firmly together. With a ½ right-hand twist of twist-lock collar, lock securely in place. Attach battery end of cable to Battery BA-5598/U.	

Table 2-4. INSTALLATION INSTRUCTIONS FOR TERMINAL
AN/UGC-74B(V)3 or AN/UGC-74C(V)3 - Continued

ITEM	ACTION	REMARKS
6. Initial pre-conditioning of newly installed battery	**NOTE** Use following procedures when battery backup supply is being used with terminal. • With prime power supplying terminal, set POWER switch to ON position. Disconnect prime power source from terminal. • After a duration of not less than 2 minutes reconnect prime power. **NOTE** Ensure sufficient slack remains in cables after they are connected to allow for extension of terminal from case. **CAUTION** Ensure POWER ON/OFF switch is in OFF position when terminal is not being used. Leaving switch in ON position will drain backup battery if prime power is lost.	

MODEL C ONLY ADDITIONAL INSTALLATION INSTRUCTIONS

Table 2-4. INSTALLATION INSTRUCTIONS FOR TERMINAL AN/UGC-74B(V)3 or AN/UGC-74C(V)3 - Continued

ITEM	ACTION	REMARKS
7. Auxiliary Memory Module Installation	• Position AMM as shown.  • Insert locking bracket into hole on front of AMM and aline captive knurled-head screws with screw holes. • Insert plug P1 into connector J1 on right side of keyboard housing assembly. • Alternately screw captive knurled-head screws into keyboard housing assembly until both screws are finger-tight.	
8. Relay Port Cable	• Connect relay port cable to left-hand keyboard assembly connector if terminal is to be part of a local relay network.	

Section III. PRELIMINARY SERVICING AND ADJUSTMENTS

2-7. PRELIMINARY CHECKS

Perform following preliminary checks before locally testing terminal.

- Inspect for corrosion, rust, and fungus.
- Inspect for adequate supply of paper.
- Inspect for serviceability of ribbon.
- Inspect cable connections for firm seating.
- Ground connection - Check with multimeter to ensure that terminal is properly grounded.

2-8. INSTALLER'S TEST OF TERMiNAL

After terminal has been installed and the preliminary checks performed, installer makes two tests before turning terminal. over to operator.

Table 2-5. Installer's Local Test.

Table 2-6. Initial Communication Test with Distant Station in KSR State, or Initial Communication Test with Distant Station in ICT State.

NOTE

Whether initial communication test will be made in KSR or ICT State will depend on operating state of the distant station.

If any test fails, see troubleshooting tables in Chapter 4. Do not proceed with testing until failure is corrected.

Table 2-5. INSTALLER'S LOCAL TEST

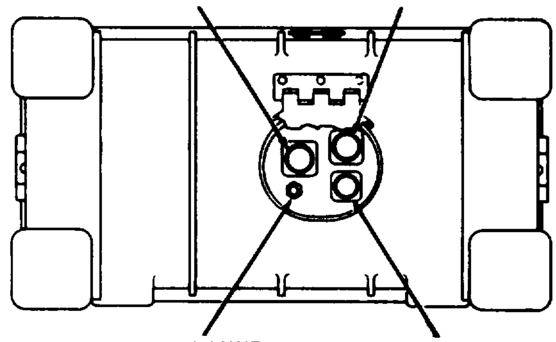
SEQUENCE ITEM	PROCEDURE
1. LOOPBACK PLUG	Disconnect CLOCK and DATA cable J1 and replace with LOOPBACK plug (part No. SM-B-916000). 
2. INTERNAL CONTROLS	a. To gain access to internal controls, perform the following: • Release combination case latches on left and right side of terminal. **CAUTION** Be careful when extending terminal from case. Ensure that cables pass through terminal rear access port with minimum of strain to avoid damaging equipment and serious injury to operating personnel. • Extend terminal out of case by withdrawing terminal forward until slides stop in extended position.

Table 2-5. INSTALLER LOCAL TEST - Continued

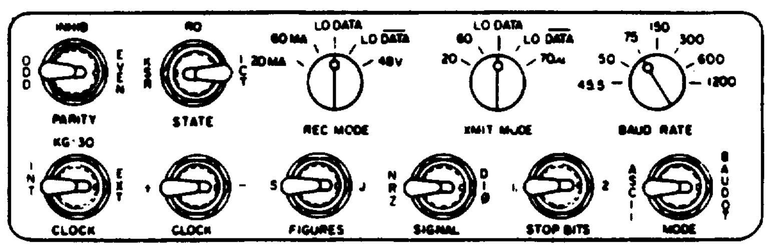
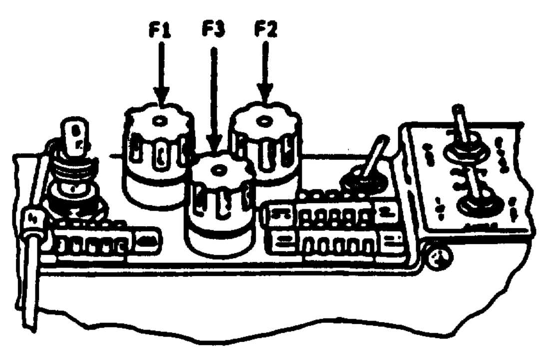
SEQUENCE ITEM	PROCEDURE
2. INTERNAL CONTROLS - Continued	b. Set interface assembly controls as follows: PARITY - ODD STATE - ICT REC MODE and XMIT MODE - LO DATA BAUD RATE - 75 CLOCK INT/EXT - INT CLOCK +/– - + FIGURES S/J - S SIGNAL NRZ/DIØ - NRZ STOP BITS - 1 MODE - ASCII  c. Before applying power to terminal for first time, check value of the fuses: F1 and F2: 2 A, operate with ac power 10 A, operate with 26 Vdc power F3: 2A, battery backup circuit protection  **CAUTION** Operating terminal with excessive fuse values may cause damage to internal circuitry during electrical surge conditions.

Table 2-5. INSTALLER LOCAL TEST - Continued

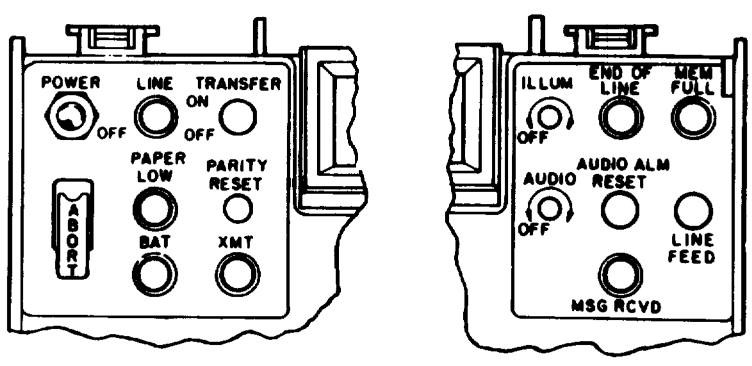
SEQUENCE ITEM	PROCEDURE
2. INTERNAL CONTROLS - Continued	**CAUTION** Be careful when returning terminal into case; ensure that cables pass through terminal rear access port with minimum of strain to avoid damaging equipment and serious injury to operating personnel. d. Return terminal into combination case; secure latches.
3. DUST COVER CONTROLS	a. Adjust the following controls: ILLUM - BRT (bright) • AUDIO - MAX (maximum) b. Set POWER ON/OFF switch to ON position: • Copy lamps light. • Dust cover lamps flash on momentarily. • Audio alarm sounds momentarily. • Print head moves to far left position. 

Table 2-5. INSTALLER'S LOCAL TEST - Continued

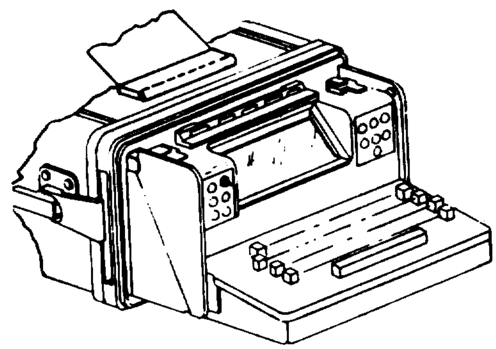
SEQUENCE ITEM	PROCEDURE
4. TERMINAL	Operation Validation/State Determination message prints out. Message should be identical to switch settings:  SYSTEM INITIALIZED SOFTWARE SYSTEM CONFIGURATION = UGC-74B SWITCH STATE = ICT OPERATIONAL STATE = ICT MODE = ASCII BAUD RATE = 75 STOP BITS = 1 PARITY OPTION = ODD DUPLEX MODE = FULL END OF LINE OPTION = CR CR LF RECEIVE ENVELOPE OPTION = V Z C Z C: N N N N TRANSMIT ENVELOPE OPTION = V Z C Z C: N N N N DE DE DE DE DE DE DE DE DE DE DE DE SPACE OPTION = OFF CAPITAL LETTER OPTION = ON LINE LENGTH = 080 LINE FEEDS = 1 END OF MESSAGE LINE FEEDS = 020 For MODEL C ONLY Operation Validation/State Determination message, see end of this table.

Table 2-5. INSTALLER'S LOCAL TEST - Continued

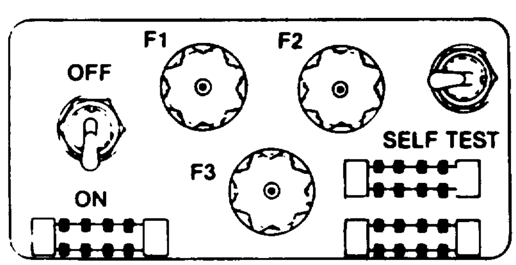
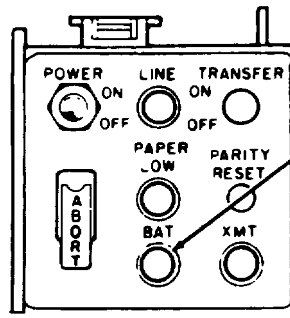
SEQUENCE ITEM	PROCEDURE
5. DUST COVER	a. Perform lamp test by pressing and holding PARITY RESET switch. All indicators remain ON while switch is pressed. b. Set POWER ON/OFF switch to OFF position.
6. SELF-TEST	• Release combination case latches and fully extend terminal out on slides. • Ensure INT/EXT/KG-30 CLOCK switch is set to INT position. • Ensure ILLUM control is set to BRT and AUDIO control is set to MAX. • Set POWER ON/OFF switch to ON position. Copy lamps light, dust cover lamps flash on momentarily, audio alarm sounds momentarily, and print head moves to far left. • Terminal prints out terminal Operation Validation/State Determination message. NOTE For failure of any test below, see paragraph 4-8, Unit Maintenance Troubleshooting Chart No. 2. If trouble cannot be corrected, notify higher level maintenance. If trouble is corrected, continue self-test until successfully completed. • Momentarily operate spring-loaded SELF-TEST switch to START position. 

Table 2-5. INSTALLER'S LOCAL TEST - Continued

SEQUENCE ITEM	PROCEDURE
6. SELF-TEST - Continued	TEST 1. UNIVERSAL CPU CIRCUIT CARD ASSEMBLY

- All dust cover indicators, except PARITY RESET lamp, turn ON immediately. BAT lamp is OFF.



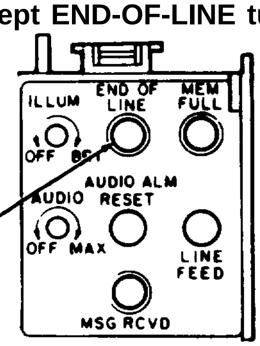
BAT OFF
ALL OTHERS ON

- PARITY RESET lamp turns ON 2 to 4 seconds later.

REMARKS
If PARITY RESET lamp does not turn on, A1A1 FAIL is printed; test has failed.

TEST 2. PRINTER CONTROL CIRCUIT CARD ASSEMBLY

- When all indicator lamps except BAT are ON, depress PARITY RESET switch to continue testing.
- All indicator lamps except END-OF-LINE turn OFF.



END OF LINE LAMP ON
ALL OTHERS OFF

- Printer prints "E" in all 80 print character columns.
- Printer prints all 64 individual characters; PARITY RESET lamp turns ON.

REMARKS
If PARITY RESET lamp does not turn on, printed error is seen, or A1A4. FAIL prints, test has failed. END-OF-LINE lamp remains on; test halts.

Table 2-5. INSTALLER'S LOCAL TEST - Continued

SEQUENCE ITEM	PROCEDURE
6. SELF-TEST - Continued	TEST 3. UNIVERSAL CPU CIRCUIT CARD ASSEMBLY (Message Memory Test) • Depress PARITY RESET switch to continue testing. **NOTE** Test requires over 2 minutes. • MEM FULL lamp will turn ON, END-OF-LINE and PARITY RESET lamps will turn OFF. • After test is successfully completed, PARITY RESET lamp will turn ON. **REMARKS** If PARITY RESET lamp does not turn on, or A1A1 FAIL is printed, test has failed. **TEST 3A. FOR MODEL C ONLY additional self-test, see end of this table.** **TEST 4. COMMUNICATIONS CIRCUIT CARD ASSEMBLY** • **Momentarily operate SELF-TEST switch to continue testing.** • **LINE lamp is only indicator ON.** • **Standard 80-character test message is transmitted and looped back through interface assembly. Received message is compared to transmitted message. If the two messages are identical terminal prints THE◊LAZY◊YELLOW◊DOG◊WAS◊CAUGHT◊BY◊THE◊SLOW◊RED◊FOX◊AS◊HE◊LAY◊SLEEPING◊IN◊THE◊SUN.** • **With start of printing, PARITY RESET lamp turns ON.** **REMARKS** **If PARITY RESET lamp does not turn on, printed error is seen, or A1A3 FAIL is printed, test has failed.** • **Terminal transmits and receives 80-character test** message then prints fox message until PARITY RESET switch is depressed. **NOTE** If keyboard not present, test ends at this time.

Table 2-5. INSTALLER'S LOCAL TEST - Continued

SEQUENCE ITEM	PROCEDURE
6. SELF-TEST - Continued	TEST 5. KEYBOARD • PAPER LOW is only indicator ON. • Terminal prints KEYBOARD TEST, executes one carriage-return and line-feed. • PARITY RESET lamp turns ON. • Operator can freely enter keyboard characters and verify that proper characters are being printed. Keyboard is functioning properly if printout agrees with what was typed on keyboard. (Special characters will print diamonds ( ).) • Check for proper ribbon feed. • SELF-TEST is ended by pressing PARITY RESET switch. • Terminal prints READY and automatically prints out Operation Validation/State Determination message.
7. LOOPBACK TEST	• Set POWER ON/OFF switch to OFF position. • Make following settings on internal controls: BAUD RATE to 45.5. MODE to BAUDOT. STATE to KSR. • Set POWER ON/OFF switch to ON position. • Check Operation Validation/State Determination message to ensure it agrees with switch settings. Printed message asks CHARACTER OR LINE TRANSMISSION? (C/L). • Press key L, then press key CR. • Type a single line message, press key LF, then key CR to cause message to be transmitted. Inspect line printed immediately below composed line. Transmitted line and received line should be identical. • Set POWER ON/OFF switch to OFF position. • Make following setting on internal controls: STATE to ICT.

Table 2-5. INSTALLER'S LOCAL TEST - Continued

SEQUENCE ITEM	PROCEDURE
7. LOOPBACK TEST - Continued	• Set POWER ON/OFF switch to ON position. • Check Operation Validation/State Determination message to ensure it agrees with switch settings. • Compare a transmitted and received message by performing the following procedures: Press keys ED Press key CR (Terminal prints MESSAGE NO. 1.) Press keys IN Press key CR Type message Press key HLT Press keys EX Press key CR Press keys TR$_{b1}$1 Press key CR Press keys PR$_{b1}$2 Press key CR (Terminal prints message.) • Transmit and receive message should be identical. • Set POWER ON/OFF switch to OFF position. • Make following settings on internal controls: BAUD RATE to 1200 SIGNAL to DIP MODE to ASCII • Check Operation Validation/State Determination message to ensure it agrees with switch settings. • Using preceding commands, compose and transmit message; transmit and receive message should be identical.

Table 2-5. INSTALLER'S LOCAL TEST - Continued

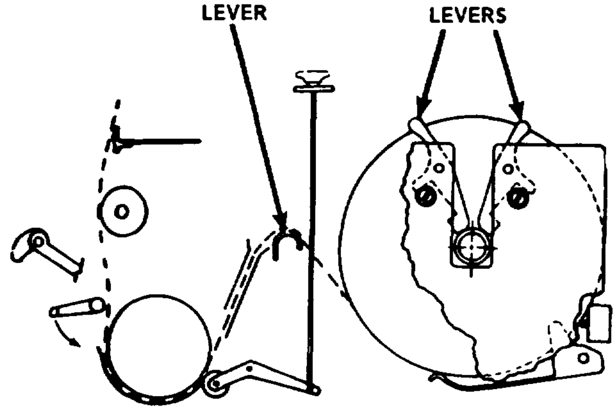
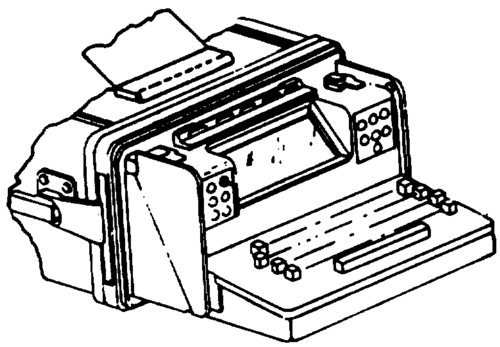
SEQUENCE ITEM	PROCEDURE
7. LOOPBACK TEST - Continued	• Release paper roll by pressing together and lifting up roll. Depress LF (line-feed) key on keyboard. PAPER LOW lamp should light.  • While depressing paper tension lever, press LF key on keyboard and then release paper tension lever. Printer shall not function. • Place paper roll in locked position and release paper tension lever. Enter GO and CR. Printer shall start again and a prompt symbol shall be printed. • Perform a lamp test by pressing and holding PARITY RESET switch and observing lamps on dust cover. While lamps are ON, adjust ILLUM control over entire range and observe a continuous change in lamp brightness. CAUTION Be careful when returning terminal into case; ensure cables pass through terminal rear access port with minimum of strain to avoid damaging equipment and serious injury to operating personnel. • Return terminal into case and secure with latches, • Remove loopback plug from J1 and adjust AUDIO control to MAX. Tone shall be continuous and vary in loudness from OFF to maximum loudness. • Reconnect loopback plug (alarm turns off upon reconnection of loopback plug) and press AUDIO ALM RESET switch; verify that alarm turns OFF.

Table 2-5. INSTALLER'S LOCAL TEST - Continued

SEQUENCE ITEM	PROCEDURE
7. LOOPBACK TEST - Continued	• Set POWER ON/OFF switch to OFF position to clear memory. • Set POWER ON/OFF switch to ON position. • Transmit composed message and activate ABORT switch immediately after terminal begins line-feeding. Terminal shall halt line-feed function and issue prompt sequence. • Press LINE-FEED switch on dust cover and observe that line-feed function is performed. WARNING Following continuity check must be made with power on. Be careful not to come in contact with exposed pins other than R and S. Use tape or sleeving to insulate test probes except for extreme tips. • Remove loopback plug (audio alarm will sound) and measure continuity across pins R and S of connector receptacle J1. (See figure 3-36.) TRANSFER switch ON - Resistance is less than 1 ohm. TRANSFER switch OFF - Meter indicates open circuit. • Reconnect loopback plug. NOTE Perform following test only if battery backup supply and cable are available. Terminal must be operating in ICT state with information stored in memory.
8. BATTERY BACKUP TEST	• Disconnect J2 from prime power source. • Observe BAT (battery) indicator on dust cover turns ON. • Reconnect prime power source to J2. • Terminal responds by printing initialization message. • Recheck message for correctness. • If terminal performs satisfactorily, set POWER ON/OFF switch to OFF position, remove loopback plug from J1 connector, and reconnect CLOCK and DATA cable. • Return terminal to case and secure with latches.

MODEL C ONLY ADDITIONAL INSTALLER'S TEST

Table 2-5. INSTALLER'S LOCAL TEST - Continued

SEQUENCE ITEM	PROCEDURE
4. TERMINAL	Operation Validation/State Determination message prints out; message should be identical to switch settings: (* denotes MODEL C ONLY additional message information)  SYSTEM INITIALIZED SOFTWARE SYSTEM CONFIGURATION = UGC-74C SWITCH STATE = ICT OPERATIONAL STATE = ICT MODE = ASCII BAUD RATE = 75 STOP BITS = 1 PARITY OPTION = ODD DUPLEX MODE = FULL END OF LINE OPTION = CR CR LF RECEIVE ENVELOPE OPTION = V Z C Z C: N N N N TRANSMIT ENVELOPE OPTION = V Z C Z C: N N N N DE DE DE DE DE DE DE DE DE DE DE DE SPACE OPTION = OFF CAPITAL LETTER OPTION = ON LINE LENGTH = 080 LINE FEEDS = 1 END OF MESSAGE LINE FEEDS = 020 FONT = 1 ENG 64 CHAR LINES PER PAGE = 066 NUMBER OF PRINT COPIES = 1 AUTO SAVE OPTION = ON AUTO PRINT OPTION = OFF NOFORM OPTION = ON HELP COMMAND AVAILABLE

a

99% AMM MEMORY AVAILABLE

MODEL C ONLY ADDITIONAL INSTALLER'S TEST - Continued

Table 2-5. INSTALLER'S LOCAL TEST - Continued

SEQUENCE ITEM	PROCEDURE
	NOTE In MODEL C ONLY test sequence, these tests are performed after Test 3 (message memory test) and before Test 4 (communication circuit card assembly test).
6. AM/RF SELF-TEST	TEST 3A. AUXILIARY INTERFACE CIRCUIT CARD ASSEMBLY, AM/RC CIRCUIT CARD ASSEMBLY, AUXILIARY MEMORY MODULE • Depress PARITY RESET switch to continue testing. • MSG RCVD lamp turns ON, all other lamps OFF. • After 15 seconds, PARITY RESET lamp turns ON. **REMARKS** One of the following messages will be printed according to failed tested item: AM/RF INTERFACE FAILURE MAINTENANCE NOTE: AM/RF ROM TEST FAILED (A2A4) MAINTENANCE NOTE: AM/RF RAM TEST FAILED (A2A4) MAINTENANCE NOTE: AM/RF RELAY TEST FAILED (A2A4) MAINTENANCE NOTE: AM/RF RTC TEST FAILED (A2A4) **NOTE** Testing continues as listed at Test 4 of this table.

Table 2-6. INITIAL COMMUNICATION TEST WITH DISTANT STATION

TEST NUMBER	PROCEDURE
1. Test in KSR State	After terminal has been satisfactorily local-tested by installer, and reinstalled into system, initial communications with distant station(s) will be established in KSR state as follows: • Set internal controls on interface assembly as follows: STATE - KSR PARITY - ODD REC MODE and XMIT MODE - LO DATA BAUD RATE -75 CLOCK - INT CLOCK - + FIGURES - S SIGNAL - NRZ STOP BITS - 2 MODE - BAUDOT • See TM 11-5815-602 -10-1 for detailed instructions on operating terminal in KSR state in CHARACTER or LINE mode. • Set POWER ON/OFF switch to ON position. • Initialization message will ask CHARACTER OR LINE TRANSMISSION? (C/L). After operator response, terminal ready for message reception or transmission. • Type message; terminal will transmit one line of text (up to 132 characters) after carriage-return (CR) or HLT key is depressed. • Editing of one line of text is provided using DLC, DLL and REV keys. • Following station SOP or CEOI. installer will transmit message-to distant station(s), " identifying installer's station and requesting a reply that the message was properly received. Example of installer's message: AN/UGC-74B(V)3 TERMINAL INSTALLED AT STATION NO. XXX (enter station serial number). ACKNOWLEDGE RECEIPT OF THIS MESSAGE AND IF RECEIVED WITHOUT ERRORS. • Installer will check all received messages to ensure that communication with distant station(s) has been established.

Table 2-6. INITIAL COMMUNICATION TEST WITH DISTANT STATION - Continued

TEST NUMBER	PROCEDURE
1. Test in KSR state - Continued	NOTE In KSR state, terminal prints a received line of text after a carriage-return is found in received text, or the line length plus one character is received, or a 0.5 to 1.5 second time lapse between received characters is detected. . When communications with distant station(s) has been satisfactorily established, installer will sign "off and set terminal POWER ON/OFF switch to OFF position.
2. Test in ICT state	Initial communications with distant station(s) will be established in ICT state as follows: • Set internal controls on interface assembly as in preceding test; STATE set to ICT. • See TM 11-5815 -602-10-1 for detailed instructions in operating terminal in ICT state TTY System Command. NOTE In TTY command, operator can transmit a single line message at a time. Line length may be set at 40 to 132 characters with LINE subcommand. • Set POWER ON/OFF switch to ON position. • After initialization message, installer will place terminal in TTY command using keystroke sequence boTTYboCR. • Terminal will respond with a carriage-return and line-feed; installer may now enter line of text. • Text of line (80 or 132 characters maximum) is printed, and may be edited with DLC, DLL, REV keys. • Line of text is transmitted with an end-of-line sequence appended, and in an envelope, when a carriage-return is entered. NOTE Line of text is not printed on terminal when it is transmitted to distant station(s).

Table 2-6. INITIAL COMMUNICATION TEST WITH DISTANT STATION - Continued

TEST NUMBER	PROCEDURE
2. Test in ICT state - Continued	• After line of text is transmitted, TTY command is terminated and terminal returns to System Command level. • Following station SOP or CEOI, installer will transmit a one line message to distant station(s), one station at a time, requesting a reply that message was properly received. Example of a one line message: AN/UGC-74B(V)3 TERMINAL INSTALLED. ACKNOWLEDGE RECEIPT OF THIS MESSAGE. • Installer will check all received messages to ensure that communications with distant station(s) has been established. • When communications with distant station(s) has been satisfactorily established, installer will sign off and set terminal POWER ON/OFF switch to OFF position.

CHAPTER 3

FUNCTIONING OF EQUIPMENT

PAGE

Section 1. FUNCTIONAL DESCRIPTION

Section 11, ELECTRICAL, ELECTRONIC AND MECHANICAL FUNCTIONS

Section III. TEST FIXTURES, ELECTRICAL AND ELECTRONIC FUNCTIONS

Table 3-1. LIST OF ABBREVIATIONS

ABBREVIATION	MEANING
CCA	Circuit Card Assembly
DMA	Direct Memory Access
EMI	Electromagnetic Interference
EMP	Electromagnetic Pulse
ICT	Intelligent Communication Terminal
KSR	Keyboard Send-Receive
MPU	Microprocessor Unit
PIA	Peripheral Interface Adapter
RAM	Random Access Memory
RFI	Radio Frequency Interface
RO	Receive Only
ROM	Read-Only Memory
SCR	Silicon Controlled Rectifier
SCMO	Speed Control Motor Output
TTL	Transistor-Transistor Logic
USART	Universal Synchronous/Asynchronous Receiver/Transmitter

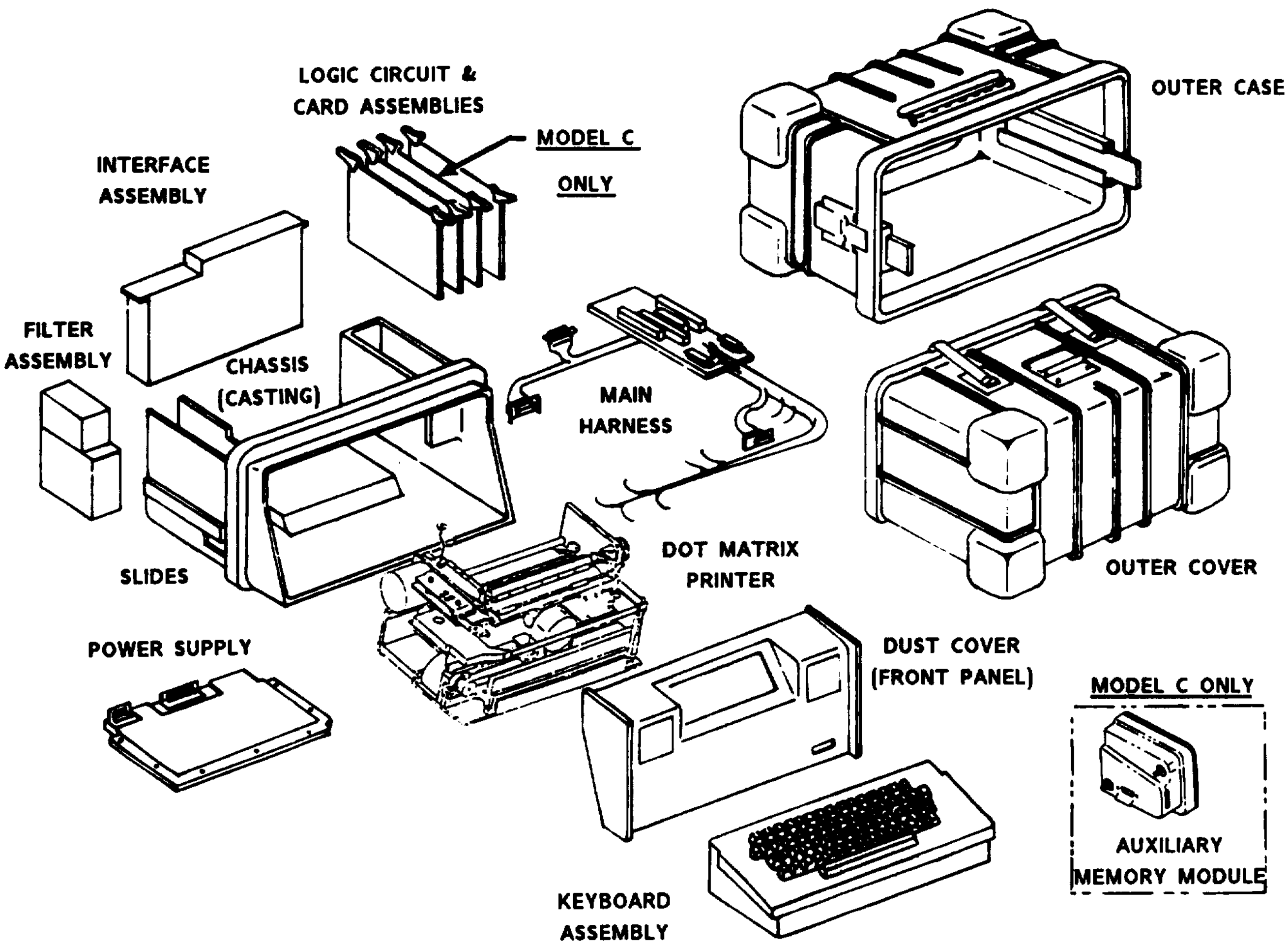


Figure 3-1. MECHANICAL COMPONENTS OF TERMINAL

Section I. Functional Description

3-1. GENERAL

A functional block diagram of the unit is shown in figure 3-2. Due to complexity of the system logic and utilization of automatic test equipment for fault isolation and testing, only functional descriptions of system logic (i. e., Universal CPU/Message Memory, Print Control, and Communications) are presented. All other electronic and mechanical functions are presented in Section II of this chapter. Abbreviations used in this chapter are presented in Table 3-1.

MODEL C ONLY

Section I also includes functional descriptions for auxiliary memory interface, auxiliary memory/relay control, and auxiliary memory module.

The following paragraphs introduce major functions of the unit:

- Universal CPU/message memory is a 6800 microprocessor-based system which provides central control for the AN/UGC-74B(V)3 or AN/UGC-74C(V)3. Read only memory (ROM) portion of the Universal CPU consists of 44k bytes of fixed program ROM and 20k bytes of overlay ROM. Overlay ROM stores system messages, help messages, and header information. Random access memory (RAM) portion of the Universal CPU consists of .8k bytes of fixed RAM (used for system overhead and buffer space) and 56k bytes of message memory.

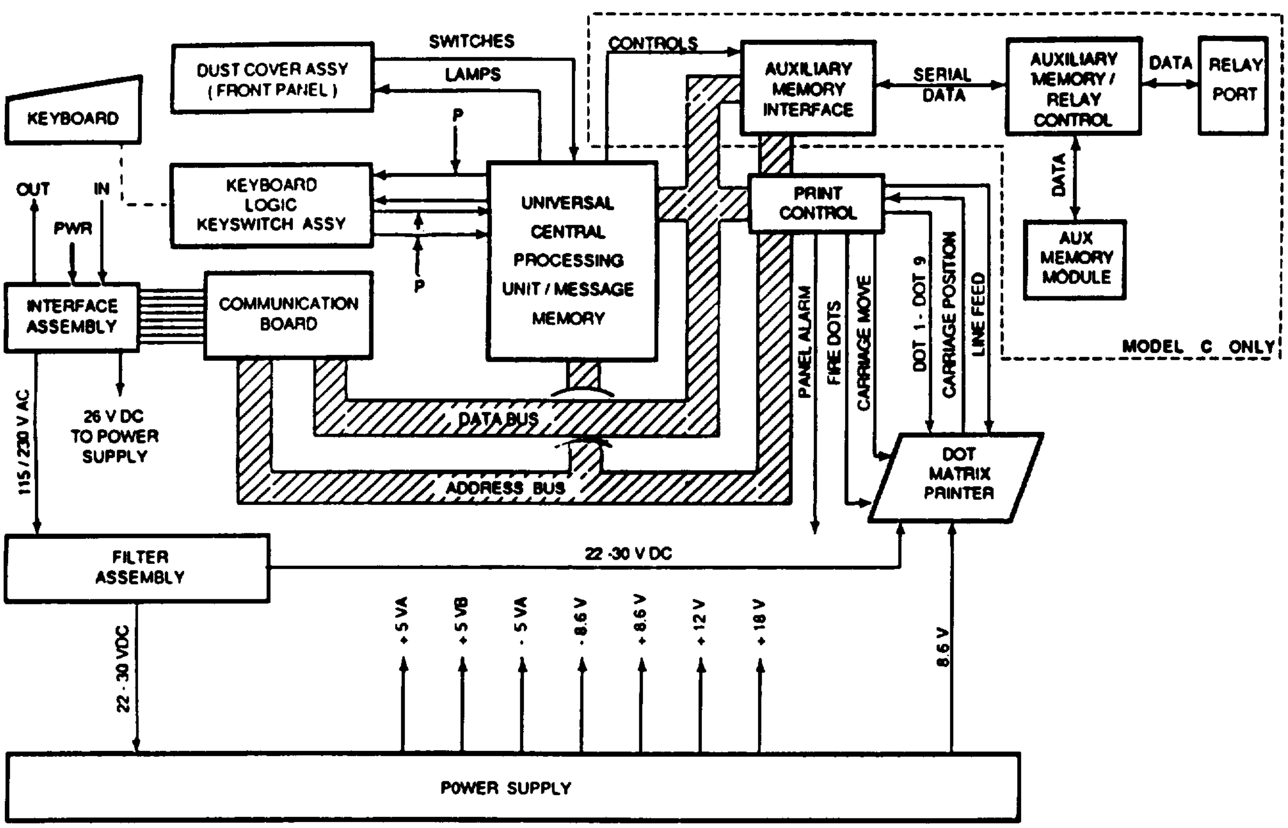


Figure 3-2. FUNCTIONAL BLOCK DIAGRAM

- Keyboard keys actuate keyswitch assembly, which contains logic circuitry to convert keyswitch inputs into an eight bit serial data word input to the Universal CPU.
- Interface between Universal CPU and rest of the system are by point to point wiring and data/address buses.
- Address bus is set of eight parallel lines which allow more than 64,000 locations of memory to be selected by the MPU. Extended address registers increase addressing beyond the capabilities of the 6800 microprocessor.
- Data bus is set of eight parallel lines which may send or receive data to or from the interfacing circuit card assembly.
- Control signals assign priority, control timing, and start and stop functions.
- Messages are sent and received by way of the communications circuit card assembly through the interface assembly to external equipment. Incoming messages are stored in message memory.
- Print control circuit card assembly controls printing functions. Timing, control, and drive signals are sent to the line-feed motor, carriage motor, and print head. Carriage position and current regulation signals are sent back from dot matrix printer to the print control circuit card assembly during printing.
- Power supply circuit card assembly generates the necessary operating dc voltages from 22-30 Vdc received from the filter assembly. This 22-30 Vdc is also sent to the dot matrix printer where additional conversion and regulation take place.

MODEL C ONLY

- Messages can be transferred from message memory to the auxiliary memory module. Messages may also be transferred from auxiliary memory module to the relay port, or back to the message memory for either printing, transmission, or editing.

3-2. SYSTEM LOGIC FUNCTIONS

System logic functions are divided into the following:

Keyboard input
Receive data input
Internal timing
Internal processing
Printer control
Line-feed functions
Data transmission

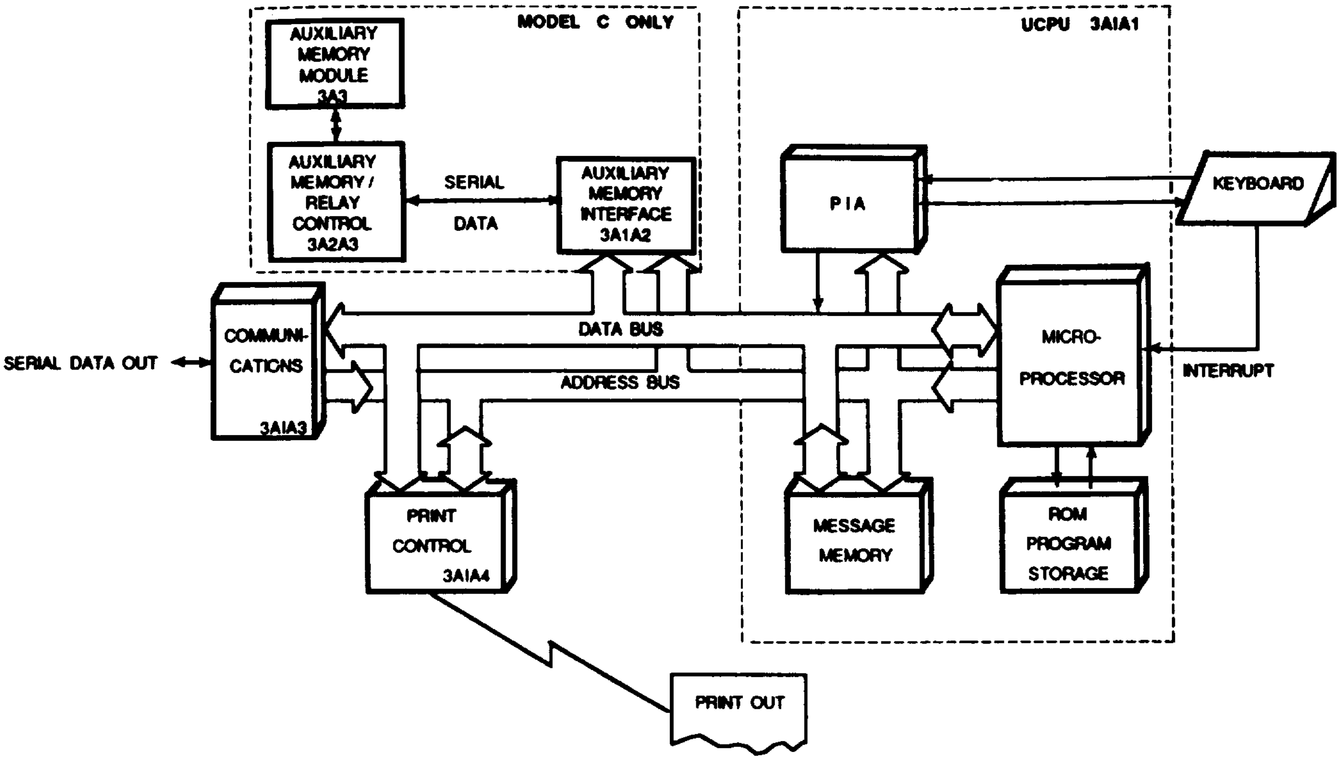


Figure 3-3. KEYBOARD DATA FLOW

KEYBOARD INPUT -

- Keyboard logic generates interrupt request whenever a character is entered from keyboard.
- Upon receipt of interrupt, Universal CPU circuit reads first bit of character from PIA, which generates keyboard clock pulse.
- Clock pulse is sent through PIA to keyboard.
- One bit of serial data is stored in microprocessor accumulator.
- Reading second data bit causes generation of a second keyboard clock pulse.
- Third data bit is shifted to PIA.
- Process is repeated until all eight bits are loaded into microprocessor.
- Control clock (2400 Hz) is received from clock generator circuitry on Universal CPU circuit card.

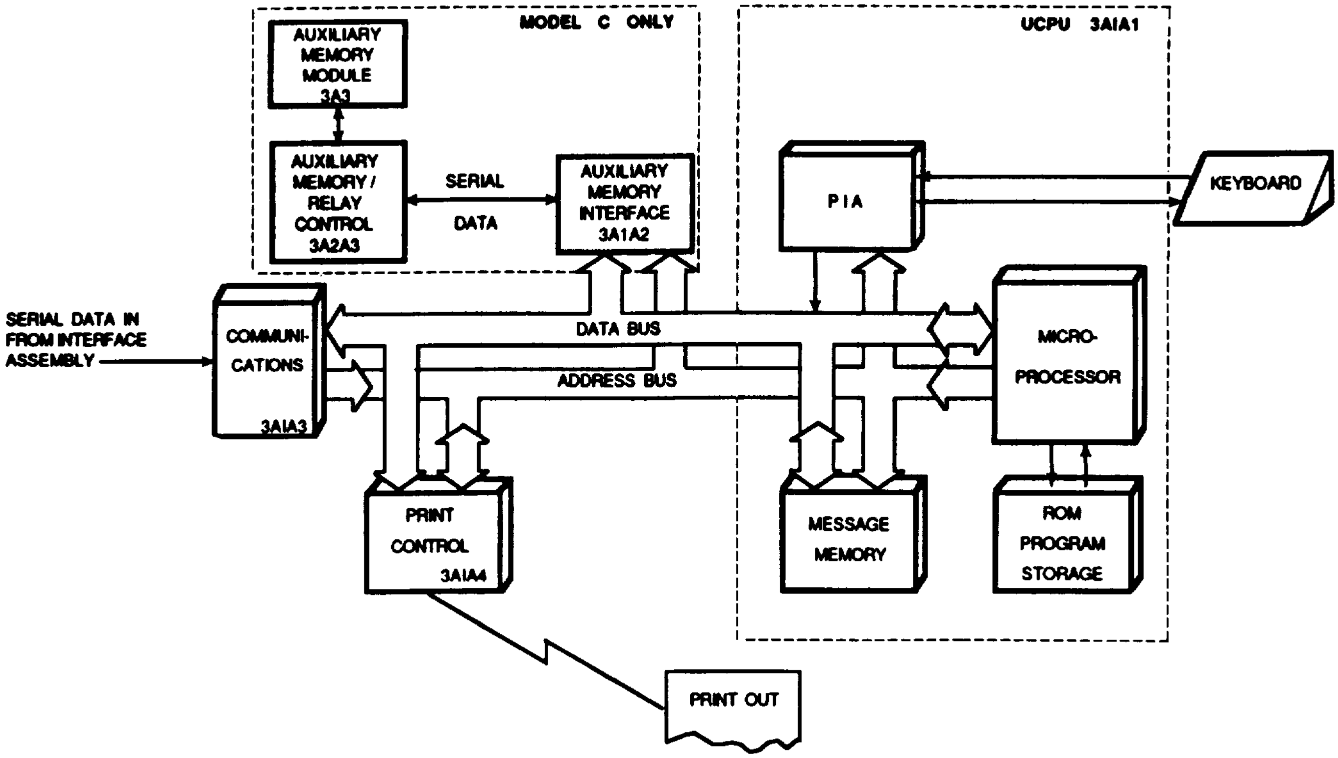


Figure 3-4. RECEIVE DATA FLOW

RECEIVE DATA INPUT -

- Serial data line interfaces with interface assembly.

- Data is conditioned for TTL processing by communications circuit card.

- Universal synchronous/asynchronous receiver/transmitter (USART) converts serial data to parallel data and places it on data bus.

- Presence of input character is indicated to Universal CPU by interrupt request from the USART.

- ASCII/Baudot data is read by microprocessor, converted to ASCII, and loaded into RAM until line length plus one character is read, a carriage return is read, or a 10 second timeout occurs.

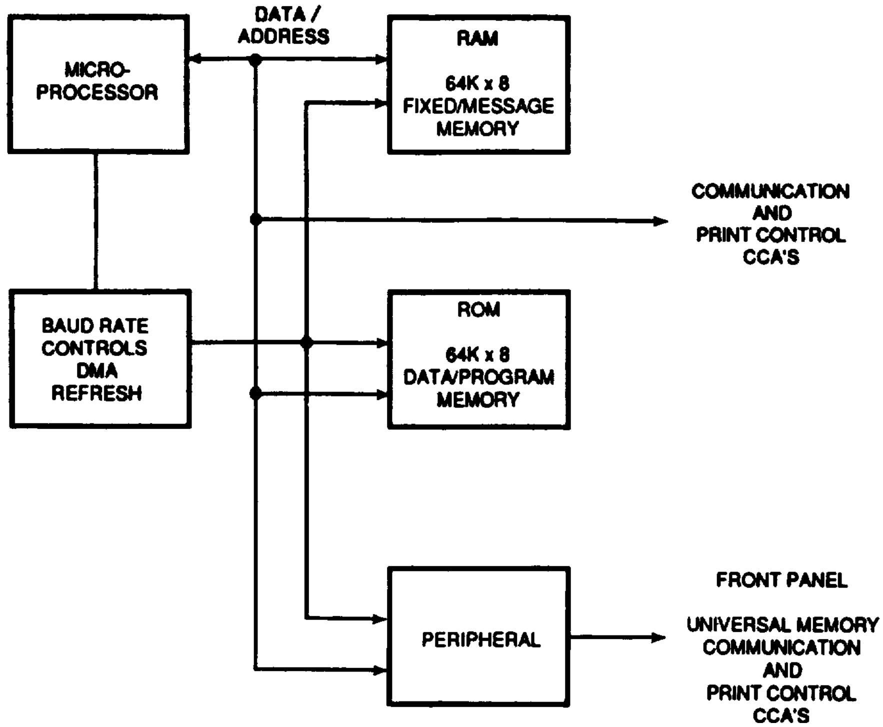


Figure 3-5. UNIVERSAL CPU BLOCK DIAGRAM

INTERNAL TIMING -

- Universal CPU circuit card contains process timing circuitry driven by a 4.9152 MHz oscillator.

- Clock generator produces Phase 1 and Phase 2 clocks:
  Control clock
  Baud-rate clock
  Memory clock

- Baud-rate generator provides timing for communications circuit card.

- Direct memory access and refresh control provide an enable to transmit control logic and RAM, transferring data from RAM to transmitter.

INTERNAL PROCESSING -

- Data received by PIA on Universal CPU is read by MPU and stored in an accumulator.

- Data is processed according to instructions applicable to MPU. (There are 72 instructions for the 6800 microprocessor.)

- Sets of instructions are stored in ROM and executed according to desired function.

- Functions include editing, printing, composing, and transmission. RAM is used for data storage before and after processing by the MPU.

PRINTER CONTROL -

- Data stored in message memory (Universal CPU RAM) is selected to be printed by Universal CPU.
- Stored data to be printed is converted from ASCII to a print code.
- Print code uniquely identifies character to be printed in terms of number of dots to be fired and carriage position.
- Code is input to print control circuit card where it is synchronized for firing.
- Under microprocessor control, printing sequence is initiated until message is printed or an interrupt is received.
- Audible alarm control function is also provided by printer control.

LINE-FEED FUNCTIONS -

- Line-feed commands are generated under program control to separate lines of text and messages. Line-feeds can also be generated from the line-feed switch.
- Line-feed command causes a series of pulses on the four line-feed stepping motor lines to be generated.
- These pulses cause stepping motor shaft to rotate.

DATA TRANSMISSION -

- When transmit data command is entered, data to be transmitted is converted to appropriate ASCII or Baudot code format containing even or odd parity, and stop bits.
- This conversion is performed by communications circuit card.
- Data is input to interface assembly where it drives appropriate system interface circuitry.

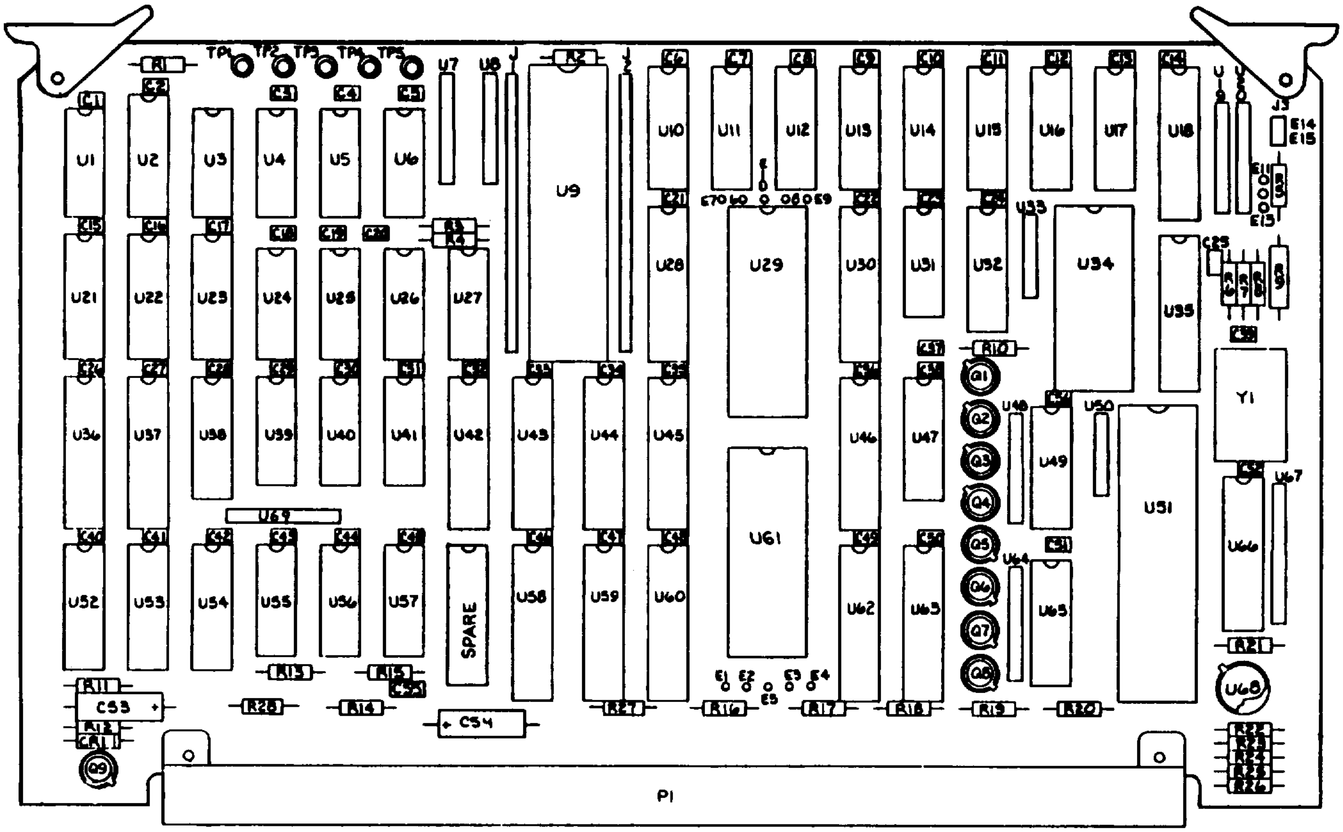


Figure 3-6. UNIVERSAL CPU CIRCUIT CARD ASSEMBLY

UNIVERSAL CPU CIRCUIT CARD ASSEMBLY (3A1A1)

- Universal Central Processing Unit (CPU) is the heart of the terminal and performs following functions:

  Clocking/timing generation

  Input data processing

  Switch and lamp interfaces

  Program memory

  Message memory

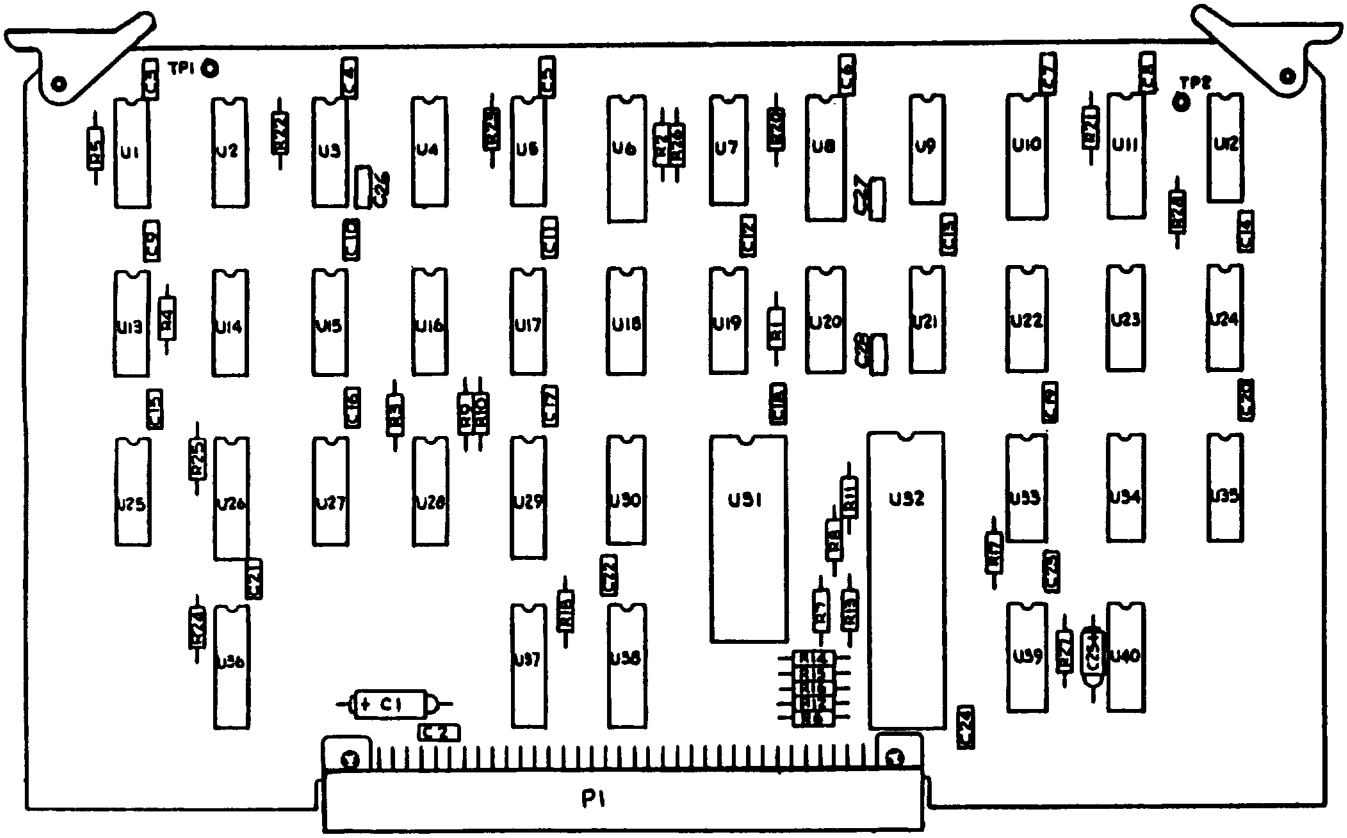


Figure 3-7. COMMUNICATIONS CIRCUIT CARD ASSEMBLY

COMMUNICATIONS CIRCUIT CARD ASSEMBLY (3A1A3)

- Receive and transmit data interfaces with terminal through interface assembly, which interfaces with communications circuit card. Overall function is to condition input and output data so that is is compatible with respective interfaces. This conditioning includes modulation and demodulation for conditioned diphase data.

- Key interface is Universal synchronous/asynchronous receiver/transmitter (USART). All data enters and exits through the USART. USART converts receiver serial data to parallel, and parallel transmitter output data to serial.

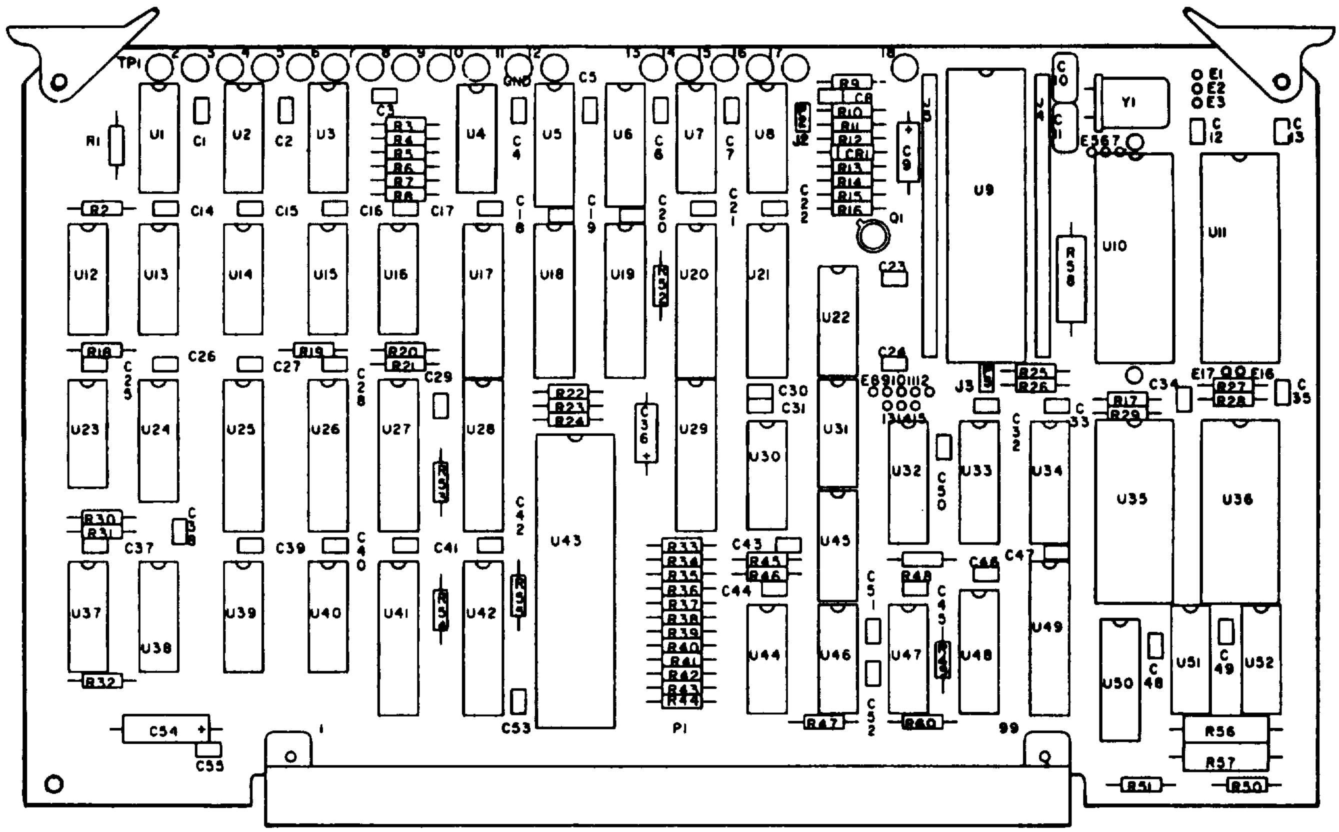


Figure 3-8. PRINT CONTROL CIRCUIT CARD ASSEMBLY

PRINT CONTROL CIRCUIT CARD ASSEMBLY (3A1A4)

- Provides all necessary timing and control signals for dot matrix printer.

- A 6809 microprocessor with a 4.9152 MHz oscillator and a 6821 PIA are at heart of the circuitry.

- Performs following other functions:

  Line-feed commands

  Audible alarm

  Carriage position

MODEL C ONLY

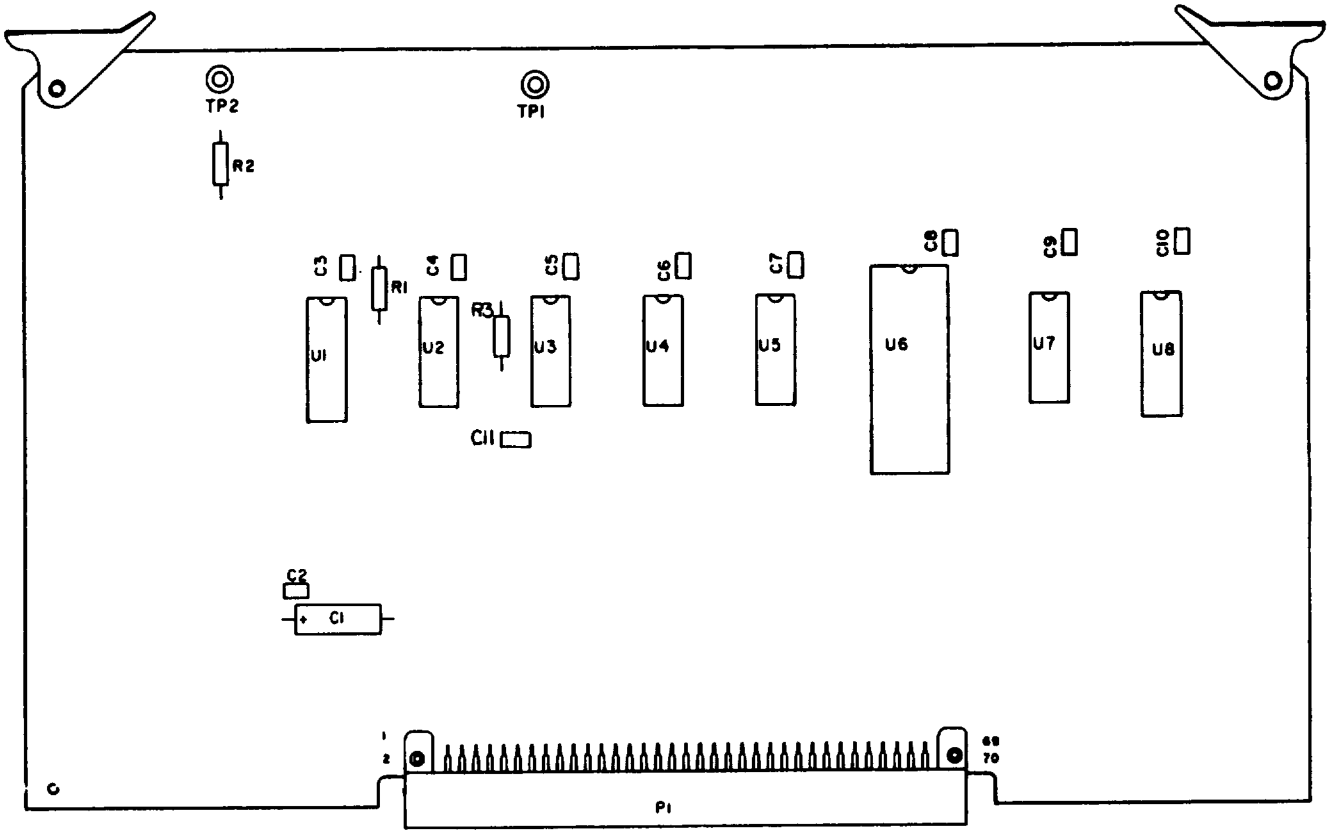


Figure 3-9. AUXILIARY INTERFACE CIRCUIT CARD ASSEMBLY

AUXILIARY INTERFACE CIRCUIT CARD ASSEMBLY (3A1A2)

- Converts parallel data to serial data and back again.

- Forms interface from message memory to auxiliary memory/relay control circuit.

- Interfaces eight bit parallel data bus and control signals of unit to a serial bus accepted by auxiliary memory/relay control and auxiliary memory module.

MODEL C ONLY

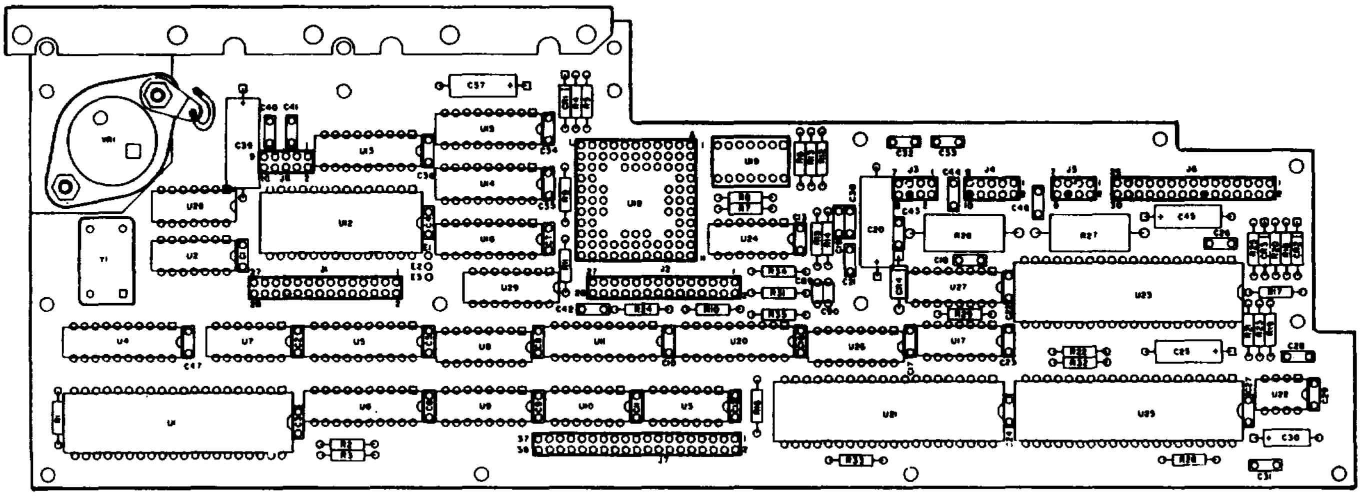


Figure 3-10. AUXILIARY MEMORY/RELAY CONTROL CIRCUIT CARD ASSEMBLY

AUXILIARY MEMORY/RELAY CONTROL CIRCUIT CARD ASSEMBLY (3A2A3)

- Located in keyboard assembly.
- Contains microprocessor, oscillator, internal data and address bus.
- Transfers messages from auxiliary memory module to both message memory and auxiliary memory port.

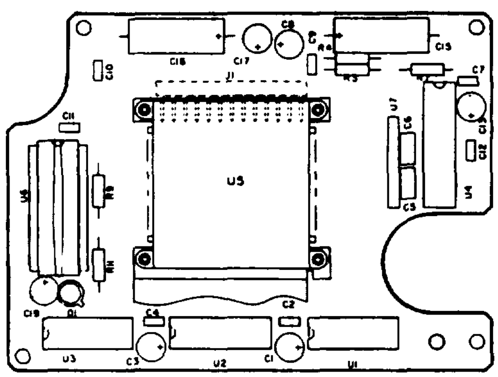


Figure 3-11. AUXILIARY MEMORY MODULE CIRCUIT CARD ASSEMBLY

AUXILIARY MEMORY MODULE CIRCUIT CARD ASSEMBLY (3A3A1)

- Housed in module attached to right side of keyboard assembly.
- Messages stored magnetically in what is known as bubble memory.
- Messages are retained even when power is removed.

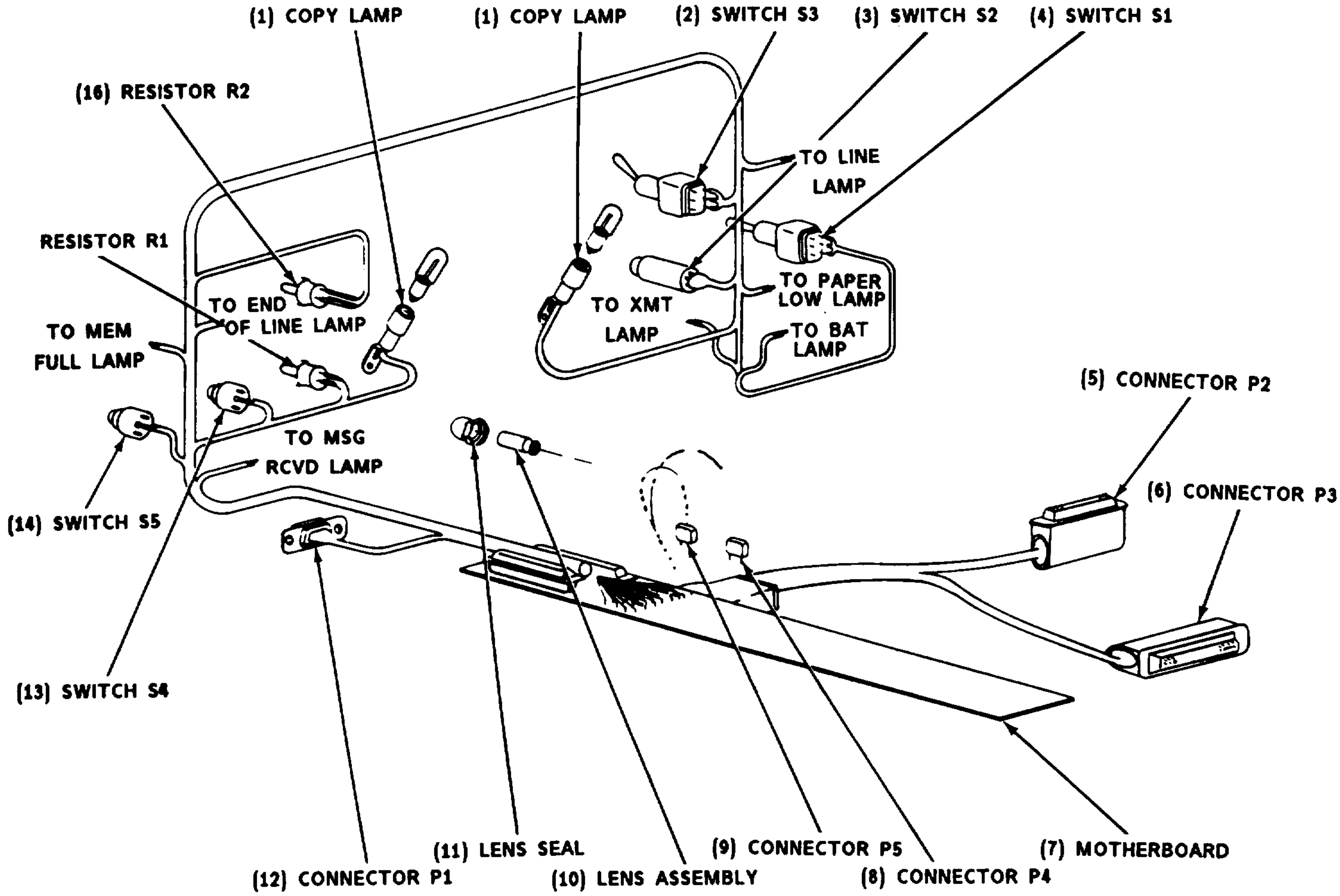


Figure 3-12. HARNESS ASSEMBLY

LEGEND FOR HARNESS ASSEMBLY

KEY	INTERFACE	KEY	INTERFACE
(1) Copy Lamps - DS9 and DS10	Copy Illumination	(9) Connector (P5) -	Inductor L2
(2) Switch (S3) -	Transfer	(10) Lens Assembly -	Parity Reset
(3) Switch (S2) -	Parity Reset	(11) Lens Seal -	Parity Reset
(4) Switch (S1) -	Abort	(12) Connector (P1) -	Keyboard
(5) Connector (P2) -	Interface	(13) Switch (S4) -	Audible Reset Alarm
(6) Connector (P3) -	Power Supply	(14) Switch (S5) -	Line-Feed
(7) Motherboard -	Electrical Interface (System)	(15) Resistor (R1) -	2.5k Audio Pot
(8) Connector (P4) -	Inductor L1	(16) Resistor (R2) -	2.5k Illum Pot

3-3. SYSTEM ELECTRICAL INTERFACES

HARNESS ASSEMBLY -

- All system electrical interfaces from logic circuit card to power supply, dust cover, and interface assembly come through harness assembly.
- Composed of motherboard, dust cover, power supply, and interface harness.

PERIPHERAL INTERFACE ADAPTER (PIA) -

- Principal interface between logic circuits and Universal CPU.
- Universal CPU, print control and communications circuit cards each contain an MC6821 or equivalent integrated circuit which performs PIA function.
- PIA may be thought of as. a traffic control device, which depending upon input control signals, allows data to flow into and out of circuit.
- Peripheral inputs and outputs are discrete lines which interface with only a single component (i. e., switch, lampdriver, audible alarm driver).
- Logic circuits interface with two sets of bidirectional data buses:
  - ❑ DATA BUS - Functions as input output lines depending upon control signal.
  - ❑ ADDRESS BUS- Provides interfaces for process control and data routing functions.

UNIVERSAL SYNCHRONOUS/ASYNCHRONOUS RECEIVER/TRANSMITTER (USART) -

- External data lines which interface with terminal carry serial data. Since terminal processes data in parallel, a converter must be provided to change input data from serial to parallel and output data from parallel to serial.
- This task is performed by USART, an AMD9551 or equivalent integrated circuit mounted on communications circuit card.

<u>MODEL C ONLY</u>

- A USART is also used on the auxiliary interface circuit card.

TRISTATE LOGIC -

Conventional Transistor-Transistor-Logic (TTL) Devices:

- Uses two states: logic 1 (+4.75 Vdc) and logic 0 (0 to 0.5 Vdc).
- Both states result in low impedance paths either to ground or to Vdc (+5V) supply.
- Interface line between output device and input devices is pulled toward ground or Vdc supply as required by output circuit.
- Impedance of this type of operation precludes wiring together outputs of other drivers which may drive some logic circuitry.
- Additional interface lines and logic must be provided for these other drivers.

Tristate TTL Devices:

- Utilize the same two logic states as conventional TTL devices.
- In addition to low impedance logic 1 and logic 0, a third state (high impedance) is provided.
- In this state, output devices offer high impedance to interface line, causing it to appear much like an open circuit.

MICROPROCESSOR -

- Located on Universal CPU circuit card and print control circuit card.
- Controls all internal processing functions and performs the “Intelligent” functions of terminal.
- Directed in process control functions by programmed instructions contained in ROM (Read Only Memory).

MODEL C ONLY

- Also located on auxiliary memory/relay control circuit card.

READ ONLY MEMORY -

- Permanently formed memory containing instruction or code conversion tables.
- In UCPU, ROM instructs microprocessor what to do and when to do it.
- In keyboard, ROM translates 16 bit keyswitch code into six bit keyboard code.

RANDOM ACCESS MEMORY (RAM) -

- Integrated circuit located on Universal CPU circuit card and print control circuit card.

- Microprocessor uses RAM as temporary storage device in performing processing calculations.

MODEL C ONLY

- Also located on auxiliary memory/relay control circuit card.

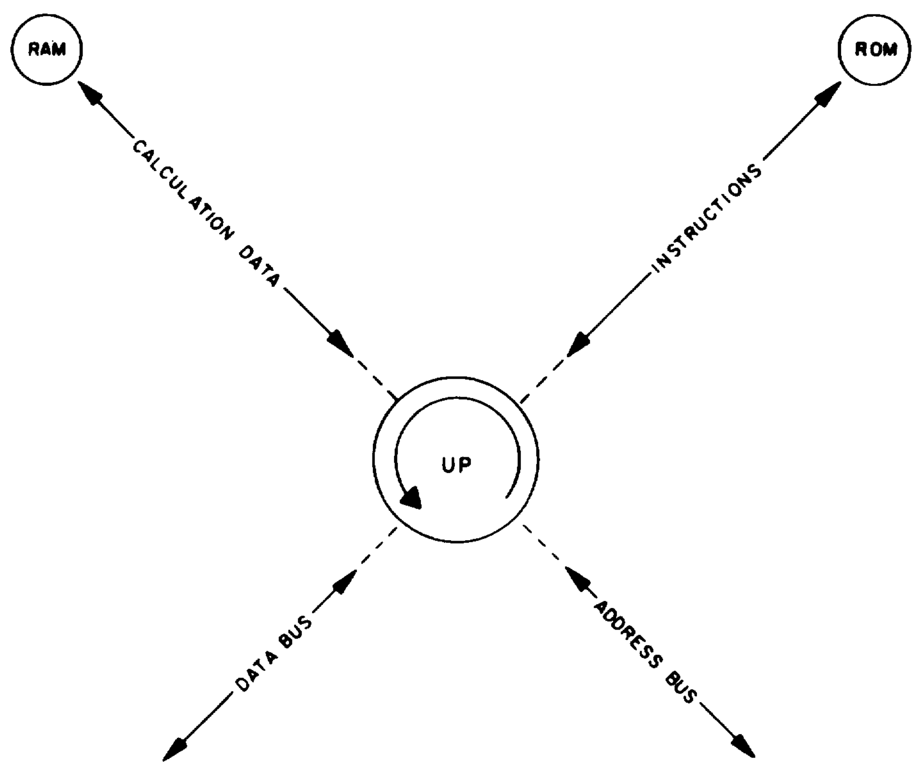


Figure 3-13. RELATIONSHIP BETWEEN RAM, ROM, AND MICROPROCESSOR

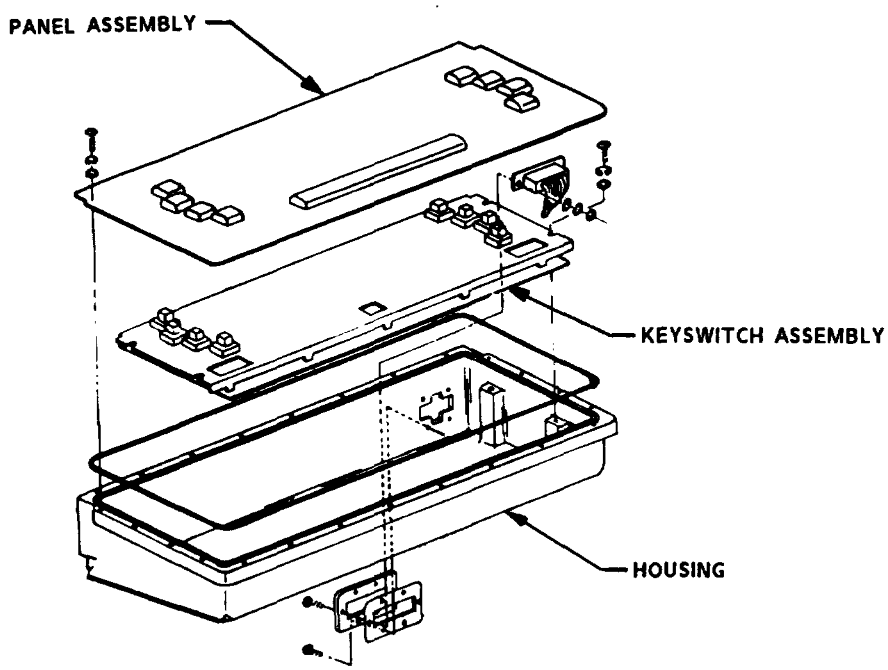
Section II. ELECTRICAL, ELECTRONIC, AND MECHANICAL FUNCTIONS

3-4. KEYBOARD ASSEMBLY (3A2)

Keyboard assembly is composed of panel assembly and keyswitch assembly mounted together in housing assembly.

PANEL ASSEMBLY -

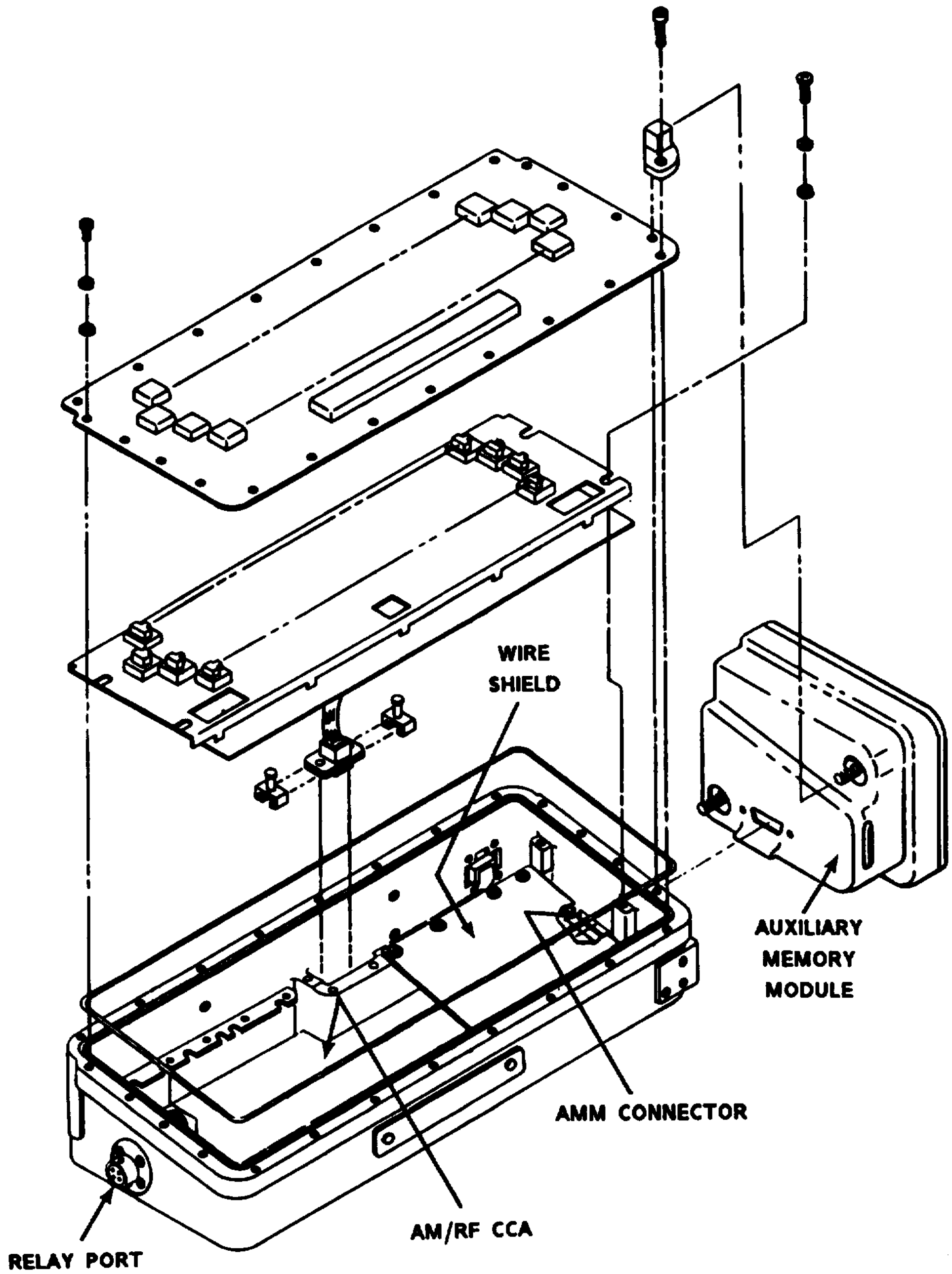
- Contains 63 keys arranged and labeled to meet ASCII and Baudot requirements.
- Terminal electronics translate input from keyboard into either ASCII or Baudot mode depending upon selected operating mode.



KEYSWITCH ASSEMBLY -

- Contains logic circuitry to convert keyswitch inputs into an eight bit serial data word which is input to UCPU circuit card.
- Each key actuates a Honeywell SD Type Hall Effect switch mounted immediately below keyboard.
- Each keyswitch has a shaft mounted within a rubber boot to provide environmental protection.
  - ❑ Shafts come in contact with plungers on keyswitch assembly, but are not attached to them, allowing panel assembly removal without removing keyswitch assembly.
- Keyboard is optional equipment; without it, terminal has only RO capability.

MODEL C ONLY



- Auxiliary memory/relay control circuit card is mounted in keyboard housing assembly.
- Auxiliary memory module attaches to connector located on right side of keyboard housing assembly.
- Relay port connector is located on left side of keyboard housing assembly.

3-5. KEYBOARD OPERATIONAL DESCRIPTION

When terminal keyboard is operated, keyswitches generate logic 0 output. All keyswitches except SHIFT (2 keys), LOC, REPEAT, and CONTROL are wired into an 8 x 8 row/column matrix. LOC key is an alternate action key. When pressed, it locks in the down position until a second depression releases it. This key provides SHIFT LOC function. REPEAT key causes last character entered to be repeated.

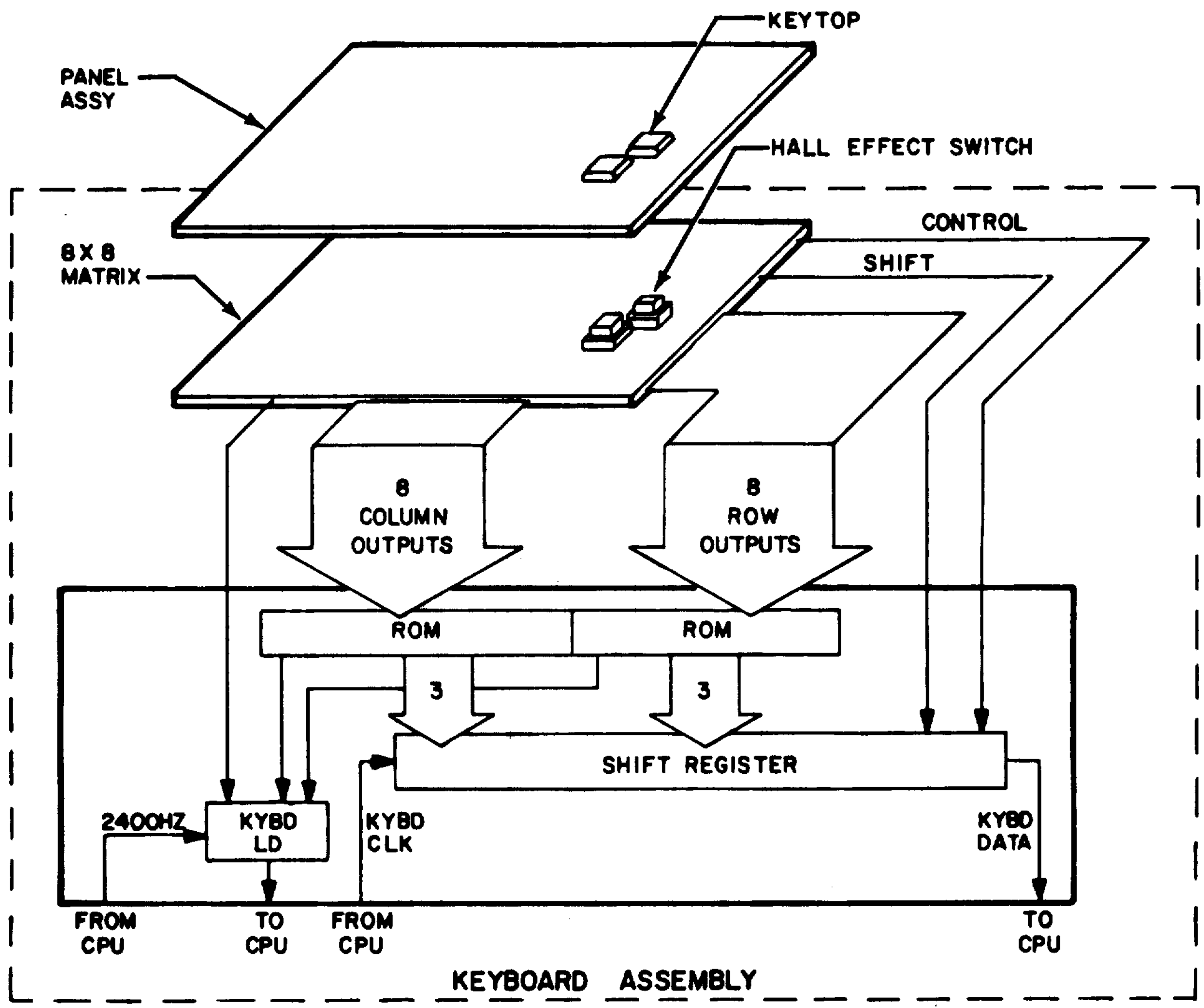


Figure 3-14. KEYBOARD BLOCK DIAGRAM

- Matrix output appears as two 8-bit words. Each 8-bit word represents a row and column address for respective ROM encoders. The 8 x 8 matrix outputs are normally all logic 1. When keyswitch other than LOC/SHIFT, CONTROL, and REPEAT is operated, the two matrix outputs change from all 1's to single logic 0 and seven logic 1's for both the row and the column outputs. Position of zeros provide row/column address of operated switch. Presence of more than one zero in address indicates more than one keyswitch is operated. In such cases ROMs U1 and U3 ignore address until one of the keys is released and legal address is again recognized.

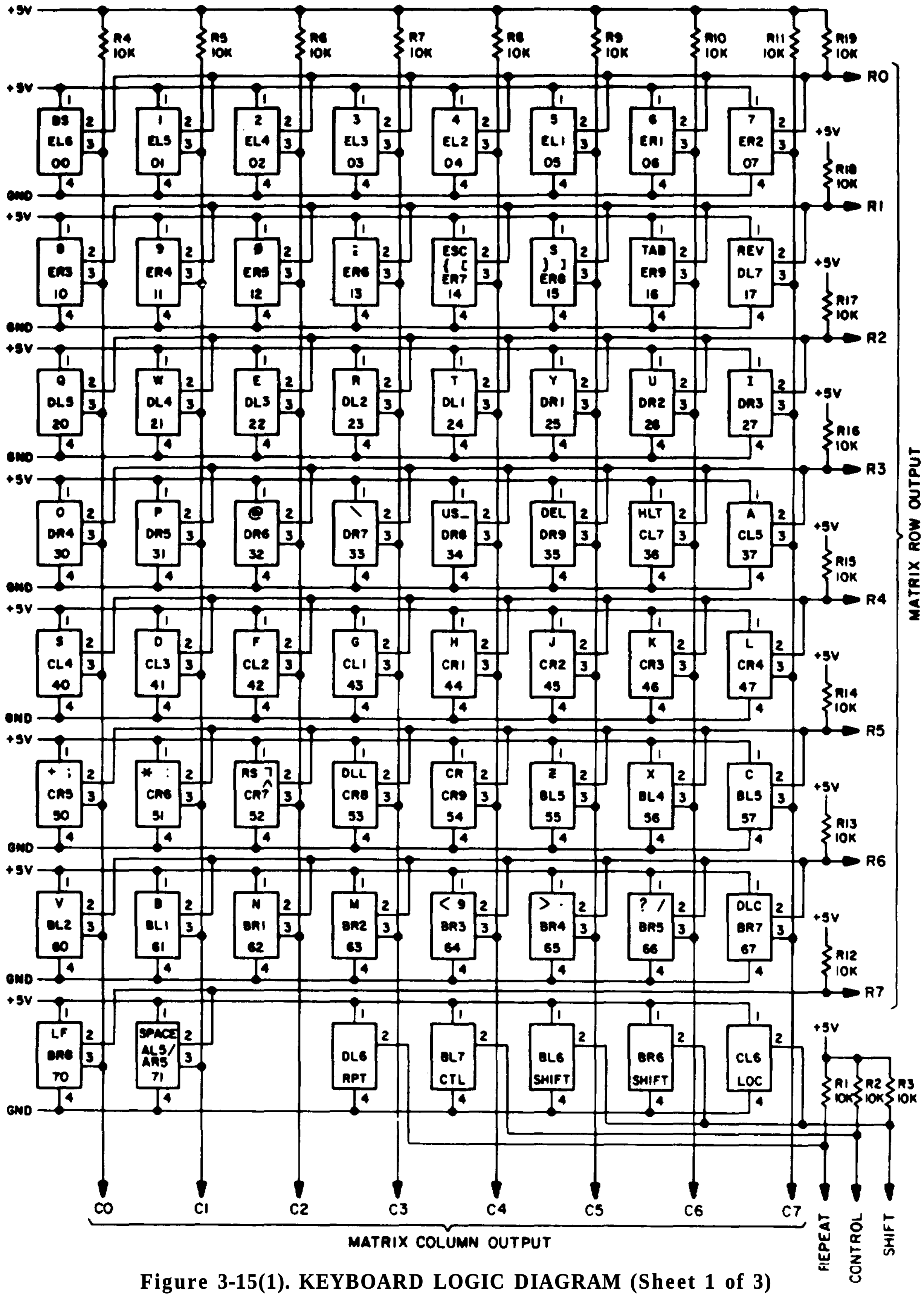


Figure 3-15(1). KEYBOARD LOGIC DIAGRAM (Sheet 1 of 3)

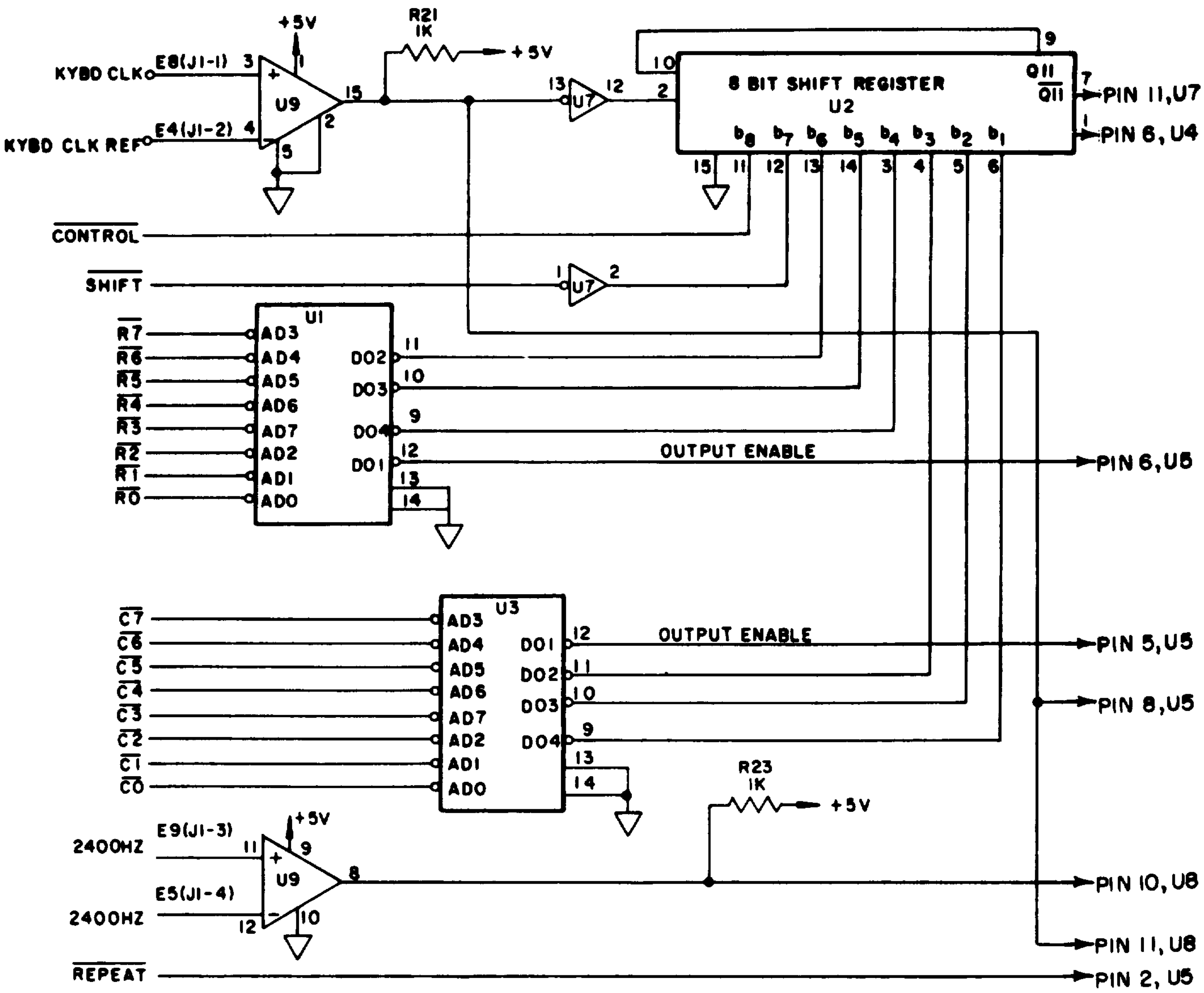


Figure 3-15(2). KEYBOARD LOGIC DIAGRAM (Sheet 2 of 3)

- Having recognized keyswitch address, the ROM generates a six-bit code representing actuated keyswitch. The six bits generated for each key are provided in Table 3-2. These six bits are input to an eight-bit shift register. Both outputs enabled from U1 and U3 become a logic 0 when keyswitch address is recognized. Presence of a logic 0 on U5 pins 6 and 5 causes a logic 1 at U5 pin 4. Flip-flop U6 pin 2 is a logic 1 because it is wired to +5V. U6 pin 5 is a logic 0 due to an earlier clear pulse from U5 pin 10. Change of output on U5 pin 4 from a logic 0 to a logic 1 causes output of U6 pin 5 to become a logic 1. Logic 1 at U6 pin 5 causes a logic 1 at U6 pin 12. Output at U6 pin 9 is a logic 0 until U9 pin 8 output changes from a logic 0 to a logic 1. When this occurs, U4 pin 2 becomes a logic 1. Output U4 pin 5 becomes a logic 1 on the next change of U9 pin 8 from a logic 0 to a logic 1. When U4 pin 5 is a logic 1, U4 pin 6 is a logic 0, enabling new data to be loaded into shift register U2. The first KYBD CLK steps first bit (b1) out of shift register U2 and also causes a logic 0 at output of U5 pin 10. This logic 0 resets flip-flops U6 and U4, causing KYBD LD to become a logic 0 again.

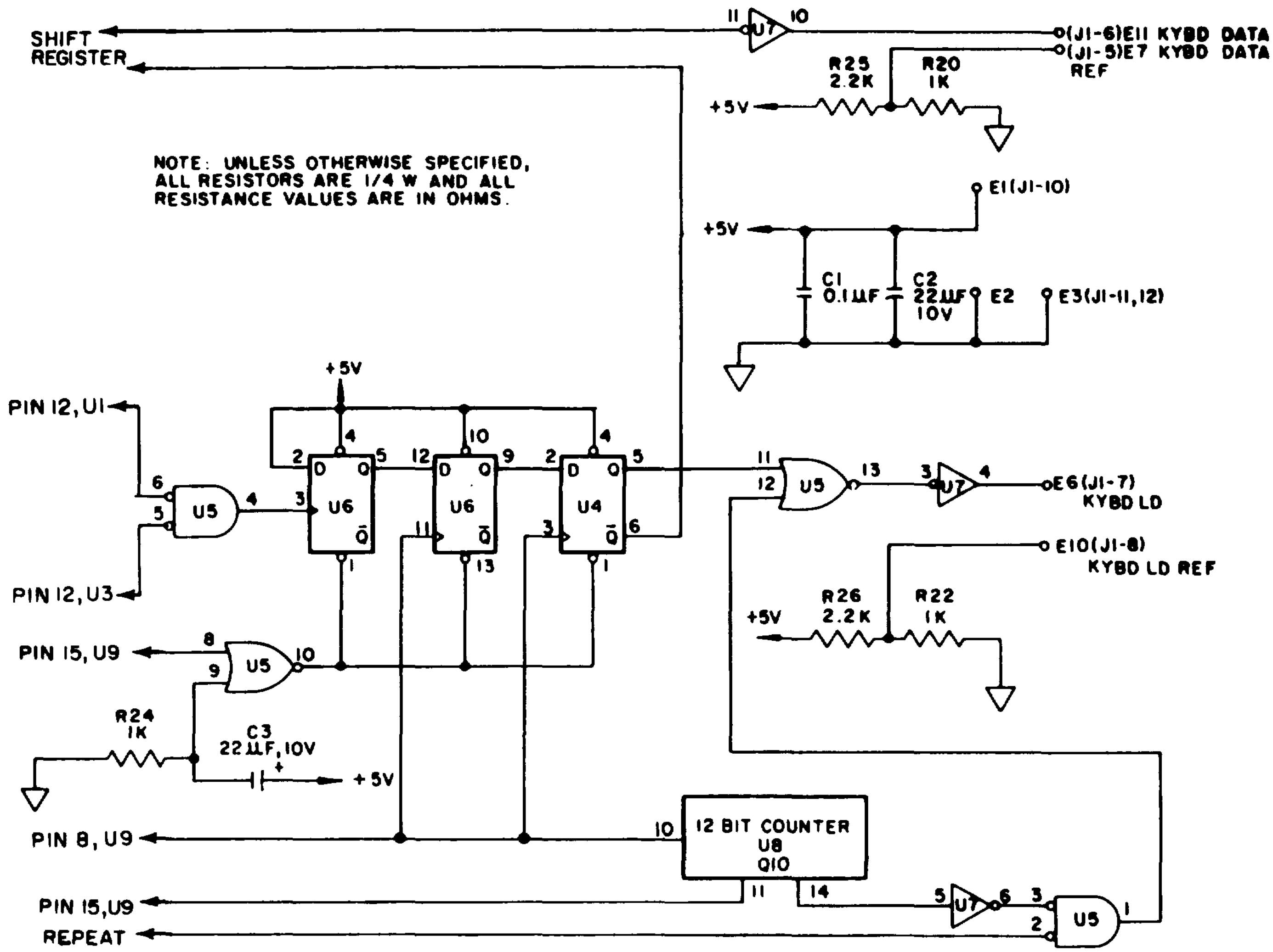


Figure 3-15(3). KEYBOARD LOGIC DIAGRAM (Sheet 3 of 3)

- Character in shift register is shifted bit by bit by the KYBD CLK from CPU circuit card. With each clock pulse, data is loaded back into register so at the end of eight clock pulses, the same data is again available. Recycling of the eight bits of data allows character to be regenerated with the REPEAT key.

- When REPEAT key is pressed, a logic 0 appears at U5 pin 2. When U8 pin 11 is a logic 0, the 12-bit binary counter U8 divides 2400 Hz by 512 to produce a positive transition at pin 14 every 213 ms (4.7 times per second). Logic 1 at U8 pin 14 produces a logic 0 at U7 pin 6 and U5 pin 3. When U5 pin 3 becomes a logic 0, U5 pin 1 becomes a logic 1. KYBD LD again becomes a logic 1, resulting in the generation of KYBD CLK. The first KYBD CLK pulse resets counter U8 causing U7 pin 6 to become a logic 1. U5 pin 1 becomes a logic 0 causing U7 pin 4 to become a logic 0. At the end of 213 ms (nominal), U7 pin 6 again becomes a logic 0. If the REPEAT keyswitch is still operated, cycle is again repeated. In any case, the character remains in register until a new character is input.

Table 3-2. CHARACTER CODE MATRIX

B8 (control)						0	0	1	1
B7 (shift)						0	1	0	1
b6	b5	b4	b3	b2	b1	Unshifted controlled	Shifted controlled	Unshifted uncontrolled	Shifted uncontrolled
1	1	1	1	1	1	BS	BS	BS	BS
1	1	1	1	1	0	1	!	1	!
1	1	1	1	0	1	2	"	2	"
1	1	1	1	0	0	3	#	3	#
1	1	1	0	1	1	4	$	4	$
1	1	1	0	1	0	5	%	5	%
1	1	1	0	0	1	6	&	6	&
1	1	1	0	0	0	7	/	7	/
1	1	0	1	1	1	8	(	8	(
1	1	0	1	1	0	9	)	9	)
1	1	0	1	0	1	0	0	0	0
1	1	0	1	0	0	—	=	—	=
1	1	0	0	1	1	ESC	ESC	[	[
1	1	0	0	1	0	GS	GS	]	]
1	1	0	0	0	1	TAB	TAB	TAB	TAB
1	1	0	0	0	0	REV	REV	REV	REV
1	0	1	1	1	1	DCI	DCI	q	Q
1	0	1	1	1	0	ETB	ETB	w	W
1	0	1	1	0	1	ENQ	ENQ	e	E
1	0	1	1	0	0	DC2	DC2	r	R
1	0	1	0	1	1	DC4	DC4	t	T
1	0	1	0	1	0	EM	EM	y	Y
1	0	1	0	0	1	NAK	NAK	u	U
1	0	1	0	0	0	i	I	i	I
1	0	0	1	1	1	o	O	o	O
1	0	0	1	1	0	DLE	DLE	p	P
1	0	0	1	0	1	NUL	NUL	@	\
1	0	0	1	0	0	FS	FS	\	1
1	0	0	0	1	1	US	US	—	—
1	0	0	0	1	0	DEL	DEL	DEL	DEL
1	0	0	0	0	1	HLT	HLT	HLT	HLT
1	0	0	0	0	0	SOH	SOH	a	A
0	1	1	1	1	1	DC3	DC3	s	S
0	1	1	1	1	0	EOT	EOT	d	D
0	1	1	1	0	1	ACK	ACK	f	F
0	1	1	1	0	0	BEL	BEL	g	G
0	1	1	0	1	1	h	H	h	H
0	1	1	0	1	0	j	J	j	J
0	1	1	0	0	1	VT	VT	k	K
0	1	1	0	0	0	FF	FF	l	L
0	1	0	1	1	1	;	+	;	+
0	1	0	1	1	0	:	*	:	*
0	1	0	1	0	1	RS	RS	^	¬
0	1	0	1	0	0	DLL	DLL	DLL	DLL

Table 3-2. CHARACTER CODE MATRIX - Continued

B8 (control)						0	0	1	1
B7 (shift)						0	1	0	1
b6	b5	b4	b3	b2	b1	Unshifted controlled	Shifted controlled	Unshifted uncontrolled	Shifted uncontrolled
0	1	0	0	1	1	CR	CR	CR	CR
0	1	0	0	1	0	SUB	SUB	z	Z
0	1	0	0	0	1	CAN	CAN	x	X
0	1	0	0	0	0	ETX	ETX	c	C
0	0	1	1	1	1	SYN	SYN	v	V
0	0	1	1	1	0	STX	STX	b	B
0	0	1	1	0	1	SO	SO	n	N
0	0	1	1	0	0	m	M	m	M
0	0	1	0	1	1	,	<	,	<
0	0	1	0	1	0	.	>	.	>
0	0	1	0	0	1	/	?	/	?
0	0	1	0	0	0	DLC	DLC	DLC	DLC
0	0	0	1	1	1	LF	LF	LF	LF
0	0	0	1	1	0	Space	Space	Space	Space

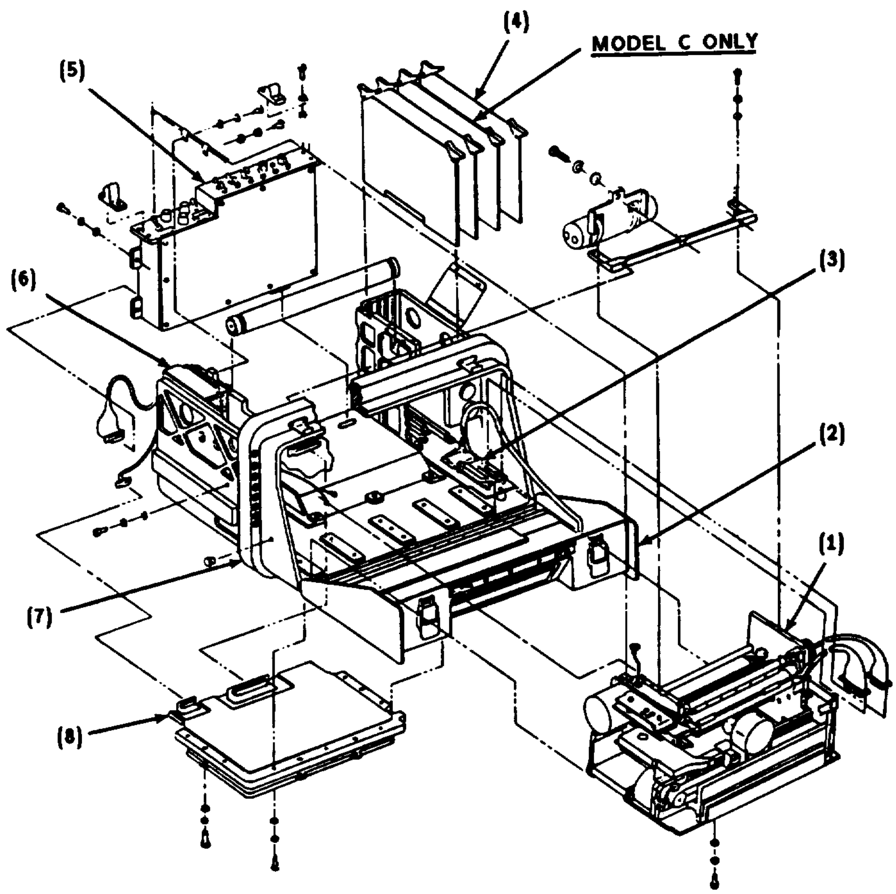


Figure 3-16. TELEPRINTER ASSEMBLY

3-6. TELEPRINTER ASSEMBLY

(1) PRINTER ASSEMBLY (3A1) -

- Converts input signals from processing logic circuit cards into printed text.

(2) DUST COVER ASSEMBLY (3A1) -

- Contains system operating controls once mode is selected. Indicators are visually observable and allow constant monitoring of terminal operation.

(3) MOTHERBOARD HARNESS ASSEMBLY (3A1) -

- Provides access to all inter-related interfaces between logic assemblies, power supply, and interface assembly.

(4) PROCESSING LOGIC CARD ASSEMBLIES ·

- Universal CPU Circuit Card Assembly (3A1A1)
  - ❑ Controls and programs all inter-related electronic functions with data processes.

- Communications Circuit Card Assembly (3A1A3)
  - ❑ Conditions input/output data, making it compatible with respective interfaces.

- Print Control Circuit Card Assembly (3A1A4)
  - ❑ Converts electrical signals into print commands.

<u>MODEL C ONLY</u>

- Auxiliary Memory Interface Card Assembly (3A1A2)
  - ❑ Interfaces unit with auxiliary memory.

(5) INTERFACE ASSEMBLY (3A1A7) -

- Interface assembly serves three functions:
  - ❑ Power mode switching.
  - ❑ Mode selection.
  - ❑ Data input/output level conversion.

(6) FILTER ASSEMBLY (3A1A6FL1) -

- Converts and filters 115/230 Vac 50/60/400 Hz power to 22-30 Vdc. Also provides EMI filtering.

(7) CHASSIS ASSEMBLY -

- Provides easy access for mounting and repair of components.

(8) POWER SUPPLY ASSEMBLY (3A1PS1) -

- Provides dc power for all functions as required. Also provides battery backup sensing and switching.

3-7. DOT MATRIX PRINTER, MAJOR ELECTRONIC COMPONENTS

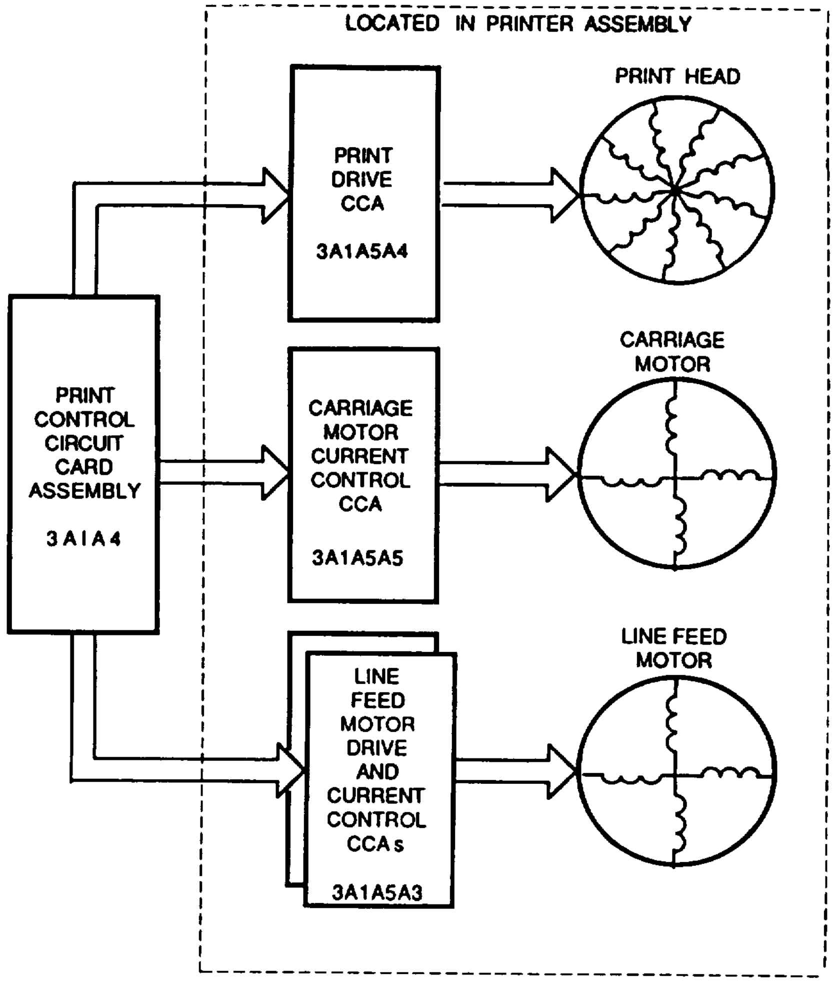


Figure 3-17. DOT MATRIX PRINTER DRIVE SIGNALS BLOCK DIAGRAM

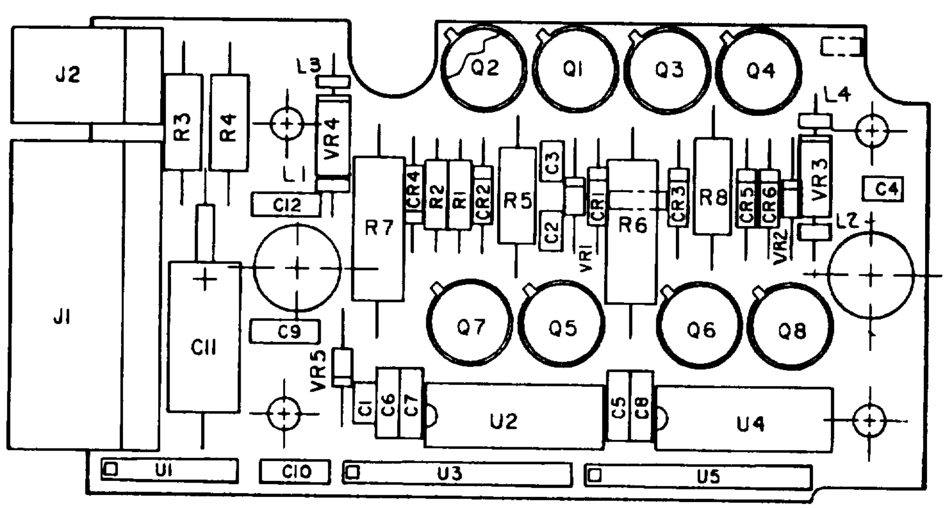


Figure 3-18. CARRIAGE MOTOR CURRENT CONTROL CIRCUIT CARD ASSEMBLY

CARRIAGE MOTOR CURRENT CONTROL CIRCUIT CARD ASSEMBLY (3A1A5A5) -

- Located in printer assembly just above the ribbon cassette.
- The four phase drive signals from the print control circuit card are translated to usable voltages and/or currents to the drive carriage motor.
- DC voltages used are generated on the print drive circuit card.

CARRIAGE MOTOR CURRENT CONTROL SCHEMATIC DIAGRAM -

NOTES

See figure 3-19 for Carriage Motor Current Control Schematic Diagram.

See figures FO-16(1) and FO-16(2) for representative waveforms pertaining to this discussion.

- The +5 V from the Print Drive CCA is used for the SWMILIM1, SWMILIM2, and ØA through ØD inputs. These signals are from the open collector outputs on the Print Drive and Print Control CCAS.
- Regulated +63 V and +58 V from the Print Drive CCA are used for the carriage motor, and to control the current to the carriage motor.
- Regulated +26 V from the Print Drive CCA is regulated to +13.8 V {nominally) by VR5. This voltage provides the voltage necessary to turn on FETs Q5-Q8 as phase move commands, ØA-ØD, are received from the Print Control CCA.
- Current flow through the motor windings is sensed by a voltage drop across R6 and R7. This voltage drop represents the amount of current flowing at any given time. This voltage is routed from J1-10 and J1-23 to the Print Drive CCA. There, it is compared against a reference voltage. Results of this comparison are fed to J1-5 and J1-9 in the form of pulse width modulation.
- Any time the drive transistors Q5-Q8 are turned off for current control, Q2 and Q3 are turned on. This provides a path for current to flow from the induced voltage, caused by the collapsing magnetic field in the motor windings, Diodes CR1, CR2, CR5, and CR6 steer this current.
- SWMILIM1 and CURRENT SENSE FB1 control SDØA and SDØB circuitry. SWMILIM2 and CURRENT SENSE FB2 control SDØC and SDØD circuitry.
- ØA-ØD are the carriage motor control signals from the Print Control CCA. These signals control the direction of the motor, which in turn controls the location of the print head.
- Diodes VR3 and VR4 are zener diodes, and provide additional transient protection during field collapse in the motor windings.

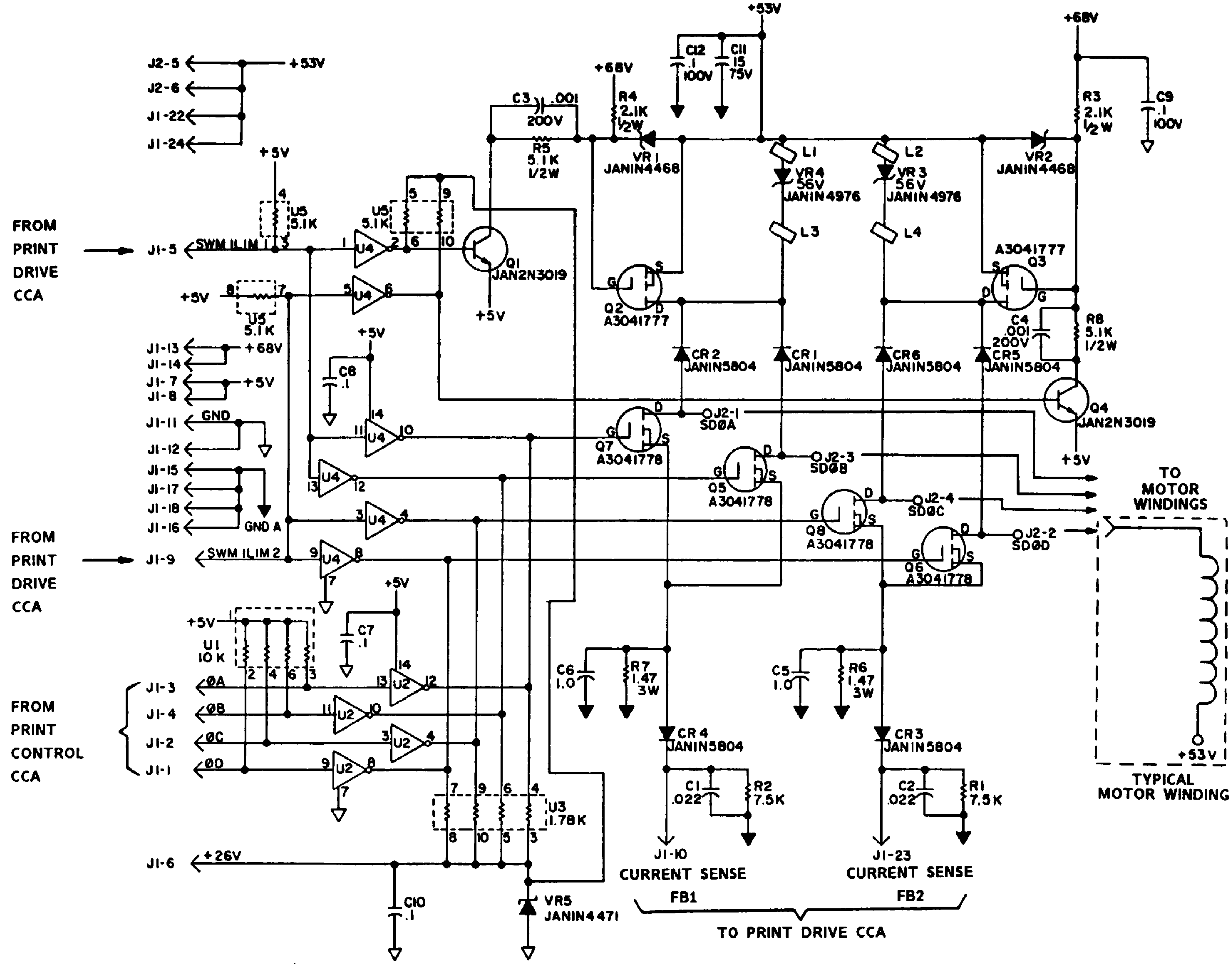


Figure 3-19. CARRIAGE MOTOR CURRENT CONTROL SCHEMATIC DIAGRAM

LINE-FEED (MOTOR DRIVE) CURRENT CONTROL NOARD ASSEMBLY -

- This assembly is composed of line-feed/current controller and line-feed driver. Assemblies mount together to make a single component, mounted on left-hand side of the printer assembly,

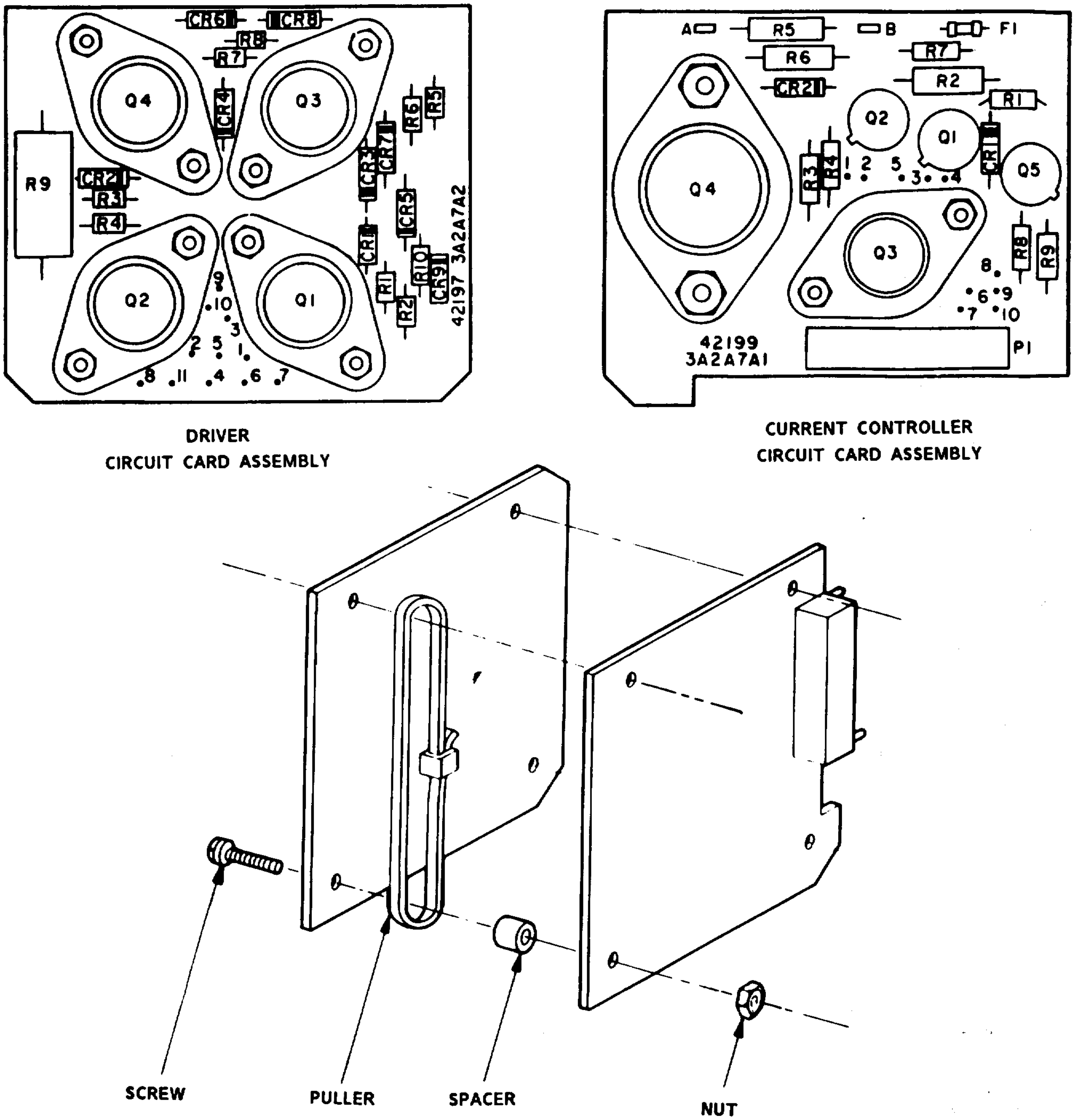


Figure 3-20. LINE-FEED (MOTOR DRIVE) CURRENT CONTROL BOARD ASSEMBLY

LINE-FEED CONTROL SYSTEM –

Interconnection between controller, line-feed stepping motor and driver, as well as circuitry contained on each circuit card, is shown in figures 3-21 and 3-22.

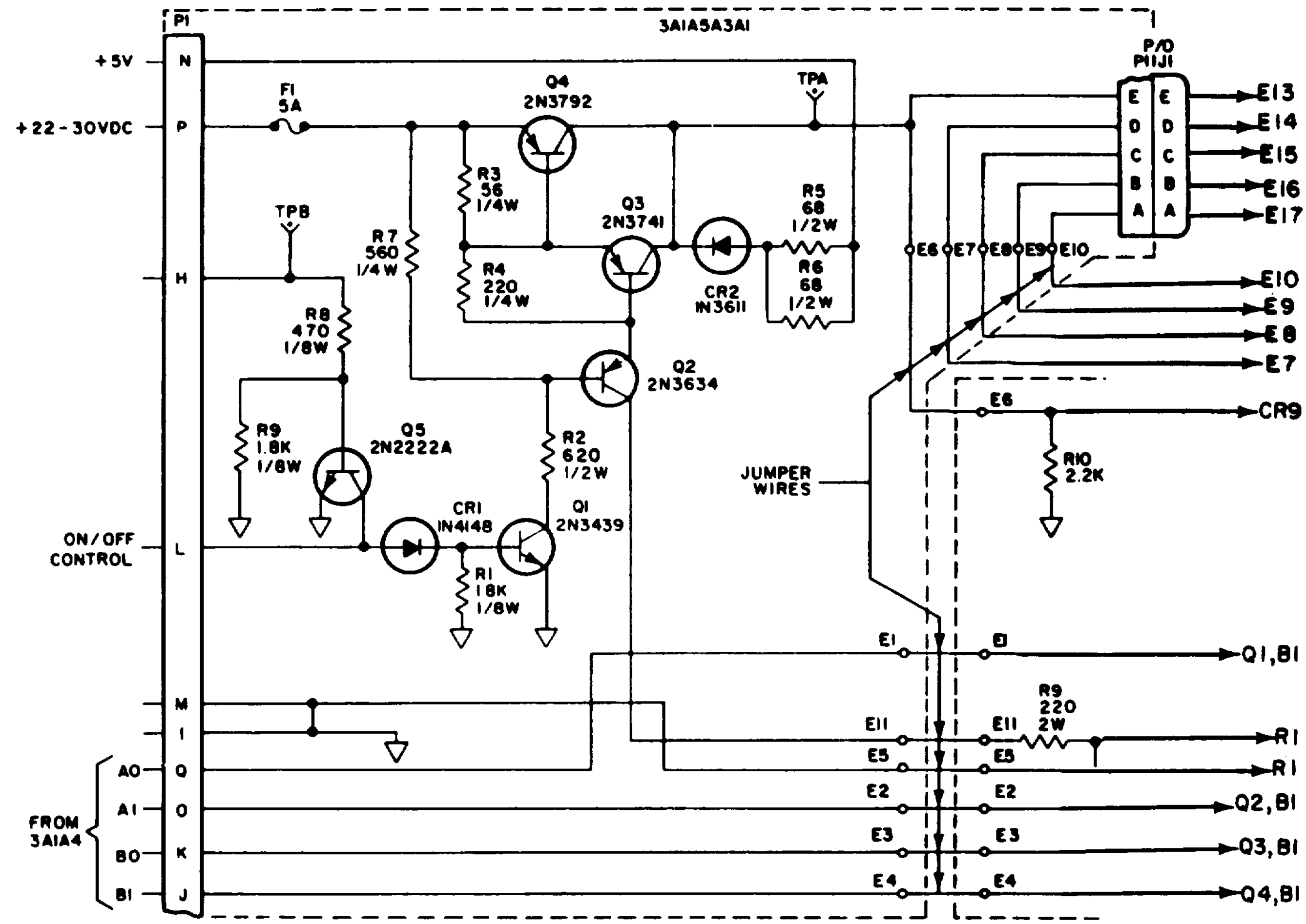


Figure 3-21. LINE-FEED CONTROL SYSTEM (Line-Feed Controller)

LINE-FEED CONTROLLER -

- Voltage of +22 to +30 Vdc is applied to P1-P and ON/OFF control signal is applied to P1-L. During periods of time when line-feed function is not required, pin L is at a logic 0 forcing Q1 to off condition. In turn, base of Q2 rises to between +22 and +30 Vdc causing it to turn off. With Q2 off, Q3 and Q4 also turn off, opening path from +22 to +30 Vdc supply to line-feed stepping motor. When P1-L becomes logic 1, Q1 turns on, causing voltage at base of Q2 to drop to between 11.4 and 15.5 Vdc. With base of Q2 at between 11.4 and 15.5 Vdc, and emitter at +22 to +30 Vdc, Q2 turns on. Q2 turning on causes base of Q3 to become between 9.7 and 13.2 Vdc. Voltage at junction of R3 and R4 drops to between 19.6 and 26.6 Vdc. Voltage at base of Q4 is now approximately 10% less positive than voltage at P1-P, causing Q4 to be biased on. Diode CR2 and resistors R5 and R6 provide transient protection during field collapse in stepping motor windings. Circuitry associated with P1-H is not used in this application.

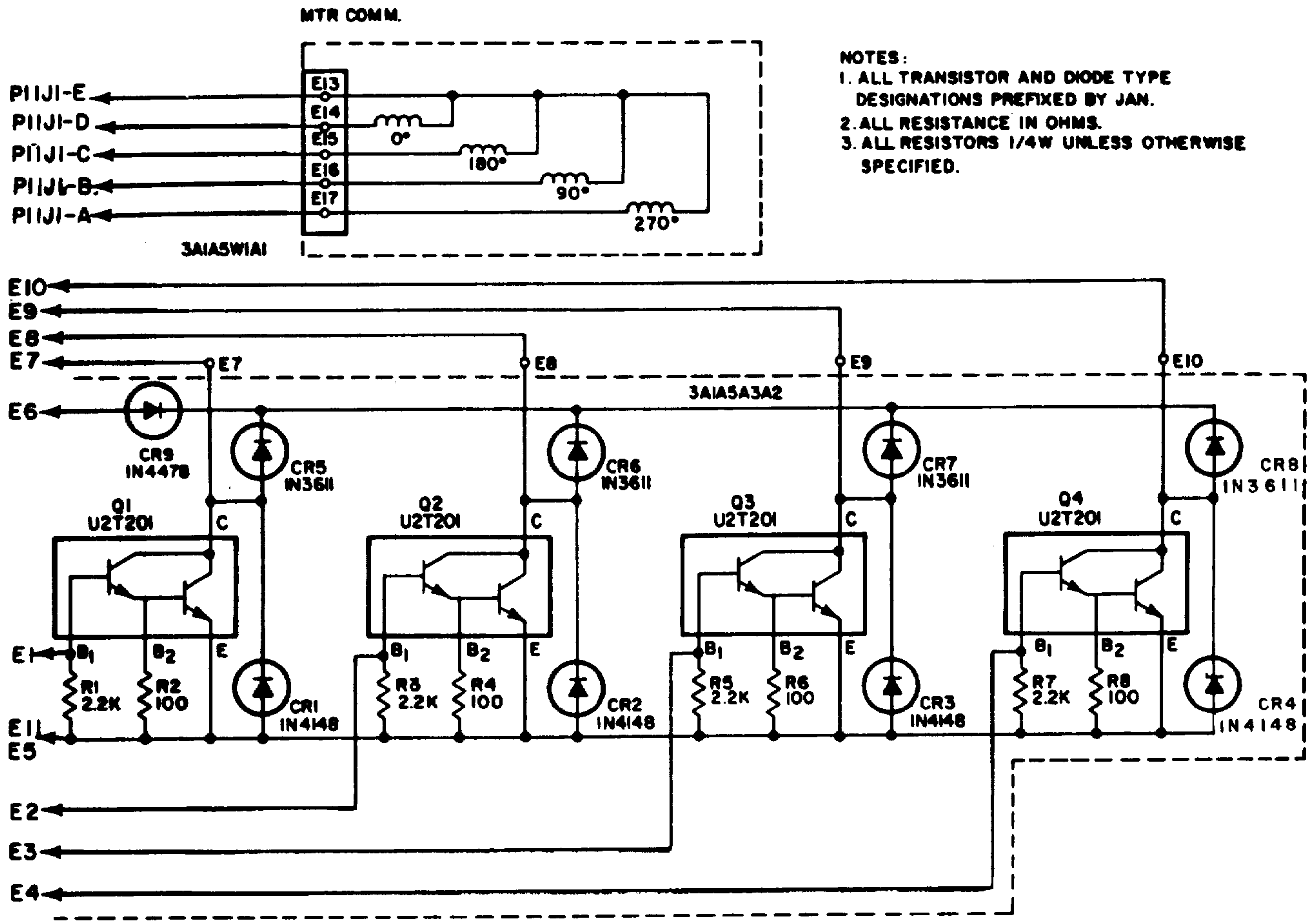
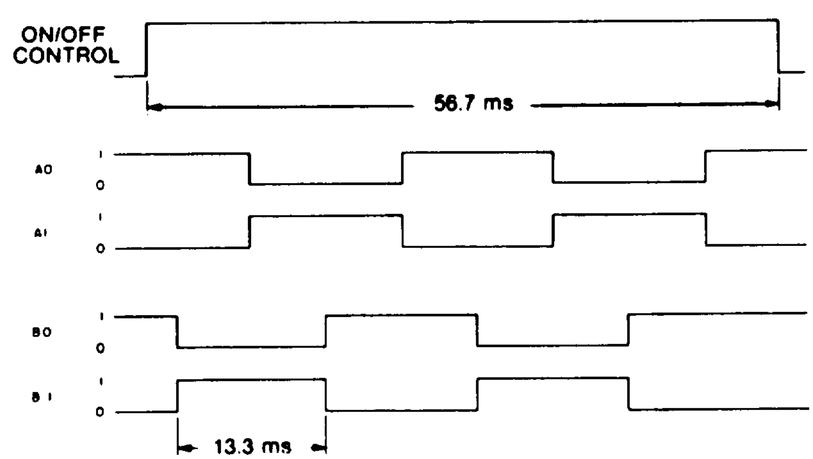


Figure 3-22. LINE-FEED CONTROL SYSTEM (Line-Feed Drivers)

LINE-FEED DRIVERS -

- Line-feed drivers function as gates allowing current to flow through selected line-feed stepping motor windings. A logic 1 applies to A0, A1, B0, and B1 causes respective transistors Q1, Q2, Q3, and Q4 to turn on and provide a low impedance path for +22 to +30 Vdc to ground. Each gate allows current to flow for 13.3 ms at a time. Diodes are provided across gating transistors to provide suppression of transients created by collapsing magnetic fields when gates are switched.



TIMING DIAGRAM SHOWING SWITCHING SEQUENCE

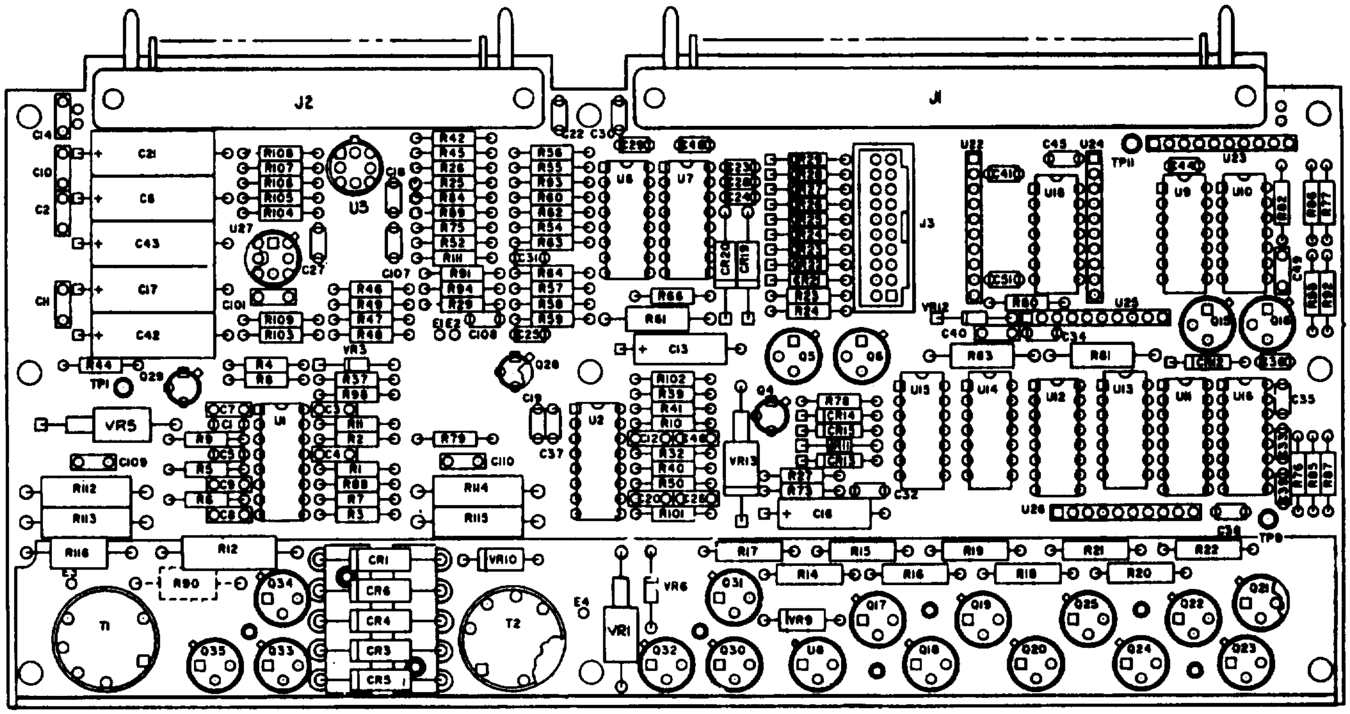


Figure 3-23. PRINT DRIVE CIRCUIT CARD ASSEMBLY

PRINT DRIVE CIRCUIT CARD ASSEMBLY (3 A1A5A4) -

- Located in bottom front of printer assembly.
- Provides dc voltage requirements for carriage motor current control circuit card and this circuit by use of dc to dc converters and voltage regulators.
- Translates signals from print control circuit card to usable voltages and/or currents to drive print head pins of dot matrix printer.
- Monitors carriage position and paper status by use of sensor inputs.
- Provides current regulation for both carriage motor current control circuit card and print drive circuit card.

PRINT DRIVE CCA SCHEMATIC DIAGRAM –

NOTES

See figures FO-15(1) through FO-15(4) for Print Drive Schematic Diagrams.

See figures FO-16-16(1) and FO-16(2) for representative waveforms pertaining to this discussion.

POWER SUPPLY SECTION -

- U8, configured as a constant current regulator, converts +8.6 Vdc to +5 Vdc (+5 VCCR), which is used in various circuitry on this CCA.

- VR13 is used as a voltage regulator to convert +8.6 Vdc to +5 Vdc (+5 V), which is used in various circuitry on this CCA and the CMCC CCA.

- Unregulated +26 Vdc is fed from filter assembly (3A1A6FL1) to J2-2 and J2-3 of this circuit card. The +26 Vdc is at pin 1 of primaries of transformers T1 and T2. Pin 2 of transformers is switched on and off by three parallel MOSFET transistors at a rate controlled by U1 and U2. Transformer secondaries are tapped at +68, +53, +48, and +26 volts used by this CCA and the CMCC CCA.

- Regulation of the +48 volts is achieved by a power transistor mounted across the +48 volt secondary tap. This power transistor is physically located on the right side of the printer assembly chassis.

- Components VR3 and R37 establish control voltage which causes the power transistor to conduct and act as a variable load. During printing, this variable load effect helps keep the energy drain on T2 constant.

CONSTANT ENERGY SUPPLY THEORY -

- Select at test (SAT) resistor R107 is selected to ensure that a constant current of 600 mA is supplied to the shunt capacitor. The capacitor is connected across the collector/emitter of the power transistor, and provides constant energy to the print head during continuous printing. CCR is low.

- Select at test resistor R101 is selected to ensure that a trickle current of at least 50 mA is used to keep the shunt capacitor charged and ready for print during a no print state. If there is an insufficient charge on the shunt capacitor, the first character may not print when the print command is received. CCR is high.

MOTOR THEORY -

- ILIM (J2-18) is the carriage motor current control signal from the Print Control CCA. The signal is converted to a reference voltage level of 2.5 V, which is compared by U6/U7 to the current sense feedback signals (CURSENFB1 and CURSENFB2) from the CMCC CCA. This comparison generates pulse width modulated signals SWMILIM1 and SWMILIM2, which are sent to the CMCC CCA and are used to control the carriage motor current. (See CMCC CCA theory for more detailed information.)

- CURSENFB1 and SWMILIM1 control ØA and ØB circuitry on CMCC CCA.

- CURSENFB2 and SWMILIM2 control ØC and ØD circuitry on CMCC CCA.

- 12 kHz (J1-13) is a control signal that is sent to the Print Control CCA, which uses this signal to control iLIM.

DOT FIRING AND PRINT HEAD CURRENT REGULATION CIRCUIT -

- FIREDOT (J1-16), the dot initiation control signal from the Print Control CCA, must be present before any dot pins can fire. The normal off state of FIREDOT is a +5 Vdc level (high). If the FIREDOT signal is missing or incorrect, no dot pins will fire or all dot current waveforms will be incorrect.

- Dot signals $\overline{\text{DOT1}}$ - $\overline{\text{DOT9}}$, also from the Print Control CCA, control what characters are printed. These signals are converted to voltage levels which either open or close the respective MOSFET transistor switches Q17 - Q25. This creates a current which is sent to the print head and causes the respective dot pin to fire.

- As current flows through the print head coils, a voltage drop develops across source resistors R14 - R22. This voltage is fed back through FET switches U13, U14, and U15 as INV (TP9) signal to U16. This signal, a voltage replica of dot current waveform, is compared to a reference voltage of +2.5 V by U16. This produces an output signal that controls the current peak by varying the voltage delivered to J3 pins 1-15 and pins 16-20 through CR14 and CR15, and causes the recirculating current to discharge through CR21 - CR29. This discharge causes a second peak to occur on the dot current waveform at the O to +5 V transition of the input DOT signal. If the feedback circuitry is operating correctly, the FIREDOT 0 V pulse at TP1l decreases by approximately 40 µec when a dot pin is firing.

- In the normal off state, voltage level at $\overline{\text{DOT1}}$ - $\overline{\text{DOT9}}$ is +5 Vdc level (high), U16-12 13 is 0 Vdc (low), INV (TP9) is 0 Vdc (low), TP11 is 0 Vdc (low), and dot current waveforms are 0 amp.

SENSOR CIRCUIT THEORY –

- There are two paper out conditions: PAPER OUT ROLL and PAPER OUT FF (fanfold). These are input signals to U10, and come from two microswitches located in the unit. The PAPER OUT ROLL switch is located on the far right side below the platen; the PAPER OUT FF switch is located on the left side above the platen.

- When either PAPER OUT input condition occurs, the signal is routed to the Print Control CCA as PAPER OUT.

- CARRIAGE POSITION is monitored by voltage comparator U3. Input is from an optical coupler mounted at a shutter wheel on the carriage motor. The optical coupler sends a voltage level signal to the inverting input (pin 2) of U3, which compares it to a reference voltage at the noninverting input (pin 3) of U3. This comparison generates CARPOSOUT, which is routed to and used by the Print Control CCA to monitor the location of the print head with respect to HOME position.

- CARSENCUR, an output control signal sent to the optical coupler, controls the supply voltage to the optical coupler.

- HOME POSITION is monitored by comparator U3. Input is from an optical coupler located on the left side of the printer assembly. The optical coupler also sends a voltage level signal to the inverting input (pin 6) of U3, which compares it to a reference Voltage at the noninverting input (pin 5) of U3. This comparison generates $\overline{\text{HOME}}$ which is routed to and used by the Print Control CCA to indicate when the print head is at the leftmost (HOME) position.

- HMSENCUR, an output control signal sent to the optical coupler, controls the voltage to the optical coupler.

3-8. DOT MATRIX PRINTER ASSEMBLY

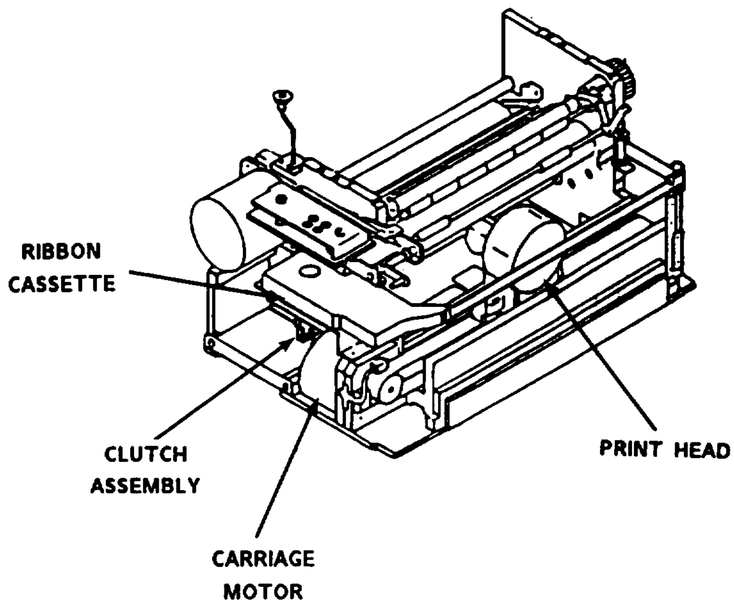


Figure 3-24. DOT MATRIX PRINTER ASSEMBLY

DOT MATRIX PRINTER ASSEMBLY -

Major electrical and electronic components:

- Print head.
- Carriage motor/ribbon drive mechanism.

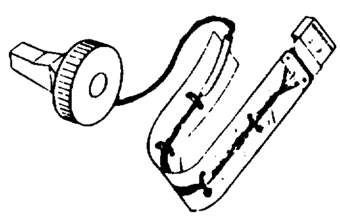


Figure 3-25. DOT MATRIX PRINT HEAD

DOT MATRIX PRINT HEAD -

- An impact matrix print head of the ballistic type.
- Mounted on bracket which sits on ball bearing glide.
- Lateral movement obtained from carriage motor and belt drive assembly.
- Position along guide rail assembly monitored by pulses generated by optical coupler mounted on carriage motor.
- Dots are fired from signals received from print drive circuit card.

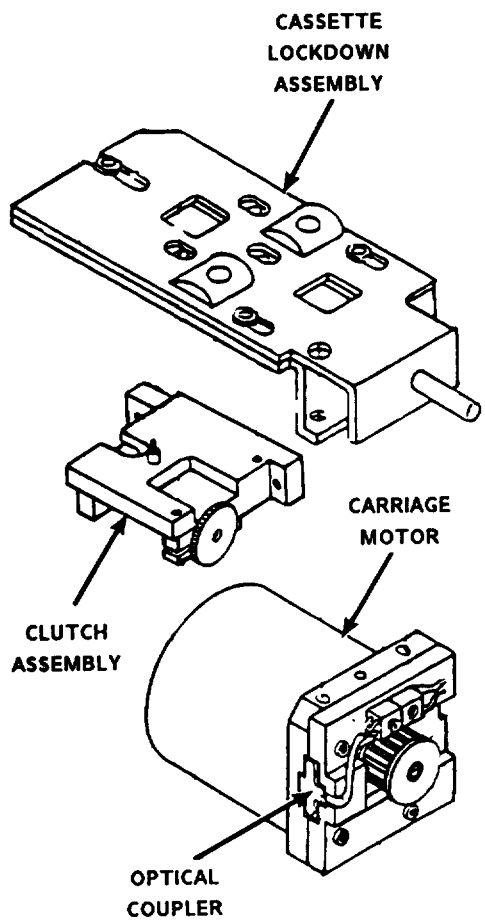


Figure 3-26. CARRIAGE MOTOR/RIBBON DRIVE MECHANISM

CARRIAGE MOTOR/RIBBON DRIVE MECHANISM

- Moves both the print head along carriage assembly, and ribbon cassette.
- Ribbon cassette mounted on cassette lockdown assembly.
- Cassette lockdown assembly located on left side of dot matrix printer assembly just above clutch assembly.
- Clutch assembly driven by gears mounted on back of carriage motor.
- Although carriage motor moves in both directions, clutch assembly allows ribbon to move in only one direction.

3-9. DUST COVER ASSEMBLY

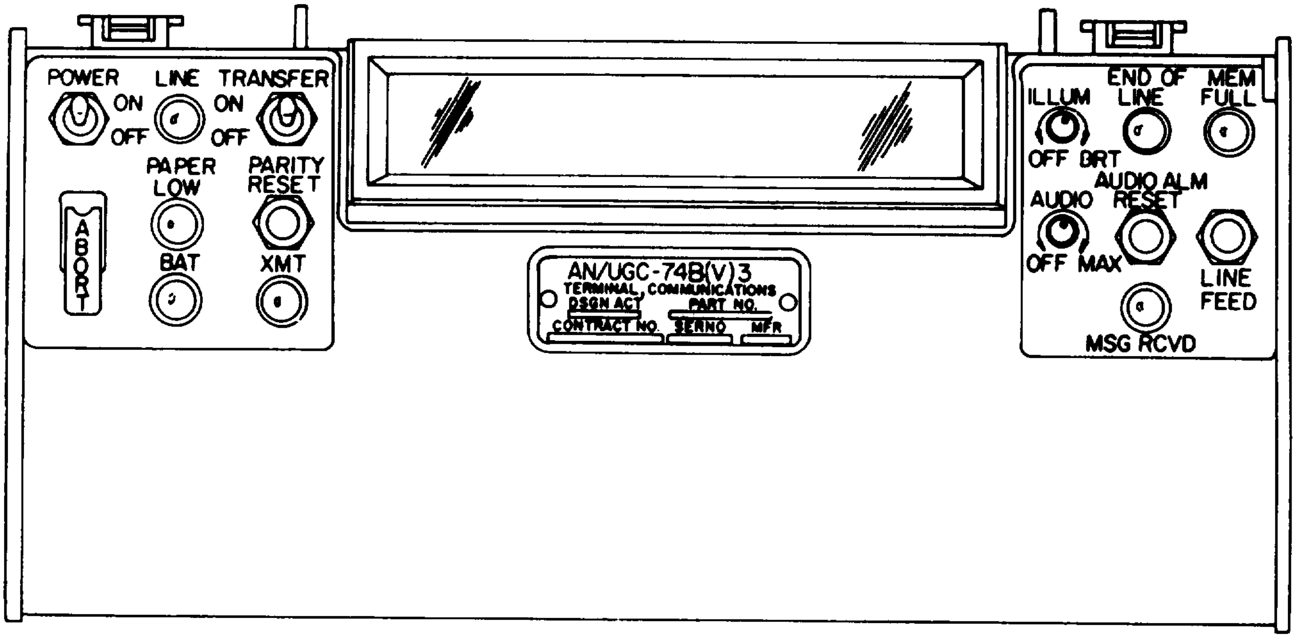
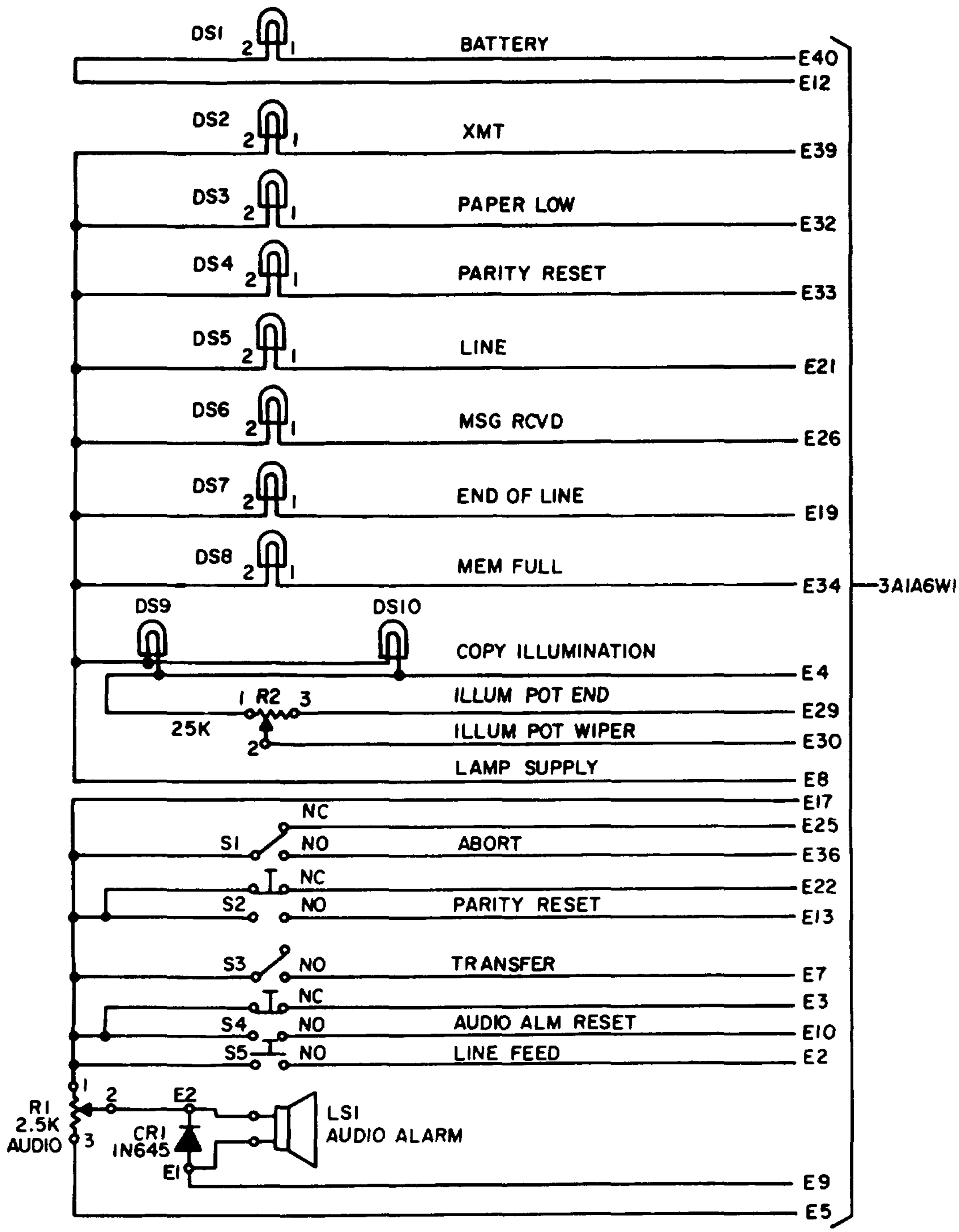


Figure 3-27. DUST COVER ASSEMBLY

DUST COVER ASSEMBLY –

- Contains controls and indicators for operating the terminal. Front cover is shown schematically in figure 3-28 on the next page.,

- See operator's manual TM 11-5815-602-10-1 for description and use of the operating controls.



NOTE 1. ALL CAPACITORS .001µF
2. ALL RESISTOR VALUES IN OHMS

Figure 3-28. DUST COVER WIRING SCHEMATIC DIAGRAM

3-10. INTERFACE ASSEMBLY

- Contains circuitry necessary for interfacing of external data and power lines with internal system electronics.
- Also contains internal operating switches.

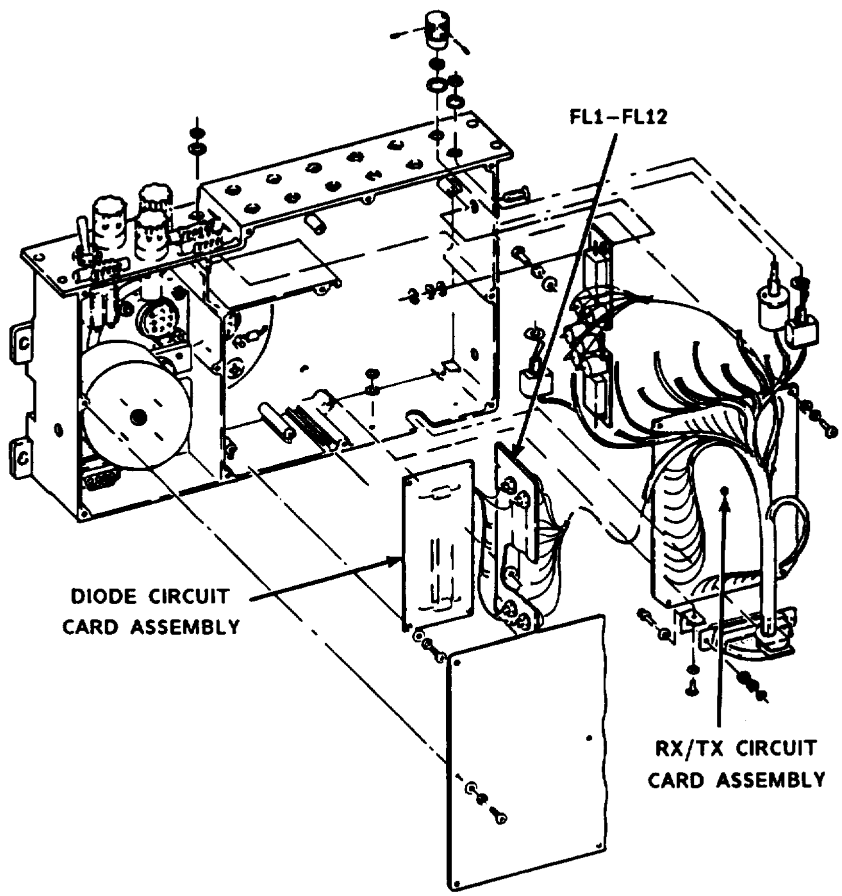


Figure 3-29. INTERFACE ASSEMBLY

POWER INTERFACE –

- Prime power, ac or dc, enters unit through connector J2 located on rear of the interface assembly.
- Fuses F1 and F2 provide protection against drawing excessive current, and are of different values depending upon input power source:
  AC input - fuse size is 2 amperes.
  DC input - fuse size is 10 amperes.
- Backup power, which enters through J3 located on the rear of assembly, is fused by F3 at 2 amperes.
- Switch S1 routes input voltage (except backup) to J2 where strapping in mating connector routes voltages to appropriate pins for application to filter assembly.
- Backup power is routed directly from S1 to filter assembly.

RECEIVE DATA INTERFACE -

- Two types of input data to terminal may be used:
  Neutral current loop of 60 or 20 mA with maximum voltage of 130 Vdc, or
  Standard low level, either inverted or non-inverted data.

- Operator selects appropriate mode by setting REC MODE switch S11 to desired position.

- Protection of input circuitry is provided by resistors R1, R2, R3, and R4 on TB1.

- Receive data is converted to TTL level on RX/TX circuit card.

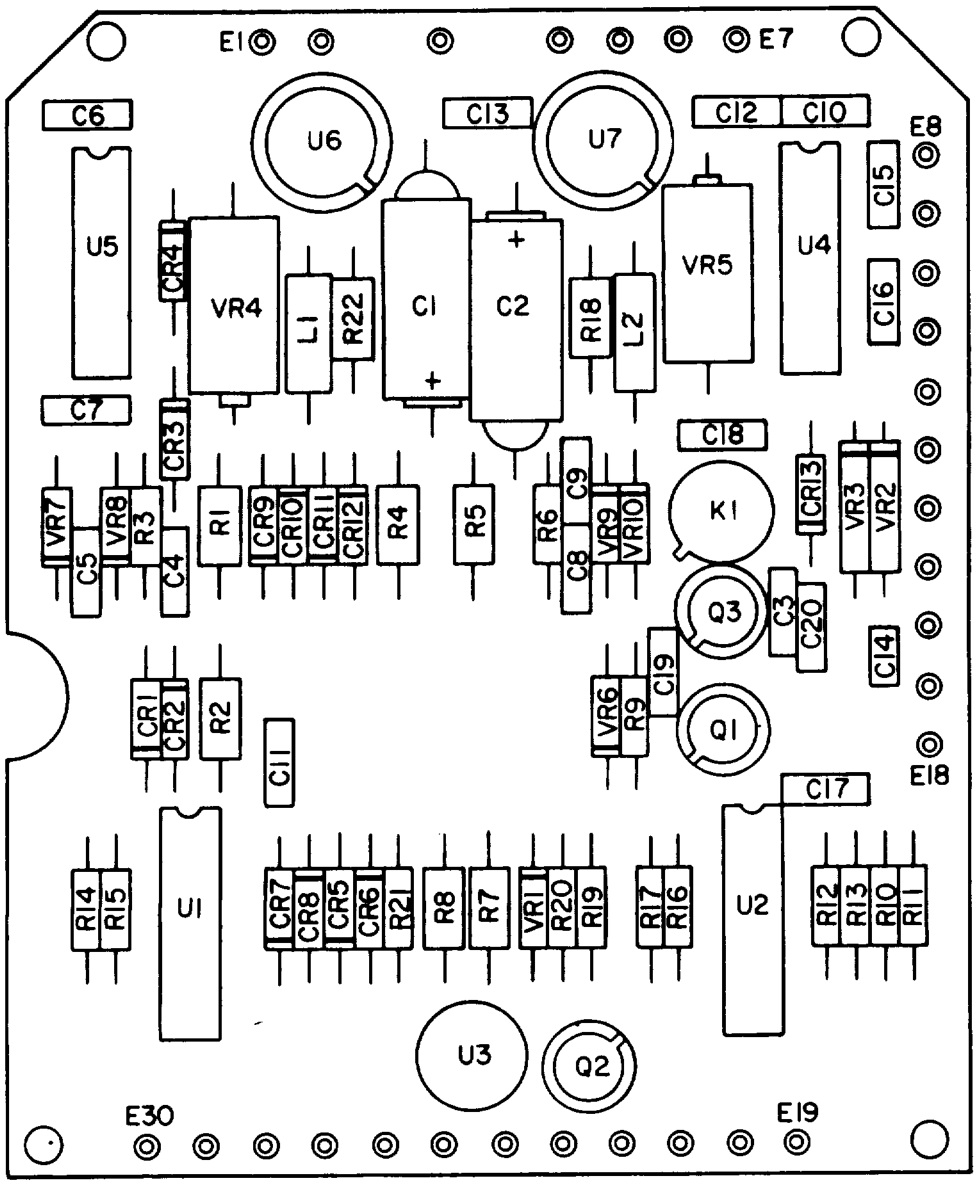
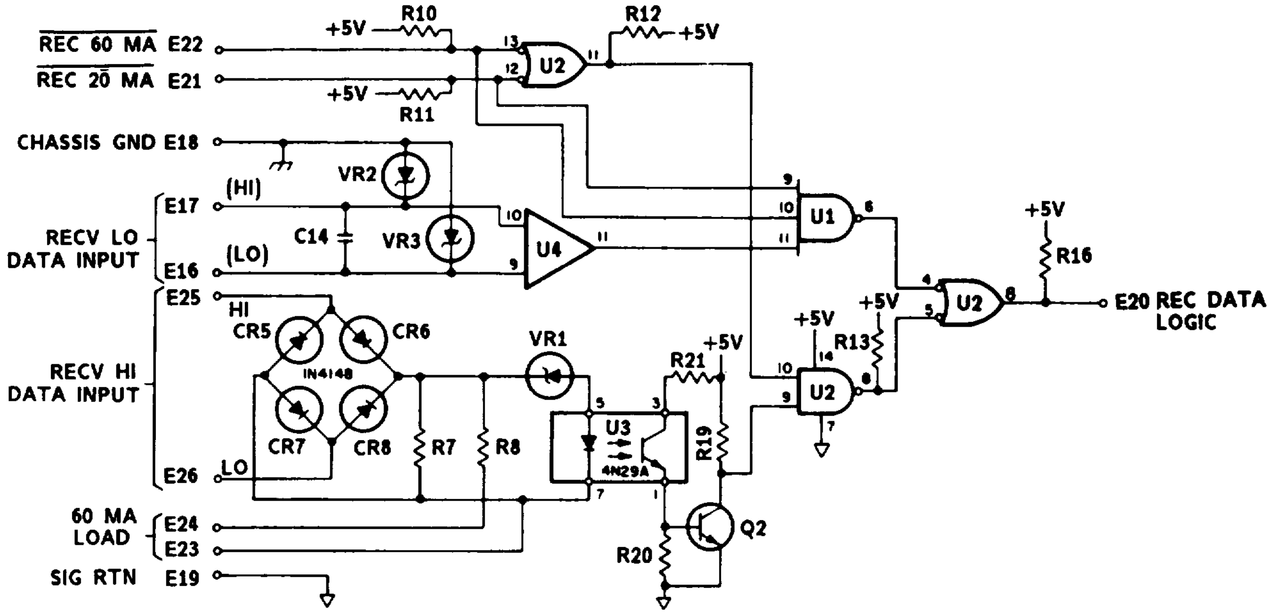


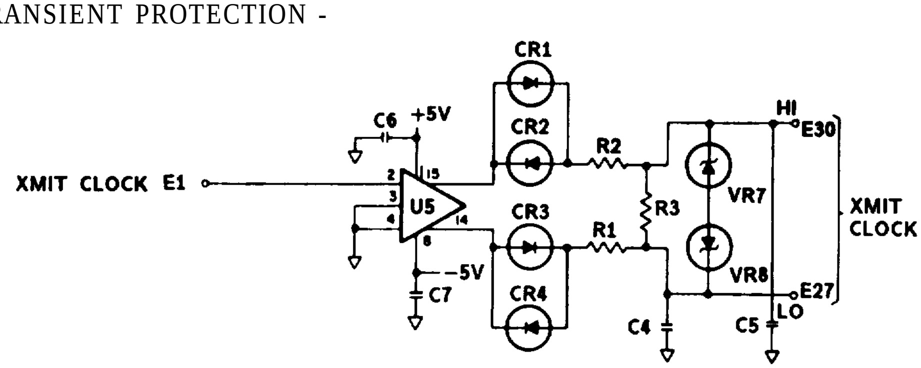
Figure 3-30. RX/TX CIRCUIT CARD ASSEMBLY

RECEIVE DATA LOGIC -



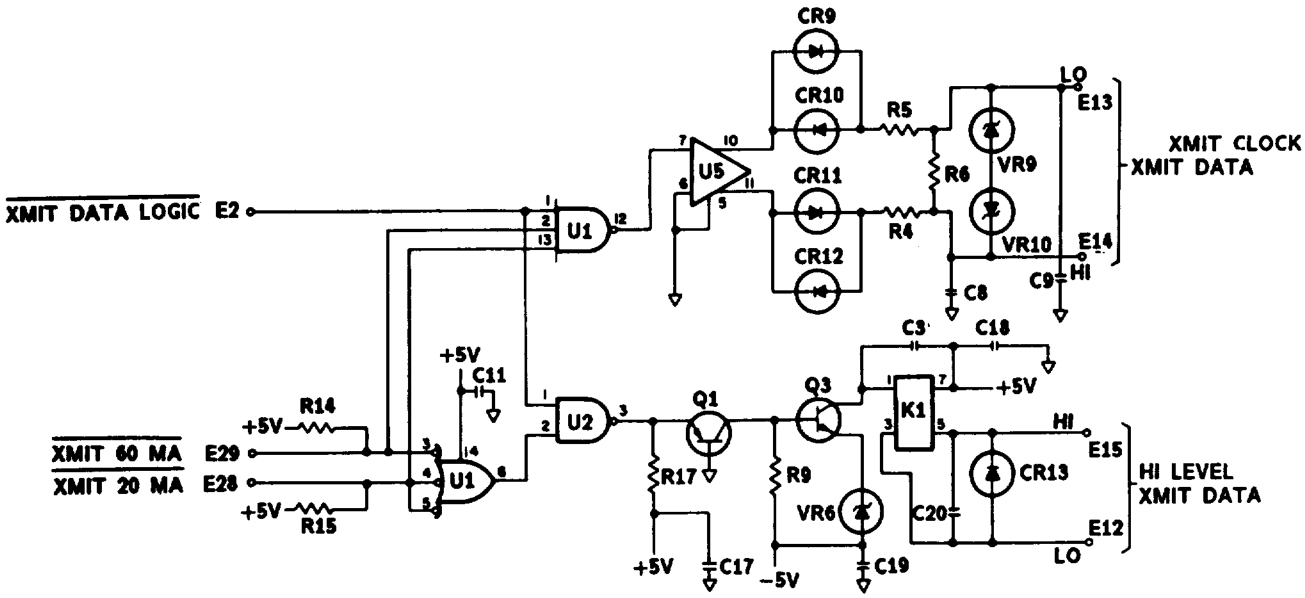
• Gate U2 is enabled when either 60 or 20 mA inputs are low. REC MODE switch provides this condition when 60 or 20 mA modes are selected. If standard low level signal modes are selected, input to U2 pins 12 and 13 are a logic 1. Input data is fed directly to U4 pins 9 and 10. Output of U4 is fed to U1 pin 11 which is enabled by a logic 1 on U1 pins 9 and 10. Output of U1 pin 8 drives U2 pin 4. Since U2 pin 5 is a constant logic 1, the gate U2 is enabled to pass data at U2 pin 4 at TTL levels. When REC MODE switch is in 20 mA, 60 mA, or 49 V position, U2 pin 11 is a logic 1. Switch also routes, data directly to a diode bridge. Bridge steers nonpolarized input current through sensing resistor R7 in 60 mA mode. Lower combined resistance allows greater current flow through R7 and R8 combination without increasing voltage across them. When VR1 fires, current flows through optical coupler U3, which inputs data to U2 pin 9. Since U2 pin 10 is a logic 1, data flows from U2 pin 8 to U2 pin 5 and is output from U2 pin 6.

TRANSIENT PROTECTION -



• Within interface assembly is an EMI enclosure containing a diode circuit card assembly and filters. These diodes provide transient suppression and reduce conducted interference on data lines.

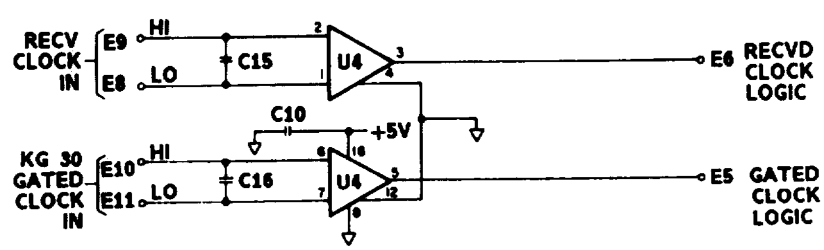
TRANSMIT DATA INTERFACE -



- Transmit interface circuitry functions similarly to receive except for the translation levels.

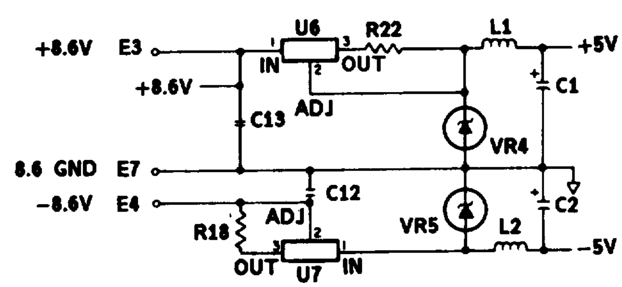
- TTL data is applied to U1 pin 1, which in turn inputs to dual line driver U5 which converts TTL data for transmission to a balanced MIL-STD-188-144 signal line. When XMIT MODE switch is in 20 mA, 60 mA, or 70 µA position, U1 pin 6 is a logic 1. U2 pin 3 is enabled to allow transmitted data to modulate at the HI level dc source. Modulation is accomplished by switching Q3 on and off, which in turn causes contacts of K1 to open and current path to close.

CLOCK INTERFACES -

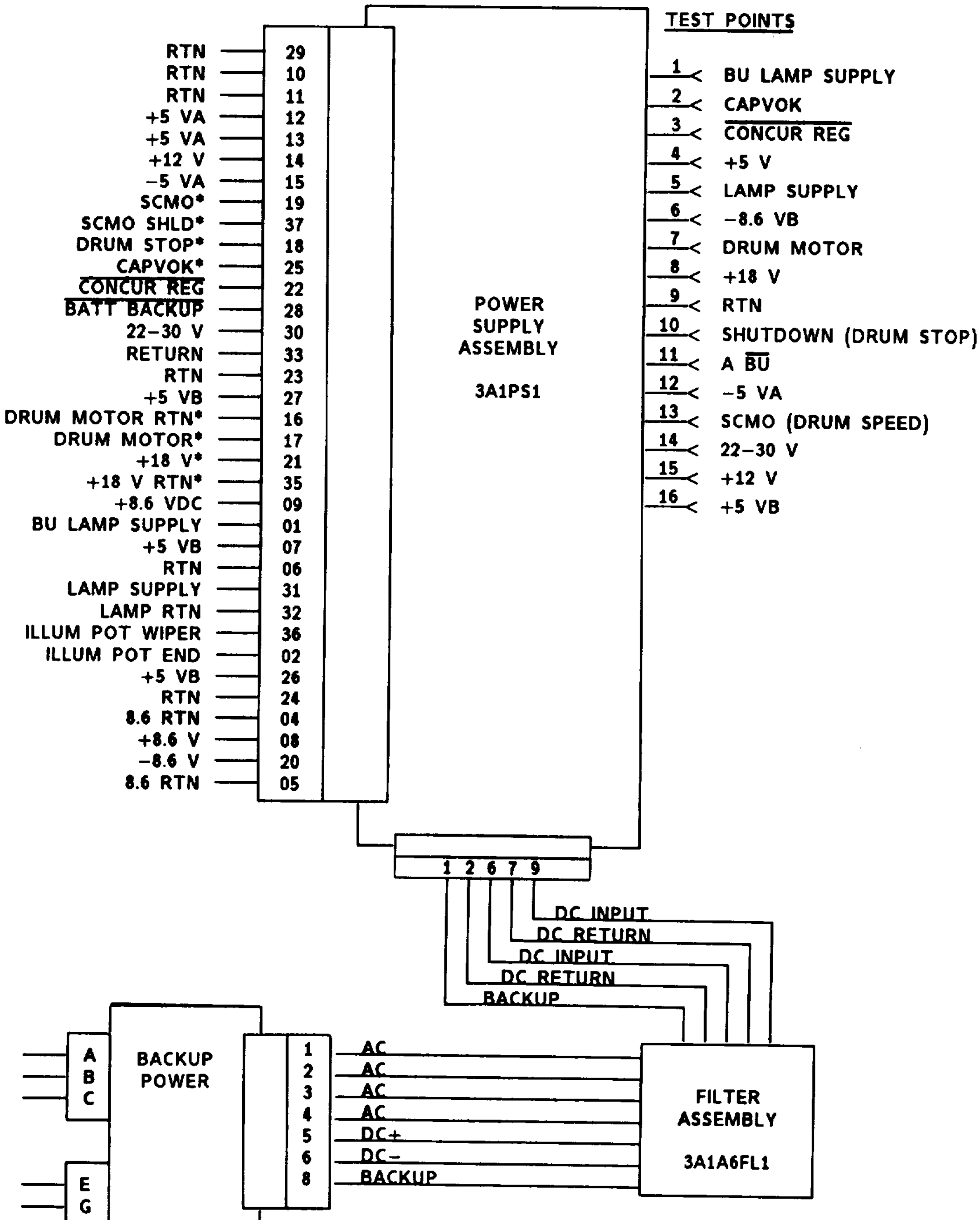


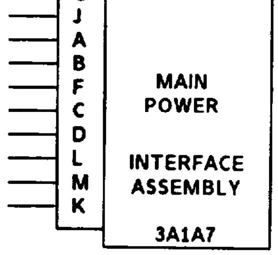
- Clock interfaces are performed by receivers and drivers as applicable.

POWER SUPPLY INTERFACE -



- Input power from power supply to RX/TX circuit card is ±8.6 Vdc. Both voltages are regulated to provide +5 Vdc and -5 Vdc for transmit and receive circuitry.





* MODEL A ONLY information

Some circuitry exists on the power supply circuit card which is only used on Model A. Both inputs and outputs are left open. This circuitry does have power applied and is both active and passive. Functional descriptions and logic diagrams are left in this manual since the circuitry is present.

Figure 3-31. POWER SUPPLY DIAGRAM

3-11. POWER SUPPLY ASSEMBLY (3A1PS1)

Power supply assembly for terminal is a circuit card assembly located on bottom of chassis below paper roll.

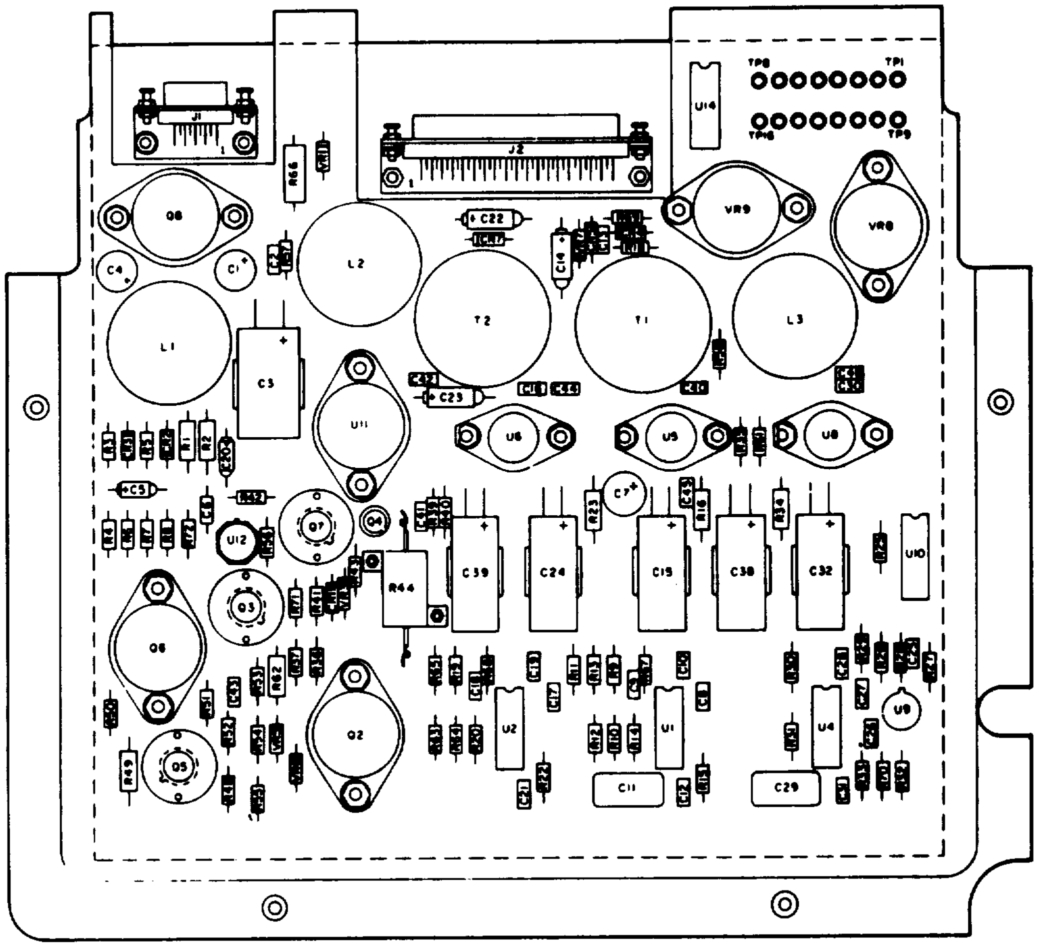


Figure 3-32. POWER SUPPLY ASSEMBLY

POWER SUPPLY ASSEMBLY -

See figure 3-31 for input and output pins and test points of power supply assembly.

- Power supply is described in terms of:
  - ❑ Input circuitry.
  - ❑ Microprocessor supply.
  - ❑ +5, ±8.6 Vdc circuitry.

<u>MODEL A ONLY</u>

- ❑ Drum motor supply.

- ❑ +18 Vdc constant current supply.

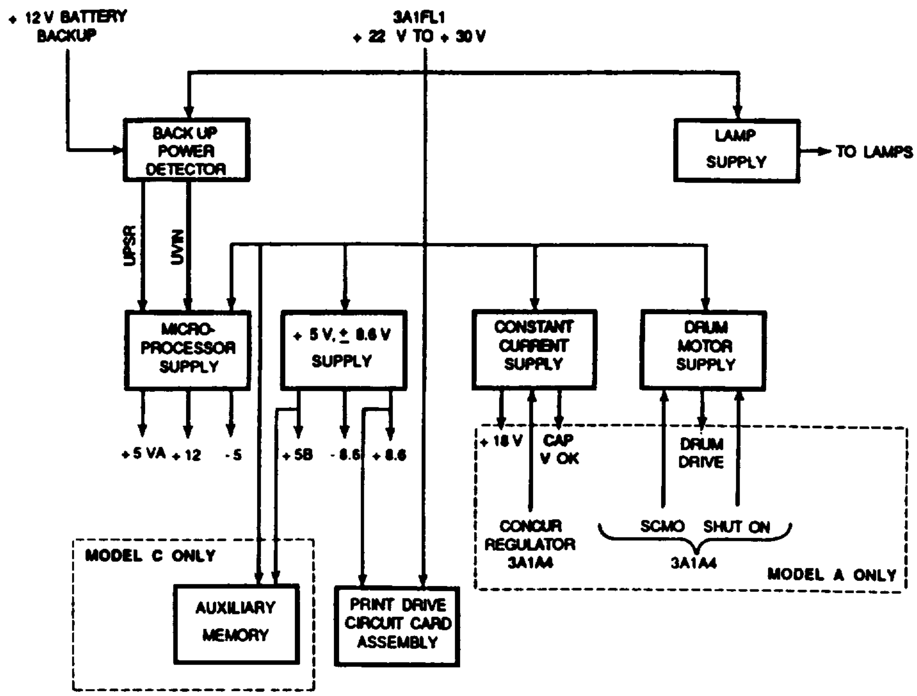


Figure 3-33. POWER SUPPLY BLOCK DIAGRAM

POWER SUPPLY INPUT CIRCUITRY (See figure FO-3.) -

Either ac or dc input power may be applied to the power supply input circuit. Input power connector A7J2 is wired with pins M and K used for either ac or dc input. Prime power is switched through S1 on interface assembly (3A1A7) and routed back to A7J2 connector. If connector is wired for 115 Vac power, pins B, D and L are strapped together. Pins A, C, and J are also strapped together. Strapping ties input power to the appropriate windings of input transformer (part of 3A1A6FL1). If other than 115 Vac power is supplied, strapping is as shown.

- Rectifier circuit (part of 3A1A6FL1) is a conventional full wave rectifier filtered to produce a +22 to +30 Vdc output. This voltage is used as primary source for all power supply circuits.
- Backup power indicator drive U12 is a comparator which drives a lamp driver on 3A1A1 to illuminate backup lamp on dust cover whenever +22 to +30 Vdc output of supply drops more than 0.4 volts below backup power voltage.
- Backup power cable supplies +12 Vdc backup power via connector 3A1A7J3. When prime power is lost, power supply automatically enables +12 Vdc battery power to microprocessor and memory. Positive side of this dc source is routed through third section of 3A1A7S1, fuse 3A1A7F3 to connector 3A1A7J4 pin 8. Negative side routed to connector 3A1A7J4 pin 6. Chassis return routed through pin C of connector 3AIA7J3.
- Backup input voltage is diode ORed with unregulated +22 to +30 volts dc to provide power input to microprocessor switching regulator.
- Voltage limiting is provided to ±5V, ±8. 6V and motor control circuit controllers U2 and U4 by limiting resistor R1.

MICROPROCESSOR SUPPLY (See figure FO-4.) -

Microprocessor supply section of power supply (3A1PS1) provides ±5 Vdc and +12 Vdc for Universal CPU circuit card (3A1A1). Supply is regulated to ±5 by a constant frequency pulse width modulated switching regulator. Regulator U1 samples output voltage of supply and compares it against a reference voltage. Depending on results of that comparison, pass circuit U5 turn-on duty cycle is increased or decreased.

- Reference voltage is a function of regulator U1. Resistors R11, R12, and R13 form voltage divider producing a 2.5 Vdc reference voltage for comparator (part of U1). Precise value of voltage is determined by selection of R11.

- Comparison voltage is fed back to comparator through voltage divider R9 and R10. If output at J2 pin 13 is less than 5.0 Vdc, comparison voltage is lowered below reference voltage, causing U5 to be commanded on. When U5 turns on, +22 to +30 Vdc is applied to capacitors C15 and C38 through transformer T1. As C15 and C38 charge, comparison voltage rises causing U5 to go to the off state.

- Sampling of comparison voltage is at a rate of approximately 25 KHz as determined by R14 and C11.

- Pulse width modulation applied to primary of T1 causes a voltage to be induced in the secondary which is used to develop +12 Vdc and -5 Vdc supply voltages. Diode VR7, a 5.1 Vdc ±5% zener, sets –5 Vdc supply voltage. The +12 Vdc supply output voltage is determined by the turns ratio and drive through T1 primary.

- A 25 KHz synchronization output for +5, ±8.6 Vdc switching regulator is generated by U1 pin 3, and U1 pin 7.

THE +5, ±8.6 Vdc VOLTAGE REGULATOR (See figure FO-5.) -

The +5, ±8. 6 Vdc voltage regulator supplies regulated power to keyboard, dust cover assembly, interface assembly, and logic circuit card assembly. Interface assembly 3A1A7 utilizes ±8. 6 Vdc exclusively. This circuit functions in a manner similar to the microprocessor regulator with the exception of output and oscillator. U2 pins 3 and 7 are controlled by microprocessor oscillator.

- Output of switching regulator pass circuitry U6 is +8.6 V applied to voltage divider R19 and R20 to produce a 2.5 nominal comparison voltage. Reference voltage is generated by R63, R64, and R65. Resistor R63 selected to provide +8.6 Vdc ±0.01 V at J2 pin 8. Component U11 is a series regulator which reduces +8.6 V to +5 Vdc ±.25 V at J2 pin 7 under normal load of 1.6 A. Diode VR9 protects load circuitry in case of U11 failure.

- Transformer T2 has a 1:1 turns ration. Diode CR7 and capacitor C22 produce a -8.6 Vdc output.

MODEL A ONLY

DRUM MOTOR CONTROL (See figure FO-6.) -

Motor control circuit provides speed and on/off control for dc motor used to drive print drum and ribbon mechanism of printer. Operation of circuit is controlled by main clock pulses developed by a timing mechanism monitoring print drum rotation. Motor control circuit operates as follows:

- Positive main clock pulses, supplied through pin 19 of connector 3A1PS1J2 are applied to U10 pin 3. Resistor R25 assures a level shift from TTL logic high voltages to +5 Vdc, supplied by pulse width controller reference U4 pin 16. Buffer U10 switches between this reference and ground. At U10 pin 4 the output is in phase with precision 518.4 µsecond speed control motor output (SCMO) pulse. This input occurs 64 times for each full drum revolution.

- DC voltage of signal at U10 pin 4 is proportional to this drum rate, filtered by R26 and C26 and buffered by voltage follower U9. Output of U9 pin 6 drives regulator controlled error amplifier which compares this voltage to a reference generated by U4 pin 16 output and resistor dividers R27, R28, and R29. Select resistor R29 trims this comparison voltage to cancel initial component errors and provide a motor speed range of approximately ±7.5% with respect to nominal pulse repetition period of 1080 µseconds.

- Motor control circuit operates at a nominal frequency of 20 KHz. Timing components C29 and R31 control this frequency. Remainder of motor control circuit functions similar to +5, ±8.6 V switching regulator except the output which drives print motor at a voltage required to maintain speed, approximately 9 Vdc ±2 V. Current sensing resistors R35 and R61 limit motor current to 4 A ±0.32 A.

- A shut down signal under microprocessor control at pin 18 of connector 3A1PS1J2 drives U4 pin 10 to turn motor off and minimize power dissipation during periods when printing is not active.

THE +18 Vdc CONSTANT CURRENT REGULATOR (See figure FO-7.)

Constant current regulator maintains printer under constant load condition to mask printing intelligence during periods of message traffic and minimizes power consumption when printer is in standby condition. Operation of circuit is controlled by printer logic. Voltage and current sources of this regulator maintains stored energy of capacitor C1 in printer subassembly chassis. Capacitor C1 reduces surges caused by printer hammer operation. Circuit operation is as follows:

- When printer is placed into operation by incoming traffic, logic control circuit supplies a logical 0 input through pin 22 of connector 3A1PS1J2 to base of transistor Q4. Transistors Q4 and Q7 are then turned on and bias diodes VR3 and CR11 to provide a 5 Vdc source across R71 and R41. Select resistors set current driver Q2 and Q3 to regulate current 1.0 A ±0.06 A.

MODEL A ONLY

THE +18 Vdc CONSTANT CURRENT REGULATOR - Continued

- Regulated current output restores loss of charge caused by hammer operation. When Cl is fully charged to +18 Vdc nominal, transistor Q5 becomes forward biased into conduction and permits transistor Q6 to also conduct. As a result, output current is shunted to ground. For output voltages below 18.1 volts, transistors Q5 and Q6 are maintained in the off condition.

- Output voltage is monitored by comparator circuit U12. Comparator outputs a print inhibit signal through pin 25 of connector 3A1PS1J2. This print inhibit signal is sent to print control 3A1A4 when print voltage drops below 16.2 Vdc nominal. If peak print rate exceeds approximately 160 characters per second, inhibit signal will be generated.

- When printing function is inactive (i. e., between messages), constant current regulator is turned off to minimize power usage by a logic 1 at pin 22 of connector 3A1PS1J2. Print voltage turn-on time delay is minimized by maintaining charge on print capacitor while in inactive state. Charge is maintained through resistor R62, which supplies current in excess of leakage and bias currents that would otherwise discharge the stored 18 Vdc.

3-12. FILTER ASSEMBLY

Filter assembly for terminal includes a power transformer, RFI filter, full wave rectifier and filter. Figure FO-3 shows filter assembly functioning as part of the power supply input.

FILTER NETWORK -

- Diodes VR1 and VR2 limit electromagnetic pulse (EMP) transients being transmitted to printer through input power cable. Filter includes RFI filters C1 through C4. Output of filter is applied across full wave rectifier CR1. It is then filtered by L1, L2, C5-C7 to supply +22 to +30 Vdc to power supply assembly through connector 3A1PS1J1.

ADDITIONAL FILTERS -

- Additional filtering for +22 to +30 Vdc input is provided by dc filter network in regulator circuit of power supply assembly 3A1PS1. Filter circuit consists L1 and L2, and Cl through C4 of this assembly.

DISTRIBUTION -

- After filtering, unregulated +22 to +30 Vdc is distributed in power supply to +5, ±8. 6 Vdc switching regulator circuit, microprocessor regulator circuit, constant current regulator circuit, and motor control circuit. Additional routing is through J2-30 to line-feed stepping motor and the lamps. Backup lamp supply voltage, the +22 to +30 Vdc ORed with backup +12 Vdc, is routed to BAT lamp through connector pin J2 pin 1.

3-13. PRINTER ASSEMBLY, MECHANICAL FUNCTIONS

Shown below is an exploded view of the printer assembly showing major mechanical assemblies. Printer assembly is a removable module containing the majority of mechanical operating functions, and consists of the following systems:

PAPER FEED SYSTEM
LINE-FEED SYSTEM
DOT MATRIX PRINTER SYSTEM

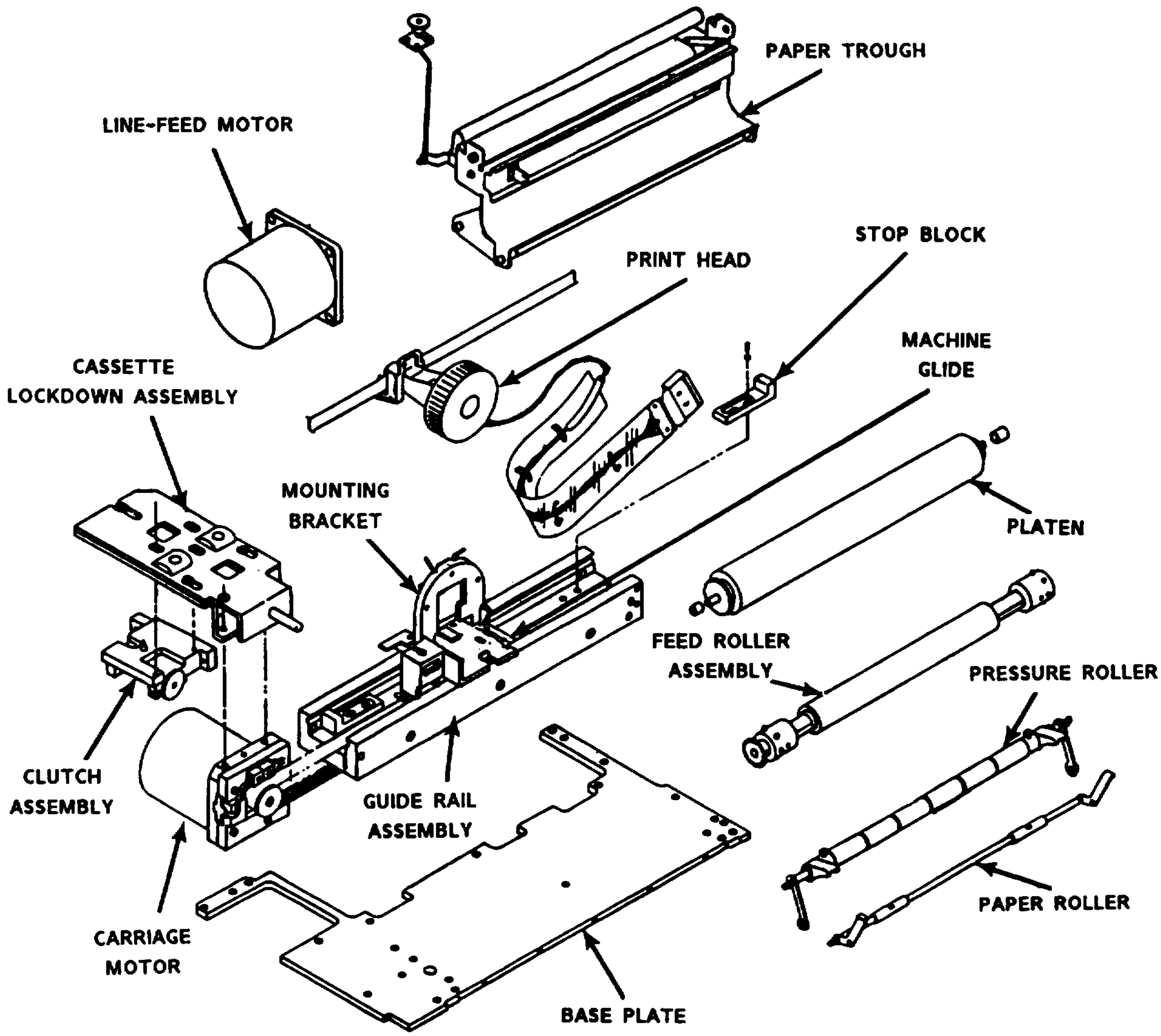
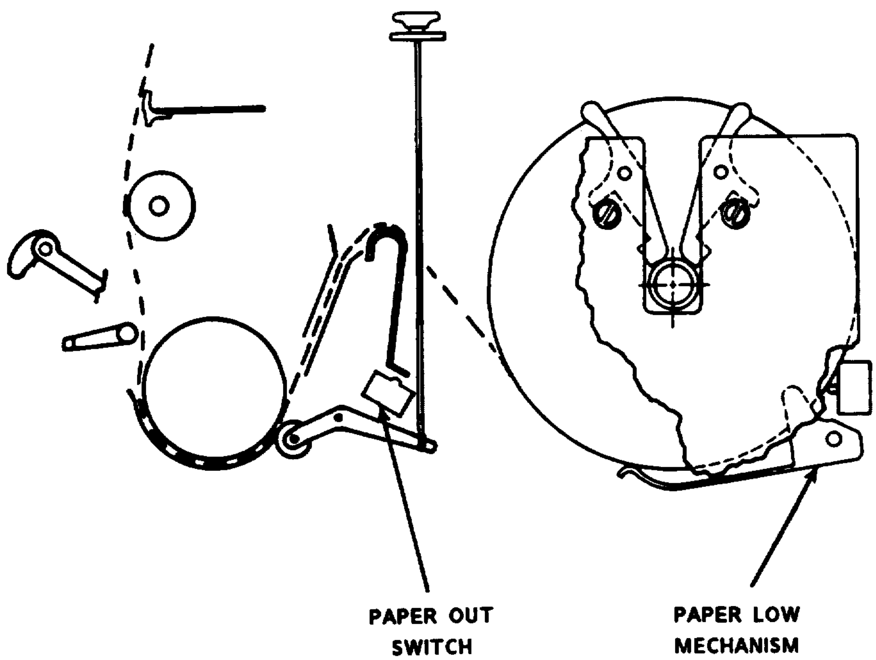


Figure 3-34. PRINTER ASSEMBLY MECHANICAL ASSEMBLIES

PAPER FEED SYSTEM -

Paper feed system of the printer handles both single and multi-part roll paper. System guides paper from paper roll through printing area and out the printer front cover. System includes a PAPER LOW and a PAPER OUT sensing mechanism.



PAPER LOW MECHANISM -

- Consists of a spring-loaded extension arm and a switch. Extension arm rides outer circumference of paper roll. When paper roll diameter decreases to the point where printer is almost out of paper, the lever operates switch and PAPER LOW lamp lights. It does not stop printer.

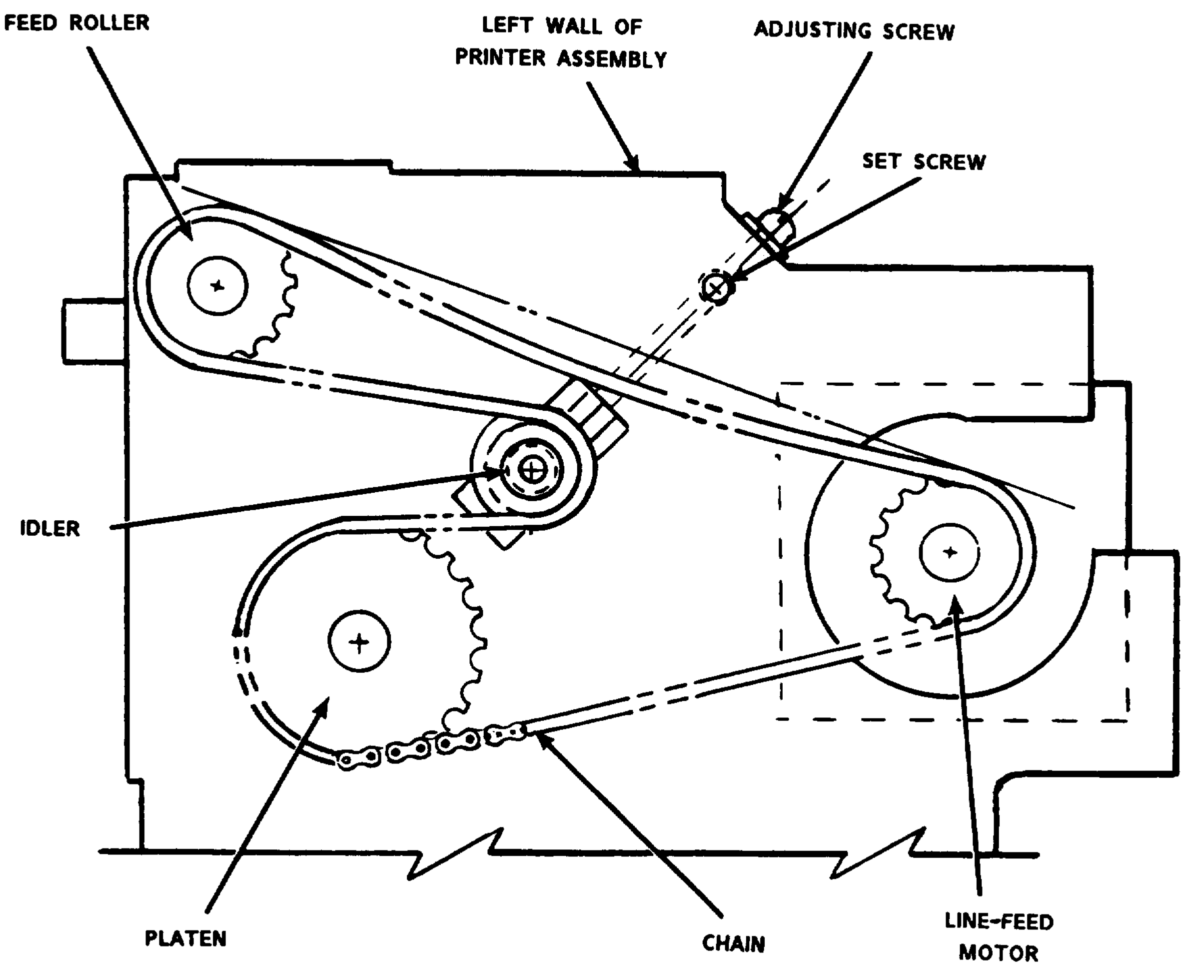
PAPER OUT MECHANISM -

- Consists of a lever operated switch. Roll paper is secured to paper roll. When paper supply is nearly depleted, paper is drawn tight, causing lever to be pressed. Lever operates switch and generates a signal which stops the printing.

See TM 11-5815-602-10-1 for operating instructions and paper loading instructions. In addition, see Chapter 4 in this manual for fanfold paper installation.

LINE-FEED SYSTEM

Line-feed mechanism is used to advance paper one or two line spaces as determined by line-feed subcommand. Continuous paper feed is controlled by manually pressing LINE-FEED pushbutton on front panel.



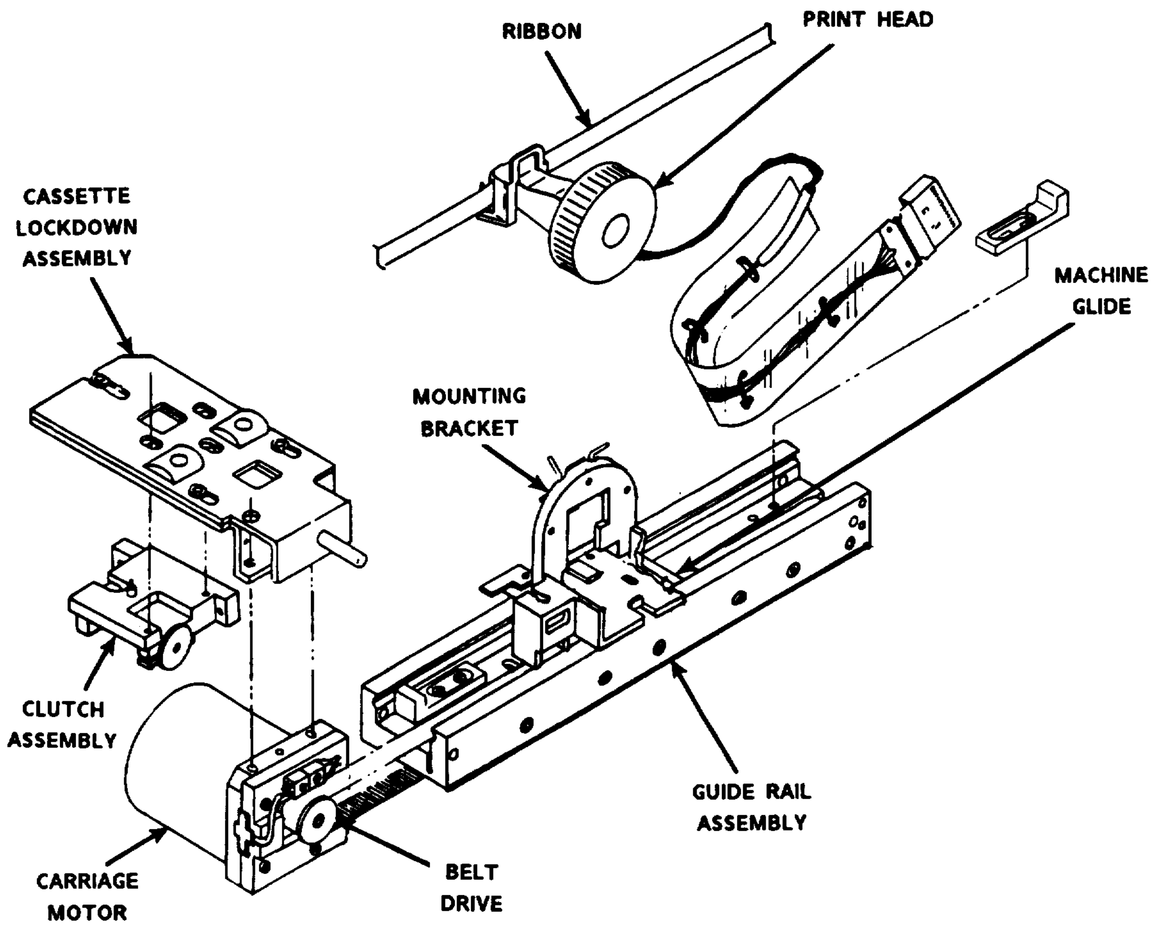
ELECTRONIC LINE-FEED CONTROL -

- **When line-feed code is received by printer, or when line-feed pushbutton on dust cover is pressed, line-feed stepping 'motor is energized. Paper is advanced by a sprocket on the motor shaft driving a chain on the feed roller, platen, and idler sprocket.**

- **Feed roller is equipped with two paper sprockets, one on each side of printer assembly. These sprockets are used to advance fanfold paper. Pressure roller moves paper when roll paper is used.**

DOT MATRIX PRINTER SYSTEM

- Major mechanical parts used in dot matrix printer are:
  - Carriage Motor and Belt Drive Assembly
  - Print Head and Mounting Bracket
  - Machine Glide and Guide Rail Assembly
  - Ribbon Drive Mechanism



- Carriage motor moves belt drive around guide rail assembly.
- Machine glide, print head, and mounting bracket are attached to belt drive and slide along guide rail assembly.
- Ribbon drive mechanism is also moved by carriage motor with a clutch assembly. See paragraph 3-8 for a more detailed description.

Section III. TEST FIXTURES, ELECTRICAL AND ELECTRONIC FUNCTIONS

3-14. GENERAL

This section provides a detailed electrical and functional description of Terminal AN/UGC-74B(V)3 or AN/UGC-74C(V)3 Test Fixtures.

- **Test fixtures are used to test and troubleshoot the modules of Terminal AN/UGC-74B(V)3 or AN/UGC-74C(V)3.**

- **Procedures and information are provided below for intermediate general support maintenance personnel:**

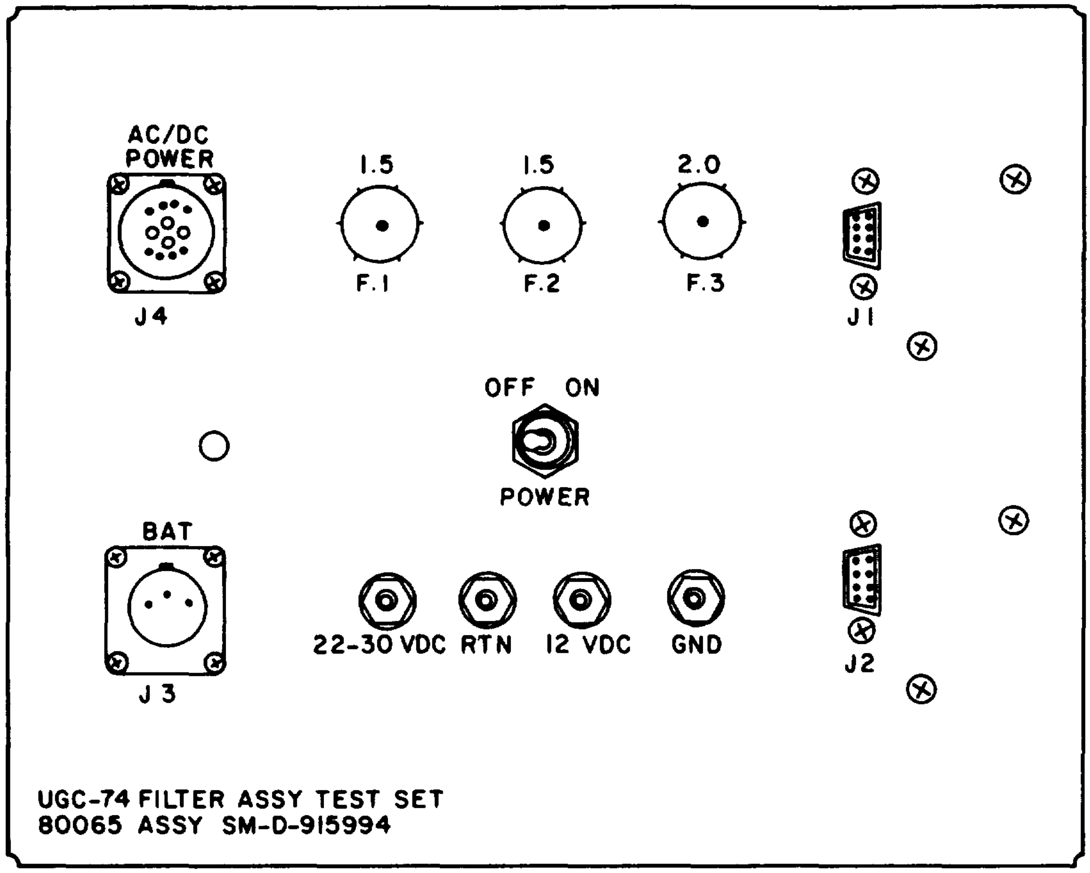
Paragraph

3-15	**Test Fixture, Filter Assembly, Honeywell SM-D-915994**
3-16	**Test Fixture, Line-Feed/Current Control Assembly, Honeywell SM-D-915988**
3-17	**Test Fixture, Power Supply, Honeywell SM-E-915979**
3-18	**Test Fixture, Interface Assembly, Honeywell SM-D-915991**
3-19	**Test Fixture, Keyswitch Assembly, Honeywell SM-D-915997**
3-20	**Test Fixture, Carriage Motor Current Control/Drive Board/Print Head, Honeywell A3042001**

- **Test Fixtures Support Equipment:**

  Power Cable, 230 Vac, SM-D-764482
  Power Cable, 120 Vac, SM-D-764481
  Power Cable, 26 Vdc, SM-D-764480
  Data Cable, SM-D-915889

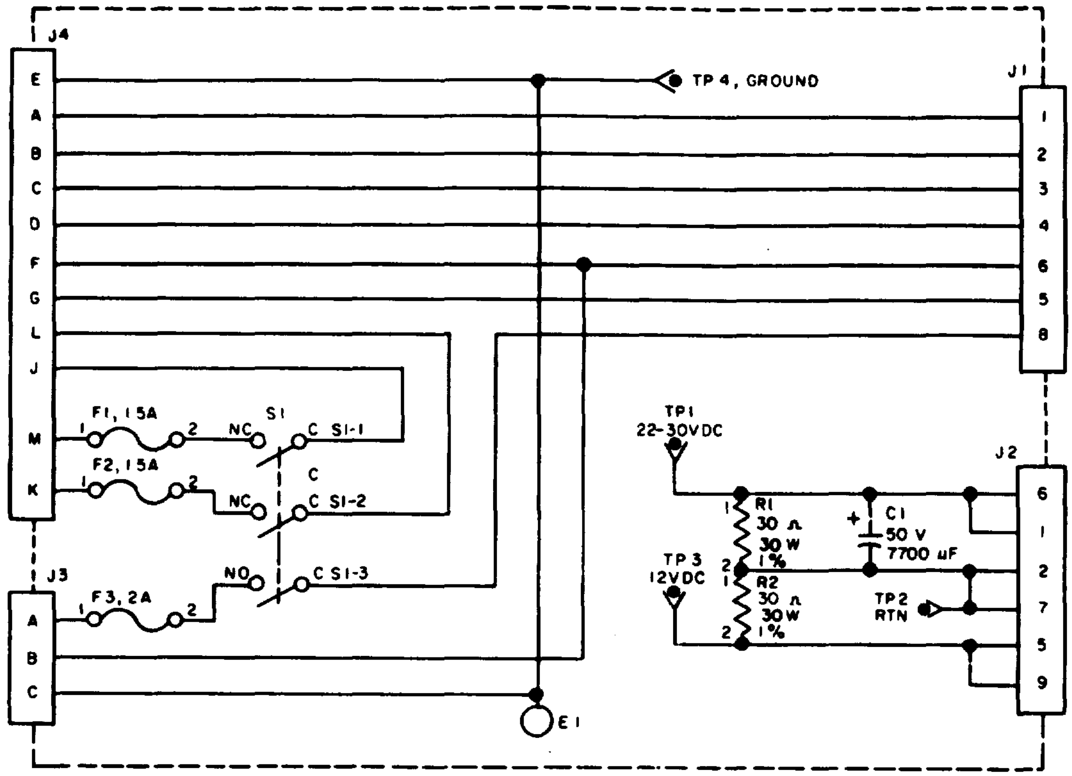
3-15. FILTER ASSEMBLY TEST FIXTURE



FILTER ASSEMBLY TEST FIXTURE -

- Provides electrical interconnections between input power cables and filter assembly.
- Provides output teat points for monitoring of output voltage.
- Consists of chassis, four connectors, three fuses, three test points, and one switch.
- Test fixture is passive device requiring no power for operation.
- Input power supplied through connectors J3 and J4 is used by module under test.
- POWER switch S1 controls electrical connections between module under test and input power.
- Fuses F1 and F2 (2 A) are provided to protect module from serious damage in case of a failure. Since loading is a constant 30 ohms and current does not exceed 2 ampere, the 2 ampere fuses in fixture are sufficient for ac and dc input voltages.

Referring to schematic shown below, connectors J1 and J2 interface directly with connector cables of filter module.



- J1 provides input power interfaces.

- J2 provides interfaces between filter module output and load circuitry contained in test fixture.

- Output from filter module at J2-1,6 with respect to J2-2,7 is nominally 30 Vdc.

- Output voltage is applied across C1 and R1 in fixture to produce load of 1 ampere, causing R1 to dissipate 30 watts.

  - R1 is physically mounted to chassis to dissipate heat.
  - Capacitor C1 provides filtering for filter assembly 22-30 Vdc output found in AN/UGC-74B(V)3 or AN/UGC-74C(V)3, provided by U8.
  - Voltage is monitored at TP1.

- Output from filter module at J2-5,9 with respect to J2-2,7 is dependent upon +12 Vdc being supplied from J3.

  - When applied, +12 Vdc current of 400 mA nominal flows through R2.
  - Voltage may be measured at TP3 with respect to TP2.

Table 3-3. FILTER ASSEMBLY TEST FIXTURE WIRE LIST

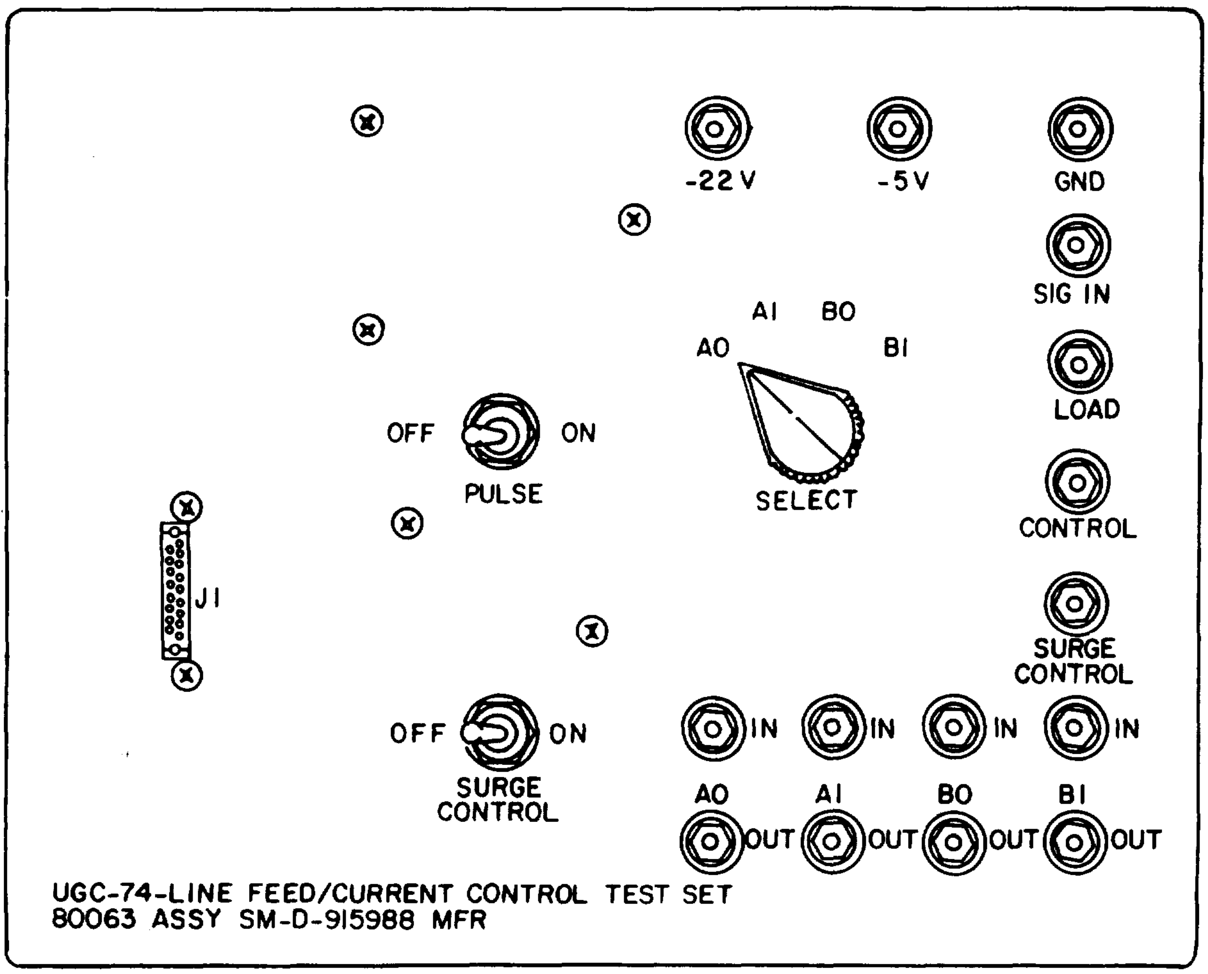
WIRE NO.	FROM	TO	REMARKS
1	J1-1	J4-A	22 Gauge Wire
2	J1-2	J4-B	22 Gauge Wire
3	J1-3	J4-C	22 Gauge Wire
4	J1-4	J4-D	22 Gauge Wire
5	J1-5	J4-G	22 Gauge Wire
6	J1-6	J3-B	22 Gauge Wire
7	J1-7*	--	Not Used
8	J1-8	S1-3C	20 Gauge Wire
9	J1-9*	--	Not Used
10	J2-1	C1(+)	22 Gauge Wire
11	J2-6	C1(+)	22 Gauge Wire
12	TP-1	C1(+)	22 Gauge Wire
13	J2-2	C1(-)	22 Gauge Wire
14	R2-1	C1(-)	22 Gauge Wire
15	TP-2	C1(-)	22 Gauge Wire
16	J2-3*	--	Not Used
17	J2-4*	--	Not Used
18	J2-8*	--	Not Used
19	J2-5	TP-3	22 Gauge Wire
20	J2-7	TP-2	22 Gauge Wire
21	J2-9	TP-3	22 Gauge Wire
22	R1-1	TP-1	22 Gauge Wire
23	R1-2	R2-1	22 Gauge Wire
24	R2-2	TP-3	22 Gauge Wire
25	XF1-2	S1-1-NC	20 Gauge Wire
26	XF2-2	S1-2-NC	20 Gauge Wire
27	XF3-2	S1-3-NO	20 Gauge Wire
28	J3-A	XF3-1	20 Gauge Wire
29	J4-L	S1-2C	20 Gauge Wire
30	J4-J	S1-1C	20 Gauge Wire
31	J4-M	XF1-1	20 Gauge Wire
32	J4-K	XF2-1	20 Gauge Wire
33	J3-B	J4-F	22 Gauge Wire

Table 3-3. FILTER ASSEMBLY TEST FIXTURE WIRE LIST - Continued

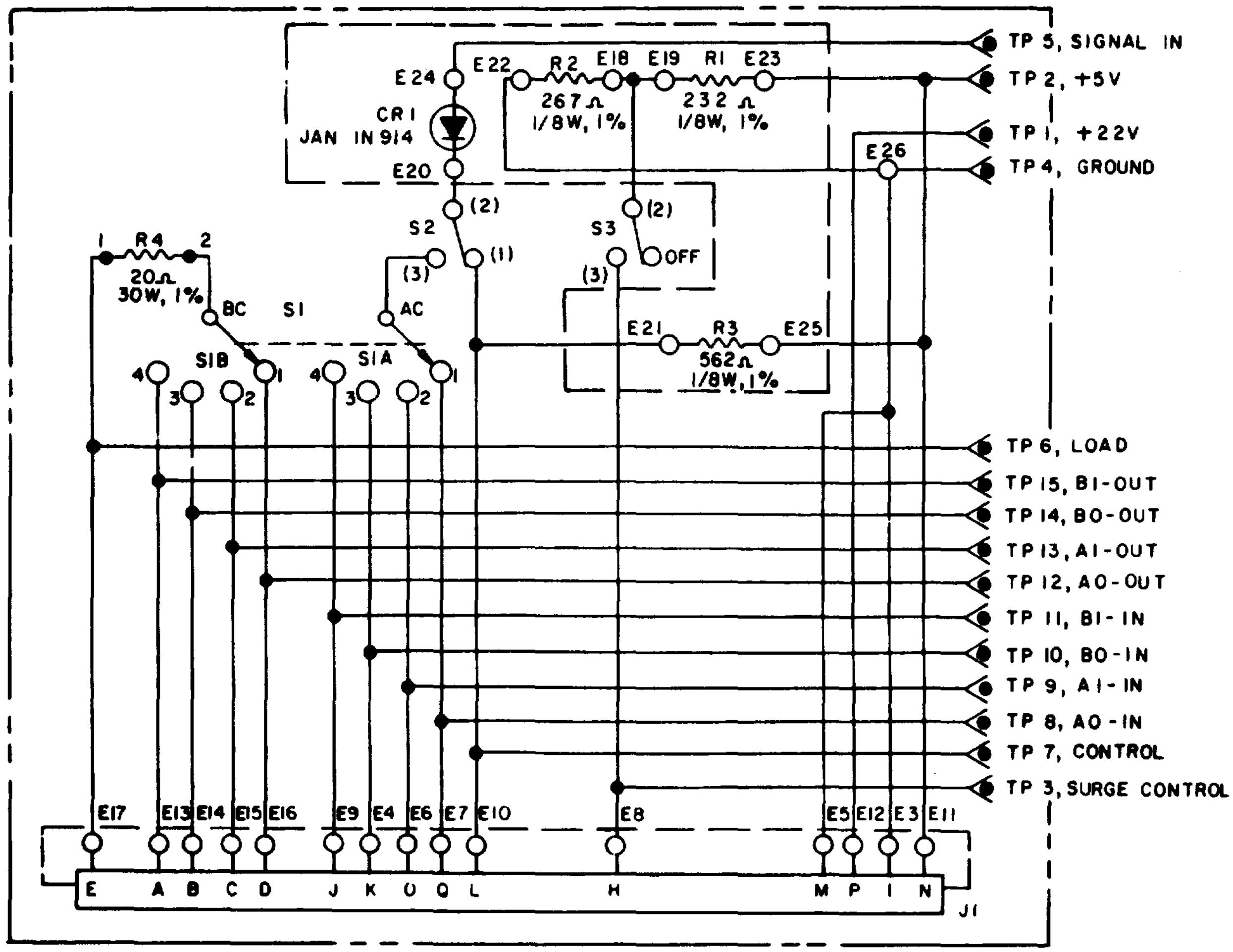
WIRE NO.	FROM	TO	REMARKS
34	J3-C	E-1	22 Gauge Wire
35	J3-D*	--	Not Used
36	J3-E*	--	Not Used
37	J4-H*	--	Not Used
38	TP-4	E-1	22 Gauge Wire
39	TP-4	J4-E	22 Gauge Wire

• No connection required.

3-16. LINE-FEED (MOTOR DRIVE) CURRENT CONTROL TEST FIXTURE



LINE-FEED (MOTOR DRIVE) CURRENT CONTROL TEST FIXTURE



- Provides power and signal interfaces for line-feed current control assembly.
- Test points provided for connecting +5 Vdc supply, +22 Vdc supply, pulse generator, and supply generator returns.
- Test points also provided for monitoring input and output signals.
- Input +22 Vdc at TP1 routed directly to line-feed/current control connector J1-P.
- +5 Vdc at TP2 used to produce an input control signal and supply +5 Vdc for module under test.
- +5 Vdc divided by R1 and R2 to produce input voltage of 2.3 Vdc at wiper of CONTROL switch S3.
- When switch is closed, voltage is applied to J1-H for actuation of module circuitry.

- Resistor R3 provides pull-up voltage for module circuitry connected to J1-L (CONTROL) when S2-3 (PULSE) is in CC position.
  - This pull-up voltage causes current control portion of module under test to be enabled continuously.
- When S2 is placed in LF position, pulse generator is connected to switching circuits of line-feed (motor drive) current control module.
- Input square wave turns gating transistors on line-feed (motor drive) current control module on and off.
- Flow of current through these transistors is monitored as voltage across resistor R4 in fixture wiper.
- SIB connects R4 to proper gating transistors.
- Diode CR1 provides +5 Vdc isolation for oscillator when S1 is in OFF position.

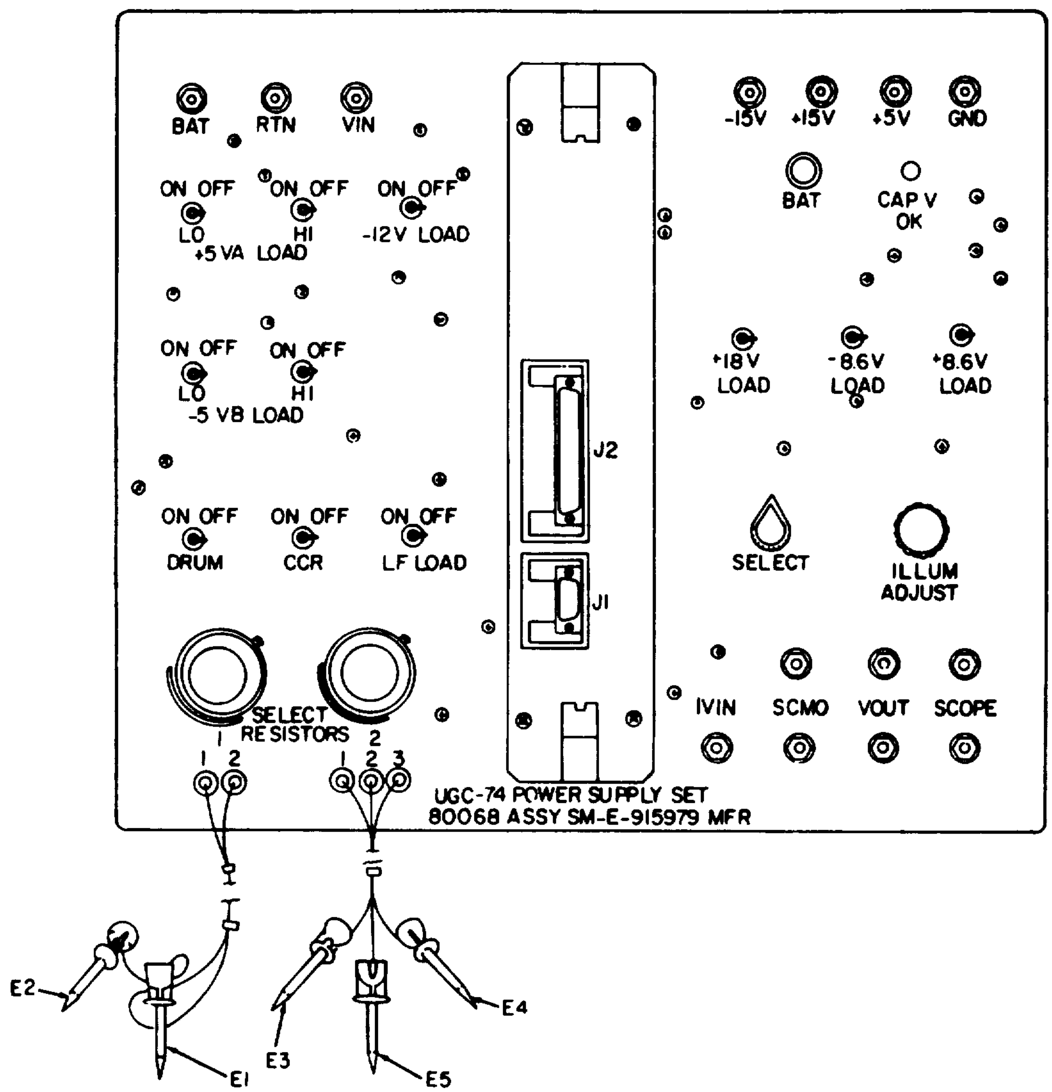
Table 3-4. LINE-FEED (MOTOR DRIVE) CURRENT CONTROL TEST FIXTURE WIRE LIST

WIRE NO.	FROM	TO	REMARKS
1	A1-E3	TP-4	22 Gauge Wire
2	A1-E4	TP-10	22 Gauge Wire
3	A1-E5	TP-4	22 Gauge Wire
4	A1-E6	TP-9	22 Gauge Wire
5	A1-E7	TP-8	22 Gauge Wire
6	A1-E8	S3-3	22 Gauge Wire
7	A1-E9	TP-11	22 Gauge Wire
8	A1-E1O	S2-1	22 Gauge Wire
9	A1-E11	TP-2	22 Gauge Wire
10	A1-E12	TP-1	22 Gauge Wire
11	A1-E13	TP-15	22 Gauge Wire
12	A1-E14	TP-14	22 Gauge Wire
13	A1-E15	TP-13	22 Gauge Wire

Table 3-4. LINE-FEED (MOTOR DRIVE) CURRENT CONTROL TEST FIXTURE WIRE LIST -Continued

WIRE NO.	FROM	TO	REMARKS
14	A1-E16	TP-12	22 Gauge Wire
15	A1-E17	R4-1	22 Gauge Wire
16	TB1-E18	TB1-E19	22 Gauge Wire
17	TB1-E19	S3-2	22 Gauge Wire
18	TB1-E20	S2-2	22 Gauge Wire
19	TB1-E21	S2-1	22 Gauge Wire
20	TB1-E23	TB1-E25	22 Gauge Wire
21	TB1-E22	E26	22 Gauge Wire
22	TB1-E24	TP-5	22 Gauge Wire
23	TB1-E22	TP-4	22 Gauge Wire
24	R4-2	TP-4	22 Gauge Wire
25	S1-B1	TP-12	22 Gauge Wire
26	S1-B2	TP-13	22 Gauge Wire
27	S1-B3	TP-14	22 Gauge Wire
28	S1-B4	TP-15	22 Gauge Wire
29	S1-AC	S2-3	22 Gauge Wire
30	S1-A1	TP-8	22 Gauge Wire
31	S1-A2	TP-9	22 Gauge Wire
32	S1-A3	TP-10	22 Gauge Wire
33	S1-A4	TP-11	22 Gauge Wire
34	TB1-E21	TP-7	22 Gauge Wire
35	R4-1	TP-6	22 Gauge Wire
36	S3-3	TP-3	22 Gauge Wire
37	TB1-E23	TP-2	22 Gauge Wire

3-17. POWER SUPPLY TEST FIXTURE



POWER SUPPLY TEST FIXTURE

Provides following interfaces for AN/UGC-74B(V)3 or AN/UGC-74C(V)3 power supply module:

INPUT POWER (22-30 Vdc)

BATTERY BACKUP POWER (+12 Vdc)

OUTPUT LOADS AND CONTROLS

DRUM MOTOR SIMULATOR

POWER SUPPLY TEST FIXTURE - Continued

- Provides two variable resistors for use in selecting resistor values on power supply under test.
- +22 to +30 Vdc input power is applied to J2-1,6 from external power supply to VIN (TP3) and RTN (TP2). (See figure FO-12.)
- Input current flows through R47 to module under test.
- Input current may be measured as a voltage by placing voltmeter across TP3 (+) and TP14 (-).
- Switch S11A in position enables VIN to be monitored at TP8 and TP9.

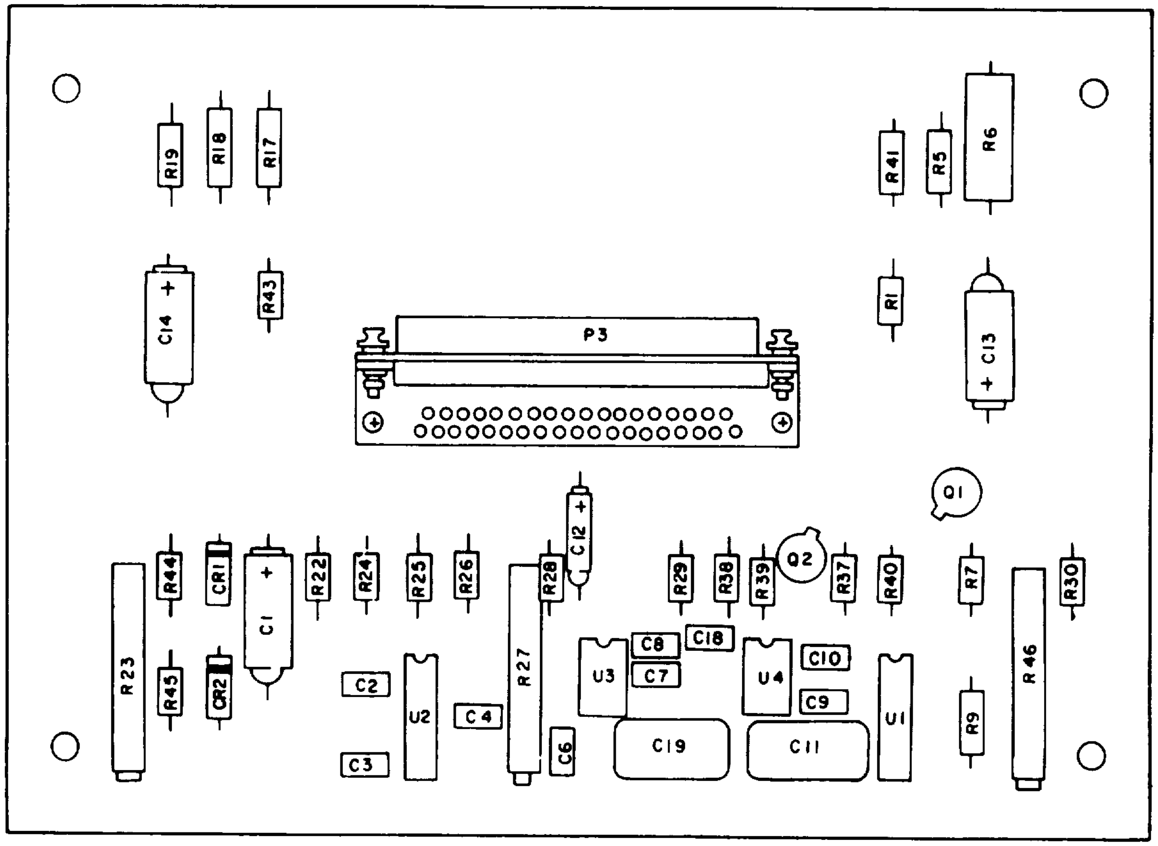
BATTERY BACKUP POWER

- +12 Vdc battery backup power is applied to J2-5,9 from a second external supply to BAT terminal (TP1).
- Voltage may be monitored at TP8 and TP9 by placing S11A to position 2 (BAT BU).

OUTPUT LOADS AND CONTROLS

- +5 VA output from supply under test enters test fixture at J2-12,13.
- Output is loaded by R2, R3, and R4.
- Amount of load is determined by switches S1 and S2.
- With S1 and S2 both in OFF position, a minimum load condition of 8.25 ohms exists.
- When S1 (+5 VA LOAD LO) is set to ON position, a 4.99-ohm resistor is placed in parallel with 8.25 ohms, resulting in effective load of 3.11 ohms.
- Setting S2 (+5 VA LOAD Hl) to ON position results in maximum load condition of 1.92 ohms by placing additional 4.99-ohm resistor across R2, R3 combination.
- +5 VA output voltage is monitored at TP8 and TP9 by setting S11A to position 3.
- +5 VA supply also provides source voltage for DS2.
- +12 VA supply (part of module under test) outputs +12 Vdc at P1-14.
- Mating connector J2-14 is wired to switch S3, switch S11A, and connector J3-31.
- Connector J3 mates with test fixture circuit card assembly shown on next page.

POWER SUPPLY TEST FIXTURE - Continued



- J3-31 interconnects with P3-31.
- P3-31 is connected to R41, which in turn is connected to R5 and P3-32.
- When switch S3 is in NORM position, +12 VA current flows through R41 and R5, and through R6 to RTN on J3-30.
- Resistors R41 and R5 provide load for +12 V supply whenever switch is in a NONMAX position.
- With switch in MAX position, R41 is bypassed, the connection J3-33 is opened, and R5 becomes load resistor for +12 VA supply.
- Performance of supply may be monitored at TP8 and TP9 by setting switch S11B (SELECT) to position 4.
- -5 VA supply (part of module under test) outputs -5 Vdc at P1-15.
- Mating connector J2-15 is wired to J3-35 and S11A-5.

POWER SUPPLY TEST FIXTURE - Continued

- +5 VB output (from module under test) enters test fixture at J1-7,26.
- +5 VB RTN (RTNB) is on J1-4, 5, 6, and 24.
- Resistor R1O (15 ohms) is connected across +5 VB output.
- When +5 VB LOAD LO switch S6 is in ON position, R11 (30.1 ohms) is placed in parallel with R10. Combination of R10 and R11 produces effective resistive load of 10.0 ohms.
- Setting +5 VB LOAD HI switch S7 to ON position places R12 (30.1 ohms) in parallel with R10. If S6 is in ON position, effective rsistive load is 7.5 ohms.
- SELECT switch S11, when set in position 6, connects +5 VB output to V OUT (TP9 and TP12) and SCOPE (TP8 and TP11) terminals.

MODEL A ONLY

- +18 V output from module under test enters “test fixture at J1-21.
- +18 V RTN enters at J1-35.
- Capacitor C15 is connected across +18 V output and simulates capacitor C2 in AN/UGC-74A(v)3.

  Supply output is placed under load by +18 V LOAD switch S9 to either NORM position or MAX position.
- When S9 is in NORM position, R15 (27.4 ohms) placed across C15 and supply output.
- Setting S9 to MAX position removes R15 and places R16 (12 ohms) across output.
- When S9 is in OFF position, both resistors are removed from output and only C15 remains in circuit.
- +18 V output is enabled by a logic 0 at J1-22.
- Setting switch S5 (CCR) to ON position connects R43 (100 ohms) across J1-22 and J1-32. Presence of this resistor produces a logic O at J1-22.
- When +18 V is present, module under test supplies a +5 Vdc voltage at J1-25 (CAPVOK).
- Voltage is input through J3-36 to a lamp driver (U1-9) on circuit card assembly.
- Lamp driver supplies return path for current to flow through J1-12, 13, DS2, J3-16, R9 (on circuit card assembly) and U1 output.
- SELECT switch set in position 9 enables monitoring of +18 V supply voltage at SCOPE and V OUT terminals.

POWER SUPPLY TEST FIXTURE - Continued

- **Lamp supply output of module under test provides +22 to +30 Vdc which enters test fixture at J1-2.**
- **Potentiometer R8 (ILLUM ADJUST) is connected across +22 to +30 Vdc supply.**
- **Wiper of R8, controlled by test fixture operator, presents variable voltage at J1-36, used by module to control amplitude of lamp supply voltage applied to test fixture at J1-31.**
- **Resistor R13 (40.2 ohms) is load resistor for lamp supply output.**

- **+8.6 V module under test supplies +8.6 Vdc to J1-8.**
- **Switch S13 (+8.6 V LOAD) is wired to J1-8 and load resistors R34, R35, and R36.**
- **Load resistor return (RTN) is provided by J1-5.**
- **When S13 is in NORM position, +8.6 V load is provided by R35 (44.2 ohms).**
- **Load resistor is switched to R36 (53.6 ohms) when S13 is set to MIN position.**
- **When MAX position is selected, R34 provides load of 30.1 ohms.**
- **SELECT switch S11, set to position 12, enables monitoring of +8.6 Vdc output of SCOPE and V OUT terminals.**

- **-8.6 V module under test supplies -8.6 V to J1-20.**
- **Wiper of switch S10 (-8.6 V LOAD) is connected to J1-20.**
- **Three loads are selectable:**
  - **53.6 ohms**
  - **82.50 ohms**
  - **115 ohms**
- **When in MAX position, current flows through S10-1 to J3-27.**
- **On circuit card assembly, P3-27 is connected to R17 (53.6 ohms).**
- **Current then flows through R17 to return (RTN) P3-24, J1-4.**
- **When S10 is in NORM position, current flow is through R18 (82.5 ohms).**
- **Resistor R19 is used by setting S10 to MIN position.**
- **-8.6 V output monitored by setting SELECT switch S11 to position 7. This connects -8.6 V output to V OUT and SCOPE test points.**

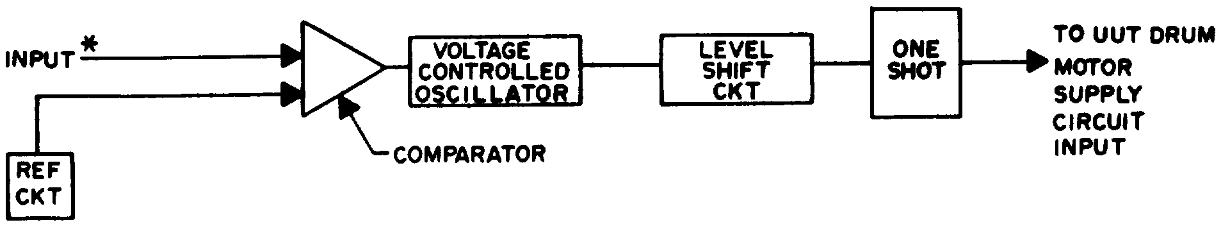
POWER SUPPLY TEST FIXTURE - Continued

- Line-feed module under test outputs 22-30 V line-feed voltage at J1-30.
- Output is loaded by R14 (30 ohms) when switch S8 (LF LOAD) is in ON position.
- Test fixture provides two precision variable resistors used to select resistor values on module under test.
- Test leads E1 and E2 are connected to SELECT RESISTOR 1 (R31), which is a 10-turn, 500-ohm potentiometer.
  - q E1 (RED) is connected to wiper (2) and one end (3) of R31.
  - q E2 (BLACK) is connected to terminal 1 of R31.
  - q Capacitor C16 is placed across terminals 1 and 3 of R31, providing noise filtering.
- SELECT RESISTOR 2 (R32) is the same type potentiometer as R31.
  - q R32 is configured for three-wire connection and is used to select resistors used in a voltage divider application on module under test.
  - q E3 (RED) is connected to wiper.
  - q E4 (BLACK) and E5 (YELLOW) are connected to ends 1 and 3, respectively.

MODEL A ONLY

DRUM MOTOR SIMULATOR (See figure FO-13.) -

- Drum motor output of power supply module under test is determined by drum speed.
- To test this circuit, simulation of drum motor control loop must be provided in fixture. U1, U2, U3, and J4 provide this capability.
- l Power supply under test outputs voltage which is compared against reference voltage by a difference amplifier.
- l Output of this amplifier is a voltage proportioned to the difference between drum motor supply output and reference voltage.



* FROM UUT DRUM MOTOR OUTPUT CIRCUIT

- Voltage-controlled oscillator (VCO) responds to variable input by changing frequency of output square wave.
- Because output level of VCO is incompatible with one-shot device, a level converter is provided.

POWER SUPPLY TEST FIXTURE - Continued

MODEL A ONLY

DRUM MOTOR SIMULATOR - Continued

- TTL input to one-shot causes it to produce fixed duration pulse at frequency determined by VCO.
- This pulse is returned to power supply under test as signal SCMO.
- Drum motor supply output of module under test divided by resistors R20 and R21.
- This voltage is applied to J3-6, which in turn is applied to U2-4 through resistor R22.
- Resistors R23 and R45 adjust reference voltage applied to U2-5.
- Resistors R21 and R24 set gain of U2 for unity.
- Capacitor C2 defines bandwidth to 1/8 pf or 55.5 Hz.
- Capacitor C4 provides noise decoupling to reduce effects of circuit random noise.
- Reference voltage for U2 provided by CR1, CR2, C1, R45, and R23.
  - CR1 and CR2 are 6.2 V Zener diodes and provide constant 12.5 Vdc across R45, R23, and C1.
  - Capacitor C1 eliminates low frequency noise and helps stabilize reference voltage.
  - Resistor R23 adjusts value of voltage to be used by U2 for reference and is normally set for 8.0 Vdc.
- Output of U2 at pin 10 is normally 10 Vdc to 12 Vdc with input voltage of 5 Vdc applied to J3-6.
- With +15 Vdc applied at junction of C4 and R26, current flows through R26, and R25 causes 13.5 Vdc to be input to U3 pin 5.
- U3 is a voltage-controlled oscillator (VCO), with output frequency a function of value of the input voltage.
- Resistors R27, R28, and capacitor C7 determine center frequency value.
  - C7 (.022 µf) sets VCO output at approximately 1 kHz.
  - Resistor R27 is adjustable and is used to set output frequency for 926 Hz.
  - Capacitor C6 provided to prevent parasitic oscillations which may occur during VCO switching.
- VCO output is a 5 V square wave which switches between +6 and +11 Vdc.
- In order for this signal to be used by U4, levels must be converted to TTL.
- TTL conversion is accomplished by transistor Q2.
- Capacitor C18 and resistor R39 provide dc and load isolation for converter and VCO.

POWER SUPPLY TEST FIXTURE - Continued

MODEL A ONLY

DRUM MOTOR SIMULATOR - Continued

- Collector of Q2 is driven by VCO and switches between +5 V and ground.
  - Output of Q2 applied to trigger input of one-shot U4.
- Output of U4 is a pulse, width determined by values of C19, C11, C46, and R30.
- R46 is adjusted to produce pulse width of 518 µsec.
- Output at SCMO (J3-12) is a 518 ±3 µsec pulse at interval of 1080 ±5 µsec.

Table 3-5. POWER SUPPLY TEST FIXTURE WIRE LIST

WIRE NO.	FROM	TO	REMARKS
1	J1-1	DSI-2	22 Gauge Wire
2	J1-2	R8-3	22 Gauge Wire
3	J1-4	TB1-5	22 Gauge Wire
4	J1-5	TB1-5	22 Gauge Wire
5	J1-6	TB1-5	22 Gauge Wire
6	J1-24	TB1-5	22 Gauge Wire
7	J1-7	TB1-4	22 Gauge Wire
8	J1-26	TB1-4	22 Gauge Wire
9	J1-10	TB1-6	22 Gauge Wire
10	J1-11	TB1-6	22 Gauge Wire
11	J1-12	TB1-7	22 Gauge Wire
12	J1-13	TB1-7	22 Gauge Wire
13	J1-14	S11-A4	22 Gauge Wire
14	J1-15	S11-A5	22 Gauge Wire
15	J1-16	S11-B11	22 Gauge Wire
16	J1-17	S11-A11	22 Gauge Wire
17	J1-20	S11-A7	22 Gauge Wire
18	J1-21	S11-A9	22 Gauge Wire
19	J1-29	S11-B5	22 Gauge Wire
20	J1-30	S11-A1O	22 Gauge Wire
21	J1-31	S11-A8	22 Gauge Wire
22	J1-8	S11-A12	22 Gauge Wire

Table 3-5. POWER SUPPLY TEST FIXTURE WIRE LIST - Continued

WIRE NO.	FROM	TO	REMARKS
23	J1-32	TB1-8	22 Gauge Wire
24	J1-33	TB1-8	22 Gauge Wire
25	J1-35	TB1-8	22 Gauge Wire
26	J1-18	S4-3	22 Gauge Wire
27	J1-19	TP-10	Center Conductor of Shielded Cable
28	J1-22	P3-22	22 Gauge Wire
29	J1-25	P3-36	22 Gauge Wire
30	J1-28	P3-13	22 Gauge Wire
31	J1-36	R8-2	22 Gauge Wire
32	J1-37	TP-13	Shield of Shielded Cable
33	J2-6	TB1-3	22 Gauge Wire
34	J2-1	TB1-3	22 Gauge Wire
35	J2-5	TB1-1	22 Gauge Wire
36	J2-9	TB1-1	22 Gauge Wire
37	J2-7	S11-B2	22 Gauge Wire
38	J2-2	TB1-2	22 Gauge Wire
39	P3-7	TB1-2	22 Gauge Wire
40	P3-34	TB1-6	22 Gauge Wire
41	P3-30	TB1-6	22 Gauge Wire
42	P3-32	S11-A4	22 Gauge Wire
43	P3-35	S11-A5	22 Gauge Wire
44	P3-32	S3-3	22 Gauge Wire
45	P3-33	S3-1	22 Gauge Wire
46	P3-23	S5-3	22 Gauge Wire
47	P3-15	DS1-1	22 Gauge Wire
48	P3-16	DS2-2	22 Gauge Wire
49	P3-5	R21-1	22 Gauge Wire
50	P3-6	R21-2	22 Gauge Wire
51	P3-27	S1O-6	22 Gauge Wire
52	P3-26	S1O-4	22 Gauge Wire
53	P3-25	S10-1	22 Gauge Wire

Table 3-5. POWER SUPPLY TEST FIXTURE WIRE LIST - Continued

WIRE NO.	FROM	TO	REMARKS
54	P3-12	TP-10	Conductor of Shielded Cable
55	P3-9	TP-13	Shield of Shielded Cable
56	P3-14	TB1-8	22, Gauge Wire
57	P3-24	TB1-5	22 Gauge Wire
58	P3-8	TB1-2	22 Gauge Wire
59	P3-11	TP-6	22 Gauge Wire
60	P3-10	TP-6	22 Gauge Wire
61	P3-28	TP-6	22 Gauge Wire
62	P3-29	TP-6	22 Gauge Wire
63	P3-18	TP-5	22 Gauge Wire
64	P3-19	TP-5	22 Gauge Wire
65	P3-37	TP-5	22 Gauge Wire
66	P3-1	TP-4	22 Gauge Wire
67	P3-2	TP-4	22 Gauge Wire
68	PE-20	TP-4	22 Gauge Wire
69	TB1-8	S9-C	22 Gauge Wire
70	TB1-8	C15-2	22 Gauge Wire
71	TB1-8	R8-1	22 Gauge Wire
72	TB1-8	S11-B8	22 Gauge Wire
73	TB1-5	R34-1	22 Gauge Wire
74	TB1-5	R1O-1	22 Gauge Wire
75	TB1-5	R35-1	22 Gauge Wire
76	TB1-6	R2-1	22 Gauge Wire
77	TB1-6	S11-B3	22 Gauge Wire
78	TB1-7	R2-2	22 Gauge Wire
79	TB1-7	S1-2	22 Gauge Wire
80	TB1-7	DS2-1	22 Gauge Wire
81	TB1-7	S2-2	22 Gauge Wire
82	TB1-7	S11-A3	22 Gauge Wire
83	TB1-2	TP-7	22 Gauge Wire
84	TB1-2	TP-2	22 Gauge Wire

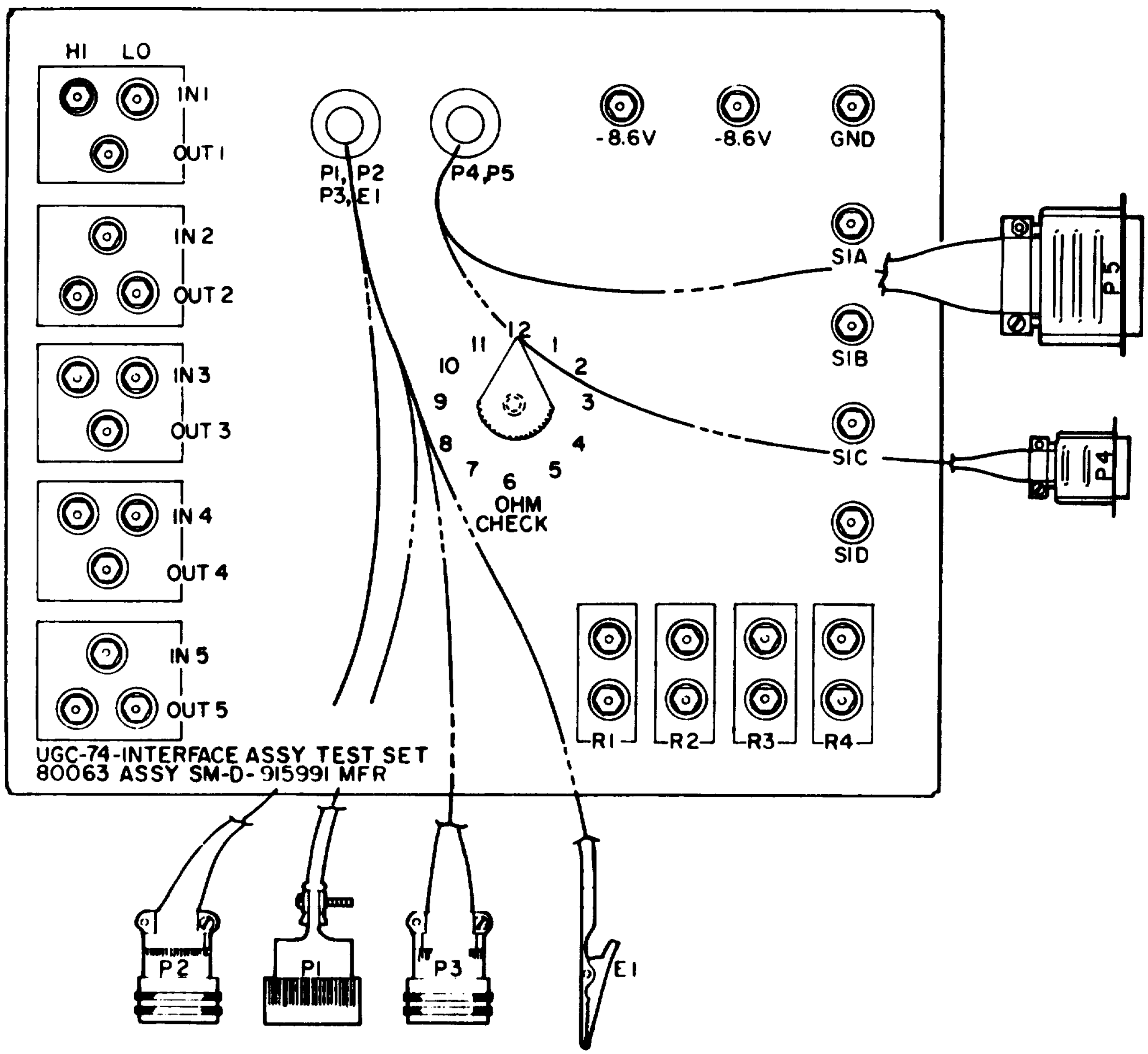
Table 3-5. POWER SUPPLY TEST FIXTURE WIRE LIST - Continued

WIRE NO.	FROM	TO	REMARKS
85	TB1-2	S11-B1	22 Gauge Wire
86	TB1-2	TP-13	22 Gauge Wire
87	TB1-4	R11-1	22 Gauge Wire
88	TB1-4	S11-A6	22 Gauge Wire
89	TB1-3	R47-2	22 Gauge Wire
90	TB1-3	TP-14	22 Gauge Wire
91	TB1-1	S11-A2	22 Gauge Wire
92	TP-9	TP-8	22 Gauge Wire
93	TP-8	S11-AC	22 Gauge Wire
94	TP-12	TP-11	22 Gauge Wire
95	TP-11	S11-BC	22 Gauge Wire
96	R21-1	S11-B11	22 Gauge Wire
97	S11-B8	S11-B9	22 Gauge Wire
98	S11-B9	S11-B1O	22 Gauge Wire
99	S11-B9	R13-1	22 Gauge Wire
100	R13-1	S5-2	22 Gauge Wire
101	S11-B1O	R14-1	22 Gauge Wire
102	R14-1	S4-2	22 Gauge Wire
103	S11-A4	S3-2	22 Gauge Wire
104	R10-1	S11-B6	22 Gauge Wire
105	S11-B6	R36-1	22 Gauge Wire
106	S11-B6	S11-B7	22 Gauge Wire
107	S11-B7	S6-2	22 Gauge Wire
108	S11-B7	S11-B12	22 Gauge Wire
109	S11-B12	S7-2	22 Gauge Wire
110	R2-1	R3-1	22 Gauge *Wire*
111	R3-1	R4-1	22 Gauge Wire
112	S11-B3	S11-B4	22 Gauge Wire
113	S11-B4	S11-B5	22 Gauge Wire
114	S11-B1	S11-B2	22 Gauge Wire
115	R21-2	R20-1	22 Gauge Wire
116	S11-A12	S13-2	22 Gauge Wire

Table 3-5. POWER SUPPLY TEST FIXTURE WIRE LIST - Continued

WIRE NO.	FROM	TO	REMARKS
117	S11-A11	R20-2	22 Gauge Wire
118	S11-A1O	S8-2	22 Gauge Wire
119	S11-A9	R15-1	22 Gauge Wire
120	R15-1	R16-1	22 Gauge Wire
121	R16-1	C15-1	22 Gauge Wire
122	S11-A8	R13-2	22 Gauge Wire
123	S11-A7	S10-2	22 Gauge Wire
124	S11-A6	R12-1	22 Gauge Wire
125	R12-1	R1O-2	22 Gauge Wire
126	TP-3	S11-A1	22 Gauge Wire
127	S11-A1	R47-1	22 Gauge Wire
128	R14-2	S8-3	22 Gauge Wire
129	R16-2	S9-1	22 Gauge Wire
130	R15-2	S9-3	22 Gauge Wire
131	R4-2	S2-3	22 Gauge Wire
132	R3-2	S1-3	22 Gauge Wire
133	R34-2	S13-6	22 Gauge Wire
134	R35-2	S13-4	22 Gauge Wire
135	R36-2	S13-1	22 Gauge Wire
136	R11-2	S6-3	22 Gauge Wire
137	R12-2	S7-3	22 Gauge Wire
138	S1O-5	S1O-3	22 Gauge Wire
139	S13-5	S13-3	22 Gauge Wire
140	R31-1	E2	22 Gauge Wire (Red)
141	R31-1	R31-3	22 Gauge Wire (Black)
142	R31-3	C16-2	22 Gauge Wire (Black)
143	R31-3	R31-2	22 Gauge Wire (Red)
144	R31-2	E1	22 Gauge Wire (Black)
145	R32-3	E5	22 Gauge Wire (Yellow)
146	R32-1	E4	22 Gauge Wire (Red)
147	R32-2	E3	22 Gauge Wire (Black)

3-18. INTERFACE ASSEMBLY TEST FIXTURE

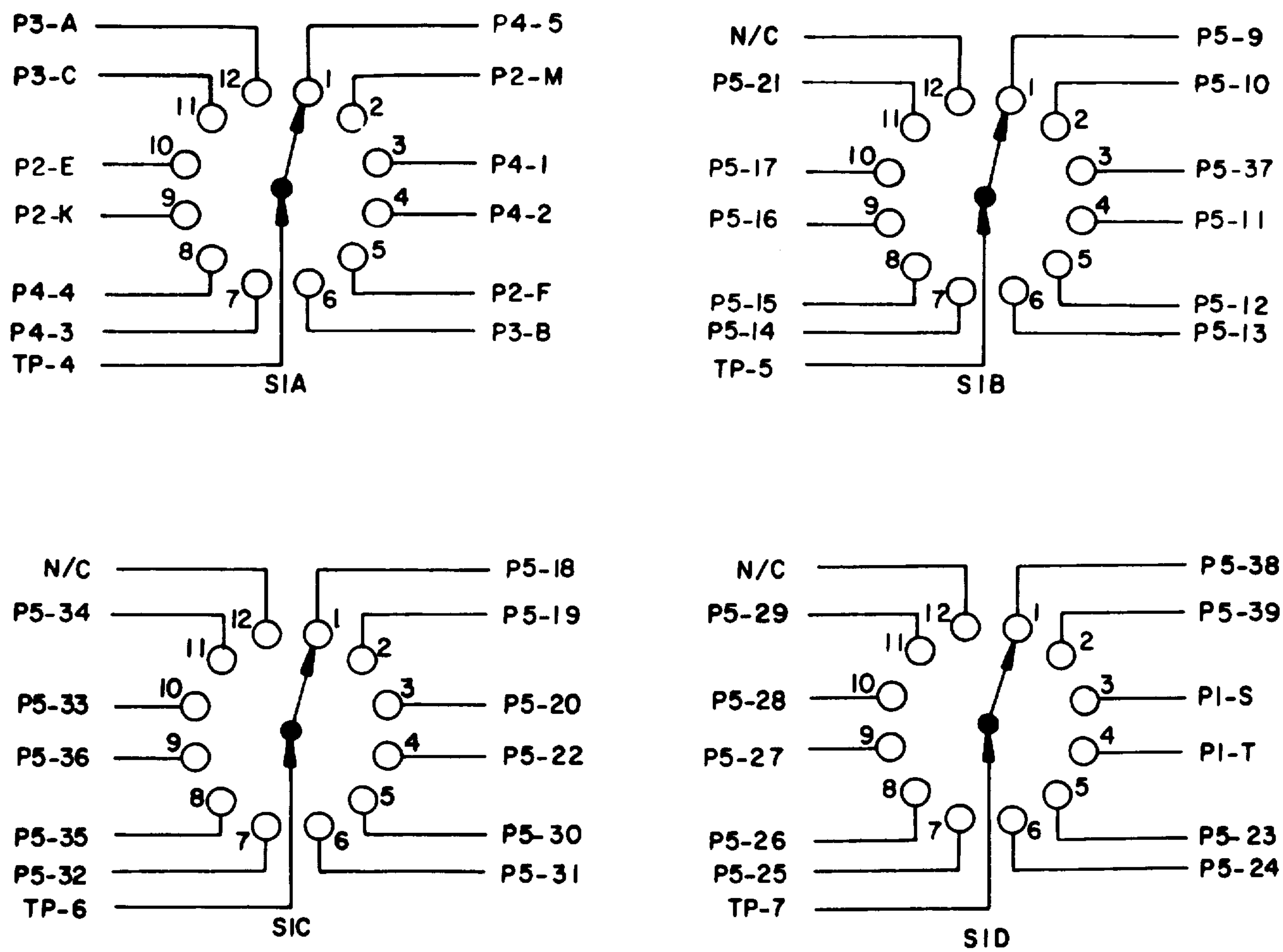


INTERFACE ASSEMBLY TEST FIXTURE

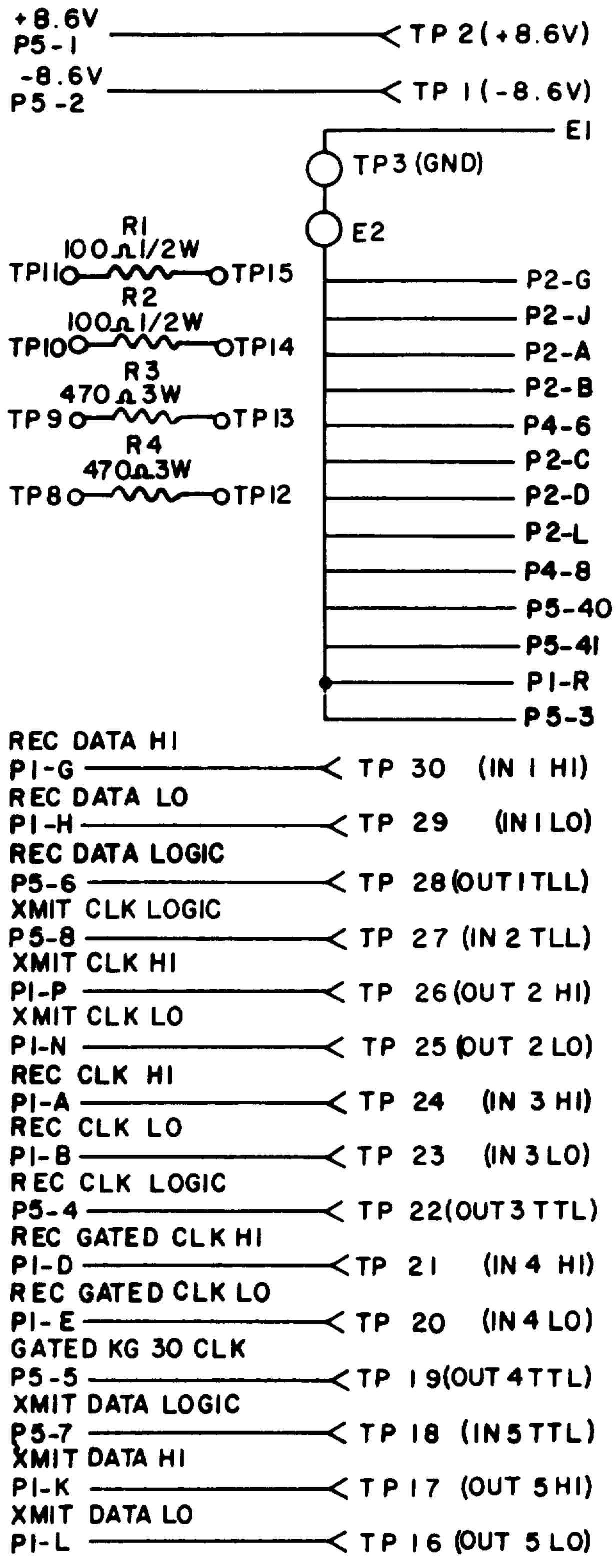
- Provides an easy means of performing continuity and functional electrical tests on interface assembly.

CONTINUITY TESTS

Switch S1 (OHM CHECK) is used along with terminals S1A, S1B, S1C, and S1D to perform continuity tests of internal wiring of interface assembly.



- Placing an ohmmeter between ground terminal (GND) and any of these four terminals enables a series of continuity checks to be made.
- Each of 12 terminals of wafer A of S1 are wired to pins of P2, P3, and P4.
- GND terminal is also wired to pins of P2, P4, and P5.
- By placing S1 in each of 12 positions, continuity can be read through switches, connectors, and harness of interface assembly which are wired to wafer A.
- Additional continuity tests can be performed by moving ohmmeter to terminal 5 (S1B), 6 (S1C), and 7 (S1D) and sequencing through the 12 switch positions.



INTERFACE ASSEMBLY TEST FIXTURE SCHEMATIC DIAGRAM

Table 3-6. INTERFACE ASSEMBLY TEST FIXTURE WIRE LIST

WIRE NO.	FROM	TO	REMARKS
1	P1-A	TP24 WHT	22 Gauge Twisted Pair Wire
2	P1-B	TP23 BLK	22 Gauge Twisted Pair Wire
3	P1-D	TP21 WHT	22 Gauge Twisted Pair Wire
4	P1-E	TP20 BLK	22 Gauge Twisted Pair Wire
5	P1-G	TP30 WHT	22 Gauge Twisted Pair Wire
6	P1-H	TP29 BLK	22 Gauge Twisted Pair Wire
7	P1-K	TP17 WHT	22 Gauge Twisted Pair Wire
8	P1-L	TP16 BLK	22 Gauge Twisted Pair Wire
9	P1-N	TP25 BLK	22 Gauge Twisted Pair Wire
10	P1-P	TP26 WHT	22 Gauge Twisted Pair Wire
11	P1-R	E2	22 Gauge Wire
12	P1-s	S1-D3	22 Gauge Wire
13	P1-T	S1-D4	22 Gauge Wire
14	P2-A	E2	22 Gauge Wire
15	P2-B	E2	22 Gauge Wire
16	P2-C	E2	22 Gauge Wire
17	P2-D	E2	22 Gauge Wire
18	P2-E	S1-A1O	22 Gauge Wire
19	P2-F	S1-A5	22 Gauge Wire
20	P2-G	E2	22 Gauge Wire
21	P2-J	E2	22 Gauge Wire
22	P2-K	S1-A9	22 Gauge Wire
23	P2-L	E2	22 Gauge Wire
24	P2-M	S1-A2	22 Gauge Wire
25	P3-A	S1-A12	22 Gauge Wire
26	P3-B	S1-A6	22 Gauge Wire
27	P3-C	S1-A11	22 Gauge Wire
28	P4-1	S1-A3	22 Gauge Wire

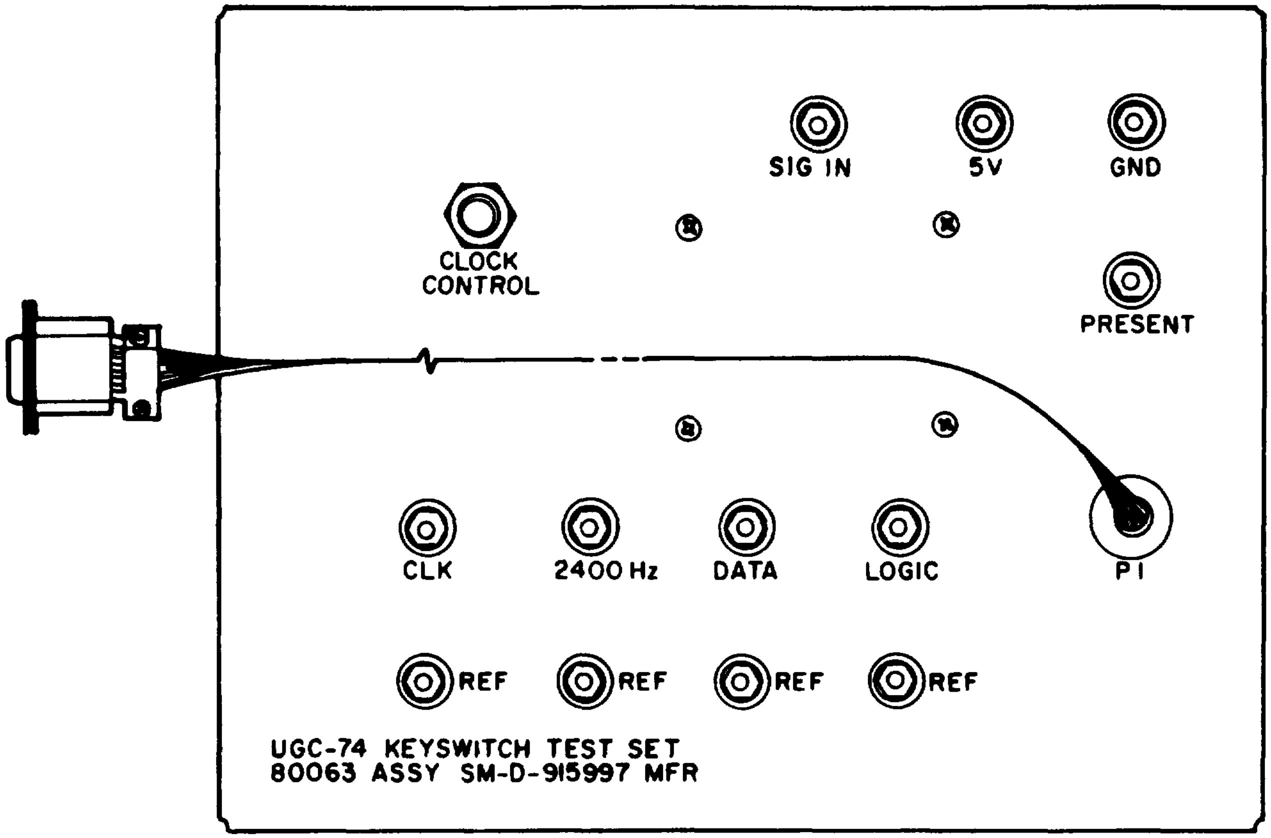
Table 3-6. INTERFACE ASSEMBLY TEST FIXTURE WIRE LIST - Continued

WIRE NO.	FROM	TO	REMARKS
29	P4-2	S1-A4	22 Gauge Wire
30	P4-3	S1-A7	22 Gauge Wire
31	P4-4	S1-A8	22 Gauge Wire
32	P4-5	S1-A1	22 Gauge Wire
33	P4-6	E2	22 Gauge Wire
34	P4-8	E2	22 Gauge Wire
35	P5-1	TP-2	22 Gauge Wire
36	P5-2	TP-1	22 Gauge Wire
37	P5-3	E2	22 Gauge Wire
38	P5-4	TP-22	22 Gauge Wire
39	P5-5	TP-19	22 Gauge Wire
40	P5-6	TP-28	22 Gauge Wire
41	P5-7	TP-18	22 Gauge Wire
42	P5-8	TP-27	22 Gauge Wire
43	P5-9	S1-B1	22 Gauge Wire
44	P5-10	S1-B2	22 Gauge Wire
45	P5-11	S1-B4	22 Gauge Wire
46	P5-12	S1-B5	22 Gauge Wire
47	P5-13	S1-B6	22 Gauge Wire
48	P5-14	S1-B7	22 Gauge Wire
49	P5-15	S1-B8	22 Gauge Wire
50	P5-16	S1-B9	22 Gauge Wire
51	P5-17	S1-B1O	22 Gauge Wire
52	P5-18	S1-C1	22 Gauge Wire
53	P5-19	S1-C2	22 Gauge Wire
54	P5-20	S1-C3	22 Gauge Wire
55	P5-21	S1-B11	22 Gauge Wire
56	P5-22	S1-C4	22 Gauge Wire
57	P5-23	S1-D5	22 Gauge Wire
58	P5-24	S1-D6	22 Gauge Wire
59	P5-25	S1-07	22 Gauge Wire
60	P5-26	S1-D8	22 Gauge Wire
61	P5-27	S1-D9	22 Gauge Wire

Table 3-6. INTERFACE ASSEMBLY TEST FIXTURE WIRE LIST - Continued

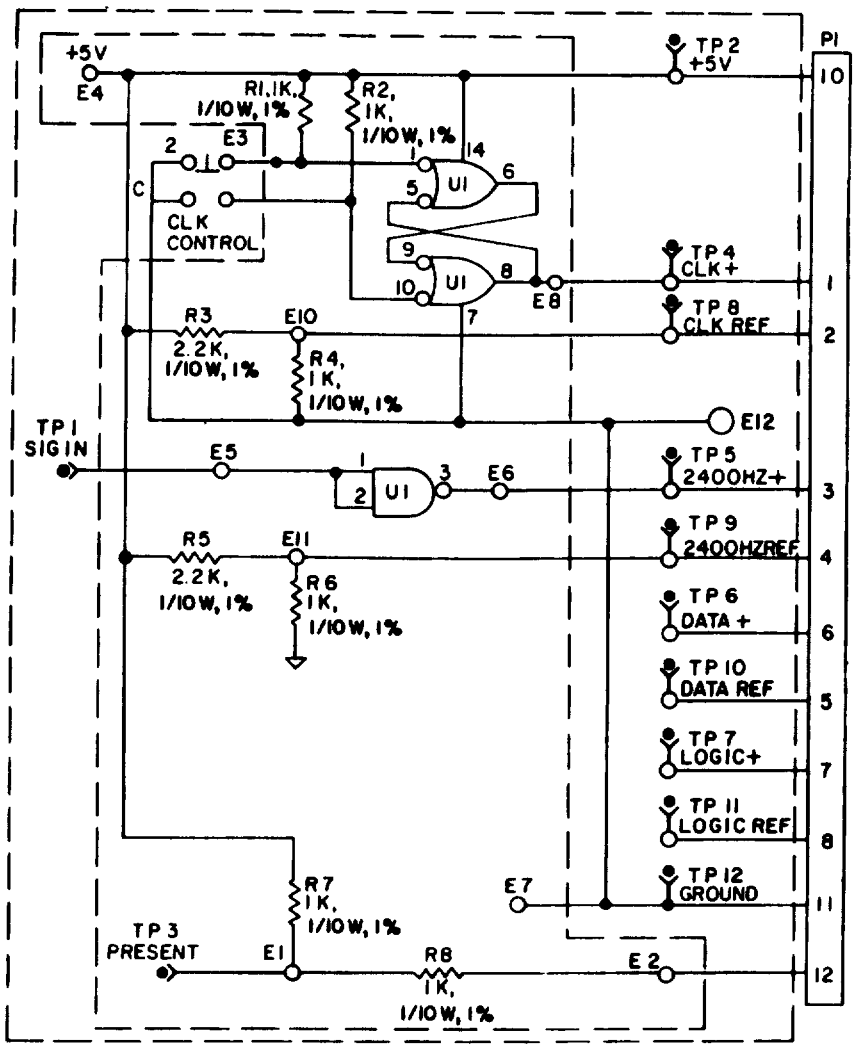
WIRE NO.	FROM	TO	REMARKS
62	P5-28	S1-D1O	22 Gauge Wire
63	P5-29	S1-D11	22 Gauge Wire
64	P5-30	S1-C5	22 Gauge Wire
65	P5-31	S1-C6	22 Gauge Wire
66	P5-32	S1-C7	22 Gauge Wire
67	P5-33	S1-C10	22 Gauge Wire
68	P5-34	S1-C11	22 Gauge Wire
69	P5-35	S1-C8	22 Gauge Wire
70	P5-36	S1-C9	22 Gauge Wire
71	P5-37	S1-B3	22 Gauge Wire
72	P5-38	S1-D1	22 Gauge Wire
73	P5-39	S1-D2	22 Gauge Wire
74	P5-40	E2	22 Gauge Wire
75	P5-41	E2	22 Gauge Wire
76	TP-6	S1-CCOM	22 Gauge Wire
77	TP-4	S1-ACOM	22 Gauge Wire
78	TP-5	S1-BCOM	22 Gauge Wire
79	TP-7	S1-DCOM	22 Gauge Wire
80	TP-3	E2	18 Gauge Wire
81	E2	E1	16 Gauge Wire
--	TP-11	TP-15	100 Ω Resistor ½W
--	TP-10	TP-14	100 Ω Resistor ½W
--	TP-9	TP-13	470 Ω Resistor 3W
--	TP-8	TP-12	470 Ω Resistor 3W

3-19. KEYSWITCH ASSEMBLY TEST FIXTURE



KEYSWITCH ASSEMBLY TEST FIXTURE

- Provides power and input signal interfaces for keyswitch assembly and keyboard assembly.
- Input power of +5 Vdc supplied by external supply, and input signal clock supplied by external pulse generator.
- Consists of interface terminals, connecting cable, and clock control switch.
- Input clocks and power applied to assembly under test through TP1 (SIG IN), TP2 (+5 V) and TP12 (GND), respectively.
- Circuit card assembly (A1) is mounted in test fixture and contains interface and control circuitry.
- +5 Vdc, supplied to test fixture from external supply at TP2, provides operating voltage for test fixture logic circuits, as well as assembly/unit under test (UUT).
- Interface with circuit card assembly is via E4 on assembly.
- UUT interface is through P1-10.



- Return for both power and signal sources is TP12.
- Return for circuit card assembly is connected to E7.
- UUT return is through P1-11.
- External pulse generator signal input at TP1 enters circuit card assembly at E5.
- U1 assures TTL input to UUT at P1-3.
- When UUT is connected to test fixture, P1-12 is tied to P1-11, forming a voltage divider through 1R7 and R8.
- When +5 Vdc is applied and UUT is connected to fixture, +2.5 Vdc may be measured at PRESENT terminal TP3.
- Resistors R3 and R4 form voltage divider which supplies 1.5 Vdc nominal for CLK REF input to UUT through P1-2. TP8 is monitor test point for this voltage.
- Resistors R5 and R6 supply 2400 Hz REF input for UUT through P1-4. TP9 is monitor test point for this voltage.
- TP6 (DATA +) monitors KYBD DATA line from UUT at P1-6.
- TP7 (LOGIC +) monitors KYBD LD line from UUT at P1-7.

- TP10 (DATA REF) and TP11 (LOGIC REF) monitor voltage in UUT similar to R3/R4 and R5/R6 in fixture.

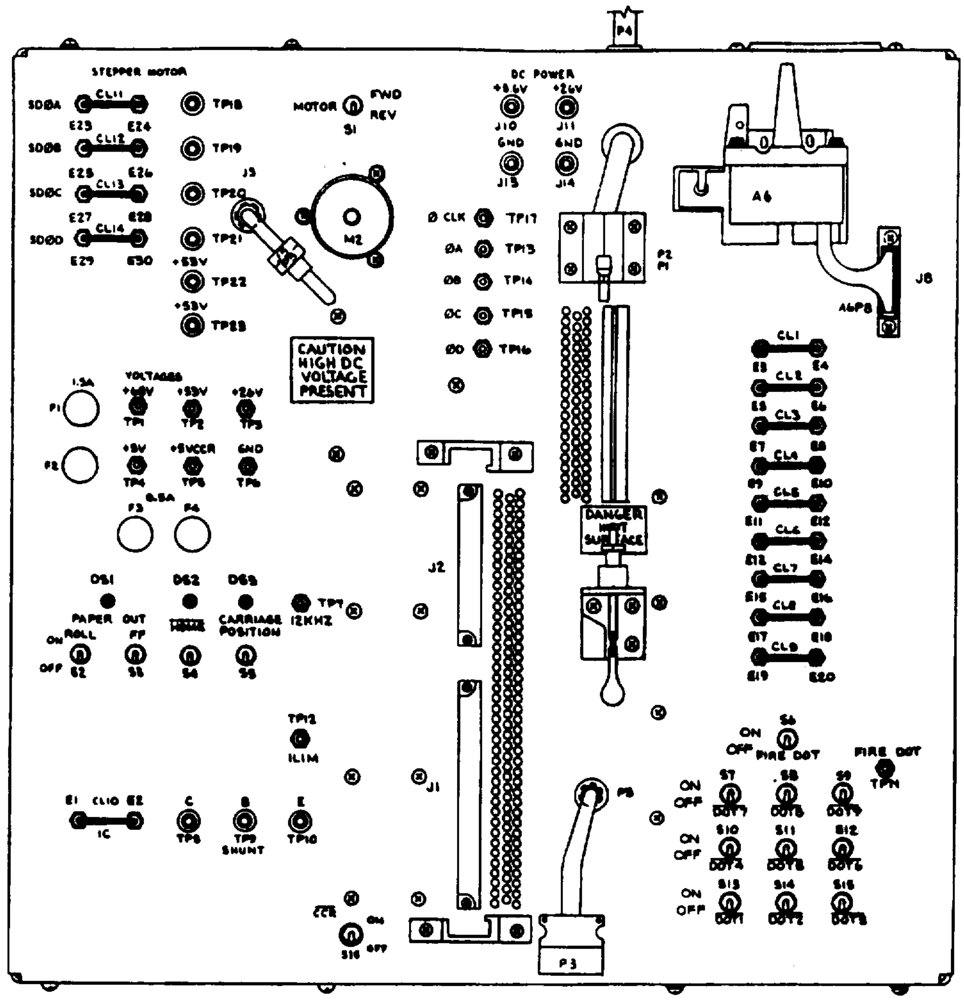
- Control of clock signal for UUT is provided by S1 and U1.
  - When S1 is not depressed, U1-4 is a logic 0 and U1-10 is a logic 1.
  - Since 0 at U1-4 forces U1-6 to 1, U1-9 is also a logic 1, and U1-8 is a logic 0.
  - When S1 is depressed, logic 0 is placed at U1-10, and logic 1 is placed at U1-4. This resets output at U1-8 to a logic 1.
  - Input at U1-5 becomes a logic 1, causing U1-6 to become a logic 0.
  - This logic 0 causes U1-8 output to remain a logic 1.
  - When S1 is released, output at U1-8 returns to a logic 0.

- Purpose of this flip-flop action is to eliminate effects of "Contact bounce" inherent with almost all switches.

Table 3-7. KEYSWITCH ASSEMBLY TEST FIXTURE WIRE LIST

WIRE NO.	FROM	TO	REMARKS
1	P1-1	TP-4	22 Gauge Wire
2	A1-E8	TP-4	22 Gauge Wire
3	P1-2	TP-8	22 Gauge Wire
4	A1-E10	TP-8	22 Gauge Wire
5	P1-3	TP-5	22 Gauge Wire
6	A1-E6	TP-5	22 Gauge Wire
7	P1-4	TP-9	22 Gauge Wire
8	A1-E11	TP-9	22 Gauge Wire
9	P1-5	TP-10	22 Gauge Wire
10	P1-6	TP-6	22 Gauge Wire
11	P1-7	TP-7	22 Gauge Wire
12	P1-8	TP-11	22 Gauge Wire
13	P1-9	--	No Connection
14	P1-10	TP-2	22 Gauge Wire
15	A1-E4	TP-2	22 Gauge Wire
16	P1-11	TP-12	22 Gauge Wire
17	A1-E7	E12	22 Gauge Wire
18	P1-12	A1-E2	22 Gauge Wire
19	TP-1	A1-E5	22 Gauge Wire
20	TP-3	A1-1	22 Gauge Wire
21	S1-3	A1-E9	22 Gauge Wire
22	S1-5	E12	22 Gauge Wire
23	S1-1	A1-E3	22 Gauge Wire
24	TP-12	E12	22 Gauge Wire

3-20. CMCC/DRIVE BOARD/PRINT HEAD TEST FIXTURE



CARRIAGE MOTOR CURRENT CONTROL/DRIVE BOARD/PRINT HEAD TEST FIXTURE

- **Provides means of testing either the CMCC or the print drive circuit card.**
- **Stepper motor is mounted as a load for the CMCC, and print head is mounted as load for the print drive.**
- **Test fixture is manually operated and can test any function of either circuit card. Print drive must be mounted to test CMCC since the dc power requirements of the CMCC are generated on the print drive.**
- **Inputs are provided for two external power supplies.**
- **Contains active circuitry to provide necessary signals to exercise both circuit cards.**
- **Power transistor and filter capacitors are mounted in test fixture to simulate printer assembly.**
- **Test points available to monitor voltage and current waveshapes and dc voltages.**
- **Switches and LED indicators used to make and break connections and monitor functions.**

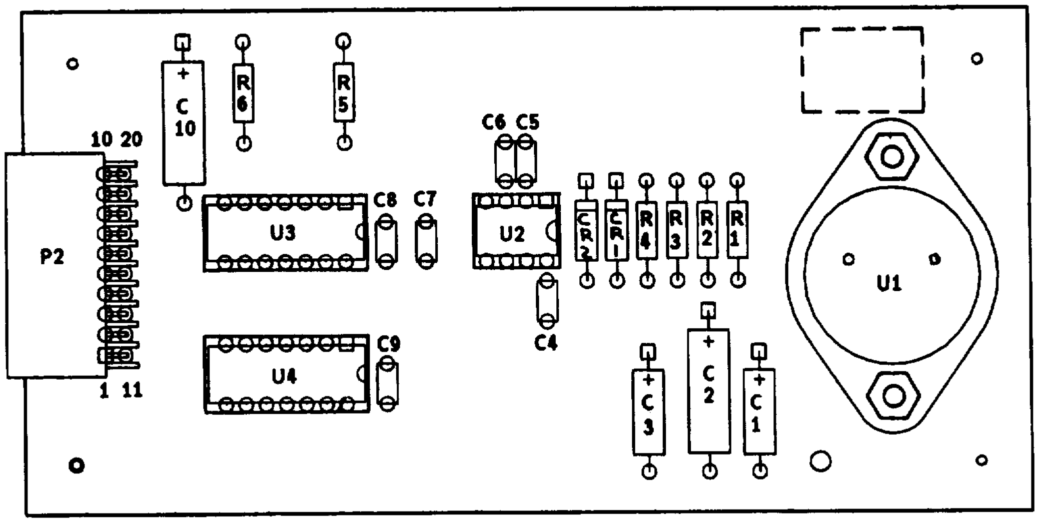


Figure 3-35. A1 BOARD CIRCUIT CARD ASSEMBLY

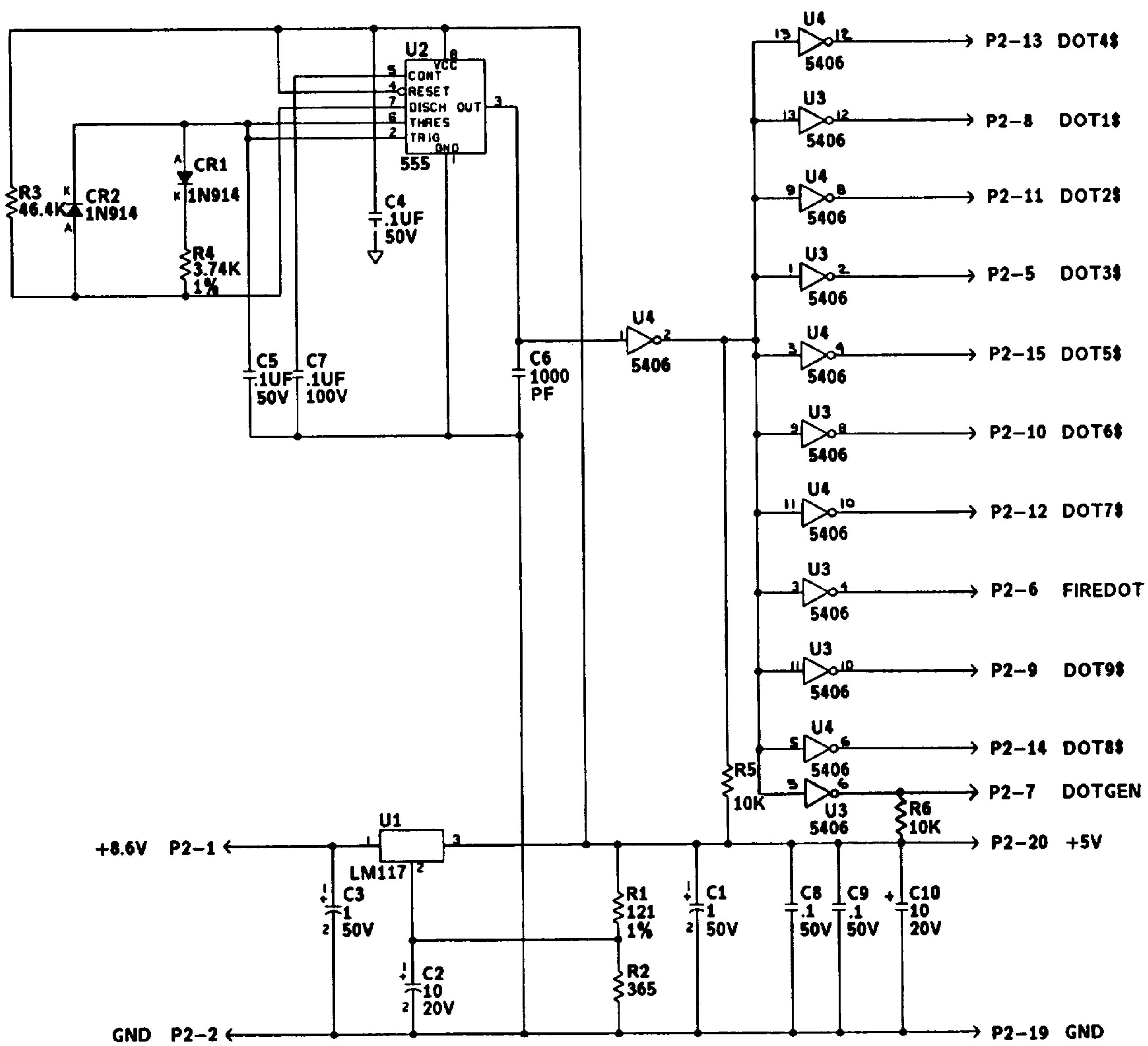


Figure 3-36. A1 BOARD SCHEMATIC DIAGRAM

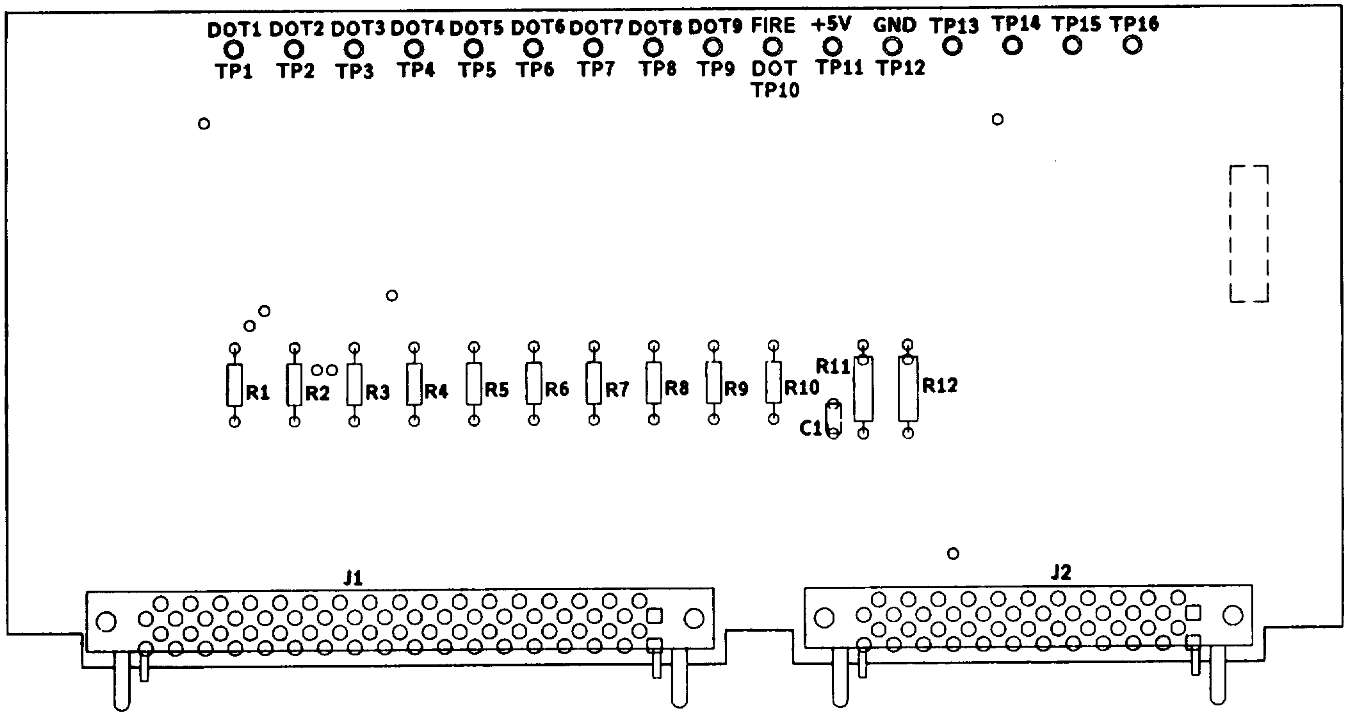


Figure 3-37. A7 BOARD CIRCUIT CARD ASSEMBLY

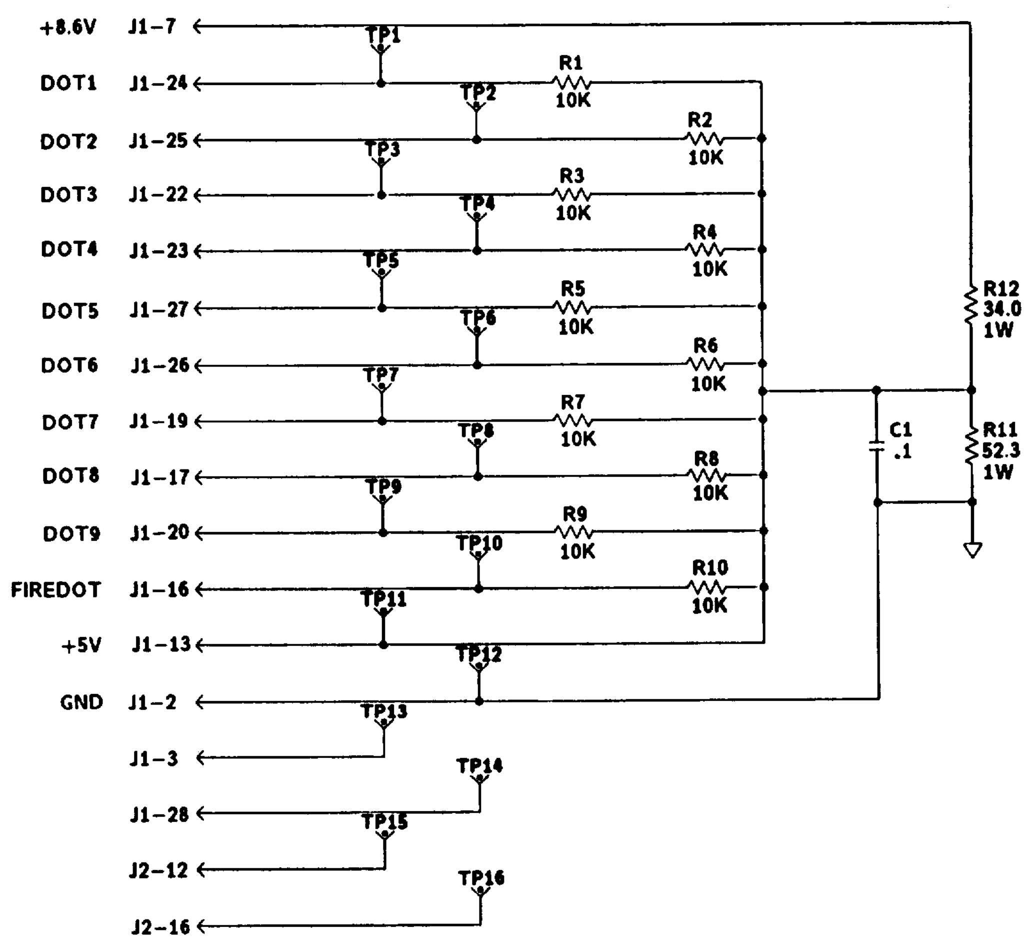


Figure 3-38. A7 BOARD SCHEMCATIC DIAGRAM

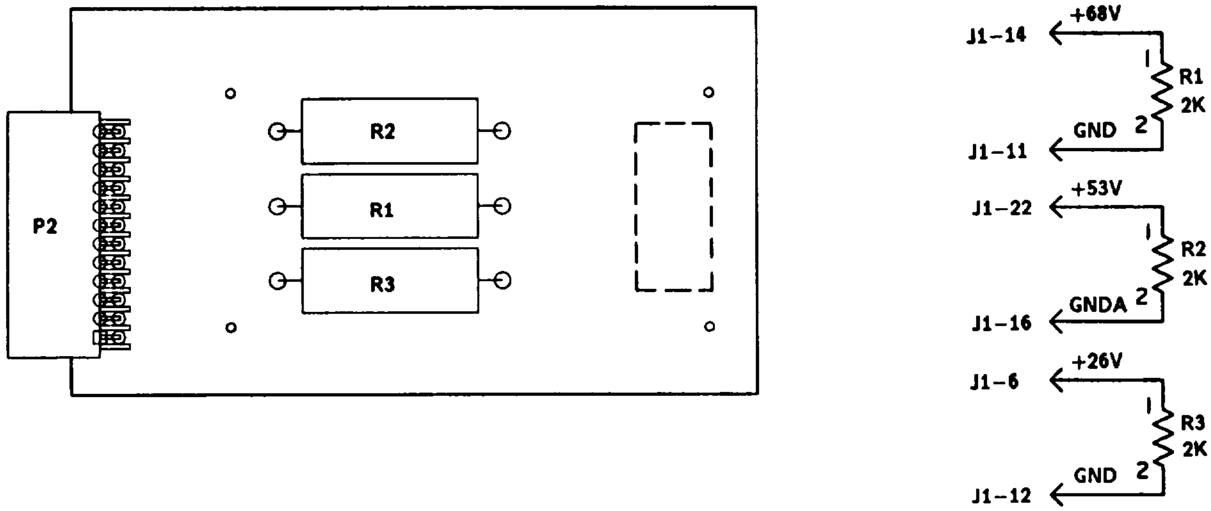


Figure 3-39. A3 BOARD CIRCUIT CARD ASSEMBLY AND SCHEMATIC DIAGRAM

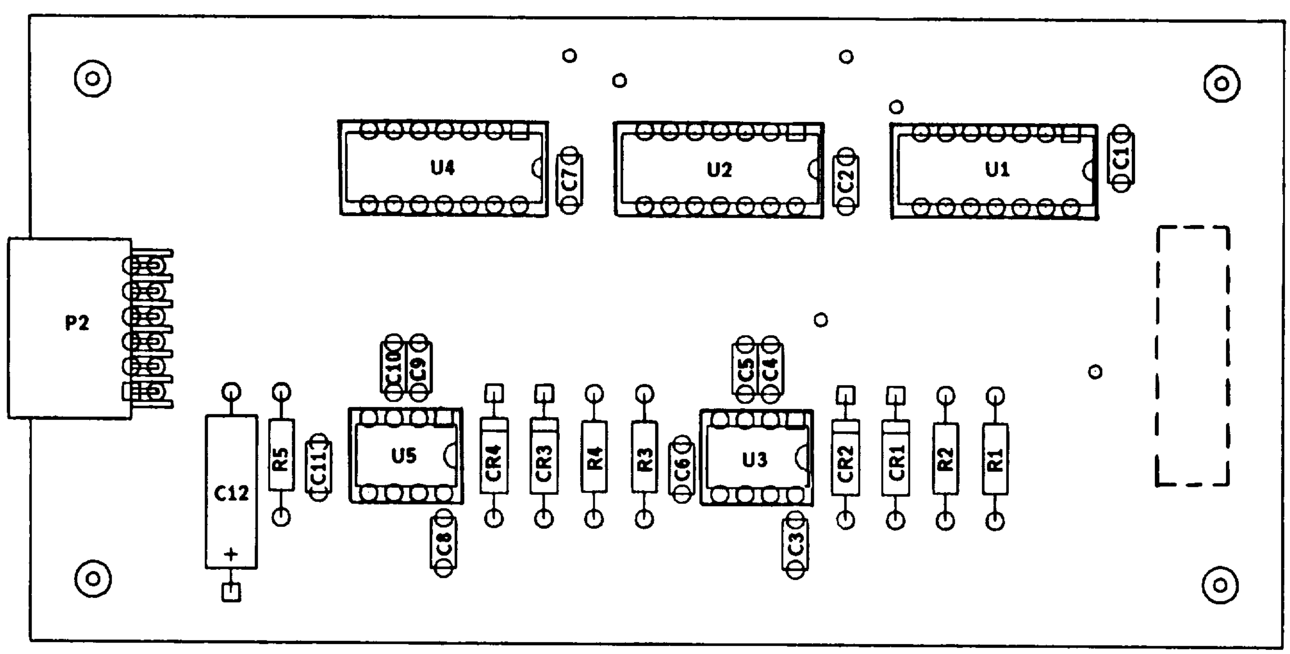
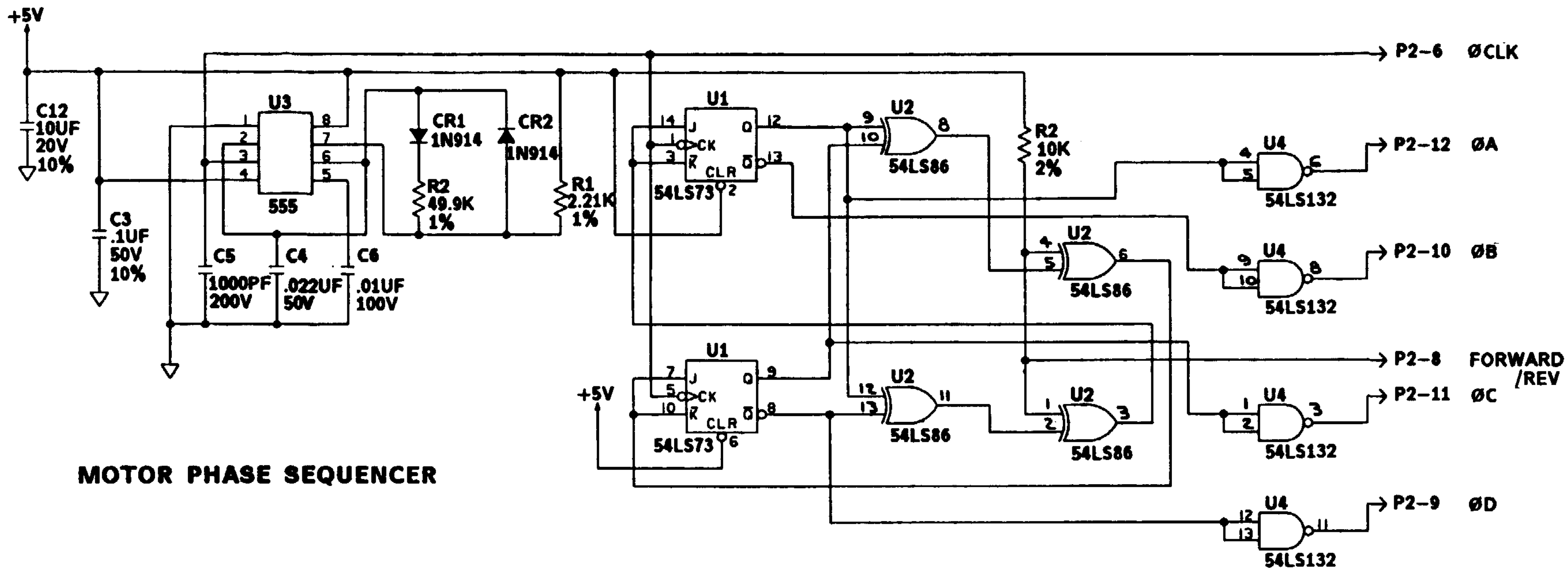
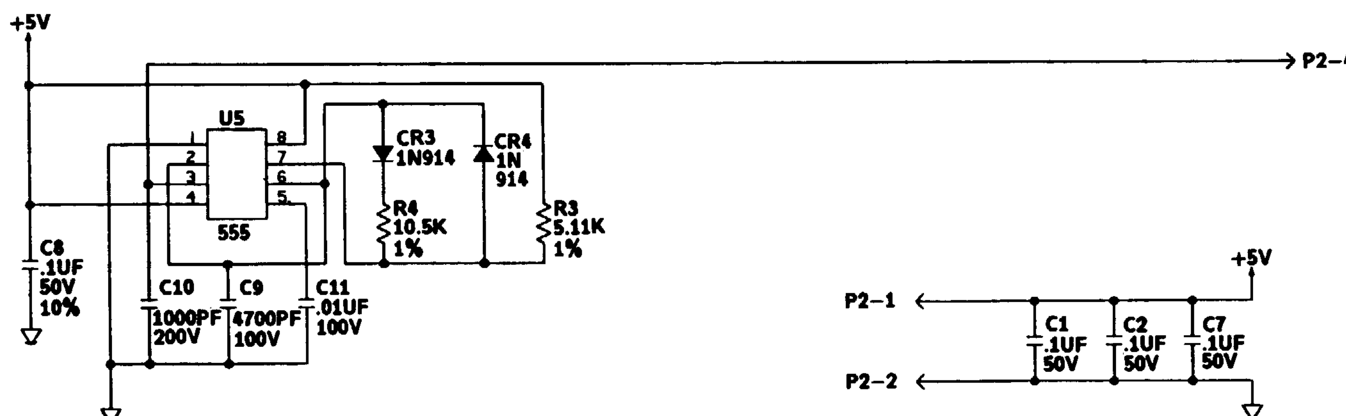


Figure 3-40. A2 BOARD CIRCUIT CARD ASSEMBLY



MOTOR PHASE SEQUENCER



ILIM GENERATOR

Figure 3-41. A2 BOARD SCHEMATIC DIAGRAM

Table 3-8. CMCC/DRIVE BOARD/PRINT HEAD TEST FIXTURE WIRE LIST

WIRE NO.	FROM	To	REMARKS
1	J3-7	TP-11	24 Gauge Wire
2	J3-6	S6-1	24 Gauge Wire
3	S6-2	J1-16	24 Gauge Wire
4	J3-8	S13-1	22 Gauge Wire
5	S13-2	J1-24	22 Gauge Wire
6	J3-11	S14-1	22 Gauge Wire
7	S14-2	J1-25	22 Gauge Wire
8	J3-5	S15-1	22 Gauge Wire
9	S15-2	J1-22	22 Gauge Wire
10	J3-13	S10-1	22 Gauge Wire
11	S1O-2	J1-23	22 Gauge Wire
12	J3-15	S11-1	22 Gauge Wire
13	S11-2	J1-27	22 Gauge Wire
14	J3-10	S12-1	22 Gauge Wire
15	S12-2	J1-26	22 Gauge Wire
16	J3-12	S7-1	22 Gauge Wire
17	S7-2	J1-19	22 Gauge Wire
18	J3-14	S8-1	22 Gauge Wire
19	S8-2	J1-17	22 Gauge Wire
20	J3-9	S9-1	22 Gauge Wire
21	S9-2	J1-20	22 Gauge Wire
22	J1-5	S16-2	22 Gauge Wire
23	S16-1	J1-32	22 Gauge Wire
24	S2-1	S3-1	22 Gauge Wire
25	S3-1	S4-1	22 Gauge Wire
26	S4-1	S5-1	22 Gauge Wire
27	S5-1	J1-31	22 Gauge Wire
28	S2-2	J1-30	22 Gauge Wire
29	S3-2	J1-29	22 Gauge Wire
30	S4-2	J2-13	22 Gauge Wire
31	S5-2	J2-20	22 Gauge Wire
32	J4-4	TP-12	22 Gauge Wire
33	TP-12	J2-18	22 Gauge Wire

Table 3-8. CMCC/DRIVE BOARD/PRINT HEAD TEST FIXTURE WIRE LIST - Continued

WIRE NO.	FROM	TO	REMARKS
34	P3-1	E4	22 Gauge Wire
35	E3	J8-1	22 Gauge Wire
36	P3-2	E6	22 Gauge Wire
37	E5	J8-2	22 Gauge Wire
38	P3-4	E8	22 Gauge Wire
39	E7	J8-4	22 Gauge Wire
40	P3-5	E1O	22 Gauge Wire
41	E9	J8-5	22 Gauge Wire
42	P3-6	E20	22 Gauge Wire
43	E19	J8-6	22 Gauge Wire
44	P3-7	E18	22 Gauge Wire
45	E17	J8-7	22 Gauge Wire
46	P3-8	E16	22 Gauge Wire
47	E15	J8-8	22 Gauge Wire
48	P3-9	E14	22 Gauge Wire
49	E13	J8-9	22 Gauge Wire
50	P3-10	E12	22 Gauge Wire
51	E11	J8-10	22 Gauge Wire
52	P3-11	J8-11	24 Gauge Wire
53	P3-12	J8-12	24 Gauge Wire
54	P3-14	J8-14	24 Gauge Wire
55	P3-15	J8-15	24 Gauge Wire
56	P3-16	J8-16	24 Gauge Wire
57	P3-17	J8-17	24 Gauge Wire
58	P3-18	J8-18	24 Gauge Wire
59	P3-19	J8-19	24 Gauge Wire
60	P3-20	J8-20	24 Gauge Wire
61	J11-1	C6+	20 Gauge Wire
62	J2-2	J11-1	20 Gauge Wire
63	J14-1	C6-	20 Gauge Wire
64	J2-7	J14-1	20 Gauge Wire
65	J10-1	J1-7	20 Gauge Wire
66	J1O-1	J3-1	20 Gauge Wire

Table 3-8. CMCC/DRIVE BOARD/PRINT HEAD TEST FIXTURE
WIRE LIST - Continued

WIRE NO.	FROM	TO	REMARKS
67	J13-1	J3-2	20 Gauge Wire
68	J1-2	J13-1	20 Gauge Wire
69	J13-1	J14-1	20 Gauge Wire
70	J3-20	J4-1	22 Gauge Wire
71	J4-8	S1-1	22 Gauge Wire
72	S1-2	J4-2	22 Gauge Wire
73	J14-1	S1-2	22 Gauge Wire
74	J3-19	J13-1	22 Gauge Wire
75	J1-9	P1-5	22 Gauge Wire
76	J1-4	P1-9	22 Gauge Wire
77	J2-19	P1-10	24 Gauge Wire
78	J2-22	P1-23	24 Gauge Wire
79	J1-8	P1-8	22 Gauge Wire
80		TP-4	22 Gauge Wire
81	TP-4	P1-7	22 Gauge Wire
83	J2-21	TP-3	20 Gauge Wire
84	TP-3	P1-6	20 Gauge Wire
85	F3-2	TP-1	20 Gauge Wire
86	F3-1	P1-13	20 Gauge Wire
87	F3-1	P1-14	20 Gauge Wire
88	J2-8	F4-1	20 Gauge Wire
89	F4-1	P1-22	20 Gauge Wire
90	J2-9	P1-24	20 Gauge Wire
93	P1-11	J1-1	20 Gauge Wire
94	TP-6	P1-12	20 Gauge Wire
95	J1-15	E1	20 Gauge Wire
96	E2	TP-8	20 Gauge Wire
98	E2	Q4-C	20 Gauge Wire
100	TP-9	J2-11	20 Gauge Wire
101	TP-9	Q4-B	20 Gauge Wire
102	TP-10	Q4-E	20 Gauge Wire
103	TP-10	J1-11	20 Gauge Wire
104	J1-14	C8+	22 Gauge Wire

Table 3-8. CMCC/DRIVE BOARD/PRINT HEAD TEST FIXTURE WIRE LIST - Continued

WIRE NO.	FROM	TO	REMARKS
105	J1-12	C8-	20 Gauge Wire
106	J2-14	P1-15	22 Gauge Wire
107	J2-23	P1-16	22 Gauge Wire
108	J2-4	P1-17	22 Gauge Wire
109	J2-5	P1-18	22 Gauge Wire
110	J4-12	TP-13	22 Gauge Wire
111	TP-13	P1-3	22 Gauge Wire
112	J4-10	TP-14	22 Gauge Wire
113	TP-14	P1-4	22 Gauge Wire
114	J4-11	TP-15	22 Gauge Wire
115	TP-15	P1-2	22 Gauge Wire
116	J4-9	TP-16	22 Gauge Wire
117	TP-16	P1-1	22 Gauge Wire
118	J1-35	E36	20 Gauge Wire
119	J2-1	E36	20 Gauge Wire
120	J1-28	TB1-E4	22 Gauge Wire
121	TB1-E4	TB1-E6	22 Gauge Wire
123	TB1-E7	TB1-E14	22 Gauge Wire
124	TB1-E13	TB1-E14	22 Gauge Wire
125	TB1-E13	J1-3	22 Gauge Wire
126	TB1-E9	DS1-1	22 Gauge Wire
127	DS1-2	TB1-E22	24 Gauge Wire
128	TB1-E21	TP-5	22 Gauge Wire
129	DS3-2	DS2-2	24 Gauge Wire
130	TB1-E3	TB1-E1	24 Gauge Wire
131	R6-2	TB1-E1	22 Gauge Wire
132	J1-21	TP-5	22 Gauge Wire
133	J2-12	TB1-E18	22 Gauge Wire
134	TB1-E17	TB1-E12	22 Gauge Wire
135	TB1-E16	DS3-1	22 Gauge Wire
136	J2-16	TB1-E20	22 Gauge Wire
137	TB1-E19	TB1-E11	22 Gauge Wire
138	TB1-E15	DS2-1	22 Gauge Wire

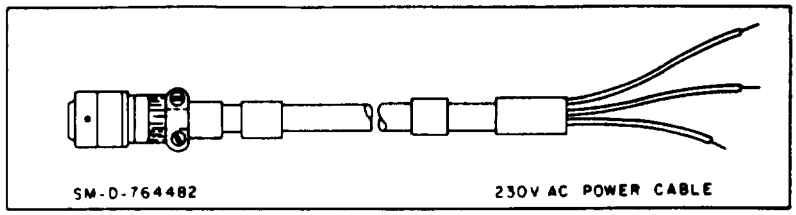
Table 3-8. CMCC/DRiVE BOARD/PRINT HEAD TEST FIXTURE WIRE LIST - Continued

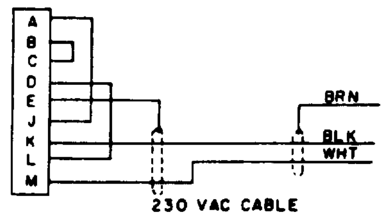
WIRE NO.	FROM	TO	REMARKS
139	J1-13	TB1-E2	22 Gauge Wire
140	TP-7	TB1-E2	22 Gauge Wire
141	J4-6	TP-17	24 Gauge Wire
142	J2-3	C7+	20 Gauge Wire
143	J2-6	C7-	20 Gauge Wire
144	P2-1	E23	20 Gauge Wire
145	P2-2	E25	20 Gauge Wire
146	P2-5	E27	20 Gauge Wire
147	P2-4	E29	20 Gauge Wire
148	P2-3	F1-1	20 Gauge Wire
149	P2-6	F2-1	20 Gauge Wire
150	E24	TP-18	20 Gauge Wire
151	E26	J5-2	20 Gauge Wire
152	E28	TP-20	20 Gauge Wire
153	E30	TP-21	20 Gauge Wire
156	P4-1	M1	
157	P4-2	M1	
158	P4-3	E35	
159	P4-SHIELD	E35	
160	J5-1	E24	20 Gauge Wire
161	E26	TP-19	20 Gauge Wire
162	J5-5	E28	20 Gauge Wire
163	J5-4	TP-21	20 Gauge Wire
164	F1-2	TP-22	20 Gauge Wire
165	J5-6	F2-2	20 Gauge Wire
166	TB1-E21	TB1-E3	22 Gauge Wire
167	F1-2	J5-3	20 Gauge Wire
168	F2-2	TP-23	20 Gauge Wire
169	F4-2	TP-2	20 Gauge Wire
170	J2-10	F3-1	20 Gauge Wire

3-21. POWER AND DATA CABLES

There are three power cables and one data cable used to support AN/UGC-74B(V)3 and AN/UGC-74C(V)3 testing.

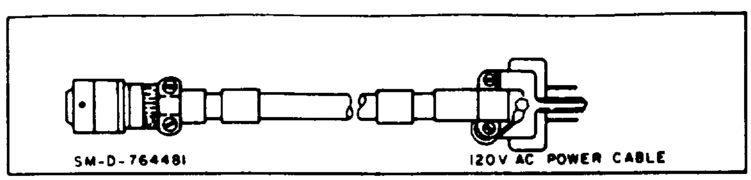
230 Vac POWER CABLE

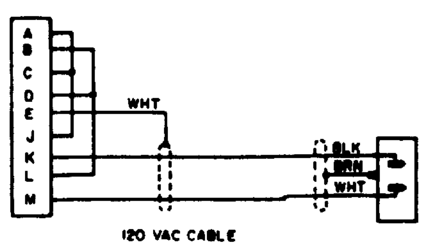




- The 230 Vac power cable is configured with a prewired connector for mating with J2 on AN/UGC-74B(V)3 or AN/UGC-74C(V)3, or filter assembly test fixture.
- Connector is wired to properly interconnect 230 Vac prime power with appropriate winding of power transformer in filter module. Cable is 8 feet long and is not terminated at the other end.

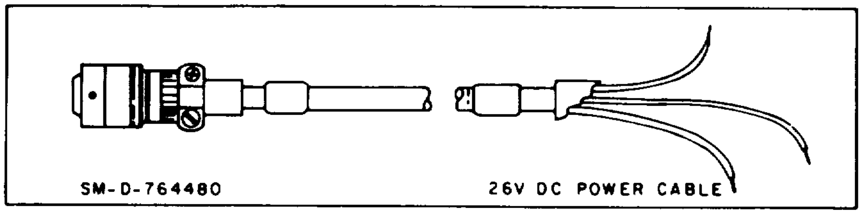
120 Vac POWER CABLE

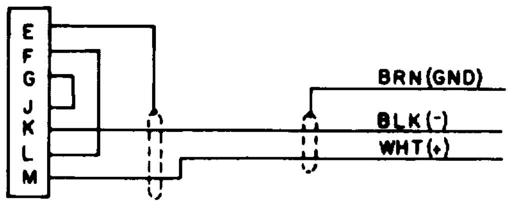




- The 120 Vac power cable is configured with prewired connector for mating with J2 on AN/UGC-74B(V)3 or AN/UGC-74C(V)3, or filter assembly test fixture.
- Connector is wired to properly interconnect 120 Vac prime power with appropriate windings of filter assembly power transformer.
- Cable is 7 feet long and is terminated in a standard 3-prong 120 V plug.

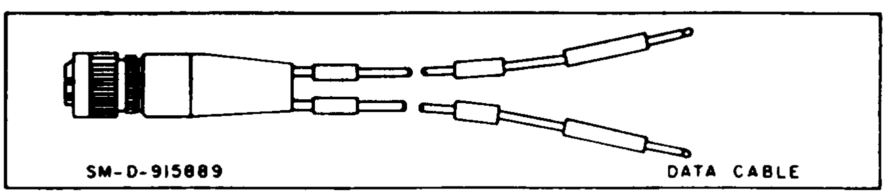
26 Vdc POWER CABLE

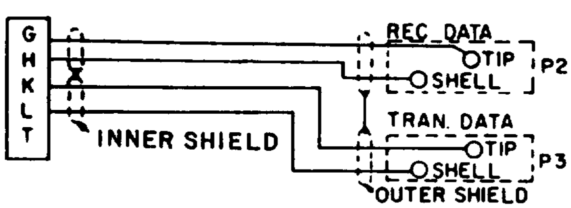




- The 26 Vdc power cable is configured with prewired connector for mating with J2 on AN/UGC-74B(V)3 or AN/UGC-74C(V)3, or filter assembly test fixture.
- Connector is wired to properly interconnect 26 Vdc prime power to filter module.
- Cable is 8 feet long and is not terminated at the other end.
- When connecting to dc source, WHT wire should be connected to (+) and BLK wire to (–). BRN wire is ground.

DATA CABLE





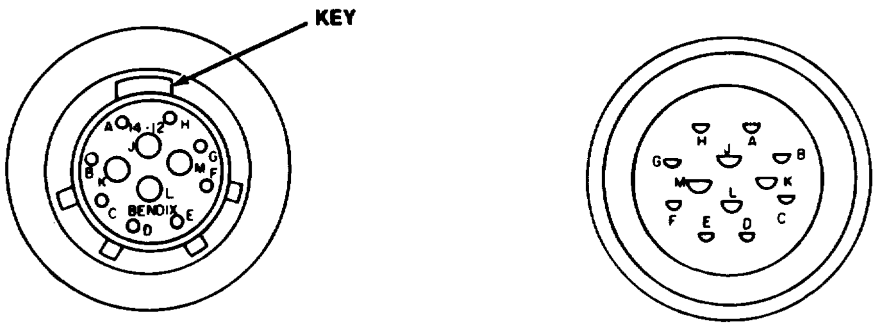
- Data cable provides interface capability between equipments having phone jacks connectors, and the transmit and receive lines of AN/UGC-74B(V)3 or AN/UGC-74C(V)3.
- Used in conjunction with TS-3378/G and SG-1054/G during testing.

Figure 3-35 shows key and pin identification for connector MS3116F14-12S used on the following power cables:

SM-D-764482 (for 230 Vac power source)

SM-D-764481 (for 115 Vac power source)

SM-D-764480 (for 26 Vdc power source)



A. CONNECTOR SIDE B. SOLDER SIDE

Figure 3-42. POWER CONNECTOR KEY AND PIN IDENTIFICATION

Figure 3-36 shows key and pin identification for data connector used on the SM-D-915889 data cable.

A. CONNECTOR SIDE B. SOLDER SIDE

Figure 3-43. DATA CONNECTOR KEY AND PIN IDENTIFICATION

CHAPTER 4

UNIT MAINTENANCE INSTRUCTIONS

PAGE

Section i. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

Section III. TROUBLESHOOTING

Section IV. MAINTENANCE PROCEDURES

Section V. PREPARATION FOR STORAGE AND SHIPMENT

Section I. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

4-1. COMMON TOOLS

For all authorized common tools and equipment, see Modified Table of Organization and Equipment (MTOE) applicable to unit.

4-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

Special tools, TMDE, and support equipment required by unit maintenance personnel are listed below:

Tool Kit TE-50B
Multimeter AN/PSM-45, or equivalent
Loopback Plug SM-B-916000

4-3. REPAIR PARTS

Repair parts are listed and illustrated in the repair parts and special tools list in the TM 11-5815-602-24P-1 for unit maintenance.

Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

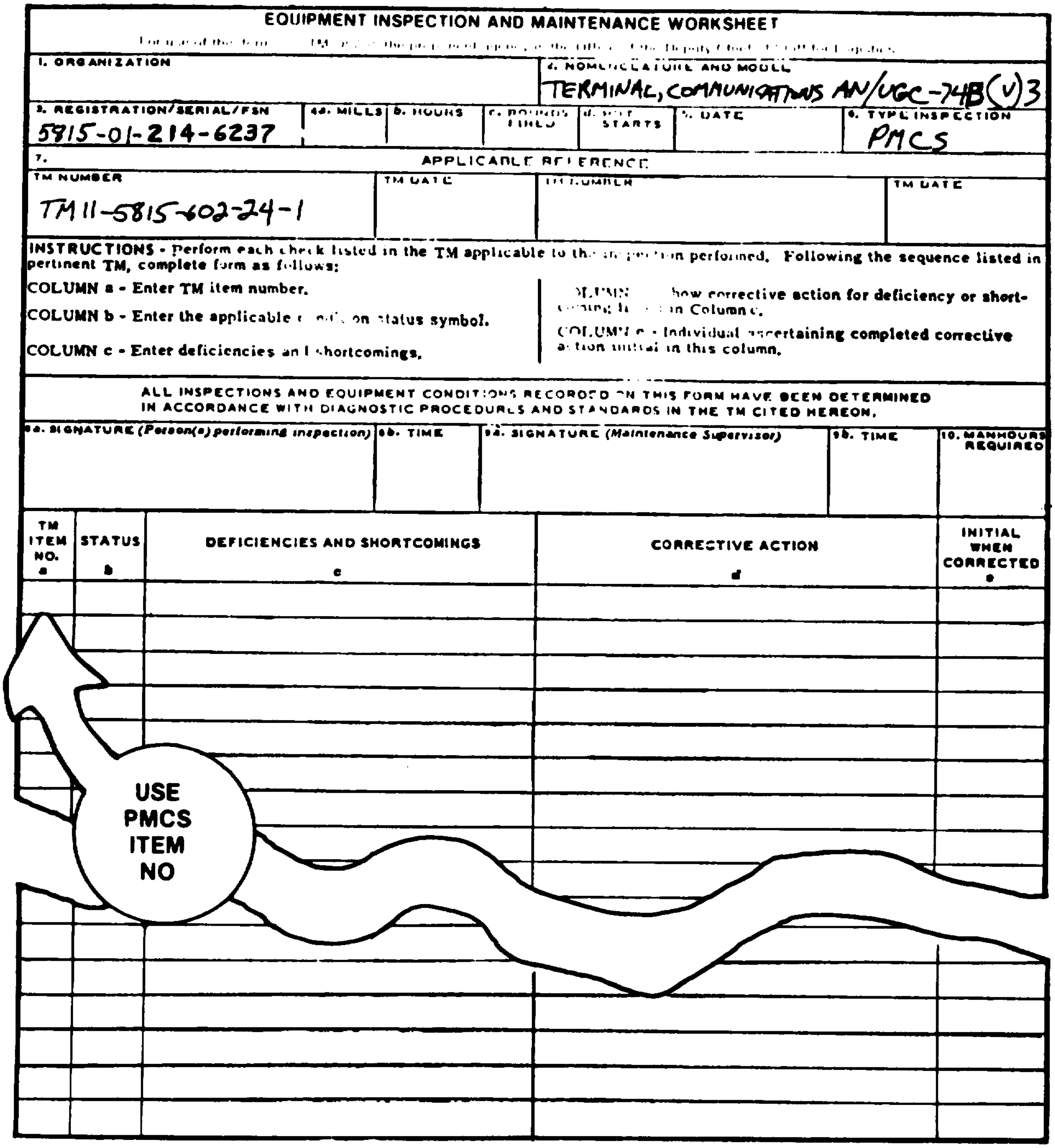
4-4. GENERAL

Purpose of scheduled preventive maintenance checks and services (PMCS) is to prevent trouble, reduce downtime, and assure that Communications Terminals AN/UGC-74B(V)3 and AN/UGC-74C(V)3 remain in serviceable condition.

4-5. RECORDS AND REPORTS

Records and reports of preventive maintenance checks and services must be made in accordance with requirements set forth in DA PAM 738-750, The Army Maintenance Management System (TAMMS). Use PMCS Table Item No. column to get the number for TM ITEM NO. column of DA Form 2404, Equipment Inspection and Maintenance Worksheet. (See example on page 4-2.)

DA FORM 2404, EQUIPMENT INSPECTION AND MAINTENANCE WORKSHEET


EQUIPMENT INSPECTION AND MAINTENANCE WORKSHEET

1. ORGANIZATION				2. NOMENCLATURE AND MODEL TERMINAL, COMMUNICATIONS AN/UGC-74B(V)3		
3. REGISTRATION/SERIAL/FSN 5915-01-214-6237	4a. MILES	b. HOURS	c. ROUNDS FIRED	d. HOT STARTS	5. DATE	6. TYPE INSPECTION PMCS

7. APPLICABLE REFERENCE

TM NUMBER	TM DATE	TM NUMBER	TM DATE
TM 11-5815-602-24-1			

INSTRUCTIONS - Perform each check listed in the TM applicable to the inspection performed. Following the sequence listed in pertinent TM, complete form as follows:

COLUMN a - Enter TM item number.
COLUMN b - Enter the applicable condition status symbol.
COLUMN c - Enter deficiencies and shortcomings.
COLUMN d - Show corrective action for deficiency or shortcoming listed in Column c.
COLUMN e - Individual ascertaining completed corrective action initial in this column.

ALL INSPECTIONS AND EQUIPMENT CONDITIONS RECORDED ON THIS FORM HAVE BEEN DETERMINED IN ACCORDANCE WITH DIAGNOSTIC PROCEDURES AND STANDARDS IN THE TM CITED HEREON.

8a. SIGNATURE (Person(s) performing inspection)	8b. TIME	9a. SIGNATURE (Maintenance Supervisor)	9b. TIME	10. MANHOURS REQUIRED

TM ITEM NO. a	STATUS b	DEFICIENCIES AND SHORTCOMINGS c	CORRECTIVE ACTION d	INITIAL WHEN CORRECTED e

NOTE

LOCAL COMMAND SOP SHOULD PROVIDE INSTRUCTIONS ON HOW TO COMPLETE DA FORM 2404 IN ACCORDANCE WITH COMMAND POLICY. IN ADDITION, DA PAM 738-750 (TAMMS) PROVIDES ALL INFORMATION NEEDED FOR THE COMPLETION OF THIS FORM.

4-6. PMCS TABLE

Unit PMCS Table 4-1 can be used to assist in:

• SYSTEMATIC CARE - Procedures given in PMCS table explain routine, systematic care and cleaning essential to proper upkeep and operation of the terminal.

• TROUBLESHOOTING - To help determine and correct faults.

Ž Reestablishing service after a shutdown.

Routine checks such as the following are not listed as PMCS checks:

ž Cleaning
• Dusting
Ž Checking for frayed cables
• Storing items not in use
• Checking for loose nuts, bolts, and screws
• Checking for loose or broken knobs

Routine checks are things that should be done anytime it is seen they must be done. If a routine check (such as above) is found listed in the PMCS table, it is because other personnel reported problems with this item.

SEQUENCE

ž Procedures in PMCS table are to be done in order of item number.

PMCS COLUMN HEADINGS

• ITEM NUMBER gives the order in which procedures are to be done. Also, these item numbers are used to identify individual procedures in PMCS table.

• ITEM TO BE INSPECTED tells what part or function the procedure will check or service.

• PROCEDURE gives details of what is to be done, the required order for doing any steps, and results which are acceptable.

NOTES

When equipment is installed or reinstalled, all items in unit PMCS table shall be performed. WARNINGS and CAUTIONS concerning electrical shock and bodily harm must be observed when performing PMCS. See WARNING page in the front of this manual.

If terminal MUST be in operation all the time, check and service those items that can be checked and serviced without disturbing operations. Make complete checks and services when equipment CAN be shut down.

Table 4-1. UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES TABLE

SEMIANNUAL SCHEDULE

ITEM NO.	ITEM TO BE INSPECTED	PROCEDURES
1	Printing	Using message from SELF-TEST, inspect printing for clearness.
2	Gaskets	Check following gaskets for serviceability; inspect for dryness, rips, tears, gouges, missing portions. Notify intermediate direct support maintenance personnel of any unserviceable gaskets.

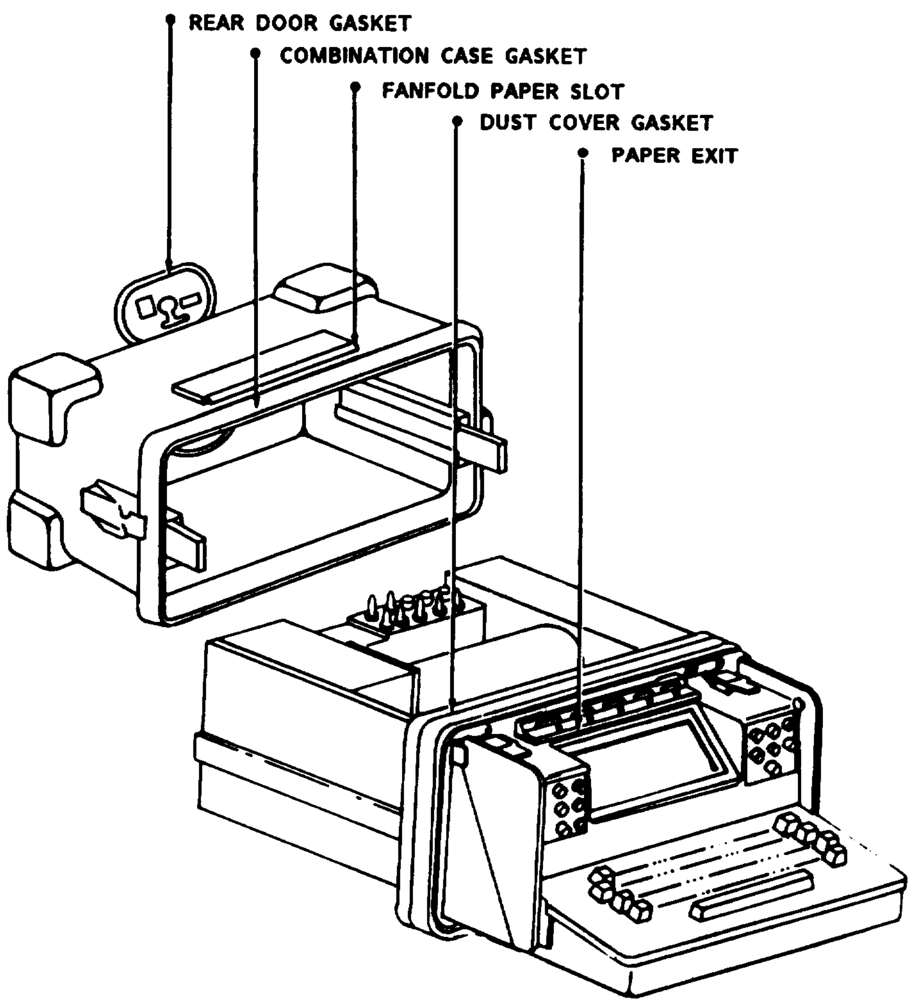


Table 4-1. UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES TABLE

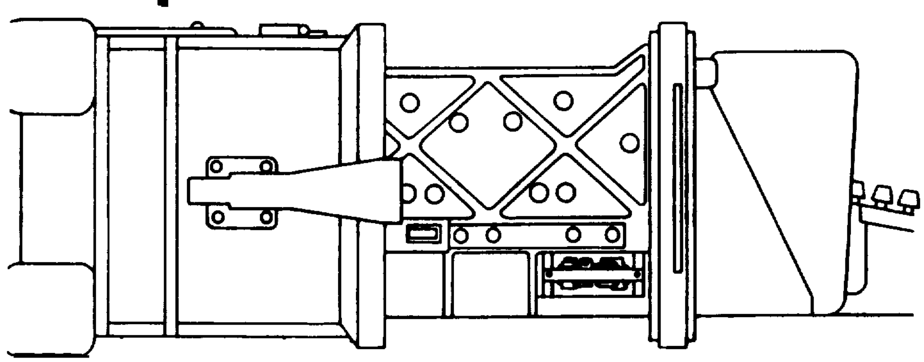
SEMIANNUAL SCHEDULE - Continued

ITEM NO.	ITEM TO BE INSPECTED	PROCEDURES
3	Ground connector	Inspect ground connector for serviceability and cleanliness.

CAUTION

Use extreme care when extending terminal to ensure that connecting cables at rear are carefully pulled through rear opening so as to prevent damaging cables or connectors.

ITEM NO.	ITEM TO BE INSPECTED	PROCEDURES
4	Terminal slides	Release combination case latches and carefully slide terminal out from case until slides stop.



ITEM NO.	ITEM TO BE INSPECTED	PROCEDURES
		Terminal should slide out smoothly to stop position. Inspect slides for cracks or breaks, burrs, or other obstructions. File off any burrs or obstructions.

CAUTION

Ensure that all filings are kept out of terminal interior. Any small steel particles which contact terminal electrical components may cause serious internal shorts and grounding of circuits.

ITEM NO.	ITEM TO BE INSPECTED	PROCEDURES
		Check to ensure spring-loaded slide stop locks are working properly. Report any inoperable or unserviceable stop locks to intermediate direct support maintenance personnel.

Table 4-1. UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES TABLE

SEMIANNUAL SCHEDULE - Continued

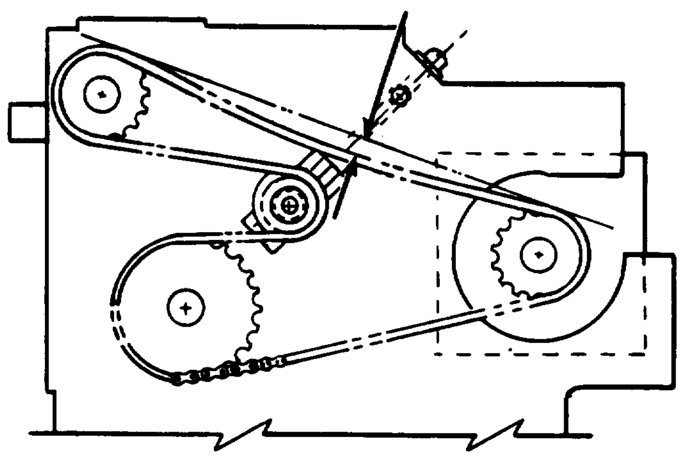
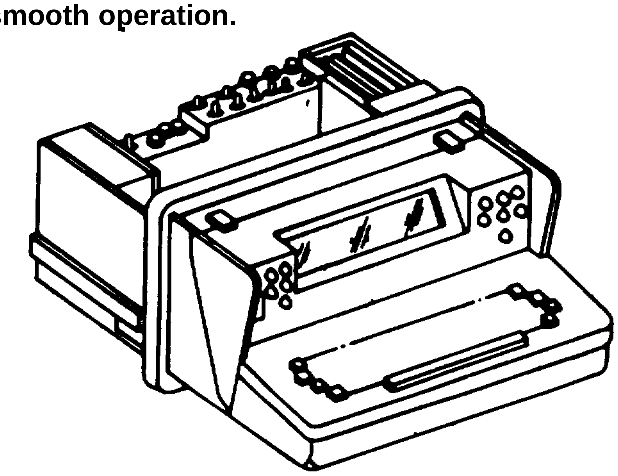
ITEM NO.	ITEM TO BE INSPECTED	PROCEDURES
5	**Line-feed (motor drive) chain and sprocket**	**Inspect line-feed (motor drive) chain and sprockets for signs of wear or misalinement. Chain should have between 1/16 to 1/8 inch of slack.**  **Adjust chain tension as required. (See paragraph 4-14A). If line-feed (motor drive) sprockets are misalined, make necessary adjustments. Adjustments to be performed by technician only.**
6	**Internal switches and controls**	**Inspect for loose, bent, or cracked controls and switches. Check for smooth operation.**  **Tighten any loose knobs. Notify intermediate direct support maintenance personnel of bent or broken controls and switches.**

Table 4-1. UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES TABLE

SEMIANNUAL SCHEDULE - Continued

ITEM NO.	ITEM TO BE INSPECTED	PROCEDURES
7	Low paper switch	Test low paper switch as directed in paragraph 4-14B.
8	Paper exit bracket	Test paper exit bracket as directed in paragraph 4-14C.
9	Paper out switch	Test paper out switch as directed in paragraph 4-14D. Adjustment to be performed by technician only.
10	Power linkage cable	Test power linkage cable as directed in paragraph 4-14E.

Section III. TROUBLESHOOTING

4-7. GENERAL

Troubleshooting at unit maintenance level requires location of any trouble as quickly as possible.

Once trouble is located, repair it if authorized to do so, or determine if a higher category of maintenance is required. Repair by unit maintenance personnel is limited by tools, test equipment, and replacement parts allocated to that level by the Maintenance Allocation Chart (MAC) in Appendix B.

Replacement of defective units is done by a higher category of maintenance (intermediate direct support).

NOTE

Before using troubleshooting charts, check work order and talk to operator, if possible, for a description of trouble symptom(s).

4-8. USE OF TROUBLESHOOTING CHART

Troubleshooting charts for the terminal are provided in this section. Only those corrective actions which are within the scope of unit maintenance are listed in these charts. If these actions do not restore the terminal to normal operation, refer to higher category of maintenance for corrective action.

NO POWER INPUT:

- If there is no indication of power input (motor does not run, lamps do not light), and there is a loss of all terminal functions, see Troubleshooting Chart No. 1.

TROUBLE INDICATION WITH POWER INPUT:

- See Troubleshooting Chart No. 2 and start with Step No. 1 “Self-Test”.

When a trouble appears, refer to proper step in the chart for correction of trouble. If higher level maintenance is not required, perform listed adjustment(s), or replace the defective lamp or fuse.

If a trouble does not appear during Self-Test, perform Loopback Test, Troubleshooting Chart No. 2, Step No. 7.

If there is a trouble in battery backup operation, see Troubleshooting Chart No, 2, Step No. 8.

If a trouble does not appear when operating in other than LO DATA or $\overline{\text{LO DATA}}$, see Troubleshooting Chart No. 2, Step No. 9.

UNIT MAINTENANCE TROUBLESHOOTING CHART NO. 1

STEP	INSTRUCTION	INDICATION	YES	NO	REMARKS
1	Check J1 and J2 cable connectors.	Connectors are securely fastened.	X		Continue troubleshooting.
				X	Fasten connectors securely.
2	Lower dust cover and check power cable.	Linkage secure and working properly.	X		Continue troubleshooting.
				X	Adjust linkage as in paragraph 4-14E.
3	Extend terminal out on slides, locate and remove fuses F1 and F2, and check continuity (less than 1 ohm) of each fuse.	Continuity.	X		Continue troubleshooting.
				X	Replace defective fuses.
4	Disconnect power cable J2 from terminal and check cable for operating voltage (115 VAC or 230 VAC) between pins M and K. (See figure 3-35.)	Operating voltage present.	X		Higher maintenance required.
				X	Replace power cable J2.
5	Check external power input circuit (ac or de), especially fuses, circuit breakers, switches, and plug connections.				Repair trouble if found; if not, notify higher maintenance (intermediate direct support).

UNIT MAINTENANCE TROUBLESHOOTING CHART NO. 2

STEP	INSTRUCTION	INDICATION	YES	NO	REMARKS
1	Start Self-Test (see table 2-5, item 6).	Self-Test starts.	X		Continue trouble-shooting.
				X	Check switch settings.
		UCPU Test correct.	X		Continue trouble-shooting.
				X	Higher level main-tenance required.
		Printing correct.	X		Continue trouble-shooting.
				*	Go to steps 2,5,6; go to memory test.
		Memory Test correct.	X		Continue trouble-shooting.
				X	Higher level main-tenance required.
		For MODEL C ONLY, see step 1a.			
		Communications Test correct.	X		Continue trouble-shooting.
				X	Check switch settings.
		Keyboard Test correct.	X		Continue trouble-shooting.
				X	Higher level main-tenance required.
MODEL C ONLY					
1a		AM/RF Test correct	X		Continue trouble-shooting.
				X	Higher level main-tenance required.

UNIT MAINTENANCE TROUBLESHOOTING CHART NO. 2 - Continued

STEP	INSTRUCTION	INDICATION	YES	NO	REMARKS
2	Check ribbon feed.	Ribbon feed operates properly.	X		Continue trouble-shooting.
				X	Check cassette mount, feed path.
				X	Install new ribbon cassette.
				X	Higher level main-tenance required.
3	Using initial-ization message check printing for errors and quality of print.	Print quality good and error free.	X		Continue trouble-shooting.
				X	Replace ribbon cas-sette and recheck.
		Print errors, characters not properly formed.	X		Higher level main-tenance required.
				X	Continue trouble-shooting.
4	Check line-feed tension and sprocket adjustment.	Adjustment required. ●	*		Perform adjustment in paragraph 4-14A.
				X	Continue trouble-shooting.
5	Check paper exit bracket adjustment.	Adjustment required. ●	*		Perform adjustment in paragraph 4-14C.
				X	Continue trouble-shooting.
6	Start Loopback Test (see Table 2-5, item 7).	All operating modes correct.	X		Continue trouble-shooting.
				X	Higher level main-tenance required.
		Audio alarm resets.	X		Continue trouble-shooting.
				X	Higher level main-tenance required.

* These adjustments to be performed by technician only.

UNIT MAINTENANCE TROUBLESHOOTING CHART NO. 2 - **Continued**

STEP	INSTRUCTION	INDICATION	YES	NO	REMARKS
6	Start Loopback Test - Continued	ABORT Test correct.	X		Continue trouble-shooting.
				X	Higher level main-tenance required.
		Manual line-feed operates correctly.	X		Continue trouble-shooting.
				X	Check paper feed obstruction. If fault not corrected highef level maintenance required.
		Continuity between pins R and S of J1 (TRANSFER switch ON). Open circuit between pins R and S (TRANSFER switch OFF). (See figure 3-36.)	X		Continue trouble-shooting.
				X	Higher level main-tenance required.
		Paper low switch operates correctly.	X		Continue trouble-shooting.
				X	Check paper low adjustment as in paragraph 4-14D.
		Print head car-riage motor deenergizes when paper tension lever is depressed.	X		Continue trouble-shooting.
				*	Check paper out ad-just, para. 4-14D.
		Lamp Test correct.	X		Continue trouble-shooting.
				X	Replace defective lamps.
		Audio alarm operates correctly.	X		Continue trouble-shooting.
				X	Higher level main-tenance required.

* These adjustments to be performed by technician only.

UNIT MAINTENANCE TROUBLESHOOTING CHART NO. 2 - Continued

STEP	INSTRUCTION	INDICATION	YES	NO	REMARKS
7	(Optional test if battery backup supply available.) Using a multi-meter, check battery backup supply voltage.	Voltage acceptable +12 Vdc.	X		Return terminal to service.
				X	Remove and check F2. If fuse is good, replace battery.
8	If operating in other than LO DATA or LO DATA, perform a Loopback Test looping signal at a local or distant patching facility. Improper operation indicates receive or transmit fault.		X		Trouble may be external to terminal
				X	Higher level maintenance required.

Section IV. MAINTENANCE PROCEDURES

4-9. GENERAL

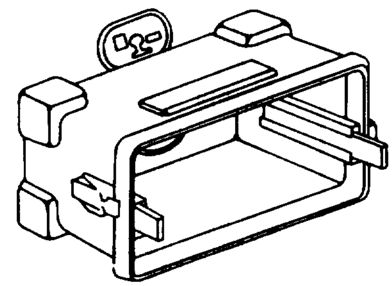
This section includes the following maintenance procedures authorized to be performed by unit maintenance personnel:

WARNING

Disconnect power connections from terminal before proceeding.

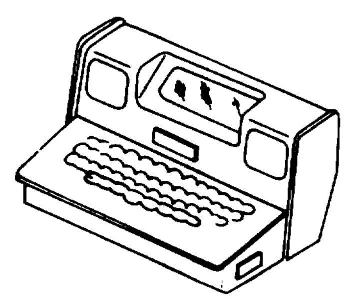
- Cleaning (paragraph 4-10)
- Painting (paragraph 4-11)
- Replacement of fuses in interface assembly (paragraph 4-12)
- Replacement of PARITY RESET lamp (paragraph 4-12)
- Lubrication (paragraph 4-13)
- Adjustments (paragraph 4-14)
- Final inspection (paragraph 4-15)

4-10. UNIT MAINTENANCE CLEANING INSTRUCTIONS

ITEM/LOCATION	PROCEDURES	REMARKS
1. Terminal Exterior	• With outer combination case removed, inspect exterior of combination case, keyboard, and dust cover. • Exterior surfaces should be free of dirt, dust, moisture, rust, grease, fungus and corrosion. • Remove dust, moisture and loose dirt with clean, soft, lint-free cloth (Appendix C, item 7).	Instructions are provided to help meet serviceability requirements during unit maintenance, and should be done whenever needed. 

WARNING

Adequate ventilation should be provided while using TRICHLOROTRIFLUOROETHANE. Prolonged breathing of vapor should be avoided. Solvent should not be used near heat or open flames; products of decomposition are toxic and irritating. Since TRICHLOROTRIFLUOROETHANE dissolves natural oils, prolonged contact with skin should be avoided. When necessary, use gloves which solvent cannot penetrate. If solvent is taken internally, consult a physician immediately.

ITEM/LOCATION	PROCEDURES	REMARKS
	• Remove grease, fungus, and ground-in dirt with a cloth dampened (not wet) with TRICHLOROTRIFLUORO-ETHANE (Appendix C, item 8). • Remove dirt and dust from plugs and jacks with stiff bristle brush.	

CAUTION

Be careful when cleaning plugs and jacks; dirt forced into jacks causes malfunctions which may be dangerous to personnel.

4-10. UNIT MAINTENANCE CLEANING INSTRUCTIONS - Continued

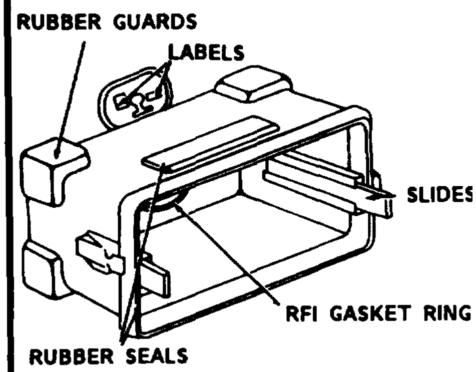
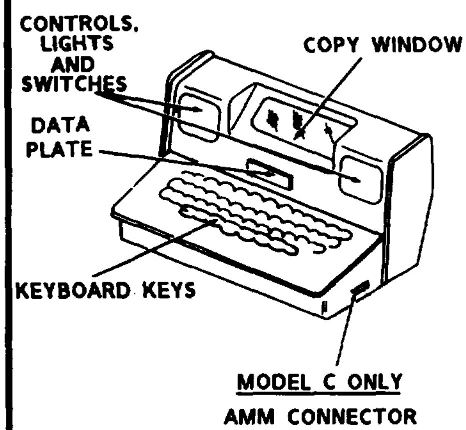
ITEM/LOCATION	PROCEDURES	REMARKS
1. Terminal Exterior - Continued	• Clean dust cover, keys, and control switches with a soft, clean cloth. • If dirt is difficult to remove, clean with a mild soap and water.	
2. Terminal Interior	• With terminal fully extended out from combination case, inspect interior for cleanliness. • Use a clean, dry, lint-free cloth or a dry, long handle sash or camel hair brush for cleaning interior portion of terminal. • Cleaning with a dry brush is preferred, but several cleaning methods may be used.	

WARNING

Compressed air shall not be used for cleaning purposes except where reduced to less than 29 pounds per square inch (psi) and then only with effective chip guarding and personnel protective equipment. Do not use compressed air to dry parts where TRICHLOROTRIFLUOROETHANE has been used. Compressed air is dangerous and can cause serious bodily harm if protective means or methods are not observed to prevent chip or particle (of whatever size) from being blown into the eyes or unbroken skin of the operator.

	• Vacuum cleaning method may be used, or compressed air may be used if air pressure is kept low enough to prevent damage to equipment.	

4-11. UNIT MAINTENANCE PAINTING INSTRUCTIONS

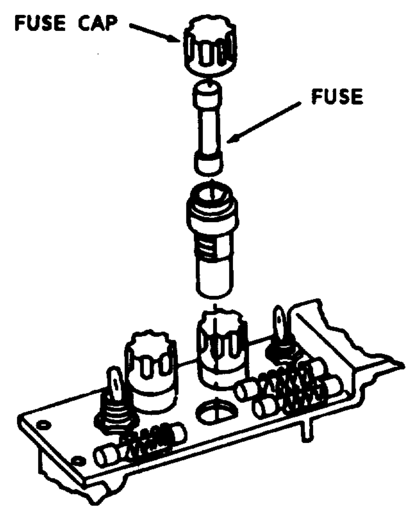
ITEM/LOCATION	PROCEDURES	REMARKS
Terminal Exterior Surfaces	• Clean all damaged painted surfaces of dust, dirt and moisture with a clean, soft, lint-free cloth. • Remove rust and corrosion from metal surfaces by lightly sanding with 0000 sandpaper. **NOTE** The only type paints or finishes authorized for use on terminal components and assemblies are those listed in SB 11-573. • Brush two thin coats of paint on bare metal to protect it from further corrosion. • Refer to applicable cleaning and refinishing practices specified in TB 43-0118.	Areas identified below require caution and care to prevent accidental painting, and should be inspected after any painting.  

4-12. UNIT MAINTENANCE REPLACEMENT

ITEM/LOCATION	PROCEDURES	REMARKS

WARNING

Disconnect power connections from terminal before proceeding.

ITEM/LOCATION	PROCEDURES	REMARKS
1. Interface Assembly Fuse - REMOVAL	• Release combination case latches and fully extend terminal out on slides. • Press downward on fuse cap and rotate cap counter-clockwise until it is released. • Pull cap and fuse from fuseholder. • Remove old fuse, check for continuity (less than 1 ohm) using Multimeter AN/PSM-45 and insert new fuse, if required, into fuse cap.	

CAUTION

Be sure to install only fuses of correct current rating (Table 2-2) in the fuseholders.

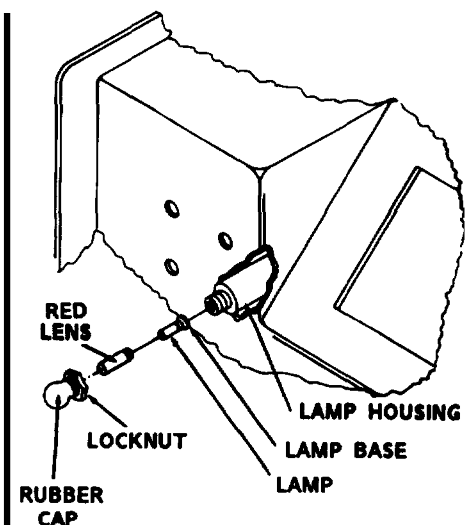
ITEM/LOCATION	PROCEDURES	REMARKS
INSTALLATION	• Install fuse cap by pressing downward on cap and rotating the cap one-half turn clockwise. • Return terminal into combination case and secure with latches. • Apply power.	

4-12. UNIT MAINTENANCE REPLACEMENT - Continued

ITEM/LOCATION	PROCEDURES	REMARKS
2. Dust Cover PARITY RESET Lamp - REMOVAL	• Set POWER ON/OFF switch to OFF position. • Release dust cover latches and lower dust cover sufficiently to allow access to back of parity reset switch.	

CAUTION

Firmly hold switch from rear to prevent switch from turning and to prevent wires being broken off from their connectors.

ITEM/LOCATION	PROCEDURES	REMARKS
	• Using 5/8 inch wrench, loosen nut inside rubber cup. • Remove cover (rubber cap) and nut from dust cover. • With fingers, grasp red lens protruding from switch and turn it counterclockwise until it is removed from housing. • Once removed, grasp small rimmed flange at tip of lens assembly and pull bulb out from red lens assembly.	

4-12. UNIT MAINTENANCE REPLACEMENT - Continued

ITEM/LOCATION	PROCEDURES	REMARKS
2. Dust Cover PARITY RESET Lamp - Continued INSTALLATION	• Insert replacement lamp into red lens, place red lens into switch, and tighten with a clockwise motion until lens is finger-tight.	
	• Reinstall protective rubber cap and nut and tighten down snugly with 5/8 inch wrench.	
	• Observe CAUTION to prevent equipment damage.	
	• Inspect switch assembly for any broken wires and resecure dust cover with latches.	
	• Set POWER ON/OFF switch to ON position.	
	• Test PARITY RESET lamp by pressing and holding PARITY RESET switch.	
	• Lamp should light.	

4-13. UNIT MAINTENANCE LUBRICATI0N INSTRUCTIONS

See replacement procedures in Chapter 5 for access to lubrication points where required.

Table 4-2. LUBRICATION SCHEDULE (SEMI-ANNUAL)

To be performed by technician only.

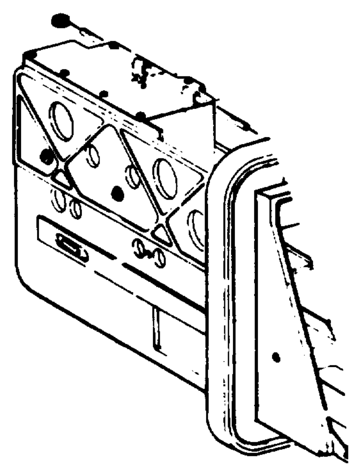
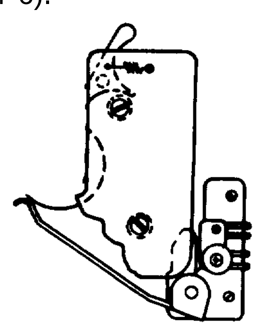
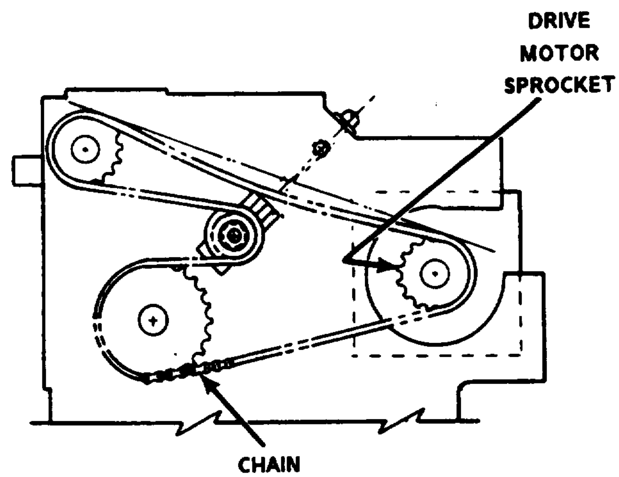
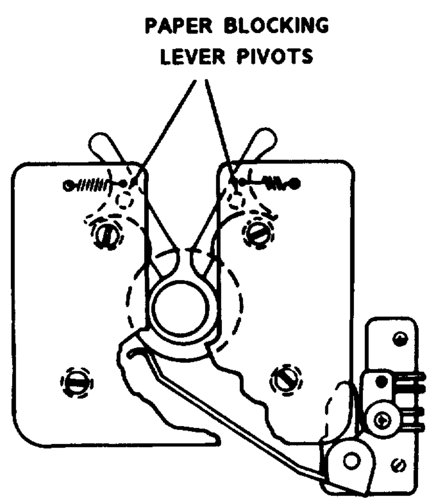
ITEM NO.	ITEMS TO BE LUBRICATED	LUBRICATION PROCEDURES
1	Slides	• With a clean, lint-free cloth, wipe a thin film (light, visible coating) of grease over terminal slides and into top and bottom grooves of slides.  **NOTE** A drop of oil is the amount of oil retained on a No. 22 gauge wire which has been dipped approximately 1/2 inch into a container of oil (MIL-L-46000).
2	Paper low switch activator arm	• Lubricate paper low arm pivot with a drop of oil (Appendix C, item 6). 

Table 4-2. LUBRICATION SCHEDULE (SEMIANNUAL) - Continued

To be performed by technician only.

ITEM NO.	ITEMS TO BE LUBRICATED	LUBRICATION PROCEDURES
3	Line-feed (motor drive)	• Lightly oil chain using a fine bristle brush; remove excess oil. 
	chain	• Apply a film of grease to drive motor sprocket using a bristle brush.
4	Roll paper blocking levers	• Place a drop of oil on left and right side of each lever pivot point. 

4-14. UNIT MAINTENANCE ADJUSTMENTS

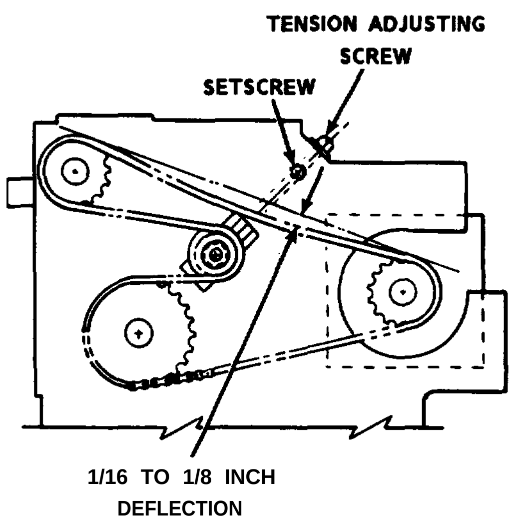
Unit maintenance personnel are authorized to make following adjustments to terminal.

A. LINE-FEED (MOTOR DRIVE) TENSION*
B. LOW PAPER ALARM SWITCH
C. PAPER EXIT BRACKET
D. PAPER OUT SWITCH*
E. POWER CABLE LINKAGE
F. FANFOLD PAPER INSTALLATION ADJUSTMENT

- These adjustments to be performed by technician only.

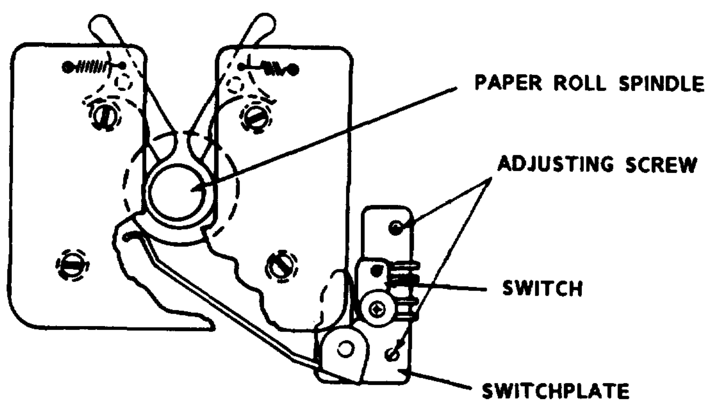
A. LINE-FEED (MOTOR DRIVE) TENSION ADJUSTMENT

ITEM/LOCATION	PROCEDURES
1. Terminal	• Set POWER ON/OFF switch to OFF position. • Release combination case latches and fully extend terminal out on slides.
2. Printer Assembly Left Vertical Wall	• Loosen setscrew using a counterclockwise motion. • Adjust tension adjustment screw to obtain 1/16 to 1/8 inch deflection as shown (turn clockwise to tighten; counterclockwise to loosen). • Tighten setscrew. • Return terminal into combination case and secure with latches.



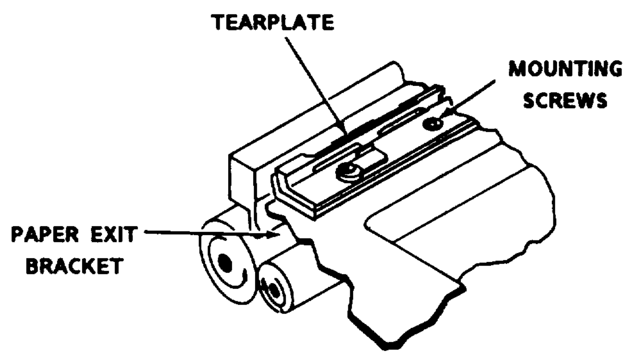
B. LOW PAPER ALARM SWITCH ADJUSTMENT

ITEM/LOCATION	PROCEDURES
1. Terminal	• Set POWER ON/OFF switch to OFF position. • Release combination case latches and fully extend terminal out on slides.
2. Paper Roll	• Remove paper from paper roll spindle and reinsert spindle into paper roll holding bracket.
3. Paper Out Switch	• Loosen adjusting screw on switchplate and position it so that switch is actuated when actuator is 3/16 to 1/4 inch from paper roll spindle. • Tighten adjusting screw. • Install paper. • Raise and secure dust cover.



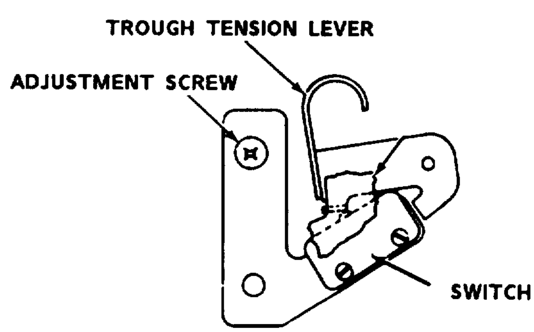
C. PAPER EXIT BRACKET ADJUSTMENT

ITEM/LOCATION	PROCEDURES
1. Dust Cover Assembly	• Loosen five mounting screws on top of tear plate. • Position tear plate forward to backward to hold paper as snug as possible without causing paper to bind at paper exit bracket. • Manually operate line-feed by pressing line-feed switch to ensure paper does not bind. Repeat first two steps as necessary. • Tighten five mounting screws.

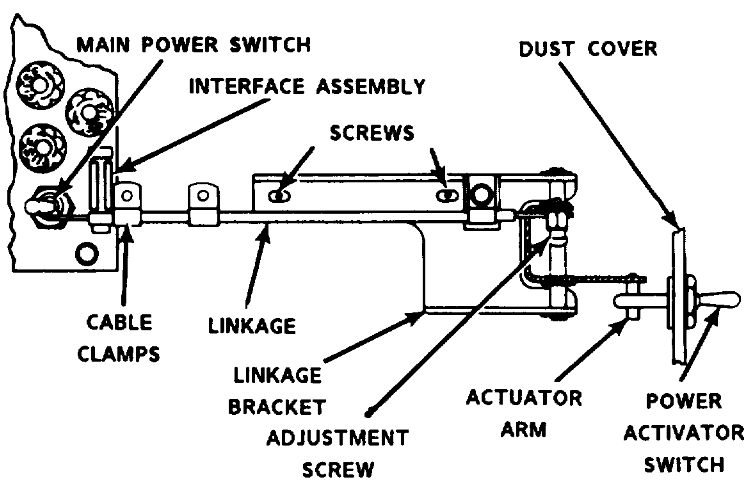


D. PAPER OUT SWITCH ADJUSTMENT

ITEM/LOCATION	PROCEDURES
1. Terminal	• Set POWER ON/OFF switch to OFF position. • Release combination case latches and fully extend terminal out on slides. • Remove paper roll and spindle from terminal.
2. Paper Out Switch	• Loosen adjustment screw. • Position switch mounting plate so that switch "clicks" before paper trough tension lever reaches end of travel. • Tighten adjustment screw.
3. Terminal	• Reinstall paper roll and spindle. • Return terminal into case and secure latches. • Set POWER ON/OFF switch to ON position and verify switch operation. **NOTE** If insufficient adjustment is available by moving switch mounting plate, reform tab on tension level to meet requirements.

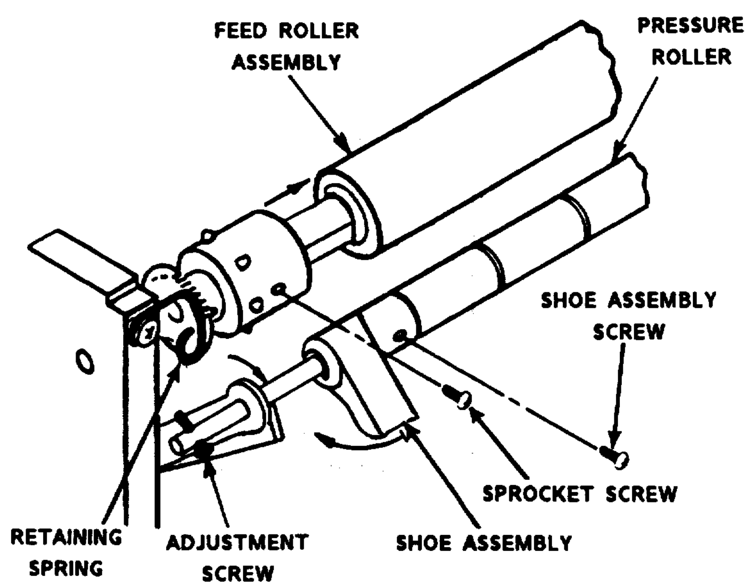


E. POWER CABLE LINKAGE ADJUSTMENT

ITEM/LOCATION	PROCEDURES
1. Interface Assembly	• Set POWER ON/OFF switch to OFF position. • Disconnect power cable J2 from terminal.
2. Terminal	• Release dust cover latches and lower dust cover. • Inspect main power switch of interface assembly. End loop of power linkage cable should press against the power switch from the rear with main power switch in OFF position. • If loop is not properly positioned, continue adjustment. If cable loop is properly positioned, skip next two steps. • Loosen two cable clamps nearest to main power switch. • Pull lightly against the linkage cable assembly until cable loop is resting against rear of the main power switch, with switch in the OFF position. • Loosen adjustment screw securing actuator to cable. • Manually position actuator arm until approximately ¼ inch of cable extends beyond adjustment screw. • Tighten adjustment screw. 
3. Dust Cover Assembly	• To engage actuator arm, close dust cover, being careful to hold POWER switch in OFF position. • Secure dust cover latches.
4. Interface	• Reconnect power cable J2 to terminal. • Set POWER ON/OFF switch to ON position to verify operation.

F. FANFOLD PAPER INSTALLATION ADJUSTMENT

ITEM/LOCATION	PROCEDURES
1. Dust Cover Assembly	• Open dust cover to gain access to front of printer assembly.
2. Printer Assembly	• Loosen screws on left and right shoe assemblies of pressure roller. • Release pressure roller from retaining springs. • Loosen screws on left and right sprocket of feed roller assembly and slide sprockets inward to fit paper. Tighten screws. **NOTE** When readjusting sprockets for roll paper, leave at least .020 inch clearance from chain on left and .020 inch from right vertical wall. • Raise and engage pressure roller with retaining springs. Position left and right shoe over protruding sprockets. Tighten screws on shoe assemblies. • Adjust pressure roller adjustment screws so that paper moves between roller and feed roller without binding.



4-15. FINAL INSPECTION PROCEDURES

ITEM/LOCATION	PROCEDURES
1. Terminal	• Final inspection procedures ensure that all maintenance functions contained in this technical manual have been complied with before equipment is returned to service. • Modifications - Ensure that all MWOs (if listed in DA Pam 25-30 have been accomplished. • PMCS - Ensure that PMCS in Section III has been accomplished. • Completeness - Inspect terminal for completeness. See TM 11-5815-602 -24P-1 for list of components and accessories. • Be sure that all items listed in Basic Issue Items List are on hand. • Check to see that each item is correctly stock numbered. • Be sure that correct quantity is in each package. • Perform complete operational check, to include the Self-Test and Loopback Test (Table 2-5) before turning equipment over to operating personnel. • If operational check cannot be performed satisfactorily after all unit maintenance has been performed, notify next level of maintenance (intermediate direct support).

Section V. PREPARATION FOR STORAGE AND SHIPMENT

4-16. SHUTDOWN

Shutdown procedures for the terminal are as follows:

- Print out all stored messages. Any stored messages not printed out will be lost once the terminal is powered down. (See TM 11-5815-602-10-1 for procedure in printing out stored messages.)
- Verify that all messages have been transmitted.
- Set POWER ON/OFF switch to OFF position.
- Perform the AFTER OPERATING checks of Operator PMCS Table of TM 11-5815-602-10-1.

4-17. SECURE

Secure the terminal as follows:

- Remove copyholder by loosening mounting screw knob in a counterclockwise direction.
- Release hinged sections from center section by opening the four rotating clips.
- Fold the two hinged sections.
- Store copyholder in the front case cover storage compartment.
- With power source shut off, disconnect all cables and close rear panel door; secure with latch.
- Attach front case to terminal and secure latches.

4-18. ADMINISTRATIVE STORAGE

See TM 740-90-1, Chapter 10, for proper siting, preparation, and storage procedures.

CHAPTER 5

INTERMEDIATE DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

PAGE

Section I. GENERAL INFORMATION

Section II. TOOLS AND EQUIPMENT REQUIRED

Section III. TROUBLESHOOTING

Section IV. REPLACEMENT OF MODULAR ASSEMBLIES

Section V. DISASSEMBLY AND REASSEMBLY OF TERMINAL, COMMUNICATIONS AN/UGC-74B(V)3 or AN/UGC-74C(V)3

Section VI. INTERMEDIATE DIRECT SUPPORT TEST PROCEDURES

Section 1. GENERAL INFORMATION

5-1. VOLTAGE AND RESISTANCE MEASUREMENTS

Voltage and resistance measurements performed by intermediate direct support maintenance personnel are described in the troubleshooting procedures, and should be performed in conjunction with those procedures. Where applicable, procedures reference paragraphs, tables, and diagrams which contain the necessary measurement requirements. Unless specified in the procedure, all voltage measurements are made in terminal using Multimeter AN/PSM-45 or equivalent.

5-2. CONTINUITY TESTS

Instructions and data are provided for testing the continuity of wire circuits. Data includes location of test points, operation of switches and maximum allowable resistance.

5-3. BENCH TESTING

Intermediate direct support bench testing, troubleshooting, and repairing of terminal is as specified by the Maintenance Allocation Chart (MAC) in Appendix B. Detailed procedures are provided in troubleshooting and maintenance sections of this chapter.

CAUTION

Before applying power to terminal for the first time, check value of fuses F1 and F2. If fuses are 2 amps, operate only with ac power. If fuses are 10 amps, operate with 26 Vdc power.

Section II. TOOLS AND EQUIPMENT REQUIRED

NOTE

See Maintenance Allocation Chart (MAC) in Appendix B for National Stock Numbers (NSN) of the following tools and test equipment.

5-4. TOOLS AND TEST EQUIPMENT

Tool Kit TE-50B
Tool Kit, Electronic Equipment TK-105/G
Multimeter AN/PSM-45, or equivalent

5-5. SPECIAL TOOLS

Loopback Plug (SM-B-916000)

Remover, Module (SM-B-916003)

Pin Extractors M24308/18-1 and MS27534-22VD

Module, Universal CPU (3A1A1)

Module, Communications (3A1A3)

Module, Print Control (3A1A4)

Module, MD & CC (3A1A5A3)

Assembly, Interface (3A1A7)

Module, Power Supply (3A1PS1)

Assembly, Printer (3A1A5)

MODEL C ONLY

Module, Auxiliary Interface (3A1A2)

Module, Auxiliary Memory/Relay Control (3A2A3)

Module, Auxiliary Memory (3A3)

Section III. TROUBLESHOOTING

5-6.GENERAL

Troubleshooting at intermediate direct support level includes all the troubleshooting techniques outlined for unit maintenance (Chapter 4, Section III), and any special or additional techniques required to isolate a defective assembly.

Systematic troubleshooting procedures, beginning with the operational checks performed at unit level, must be completed by means of sectionalization and localization procedures.

- Sectionalization, the first step in troubleshooting, means tracing trouble to the ma]or assembly responsible for abnormal operation.
- Localization, the second step, means tracing trouble to a particular component within the major assembly.

5-7. TROUBLESHOOTING CHART

Use the following chart (Table 5-1) to sectionalize trouble to the major assembly. Chart is indexed by MALFUNCTION/SYMPTOM, and Test or Procedure to follow in order to locate defective major assembly.

Location of defective major assembly is done by checking for correct terminal response listed in the INDICATION column, and performing indicated procedures when necessary for failures.

Table 5-1. INTERMEDIATE DIRECT SUPPORT TROUBLESHOOTING

MALFUNCTION / SYMPTOM			
		INDICATION	
Step	Test or Procedure	Yes	No
	(1) NO POWER INDICATION / LOSS OF ALL TERMINAL FUNCTIONS		
1.	Check fuses.	Fuses good; go to Step 2.	Replace defective fuses.
2.	Replace power supply assembly (paragraph 5-11A).	Terminal has power; lights are on.	Reinstall original power supply; go to Step 3.
3.	Replace filter assembly (paragraph 5-11E).	Terminal has power; lights are on.	Reinstall original filter assembly; go to intermediate general support maintenance.
	(2) UNIT DOES NOT INITIALIZE CORRECTLY FOLLOWING POWER ON / AUDIO ALARM, DUST COVER LAMPS, PRINT HEAD MOTION MALFUNCTION		
1.	Replace Universal CPU A1A1 CCA (paragraph 5-11B).	Correct initialization.	Reinstall original CCA; go to Step 2.
2.	Replace Print Control A1A4 CCA (paragraph 5-11B).	Correct initialization.	Reinstall original CCA; go to intermediate general support maintenance.
	(3) TERMINAL FAILS SELF-TEST		
1.	If Test No. 1 fails, replace Universal CPU A1A1 CCA (paragraph 5-11B).	Test successful.	Reinstall original CCA; go to intermediate general support maintenance.
2.	If Test No. 2 fails, replace Print Control A1A4 CCA.	Test successful.	Reinstall original CCA; go to Step 2.1.

Table 5-1. INTERMEDIATE DIRECT SUPPORT TROUBLESHOOTING - Continued

MALFUNCTION / SYMPTOM

Step	Test or Procedure	INDICATION Yes	INDICATION No
2.1.	Replace Universal CPU A1A1 CCA (paragraph 5-11B).	Test successful.	Reinstall original CCA; go to intermediate general support maintenance.
3.	If Test No. 3 fails, replace Universal CPU A1A1 CCA (paragraph 5-11B).	Test successful.	Reinstall original CCA; go to intermediate general support maintenance.
MODEL C ONLY (Step 3A)			
3A.	If Test No. 3A fails, replace Auxiliary interface A1A2, Auxiliary Memory/Relay Control 3A2A3, or Auxiliary Memory Module 3A3 according to message.	Test successful.	Reinstall original CCA; go to intermediate general support maintenance.
4.	If Test No. 4 fails, replace COMMUNICATIONS A1A3 CCA.	Test successful.	Reinstall original CCA; go to Step 4.1.
4. 1.	Replace Universal CPU A1A1 CCA (paragraph 5-11B).	Test successful.	Reinstall original CCA; go to intermediate general support maintenance.
5.	If test No. 5 fails, replace keyswitch assembly.	Test successful.	Reinstall original keyswitch assembly; go to Step 5.1+
5.1.	Replace Universal CPU A1A1 CCA (paragraph 5-11B).	Test successful.	Reinstall original CCA; go to intermediate general support maintenance.
(4) IMPROPER OR NO PRINTING			
	Replace Printer Assembly (paragraph 5-11F).	Fault corrected.	Reinstall original assembly; go to intermediate general support maintenance.

Table 5-1. INTERMEDIATE DIRECT SUPPORT TROUBLESHOOTING - Continued

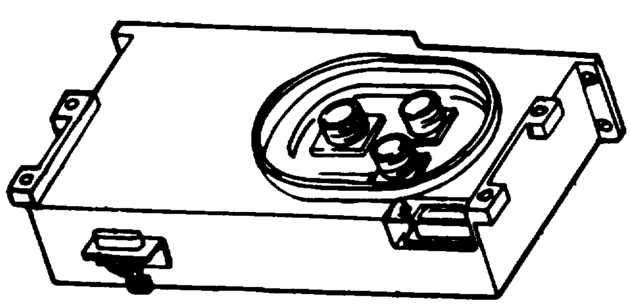
Step	Test or Procedure	INDICATION Yes	INDICATION No
	MALFUNCTION / SYMPTOM		
	(5) IMPROPER OR NO LINE-FEED		
	Replace motor drive and current control CCA (paragraph 5-11D).	Proper line-feed.	Reinstall original CCA; go to intermediate general support maintenance.
	(6) IMPROPER TRANSMISSION AND RECEPTION		
1.	Check for proper control and switch settings on interface assembly.	Identical transmitted and received message.	Go to Step 2.
2.	Replace (paragraph 5-11C) or repair (paragraph 5-11D) interface assembly.	Identical transmitted and received message.	Go to intermediate general support maintenance.
	(7) IMPROPER TRANSMISSION		
	Replace (paragraph 5-11H) or repair (paragraph 5-13D) keyboard keyswitch assembly.	Proper character or command is transmitted when appropriate key is pressed.	Go to intermediate general support maintenance.

5-8. INTERFACE ASSEMBLY FAULT LOCALIZATION

- Make all continuity tests with power cable removed.
- Fault localization in the interface assembly is limited to faults which can be found by performing a continuity test as directed in Table 5-2.
- Failure to detect the fault with this procedure will require forwarding the assembly to intermediate general support.
- Remove interface assembly as directed in paragraph 5-11C.

Table 5-2. INTERFACE ASSEMBLY CONTINUITY TEST

Switch	Position	From	To	Resistance (Max)
CLOCK	INT	J5-40	J5-30	1 ohm
	EXT	J5-40	J5-31	1 ohm
	KG-30	J5-40	J5-30,J5-31	OPEN
CLOCK +/–	+	J5-40	J5-32	1 ohm
	–	J5-40	J5-32	OPEN
FIGURES S/J	S	J5-40	J5-35	1 ohm
	J	J5-40	J5-35	OPEN
SIGNAL	DIØ	J5-40	J5-36	1 ohm
	NRZ	J5-40	J5-36	OPEN
STOP BITS	1	J5-40	J5-9	1 ohm
	2	J5-40	J5-10	1 ohm
MODE	ASCII	J5-40	J5-37	OPEN
	BAUDOT	J5-40	J5-37	1 ohm
SELF-TEST	NORMAL	J5-40	J5-33	1 ohm
	SELF-TEST	J5-40	J5-34	1 ohm
POWER	ON	J2-J	J2-M	1 ohm
	OFF	J2-J	J2-M	OPEN
	ON	J2-L	J2-K	1 ohm
	OFF	J2-L	J2-K	OPEN
	ON	J3-A	J4-8	1 ohm
	OFF	J3-A	J4-8	OPEN



INTERFACE ASSEMBLY

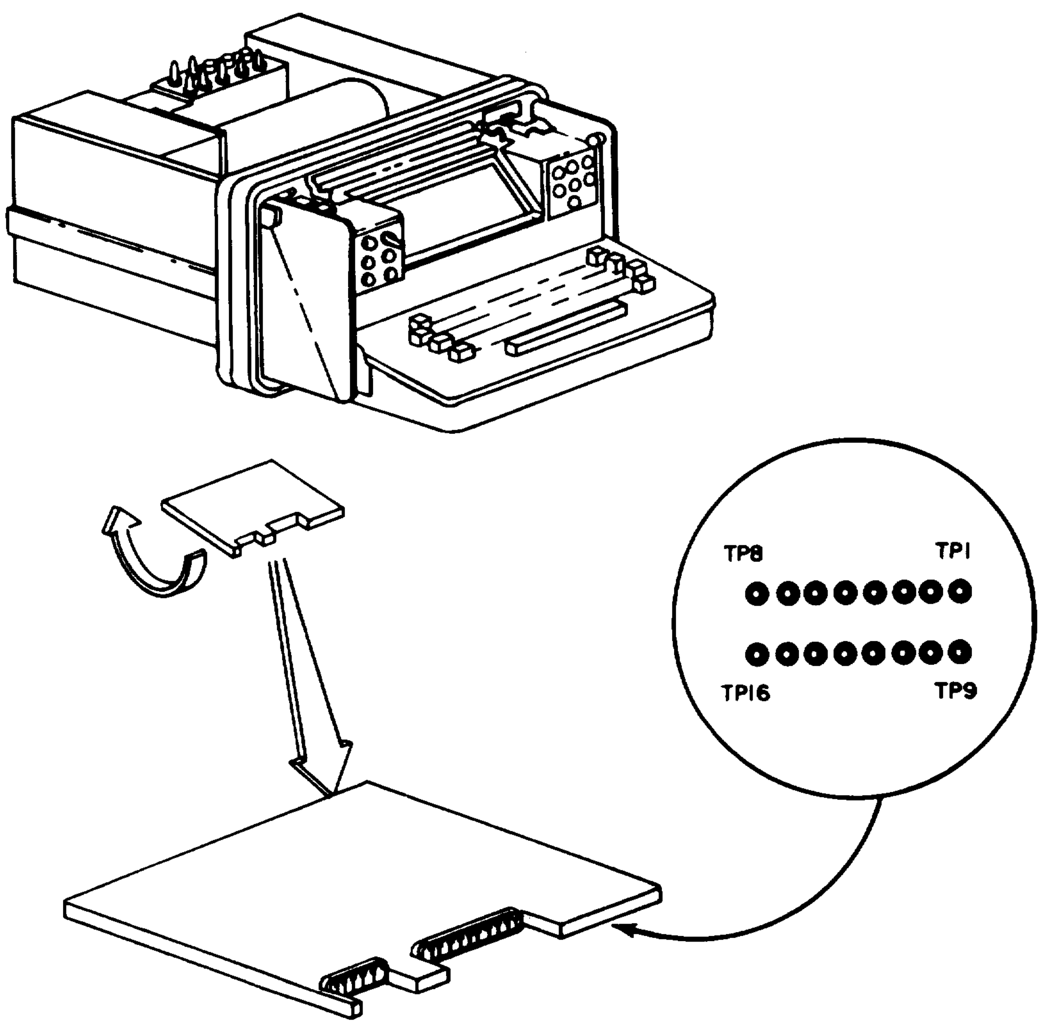
5-9. POWER SUPPLY OUTPUT VOLTAGES

- **Values listed in Table 5-3 are for troubleshooting purposes only; they represent average values. Use Multimeter AN/PSM-45 or equivalent for taking measurements.**

CAUTION

Do not short test point jacks to chassis as this could cause equipment damage.

- **Refer to the following figure for location of power supply test points.**



POWER SUPPLY TEST POINTS

Table 5-3. POWER SUPPLY OUTPUT VOLTAGES

Test Point	Test Point Name	Normal Voltage[1]
1	BU lamp supply	+22 to +32 Vdc (normal input)
		+12 Vdc Nominal (battery backup)
2	CAPVOK	+4.5 Vdc to +5.5 Vdc
3	CONCURR REG	+2.5 Vdc to +5.5 Vdc (not printing)[3]
		0 to +0.5 Vdc (printing)[3]
4	+5 VA	+4.75 to +5.25 Vdc[3]
5	LAMP SUPPLY	0 to +21.5 Vdc (variable by ILLUM control)
6	−8.6 VB	−7.95 to −9.25 Vdc
7	DRUM MOTOR	+5.6 to +11.6 Vdc (drum on)[3]
8	+18 V	+17 to +19.6 Vdc[3]
9	VIN RTN	0
10	SHUT DOWN	0 to +0.5 Vdc (motor running)[3]
		+2.5 Vdc to +5.5 Vdc (motor not running)[3]
11	ABU	0 to +0.6 Vdc (battery backup)
		+3.0 Vdc to +5.23 Vdc (not in battery backup)
12	−5 VA	−4.8 Vdc to −5.9 Vdc
13	SCMO (drum speed)	1080 ±50 μs period[2][3]
14	22 to 30 V	+22 to +32 Vdc
15	+12 V	+10.8 Vdc to +13.69 Vdc
16	+5 VB	+4.8 Vdc to +5.4 Vdc

(1) All voltages are measured with respect to test point 9.

(2) Cannot be checked by intermediate direct support maintenance.

(3) MODEL A ONLY

Section IV. REPLACEMENT OF MODULAR ASSEMBLIES

5-10. GENERAL

This section covers replacement and repair of the following terminal components:

A. POWER SUPPLY
B. PROCESSING LOGIC CARD ASSEMBLIES
C. INTERFACE ASSEMBLY
D. LINE-FEED (MOTOR DRIVE) CURRENT CONTROL CIRCUIT BOARD
E. FILTER ASSEMBLY
F. PRINTER ASSEMBLY
G. KEYBOARD KEYSWITCH ASSEMBLY
H. DUST COVER

MODEL C ONLY

1. AUXILIARY MEMORY/RELAY CONTROL CCA

Procedures listed are for removable modules, components, and assemblies as specified in Maintenance Allocation Chart (MAC), Appendix B, for Intermediate Direct Support maintenance.

Most parts and assemblies of the terminal can be easily reached and replaced without use of special tools or instructions. Replacement, however, may require special techniques and tools to assure proper operation.

Tag all wires to be unsoldered or removed by any other means so as to reduce error in replacement.

When replacement procedures require movement of connectors and/or cable assemblies, the following applies:

To remove, push slide latch to unlock position, then disconnect.
To install, push slide latch to locked position after reconnect.

WARNING

Do not attempt any unauthorized repairs on this equipment -- Avoid personal injury -- BE SAFE. Observe all cautions listed on the front page of this manual.

NOTE

Remove paper roll and ribbon cassette before beginning the following procedures.

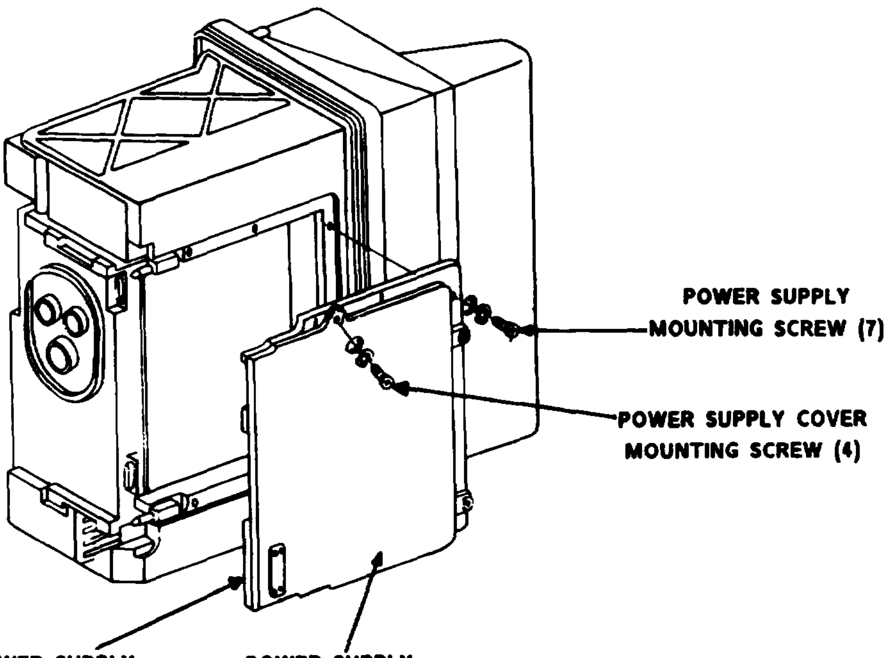
5-11. REPLACEMENT PROCEDURES

A. POWER SUPPLY

<table>
<tr><th>LOCATION/Item</th><th>ACTION/Procedure</th></tr>
<tr><td>CHASSIS BOTTOM
Power Supply</td><td>

REMOVAL

- Set POWER ON/OFF switch to OFF position.
- Disconnect interface cabling from J1, J2, J3.
- Release combination case latches and fully extend terminal.
- Holding in spring-loaded stops, remove case from terminal.
- Turn terminal onto side.
- Remove seven mounting screws holding power supply.
- Gently pull power supply away from chassis.
- Disconnect cable assemblies P2 and P3.

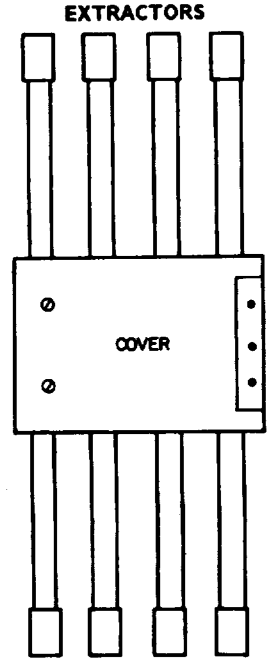


INSTALLATION

- Install power supply cover, if removed, by fastening with four screws.
- Reconnect cable assemblies P2 and P3 to new power supply.
- Gently position power supply in place and fasten with seven mounting screws.
- Return terminal to upright position.
- Return terminal into combination case and reconnect interface cabling; leave terminal in extended position.
- Set POWER ON/OFF switch to ON position.
- Perform SELF-TEST.
- Fully return terminal into combination case and secure latches.

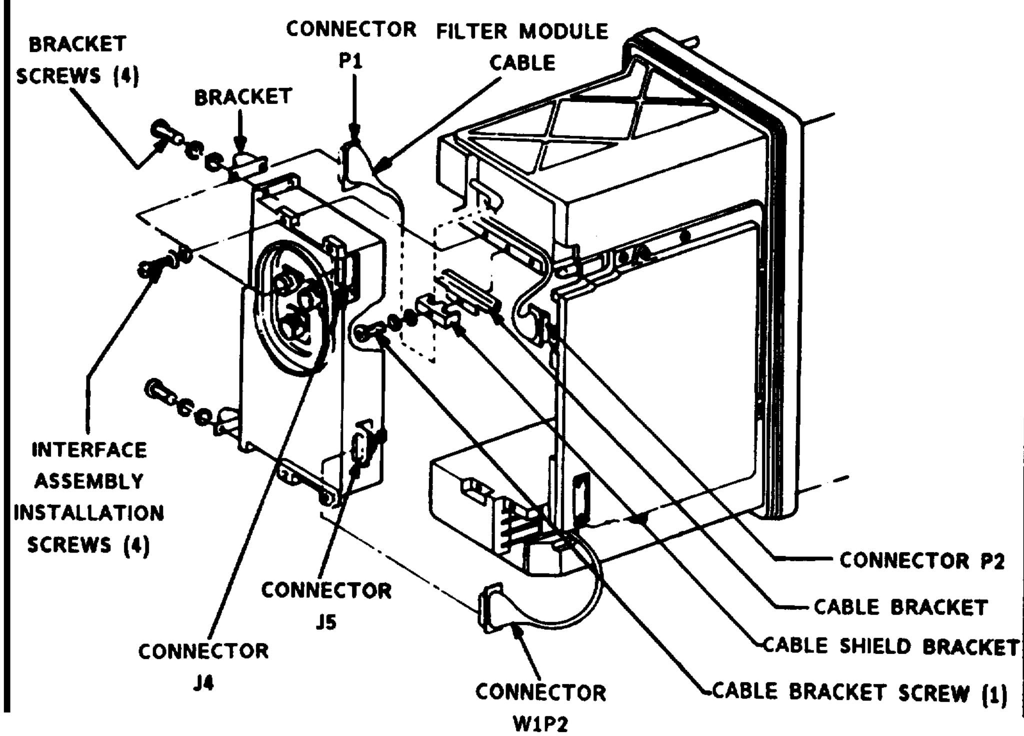
</td></tr>
</table>

B. PROCESSING LOGIC CARD ASSEMBLIES

LOCATION/Item	ACTION/Procedure
RIGHT REAR END OF CHASSIS Processing Logic Card Assemblies	**NOTE** Before removing printed circuit boards and printed wiring assemblies, maintenance personnel should be familiar with ESD procedures in TB 43-0127, Maintenance and Repair of Printed Circuit Boards and Printed Wiring Assemblies. **REMOVAL** • Set POWER ON/OFF switch to OFF position. • Release combination case latches and fully extend terminal. • Loosen two screws and lift cover out of the way. • Simultaneously lift inside ends of the extractors on desired logic card assembly until board is dislodged from mating connector.  **INSTALLATION** • Insert replacement logic card assembly. • Reposition cover and secure in place with two screws. • Set POWER ON/OFF switch to ON position. • Perform SELF-TEST. • Return terminal into combination case and secure latches.

C. INTERFACE ASSEMBLY

LOCATION/Item	ACTION/Procedure
REAR OF CHASSIS Interface Assembly	REMOVAL • Set POWER ON/OFF switch to OFF position. • Disconnect interface cabling from J1, J2, J3. • Release combination case latches and fully extend terminal. • Holding in spring-loaded stops, remove case from terminal. • Turn terminal on side as shown in illustration below. • Disconnect power linkage cable from POWER switch by removing cable guides. • Place power linkage cable over filter assembly. • Remove cable bracket and disconnect connector P1 from connector J4. • Remove cable shield and bracket, then free filter module cable, • Remove four screws and two brackets. • Remove four interface assembly installation screws. CAUTION Be very careful when removing interface assembly. The white wire can be cut or broken if care is not exercised. • Disconnect connector W1P2 from connector J5. • Gently pull interface assembly away from chassis.



C. INTERFACE ASSEMBLY - Continued

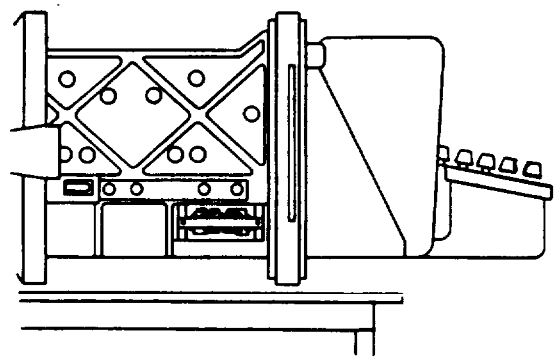
LOCATION/Item	ACTION /Procedure
REAR OF CHASSIS Interface Assembly - Continued	INSTALLATION • Orient terminal as shown in illustration on previous page. • Gently place interface assembly into position and fasten with four interface assembly installation screws. CAUTION Be very careful when installing interface assembly. The white wire can be cut or broken if care is not exercised. • Reconnect connector W1P2 to connector J5. • Reconnect connector P1 to connector J4. • Install cable shield and bracket. • Install two brackets, fastening with four screws. • Reconnect power linkage cable to power switch. • Install power linkage cable clamps. • Engage actuator arm by holding POWER ON/OFF switch in OFF position while closing dust cover. • If power linkage cable adjustment is required, refer to paragraph 4-14E. • Return terminal into combination case and reconnect interface cabling; leave terminal in extended position. • Set POWER ON/OFF switch to ON position. • Perform SELF-TEST. • Fully return terminal into combination case and secure latches.

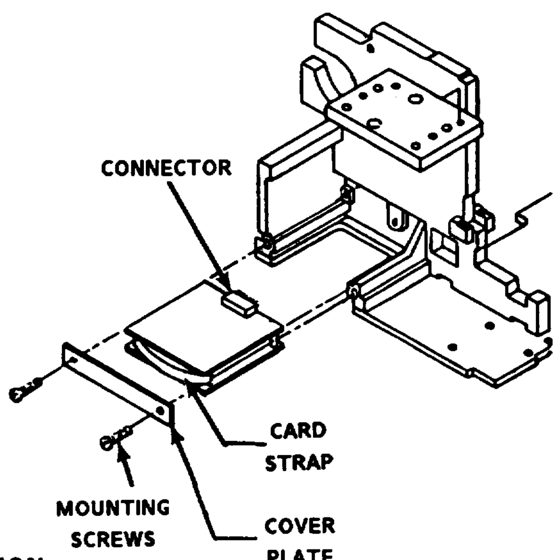
D. CIRCUIT CARD

<table>
<tr><th>LOCATION/Item</th><th>ACTION/Procedure</th></tr>
<tr><td>LEFT SIDE OF CHASSIS
Line-Feed (Motor Drive) Current Control Board Assembly</td><td>

REMOVAL

- Set POWER ON/OFF switch to OFF position.
- Release combination case latches and fully extend terminal.
- Remove two mounting screws and remove cover plate.
- Grasp card strap and pull gently until assembly is disengaged from connector.





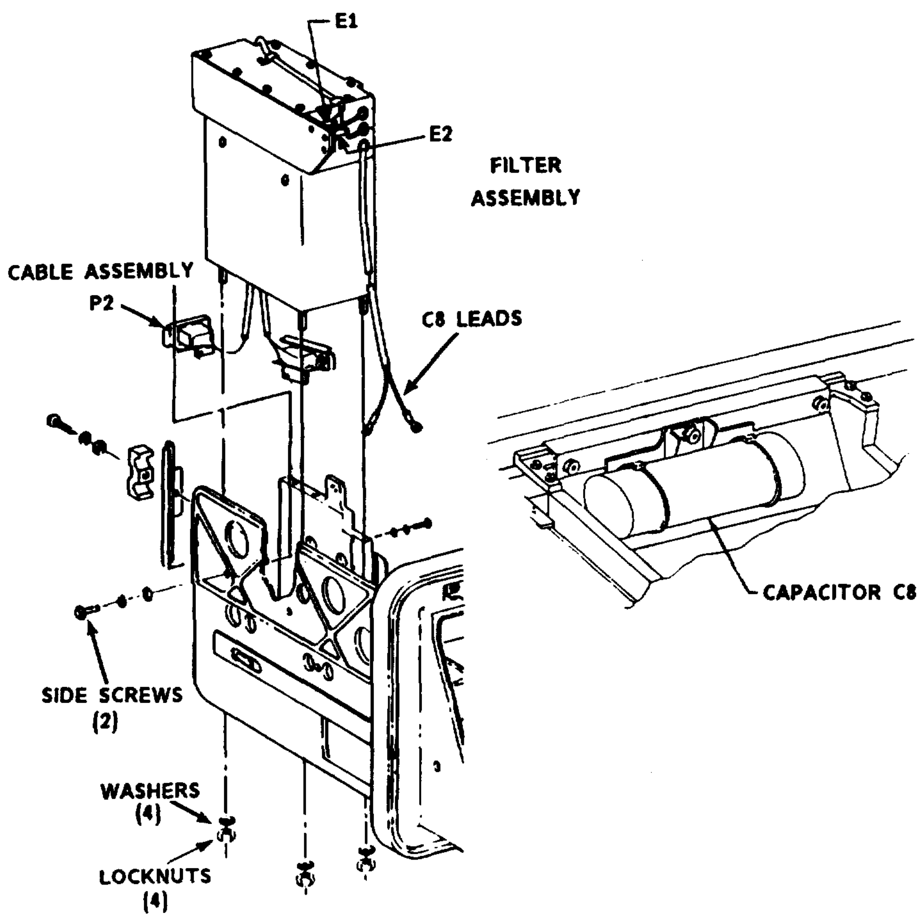
INSTALLATION

- Orient board assembly as shown in above figure.
- Insert board, ensuring that connectors are seated correctly.
- Turn terminal on side so opening for board assembly is up.
- Install cover plate and install two screws.
- Set POWER ON/OFF switch to ON position.
- Perform SELF-TEST.
- Return terminal into combination case and secure latches.

</td></tr>
</table>

E. FILTER ASSEMBLY

LOCATION/Item	ACTION/Procedure
REAR OF CASTING Filter	REMOVAL • Remove interface assembly as directed in paragraph 5-11C. • Tag and remove leads attached to standoffs El and E2. **WARNING** Discharge capacitor C8 before unscrewing leads. • Remove capacitor assembly C8 from tiebar. • Noting capacitor polarity, unscrew two leads from capacitor C8 • Turn terminal onto side. • Remove four locknuts and washers at bottom of assembly. • Remove two side screws and washers. • Remove cable assembly P2. • Grasp filter assembly and pull upward to remove from chassis.

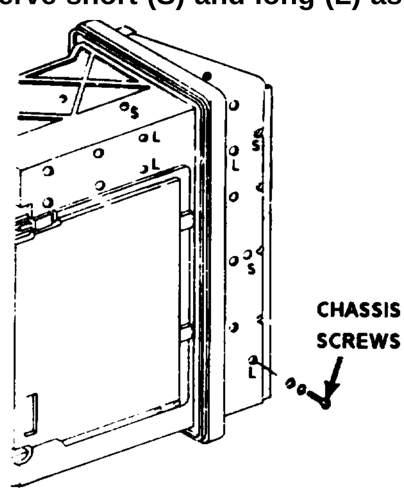


E. FILTER ASSEMBLY - Continued

LOCATION/Item	ACTION/Procedure
REAR OF CASTING Filter - Continued	INSTALLATION • Disconnect leads from El and E2, if connected. • Position filter assembly in chassis. • Install cable assembly P2. • Install two side screws and washers. • Install four locknuts and washers at bottom of filter assembly. • While supporting capacitor assembly to prevent stresses on leads, attach leads to capacitor C8. • Turn terminal so that filter assembly is down and standoffs E1 and E2 are up. • Attach leads to standoffs E1 and E2; dress leads so they do not protrude above filter assembly. • Install interface assembly as directed in paragraph 5-11C. CAUTION Perform continuity check from each filter assembly standoff to chassis before applying power. Resistance shall be greater than 100K ohm after initial charging indication. Also, check between standoffs for absence of short circuit. Normal diode type response should be observed.

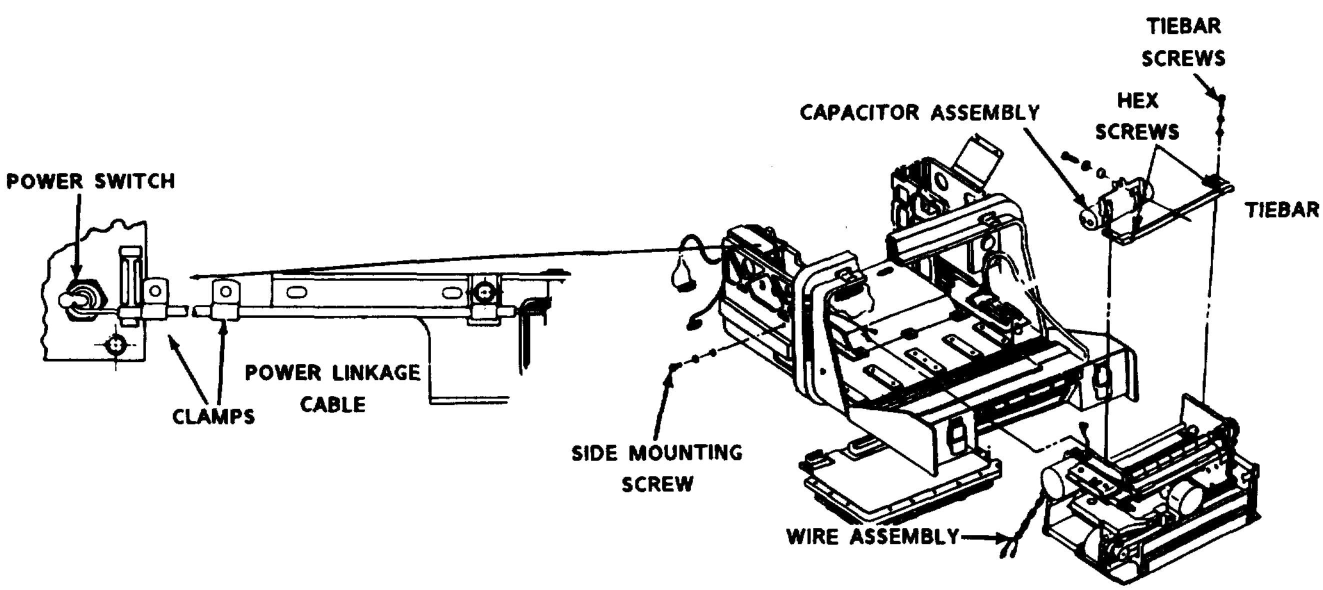
F. PRINTER ASSEMBLY

LOCATION/item	ACTION/Procedure
CHASSIS Casting	REMOVAL • Set POWER ON/OFF switch to OFF position. • Release combination case latches and fully extend terminal. • Remove eight screws and mounting hardware from bottom of chassis (observe short (S) and long (L) as indicated).



F. PRINTER ASSEMBLY - Continued

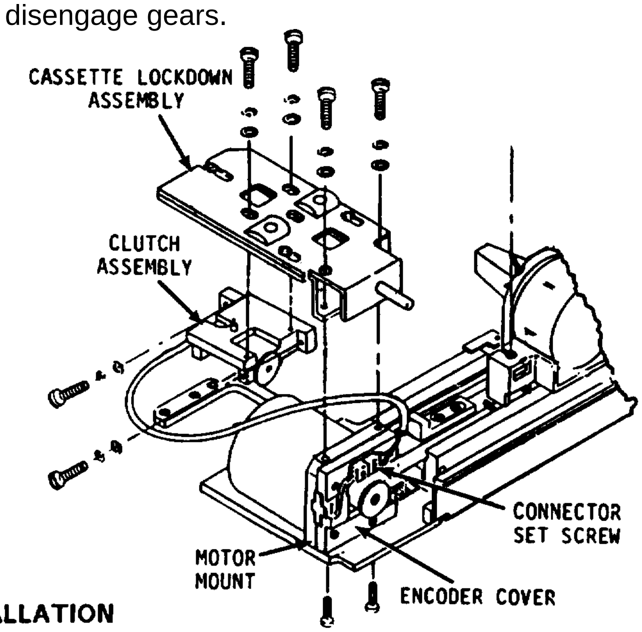
LOCATION/Item	ACTION/Procedure
CHASSIS Casting - Continued	REMOVAL - Continued • Lower dust cover. • Remove one side mounting screw and mounting hardware. WARNING Discharge capacitor C8 before removing capacitor assembly. • Remove C8 capacitor assembly from tiebar. • Loosen tiebar by removing four screws and loosening two hex screws. • Disconnect power linkage cable from power switch. • Remove power linkage cable clamps. • Disconnect cables P1 and P2 from motherboard. • Disconnect lead wire assembly (which runs from capacitors **on**



F. PRINTER ASSEMBLY - Continued

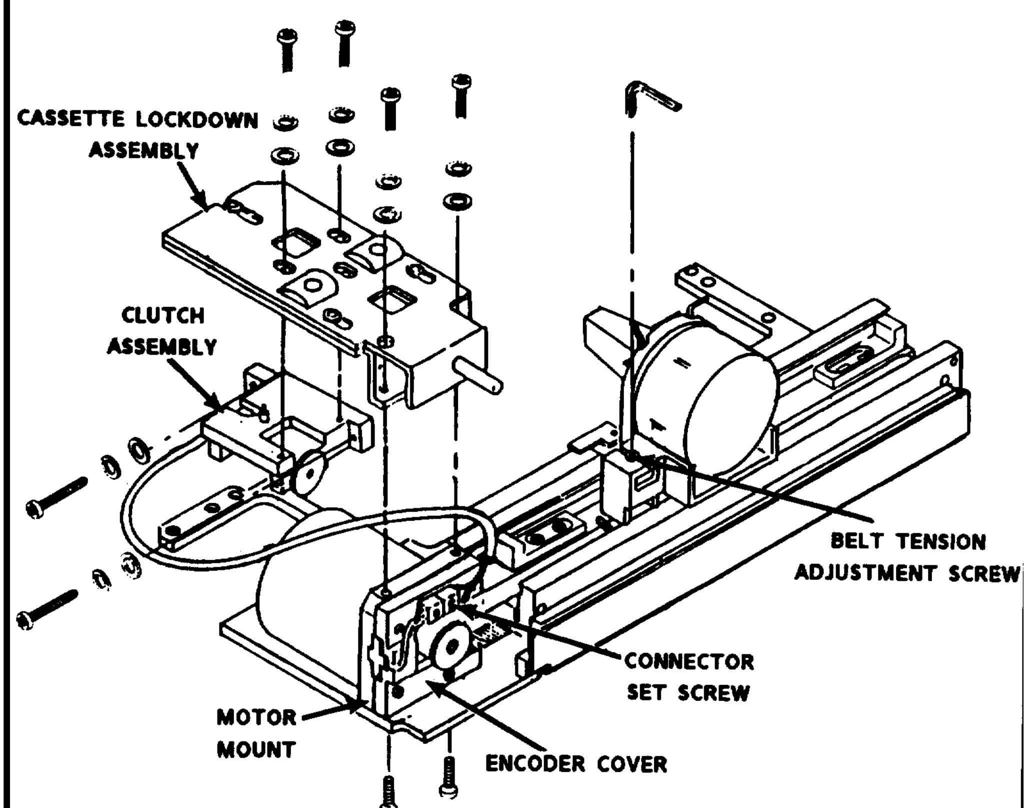
LOCATION/Item	ACTION/Procedure
CHASSIS Casting - Continued	REMOVAL - Continued **CAUTION** To avoid damaging equipment, ensure chassis is secured to workbench before attempting to remove printer assembly. Avoid catching wires on J1 and J2 of motherboard. • Gently slide printer assembly over combination case flanges and lift from chassis. **INSTALLATION** **CAUTION** Exercise care when installing printer assembly. Sharp edges on right side of chassis can cut the skin. • Position printer assembly on chassis. • Reconnect cables P1 and P2. • Reconnect wire assembly at El and E2. • Reconnect power linkage cable and clamps. • Install four screws securing tiebar to printer assembly to aline printer assembly to chassis. (Do not completely tighten screws until all mounting hardware is in place.) • Install side mounting screw and mounting hardware. • Raise dust cover. • Install eight screws and mounting hardware. • Install C8 capacitor assembly. • Tighten all mounting hardware. NOTE With power cable disconnected, perform continuity test between filter assembly terminals E1 and E2 to chassis before applying power. Resistance shall be greater than 100K ohms after an initial capacitor charging indication (low side to chassis). • Return terminal into combination case and secure latches.

F. PRINTER ASSEMBLY - Continued

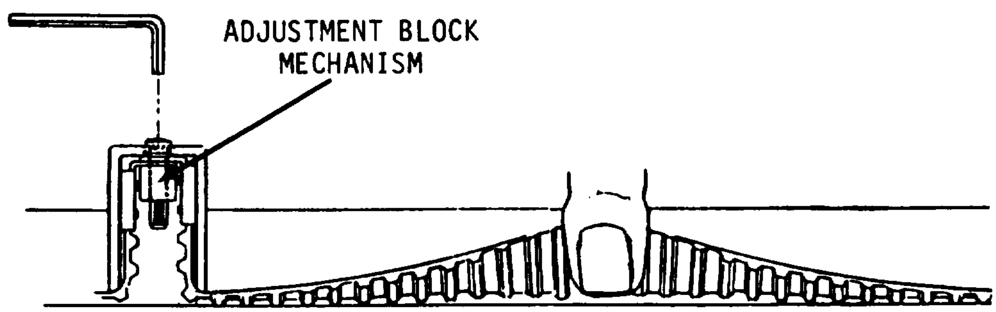
LOCATION/Item	ACTION/Procedure
PRINTER ASSEMBLY Clutch Assembly	REMOVAL • Remove printer assembly as directed in this paragraph. • Remove CMCC CCA as directed in paragraph 6-13 (intermediate general support maintenance item). • Remove actuator assembly by removing two screws and mounting hardware. • Remove cassette lockdown assembly by removing four screws and mounting hardware (two screws on motor mount and two screws on clutch assembly). • Loosen two screws securing motor mount to bottom plate. • Remove two screws and mounting hardware from clutch assembly to left wall. • Remove clutch ,assembly by turning carriage motor slightly to disengage gears.  **INSTALLATION** • Install clutch assembly in position (motor mount should be loose to ensure proper gear alinement). • Install two screws and mounting hardware from clutch assembly to left wall; tighten all mounting hardware. • Tighten two screws securing motor mount to bottom plate. • Install cassette lockdown assembly by installing four screws and mounting hardware. • Install actuator assembly with two screws and mounting hardware. • Install CMCC CCA as directed in paragraph 6-13 (intermediate general support item). • Install printer assembly as directed in this paragraph.

F. PRINTER ASSEMBLY - Continued

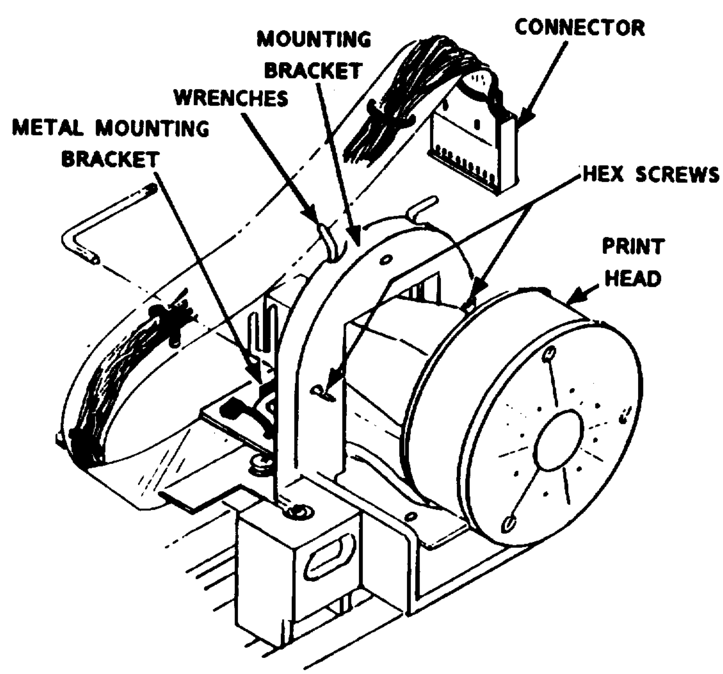
LOCATION/Item	ACTION/Procedure
PRINTER ASSEMBLY Carriage Drive Assembly	REMOVAL • Remove printer assembly as directed in this paragraph. • Remove ribbon cassette. • Loosen belt tension adjustment screw on left side of print head mounting bracket. • Remove belt assembly if replacement is necessary; special cut outs are provided on top of guide rail assembly to accommodate belt removal. • Free belt assembly from carriage motor pulley. • Remove right set screw and unplug right side of connector from encoder cover. • Remove two screws securing bottom plate to motor mount. • Remove two screws and mounting hardware from top of motor mount and remove cassette lockdown assembly. • Carriage drive assembly may now be removed. • Disconnect wiring harness and feed out carefully through chassis opening.



F. PRINTER ASSEMBLY - Continued

LOCATION/Item	ACTION/Procedure
PRINTER ASSEMBLY Carriage Drive Assembly	INSTALLATION • Feed wiring harness in through chassis opening and reconnect. • Position carriage drive assembly in place and secure loosely to bottom plate, ensuring gears of clutch assembly aline and motor mount is alined to bottom plate at 90 degrees. • Install and tighten two screws from bottom plate to motor mount. • Install two screws and mounting hardware securing cassette lockdown assembly to top of motor mount. • Wind belt assembly around pulley and adjust at adjustment block mechanism according to procedure below. • Plug in right hand connector to encoder cover and fasten with one set screw.  ADJUSTMENT PROCEDURE • Slide print head to right most position of guide rail. • Adjust adjustment screw on left side of print head so drive belt can be deflected 90 degrees at center of exposed area.

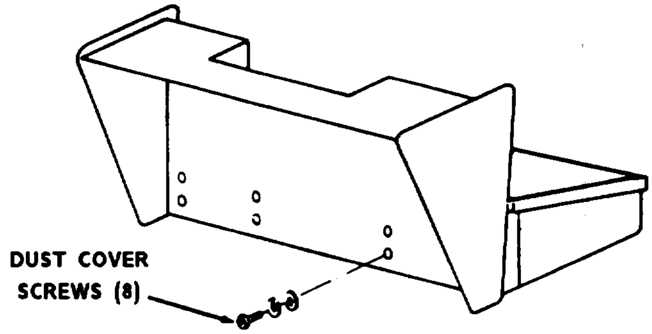
F. PRINTER ASSEMBLY - Continued

LOCATION/Item	ACTION/Procedure
PRINTER ASSEMBLY Print Head	REMOVAL • Remove ribbon cassette and print head ribbon guide. • Remove two hex screws and washers holding print head to mounting bracket. • Using index fingers, unplug connector from print drive CCA. • Remove wrenches by lifting upward to free hex end from hex screws. Push downward and with a looping motion free and remove L-shaped wrenches. Using straight allen wrench, remove two hex screws securing metal bracket to mounting bracket. • Remove print head assembly and metal mounting bracket. **NOTE** Retain print head cover for later use, • Cut and remove two cable ties and remove bracket and strain relief from print head assembly. Attach bracket and strain relief (Appendix C, item 10) to new print head assembly. 

F. PRINTER ASSEMBLY - Continued

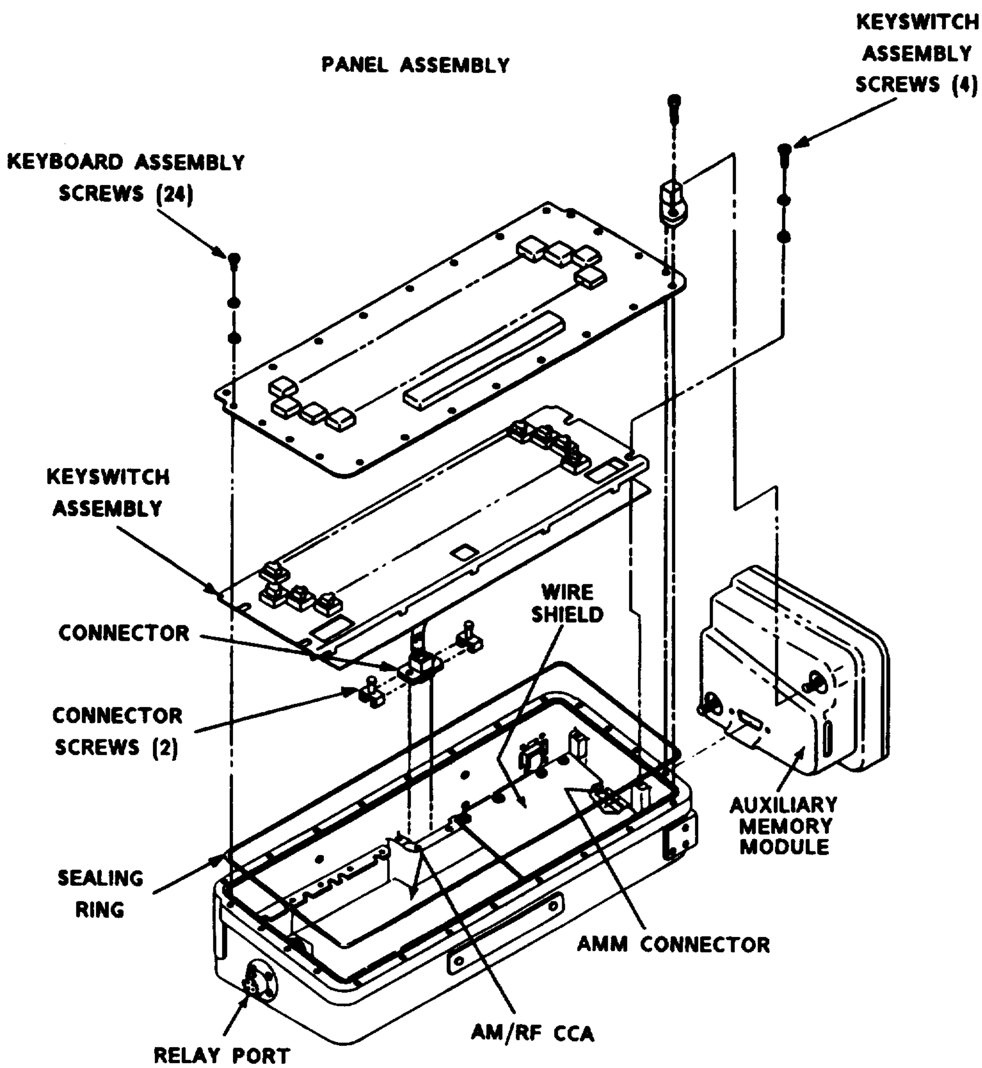
LOCATION/Item	ACTION/Procedure
PRINTER ASSEMBLY Print Head - Continued	INSTALLATION • Route cable assembly and plug connector into slot on print drive CCA. • Hold print head in position and fasten to mounting bracket with two screws. Do not tighten screws at this time. • Insert two hex screws and fasten metal bracket to mounting bracket. Tighten screws, then back off one half turn. • Insert L-shaped wrenches into position through guide holes with top facing left. • Tighten two hex screws securing print head to mounting bracket. • Push print head forward and tighten L-shaped wrenches. • Install ribbon cassette and print head ribbon guide.

G. KEYBOARD KEYSWITCH

LOCATION/Item	ACTION/Procedure
FRONT OF TERMINAL Dust Cover	REMOVAL • Set POWER ON/OFF switch to OFF position. **CAUTION** To avoid damaging equipment, support keyboard as the last screw is removed. • Release latches and lower dust cover. • Remove eight screws and washers. 

G. KEYBOARD KEYSWITCH - Continued

LOCATION/Item	ACTION/Procedure
KEYBOARD HOUSING ASSEMBLY Keyboard Assembly	REMOVAL • Remove 24 keyboard assembly screws and mounting hardware.
MODEL C ONLY	• Remove 22 keyboard assernbly screws and mounting hardware; remove two socket head screws securing AMM mounting bracket. • Lift off panel assembly.



G. KEYBOARD KEYSWITCH - Continued

LOCATION/Item	ACTION/Procedure
Keyswitch Assembly	REMOVAL • Remove four keyswitch assembly screws and mounting hardware. • Reposition keyswltch assembly to allow access to connector. NOTE Retain sealing ring for reuse in installation.
Connector	REMOVAL • Loosen two connector screws. • Disconnect connector and remove keyswitch.
Connector	INSTALLATION NOTE Ensure that wide side of connector is installed toward the top of keyboard assembly. • Position keyswitch assembly and install connector with two screws.
Keyswitch Assembly	INSTALLATION • Install keyswitch assembly with four screws and mounting hardware.
Keyboard Assembly	INSTALLATION • Install keyboard assembly with 24 screws and mounting hardware.
<u>MODEL C ONLY</u>	• Install keyboard assembly with 22 screws and mounting hardware; install two socket head screws securing AMM mounting bracket.

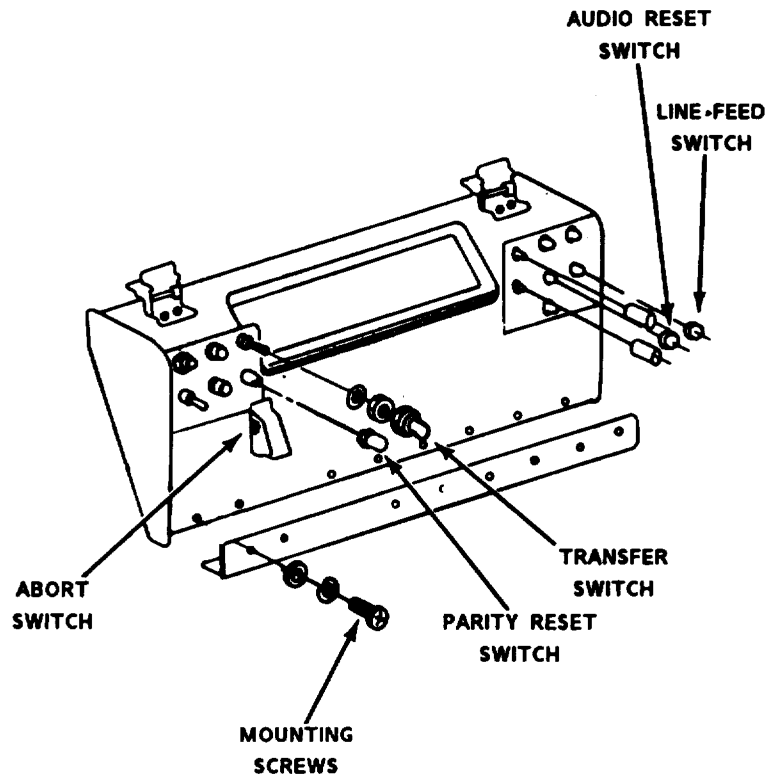
G. KEYBOARD KEYSWITCH - Continued

LOCATION/Item	ACTION/Procedure
Dust Cover	INSTALLATION • Turn terminal onto side, and support keyboard assembly while performing the next two steps. • Connect keyboard assembly to dust cover connector. • Attach keyboard assembly to dust cover with eight screws and mounting hardware. Ensure that lock washers are not used with four center screws. • Return terminal to upright position. • Engage POWER switch acutator arm by holding POWER ON/OFF switch in OFF position while closing dust cover. • Set POWER ON/OFF switch to ON position. • Perform SELF-TEST.

H. DUST COVER

LOCATION/Item	ACTION/Procedure
TERMINAL Dust Cover	REMOVAL • Remove keyboard keyswitch assembly as directed in paragraph 5-11G. NOTE Do not unsolder leads to switches or potentiometers. • Disassemble ABORT switch as directed in paragraph 5-13B. • Disassemble TRANSFER switch by removing boot, nut, and lock washer. • Disassemble PARITY RESET switch by removing boot. • Disassemble LINE-FEED switch by removing boot. • Disassemble AUDIO RESET switch by removing boot. • Disassemble potentiometers from dust cover assembly. • Disassemble copy lamps from dust cover assembly. • Remove nine screws, lock washers, and washers, • Remove dust cover.

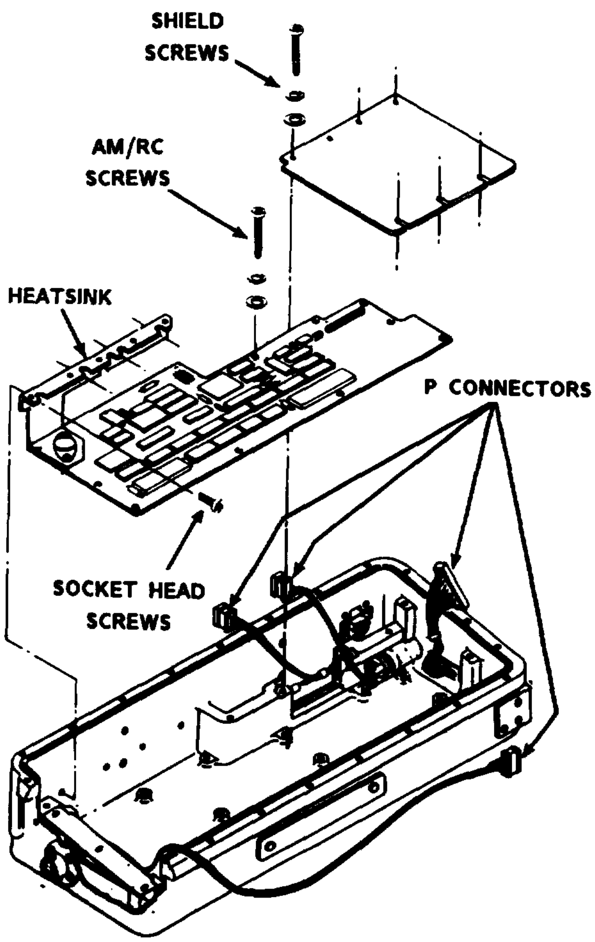
H. DUST COVER - Continued

LOCATION/Item	ACTION/Procedure
Dust Cover - Continued	INSTALLATION  • Install dust cover. • Insert screws, lock washers, and washers. • Install copy lamps and potentiometers. • Install AUDIO RESET, LINE-FEED, PARITY RESET, TRANSFER, and ABORT switches. • Install keyboard keyswitch assembly as directed in paragraph 5-11G. • Perform SELF-TEST.

MODEL C ONLY

1. AUXILIARY MEMORY/RELAY CONTROL CCA

LOCATION/Item	ACTION/Procedure
KEYBOARD HOUSING ASSEMBLY AM/RC CCA	REMOVAL **NOTE** Before removing printed circuit boards and printed wiring assemblies, maintenance personnel should be familiar with ESD procedures in TB 43-0127, Maintenance and Repair of Printed Circuit Boards and Printed Wiring Assemblies. • Remove keyswltch assembly as directed in paragraph 5-11G. • Remove six screws, washers, and lock washers and remove shield.



MODEL C ONLY - Continued

I. AUXILIARY **MEMORY/RELAY** CONTROL **CCA -** Continued

LOCATION/Item	ACTION/Procedure
KEYBOARD HOUSING ASSEMBLY AM/RC CCA - Continued	**REMOVAL - Continued** ● **Disconnect all P connectors and dress all wiring harnesses out of the way.** ● **Remove 13 screws, washers, and lock washers from bottom of AM/RC CCA.** ● **Remove four socket head screws from heatsink attached to front of keyboard housing assembly.** ● **Lift AM/RC CCA by heatsink and slide out to left so as to clear wiring harnesses at bottom right side of keyboard assembly housing.** **INSTALLATION** ● **Position new AM/RC CCA in bottom of keyboard assembly.** NOTE **Ensure insulating washers are in place under each screw hole.** ● **Fasten AM/RC CCA in place with 13 screws, washers, and lock washers on bottom of keyboard housing assembly.** ● **Fasten heatsink to front wall of housing at four screw holes using socket head screws.** ● **Connect all P connectors of wiring harnesses to appropriate J connectors.** ● **Dress ali wiring harnesses.** ● **Install and fasten shield with six screws, washers, and lock washers.** ● **Install keyswitch assembly as directed in paragraph 5-11G.**

Section V. DISASSEMBLY AND REASSEMBLY OF TERMINAL, COMMUNICATIONS AN/UGC-74B(V)3 or AN/UGC-74C(V)3

5-12. GENERAL

This section contains disassembly and reassembly information for following assemblies:

A. CHASSIS ASSEMBLY

B. DUST COVER ASSEMBLY

C. INTERFACE ASSEMBLY

D. KEYBOARD ASSEMBLY

Disassembly is performed down to level for intermediate direct support maintenance as listed in the Maintenance Allocation Chart (MAC), Appendix B.

5-13. DISASSEMBLY AND REASSEMBLY PROCEDURES

A. CHASSIS ASSEMBLY

LOCATION/item	ACTION/Procedure
CHASSIS ASSEMBLY Filter Module	DISASSEMBLY • Remove as directed in paragraph 5-11E.
Harness Assembly	• Intermediate general support maintenance item. Remove as directed in paragraph 6-10.
CHASSIS ASSEMBLY Filter Module	REASSEMBLY • Install as directed in paragraph 5-11E.
Harness Assembly	• Intermediate general support maintenance item. Install as directed in paragraph 6-10.

B. DUST COVER ASSEMBLY

LOCATION/Item	ACTION/Procedure
CHASSIS ASSEMBLY **Dust Cover**	**DISASSEMBLY** **NOTES** **See Dust Cover Assembly, pages 5-36 and 5-37** **Disassemble and reassemble dust cover by removal and installation of piece parts.** • **Set POWER ON/OFF switch to OFF position.** • **Lower dust cover.**
DUST COVER **Receiver Assembly**	**REMOVAL** **NOTE** **Receiver assembly must be removed prior to removal of piece parts on the right side of dust cover.** • **Loosen three screws (43) securing receiver assembly plate (60) and move assembly aside.** • **receiver assembly.** **INSTALLATION** • **Solder wires to their respective terminals.** • **Secure receiver assembly into place with three screws.**
Receiver	**REMOVAL** • **Tag and remove terminal lugs on receiver (56) by removing two screws.** • **Remove two screws (55) securing receiver bracket (52) and remove receiver.** **INSTALLATION** • **Install receiver in bracket and secure bracket into place with two screws.** • **Install two screws holding terminal lugs.**

B. DUST COVER ASSEMBLY - Continued

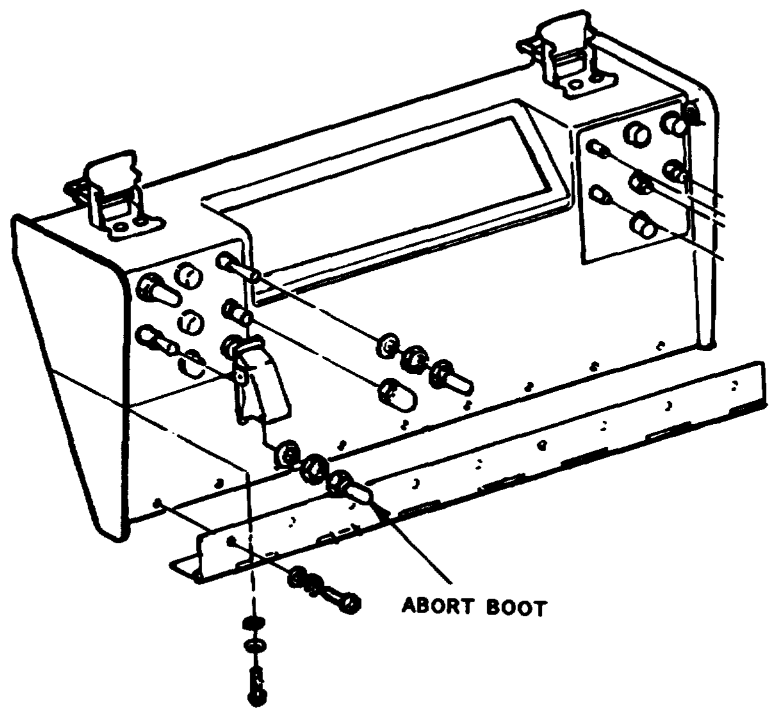
LOCATION/item	ACTION/Procedure
DUST COVER Frame and Window	REMOVAL • Remove 16 screws (62), lock washers (63) and flat washers (64) securing window frame to dust cover. NOTE Copy lamps must be removed to gain access to screws (38) and (42). • Remove window and frame. INSTALLATION • Install replacement window into position and secure with 16 screws. • Replace copy lamps.
Paper Exit	REMOVAL • Remove five screws (31), lock washers (30), and flat washers (29). • Remove tear bar (1). • Remove gasket (2). INSTALLATION • Position gasket into place. • Position tear bar into place. • Secure with five screws, lock washers, and flat washers.
POWER ON/OFF SWITCH Lever Assembly	REMOVAL • Remove rubber boot (18) from toggle (28) by turning nut (part of boot securing it to lever assembly) counterclockwise. • Remove lever assembly. INSTALLATION • Position bent portion of lever toward bottom of unit. • Secure into position with nut (rubber boot) by turning clockwise.

B. DUST COVER ASSEMBLY - Continued

LOCATION/Item	ACTION/Procedure
LINE, PAPER LOW, BAT, XMT, END OF LINE, MEM FULL, MSG RCVD Lamp Socket	REMOVAL • Tag and unsolder leads on inside of dust cover. • Remove rear locking nut (34) and slide lamp socket (8) forward through hole in dust cover. INSTALLATION • Position lamp socket in hole and secure with locking nut. • Solder wires to their respective terminals.
TRANSFER PARITY RESET AUDIO ALM RESET LINE-FEED Switch	REMOVAL • Tag and unsolder leads on inside of dust cover. • Remove front mounting nut and remove switch assembly from the rear. INSTALLATION • Position switch in mounting hole and secure with front mounting nut. • Solder wires to their respective terminals.
ILLUM AUDIO Potentiometer	REMOVAL • Tag and unsolder leads on inside of dust cover. • On front of dust cover, loosen setscrews securing knob to shaft and remove knob. • Remove front mounting nut from potentiometer and remove potentiometer from the rear. INSTALLATION • Position potentiometer into mounting hole and secure with front mounting nut, making sure potentiometer shaft is turned fully clockwise. • Solder wires to their respective terminals. • Aline knob to point to OFF and tighten setscrew.

B. DUST COVER ASSEMBLY - Continued

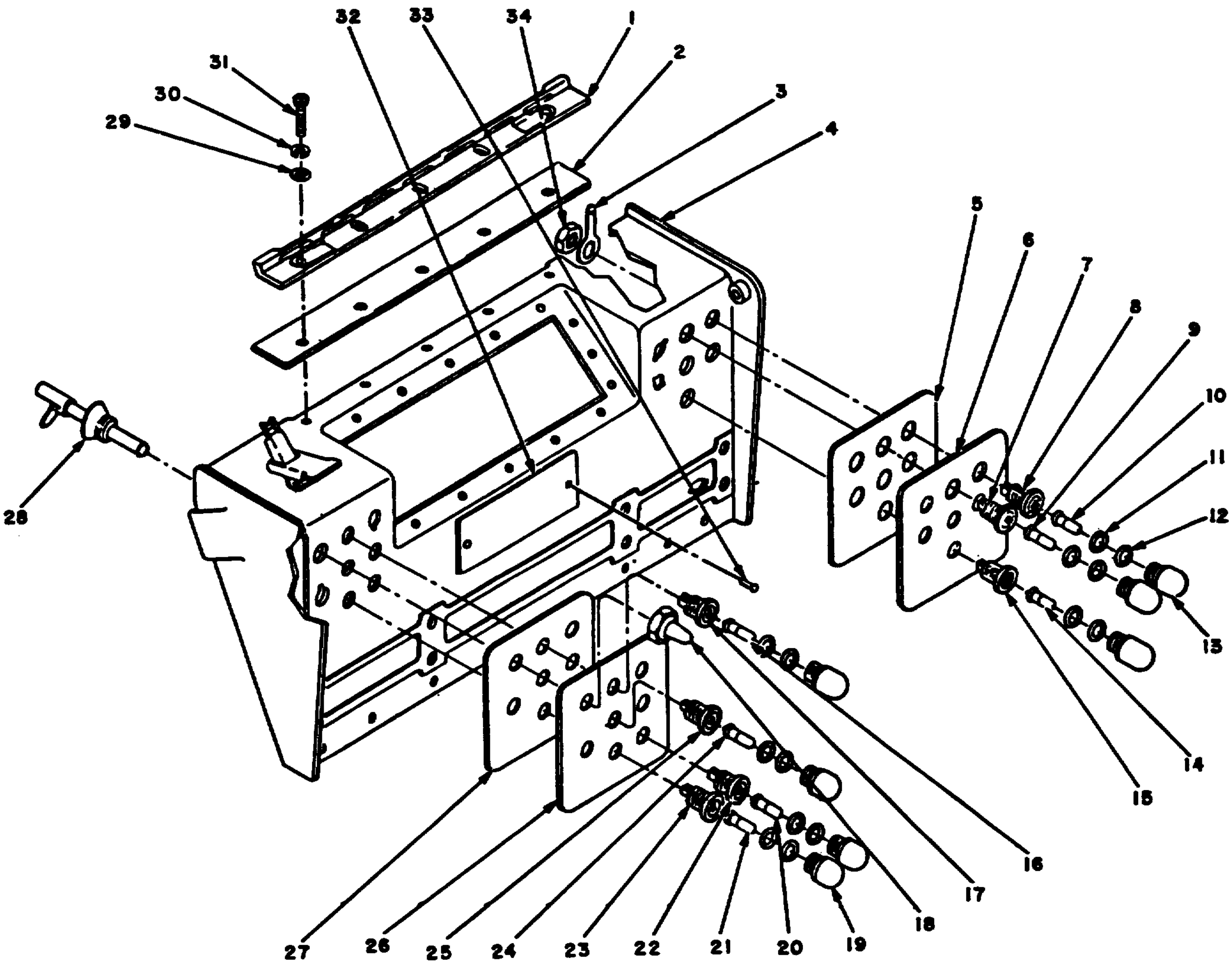
LOCATION/Item	ACTION/Procedure
CHASSIS ASSEMBLY ABORT Switch	**REMOVAL** • Raise ABORT switch cover and remove protective boot (1) by turning nut (part of boot) counterclockwise. • Remove switch cover. • Lower dust cover. • Tag and unsolder three wires from ABORT switch. • Remove switch from the rear.



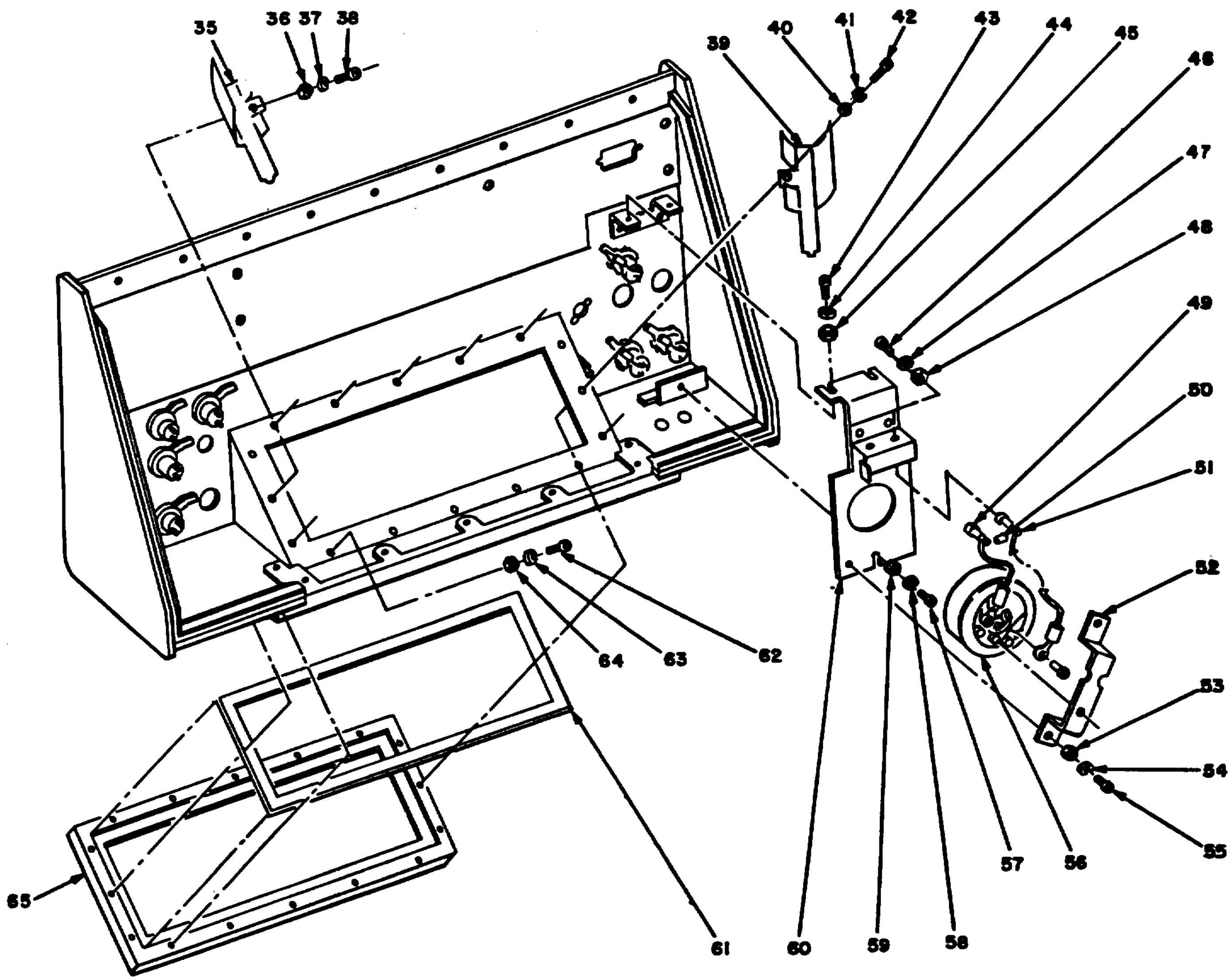
	INSTALLATION • Place positioning washer on switch and insert switch in mounting hole. • Place safety cover on threaded switch shaft with hinge up. • Anne tang on positioning washer with small hole above mounting hole. • Install protective boot. • Reconnect leads.

B. DUST COVER ASSEMBLY - Continued

LOCATION/Item	ACTION/Procedure
DUST COVER ASSEMBLY Designation Plate	**REMOVAL** • **Remove switches, potentiometers, and lamps as required to free designation plates (6) or (26).** CAUTION Be **sure to mark all wires as to proper switch, potentiometer, and lamp connections.** • **Remove designation plate and gasket.** **INSTALLATION** • **Position designation plate and gasket into place.** • **Replace switches, potentiometers, and lamps as required.**



DUST COVER ASSEMBLY (Sheet 1 of 2)



DUST COVER ASSEMBLY (Sheet 2 of 2)

C. INTERFACE ASSEMBLY

LOCATION/Item	ACTION/Procedure
REAR OF TERMINAL Interface Assembly	• Remove interface assembly as directed in paragraph 5-11C. NOTE See Interface Assembly, pages 5-42, 5-43, 5-44, and 5-45.
INTERFACE ASSEMBLY Rear Cover	DISASSEMBLY • Remove 12 screws (25), lock washers (26), and flat washers (27). • Remove rear cover.
Fuseholder	• Remove shrink tubing, and mark and unsolder leads from fuseholder. • Remove nut (39), lock washer (38), and flat washer (37). • Lift fuseholder from interface assembly.
Fuseholder	REASSEMBLY • Position replacement fuseholder in proper hole. • Secure in place with washers and nuts. • Solder wires to their respective terminals,
Toggle Switch	DISASSEMBLY NOTE Only toggle switches (47), (%), (98), (102), (134), (135), and (136) are authorized for replacement at intermediate direct support. Rotary switches and remaining toggle switches are replaced at intermediate general support. • Tag and unsolder wires from toggle switch to be removed. • Remove nut (5) and lock washer (6) as applicable for switch to be removed. • Remove switch.

C. INTERFACE ASSEMBLY - Continued

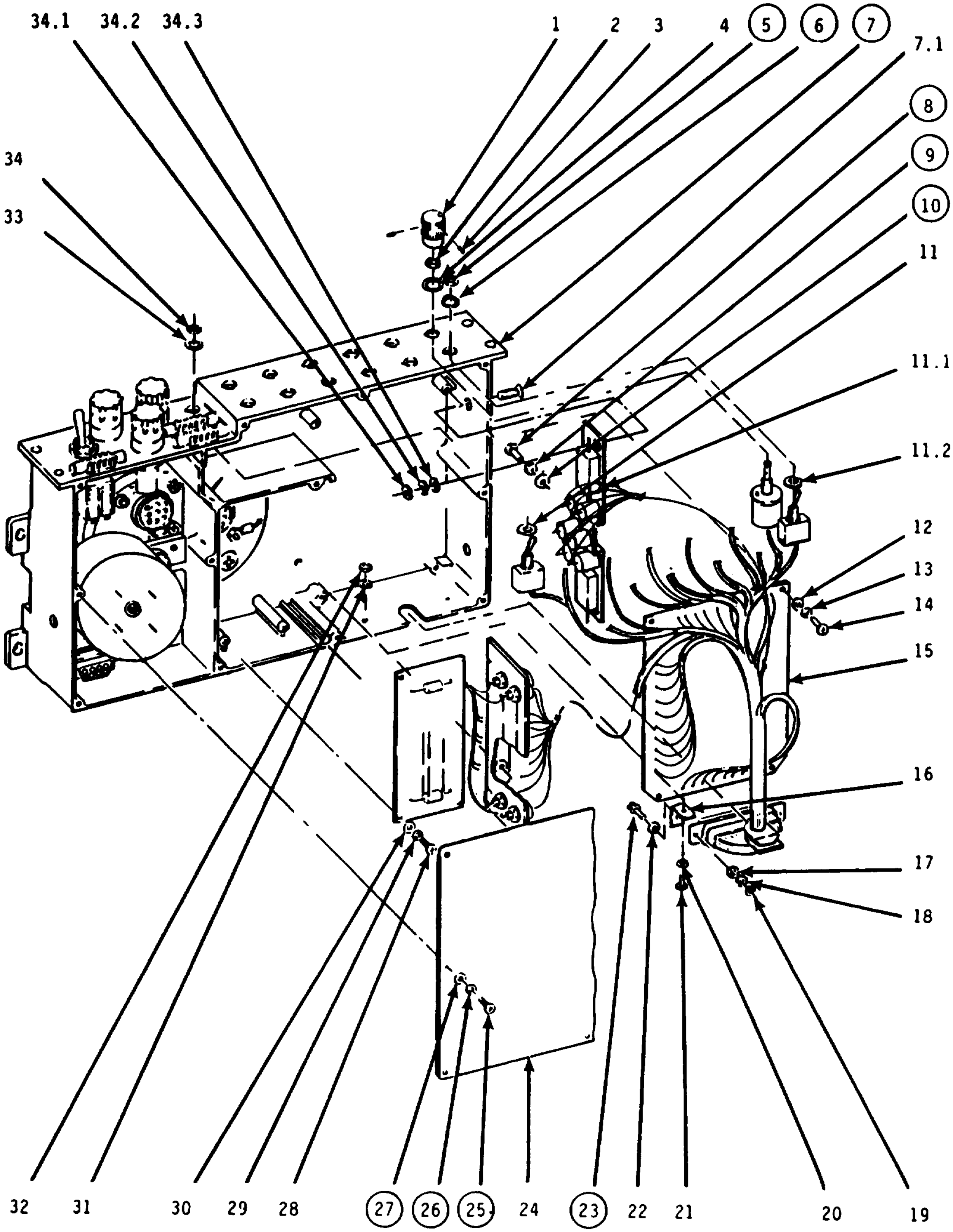
LOCATION/Item	ACTION/Procedure
Toggle Switch	REASSEMBLY NOTE If switch (47) is being installed, place inside nut (48) 3/16 inch ±1/32 inch away from switch body. • Install switch and secure into position with nut and lock washer. • Solder wires to their respective terminals.
Jl, J2, J3 Connectors	DISASSEMBLY NOTE Remove four mounting screws on diode board (116) and gently lift to gain access to connector J1 wiring. • Tag and unsolder each wire to connector (82), (88), or (92) to be removed. • Remove four screws and washers securing connector to housing. • Remove connector (and ground wires for J1 and J2). • Removal of gasket (81), (89), or (93) may now be performed by pulling gasket from housing. REASSEMBLY • Place gasket in position. • Secure connector in place using four screws, and install ground wires if previously removed. • Solder wires to their respective terminals. • Install diode board with four mounting screws.

C. INTERFACE ASSEMBLY - Continued

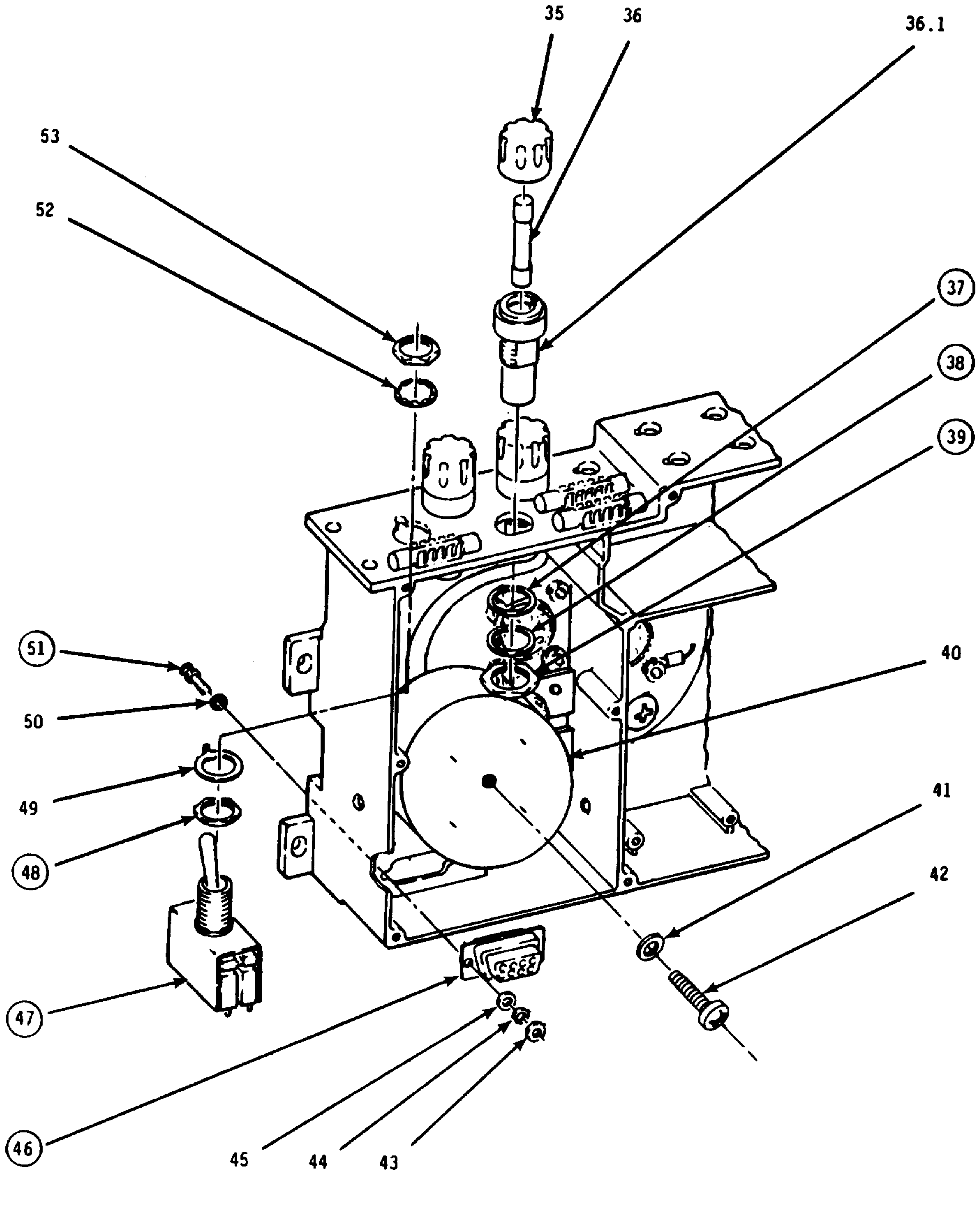
LOCATION/item	ACTION/Procedure
J4 and J5 Connectors	DISASSEMBLY . Tag each wire in connector (46) or (106) to be removed. l Using appropriate extraction tool (M24308/18-1 for connector J4 and MS27534-22D for connector J5) remove pins as follows: Insert extraction tool over wire connected to pin to be removed. Slide tool over pin until it bottoms in pin socket. Gently pull wire, tool, and pin from connector. l Remove all pins from connector by repeating procedure. l Remove two screws (23) or (51) securing connector being removed to housing (7). l Remove connector. REASSEMBLY l Position connector in mounting hole. l Pull wires through their respective holes. l Secure connector in place with two screws.
Filter A7A1F1I through A7A1FL12	DISASSEMBLY NOTE Remove four mounting screws and gently lift diode board (116) to gain access to all filters. . Tag and remove wires from filter to be removed. l Remove nut (130) and washer (131) from filter to be removed. l Remove filter. REASSEMBLY l Position replacement filter in respective mounting hole. l Secure with nut and washer. l Solder wires to their respective terminals.

C. INTERFACE ASSEMBLY - Continued

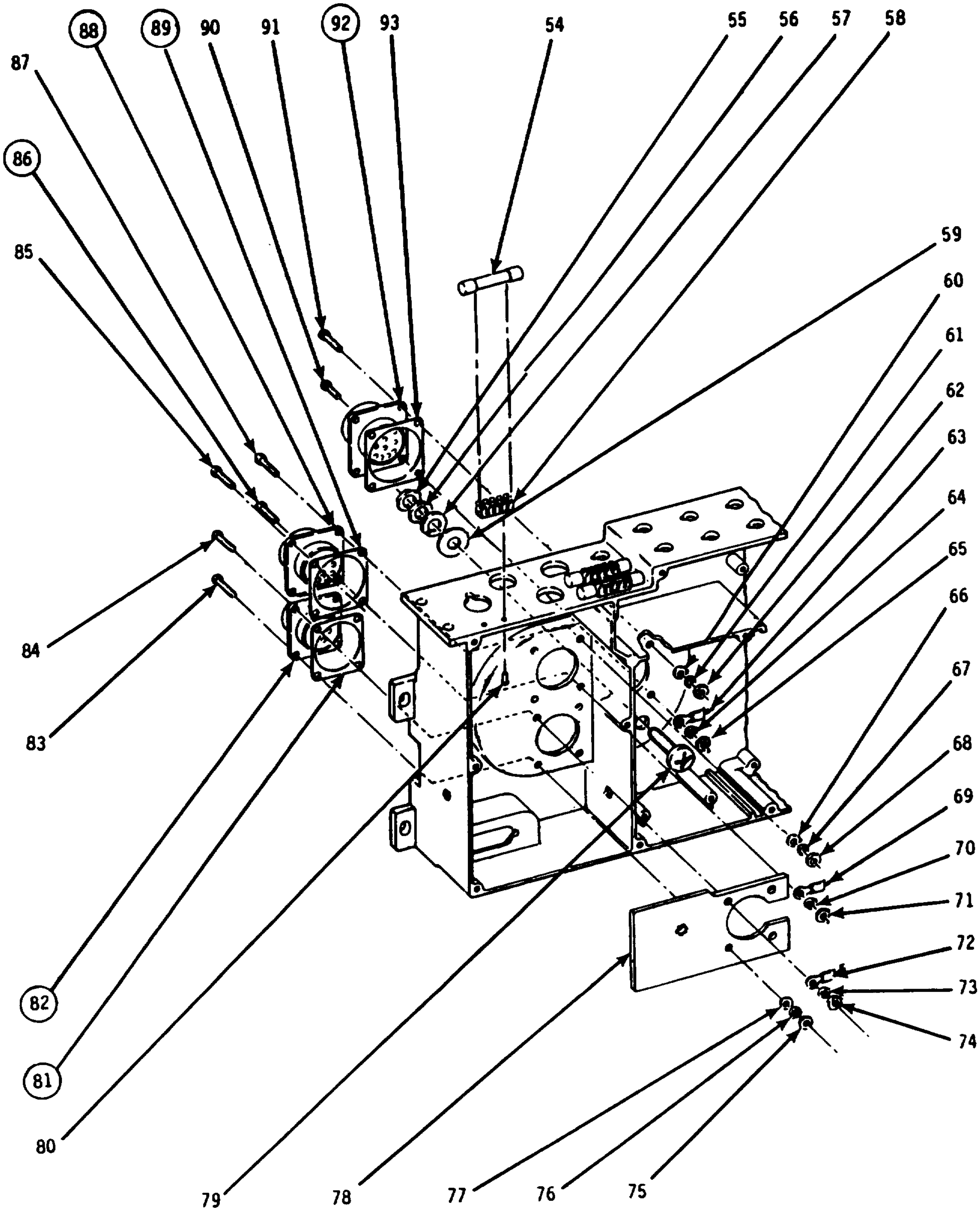
LOCATION/Item	ACTION/Procedure
Inductor L1	DISASSEMBLY • Tag and remove four wires from inductor L1 (40). • Remove screw (42) and washer (41). • Remove inductor. REASSEMBLY • Position inductor into housing. Ž Recure inductor with screw and washer. • Reconnect wires to their respective terminals.
Rear Cover	REASSEMBLY • Position cover on interface assembly and secure with 12 screws, lock washers, and flat washers.



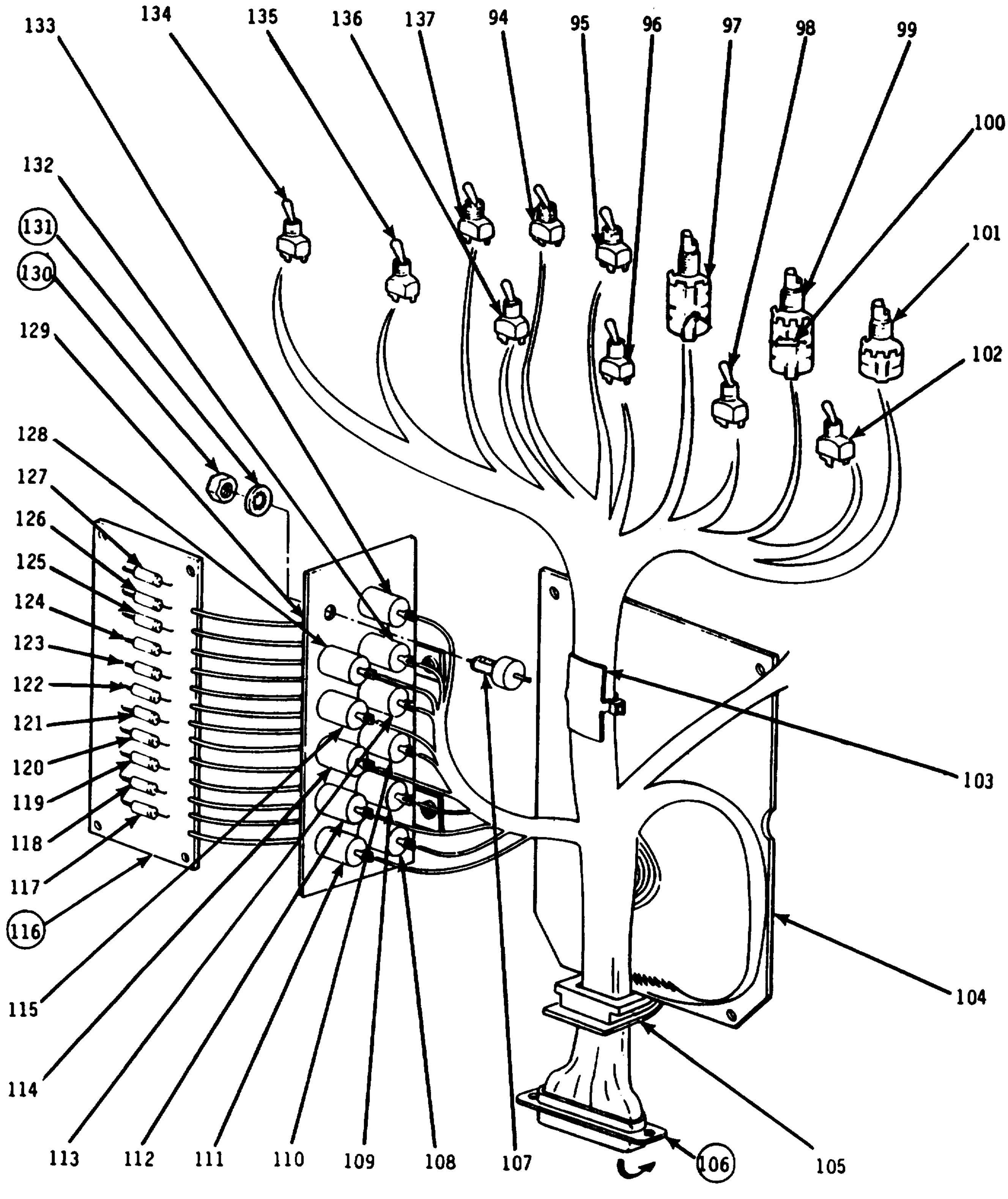
INTERFACE ASSEMBLY (Sheet 1 of 4)



INTERFACE ASSEMBLY (Sheet 2 of 4)



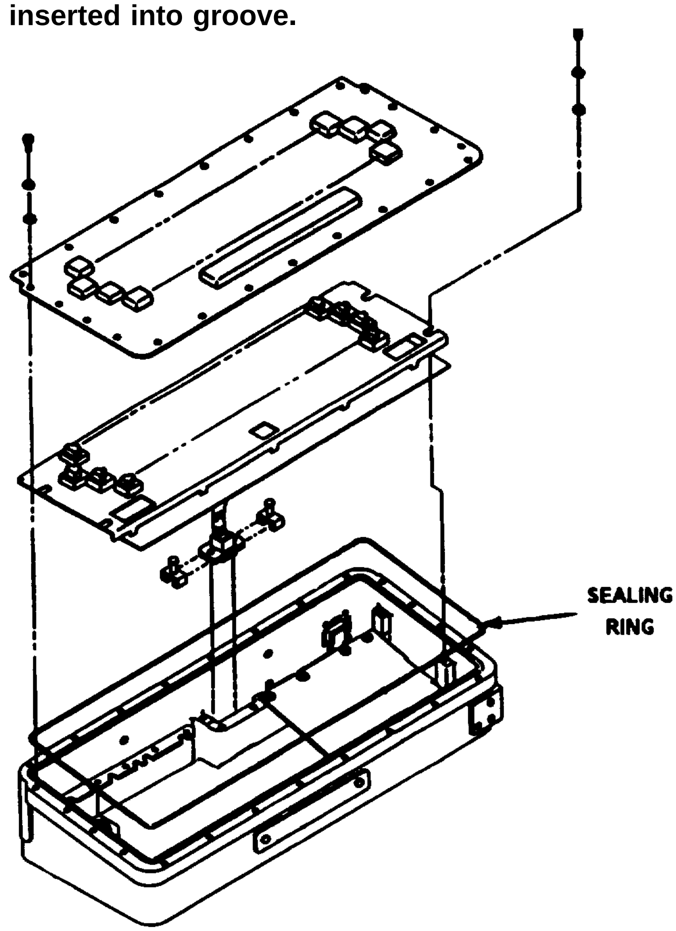
INTERFACE ASSEMBLY (Sheet 3 of 4)



INTERFACE ASSEMBLY (Sheet 4 *of* 4)

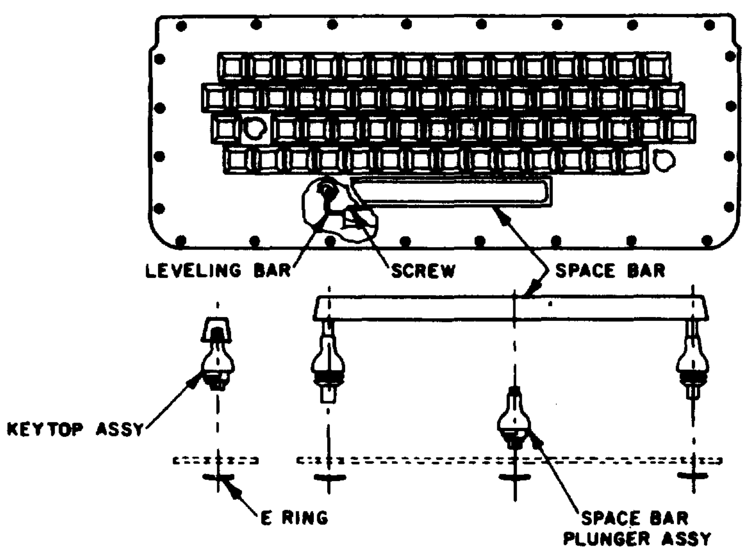
D. KEYBOARD ASSEMBLY

LOCATION/Item	ACTION/Procedure
KEYBOARD HOUSING Keyboard Assembly	DISASSEMBLY • For replacement of keyboard components, remove keyboard assembly as directed in paragraph 5-11G.
KEYBOARD HOUSING Sealing Ring	REMOVAL • Remove sealing ring. INSTALLATION • Install new sealing ring, being careful not to stretch ring as it is inserted into groove.



D. KEYBOARD ASSEMBLY - Continued

LOCATION/Item	ACTION/Procedure
Connector Mounting Plate and Gasket	REMOVAL • Remove four connector plate mounting screws. • Remove connector mounting plate. • Remove connector mounting plate gasket. INSTALLATION • Install replacement gasket and position connector mounting plate into place. • Secure with four screws.
PANEL ASSEMBLY Plunger Assembly	REMOVAL • Remove E-ring and lift out keytop and plunger assembly. INSTALLATION • Install new plunger assembly and secure with E-ring. • Install keytop.



0. KEYBOARD ASSEMBLY - Continued

LOCATION/Item	ACTION/Procedure
Space Bar	REMOVAL • Remove two screws securing leveling bar to panel assembly. • Remove three E-rings securing space bar to panel and remove space bar. • Remove center plunger assembly by pulling it away from space bar. INSTALLATION • Install new space bar and secure with three E-rings. • Install two screws securing leveling bar to panel assembly.
KEYBOARD HOUSING Keyboard Assembly	REASSEMBLY • Install keyboard assembly as directed in paragraph 5-11G.

Section VI. INTERMEDIATE DIRECT SUPPORT TEST PROCEDURES

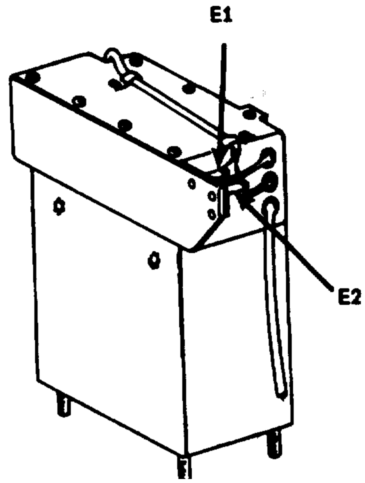
5-14. GENERAL

Perform terminal test (an overall function test) in the following paragraph to determine if equipment has been properly repaired and can be returned to stock. This test is a compilation of tests from Chapter 2 and Chapter 4.

5-15. TERMINAL TEST

PRELIMINARY TEST

- With power off, disconnect power cable, extend terminal and connect AN/PSM-45 or equivalent to E2 and E3 on the filter module.
- Measure a resistance greater than 100K to the chassis after an initial capacitor charging indication.



POWER SUPPLY TEST

- Check power supply outputs (see paragraph 5-9).

SELF-TEST

- Initiate self-test by operating the SELF-TEST switch (see Table 2-5, item 6).

LOOPBACK TEST (STATE switch at KSR)

- With power off, connect loopback plug to connector J1.
- Make following internal control settings:

  REC MODE and XMIT MODE to LO DATA
  BAUD RATE to 45.5
  CLOCK to INT
  SIGNAL to NRZ
  MODE to BAUDOT

- Apply power; check Operation validation/State Determination message to ensure that it agrees with switch settings.

- Compose a single line message and press carriage return to cause message to be transmitted.

- Inspect the line printed immediately below composed line. Transmitted and received lines should be identical.

LOOPBACK TEST (STATE switch at ICT), Part 1

- With power off, connect loopback plug to terminal J1,
- Make following internal control settings:

  REC MODE and XMIT MODE to LO DATA
  BAUD RATE to 45.5
  CLOCK to INT
  SIGNAL to NRZ
  MODE to BAUDOT

- Apply power; check Operation Validation/State Determination message to ensure that it agrees with switch settings.
- Compose a single line message and cause message to be transmitted.
- Inspect the line printed immediately below composed line. Transmitted and received lines should be identical.

LOOPBACK TEST (STATE switch at ICT), Part 2

- With power off, connect loopback plug to terminal J1.
- Make following internal control settings:

  REC MODE and XMIT MODE to LO DATA
  BAUD RATE to 1200
  CLOCK to INT
  SIGNAL to DI~
  MODE to ASCII

- Apply power; check Operation Validation/State Determination message to ensure that it agrees with switch settings.
- Compose a single line message and cause message to be transmitted.
- Inspect the line printed immediately below composed line. Transmitted and received lines should be identical.

PAPER TEST

- Release paper roll and press LF (Line-Feed) key on keyboard. PAPER lamp will light.
- Press paper tension lever and press LF key on keyboard.
- Place paper roll in locked position and release paper tension lever.
- Enter GO and carriage return. Print head will go to left home position. @ will be printed.

LAMP TEST

- Press and hold PARITY RESET switch.
- Adjust ILLUM control over entire range and check for a continuous change in brightness (clockwise rotation increases brightness and counterclockwise rotation decreases brightness).

AUDIO TEST

- Remove loopback plug from connector J1.
- Adjust AUDIO control from OFF to MAX. Tone will be continuous and vary in loudness from OFF to a maximum loudness.
- Reconnect loopback plug and press AUDIO ALM RESET switch. Alarm will stop.

LINE-FEED TEST

- Transmit composed message.
- Activate ABORT switch immediately after terminal begins line-feeding. Terminal will halt line-feed function and issue a prompt sequence.
- Press LINE-FEED switch on the dust cover. Line-feed function will perform.

TRANSFER SWITCH TEST

- Remove loopback plug from connector J1.
- With power removed, measure continuity across pins R and S. There will be continuity with TRANSFER switch at ON position and no continuity with TRANSFER switch at OFF position.

MEMORY TEST

NOTE

Perform this test only when a battery backup supply and cable are available to the terminal,

- Operate terminal with STATE switch at ICT position and information stored in message memory.
- Remove input power from terminal by disconnecting prime power source from connector J2.
- Reconnect prime power source to connector J2. Terminal will print Operation Validation/State Determination message. Check contents of message memory.

CHAPTER 6

INTERMEDIATE GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

PAGE

Section i. GENERAL INFORMATION

Section II. TOOLS AND EQUIPMENT

Section III. TROUBLESHOOTING

Section IV. REPLACEMENT OF TERMINAL ASSEMBLIES

Section V. DISASSEMBLY AND REASSEMBLY OF TERMINAL COMPONENTS

CHAPTER 6

INTERMEDIATE GENERAL SUPPORT MAINTENANCE INSTRUCTIONS
(Continued)

PAGE

Section VI. INTERMEDIATE GENERAL SUPPORT TESTING PROCEDURES

Section VII. TEST FIXTURES DISASSEMBLY AND REASSEMBLY

Section VIII. TEST FIXTURE TEST PROCEDURES

Section 1. GENERAL INFORMATION

6-1. GENERAL

This chapter contains information necessary for intermediate general support personnel to perform maintenance tasks allocated to intermediate general support by the Maintenance Allocation Chart (MAC) in Appendix B. The chapter describes tools and equipment required, procedures for troubleshooting, replacement, disassembly and reassembly, and testing.

6-2. INTERMEDIATE GENERAL SUPPORT MAINTENANCE PROCEDURES

Maintenance procedures described in lower categories of maintenance (unit and intermediate direct support) and maintenance procedures in this chapter are all included in intermediate general support maintenance. Testing procedures in this chapter determine acceptability of repaired equipment. These procedures set forth specific requirements that repaired equipment must meet before it is returned to using organization.

6-3. MODIFICATION WORK ORDERS

Performance standards listed in Sections VI and Vlll assume that current modification work orders (MWO) have been performed. Any MWOs pertaining to this equipment that may have been published after the date of this publication will be listed in DA Pam 25-30. MWOs other than those classified URGENT shall not be a reason for rejeotion.

Section II. TOOLS AND EQUIPMENT

6-4. REQUIRED TOOLS AND TEST EQUIPMENT

For common tools and equipment, see the Modified Table of Organization (MTOE) applicable to unit.

Table 6-1 contains a list of all tools and test equipment required by intermediate general support maintenance personnel for performance of the tasks described in this chapter.

Table 6-1. INTERMEDIATE GENERAL SUPPORT TOOLS AND TEST EQUIPMENT

Tool Equipment TE-50B

Multimeter AN/PSM-45 or equivalent

Loopback Plug, Honeywell (SM-B-916000)

Oscilloscope AN/USM-488

Frequency Counter AN/USM-207

Pace Kit

Power Supply PP-2309C/U (six each)

Function Generator SG-1171/A

Voltmeter, Digital AN/GSM-64C

Tool Kit, Electronic Equipment TK-105/G

Test Fixture, CMCC/Drive Board/Print Head, Honeywell (A3042001)

Test Fixture, LF/CC CCA Assembly, Honeywell (SM-D-915988)

Test Fixture, Filter Assembly, Honeywell (SM-D-915994)

Test Fixture, Power Supply, Honeywell (SM-E-915979)

Test Fixture, Interface Assembly, Honeywell (SM-D-915991)

Test Fixture, Keyswitch Assembly, Honeywell (SM-D-915997)

Data Analyzer, Telegraph TS-3378/G

Signal Generator SG-1054/G

Remover, Module, Honeywell (SM-B-916003) (two each)

Power Cable, UGC-74, 120 Vac (SM-D-764481)

Power Cable, UGC-74, 230 Vac (SM-D-764482)

Power Cable, UGC-74, 26 Vdc (SM-D-764480)

Data Cable Assembly (SM-D-915889)

Rolling Punch, Cambion 6629

Extraction Tool 465199-1 (AMP)

Extraction Tool 91052-1 (AMP)

The following are used only at a specialized repair activity (SRA), category L in the Maintenance Allocation Chart (MAC), Appendix B.

Interconnection Device, Printed Wiring Assembly, Honeywell (A3041830)
Test and Repair System, Electronic Equipment AN/USM-465A

MODEL C ONLY

Interconnection Device, Auxiliary Memory/Relay Control, Honeywell (A3041860)
Interconnection Device, Auxiliary Memory Unit, Honeywell (A3041800)

6-5. SPECIALIZED TEST EQUIPMENT

Test and Repair System, Electronic Equipment AN/USM-465A is located at a designated Specialized Repair Activity (SRA) and is operated only by skilled personnel trained in the function of this equipment.

6-6. REPAIR PARTS

Repair parts are listed and illustrated in the repair parts and special tools list TM 11-5815-602-24P-1 covering intermediate general support maintenance for this equipment.

Section iii. TROUBLESHOOTING

6-7. GENERAL

Intermediate general support troubleshooting procedures in this manual supplement those of unit and intermediate direct support maintenance for the terminal. Systematic troubleshooting procedures include unit and intermediate direct support sectionalization checks of the complete system and replacement of components.

6-8. TROUBLESHOOTING PROCEDURES

a. Troubleshooting procedures for modules/assemblies tested at intermediate general support become part of the test procedures for these modules/assemblies. Assemblies which are not testable by themselves (i. e., printer assembly) may be fault isolated using Table 6-2.

CAUTION

Before applying power to terminal for the first time, check value of fuses F1 and F2. If fuses are 2 A, operate only with ac power. If fuses are 10 A, operate only with 26 Vdc power.

NOTE

Before removing printed circuit boards and printed wiring assemblies, maintenance personnel should be familiar with ESD procedures in TB 43-0127, Maintenance and Repair of Printed Circuit Boards and Printed Wiring Assemblies.

b. Refer to the following tables and test setups for troubleshooting defective module/assembly.

MODULE/ASSEMBLY	TROUBLESHOOTING TABLE NO.	TEST SET-UP PARAGRAPH NO.
Chassis Assembly	6-2	--
Line-Feed Current Control Board (3A1A5A3)	6-3	6-24
Carriage Motor Current Control (3A1A5A5)	6-4	6-25
Print Drive Board (3A1A5A4)	6-5	6-26
Interface Assembly (3A1A7)	6-6,6-7,6-8,6-9	6-27
Power Supply (3A1PS1)	6-10a,b,c,d,e	6-28
Filter Assembly (3A1A6FL1)	6-11	6-30
Keyboard Keyswitch Assembly (3A2A1)	6-12	6-31

c. For repair of modules/assemblies, use tools in Pace Kit and Tool Kit, Electronic Equipment TK-105/G and TE-50B. Where required, recoat repaired area with conformal coating type UR MIL-1-46058 (Appendix C, item 13).

d. After repair, repeat test procedures to verify repair action.

Table 6-2. TROUBLESHOOTING CHASSIS ASSEMBLY

‘MALFUNCTION / SYMPTOM		CIRCUIT TO BE TESTED		
Step	Test or Procedure	INDICATION	Yes	No
PRINTER DOES NOT OPERATE NO CARRIAGE HEAD MOVEMENT		HARNESS ASSEMBLY (3A1A6W1)		
	Replace harness assembly (see paragraph 6-10).	Printer operates.	Return to service.	Troubleshoot chassis wiring.
DUST COVER LAMPS OR SWITCHES DO NOT OPERATE		HARNESS ASSEMBLY (3A1A6W1)		
	Replace harness assembly (see paragraph 6-10).	Switches and lamps operate.	Return to service.	Troubleshoot harness and dust cover assembly.
KEYBOARD INOPERATIVE		HARNESS ASSEMBLY (3A1A6W1)		
	Replace harness assembly (see paragraph 6-10).	Keyboard operates.	Return to service.	Troubleshoot keyboard keyswitch assembly (see Table 6-12).

Table 6-3. TROUBLESHOOTING LINE-FEED (MOTOR DRIVE) CURRENT CONTROL BOARD ASSEMBLY 3A1A5A3 (figure 6-1)

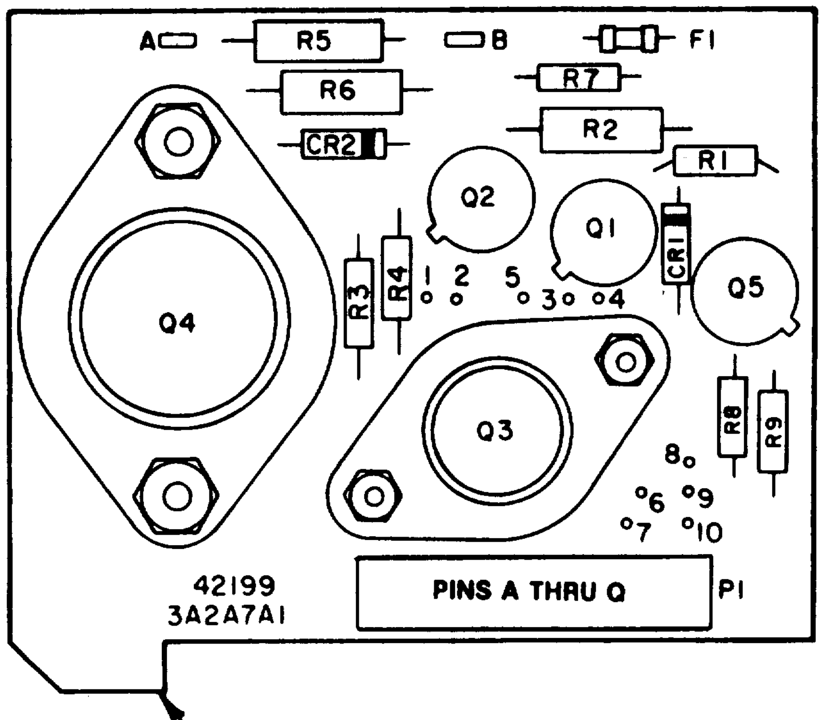
MALFUNCTION / SYMPTOM		CIRCUIT TO BE TESTED		
Step	**Test or Procedure**	**INDICATION**	**Yes**	**No**
LINE-FEED FUNCTION ABNORMAL		CONTROL CIRCUIT		
	NOTE Use test setup as directed in paragraph 6-24.			
1.	Connect multimeter to CONTROL test point.	Test fixture input diode and bias circuit are working, measure 1.5 Vdc ±5%.	Go to Step 2.	Test fixture defective.
2.	Connect multimeter to LOAD test point.	Check current control (CC) board ability to switch 22 V to output load, measure 22 Vdc ±5%.	Go to Step 3.	Current controi board defective.
3.	Set SURGE CONTROL switch to ON position.	Surge control circuit cuts off switching action in Step 2. Measure 4 to 5 Vdc at LOAD test point.	Go to Step 4.	Surge control switch defective.
4.	Return SURGE CONTROL switch to OFF position.	Measure 22 Vdc ±5% at LOAD test point.	Go to Step 5.	Surge control switch defective.
5.	Set PULSE switch to LF position.	Routes input signai (SIG IN) to pin Q, AO iN and appiles it to line-feed board.	output available AO OUT, go to Step 6.	Line-feed board defective.

Table 6-3. TROUBLESHOOTING LINE-FEED (MOTOR DRIVE) CURRENT CONTROL BOARD ASSEMBLY 3A1A5A3 - Continued (figure 6-1)

MALFUNCTION / SYMPTOM		CIRCUIT TO BE TESTED		
Step	Test or Procedure	INDICATION	Yes	No
6.	Observe output of channel B of oscilloscope (AO OUT).	A 22 V peak to peak ±5% square wave at 50 Hz.	Go to Step 7.	Turn test equipment off and remove line-feed/current control board assembly from test fixture. Perform continuity checks through Q1 (positive lead on P1-Q and negative lead on P1-D) and read approximately 621 ±20 ohms. Reverse leads and read open. If test fails, isolate fault to piece part. See figure 3-20(1) and 3-20(2).
7.	Return LF/CC board assembly to test fixture and compare function generator output on channel A of oscilloscope with channel B.	Waveforms should coincide (same frequency and waveshape).	Go to Step 8.	Use scope and fault isolate to failed piece part. See figure 3-20(1) and 3-20(2).
8.	Set SELECT switch to A1 position (connects a 20-ohm load resistor to A1 OUT). Measure as Steps 6 and 7 at A1 OUT and A1 IN.	Indication same as Step 7.	Go to Step 9.	Turn test equipment off and remove LF/CC board assembly from test fixture. Perform continuity checks through Q2 (positive lead on P1-O and negative lead on P1-C) and read approximately 621 ±20 ohms. Reverse leads and read open. If test fails, isolate fault to piece part. See figure 3-20(1) and 3-20(2) .

Table 6-3. TROUBLESHOOTING MOTOR DRIVE AND CURRENT CONTROL BOARD ASSEMBLY 3A1A5A3 - Continued (figure 6-1)

MALFUNCTION / SYMPTOM		CIRCUIT TO BE TESTED		
Step	Test or Procedure	INDICATION	Yes	No
9.	Set SELECT switch to BO position (connects a 20-ohm resistor to BO OUT). Measure as in Steps 6 and 7 at BO OUT and BO IN.	Indication same as Step 7.	Go to Step 10.	Perform continuity checks through Q3 (positive lead on P1-K and negative lead on P1-B) and read approx imately 621 ±2O ohms. Reverse leads, and read open. If test fails, isolate fault to piece part. See figure 3-20(1] and 3-20(2).
10.	Set SELECT switch to B1 position (connects a 20-ohm resistor to B1 OUT). Measure as in Steps 6 and 7 at B1 OUT and B1 IN.	Indication same as Step 7.	Return to service.	Perform continuity checks through Q4 (positive lead on P1-J and negative lead on P1-A} and read approx imately 621 ±20 ohms. Reverse leads and read open. K test fails, isolate fault to piece part. See figure 3-20(1) and 3-20(2).



CURRENT CONTROLLER CIRCUIT CARD ASSEMBLY

DRIVER CIRCUIT CARD ASSEMBLY

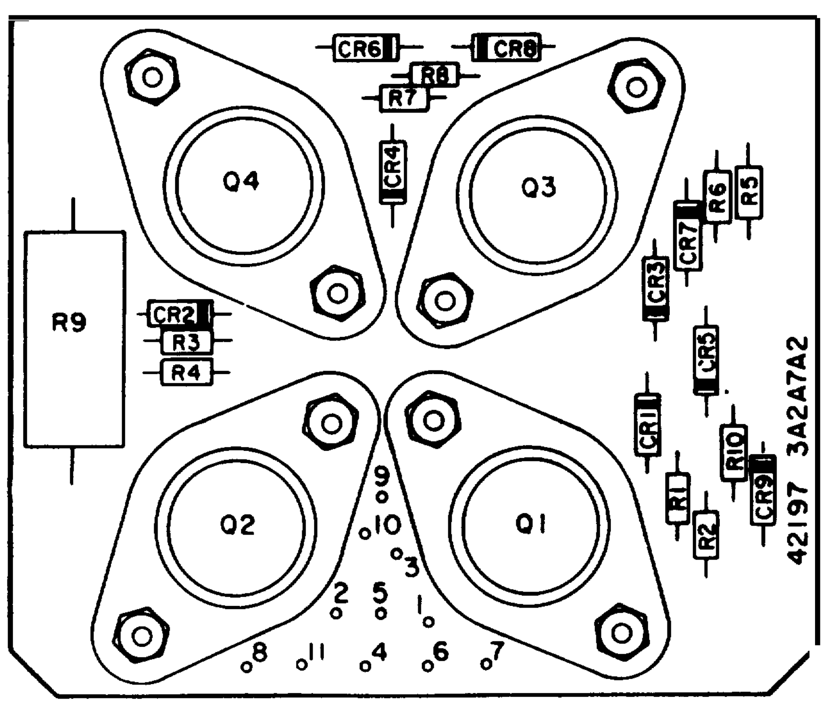


Figure 6-1. LINE-FEED (MOTOR DRIVE) CURRENT CONTROL BOARD ASSEMBLY

Table 6-4. TROUBLESHOOTING CARRIAGE MOTOR CURRENT CONTROL CIRCUIT CARD ASSEMBLY 3A1A5A5 (figure 6-2)

MALFUNCTION / SYMPTOM		CIRCUIT TO BE TESTED		
Step	Test or Procedure	INDICATION	Yes	No

CAUTION

When turning power supplies on or off ensure +26 V supply is last supply turned on and first supply turned off, for control of regulation circuits during power on/off cycles.

Continually monitor +26 V power supply current during test procedure. Current drawn should be greater than 1 amp and less than 3 amps. If at any time current exceeds 4 amps, immediately turn off +26 V power supply. Use resistance chart in Table 6-4 to isolate faulty components if too much or too little current is drawn.

NOTE

Use test setup as directed in paragraph 6-25. Because of a voltage divider effect, with the UUT inserted, +26 V test point will not read +26 V. Voltage will vary, depending on inputs at four phase motor signals,

See figure 3-19 for CMCC schematic diagram.

Step	Test or Procedure	INDICATION	Yes	No
1.	Turn all power supplies on.	All power supply inputs and test points measure as indicated.	Go to Step 2.	If components draw too much/too little current: use ohm-meter to isolate bad components on supply inputs and associated circuitry. If voltage failure: suspect VR5; check associated voltage circuitry.
2.	Monitor motor current waveforms on four phase drive signals.	Motor turning. Current waveforms at current monitoring loops appear as in FO-16(m).	Go to Step 3.	SDØA and SDØB: check SWMILIM1/CURSENFB1 circuitry. SDØC and SDØD: check SWMILIM2 /CURSENFB2 circuitry. Individual SDØ: check individual circuitry.
3.	Check for correct motor operation. Apply slight pressure to motor shaft.	Motor smooth. Input current increases slightly as pressure to shaft increases.	Go to Step 4.	Check +26 V unreg. voltage-may be loaded down by +68 V, +53 V, or +26 V lines.

Table 6-4. TROUBLESHOOTING CARRIAGE MOTOR CURRENT CONTROL CIRCUIT CARD ASSEMBLY 3A1A5A5 - Continued (figure 6-2)

MALFUNCTION / SYMPTOM		CIRCUIT TO BE TESTED		
Step	Test or Procedure	INDICATION	Yes	No
4.	Operate forward/ reverse switch on test fixture.	Motor turns in both directions. Wave-forms appear as in Step 2.	Return to service.	Same as Step 2.

CARRIAGE MOTOR CURRENT CONTROL CCA RESISTANCE CHART
(For use at bench level. Resistances will change when UUT is inserted in test fixture.)

STEP	FROM	TO	RESISTANCE
1	J2-5 (+53 V)	J1-6 (+26 V)	OPEN
2	J2-5 (+53 V)	J1-7 (+5 V)	OPEN
3	J2-5 (+53 V)	J1-13 (+68 V)	OPEN
4	J2-5 (+53 V)	J1-11 (GND)	OPEN
5	J2-5 (+53 V)	J1-15 (GND A)	OPEN
6	J1-6 (+26 V)	J1-7 (+5 V)	> 3M
7	J1-6 (+26 V)	J1-13 (+68 V)	> 3M
8	J1-6 (+26 V)	J1-11 (GND)	> 3M
9	J1-6 (+26 V)	J1-15 (GND A)	OPEN
10	J1-7 (+5 V)	J1-13 (+68 V)	> 3M
11	J1-7 (+5 V)	J1-11 (GND)	> 1M
12	J1-7 (+5 V)	J1-15 (GND A)	OPEN
13	J1-13 (+68 V)	J1-11 (GND)	OPEN
14	J1-13 (+68 V)	J1-15 (GND A)	OPEN

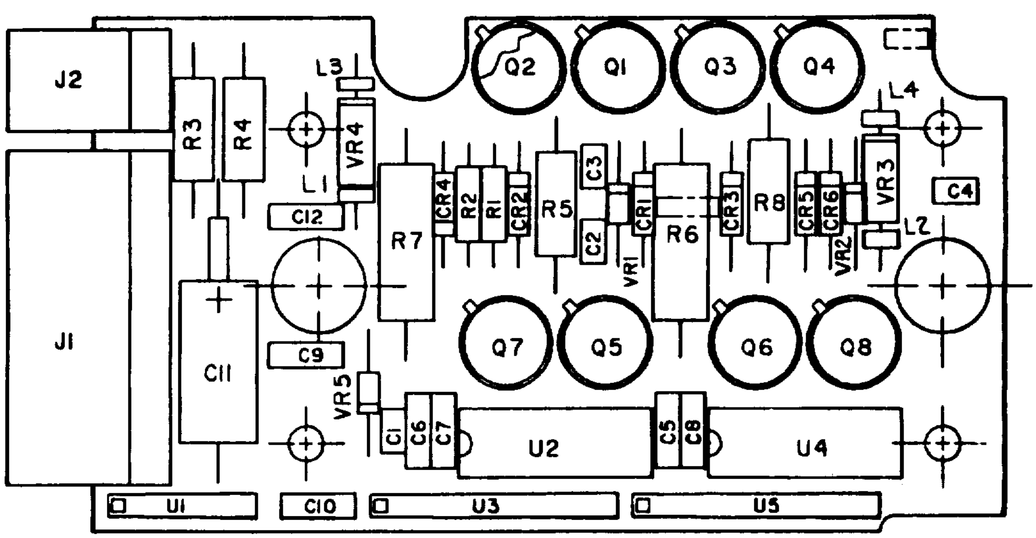


Figure 6-2. CARRIAGE MOTOR CURRENT CONTROL CIRCUIT CARD ASSEMBLY

Table 6-5. TROUBLESHOOTING PRINT DRIVE BOARD 3A1A5A4 (fgure 6-3)

MALFUNCTION / SYMPTOM		CIRCUIT TO BE TESTED		
Step	Test or Procedure	INDICATION	Yes	No

CAUTION

When turning power supplies on or off, ensure +26 V supply is the last supply turned on and the first supply turned off to ensure control of regulation circuits.

Monitor +26 V power supply current during test procedure. Current drawn should be greater than 1 amp and less than 3 amps. If current exceeds 4 amps at this point in test, a fault exists and should be located with ohmmeter.

NOTES

Use test procedures as directed in paragraph 6-26.

See figures FO-15(1)–FO-15(4) for Print Drive schematic diagrams.

Step	Test or Procedure	INDICATION	Yes	No
REGULATED VOLTAGE CIRCUITRY -				
1.	Turn on +8.6 V power supply.	All inputs and test points measure as indicated.	Go to Step 2.	+5 VCCR: Check U8 & associated circuitry; check +5 VCCR lines for loading. +5 V: Check VR13 & associated circuitry; check all +5 V lines for loading.
2.	Turn on +26 V power supply.	All inputs and test points measure as indicated.	Go to Step 3.	All fails: Check T1 and associated circuitry. Additionally, for +63 V check CR3; +53 V check CR4; +26 V check CR1.
SENSOR CIRCUITRY -				
3.	Set ROLL switch to ON position.	Paper Out LED turns on.	Go to Step 4.	U1O defective.
4.	Set ROLL switch to OFF; set FF switch to ON position.	Paper Out LED turns off, then on again.	Go to Step 5.	U1O defective.
5.	Set FF switch to OFF; set HOME switch to ON position.	Paper Out LED turns off, Home LED turns on.	Go to Step 6.	U3 or associated circuitry defective.

Table 6-5. TROUBLESHOOTING PRINT DRIVE BOARD 3A1A5A4 - Continued (figure 6-3)

MALFUNCTION / SYMPTOM		CIRCUIT TO BE TESTED		
Step	Test or Procedure	INDICATION	Yes	No
6.	Set HOME switch to OFF position; set CARRIAGE POS. switch to ON, then to OFF.	Home LED turns off, Carriage Pos. LED turns on, then off.	Go to Step 7.	U3 or associated circuitry defective.
CONSTANT ENERGY SUPPLY CIRCUITRY -				
7.	Measure voltage between TP6 (GND) and TP8 (SHUNT C).	Voltage is between +44 V - +52 V.	Go to Step 8.	Check CR6, T2, and associated circuitry.
8.	Connect current probe to CL10.	Voltage is between 0.05 v - 0.10 v.	Go to Step 9.	Replace R101 with opposite (15k or 20k) value. If fail continues check U2 and Q4.
9.	Set CCR to ON position.	+26 V power supply current increase to 3 A, maximum.	Go to Step 10.	Check CCR input circuitry - CCR on (low) state not recognized.
10.	Vary +26 V from +20 V to +32 V and monitor tracking.	Voltage tracks between 0.110 - 0.300 Vac.	Go to Step 11.	Reselect R107. If fail continues, replace U27 and reselect R107. If still fails, check associated circuitry.
PRINT HEAD CIRCUITRY –				
11.	Set FIREDOT S6 to ON position.	No dots fire; no signals present.	Go to Step 12.	Check respective DOT circuitry.
12.	Activate DOT1 through DOT9.	Dot fires; wave-forms appear as in Fo-16(f) .	Go to Step 13.	If all DOTS are missing or incorrect, check FIREDOT and feedback circuitry. For missing or incorrect individual DOTS, check respective DOT and feedback circuitry.

Table 6-5. TROUBLESHOOTING PRINT DRIVE BOARD 3A1A5A4 - Continued (figure 6-3)

MALFUNCTION / SYMPTOM		CIRCUIT TO BE TESTED		
Step	Test or Procedure	INDICATION	Yes	No
CARRIAGE MOTOR CIRCUITRY -				
13.	Monitor 12 kHz test point on test fixture with oscilloscope and check positive pulses.	Waveform and period appear as in FO-16(1).	Go to Step 14.	Check U1O, U6, U7, and associated circuitry.
14.	Monitor motor current waveforms on each of the four phase drive signals on test fixture.	Waveforms appear as in FO-16(m).	Go to Step 15.	If all fail, check ILIM circuitry. If SDØA and SDØB fail, check CURSENFB1 and SWMILIM1 circuitry. If SDØC and SDØD fail, check CURSENFB2 and SWMILIM2 circuitry.
15.	Apply slight pressure to motor shaft. Operate forward/reverse switch on test fixture.	Current increases slightly as pressure is applied. Waveforms at motor windings appear as in FO-16(m). Motor turns in both directions.	Return to service.	Check +26 V unregulated circuitry (T1).

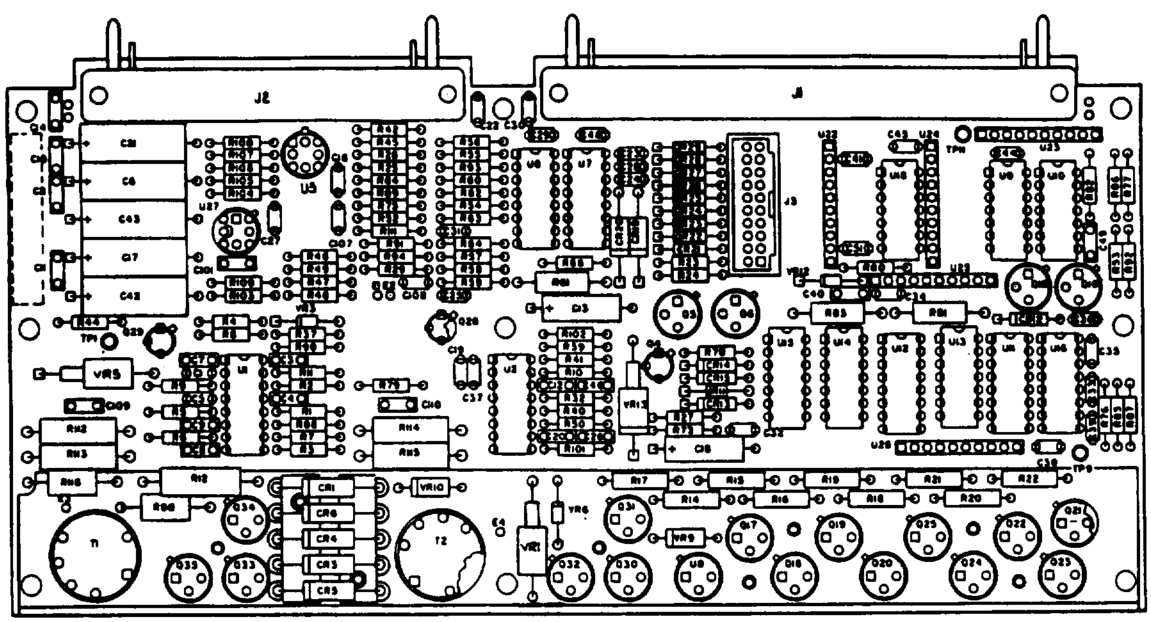


Figure 6-3. PRINT DRIVE CIRCUIT CARD ASSEMBLY

Table 6-6. TROUBLESHOOTING INTERFACE ASSEMBLY ±6 VOLT ±1 VOLT DATA CIRCUITS

MALFUNCTION / SYMPTOM		CIRCUIT TO BE TESTED		
Step	Test or Procedure	INDICATION	Yes	No
LOSS OF TRANSMIT OR RECEIVE CAPABILITY		±6 V ±1 V DATA CIRCUIT(S)		
	NOTE Use test setup as directed in paragraph 6-27c(1).			
	Transmit alternate character bits from SG-1054/G at DATA ±6 V and at speeds between 45.5 baud and 1200 baud. Make following checks in RECEIVER CLOCK, RECEIVER GATED CLOCK circuits: J1-G to VR7 to FL7 to S11B to VR2 to E17 to U4, U1, U2 to J5-6 J1-G to VR8 to FL8 to S11C to VR3 to E16 J5-8 to U5 to CR1, CR4 to FL5 to VR5 to J1P FL6 to VR6 to J1-N J1-A to VR1 to FL1 to E9 to U4 to J5-4 J1-B to VR2 to FL2 to E8 J5-7 to E1 to U1, U5 to CR13, CR14 to E13 to S12B to FL9 to VR9 to J1-K U5 to CR15, CR16 to E14 to S12C to FL1O to J1-L	Output checks on TS-3378/G analyzer.	Continue trouble-shooting.	Intermediate points can be checked with oscilloscope.

Table 6-7. TROUBLESHOOTING INTERFACE ASSEMBLY 20 MA and 60 MA CIRCUITS

MALFUNCTION / SYMPTOM		CIRCUIT TO BE TESTED		
Step	Test or Procedure	INDICATION	Yes	No
LOSS OF TRANSMIT OR RECEIVE CAPABILITY		20 MA and 60 MA DATA CIRCUIT(S)		
	NOTE Use test setup as directed in paragraph 6-27c(3).			
1.	Transmit alternate character bits from SG-1054/G at speeds between 45.5 baud and 75 baud. Make the following checks with power supplies at 20 mA: J1-G to VR7 to FL7 to S11B to E25 to CR5 to VR1, U3, Q2, U2 to E20 to J5-6 J1-H to VR8 to FL8 to Sllc to E26 to CR8, CR7 J5-7 to E2 to U1, U2, U5, Q1, Q3, CR12, K1, CR13 to E15 to S12B to FL9 to VR9 to J1-K E12 to S12C to FL1O to VR1O to J1-L	Output checks on TS-3378/G analyzer.	Continue trouble-shooting.	Intermediate points can be checked with oscilloscope.
2.	Repeat procedures in Step 1 for 60 mA test.	Output checks on TS-3378/G analyzer.	Return to service.	Defective S11 and R8.

Table 6-8. TROUBLESHOOTING INTERFACE ASSEMBLY SWITCHES
(figure 6-4)

MALFUNCTION / SYMPTOM Step | Test or Procedure	CIRCUIT TO BE TESTED INDICATION	Yes	No
INTERFACE ASSEMBLY SWITCH CONTINUITY			
NOTE Use test setup as directed in paragraph 6-27c(5).			
Set OHM CHECK switch to position 1. (Checks continuity of circuit path from J2-G to J4-5.)	Less than 1 ohm.	Continue trouble-shooting (Table 6-9).	Use multimeter and fault isolate to failed piece part.
NOTE Table 6-9, Interface Assembly Continuity Checks, shows all 12 positions and circuit parts that are to be checked. Move the AN/PSM-45 to test points SIB, then to SIC, and finally to S1D.			

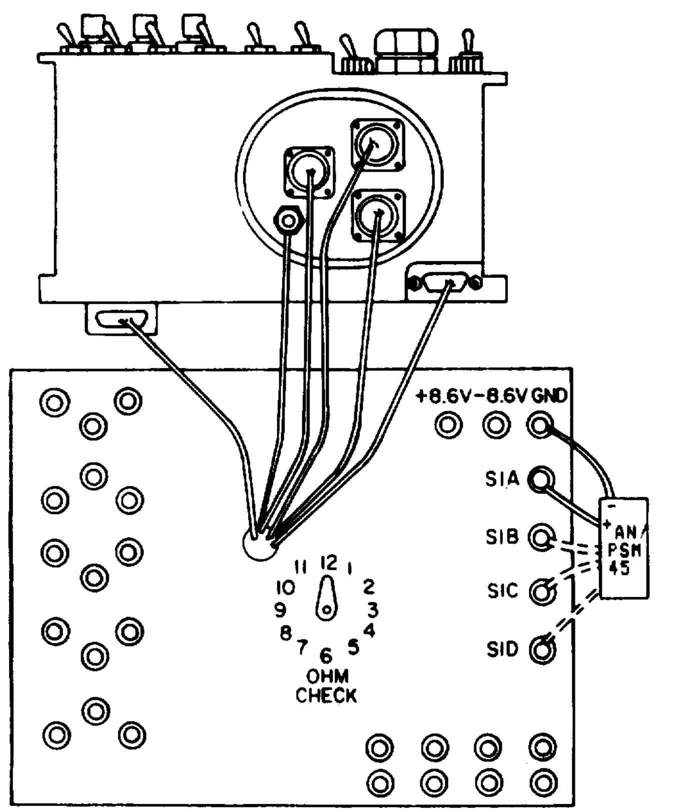


Figure 6-4. SET-UP FOR TESTING INTERFACE ASSEMBLY SWITCHES

Table 6-9. INTERFACE ASSEMBLY CONTINUITY CHECKS

TEST POINT	OHM CHECK POSITION	INTERFACE SWITCH POSITION	CONNECTION	RESISTANCE (OHMS)
S1A-GND	1	....	J2-G to J4-5	Less than 1
	2	Power ON	J2-M to J2-J	Less than 1
	2	Power OFF	J2-M to J2-J	OPEN
	3	....	J4-1 to J2-A	Less than 1
	4	....	J4-2 to J2-B	Less than 1
	5	....	J4-6 to J2-F	Less than 1
	6	....	J4-6 to J3-B	Less than 1
	7	....	J2-C to J4-3	Less than 1
	8	....	J2-D to J4-4	Less than 1
	9	Power ON	J2-L to J2-K	Less than 1
	9	Power OFF	J2-4 to J2-K	OPEN
	10	....	GND to J2-E	Less than 1
	11	....	J3-C to GND	Less than 1
	12	Power ON	J3-A to J4-8	Less than 1
	12	Power OFF	J3-A to J4-8	OPEN
S1B-GND	1	STOP BITS 1	J5-9 to J5-40	Less than 1
	2	STOP BITS 2	J5-10 to J5-40	Less than 1
	3	BAUDOT	J5-37 to J5-40	Less than 1
	3	ASCII	J5-37 to J5-40	OPEN
	4	PARITY - EVEN	J5-11 to J5-40	Less than 1
	5	PARITY - ODD	J5-12 to J5-40	Less than 1
	5	PARITY - INHIBIT	J5-12 to J5-40	OPEN
	6	STATE - KSR	J5-13 to J5-40	Less than 1
	7	STATE - ICT	J5-14 to J5-40	Less than 1
	7	STATE - RO	J5-14 to J5-40	OPEN
	8	REC MODE - 20 MA	J5-15 to J5-40	Less than 1
	9	REC MODE - 60 MA	J5-16 to J5-40	Less than 1
	10	REC MODE - 48 V	J5-17 to J5-40	Less than 1
	11	REC MODE - $\overline{\text{LO DATA}}$	J5-21 to J5-40	Less than 1
		REC MODE - LO DATA	No Connection	....
	12	SPARE	....	....
S1C-GND	1	XMIT MODE - 20 MA	J5-18 to J5-40	Less than 1
	2	XMIT MODE - 60 MA	J5-19 to J5-40	Less than 1
	3	XMIT MODE - 70 uA	J5-20 to J5-40	Less than 1
	4	XMIT MODE - $\overline{\text{LO DATA}}$	J5-22 to J5-40	Less than 1
		XMIT MODE - LO DATA	No Connection	....
	5	CLOCK - INT	J5-30 to J5-40	Less than 1
	6	CLOCK - EXT	J5-31 to J5-40	Less than 1
	7	CLOCK - +/− to +	J5-32 to J5-40	Less than 1
	8	FIGS S/J to S	J5-35 to J5-40	Less than 1
	9	SIGNAL DIPHASE	J5-36 to J5-40	Less than 1
	10	SELF-TEST normal	J5-33 to J5-40	Less than 1
	11	SELF-TEST operated	J5-34 to J5-40	Less than 1
S1D-GND	1	....	J5-38 to J1-R	Less than 1
	2	....	J5-39 to J5-3	Less than 1
	3	....	J1-S to J5-3	Less than 1
	4	....	J1-T to J5-3	Less than 1
	5	BAUD RATE - 45.5	J5-23 to J5-41	Less than 1
	6	BAUD RATE - 50	J5-24 to J5-41	Less than 1
	7	BAUD RATE - 75	J5-25 to J5-41	Less than 1
	8	BAUD RATE - 150	J5-26 to J5-41	Less than 1
	9	BAUD RATE - 300	J5-27 to J5-41	Less than 1
	10	BAUD RATE - 600	J5-28 to J5-41	Less than 1
	11	BAUD RATE - 1200	J5-29 to J5-41	Less than 1

Table 6-10a. TROUBLESHOOTING POWER SUPPLY
(+5 VA LOAD CIRCUIT)

MALFUNCTION / SYMPTOM		CIRCUIT TO BE TESTED		
Step	Test or Procedure	INDICATION	Yes	No
+5 VA LOAD CIRCUIT MALFUNCTIONS		+5 VA LOAD CIRCUIT		
NOTE Use test setup as directed in paragraph 6-28d.				
1.	Set SELECT switch to position 3 (connects VOUT and SCOPE terminal to +5 VA output).	+5 Vdc ±5%. 50 mVrms ripple and noise maximum using AC function on DVM.	Go to Step 2.	Troubleshoot +5 VA regulator circuit on microprocessor supply (See figure FO-4.) Verify select resistor value per para. 6-29a.
2.	Set +5 VA LOAD LO to ON position (places 10-ohm resistor across +5 VA output) .	+5 Vdc ±5%. 50 mVrms ripple and noise maximum using AC function on DVM.	Go to Step 3.	Troubleshoot +5 VA regulator circuit on microprocessor supply (See figure FO-4.) Verify select resistor value per para. 6-29a.
3.	Set +5 VA LOAD LO to OFF position and place +5 VA LOAD HI to ON position (places 1. 5-ohm resistor across +5 VA output).	+5 Vdc ±5%. 50 mVrms ripple and noise maximum using AC function on DVM.	Go to Step 4.	Troubleshoot +5 VA regulator circuit on microprocessor supply (See figure FO-4.) Verify select resistor value per para. 6-29a.
4.	Set +5 VA LOAD LO to ON position.	+4. 3 Vdc ±12%.	Return to service.	Troubleshoot +5 VA regulator circuit on microprocessor supply (See figure FO-4.) Verify select resistor value per para. 6-29a.

Table 6-10b. TROUBLESHOOTING POWER SUPPLY
(+12 V AND -5 VA LOAD CIRCUITS)

MALFUNCTION / SYMPTOM		CIRCUIT TO BE TESTED		
Step	Test or Procedure	INDICATION	Yes	No
		NOTE Use test setup as directed in paragraph 6-28d.		
(1) +12 V LOAD CIRCUIT MALFUNCTIONS		+12 V LOAD CIRCUIT		
1.	Set SELECT switch to position 4 (connects VOUT and SCOPE terminals to +12 v output).	+12 Vdc ±5%. 100 mVrms ripple and noise maximum.	Go to Step 2.	Troubleshoot microprocessor supply. (See figure FO-4.)
2.	Set +12 V LOAD from OFF to ON position (places 332-ohm resistor across +12 V output).	+12 Vdc ±5%. 100 mVrms ripple and noise maximum.	Return to service.	Troubleshoot microprocessor supply. (Sac figure FO-4.)
(2) -5 VA LOAD CIRCUIT MALFUNCTIONS		-5 VA LOAD CIRCUIT		
	Set SELECT switch to position 5 (connects VOUT and SCOPE terminals to -5 VA output).	-5 Vdc ±5%. 40 mVrms ripple and noise maximum.	Return to service.	Troubleshoot microprocessor supply. (See figure FO-4.)

Table 6-1OC. TROUBLESHOOTING POWER SUPPLY (+5VB and -8.6 LOAD CIRCUITS)

MALFUNCTION / SYMPTOM		CIRCUIT TO BE TESTED		
Step	Test or Procedure	INDICATION	Yes	No
	NOTE Use test setup as directed in paragraph 6-28d.			
(1) +5VB LOAD CIRCUIT MALFUNCTIONS		+5VB LOAD CIRCUIT		
1.	Set SELECT switch to position 6 (connects VOUT and SCOPE terminals to +5VB output).	+5 Vdc ±5%. 15 mVrms ripple and noise maximum.	Go to Step 2.	Troubleshoot +5 V, &8. 6 V Supply. (See FO-5.) Verify select resistor value, 6-29b.
2.	Set +5VB LOAD LO to ON position (2. 37-ohm load across +5VB output).	+5 Vdc ±5%. 15 mVrms ripple and noise maximum.	Go to Step 3.	Troubleshoot +5 V, ±8. 6 V Supply. (See FO-5.) Verify select resistor value, 6-29b.
3.	Set +5VB LOAD LO to OFF position and place +5VB LOAD HI to ON (1.7-ohm resistor across +5VB output).	+5 Vdc ±5%. 15 mVrms ripple and noise maximum.	Go to Step 4.	Troubleshoot +5 V, ±8. 6 V Supply. (See FO-5.) Verify select resistor value, 6-29b.
4.	Set +5VB LOAD LO to ON position.	+4.0 Vdc ±15%.	Return to service.	Troubleshoot +5 V, ±8. 6 V Supply. (see FO-5.) Verify select resistor value, 6-29b.
(2) -8.6 V LOAD CIRCUIT MALFUNCTIONS		-8.6 V LOAD CIRCUIT		
1.	Set SELECT switch to position 7 (-8.6 V output) and set -8.6 V LOAD switch to position 3 (115-ohm load across output).	-8.6 Vdc ±5%. 85 mVrms ripple and noise maximum.	Go to Step 2.	Troubleshoot +5 V, ±8. 6 V Supply. (See figure FO-5.)
2.	Set -8.6 V LOAD to petition 2 (82. 5-ohm load).	-8.6 Vdc ±5%. 85 mVrms ripple and noise maximum.	Go to Step 3.	Troubleshoot +5 V, &8. 6 V supply. (see figure FO-5.)
3.	Set -8.6 V LOAD to position 1 (53.6-ohm load).	-8.6 Vdc ±5%. 85 mVrms ripple and noise maximum.	Return to service.	Troubleshoot +5 V, ±8. 6 V Supply. (See figure FO-5.)

Table 6-10d. TROUBLESHOOTING POWER SUPPLY (+8.6 v LOAD, LAMP SUPPLY, and LINE-FEED LOAD CIRCUITS)

MALFUNCTION / SYMPTOM		CIRCUIT TO BE TESTED		
Step	Test or Procedure	INDICATION	Yes	No
	NOTE Use test setup as directed in paragraph 6-28d.			
(1) +8.6 V LOAD CIRCUIT MALFUNCTIONS		+8.6 V LOAD CIRCUIT		
1.	Set SELECT switch to position 12 (+8.6 V output) and set '+8.6 V LOAD switch to position 3 (53.6-ohm load).	+8.6 Vdc ±5%. 85 mVrms ripple and noise maximum.	Go to Step 2.	Troubleshoot +5 V, ±8. 6 V supply. (See figure FO-5.) Verify select resistor value per para. 6-29b.
2.	Set +8.6 V LOAD to position 2 (44.2-ohm load).	+8.6 Vdc ±5%. 85 mVrms ripple and noise maximum.	Go to Step 3.	Troubleshoot +5 V, ±8.6 V supply. (See FO-5.) Verify 6-29b.
3.	Set +8.6 V LOAD to position 1 (30. l-ohm load).	+8. 6 Vdc ±5%. 85 mVrms ripple and noise maximum.	Return to service.	Troubleshoot +5 V, &8. 6 V Supply. (see FO-5.) Verify 6-29b.
(2) LAMP SUPPLY CIRCUIT MALFUNCTIONS		LAMP SUPPLY CIRCUIT		
	Set SELECT switch to position 8 (lamp Supply). Adjust ILLUM ADJUST (varies input to Q8 on power supply from O to 20 Vdc).	Lamp supply will vary from 0.0 Vdc ±. 2 to 19 Vdc ±2.	Return to service.	Troubleshoot Q8, R66 and VR1. (See figure FO-3.)
(3) LINE-FEED LOAD CIRCUIT MALFUNCTIONS		LINE-FEED LOAD CIRCUIT		
1.	Set SELECT switch to position 10 (LF output).	+22 to +30 Vdc (pin 30 of power supply) at VOUT terminals.	Go to Step 2.	Troubleshoot power supply input. (See figure FO-3.)
2.	Set LF LOAD to ON.	+22 to +30 Vdc (pin 30 of power supply) at VOUT terminals.	Return to service.	Troubleshoot power supply input. (See figure FO-3.)

Table 6-10e. TROUBLESHOOTING POWER SUPPLY
(DRUM MOTOR, BACKUP BATTERY, and +18 V, CCR, CAPVOK CIRCUITS)

MALFUNCTION / SYMPTOM		CIRCUIT TO BE TESTED		
Step	**Test or Procedure**	**INDICATION**	**Yes**	**No**
	NOTE **Use test setup as directed in paragraph 6-28d.**			
(1) DRUM MOTOR CIRCUIT MALFUNCTIONS		DRUM MOTOR CIRCUIT		
	Set SELECT switch to position 11 (drum motor). Connect AN/USM-488 across SCMO HI and LO (timing simulator output) and set DRUM switch to ON position (logic 0 to DRUM SHUTDOWN).	**Timing simulator outputs pulse period proportional to drum motor output, 1080 µsec ±50.**	**Return to service.**	**Troubleshoot drum motor supply circuit. (See FO-3.)Verify select resistor value per para. 6-29b.**
	NOTE **Drum motor circuits are not used in B and C models, but are operative.**			
(2) BACKUP BATTERY CIRCUIT MALFUNCTIONS		**BATTERY CIRCUIT**		
1.	**Remove VIN lead.**	**BAT lamp comes on.**	**Go to Step 2.**	**Troubleshoot comparator on input circuit. (See figure FO-3.)**
2.	**Perform test procedures of Tables 6-10a, 6-10b.**	**Indications satisfactory.**	**Go to Step 3.**	**Troubleshoot comparator on input circuit. (See figure FO-3.)**
3.	**Replace VIN lead.**	**BAT lamp goes off.**	**Return to service.**	**Troubleshoot comparator on input circuit. (See figure FO-6.)**

Table 6-10e. TROUBLESHOOTING POWER SUPPLY (DRUM MOTOR, BACKUP BATTERY, and +18 V, CCR, CAPVOK CIRCUITS) -Continued

MALFUNCTION / SYMPTOM		CIRCUIT TO BE TESTED		
Step	Test or Procedure	INDICATION	Yes	No
(3) +18 V, CCR, CAPVOK CIRCUIT MALFUNCTIONS		+18 V, CCR, CAPVOK CIRCUIT		
1.	Connect AN/PSM-45 across VOUT HI and LO. Set SELECT to position 9 (+18 V print coils). With +18 V LOAD to position 2 (no load), set CCR to ON (causes power supply circuit card, pin 22 to become logic 0).	CAP V OK lamp comes ON and VOUT measures +18 Vdc ±5%.	Go to Step 2.	Troubleshoot constant current supply. (See figure FO-7.) Verify select resistor value per para. 6-29d.
2.	Set CCR to OFF (pin 22 becomes logic 1). Set +18 V LOAD switch to position 1 (27.4 ohms).	CAP V OK lamp goes OUT and VOUT drops to less than 1 volt dc.	Go to Step 3.	Troubleshoot constant current supply. (See figure FO-7.) Verify select resistor value per para. 6-29d.
3.	Set CCR to ON position.	CAP V OK lamp comes ON and VOUT measures +18 Vdc ±5%.	Go to Step 4.	Troubleshoot constant current supply. (See figure FO-7.) Verify select resistor value per para. 6-29d.
4.	Set +18 V LOAD to position 3 (12 ohms).	CAP V OK lamp goes OUT and VOUT measures +12 Vdc ±10% .	Return to service.	Troubleshoot constant current supply. (See figure FO-7.) Verify select resistor value per para. 6-29d.

Table 6-11. TROUBLESHOOTING FILTER ASSEMBLY
(3A1A6FL1)

MALFUNCTION / SYMPTOM		CIRCUIT TO BE TESTED		
Step	**Test or Procedure**	**INDICATION**	**Yes**	**No**
	NOTE **Use test setup as directed in paragraph 6-30d.**			
(1) 120 VAC OPERATION MALFUNCTION		**FILTER ASSEMBLY**		
1.	**Set test fixture POWER switch to ON position. Using AN/PSM-45, measure across 22-30 VDC test point and RTN.**	**+28 Vdc ±3.5.**	**Go to Step 2.**	**Troubleshoot filter assembly. (See figure FO-3.)**
2.	**Use AN/USM-488 to measure ripple.**	**750 mVrms maximum.**	**Go to Step 3.**	**Troubleshoot filter assembly. (See figure FO-3.)**
3.	**Measure continuity of +12 Vdc circuitry by measuring from fixture test point 12 VDC to BAT (J3) pin A. Ensure that power is disconnected but POWER switch is ON and fuse F3 is not open.**	**Less than 1 ohm.**	**Return to service.**	**Troubleshoot filter assembly. (See figure FO-3.)**
(2) 230 VAC OPERATION MALFUNCTION		FILTER ASSEMBLY		
	Repeat test procedures in (1) above.			
(3) 28 VDC OPERATION MALFUNCTION		FILTER ASSEMBLY		
	Repeat test procedures in (1) above.			

Table 6-12. TROUBLESHOOTING KEYBOARD KEYSWITCH ASSEMBLY (3A2A1)
(figure 6-5)

MALFUNCTION / SYMPTOM		CIRCUIT TO BE TESTED		
Step	**Test or Procedure**	**INDICATION**	**Yes**	**No**
	NOTE **Use test setup as directed in paragraph 6-30c.**			
	KEYBOARD KEYSWITCH ASSEMBLY MALFUNCTIONS	KEYBOARD KEYSWITCH ASSEMBLY		
1.	**Connect AN/USM-488 to LOGIC terminal and probe ground to (LOGIC) REF. Apply +5 Vdc ±5% to test fixture by turning on +5 V supply. Press and release CLOCK CONTROL switch.**	**Oscilloscope reads O to +0.5 Vdc.**	**Assures initial-ization of logic cir-cuitry, go to Step 2.**	See figure 3-15 **for keyboard logic diagrams.**
2.	**Connect AN/USM-488 to 2400 Hz terminal and ground to GND terminal.**	**Oscilloscope shows 410 µsec nominal pulse, with a low logic level of .4 Vdc max and a high logic level not to exceed 5 Vdc, or be less than 2.5 Vdc.**	**Go to Step** 3.	**See figure 3-15 for keyboard logic diagrams.**
3.	**Connect AN/USM-488 to DATA terminal and ground to (DATA) REF terminal. Press and hold a key on keyswitch assembly that is called out in the following Character Code Matrix.**	**Record logic level displayed on scope (bit 1).**	**Go to Step** 4.	**Use scope and fault isolate to failed piece part.**

Table 6-12. TROUBLESHOOTING KEYBOARD KEYSWITCH ASSEMBLY (3A2A1) -Continued (figure 6-5)

MALFUNCTION / SYMPTOM		CIRCUIT TO BE TESTED		
Step	Test or Procedure	INDICATION	Yes	No

CHARACTER CODE MATRIX

Character Code	b1	b2	b3	b4	b5	b6	b7	b8
BS (CTL, SHIFT)	1	1	1	1	1	1	1	0
9	0	1	1	0	1	1	0	1
E (SHIFT)	1	0	1	1	0	1	1	1
FS (SHIFT)	0	0	1	0	0	1	1	1
H (SHIFT)	1	1	0	1	1	0	1	1
z (SHIFT)	0	1	0	0	1	0	1	1
?	1	0	0	1	0	0	1	1
LF	1	1	1	0	0	0	0	1
DLC	0	0	0	1	0	0	0	1
A	0	0	0	0	0	1	0	1

NOTE

This procedure causes an 8-bit character to be loaded and read out one bit at a time.

Step	Test or Procedure	INDICATION	Yes	No
4.	Press and release CLOCK CONTROL switch on fixture. Key may now be released because character is stored in the logic.	Record logic level displayed on scope (bit 2).	Go to Step 5.	Use scope and fault isolate to failed piece part.
5.	Press and release CLOCK CONTROL switch.	Record logic level displayed on scope (bit 3).	Go to Step 6.	Use scope and fault isolate to failed piece part.
6.	Repeat procedures until bits 4 through 8 have been recorded. Compare eight readings recorded with the Character Code Matrix.	Matrix verified.	Go to Step 7.	Use scope and fault isolate to failed piece part.

NOTE

Further use of clock control will allow 8 bit character to be reread providing another key has not been pressed. For other codes, see Table 3-2.

Table 6-12. TROUBLESHOOTING KEYBOARD KEYSWITCH ASSEMBLY (3A2A1) -Continued (figure **6-5)**

MALFUNCTION / SYMPTOM		CIRCUIT TO BE TESTED		
Step	**Test or Procedure**	**INDICATION**	**Yes**	**No**
7.	**Test 12 bit counter (U8) by pressing RPT key. Disconnect oscilloscope leads.**	**Observe a 210 msec square wave at logic terminals.**	**Go to Step 8.**	**Use scope and fault isolate to failed piece part.**
8.	**Using multimeter, check PRESENT test point with respect to GND.**	+2. 5 **Vdc ±10%.**	**Go to Step 9.**	**Use scope and fault isolate to failed piece part.**
9.	**Using multimeter, check each REF terminal with respect to GND.**	**+1. 5 Vdc ±5%.**	**Return to service.**	**Use scope and fault isolate to failed piece part.**

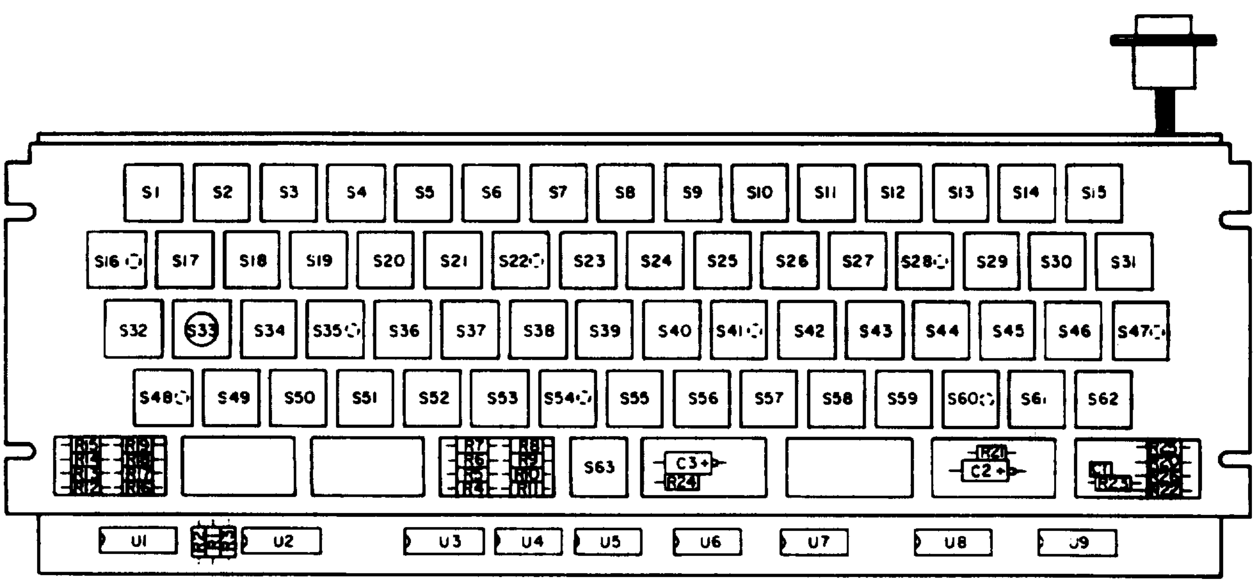


Figure 6-5. KEYSWITCH ASSEMBLY

Section IV. REPLACEMENT OF TERMINAL ASSEMBLIES

6-9. GENERAL

This section covers removal, installation, and adjustment of the following components:

HARNESS ASSEMBLY (Motherboard)
PAPER ROLL SUPPORT ASSEMBLY
LOGIC BOX COVER ASSEMBLY
CARRIAGE MOTOR CURRENT CONTROL CCA
PRINT DRIVE CCA
MACHINE GLIDE AND GUIDE RAIL ASSEMBLY
LINE-FEED DRIVE ASSEMBLY

6-10. HARNESS ASSEMBLY - REPLACEMENT

REMOVAL (See figure 6-6.)

CAUTION

Do not extend chassis over edge of workbench without securing case to bench.

- **Extend chassis from** case.
- **Disconnect power supply from harness assembly and filter module connectors.**
- **Remove power supply assembly as directed in paragraph 5-11A.**
- **Remove interface assembly as directed in paragraph 5-11C.**
- **Release dust cover latches and lower dust cover.**
- **Remove printer assembly as directed in paragraph 5-11F.**
- **Remove keyboard as directed in paragraph 5-11G.**
- **With keyboard removed, remove screw (10), lock washer (2), and nut (1) holding keyboard connector to dust cover.**

NOTE

Mark all wires with appropriate labels. Remove all cable clamps (11) by removing screws (12), lock washers (13), and flat washers (14).

- **Remove** all **rear mounted dust cover lamps and switches.**
- **Unsolder all front mounted lamps and receiver assembly. (See paragraph 5-13B for instructions on receiver assembly removal.)**
- **Remove copy lamps by removing screw (3), lock washer (4), and flat washer (5) for each lamp assembly.**
- **Remove all logic circuit card assemblies as directed in paragraph 5-11B.**
- **Remove seven screws (8) securing the motherboard (9) to casting (6).**
- **Unsolder** paper low **switch terminals (7) and cut five cable ties holding cable to casting. (See Appendix C, item 10.)**
- **Extract motherboard by gently pulling it forward.**
- **Route paper low switch and power supply cables through casting opening as harness is extracted.**

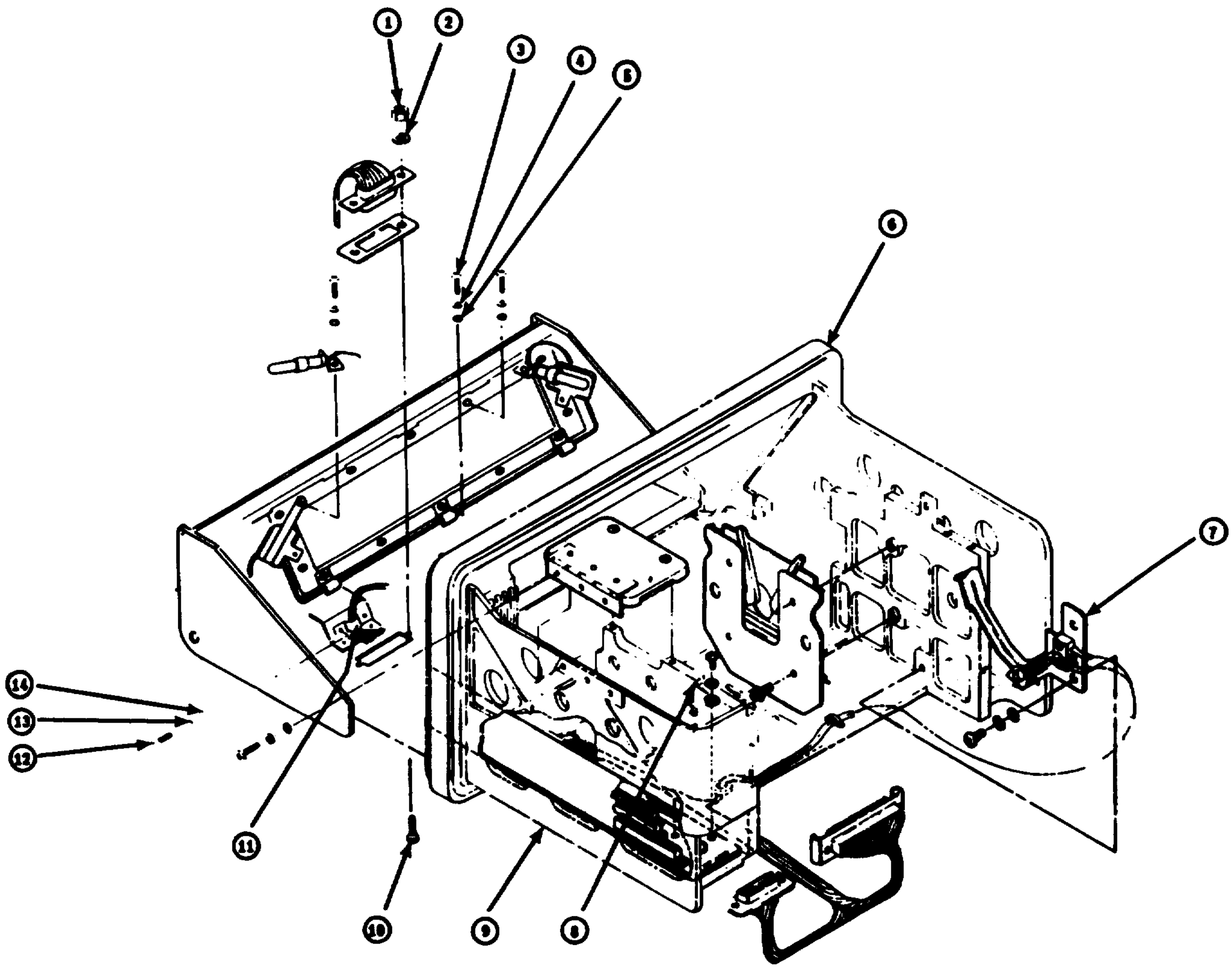


Figure 6-6. HARNESS ASSEMBLY - REPLACEMENT

LEGEND

1. Nut
2. Washer, lock
3. Screw, pnh
4. Washer, lock
5. Washer, flat
6. Casting
7. Switch assembly, paper low
8. Screw
9. Harness assembly, (motherboard)
10. Screws, fhd
11. Clamp, cable
12. Screw, pnh
13. Washer, lock
14. Washer, flat

6-10. HARNESS ASSEMBLY - REPLACEMENT (Continued)

INSTALLATION (See figure 6-7.)

- **Route paper low switch and power supply cables through casting opening as motherboard is positioned.**
- **Solder paper low switch terminal wires into correct position.**
- **Install shrink tubing (Appendix C, item 11), and install five cable ties holding cable to casting.**
- **Install seven screws and logic circuit card assemblies.**
- **Install copy lamps, and solder all front mounted lamps into position.**
- **Install rear mounted dust cover lamps and switches.**
- **Install keyboard and connector as directed in paragraph 5-11G.**
- **Install printer assembly as directed in paragraph 5-11F.**
- **Install power supply assembly as directed in paragraph 5-11A.**
- **Install interface assembly as directed in paragraph 5-11C.**
- **Apply power and verify terminal is operational.**

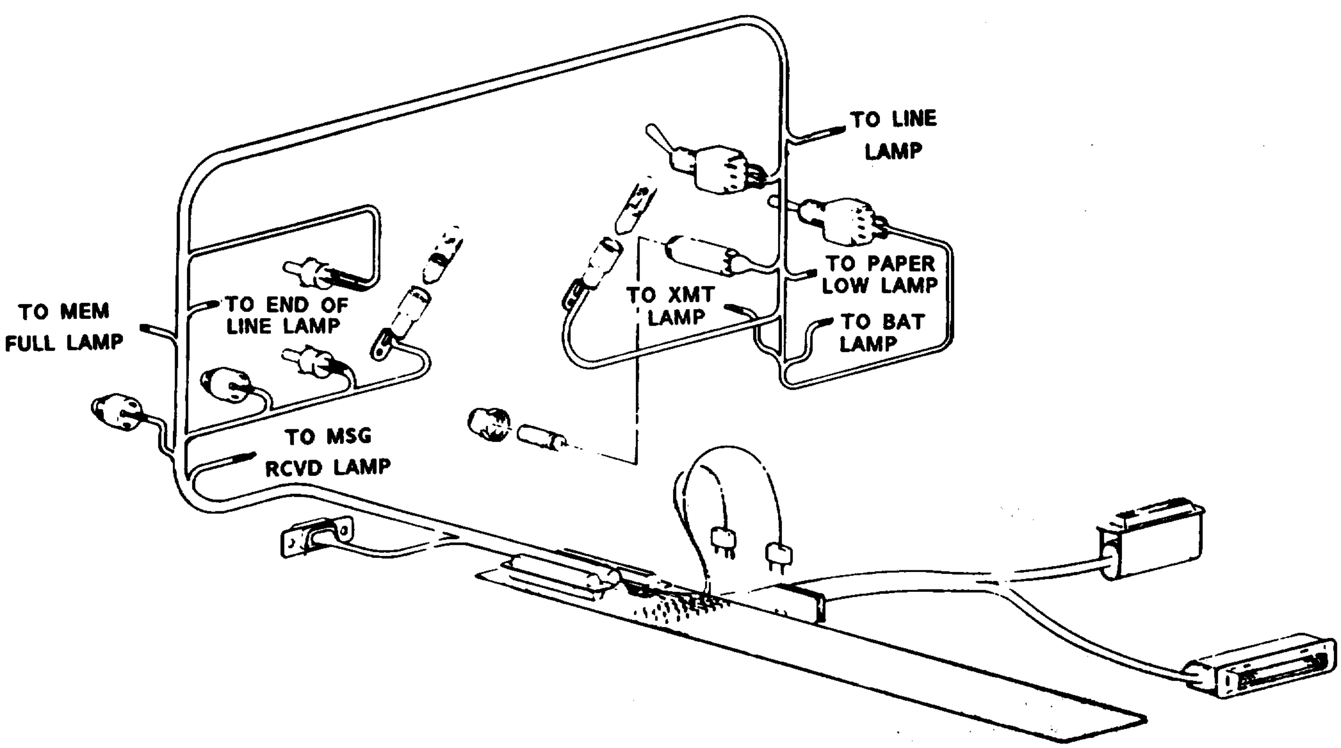


Figure 6-7. HARNESS ASSEMBLY

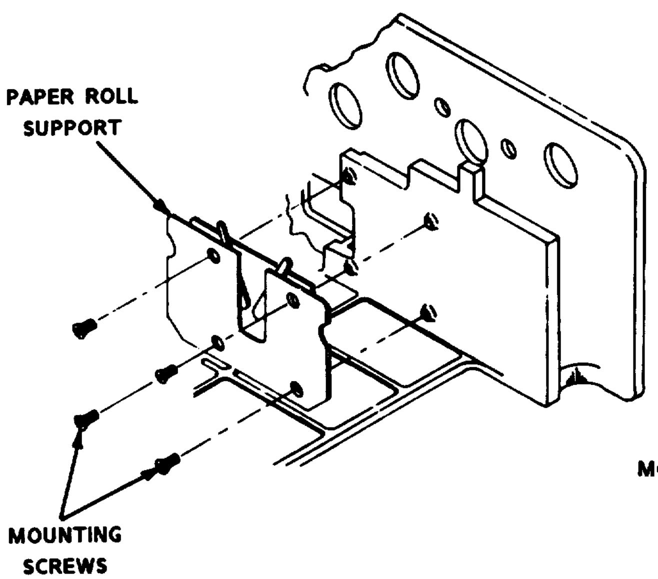
6-11. PAPER ROLL SUPPORT ASSEMBLY-REPLACEMENT

REMOVAL

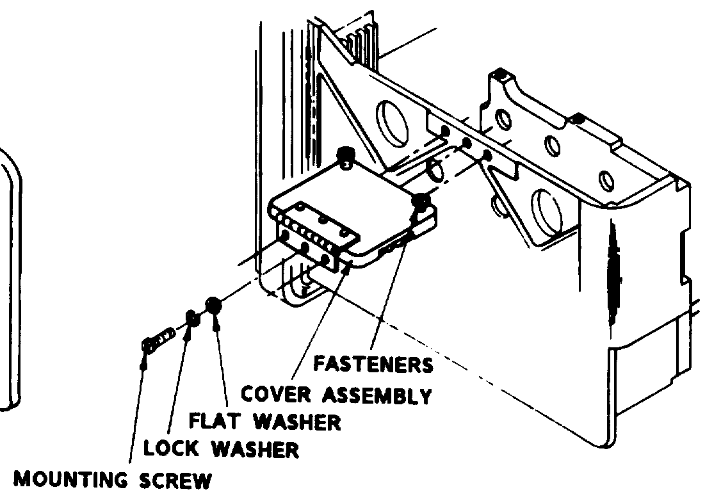
- Release side latches and extend chassis from case.
- Remove paper roll.
- Remove four mounting screws securing support assembly to casting.
- Remove assembly.

INSTALLATION

- Position new assembly onto casting wall.
- Apply locking compound MIL-S-22473 (Appendix C, item 12) to threads of mounting screws.
- Install paper roll and secure terminal in case.



PAPER ROLL SUPPORT ASSEMBLY



LOGIC BOX COVER ASSEMBLY

6-12. LOGIC BOX COVER ASSEMBLY - REPLACEMENT

REMOVAL

- Release side latches and extend chassis from case.
- Loosen two fasteners securing cover across logic box (do not remove fasteners).
- Remove three mounting screws securing cover assembly to chassis and remove cover assembly.

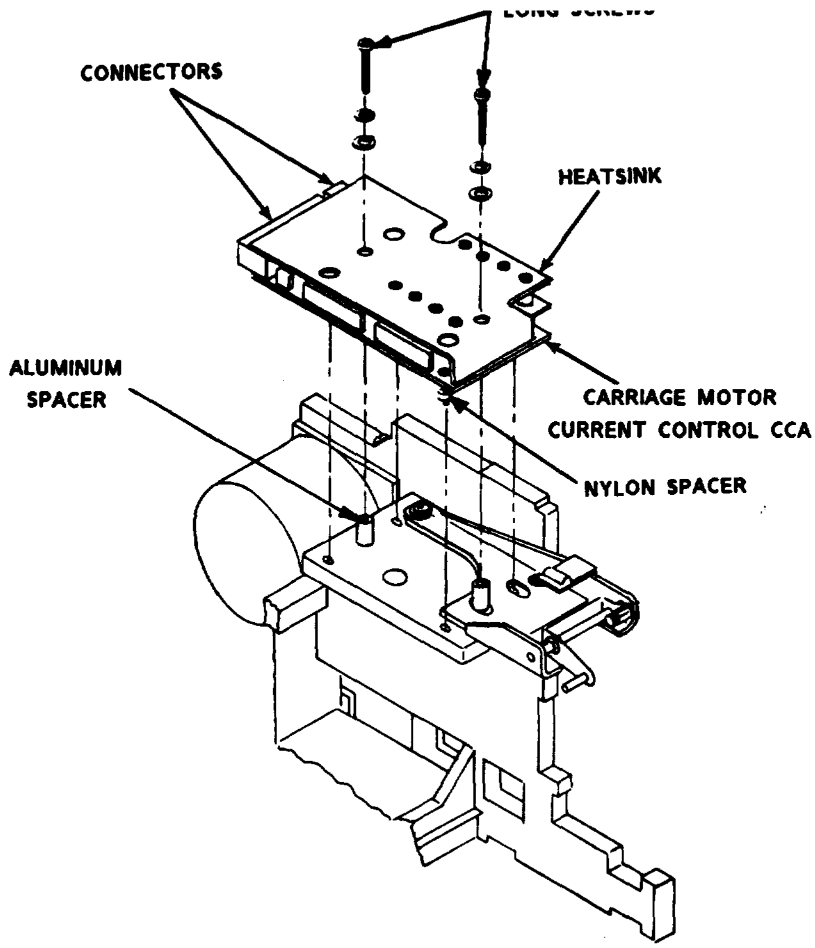
INSTALLATION

- Install three mounting screws.
- Tighten two fasteners and secure terminal in case.

6-13. CARRIAGE MOTOR CURRENT CONTROL CCA - REPLACEMENT

REMOVAL

- Remove printer assembly as directed in paragraph 5-11F.
- Unfasten-two connectors on back of CCA.
- Remove two long screws and mounting hardware securing CCA and heatsink assembly through aluminum spacers at front and rear of heatsink.
- Remove eight short screws and mounting hardware securing heatsink to CCA.
- Remove heatsink and two aluminum spacers.
- Remove four screws and mounting hardware securing CCA to bracket through nylon spacers.
- Remove CCA and four nylon spacers.



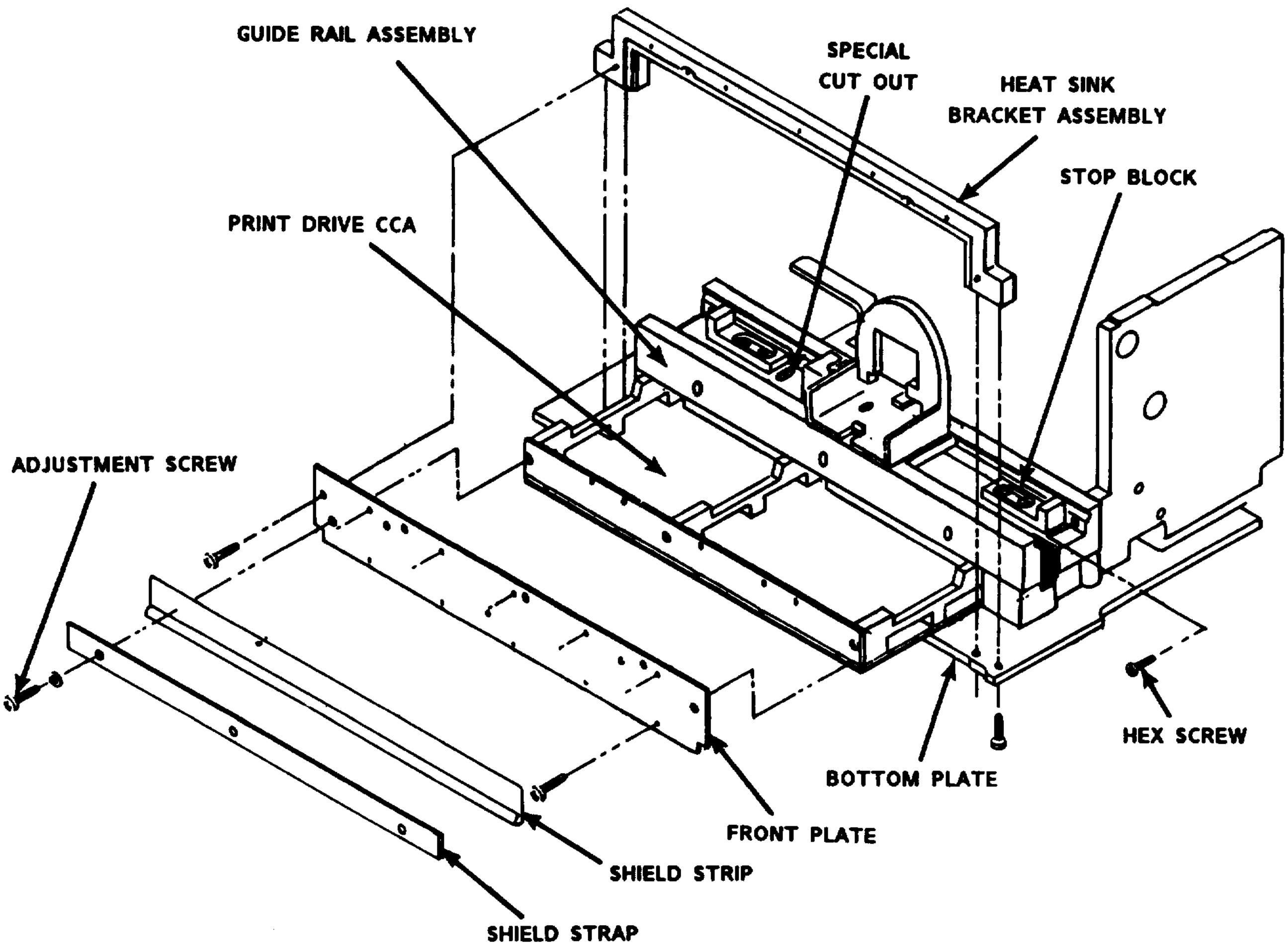
INSTALLATION

- Hold CCA in place and fasten with four screws and mounting hardware, ensuring four nylon spacers are in place under CCA.
- Place aluminum spacers in place and fasten heatsink to CCA through aluminum spacers with two large screws and mounting hardware.
- Install remaining eight short screws and mounting hardware to heatsink.
- Plug both connectors on back of CCA.

6-14. PRINT DRIVE CCA - REPLACEMENT

REMOVAL

- Move print head to left most position.
- Using both index fingers, unplug connector from print drive CCA.
- Remove three screws, washers, and lock washers and remove shield strip and shield strap.
- Remove 12 screws and remove front plate.
- Using top corners of CCA, pry slowly forward, being careful that components do not catch on underside of drive belt.



INSTALLATION

- Push CCA into slot (use caution if belt drive is installed so as not to catch high components).
- Fasten front plate with 12 screws.
- Install shield strip and shield strap and secure with three screws, washers, and lock washers.

6-15. MACHINE GLIDE AND GUIDE RAIL ASSEMBLY - REPLACEMENT

REMOVAL (See illustration on page 6-34.)

- Remove printer assembly as directed in paragraph S-11F.
- Loosen belt tension adjustment screw on left side of print head mounting bracket enough to disengage belt assembly from mounting bracket.
- Free belt assembly from mounting bracket and from carriage motor.
- Remove three screws, washers, and lock washers and remove shield strip and shield strap.
- Remove 12 screws and remove front plate.
- Remove two screws, washers, and lock washers securing bottom drive board shield to heatsink bracket.
- Remove ribbon guide bracket.
- Remove heatsink bracket assembly by removing four screws from bottom plate.
- Place end of belt assembly in special cut out on guide rail assembly and slip machine glide over it to free belt assembly.
- Remove five large machine screws securing guide rail assembly to bottom plate.
- Remove two hex screws, washers, and lock washers securing guide rail assembly to vertical walls. (Right stop block must be removed to access right hex screws.)
- Remove machine glide and guide rail assembly.

INSTALLATION

- Place machine glide and guide rail assembly in position.
- Fasten in place with five large screws to bottom plate and two screws, washers, and lock washers to vertical wails.
- Move machine glide to left position and place end of belt assembly in special slot. Slide machine glide over slot to right.
- Assemble adjustment block mechanism and slip under mounting bracket.
- Adjust belt tension according to procedures in 5-11F.
- Install heatsink bracket assembly and fasten to bottom plate with four screws.
- Install ribbon guide bracket.
- Install right stop block.
- Secure bottom drive board shield to heatsink bracket with two screws, washers, and lock washers.
- Fasten front plate with 12 screws.
- Install shield strip and shield strap and secure with three screws, washers, and lock washers.

GUIDE RAIL ASSEMBLY ADJUSTMENT PROCEDURE

- Position machine glide over each adjustment screw and adjust three adjustment screws on front of printer assembly. Adjust so that movement by hand does not exceed .003 inch of play at top of print head. Machine glide shall slide across guide rail assembly with firm and equal pressure when moved by hand.

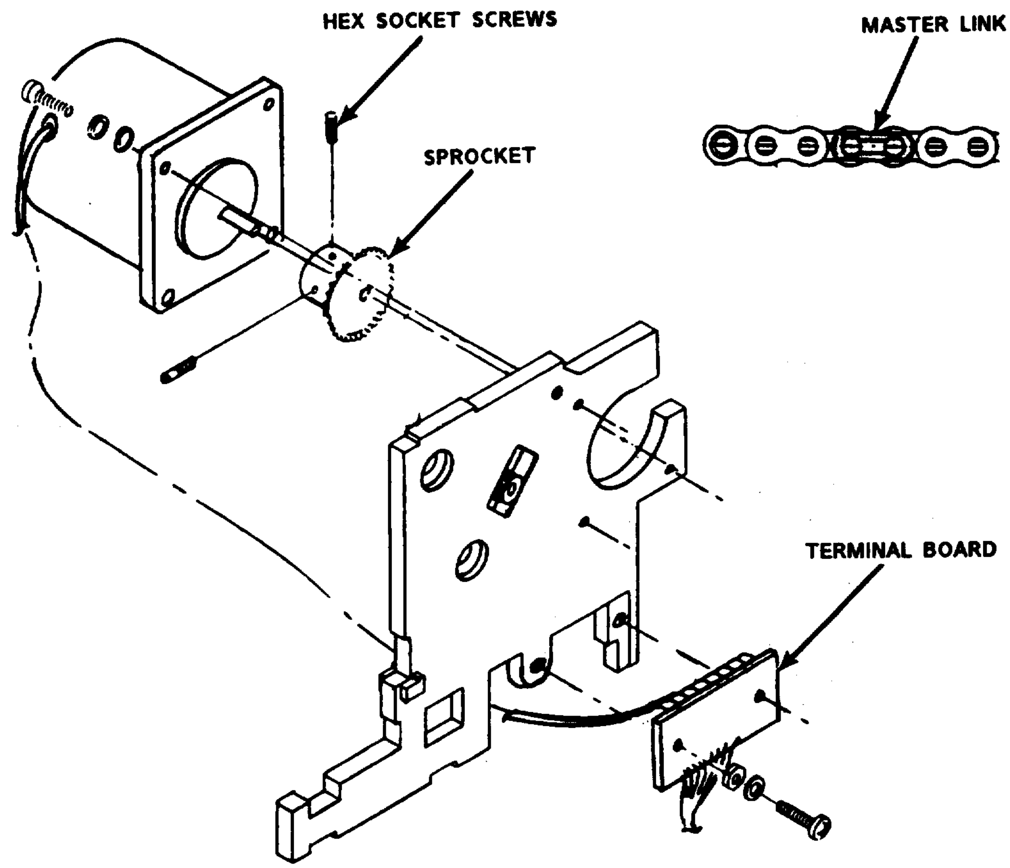
PRINT HEAD/STOP BLOCK ADJUSTMENT PROCEDURE

- Loosen wrenches on print head. Insert .02 inch feeler gage between platen and pins of print head. Push print head forward and tighten forward set screw. Pull print head back. Insert .03 inch feeler gage between platen and print head pins. Push print head forward and tighten rear set screw.

6-16. LINE-FEED DRIVE ASSEMBLY - REPLACEMENT

REMOVAL

- Remove line-feed assembly as directed in paragraph 5-11D.
- Remove printer assembly as directed in paragraph 511lF.
- Turn wheel until master link on chain is accessible.
- Remove master link on chain and remove chain.
- Remove two hex socket set screws and remove sprocket.
- Tag and unsolder five wires on terminals E13 through E17 on terminal board.
- Remove three screws securing motor to left side wall and remove motor.



INSTALLATION

- Position line-feed motor into place and fasten with three screws.
- Solder five wires to their respective terminals.
- Fasten sprocket to motor shaft with two hex socket set screws.
- Place chain into position and install master link.
- Adjust line-feed chain tension according to procedures in Chapter 4.

Section V. DISASSEMBLY AND REASSEMBLY OF TERMINAL COMPONENTS

6-17. GENERAL

This section covers disassembly and reassembly of the following components:

KEYSWITCH MODULE
PRINTER ASSEMBLY
PAPER LOW SENSING MECHANISM
INTERFACE ASSEMBLY
FILTER MODULE

6-18. KEYSWITCH MODULE - DISASSEMBLY AND REASSEMBLY

DISASSEMBLY

- Remove keyboard as directed in 5-11G.
- Remove 24 screws, washers, and lock washers.

MODEL C ONLY

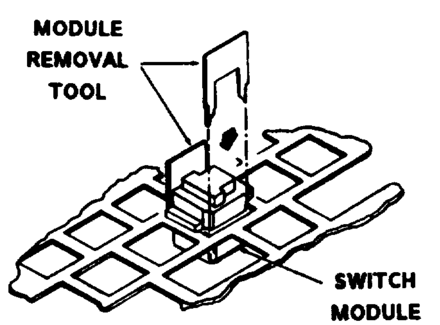
- Remove 22 screws, washers and lock washers.
- Remove two hex screws securing AMM mount.

- Remove panel assembly, being careful to leave sealing ring in place.
- Remove keyswitch assembly.
- Turn keyswitch assembly over and locate keyswitch module to be replaced.
- Unsolder four terminals of switch to be replaced from keyswitch assembly using a 750°F controlled temperature, 1/8 inch chisel tip soldering iron.
- When unsoldering terminals, use a solder removal tool to remove all solder from pin holes in keyswitch assembly.

NOTE

There are 21 switches secured to printed circuit card by screws. If switch to be removed is one of the 21, remove screw securing it to printed circuit card assembly.

- Insert module removal tools at each side of module to restrain tangs.
- With removal tools in position, grip switch module with a pair of pliers and pull straight out.



REASSEMBLY

- When installing new module, take care to orient switch properly. Observe that solder terminals are through keyswitch assembly prior to snapping in place,
- Solder new switch terminals using chisel tip soldering iron.

CAUTION

Solder tip should NEVER be held on terminal over 4 seconds.

- Clean solder connections with cleaning solvent (Appendix C, item 8). Take care not to contact switch with solvent.
- Touch up conformal coating with type UR MIL-1-46058 material (Appendix C, item 13).
- With sealing ring in place, replace panel assembly and keyswitch assembly into housing assembly and secure with 24 screws, washers, and lock washers.

MODEL C ONLY

- Install two screws securing AMM mount.
- With sealing ring in place, replace panel assembly and keyswitch assembly into housing assembly and secure with 22 screws, washers, and lock washers.

- Reinstall keyboard as directed in paragraph 5-11G.

6-19. PRINTER ASSEMBLY - DISASSEMBLY AND REASSEMBLY

CAUTION

Many of the assemblies in this unit have been precisely alined. Do not loosen screws holding left vertical wall. All other assemblies are mounted with reference to this wall (left-hand plate).

NOTES

The following procedures assume complete disassembly. Procedures may be stopped and reversed at any point where desired assembly has been removed.

Some assemblies within the printer assembly may be removed as per instructions contained in Section IV of this chapter. CCAs, drive assemblies, and print head are among these items.

DISASSEMBLY (See figures 6-8(1) and 6-8(2).)

- Remove printer assembly as directed in paragraph 5-11F.
- Remove machine glide and guide rail assembly as per instructions in Section IV.

NOTE

Remove wires from transistor only if replacement is required.

- Tag and remove all wires from power transistor (10) located on right wall (5). Remove transistor and all mounting hardware (9) through (19).
- Remove one screw (20) securing right vertical wall to bottom plate (21).
- Remove five remaining screws (8), washers (6), and lock washers (7) from right vertical wall.
- Using needle nose pliers, unfasten springs (37) at both ends of paper roller (38).
- Remove retaining rings (36) from both sides of paper roller inside of vertical walls.
- Remove nut (33) and washer (34) from feed roller assembly (22) and remove wheel (32).
- Right vertical wall is now loose from printer assembly.
- Remove paper roller assembly (38).
- Remove pressure roller assembly (35).
- Using snap ring pliers, remove retaining ring (31), two washers (29), (30) and ball bearing (28) from feed roller assembly.
- Remove retaining ring (26), ball bearing (25) and spacer (24) from platen (23).
- Loosen and remove chain from left side of feed roller assembly and remove feed roller assembly and platen assembly.
- Remove paper out switch (47) from paper trough (46) by removing two screws (48), washers (44) and nuts (43) from mounting bracket (49) and untying cable at two places on paper trough.
- Using Allen wrench, remove knob (45) on paper trough lever.
- Remove three screws (42), washers (40) and lock washers (41) securing paper trough to left vertical wall and remove paper trough.
- Remove paper out switch bracket (27) from right vertical wall.
- Remove right vertical wall.
- Remove capacitor assembly (39) from left vertical wall.
- Tag and remove wires from capacitors.
- Remove bottom drive board shield (1) by removing five hex screws (2), washers (4), and lock washers (3).

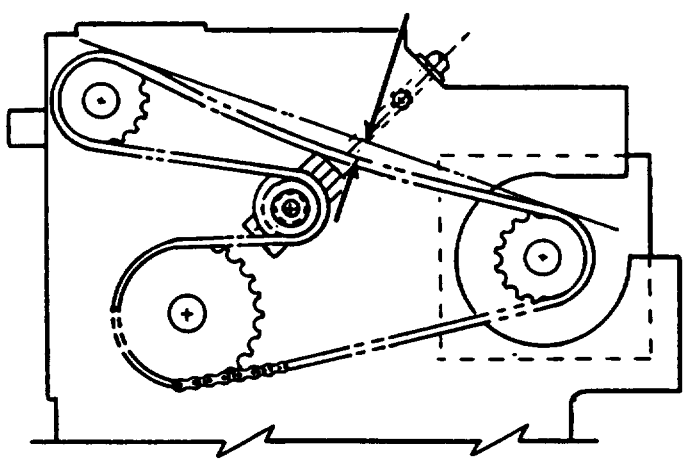
NOTE

Wire harness is now accessible and can be repaired as necessary. Bearings in left wall are accessible and can be replaced as necessary.

REASSEMBLY

- Install bottom drive board shield and secure to assembly connector bracket with five hex screws, washers, and lock washers.
- Fasten capacitor assembly to left vertical wall.
- Fasten leads to capacitors.
- Hold right vertical wall in place and fasten to bottom plate loosely with one screw.
- Install paper out switch bracket to right vertical wall.
- Install transistor and mounting hardware to right vertical wall.
- Put chain in place and fasten paper trough to left vertical wall with three screws, washers, and lock washers.

1/16 TO 1/8 INCH DEFLECTION



- Install platen assembly in position in left vertical wall using left spacer and feed roller assembly in place in left vertical wall. Ensure chain is properly installed and right sides of both assemblies are in place in right vertical wall.
- Secure platen assembly to right vertical wall with spacer (bore out side in), bearing, and retaining ring.
- Secure feed roller assembly to right vertical wall with two washers, bearing, and retaining ring.
- Install pressure roller and paper roller to inside walls using retaining rings.
- Fasten springs from paper trough to feed roller assembly.
- Install wheel, washer, and nut to right side of feed roller assembly.
- Install five screws, washers, and lock washers to right vertical wall.
- Tighten screw holding bottom plate to right vertical wall.
- Install machine glide and guide rail assembly as per instructions in Section IV.

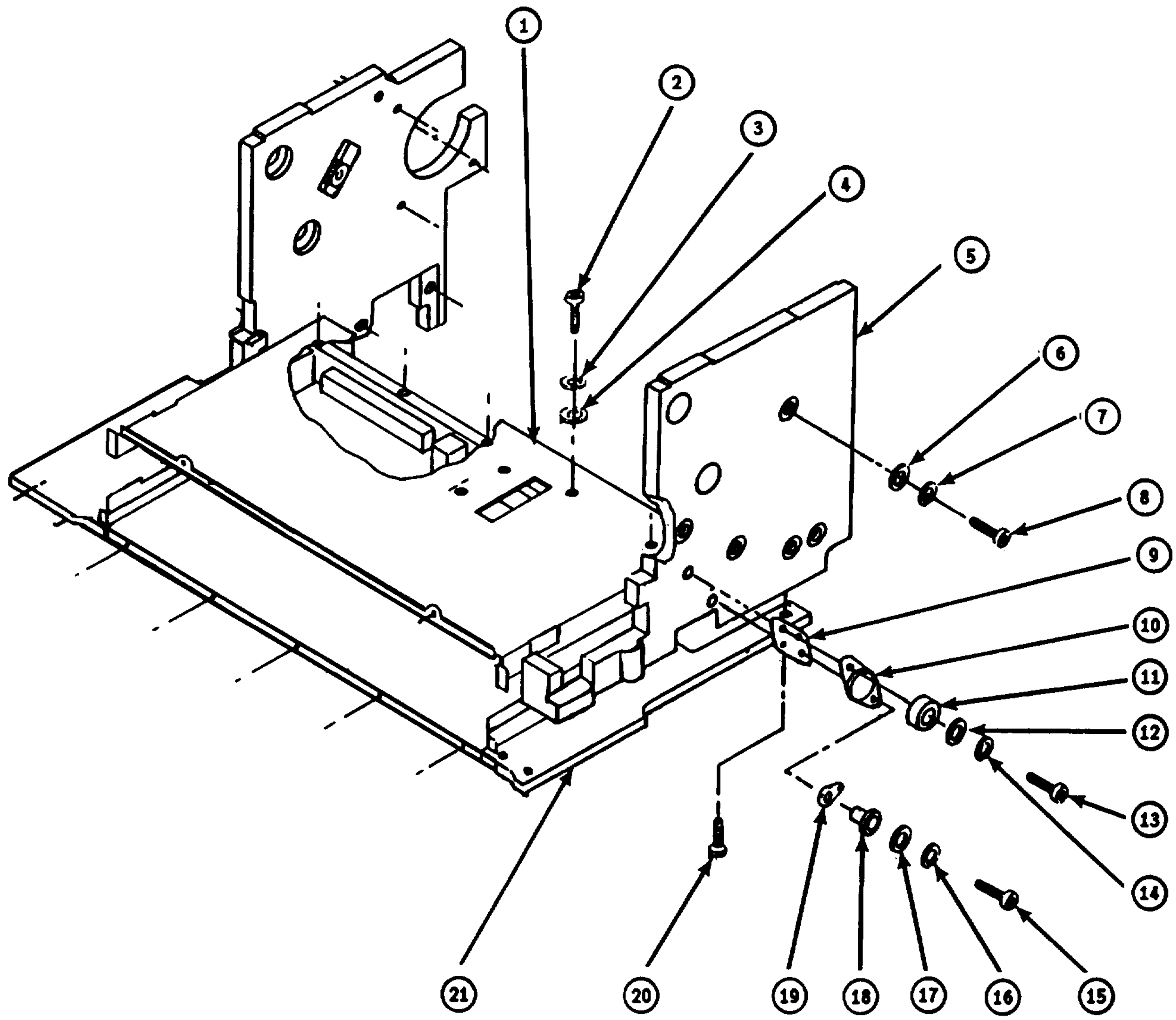


Figure 6-8(1). PRINTER ASSEMBLY
(Sheet 1 of 2)

LEGEND

1. Shield, top-drive board
2. Screw, cap, socket head
3. Washer, lock
4. Washer, flat
5. Chassis assembly, printer - RH
6. Washer, flat
7. Washer, lock
8. Screw, machine
9. Insulator, TO-3
10. Transistor
11. Guard, shunt
12. Washer, flat
13. Screw, machine
14. Washer, lock
15. Screw, machine
16. Washer, lock
17. Washer, flat
18. Insulator, screw
19. Terminal, lug, solder
20. Screw, machine
21. Plate, base, printer

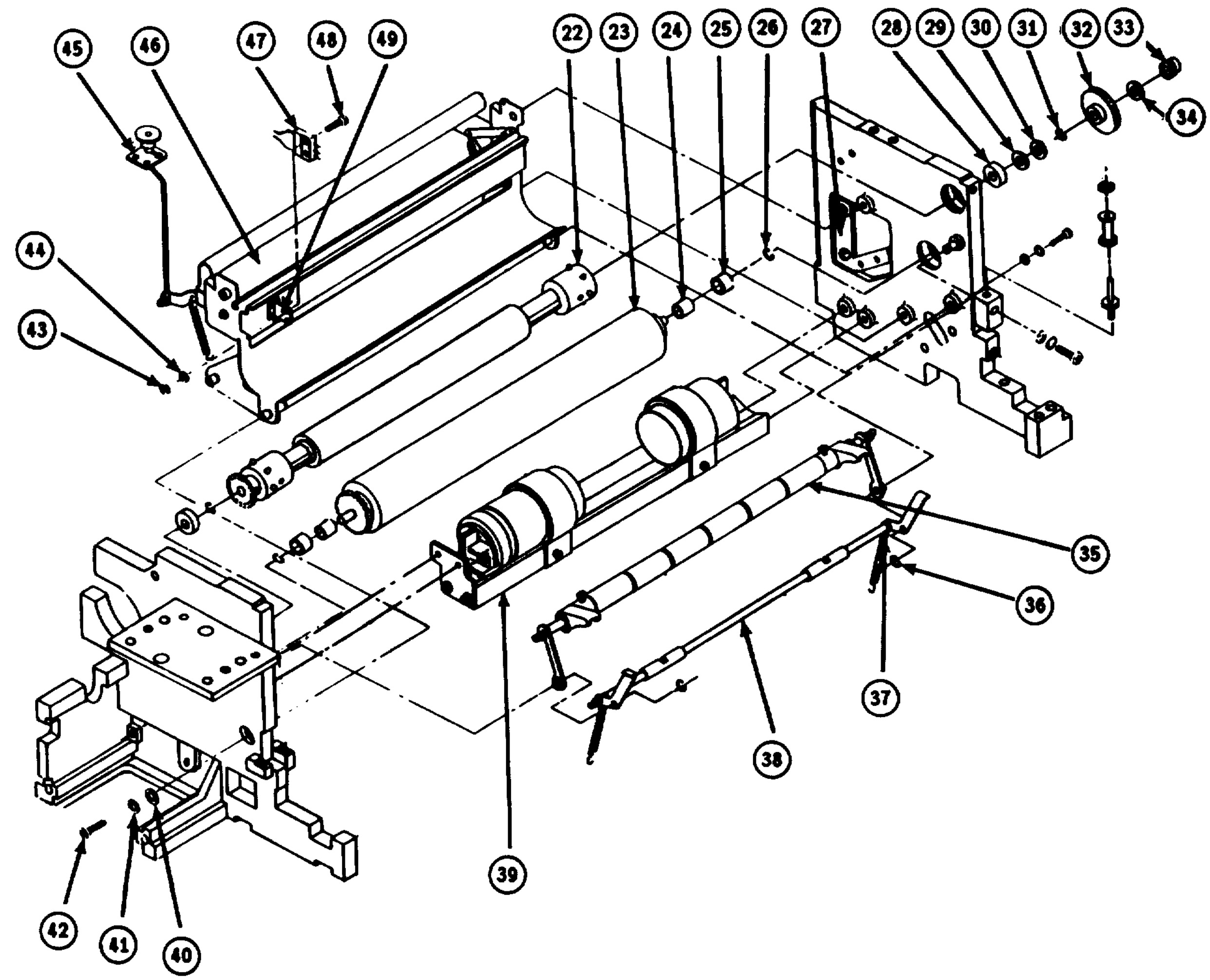


Figure 6-8(2). PRINTER ASSEMBLY
(Sheet 2 of 2)

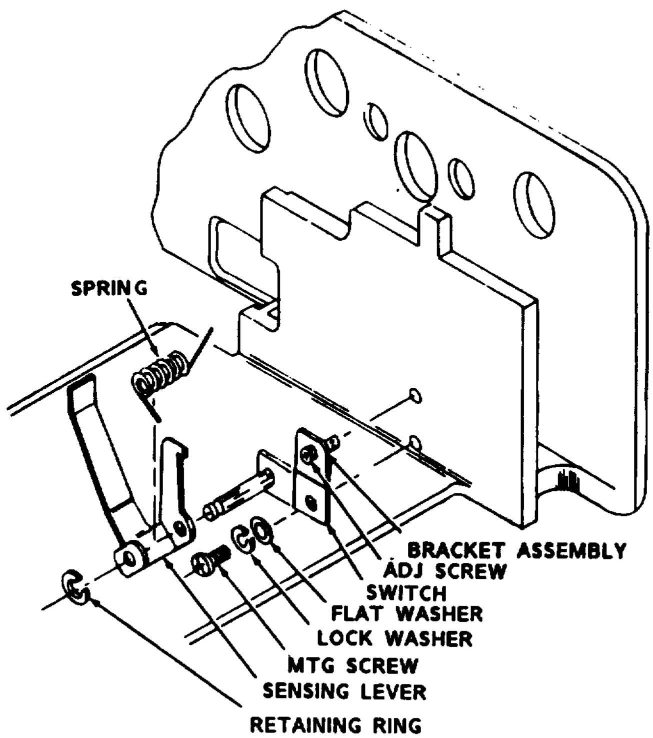
LEGEND

22. Feed roller assembly
23. Platen assembly
24. Spacer, RH
25. Bearing, ball
26. Ring, retaining
27. Bracket, mounting
28. Bearing, ball
29. Washer, special
30. Washer, special
31. Ring, retaining
32. Wheel
33. Nut, self-locking, hex
34. Washer, flat
35. Pressure roller assembly
36. Ring, retaining
37. Spring
38. Paper roller assembly
39. Capacitor assembly
40. Washer, flat
41. Washer, lock
42. Screw, machine
43. Nut, hex, machine
44. Washer, flat
45. Knob, lever
46. Paper trough assembly
47. Switch, paper out
48. Screw, machine
49. Bracket, mounting

6-20. PAPER LOW SENSING MECHANISM - DISASSEMBLY AND REASSEMBLY

DISASSEMBLY

- Remove paper roll.
- Remove two mounting screws while holding switch in place.
- Remove switch.
- Remove adjusting screws.
- Remove bracket assembly from frame.
- Remove retaining ring.
- Slide sensing lever until spring and lever are free.



REASSEMBLY

- Install switch with mounting screws.
- Position spring and lever into place.
- Secure spring behind large washer.
- Reattach bracket assembly to frame with adjusting screws.
- Secure assembly into place with retaining ring.
- Install paper roll.
- Perform adjustment procedures as necessary.

6-21. INTERFACE ASSEMBLY - DISASSEMBLY AND REASSEMBLY (See figure 6-9.)

- **Remove interface assembly as directed in paragraph 5-11C.**

RX/TX CIRCUIT CARD DISASSEMBLY

- **Remove 12 screws (10), lock washers (11), and flat washers (12) securing top cover (9) to interface assembly (1).**
- **Remove two screws (8), flat washers (7), lock washers (16), and nuts (17) holding connector J2 in place.**
- **Remove two screws (2), flat washers (20), lock washers (19), and nuts (18).**
- **Remove TB1 (3).**
- **Remove four screws (13), lock washers (14), and flat washers (15) securing diode circuit and gently lift out.**
- **Remove two screws on back side on interface assembly holding filter board in place.**
- **Remove four screws (6), lock washers (5) and flat washers (4) holding RX/TX circuit card in place.**
- **Gently lift up both the RX/TX circuit card and filter board at the same time.**
- **Tag and unsolder each wire from harness assembly connected on RX/TX circuit card with terminal number/color code.**
- **Remove RX/TX circuit card.**

DIODE CIRCUIT CARD DISASSEMBLY

- **Remove 12 screws (10), lock washers (11), and flat washers (12) securing top cover (9) to interface assembly (1).**
- **Remove four screws (13), lock washers (14), and flat washers (15) securing diode circuit card to interface assembly.**
- **Gently lift diode circuit card until wires on bottom of circuit are exposed.**
- **Remove diodes as required, using Pace Kit.**

RX/TX CIRCUIT CARD REASSEMBLY

- **Resolder wires to their respective terminals.**
- **Carefully install RX/TX circuit card and filter board into original positions, at the same time.**
- **Secure RX/TX card into position with four screws, lock washers, and flat washers.**
- **Secure filter board with two screws through back side of interface assembly.**
- **Install diode circuit card.**
- **Install TB1.**
- **Install connector J2.**
- **Install top cover.**

DIODE CIRCUIT CARD REASSEMBLY

- **Position diode circuit card into assembly and secure with four screws, lock washers, and flat washers.**
- **Secure top cover into place.**

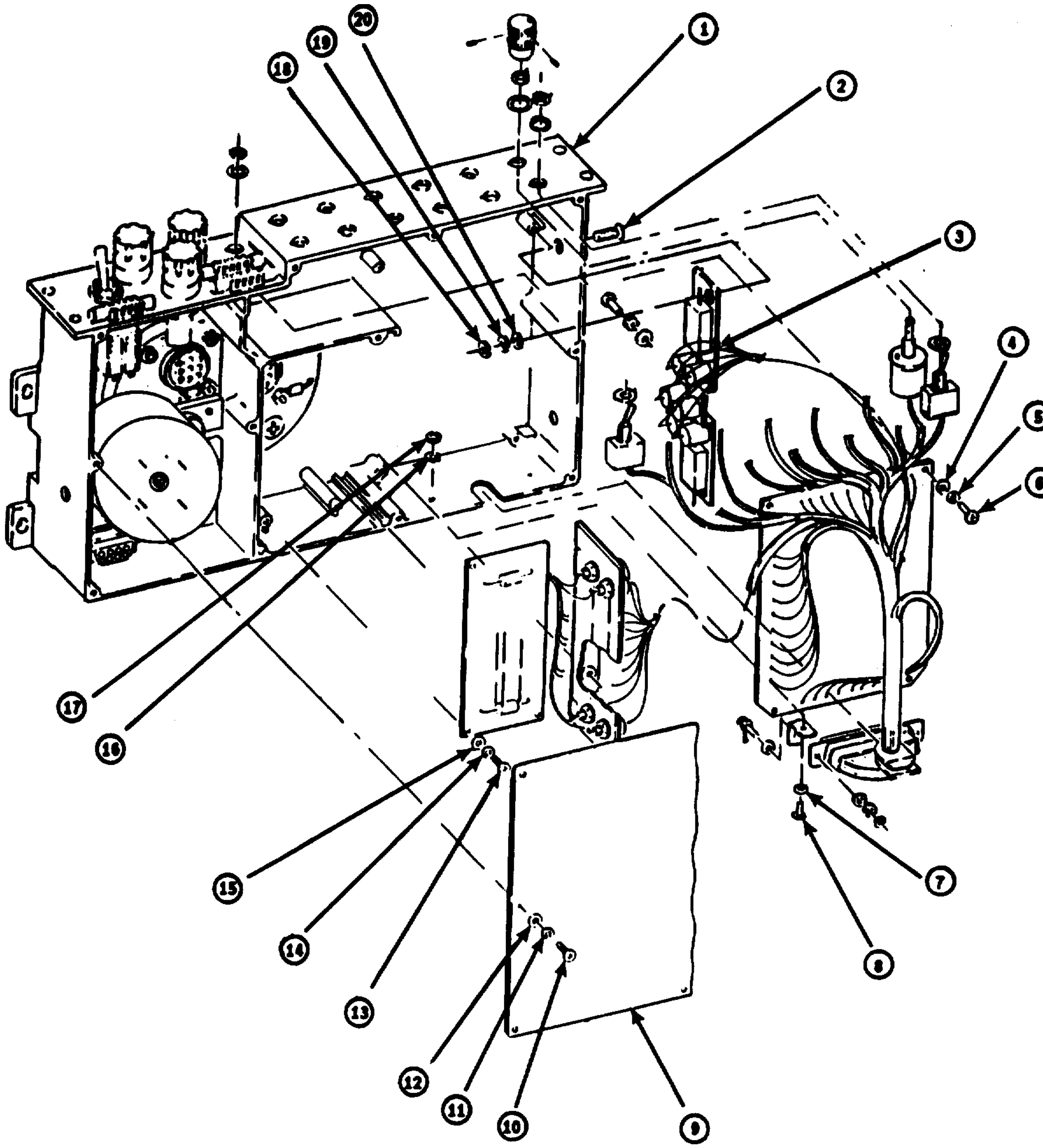


Figure 6-9. INTERFACE ASSEMBLY

LEGEND

1. Housing, interface
2. Screw, machine, flathead
3. TB1
4. Washer, flat
5. Washer, lock
6. Screw
7. Washer, flat
8. Screw
9. Cover, interface
10. Screw
11. Washer, lock
12. Washer, flat
13. Screw
14. Washer, lock
15. Washer, flat
16. Washer, lock
17. Nut
18. Nut
19. Washer, lock
20. Washer, flat

6-22. FILTER MODULE - DISASSEMBLY AND REASSEMBLY (See figure 6-10.)

DISASSEMBLY

- Remove filter module as directed in paragraph 5-11E.
- Remove seven screws (7), lock washers (6), and flat washers (5), and two screws (9), lock washers (10), and flat washers (11) securing top cover plate (8) to module and remove cover plate. Note that two longer screws (9) are used with cable clamps (12).
- Remove transformer T1 (1) as follows:
  - ❑ Remove five screws (4), lock washers (3), and flat washers (2) securing casting (13) to transformer.
  - ❑ Gently lift casting until transformer terminals are accessible.
  - ❑ Unsolder leads from terminals, being careful to tag them as they are removed.
  - Lift casting free of transformer T1.
  - ❑ Remove components as required, being sure to note wiring and polarities as required.

REASSEMBLY

- Solder leads to their respective terminals.
- install five screws with attaching hardware securing casting to transformer.
- install top cover and secure into position with seven screws with attaching hardware and two screws with mounting hardware.

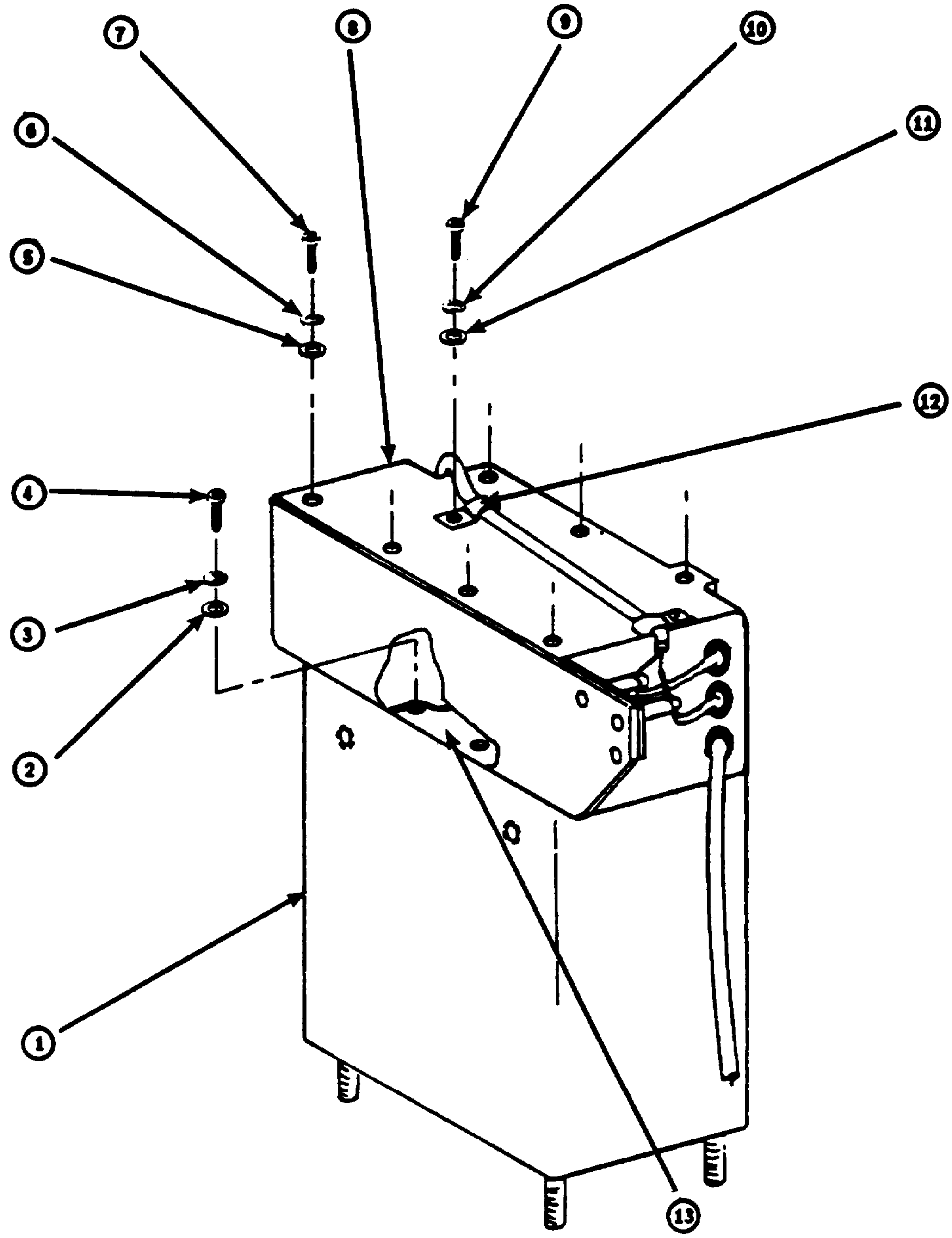


Figure 6-10. FILTER ASSEMBLY

LEGEND

1. Transformer (T1)
2. Washer, flat
3. Washer, lock
4. Screw, pnh
5. Washer, flat
6. Washer, lock
7. Screw, pnh
8. Cover
9. Screw, pnh
10. Washer, lock
11. Washer, flat
12. Clamp, cable
13. Casting

Section VI. INTERMEDIATE GENERAL SUPPORT TESTING PROCEDURES

6-23. GENERAL

- Perform tests listed below after performing maintenance on equipment. These tests determine if equipment has been properly repaired and can be returned to using organization, or stock.

- Repaired equipment must meet requirements given in paragraph 6-32, Final Test of Communications Terminal AN/UGC-74B(V)3 or AN/UGC-74C(V)3.

- The following circuit card assemblies are tested land repaired only at a designated specialized repair activity (SRA) using Test & Repair System, Electronic Equipment AN/USM-465A, associated test programs, and interconnection devices.

  Universal CPU (3A1A1)
  Communications (3A1A3)
  Printer Control (3A1A4)

MODEL C ONLY

  Auxiliary Interface (3A1A2)
  Auxiliary Memory/Relay Control (3A2A3)
  Auxiliary Memory Module (3A3)

- Test procedures for the following modules and assemblies are explained in detail.

Paragraph 6-24	Line-Feed Current Control Board Assembly (3A1A5A3)
Paragraph 6-25	Carriage Motor Current Control (3A1A5A5)
Paragraph 6-26	Print Drive Board (3A1A5A4)
Paragraph 6-27	Interface Assembly (3A1A7)
Paragraph 6-28	Power Supply (3A1PS1)
Paragraph 6-30	Filter Assembly (3A1A6FL1)
Paragraph 6-31	Keyboard Keyswitch Assembly (3A2A1)

- Power supply adjustments are described in paragraph 6-29.

- Final test of Communications Terminal AN/UGC-74B(V)3 or AN/UGC-74C(V)3 is described in paragraph 6-32.

- If a failure is observed in testing procedure, use the same test setup and refer to applicable troubleshooting table in Section III, Troubleshooting, to isolate fault to failed part(s).

- If repaired item is to be installed on unit, follow appropriate paragraph 5-11, Replacement Procedures.

NOTE

Performers of test functions are directed to follow all WARNINGS, CAUTIONS, and NOTES. BE SAFE, NOT SORRY.

6-24. LINE-FEED (MOTOR DRIVE) CURRENT CONTROL BOARD ASSEMBLY 3A1A5A3

a. PURPOSE. This board assembly (LF/CC) supplies operating voltages and current control to enable and stop the paper (line-feed) motor. Four output circuits sequentially control the motor windings, causing this motor to feed the copy paper. The control circuit, which is not used in the AN/UGC-74B(V)3 or AN/UGC-74C(V)3, cuts off output signals. The line-feed/current control test fixture has a circuit which checks control circuitry, a two level rotary selection switch that allows measurement of winding input and output signals, and a load resistor which simulates the motor and a control circuit.

b. TEST EQUIPMENT, TOOLS AND MATERIALS.

- Line-Feed/Current Control Test Fixture SM-D-915988
- Power Supply PP-2309C/U (2 each)
- Function Generator SG-1171/A
- Oscilloscope AN/USM-488
- Multimeter AN/PSM-45, or equivalent

c. TEST SETUP PROCEDURE FOR LINE-FEED (MOTOR DRIVE) CURRENT CONTROL BOARD ASSEMBLY. (See figure 6-11.)

- Remove board assembly as directed in paragraph 5-11D.
- Adjust one power supply to +5 Vdc ±5%. Turn power supply off and connect it to 5 V input on test fixture.
- Adjust one power supply to +26 Vdc ±4 Vdc. Turn power supply off and connect it to 22 V input on test fixture.
- Adjust function generator to 50 Hz, 0 to +5 V square wave (20 msec period). Turn function generator off and connect it to SIG IN input on test fixture.
- Adjust channel B on oscilloscope to DC, 5 mSEC/DIV and connect to A0 OUT.
- Adjust channel A to DC, 5 mSEC/DIV and connect to A0 IN.
- Connect all test equipment grounds to GND on test fixture.
- Install line-feed (motor drive) current control circuit card assembly into test fixture.
- Set test fixture PULSE switch to CC position (connects SIG IN to pin L and CONTROL).
- Set test fixture SURGE CONTROL switch to OFF position (opens circuit to pin H and SURGE CONTROL (TP)).
- Set test fixture SELECT switch to A0 position (connects 20-ohm load resistor to A0 OUT).
- Turn all test equipment on and ensure that outputs are as originally set up.

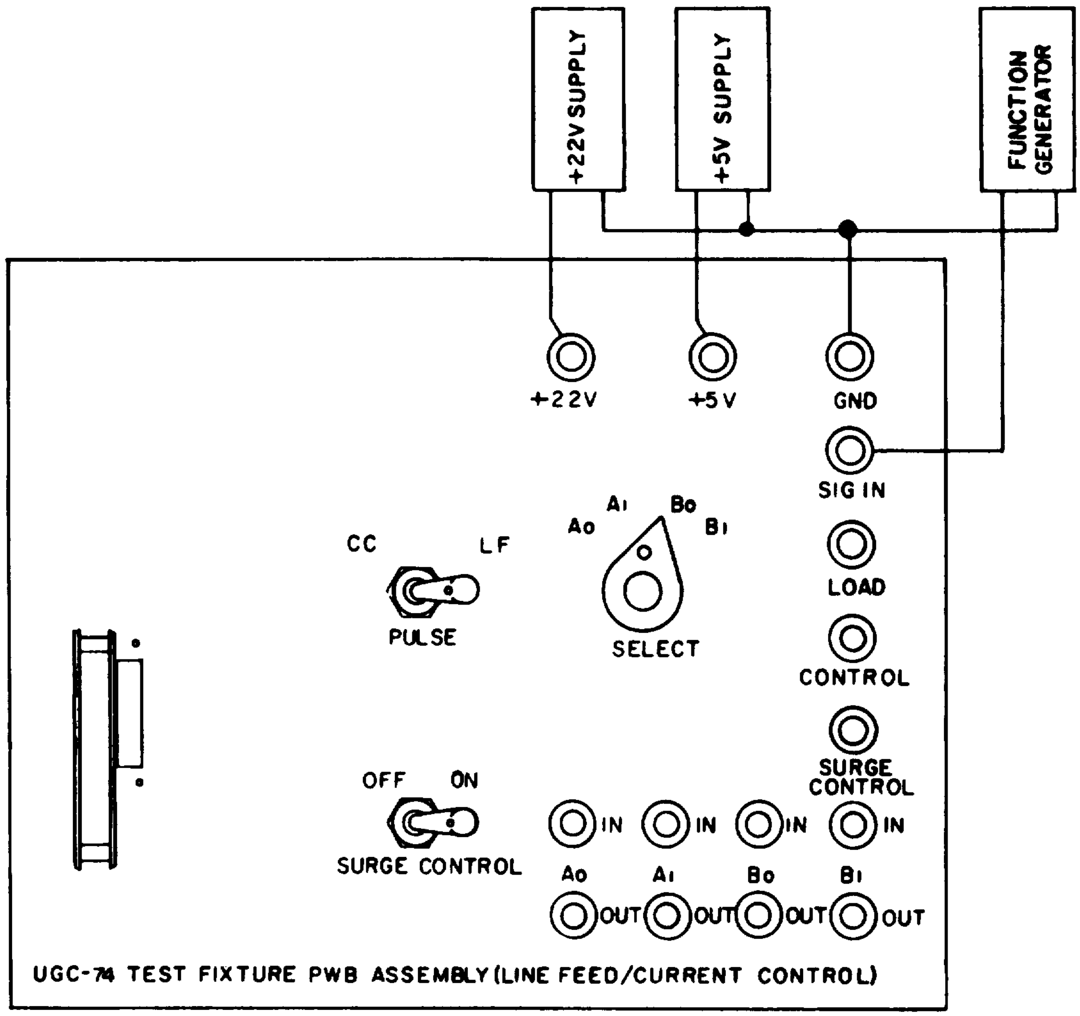


Figure 6-11. LINE-FEED (MOTOR DRIVE) CURRENT CONTROL BOARD ASSEMBLY TEST SETUP

d. TEST PROCEDURES. (See figure 3-20.)

1. **Connect multimeter to CONTROL test point and GND and measure 1.5 Vdc ±5%. This proves that the test fixture input diode and bias circuit are working properly.**
2. **Connect multimeter to LOAD test point and measure 24 Vdc ±4 Vdc. This checks out current control board ability to control and switch 26 Vdc to the output load.**
3. **Set SURGE CONTROL switch to ON position, causing surge control circuit to cut off the switching action in (2) above. Measure 4 to 5 Vdc at LOAD test point.**
4. **Return SURGE CONTROL switch to OFF position. Measure 24 Vdc ±4 Vdc at LOAD test point.**

5. Set PULSE switch to LF position. This routes input signal (SIG IN) to pin Q, A0 IN applying it to the line-feed board. Output of this circuit is available at A0 OUT.

6. Set channel B of oscilloscope to .5V/DIV and measure 24 V peak-to-peak ±4 v square wave at 50 Hz at A0 OUT. This measurement checks input circuit from pin Q to E1, current control (CC) jumper to E1 line-feed (LF), through Q1 circuit to E7, E7 (LF) jumper to E7 (CC), E7 to Pin D.

7. Set channel B of oscilloscope to 1V/DIV and channel A to 5V/DIV. Compare function generator output on channel A of oscilloscope with channel B. Waveforms should be 180 degrees out of phase, and have the same frequency and wave shape.

8. Set SELECT switch to A1 position (connects 20-ohm load resistor to A1 OUT).

9. Remove scope probes from A0 OUT and A0 IN and connect to A1 OUT and A1 IN.

10. Measure as in steps (6) and (7) above. This measurement checks input circuit from pin 0 to E2, E2 (CC) jumper to E2 (LF), through Q2 circuit to E8, E8 (LF) jumper to E8 (CC), E8 to pin C.

11. Set SELECT switch to B0 position (connects 20-ohm load resistor to B0 OUT).

12. Remove scope probes from A1 OUT and A1 IN and connect to B0 OUT and B0 IN.

13. Measure as in steps (6) and (7) above. This measurement checks input circuit from pin K to E3, E3 (CC) jumper to E3 (LF), through Q3 circuit to E9, E9 (LF) jumper to E9 (CC), E9 to pin B.

14. Set SELECT switch to B1 position (connects 20-ohm load resistor to B1 OUT).

15. Remove scope probes from B0 OUT and B0 IN and connect to B1 OUT and B1 IN.

16. Measure as in steps (6) and (7) above. This measurement checks input circuit from pin J to E4, E4 (CC) jumper to E4 (LF), through Q4 circuit to E10, E10 (LF) jumper to E10 (CC), E10 to pin A.

17. If a failure is observed in the above steps, see Troubleshooting Table No. 6-3 in Section III for trouble location instructions. Also see paragraph 3-16 for line-feed (motor drive) current control test fixture theory of operation.

6-25. CARRIAGE MOTOR CURRENT CONTROL CIRCUIT CARD ASSEMBLY 3A1A5A5

NOTE

See figure 3-19 for CMCC Schematic Diagram.

a. **PURPOSE.** This circuit card assembly provides drive signals to operate the carriage motor. Drive signals are generated on the print control CCA. Current regulation of these signals is achieved by a feedback loop through the print drive CCA. Operating voltages for this CCA are generated on the print drive CCA. The carriage motor current control/drive board/print head test fixture provides for this interaction of signals by using both a print drive CCA and a CMCC CCA together. When testing a CMCC CCA, the operator must ensure that the print drive CCA is operational. Carriage motor, print head, load boards, power transistor, internal circuitry, current probe, and standard CMCC and print drive boards are contained in or provided with this test fixture to simulate operation in a printer assembly. Switches, test points, current monitoring loops, and indicators are available to test separate functions.

b. **TEST EQUIPMENT, TOOLS AND MATERIALS.**

- CMCC/Drive Board/Print Head Test Fixture A3042001
- Power Supply PP-2309C/U (2 each)
- Oscilloscope AN/USM-488
- Multimeter AN/PSM-45, or equivalent

c. **TEST SETUP PROCEDURES FOR TESTING CARRIAGE MOTOR CURRENT CONTROL CCA ON CARRIAGE MOTOR CURRENT CONTROL/DRIVE BOARD/PRINT HEAD TEST FIXTURE. (See figure 6-12.)**

NOTE

Figures FO-16(1) and FO-16(2) provide suggested oscilloscope and current probe settings and representative waveforms pertaining to CMCC testing.

- Remove CMCC CCA as directed in paragraph 6-13; perform visual inspection.
- With multimeter, check for shorts on ail power inputs as given in Table 6-4.
- Ensure test fixture P4 is connected to a 115 VAC, 60 cycle outlet,
- Adjust one power supply to +8.6 ±0.1 Vdc, 1 amp. Turn power supply off and connect to +8.6 V input on test fixture.
- Adjust one power supply to +26 ±0. 1 Vdc, 5 amps. Turn power supply off and connect to +26 V input on test fixture.
- Connect test equipment grounds to J13 and J14 (GNDs) on test fixture.
- Ensure all switches on test fixture are in OFF position.
- Turn on +8.6 V power supply; current 0.05 to 0.2 amp,
- With oscilloscope, test for the following signals on the test fixture (if none of these signals are present, check voltage regulator A1U1-3 for +5 V output).
  - ☐ ILIM (TP12) (see FO-16(b) waveform).
  - ☐ Ø CLK (TP17) (see FO-16(C) waveform).
  - ☐ ØA (TP13) (see FO-16(d) waveform).
  - ☐ ØB (TP14) (see FO-16(d) waveform).
  - ☐ ØC (TP15) (see FO-16(d) waveform).
  - ☐ ØD (TP16) (see FO-16(d) waveform).
- Turn off the +8.6 V power supply.

- **Insert standard print drive CCA in test fixture J1/J2; connect P3.**
- **Insert load board A3 into test fixture P1.**
- **Ensure all switches on test fixture are in OFF position.**

CAUTION

When turning power supplies on or off, ensure 26 V supply is last supply turned on and first supply turned off, for control of regulation circuits during power on/off cycles.

Continually monitor 26 V power supply current during test procedure. If current exceeds 4 amps, immediately turn off 26 V power supply. Use ohmmeter to isolate faulty components if too much or too little current is drawn.

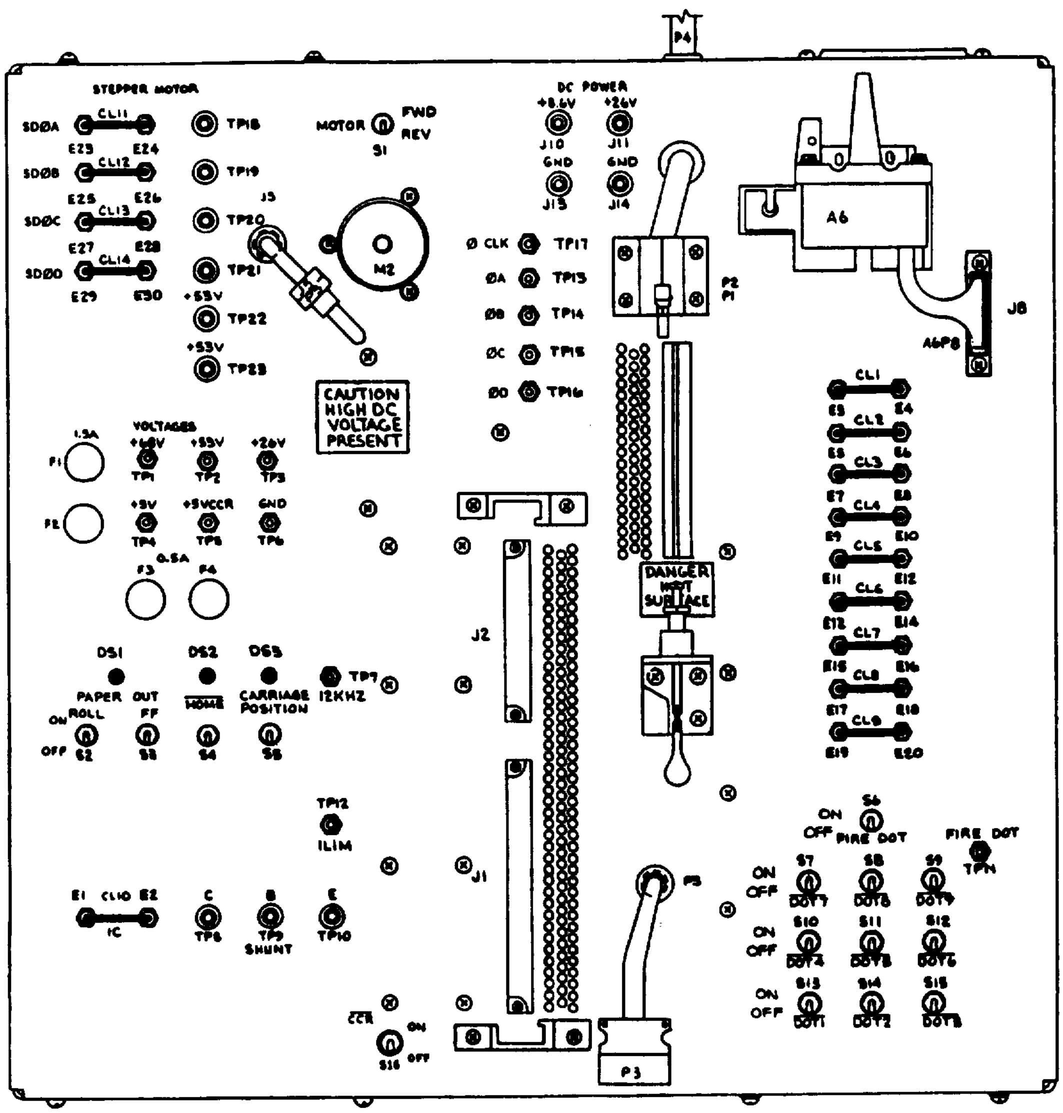


Figure 6-12. CARRIAGE MOTOR CURRENT CONTROL/DRIVE BOARD/ PRINT DRIVE TEST FIXTURE

- Turn on the +8.6 V power supply and check for the following voltages with respect to GND (TP6); current 0.1 to 0.3 amp:

  - ❑ +5 VCCR (TP5) for +5.30 V - +5.90 V.
  - ❑ +5 V (TP4) for +5.30 V - +5.90 V.

- Turn on the +26 V power supply (current should be 0.5 - 1.5 A) and check for the following voltages with respect to GND (TP6):

  - ❑ +68 V (TP1) for +64.0 V - +72.0 V.
  - ❑ +53 V (TP2) for +51.0 V - +55.0 V.
  - ❑ +26 v (Tp3) for +18.0 V - +22.0 V.

- Turn off power supplies and remove A3 load board.

d. TEST PROCEDURES.

1. Ensure power supplies and all test fixture switches are in OFF position.
2. Insert CMCC UUT into test fixture P1/P2.
3. Turn on the +8.6 V power supply and check for the following voltages with respect to GND (TP6); current 0.1 to 0.3 amp:

   - ❑ +5 VCCR (TP5) for +5.30 V - +5.90 V.
   - ❑ +5 V (TP4) for +4.50 V - +5.50 V.

   NOTE
   Because of a voltage divider effect, with the UUT inserted, +26 V test point will not read +26 V. Voltage will vary, depending on inputs at four phase motor signals.

4. Turn on the +26 V power supply (motor turns, and current is 1.0- 3.0 A) and check for the following voltages with respect to GND (TP6):

   - ❑ +68 V (TP1) for +64.0 V - +76.0 V.
   - ❑ +53 V (TP2) for +51.0 V - +55.0 V.
   - ❑ +26 V (TP3) for +10.5 V - +14.5 V.

   NOTE
   When using the current probe, ensure that thumb switch is facing up (current flow right to left). See figures FO-16(1) and FO-16(2) for representative waveforms and suggested current probe and oscilloscope settings.

5. With the current probe, monitor motor current waveforms on each of the four phase drive signals SDØA through SDØD (CL11 through CL14). Signal is a function of the ILIM and the motor phases; as ILIM pulse width increases, amplitude decreases. Signals shall appear as in waveform FO-16(m). (Check for all phases before troubleshooting the UUT.)
6. Ensure motor operates correctly and turns smoothly. Check motor torque by grasping motor shaft; input current on the +26 V power supply increases slightly as grip is increased.
7. Operate forward/reverse switch S1 on test fixture. Ensure motor turns in both directions, and signals appear as shown in waveform FO-16(m).

NOTE
See Chapter 3 for detailed theory of operation.

6-26. PRINT DRIVE CIRCUIT CARD ASSEMBLY 3A1A5A4

NOTE

See figures FO-15(1) through FO-15(4) for Print Drive schematic diagrams.

a. PURPOSE. This circuit card assembly has four functions within the printer assembly: Current regulation of print drive signals; generation of special voltage requirements for printer assembly; monitoring of signals within printer assembly, and current regulator circuits for the CMCC CCA. During operation, signals are received and sent to both the CMCC and print control CCAS. The carriage motor current control/drive board/print head test fixture provides for this interaction of signals. Carriage motor, print head, load boards, power transistor, internal circuitry, current probe, and standard CMCC and print drive boards are contained in or provided with this test fixture to simulate operation in a printer assembly. Switches, test points, current monitoring loops, and indicators are available to test separate functions.

b. TEST EQUIPMENT, TOOLS AND MATERIALS.

- CMCC/Drive Board/Print Head Test Fixture A3042001
- Power Supply PP-2309C/U (2 each)
- Oscilloscope AN/USM-488
- Multimeter AN/PSM-45, or equivalent

c. TEST SETUP PROCEDURES FOR TESTING PRINT DRIVE CCA ON CARRIAGE MOTOR CURRENT CONTROL/DRIVE BOARD/PRINT HEAD TEST FIXTURE. (See figure 6-12.)

NOTE

Figures FO-16(1) and FO-16(2) provide suggested oscilloscope and current probe settings and representative waveforms pertaining to print drive testing.

- Remove print drive CCA as directed in paragraph 6-14.
- Ensure test fixture P4 is connected to a 115 Vac, 60 cycle outlet.
- Adjust one power supply to +8.6 ±0. 1 Vdc (1 amp). Turn power supply off and connect to 8.6 V input on test fixture.
- Adjust one power supply to +26 ±0. 1 Vdc (5 amps). Turn power supply off and connect to +26 V input on test fixture.
- Connect test equipment grounds to J13 and J14 (GNDs) on test fixture.
- Ensure all switches on test fixture are in OFF position.
- Insert A7 load board into J1/J2 connectors on test fixture.
- Turn on +8.6 V power supply; current should read between 0.05 and 0.2 amp.
- With oscilloscope, test for the following signals on the test fixture (if none of these signals are present, check voltage regulator A1U1-3 for +5 V output).
  - ☐ FIREDOT (TP11) (see FO-16(a) waveform).
  - ☐ ILIM (TP12) (see FO-16(b) waveform).
  - ☐ Ø CLK (TP17) (see FO-16(C) waveform).
  - ☐ ØA (TP13) (see FO-16(d) waveform).
  - ☐ ØB (TP14) (see FO-16(d) waveform).
  - ☐ ØC (TP15) (see FO-16(d) waveform).
  - ☐ ØD (TP16) (see FO-16(d) waveform).

- With oscilloscope, test for the following signals on A7:
  - ❑ DC Level (A7TP11), +4.5 to +6.0 V.

NOTE

For the following signals, the respective switch must be activated to view signal; see figure FO-16(a) for waveform.

DOT1 (A7TP1)	DOT6 (A7TP6)
DOT2 (A7TP2)	DOT7 (A7TP7)
DOT3 (A7TP3)	DOT8 (A7TP8)
DOT4 (A7TP4)	DOT9 (A7TP9)
DOT5 (A7TP5)	FIREDOT (A7TP10)

- Test DS1, DS2, and DS3 by performing the following:
  - ❑ Jumper A7TP13 (SIGNAL RTN) to A7TP12 (GND).
    - o DS1 (PAPER OUT) LED is on, all others are off.
  - ❑ Leaving above jumper, jumper A7TP14 (PAPER OUT) to A7TP16 (HOME).
    - o DS1 (PAPER OUT) and DS2 (HOME) LEDs are on, DS3 (CARRIAGE POSITION) LED is off.
  - ❑ Move jumper from A7TP16 to A7TP15 (CARRIAGE POSOUT).
    - o DS1 (PAPER OUT) and DS3 (CARRIAGE POSITION) LEDs are on, DS2 (HOME) LED is off.
  - ❑ Move jumper from A7TP15 to A7TP12.
    - o All LEDs are off.
- Remove all jumpers.
- Turn off the +8.6 V power supply.
- Remove A7 load board.

d. TEST PROCEDURES.

REGULATED VOLTAGE CIRCUITRY TESTS -

1. Ensure power supplies and all test fixture switches are in OFF position.
2. Insert print drive CCA in test fixture J1/J2; connect P3.
3. Insert A3 passive load board into test fixture P1 connector.

CAUTION

When turning power supplies on or off, ensure 26 V supply is last supply turned on and first supply turned off, for control of regulation circuits during power on/off cycles.

Continually monitor 26 V power supply current during test procedure. Current ‘drawn should be greater than .5 amp. If at any time the current exceeds 4 amps, immediately turn off the 26 V power supply. Use ohmmeter to isolate faulty components if too much or too little current is drawn.

4. Turn +8.6 V power supply on; current should read between 0.1 and 0.3 amp.
5. With multimeter, check for following voltages with respect to GND (TP6):
   - ❑ +5 VCCR (TP5) for +5.30 V - +5.90 V.
   - ❑ +5 V (TP4) for +5.30 V - +5.90 V.

6. Turn on the +26 V power supply (current should be 0.5 - 1.5 amp) and check for the following voltages with respect to GND (TP6):

- ❑ +68 V (TP1) for +64.0 V - +72.0 V.
- ❑ +53 V (TP2) for +51.0 V - +55.0 V.
- ❑ +26 V (TP3) for +18.0 V - +22.0 V.

SENSOR CIRCUITRY TESTS -

7. Set ROLL switch on test fixture to ON position; ensure PAPER OUT LED turns on.
8. Set ROLL switch on test fixture to OFF position; ensure all LEDs are off.
9. Set FF switch to ON position; ensure PAPER OUT LED turns on.
10. Set FF switch to OFF position; ensure all LEDs are off.
11. Set HOME switch to ON position; ensure HOME LED turns on.
12. Set HOME switch to OFF position; ensure all LEDs are off.
13. Set CARRIAGE POS switch to ON position; ensure CARRIAGE POS LED on.
14. Set CARRIAGE POS switch to OFF position; ensure all LEDs are off.

CONSTANT ENERGY SUPPLY CIRCUITRY TESTS (R107) -

15. With multimeter, measure the following voltage with respect to GND (TP6):

    ❑ SHUNT C (TP8) should be +44.0 - +52.0 V.

16. Connect a BNC to banana plug converter into multimeter; set multimeter to AC voltage, 1.0 ACV range.
17. Connect current probe to multimeter and set switch to 2 ma/div.
18. Connect current probe to CL10; multimeter reads between 0.050 and 0.10 V.
19. Set CCR switch (S16) to ON position; current on +26 Vdc power supply should increase to 3.0 amp, maximum.
20. Vary +26 Vdc power supply from +20 to +32 V while monitoring multimeter and verify that voltage tracks between 0.110 and 0.300 Vac.
21. Reset DC power supply to +26 ±0. 1 Vdc.

PRINT HEAD CIRCUITRY TESTS –

22. Set oscilloscope as follows:

    ❑ HORIZONTAL: 50 µsec/div
    TRIGGER: Channel 1
    Dual trace

23. Connect oscilloscope probe to Channel 1 and set for 2 V/div.

NOTE

When using current probe, always ensure that thumb switch is facing up (current flow right to left). See figure FO-16(1) and FO-16(2) for representative waveforms and suggested oscilloscope and current probe settings.

24. Connect current probe to Channel 2; set current probe switch to 10 ma/div and oscilloscope to 0.1 V/div (this gives 1.0 a/div).

25. Ensure that CCR switch is set to ON position.

26. Set FIREDOT switch (S6) to ON position.

27. Connect current probe to CL1 through CL9 respectively to verify that no dots are firing (no signals present). Check all CLs before troubleshooting.

28. While monitoring both FIREDOT (TP11) and dot current waveform on oscilloscope, activate the respective DOT switch (DOT1 through DOT9) and check dot current signal (see figure FO-16(f) for representative waveform). Check all CLs before troubleshooting.

29. Turn off power supplies and remove A3 load board.

CARRIAGE MOTOR CIRCUITRY TESTS -

30. Ensure power supplies and all test fixture switches are in OFF position.

31. Insert standard CMCC CCA into test fixture P1/P2.

32. Turn on +8.6 V power supply; current should be between 0.1 and 0.3 amp.

33. Turn on +26 V power supply; motor should start turning, and current is 1.0- 2.0 amp. (If motor does not turn, and power supplies are correct, the remainder of the test should be completed before troubleshooting.)

34. With oscilloscope, test for the following signal on the test fixture:

    ▫12 KHz (TP7) (see FO-16(1) waveform).

35. With the current probe, monitor motor current waveforms on each of the four phase drive signals SDØA through SDØD (CL11 through CL14). Signals shall appear as in waveform FO-16(m). (Check for all phases before troubleshooting the UUT.)

36. Ensure motor operates correctly and turns smoothly. Check motor torque by grasping motor shaft; input current on the +26 V power supply increases slightly as grip is increased.

37. Operate forward/reverse switch S1 on test fixture. Ensure motor turns in both directions, ‘and signals appear as shown in waveform FO-16(m).

NOTE

See Chapter 3 for detailed theory of operation.

e. SELECT R107 PROCEDURES.

- Adjust one power supply to +8.6 ±0. 1 Vdc (1 amp). Turn power supply off and connect to 8.6 V input on test fixture.
- Adjust one power supply to +26 ±0. 1 Vdc (5 amps). Turn power supply off and connect to +26 V input on test fixture.
- Connect test equipment grounds to J13 and J14 (GNDs) on test fixture.
- Ensure that Energy Mod jumper (E1 to E2) is removed from UUT.
- Ensure all switches on test fixture are in OFF position.
- Insert print drive CCA into J1/J2 on test fixture; connect P3.
- Insert A3 load board into P1 connector on test fixture.

- Turn on +8.6 V power supply; current should read between 0.1 and 0.3 amp.
- Turn on +26 V power supply; current should read between 0.5 and 3.0 amp.
- Connect BNC to banana plug converter to multimeter.
- Set current probe switch to 2 ma/div.
- Set multimeter to AC voltage, and 1.0 ACV range.
- Connect current probe to multimeter and CL1O on test fixture.
- Set CCR switch (S16) to ON position.
- Vary +26 V power supply voltage until multimeter reads 0.180 V ±0.001 V.
- Remove current probe from multimeter; set multimeter to DC voltage.
- Measure +26 v power supply voltage at test fixture jacks; use the following table to select value of R107.

R107 SELECT VALUES

MEASURED VOLTAGE	R107	PART NO.
18.50 V to 19.13 V	11.0k	RLR07C1102FP
19.14 V to 19.46 V	10.7k	RLR07C1072FP
19.47 V to 19.98 V	10.5k	RLR07C1052FP
19.99 V to 20.34 V	10.2k	RLR07C1022FP
20.35 V to 20.79 V	10.0k	RLR07C1002FP
20.80 V to 21.25 V	9.76k	RLR07C9761FP
21.26 V to 21.71 V	9.53k	RLR07C9531FP
21.72 V to 22.19 V	9.31k	RLR07C9311FP
22.20 V to 22.70 V	9.09k	RLR07C9091FP
22.71 V to 23.20 V	8.87k	RLR07C8871FP
23.21 V to 23.72 V	8.66k	RLR07C8661FP
23.74 V to 24.26 V	8.45k	RLR07C8451FP
24.27 V to 24.79 V	8.25k	RLR07C8251FP
24.80 V to 25.35 V	8.06k	RLR07C8061FP
25.36 V to 25.93 V	7.87k	RLR07C7871FP
25.94 V to 26.51 V	7.68k	RLR07C7681FP
26.52 V to 27.11 V	7.50k	RLR07C7501FP
27.12 V to 27.71 V	7.32k	RLR07C7321FP
27.72 V to 28.34 V	7.15k	RLR07C7151FP
28.35 V to 28.50 V	6.98k	RLR07C6981FP

- After installation of R107 and energy mod jumper (E1 to E2), perform complete retest of the UUT.

6-27. INTERFACE ASSEMBLY 3A1A7

a. PURPOSE. The interface assembly has three functions: power switching, mode selection, and data input/output level conversion. Prime power is switched on and routed to the filter assembly. Mode selection is performed by setting rotary and toggle switches to the desired data mode positions. These data are routed to the CPU communications and print control circuit card assemblies. Data input and output circuits consist of five circuits which accept and convert a variety of inputs and outputs to the selected formats. Interface assembly test fixture has input and output jacks which provide direct access to inputs and outputs of each of the five data circuits. This provides capability to check individual circuits or series, and combinations of the five circuits. Test fixture also provides several load resistors to be used in data circuit testing. Power and mode selection wiring and switches are connected to a four-level wafer switch, and their continuity is easily checked.

b. TEST EQUIPMENT, TOOLS AND MATERIALS.

- Interface Assembly Test Fixture SM-D-915991
- Power Supply PP-2309C/U (4 each)
- Function Generator SG-1171/A
- Oscilloscope AN/USM-488
- Multimeter AN/PSM-45, or equivalent
- Data Cable Assembly SM-D-915889
- Data Analyzer, Telegraph TS-3378/G
- Signal Generator SG-1054/G

c. TEST SETUPS AND PROCEDURES. (See figure 6-13.)

- Remove interface assembly as directed in paragraph 5-11C.

NOTE

See Table 6-13, Interface Test Fixture Interconnections, for test point data.

(1) ±6 V ±1 V DATA FUNCTIONAL TEST SETUP

- Patch as follows:

  OUT 1 to IN 2
  IN 3 HI to OUT 2 HI to R1
  IN 3 LO to OUT 2 LO to R1 (other side)
  OUT 3 to IN 5
  OUT 5 HI to R2
  OUT 5 LO to R2 (other side)

- Connect SG-1054/G (DATA +6/12) to IN 1 HI/LO, and TS-3378/G (BRIDGING) to OUT 5 HI/LO.
- Adjust one power supply to +8.6 Vdc ±5%. Turn power supply off and connect to +8.6 V input on test fixture.
- Adjust one power supply to –8.6 Vdc ±5%. Turn power supply off and connect to -8.6 V input on test fixture.
- Connect test fixture P1 to J1, P5 to J5, and ground strap to GND lug) on interface assembly.
- Set interface assembly REC MODE and XMIT MODE switches to LO DATA.
- Turn all test equipment on and ensure that outputs are as originally set up.

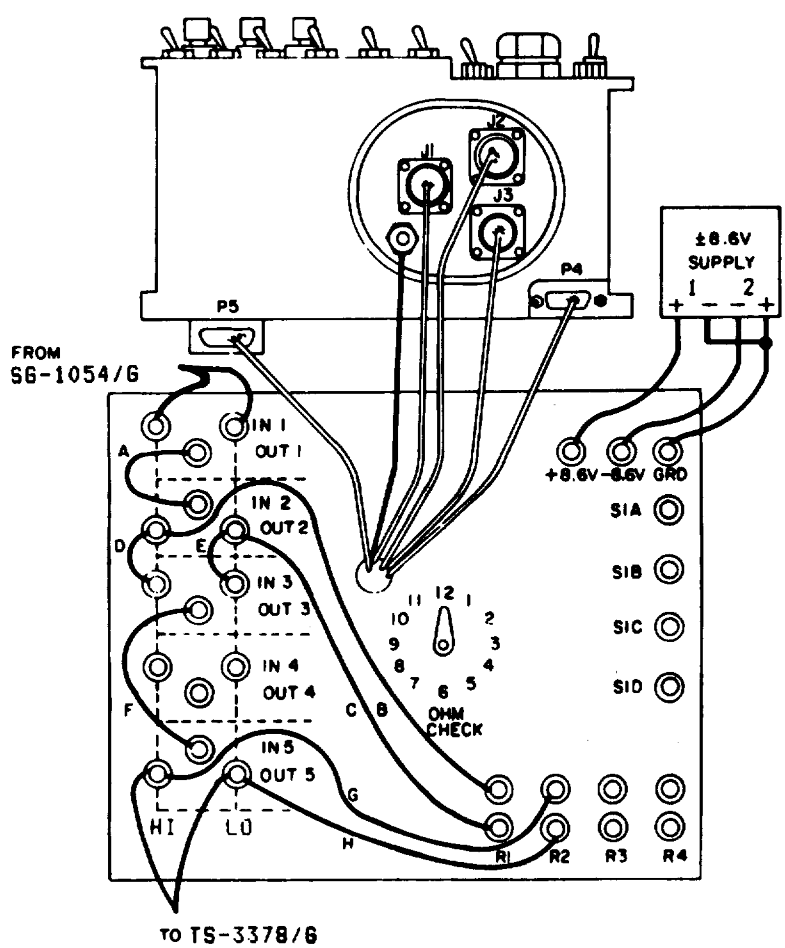


Figure 6-13. INTERFACE TEST SETUP

Table 6-13. INTERFACE TEST FIXTURE INTERCONNECTIONS

TEST POINT	INTERFACE CIRCUIT	CONNECTOR
IN 1 HI	REC DATA HI	J1-G
IN 1 LO	REC DATA LO	J1-H
OUT 1 (TTL)	RCV DATA LOGIC	J5-6
IN 2 (TTL)	XMIT CLK LOGIC	J5-8
OUT 2 HI	XMIT CLK HI	J1-P
OUT 2 LO	XMIT CLK LO	J1-N
IN 3 HI	REC CLK HI	J1-A
IN 3 LO	REC CLK LO	J1-B
OUT 3 (TTL)	RCV CLK LOGIC	J5-4
IN 4 HI	REC GATED CLK HI	J1-D
IN 4 LO	REC GATED CLK LO	J1-E
OUT 4 (TTL)	GATE KG 30 CLK	J5-5
IN 5 (LOGIC)	XMIT DATA LOGIC	J5-7
OUT 5 HI	XMIT DATA HI	J1-K
OUT 5 LO	XMIT DATA LO	J1-L
+8.6 V	+8.6 V	J5-1
−8.6 V	−8.6 V	J5-2
GND	GND	J5-40

(2) ±6 V ±1 V DATA TEST PROCEDURES. (See figure 6-14.)

- Transmit alternate character bits from the SG-1054/G at DATA ±6 V and at speeds between 45.5 baud and 1200 baud. Check output on the TS-3378/G analyzer. Intermediate points can be checked with oscilloscope AN/USM-488 using interface assembly schematic, figure FO-2, and RX/TX assembly schematic, paragraph 3-10. This test checks the following:

  (a) J1-G to VR7 to FL7 to S11B to E17 to U4, U1, U2 to E20.
  (b) J1-H to VR8 to FL8 to S11C to E16 to U4, U1, U2 to E20.
  (c) J5-8 to U5 to CR1, CR4 to FL5 to VR5 to J1-P.
  (d) FL6 to VR6 to J1-N.
  (e) J1-A to VR1 to FL1 to E9 to U4 to J5-4.
  (f) J1-B to VR2 to FL2 to E8.
  (g) J5-7 to E2 to U1, U5 to CR9, CR10 to E13 to S12C to FL10 to VR10 to J1-L.
  (h) U5 to CR11, CR12 to E14 to S12B to FL9 to J1-K.

- Repeat above testing, substituting RECEIVER GATED CLOCK circuit for RECEIVER CLOCK circuit. Remove test lead F from OUT 3 and connect to OUT 4. Remove test lead E from IN 3 LO and connect to IN 4 LO. Remove test lead D from IN 3 HI and connect to IN 4 HI. This layout now additionally checks J1-D/E to VR3/4 to FL3/4 to E10/11 to U4 to J5-5.

NOTE

If a failure is observed in any of the above testing, see Troubleshooting Table No. 6-6 in Section III for trouble location instructions. Also see paragraph 3-18 for the interface test fixture theory of operation.

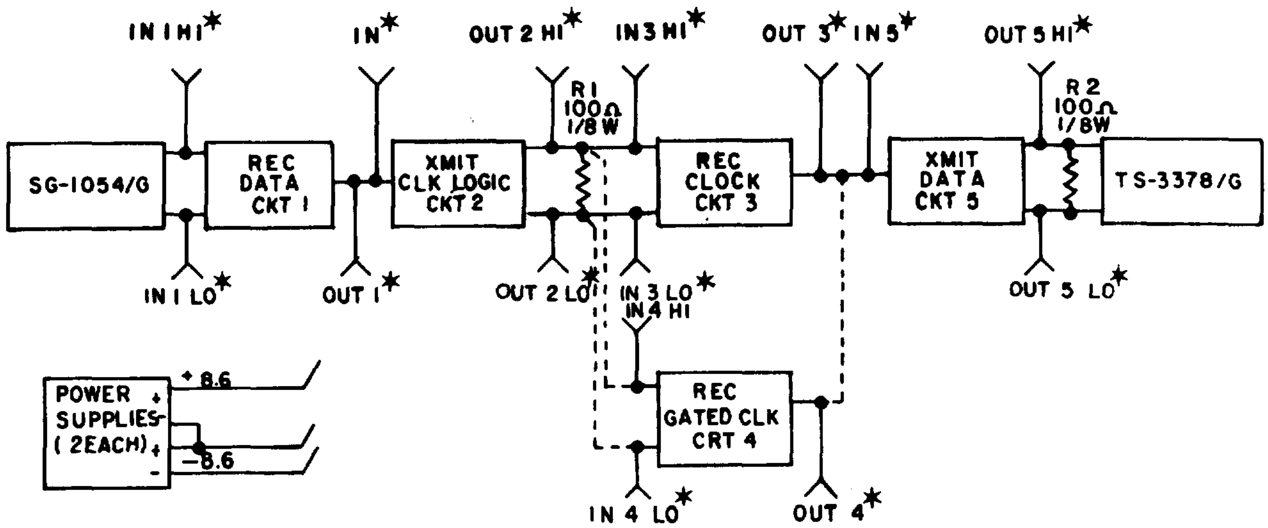


Figure **6-14.** INTERFACE ±6 V DATA FUNCTIONAL TEST LAYOUT

(3) 20 mA AND 60 mA DATA FUNCTIONAL TEST SETUP. (See figure 6-15.)

- Remove all leads from test fixture.
- Patch as follows:

  OUT 1 to IN 5
  OUT 5 HI to R4
  IN 1 HI to (-) Power Supply 3
  R3 to (+) Power supply 3
  R4 (other side) to (+) Power Supply 4

- Connect SG-1054/G (DRY CONTACTS) HI to R3 [other side), COMMON to IN 1 LO, and TS-3378/G HI to (-) Power Supply 4, COMMON to OUT 5 LO.
- Connect power supplies as shown in figure 6-15.
- Adjust power supplies 3 and 4 for 20 mA output.
- Verify -8.6 V ±5% at -8.6 V input on test fixture.
- Verify +8. 6 V ±5% at +8.6 V input on test fixture.

- **Verify that test fixture plug is connected to J1 and plug P5 is connected to J5.**
- **Ensure that ground strap is connected to interface assembly.**
- **Set interface assembly REC MODE switch to 20 mA and XMIT MODE switch to 20.**
- **Turn all test equipment on and ensure that outputs are as originally set up.**

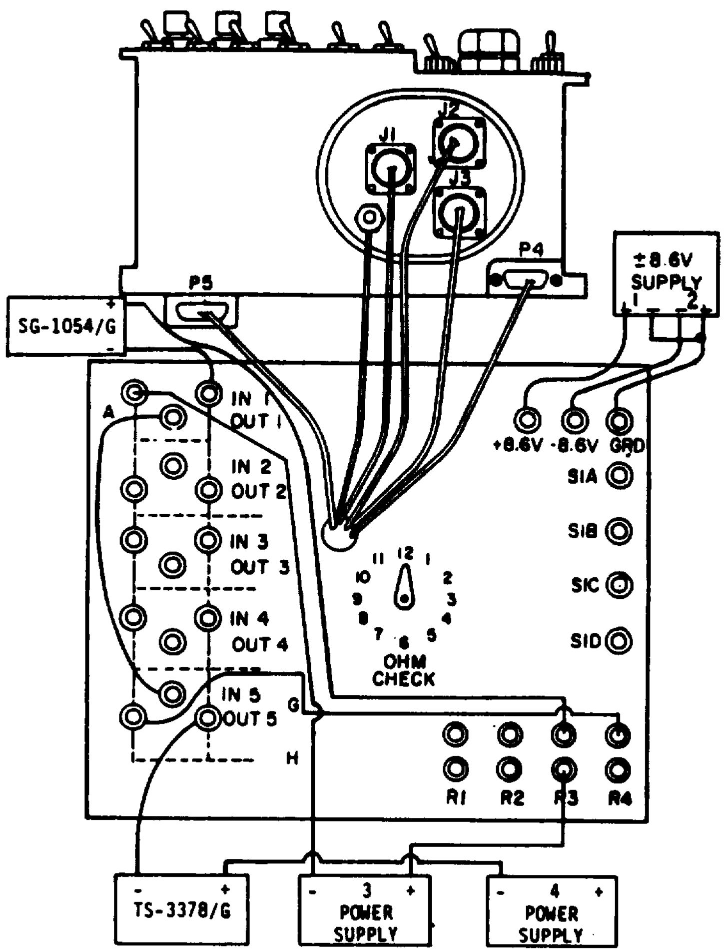


Figure 6-15. INTERFACE 20 mA and 60 mA TEST SETUP

(4) 20 mA AND 60 mA DATA TEST PROCEDURES. (See figure 6-16.)

- **Transmit alternate character bits from SG-1054/G at speeds between 45.5 baud and 75 baud. Check output on the TS-3378/G analyzer. Intermediate points can be checked with the AN/USM-488 oscilloscope using interface assembly schematic figure FO-2 and RX/TX assembly schematic, paragraph 3-10. This test checks the following:**

  (a) J1-G to VR7 to FL7 to S11B to E25 to CR5 to VR1, U3, Q2, U2 to E20 to J5-6.

  (b) J1-H to VR8 to FL8 to S11C to E26 to CR8, CR7.

(C) J5-7 to E2 to U1, U2, Q1 to K1, CR13, E15 to S12B to FL9 to VR9 to J1-K.

(d) E12 to S12C to FL1O to VR1O to J1-L.

• Repeat test for 60 mA by readjusting power supplies to 60 mA. Change REC MODE switch to 60 mA and XMIT MODE switch to 60. This check verifies proper operation of S11 and R8.

NOTE

If failure is observed on any of the above steps, see Troubleshooting Table No. 6-7 in Section Ill for trouble location instructions.

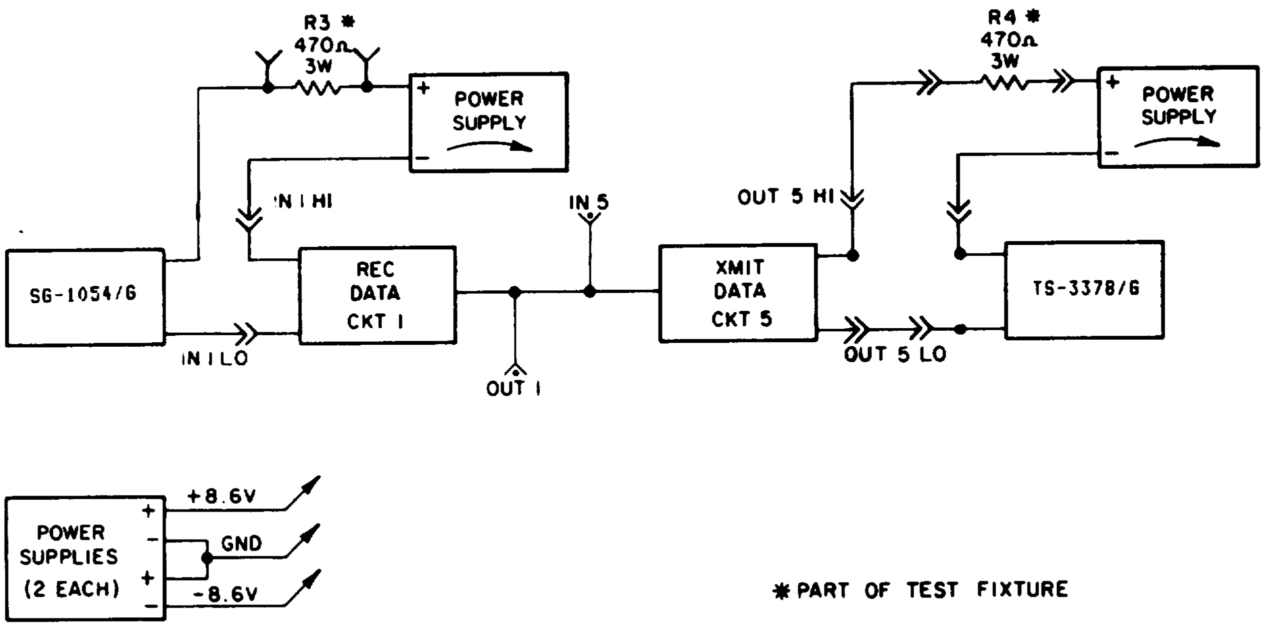


Figure 6-16. INTERFACE 20 mA and 60 mA FUNCTIONAL TEST LAYOUT

(5) CONTINUITY CHECKS TEST SETUP. (See figure 6-17.)

• Connect test cables P1, 2, 3, 4, 5 and ground strap to interface assembly.

• Connect AN/PSM-45 across test fixture GND and test point S1A.

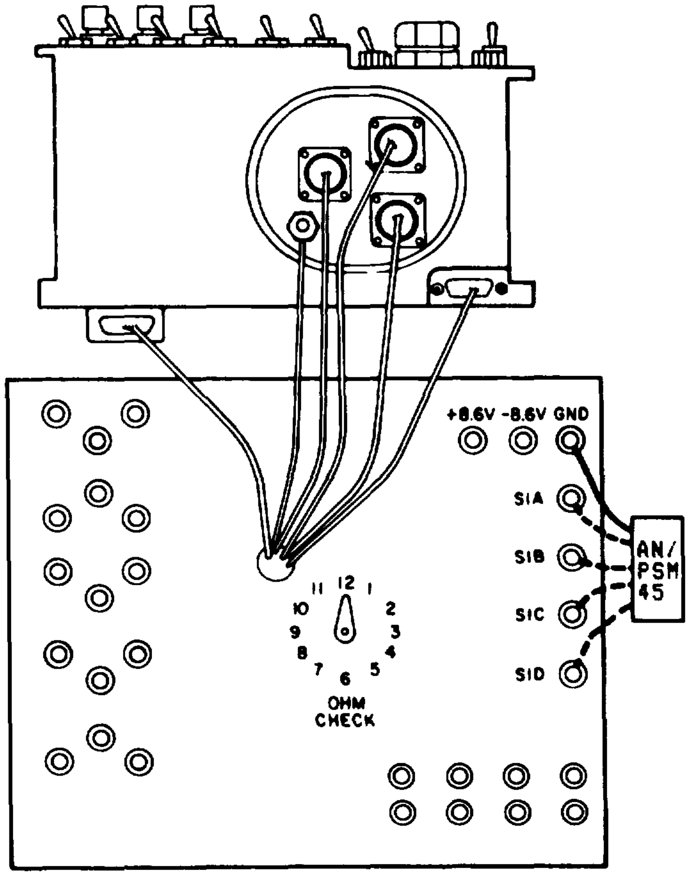


Figure 6-17. INTERFACE CONTINUITY TEST SETUP

(6) CONTINUITY CHECKS TEST PROCEDURES.

CAUTION

All test equipment power must be off. Set AN/PSM-45 to measure ohms.

- **Set OHM CHECK switch to position 1. The AN/PSM-45 should read less than 1 ohm resistance. This checks continuity of circuit path from J2-G to J4-5.**
- **Table 6-14, Interface Assembly Continuity Checks, shows all 12 positions and circuit parts that are checked.**
- **Checking next circuits requires moving AN/PSM-45 to test point SIB, then to S1C, and finally to S1D.**

NOTE

If failure is observed on any of above steps, see Troubleshooting Table No. 6-7 in Section III for trouble location instructions.

Table 6-14. INTERFACE ASSEMBLY CONTINUITY CHECKS

TEST POINT	OHM CHECK POSITION	INTERFACE SWITCH POSITION	CONNECTION	RESISTANCE (OHMS)
S1A-GND	1	....	J2-G to J4-5	Less than 1
	2	Power ON	J2-M to J2-J	Less than 1
	2	Power OFF	J2-M to J2-J	OPEN
	3	....	J4-1 to J2-A	Less than 1
	4	....	J4-2 to J2-B	Less than 1
	5	....	J4-6 to J2-F	Less than 1
	6	....	J4-6 to J3-B	Less than 1
	7	....	J2-C to J4-3	Less than 1
	8	....	J2-D to J4-4	Less than 1
	9	Power ON	J2-L to J2-K	Less than 1
	9	Power OFF	J2-4 to J2-K	OPEN
	10	....	GND to J2-E	Less than 1
	11	....	J3-C to GND	Less than 1
	12	Power ON	J3-A to J4-8	Less than 1
	12	Power OFF	J3-A to J4-8	OPEN
S1B-GND	1	STOP BITS 1	J5-9 to J5-40	Less than 1
	2	STOP BITS 2	J5-10 to J5-40	Less than 1
	3	BAUDOT	J5-37 to J5-40	Less than 1
	3	ASCII	J5-37 to J5-40	OPEN
	4	PARITY - EVEN	J5-11 to J5-40	Less than 1
	5	PARITY - ODD	J5-12 to J5-40	Less than 1
	5	PARITY - INHIBIT	J5-12 to J5-40	OPEN
	6	STATE - KSR	J5-13 to J5-40	Less than 1
	7	STATE - ICT	J5-14 to J5-40	Less than 1
	7	STATE - RO	J5-14 to J5-40	OPEN
	8	REC MODE - 20 MA	J5-15 to J5-40	Less than 1
	9	REC MODE - 60 MA	J5-16 to J5-40	Less than 1
	10	REC MODE - 48 V	J5-17 to J5-40	Less than 1
	11	REC MODE - LO DATA	J5-21 to J5-40	Less than 1
		REC MODE - LO DATA	No Connection	....
	12	SPARE	....	....
S1C-GND	1	XMIT MODE - 20 MA	J5-18 to J5-40	Less than 1
	2	XMIT MODE - 60 MA	J5-19 to J5-40	Less than 1
	3	XMIT MODE - 70 uA	J5-20 to J5-40	Less than 1
	4	XMIT MODE - LO DATA	J5-22 to J5-40	Less than 1
		XMIT MODE - LO DATA	No Connection	....
	5	CLOCK - INT	J5-30 to J5-40	Less than 1
	6	CLOCK - EXT	J5-31 to J5-40	Less than 1
	7	CLOCK - +/– to +	J5-32 to J5-40	Less than 1
	8	FIGS S/J to S	J5-35 to J5-40	Less than 1
	9	SIGNAL DIPHASE	J5-36 to J5-40	Less than 1
	10	SELF-TEST normal	J5-33 to J5-40	Less than 1
	11	SELF-TEST operated	J5-34 to J5-40	Less than 1
S1D-GND	1	....	J5-38 to J1-R	Less than 1
	2	....	J5-39 to J5-3	Less than 1
	3	....	J1-S to J5-3	Less than 1
	4	....	J1-T to J5-3	Less than 1
	5	BAUD RATE - 45.5	J5-23 to J5-41	Less than 1
	6	BAUD RATE - 50	J5-24 to J5-41	Less than 1
	7	BAUD RATE - 75	J5-25 to J5-41	Less than 1
	8	BAUD RATE - 150	J5-26 to J5-41	Less than 1
	9	BAUD RATE - 300	J5-27 to J5-41	Less than 1
	10	BAUD RATE - 600	J5-28 to J5-41	Less than 1
	11	BAUD RATE - 1200	J5-29 to J5-41	Less than 1

6-28. POWER SUPPLY 3A1PS1

NOTE

See figure FO-12 for Power Supply Test Fixture Schematic Diagram.

a. PURPOSE. The power supply module provides dc power for the AN/UGC-74B(V)3 or AN/UGC-74C(V)3. It converts 28 Vdc into ±5 Vdc, ±8.6 Vdc, +12 Vdc, +18 Vdc, and variable 0-22 Vdc lamp supply. It also provides battery backup sensing and switching for the terminal. Five power supplies are required for the test: +26 Vdc supply provides 22 to 30 Vdc power input; +12 Vdc provides battery backup power, and three dc power supplies (+5 Vdc, +15 Vdc, and -15 Vdc) supply power for circuitry in power supply test fixture.

b. TEST EQUIPMENT, TOOLS AND MATERIALS.

- Power Supply Test Fixture SM-E-915979
- Power Supply PP-2309C/U (5 each)
- Oscilloscope AN/USM-488
- Digital Voltmeter AN/GSM-64C

c. TEST SETUP PROCEDURE FOR POWER SUPPLY TEST FIXTURE. (See figure 6-18.)

- Remove power supply module as directed in paragraph 5-11A; remove power supply by removing four screws.
- Connect power supply PS1 to VIN and RTN.
- Connect digital voltmeter (DVM) AN/GSM-64C to VOUT HI and VOUT LO.
- Set SELECT switch to position 1.
- Adjust PS1 for +26 Vdc ±5% as measured on DVM. This provides input power for supply under test.
- Connect power supply PS2 to BAT and RTN.
- Set SELECT switch to position 2.
- Adjust PS2 for +12 Vdc ±5% (battery backup power).
- Connect power supply PS3 to +5 V and GND and adjust for +5 Vdc ±2%. Measure at +5 V and GND (test fixture power) with DVM.
- Connect power supply PS4 to +15 V and GND. Measure with DVM at +15 V and GND and adjust for +15 Vdc ±1% (test fixture power).
- Connect power supply PS5 to -15 V and GND. Adjust for –15 V ±1% as measured on DVM at -15 V and GND (test fixture power).
- Turn all power supplies off.
- Install power supply module under test into test fixture.
- Turn all power supplies on and ensure that outputs are as originally set up.
- Reconnect AN/GSM-64C to VOUT HI and VOUT LO.

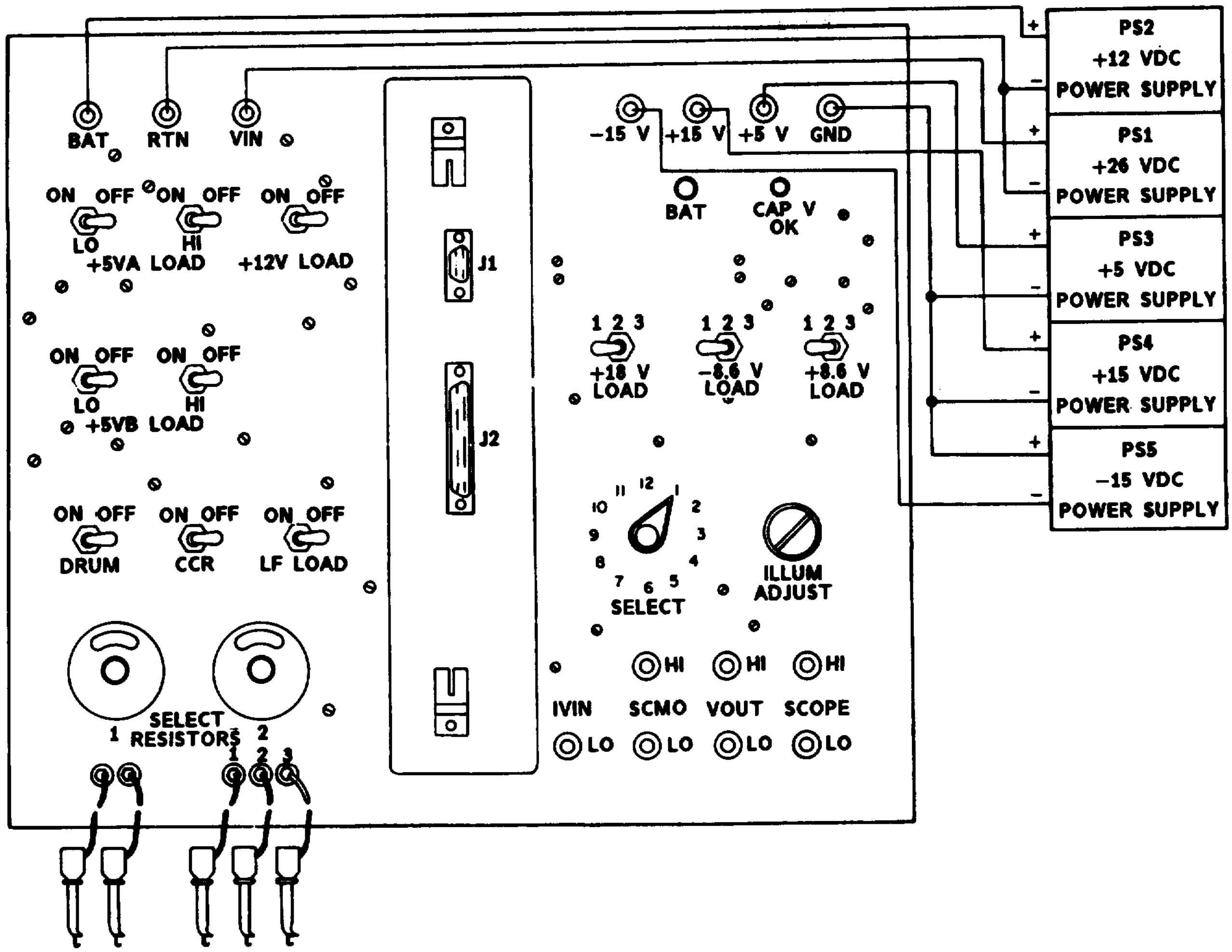


Figure 6-18. POWER SUPPLY TEST SETUP

d. TEST PROCEDURES.

+5 VA TEST PROCEDURES

1. With test set up as described in 6-28c, set SELECT switch to position 3 (connects VOUT and SCOPE terminals to +5 VA output).
2. Measure +5 Vdc ±5%. Using AC function on DVM, measure 50 mvrms ripple maximum.
3. Set +5 VA LOAD LO switch to ON position; measure same as above.
4. Set +5 VA LOAD HI switch to ON position. Measure +5 V ±12%.
5. Return +5 VA LOAD switches to OFF position.
6. If power supply fails to regulate as described above, see Troubleshooting Table No. 6-10a in Section III for trouble location instructions. Also see paragraph 3-17 for power supply test fixture theory of operation.

+12 V TEST PROCEDURES

1. With test set up as described in 6-28c, set SELECT switch to position 4 (connects VOUT and SCOPE terminals to +12 V output).
2. Measure? +12 Vdc ± 5% and 100 mVrms ripple maximum using DVM.
3. Set +12 V LOAD switch from OFF to ON position and measure same as above.
4. Return +12 V LOAD switch to OFF position.
5. If power supply fails to perform as described above, see Troubleshooting Table No. 6-10b in Section Ill for trouble location instructions.

–5 VA TEST PROCEDURES

1. With test set up as described in 6-28c, set SELECT switch to position 5 (connects VOUT and SCOPE terminals to -5 VA output].
2. Measure -5 Vdc ±10% and 40 mVrms ripple maximum using DVM.
3. If power supply fails to perform as described above, see Troubleshooting Table No. 6-10b in Section Ill for trouble location instructions.

+5 VB TEST PROCEDURES

1. With test set up as described in 6-28c, set SELECT switch to position 6 (connects VOUT and SCOPE terminals to +5 VB output).
2. Measure +5 Vdc ±5% and 15 mVrms ripple maximum using DVM.
3. Set +5 VB LOAD LO switch to ON position and measure same as above.
4. Set +5 VB LOAD LO switch to OFF position and set +5 VB LOAD HI switch to ON position. Measure +5 Vdc ±12%.
5. Set +5 VB LOAD LO switch to ON position and measure +5 Vdc ±15%. Return +5 VB LOAD switches to OFF position.
6. If power supply fails to perform as described above, see Troubleshooting Table No. 6-10c in Section Ill for trouble location instructions.

–8. 6 V TEST PROCEDURES

1. With test set up as described in 6-28c, set SELECT switch to position 7 (-8.6 V output).
2. Set -8.6 V LOAD switch to position 3.
3. Measure -8.6 Vdc ±5% and 85 mVrms ripple and noise maximum using DVM.
4. Change -8.6 V LOAD switch from position 3 to position 2; measure same as above.
5. Change -8.6 V LOAD switch from position 2 to position 1; measure same as above.
6. Return -8.6 V LOAD switch to position 3.
7. If power supply fails to perform as described above, see Troubleshooting Table No. 6-10c in Section Ill for trouble location instructions.

+8.6 V TEST PROCEDURES

1. With test set up as described in 6-28c, set SELECT switch to position 12 (+8.6 v output).
2. Set +8.6 V LOAD switch to position 3.
3. Measure +8.6 Vdc ±5% and 85 mVrms ripple maximum using DVM.
4. Change +8. 6 V LOAD switch from position 3 to position 2; measure same as above.
5. Change +8. 6 V LOAD switch from position 2 to position 1; measure same as above.
6. Return +8.6 V LOAD switch to position 3.
7. If power supply fails to perform as described above, see Troubleshooting Table No. 6-10d in Section III for trouble location instructions.

LAMP SUPPLY TEST PROCEDURES

1. With test set up as described in 6-28c, set SELECT switch to position 8 (lamp supply).
2. Vary ILLUM ADJUST through full range (varies input to Q8 on power supply from 0 to 20 Vdc). Lamp supply will vary from 0.0 Vdc ±.2 to 19 Vdc ±2.
3. If power supply fails to perform as described above, see Troubleshooting Table No. 6-10d in Section III for trouble location instructions.

LINE-FEED TEST PROCEDURES

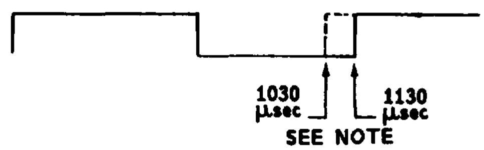
1. With test set up as described in 6-28c, set SELECT switch to position 10 (LF output).
2. Measure +22 to +30 Vdc (pin 30 of power supply) at VOUT terminals.
3. Change LF LOAD switch from OFF to ON position; measure same as above.
4. Return LF LOAD switch to OFF position.
5. If power supply fails to perform as described above, see Troubleshooting Table No. 6-10d in Section III for trouble location instructions.

NOTE

Drum motor circuits are no longer used in the AN/UGC-74B(V)3 or AN/UGC-74C(V)3 models. However, these circuits should be tested because they are operational and could load down other circuitry if faulty.

DRUM MOTOR TEST PROCEDURES

1. Set up test as described in 6-28c.
2. Connect oscilloscope across SCMO HI and LO (timing simulator output) and set DRUM switch to ON position (logic 0 to DRUM SHUTDOWN). Timing simulator outputs pulse whose period is proportional to drum motor output.
3. Observe 1080 µsec ±50 µsec pulse period on oscilloscope. (See figure 6-19.) Observe that pulse amplitude is 2.5 to 5.5 volts peak-to-peak.
4. Return DRUM switch to OFF position.
5. If power supply fails to perform as described above, see Troubleshooting Table No. 6-10e in Section III for trouble location instructions.



NOTE: OBSERVE THAT NO TRANSITIONS OCCUR AT LESS THAN 1030 µSEC OR GREATER THAN 1130 µSEC

Figure 6-19. SCMO MEASUREMENT

BACKUP BATTERY TEST PROCEDURES

1. Set up test as described in 6-28c.
2. Remove VIN (BAT lamp comes on).
3. Repeat +5 VA, 12 V, and –5 VA tests.
4. Replace VIN (BAT lamp goes off).
5. If power supply fails to perform as described above, see Troubleshooting Table No. 6-10e in Section III for trouble location instructions.

+18 V, CCR, CAP V OK TEST PROCEDURES

1. Set up test as described in 6-28c.
2. Connect DVM across VOUT HI and LO and set SELECT switch to position 9 (+18 V print coils).
3. With +18 V LOAD switch to position 2, set CCR switch to ON position to cause power supply circuit card assembly pin 22 to become a logic 0.
4. Observe that CAP V OK lamp is on and VOUT measures +18 Vdc ±5%.
5. Set CCR switch to OFF position (pin 22 at logic 1); output should read +18 Vdc ±5%.
6. Set +18 V LOAD switch to position 1. VOUT drops to less than one volt dc and CAP V OK lamp goes out.
7. Set CCR switch to ON position; VOUT becomes +18 V ±5% and CAP V OK lamp comes on.
8. Set +18 V LOAD switch to position 3. VOUT is approximately +12 Vdc ±10% and CAP V OK lamp goes out.
9. Set CCR switch to OFF position.
10. If power supply fails to perform as described above, see Troubleshooting Table 6-10e in Section III for trouble location instructions.

6-29. POWER SUPPLY ADJUSTMENTS (See figure 6-18.)

NOTE

Power supply adjustments are performed only when power supply voltage is outside specified tolerances: This is determined by the procedures of paragraph 6-28.

a. +5 V(A) ADJUSTMENT

- Set up power supply test fixture configuration as described in paragraph 6-28c and figure 6-18.
- Remove power from test fixture by setting each power supply to OFF position.
- Using a pair of diagonal cutters, clip Rll at the resistor body, being sure to leave the leads in circuit card assembly. (See figure FO-8.)
- Attach SELECT RESISTOR number 1 test leads to R11 leads.
- Set SELECT RESISTOR number 1 to 500 and set all power supplies to the ON position.
- Set +5 VA LOAD HI switch to OFF position and +5 VA LOAD LO switch to ON position.
- Set +12 V LOAD switch to OFF position.
- Set SELECT switch to position 3. Connect DVM to VOUT test points on the fixture.
- Measure dc voltage on meter and adjust SELECT RESISTOR number 1 as required to cause output to be +5.02 Vdc ±.01. Note SELECT RESISTOR setting and select the closest value of R11 from Table 6-15, Selection Values for Resistors R11, R29, R63.
- Set SELECT switch to position 4 and measure +12 V ±5% on the meter.
- Set SELECT switch to position 5 and measure –5 V ±5% on the meter.
- Install selected value of R11.

Table 6-15. SELECTION VALUES FOR RESISTORS R11, R29, R63

SELECT RESISTOR SETTING	RESISTOR VALUE (OHMS)	SELECT RESISTOR SETTING	RESISTOR VALUE (OHMS)
0020	10	0498	249
0080	40.2	0574	287
0143	71.5	0648	324
0210	105	0730	365
0274	137	0824	412
0358	174	0906	453
0420	210	0998	499

b. +5 VB (+8.6 V) ADJUSTMENT

- Set up power supply test fixture configuration as described in paragraph 6-28c and figure 6-18.
- Remove power from test fixture by setting each power supply to OFF position.
- Using a pair of diagonal cutters, clip R63 at the resistor body, being sure to leave the leads in circuit card assembly. (See figure FO-8.)
- Attach SELECT RESISTOR number 1 test leads to R63 leads.
- Set SELECT RESISTOR number 1 to 500 and Set all power supplies to ON position.
- Set +5 VB LOAD HI switch to OFF position, +5 VB LOAD LO switch to ON position.
- Set SELECT switch to position 12. Connect meter to VOUT test points on fixture.
- Measure dc voltage on meter and adjust SELECTOR RESISTOR number 1 as required to cause output to be +8.6 Vdc ±0. 01. Note SELECT RESISTOR setting and select the closest value of R63 from Table 6-15, Selection Values for Resistors R11, R29, R63.
- Install selected value of R63.

c. DRUM MOTOR OUTPUT ADJUSTMENT

NOTE

Drum motor output circuitry is adjusted when value of the pulse period is 1080 p.seconds.

- Set up power supply test fixture configuration as described in paragraph 6-28c and figure 6-18.
- Remove power by setting external lower power supply switches in OFF position.
- Using a pair of diagonal cutters, clip R29 at the resistor body, being sure to leave the leads in circuit card assembly. (See figure FO-8.)
- Connect SELECT RESISTOR number 1 leads across R29.
- Apply power by setting all power switches on external supplies to ON position.
- Connect oscilloscope to SCMO HI and LO and set DRUM switch to ON position.
- Observe pulse period and adjust SELECT RESISTOR number 1 until SCMO is 1080 µsec ±12, measured from leading edge to middle of jitter. (See figure 6-15.)
- Note SELECT RESISTOR setting and select the closest value of R29 from Table 6-15, Selection Values for Resistors R11, R29, R63.
- Install selected value of R29.

d. +18 V CONSTANT CURRENT ADJUSTMENT

- Remove power from test fixture by setting individual external power supply power switches to OFF position.
- Clip resistors R41 and R71 at the resistor bodies and attach SELECT RESISTOR number 2 clips 1, 2, 3 as shown in figure FO-8.
- Reapply power to test fixture. Set +18 V LOAD switch to position 1 (normal).
- Set CCR switch to ON position. Set SELECT RESISTOR number 2 to 10.0. Set SELECT switch to position 9.
- Adjust SELECT RESISTOR number 2 until CAP V OK lamp goes out. Measure voltage at VOUT test points. It should be +16.2 Vdc ±.45.
- Set +18 V LOAD switch to position 3 (max.) and increase SELECT RESISTOR number 2 until 12 Vdc ±.05 is observed on the meter.
- Observe reading on SELECT RESISTOR number 2 dial and select closest values of R71 and R41 from Table 6-16, Selection Values for Resistors R41 and R71.
- Install selected resistors R41 and R71.

Table 6-16. SELECTION VALUES FOR RESISTORS R41 and R71

SELECT RESISTOR SETTING	RESISTOR VALUE (OHMS) R41	R71	SELECT RESISTOR SETTING	RESISTOR VALUE (OHMS) R41	R71
0	10	499	500	249	249
22	10	453	542	249	210
74	40	499	577	287	210
81	40	453	607	324	210
89	40	412	622	287	174
136	71.5	453	651	324	174
148	71.5	412	677	365	174
188	105	453	703	324	137
203	105	412	727	365	137
223	105	365	750	412	137
250	137	412	777	365	105
273	137	365	797	412	105
297	137	324	812	453	105
322	174	365	852	312	71.5
349	174	324	864	453	71.5
377	174	287	916	412	40
393	210	324	919	453	40
422	210	287	926	499	40
458	210	249	978	453	10
465	249	287	980	499	10

6-30. FILTER ASSEMBLY 3A1A6FL1

a. PURPOSE. The filter assembly converts and filters 115/230 Vac, 50/60/400 Hz power to 22-30 Vdc. It also provides EMI filtering of the 26 Vdc ±4 and +12 Vdc inputs. The filter assembly test fixture provides appropriate interfaces between input power cabling and the filter assembly. Input power is provided through the three power cables listed below. Table 6-17 provides list of interconnections between J4 and J1 on the fixture. Filter output is normally connected to C8 when installed in AN/UGC-74B(V)3 or AN/UGC-74C(V)3. An equivalent capacitor is part of the fixture, and is connected to the output through P2-6 and P2-2. Resistive load is included in the fixture to simulate load provided by power supply 3A1PS1.

b. TEST EQUIPMENT, TOOLS AND MATERIALS.

- Filter Assembly Test Fixture SM-D-915994
- Oscilloscope AN/USM-488
- Multimeter AN/PSM-45, or equivalent
- Power Cable, UGC-74, 120 VAC, SM-D-764481
- Power Cable, UGC-74, 230 VAC, SM-D-764482
- Power Cable, UGC-74, 26 VDC, SM-D-764480

Table 6-17. PROGRAMMABLE PLUG CONNECTIONS

PLUG	J4 to	J1
120 VAC	A/C/J	1/3
	B/D/L	2/4
	M/K	1/2/3/4
230 VAC	A/J	1
	B/C	2/3
	D/C	4
	M/K	1/2/3/4
26 VDC	G/J	5
	F/L	6
	M/K	6/8

CAUTION

Certain filter assembly configurations may have two loose output leads to C8. If so, tape each lead separately so that they will not short out to each other or to any other object.

c. TEST SETUP AND PROCEDURES FOR FILTER ASSEMBLY. (See figure 6-20.)

- Remove filter assembly as directed in paragraph 5-11E.
- Reconnect leads to standoffs El and E2 on filter assembly.

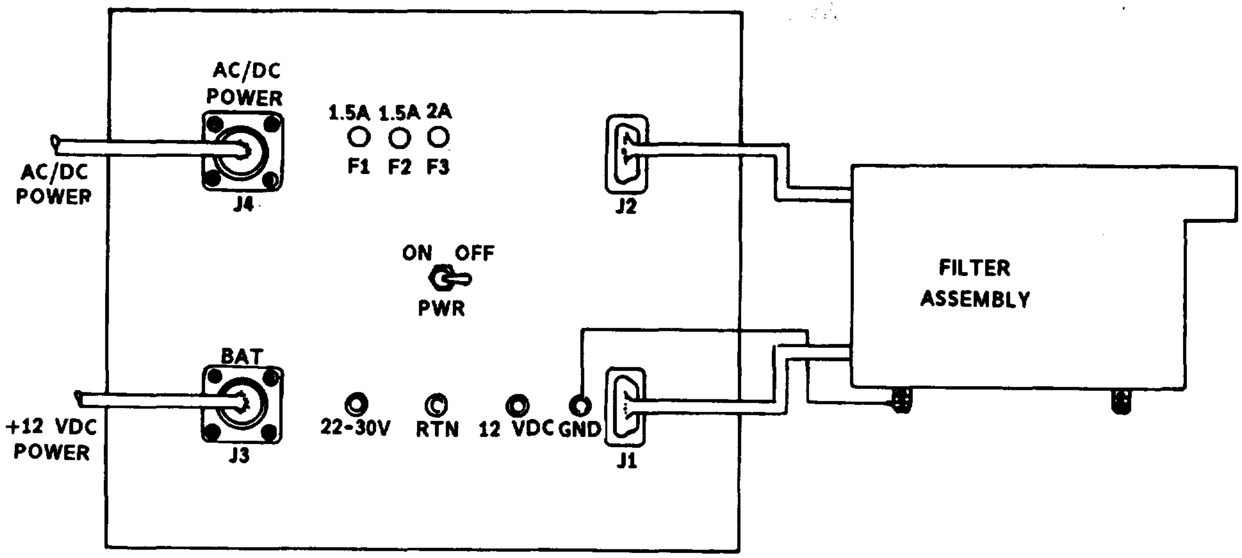


Figure 6-20. FILTER ASSEMBLY TEST SETUP

c. TEST SETUP AND PROCEDURES FOR FILTER ASSEMBLY. (Continued)

- Perform continuity check from each filter assembly standoff (El and E2) to chassis. Resistance shall be greater than 100K ohm after initial charging indication. Also check between standoffs El and E2 for absence of short circuit. Normal diode type response should be observed.
- Connect 120 Vac cable SM-D-766481 to J4 and to a 120 Vac source. Connect P1 and P2 (filter) to J1 and J2 (fixture). Orient filter to avoid stress on P1 or on cable.
- Ground filter assembly to test fixture GND.
- Set test fixture power switch to ON position.
- Use AN/PSM-45 to measure +28 Vdc ±3.5 across 22-30 Vdc test point and RTN.
- Use AN/USM-45 to measure 750 mVrms maximum ripple.

- Set power switch to OFF position. Remove 120 Vac cable and replace with the 230 Vac cable SM-D-764482. Connect cable to a 230 Vac source.
- Repeat above procedures.

- Set power switch to OFF position. Remove 230 Vac cable and replace with the 26 Vdc cable SM-D-764480. Connect cable to a 26 Vdc source.
- Repeat above procedures.

- Set power switch to OFF position and remove 26 Vdc cable from J4.
- Measure continuity of +12 Vdc circuitry by measuring from the fixture test point 12 Vdc to BAT (J3) pin A.
- Ensure that power switch is ON and fuse F3 is not open. Read less than 1 ohm from J3-A to the 12 Vdc test point using AN/PSM-45.

NOTE

An alternate method would be to connect a 12 Vdc battery backup cable and source to fixture and measure +12 volts at the 12 Vdc test point.

- If a failure is observed in any of the above steps, see Troubleshooting Table 6-11 in Section III for trouble location instructions. Also see paragraph 3-15 for filter assembly test fixture theory of operation.

6-31. KEYBOARD KEYSWITCH ASSEMBLY

a. PURPOSE. The keyswitch assembly contains all the electronics and switches used by operator in keyboard operation. It is tested by verifying that proper codes are produced in response to keyswitch pressed. Test fixture provides clock simulation circuitry to generate required clocks for keyswitch assembly operation.

b. **TEST EQUIPMENT, TOOLS AND MATERIALS.**

- Keyswitch Assembly Test Fixture SM. D-915997
- Multimeter AN/PSM-45, or equivalent
- Oscilloscope AN/USM-488
- Power Supply PP-2309C/U
- Function Generator SG-1171/A

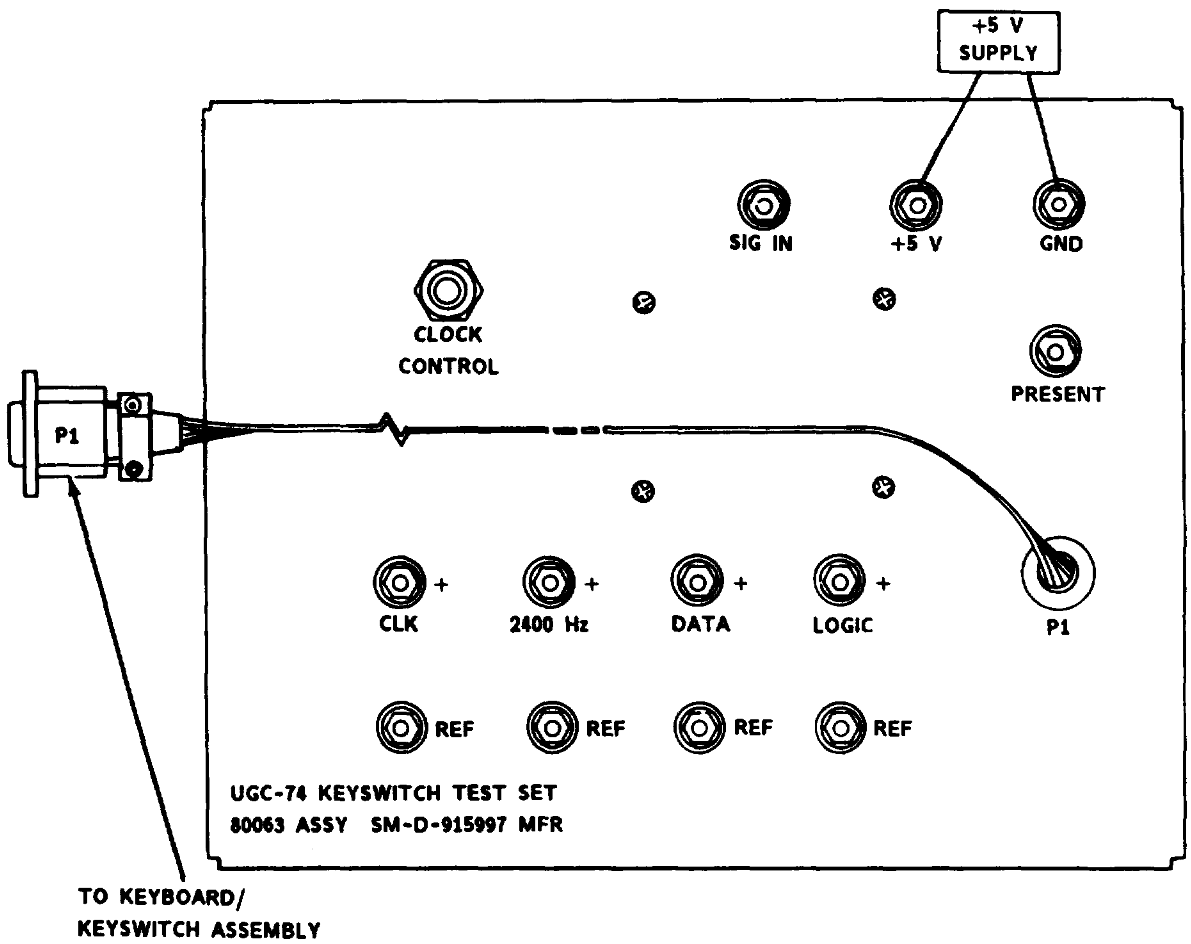


Figure 6-21. KEYBOARD KEYSWITCH ASSEMBLY TEST SETUP

c. **TEST SETUP PROCEDURE FOR KEYBOARD KEYSWITCH ASSEMBLY. (See figure 6-21.)**

- Remove keyboard keyswitch assembly as directed in paragraph 5-11G.
- Adjust power supply for +5 Vdc ±0.25; turn power supply OFF.
- Connect +5 V power supply to test fixture.
- Adjust function generator for 2400 Hz nominal +5 V square wave and connect to SIG IN connector and GND terminals.
- Connect keyswitch assembly to test fixture.
- Connect all test equipment to ground.

NOTE

Complete keyboard assembly may also be tested on fixture.

d. **TEST PROCEDURES.**

1. Connect multimeter lead to LOGIC terminal and GND.
2. Apply +5 Vdc ±5% to test fixture by turning +5 V power supply on.
3. Verify that multimeter reads from O to +0.5 Vdc. If multimeter reads from +0. 5 to +5.0 Vdc, press, then release, CLOCK CONTROL switch.
4. Set oscilloscope to .1 ms and 1 V/DIV.
5. Connect oscilloscope probe to 2400 Hz terminal and GND terminal.
6. Verify .41 ms sec nominal pulse, with low logic level of 0.4 Vdc max and high logic level not to exceed 5 Vdc, or be less than 2.5 Vdc. Note readings for both low and high logic levels.
7. Connect oscilloscope probe to DATA terminal and REF(DATA) terminal.
8. Press and hold CTRL and SHIFT switches, then press and hold BS switch. Note logic level (see step 6) displayed on oscilloscope and compare with b_1 (bit 1) value shown in table 6-18. Do not release switches at this time.
9. While holding down switches pressed in step 8, press and release CLOCK CONTROL switch on fixture. Note logic level (see step 6) displayed on oscilloscope and compare with b_2 (bit 2) value shown in table 6-18.

NOTE

Switches may now be released because character is loaded and can be read out one bit at a time.

10. Press and release CLOCK CONTROL switch, note logic level (see step 6) displayed on oscilloscope, and compare with b_3 (bit 3) value shown in table 6-18.
11. Repeat step 10 for bits 6 through 8.

NOTE

Further use of CLOCK CONTROL will allow the 8-bit character to be reread, providing that another key has not been pressed.

12. Repeat steps 8 through 11 for remaining switches listed in table 6-18.

NOTES

For switches with SHIFT shown in parenthesis, press and hold SHIFT switch, then press and hold additional switch indicated.

Character codes for switches not shown in table 6-18 are located in table 3-2.

Table 6-18. CHARACTER CODE MATRIX TEST

CHARACTER CODE	b1	b2	b3	b4	b5	b6	b7	b8
BS (CTL,SHIFT)	1	1	1	1	1	1	1	0
9	0	1	1	0	1	1	0	1
E (SHIFT)	1	0	1	1	0	1	1	1
FS (SHIFT)	0	0	1	0	0	1	1	1
H (SHIFT)	1	1	0	1	1	0	1	1
Z (SHIFT)	0	1	0	0	1	0	1	1
?	1	0	0	1	0	0	1	1
LF	1	1	1	0	0	0	0	1
DLC	0	0	0	1	0	0	0	1
A	0	0	0	0	0	1	0	1

NOTE

Refer to panel assembly to identify location of switches listed in table 6-18.

13. Connect oscilloscope probes to logic + and RCF + terminals. Test 12 bit counter U8 by pressing and holding RPT key and observing a 210 msec square wave at LOGIC terminals. (Ensure that oscilloscope trigger adjustment results in repetitive pulse widths.) Disconnect oscilloscope leads.
14. Check for +2.5 Vdc ±1O% at PRESENT test point with respect to GND using the multimeter.
15. Check for +1.5 Vdc ±5% with respect to GND at each of REF terminals.
16. If a failure is observed in any of the above steps, see Troubleshooting Table 6-12 in Section III for trouble location instruction. Also see paragraph 3-19 for keyboard keyswitch test fixture theory of operation.

6-32. FINAL TEST OF COMMUNICATIONS TERMINAL AN/UGC-74B(V)3 OR AN/UGC-74C(V)3

a. PURPOSE. Final test of the terminal is performed to verify operational condition of the terminal. Terminal message transmission and reception capabilities are tested using equipment identified below.

b. TEST EQUIPMENT, TOOLS AND MATERIALS.

- Interface Assembly Test Fixture SM-D-915991
- Oscilloscope AN/USM-488
- Power Supply PP-2309C/U
- Function Generator SG-1171/A
- Loopback Plug SM-B-916000
- Power Cable 26 Vdc SM-D-764480
- Power Cable 120 Vac SM-D-764481
- Power Cable 230 Vac SM-D-764482
- Battery Backup Cable SM-D-915890

c. **TEST SETUP PROCEDURE FOR INTERFACE ASSEMBLY. (See figres 6-22 and 6-23.)**

- Set interface switches as follows:

INTERFACE SWITCH	SETTING
BAUD RATE	300
ASCII/BAUDOT	ASCII
PARITY	ODD
CLOCK	INT
XMIT MODE	LO DATA
REC MODE	LO DATA
STATE	ICT
SIGNAL	DIØ

- Connect loopback plug to J1.

d. **TEST PROCEDURES.**

1. Apply power and perform SELF-TEST as directed in Chapter 2 using both internal and external loopbacks.
2. Repeat Step 1 for LO DATA.
3. Perform Loopback Test as directed in Chapter 2. Verify initialization sequences and operation of the following:

   MSG RCVD lamp
   XMT lamp
   Keyboard line-feed

4. Remove loopback plug; connect interace test fixture to data connector J1.
5. Connect oscilloscope to OUT 5 HI and OUT 5 LO. (See figure 6-22 for test setup.)
6. Set up function generator for 0 to +6 V square wave at 100 Hz (external/ clock) and connect to IN 3 HI and IN 3 LO.
7. Connect OUT 5 to IN 1 HI and IN 1 LO.
8. Connect second oscilloscope channel to OUT 2 HI and OUT 2 LO.
9. Using TTY Command, transmit a line of E's, observing that data at OUT 5 is being clocked on the positive edge of the clock. Synchronize oscilloscope on DATA.
10. Set CLOCK +/- switch to (-) position and observe that data is transmitted on negative edge of clock.
11. Remove power by setting POWER switch to OFF position.

12. Set XMIT MODE and REC MODE switches to 60 mA position.
13. Using interface assembly test fixture, connect 26 V supply through 470-ohm resistor R3 to OUT 5 HI (XMIT DATA Hl) and OUT 5 LO (XMIT DATA LO).
14. Connect OUT 5 HI and OUT 5 LO to IN 1 HI (REC DATA HI) and IN 1 LO (REC DATA LO). (See figure 6-23 for test setup.
15. Perform Loopback Test as directed in Chapter 2.
16. Remove power by setting POWER switch to OFF position.

17. Connect external function generator adjusted for 100 Hz, ±6 V peak-to-peak square wave to IN 3 HI and IN 3 LO.
18. Set CLOCK to EXT.
19. Apply *power* and perform Loopback Test as directed in Chapter 2.
20. Observe OUT 5 and IN 3 on oscilloscope. Data on OUT 5 should be edge coincident with clocks on IN 3.
21. Set CLOCK to KG30 and connect IN 3 to IN 4.
22. Remove power by setting POWER switch to OFF position.

23. Install 230 Vac cable and connect to 230 Vac source.
24. Apply power and perform SELF-TEST as directed in Chapter 2.
25. Remove power and disconnect 230 Vac cable.

26. Install 10 Amp fuses in fuseholders F1 and F2.
27. Connect 26 V cable to 26 Vdc source and terminal.
28. Apply power and perform SELF-TEST as directed in Chapter 2.

,

29. If a failure occurs in any of the preceding tests, see Troubleshooting Tables in Section Ill of this manual. Also, see figures FO-9 and FO-10 to check system interconnects.

30. To assist in identifying capacitor values and ratings, see figure FO-1.

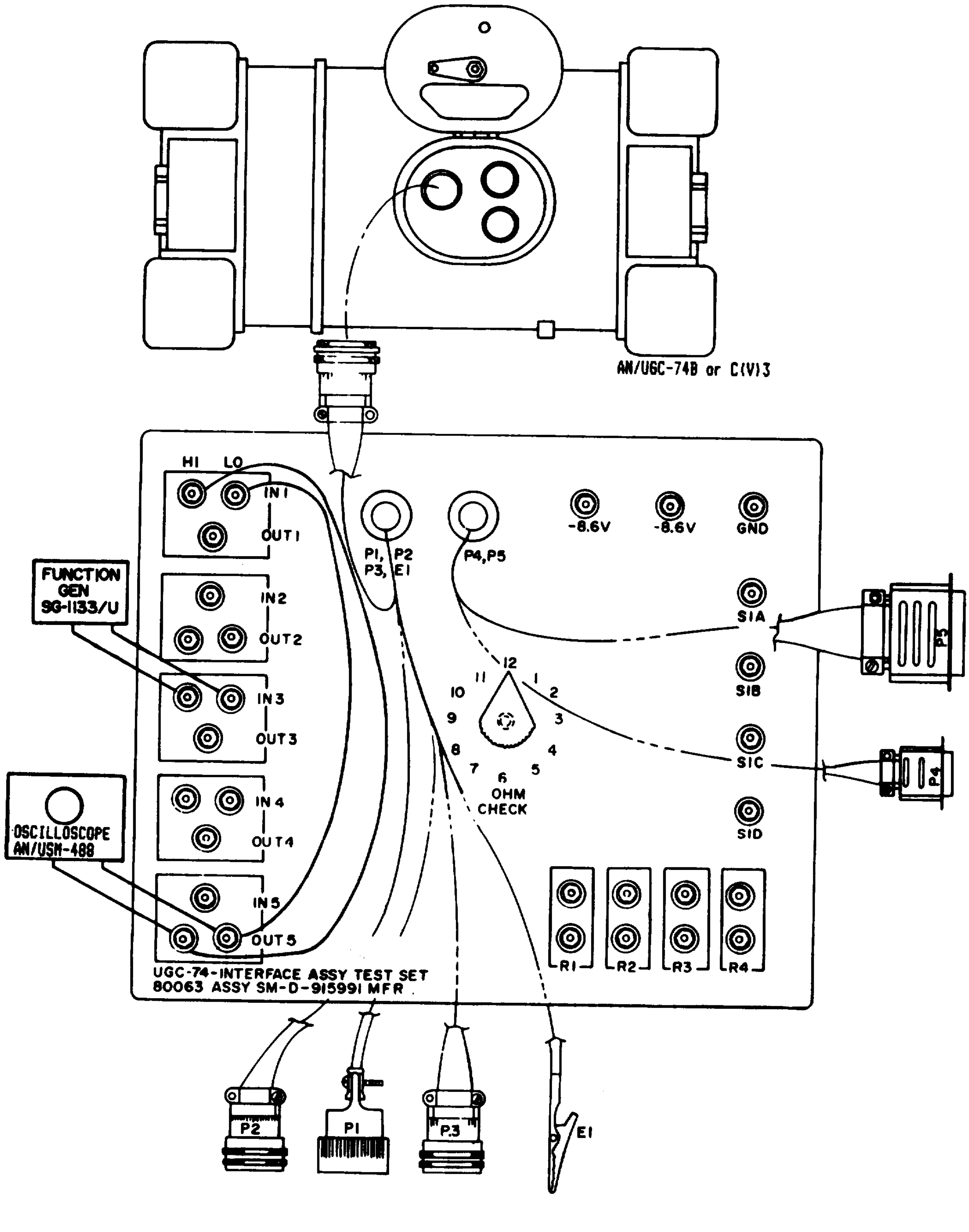


Figure 6-22. EQUIPMENT SETUP FOR DATA/CLOCK TEST

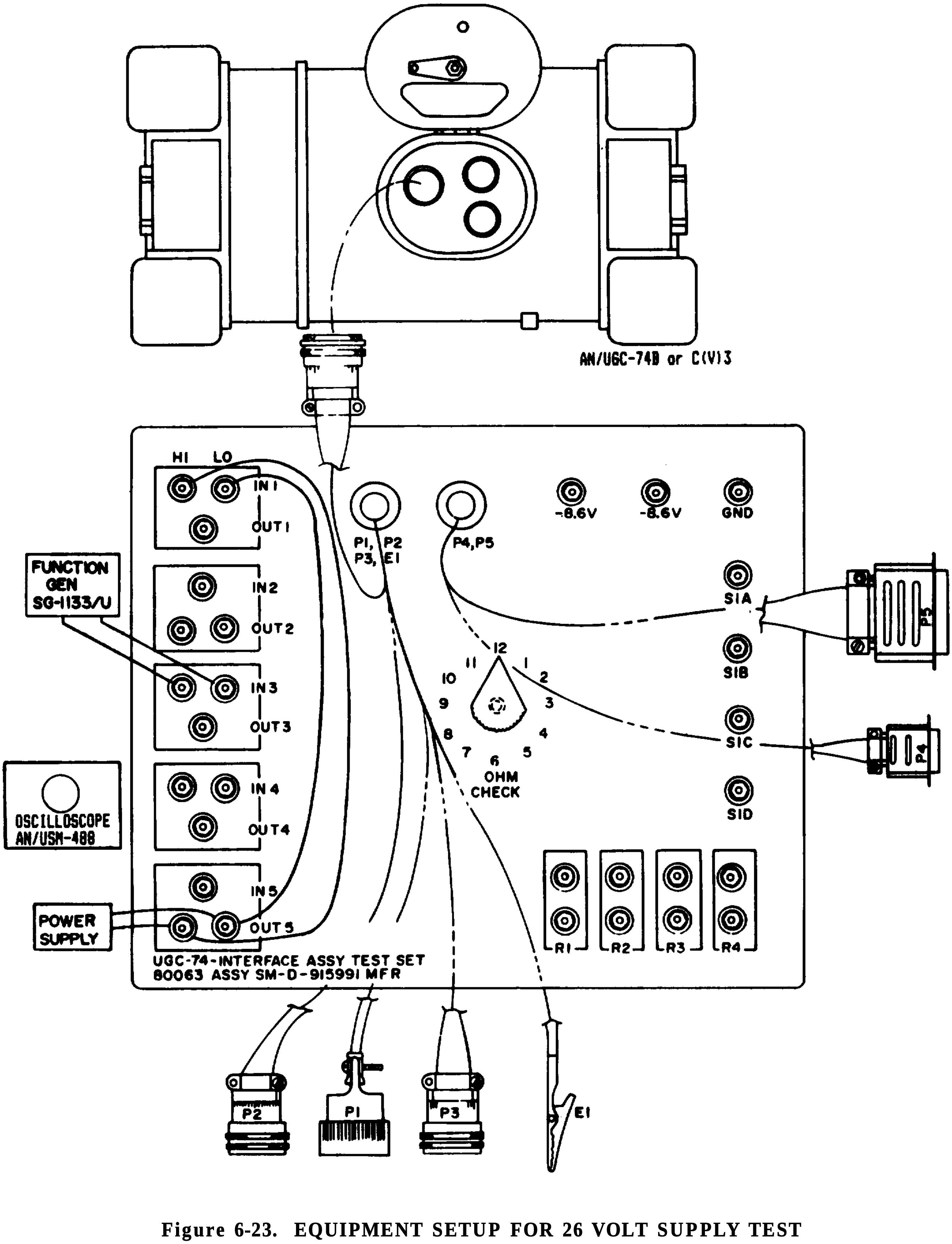


Figure 6-23. EQUIPMENT SETUP FOR 26 VOLT SUPPLY TEST

Section VII. TEST FIXTURES DISASSEMBLY AND REASSEMBLY

6-33. GENERAL

This section describes disassembly and reassembly of the following test fixtures used to test modules and assemblies of the AN/UGC-74B(V)3 and AN/UGC-74C(V)3.

TEST FIXTURE

A. FILTER ASSEMBLY
B. INTERFACE ASSEMBLY
C. LINE-FEED (MOTOR DRIVE) CURRENT CONTROL
D. POWER SUPPLY
E. KEYSWITCH ASSEMBLY
F. CMCC/DRIVE BOARD/PRINT HEAD

Use same care and precautions for disassembly and reassembly of test fixtures as used for terminal components in Section V of this chapter.

See applicable figure and parts description list for identification and location of test fixture parts.

After repair and reassembly of a test fixture, see Section VIII of this chapter and perform test procedures required to ensure complete repair of the fixture.

6-34. DISASSEMBLY AND REASSEMBLY PROCEDURES

A. FILTER ASSEMBLY TEST FIXTURE - DISASSEMBLY AND REASSEMBLY (See figure 6-24.)

- Remove four screws (8) and washers (9) securing bottom cover (10) to chassis (11). Remove bottom cover.

REPLACEMENT OF SWITCH S1 (58).

REMOVAL
- Label and unsolder wires from terminals of switch S1 (58).
- Remove nut (38) and tab washer (39) and remove switch S1.

INSTALLATION
- Position hardware over mounting hole prior to inserting switch.
- Insert switch S1 into chassis, and aline by installing washer so that tang on washer mates with alinement hole in chassis.
- Tighten nut on switch until 1-2 threads appear above shoulder of nut.
- Tighten nut as required to secure switch.
- Install and solder wires on terminals of switch S1.

REPLACEMENT OF CONNECTOR J1 (19).

REMOVAL

- Label and disconnect wires from connector J1 (19).
- Remove two screws (15), washers (14), and attaching hardware (16), (17), (18).
- Remove connector J1.

INSTALLATION

- Install connector J1.
- Install attaching hardware.
- Place washers and screws into position and secure.
- Install and connect wires on terminals of J1.

REPLACEMENT OF CONNECTOR J2 (28).

REMOVAL

- Label and unsolder wires to connector J2 (28).
- Remove *two* screws (31), washers (29), and attaching hardware (21), (22), (23).
- Remove connector J2.

INSTALLATION

- Install connector J2.
- Install attaching hardware.
- Secure into position with washers and screws.
- Install and solder wires on terminals of J2.

REPLACEMENT OF CONNECTOR J3 (50).

REMOVAL

- Label and unsolder wires to connector J3 (50).
- Remove four screws (49) and attaching hardware (51), (52), (53).
- Remove connector J3.

INSTALLATION

- Install connector J3.
- Install attaching hardware.
- Secure into position with screws.
- Install and solder wires on terminals of J3.

REPLACEMENT OF CONNECTOR J4 (57).

REMOVAL

- Label and unsolder wires to connector J4 (57).
- Remove four screws (48) and attaching hardware (54), (55), (56).
- Remove connector J4.

INSTALLATION

- Install connector J4.
- Install attaching hardware.
- Secure into position with screws.
- Install and solder wires on terminals of J4.

REPLACEMENT OF FUSEHOLDERS (12), (13), (34).

REMOVAL
- Label and unsolder respective wires at fuseholder (12), (13), (34).
- Remove nut (6) and washer (7) on each of three fuseholders as required.
- Remove fuseholder (12), (13), (34) and washer (33) as required.

INSTALLATION
- Install fuseholder Into mounting hole with washer.
- Secure into place with washer and nut.
- Install and solder wires on terminals of fuseholder.

REPLACEMENT OF CAPACITOR Cl (37).

REMOVAL
- Remove two screws (47), bracket (42) and attaching hardware (44), (45), (46).
- Extend capacitor C1 (37) from chassis.
- Mark and disconnect leads by removing two screws (36).
- Remove C1.

INSTALLATION
- Reconnect leads with two screws.
- Install C1 in chassis.
- Install bracket over C1.
- Install screws and attaching hardware.

REPLACEMENT OF RESISTORS R1 (27) and R2 (32).

REMOVAL
- Label and unsolder leads from resistors (27), (32).
- Remove two screws (20) and (30) and attaching hardware (25), (26), (27) which attach each resistor to chassis (11).
- Remove resistors.

INSTALLATION
- Install resistors to chassis with screws and attaching hardware.
- Resolder leads to resistors.

REPLACEMENT OF TEST POINTS (35), (40), (41), (42).

REMOVAL
- Unsolder wires and remove nuts (1) and (2), washers (3) and (4), and spacer (5) from test points as applicable.
- Remove applicable test point from chassis (11).

INSTALLATION
- Install test point in chassis.
- Install spacers, washers, and nuts as applicable.
- Resolder wires to applicable test points.

NOTE

See Table 3-3 for filter assembly wire list, if required.

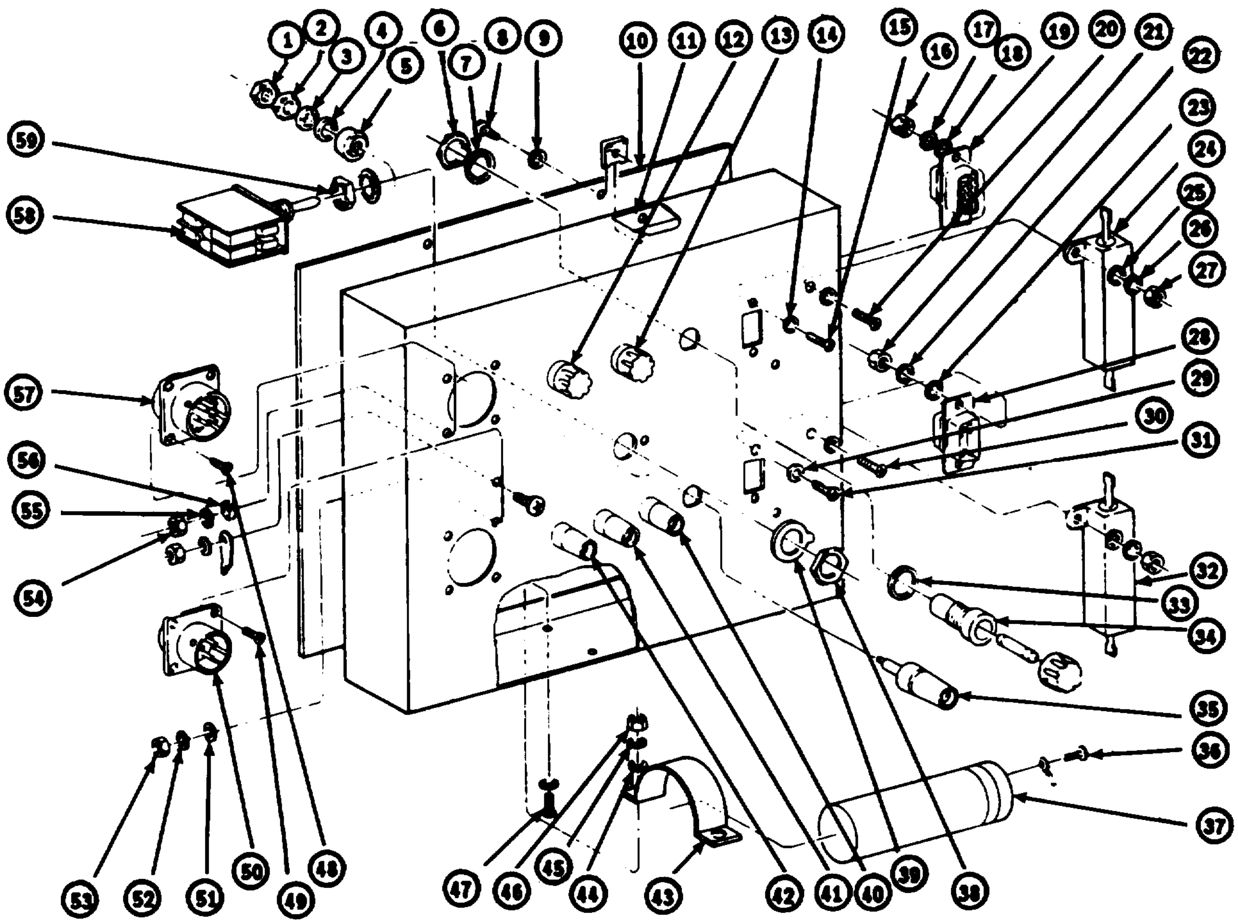


Figure 6-24. FILTER ASSEMBLY TEST FIXTURE

LEGEND

1. Nut
2. Nut
3. Washer, lock
4. Washer, flat
5. Spacer
6. Nut
7. Washer, lock
8. Screw, pnh
9. Washer, flat
10. Cover, bottom
11. Chassis
12. Holder, fuse
13. Holder, fuse
14. Washer, flat
15. Screw, pnh
16. Nut
17. Washer, lock
18. Washer, flat
19. Connector (J1)
20. Screw, pnh
21. Nut
22. Washer, lock
23. Washer, flat
24. Resistor (R1)
25. Washer, flat
26. Washer, lock
27. Nut
28. Connector (J2)
29. Washer, flat
30. Screw, pnh
31. Screw, pnh
32. Resistor (R2)
33. Washer, flat
34. Holder, fuse socket
35. Test point (TP4)
36. Screw
37. Capacitor (C1)
38. Nut
39. Washer, tab
40. Test point (TP3)
41. Test point (TP2)
42. Test point (TP1)
43. Bracket
44. Washer, flat
45. Washer, lock
46. Nut
47. Screw
48. Screw, pnh
49. Screw, pnh
50. Connector (J3)
51. Washer, flat
52. Washer, lock
53. Nut
54. Nut
55. Washer, lock
56. Washer, flat
57. Connector (J4)
58. Switch (S1)
59. Nut

B. INTERFACE ASSEMBLY TEST FIXTURE - DISASSEMBLY AND REASSEMBLY (See figures 6-25, 6-26, 6-27.)

- Remove four screws (2) and washers (3) securing bottom cover (4) to chassis (11). Remove bottom cover.

REPLACEMENT OF SWITCH S1 (1). (See figure 6-25.)

REMOVAL
- Label and unsolder wires from terminals of switch S1 (1).
- Loosen setscrews in knob (24) and remove knob.
- Remove nut (31) and washer (32).
- Remove switch S1.

INSTALLATION
- Position switch S1 into mounting hole in chassis.
- Secure into position with washer and nut.
- Solder wires to their respective terminals.

REPLACEMENT OF TEST POINTS (10), (12), (13), (14), (15), (16), (17), (33) through (38), (40), (42), (44), (45), (46), (47), (48), (49) and (50). (See figure 6-25).

REMOVAL
- Label and unsolder wires from terminals of applicable test points (10), (12), (13), (14), (15), (16), (17), (33) through (38), (40), (42), (44), (45), (46), (47), (48), (49) or (50).
- Remove attaching hardware (5), (6), (7), (8) and (9) from each test point to be removed.
- Remove applicable test point(s).

INSTALLATION
- Position test point into mounting hole in chassis and secure with attaching hardware.
- Solder wires to their respective terminals.

REPLACEMENT OF TEST POINTS (12), (13), (14), (16), (17), (18), (2O) and (21). (See figure 6-27.)

REMOVAL
- Remove resistor R1 (6), R2 (15), R3 (19) and R4 (22) as required.
- Remove attaching hardware (1) through (5) and (7) through (11) as required.
- Remove applicable test points (12), (13), (14), (16), (17), (18), (20) or (21).

INSTALLATION
- Position test point into mounting hole in chassis and secure with attaching hardware.
- Install removed resistors as required.

REPLACEMENT OF CONNECTOR ASSEMBLY (22) and (23). (See figure 6-25.)

REMOVAL
- Remove two screws (21), washers (20), and attaching hardware (18) and (19).
- Remove back shell (22) from connector (23).
- Slide back shell toward chassis (11) along the cable.

INSTALLATION
- With connector in place, move back shell along cable to connector.
- Secure into place with two screws and attaching hardware.

REPLACEMENT OF CONNECTOR ASSEMBLY (30) and (29). (See figure 6-25.)

REMOVAL
- Remove two screws (27), washers (26), and attaching hardware (28) and (25).
- Remove back shell (30) from connector (29).
- Slide back shell toward chassis (11) along the cable.

INSTALLATION
- With connector in place, move back shell along cable to connector.
- Secure into place with two screws and attaching hardware.

REPLACEMENT OF CONNECTOR ASSEMBLY (39), (41) and (43). (See figure 6-25.)

REMOVAL
- Remove clamp and two screws on connector requiring replacement.
- Disassemble connector shell.
- Label and unsolder wires from connector.

INSTALLATION
- Resolder wires to connector.
- Reassemble connector.
- Install clamp and tighten two screws.

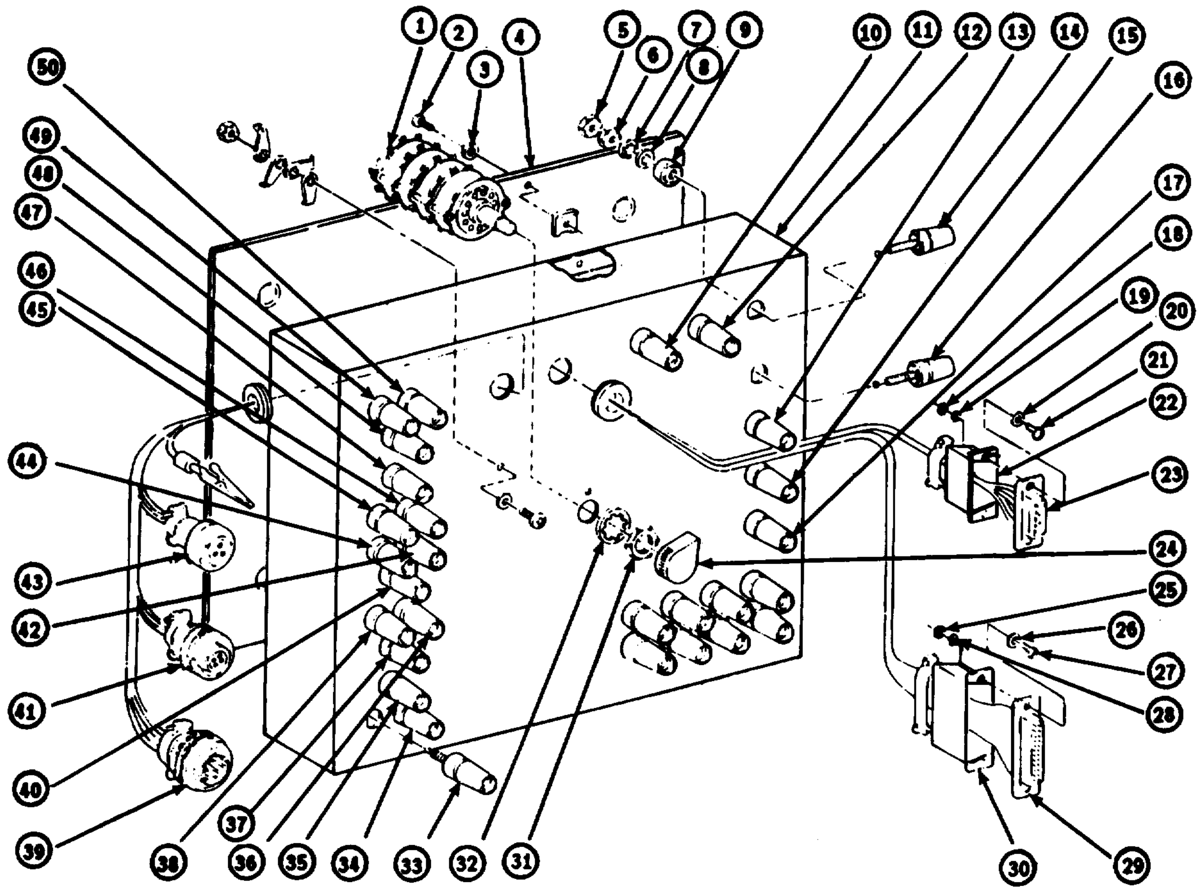


Figure 6-25. INTERFACE ASSEMBLY TEST FIXTURE

LEGEND

1. Switch, rotary (S1)
2. Screw, pnh
3. Washer, flat
4. Cover, chassis bottom
5. Nut
6. Nut
7. Washer, lock
8. Washer, flat
9. Insulator base
10. Test point (TP1)
11. Chassis, interface assembly
12. Test point (TP2)
13. Test point (TP5)
14. Test point (TP3)
15. Test point (TP6)
16. Test point (TP4)
17. Test point (TP7)
18. Nut
19. Washer, lock, split
20. Washer, flat
21. Screw, pnh
22. Shell connector
23. Connector, electrical
24. Knob, pointer
25. Nut
26. Washer, flat
27. Screw
28. Washer, lock, split
29. Connector, electrical
30. Shell connector
31. Nut
32. Washer, lock
33. Test point (TP17)
34. Test point (TP16)
35. Test point (TP18)
36. Test point (TP20)
37. Test point (TP19)
38. Test point (TP21)
39. Connector, electrical
40. Test point (TP22)
41. Connector, electrical
42. Test point (TP23)
43. Connector, electrical
44. Test point (TP24)
45. Test point (TP26)
46. Test point (TP25)
47. Test point (TP27)
48. Test point (TP28)
49. Test point (TP30)
50. Test point (TP29)

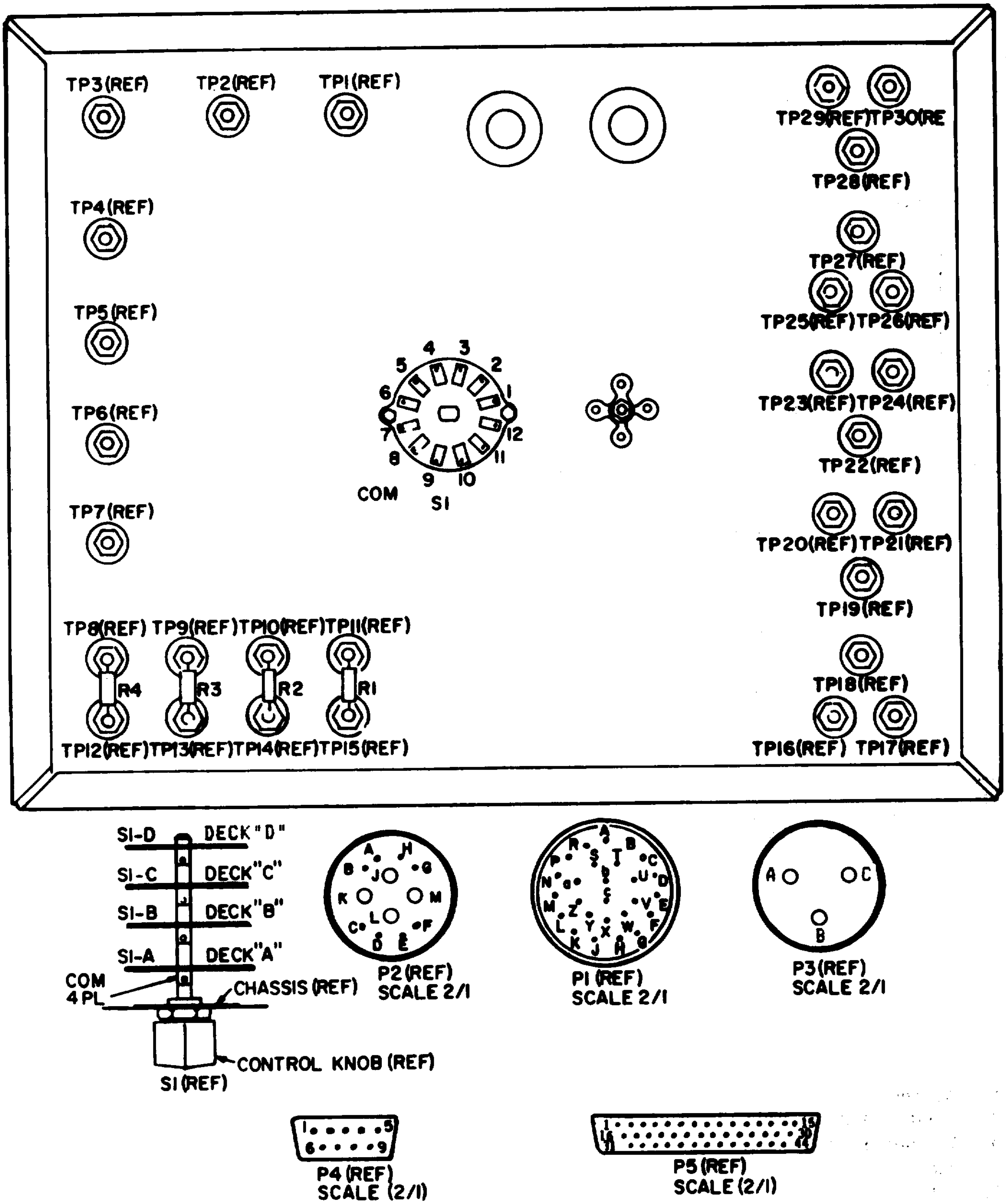


Figure 6-26. INTERFACE ASSEMBLY TEST FIXTURE (BOTTOM VIEW)

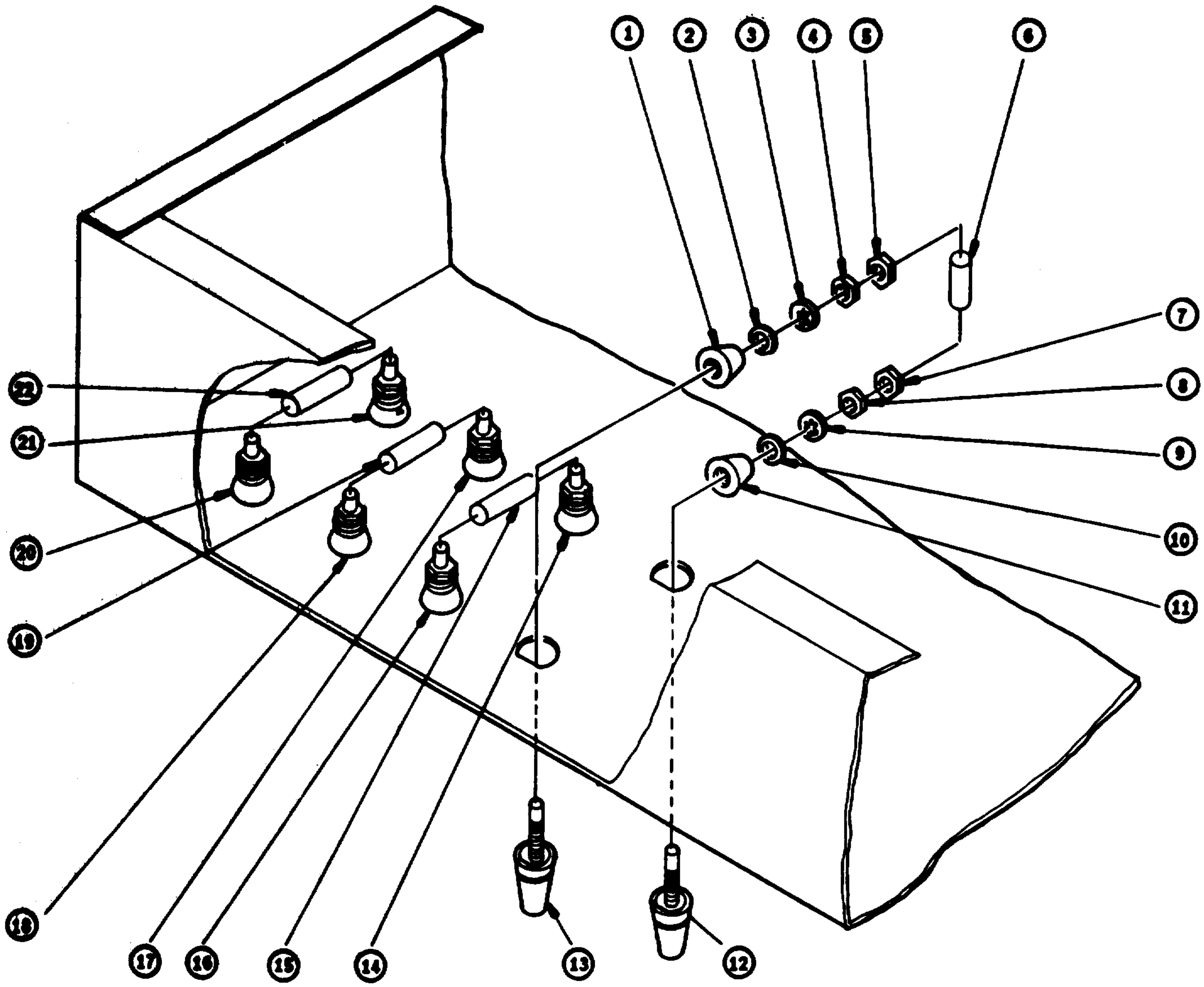


Figure 6-27. INTERFACE ASSEMBLY TEST FIXTURE
(TEST POINT RESISTORS)

LEGEND

1. Spacer
2. Washer, flat
3. Washer, lock
4. Nut
5. Nut
6. Resistor (R1)
7. Nut
8. Nut
9. Washer, lock
10. Washer, flat
11. Spacer
12. Test point (TP11)
13. Test point (TP15)
14. Test point (TP10)
15. Resistor (R2)
16. Test point (TP14)
17. Test point (TP9)
18. Test point (TP13)
19. Resistor (R3)
20. Test point (TP12)
21. Test point (TP8)
22. Resistor (R4)

c. LINE-FEED (MOTOR DRIVE) CURRENT CONTROL TEST FIXTURE - DISASSEMBLY AND REASSEMBLY. (See figure 6-28.)

- Remove four screws (4), washers (5) and cover (11).

REPLACEMENT OF TEST POINTS (12) through (20) and (22) through (27).

REMOVAL

- Label and unsolder wires to test points (12) through (20), (22) through (27) as required.
- Remove attaching hardware (6) through (10) from each test point as required.
- Remove applicable test point.

INSTALLATION

- Position test points into mounting hole and secure with attaching hardware.
- Solder wires to their respective terminals.

REPLACEMENT OF SWITCH S1 (3).

REMOVAL

- Loosen two setscrews and remove knob (21).
- Label and unsolder wires from S1 (3).
- Remove nut (28) and washer (29).
- Remove switch S1.

INSTALLATION

- Position switch S1 into mounting hole and secure with nut and washer.
- Solder wires to their respective terminnals.
- Install knob and tighten two setscrews.

REPLACEMENT OF SWITCH S2 (1).

REMOVAL

- Label wires on switch S2 (1).
- Remove wires by removing three screws (62).
- Remove nut (30) and tab washer (31).
- Remove switch S2.

INSTALLATION

- Position nut and tab washer over mounting hole prior to inserting switch.
- Insert switch S2 into chassis, and aline by installing washer so that tang on washer mates with alinement hole in chassis.
- Tighten nut on switch until 1-2 threads appear above shoulder of nut.
- Tighten nut as required to secure switch.
- install wires on terminals of switch S2 with screws.

REPLACEMENT OF TERMINAL BOARD TB1 (60).

REMOVAL
- Label and unsolder leads from solder terminals E18 through E25 on TB1 (60).
- Remove resistors (54), (55), (56), and (61), noting position on TB1.
- Remove screw (52), terminal lug (51), and washer (53).
- Remove two screws (57) and washers (58) and (59).
- Remove terminal board TB1.

INSTALLATION
- Position TB1 into place and secure with attaching hardware.
- Install resistors.
- Solder wires to their respective terminals.

REPLACEMENT OF PRINT CIRCUIT BOARD (47).

REMOVAL
- Label and unsolder wires from printed circuit board (47) as required.
- Remove two screws (36) and washers (37) with attaching hardware (48), (49), and (50).
- Unsolder connector pins to separate connector from printed circuit board.
- Remove printed circuit board.

INSTALLATION
- Connect connector to printed circuit card and solder pins.
- Position into chassis and secure with attaching hardware.
- Solder wires to their respective terminals.

REPLACEMENT OF RESISTOR R4 (43).

REMOVAL
- Label and unsolder wires from resistor R4 (43).
- Remove two screws (34), washers (35), and attaching hardware (44), (45), (46).
- Remove resistor R4.

INSTALLATION
- Position resistor R4 into place.
- Secure with attaching hardware.
- Solder leads to their respective terminals.

REPLACEMENT OF SWITCH S3 (42).

REMOVAL
- Label and remove two wires by removing two screws (41) from switch S3 (42).
- Remove attaching hardware (32) and (33).
- Remove switch S3.

INSTALLATION
- Install positioning hardware and position switch through mounting hole.
- Insert switch S3 into chassis, and aline by installing washer so that tang on washer mates with alinement hole in chassis.
- Tighten nut on switch until 1-2 threads appear above shoulder of nut.
- Tighten nut as required to secure switch.
- Install wires on terminals of switch S3.

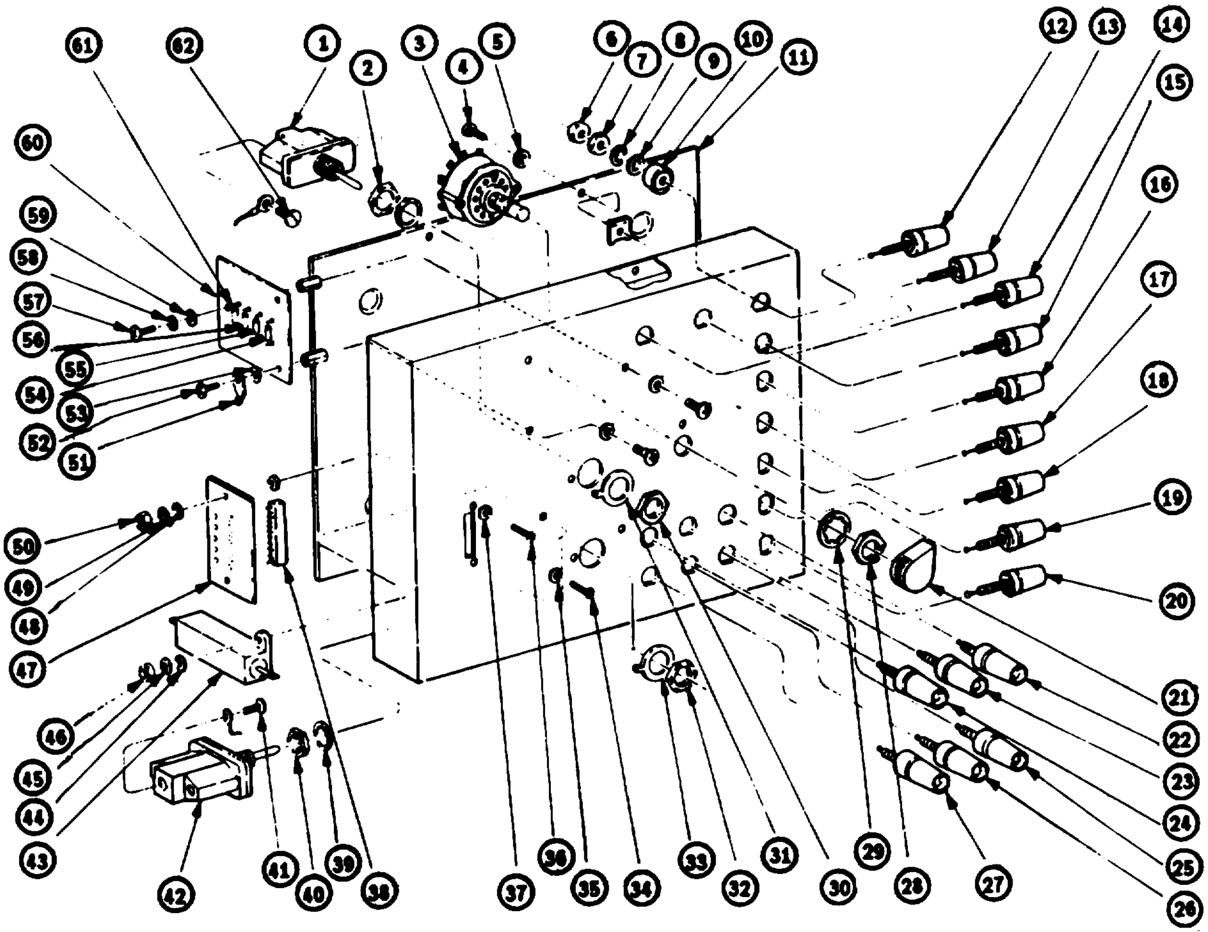


Figure 6-28. LINE-FEED (MOTOR DRIVE) CURRENT CONTROL TEST FIXTURE

LEGEND

1. Switch, toggle (S2)
2. Nut
3. Switch, rotary (S1)
4. Screw, pnh
5. Washer, flat
6. Nut
7. Nut
8. Washer, lock
9. Washer, flat
10. Spacer
11. Cover, chassis
12. Test point (TP4)
13. Test point (TP2)
14. Test point (TP1)
15. Test point (TP5)
16. Test point (TP6)
17. Test point (TP7)
18. Test point (TP3)
19. Test point (TP11)
20. Test point (TP15)
21. Knob, pointer
22. Test point (TP10)
23. Test point (TP9)
24. Test point (TP8)
25. Test point (TP14)
26. Test point (TP13)
27. Test point (TP12)
28. Nut
29. Washer, lock
30. Nut
31. Washer, tab
32. Nut
33. Washer, tab
34. Screw, pnh
35. Washer, flat
36. Screw, pnh
37. Washer, flat
38. Connector
39. Washer, lock
40. Nut
41. Screw, pnh
42. Switch,toggle (S3)
43. Resistor (R4)
44. Washer, flat
45. Washer, lock
46. Nut
47. Printed circuit board
48. Washer, flat
49. Washer, lock
50. Nut
51. Terminal, lug, solder
52. Screw, pnh
53. Washer, flat
54. Resistor (R3)
55. Diode (CR1)
56. Resistor (R1)
57. Screw, pnh
58. Washer, lock
59. Washer, flat
60. Terminal board assembly (TB1)
61. Resistor (R2)
62. Screw, pnh

D. POWER SUPPLY TEST FIXTURE - DISASSEMBLY AND REASSEMBLY
(See figures 6-29 and 6-30.)

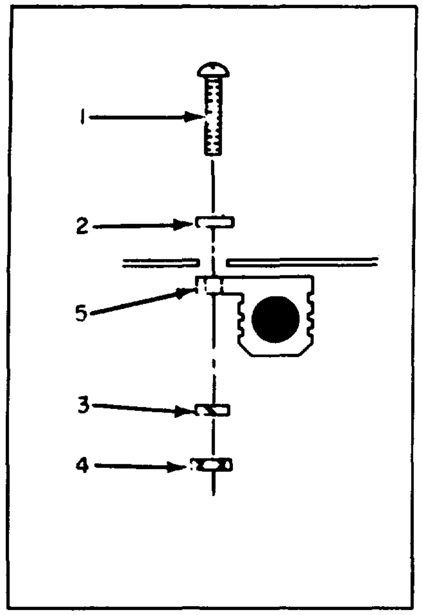
- Remove four screws securing bottom cover to chassis and remove cover.

NOTE
See figure 6-29 for the location of required component, then refer to illustrations accompanying instructions.

REPLACEMENT OF TYPICAL POWER RESISTOR.

REMOVAL
- Label and unsolder leads from resistor terminals 1 and 2.
- Remove two screws (l), washer (2), and attaching hardware (3) and (4).
- Remove resistor (5).

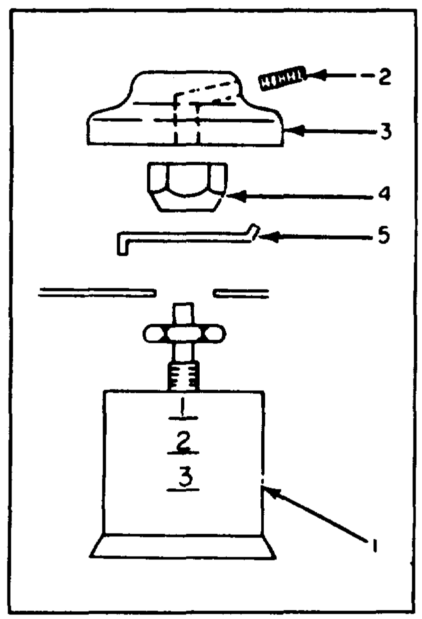
INSTALLATION
- Mount and reattach hardware and tighten screws into place.
- Identify leads and solder into place.



REPLACEMENT OF TYPICAL POTENTIOMETER.

REMOVAL
- Label and unsolder wires from potentiometer R31 (4) or R32 (21) as required.
- Loosen setscrew (2) and remove knob (3).
- Remove nut (4) and locating washer (5).
- Remove potentiometer (l).

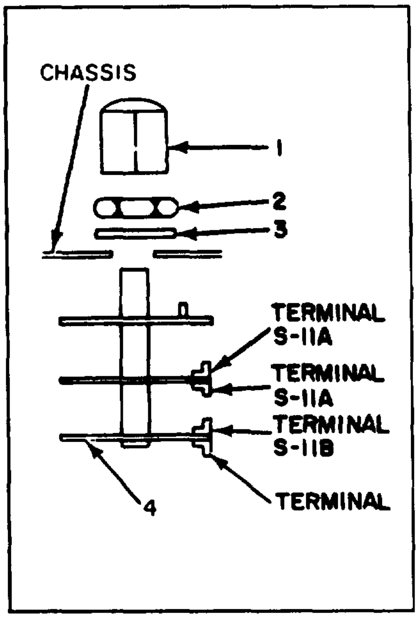
INSTALLATION
- Mount potentiometer and place into position using locating washer.
- Install nut and tighten.
- Install knob and tighten setscrew.
- Identify wires and solder into place.



REPLACEMENT OF ROTARY SWITCH.

REMOVAL
- Label and unsolder leads from rotary switch.
- Loosen setscrew (1) and remove knob.
- Remove nut (2) and lock washer (3).
- Remove switch (4).

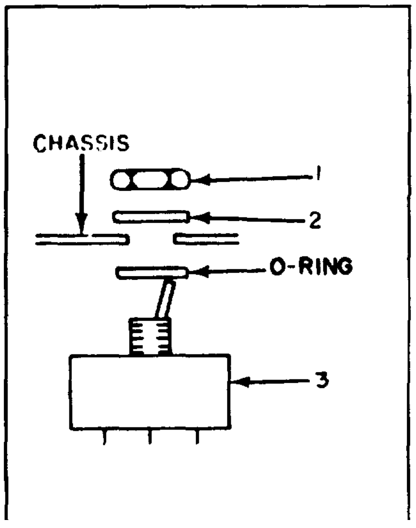
INSTALLATION
- Mount switch in position with lock washer and tighten nut.
- Install knob and tighten setscrew.
- Identify leads and solder into place.



REPLACEMENT OF TYPICAL TOGGLE SWITCH.

REMOVAL
- Label and unsolder wires from toggle switch as applicable.
- Remove nut (1) and lock washer (2).
- Remove switch (3).

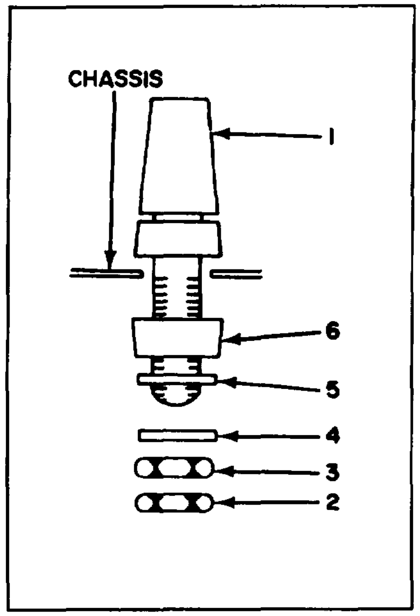
INSTALLATION
- Mount switch into position and install hardware.
- Tighten switch into position.
- Identify wires and solder into place.



REPLACEMENT OF A TYPICAL TEST POINT.

REMOVAL
- Label and unsolder wire from test point (1) as required.
- Remove nuts (2) and (3), washers (4) and (5), and spacer (6).
- Remove test point.

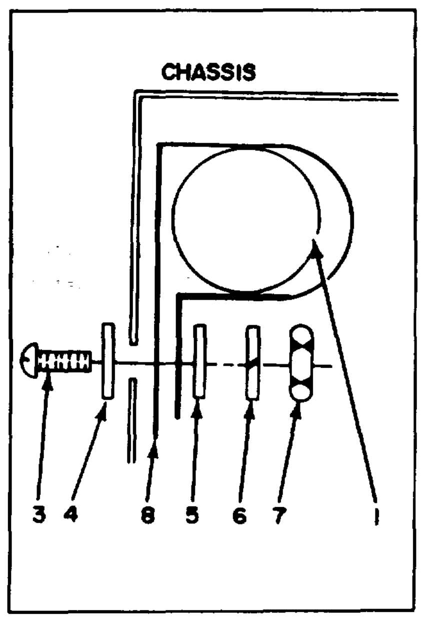
INSTALLATION
- Mount test point into position and install hardware.
- Install nuts into place.
- Solder wire into place.



REPLACEMENT OF CAPACITOR Cl.

REMOVAL
- Remove two screws and connecting wires.
- Remove screw (3) and washer (4).
- Remove attaching hardware (5), (6), (7) and (8).
- Remove capacitor from clamp.

INSTALLATION
- Place capacitor into clamp.
- Install attaching hardware.
- Secure into place with washer and screw.
- Install two screws and connecting wires.



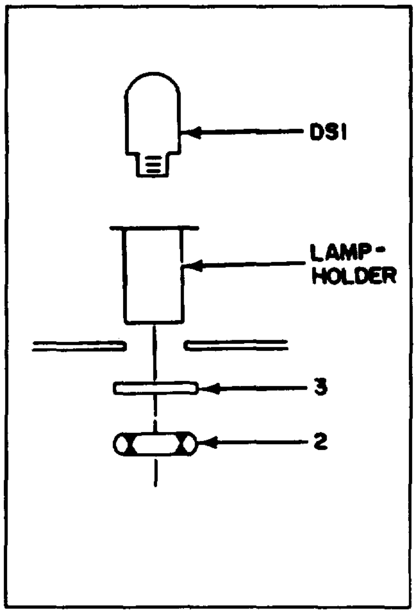
REPLACEMENT OF LAMP DS1 ASSEMBLY.

REMOVAL

- Label wires on terminals of lamp DS1 (1).
- Unsolder and remove wires.
- Remove nut (2) and washer (3).
- Remove DS1 from lens.

INSTALLATION

- Install lamp assembly into mounting hole.
- Secure into position with washer and nut.
- Identify and solder wires to terminals.



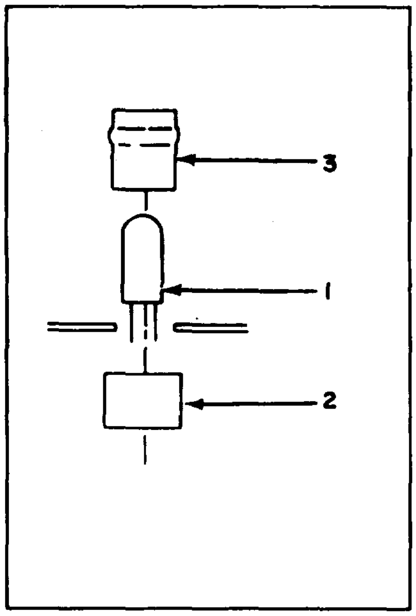
REPLACEMENT OF LED DS2 ASSEMBLY.

REMOVAL

- Label and unsolder wires on LED DS2 (l).
- Unscrew threaded bushing (2).
- Remove sleeve (3).
- Remove DS2.

INSTALLATION

- Install LED assembly into mounting hole.
- Secure into position with bushing and sleeve.
- Identify wires and solder into place.



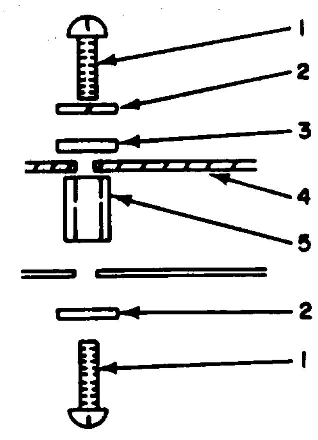
REPLACEMENT OF PRINTED WIRING BOARD Al,

REMOVAL

- Unplug cable connector from receptacle on printed wiring board Al. (See figure on page 3-63.)
- Remove four screws (1), lock washers (2), flat washers (3), and spacers (5).
- Remove printed wiring board (4).

INSTALLATION

- Install printed wiring board.
- Secure into position with hardware.
- Plug cable connector into connector on printed wiring board.



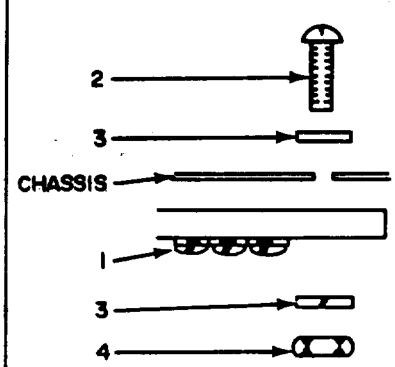
REPLACEMENT OF TERMINAL BLOCK TB1.

REMOVAL

- Label and remove all connecting wires from terminal block TB1 (I).
- Remove four screws (2), washers (3), and nuts (4) on each end of block.
- Remove terminal block.

INSTALLATION

- Position terminal block into position.
- Secure into position with hardware.
- Connect all wires to their appropriate terminals.



REPLACEMENT OF CARD MOUNTING ASSEMBLY.

REMOVAL

- Use figure 6-28 and part description list for removal and disassembly of card mounting assembly located on top of the power supply test fixture.

INSTALLATION

- Reassemble card mounting assembly using figure 6-28 and install on top of the power supply test fixture.

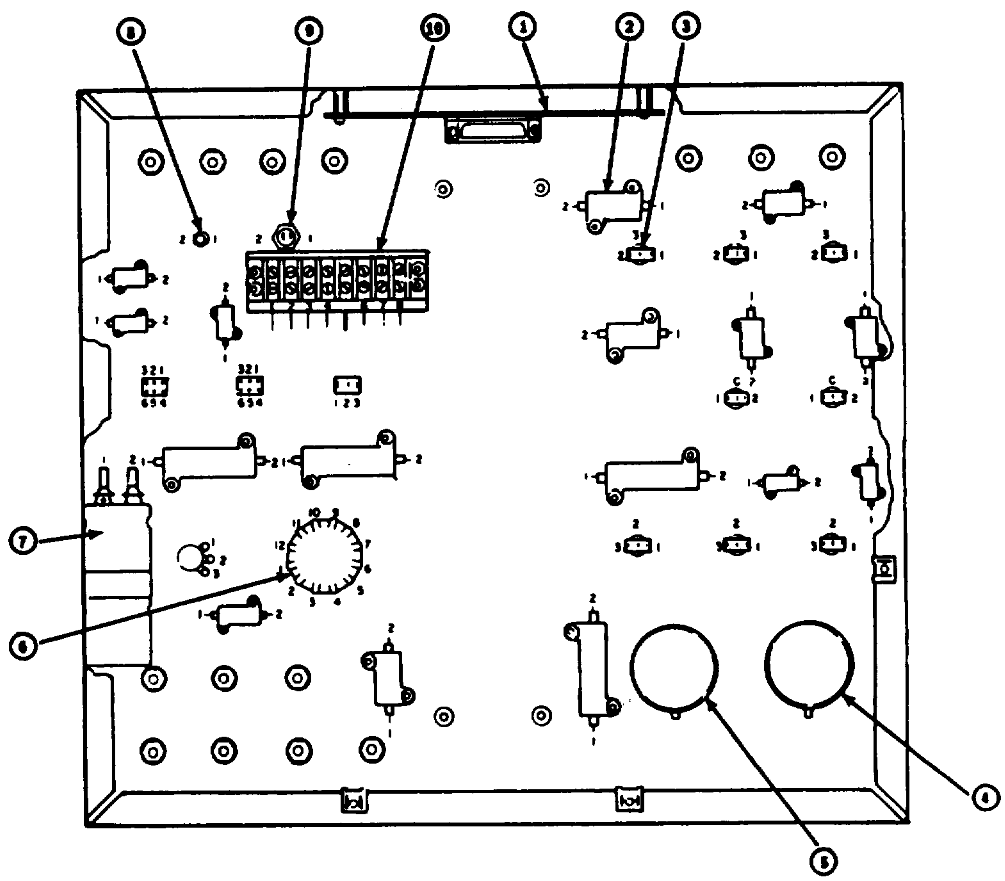


Figure 6-29. POWER SUPPLY TEST FIXTURE
(BOTTOM VIEW)

LEGEND

1. Printed wiring board (A1)
2. Resistor (R20)
3. Switch (S1)
4. Potentiometer (R31)
5. Potentiometer (R32)
6. Switch (S11)
7. Capacitor (C1)
8. LED (DS2)
9. Lamp (DS1)
10. Terminal Block (TB1)

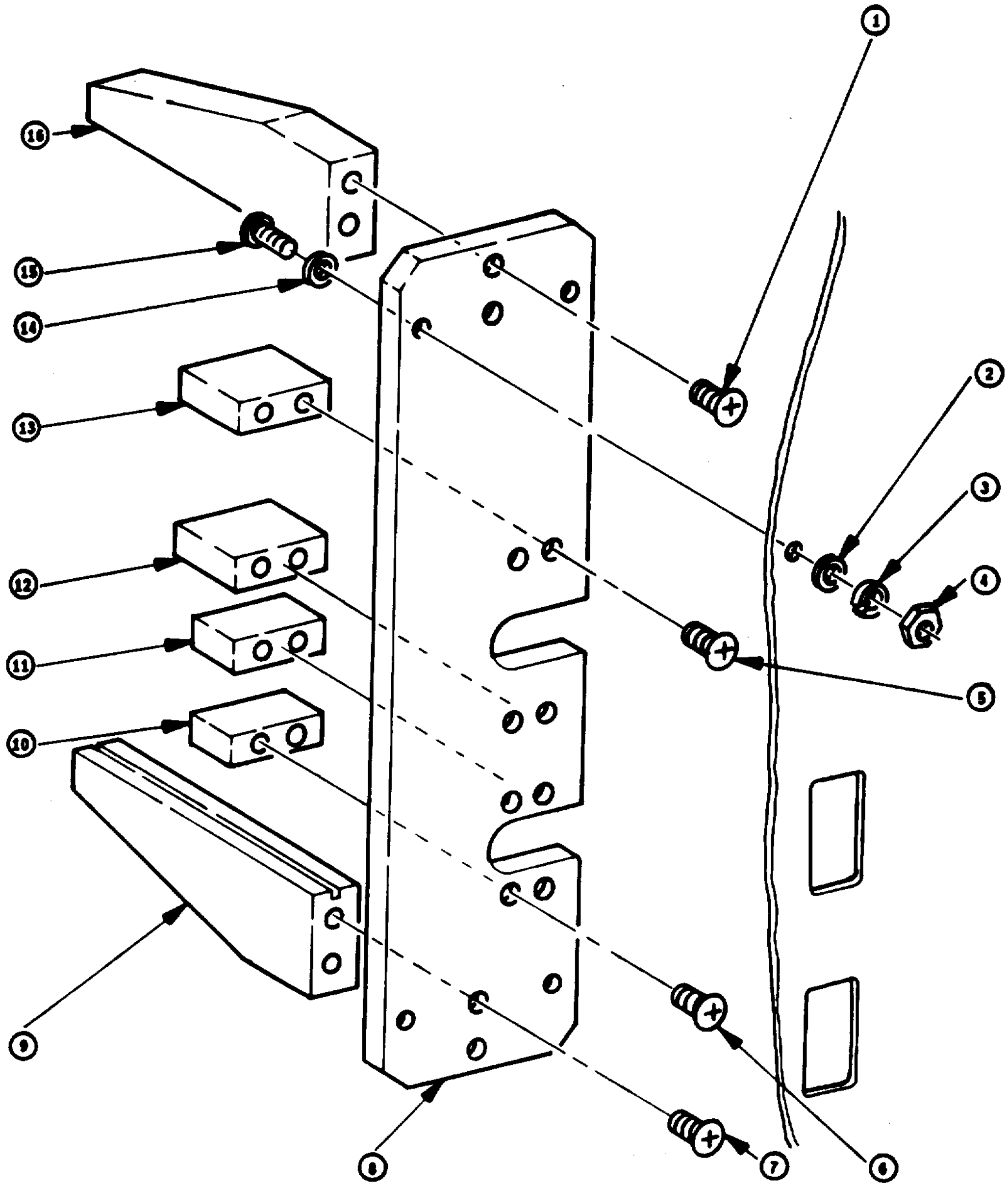


Figure 6-30. POWER SUPPLY TEST FIXTURE
(CARD MOUNTING ASSEMBLY)

LEGEND

1. Screw
2. Washer, flat
3. Washer, lock
4. Nut
5. Screw
6. Screw
7. Screw
8. Base, card guide
9. Guide, card
10. Mounting block, connector
11. Mounting block, connector
12. Mounting block, connector
13. Mounting block, connector
14. Washer, flat
15. Screw
16. Guide, card

E. KEYSWITCH TEST FIXTURE - DISASSEMBLY AND REASSEMBLY
(See figures 6-31 and 6-32.)

- Remove four screws (1) and washers (2), and remove cover (3) from chassis (9).

REPLACEMENT OF TEST POINTS (10) through (13) and (20) through (27).

REMOVAL

- Label and unsolder wires from test points (10) through (13) and (20) through (27) as required.
- Remove attaching hardware (4), (5), (6), (7) and (8) from each test point as required.
- Remove applicable test point.

INSTALLATION

- Place test point into mounting hole and secure with attaching hardware.
- Solder wires to their respective terminals.

REPLACEMENT OF SWITCH S1 (36).

REMOVAL

- Label and unsolder wires from each terminal of switch S1 (36).
- Remove attaching hardware (28) and (29), and positioning hardware (34) and (35).
- Remove switch S1.

INSTALLATION

- Place S1 in chassis, with positioning hardware installed on threaded portion of switch.
- Install attaching hardware so that tang on washer is properly alined with alinement hole in chassis.
- Tighten nut until 1-2 threads can be seen above shoulder of nut.
- Tighten nut until snug.
- Solder wires to their respective terminals.

REPLACEMENT OF TERMINAL BOARD TB1 (33).

REMOVAL

- Remove terminal board TB1 (33) by marking and unsoldering leads from each terminal E1 through E11.
- Remove three screws (32), lock washers (31), and flat washers (30).
- Remove TB1.

INSTALLATION

- Place TB1 into position and secure with flat washers, lock washers, and screws.
- Solder leads to their respective terminals.

REPLACEMENT OF CONNECTOR ASSEMBLY (18) and (19).

REMOVAL

- Remove back shell (18) from connector (19) by loosening two screws on back shell clamping the cable.
- Remove two screws (17) and washers (16), along with attaching hardware (14) and (15).
- Slide back shell toward chassis (9) along the cable.

INSTALLATION

- With connector in place, move back shell along cable to connector.
- Secure into place with attaching hardware and two screws.

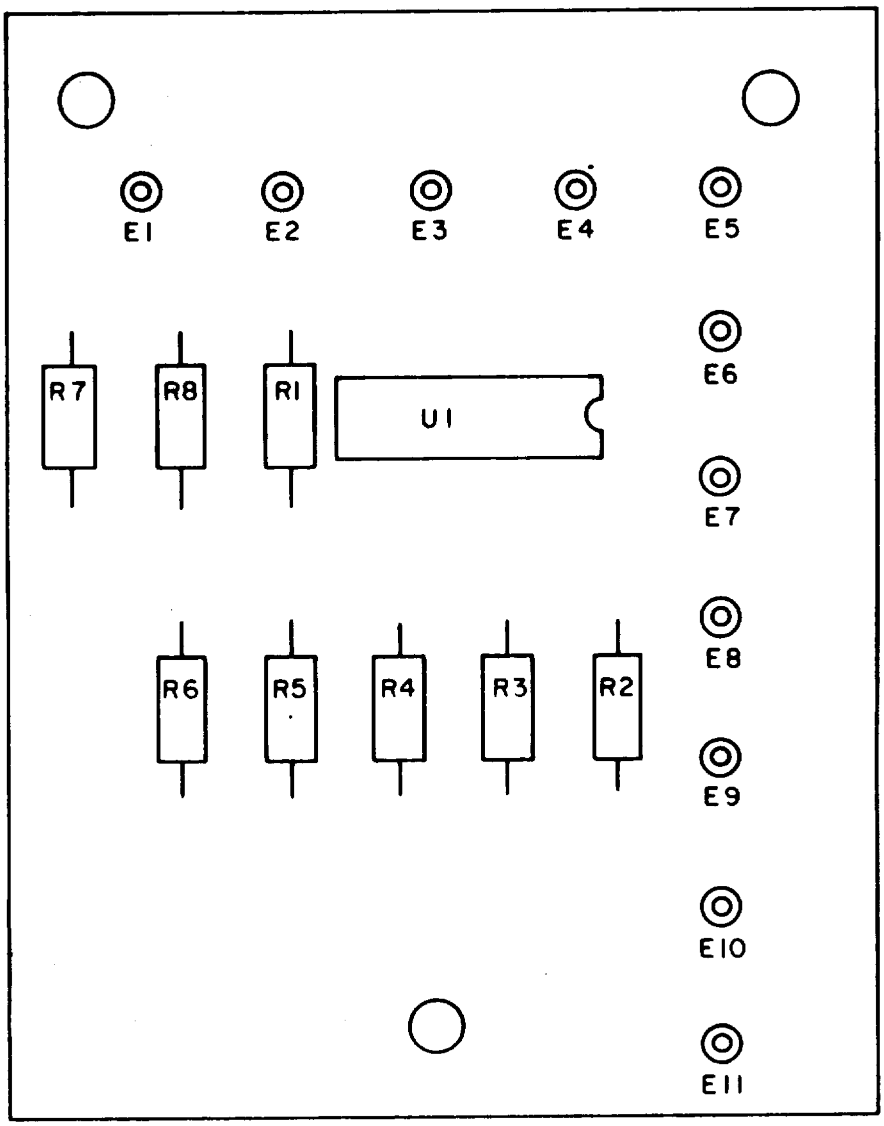


Figure 6-31. KEYBOARD TEST FIXTURE, TB1

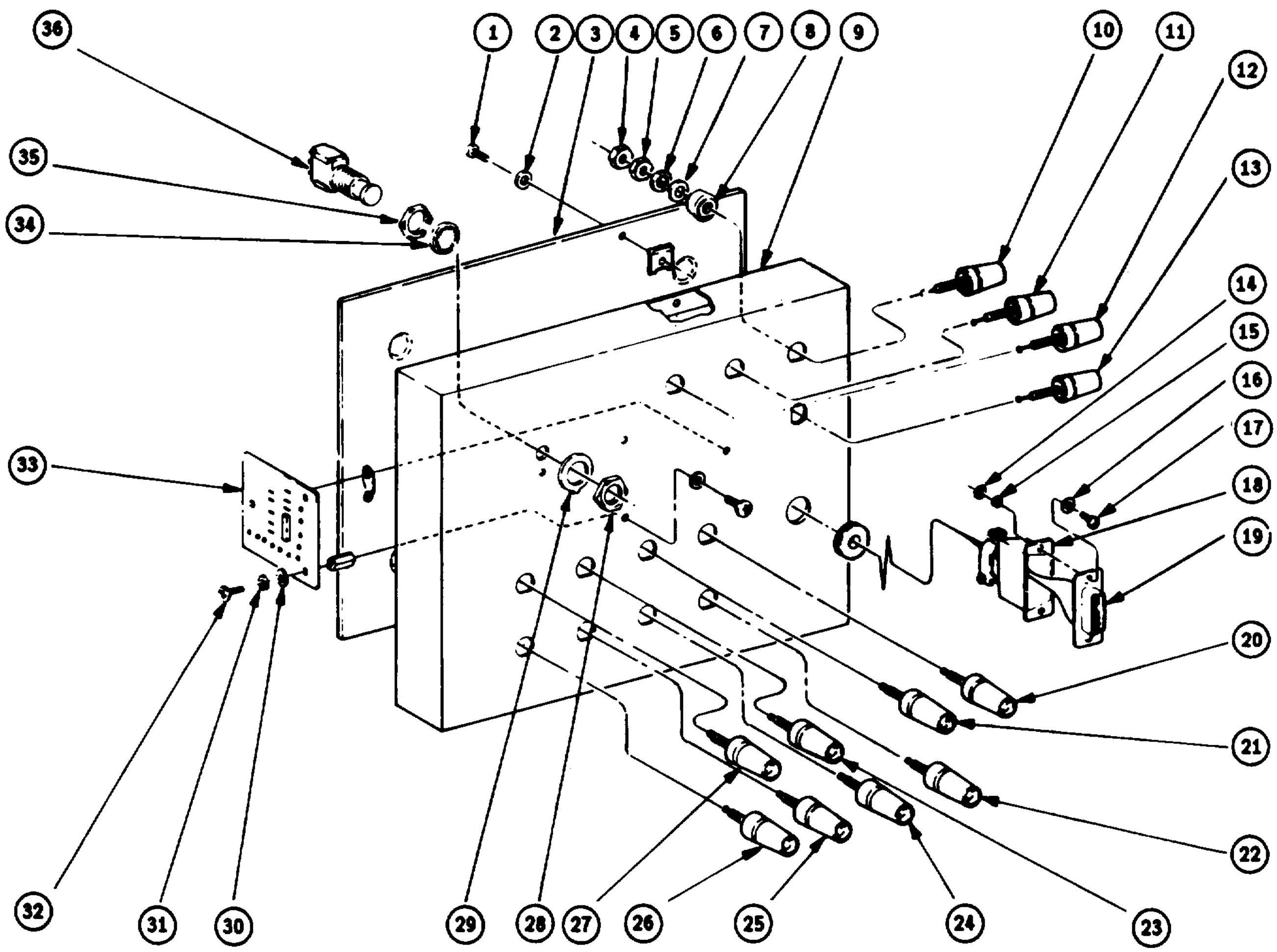


Figure 6-32. KEYBOARD TEST FIXTURE

LEGEND

1. Screw, pnh
2. Washer, flat
3. Cover, chassis
4. Nut, hex, plain
5. Nut, hex, plain
6. Washer, lock
7. Washer, flat
8. Spacer
9. Chassis
10. Test point (TP12)
11. Test point (TP2)
12. Test point (TP1)
13. Test point (TP3)
14. Nut, hex, plain
15. Washer, lock
16. Washer, flat
17. Screw, pnh
18. Back shell
19. Connector (P1)
20. Test point (TP7)
21. Test point (TP6)
22. Test point (TP11)
23. Test point (TP5)
24. Test point (TP10)
25. Test point (TP9)
26. Test point (TP8)
27. Test point (TP4)
28. Nut
29. Washer, tab
30. Washer, flat
31. Washer, lock
32. Screw, pnh
33. Circuit card (TB1)
34. Washer, lock
35. Nut
36. Switch,pushbutton (S1)

F. CMCC/DRIVE BOARD/PRINT HEAD TEST FIXTURE - DISASSEMBLY AND REASSEMBLY (See figures 6-33(1), 6-33(2), and 6-33(3).)

- Remove nine screws (37) and washers (38) securing bottom cover (39) to chassis (40) and remove bottom cover.

REPLACEMENT OF TYPICAL TEST POINT (41).

REMOVAL
- Mark wire to identify test point.
- Unsolder wire from applicable test point.
- Remove nut (36) and washer (35) from applicable test point.

INSTALLATION
- Position test point into mounting hole in chassis and secure with mounting hardware.
- Solder wire to applicable test point.

REPLACEMENT OF TYPICAL CURRENT LOOP (42).

REMOVAL
- Remove current loop by pulling upward. (Current loops are simply heavy gauge wire fitted into test points.)

INSTALLATION
- Position current loop between applicable test points and press into place.

REPLACEMENT OF TYPICAL SWITCH (28).

REMOVAL
- Label and unsolder wires from each terminal of switch (28).
- Remove nut (31) and washer (30) from top of chassis on applicable switch.
- Remove washer (29) and switch from bottom of chassis.

INSTALLATION
- Position switch and washer into respective hole in chassis from bottom.
- Secure switch with mounting hardware from top of chassis.
- Solder wires to their respective terminals.

REPLACEMENT OF TYPICAL J-CONNECTOR (33).

REMOVAL
- Label and remove all wires from applicable J-connector using appropriate removal tool.
- Remove J-connector.

INSTALLATION
- Position connector in place and fasten to chassis with mounting hardware.
- Install all wires into place.
- Using ohmmeter, check wiring according to Table 6-25.

REPLACEMENT OF TYPICAL LED (34).

REMOVAL

- Label and remove all wires from applicable LED.
- Remove nut (24) and washer (23) from bottom of chassis.
- Remove LED from top of chassis.

INSTALLATION

- Install LED in place in mounting hole from top of chassis.
- Fasten to chassis with mounting hardware from bottom.
- Solder wires to both terminals observing polarity.

REPLACEMENT OF TYPICAL CAPACITOR (17).

REMOVAL

- Label and remove both terminal lugs (16) by removing screws (15).
- Loosen screw (10) on capacitor clamp (9).
- Remove capacitor.

INSTALLATION

- Position capacitor in place in capacitor clamp.
- Tighten screw on capacitor clamp.
- Fasten terminal lugs to capacitor.

REPLACEMENT OF POWER TRANSISTOR (11).

REMOVAL

- Label and remove wires from each terminal on power transistor (11).
- Remove heat sink (7) from chassis by removing four screws (18), washers (6), lock washers (5), and nuts (4).
- Remove two screws (14), washers (13), insulators (12), washers (3), lock washers (2), and nut (l).
- Remove gasket (8).

INSTALLATION

- Install transistor in place in the heat sink (use new gasket) and fasten in place with mounting hardware.
- Fasten heat sink to chassis with mounting hardware.
- Solder wires to their respective terminals.

REPLACEMENT OF STEPPER MOTOR (19).

REMOVAL

- Label and unsolder all wires from motor (19).
- Remove motor from chassis by removing three screws (20), lock washers (21), and washers (22) from bottom of chassis.

INSTALLATION

- Install motor in place from bottom of chassis.
- Fasten motor to chassis with mounting hardware.
- Solder wires to their respective terminals.

Replacement of print head is performed by unplugging the P-8 connector and removing print head from mounting bracket in a manner similar to the actual dot matrix printer.

Replacement of circuit boards, card guides, brackets, and other hardware is performed using figures 6-33(1), 6-33(2), and 6-33(3) as guidelines. No special instructions are required.

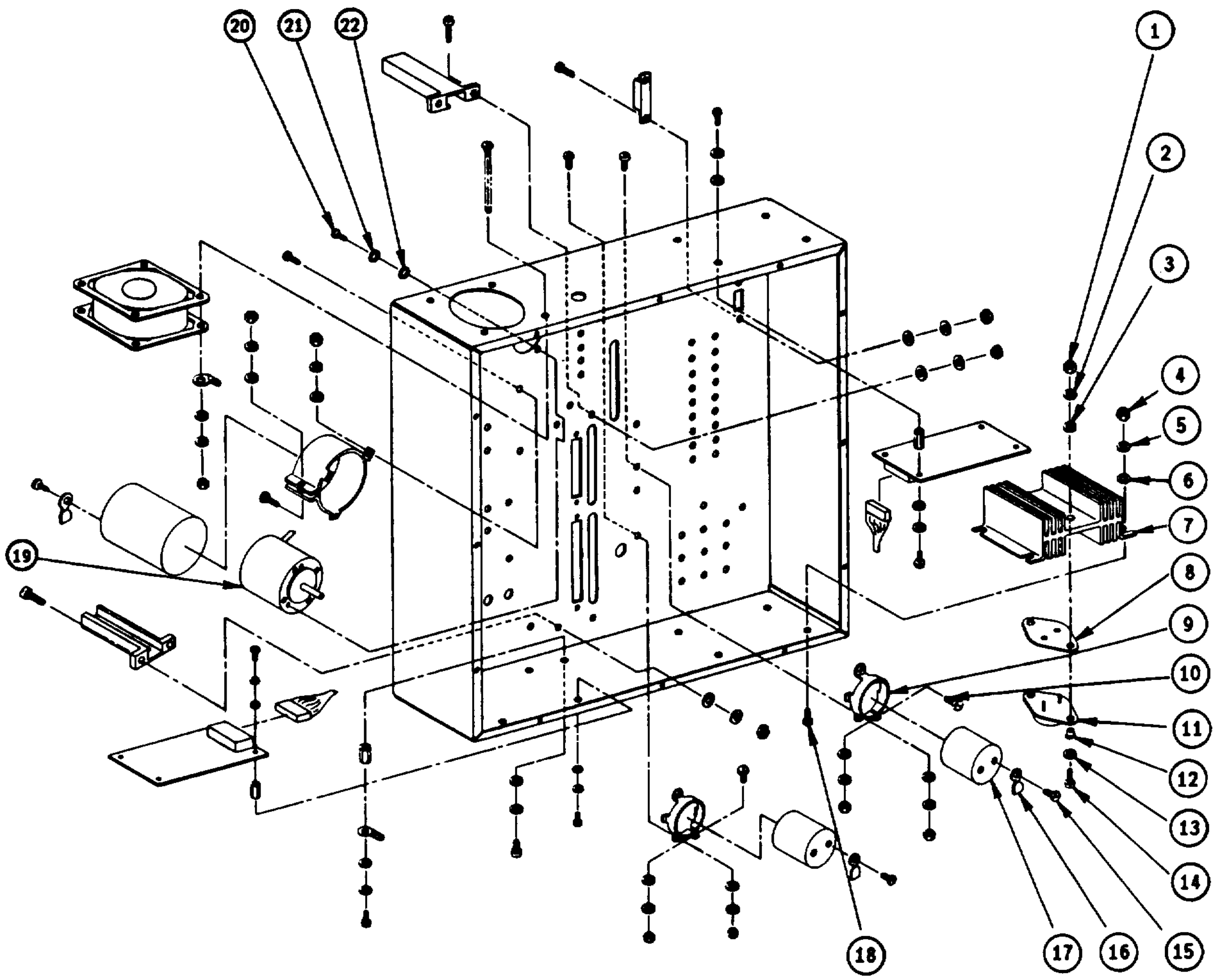


Figure 6-33(1). CMCC/DRIVE BOARD/PRINT HEAD TEST FIXTURE (Sheet 1 of 3)

LEGEND

1. Nut
2. Washer, lock
3. Washer, flat
4. Nut
5. Washer, lock
6. Washer, flat
7. Heat sink
8. Gasket
9. Capacitor clamp
10. Screw
11. Power transistor
12. Insulator
13. Washer, flat
14. Screw
15. Screw
16. Terminal lug
17. Capacitor
18. Screw
19. Stepper motor
20. Screw
21. Washer, lock
22. Washer, flat

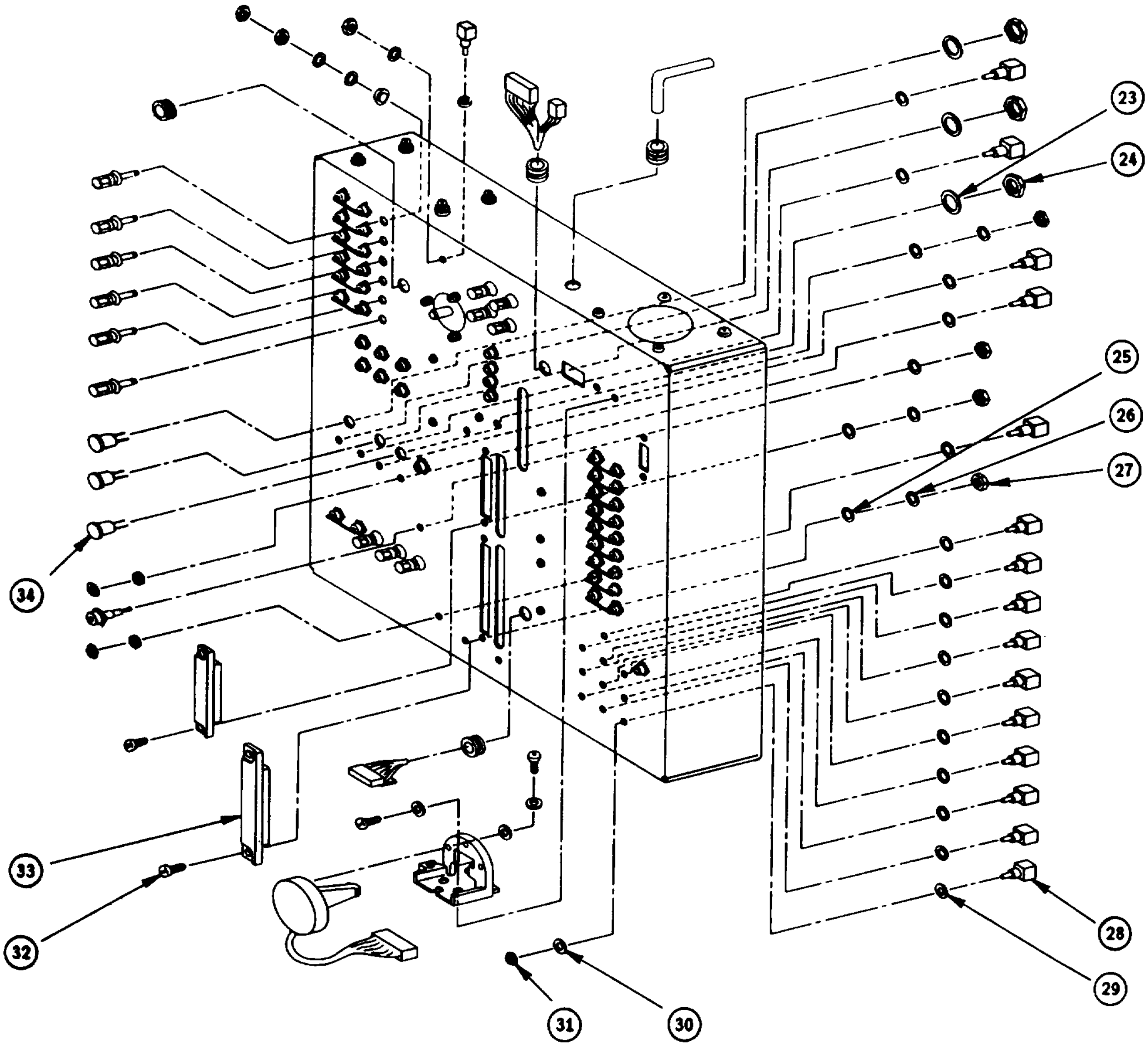


Figure 6-33(2). CMCC/DRIVE BOARD/PRINT HEAD TEST FIXTURE
(Sheet 2 of 3)

LEGEND

23. Washer, flat
24. Nut
25. Washer, flat
26. Washer, lock
27. Nut
28. Switch
29. Washer, flat
30. Washer, flat
31. Nut
32. Screw
33. J-connector
34. LED

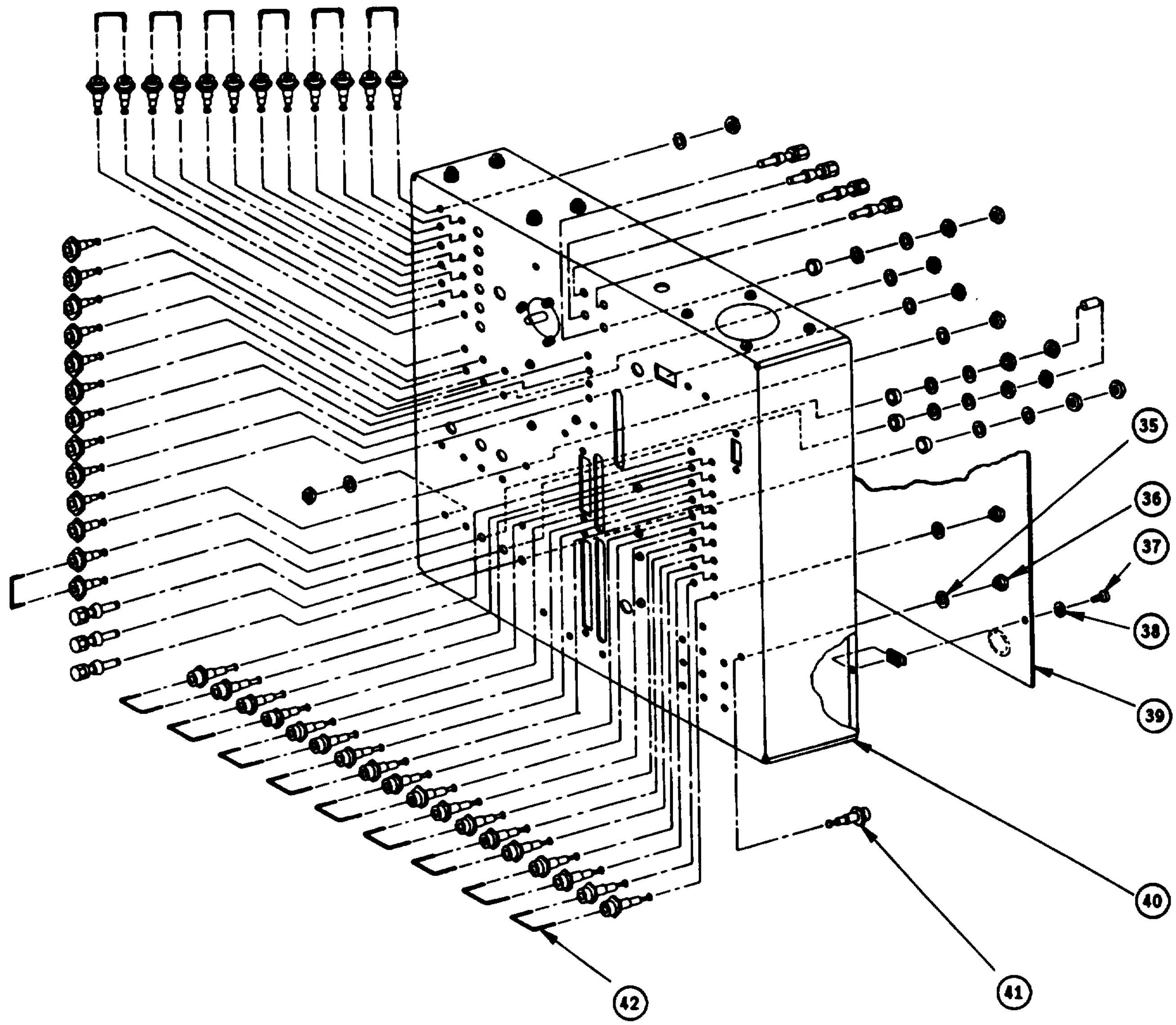


Figure 6-33(3). CMCC/DRIVE BOARD/PRINT HEAD TEST FIXTURE (Sheet 3 of 3)

LEGEND

35. Washer, flat
36. Nut
37. Screw
38. Washer, flat
39. Bottom cover
40. Chassis
41. Test point
42. Current loop

Section VIII. TEST FIXTURE TEST PROCEDURES

6-35. GENERAL

The following test procedures are used to verify proper operation of the respective test fixtures. Because of simplicity of some of the test fixtures, test procedures may be limited to a continuity test. Others will require normal electronic maintenance test equipment and procedures.

TEST PROCEDURES

A. FILTER ASSEMBLY TEST FIXTURE
B. INTERFACE ASSEMBLY TEST FIXTURE
C. LINE-FEED (MOTOR DRIVE) CURRENT CONTROL TEST FIXTURE
D. POWER SUPPLY TEST FIXTURE
E. KEYSWITCH ASSEMBLY TEST FIXTURE
F. CMCC/DRIVE BOARD/PRINT HEAD TEST FIXTURE

TOOLS REQUIRED FOR TESTS

Multimeter AN/PSM-45, or equivalent
Oscilloscope AN/USM-488
Power Supply PP-2309C/U (6 required)
Frequency Counter AN/USM-207

NOTE

Perform all continuity tests with Multimeter AN/PSM-45 or equivalent unless otherwise stated. Ensure all input power to test fixture is OFF.

6-36. TEST PROCEDURES

A. FILTER ASSEMBLY TEST FIXTURE TEST PROCEDURES. (See figure 6-34.)

- Test fixture provides an Interface between prime power inputs and the filter assembly. Fuse protection, ON/OFF power control, and test points are provided.
- See Table 6-19 and fixture schematic and perform continuity tests of each wire.
- Resistance in each case shall be less than 1 ohm.
- Connect ohmmeter across TP1 and TP2 and measure 30 ohms ±5%.
- Connect ohmmeter across TP2 and TP3 and measure 30 ohms ±5%.

Table 6-19. FILTER ASSEMBLY TEST FIXTURE WIRE LIST

WIRE NO.	FROM	TO	WIRE NO.	FROM	TO
1	J1-1	J4-A	21	J2-9	TP3
2	J1-2	J4-B	22	R1-1	TP1
3	J1-3	J4-C	23	R1-2	R2-1
4	J1-4	J4-D	24	R2-2	TP3
5	J1-5	J4-G	25	XF1-2	S1-1NC
6	J1-6	J3-B	26	XF2-2	S1-2NC
7	J1-7*	--	27	XF3-2	S1-3ND
8	J1-8	S1-3C	28	J3-A	XF3-1
9	J1-9*	--	29	J4-L	S1-2C
10	J2-1	C1(+)	30	J4-J	S1-1C
11	J2-6	C1(+)	31	J4-M	XF1-1
12	TP1	C1(+)	32	J4-K	XF2-1
13	J2-2	C1(–)	33	J3-B	J4-F
14	R2-1	C1(–)	34	J3-C	E1
15	TP2	C1(–)	35	J3-D*	--
16	J2-3*	--	36	J3-E*	--
17	J2-4*	--	37	J4-H*	--
18	J2-8*	--	38	TP4	E1
19	J2-5	TP3	39	TP4	J4-E
20	J2-7	TP2			

* No connection required.

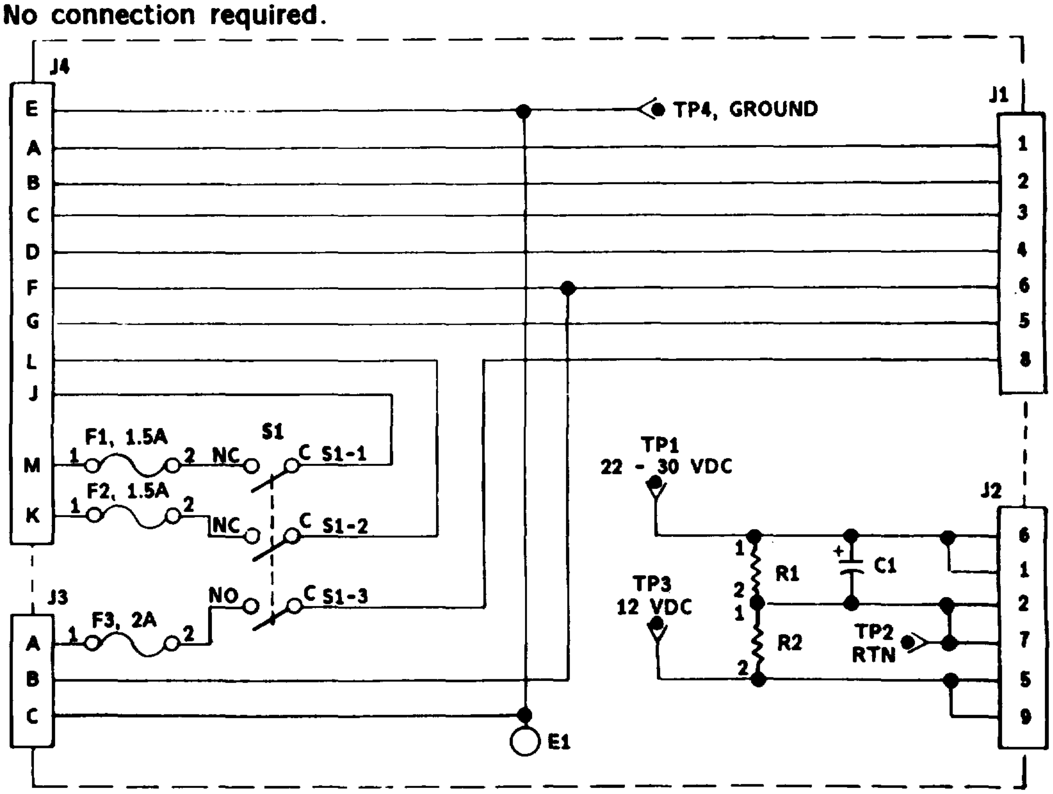


Figure 6-34. FILTER ASSEMBLY TEST FIXTURE SCHEMATIC DIAGRAM

B. INTERFACE ASSEMBLY TEST FIXTURE TEST PROCEDURES. (See figure 6-35.)

- Test fixture provides interconnections between the unit under test and the required test equipment.
- Perform test point resistance tests of each wire in accordance with Table 6-20.
- Perform switch continuity tests in accordance with Table 6-21.
- Use interface assembly test fixture schematic during both tests.

Table 6-20. INTERFACE ASSEMBLY TEST FIXTURE
TEST POINT RESISTANCE TESTS

FROM	TO	RESISTANCE
TP30 (IN 1 HI)	P1-G	Less than 1 ohm
TP29 (IN 1 LO)	P1-H	Less than 1 ohm
TP28 (OUT 1 TTL)	P5-6	Less than 1 ohm
TP27 (OUT 2 TTL)	P5-8	Less than 1 ohm
TP26 (OUT 2 HI)	P1-P	Less than 1 ohm
TP25 (OUT 2 LO)	P1-N	Less than 1 ohm
TP24 (IN 3 HI)	P1-A	Less than 1 ohm
TP23 (IN 3 LO)	P1-B	Less than 1 ohm
TP22 (OUT 3 TTL)	P5-4	Less than 1 ohm
TP21 (IN 4 HI)	P1-D	Less than 1 ohm
TP20 (IN 4 LO)	P1-E	Less than 1 ohm
TP19 (OUT 4 TTL)	P5-5	Less than 1 ohm
TP18 (IN 5 TTL)	P5-7	Less than 1 ohm
TP17 (OUT 5 HI)	P1-K	Less than 1 ohm
TP16 (OUT 5 LO)	P1-L	Less than 1 ohm
TP2 (+8.6 V)	P5-1	Less than 1 ohm
TP1 (−8.6 V)	P5-2	Less than 1 ohm
TP3 (GND)	E1	Less than 1 ohm
TP11 (R1)	TP15	100 ohms ±5%
TP10 (R2)	TP14	100 ohms ±5%
TP9 (R3)	TP13	470 ohms ±5%
TP8 (R4)	TP12	470 ohms ±5%
TP3 (GND)	P1-R	Less than 1 ohm
TP3 (GND)	P2-A,B,C,D,L	Less than 1 ohm
TP3 (GND)	P4-6,8	Less than 1 ohm
TP3 (GND)	P5-3,40,41	Less than 1 ohm

Table 6-21. INTERFACE ASSEMBLY TEST FIXTURE
SWITCH CONTINUITY TESTS

SWITCH S1 POSITION	FROM	TO	RESISTANCE
1	TP6 (S1-C)	P5-18	Less than 1 ohm
2	TP6 (S1-C)	P5-19	Less than 1 ohm
3	TP6 (S1-C)	P5-20	Less than 1 ohm
4	TP6 (S1-C)	P5-22	Less than 1 ohm
5	TP6 (S1-C)	P5-30	Less than 1 ohm
6	TP6 (S1-C)	P5-31	Less than 1 ohm
7	TP6 (S1-C)	P5-32	Less than 1 ohm
8	TP6 (S1-C)	P5-35	Less than 1 ohm
9	TP6 (S1-C)	P5-36	Less than 1 ohm
10	TP6 (S1-C)	P5-33	Less than 1 ohm
11	TP6 (S1-C)	P5-34	Less than 1 ohm
12	No Connection		
1	TP7 (S1-D)	P5-38	Less than 1 ohm
2	TP7 (S1-D)	P5-39	Less than 1 ohm
3	TP7 (S1-D)	P1-S	Less than 1 ohm
4	TP7 (S1-D)	P1-T	Less than 1 ohm
5	TP7 (S1-D)	P5-23	Less than 1 ohm
6	TP7 (S1-D)	P5-24	Less than 1 ohm
7	TP7 (S1-D)	P5-25	Less than 1 ohm
8	TP7 (S1-D)	P5-26	Less than 1 ohm
9	TP7 (S1-D)	P5-27	Less than 1 ohm
10	TP7 (S1-D)	P5-28	Less than 1 ohm
11	TP7 (S1-D)	P5-29	Less than 1 ohm
12	No Connection		

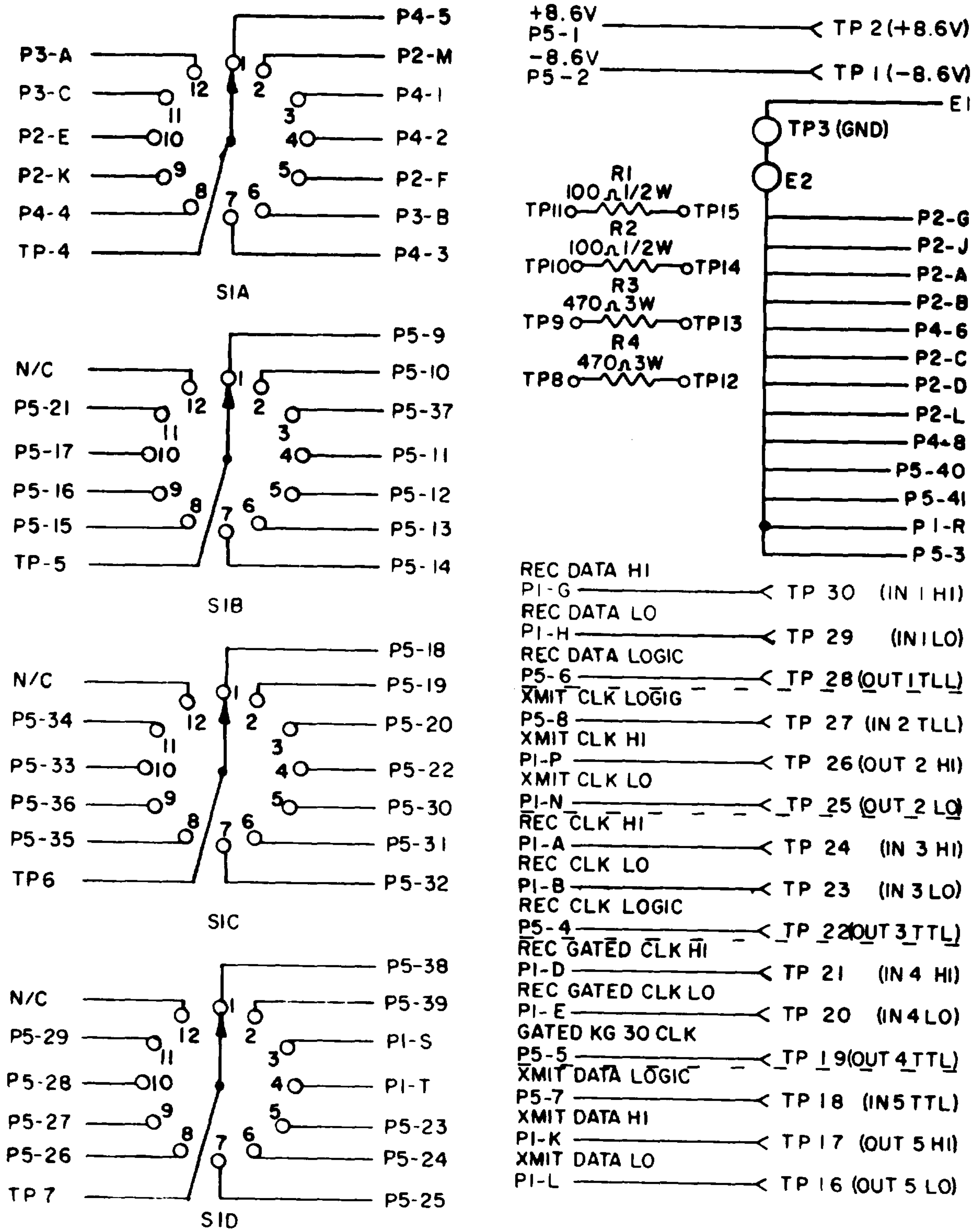


Figure 6-35. INTERFACE ASSEMBLY TEST FIXTURE SCHEMATIC

c. LINE-FEED (MOTOR DRIVE) CURRENT CONTROL TEST FIXTURE TEST PROCEDURES. (See figure 6-36.)

- Test fixture provides interconnections between external test equipment and line-feed (motor drive) current control unit under test. Test fixture also provides input signal selection capability and loads for unit under test outputs.
- See Table 6-22 and line-feed (motor drive) current control test fixture schematic and perform continuity tests of each wire.

Table 6-22. LINE-FEED (MOTOR DRIVE) CURRENT CONTROL TEST FIXTURE INPUT RESISTANCE MEASUREMENTS

SWITCH/POSITION	FROM	TO	RESISTANCE
PULSE OFF (CC)	SIG IN (+)	CONTROL (–)	Forward diode drop
PULSE ON (LF)	SIG IN (+)	A0 IN (–)	
SELECT A0			Forward diode drop
PULSE ON (LF)	SIG IN (+)	A1 IN (–)	
SELECT A1			Forward diode drop
PULSE ON (LF)	SIG IN (+)	B0 IN (–)	
SELECT B0			Forward diode drop
PULSE ON (LF)	SIG IN (+)	B1 IN (–)	
SELECT B1			Forward diode drop
SELECT A0	LOAD (+)	A0 OUT (–)	20 ohms ±1%
SELECT A1	LOAD (+)	A1 OUT (–)	20 ohms ±1%
SELECT B0	LOAD (+)	B0 OUT (–)	20 ohms ±1%
SELECT B1	LOAD (+)	B1 OUT (–)	20 ohms ±1%
SURGE CONTROL OFF	+5 V (+)	SURGE CONTROL (–)	> 100K ohms
SURGE CONTROL ON	+5 V (+)	SURGE CONTROL (–)	232 ohms ±1%
	+5 V (+)	GND (–)	499 ohms ±2%
	+5 V (+)	CONTROL (–)	562 ohms ±1%
	LOAD (+)	J1-E (–)	Less than 1 ohm
	B1 OUT (+)	J1-A (–)	Less than 1 ohm
	B0 OUT (+)	J1-B (–)	Less than 1 ohm
	A1 OUT (+)	J1-C (–)	Less than 1 ohm
	A0 OUT (+)	J1-D (–)	Less than 1 ohm
	B1 IN (+)	J1-J (–)	Less than 1 ohm
	A1 IN (+)	J1-O (–)	Less than 1 ohm
	B0 IN (+)	J1-K (–)	Less than 1 ohm
	A0 IN (+)	J1-Q (–)	Less than 1 ohm
	CONTROL (+)	J1-L (–)	Less than 1 ohm
	SURGE CONTROL(+)	J1-H (–)	Less than 1 ohm
	GND (+)	J1-M (–)	Less than 1 ohm
	+5 V (+)	J1-N (–)	Less than 1 ohm
	+22 V (+)	J1-P (–)	Less than 1 ohm

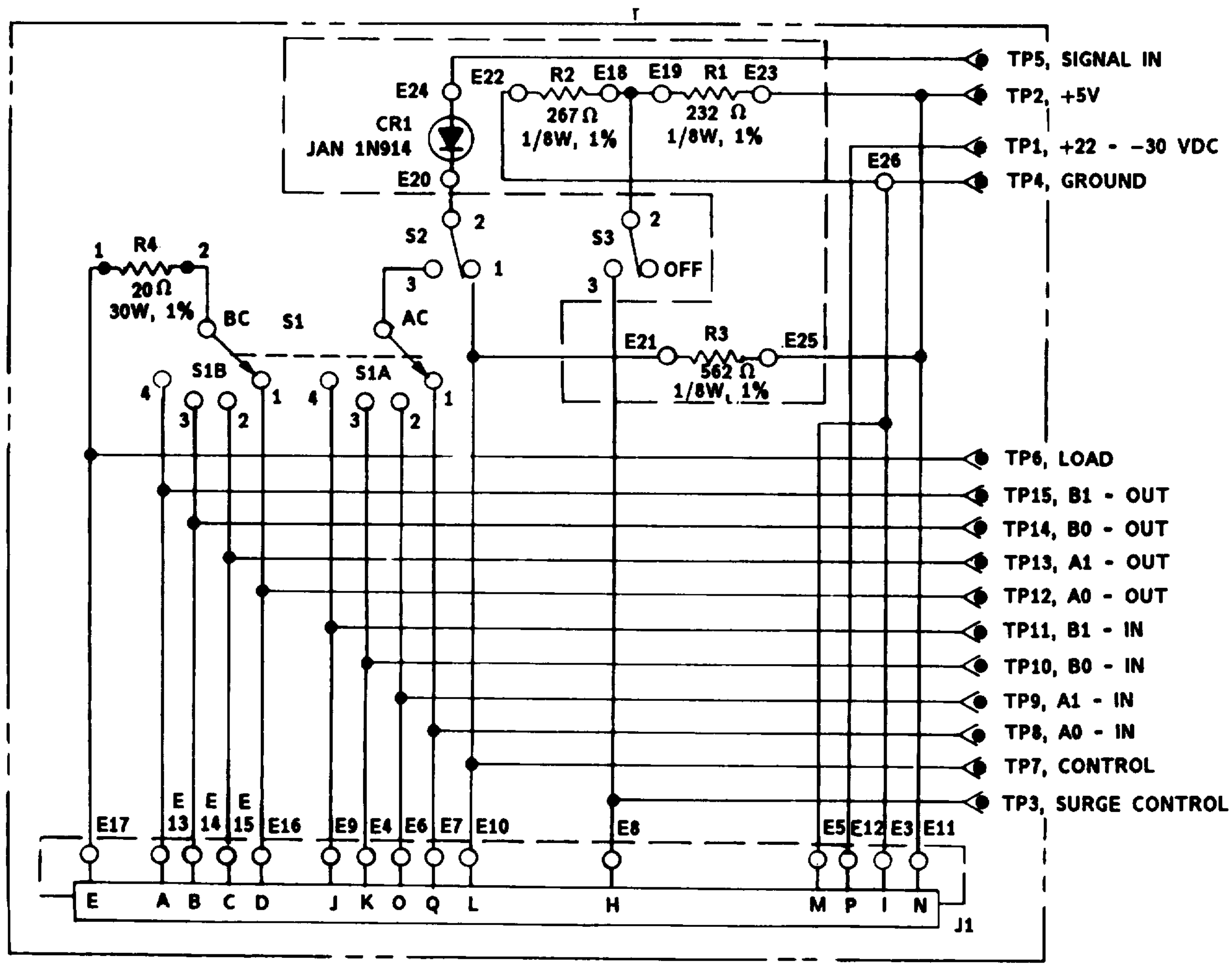


Figure 6-36. LINE-FEED (MOTOR DRIVE) CURRENT CONTROL
TEST FIXTURE SCHEMATIC DIAGRAM

D. POWER SUPPLY TEST FIXTURE TEST PROCEDURES. (See figure 6-37.)

- Test fixture provides interconnections between unit under test and external test equipment. Also provides simulation and load circuitry for calibration of the unit under test.
- See Tables 6-23 and 6-24 and perform continuity and resistance checks as listed.
- See power supply test fixture schematic, figure FO-10.

Table 6-23. POWER SUPPLY TEST FIXTURE CONTINUITY CHECKS

FROM	TO	RESISTANCE
TP1 (BAT)	J1-5,9	Less than 1 ohm
TP1 (BAT)	TB1-1	Less than 1 ohm
TP2 (RTN)	TB1-2	Less than 1 ohm
TP2 (RTN)	J1-2,7	Less than 1 ohm
TP3 (VIN)	TP14 (IVIN)	0.1 ohms ±1%
TP4 (−15 V)	J3-1,2,20	Less than 1 ohm
TP5 (+15 V)	J3-18,19,37	Less than 1 ohm
TP6 (+5 V)	J3-10,11,28,29	Less than 1 ohm
TP7 (GND)	J3-7,8,9	Less than 1 ohm
TP10 (SCMO HI)	J3-12	Less than 1 ohm
TP13 (SCMO LO)	TP7	Less than 1 ohm
TP14 (IVIN)	J1-1,6 and TB1-3	Less than 1 ohm

Table 6-24. POWER SUPPLY TEST FIXTURE
RESISTANCE CHECKS

CHECK	SWITCH/POSITION	FROM	TO	RESISTANCE
1	SELECT/1	TP9 (+)	TP12 (–)	> 100K ohms
2	SELECT/2			> 100K ohms
3	SELECT/3			
	+5 VA LOAD LO OFF			
	+5 VA LOAD HI OFF			8.25 ohms ±1%
4	SELECT/3			
	+5 VA LOAD LO ON			
	+5 VA LOAD HI OFF			3.11 ohms ±1%
5	SELECT/3			
	+5 VA LOAD LO ON			
	+5 VA LOAD HI ON			1.92 ohms ±1%
6	SELECT/4			
	+12 VA LOAD OFF			197.84 ohms ±1%
7	SELECT/4			
	+12 VA LOAD ON			332 ohms ±1%
8	SELECT/5			51.1K ohms ±1%
9	SELECT/6			
	+5 VB LOAD LO OFF			
	+5 VB LOAD HI OFF			15 ohms ±1%
10	SELECT/6			
	+5 VB LOAD LO ON			
	+5 VB LOAD HI OFF			10 ohms ±1%
11	SELECT/6			
	+5 VB LOAD LO ON			
	+5 VB LOAD HI ON			2.31 ohms ±1%
12	SELECT/7			
	–8.6 V LOAD NORM (2)			82.5 ohms ±1%
13	SELECT/7			
	–8.6 V LOAD MIN (3)			115 ohms ±1%
14	SELECT/7			
	–8.6 V LOAD MAX (1)			53.6 ohms ±1%
15	SELECT/8			40.2 ohms ±1%
16	SELECT/9			
	+18 V LOAD OFF (2)			Capacitor Charging
17	SELECT/9			
	+5 VB LOAD NORM (1)			27.4 ohms ±5%
	+5 VB LOAD MAX (3)			12 ohms ±5%
18	SELECT/10			
	LF LOAD OFF			> 100K ohms
	LF LOAD ON			30 ohms ±1%
19	SELECT/12			
	+8.6 V LOAD NORM (2)			44.2 ohms ±1%
	+8.6 V LOAD MIN (3)			53.6 ohms ±1%
	+8.6 V LOAD MAX (1)			30.1 ohms ±1%
20	ILLUM ADJ	J2-2	J2-36	Variable 0-25K ohms
21	DRUM ON	J2-18	J2-32	Less than 1 ohm
	DRUM OFF			> 100K ohms

NOTES

Do not insert power supply module SM-D-915606 (power supply for the AN/UGC-74B(V)3 or AN/UGC-74C(V)3 for the following test procedures.

Oscilloscope AN/USM-488 and six Power Supplies PP-2309C/U are required for the following test procedures.

- Set up test fixture supplies as shown in figure 6-37.
- Set SELECT switch to position 11 (Drum Motor) and connect a +10 Vdc power supply (place jumper between VOUT LOW to GND) to TP9 and TP12 (–).
- Turn power supplies on and check voltages.
- Place multimeter leads to TP12 and U2-5 and monitor dc voltage as R23 is adjusted.
- Adjust R23 for 7 to 8 Vdc as observed on oscilloscope.
- Observe input pin 5 of U3. Readjust R23 for 13.5 Vdc.
- Connect frequency counter to U3-3 and GND and adjust R27 for a square wave having a period of 1.08 msec, ±.015 ms.
- Connect oscilloscope to SCMO (Hi) and SCMO (LO) and observe output waveform as R46 is adjusted.
- Adjust R46 until positive pulse is 518 ±3 usec and total period is 1080 ±15 usec.
- Remove 10 Vdc from VOUT LO and VOUT HI.
- Adjust power supply for 15 Vdc.
- Set SELECT switch to position 10.
- Apply +15 Vdc to J-28 and J2-1 on fixture and observe DSI (BAT) lights. (NOTE: Do not remove GND from VOUT LO to GND.)
- Adjust power supply for 5 Vdc.
- Set SELECT switch to position 3.
- Apply +5 Vdc to VOUT HI on fixture and observe DS2 (CAP V OK) lights.
- In the event of failure in any one of the above steps, see theory of operation in Chapter 3 of this manual and troubleshoot as required.

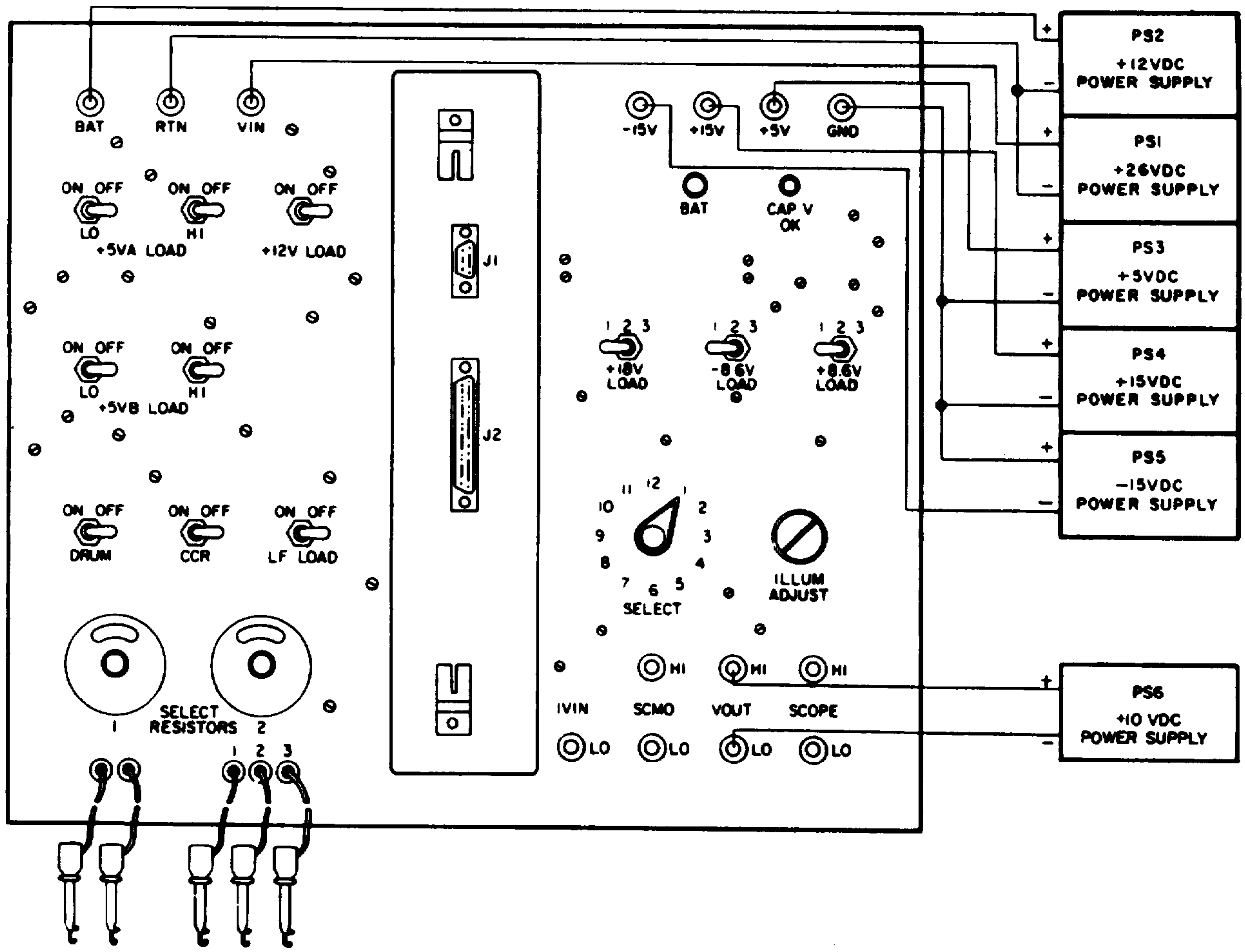


Figure 6-37. POWER SUPPLY TEST CONFIGURATION

E. KEYSWITCH ASSEMBLY TEST FIXTURE TEST PROCEDURES.
(See figures 6-38 and 6-39.)

- Test fixture provides signal and power interfaces between the external test equipment and the keyswitch assembly under test.

NOTE

Oscilloscope AN/USM-488 and Power Supply PP-2309C/U are required for the following test procedures.

- Set up test fixture as shown in figure 6-38, with the exception of connection to keyswitch assembly.
- Connect +5 Vdc to +5 V and GND and monitor voltage at TP4 (CLK) with respect fo TP12 (GND).
- Observe that voltage changes from GND to 5 Vdc whenever CLOCK CONTROL switch is depressed (oscilloscope connected across TP4).
- Connect TP4 (CLK) to TP1 (SIG IN) with a Jumper wire and observe that TP5 (2400 Hz) changes state each time CLK CONTROL switch is depressed.
- Also observe that TP5 is inverse of TP4.
- Measure 1.5 Vdc ±10% at TP8 (CLK REF) and TP9 (2400 Hz REF).
- Measure +5 Vdc ±10% at TP3 (PRESENT).
- Connect P1-12 to TP12 (GND) and observe TP3 for 2.5 Vdc ±10%.
- In the event of failure in any one of the above steps, see keyswitch assembly test fixture schematic, figure 6-39, and theory of operation in Chapter 3 of this manual and troubleshoot as required.

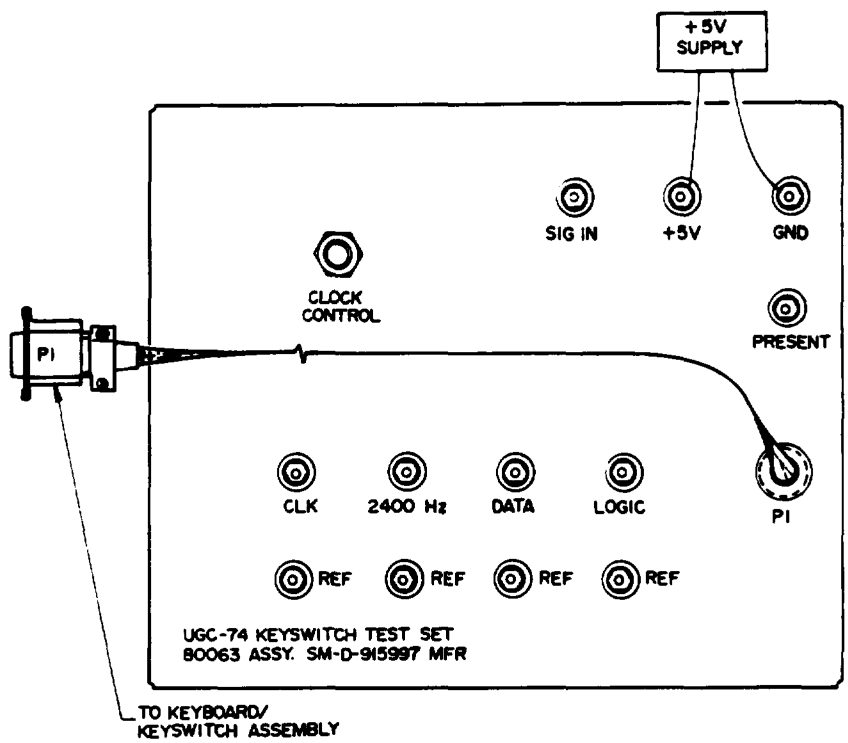


Figure 6-38. KEYBOARD ASSEMBLY TEST CONFIGURATION

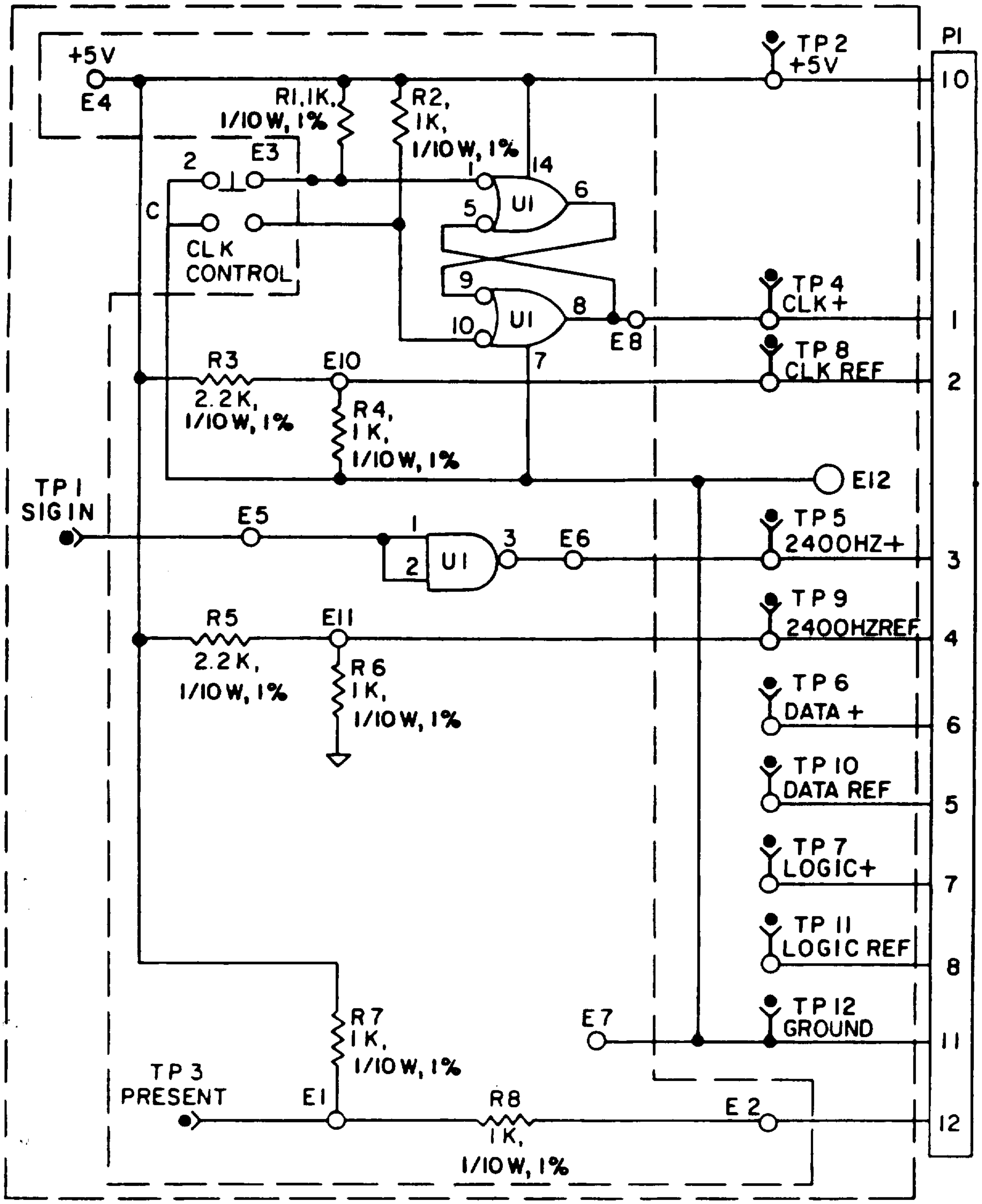


Figure 6-39. KEYSWITCH ASSEMBLY TEST FIXTURE SCHEMATIC DIAGRAM

F. CMCC/DRIVE BOARD/PRINT HEAD TEST FIXTURE TEST PROCEDURES. (See figure FO-14 for interconnect diagram.)

- Test fixture provides interconnections between units under test, test equipment and circuitry contained within the test fixture.

- Testing is divided into five sections:

  - ❑ Point to point continuity tests.
  - ❑ Switch continuity tests.
  - ❑ External loads resistance tests.
  - ❑ A1, A2, and LED circuitry tests.
  - ❑ M1, blower motor test.

- Perform point to point continuity tests using Table 6-25, figure 6-40, and figure 6-41.

- Perform switch continuity tests using Table 6-26, figure 6-40, and figure 6-41. (Ensure J3 and J4 are reconnected after testing.)

- Perform external loads resistance tests as follows:

  - ❑ Measure resistance of each resistor on A3. Each resistor shall be 2K ohms ±10%.
  - ❑ Measure resistance of each resistor on A7 per figure 3-38, A7 Board Schematic Diagram.
  - ❑ Measure resistance of B (TP8), C (TP9), and E (TP10) of Q4 with respect to each other. If resistance is less than 8K ohms, replace Q4.
  - ❑ Disconnect M2P5 and measure the resistance of each stepper motor phase. The resistance of each phase should be 4.5 ohms minimum to 6.0 ohms maximum. Phases are ØA (M2P5-1, -6), ØB (M2P5-2, -6), ØC (M2P5-5, -3), ØD (M2P5-4, -3). (Ensure M2P5 is reconnected to J5 after testing.)
  - ❑ Disconnect A6P8 and measure the resistance of each print head coil. The resistance of each shall be 2.5 - 3.3 ohms for sintered coil material, or 5.5 - 7.5 ohms for laminated coil material. Coils are located as follows:

COIL	FROM	TO	COIL	FROM	TO
DOT1	A6P8-1	A6P8-11	DOT6	A6P8-9	A6P8-19
DOT2	A6P8-2	A6P8-12	DOT7	A6P8-8	A6P8-18
DOT3	A6P8-4	A6P8-14	DOT8	A6P8-7	A6P8-17
DOT4	A6P8-5	A6P8-15	DOT9	A6P8-6	A6P8-16
DOT5	A6P8-10	A6P8-20			

(Ensure A6P8 is reconnected to P8 after testing.)

NOTE

Figures FO-16(1) and FO-16(2) provide suggested oscilloscope and current probe settings and representative waveforms pertaining to test fixture testing.

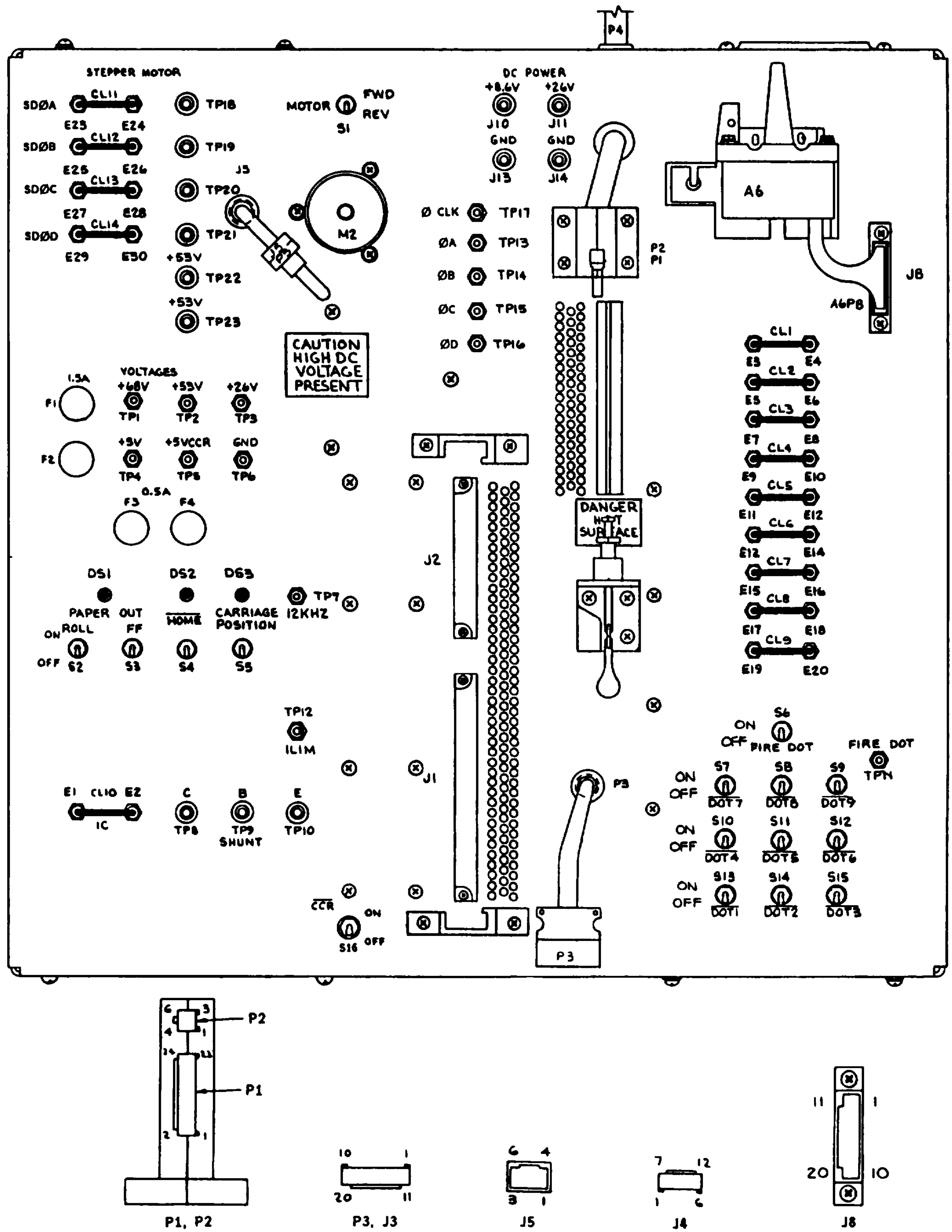


Figure 6-40. CMCC/DRIVE BOARD/PRINT HEAD TEST FIXTURE - FRONT VIEW

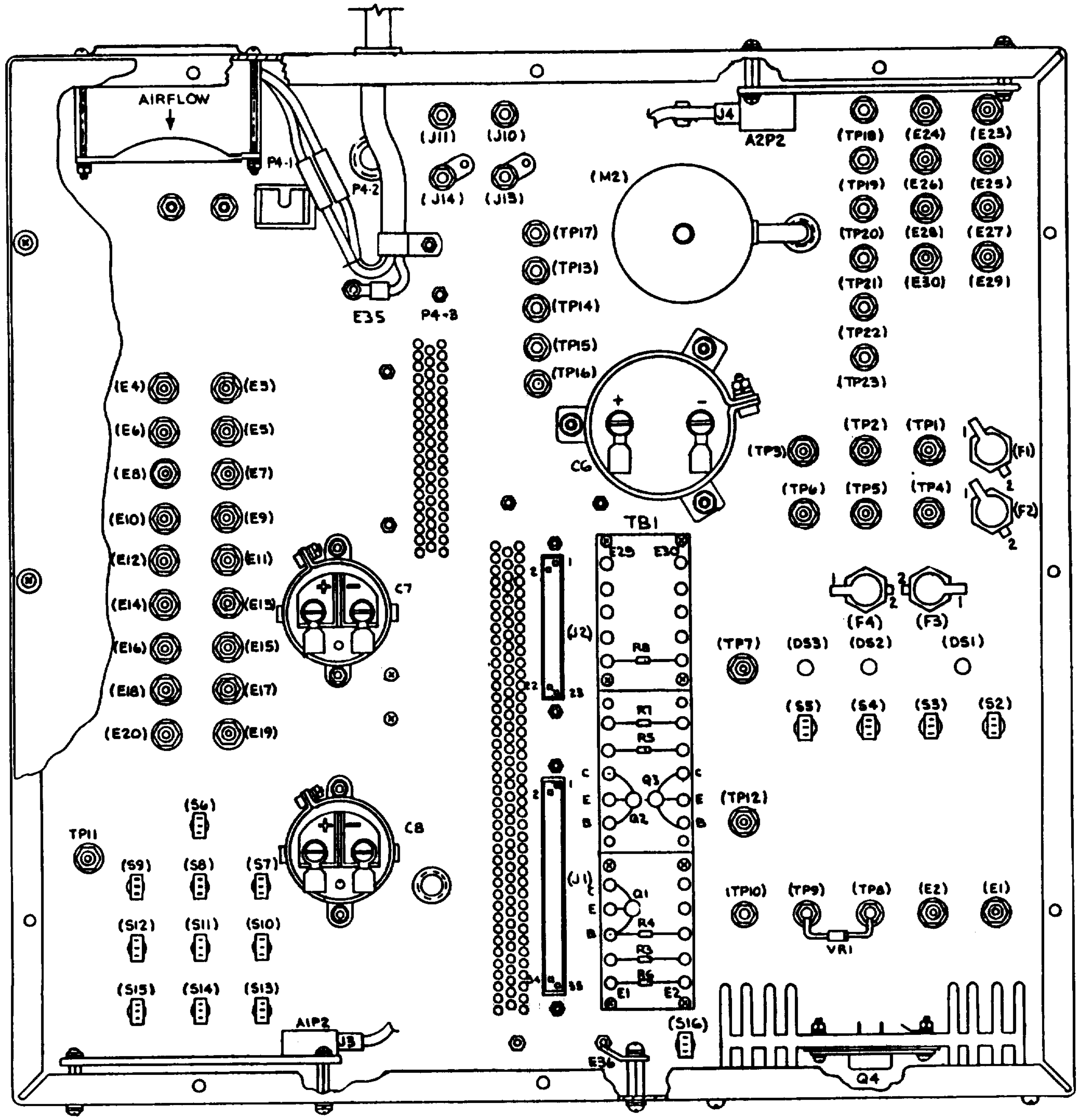


Figure 6-41. CMCC/DRIVE BOARD/PRINT HEAD TEST FIXTURE - INTERNAL VIEW

• Perform A1, A2, and LED circuitry tests as follows:

❑ Set power supply to +8.6 ±0.1 Vdc. Turn power supply off and connect to 8.6 V input on test fixture.

❑ Connect power supply ground to J13 (GND) on test fixture.

❑ Ensure all switches on test fixture are in OFF position.

❑ Insert A7 load board into J1/J2 connectors on test fixture.

❑ Turn +8.6 V power supply on.

❑ Using oscilloscope, test for the following signals on the test fixture (if none of these signals are present, check voltage regulator A1U1-3 for +5 V output):

o FIRE DOT (TP11) verifies A1U2, A1U3, and A1U4 (see FO-16(a) waveform).

o ILIM (TP12) verifies A2U5 (see FO-16(b) waveform).

o Ø CLK (TP17) verifies A2U3 (see FO-16(C) waveform).

o ØA (TP13) verifies A2U1, A2u2, and A2U4 (see FO-16(d) waveform).

o ØB (TP14) verifies A2U1, A2U2, and A2U4 (see FO-16(d) waveform).

o ØC (TP15) verifies A2U1, A2u2, and A2U4 (see FO-16(d) waveform).

o ØD (TP16) verifies A2U1, A2U2, and A2U4 (see FO-16(d) waveform).

❑ Using oscilloscope, check A7 load board (TP11) for +4.5 - +5.5 V to verify resistor divider network.

❑ Using oscilloscope, activate corresponding test fixture DOT switches and test for the following DOT signals on A7 load board (see FO-16(a) waveform).

DOT1 (TP1)	DOT6 (TP6)
DOT2 (TP2)	DOT7 (TP7)
DOT3 (TP3)	DOT8 (TP8)
DOT4 (TP4)	DOT9 (TP9)
DOT5 (TP5)	FIREDOT (TP10)

❑ Verify DS1, DS2, and DS3 by performing the following:

o Jumper A7TP13 (SIGNAL RTN, J1-3) to A7TP12 (GND, J1-2). Verify that PAPER OUT LED (DS1) is on and all others are off. This verifies Q1.

o Leave above jumper, and jumper A7TP14 (PAPER OUT, J1-28) to A7TP16 (HOME, J2-16). Verify PAPER OUT LED (DS1) and HOME LED (DS2) are on, and CARRIAGE POSITION LED (DS3) is off. This verifies Q2.

o Move jumper from A7TP16 to A7TP15 (CARRIAGE POSOUT, J2-12). Verify PAPER OUT LED (DS1) and CARRIAGE POSITION LED (DS3) are on, and HOME LED (DS2) is off. This verifies Q3.

o Move jumper from A7TP15 to A7TP12, and verify all LEDs are off.

o Remove all jumpers.

❑ Turn +8. 6 V power supply off.

• Connect P4 to a 115 VAC, 60 cycle AC outlet and verify that motor is blowing air through air holes on the test fixture.

TABLE 6-25. CMCC/DRIVE BOARD/PRINT HEAD TEST FIXTURE WIRE LIST FOR POINT TO POINT Continuity TEST

FROM	TO	FROM	TO	FROM	TO
These measurements to be made on the top of the test fixture:					
J1-1	TP6	J2-22	P1-23	J8-18	P3-18
J1-2	J13-1	J2-23	P1-16	J8-19	P3-19
J1-4	P1-9	J5-1	TP18	J8-20	P3-20
J1-7	J10-1	J5-2	TP19	J13-1	J14-1
J1-8	TP4	J5-3	TP22	P1-1	TP16
J1-9	P1-5	J5-4	TP21	P1-2	TP15
J1-10	TP4	J5-5	TP20	P1-3	TP13
J1-11	TP10	J5-6	TP23	P1-4	TP14
J1-13	TP7	J8-1	P3-1	P1-6	TP3
J1-15	TP8	J8-2	P3-2	P1-7	TP4
J1-21	TP5	J8-4	P3-4	P1-8	TP4
J2-2	J11-1	J8-5	P3-5	P1-11	TP6
J2-4	P1-17	J8-6	P3-6	P1-12	TP6
J2-5	P1-18	J8-7	P3-7	P1-13	TP1
J2-7	J13-1	J8-8	P3-8	P1-14	TP1
J2-8	TP2	J8-9	P3-9	P1-22	TP2
J2-9	TP2	J8-10	P3-10	P1-24	TP2
J2-10	TP1	J8-11	P3-11	P2-1	TP18
J2-11	TP9	J8-12	P3-12	P2-2	TP19
J2-14	P1-15	J8-14	P3-14	P2-3	TP22
J2-18	TP12	J8-15	P3-15	P2-4	TP21
J2-19	P1-10	J8-16	P3-16	P2-5	TP20
J2-21	TP3	J8-17	P3-17	P2-6	TP23
For these measurements, remove test fixture bottom and disconnect J3 and J4:					
J1-3	TB1-E7	J2-16	TB1-E20	J4-12	TP13
J1-3	TB1-E13	J3-1	J10-1	J11-1	C6+
J1-3	TB1-E14	J3-2	J13-1	J14-1	C6–
J1-12	C8–	J3-7	TP11	TB1-E1	TP5
J1-14	C8+	J3-19	J13-1	TB1-E2	TP7
J1-28	TB1-E4	J3-20	J4-1	TB1-E3	TP5
J1-28	TB1-E6	J4-2	J13-1	TB1-E11	TB1-E19
J1-35	E36	J4-4	TP12	TB1-E12	TB1-E17
J2-1	E36	J4-6	TP17	TB1-E21	TP5
J2-3	C7+	J4-9	TP16	Q4-C	TP8
J2-6	C7–	J4-10	TP14		
J2-12	TB1-E18	J4-11	TP15		

TABLE 6-26. CMCC/DRIVE BOARD/PRINT HEAD TEST FIXTURE SWITCH CONTINUITY TEST

SWITCH	POSITION	FROM	TO	RESISTANCE
1 (MOTOR)	ON	J4–8	J4–2	Less than 1 ohm
	OFF	J4–8	J4–2	OPEN
2 (ROLL)	ON	J1–30	J1–31	Less than 1 ohm
	OFF	J1–30	J1–31	OPEN
3 (FF)	ON	J1–29	J1–31	Less than 1 ohm
	OFF	J1–29	J1–31	OPEN
4 ($\overline{\text{HOME}}$)	ON	J2–13	J1–31	Less than 1 ohm
	OFF	J2–13	J1–31	OPEN
5 (CRP)	ON	J2–20	J1–31	Less than 1 ohm
	OFF	J2–20	J1–31	OPEN
6 (FIRE	ON	J3–6	J1–16	Less than 1 ohm
DOT)	OFF	J3–6	J1–16	OPEN
7 ($\overline{\text{DOT7}}$)	ON	J3–12	J1–19	Less than 1 ohm
	OFF	J3–12	J1–19	OPEN
8 ($\overline{\text{DOT8}}$)	ON	J3–14	J1–17	Less than 1 ohm
	OFF	J3–14	J1–17	OPEN
9 ($\overline{\text{DOT9}}$)	ON	J3–9	J1–20	Less than 1 ohm
	OFF	J3–9	J1–20	OPEN
10 ($\overline{\text{DOT4}}$)	ON	J3–13	J1–23	Less than 1 ohm
	OFF	J3–13	J1–23	OPEN
11 ($\overline{\text{DOT5}}$)	ON	J3–15	J1–27	Less than 1 ohm
	OFF	J3–15	J1–27	OPEN
12 ($\overline{\text{DOT6}}$)	ON	J3–10	J1–26	Less than 1 ohm
	OFF	J3–10	J1–26	OPEN
13 ($\overline{\text{DOT1}}$)	ON	J3–8	J1–24	Less than 1 ohm
	OFF	J3–8	J1–24	OPEN
14 ($\overline{\text{DOT2}}$)	ON	J3–11	J1–25	Less than 1 ohm
	OFF	J3–11	J1–25	OPEN
15 ($\overline{\text{DOT1}}$)	ON	J3–5	J1–22	Less than 1 ohm
	OFF	J3–5	J1–22	OPEN
16 ($\overline{\text{CCR}}$)	ON	J1–5	J1–32	Less than 1 ohm
	OFF	J1–5	J1–32	OPEN

APPENDIX A

REFERENCES

A-1. Scope

This appendix lists forms, technical manuals, and miscellaneous publications referenced in this manual.

A-2. Forms

Equipment Inspection and Maintenance Worksheet. . . . . DA Form 2404
Discrepancy in Shipment Report . . . . SF 361
Packaging Improvement Report . . . . SF 364
Quality Deficiency Report . . . . MCO 4855.10
Report of Item and Packaging Discrepancies. . . . . .MCO 4430.3
Marine Corps. Warehousing Manual . . . . .MCO P4450.7
Transportation and Travel Report of Transportation
Discrepancies . . . . .MCO P4610.19

A-3. Technical Manuals

Operator's Manual Terminal Communications AN/UGC-74B(V)3
(NSN 5815-01-214-6237) or AN/UGC-74C(V)3
(NSN 5815 -01-211 -4122). . . . . .TM 11-5815 -602-10-1

Unit, Intermediate Direct Support and Intermediate General
Support Maintenance Repair Parts and Special Tools List
(including Depot Maintenance Repair Parts and Special Tools)
for Terminal Communications, AN/UGC-74B(V)3 (NSN 5815-01-
214-6237) or AN/UGC-74C(V)3 (NSN 5815-01-21i-4122). . . . . .TM 11-5815-602-24P

Operators, Organizational Direct Support and General Support
Maintenance Manual for Power Supply PP-2309 B/U
(NSN 6130-00-752-2215) . . . . .TM 11-6130-245-14-1

A-3. Technical Manuals - Continued

Operator's, Organizational, Direct Support and General Support Maintenance Manual for Power Supply PP-2309 B/U (NSN 6130-00-752-2215) . . . . TM 11-6130-245-14-1

Operator's, Organizational, Direct Support and General Support Maintenance Manual (Including Repair Parts and Special Tools List) for Signal Generator SG-105WG (STELMA Model PG-303A)(NSN 6625-00-137-7738) . . . . .TM 11-6625-2921-14&P

Operator's, Unit, Intermediate Direct Support, Intermediate General Support, and Depot Maintenance Manual for Oscilloscope AN/USM-488 (NSN 6624-01-187-7847) . . . . .TM 11-6625-1703-15

Procedure for Destruction of Electronics Materiel to Prevent Enemy Use (Electronics Command) . . . . .TM 750-244-2

A-4. Miscellaneous Publications

The Army Maintenance Management System (TAMMS) . . . . DA PAM 738-750

Consolidated Index of Army Publications and Blank Forms. . . . . DA Pam 25-30

First Aid for Soldiers. . . . . FM 21-11

Modification of Radio Teletypewriter Sets AN/GRC-122 (NSN 5815-00-401-9719), AN/GRC-142 (NSN 5815-00-401-9720) to Provide More Reliable, Rugged, Quieter and Higher TTY Speeds . . . . MWO 11-5815 -334-30-1

Painting and Preservation of Supplies Available for Field Use for Electronics Command Equipment . . . . SB 11 573

Field Instructions for Painting and Preserving Communications-Electronics Equipment . . . . TB 43-0118

Maintenance and Repair of Printed Circuit Boards and Printed Wiring Assemblies . . . . TB 43-0127

APPENDIX B

MAINTENANCE ALLOCATION

B-1. General

This appendix provides a summary of the maintenance operations for the AN/UGC-74B(V)3 and AN/UGC-74C(V)3. It authorizes categories of maintenance for specific maintenance functions on repairable items and components 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 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.

B-2. Maintenance Function - Continued

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 service (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 materiel 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 equipment/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, *Component/Assembly.* Column 2 contains the noun names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

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.

B-3. Column Entries - Continued

d. *Column 4, Maintenance Category.* Column 4 specifies, by the listing of a "work time" 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 or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate "work time" figures will be shown for each category. The number of task-hours specified by the "work time" 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:

C - Operator/Crew

O - Unit

F - Intermediate Direct Support

H - Intermediate General Support

L - Specialized Repair Activity

D - Depot

NOTE

If the SRA in your geographical area does not have the capability for the "L" maintenance functions listed in the MAC, or if there is not SRA in your geographical area, utilize existing procedures for obtaining depot accomplishment of the "L" maintenance functions.

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 remarks in Section IV, Remarks, which is pertinent to the item opposite the particular code.

B-4. Tool and Test Equipment Requirements (Section III)

a. *Tool or Test Equipment Reference Code.* The numbers in this column coincide with the numbers used in the tools and 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 parentheses.

B-5. Remarks (Section IV)

a. *Reference Code.* This code refers to the appropriate item in Section 11, column 6.

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

SECTION II MAINTENANCE ALLOCATION CHART
FOR
COMMUNICATIONS TERMINALS AN/UGC-74B(V)3 AND AN/UGC-74C(V)3

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL UNIT C	UNIT O	INTERMEDIATE F	INTERMEDIATE H	DEPOT D	(5) TOOLS AND EQPT.	(6) REMARKS
00	Terminals, Communications AN/UGC-74B(V)3 and AN/UGC-74C(V)3	Inspect	0.1						A
		Test	0.1	0.2					B
		Test			0.4			2,3, 25-35	D
		Service	0.1						C
		Service		0.4				23	G
		Adjust		0.5				23	E
		Adjust		0.1				1	F
		Repair			0.9			1,22	H
		Repair				2.3		1-4,6, 8-22	
		Overhaul					22.0	36-38	O
01	Teleprinter Assembly (3A1)	Repair				2.0		1,2,6,20,22 39,40,41	
		Repair			0.2				T
		Test			0.1				
0101	Circuit Card Assembly, Universal Central Processor Unit (3A1A1)	Replace			0.1				
		Repair				4.0 (L)		5,6,7	P
		Test				0.1 (L)		5,7	
0102	Circuit Card Assembly, Auxiliary Interface (3A1A2)	Replace			0.1				
		Repair				4.0 (L)		5,6,7	P
		Test				0.2 (L)		5,7	
0103	Circuit Card Assembly, Communications (3A1A3)	Replace			0.1				
		Repair				4.0 (L)		5,6,7	P
		Test				0.2 (L)		5,7	
0104	Circuit Card Assembly, Printer Control (3A1A4)	Replace			0.1				
		Repair				4.0 (L)		5,6,7	P
		Test				0.2 (L)		5,7	
0105	Assembly, Printer (3A1A5)	Repair			0.2	1.7		1,2.6 22	Q
		Replace			0.2			22	
010501	Board Assembly, Motor Drive & Current Control (3A1A5A3)	Replace			0.1			1	K
		Repair				2.0		1,2,4,6, 8,9,11	K
01050101	Circuit Card Assembly (3A1A5A3A1)								I
01050102	PWB Assembly, Line. Feed Drive (3A1A5A3A2)								I
010502	Assembly, Paper Trough (3A1A5A6)	Repair			1.0			1,22	
010503	Assembly, Harness (3A1A5W1)	Repair				2.0		1,2	Z

SECTION II MAINTENANCE ALLOCATION CHART
FOR
COMMUNICATIONS TERMINALS AN/UGC-74B(V)3 AND AN/UGC-74C(V)3

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL UNIT C	UNIT O	INTERMEDIATE F	INTERMEDIATE H	DEPOT D	(5) TOOLS AND EQPT.	(6) REMARKS
010504	Circuit Card Assembly, Drive Board (3A1A5A4)	Replace			0.2			1	
		Repair				4.5		1,2,4,6, 8,9,10	L
		Test				0.2		2,4,8,9,10	
010505	Circuit Card Assembly, Carriage Motor Current Control (3A1A5A5)	Replace			0.2			1	
		Repair				2.2		1,2,4,6, 8,9,10	L
		Test				0.1		2,4,8,9,10	
0106	Assembly, Chassis (3A1A6)	Repair				3.0		1,2,4, 12.13 14,22	
		Repair			0.3			1	U
010601	Assembly, Dustcover (3A1A6A1)								I
010602	Assembly, Filter (3A1A6FL1)	Replace			0.3			1	
		Repair				2.0		1,2,4, 12,13, 14,16	
010603	Assembly, Harness (3A1A6W1)								I
0107	Assembly, Interface (3A1A7)	Replace			0.3			1	
		Repair			2.0			1,2,22	J
		Repair				4.0		1,2,4,6, 8,9,15, 17,18, 39,40	M
		Test			0.1			2	
		Test				0.2		2,4,8,9,17	
010701	Subassembly, Interface (3A1A7A1)								I
01070101	Circuit Card Assembly, Diode (3A1A7A1A1)								I
01070102	Circuit Card Assembly, Receive/Transmit Interface (3A1A7A1A2)								I
0108	Circuit Card Assembly, Power Supply (3A1PS1)	Replace			0.3			1	
		Repair				4.5		1,4,6 8,19, 2,22	N
		Test				0.2		4,8,19	
02	Assembly, Keyboard (3A2)	Repair				0.3		1,22	
		Repair			0.3			1	V
		Test			0.1				
0201	Assembly, Keyswitch (3A2A1)	Replace			0.2			1	
		Repair				3.0		1,2,4, 6,8,9, 20,21	
0202	Panel, Assembly, Actuator (3A2A2)	Repair				1.0		1,22	
0203	Circuit Card Assembly, Auxiliary Memory/Relay Control (3A2A3)	Replace			0.3				*
		Repair				2.5 (L)		5,6,42	P
		Test				0.1 (L)		5,42	

SECTION II MAINTENANCE ALLOCATION CHART
FOR

COMMUNICATIONS TERMINALS AN/UGC-74B(V)3 AND AN/UGC-74C(V)3

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL UNIT C	O	INTERMEDIATE F	H	DEPOT D	(5) TOOLS AND EQPT.	(6) REMARKS
03	Memory Module, Auxiliary (3A3)	Replace Repair			0.1	 0.1 (L)		 22	* T
0301	Circuit Card Assembly, Auxiliary Memory Module (3A3A1)	Repair Test				1.0 (L) 0.1 (L)		5,6,43 5,43	* P
5001	Test Fixture, Power Supply Assembly	Repair				3.0		1,2,4,6, 8,22	
500101	Circuit Card Assembly, Power Supply Test Fixture	Repair				1.5		1,2,4,6, 8,19,22	
5002	Not Used								
5003	Not Used								
5004	Test Fixture, Motor Drive/Current Board	Repair				2.5		1,2,4, 6,8,9.22	
5005	Test Fixture, Interface Assembly	Repair				1.0		1,2,6, 22	
5006	Test Fixture, Filter Assembly	Repair			0.2	1.0		1,2,6, ,22	
5007	Test Fixture, Keyswitch Assembly	Repair				2.5		1,2,4,6, 8,9,22	
5008	Cable Assembly, Group	Repair			0.2			22	S
5009	Test Fixture, Print Drive Board/Carriage Motor Current Control	Repair				1.5		1,2,4,6, 8,9,22	
5010	Interface Connection Device, Logic Cards J4111A/UGC-74(V)3	Replace Repair				0.2 (L)		1	 W
5011	Interface Connection Device, Auxiliary Memory Module PWA	Replace Repair				0.2 (L)		1	 X
5012	Interface Connection Device, Auxiliary Memory/Relay Control PWA	Replace Repair				0.2 (L)		1	 Y

SECTION III TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR

COMMUNICATIONS TERMINALS AN/UGC-74B(V)3 AND AN/UGC-74C(V)3

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	F, H	Tool Equipment TE-50B	5180-00-356-4602	
2	O, F, H	Multimeter, Digital AN/PSM-45	6625-01-139-2512	
3	O, F, H	Loopback Plug, Honeywell (SM-B-916000)	5815-01-090-5366	
4	H	Oscilloscope AN/USM-488	6625-01-187-7847	
5	L,D	Test & Repair System, Electronic Equipment AN/MSM-105(V)1	6625-01-098-6764	
6	H,L,D	Pace Kit	3439-00-196-0703	
7	L,D	Interface Connection Device, Logic Cards J-4111A/UGC-74(V)3 Honeywell (A3041830)		
8	H	Power Supply PP-2309C/U	6130-01-139-2514	
9	H	Function Generator SG1171/A	6625-01-216-9684	
10	H	Test Fixture, Drive Board/ Carriage Motor Current Control PWA Honeywell (A3042001)		
11	H	Test Fixture, Circuit Card Assembly (Motor Drive/Current Control) Honeywell (SM-D-915988)	5815-01-092-2014	
12	F,H	Power Cable, UGC-74, 120Vac Honeywell (SM-D-764481)	5995-00-271-9444	
13	F,H	Power Cable, UGC-74, 230Vac Honeywell (SM-D-764482)	5995-01-090-1423	
14	F,H	Power Cable, UGC-74, 26Vdc Honeywell (SM-D-764480)	5995-00-271-9443	
15	F,H	Data Cable Assembly Honeywell (SM-D-915889)	5995-01-090-1424	
16	H	Test Fixture, Filter Assembly Honeywell (SM-D-915994)	5815-01-092-2013	
17	H	Data Analyzer, Telegraph TS-3378/G and Signal Generator, SG-1054/G	6625-00-214-8420 6625-00-137-7738	
18	H	Test Fixture, Interface Assembly Honeywell (SM-D-915991)	5815-01-090-5369	
19	H	Test Fixture, Power Supply Honeywell (SM-E-915979)	5815-01-090-5367	
20	F, H	Remover, Module Honeywell (SM-B-916003)	5815-01-090-1248	
21	H	Test Fixture, Key Switch Assembly Honeywell (SM-D-915997)	5815-01-090-9417	
22	F, H	Tool Kit, Electronic Equipment TK-105/G	5180-00-610-8177	
23	O	Tool Kit, Electronic Equipment TK-101/G	5180-00-064-5178	

SECTION III TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR

COMMUNICATIONS TERMINALS AN/UGC-74B(V)3 AND AN/UGC-74C(V)3

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
25	F	Module, Univ. Central Processor Unit (3A1A1) Honeywell (A3041422)		
26	F	Module, AUXI Interface (3A1A2) Honeywell (A3041426)		
27	F	Module, Communications (3A1A3) Honeywell (A3042242)		
28	F	Module, Printer Control (3A1A4) Honeywell (A3041430)		
29	F	Module, MD & CC (3A1A5A3)		
30	F	Assembly, Interface (3A1A7) Honeywell (A3041680)		
31	F	Module, Power Supply (3A1PS1)		
32	F	Module, Print Driver (3A1A5A4) Honeywell (A3041438)		
33	F	Module, Carriage Motor Current Control (3A1A5A5) Honeywell (A3041608)		
34	F	Module, Auxiliary Memory/ Relay Control (3A2A3) Honeywell (A3042202)		
35	F	Module, Auxiliary Memory (3A3) Honeywell (A3042160)	5815-01-209-0420	
36	D	Power Cable, UGC-74 12Vdc Honeywell (SM-D-916890)	5985-01-096-8724	
37	D	Battery BA-5598/U	6135-01-034-2239	
38	D	Terminals, Communications AN/UGC-74B(V)3 AN/UGC-74C(V)3	 5815-01-214-6237 5815-01-211-4122	
39	H	Crimping Tool, Basic (M22520/2-01) Crimping Tool, Positioner (M22520/2-06) Crimping Tool, Positioner (M22520/2-08) Crimping Tool, Positioner (M22520/2-09) Gage, GO/NOGO (M2250/3-1)	5120-00-165-3910 5120-00-017-3809 5120-00-017-3921 5120-00-017-3927 5220-00-090-6722	
40	H	Pin Extractor (M81969/14-01) Pin Extractor (M81969/14-02)	5120-00-018-0575 5120-00-915-4587	
41	H	Pliers, Retaining Ring	5120-00-089-0874	
42	L,D	Interface Connection Device, Auxiliary Memory/Relay Control PWA Honeywell (A3041860)		
43	L,D	Interface Connection Device, Auxiliary Memory Module Honeywell (A3041800)		

SECTION IV. REMARKS

REFERENCE CODE	REMARKS
A	Preventive maintenance checks.
B	Initialization and self test.
C	Service by replacement of lamps, paper, and ribbon cassette. Clean exterior.
D	Self test, loopback test, and fault isolate by module swapping.
E	Adjust chain tension, paper low switch, paper exit, power (on/off) control cable.
F	Adjust printhead mounting bracket.
G	Lubricate, clean interior, and printhead.
H	Repair by replacing FGC 0101, 0102, 0103, 0104, 0107, 010604, 010505, 010602, 0108, 0201, fuses and parity reset lamp.
I	Repaired as part of next higher assembly.
J	Repair of wiring harness, fuse sockets, and toggle switches.
K	Requires two power supplies.
L	Requires three power supplies.
M	Requires four power supplies.
N	Requires five power supplies.
O	Use depot facilities.
P	Repair at SRA.
Q	Repair at DS consists of replacing printhead.
R	Deleted
S	Repair is by replacement of cable assemblies which are throwaway items.
T	Repair is limited to replacement of circuit card assemblies.
U	Repair is limited to replacement of filter assembly.
V	Repair is limited to replacement of keyswitch assembly and/or circuit card assemblies.
W	See TM 11-6625-3083-24&P
X	See TM 11-6625-3083-24&P
Y	See TM 11-6625-3083-24&P
Z	Repair is by replacement of switches, connectors, and circuit board.
*	An asterisk denotes modules/assemblies used only on the AN/UGC-74C(V)3 terminal.

APPENDIX C

EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

C-1. Scope

This appendix lists expendable supplies and materials needed to operate and maintain the AN/UGC-74B(V)3 or AN/UGC-74C(V)3. These items are authorized by CTA 50-970, Expendable Items (Except Medical, Class V, Repair Parts, and Heraldic Items).

C-2. Explanation of Columns

a. *Column 1 - Item Number.* This number is assigned to the entry in the listing and is referenced in narrative instructions to identify the material (e. g., “Use cleaning compound, item 5, Appendix D. ”).

b. *Column 2- Level.* This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew
O - Unit Maintenance
F - Intermediate Direct Support Maintenance
H - Intermediate General Support Maintenance

c. *Column 3- National Stock Number.* This is the National Stock Number assigned to the item; use it to request or requisition the item.

d. *Column 4- Description.* Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Federal Supply Code for Manufacturer (FSCM) in parentheses, if applicable.

e. *Column 5- Unit of Measure (U/M).* Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e. g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy requirements.

Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
1	C	7530-00-142-9037	Paper, Roll, Single Ply, White	RL
2	C	7530-00-223-7966	Paper, Roll, Single Ply, Canary	RL
3	C	7530-00-285-5030	Paper, Roll, 3-Ply	RL
4	C	7530-00-800-0996	Paper, Fanfold, Single Ply (55295)	BX
5	C		Cassette, Ribbon A3041590 (80063)	EA
6	C		Oil, MIL-L-46000 (81349)	A/R
7	C	7920-00-924-5700	Cloth, Cleaning	EA
8	C	6850-00-105-3084	Trichlorotrifluoroethane	OZ
9	O	9150-00-349-9290	Lubricant, Flourocarbon, Telomer Dispersion, 16 oz aerosol can	EA
10	H		Ties, Cable	EA
11	H		Tubing, shrink	A/R
12	H		Locking Compound, MIL-S-22473	TB
13	H		Conformal Coating, MIL-I-46058	A/R
14	H		Epoxy, SM-A-964438	A/R

GLOSSARY

Section I. ABBREVIATIONS

CCA	Circuit Card Assembly
DMA	Direct Memory Access
EMI	Electromagnetic Interference
EMP	Electromagnetic Pulse
ICT	Intelligent Communication Terminal
KSR	Keyboard Send-Receive
MPU	Microprocessor Unit
PIA	Peripheral Interface Adapter
RAM	Random Access Memory
RFI	Radio Frequency Interface
RO	Receive Only
ROM	Read-Only Memory
SCAR	Silicon Controlled Rectifier
SCMO	Speed Control Motor Output
TTL	Transistor-Transistor Logic
USART	Universal Synchronous/Asynchronous Receiver/Transmitter

Section II. DEFINITIONS OF UNUSUAL TERMS

ADDRESS - A character or group of characters that identifies a register, a particular part of storage, or some other data source or destination.

ASCII - American Standard Code for Information Interchange; a code which relates 96 displayed characters (64 without lower case) and 32 nondisplayed control characters to a sequence of 7 on or off choices.

BUFFER - A storage device in which data are assembled temporarily during data transfers. Used to compensate for a difference in the rate of flow of information or the time occurrence of events when transferring information from one device to another.

BUS - 1. A circuit over which data or power is transmitted. Often one which acts as a common connection among a number of locations (synonymous with trunk). 2. A path over which information is transferred from any of several sources to any of several destinations. 3. One or more conductors used for transmitting signals or power.

UNIVERSAL CENTRAL PROCESSING UNIT - A unit of a computer that includes the circuits controlling the interpretation and execution of instructions (synonymous with main frame). Abbreviated Universal CPU.

GLOSSARY - Continued

CLOCK - 1. That specific device or unit designed to time events. 2. A data communications clock which controls the timing of the sampling of bits received in a data stream.

CLOCK PULSE - A synchronization signal provided by a clock.

DATA PROCESSING - A generic term for all the operations carried out according to precise rules or procedures.

FLIP FLOP CIRCUIT - An electronic circuit having two stable states, one input line and one output line such that as each successive pulse is received, the output line changes between two alternative conditions (e. g., high-to-low or off-to-on).

FLIP-FLOP D-D - Stands for delay. A flip flop, the output of which is a function of the input which appeared one pulse earlier; for example, if a 1 appeared at the input, the output after the next clock pulse will be a 1.

RADIO FREQUENCY INTERFERENCE (RFI) - Interference; i.e., unwanted interference of electromagnetic radiation of radio frequency signals into operating circuits.

REGISTER INPUT BUFFER - A device that receives data from input devices and then transfers it to internal computer storage.

REGISTER, SHIFT - The computer- register capable of shifting data as directed.

REGULATION, LOAD - A deviation from steady-state of the controlled variable when the set point is fixed. Such an offset resulting from a no-load to a full-load change (or other specified limits) is often called deviation or droop.

REGULATION, VOLTAGE - A measure of the degree to which an electrical power source maintains output voltage stability under varying load conditions, with regulation given in percents.

SCRATCH PAD - A useful and informal term referring to or designating a unique internal storage area, designed to be reserved for intermediate results, various notations, or working area. It is a quickly erasable main storage.

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CAPACITOR COLOR CODE TABLES

TABLE I - For use with Group I, Styles CM, CN, CY and CB

COLOR	MIL ID	1st SIG FIG	2nd SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE				CHARACTERISTIC[2]				DC WORKING VOLTAGE	OPERATING TEMP. RANGE	VIBRATION GRADE
					CM	CN	CY	CB	CM	CN	CY	CB	CM	CM	CM
BLACK	CM, CY CB	0	0	1			±20%	±20%		A				55 to +70 C	10 - 55 cps
BROWN		1	1	10					B	E		B			
RED		2	2	100	±2%		±2%	±2%	C		C			55 to +85 C	
ORANGE		3	3	1.000		±30%			D				300		
YELLOW		4	4	10.000					E			D		55 to +125 C	10 - 200 cps
GREEN		5	5		±5%				F				500		
BLUE		6	6											55 to +150 C	
PURPLE (VIOLET)		7	7												
GREY		8	8												
WHITE		9	9												
GOLD				0.1			±5%	±5%							
SILVER	CN				±10%	±10%	±10%	±10%							

TABLE II - For use with Group II, General Purposes, Style CK

COLOR	TEMP. RANGE AND VOLTAGE - TEMP LIMITS[3]	1st SIG FIG	2nd SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE	MIL ID
BLACK		0	0	1	±20%	
BROWN	AW	1	1	10	±10%	
RED	AX	2	2	100		
ORANGE	BX	3	3	1,000		
YELLOW	AV	4	4	10,000		CK
GREEN	CZ	5	5			
BLUE	BV	6	6			
PURPLE (VIOLET)		7	7			
GREY		8	8			
WHITE		9	9			
GOLD						
SILVER						

TABLE III - For use with Group III, Temperature Compensating, Style CC

COLOR	TEMPERATURE COEFFICIENT[4]	1st SIG FIG	2nd SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE		MIL ID
					CAPACITANCES OVER 10uuf	CAPACITANCES 10uuf OR LESS	
BLACK	0	0	0	1		±2.0uuf	CC
BROWN	30	1	1	10	±1%		
RED	80	2	2	100	±2%	±0.25uuf	
ORANGE	150	3	3	1,000			
YELLOW	220	4	4				
GREEN	330	5	5		±5%	0.5uuf	
BLUE	470	6	6				
PURPLE (VIOLET)	750	7	7	0.01			
GREY		8	8	0.1	±10%		
WHITE		9	9				
GOLD	+100					1.0uuf	
SILVER							

1 The multiplier is the number by which the two significant (SIG) figures are multiplied to obtain the capacitance in uuf.

2 Letter indicate the Characteristics designated in applicable specifications: MIL-C-5, MIL-C-91, MIL-C-11272, and MIL-C-10950 respectively.

3 Letters indicate the temperature range and voltage-temperature limits designated in MIL-C-11015.

4 Temperature coefficient in parts per million per degree centigrade.

COLOR CODE MARKING FOR MILITARY STANDARD CAPACITORS

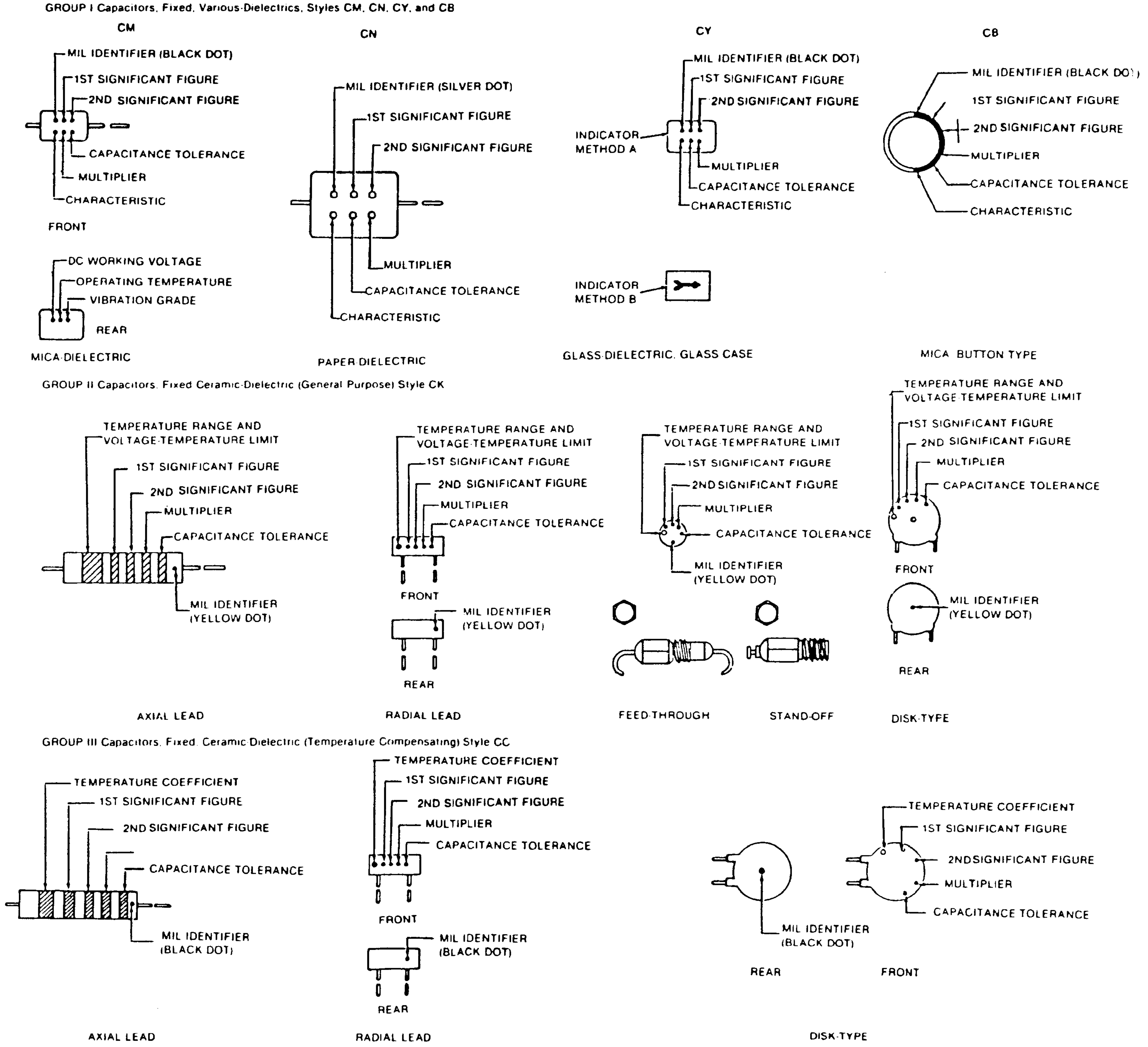
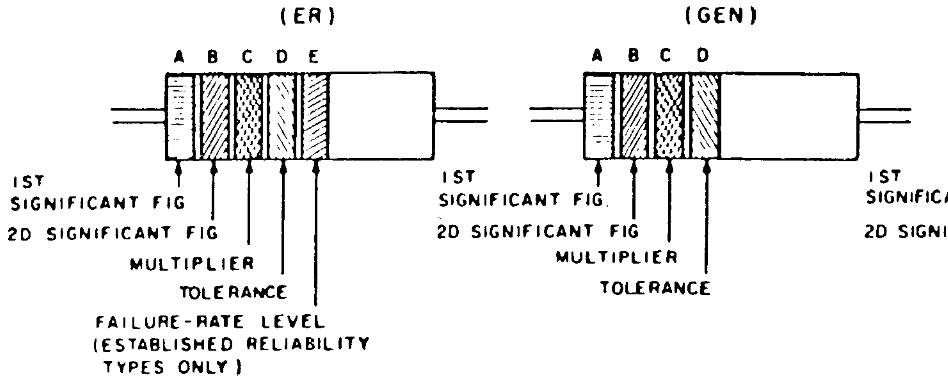
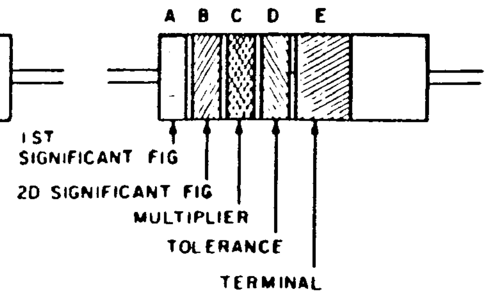


Figure FO-1(1). Color Code Marking for Military Standard Capacitors (Sheet 1 of 2)



COLOR CODE MARKING FOR COMPOSITION TYPE RESISTORS



COLOR-CODE MARKING FOR FILM-TYPE RESISTORS.

TABLE I
COLOR CODE FOR COMPOSITION TYPE AND FILM TYPE RESISTORS.

BAND A		BAND B		BAND C		BAND D		BAND E		
COLOR	FIRST SIGNIFICANT FIGURE	COLOR	SECOND SIGNIFICANT FIGURE	COLOR	MULTIPLIER	COLOR	RESISTANCE TOLERANCE (PERCENT)	COLOR	FAILURE RATE LEVEL	TERM
BLACK	0	BLACK	0	BLACK	1			BROWN	M=1.0	
BROWN	1	BROWN	1	BROWN	10			RED	P=0.1	
RED	2	RED	2	RED	100			ORANGE	R=0.01	
ORANGE	3	ORANGE	3	ORANGE	1,000			YELLOW	S=0.001	
YELLOW	4	YELLOW	4	YELLOW	10,000	SILVER	±10 (COMP. TYPE ONLY)	WHITE		SOLD-ERABLE
GREEN	5	GREEN	5	GREEN	100,000	GOLD	±5			
BLUE	6	BLUE	6	BLUE	1,000,000	RED	±2 (NOT APPLICABLE TO ESTABLISHED RELIABILITY)			
PURPLE (VIOLET)	7	PURPLE (VIOLET)	7							
GRAY	8	GRAY	8	SILVER	0.01					
WHITE	9	WHITE	9	GOLD	0.1					

BAND A — THE FIRST SIGNIFICANT FIGURE OF THE RESISTANCE VALUE (BANDS A THRU D SHALL BE OF EQUAL WIDTH.)

BAND B — THE SECOND SIGNIFICANT FIGURE OF THE RESISTANCE VALUE.

BAND C — THE MULTIPLIER (THE MULTIPLIER IS THE FACTOR BY WHICH THE TWO SIGNIFICANT FIGURES ARE MULTIPLIED TO YIELD THE NOMINAL RESISTANCE VALUE.)

BAND D — THE RESISTANCE TOLERANCE.

BAND E — WHEN USED ON COMPOSITION RESISTORS, BAND E INDICATES ESTABLISHED RELIABILITY FAILURE-RATE LEVEL (PERCENT FAILURE PER 1,000 HOURS) ON FILM RESISTORS, THIS BAND SHALL BE APPROXIMATELY 1-1/2 TIMES THE WIDTH OF OTHER BANDS, AND INDICATES TYPE OF TERMINAL

RESISTANCES IDENTIFIED BY NUMBERS AND LETTERS
(THESE ARE NOT COLOR CODED)

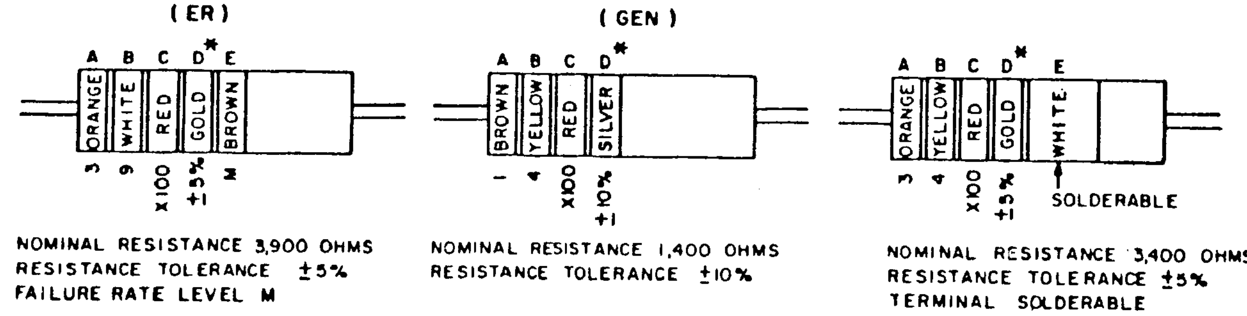
SOME RESISTORS ARE IDENTIFIED BY THREE OR FOUR DIGIT ALPHA NUMERIC DESIGNATORS. THE LETTER R IS USED IN PLACE OF A DECIMAL POINT WHEN FRACTIONAL VALUES OF AN OHM ARE EXPRESSED. FOR EXAMPLE:

2R7 = 2.7 OHMS   10R0 = 10.0 OHMS

FOR WIRE-WOUND-TYPE RESISTORS COLOR CODING IS NOT USED, IDENTIFICATION MARKING IS SPECIFIED IN EACH OF THE APPLICABLE SPECIFICATIONS.

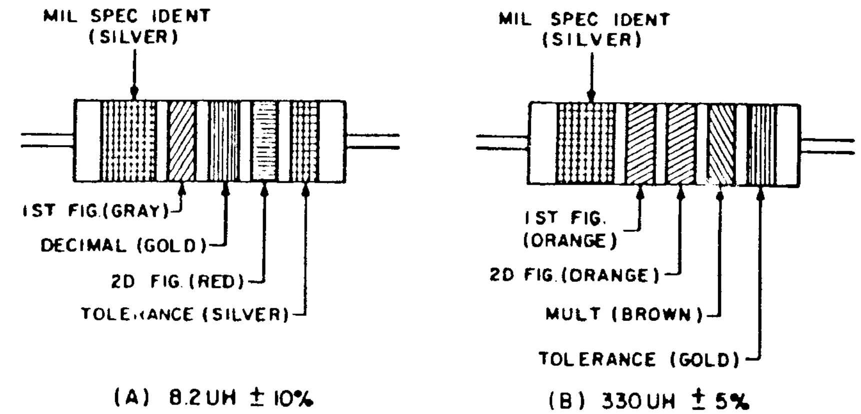
A COLOR CODE MARKING FOR MILITARY STANDARD RESISTORS

EXAMPLES OF COLOR CODING



COMPOSITION-TYPE RESISTORS   FILM-TYPE RESISTORS

* IF BAND D IS OMITTED, THE RESISTOR TOLERANCE IS ± 20% AND THE RESISTOR IS NOT MIL-STD.



COLOR CODING FOR TUBULAR ENCAPSULATED R.F. CHOKES. AT A, AN EXAMPLE OF OF THE CODING FOR AN 8.2UH CHOKE IS GIVEN. AT B, THE COLOR BANDS FOR A 330UH INDUCTOR ARE ILLUSTRATED.

TABLE 2
COLOR CODING FOR TUBULAR ENCAPSULATED R.F. CHOKES.

COLOR	SIGNIFICANT FIGURE	MULTIPLIER	INDUCTANCE TOLERANCE (PERCENT)
BLACK	0	1	
BROWN	1	10	1
RED	2	100	2
ORANGE	3	1,000	3
YELLOW	4		
GREEN	5		
BLUE	6		
VIOLET	7		
GRAY	8		
WHITE	9		
NONE			20
SILVER			10
GOLD	DECIMAL POINT		5

MULTIPLIER IS THE FACTOR BY WHICH THE TWO COLOR FIGURES ARE MULTIPLIED TO OBTAIN THE INDUCTANCE VALUE OF THE CHOKE COIL.

B. COLOR CODE MARKING FOR MILITARY STANDARD INDUCTORS.

Figure FO-1(2). Color Code Marking for Military Standard Capacitors (Sheet 2 of 2)

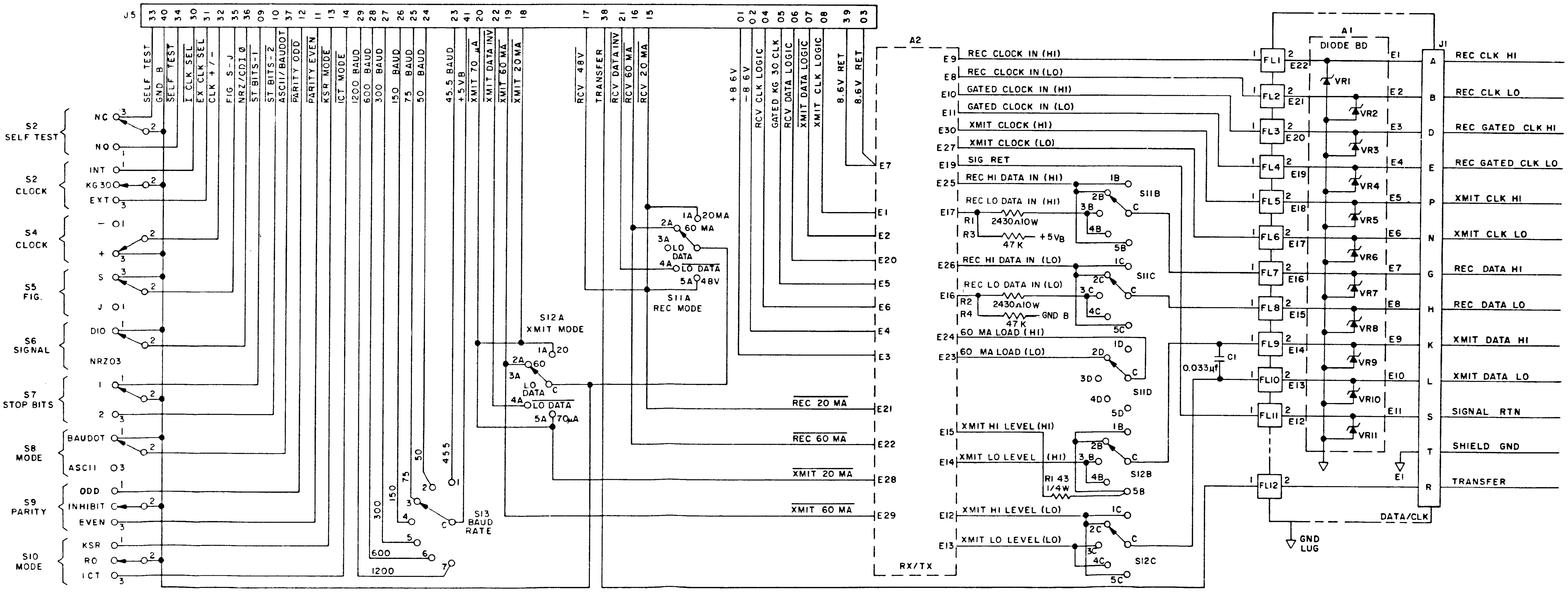


Figure FO-2. Interface Assembly, Schematic Diagram

NOTES:
1- UNLESS OTHERWISE SPECIFIED:
RESISTORS ARE 1/4 W
RESISTOR VALUES ARE IN OHMS
CAPACITOR VALUES ARE IN MICROFARADS
2- LINES CONTINUED FROM FOLD-OUT TO FOLD-OUT ARE INDICATED AS FOLLOW:
XXXXXX SIGNAL NAME
FO-9-U14-6
PIN NO.
REF DES
FOLD-OUT NO.

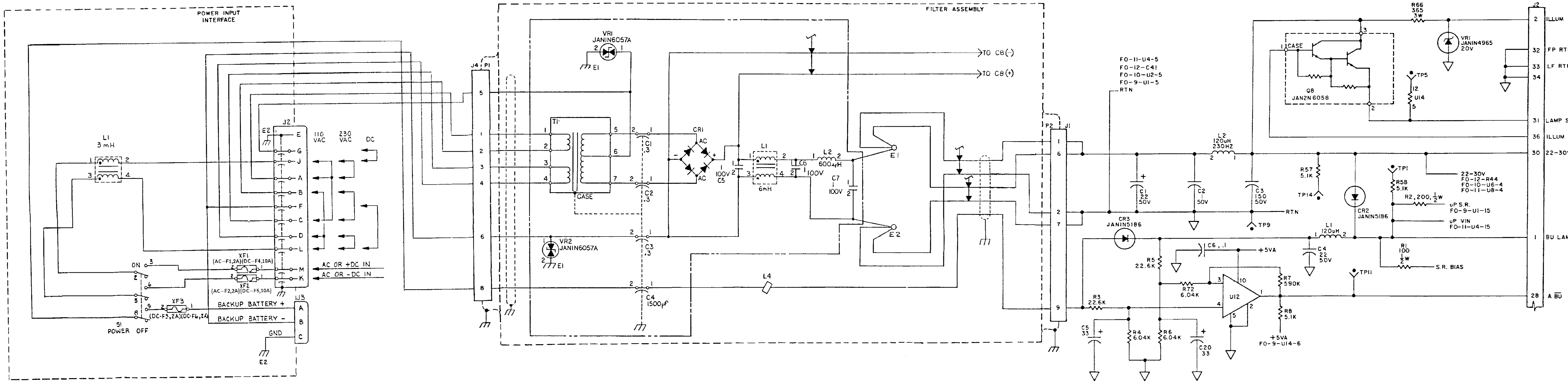
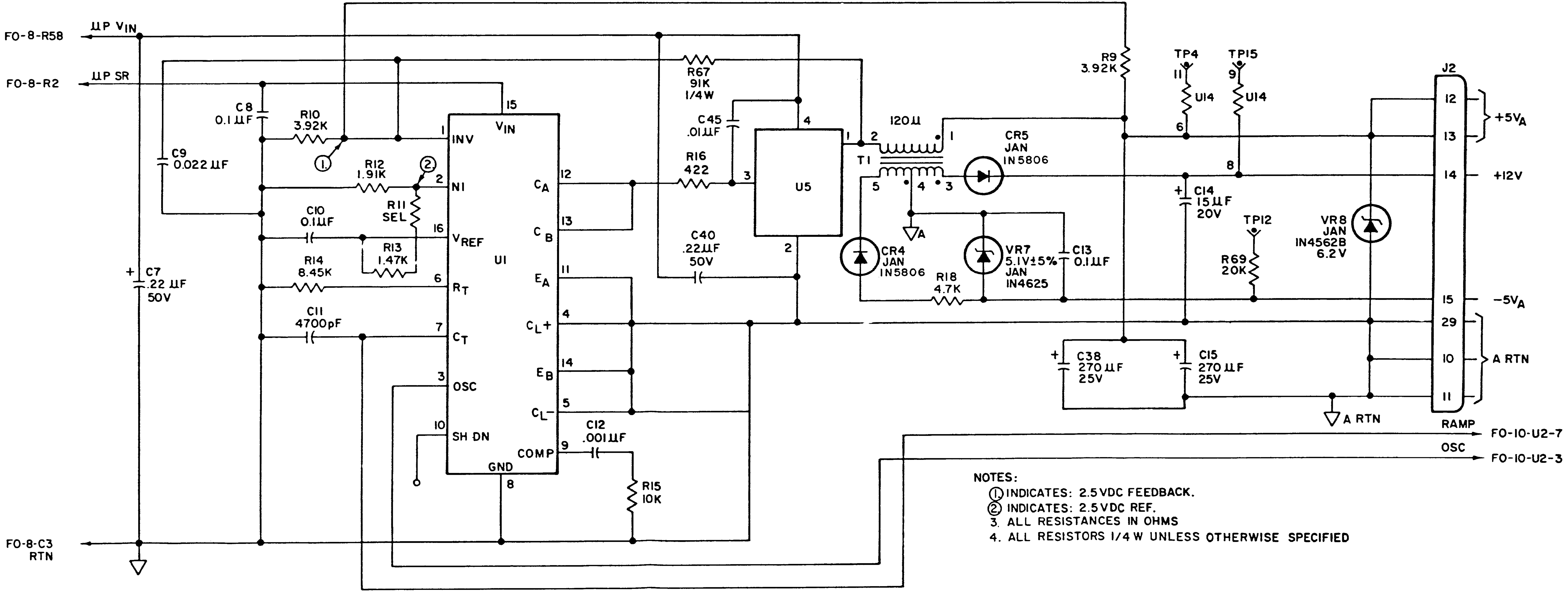
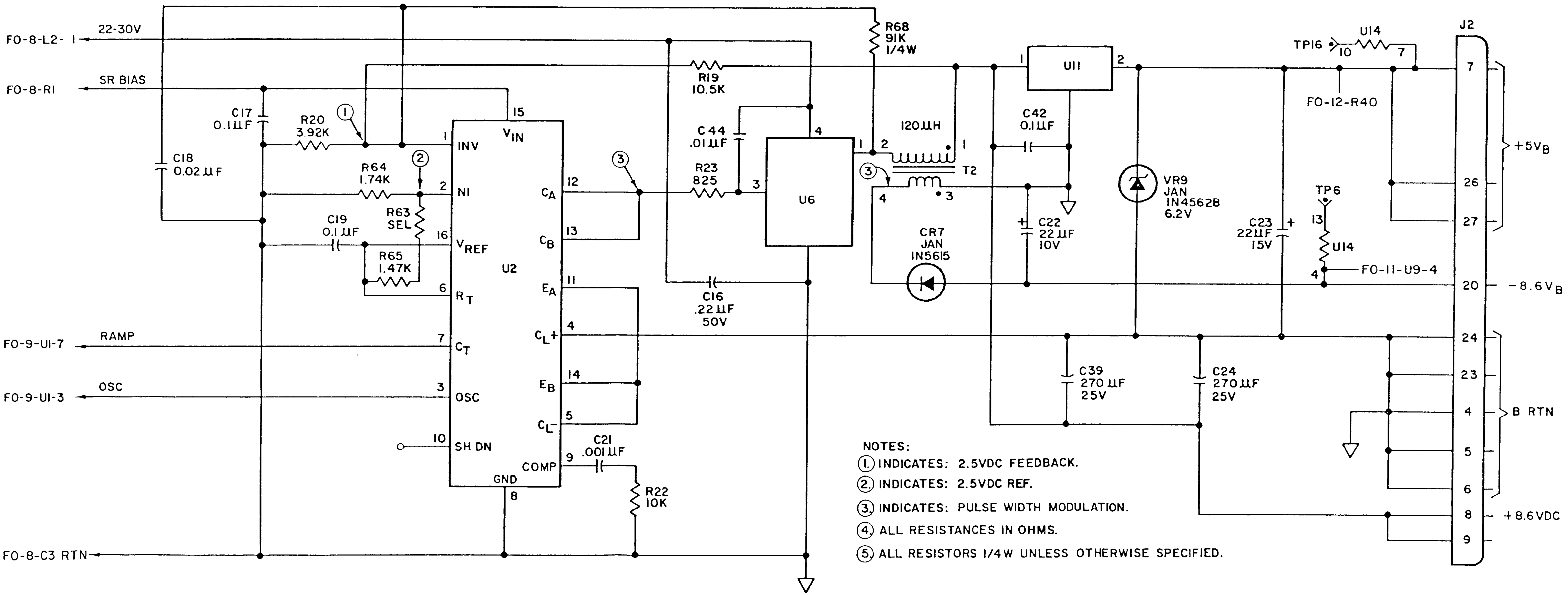


Figure FO-3. Power Supply Input, Schematic Diagram



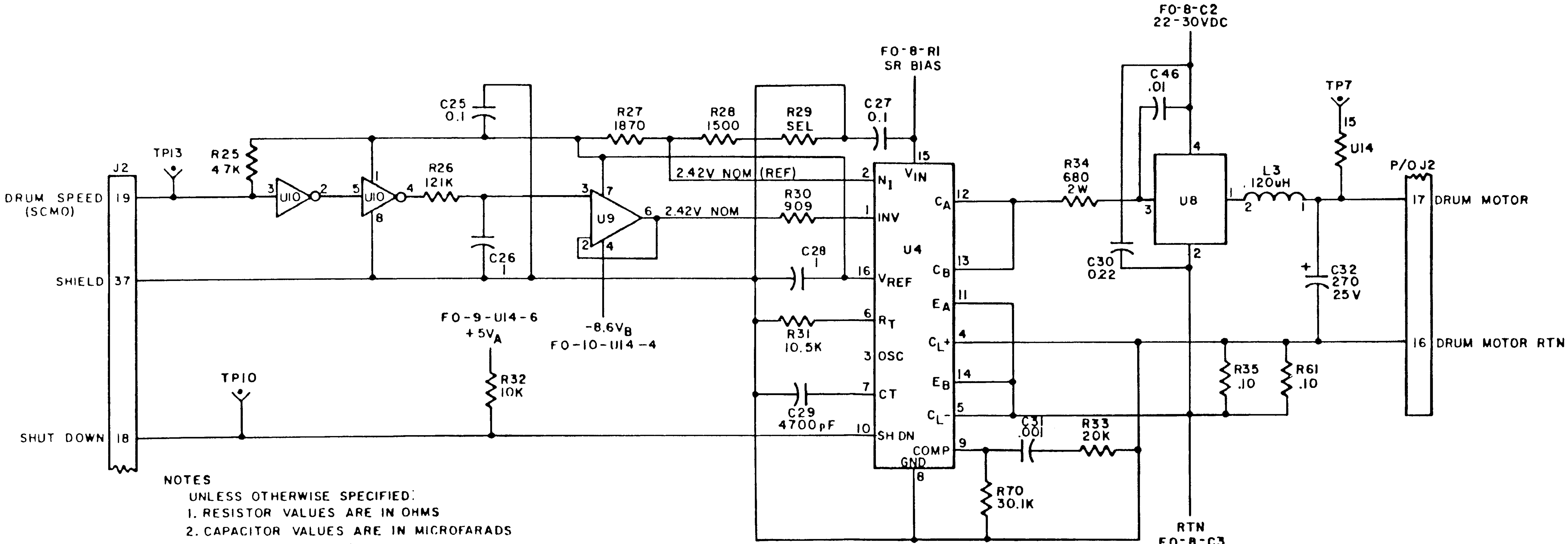
NOTES:
1. (1) INDICATES: 2.5VDC FEEDBACK.
2. (2) INDICATES: 2.5VDC REF.
3. ALL RESISTANCES IN OHMS
4. ALL RESISTORS 1/4 W UNLESS OTHERWISE SPECIFIED

Figure FO-4. Microprocessor Supply



±8.6 V supply

Figure FO-5. +5, ±8.6 Vdc Supply



NOTES

UNLESS OTHERWISE SPECIFIED:

1. RESISTOR VALUES ARE IN OHMS
2. CAPACITOR VALUES ARE IN MICROFARADS
3. RESISTORS ARE 1/4W
4. LINES CONTINUED FROM FOLD-OUT TO FOLD-OUT ARE INDICATED AS FOLLOWS:

SIGNAL NAME

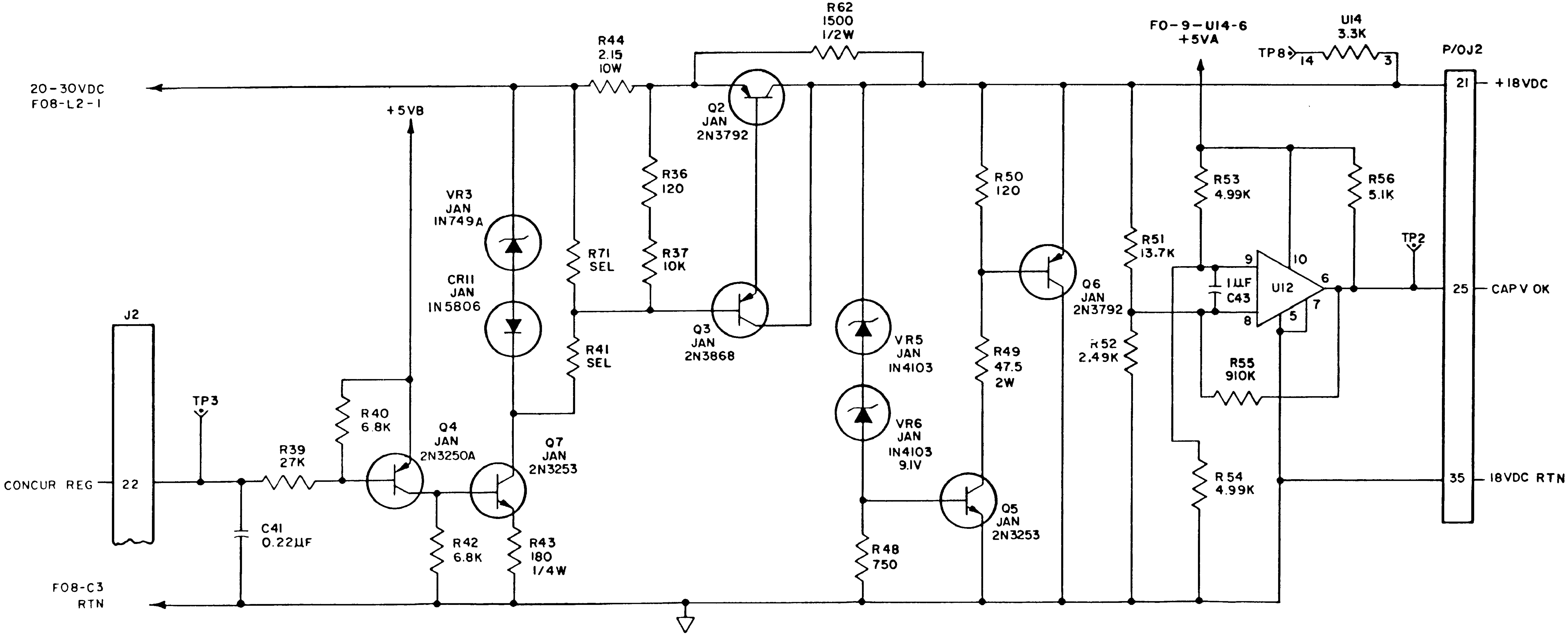
XXXXXX FO-10-U14-4

PIN NO

REF DES

FOLD-OUT NO

Figure FO-6. Drum Motor Supply



NOTES
1. ALL RESISTANCES IN OHMS
2. ALL RESISTORS 1/4 W UNLESS OTHERWISE SPECIFIED

Figure FO-7. +18 Vdc Constant Current Supply

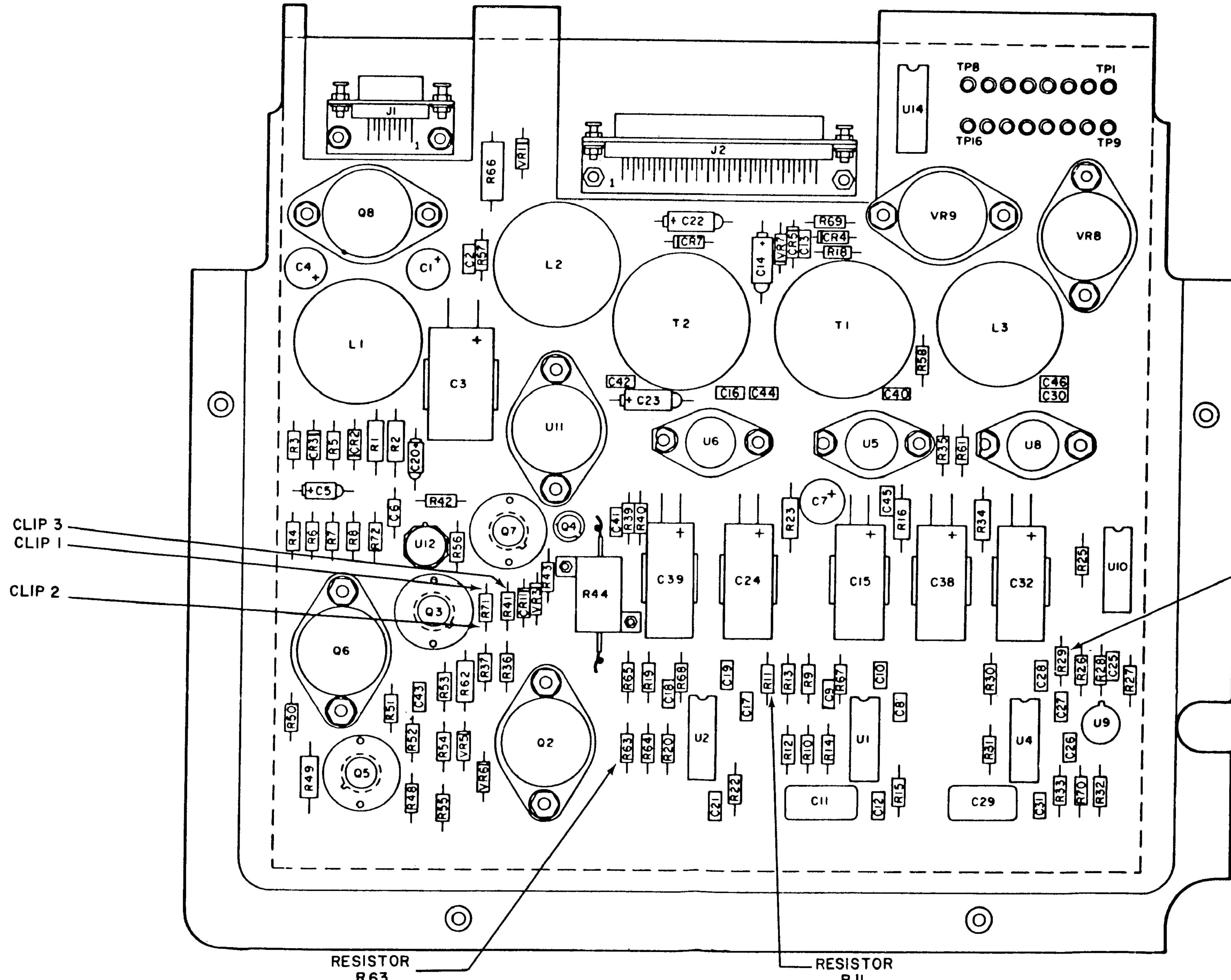


Figure FO-8. R41 and R71 Test Connections

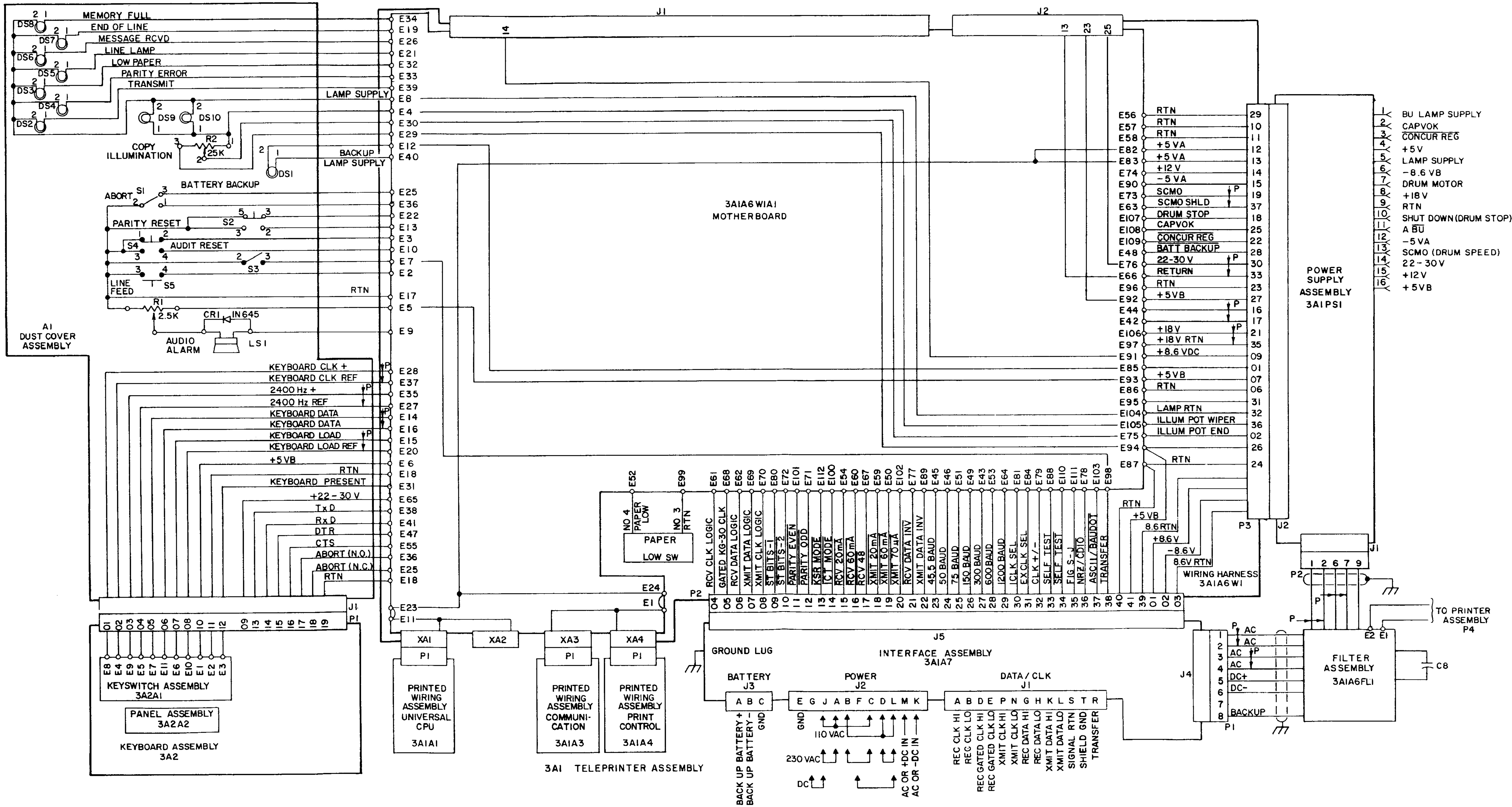


Figure FO-9. AN/UGC-74B(V)3 Interconnect Diagram

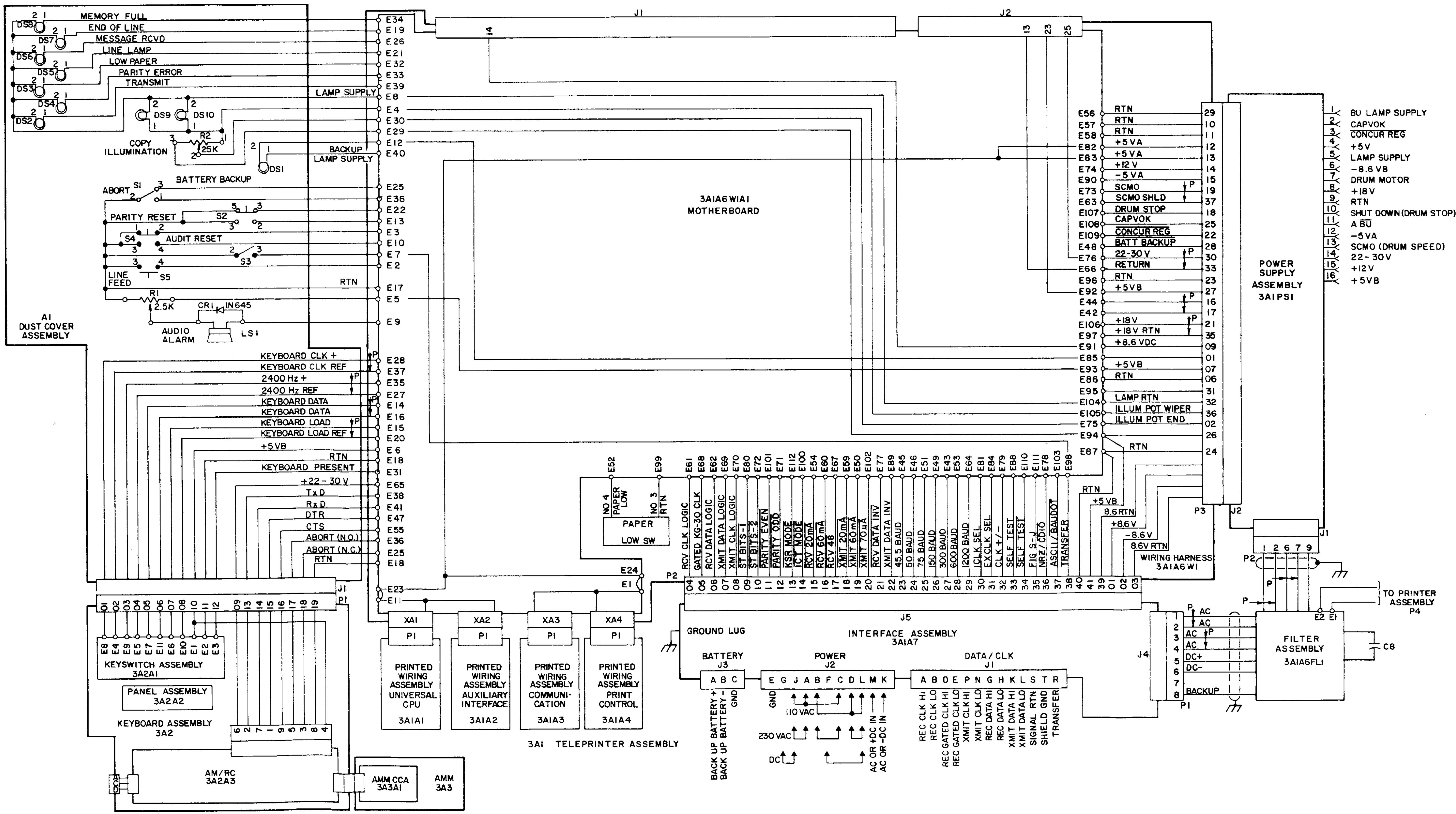


Figure FO-10. AN/UGC-74C(V)3 Interconnect Diagram

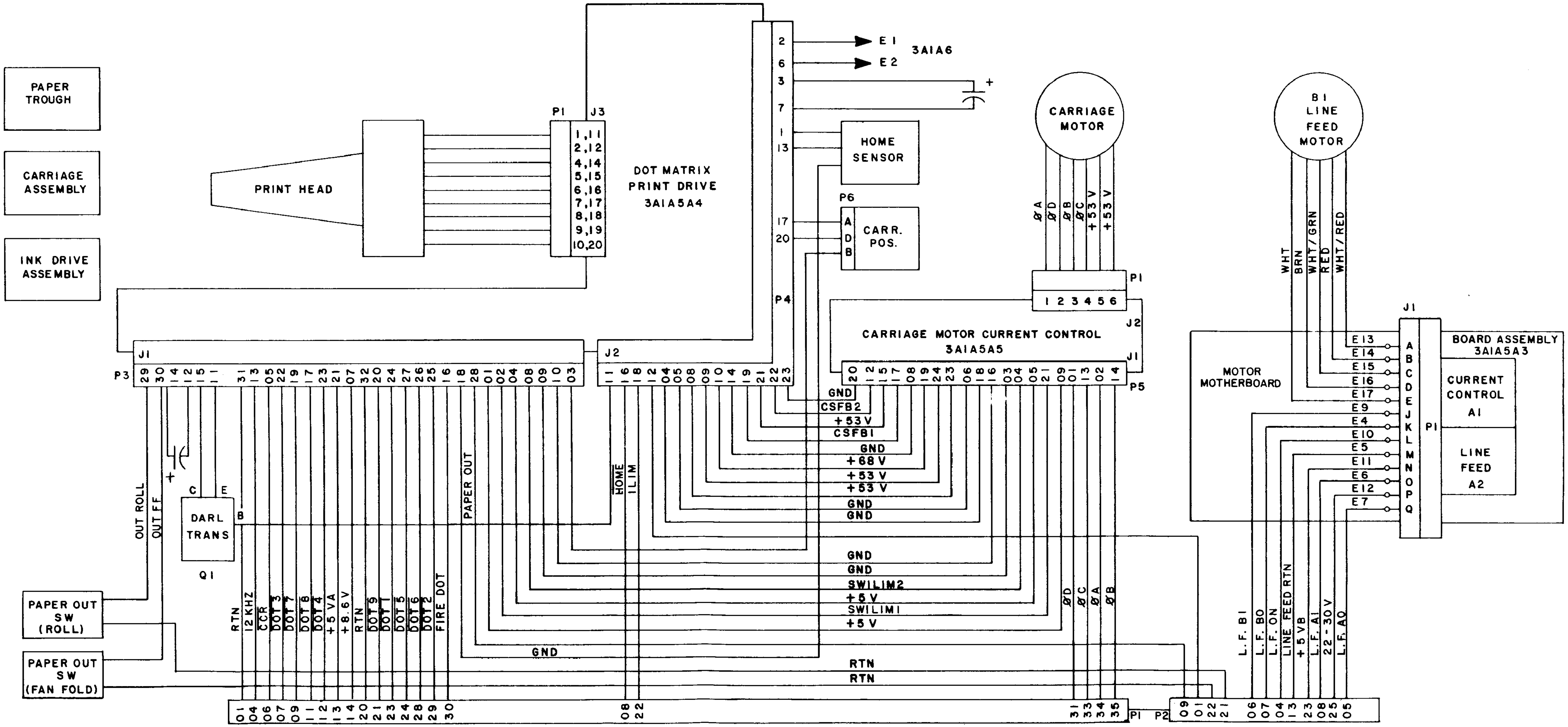


Figure FO-11. AN/UGC-74B(V)3 or AN/UGC-74C(V)3 Dot Matrix Printer Interconnect Diagram

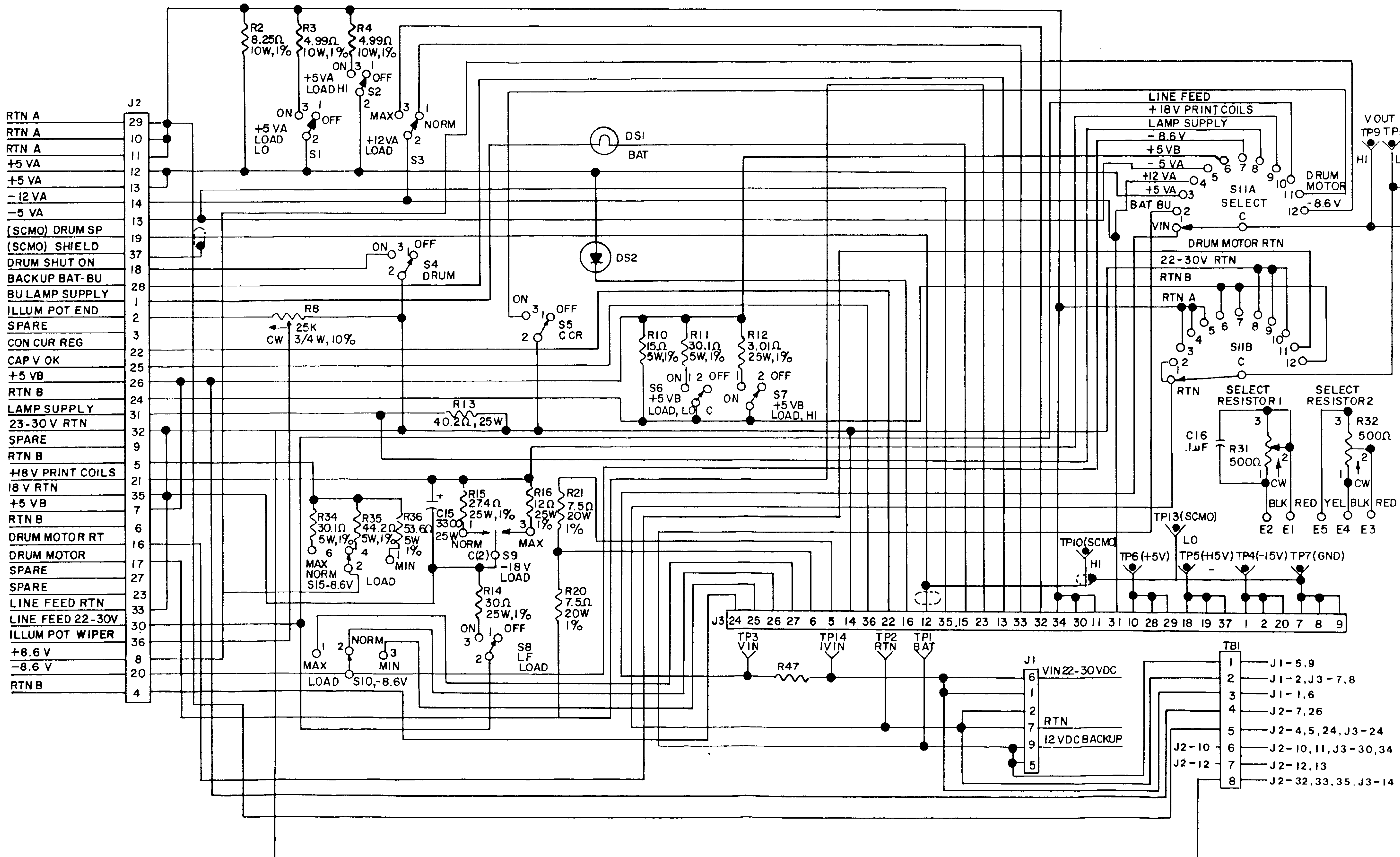


Figure FO-12. Power Supply Test Fixture, Schematic Diagram

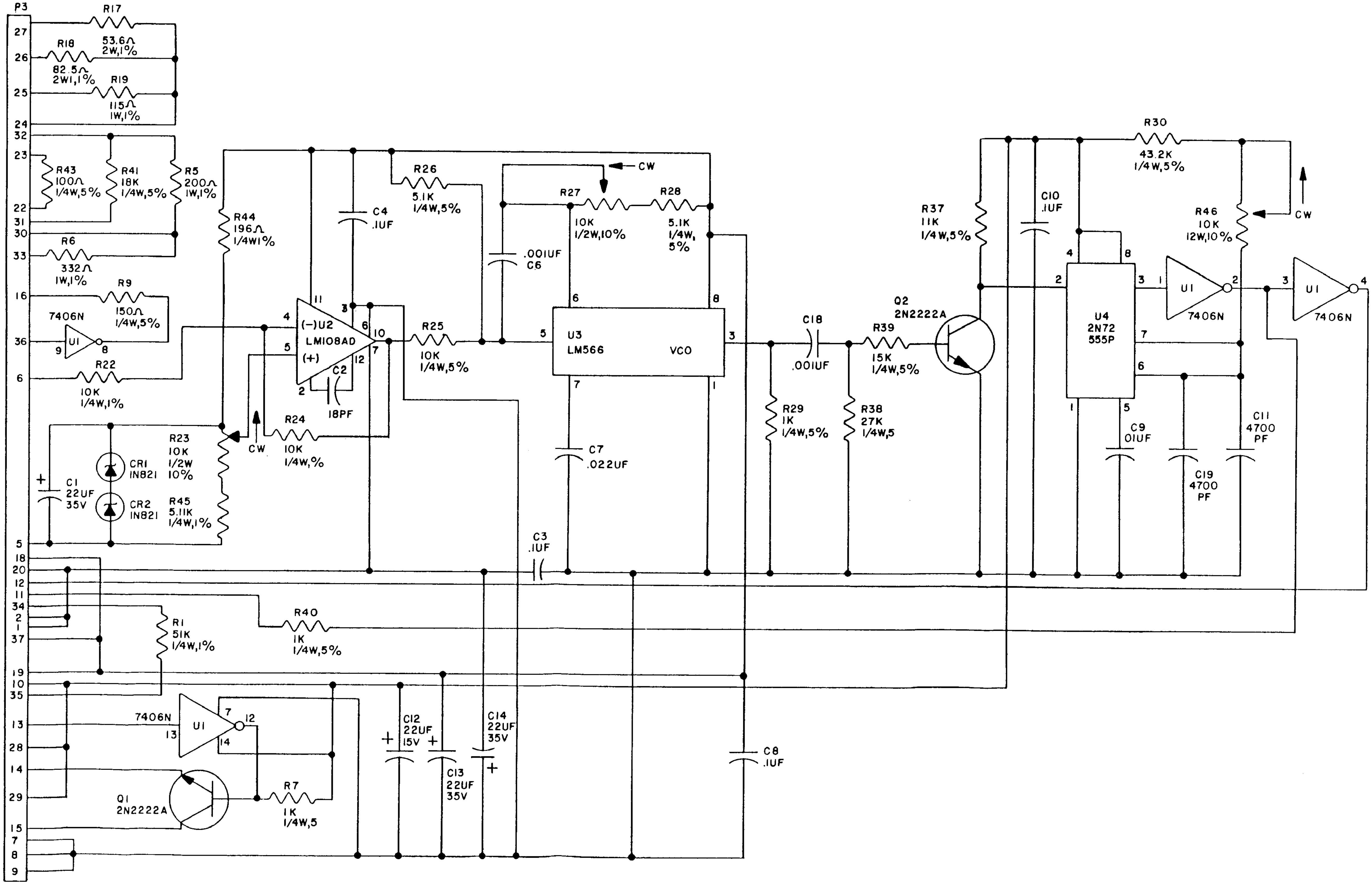


Figure FO-13. Drum Motor Simulator Test Fixture, Schematic Diagram

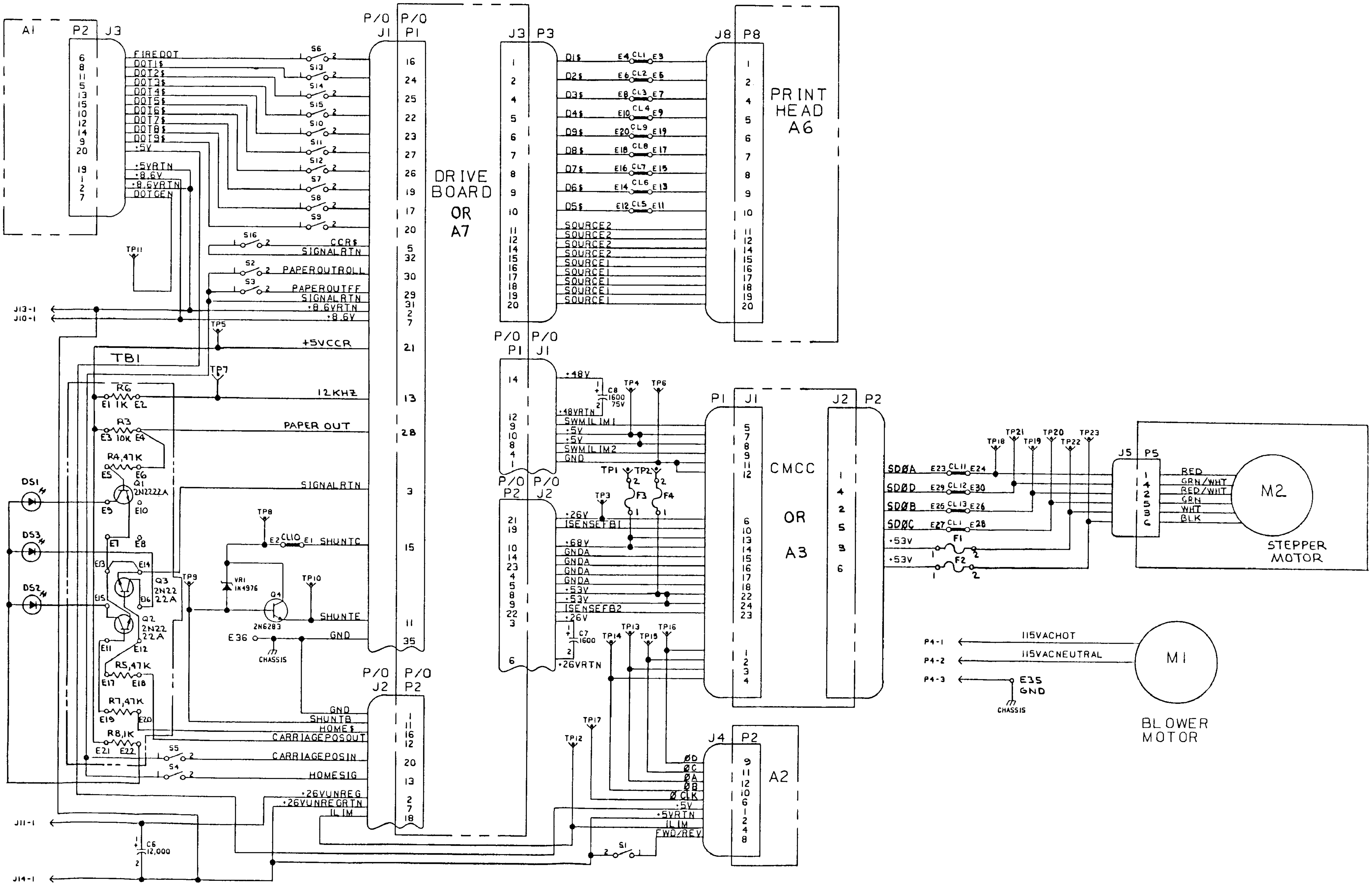
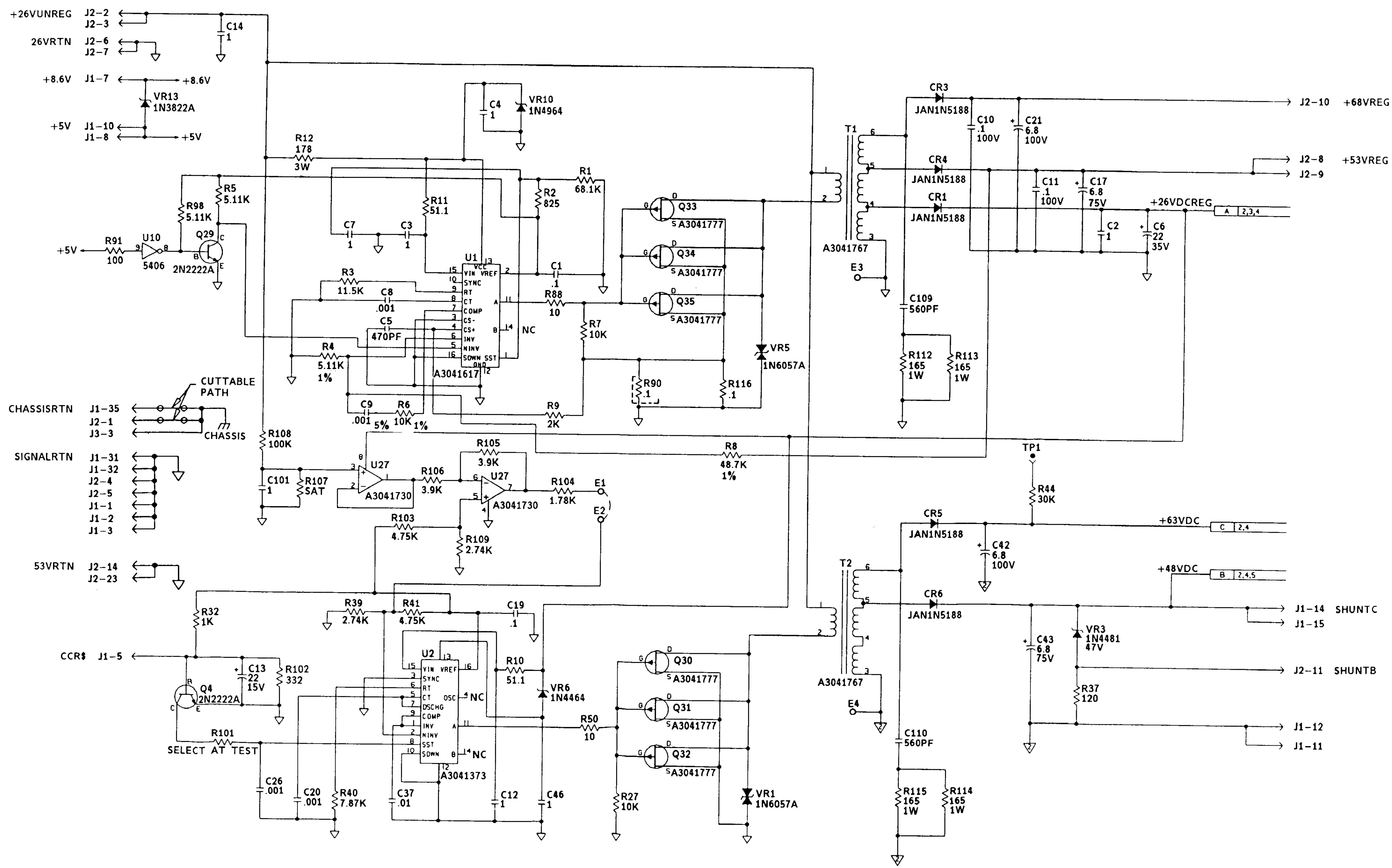
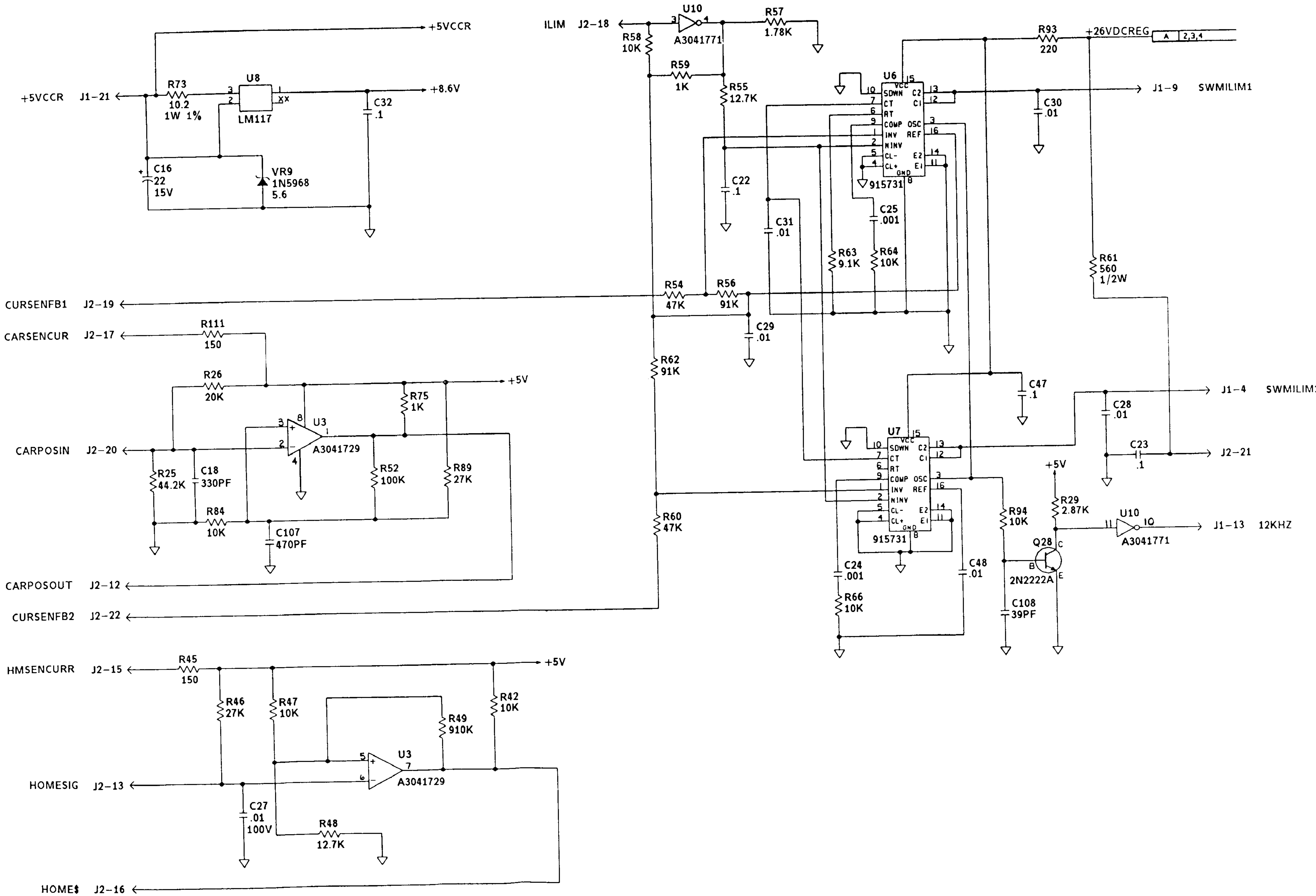


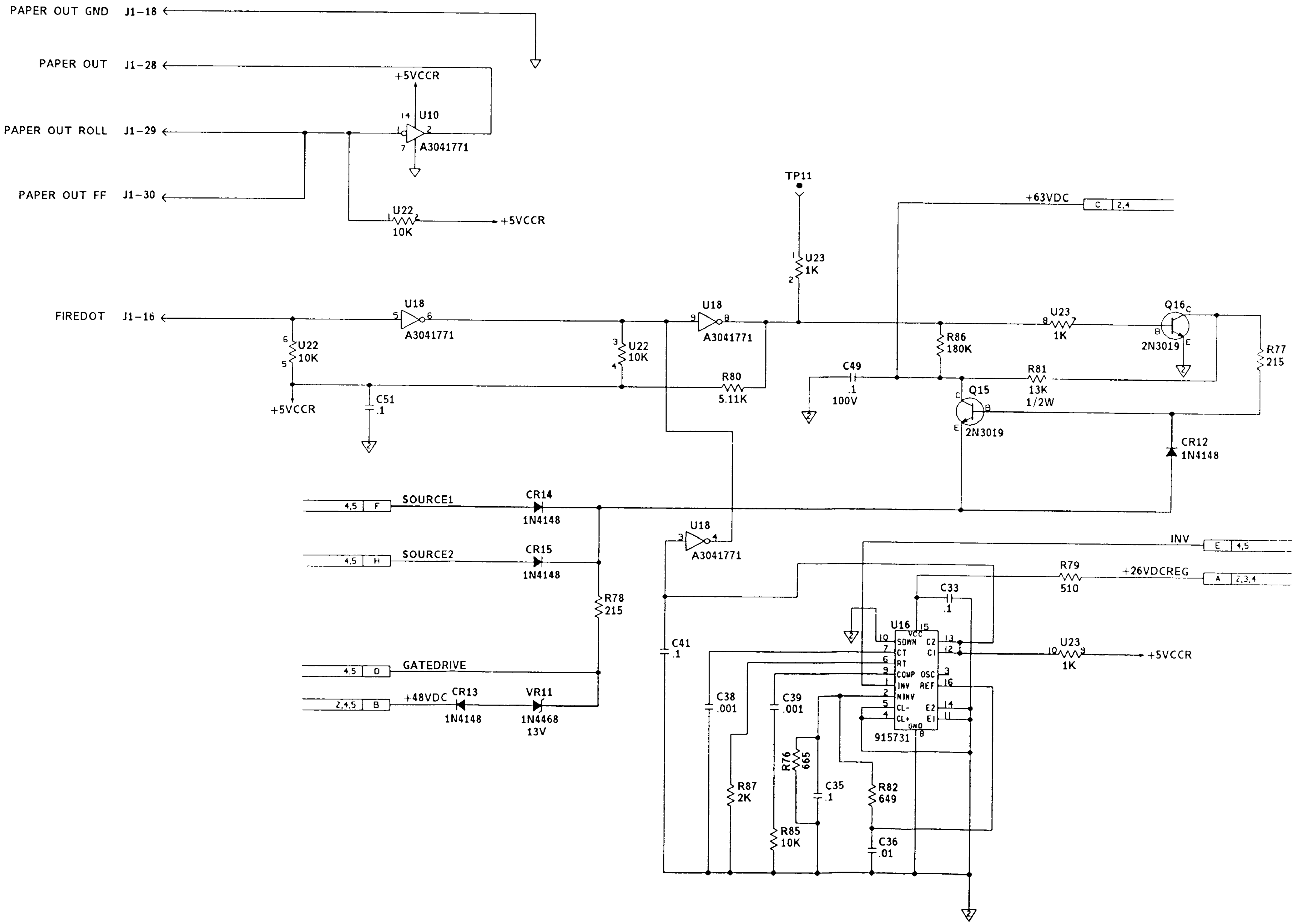
Figure FO-14. CMCC/Drive Board/Print Head Test Fixture Interconnect Diagram



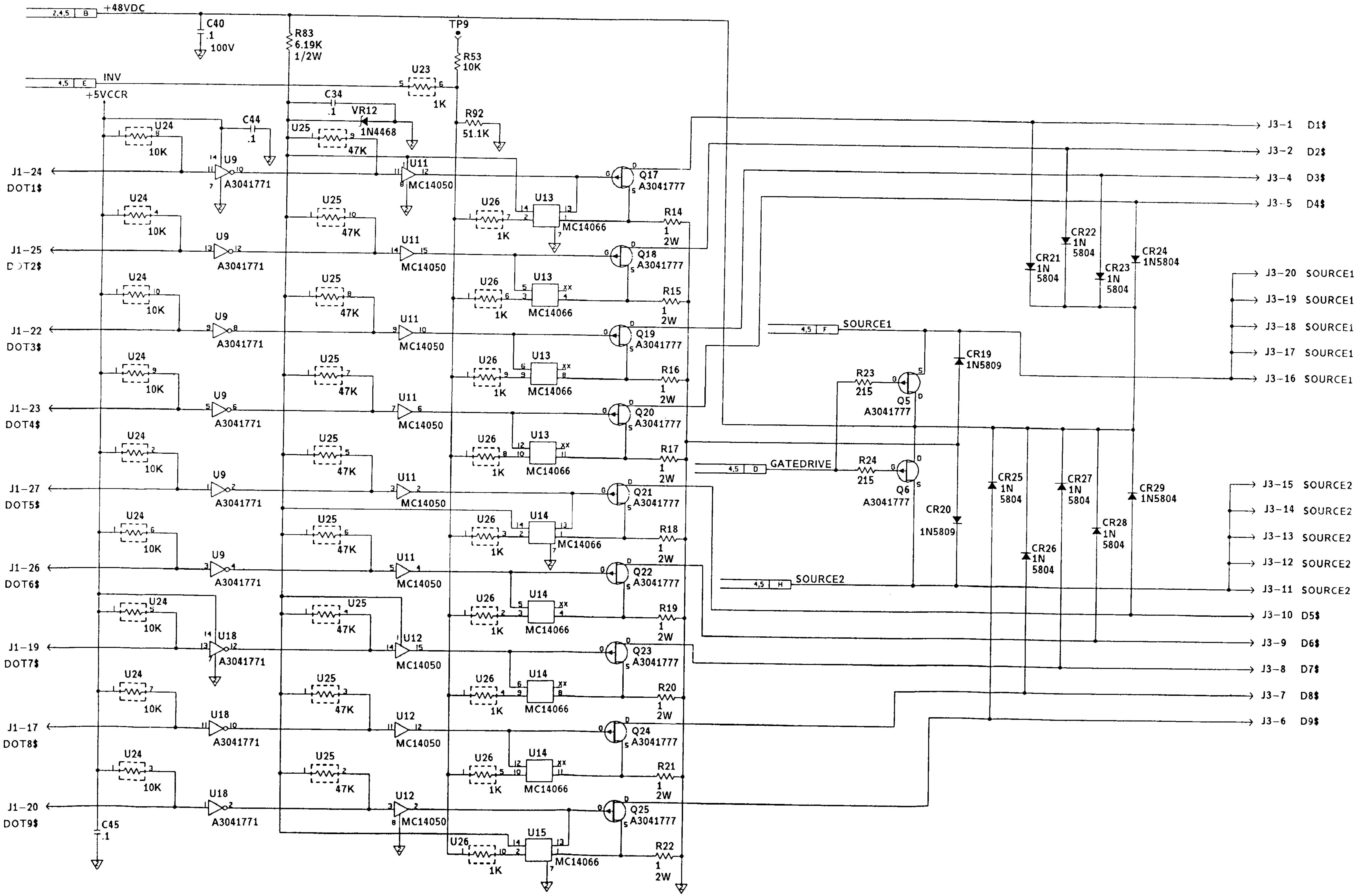
FO-15(1). Print Drive CCA Schematic Diagram
(Sheet 1 of 4)



FO-15(2). Print Drive CCA Schematic Diagram
(Sheet 2 of 4)



FO-15(3). Print Drive CCA Schematic Diagram
(Sheet 3 of 4)

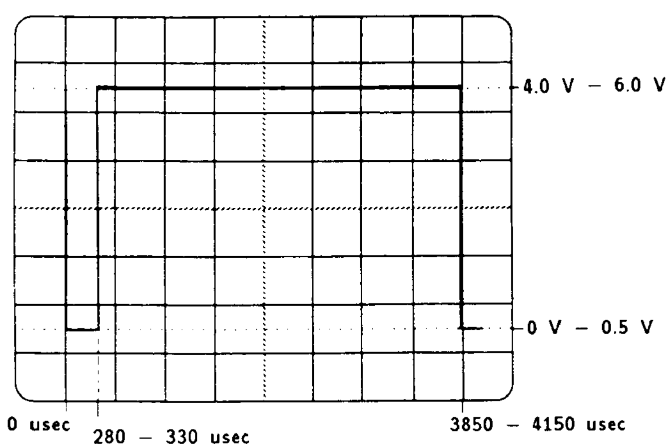


FO-15(4). Print Drive CCA Schematic Diagram
(Sheet 4 of 4)

(a) FIREDOT (Typical Waveform)

NOISE MINIMAL

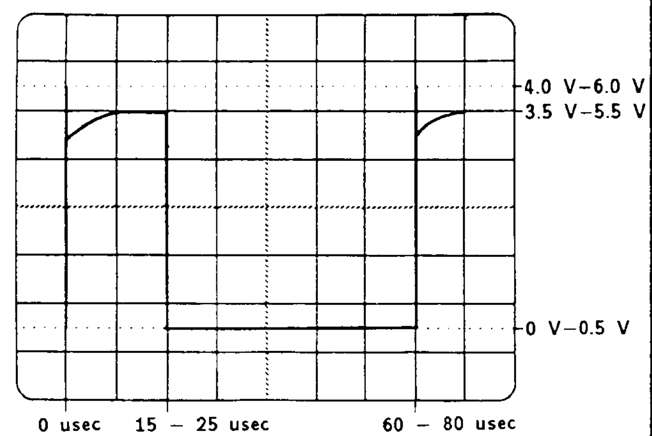
OSCILLOSCOPE SETTINGS:
1 V/DIV
0.5 MS/DIV



0 V PULSE WIDTH: 280 – 330 usec
PERIOD: 3850 – 4150 usec
AMPLITUDE: +4.0 V – +6.0 V

(b) ILIM (Typical Waveform)

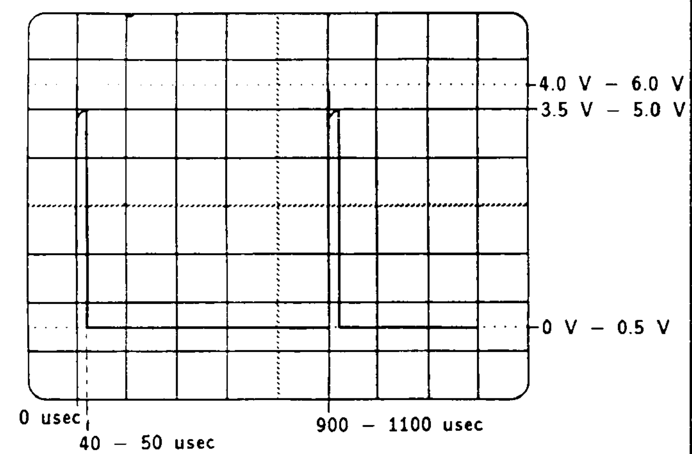
OSCILLOSCOPE SETTINGS:
1 V/DIV
10 uS/DIV



+5 V PULSE WIDTH: 15 – 25 usec
PERIOD: 60 – 80 usec
AMPLITUDE: +4.0 V – +6.0 V

(c) ØCLK (Typical Waveform)

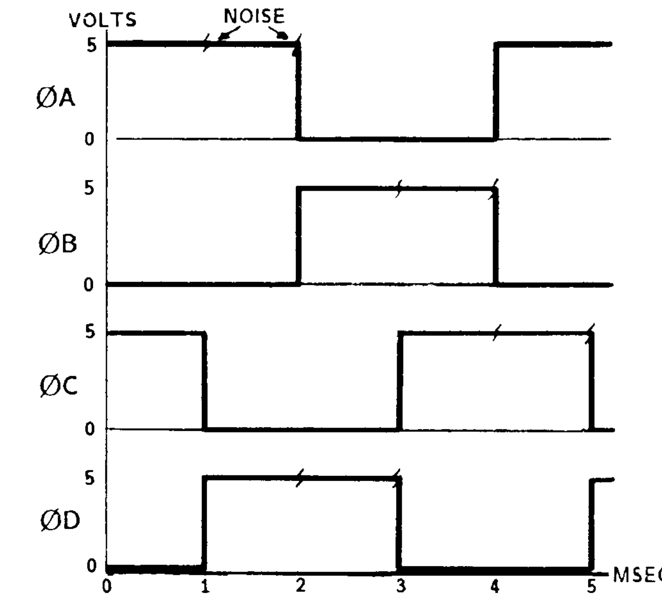
OSCILLOSCOPE SETTINGS:
1 V/DIV
0.2 MS/DIV



+5 V PULSE WIDTH: 40 – 50 usec
PERIOD: 900 – 1100 usec
AMPLITUDE: +4.0 V – +6.0 V

(d) ØA – ØD

OSCILLOSCOPE SETTINGS:
1 V/DIV
0.5 MS/DIV

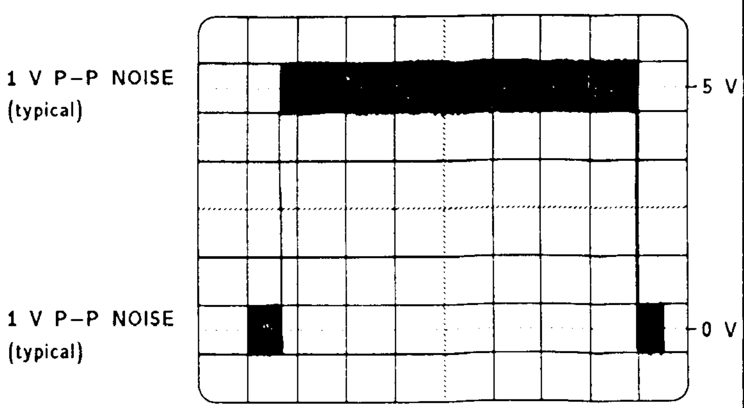


+5 V PULSE WIDTH: 1.75 – 2.25 usec
PERIOD: 3.5 – 4.5 msec
AMPLITUDE: +4.0 V – +6.0 V

(e) FIREDOT – DOT1–DOT9

A3 LOAD BOARD USED, $\overline{CCR}$ ON ($\overline{CCR}$ OFF DECREASES NOISE TO 0.5 V P–P), FIREDOT and/or $\overline{DOT}$ ON

OSCILLOSCOPE SETTINGS:
1 V/DIV
0.5 MS/DIV

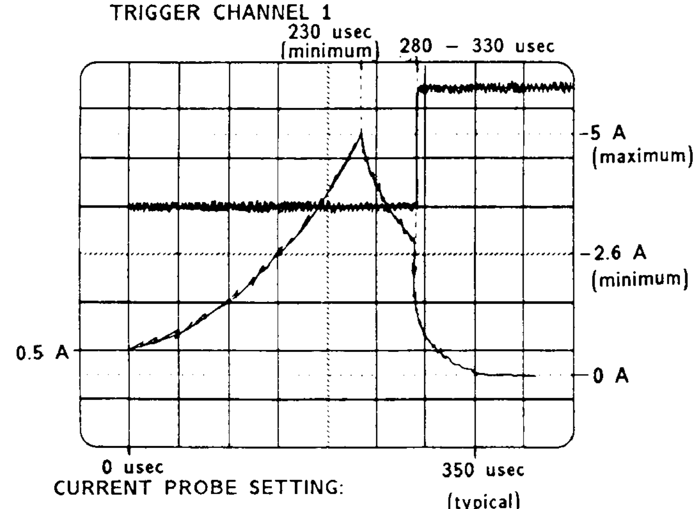


0 V PULSE WIDTH: 280 – 330 usec
PERIOD: 3850 – 4150 msec
AMPLITUDE: 0 V to +4.0 V – +6.0 V

(f) DOT CURRENT (Typical Waveform)

A3 BOARD USED, $\overline{CCR}$ ON, FIREDOT ON, $\overline{DOT}$ ON

OSCILLOSCOPE SETTINGS:
CH. 1 – 2.0 V/DIV (FIREDOT)
CH. 2 – 0.1 V/DIV (DOT CURRENT)
HORIZ – 50 uS/DIV
TRIGGER CHANNEL 1



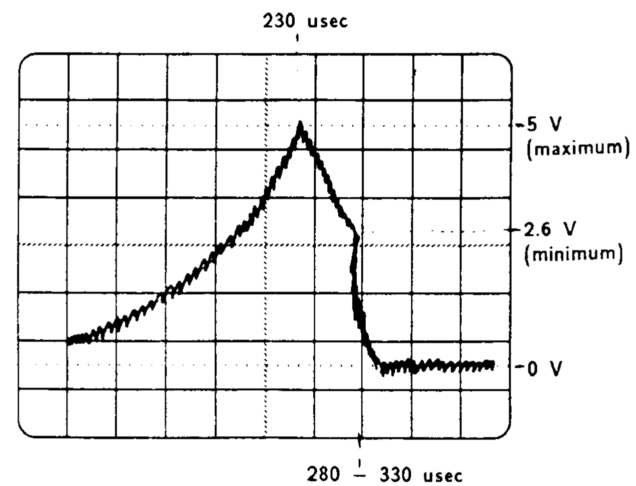
CURRENT PROBE SETTING:
10 MA/DIV
(GIVES 1 A/DIV ON OSCILLOSCOPE)

CURRENT PEAK: 3.5 A – 5.0 A at 230 usec (minimum)
SECOND PEAK: 2.6 A (minimum) at 0 V to +5V transistion of FIREDOT

(g) INV (TP9) – ON State

FIREDOT ON, $\overline{DOT}$ SWITCH ON, $\overline{CCR}$ OFF (TO REDUCE NOISE)

OSCILLOSCOPE SETTINGS:
1 V/DIV
50 uS/DIV

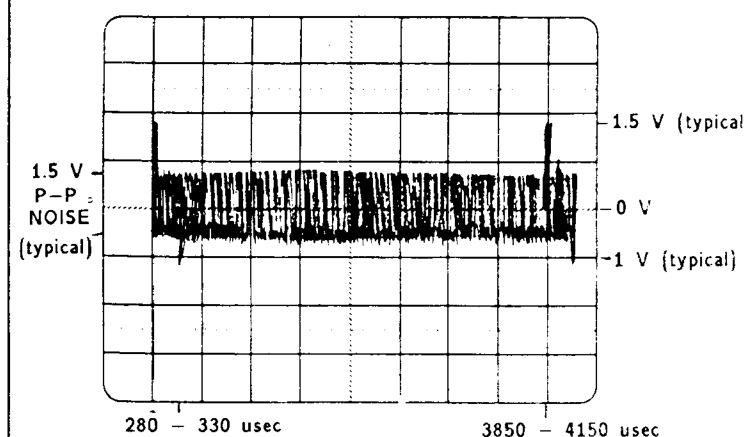


SIGNAL IS A VOLTAGE REPLICA OF DOT CURRENT WAVEFORM; SIGNALS CAN BE OVERLAID.
INV WILL FALL MORE SHARPLY.

(h) INV (TP9) – OFF State

A3 BOARD USED, $\overline{CCR}$ ON, FIREDOT ON, $\overline{DOT}$ SWITCH OFF. VOLTAGE SPIKES OCCUR AT THE TRANSISTION STATES OF FIREDOT; $\overline{CCR}$ OFF DECREASES NOISE TO 0.5 V P–P.

OSCILLOSCOPE SETTINGS:
1 V/DIV
0.5 MS/DIV

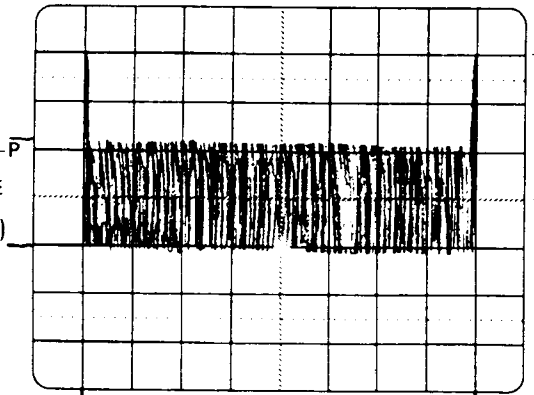


FO-16(1). CMCC and Print Drive Waveforms
(Sheet 1 of 2)

(i) U16–12,13 – ON State

$\overline{CCR}$ ON, FIREDOT ON, $\overline{DOT}$ ON ($\overline{CCR}$ OFF DECREASES NOISE TO 1 V P–P.) VOLTAGE SPIKE OF APPROXIMATELY 3 V OCCURS AT PERIOD OF FIREDOT.

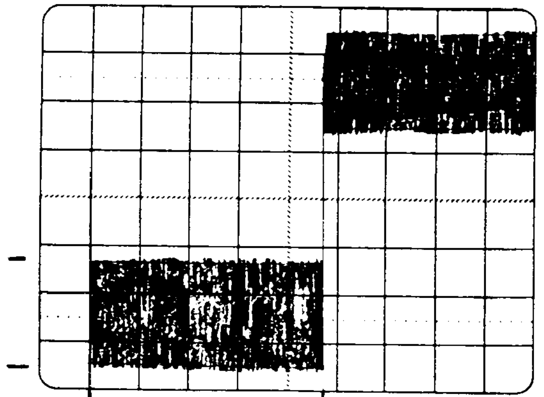
OSCILLOSCOPE SETTINGS:
1 V/DIV
0.5 MS/DIV



(j) TP11 (U18–8)

FIREDOT ON, $\overline{DOT}$ SWITCH ON, $\overline{CCR}$ OFF (TO REDUCE NOISE)

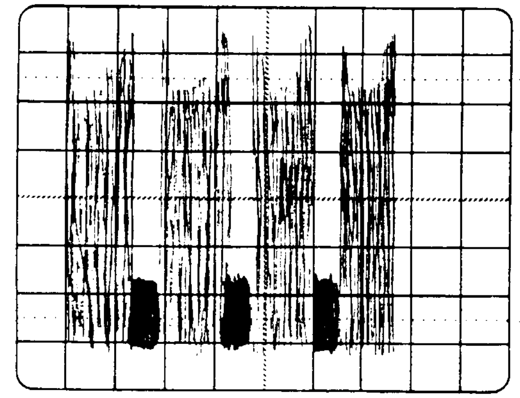
OSCILLOSCOPE SETTINGS:
0.5 V/DIV
50 uS/DIV



(k) SWMILIM1 & SWMILIM2

SIGNAL DOES NOT TRIGGER WELL.

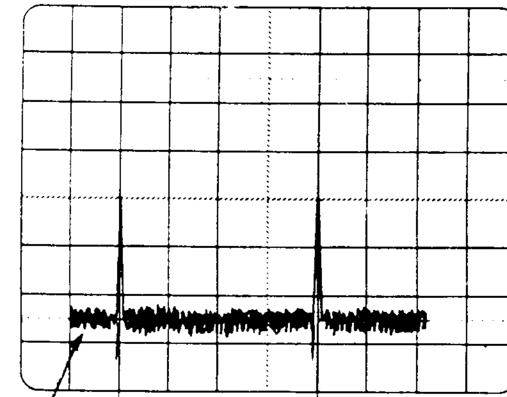
OSCILLOSCOPE SETTINGS:
1 V/DIV
1 MS/DIV



0 V PULSE APPROXIMATELY 0.4 msec
PERIOD APPROXIMATELY 1.8 ms
AMPLITUDE 6 V
NOISY SIGNAL

(l) 12kHZ (Typical Waveform)

OSCILLOSCOPE SETTINGS:
2 V/DIV
20 uS/DIV

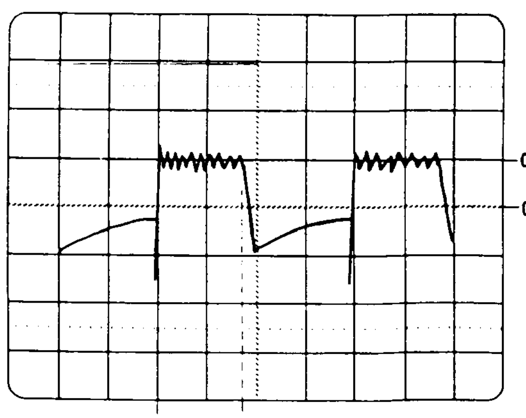


PERIOD: 60 – 80 usec
AMPLITUDE: 5.0 V – 7.0 V

(m) SDØA – SDØD (Typical Waveform)

SIGNAL MAY NOT TRIGGER WELL.

OSCILLOSCOPE SETTINGS:
50 mV/DIV
1 MS/DIV



CURRENT PROBE SETTING:
10 MA/DIV
(GIVES 1 A/DIV ON OSCILLOSCOPE)

POSITIVE GOING PULSE AMPLITUDE: 0.5 – 1.5 A
POSITIVE GOING PULSE WIDTH: 1.5 – 2.0 msec

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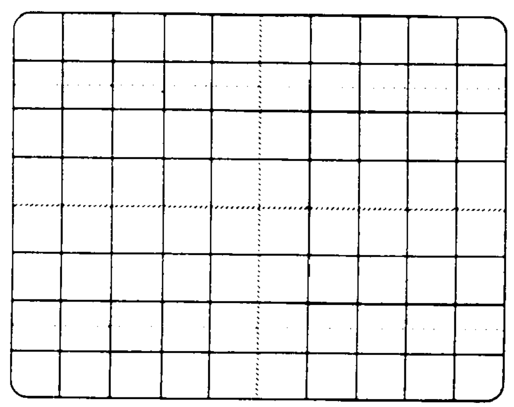

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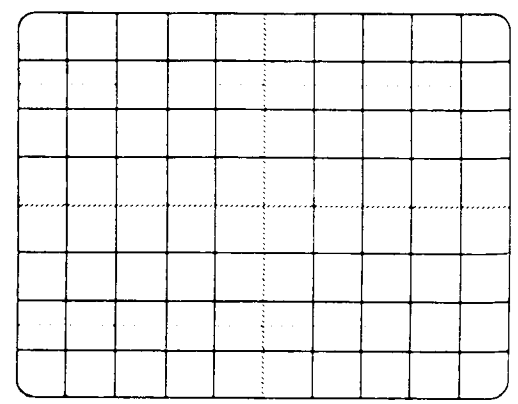

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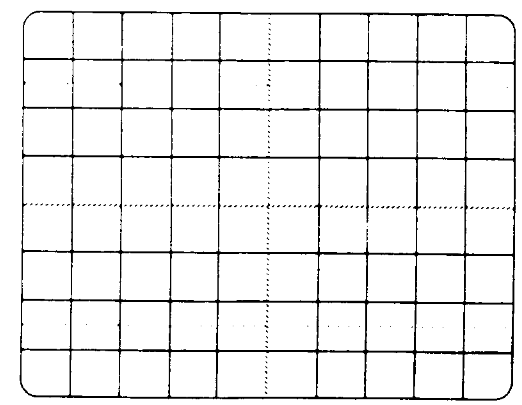

FO-16(2). CMCC and Print Drive Waveforms
(Sheet 2 of 2)

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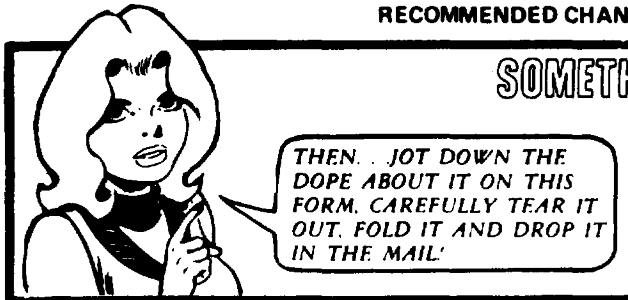
RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS



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FROM (PRINT YOUR UNIT'S COMPLETE ADDRESS)
Commander
Stateside Army Depot
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Stateside, N.J. 07703

DATE SENT
10 July 1975

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 11-5840-340-12	23 Jan 74	Radar Set AN/PRC-76

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
2-25	2-28			Recommend that the installation antenna alignment procedure be changed throughout to specify a 2° IFF antenna lag rather than 1°. REASON: Experience has shown that with only a 1° lag, the antenna servo system is too sensitive to wind gusting in excess of 25 knots, and has a tendency to rapidly accelerate and decelerate as it hunts, causing strain to the drive train. Hunting is minimized by adjusting the lag to 2° without degradation of operation.
3-10	3-3		3-1	Item 5, Function column. Change "2 db" to "3db." REASON: The adjustment procedure for the TRANS POWER FAULT indicator calls for a 3 db (500 watts) adjustment to light the TRANS POWER FAULT indicator.
5-6	5-8			Add new step f.1 to read, "Replace cover plate removed in step e.1, above." REASON: To replace the cover plate.
		F03		Zone C 3. On J1-2, change "+24 VDC to "+5 VDC." REASON: This is the output line of the 5 VDC power supply. +24 VDC is the input voltage.

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
SSG I. M. DeSpiritof 999-1776

SIGN HERE
SSG I. M. DeSpiritof

DA FORM 1 JUL 79 2028-2

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P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS

TEAR ALONG PERFORATED LINE

TEAR ALONG PERFORATED LINE

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

THEN...JOT DOWN THE DOPE ABOUT IT ON THIS FORM. CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL.

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 11-5815-602-24-1	15 Sept 1987	Terminal, Communications AN/UGC-74B&C(V)3

BE EXACT PIN-POINT WHERE IT IS				IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.	

PRINTED NAME GRADE OR TITLE AND TELEPHONE NUMBER	SIGN HERE

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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

'/EIGHTS

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

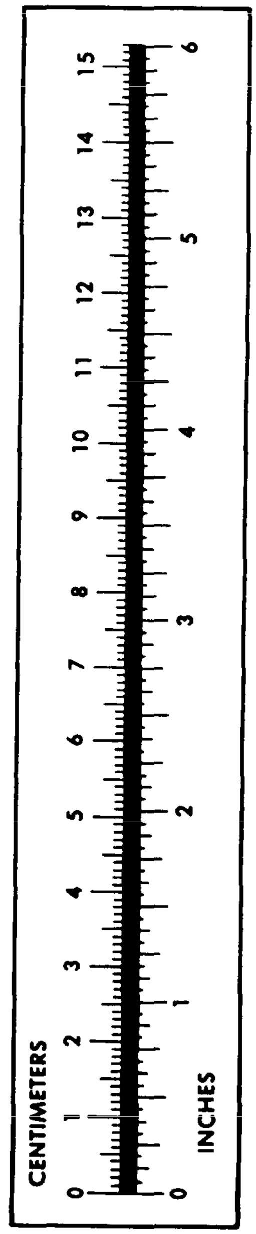
TEMPERATURE

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
'ometers per Liter	Miles per Gallon	2.354
›meters per Hour	Miles per Hour	0.621



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