DEPARTMENT OF THE ARMY TECHNICAL MANUAL
DEPARTMENT OF THE NAVY TECHNICAL MANUAL
DEPARTMENT OF THE AIR FORCE TECHNICAL ORDER

TM 11-7440-223-15
NAVSHIPS 0967-324-0080
TO 31W4-2G-91

OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE MANUAL

PRINTER PAGE RP-157/G

This copy is a reprint which includes current pages from Changes 1 through 10.

DEPARTMENTS OF THE ARMY, THE NAVY, AND THE AIR FORCE
1969

WARNING

DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT

Be careful when working anywhere within the enclosure of this equipment. Serious injury or death may result from contact with high-voltage terminals.

DON'T TAKE CHANCESI

Change No. 10

DEPARTMENTS OF THE ARMY,
THE NAVY, AND THE AIR FORCE
Washington, DC, *25 September 1981*

**Operator's, Organizational, Direct Support, General Support,
and Depot Maintenance Manual
PRINTER, PAGE RP-157/G (NSN 7440-00-997-6210)**

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4-43 and 4-44	4-43 and 4-44
5-9 and 5-10	5-9 and 5-10
5-13 and 5-14	5-13 and 5-14
5-17 through 5-19 (5-20 blank)	5-17 through 5-19/5-20 blank)
8-41	8-41
8-43	8-43
8-61	8-61

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CHANGE
No. 9

DEPARTMENTS OF THE ARMY,
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WASHINGTON, DC, 27 August 1979

Operator's Organizational, Direct Support, General Support, and Depot Maintenance Manual

PRINTER, PAGE RP-157/G (NSN 7440-00-997-6210

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i/(ii blank)	i/(ii blank)
4-11 and 4-12	4-11 and 4-12
C-1 through C-3	C-1 through C-7
D-1 through D-295	None
I-1 and I-2	I-1 and I-2

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USACC-EUR (25)
USACC-SO (10)
USACC-A (5)
HQ 7th Sig Cmd (5)
Sig Gp (USACC) Japan (3)
Sig Gp (USACC) Taiwan (3)
USASATCOMA (2)
USACSA (4)
USASIGS (5)
USAICS (3)
7th & 8th Armies (4)
Corps (2)
Sig Dep (2)
Sig Sec GENDEPS (2)
Army Depots (2) except
    Ft Gillem (10)
    LBAD (10)
    SAAD (25)
    TOAD (14)
GENDEPS (2) except
    Pirmasens (10)
USAERDAA (1)
USAERDAW (1)
Ft Carson (5)
Ft Richardson (CERCOM Ofc) (1)
Units org under fol TOE:
    (1 cy each units)
    11-75
    11-85
    11-95
    11-98
    11-137
    11-302
    11-347
    11-367
    11-368
    11-500 (AA-AC)
    29-134
    29-136

NG: None

USAR: None

For explanation of abbreviations used see, AR 310-50.

CHANGE NO. 8

DEPARTMENTS OF THE ARMY,
THE NAVY, AND THE AIR FORCE
WASHINGTON, DC, *4 October 1978*

Operator's, Organizational, Direct Support, General Support, and Depot Maintenance Manual (Including Repair Parts and Special Tools Lists)
PRINTER, PAGE RP-157/G (NSN 7440-00-997-6210)

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Remove pages	*Insert pages*
iii and iv	iii and iv
3-41 and 3-42	3-41 and 3-42
4-1 and 4-2	4-1 and 4-2
4-2.1	4-2.1/(4-2.2 blank)
4-43 and 4-44	4-43 and 4-44
4-49 and 4-50	4-49 and 4-50
4-81 through 4-84	4-81 through 4-84
4-85 and 4-86	4-85 and 4-86
4-88.1 and 4-88.2	4-88.1 through 4-88.3 (4-88.4 blank)
7-1	None
8-63	8-63/(8-64 blank)
8-71	8-71/(8-72 blank)
D-11 and D-12	D-11 and D-12
52 and 53	52 and 53
57 and 58	57 and 58
71 and 72	71 and 72

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USACC-PAC (2)
USACC-EUR (25)
USACC-SO (10)
USACC-A (5)
HQ, 7th Sig Comd (5)
Sig Gp (USACC) Japan (3)
Sig Gp (USACC) Taiwan (3)
USASATCOMA (2)
USACSA (4)
USADIGS (5)
USAICS (3)
7th & 8th Armies (4)
Corps (2)
Army Depots (2) except
LBAD (10)
SAAD (25)
TOAD (14)

Gen Deps (2) except
Pirmasens (10)
Sig Dep (2)
Sig Sec Gen Deps (2)
USAERDAA (1)
USAERDAW (1)
Fort Gillem (5)
Ft Richardson (CERCOM) (1)
Ft Monmouth (HISA) (26)
Units org under fol TOE:
(1 cy to ea unit)
11-75
11-85
11-95
11-98
11-137
11-302
11-347
11-367
11-368
11-500 (AA-AC)
29-134
29-136

NG: None

USAR: None

For explanation of abbreviations used, see AR 310-50

CHANGE
NO. 7

DEPARTMENTS OF THE ARMY,
THE NAVY, AND THE AIR FORCE
WASHINGTON, DC, *17 November 1976*

Operator's, Organizational, Direct Support, General Support, and Depot Maintenance Manual Including Repair Parts and Special Tools Lists
PRINTER, PAGE RP-157/G (NSN 7440-00-997-6210)

TM 11-7440-223-15/NAVELEX 0967-324-0080/TO 31W4-2G-91, 22 January 1969, is changed as follows:
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Remove pages	*Insert pages*
A through F	None
i	i/(ii blank)
v and vi	v and vi
1-1 and 1-2	1-1 through 1-2
3-11 and 3-12	3-11 and 3-12
4-1 and 4-2	4-1 and 4-2
4-9 through 4-12	4-9 through 4-12
4-21 and 4-22	4-21 and 4-22
4-22.1 and 4-22.2	4-22.1 and 4-22.2
4-27/(4-28 blank)	4-27/(4-28 blank)
4-43 and 4-44	4-43 and 4-44
4-75 through 4-82	4-75 through 4-82
4-84.1	4-84.1/(4-84.2 blank)
4-85 through 4-88	4-85 through 4-88
4-88.1	4-88.1 and 4-88.2
4-89 and 4-90	4-89 and 4-90
8-1	8-1/(8-2 blank)
8-3/(8-4 blank)	None
8-15/(8-16 blank)	8-15/(8-16 blank)
8-21/(8-22 blank)	8-21/(8-22 blank)
8-29	8-29/(8-30 blank)
A-1/(A-2 blank)	A-1/(A-2 blank)
I-1 through I-3	I-1 through I-3/(I-4 blank)
None	Authentication Page

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USAREUR (5)
TECOM (2)
MICOM (2)
USACC (10)
USACC-PAC (2)
USACC-EUR (25)
USACC-SO (10)
USACC-A (5)
USACC-CONUS (10)
Sig Bde (USACC) Korea (3)
Sig Gp (USACC) Japan (3)
Sig Gp (USACC) Taiwan (3)
SATCOM (2)
USACSA (4)
USASIGS (5)
USAICS (3)
7th & 8th Armies (4)
Corps (2)

Sig FLDMS (1)
USAERDAA (1)
USAERDAW (1)
Instl (2) except
ATAD (10)
LBAD (10)
SAAD (25)
TOAD (14)
Pirmasens (10)
Fort Carson (5)
Ft Richardson (ECOM) (1)
Units Org under fol TOE:
(1 cy each unit)
11-75
11-86
11-95
11-98
11-137
11-302
11-347
11-367
11-368
11-500 (AA-AC)
29-134
29-136

NG: None

USAR: None

For explanation of abbreviations used, see AR 310-50.

CHANGE
No. 6

DEPARTMENTS OF THE ARMY,
THE NAVY, AND THE AIR FORCE
WASHINGTON, DC, *11 November 1975*

Operator's, Organizational, Direct Support, General Support and Depot

Maintenance Manual Including Repair Parts and Special Tools Lists

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Remove pages	Insert pages
A through E	A through E
i/(ii blank)	i/(ii blank
v, vi	v, vi
1-1 through 1-4	1-1 through 1-4, and
3-23 through 3-25/(3-26 blank)	3-23 through 3-25/(3-26 blank)
3-27 through 3-32	3-27 through 3-32
3-35, 3-36	3-35, 3-36
3-39 through 3-50	3-39 through 3-50
3-57 through 3-66	3-57 through 3-66
4-1, 4-2, 4-2.1/(4-2.2 blank)	4-1, 4-2, 4-2.1
4-3 through 4-10	4-3 through 4-10
4-21, 4-22	4-21, 4-22, 4-22.1 and 4-22.2
4-31 through 4-44	4-31 through 4-42 and 4-42.1/(4-42.2 blank), 4-43 and 4-44
4-49, 4-50	4-49, 4-50
4-55 through 4-60	4-55 through 4-60
4-71, 4-72	4-71, 4-72
4-79, 4-80	4-79, 4-80
4-83 through 4-91	4-83, 4-84, and 4-84.1/(4-84.2 blank), 4-85 through 4-88 and 4-88.1/(4-88.2 blank), 4-89 through 4-91/(4-92 blank)
5-17 through 5-19/(5-20 blank)	5-17 through 5-19/(5-20 blank)
8-9, 8-10	8-9, 8-10
8-13/18-14 blank)	8-13/(8-14 blank)
8-15/(8-16 blank)	8-15/(8-16 blank)
8-21/(8-22 blank)	8-21/(8-22 blank)
8-39/(8-40 blank)	8-39/(8-40 blank)
8-49/(8-50 blank)	8-49/(8-50 blank)
8-69/(8-70 blank)	8-69/(8-70 blank)
B-1 through B-3	None
D-3, D-4	D-3, D-4
D-9, D-10	D-9, D-10
D-17, D-18	D-17, D-18
I-1, I-2	I-1, I-2

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Sig FLDMS (1)
USAERDAA (1)
USAERDAW (1)
Fort Gillem (10)
Fort Carson (5)
Ft Richardson (ECOM Ofc) (1)
Units org under fol TOE
(1 copy each unit):
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11-95
11-98
11-137
11-302
11-347
11-367
11-368
11-500 (AA-AC)
29-134
29-136

NG: None.
USAR: None.
For explanation of abbreviations used, see AR 310-50.

TECHNICAL MANUAL
No. 11-7440-223-15
NAVELEX 0967-324-0080
TECHNICAL ORDER
No. 31W4-2G91

DEPARTMENTS OF THE ARMY,
THE NAVY, AND THE AIR FORCE
WASHINGTON, DC, *22 January 1969*

Operator's Organizational, Direct Support, General Support, and Depot Maintenance Manual

PRINTER, PAGE RP-157 G
(NSN 7440-00-997-6210)

LIST OF ILLUSTRATIONS

LIST OF ILLUSTRATIONS-Continued

NOTE: → symbol indicates; added entry (see bottom of page).

LIST OF ILLUSTRATIONS (continued)

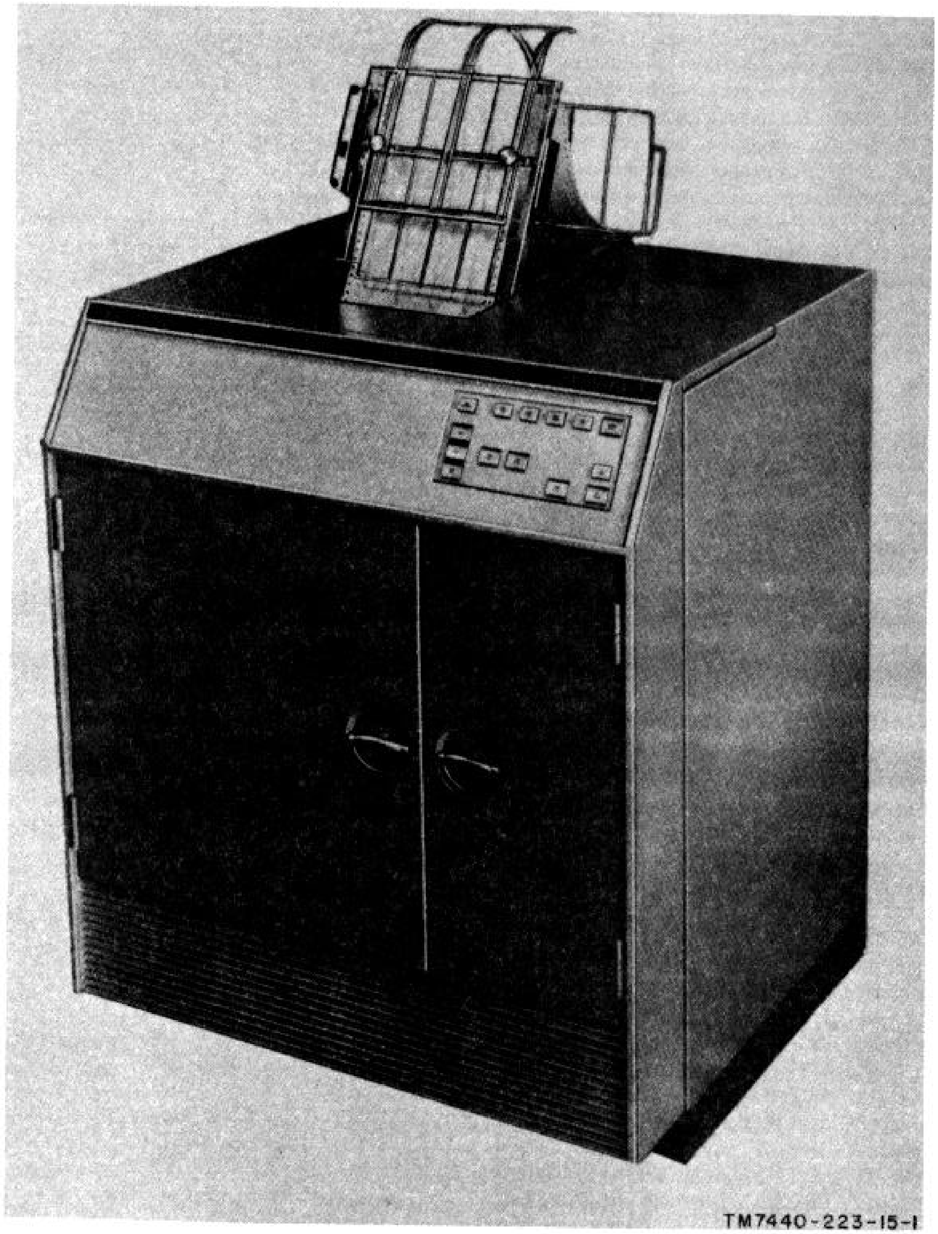


Figure 1-1. Page Printer RP-157/G, less running spares.

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1-1. Scope

This manual describes Page Printer RP-157/G (fig. 1-1), and contains operation and maintenance information. It also covers detailed functioning of the page printer and includes the maintenance allocation chart (app C). Refer to TM 11-7440-239-15/TO 31W 4-4-11 NAVSHIPS 0967-324-0110 (app A) for installation and checkout procedures.

1-2. Indexes of Publications

DA Pam 310-4. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, additional publications or modification work orders pertaining to the equipment.

1-3. Maintenance Forms, Records, and Reports

a. Reports of Maintenance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by TM 38-750, The Army Maintenance Management System (Army). Air Force personnel will use AFM 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.

b. Report of Item and Packaging Discrepancies. Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140.55/NAVMATINST 4355.73/AFR 400-54 and MCO 4430.3E.

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33B/AFR 75-18/MCO P4610.19C and DLAR 4500.15.

1-3.1. Reporting Errors and Recommending Improvements

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct to Commander, US Army Communications-Electronics Command. ATTN: DRSEL-ME-MQ, Fort Monmouth, NJ 07703. 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. For Navy, mail comments to the Commander, Naval Electronics Systems Command, ATTN: ELEX 45053 (O.H.), Washington, DC 20360. A reply will be furnished direct to you.

1-3.2. Reporting Equipment Improvement Recommendations (EIR)

a. Army. If your page Printer RP-157/G needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Tell us why a procedure is hard to perform. Put it on an SF 368 (Quality Deficiency Report). Mail it to Commander, US Army Communication-Electronics Command, ATTN DRSEL-ME-MQ, Fort Monmouth, NJ 07703. We'll send you a reply.

b. Air Force. Air Force personnel are encouraged to submit EIR's in accordance with AFM 900-4.

c. Navy. Navy personnel are encouraged to submit EIR's through their local Beneficial Suggestion Program.

1-3.3. Administrative Storage

For procedures, forms, and records, and inspections required during administrative storage of this equipment, refer to TM 740-90-1.

1-3.4. Destruction of Electronics Materiel

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

Section II. DESCRIPTION AND DATA

1-4. Purpose and Use

a. The page printer is used to convert electrical input data to printed copy on 9¼ x 2=inch wide, fan-fold, sprocket-fed paper. The input data is transferred to the page printer in eight-bit, American Standard Code for Information Interchange (ASCII), on a bit-parallel, character-serial basis (eight bit used to Maintain odd parity). In response to the input data, the page printer prints the corresponding message characters at speeds up to 300 characters per second, ten characters per inch, six lines per inch, and from one to eighty characters per line.

b. The page printer is used as an output and monitoring component of Digital Subscriber Terminals AN/FYA-71 (V) 1 through AN/FYA-71(V)6 (described in TM 11-7440-238-15; TO 31W4-4-1-101; NAVSHIPS 0967-324-0100; app A). The page printer is connected to Common Control Unit C-8120(P)/G(CCU) and receives its control and ASCII data signals from the CCU (fig. 1-2).

1-5. Technical Characteristics of Page Printer

Input	Eight-bit electrical data in ASCII form transferred on a bit-parallel, character-serial basis with the eighth bit maintaining odd parity.
Output data	Character print-out on standard 66-line sprocketed fan-fold paper.
Operating speed	300 characters per second.
Paper type	9½-inch wide, sprocket-fed, single-ply or 2, 3, 4, or 5 multiply. Paper lengths can be 8½, 11, or 14 inches.
Print-out capability	10 characters per inch, 1 to 80 characters per line, 6 lines per inch.
Power requirements	120 volts (+12,-24), 50 Hz (+2.5) or 60 Hz (+3), single-phase, 11 amperes running current, 64 amperes starting current.

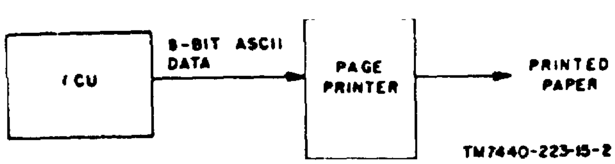


Figure 1-2. Typical system application, block diagram.

1-6. Items Comprising an Operable Equipment

a. Components.

NSN	QTY	Nomenclature, part No., and mfr code	Dimensions (in.) Height	Depth	Width	Weight (lbs)
		NOTE The part number is followed by the applicable 5-digit Federal supply code for manufacturers (FSCM) identified in SB 708-42 and used to identify manufacturer, distributor, Government agency, etc.				
7440-00-997-6210		Page Printer RP-157/G: 461736; 58189	43	30	35	750
		Consisting of:				
	2	Ribbon and Roll Assembly: 52531G1; 09211				
	1	Strobe Disc Assy 8½ inch: 56531G1; 09211				
	1	Strobe Disc Assy 14 inch: 56521G3; 09211				
	1	Pulley 50 Cycle: 566-1; 09211				
	2	Spring 50 Cycle: 11200-1; 09211				

b. Common Names. The following list provides the reference designation, official name, common name used in this manual, and the manufacturer's part number of each item listed. Although the full reference designations are shown below, abbreviated reference designations for subassemblies and subassembly parts are frequently used in this manual. Prefix the abbreviated reference designation with the applicable assembly and/or subassembly identification letters and numbers to obtain the full reference designations.

Reference designation	*Item name*	*Common name*	*Mfg. part No.*
A1	Electrical equipment cabinet	Enclosure	56611
A1A1, A1A3	Fan assembly	Fan assembly	56907
A1A2	Ac line filter assembly	Filter assembly	56912

Reference designation	*Item name*	*Common name*	*Mfg. part No.*
A2A2A4B3	PC card	Interface A	56732
A2A2A4B4	PC card	Compare and restore	(See note.)
A2A2A4B5	PC card	7x32 SR storage	56726
A2A2A4B6	PC card	Decode and parity	56725
A2A2A4B7	PC card	Control interface	56720
A2A2A4B8	PC card	Run control	56721
A2A2A4B9	PC card	Load and line control	56724
A2A2A4B10	PC card	Message control	56722
A2A2A4B11	PC card	Function control	56723
A2A2A4B12	PC card	Print address	56729
A2A2A4B13	PC card	Print control	56728
A2A3	Internal paper storage backet	Storage basket	56775
A2A5	Front access panel assembly	Front panel assembly	56935
A2A5A1	Power distribution and indicating panel	Control panel	56934
A3	External paper stacker	Paper stacker	56614

NOTE

MWO 11-7440-223-30-1 changes the part number of A2A24A1 from 56730 to 12-890136 and the part number of A2A2A4B4 from 56727 to 12-890137.

1-6.1 Expendable Consumable Supplies and Materials

Expendable consumable supplies and materials are listed in table 1-1.

Table 1-1. Expendable Consumable Supplies and Materials

The supplies and materials listed in this table are required for operation of this equipment and are authorized to be requisitioned by CTA 50-970. The NSN for the applicable unit of issue required can be found in appropriate supply catalogs. The FSCM is used as an element in item identification to designate manufacturer or distributor to Government agency, etc., and is identified in SB 708-42.

Item	*Description*	*Ref No. and FSCM*	*FSC*
1	Paper; (400-1 Part)	09211 56093-1	

1-7. Description of Page Printer

When ready for operation, the components of the page printer are assembled in an RFI-tight, cabinet-type enclosure as shown in figure 1-1. Front access panel assembly A2A5 has two doors for easy access to the front of print head assembly A2A1, electronic assembly A2A2, and internal paper storage basket A2A3. Frame assembly A2 is mounted on four wheels which provide easy removal from the inclosure (fig. 1-3). Removal of frame assembly A2 provides access to the sides and rear of print head assembly A2A1, electronic assembly A2A2, and front access panel assembly A2A5. RFI shielding is provided for all interface connectors by an interface terminal board assembly A1A4 located inside the inclosure. The interface terminal board assembly A1A4 also supports ac line filter assembly A1A2 (located inside the inclosure) which filters incoming ac power. Two fan assemblies A1A1 and A1A3 are also located inside the inclosure to provide a cooling air flow to the power supply and logic assemblies.

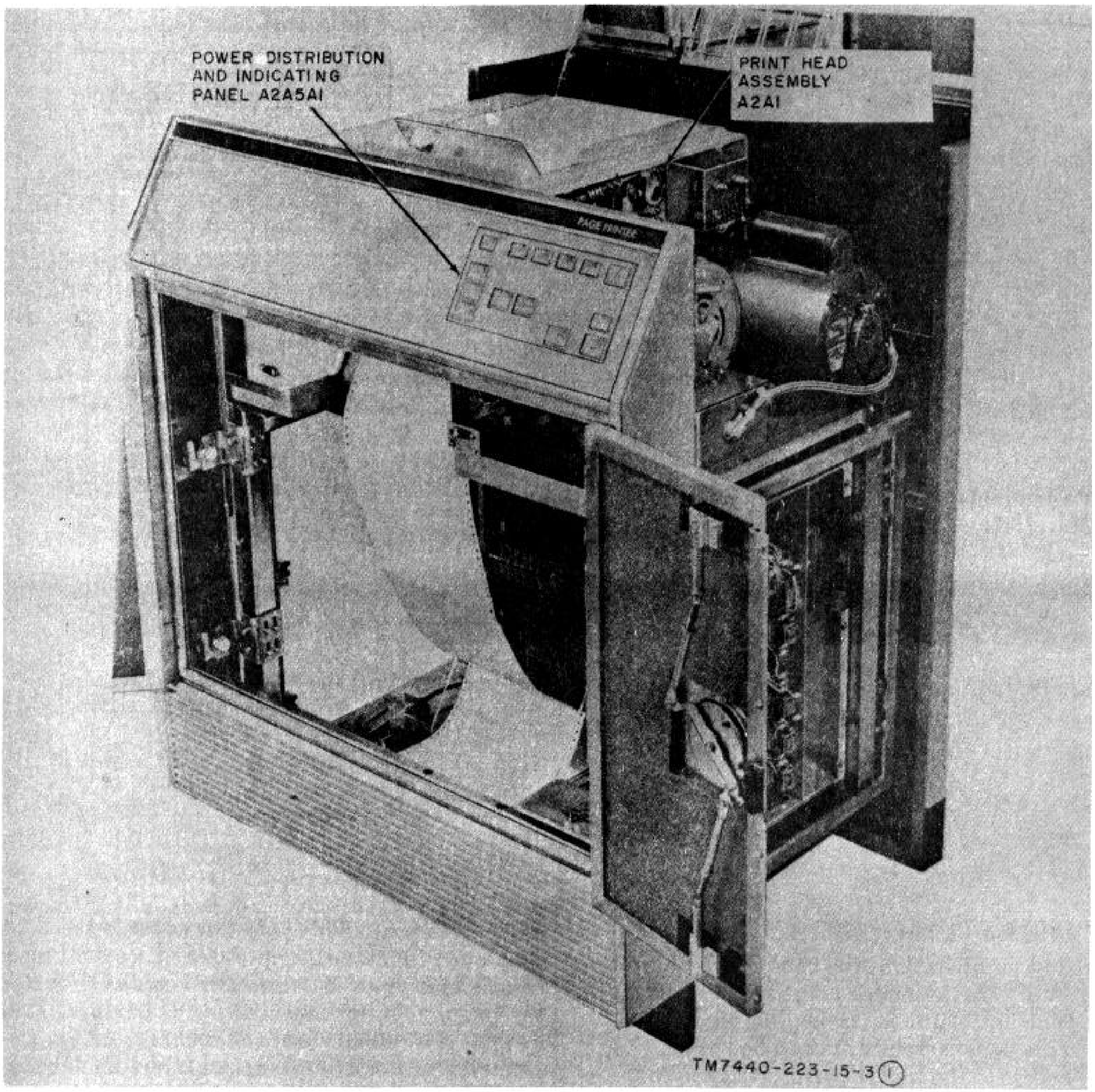


Figure 1-3 (1) . Page printer showing location of major assemblies (part 1 of 2).

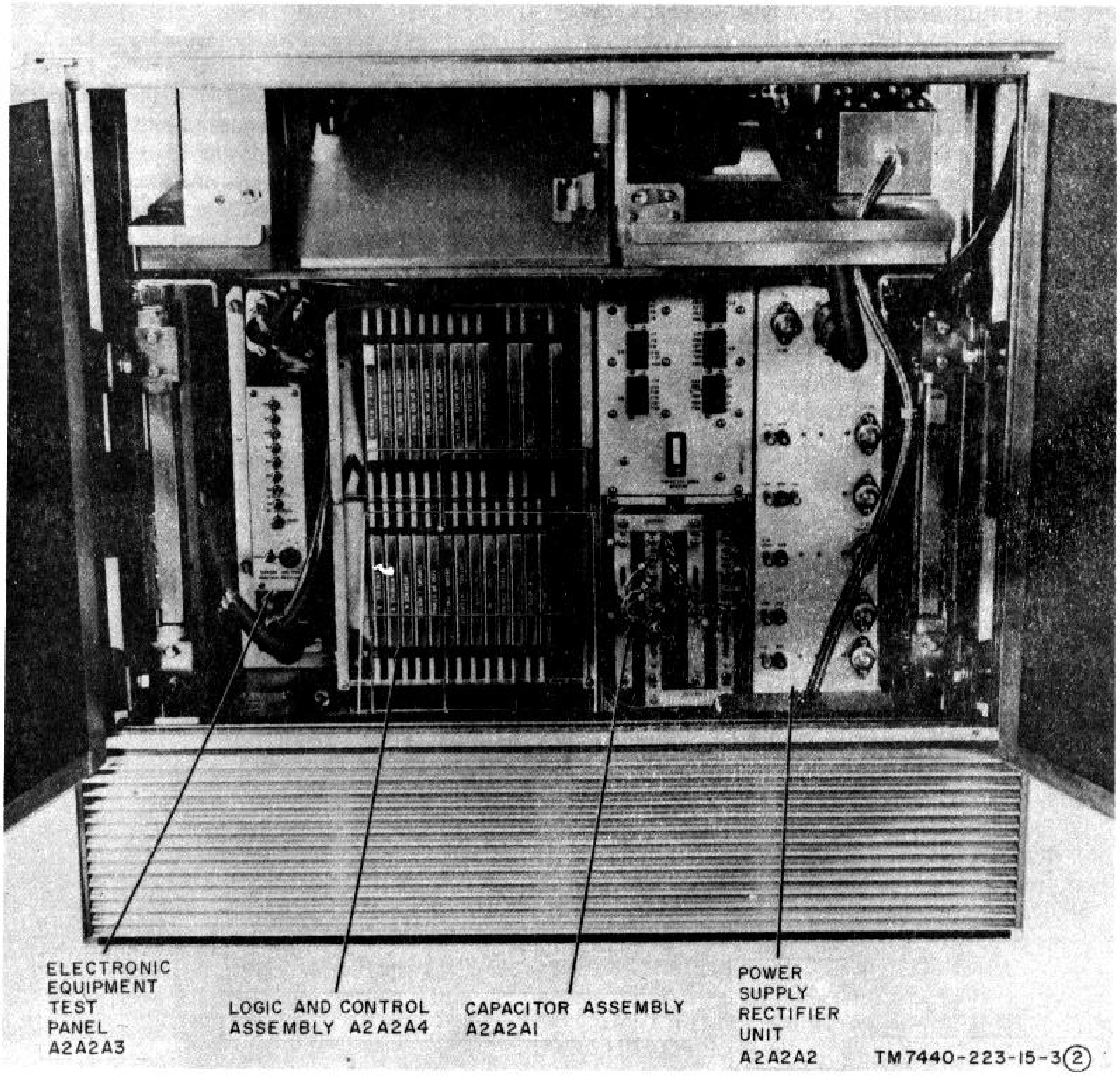


Figure 1-3 (2). Page printer, showing location of major assemblies (part 2 of 2).

a. Frame Assembly A2. The frame assembly is a wheel-mounted assembly which is positioned inside the enclosure and consists of the printer mechanism, electronic assembly, storage basket, and front panel assembly. In addition to the control panel mounted controls and indicators, operator's controls are provided to allow adjustment of the impact of the print hammers to compensate for varying thickness of printing mediums, selection of single, double, or triple line spacing, and selection of a 1-inch margin immediately above and below perforations at paper folds.

b. Print Head Assembly A2A1. The print head assembly is shelf-mounted at the top of the frame assembly, behind the front panel. The print head assembly consists of the print drum, paper feed mechanism, ribbon drive mechanism, hammer io.3dules, code wheel, and strobe disc. All the mechanical operations such as paper feeding, ribbon motion, and printing take place in this assembly.

c. Electronic Assembly A2A2. The electronic assembly is mounted at the lower rear of the frame assembly and consists of the capacitor assembly A2A2A1, power supply rectifier unit A2A2A2, electrical equipment test panel A2A2A3, logic and control assembly A2A2A4, and appropriate cabling. The logic and control assembly contains the printed circuit (PC) cards for control and interface of the printer mechanism. Eleven switches necessary for operation and testing of the electronic assembly are mounted on the electrical equipment test panel.

d. Internal Paper Storage Basket A2A3. The storage basket is located at the bottom of the frame assembly and provides a compartment capable of holding a 12 inch high stack of paper.

e. Front Access Panel Assembly A2A5. The front panel assembly consists of the front panel with two doors and power distribution and indicating panel A2A5A1 mounted on the upper right side of the panel. The power distribution and indicating panel contains the necessary controls and indicators to allow the page printer to be operated in either the oh-line or manual off-line modes of operation.

f. External Paper Stacker A3.
The paper stacker is located at the top of the enclosure. The paper stacker is capable of accommodating at least a 3-inch high stack of printed paper after the paper has passed through the printer mechanism.

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. OPERATOR'S CONTROLS AND INDICATORS

Note. This section covers only items used by the operator; items used by higher category maintenance personnel are covered elsewhere in this manual.

2-1. Control Panel Controls and Indicators

(fig. 2-1)

Control or indicator	Function
NOT ASSIGNED indicator	Lights (amber) when page printer is not assigned by CCU.
PAPER LOW indicator	Lights (amber) when paper supply has diminished to number of forms previously selected by operator. Extinguishes when condition is corrected or when paper low condition becomes paper fail condition.
PAPER FAIL indicator	Lights (red) and places page printer in stop condition when out of paper or at end of message following paper low condition. Extinguishes by correction of condition and depression of START switch-indicator.
PARITY ERROR indicator	Lights (red) and places page printer in stop condition when parity error (even parity) is detected. Character in error is printed as (*). Extinguishes by depression of START switch-indicator.
PRINT FAIL indicator	Lights (red) and places page printer in stop condition when one of the following failures is detected: blown fuse; printer comparison failure; or circuit card interlock failure. Extinguishes by correction of condition and depression of START switch-indicator.
AUDIBLE RESET switch	Depressing AUDIBLE RESET switch discontinues operation of audible alarm at CCU.
DC POWER indicator	Lights (white) when dc power is applied (approx 45 seconds after ac power is applied). Extinguishes upon loss of any dc voltage.
AC POWER switch-indicator	Depressing AC POWER switch-indicator applies ac power to the page printer. When ac power is applied, the indicator lights (white).
LAMP TEST switch	Depressing LAMP TEST switch causes all (except AC and DC POWER) indicators to light for as long as switch is depressed.
LINE FEED switch	Depressing LINE FEED switch initiates a paper feed operation to advance the paper in the page printer, so that the next printable character shall be printed in column one of the next usable line. This switch is operative with page printer in stop condition.
FORM FEED switch	Depressing FORM FEED switch initiates a paper feed operation to advance the paper to the next form. This switch is operative with the page printer in stop condition.
LOCAL TEST switch-indicator	Depressing LOCAL TEST switch-indicator initiates print test while page printer is in a stop, (not assigned) condition. Initiation of print test is inhibited when page printer is on line with the CCU (START switch-indicator illuminated), assigned by the CCU, or in fault condition. Lights (amber) when operating in local test mode.
STOP switch-indicator	Depression of STOP switch-indicator stops operation of page printer, and lights indicator (red). Indicator also lights (red) automatically to indicate detection of a fault. Is extinguished when either START or LOCAL TEST switch-indicator is depressed.
START switch-indicator	Depression of START switch-indicator places the page printer in a ready condition and lights indicator (green). Lights (white) when page printer is assigned and selected at the CCU. Operation of the START switch-indicator is inhibited during a fault condition and during local test. While illuminated, line feed and form feed are inoperative.

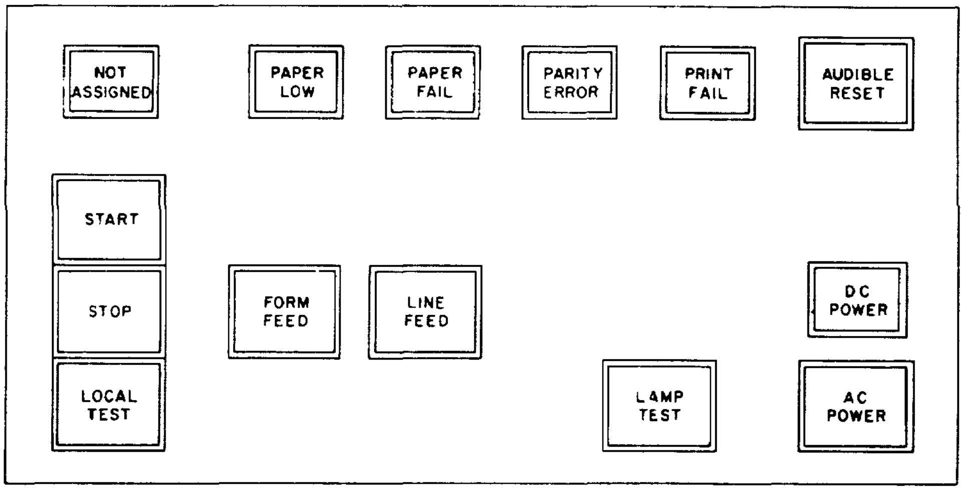


Figure 2-1. Control panel controls and indicators.

2-2. Test Panel and Paper Installation Controls

Control	*Function*
MARGIN SELECTION toggle switch (fig. 2-2)	With switch in the IN position, printing stops 1 inch from the bottom of the form and starts one inch from the top of the next form. With switching the OUT position, printing continues to the end of the form and starts at the top of the next form.
LINE FEED SELECTION rotary switch (fig. 2-2)	With switch in position 1, printer prints on every line. With switch in position 2, printer prints on every other lint. With switch in position 3, printer prints on every third line.
BIT SELECTION toggle switches (fig. 2-2)	Used to set up character for local test purposes.
RESET switch (fig. 2-2)	Used by maintenance personnel only.
YOKE RELEASE handle (fig. 2-3)	When pulled downward, provides additional space behind ribbon for insertion of paper.
Penetration control knobs (fig. 4-50)	Permit adjustment of darkness of printed characters.
Paper out switch hold down (fig. 2-3)	Holds paper against paper out switch arm.
Paper low switch arm assembly (fig. 4-25)	Used to adjust operation of PAPER LOW indicator.

Section II. OPERATION

2-3. Types of Operation

a. The page printer can be operated in either the on-line or local test mode of operation. Selection of the on-line mode transfers control of the page printer to the CCU. The local test mode is used for test and maintenance. Selection of the local test mode of operation removes control of the page printer from the CCU. Depression of the LOCAL TEST switch-indicator initiates the print test function.

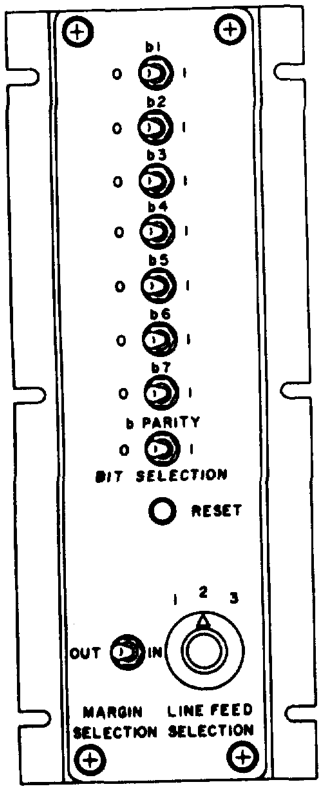


Figure 2-2. Test panel controls and indicators.

b. Perform the following sequence of procedures when operating the page printer:

(1) Preliminary starting procedure (para 2-4).
(2) Installing paper (para 2-5).
(8) Starting procedure (para 2-6).
(4) Operating procedure (para 2-7).
(5) Stopping procedure (para 2-8).
(6) Special operating procedures (para 2-9).
(7) Operation checkout procedure (para 2-10).

2-4. Preliminary Starting Procedure

a. Check for the presence of a sufficient amount)f paper and for proper positioning of the paper. If installation of more paper is necessary, refer to paragraph 2-5.

b. Check the inked ribbon for tears or improper positioning. If necessary, install a new ribbon as described in paragraph 2-10.

2-5. Installing Paper
(fig. 23)

a. Press the AC POWER switch-indicator. When the DC POWER indicator lights, press and release the FORM FEED switch to condition the form feed mechanism.

b. Open both front doors of the enclosure. Place the paper in the internal paper storage basket and insert the end of the paper low switch arm assembly (13, fig. 4-25) above the desired number of fan folds from the end of the paper supply. If necessary, loosen the indicator knob (1, fig. 4-25), reposition the indicator, and tighten the indicator knob.

Note

When multiply paper is used, be sure the ink surface of the carbons face toward the rear of the page printer when the paper is threaded into the printer.

c. Reach into the upper right-hand corner of the enclosure and pull the YOKE RELEASE handle downward to move the print hammer module mounting plate rearward, away from the ribbon.

d. Pivot the paper-out switch hold down to the right.

e. Deleted.

f. Guide the paper upward, between the ribbon and the module mounting plate, until the tear line is aligned with the bottom edge of the tear bar.

g. Engage the paper sprocket holes on the sprocket chain pins.

h. Deleted,

i. Set the paper-out switch holddown plate in the down position.

j. Raise the YOKE RELEASE handle to lock the print hammer module mounting plate forward in the printing position.

k. Depress and release the FORM FEED switch several times, observing that the tear line on the paper lines up with the bottom edge of the plastic paper guide and that the paper has started moving correctly into the external paper stacker.

Note

If the tear line on the paper is not aligned correctly, repeat steps c through k.

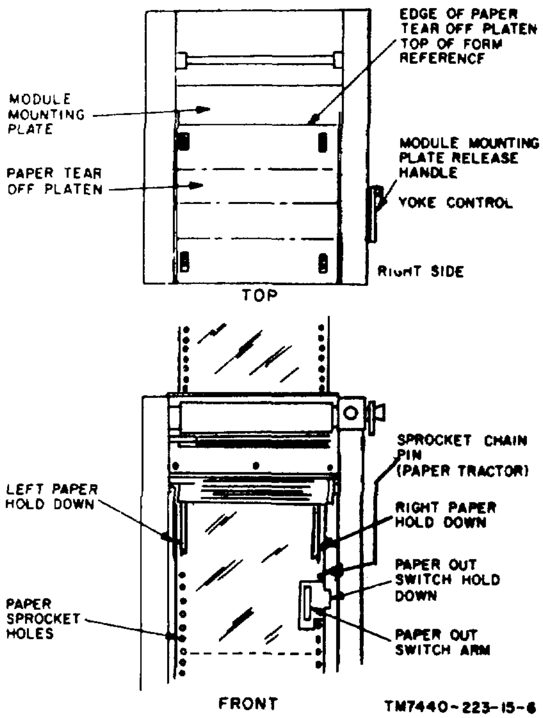


Figure 2-3. Paper installation details

2-6. Starting Procedure

a. Set the MARGIN SELECTION and LINE FEED SELECTION switches (fig. 2-2) to the desired margin and line spacing requirements.

b. Press the AC POWER switch-indicator on the control panel (fig. 2-1). When the DC POWER indicator lights, press the START switch-indicator.

2-7. Operating Procedure

Operation of the page printer with the CCU is automatic. Occasionally, during operation, check the darkness of the printed copy. When necessary, adjust the penetration control knobs (fig.4-50) to obtain clear copy.

Note

The page printer does not include an alarm to alert the operator of a paper jam. During operation, check for proper feeding of the paper.

2-8. Stopping Procedure

To stop operation of the page printer, press the STOP switch-indicator. To power down the page printer, press the AC POWER switch-indicator.

2-9. Special Operating Procedures

When a fault condition occurs, proceed as follows:

a. Check the control panel fault indicators to determine the cause of trouble.

b. Correct the fault if correction by the operator is possible; otherwise category maintenance is required.

c. After correcting the fault, press the START switch-indicator to resume operation.

2-10. Installing Inking Ribbon

a. Remove the old inking ribbon as follows:

(1) Remove the paper tear off cover subassembly (74, fig. 4-11, part 1).

(2) Set the yoke open operating handle (273, fig 4-11, part 2) to the OUT position.

(3) Wind the entire length of the old ribbon on the bottom ribbon roll (379, fig. 4-11, part 2).

(4) Move the old ribbon and the bottom ribbon roll (379 and 380, fig. 4-11, part 2) to the right to remove them from the page printer.

b. To install a new inking ribbon, reverse the removal procedure (*a* above). During installation of the now ribbon, be certain that the side edge of the ribbon is exactly parallel with the end surfaces of the roller, otherwise, the ribbon will be wound crookedly the ribbon spool.

2-11. Operation Check out Procedure

Check operation of the page printer with the CCU as described in TM 11-7440-238-15 (App A).

CHAPTER 3

FUNCTIONING OF PAGE PRINTER

Note

The purpose, operation, and inter operation of the various circuits (electrical, electronic, mechanical, electromechanical, and optical) in this equipment are explained in this chapter. Familiarity with the equipment, how it works, and why it works that way are valuable tools in troubleshooting the equipment rapidly and effectively.

Section I. GENERAL FUNCTIONING OF PAGE PRINTER

3-1. Page Printer, Block Diagram

fig. 3-1)

All the paper handling and printing functions of the page printer are performed by printer mechanism A2A1. Within this assembly, fanfold paper is automatically fed from the paper supply hopper, through the printing station where printing takes place, to the paper stacker. Control of the paper motion and processing of the data prior to printing are performed by electronic circuits in logic and control assembly A2A2A4 and by manual switches on control panel A2A5A1. These functions are described in paragraphs 3-2 through 3-7.

3-2. Paper Feeding

Before operating the page printer, 9-1/2-inch wide, fanfold, sprocket-fed paper is loaded into the paper supply hopper in printer mechanism A2A1. Feeding paper from the hopper through the printing station to the stacker is remotely controlled by coded line feed (LF) command signals from the Common Control Unit (CCU). Line feed and form feed functions are also initiated by function control circuits in logic and control assembly A2A2A4 when certain conditions occur during operation with the CCU. In addition, line feed and form feed functions can be performed by manual switch selection at control panel A2A5A1.

a. Remote Operation. Automatic paper feeding under control of the CCU is made possible by operation of the START mode switch on control panel A2A5A1. This enables run control circuits in logic and control assembly A2A2A4 to switch to a ready condition for remote operation.

(1) If an error condition exists in the page printer as indicated by a lighted STOP indicator and a lighted PAPER FAIL, PARITY ERROR, or PRINT FAIL indicator on the control panel, the run control circuits are prevented from entering a ready condition. This causes the START switch indicator to remain unlit.

(2) If no error condition exists, the start mode is initiated and the page printer is considered to be in a ready condition. This causes a green START indication on control panel A2A5A1 and also causes a ready signal to be sent through transmit interface circuits to the CCU. The ready signal causes an appropriate visual indication on the front panel of the CCU to indicate to the CCU operator that the page printer is ready for remote operation.

(3) Actual paper feeding and printing under control of the CCU cannot begin until the CCU operator assigns the page printer to operate with the CCU. He does this by pressing a front panel push button on the CCU. This results in an as, signed signal being routed through the receive interface circuits of the page printer to the run control circuits. Consequently, the NOT ASSIGNED indicator, which is lighted while the page printer is not assigned, goes out.

(4) Even after the CCU has assigned the page printer to operate with the CCU, data cannot be sent from the CCU to the page printer until the CCU circuits sense that a complete data block of 80 characters is ready for transmission. When this condition is satisfied, the CCU sends a select signal through the receive interface circuits to the message control circuits of the page printer.

(5) The select signal, as received by the page printer, generates the SOB signal which corresponds to the FDR. The FDR is sent to the CCU which responds with the SOM pulse on the control line which is strobed in with the first data strobe. The print function will begin after the 32nd character is received (memory will be full). Paper motion is controlled by LF and CR functions which are performed as a result of coded command signals if in paper tape operation or generated by the PP if in the card mode.

(6) The select signal from the CCU remains active only until the complete data block of 80 characters has been transmitted. The select signal is then terminated until a new data block is ready for transmission to the page printer. At that time, the select line is again activated and the process is repeated.

b. Local Operation. When the page printer is not assigned to the CCU, the operator can initiate a print test operation by pressing the LOCAL TEST push button on control panel A2A5A1 or he can initiate paper motion by pressing the FORM FEED or LINE FEED push button on the control panel.

(1) Pressing the LOCAL TEST push button causes operation of the page printer in the print test mode which permits printing of any one of the 64 (63 printable and space) characters selected by the operator at the test panel. The selected character is then printed in all 80 print positions of one line on the paper.

(2) Pressing the FORM FEED push button causes the paper to slew to the next top-of-form position so that the next printable character shall be printed in column one of the first usable line of the new form. Pressing the LINE FEED push button causes the next printable character to be printed in column one of the next usable line Both controls are operative with the page printer in the stop condition.

3-3. Printing

a. As the paper is fed through the printing station, it is printed one line at a time with as many as 80 characters to a line. There are 6 lines to an inch and it is possible, through line feed selection control circuits, to print on every line, every other line, or every third line. This selection is made at test panel A2A2A3. The 80 printing positions or columns on a line are divided into three zones. Zone 1 includes columns 1 through 32; zone 2 includes columns 33 through 64, and zone 3 includes columns 65 through 80.

b. The printing operation for each zone is called a print cycle. Thus, three print cycles are required to print characters in all 80 columns of a line. If a partial line is printed, coded line feed and carriage return command signals from the CCU will follow the last character to be printed so that the paper is fed to the next printable line and printing begins in column 1. In certain situations, only the line feed command is given so that printing on the next printable line begins in the column following the last printed character on the preceding line. For example, if the last character printed on a line is in column 35 and only a line feed command signal is given, the next character following the line feed command will be printed in column 36 of the new line.

3-4. Printing in Remote Operation

The print control circuits operate in the start mode when the ready signal to the CCU is received from the run control circuits. If the CCU has data ready for transmission, it sends the select signal to the page printer which, in turn, generates the start block signal. This signal is the first data request sent through the transmit interface circuits to the CCU where it causes the first character of the block to be transmitted to the page printer.

a. The character is received on eight parallel lines in ASCII code format at the receive interface circuits. The eight bits representing the character are accompanied by a 4-µsec data strobe pulse which appears a minimum of 2-µsec after the start of the character data. On receipt of the data strobe pulse, the data request pulse to the CCU is terminated.

b. The eight data bits are applied to decode and parity circuits. These circuits are conditioned to accept the eight data bits by an internal start signal. This signal is generated by the run control circuit when the start mode is entered. In the decode and parity circuits, the eight data bits are checked for parity error and reduced to six 3-6 bits which can represent all of the 64 possible characters that can be printed.

c. The six bits are applied to the 7 x 32 shift registers where they are stored as soon as a load data pulse is received from the load and line control circuits. The load data pulse is generated by strobe pulses derived from the data strobe pulse so that, effectively, the data strobe pulse strobes the data into the registers. The data strobe is necessary to insure that the character is not stored until it is made available by the CCU.

d. A short time after the first character has been strobed into the registers, another data request signal is sent to the CCU as the result of the same data strobe pulse. This results in receipt of the next character with an accompanying data strobe. Thus, the second character is also stored in the registers. This process is repeated until all 32 columns of the registers are filled or line feed and carriage return commands are received from the CCU. These commands arrive on the data lines and are decoded in the decode and parity circuits. As a result, an inhibit data request signal is generated by the function control circuits to stop further data requests from being sent to the CCU.

e. At this time, the inhibit data request signal also generates an enter print cycle signal which causes the print control circuit to begin producing print shift pulses. These pulses shift the data stored in the registers through the compare and restore circuitry where each character is compared with a code wheel character. When the two characters are the same, a compare signal causes the print control and address circuits to set a particular hammer driver for eventual firing. When the two characters are not the same, the data is restored in the register in its original column. In this manner, all 32 columns of the register are compared with the same code wheel character.

f. When the next code wheel character appears, an accompanying code wheel strobe causes the print control circuits to fire all hammer drivers which were set during the preceding compare function. Since the print drum is synchronized with the code wheel, the fired hammers print the compared character in the proper columns on the paper. These columns are in zone 1 which consists of the first 32 columns on the paper.

g. The data remaining in the registers is now compared with the second code wheel character in the same manner as the first. If this character matches any character from the registers, it is printed in the appropriate zone 1 column or columns on the paper when the next code wheel strobe appears. This process is repeated for each subsequent code wheel character until the registers are empty. Usually, this function occurs before all 64 code wheel characters are used so that it never takes more than one revolution of the code wheel to complete a print cycle.

h. The end of the print cycle causes data requests to the CCU to start again if the page printer is selected. When this occurs, the new data is loaded into the shift registers as before. However, this data is now printed in the second set of 32 columns (zone 2) on the paper unless line feed and carriage return commands followed the data printed in the first print cycle. If received, these commands cause printing to start in the first 32 columns (zone 1) of the next line on the pages.

i. If no line and carriage return commands are received in the first or second print cycles, then the third print cycle will also print on the same line but only in the remaining 16 columns (zone 3). Because there are only 16 columns in zone 3, a maximum of 16 characters are permitted to be loaded into the shift registers for this print cycle which completes the line.

j. When an invalid character or the DEL (delete) code is detected or when a cancel signal is received, the decode and parity circuits send an ignore signal to the load and line circuits so that the invalid, deleted, or canceled character is not loaded into the shift registers for printing. This is done by an inhibit load data signal which the load and line circuit sends to the 7 x 32 shift registers. In a cancel condition, the load and line circuit initiates a line feed and carriage return function which is followed by a printout of a complete line of circumflexes (A). After this, a form feed is enabled so that any new printing begins on a new form.

3-5. Printing in Local Test Mode

a. When the page printer goes into operation as the result of pressing the LOCAL TEST push button on control panel A2A5A1, the data for printing is a single character generated by the eight BIT SELECTION switches on test panel A2A2A3. Each switch is set to 1 or 0, depending on the desired character code.

b. The eight test bits representing the character are then applied to the decode and parity circuits which are conditioned to accept the test data bits by a local test signal. This signal is generated by the run control circuits when the local test mode is entered. The data is strobed into the shift registers as soon as a load data pulse is received from the load and line control circuits. The load data pulse is now generated by strobe pulses derived from test strobe pulses that are generated internally.

c. The same character is strobed into all 32 columns of the registers. Thus, in the first print cycles the character is printed in the first 32 columns (zone 1) on the paper. Then, the same character is again loaded into all 32 columns of the registers and is printed in the next 32 columns (zone 2) of the same line on the paper. In the third and final print cycle, the character is printed in the remaining 16 columns (zone 3) on the same line. As a result, the selected test character is printed across one complete line on the paper.

d. At the end of the local test mode, the run control circuits send a 4-ms test stop pulse to the function control circuits. This causes a double form feed in order to have a blank form separate the form on which the test character was printed from the next form to be printed.

3-6. Error Control

a. The page printer contains a number of error detection circuits which monitor and check paper supply, parity, and printing. When any error is detected, it causes the error control circuits to light a corresponding error indicator on control panel A2A5A1. Depending on the detected error, either a caution or an alarm stop signal is sent through the transmit interface circuits to the CCU to light a caution indicator or to activate an audible alarm, respectively. The alarm stop signal also prevents any further data processing at the CCU until the problem has been removed.

b. When the audible alarm in the CCU is activated as a result of an alarm stop signal from the page printer, the page printer operator can switch off the audible alarm by pressing the AUDIBLE RESET push button on control panel A2A5A1. This causes the error control circuits to generate an audible reset signal which is routed through the transmit interface circuits to the CCU to reset the alarm.

3-7. Error Detectors

The individual types of errors which are detected in the page printer are as follows:

a. Parity Error. A parity error detector monitors the parallel input data from the receive interface circuits. The sum of all eight data bits in each character is checked for odd parity at the time when the data strobe appears. If the odd parity requirement is not satisfied, a parity error exists and is encoded to print an asterisk (*) in the position of the errored character. As a result, the run control circuits drop the ready line to the CCU on the trailing edge of the 81st data strobe after the parity error. This condition causes the PARITY ERROR and STOP indicators on control panel A2A5A1 to light, the START indicator to go out, and an alarm stop signal to be sent to the CCU resulting in an audible alarm.

b. Print Error. A print error can be caused by a blown fuse, a PC card interlock failure, or a printer comparison failure. A printer comparison failure occurs when data in memory does not compare favorably with any of the page printer characters so that the data cannot be extracted from memory. As a result of a print error, the ready line to the CCU is dropped immediately upon detection of the fault. In addition, the PRINT FAIL and STOP indicators on control panel A2A5A1 light, the START indicator goes out, and an alarm stop signal is sent to the CCU to initiate an audible alarm.

c. Paper Low. If the supply of paper in the hopper becomes low, a corresponding error signal is supplied by printer mechanism A2A1 to the run control circuits. The error signal causes the PAPER LOW indicator on control panel A2A5A1 to light and a caution signal to be sent to the CCU to light a caution indicator.

d. Paper Fail. If the supply of paper in the hopper runs out, a corresponding error signal from printer mechanism A2A1 is supplied to the run control circuits. If the paper fail occurs after the 81st data strobe and before the next start-of-block signal, the ready line to the CCU drops immediately; otherwise, the ready line drops on the trailing edge of the 81st data strobe and the next start-of-block signal is inhibited. The error signal causes the PAPER FAIL and the STOP 34 indicators on control panel A2A5A1 to light, the START indicator to go out, and an alarm stop signal to be sent to the CCU in order to initiate an audible alarm.

3-8. Signaling Code

The signaling code used by the CCU to transmit data to the page printer is the eight-bit ASCII code. Seven of the ASCII bits contain the data. The eighth bit is a parity bit which is added or left out, as necessary, to have odd parity for each character. Table 3-1 lists 96 ASCII characters received and the 64 characters (63 characters and space) and the symbols which are printed for each character. When an invalid character is received, an asterisk is printed.

Table 3-1. Signaling Code

CHARACTER		INPUT ASCII CODE	
Symbol	**Name**	**8(P)765 4321 (Bits)**	**Symbol Printed**
&	Ampersand	0 010 0110	&
‘	Apostrophe	1 010 0111	‘
(	Opening parenthesis	1 010 1000	(
)	Closing parenthesis	0 010 1001	)
*	Asterisk	0 010 1010	*
+	Plus	1 010 1011	+
,	Comma	0 010 1100	,
-	Hyphen	1 010 1101	-
.	Period	1 010 1110	.
/	Slant	0 010 1111	/
0	Zero	1 011 0000	0
1	One	0 011 0001	1
2	Two	0 011 0010	2
S	Three	1 011 0011	8
4	Four	0 011 0100	4
5	Five	1 011 0101	5
6	Six	1 011 0110	6
7	Seven	0 011 0111	7
8	Eight	0 011 1000	8
9	Nine	1 011 1001	9
:	Colon	1 011 1010	:
;	Semicolon	0 011 1011	;
<	Less than	1 011 1100	<
=	Equals	0 011 1101	=
>	Greater than	0 011 1110	>
?	Question mark	1 011 1111	?
\	Grave accent	0 100 0000	\
A	A	1 100 0001	A
B	B	1 100 0010	B
C	C	0 100 0011	C
D	D	1 100 0100	D
E	E	0 100 0101	E
F	F	0 100 0110	F
G	G	1 100 0111	G
H	H	1 100 1000	H
I	I	0 100 1001	I
J	J	0 100 1010	J

Table 3-1. Signaling Code-Continued

CHARACTER		INPUT ASCII CODE	
Symbol	Name	8(P)765 4321 (Bits)	Symbol Printed
K	K	1 100 1011	K
L	L	0 100 1100	L
M	M	1 100 1101	M
N	N	1 100 1110	N
O	O	0 100 1111	0
P	P	1 101 0000	P
Q	Q	0 101 0001	Q
R	R	0 101 0010	R
S	S	1 101 0011	S
T	T	0 101 0100	T
U	U	1 101 0101	U
V	V	1 101 0110	V
W	W	0 101 0111	W
x	X	0 101 1000	X
Y	Y	1 101 1001	Y
Z	Z	1 101 1010	Z
[	Opening bracket	0 101 1011	[
~	Tilde	1 101 1100	~
]	Closing bracket	0 101 1101	]
^	Circumflex	0 101 1110	^
_	Underline	1 101 1111	_
@	Commercial at	1 110 0000	@
a	a	0 110 0001	A
b	b	0 110 0010	B
c	c	1 110 0011	C
d	d	0 110 0100	D
e	e	1 110 0101	E
f	f	1 110 0110	F
g	g	0 110 0111	G
h	h	0 110 1000	H
i	i	1 110 1001	I

Table 3-1. Signaling Code-Continued

CHARACTER		INPUT ASCII CODE	
Symbol	Name	8(P)765 4321 (Bits)	Symbol Printed
j	j	1 110 1010	J
k	k	0 110 1011	K
l	l	1 110 1100	L
m	m	0 110 1101	M
n	n	0 110 1110	N
0	0	1 110 1111	0
p	p	0 111 0000	P
q	q	1 111 0001	Q
r	r	1 111 0010	R
s	a	0 111 0011	S
t	t	1 111 0100	T
u	u	0 111 0101	U
v	v	0 111 0110	V
w	w	1 111 0111	W
x	x	1 11i 0000	X
y	y	0 111 1001	Y
z	z	0 111 1010	Z
{	Opening brace	1 111 1011	{
¬	Overline	0 111 1100	N
}	Closing brace	1 111 1101	}
|	Vertical line	1 111 1110	None
DEL	Delete	0 111 1111	0lor
SP	Space (blank)	0 010 0000	None
!	Exclamation point	1 010 0001	!
“	Quotation mark	1 010 0010	“
#	Number sign	0 010 0011	#
$	Dollar sign	1 010 0100	$
%	Percent sign	0 010 0101	%

Section II. MECHANICAL FUNCTIONING OF PAGE PRINTER

3-9. General

The mechanical functioning of the page printer consists of mechanically driven operations such as paper feeding, ribbon motion, print drum motion, code wheel and strobe disc motion, and alternator drive. Other mechanical functions are solenoid-operated such as clutching and braking the paper feed operation, controlling ribbon drive, and firing the print hammers. In addition, other mechanical functions are the actuation of the paper low and paper out switches, the yoke open switch, and the ribbon direction switches.

3-10. Mechanical Drive (fig. 3-2)

a. Mechanical drive power for paper feeding, ribbon motion, print drum motion, code wheel and strobe disc motion, and alternator drive is supplied by the 120-volt, 50- to 60-Hz, single-phase, ac motor. The alternator is driven continuously by the motor through a drive belt to provide ac power to the power supply. The print drum and the code wheel that is on the print drum shaft are also driven continuously by the motor through a drive belt.

b. The motion of the print drum shaft is also made available through drive belts to the ribbon drive clutches and to the paper feed clutch. When a feed pulse is received, the paper feed clutch is energized to start paper feeding. While the paper is feeding, the strobe disc, which is geared to the paper feed mechanism, is also driven. At the end of the paper feed pulse, the paper feed clutch is deactivated and the paper feed brake is energized by a brake pulse to stop the paper advance. The ribbon drive clutches are energized alternately during printing operations to reverse the direction of ribbon when the supply runs out in either direction.

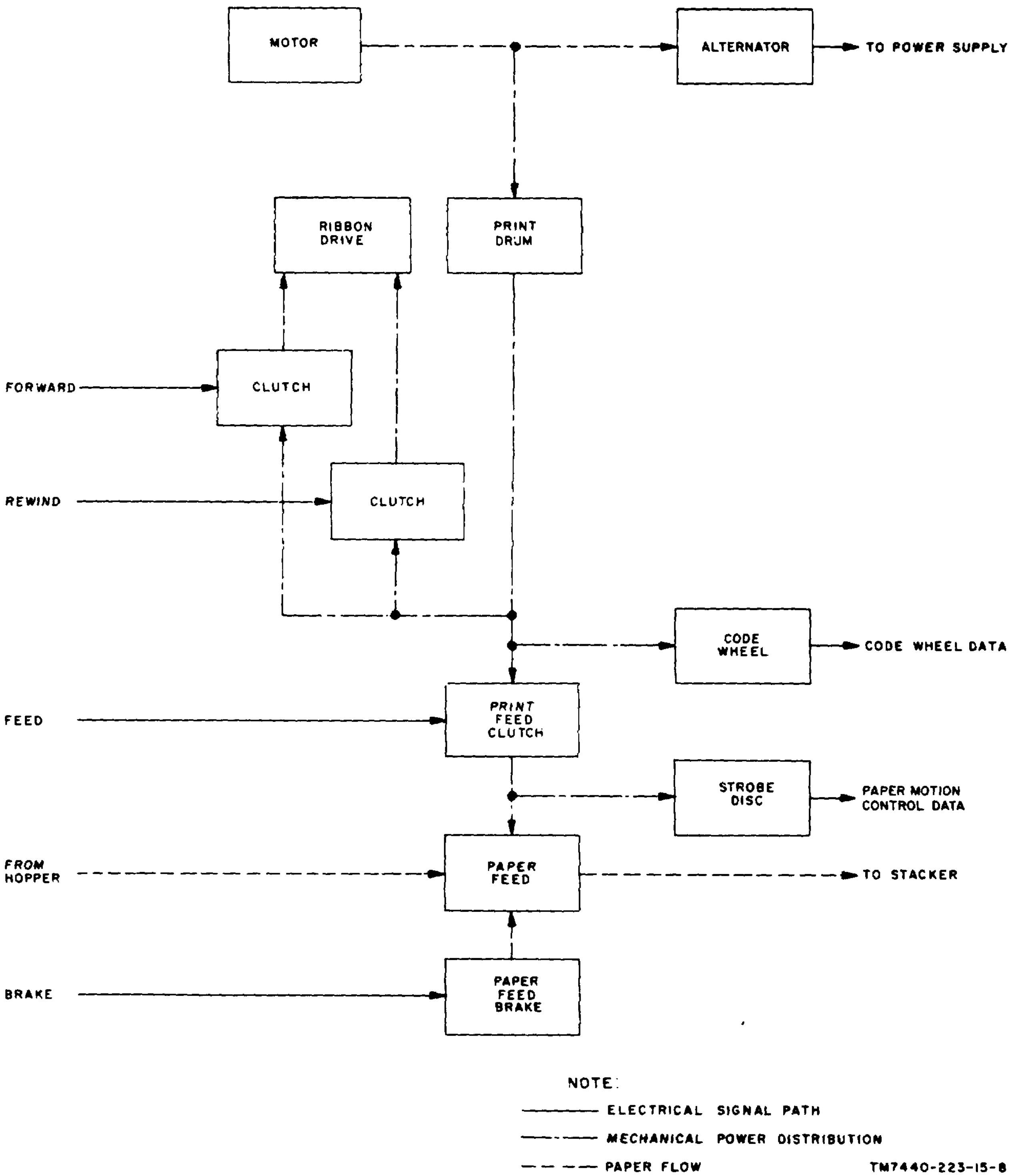


Figure 3-2. Mechanical power distribution.

3-11. Print Drum and Code Wheel (fig. 3-3, 3-4, and 3-5)

a The print drum and the code wheel are turned continuously by a drive belt which is driven by the motor. This motion is transferred by another drive belt from the other end of the print drum shaft to the paper feed and ribbon drive mechanisms (fig. 3-3).

b. The print drum has 80 columns of engraved characters in 64 evenly spaced rows around its periphery (fig. 3-4). The 64 characters in each row are identical so that the same character appears across the length of the print drum. The rows of characters are arranged for the best possible balance of the print drum and, therefore, are not in alphabetical and numerical order.

c. The code wheel is opaque except for transparent holes or slots arranged on 64 equally spaced radii (fig. 3-5). Each radius contains a six-bit code corresponding to a specific row of characters on the print drum. A lamp and light sensor assembly straddle the code wheel so that each radius is read by the light sensors as the code wheel rotates. The light from the lamps passes through the transparent holes to activate the associated light sensor. When no hole appears, the light sensor remains deactivated.

d. Both the print drum and the code wheel are mounted on the same shaft and are synchronized so that the character being read by the code wheel light sensors corresponds to the print drum character row in position for printing. Actually, a character is read from the code wheel first and fed to the logic circuitry for comparison with data received from the CCU. Then, the same character row on the print drum lines up with the print hammers after a slight delay to allow enough time for the comparison operation to be completed.

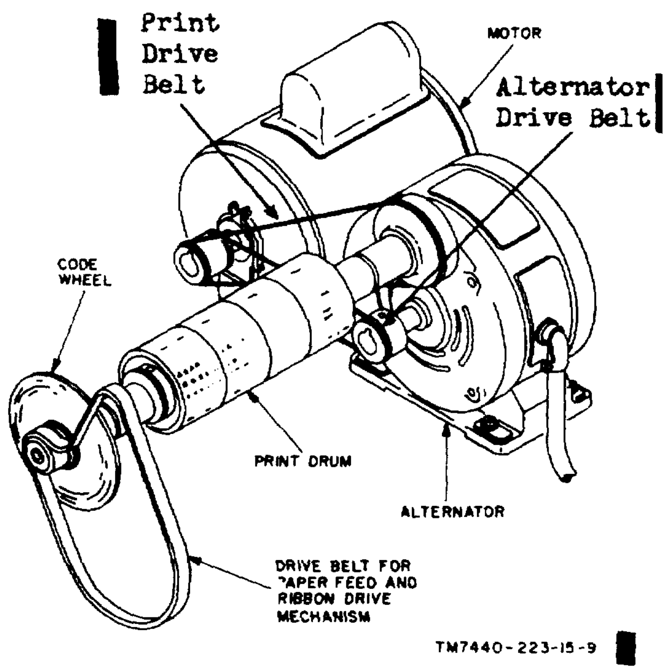


Figure 3-3. Print drum and code wheel drive.

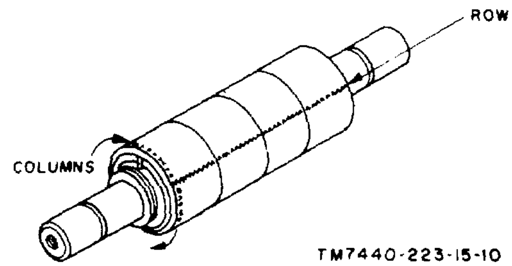


Figure 3-4. Print Drum.

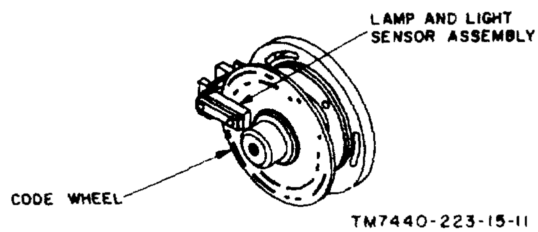


Figure 3-5. Code wheel.

3-12. Paper Feed Mechanism (fig. 3-6)

a. The paper feed mechanism feeds paper as long as the paper feed clutch is energized. With the clutch engaged, the mechanical drive provided by the continuously rotating print drum drive shaft is transmitted from the paper feed clutch pulley through the clutch to the paper feed drive shaft. Thus, the paper feed chain drive, which engages the sprocket holes in the paper, feeds paper through the page printer. At the same time, the paper feed drive shaft turns the strobe disk through a pair of gears (para 3-13).

b. When the paper feed clutch is deenergized, paper feeding is stopped immediately since the paper feed brake clutch is energized at precisely the same time. This is necessary to prevent momentum from moving the paper further than was intended. Normally, the paper is fed exactly one, two, or three lines at a time, depending on how long the paper feed clutch is energized. Also, when the last line on a paper form is used, the paper is fed until the first line on the next paper form is lined up for printing. The paper feeding operation is controlled by logic and control assembly A2A4 in conjunction with manual switch settings.

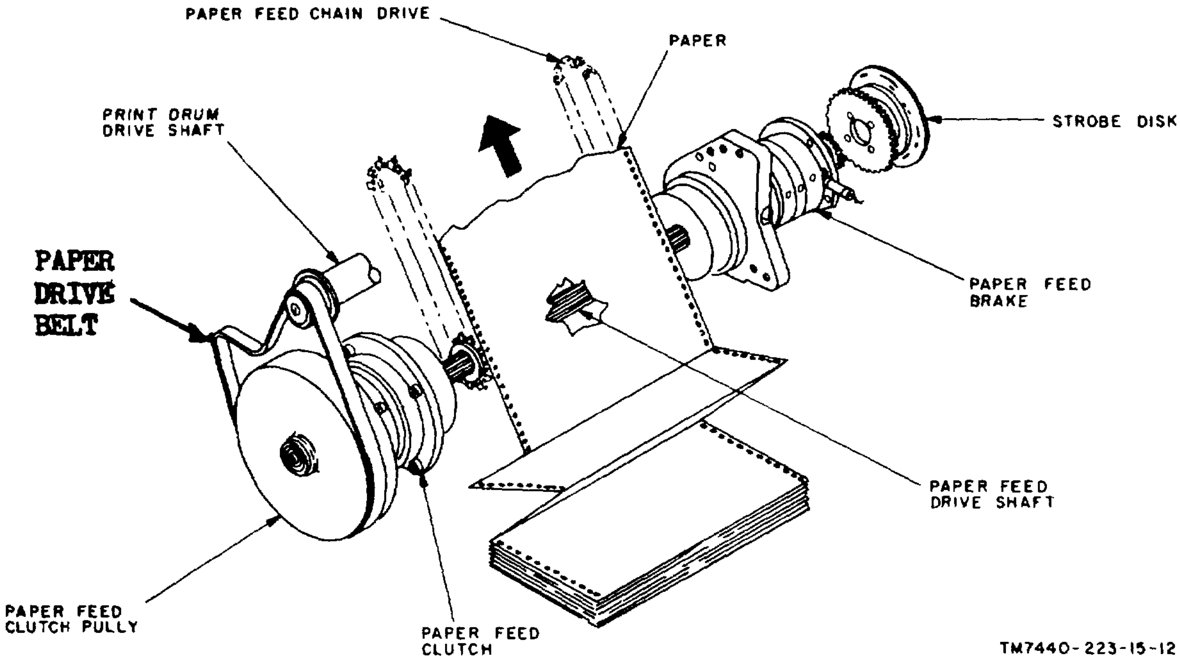


Figure 3-6. Paper feed mechanism.

3-13. Strobe Disc (fig. 3-7)

a. The strobe disc is an opaque wheel similar to the code wheel with transparent holes or slots which are synchronized with the paper feed mechanism. A lamp and light sensor assembly straddles the strobe disc to monitor the holes or slots, Since the strobe disc is directly driven by the paper feed drive shaft, the strobe disc causes the light sensor assembly to produce outputs representing the amount of paper that is fed.

b. The strobe disc and associated light sensor assembly produce four different outputs. One output is produced whenever the paper is advanced a single line space. Another indicates when the bottom of a page form passes the print line and another indicates when the top of a page form passes the print line. The fourth output is produced during the time the top six line spaces and the bottom six line spaces of a page form are passing the print line. This is used when 1-inch margins are required at the top and bottom of each page form.

c. A different strobe disc and matching gear must be used for each of the three paper sizes (8-1/2, 11, and 14 inches) used with the page printer. It is important to check that the proper disc and gear are installed before operation of the page printer.

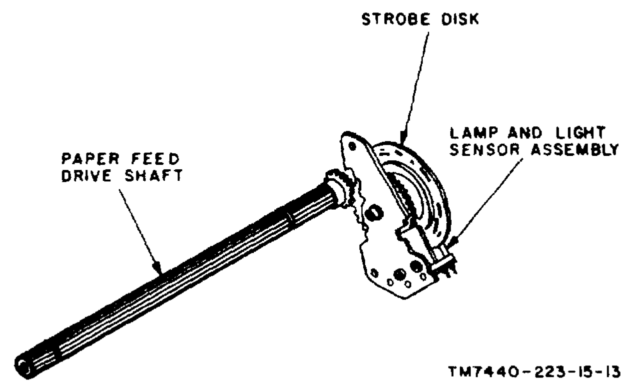


Figure 3-7. Strobe disc.

3-14. Ribbon Drive Mechanism (fig. 3-8)

a. The inked ribbon used for printing is transported from a spool past the line of print hammers and onto a second spool by the ribbon drive mechanism. The ribbon can be transported in either direction but is moved only during the print cycles. When the end of the ribbon approaches, the ribbon drive mechanism automatically reverses the action and begins transporting the ribbon in the opposite direction.

b. The ribbon direction control is provided by two microswitches, each of which has a sensing arm riding on one of the spools. The sensing arms are set to actuate the associated microswitch when less than 8 turns of ribbon are left on a spool.

c. Drive power for the ribbon motion is transmitted by a drive belt from the paper feed drive shaft, through a gear train, to the bushings of both clutches. The rotors of the two clutches are attached to the two ribbon spools. When a clutch is energized, the rotating bushing engages the rotor and the associated spool is driven and the other spool is free wheeling. When a low ribbon supply is sensed by the corresponding microswitch, the engaged clutch is deenergized and the disengaged clutch is energized, thereby reversing the process.

d. Pressure feet apply pressure to each spool shaft to prevent the spools from free wheeling once both ribbon clutches are deenergized to stop ribbon motion.

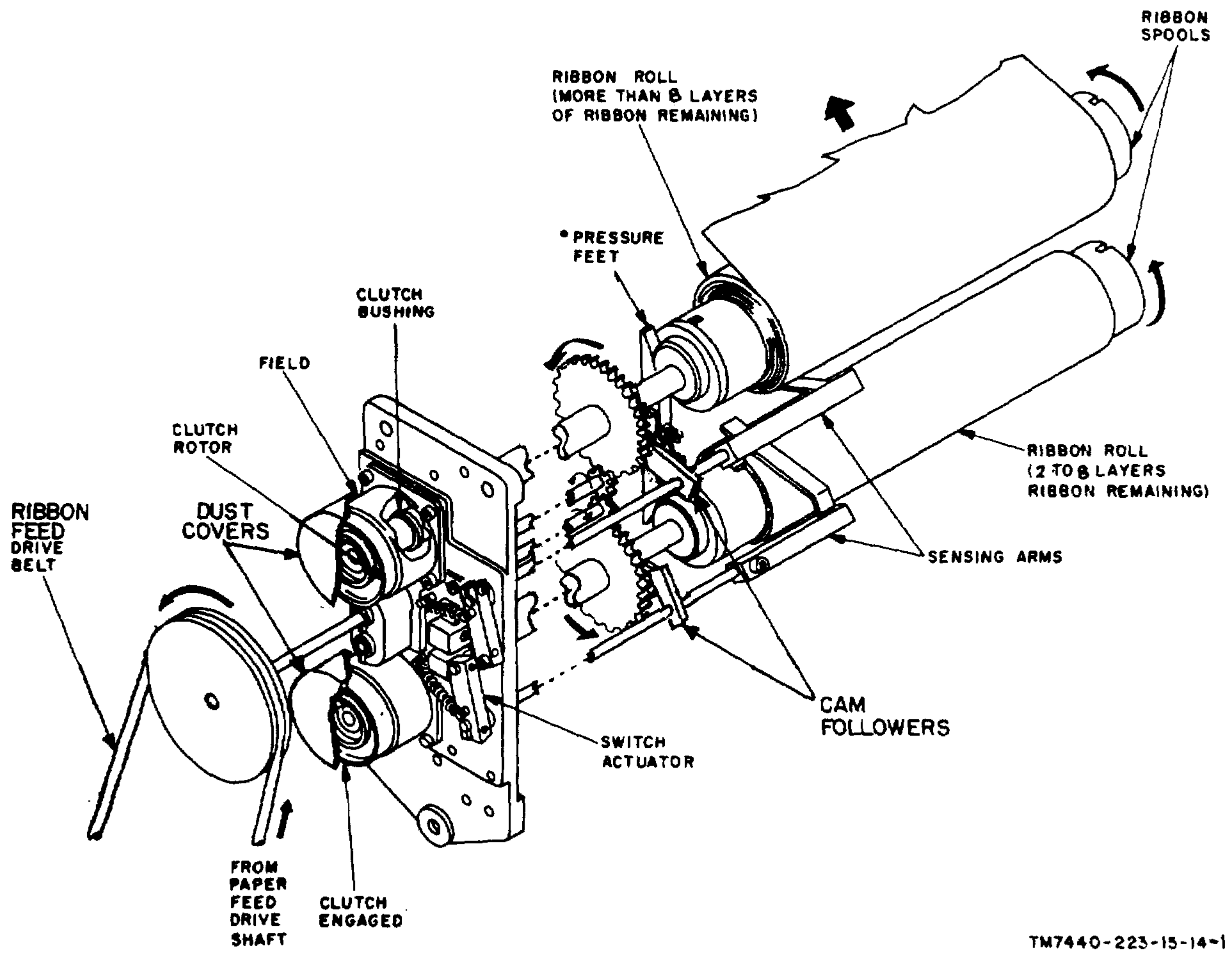


Figure 3-8. Ribbon drive mechanism.

3-15. Print Hammers (fig. 3-9 and 3-10)

a. There are 20 print hammer modules in the page printer with 4 hammers in each module. The modules are arranged so that two rows of 10 modules each face each other. Thus, the 40 hammers in each row are interlaced with-the 40 hammers in the opposite row to form a single line of 80 hammers.

b. Each hammer is individually activated when its associated solenoid is energized by the corresponding hammer driver in logic and control assembly A2A2A4. When a hammer solenoid is energized, it attracts the hammer armature causing the hammer to pivot so that the hammer face strikes the paper against the inked ribbon and the engraved character on the print drum; then the hammer returns to rest. Although the inked ribbon and the print drum are in motion when this occurs, the short dwell time of the hammer prints the character on the paper without smudging or blurring. The density of print can be varied by manual adjustment.

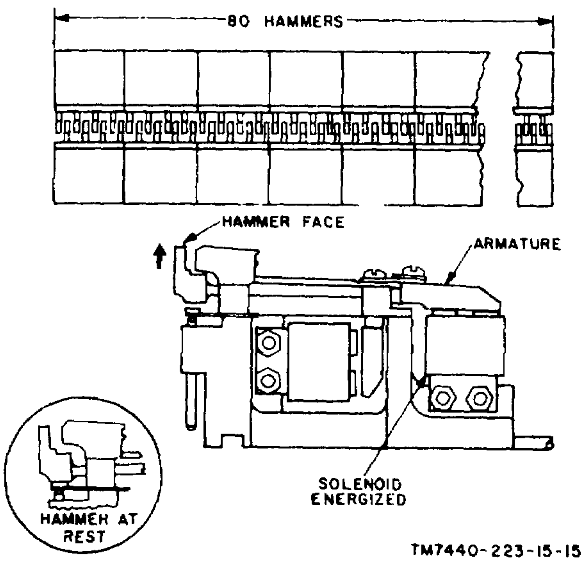


Figure 3-9. Print hammers.

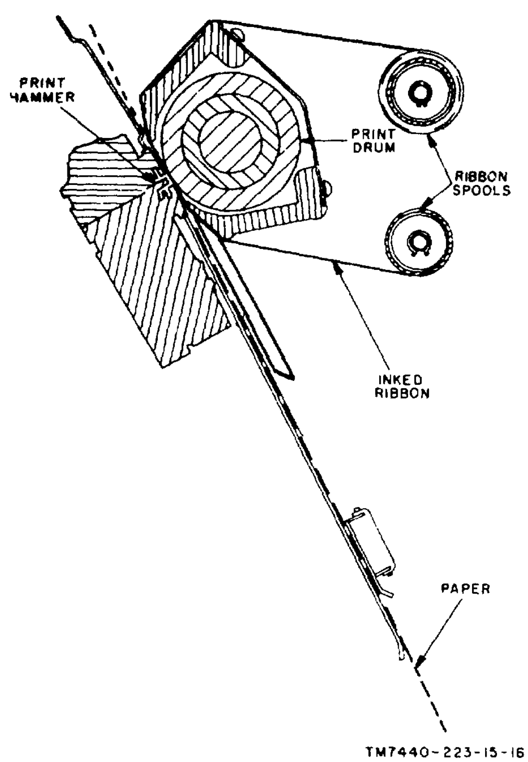


Figure 3-10. Printing operation.

3-16. Paper Low Switch (fig. 3-11)

The paper low switch is a magnetic limit switch which is actuated by the switch actuating lever when a predetermined paper supply remains. The switch actuating lever is inserted between the appropriate paper forms so that when the form below the lever is pulled up, the switch is actuated. The height of the switch actuating lever can be adjusted by sliding the knob to the desired setting. When the switch is actuated, a low level signal is sent to the logic and control assembly A2A2A4 which results in a caution condition and the lighting of the PAPER LOW indicator on control panel A2A5A1.

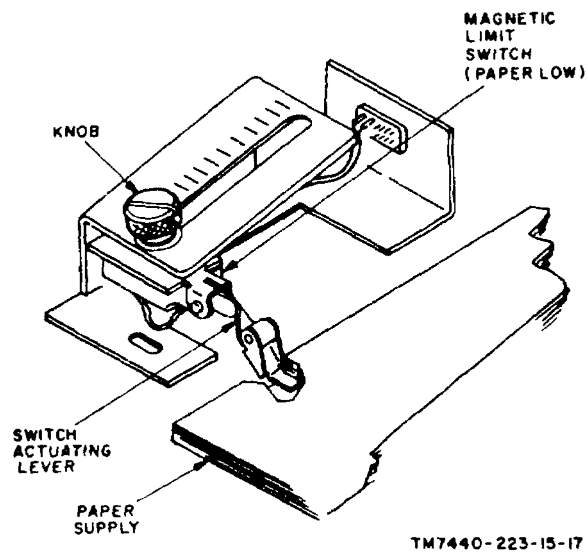


Figure 3-11. Paper-Out switch.

3-17. Paper-Out Switch (fig. 3-12)

The paper-out switch is actuated when the paper supply is completely exhausted. As soon as the trailing edge of the paper passes the switch actuator, the spring-loaded actuator releases the paper-out switch. When the switch is released, a high level signal is sent to the logic and control assembly A2A2A4 which results in an alarm stop condition and the lighting of the PAPER OUT indicator on control panel A2A5A1.

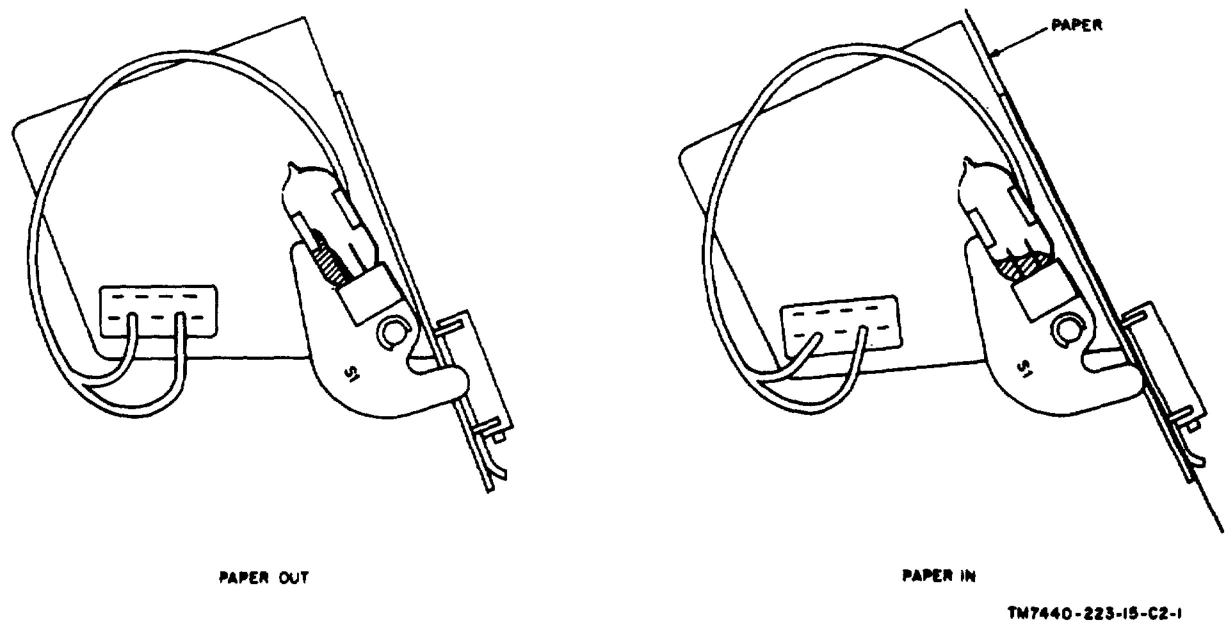


Figure 3-12. Paper out switch.

3-18. Yoke Open Switch (fig. 3-13)

The yoke open switch monitors the position of the print hammer module mounting plate. When paper is loaded into the page printer, the yoke handle is lowered to move the print hammer module mounting plate down and away for the print roll. This makes it possible to thread the leading edge of the paper through the otherwise narrow space between the print hammers and print drum. While the plate is in this position, the switch actuator is not in contact with the yoke open switch. Thus, a high level signal is sent to logic and control assembly A2A2A4 which results in an alarm stop condition and the lighting of the PRINT FAIL indicator on control panel A2A5A1. This prevents operation of the page printer while the yoke is open.

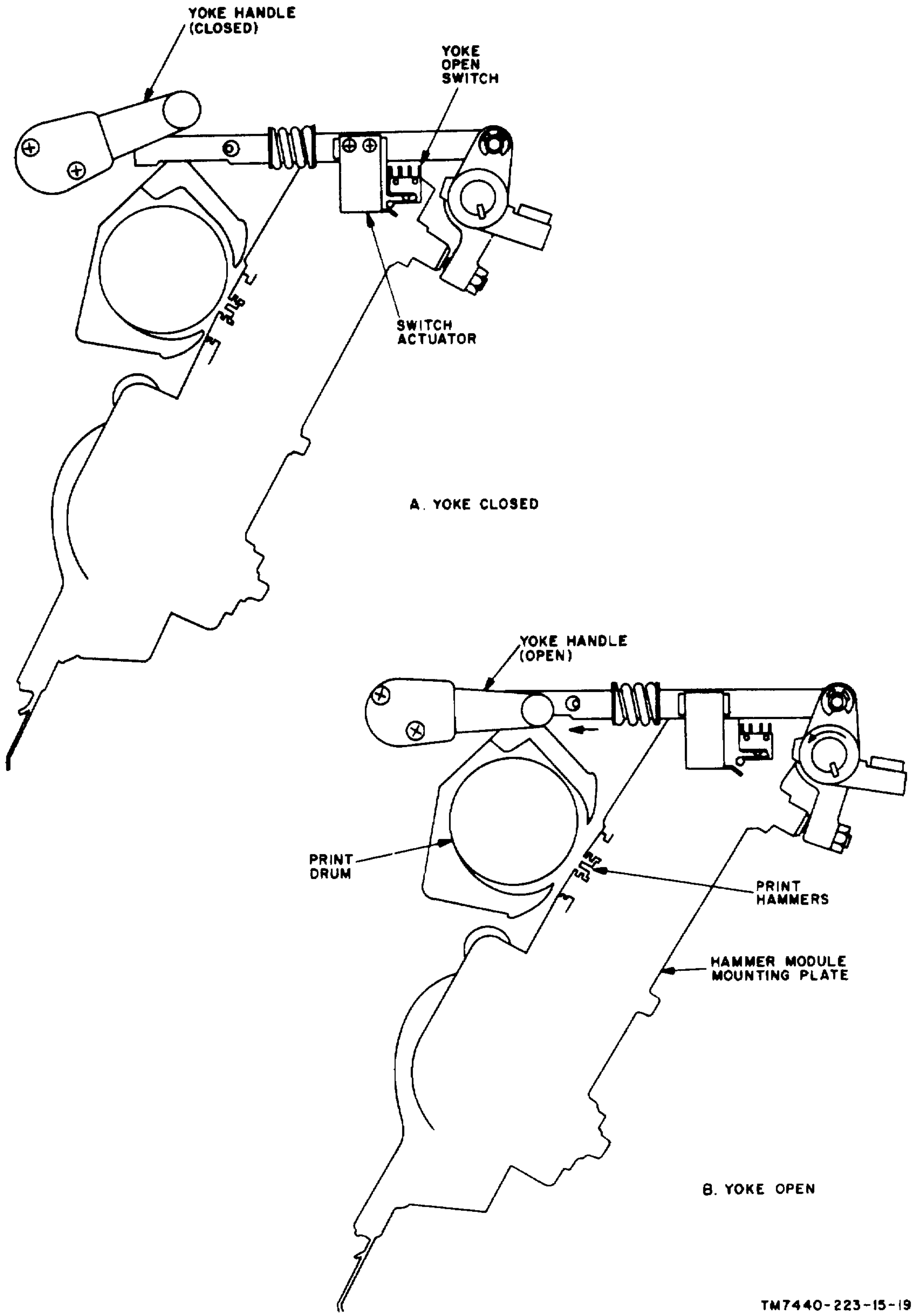


Figure 3-13. Yoke open switch.

Section III. ELECTRICAL FUNCTIONING OF PAGE PRINTER

3-19. Logic Diagram

a. Most of the data processing and control functions of the page printer are performed by logic circuits on the printed circuit cards in logic and control assembly A2A2A4. Thus, the electrical operation of each card is represented in chapter 8 by a logic diagram rather than by a conventional schematic diagram. The logic diagram shows all input and output connections of the card, including power connections, but does not show the circuit components which make up the individual logic elements.

b. Most of the logic elements in the page printer are mounted in integrated circuit modules. Thus, detailed circuit components are not applicable. (Each integrated circuit logic element is considered to be a single electrical component.) For those logic elements that are made up of discrete circuit components, the schematic representation and a description of the circuit operation for each type of logic element is given in paragraph 3-83.

Note

For convenience, all cards in logic and control assembly A2A2A4 are identified only by their distinguishing reference designations (AI, A2, A3, etc.). It should be understood that these designations are prefixed by A2A2A4.

3-20. Logic Signal Notation

a. In general, logic signals in the page printer switch between a high level of +5.0 volts and a low level of 0 volts. Some signal lines are considered activated when the level is high while others are considered activated when the level is low. The state indicators (small circles) at the input and outputs of logic elements indicate which lines are activated by a high level (state indicator absent) and which lines are activated by a low level (state indicator present).

b. All significant logic signals are assigned a functional name or designation. Many of the functional names are also assigned mnemonic designations. A glossary of all mnemonic designations used on the logic diagrams is given in table 3-2. To permit the active state of a signal to be indicated by its functional name, either (+) or (-) will also be included as a part o the designation. The functional name of signal which is active when a high or logic 1 level is present will be designated as (+) (for example: RECYCLE (+) or (+) SEL). In like manner, the functional name of a signal which is active when a low or logic O level is present will include (-) as part of its identification (for example: (-) DATA REQUEST).

c. In the functional descriptions, the terms high and low are used for +5.0-volt and 0-volt levels. Pulses or levels going from 0 volts to +5.0 volts are called positive pulses or high levels, and those going from +5.0 volts to 0 volts are called negative pulses or low levels.

3-21. Logic Diagram Symbol Notation

a. Typical integrated circuit and discrete circuit logic elements are shown in figure 8-12. Inputs and outputs of integrated circuit logic elements are identified by the wire terminal numbers of the integrated circuit modules in which the elements are located.

b. Two tagging lines are used within each logic symbol for identification purposes.

(1) The first tagging line in each logic symbol identifies the logic element type. The various types of integrated circuit and discrete circuit logic elements are described in paragraphs 3-22 through 3-26.

(2) The second tagging line in each logic symbol identifies the electrical reference designation of the logic element. This reference designation is prefixed by the reference designation of the printed circuit card on which it is located (and the letters "QA" in the case of integrated circuit modules (para 3-22)).

3-22. Integrated Circuit Modules

a. The integrated circuit modules used in the page printer are of several types as described in the following paragraphs. However, they are all of standard construction and wired to the printed circuit cards through 14 terminals (1 through 14). Reference designations for the integrated circuit modules are determined by their location on the PC card. For example, if a module is in row 4 of column A, it is designated A4. The complete reference designation for each module includes the PC card designation, followed by the letters QA (to indicate an integrated circuit module), and ending with the grid location of the module on the PC card.

Table 3-2. Glossary of Mnemonic Designations

Mnemonic	*Definitions*
AUD	Audible
BOP	Bottom of page
BR	Brake
CAN	Cancel
CL	Control line
CR	Carriage return
CW	Code wheel
EOM	End of message
EX	Execute
FF	Flip-flop
GRD	Ground
HD	Hammer driver
IND	Indicator
INH	Inhibit
ISO	Isolated
LF	Line feed
MAN	Manual
MIN	Minimum
MR	.Memory restore
PC	Print cycle
REQ	Request
SEL	Select
SOB	Start of block
SOM	Start of message
SRI	Shift register input
ST	Strobe
TOF	Top of form
T REG	Tally register

b. Sale of the integrated circuit modules contain only one logic element while others contain as many as four. In those cases where two logic elements are contained in one integrated circuit module, the two elements are shown separately on the logic diagrams and are designated A and B (for example: A1A and A1B).

c. Power supply inputs to the individual logic elements are shown on the logic diagrams since there is no provision for them in logic symbology. However, all integrated circuit modules receive power supply inputs of +5.0 volts and 0 volt.

d. Since the integrated circuits are of standard construction, not all inputs to AND gates and OR gates are used in each application. Unused gating inputs are always wired to one of the used gating inputs, to ground or +5 volts. Thus, more than one terminal may be listed at an input on the logic diagram symbol.

e. Most integrated circuit logic elements can function in more than one way. Thus, every AND gate for high inputs is an OR gate for low inputs and every OR gate for low inputs is an AND gate for high inputs. A noninverting OR gate becomes a simple buffer if the inputs are wired together and an inverting OR gate becomes an inverter if the inputs are wired together. The logic operation of each integrated circuit module type is described in paragraphs 3-23 and 3-24.

3-23. Operation of Individual Integrated Circuit Module

The operation of the individual integrated circuit modules used in the page printer is described below. Logic symbols are given for each type of module using typical tagging lines.

a. Type 116 Module. Two 16-bit type 116 shift register and two 4-bit type 116 shift registers are located on each type 116 module (fig. 3-14). Each shift register produces a high output if the data shifted to column 1 (output column) is high. Data is shifted one bit each time a data shift input pulse is received.

b. Type 120 Module. Two type 120 gates feeding two type 120 Schmitt triggers are located on each type 120 module (fig. 3-15). she gates may be noninverting AND gates for high inputs (case A) or noninverting OR gates for low inputs (case B). The gates are used with expander inputs to connect external components to a 4K resistor on the module to construct an RC delay network. This is used to delay the AND or OR function before triggering the Schmitt triggers which are noninverting.

c. Type 121 Module. Four type 121 gates are located on each type 121 module (fig. 3-16). These may be inverting OR gates for low inputs (case A) or inverting AND gates for high inputs (case B).

d. Type 122 Module. Four type 122 gates are located on each type 122 module (fig. 3-17). These may be inverting OR gates for high inputs (case A) or inverting AND gates for low inputs (case B).

e. Type 123 Module. One type 123 gate is located on each type 123 module (fig. 3-18). This gate may be an inverting OR gate for low inputs (case A) or an inverting AND gate for high inputs (case B).

f. Type 124 Module. Two type 124 gates are located on each type 124 module (fig. 3-19). These may be inverting OR gates for low inputs (case A) or inverting AND gates for high inputs (case B).

g. Type 126 Module. Two configurations consisting of two input gates feeding into one output gate are located on each type 126 module (fig. 3-20). The input gates may be noninverting AND gates for high inputs, feeding into an inverting OR gate (case A), or two noninverting OR gates for low inputs, feeding into an inverting AND gate (case B).

h. Type 127 Module. Four type 127 noninverting gates feeding into one type 127 inverting gate are located on each type 127 module (fig. 3-21). The noninverting gates are used as AND gates for high inputs (case A) and the inverting gates are used as OR gates for high inputs.

i. Type 128 Module. Two type 128 flip-flops are located on each type 128 module (fig. 3-22). The flip-flop can be set by either a low level at the S input or a high level at the J input which is clocked by a positive step at the CL input. The flip-flop can be cleared by either a low level at the C input or a low level at the K input which is clocked by a positive step at the CL input.

j. Type 129 Module. Two type 129 gates are located on each type 129 module (fig. 3-23). These may be inverting OR gates for low inputs (case A) or inverting AND gates for high inputs (case B). The gates are used with expander inputs to provide a return path when the gates are used as lamp drivers.

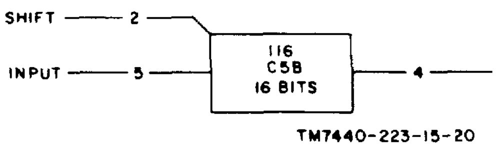


Figure 3-14. Type 116 module, logic symbols.

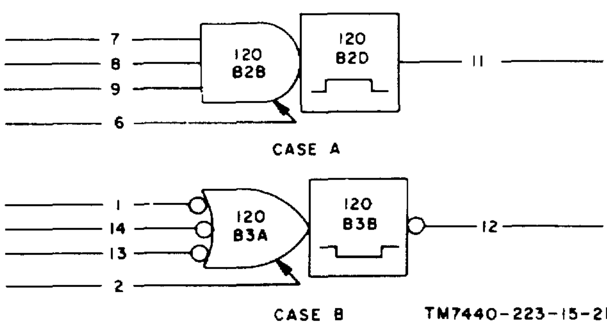


Figure 3-15. Type 120 module, logic symbols.

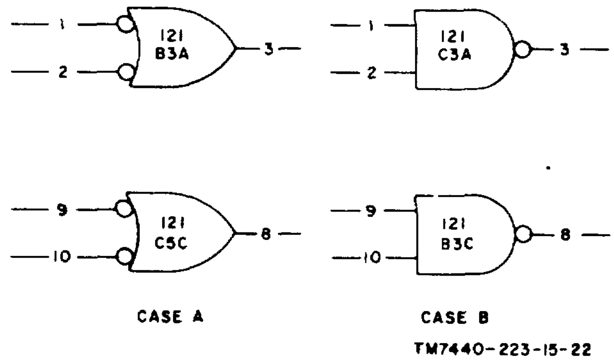


Figure 3-16. Type 121 module, logic symbols.

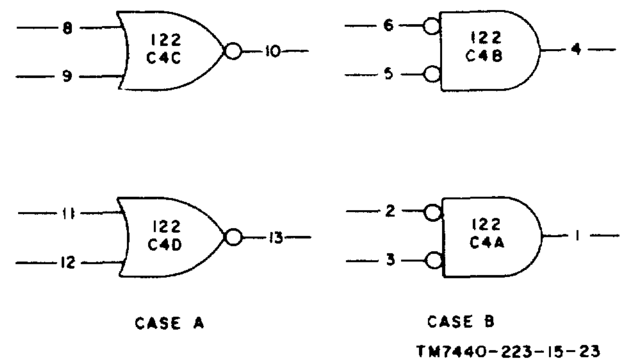


Figure 3-17. Type 122 module, logic symbols.

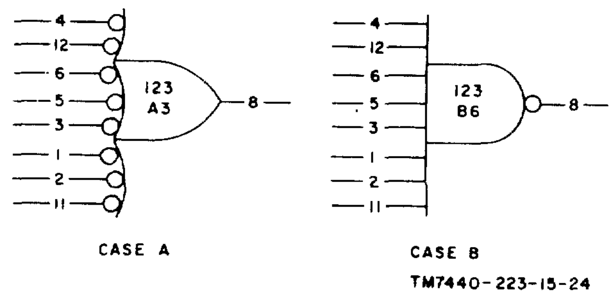


Figure 3-18. Type 123 module, logic symbols.

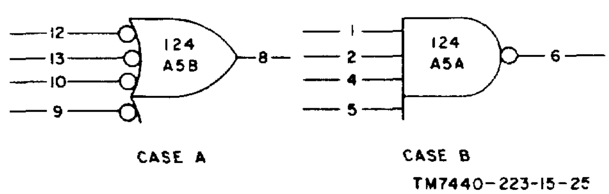


Figure 3-19. Type 124 module, logic symbols.

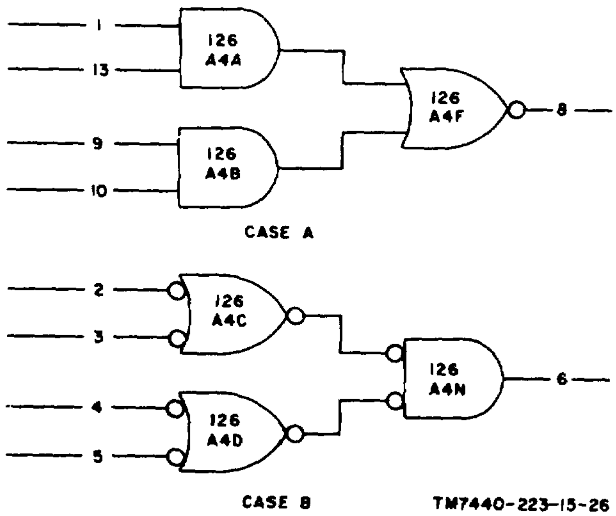


Figure 3-20. Type 126 module, logic symbols.

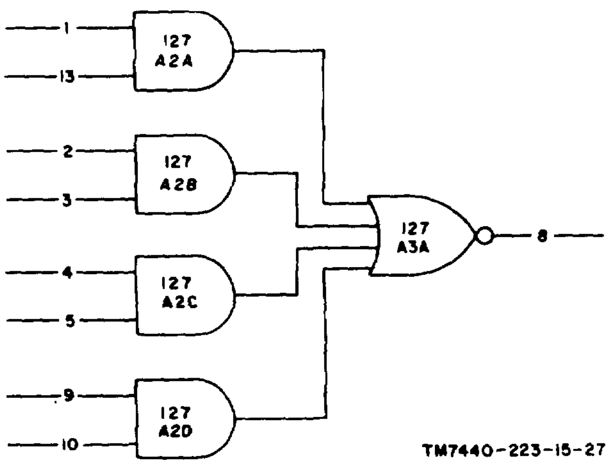


Figure 3-21. Type 127 module, logic symbols.

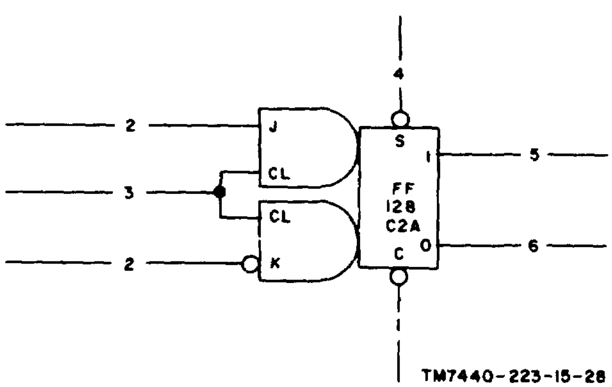


Figure 3-22. Type 128 module, logic symbols.

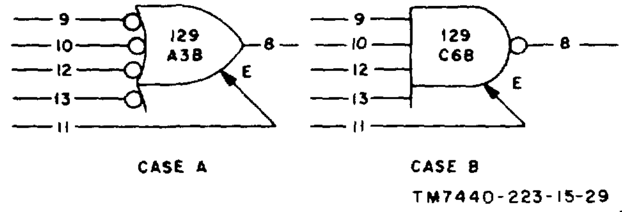


Figure 3-23. Type 129 module, logic symbols.

3-24. Integrated Circuit Latch

a. A special combination of gates called a latch (fig. 3-24) is used several times in the page printer logic circuits. It consists of one inverting AND gate and one inverting OR gate and functions as a flip-flop to register the occurrence of momentary signals.

b. To set the latch (case A), at least one input to the OR gate must be low so that the resulting high output is applied to the AND gate. This input must be accompanied by another external high input in order to enable the AND gate. The low level output of the AND gate then reinforces the low level input to the OR gate so that even if the other input to the OR gate goes low, the latch remains set Thus, the 1 output is high and the O output is low.

c. To clear the latch, the external input to the AND gate must go low. This causes the reinforcing input to the OR gate to go high so that its output goes low to keep the AND gate inhibited. Thus, the clear condition is reinforced and remains cleared even though the external input to the AND gate is high. Thus, the 1 output is low and the 0 output is high.

d. Another version of the latch (case B) is set when the OR gate receives at least one high input and the resulting low input to the AND gate is accompanied by another external low input. The high level output of the AND gate then reinforces the high level input to the OR gate so that even if the other input to the OR gate goes low, the latch remains set and the i output remains high.

e. This latch is cleared when the external input to the AND gate goes high, causing the reinforcing input to the OR gate to go low. As a result, the high OR gate output keeps the AND gate inhibited and the latch is cleared.

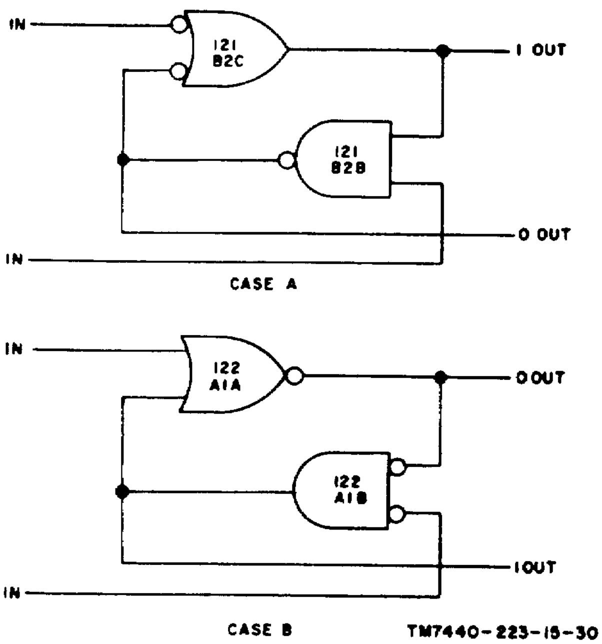


Figure 3-24. Typical latches, logic symbols.

3-25. Discrete Circuit Logic Elements

a. There are several types of discrete circuit logic elements as described in paragraph 3-26. Each discrete circuit logic element consists of a combination of standard circuit components such as resistors, diodes, etc. Thus, wire terminal numbers for inputs and outputs are not assigned as for integrated circuit logic elements.

b. Reference designations for discrete circuit logic elements are (A), (B), (C), etc. prefixed by the reference designation of the printed circuit card on which they are located.

3-26. Operation of Discrete Circuit Logic Elements

The logic operation of each discrete circuit logic element type is described below. Logic symbols for each type are given, using typical tagging lines. The logic elements are grouped by the card on which they are located. Schematic diagrams and detailed circuit operation of each type of discrete circuit logic element are given in paragraphs 3-84 and 3-85.

a. PC Cards BR and B2. The following discrete circuit logic elements are located on PC cards B1 and B2 (fig. 3-25).

(1) *Tape RCVR-1*. The type RCVR-1 interface receiver converts **a +6.2V** input from the CCU to +5 volts and **a -6.2 volt** input from the CCU to 0 volt.

(2) *Type XMTR-1.* The type XMTR-1 interface transmitter transmits +6.2 volts to the CCU when the input is high. When the input goes low, -6.2 volts is transmitted to the CCU.

b. PC Card BS. The following discrete circuit logic elements are located on PC card B3 (fig. 326).

(1) *Type XMTR-2.* The type XMTR-2 interface transmitter transmits an open ckt to the CCU when the input is low. When the input goes high, 0 volt is transmitted to the CCU.

(2) *Type RCVR-2.* The type RCVR-2 interface receiver converts a 0-volt input from the CCU to +5 volts and an open circuit input from the CCU to 0 volt.

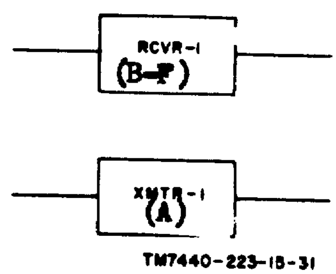


Figure 3-25. PC cards B1 and B2 discrete circuit, logic element symbol.

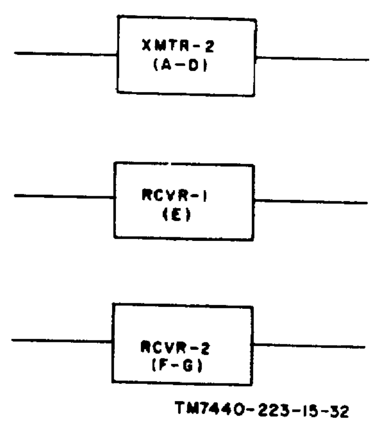


Figure 3-26. PC card B3 discrete circuit, logic element symbol.

c. Type 109 Power Driver. The type 109 power driver consists of a single NPN transistor (fig. 3-27) which drives the collector to ISO GRD (isolated ground) whenever the base receives a positive input. This inverter is used throughout the page printer logic to provide return paths for activating voltages to hammer drivers, paper feed brake, paper feed clutch, ribbon drive mandrels, and power sequencer functions.

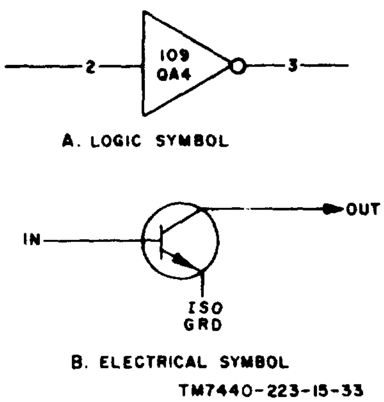


Figure 3-27. Type 109 power driver, logic and electrical symbols.

d. Type 322 Gate. The type 322 gates consist of a single field effect transistor (fig. 3-28) which is used to couple the outputs of the shift registers to the next buffer gates. When a high input is received by the type 322 gate, it produces a low output.

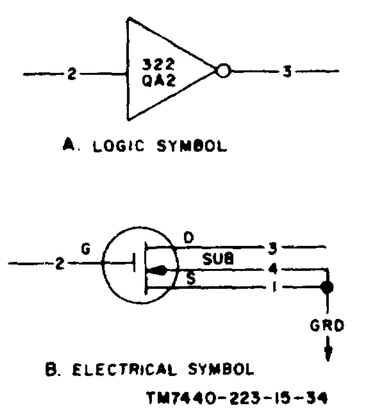


Figure 3-28. Type 322 gate logic and electrical symbols.

3-27. Ac Circuits

(fig. 8-6)

The ac input circuit receives the external ac power and distributes the power to the various circuits of the page printer. The 120-volt, singlephase input power is routed, through terminal board TB1 and power filters FL1 and FLI2 on line filter assembly A1A2, to terminal board TH2. From TB2, it is routed to ac controller assembly A2A4A1 which consists of a control transformer and a relay. The control transformer produces a control voltage which is used as a bias voltage for the power sequencing function. When AC POWER switch S5 on control panel A2A5A1 (fig. 8-4) is pressed, the control voltage is returned from the power sequencer to energize the ac controller relay. The relay then applies ac power to motor A2AlB1, which drives alternator A2AtA9, and also to fans A2A1B2 and A2A1B3 through filters A2A1FL1 and A2A1FL2 (fig. 8-6). The ac power is also applied to fans A1A1 and A1A3. The indicator lamps in the AC POWER switch indicates when the ac power is switched on.

3-28. Dc Circuits

(fig. 8-7)

a. The dc voltages required for the page printer are generated in the power supply. The following dc voltages are supplied: +48 volts dc, -4-5 volts de, +12 volts dc, and -;24 and -24 volts dc. The 12and 24-volt dc supplies are further regulated by voltage regulator PC card A14 in order to produce -F5, +12, -12, -15, and the + Vx dc voltages for distribution.

b. The +5-, +12-, -12-, -15-, and 1' 8volt supplies are automatically checked during turn-on and must be at the proper levels before operation of the page printer can begin. In the event of failure of any one of the supplies, or when the equipment is turned off, the power supplies are turned off. Turn-on and turn-off of the dc power supplies are controlled by AC POWER switch S5. DC POWER indicator DS9 on the control panel indicates when the dc power supplies have been turned on. The reason for using the same switch to turn on ac and dc power is that the sequence of power turn-on requires ac power to be supplied to the motor-alternator and blowers before turning on the dc power supplies.

3-29. Power Supply, Block Diagram

(fig. 3-29)

a. The power supply consists of a motor-alternator unit, a rectifier unit, a de regulator unit, a sequencer circuit, and an ac controller. It converts site ac line voltage into nine separate dc outputs, six of which are regulated.

The sequence in which these dc supplies are connected to and disconnected from the page printer circuits is controlled automatically by the sequencer circuit, as is the application and removal of ac power from the motor-alternator. The sequencer circuit also senses a failure in any one of the dc supplies, and automatically turns off all supplies if this occurs. Turn-on and turn-off power sequencing is controlled in such a manner to insure that damage will not be done to the page printer by operating the hammer drivers and paper feed mechanism if the logic, memory, or control circuits are not receiving the proper dc operating voltages.

b. The power for the power, supply is generated by the motor-alternator unit A2AIA9. The alternator has three 3-phase, 3-wire outputs and one 3-phase, 4-wire output (fig. 8-8). The alternator includes an ac regulator which regulates the output voltages to within ±6 percent. After rectification, those dc power sources which require better regulation, because of their use, are regulated by integrated circuit regulator packs, which provide dc voltages held stable to --1 percent of rated output.

c. The four 3-phase outputs of the alternator are rectified and filtered in the rectifier unit to provide four independent dc power sources. The four power sources supply: +48 vdc, +5 vdc, +12 vdc, and +24 and -24 vdc. The +48vdc and +5-vdc supplies are used without further regulation, since the 6 percent regulation provided by the alternator is sufficient regulation for their use. The +48vdc supply drives the hammer drivers and paper feed mechanism; whereas the +5-vdc supply is used as the bias supply for the integrated circuit (IC) packs which comprise the logic circuits. Also, a portion of the output of the +12-vdc supply is used unregulated as the power source for the indicator lamps. The +12-vdc, +24-vdc, and -24-vdc supplies are applied to six regulator circuits to provide the following regulated dc sources: the +24-vdc supply provides two separate regulated +12-volt supplies; the -24-vdc supply provides a regulated -12-vdc supply and a --15vdc supply; and the +12-vdc supply is used both as a source of lamp voltage and as the input to a temperature-compensated regulator which supplies the Vx control voltage for the hammer driver circuits.

d. An ac controller circuit, consisting of a transformer and a relay, is included in the power supply to control application of the ac power to the motor of the motor-generator (fig. 8-6). The control transformer receives power directly from I the site ac powerline. The output of the control transformer is rectified and applied to the sequencer circuit where it is used as the bias voltage for the IC circuits in the sequencer circuit. It is also used as the control voltage for the relay in the ac controller. The sequencer circuit returns the relay control voltage to the ac controller, energizing this relay to connect the ac power to the motor. This provides the power for the dc power supplies, initiating the turn-on procedure for the page printer.

e. The sequencer circuit associated with the power supply controls the power turn-on and turnoff sequence of the dc power supplies. On initial power turn-on, the sequencer circuit controls the rate at which the capacitor bank at the output of the 48-vdc rectifier charges up to the output voltage of the rectifier (the other three power supplies reach operating power almost immediately). The capacitor bank supplies the power to the hammer drivers and paper feed mechanism. For approximately the first 10 seconds after turn-on, the charging current is limited to approximately 2 amperes, which produces a relatively slow increase in the voltage on the capacitor bank. After this initial interval, the sequencer circuit permits normal charge rate and the voltage on the capacitor bank then builds up rapidly to the normal operating voltage of approximately 48 vdc. The purpose of this action is to prevent the hammer drivers and paper feed mechanism from going into operation before the proper application of dc bias and operating voltages to the logic, control, and memory circuits. This is done to prevent damage to the page printer mechanism.

f. The sequencer circuit also receives each of the dc output voltages from the five rectifier circuits. Failure of any of these supplies is sensed by the sequencer circuit. If this occurs, the sequencer circuit automatically turns off the 48vdc supply, and then the motor-alternator, preventing further operation of the page printer.

3-30. Power Supply Detailed Circuit Description

a. Rectifier Circuits (fig. 8-9). Three-phase power from the motor-alternator is applied to four separate three-phase rectifiers. The three 3-wire power sources are full-wave rectified, whereas the 4-wire source is half-wave rectified. The output of each receiver is filtered to provide an unregulated de output voltage. Filtering is accomplished by a pair of choke coils and a capacitor at the output of the rectifier. Two capacitors, C3 and C4, are used with the half-wave rectifier, CR3, for the 4-wire input since this rectifier provides two dc output voltages, one at +24 vdc and the other at -24 vdc. Rectifier CR2 for the 48-vdc supply includes radio frequency (rf) filter capacitors C8, C9, and C10, which remove high-frequency harmonics and rf noise from the input ac power. This strongly supresses any radio frequencies which might enter this dc source.

b. +48-Volt, Unregulated Supply (fig. 8-9). The filtered output voltage of the +48-vdc rectifier circuit, CR2, is applied to a capacitor bank, C1 through C6 (charging capacitor), which is the power source for the hammer drivers, through a limiting resistance network consisting of R11 and R12 in parallel. An SCR, CR6, is connected across the limiting resistance. When power is first turned on, the SCR acts as an open circuit and the charging capacitor builds up its charge through the resistance network. This network limits the charging current to approximately 2 amperes, causing the voltage on the capacitor bank to build up relatively slowly. A sample of the voltage at the capacitor bank is coupled to the sequencer circuit from pin H of connector J2. After approximately 10 seconds, the voltage on the capacitor bank will build up to a sufficient value to operate a sensing circuit in the sequencer circuit module. This circuit supplies a positive gating voltage through a Darlington constant-current amplifier on the sequencer circuit module to pin T of J2. From here, the gating voltage is coupled through diode CR8 to fire SCR CR6. The SCR now shorts out the current-limiting resistance network, and the capacitor bank now rapidly completes charging up to the full output voltage of the +48-vdc rectifier.

c. During a turnoff sequence, the sequencer circuit applies a gating voltage through a constant current Darlington amplifier on the sequencer circuit module to pin Y on J2. From here, the gating voltage is applied through Zener regulator CR9 to SCR CR7, firing this SCR. The SCR now acts as a short circuit across the 820-ohm output load of the 48-volt supply, reducing the output voltage to near zero. The high current now flowing is dissipated in the two large, parallel-connected 2-ohm, 50-watt resistors, R9 and R10. When the +48-vdc output has dropped to near zero, this is sensed by the sequencer circuit which continues the turn-off sequence. This assures that power is removed from the hammer drivers and paper feed mechanism before it is removed from the logic and control circuits, or if there is a failure in any of the other power supplies.

d. Regulated Power Supplies (fig. 8-23). The six regulators consist of six similar integrated circuit packs on PC card A14, each of which converts input dc voltages which have a +_6 percent regulation to output dc voltages with a better than ± 1 percent regulation. The regulator which provides the Vx control voltage for the hammer driver circuits must provide more accurate regulation than the other regulators. The integrated circuit (1C) pack is therefore temperature-compensated by means of a feedback voltage supplied by a voltage divider consisting of resistor R2, potentiometer R3, and sensitor RT1. The potentiometer is set to provide the required Vx output at the normal operating temperature of the circuit. If the temperature varies, the resistance of the sensitor changes accordingly, varying the feedback voltage to the IC pack. This compensates for changes in gain characteristics of 1C packs, which improves the voltage regulation with changes in temperature. The regulated voltages produced from the unregulated supplies are listed as follows:

Unregulated DC Supply	*Regulated DC Output*
+24 vdc	+12 vdc to interface
	+12 vdc to logic
-24 vdc	-12 vdc to interface
....	-15 vdc to memory
+12 vdc	V_x control voltage for hammer driver circuits

3-31. Power Sequencing

When power is turned on, a power sequencing turn-on operation is performed by sequencer circuits which insures that all dc voltage levels are correct before the page printer is allowed to operate. These circuit also monitor the same dc voltages during operation. If an incorrect voltage is sensed during turn-on or during operation, the sequencers automatically shut off power to prevent damage to the page printer.

3-32. Power Turn-On

a. Before a turn-on sequence can be initiated by the AC POWER switch S5 on control panel A2A5A1, the sequencer circuits on PC cards All and A12 (fig. 8-21 and 8-22) must receive the control voltage +Vcv from the power supply. This control voltage is supplied as soon as ac power is connected to the power supply and immediately ensures that the sequencer counter steps to the count of 12 and shuts off (para 3-34).

b. When the AC POWER switch S5 is pressed to turn power on, a high level is transferred from the AC POWER switch to AND gate C4B on the AC ON/OFF line on PC card A12 (fig. 8-22). This causes C4B to fire delayed Schmitt trigger C4D which produces a high level output, after 1.4 ms, to trigger the pulse generator consisting of AND gate C4A and Schmitt trigger C4C and also to enable AND gate C5B. After 0.7 ms, Schmitt trigger C4C produces a high output which is inverted by AND gate C5A to disable C5B. As a result, C5B produces a negative 0.7-ms pulse after a 1.4IIis delay. The purpose of the delay is to prevent switch bounce from affecting the sequencing process.

c. The 0.7-ms pulse from C5B causes OR gate C5D to provide a high level input to C5C. If the (—) COUNT 8 line from the sequencer counter is high at this time, C5C is enabled to set the ON latch consisting of OR gate B6A and AND gate C6A , This places a low level signal on the (—) DRIVE K01 which then causes OR gate A'B3 on PC card All to drive QA2 into conduction. Thus, QA2 provides a return path for the relay in the ac controller so that the relay energizes to connect the ac power to the motor: alternator. The low level (-) DRIVE K01 line is also inverted by OR gate C3C which then causes lamp drivers C6A, C6B, B6A, and B6B to light the AC indicator lamps on the control panel.

d. The high level output of A3B also appears on the (+) COUNT RESET line which causes AND gate A3A and OR gate C5C to produce the (+) INITIAL CLEAR and (—) INITIAL CLEAR signals. Another result of the ( ) COUNT RESET line going high is the clearing of ill sequencer counter flip-flops. This starts the counter counting during which time the sequencer circuits check that the various dc levels are correct. If any voltage level is not correct, the sequencing operation goes into a recycle function to shut off power.

e. The high level output of OR gate B6A of the ON latch also triggers the pulse generator, consisting of AND gate B3B and Schmitt trigger B3D on PC card A12 (fig. 8-22), which places a high level on the (+) DELAYED ON line after a delay of 140 ms. This high level signal conditions AND gate B6B of the RECYCLE latch to permit a recycle function to shut off power, if necessary.

f. The first voltage check is the +5-volt de (+Vcc) supply. The +Vcc level is checked for overvoltage by a sensing network consisting of diodes CR1, CR2, and CR3 and resistor R9 on PC card A11 (fig. 8-21). When an overvoltage is sensed, AND gate B4A triggers Schmitt trigger B4C to produce a positive (+) 5 OVERVOLTAGE signal to OR gate A6B on PC card A12. The resulting output of A6B sets the RECYCLE latch to shut off power.

g. As the counter reaches the count of 4, the -15, -12, +12, and the +5 (4-Vcc) levels are checked for undervoltage conditions. For example, AND gate A6A is enabled when the regulated -12-volt and -15-volt de levels are above the minimum limit established by the sensing networks consisting of Zener diodes CR5 and CR6, diodes CR8 through CR11, and resistors R7, R8, R10, and R11. The high output of A6A provides a high input to AND gate A5A. Another high input is applied to A5A if the -12-volt de level is determined to be satisfactory by the sensing network consisting of Zener diode CR7 and resistors R9 and R12. A third high input appears at A5A if the two +12-volt dc and the +5-volt dc levels are above the minimum limit set by their sensing networks. This high is provided by Schmitt trigger B2C when the three sensing networks enable AND gate B2A. The fourth input to A5A is high when the +Vcv voltage is present.

h. If all six dc levels are correct, A5A is enabled to produce an inhibiting low level input to AND gate B2B. However, if one or more of the voltage levels is not correct and A5A does not produce a low level output by the time the sequencer counter reaches the count of 4, B2B is enabled since the (+) COUNT 4 and (+) SENSE GATE levels are high at this time. When B2B is enabled, Schmitt trigger B2D produces a high level output which is then inverted by A6B to set the RECYCLE latch in order to shut off power.

i. A recycle is also started at the count of 12 if the +48-volt dc level is not above the minimum limit sensed by diodes CR12 through CR16 and resistors R13 and R14. This is indicated by a low level input to AND gate A6D which is enabled since the (-) COUNT line is also low. The high output of A6D then enables AND gate B6C which is already conditioned by a high on the (+) SENSE GATE line. The resulting low level output sets the RECYCLE (+) SENSE GATE line. The resulting low level output sets the RECYCLE latch to shut off power.

j. If a recycle does not occur when the count of 12 is reached, AND gate C4A on PC card All (fig. 8-21) is enabled to produce a high level output to AND gate A3A. Thus, A3A is enabled to place a low on the (+) INITIAL CLEAR line which causes OR gate C5C to place a low on the (-) INITIAL CLEAR line. The two lines are used to clear flip-flops throughout the system. The highlevel output of C5C also causes lamp drivers A6A and A6B to light the DC indicator lamps on the control panel.

k. As discussed in the description of the t48It unregulated supply (para 3-30), limiting resistors limit the charging current to the capacitor bank to prevent a heavy initial surge of current at the start of power sequencing turn-on. After approximately 10 seconds, the sequencer counter reaches the count of 8 and the high level 1 output of counter flip-flop C2B enables AND gate C3A on PC card All (fig. 8-21) if the (-) RECYCLE line is high. The low level output of C3A then causes QA3 to fire an SCR in the power supply in order to bypass the current limiting resistors since by this time the capacitor bank is sufficiently charged so that less current is drawn. Once the resistors are bypassed, the capacitor bank rapidly completes charging up through the SCR to the full output level of +48 volts.

3-33. Power Turn-Off

a. When the AC POWER switch is pressed to turn power off, the negative pulse generated by AND gate C5B, as in turn-on, now causes OR gate A5B on PC card A12 (fig. 8-22) to set the RECYCLE latch. As a result, the (+) RECYCLE line goes high, the (-) RECYCLE line goes low, and the pulse generator consisting of AND gate B3A and Schmitt trigger B3C is triggered. After a 1-second delay, the pulse generator places a high level on the (+) DELAYED RECYCLE line which causes OR gate C4D on PC card All (fig. 8-21) to clear all of the sequencer counter flip-flops.

b. The high level output of Schmitt trigger B3C also causes OR gate A6C to reset the ON latch through AND gate C6A on PC card A12 (fig. 8-22). As a result, the (-) DRIVE K01 line goes high and causes the relay in the ac controller to deenergize and remove ac power from the entire system. In addition, the AC and DC lamps on the control panel go out.

c. The high level (+) RECYCLE line enables AND gate C5A on PC card All (fig. 8-21) so that the low output of C5A causes QA1 to produce a high level DRIVE CROWBAR signal which fires an SCR in the +48-volt unregulated power supply. This SCR acts as a short circuit for discharging the capacitor bank. The low level (-) RECYCLE line inhibits AND gate C3A so that QA3 cuts off the SCR which was used to bypass the current-limiting resistors during the initial charging of the capacitor bank.

3-34. Sequencer Counter

a. The sequencer counter is a four-stage binary counter which is automatically stepped to the count of 12 when the +Vcv voltage is supplied by the power supply and when all counter flip-flops are cleared by a control signal.

b. The counter consists of flip-flops C1A, C1B, C2A, and C2B on PC card A11 (fig. 8-21). The count input to flip-flop C1A is provided by the counter pulse generator consisting of AND gates B2B and B3C, Schmitt trigger B2D, and OR gate B3B. This pulse generator produces negative 0.9second count pulses at 0.9.second intervals.

c. The positive-going trailing edge of each pulse changes the state of C1A. Subsequent flip-flops in the counter are toggled by the positive change of state which occurs at the 0 output of the preceding stage, when the preceding stage is reset. This gives normal binary counter operation if the set state is understood to be the 1 state for the counter flip-flops and the clear state is understood to be the 0 state. Thus, each stage changes from a 0 to a 1 or from a 1 to a 0 when the preceding stage changes from a 1 to a 0.

d. When the counter is at any count other than 12, AND gage C3B is inhibited by the low level 1 output from either C2A or C2B or both. The resulting high output triggers the pulse generator, consisting of AND gate B2A and Schmitt trigger B2C, to produce a positive-going step after a 0.6-second delay. This step is inverted by OR gate B3A to disable B3D so that the counter pulse generator is triggered to produce a negative 0.6-second pulse at the output of B3C. The trailing edge of this pulse steps counter flip-flop C1A and initiates another pulse at B2A.

e. This cycle is repeated until the count of 12 is reached at which time both flip-flops C2A and C2B are in the 1 state. Thus, the high level 1 outputs of the two flip-flops enable C3B which then inhibits B2A to prevent the generation oft more pulses. At this time, the (+) COUNT 4 and (+) COUNT 8 lines are high level and the (-) COUNT 12 line is low level.

f. Once the counter is stopped at the count of 12, it can only be recycled by clearing all four counter flip-flops. This occurs when either the (+) DELAYED RECYCLE or the (+) COUNT RESET line goes high. When the (+) DELAYED RECYCLE line goes high, it causes OR gate C4D to clear all four flip-flops. When the (+) COUNT RESET line goes high, it enables AND gate C3D and triggers the pulse generator consisting of AND gate B4B and Schmitt trigger B4D. C3D produces a low level output to enable C4B and the pulse generator produces a high level output after a delay of 10 ms to disable C4B. As a result, C4B provides a positive 10-ns pulse to C4D which inverts the pulse to clear the counter flip-flops.

g. When ac power is first connected, and the sequencer counter counts to 12 or is already at 12, AND gate C4A places a conditioning input on AND gate A3A. This gate produces the INITIAL CLEAR signals when power sequencing begins.

3-35. Clear Function

a. When power is applied to the page printer and the AC POWER push-button on control panel A2A5A1 is pressed, the power sequencing operation begins (para 3-31) and the (+) INITIAL CLEAR line goes high and remains high until power sequencing is completed. As the (+) INITIAL CLEAR line goes high, OR gate A4D on PC card B7 (fig. 8-31) produces a low level (-) CLEAR SYSTEM signal which is used to clear TEST PRINT, START, and PAPER FAIL flip-flops B1A, B1B, and C4A, respectively, on PC card B8 (fig. 8-32). The (-) CLEAR SYSTEM signal is also inverted by OR gate C3A to produce the (+) CLEAR signal which in turn is inverted by AND gate C3B and by OR gate C2A to produce the (-) CLEAR and the (-) CLEAR MSG CONT signals, respectively. The (+) CLEAR, (-) CLEAR, and (-) CLEAR MSG CONT signals are used throughout the page printer logic to clear flip-flops and the 7 x 32 shift registers (memory).

b. Also, a low level (-) CLEAR SYSTEM signal is produced when the maintenance RESET push-button is pressed on test panel A2A2A3 and the (+) ASSIGN-IN line is low indicating that the page printer is not in an on line mode. In this situation, AND gate A4C is enabled to provide a positive input to OR gate A4D resulting in a low level (-) CLEAR SYSTEM signal.

3-36. Start Switch Control

a. When START switch-indicator S3 on control panel A2A5A1 is pressed, a 0-volt level connection is transferred from the START switch to AND gate A2A and OR gate A3 on PC card B7 (fig. 8-31). This low level conditions AND gate A2A and causes OR gate A3 to produce a high level signal which triggers the pulse generator consisting of AND gate B4A and Schmitt trig B4C. After a 4.3 ms delay, the pulse generator enables AND gate B5D with a high level input and also triggers the pulse generator consisting of AND gate B4B and Schmitt trigger B4D. After a 1-ms delay, B4D produces a positive output which is inverted by AND gate B5A to inhibit AND gate B5D. Thus, a 1-ms pulse is produced 4.3 ms after the START switch is pressed so that switch bounce does not affect the start control function.

b. The resulting 1-ms negative pulse output from AND gate B5D on PC card B7 enables AND gate A2A to produce a positive 1-ms (+) MAN START pulse. In the same manner (+) MAN STOP, (+) MAN TEST PRINT, (+) MAN LINE FEED, (+) MAN FORM FEED, or (+) MAN AND RESET pulse is produced when the appropriate switch on control panel A2A4A1 is pressed.

c. The first function of the (+) MAN START pulse is to generate the (+) CLEAR, (-) CLEAR, and (-) CLEAR MSG CONT pulses which are used to clear the system flip-flops and the 7 x 32 shift register (memory). To accomplish this, the (+) MAN START pulse enables AND gate C1D on PC card B8 (fig. 8-32) so that a negative pulse is inverted by OR gate CIA and again by AND gate B3A. The low level output of B3A is fed into a pulse generator configuration consisting of inverter B3B, AND gate B2B, Schmitt trigger B2D, and AND gate C2C in order to generate the 500-,usec (t) CLEAR pulse.

d. The input to the pulse generator is a 1-ms pulse and B2D generates a positive pulse after a 500-ysec delay so that AND gate C2C is enabled for the first 500 µsec of the 1-ms input pulse period. The resulting positive pulse is passed through inverter C2D and OR gate C3A to produce the 500-,usec (+) CLEAR pulse. The negative (-) CLEAR pulse is produced by inverter C3B and the negative (-) CLEAR MSG CONT pulse is produced by inverter C2A.

e. The START mode is entered when START flip-flop B1B is set by the positive-going trailing edge of the negative signal from AND gate C1D. However, flip-flop BIB is prevented from becoming set if there is a paper fail, parity error, or printer fail condition, or if power sequencing is still in progress. In a paper fail condition, a positive signal from PAPER FAIL flip-flop C4A is passed and inverted by OR gates C6B, A4C, and C5B to .keep START flip-flop BIB from being set. When a parity error occurs, the (-) PARITY FF line is passed by OR gates A4C and C5B to keep flip-flop B1B from being set. In a printer fail condition, the (-) PRINTER FAIL line is passed by OR gates A4B and B4B to keep flip-flop BIB cleared. During power sequencing, the (-) CLEAR SYSTEM line is passed by OR gates A4B and B4B to keep flip-flop B1B cleared.

f. If no fault condition exists and power sequencing is completed, the START mode is entered as START flip-flop BIB is set and produces a low level (-) START signal. This signal is inverted by OR gate QA2 on PC card B3 (fig. 8-27) causing the READY line to the CCU to be activated. It also conditions the data input AND gates of the decode and parity logic on PC card B6. In addition, the low level (-) START signal is inverted by OR gate AIB on PC card B8 to produce a high level (+) START signal.

g. **The** high level (+) START line is applied to the J input of SEL flip-flop B4A on PC card B10 (fig. 8-34) so that the internal select circuitry can be enabled when the page printer is selected by the CCU. A low level (+) START line to OR gate A4D on PC card B10 is one of the qualifying conditions for providing a (-) AUD RES signal to the CCU when the AUD RESET switch on control panel A2A5A1 is pressed. Also, the high level (+) START line causes lamp drivers A6A and A6B on PC card B8 to light the green START indicator lamps on the control panel to indicate that the page printer is in a ready condition.

h. The low level (-) START signal is also inverted by OR gate B3D on PC card B8 to produce a positive (-) NOT STOP signal which is used to inhibit AND gate CIB through OR gate C6A so that the MANUAL TEST PRINT' MODE cannot be entered during the START mode. It also conditions AND gate C1D of the data request circuits on PC card B9 (fig. 8-33). In addition, the (+) NOT STOP signal is inverted by OR gate AIC on PC card B8, producing a low level (--) STOP line which is used to condition AND gate C6D for eventual enabling by a start-of message (-) (SOM $\rightarrow$ EOM) indication from the CCU. When this occurs, lamp drivers B6A and B6B light the white START indicator lamps on control panel A2A5A1.

i. The low level (+) STOP line also prevents manual line feed and manual form feed, when the page printer is in the START mode, by inhibiting AND gates AIB and **A2D** on PC card B11 (fig. 8-35). Furthermore, the low level (+) STOP line inhibits lamp drivers B6A and B6B on PC card B4 (fig. 8-28) in order to keep the STOP indicator on the control panel not lighted. AND gate CID on PC card B8 is also inhibited by the low level (+) STOP line to avoid any effect that pressing the START push-button may have while the page printer is operating normally.

j. The START mode is terminated by clearing START flip-flop B1B with a low level signal to the C input. This is normally the result of depressing STOP switch-indicator S2 on control panel A2A5A1 so that STOP REQUEST flip-flop C4B is set to condition AND gates B4C and B4D **thru C1C if (-) CANCEL is high. Thus, the when page printer is deselected by the**

CCU and the (+) SEL line goes low, AND gate B4C provides a positive output which is passed by OR gate B4B to clear START flip-flop B1B and end the .tart mode. This will also occur when there is a paper fail or parity error condition. In the event of a printer fail condition which is considered a catastrophic failure, the (—) PRINTER FAIL line is immediately passed by OR gates A4B and B4B to clear flip-flop B1B.

3-37. Local Test Switch Control

a. When LOCAL TEST switch-indicator S1 on control panel A2A5A1 is pressed, a 0-volt level connection is transferred from the LOCAL TEST switch to the control interface circuit on PC card B7 (fig. 8-31). This circuit responds by producing a position (+) MAN TEST PRINT signal as described in the start switch control discussion (para 3-36).

b. The (+) MAN TEST PRINT line enables AND gate C1B on PC card B8 unless it is inhibited to prevent the LOCAL TEST mode from being selected. The inhibiting signal is produced by OR gate C6A when the page printer is in the START mode or if the page printer is assigned by the CCIT causing the (+) ASSIGN-IN line to be positive. When CIB is enabled, it produces a negative pulse output which is passed through OR gate C1A to trigger the pulse generator configuration (discussed in para 3-36*c* and *d*) in order to generate the 500-,sec (+) CLEAR and (-) CLEAR pulses. The trailing edge of the negative pulse from AND gate C1B sets TEST PRINT flip-flop B1A to enter the LOCAL TEST mode.

c. TEST PRINT flip-flop B1A is prevented from becoming set by the same conditions described in the start mode discussion (para 3-36*d*). For example, if there is a paper fail, parity error, or printer fail condition, or if power sequencing is still in progress, B1A cannot be set by the positive-going trailing edge of the negative pulse output of AND gate C1B. If no fault conditions exist and power sequencing is completed, the LOCAL TEST mode is entered as TEST PRINT flip-flop B1A is set and produces a low level (-) LOCAL TEST signal. This signal is inverted by OR gate B3C and applied to lamp drivers B5A and B5B to light the LOCAL TEST indicator lamps on control panel A2A5A1.

d. The (-) LOCAL TEST signal is also inverted by OR gate B3D to produce a high level (+) NOT STOP line as in the start switch control discussion (para 3-36). It also conditions the test data input AND gates of the decode and parity logic on PC card B6 and is one of the qualifying inputs for generating + TEST STROBE pulses in the LOCAL TEST mode on PC card B9.

e. At the end of the LOCAL TEST mode, a 4-µs (-) TEST STOP pulse is generated to produce a double form feed so that a completely blank paper form is skipped to separate the form with the test print-out from any new printing. This 4 µs (-) TEST STOP pulse is generated when TEST PRINT flip-flop B1A is cleared and produces a high level 0 output which enables AND gate A1A to start the 4µs pulse. The high level 0 output of B1A also triggers the pulse generator consisting of AND gate B2A and Schmitt trigger B2C which produces a positive output pulse after a 4ys delay to inhibit AND gate A1A and, thus, end the (-) TEST STOP pulse.

3-38. Assign Function

When interface receiver circuitry on PC card B3 (fig. 8-27) receives an assign signal from the CCU, the (+) ASSIGN-IN line goes high and is inverted by OR gate C6A on PC card B8 (fig. 832) to inhibit AND gate CIB. This prevents the LOCAL TEST mode from being selected once the page printer is assigned. The high level (+) ASSIGN-IN line is also inverted by inverter C2B to produce the low level (-) ASSIGN signal. This signal is inverted by inverter A4C PC card B10 (fig. 8-34) to condition the MAN AUD RESET function of the page printer. The low level (-) ASSIGN line also inhibits lamp drivers C6A and C6B on PC card B9 (fig. 8-33) to keep the NOT ASSIGNED indicator lamps on control panel A2A5A1 unlit when the page printer is assigned. The (+) ASSIGN IN line is applied to AND gate A4C on PC card A7 where it enables operation of the maintenance Reset Switch.

3-39. Stop Switch Control

a. When STOP switch-indicator S2 on control panel A2A5A1 is pressed, 0-volt level connection is transferred from the STOP switch to the control interface circuitry on PC card B7 (fig. 831). This circuitry responds by producing a positive (+) MAN STOP signal as described in the start switch control discussion (para 3-36) b. The (+) MAN STOP line is passed by OR gate C5B on PC card B8 (fig. 8-32) to lower the J input of START flip-flop B1B and of TEST PRINT flip-flop B1A and to set STOP REQUEST flip-flop C4B. The resulting hi-level 1 output of C4B enables AND gate C1C.

The resulting low output of C1C conditions B4C and B4D so that when the (+) SEL line goes low at the end of a message block from the CCU or when the (-) ENABLE FUNCTION line goes low as the result of a line feed or carriage return function in the LOCAL TEST mode, the corresponding AND gate is enabled. The high level output from the enabled AND gate is then passed by OR gate B4B or B4A to clear START flip-flop B1B or TEST PRINT flip-flop B1A in order to terminate the mode. The same result is obtained when a cancel condition occurs during operation causing the (--) CANCEL input to CIC to go low.

c. When either mode is terminated, the (+) NOT STOP line goes low and the (4-) STOP line goes high. The low level (+) NOT STOP line inhibits the data request logic and the high level (+) STOP line enables AND gates A1B and A2D on PC card B11 (fig. 8-35) to permit the MAN LINE FEED and MAN FORM FEED functions. Also, the (+) STOP line causes lamp drivers B6A and B6B on PC card B4 (fig. 8-28) to light the STOP indicator lamps on control panel A2A5A1. In addition, the high level (+) STOP line inhibits AND gate C6D on PC card B8 in order to keep the white START indicator lamps on control panel A2A5A1 not lighted.

d. When the START mode is terminated, the (-) START line goes high and deactivates the ready line to the CCU. Furthermore, the high level (-) START line inhibits the data input AND gates of the decode and parity logic on PC card B6 (fig. 8-30). The (+) START line goes low and, as a result, the select logic on PC card B10 (fig. 8-34) is inhibited so that the CCU cannot select the page printer and the green START indicator lamps on control panel A2A5A1 go out.

3-40. Line Feed Switch Control

Pressing the LINE FEED switch on control panel A2A5A1 during the STOP mode actually causes two functions to be performed. These are the line feed and carriage return functions. The line feed function is the actual feeding of paper so that a new line is moved into position for printing. The carriage return function insures that printing on the new line begins in zone 1 which consists of columns 1 through 32 on the paper. The number of lines fed in each line feed function can be one, two, or three so that printing is on every line, every other line, or every third line. This is determined by a LINE FEED SELECTION switch setting on test panel A2A2A3 (para 3-50).

a. When LINE FEED switch S7 on control panel A2A5A1 is pressed, a 0-volt level connection is transferred from the LINE FEED switch to the control interface circuitry on PC card B7 (fig. 8-31). This circuitry responds by producing a positive (+) MAN LINE FEED signal as described in the start switch control discussion (para 3-36).

b. The (+) MAN LINE FEED signal enables AND gate A1B on PC card B11 (fig. 8-35) if the (+) STOP input line is high level, indicating that the page printer is in a STOP mode. If the START mode is in effect, AIB is inhibited by a low level (+) STOP line to prevent manual line feed. Therefore, this function is only possible when the page printer is in the STOP mode. When AND gate A1B is enabled the line feed and carriage return functions are initiated (para 3-49).

3-41. Form Feed Switch Control

Pressing the FORM FEED switch on control panel A2A5A1 during the STOP mode causes the paper feed mechanism to move a new paper form into the printing position. This function includes the line feed and carriage return operation to initiate paper feeding and to ensure that printing begins in zone 1 (columns 1 through 32). A MARGIN SELECTION switch on test panel A2A2A3 can be used to select a 1-inch margin (6 lines at the top and bottom of each form (para 3-51)).

a. When FORM FEED switch S8 (fig. 8-4) on control panel A2A5A1 is pressed, a 0-volt level connection is transferred from the FORM FEED switch to the control interface circuitry on PC card B7 (fig. 8-31). This circuitry responds by producing a positive (+) MAN FORM FEED signal as described in the start switch control discussion (para 3-36).

b. The (+) MAN FORM FEED signal enables AND gate A2D on PC card B11 (fig. 8-35) if the (+) STOP input line is high level, indicating that the page printer is in a STOP mode. If the START mode is in effect, A2D is inhibited by a low level (+) STOP line to prevent manual form feed. Therefore, this function is only possible when the page printer is in the STOP mode. When AND gate A2D is enabled, the form feed, line feed, and carriage return functions are initiated (para 3-49 and 3-52).

3-42. Audible Reset Switch Control

a. When an audible alarm is triggered at the CCU by the page printer, it indicates that either an alarm stop condition or a caution condition exists in the page printer. After serving its purpose, the audible alarm can be shut off at the page printer by pressing AUDIBLE RESET switch S4 on control panel A2A5A1 (fig. 8-4). When the switch is pressed, a 0-volt level connection is transferred from the switch to the control interface circuits on PC card B7 (fig. 831). This circuit responds by producing a positive (+) MAN AUD RESET signal as described in the start switch control discussion (para 3-36).

b. The (+) MAN AUD RESET line enables AND gate A2D on PC card B10 (fig. 8-34) but only if the page printer is assigned by the CCU and is either in a STOP mode or a caution condition. If the page printer is assigned, the (-) ASSIGN line (para 3-38) is low level which passes through OR gate A4C to condition AND gate A4H. If the page printer is also in a STOP mode, the (+) START signal is low level (para 3-36) and passes through OR gate A4D to enable AND gate A4H. The same result is obtained if the page printer is in the START mode but, because of a low paper supply, is also in a caution condition. Thus, the (-) CAUTION signal is low level and passes through OR gate A4D to enable AND gate A4H.

c. Enabled AND gate A4H provides a conditioning high level input to AND gate A2D so that if the AUD RESET push-button is pressed, the resulting positive (+) MAN AUD RESET pulse enables A2D to produce a negative output signal. This negative signal triggers the pulse generator, consisting of AND gate B5B and Schmitt trigger B5D, through AND gate A5A and also enables AND gate A5B which then causes AND gate C1D to produce a negative (-) AUD RES pulse. The length of the pulse is determined by the pulse generator which generates a positive output, after a 20-µsec delay, to inhibit AND gate A5B. The result is a 20-µsec (-) AUD RESET pulse which is transferred by an interface transmitter on PC card B3 to the CCU.

3-43. Select Control

a. Selection of the page printer by the CCU results in a high level on the (+) SEL IN line to the pulse generator consisting of AND gate B3A and Schmitt trigger B3C on PC card B12 (fig. 8-36) which produces a positive output after a 0.3-ms delay. The delay prevents the select logic from reaching to rapid select-deselect transitions of which the CCU is capable. After delay, B3C places a high level on the (+) DELAYED SEL line to enable AND gate CIC on PC card B10 (fig. 8-34). The resulting low level output of C1C is inverted by OR gate C1B to set SEL flip-flop B4A. This occurs before the start of each message block.

b. SEL flip-flop B4A is prevented from becoming set if the (+) START line to the J input is low level indicating that the page printer is not in the START mode or if CAN flip-flop C2B is set indicating a cancel condition. When C2B is set, the low level 0 output inhibits AND gate C1C so that the arrival of a positive (+) DELAYED SEL signal cannot set SEL flip-flop B4A. When B4A is set, the 1 output produces a high level (+) SEL line which allows several logic functions to be performed as described in the following paragraphs.

3-44. Data Request Generator

The data request generator controls the generation of data request and first data request pulses to the CCU.

a. The distinction between the first data request and subsequent data requests in each block is made by SOB flip-flop B4B on PC card B10 (fig. 8-34). This flip-flop is set by the high (+) SEL line to permit the first data request which indicates to the CCU that the page printer is ready to accept the first character data. When SOB flip-flop B4B is set, the 1 and 0 outputs produce a high level (+) SOB signal and a low level (-) SOB signal, respectively. The (-) SOB line conditions AND gate C2C on PC card B9 (fig. 8-33) so it can be enabled by AND gate C1B which in turn is conditioned by a high (+) SEL line and enabled by AND gate A1B. This is accomplished when DATA REQ flip-flop B1A is set and the (+) CANCEL line is low indicating that a cancel condition does not exist. As a result, AND gate C2C produces a positive (+) START BLOCK OUT signal which is sent to the CCU by interface circuitry on PC card B1 as a positive START BLOCK LINE (first data request). AND gate C2D which is used to produce subsequent data requests is inhibited by the (4) SOB line at this time.

b. SOB flip-flop B4B on PC card B10 (fig. 834) remains set only until the first data strobe (+) ST-IN pulse is received in response to the first data request. Thus, when the (+) STEND pulse is derived from the first data strobe, it clears SOB flip-flop B4B and reverses the levels on the (-) SOB and (+) SOB lines. The resulting high (-) SOB line inhibits AND gate C2C on PC card B9 (fig. 8-33) and the low (+) SOB line conditions AND gate C2D which is used to generate high level (+) DATA REQ OUT signals. Therefore, subsequent (+) DATA REQ OUT signals are generated when DATA REQ flip-flop B1A is set to enable AND gate A1B.

c. To produce the (+) START BLOCK OUT signal, DATA REQ flip-flop B1A is set when AND gate A1A is enabled by two low level inputs. One of these inputs is provided by the (+) INHIBIT DATA REQ line when it is low level (para 3-45) and the other input is provided when AND gate C1D is enabled. This occurs when C1D receives a high level input from the 0 output of REQ GOV flip-flop BIB which is in a cleared state and when the (+) NOT STOP line is high indicating that the page printer is in the START mode. Thus, B1A is set at the beginning of a START mode.

d. When the CCU responds to the first data request, the (+) ST-IN pulse caused by the first data strobe from the CCU enables AND gate C1A. The negative output pulse of C1A is passed by OR gate B6AC to clear DATA REQ flip-flop B1A. The (-) STB pulse caused by the same data strobe sets REQ GOV flip-flop B1B, and the resulting high level 1 output of B1B triggers the pulse generator consisting of AND gate B2A and Schmitt trigger B2C. After a 20-usec delay, B2C produces a positive pulse to clear REQ GOV flip-flop BIB. During the 20-usec delay period, the low level 0 output of BIB inhibits AND gate CID in order to keep the data request lines to the CCU low level for at least 20-usec between subsequent data requests.

e. When REQ GOV flip-flop B1B is cleared, the positive step at the 0 output causes DATA REQ flip-flop BIA to be set through AND gates C1D and A1A. As a result, the low level 0 output of B1A goes high and causes the (+) DATA REQ OUT line to go high. The same cycle is repeated for subsequent data requests to the CCU until the end of the message block (EOB) and the 81st strobe arrive to deselect the select control circuitry, causing the (+) SEL line to go low. The entire operation begins again when the CCU selects the page printer to receive another message block.

f. During the LOCAL TEST mode or in the event of a cancel condition, the (-) LOCAL TEST line or the (-) CANCEL lines cause OR gate B3C on PC card B9 to condition AND gate B3B. When DATA REQ flip-flop B1A is set, the high level 1 output triggers the pulse generator consisting of AND gate B2B and Schmitt trigger B2D which produces a positive output after a 170-,sec delay to enable B3B. The low level output of B3B enables AND gate A5B to produce a (+) TEST STROBE pulse and also triggers the pulse generator consisting of AND gate B6B and Schmitt trigger B6D through AND gate A5A. After a 4-µsec delay, B6D produces a positive output to inhibit AND gate A5B and to end the (+) TEST STROBE pulse. This 4-µsec pulse is used in a cancel condition to enable AND gate C5B to produce a negative (-) CIRCUMFLEX pulse. In the LOCAL TEST mode, the 4-µsec (+) TEST STROBE pulses take the place of data strobes which would be received from the CCU in normal operation.

g. The (+) INHIBIT DATA REQ line can inhibit generation of data requests if a line feed or carriage return is commanded or if a feeding function is in progress or the 7 x 32 shift registers (memory) have been loaded and a print cycle is in progress (para 3-65).

3-45. Inhibit Data Request Function

a. The (+) INHIBIT DATA REQ signal is used to inhibit the data request function if either a line feed or carriage return function is commanded, or if paper is feeding, or if column 1 of the 7 x 32 shift registers contains data. This signal is produced by OR gate C5D on PC card B11 (fig. 8-35) when the (-) FULL → EXIT PC END line is low level, indicating that the memory is fully loaded, or when OR gate C2D produces a low level input to C5D.

b. When LF flip-flop B3B is set, the low level 0 output is inverted by OR gate C3B, thereby causing C2D to produce the (+) INHIBIT DATA IREQ signal. This occurs if paper is feeding and FEED flip-flop B1A is cleared so that the low level 1 output is inverted by OR gate C3B and applied to C2D. Also, if CR flip-flop B3A is set, the high level I output causes C2D to produce the (+) INHIBIT DATA REQ signal.

c. The low level (-) FULL → EXIT PC END signal is produced when FULL flip-flop B1A on PC card B10 (fig. 8-34) is set. This flip-flop is set when the 7 x 32 shift registers are fully loaded and the (+) T-REG-1 line goes high, indicating that the last register (column 1) has received data. The (+) T-REG-1 signal is strobed through AND gate B2A by the (+) ST-END pulse related to the last character data stored in position 32 of the register. The resulting low level output of B2A sets FULL flip-flop BIA so that the 0 output provides a low level (-) FULL → EXIT PC END signal to OR gate C5D on PC card B11 in order to generate a positive (+) INHIBIT DATA REQ signal. The FULL flip-flop is cleared when the trailing edge of the negative (-) EXIT PC appears at the CL input, indicating the end of a print cycle.

3-46. Data Control Line

The data control line is used by the CCU to carry the start-of-message (SOM), end-of-block (EOB), and end-of-message (EOM) data control signals to the page printer (fig. 3-30).

a. When a positive (+) CL-IN pulse is received from the CCU through interface circuitry on PC card B1 (fig. 8-25) and the (+) SEL line is high, AND gate B5B on PC card B7 (fig. 8-31) is enabled. The resulting negative pulse is inverted by OR gate B5C to produce a positive (-) CONTROL LINE pulse which can represent either the SOM, EOB, or EOM. The SOM is sensed when a (+) CONTROL LINE pulse is gated with the first data strobe pulse from the CCU following the first data request. The EOB is sensed when a (+) CONTROL LINE pulse is gated with the 80th data strobe pulse from the CCU and an EOM is sensed when a (+) CONTROL LINE pulse is gated with the 81st data strobe pulse from the CCU.

b. The SOM, EOB, and EOM gating is accomplished by AND gate CIA on PC card B10 (fig. 8-34) which receives the (+) CONTROL LINE input and a (+) STB input. The (+) STB input is a positive pulse which is a product of a data strobe pulse from the CCU (para 3-47). Thus, when both the (+) CONTROL LINE and (+) STB pulses appear simultaneously, AND gate C1A is enabled to produce a negative pulse to AND gate AIC. When this occurs with the first data strobe, AND gate A1C is enabled to set the MSG latch consisting of OR gate A1A and AND gate AIB. The conditioning input to AND gate A1C is low because SOB flip-flop B4B is set during the first data strobe.

c. The result is that the MSG latch produces a low level (-) SOM → EOM output which indicates that a message is in progress by activating lamp drivers B6A and B6B on PC card B8 to light the white lamps in START switch-indicator S3 on control panel A2A5A1. At the same time, the (-) SOM → EOM line inhibits lamp drivers A6A and A6B to put out the green lamps in the START indicator. The MSG latch remains set until the end of the message. At the end of the first data strobe, the (+) ST-END line produces a positive pulse which is inverted by AND gate B2C on PC card B10 to clear SOB flip-flop B4B.

d. The next (+) CONTROL LINE pulse after SOM is the EOB which is strobed by the 80th data strobe at AND gate C1A. When this occurs, AND gate AID produces a positive output signal to enable AND gate A2A, which is already conditioned by the high level 0 output of the cleared SOB flip-flop. The resulting negative pulse from A2A sets the EOB latch consisting of OR gate A2C and AND gate A2B so that the high level output of OR gate A2C conditions the J input of 81 flip-flop C2A. Thus, the next (+) STA pulse which is generated by the 81st data strobe sets C2A so that the low level 0 output condition AND gate A3C in preparation for deselecting the page printer.

e. To deselect the page printer, SEL flip-flop B4A is cleared by a low level signal from OR gate A3D. This signal is produced when the (+) ST-END pulse generated by the 81st data strobe is inverted by AND gate B2C to enable AND gate A3C to provide a high level input to OR gate A3D. Thus, SEL flip-flop B4A is cleared and the (t-) SEL goes low. The low level output of A3D also clears the EOB latch by inhibiting AND gate A2B.

f. During the 81st data strobe period, while 81 flip-flop C2A is set, the control line is checked by AND gate A2A on PC card B11 (fig. 8-35) for a (+) CONTROL LINE pulse which would represent the end of the message (EOM). To do this, A2A is conditioned by the (+) 81-END signal produced by AND gate A3C. When such a pulse appears, it generates a form feed function (para 3-49). When no EOM appears, the next data block from the CCU is preceded by a repeat of the select function described in paragraph 3-43. Therefore, when SEL flip-flop B4A on PC card B10 (fig. 8-34) is set and, in turn, sets SOB flip-flop B4B, the low level 0 output of B4B clears 81 flip-flop C2A.

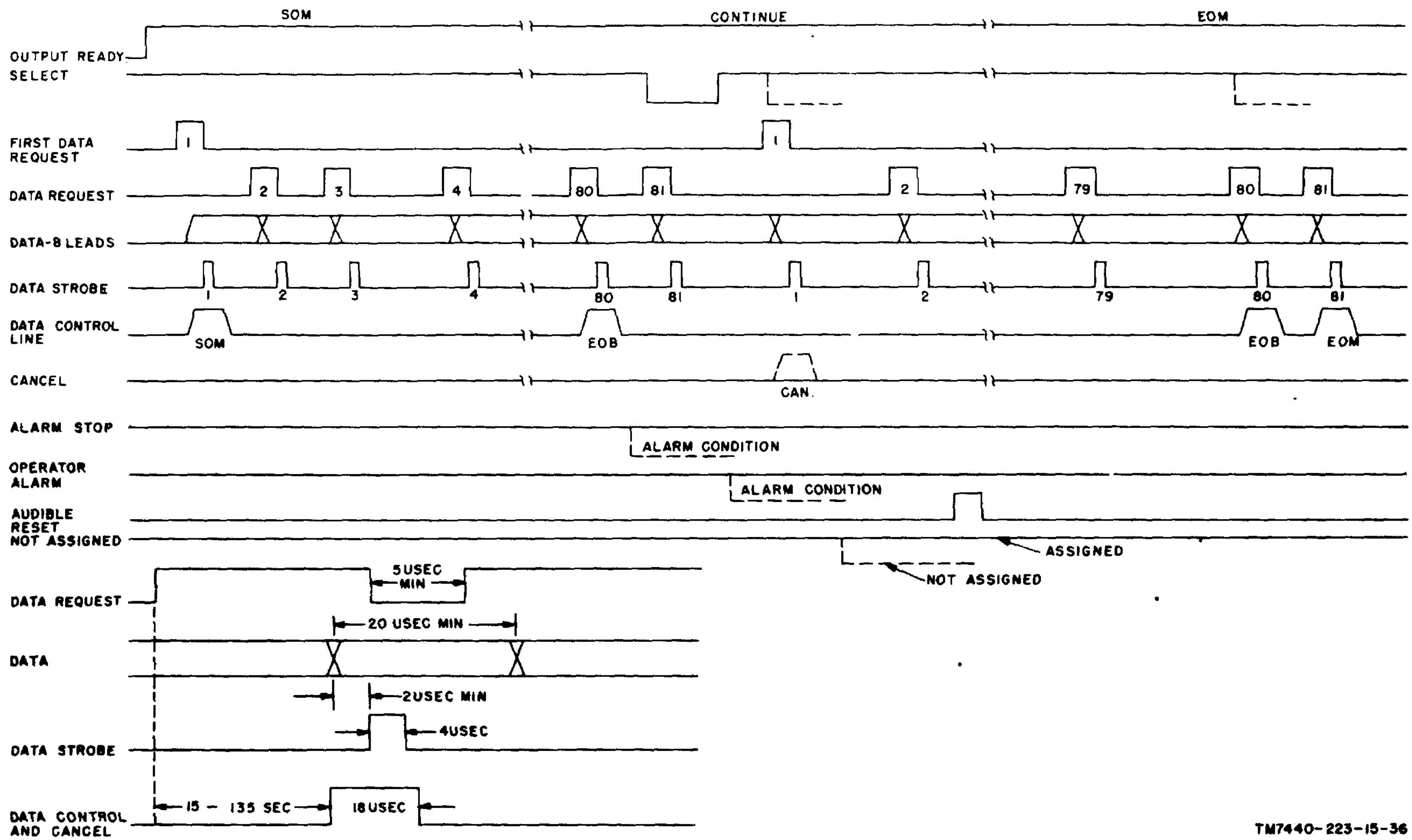


Figure 3-30. Interface timing diagram.

3-47. Date Strobe Pulses

The strobe pulses STA, STB, and ST END are all products of the data strobe pulse which is received from the CCU with each column of data. The 1-µsec STA pulse is generated by the leading edge of the 4-itsec data strobe pulse and the 1-µsec STB pulse is generated by the trailing edge of the STA pulse. The 2-µsec ST END pulse is generated by the trailing edge of the data strobe pulse (fig. 3-31). These pulses are used for clocking various functions throughout the page printer logic.

a. The high level.(+) SEL line conditions AND gate A4A on PC card B10 (fig. 8-34) so that when a data strobe pulse is received from the CCU causing the receive interface circuitry on PC card B3 to produce a positive (+) STIN pulse, A4A is enabled. The positive pulse output of A4A is inverted by OR gate A4F, producing a negative pulse. This pulse enables AND gate A5C and is also inverted by OR gate C3A to trigger the pulse generator consisting of AND gate B3B and Schmitt trigger B3D. After 1-µsec, B3D produces a positive output to inhibit AND gate A5C. The result is that A5C is enabled to provide a 1-µsec positive pulse which is inverted by AND gate C5A and OR gate C5D in succession to produce the (+) STA pulse.

b. The negative 1-psec pulse from C5A also causes the pulse generator consisting of OR gate B5A and Schmitt trigger B5C to produce a 2-esec negative pulse after a 1-psec delay. This negative pulse appears at AND gate A5D at the same time that the positive pulse output of AND gate A5C goes negative. Thus, A5D produces a positive I-,sec (+) STB pulse following the end of the 1-usec (-.) STA pulse. Also, AND gate C3C inverts the positive (+) STB pulse to produce a negative (-) STB pulse.

c. The pulse generator, consisting of OR gate B3A and Schmitt trigger B3C, is triggered by a low level step from OR gate A3B when the (+) ST-IN pulse starts in order to produce a negative output. This negative signal conditions AND gate A3A which is inhibited by the positive output of OR gate C3A for as long as the (+) ST-IN pulse is positive. Therefore, at the trailing edge of (+) ST-IN, A3A is enabled to produce a positive (+) ST-END pulse.

d. Consequently, the start of a positive (+) ST-IN pulse is followed by a (+) STA pulse which, in turn, is followed by a (+) STB pulse. The end of the (+) ST-IN pulse is followed by a (+) ST-END pulse.

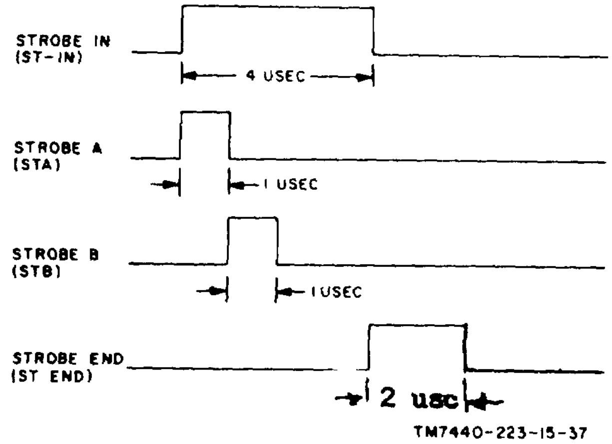


Figure 3-31. Data strobe pulse timing diagram.

3-48. Line Feed, Carriage Return, and Form Feed Commands

a. Line feed and carriage return functions are initiated when LF and CR flip-flops B3A and B3B on PC card B11 (fig. 8-35) are set. Both flip-flops are set when OR gate B4B presents a high level input to OR gates A4A and A4B as the result of either a line feed carriage return command or a form feed command. A line feed carriage return command is represented by a low level output from OR gate A1F. This occurs when the LINE FEED switch on control panel A2A5A1 is pressed during the STOP mode (para 3-39) and also when a cancel condition causes the (+) CAN DATA line to go high and a (+) ST END pulse is generated.

b. Also, both the LF and CR flip-flops are set when an automatic line feed carriage return is commanded by a low level AND gate A3A output which is inverted by OR gates B4C and B4D to set the flip-flops. This occurs when all high inputs appear at A3A. One of these inputs is provided by OR gate C5A when printing is in the 16-character zone 3 (columns 65 through 80) or the (-) ENABLE AUTO line is low level (para 3-70). The (+) T-REG-17 input is high if the 7 x 32 shift registers (memory) are half-filled (16 characters) before printing in zone 3. This indicates that a full line (80 characters) is being printed and an automatic line feed and carriage return are required. When partial lines are printed, line feed and carriage return functions are initiated by coded commands from the CCU. The (-) T-REG-1 OR CLEAR line is high unless clearing is underway or data is stored in the first register of memory, which is not a normal condition when printing in zone 3.

c. The LIF flip-flop can be set separately by OR gate A4A when a low level (-) LF CODE OR MSG STOP appears and is inverted by OR gate B4C. This occurs when the page printer is stopped during a message mode or when a line feed command is decoded from the incoming data supplied by the CCU. The CR flip-flop can also be set separately by OR gate A4B when a low level (-) CR CODE signal appears. This occurs when a carriage return command is decoded from the incoming data supplied by the CCU.

d. When the page printer is manually stopped, the STOP REQ flip-flop C4B on PC card B8 produces a high level 1 output which conditions AND gate C1C. Since the (-) CANCEL line will normally be high, the low output from AND gate C1C conditions AND gate B4C. The low level on the (+) SEL line then enables AND gate B4C to trigger pulse generator A5BD and to enable AND gate A4D. The resulting low level output of A4D cause OR gate A5AC to start a negative (-) LF CODE OR MSG STOP pulse. Then, after a 4-µsec delay, A5BD produce a positive output signal which is inverted by OR gate C6C to inhibit AND gate A4D and to end the (-) LF CODE OR MSG STOP pulse. One qualification for producing this pulse is that there must be a high level 0 output from the TEST PRINT flip-flop B1A which is inverted by OR gate B3C and applied to OR gate C6C. Thus, a manual stop operation while in local test will not develop the (-) LF CODE OR MSG STOP pulse. A second condition for generating the (-) LF CODE OR MSG STOP pulse occurs when a line feed code is decoded by the decode circuits on PC card B6 (fig. 8-30), a low level (-) LF CODE signal is passed through OR gate ASAC.

e. A form feed function is initiated when FORM flip-flop B2A is set by a low level OR gate A2F output which is the result of either AND gate A2A, A2B, A2C, or A2D being enabled. AND gate A2A is enabled when both the (+) 81 END and (+) CONTROL LINE inputs go high, indicating an end-of-message (EOM) signal from the CCU. AND gate A2B is enabled in a cancel condition, indicated by a high (+) CANCEL line, when an automatic line feed carriage return output is produced by AND gate A3A and inverted by OR gate B4A. This occurs after a line of circumflexes (A) is printed as the result of a cancel condition. AND gate A2C is enabled when a negative ()TEST STOP pulse is provided at the end of a LOCAL TEST mode and AND gate A2D is enabled when the FORM FEED switch on control panel A2A5A1 is pressed during the STOP mode to produce a positive (+) MAN FORM FEED pulse.

f. When a form feed is commanded, the low level output of OR gate A2F also causes initiation of the line feed and carriage return functions through OR gates B4B, A4A, and A4B. This is necessary because a carriage return must accompany a form feed and because the line feed is needed to start paper feeding. The low level A2F output is also used as the (-) RESET MSG signal which resets the MSG latch (OR gate AIA and AND gate AIB) on PC card B10, causing the (-) SOM X) EOM line to go high in preparation for the next start-of-message (SOM) signal.

3-49. Line Feed and Form Feed Functions

a. When LF flip-flop B3B is set by a line feed command (para 3-48), the low level 0 output conditions AND gate C2A and is inverted by OR gate C3A to place a high level on the J input of ENABLE FUNCTION flip-flop C4A. Thus, at the end of the preceding print cycle, the (-) EXIT PC line goes high and sets C4A so that its low level 0 output enables AND gate C2A. The high level output of C2A is inverted by AND gate CIB to clear FEED flip-flop B1A. The low 1 output of B1A enables AND gate A4D which then causes AND gate A5D to produce a low level (-) FEED line to the paper feed control circuitry on PC card AI (fig. 8-12).

b. The (-) FEED line causes paper feeding (para 3-78) to start and continue until the 'EE;D flip-flop is set by the trailing edge of a negative (-) LF STR pulse. Paper feeding can be for one, two, or three lines or for one or two forms, with or without top and bottom l-inch margins, depending upon the state of the FEED flip-flop J input and the arrival time of the (-) LF STR PULSE.

c. When a negative (-) LF STR pulse appears, the trailing edge of the pulse sets FEED flip-flop B1A on PC card B11 (fig. 8-35) if the J input is conditioned by a high level output from OR gate A1H. However, if the margin selection control logic (para 3-51) enables AND gate A1C, the low output of OR gate A1H prevents the set, ting of the FEED flip-flop and paper feeding is not stopped by certain (-) LF STR pulses. This is done to leave 1-inch margins at the top and bottom of each paper form.

d. Also, if negative (-) LF STR pulses appear when FORM flip-flop B2A is set, indicating that form feeding is in progress, the high level 1 output of B2A enables AND gate A1D. This places a low at the output of OR gate A1H, thereby preventing the FEED flip-flop from being set by the (-) LF STR pulses. Thus, paper feeding continues until the FORM flip-flop is cleared to complete a single form feed.

e. Form feeding is ended when a new paper form is in position for printing. This condition is represented by a high level output at OR gate C3C which clears FORM flip-flop B2A to stop paper feeding. However, one qualification for this is that TWO FORM flip-flop B2B must be cleared in order to provide a low level 1 output to the K input of the FORM flip-flop. The high level clearing output of OR gate C3C is produced when a (+) BOP ECHO pulse is followed by a (+) TOF ECHO pulse.

f. The two echo pulses are products of the light sensors monitoring the strobe disk which is synchronized with the paper feed sprocket. When a form feed is commanded, the bottom of a page form is indicated by a negative (-) BOP pulse from the light sensors. This pulse causes OR gate A1A to trigger the pulse generator consisting of AND gate A2B and Schmitt trigger A2D on PC card A1 (fig. 812). After a 50-µsec delay, A2D produces a positive (+) BOP ECHO pulse which sets ENABLE FORM flip-flop B1B on PC card B11 (fig. 8-35). The resulting high level 1 output conditions AND gate C3D. The other input to C3D goes high when the top of the next form causes the light sensors to produce a (-) TOF pulse. This pulse causes OR gate A1D on PC card A1 to trigger the pulse generator consisting of AND gate A2A and Schmitt trigger generator A2C so that after 50 µsec, A2C produces a positive (+) TOF pulse to enable AND gate C3D on PC card B11. Therefore, the low level output of C3D causes OR gate C3C to clear FORM flip-flop B2A. The next form feed command produced by OR gate A2F on PC card B11 clears ENABLE FORM flip-flop B1B.

g. When a LOCAL TEST mode is terminated, the (-) TEST STOP line goes low to initiate a form feed command through OR gate C5C and also to set TWO FORM flip-flop B2B. The resulting high level 1 output of B2B prevents FORM flip-flop B2A from being reset when the next pair of (+) BOP ECHO and (+) TOF ECHO pulses, which indicate the end of a single form feed, enable AND gate C3D. However, the low level output of C3D resets the TWO FORM flip-flops, causing the 1 output line to the K input of the FORM flip-flop to go low. Therefore, the next time (+) BOP ECHO and (+) TOF ECHO pulses enable AND gate C3D, the FORM flip-flop is cleared. This allows the FEED flip-flop to be set by next (-) LF STR pulse in order to stop paper feeding. As a result, two paper forms are fed so that a blank form is left between the test printout and whatever printing is to be done.

h. When paper feeding is stopped and the FEED flip-flop causes the (-) FEED line to go high, the positive step sets GOV flip-flop C4B, which then enables the pulse generator consisting of AND gate B5B and Schmitt trigger B5D and inhibits AND gate A4D. After a 43-ms delay, B5D provides a low level signal through AND gate A5C to clear GOV flip-flop C4B in order to remove the inhibiting input from AND gate A4D. This insures at least a 43-ms period between successive line feed functions to prevent overloading power supplies.

3-50. Line Feed Selection Control

LINE FEED SELECTION switch S11 on test panel A2A2A3 is used to select either one-line, two-line, or three-line feed function. The setting of this switch is represented by the arrival time of the (-) LF STR pulses at the CL input of FEED flip-flop B1A on PC card B11 (fig. 8-35) which controls paper feeding. When a (-) LF STR pulse appears during a line feed, it causes the FEED flip-flop to stop paper feeding. Consequently, the arrival of the pulse, relative to paper feeding, can be selected to allow printing on every line, every other line, or every third line.

a. The (-) LF STR pulses are produced by OR gate A4F on PC card B9 (fig. 8-33) when AND gate A4A is enabled by a (+) LF ECHO pulse and a high level input from the 0 output of ST2 flip-flop C4A. The (+) LF echo pulse is a product of the light sensors monitoring the strobe disk which is synchronized with the paper feed sprockets.

b. As each line of paper is fed, a negative (-) LF pulse from the light sensors causes OR gate A1B to trigger the pulse generator consisting of AND gate C1A and Schmitt trigger C1C on PC card A1 (fig. 8-12). After a 50-µsec delay, C1C produces a positive (+) LF ECHO pulse which triggers the pulse generator consisting of OR gate B4A and Schmitt trigger B4C through AND gate C5D on PC card B9 (fig. 8-33). As a result, AND gate A5C produces a 20-µsec positive pulse which is gated by AND gate A4F with the 0 output of the ST2 flip-flop. The state of the ST2 flip-flop depends upon the setting of the LINE FEED SELECTION switch.

c. When the LINE FEED SELECTION switch is set to the 1 position, a low level connection is transferred to AND gate C3C on PC card B9 (fig. 8-33). This conditions C3C so that during a line feed function, the (-) SET LF signal provided by OR gate A4A on PC card B11 (fig. 8-35) to set the LF flip-flop also enables C3C. The high level output of C3C on PC card B9 is then inverted by OR gate C3D to clear ST2 flip-flop C4A. As a result, the high level 0 output of ST2 conditions AND gate A4A so that each (+) LF ECHO pulse enables A4A, causing OR gate A4F to produce a negative (-) LF STR pulse.

d. When the LINE FEED SELECTION switch is set to the 2 position, interface AND gate A3A causes AND gate C5A and OR gate A3C to set ST1 and ST2 flip-flops C4B and C4A, respectively. The low level 0 output of ST2 inhibits AND gate A4A and the high level 1 output conditions AND gate C5C. When the next (+) LF ECHO pulse comes through, it enables C5C, but is blocked by the inhibited A4A. The resulting low level output of C5C clears the ST1 flip-flop so that the high level 0 output clears the ST2 flip-flop. Therefore, AND gate A4A is conditioned by the high level 0 output of the ST2 flip-flop and is enabled by the next (+) LF ECHO pulse. In this manner, every other (+) LF ECHO pulse causes a (-) LF STR pulse to be produced so that printing is on every second line.

e. When the LINE FEED SELECTION switch is set to the 3 position, interface AND gate C3B causes OR gate C3A clear the ST1 flip-flop and OR gate A3C to set the ST2 flip-flop. The low level 0 output of ST2 inhibits AND gate A4A and the high level 1 output conditions AND gate C5C. When the next (+) LF ECHO pulse appears, it enables C5C, but is blocked by the inhibited A4A. Since the J input of the ST1 flip-flop is enabled to be set by the positive 0 output, the trailing edge of the negative C5C output pulse sets ST1. However, the ST2 flip-flop remains in the set state so that the next (+) LF ECHO pulse is also blocked by A4A, but causes C5C to set the ST1 flip-flop. As a result, the positive stop that appears at the 0 output of ST1 clears the ST2 flip-flop, thereby conditioning AND gate A4A for the next (+) LF ECHO pulse. Therefore, every third (+) LF ECHO pulse causes a (-) LF STR pulse to be produced so that printing is on every third line.

3-51. Margin Selection Control

MARGIN SELECTION switch S10 on test panel A2A2A3 is used to select a 1-inch margin at the top and bottom of each form page when the switch is set to IN. This setting is represented by a low level inhibiting signal at the J input of FEED flip-flop B1A on PC card B11 (fig. 8-35) which controls paper feeding. The low level appears during the last inch (6 lines) on a paper form and the first inch (6 lines) of the next paper form in order to continue paper feeding.

a. When the MARGIN SELECTION switch is set to IN, a high level open connection conditions AND gate A1C. Therefore, if paper is feeding and the (+) MARGIN INHIBIT line goes high, A1C is enabled and prevents FEED flip-flop B1A from being set by the six (-) LF STR pulses associated with the lines in each of the bottom and top margins. As a result, paper feeding continues until A1C is disabled by a low level (+) MARGIN INHIBIT signal.

b. The (+) MARGIN INHIBIT signals are a product of the light sensors monitoring the strobe disk which is synchronized with the paper feed sprockets. The light sensors produce a low level to interface OR gate A1C on PC card A1 (fig. 8-12) when the last inch on one form and the first inch on the next form are passing through the print position. As a result, OR gate A1C produces a high level (+) MARGIN INHIBIT signal to AND gate A1C on PC card B11 (fig. 835).

c. When the MARGIN SELECTION switch is in the OUT position, a low level is applied to AND gate A1C so that printing is done on the full paper form.

3-52. Carriage Return Function

a. When CR flip-flop B3A is set for the carriage return function, the low level 0 output is inverted by OR gate C3A to apply a high level signal to the J input of ENABLE FUNCTION flip-flop C4A. Thus, at the end of the preceding print cycle, the (-) EXIT PC line goes high and sets C4A so that its low level 0 output enables AND gate C2R. In addition, the high level from OR gate C3A enables AND gate C1A if the loading of data is not in progress or if there is no zone delay. If either of these conditions exist, OR gate C2C inhibits CIA.

b. When C1A is enabled, the low level output causes OR gate C1C to enable AND gate C1D, since C1D is already conditioned by the high level 1 output of the CR flip-flop. The resulting low level output of C1D is gated by AND gate C2B with the (-) ENABLE FUNCTION line from the ENABLE FUNCTION flip-flop to produce the positive (+) C-RET signal.

c. The (4-) C-RET signal is inverted by AND gate B3A on PC card B9 (fig. 8-33) to enable AND gate A3D and to trigger pulse generator B4BD through OR gate B3D. AND gate A3D causes OR gates A1D to produce the start of a negative (-) EX CR pulse. After a 300-µsec delay, B4BD produces a positive signal to inhibit A3D, thereby ending the (-) EX CR pulse.

d. The 300-µsec (-) EX CR pulse is used to clear FULL LOAD flip-flop B1A on PC card B10, since a carriage return requires a new data load. The pulse also triggers pulse generator B1BD on PC card B7 (fig. 8-31) which produces a (-) RESET CR pulse to reset CR flip-flop B3A on PC card B11 (fig. 8-35). Other functions of the (-) EX CR pulse are covered in the print address description (para 3-69).

3-53. CCU Data Control

a. The basic ASCII code identifies 128 characters. However, the page printer is limited to 64 characters (63 printable and 1 space) which can be printed. The 128 characters of the basic ASCII code are defined by data bits 1 through 7. Data bit 8, being a parity bit, is used only for parity error detection.

b. The 128 characters of the basic ASCII code may be arranged in array shown in table 3-3. This is a matrix consisting of eight columns numbered 0 through 7 and 16 rows numbered 0 through 15. The row number is specified by the binary value of data bits 1 through 4 and the column number is specified by the binary value of data bits 5 through 7 for that character. Thus, the code for the character H is 1001000 in data bits 7 through 1, respectively. The binary value for data bits 1 through 4 (1000) places this character in row 8 and the binary value for data bits 5 through 7 (100) places this character in column 4.

c. The 64 characters which can be printed by the page printer fall in four columns of the basic ASCII matrix. These four columns are numbered 2, 3, 4, and 5. If a character code is received from the CCU in column 6 or 7 (identified by the code 110 or 111 in data bits 7, 6, and 5), the character is printed as though it were in column 4 or 5 instead of 6 or 7. This process is called fold-over. For example, if the character "a" (row 1, column 6) is received, it is converted into the character "A" (row 1, column 4) by the fold-over of column 6 into column 4. A similar technique is used to fold over column 7 into column 5. Any characters received from the CCU which happen to be in column 0 or 1 are considered invalid and are ignored.

d. The selection of a character in columns 2, 3, 4, and 5 is effectively determined by data bits 5 and 6. This is possible since the characters in each of columns 2, 3, 4, and 5 use a different combination of data bits 5 and 6. Data bit 7 can therefore, be disregarded with no loss to character selection. However, data bit 7 is needed to identify characters in columns 6 and 7 so that they can be folded over and also to identify characters in columns 0 and I so that they can be ignored.

Table 3-3. Basic ASCII Matrix Chart

					Data Bits	7	0	0	0	0	1	1	1	1
						6	0	0	1	1	0	0	1	1
Data Bits				Row		5	0	1	0	1	0	1	0	1
4	3	2	1	No.	Column No.		0	1	2	3	4	5	6	7
0	0	0	0	0			NULL	DLE	SP	0	\	P	@	P
0	0	0	1	1			SOH	DC_1	!	1	A	Q	a	q
0	0	1	0	2			STX	DC_2	'	2	B	R	b	r
0	0	1	1	3			ETX	DC_3	#	3	C	S	c	s
0	1	0	0	4			EOT	DC_4	$	4	D	T	d	t
0	1	0	1	5			ENG	NACK	%	5	E	U	e	u
0	1	1	0	6			ACK	SYNC	&	6	F	V	f	v
0	1	1	1	7			BELL	ETB	'	7	G	W	g	w
1	0	0	0	8			BS	CNCL	(	8	H	X	h	x
1	0	0	1	9			HT	EM	)	9	I	Y	i	y
1	0	1	0	10			LF	SS	*	:	J	Z	j	z
1	0	1	1	11			VT	ESC	+	;	K	[	k	{
1	1	0	0	12			FF	FS	,	<	L	~	l	¬
1	1	0	1	13			CR	GS	-	=	M	]	m	}
1	1	1	0	14			SO	RS	.	>	N	^	n	|
1	1	1	1	15			SI	US	/	?	O	—	o	DEL

3-54. Data Receivers

a. Data bits 1 through 8 are received from the CCU on lines DATA LINE 1 through DATA LINE 8 (PARITY). These eight lines are applied to interface receivers on PC cards B1 and B2 (fig. 8-25 and 8-26) for conversion from the logic levels used in the cables from the CCU to the logic levels used in electronic assembly A2A2 of the page printer. In the cables, logic signals switch between an active state of +6.2V and -6.2V. The interface receivers provide an impedance match for these signals and convert them to the page printer levels of 4-5.0 volts active and 0 volts inactive.

b. The eight interface receiver outputs (-+) DATA 1 through (+) DATA 8 (PARITY) are applied to eight groups of input gates on PC card B6 (fig. 8-30). Each group of input gates consists of two AND gates and an OR gate. One AND gate receives a data input during operation with the CCU and the other AND gate receives one of the (+) TEST 1 through (+) TEST 8 bits from BIT SELECTION switches on test panel A2A2 during a local test mode. For example, AND gate A5A and its associated AND gate A5B receive the (+) DATA 1 input and the (+) TEST 1 in put, respectively. This arrangement is typical of the other input AND gates.

c. When the page printer is operating with the CCU, the low level (-) START line (para 3-36) is inverted by AND gate B4C to condition all of the data input AND gates. At the same time, the high output of B4C also inhibits AND gate B4B which then inhibits all the test input AND gates. Thus, the conditioned AND gates are enabled by any high (+) DATA 1 through (+) DATA 8 bits so that the associated OR gates produce low level outputs. As a result, a low level output from an OR gate represents a high level data bit from the CCU and a high level output represents a low level data bit. These OR gate outputs are checked for parity errors (para 3-55), decoded for control functions (para 3-49), and converted into shift register inputs.

d. When the page printer is operating in the LOCAL TEST mode (para 3-37), the (-) START line goes high to inhibit B4C. This conditions AND gate B4B to be enabled by the low level (-) LOCAL TEST line. As a result, B4B conditions the test input AND gates so that the (+) TEST 1 through (+) TEST 8 lines instead of the (+) DATA 1 through (+) DATA 8 lines are checked for high and low bits.

3-55. Parity Error Detector

The parity error detector checks the parity of eight parallel data bits received from the CCU for each character. If the sum of all eight bits is even, a parity error signal is generated.

a. To check the parity of the eight data bits for each character, the data bits are grouped in pairs and applied from the data input gates to four parity detectors on PC card B6 (fig. 8-30). Each of the four parity detectors consists of two AND gates and an OR gate as follows:

Data bits	*Parity detectors*		
1 and 2	A6C	A6D	A6H
3 and 4	A4A	A4B	A4F
5 and 6	A3C	A3D	A3H
7 and 8	AA	A1B	A1F

b. The parity detector for bits 1 and 2 is typical of the others. In this parity detector, AND gate A6D detects if data bit line (+) DATA 2 is high and (+) DATA 1 is low. Similarly, AND gate A6C detects if data bit lines (+) DATA 1 is low and (+) DATA 2 high. If either situation occurs, OR gate A6H produces a low level output. If both data bits are even (both high or low), the two AND gates are inhibited, and the output of OR gate A6H is high.

c. The outputs of the two parity detectors for bits 1 through 4 are fed to another parity detector formed by AND gates C5A and C5B and OR gate C5F. This parity detector operates in the same way as the others. Thus, if the sum of data bits 1 and 2 is odd, AND gate C5A is inhibited, whereas, AND gate C5B is conditioned through OR gate C6B. If the sum of data bits 3 and 4 is also odd, AND gate C5B is also inhibited so that the output of OR gate C5F is high. If one of the two pairs of data bits is even while the other pair is odd, one AND gate C5A or C5B is enabled, causing OR gate C5F to produce a low level output. This indicates that the sum of data bits 1 through 4 is odd.

d. The outputs of the two parity detectors associated with data bits 5 through 8 are applied to a parity detector consisting of AND gates C3A and C3B and OR gate C3F. This parity detector operates in a manner similar to that described for data bits 1 through 4 so that a low output is produced by OR gate C3F only if the sum of data bits 5 through 8 is odd.

e. The parity indications produced by OR gates C5F and C3F for data bits 1 through 4 and 5 through 8, respectively, are applied to a final parity detector formed by AND gates C3C and C3D and OR gate C3F. If the parity indications produced by C5F and C3F are the same (both high or both low), C5F and C3F are inhibited and OR gate C3H produces a high output. This indicates that the sum of data bits 1 through 8 is even and that a parity error exists. If the sum is odd, either C3C or C3D is enabled and a low output is produced by C3H.

f. The state of the output of OR gate C3H is meaningful only when data bits are present at the input lines. Therefore, this output is applied to the J input of flip-flop C2B which is clocked by a positive (+) STA pulse in the middle of the data bit time for each character. If a parity error exists, the J input is enabled and C2B is set by the (+) STA pulse.

g. The resulting high level 1 and low 0 outputs of C2B force an asterisk (*) code through the shift register input gates so that an asterisk is printed to indicate a parity error. The low level 0 output of C2B also sets PARITY flip-flop C2A. The high level 1 output of C2A causes lamp drivers C1A and C1B to light the PARITY ERROR indicator !amps on the control panel. The low level 0 output of C2A initiates a stop condition which will then occur at the end of a message block from the CCU or at the end of a line in the LOCAL TEST mode (para 3-37).

h. Flip-flop C2B is cleared by OR gate C4A as a result of either the (+) ST-END pulse generated by the data strobe that accompanied the data with the parity error or by a high level output from AND gate C5H. This occurs when either the (-) CLEAR line goes low or a cancel condition causes the (-) CANCEL line to go low. The PARITY flip-flop is cleared when the (-) CLEAR line goes low as the result of pressing the START switch on the control panel to go into the START mode or pressing the maintenance RESET switch on the test panel.

3-56. Shift Register Inputs

a. The shift register inputs are produced by AND gates B4A, B4D, B1C, and B1A on PC card B6 (fig. 8-30), for data bits 1, 3, 5, and 7 and by OR gates C6D, B3C, and B3A for data bits 2, 4, and 6.

This arrangement makes it possible to provide the asterisk (*) code to the shift register when a parity error occurs. Since flip-flop C2B is set by a parity error, the high level 1 output inhibits the four AND gates and the low level q output causes the three OR gates to produce high outputs. The resulting low level AND gate outputs and high level OR gate outputs represent the asterisk (*) code which is 0101010 (bits 1 through 7).

b. This code and all valid codes are applied to the 7 x 32 shift registers through ( ) SR1-1 through (+) SR1-5 and (+) SR1-7 lines. Data bit 6 is not sent to the shift register since it is a redundant bit. However, the output of OR gate B3A (data bit 6) and AND gate B1D (data bit 8) along with the SR1 signals are applied to the parity error detector (para 3-55) for the parity error check.

c. The (+) SR1-7 line (data bit 7) and the output of OR gate B3A (data bit 6) are applied to AND gate B1B. When both data bits are low, indicating an invalid character, B1B is enabled to produce a positive (+) IGNORE signal through OR gates C4D and C6A. The (+) IGNORE signal is also produced when the (+) CANCEL line goes high in a cancel condition in order to ignore the character that caused the cancel.

d. When invalid character codes or the DEL (delete) code are detected or when a cancel condition occurs, OR gate C6A produces a positive (+) IGNORE signal which is used to generate a negative (-) INHIBIT LOAD DATA in order to prevent the invalid deleted, or canceled character from being loaded into the shift register. An invalid character is detected by AND gate B1B which receives the (+) SR1-7 signal (data bit 7) and the output of OR gate B3A (data bit 6). When both data bits are low, B1B is enabled to indicate an invalid character. As a result OR gate C4D causes OR gate C6A to produce a positive (+) IGNORE signal. In a cancel condition, the (+) CANCEL line goes high to generate the (+) IGNORE signal. Also, when the DEL code is sensed by AND gate B2, the resulting low level output causes OR gate C6A to produce an (+) IGNORE signal.

3-57. Line Feed and Carriage Return Decoders

a. The decoding of the line feed and carriage return codes is accomplished by AND gates B5 and B6 on PC card B6 (fig. 8-30). These AND gates monitor input lines representing data bits 1 through 7 to produce the negative (-) LF CODE and (-) CR CODE signals when the corresponding code is detected.

b. When AND gate B5 is enabled by all high inputs, it indicates that the data receivers have received the line feed code (0101000) from the CCU. Data bits 2 and 4 are inverted by OR gates C6D and B3C before being applied to B5. As a result, B5 produces a negative (-) LF CODE signal which is used to initiate a line feed function.

c. When AND gate B6 is enabled by all high inputs, it indicates that the data receivers have received the carriage return code (1011000) from the CCU. Data bits 1, 3, and 4 are inverted by AND gates B4A and B4D, and OR gate B3C, respectively, before being applied to B6. As a result, B6 produces a negative (-) CR CODE signal which is used to initiate a carriage return function.

3-58. Storing, Comparing, and Printing

a. Valid input data from the CCU is loaded into the 7 x 32 shift registers (memory) after decoding and parity checks are made by the decode and parity PC card B6. The data is loaded in bit-parallel, characters-serial form into six shift registers each of which is capable of storing 32 bits. The six data shift registers each consist of two 16-bit registers in series. A seventh shift register which consists of eight 4-bit registers in series is used as a tally register.

b. The input data bits are loaded into the six data shift registers in the same sequence that they are received from the CCU. If 32 characters are received from the CCU; the first character loaded is eventually shifted to the column 1 position of the registers by the loading of subsequent characters. If less than 32 characters are received from the CCU, a housekeeping function takes over after the last character is loaded to shift all characters to the right until the first character loaded is moved to column 1.

c. All the characters stored in the shift registers are then fed out of the front end of the registers to be compared in sequence with the first code wheel character. If a comparison is true, the character is printed in the appropriate column of the enabled zone. If a comparison is not true, the character is recirculated into the back end of the shift registers and restored in the original column position of the registers. This operation is repeated for each of the 64 code wheel characters so that in 1 revolution of the code wheel all data in the shift registers is printed.

d. The loading of each character into the data shift registers is accompanied by the loading of a tally bit into the tally shift register. Outputs are produced by this register when tally bits are present in columns 1 and 17 thereby indicating the position of the associated data in the data shift registers. The column 1 output is used to enable the comparing, printing, and restoring functions to begin. The column 17 output is used to initiate automatic line feed and carriage return functions when printing in zone 3.

3-59. 7 x 32 Shift Registers

a. The data received from the CCU is represented by the (+) SR1-1 through (+) SR1-5 and (+) SR1-7 inputs which are gated into the data shift registers through AND gates A1B, A1C, AID, A2A, A2B, and A2D on PC card B5 (fig. 8-29). All of these AND gates are conditioned by the (-) INHIBIT LOAD DATA line if the line is high level. If the (-) INHIBIT LOAD DATA line is low level, all AND gates are inhibited to prevent data from being loaded into the shift registers. Thus, when the AND gates are conditioned and data representing a character appears, the AND gates receiving highs are enabled to produce low level outputs and the AND gates receiving lows remain disabled to provide high level outputs.

b. The AND gate outputs are inverted by the associated OR gates on PC card B5 (fig. 8-29) which, therefore, present a high or a low to the respective shift registers. However, in order to store this data, the shift registers require a negative (-) RIGHT SHIFT TRIGGER pulse. This pulse is gated through AND gate C1A whenever OR gate A1A receives a negative (-) LOAD DATA pulse (para 3-60) or a negative (-) PRINT SHIFT pulse (para 3-61). The (-) LOAD DATA pulses are produced for the initial loading of data into the shift registers and the (-) PRINT SHIFT pulses are produced for housekeeping and for the restoring of data into the shift registers during the print cycle.

c. During a print cycle, the (-) PRINT SHIFT pulses generate the (-) RIGHT SHIFT TRIGGER pulses, and the data shift registers shift the first row of data bits through field effect transistors QA1 through QA6 and AND gates B6A, B6B, B6C, C6B, C6C, and C6D. The AND gate outputs called (+) MR-1 through (+) MR-5 and (4) MR-7 are sent to the compare and restore logic on PC card B4 (para 3-66).

d. The tally shift register, consisting of the eight 4-bit registers in series, registers a high as each character code is loaded into the data shift registers. This process is also enabled by the high level (-) INHIBIT LOAD DATA line and by (-) RIGHT SHIFT TRIGGER pulses as in the data shift registers. When the tally bits are shifted through the tally shift register and the first tally bit stored reaches column 1, register C5B produces a high level output. This output is inverted by field effect transistor QA8, causing AND gate C6A to produce a positive (+) T-REG-1 signal. Since the tally bits are loaded in step with the data, the high (+) T-REG-1 signal also indicates the presence of data in column 1 of the data shift registers.

e. The (+) T-REG-1 signal causes the (+) INHIBIT DATA REQUEST line to go high (para 3-45) in order to stop further data requests from going to the CCU. This, in turn, causes the (-) INHIBIT LOAD DATA line to go low and disable all of the shift register input AND gates. The high level (+) INHIBIT DATA REQUEST also generated a low level (-) ENTER PC signal which sets PC flip-flop C2A on PC card B13 (fig. 8-37) in order to start the print cycle. The resulting low level 0 output of C2A causes OR gate B1B to produce a positive (+) ENABLE RESTORE TALLY line which is gated with the high (+) T-REG-1 line by AND gate B2A on PC card B4 (fig. 8-28). The result is a low level (-) RESTORE input to OR gate B2B on PC card B5 (fig. 8-29). B2B then maintains a high level input at the tally shift register B3B for the purpose of keeping tally when data is recirculated through the shift registers during the compare functions.

f. When a tally bit is in column 17 of the tally shift registers, register B4D causes AND gate B6D to produce a high level (+) T-REG-17 signal. This output is used to initiate automatic line feed and carriage return functions which, in turn, cause the (+) INHIBIT DATA REQUEST line to go high in order to stop data requests from going to the CCU. However, the (+) T-REG-17 is only effective during the initial loading of data into the shift registers for a zone 3 printing. This is because zone 3 has only 16 printing positions which constitute the end of 80-character line on the printing paper. Thus, if the CCU provides data for 16 characters, further data requests must be stopped and the line feed and carriage return functions must occur after the 16 characters are printed.

g. During a cancel condition (para 3-75), the (-) CIRCUMFLEX line to OR gates C2A, C1B, B1B, B2A, B1A, and B2B goes low so that the circumflex code (0111111) is forced through the shift registers. This is done to print a complete line of circumflexes when a cancel condition occurs.

3-60. Load Data Control

a. The (-) LOAD DATA signal produced by OR gate A4H on PC card B9 (fig. 8-33) goes low if either AND gate A4C or A4D is enabled. AND gate A4D is conditioned when the (-) INHIBIT LOAD DATA line is high level so that A4D is enabled by (+) STB pulses. Also, during a cancel condition, AND gate A3B conditions A4C after the initial (+) CAN DATA period so that A4C is enabled by (+) STB pulses.

b. The (-) INHIBIT LOAD DATA signal represented by the output of OR gate C2B is high level unless either one of the (+) INHIBIT DATA REQ, (+) IGNORE, or (+) 81-F lines go high level. When this occurs, OR gates A5D and C1C, or C2A and C1C cause OR gate C2B to produce a low level (+) INHIBIT LOAD DATA signal. The (-) INHIBIT DATA REQ line goes high if a line feed or carriage return function is initiated, if paper is feeding, or the 7 x 32 shift register is loaded (para 3-59). The (+) 81-F line goes high when the 81st data strobe is received from the CCU. This causes a low level (-) INHIBIT LOAD DATA signal so that any data received with the 81st strobe is not recognized. The (+) IGNORE line goes high if a character is received that is a non-printable non-comparable character.

3-61. Enter-Housekeeping Control

When less than 32 characters are received from the CCU and loaded into the shift registers for a zone 1 or zone 2 printing, or less than 16 characters are received for a zone 3 printing, an enter-housekeeping function is necessary to shift the data and the associated tally bits to the front end (column 1) of the shift registers in preparation for the comparing and printing functions (fig. 3-32). This function follows the initial loading of data and immediately precedes the print cycle. To perform this function, a series of negative (-) PRINT SHIFT pulses are generated in order to produce (-) RIGHT SHIFT TRIGGER pulses for the shifting of data and tally bits through the shift registers.

a. The (-) PRINT SHIFT pulses are generated by a clock circuit consisting of back-to-back pulse generators that produce a positive 3-µsec pulse every 6 µsec. The clock is initially triggered to start the enter-housekeeping function when ENTER HK flip-flop C2B on PC card B13 (fig. 8-37) is set by the high level 1 output of MIN PC flip-flop B3A. The MIN PC flip-flop is set by the leading edge of the low level (-) ENTER PC signal (para 3-62). Thus, the low level 0 output of the ENTER HK flip-flop enables AND gate A5B through OR gates C6B, A6A, and A5D, and AND gate A5B. The output of A5B also triggers Schmitt trigger B6C through OR gate A5C and AND gate B6A.

b. AND gate A6B is enabled to produce a positive 3-µsec pulse which is ended when B6C inhibits A6B. This pulse is inverted by AND gate C6A to produce a negative (-) PRINT SHIFT pulse which is used to generate a (-) RIGHT SHIFT TRIGGER pulse for the shift registers. The 3-µsec pulse output of A6B also triggers the pulse generator, consisting of OR gate B6B and Schmitt trigger B6D, through AND gate C6D and inhibits AND gate A6C. After 3 µsec, the trailing edge of the pulse from A6B and the leading edge of negative 3-µsec pulse from B6D cause A6C to produce a positive 3-µsec pulse. This pulse, in turn, is inverted by AND gate C6C to inhibit A5B for 3 µsec. Therefore, on the trailing edge of the second 3-µsec pulse, A5B is enabled to repeat the cycle and trigger another (-) PRINT SHIFT pulse. The (-) SCAN SHIFT pulses are produced by the same clock through AND gate A2A except that A2A can only be enabled during a print cycle.

c. The (-) PRINT SHIFT pulses are generated as long as AND gate A5B is conditioned by the ENTER HK flip-flop. The flip-flop remains set until enough (-) PRINT SHIFT pulses are generated to shift data and tally bits over to column 1 in the shift registers.

At that time, the (q-) T-REG-1 line from the tally register goes high and resets the ENTER HK flip-flop through OR gate C3B in order to stop the clock.

d. The enter-housekeeping function is not entered if there are 32 characters stored in the data shift registers because this would mean that there are 32 tally bits stored in the tally shift register and the (+) T-REG-1 line would already be high. Therefore, the ENTER HK flip-flop would be kept in a cleared state by the low level output of OR gate C3B which is applied to the C input of the flip-flop.

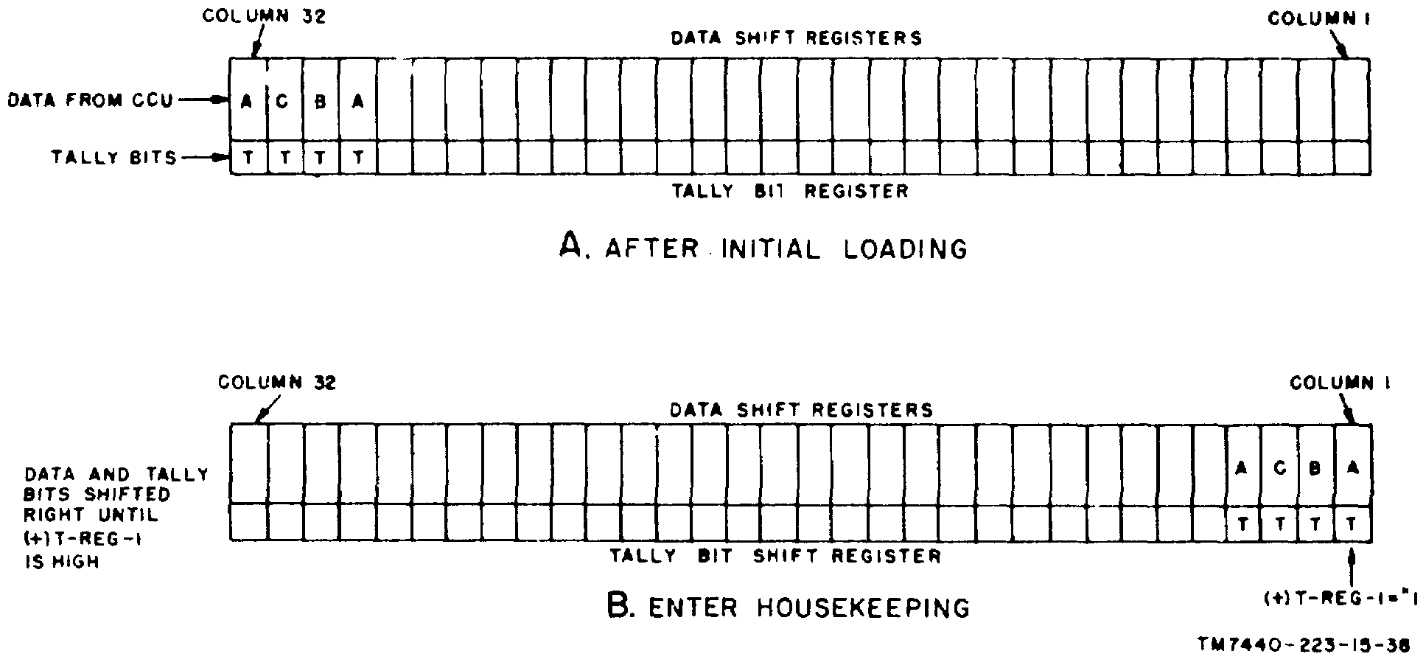


Figure 3-32. Enter-housekeeping function.

3-62. Enter Print Cycle

a. To enter the print cycle, it is necessary to generate a 300-µsec (-) ENTER PC pulse which is produced when AND gate A3B on PC card B 11 (fig. 8-35) is enabled by four conditions. One condition is that the (-) SETTLE line be high level, indicating that the paper is not feeding. Immediately following a paper feed operation, the (-) SETTLE line goes low level for a short period of time, thereby inhibiting the print cycle in order to allow sufficient time for the paper to settle.

b. Another condition is high level (+) IN PROCESS line from IP flip-flop B1B on PC card B10 (fig. 8-34). This flip-flop is set when any data is loaded into the 7 x 32 shift registers. This is indicated by the (-) LOAD DATA line which goes low in order to load data into the shift registers. The low level (-) LOAD DATA line sets IP flip-flop B1B, resulting in a high level (+) IN PROCESS line provided by the 1 output to AND gate A3B on PC card B11 (fig. 8-35). The IP flip-flop is cleared when the trailing edge of the negative (-) EXIT PC appears at the CL input, indicating the end of a print cycle.

c. A third condition is a high level (-) INHIBIT ENTER PC line. This line goes low for 2 ms at the end of a print cycle to allow enough time for new data to be loaded into the data shift registers. It also goes low for 12 ms when a zone 1 print cycle is to be followed by another zone 1 print cycle. The fourth and final condition is a high level (+) INHIBIT DATA REQ line which indicates that the 7 x 32 shift registers are full, or that a line feed or carriage return command has been received, or that paper is already feeding.

d. When all four inputs to A3B are high, the AND gate is enabled to produce a low level output which enables AND gate A4C to produce the start of a negative (-) ENTER PC pulse. The A3B output also triggers a pulse generator, consisting of AND gate B5A and Schmitt trigger B5C, through OR gate A5B. After a 300-µsec delay, the pulse generator produces a positive signal to inhibit A4C, thereby ending the 300-µsec (-) ENTER PC pulse.

3-63. Inhibit Enter Print Cycle

a. To inhibit entering a print cycle, the (-) INHIBIT ENTER PC line is made to go low for 2 ms by the zone delay function (para 3-64) or for 12 ms when a carriage return command follows data printed in zone 1. In either situation, the (-) INHIBIT ENTER PC pulse inhibits AND gate A3B on PC card B11 to prevent the start of a print cycle (para 3-65).

b. When a zone 1 print cycle is in progress, AND gate C1D receives a high input from flip-flop A3B of the zone select circuitry on PC card B12 (fig. 8-36). If the (-) BRAKE PULSE line is also high at this time, C1D provides AND gate C6C with a low level input. The other C6C input, (-) EX CR, is also low if a carriage return command was part of the data received from the CCU for the zone 1 print cycle. If so, C6C is enabled to produce a high level output. This output indicates that a carriage return was received in a zone 1 print cycle, meaning that the next print cycle will also take place in zone 1.

c. The high output from C6C causes OR gate C6B to enable AND gate C6A. The resulting high level output triggers the pulse generator, consisting of AND gate B6A and Schmitt trigger B6C, and also causes OR gate B2C to produce a low level output on the (-) INHIBIT ENTER PC line. This output is ended after 12 ms when the pulse generator produces a high level output to inhibit C6A. Thus, a 12-ms negative pulse is sent to the enter print cycle AND gate A3B on PC card B11 to prevent the start of the print cycle for 12 ms.

d. The 12-ms delay allows print hammers, used in the first zone 1 print cycle, sufficient time to return to rest before starting the second zone 1 print cycle.

3-64. Zone Delay

a. The zone delay function provides a 2-ms period after each print cycle which allows time for new data to be loaded into the data shift registers. It also allows enough time for the hammers used in the print cycle just ended to return to rest after printing. This function is performed by ZONE DELAY flip-flop A5B and the pulse generator consisting of AND gate B6B and Schmitt trigger B6D on PC card B12 (fig. 8-36).

b. When a print cycle ends, the (-) EXIT PC line goes low to set the ZONE DELAY flip-flop. The high 1 output of the flip-flop then causes OR gate B2C to produce a negative (-) INHIBIT ENTER PC signal and also triggers the pulse generator. After 2 ms, the pulse generator produces a positive step output which resets the ZONE DELAY flip-flop. Thus, the negative output of B2C is ended as a 2-ms pulse which is used to inhibit entering the next print cycle (para 3-65).

c. The 2-ms pulse also appears on the (+) ZONE DELAY line as a positive pulse. This pulse causes OR gate C2C on PC card B11 (fig. 8-35) to inhibit AND gate C1A. Thus, paper feeding functions are inhibited for 2 ms after a print cycle ends to allow enough time for the hammers to settle down.

3-65. Print Cycle

a. A print cycle is started when PC flip-flop C2A on PC card B13 (fig. 8-37) is set by the trailing edge of a negative 300-µsec (-) ENTER PC pulse. However, before this occurs, the leading edge of the pulse sets MIN PC flip-flop B3A which then starts the enter-housekeeping function, if one is necessary. Sufficient time to complete an enter-housekeeping function is allowed by the 300-µsec period which elapses before the print cycle is entered.

b. When MIN PC flip-flop B3A is set, it also triggers a pulse generator consisting of AND gate B2B: and Schmitt trigger B2D. After 35 ms, the pulse generator produces a positive-going step to clear B3A. Since ALL DONE flip-flop B3B must be set to end a print cycle and depends upon a low level 1 output from B3A to be conditioned for setting, a print cycle of at least 35 ms is ensured. This prevents the possibility of a rapid succession of short print cycles which could overload the power supplies.

c. Once the PC flip-flop is set and the print cycle is entered, the data stored in the shift registers is circulated out of the registers for comparison with the first code wheel character. In order to do this, a series of 32 (-) RIGHT SHIFT TRIGGER pulses are generated by (-) PRINT SHIFT pulses from the clock described in enter-housekeeping (para 3-61). However, the clock is now fired when ENABLE SCAN flip-flop B5A is set. This is the result of a code wheel strobe, (-) CW STROBE, which is received with each code wheel character.

d. The (-) CW STROBE triggers a pulse generator consisting of OR gate A2B and Schmitt trigger A2D on PC card B4 (fig. 8-28). The resulting negative (-) CW CLOCK pulse output of the pulse generator enables AND gate A4D on PC card B13. This sets FIRE flip-flop C4B since the J input of the flip-flop is already conditioned by a high output from, AND gate C1A, indicating that the print cycle is in progress. The high level 1 output of C4B triggers a pulse generator consisting of AND gate B4B and Schmitt trigger B4D which, after 4 µsec, produces a positive-going output. This positive step is inverted by OR gate A4C to clear the FIRE flip-flop.

e. However, while the FIRE flip-flop is set, the high 1 output also enables AND gate A3D. The resulting low output of A3D performs two functions. First, it causes OR gate A3A to produce a high level (+) FIRE signal to all hammer drivers in order to fire any hammers that were set by the preceding compare scan. Second, it triggers the pulse generator, consisting of OR gate B4A and Schmitt trigger B4C, which sends a low level pulse through AND gates A4B and A5A to set ENABLE SCAN flip-flop B5A The high level 1 output of the flip-flop then starts the clock through OR gates A6A and A5D and AND gate A5B.

f. resulting (-) PRINT SHIFT pulses cause the data to be shifted out of the data shift registers for a compare scan with a code wheel character. All 32 columns are compared in sequence with a single code wheel character (fig. 3-33). The data from those columns having characters that are different from the code wheel character being compared is recirculated through the data shift registers and restored in the same column for the next compare scan. Any column having the same character as the code wheel character is left empty although the tally bit is restored. Exactly 32 (-) PRINT SHIFT pulses corresponding to the 32 columns in the data shift registers are provided for this function.

g. The counting of 32 pulses is accomplished by the scan shift counter (para 3-73) which counts (-) SCAN SHIFT pulses generated by the same clock. After 32 pulses, the counter produces a high (+) CARRY output which clears ENABLE SCAN flip-flop B5A to end one scan of the shift register data. In one comparison all the shift register data is compared with one code wheel character. This process is repeated for each of the 64 (63 and space) code wheel characters and each of the subsequent scans is started by the (-) CW STROBE pulse which accompanies every code wheel character.

h. As the ENABLE SCAN flip-flop is cleared, the positive step produced by the 0 output triggers a pulse generator consisting of AND gate C5A and Schmitt trigger C5C. After a 4-µsec delay, the pulse generator sends a positive pulse to the CL input of ALL DONE flip-flop B3B. If the print cycle is completed, the J input of B3B is high so that the pulse to the CL input sets the flip-flop to end the print cycle. However, if the J input is low, it indicates that one or more compare scans are still required to complete the print cycle; therefore, B3B remains in the cleared state.

i. The level of the J input is determined by the inputs to OR gate A1C. In order to produce a high level J input, A1C requires two low level inputs. One of these is provided by the 1 output of MIN PC flip-flop B3A when the flip-flop is cleared. This determines the minimum period of a print cycle. The other is provided by a NOT FINISHED latch consisting of AND gate A3C and OR gate A3B when there is no data left in the shift registers as indicated by a low (+) DATA IN MEMORY line.

j. The (+) DATA IN MEMORY input is gated with each (-) PRINT SHIFT pulse by AND gate A2C to check for the presence of data in the shift registers. As long as data is present, the high level (+) DATA IN MEMORY line enables AND gate A2C which keeps the latch in a state wherein A3B produces a high input to A1C. Thus, the J input of B3B remains low to keep the print cycle going. When the data shift registers are empty and the (+) DATA IN MEMORY line goes low, the state of the latch is switched so that A3B produces a low level output. If the 1 output of MIN PC flip-flop B3A is low at the same time, A1C provides a high level to the J input of B3B. Thus, the next positive pulse generated by Schmitt trigger C5C, as the ENABLE SCAN flip-flop is cleared, sets the ALL DONE flip-flop.

k. When the ALL DONE flip-flop is set, the resulting low level 0 output produces the low level (-) EXIT PC signal. The high level 1 output sets EXIT HK flip-flop C4A to start the exit housekeeping function and also clears PC flip-flop C2A to end the print cycle. The negative-going step produced by the I output, as C2A is cleared, is inverted by OR gate A3A to produce the final (+) FIRE pulse. This pulse triggers any print hammer drivers which were set during the last compare scan.

l. The high level 1 output of the ALL DONE flip-flop also triggers a pulse generator consisting of AND gate C5B and Schmitt trigger C5D. After a 300-µsec delay, the pulse generator produces a positive output which causes OR gate A1B to clear the ALL DONE flip-flop. The 300-µsec period allows enough time for completion of the exit-housekeeping function.

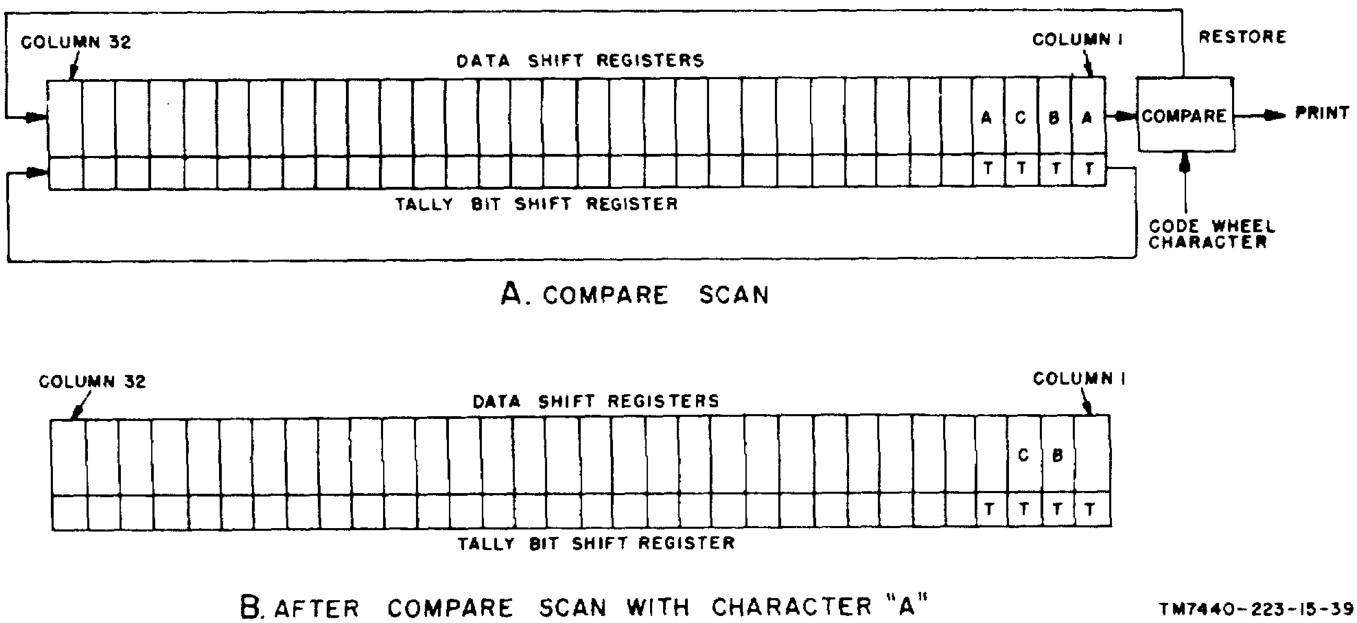


Figure 3-33. Compare and restore function.

3-66. Compare and Restore

During a print cycle, the shift register outputs representing input data from the CCU is compared with the code wheel characters by three comparators on PC card B4 (fig. 8-28). The first comparator compares data bits 1 and 2 with code wheel bits 1 and 2, the second comparator compares data bits 3 and 4 with code wheel bits 3 and 4, and the third comparator compares data bits 5 and 7 with code wheel bits 5 and 7.

a. The bits 1 and 2 comparator consists of four AND gates, A4A through A4D,and OR gate A4F. When data bit 1 and code wheel bit 1 are equal and data bit 2 and code wheel bit 2 are equal, each of the four AND gates receives one inhibiting low level input so that OR gate A4F produces a high level output.

b. For example, the (--) MR-1 input representing data bit 1 is applied to AND gate A4B along with the output of AND gate B4A which is low level when the (-) CW-1 input is low. This occurs when a transparent hole in the code wheel permits light to reach the associated light sensor so that a low (-) CW-1 signal actually represents a logic 1. If the (+) MR-1 input is high and the (-) CW-1 input is low, both represent a logic I and are therefore equal. Thus, AND gate A4B remains disabled. Since AND gate A4C receives the reverse forms of the two inputs, it also remains disabled.

c. At the same time and in the same manner, AND gates A4A and A4D compare the complementary forms of the (+) MR-2 and the (-) CW-2 inputs. If these bits are equal, both A4A and A4D remain disabled and OR gate A4F produces a high level input to OR gate C5C.

d. OR gate C5C also receives an input from the bits 3 and 4 comparator which consists of AND gates C4A through C4D and OR gate C4F. This comparator operates in the same manner as the bits 1 and 2 comparator so that C4F produces a high level input to C5C if both pairs of bits are equal. As a result, C5C applies a low level input to OR gate C3C.

e. OR gate C3C receives a second input from OR gate B2D which is the result of the comparing functions performed by the bits 5 and 7 comparator. This comparator consists of AND gates C2A through C2D and OR gate C2F and operates in the same manner as the other two comparators. Therefore, if both pairs of bits (+) MR5 and (-) CW-5, and (+) MR-7 and (-) CW7 are equal, C2F causes B2D to provide a low level input to OR gate C3C.

f. With two low inputs, C3C produces a high level (-) NOT COMPARE output which is sent to the print control circuits. This results in the printing of the compared character since the same character on the print drum is now in position over the paper line being printed. The character is printed in the column determined by the original position of the associated character data in the shift registers after loading.

g. If any pair or pairs of bits are not equal, the corresponding comparator causes C3C to produce a low level (-) NOT COMPARE output. This inhibits AND gate A2D on PC card B13 which, in turn, inhibits AND gate A1D. The result is that the low level output of A1D enables AND gate C1C to produce a high level (4-) ENABLE RESTORE DATA signal since C1C is already conditioned by PC flip-flop C2A which is set during a print cycle.

h. The (+) ENABLE RESTORE DATA signal is applied to restore AND gates A3A, A3B, C5D, C5B, B2C, and B2B on PC card B4. As a result, those AND gates which have high level (+) MR inputs are enabled and those with low level (+) MR inputs remain disabled. Thus, the parallel output levels of the six AND gates represent the code of the not-compared character. This data and associated tally bits are restored in the shift registers by the next (-) RIGHT SHIFT TRIGGER pulse so that the data can be recirculated through the bit comparators for comparison with the next code wheel character.

i. The function of OR gate B3 is to monitor the MR input lines for the presence of data outputs from the shift registers. Any high level input line, which indicates the presence of data, appears as a low level input to B3 causing it to produce a high level (4-) DATA IN MEMORY output. When al' inputs to B3 are high, representing either a space or no data at all, the (+) DATA IN MEMORY output goes low. This line is used to indicate when a print cycle can be ended.

j. During the print cycle, all tally bits originally stored in the tally bit shift register during the initial loading operation are restored whether associated characters are restored in the data shift register or are printed and not restored (fig. 3-33).

k. The restoring of tally bits is the result of PC flip-flop C2A on PC card B13 being in the set state. In this state, the low level 0 output of the flip-flop causes OR gate B1B to produce a high level (+) ENABLE RESTORE TALLY signal. This signal is gated with the (+) T-REG-1 output of the tally bit shift register by AND gate B2A on PC card B4 (fig. 8-28). When B2A is enabled by two high inputs, it provides a low level (-) RESTORE line to the tally bit shift register input OR gate B2B on PC card B5 (fig. 8-29).

l. As a result, whenever a tally bit appears in column 1 of the tally bit shift register, the (+) T-REG-1 line goes high, thereby causing the (-) RESTORE line to go low. Thus, a tally bit is restored in column 32 of the tally bit shift register on the next (-) RIGHT SHIFT TRIGGER pulse. Therefore, at the end of a print cycle, the data shift registers are empty but the tally bit shift register still has the original tally bits. At this time, the exit-housekeeping operation either clears the tally bit shift register or, if required by a keep-tally situation, shifts the tally bits to the back end of the tally bit shift register (para 3-59) for proper positioning of the characters for the next line of printing.

3-67. Exit Housekeeping Control

After a print cycle ends, an exit-housekeeping function is required to clear all tally bits from the tally bit shift register. To do this, the tally bits are shifted out of the register until the (+) T-REG-1 line goes low to indicate that the last tally bit has left column 1 of the register (fig. 3-34). To perform the exit-housekeeping function, negative (-) PRINT SHIFT pulses are generated in order to produce (-) RIGHT SHIFT TRIGGER pulses for the shifting of tally bits out of the tally bit shift register.

a. The (-) PRINT SHIFT pulses are generated in the same manner described in the discussion of the enter-housekeeping function (para 361) except that now they are triggered by the EXIT HK flip-flop C4A on PC card B13 (fig. 8-37). The EXIT flip-flop is set by the high level 1 output of ALL DONE flip-flop B3B which is set to end a print cycle. The resulting low level 0 output of the EXIT HK flip-flop starts the chain of (-) PRINT SHIFT pulses required for this function.

b. At the same time, the high level 1 output of the EXIT HK flip-flop is applied to AND gate B1A which is either inhibited or conditioned, depending on the level of the (-) KEEP TALLY signal. This signal is produced by a latch consisting of OR gate C5D and AND gate C5C on PC card B12 (fig. 8-36). When a line feed command and a carriage return command are received from the CCU, the (-) LF-FF line is high level and the (-) CR-FF is low level. This indicates that the tally bit shift register is to be cleared of all tally bits. Thus, AND gate C5C produces a low level output which inhibits AND gate C5B, thereby producing a high level (-) KEEP TALLY signal. This inhibits AND gate A1A on PC card B13 (fig. 8-37) which, in turn, inhibits AND gate B1A, causing OR gate B1B to produce a low level (+) ENABLE RESTORE TALLY.

c. As a result, AND gate B2A on PC card B4 (fig. 8-28) is disabled, causing the (-) RESTORE line to go high. The resulting low level output of OR gate B2B on PC card B5 (fig. 8-29) prevents tally bits from being restored into the back end of the tally-bit shift registers as the bits are cleared through the front end by (-) RIGHT SHIFT TRIGGER pulses. When the last tally bit leaves the register, the (+) T-REG-1 line goes low and enables AND gate C3C on PC card B13. The high output of C3C causes OR gate C3D to produce a low level signal which clears the EXIT HK flip-flop, ending the exit-housekeeping operation.

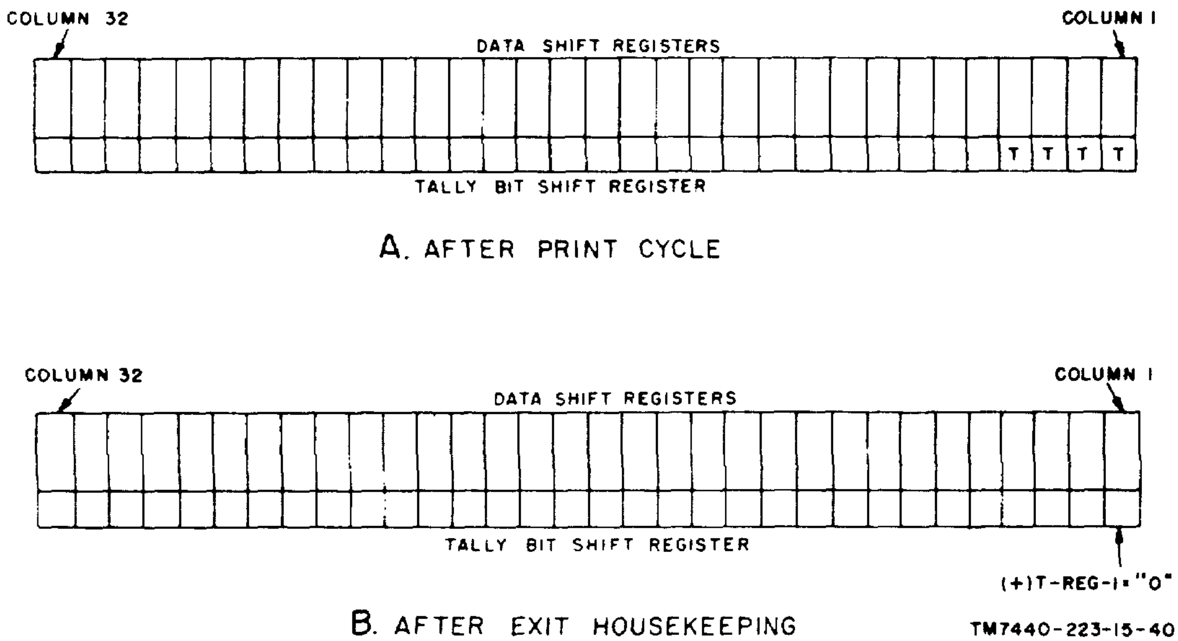


Figure 3-34. Exit-housekeeping /function.

3-68. Keep Tally Control

After a print cycle ends, the exit-housekeeping function clears all tally bits from the tally bit shift register except when a keep-tally situation irises. This occurs when the CCU data for the preceding print cycle contained a line feed command but no carriage return command. In this situation, instead of clearing the tally bits out of the register, exit-housekeeping circulates the bits out of the front end (column 1) and back into the high-numbered columns of the shift register (fig. 3-35).

The keep-tally bits fill up the number of columns in the shift register corresponding to the number of printed characters in the preceding print cycle. Thus, if 4 columns were used in the preceding print cycle, there will be 4 tally bits kept in the tally bit shift register so that the next line of printing starts in column 5 on the paper (fig. 3-35).

a. When a line feed command is received from the CCU without a carriage return command, both the (+) LF-FF and (-) CR-FF are high level so that AND gate C5C on PC card B12 (fig. 8-36) produces a high level output. This indicates the tally bits are to be kept and repositioned in the shift register. The C5C output and the high level (+) LF-FF line enable AND gate C5B to produce a low level (-) KEEP TALLY signal. When AND gate B1A on PC card B1.3 (fig. 837) is enabled, it causes OR gate B1B to provide a high level (+) ENABLE RESTORE TALLY signal to AND gate B2A on PC card B4 (fig. 828). The other input to B2A is the (+) T-REG-1 line which is also high level since the tally bit associated with the last character read out of the data shift registers must be in column 1 at the end of a print cycle. The resulting low level (-) RESTORE line causes OR gate B2B on PC card B5 (fig. 8-29) to maintain a high level input to the tally bit shift register.

b. As a result, the first (-) RIGHT SHIFT TRIGGER pulse of the exit-housekeeping function shifts the tally bit out of column 1 of the tally bit shift register and a new tally bit into column 32. In effect, the tally bit is circulated out of the front end of the register and into the back end. If another tally bit is moved into column 1 by this operation, the same cycle is repeated. Actually the cycle is repeated until all tally bits in the front end are repositioned in the back end so that column 1 is empty and the (+) T-REG-1 line goes low to end exit-housekeeping.

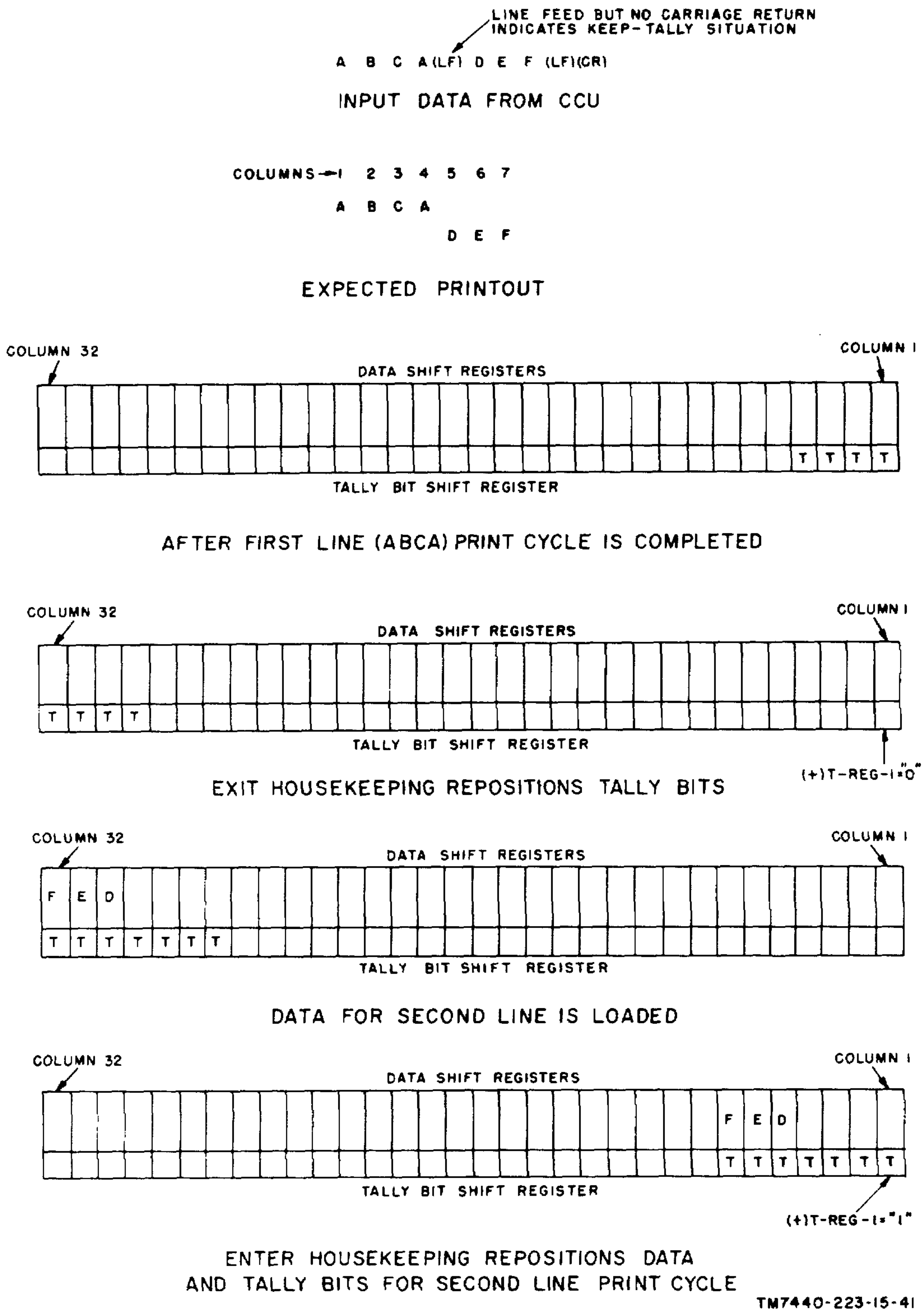


Figure 3-35. Keep-tally function.

3-69. Print Address

a. Tile 80 hammer drivers which control the 80 print hammers are made available for activation by print address functions during a print cycle. The 80 hammers are divided into three zones: zone 1 contains hammers 1 through 32; zone 2 contains hammers 33 through 64; and zone 3 contains hammers 65 through 80 (fig. 3-36). In any print cycle, printing can only take place in one zone.

b. When the 32 columns of the data shift registers are circulated through the compare scan operation in a zone 1 print cycle, it is the function of the print address circuits to make each hammer driver available for activation at the proper instant. Since each of the 32 hammer drivers correspond to the same numbered columns of the data shift registers, hammer driver No. 1 is made available for printing immediately following the comparison of the data from column No. 1 of the data shift registers. At this time, the print drum character represented by the code wheel inputs for the compare scan is in position for printing. Therefore, if the comparison was true, hammer driver No. 1 is activated to print the correct character in column 1 on the paper. If the comparison was not true, hammer driver No. 1 is not activated, the data is restored in the data shift registers for comparison with the next code wheel character, and column 1 on the paper remains blank.

c. As data from subsequent columns in the data shift registers is compared with the same code wheel character, the corresponding hammer drivers are made available for activation by the print address circuits in rapid sequence. This entire process is repeated for each code wheel character until the data shift registers are cleared.

d. If a zone 2 print cycle and a zone 3 print cycle are necessary, the print address function is the same except that different sets of hammer drivers are matched up with the columns of the data shift registers. In a zone 2 print cycle, hammer drivers 33 through 64 are matched up with data shift register columns 1 through 32, respectively, and are selected in the proper order for possible activation. In zone 3, there are only 16 hammer drivers (65 through 80) and these are matched up with columns 1 through 16 of the data shift registers when printing in a zone 3 print cycle.

e. The addressing of hammer drivers during any print cycle is accomplished first by zone select logic and then by high and low order address logic within the selected zone. In addition to being divided into three zones, the 80 hammers are divided into four groups. Groups 0 and 8 are assigned 8 hammers in each of the three zones for a total of 24 hammers in each group. Groups 16 and 24 are assigned 8 hammers in zones 1 and 2 only for a total of 16 hammers in each group. In any print cycle, the groups are addressed in sequence by high order address functions so that eight hammers are made available for the low order address sequence as each group is addressed.

f. If a full line of 80 characters is to be printed, 32 characters are loaded into the data shift registers before entering the zone 1 print cycle. In the first compare scan of zone I print cycle, the 32 characters in the data shift registers are circulated for comparison with one code wheel character. During this scan, high order address functions select groups 0, 8, 16, and 24 in that order. In each group, low order address functions select the eight hammers in numerical order. Therefore, the first 32 hammers are made available individually in rapid sequence and in synchronization with the 32 comparisons of the compare scan.

g. This process is repeated for each code wheel character until all 32 characters are printed. Then new data is loaded into the data shift registers for the zone 2 printing which is the same as the zone 1 printing except that the second set of 32 hammers (33 through 64) is addressed and activated. For the zone 3 print cycle, only 16 characters are loaded into the data shift registers since this zone has only 16 hammers (65 through 80). In zone 3, print address functions are the same as in the other two zones except that only the high order selections of groups 0 and 8 are meaningful since there are no zone 3 hammers in groups 16 and 24.

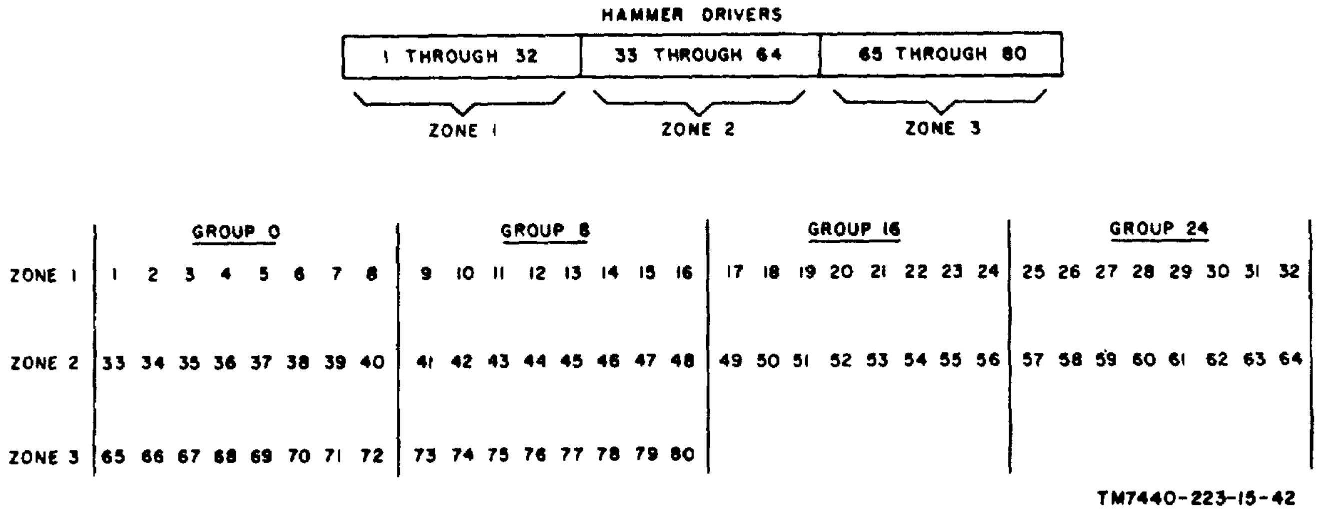


Figure 3-36. Print address assignment.

3-70. Zone Select Control

a. Selection of print cycle zones 1, 2, or 3 is controlled by the state of flip-flops A3A and A3B on PC card B12 (fig. 8-36). The 1 and 0 outputs of the two flip-flops are monitored by AND gates A4A, B1A, A4B, C5A, and C1A to produce zone selection signals on the (-) ZONE 1, (-) ZONE 2, (-) ZONE 3, (-) ZONE 1B, or (-) ZONE 2B lines to the hammer driver matrix. The (-) ZONE 1B and (-) ZONE 2B lines are merely extensions of the (-) ZONE 1 and (-) ZONE 2 lines, respectively.

b. The switching from zone 1 to zone 2 or from zone 2 to zone 3 is controlled by flip-flops A3A and A3B as the result of ENABLE STEP flipflop A5A operation. This flip-flop is reset before a print cycle is entered in order to provide a positive step output to switch the state of flip-flops A3A and A3B.

c. The switching from zone 2 or zone 3 back to zone 1 is the result of the carriage return function. When a carriage return function is commanded, the (-) EX CR line goes low to clear A3A and set A3B. Thus, the high level 1 output of A3B enables AND gates A4A and C5A to produce the (-) ZONE 1 and 1B signals which then make all 32 of the zone 1 hammer drivers available for high order and low order address control during the print cycle. The (-) EX CR also clears the ENABLE STEP flipflop which then remains in the cleared state until the print cycle starts.

d. When MIN PC flip-flop B3A on PC card B13 (fig. 8-37) is set before the zone 1 print cycle starts, it produces a positive step on the (+) MIN PC line to the CL input of ENABLE STEP flip-flop A5A on PC card B12 (fig. 8-36). Since the K input of the flip-flop is permanently low, the (+) MIN PC step has no effect on the flip-flop since it was already cleared by the (-) EX CR line.

e. If the (-) SET ENABLE STEP line goes low when the zone 1 print cycle starts, it sets the ENABLE STEP flip-flop in preparation for switching to zone 2 for the next print cycle. However, A3A and A3B remain in the zone I configuration. After the zone I print cycle ends, the (+) MIN PC line goes high before the start of the next print cycle and resets the ENABLE STEP flip-flop. The positive step which then appears at the O output resets A3B and sets A3A. As a result, the high level 1 output of A3A enables AND gates B1A and C1A to produce the (-) ZONE 2 and (-) ZONE 2B signals. These signals are applied to the hammer driver matrix to make all 32 of the zone 2 hammer drivers available for high order and low order address control during the print cycle.

f. When the zone 2 print cycle starts, the ENABLE STEP flip-flop is set in preparation for switching to zone 3 for the next cycle if the (-) SET ENABLE STEP line goes low. After the zone 2 print cycle ends, the ENABLE STEP flip, flop is again reset as before in order to produce a positive step at the 0 output. This time, the step resets A3A but has no effect on A3B which is already reset, As a result, the high level 0 outputs of both flip-flops enable AND gate A4B to produce the (-) ZONE 3 signal to the hammer driver matrix. This makes all 16 of the zone 3 hammer drivers available for high order and low order address control during the print cycle.

g. At the end of the zone 3 print cycle, a carriage return command causes the (-) EX CR zone to switch the flip-flops back to the states required for zone 1 printing. Actually, the carriage return can be commanded in any one of the three zones in order to have printing begin in zone 1 in the next print cycle. If, at the beginning of any print cycle, the (-) SET ENABLE STEP line does not go low, a zone switch will not take place for the next print cycle because of a keep-tally situation.

h. A keep-tally situation is one in which a line feed command is received without a carriage return command. When this occurs, the (-) KEEP TALLY line goes low to inhibit AND gate B1D on PC card B13 (fig. 8-37) so that the (-) SET ENABLE STEP line to the ENABLE STEP flip-flop on PC card B12 (fig. 8-36) remains high. As a result, the flip-flop remains in the reset state, thereby preventing it from switching flip-flops A3A and A3B to change zones. Thus, the first print cycle after the line feed takes place in the same zone on the new line. Actually, the)Tinting starts on the new line in the column immediately following the last column printed on the preceding line (para 3-68).

i. One other function of the zone select circuitry is to produce a low level (-) ENABLE AUTO line to the line feed and carriage return command circuits (para 3-48) when printing in zone 2. This permits automatic line feed and carriage return functions to be enabled at the end of a zone 3 print cycle if the data received from the CCU does not include line feed and carriage return commands. To purchase a low level (-) ENABLE AUTO output, AND gate B2D is enabled by two low inputs. One is provided by the O output of the ENABLE STEP flip-flop when it is set by the start of the zone 2 print cycle. The other is provided by AND gate C1A when it is enabled for a zone 2 print cycle.

3-71. High Order Address Control

a. The high order address function is the systematic addressing of the four groups of hammer drivers in each printing zone. The addressing function is performed by four lines labeled (+) GROUP 0, (-+) GROUP 8, (+) GROUP 16, and (+) GROUP 24 which are applied to the hammer driver matrix. These lines are controlled by AND gates AID, A1A, A1C, and A1B on PC card B12 (fig. 8-36). The four AND gates monitor various combinations of the 1 and 0 outputs of scan shift counter flip-flops A2A and A2B in order to keep in step with the compare scanning of the 32 columns of data in the data shift registers.

b. When the counter is counting and data is circulated from the data shift registers through the compare scan operation, the counter flip-flops enable the AND gates in a particular sequence. Since A2A and A2B are in the 0 state during the count from 0 to 7, AND gates A1A, A1C, and A1B are inhibited by high inputs but AND gate A1D is enabled by two low level inputs to produce a high level (+) GROUP 0 output. When this occurs in a zone 1 print cycle, hammer drivers 1 through 8 are made available for activation as the first 8 columns of the data shift registers are compared (para 3-72). In a zone 2 print cycle, hammer drivers 33 through 40 are made available and in .a zone 3 print cycle, hammer drivers 65 through 72 are made available. The 8 hammer drivers are individually addressed by the low order address function as the data from each associated column of the data shift registers is compared.

c. At the count of eight, A2B is switched to a 1 state to inhibit A1D and enable A1A. A2A remains in the 0 state and A1C and A1B remain inhibited. As a result, A1D produces a high level (+) GROUP 8 output, making hammer drivers 9 through 16 available for activation in a zone 1 I print cycle, hammer drivers 41 through 48 in a zone 2 print cycle, or hammer drivers 73 through 80 in a zone 3 print cycle.

d. At the count of 16, A2A is switched to a 1 state and A2B is switched to a 0 state. The result is that A1C is enabled and A1A, A1D, and A1B are inhibited. As a result, A1C produces a high level (+) GROUP 16 output, making hammer drivers 17 through 24 available for activation in a zone 1 print cycle or hammer drivers 49 through 56 in a zone 2 print cycle.

e. At the count of 24, A2B is switched back to the 1 state so that A1B is now enabled whereas AID, A1A, and A1C are inhibited. As a result, A1B produces a high level (i-) GROUP 24 output, making hammer drivers 25 through 32 available for activation in a zone 1 print cycle or hammer drivers 57 through 64 in a zone 2 print cycle.

f. At the count of 32, both counter flip-flops are switched back to the 0 state so that AND gate AID is enabled and the other AND gates are inhibited. Thus, the (+) GROUP 0 output is high in preparation for the start of the next compare scan operation. The entire process can be repeated as many as 64 times during a print cycle, since the code wheel contains the codes for 63 characters and a space.

3-72. Low Order Address Control

a. The low order address function performs the addressing of individual hammer drivers during each high order group address. This addressing of hammer drivers is performed by eight lines labeled COCK 1 through COCK 8, respectively, which 'are applied to the hammer driver matrix. These lines are controlled by the eight AND gates (B4A through B4D and B5A through B5D) on PC card B12 (fig. 8-36). Each of the eight AND gates is enabled only if the comparison of data from the associated column of the data shift registers with the code wheel character is true. Actually. the AND gates are enabled by a combination of (+) COMPARE pulses and scan shift counter outputs.

b. To perform this function, the 1 and 0 outputs of scan shift counter flip-flops C3A and C3B are monitored by AND gates C4A, C4B, C4C, and C4D. Each of these AND gates is enabled, in succession, by the counter flip-flop outputs for a period of two counts. First C4B is enabled for a two-count period, followed by C4A, C4D, and C4C, in that order. When enabled, C4B conditions the COCK 1 and 2 AND gates, B4A and B5D; C4A conditions the COCK 3 and 4 AND gates, B4B and B5C; C4D conditions the COCK 5 and 6 AND gates, B4C and B5B; and C4C conditions the COCK 7 and 8 AND gates, B4D and B5A.

c. However, a COCK AND gate cannot be enabled unless a true comparison is made while the gate is conditioned. When a true comparison is made, the (+) COMPARE line goes high and conditions flip-flop C2A so that it is set by the next (-) SCAN SHIFT pulse through AND gate B2A. The resulting high level 1 output triggers the pulse generator, consisting of AND gate B3B and Schmitt trigger B3D, which produces a positive step after a 1-µsec delay. This step is inverted by OR gate B2B to clear flip-flop C2A. Therefore, the 1 output of the flip-flop produces a 1-µsec pulse to AND gates C1B and C1C every time a true comparison occurs.

d. This pulse enables one of the two AND gates, depending on the state of scan shift counter flipflop C2B since C1B monitors the 0 output ant C1C monitors the 1 output. Therefore, the two AND gates are alternately conditioned when the counter is counting. When the conditioned AND gate receives the 1-µsec pulse, it is enabled to produce a low level output. If C1B is enabled, the low level output is sent to CCK 1, 3, 5, and 7 AND gates B4A, B4B, B4C, and B4D and if C1C is enabled, the low level output is sent to COCK 2, 4, 6, and 8 AND gates B5A, B5B, B5C, and B5D.

e. The arrival of a low level output from C1B or C1C at any COCK AND gate conditioned by the counter flip-flops, produces a high level COCK output to the hammer driver matrix. In this manner, the eight COCK AND gates are scanned by the counter in rapid sequence from 1 to 8 for the simultaneous arrival of associated compare pulses. This occurs once for every high order group address since each group is assigned eight hammer drivers. Since four high order group addresses make up one compare scan (32 count) and a maximum of 64 compare scans make up a print cycle, the COCK AND gates can be scanned 4 X 64-=256 times during a print cycle.

3-73. Scan Shift Counter

The scan shift counter is a five-stage binary counter which counts 32 (-) SCAN SHIFT pulses for each compare scan operation in a print cycle. During the 32 count, it provides high and low order address inputs to select the appropriate hammer drivers for the printing operation. At the count of 32, the counter produces a positive (+) CARRY signal to indicate that the data in the data shift registers has completed a compare scan operation.

a. The counter consists of flip-flops C2B, C3B, C3A, A2B, and A2A on PC card B12 (fig. 8-36). The count input to flip-flop(2B is provided by clock pulses (para 3-61) on the (-) SCAN SHIFT line. Each pulse changes the state of C2B. Subsequent flip-flops in the counter are toggled by the positive change of state which occurs at the 0 output of the preceding stage, when the preceding stage is set. This gives normal binary counter operation if the set state is understood to be the 1 state for the counter flip-flops and the clear state is understood to be the 0 state. Thus, each stage changes from a 0 to a 1 or from a 1 to a 0 when the preceding stage changes from a 1 to a 0.

b. During normal operation, the counter flip-flops are all in a 0 state until the trailing edge of the first 3-µsec (-) SCAN SHIFT pulse is produced by the clock. In a print cycle, the clock is enabled to produce (-) SCAN SHIFT pulses after each code wheel strobe is received to start a compare scan operation. Once the clock is fired, 3-µsec (-) SCAN SHIFT pulses are generated every 3-µsec to step the counter.

c. During the counting operation, the I and 0 outputs of counter flip-flops C2B, C3B, and C3A are monitored by the low order address gates in order to produce the series of COCK 1 through 8 outputs. This series of outputs is repeated four times during a 32-step count. The 1. and 0 outputs of counter flip-flops A2B and A2A are monitored by the high order address gates in order to produce one series of (+) GROUP 0, (+) GROUP 8, (+) GROUP 16, and (+) GROUP 24 outputs during a 32-step count.

d. The trailing edge of the 32d (-) SCAN SHIFT pulse causes all counter flip-flops to be returned to the 0 state so that the high level 0 output of flip-flop A2A produces a high level (t) CARRY signal. The signal is used to end the compare scan operations which make up each print cycle.

e. All counter flip-flops are cleared when the (+) NOT PC line goes high to enable AND gate B1B. This occurs at the end of a print cycle.

3-74. Hammer Driver Matrix

The hammer driver matrix sets and fires the 80 hammer drivers as the result of zone selection, high order address, and low order address inputs, and the (+) FIRE pulse. For example, none, any, or all of the 32 hammer drivers in zone 1 may be set for firing as the data in the 32 columns of the data shift registers is compared with a code wheel character during a zone 1 print cycle. When a true comparison occurs between any register column and the code wheel character, the individual zone 1 hammer driver, selected by the high order and low order address inputs at that instant, is set for firing. After the compare scan is completed, the (+) FIRE pulse generated by the next code wheel strobe fires all the set hammer drivers.

a. The hammer driver matrix consists of 80 hammer drivers which are on 8 PC cards, A2 through A9 (fig. 8-13 through 8-20). Each PC card has 10 hammer drivers divided into four groups with two of the groups consisting of three hammer drivers each and the other two groups consisting of two hammer drivers each. One hammer driver in each group is assigned to zone 1 and another hammer driver in each group is assigned to zone 2. The remaining hammer drivers in the first two groups are assigned to zone 3.

b. On PC card A2 (fig. 8-13), which is typical of the other hammer driver matrix PC cards, AND gates A2A, C2B, C5B, and A5B are conditioned by a low level (-) ZONE 1 line during a zone 1 print cycle. Since each AND gate is in a different group only the AND gate in the group addressed by the high order (+) GROUP 0, 8, 16, and 24 inputs can be enabled at any one time.

c. For example, when the (+) GROUP 0 line goes high in a zone 1 print cycle, it conditions AND gate A1A to be enabled if a positive COCK 1 pulse is received. This occurs if the character. represented by the data stored in column 1 of the shift data registers is the same as the code wheel character with which it is being compared. When the (+) GROUP 8 line goes high and a COCK 1 pulse is received, AND gate C1A is enabled to indicate that the character in column 9 of the registers is the same as the code wheel character being compared. Similarly, when a COCK 1 pulse accompanies a high (+) GROUP 16 or 24 line, AND gate C6C or A6D is enabled to indicate that the character in column 17 or 25 of the register is the same as the code wheel character being compared.

d. When the (+) GROUP 0 line goes high and COCK 1 pulse is received, A1A is enabled to set the latch consisting of OR gate A1D and AND gate A1C. The high output of A1D inhibits AND gate A2C and the low output of A1C triggers the pulse generator consisting of OR gate B2A and Schmitt trigger B2C. The pulse generator produces a low level output which conditions A2C. This represents the setting of hammer driver No. 1 in zone 1. In a zone 2 or a zone 3 print cycle, this would represent the setting of hammer driver No. 33 or No. 65, respectively.

e. After the compare scan is completed, a code wheel strobe is received to generate a positive (+) FIRE pulse, causing OR gate C5A to inhibit A1C. Thus, the low level input to the pulse generator is removed and OR gate A1D produces a low level output to enable AND gate A2C. However, after 1.8 ms, the pulse generator output goes high to inhibit A2C. As a result, A2C produces a positive 1.8 ms pulse output.

f. The positive pulse output of A2C causes AND gate A1B to provide a negative pulse to AND gates A2A, A2R, and A2D. The negative pulse enables only A2A since it is the only gate in the group which is conditioned by the low level (-) ZONE 1 line. The resulting positive pulse output of A2A causes hammer driver QA1 to pull the HD No. 1 line to ISO GRD (isolation ground). This provides a ground return path for the +48 volts de which is applied to the hammer solenoid. As a result, the hammer is fired to print the compared character. Any other zone 1 hammer drivers (1 through 32) which were set during the compare scan are fired by the same (+) FIRE pulse to print the same character.

g. The + Vx line provides a regulated voltage to all pulse generators on the hammer driver PC cards to insure that the 1.8 ms pulse period remains stable. The voltage is regulated according to environmental temperature changes by the voltage regulator on PC card A14 (fig. 8-23, 5-18, and para, 3-30*d*).

3-75. Cancel Detector

A cancel command is received from the CCU on the cancel line in the form of a pulse which appears prior to the first data strobe. Cancel functions then occur in the page printer when the first data strobe is received from the CCU. When cancel occurs, it causes automatic line feed, carriage return, and a print-out of one row (80 columns) or circumflexes (A) followed by a single form feed.

a. When a pulse is received on the cancel line from the CCU, interface circuitry on PC card B1 (fig. 8-25) produces a positive (+) CAN-IN signal which enables AND gate C3D on PC card B10 (fig. 3-84) if the (+) SEL line is high indicating that the page printer is selected. This produces the positive (+) CAN DATA signal which lasts as long as the (+) CAN-IN line stays high. Actually, this is only a short period at the beginning of a cancel condition. Thus, the (+) CAN DATA signal inhibits AND gate A3B on PC card B9 (fig. 8-33) to prevent the load data function from loading the character which caused the cancel condition. The (+) CAN DATA signal also initiates the line feed and carriage return functions to prepare for the printing of a row of circumflexes.

b. The (+) CAN DATA signal also appears at AND gate C5C on PC card B10 (fig. 8-34) so that on the next (+) STA pulse, C5C is enabled to set CAN flip-flop C2B. The resulting positive 1 output of C2B provides the (+) CANCEL signal which is used to condition AND gate B2D to be enabled by a (+) ST-END pulse. As a result, the negative pulse output of B2D, after inversion by OR gates B2B and A3D, clears SEL flip-flop B4A to deselect the page printer. The low level (-) CANCEL line from the 0 output of C2B inhibits AND gate C1C to prevent the (+) DELAYED SEL line from setting SEL flip-flop B4A until the cancel condition has ended.

c. After the (+) CAN DATA period, the (-) CANCEL signal is also used to enable AND gate A3B on PC card B9 in order to initiate the load data function for loading circumflexes into the shift registers (para 3-59). The (-) CANCEL signal also causes OR gate B3C to allow the generation of (+) TEST STROBE pulses. These pulses are gated with the (+) CANCEL line by AND gate C5B which then produces a low level output. This low output causes the loading of the circumflex code into all positions of the data shift registers (para 3-59) for the printing of a complete line of circumflexes.

d. The (+) CANCEL line inhibits (+) START BLOCK OUT and (+) DATA REQ OUT AND gates C2C and C2D to prevent data requests from being sent to the CCU during the cancel condition. It also enables AND gate A2B on PC card B11 (fig. 8-35) if the automatic line feed and carriage return line is high so that a form feed function is commanded at the end of the circumflex printing operation.

e. Another function of the (+) CANCEL line is to cause OR gate C4D on PC card B6 (fig. 830) to produce a low level output. This output then causes OR gate C6A to produce a high level (+) IGNORE signal which results in an inhibit load data function. Thus, the character which caused the cancel condition is not loaded into the data shift register.

f. The (+) CANCEL line also inhibits AND gate A1A on PC card B13 (fig. 8-37) which, in turn, inhibits AND gate B1A. The high level output of B1A then causes OR gate B1B to produce a low level (+) ENABLE RESTORE TALLY line. As a result, no tally bits are restored in the tally bit shift register during the cancel condition.

g. Another function of the (-) CANCEL line is to cause OR gates C5C and C5D to enable AND gate C5H on PC card B6 (fig. 8-30). The resulting high output of C5H is inverted by OR gate C4A to clear FORCE AST flip-flop C2B. This prevents asterisks from being forced into the data shift registers to conflict with the circumflex code. The (-) CANCEL line is also used to inhibit the generation of a (-) LF CODE OR MSG STOP signal when a cancel condition occurs by inhibiting AND gate C1C on PC card B8 (fig. 8-32).

3-76. Paper Fail

a. A paper fail condition can be caused by the paper out switch being opened because of an empty hopper or by a negative (-) FORM FEED line following a paper low indication. A paper low indication means that the paper supply in the hopper is insufficient for the page printer to continue operating beyond the next form feed cycle at which time a paper fail condition is initiated.

b. With no paper in the hopper, the paper out switch A2A1A251 (fig. 8-8) is opened to produce a positive (+) PAPER OUT SW signal which is inverted by OR gate C5A to set PAPER FAIL flip-flop C4A. The (+) PAPER OUT SW line is also present at the K inputs of C4A until the fault is corrected. While PAPER FAIL flip-flop C4A is set, the high level 1 output is applied to lamp drivers C5A and C5B on PC card A1 to light the PAPER FAIL indicator lamps on control panel A2A5A1. In addition, the START mode or LOCAL TEST mode is terminated since the paper fail condition causes START and LOCAL TEST flip-flops B1B and B1A, respectively, to be cleared. Thus, the ready line to the CCU is dropped, the START indicators go out, and the STOP indicator lights.

c. When the paper supply is replenished, the high level signal is removed from the K input of PAPER FAIL flip-flop C4A so that when the START mode or the LOCAL TEST mode is entered, the resulting (+) CLEAR signal to the CL input clears the flip-flop. However, if the paper supply is not replenished before the START or LOCAL TEST switch is pressed, the low level at the S input of C4A would cause the flip-flop to be set until the fault is corrected.

d. When the paper low switch A2A3A151. (fig. 8-11) is opened, the (-) PAPER LOW SW line goes low and enables AND gate C5C on PC card B8 (fig. 8-32) to produce a positive (+) IND PAPER LOW output. This output is applied to lamp drivers A5A and A5B on PC card A1 (fig. 8-12) which cause the PAPER LOW indicator lamps on control panel A2A5A1 to light. The (-) PAPER LOW SW line also conditions AND gate C5D so that when the next form feed occurs and the (-) FORM FEED line goes low, C5D is enabled. The positive output from C5D is inverted by OR gate C5A to set PAPER FAIL flip-flop C4A initiating a paper fail condition. The high level 1 output of C4A inhibits AND gate C5C ending the PAPER LOW indication.

3-77. Print Fail

a. A print fail condition is caused by any print cycle lasting 50 ms or longer or by an open yoke, a blown fuse, or a missing PC card. When a print fail condition occurs, the START mode or the LOCAL TEST mode, whichever is in effect, is ended and the ALARM STOP LINE to the CCU is activated. In addition, the PRINT FAIL indicator lamps on control panel A2A5A1 are lighted at the same time.

b. The length of a print cycle is monitored by a pulse generator consisting of AND gate B2A and Schmitt trigger B2C on PC card B13 (fig. 8-37). When PC flip-flop C2A is set to start a print cycle, the low level 0 output is inverted by OR gate B1C to fire the pulse generator. However, the pulse generator does not produce an output unless the input from B1C is present for 50 ms. Since the maximum print cycle period is approximately 42 ms, any print cycle lasting 50 ms or more indicates trouble. Usually, the trouble results from a failure of the compare scans to empty the data shift registers.

c. When trouble does occur, the pulse generator, after 50 ms, sets PRINT FAIL flip-flop B5B causing the 0 output to produce a low level (-) PRINTER FAIL signal. This signal is used to reset START flip-flop B1B or TEST PRINT flipflop B1A on PC card B8 (fig. 8-32), whichever is set, to end the START mode or the LOCAL

TEST mode. The (-) PRINTER FAIL signal is also inverted by OR gate A4A to produce a positive (+) IND PRINT FAIL output. This output causes lamp drivers A6A and A6B on PC card A1 (fig. 8-12) to light the PRINT FAIL indicator lamps on the control panel.

d. The same results are obtained immediately when the (+) YOKE, FUSE, INTERLOCK, ALARM line from OR gate C5B on PC card A11 (fig. 8-21) goes high and sets the PRINT FAIL flip-flop. This occurs when the yoke in the print head is in an open position or a PC card is not plugged in properly. Such conditions are indicated by a low level (-) HD INTERLOCK line which causes OR gate C4C to feed a low level input to C5B. This also occurs when a fuse in the power supply is blown causing (+) 48V FUSE ALARM line to enable AND gate C5D. The resulting low level output of C5D causes C5B to produce the high level (+) YOKE, FUSE, INTERLOCK, ALARM signal.

3-78. Paper Feed Control

The paper feed control circuit energizes the paper feed clutch solenoid to advance paper in response to a negative (-) FEED pulse from the line feed and form feed control circuit. The paper stops when the trailing edge of the negative (-) FEED pulse causes the paper feed clutch solenoid to be deenergized and the paper feed brake solenoid to be energized. Thus, the amount of paper advance is determined by the length of the (-) FEED pulse (para 3-49).

a. The leading edge of a negative (-) FEED pulse enables AND gate B5C on PC card A1 (fig. 8-12) to drive QA2 and QA7 into pulling the (-) CL PULL line to ISO GRD (isolated ground). QA2 and QA7 are connected in parallel for high current carrying capability. As a result, the +48 volts dc which is applied to the paper feed clutch solenoid A2A1L1 (fig. 8-8) is provided with a low resistance ground return path. Thus, the clutch is activated to advance paper.

b. At the same time, the leading edge of the negative (-) FEED pulse causes OR gate C6B to trigger the pulse generator consisting of AND gate B6A and Schmitt trigger B6C. After a delay of 4 ms, the pulse generator produces a positive output to disable AND gate B5C and end the high-current clutch pull function (fig. 3-37). Now, the paper feed clutch solenoid is held by the low-current (-) CL HOLD line since the (-) 3-64

Change 6 FEED pulse also causes OR gate C6C to drive QA1 into pulling the (-) CL HOLD line to ISO GRD.

c. As a result, the (-) CL PULL line provides the high initial surge of current that is needed to activate the clutch, then the low current (-) CL HOLD line provides the smaller current required to hold the clutch until the (-) feed pulse ends.

d. When the (-) FEED pulse ends and the paper feed clutch solenoid is released, the trailing edge of the negative (-) FEED pulse causes the paper feed brake solenoid to energize and stop the paper. This operation is similar to the clutch energizing operation since the brake solenoid is also energized by a high pull current and then held by a lower hold current. e. The paper feed brake solenoid is pulled in when the trailing edge of a negative (-) FEED pulse enables AND gate B2D which, in turn, enables B5B. The high output of B5B drive QA3 and QA8 into pulling the (-) BR PULL line to ISO GRD. Thus, the +48 volts dc applied to the paper feed brake solenoid A2A1L2 (fig. 8-8) is provided with a low resistance ground return path and the solenoid is energized to stop the paper.

f. At the same time, the trailing edge of the negative (-) FEED pulse causes OR gate C6D to trigger the pulse generator consisting of AND gate B6B and Schmitt trigger B6D. After a delay of 6 ms, the pulse generator produces a positive output to disable AND gate B5B and end the high-current brake pull function (fig. 3-37). Now, the paper feed clutch solenoid is held by the low-current (-) BR HOLD line since the (-) FEED pulse also causes OR gate C6A to drive QA4 into pulling the (-) BR HOLD line to ISO GRD.

g. AND gate B5D is also enabled by the trailing edge of (-) FEED pulse through B2D and is disabled after 6 ms by the pulse generator. Consequently, a 6-ms pulse is produced by OR gate B5A to the (-) BRAKE PULSE line. The negative pulse causes OR gate A2A and Schmitt trigger A2C on PC card B4 (fig. 8-28) to produce a negative (-) SETTLE pulse which is used to inhibit the enter print cycle function. This allows enough time for the paper to settle, after a paper feed function is completed, before a print cycle is entered.

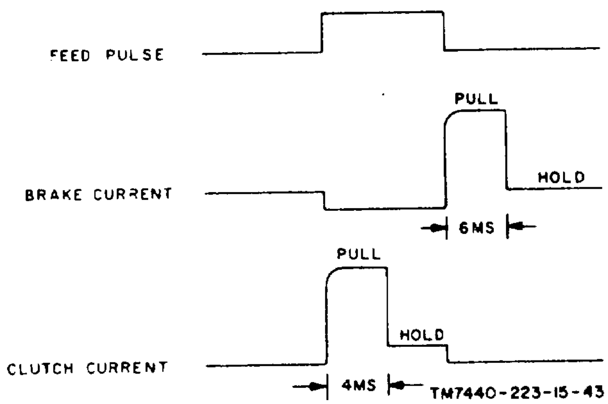


Figure 3-37. Paper feed timing pulses.

3-79. Ribbon Control Circuit

The ribbon control circuit energizes the forward or the reverse ribbon solenoid for ribbon motion during a print cycle. It is controlled by inputs from the ribbon-actuated switches in the ribbon feed mechanism and a high level signal on the (+) PC line which indicates when a print cycle is started.

a. The direction of ribbon motion is controlled by the state of the RIBBON DIRECTION latch which consists of AND gate B2B and OR gate B2C on PC card Al (fig. 8-12). This latch is switched from one state to the other by a negative pulse which is generated by either the ribbon forward or ribbon rewind sense switch A2A1A1S1 or A2A1A1S2 (fig. 8-8).

b. When ribbon motion is in the rewind direction and the ribbon supply is nearly used up, the sensing arm assembly actuates ribbon forward sense switch A2A1A1S1. The switch is momentarily closed to produce a negative pulse on the (-) MANDREL A line. This Pulse disables AND gate B2B so that OR gate, produces a low level output to AND gate C2B. If the print cycle is in progress, C2B causes QA5 to pull the (-) DRIVE MANDREL A line to ISO GRD (isolated ground). This provides a ground return path for the +48 volts dc applied to the forward ribbon clutch solenoid so that the solenoid energizes and causes ribbon motion in the reverse direction.

c. When the ribbon supply runs out in the reverse direction, ribbon switch A2A1A1S2 is actuated and the resulting low level (-) MANDREL B line switches the state of the ribbon direction latch. Thus, C2B is disabled and C2C is enabled to drive QA6 into pulling the (-) DRIVE MANDREL B line is ISO GRD. This causes ribbon motion in the rewind direction.

d. Ribbon feed in either direction continues as long as a print cycle is in progress plus 100 ms. The purpose of the additional 100 ms is to keep the ribbon in motion when one print cycle immediately follows another print cycle. This avoids stopping and starting the ribbon feed mechanism during the short period of time between print cycles. The 100-ms delay is provided by the pulse generator consisting of OR gate C1B and Schmitt trigger C1D.

e. When a print cycle is started, the (+) PC line goes high and causes AND gate B2A to trigger the pulse generator. The pulse generator produces a low level output which enables either AND gate C2B or C2C, whichever is conditioned by the RIBBON DIRECTION latch. This starts ribbon motion which then continues as long as the pulse generator output remains low level.

f. When a print cycle ends and the (+) PC line goes low, the pulse generator output remains low for a period of 100 ms. If another print cycle is started within that period, the (+) PC line goes high again, and the pulse generator output remains low without interrupting ribbon motion. If no new print cycle is started, the pulse generator output goes high after 100 ms and stops ribbon motion.

3-80. Code Wheel Light Sensors

a. The 10 permanently lighted code wheel lamps are arranged in a single row directed at the 7 associated light sensors on code wheel light sensor assembly A2A1A7 which read the coded characters in each radius of the code wheel. On the ASCII code wheel, each radius consists of seven bits including the code wheel strobe bit and code wheel bits I through 5 and 7; code wheel bit 6 is emitted.

b. The light sensors are arranged in a line so that all bits in a radius are simultaneously read. The operation of the code wheel light sensors is illustrated in figure 3-38 for typical radii of the code wheel. The light sensor output is low when a transparent hole in the code wheel passes the light sensor causing it to light. As the code wheel turns, the signal goes hi when no hole is present since the light is blocked from reaching the light sensor by the opaque part of the code wheel. The light sensor signals are fed from the print head A2A1 to the compare and restore logic on PC card B4 (fig. 8-28).

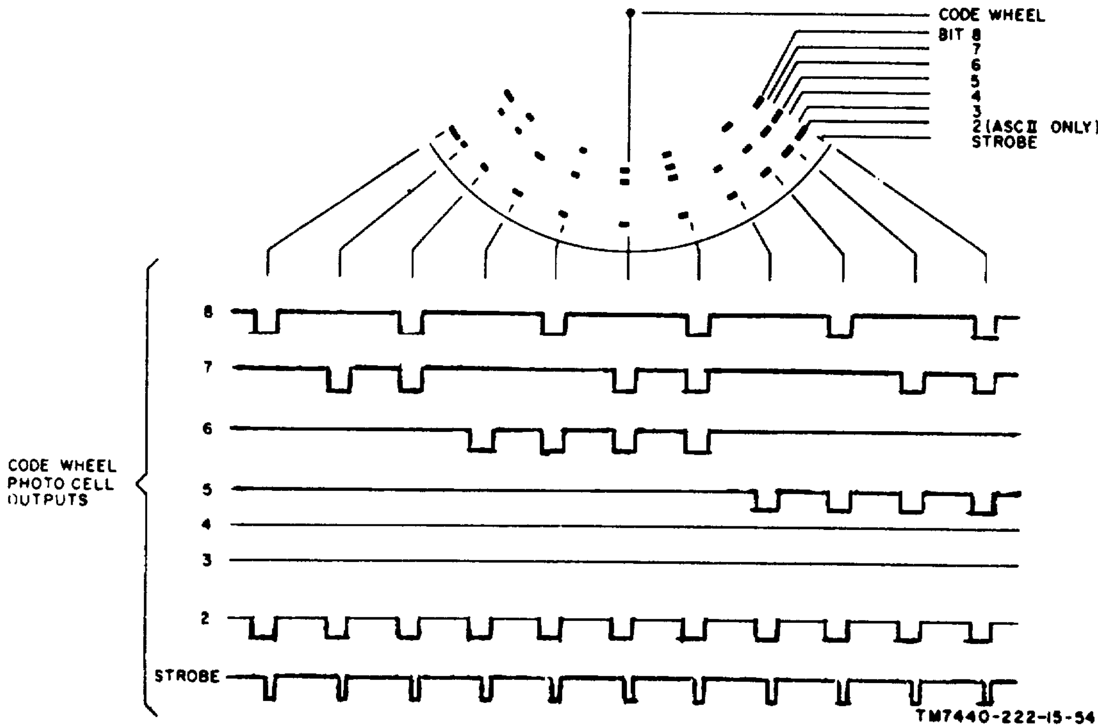


Figure 3-38. Typical code wheel light sensor outputs.

3-81. Strobe Disk Light Sensors

a. The six permanently lighted strobe disk lamps are arranged in a single row directed at the four associated light sensors on strobe disk light sensor assembly A2A1A5 which read the coded slots in the strobe disk (fig. 8-8). Since the strobe disk is synchronized with the paper feed sprocket chain. the transparent holes in the disk represent certain functions of paper feed such as line feed, top of form, bottom of page, and margin inhibit. The light sensors are arranged so that each one monitors a particular function.

b. The line feed light sensor senses a transparent hole in the disk each time the paper is advanced one line. The top of form light sensor senses a transparent hole in the disk each time the top of t paper form reaches the print station. Similarly, the bottom-of-page light sensor indicates when the bottom of a page reaches the print station. The margin inhibit light sensor output is used when a 1-inch margin is selected for the tot)p into bottom of each form. This output inhibits the stopping of paper feeding for 6 lines at the bottom of the form and for 6 lines at the top of the next form.

c. Since the page printer can handle paper form lengths of 8-1/2, 11, and 14 inches, different strobe disks and associated gears must be used for each size.

3-82. Test Points

PC card B0 (fig. 8-24) contains 40 test points which make important pulses and signal levels from various PC cards in the logic and control assembly A2A4 accessible for testing. Representative waveforms measured at some of these test points are shown in figure 8-38.

3-83. Detailed Operation of Discrete Logic Elements

The detailed circuit operation of discrete circuit logic elements is described in paragraphs 3-25 through 3-26. The component make-up of each type of logic element is shown in figures 3-39 through 3-42. However, since one example of each type is shown in these figures, a detailed listing of the corresponding components in the logic element of each type is given.

3-84. Detailed Operation of Discrete Circuit Logic Elements on PC Cards B1 and B2

a. Type RCVR-1 Interface Receiver (fig. 3-39). The type RCVR-1 interface receiver converts a +6.2-volt input from the CCU to +5 volts and a -6.2-volt input to 0 volt. A +6.2-volt input causes transistor Q4 of differential amplifier Q4-Q5 to go into conduction and causes transistor Q5 to go into cutoff. The negative voltage at the collector of Q4 is coupled through resistor R12 to drive transistor Q6 into cutoff. Thus, the output assumes the +5-volt level supplied through resistor R13. If, however, the input to the circuit is -6.2 volts, the base of Q4 assumes a negative potential established through resistors R10 and R14. Thus,Q4 is driven into cutoff and Q5 into conduction. The positive level at the collector of Q4 drives Q6 into conduction so that the output goes to 0 volt.

Type RCVR-1 designations	Components											
B	R10	R11	R12	R13	R14	R15	R16	R17	R18	CR3	Q4	Q5	Q6
C	R19	R20	R21	R.22	R23	R24	R25	R26	R27	CR4	Q7	Q8	Q9
D	R28	R29	R30	R31	R32	R33	R34	R35	R36	CR5	Q10	Q11	Q12
E	R37	R38	R39	R40	R41	R42	R43	R44	R45	CR6	Q13	Q14	Q15
F	R46	R47	R48	R49	R50	RS1	R62	R53	R54	CR7	Q16	Q17	Q18

b. Type XMTR-1 Interface Transmitter (fig. 340). The type XMTR-1 interface transmitter transmits +6.2 volts to the CCU when the input is +5 volts. When the input is 0 volt, -6.2 volts is transmitted to the CCU. When the input across resistor R3 is +5 volts, a positive voltage at the junction of resistor R1 and R2 turns on transistor Q1. This results in a +12-volt level at the Q1 collector. This drives transistor Q2 into conduction and transistor Q3 into cutoff. Thus, +6.2 volts established by Zener diode VR1 and resistor R4 is drawn through Q2 and resistor R6 to the circuit output. When a 0-volt level is applied to the input, Q1 is cut off so that a negative voltage appears at the Q1 collector. This voltage drives Q3 into conduction and Q2 into cutoff. Thus, the -6.2 volts established by Zener diode VR2 and resistor R9 is drawn through Q3 and resistor R7 to the circuit output.

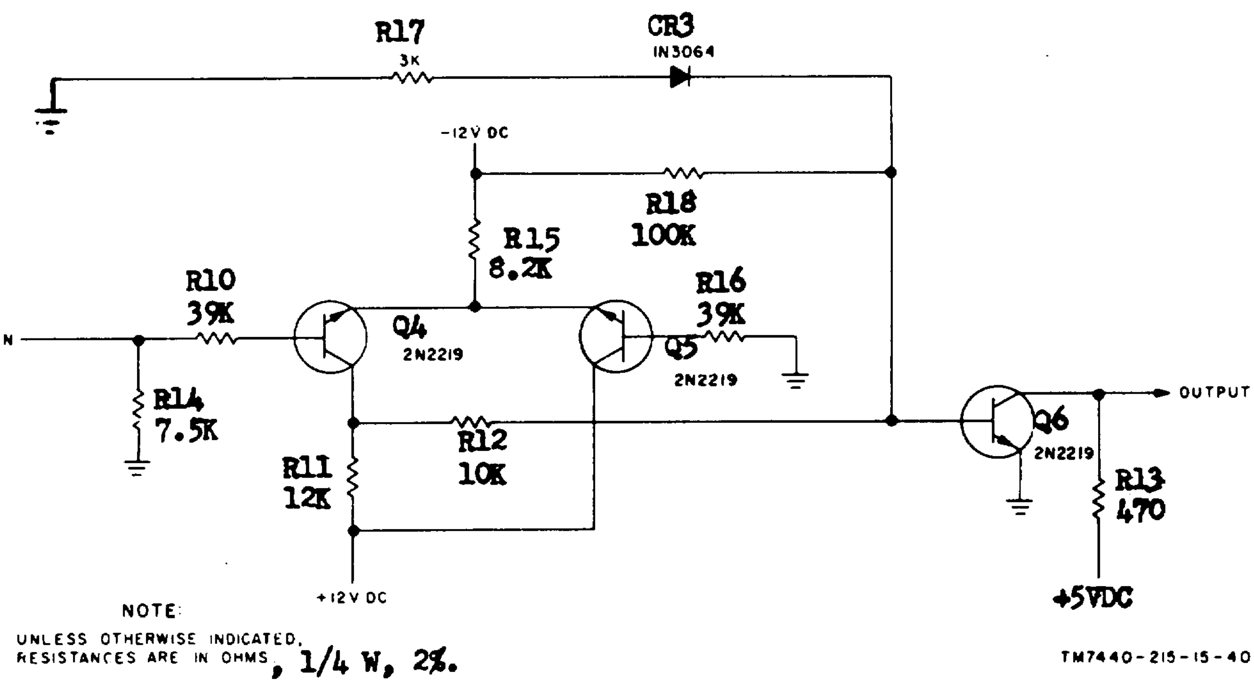


Figure 3-39. Type RCVR-1 interface receiver, schematic diagram.

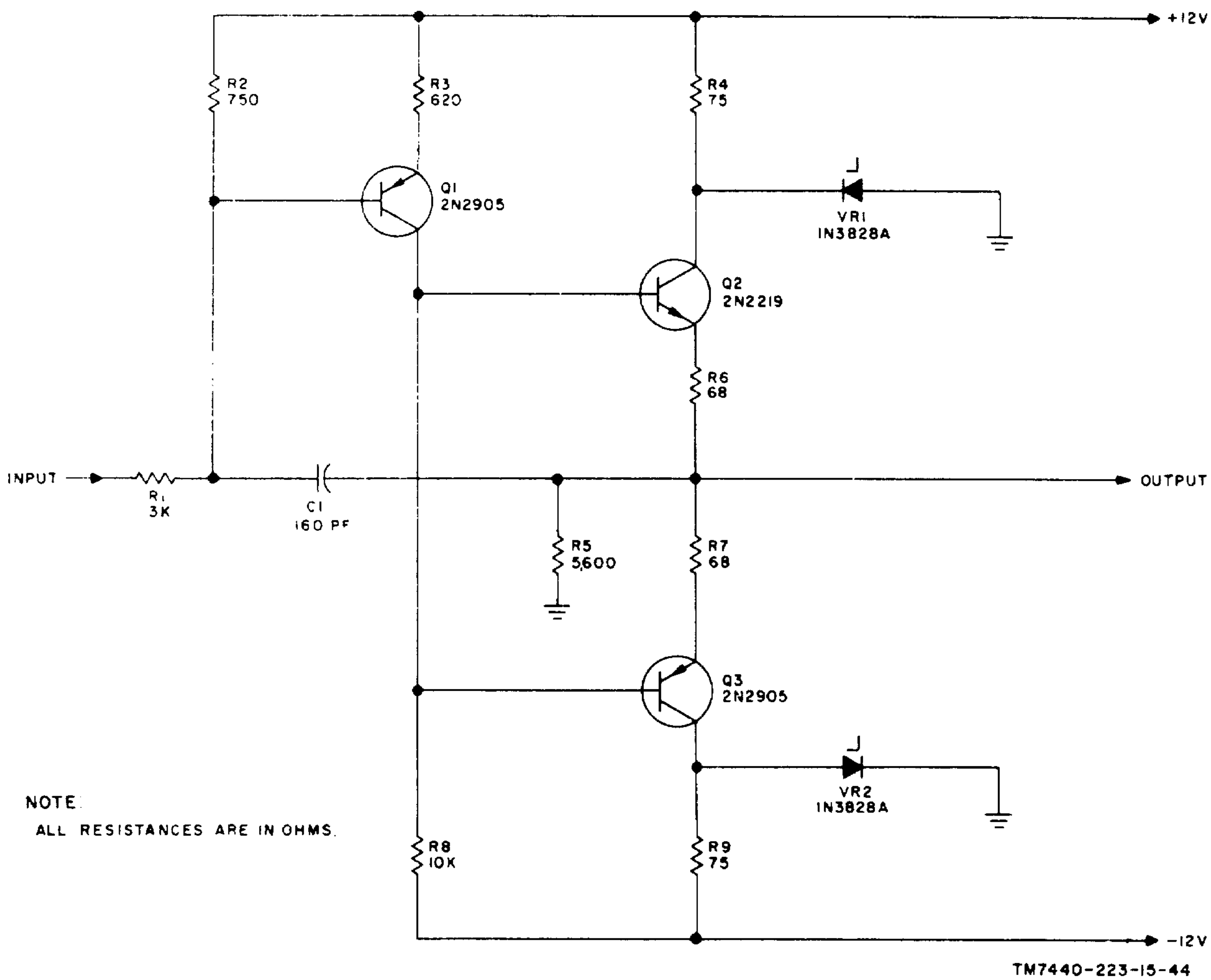


Figure 3-40. Type XMTR-1 interface transmitter, schematic diagram.

3-85. Detailed Operation of Discrete Circuit Logic Elements on PC Card B3

(fig. 8-27)

a. Type XMTR-2 Interface Transmitter (fig. 341). The input to the XMTR-2 interface transmitter switches from 0 volt and +5 volts. The input is coupled by biasing network R1, R2, R3 to the base of transistor Q1. When the input is 0 volt, QI is cut off and supplies an open circuit to the CCU. When the input is +5 volts, Q1 is driven into conduction, resulting in a 0-volt output to the CCU.

Type XMTR-2 designations	Components			
A	R1	R2	R3	Q1
B	R4	R5	R6	Q2
C	F7	R8	R9	Q3
D	R10	R11	R12	Q4

b. Type RCVR-2 Interface Receiver (fig. 3-42). The RCVR-2 interface receiver converts a 0-volt input from the CCU to +5 volts and an open circuit input from the CCU to 0 volt. When the transmitting source becomes an open circuit, the input signal becomes +6.2 volts. This is coupled by resistor R22 and bias network R23, R24, and Zener diode CR2 to the base of transistor Q8, driving Q8 into conduction. This results in a 0volt output at the Q8 collector. When the input signal goes to 0 volt, transistor QS is cut off and a +5-volt output is coupled through resistor R25 to the load.

Type RCVR-2 designations	Components					
F	R22	R23	R24	R25	CR2	Q8
G	R26	R27	R28	R29	CR3	Q9

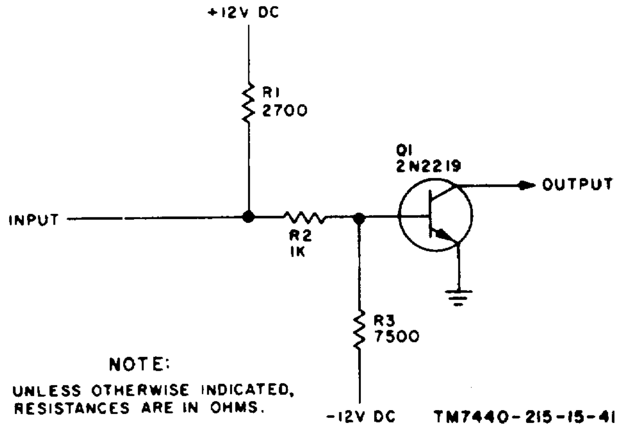


Figure 3-41. Type XMTR-2 interface transmitter, schematic diagram.

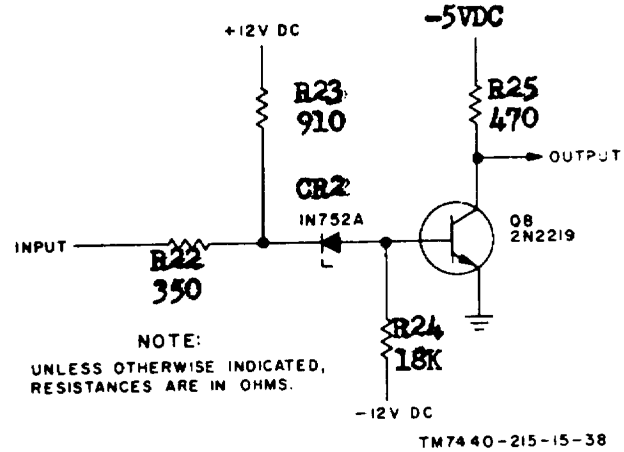


Figure 3-42. Type RCVR-2 interface receiver, schematic diagram.

CHAPTER 4

MAINTENANCE INSTRUCTIONS

Section I. PREVENTIVE MAINTENANCE

4-1. Scope of Maintenance

a. This chapter includes instructions for performing preventive and corrective maintenance procedures on all major assemblies, subassemblies, and components (except printed circuit cards) of the page printer. Refer to chapter 5 for information on troubleshooting and repair of the printed circuit cards.

b. Maintenance of the page printer includes the following:

(1) Preventive maintenance (para 4-3 through 4-11).

(2) Lubrication (para 4-12 through 4-15).

(3) Troubleshooting (para 4-16 through 4-18).

(4) Removal and replacement (para 4-19 through 4-95).

(5) Repair and adjustments (para 4-96 through 4-115).

4-2. Tools, Materials, and Test Equipment Required

a. Tools and Test Equipment. Refer to appendix C, maintenance allocation chart for a list of the tools and test equipment required for maintenance of the page printer.

b. Materials. The following maintenance materials are required in addition to the maintenance materials furnished as part of the tool kits listed in appendix C:

(1) Cloth, lint-free, cleaning, NSN 8305-00267-3015.

(2) Sandpaper, fine, No. 0000, NSN 5350-00235-0124.

(3) Primer; zinc chromate, FED SPEC TT-P664, NSN 8010-00-936-8372 (pt).

(4) Lacquer, semigloss, blue (No. 25184, per FED STD 595), NSN 8010-00-721-9753 (pt).

(5) Enamel, semigloss, gray (No. 26492, per FED STD 595), NSN 8010-00-087-0109 (qt).

(6) Enamel, semigloss, black (No. 27038, per FED STD 595), NSN 8010-00-844-4792 (qt).

(7) Trichloroethane, FED SPEC O-T-620, Type 1, NSN 6810-00-292-9625 (qt), or NSN 6810-00-664-0387 (gal).

(8) Compound, silicone (heat sink), Dow Corning 340, NSN 6850-00-181-6995 (2 oz), or NSN 6850-00-927-9461 (5 oz).

(9) Sealing Compound, retaining LOCTITE Grade E), NSN 8030-00-081-2328 (50 cc).

(10) Adhesive (GLYPTAL 1153), NSN 597000-162-7523 (pt).

(11) Oil, lubricating, instrument, MIL SYMB 0-147 (equiv. Boyle Midway Div. 3-in-1 oil), NSN 9150-00-257-5449 (4 oz spout can).

(12) Grease, extrement pressure, MIL SYMB VV-C-632, Type B, Grade 2, (equiv. Chicago Mfg. & Dist. Co. Lube No. 3), NSN 9150-00-753-4649 (8 oz tube).

(13) Grease, MIL SYMB G-354, (equiv. ESSO Beacon Co. 325), NSN 9150-00-985-7246 (1 lb).

(14) Brush, type cleaning, NSN 7510-00550-8446.

(15) Compound, anti-static and cleaner, STATNOL, NSN 6850-00-882,6690.

4-3. Preventive Maintenance

a. Preventive maintenance is the systematic care, inspection, lubrication, and servicing of the page printer to maintain it in serviceable condition, to prevent breakdowns, and to assure maximum operational capability. Preventive maintenance includes the inspection, testing, and replacement of parts, subassemblies, or units that inspection and tests indicate would probably fail before the next scheduled periodic service.

b. The preventive maintenance checks and services charts (para 4-4 and 4-6) outline functions necessary to maintain the page printer in good operating condition. The charts indicate what to check, how to check, and what the normal conditions are; the references column lists the illustrations, paragraphs, or manuals that contain detailed maintenance procedures.

c. Monthly preventive maintenance periods are defined as approximately 30 calendar days of 8 hours a day operation. If the page printer is operated 16 hours a day, the monthly preventive maintenance checks and services should be performed at 15-day intervals. Adjustment of the preventive maintenance interval should be made to compensate for any unusual operating conditions.

d. Special cleaning procedures required for maintenance of the page printer are described in paragraphs 4-10 and 4-11.

e. If the page printer is in a standby (ready for immediate operation) status, the preventive maintenance checks and services listed in paragraph 4-4 must be performed monthly.

f. Records and reports of the preventive maintenance checks and services must be made in accordance with the requirements of the documents listed in paragraph 1-3*a*.

4-4. Weekly and Monthly Preventive Maintenance Checks and Services Chart

(W) Weekly: (M) Monthly

Sequence No.	Freq.	Item	Procedure	Paragraph reference
1.	M	Surface of hammer modules	Clean	4-9.1
2.	M	Print roll	Clean	4-11
3.	W	Clutch and brake	Clean	4-11.1
4.	W	Code disc	Clean	4-10
5.	M	Code disc	Clean and spray	4-10
6.	W	Diode block face	Clean	4-10
7.	W	Cabinet filters	Clean	4-9
8.	M	Tractor chain	Check and adjust	4-105-4-108
9.	M	Flat and vee velts	Check for wear and tension; replace or adjust if necessary.	4-117-4-119
10.	M	Ribbon feed belt	Check for wear and tension; replace or adjust if necessary.	4-27

4-5. Two-Month Preventive Maintenance Checks and Services

Check print-out and hammer penetration of the hammer module, and adjust as described in paragraphs 4-104, 4-110, 4-115, and 4-120.

4-6. (Deleted)

4-7. Six-Month Preventive Maintenance Checks and Services

Disassemble, clean, and reassemble the alternator (para 4-52). Do not remove the bearings during preventive maintenance.

4-8. Two-Year Preventive Maintenance Checks and Services

Replace the feed clutch and brake assemblies as described in paragraph 4-27 and adjust (para 4-116). Lubricate print head (para 4-14).

4-9. Cleaning and Touchup

a. External and Internal Cleaning. Use a vacuum cleaner, a dry brush, or a lint-free cloth to clean the exterior and interior of the page printer. Clean the filters at the lower front and rear of cabinet (8, fig. 4-6 and 4, fig. 4-41, respectively) weekly with a vacuum cleaner. Roll the page printer mechanism forward from the cabinet to provide access to the filters near the muffin fans on the rear of the cabinet. Remove the screws that secure the grill to the front of the cabinet and remove the grill to provide access to the filters in front of the cabinet.

CAUTION

Failure to clean the cabinet filters regularly will result in equipment failure and excessive corrective maintenance.

WARNING

Prolonged breathing of cleaning compound is dangerous. Provide adequate ventilation. Cleaning compound is flammable; do not use it near a flame.

b. Cleaning Compound. Use a cloth slightly moistened with cleaning compound to clean hard-to remove dirt and oil or grease deposits; wipe the cleaning compound from the surfaces with a clean, dry cloth.

c. Electrical Contacts. Use a flushing action to clean electrical contacts. Dip an orangestick in cleaning compound and allow the liquid to drip from the stick through the contacts to a piece of cloth below. Remove the cleaning compound carefully with a clean, dry cloth.

d. Touchup Painting Instructions. Remove rust and corrosion from metal by lightly sanding the surface with No. 0000 sandpaper. Brush two coats of paint on bare metal to protect it from further corrosion.

CAUTION

Do not apply paint to the metal surface directly under a ground terminal; a clean, bare metal surface is required for a good electrical ground lead connection.

4-9.1 Hammer Module Cleaning Procedure

a. Roll the page printer mechanism forward from the cabinet.

b. Remove printer top cover (250, fig. 4-11).

c. Push yoke release down, then hold hammer module assembly and release bellcrank stop assembly (299-303, fig. 4-11).

d. Clean hammer modules (para. 4-9).

e. Reassemble components in reverse sequence.

4-10. Code Disk Cleaning Procedure

a. Remove the code disk (117, fig. 4-11).

CAUTION

When handling the code disk, be careful to avoid scratching the emulsion side of the disk. Do not use water to wash disk.

b. Inspect the code disk for scratches, cracks, and bends. Replace the code disk, if defective.

c. If the code disk is not defective, use a clean, lint free cloth to lightly clean the surfaces of the code disk. Lightly wipe dust from face of diode block of signal code subassembly (134).

d. Place the code disk on a clean piece of paper. Spray one side of the disk with anti-static and cleaner compound, and then gently rub that side with a clean, lint-free cloth to lightly clean its surfaces. Repeat for the other side. Respray the code disk, letting each side dry for 10 minutes.

e. Reinstall code disk carefully. Turn code disk clockwise until the code disk spacer pin (118) touches the side of the guide hole in the code disk. Then tighten the socket screw (115).

NOTE

Code disk cleaning can be reduced considerably if the clutch field wire notch in the clutch housing (207) is sealed from the dust generated by the clutch rotor (13). Notch, which is located on the left side of the clutch housing, is sealed by inclosing the opening with Press Kleen Typewriter Cleaner, NSN 7510-00-285-1745. This sealing material is nondrying, reusable, easily removed and replaced.

4-11. Print Roll and Ribbon Guide Cleaning Procedure

a. Roll the page printer mechanism forward from the cabinet.

b. Remove screws (247 and 248, fig. 4-11) and lift off printer top cover (250).

c. Lower hammer module assembly by releasing yoke handle and while supporting hammer module assembly, lifting bellcrank stop.

d. Remove paper tearoff cover assembly (74).

e. Remove screws (103), washers (104), and cover (105).

WARNING

Prolonged breathing of cleaning compound (f and g below) is dangerous. Provide adequate ventilation. Cleaning compound is flammable; do not use it near a flame.

f. Use a toothbrush-type brush and cleaning compound to scrub the print roll thoroughly. Make sure all characters are clean; wipe them with a clean, dry, lint-free cloth.

g. Use a cloth moistened with cleaning compound to thoroughly clean the ribbon guide post (68); wipe with a clean, dry cloth.

4-11.1 Paper Feed Clutch and Brake Cleaning Procedures

a. Open the two (2) access covers (37 and 310, fig. 4-11) located on the front corners of the print head assembly side frames.

b. Place vacuum cleaner hose nozzle over the exposed holes in the side frames thus cleaning the dust out of the clutch and brake assembly dust containers (236 and 317, fig. 4-11).

c. After cleaning, position the access covers to close the dust exhaust tubes.

4-11.2 Alternator Cleaning Procedure

a. Remove the alternator (421, fig. 4-11) and disassembly in accordance with paragraph 4-52.

WARNING

Prolonged breathing of cleaning compound is dangerous. Provide adequate ventilation. Cleaning compound is flammable; do not use it near a flame.

b. Wipe the exterior of the alternator with a clean, dry cloth. If necessary, use cleaning compound to remove accumulated dirt, dust, and oil.

c. If dirt accumulation on the windings is especially heavy or electrically conductive, vacuum clean the windings.

d. Clean the windings with compressed air. Use 40 to 60 psi, and do not blow the air directly on the windings.

e. Reassemble the alternator (para 4-52).

4-12. (Deleted)

4-13. Methods of Applying Lubricants

a. Grease. Hold the grease gun so that the nozzle forms an angle of 45° with the part to be lubricated. Operate the handle of the grease gun until grease is ejected.

b. Oil. Use a syringe or a piece of wire to apply oil to parts that require a small amount of oil. If a wire is used, dip the wire approximately 1/2 inch into the oil to collect a small amount on the end of the wire; then touch the wire to the lubrication point to apply the oil. This method permits closer control over the amount of oil applied to these points and prevents over-lubrication.

Caution: After lubrication, always wipe away all excess lubricant. The presence of excess lubricant is a common cause of damage to wire insulation and other nonmetallic parts.

4-14. Lubrication of Print Head Assembly

The points to be lubricated and the quantity of lubricant to be applied are listed in the chart below. The item numbers listed in the chart correspond to the item numbers on the figures being referenced.

NOTE: Lubricate the print head assembly every 2 years (avg opn 8-hrs per day) or more frequently for more than 8-hrs per day operation. Also, whenever the print head assembly is disassembled for either corrective or preventive maintenance, check each lube point and add lube as req'd.

Fig. No.	*Item No.*	*Name of part*	* *Lubricant, method and quantity*
4-1	1	Left-hand yoke of module plate yoke subassembly.	Fill groove of inside diameter of large (3-1/8-in.) hole in yoke with grease, Esso-Beacon No. 325.
4-1	2	Follower assembly and gear assembly.	Apply lubricant, CMD Lube No. 3 sparingly to cam edge of follower assembly and to cam surface of gear assembly.
4-1	3	Cam gear of ribbon feed assembly.	Apply small amount of Esso-Beacon No. 325 grease to teeth of cam gear.
4-1	4	Wear plats	Apply light film of Esso-Beacon No. 326 grease to cam working surface of wear plate.
4-1	5	Sensing ring	Apply Esso-Beacon No. 325 grease sparingly to mounting surface of sensing ring.
4-1	6	Bearing retainer	Apply light film of 3-in-1 oil to inside diameter of bearing retainer before installing bearing.
4-2	1	Right-hand yoke of mode plate subassembly.	Fill groove of inside diameter of large (31/8-in.) hole in yoke with Esso-Beacon No. 325 grease.
4-2	2	Clevis pin, rear yoke open rod, and bellcrank.	Apply CMD Lube No. 3 sparingly to body of clevis pin, to bearing hole of rear yoke open rod and to bellcrank.
4-2	3	Yoke open pin, yoke open block, front yoke open rod, and rear yoke open stud.	Apply CMD Lube No. 3 sparingly to outside diameter of small end of yoke open pin, to inside 7/16-inch diameter of yoke open block, in hole on end of front yoke open rod, in pin mating hole of front yoke open rod, and to small end of yoke open rear rod.
4-2	4	Drive gear	Apply small amount of Esso-Beacon No. 325 grease to teeth of drive gear.
4-2	5	Bearing retainer	Apply light film of 3-in-1 oil to inside diameter of bearing retainer before installing bearing.
4-2	6	Strobe disc hub	Apply light film of Esso-Beacon No. 325 grease to each end of strobe disc hub before assembly.

NOTE: Cheek each of the above lubrication points quarterly, or at 500operating hour intervals, whichever occurs first; add lubricant as required. DO NOT OVERLUBRICATE.

* Where commercial lubricant is indicated, refer to paragraph 4-2 for National Stock Number or military equivalent.

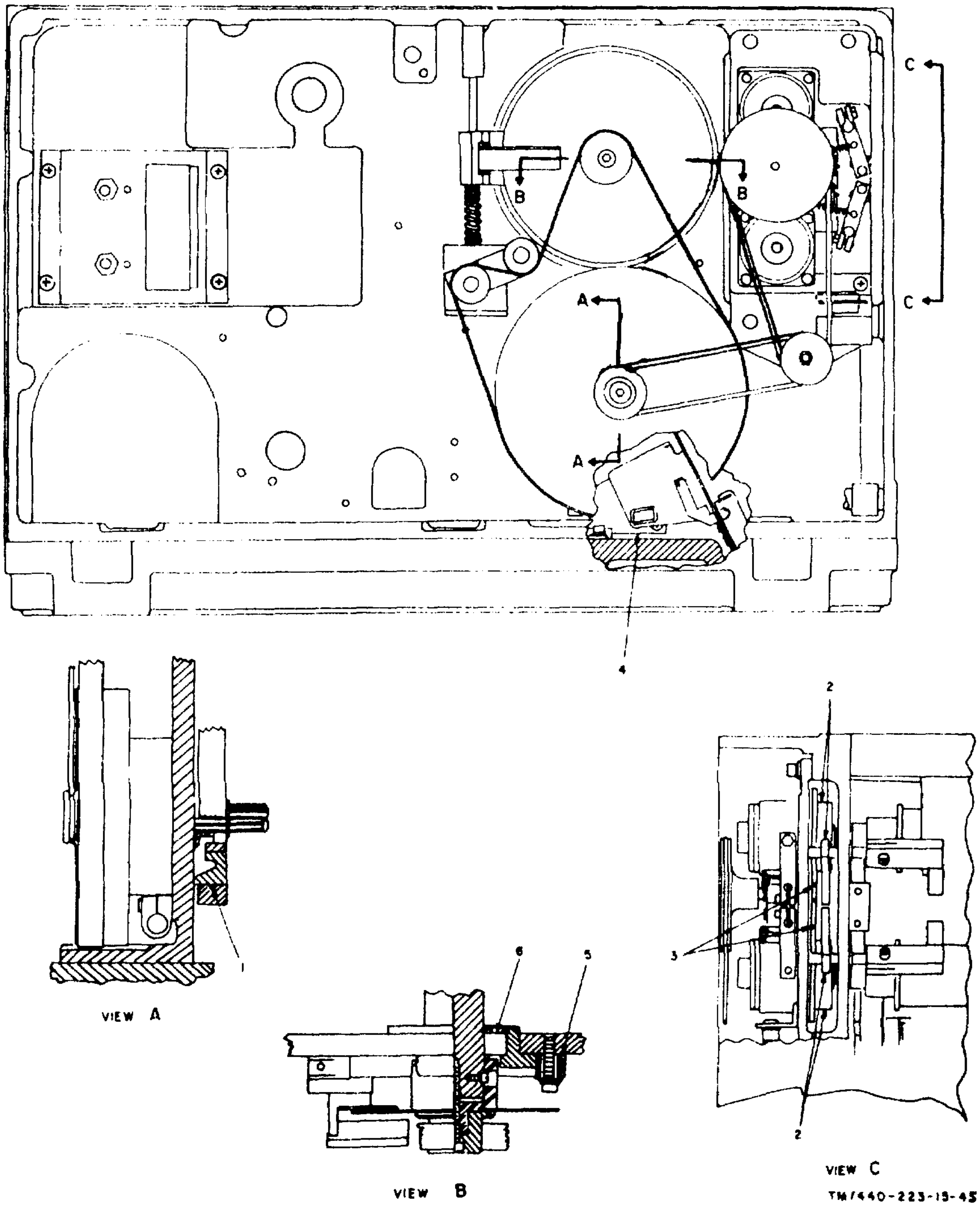


Figure 4-1. Left side of print head assembly showing lubrication points.

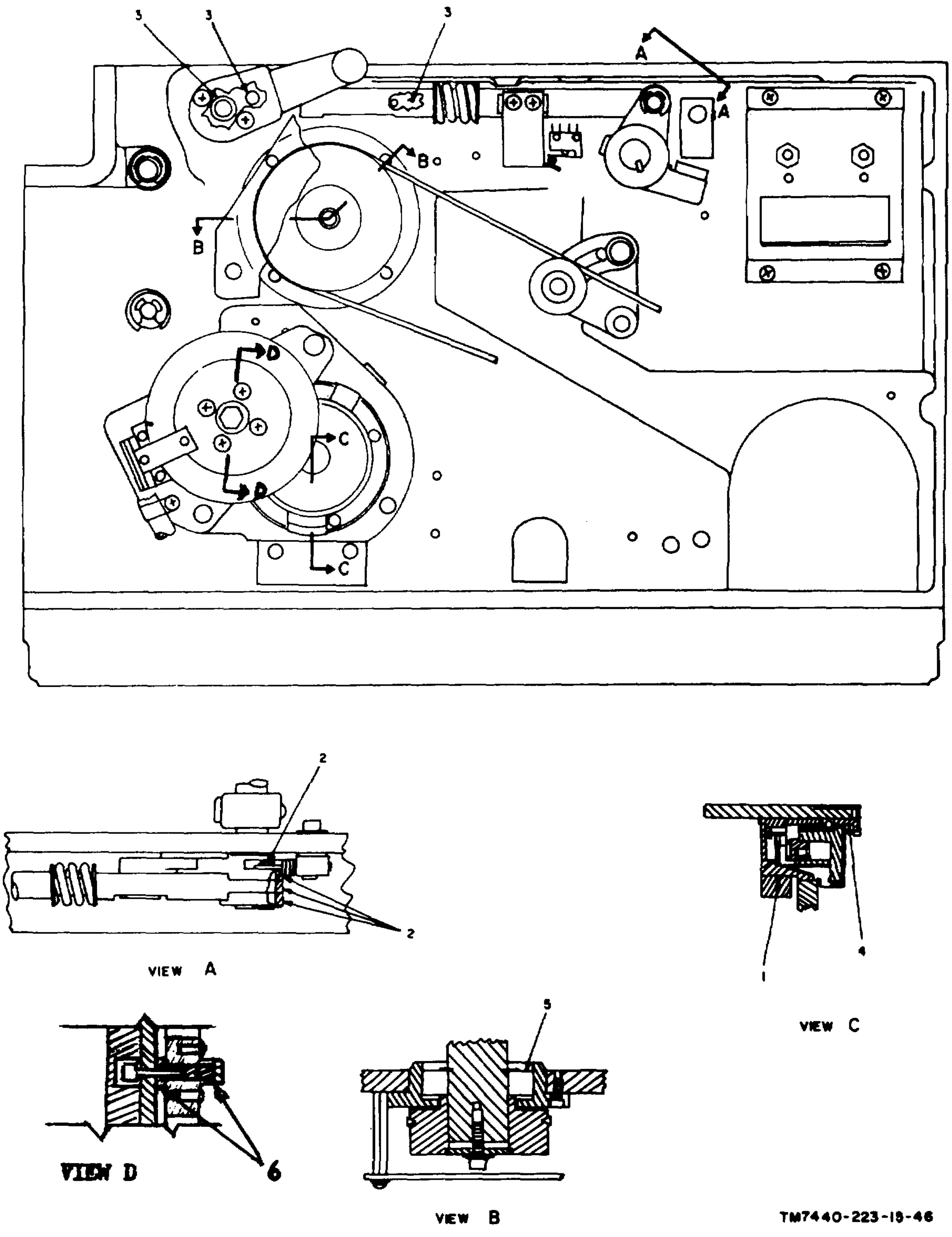


Figure 4-2. Right side of print head assembly showing lubrication points.

4-15. Lubrication of Heat Sink Assembly Rectifiers

Whenever installing silicon rectifiers in the heat sink assembly, apply a light film of Dow Corning DC 340 silicone grease to the indicated surfaces (1 fig. 4-3).

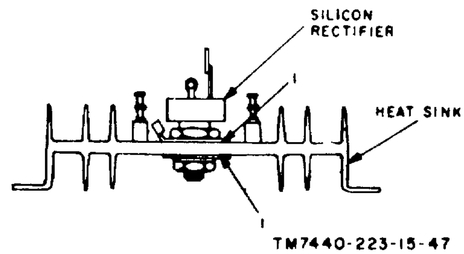


Figure 4-3. Heat sink assembly grease application points.

Section II. TROUBLESHOOTING

4-16. Use of Troubleshooting Data

Troubleshooting information for the page printer is given in the page printer troubleshooting chart (para 4-17). When a particular trouble symptom is observed, the particular trouble or troubles can be corrected by replacing one or more of the components listed in the *checks and corrective measures* column. First check resistors, capacitors, relays, and other nonplug-in electrical or mechanical components before replacing the component When a PC card trouble is suspected, check the PC card by substituting a new card. Always recheck the page printer operation after repairs or replacements are performed.

4-17. Page Printer Troubleshooting Chart

Item No.	*Trouble symptom*	*Probable trouble*	*Checks and Corrective measures*
1	*Print head assembly* A2A1.	(1.1) Clutch limiter controls adj.	(1.1) Adj (para 4-116).
		(1.2) Tractor Chain mech adj	(1.2) Para 4-105 thru 4-108.
	a. Loss of ribbon feed.	(1) Defective forward ribbon coil A2A1A1L1.	(1) Replace coil.
		(2) Defective forward ribbon coil diode.	(2) Replace diode.
		(3) Defective rewind ribbon coil A2A1A1L2.	(3) Replace coil.
		(4) Defective rewind ribbon coil diode.	(4) Replace diode.
		(5) Defective forward sensing switch A2A1A1S1.	(5) Replace switch.
		(6) Defective forward sensing switch network.	(6) Replace network.
		(7) Defective rewind sensing switch A2A1A1S2.	(7) Replace switch.
		(8) Defective rewind sensing switch network.	(8) Replace network.
		(9) Loose or defective ribbon feed belt.	(9) Tighten or replace belt.
		(10) Defective ribbon feed connector.	(10) Replace connector.
		(11) Defective ribbon feed mechanism.	(11)Replace mechanism.
		(12) Paper and ribbon control.	(12) Replace PC card A1.
	b. Loss of paper feed.	(1) Dirty paper feed clutch or brake.	(1) Clean (para 4-11.1.
		(1.1) Clutch limiter controls adj.	(1.1) Adj (para 4-116
		(1.2) Tractor Chain mech adj	(1.2) Para 4-105
		(2) Defective paper feed clutch mechanism.	(2) Replace mechanism.
		(3) Defective left-hand tractor mechanism.	(3) Replace mechanism.
		(4) Defective right-hand tractor mechanism.	(4) Replace mechanism.
		(5) Defective paper feed clutch variable resistor A2A13R2.	(5) Replace resistor.
		(6) Defective paper feed clutch variable resistor A2A13R3.	(6) Replace resistor.
		(7) Defective paper feed clutch resistor	(7) Replace resistor.
		(8) Defective paper feed clutch resistor A2A1A3R4.	(8) Replace resistor.

Item No.	Trouble symptom	Probable trouble	Checks and Corrective measures
1 (cont)		(9) Defective paper feed clutch resistor A2A1L1RS.	(9) Replace resistor.
		(10) Defective paper feed clutch resistor A2A1L1R6.	(10) Replace resistor.
		(11) Loose or defective paper feed belt.	(11) Tighten or replace belt.
		(12) Defective paper feed belt idler.	(12) Replace idler.
		(13) Defective paper feed clutch coil A2A1L1.	(13) Replace coil.
	c. Erratic paper feed.	(1) Dirty paper feed clutch or brake.	(1) Clean (para 4-11.1)
		(1.1) Clutch limiter control adj.	(1.1) Para 4-116.
		(1.2) Brake limiter control adj.	(1.2) Para 4-116.
		(1.3) Tractor chain mechanical adj.	(1.3) Para 4-105-108
		(2) Defective paper feed brake coil A2A1L1.	(2) Replace coil.
		(3) Defective paper feed brake mechanism.	(3) Replace mechanism.
		(4) Defective paper feed brake variable resistor A2A1A4R2.	(4) Replace resistor.
		(5) Defective paper feed brake variable resistor A2A1A4RS.	(6) Replace resistor.
		(6) Defective paper feed brake resistor A2A1A4R1.	(6) Replace resistor.
		(7) Defective paper feed brake resistor A2A1MR4.	(7) Replace resistor.
		(8) Defective paper feed brake resistor A2A1A4R5.	(8) Replace resistor.
		(9) Defective paper feed brake resistor A2A1A4R6.	(9) Replace resistor.
		(10) Defective strobe gear or strobe disk.	(10) Replace gear or disk.
		(11) Defective strobe disk contact pin on strobe lamp assembly A2A1A6DS1.	(11) Replace pin.
		(12) Defective strobe disk sensor assembly A2A1A5.	(12) Replace sensor.
		(13) Defective strobe disk lamp assembly A2A1A6DS1.	(13) Replace lamp.
		(14) Defective strobe disk sensor connector A2A1J21.	(14) Replace connector.
	d. One column printing dark or light.	(1) Improper hammer penetration.	(1) Adjust para. 4-121
		(2) Loose taper pin contact on connector J1.	(2) Tighten contact.
	e. One column printing high or low.	e. Hammer striking early or late.	e. Adjust para 4-114.
	f. All hammers printing dark or light.	f. Improper hammer penetration.	f. Turn knurled knobs on upper left or right side of printer as required,
	g. All hammers printing high or low.	g. Hammers striking early or late.	g. Adjust para (4-115).
	h. Smudged characters.	(1) Dirty print drum.	(1) Clean (para 4-11).
		(2) Improper hammer penetration.	(2) Adjust para 4-121
		(3) Defective hammer module.	(8) Replace module.
		(4) Defective print drum.	(4) Replace drum,
	i. Complete loss of one column.	(1) Loose taper pin contact on connector J1.	(1) Tighten contact
		(2) Improper hammer penetration.	(2) Adjust para 4-121
		(3) Defective hammer coil.	(3) Replace hammer module,
		(4) Defective print drum.	(4) Replace drum.
	j. PRINT FAIL indication.	(1) Yoke open.	(1) Close yoke.
		2 Print fuse F1-F32	(2) Check for proper seating and insure contacts are not-bent.
		(3) Defective code disk sensor assembly A2A1A7.	(3) Replace sensor.
		(4) Defective yoke open switch A2A1S1.	(4) Replace switch.
		(5) Defective print roll belt.	(5) Replace belt
		(6) Defective print roll belt idler.	(6) Replace idler.

Item No.	Trouble symptom	Probable trouble	Checks and Corrective measures
1 (cont)		(7) Defective code disc contact pin on code disk lamp assembly A2A1A8DS1.	(7) Replace pin.
		(8) Defective code disk lamp assembly A2A1A8DS1.	(8) Replace lamp.
		(9) Defective code disk sensor connector A2A1J22	(9) Replace connector.
		(10) Defective yoke subassembly.	(10) Replace yoke.
		(11) See item No. 2g.	(11) See item No. 2g.
	k. No air flow.	(1) Defective fan A2A1B2.	(1) Replace fan.
		(2) Defective fan A2A1B3.	(2) Replace fan.
	l. Power loss.	(1) Defective filter A2A1FL1.	(1) Replace filter.
		(2) Defective filter A2A1FL2.	(2) Replace filter.
		(3) Defective alternator belt.	(3) Replace belt.
		(4) Defective drive motor.	(4) Replace motor.
		(5) Defective alternator.	(5) Replace alternator.
		(6) Defective alternator belt idler.	(6) Replace idler.
	m. Noisy operation.	(1) Defective left-hand side frame bushing.	(1) Replace bushing.
		(2) Defective right-hand side frame bushing.	(2) Replace bushing.
	n. Loss of print-out.	(1) Defective ribbon mandrel extension spring.	(1) Replace spring.
		(2) Defective paper-out connector A1A2J1.	(2) Replace connector.
		(3) Defective paper-out switch A2A1A2SW1.	(3) Replace switch.
2	*Electronic assembly A2A2.*		
	a. Paper slewing.	(1) Blown fuse F36.	(1) Replace fuse.
		(2) Defective paper and ribbon PC card.	(2) Replace PC card A1 (No. 56730).
		(3) Tractor chain.	(3) Check adjustments (para 4-105 through 4-108).
	b. Erratic paper or ribbon feed.	b. Defective paper and ribbon PC card.	b. Replace PC card Al (No. 56730).
	c. Partial loss of print-out.	(1) Blown fuse F1 through F32.	(1) Replace fuse.
		(2) Defective resistor R1 through R32.	(2) Replace resistor.
		(3) Defective hammer driven matrix PC card.	(3) Replace PC card A2 through A9 (No. 56731).
		(4) Defective connector J1 through J6.	(4) Replace connector.
		(5) Hammer drive matrix.	(5) Replace applicable PC card (A2 through A9).
	d. Power loss.	(1) Defective sequencer B PC card.	(1) Replace PC card A11 (No. 56735).
CAUTION: Remove AC voltage from Page Printer before removing PC Cards A11, A12 or A14.		(2) Defective sequencer A PC card.	(2) Replace PC card A12 (No. 56734).
		(3) Defective voltage regulator PC card.	(3) Replace PC card A14 (No. 656736).
		(4) See item No. 3.	(4) See item No. 3.
	e. Parity errors or printing errors.	(1) Defective interface B PC card.	(1) Replace PC card B1 or B2 (No. 56733).
		(2) Defective decode and parity PC card.	(2) Replace PC card B6 (No. 56725).
	f. Improper communication with CCU.	(1) Defective interface B PC card.	(1) Replace PC card B1 or B2 (No. 56733).
		(2) Defective interface A PC card.	(2) Replace PC card B6 (No. 66732).
	g. PRINT FAIL indication.	(1) Defective connector J6.	(1) Replace connector.
		(2) Defective compare and restore PC card.	(2) Replace PC card B4 (No. 56727).
		(3) Defective paper and ribbon PC card.	(3) Replace PC card Al (No, 56730).
		(4) Defective sequencer B PC card.	(4) Replace PC card All (No. 56735).

Item No.	*Trouble symptom*	*Probable trouble*	*Checks and Corrective measures*
2 (cont)		(5) Defective run control PC card.	(5) Replace PC card B8 (No. 66721).
		(6) Defective load and line control PC card.	(6) Replace PC card B9 (No. 56724).
		(7) Defective print address PC card.	(7) Replace PC card B12 (No. 56729).
		(8) Defective print control PC card.	(8) Replace PC card B13 (No. 66728).
		(9) See item No. 1j.	(9) See item No. lj.
	h. Improper format.	(1) Defective decode and parity PC card.	(1) Replace PC card B6 (No. 56725).
		(2) Defective function control PC card.	(2) Replace PC card B11 (No. 66723).
	i. Improper control response.	(1) Defective control interface PC card.	(1) Replace PC card B7 (No. 56720).
		(2) Defective message control PC card.	(2) Replace PC card B10 (No. 56722).
		(3) Defective function control PC card.	(3) Replace PC card B11 (No. 56723).
	j. Improper print-out.	(1) Defective compare and restore PC card.	(1) Replace PC card B4 (No. 56727).
		(2) Defective 7X32 SR storage PC card.	(2) Replace PC card B5 (No. 56726).
		(3) Defective print address PC card.	(3) Replace PC card B12 (No. 56729).
	Misprints an entire zone in local test.	Defective PC card B13	Replace PC card B13
	k. Loss of paper feed or ribbon feed.	(1) Blown fuse F34, F36, or F86.	(1) Replace fuse.
		(2) Defective resistor R356 or R36.	(2) Replace resistor.
		(3) Defective connector J6.	(3) Replace connector.
	l. Improper control response to operator panel switches or improper indicator display.	(1) Defective connector J6.	(1) Replace connector.
		(2) Defective run control PC card.	(2) Replace PC card B8 (No. 66721).
		(8) Defective function control PC card.	(8) Replace PC card B11 (No. 56723).
	m. Loss of manual reset.	(1) Defective switch S9.	(1) Replace switch.
		(2) Defective connector J8.	(2) Replace connector.
		(3) Defective control interface PC card.	(3) Replace PC card B7 (No. 66720).
	n. Loss of margin control	(1) Defective switch 510.	(1) Replace switch.
		(2) Defective connector J8.	(2) Replace connector.
		(3) Defective paper and ribbon PC card.	(3) Replace PC card A1 (No. 66730)
		(4) Defective function control PC card.	(4) Replace PC card B11 (No. 66723).
	o. Loss of line feed selection.	(1) Defective switch S11.	(1) Replace switch.
		(2) Defective connector J8.	(2) Replace connector.
		(3) Defective load and line control PC card.	(3) Replace PC card B9 (No. 56724).
		(4) Defective function control PC card.	(4) Replace PC card B11 (No. 56728).
	p. Erroneous printing In LOCAL TEST mode.	(1) Defective bit switch on maintenance test panel.	(1) Replace switch.
		(2) Defective connector J8.	(2) Replace connector.
		(3) Defective decode and parity PC card.	(3) Replace PC card B6 (No. 56725).
3	*Power supply electronics.*	(No. 72	
	a. Power loss.	(1) Defective power supply rectifier unit fuses.	(1) Replace fuses.
		(2) Defective power supply rectifier unit fuseholder.	(2) Replace fuseholders.
		(3) Defective ac controller relay A2A4A1K1.	(8) Replace relay.

Item No.	*Trouble symptom*	*Probable trouble*	*Checks and Corrective measures*
3 (cont)		(4) Defective ac controller transformer A2A4A1T1.	(4) Replace transformer.
		(5) Defective radio interference filter A2A4A1FL1.	(5) Replace filter.
		(6) Defective radio interference filter A2A4A1FL2.	(6) Replace filter.
		(7) Defective feed-through filter A2A4AIFL3.	(7) Replace filter.
		(8) Defective feed-through filter A2A4A1FL4.	(8) Replace filter.
		(9) Defective capacitor bank A2A2A1C1 through C6 assembly.	(9) Replace capacitor
		(10) Defective power supply rectifier unit inductors A2A2A2L1 through L9.	(10) Replace inductors.
		(11) Defective power supply rectifier unit bridge A2A2A2CR1 through CR5.	(11) Replace bridges.
		(12) Defective power supply rectifier unit resistors A2A2A2R1 through R12.	(12) Replace resistors.
		(13) Defective power supply rectifier unit SCR A2A2A2CR6 through CR9.	(13) Replace SCR.
		(14) Defective power supply rectifier unit connectors A2A2A2J1 through J3.	(14) Replace connectors.
		(15) See item No. 2d.	(15) See item No. 2d.
	b. Erratic meter indication.	(1) Defective -48V meter A2A2A2M1.	(1) Replace meter.
		(2) Defective meter board.	(2) Replace meter board.
	c. Excessive ripple on power. (more than 10%)	(1) Defective power supply rectifier unit capacitor A2A2A2C1 through C7.	(1) Replace capacitors.
		(2) Defective power supply rectifier unit in-ductors A2A2A2L1 through L9.	(2) Replace inductors.
		(3) Defective power supply rectifier unit resistors A2A2A2R1 through R6.	(3) Replace resistors.
	d. Low indication on CAPACITOR BANK STATUS meter.	(1) Defective meter	(1) Refer to 3b above.
		(2) Defective meter board.	(2) Refer to 3b above.
		(3) Defective capacitors.	(3) Refer to 3a above.
		(4) Defective charging electronics	(4) Refer to 3a above.
4	*Cabinet.*		
	a. No indicator display.	(1) Defective PRINT FAIL indicator DC8.	(1) Replace indicator.
		(2) Defective NOT ASSIGNED indicator DS4.	(2) Replace indicator.
		(3) Defective PAPER LOW indicator DS5.	(3) Replace indicator.
		(4) Defective PAPER FAIL indicator DS6.	(4) Replace indicator.
		(5) Defective PARITY ERROR indicator DS7.	(5) Replace indicator.
		(6) Defective DC POWER indicator DS9.	(6) Replace indicator.
		(7) Defective START switch-indicator DS3.	(7) Replace switch-indicator.
		(8) Defective STOP switch-indicator DS2.	(8) Replace switch-indicator.
		(9) Defective LOCAL TEST switch-indicator DS1.	(9) Replace switch-indicator.
		(10) Defective AC POWER switch-indicator DC10.	(10) Replace switch-indicator.
	b. No cable take-up.	b. Defective cable retractor extension spring.	b. Replace spring.
	c. Improper panel in-dication.	c. Defective diodes CR1 through CR18.	c. Replace diodes.
	d. Improper control re-ponse.	(1) Defective START switch SW3.	(1) Replace switch.
		(2) Defective STOP switch SW2.	(2) Replace switch.
		(3) Defective LOCAL TEST switch SWI.	(3) Replace switch.
		(4) Defective AC POWER switch SW5.	(4) Replace switch.
		(5) Defective LINE FEED switch SW7.	(5) Replace switch.
		(6) Defective FORM FEED switch SW8.	(6) Replace switch.
		(7) Defective AUDIBLE RESET switch SW4.	(7) Replace switch.

Item No.	Trouble symptom	Probable trouble	Checks and Corrective measures
4 (cont)	*e.* Improper LAMP TEST operation.	(1) Defective LAMP TEST switch SW6.	(1) Replace switch.
		(2) Defective capacitor C1.	(2) Replace capacitor.
		(3) Defective resistor R1.	(3) Replace resistor.
	f. No air flow.	(1) Defective fan A1A1B1.	(1) Replace fan.
		(2) Defective fan A1ASB2.	(2) Replace fan.
	g. Power loss.	(1) Defective AC POWER switch-indicator DS10.	(1) Replace switch-indicator.
		(2) Defective ac line filter A1A2FL1.	(2) Replace filter.
		(3) Defective ac line filter A1A2FL2.	(3) Replace filter.

4-18. Troubleshooting Reference Data

a. Illustrations. Illustrations that will help maintenance personnel to troubleshoot the page printer are referenced in the chat below:

Figure No.	*Figure description*
8-1	MIL-STD resistor color code chart
8-2	MIL-STD capacitor color code chart.
8-3	Page printer, interconnection diagram
8-4	Control panel, schematic diagram
8-5	Test panel, schematic diagram
8-6	Ac circuits, schematic diagram
8-7	Dc circuits, schematic diagram
8-8	Print head, schematic diagram
8-9	Power supply, schematic diagram
8-10	Fuse and resistor, schematic diagram
8-11	Paper low switch, schematic diagram
8-38	Test point waveforms

b. Test Point Data. Test point data is provided to assist in isolation of logic circuitry faults. This data consists of waveforms (fig. 8-38) measured at test points TP1 through TP40 on PC card BO and a chart which identifies the PC card most likely to be the source of trouble when the proper waveform is not obtained at a test point. The chart also includes the name of the signal measured at each test point to aid in tracing the line through the logic diagrams in chapter 8, if necessary.

NOTE

Refer to fig. 8-9 for required voltages ($\pm$6 percent) at power supply test points for all voltages except the 12Vdc sequence control voltage (TP6-7) which should be $\pm$2 volts

Test point	PC card	Signal name
TP1	B10	(-) FULL EXIT PC END
TP2	B9	(-) LOAD DATA
TP3	B13	(-) PRINT SHIFT
TP4	B8	(+) CLEAR
TP5	B12	(-) ZONE 1
TP6	B13	(+) PC
TP7	B12	(-) ZONE 3
TP8	B4	(-) RESTORE-T
TP9	B4	(-) CW CLOCK
TP10	B12	(+) ZONE DELAY
TP11	B9	(-) INHIBIT LOAD DATA
TP12	B9	(+) START BLOCK OUT
TP13	B9	(+) DATA REQ OUT
TP14	B13	(-) SCAN SHIFT
TP15	B4	(-) RESTORE-1
TP16	B6	(+) MR-1
TP17	B7	STOP SW
TP18	B3	(+) SELIN
TP19	B5	(+) T-REG-1
TP20	B10	(+) ST END
TP21	B11	(-) CR FF
TP22	B10	(+) 81 END
TP23	B18	(+) EOMPARE
TP24	B8	(+) ST IN
TP25	B9	(-) LF STR PULSE
TP26	B9	(+) TEST STROBE
TP27	B4	(+) DATA IN MEMORY
TP28	B1	(+) CL IN
TP29	B10	(+) SEL
TP30	B11	(-) ENTER PC
TP31	B11	(-) FEED
TP32	B12	COCK 8
TP33	B12	(-) ZONE 2
TP34	B13	(+) FIRE
TP35	B11	(+) INHIBIT DATA REQ
TP36	B12	(+) GROUP 24
TP37	B11	(-) ENABLE FUNCTION
TP38	B10	(+) IN PROCESS
TP39	B11	(+) LF FF
TP40	B13	(+) EXIT PRINT
TP41		GROUND

c. Wire Run Lists. Refer to chapter 8 (table 8-1) for wire run lists for the following assemblies:

(1) Logic and control assembly A2A4.
(2) Cable assemblies W1 thru W12.
(3) Clutch limiter A2A1A3.
(4) Brake limiter A2A1A4.
(5) Cable between fans and A2A1 filters.
(6) Cable between A2A1 fans.
(7) Cable between A2A4 and A2A6.
(8) Capacitor assembly A2A2A1.
(9) Fuse and resistor assembly A2A2A1A1.

Section III. REMOVAL AND REPLACEMENT

4-19. General

The following paragraphs describe the removal and replacement of major assemblies, .subassemblies, and components of the page printer. These paragraphs also describe the disassembly and reassembly of major assemblies and subassemblies when not in the order of index numbers on exploded views or when special tools and procedures are required. Use these procedures in conjunction with the lubrication, troubleshooting, repair, and adjustment procedures described in paragraphs 4-12 through 4-156, 4-16 through 4-18, and 4-96 through 4-115, respectively.

a. Removal and Disassembly.

(1) Disassemble the page printer only to the extent necessary to inspect, clean, lubricate, and replace a defective part, or to adjust the assembly that is in need of maintenance.

(2) When removing shims, note the number and thickness of the shims used at each point. Be sure to replace the same thickness of shims at each point (unless otherwise specified) when reassembling the assembly.

(3) When removing springs that are similar in appearance, tag or otherwise identify each spring to ensure proper identification during reassembly.

Caution:

When disassembling connectors of the type shown in figure 4-17 (item 10), tag the location of male and female knurled screws to prevent accidental reversal of connections between plug and jack.

b. Reassembly and Replacement.

(1) Inspect all removed parts for evidence of excessive wear or damage. Install only parts that are unquestionably serviceable.

(2) Check to be sure that mating gears and mechanical linkages are properly engaged before tightening the mounting screws or nuts.

Caution:

When securing parts In place, be careful not to tighten the mounting screws or nuts excessively.

c. Post Replacement Checks. After replacing a part or an assembly, perform the operational checkout procedures given in paragraphs 2-1 Q through 2-10.

4-20. Removal and Replacement of Frame Assembly A2

Warning:

Before removing the frame assembly, remove page printer power from the source.

a. Removal

Caution:

If bottom of page printer is mounted on a platform or above the floor level, the surface area directly in front of page printer must be raised to the same height whenever the frame assembly (1, fig. 4-4) is to be rolled forward from the cabinet (6). This may be accomplished by positioning a portable platform of appropriate height in front of the page printer. Failure to observe this precaution may result in damage to components in the frame assembly.

(1) Open the two doors at the front of frame assembly (1, fig. 4-4).

(2) Press the two levers at the top of electrical equipment cabinet (6) and lift open the top access door.

(3) Twist the two hand-hold levers that can be seen through the top access door and roll frame assembly (1) out of electrical equipment cabinet (6) far enough to gain access to the cable below the electrical equipment test panel (4, fig. 4-26).

(4) Remove tile internal paper storage basket (fig. 4-24) to gain access to the power cable, remove the two power cable clamps and remove the power cable.

(5) Remove the right-hand stop bolt (42, fig. 4-41) and roll the assembly out of the cabinet while turning it to the left.

b. Replacement. To replace the frame assembly, reverse the removal procedure in *a* above.

LEGEND FOR FIGURE 4-4

1 Frame assembly (A2)
2 Strobe disk, 81/2 in.
3 Strobe disk, 14 in.
4 Motor pulley, 50 cycle
5 External paper stacker (A3)
6 Electrical equipment cabinet (1)
7 Spring (50-Hz operation)
8 Plate, motor conversion
9 Plate, designation
10 RFI gasket
11 Screw, flathead, No. 6-32x½ in. 1g
12 Washer, flat, No. 6
13 Nut, self-lock, No. 6-32

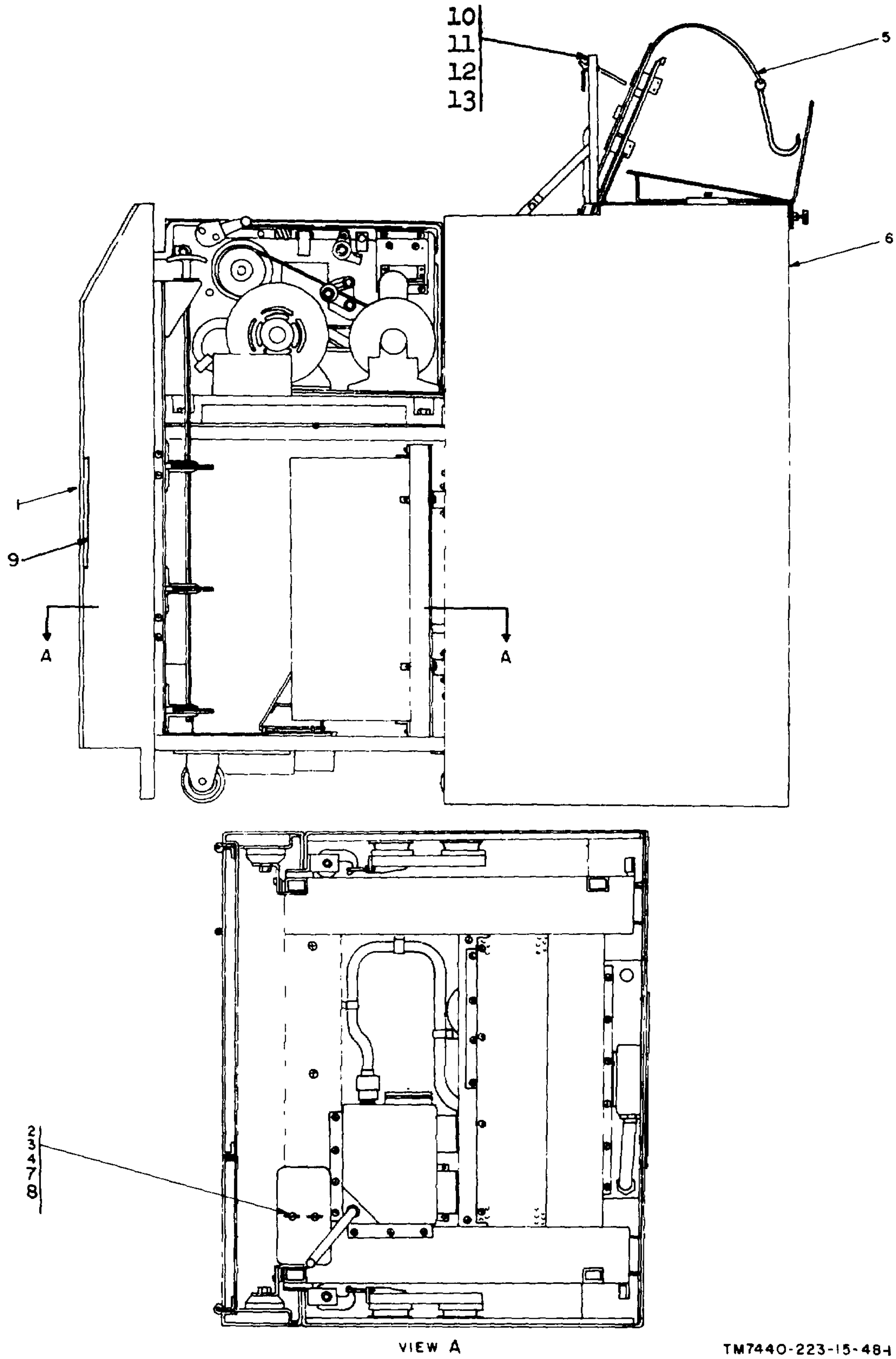


Figure 4-4. Page printer, component location diagram.

4-21. Disassembly and Reassembly of Frame Assembly A2

a. Disassembly. Disassemble the frame assembly (1, fig. 4-4) as follows:

(1) Loosen the four screws on the sides of front access panel assembly (1, fig. 4-5) and carefully lift the assembly up and out of the four slotted brackets on electrical equipment frame (14).

(2) Disconnect the cables and separate front access panel assembly (1) from electrical equipment frame (14).

(3) Disconnect the cables between print head assembly (11) and electronic assembly (13).

(4) Remove the four screws (8) and nuts (9), and the eight washers (10), and carefully lift print head assembly (11) off electrical equipment frame (14).

(5) Remove the four knurled-head screws which secure electronic assembly (13) to electrical equipment frame (14) and separate the assembly from the frame (making sure all cable, have been disconnected).

b. Reassembly. To reassemble the frame assembly, reverse the disassembly procedure in *a* above.

LEGEND FOR FIGURE 4-5

1 Front access panel assembly (A2A5)
2 Drive screw
3 Page printer identification plate
4 Screw, socket head, No. 8-32, 3/8 in. long.
5 Washer, flat, No. 8
6 Lockwasher, No. 8
7 Cable clamp
8 Screw, hex head, No. 3/8-16, 1-3/4 in. long
9 Nut, hex, No. 3/8
10 Washer, flat, No. 3/8
11 Print head assembly (A2A1)
12 Internal paper storage basket (A2A3)
13 Electronic assembly (A2A2)
14 Electrical equipment frame (A2A4)

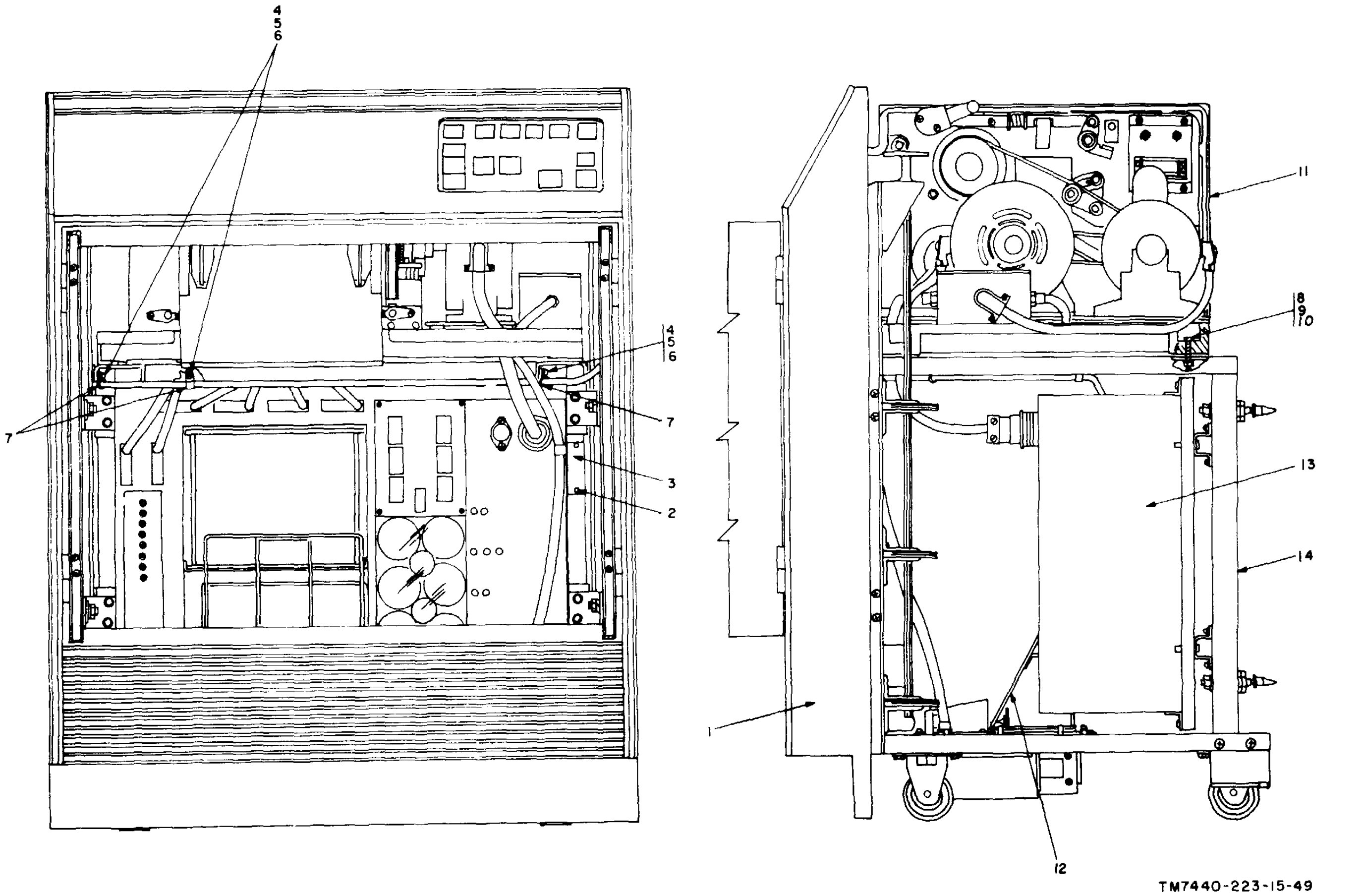


Figure 4-5. Frame assembly, component location diagram.

4-22. Disassembly and Reassembly of Front Access Panel Assembly A2A5

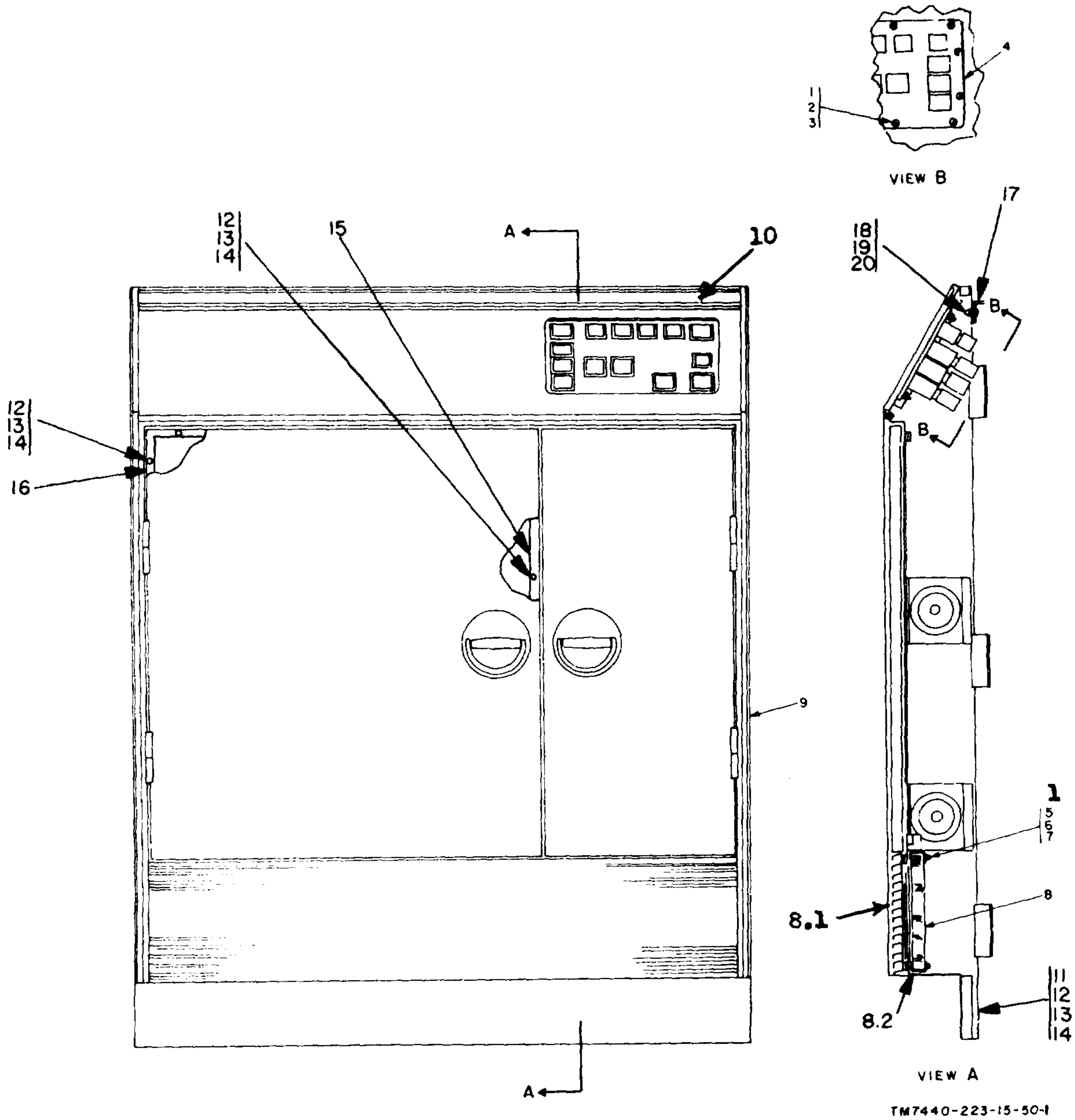
a. Disassembly. Disassemble the front access panel assembly (1, fig. 4-5) as follows:

(1) Remove and disassemble the frame assembly (1, fig. 4-4) as described in paragraphs 4-20 and 4-21.

(2) Remove the 12 nuts (1, fig. 4-6), lockwashers (2), and washers (3) and separate power distribution and indicator assembly panel (4) from front section assembly (9).

(3) Remove the 24 screws (5), washers (6), and lockwashers (7), and separate the two honeycomb filters (8) from front section assembly (9).

b. Reassembly. To reassemble the front access panel assembly (1, fig. 4-5). reverse the disassembly procedure in *a* above.



1 Nut, hex, No. 6-32
2 Lockwasher, No. 6
3 Washer, flat, No. 6
4 Power distribution and indicator assembly panel (A2A5A1)
5 Screw, panhead, No. 6-32, 1 1/4 in. long
6 Washer, flat, No. 6
7 Lockwasher, No. 6
8 Honeycomb filter
8.1 Filter guard
8.2 RFI gasket material (43 in.)
9 Front section assembly
10 Identification strip
11 RFI gasket
12 Screw, flathead, No. 6-32, 1/2 in. long
13 Washer, flat, No. 6
14 Nut, self-lock, No. 6-32
15 RFI gasket
16 RFI gasket
17 RFI gasket
18 Screw, panhead, No. 6-32, 5/8 in. long
19 Lockwasher, No. 6
20 Washer, flat, No. 6

Figure 4-6. Front access panel assembly, component location diagram.

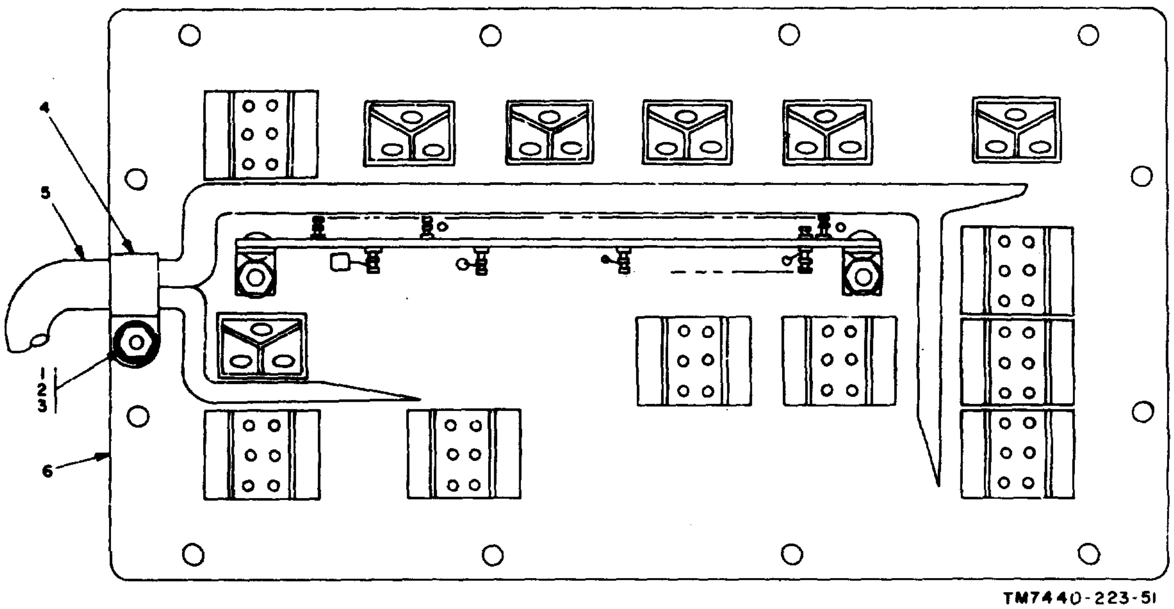
4-23. Disassembly and Reassembly of Power Distribution and Indicator Assembly Panel A2A5A1

a. Disassembly. Disassemble the power distribution and indicator assembly panel (4, fig. 4-6) as follows:

(1) Disassemble front access panel assembly (1, fig. 4-5) as described in paragraph 4-22.

(2) Remove the nut (1, fig. 4-7), lockwasher (2), washer (3), and cable clamp (4), and separate control panel cable assembly (5) from power distribution and indicator panel subassembly (6).

b. Reassembly. To reassemble the power distribution and indicator assembly panel (4, fig. 46), reverse the disassembly procedure in a above.



1 Nut, hex, No. 6-32
2 Lockwasher, No. 6
3 Washer, flat, No. 6
4 Cable clamp
5 Control panel cable assembly
6 Power distribution and indicator panel subassembly

Figure 4-7. Power distribution and indicator assembly panel, component location diagram.

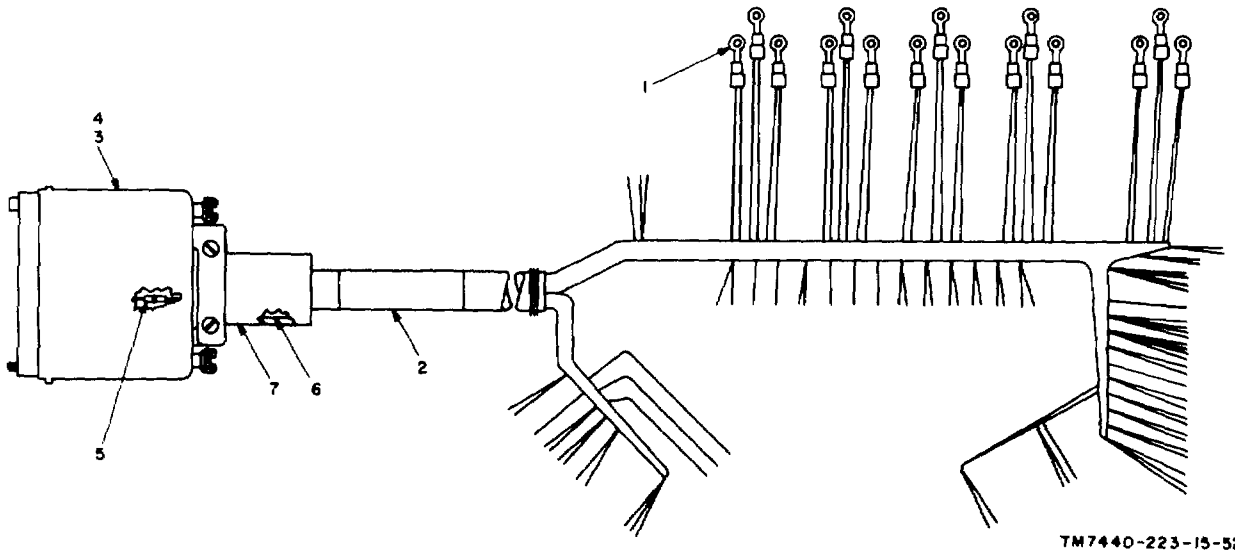
424. Disassembly and Reassembly of Control Panel Cable Assembly

a. Disassembly. Disassemble the control panel cable assembly (5, fig. 4-7) as follows:

(1) Disassemble the power distribution and indicator assembly panel (4, fig. 4-6) as described in paragraph 4-23.

(2) Follow the sequence of index numbers in figure 4-8.

b. Reassembly. To reassemble the control panel table assembly reverse the disassembly procedure in a above.



1 Terminal
2 Cable marker
3 Plug and receptacle connector assembly
4 Contact
5 Solder sleeve
6 Bushing
7 Bushing

Figure 4-8. Control panel cable assembly, component location diagram.

4-25. Disassembly and Reassembly of Power Distribution and Indicator Panel Subassembly

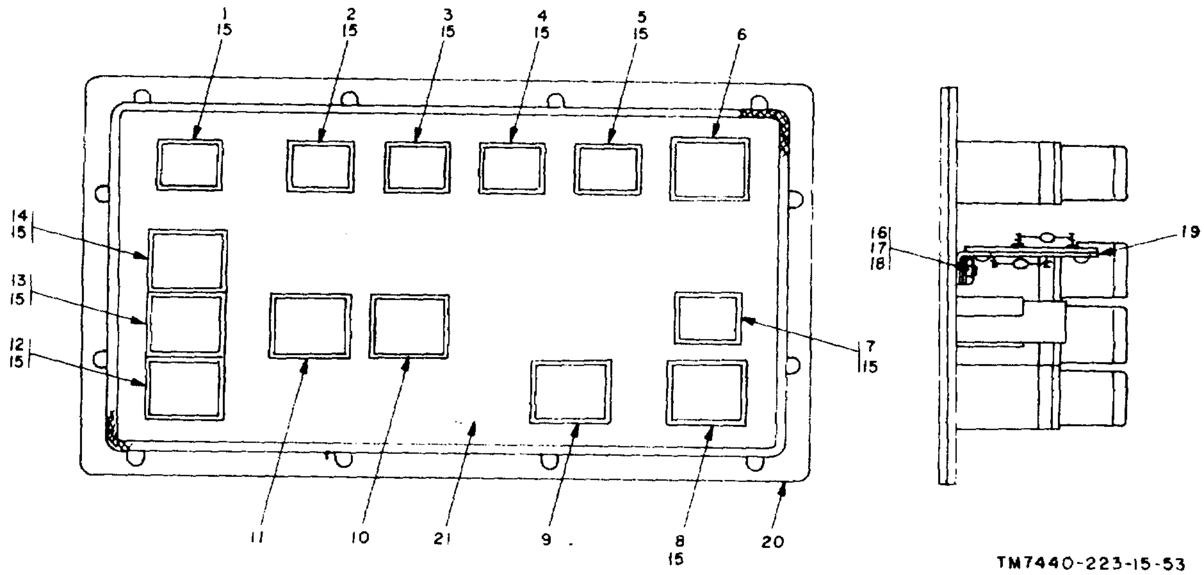
a. Disassembly. Disassemble the power distribution and indicator panel subassembly (6, fig. 4-7) as follows:

(1) Disassemble the power distribution and indicator assembly panel (4, fig. 4-6) as described in paragraph 4-23.

(2) Disconnect the leads and remove the 14 indicator units (1 through 14, fig. 4-9) and the 24 incandescent lamps (15) from switch mounting control panel (21).

(3) Remove the two nuts (16), lockwashers (17), and washers (18), and separate electrical component assembly (19) from switch mounting control panel (21).

b. Reassembly. To reassemble the power distribution and indicator panel subassembly (6, fig. 4-7), reverse the disassembly procedure in a above.



1 Indicator (XDS4)	11 Indicator (S8)
2 Indicator (XDS5)	12 Indicator (S1, XDS1)
3 Indicator (XDS6)	13 Indicator (S2, XDS2)
4 Indicator (XDS7)	14 Indicator (S3, XDS3)
5 Indicator (XDS8)	15 Incandescent lamp
6 Indicator (S4)	16 Nut, hex, No. 6-32
7 Indicator (XDS9)	17 Lockwasher, No. 6
8 Indicator (S5, XDS10)	18 Washer, flat, No. 6
9 Indicator (S6)	19 Electrical component assembly
10 Indicator (S7)	20 Shielding gasket
	21 Switch mounting control panel

Figure 4-9. Power distribution and indicator panel subassembly, component and location diagram.

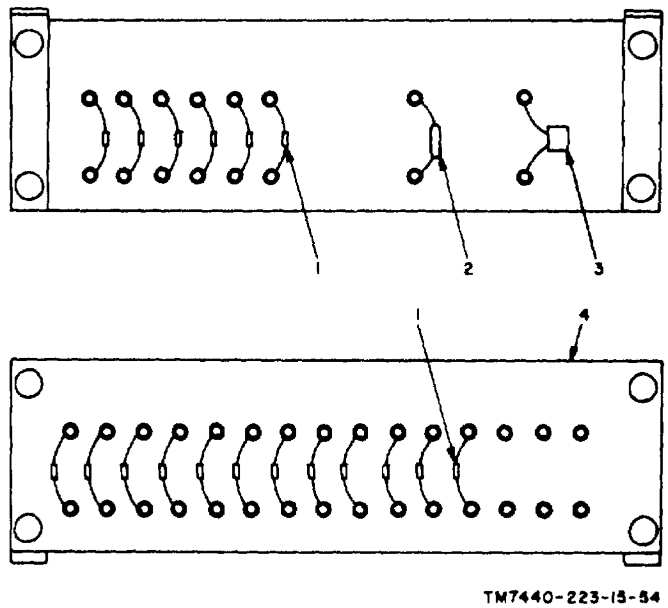
4-26. Disassembly and Reassembly of Electrical Component Assembly

a. Disassembly. Disassemble the electrical component assembly (19, fig. 4-9) as follows:

(1) Disassemble the power distribution and indicator panel subassembly (6, fig. 4-7) as described in paragraph 4-25.

(2) Follow the sequence of index numbers in figure 4-10.

b. Reassembly. To reassemble the electrical component assembly (19, fig. 4-9), reverse the disassembly procedure in a above.



1 Silicon diode (CR1 through CR18)
2 Resistor (R1)
3 Capacitor (CR1)
4 Terminal board

Figure 4-10. Electrical component assembly, component location diagram.

4-27. Disassembly and Reassembly of Print Head Assembly A2A1

ATTN: SEE CAUTIONS and NOTE at end of paragraph 428.

a. Disassembly. Disassemble the print head assembly (11, fig. 4-5) as follows:

(1) Disassemble the frame assembly (1, fig. 4-4) as described in paragraph 4-21.

(2) Disassemble the print assembly (148.1, fig. 4-111 as outlined in paragraph 4-27.1.

(3) Disassemble the clutch assembly (6 through 13, and 204 through 216, fig. 4-11) as outlined in paragraph 4-27.2.

(4) Disassemble the paper drive brake assembly (332 through 370, fig. 4-11) as outlined in paragraph 4-27.3.

(5) Disassemble the remaining component parts of the print head assembly by following the sequence of index numbers in figure 4-11.

b. Reassembly. To reassemble the print head assembly (11, fig. 4-5), reverse the disassembly procedure in a above and note the following special procedures:

(1) During reassembly of the print head assembly (11, fig. 4-5), perform lubrication Procedures as described in paragraphs 4-12 through 4-15.

(2) Apply a small amount of staking varnish, Glyptal 1153 to the threads of screws (63, 67, 267, and 422, fig. 4-11) and retaining compound, Loctite Grade E to the threads of screws (2 and 119, fig. 4-11) before installing.

(3) When assembling the ribbon feed drive mechanism (consisting of setscrews (24 and 189), armature plate hub (26), armature plate (26), ribbon feed assembly (30), self locking pin (190), drive detail cap (191), and clutch ribbon drive shaft (199)), perform the adjustment procedures described in paragraphs 4-100 and 4-101.

(4) After assembling the ribbon feed drive mechanism, perform the adjustment procedures described in paragraphs 4-102 and 4-103.

(5) When assembling the left hand and right hand penetration control subassemblies items 87 through 102), perform the adjustment procedure described in paragraph 4-104.

(6) Adjust for tractor chain setting, top-of-form setting, and horizontal print-out setting as described in paragraphs 4-106 through 4-110.

(7) Adjust the paper-out switch as described in paragraph 4-111.

(8) Adjust the yoke open handle as described in paragraph 4-112.

(9) After assembly and adjustment of print head is performed, apply one drop of insulating paint, General Electric No. 1201 between setscrews (14, 24, 189, 196, and 299) and there mating surfaces and between screw (200) and its mating surface.

(10) If it is necessary to change the form length, perform the adjustment procedure described in paragraph 4-113.

(11) Adjust belt tension as described in paragraphs 4-117 through 4-120.

(12) Perform the flight time adjustment as outlined in paragraph 4-114.

(13) Perform the phasing adjustment as described in paragraph 4-115.

(14) Perform the hammer penetration adjustment as described in paragraph 4-121.

(15) Perform the signal code lamp housing adjustment as outlined in paragraph 4-122.

(16) Perform the signal strobe lamp housing adjustment as outlined in paragraph 4-123.

4-27.1 Removal and Replacement of Print Assembly

(fig. 4-11)

a. Removal. Remove the print assembly (148.1, fig. 4-11) as follows:

(1) Remove the frame assembly A2 as described in paragraph 4-20.

(2) Remove screws (247), screws (248), and cover (250).

(3) Remove cover assembly (74) and lower hammer module assembly.

(4) Remove ribbon and ribbon rolls (379, 380, and 38-1).

(5) Remove screws (103), washers (104), and ribbon guide shield (105).

(6) Remove belt (1).

(7) Remove items (115 through 122 and 125 through 139) following sequence of index numbers in figure 4-11.

(8) Wrap several layers of heavy paper around the print roll to prevent damage and secure with pressure sensitive tape.

(9) Remove screws (318), washers (319, 320), and belt guard (321).

(10) Remove print drum drive belt (405).

(11) Remove items (323 through 329) - following sequence of index numbers in figure 411.

(12) Remove screws (449) and upper paper guides (450 and 450.1).

(13) Remove right-hand bearing retainer (330) and spring washer (331). If necessary, loosen the bearing retainer from the inside and use a bearing puller to remove the bearing retainer.

(14) Remove the left-hand bearing retainer (123) and retainer ring (124). If necessary, loosen he bearing retainer from the inside and use a bearing puller to remove the bearing retainer (123).

(15) Remove the print assembly (148.1).

(16) Disassemble the print assembly by following the sequence of index numbers (140 through 148) in figure 4-11.

b. Replacement. To replace the print 4-22 Change 6 assembly, reverse the removal procedures in al above. In addition, perform the adjustment procedures described in paragraphs 4-115, 4-117, 4-118, 4-119, and 4-121.

4-27.2 Removal and Replacement of Paper Drivel Clutch

(fig. 4-11)

a. Removal. Remove and disassemble the paper drive clutch (6 through 13 and 204 through 216, fig. 4-11) as follows:

(1) Remove the frame assembly A2 as described in paragraph 4-20.

(2) Remove belt (1), belt (5), screw (2), and pulley retainer (3).

(3) Remove paper feed clutch pulley (4).

(4) Unsolder clutch field wires from insulated standoffs El and E2.

CAUTION

When removing the field assembly (6 through 13), do not apply excess strain on the wires. They break easily and cannot be replaced.

(5) Remove screws (6) and washers (6.1), then insert two screws in the tapped holes in field assembly (8). Carefully turn these screws pulling the clutch feed out of the frame and at the same time feed the clutch field wires through the access hole.

NOTE

Armature plate (208), spring (209) and retaining ring (214) should come off with the splined hub (213). Note the position of the alignment markings on the armature plate (208) and the splined hub (213) for proper reassembly.

CAUTION

Do not touch or contaminate the clutch rotor face (13) or the armature plate faces (208). Contact with fingers or oil reduce the effectiveness of the clutch.

(6) Remove screw (210), washer (211), and washer (212). Then remove items (208, 209, 213, and 214) together.

(7) Remove ball bearing (215) and retaining ring (216).

CAUTION

Prior to removing clutch housing assembly (207), be sure to lower and support the module plate yoke assembly (230). When 207 is removed, the yoke assembly is free.

(8) Remove screws (204), screws (205), and washers (205.1). Then remove clutch housing (207) and bushing (206).

b. Replacement. Prior to reassembly, vacuum all metal dust from the clutch components and wipe clutch facings with a dry lint free cloth. Replace the clutch components in the reverse order of removal while observing the following special precautions:

(1) Perform lubrication requirements outlined in paragraph 4-14.

(2) When replacing the clutch spring (209), be sure that the raised edges of the spring are facing to the outside of the assembly.

(3) Do not apply excessive strain on the wires of the field assembly (8).

(4) After replacement, perform the adjustments outlined in paragraphs 4-116, 4-117, and 4-118.

4-27.3 Removal and Replacement of Paper Drive Brake
(fig. 4-11)

a. Removal. Remove and disassemble the paper drive brake (332 through 370, fig. 4-11) as follows:

(1) Remove the alternator as described in paragraph 4-52.

(2) Remove screws (364), lockwashers (365), and flatwashers (366).

(3) Tilt signal strobe assembly (367) to the side.

(4) Hold gear (334) and remove screw (332) and drive gear retainer (333).

(5) Remove screws (335) and washers (335.1).

(6) Unsolder field winding wires from standoff terminals E3 and E4.

CAUTION

Do not place excess strain on wires of field winding (342). The wires break easily and cannot be replaced.

(7) Insert two screws in the tapped holes in flange of field (342). Carefully turn these screws pulling the field out of the frame and at the same time feed the field wires through the access hole.

CAUTION

Do not touch or contaminate the brake rotor face (343) or the armature plate face (337). Contact with the hands or oil reduces the operating efficiency.

(8) Remove items (343 through 346) in sequence of index numbers in figure 4-11).

(9) Remove screws (368) and washers (369).

(10) Lower the hammer module assembly and support right-hand yoke assembly (230). Then remove the brake housing (370).

b. Replacement. Prior to reassembly, vacuum all metal dust from the brake components and wipe brake facings with a dry lint free cloth. Replace the brake components in the reverse order of removal while observing the following special precautions.

(1) Perform lubrication requirements outlined in paragraph 4-14.

(2) When replacing the brake spring (344), be sure that the raised edges of the spring are facing to the outside of the assembly.

(3) Do not apply excessive strain to the wires on the field assembly (342) of the brake.

(4) After replacement, perform the adjustments outlined in paragraphs 4-109, 4-116, and 4-119.

4-28. Removal and Replacement of Ribbon Feed Assembly

a. Removal. Remove the ribbon feed assembly (30, fig. 4-11) as follows:

(1) Roll out frame assembly (1, fig. 4-4) as described in paragraph 4-20.

(2) Remove the ribbon drive belt (5, fig. 4-11) from ribbon feed drive pulley (15).

(3) Loosen the two setscrews (14) and remove the ribbon feed drive pulley (15).

(3.1) Remove the dust covers (15.1) from the ribbon feed clutches.

(4) Remove the attaching hardware (items 16 through 22) and remove switch actuators (23).

(5) Loosen the four setscrews (24) and remove the two armature plate hubs (25) and armature plates (26).

(5.1) Disconnect cable assembly from ribbon feed assembly.

(6) Remove the four screws (27), lockwashers (28), and washers (29), and separate ribbon feed assembly (30) from left hand side frame (495).

b. Replacement. Replace ribbon feed assembly (30, fig. 4-11) as follows:

(1) Slide the ribbon feed assembly (30) onto the cam follower shafts (32) and the clutch ribbon drive shafts (199). It may be necessary to move the sensing arms (201 and 202) to allow the cam followers (33) to ride up over the edge of the cams (19.6, fig. 4-12).

(2) Replace hardware (27 through 29, fig. 4-11) and tighten.

(3) Replace setscrews (16) in switch actuators (23).

(4) Replace but do not tighten screws (18) in switch actuators (23).

(5) Push switch actuators on cam follower shafts (32) as shown in figure 4-48 while holding the shafts from the ribbon side. Replace springs (17).

(6) Perform the sensing arm adjustment described in paragraph 4-102. Tighten screws (18, fig. 4-11).

(7) Replace the armature plates (23) and armature plate hubs (25). Perform the adjustment

described in paragraphs 4-100 and 4-101, then tighten setscrews (24).

(8) Replace dust covers 115.1) on ribbon feed clutches and reconnect the cable assembly.

(9) Replace ribbon feed pulley (15) but do not tighten screws (14). Align pulley (15) with pulley (32, fig. 4-12), then tighten screws (14).

(10) Replace ribbon drive belt (5, fig. 4-11).

(11) Replace frame assembly as described in paragraph 4-20.

CAUTIONS

1. When removing and/or replacing any assemblies that include electrical leads such as the paper feed clutch and brake assys (8, fig. 4-11 (1) and 342, fig. 411 (2) , BE EXTREMELY CAREFUL not to place any strain on the leads of the assembly; strain on the leads may damage the assembly beyond repair.

2. During replacement of the rotor and armature plate of the paper feed clutch and/or brake assemblies (13, 208, and 343, fig. 4-11), BE CAREFUL not to allow the mating surfaces of the rotor or armature plate to come in contact with your fingers; oil, moisture, or dirt will decrease efficiency of the assembly.

NOTE

In the event the two parts of the idler sprocket subassembly, consisting of the nylon sprocket and the splined metal insert, become separated or loose, they may be glued back together using Epoxy Base, NSN 8040-00-753-4800, or equivalent.

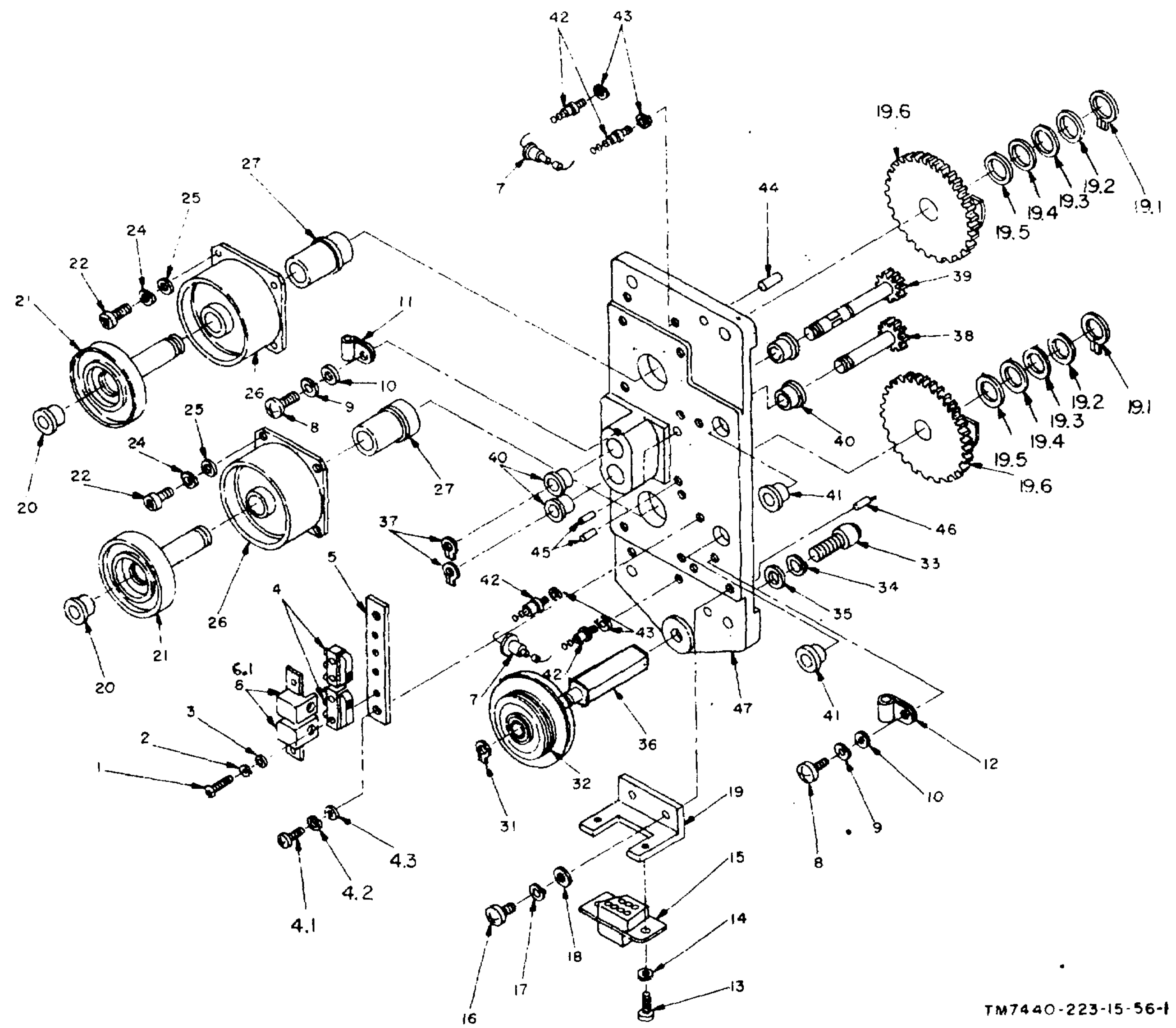


Figure 4-12. Ribbon feed assembly. exploded view.

LEGEND FOR FIGURE 4-12

1	Screw, panhead, No. 2-56, 1/2 inch long	14	lockwasher, No. 4	27	Clutch bushing
2	Lockwasher. No. 2	15	Receptacle connector	28	Deleted
3	Washer, flat, No. 2	16	Screw, panhead, No. 8-32, 3/8 inch long	29	Deleted
4	Subminature switch	17	Lockwasher, No. 8	30	Deleted
4.1	Screw, panhead, No. 6-32, 3/8 inch long	18	Washer, flat. No. 8	31	Retaining ring
4.2	Lockwasher, No. 6	19	Ribbon feed connector bracket	32	Pulley, double
4.3	Washer, flat, No. 6	19.1	Retaining ring	33	Screw, socket head, No. 10-32, 3/4 inch long
5	Switch mounting block	19.2	Shim, 0.005 in. thick	34	Lockwasher, No. 10
6	Printed network	19.3	Shim, 0.003 in. thick	35	Washer, flat, No. 10
6.1	Switch assy (consists of 1 through 6)	19.4	Shim, 0.007 in. thick	36	Idler pulley standoff
7	Silicon diode	19.5	Shim, 0.010 in. thick	37	Retaining ring
8	Screw, panhead, No. 8-32, 3/8 inch long	19.6	Cam gear	38	Idler gear
9	Lockwasher, No. 8	20	Bushing	39	Drive pinion
10	Washer, flat, No. 8	21	Clutch rotor	40	Bushing
11	Cable clamp	22	Screw, socket head, No. 6-32, 3/8 inch long	41	Bushing
12	Cable clamp	23	Deleted	42	Terminal
13	Screw, panhead, No. 4-40. 1/4 inch long	24	Lockwasher, No. 6	43	Lockwasher, No. 6
		25	Washer, flat, No. 6	44	Dowel pin
		26	24-volt field	45	Self-locking pin
				46	Aligning pin
				47	Ribbon feed base

4-29. Disassembly and Reassembly of Ribbon Feed Assembly

a. Disassembly. Disassemble the ribbon feed assembly (30, fig. 4-11) by following the sequence of index numbers in figure 4-12.

b. Reassembly. To reassemble the ribbon feed assembly (30, fig. 4-11), reverse the disassembly procedure in a above. After reassembly, lubricate the ribbon feed assembly as outlined in paragraph 4-I4

4-30. Removal and Replacement of Clutch Limiter Wiring Assembly.

a. Removal. Remove the clutch limiter wiring assembly (41, fig. 4-11) as follows:

(1) Roll the frame assy (1, fig. 4-4) as described in paragraph 4-20.

(2) Disconnect the leads.

. (3) Remove the four screws (38, fig. 4-11), lockwashers (39), and washers (40), and separate the clutch limiter wiring assembly (41) from left hand side frame (495).

b. Replacement. To replace the clutch limiter wiring assembly (41, fig. 4-11), reverse the removal procedure in *a* above. Check the adjustment requirements (para 4-116) and readjust if necessary.

4-31. Disassembly and Reassembly of Clutch Limiter Wiring Assembly

a. Disassembly. Disassemble the clutch limiter wiring assembly (41, fig. 4-11) by following the sequence of index numbers in figure 4-13.

b. Reassembly. To reassemble the clutch limiter wiring assembly (41, fig. 4-11), reverse the disassembly procedure in *a* above.

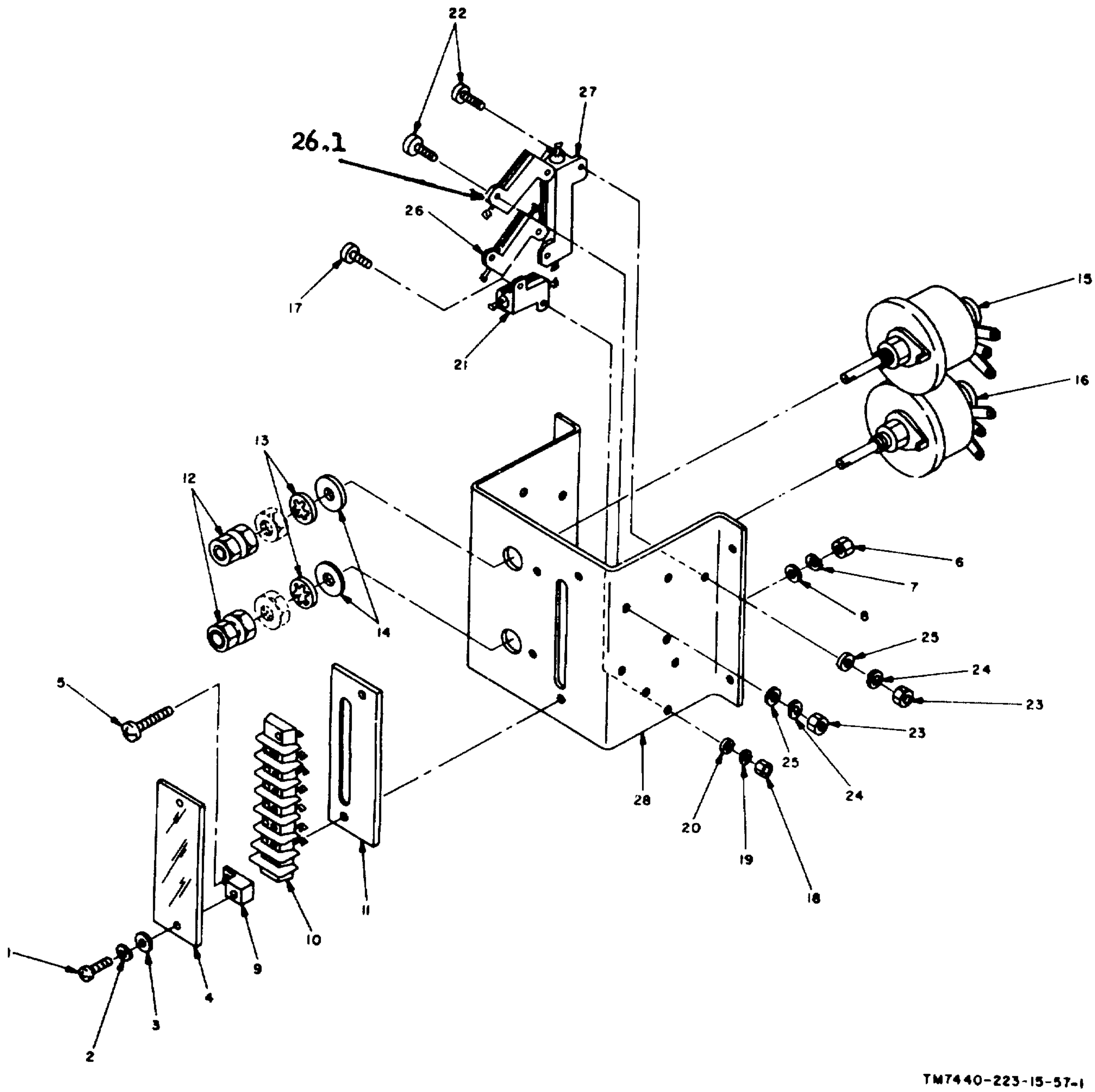


Figure 4-13. Clutch limiter wiring assembly, exploded view.

1 Screw, panhead, No. 440, 1/2 in. long
2 Lockwasher, No. 4
3 Washer, flat, No. 4
4 Terminal strip cover
5 Screw, panhead, No. 632, 3/4 in. long
6 Nut, hex., No. 6-32
7 Lockwasher, No. 6
8 Washer, flat, No. 6
9 Terminal strip spacer
10 Terminal block
11 Marker strip
12 Shaft lock
18 Lockwasher, No. 3/8
14 Washer, flat, No. 3/8
15 Variable resistor (R3)
16 Variable resistor (R2)
17 Screw, panhead, No. 2-68, 3/8 in. long
18 Nut, hex., No. 2-56
19 Lockwasher, No. 2
20 Washer, flat, No. 2
21 Resistor (RI)
22 Screw, panhead, No. 440, 3/8 In. long
23 Nut, hex., No. 4-40
24 Lockwasher, No. 4
25 Washer, flat. No. 4
26 Resistor (R6)
27 Resistor (R4)
28 Clutch limiter chassis
26.1 Resistor (R7)

4-32. Removal and Replacement of Cable Assembly W6

a. Removal. Remove cable assembly W6 (62, fig. 4-11) as follows:

(1) Roll out frame assembly (1, fig. 4-4) as described in paragraph 4-20.

(2) Disconnect the cable.

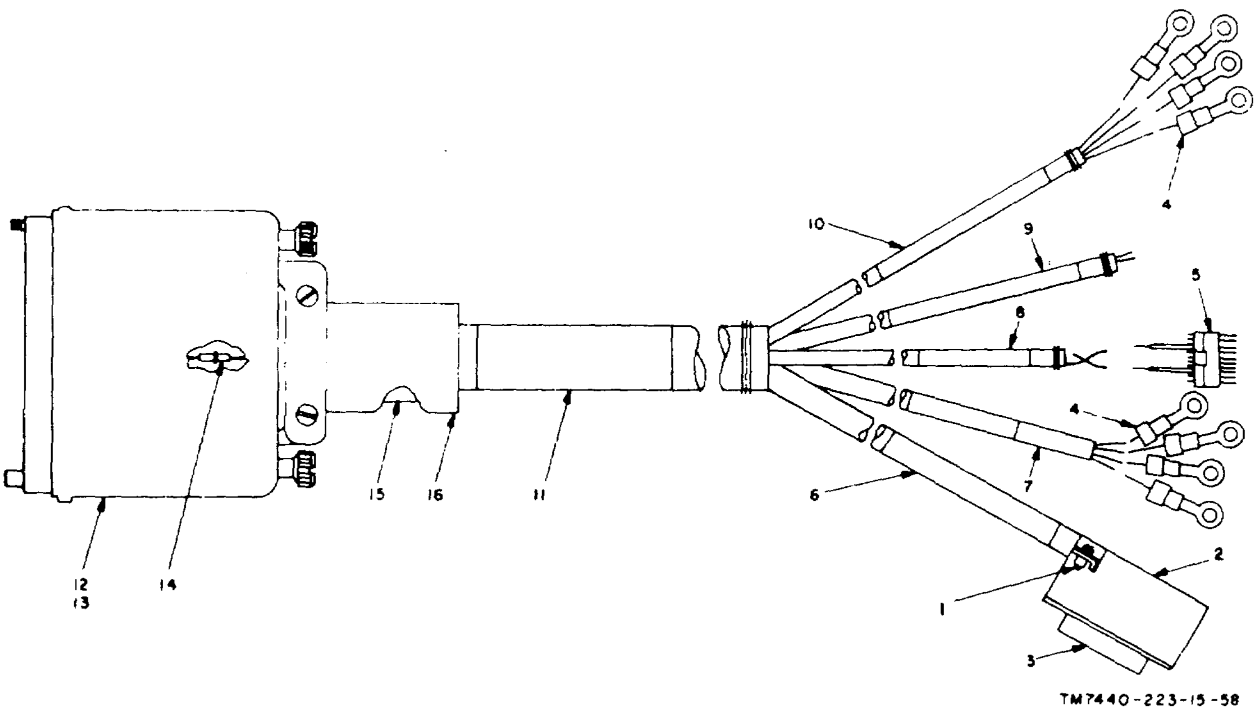
(3) Remove the four screws (55, fig. 4-11), lockwashers (56), washers (57), and cable clamps (58 and 59), and separate cable assembly (62) from left hand side frame (495).

b. Replacement. To replace the cable assembly, reverse the removal procedure in a above.

4-33. Disassembly and Reassembly of Cable Assembly W6

a. Disassembly. Disassemble cable assembly W6 (62, fig. 4-11) by following the sequence of index numbers in figure 4-14.

b. Reassembly. To reassemble the cable assembly, reverse the disassembly procedure in a above.



1	Screw, panhead, No. 4-40, 1/4 in. long
2	Receptacle hood
3	Receptacle
4	Terminal lug
5	9-pin plug module
6	Cable marker
7	Cable marker
8	Cable marker
9	Cable marker
10	Cable marker
11	Cable marker
12	Plug and receptacle connector assembly
13	Contact
14	Solder sleeve
15	Bushing
16	Bushing

Figure 4-14. Cable assembly W6, component location diagram.

4-34. Removal and Replacement of Cable Assembly W5

a. Removal. Remove cable assembly W5 (129, fig. 4-11) as follows:

(1) Roll out frame assembly (1, fig. 4-4) as described in paragraph 4-20.

(2) Disconnect the cable.

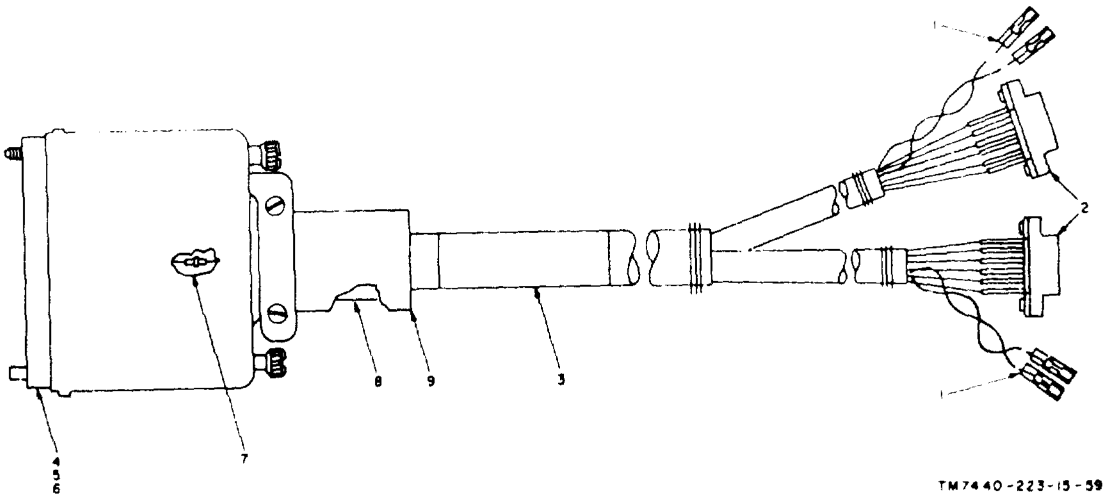
(3) Remove screw (125, fig. 4-11), lockwasher (126), washer (127), and cable clamp (128), and separate the cable assembly (129) from left hand side frame (495).

b. Replacement. To replace the cable assembly, reverse the removal procedure in a above.

4-35. Disassembly and Reassembly of Cable Assembly W5

a. Disassembly. Disassemble cable assembly (129, fig. 4-11) by following the sequence of index numbers in figure 4-15.

b. Reassembly. To reassemble the cable assembly, reverse the disassembly procedure in a above.



1 Electrical receptacle connector
2 20-contact connector
3 Cable marker
4 Plug and receptacle connector assembly
5 Contact
6 Contact
7 Solder sleeve
8 Bushing
9 Bushing

Figure 4-15. Cable assembly W5, component location diagram

4-36. Removal and Replacement of Signal Code Subassembly

a. Removal. Remove the signal code sub-assembly (134, fig. 4-11) as follows:

(1) Roll out frame assy (1, fig. /44) as described in paragraph 41-20.

(2) Disconnect the leads.

(2.1) Remove setscrew (65, fig. 4-11), rod (66), then remove spring (52).

(3) Remove the three screws (130 and 132, fig. 4-11) and lockwashers (131 and 133), and separate the signal code subassembly (134) from the phasing ring support (139).

b. Replacement. To replace the signal code subassembly, reverse the removal procedure in a above. When reconnecting leads to the lamp assembly, observe polarity. Connect the white lead to A and the black lead to B. After replacement, perform the phasing adjustment as described in paragraph 4-115.

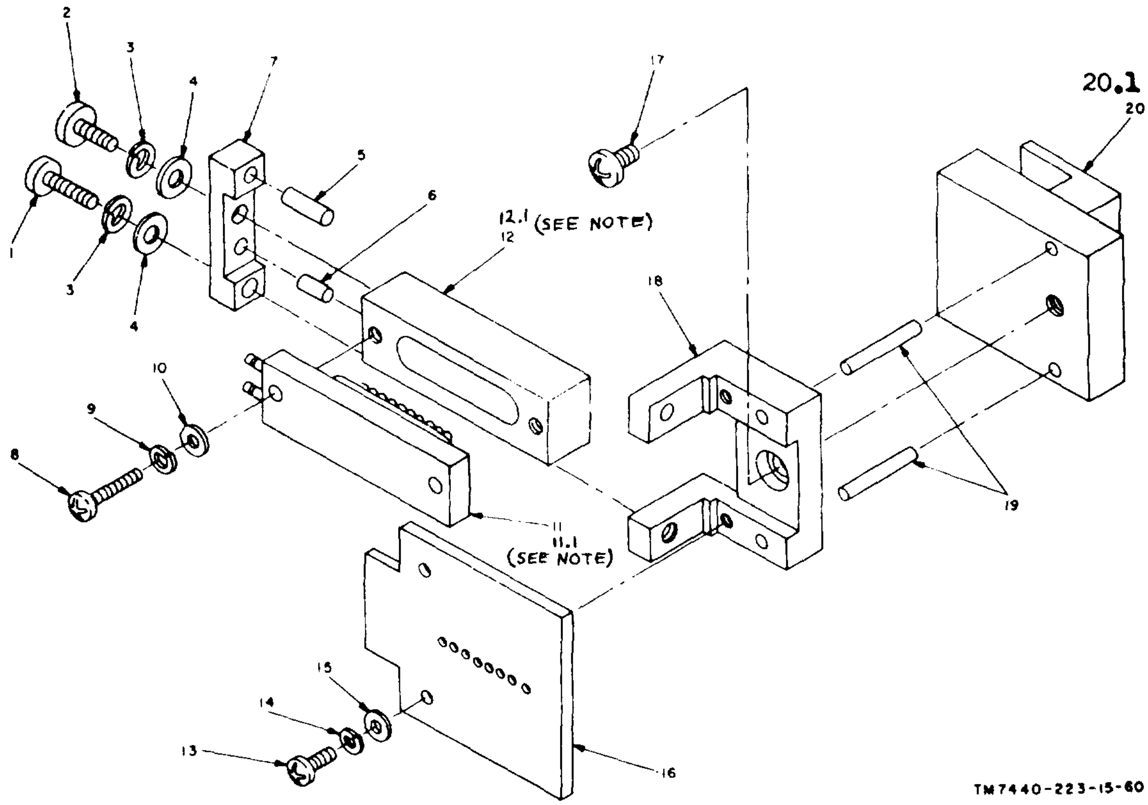
4-37. Disassembly and Reassembly of Signal Code Subassembly

a. Disassembly. Disassemble the signal code subassembly (134, fig. 4-11) by following the sequence of index numbers in figure 4-16.

b. Reassembly. To reassemble the signal code subassembly, reverse the disassembly procedure in a above.

LEGEND FOR FIGURE 4-16

1 Screw, panhead, No. 6-32, 7/16 in. long
2 Screw, panhead, No. 6-32, 5/16 in. long
3 Lockwasher, No. 6
4 Washer, flat, No. 6
5 Self-locking pin
6 Self-locking pin
7 Support
8 Screw, panhead, No. 4-40, 1/2 in. long
9 Lockwasher, No. 4
10 Washer, flat, No. 4
11 Lamp assembly
11.1 Lamp assembly (LED)
12 Lamp horsing
12.1 Lamp housing (LED)
13 Screw, panhead, No. 4-40, 1/4 in. long
14 Lockwasher, No. 4
15 Washer, flat, No. 4
16 Light sensor assembly
17 Screw, panhead, No. 632, 1/4 in. long
18 Connector bracket
19 Self-locking pin
20 Block
20.1 Block support subassembly (c/o items 17 through 20)



NOTE: Item 11.1 is a light-emitting diode (LED) assembly. Items 11.1 and 12.1 replace items 11 and 12 in accordance with 14WO 11-7440-223-30-1/ NAVELEX 0967-324-0230/TCTO 31W4-2G-509. After the page printer has been modified by installation of the IED assemblies, use of items 11 and 12 is not authorized under any circumstance, to preclude possible equipment damage. Items 11.1 and 12.1 must be used in LED-modified equipment.

Figure 4-16. Signal code subasembtly, exploded view.

4-38. Removal and Replacement of Paper-Out Switch Assembly

a. Removal. Remove the paper-out switch assembly (items 154 through 161, fig. 4-11) as follows:

(1) Roll out frame assy (1, fig. 4-4) ae described in paragraph 4-20.

(2) Set the yoke open operating handle (273, fig. 4-11) to the out position.

(3) Lift the hammer module plate (186) to free penetration control bellcrank stop (302). Move the bellcrank stop counterclockwise and allow the module plate to move toward the base plate until it is supported by bumpers (447).

(4) Disconnect the electrical connectors.

(5) Remove the two screws (152) and lockwashers (153) and separate the paper-out switch assembly (items 154 through 161) from lower guide plate subassembly (168) far enough to disconnect the leads.

b. Replacement. To replace the paper-out switch assembly (items 154 through 161, fig. 411), reverse the removal procedure in a above.

4-39. Disassembly and Reassembly of Paper-Out Switch Assembly

a. Disassembly. Disassemble the paper-out switch assembly by following the sequence of index numbers 154 through 161 in figure 4-11.

b. Reassembly. To reassemble the paper-out switch assembly, reverse the disassembly procedure in a above.

4-40. Removal and Replacement of Cable Assemblies W1, W2, W3, and W4

a. Removal. Remove cable assemblies (176 through 179. fig. 4-11) as follows:

(1) Roll out frame assembly (1, fig. 4-4) as described in paragraph 4-20.

(2) Remove the six screws (247, fig. 4-11), lockwashers (248), and washers (249) and lift the printer top cover (250) from the print head assembly.

(3) Loosen the three screws (169, fig. 4-11), and carefully lift the upper paper guide plate (172) off of the hammer module plate (186).

(4) Loosen the three screws (149, fig. 4-11), remove the two screws (167) and carefully lift the lower paper guide plate (168) off of the hammer module plate (186).

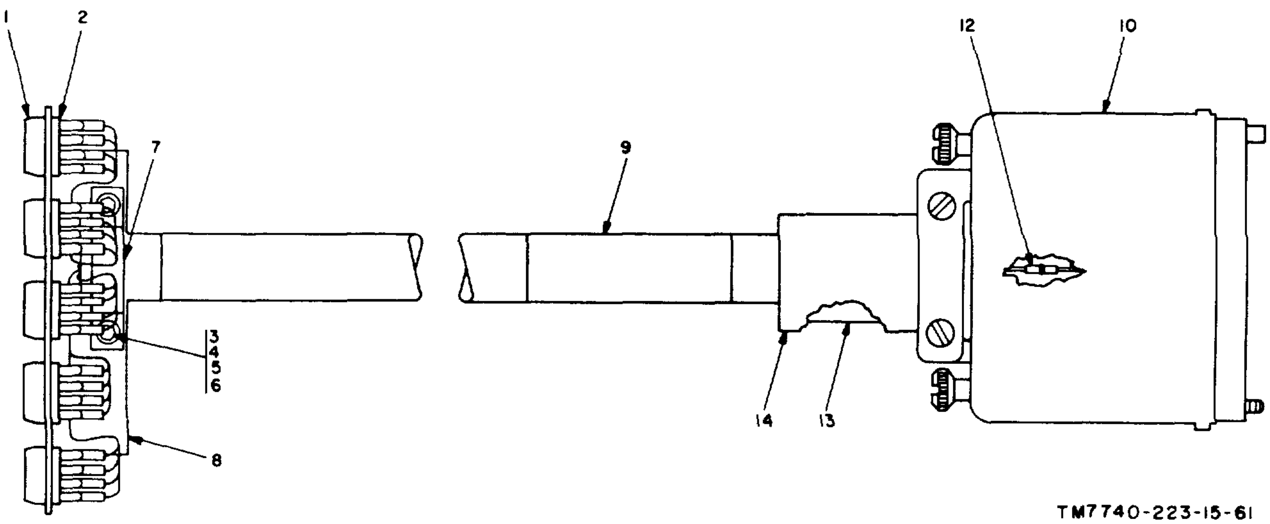
(5) Disconnect the cables, remove associated cable clamps and brackets, remove the eight screws (173), lockwashers (174), and washers (175), and carefully separate the cable assemblies (176 through 179) from the hammer module plate (186).

b. Replacement. To replace cable assemblies (176 through 179, fig. 4-11), reverse the removal procedure in a above.

4-41. Disassembly and Reassembly of Cable Assemblies WI, W2, W3, and W4

a. Disassembly. Disassemble the cable assemblies (176 through 179, fig. 4-11) by following the sequence of index numbers in figure 4-17.

b. Reassembly. To reassemble the cable assemblies (176 through 179, fig. 4-11), reverse the disassembly procedure in a above.



1	9-pin receptacle	9	Cable marker W1
2	Connector retainer	9.1	Cable marker W2
3	Screw, socket head, No. 8-32, 3/8 in. long	9.2	Cable marker W3
4	Nut, hex., No. 8-32	9.3	Cable marker W4
5	Lockwasher, No. 8	10	Plug and receptacle connector assembly
6	Washer, flat, No. 8	11	Contact
7	Hammer cable clamp	12	Solder sleeve
8	Connector bracket W1-W3	13	Bushing
8.1	Connector bracket W2-W4	14	Bushing

Figure 4-17. Cable assemblies WI, W2, W3, and W4, component location diagram.

441.1. Removal and Replacement of Hammer Module Plate Assembly

a. Removal. Remove the hammer module plate assembly (186, fig. 4-11) as follows:

(1) Roll out frame assembly (1, fig. 4-4) as described in paragraph 4-20.

(2) Remove cover assembly (74.1, fig. 4-11).

(3) Remove screws (247 and 248) and printer top cover (250).

(4) Unplug cable assemblies W1, W2, W3, and W4 (para. v-41).

(5) Remove screws (460), washers (461 and 462), and cable clamp (463).

(6) Remove screws (169), washers (170, 171), and paper upper guide plate (172).

(7) Remove screws (149), washers (150, 151), screws (167) and unplug cable assembly from J1 of the paper-out switch.

(8) Lower the module plate yoke assembly (230) and slide lower guide plate subassembly 1168) off bottom of assembly (230).

(9) Raise the module plate yoke assembly

(230) and remove screws (184 while supporting the hammer module plate assembly (186). Carefully remove assembly (186) and the cable assemblies attached to it.

(10) If further disassembly of the hammer module assembly (186) is required, follow the sequence of index numbers (173 through 186) in figure 4-11.

b. Reassembly. To reassemble the hammer module plate assembly, reverse the disassembly procedure in a above, observing the following special procedures:

(1) After the plate assembly (186, fig. 4-11) is attached to the module plate yoke assembly (230), reconnect cables WI, W2, W3, and W4. Then perform the adjustments described in paragraphs 4-114 and 4-121.

(2) After reassembly, perform the phasing adjustment described in paragraph 4-115 and check the operation of the paper out switch as described in paragraph 4-111.

4-42. Removal and Replacement of Module Plate Yoke Subassembly

a. Removal. Remove the module plate yoke subassembly (230, fig. 4-11) as follows:

(1) Roll out frame assembly (1, fig. 4-4) as described in paragraph 4-20.

(2) Remove the hammer module plate assembly (186, fig. 4-11) as described in paragraph 4-41.1.

CAUTION

During the following procedure, the yoke assembly (230) must be lowered and supported under the pivot points.

(3) Remove the paper drive clutch assembly as described in paragraph 4-27.2.

(4) Remove the paper drive brake assembly as described in paragraph 4-27.3.

(5) Loosen the six screws (225, fig. 4-11) and remove the right-hand (228) and the left-hand (229) module plate shields.

(6) Loosen the two setscrews (8, fig. 4-18) and loosen the four screws (9, fig. 4-18) to remove the tension on the paper feed chains (231, fig. 411).

(7) Loosen the two screws (1, fig. 4-18) on the idler sprocket pillow block (12, fig. 4-18). Loosen one setscrew (217, fig. 4-11) in each tractor hub (221) located on either side of the paper feed drive shaft (232). With the upper sprocket subassembly lower tractor hubs loose, move the left-hand paper feed chain to the right, to allow removal of the upper sprocket subassembly from the pillow block (12, fig. 4-18). Remove the right-hand chain and sprocket subassembly by moving it to the left.

(8) Remove components (217 through 223, fig. 4-11), then slide out shaft (232).

(9) The module plate yoke subassembly (230) may now be removed from the print head assembly.

b. Replacement. To replace the module plate yoke subassembly (230, fig. 4-11), reverse the removal procedure in a above. In addition perform the following:

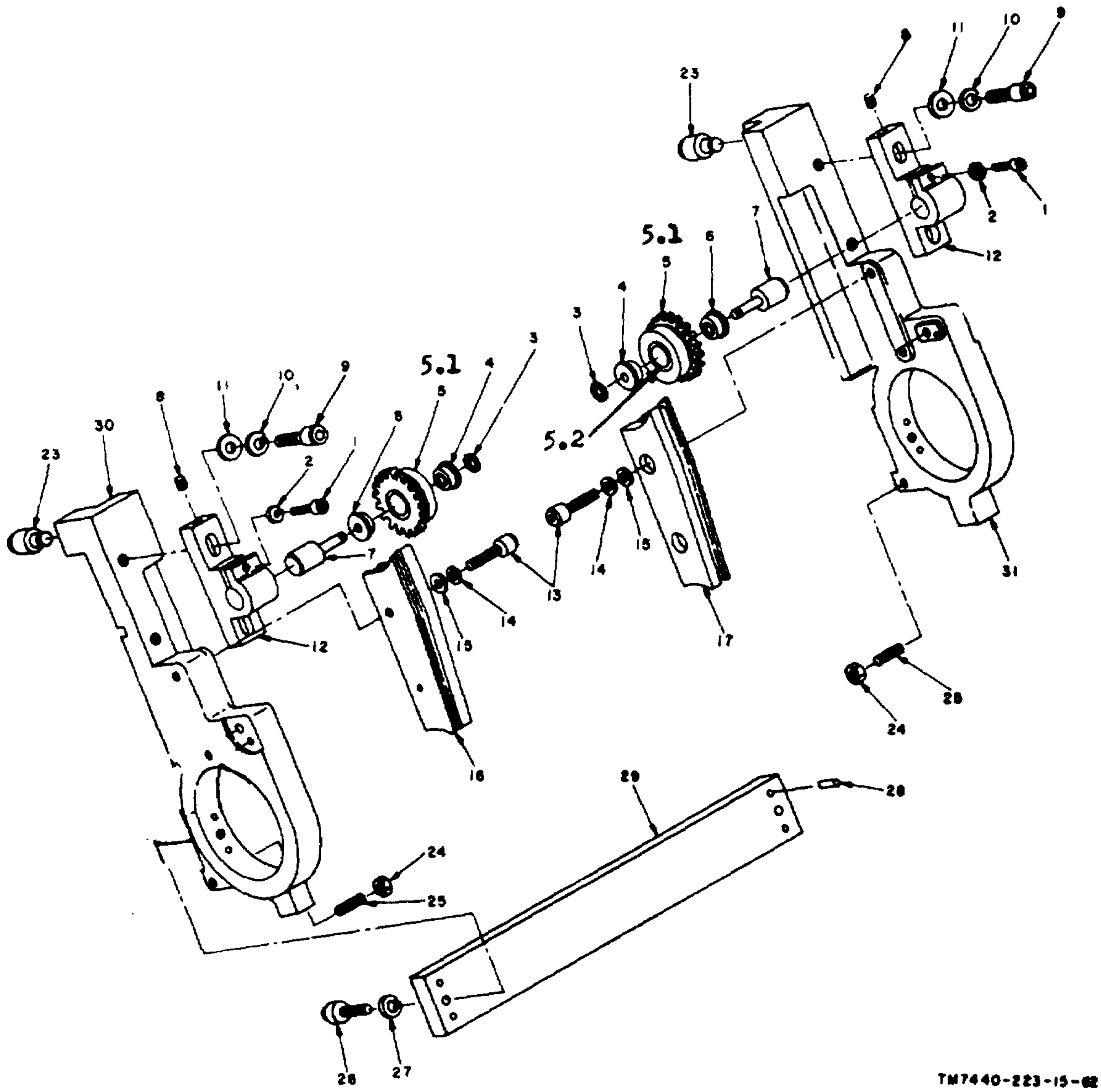
(1) Lubricate the yoke subassembly (para. 414) prior to reassembly.

(2) Perform the adjustments described in paragraphs 4-105 through 4-110.

4-43. Disassembly and Reassembly of Module Plate Yoke Subassembly

a. Disassembly. Disassemble the module plate yoke subassembly (230, fig. 4-11) by following the sequence of index numbers in figure 4-18.

b. Reassembly. To reassemble the module plate yoke subassembly, reverse the disassembly procedure in a above.



1 Screw, socket head, No. 8-32, 5/8 in. long
2 Lockwasher, No. 8
3 Retaining ring
4 Ball bearing
5 Idler sprocket subassembly
5.1 Sprocket
5.2 Insert
6 Ball bearing
7 Sprocket idler shaft
8 Setscrew, hex., socket, No. 10-32, 3/8 in. long
9 Shoulder screw
10 Lockwasher, No. 5/16
11 Washer, flat, No. 5/16
12 Idler sprocket pillow block
13 Screw, socket head, No. 10-32, 3/4 in. long
14 Lockwasher, No. 10
15 Washer, flat, No. 10
16 Left-hand chain support
17 Right-hand chain support
18–22 Deleted
23 Jig foot
24 Jamnut
25 Setscrew, oval point, No. 1/4-20, 1 in. long
26 Screw, socket head, No. 5/16-18, 1 in. long
27 Lockwasher, No. 5/16
28 Self-locking pin
29 Tie bar
30 Left-hand hinge yoke
31 Right-hand hinge yoke

Figure 4-18. Module plate yoke subassy, exploded view.

4-44. Removal and Replacement of Chassis Brake Limiter Subassembly

a. Removal. Remove the chassis brake limiter subassembly (266, fig. 4-11) as follows:

(1) Roll out frame assy (1, fig. 4-4) as described in paragraph 4-20.

(2) Disconnect the leads.

(3) Remove the four screws (263, fig. 4-11), lockwashers (264), and washers (265) and separate chassis brake limiter subassembly (266) from right hand side frame (499).

b. Replacement. To replace the chassis brake limiter subassembly, reverse the removal procedure in a above. Check the applicable adjustment requirements in paragraph 4-116 and readjust as necessary.

4-45. Disassembly and Reassembly of Chassis Brake Limiter Subassembly

a. Disassembly. Disassemble the chassis brake limiter subassembly (266, fig. 4-11) by following the sequence of index numbers in figure 4-19.

b. Reassembly. To reassemble the chassis brake limiter subassembly, reverse the disassembly procedure in a above.

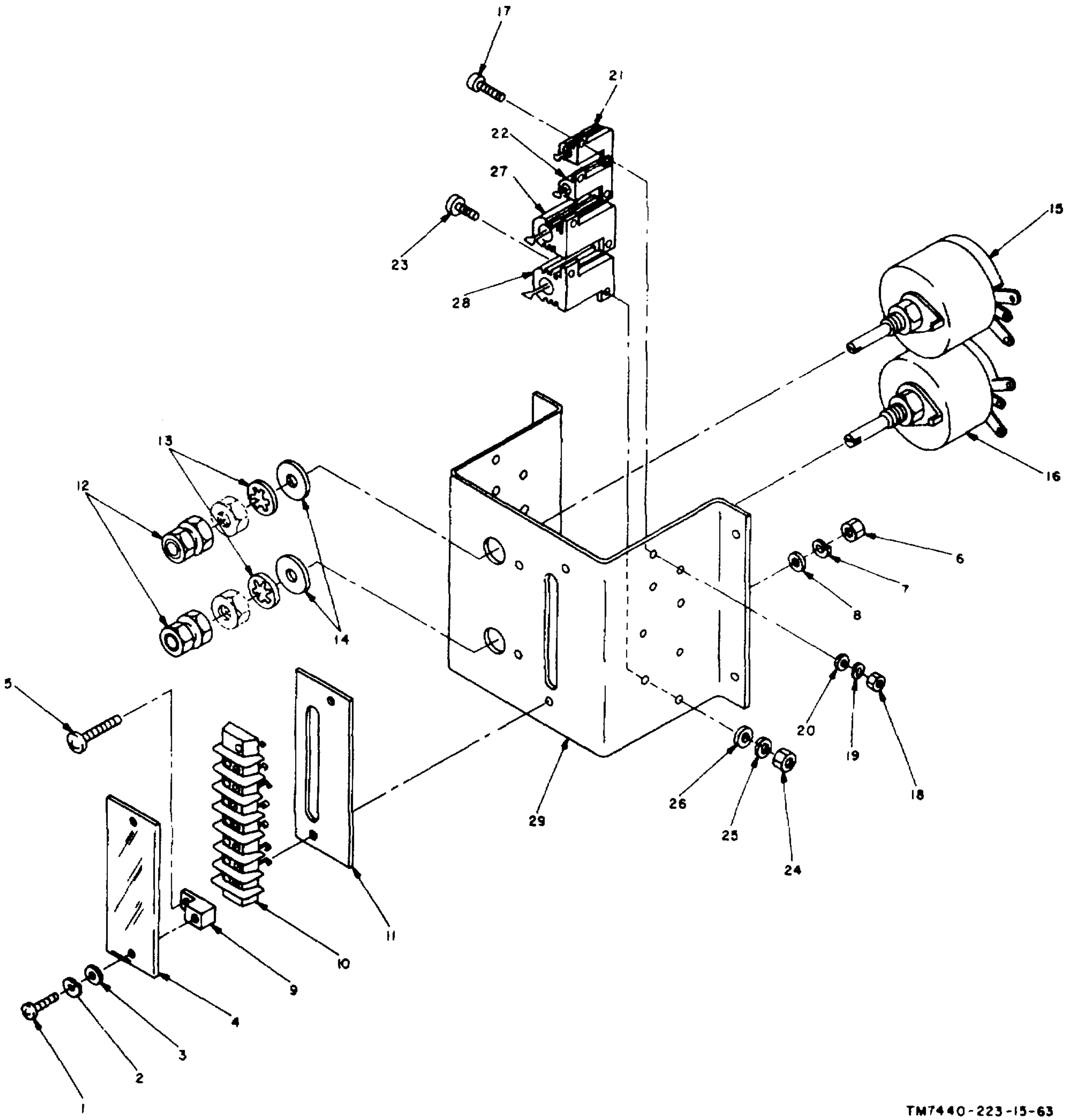


Figure 4-19. Chassis brake limiter subassembly, exploded view.

1	Screw, panhead, No. 4-40, 1/2 in. long	13	Lockwasher, No. 3/8
2	Lockwasher, No. 4	14	Washer, flat, No. 3/8
3	Washer, flat, No. 4	15	Variable resistor (R2)
4	Terminal strip cover	16	Variable resistor (R3)
5	Screw, panhead, No. 6-32, 3/4 in. long	17	Screw, panhead, No. 2-56, 3/8 in. long
6	Nut, hex., No. 6-32	18	Nut, hex., No. 2-56
7	Lockwasher, No. 6	19	Lockwasher, No. 2
8	Washer, flat, No. 6	20	Washer, flat, No. 2
9	Terminal strip spacer	21	Resistor (R1)
10	Terminal block	22	Resistor (R6)
11	Marker strip	23	Screw, panhead, No. 4-40, 3/8 in. long
12	Shaft lock	24	Nut, hex., No. 4-40

LEGEND FOR FIGURE 4-19–Continued

25 Lockwasher, No. 4
26 Washer, flat, No. 4
27 Resistor (R4)
28 Resistor (R5)
29 Brake limiter chassis

46. Removal and Replacement of Yoke Open Actuator Switch

a. Removal. Remove the yoke open actuator switch (295, fig. 4-11) as follows:

(1) Roll out frame assembly (1, fig., 4-4) as described in paragraph 4-20.

(2) Set the yoke open operating handle (273, fig. 4-11) to the out position.

(3) Lift the hammer module plate (186) to free the penetration control bellcrank stop (302). Move the bellcrank stop counterclockwise and allow the module plate to move toward the base plate until it is supported by bumpers (447).

(4) Remove the two screws (269), lockwashers (270), and washers (271), and separate yoke open operating handle (273) from yoke open block (278).

(5) Remove pin (277) and separate yoke open block (278) from yoke open front rod (280).

(6) Remove the two screws (283), lockwashers (284), and washers (285), and separate yoke 3n actuator switch bracket (286) from yoke open rear rod (289).

(7) Raise the yoke open rods to gain access to yoke open switch mounting plate (296) and remove the two screws (292), lockwashers (293), and washers (294), separating the mounting plate (with the switch attached) from right-hand side frame (499).

(8) Remove the two screws, nuts, and washers securing yoke open actuator switch (295) to yoke open switch mounting plate (296) and separate the two parts.

b. Replacement. To replace the yoke open actuator switch (295, fig. 4-11), reverse the removal procedure in a above. After replacement adjust switch as outlined in paragraph 4-112.

4-47. Removal and Replacement of Signal Strobe Subassembly

a. Removal. Remove the signal strobe subassembly (367, fig. 4-11) as follows:

(1) Disconnect the connectors from the strobe light sensor assembly (9, fig. 4-20) and the strobe disk lamp assembly (4 or 4.1).

(2) Deleted.

(3) Remove the two screws (364, fig. 4-11), lockwashers (365), and washers (366) and separate signal strobe subassembly (367) (together with the strobe disk assembly and a cable clamp) from brake housing (370).

(4) Remove screw (360), lockwasher (361), and washer (362), and separate cable clamp (363) from signal strobe subassembly (367).

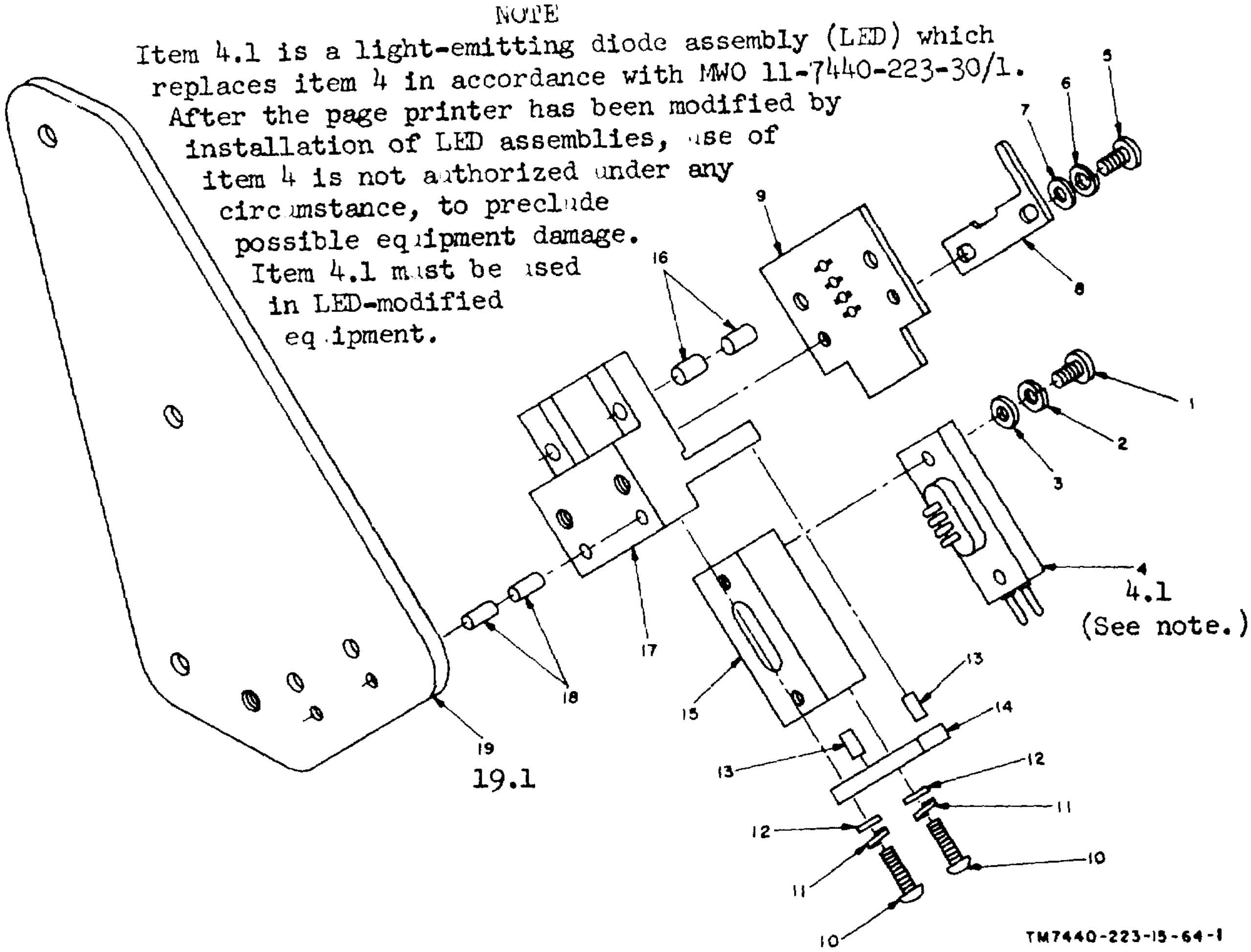
(5) Remove pin (347), screws (348), and lockwasher (349), and separate the strobe disk assembly (items 351 through 359) from signal strobe subassembly (367).

b. Replacement. To replace signal strobe subassembly (367, fig. 4-11), reverse the removal procedure in a above. When reconnecting the leads to the strobe lamp assembly, observe polarity. Connect the white lead to pin A, and the black lead to pin B. After replacement, perform the adjustments outlined in paragraphs 4-113c(5), (6), and (7)

4-48. Disassembly and Reassembly of Signal Strobe Subassembly
(fig. 4-20)

a. Disassembly. Disassemble signal strobe subassembly (367, fig. 4-11) by following the sequence of index numbers in figure 4-20.

b. Reassembly. To reassemble signal strobe subassembly (367, fig. 4-11), reverse the disassembly procedure in *a* above.



I Screw, panhead, No. 4-40, 1/2 in, long
2 Lockwasher, No. 4
3 Washer, flat, No. 4
4 Strobe disk lamp assembly
4.1 Strobe disk lamp assembly (LED)
5 Screw, panhead, No. 4-40, 1/4 in. long
6 Lockwasher, No. 4
7 Washer, flat, No. 4
8 Strobe disk indexing pointer
9 Strobe light sensor assembly
10 Screw, panhead, No. 6-32, 3/8 in. long
11 Lockwasher, No. 6
12 Washer, flat, No, 6
13 Self-locking pin
14 Lamp housing bracket
15 Strobe disk lamp housing
16 Self-locking pin
17 Block
18 Self-locking pin
19 Plate
19.1 Plate, mounting (consists of 18 and 19)

Figure 4-20. Signal strobe subassembly, exploded view.

4-49. Removal and Replacement of Drive Motor

a. Removal. Remove the drive motor (412, fig. 4-11) as follows:

(1) Roll out frame assembly (1, fig. 4-4) as described in paragraph 4-20.

(2) Disconnect the cable from a distribution box (439, fig. 4-11).

(3) Remove the belts (405 and 406) from the motor pulley (411).

(4) Loosen the setscrew (410) and car fully slide the motor pulley (411) off the motor shaft.

(5) Remove the four screws (407), lockwashers (408), and washers (409), and carefully lift the drive motor (412) off the motor and alternator mounting plate (423).

b. Replacement. To replace the drive motor (412, fig. 4-11), reverse the removal procedure in a above. After replacement, adjust belt tension as outlined in paragraph 4-119). If a new drive motor is being installed, see CAUTION note on following page.

CAUTION

Page printer requires a drive motor that operates in a clockwise direction. Check direction of motor rotation before installing drive belts. If direction is incorrect, the procedures in paragraph 4-49.1 should be followed to permit clockwise direction.

4-49.1. Checking Direction of Drive Motor Rotation

a. Remove terminal access cover plate and check underside of motor for a wiring diagram. If no diagram exists, then go to the motor wiring terminals.

(1) There are four terminals, two with nut connectors for the AC input and two with push-on connectors that reverse the motor direction (one of the push-on wires is blue, and the other is yellow).

b. Install drive motor and connect AC input lines (main breaker to page printer is turned off).

Do not connect drive belts at this point.

c. Start motor and check drive direction.

(1) If motor rotates clockwise, go to *d* below.

(2) If motor rotates counter clockwise, turn off main breaker to page printer and reverse push-on blue and yellow wires.

CAUTION

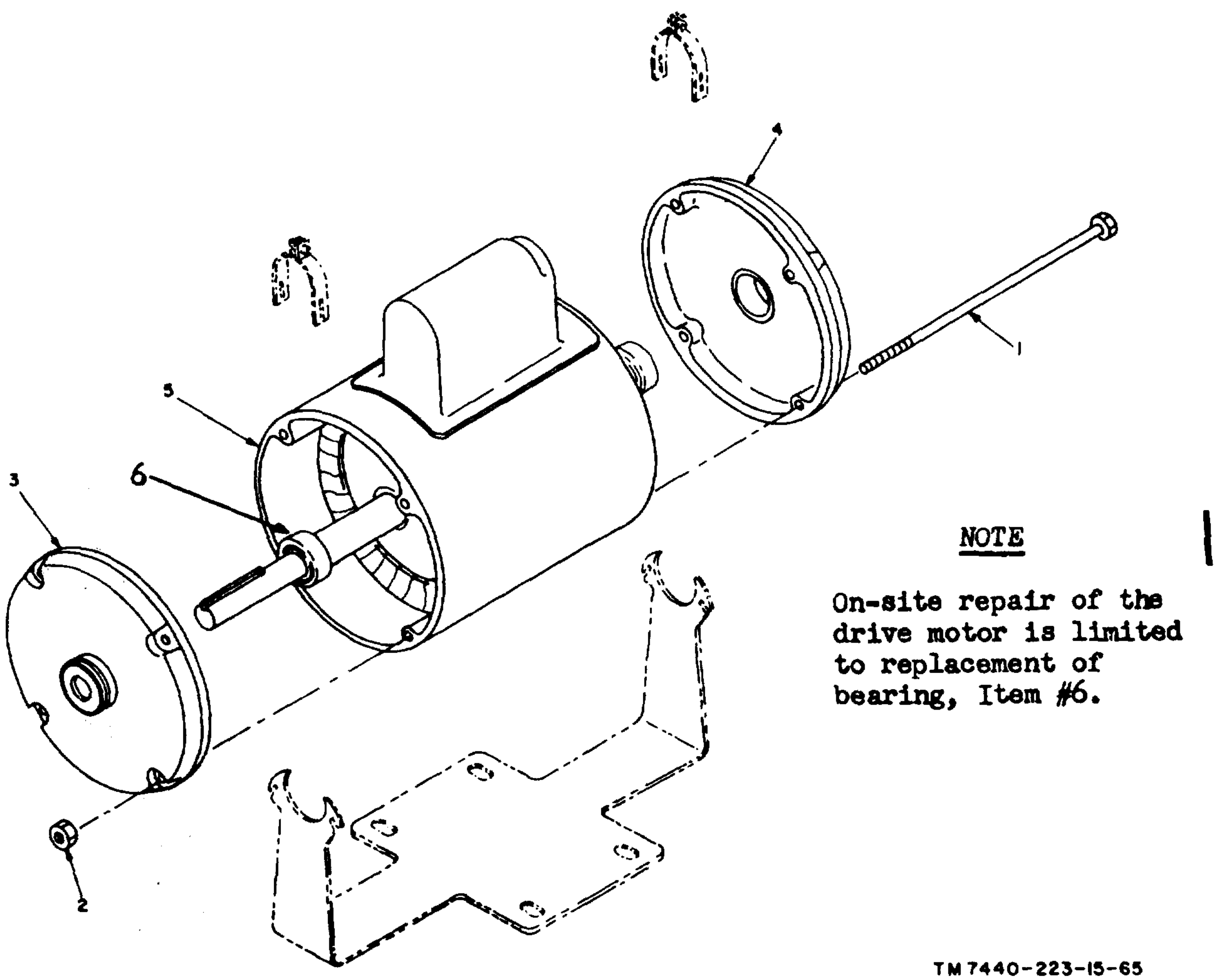
Ground the motor's AC terminals to prevent shock from the starting capacitors.

d. Reinstall terminal access cover plate and connect drive belts.

4-50. Disassembly and Reassembly of Drive Motor

a. Disassembly. Disassemble drive motor (412, fig. 4-11) by following the sequence of index numbers In figure 4-21.

b. Reassembly. To reassemble drive motor (412, fig. 4-11), reverse the disassembly procedure in *a* above.



1 Screw
2 Nut
3 Front end housing
4 Rear end housing
5 Main housing
6 Bearing

4-21. Drive motor, exploded view.

4-51. Removal and Replacement of Alternator

a. Removal. Remove the alternator (421, fig. 4.11) as follows:

(1) Roll out frame assy (1, fig. 4-4) as described in paragraph 4-20.

(2) Disconnect the power cable.

(3) Remove the belt (406, fig. 4-11) from the alternator pulley (417).

(4) Loosen setscrew (416) and carefully slide the alternator pulley (417) off the alternator shaft.

(5) Remove the four screws (418), lockwashers (414), and washers (415), and carefully lift the alternator (421) off the motor and alternator mounting plate (423).

b. Replacement. To replace the alternator, reverse the removal procedure in *a* above. After replacement, adjust belt tension as outlined in paragraph 4-119.

4-52. Disassembly and Reassembly of Alternator (fig. 4-22)

a. Disassembly. Disassemble the alternator (421, fig. 4-11) as follows:

(1) Remove the four nuts, washers, and through bolts (1, 2, and 3, fig. 4-22).

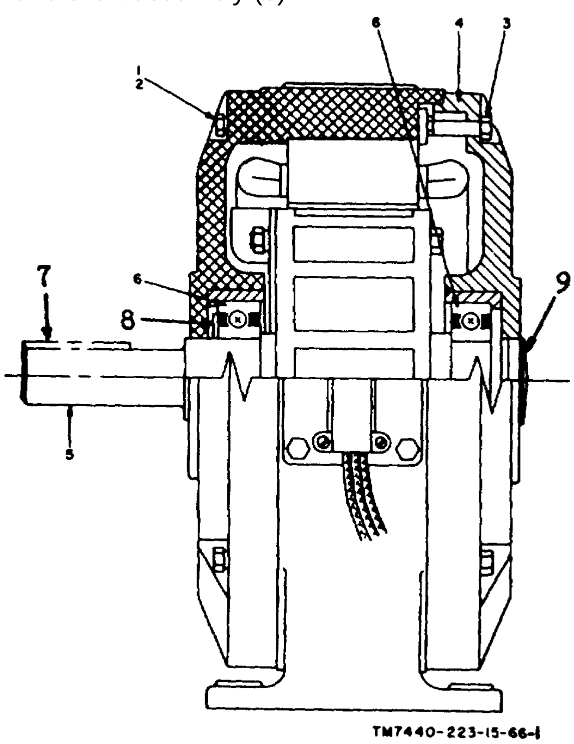
(2) Set the alternator upright on the shaft end. Use a wood or hard rubber block to protect the shaft.

(3) Lift the alternator to a height of 4 to 6 inches and drop it on the shaft, taking care to support the rotor and shaft assembly (5) so that it does not fall to the side. This shock is necessary to overcome the magnetic attraction of the rotor.

CAUTION

In the following step, take care to prevent the rotor from damaging the winding. Wrap the rotor with paper, and keep it away from tools and other magnetic material.

(4) Remove the end bell (4) and lift out the rotor and shaft assembly (5).



1. Nut
2. Lockwasher
3. Through bolt
4. End bell
5. Rotor and shaft assembly
6. Ball bearing
7. Key
8. Spring washer
9. Plug
9. Plug

Figure 4-22. Alternator, assembly details.

CAUTION

Never remove a bearing that is not to be replaced by a new one.

(5) If bearings (6) are to be replaced, remove them with a standard bearing puller.

b. Reassembly. To replace bearings (6, fig. 4-22), press only on the inside race.

(1) Lay the alternator frame flat (shaft side down) over a hole or slot to allow space for the shaft to protrude.

(2) Remove the protective paper from the rotor and shaft assembly (5), and wipe off any dirt or other foreign matter.

WARNING

In the following step, magnetic attraction may suddenly pull the rotor and shaft assembly. Exercise caution to keep fingers from being pinched, and to prevent the rotor and shaft assembly from damaging the winding.

(3) Gently lower the rotor and shaft assembly (5) into place.

(4) Reinstall the end bell (4), through bolts (3), lockwashers (2), and nuts (1). Tighten the through bolts alternately.

(5) Turn the shaft by hand to check for ease of rotation. U the shaft does not turn freely, tap the bearing housings lightly with a rubber mallet to relieve binding.

4-53. Removal and Replacement of Cable Assembly W11

a. Removal. Remove cable assembly W11 (429, fig. 4-11) as follows:

(1) Roll out frame assy (1, fig. 4-4) as described in paragraph 4-20.

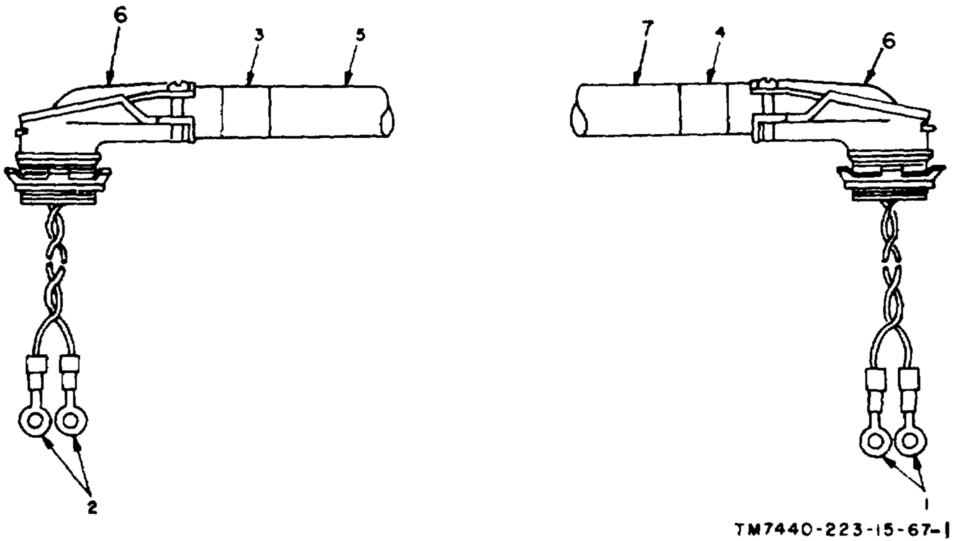
(2) Carefully disconnect one end of cable assembly W11 from distribution box (439) and the other end from drive motor (412).

b. Replacement. To replace cable assembly W11, reverse the removal procedure in *a* above.

4-54. Disassembly and Reassembly of Cable Assembly W11

a. Disassembly. Disassemble cable assembly W11 (429, fig. 4-11) by following the sequence of index numbers in figure 4-23..

b. Reassembly. To reassemble cable assembly W11, reverse the disassembly procedure in *a* above.



1. Terminal
2. Terminal
3. Cable marker
4. Cable marker
5. Conduit (consists of 6 and 7)
6. Connector
7. Conduit

Figure 4-23. Cable assembly W11, component location diagram.

4-55. Removal and Replacement of Internal Paper Storage Basket A2A3

a. Removal. Remove the internal paper storage basket (12, fig. 4-5) as follows:

(1) Open the two doors at the front of the frame assembly (1, fig. 4-4), remove the cable from the paper low switch, and release the fasteners at the bottom of the basket.

(2) Carefully lift the internal paper storage basket straight up from the bottom of the electrical equipment frame.

b. Replacement. To replace the internal paper storage basket, reverse the removal procedure in a above.

4-56. Disassembly and Reassembly of Internal Paper Storage Basket A2A3

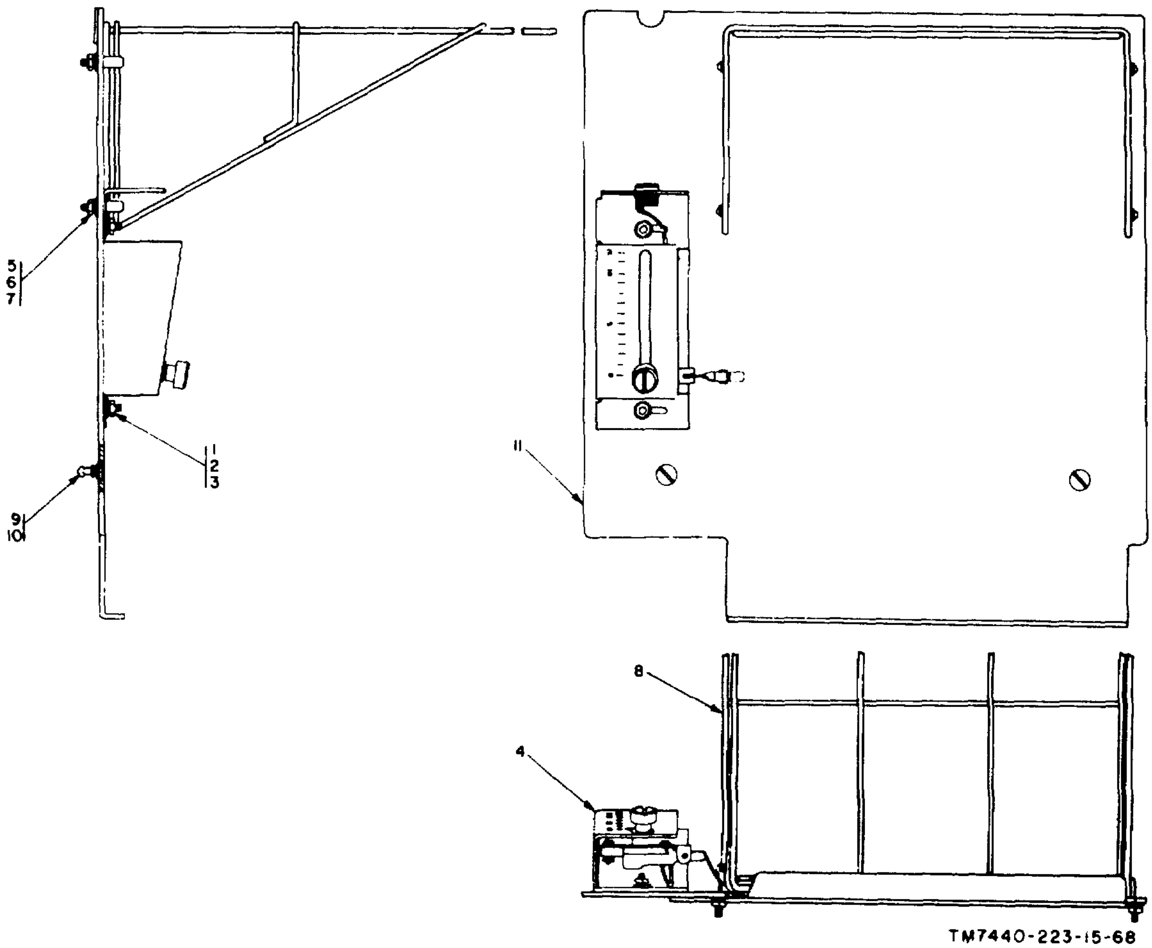
a. Disassembly. Disassemble the paper low storage basket (12, fig. 4-5) as follows:

(1) Remove the two nuts (1, fig. 4-24), lockwashers (2), and washers (3), and separate paper low switch subassembly (4) from internal paper tray (11).

(2) Remove the four nuts (5), lockwashers (6), and washers (7), and separate internal paper guide (8) from internal paper tray (11).

(3) Remove the two stud fasteners (9) and split retainers (10) from internal paper tray (11).

b. Reassembly. To reassemble the internal paper storage basket, reverse the disassembly procedure in a above.



1	Nut, hex., No. 8-32	7	Washer, flat, No. 8
2	Lockwasher, No. 8	8	Internal paper guide
3	Washer, flat, No. 8	9	Stud fastener
4	Paper low switch subassembly	10	Split retainer
5	Nut, hex., No. 8-32	11	Internal paper tray
6	Lockwasher, No. 8		

Figure 4-24. Internal paper storage basket, component location diagram.

4-57. Removal and Replacement of Paper Low Switch Subassembly

a. Removal. Remove the paper low switch subassembly (4, fig. 4-24) as follows:

(1) Remove the internal paper storage basket (12, fig. 4-5) as described in paragraph 4-55.

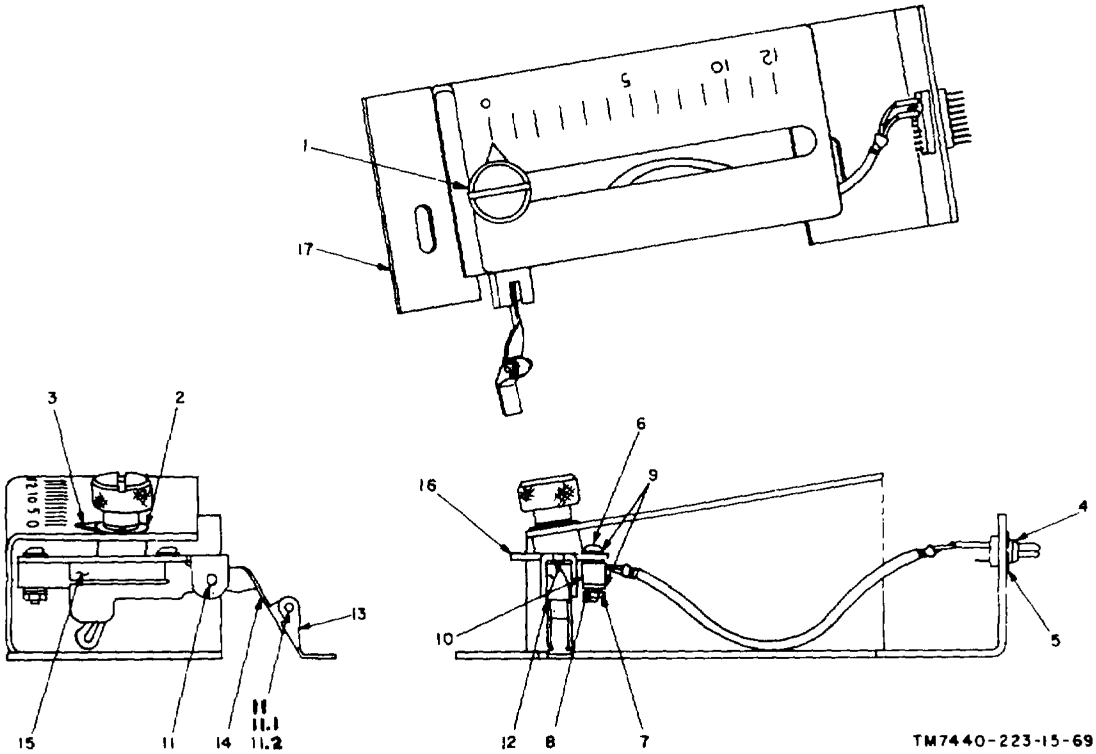
(2) Remove the two nuts (1, fig. 4-24), lockwashers (2), and washers (3), release stud fasteners (9) 1/4 turn and lift the paper low switch subassembly (4) from the internal paper tray (11).

b. Replacement. To replace the paper low switch subassembly reverse the removal procedure above.

4-58. Disassembly and Reassembly of Paper Low Switch Subassembly

a. Disassembly. Disassemble the paper low switch subassembly (4, fig. 4-24) by following the sequence of index numbers in figure 4-25.

b. Reassembly. To reassemble the paper low switch subassembly, reverse the disassembly procedure in *a* above.



1	Threaded knob	10	Magnetic limit switch
2	Lockwasher, No. 10	11	Roll pin
3	Paper low switch indicator	11.1	Washer
4	Module 9-pin plug	11.2	Roll pin
5	Connector retainer	12	Not used
6	Screw, panhead, No. 2-56, ½ in. Long	13	Operating lever extension link
		14	Switch actuating lever
7	Nut, hex, No. 2-56	15	Actuator magnet
8	Lockwasher, No. 2	16	Adjustable mounting plate
9	Washer, flat, No. 2	17	Paper low switch support

Figure 4-25. Paper low switch subassembly, component location diagram.

4-59. Removal and Replacement of Electronic Assembly A2A2

a. Removal. Remove electronic assembly A2A2 (13, fig. 4-5) as follows:

(1) Remove frame assembly (1, fig. 4-4) as described in paragraph 4-20.

(2) Disconnect the electrical leads and cables.

(3) Remove the four knurled head screws which mount electronic assembly A2A2 to the electrical equipment frame (14).

b. Replacement. To replace electronic assem bly A2A2, reverse the removal procedure in *a* above.

4-60. Disassembly and Reassembly of Electronic Assembly A2A2

a. Disassembly. Disassemble electronic assembly A2A2 (13, fig. 4-5) as follows:

(1) Disconnect all leads.

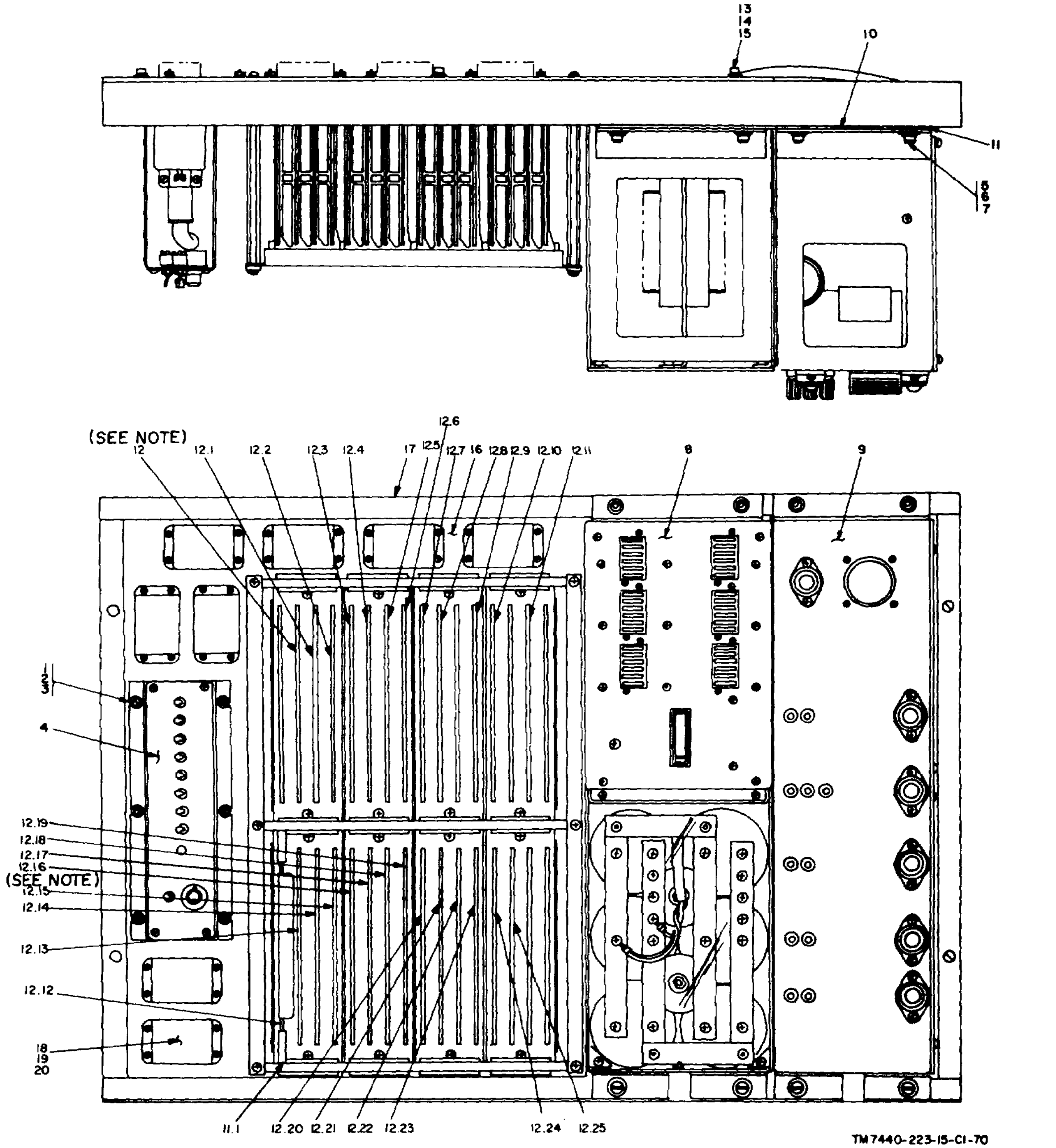
(2) Remove the six screws (1, fig. 4-26), lockwashers (2), and washers (3), and separate electrical equipment test panel (4) from electronic assembly frame (17).

(3) Remove the four screws (5), lockwashers (6), and washers (7), and separate capacitor assembly (8) and power supply rectifier unit (9) from electronic assembly frame (17).

(4) Remove the two screws (10), strip filler (11), and PC card kit buffer logic (12) from electronic assembly frame (17).

(5) Remove the seven screws (13), lockwashers (14), and washers (15), and separate logic and control assembly (16) from electronic assembly frame (17).

b. Reassembly. To reassemble electronic assembly A2A2, reverse the disassembly procedure in *a* above.



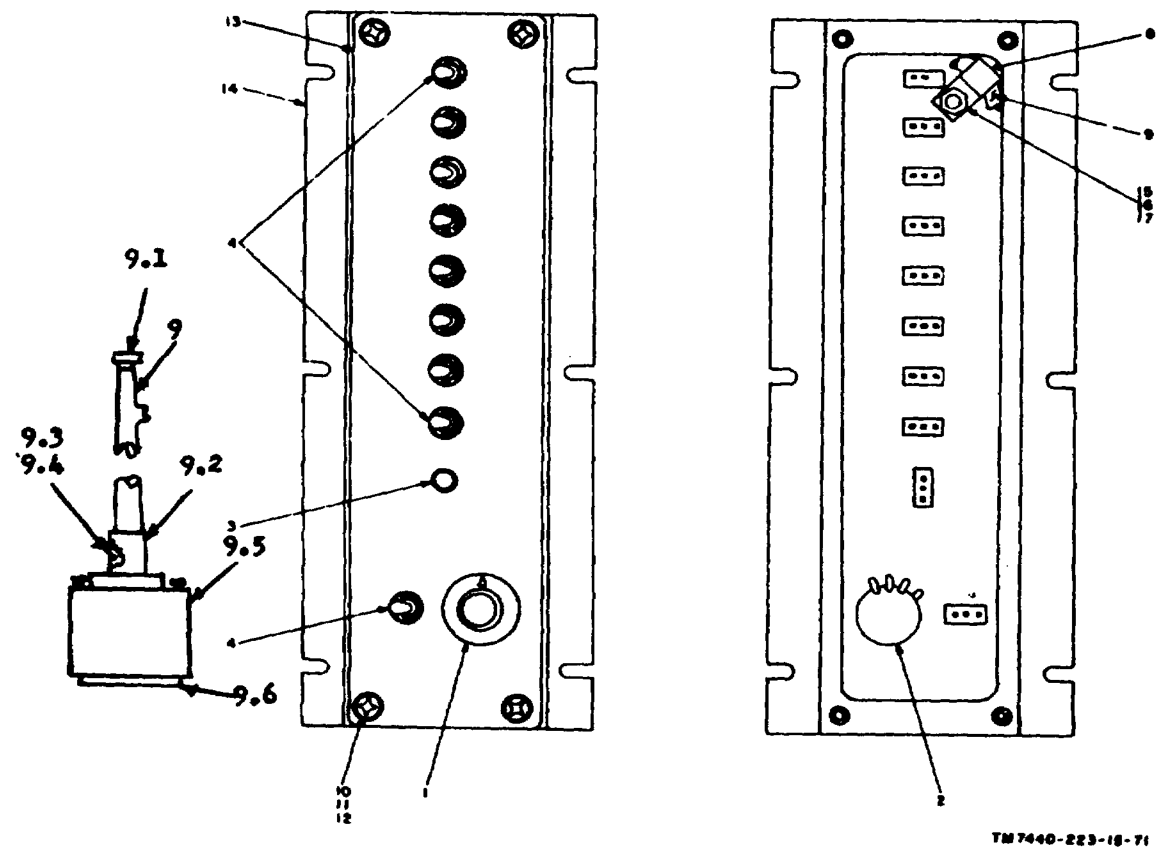
NOTE

MWO 11-7440-223-30/1 modifies items 12 ad 12.16 and changes their part numbers (see fig. 5-9 and 5-12).

Figure 4-26. Electronic assembly, A2A2, component location diagram.

Legend for Figure 4-26

1	Screw, panhead, No. 6-32, 1/2 In. long	12.4	PC card A5	12.20	PC card B8
2	Lockwasher, No. 6	12.5	PC card A6	12.21	PC card B9
3	Washer, flat, No. 6	12.6	PC card A7	12.22	PC card B10
4	Electrical equipment test panel	12.7	PC card A8	12.23	PC card B11
5	8S , socket head, 1/4-20, 5/8 in. long	12.8	PC card A9	12.24	PC card B12
6	Lockwasher, 1/4 inch	12.9	PC card A11	12.25	PC card B13
7	Washer, flit, 1/4 Inch	12.10	PC card A12	13	Screw, socket head, No. 10-32, 5/8 in. long
8	Capacitor assembly	12.11	PC card A14		
9	Power supply rectifier unit	12.12	PC card B0	14	Lockwasher, No. 10
10	Screw, flathead, No. 6-32, 3/8 in. long	12.13	PC card B1	15	Washer, flat, No. 10
11	Strip filler	12.14	PC card B2	16	Logic and control assembly
11.1	PC card kit (consists of 12 through 12.25)	12.15	PC card B3	17	Electronic assembly frame
12	PC card A1	12.16	PC card B4	18	Contact, electrical
12.1	PC card A2	12.17	PC card B5	19	Contact, electrical
12.2	PC card A3	12.18	PC card B6	20	Contact, electrical
12.3	PC card A4	12.19	PC card B7		



1	Skirted knob	8	Cable clamp	9.6	Contact, electrical
2	Rotary switch	9	Maintenance panel cable	10	Screw, panhead, No. 6-32, 7/16 in. Long
3	Pushbutton switch	9.1	Connector plug P2	11	Lockwasher, No. 6
4	Toggle switch	9.2	Bushing, telescoping	12	Washer, flat, No. 6
5	Nut, hex., No. 6-32	9.3	Bushing, telescoping	13	Electrical test panel
6	Lockwasher, No. 6	9.4	Bushing, telescoping	14	Electrical test panel support
7	Washer, flat, No. 6	9.5	Connector plug P1		

Figure 4-27. Electrical equipment test panel, component location diagram.

4-61. Removal and Replacement of Electrical Equipment Test Panel

a. Removal. Remove the electrical equipment test panel (4, fig. 4-26) as follows:

(1) Roll out frame assembly (1, fig. 4-4) as described in paragraph 4-20 and open front doors.

(2) Disconnect the leads.

(3) Remove the six screws (1, fig. 4-26), lockwashers (2), and washers (3), and carefully separate the electrical equipment test panel (4) from the electronic assembly frame (17).

b. Replacement. To replace the electrical equipment test panel, reverse the removal procedure in *a* above.

4-62. Disassembly and Reassembly of Electrical Equipment Test Panel

a. Disassembly. Dis-assemble the electrical equipment test panel (4, fig. 4-26) by following the sequence of index numbers in figure 4-27.

b. Reassembly. To reassemble electrical equipment test panel, reverse the disassembly procedure in *a* above.

WARNING

Before working on or around the capacitor subassembly, be sure to remove any hazardous charge on the capacitors by shorting the capacitor bus bars (9 and 10, fig. 4-28).

4-63. Removal and Replacement of Capacitor Assembly

a. Removal. Remove the capacitor assembly (8, fig. 4-26) as follows:

(1) Remove the electronic assembly (13, fig. 4-5) as described in paragraph 4-59.

(2) Disconnect the leads.

(3) Remove the two screws (5, fig. 4-26), lockwashers (6), and washers (7), release stud fasteners (30, fig. 4-28) 1/4 turn and carefully separate the capacitor assembly (8) from the electronic assembly (17).

b. Replacement. To replace the capacitor assembly, reverse the removal procedure in a above.

4.64. Disassembly and Reassembly of Capacitor Assembly

a. Disassembly. Disassemble the capacitor assembly (8, fig. 4-26) by following the sequence of index numbers in figure 4-28.

b. Reassembly. To reassemble the capacitor assembly, reverse the disassembly procedure in *a* above.

LEGEND FOR FIGURE 4-28

1 Screw, panhead, No. 6-32, 3/8 in. long
2 Lockwasher, No. 6
3 Washer, flat, No. 6
4 Capacitor assembly cover
5 Nut, hex., No. 8-32
6 Lockwasher, No. 8
7 Washer. flat, No. 8
8 Short bus bar
9 Bus bar
9.1 Bus bar
9.2 Deleted
9.3 Screw, panhead, 10-32, 7/16 in long
9.4 Lockwasher, No. 10
9.5 Screw, panhead, 8-32, 1/4 in. long
9.6 Lockwasher, No. 8
10 Bus bar
10.1 Bus bar
11 Fuse , 1 amp
12 Fuse, 2 amp
13 Screw, flathead, No. 6-32, 3/8 in. long
14 Capacitor assembly partition
15 Fuse and resistor assembly
16 Threaded rod
17 Nut, hex., No. 1/4-20
18 Washer, flat, No. 1/4
19 Retaining washer
20 Nut, hex., No 1/4-20
21 Capacitor, 50,000 µf
22 Screw, panhead, No. 8-32, 1 1/8 in. long
23 Nut, hex., No. 8-32
24 Lockwasher, No. 8
25 Washer flat, No. 8
26 Case leg
27 Grommet
28 Grommet
29 Electrical equipment chassis
30 Stud fastener
31 Split retainer

NOTE
Use a 1-amp fuse in the spare slot.

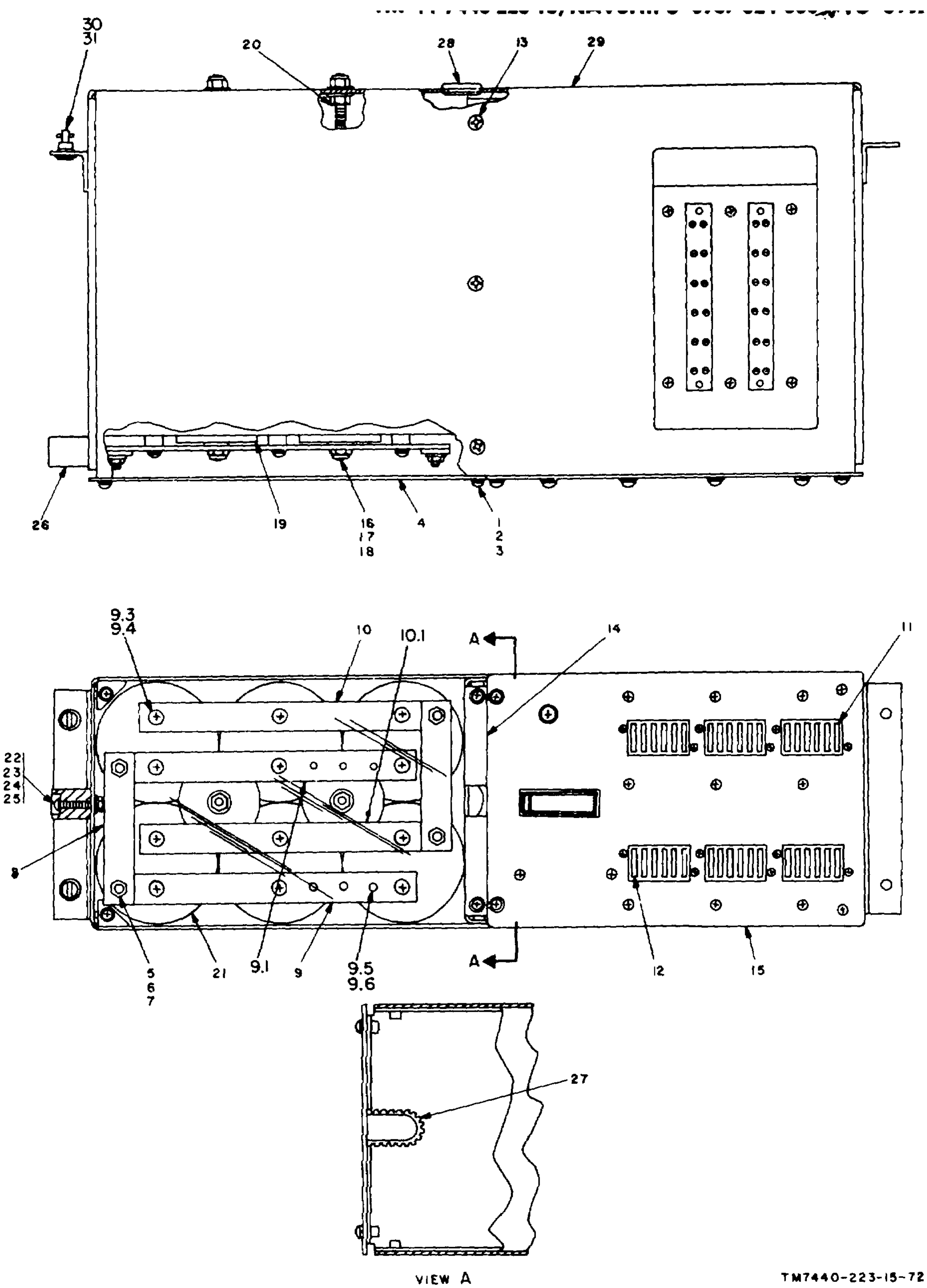


Figure 4-28. Capacitor assembly, component location diagram.

4-65. Removal and Replacement of Fuse and Resistor Assembly

a. Removal. Remove the fuse and resistor assembly (15, fig. 4-28) as follows:

(1) Remove the capacitor assembly (8. fig. 4-26) as described in paragraph 4-63.

(2) Disconnect the leads.

(3) Remove the four screws (1), lockwashers (2), and washers (3), and separate the fuse and resistor assembly (15) from the electrical equipment chassis (29).

b. Replacement. To replace the fuse and resistor assembly, reverse the removal procedure in *a* above.

4-66. Disassembly and Reassembly of Fuse and Resistor Assembly

a. Disassembly. Disassemble the fuse and resistor assembly (15, fig. 4-28) by following the sequence of index numbers in figure 4-29.

b. Reassembly. To reassemble the fuse and resistor assembly, reverse the disassembly procedure in *a* above.

LEGEND FOR FIGURE 4-29

1 Screw, panhead, No. 4-40, 1/2 in. long
1.1 Screw, panhead, No. 4-40, 3/8 in. long
2 Nut, hex, No. 4-40
2.1 Nut, hex, No. 4-40
3 Lockwasher, No. 4
4 Washer, flat. No. 4
5 Common fuse
6 Screw, panhead, No. 6-32, 5/8 in. long
7 Lockwasher-, No. 6
8 Washer, flat, No. 6
9 Resistor
10 Resistor
11 Screw, panhead, No. 6-32, 3/8 in. long
12 Lockwasher, No. 6
13 Washer, flat, No. 6
14 Left-hand bus bar assembly
15 Resistor mounting bracket
16 Right-hand bus bar assembly
17 Screw, panhead, No. 6-32, 3/8 in. long
18 Lockwasher, No. 6
19 Washer, flat, No. 6
20 Instrument meter(capacitor bank status)
21 Electronic component assembly
22 Screw, panhead, No. 10-32, 1/2 in. long
23 Nut, hex., No. 10-32
24 Lockwasher, No. 10
25 Washer, flat, No. 10
26 Cable clamp
27 Fuse and resistor cable assembly
28 Fuse and capacitor harness
28.1 Terminal lug
29 Electrical components mounting plate
30 Nut, cap, nylon, No. 6-32

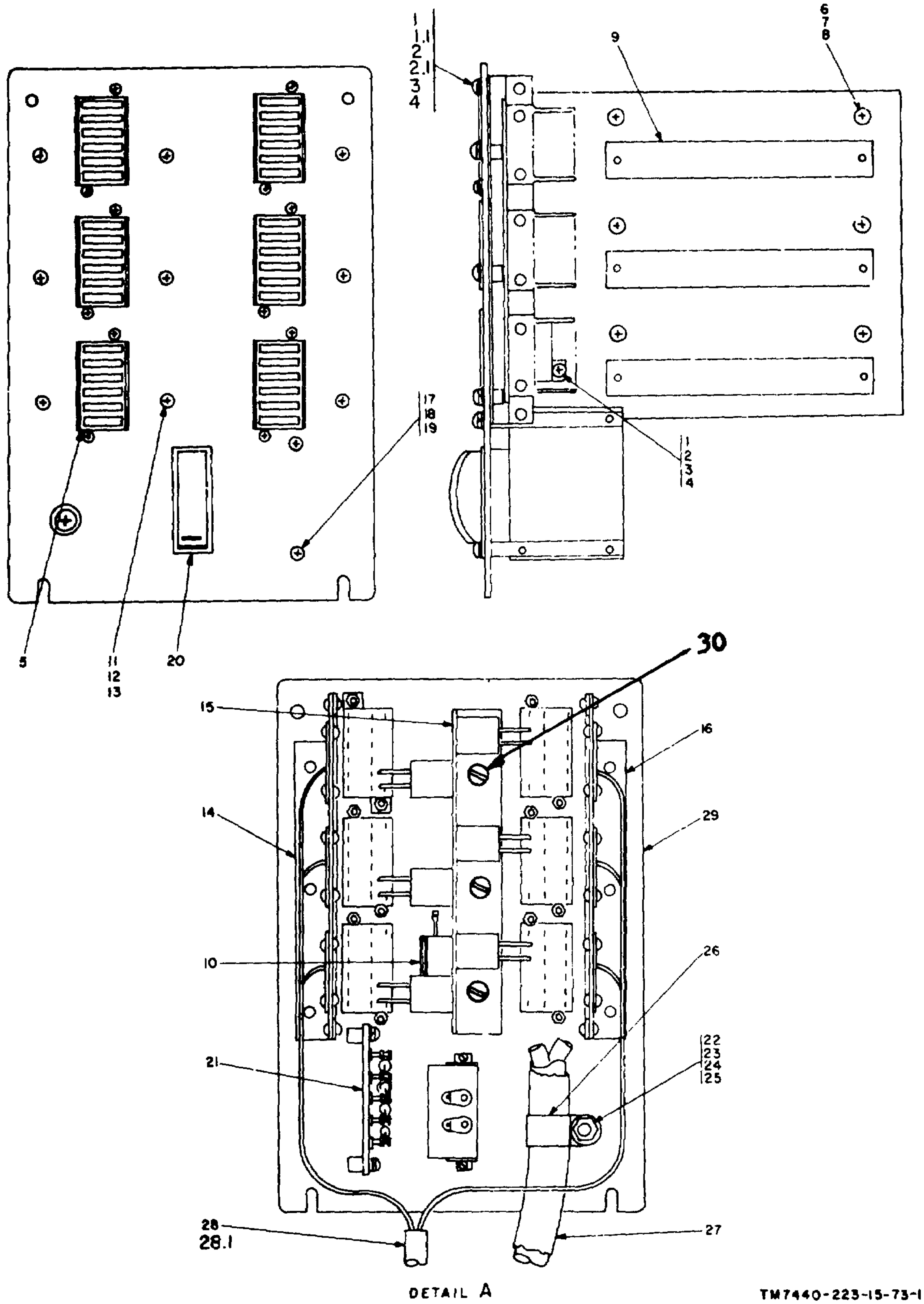


Figure 4-29. Fuse and resistor assembly, component location diagram.

4-67. Removal and Replacement of Electronic Component Assembly

a. Removal. Remove the electronic component assembly (21, fig. 4-29) as follows:

(1) Remove the fuse and resistor assembly (15, fig. 4-28) as described in paragraph 4-65.

(2) Disconnect the leads.

(3) Remove the two screws (17), lockwashers (18), and washers (19), and separate the electronic component assembly (21) from the electrical components mounting plate (29).

b. Replacement. To replace the electronic component assembly, reverse the removal procedure in *a* above.

4-68. Disassembly and Reassembly of Electronic Assembly

a. Disassembly. Disassemble the electronic component assembly (21, fig. 4-29) by following the sequence of index numbers in figure 4-30.

b. Reassembly. To reassemble electronic component assembly, reverse the disassembly procedure in a above.

4-69. Removal and Replacement of Fuse and Resistor Cable Assembly

a. Removal. Remove the fuse and resistor cable assembly (27, fig. 4-29) as follows:

(1) Remove the fuse and resistor assembly (15, fig. 4-28) as described in paragraph 4-65.

(2) Disconnect the cable.

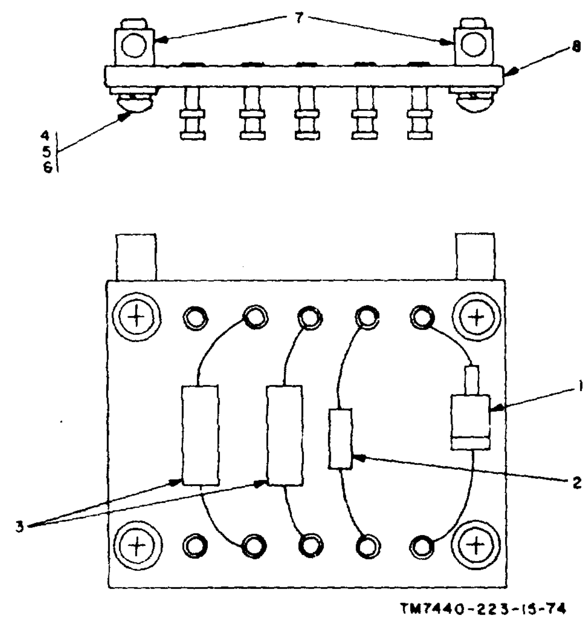
(3) Remove screw (22, fig. 4-29), nut (23), lockwasher (24), washer (25), and cable clamp (26), and separate the fuse and resistor cable assembly (27) from the electrical components mounting plate (29).

b. Replacement. To replace the fuse and resistor cable assembly, reverse the removal procedure in *a* above.

4-70. Disassembly and Reassembly of Fuse and Resistor Cable Assembly

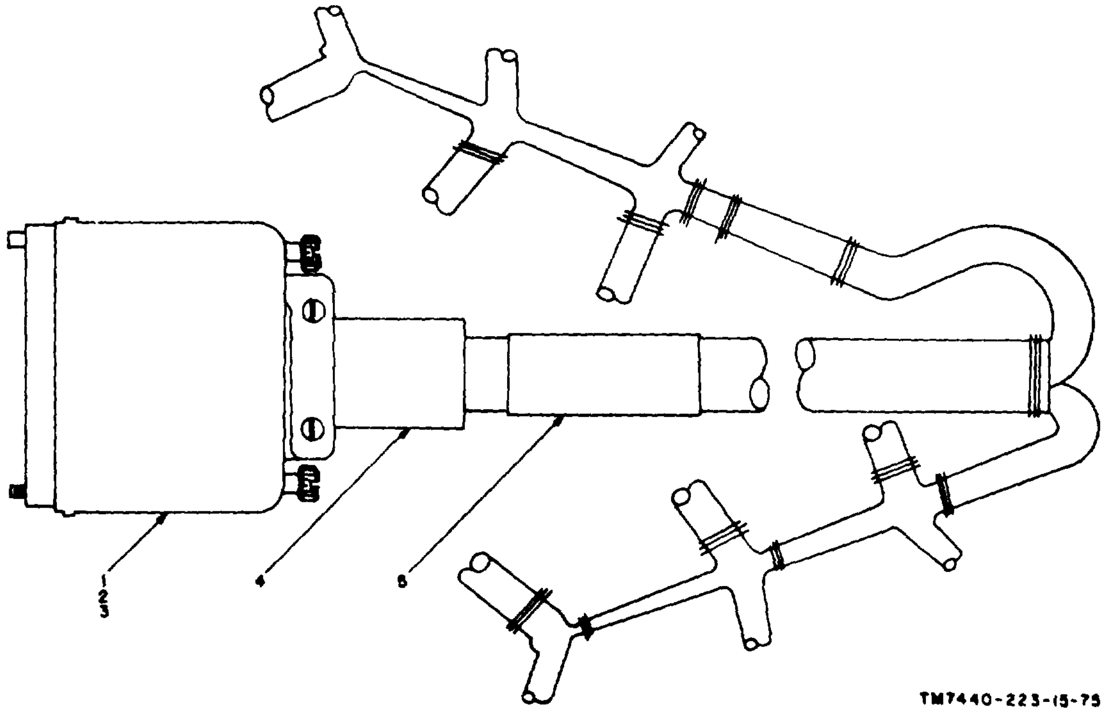
a. Disassembly. Disassemble the fuse and resistor assembly (27, fig. 4-29) by following the sequence of index numbers in figure 4-31.

b. Reassembly. To reassemble fuse and resistor cable assembly, reverse the disassembly procedure in *a* above.



1 Zener diode
2 Resistor
3 Resistor
4 Screw, panhead, No. 4-40, 1/2 in. long
5 Lockwasher, No. 4
6 Washer, flat, No. 4
7 Electronic component assembly support
8 Terminal board

Figure 4-30. Electronic component assembly, component locating diagram



1 Plug and receptacle connector assembly
2 Contact
3 Contact
4 Bushing
5 Cable marker

Figure 4-31. Fuse and resistor cable assembly, component location diagram.

4-71. Removal and Replacement of Power Supply Rectifier Unit

a. Removal. Remove the power supply rectifier unit (9, fig. 4-26) as follows:

(1) Roll out frame assembly (1, fig. 4-4) as described in paragraph 4-20 and open the front doors.

(2) Disconnect the cable assemblies from J1, J2, and J3 on power supply rectifier unit (9, fig. 4-26).

(3) Remove the two screws (5), lockwashers (6), and washers (7), then release stud fasteners (52, fig. 4-32) i turn and carefully separate the power supply rectifier unit (9) from the electronic assembly frame (17).

b. Replacement. To replace the power supply rectifier unit, reverse the removal procedure in a above.

4-72. Disassembly and Reassembly of Power Supply Rectifier Unit

a. Disassembly. Disassemble the power supply rectifier unit (9, fig. 4-26) by following the sequence of index numbers in figure 4-32.

b. Reassembly. To reassemble the power supply rectifier unit, reverse the disassembly procedure in a above.

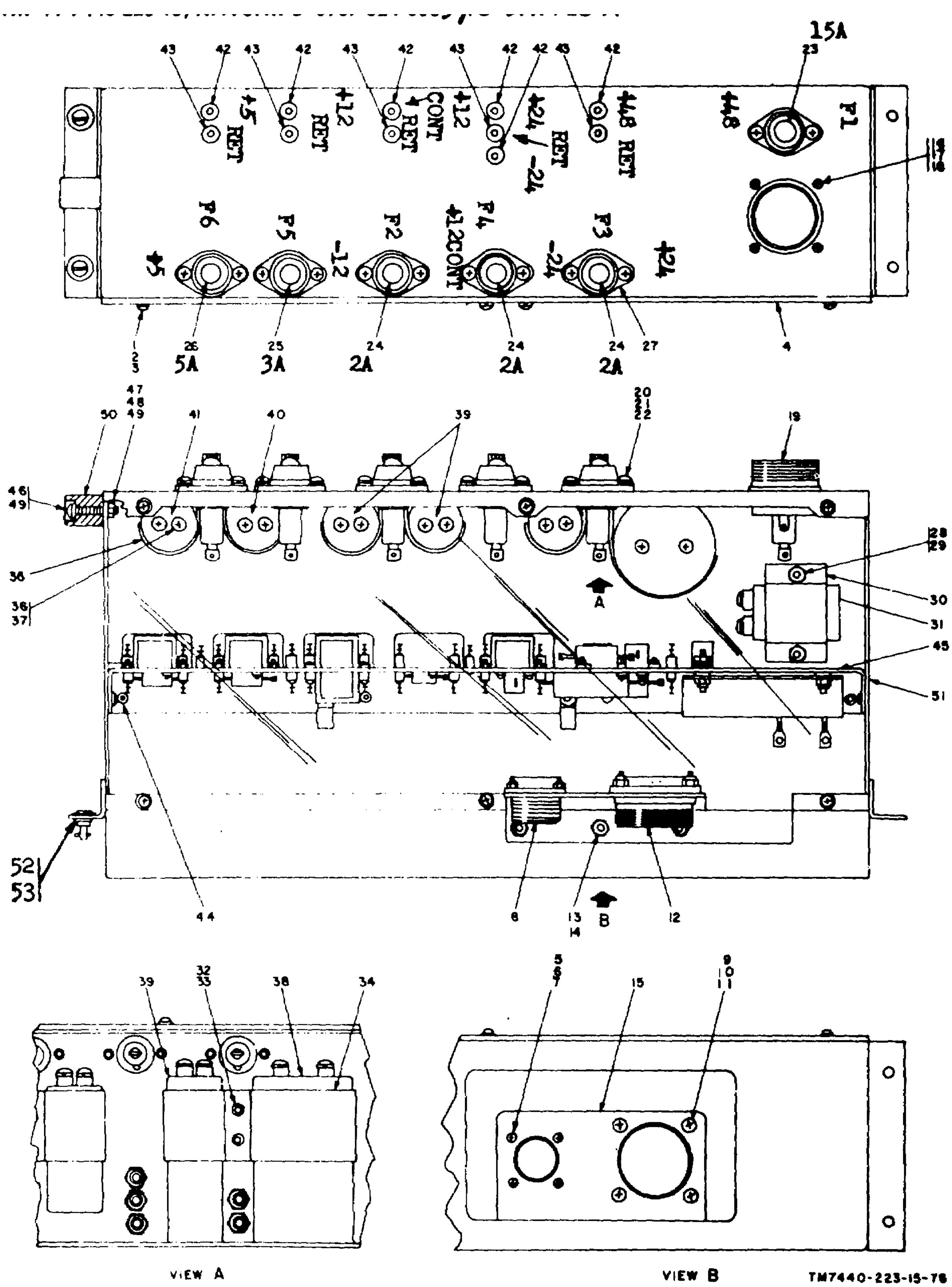


Figure 4-32. Power supply rectifier unit, component location diagram.

LEGEND FOR FIGURE 4-32

1 Screw, panhead, No. 6-32, 3/8 in. long
2 Lockwasher, No. 6
3 Washer, flat, No. 6
4 Power rectifier unit cover
5 Screw, flathead, No. 4-40, 1/2 in. long
6 Nut, hex., No. 4-40
7 Washer, flat, No. 4
8 Receptacle connector (J3)
9 Screw, flathead, No. 8-32, 9/16 in. long
10 Nut, hex., No. 8-32
11 Washer, flat, No. 8
12 Receptacle connector (J2)
13 Nut, hex., No. 8-32
14 Washer, flat, No. 8
15 Power rectifier unit connector bracket
16 Screw, flathead, No. 4-40, 1/2 in. long
17 Nut, hex., No. 4-40
18 Washer, flat, No. 4
19 Receptacle connector (J1)
20 Screw, panhead, No. 8-32, 7/16 in. long
21 Lockwasher, No. 8
22 Washer, flat, No. 8
23 Fuse, 15 amp (F1)
24 Fuse, 2 amp (F2, F3, F4)
25 Fuse, 3 amp (F5)
26 Fuse, 5 amp (F6)
27 Fuseholder
28 Nut, hex., No. 8-32
29 Washer, flat, No. 8
30 Capacitor retainer
31 Capacitor, 550 µf, C7
32 Nut, hex., No. 8-32
33 Washer, flat, No. 8
34 Dual capacitor retainer
35 Dual capacitor retainer
36 Screw, panhead, No. 10-32, 3/8 in. long
37 Lockwasher, No. 10
38 Capacitor, 4,800 µf, C2
39 Capacitor, 4,000 µf, C1, C3, C4,
40 Capacitor, 6,600 µf, C6
41 Capacitor, 4,200 µf, C5
42 Binding post
43 Binding post
44 Screw, flathead, No. 8-32, 3/8 in. long
45 Electrical component subassembly
46 Screw, panhead, No. 8-32, 1 1/8 in. long
47 Nut, hex., No. 8-32
48 Lockwasher, No. 8
49 Washer, flat, No. 8
50 Case leg
51 Power rectifier unit chassis
52 Split retainer
53 Stud fastener

4-73. Removal and Replacement of Electrical Component Subassembly

a. Removal. Remove the electrical component subassembly (45, fig. 4-32) as follows:

(1) Remove the power supply rectifier unit (9, fig. 4-26) as described in paragraph 4-71.

(2) Disconnect the leads.

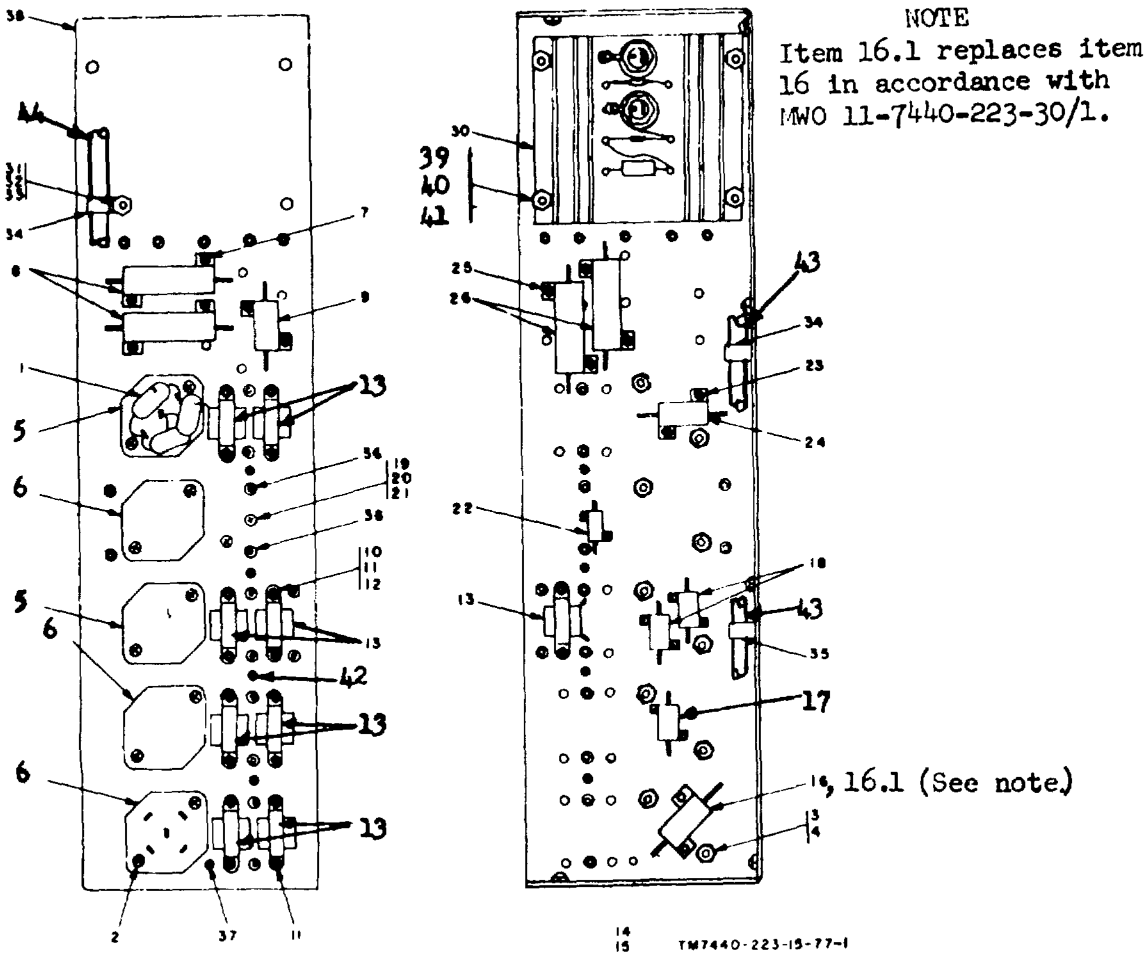
(3) Remove the six screws (44, fig. 4-32) and carefully separate the electrical component subassembly (45) from the power rectifier unit chassis (51).

b. Replacement. To replace the electrical component subassembly, reverse the removal procedure in *a* above.

4-74. Disassembly and Reassembly of Electrical Component Subassembly

a. Disassembly. Disassemble the electrical component subassembly (45, fig. 4-32) by following the sequence of index numbers in figure 4-33.

b. Reassembly. To reassemble the electrical component subassembly, reverse the disassembly procedure in a above.



1	Capacitors, C8, C9, & C10	21	Washer, flat, No. 2
2	Screw, cap, socket head, No. 6-32, 1 in. long	22	Resistor, 680 ohms R1
3	Nut, hex., 6-32	23	Nut, hex., No. 4-40
4	Washer, flat, No. 6	24	Resistor, 250 ohms R20
5	Bridge rectifier, CR2, CR3	25	Nut, hex., No. 4-40
6	Bridge rectifier, CR1, CR4, CR5	26	Resistor, 50 ohms, R11, R12
7	Nut, hex., No. 4-40	30	Power rectifier heat sink assembly
8	Resistor, 2 ohms, R9, R10	31	Nut, hex., No. 8-32
9	Resistor, 100 ohms, R8	32	Lockwasher, No. 8
10	Screw, panhead No. 4-40, 3/8 in. long	33	Washer, flat, No. 8
11	Nut, hex, No. 4-40	34	Cable clamp
12	Washer, flat No. 4	35	Cable clamp
13	Inductors, L1 thru L9	36	Terminal
14	Screw, flathead. No. 2-56, 5/16 in. long	37	Terminal
15	Nut. hex., No. 2-56	38	Electrical equipment mounting plate
16	Resistor, 10 ohms R5	39	Washer, locksplit, No. 8
16.1	Resistor, 4 ohms R5	40	Washer, small pattern, No. 8
17	Resistor, 60 ohms R6	41	Spacer, hex
18	Resistor, 80 ohms R4	42	Terminal
19	Screw, panhead, No. 2-56, 5/16 in. long	43	Wire harness
20	Nut, hex., No. 2-56	44	Wire harness

Figure 4-33. Electrical component subassembly, component location diagram.

4-75. Removal and Replacement of Power Rectifier Heat Sink Subassembly

a. Removal. Remove the power rectifier heat sink subassembly (30, fig. 4-33) as follows:

(1) Remove the electrical component subassembly (45, fig. 4-32) as described in paragraph 4-73.

(2) Disconnect the leads.

(3) Remove the four nuts (31, fig. 4-33), washer (32), and washer (33), and carefully separate the power rectifier heat sink subassembly (30) from the electrical equipment mounting plate (38).

b. Replacement. To replace the power rectifier heat sink subassembly, reverse the removal procedure in *a* above.

4-76. Disassembly and Reassembly of Power Rectifier Heat Sink Subassembly

a. Disassembly. Disassemble the power rectifier heat sink subassembly (30, fig. 4-33) by following the sequence of index numbers in figure 4-34.

b. Reassembly. To reassemble the power rectifier heat sink subassembly, reverse the disassembly procedure in *a* above.

4-77. Removal and Replacement of Logic and Control Assembly

a. Removal. Remove the logic and control assembly (16, fig. 4-26) as follows:

(1) Remove the electronic assembly (13, fig. 4-5) as described in paragraph 4-59.

(2) Disconnect the leads.

(3) Remove the seven screws (13, fig. 4-26), lockwashers (14), and washers (15), and separate the logic and control assembly (16) from the electronic assembly frame (17).

b. Replacement. To replace the logic and control assembly, reverse the removal procedure in *a* above.

4-78. Disassembly and Reassembly of Logic and Control Assembly

a. Disassembly. Disassemble the logic and control assembly (16, fig. 4-26) by following the sequence of index numbers in figure 4-35.

b. Reassembly. To reassemble the logic and control assembly, reverse the disassembly procedure in *a* above.

CAUTION: When replacing semiconductor components of the heatsink subassembly, clean the mating surfaces of the semiconductor and heatsink chassis and apply a light coat of Dow Corning DC 340 Silicone Grease to mating surfaces before mounting the semi conductor.

1 Resistor R7
2 Zener diode CR9
3 Silicon diode CRB
4 Silicon rectifier CR6
5 Silicon rectifier CR7
6 Terminal
7 Heat sink

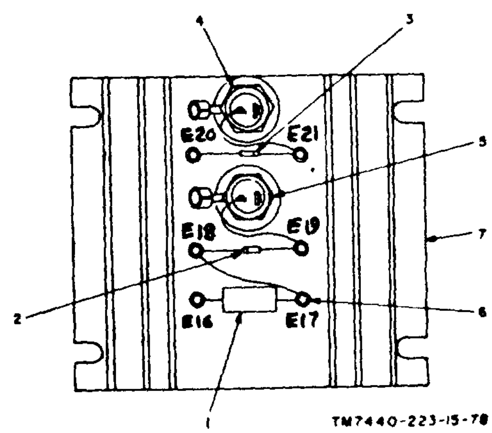


Figure 4-34. Power rectifier heat sink subassembly, component location diagram.

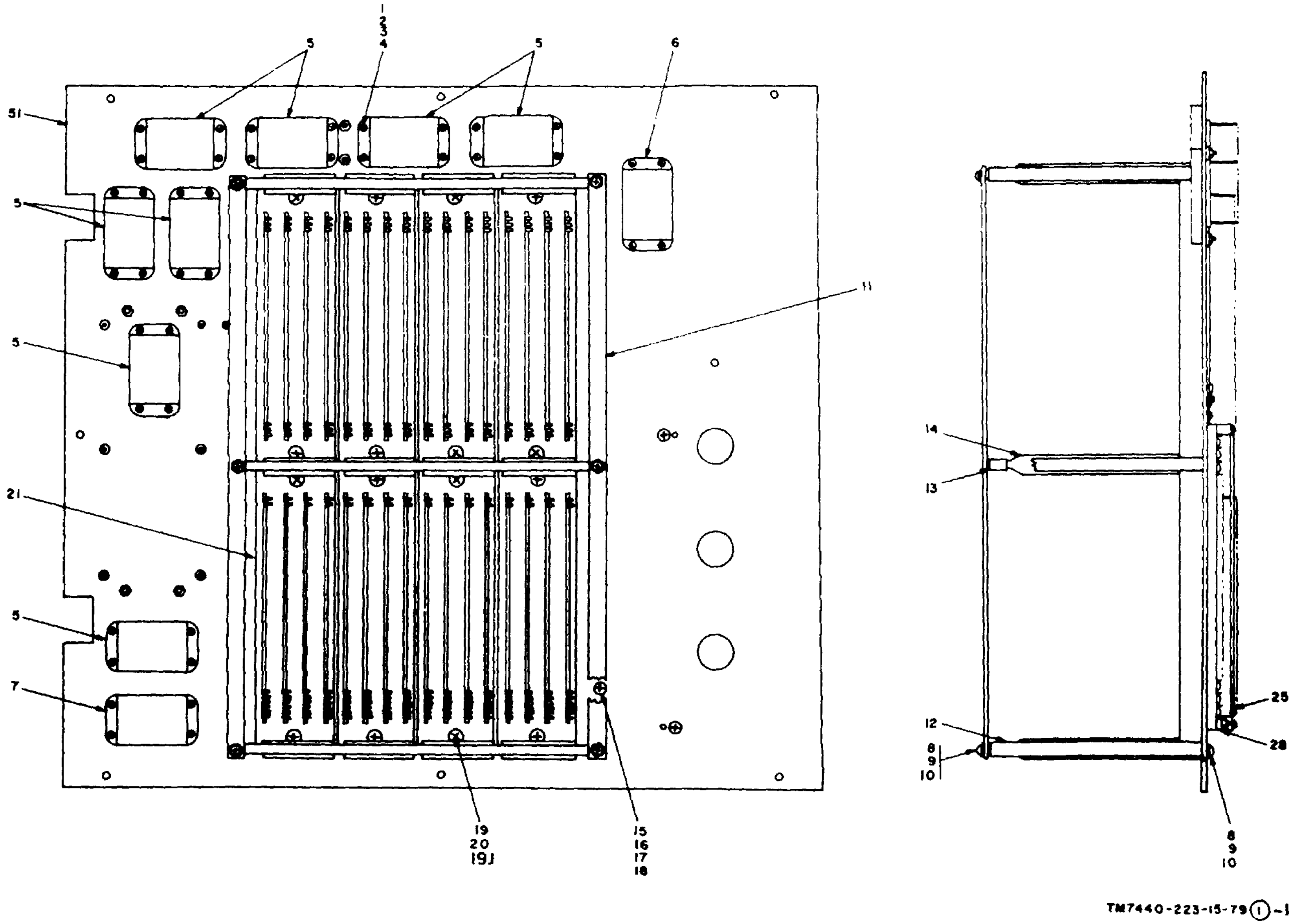


Figure 4-35 (1). Logic and control assembly, component location diagram (part 1 of 2).

LEGEND FOR FIGURE 4-35

1 Screw, panhead, No. 4-40, 7/16 in. long
2 Nut, hex., No. 4-40
3 Lockwasher, No. 4
4 Washer, flat, No. 4
5 Receptacle connector
6 Plug connector
7 Receptacle connector
8 Screw, panhead, No. 8-32, 1/2 in. long
9 Lockwasher, No.8
11 PC card guide support
12 Support post
13 Retainer channel
14 Printing wiring board guide
15 Screw, panhead, No. 6-32, 3/4 in. long
16 Nut, hex., No. 6-32
17 Lockwasher, No. 6
18 Washer, No. 6
19 Screw, panhead, No. 6-32, 7/8 in. long
19.1 Lockwasher, No. 6
20 Washer, flat, No. 6
21 Receptacle connector
22 Screw, panhead, No. 4-40, 3/8 in. long
23 Lockwasher, No. 4
24 Washer, flat, No. 4
25 Terminal board cover
26 Nut, hex., No.6-32

LEGEND FOR FIGURE 4-35 - Continued

27 Lockwasher, No. 6
28 Terminal strip spacer
29 Terminal block
30 Marker strip
30.1 Capacitor assembly
30.2 Capacitor, 5100 pf
30.3 Terminal lug
31 Screw, panhead, No. 6-32,1/2 in. long
32 Nut, hex., No. 6-32
33 Lockwasher, No. 6
34 Lockwasher, flat, No. 6
35 Strip Spacer
36 Bus bar subassembly
37 Screw, panhead, No. 6-32, 3/8 in. long
38 Lockwasher, No. 6
39 Screw, binding head, No. 6-32, 5/8 in. long
40 Washer, flat, No. 6 nylon
41 Nut, hex., No. 6-32
42 Lockwasher, No. 6
43 Washer, flat, No. 6
44 Spacer
45 Long bus bar
46 Short bus bar
47 Long bus bar
48 Decal
49 Cable clamp
50 Cable assembly (W8)
50.1 Cable marker
50.2 Cable marker
51 Electrical connector mounting plate

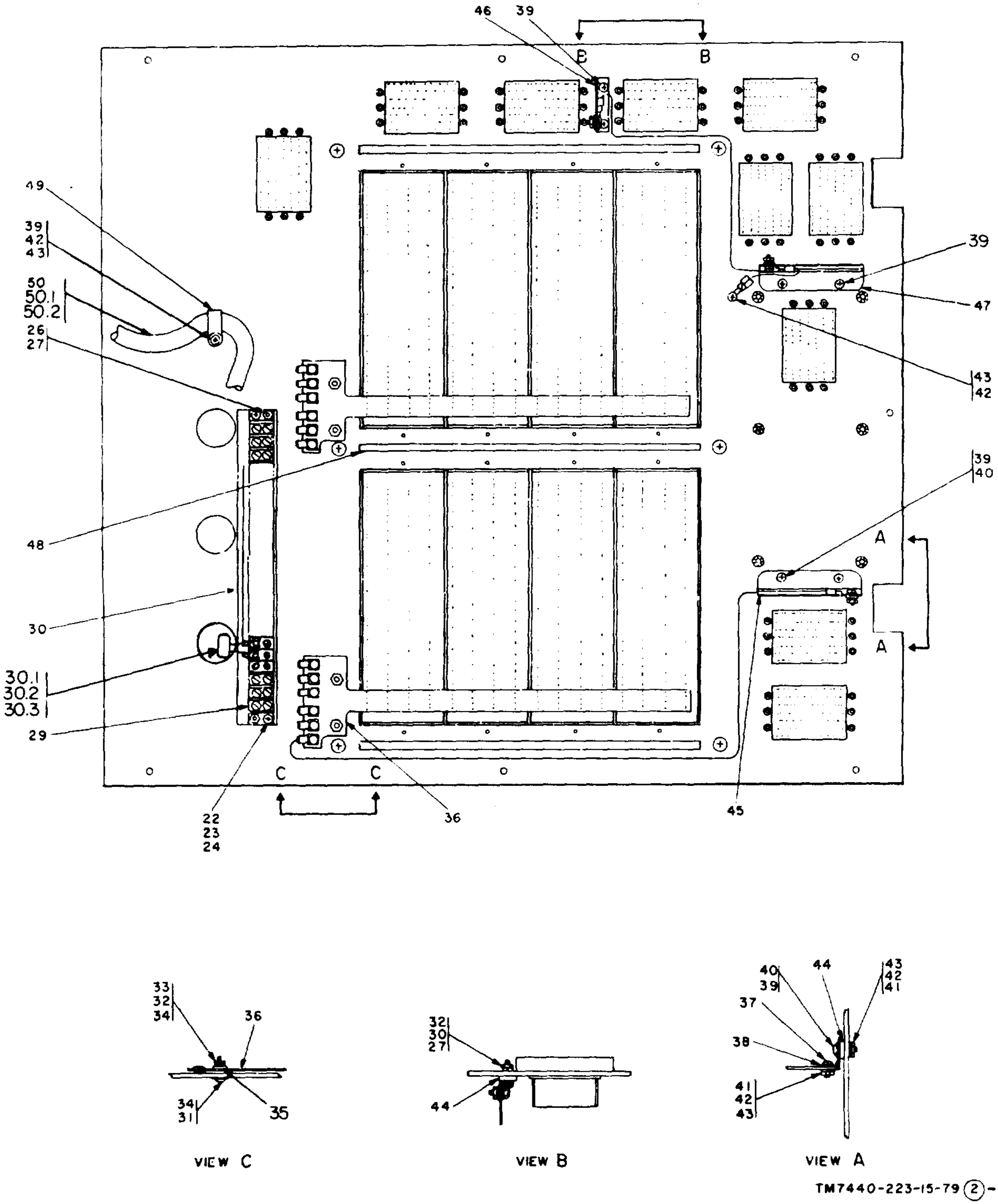


Figure 4-35 (2). Logic and control assembly, component location diagram (part 2 of 2).

4-79. Removal and Replacement of Cable Assembly W8

a. Removal. Remove cable assembly W8 (50, fig. 4-35) as follows:

(1) Remove the logic and control assembly 16. fig. 4-26) as described in paragraph 4-77.

(2) Disconnect the cable.

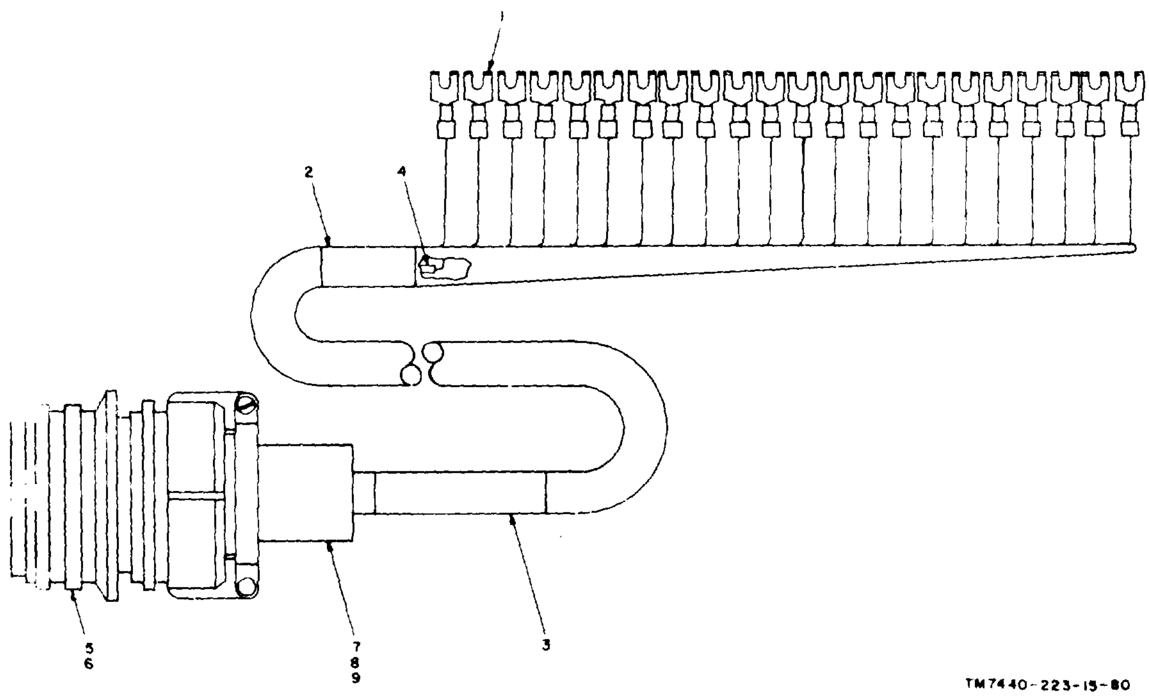
(3) Remove screw (39, fig. 4-35), lockwasher (42), washer (43), and cable clamp (49), and separate cable assembly W8 (50) from the electrical connector mounting plate (51).

b. Replacement. To replace cable assembly WS, reverse the removal procedure in *a* above.

4-80. Disassembly and Reassembly of Cable Assembly W8

a. Disassembly. Disassemble cable assembly W8 (50, fig. 4-35) by following the sequence of index numbers in figure 4-36.

b. Reassembly. To reassemble cable assembly W8, reverse the disassembly procedure in *a* above.



1	Terminal	6	Cable clamp
2	Cable marker	7	Bushing
3	Cable marker	8	Bushing
4	Solder sleeve	9	Bushing
5	Plug connector		

Figure 4-36. Cable assembly W8, component location diagram.

4-80. Disassembly and Reassembly of Electrical Equipment Frame A2A4

a. Disassembly. Disassemble electrical equipment frame A2A4 (14, fig. 4-5) by following the sequence of index numbers in figure 4-37.

b. Reassembly. To reassemble electrical equipment frame A2A4, reverse the disassembly procedure in *a* above.

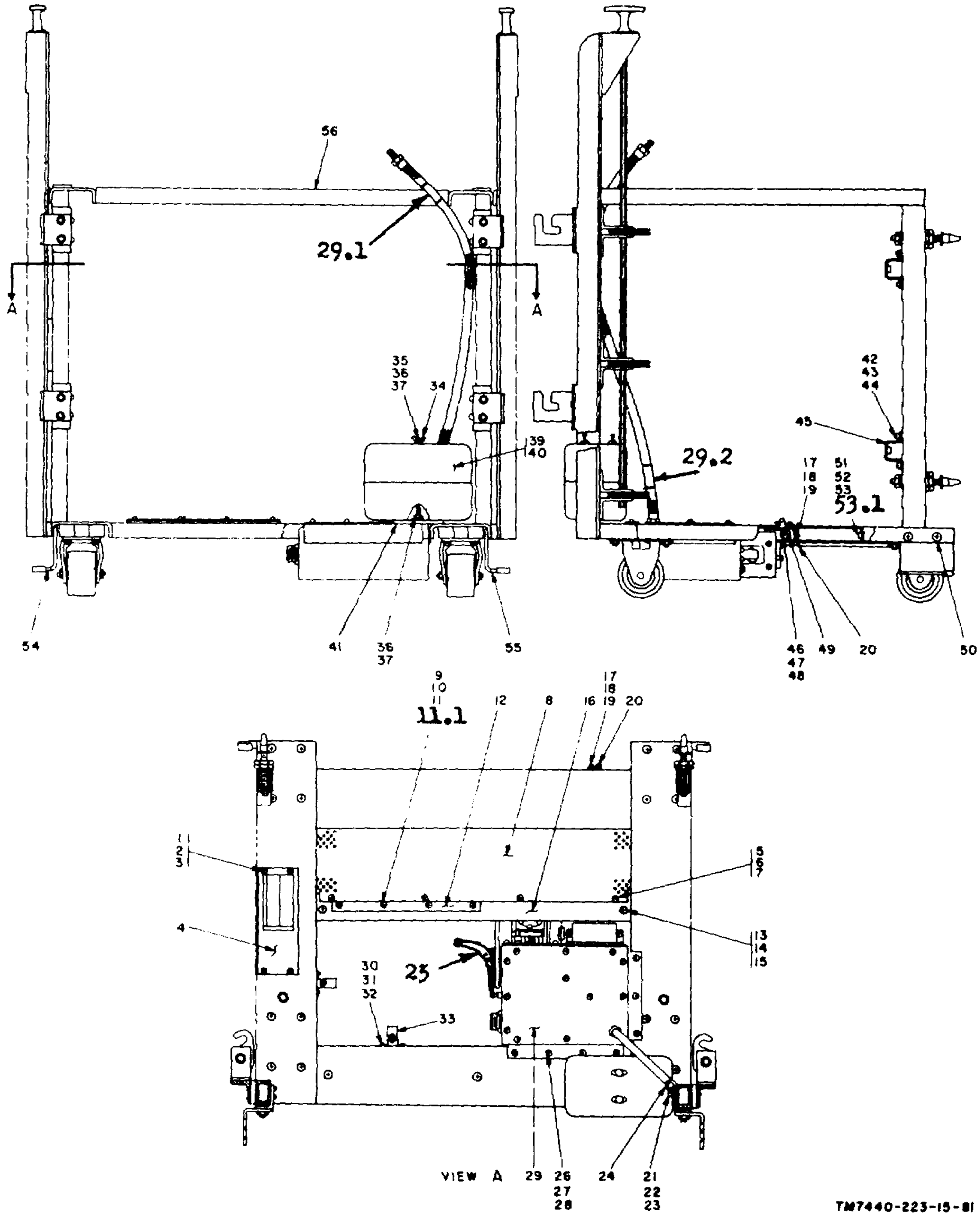


Figure 4-37. Electrical equipment frame, component location diagram.

1	Screw, panhead, No. 4-40, 3/8 in. long	8	Perforated angle bracket
2	Lockwasher, No. 4	9	Screw, panhead, No. 6-32, 5/8 in. long
3	Washer, flat, No. 4	10	Lockwasher, No. 6
4	Instruction plate	11	Washer, flat, No. 6
5	Screw, panhead, No. 6-32, 3/8 in. Long	11.1	Nut, No. 6-32
6	Lockwasher, No. 6	12	Paper tray retainer plate
7	Washer, flat, No. 4	13	Screw, panhead, No. 10-32, 1/2 in. long

LEGEND FOR FIGURE 4-37 - Continued

14 Lockwasher, No. 10
15 Washer, flat, No. 10
16 Paper tray angle bracket
17 Screw, panhead, No. 6-32, 3/8 in. long
18 Lockwasher, No. 6
19 Washer, flat, No. 6
20 Cable clamp
21 Screw, panhead, No. 8-32, 1/2 in. long
22 Lockwasher, No. 8
23 Washer, flat, No. 8
24 Cable clamp
25 Cable assembly W9
26 Screw, panhead, No. 8-32, 3/8 in. long
27 Lockwasher, No. 8
28 Washer, flat, No. 8
29 Ac controller
29.1 Cable marker
29.2 Cable marker
30 Screw, panhead, No. 8-32, 3/8 in. long
31 Lockwasher, No. 8
32 Washer, fiat, No. 8
33 Loop clamp
34 Wingnut
35 Stud
36 Nut, hex., No. 10-32
37 Lockwasher, No. 10
38 Washer, flat, No. 10
39 Storage box
40 Storage box filler
41 Plate spacer
42 Screw, panhead, No. 10-32, 1/2 in. long
43 Lockwasher, No. 10
44 Washer, flat, No. 10
45 Electronic assembly mounting bracket
46 Screw, panhead, No. 8-32, 3/8 in. long

LEGEND FOR FIGURE 4-37

47 Lockwasher, No. 8
48 Washer, flat, No. 8
49 Angle bracket
50 Screw, flathead, No. 1/4-20, 1 in. long
51 Screw, panhead, No. 6-32, 3/8 in. long
52 Lockwasher, No. 6
53 Washer, flat, No.6
53.1 Nut, 6-32
54 Left-hand stop angle bracket
55 Right-hand stop angle bracket
56 Console frame

4-82. Removal and Replacement of Cable Assembly W9

a. Removal. Remove cable assembly W9 (25, fig. 4-37) as follows:

(1) Remove and disassemble the frame assembly (1, fig. 4-4) as described in paragraphs 4-20 and 4-21.

(2) Disconnect one cable.

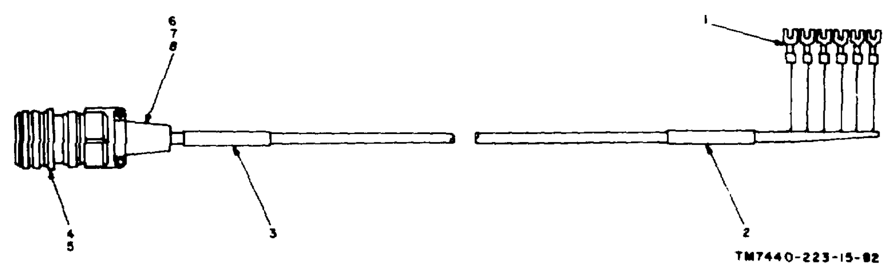
(3) Remove screw (21, fig. 4-37), lockwasher (22), washer (23), and cable clamp (24), and cable assembly W9 (25).

b. Replacement. To replace cable assembly W9, reverse the removal procedure in *a* above.

4-83. Disassembly and Reassembly of Cable Assembly W9

a. Disassembly. Disassemble cable assembly W9 (25, fig. 4-37) by following the sequence of index numbers in figure 4-38.

b. Reassembly. To reassemble cable assembly W9, reverse the disassembly procedure in *a* above.



1 Terminal
2 Cable marker
3 Cable marker
4 Connector
5 Cable clamp
6 Bushing
7 Bushing
8 Bushing

Figure 4-38. Cable assembly W9, component location diagram.

4-84. Removal and Replacement of Ac Controller

a. Removal. Remove the ac controller (29, fig. 4-37) as follows:

(1) Remove and disassemble the frame assembly (1, fig. 4-4) as described in paragraphs 4-20 and 4-21. Remove the internal paper storage basket (para. 4-55).

(2) Disconnect the cables and leads.

(3) Remove the seven screws (26, fig. 4-37), lockwashers (27), and washer (28), and carefully lift the ac controller (29) from the console frame (56).

b. Replacement. To replace the ac controller, reverse the removal procedure in *a* above.

4-85. Disassembly and Reassembly of Ac Controller (fig. 4-39)

a. Disassembly. Disassemble the ac controller (29, fig. 4-37) by following the sequence of index numbers in figure 4-39.

b. Reassembly. To reassemble the ac controller, reverse the disassembly procedure in *a* above.

LEGEND FOR FIGURE 4-39

1	Screw, panhead, No. 6-32, 7/16 in. long	23	Terminal strip cover
2	Lockwasher, No. 6	24	Screw, panhead, No. 6-32, 7/8 in. long
3	Washer, flat, No. 6	25	Lockwasher, No. 6
4	Controller relay enclosure cover	26	Washer, flat, No. 6
5	Screw, panhead, No. 6-32, 5/16 in. long	27	Terminal strip
6	Lockwasher, No. 6	28	Terminal strip spacer
7	Washer, flat, No. 6	29	Marker strip
8	Control Transformer	30	Screw, panhead, No. 4-40, 1/2 in, long
9	Pass-thru capacitor filter	31	Nut, hex., No. 4-40
10	Rubber grommet	32	lockwasher, No. 4
11	Screw, panhead, No. 6-32, 7/16 in. long	33	Washer, flat, No. 4
12	Lockwasher, No. 6	34	Receptacle connector
13	Washer, flat, No. 6	35	Radio interference filter
14	Filter mounting bracket	36	Screw, panhead, No. 4-40, 5/16 in. long
15	Silicon diode	37	Nut, hex., No. 4-40
16	Screw, panhead, No. 6-32, 5/16 in. long	38	Lockwasher, No. 4
17	Lockwasher, No. 6	39	Washer, flat, No. 4
18	Washer, flat, No. 6	40	Resistor
19	Relay contractor	41	Ac controller cable
20	Screw, panhead, No. 4-40, 5/16 in. long	42	Controller relay assembly enclosure
21	Lockwasher, No. 4	41.1	Terminal lug
22	Washer, flat, No. 4	41.2	RFI gasket

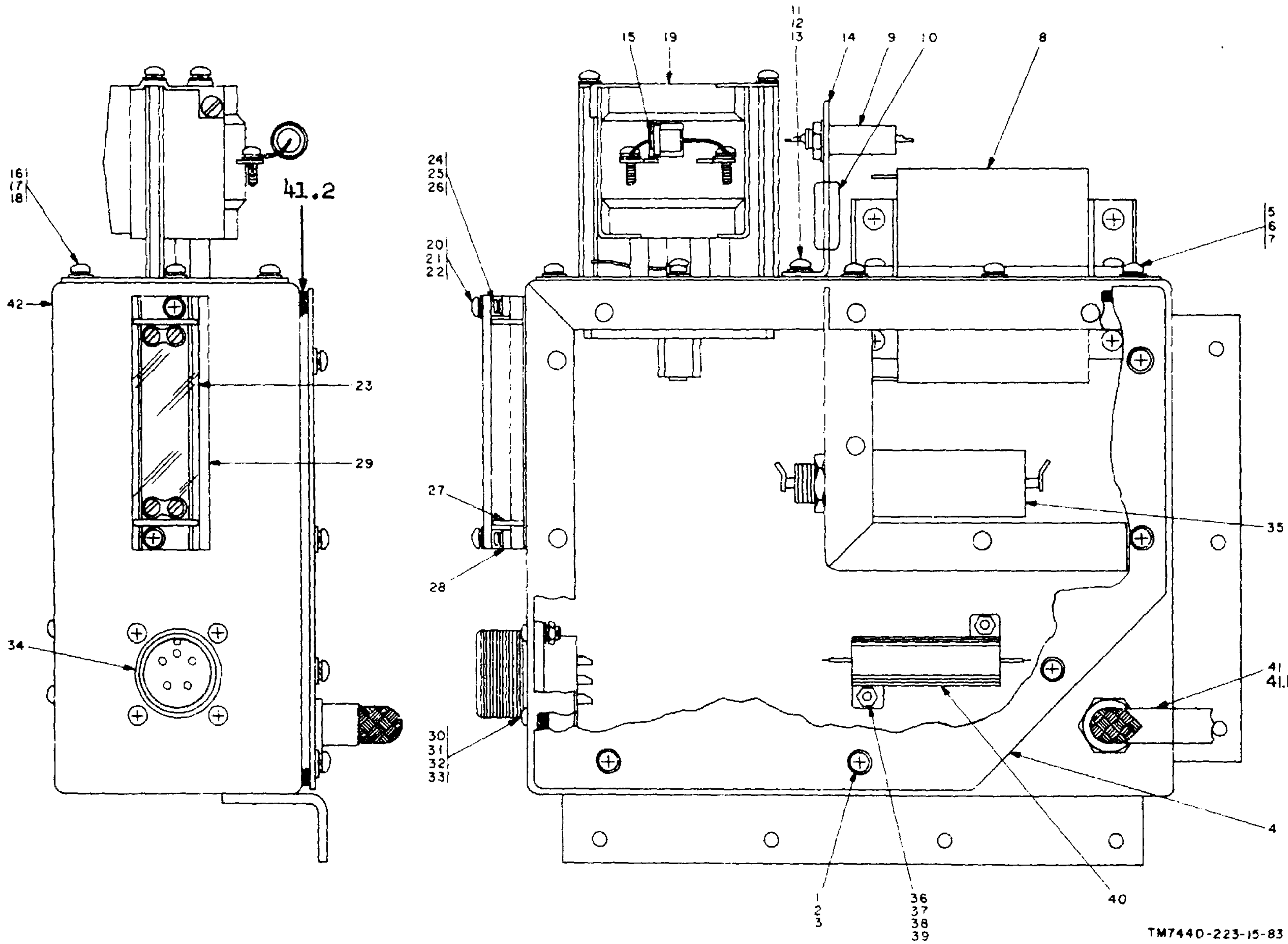


Figure 4-39. Ac controller, component location diagram.

4-86. Removal and Replacement of External Paper Stacker A3
(fig. 4-4)

a. Removal. Loosen the tension adjusting screw (1, fig. 4-40) at the rear of the electrical equipment cabinet (6, fig. 4-4). Remove the four screws (27, fig. 4-40), lockwashers (28), and washers (29). Then carefully lift the external paper stacker A3 from the cabinet.

b. Replacement. To replace the external paper stacker A3, reverse the removal procedure in *a* above.

4-87. Disassembly and Reassembly of External Paper Stacker A3
(fig. 4-40)

a. Disassembly. Disassemble external paper stacker (5, fig. 4-4) by following the sequence of index numbers in figure 4-40.

b. Reassembly. To reassemble the external paper stacker, reverse the disassembly procedure in *a* above.

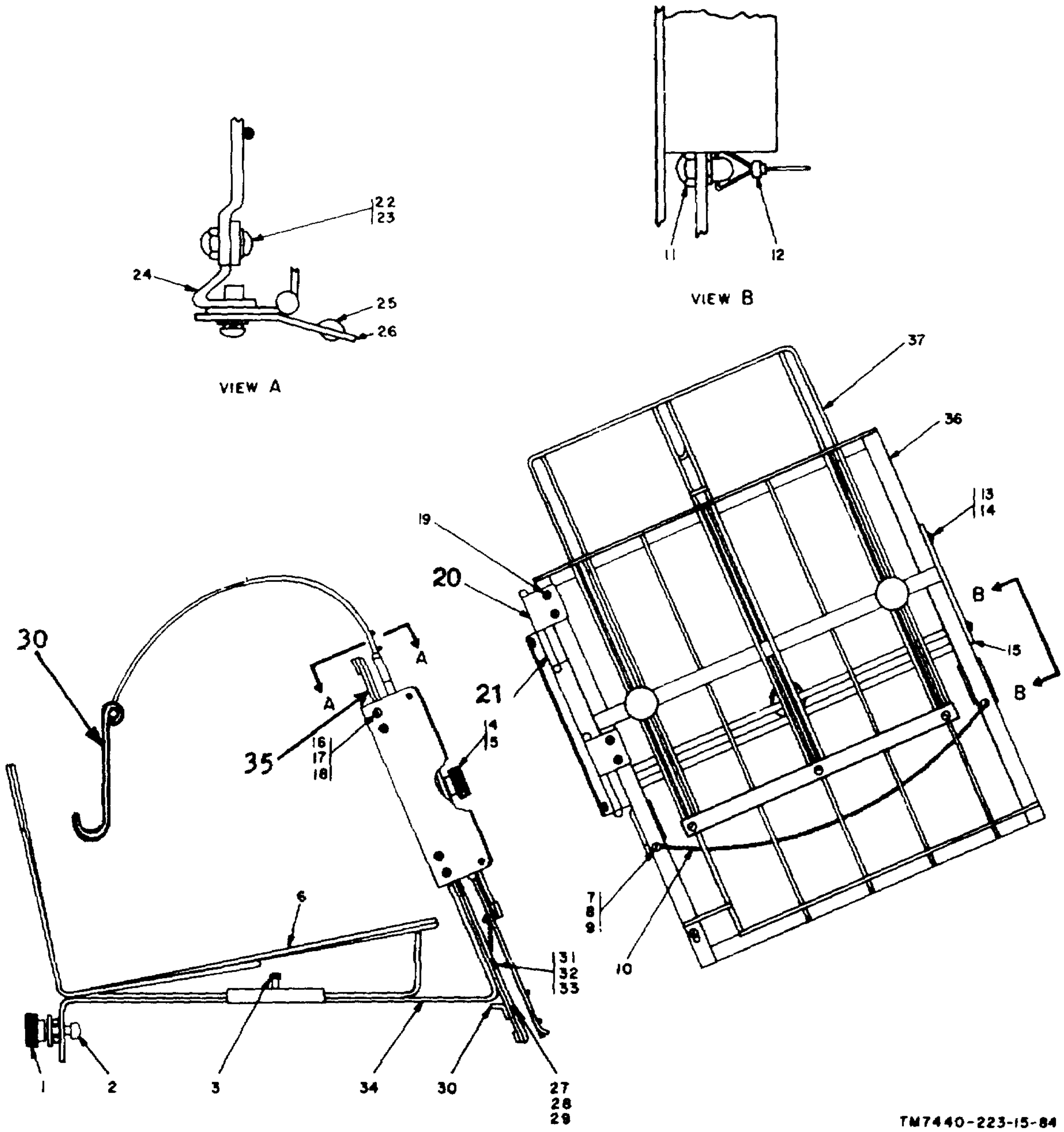


Figure 4-40. External paper stacker A3, component diagram.

4-88. Removal and Replacement of Electrical Equipment Cabinet A1

a. Removal. Remove electrical equipment cabinet A1 (6, fig. 4-4) as follows:

(1) Remove the frame assembly (1) as described in paragraph 4-20.

(2) Remove the external paper stacker (5) as described in paragraph 4-86.

b. Replacement. To replace electrical equipment cabinet A1, reverse the removal procedure in *a* above.

4-89. Disassembly and Reassembly of Electrical Equipment Cabinet A1

a. Disassembly. Disassemble electrical equipment cabinet A1 (6, fig. 4-4) by following the sequence of index numbers in figure 4-41.

b. Reassembly. To reassemble electrical equipment cabinet A1, reverse the disassembly procedure in *a* above.

LEGEND FOR FIGURE 4-40

1 Tension adjusting screw
2 Rubber bumper
3 Screw, socket head, No. 10-32, 7/16 in. long
4 Shoulder nut
5 Washer, flat, No. 8
6 Paper rack
7 Screw, panhead, No. 4-40, 3/8 in. long
8 Nut, hex., No. 4-40
9 Washer, flat, No. 4
10 Static discharge chain
11 Nut, hex., No. 8-32
12 Paper tear-off cable
13 Screw, panhead, No. 6-32, 1/16 in. long
14 Washer, flat, No. 6
15 Adjustable bracket
16 Screw, flat, No. 6-32, 1/16 in. long
17 Lockwasher, No. 6
18 Washer, flat, No. 6
19 Screw, flat head, No. 6-32, 3/8 in. long
20 Right-hand outer guide half hinge
21 Right-hand inner guide half hinge
22 Screw, panhead, No. 6-32, 1/16 in. long
23 Washer, flat, No. 6
24 Hinge mounting bracket
25 Rubber bumper
26 Stop bracket
27 Screw, panhead, No. R-32, 5/16 in. long
28 Lockwasher, No. 8
29 Washer, flat. No. 8
30 Paper deflector hook
31 Screw, panhead, No. 8-32, 3/8 in. long
32 Lockwasher, No. 8
33 Washer, flat, No. 8
34 Inner guide support
35 Inner paper guide
36 Outer paper guide
37 Adjustable guide subassembly

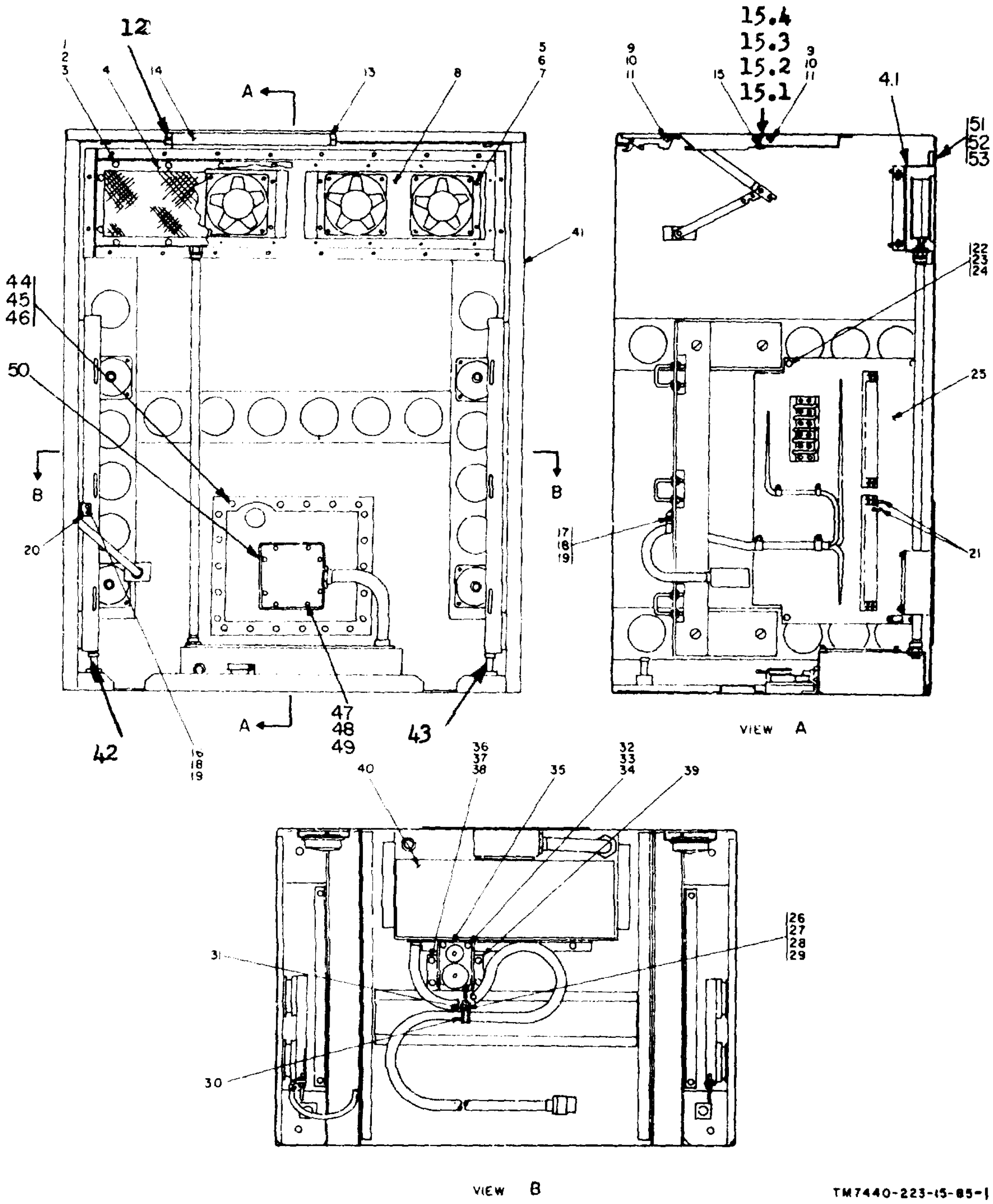


Figure 4-41. Electrical equipment cabinet, component location diagram.

1 Screw, panhead, No. 6-32, 1 1/4 in. long
2 Lockwasher, No. 6
3 Washer, flat, No. 6
4 Honeycomb filter
4.1 RFI gasket material, 43 in.
5 Nut, hex, No. 6-32
6 Lockwasher, No. 6
7 Washer, flat, No. 6
8 Fan assembly
9 Nut, hex, No. 6-32
10 Lockwasher, No. 6
11 Washer, flat, No. 6
12 Left-hand paper throat frame section
13 Right-hand paper throat frame section
14 Front paper throat frame section
15 Rear paper throat frame section
15.1 Paper throat
15.2 Mounting block
15.3 Screw, flat head, No. 4-40, 3/8 in. long
15.4 Nut, No.4-40
16 Screw, panhead, No. 6-32, 3/8 in. long
17 Screw, panhead, No. 6-32, 1/2 in. long
18 Lockwasher, No. 6
19 Washer, flat, No. 6

LEGEND FOR FIGURE 4-41 - Continued

20 Cable clamp bracket subassembly
21 Terminal
22 Screw, panhead, No. 10-32, 1/2 in. long
23 Lockwasher, No. 10
24 Washer, flat, No. 10
25 Interface terminal board assembly
26 Screw, panhead, No. 6-32, 3/8 in. long
27 Nut, hex, No. 6-32
28 Lockwasher, No. 6
29 Washer, flat, No. 6
30 Loop clamp
31 Extension clamp
32 Screw, panhead, No. 8-32, 5/8 in. long
33 Lockwasher, No. 8
34 Washer, flat, No. 8
35 Cable retractor
36 Nut, hex, 1/4-20
37 Lockwasher, 1/4 inch
38 Washer, flat, 1/4 inch
39 Cable retractor bracket
40 AC powerline filter assembly
41 Cabinet
42 Stop bolt, right
43 Stop bolt, left
44 Nut, hex, No. 10
45 Lockwasher, No. 10
46 Washer, flat, No. 10
47 Screw, panhead, No. 6-32, 5/8 in. long

LEGEND FOR FIGURE 4-41 - Continued

48 Washer, flat, No. 6
49 Lockwasher, No. 6
50 RFI gasket
51 RFI gasket
52 Nut, self-lock, 1/4-20
53 Washer, flat, 1/4 in.

4-90. Removal and Replacement of Fan Assembly

a. Removal. Remove the two fan assemblies (8, fig. 4-41) as follows:

(1) Remove the 12 screws (1, fig. 4-41), lockwashers (2), and flat washers (3), holding each honeycomb filter (4), then lift off honeycomb filters (4).

(2) Disconnect the leads.

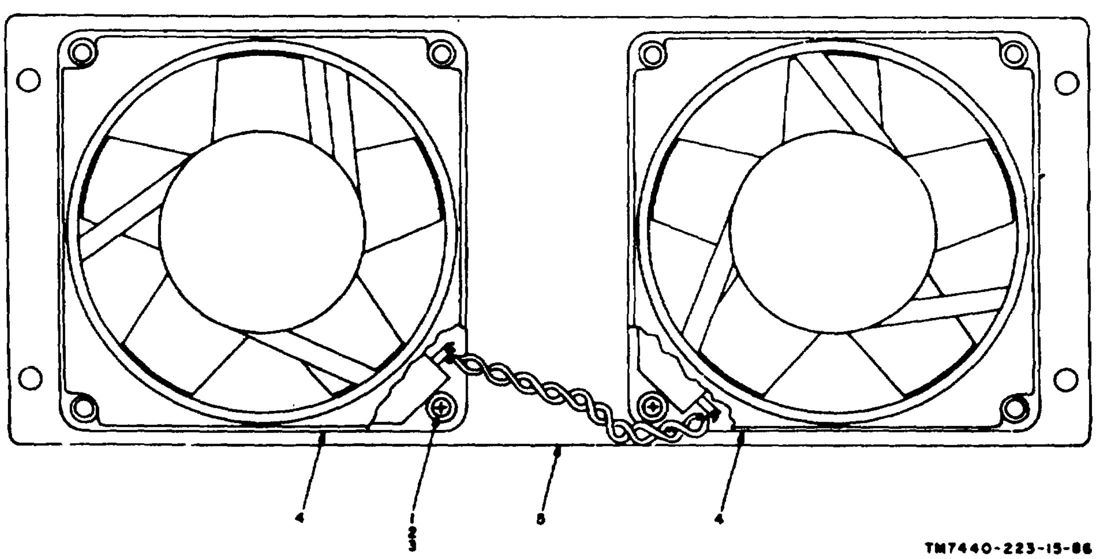
(3) Remove the eight nuts (5, fig. 4-41), lockwasher (6), and washers (7), and carefully lift the two fan assemblies (8) out of the cabinet (41).

b. Replacement. To replace the two far assemblies, reverse the removal procedure in *a* above.

4-91. Disassembly and Reassembly of Fan Assembly

a. Disassembly. Disassemble a fan assembly (8, fig. 4-41) by following the sequence of index numbers in figure 4-42.

b. Reassembly. To reassemble the fan assembly, reverse the disassembly procedure in *a* above.



1 Screw, panhead, No. 4-40, 5/8 in. Long
2 Lockwasher, No. 4
3 Washer, flat, No. 4
4 Fan
5 Fan mounting plate

Figure 4-42. Fan assembly, component location diagram.

4-92. Removal and Replacement of Interface Terminal Board Assembly

a. Removal. Remove the interface terminal board assembly (25, fig. 4-41) as follows:

(1) Remove the electrical equipment cabinet (6, fig. 4-4) as described in paragraph 4-88.

(2) Disconnect the leads.

(3) Remove the four screws (22, fig. 4-41), lockwashers (23), and washers (24), and carefully lift

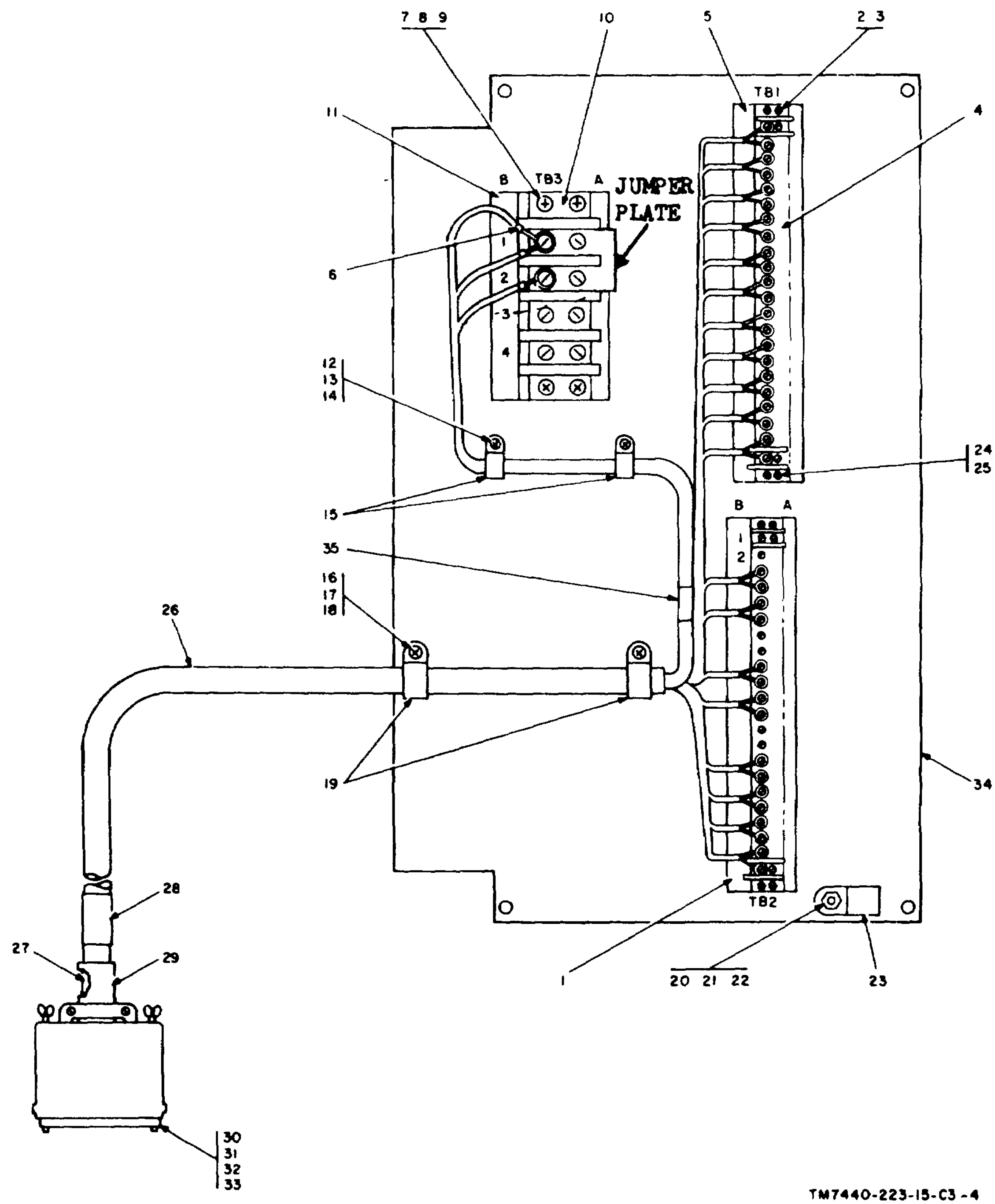


Figure 4-43. Interface terminal board assembly, component location diagram.

the interface terminal board assembly (25) out of cabinet (41).

b. Replacement. To replace the interface terminal board assembly, reverse the removal procedure in *a* above.

4-93. Disassembly and Reassembly of Interface Terminal Board Assembly

a. Disassembly. Disassemble the interface terminal board assembly (25, fig. 4-41) by following the sequence of index numbers in figure 4-43.

b. Reassembly. To reassemble the interface terminal board assembly, reverse the disassembly procedure in *a* above.

Legend for Figure 4-43

1	Terminal lug
2	Lockwasher, No. 6
3	Nut, hex, small pattern, No. 6-32
4	Terminal strip
5	Marker strip
6	Terminal lug
7	Screw, panhead, No. 8-32, 7/8 inch long
8	Washer, plain, No. 8
9	Lockwasher, No. 8
10	Terminal strip
11	Marker strip
12	Screw, panhead, No. 6-32, 1/2 inch long
13	Lockwasher, No. 6
14	Washer, plain, No. 6
15	Cable clamp
16	Screw, panhead, No. 8-32, 1/2 inch long
17	Washer, plain, No. 8
18	Lockwasher, No. 8
19	Cable clamp
20	Nut, hex, No. 8-32
21	Washer, plain, No. 8
22	Lockwasher, No. 8
23	Cable clamp
24	Screw, panhead, No. 6-32, 5/8 inch long
25	Lockwasher, No. 6
26	Electrical cable
27	Bushing
28	Cable marker
29	Marker strip
30	Plug and receptacle connector assembly
31	Contact
32	Contact
33	Contact
34	Interface terminal board mounting plate
35	Cable marker

4-94. Removal and Replacement of Ac Power Line Filter Assembly

a. Removal. Remove the ac power line filter assembly (40, fig. 4-41) as follows:

(1) Remove the electrical equipment cabinet (6, fig. 4-4) as described in paragraph 4-88.

(2) Disconnect the leads.

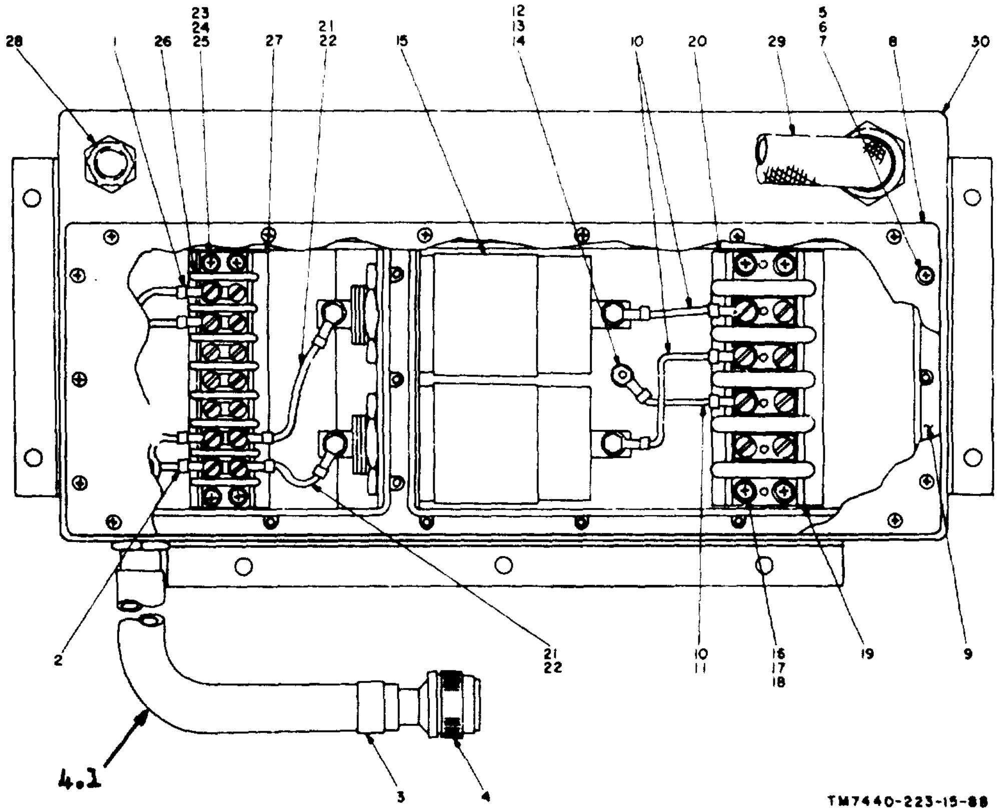
(3) Remove the seven screws (32, fig. 4-41), lockwashers (33), and washers (34), and carefully lift the ac power line filter assembly (40) out of the cabinet (41).

b. Replacement. To replace the ac power line filter assembly, reverse the removal procedure in *a* above.

4-95. Disassembly and Reassembly of Ac Power Line Filter Assembly

a. Disassembly. Disassemble the ac power line filter assembly (40, fig. 4-41) by following the sequence of index numbers in figure 4-44.

b. Reassembly. To reassemble the ac power line filter assembly, reverse the disassembly procedure in *a* above.



1 Terminal
2 Terminal
3 Cable marker
4 Conduit subassembly
4.1 Conduit
5 Screw, panhead, No. 6-32, 5/8 in. long
6 Lockwasher, No. 6
7 Washer, flat, No. 6
8 Enclosure cover (p/o 30)
9 Shielding gasket
10 Terminal
11 Terminal
12 Nut, hex., No. 10-32
13 Lockwasher, No. 10
14 Washer, flat, No. 10
15 Line filter
16 Screw, panhead, No. 3-32, 3/4 in. long
17 Lockwasher, No. 8
18 Washer, flat, No. 8
19 Terminal block
20 Marker strip
21 Terminal
22 Terminal
23 Screw, panhead, No. 6-32, 5/8 in. long
24 Lockwasher, No. 6
25 Washer, flat, No. 6
26 Terminal block
27 Marker strip
28 Conduit connector box
29 Conduit subassembly
30 Ac filter enclosure

Figure 4-44. Ac powerline filter assembly, component location diagram.

Section IV. REPAIRS AND ADJUSTMENTS

4-96. General

The paragraphs in this section describe the mechanical repairs and electrical and mechanical adjustments required to maintain the page printer.

4-97. Repair

Repair normally consists of removing and replacing a defective part as described in the removal and replacement or disassembly and reassembly procedures given in section III.

4-98. Spring Data

(fig. 4-45)

Use the following data to determine whether a spring meets the tension or compression requirement and also as a means of identifying springs.

Replace all springs that do not meet the torsion, compression, or tension requirements.

a. Parallel-End Spring (A, fig. 4-45).

Item No. (fig. 4-11)	Name	A Free length (in.)	B Extended length (in.)	Required tension extended length	C Wire thickness (in.)	E Outside diameter (in.)
17	Ribbon feed spring	1.12	1.53	6.8 lb	0.031	0.180
73	Paper tear-off spring	0.75	1.23	1.5 lb	0.014	0.094

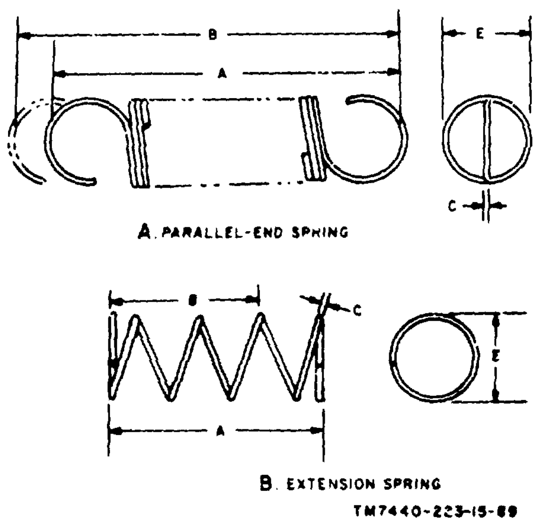


Figure 4-45. Spring dimensions.

b. Extension Spring (B, fig. 4-45).

Item No. (fig. 4-11)	Name	A Free length (in.)	B Extended length (in.)	Required tension extended length	C Wire thickness (in.)	E Outside diameter (in.)
52	Phasing ring spring	3.00	. . . . . .	. . . . . .	. . . . . .	0.875
77	Penetration control spring	0.75	0.355	4.72 lb	0.032	0.360
197	Ribbon tension spring	0.62	0.449	14.39 lb	0.042	0.240
282	Yoke open spring	1.00	. . . . . .	290 lb	0.187	1.000
377	Ribbon roll spring	1.250	0.500	6 lb	0.045	0.600

4-99. Adjustments

The remainder of Chapter 4 provides adjustment and alignment procedures and tolerance requirements for the page printer. Adjustment procedures are arranged in the proper sequence for a complete readjustment of the page printer. When making individual adjustments, check all related adjustments. Where removal of parts or subassemblies is necessary to make an adjustment, reference is made to specific paragraphs for removal and replacement instructions.

4-100. Ribbon Feed Gap Adjustment
(fig. 4-46)

Note. The ribbon feed assembly contains two clutch shafts and the following adjustment procedure applies to both clutch shafts:

a. Requirement. The gap between the armature plate and the clutch rotor face should be 0.010 inch.

b. Adjustment.

(1) Assemble the drive cap flush on the end of the clutch shaft and lock it in position with the setscrew.

(2) Pass the other end of the clutch shaft through the print head side plate and the clutch on the ribbon feed assembly.

(3) Assemble the armature plate to the armature plate hub assembly and place them on the clutch shaft so that the gap between the armature plate and the clutch rotor face meets the gap requirements then perform the clutch shaft clearance adjustment (para. 4-101).

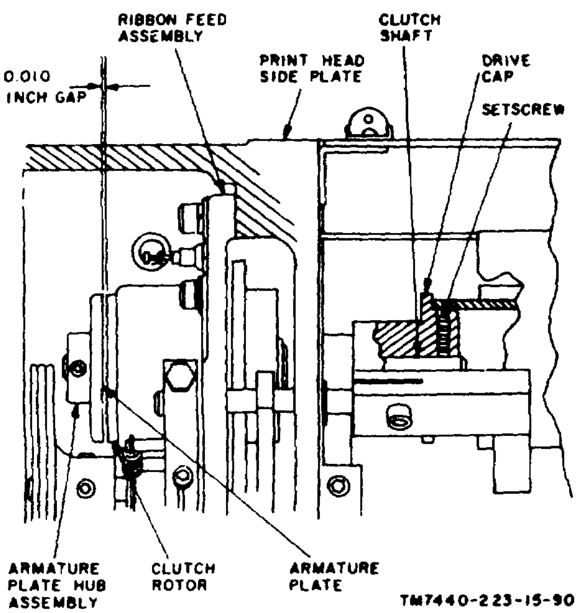


Figure 4-46. Ribbon feed gap requirements.

4-101. Clutch Shaft Clearance Adjustment
(fig. 4-47)

Note. Perform this adjustment in conjunction with the ribbon feed gap adjustment (para. 4-100).

a. Requirement. The clearance between the end of the clutch shaft and the rear of the ribbon feed drive pulley should be a minimum of 0.015 inch. Both ribbon feed drive pulleys should also be aligned for proper ribbon drive belt tracking.

b. Adjustment

(1) Before locking the parts adjusted in paragraph 4-100 in position, loosen the setscrew at the opposite end of the shaft and adjust the clutch shaft to meet the 0.015-inch clearance requirement.

(2) After making the proper adjustment lock the clutch shaft in position by tightening the setscrews, while also maintaining the gap requirement obtained in paragraph 4-100.

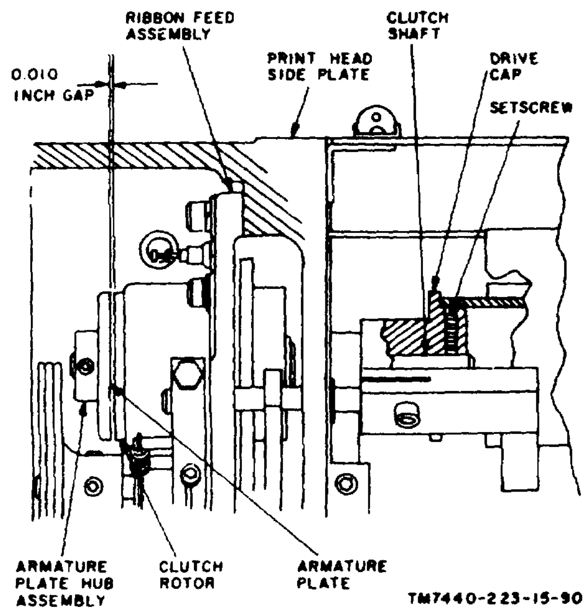


Figure 4-47. Clutch shaft clearance requirement.

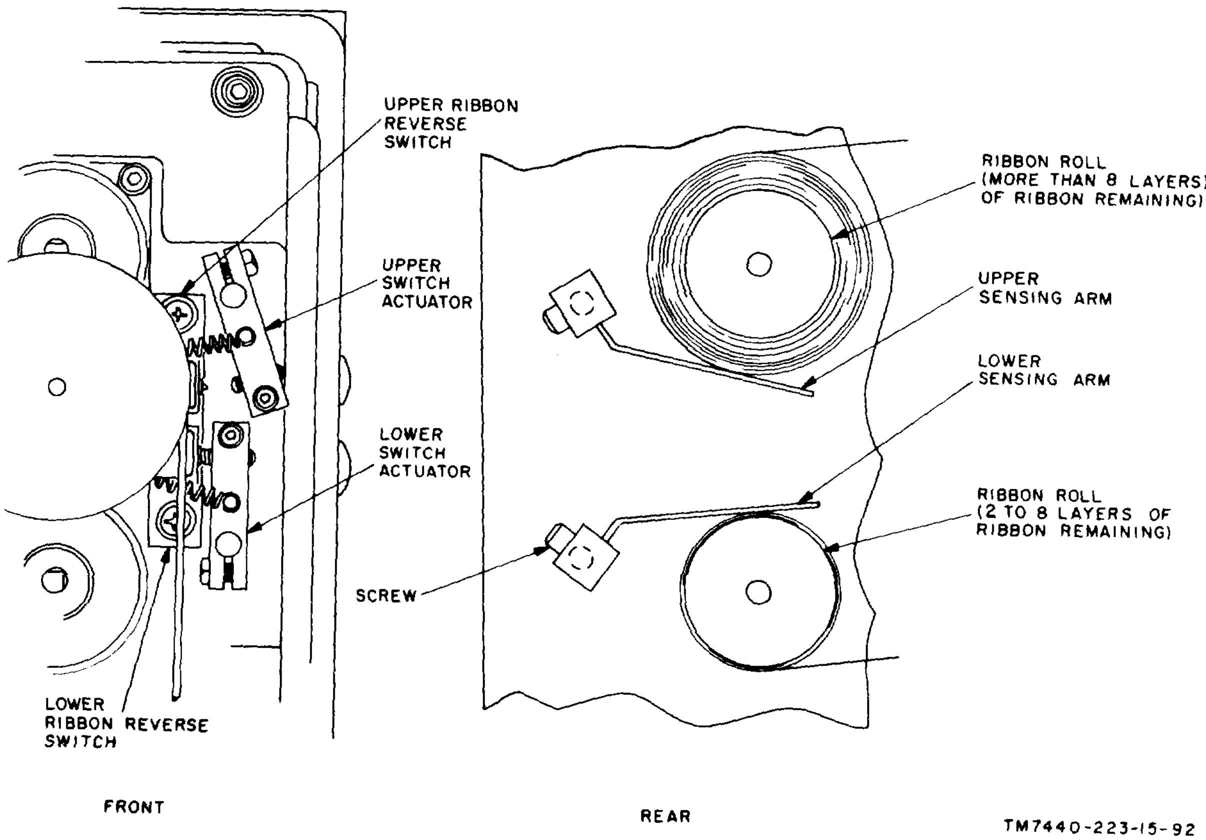


Figure 4-48. Sensing arm requirement.

4-102. Sensing Arms Adjustments
(fig. 4-48)

a. Requirements. The lower sensing arm should actuate the lower ribbon reverse switch when two to eight layers of ribbon remain at the end of the lower roll. The upper sensing arm should actuate the upper ribbon reverse switch when there is a little more than eight layers of ribbon remaining at the end of the upper roll.

b. Adjustments.

(1) Have from two to eight layers of ribbon on the lower ribbon roll.

(2) Remove the ribbon drive belts (5, fig. 4-11) from their pulleys.

(3) Loosen the screw on the lower sensing arm (fig. 4-48).

(4) Turn the ribbon feed drive pulley (15, fig. 4-11) until the lower switch actuator (fig. 4-48) actuates the lower ribbon reverse switch (fig. 4-48).

(5) Turn the lower sensing arm so that it rests against the layers of ribbon on the lower ribbon roll. Tighten the screw.

(6) Reverse the ribbon so that there is a little more than eight layers of ribbon on the upper roll.

(7) Proceed with (3), (4), and (5) above, performing the adjustment on the upper sensing arm.

(8) Replace the ribbon drive belts removed in (2) above.

4-103. Ribbon Tension Adjustment
(fig. 4-49)

a. Requirement. The tension block assembly should provide adequate drag tension for ribbon drive and reversal.

b. Adjustment. Tighten the setscrews in the tension block assembly so that the compression spring forces the pressure foot to bear on the shoulder of the drive cap assembly until the requirement is met.

Note. Further adjustment of the setscrews may be required for maintaining proper drag tension when replacing the ribbon.

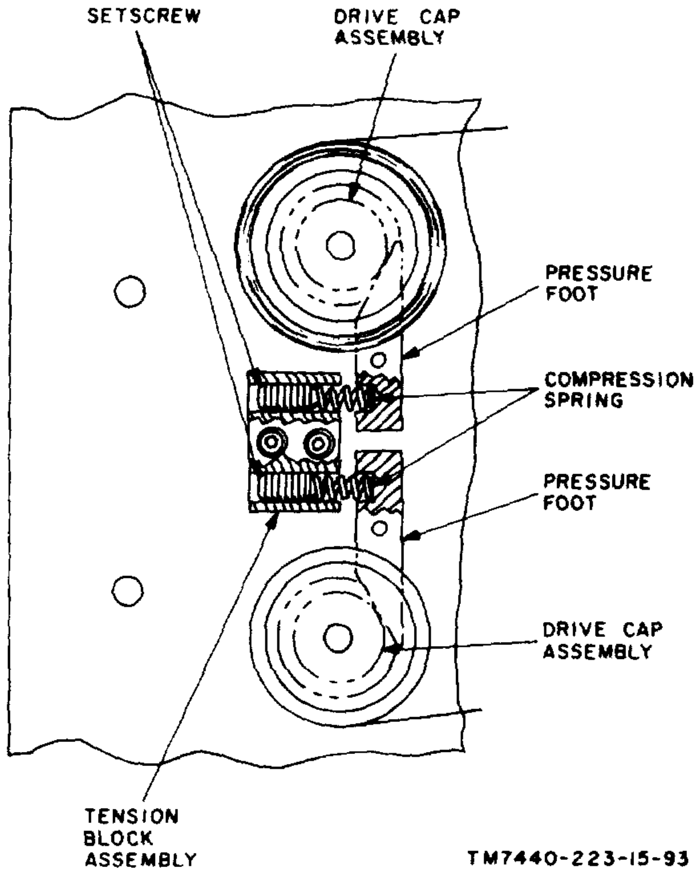


Figure 4-49. Ribbon tension requirement.

4-104. Penetration Control Adjustment
(fig. 4-50 and 4-51)
(See note on fig. 4-50.)

a. Requirement. The zero setting between the print roll character and the hammer module plate should be a nominal dimension of 2.1485 inches, measured at the print centerline.

b. Adjustment.

(1) Mount the left and right-hand penetration control subassemblies in place. Remove eight hammer module assemblies (two upper and two lower from each end of the hammer module plate), and substitute two gages (No. 55292) in place of the missing hammer modules.

(2) Raise the hammer module plate to the approximate printing position and hold it in place by depressing the yoke open handle.

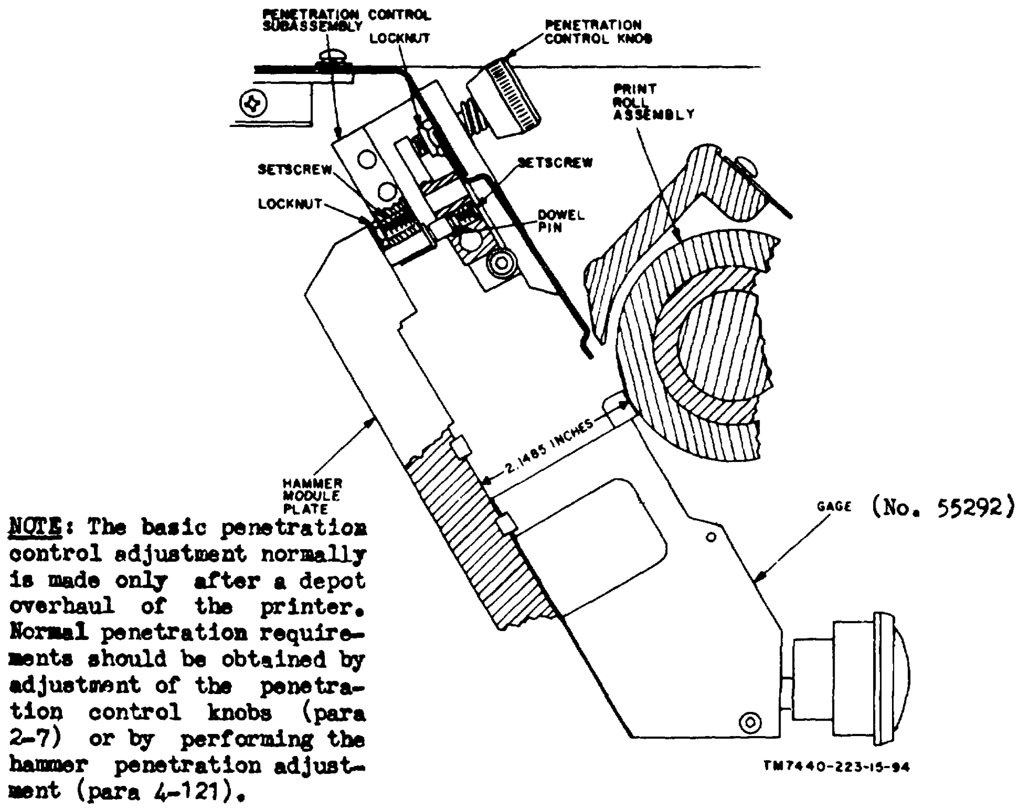


Figure 4-50. Penetration control requirement.

(3) Position the hammer module plat, to meet the requirement by adjusting the setscrews on the penetration control subassemblies.

(4) Lock the setscrews in place with the locknuts on the penetration control subassemblies.

Note

When making this adjustment, observe the following precautions: Do not allow the dowel pins in the penetration control subassemblies to interfere with the obtaining of the proper adjustment dimension. If necessary, back out their associated setscrews. Make sure that sufficient pressure is applied to each side of the hammer module plate by adjusting the setscrews and locknuts on the support arm. Observe the 1/64-Inch dimension shown on figure 4-56.

(5) With the hammer module plate in the printing position, adjust the lock nuts and the Setscrews on the penetration control subassemblies so that when the penetration control knobs are set at zero, the dowel pins (on the penetration control subassemblies) will be bottomed on the hammer module plate.

(6) Penetration control on the print head is now set at maximum penetration.

4-105. Tractor Chain High Point Adjustment (fig. 4-51)

NOTE

During adjustment and setting of the tractor chains, be sure there is access to the two sprocket position setscrews and both sprocket position setscrews are engaged with the same spline tooth of the paper feed shaft.

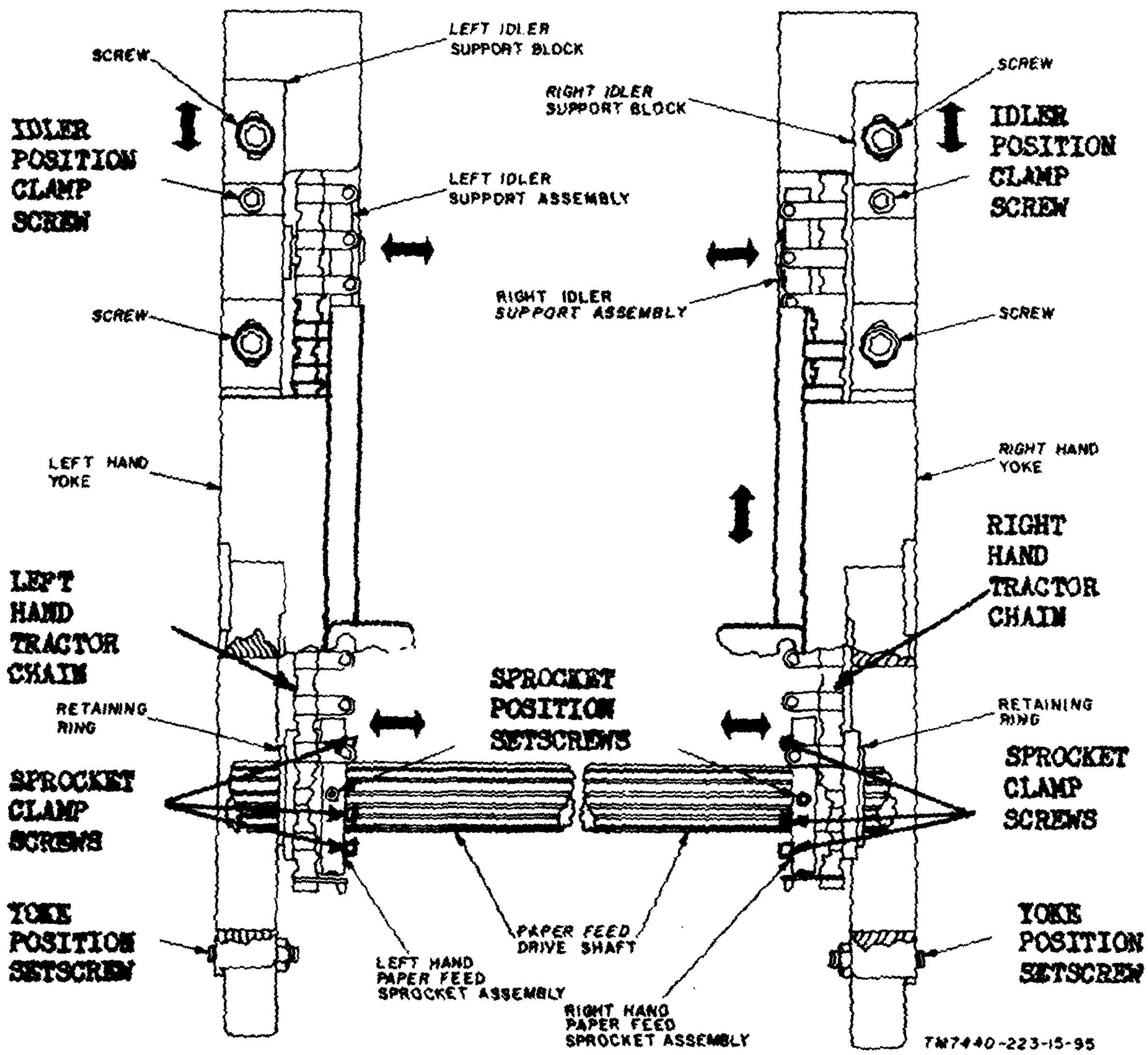


Figure 4-51. Tractor chain setting requirements.

a. Requirement. The high point (or points) ot maximum resistance to turning on one tractor chain should be approximately 180 degrees out-of-phase with the high point (or points) of maximum resistance to turning on the other tractor chain.

NOTE

If more than four high points of maximum resistance are found on any one tractor chain, replace the chain and adjust the new chain.

b. Method of Checking. Loosen the three sprocket clamp screws on each paper feed sprocket assembly and manually move the tractor drive chains through their entire length noting points of maximum resistance.

c. Adjustment. Position the tractor chains to meet the requirement and tighten the sprocket clamp screws.

4-106. Tractor Chain Deflection Adjustment (fig. 4-51)

a. Requirement. The deflection of the tractor chains should not exceed 1/2 inch 1/4 inch above or below the normal tangent line).

b. Method of Checking. Remove printer top cover (250, fig. 4-11(2)). Manually deflect the chain in the center of its span between the paper feed sprocket assembly and the idler support assembly and measure deflection.

c. Adjustment. Loosen the two screws holding each idler support block to its respective yoke and move the block to meet the requirement. Tighten the screws. Replace printer top cover.

4-107. Tractor Chain Centerline Adjustment (fig. 4-51 and 4-52)

a. Requirement. The centerline of the pins of the left-hand tractor chain should be parallel with the outside edge of the left-hand yoke with a nominal full length spacing of 1-3/8 inch.

b. Method of Checking. Measure the spacing between the outside edge of the left-hand yoke and the centerline of the pins at both ends of the left-hand tractor chain.

c. Adjustment.

(1) Loosen the left-hand sprocket position setscrew and move the left-hand paper feed sprocket assembly on the splined paper feed drive shaft until the lower end of the tractor chain meets the requirement. Tighten the setscrew.

(2) Loosen the left-hand idler position clamp screw and position the left idler support assembly in the left idler support block until the upper end of the tractor chain meets the requirement. Tighten the idler position clamp screw.

(3) Perform tractor chain parallel spacing, adjust (para 4-108).

4-108. Tractor Chain Parallel Spacing Adjustment (fig. 4-51 and 4-53)

a. Requirement. Prior to this adjustment, check adjustment in paragraph 4-107.

(1) The parallel spacing over the full length of the tractor chains should be 9.160 inches from the outside diameter of the pins.

(2) The pins on the right and left tractor chains should be in horizontal alignment with each other to within 0.010 inch.

b. Method of Checking. Place the tractor drive chain gage (MDS part No. 56635) in position as shown in figure 4-53. The tractor drive chain pins should protrude through the holes in the gage without binding.

c. Adjustment.

(1) Loosen the sprocket position setscrew in the right-hand paper feed sprocket assembly. Using the tractor drive chain gage (part No. 56635), position the right-hand paper feed sprocket on the paper feed drive shaft until the lower end of the tractor chains meet the parallel spacing requirement. Tighten the sprocket position setscrew.

(2) Loosen the idler position clamp screw in the right-hand idler support block and position the right idler support assembly in the support block until the upper end of the tractor chains meet the parallel spacing requirement. Tighten the right idler position clamp screw.

(3) Loosen the three sprocket clamp screws in the right-hand paper feed sprocket assembly and rotate the sprocket until the right tractor chain meets the horizontal alignment requirement. Tighten the sprocket clamp screws.

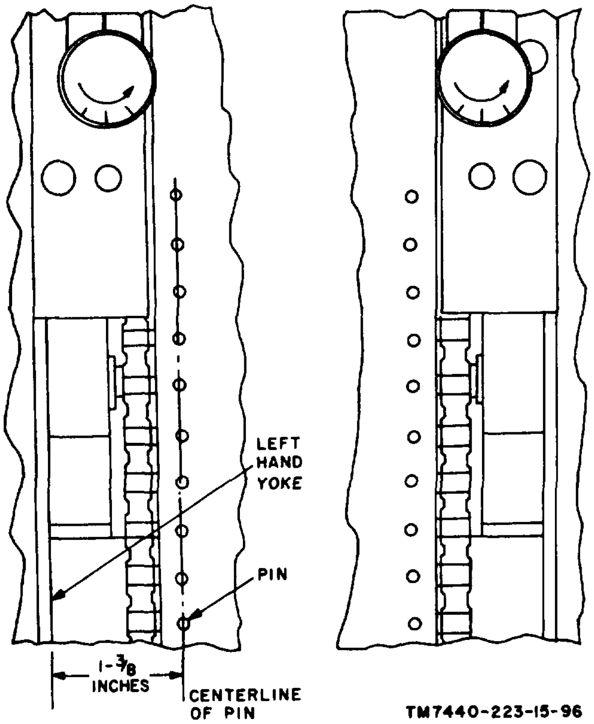


Figure 4 -52. Tractor chain centerline requirements.

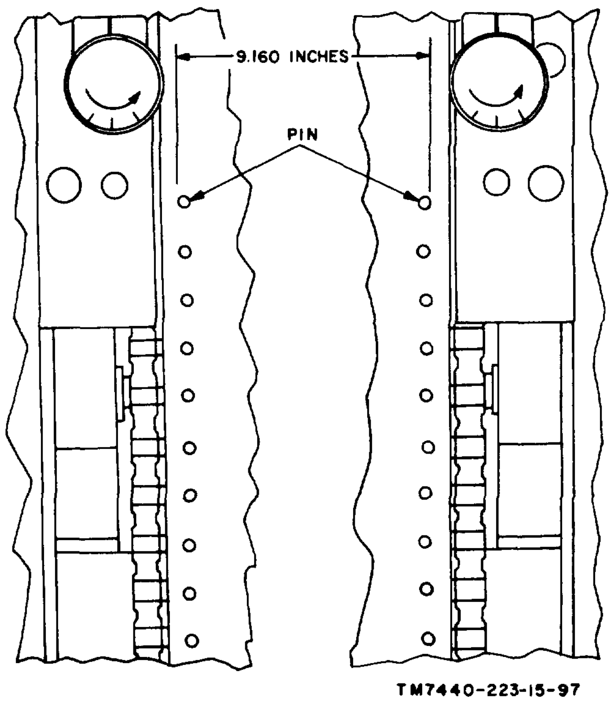


Figure 4-53. Tractor chain parallel spacing requirement.

4-109. Top-of-Form Adjustment (fig. 4-51, 4-54, and 4-57)

NOTE

When adjustments in paragraphs 4-105 through 4-108 have been completed, top-of-form will be found as indicated below.

a. Requirement. The centerline of any pin of the left-hand tractor chain should be in line with the upper end of the left-hand chain support.

b. Method of Checking. Apply power to the print head and press the FORM FEED switch.

c. Adjustment

(1) Lower the hammer module plate and allow it to rest on the rubber bumper.

(2) Loosen the four strobe disc mounting screws (fig. 4-57) slightly until the strobe disc can be rotated.

(3) Note the stop position of any pin of the left hand tractor chain to the chain support.

(4) Rotate the strobe disc to obtain adjustment and then lightly tighten strobe disc mounting screws enough to prevent movement. Rotating the strobe disc clockwise will cause the pin stop point to move up. Rotating the strobe disc counterclockwise will cause the stop point to move down.

(5) Press the form feed to check adjustment. Repeat steps (2), (3), and (4) if necessary.

(6) After requirement in a is obtained, fully tighten the four strobe mounting screws.

4-110. Horizontal Print Out Adjustment (fig. 4-51)

a. Requirement. The print hammers of the hammer modules should be aligned with the print roll so that complete characters are printed on the paper.

b. Method of Checking. Apply power to the print head and set the "M" character to print. Using ribbon only, fire a single row of hammers which will leave "M" on each print hammer head.

c. Adjustment.

NOTE

Setscrew locking nuts must be loosened before setscrews can be turned.

(1) For adjustment toward the right, loosen the setscrew (counterclockwise rotation) on the lower right side of the yoke assembly and tighten the setscrew (clockwise rotation) on the lower left side of the yoke assembly, until the requirement is met.

(2) For adjustment toward the left, loosen the setscrew (counterclockwise rotation) on the lower left side of the yoke assembly and tighten the setscrew (clockwise rotation) on the right side of the yoke assembly, until the requirement is met.

(3) Lock the yoke assembly in position by tightening both setscrews until there is 0.002 to 0.003-inch clearance between the left yoke position setscrew and the wear plate on the left-hand

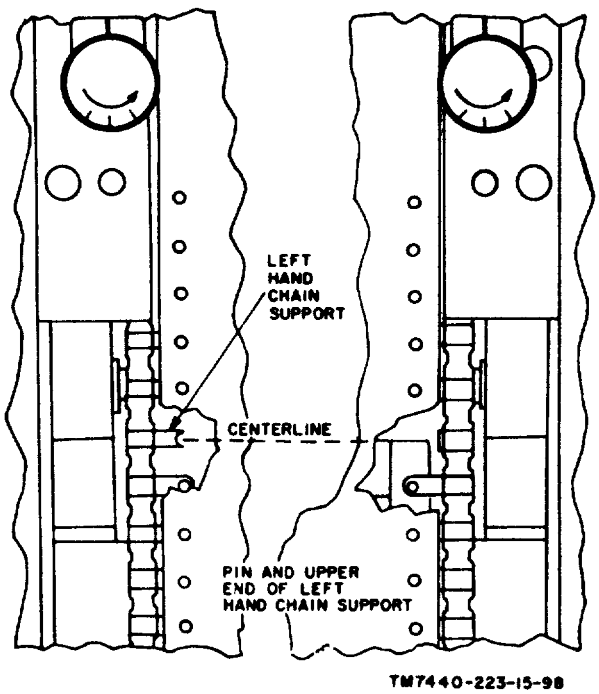


Figure 4-54. Top-of-form adjustment requirement.

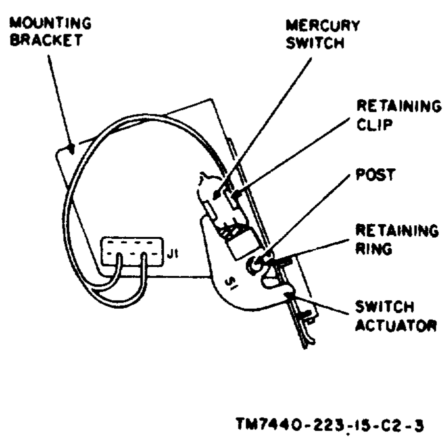


Figure 4-55. Paper out switch requirement.

side of the frame and 0.002-to 0.003-inch clearance between the right yoke position setscrew and the wear plate mounted on the right-hand side of the frame on the print head assembly.

4-111. Paper-Out Switch Adjustment (fig. 4-55)

a. Requirement. The position of the sensing arm on the paper out switch should be such that the alarm circuit is actuated only when no paper is present.

b. Adjustment. Adjust the mercury switch retaining clip so that the alarm circuit will not be actuated when single or five-ply paper is in place in the printer and such that the sensing arm will have a minimum overtravel of 1/16 inch after alarm actuation.

4-112. Yoke Open Handle Adjustment (fig. 4-56)

a. Requirement. The yoke open handle should be positioned so that if it moves downward approximately 1 inch, the alarm circuit will be actuated.

b. Adjustment. Position the switch actuator on the yoke rod to meet the requirement.

4-113. Form Length Change Adjustment (fig. 4-57)

NOTE

When form length (8 1/2 inches, 11 inches, or 14 inches) change is required, adjust as follows:

a. Requirement. The page printer should be prepared for operation with the desired form length.

b. Method of Checking. Apply power to the print head, depress the FORM FEED switch, and turn the power off.

CAUTION

Be extremely careful when handling the strobe disk assemblies to avoid physical harm to personnel and damage to the disks. Make sure no movement of the tractor drive shaft occurs during this adjustment procedure. Movement of the tractor drive shaft would result in loss of the top-of-form requirement and necessitate readjustment as described in paragraph 4-109.

c. Adjustment.

(1) Remove the upper screw and loosen the lower screw that secures the signal strobe subassembly.

(2) Swing the signal strobe subassembly to the front and secure it with a screw in the tapped hole provided.

(3) Remove the locking screw (at the rear of the assembly) and remove the strobe disk assembly.

(4) Remove the new strobe disk assembly from the storage box in the cabinet (fig. 4-1), install it in place and secure it with the locking screw.

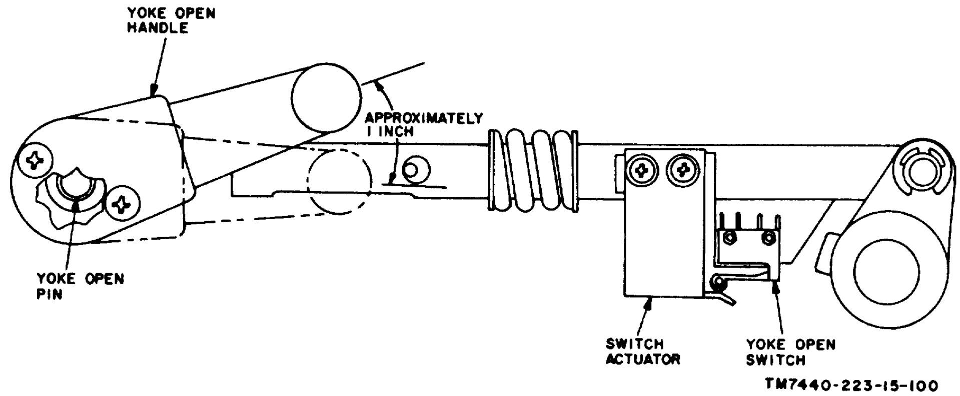


Figure 4-56. Yoke open handle adjustment requirement.

(4.1) Carefully wrap the removed code disk assembly in protective material and store it in the storage box in the cabinet.

(5) Remove the upper screw and swing the signal strobe subassembly into position for the gears to mesh.

NOTE

The index mark on the strobe disk should be approximately aligned with the fixed index when the gears are meshed.

(6) Install the upper screw and secure the assembly by tightening this screw and the lower screw.

(7) Loosen the four strobe disk mounting screws, align the strobe index mark with the fixed index, and tighten the screws.

4-113.1. Voltage Adjustments, Printed Circuit Card A14

When replacing PC Card A14, always set R3 to a midpoint position. Then set the character "M" on the bit selection switches and check for acceptable printing (fig. 4-58) in the local test positions (see fig. 4-59 for incorrect copy results). If the hammers are not striking correctly, move R3 to the point where the best readable print is obtained. This should be checked prior to making the penetration, flight time or phasing adjustments. Also, if all of the characters change to an unacceptable printout during normal operation, readjust R3 or replace PC Card A14.

4-114. Flight Time Adjustment

a. Requirement. All printed characters should be properly aligned and of equal density with no smudging or blurring as shown in figure 4-58.

b. Method of Checking. Print several lines in the local test mode. Compare the printed form with the examples in figure 4-58. If one or more, but not all, hammers are shown to be striking early or late, a maladjustment of the individual hammer flight time(s) is indicated. Refer to paragraph 4-115 if a majority of the hammers are striking early or late.

c. Adjustment. At the rear of the hammer module plate (186, fig. 4-11), use the hammer alignment tool (part No. 51787) to turn the appropriate flight time adjusting screw (figs. 4-56.1 and 4-56.2) to adjust the flight time of the applicable hammer until the ACCEPTABLE PRINTING requirement shown in figure 4-58 is obtained. (Also refer to paragraph 4-121.) ■

4-115. Phasing Adjustment (fig. 4-59)

a. Requirement. All printed characters should be properly aligned and of equal density with no smudging or blurring as shown in figure 4-59.

b. Method of Checking. Print several lines in the local test mode, preferably using the code for the character M (bit selection switches, fig. 2-2, set to 11001101). Compare the printed form with the examples in figure 4-59. If a majority of the hammers are striking high or low, a maladjustment of phasing is indicated. Refer to paragraph 4-114 if only a few hammers are out of alignment.

c. Adjustment. Adjust the printing of all characters by turning the PHASING ADJ setscrew (65, fig. 4-11) on the upper left side of the printer to meet the requirement.

4-116. Paper Feed Brake and/ or Clutch Adjustment

a. Requirement. With the character " E" set in the test switches and the page printer running in local test operation, the display on the oscilloscope should be as shown in figure 4-60.

b. Method of Checking.

(1) Set the character "E" in the bit switches on the maintenance test panel (11100101).

(2) Set the oscilloscope to external negative sync, .5 volts/CM, and time division of 2 milliseconds/CM.

(3) Sync the oscilloscope on the (-) FEED signal (TP 31, card B 0).

(4) Insert the tachometer, Servo-Tek SA7574-2, leads into the oscilloscope, ground-to-ground and signal lead to signal.

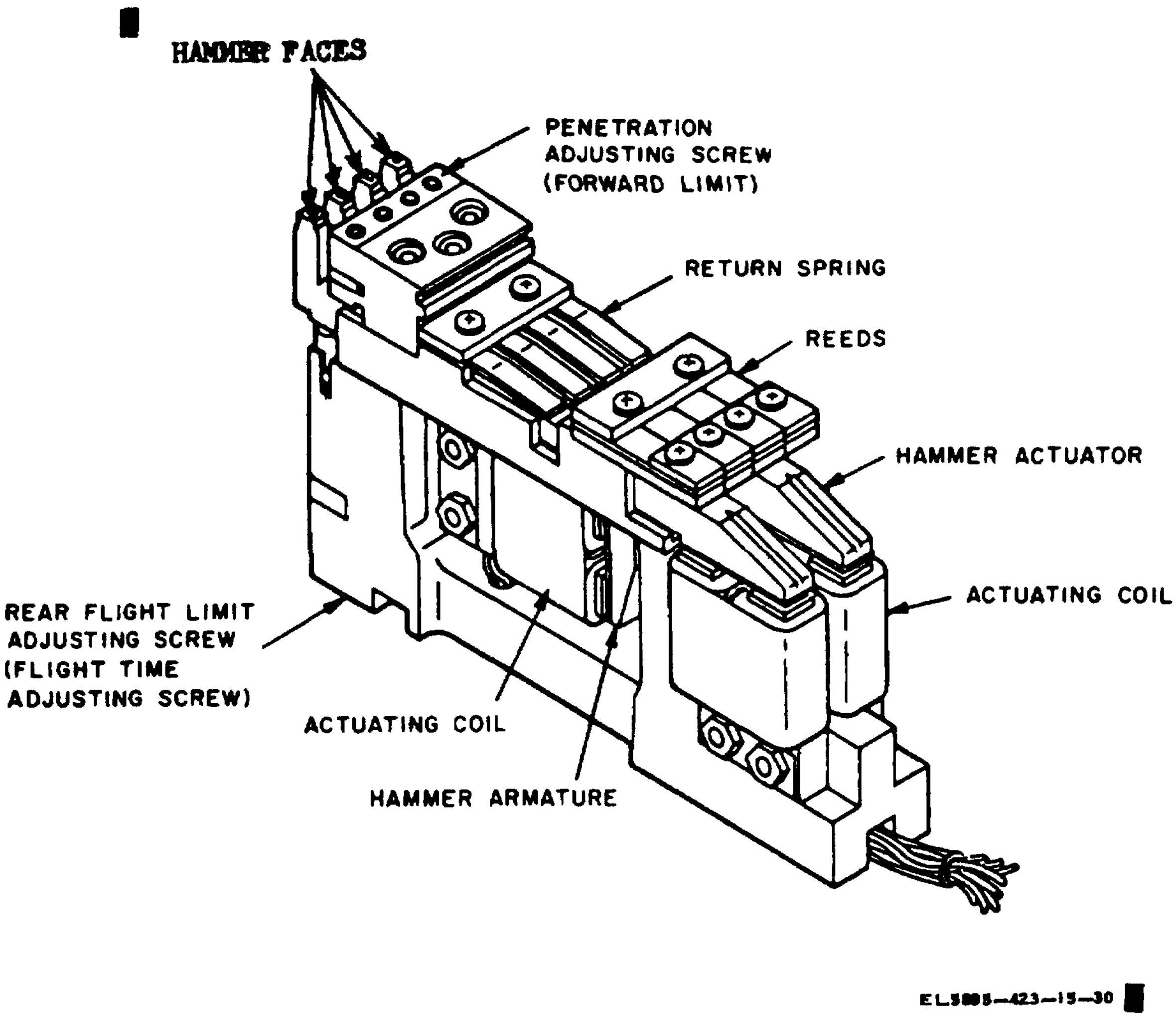


Figure 4-56.1 Hammer module adjustment detail.

(5) Holding the tachometer in hand, place the adapter wheel, 57756-G1, in contact with the paper on the lower paper guide. Depress the local test switch and observe the tachometer trace on the oscilloscope.

(6) Compare the traces on the oscilloscope with figure 4-60. If the traces do not agree follow the procedures for adjusting.

c. Adjustment.

(1) Adjust the clutch and/or brake limiter controls (15 and 16, fig. 4-13 for the clutch an fig. 4-19 for the brake) for the desired waveshape on the oscilloscope.

(2) If the traces still do not approximately agree, check for a mechanical deficiency, ie: form feed assembly, tractor chain adjustments.

d. Checkout Procedure. Following the

replacement of the clutch and/or brake assembly, the following procedure is to be used.

(1) Set the bit selecting switches on the electronic equipment test panel to the character space (00000100).

(2) Remove the paper from the tractor feed assembly and insert a small piece of paper between the paper out-sensing arm and the pressure foot to eliminate the out-of-paper alarm.

(3) Run the page printer in local test MODE and allow 10 hours of continual operation for clutch run-in and checkout time. Be sure to vacuum the dust from the appropriate dust ports (para 4-11.1) at half-hour intervals during the entire run-in period.

(4) At the end of the run-in period, reinstall the paper, remove the paper from the paper-out alarm, reset the bit selecting switches to the character E (11100101) and perform any required adjustments.

4-117. Paper Feed and Ribbon Drive Belt Tracking Adjustment

a. Requirement. The entire flat surface of the belt (1, fig. 4-11) must make contact with the paper drive pulley (116, fig. 4-11) and the paper feed clutch pulley (4, fig. 4-11).

b. Adjustment.

NOTE

When tracking adjustment is properly aligned, the outer edge of the two belt drive sleeves (44, fig. 4-11 (1) will be equally distant from the frame of the printer assembly and the belt should be centered on both belt drive sleeves. If bearings (43) have been replaced and are not exactly centered in the drive sleeves (44), it may be necessary to perform the following to both the front and rear sleeve subassemblies (44.1).

(1) Remove the rear sleeve subassembly (44.1) from the takeup block (47).

(2) Discard hexagon takeup spacer (45.1).

(3) Apply sealant, compound, retaining SMB-583244-008 (or equivalent) to threads of screw and install hexagon nut (NSN 5310-00-250-9477) to secure sleeve subassembly (44.1) to screw (42).

Use sealant sparingly to prevent screw from adhering to the bearing.

(4) Install a second hexagon nut (NSN 531000-250-9477) on the screw (42) but do not tighten.

(5) Replace the rear sleeve subassembly (44.1) on the takeup block (47) and turn screw until the inside edge of the sleeve subassembly is one inch from the inside edge of the takeup block.

(6) Verify the inside edge of the front sleeve subassembly (44.1) in one inch from the inside edge of the takeup block. If it is not, remove the sleeve assembly, discard the takeup spacer (45) and perform steps (3), (4), and (5) above to the front sleeve assembly.

(7) Replace the paper feed and ribbon drive belt (1) and adjust belt tension according to paragraph 4-118.

(8) Apply power to the page printer and check to insure the belt is tracking fully on the paper feed clutch pulley (4) but is not rubbing against the flange on the paper drive pulley (116). If either condition exists, adjust the position of the rear sleeve subassembly by turning the screw (42) with the motor running. If the belt cannot be made to track within one turn of the rear sleeve subassembly in one direction or the other, it will be necessary to provide adjustment capability to the front sleeve subassembly (see Note). Since the front sleeve subassembly has the most effect on the belt tracking, complete adjustment by turning the screw (42) in the front sleeve subassembly.

(9) Lock the sleeve subassemblies in position by tightening the hexagon nuts installed in step (4) against the takeup block. Hold the cap screws (42) in position with a socket wrench while tightening the locknuts.

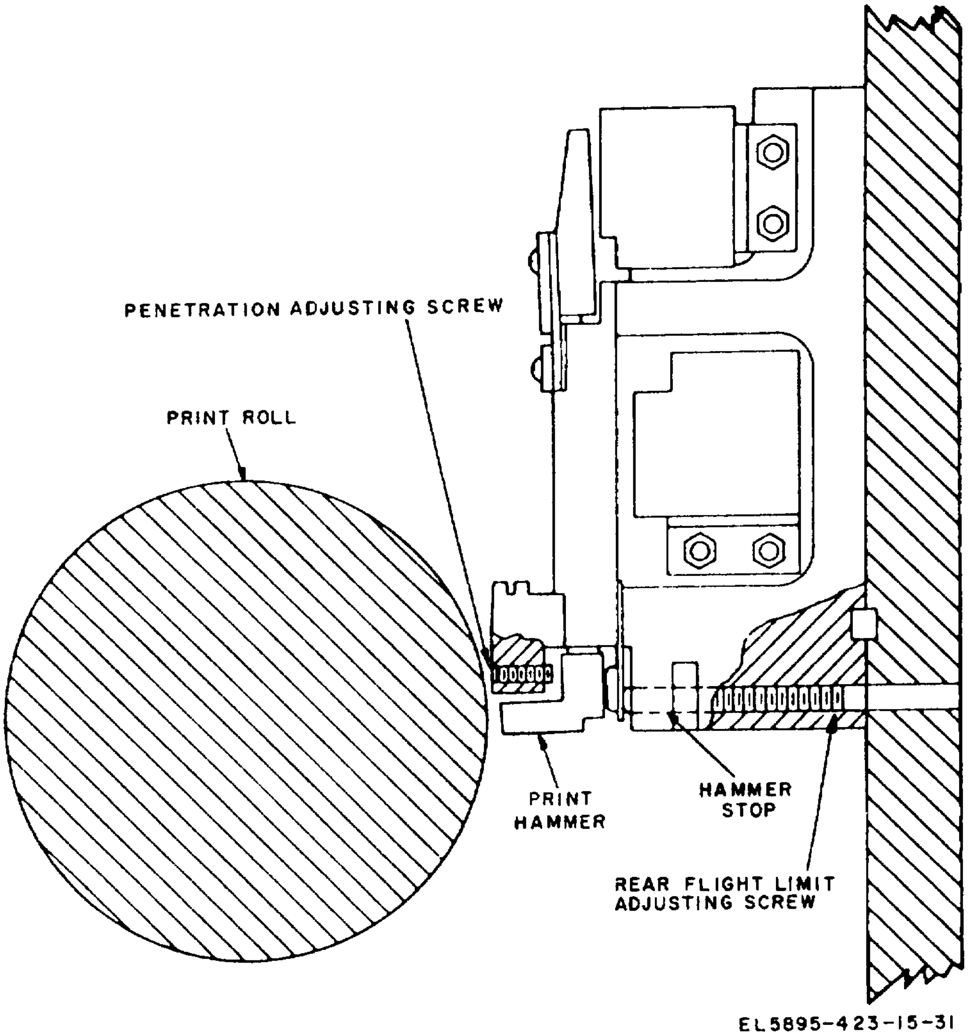


Figure 4-56.2. Flight time and hammer penetration adjustment details.

CAUTION

Do not overtighten screws (42); overtightening them will cause the bearings to bind.

4-118. Paper Feed Drive Belt Tension Adjustment (fig. 4-61)

a. Requirement. There should be no loss of paper feed, nor high noise emitted by the idler bearings during local test operation due to slippage and overtightening of the belt, respectively.

b. Method of Checking.

(1) Print several lines in LOCAL TEST mode, checking for proper feed and equal line spacing.

(2) Using a long screwdriver as a stethoscope, listen to the noise being emitted by the idler bearings by placing the screwdriver on the bearing mounting screws while the belt is moving.

CAUTION

Be careful when making this check because of the moving parts.

c. Adjustment.

(1) Turn AC POWER off to the page printer. Slightly loosen the socket capscrew in the idler assembly (fig. 4-61).

(2) With AC POWER on, and in LOCAL TEST, operate the page printer.

(a) Rotate adjusting screw counterclockwise until the paper fails to move.

(b) Rotate adjusting screw clockwise until paper starts to move again. From this point, turn the adjusting screw 1/4 to 1/2 of a turn clockwise. Tighten socket capscrew.

NOTE

When adjusting the belt tension, it is possi-

ble that the belt tracking adjustment may change.

(3) Check paper feed drive belt tracking adjustment (para 4-117).

4-118.1 DELETED

4-119. Print Drum Drive Belt and Alternator Drive Belt Tension Adjustments (fig. 4-62)

a. Requirements.

(1) The print drum drive belt (fig. 4-62) should have sufficient tension to remove the slack in the belt without causing the motor/alternator mounting plate to shift on its shock mounting.

(2) The power supplies should properly sequence up and remain on after the AC POWER switch is depressed.

(3) The motor/alternator assembly and belts should show very little indication of vibration.

(4) Slippage of the alternator belt should be noted during the initial start of the motor and at the point where the charging diodes short out. This can be detected by the squeal of the belt during these time periods.

b. Method of Checking.

(1) Check for abnormal amounts of belt dust around general area which indicates maladjustment of print drum drive and alternator belts.

(2) Check for excessive vibration in motor/alternator assembly and belts.

(3) Check for continuous squealing of belts which indicates that belts are undertensioned.

c. Adjustments. Adjustment of the alternator drive belt will require that adjustment procedure for the print drum drive belt also be performed.

(1) With AC POWER off to the page printer, perform the following steps.

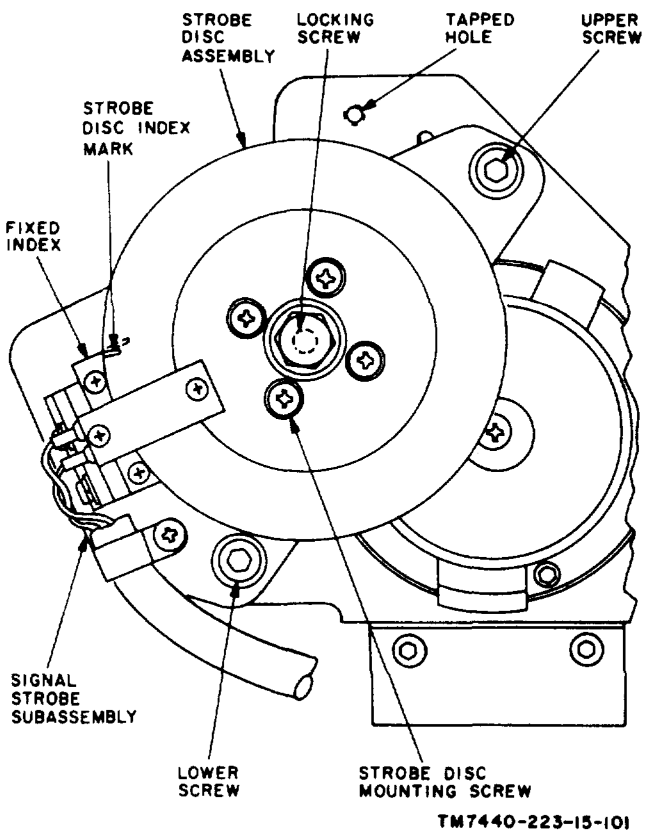


Figure 4-57. Form length change requirement.

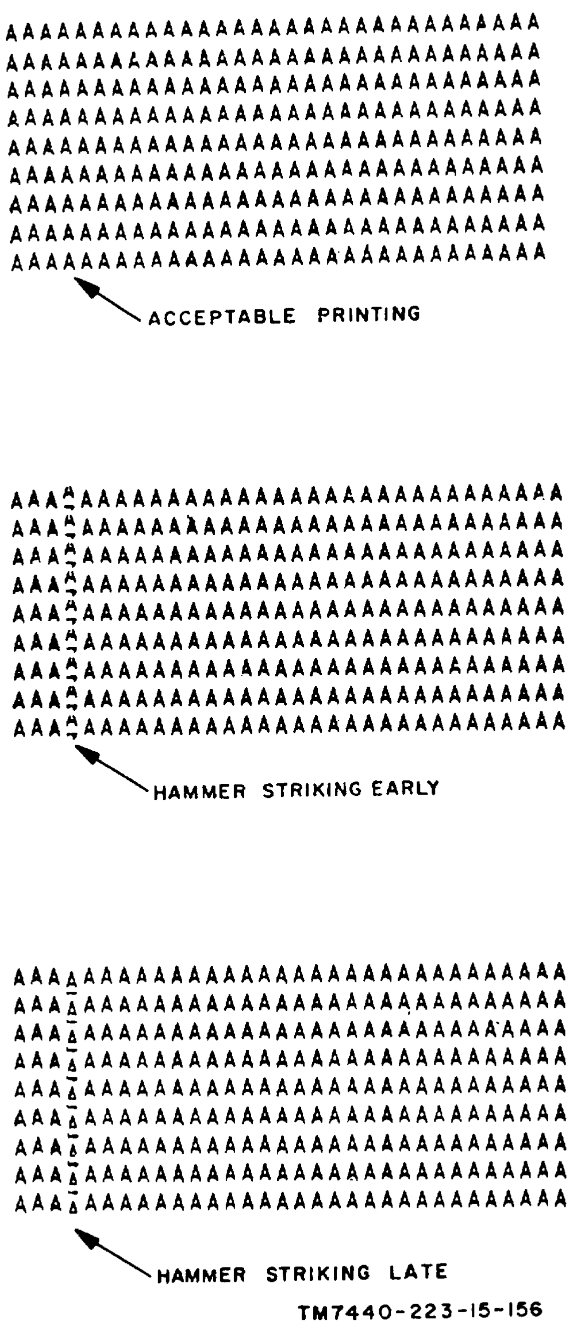


Figure 4-58. Effect of fight time variations on printed copy.

(*a*) Loosen the four mounting capscrews on the alternator.

(*b*) Slide alternator to the rear in order to remove tension on its belt.

(*c*) Remove No. 1 idler capscrew (fig. 4-62).

(*d*) Loosen No. 2 idler capscrew (fig. 4-62) to allow free movement of belt idler assembly.

(*e*) Loosen the four motor mounting capscrews. Move the motor to the rear far enough to remove slack in the print drum drive belt. Tighten motor mounting capscrews after the motor is squared with the back edge of the base (fig. 4-62).

(*f*) Loosen the double pulley on the motor shaft. Position the pulley to a point where the idler pulley centers on both the upper and lower sides of the print drum drive belt. This can be accomplished by rotating the belt idler assembly on its pivot point. Tighten the screws on the motor shaft double pulley.

NOTE

If the condition in (f) above cannot be met, it indicates that the motor/alternator mounting assembly is not level. Reshimming of this assembly is then necessary.

(*g*) Move the alternator towards the front of the machine to obtain proper belt tension. Before the alternator mounting capscrews are tightened, insure that the rear of the alternator base is square with the side of the motor base (fig. 4-62).

(*h*) Loosen the pulley on the alternator shaft. Slide the pulley to align the alternator drive belt with the print drum drive belt. Tighten the screws on the alternator shaft pulley.

(*i*) Visually recheck the squaring of the motor, alternator and belts.

(2) With AC POWER on, position the belt idler assembly so as to apply enough pressure to the print drum drive belt to remove vibrations. Reinstall idler capscrew No. 1 and tighten. Tighten capscrew No. 2.

4-119.1 Print Drum Drive Belt and Alternator Drive Belt Tension Adjustments (Alternate) (fig. 4-62)

NOTE

The following alternate adjustment procedure can be used when a push-pull gage, NSN 5210-00-88-7868, Part No. DPP-10, is available. This gage is part of the Punched Card Equipment Tool Kit (AUTODIN DST).

a. Requirements.

(1) With 3 1/2 pounds (± 0.5 pound) of pressure applied to the center of the upper span of the alternator drive belt (from above), the belt should deflect downward between 1/4 and 3/8 inch.

(2) The print drum drive belt (fig. 4-62) should have sufficient tension to remove the slack in the belt without causing the motor/alternator mounting plate to shift on its shock mounting.

(3) The power supplies should properly sequence

up and remain on after the AC POWER switch is depressed.

(4) The motor/alternator assembly and belts should show very little indication of vibration.

(5) Slippage of the alternator belt should be noted during the initial start of the motor and at the point where the charging diodes short out. This can be detected by the squeal of the belt during these time periods.

b. Method of Checking.

(1) Apply gage to the center of the upper span of the alternator drive belt (from above), and observe gage dial indication and subsequent belt deflection (fig. 4-62).

(2) Check for abnormal amounts of belt dust around general area which indicates maladjustment of print drum drive and alternator belts.

(3) Check for excessive vibration in motor/ alternator assembly and belts.

(4) Check for continuous squealing of belts which indicates that belts are undertensioned.

c. Adjustments. Adjustment of the alternator drive belt will require that adjustment procedure for the print drum drive belt also be performed.

(1) With AC POWER off to the page printer, perform the following steps.

(*a*) Loosen the four mounting capscrews on the alternator.

(*b*) Slide alternator to the rear in order to remove tension on its belt.

(*c*) Remove No. 1 idler capscrew (fig. 4-62).

(*d*) Loosen No. 2 idler capscrew (fig. 4-62) to allow free movement of belt idler assembly.

(*e*) Loosen the four motor mounting capscrews. Move the motor to the rear far enough to remove slack in the print drum drive belt. Tighten motor mounting capscrews after the motor is squared with the back edge of the base (fig. 4-62).

(*f*) Loosen the double pulley on the motor shaft. Position the pulley to a point where the idler pulley centers on both the upper and lower sides of the print drum drive belt. This can be accomplished by rotating the belt idler assembly on its pivot point. Tighten the screws on the motor shaft double pulley.

NOTE

If the conditions in (*f*) above cannot be met, it indicates that the motor/alternator mounting assembly is not level. Reshimming of this assembly is then necessary.

(*g*) Move the alternator towards the front of the machine to obtain proper belt tension. Apply 3 1/2 pounds (± 0.5 pound) of force with the DPP-10 pushpull gage as described in a (1) above. The belt should deflect between 1/4 and 3/8 inch. Before the alternator mounting capscrews are tightened, insure that the

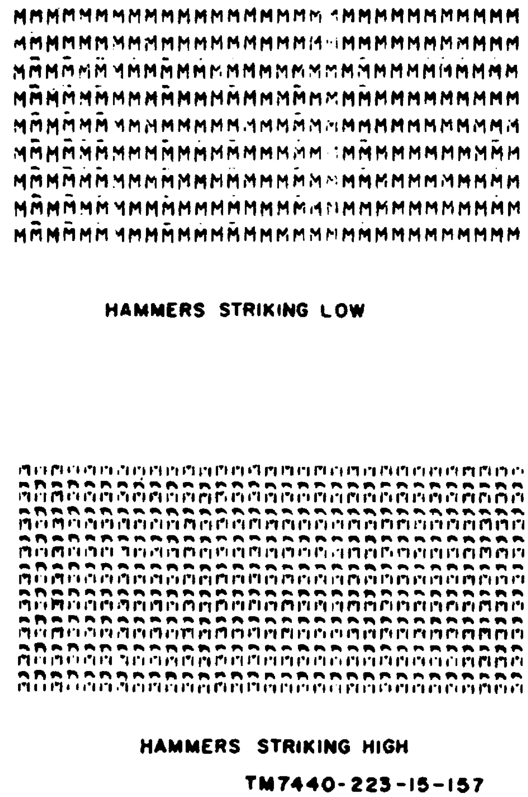


Figure 4-59. Effect of phasing variations on printed copy.

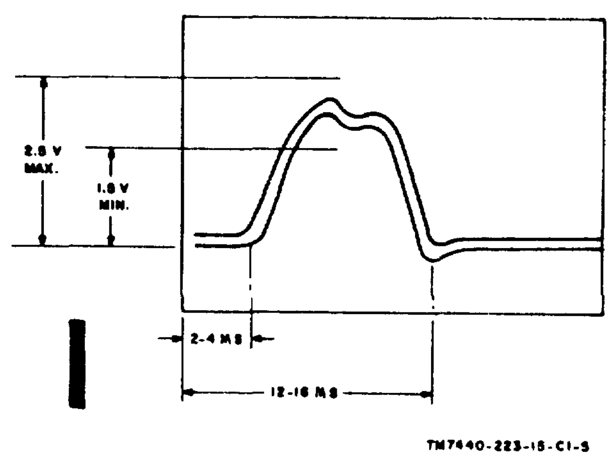


Figure 4-60. Paper feed pulse.

Rear of the alternator base is square with the side of the motor base (fig. 4-62).

(*h*) Loosen the pulley on the alternator shaft. Slide the pulley to align the alternator drive belt with the print drum drive belt. Tighten the screws on the alternator shaft pulley.

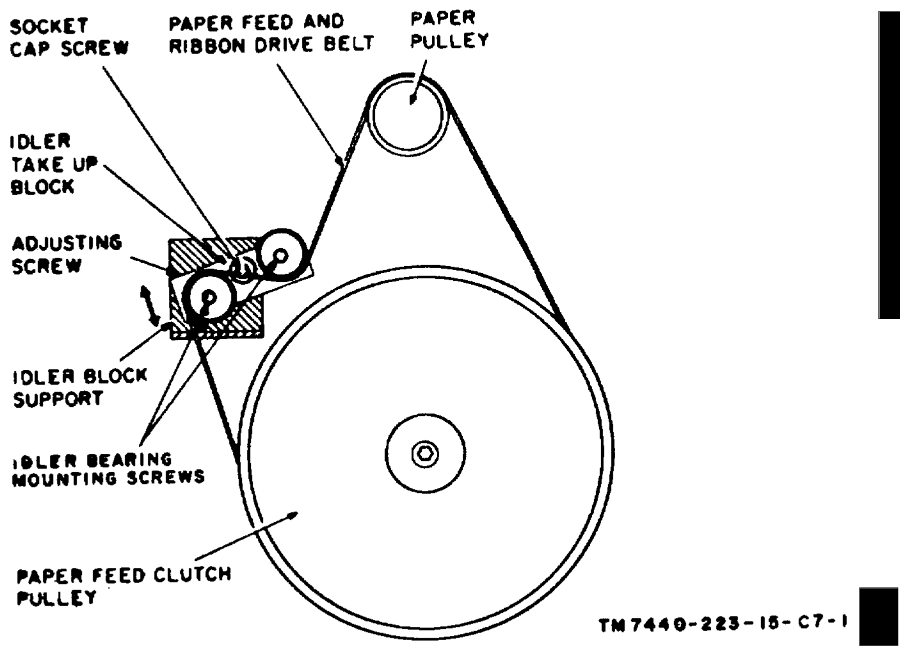


Figure 4-61. Paper feed drive belt tension requirements.

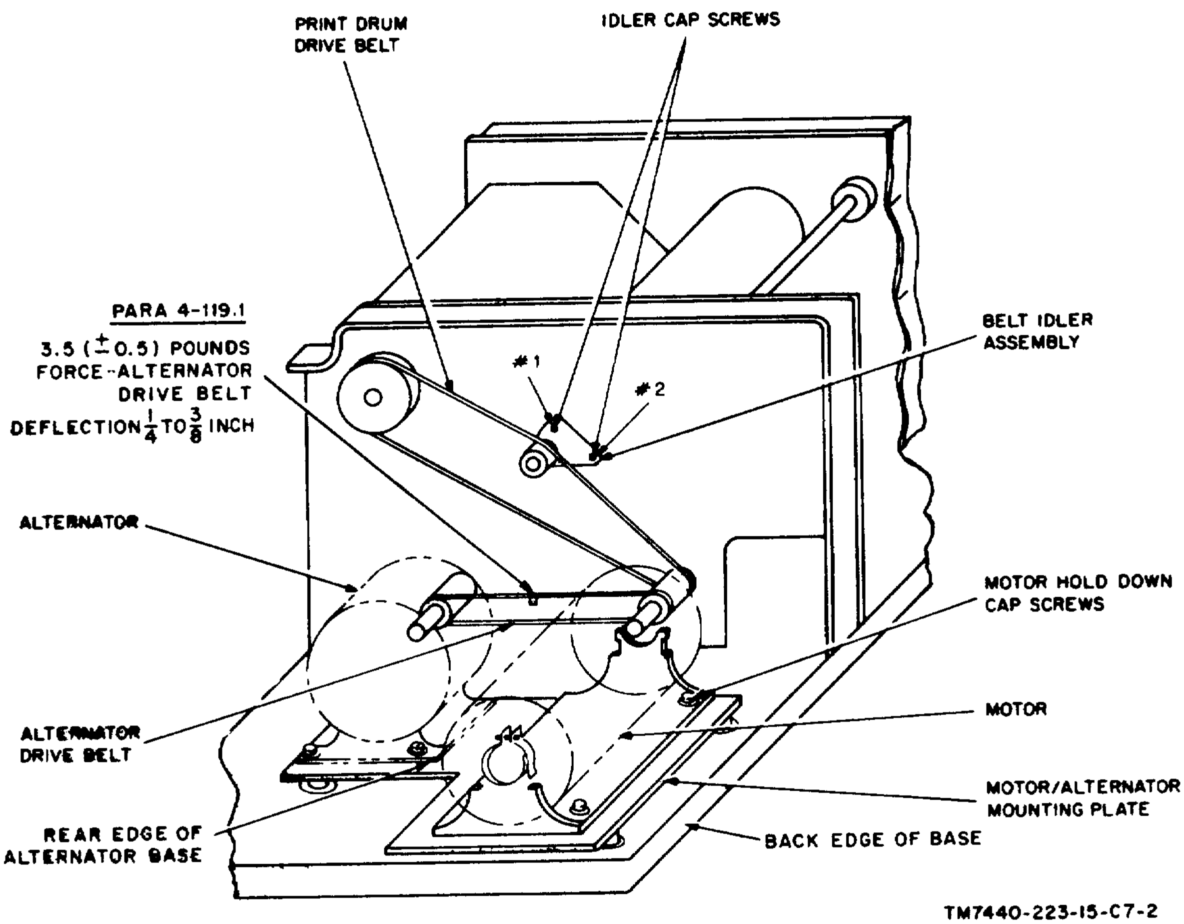


Figure 4-62. Print drum drive belt and alternator drive belt tension requirements.

(*i*) Visually recheck the squaring of the motor, alternator and belts.

(2) With AC POWER on, position the belt idler assembly so as to apply enough pressure to the print drum drive belt to remove vibrations. Reinstall idler capscrew No. 1 and tighten. Tighten capscrew No. 2.

4-120. Ribbon-Drive Belts Tension

a. Requirement. The two ribbon drive belts (5, fig. 4-11) must have sufficient tension to drive the ribbon feed mechanism without slipping.

b. Adjustment. The ribbon drive belts have been designed to provide proper tension without adjustment. Remove and replace if slippage occurs.

4-121. Hammer Penetration Adjustment

a. Requirement. All printed characters should be properly aligned and of equal density with no smudging or blurring as shown in figure 4-58.

b. Method of Checking. Print several lines in local test mode, preferably using the code for the character M (11001101, with select switches, fig. 2-2). Visually examine the printed form and observe that all characters are printed with equal density. If one or more, but not all, of the columns are printed either light or heavy, a maladjustment of the penetration control for the applicable hammer(s) is indicated. Refer to paragraph 2-7 if all columns are printed too light or too heavy.

CAUTION

The penetration adjusting screws (fig. 4-56.1 and 4-56.2) fit tightly, therefore do not force them; otherwise the small hexagonal socket may be stripped. NORMALLY, NO MORE THAN 1/4 TURN IN EITHER DIRECTION IS REQUIRED TO ACHIEVE UNIFORM PRINTING DENSITY.

c. Adjustment. Lower the hammer module plate and allow it to rest on the rubber bumper. On the front of the hammer module plate (186, fig. 4-11), use hammer alignment tool (part No. 51787) to adjust the penetration adjusting screw(s) (fig. 4-56.1) of the applicable hammer(s) to meet the acceptable printing requirement.

NOTE

1. This adjustment is one of three adjustments that pertain to hammer penetration. See the note on figure 4-50 for additional hammer penetration adjustment information.

2. To facilitate the hammer penetration adjustment, it is recommended that the template illustrated in figure 4-62.1 be constructed. Follow the instructions below (a thru e) in constructing and using the template.

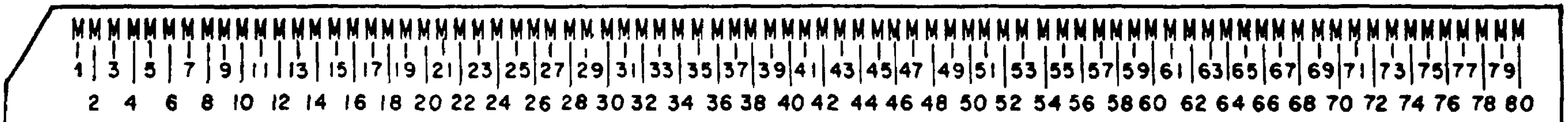
a. As shown, the template uses one line of printed characters from an 80-column test printout.

b. The one line of characters (preferably the letter M) is numbered from 1 to 80, and information concerning hammer driver PCB's is included below the numbered characters to aid in troubleshooting.

c. The required printout containing the line of characters, and the space necessary for including PCB information, can be obtained by pushing the Electronic Equipment Test Panel A2A2A3 RESET button after one line of characters has been printed, and then depressing the FORM FEED switch to advance the paper to next form.

d. After numbering the characters and writing or typing in the PCB information, the form can then be trimmed down to eliminate unused paper and mounted on to a clean piece of thin cardboard with glue or paste. Be careful not to wrinkle the numbered column portion of the form before mounting on the cardboard as this will affect the accuracy of the template in indicating the column number.

e. The finished template can be used to identify the number of a misprinted column during local test hammer adjustments by lining it up with one printed row of characters.



HAMMER DRIVER PCB A2 CONTROLS COLUMNS 1,9,17,25,33,41,49,57,65,73	HAMMER DRIVER PCB A3 CONTROLS COLUMNS 2,10,18,26,34,42,50,58,66,74
HAMMER DRIVER PCB A4 CONTROLS COLUMNS 3,11,19,27,35,43,51,59,67,75	HAMMER DRIVER PCB A5 CONTROLS COLUMNS 4,12,20,28,36,44,52,60,68,76
HAMMER DRIVER PCB A6 CONTROLS COLUMNS 5,13,21,29,37,45,53,61,69,77	HAMMER DRIVER PCB A7 CONTROLS COLUMNS 6,14,22,30,38,46,54,62,70,78
HAMMER DRIVER PCB A8 CONTROLS COLUMNS 7,15,23,31,39,47,55,63,71,79	HAMMER DRIVER PCB A9 CONTROLS COLUMNS 8,16,24,32,40,48,56,64,72,80

EL50Y001

Figure 4-62.1. Template (optional) for hammer penetration adjustment and troubleshooting.

4-122. Signal Code Lamp Housing Adjustment

a. Requirement. The proper signal code waveforms must be generated.

b. Method of checking.

(1) Connect channel A of the oscilloscope to pin 7 of PC card A2A2A4B4. Connect oscilloscope ground to page printer logic ground point.

(2) Apply power to the page printer, and verify that the oscilloscope presentation meets the requirements of A, figure 4-63.

(3) Synchronize the waveform on oscilloscope channel A.

(4) Connect the oscilloscope channel B to the following test points on PC card A2A2A4B4, and verify that the signal at each point meets the requirements of B, figure 4-63. Lowest level observed must be 0.5 volt or less.

Signal	A2A2A4B4 test point	Signal	A2A2A4B4 test point
CW-1	35	CW-4	34
CW-2	26	CW-5	2
CW-3	28	CW-7	3

c. Adjustment. After performing the preceding check, loosen the screw (2, fig. 4-16), and rotate the lamp housing (12 or 12.1) until the desired waveform is obtained. Retighten the screw (2). Recheck as directed in the preceding paragraph and readjust as required until all six test points meet the requirements of figure 4-63.

4-123. Signal Strobe Lamp Housing Adjustment

a. Requirement. The page printer shall be prepared for operation with the proper form length, and signal strobe output at the minimum-level point must be no greater than 0.5 volt.

b. Method of Checking.

(1) Apply power to the printer.

(2) Depress the FORM FEED switch.

(3) Remove power from the printer.

WARNING

Be extremely careful when handling the strobe disk assembly to avoid physical

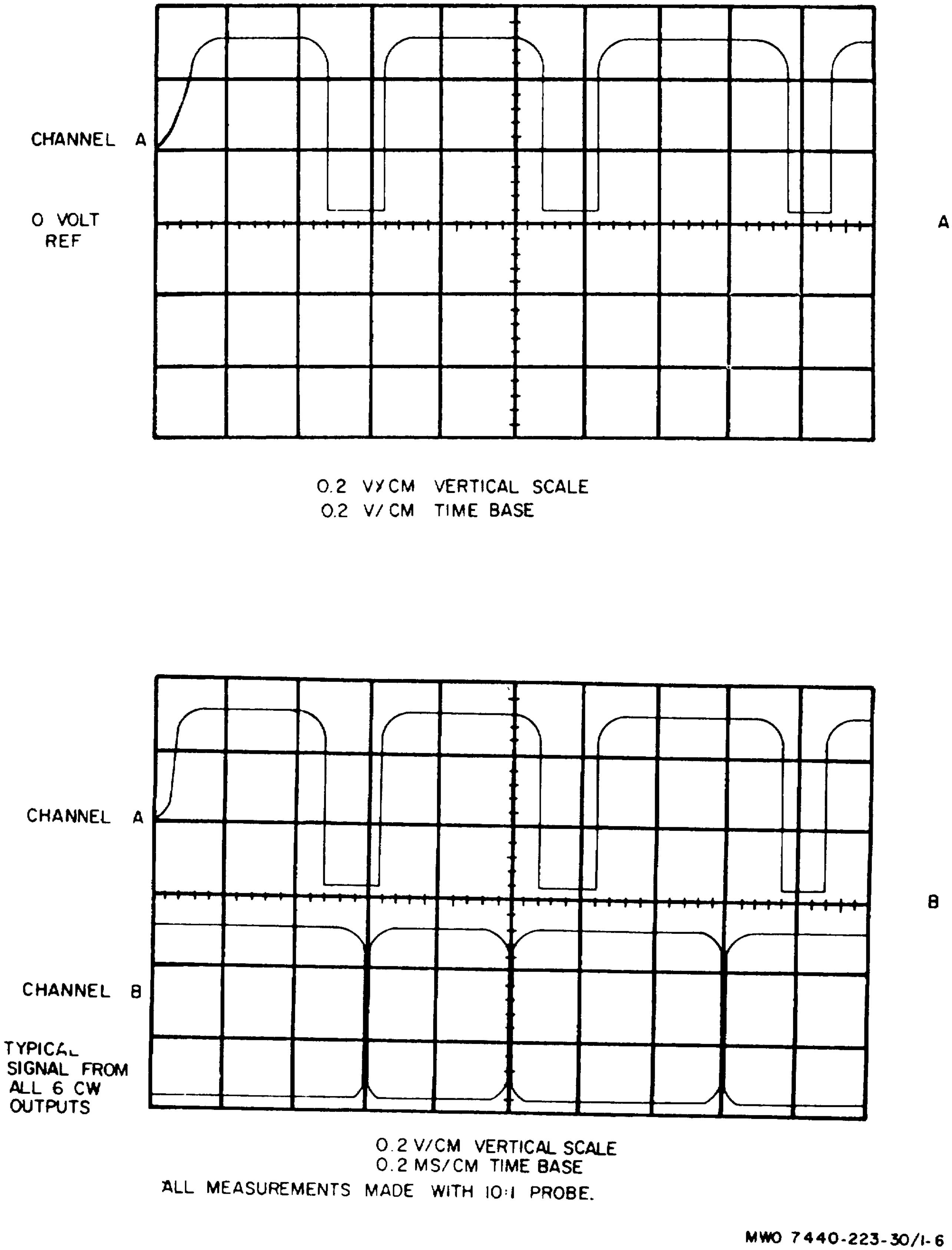


Figure 4-63. Signal code waveform.

harm to personnel and damage to the strobe disk. Make very sure no movement of the tractor drive shaft occurs during this adjustment procedure. Even slight movement of the tractor drive shaft results in loss of the top-of-form requirement and necessitates readjustment as described in paragraph 4-109.

(4) Remove the upper screw (fig. 4-57), and loosen the lower screw.

(5) Swing the signal strobe subassembly toward the front of the page printer, and secure it with the upper screw in the tapped hole.

(6) Remove one of the two white wires connected to TB1-5 of clutch limiter wiring assembly (41, fig. 4-11), and tape the end of the wire to prevent possible short circuits. Allow this wire to hang loose.

(7) Connect an oscilloscope to pin 6 of PC card A2A2A4A1. Set the oscilloscope to display a line across the face of the CRT.

(8) Apply power to the page printer.

(9) While observing the oscilloscope, slowly rotate the strobe disk assembly (fig. 4-57) by hand until the signal displayed on the oscilloscope drops to its lowest level.

(10) Verify that the lowest level observed in * the preceding step is 0.5 volts or less.

(11) Repeat steps 9 and 10 for pins 3, 7, and 12 of PC card A2A2A4A1.

c. Adjustment.

(1) After performing the preceding check, connect the oscilloscope to the pin of PC card A2A2A4A1 which was the farthest from meeting 3 the 0.5 volt requirement.

(2) While observing the oscilloscope, slowly rotate the strobe disk assembly (fig. 4-57) by hand until the signal displayed on the oscilloscope drops to its lowest level.

NOTE

While performing the next two steps, take care not to move the strobe disk assembly.

(3) Loosen the screw (10, fig. 4-20) securing the strobe disk lamp housing (15) to the lamp housing bracket (14).

(4) While observing the oscilloscope, rotate the strobe disk lamp housing until the oscilloscope indication drops to its lowest level. Tighten the screw, loosened in the preceding step.

(5) Recheck and readjust as required until all four test points (pins 3, 6, 7, and 12 of PC card A2A2A4A1) meet the requirement of 0.5 volt or less.

(6) Remove power from the page printer.

(7) Disconnect the oscilloscope from the page printer.

(8) Remove the tape applied during checkout, and reconnect the white wire to TB1-5 of the clutch limiter wiring assembly.

(9) Align the strobe disk index mark (fig. 4-57) with the fixed index on the signal strobe subassembly.

(10) Remove the upper screw from the tapped hole. Swing the signal strobe subassembly back into the position shown in figure 4-57, making sure the spur gear (357, 357.1, or 357.2; fig. 4-11) meshes with the line strobe gear drive (334).

(11) Reinstall the upper screw as shown in figure 4-57. Tighten the upper and lower screws.

CHAPTER 5
PRINTED CIRCUIT CARD MAINTENANCE INSTRUCTIONS

Section I. GENERAL

5-1. Scope of PC Card Maintenance

a. This chapter includes instructions for performing corrective maintenance procedures on PC cards. Isolation of a malfunction in the page printer to a PC card is given in chapter 4. The instructions in chapter 5 are used to isolate the malfunction to a defective part in the PC card and to replace the defective part.

b. PC card maintenance includes (1) Testing a PC card suspected to be defective.

(2) Troubleshooting using manual techniques.

(3) Replacement of defective parts.

5-2. Tools and Test Equipment Required

The following chart lists tools and test equipment required for performing PC card maintenance

Item (or equal)	Manufacture	Model number
Mutimeter ME-185	Simpson	269
Oscilloscope	Hewlett-Packard	140-A
Dual Channel Amplifier Plug-In.	Hewlett-Packard	1405B
Time Base Plug-In	Hewlett-Packard	1121A
Oscilloscope Cart	Hewlett-Packard	1115A
Voltage Divider Probe (with tip kit).	Hewlett-Packard	CO-7-10003A
Hood, Oscilloscope	Hewlett-Packard	10175A
Transistor Tester TS-2086/U.	....	....
Analyzer ZM-3/U	....	....
Electrical Equipment Tool Kit TK-105/G	....	....
Extender Board	Anelex Corp.	11244G1

Section II. TROUBLESHOOTING PRINTED CIRCUIT CARDS

5-3. Testing Procedure

If a PC card is suspected of being defective, install it in a page printer which is known to be otherwise operable. Then operate the page printer with an associated CCU, and transmit a message which contains all possible characters (table 3-1). If all the characters are properly printed, and the paper advances correctly, the PC card being checked is considered good. If a malfunction occurs, refer to the troubleshooting instructions.

5-4. General Troubleshooting Procedure

The first step in servicing a defective PC card is to perform a visual inspection (para 5-5). If this does not help in localizing the fault, signal tracing and signal substitution techniques are required (para 5-6 and 5-7).

5-5. Visual Inspection

Carefully inspect the PC card for evidence of overheating. Check for corrosion and loose connections.

5-6. Signal Tracing

a. Place the PC card on an extender board and, with power off, install it in a page printer known to be in good operating condition. Operate the page printer to simulate the condition under which the malfunction was observed, then use standard signal tracing techniques to isolate the defective part. A thorough knowledge of the operation of the page printer circuits (Chap. 3) is required to use signal tracing techniques effectively.

b. The voltages and waveforms at most test points may be observed with the oscilloscope. In general, signals at input and outputs of integrated circuit logic element modules switch between +4.5 volts dc (high) and 0 volt dc (low). Determine whether the voltage at a specific terminal is high or low at any time by studying the operating conditions at that time. For voltages at inputs and outputs of discrete component logic circuits, refer to paragraphs 3-84 and 3-85.

c. For the location of parts on PC cards, refer to figures 5-2 through 5-18. For the location of terminals on integrated circuit logic element modules, see figure 5-1. This figure applies to all types of integrated circuit logic elements.

d. The page printer can be operated to print one column at a time using the CCU. If the PC card being checked contains circuits which process the character data bits, repetitive waveforms for signal tracing can be obtained by continually generating the same character from the CCU. If the PC card being checked contains circuits which involve paper motion, the PC card can be checked by using the LINE FEED or FORM FEED switch (as necessary) on the control panel. Pressing the LINE FEED or FORM FEED switch (as necessary) should provide continuous paper feeding as long as the switch is pressed.

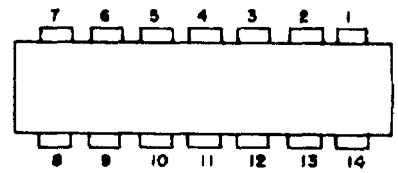


Figure 5-1. Location of terminals on integrated circuit modules.

5-7. Signal Substitution In some cases, isolating a malfunction within a complex logic circuit can be simplified by using signal substitution techniques. Specifically, any point or points at the input to a logic element may be grounded, thereby making the operation of the logic elements easily predictable. This method cannot normally be used to insert a high level (+4.5 volts) without physically disconnecting the signal input from the logic element; therefore, signal substitution should not be used for high level inputs.

Section III. REPAIR

5-8. General Parts Replacement

Techniques Most of the parts on a PC card can be easily replaced without special procedures. For PC card soldering techniques, refer to TB SIG 222 (Army), TO 00-25-234 (Air Force) or NW 00-15PA-1 (Navy) (app A). When replacing integrated circuit logic elements, it is important to unsolder only one terminal at a time; use a solder syringe to remove the solder before unsoldering the next terminal.

5-9. Parts Location Diagrams

The locations of all replaceable parts on the PC cards of the page printer are shown in figures 5-2 through 5-18.

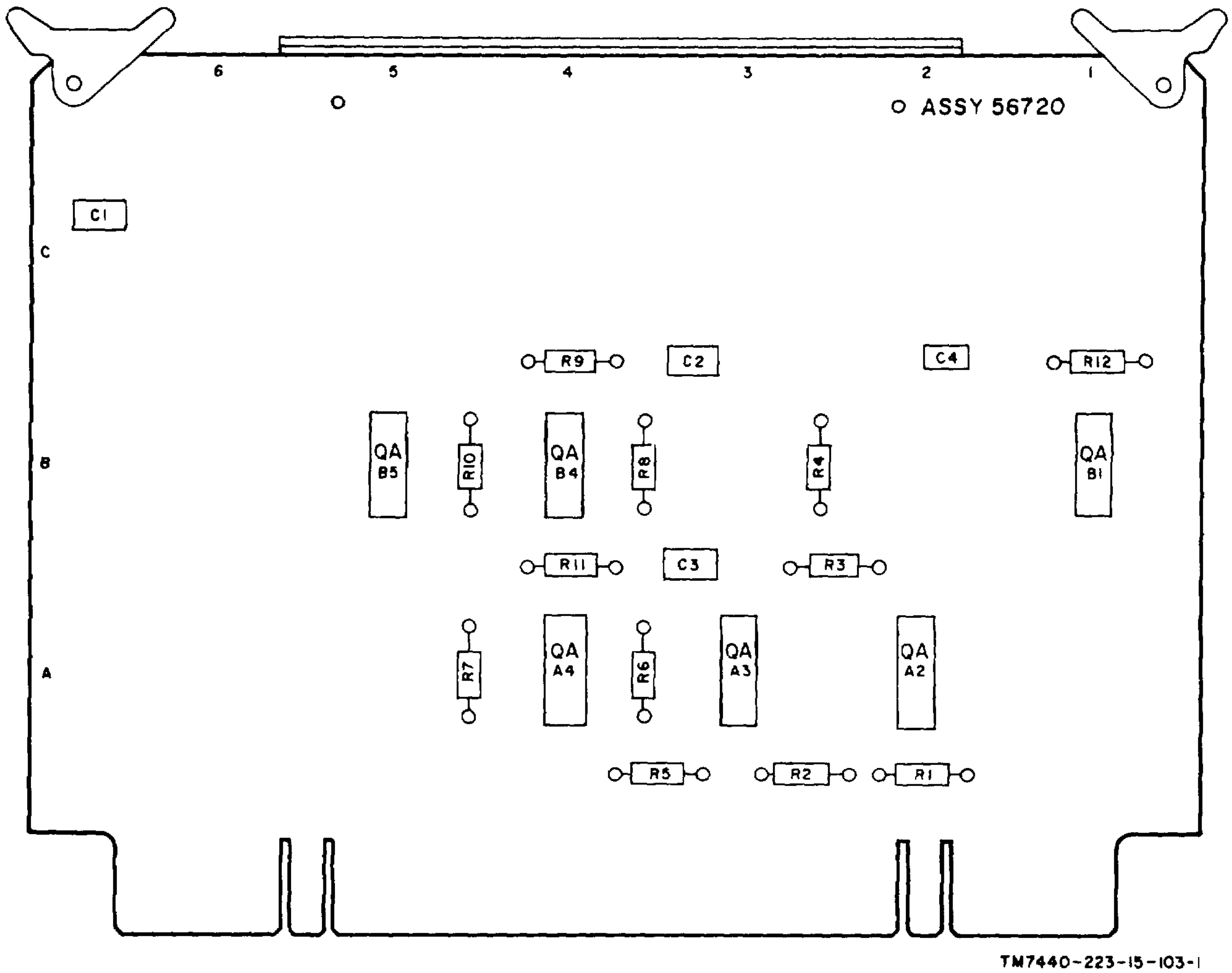


Figure 5-2. PC card B7 (No. 56720), component location diagram,

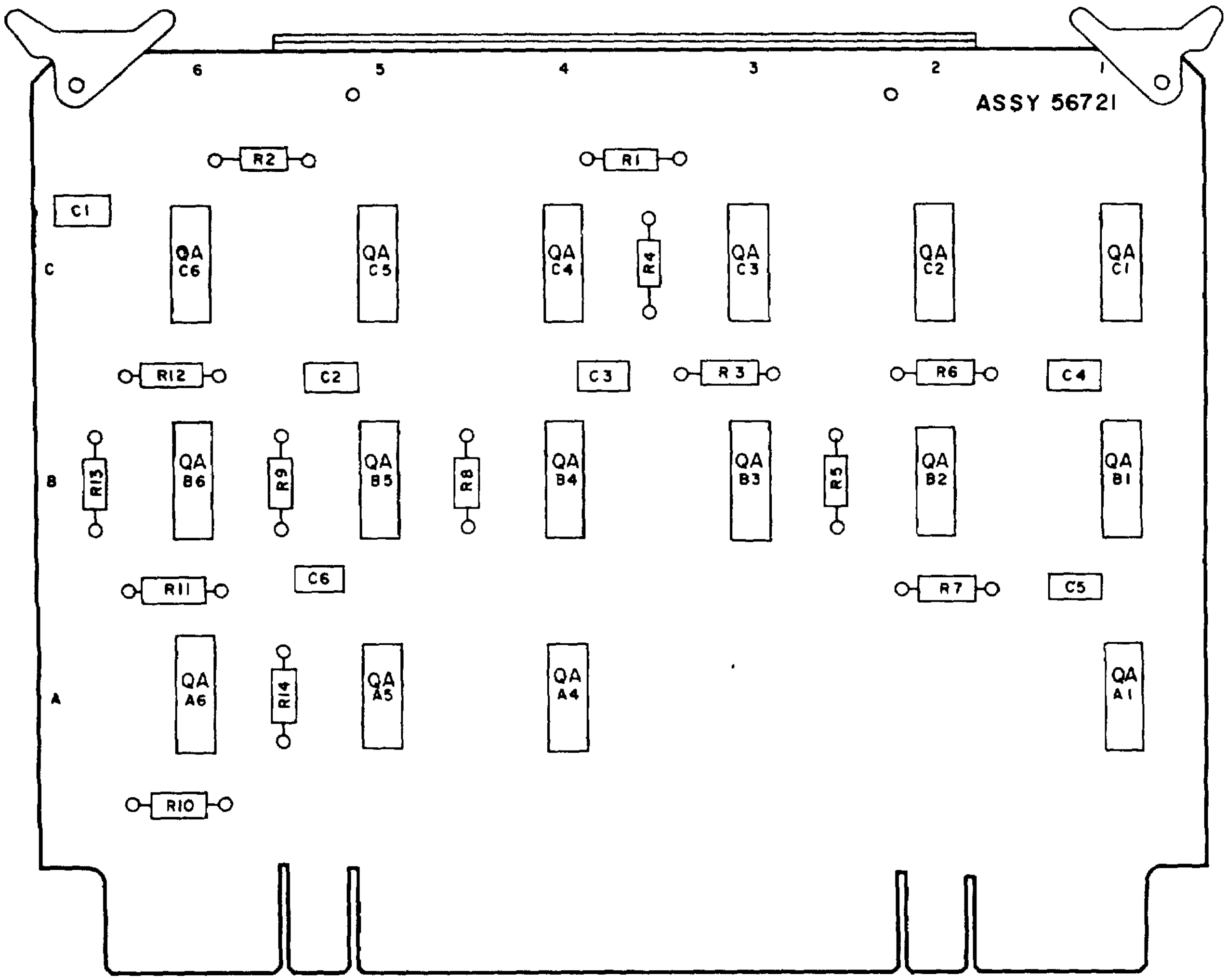


Figure 5-3. PC card B8 (No. 56721), component location diagram.

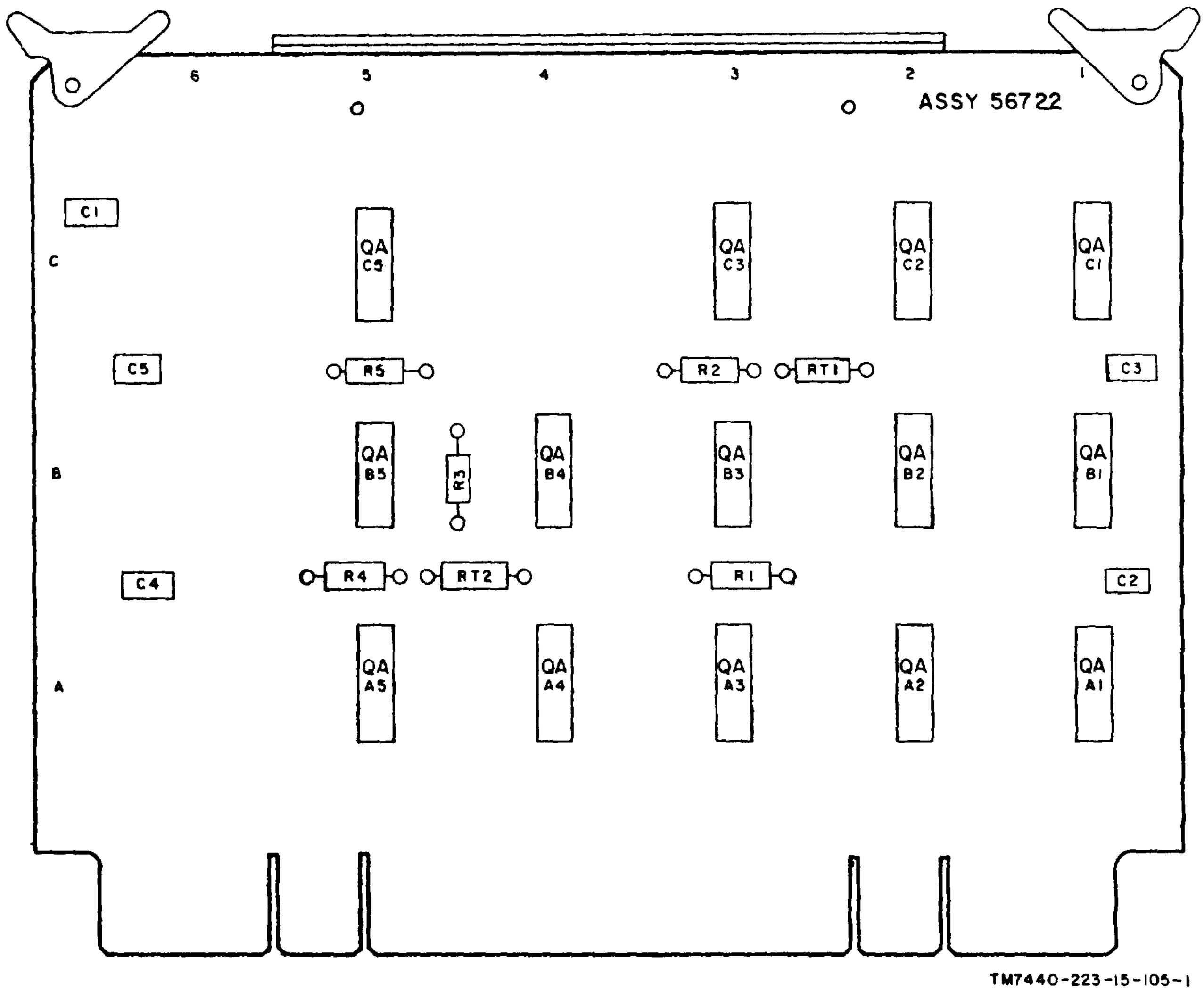


Figure 5-4. PC card B10 (No. 56722), component location diagram.

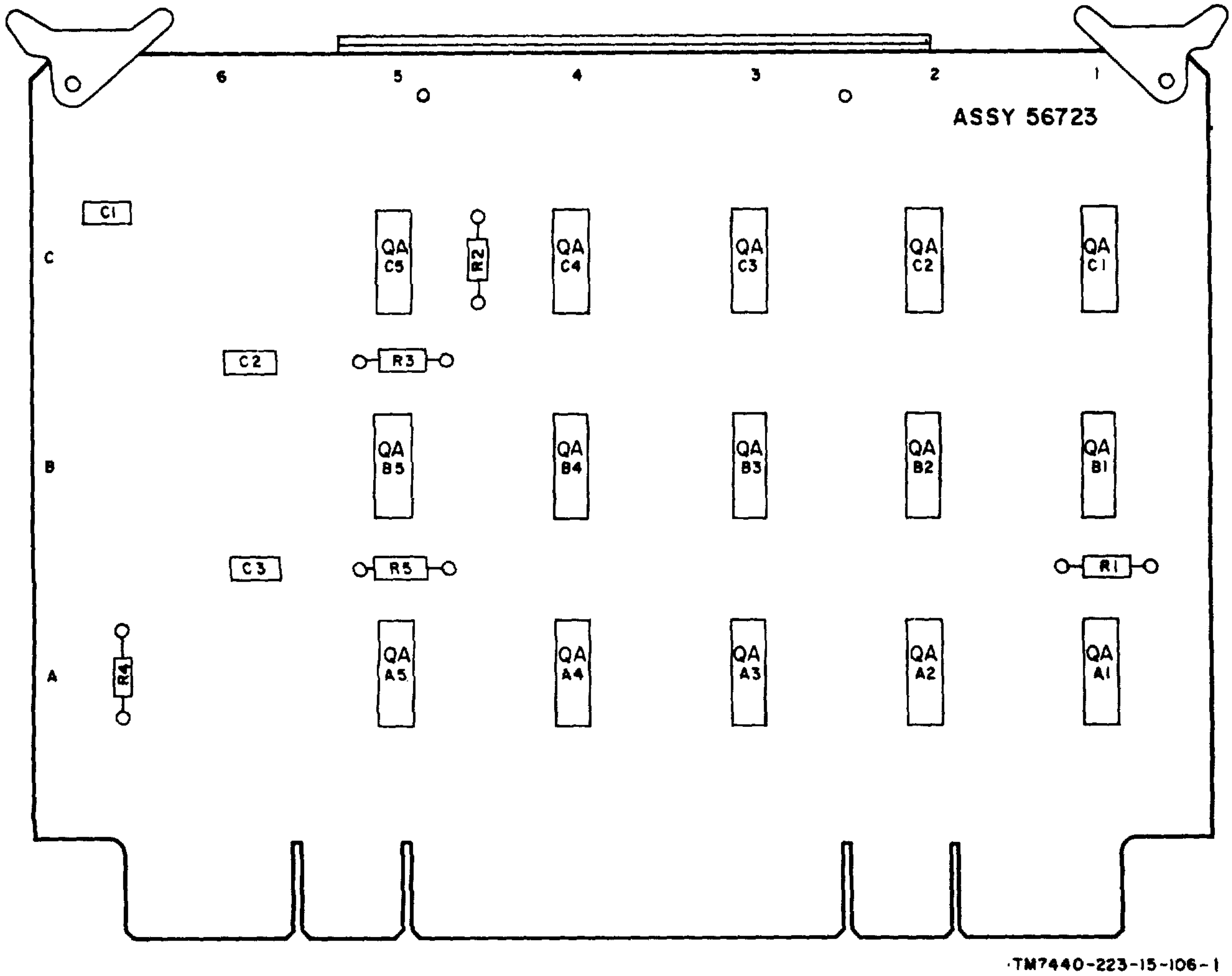


Figure 5-5. PC card B11 (No. 56723), component location diagram.

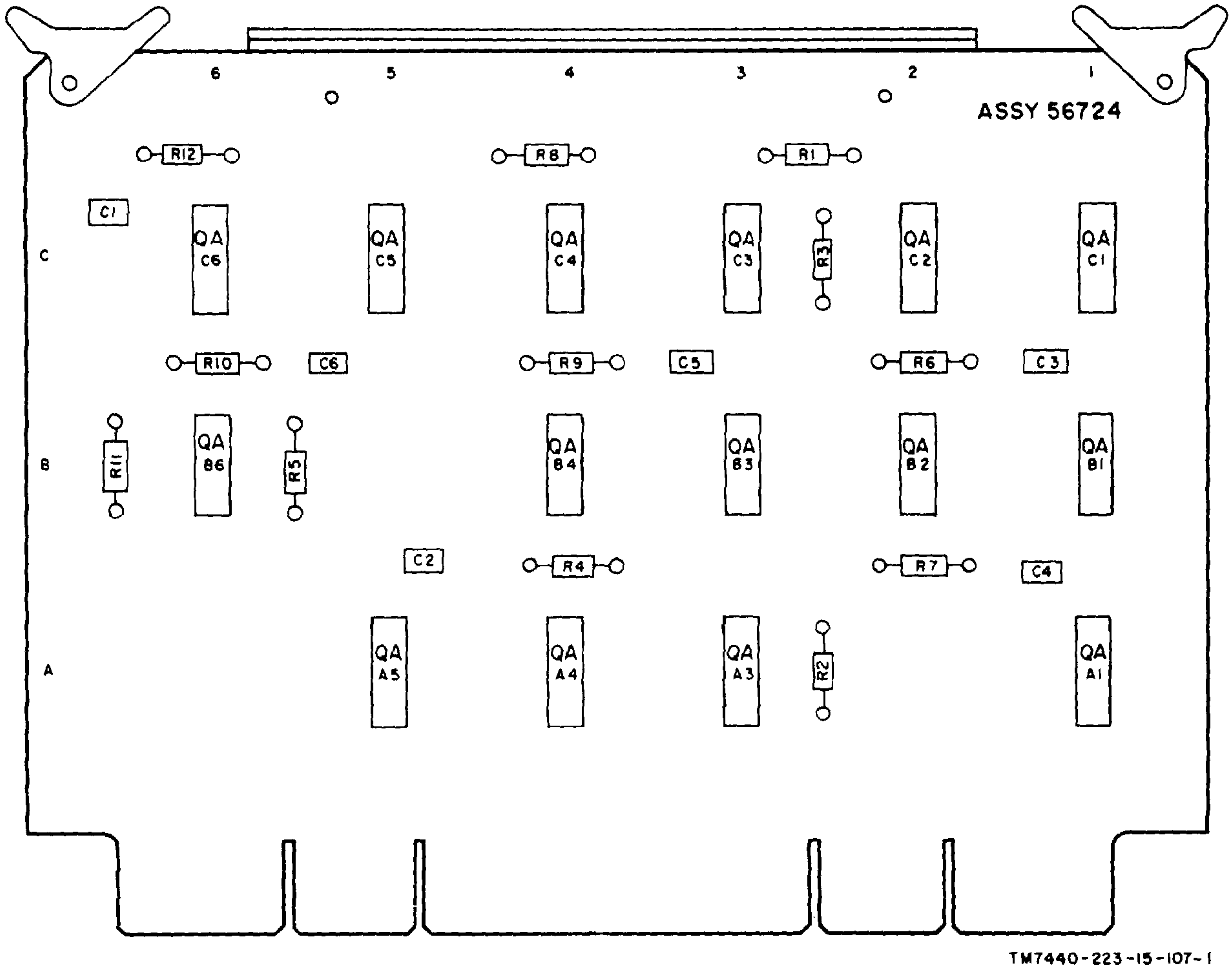


Figure 5-6. PC card B9 (No. 56724), component location diagram.

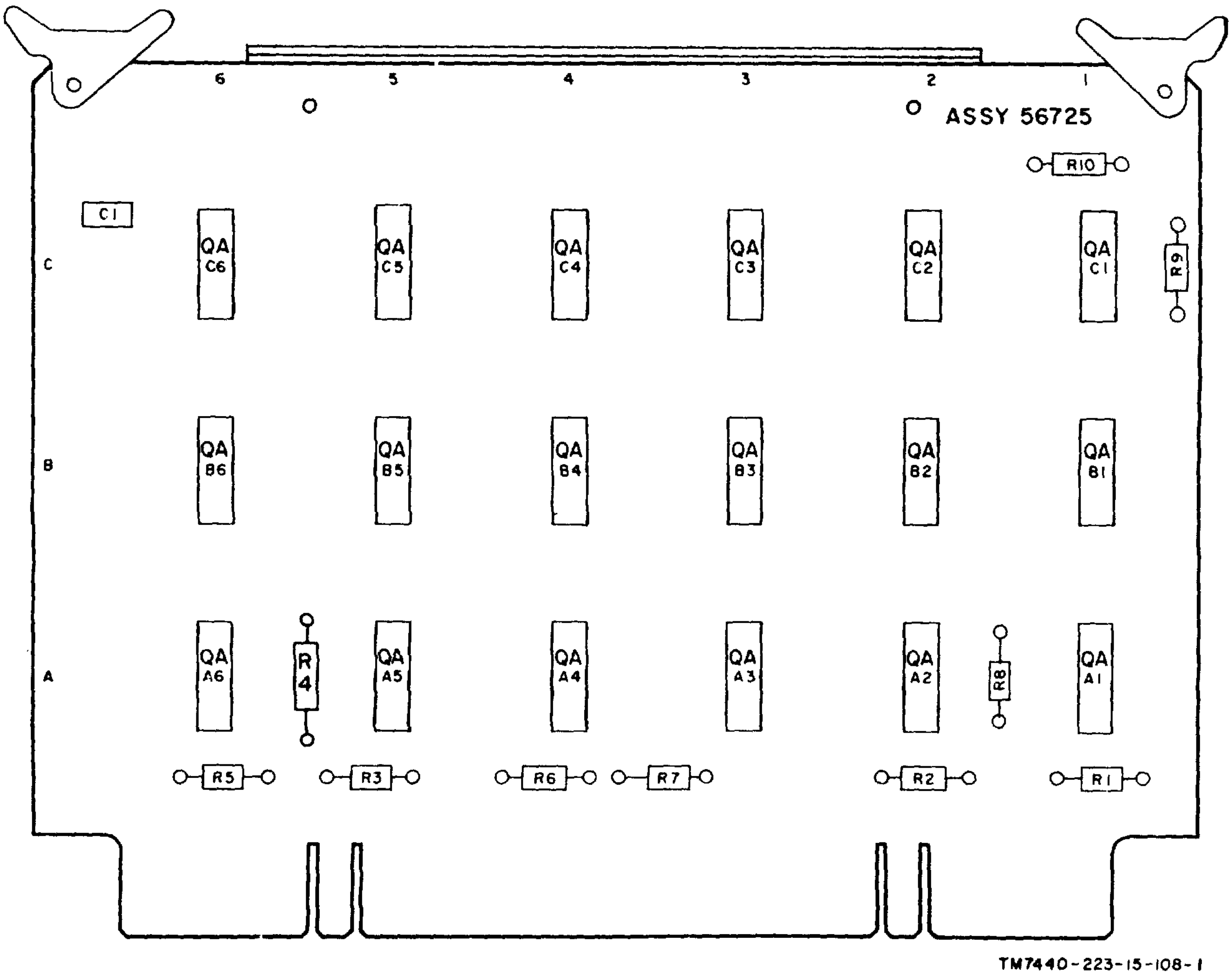


Figure 5-7. PC card B6 (No. 56725), component location diagram.

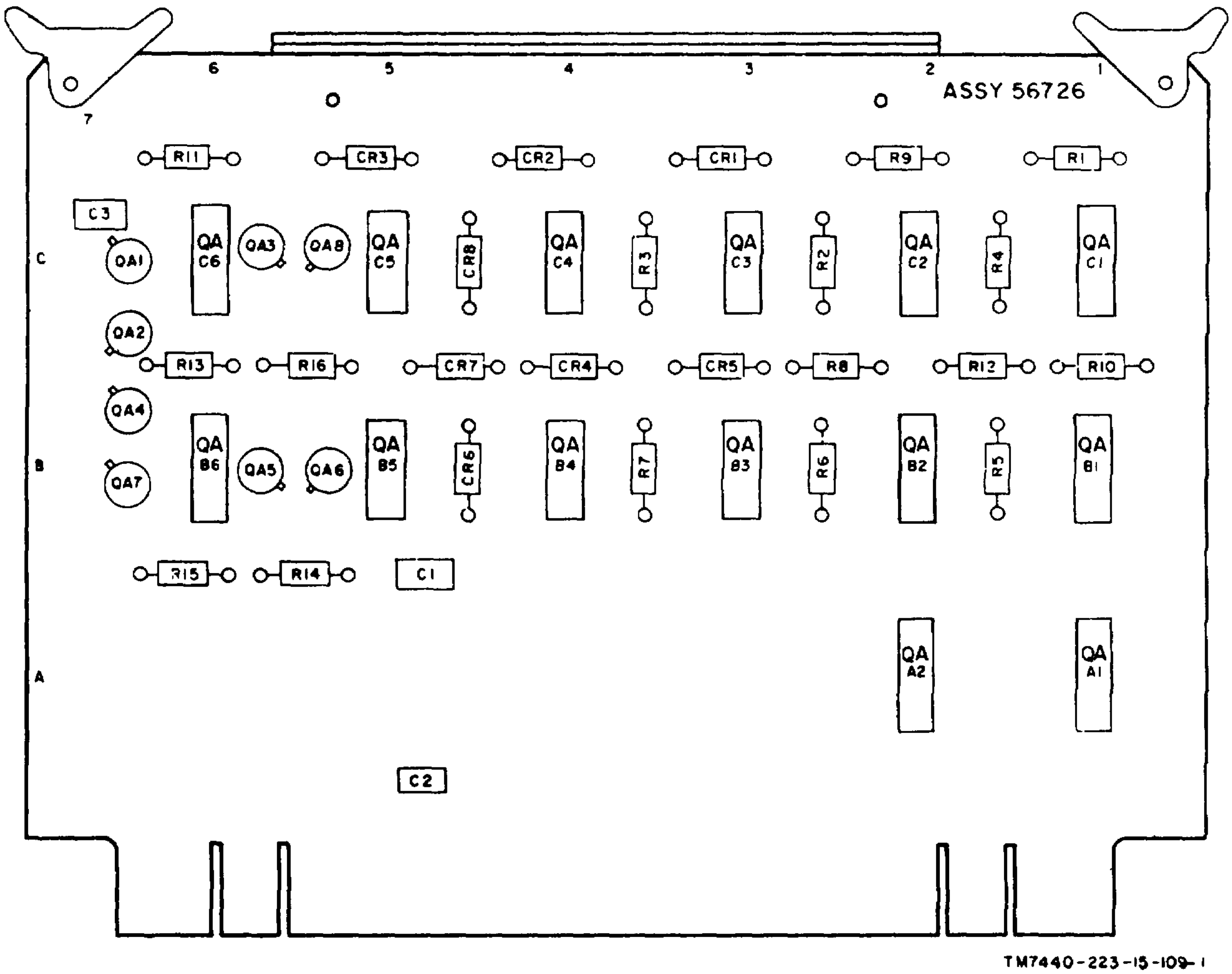


Figure 5-8. PC card B5 (No. 56726), component location diagram.

NOTE

MWO 11-7440-223-30/1 changes the values of resistors R2 through R8 from 5600 ohms to 22k and changes the part number as shown.

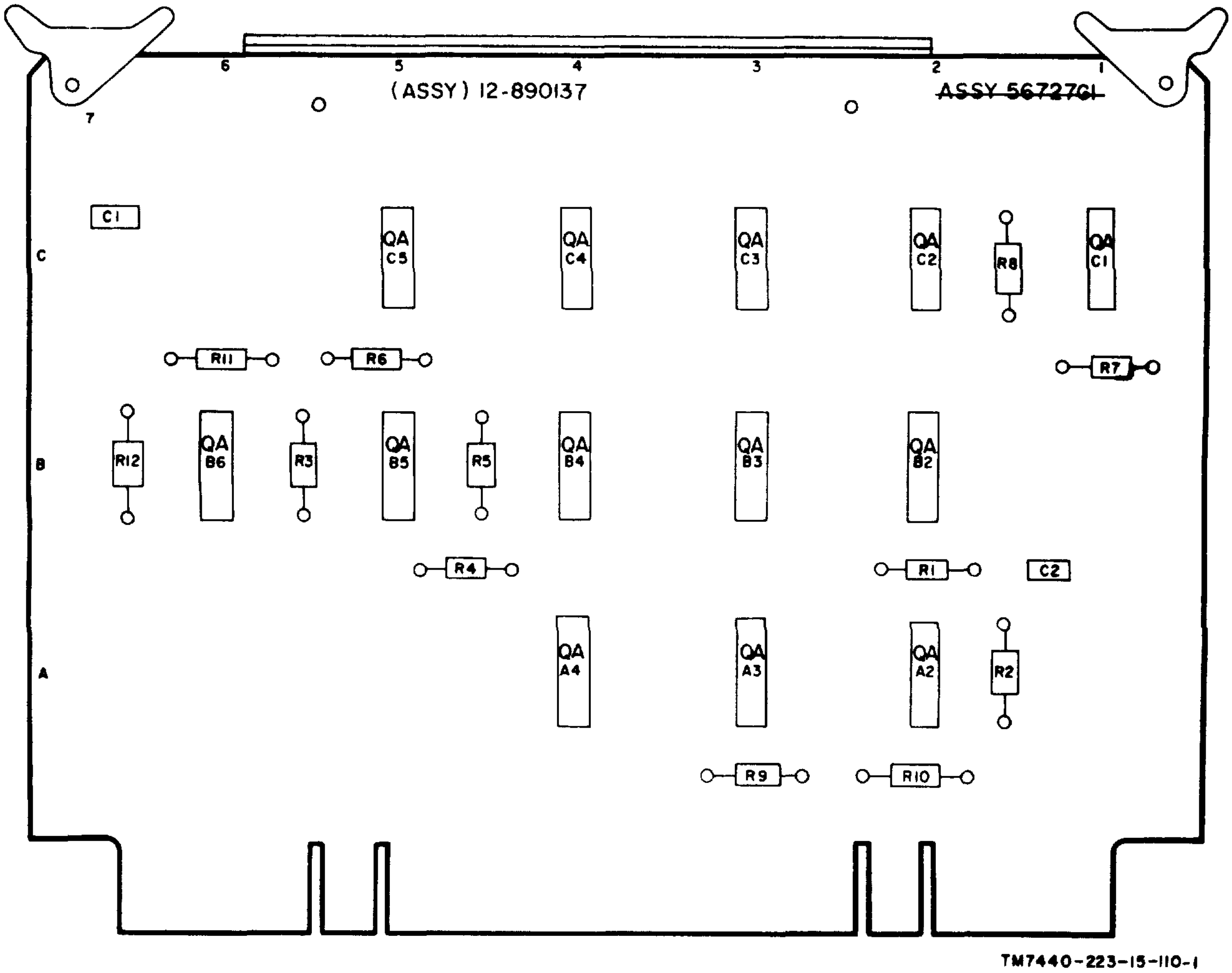


Figure 5-9. PC card B4 (No. 12-890137), component location diagram

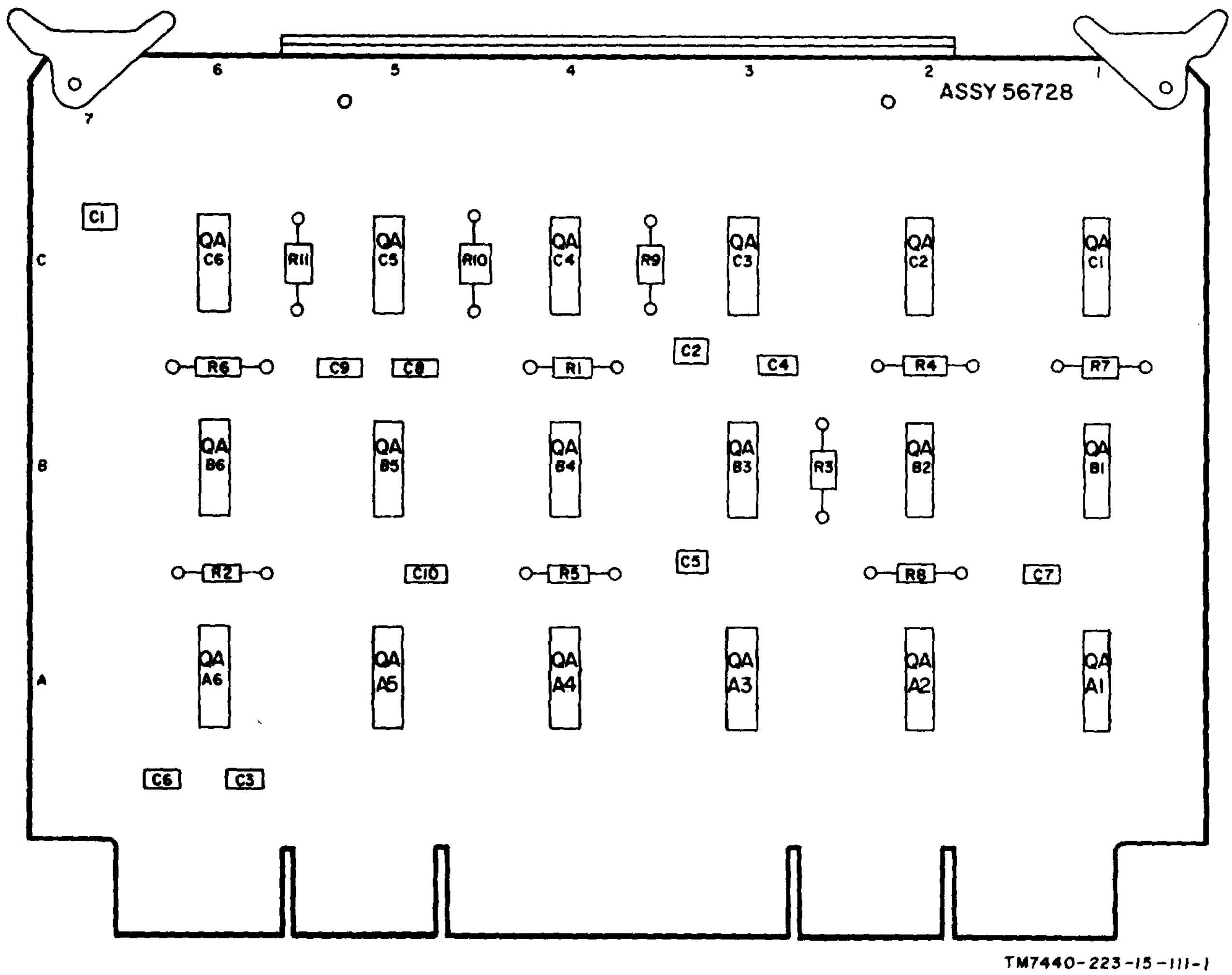


Figure 5-10. PC card B13 (No. 56728), component location diagram.
(Print Control)

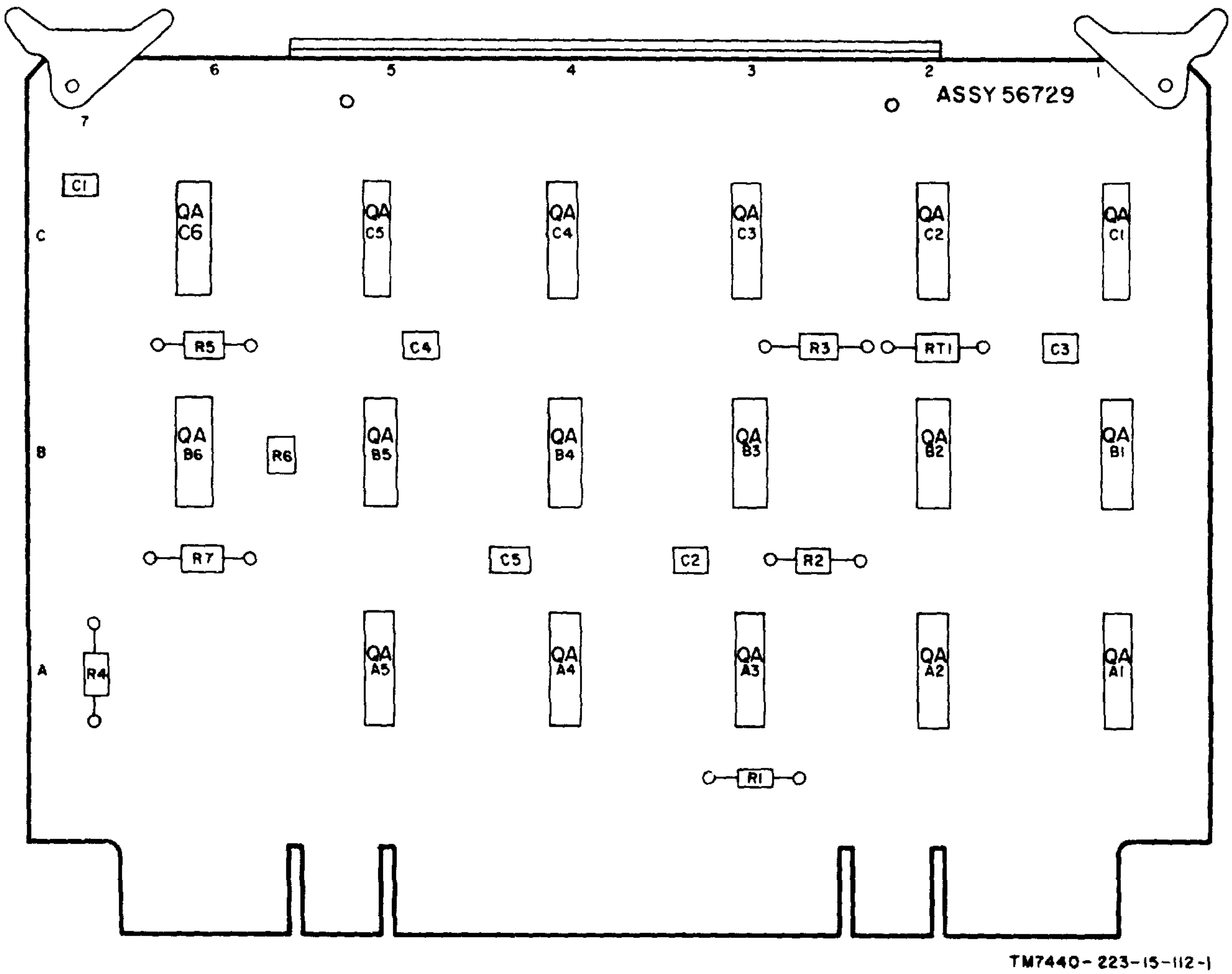


Figure 5-11. PC card B12 (No. 56729), component location diagram. (Print Address)

NOTE

MWO 11-7440-223-30/1 changes the values of resistors R4 through R7 from 5600 ohms to 22k and changes the part number as shown.

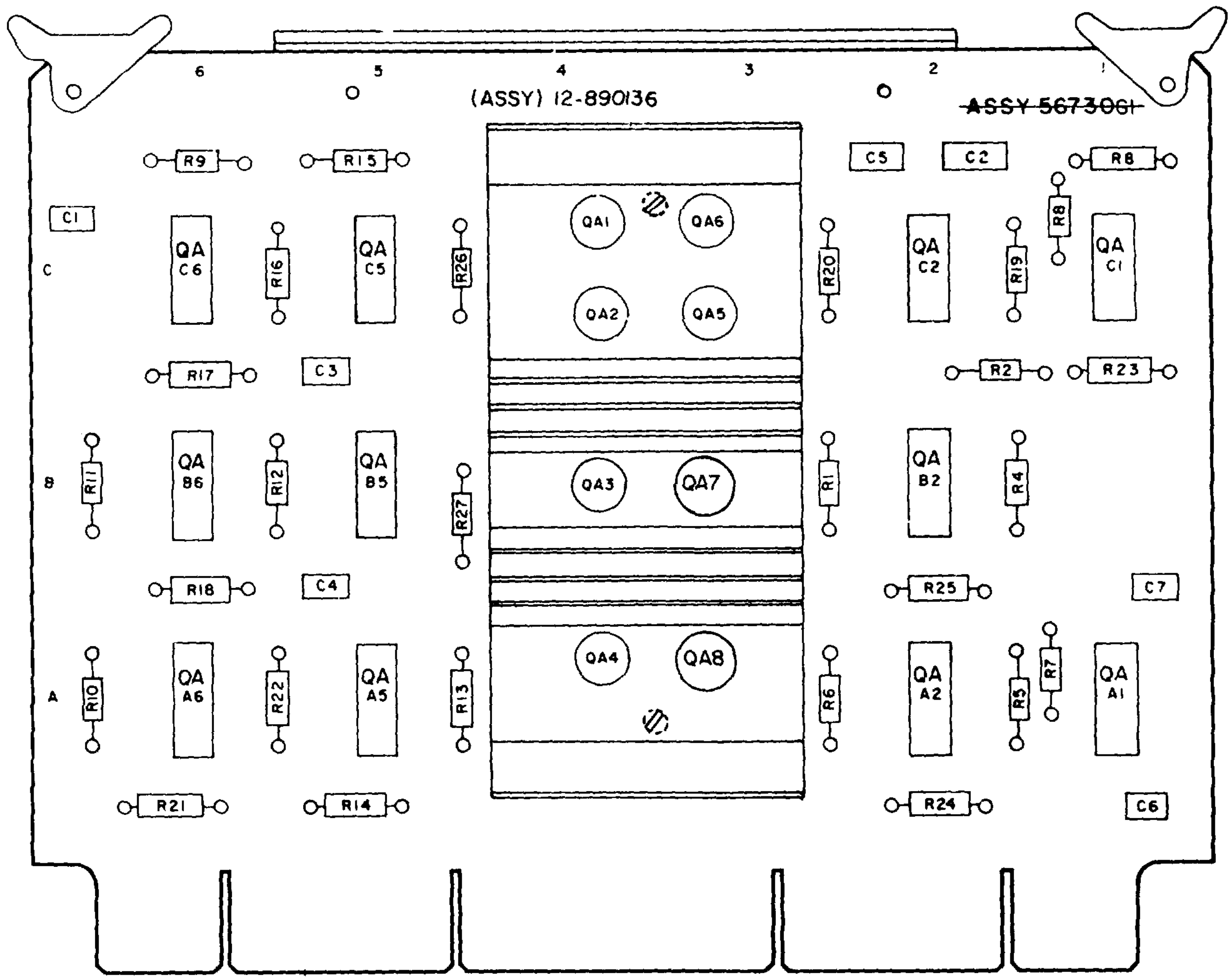


Figure 5-12. PC card A1 (No. 12-890136), component location diagram.

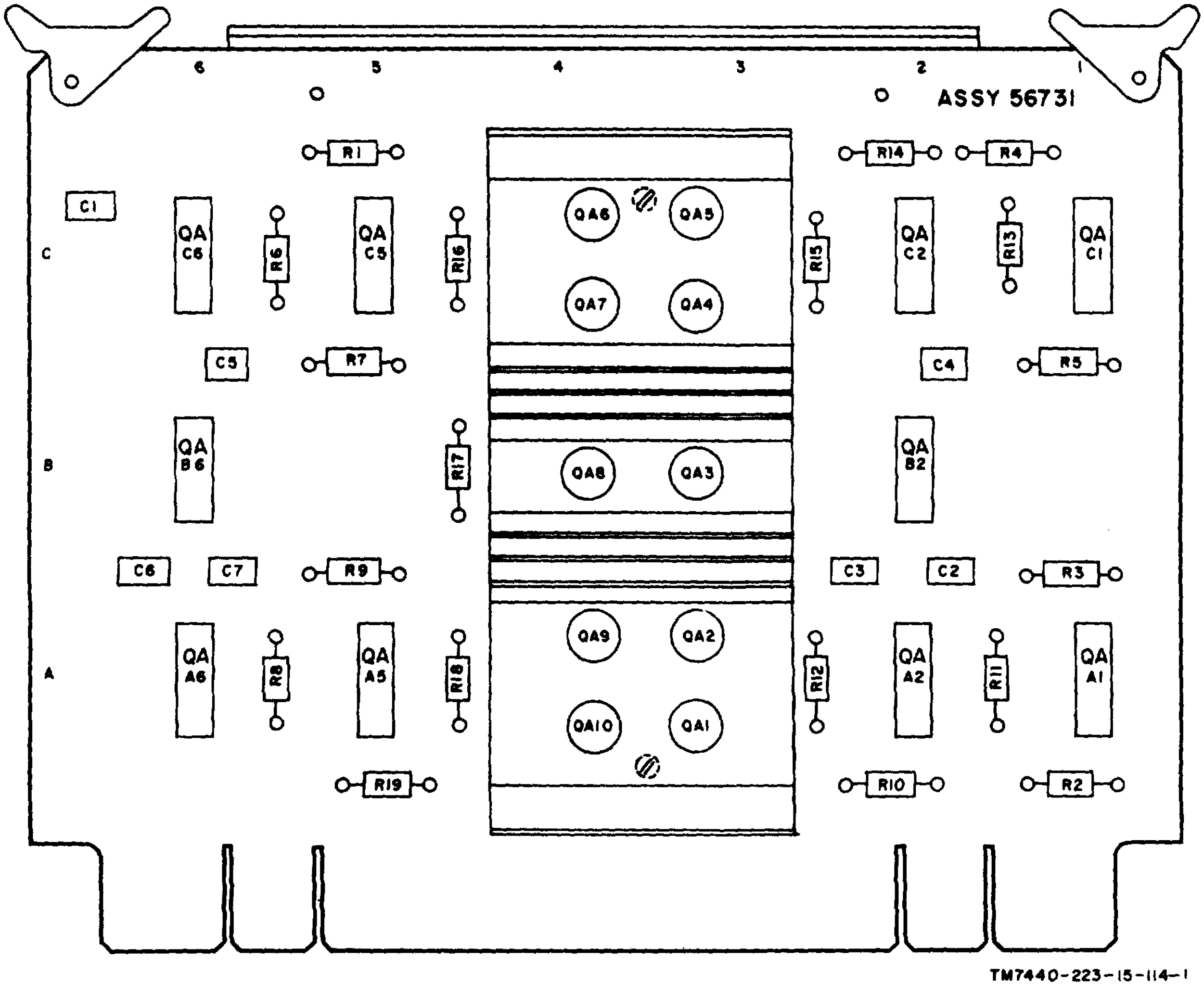
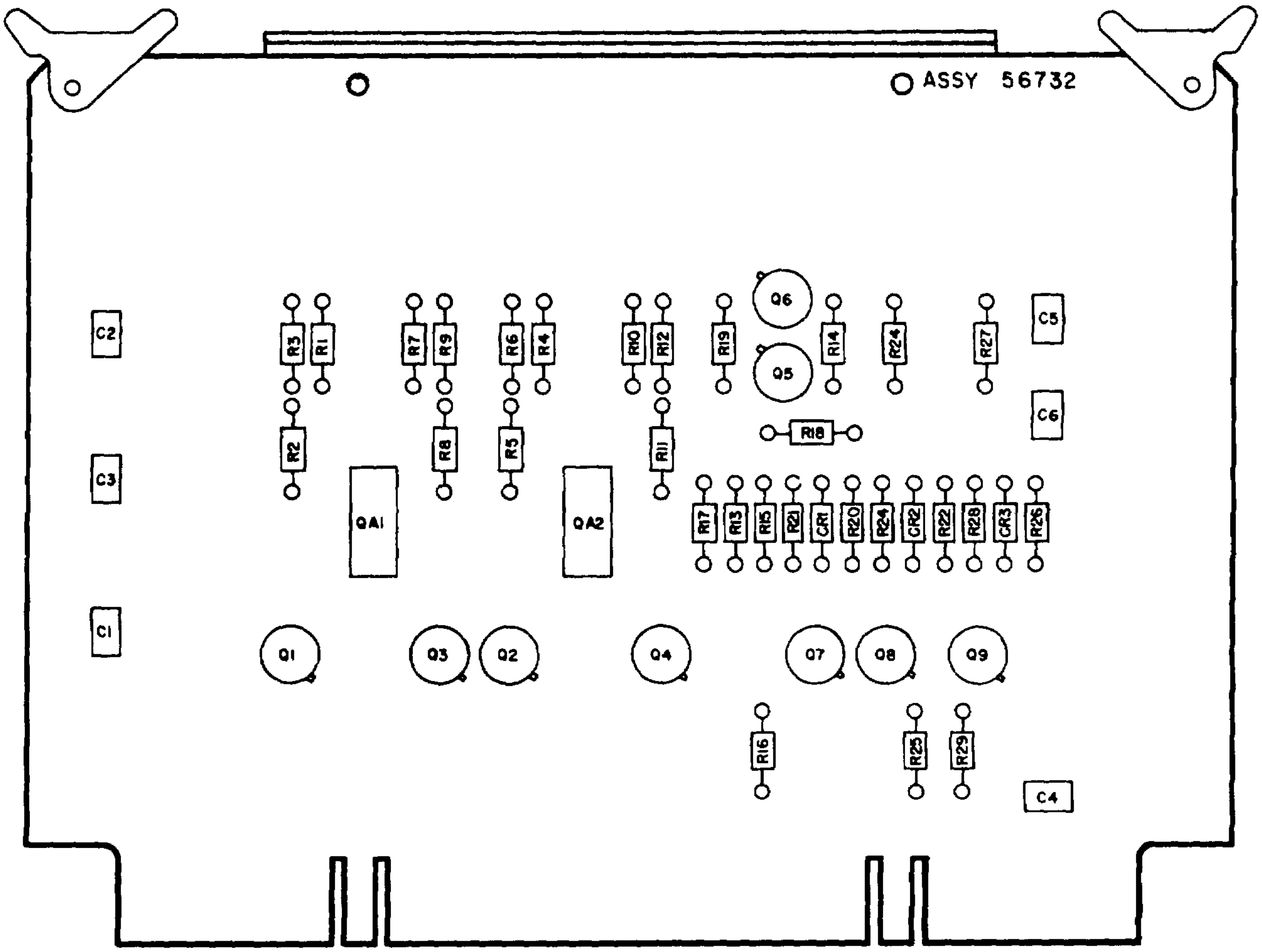


Figure 5-13. PC cards A2 through A9 (No. 56731), component location diagram.



TM7440-223-15-115-1

Figure 5-14. PC card B3 (No. 56732), component location diagram.

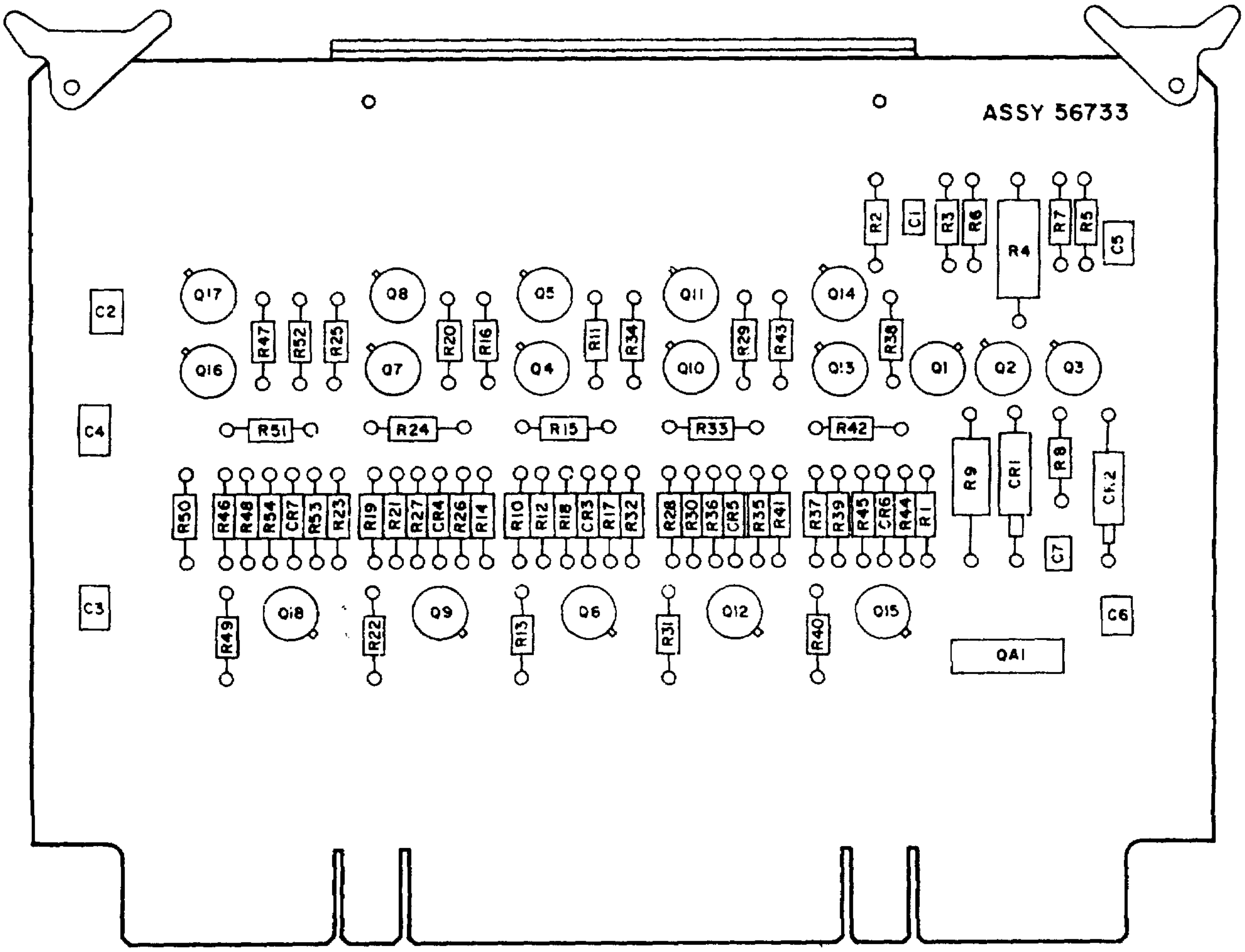


Figure 5-15. PC cards B1 and B2 (No. 56733), component location diagram.

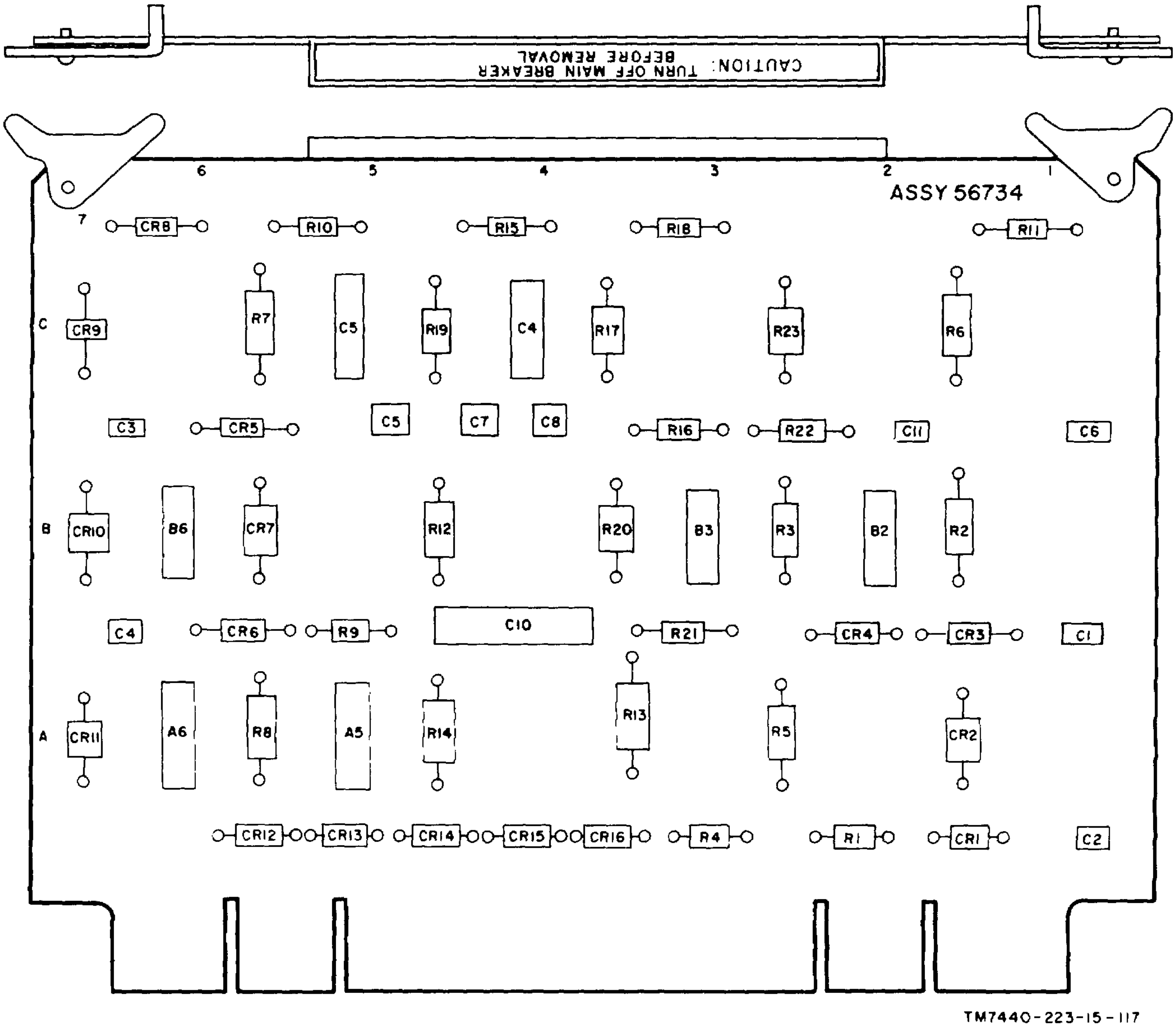


Figure 5-16. PC card A12 (No. 56734), component location diagram.

CAUTION
Turn off the main breaker before removing this card.

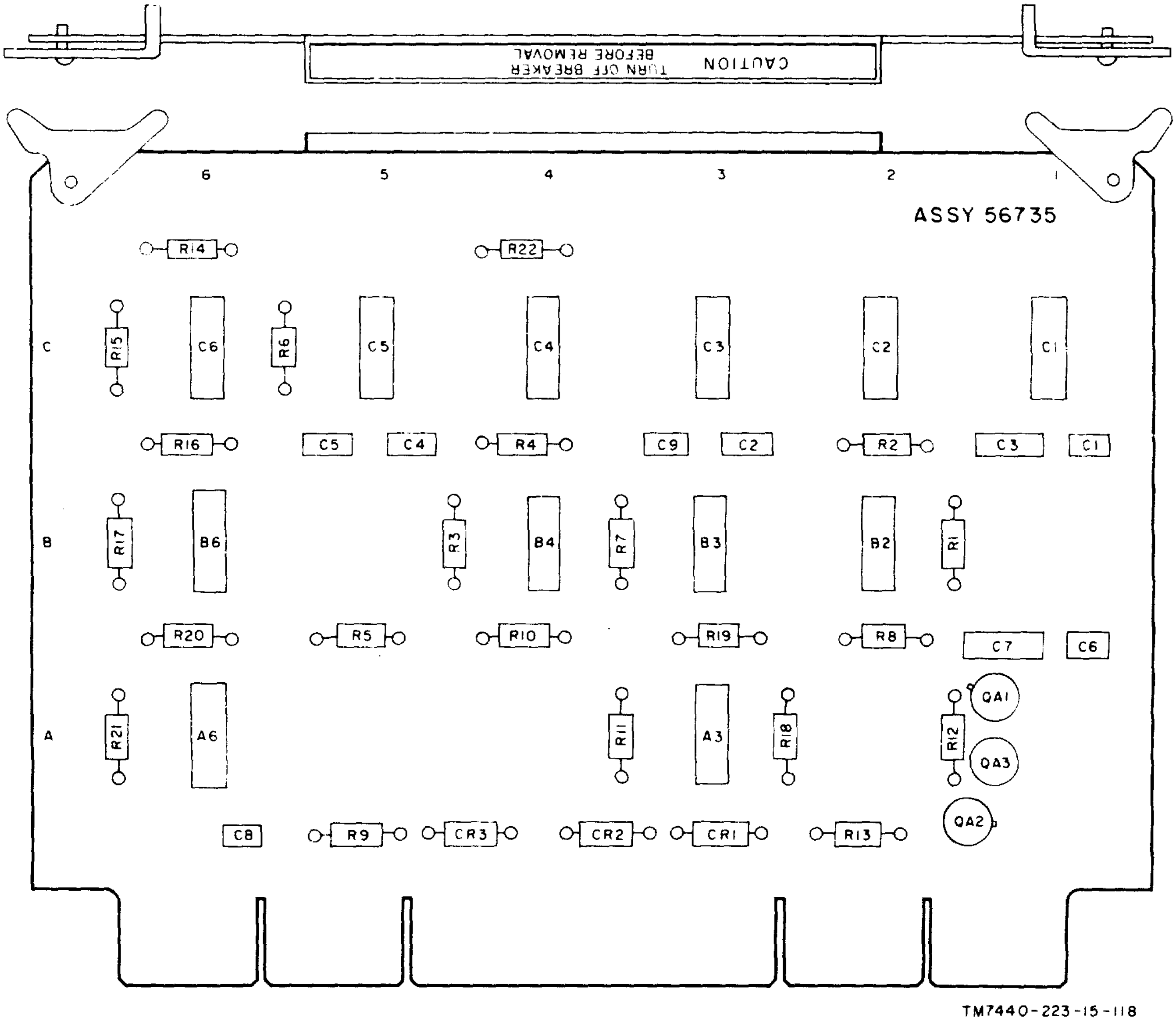


Figure 5-17. PC card A11 (No. 56735), component location diagram.

CAUTION
Turn off the main breaker before removing this card.

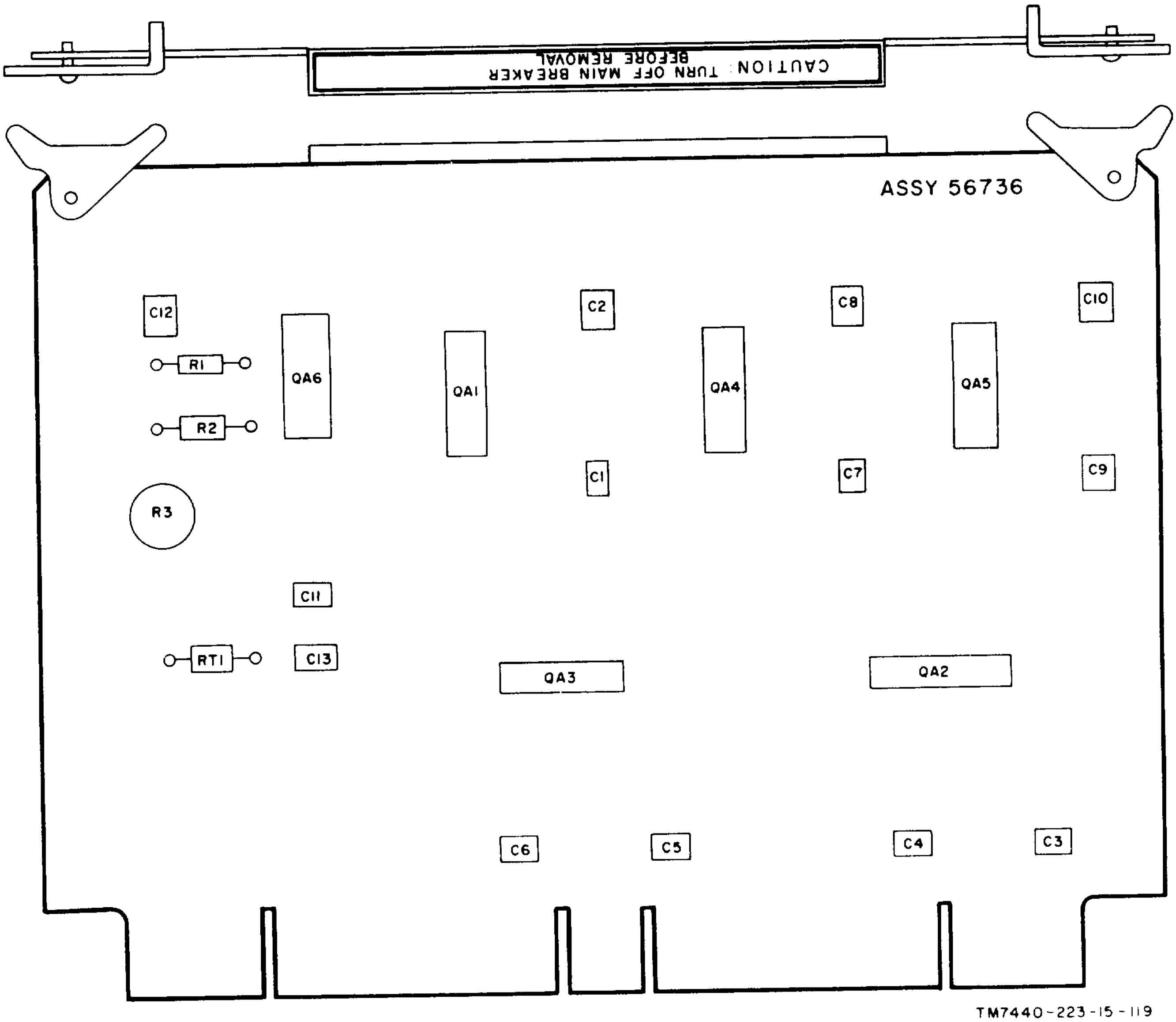


Figure 5-18. PC card A14 (No. 56736), component location diagram (Voltage regulator).

CAUTION
Turn off the main breaker before removing this card.

CHAPTER 6

DEPOT MAINTENANCE

Section I. DEPOT REPAIR

6-1. General

Complete rebuild of the page printer may be accomplished by depot maintenance facilities, when authorized by appropriate authority. Rebuild action includes all repairs, rebuild, and replacement necessary to make this equipment equivalent to new material and suitable for return to the military supply system for reissue to using organizations.

6-2. Depot Repair

Depot repair includes all repair procedures described in chapters 4 and 5, in addition to part fabrication and refinishing procedures possible with the metal-working and refinishing equipment available at a depot.

Section II. DEPOT OVERHAUL STANDARDS

6-3. Applicability of Depot Overhaul Standards

Printer, Page RP-157/G (page printer or PP) must be tested thoroughly after repair to insure that it meets adequate performance requirements for return to stock and reissue. Use the tests described in this section to measure the performance of the repaired device. Equipment that is to be returned to stock should meet all the performance standards given in this chapter.

6-4. Applicable References

a. Repair Standards. Applicable procedures of the depots performing this test and the general standards for repaired equipment given in TB SIG 355-1, TB SIG 355-2, and TB SIG 355-3 form a part of the requirements for testing this equipment.

b. Technical Publications. The technical publications applicable to the equipment to be tested are listed in appendix A.

c. Modification Work Orders. Perform the work specified by modification work orders pertaining to this equipment before making the tests specified. DA Pam 310-7 lists all available MWO's.

6-5. Test Facilities Required

In addition to the tools and test equipment listed in appendix C, the following special tools and test equipment are required to perform the Depot Overhaul Tests:

Item	*Description*
Regulated Power Amplifier (variable frequency and voltage source}	CML Model N5000A, or equivalent, with 0.5% accuracy.
Plug-in Oscillator	CML Model SG-13A, or equivalent, with 0.25% accuracy.
Timer	Standard, Model TF-4421, or equivalent.
Frequency Counter	Beckman, Model 7350A, or equivalent, accuracy of 5 parts in 10^8 per week.
Pocket Comparator with MICR Grid	Edmund Scientific, Model 30.285 or equivalent.
Belt Tension Gage	Anelex, Model 57824, 0-10 lbs, ±4 oz. accuracy.
Page Printer Test Set	Anelex Corp., Model No. 56279, or equivalent.

6-6. General Test Conditions and Requirements

Before the tests (para 6-7 through 6-9) are made, the equipment shall meet the mechanical requirements specified in a below the general test conditions of b below shall be established.

a. Mechanical Requirements. The page printer should be adjusted to meet the requirements of paragraphs 4-100 through 4-123.

b. Test Conditions.

(1) Unless otherwise specified, all tests will be performed under the following conditions:

Temperature	Ambient, 15° C. to 35° C.
Altitude	Normal ground
Humidity	Room ambient up to 98%
Power	Nominal 120 VAC, 60 hertz and 208/230 VAC, 3 ∅, 60 hertz

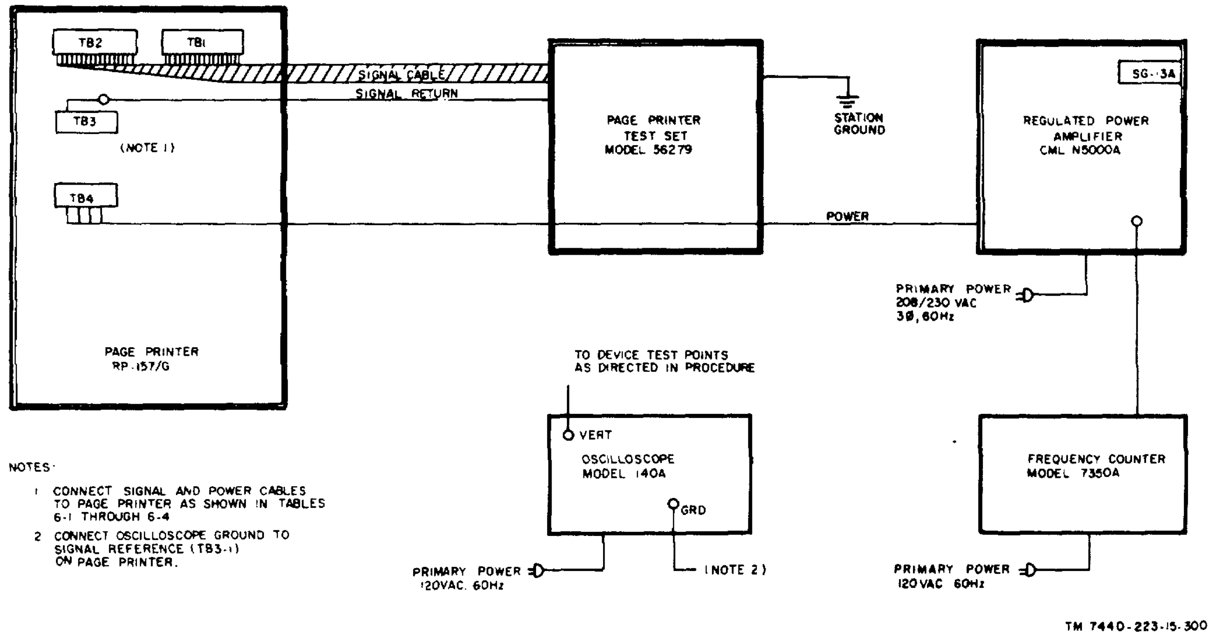


Figure 6-1. Test setup.

(2) Connect the page printer to the test equipment as shown in figure 6-1. Tables 6-1 through 6-4 identify the connections to the page printer terminal boards.

Table 6-1. Test Set Connections to Page Printer (TB1)

TB 1 terminal	Signal
1	Data Line 1
2	Shield of Data Line 1
3	Data Line 2
4	Shield of Data Line 2
5	Data Line 3
6	Shield of Data Line 3
7	Data Line 4
8	Shield of Data Line 4
9	Data Line 5
10	Shield of Data Line 5
11	Data Line 6
12	Shield of Data Line 6
13	Data Line 7
14	Shield of Data Line 7
15	Data Line 8 (Parity)
16	Shield of Data Line 8
17	Data Strobe
18	Shield of Data Strobe
19	Cancel
20	Shield of Cancel
21	Data Control
22	Shield of Data Control

Table 6-2. Teat Set Connections to Page Printer (TB2)

TB 2 terminal	Signal
1	Spare
2	Spare
3	Select
4	Shield of Select
5	Not Assigned
6	Shield of Not Assigned
7	Spare
8	Spare
9	Start Block
10	Shield of Start Block
11	Data Request
12	Shield of Data Request
13	Spare
14	Spare
16	Operator Alarm
16	Shield of Operator Alarm
17	Alarm Stop
18	Shield of Alarm Stop
19	Ready
20	Shield of Ready
21	Audible Reset
22	Shield of Audible Reset

Table 6-3. Test Set Connections to Page Printer (TB3)

TB3 terminal	Signal
1	Signal Return
2	Shield of Signal Return

Table 6-4. Test Set Connections to Page Printer (TB4)

TB4 terminal	Signal
1	120 VAC
2	120 VAC Return
3	Hazard Ground
4	Spare

c. Description of Page Printer Test Set. This test procedures makes extensive use of the page printer test set, Anelex Corporation, Model 56279 (test set). To assist the user, the control panel of this test set is shown in figure 6-2. The test set transmits seven-bit binary character codes and parity for printing, in answer to data requests from the page printer. Correct parity is generated within the test set and transmitted over the eighth data line. The test set includes a control panel from which various modes of operation may be selected. Printer status signals and remote alarms are indicated on the control panel. A brief summary of controls, indicators and functions available is given below:

Control or indicator	Function
AC switch	When set to ON, this switch applies input AC power to the test set power supply, making the test set available for operation.
START/RESET switch	This is the main test set control. Positioning of this switch to START enables the test set to respond to START BLOCK and DATA REQUESTS of the printer. RESET inhibits test set response at the end of the block.
FIX DATA/RUN DATA switch.	This toggle switch provides selection of either solid character code (FIX DATA) or ripple mode (RUN DATA). In solid mode, one selected character is transmitted continuously to the PP for printing. In ripple mode, the test set transmits part or all (as selected) of the ASCII character codes sequentially for printing.
PARTIAL DATA/ALL DATA switch.	This toggle switch enables the operator to select, when operating in ripple, either: ALL DATA-ASCII codes 0000000 through 1111101, which includes LF and CR codes or PARTIAL DATA-Printable AS C11 codes (see table 6-5).

Control or indicator	Function
DATA switches	This set of seven toggle switches may be positioned for any one of the test print characters shown in table 6-5 when operating in solid mode.
FUNCTION POSITION switches.	These toggle switches may be set at any desired line length up to 80 columns by making appropriate combinations of the assigned numbers, thereby selecting the columns to be effected by the function switches. Their settings determine which character column is followed by command characters (LF, CR, BELL), which one or two adjacent characters have a parity error, or whether or not a CANCEL command is to be transmitted. Transmission of the data block continues after the selected functions have been transmitted, except when short lines terminated with CR are employed. In this case, EOB is not transmitted and the printer remains selected, formatted by LF and CR commands alone. Example: If the 16 and 32 toggle switches are in the up position, 48 characters are transmitted prior to action as selected by FUNCTION I and then FUNCTION 2.
FUNCTION 1 and FUNCTION 2 switches.	The setting of these rotary switches determines the function commands applied to the printer directly following the last character of the line selected. For example, if a line length of 16 characters is selected and FUNCTION 1 switch is set to LF, and FUNCTION 2 switch is set to CR, a line of 16 characters is printed, followed by a line feed and a carriage return. When one of the function switches is set to PARITY, a parity error (even parity) is transmitted to the printer logic to check capability of the latter to detect and indicate this type of error occurring in incoming data. When a parity error is detected, an asterisk (*) is printed in the place of the erroneous character. As in LF/ CR, the column selection for the erroneous character is

Control or indicator	Function
	controlled by the setting of the line function position switches. A setting to CANCEL and line-length of zero causes the test set to transmit a positive pulse to the printer, indicating that the message being transmitted is to be canceled. CANCEL is strobed with the first data strobe and initiates a sequence causing a single LF/CR, full line printout of circumflex ( ) and a form feed.
EOM switch	Setting this toggle switch to ON causes the test set to transmit a positive pulse which is strobed with the 81st data strobe. The pulse occurs after the last block in the message has been transferred to the printer, and generates a single form feed following printout of any data that may be stored.
ALARM STOP indicator	This indicator lights to indicate sending a down-level (unready) of the READY line to the CCU for any of the following causes:
	Printer off-line; i.e., disconnected from the CCU (either in STOP condition or in LOCAL mode of operation). Paper supply exhausted. Printer fault. Parity error.
CAUTION indicator	This indicator lights to indicate sending a down level on the OPERATOR ALARM interface line to the CCU as an indication of low paper supply.
READY indicator	This indicator lights to indicate sending an up level on the READY interface line, to the CCU as an indication of establishment of the start mode.
AUDIBLE RESET indicator.	This indicator lights to indicate sending a positive AUDIBLE RESET pulse to the CCU.
ASSIGNED-NOT AS-SIGNED switch.	Setting this toggle switch to AS-SIGNED causes the test set to transmit an up level to the printer on the NOT ASSIGNED line.
LAMP TEST switch	Pressing this switch causes all indicator lamps to light without interfering with any other functions.

Table 6-5. Page Printer Test Print Characters

					ASCII Code										ASCII Code				
		1	2	4	8	16	32	64	Print			1	2	4	8	6	32	64	Print
Test	p[a]	b1	b2	b3	b4	b5	b6	b7	Char.	Test	p[a]	b1	b2	b3	b4	b5	b6	b7	Char.
1	1	1	0	0	0	0	1	0	!	22	1	0	1	1	0	1	1	0	6
2	1	0	1	0	0	0	1	0	“	23	0	1	1	1	0	1	1	0	7
3	0	1	1	0	0	0	1	0	#	24	0	0	0	0	1	1	1	0	8
4	1	0	0	1	0	0	1	0	$	25	1	1	0	0	1	1	1	0	9
5	0	1	0	1	0	0	1	0	%	26	1	0	1	0	1	1	1	0	:
6	0	0	1	1	0	0	1	0	&	27	0	1	1	0	1	1	1	0	;
7	1	1	1	1	0	0	1	0	‘	28	1	0	0	1	1	1	1	0	<
8	1	0	0	0	1	0	1	0	(	29	0	1	0	1	1	1	1	0	=
9	0	1	0	0	1	0	1	0	)	30	0	0	1	1	1	1	1	0	>
10	0	0	1	0	1	0	1	0	*	31	1	1	1	1	1	1	1	0	?
11	1	1	1	0	1	0	1	0	+	32	0	0	0	0	0	0	0	1	`
12	0	0	0	1	1	0	1	0	,	33	1	1	0	0	0	0	0	1	A
13	1	1	0	1	1	0	1	0	-	34	1	0	1	0	0	0	0	1	B
14	1	0	1	1	1	0	1	0	.	35	0	1	1	0	0	0	0	1	C
15	0	1	1	1	1	0	1	0	/	36	1	0	0	1	0	0	0	1	D
16	1	0	0	0	0	1	1	0	∅	37	0	1	0	1	0	0	0	1	E
17	0	1	0	0	0	1	1	0	1	38	0	0	1	1	0	0	0	1	F
18	0	0	1	0	0	1	1	0	2	39	1	1	1	1	0	0	0	1	G
19	1	1	1	0	0	1	1	0	3	40	1	0	0	0	1	0	0	1	H
20	0	0	0	1	0	1	1	0	4	41	0	1	0	0	1	0	0	1	I
21	1	1	0	1	0	1	1	0	5	42	0	0	1	0	1	0	0	1	J

[a] Parity - The Page Printer Test Set automatically generates the proper parity and is not provided with a parity switch. When the page printer maintenance panel is used set the bPARITY switch to select proper (odd) parity.

Table 6-5. Page Printer Test Print Characters (cont'd)

		ASCII Code							
		1	2	4	8	6	32	64	Print
Test	p[a]	b1	b2	b3	b4	b5	b6	b7	Char.
43	1	1	1	0	1	0	0	1	K
44	0	0	0	1	1	0	0	1	L
45	1	1	0	1	1	0	0	1	M
46	1	0	1	1	1	0	0	1	N
47	0	1	1	1	1	0	0	1	O
48	1	0	0	0	0	1	0	1	P
49	0	1	0	0	0	1	0	1	Q
50	0	0	1	0	0	1	0	1	R
51	1	1	1	0	0	1	0	1	S
52	0	0	0	1	0	1	0	1	T
53	1	1	0	1	0	1	0	1	U
54	1	0	1	1	0	1	0	1	V
55	0	1	1	1	0	1	0	1	W
56	0	0	0	0	1	1	0	1	X
57	1	1	0	0	1	1	0	1	Y
58	1	0	1	0	1	1	0	1	Z
59	0	1	1	0	1	1	0	1	[
60	1	0	0	1	1	1	0	1	~
61	0	1	0	1	1	1	0	1	]
62	0	0	1	1	1	1	0	1	^
63	1	1	1	1	1	1	0	1	_
64	1	0	0	0	0	0	1	1	\
65	0	1	0	0	0	0	1	1	A

		ASCII Code							
		1	2	4	8	16	32	64	Print
Test	p[a]	b1	b2	b3	b4	b5	b6	b7	Char.
66	0	0	1	0	0	0	1	1	B
67	1	1	1	0	0	0	1	1	C
68	0	0	0	1	0	0	1	1	D
69	1	1	0	1	0	0	1	1	E
70	1	0	1	1	0	0	1	1	F
71	0	1	1	1	0	0	1	1	G
72	0	0	0	0	1	0	1	1	H
73	1	1	0	0	1	0	1	1	I
74	1	0	1	0	1	0	1	1	J
75	0	1	1	0	1	0	1	1	K
76	1	0	0	1	1	0	1	1	L
77	0	1	0	1	1	0	1	1	M
78	0	0	1	1	1	0	1	1	N
79	1	1	1	1	1	0	1	1	O
80	0	0	0	0	0	1	1	1	P
81	1	1	0	0	0	1	1	1	Q
82	1	0	1	0	0	1	1	1	R
83	0	1	1	0	0	1	1	1	S
84	1	0	0	1	0	1	1	1	T
85	0	1	0	1	0	1	1	1	U
86	0	0	1	1	0	1	1	1	V
87	1	1	1	1	0	1	1	1	W
88	1	0	0	0	1	1	1	1	X

Table 6-5. Page Printer Test Print Characters (cont'd)

Test	pa	1 b1	2 b2	4 b3	8 b4	6 b5	32 b6	64 b7	Print Char.
				ASCII Code					
89	0	1	0	0	1	1	1	1	Y
90	0	0	1	0	1	1	1	1	Z
91	1	1	1	0	1	1	1	1	[
92	0	0	0	1	1	1	1	1	~
93	1	1	0	1	1	1	1	1	]
94	1	0	1	1	1	1	1	1	^
SPACE	0	0	0	0	0	0	1	0	
Non-printable Command Characters									
LF	1	0	1	0	1	0	0	0	
CR	0	1	0	1	1	0	0	0	

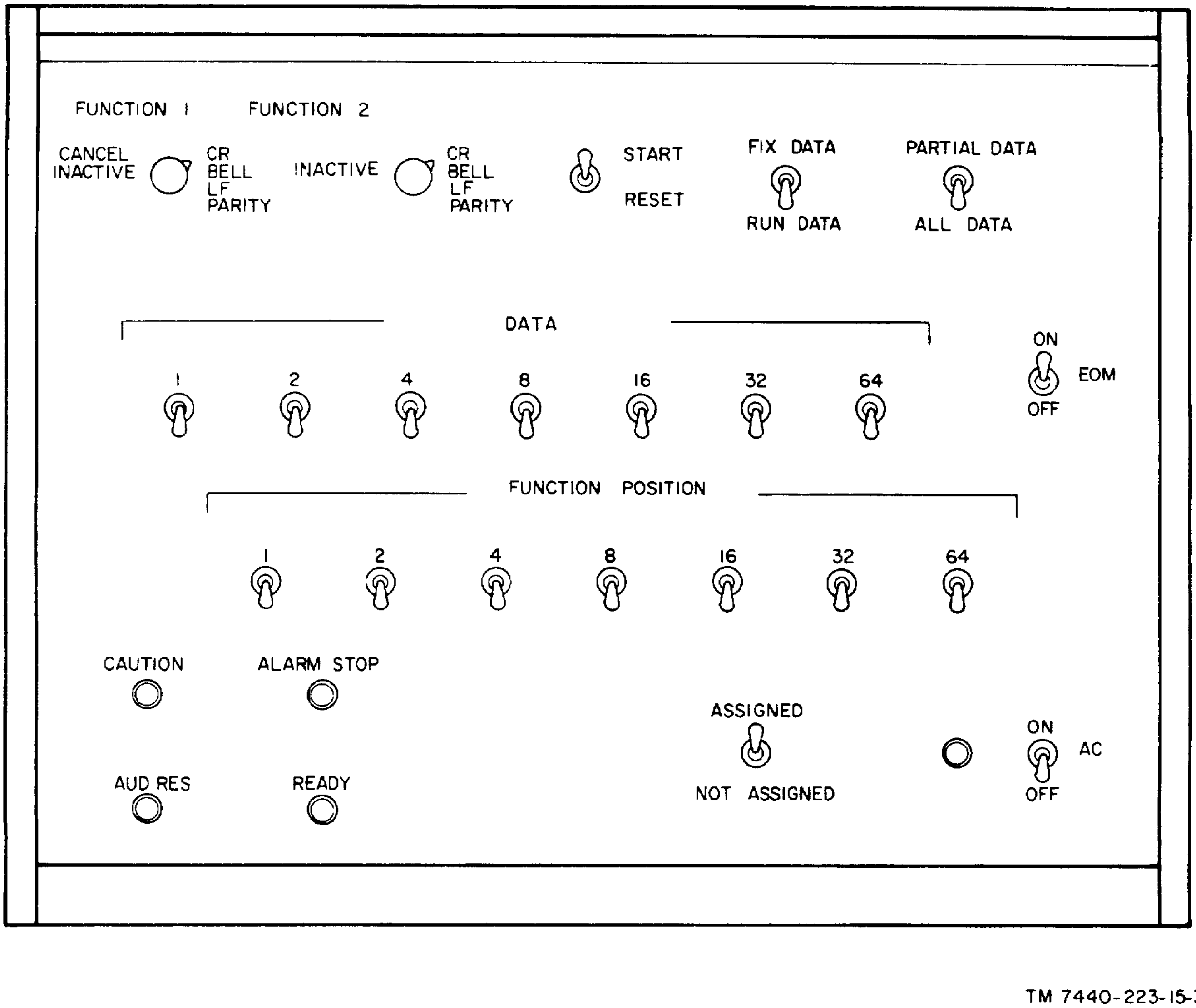


Figure 6-2. Page printer test set, controls and indicators.

6-7. Visual Tests

Check the general physical condition of the page printer as follows:

a. Exterior and Interior Surfaces. All surface finishes must be free from rust, scratches, discoloration, or other damage.

b. Cables. The lead connections of all cables must be secure. All cable connectors must be undamaged and cables should not be cracked, frayed, or rotted to place strain on the wires.

c. Hardware. All bolts and screws, such as panel mounting screws, motor mounting bolts, and mechanism mounting hardware must be tight.

d. PC Cards. Check that all printed circuit cards in logic assembly are mounted securely in the proper connector (para 1-6).

e. Running Spares/Auxiliary Items. Refer to appendix B and check for availability and serviceability of running spare and auxiliary items.

6-8. Preliminary Procedures

a. Sixty (60) Hertz Operation. Prepare the page printer for 60 hertz operation. Conversion procedures for 50/60 hertz operation are outlined in paragraph 2-11, TM 11-7440-239-15/ NAVSHIPS 0967-324-0112/TO 31W4-4-1-111.

b. Form Length. Prepare the page printer for operation with 11-inch long paper (strobe disk, part number 56521G2 is installed). Refer to paragraph 4-113 for procedures to change form length.

c. Verify that the page printer is not loaded with paper. Also verify that internal paper storage basket A2A3 and external paper stacker A3 are properly secured to the page printer.

d. Input Power.

(1) Position the POWER switch on the variable frequency and voltage source (CML N5000A) to ON and allow a 5-minute warm up.

(2) Position the HIGH VOLTAGE switch on the variable frequency and voltage source to ON.

(3) Adjust the OUTPUT LEVEL control on the variable frequency and voltage source to produce a reading of 120 VAC on the OUTPUT VOLTAGE meter. Adjust the frequency control for 60 hertz.

(4) Position the AC ON-OFF switch on the page printer test set to the ON position. Verify that all indicators on the page printer are extinguished.

6-9. Performance Tests

a. Power On. The purpose of this test is to verify that the status indicators are functioning correctly when input power is applied to the PP.

(1) Position the ASSIGNED/NOT ASSIGNED switch on the test set to the SIGNED position.

(2) Press the AC POWER switch-indicator on the page printer. Verify the following indications on the page printer.

AC POWER switch-indicator lights white.
STOP switch-indicator lights red.
PAPER FAIL indicator lights red.
DC POWER indicator lights white after completion of power sequencing (approximately 15 seconds).
NOT ASSIGNED indicator is not lit.

(3) On the test set, position the ASSIGNED/NOT ASSIGNED switch to the NOT ASSIGNED position. Observe the page printer NOT ASSIGNED indicator lights amber.

(4) Load single-ply 11-inch long paper into the page printer (para 2-5).

b. Simulated Loss of DC Power. The purpose of this test is to verify that loss of any DC voltage will cause the READY interface line to go to its inactive state.

(1) Set the START/RESET switch on the test set to the RESET position.

(2) Press the START switch-indicator on the page printer. Observe that the START switch-indicator lights green.

(3) Open the front doors of the page printer and simulate loss of DC power by removing any DC fuse from the power supply rectifier unit A2A2A2 (fig. 1-(3). Verify that the page printer goes through the power-down sequence as indicated by the following:

ALARM STOP indicator on test set lights.
CAUTION indicator on test set lights.
READY indicator on test set extinguishes.
All indicators on page printer extinguish.

(4) Replace the fuse removed in the previous step. Press the AC POWER switch indicator on the page printer to restore power. Verify that AC POWER switch-indicator and DC POWER indicator light.

c. Test Print-Local Test Mode.

(1) The object of this test is to assure that the page printer can-

(a) Satisfactorily print the printable ASCI character code inputs from the maintenance panel.

(b) Ignore nonprintable ASCII character code inputs from the maintenance panel.

(c) Print full lines of 80 characters and perform automatic carriage return (CR) and line feed (LF) functions.

(d) Stop printing when the RESET pushbutton switch on the maintenance panel is pressed.

(e) Ignore manual pressing of LINE FEED and FORM FEED switches in the LOCAL TEST mode.

(2) Set the BIT SELECTION toggle switches on the maintenance panel to the code for exclamation point (!) as follows:

Parity	b7	b6	b5	b4	b3	b2	b1
1	0	1	0	0	0	0	1

(3) On the maintenance panel, set LINE FEED SELECTION switch to 1 and MARGIN SELECTION switch to OUT.

(4) Press the LOCAL TEST switch-indicator. Verify the following:

(a) STOP switch-indicator is extinguished.

(b) LOCAL TEST switch-indicator lights amber.

(c) The page printer starts printing exclamation point (!) character in all 80 columns. Automatic LF and CR occurs for each line.

(5) While printing is in progress, press the FORM FEED and LINE FEED switches several times. Verify that pressing these switches has no effect on the test print operation.

(6) While printing is in progress, set the ASSIGNED/NOT ASSIGNED switch on the test set to the ASSIGNED position. Verify that changing the position of this switch has no effect on the test print operation.

(7) Press the STOP switch-indicator on the page printer. Verify the following:

(a) STOP switch-indicator lights red.

(b) LOCAL TEST switch-indicator is extinguished.

(c) Page printer continues printing until a full line is completed and then printing stops.

(d) After printing stops, the page printer automatically feeds paper to the second next top-of-form, leaving one full form blank.

(8) Press the LINE FEED switch several times. Verify that each pressing of the LINE FEED switch causes paper to advance a single line.

(9) Press the FORM FEED switch several times. Verify that each pressing of the FORM FEED switch causes paper to advance until the next top-of-form position is reached.

(10) On the test set, position the ASSIGNED/NOT ASSIGNED switch to NOT ASSIGNED.

(11) Set the BIT SELECTION toggle switches located on the maintenance panel to the code for character "S" as follows:

Parity	b7	b6	b5	b4	b3	b2	b1
1	1	0	1	0	0	1	1

(12) Press the LOCAL TEST switch-indicator. Verify the following:

(a) STOP switch-indicator is extinguished.

(b) LOCAL TEST switch-indicator lights amber.

(c) The page printer starts printing the character determined by the BIT SELECTION switches in all 80 columns. Automatic LF and CR occur for each line.

(13) Press the RESET pushbutton switch on the maintenance panel. Verify the following:

(a) STOP switch-indicator lights red.

(b) LOCAL TEST switch-indicator is extinguished.

(c) Printing stops when RESET switch was pressed and paper does not advance after stopping printing.

(14) Press the LINE FEED switch several times. Check the last line of printing and observe that normally the line has less than 80 characters printed.

(15) Repeat steps (11) through (14) with the BIT SELECTION switches set for each of the following printable characters and verify results:

Character	Parity	b7	b6	b5	b4	b3	b2	b1
S	0	1	1	1	0	0	1	1
O	0	1	0	0	1	1	1	1
O	1	1	1	0	1	1	1	1
M	1	1	0	0	1	1	0	1
M	0	1	1	0	1	1	0	1
E	0	1	0	0	0	1	0	1
E	1	1	1	0	0	1	0	1
X	0	1	0	1	1	0	0	0
X	1	1	1	1	1	0	0	0

(16) Repeat steps (11) through (14) with BIT SELECTION switches set for each of the following nonprintable characters. Verify that the page printer ignores the character codes and printing does not occur.

Character	Parity	b7	b6	b5	b4	b3	b2	b1
DEL	0	1	1	1	1	1	1	1
NUL	1	0	0	0	0	0	0	0

(17) Repeat steps (11) through (14) with BIT SELECTION switches set for the SPACE character as shown below. Verify printing on the page printer does not occur however paper advances a single line at a time as a result of automatic LF.

Parity	b7	b6	b5	b4	b3	b2	b1
0	0	1	0	0	0	0	0

(18) Set the BIT SELECTION switches to the code for character "S" as follows:

Parity	b7	b6	b5	b4	b3	b2	b1
1	1	0	1	0	0	1	1

d. Audible Reset. This test is to verify that the page printer can provide a manually initiated AUDIBLE RESET interface pulse.

(1) On the test set, position the controls as follows:

ASSIGNED/NOT ASSIGNED switch to NOT ASSIGNED.

START/RESET switch to RESET.

(2) On the page printer, press the START switch-indicator and verify the indicator lights green.

(3) While observing the AUDIBLE RESET indicator on the test set, press the AUDIBLE RESET switch on the page printer. Verify that the test set AUDIBLE RESET indicator does not light.

(4) Press the STOP switch-indicator on the page printer. Verify that the STOP indicator lights red; then repeat step (3).

(5) On the test set, position the ASSIGNED/NOT ASSIGNED switch to ASSIGNED.

(6) While observing the AUDIBLE RESET indicator on the test set, press the AUDIBLE

RESET switch on the page printer. Verify that the test set AUDIBLE RESET indicator lights.

e. Line Feed and Carriage Return. This test verifies that the page printer can perform the LF and CR functions upon receipt of these character codes from the test set.

(1) On the test set, position the controls as follows:

FUNCTION 1 switch to LF.
FUNCTION 2 switch to CR.
FIX DATA/RUN DATA switch to FIX DATA.
PARTIAL DATA/ALL DATA switch-not applicable.

DATA switches to:	1	2	4	8	16	32	64
(Character "A")	1	0	0	0	0	0	1
FUNCTION POSITION							
switches to:	1	2	4	8	16	32	64
(60 columns)	0	0	1	1	1	1	0

EOM switch to OFF.
START/RESET switch to RESET.
ASSIGNED/NOT ASSIGNED switch-not applicable.

(2) On the page printer, press the START switch-indicator. Verify the following:

(a) Page printer START switch-indicator lights green.

(b) Test set ALARM STOP indicator is extinguished.

(c) Test set READY indicator lights.

(3) Set the test set START/RESET switch to START, allow at least 10 lines to be printed, and position the test START/RESET switch to RESET. Verify the following:

(a) Page printer START switch-indicator changes from green to white illumination when printing starts.

(b) Character "A" is printed in columns 1 through 60 of each line.

(c) After the 60th character is printed, the page printer performs a LF and CR function, and printing continues in columns 1 through 60 of each succeeding line until test set START/RESET switch is positioned to RESET.

f. Print Fail.

(1) This test is to verify that

(a) The printer can detect noncoincidence of input code to code wheel characters (loss of photocell, etc., or a blown fuse).

(b) In this condition, printing does not occur.

(c) The page printer READY interface line immediately goes to its inactive state.

(d) Proper indications occur.

(2) Press the AC POWER switch-indicator on the page printer. Verify that all indicators on the page printer are extinguished.

CAUTION

Take care not to damage the code disk in the following steps.

(3) Block the code disk light source on the page printer with a piece of opaque paper.

(4) On the test set, position the controls as follows:

FUNCTION 1 switch to INACTIVE.
FUNCTION 2 switch to INACTIVE.
FIX DATA/RUN DATA switch to FIX DATA.
PARTIAL DATA/ALL DATA switch to PARTIAL DATA.

DATA switches to:	1	2	4	8	16	32	64
(Character "A")	1	0	0	0	0	0	1
FUNCTION POSITION							
switches to:	1	2	4	8	16	32	64
(60 columns)	0	0	1	1	1	1	0

EOM switch to OFF.
START/RESET switch to START.
ASSIGNED/NOT ASSIGNED switch-not applicable.

(5) On the page printer, press the AC POWER switch-indicator. Verify that the page printer goes through the power-on sequence as indicated by the AC POWER and DC POWER indicators being lit.

(6) Press the START switch-indicator on the page printer. Verify the following:

(a) ALARM STOP indicator on the test set lights.

(b) STOP switch-indicator on page printer lights red.

(c) PRINT FAIL indicator on the page printer lights red.

(d) No printing occurs.

(e) READY indicator on the test set is extinguished.

(7) Press the START switch-indicator on the page printer and verify that the switch is ineffective.

(8) On the page printer, press AC POWER switch-indicator to turn page printer off, correct fault, and press AC POWER switch-indicator to restore power.

(9) Repeat steps (2) through (8) above, using a blown fuse installed in place of any print hammer fuse in the capacitor assembly A2A2A1 (fig. 1-3) as the fault condition.

(10) Repeat steps (2) through (8) above leaving the yoke release handle (273, fig. 4-11) in the open position as the fault condition.

g. Data Control (EOM). This test is to verify the page printer can perform form feed (FF) and carriage return (CR) functions upon receipt of an EOM signal on the DATA CONTROL interface line.

(1) On the test set, position the controls as follows:

FIX DATA/RUN DATA switch to FIX DATA.
PARTIAL DATA/ALL DATA switch to PARTIAL DATA.
FUNCTION 1 SWITCH TO INACTIVE.
FUNCTION 2 switch to INACTIVE.

EOM switch to ON.
FUNCTION POSITION

switches to:	1	2	4	8	16	32	63
(60 columns)	0	0	1	1	1	1	0
DATA switches to:	1	2	4	8	16	32	64
(Character "A")	1	0	0	0	0	0	1

START/RESET switch to START.
ASSIGNED/NOT ASSIGNED switch-not applicable.

(2) On the page printer, while observing the START switch-indicator, press the START switch-indicator. Verify that the START switch-indicator, flashes white, then remains green until the STOP switch-indicator is pressed instep (3) below.

(3) Allow at least three pages to be printed, and then press the page printer STOP switch-indicator. Review the print copy and verify that each page of the copy has a single line of 80 character printing (after each line was printed, the paper had advanced to the next top-of-form).

h. Parity Error. The function of this test is to verify that the page printer can detect a parity error (even parity on the eight incoming data interface lines), can encode the error condition to print an asterisk for the error character, and can continue printing until the end of the print line at which point printing stops.

(1) On the test set, position the controls as follows:
FIX DATA/RUN DATA switch to FIX DATA.
FUNCTION 1 switch to PARITY.
FUNCTION 2 switch to INACTIVE.
PARTIAL DATA/ALL DATA switch to PARTIAL DATA.
FUNCTION POSITION

switches to:	1	2	4	8	16	32	64
(65 columns)	1	0	0	0	0	0	1

DATA switches-not applicable.
EOM switch to OFF.
START/RESET switch to START.
ASSIGNED/NOT ASSIGNED switch-NOT ASSIGNED.

(2) Press the START switch-indicator on the page printer one time. Verify the following:

(a) Page printer prints a full single line of data, and then the STOP switch-indicator lights red.

(b) PARITY ERROR indicator on the page printer lights red.

(c) ALARM STOP indicator on the test set lights.

(d) READY indicator on the test set extinguishes.

(3) After printing stops in step (2) above, press the page printer FORM FEED switch. On the test set, position the START/RESET switch to RESET. Review the print copy for the following:

(a) Column 1 is a space character.

(b) Columns 2 through 80 are in the same sequence as test 1-79 characters of table 6-5 with the exception of column 66. Column 66 is an asterisk instead of an "A".

(c) Page printer stops printing after a single line.

i. Cancel. The function of this test is to verify that the page printer can print an 80 character line of circumflexes and then form feed in response to a pulse on the CANCEL interface line.

(1) On the test set, position the START/RESET switch to RESET.

(2) Press the RESET switch on the page printer maintenance panel.

(3) On the test set, position the controls as follows:
FIX DATA/RUN DATA switch to RUN DATA.
FUNCTION 1 switch to CANCEL.
FUNCTION 2 switch to INACTIVE.
PARTIAL DATA/ALL DATA switch to PARTIAL DATA.
FUNCTION POSITION switches: All switches down (0).
DATA switches-not applicable.
EOM switch-not applicable.
START/RESET switch to START.
ASSIGNED/NOT ASSIGNED switch-not applicable.

(4) On the page printer, press the START switch-indicator. After five form feeds, press the page printer STOP switch-indicator.

(5) On the test set, position the START/RESET switch to RESET. On the print copy, verify the following:

(a) The page printer performs successive form feeds until the STOP switch-indicator is pressed.

(b) The top line of each page contains a full line of circumflexes.

(6) On the test set, position the FUNCTION POSITION switches to-

	1	2	4	8	16	32	64
(2 columns)	0	1	0	0	0	0	0

(7) On the test set, position the START/RESET switch to START.

(8) On the page printer, press the START switch-indicator. After five form feeds, press the page printer STOP switch-indicator.

(9) On the test set, position the START/RESET switch to RESET. On the print copy, verify the following.

(a) The page printer performs successive form feeds until the STOP switch-indicator is pressed.

(b) The top line of each page contains a space and an exclamation point.

(c) The second line of each page contains a full line of circumflexes.

j. Paper Low and Paper Fail Alarm.

(1) This test is to verify that-

(a) When a predetermined paper supply remains, the page printer provides an active level on the OPERATOR ALARM interface line and lights the PAPER LOW indicator on the control panel.

(b) When the paper supply is exhausted, printing and paper advance functions stop, and the page printer provides an active level on the ALARM STOP interface line and lights the PAPER FAIL indicator on the control panel. At this time the PAPER LOW indicator extinguishes.

(c) Form feeding during low paper condition causes a PAPER FAIL indication.

(2) Adjust the paper supply so that only a few forms remain in the paper supply storage bin.

(3) On the test set, position the controls as follows:

FUNCTION 1 switch to INACTIVE.
FUNCTION 2 switch to INACTIVE.
FIX DATA/RUN DATA switch to RUN DATA.
PARTIAL DATA/ALL DATA switch to PARTIAL DATA.
DATA switches-not applicable.
FUNCTION POSITION switches: All switches down (0).
EOM switch to OFF.
START/RESET switch to START.
ASSIGNED/NOT ASSIGNED switch-not applicable.

(4) While observing indicators on the page printer, press the START switch-indicator on the page printer. Allow printing to continue until printing stops as a result of the "Alarm Stop" condition. Verify the following:

(a) Page printer prints ripple pattern (space and characters in sequence of test 1 through 79 as shown in table 6-5).

(b) The CAUTION indicator on the test set and the PAPER LOW indicator on the page printer light as a result of depletion of paper in the supply bin.

(c) Printing continues until the paper out switch on the page printer is activated.

(d) When the paper out switch is activated, verify the following indications:

Test set ALARM STOP indicator lights.
Test set CAUTION indicator extinguishes.
Test set READY indicator extinguishes.
Page printer PAPER FAIL indicator lights red.
Page printer PAPER LOW indicator extinguishes.

(5) Remove paper manually from the page printer and verify that the last line of printing contains all 80 characters.

(6) Install a small supply (approximately 20 forms) of paper in the page printer.

(7) On the test set, position the EOM switch to ON and then set the START/RESET switch to the START position.

(8) On the page printer, press the START switch-indicator and verify the following results:

(a) The page printer prints a ripple pattern (space and characters in sequence of test 1 through 79 as shown in table 6-5) on the first line and then paper form feeds to next top-of-form. This operation continues until the paper low alarm is actuated.

(b) When the paper low alarm is actuated, the PAPER FAIL indicator on the page printer lights red.

(c) PAPER LOW indicator on the page printer remains extinguished.

(d) ALARM STOP indicator on the test set lights.

(e) CAUTION indicator on the test set remains extinguished.

(9) Install a small supply (approximately 20 forms) of paper in the page printer.

(10) On the test set, position the EOM switch to OFF and FUNCTION 1 switch to CANCEL.

(11) On the page printer, press the START switch-indicator. Verify the following results:

(a) The page printer prints one line of circumflexes and form feeds to the top of the next form. This operation continues until the paper low alarm switch actuates.

(b) When the paper low alarm switch is actuated, the PAPER FAIL indicator on the page printer lights red.

(c) ALARM STOP indicator on test set lights.

(d) CAUTION indicator on test set remains extinguished.

(e) PAPER LOW indicator on page printer remains extinguished.

(12) Repeat step (11) until supply of paper is exhausted. Verify that each time the START switch-indicator is pressed, the form feed advances only once until paper is exhausted.

k. Alarm Reset. This test is used to verify that the START switch-indicator is inhibited until the paper supply is replenished following a "paper out" condition.

(1) While the PAPER FAIL indicator on the page printer is lit, press the page printer START switch-indicator. Verify that the START switch-indicator has no effect on the page printer.

(2) Install a new supply of single-ply paper into the page printer.

(3) Press the START switch-indicator on

the page printer. Allow several forms to be printed and press the STOP switch-indicator on the page printer. Verify the following:

(a) PAPER FAIL and PRINT FAIL (caused by paper loading) indicators on the page printer extinguish when the START switch-indicator was pressed.

(b) ALARM STOP indicator on the test set extinguishes.

l. Printer Not Ready and Lamp Test.

(1) This test is used to verify that-

(a) When the page printer is in the STOP or LOCAL TEST modes, a "not ready" (inactive) level is supplied to the READY interface line.

(b) Activation of the page printer LOCAL TEST, LINE FEED, and FORM FEED switches is ineffective in the START mode.

(2) On the page printer maintenance panel, position the BIT SELECTION switches for the character "E":

b PARITY	b7	b6	b5	b4	b3	b2	b1
0	1	0	0	0	1	0	1

(3) On the test set, position the controls as follows:

FUNCTION 1 switch to INACTIVE.
FUNCTION 2 switch to INACTIVE.
FIX DATA/RUN DATA switch to RUN DATA.
PARTIAL DATA/ALL DATA switch to PARTIAL DATA.
DATA switches-not applicable.
FUNCTION POSITION switches-not applicable.
EOM switch-OFF.
START/RESET switch to START.
ASSIGNED/NOT ASSIGNED switch to NOT ASSIGNED.

(4) Press the START switch-indicator on the page printer. Check that READY indicator on the test set lights.

(5) Press the STOP switch-indicator on the page printer. Observe the following:

(a) STOP switch-indicator on page printer lights red.

(b) ALARM STOP indicator on test set lights.

(c) READY indicator on test set extinguishes.

(6) Press the START switch-indicator on the page printer. Check that the page printer is printing.

(7) Press the LOCAL TEST switch-indicator on the page printer. Verify the following:

(a) START switch-indicator on page printer remains lit.

(b) LOCAL TEST switch-indicator on page printer does not light.

(c) READY indicator on test set remains lit.

(8) Press the LINE FEED switch and the FORM FEED switch on the page printer. Verify that the page printer ignores the switches and the START switch-indicator remains lit.

(9) Press the LAMP TEST switch on the page printer. Verify that all switch-indicators and indicators on the page printer light, but the page printer continues printing in the START mode.

(10) Press the STOP switch-indicator on the page printer and then press the LOCAL TEST switch indicator. Verify the following:

(a) The page printer starts printing solid lines of the local test character determined by the BIT SELECTION switches on the maintenance panel.

(b) LOCAL TEST switch-indicator on the page printer lights.

(c) ALARM STOP indicator on the test set lights.

(d) READY indicator on the test set is extinguished.

(11) Press the LINE FEED switch and the FORM FEED switch on the page printer. Verify the page printer ignores the switches and the LOCAL TEST switch-indicator remains lit.

(12) Press the LAMP TEST switch on the page printer. Verify all switch-indicators and indicators on the page printer light but the page printer continues printing in the LOCAL TEST mode.

(13) Press the page printer STOP switch-indicator.

m. Print Copy Evaluation (Solid Character). This test verifies that each character prints clearly and evenly in each of the 80 columns.

(1) Set the test set controls as follows:

FUNCTION 1 switch to INACTIVE.
FUNCTION 2 switch to INACTIVE.
FIX DATA/RUN DATA switch to FIX DATA.
PARTIAL DATA/ALL DATA switch to PARTIAL DATA.
FUNCTION POSITION switch-not applicable.

DATA SWITCHES to:	1	2	4	8	16	32	64
(Character "!")	1	0	0	0	0	1	0

EOM switch to OFF.
START/RESET switch to RESET.
ASSIGNED/NOT ASSIGNED switch-not applicable.

(2) Press the START switch-indicator on the page printer. Observe the START switch-indicator lights green.

(3) On the test set, position the START/RESET switch to START. After twenty or more lines have been printed, position the START/RESET switch to RESET to stop printing. Evaluate the printed copy for the following:

(a) The character "!" is printed clearly and completely in each of the 80 columns.

(b) Each character is legible and has a uniform density of printing as outlined in table 6-6, Print Quality Specification.

(c) Line spacing shall be six (6) lines per inch (lines spaced at 0.167 ±0.015 inch intervals).

(d) Vertical registration is as outlined in table 6-6.

(e) Horizontal registration is 10 characters per inch/80 characters across the page.

(4) Repeat step (3) for each printable character by setting the test set DATA switches for each of the characters as shown in table 6-5, tests 2 through 63.

(5) Press the STOP switch-indicator on the page printer.

n. Print Copy Evaluation (Ripple): This test verifies that the printout in ripple mode meets the standards set forth in table 6-6, Print Quality Specifications:

(1) On the test set, position the controls as follows:

FUNCTION 1 switch to BELL.
FUNCTION 2 switch to INACTIVE.
FIX DATA/RUN DATA switch to RUN DATA.
PARTIAL DATA/ALL DATA switch to PARTIAL DATA.
FUNCTION POSITION

switches to:	1	2	4	8	16	32	64
(64 columns)	0	0	0	0	0	0	1

DATA switches-not applicable.
EOM switch to OFF.
START/RESET switch to START.
ASSIGNED/NOT ASSIGNED switch-not applicable.

(2) Press the START switch-indicator on the page printer, allow at least three (3) full pages to be printed, and press the STOP switch-indicator on the page printer. Evaluate the ripple printout to verify that printout meets the specifications outlined in m(3) (b) through (e) above.

o. Baud Rate. This test verifies that the page printer can accept and print data at a 2400 Baud (minimum) rate with an 18 character line, including LF and CR commands (16 printed characters per line) and an 80 column line with automatic LF and CR.

(1) On the test set, position the controls as follows:

FUNCTION 1 switch to LF.
FUNCTION 2 switch to CR.
FIX DATA/RUN DATA switch to RUN DATA.
FUNCTION POSITION

switches to:	1	2	4	8	16	32	64
(16 columns)	0	0	0	0	1	0	0

DATA switches-are applicable.
EOM switch to OFF.
PARTIAL DATA/ALL DATA switch to PARTIAL DATA.
START/RESET switch to START.
ASSIGNED/NOT ASSIGNED switch-not applicable.

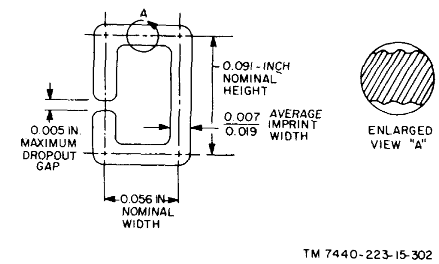


Figure 6-3. Character imprint specification.

Table 6-6. Print Quality Specification

Item	*Description*	*Specification*
1.	*Vertical Spacing.* The vertical line spacing shall be defined as the distance between the mean horizontal character center lines of successive printed lines.	Six (6) lines per vertical inch. Each successive line 0.167 ±0.015 inch apart. The tolerance shall be nonaccumulative.
2.	*Quality of Character Imprint.* The quality of the imprinted characters is dependent on the type of engraving, type and condition of the inked ribbon, the composition of the paper media and upon the degree of print density.	Determine quality of character imprint as shown in figure 6-3 for maximum dropout gap, nominal width, nominal height, and average imprint width. The average imprint width shall be as shown in enlarged view "A". The term "average imprint width" is defined as the distance between imaginary lines on each side of the printed area which divides the irregularities so that the summation of the white areas on one side of the line is equal to the sum of the black areas on the other side.
3.	*Vertical Register.* Properly adjust page printer so that all characters on a given line are evenly printed on a common centerline (fig. 4-58 and 4-59).	While printing at the maximum speed of the page printer: a. Ninety-five (95) percent of the characters shall be within ±0.010-inch vertical displacement of the common centerline. b. The remaining five (5) percent shall be within ±0.015-inch vertical displacement of the common centerline.
4.	*Character Skew.* Character skew is defined as the variation of printing of the characters measured at the top of the character with respect to a mean-horizontal line.	The maximum allowable character skew shall be plus or minus 1 1/2 degrees.

(2) Using a timer, press the START switch-indicator on the page printer and simultaneously start the timer. At one minute, set the START/RESET switch on the test set to REST.

(3) On the page printer, open the yoke, close the yoke, and then press the FORM FEED switch to remove the printed copy. Count the number of full printed pages and count the number of lines on unfilled pages. Verify that a minimum of 15 full pages plus 40 full lines are printed.

(4) On the test set, change the position of the following switches:
FUNCTION 1 switch to INACTIVE.
FUNCTION 2 switch to INACTIVE.
START/RESET switch to START.

(5) Using a timer, press the START switch-indicator on the page printer and simultaneously start the timer. At 1 minute, set the START/RESET switch on the test set to RESET.

(6) On the page printer, open the yoke, close the yoke, and then press the FORM FEED switch to remove the printed copy. Count the number of full printed pages, and count the number of lines on unfilled pages. Verify a minimum 3 full pages plus 33 full lines are printed.

p. Vertical Format. This test verifies the ability of the page printer to provide a 1, 2, and 3 line spacing and a 1-inch margin above and below the serration between forms.

(1) On the test set, position the controls to-
FUNCTION 1 switch to BELL.
FUNCTION 2 switch to INACTIVE.
FIX DATA/RUN DATA switch to RUN DATA.
PARTIAL DATA/ALL DATA switch to PARTIAL DATA.
FUNCTION POSITION switches-not applicable.
DATA switches: All switches down (0).
EOM switch to OFF.
START/RESET switch to START.
ASSIGNED/NOT ASSIGNED switch-not applicable.

(2) On the page printer maintenance panel, position the controls to-
MARGIN SELECTION switch to OUT.
LINE FEED SELECTION switch to 1.

(3) On the page printer, press the START switch-indicator, allow at least 3 pages to be printed, then press the STOP switch-indicator. Verify the following:

(a) Copy is printed in ripple pattern format.

(b) Each line is followed by a single space (6 lines per inch).

(c) One line above and one line below the serration between forms is blank (paper must have been properly installed in the page printer at the top-of-form location).

(4) On the page printer maintenance panel, set the LINE FEED SELECTION switch to 2.

(5) Repeat step (3) except verify double spacing follows each line of print (3 lines of printing per inch).

(6) On the page printer maintenance panel, set the LINE FEED SELECTION switch to 3.

(7) Repeat step (3) except verify that triple spacing follows each line of print (2 lines of printing per inch).

(8) On the page printer maintenance panel, set the MARGIN SELECTION switch to IN.

(9) Repeat steps (3) through (7). All indications should be the same as indicated except the page printer should leave a blank margin of one-inch above and below the serration between each form.

q. Signal Levels and Waveforms. This test verifies that the output levels and waveforms meet the interface requirements of the common control unit.

(1) Press the AC POWER switch-indicator on the page printer. Observe that power is off and all indicators on the page printer are extinguished.

(2) Unload the paper from the page printer, and remove all paper from the paper storage bin.

(3) At the test set, set the controls as follows:
FUNCTION 1 switch to INACTIVE.
FUNCTION 2 switch to INACTIVE.
FIX DATA/RUN DATA switch to RUN DATA.
PARTIAL DATA/ALL DATA switch to PARTIAL DATA.
DATA switches-not applicable.
FUNCTION POSITION switches-not applicable.
EOM switch to OFF.
START/RESET switch to RESET.
ASSIGNED/NOT ASSIGNED switch to ASSIGNED.

(4) Attach oscilloscope ground lead to page printer interface terminal board TB3, terminal 1.

(5) Press the AC POWER switch-indicator on the page printer. Observe that the AC POWER switch-indicator and DC POWER indicator light.

(6) Measure the voltage level on the READY interface line at interface terminal board TB2, terminal 19. Verify that voltage measured is +6 ±1.0 volts.

(7) Measure the voltage level on the ALARM STOP interface line at interface terminal board TB2, terminal 17. Verify that voltage measured is +6 ±1.0 volts.

(8) Use a piece of paper to block the paper out switch. Press the START switch-indicator on the page printer. Measure the voltage on the OPERATOR ALARM interface signal at interface terminal board TB2, terminal 15. Verify that voltage measured is +6 ±1.0 volts.

(9) Measure the AUDIBLE RESET interface line pulse characteristics at interface terminal board TB2, terminal 21 while pressing the AUDIBLE RESET switch on the page printer. Verify the following:

(a) High level measures +6 ±1.0 volts.

(b) Low level measures +0.5 ±0.5 volts.

(c) Low duration measures 5 to 100 microseconds.

(10) Simulate installation of paper by blocking the paper out and paper low switches with pieces of paper. Back off the penetration control knobs for the module plate (fig. 4-50).

(11) Press the START switch-indicator on the page printer. Observe that the START switch-indicator lights green.

(12) Measure the voltage level on the READY interface line at interface terminal board TB2, terminal 19. Verify that voltage measured is +0.5 ±0.5 volts.

(13) Measure the voltage level on the OPERATOR ALARM interface line at interface terminal board TB2, terminal 15. Verify that voltage measured is +0.5 ±0.5 volts.

(14) Measure the voltage level on the ALARM STOP interface line at interface terminal board TB2, terminal 17. Verify that voltage measured is +0.5 ±0.5 volts.

(15) On the test set, position the START/RESET switch to START. Observe that the page printer START switch-indicator lights white.

(16) Measure the START BLOCK interface line pulse characteristics at interface terminal board TB2, terminal 9. Verify the following:

(a) High level measures +6 ±1.0 volts.

(b) Low level measures -6 ±1.0 volts.

(c) Rise and fall times measure 0.6 2.2 microseconds.

(17) Measure the DATA REQUEST interface line pulse characteristics at interface terminal board TB2, terminal 11. Verify the following:

(a) High level measures +6 ±1.0 volts.

(b) Low level measures -6 ±1.0 volts.

(c) Rise and fall times measure 0.6 2.2 microseconds.

(d) Low duration time measures 5.0 microseconds minimum.

(18) On the page printer, press the AC POWER switch-indicator to remove power, and disconnect the oscilloscope ground lead.

(19) On the page printer, press the AC POWER switch-indicator to apply power and install single-ply, 11-inch long paper into the page printer.

r. Print Quality-Nominal Input Power Conditions. The function of this procedure is to evaluate print quality under nominal input power conditions and to prepare a print copy to be used for comparison of print quality under variable voltage and frequency conditions.

(1) On the test set, position the controls as follows:

FUNCTION 1 switch to INACTIVE.
FUNCTION 2 switch to INACTIVE.
PARTIAL DATA/ALL DATA switch to PARTIAL DATA.
FIX DATA/RUN DATA switch to RUN DATA.
FUNCTION POSITION switches-not applicable.
DATA switches-not applicable.
EOM switch to OFF.
START/RESET switch to START.
ASSIGNED/NOT ASSIGNED switch to ASSIGNED.

(2) Verify the controls on the variable frequency and voltage source (CML N5000A) are set to produce 120 VAC at a frequency of 60 hertz.

(3) On the page printer, press the START switch-indicator. Allow at least five pages of print copy to be printed, then press the STOP switch-indicator. Press the FORM FEED switch and remove the print copy from the page printer.

(4) Evaluate the printed copy to verify that the conditions of table 6-6 are met. Label the print copy as "Nominal Power Input" and show voltage and frequency. Retain this copy for use as a comparison for print quality of print copy made under variable voltage and frequency conditions in following procedures.

s. Vertical Format. The function of this test is to verify ability of the page printer to provide a 1-inch margin above and below the serration between forms and demonstrate operation with 8 1/2 and 14-inch paper.

(1) On the page printer, press the FORM FEED switch, then press the AC POWER switch-indicator to remove power. Take the strobe disk assembly, part number 56521G3 from the storage box in the cabinet and convert the page printer for 14-inch paper operation (see form length change adjustment, para 4-113).

(2) On the test set, position the controls as follows:

FUNCTION 1 switch to BELL.
FUNCTION 2 switch to INACTIVE.
FIX DATA/RUN DATA switch to RUN DATA.

PARTIAL DATA/ALL DATA switch to PARTIAL DATA.
FUNCTION POSITION switches-not applicable.
DATA switches: All down (0).
EOM switch to OFF.
START/RESET switch to START.
ASSIGNED/NOT ASSIGNED switch to ASSIGNED.

(3) Install single-ply, 14-inch paper in the page printer.

(4) On the page printer, press the AC POWER switch to apply power. On the maintenance panel, position the MARGIN SELECTION switch to OUT and LINE FEED SELECTION switch to 1.

(5) On the page printer, press the START switch-indicator. Allow at least three pages to be printed, then press the STOP switch-indicator. Check the print copy to verify printing for single spacing (6 lines per inch) with a single space above and below the serration.

(6) On the page printer maintenance panel, set the MARGIN SELECTION switch to IN.

(7) On the page printer, press the START switch-indicator. Allow at least three pages to be printed, then press the STOP switch-indicator. Check the print copy to verify printing for single spacing with one-inch above and below the serration on the paper.

(8) On the page printer, press the FORM FEED switch, then press the AC POWER switch-indicator to remove power. Take the strobe disk assembly, part number 56521G1 from the storage box in the cabinet and convert the page printer for 8 1/2-inch-paper operation (see form length change adjustment, para 4-113).

(9) Install 8 1/2-inch, single-ply paper in the page printer.

(10) Repeat steps (4) through (7) above.

(11) On the page printer, press the FORM FEED switch, then press the AC POWER switch-indicator to remove power. Take the strobe disk assembly, part number 56521G2 removed in step (1) above and convert the page printer for 11-inch paper operation (see form length change adjustment, para 4-113).

(12) Install 11-inch single-ply paper in the page printer.

(13) On the page printer maintenance panel, set the MARGIN SELECTION switch to OUT.

t. Operation Versus Static Variation of Input Voltage (60 Hertz). This test assures the page printer performs satisfactorily under conditions of static variation in the input voltage.

(1) Set the controls on the variable frequency and voltage source (CML N5000A) to produce an output of 96 VAC at a frequency of 60 hertz.

(2) On the test set, position the controls as follows:
FUNCTION 1 switch to INACTIVE.
FUNCTION 2 switch to INACTIVE.
FIX DATA/RUN DATA switch to RUN DATA.
PARTIAL DATA/ALL DATA switch to PARTIAL DATA.
FUNCTION POSITION switches-not applicable.
DATA switches-not applicable.
EOM switch to OFF.
START/RESET switch to START.
ASSIGNED/NOT ASSIGNED switch to ASSIGNED.

(3) Using a timer, simultaneously press the START switch-indicator on the page printer and start the timer. At 1 minute, press the STOP switch on the page printer.

(4) Press the FORM FEED switch on the page printer. Remove the printed copy from the page printer, record input AC voltage and frequency on the printed copy, and check the following:

(a) Copy is printed in the ripple pattern.

(b) Compare the printed copy against the printed copy prepared in *r* above for nominal power conditions and verify that the print quality has not been degraded.

(c) Verify that a minimum baud rate of 300 characters per second were printed (3 full pages plus 33 lines minimum printed per minute).

(5) Set the controls on the variable frequency and voltage source (CML N5000A) to produce an output of 120 VAC at a frequency of 60 Hertz.

(6) Repeat steps (3) and (4) above.

(7) Set the controls on the variable frequency and voltage source (CML N5000A) to produce an output of 132 VAC at a frequency of 60 hertz.

(8) Repeat steps (3) and (4) above.

u. Operation Versus Dynamic Variation of Input Voltage (60 Hertz). This test assures that the page printer performs satisfactorily under conditions of dynamic variations in the input AC voltage.

(1) Set the controls on the variable frequency and voltage source (CML N5000A) to produce an output of 120 VAC at a frequency of 60 hertz.

(2) Verify the test set controls are positioned the same as outlined in *t* above.

(3) Using a timer, simultaneously press the START switch-indicator on the page printer and start the timer. While the page printer is printing, vary the voltage controls on the variable frequency and voltage source (CML N5000A) from the nominal 120 VAC, to a maximum of 132 VAC, then to a minimum of 96 VAC,

and return to a nominal 120 VAC. This variation of voltage cycle shall be completed within 45 to 60 seconds. At 1 minute after the START switch-indicator was pressed, press the STOP switch-indicator on the page printer.

(4) Press the FORM FEED switch on the page printer. Remove the printed copy from the page printer, record input AC voltage and frequency on the printed copy, and check the following:

(a) Copy is printed in the ripple pattern.

(b) Compare the printed copy against the printed copy prepared in *r* above for nominal power conditions and verify that the print quality has not been degraded.

(c) Verify a minimum baud rate of 300 characters per second were printed (3 full pages plus 33 lines minimum printed per minute).

v. Operation Versus Static Variation of Input Frequency (60 Hertz). This test assures that the page printer performs satisfactorily under conditions of static variations in the input frequency.

(1) Set the controls on the variable frequency and voltage source (CML N5000A) to produce an output of 120 VAC at a frequency of 57 hertz.

(2) Verify the test set controls are positioned the same as outlined in *t* above.

(3) Using a timer, simultaneously press the START switch-indicator on the page printer and start the timer. At 1 minute, press the STOP switch-indicator on the page printer.

(4) Press the FORM FEED switch on the page printer. Remove the printed copy from the page printer, record input AC voltage and frequency on the printed copy, and check the following:

(a) Copy is printed in the ripple pattern.

(b) Compare the printed copy against the printed copy prepared in *r* above for nominal power conditions and verify that the print quality has not been degraded.

(c) Verify that a minimum baud rate of 300 characters per second were printed (3 full pages plus 33 lines minimum printed per minute).

(5) Set the controls on the variable frequency and voltage source (CML N5000A) to produce an output of 120 VAC at a frequency of 63 hertz.

(6) Repeat steps (3) and (4) above.

w. Operation Versus Dynamic Variation of Input Frequency (60 Hertz). This test assures that the page printer performs satisfactorily under conditions of dynamic variation in input frequency.

(1) Set the controls on the variable frequency and voltage source (CML N5000A) to produce an output of 120 VAC at a frequency of 60 hertz.

(2) Verify the test set controls are positioned the same as outlined in *t* above.

(3) Using a timer, simultaneously press the START switch-indicator on the page printer and start the timer. While the page printer is printing, vary the frequency controls on the variable frequency and voltage source (CML N5000A) from the nominal of 60 hertz, to a maximum of 63 hertz, then lower to a minimum of 57 hertz, and raise back to the nominal of 60 hertz. This variation of frequency cycle shall be completed within 30 to 60 seconds. At 1 minute after the START switch-indicator was pressed, press the STOP switch-indicator on the page printer.

(4) Press the FORM FEED switch on the page printer. Remove the printed copy from the page printer, record input AC voltage and frequency on the printed copy, and check the following:

(a) Copy is printed in the ripple pattern.

(b) Compare the printed copy against the printed copy prepared in *r* above for nominal power conditions and verify that the print quality has not been degraded.

(c) Verify a minimum baud rate of 300 characters per second were printed (3 full pages plus 33 lines minimum printed per minute).

x. Operation Versus Static Variation of Input Voltage (50 Hertz). This test assures that the page printer performs satisfactorily under conditions of static variations in the input voltage.

(1) Press the AC POWER switch-indicator on the page printer to remove power. Use the procedures outlined in paragraph 2-11q, TM 11-7440-239-15/NAVSHIPS 0967-324-0112/TO 31W4-4-1-111 to convert the page printer for 50-hertz operation. Use the 50-hertz pulley, part number 56556-1, and the two (2) blue 50-hertz springs, part number 11200-1, stored in the page printer ancillary item storage box. It is not necessary to mount the 50-hertz motor nameplate. Retain the 60-hertz pulley and red springs for replacement in a later step. Press the AC POWER switch-indicator to restore power.

(2) Set the controls on the variable frequency and voltage source (CML N5000A) to produce an output of 96 VAC at a frequency of 50 hertz.

(3) Verify the test set controls are

positioned the same as outlined in *t* above.

(4) Using a timer, simultaneously press the START switch-indicator on the page printer and start the timer. At 1 minute, press the STOP switch-indicator on the page printer.

(5) Press the FORM FEED switch on the page printer. Remove the printed copy from the page printer, record input AC voltage and frequency on the printed copy, and check the following:

(a) Copy is printed in the ripple pattern.

(b) Compare the printed copy against the printed copy prepared in *r* above for nominal power conditions and verify that the print quality has not been degraded.

(c) Verify that a minimum baud rate of 300 characters per second were printed (3 full pages plus 33 lines minimum printed per minute).

(6) Set the controls on the variable frequency and voltage source (CML N5000A) to produce an output of 120 VAC at a frequency of 50 hertz.

(7) Repeat steps (4) and (5) above.

(8) Set the controls on the variable frequency and voltage source (CML N5000A) to produce an output of 132 VAC at a frequency of 50 hertz.

(9) Repeat steps (4) and (5) above.

y. Operation Versus Dynamic Variation of Input Voltage (50 Hertz). This test assures the page printer performs satisfactorily under conditions of dynamic variations in the input AC voltage.

(1) Set the controls on the variable frequency and voltage source (CML N5000A) to produce an output of 120 VAC at a frequency of 50 hertz.

(2) Verify that the test set controls are positioned the same as outlined in *t* above.

(3) Using a timer, simultaneously press the START switch-indicator on the page printer and start the timer. While the page printer is printing, vary the voltage controls on the variable frequency and voltage source (CML N5000A) from the nominal 120 VAC, to a maximum of 132 VAC, then to a minimum of 96 VAC, and return to a nominal 120 VAC. This variation of voltage cycle shall be completed within 45 to 60 seconds. At 1 minute after the START switch-indicator was pressed, press the STOP switch-indicator on the page printer.

(4) Press the FORM FEED switch on the page printer. Remove the printed copy from the page printer, record input AC voltage and frequency on the printed copy, and check the following:

(a) Copy is printed in the ripple pattern.

(b) Compare the printed copy against the printed copy prepared in *r* above for nominal power conditions and verify that print quality has not been degraded.

(c) Verify that a minimum baud rate of 300 characters per second were printed (3 full pages plus 33 lines minimum printed per minute).

z. Operation Versus Static Variation of Input Frequency (50 Hertz). This test assures that the page printer performs satisfactorily under conditions of static variation in the input frequency.

(1) Set the controls on the variable frequency and voltage source (CML N5000A) to produce an output of 120 VAC at a frequency of 47.5 Hertz.

(2) Verify the test set controls are positioned the same as outlined in *t* above.

(3) Using a timer, simultaneously press the START switch-indicator on the page printer and start the timer. At 1 minute, press the STOP switch-indicator on the page printer.

(4) Press the FORM FEED switch on the page printer. Remove the printed copy from the page printer, record input AC voltage and frequency on the printed copy, and check the following:

(a) Copy is printed in the ripple pattern.

(b) Compare the printed copy against the printed copy prepared in *r* above for nominal power conditions and verify that the print quality has not been degraded.

(c) Verify that a minimum baud rate of 300 characters per second were printed (3 full pages plus 33 lines minimum printed per minute).

(5) Set the controls on the variable frequency and voltage source (CML N5000A) to produce an output of 120 VAC at a frequency of 52.5 hertz.

(6) Repeat steps (3) and (4) above.

aa. Operation Versus Dynamic Variation of Input Frequency (50 Hertz). This test assures that the page printer performs satisfactorily under conditions of dynamic variation in input frequency.

(1) Set the controls on the variable frequency and voltage source (CML N5000A) to produce an output of 120 VAC at a frequency of 50 hertz.

(2) Verify the test set controls are positioned the same as outlined in *t* above.

(3) Using a timer, simultaneously press the START switch-indicator on the page printer and start the timer. While the page printer is printing, vary the frequency controls on the variable frequency and voltage source (CML N5000A) from the nominal of 50 hertz, to a maximum of 52.5 hertz, then lower to a minimum of 47.5 hertz, and raise back to the nominal of 50 hertz. This variation of frequency cycle shall be completed within 30 to 60 seconds. At 1 minute after the START switch-indicator was pressed, press the STOP switch-indicator on the page printer.

(4) Press the FORM FEED switch on the page printer. Remove the printed copy from the page printer, record input AC voltage and frequency on the printed copy and check the following:

(a) Copy is printed in the ripple pattern.

(b) Compare the print copy against the printed copy prepared in *r* above for nominal power conditions and verify that the print quality has not been degraded.

(c) Verify a minimum baud rate of 300 characters per second were printed (3 full pages plus 33 lines minimum printed per minute).

ab. Operation Using Short Printed Lines (50 Hertz). This test assures the page printer performs satisfactorily while printing short lines in 50-hertz operation.

(1) Set the controls on the variable frequency and voltage source (CML N5000A) to produce an output of 120 VAC at a frequency of 47.5 hertz.

(2) On the test set, position the controls as follows:

FUNCTION 1 switch to LF.
FUNCTION 2 switch to CR.
FIX DATA/RUN DATA switch to RUN DATA.
PARTIAL DATA/ALL DATA switch to PARTIAL DATA.
FUNCTION POSITION

switches to:	1	2	4	8	16	32	64
(16 columns)	0	0	0	0	1	0	0

DATA switches-not applicable.
START/RESET switch to START.
ASSIGNED/NOT ASSIGNED switch to ASSIGNED.

(3) Using a timer, simultaneously press the START switch-indicator on the page printer and start the timer. At 1 minute, set the START/RESET switch on the test set to RESET.

(4) On the page printer, open the yoke, then close the yoke and press the FORM FEED switch. Remove the printed copy from the page printer, record the AC voltage and frequency on the printed copy, and check the following:

(a) Copy is printed in the ripple pattern.

(b) Compare the printed copy against the printed copy prepared in *r* above for nominal power conditions and verify that the print quality has not been degraded.

(c) Verify a minimum baud rate of 300 characters per second were printed (15 full pages plug 40 lines minimum printed per minute).

6-10. Shutdown

a. Convert Page Printer for 60-Hertz Operation.

(1) Press the AC POWER switch-indicator on the page printer to remove power. Use the procedures outlined in paragraph 2-11g, TM 11-7440-239-15/NAVSHIPS 0967-324-0112/TO 31W4-4-1-111 to convert the page printer for 60-hertz operation; however, the 60-hertz pulley, part number 56557-1, and the two (2) red 60-hertz springs removed in paragraph 6-9x shall be installed in the page printer.

(2) Replace the 50-hertz pulley and springs in the ancillary items storage box in the page printer. Insure all ancillary items (app B) are properly stored, then secure the cover on the ancillary items storage box.

(3) Press the AC POWER switch-indicator on the page printer to turn on power.

(4) On the test set, position the controls as follows:

FUNCTION 1 switch to INACTIVE.
FUNCTION 2 switch to INACTIVE.
FIX DATA/RUN DATA switch to RUN DATA.
PARTIAL DATA/ALL DATA switch to PARTIAL DATA.
FUNCTION POSITION switches-not applicable.
DATA switches-not applicable.
EOM switch to OFF.
START/RESET switch to START.
ASSIGNED/NOT ASSIGNED switch to ASSIGNED.

(5) Set the controls on the variable frequency and voltage source (CML N5000A) to produce an output of 120 VAC at a frequency of 60 hertz.

(6) Check the page printer for proper operation after the 60-hertz conversion. Press the START switch-indicator on the page printer, allow at least three pages to be printed, and press the STOP switch-indicator. Check the printed copy and verify that print quality has not been degraded and page printer is printing correct ripple pattern (table 6-5).

b. Page Printer. Press the AC POWER switch to remove power. Unload the paper from the page printer.

c. Page Printer Test Set. Set the AC switch to the OFF position.

d. Regulated Power Amplifier (CML N5000A).

Position the HIGH VOLTAGE switch to OFF, then place the POWER switch to OFF.

e. Test Equipment. Power down the test equipment and disconnect test leads.

f. Disconnect Test Setup. Remove the interconnection signal and power connections between the variable voltage and frequency source, ' page printer test set, and the page printer.

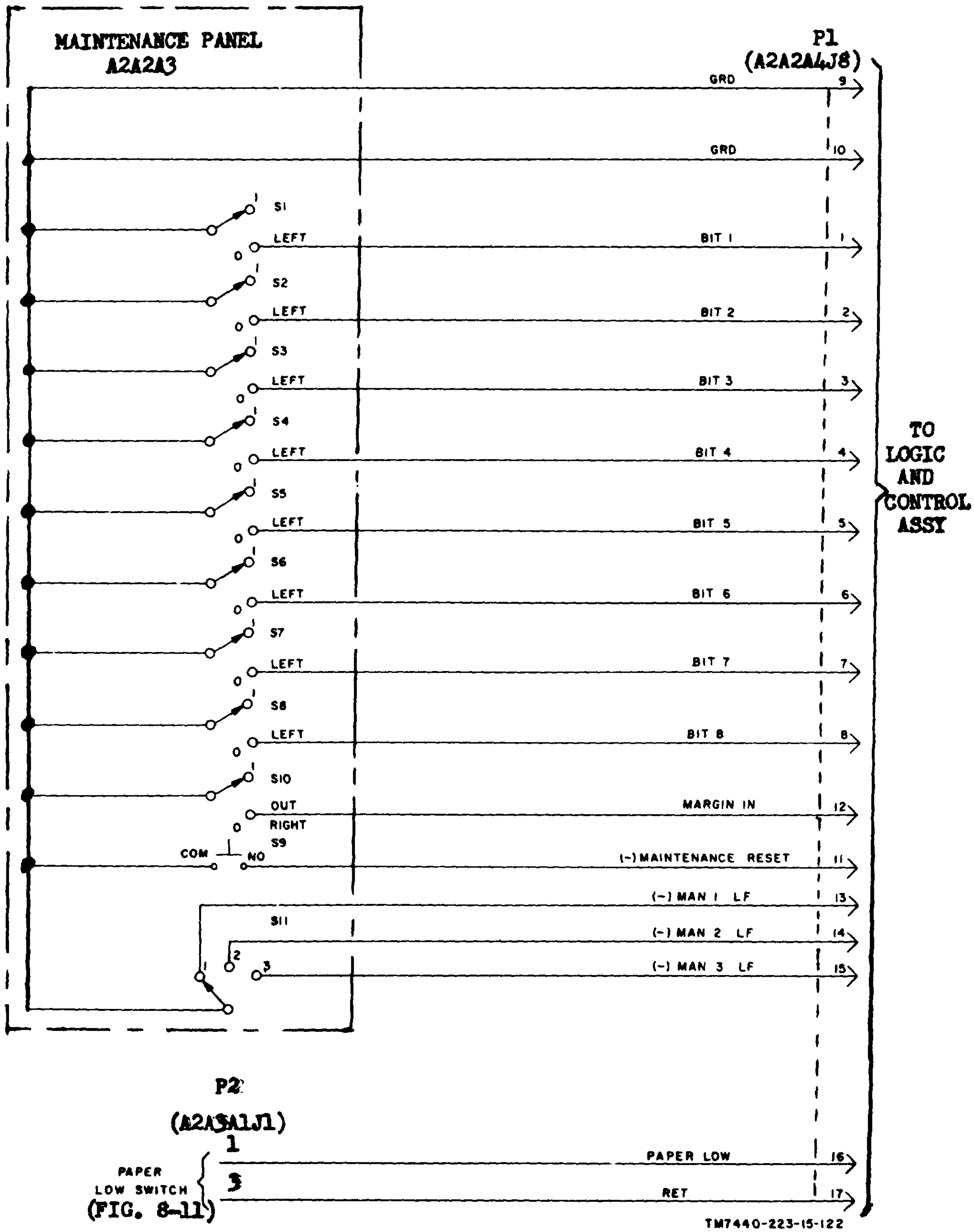


Figure 8-5. Test panel, schematic diagram.

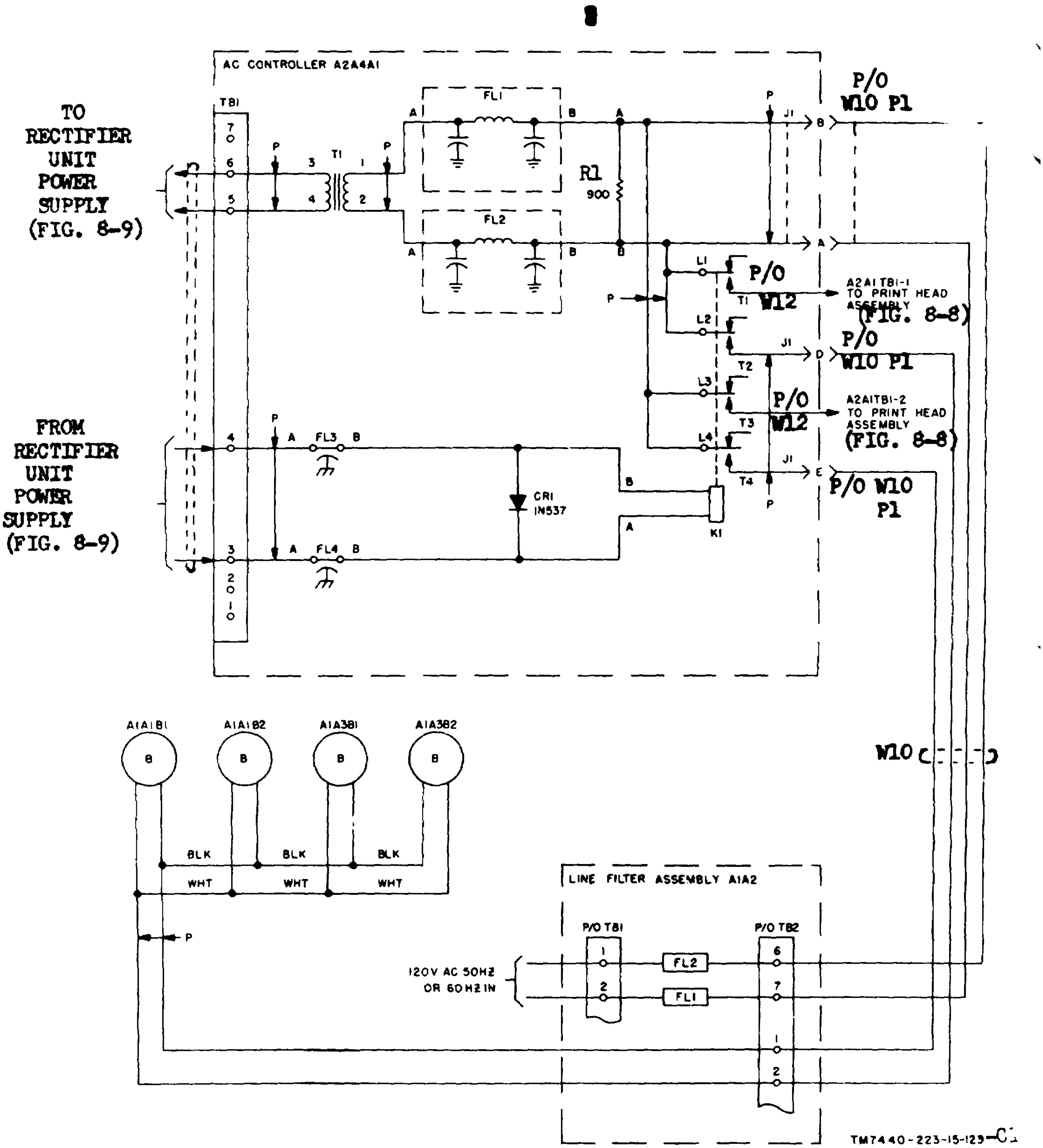


Figure 8-6. Ac Circuits, schematic diagram.

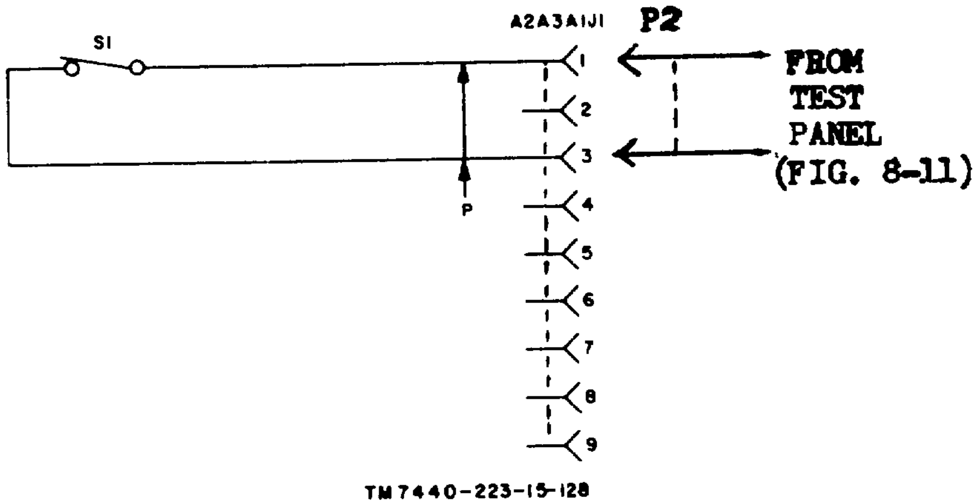


Figure 8-11. Paper low switch, schematic diagram.

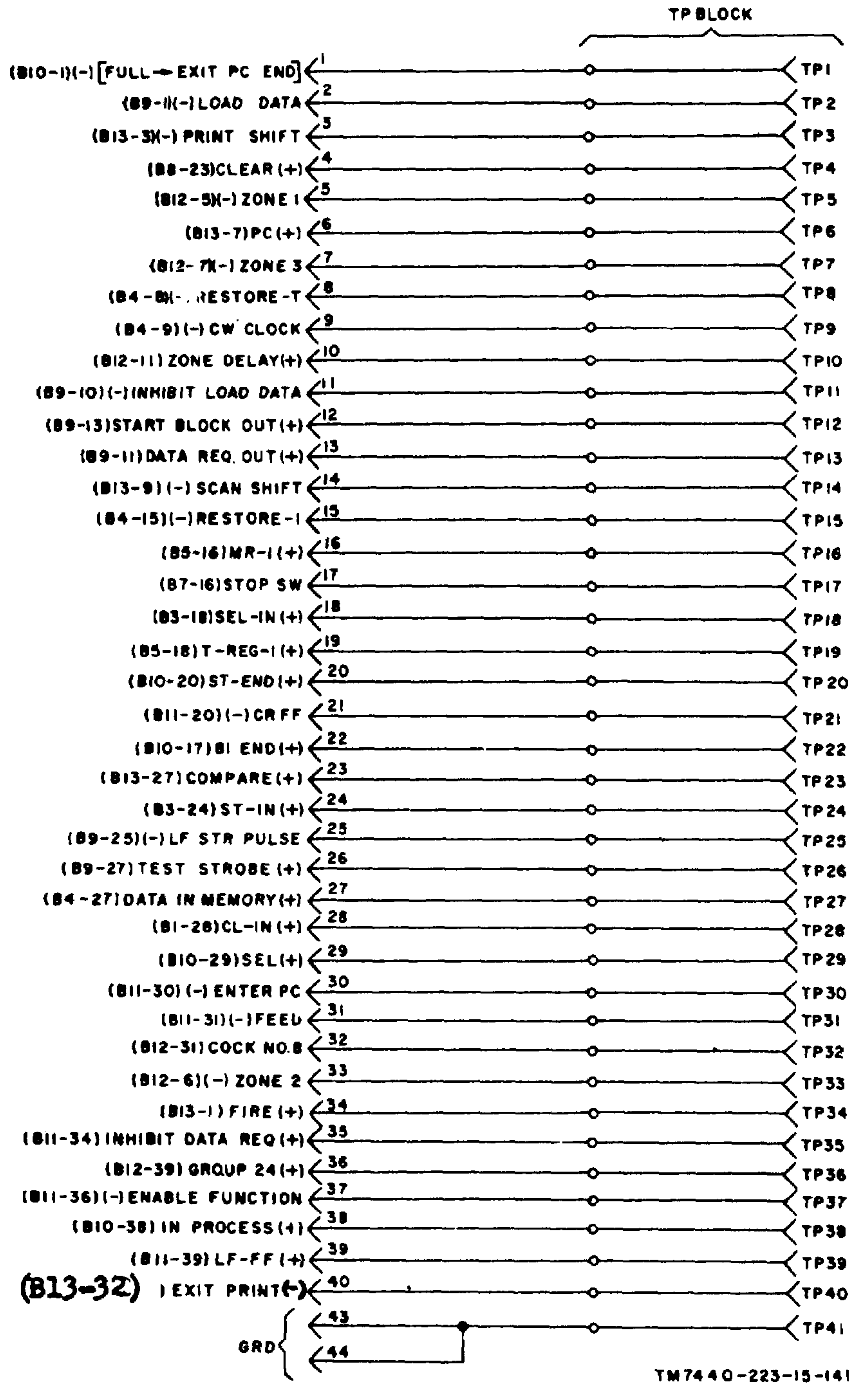
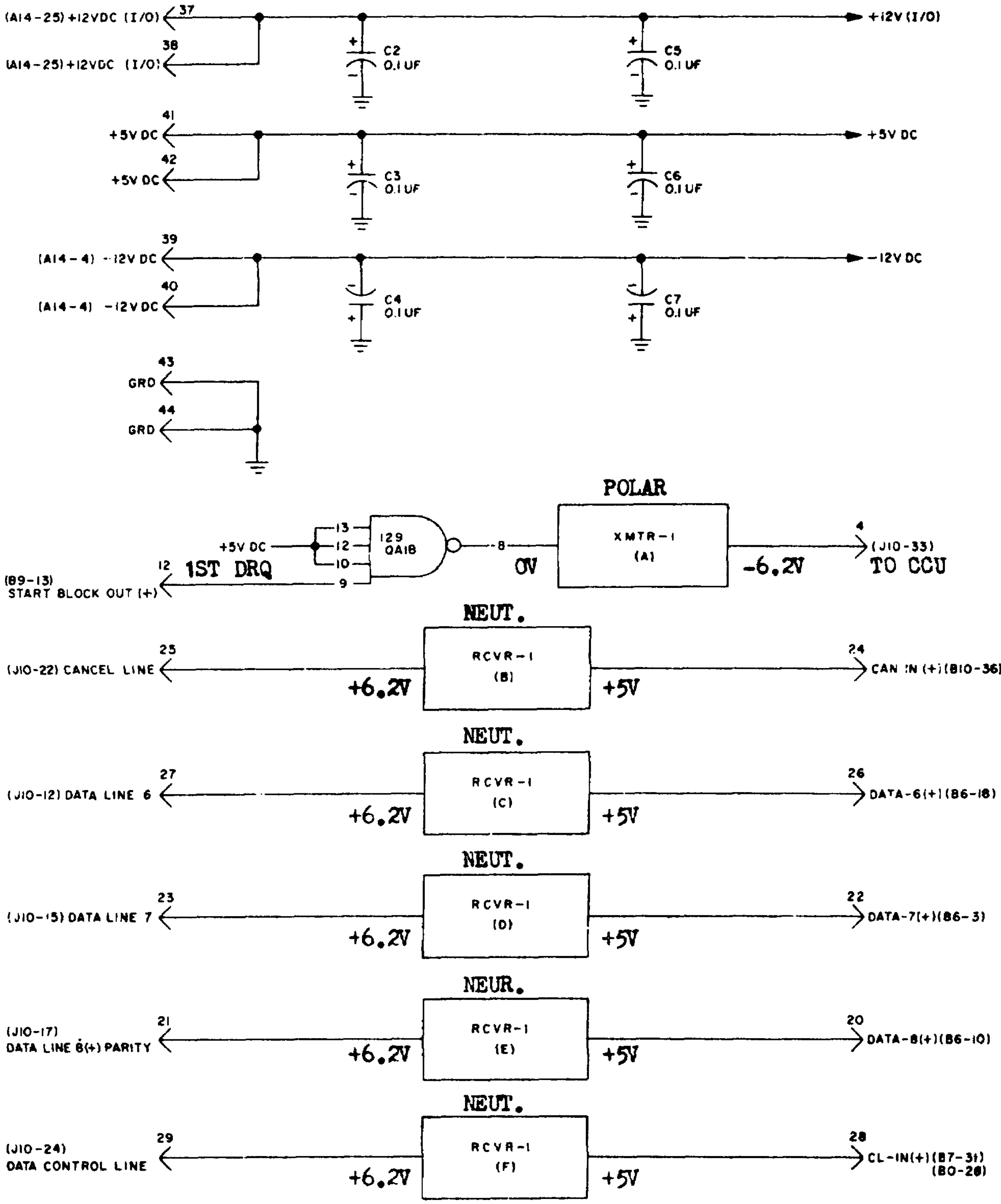


Figure 8-24. Assembly test points PC card B0 (No. 56737), logic diagram.

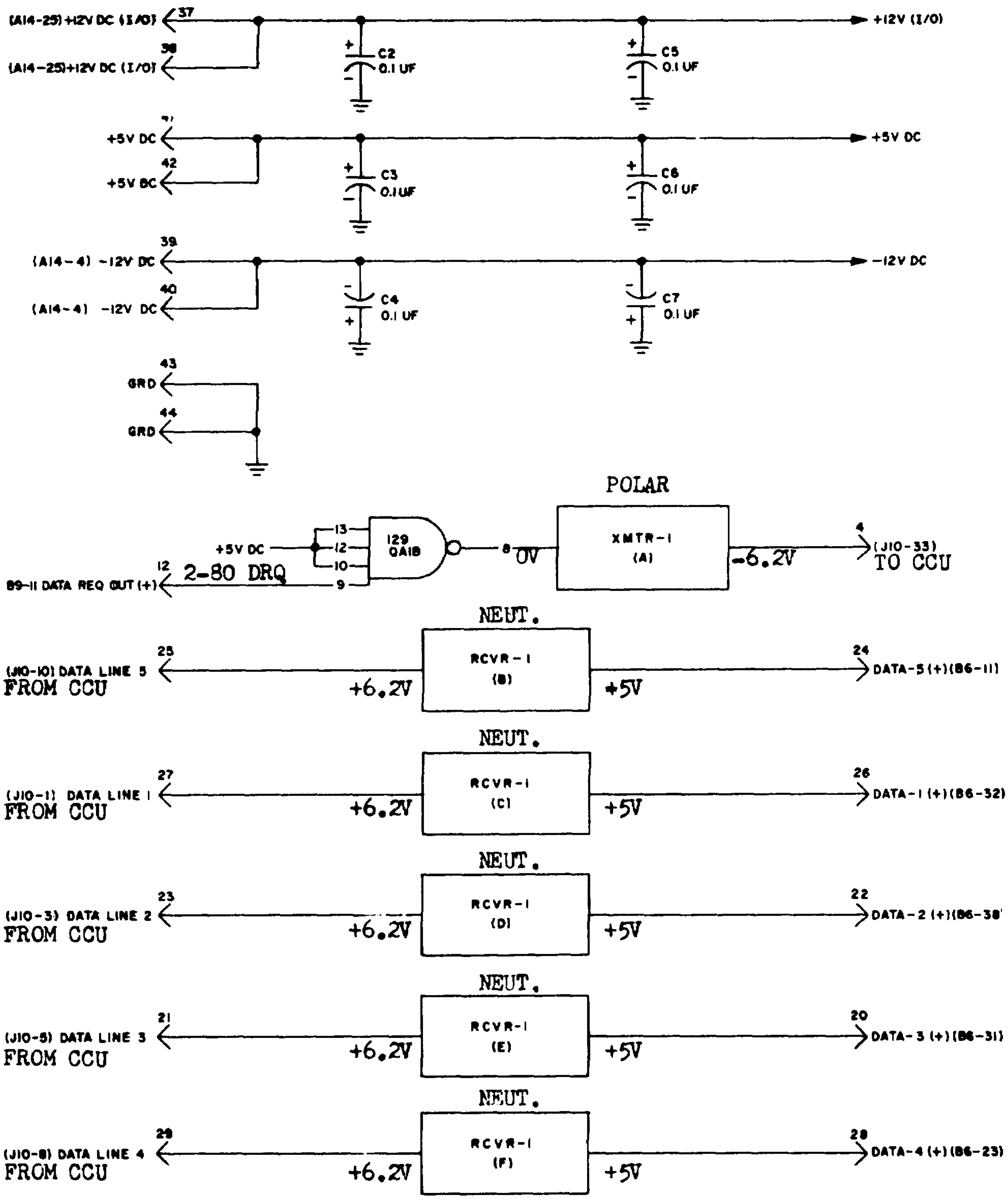


POWER INPUT PINS	
	QA1
$+V_{cc}$	14
GRD	7

NOTE:
PARTIAL REFERENCE DESIGNATORS ARE SHOWN. FOR COMPLETE DESIGNATION PREFIX WITH UNIT NUMBER OR SUBASSEMBLY DESIGNATION.

TM7440-223-15-142

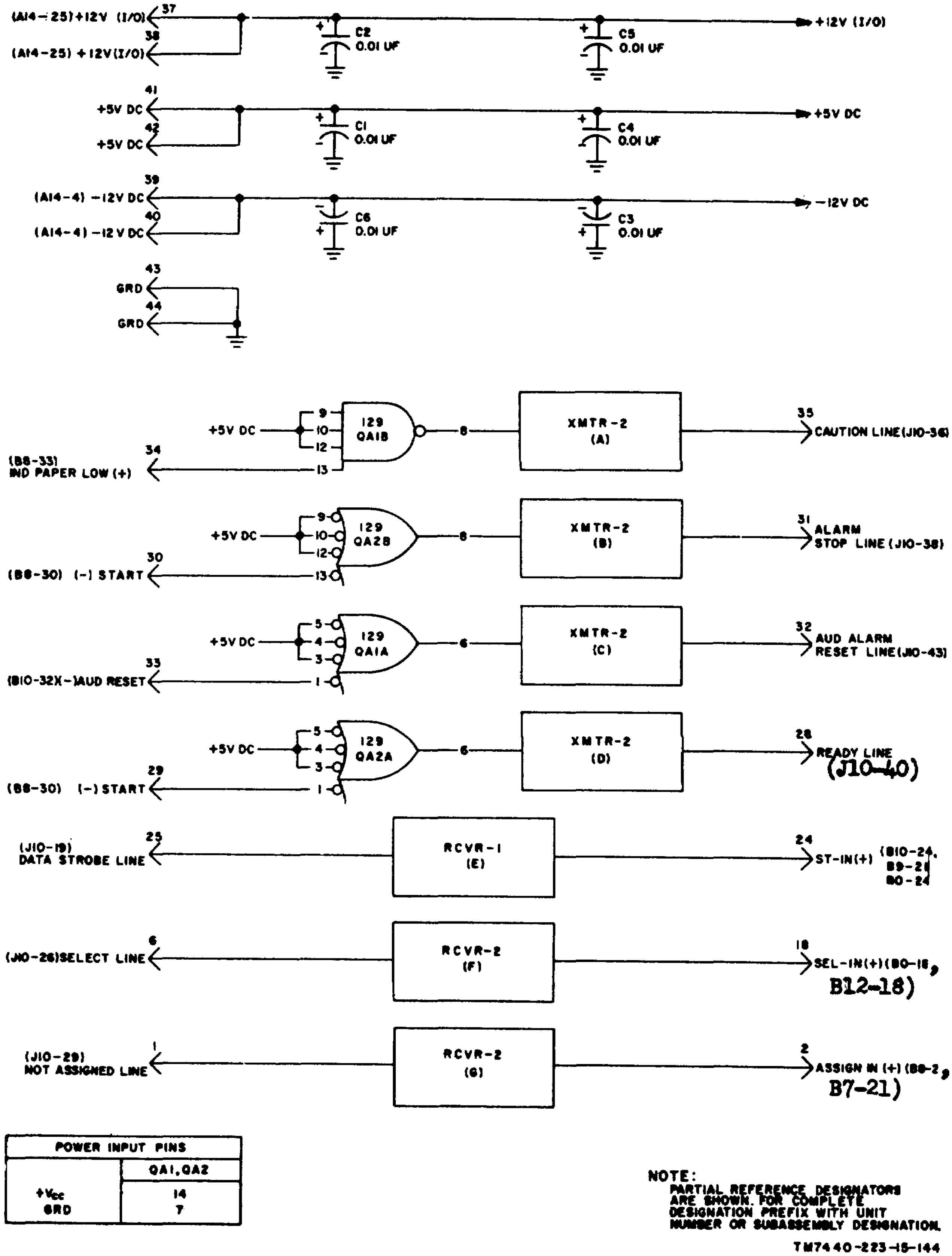
Figure 8-25. Interface B PC card B1 (No. 56733), logic diagram.



POWER INPUT PINS	
	QA1
$+V_{cc}$	14
GRD	7

NOTE:
PARTIAL REFERENCE DESIGNATORS ARE SHOWN. FOR COMPLETE DESIGNATION PREFIX WITH UNIT NUMBER OR SUBASSEMBLY DESIGNATION.

Figure 8-26. interface B PC card B2 (No. 56733), logic diagram.



POWER INPUT PINS	
	QA1, QA2
+Vcc	14
GRD	7

Figure 8-27. Interface A PC card B3 (No. 56732), logic diagram.

Table 8-1. Wire Run Lists

From	To	From	To	From	To
LOGIC AND CONTROL ASSEMBLY A2A2A4		LOGIC AND CONTROL ASSEMBLY A2A2A4		LOGIC AND CONTROL ASSEMBLY A2A2A4	
A1-1	B8-1	A1-37	J9-24	A2-34	A3-34
A1-2	B9-2	A1-38	J9-20	A2-35	A3-35
A1-3	J7-16	A1-39	J9-19	A2-35	B13-24
A1-4	B11-3	A1-40	B4-40	A2-38	A3-38
A1-5	B9-4	A1-44	A1-29	A2-39	A3-39
A1-6	J7-5			A2-40	A3-40
A1-7	J7-9	A2-1	A3-1	A2-44	A2-33
A1-8	B13-7	A2-2	A3-2		
A1-9	J6-9	A2-3	A3-3	A3-1	A4-1
A1-9	J7-6	A2-4	B12-24	A3-1	A2-1
A1-9	J7-10	A2-5	A3-5	A3-2	A4-2
A1-10	J6-6	A2-6	A3-6	A3-2	A2-2
A1-10	J7-13	A2-7	A3-7	A3-3	A4-3
A1-10	J7-17	A2-11	J1-4	A3-3	A2-3
A1-11	B11-11	A2-12	J1-3	A3-4	B12-35
A1-12	J7-12	A2-12	J4-10	A3-5	A4-5
A1-13	J6-8	A2-13	J3-1	A3-5	A2-5
A1-14	J6-5	A2-13	J3-38	A3-6	A4-6
A1-16	J1-66	A2-14	J3-2	A3-6	A2-6
A1-17	J1-65	A2-15	J4-11	A3-7	A4-7
A1-17	J6-3	A2-16	J3-39	A3-7	A2-7
A1-18	J6-1	A2-17	J3-30	A3-11	J1-10
A1-19	J6-4	A2-18	J4-39	A3-12	J1-11
A1-20	J6-2	A2-19	J4-2	A3-12	J5-10
A1-21	J1-68	A2-20	J3-29	A3-13	J2-1
A1-22	J1-67	A2-20	J4-38	A3-13	J2-38
A1-22	J6-27	A2-21	J1-1	A3-14	J2-2
A1-23	J6-25	A2-21	J4-1	A3-15	J5-11
A1-24	J6-26	A2-22	J1-2	A3-16	J2-39
A1-25	J6-19	A2-23	J1-14	A3-17	J2-30
A1-26	J6-20	A2-24	J1-7	A3-18	J5-39
A1-27	J1-69	A2-24	J4-29	A3-19	J5-2
A1-27	J6-18	A2-25	J3-19	A3-20	J2-29
A1-28	J1-68	A2-26	J3-20	A3-20	J5-1
A1-29	A1-44	A2-27	J4-30	A3-21	J1-13
A1-30	B8-28	A2-28	J3-11	A3-21	J5-38
A1-31	J9-21	A2-29	J4-20	A3-22	J1-12
A1-32	J9-22	A2-30	J3-10	A3-23	J1-16
A1-33	B11-31	A2-31	J1-5	A3-24	J1-15
A1-34	B3-34	A2-31	J4-19	A3-24	J5-29
A1-35	B4-17	A2-32	J1-6	A3-25	J2-19
A1-36	J9-23	A2-33	A2-44	A3-26	J2-20

NOTE: See figure 8-3 shooing interconnection diagram.

Table 8-1. Wire Run Lists (continued)

From	To	From	To	From	To
LOGIC AND CONTROL ASSEMBLY A2A2A4		LOGIC AND CONTROL ASSEMBLY A2A2A4		LOGIC AND CONTROL ASSEMBLY A2A2A4	
A3-27	J5-30	A4-21	J1-17	A5-14	J2-4
A3-28	J2-11	A4-21	J4-3	A5-15	J5-13
A3-29	J5-20	A4-22	J1-18	A5-16	J2-41
A3-30	J2-10	A4-23	J1-26	A5-17	J2-32
A3-30	J5-19	A4-24	J1-27	A5-18	J5-41
A3-31	J1-9	A4-24	J4-31	A5-19	J5-4
A3-32	J1-8	A4-25	J3-22	A5-20	J2-31
A3-33	A3-44	A4-26	J3-23	A5-20	J5-3
A3-34	A4-34	A4-27	J4-32	A5-21	J1-25
A3-34	A2-34	A4-28	J3-13	A5-21	J5-40
A3-35	A4-35	A4-29	J4-23	A5-22	J1-24
A3-35	A2-35	A4-30	J3-12	A5-23	J1-32
A3-38	A4-38	A4-31	J1-21	A5-24	J1-31
A3-38	A2-38	A4-31	J4-22	A5-24	J5-31
A3-39	A4-39	A4-32	J1-28	A5-25	J2-22
A3-39	A2-39	A4-33	A4-44	A5-26	J2-23
A3-40	A4-40	A4-34	A5-34	A5-27	J5-32
A3-40	A2-40	A4-34	A3-34	A5-28	J2-13
A3-44	A3-33	A4-35	A5-35	A5-29	J5-23
		A4-35	A3-35	A5-30	J2-12
A4-1	A5-1	A4-38	A5-38	A5-30	J5-22
A4-1	A3-1	A4-38	A3-38	A5-31	J1-29
A4-2	A5-2	A4-39	A5-39	A5-32	J1-30
A4-2	A3-2	A4-39	A3-39	A5-33	A5-44
A4-3	A5-3	A4-40	A5-40	A5-34	A6-34
A4-3	A3-3	A4-40	A3-40	A5-34	A4-34
A4-4	B12-23	A4-44	A4-33	A5-35	A6-35
A4-5	A5-5			A5-35	A4-35
A4-5	A3-5	A5-1	A6-1	A5-38	A6-38
A5-6	A5-6	A5-1	A4-1	A5-38	A4-38
A4-6	A3-6	A5-2	A6-2	A5-39	A6-39
A4-7	A5-7	A5-2	A4-2	A5-39	A4-39
A4-7	A3-7	A5-3	A6-3	A5-40	A6-40
A4-11	J1-20	A5-3	A4-3	A5-40	A4-40
A4-12	J1-19	A5-4	B12-30	A5-44	A5-33
A4-12	J4-12	A5-5	A6-5		
A4-13	J3-3	A5-5	A4-5	A6-1	A7-1
A4-13	J3-40	A5-6	A6-6	A6-1	A5-1
A4-14	J3-4	A5-6	A4-6	A6-2	A7-2
A4-15	J4-13	A5-7	A6-7	A6-2	A5-2
A4-16	J3-41	A5-7	A4-7	A6-3	A7-3
A4-17	J3-32	A5-11	J1-22	A6-3	A5-3
A4-18	J4-41	A5-12	J1-23	A6-4	B12-28
A4-19	J4-4	A5-12	J5-12	A6-5	A7-5
A4-20	J3-31	A5-13	J2-3	A6-5	A5-5
A4-20	J4-40	A5-13	J2-40	A6-6	A7-6

Table 8-1. Wire Run Lists (continued)

From	To	From	To	From	To
LOGIC AND CONTROL ASSEMBLY A2A2A4		LOGIC AND CONTROL ASSEMBLY A2A2A4		LOGIC AND CONTROL ASSEMBLY A2A2A4	
A6-6	A5-6	A6-40	A5-40	A7-30	J5-24
A7-7	A7-7	A6-44	A6-33	A7-31	J1-45
A6-7	A5-7			A7-32	J1-46
A6-11	J1-42	A7-1	A8-1	A7-33	A7-44
A6-12	J1-35	A7-1-1	A6-1	A7-34	A8-34
A6-12	J4-15	A7-2	A8-2	A7-34	A6-34
A6-13	J3-5	A7-2-2	A6-2	A7-35	A8-35
A6-13	J3-43	A7-3-3	A8-3	A7-35	A6-35
A6-14	J3-6	A7-3-3	A6-3	A7-38	A8-38
A6-15	J4-16	A7-4	B12-32	A7-38	A6-38
A6-16	J3-44	A7-5	A8-5	A7-39	A8-39
A6-17	J3-34	A7-5	A6-5	A7-39	A6-39
A6-18	J4-44	A7-6	AS-6	A7-40	A8-40
A6-19	J4-6	A7-6-6	A6-6	A7-40	A6-40
A6-20	J3-33	A7-7	A8-7	A7-44	A7-33
A6-20	J4-43	A7-7	A6-7		
A6-21	J1-33	A7-11	J1-44	A8-1	A9-1
A6-21	J4-5	A7-12	J1-43	A8-1	A7-1
A6-22	J1-34	A7-12	J5-15	A8-2	A9-2
A6-23	J1-38	A7-13	J2-5	A8-2	A7-2
A6-24	J1-39	A7-13	J2-43	A8-3	A9-3
A6-24	J4-33	A7-14	J2-6	A8-3	A7-3
A6-25	J3-24	A7-15	J5-16	A8-4	B12-26
A6-26	J3-25	A7-16	J2-44	A8-5	A7-5
A6-27	J4-34	A7-17	J2-34	A8-5	B12-5
A6-28	J3-16	A7-18	J5-44	A8-6	A7-6
A6-29	J4-25	A7-19	J5-6	A8-6	B12-6
A6-30	J3-15	A7-20	J2-33	A8-7	A9-7
A6-31	J1-41	A7-20	J5-5	A8-7	A7-7
A6-31	J4-24	A7-21	J1-37	A8-11	J1-54
A6-32	J1-40	A7-21	J5-43	A8-12	J1-55
A6-33	A6-44	A7-22	J1-36	A8-12	J4-17
A6-34	A7-34	A7-23	J1-48	A8-13	J3-8
A6-34	A5-34	A7-24	J1-47	A8-13	J3-45
A6-35	A7-35	A7-24	J5-33	A8-14	J3-9
A6-35	A5-35	A7-25	J2-24	A8-15	J4-18
A6-38	A7-38	A7-26	J2-25	A8-16	J3-46
A6-38	A5-38	A7-27	J5-34	A8-17	J3-37
A6-39	A7-39	A7-28	J2-16	A8-18	J4-46
A6-39	A5-39	A7-29	J5-25	A8-19	J4-9
A6-40	A7-40	A7-30	J2-15	A8-20	J3-36

Table 8-1. Wire Run Lists (continued)

From	To	From	To	From	To
LOGIC AND CONTROL ASSEMBLY A2A2A4		LOGIC AND CONTROL ASSEMBLY A2A2A4		LOGIC AND CONTROL ASSEMBLY A2A2A4	
A8-20	J4-45	A9-12	J1-59	A11-2	A12-2
A8-21	J1-49	A9-12	J5-17	A11-3	B13-2
A8-21	J4-8	A9-13	J2-8	A11-4	TB1-5
A8-22	J1-56	A9-13	J2-45	A11-5	A12-5
A8-23	J1-50	A9-14	J2-9	A11-6	TB1-26
A8-24	J1-51	A9-15	J5-18	A11-7	A11-14
A8-24	J4-36	A9-16	J2-46	A11-8	TB1-19
A8-25	J3-26	A9-17	J2-37	A11-9	A12-9
A8-26	J3-27	A9-18	J5-46	A11-10	TB1-22
A8-27	J4-37	A9-19	J5-9	A11-12	A12-12
A8-28	J3-18	A9-20	J2-36	A11-13	A12-13
A8-29	J4-27	A9-20	J5-8	A11-14	A11-7
A8-30	J3-17	A9-21	J1-57	A11-15	A12-15
A8-31	J1-53	A9-21	J5-45	A11-17	A12-6
A8-31	J4-26	A9-22	J1-58	A11-19	A12-19
A8-32	J1-52	A9-23	J1-70	A11-20	B7-28
A8-33	A8-44	A9-24	J1-63	A11-23	A12-39
A8-34	A9-34	A9-24	J5-36	A11-24	A12-40
A8-34	A7-34	A9-25	J2-26	A11-25	A9-35
A8-35	A9-35	A9-26	J2-27	A11-26	A12-26
A8-35	A7-35	A9-27	J5-37	A11-27	A12-27
A8-38	A9-38	A9-28	J2-18	A11-29	A12-29
A8-38	A7-38	A9-29	J5-27	A11-31	A12-31
A8-39	A9-39	A9-30	J2-17	A11-32	J1-64
A8-39	A7-39	A9-30	J5-26	A11-33	J9-25
A8-40	A9-40	A9-31	J1-61	A11-34	J9-31
A8-40	A7-40	A9-32	J1-62	A11-35	J9-27
A8-44	A8-33	A9-33	A9-44	A11-37	J9-32
		A9-34	A8-34	A11-38	J9-28
A9-1	A5-1	A9-34	B8-23	A11-39	J9-26
A9-1	B13-1	A9-35	A11-25	A11-40	A14-34
A9-2	A8-2	A9-35	A8-35	A11-40	B9-40
A9-2	B12-2	A9-38	A8-38		
A9-3	A8-3	A9-38	B12-39	A12-1	A11-1
A9-3	B12-3	A9-39	A8-39	A12-1	A14-31
A9-4	B12-31	A9-39	B12-40	A12-2	A11-2
A9-5	B12-29	A9-40	A14-40	A12-3	A14-26
A9-6	B12-1	A9-40	A8-40	A12-4	A14-25
A9-7	A8-7	A9-44	A9-33	A12-5	A11-5
A9-7	B12-7			A12-6	A11-17
A9-11	J1-60	A11-1	A12-1	A12-6	A12-42

Table 8-1. Wire Run Lists (continued)

LOGIC AND CONTROL ASSEMBLY A2A2A4

From	To
A12-7	J9-29
A12-8	A14-7
A12-9	A11-9
A12-10	A14-28
A12-11	TB1-16
A12-12	A11-12
A12-13	A11-13
A12-15	A11-15
A12-17	A14-4
A12-19	A11-19
A12-26	A11-26
A12-27	A11-27
A12-29	A11-29
A12-30	A14-33
A12-31	A11-31
A12-38	TB1-4
A12-39	A14-30
A12-39	A11-23
A12-40	A11-24
A12-42	A12-6
A12-43	J9-33
A14-2	TB1-9
A14-3	TB1-8
A14-4	B3-39
A14-4	A12-17
A14-7	A12-8
A14-7	B5-39
A14-22	TB1-6
A14-23	TB1-7
A14-25	A12-4
A14-25	B3-37
A14-26	A12-3
A14-26	B5-40
A14-28	A12-10
A14-28	TB1-21
A14-29	TB1-22
A14-30	A12-39
A14-31	A12-1
A14-33	A12-30
A14-33	TB1-10

LOGIC AND CONTROL ASSEMBLY A2A2A4

From	To
A14-34	A11-40
A14-34	TB1-11
A14-35	A14-37
A14-36	A14-38
A14-37	A14-35
A14-38	A14-36
A14-40	A9-40
B0-1	B10-1
B0-2	B5-2
B0-3	B5-3
B0-4	B13-23
B0-5	B12-5
B0-6	B13-7
B0-7	B11-7
B0-8	B4-8
B0-9	B4-9
B0-10	B11-10
B0-11	B5-9
B0-12	B1-12
B0-13	B2-12
B0-14	B12-9
B0-15	B4-15
B0-16	B4-16
B0-17	B7-16
B0-18	B3-18
B0-19	B4-18
B0-20	B6-20
B0-21	B11-20
B0-22	B10-17
B0-23	B12-27
B0-24	B3-24
B0-25	B9-25
B0-26	B9-27
B0-27	B4-27
B0-28	B1-28
B0-29	B7-29
B0-30	B11-30
B0-31	B11-31
B0-32	B12-31
B0-33	B12-6

LOGIC AND CONTROL ASSEMBLY A2A2A4

From	To
B0-34	B13-1
B0-35	B9-35
B0-36	B12-39
B0-37	B8-37
B0-38	B10-38
B0-39	B11-39
B0-40	B11-40
B1-4	J10-31
B1-12	B9-13
B1-12	B0-12
B1-20	B6-10
B1-21	J10-17
B1-22	B6-3
B1-23	J10-15
B1-24	B10-36
B1-25	J10-22
B1-26	B6-18
B1-27	J10-12
B1-28	B7-31
B1-28	B0-28
B1-29	J10-24
B1-37	B2-37
B1-39	B2-39
B2-4	J10-33
B2-12	B0-13
B2-12	B9-11
B2-20	B6-31
B2-21	J10-5
B2-22	B6-38
B2-23	J10-3
B2-24	B6-11
B2-25	J10-10
B2-26	B6-32
B2-27	J10-1
B2-28	B6-23
B2-29	J10-8
B2-37	B1-37
B2-37	B3-37
B2-39	B1-39
B2-39	B3-39

Table 8-1. Wire Run Lists (continued)

From	To	From	To	From	To
LOGIC AND CONTROL ASSEMBLY A2A2A4		LOGIC AND CONTROL ASSEMBLY A2A2A4		LOGIC AND CONTROL ASSEMBLY A2A2A4	
		B4-17	A1-35	B-17	B5-42
		B4-17	B12-16	B5-18	B4-18
B3-1	J10-29	B4-18	B0-19	B5-18	B10-18
B3-2	B7-21	B4-18	B5-18	B5-19	B4-19
B3-2	B8-2	B4-19	B5-19	B5-21	B6-21
B3-6	J10-26	B4-20	B13-20	B5-23	B6-8
B3-18	B0-18	B4-21	B11-21	B5-24	B4-24
B3-18	B12-18	B4-24	B5-24	B5-27	B6-27
B3-24	B0-24	B4-26	J7-30	B5-29	B4-29
B3-24	B10-24	B4-27	B0-27	B5-30	B4-30
B3-25	J10-19	B4-27	B13-29	B5-33	B4-33
B3-28	J10-40	B4-28	J7-33	B5-35	B9-36
B3-29	B3-30	B4-29	B5-29	B5-36	B6-36
B3-29	B6-29	B4-30	B5-30	B5-37	B6-37
B3-30	B3-29	B4-33	B5-33	B5-38	B5-43
B3-31	J10-38	B4-34	J7-37	B5-39	A14-7
B3-32	J10-43	B4-35	J7-26	B5-40	A14-26
B3-33	B10-32	B4-36	J9-1	B5-41	B5-1
B3-34	A1-34	B4-39	J9-2	B5-41	B5-5
B3-34	B8-33	B4-40	A1-40	B5-42	B5-17
B3-35	J10-36	B4-40	B6-40	B5-43	B5-38
B3-37	A14-25	B4-43	J7-24	B5-43	J7-38
B3-37	B2-37	B4-43	J7-27	B5-44	J7-41
B3-39	A14-4	B4-44	J7-31	B5-44	J7-45
B3-39	B2-39	B4-44	J7-34		
				B6-1	J9-11
B4-2	J7-40	B5-1	B5-41	B6-2	J8-7
B4-3	J7-44	B5-2	B0-2	B6-3	B1-22
B4-4	B8-4	B5-2	B9-1	B6-4	B5-4
B4-5	B13-5	B6-3	B0-3	B6-5	J9-12
B4-6	B5-6	B5-3	B13-3	B6-6	J8-8
B4-7	J7-23	B5-4	B6-4	B6-7	B8-6
B4-8	B0-8	B5-5	B5-41	B6-8	B5-23
B4-8	B5-7	B5-6	B4-6	B6-8	B8-9
B4-9	B0-9	B5-7	B4-8	B6-9	B5-8
B4-9	B13-11	B5-8	B6-9	B6-10	B1-20
B4-10	B5-10	B5-9	B0-11	B6-11	B2-24
B4-11	B5-11	B5-9	B9-10	B6-12	J8-5
B4-12	B5-12	B5-10	B4-10	B6-13	B10-13
B4-13	B5-13	B5-11	B4-11	B6-16	B8-15
B4-14	B13-14	B5-12	B4-12	B6-16	B9-16
B4-15	B0-15	B5-13	B4-13	B6-18	B1-26
B4-15	B5-15	B5-14	B11-14	B6-19	J8-6
B4-16	B0-16	B5-15	B4-15	B6-20	B0-20
B4-16	B5-16	B5-16	B4-16	B6-20	B9-9

Table 8-1. Wire Run Lists (continued)

From	To	From	To	From	To
LOGIC AND CONTROL ASSEMBLY A2A2A4		LOGIC AND CONTROL ASSEMBLY A2A2A4		LOGIC AND CONTROL ASSEMBLY A2A2A4	
B6-21	B5-21				
B6-22	B8-22	B7-28	A11-20	B8-30	B6-29
B6-23	B2-28	B7-29	B0-29	B8-31	B6-35
B6-24	J8-4	B7-29	B8-29	B8-32	B11-25
B6-26	B11-27	B7-30	J8-11	B8-33	B3-34
B6-27	B5-27	B7-31	B1-28	B8-34	J9-8
B6-28	B9-28	B7-37	B10-37	B8-36	J9-6
B6-29	B3-29	B7-43	J9-34	B8-37	B0-37
B6-29	B8-30			B8-37	B11-36
B6-30	J8-3	B8-1	A1-1	B8-38	J9-5
B6-31	B2-20	B8-2	B3-2	B8-39	J9-3
B6-32	B2-26	B8-3	B9-3	B8-40	B6-40
B6-33	J8-1	B8-4	B4-4	B8-40	B9-40
B6-34	B9-34	B8-4	B11-4	B8-43	B8-20
B6-35	B8-31	B8-5	B10-9	B8-43	J8-17
B6-36	B5-36	B8-6	B6-7		
B6-37	B5-37	B8-7	B10-7	B9-1	B5-2
B6-38	B2-22	B8-8	B10-8	B9-1	B10-3
B6-39	J8-2	B8-9	B6-8	B9-2	A1-2
B6-40	B4-40	B8-9	B9-8	B9-3	B8-3
B6-40	B8-40	B8-10	B7-10	B9-4	A1-5
B6-43	J8-9	B8-11	B7-11	B9-4	B11-5
B6-43	J8-10	B8-12	J9-7	B9-5	B10-5
		B8-13	J9-4	B9-6	B10-6
B7-5	B10-2	B8-14	B7-14	B9-7	B11-8
B7-5	B12-17	B8-15	B6-16	B9-8	B8-9
B7-7	B11-17	B8-16	B11-15	B9-8	B11-9
B7-9	J9-13	B8-17	J6-10	B9-9	B6-20
B7-10	B8-10	B8-18	J6-11	B9-9	B10-20
B7-11	B8-11	B8-19	J8-16	B9-10	B5-9
B7-12	B11-12	B8-20	B8-43	B9-11	B2-12
B7-13	J9-14	B8-21	B10-21	B9-13	B1-12
B7-14	B8-14	B8-22	B6-22	B9-14	J8-14
B7-15	J9-15	B8-22	B9-23	B9-15	J8-15
B7-16	B0-17	B8-23	A9-34	B9-16	B6-16
B7-16	J9-16	B8-23	B9-22	B9-16	B10-16
B7-19	J9-17	B8-24	B10-22	B9-17	B10-2
B7-21	B3-2	B8-25	B9-24	B9-19	B10-19
B7-22	J9-18	B8-26	B13-26	B9-20	J8-13
B7-23	B11-23	B8-27	B7-27	B9-21	B10-24
B7-25	B10-25	B8-28	A1-30	B9-22	B8-23
B7-27	B8-27	B8-29	B7-29	B9-22	B13-23
B7-27	B10-26	B8-29	B9-29	B9-23	B8-22

Table 8-1. Wire Run Lists (continued

From	To	From	To	From	To
LOGIC AND CONTROL ASSEMBLY A2A2A4		LOGIC AND CONTROL ASSEMBLY A2A2A4		LOGIC AND CONTROL ASSEMBLY A2A2A4	
B9-24	B8-25	B10-18	B13-18	B11-10	B0-10
B9-24	B10-23	B10-19	B9-19	B11-10	B12-11
B9-25	B0-25	B10-20	B9-9	B11-11	A1-11
B9-25	B11-24	B10-20	B11-18	B11-12	B7-12
B9-26	B11-26	B10-21	B8-21	B11-13	B12-12
B9-27	B0-26	B10-21	B10-14	B11-14	B5-14
B9-27	B10-27	B10-22	B8-24	B11-15	B8-16
B9-28	B6-28	B10-23	B9-24	B11-16	B10-15
B-28	B9-22	B10-24	B3-24	B11-17	B7-7
B9-29	B8-29	B10-24	B9-21	B11-18	B10-20
B9-29	B10-29	B10-25	B7-25	B11-18	B11-35
B9-30	B10-30	B10-26	B7-27	B11-19	B10-17
B9-31	B10-31	B10-27	B9-27	B11-20	B0-21
B9-33	B10-34	B10-28	B9-28	B11-20	B12-20
B9-34	B6-34	B10-28	B11-28	B11-11	B4-21
B9-35	B0-35	B10-29	B9-29	B11-22	B13-12
B9-35	B11-34	B10-30	B9-30	B11-23	B7-23
B9-36	B5-35	B10-31	B9-31	B11-24	B9-25
B9-37	J9-10	B10-31	B11-3	B11-25	B8-32
B9-39	J9-9	B10-32	B3-33	B11-26	B9-26
B9-40	A11-40	B10-33	B11-40	B11-27	B6-26
B9-40	B8-40	B10-33	B12-33	B11-28	B10-28
		B10-34	B9-33	B11-28	B13-28
B10-1	B0-1	B10-36	B1-24	B11-29	B12-34
B10-1	B11-1	B10-37	B7-37	B11-30	B0-30
B10-2	B7-5	B10-37	B11-37	B11-30	B13-30
B10-2	B9-17	B10-38	B0-38	B11-31	A1-33
B10-3	B9-1	B10-38	B11-38	B11-31	B0-31
B10-5	B9-5	B10-39	B12-36	B11-32	B10-31
B10-6	B9-6			B11-33	B11-41
B10-7	B8-7	B11-1	B10-1	B11-34	B9-35
B10-8	B8-8	B11-2	J8-12	B11-35	B11-18
B10-9	B8-5	B11-3	A1-4	B11-36	B8-37
B10-9	B11-6	B11-4	B8-4	B11-37	B10-37
B10-13	B6-13	B11-5	B9-4	B11-38	B10-38
B10-14	B10-21	B11-6	B10-9	B11-39	B0-39
B10-15	B11-16	B11-7	B0-7	B11-39	B12-38
B10-16	B9-16	B11-7	B12-7	B11-40	B0-40
B10-17	B0-22	B11-8	B9-7	B11-40	B10-33
B10-17	B11-19	B11-9	B9-8	B11-41	B11-33
B10-18	B5-18	B11-9	B12-8		

Table 8-1. Wire Run Lists (continued)

From	To	From	To	From	To
LOGIC AND CONTROL ASSEMBLY A2A2A4		LOGIC AND CONTROL ASSEMBLY A2A2A4		LOGIC AND CONTROL ASSEMBLY A2A2A4	
B12-1	A9-6	B12-37	B13-6	E1	E2
B12-2	A9-2	B12-38	B11-39	E1-1	J2-49
B12-3	A9-3	B12-39	A9-38	E1-2	J3-49
B12-4	B13-4	B12-39	B0-36	E1-3	J4-49
B12-5	A8-5	B12-40	A9-39	E1-4	J5-49
B12-5	B0-5	B12-44	J6-13		
B12-6	A8-6			E2	Frame
B12-6	B0-33	B13-1	A9-1		GRD
B12-7	A9-7	B13-1	B0-34	E2	E1
B12-7	B11-7	B13-2	A11-3	E2-1	J6-7
B12-8	B11-9	B13-3	B5-3	E2-1	J6-14
B12-8	B13-8	B13-4	B12-4	E2-2	J6-21
B12-9	B0-14	B13-5	B4-5	E2-2	J6-28
B12-9	B13-9	B13-6	B12-37	E2-3	J7-7
B12-10	B13-10	B13-7	A1-8	E2-3	J7-8
B12-11	B11-10	B13-7	B0-6	E2-4	J7-14
B12-12	B11-13	B13-8	B12-8	E2-4	J7-15
B12-14	B13-25	B13-9	B12-9	E2-5	J7-21
B12-15	J6-12	B13-10	B12-10	E2-6	J7-22
B12-16	B4-17	B13-11	B4-9	E2-6	J7-28
B12-17	B7-5	B13-11	TB1-17	E2-7	J7-29
B12-17	B13-31	B13-12	B11-22	E2-7	J7-35
B12-18	B3-18	B13-13	B12-13	E2-8	J7-36
B12-20	B11-20	B13-14	B4-14	E2-8	J7-42
B12-21	B13-21	B13-18	B10-18	E2-9	J7-43
B12-23	A4-4	B13-20	B4-20	E2-9	J7-49
B12-24	A2-4	B13-21	B12-21	E2-10	J9-35
B12-26	A8-4	B13-23	B0-4		
B12-27	B0-23	B13-23	B9-22	E3	B-BUS-6
B12-27	B13-27	B13-24	A2-35	E3-1	J10-27
B12-28	A6-4	B13-25	B12-14	E3-2	J10-30
B12-29	A9-5	B13-26	B8-26	E3-3	J10-32
B12-30	A5-4	B13-27	B12-27	E3-4	J10-34
B12-31	A9-4	B13-28	B11-28		
B12-31	B0-32	B13-29	B4-27	J1-1	A2-21
B12-32	A7-4	B13-30	B11-30	J1-2	A2-22
B12-33	B10-33	B13-31	B12-17	J1-3	A2-12
B12-33	B13-32	B13-32	B12-33	J1-4	A2-11
B12-34	B11-29	B13-44	TB1-18	J1-5	A2-31
B12-35	A3-4			J1-6	A2-32
B12-36	B10-39			J1-7	A2-24

Table 8-1. Wire Run Lists (continued)

From	To	From	To	From	To
LOGIC AND CONTROL ASSEMBLY A2A2A4		LOGIC AND CONTROL ASSEMBLY A2A2A4		LOGIC AND CONTROL ASSEMBLY A2A2A4	
J1-8	A3-32	J1-53	A8-31	J2-32	A5-17
J1-9	A3-31	J1-54	A8-11	J2-33	A7-20
J1-10	A3-11	J1-55	A8-12	J2-34	A7-17
J1-11	A3-12	J1-56	A8-22	J2-36	A9-20
J1-12	A3-22	J1-57	A9-21	J2-37	A9-17
J1-13	A3-21	J1-58	A9-22	J2-38	A3-13
J1-14	A2-23	J1-59	A9-12	J2-39	A3-16
J1-15	A3-24	J1-60	A9-11	J2-40	A5-13
J1-16	A5-23	J1-61	A9-31	J2-41	A5-16
J1-17	A4-21	J1-62	A9-32	J2-43	A7-13
J1-18	A4-22	J1-63	A9-24	J2-44	A7-16
J1-19	A4-12	J1-64	A11-32	J2-45	A9-13
J1-20	A4-11	J1-65	A1-17	J2-46	A9-16
J1-21	A4-31	J1-66	A1-16	J2-49	E1-1
J1-22	A5-11	J1-67	A1-22		
J1-23	A5-12	J1-68	A1-21	J3-1	A2-13
J1-24	A5-22	J1-68	A1-28	J3-2	A2-14
J1-25	A5-21	J1-69	A1-27	J3-3	A4-13
J1-26	A4-23	J1-70	A9-23	J3-4	A414
J1-27	A4-24	J3-5	A6-13		
J1-28	A4-32	J2-1	A3-13	J3-6	A6-14
J1-29	A5-31	J2-2	A3-14	J3-8	A8-13
J1-30	A5-32	J2-3	A5-13	J3-9	A8-14
J1-31	A5-24	J2-4	A5-14	J3-10	A2-30
J1-32	A5-23	J2-5	A7-13	J3-11	A2-28
J1-33	A6-21	J2-6	A7-14	J3-12	A4-30
J1-34	A6-22	J2-8	A9-13	J3-13	A4-28
J1-35	A6-12	J2-9	A9-14	J3-15	A6-30
J1-36	A7-22	J2-10	A3-30	J3-16	A6-28
J1-37	A7-21	J2-11	A3-28	J3-17	A8-30
J1-38	A6-23	J2-12	A5-30	J3-18	A8-28
J1-39	A6-24	J2-13	A5-28	J3-19	A2-25
J1-40	A6-32	J2-15	A7-30	J3-20	A2-26
J1-41	A6-31	J2-16	A7-28	J3-22	A4-25
J1-42	A6-11	J2-17	A9-30	J3-23	A4-26
J1-43	A7-12	J2-18	A9-28	J3-24	A6-25
J1-44	A7-11	J2-19	A3-25	J3-25	A6-26
J1-45	A7-31	J2-20	A3-26	J3-26	A8-25
J1-46	A7-32	J2-22	A5-25	J3-27	A8-26
J1-47	A7-24	J2-23	A5-26	J3-29	A2-20
J1-48	A7-23	J2-24	A7-25	J3-30	A2-17
J1-49	A8-21	J2-25	A7-26	J3-31	A4-20
J1-50	A8-23	J2-26	A9-25	J3-32	A4-17
J1-51	A8-24	J2-27	A9-26	J3-33	A6-20
J1-52	A8-32	J2-29	A3-20	J3-34	A6-17
		J2-30	A3-17	J3-36	A8-20
		J2-31	A5-20		

Table 8-1. Wire Run Lists (continued)

From	To	From	To	From	To
LOGIC AND CONTROL ASSEMBLY A2A2A4		LOGIC AND CONTROL ASSEMBLY A2A2A4		LOGIC AND CONTROL ASSEMBLY A2A2A4	
J3-37	A8-17	J4-36	A8-24	J5-34	A7-27
J3-38	A2-13	J4-37	A8-27	J5-36	A9-24
J3-39	A2-16	J4-38	A2-20	J5-37	A9-27
J3-40	A4-13	J4-39	A2-18	J5-38	A3-21
J3-41	A4-16	J4-40	A4-20	J5-39	A3-18
J3-43	A6-13	J4-41	A4-18	J5-40	A5-21
J3-44	A6-16	J4-43	A6-20	J5-41	A5-18
J3-45	A8-13	J4-44	A6-18	J5-43	A7-21
J3-46	A8-16	J4-45	A8-20	J5-44	A7-18
J3-49	E1-2	J4-46	A8-18	J5-45	A9-21
		J4-49	E1-3	J5-46	A9-18
J4-1	A2-21			J5-49	E1-4
J4-2	A2-19	J5-1	A3-20		
J4-3	A4-21	J5-2	A3-19	J6-1	A1-18
J4-4	A4-19	J5-3	A5-20	J6-2	A1-20
J4-5	A6-21	J5-4	A5-19	J6-3	A1-17
J4-6	A6-19	J5-5	A7-20	J6-4	A1-19
J4-8	A8-21	J5-6	A7-19	J6-5	A1-14
J4-9	A8-19	J5-8	A9-20	J6-6	A1-10
J4-10	A2-12	J5-9	A9-19	J6-7	E2-1
J4-11	A2-15	J5-10	A3-12	J6-8	A1-13
J4-12	A4-12	J5-11	A3-15	J6-9	A1-9
J4-13	A4-15	J5-12	A5-12	J6-10	B8-17
J4-15	A6-12	J5-13	A5-15	J6-11	B8-18
J4-16	A6-15	J5-15	A7-12	J6-12	B12-15
J4-17	A8-12	J5-16	A7-15	J6-13	B12-44
J4-18	A8-15	J5-17	A9-12	J6-14	E2-1
J4-19	A2-31	J5-18	A9-15	J6-18	A1-27
J4-20	A2-29	J5-19	A3-30	J6-19	A1-25
J4-22	A4-31	J5-20	A3-29	J6-20	A1-26
J4-23	A4-29	J5-22	A5-30	J6-21	E2-2
J4-24	A6-31	J5-23	A5-29	J6-25	A1-23
J4-25	A6-29	J5-24	A7-30	J6-26	A1-24
J4-26	A8-31	J5-25	A7-29	J6-27	A1-22
J4-27	A8-29	J5-26	A9-30	J6-28	E2-2
J4-29	A2-24	J5-27	A9-29		
J4-30	A2-27	J5-29	A3-24	J7-1	A-BUS-2, PLUS
J4-31	A4-24	J5-30	A3-27		
J4-32	A4-27	J5-31	A5-24	J7-2	A-BUS-2, MINUS
J4-33	A6-24	J5-32	A5-27		
J4-34	A6-27	J5-33	A7-24	J7-5	A1-6

Table 8-1. Wire Run Lists (continued)

LOGIC AND CONTROL ASSEMBLY A2A2A4

From	To
J7-6	A1-9
J7-7	E2-3
J7-8	E2-3
J7-9	A1-7
J7-10	A1-9
J7-12	A1-12
J7-13	A1-10
J7-14	E2-4
J7-15	E2-4
J7-16	A1-3
J7-17	A1-10
J7-19	A-BUS-2/ PLUS
J7-20	A-BUS-5/ MINUS
J7-21	E2-5
J7-22	E2-6
J7-23	B4-7
J7-24	B4-43
J7-26	B4-35
J7-27	B4-43
J7-28	E2-G
J7-29	E2-7
J7-30	B4-26
J7-31	B4-44
J7-33	B4-28
J7-34	B4-44
J7-35	E2-7
J7-36	E2-8
J7-37	B4-34
J7-38	B5-43
J7-40	B4-2
J7-41	B5-44
J7-42	E2-8
J7-43	E2-9
J7-44	B4-3
J7-45	B5-44
J7-49	E2-9
J8-1	B6-33
J8-2	B6-39
J8-3	B6-30

LOGIC AND CONTROL ASSEMBLY A2A2A4

From	To
J8-4	B6-24
J8-5	B6-12
J8-6	B6-19
J8-7	B6-2
J8-8	B6-6
J8-9	B6-43
J8-10	B6-43
J8-11	B7-30
J8-12	B11-2
J8-13	B9-20
J8-14	B9-14
J8-15	B9-15
J8-16	B8-19
J8-17	B8-43
J9-1	B4-36
J9-2	B4-39
J9-3	B8-39
J9-4	B8-13
J9-5	B8-38
J9-6	B8-36
J9-7	B8-12
J9-8	B8-34
J9-9	B9-39
J9-10	B9-37
J9-11	B6-1
J9-12	B6-5
J9-13	B7-9
J9-14	B7-13
J9-15	B7-15
J9-16	B7-16
J9-17	B7-19
J9-18	B7-22
J9-19	A1-39
J9-20	A1-38
J9-21	A1-31
J9-22	A1-32
J9-23	A1-36
J9-24	A1-37
J9-25	A11-33
J9-26	A11-39
J9-27	A11-35

LOGIC AND CONTROL ASSEMBLY A2A2A4

From	To
J9-28	A11-38
J9-29	A12-7
J9-31	A11-34
J9-32	A11-37
J9-33	A12-43
J9-34	B7-43
J9-35	E2-10
J9-36	TB1-10
J9-37	TB1-11
J10-1	B2-27
J10-3	B2-23
J10-5	B2-21
J10-8	B2-29
J10-10	B2-25
J10-12	B1-27
J10-15	B1-23
J10-17	B1-21
J10-19	B3-25
J10-22	B1-25
J10-24	B1-29
J10-2G	B3-6
J10-27	E3-1
J10-29	B3-1
J10-30	E3-2
J10-31	B1-4
J10-32	E3-3
J10-33	B2-4
J10-34	E3-4
J10-36	B3-35
J10-38	B3-31
J10-40	B3-28
J10-43	B3-32
J10-63	A-BUS-4
J10-64	A-BUS-6
J10-65	A-BUS-6
J10-66	B-BUS-4
J10-67	B-BUS-6
J10-68	B-BUS-5
J10-69	B-BUS-5
J10-70	B-BUS-6

Table 8-1. Wire Run Lists (continued)

LOGIC AND CONTROL ASSEMBLY A2A2A4

From	To
TB1-4	A12-38
TB1-5	A11-4
TB1-6	A14-22
TB1-7	A14-23
TB1-8	A14-3
TB1-9	A14-2
TB1-10	A14-33
TB1-10	J9-36
TB1-11	A14-34
TB1-11	J9-37
TB1-12	A- BUS-3
TB1-13	A-BUS-4
TB1-14	B-BUS-3
TB1-15	B-BUS-4
TB1-16	A12-11
TB1-17	B13-11
TB1-18	B13-44
TB1-19	A11-8
TB1-20	A11-6
TB1-21	A14-28
TB1-22	A14-29
TB1-22	A11-10
A-BUS-2/ MINUS	J7-2
A-BUS-2/ PLUS	J7-1
A-BUS-2/ PLUS	J7-19
A-BUS-3	TB1-12
A-BUS-4	TB1-13
A-BUS-4	J10-63
A-BUS-5/ MINUS	J7-20
A-BUS-6	J10-64
A-BUS-6	J10-65
B-BUS-3	TB1-14
B-BUS-4	TB1-15
B-BUS-5	J10-68
B-BUS-5	J10-69
B-BUS-6	E3
B-BUS-6	J10-67
B-BUS-6	J10-70

From	To
CABLE BETWEEN A2A1 FILTERS AND FANS	
B3-1	FL1-A
B3-2	FL2-B
F11-A	B3-1
F12-B	B3-2
CABLE BETWEEN A2A1 FANS	
B2-1	B3-1
B2-2	B3-2
B3-1	B2-1
B3-2	B2-2
BRAKE LIMITER A2A1A4	
A2A1A4TB1-1	SHIELD
A2A1A4TB1-2	A2A1E4
A2A1A4TB1-6	A2A1E3
A2A1E3	A2A1A4TB1-6
A2A1E4	A2A1A4TB1-2
SHIELD	A2A1A4TB1-1
CLUTCH LIMITER A2A1A3	
A2A1A3TB1-1	A2A1E1
A2A1A3TB1-5	A2A1E2
A2A1A3TB1-6	SHIELD
A2A1E1	A2A1A3TB1-1
A2A1E2	A2A1A3TB1-5
SHIELD	A2A1A3TB1-6
CABLE ASSEMBLY W1	
J12-1	P1-2
J12-2	P1-1
J12-3	P1-4
J12-4	P1-3
J12-5	P1-6
J12-6	P1-5
J12-7	P1-9
J12-8	P1-B

CABLE ASSEMBLY W1

From	To
J14-1	P1-11
J14-2	P1-10
J14-3	P1-13
J14-4	P1-12
J14-5	P1-16
J14-6	P1-15
J14-7	P1-18
J14-8	P1-17
J16-1	P1-20
J16-2	P1-19
J16-3	P1-23
J16-4	P1-22
J16-5	P1-25
J16-6	P1-24
J16-7	P1-27
J16-8	P1-26
J18-1	P1-30
J18-2	P1-29
J18-3	P1-32
J18-4	P1-31
J18-5	P1-34
J18-6	P1-33
J18-7	P1-37
J18-8	P1-36
J20-1	P1-39
J20-2	P1-38
J20-3	P1-41
J20-4	P1-40
J20-5	P1-44
J20-6	P1-43
J20-7	P1-46
J20-8	P1-45
P1-1	J12-2
P1-2	J12-1
P1-3	J12-4
P1-4	J12-3
P1-5	J12-6
P1-6	J12-5
P1-8	J12-8
P1-9	J12-7
P1-10	J14-2
P1-11	J14-1
P1-12	J14-4

Table 8-1. Wire Run Lists (continued)

CABLE ASSEMBLY W1

From	To
P1-13	J14-3
P1-15	J14-6
P1-16	J14-5
P1-17	J14-8
P1-18	J14-7
P1-19	J16-2
P1-20	J16-1
P1-22	J16-4
P1-23	J16-3
P1-24	J16-6
P1-25	J16-5
P1-26	J16-8
P1-27	J16-7
P1-29	J18-2
P1-30	J18-1
P1-31	J18-4
P1-32	J18-3
P1-33	J18-6
P1-34	J18-5
P1-36	J18-8
P1-37	J18-7
P1-38	J20-2
P1-39	J20-1
P1-40	J20-4
P1-41	J20-3
P1-43	J20-6
P1-44	J20-5
P1-45	J20-8
P1-46	J20-7
P1-49	SHIELD
SHIELD	P1-49

CABLE ASSEMBLY W2

From	To
J11-1	P1-9
J11-2	P1-8
J11-3	P1-6
J11-4	P1-5
J11-5	P1-4
J11-6	P1-3
J11-7	P1-2

CABLE ASSEMBLY W2

From	To
J11-8	P1-1
J13-1	P1-18
J13-2	P1-17
J13-3	P1-16
J13-4	P1-15
J13-5	P1-13
J13-6	P1-12
J13-7	P1-11
J13-8	P1-10
J15-1	P1-27
J15-2	P1-26
J15-3	P1-25
J15-4	P1-24
J15-5	P1-23
J15-6	P1-22
J15-7	P1-20
J15-8	P1-19
J17-1	P1-37
J17-2	P1-36
J17-3	P1-34
J17-4	P1-33
J17-5	P1-32
J17-6	P1-31
J17-7	P1-30
J17-8	P1-29
J19-1	P1-46
J19-2	P1-45
J19-3	P1-44
J19-4	P1-43
J19-5	P1-41
J19-6	P1-40
J19-7	P1-39
J19-8	P1-38
P1-1	J11-8
P1-2	J11-7
P1-3	J11-6
P1-4	J11-5
P1-5	J11-4
P1-6	J11-3
P1-8	J11-2
P1-9	J11-1

CABLE ASSEMBLY W2

From	To
P1-10	J13-8
P1-11	J13-7
P1-12	J13-6
P1-13	J13-5
P1-15	J13-4
P1-16	J13-3
P1-17	J13-2
P1-18	J13-1
P1-19	J15-8
P1-20	J15-7
P1-22	J15-6
P1-23	J15-5
P1-24	J15-4
P1-25	J15-3
P1-26	J15-2
P1-27	J15-1
P1-29	J17-8
P1-30	J17-7
P1-31	J17-6
P1-32	J17-5
P1-33	J17-4
P1-34	J17-3
P1-36	J17-2
P1-37	J17-1
P1-38	J19-8
P1-39	J19-7
P1-40	J19-6
P1-41	J19-5
P1-43	J19-4
P1-44	J19-3
P1-45	J19-2
P1-46	J19-1
P1-49	SHIELD
SHIELD	P1-49

CABLE ASSEMBLY W3

From	To
J1-1	P1-9
J1-2	P1-8
J1-3	P1-6
J1-4	P1-5

Table 8-1. Wire Run Lists (continued)

From	To	From	To	From	To
CABLE ASSEMBLY W3		CABLE ASSEMBLY W3		CABLE ASSEMBLY W4	
J1-5	P1-4	P1-6	J1-3	J2-2	P1-1
J1-6	P1-3	P1-8	J1-2	J2-3	P1-4
J1-7	P1-2	P1-9	J1-1	J2-4	P1-3
J1-8	P1-1	P1-10	J3-8	J2-5	P1-6
J3-1	P1-18	P1-11	J3-7	J2-6	P1-5
J3-2	P1-17	P1-12	J3-6	J2-7	P1-9
J3-3	P1-16	P1-13	J3-5	J2-8	P1-8
J3-4	P1-15	P1-15	J3-4	J4-1	P1-11
J3-5	P1-13	P1-16	J3-3	J4-2	P1-10
J3-6	P1-12	P1-17	J3-2	J4-3	P1-13
J3-7	P1-11	P1-18	J3-1	J4-4	P1-12
J3-8	P1-10	P1-19	J5-8	J4-5	P1-16
J5-1	P1-27	P1-20	J5-7	J4-6	P1-15
J5-2	P1-26	P1-22	J5-6	J4-7	P1-18
J5-3	P1-25	P1-23	J5-5	J4-8	P1-17
J5-4	P1-24	P1-24	J5-4	J6-1	P1-20
J5-5	P1-23	P1-25	J5-3	J6-2	P1-19
J5-6	P1-22	P1-26	J5-2	J6-3	P1-23
J5-7	P1-20	P1-27	J5-1	J6-4	P1-22
J5-8	P1-19	P1-29	J7-8	J6-5	P1-25
J7-1	P1-37	P1-30	J7-7	J6-6	P1-24
J7-2	P1-36	P1-31	J7-6	J6-7	P1-27
J7-3	P1-34	P1-32	J7-5	J6-8	P1-26
J7-4	P1-33	P1-33	J7-4	J8-1	P1-30
J7-5	P1-32	P1-34	J7-3	J8-2	P1-29
J7-6	P1-31	P1-36	J7-2	J8-3	P1-32
J7-7	P1-30	P1-37	J7-1	J8-4	P1-31
J7-8	P1-29	P1-38	J9-8	J8-5	P1-34
J9-1	P1-46	P1-39	J9-7	J8-6	P1-33
J9-2	P1-45	P1-40	J9-6	J8-7	P1-37
J9-3	P1-44	P1-41	J9-5	J8-8	P1-36
J9-4	P1-43	P1-43	J9-4	J10-1	P1-39
J9-5	P1-41	P1-44	J9-3	J10-2	P1-38
J9-6	P1-40	P1-45	J9-2	J10-3	P1-41
J9-7	P1-39	P1-46	J9-1	J10-4	P1-40
J9-8	P1-38	P1-49	SHIELD	J10-5	P1-44
P1-1	J1-8	SHIELD	P1-49	J10-6	P1-43
P1-2	J1-7			J10-7	P1-46
P1-3	J1-6	CABLE ASSEMBLY W4		J10-8	P1-45
P1-4	J1-5			P1-1	J2-2
P1-5	J1-4	J2-1	P1-2	P1-2	J2-1

Table 8-1. Wire Run Lists (continued)

From	To	From	To	From	To
CABLE ASSEMBLY W4		CABLE ASSEMBLY W5		CABLE ASSEMBLY 5	
P1-3	J2-4			P1-15	SHIELD
P1-4	J2-3			P1-16	J21-B10
P1-5	J2-6	DS1-A	P1-1	P1-17	J21-A10
P1-6	J2-5	DS1-A	P1-19	P1-19	DS1-A
P1-8	J2-8	DS1-B	P1-2	P1-20	DS1-B
P1-9	J2-7	DS1-B	P1-20	P1-21	SHIELD
P1-10	J4-2			P1-22	SHIELD
P1-11	J4-1	J21-A4	P1-6	P1-23	J22-B6
P1-12	J4-4	J21-A6	P1-10	P1-24	J22-A6
P1-13	J4-3	J21-A8	P1-13	P1-26	J22-B7
P1-15	J4-6	J21-A10	P1-17	P1-27	J22-A7
P1-16	J4-5	J21-B4	P1-5	P1-28	SHIELD
P1-17	J4-8	J21-B6	P1-9	P1-29	SHIELD
P1-18	J4-7	J21-B8	P1-12	P1-30	J22-B4
P1-19	J6-2	J21-B10	P1-16	P1-31	J22-A4
P1-20	J6-1	J22-A2	P1-45	P1-33	J22-B8
P1-22	J6-4	J22-A3	P1-38	P1-34	J22-A8
P1-23	J6-3	J22-A4	P1-31	P1-35	SHIELD
P1-24	J6-6	J22-A6	P1-24	P1-36	SHIELD
P1-25	J6-5	J22-A7	P1-27	P1-37	J22-B3
P1-26	J6-8	J22-A8	P1-34	P1-38	J22-A3
P1-27	J6-7	J22-A9	P1-41	P1-40	J22-B9
P1-29	J8-2	J22-B2	P1-44	P1-41	J22-A9
P1-30	J8-1	J22-B3	P1-37	P1-42	SHIELD
P1-31	J8-4	J22-B4	P1-30	P1-43	SHIELD
P1-32	J8-3	J22-B6	P1-23	P1-44	J22-B2
P1-33	J8-6	J22-B7	P1-26	P1-45	J22-A2
P1-34	J8-5	J22-B8	P1-33	P1-49	SHIELD
P1-36	J8-8	J22-B9	P1-40	SHIELD	P1-7
P1-37	J8-7	P1-1	DS1-A	SHIELD	P1-8
P1-38	J10-2	P1-2	DS1-B	SHIELD	P1-14
P1-39	J10-1	P1-5	J21-B4	SHIELD	P1-15
P1-40	J10-4	P1-6	J21-A4	SHIELD	P1-21
P1-41	J10-3	P1-7	SHIELD	SHIELD	P1-22
P1-43	J10-6	P1-8	SHIELD	SHIELD	P1-28
P1-44	J10-5	P1-9	J21-B6	SHIELD	P1-29
P1-45	J10-8	P1-10	J21-A6	SHIELD	P1-35
P1-46	J10-7	P1-12	J21-B8	SHIELD	P1-36
P1-49	SHIELD	P1-13	J21-A8	SHIELD	P1-42
SHIELD	P1-49	P1-14	SHIELD	SHIELD	P1-43
				SHIELD	P1-49

Table 8-1. Wire Run Lists (continued)

CABLE ASSEMBLY W6

From	To
A1A3TB1-3	P1-20
A1A3TB1-4	P1-19
A1A3TB1-5	P1-18
A2A1A4TB1-2	P1-27
A2A1A4TB1-3	P1-26
A2A1A4TB1-4	P1-25
P1-1	P2-5
P1-2	P2-9
P1-3	P2-4
P1-4	P2-8
P1-5	P2-2
P1-6	P2-7
P1-7	SHLD
P1-8	P2-1
P1-9	P2-6
P1-10	P3-7
P1-11	P3-3
P1-12	S1-N.O.
P1-13	S1-C
P1-14	SHLD OF P1-13
P1-18	A1A3TB1-5
P1-19	A1A3TB1-4
P1-20	A1A3TB1-3
P1-21	SHLD TB1-6
P1-25	A2A1A4TB1-4
P1-26	A2A1A4TB1-3
P1-27	A2A1A4TB1-2
P1-28	SHLD A5TB1-1
P2-1	P1-8
P2-2	P1-5
P2-4	P1-3
P2-5	P1-1
P2-6	P1-9
P2-7	P1-6
P2-8	P1-4
P2-9	P1-2
P3-3	P1-11
P3-7	P1-10

CABLE ASSEMBLY W6

From	To
SHLD	P1-7
SHLD A5TB1-1	P1-28
SHLD OF P1-13	P1-14
SHLD TB1-6	P1-21
S1-C	P1-13
S1-N.O.	P1-12

CABLE ASSEMBLY W7

*SHIELDS NO ELECTRICAL CONNECTION ON P1

From	To
P1	TB2-18
P1	TB2-20
P1	TB2-22
P1	TB1-2
P1	TB1-4
P1	TB1-6
P1	TB1-8
P1	TB-10
P1	TB1-12
P1	TB1-14
P1	TB1-16
P1	TB1-18
P1	TB1-20
P1	TB1-22
P1-1	TB1-1
P1-3	TB1-3
P1-5	TB1-5
P1-8	TB1-7
P1-10	TB1-9
P1-12	TB1-11
P1-15	TB1-13
P1-17	TB1-15
P1-19	TB1-17
P1-22	TB1-19
P1-24	TB1-21
P1-26	TB2-3
P1-27	TB2-4
P1-29	TB2-5
P1-30	TB2-6
P1-31	TB2-9
P1-32	TB2-10

CABLE ASSEMBLY W7

From	To
P1-33	TB2-11
P1-34	TB2-12
P1-36	TB2-15
P1-38	TB2-17
P1-40	TB2-19
P1-43	TB2-21
P1-62	TB3-2
P1-63	TB3-1
P1-64	TB3-1
P1-65	TB3-1
P1-66	TB3-1
P1-67	TB3-1
P1-68	TB3-1
P1-69	TB3-1
P1-70	TB3-1
TB1-1	P1-1
TB1-2	P1*
TB1-3	P1-3*
TB1-4	P1*
TB1-5	P1-5
TB1-6	P1
TB1-7	P1-8
TB1-8	P1
TB1-9	P1-10
TB1-10	P1
TB1-11	P1-12
TB1-12	P1
TB1-13	P1-15
TB1-14	P1
TB1-15	P1-17
TB1-16	P1
TB1-17	P1-19
TB1-18	P1
TB1-19	P1-22
TB1-20	P1
TB1-21	P1-24
TB1-22	P1
TB2-3	P1-26
TB2-4	P1-27
TB2-5	P1-29

Table 8-1. Wire Run Lists (continued)

From	To
CABLE ASSEMBLY W7	
TB2-6	P1-30
TB2-9	P1-31
TB2-10	P1-32
TB2-11	P1-33
TB2-12	P1-34
TB2-15	P1-36
TB2-17	P1-38
TB2-18	P1
TB2-19	P1-40
TB2-20	P1
TB2-21	P1-43
TB2-22	P1
TB3-1	PI-63
TB3-1	P1-64
TB3-1	P1-65
TB3-1	P1-66
TB3-1	P1-67
TB3-1	P1-68
TB3-1	P1-69
TB3-1	P1-70
TB3-2	P1-62
CABLE ASSEMBLY W8	
A2A2A4TB1-1	SHIELD
A2A2A4TB1-2	P1-M
A2A2A4TB1-3	P1-N
A2A2A4TB1-4	P1-H
A2A2A4TB1-5	P1-I
A2A2A4TB1-6	P1-A
A2A2A4TB1-7	P1-B
A2A2A4TB1-8	P1-E
A2A2A4TB1-9	P1-D
A2A2A4TB1-10	P1-C
A2A2A4TB1-11	P1-G
A2A2A4TB1-12	P1-J
A2A2A4TB1-13	P1-K
A2A2A4TB1-14	P1-P
A2A2A4TB1-15	P1-R
A2A2A4TB1-16	P1-S

From	To
CABLE ASSEMBLY W8	
A2A2A4TB1-19	P1-Y
A2A2A4TB1-20	P1-T
A2A2A4TB1-21	P1-U
A2A2A4TB1-22	P1-V
P1-A	A2A2A4TB1-6
P1-B	A2A2A4TB1-7
P1-C	A2A2A4TB1-10
P1-D	A2A2A4TB1-9
P1-E	A2A2A4TB1-8
P1-G	A2A2A4TB1-11
P1-H	A2A2A4TB1-4
P1-I	A2A2A4TB1-5
P1-J	A2A2A4TB1-12
P1-K	A2A2A4TB1-13
P1-M	A2A2A4TB1-2
P1-N	A2A2A4TB1-3
P1-P	A2A2A4TB1-14
P1-R	A2A2A4TB1-15
P1-S	A2A2A4TB1-16
P1-T	A2A2A4TB1-20
P1-U	A2A2A4TB1-21
P1-V	A2A2A4TB1-22
P1-Y	A2A2A4TB1-19
SHIELD	A2A2A4TB1-1
CABLE ASSEMBLY W9	
A2A4A1TB1-3	P1-F
A2A4A1TB1-4	P1-E
A2A4A1TB1-5	P1-B
A2A4A1TB1-6	P1-A
P1-A	A2A4A1TB1-6
P1-B	A2A4A1TB1-5
P1-E	A2A4A1TB1-4

From	To
CABLE ASSEMBLY W9	
P1-F	A2A4A1TB1-3
CABLE ASSEMBLY W10	
A1A2TB2-1	P1-E
A1A2TB2-2	P1-D
A1A2TB2-6	P1-B
A1A2TB2-7	PI-A
P1-A	A1A2TB2-7
P1-B	A1A2TB2-6
P1-D	A1A2TB2-2
P1-E	A1A2TB2-1
CABLE ASSEMBLY W11	
A2A1B1-L	A2A1TB1-1
A2A1B1-L	A2A1TB1-2
A2A1TB1-1	A2A1B1-L
A2A1TB1-2	A2A1B1-L
CABLE ASSEMBLY W12	
A2A1TB1-1	A2A4A1K1-T1
A2A1TB1-2	A2A4A1K1-T3
A2A4A1K1-T1	A2A1TB1-1
A2A4A1K1-T3	A2A1TB1-2
CABLE BETWEEN A2A2A4 AND A2A5	
A2A5A1DS1-A	P1-7
A2A5A1DS1-C	P1-8
A2A5A1DS2-A	P1-1
A2A5A1DS2-A	P1-2
A2A5A1DS3-A	P1-5
A2A5A1DS3-B	P1-3
A2A5A1DS3-C	P1-6
A2A5A1DS3-D	P1-4
A2A5A1DS4-A	P1-9
A2A5A1DS4-B	P1-10
A2A5A1DS5-A	P1-21

Table 8-1. Wire Run Lists (continued)

From	To	From	To
CABLE BETWEEN A2A2A4 AND A2A5		CABLE BETWEEN A2A2A4 AND A2A5	
A2A5A1DS5-B	P1-22	A2A5A1DS5-C	A5A1DS4-C
A2A5A1DS6-A	P1-23	A2A5A1DS5-C	A5A1DS6-C
A2A5A1DS6-B	P1-24	A2A5A1DS6-A	A5A1E32
A2A5A1DS7-A	P1-11	A2A5A1DS6-B	A5A1E30
A2A5A1DS7-B	P1-12	A2A5A1DS6-C	A5A1DS5-C
A2A5A1DSS-A	P1-19	A2A5A1DS6-C	A5A1DS7-C
A2A5A1DS8-B	P1-20	A2A5A1DS7-A	A5A1E36
A2A5A1DS9-A	P1-31	A2A5A1DS7-B	A5A1E34
A2ASA1DS10-A	P1-25	A2A5A1DS7-C	A5A1DS6-C
A2A5A1DS10-B	P1-26	A2A5A1DS7-C	A5A1DS8-C
A2A5A1DS10-C	P1-27	A2A5A1DS8-A	A5A1E40
A2A5A1DS10-D	P1-28	A2A5A1DS8-B	A5A1E38
A2A5A1S1-1-N.O.	P1-14	A2A5A1DS8-C	A5A1DS7-C
A2A5A1S2-1-N.O.	P1-16	A2A5A1DS8-C	A5A1DS9-C
A2A5A1S3-1-N.O.	P1-13	A2A5A1DS9-B	P1-32
A2A1A1S4-1-N.O.	P1-17	A2A5A1DS9-C	A5A1DS8-C
A2A5A1S5-1-N.C.	P1-29	A2A5A1DS9-C	A5A1DS10-G
A2A5A1S5-2-N.C.	P1-30	A2A5A1DS10-G	A5A1DS9-C
A2A5A1S7-1-N.O.	P1-15	A2A5A1DS10-G	P1-36
A2A5A1S8-1-N.O.	P1-18	A2A5A1E2	A5A1S6-1-N.O.
A2A5A1DS1-A	A2A5A1E8	A2A5A1E4	A5A1DS1-G
A2A5A1DS1-C	A2A5A1E6	A2A5A1E6	A5A1DS1-C
A2A5A1DS1-G	A2A5A1E4	A2A5A1E8	A5A1DS1-A
A2A5A1DS1-G	A2A5A1DS2-G	A2A5A1E10	A5A1DS2-C
A2A5A1DS2-A	A2A5A1E12	A2A5A1E12	A5A1DS2-A
A2A5A1DS2-C	A2ASA1E10	A2A5A1E14	A5A1DS3-D
A2A5A1DS2-G	A2A5A1DS1-G	A2A5A1E16	A5A1DS3-C
A2A5A1DS2-G	A2A5A1DS3-G	A2A5A1E18	A5A1DS3-B
A2A5A1DS3-A	A2A5A1E20	A2A5A1E20	A5A1DS3-A
A2A5A1DS3-B	A2A5A1E18	A2A5A1E22	A5A1DS4-B
A2A5A1DS3-C	A2A5A1E16	A2A5A1E24	A5A1DS4-A
A2A5A1DS3-D	A2A5A1E14	A2A5A1E26	A5A1DS5-B
A2A5A1DS3-G	A2A5A1DS2-G	A2A5A1E28	A5A1DS5-A
A2A5A1DS3-G	A2A5A1DS4-C	A2A5A1E30	A5A1DS6-B
A2A5A1DS4-A	A2A5A1E24	A2A5A1E32	A5A1DS6-A
A2A5A1DS1-B	A2A5A1E22	A2A5A1E34	A5A1DS7-B
A2A5A1DS4-C	A2A5A1D33-G	A2A5A1E36	A5A1DS7-A
A2A5A1DS4-C	A2A5A1D35-C	A2A5A1E38	A5A1DS8-B
A2A5A1DS5-A	A2A5A1E28	A2A5A1E40	A5A1DS8-A
A2A5A1DS5-B	A2A5A1E26	A2A5A1E41	A5A1S6-1-C

Table 8-1. Wire Run Lists (continued)

CABLE BETWEEN A2A2A4 AND A2A5

From	To
A2A5A1S1-1-C	A2A5A1S8-1-C
A2A5A1S1-1-C	A2A5A1S2-1-C
A2A5A1S2-1-C	A2A5A1S1-1-C
A2A5A1S2-1-C	A2A5A1S3-1-C
A2A5A1S3-1-C	A2A5A1S2-1-C
A2A5A1S3-1-C	A2A5A1S4-1-C
A2A5A1S4-1-C	A2A5A1S3-1-C
A2A5A1S4-1-C	P1-34
A2A5A1S5-2-C	P1-33
A2A5A1S6-1-C	A2A5A1E41
A2A5A1S6-1-N.O.	P1-37
A2A5A1S6-1-N.O.	A2A5A1E2
A2A5A1S7-1-C	A2A5A1S8-1-C
A2A5A1S8-1-C	A2A5A1S7-1-C
A2A5A1S8-1-C	A2A5A1S1-1-C
P1-1	A2A5A1DS2-A
P1-2	A2A5A1DS2-A
P1-3	A2A5A1DS3-B
P1-4	A2A5A1DS3-D
P1-5	A2A5A1DS3-A
P1-6	A2A5A1DS3-C
P1-7	A2A5A1DS1-A
P1-8	A2A5A1DS1-C
P1-9	A2A5A1DS4-A
P1-10	A2A5A1DS4-B
P1-11	A2A5A1DS7-A
P1-12	A2A5A1DS7-B
P1-13	A2A5A1S3-1-N. O.
P1-14	A2A5A1S1-1-N. O.
P1-15	A2A5A1S7-1-N. O.
P1-16	A2A5A1S2-1-N. O
P1-17	A2A5A1S4-1-N. O
P1-18	A2A5A1S8-1-N. O
P1-19	A2A5A1DS8-A
P1-20	A2A5A1DS8-B
P1-21	A2A5A1DS5-A
P1-22	A2A5A1DS5-B
P1-23	A2A5A1DS6-A
P1-24	A2A5A1DS6-B
P1-25	A2A5A1DS10-A
P1-26	A2A5A1DS10-B

CABLE BETWEEN A2A2A4 AND A2A5

From	To
P1-27	A2A5A1DS10-C
P1-28	A2A5A1DS10-D
P1-29	A2A5A1S5-1-N. C.
P1-30	A2A5A1S5-2-N. C.
P1-31	A2A5A1DS9-A
P1-32	A2A5A1DS9-B
P1-33	A2A5A1S5-2-C
P1-36	A2A5A1S4-1-C
P1-35	SHIELD
P1-36	A2A5A1DS10-G
P1-37	A2A5A1S6-1-N. 0.
SHIELD	P1-35

CAPACITOR ASSEMBLY A2A2A1

From	To
A1A1E1-7	A2A2A1E1
A1A1E10	A2A2A1E16
A1A1E16	A2A2A1E11
A1A1E2-7	A2A2A1E1
A1A1E3-7	A2A2A1E2
A1A1E4-7	A2A2A1E2
A1A1E5-7	A2A2A1E11
A1A1E6-7	A2A2A1E11
A2A2A1E1	A1A1E1-7
A2A2A1E1	A1A1E2-7
A2A2A1E2	A1A1E3-7
A2A2A1E2	A1A1E4-7
A2A2A1E5	XF6-B
A2A2A1E6	XF18-B
A2A2A1E6	XF24-B
A2A2A1E7	XF12-B
A2A2A1E11	A1A1E5-7
A2A2A1E11	A1A1E6-7
A2A2A1E11	A1A1E16
A2A2A1E14	XF36-B
A2A2A1E15	XF30-B
A2A2A1E16	A1A1E10
XF6-B	A2A2A1E5
XF12-B	A2A2A1E7
XF18-B	A2A2A1E6
XF24-B	A2A2A1E6

CAPACITOR ASSEMBLY A2A2A1

From	To
XF30-B	A2A2A1E15
XF36-B	A2A2A1E14

FUSE AND RESISTOR ASSEMBLY A2A2A1A1

From	To
E1-1	P1-2
E1-2	P1-4
E1-3	P1-6
E1-4	P1-14
E1-5	P1-12
E1-6	P1-10
E2-1	P1-8
E2-2	P1-16
E2-3	P1-18
E2-4	P1-20
E2-5	P1-28
E2-6	P1-26
E3-1	P1-24
E3-2	P1-22
E3-3	P1-30
E3-4	P1-32
E3-5	P1-34
E3-6	P1-42
E4-1	P1-40
E4-2	P1-38
E4-3	P1-36
E4-4	P1-44
E4-5	P1-46
E4-6	P1-48
E5-1	P1-56
E5-2	P1-54
E5-3	P1-52
E5-4	P1-50
E5-5	P1-58
E5-6	P1-60
E6-1	P1-62
E6-2	P1-70
E6-4	P1-68
E6-5	P1-66
E6-6	P1-68
P1-1	R1-A

Table 8-1. Wire Run Lists (continued)

FUSE AND RESISTOR ASSEMBLY A2A2A1

From	To
P1-2	E1-1
P1-3	R2-A
P1-4	E1-2
P1-5	R3-A
P1-6	E1-3
P1-7	R4-A
P1-8	E2-1
P1-9	R7-A
P1-10	E1-6
P1-11	R6-A
P1-12	E1-5
P1-13	RS-A
P1-14	Ei-4
P1-15	R8-A
P1-16	E2-2
P1-17	R9-A
P1-18	E2-3
P1-19	R10-A
P1-20	E2-4
P1-21	R11-A
P1-22	E3-2
P1-23	R14-A
P1-24	E3-1
P1-25	R13-A
P1-26	E2-6
P1-27	R12-A
P1-28	E2-5
P1-29	R15-A
P1-30	E3-3
P1-31	R16-A
P1-32	E3-4
P1-33	R17-A
P1-34	E3-5
P1-35	R18-A
P1-36	E4-3
P1-37	R21-A
P1-38	E4-2
P1-39	R20-A
P1-40	E4-1
P1-41	R19- A
P1-42	E3-6

FUSE AND RESISTOR ASSEMBLY A2A2A1

From	To
P1-43	R22-A
P1-44	E4-4
P1-45	R23-A
P1-46	E4-5
P1-47	R24-A
P1-48	E4-6
P1-49	R25-A
P1-50	E5-4
P1-51	R28-A
P1-52	E5-3
P1-53	R27-A
P1-54	E5-2
P1-55	R26-A
P1-56	E5-1
P1-57	R29-A
P1-58	E5-5
P1-59	R30-A
P1-60	E5-6
P1-61	R31-A
P1-62	E6-1
P1-63	R32-A
P1-64	XF19-C
P1-65	R37-A
P1-66	E6-5
P1-67	R36-A
P1-68	E6-4
P1-68	E6-6
P1-69	R34-A
P1-70	E6-2
R1-A	P1-1
R1-B	XF1-A
R2-A	P1-3
R2-B	XF2-A
R3-A	P1-5
R3-B	XF3-A
R4-A	P1-7
R4-B	XF4-A
R5-A	P 1-13
R5-B	XFS-A
R6-A	P1-11
R6-B	XF6-A

FUSE AND RESISTOR ASSEMBLY A2A2A1

From	To
R7-A	P1-9
R7-B	XF7-A
R8-A	P1-15
R8-B	XF8-A
R9-A	R1-17
R9-B	XF9-A
R10-A	P1-19
R10-B	XF10-A
R11-A	P1-21
R11-B	XF11-A
R12-A	P1-27
R12-B	XF12-A
R13-A	P1-25
R13-B	XF13-A
R14-A	P1-23
R14-B	XF14-A
R15-A	P1-29
R15-B	XF15-A
R16-A	P1-31
R16-B	XF16-A
R17-A	P1-33
R17- B	XF17-A
R18-A	P1-35
R18-B	XF18-A
R19-A	P1-41
R19-B	XF19-A
R20-A	P1-39
R20-B	XF20-A
R21-A	P1-37
R21-B	XF21-A
R22-A	P1-43
R22-B	XF22-A
R23-A	P1-45
R23-B	XF23-A
R24-A	P1-47
R24-B	XF24-A
R25-A	P1-49
R25-B	XF25-A
R26-A	P1-55
R26-B	XF26-A
R27-A	P1-53

Table 8-1. Wire Run Lists (continued)

From	To
FUSE AND RESISTOR ASSEMBLY A2A2A1	
R27-B	XF27-A
R28-A	P1-51
R28-B	XF28-A
R29-A	P1-57
R29-B	XF29-A
R30-A	P1-59
R30-B	XF30-A
R31-A	P1-61
R31-B	XF31-A
R32-A	P1-63
R32-B	XF32-A
R34-A	P1-69
R34-B	XF34-A
R36-A	P1-67
R36-B	XF36-A
R37-A	P1-65
R37-B	XF35-A
XF1-A	R1-B
XF2-A	R2-B
XF3-A	R3-B
XF4-A	R4-B
XF5-A	R5-B
XF6-A	R6-B
XF6-C	XF7-C
XF7-A	R7-B
XF7-C	XF6-C
XF8-A	R8-B
XF9-A	R9-B
XF10-A	R10-B
XF11-A	R11-B
XF12-A	R12-B
XF12-C	XF13-C
XF13-A	R13-B
XF13-C	XF12-C
XF14-A	R14-B
XF15-A	R15-B

From	To
FUSE AND RESISTOR ASSEMBLY A2A2A1	
XF16-A	R16-B
XF17-A	R17-B
XF18-A	R18-B
XF18-C	XF36-C
XF19-A	R19-B
XF19-C	R1-64
XF20-A	R20-B
XF21-A	R21-B
XF22-A	R22-B
XF23-A	R23-B
KF24-A	R24-B
XF24-C	XF25-C
XF25-A	R25-B
XF25-C	XF24-C
XF26-A	R26-B
XF27-A	R27-B
XF28-A	R28-B
XF29-A	R29-B
XF30-A	R30-B
XF30-C	XF31-C
XF31-A	R31-B
XF31-C	XF30-C
XF32-A	R32-B
XF34-A	R34-B
XF35-A	R37-B
XF36-A	R36-B
XF36-C	XF18-C
CABLE BETWEEN A2A2A3 AND A2A2A4	
A2A2A35(1-11) COM	P1-9
A2A2A35(1-11) COM	P1-10
A2A2A351-LEFT	P1-1

From	To
CABLE BETWEEN A2A2A3 AND A2A2A4	
A2A2A352-LEFT	P1-2
A2A2A353-LEFT	P1-3
A2A2A354-LEFT	P1-4
A2A2A355-LEFT	P1-5
A2A2A356-LEFT	P1-6
A2A2A357-LEFT	P1-7
A2A2A358-LEFT	P1-8
A2A2A359-NO	P1-11
A2A2A3510-RIGHT	P1-12
A2A2A3511-1	P1-13
A2A2A3511-2	P1-14
A2A2A3511-3	P1-15
P-1I	A2A2A351-LEFT
P1-2	A2A2A352-LEFT
P1-3	A2A2A353-LEFT
P1-4	A2A2A354-LEFT
P1-5	A2A2A355-LEFT
P1-6	A2A2A356-LEFT
P1-7	A2A2A357-LEFT
P1-8	A2A2A358-LEFT

Table 8-1. Wire Run Lists (continued)

CABLE BETWEEN A2A2A3 AND A2A2A4

From	To
P1-9	A2A2A35(1-11) COM
P1-10	A2A2A35(1-11) COM
P1-11	A2A2A359-NO
P1-12	A2A2A3510-RIGHT
P1-13	A2A2A3511-1
P1-14	A2A2A3511-2
P1-15	A2A2A3511-3
P1-16	P2-1
P1-17	P2-3
P2-1	P1-16
P2-3	P1-17

CABLE ASSEMBLY W13

From	To
A2A2A1E2	A2A2A4TB1-2
A2A2A1E7	A2A2A4TB1-3
A2A2A1E7	SHIELD
A2A2A4TB1-1	SHIELD
A2A2A4TB1-2	A2A2A1E2
A2A2A4TB1-3	A2A2A1E7
SHIELD	A2A2A1E7
SHIELD	A2A2A4TB1-1

APPENDIX A

REFERENCES

The following publications apply to operation and maintenance of the equipment covered in this manual:

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 7, 8, and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 810-7	U. S. Army Equipment Index of Modification Work Orders.
MIO 11-7440-223-30-1/ NAVELEX 067-324-0230/ TCTO 31W4-20-509	Installation of Light Emitting Diodes in Page Printer RP-157/G.
NW 00-15PA-1	Technical Inspection Manual, Soldering for Electric and Electronic Application (Navy)
SB 88-100	Preservation, Packaging, Packing and Marking Materials, Supplies, and Equipment Used by the Army.
TB SIG 222	Solder and Soldering.
TB 43-0118	Field Instructions for Painting and Preserving Electronics Command Equipment.
TO 00-25-234	General Shop Practice Requirements for the Repair, Maintenance, and Test of Electronic Equipment.
TM 38-750	The Army Maintenance Management System (TAMMS).
TM 11-7440-28-15, TO 81W1-101, NAVSHIPS 0967-324-0100	Operator, Organizational, Direct Support, General Support, and Depot Maintenance Manual: Digital Subscriber Terminal AN/FYA-71(V)1 through AN/FYA-71(V)6 and Device Switch Module SA-1616/G.
TM 11-7440-239-15, TO 81W44 1-111 , NAVSHIPS 0967-324-110	Operators, Organizational, DS, GS, and Depot Maintenance Manual: AUTODIN Digital Subscriber Terminals.
TM 750-244-2	Procedures for Destruction of Electronics Materiel to Prevent Enemy Use (Electronics Command).
TB SIG 355-1	Depot Inspection Standard for Repaired Signal equipment.
TB SIG 355;2	Depot Inspection Standard for Refinishing Repaired Signal Equipment.
TB SIG 355-3	Depot Inspection Standard for Moisture and Fungus Resistant Treatment.
TM 740-90-1	Administrative Storage of Equipment

APPENDIX B
BASIC ISSUE ITEMS

Section I. INTRODUCTION

B-1. General
This appendix lists items for Page Printer RP157/G, the component items comprising it, and the items which accompany it, or are required for installation, operation, or operator's maintenance.

B-2. Explanation of Columns
An explanation of the columns in section II is given below.

a. Source, Maintenance, and Recoverability Codes (Col. 1).

(1) *Source code, column 1a*. The selection status and source for the listed item is noted here. The source code used is

Code Explanation
P .... Applies to repair parts which are stocked in or supplied from the GSA/DSA, or Army Supply System, and authorized for use at indicated maintenance categories.
G .... Applies to major assemblies that are procured with PEMA funds for initial issue only to be used as exchange assemblies at DSU and GSU category. These assemblies will not be stocked above DSU and GSU category or returned to depot supply category.

(2) Maintenance code, column lb. The lowest category of maintenance authorized to install the listed item is noted here. The maintenance code used is as follows:

Code Explanation
H .... General Support Maintenance Category
.... (Using organization authorized to perform H category maintenance on this equipment).

(3) *Recoverability code, column, 1c*. The information in this column indicates whether unserviceable items should be returned for recovery or salvage. Recoverability codes and their explanations are as follows:

Note. When no code is indicated in the recoverability column, the part will be considered expendable.

Code Explanation
R .... Applies to repair parts and assemblies that are economically repairable at DSU and GSU activities and normally are furnished by supply on an exchange basis.

b. Federal Stock Number, Column 2. The Federal stock number for the item is indicated in this column.

c. Description, Column 3. The Federal item name, a five-digit manufacturer's code, and a part number are included in this column.

d. Unit of Issue, Column 4. The unit used as a basis of issue (e.g., ea, pr, ft, yd, etc.) is noted in this column.

e. Quantity Incorporated in Unit Pack, Column 5. Not used.

f. Quantity Incorporated in Unit, Column 6. The total quantity of the item used in the equipment is given in this column.

g. Quantity Authorized, Column 7. The total quantity of an item required to be on hand and necessary for the operation and maintenance of the equipment is given in this column.

h. Illustrations, Column 8.

(1) *Figure number, column 8a.* The number of the illustration in which the item is shown is indicated in this column.

(2) *Item or symbol number, column 8b*. Not used.

B-3. Federal Supply Codes
This paragraph lists the Federal supply code with the associated manufacturer's name.

Code Manufacturer
09211 .... Anelex Corporation
58189 .... General-Dynamics-Electronics
71400 .... Bussman Div, McGraw Edison Co.
71744 .... Chicago Miniature Lamp Works

SECTION II: BASIC ISSUE ITEMS LIST

(1) Source, maint. & recov. code (A) S	(B) M	(C) R	(2) Federal stock No.	(3) Description	(4) Unit of issue	(5) Qty. inc in unit pack	(6) Qty. inc in unit	(7) Qty. auth	(8) Illustrat. (A) Fig. No.	(9) (B) Item No.
				PART 1 - OPERABLE EQUIPMENT						
A	H	R	74409976210	PAGE PRINTER; RP-157/G; 58189, Mfr. Part No. A61736-001; Electrical Data: AC power, 120 volts, 50 and 50 hz. signals; 8 data lines plus 11 control lines. Overall Dimensions: 35 in. W, 30 in. D, 43 in. H, plus a 20 in. II Paper Stacker. Principles of Operation: Electro-mechanical "on the fly" impact printer. Performance Characteristics: Page Printer is capable of printing up to 80 characters per line, 10 characters per inch, 6 lines per inch, single, double or triple spacing. printing stock 9 1/2 inch wide; Sprocket feed, single to 5 part paper, plus ditto or multilith masters. Application Data: End item; page printer, General Dynamics, Electronics Division, Part No. A61736001. Component Parts: Anelex Corp., Part No. 56500G1, Print Head Assembly, Quantity 1; Anelex Corp., Part No. 56611G1, Cabinet Assembly Quantity 1; Anelex Corp., Part No. 56615G1, Frame Assembly, Quantity 1; Anelex Corp., Part No. 56614G1 Paper Stacker, Quantity 1. The Manufacturer's Data: General Dynamics , Electronics Division, Rochester, New York, Code No. 58189 Part No. A61736-001.	EA		1		1-1	
				Technical Manual TM 11-7440-223-15	EA		2	2		
				PART 2 - RUNNING SPARES A53933-001 consisting of:						
				RIBBON AND ROLL ASSEMBLY; 09211; Mfr. Part No. 52531G1	EA		1			
P	H			LAMP, INCANDESCANT; 71744; Mfr. Part No. 382	EA		5		4-9	
P	H		59207613898	FUSE, CARTRIDGE; 71400; Mfr. Part No. MIN2	EA		10		4-32	24
P	H		59208778390	FUSE, CARTRIDGE; 71400; Mfr. Part No. MIN3	EA		5		4-32	25

SECTION II: BASIC ISSUE ITEMS LIST

(1) Source, maint. & recov. code (A) S	(B) M	(C) R	(2) Federal stock No.	(3) Description	(4) Unit of issue	(5) Qty. inc in unit pack	(6) Qty. inc in unit	(7) Qty. auth	(8) Illustrat. (A) Fig. No.	(9) (B) Item No.
P	H		59202433800	FUSE, CARTRIDGE; 71400; Mfr. Part No. MIN5	EA		3		4-32	26
P	H		59202850806	FUSE, CARTRIDGE; 71400; Mfr. Part No. MIN15	EA		3		4-32	23
P	H		59209019936	FUSE, CARTRIDGE; 71400; Mfr. Part No. GMT1	EA		17		4-28	11
P	H		59208578933	FUSE, CARTRIDGE; 71400; Mfr. Part No. GMT2	EA		5		4-28	12
				PAPER; (400-1 Part) 09211; 56093-1	EA		2			
				Part 3 - Auxiliary Items A61736-001 consisting of:						
				Ribbon and roll Assy 09211; mfr. Part No. 52531G1	EA		1			
				Strobe Disc Assy &i inch 09211; mfr. Part No. 56521G1	EA		1			
				Strobe Disc Assy 14 inch 09211; mfr. Part No. 56521G3	EA		1			
				Pulley 50 cycle 09211; mfr. Part No. 56556-1	EA		1			
				Spring 50 cycle 09211; mfr. Part No. 11200-1	EA		2			

APPENDIX C
MAINTENANCE ALLOCATION

Section I. INTRODUCTION

C-1. General

This appendix provides a summary of maintenance operations for Page Printer RP-157/G. 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.

C-2. Maintenance Function

Maintenance functions will be limited to and defined as follows:

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

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

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

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

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

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

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

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

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

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

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of 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 equipments/components.

C-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 purpose of having the group numbers in the MAC and RPSTL coincide.

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a "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-Organizational
F-Direct Support
H-General Support
D-Depot

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

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

C-4. Tool and Test Equipment Requirements (Sec. 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 re(quired 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.

C-5. Remarks (Sec. IV)

a. Reference Code. This code refers to the appropriate item in section II, column 6.

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

(Next printed page is 3.)

Section II MAINTENANCE ALLOCATION CHART FOR PAGE PRINTER RP-157/G

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level: Unit C	Unit O	Direct Support F	General Support H	Depot D	(5) Tools and Equipment Ref Code	(6) Remarks Code
00	PAGE PRINTER RP-157/G, ORGANIZATIONAL MAINTENANCE MAY BE PERFORMED UP TO GENERAL SUPPORT LEVEL	Inspect				0.4			
		Test				3.2		1,2,3,5,6	
		Service				0.5		4,6	
		Adjust				4.1		1,2,3,6,7,8	
		Repair				7.2		1,2,5,6,7,8	
		Overhaul					60.0	1,2,3,5 thru 17	
01	CABINET ASSEMBLY A1								A
0101	PAPER THROAT SUBASSEMBLY								A
0102	FAN ASSEMBLY A1A1, A1A3								A
0103	TERMINAL BOARD ASSEMBLY A1A4								A
0104	CABINET BODY ASSEMBLY A1A2								A
0105	LINE FILTER								A
02	FRAME ASSEMBLY A2								A
0201	PRINT HEAD ASSEMBLY A2A1								A
020101	RIBBON FEED ASSEMBLY A2A1A1	Replace				0.4	6,7,8		
		Repair				1.2	5,7,8		
02010101	RIBBON FEED								A
0201010101	SWITCH RIBBON FEED ASSEMBLY								A
020102	CLUTCH LIMITER, WIRED ASSEMBLY								A
02010201	CHASSIS CLUTCH LIMITER								A
020103	TAKEUP PF ASSEMBLY								A
020104	CLUTCH ASSEMBLY, WIRED A2A1A3								A
020105	TAKEUP ASSEMBLY								A
02010501	IDLER ASSEMBLY								A
020106	SIGNAL STROBE SUBASSELMBLY								A
020107	BRAKE ASSEMBLY, WIRED								A
02010701	BRAKE ASSEMBLY								A
020108	DISK, STROBE A2A1A6								A
020109	SWITCH, ACTUATOR ASSEMBLY								A
020110	BRAKE LIMITER ASSEMBLY A2A1A4								A
02011001	CHASSIS SUBASSEMBLY								A
020111	PRINT ASSEMBLY								A
320112	SPROCKET ASSEMBLY								A
320113	PAPER OUT ASSEMBLY								A
320114	HAMMER MODULE ASSEMBLY	Replace				0.5		6	
		Overhaul					1.5		
320115	YOKE SUBASSEMBLY								A
)20116	MOTOR, DRIVE	Replace				0.4		6	
		Repair				1.0		1,6	
		Overhaul					1.5		

Section II MAINTENANCE ALLOCATION CHART FOR PAGE PRINTER RP-157/G

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level: Unit C	Unit O	Direct Support F	General Support H	Depot D	(5) Tools and Equipment Ref Code	(6) Remarks Code
020117	ALTERNATOR, WIRING ASSEMBLY A2A1A9							A	
02011701	ALTERNATER	Replace				0.4		6	
	Repair					1.4	1.6		
020118	DISTRIBUTION BOX ASSEMBLY								A
020119	FRAME								A
02011901	SIDE-BASE ASSEMBLY								A
0202	ELECTRONIC ASSEMBLY A2A2								A
020201	CIRCUIT CARD ASSEMBLY	Test					0.7	1,2,5,6,	
	(PAPER FEED AND RIBBON) A1							9 thru 11	
		Replace				0.3	6		
		Repair					1.3	1,2,5,6,	
								9 thru 11	
020202	CIRCUIT CARD ASSEMBLY (PRINT HAMMER								
	DRIVER MATRIX) A2, A3, A4, AS, A6, A7, AB, A9								B
020203	CIRCUIT CARD ASSEMBLY								
	(SEQUENCE B) A11								B
020204	CIRCUIT CARD ASSEMBLY								
	(SEQUENCE A) A12								B
020205	CIRCUIT CARD ASSEMBLY (VOLTAGE REGULATOR) A14 B								
020206	CIRCUIT CARD ASSEMBLY								
	(INTERFACE B) B1, B2								B
020207	CIRCUIT CARD ASSEMBLY								
	(INTERFACE A) 83								B
020208	CIRCUIT CARD ASSEMBLY								
	(COMPARE AND RESTORE) B4								B
020209	CIRCUIT CARD ASSEMBLY (7X32SR STORAGE) B5								B
020210	CIRCUIT CARD ASSEMBLY (DECODE AND PARITY) 86								B
020211	CIRCUIT CARD ASSEMBLY (CONTROL INTERFACE) 87								B
020212	CIRCUIT CARD ASSEMBLY (RUN CONTROL) B8								B
020213	CIRCUIT CARD ASSEMBLY (LOAD AND LINE CONTROL) B9								B
020214	CIRCUIT CARD ASSEMBLY								
	(MESSAGE CONTROL) B10								B
020215	CIRCUIT CARD ASSEMBLY (FUNCTION CONTROL) B11								B
020216	CIRCUIT CARD ASSEMBLY (PRINT ADDRESS) B12								B
020217	CIRCUIT CARD ASSEMBLY(PRINT CONTROL) 813								B
020218	CAPACITOR ASSEMBLY A2A2A1								A
02021801	FUSE, RESISTOR ASSEMBLY A2A2A1A1								A
0202180101	ELECTRICAL COMPONENT ASSEMBLY A2A2A1A1A1								A
020219	POWER RECTIFIER ASSEMBLY A2A2A2								A
02021901	ELECTRICAL COMPONENT SUBASSEMBLY								A
0202190101	HEAT SINK SUBASSEMBLY								A
020220	PANEL ASSEMBLY, TEST A2A2A3								A
020221	LOGIC CONTROL ASSEMBLY A2A2A4								A
0203	PPR BASKET ASSEMBLY A2A3								A
020301	SWITCH SUBASSEMBLY								A
0204	FRAME ASSEMBLY A2A4								A
020401	CONTROLLER ASSEMBLY A2A4A1								A

Section II MAINTENANCE ALLOCATION CHART FOR PAGE PRINTER RP-157/G

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level Unit C	Unit O	Direct Support F	General Support H	Depot D	(5) Tools and Equipment Ref Code	(6) Remarks Code
0205	FRONT PANEL ASSEMBLY A2A5								A
020501	FRONT SECTION ASSEMBLY								A
02050101	CABLE ASSEMBLY								A
02050102	PANEL SUBASSEMBLY								A
0205010201	ELECTRICAL COMPONENT ASSEMBLY								A
03	PAPER STACKER A3								A
04	STROBE DISK ASSEMBLY								A
05	DISK, STROBE								A

SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS FOR PAGE PRINTER RP-157/G

(1) Reference Number	(2) Maintenance Level	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
1	H, D	MULTIMETER AN/USM-223	6625-00-999-7465	
2	H, D	OSCILLOSCOPE AN/USM-281C	6625-00-106-9622	
3	H, D	PROBE, TIP, COIL SPRING (TEKTRONIX INC., NO. 206-061) 2 EA REQUIRED	6625-00-054-0231	
4	H	VACUUM CLEANER, HAND TYPE INDUSTRIAL (CLEMENTS MFG. CO., NO CMVU)	7910-00-205-3400	
5	H, D	EXTENDER CARD (ANELEX CORP. NO. 11244G1)	5895-00-179-7837	
6	H, D	TOOL KIT, ELECTRONIC EQUIPMENT TK-IOS/G	5810-00-610-8177	
7	H, D	TOOL KIT, ELECTRONIC SYSTEM MAINTENANCE MISC PPL-4808	5180-00-168-9996	
8	H, D	TOOL KIT, ELECTRONIC SYSTEM MAINTENANCE (PAGE PRINTER)	5180-00-168-9997	
9	D	TEST SET, SEMICONDUCTOR DEVICE TS-1836C/U	6625-00-159-2263	
10	D	VOLTMETER, DIGITAL (HEWLETT-PACKARD MULTIMETER NO. 34702A AND DISPLAY NO. 34750A060)	6625-00-032-5862	
11	D	TEST FACILITY PRINTED CIRCUIT BOARD		
12	D	COUNTER, FREQUENCY (BECKMAN MODEL NO. 7350A)		
13	D	TIMER (STANDARD MODEL TF-4570)		
14	D	POWER AMPLIFIER, REGULATED (COMMUNICATIONS MEASUREMENTS LABS MODEL NSOOOA)		
15	D	OSCILLATOR, PLUG-IN (COMMUNICATIONS MEASUREMENTS LABS MODEL SG-13A)		
16	D	TEST SET, PAGE PRINTER (ANELEX CORP., MODEL NO. 56279)		
17	D	POCKET COMPARATOR WITH MICR GRID (EDMUND SCIENTIFIC MODEL 30.285)		
		NOTE		
		DEPOT MAY SUBSTITUTE AVAILABLE EQUIVALENT TEST EQUIPMENT.		

SECTION IV. REMARKS

REFERENCE CODE	REMARKS
A	MAINTAINED AS PART OF THE NEXT HIGHER ASSEMBLY WHICH HAS MAINTENANCE FUNCTIONS ASSIGNED
B	MAINTENANCE FUNCTIONS, MAINTENANCE CATEGORY, AND TOOLS AND TEST EQUIPMENT ARE THE SAME AS THAT FOR 020201

INDEX

By Order of the Secretaries of the Army, the Navy, and the Air Force:

W. C. WESTMORELAND,
General, United States Army,
Chief of Staff.

Official:
KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

JOSEPH E. RICE,
Rear Admiral, U. S. Navy,
Commander, Naval Electronic
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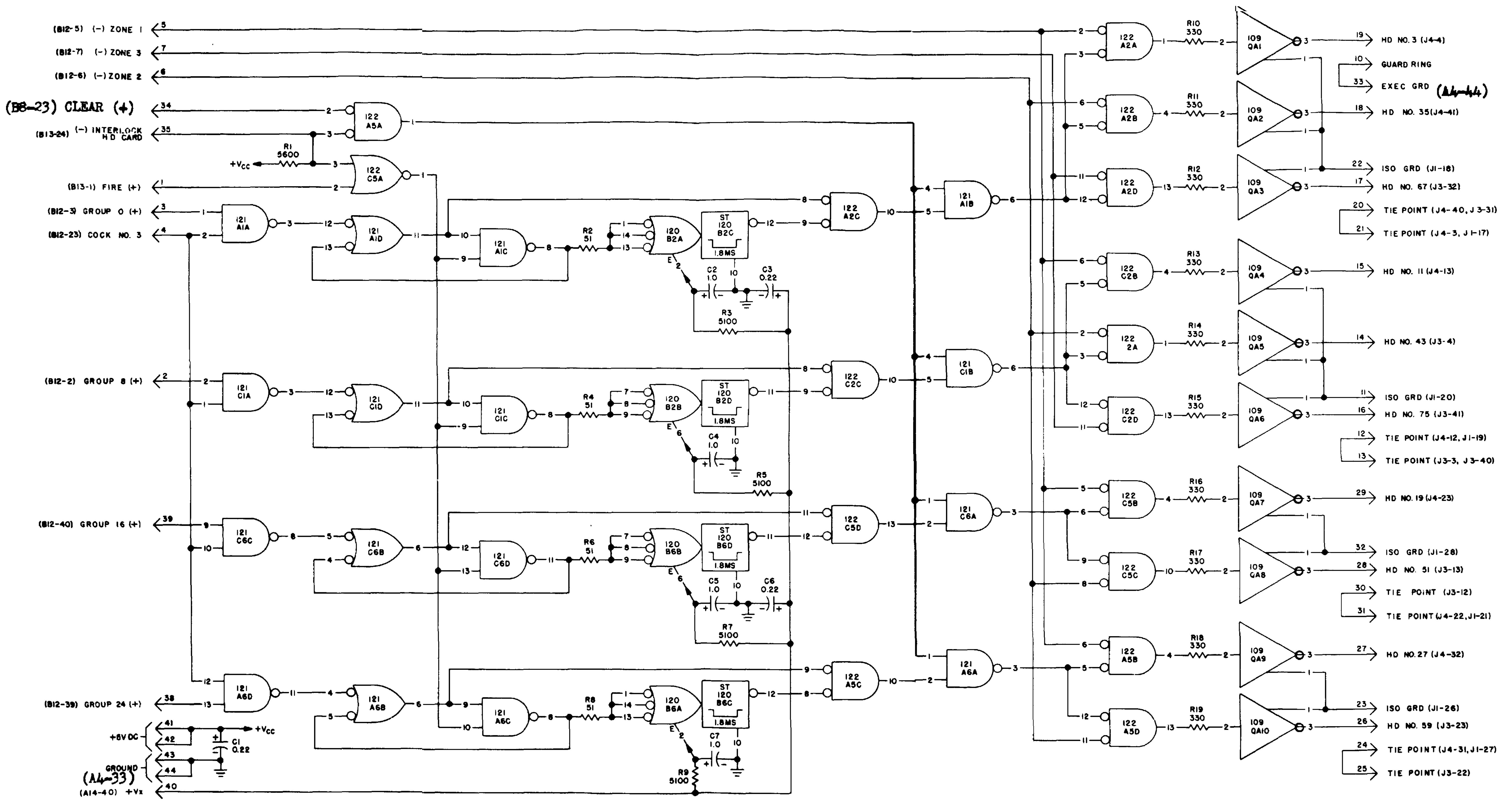


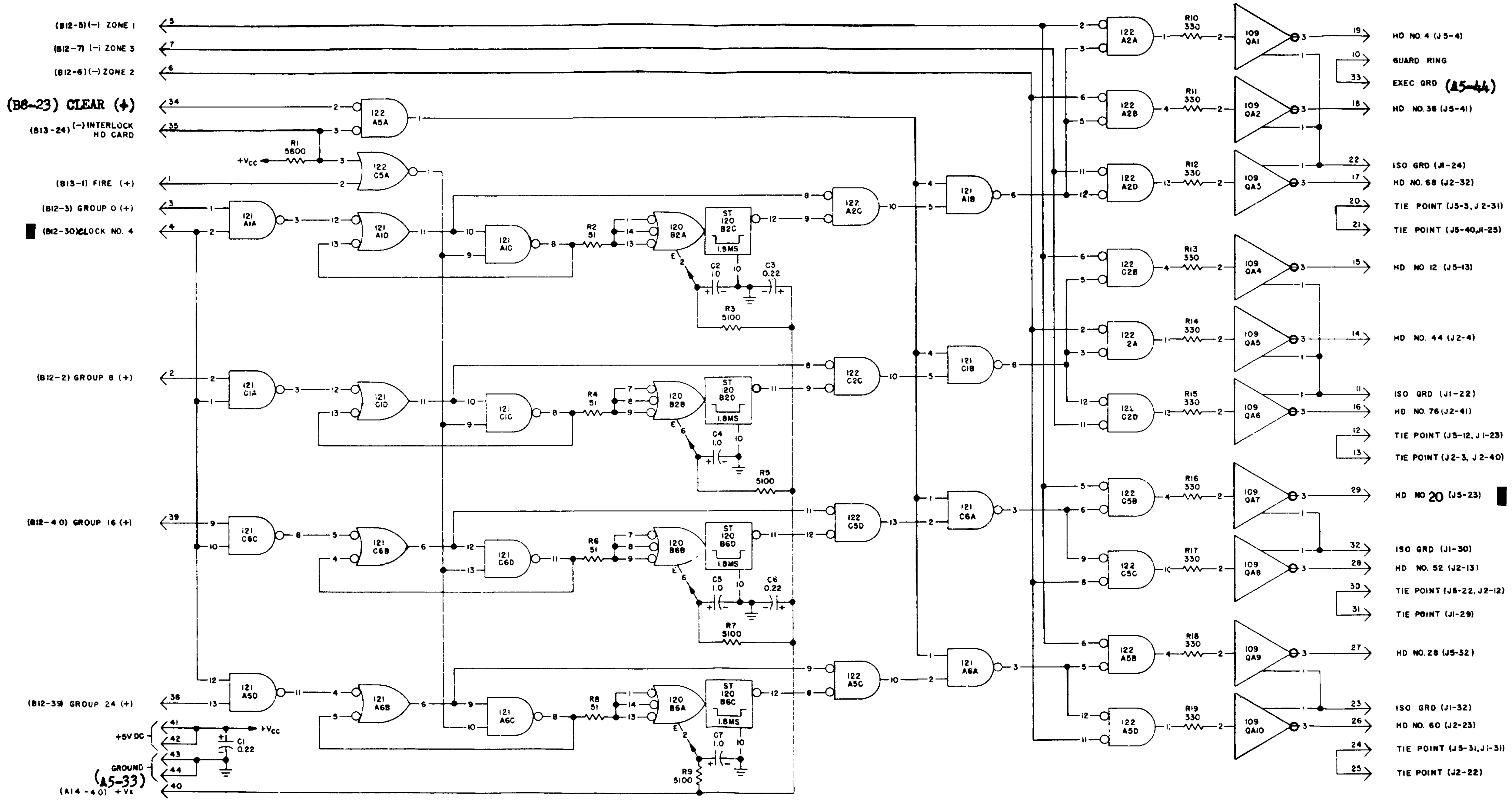
POWER INPUT PINS		
	A1, A2, A5, A6, C1, C2, C5, C6	B2, B6
$+V_{CC}$	14	4
GRD	7	10

NOTES:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION, PREFIX WITH UNIT NUMBER OR SUBASSEMBLY DESIGNATION(S).
2. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UF.

TM7440-223-15-132

Figure 8-15. Hammer driver matrix PC card A4 (No. 56731), logic diagram.



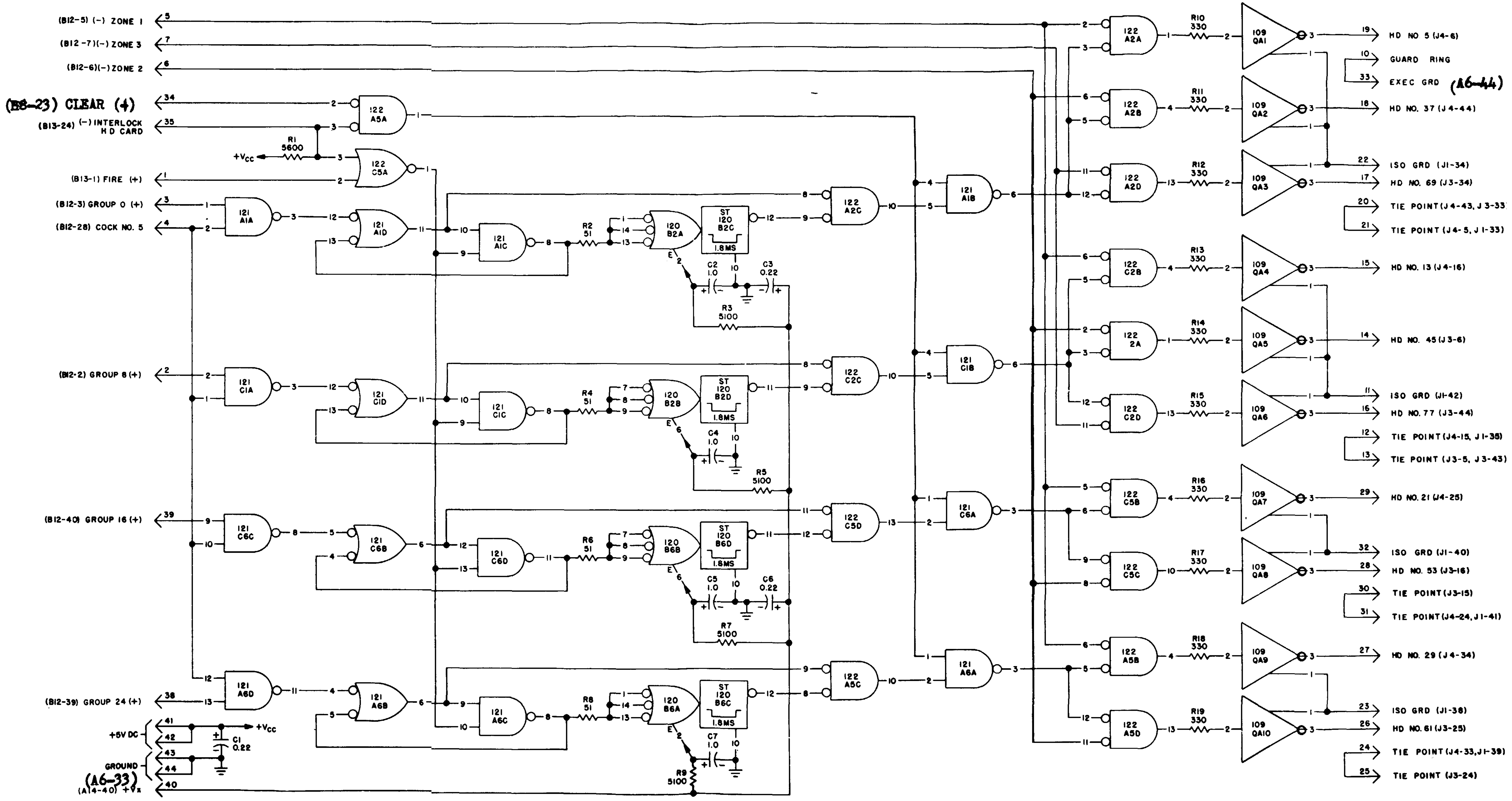
POWER INPUT PINS		
	A1, A2, A5, A6, C1, C2, C5, C6	B2, B6
+Vcc	14	4
GRD	7	10

NOTES:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION, PREFIX WITH UNIT NUMBER OR SUBASSEMBLY DESIGNATION(S).
2. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UF.

TM7440-223-15-133

Figure 8-16. Hammer driver matrix PC card A5 (No. 56731), logic diagram.



POWER INPUT PINS		
	A1, A2, A5, A6, C1, C2, C5, C6	B2, B6
$+V_{CC}$	14	4
GRD	7	10

NOTES:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION, PREFIX WITH UNIT NUMBER OR SUBASSEMBLY DESIGNATION(S).
2. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UF.

TM7440-223-15-134

Figure 8-17. Hammer driver matrix PC card A6 (No. 56731), logic diagram.

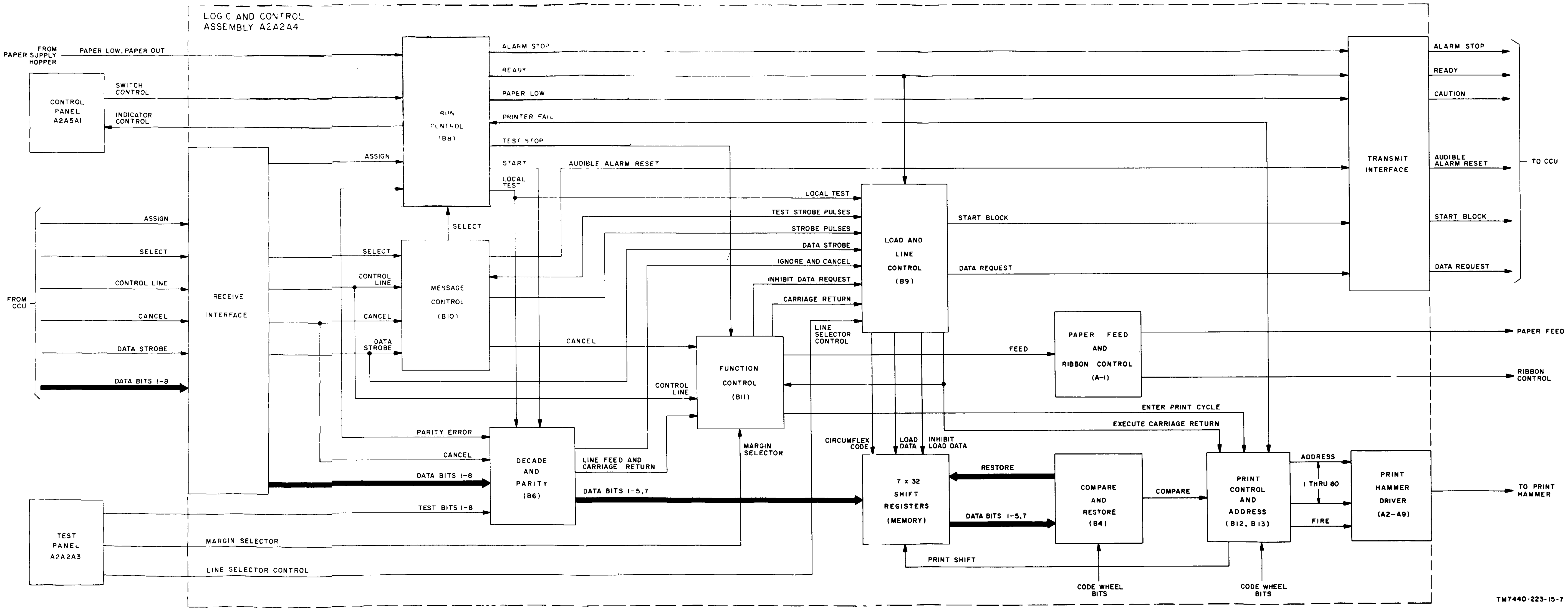


Figure 3-1. Page printer, block diagram.

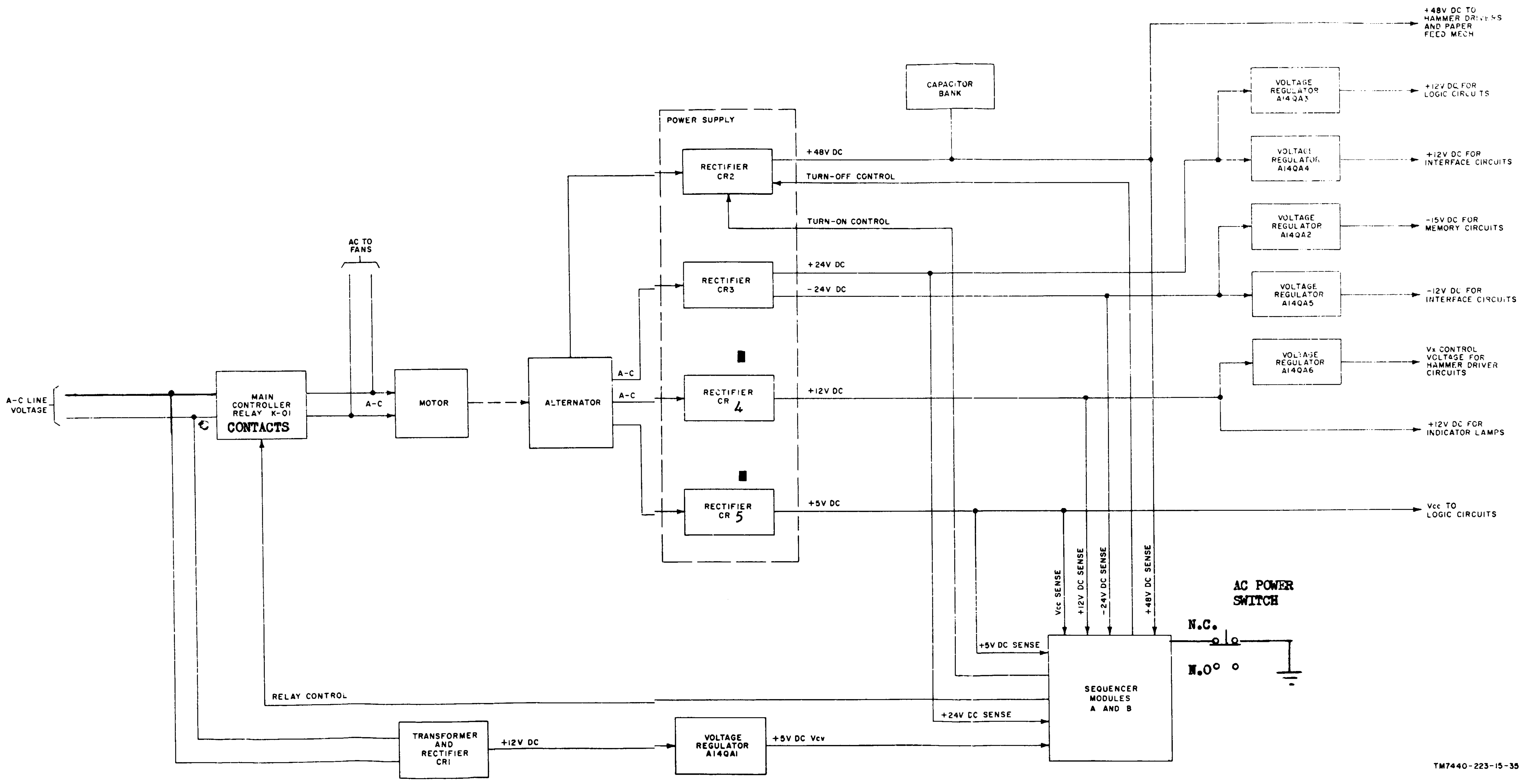


Figure 3-29. Power supply, block diagram.

LEGEND FOR FIGURE 4-11 (1)

1	Belt, paper feed and ribbon drive
2	Screw, socket head, 1/4-20, 5/8 in. long
3	Clutch pulley retainer
4	Paper feed clutch pulley
5	Ribbon drive belt
6	Screw, socket head, No. 8-32, 3/8 in. long
6.1	Lockwasher, split, high collar, No. 8
7	Woodruff key
8	Clutch field
8.1	Clutch assembly, wired (consists of 6 through 13)
8.2	Clutch assembly w/o wires (consists of 6 through 13)
9	Ball bearing
10	Clutch spacer
11	Clutch bearing spacer
12	Ball bearing
13	Paper feed clutch rotor
14	Setscrew, hex, socket, No. 8-32, 1/4 in. long
15	Ribbon feed drive pulley
15.1	Clutch dust cover
16	Setscrew, hex, socket, No. 8-32, 1/2 in. long
17	Extension spring
18	Screw, hex, head, No. 8-32, 3/8 in. long
19	Screw, socket head, No. 4-40, 3/8 in. long
20	Lockwasher, No. 4
21	Washer, flat, No. 4
22	Self-locking pin
23	Switch actuator
23.1	Actuator switch assembly (consists of 22 and 23)
24	Setscrew, hex, socket, No. 6-32, 1/4 in. long
25	Armature plate hub
26	Armature plate
27	Screw, socket head, No. 10-32, 3/4 in. long
28	Lockwasher, No. 10
29	Washer, flat, No. 10
30	Ribbon feed assembly, (fig. 4-12)
30.1	Ribbon feed (w/o electrical components)
31	Self-locking pin
32	Cam follower shaft
33	Cam follower
33.1	Follower subassy (consists of 32 and 33)
34	Screw, panhead, No. 8-32, 5/8 in. long
35	Nut, hex, No. 8-32
36	Washer, flat, No. 8
37	Access cover
38	Screw, panhead, No. 8-32, 3/8 in. long
39	Lockwasher, No. 8
40	Washer, flat, No. 8
41	Clutch limiter wiring assembly (fig. 4-13)
42	Screw, socket head, 1/4-20, 1 1/2 in. long
43	Ball bearing
44	Belt drive sleeve
44.1	Sleeve subassy (consists of 42 through 44)
45	Takeup spacer
45.1	Takeup spacer, adjustable
46	Setscrew, hex, socket, No. 10-32, 3/4 in.long
47	Takeup block
47.1	Takeup paper feed assy (consists of 42 through 47)
48	Screw, socket head, 1/4-20, 1 1/2 in. long
49	Lockwasher, 1/4 in.
50	Screw, socket head, 1/4-20, 3/4 in. long
51	Lockwasher, 1/4 in.
52	Phasing ring spring
53	Spring guide pin
54	Idler block support
54.1	Idler support subassy (consists of items 52 through 54)
55	Screw, panhead, No. 8-32, 3/8 in. long
56	Lockwasher, No. 8
57	Washer, flat, No. 8
58	Cable clamp
59	Cable clamp
60	Terminal
61	Cable marker
61.1	Cable assembly
62	Cable assembly W6
63	Screw, flathead, No. 8-32, 3/8 in. long
64	Guide adjusting screw
65	Setscrew, hex, socket, 1/4-20, 1/2 in. long
66	Rod adjusting phasing ring
67	Screw, panhead, No. 8-32, 3/8 in. long
68	Ribbon guide block
68.1	Nut, hex, self-locking, No. 4-40
68.2	Screw, flat head, No. 4-40, 1/4 in. long
68.3	Bracket, adj, paper guide, LH
68.4	Bracket, adj, paper guide, RH
68.5	Washer, nylon, No. 4
68.6	Nut, hex, self-locking, No. 4-40
68.7	Washer, flat, No. 4
68.8	Screw, flat head, No. 4-40, 5/16 in. long
68.9	Bracket, paper guide
68.10	Depresser, paper guide
69	Screw, flat head, No. 4-40, 1/4 in. long
70	Nut, hex, No. 4-40
71	Lower spring clip
72	Paper tear-off plate
73	Extension spring
74	Paper tear-off cover subassembly
74.1	Cover assy (consists of 68.1 through 74)
74.2	Washer, latch
74.3	Latch guide
74.4	Rivet, latch
74.5	Fastener latch (consists of 74.2 through 74.4)
75	Setscrew, hex, socket, No. 8-32, 1/4 in. long
76	Penetration control knob
77	Helical compression spring
78	Penetration control adjusting spring
79	Nut, hex, 1/4-20
80	Penetration control decal
81	Screw, flathead, No. 10-32, 5/8 in. long
82	Right-hand penetration control cover plate
83	Left-hand penetration control cover plate
84	Screw, socket head, No. 8-32, 1 in. long
85	Lockwasher, No. 8
86	Washer, flat, No. 8
87	Dowel pin
88	Setscrew, 1/4-20, 3/8 in. long
89	Penetration control nut
90	Setscrew, hex, socket, 1/4-20, 5/8 in. long
91	Right-hand penetration control actuator lever
92	Grip ring
93	Self-locking pin
94	Right-hand penetration control base
94.1	Penetration control, right (consists of 87 through 94)
95	Straight pin
96	Setscrew, 1/4-20, 3/8 in. long
97	Penetration control nut
98	Setscrew, hex, socket, 1/4-20, 5/8 in. long
99	Left-hand penetration control actuator lever
100	Grip ring
101	Self-locking pin
102	Left-hand penetration control base
102.1	Penetration control/left (consists of 95 through 102)
103	Screw, panhead, No. 8-32, 3/8 in. long
104	Lockwasher, No. 8
105	Ribbon guide shield
106	Snapslide stud
107	Lockwasher, No. 8
108	Tear-off cover spacer
109	Snapslide stud
110	Nut, hex, No. 8-32
111	Screw, panhead, No. 8-32, 3/8 in. long
112	Lockwasher, No. 8
113	Right-hand tear-off cover bracket
114	Left-hand tear-off cover bracket
115	Screw, socket head, 1/4-20, 1 3/4 in. long
115.1	Lockwasher, split, high-collar, 1/4 in.
116	Paper drive pulley
117	Code disk
118	Code disk spacer pin
119	Self-locking pin
120	Adapter shaft
120.1	Adapter print assy (consists of 119 and 120)
121	Screw, socket head, No. 10-32, 1/2 in. long
122	Lockwasher, No. 10
123	Left-hand print roll bearing retainer
124	Retaining ring
125	Screw, panhead, No. 8-32, 3/8 in. long
126	Lockwasher, No. 8
127	Washer, flat, No. 8
128	Cable clamp
129	Cable assembly W5 (fig. 4-15)
130	Screw, socket head, No. 10-32, 1/2 in. long
131	Lockwasher, No. 10
132	Screw, panhead, No. 4-40, 3/8 in. long
133	Lockwasher, No. 4
134	Signal code subassembly (fig. 4-16)
135	Screw, socket head, 1/4-20, 1 inch long
136	Lockwasher, 1/4 in.
137	Washer, flat, 1/4 in.
138	Phasing ring spacer
139	Phasing ring support
140	Ball bearing
141	Retaining ring
142	Retaining ring
143	Retaining ring
144	Shim
145	Key
146	Engraved print roll section
147	Dowel pin
148	Print roll shaft
148.1	Print assy (consists of 140 through 148)
149	Screw, panhead, No. 8-32, 5/8 in. long
150	Lockwasher, No. 8
151	Washer, flat, No. 8
152	Screw, socket head, No. 4-40, 1/4 in. long
153	Lockwasher, No. 4
154	Retaining ring
155	Paper-out sensing arm
156	Washer, flat, No. 4
157	Connector retainer
158	9-pin receptacle
159	Mercury switch
160	Screw, panhead, No. 4-40, 1/4 in. long
160.1	Lockwasher, No. 4
160.2	Clip, mercury switch
161	Paper-out signal mounting bracket
161.1	Paper-out assy (consists of 155 through 161)
161.2	Pivet pin
161.3	Bracket assy (consists of 161 and 161.2)
162	Self-locking pin
163	Setscrew, hex, socket, No. 4-40, 3/8 in. long
164	Paper-out support block
165	Paper-out pressure foot
166	Paper-out spring
166.1	Hold down subassy (consists of 162 through 166)
167	Screw, panhead, No. 8-32, 3/8 in. long
168	Lower guide plate subassembly
169	Screw, panhead, No. 8-32, 5/8 in. long
170	Lockwasher, No. 8
171	Washer, flat, No. 8
172	Paper upper guide plate
173	Screw, socket head, No. 8-32, 3/8 in. long
174	Lockwasher, No. 8
175	Washer, flat, No. 8
176	Cable assembly W2 (fig. 4-17)
177	Cable assembly W3 (fig. 4-17)
178	Cable assembly W4 (fig. 4-17)
179	Cable assembly W1 (fig. 4-17)
180	Screw, socket head, No. 6-32, 1 in. long
181	Lockwasher, No. 6
182	Single duty hammer module assembly
183	Key
184	Screw, socket head, 5/16-8, 1 in. long
185	Lockwasher, 5/16 in.
186	Hammer module plate
187	Odd marking strip
188	Even marking strip
189	Setscrew, hex, socket, No. 8-32, 3/8 in. long
190	Self-locking pin
191	Drive detail cap
191.1	Cap ribbon drive assy (consists of 190 and 191)
192	Screw, socket head, No. 6-32, 1/2 in. long
193	Lockwasher, No. 6
194	Insert
195	Setscrew, 1/4-20, 1/2 in. long
196	Ribbon tension block
196.1	Tension block subassembly (consists of 194 through 196)
197	Helical compression spring
198	Pressure block
199	Clutch ribbon drive shaft
200	Screw, socket head, No. 8-32, 1/2 in. long
201	Upper sensing arm
202	Lower sensing arm
203	Retaining ring
204	Screw, socket head, No. 10-32, 1/2 in.long
205	Screw, socket head, No. 10-32, 1/2 in. long
205.1	Lockwasher, No. 10
206	Clutch housing bushing
207	Clutch housing
207.1	Clutch housing assembly (consists of 206 and 207)
208	Paper feed armature plate
209	Clutch and brake spring
210	Screw, socket head, 1/4-20, 3/4 in. long
211	Lockwasher, 1/4 in.
212	Clutch washer
213	Clutch hub
214	Retaining ring
215	Ball bearing
216	Retaining ring
217	Setscrew, hex, socket, No. 10-32, 1/4 in. long
218	Plug
219	Screw, socket head, No. 6-32, 1/2 in. long
220	Lockwasher, No. 6
221	Tractor hub
222	Tractor sprocket
223	Tractor clamping ring
223.1	Sprocket assy (consists of 217 through 223)
224	Key
225	Screw, panhead, No. 8-32, 3/8 in. long
226	Lockwasher, No. 8
227	Washer, flat, No. 8
228	Right-hand module plate shield
229	Left-hand module plate shield
230	Module plate yoke subassembly (fig. 4-18)
231	Paper feed chain drive
232	Paper feed drive shaft
233	Dust container gasket
234	Screw, socket head, No. 8-32, 7/8 in. long
235	Lockwasher, No. 8
235.1	Washer, flat, No. 8
236	Left-hand clutch assembly dust container
237	Dust exhaust tube
238	Terminal
239	Lockwasher, No. 6
240	Washer, flat, No. 6
241	Deleted
242	Deleted
243	Screw, panhead, No. 8-32, 3/8 in. long
244	Lockwasher, No. 8
245	Washer, flat, No. 8
246	Cable clamp

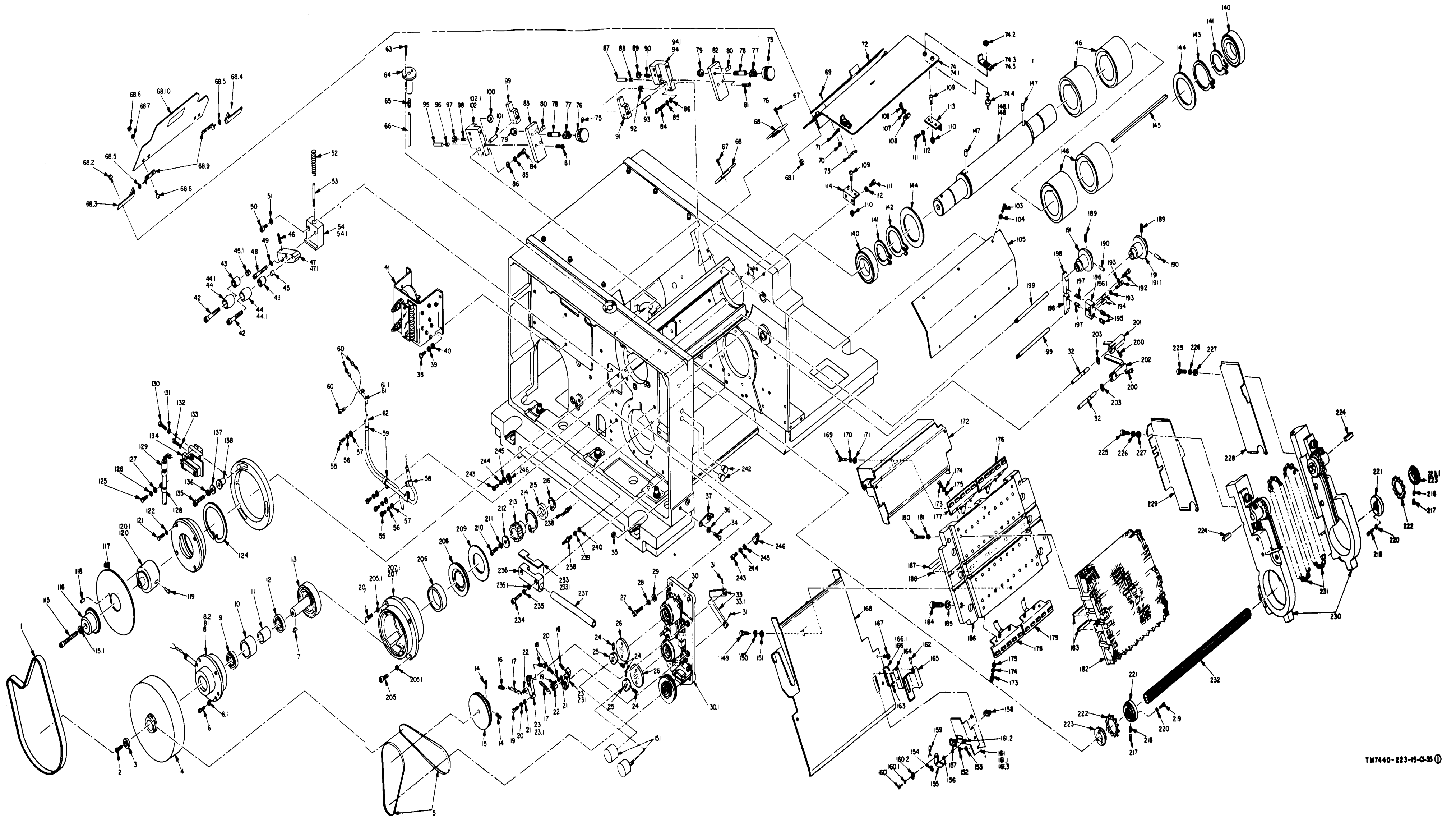
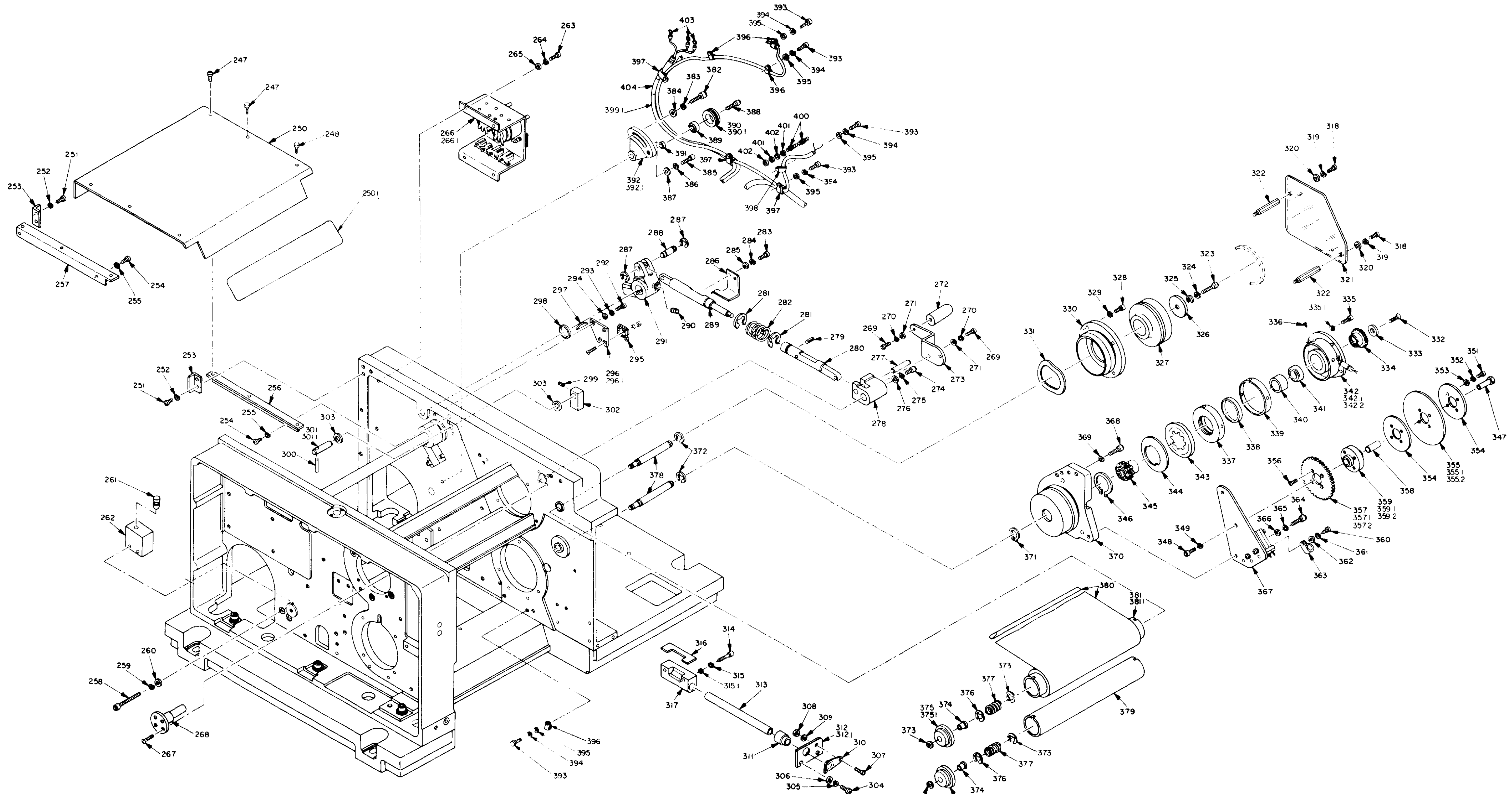


Figure 4-11(1). Print head assembly, exploded view (part 1 of 3).

LEGEND FOR FIGURE 4-11 ②

247	Screw, panhead, No. 8-32, 3/8 in. long
248	Screw, nylon, No. 8-32, 3/8 in. long
249	Deleted
250	Printer top cover
250.1	Guide, paper, anti-jamming
251	Screw, panhead, No. 8-32, 3/8 in. long
252	Lockwasher, No. 8
253	Rear cover bracket
254	Screw, panhead, No. 8-32, 3/8 in. long
255	Lockwasher, No. 8
256	Right-hand cover bracket
257	Left-hand cover bracket
258	Screw, socket head, No. 10-32, 7/8 in. long
259	Lockwasher, No. 10
260	Washer, flat, No. 10
261	Bumper
262	Bumper module plate block
263	Screw, panhead, No. 8-32, 3/8 in. long
264	Lockwasher, No. 6
265	Washer, flat, No. 6
266	Chassis brake limiter subassembly (fig. 4-19)
266.1	Brake limiter assembly, wired
267	Screw, flathead, No. 8-32, 1/2 in. long
268	Yoke open pin
269	Screw, panhead, No. 10-32, 1/2 in. long
270	Lockwasher, No. 10
271	Washer, flat, No. 10
272	Yoke open handle knob
273	Yoke open operating handle
274	Screw, socket head, 1/4-20, 3/8 in. long
275	Lockwasher, 1/4 in.
276	Washer, flat, 1/4 in.
277	Pin
278	Yoke open block
279	Pin
280	Yoke open front rod
281	Retaining ring
282	Helical compression spring
283	Screw, panhead, No. 6-32, 1/2 in. long
284	Lockwasher, No. 6
285	Washer, flat, No. 6
286	Yoke open actuator switch bracket
287	Retaining ring
288	Clevis pin
289	Yoke open rear rod
290	Setscrew, hex, socket, 1/4-20, 3/8 in. long
291	Penetration control bellcrank
292	Screw, panhead, No. 6-32, 1/2 in. long
293	Lockwasher, No. 6
294	Washer, flat, No. 6
295	Yoke open actuator switch
296	Yoke open switch mounting plate
296.1	Switch actuator, (consists of 295 and 296)
297	Woodruff key
298	Washer, flat, 3/4 in.
299	Setscrew, hex, socket, No. 10-32, 3/16 in. long
300	Self-locking pin
301	Bellcrank stop pivot
301.1	Pivot, crank (consists of 300 and 301)
302	Penetration control bellcrank stop
303	Washer, flat, 3/8 in.
304	Screw, panhead, No. 8-32, 1/2 in. long
305	Lockwasher, No. 8
306	Washer, flat, No. 8
307	Screw, panhead, No. 8-32, 1/2 in. long
308	Nut, hex, No. 8-32
309	Washer, flat, No. 8
310	Access cover
311	Dust exhaust ferrule
312	Dust exhaust plate support
312.1	Adaptor, dust (consists of 307 through 312)
313	Dust exhaust tube
314	Screw, socket head, No. 8-32, 7/8 in. long
315	Lockwasher, No. 8
315.1	Washer, flat, No. 8
316	Dust container gasket
317	Right-hand brake assembly dust container
318	Screw, panhead, No. 8-32, 1/2 in. long
319	Lockwasher, No. 8
320	Washer, flat, No. 8
321	Belt guard
322	Belt guard support spacer
323	Screw, socket head, 1/4-20, 1 in. long
324	Lockwasher, 1/4 in.
325	Washer, flat, 1/4 in.
326	Pulley retainer washer
327	Print roll belt pulley
328	Screw, socket head, No. 10-32, 1/2 in.long
329	Lockwasher, No. 10
330	Right-hand bearing retainer
331	Spring washer
332	Screw, flathead, No. 10-32, 5/8 in. long
333	Drive gear retainer
334	Line strobe gear drive
335	Screw, socket head, No. 8-32, 1/2 in. long
335.1	Lock washer, split, high collar, No. 8
336	Screw, panhead, No. 4-40, 1/8 in. long
337	Friction face
338	Inner shim
339	Outer shim
340	Brake spacer
341	Ball bearing
342	Flange mounted field
342.1	Brake assembly wired (consists of 336 through 342)
342.2	Brake assembly w/o wires (consists of 336 through 342)
343	Paper feed armature plate
344	Clutch and brake spring
345	Brake hub
346	Retaining ring
347	Pin
348	Screw, socket head, No. 10-32, 1/2 in. long
349	Lockwasher, No. 10
350	Deleted
351	Screw, panhead, No. 6-32, 5/16 in. long
352	Lockwasher, No. 6
353	Washer, flat, No. 6
354	Strobe, disk assembly retainer
355	Strobe disk, 11 in.
355.1	Strobe disk, 8 1/2 in.
355.2	Strobe disk, 14 in.
356	Screw, flathead, No. 6-32, 5/16 in. long
357	Spur gear, 11 in.
357.1	Spur gear, 8 1/2 in.
357.2	Spur gear, 14 in.
358	Bushing
359	Hub
359.1	Disk, strobe (consists of 354 through 359)
359.2	Hub assembly (consists of 358 and 359)
360	Screw, pan head, No. 10-32, 3/8 in. long
361	Lockwasher, No. 10
362	Washer, flat, No. 10
363	Cable clamp
364	Screw, socket head, No. 10-32, 5/8 in. long
365	Lockwasher, No. 10
366	Washer, flat, No. 10
367	Signal strobe subassembly (fig. 4-20)
368	Screw, socket head, No. 10-32, 3/4 in. long
369	Lockwasher, No. 10
370	Brake housing
371	Retaining ring
372	Retaining ring
373	Retaining ring
374	Bushing
375	Roller cap
375.1	Cap, roller (consists of 374 and 375)
376	Retaining ring
377	Helical compression spring
378	Ribbon drive spindle
379	Ribbon roll
380	Ribbon
381	Ribbon roll
381.1	Ribbon assembly (consists of 380 and 381)
382	Screw, socket head, 1/4-20, 7/8 in. long
383	Lockwasher, 1/4 in.
384	Washer, flat, 1/4 in.
385	Screw, socket head, No. 8-32, 7/8 in. long
386	Lockwasher, No. 8
387	Washer, flat, No. 8
388	Screw, socket head, 1/4-20, 3/4 in. long
389	Ball bearing
390	Idler pulley
390.1	Idler assembly (consists of 389 and 390)
391	Takeup spacer
392	Idler bracket
392.1	Takeup assembly (consists of 388 through 392)
393	Screw, panhead, No. 8-32, 3/8 in. long
394	Lockwasher, No. 8
395	Washer, flat, No. 8
396	Cable clamp
397	Cable clamp
398	Cable clamp
399	Deleted
399.1	Cable assembly W6 (fig. 4-14)
400	Terminal
401	Lockwasher, No. 6
402	Washer, flat, No. 6
403	Terminal
404	Cable marker



TM7440-223-15-CI-55 ②

Figure 4-11(2). Print head assembly, exploded view (part 2 of 3).

LEGEND FOR FIGURE 4-11 ③

405	Belt, print drum drive	452	Lockwasher, No. 8
406	Belt, alternator drive	453	Wear plate
407	Screw, socket head, No. 5/16-18, 1/2 in. long	454	Screw, panhead, No. 8-32, 3/8 in. long
408	Lockwasher, No. 5/16	455	Lockwasher, No. 8
409	Washer, flat, No. 5/16	456	Washer, flat, No. 8
410	Setscrew, hex, socket, No. 10-32, 3/8 in. long	457	Cable clamp
411	Motor pulley	458	Drivescrew
412	Drive motor	459	Nameplate
413	Screw, socket head, 1/4-20, 3/4 in. long	460	Screw, socket head, No. 8-32, 3/8 in. long
414	Lockwasher, 1/4 in.	461	Lockwasher, No. 8
415	Washer, flat, 1/4 in.	462	Washer, flat, No. 8
416	Setscrew, hex, socket, No. 10-32, 3/16 in. long	463	Cable clamp
417	Alternator pulley	464	Screw, panhead, No. 6-32, 2 in. long
418	Connector	465	Lockwasher, No. 6
419	Cable clamp with bushing	466	Washer, flat, No. 6
420	Cable marker	467	Fan grille
421	Multiple output alternator (fig. 4-22)	468	Fan
421.1	Alternator, wiring assembly (consists of 418 through 421)	469	Screw, panhead, No. 8-32, 3/8 in. long
422	Screw, flathead, 1/4-20, 3/4 in. long	470	Lockwasher, No. 8
423	Motor and alternator mounting plate	471	Washer, flat, No. 8
424	Screw, panhead, No. 6-32, 5/16 in. long	472	Cable clamp
425	Lockwasher, No. 6	473	Cable clamp
426	Washer, flat, No. 6	474	Screw, socket head, 1/4-20, 5/8 in. long
427	Distribution box cover	475	Lockwasher, 1/4 in.
428	Shielding gasket	476	Lower ribbon guide
429	Cable assembly W11 (fig. 4-23)	477	Upper ribbon guide
430	Cable assembly	478	Washer, flat, 3/4 in.
430.1	Conduit	479	Nut, hex, 5/16-18
431	Screw, panhead, 1/4-20, 1/2 in. long	480	Setscrew, hex, socket, 5/16-18, 1 in. long
432	Lockwasher, 1/4 in.	481	Setscrew, hex, socket, 1/4-20, 3/8 in. long
433	Screw, binding head, No. 6-32, 1/2 in. long,	482	Penetration control arm support
434	Lockwasher, No. 6	483	Woodruff key
435	Washer, flat, No. 6	484	Penetration control shaft
436	Terminal block	485	Dowel pin
437	Marker strip	486	Screw, socket head, 5/16-18, 1 in. long
438	Filter	487	Screw, socket head, 5/16-18, 1 1/4 in. long
439	Distribution box	488	Lockwasher, 5/16 in.
439.1	Distributor box assembly (consists of 433 through 439)	489	Washer, flat, 5/16 in.
439.2	Plate (TB1)	490	Left-hand dust exhaust ferrule
439.3	Terminal ring	491	Self-locking pin
439.4	Support	492	Self-locking pin
439.5	Rivet nut, 1/4-20	493	Bushing
440	Shielding gasket	494	Bushing
441	Screw, socket head, 1/4-20, 1 1/4 in. long	495	Left-hand side frame
442	Lockwasher, 1/4 in.	495.1	Left-side frame assembly
443	Washer, flat, 1/4 in.	496	Self-locking pin
444	Screw, socket head, No. 10-32, 7/8 in. long	497	Bushing
445	Lockwasher, No. 10	498	Bushing
446	Washer, flat, No. 10	498.1	Right-side frame assembly
447	Bumper	499	Right-hand side frame
448	Bumper module plate block	499.1	Frame
449	Screw, button head	499.2	Side base assembly
450	Upper paper guide, RH	499.3	Screw, flathead, No. 8-32, 3/8 in. long
450.1	Upper paper guide, LH	499.4	Mounting bracket
451	Screw, panhead, No. 8-32, 3/8 in. long	499.5	Shock mount
		499.6	Cap screw, 1/4-20, 3/4 in. long
		499.7	Lockwasher, 1/4 in.
		499.8	Plate support
		499.9	Plate support
		500	Printer base

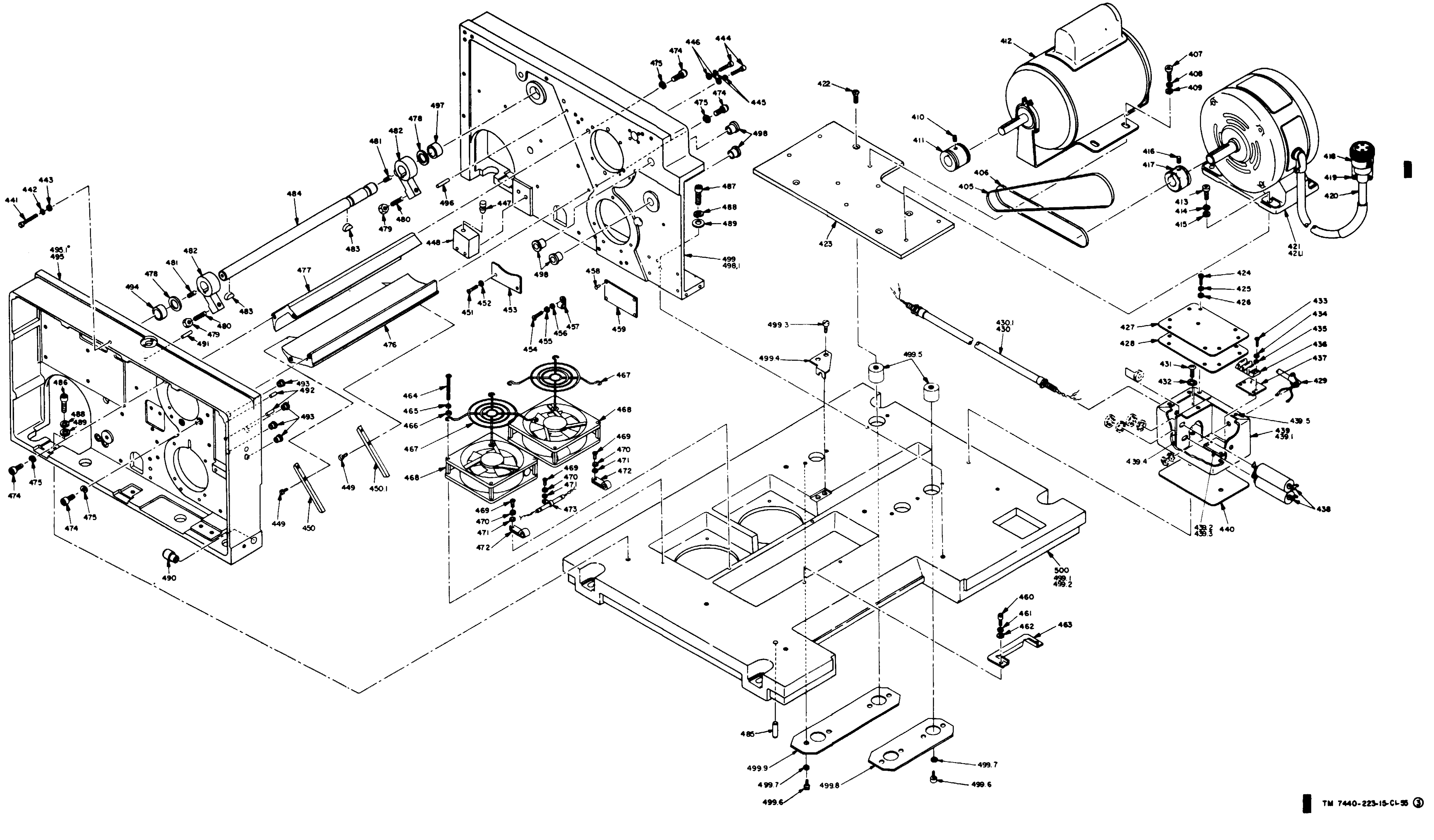
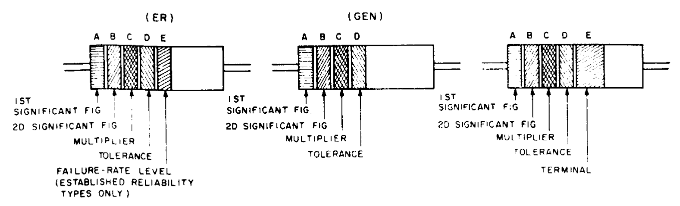


Figure 4-11 (3). Print head assembly, exploded view (part 3 of 3)

CHAPTER 8

ILLUSTRATIONS



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)

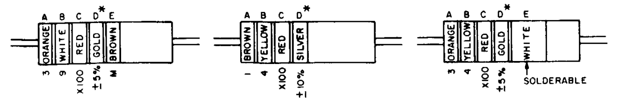
SOME RESISTORS ARE IDENTIFIED BY THREE OR FOUR DIGIT ALPHA NUMERIC DESIGNATORS. THE LETTER R IS USED IN PLACE OF A DECIMAL POINT WHEN FRACTIONAL VALUES OF AN OHM ARE EXPRESSED. FOR EXAMPLE:

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.

EXAMPLES OF COLOR CODING

(ER)   (GEN)



NOMINAL RESISTANCE 3,900 OHMS
RESISTANCE TOLERANCE ±5%
FAILURE RATE LEVEL M

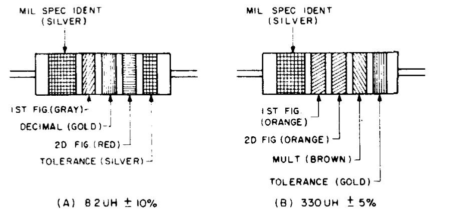
NOMINAL RESISTANCE 1,400 OHMS
RESISTANCE TOLERANCE ±10%

NOMINAL RESISTANCE 3,400 OHMS
RESISTANCE TOLERANCE ±5%
TERMINAL SOLDERABLE

COMPOSITION-TYPE RESISTORS   FILM-TYPE RESISTORS

* IF BAND D IS OMITTED, THE RESISTOR TOLERANCE IS ± 20% AND THE RESISTOR IS NOT MIL-STD.

A. COLOR CODE MARKING FOR MILITARY STANDARD RESISTORS.



(A) 8.2UH ± 10%   (B) 330UH ± 5%

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 330 UH 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 TH CHOKE COIL.

B. COLOR CODE MARKING FOR MILITARY STANDARD INDU

CAPACITORS, FIXED, VARIOUS-DIELECTRICS, STYLES CM, CN, CY, AND CB.

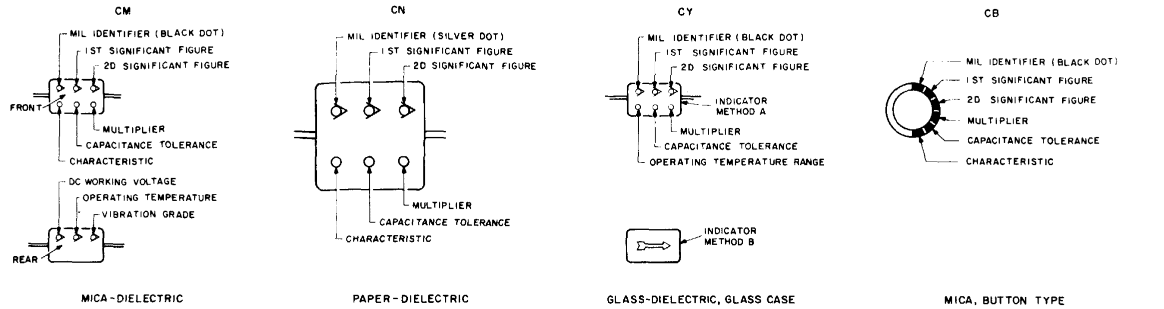


TABLE 3 — FOR USE WITH STYLES CM, CN, CY AND CB.

COLOR	MIL ID	1ST SIG FIG.	2D SIG FIG	MULTIPLIER[1]	CAPACITANCE TOLERANCE				CHARACTERISTIC[2]			DC WORKING VOLTAGE	OPERATING TEMP. RANGE	VIBRATION GRADE
					CM	CN	CY	CB	CM	CN	CB	CM	CY, CM	CM
BLACK	CM, CY CB	0	0	1			±20%	±20%		A			-55° TO +70°C	10-55 Hz
BROWN		1	1	10					B	E	B			
RED		2	2	100	±2%		±2%	±2%	C				-55° TO +85°C	
ORANGE		3	3	1,000		±30%			D		D	300		
YELLOW		4	4	10,000					E				-55° TO +125°C	10-2,000Hz
GREEN		5	5		±5%				F			500		
BLUE		6	6										-55° TO +150°C	
PURPLE (VIOLET)		7	7											
GRAY		8	8											
WHITE		9	9											
GOLD				0.1			±5%	±5%						
SILVER	CN			0.01	±10%	±10%	±10%	±10%						

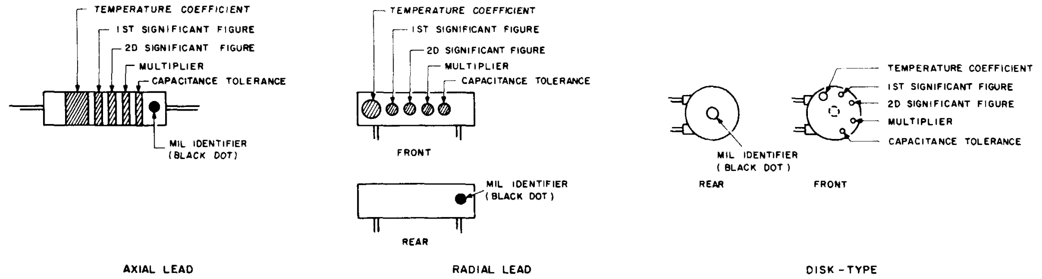


TABLE 4 — TEMPERATURE COMPENSATING, STYLE CC.

COLOR	TEMPERATURE COEFFICIENT[4]	1ST SIG FIG.	2D SIG FIG.	MULTIPLIER[1]	CAPACITANCE TOLERANCE		MIL ID
					CAPACITANCES OVER 10 UUF	CAPACITANCES 10 UUF OR LESS	
BLACK	0	0	0	1		± 2.0 UUF	CC
BROWN	−30	1	1	10	± 1%		
RED	−80	2	2	100	±2 %	± 0.25 UUF	
ORANGE	−150	3	3	1,000			
YELLOW	−220	4	4				
GREEN	−330	5	5		± 5 %	± 0.5 UUF	
BLUE	−470	6	6				
PURPLE (VIOLET)	−750	7	7				
GRAY		8	8	0.01*			
WHITE		9	9	0.1*	± 10%		
GOLD	+100			0.1		± 1.0 UUF	
SILVER				0.01			

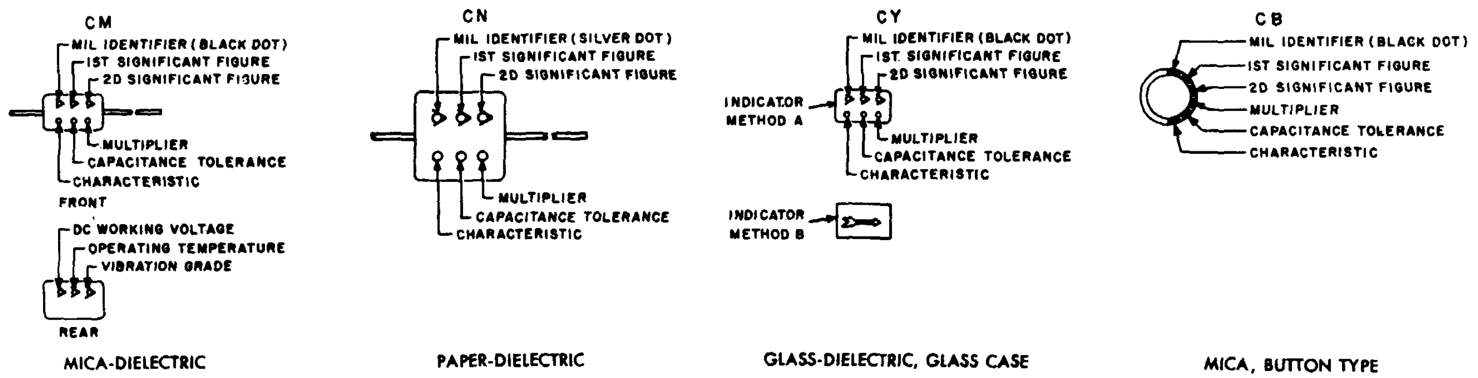
1. THE MULTIPLIER IS THE NUMBER BY WHICH THE TWO SIGNIFICANT (SIG) FIGURES ARE MULTIPLIED TO OBTAIN THE CAPACITANCE IN UUF.
2. LETTERS INDICATE THE CHARACTERISTICS DESIGNATED IN APPLICABLE SPECIFICATIONS: MIL-C-5, MIL-C-25D, MIL-C-11272B, AND MIL-C-10950C RESPECTIVELY.
3. LETTERS INDICATE THE TEMPERATURE RANGE AND VOLTAGE-TEMPERATURE LIMITS DESIGNATED IN MIL-C-11015D.
4. TEMPERATURE COEFFICIENT IN PARTS PER MILLION PER DEGREE CENTIGRADE.

* OPTIONAL CODING WHERE METALLIC PIGMENTS ARE UNDESIRABLE.

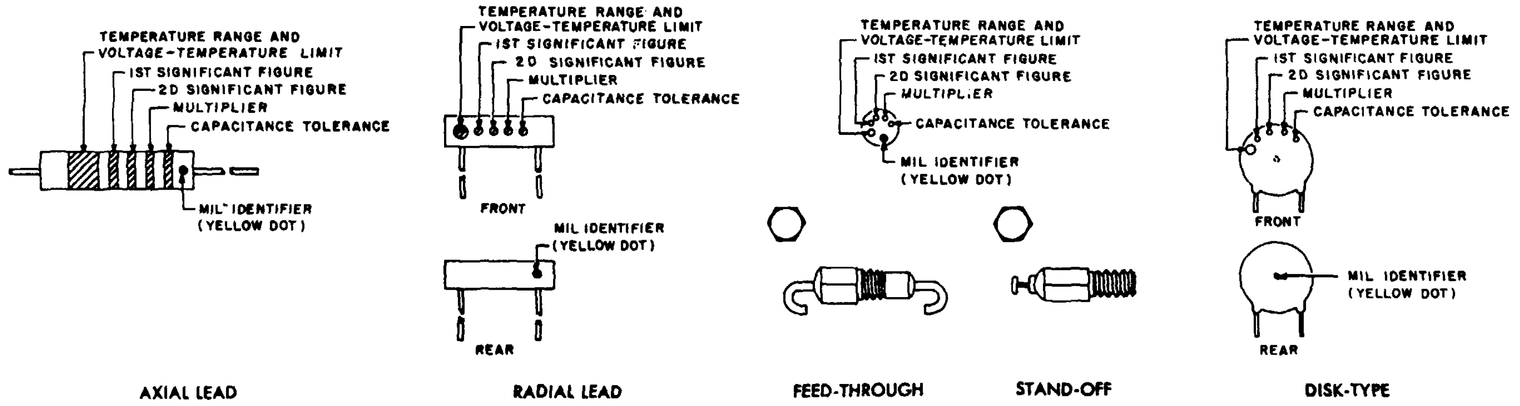
Figure 8-1. Military standard for color code marking.

COLOR CODE MARKING FOR MILITARY STANDARD CAPACITORS

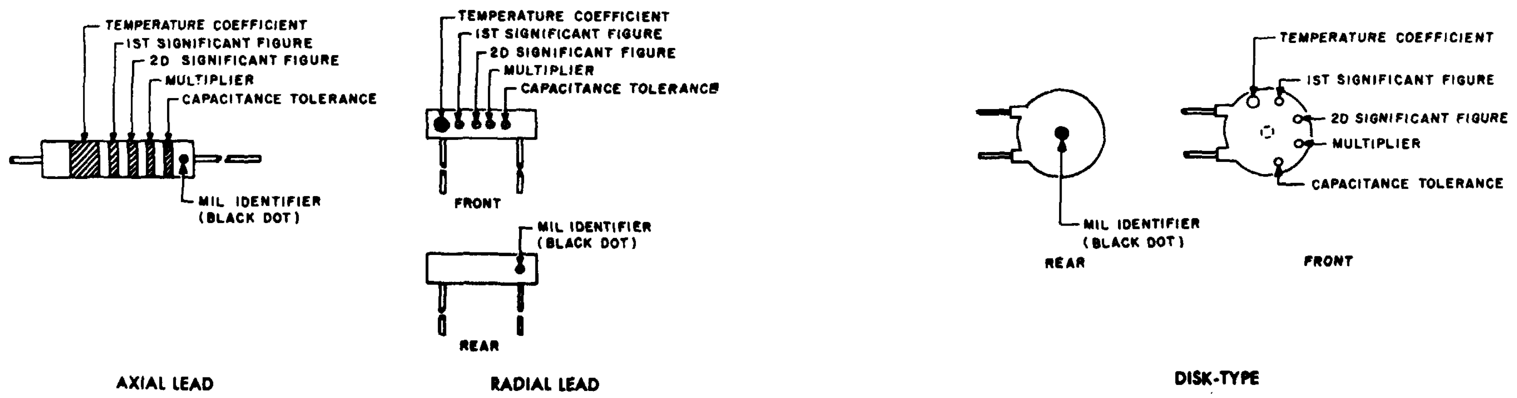
GROUP I Capacitors, Fixed, Various Dielectrics, Styles CM, CN, CY, and CB



GROUP II Capacitors, Fixed Ceramic-Dielectric (General Purpose) Style CK



GROUP III Capacitors, Fixed, Ceramic-Dieletric (Temperature Compensating) Style CC



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			D	300		
YELLOW		4	4	10,000					E					−55° to +125°C	10–2,000 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 Purpose, 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				
GREY		8	8	0.01			
WHITE		9	9	0.1	± 10%		
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. Letters 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.*

STD–C2

Figure 8-2. Color code for marking MIL-STD capacitors.

Figure 8-2. Color code for marking MIL-STD capacitors.

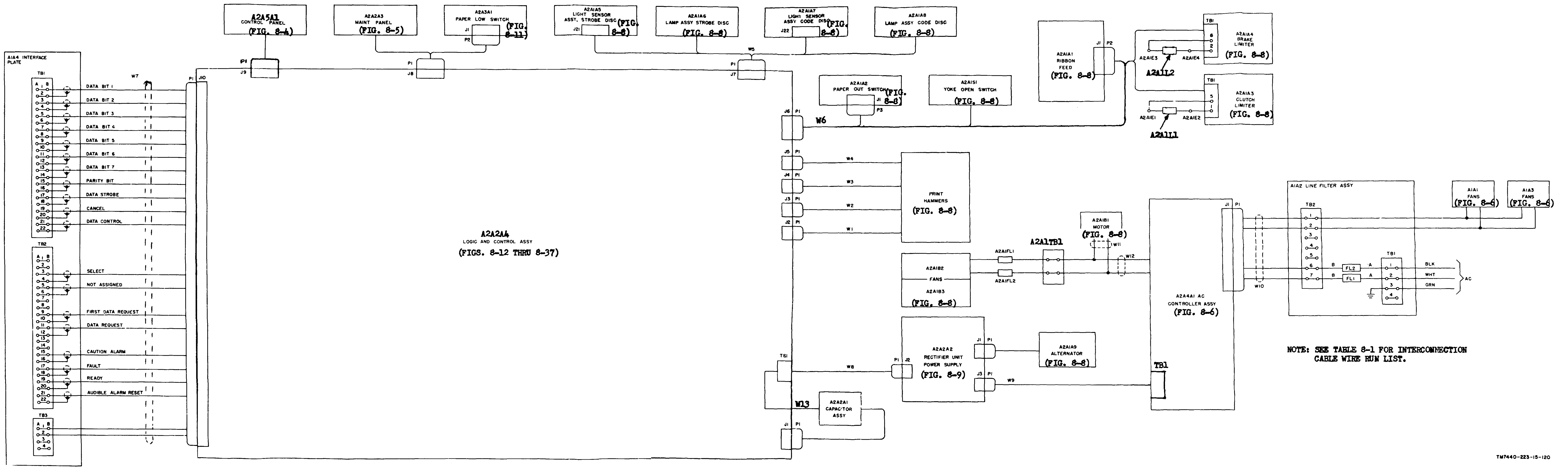


Figure 8-3. Page printer, interconnection diagram.

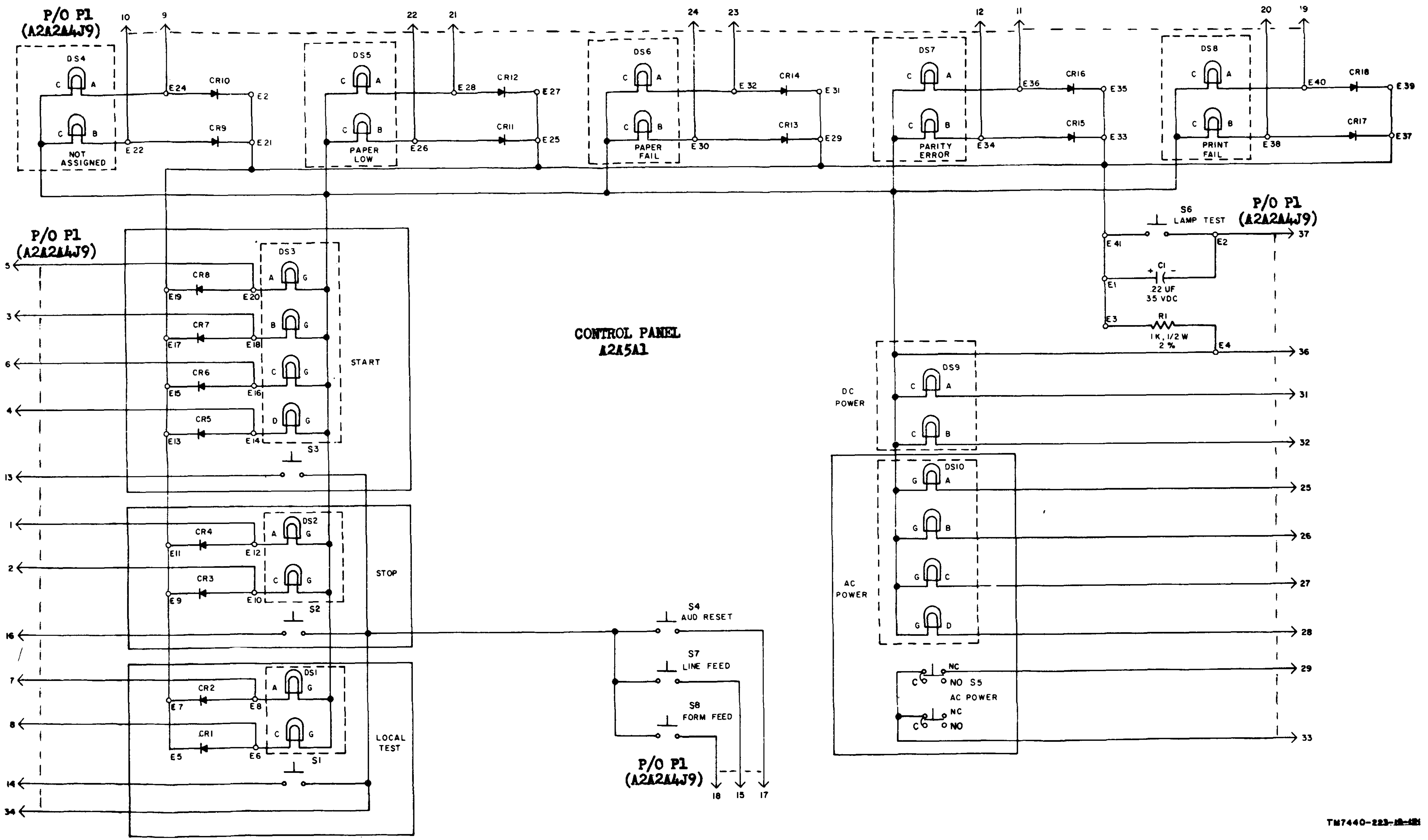


Figure 8-4. Control panel, schematic diagram

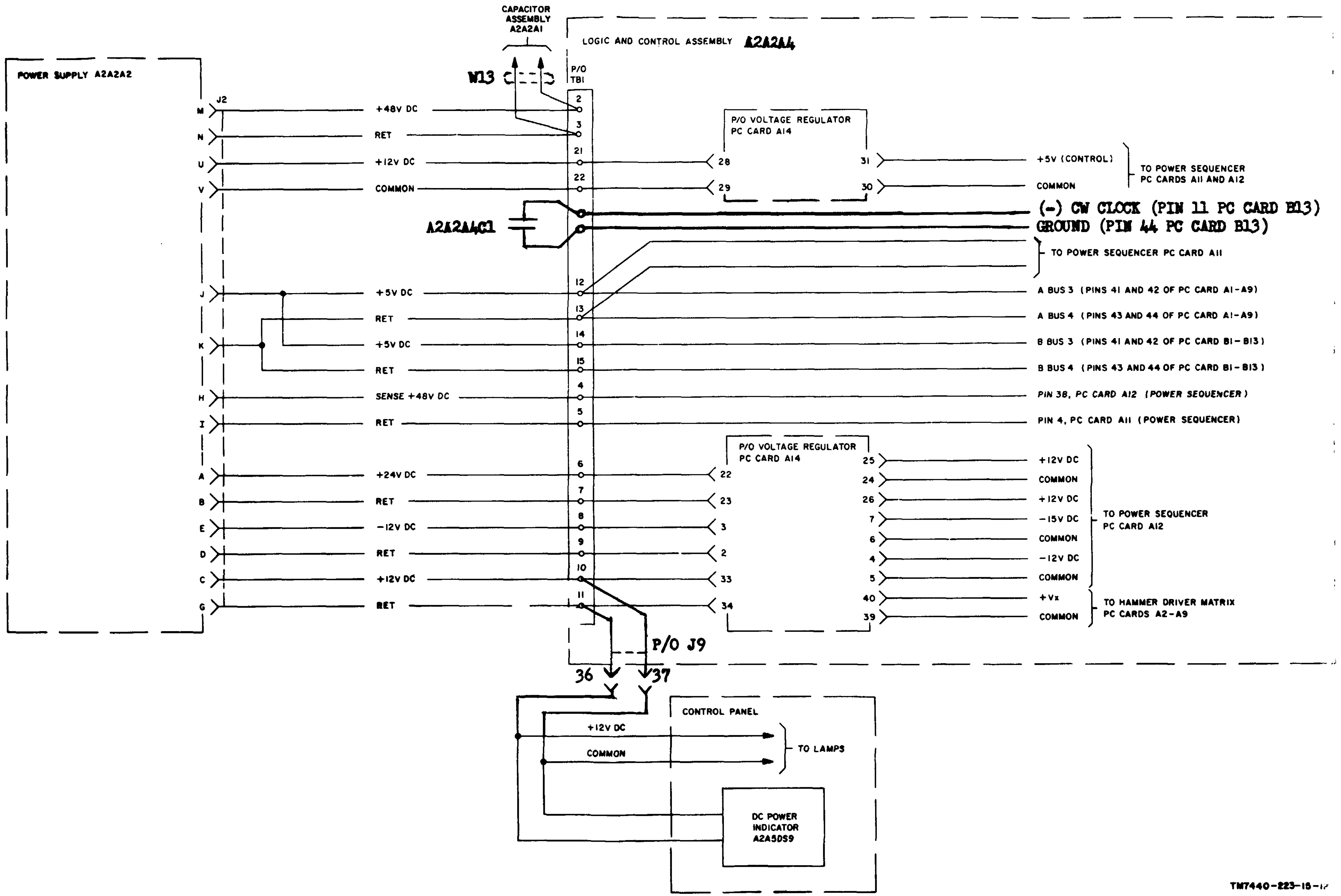


Figure 8-7. Dc circuits, schematic diagram

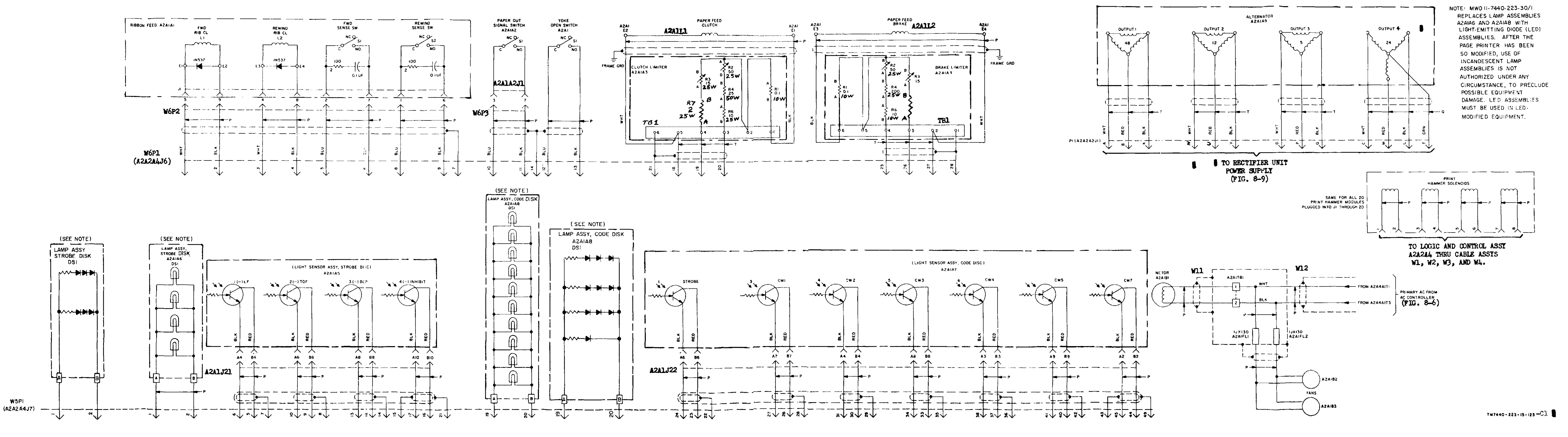
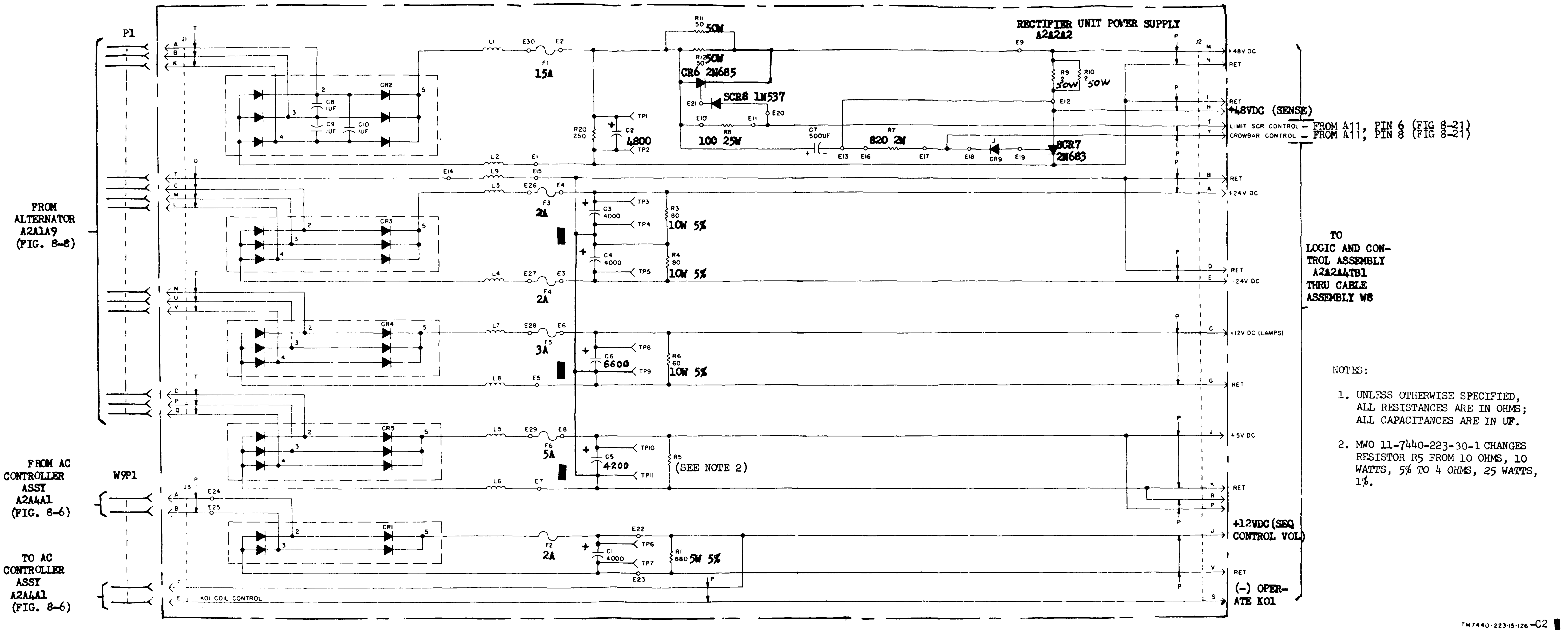


Figure 8-8. Print head, schematic diagram.



NOTES:

1. UNLESS OTHERWISE SPECIFIED, ALL RESISTANCES ARE IN OHMS; ALL CAPACITANCES ARE IN UF.
2. MWO 11-7440-223-30-1 CHANGES RESISTOR R5 FROM 10 OHMS, 10 WATTS, 5% TO 4 OHMS, 25 WATTS, 1%.

Figure 8-9. Rectifier Unit, power supply schematic diagram

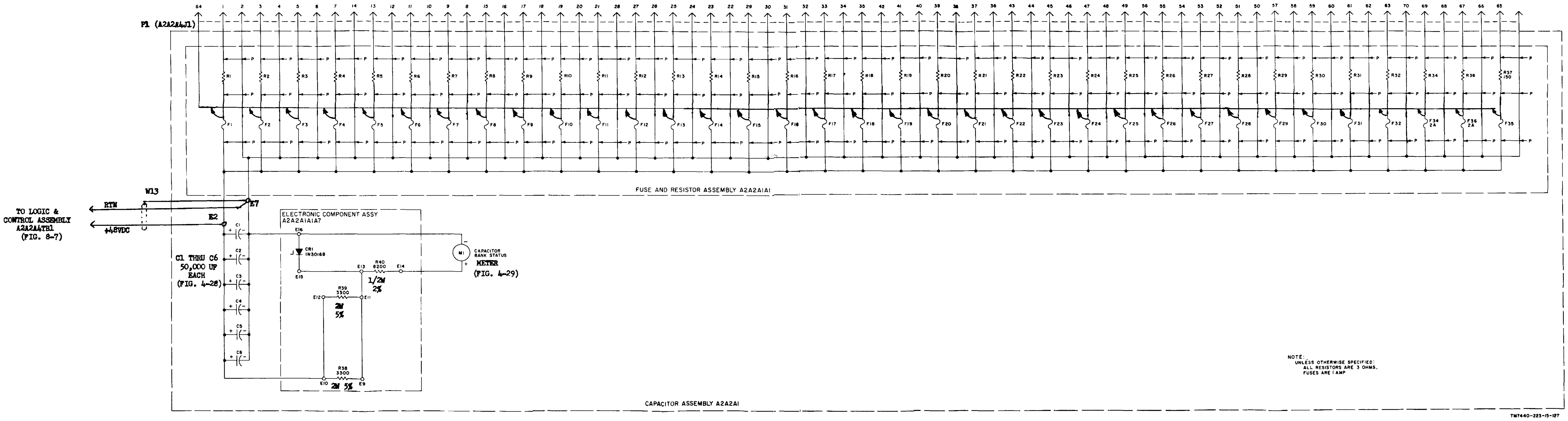
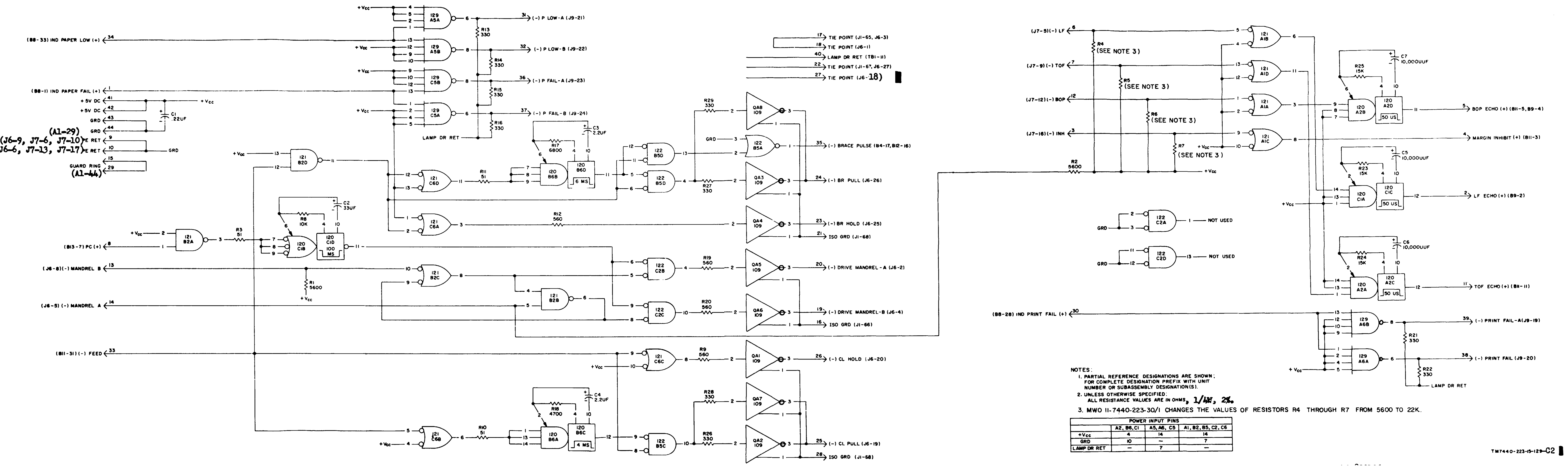


Figure 8-10. Capacitor assembly (including fuse and resistor subassembly), schematic diagram.

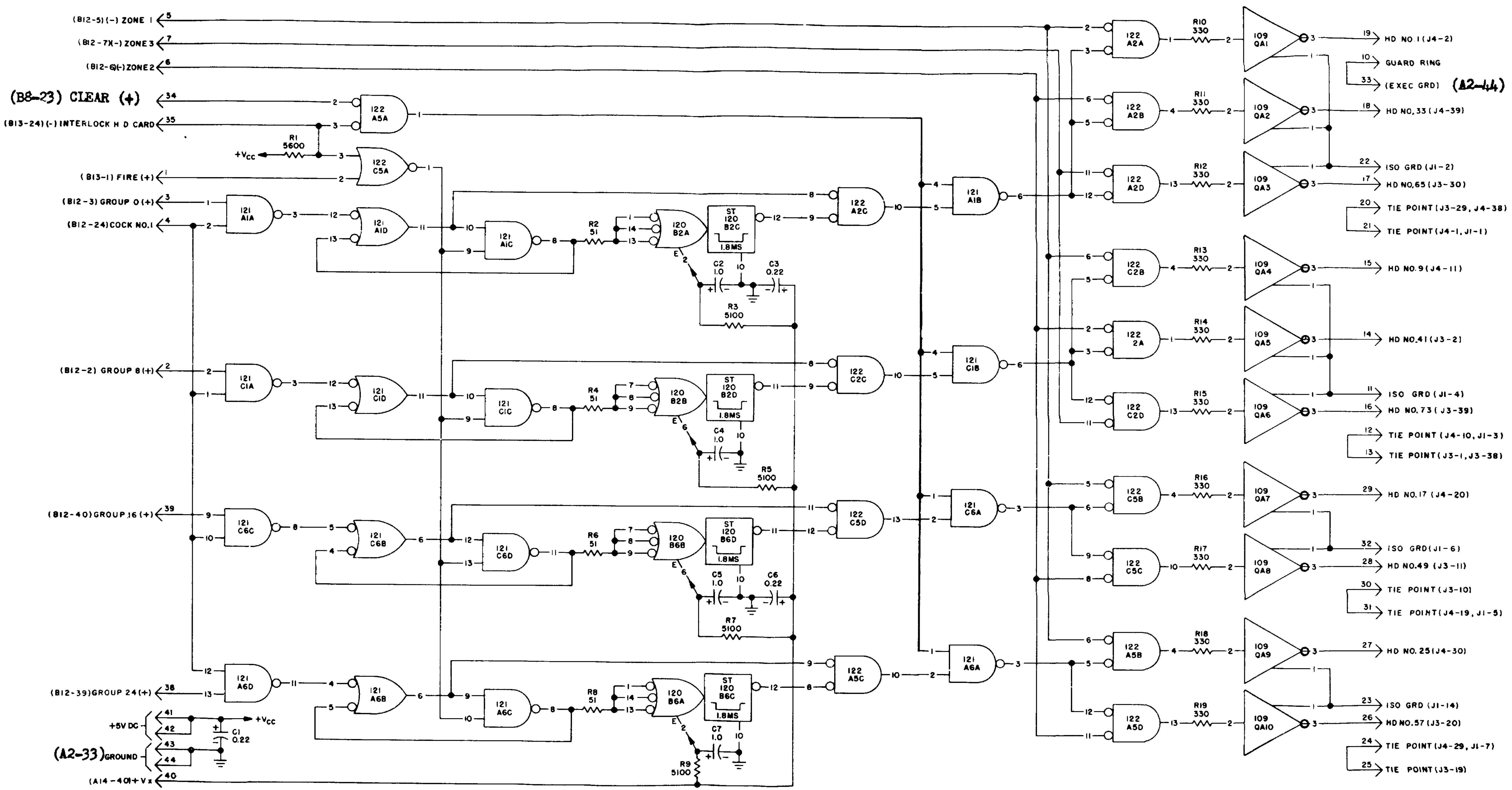


NOTES:
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION PREFIX WITH UNIT NUMBER OR SUBASSEMBLY DESIGNATION(S).
2. UNLESS OTHERWISE SPECIFIED: ALL RESISTANCE VALUES ARE IN OHMS, 1/4W, 2%.
3. MWO 11-7440-223-30/1 CHANGES THE VALUES OF RESISTORS R4 THROUGH R7 FROM 5600 TO 22K.

POWER INPUT PINS			
	A2, B6, C1	A5, A6, C5	A1, B2, B5, C2, C6
+Vcc	4	14	14
GRD	10	—	7
LAMP DR RET	—	7	—

TM7440-223-15-129-C2

Figure 8-12. Paper and ribbon PC card A1 (No. 12-890136 or 56730), logic diagram.



POWER INPUT PINS		
	A1, A2, A5, A6, C1, C2, C5, C6	B2, B6
$+V_{CC}$	14	4
GRD	7	10

NOTES:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION, PREFIX WITH UNIT NUMBER OR SUBASSEMBLY DESIGNATION(S).
2. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UF.

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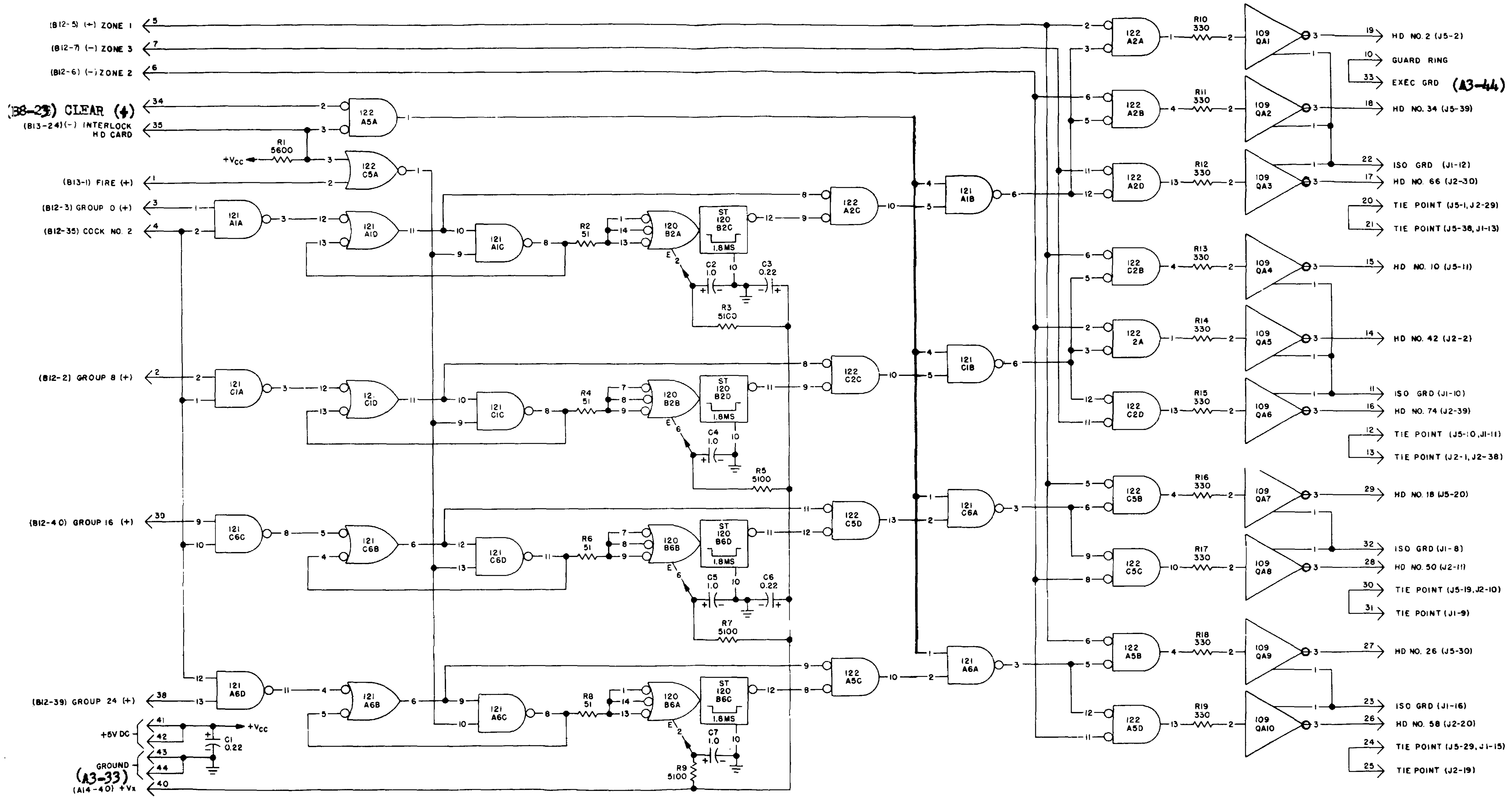
Figure 8-13. Hammer driver matrix PC card A2 (No. 56731), logic diagram.



POWER INPUT PINS		
	A1, A2, A5, A6, C1, C2, C5, C6	B2, B6
$+V_{CC}$	14	4
GRD	7	10

NOTES:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION, PREFIX WITH UNIT NUMBER OR SUBASSEMBLY DESIGNATION(S).
2. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UF.

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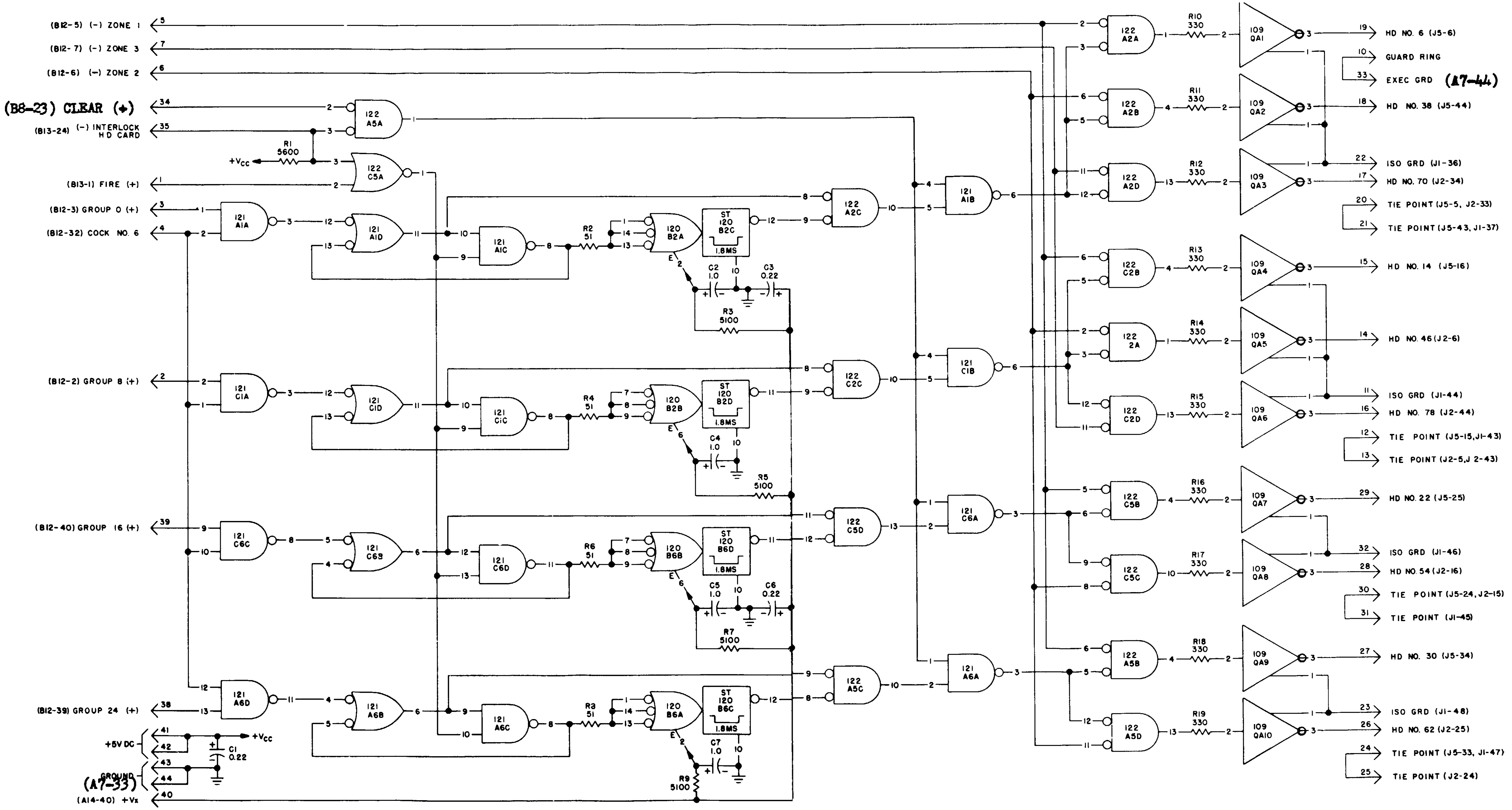
Figure 8-14. Hammer driver matrix PC card A3 (No. 56731), logic diagram.



POWER INPUT PINS		
	A1, A2, A5, A6, C1, C2, C5, C6	B2, B6
+Vcc	14	4
GRD	7	10

NOTES:
1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION, PREFIX WITH UNIT NUMBER OR SUBASSEMBLY DESIGNATION(S).
2. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UF.

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Figure 8-18. Hammer driver matrix PC card A7 (No. 56731), logic diagram.

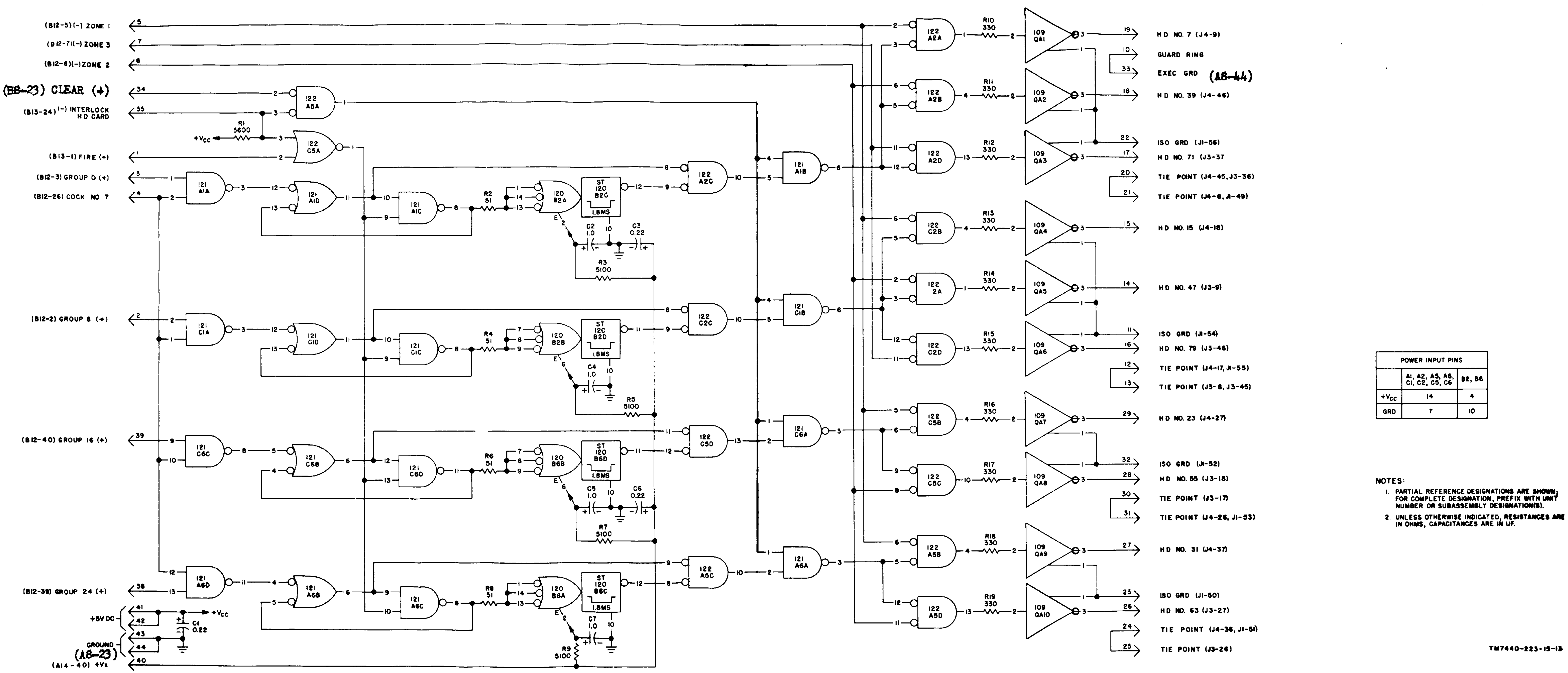
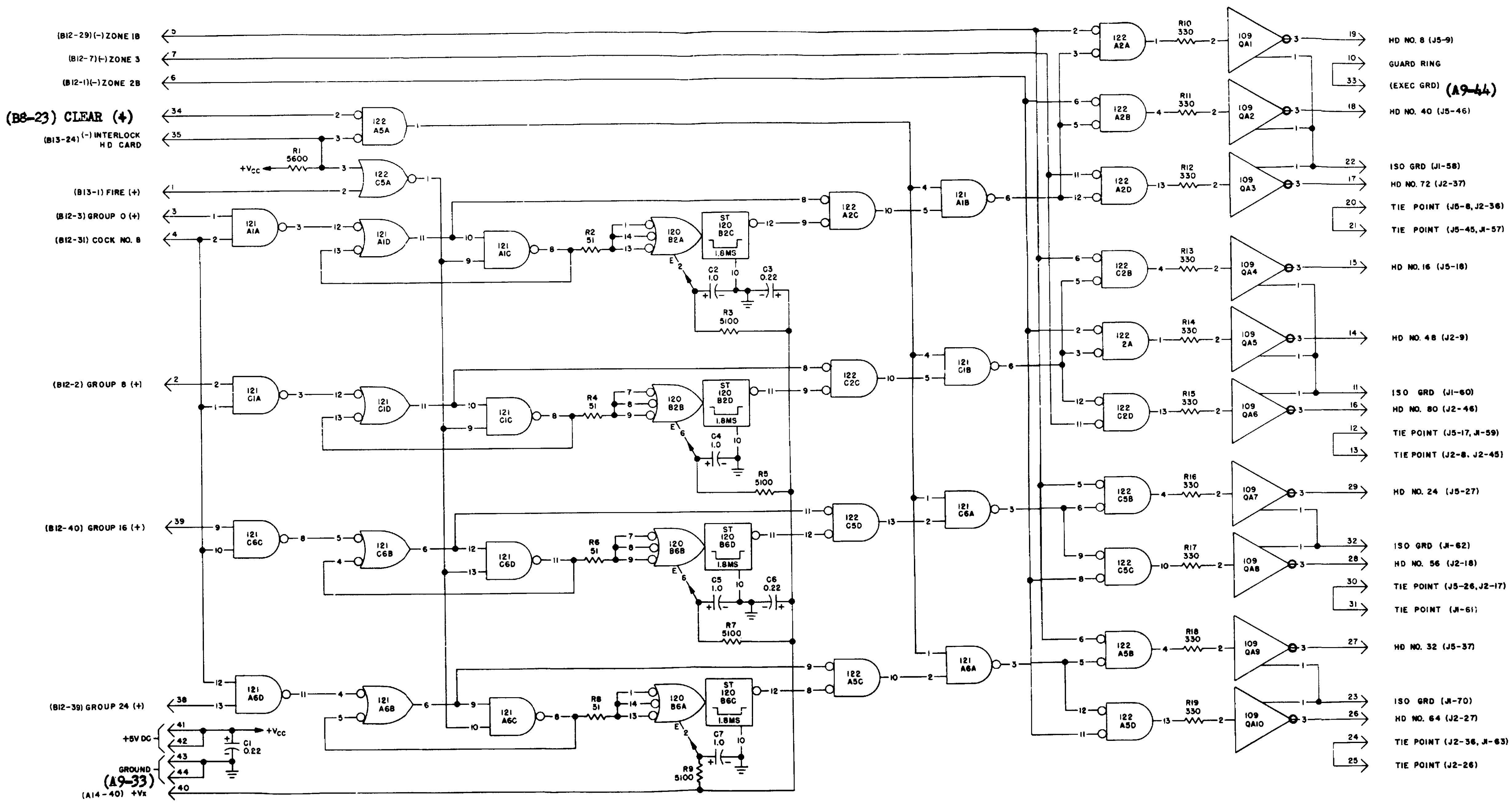


Figure 8-19. Hammer driver matrix PC card A8. (No. 56731), logic diagram.



POWER INPUT PINS	A1, A2, A5, A6, C1, C2, C5, C6	B2, B6
$+V_{CC}$	14	4
GRD	7	10

NOTES:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION, PREFIX WITH UNIT NUMBER OR SUBASSEMBLY DESIGNATION(S).
2. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN UF.

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Figure 8-20. Hammer driver matrix PC card A9 (No. 56731), logic diagram.

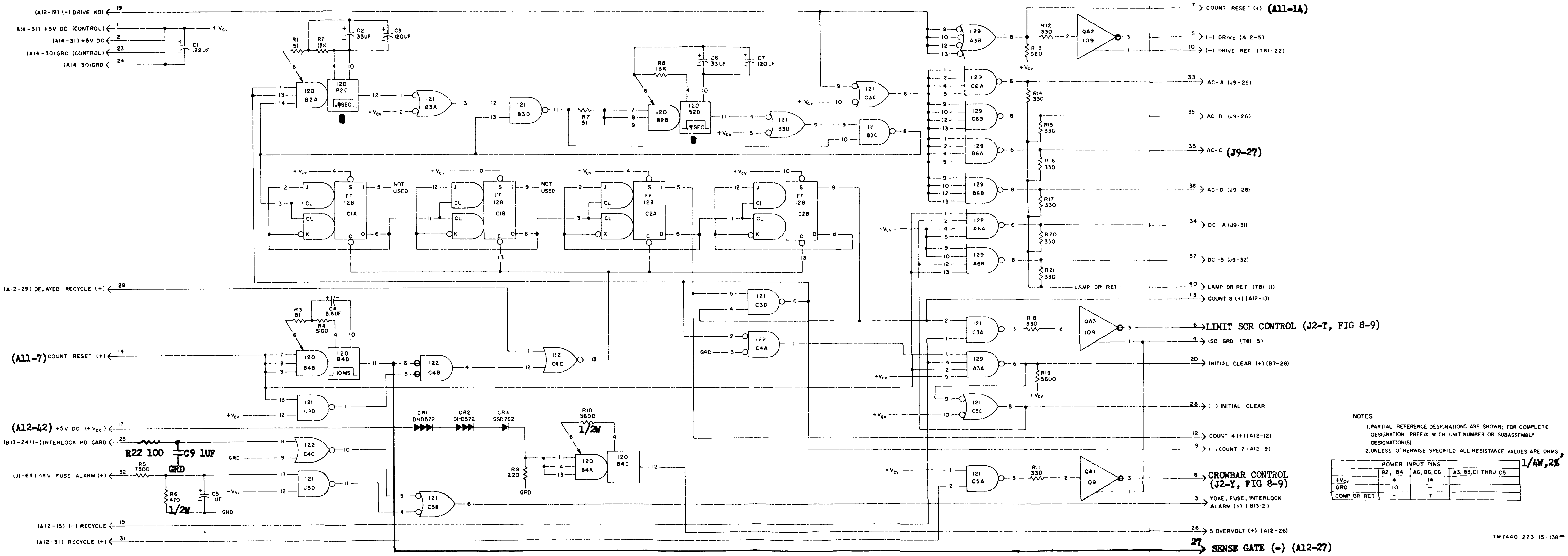
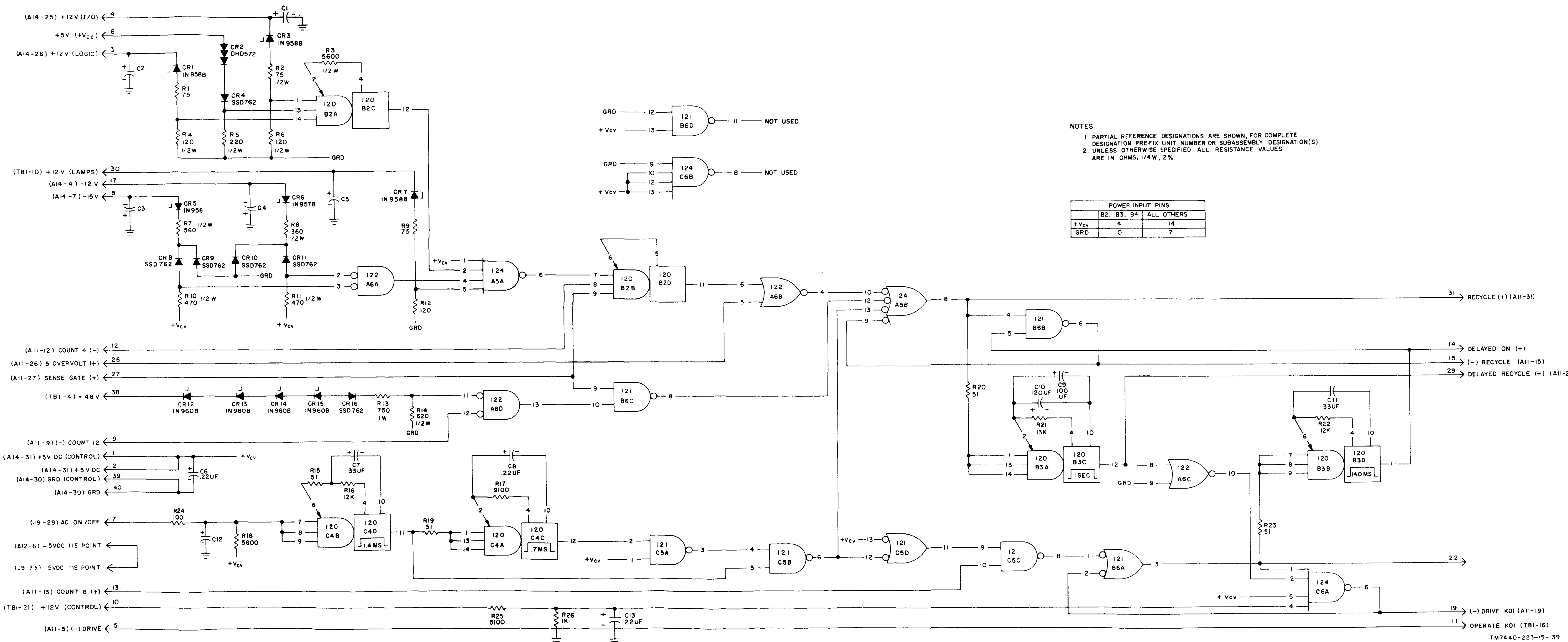
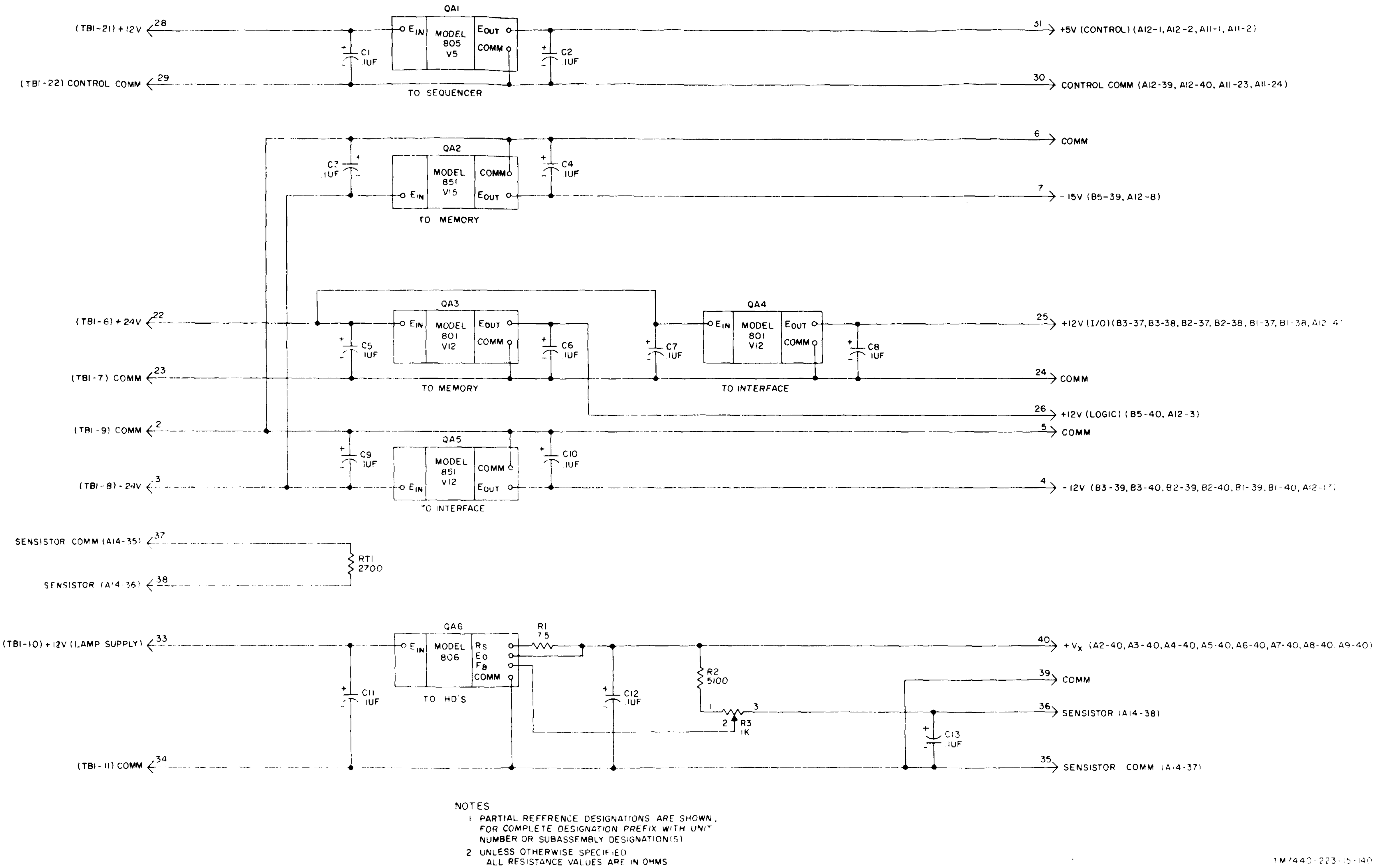


Figure 8-21. Sequencer B PC card A11 (No. 56735), logic diagram.



▌ **FO 8-22. Sequencer A PC card A12 (No. 56734), logic diagram.**



FO 8-23. Voltage regulator PC card A14 (56736), logic diagram.

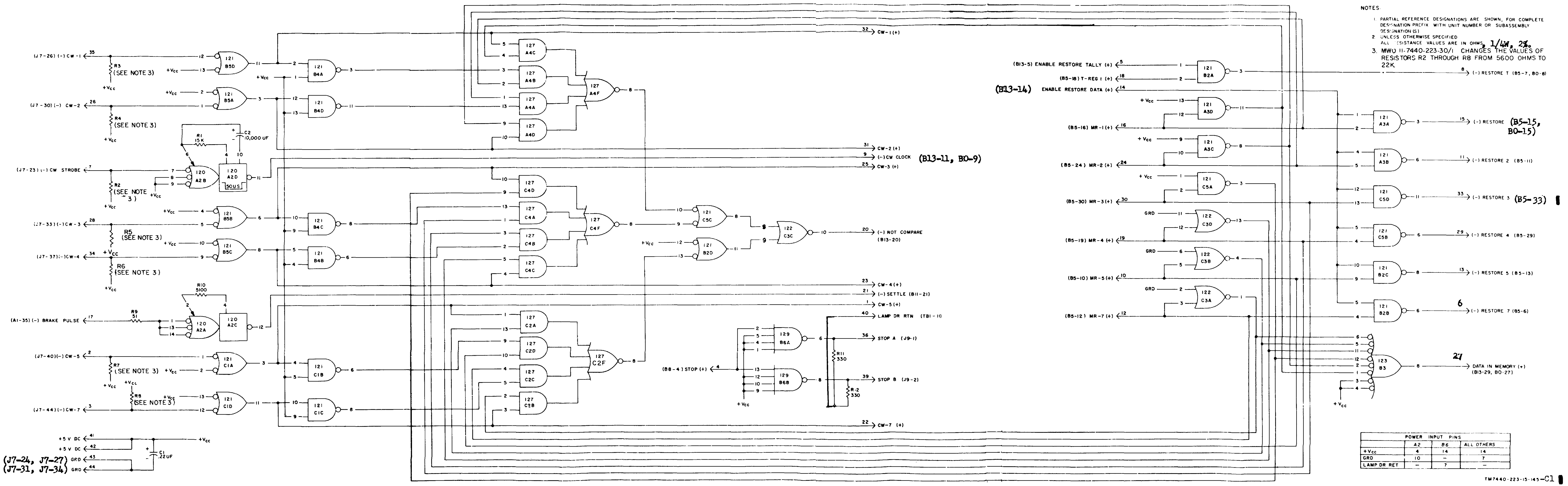


Figure 8-28. Compare and restore PC card B4 (No. 12-890137 or 56727), logic diagram.

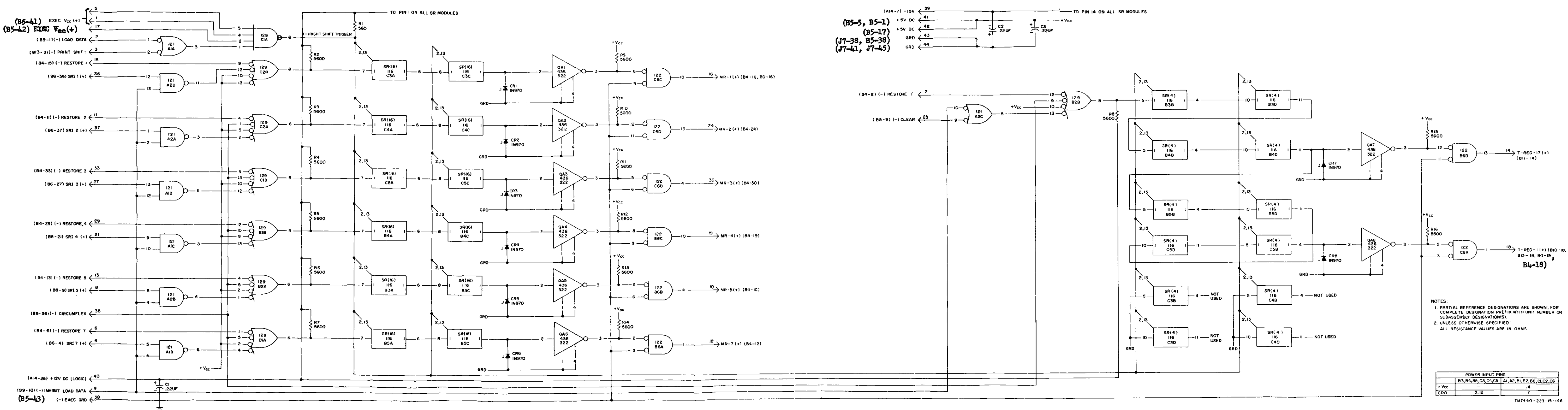


Figure 8-29. 7X32 SR storage PC card B5 (No. 56726), logic diagram.

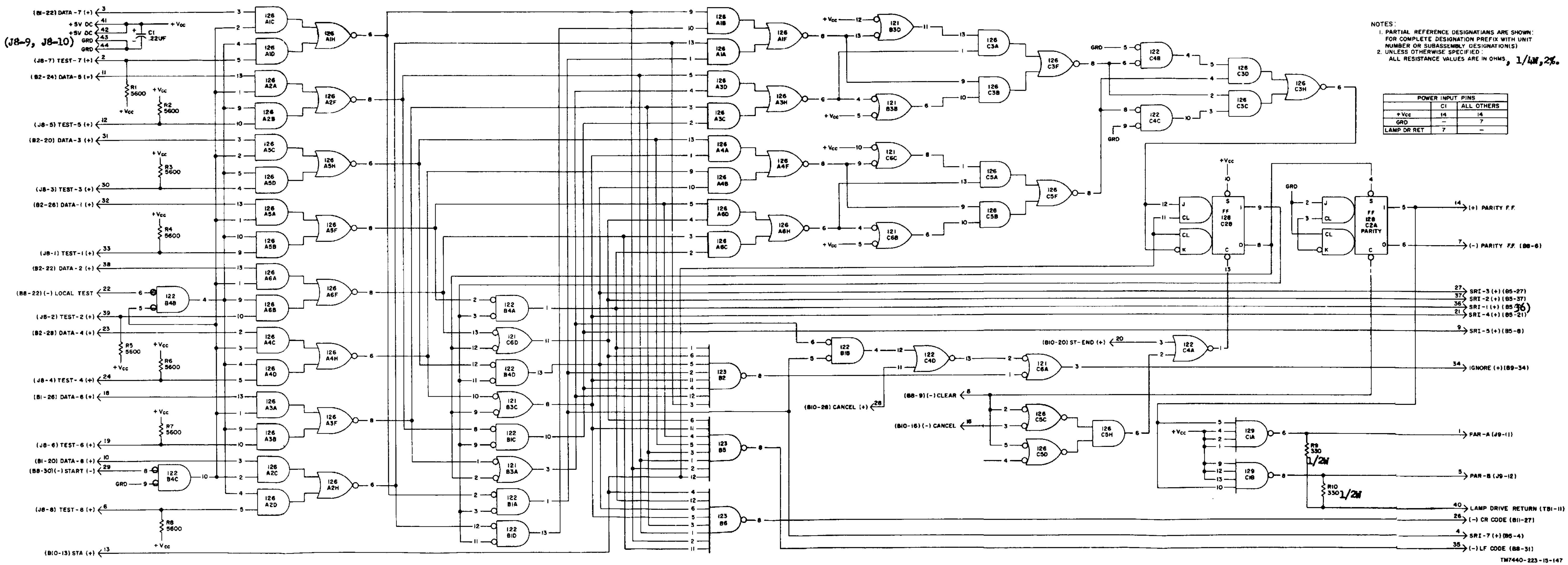
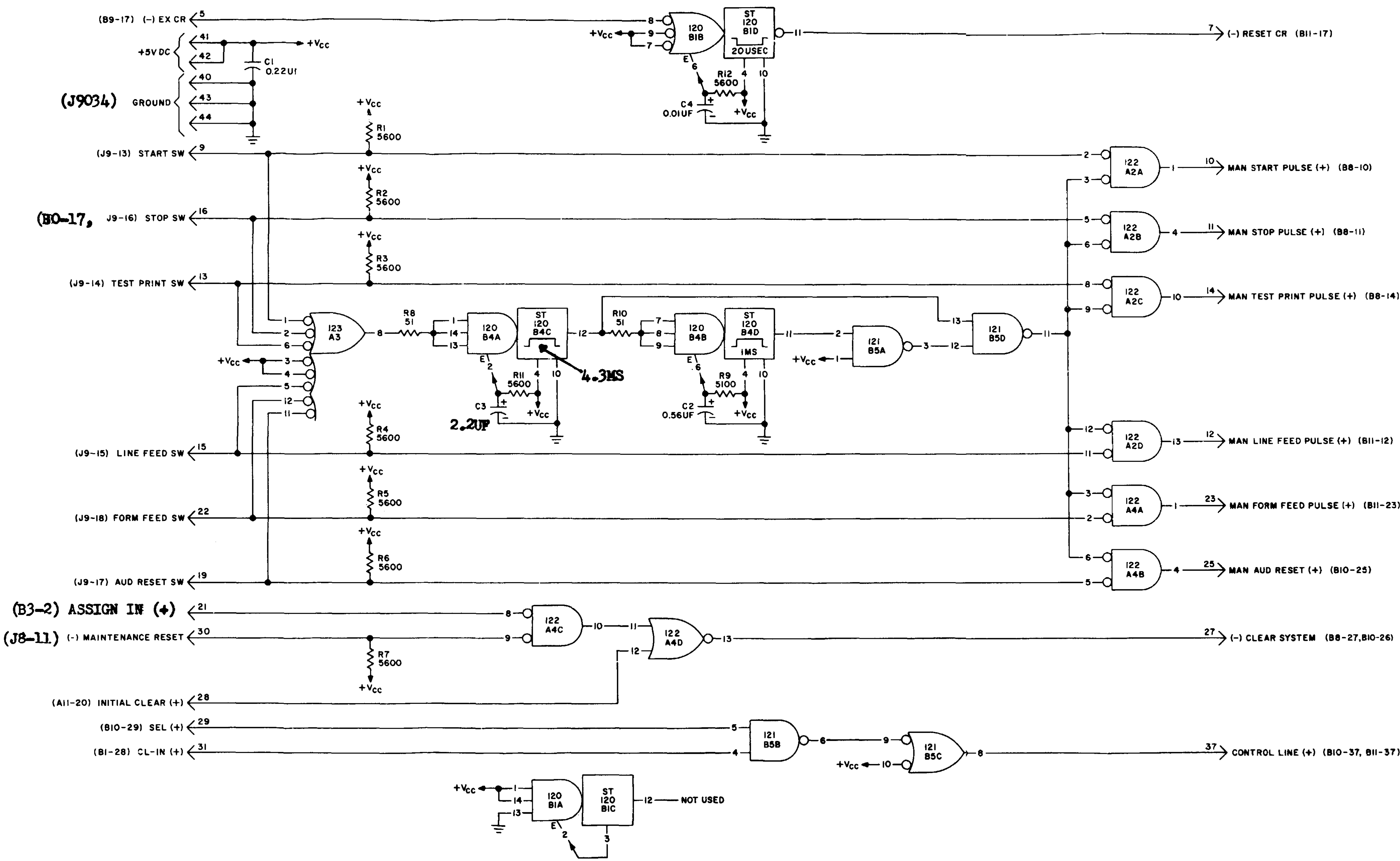


Figure 8-30. Decode and parity PC card B6 (No. 56725), logic diagram.



POWER INPUT PINS		
	B1, B4	ALL OTHERS
+V_{CC}	4	14
GRD	10	7

NOTES:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION, PREFIX WITH UNIT NUMBER OR SUBASSEMBLY DESIGNATION(S).
2. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS.

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Figure 8-31. Control interface PC card B7 (No. 56720), logic diagram.

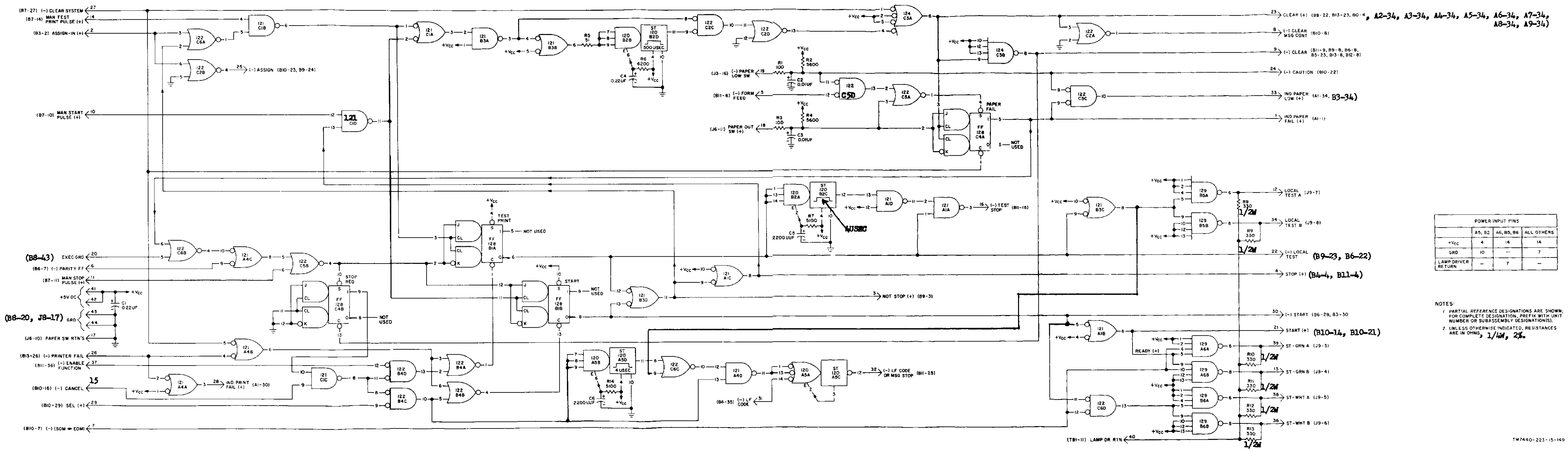


Figure 8-32. Run control PC card B8 (No. 56721), logic diagram.

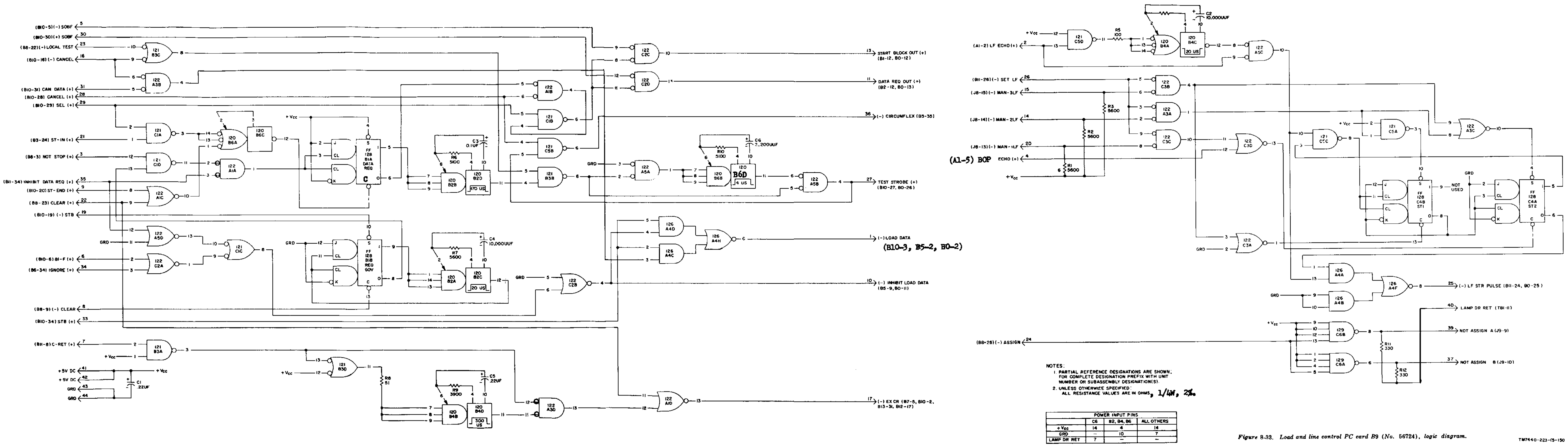
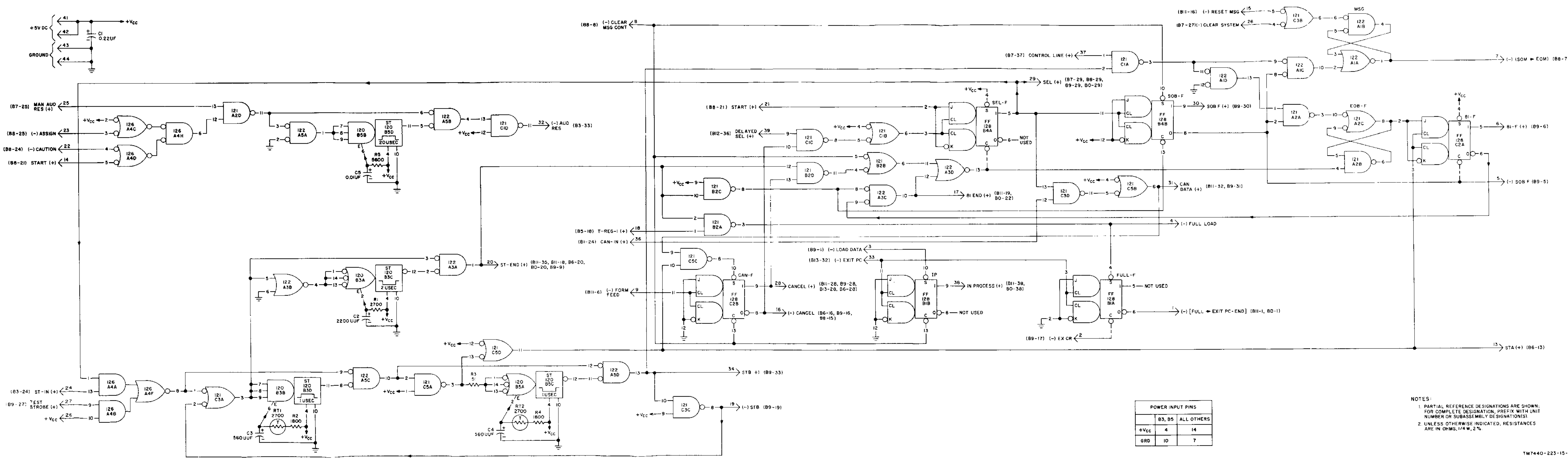
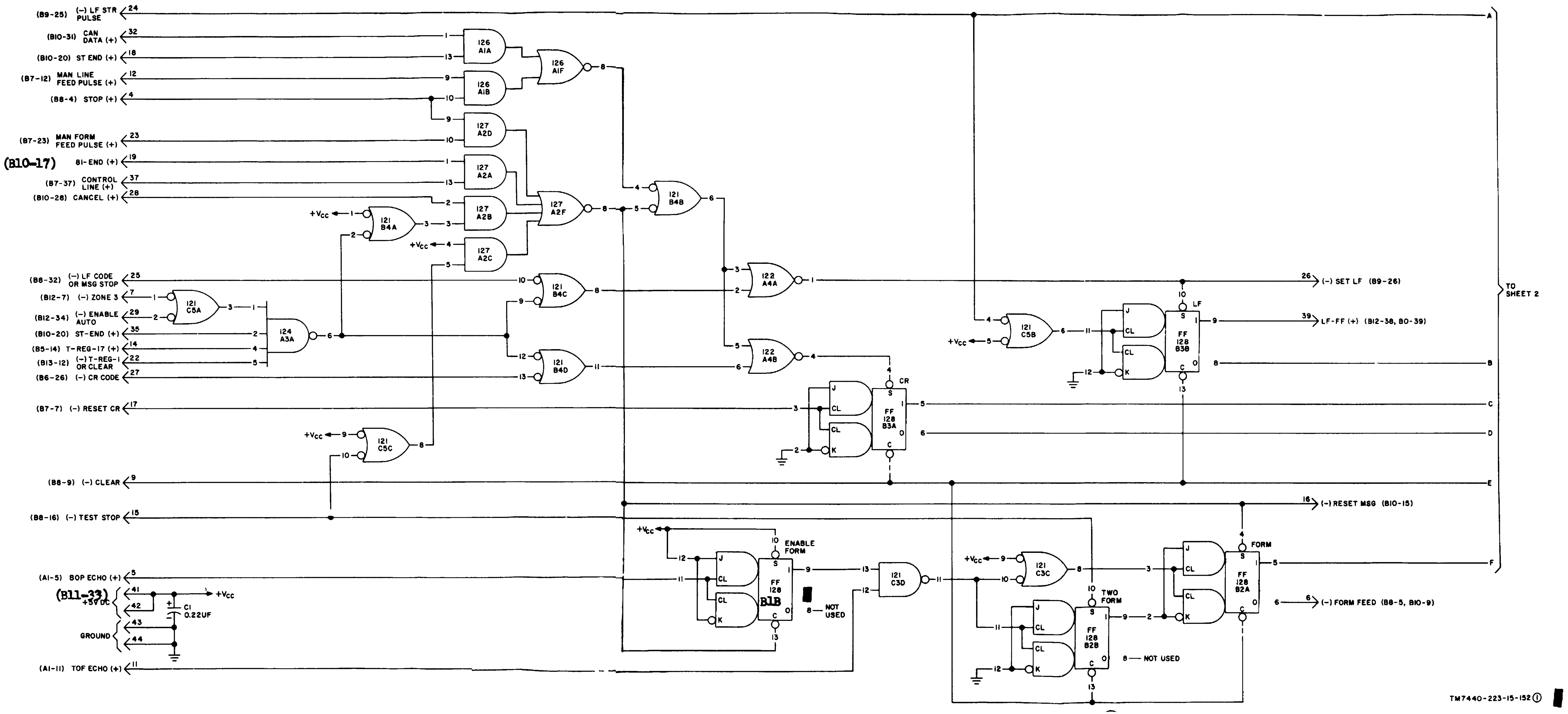


Figure 8-33. Load and line control PC card B9 (No. 56724), logic diagram.



■ FO 8-34. Message control PC card B10 (No. 56722), logic diagram.



POWER INPUT PINS		
	B5	ALL OTHERS
$+V_{CC}$	4	14
GRD	10	7

NOTES:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION, PREFIX WITH UNIT NUMBER OR SUBASSEMBLY DESIGNATION(S).
2. UNLESS OTHERWISE INDICATED, RESISTANCES ARE IN OHMS.

Figure 8-35 (1). Function control PC card B11 (No. 56723), logic diagram (part 1 of 2).

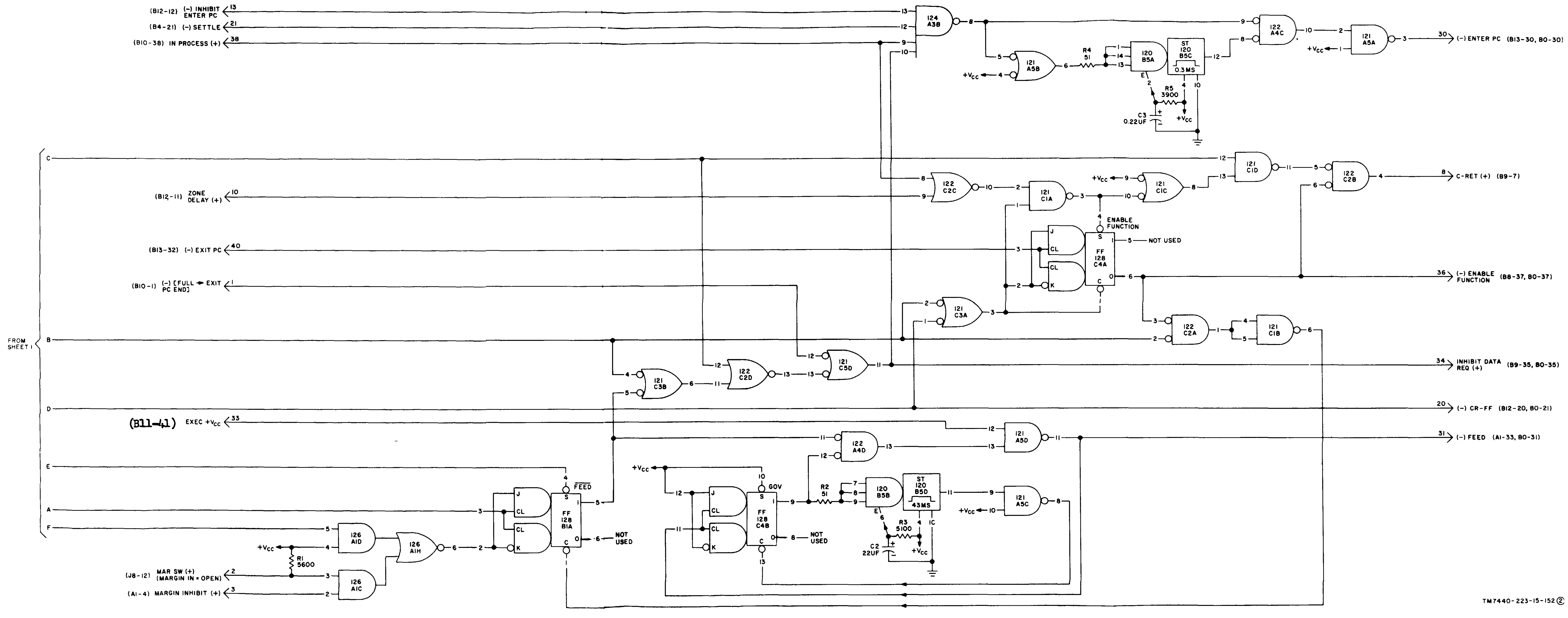


Figure 8-35 (2). Function control PC card B11 (No. 56723), logic diagram (part 2 of 2).

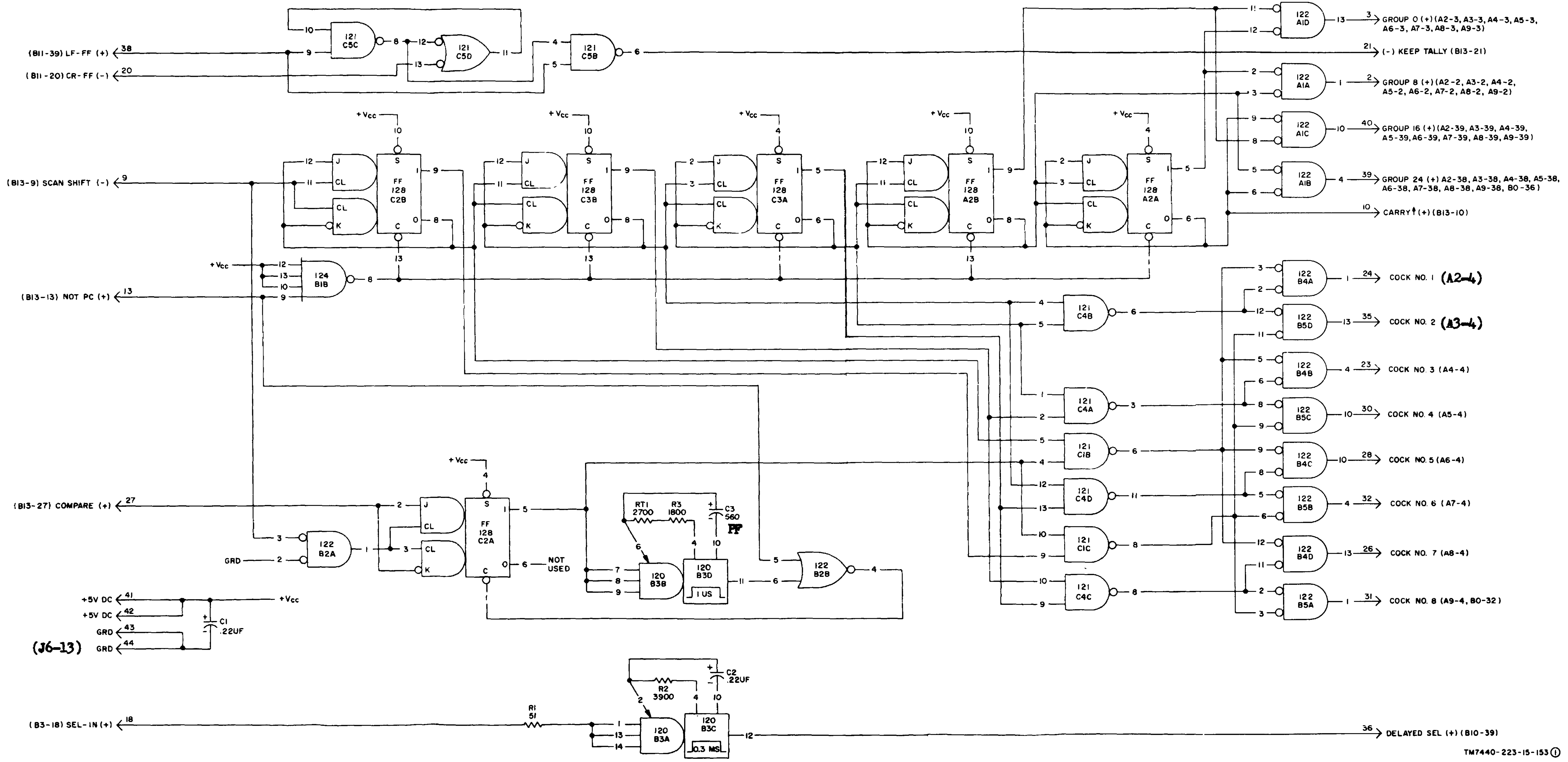
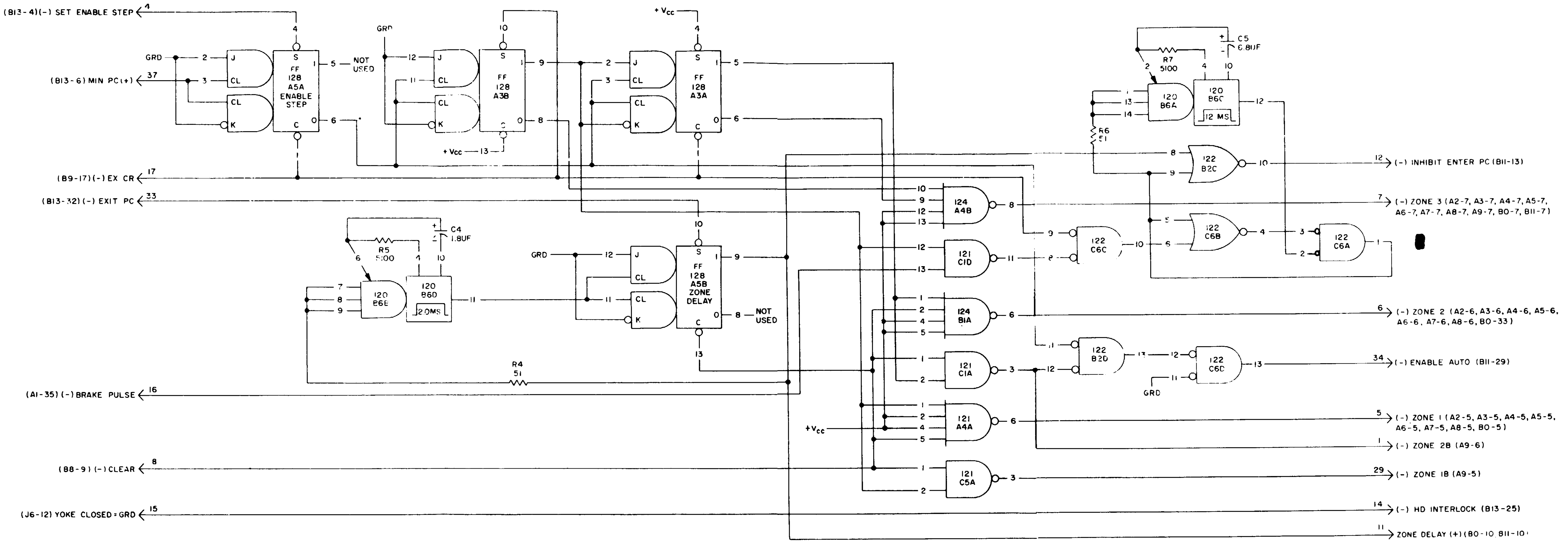


Figure 8-36 (1). Print address PC card B12 (No. 56729), logic diagram (part 1 of 2).



NOTES:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN; FOR COMPLETE DESIGNATION PREFIX WITH UNIT NUMBER OR SUBASSEMBLY DESIGNATION(S).
2. UNLESS OTHERWISE SPECIFIED: ALL RESISTANCE VALUES ARE IN OHMS.

POWER INPUT PINS		
	B3, B6	ALL OTHERS
+Vcc	4	14
GRD	10	7

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Figure 8-36 (2). Print address PC card B12 (No. 56729), logic diagram (part 2 of 2).

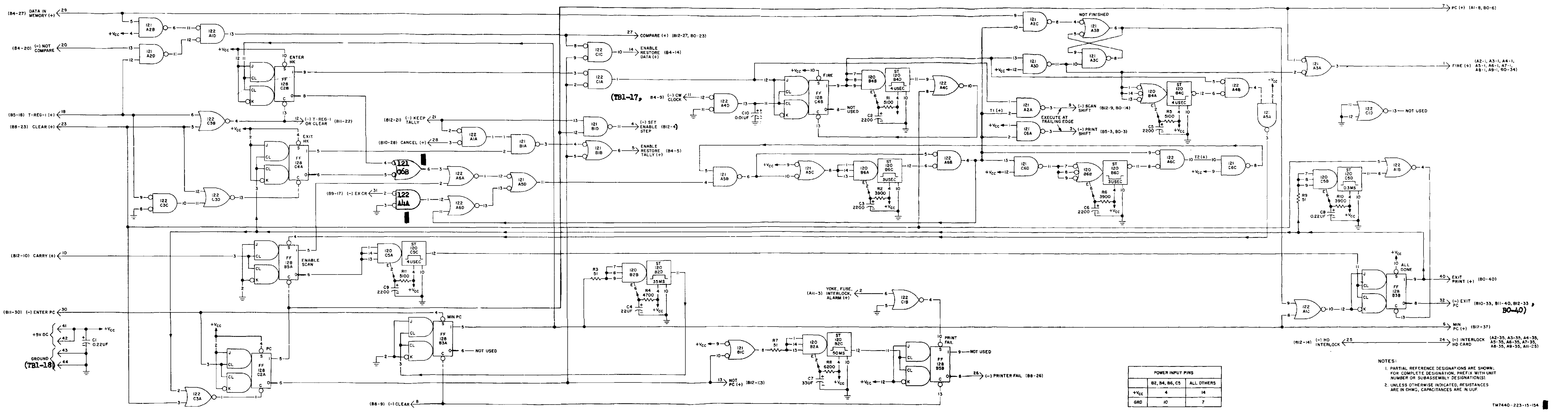

Figure 8-37. Print control PC card B13 (No. 56728), logic diagram.

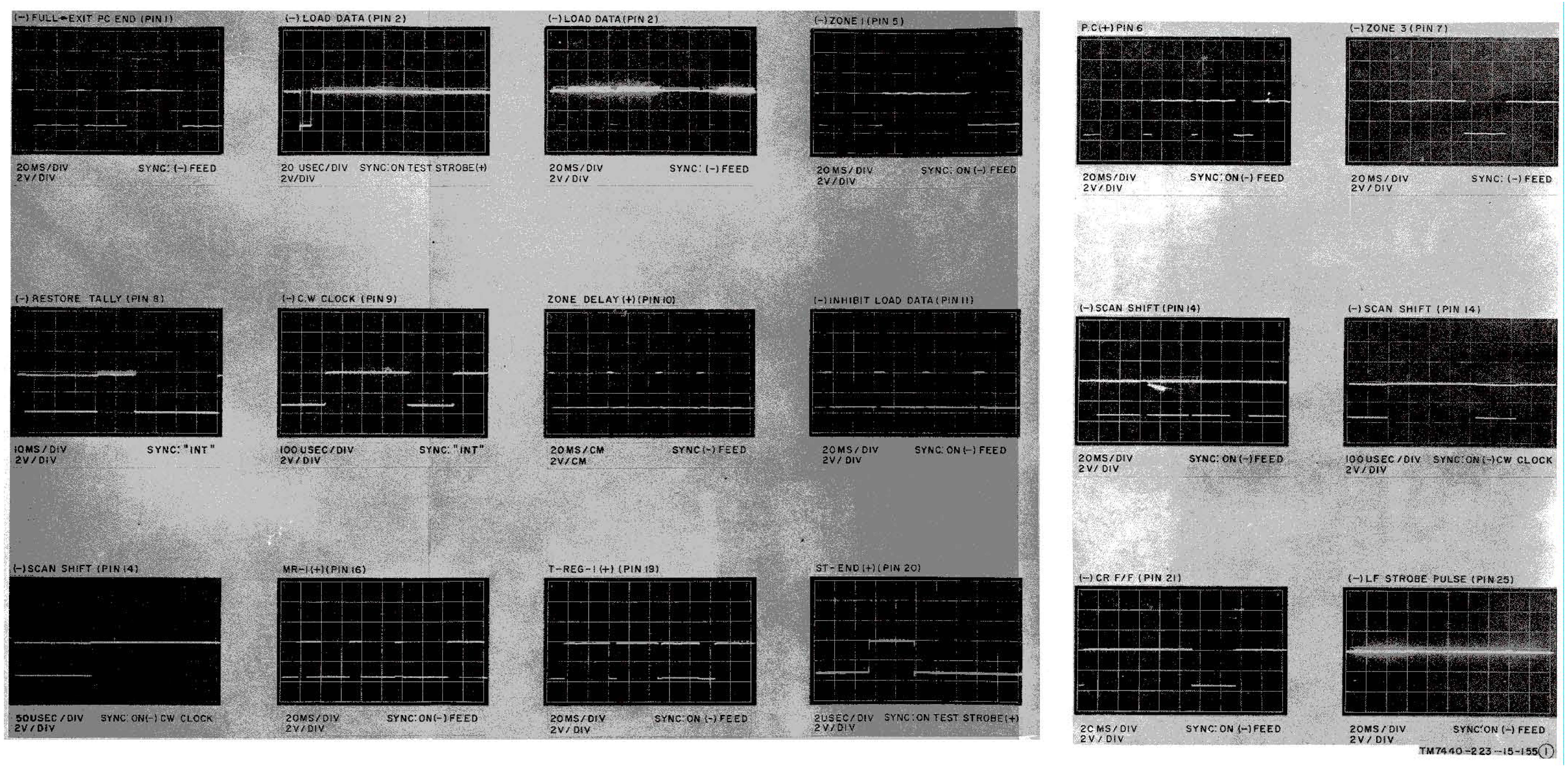

Figure 8-38 (1). Test point waveforms (part 1 of 2).

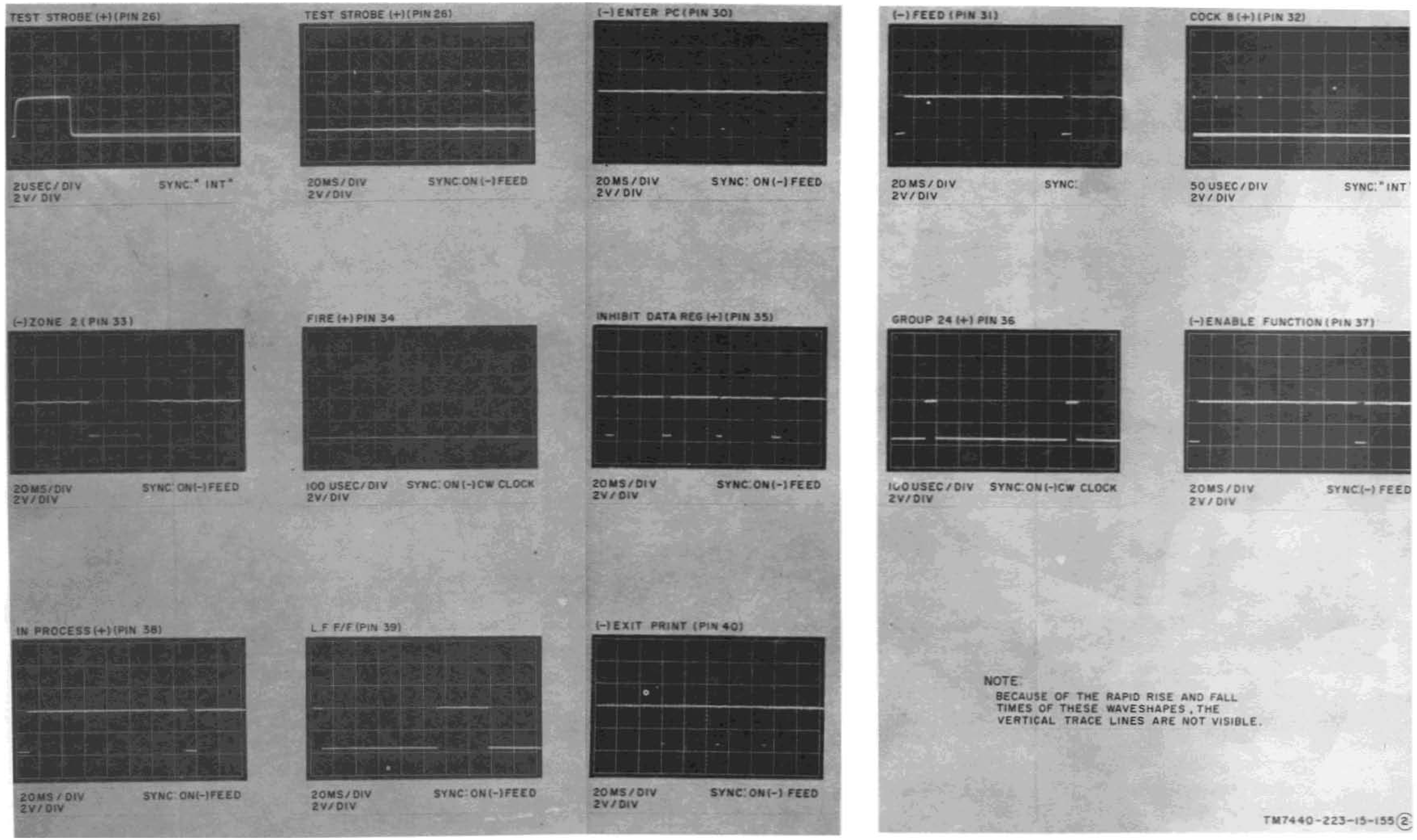

Figure 8-38 (2). Test point waveforms (part 2 of 2).

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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.

The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 decagram = 10 grams = .35 ounce
1 hectogram = 10 decagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce-inches	Newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	Newton-meters	1.356	metric tons	short tons	1.102
pound-inches	Newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

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