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Operation/Maintenance
Manual
for
Model 800
Synchro Panel
Meter

1. In section 1, replace Table 1-2 with the following (shaded areas have been changed).

EDAC pin	P1 pin	P4 (Option F3X) signal name
19	800	Spare
21	400	Spare
23	200 (or "-" for option F2X)	Spare
17	100	Spare
25	Disable hundreds	Spare
34	80	0.0002
30	40	0.008
26	20	0.002
38	10	0.0008
42	Disable tens	Multiply/divide
24	8	0.001
28	4	0.004
32	2	0.0001
36	1	0.0004
40	Disable units	Spare
16	0.8	0.04
14	0.4	0.02
12	0.2	0.01
10	0.1	0.8
20	Disable tenths	Spare
22	Logic ground	Spare
4	Busy signal	0.1
13	Data freeze (open = track)	Spare
9	Jump to 27 for 90 V L-L	Spare
3	Jump to 27 for 26 V L-L	Spare
5	Jump to 27 for 11.8 V L-L	Spare
27	L-L jumper	Spare
41	S1, synchro or resolver	Spare
48	S2, synchro or resolver	Spare
44	S3, synchro or resolver	Spare
46	S4, resolver	Spare
50,39	Jump 50 to 39 for synchro; open for resolver	
8	R1 (Ref HI)	0.4
6	R2 (Ref LO)	0.2
47	115 V power HI	Spare
43	115 V or 26 V power LO	Spare
45	26 V power HI or 26 V output tap	Spare
2	Chassis ground*	Spare
7	Spare	Spare
11	Spare	Spare
15	Spare	Spare
18	Spare	0.08
29	Spare	Spare
31	Spare (E5)	Spare
33	Spare (E6) used for dimmer option	Spare
35	+5V	Spare
37	Spare	Spare
1	Chassis ground*	Chassis ground
49	Chassis ground	Spare

* P1 Pins 1 & 2 only connect to chassis when unit is installed in case

1. In section 1, Table 1-5 (Test Equipment Required), revise the following table entry:

Equipment	Manufacturer	Model Number
Synchro/Resolver Simulator	North Atlantic Instruments	5300

Throughout section 4, revise any references to other test equipment to reflect equipment listed above.

In section 1, replace Table 1-3 with the following:

26 V ac reference		115 V ac reference	
From	To	From	To
8	45	8	47
6	43	6	43

In Section 4 change the following:

1. In table 4-7 change description of resistor R6 as follows:

R6	Resistor, Metal Film, 147 k. 1/10 W, ±1%	808364	81349	RN55C1473F
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2. In figure 4-6 change the cable jack reference designations as follows:

From: A3W1J2
To: A3W1J1

From: A3W2J1
To: A3W2J2

STATUS OF PUBLICATION

Publication No. TM-I-5012A

Original - December 1988
Change 1 - October 1989
Change 2 - November 1989
Change 3 - October 2, 1991
Change 4 - February 11, 1997
Change 5 - October 8, 1997

WARNING

High voltage exists at several points in the instrument. Normal precautions consistent with good practice should be taken to reduce shock hazard.

A potential shock hazard exists when ungrounded power source or ungrounded case operation is employed. Persons operating the instrument should be made aware of and take precautions against this condition.

North Atlantic Industries, Inc. cannot be held responsible for damage to persons or property in the process of or as a result of maintenance, calibration, or setting up of the instrument.

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INFORMATION FOR UNITS SOLD WITHIN THE EUROPEAN UNION

GENERAL

Information contained within the following paragraphs supplements and in some cases supersedes information contained throughout this Manual. Where there is a conflict between information contained in these paragraphs and information contained elsewhere in the manual, these paragraphs take precedence for units sold within the European Union.

SPECIFICATIONS

Add to the list of specifications the following information:

Environmental

Temperature, operating	0° to 50° C
Temperature, non-operating	-55° to 75° C
Relative Humidity	95%, non condensing
Altitude	3050 Meters operating, 12,000 Meters non-operating
Overvoltage/Installation Category	Category II
Pollution Degree	Degree 1

Fuses

Fuses are not serviceable by the OPERATOR
Maintenance personnel should refer to REPLACEMENT
PARTS LIST section.

INSTALLATION AND MAINS INPUT

The Model 800 API is designed for permanent panel-mount installation. It is not recommended that the Model 800 be used in bench-top applications. When the Model 800 is used in a permanent panel-mount installation with only the front panel accessible to the operator and mains supply applied to the rear panel card-edge connector, there is no high quality safety (earth) ground provided for the chassis. If such a ground is desired in your application, connect safety (earth) ground to one of the standoffs for the card-edge connector using an AWG 16 wire and lug.

For continued safe operation of the model 800 API, observe the following:

- a. Mains input wiring to rear panel card-edge connector must include a disconnect device such as a switch (2 pole), or circuit breaker easily accessible to the operator.
- b. Insulation rating for all wires connected to rear panel card-edge connector must be consistent with the applied mains supply .
- c. Mains supply may not be applied to the rear panel card-edge connector for bench-top use.

IMPROPER USAGE

If the equipment is installed or used in a manner not specified safety may be impaired.

REAR PANEL CONTROLS AND ADJUSTMENTS

Any controls or adjustments on the rear panel of the unit are not available to the OPERATOR. Refer any adjustment or changes to rear panel controls to qualified maintenance personnel.

MAINTENANCE

The OPERATOR only has access to the exterior of the unit. All maintenance, including any procedures that require removal of covers, must be referred to qualified maintenance personnel

TECHNICAL ASSISTANCE

Contact your local Sales Representative for any technical assistance. Alternately, contact the Factory at:

**North Atlantic Industries
170 Wilbur Place
Bohemia, NY 11716 USA**

**Telephone: (631) 567-1100
Fax: (631) 567-1823
Email: sales@naih.com
Web site: www.naih.com**

WARNING

SAFETY SUMMARY

GENERAL SAFETY NOTICES

The following general safety notices supplement the specific warnings and cautions appearing elsewhere in this manual. They are recommended precautions that must be understood and applied during operation and maintenance of the equipment covered herein.

DO NOT REPAIR OR ADJUST ALONE

Under no circumstances should repair or adjustment of energized equipment be attempted alone. The immediate presence of someone capable of rendering aid is required.

HIGH VOLTAGE IS USED IN THE OPERATION OF THIS EQUIPMENT

DEATH ON CONTACT may result if personnel fail to observe safety precautions. Learn the areas containing high voltage on this equipment. Be careful not to contact high-voltage connections when installing, operating, or maintaining this equipment.

SECTION 1

INTRODUCTION

1.1 GENERAL

This manual provides operating and maintenance procedures for Synchro Panel Meter, Model 800. It also contains parts lists, schematic and parts location diagrams.

The Synchro Panel Meter, Model 800 (figure 1-1) is a synchro/resolver to digital converter. It combines LSI technology, sophisticated transformers, solid state D/A conversion circuits and state-of-the-art error processing circuits to insure ul-

mate in analog-to-digital conversion. The converted synchro or resolver data is presented in two forms:

- o Front LED display
- o Tri-state, bussable BCD output at read connector

1.2 SPECIFICATIONS

Table 1-1 provides the electrical and physical specifications for the synchro panel meter.

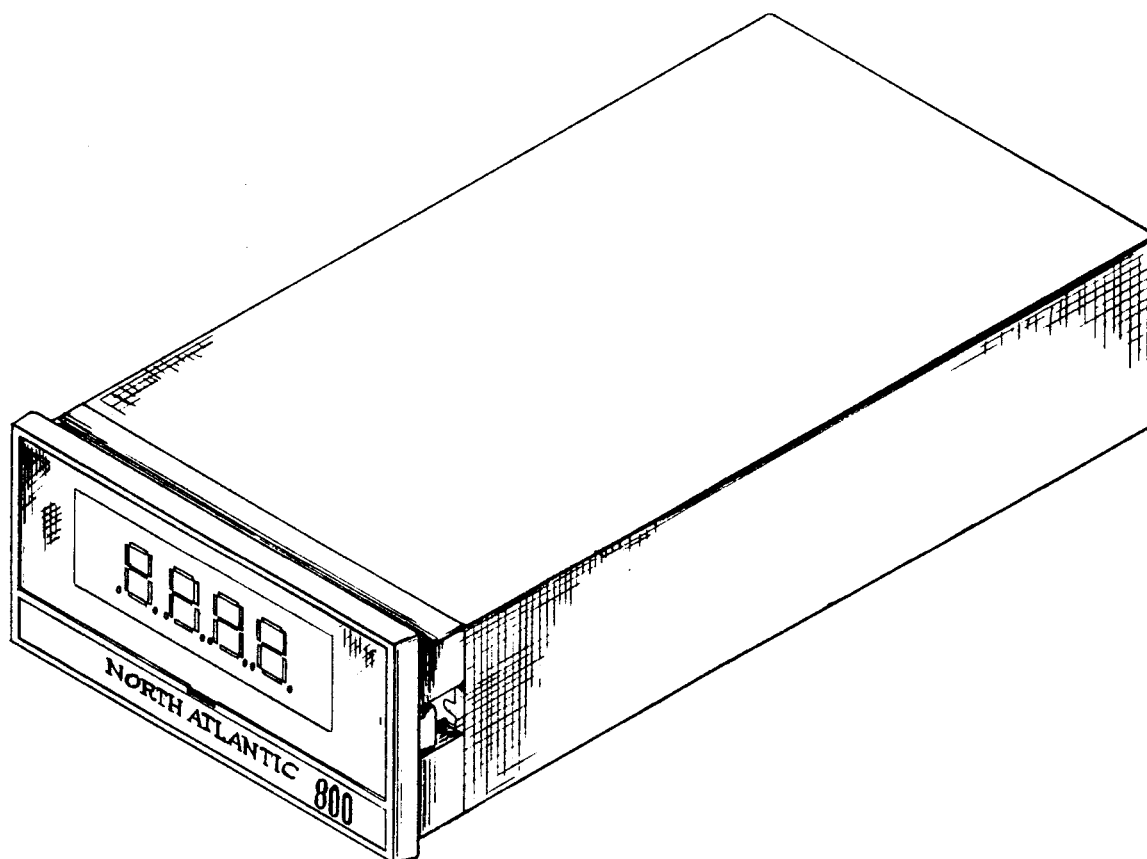


Figure 1-1. Synchro Panel Meter, Model 800

Table 1-1. Specifications

ITEM	SPECIFICATION
Input data	Synchro or resolver (pin programmed) 11.8 V, 26 V, or 90 V L-L (pin programmed)
Data reference frequency	47 Hz to 1200 Hz
Reference voltage	3 V to 126 V rms
Angular range	000.0 to 359.9° (F1X) 000.0 +180.0° (F2X) Variable scaling (switch selectable with option F3X)
Accuracy F1X and option 179.0 Option F3X	6' ±1 LSB See paragraph 1.3
Resolution <3600 FS >3600 FS	1 LSB Scale factor rounded up (3 LSBs in example of paragraph 1.3)
Data input impedance	100 Megohm (min)
Reference input impedance	100 k (min)
Tracking speed (full accuracy)	1500°/s
Settling time	1.5 s for 180° step
K _a	400
Digital output	4 decade BCD, +5 V (true); 0 V (false) 10 TTL loads, tristate bussable (0 V on disable line enables that appropriate bite. Ground all disable lines if parallel data is desired.) For option F2X, "-" output is +5 V for "-", 0 V for "+".
Converter busy	+5 V = busy; 0 V = not busy (3 TTL loads), 2-4 μs wide. Data may be transferred on falling edge of converter busy signal.
Data freeze	0 V or gnd = freeze; +5 V or open = track TTL/CMOS compatible
Power	115 V, 47 to 440 Hz, 0.1 A, or 26 V, 47 to 440 Hz, 0.5 A
Reference tap	26 V tap on power transformer may be used to provide 26 V synchro reference (100 ma max)
Operating temperature	0 to 50° C
Size	1.89" x 3.79" x 7.875"
Weight	2-1/4 lb. (max)

1.3 VARIABLE SCALE OPTION ACCURACY

Accuracy, expressed in LSB for option F3X, is determined by multiplying 2 LSBs by the scale factor*, rounded up to the full digit. The scale factor is:

$$\text{Scale factor} = \frac{\text{Full scale (no decimals)}}{3600}$$

For F3X, the scale factor is:

$$\frac{9999}{3600} = 2.778, \text{ or } 3$$

Therefore,

$$\begin{aligned} \text{Accuracy} &= 2 \text{ LSBs} \times \text{Scale factor} \\ &= 2 \times 3 = 6 \text{ LSBs} \end{aligned}$$

$$\text{Accuracy in percent} = \frac{6}{9999} = 0.06\%$$

1.4 MATING CONNECTORS

Edge connector P1 and P4 (on rear of unit) (figure 1-2) mate with EDAC connectors

*If scale factor is less than 1.000, use 1.0.

which include contacts. The connector may be supplied as NAI P/N 808516:

Qty	EDAC P/N
1 connector	345-050-500-202
2 keying plugs	345-240-318

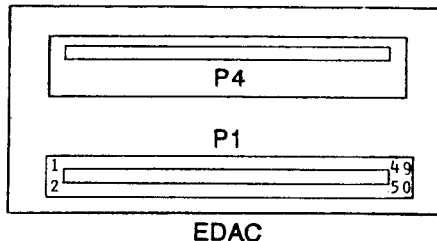


Figure 1-2. Connector Pin Identification Rear View

CAUTION

In order to prevent accidental damage to the instrument, key between pins 9 and 11 and between pins 35 and 37. If scaling option is used, refer to paragraph 3.3.3 for connector keying.

1.5 CONNECTOR PIN ASSIGNMENTS

Table 1-2 provides pin assignments for connectors P1 and P4. Connector P1 is located on the main board and connector P4 is located on the variable scaling board.

Table 1-2. Connector Pin Assignments

EDAC pin	P1 signal name	P4 (Option F3X) signal name
19	800	Spare
21	400	Spare
23	200 (or "-" for option F2X)	Spare
17	100	Spare
25	Disable hundreds	Spare
34	80	.0002
30	40	.008
26	20	.002
38	10	.0008
42	Disable tens	Multiply/divide
24	8	.001
28	4	.004
32	2	.0001
36	1	.0004
40	Disable units	Spare
16	.8	.04

Table 1-2. Connector Pin Assignments (Continued)

EDAC pin	P1 pin	P4 (Option F3X) signal name
14	.4	.02
12	.2	.01
10	.1	.8
20	Disable tenths	Spare
22	Logic ground	Spare
4	Busy signal	.1
13	Data freeze (open = track)	Spare
9	Jump to 27 for 90 V L-L	Spare
3	Jump to 27 for 26 V L-L	Spare
5	Jump to 27 for 11.8 V L-L	Spare
27	L-L jumper	Spare
41	S1, synchro or resolver	Spare
48	S2, synchro or resolver	Spare
44	S3, synchro or resolver	Spare
46	S4, synchro or resolver	Spare
50, 39	Jump 50 to 39 for synchro; open for resolver	.4
8	R1 (Ref HI)	.2
6	R2 (Ref LO)	Spare
47	115 V power HI	Spare
43	115 V or 26 V power LO	Spare
45	26 V power HI or 26 V output tap	Spare
2	Chassis ground*	Spare
7	Spare	Spare
11	Spare	Spare
15	Spare	Spare
18	Spare	.08
29	Spare	Spare
31	Spare (E5)	Spare
33	Spare (E6) used for dimmer option	Spare
35	+5 V	Spare
37	Spare	Spare
1	Chassis ground*	Chassis ground
49	Chassis ground	Spare

* P1 Pins 1 & 2 only connect to chassis when unit is installed in case

1.6 MOUNTING INSTRUCTIONS

Mount the synchro panel meter as follows:

- a. Cut out hole in panel (B, figure 1-3).
- b. Remove front lens by inserting a screwdriver at the bottom of the lens, pushing it upwards and prying out lens (figure 1-4).
- c. Retract cams to their rearmost position using a phillips head screwdriver (figure 1-5).
- d. Turn the two mounting screws to bring cams forward and, thus, lock unit to panel.
- e. Replace lens, glossy side inward, by bowing slightly and resting the edges into the unit edge grooves (figure 1-6). Release lens, allowing it to snap into place.

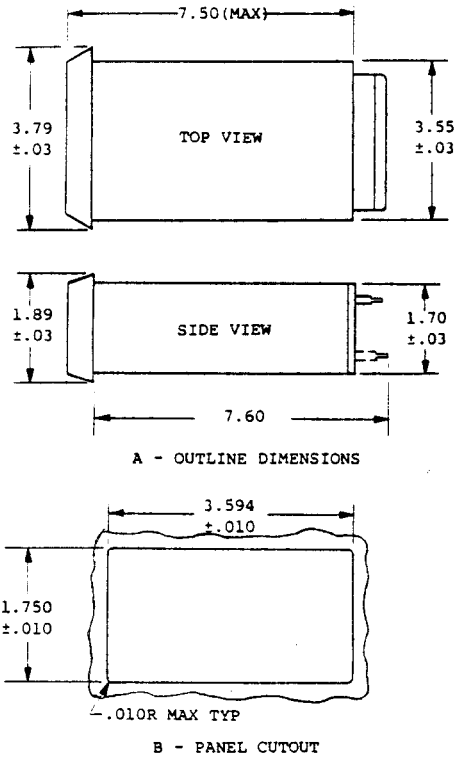


Figure 1-3. Installation Drawings

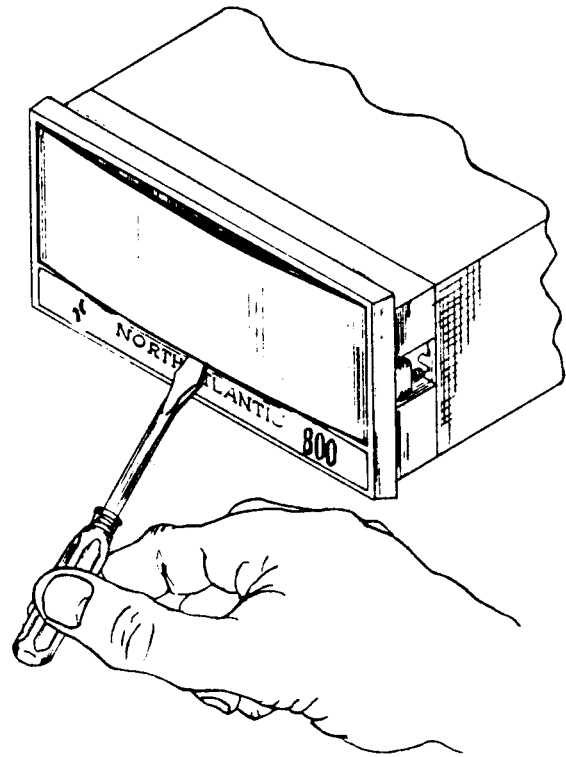


Figure 1-4. Removal of Lens

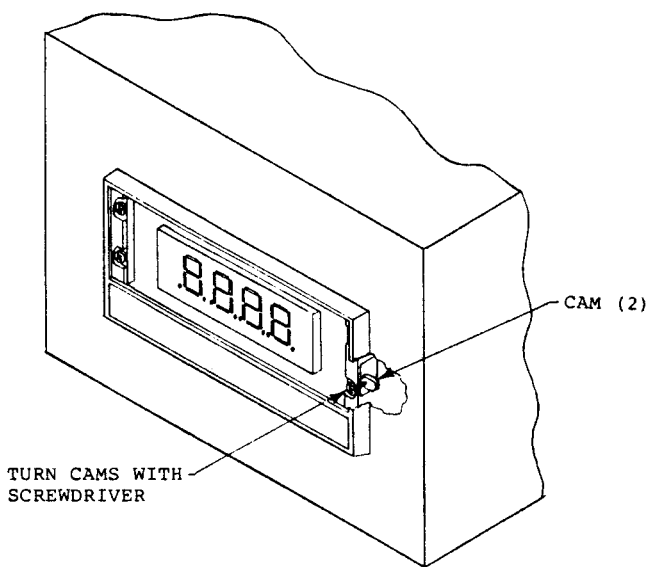


Figure 1-5. Installing Model 800

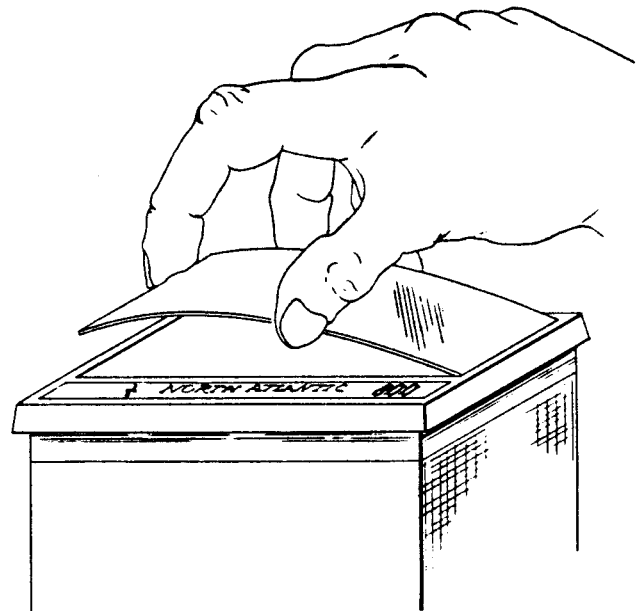


Figure 1-6. Replacement of Lens

1.7 INPUT CONNECTIONS

To operate, the Model 800 must have synchro or resolver stator inputs, reference inputs, and power input.

1.7.1 Stator Inputs

The synchro or resolver stator inputs (P1) for S1, S2, S3, and S4 (resolver only) are shown in table 1-2.

1.7.2 Reference Inputs

The synchro or resolver reference inputs are connected to pin 8 for Ref Hi and to pin 6 for Ref Lo. If a 26 V or 115 V source is available, it can also be used to power the Model 800 by jumping pins on connector P1 as shown in table 1-3.

NOTE

The Model 800 draws approximately 500 ma from the 26 V and 100 ma from the 115 V source.

Table 1-3. Reference Inputs

26 V ac reference		115 V ac reference	
From	To	From	To
8	45	8	47
6	46	6	43

If desired, the Model 800 can also be powered from an external 115 V ac or 26 V ac source.

If a 26 V ac reference is needed to excite the synchro or resolver in the system, but only 115 V ac is available, it can be obtained from the internal autotransformer (100 ma max.) as follows:

- Connect 115 V ac to pins 47 (Hi) and 43 (Lo).
- 26 V ac is now available on pins 45 (Hi) and 43 (Lo).
- Connect the 26 V ac reference signal obtained in step b to pins 8 and 6.

1.7.3 Grounding

In a synchro/resolver-to-digital converter, it is necessary for both chassis and digital ground to be tied together (table 1-2). Ground loops should be avoided in system applications.

In bench applications, chassis and digital ground should be tied together and connected to the low side of the signal source to the synchro or resolver.

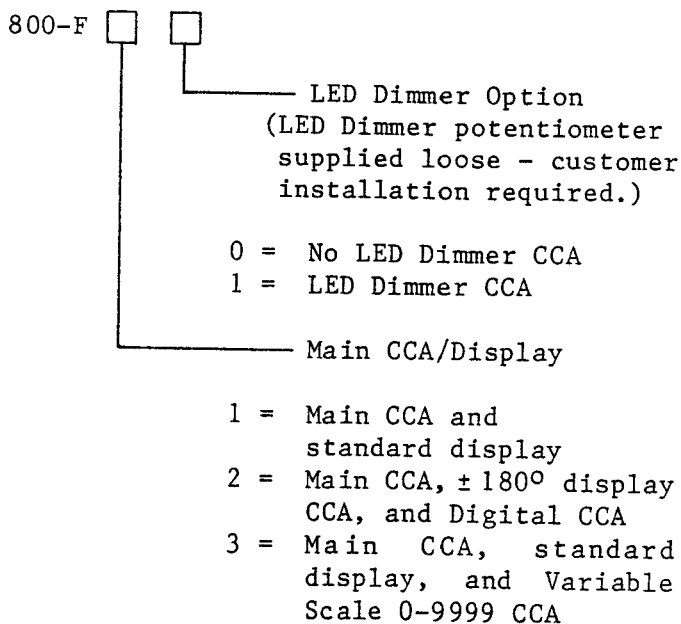
In system applications, the separate pins make connections in other parts possible. When not used, tie them together at the connector.

1.8 CONFIGURATION OPTIONS

The Model 800 is available in the following configurations:

- o Main Circuit Card Assembly and standard display (CCA)
- o $\pm 180^\circ$ Display CCA (optional)
- o Variable Scale 0-9999 CCA (optional)
- o LED Dimmer CCA (optional)

Options are specified by a two-digit number following the model number as follows:



1.9 CALIBRATION

The following paragraphs contain procedures to calibrate the Model 800. The procedures test both the synchro and resolver accuracy of the unit and should be performed as needed.

1.9.1 Test Equipment

Table 1-5 lists standard test equipment required to calibrate the Model 800. The equipment listed or their equivalents may be used.

1.9.2 Equipment Setup

Set up equipment as shown in figure 1-7 observing the following pretest conditions:

- a. Turn off all test equipment.
- b. Set amplitude control on power amplifier to zero.
- c. Turn on test equipment and let it warm up.
- d. Adjust input to synchro/resolver simulator to 115 V rms $\pm 5\%$ at 400 Hz $\pm 5\%$.

Table 1-5. Test Equipment Required

Equipment	Manufacturer	Model No.
Synchro/Resolver Simulator	North Atlantic Industries	5310
Oscillator	Hewlett-Packard	HP200CD
Power Amplifier	Krohn-Hite	DCA10R
Multimeter	Fluke	75 (1% ac accuracy or better)

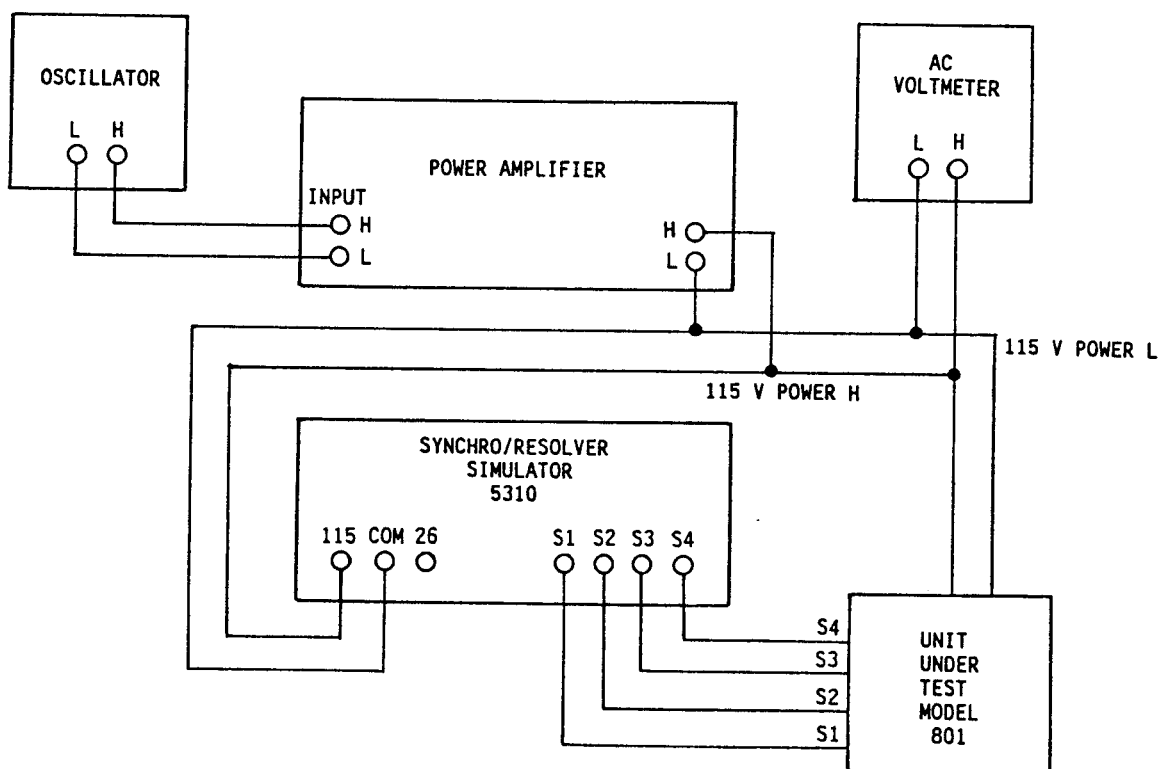


Figure 1-7. Calibration Test Equipment Setup

1.9.3 Resolver Accuracy Test

- a. Set synchro/resolver simulator as follows:
- (1) Select 115 V, 400 Hz reference input
 - (2) Select Resolver mode
 - (3) Select 11.8 V Line-to-Line output
 - (4) Set front panel leverwheel switches to 000.00 degree

NOTE

Input data are pin programmed (i.e., modes and voltages). Refer to table 1-1. Specifications.

- b. Locate rear panel connector P1-EDAC (figure 1-2) and wire the Model 800 as follows (refer to table 1-2):

- (1) Jump pin 5 to pin 27 to set 11.8 V L-L mode.
- (2) Leave pins 50 and 39 open to set Resolver mode.

- c. Sequentially step the synchro/resolver simulator leverwheel switches and record the resultant Model 800 display readings. Step the synchro/resolver simulator in the exact order as indicated below:

NOTE

The Model 800 display indication should be accurate to within ± 0.2 degrees of the input angle.

- (1) 10 degree steps (000.0 - 350 degrees)
- (2) 1 degree steps (1 - 9 degrees)
- (3) .1 degree steps (.1 - .9 degrees)

1.9.4 Synchro Accuracy Test

- a. Set synchro/resolver simulator as follows:

- (1) Select 115 V, 400 Hz reference input
- (2) Select Synchro mode
- (3) Select 90 V Line-to-Line output
- (4) Set front panel leverwheel switches to 000.00 degree.

NOTE

Input data are pin programmed (i.e., modes and voltages). Refer to table 1-1. Specifications.

- b. Locate rear panel connector P1-EDAC (figure 1-2) and wire the Model 800 as follows (refer to table 1-2):

- (1) Jump pin 9 to pin 27 to set 90 V L-L mode.
- (2) Jump pin 50 to pin 39 to set synchro mode.

- c. Adjust rear panel reference offset potentiometer for an exact 000.00 reading on the Model 800 front panel display.

- d. Sequentially step the synchro/resolver simulator leverwheel switches and record the resultant Model 800 display readings. Step the synchro/resolver simulator in the exact order as indicated below:

NOTE

The Model 800 display indication should be accurate to within ± 0.2 degrees of the input angle.

- (1) 10 degree steps (000.0 - 350 degrees)
- (2) 1 degree steps (1 - 9 degrees)
- (3) .1 degree steps (.1 - .9 degrees)

NOTE

If any of the previous recorded resolver or synchro readings are not within specifications, adjust Display Offset (figure 1-7) potentiometer located at rear of unit so that the largest positive and negative errors are of equal magnitude. If, after balancing the worst case positive and negative errors, the unit does not perform to rated specifications (± 0.2 degrees), consult the factory.

1.10 EQUIPMENT REVISION LEVEL STATUS

status of each assembly. For subsequent updates to Model 800 assemblies refer to SECTION 6 - UPDATE INFORMATION.

Table 1-6 lists the major assemblies of the Model 800 and the current revision level

Table 1-6. Revision Level Status of Major Assemblies

REF DES	NAME	PART NO.	CURRENT REVISION
A1	Main Circuit Card Assembly (CCA)	783808-1.-2.-3	N
A1A1	Standard Display CCA	783849	F
A1A1	$\pm 180^\circ$ Display CCA	783851	D
A2	$\pm 180^\circ$ Digital CCA	783812	J
A3	Variable Scale 0-9999 CCA	783823-1	F
A4	LED Dimmer CCA	783825	A

SECTION 2

THEORY OF OPERATION

2.1 THEORY

The synchro panel meter employs a Type II closed-loop servo design which continuously tracks analog input data. The heart of the unit (a custom LSI TRIG-LOGIC™ processor chip) contains analog switches, an up/down counter, and trigonometric digital circuitry. For the following discussion, refer to figure 2-1.

Input synchro or resolver signals are fed into a precision transformer and resistor network bridge assembly. The output of this bridging process is an AC error signal fed into a null circuit which uses an input reference signal. The null circuit performs both phase-sensitive detection and clock pulse generation (with frequency proportional to input signal rate). These clock pulses drive the up/down counter; the outputs digitally closing the loop with the bridge circuits.

The counter's BCD digital word drives the display decoder-drivers and goes through tri-state bussable output buffers.

In operation, whenever the input synchro or resolver accelerates, an ac error buildup cause a corresponding increase in rate of clock pulses in the direction (up/down) to reduce the error signal magnitude. When errors are reduced to zero (plus or minus threshold voltages), both the digital output and display then match the input syn-

chro or resolver angle, and the unit will continue to track the input data without lag error until the data rate changes again.

2.2 SYNCHRO AND RESOLVER CONVENTIONS

The synchro panel meter operates in accordance with the following conventions:

Synchro per MIL-S-20708:

$$\begin{aligned} S3-S1 &= \sin \theta \sin \omega t \\ S2-S3 &= \sin (\theta + 120^\circ) \sin \omega t \\ S1-S2 &= \sin (\theta + 240^\circ) \sin \omega t \end{aligned}$$

Angles are for an R1 (HI) R2 (LO) excited transmitter (CX)

Resolver per MIL-R-21530:

$$\begin{aligned} S3-S1 &= \sin \theta \sin \omega t \\ S2-S4 &= \cos \theta \sin \omega t \end{aligned}$$

Angles are for an R2 (HI) R4 (LO) excited transmitter (RX)

For an alternate convention (R1-R3) excited transmitter, convert terminations as follows: Change S1 to S4, S2 to S1, S3 to S2, and S4 to S3.

NOTE

For both synchro and resolver conventions, counterclockwise rotation, as viewed from the shaft end of the component, is increasing angle.

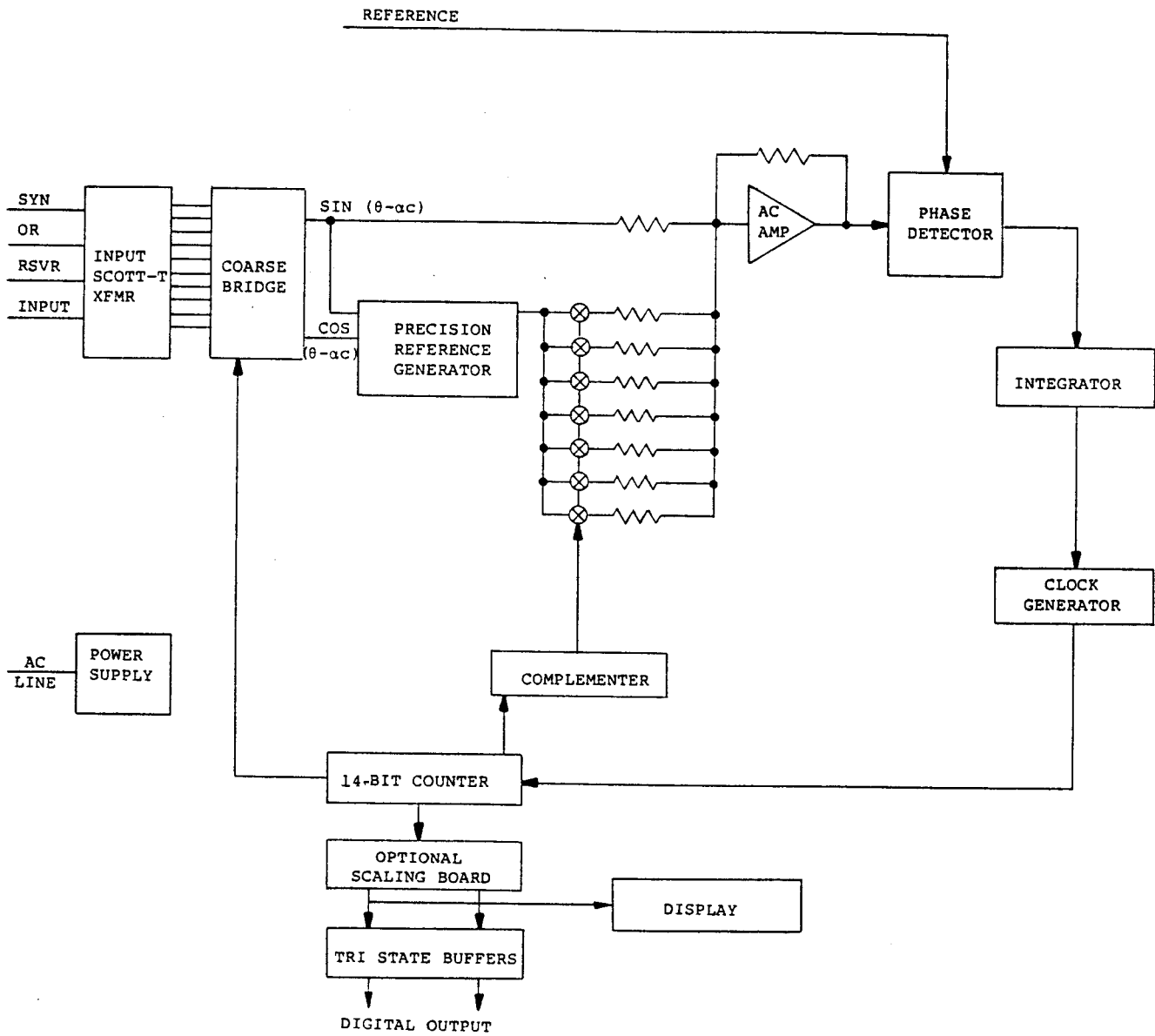


Figure 2-1. Synchro Panel Meter, Block Diagram

SECTION 3

PREPARATION FOR USE

3.1 NONSTANDARD L-L LEVELS

Resistor R10 (on the main board) determines the gain for 90 V L-L (pin E), R13 for 26 V L-L (pin B), and R16 for 11.8 V L-L (pin C). Line-to-line level is selected by jumping one of these pins externally to pin R.

For other line-to-line levels use the following formula to determine the appropriate resistor value:

$$R = \frac{78.3M}{E_{L-L}}$$

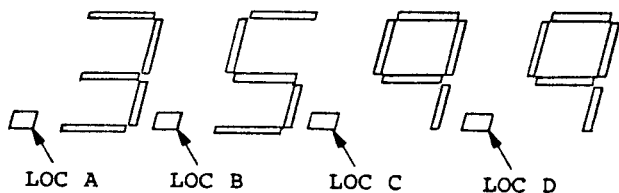
Replace R10, R13, or R16 with the new resistor.

NOTE

E_{L-L} must be between 6 V and 100 V rms.

3.2 NONSTANDARD DECIMAL POINT LOCATION

The decimal point may be fixed in any of the following locations:



The standard unit and option F2X have the decimal point fixed in location D and feature leading zero blanking (first two digits). Option F3X (Variable Scaling) units are shipped with no decimal point and no leading zero blanking. See standard display board schematic (figure 5-2) and standard display board parts locator (figure 4-3) for information concerning fixing decimal point location in option F3X units.

3.3 SCALE FACTOR SELECTION (OPTION F3X)

The scaling factor circuitry is located on the variable scaling board (figure 4-6 and 5-5). The switch on this board is used to select the desired scale factor from 1000 to 9999.

3.3.1 Determining Scale Ratio

To determine the Scale Ratio, use the following formula:

$$\text{Ratio} = \frac{\text{Scale}}{3599}$$

For a scale of 0 to 9999,

$$\text{Ratio} = \frac{9999}{3599} = 2.7783$$

If the ratio is less than 1.000, set the X3/X1 switch (figure 3-1) to X1 and set the Scale Factor switches to the ratio calculated.

If the ratio is greater than 1.000, set the X3/X1 to X3 and set the Scale Factor switches to: $\frac{\text{Ratio}}{3}$

To set a ratio of 1.000, set the X3/X1 switch to X1 and the Scale Factor switches to .9999. In the above example set X3/X1 switch to X3 and the Scale Factor switches to .9261.

3.3.2 Setting Up Scale

To set up the scale, use the switches accessible through the back cover (figure 3-1). Up indicates a logic 0; down indicates a logic 1. As shown in figure 3-1, there are four groups of switches which are used to set the scale ratio as follows:

- .X - Sets the first digit after the decimal point.
- .0X - Sets the second digit after the decimal point.

- .00X - Sets the third digit after the decimal point.
- .000X - Sets the fourth digit after the decimal point.

To set the scale ratio (in BCD) for .3599, set X3/X1 switch to Divide (up) and the remaining switches as shown below (figure 3-1).

<u>Group .X</u>	<u>Group .0X</u>
.1 down	.01 down
.2 down	.02 up
.4 up	.04 down
.8 up	.08 up
<u>Group .00X</u>	<u>Group .000X</u>
.001 down	.0001 down
.002 up	.0002 up
.004 up	.0004 up
.008 down	.0008 down

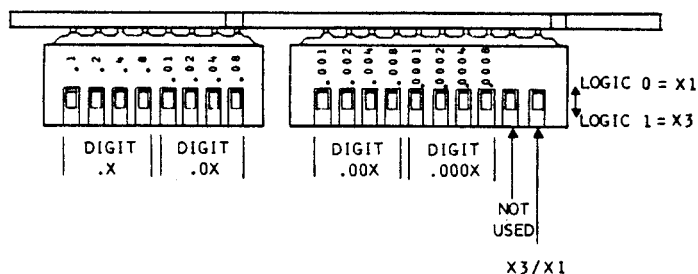


Figure 3-1. Scale Factor Switch

To program the scale ratio externally via an edge connector, set all switches to the down position. An external open collector device will now program these lines.

NOTE

It is possible to optimize a scale ratio at a given point on the scale by adjusting the last digit of the ideal scale ratio.

NOTE

If all switches are in the down position and X3/X1 switch is at X1, reading is 3599 full scale.

3.3.3 Connector Keying

CAUTION

To prevent accidental damage to the instrument, key between pins 15 and 17 and between pins 35 and 37.

3.4 ZERO OFFSET

NOTE

Once zero offset adjustment is set, do not change setting while making other system measurements.

A zero offset screw adjustment is located at the rear panel. This adjustment has a nominal range of $\pm 2.0^\circ$. The unit is furnished with this adjustment set to zero.

In some applications it may be desirable to offset this adjustment to compensate for some system error or minor synchro misalignment. Simply insert a small screwdriver or alignment tool through the hole provided and adjust as necessary.

3.5 DISASSEMBLY

The case need not be removed from the user's panel in order to disassemble (figure 4-1).

- a. Remove the two rear cover mounting screws and remove rear cover from the unit.
- b. Grasp the edge connector and slide the entire assembly out of the housing.
- c. To reassemble, reverse the above procedure.

CAUTION

If the unit is operated outside of the housing for troubleshooting purposes, observe proper precautions to avoid shorting of circuit points to the work surface and to avoid electrical shock. 115 V appears at points on the circuit board when the unit is in operation, even when it is powered off 26 V.

3.6 DIMMER DISPLAY OPTION (FX1)

All Model 800 configurations can utilize the Dimmer Display option which enables adjustment of front panel display intensity. The Dimmer circuit card assembly is factory installed but the dimmer potentiometer (R5) is supplied loose and must be installed by the user.

3.6.1 Installation

To install the Dimmer Display option proceed as follows:

- a. Remove screws securing rear cover (figure 4-1) and slide unit out of case.
- b. Determine location for remote dimmer potentiometer (R5) and cut two pieces of wire the desired length.
- c. Locate main Circuit Card Assembly (A1) and solder wires to pins 31 and 35.
- d. Referring to figure 5-6, solder other end of wires to potentiometer R5.
- e. Mount potentiometer in desired location.

SECTION 4

REPLACEMENT PARTS LISTS

4.1 INTRODUCTION

This section contains the replaceable parts list, federal supply codes for manufacturers (FSCM), usable on codes (UOC), parts location diagrams, and a list of manufacturers of parts used for the Model 800 Synchro Panel Meter.

The Model 800 is available in three major configurations:

- a. F1X - Standard
- b. F2X - +180 Display option
- c. F3X - Variable Scale 0-9999 option

All of the above configurations are also available with a LED Dimmer option (FX1) or without (FX0).

4.1.1 Parts List. The parts list contains only replaceable parts for the Model 800. It is prepared in tabular form and divided into six columns as follows:

4.1.1.1 Column 1 - Ref Des (Reference Designations). Lists alphanumerical reference designations for circuit card assembly replaceable parts shown on schematic and parts location diagrams.

4.1.1.2 Column 2 - Description. Contains descriptions which identify replaceable parts.

4.1.1.3 Column 3 - NAI P/N. Lists North Atlantic Industries part numbers assigned to replaceable parts.

4.1.1.4 Column 4 - FSCM. Lists Federal Supply Code for Manufacturers. The FSCM identifies manufacturer or government agency whose number is listed in the manufacturer's part number column. If a FSCM is not assigned to a manufacturer, a

five letter code is given and alphabetically referenced (AAAAA, BBBBB, etc.) to the List of Manufacturer's table within this manual.

4.1.1.5 Column 5 - Mfr P/N. Lists manufacturers' part numbers of replaceable parts.

4.1.1.6 Column 6 - UOC (Usable On Code). This column contains codes to identify specific equipment configurations (model, assembly, etc). When a part applies to all configurations, no coding system is used. The coding system is as follows: A, B, C,... and continues with double, AA through AZ, BA, BB, etc., when necessary.

4.1.2 List of Manufacturers. This list contains the names, addresses, FSCM's, and other identifying codes of manufacturers referenced in the parts list. It is arranged numerically using the manufacturers' FSCMs provided in the Federal Supply Code for Manufacturers, Cataloging Handbooks H4-1, H4-2, and H4-3.

The list is prepared in tabular form as follows:

- a. Column 1 contains FSCMs of all manufacturers referenced in the parts list.
- b. Column 2 contains the names and addresses of manufacturers applicable to FSCMs listed in column 1.

4.1.3 Parts Location Illustrations. Parts location illustrations are provided to give the user a quick and positive method for locating parts on specific assemblies being repaired. Each parts location diagram provides reference designations for circuit card components.

Table 4-1. Model 800-FXX - Common Parts

<u>Ref Des</u>	<u>Description</u>	<u>NAI P/N</u>	<u>FSCM</u>	<u>Mfr P/N</u>	<u>UOC</u>
NOTE					
Connector J1 and Polarizing Key P1 are supplied loose with the unit and must be installed on Main CCA A1.					
J1	Connector, 50-pin, PC Edge	808535	31781	345-050-500-202	
MP1	Case, Synchro Panel Meter	206030	07342	206030	
MP2	Lens, Synchro Panel Meter	206019-1	07342	206019-1	
MP3	Cover, Rear, Synchro Panel Meter	205956	07342	205956	
MP4	Name Plate, Front	205943	07342	205943	
MP5	Bezel Kit Assembly	500946	07342	500946	
P1	Plug, Polarizing Key	808536	31781	345-240-31	

Table 4-2. Model 800-F1X Feature 1, Option 1 - Standard Display 0-359° - Unique Parts

<u>Ref Des</u>	<u>Description</u>	<u>NAI P/N</u>	<u>FSCM</u>	<u>Mfr P/N</u>	<u>UOC</u>
A1	Main CCA and Standard Display 0-359°	783808-1	07342	783808-1	

Table 4-3. Model 800-F2X Feature 1, Option 2 - +179.9 Display - Unique Parts

<u>Ref Des</u>	<u>Description</u>	<u>NAI P/N</u>	<u>FSCM</u>	<u>Mfr P/N</u>	<u>UOC</u>
A1	Main CCA and +180° Display	783808-3	07342	783808-3	
A2	+180° Digital CCA	783812	07342	783812	

Table 4-4. Model 800-F3X Feature 1, Option 3 - Variable Scale 0-9999 - Unique Parts

<u>Ref Des</u>	<u>Description</u>	<u>NAI P/N</u>	<u>FSCM</u>	<u>Mfr P/N</u>	<u>UOC</u>
A1	Main CCA and Standard Display	783808-2	07342	783808-2	
A3	Variable Scale 0-9999 CCA	783823-1	07342	783823-1	

Table 4-5. Model 800-FX0 Feature 2, Option 0 - LED Dimmer CCA - Unique Parts

NOTE

Units with Option 0 (FX0) do not contain LED Dimmer Circuit Card Assemblies or any related components.

Table 4-6. Model 800-FX1 Feature 2, Option 1 - LED Dimmer CCA - Unique Parts

<u>Ref Des</u>	<u>Description</u>	<u>NAI P/N</u>	<u>FSCM</u>	<u>Mfr P/N</u>	<u>UOC</u>
A4	LED Dimmer CCA	783825	07342	783825	

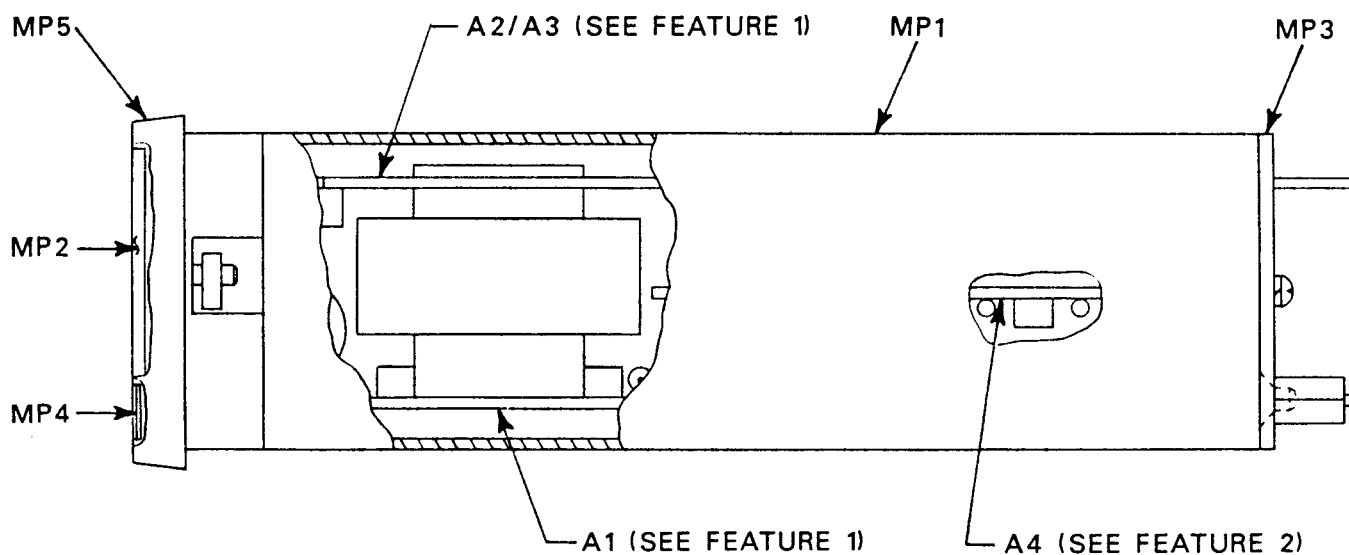


Figure 4-1. Model 800 Synchro Panel Meter (P/N 408100), Parts Location Diagram (Sheet 1 of 2)

NOTE: AFTER COVER (MP1) IS REMOVED, A NEW LABEL (MP3) MUST BE INSTALLED.

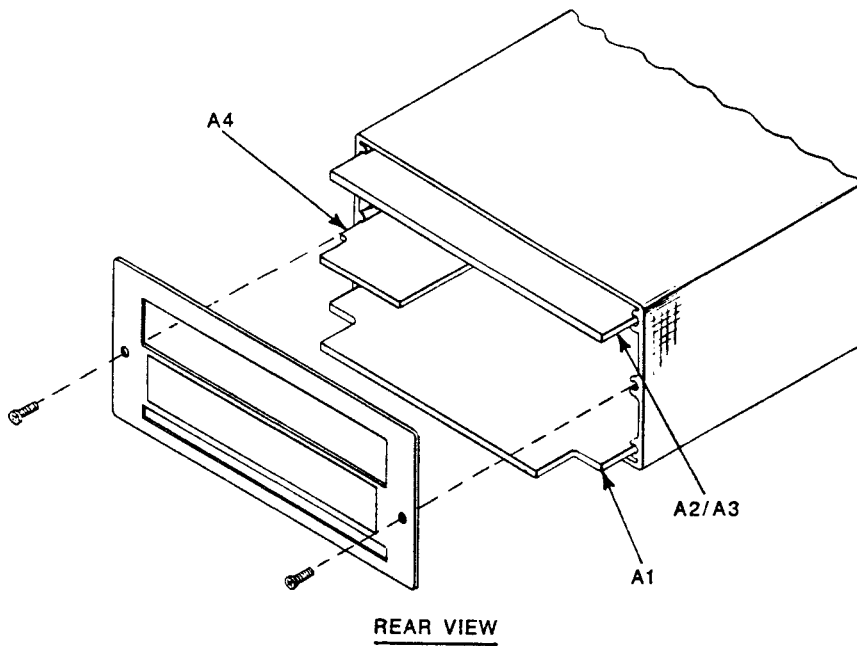
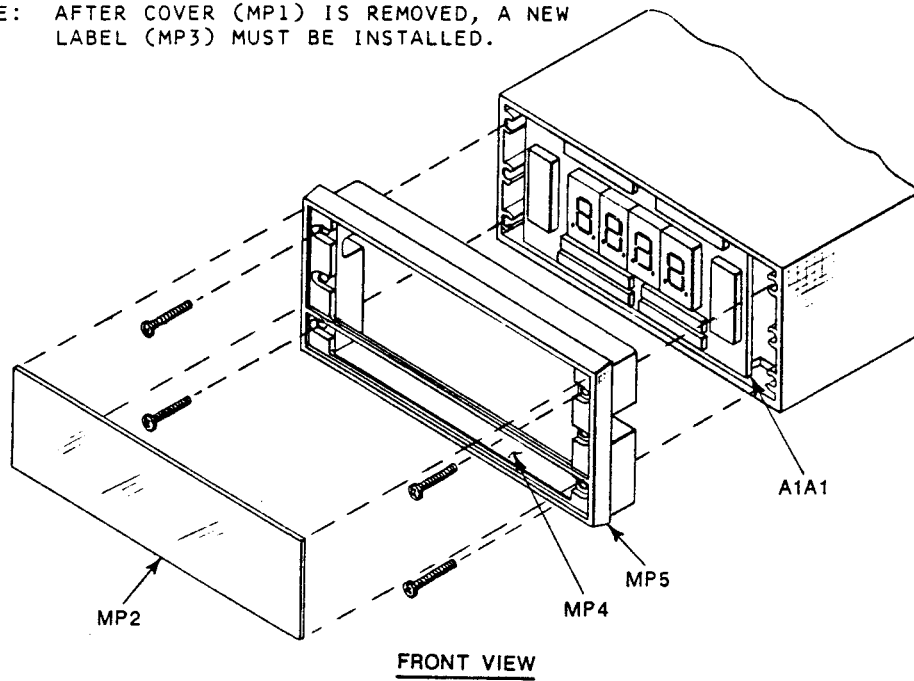


Figure 4-1. Model 800 Synchro Panel Meter (P/N 408100), Parts Location Diagram
(Sheet 2 of 2)

Table 4-7. Main Circuit Card Assembly A1 - 783808-1, -2, -3

<u>Ref Des</u>	<u>Description</u>	<u>NAI P/N</u>	<u>FSCM</u>	<u>Mfr P/N</u>	<u>UOC</u>
A1A1	Standard Display CCA	783849	07342	783849	
A1A1	$\pm 180^\circ$ Display CCA	783851	07342	783851	
C1	Capacitor, Tantalum, 6.8 uf, 6.3 V, $\pm 20\%$	808485	56289	196D685X9006HA1	
C2	Capacitor, Ceramic, 0.047 uf, 100 V, $\pm 10\%$	808486	56289	CKR06BX473KL	
C3	Capacitor, Ceramic, 0.01 uf, 100 WVDC, $\pm 10\%$	808487	56289	CKR06BX103KL	
C4	Capacitor, Ceramic, 2200 pf, 100 V, $\pm 1\%$	808488	56289	CKR06BX22KL	
C5	Capacitor, Ceramic, 6.8 pf, 1000 WVDC, $\pm 10\%$	808489	84171	CCD6R8	
C6	Capacitor, Ceramic, 33 pf, 1000 WVDC, $\pm 10\%$	808490	84171	CCD-330	
C7	Capacitor, Ceramic, 0.1 uf, 100 V, $\pm 10\%$	882188	81349	CKR06BX104KR	
C8	Capacitor, Ceramic, 0.01 uf, 50 V, +80-20%	808495	84171	TCD-103Z	
C9	Same as C8				
C10	Capacitor, Aluminum, 100 uf, 35 VDC, $\pm 20\%$, Radial	886177	74840	107RSS035M-PX	
C11	Capacitor, Aluminum, 220 uf, 35 V, -10+75%	808491	74840	227CKR035M-PX	
C12	Capacitor, Aluminum, 330 uf, 16 VDC, $\pm 20\%$, Radial	886179	OEHX1	NRWA331M16V	
C13	Same as C7				
C14	Capacitor, Tantalum, 1 uf, 35 V, $\pm 20\%$	807192	56289	196D105X9035 HA1	
C15	Same as C7				
C16	Capacitor, Ceramic, 0.01 uf, 25 V, +80-20%	880034	72982	5835-000 Y5U103Z	
C17	Same as C16				

Table 4-7. Main Circuit Card Assembly A1 - 783808-1, -2, -3 (Continued)

<u>Ref Des</u>	<u>Description</u>	<u>NAI P/N</u>	<u>FSCM</u>	<u>Mfr P/N</u>	<u>UOC</u>
CR1	Diode, Signal	805805	81349	JAN1N4148	
CR2-CR11	Same as CR1				
CR12	Diode, PWR/RECT	880112	04713	1N4002	
CR13,CR14	Same as CR12				
F1	Fuse, 1/4 A, 125 V	808502	75915	275.250	
F2	Fuse, 1 A, 125 V	808517	75915	275001	
R1	Resistor, Composition, 1 M, 1/8 W, <u>+5%</u>	805107	81349	RC05GF105J	
R2	Resistor, Metal Film, 437 k, 1/10 W, <u>+0.5%</u>	808462	01121	CC4373D	
R3	Resistor, Metal Film, 6.65 k, 1/10 W, <u>+0.1%</u>	808463	71785	MAR5T13 .1% 6.65K	
R4	Resistor, Metal Film, 38.3 k, 1/10 W, <u>+0.1%</u>	808464	71785	MAR5T13 .1% 38.3K	
R5	Same as R3				
R6	Resistor, Metal Film, 147 k, 1/10 W, <u>+0.5%</u>	808364	91637	CMF 1/10,147K, <u>+0.5%</u>	
R7	Resistor, Composition, 300 ohm, 1/8 W, <u>+5%</u>	807301	81349	RC05GF301J	
R8	Resistor, Metal Film, 39.2 k, 1/10 W, <u>+0.1%</u>	808465	71785	MAR5T13 .1% 39.2K	
R9	Resistor, Metal Film, 200 k, 1/10 W, <u>+0.1%</u>	808466	71785	MAR5T13 .1% 200K	
R10	Resistor, Metal Film, 887 k, 1/10 W, <u>+1%</u>	808475	91637	CMF 1/10,887K,T1	
R11	Resistor, Composition, 10 k, 1/8 W, <u>+5%</u>	805099	81349	RC05GF103J	
R12	Same as R9				
R13	Resistor, Metal Film, 3.01 M, 1/8 W, <u>+1%</u>	808476	80031	5053YL3M010F	
R14	Same as R11				

Table 4-7. Main Circuit Card Assembly A1 - 783808-1, -2, -3 (Continued)

<u>Ref Des</u>	<u>Description</u>	<u>NAI P/N</u>	<u>FSCM</u>	<u>Mfr P/N</u>	<u>UOC</u>
R15	Resistor, Composition, 22 M, 1/8 W, <u>+5%</u>	808515	01121	BB2265	
R16	Resistor, Metal Film, 6.65 M, 1/10 W, <u>+1%</u>	808477	80031	5053YL6M650F	
R17	Same as R11				
R18	Resistor, Metal Film, 249 k, 1/10 W, <u>+0.1%</u>	808467	71785	MAR5T13 1% 249KOHM	
R19	Resistor, Metal Film, 499 k, 1/8 W, <u>+0.25%</u>	808468	71785	MAR6T10 .25% 499KOHM	
R20	Resistor, Metal Film, 1 M, 1/8 W, <u>+0.5%</u>	808469	71785	MAR6T10 .5% 1MOHM	
R21	Resistor, Metal Film, 2 M, 1/10 W, <u>+1%</u>	808470	01121	CC2004F	
R22	Resistor, Metal Film, 1.13 M, 1/10 W, <u>+1%</u>	808471	01121	CC1134F	
R23	Resistor, Metal Film, 249 k, 1/10 W, <u>+1%</u>	808472	01121	CC2493F	
R24	Resistor, Metal Film, 499 k, 1/10 W, <u>+1%</u>	808473	01121	CC4993F	
R25	Resistor, Metal Film, 1 M, 1/10 W, <u>+1%</u>	808262	01121	CC1004F	
R26	Resistor, Composition, 2 M, 1/8 W, <u>+5%</u>	807624	81349	R05GG205J	
R27	Same as R26				
R28	Resistor, Metal Film, 26.1 k, 1/10 W, <u>+1%</u>	807368	81349	RN55D2612F	
R29	Resistor, Composition, 100 k, 1/4 W, <u>+5%</u>	880846	01121	CB1045	
R30	Same as R29				
R31	Resistor, Composition, 3.3 k, 1/8 W, <u>+5%</u>	805103	81349	RC05GF332J	
R32	Same as R31				

Table 4-7. Main Circuit Card Assembly A1 - 783808-1, -2, -3 (Continued)

<u>Ref Des</u>	<u>Description</u>	<u>NAI P/N</u>	<u>FSCM</u>	<u>Mfr P/N</u>	<u>UOC</u>
R33	Resistor, Composition, 47 k, 1/8 W, <u>+5%</u>	807313	81349	RCR05G473JS	
R34	Resistor, Composition, 18 k, 1/8 W, <u>+5%</u>	805108	81349	RC05GF183J	
R35	Resistor, Metal Film, 402 k, 1/10 W, <u>+1%</u>	808187	01121	CC4023F	
R36	Same as R26				
R37	Potentiometer, 100 k, 1/2 W, 25-turn	808428	32997	3299X-1-104	
R38	Same as R24				
R39	Resistor, Metal Film, 2.55 k, 1/20 W, <u>+1%</u>	808510	01121	CC2551F	
R40	Resistor, Metal Film, 2.67 M, 1/10 W, <u>+1%</u>	808479	80031	5053Y02M670F	
R41	Same as R33				
R42	Same as R31				
R43	Resistor, Composition, 100 k, 1/8 W, <u>+5%</u>	805104	81349	RC05GF104J	
R44-R46	Same as R43				
R47	Resistor, Composition, 1.6 k, 1/8 W, <u>+5%</u>	805787	81349	RC05GF162J	
T1	Transformer Set, Scott-T	808261-2	07342	808261-2	
T2	Same as T1				
T3	Transformer, Power, 26 V and 115 V	808447	07342	808447	
U1	IC, Quad Low Offset Op Amp, Linear	808545	06665	OP11FY	
U2	IC, LSI, TRIG-LOGIC TM	888068	07342	888068	
U3	IC, Quad OP Amp, 14-pin, Std. Temp.	808496	01295	TL084CN	
U4	IC, Quad Comparator, 14-pin, Std. Temp.	807626	01295	LM339N	

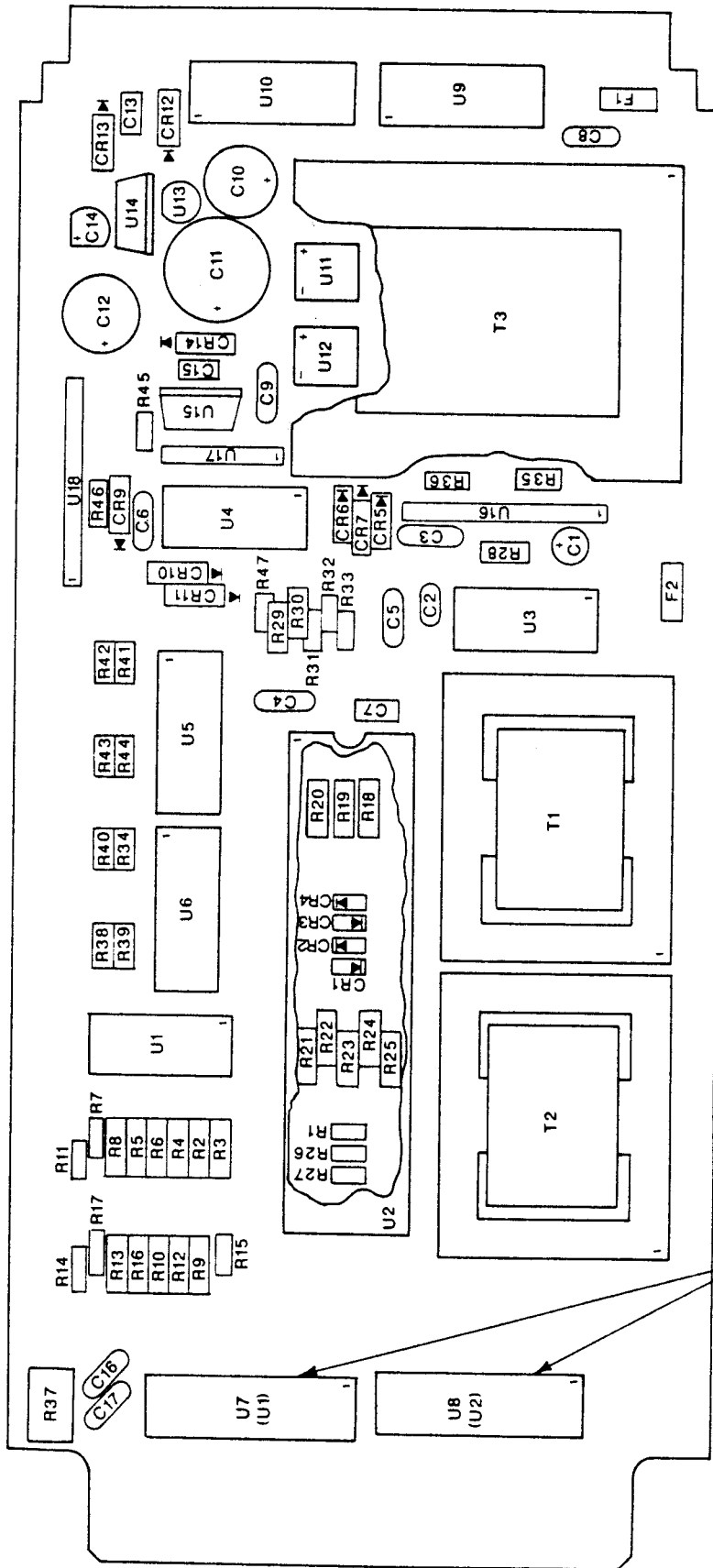
Table 4-7. Main Circuit Card Assembly A1 - 783808-1, -2, -3 (Continued)

<u>Ref Des</u>	<u>Description</u>	<u>NAI P/N</u>	<u>FSCM</u>	<u>Mfr P/N</u>	<u>UOC</u>
U5	IC, CMOS, 2 Channel Analog Multiplexer, 16-pin DIP	808304-MOS	02735	CD4053BE	
U6	Same as U5				
U7,U8 ¹	IC, TTL, Octal Bus Transceiver, Tri-State Outputs	808713	18324	74LS244	
U7,U8 ²	IC, TTL, Octal Buffer	808497	12040	DM81LS97N	
U7,U8 ³	Adapter Board	783839	07342	783839	
U9	IC, TTL, Decoder/Driver	808501	07263	74LS47PC	
U10	Same as U9				
U11	Bridge Rectifier, 50 V	807704	30870	VM08	
U12	Same as U11				
U13	Voltage Regulator, +12 V	808499	12040	LM340LAZ-12	
U14	Voltage Regulator, -12 V	808500	12040	LM320T-12	
U15	Voltage Regulator, +5 V	808498	12040	LM340T-5.0	
U16	Resistor Network, 100 k, 2%, 5 Resistors, 10 pin	808483	32997	4310R-102-104	
U17	Resistor Network, 47 k, 2%, 3 Resistors	808482	32997	4306R-102-473	
U18	Resistor Network, 10 k, 2%, SIP, 5 Resistors	808481	32997	4310R-102-103	
XU2	Socket, Strip, 25 pin	808694	06776	SB-25-100-T	

¹For rev. B and above assemblies.

²Alternate one for rev. A and below assemblies.

³Alternate two for rev. A and below assemblies.



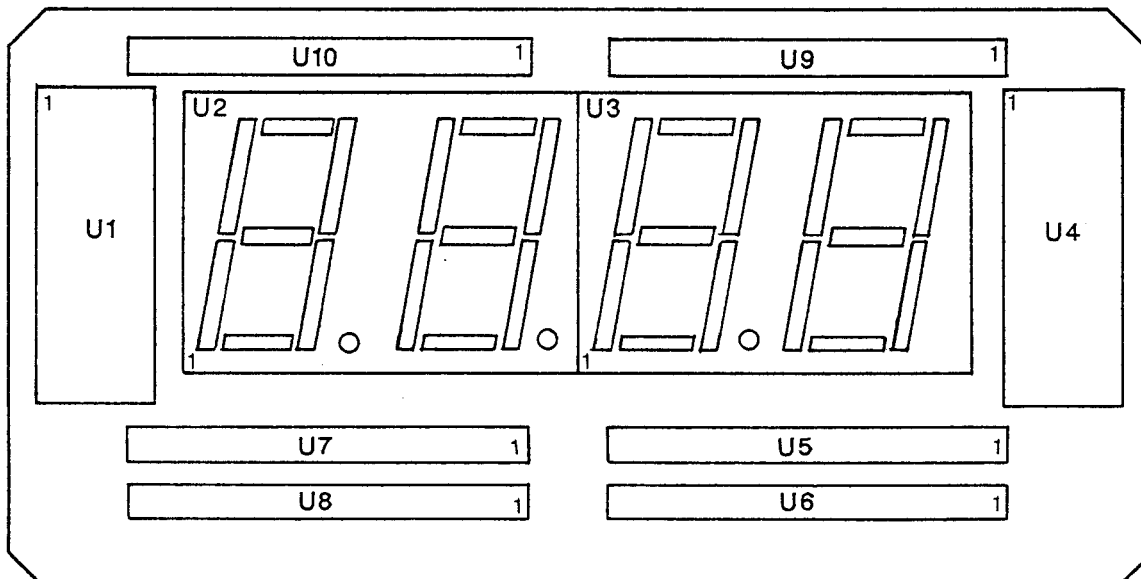
NOTE: WHEN ALTERNATE MANUFACTURING METHOD IS REQUIRED USING ADAPTER BOARD P/N 783839, THE REF. DESIGNATIONS ARE U1 AND U2.

783808 11-N

Figure 4-2. Main Circuit Card Assembly A1, Parts Location Diagram

Table 4-8. Standard Display Circuit Card Assembly A1A1 (Option F1X) - 783849

<u>Ref Des</u>	<u>Description</u>	<u>NAI P/N</u>	<u>FSCM</u>	<u>Mfr P/N</u>	<u>UOC</u>
U1	IC. TTL. Decoder/Driver	808501	07263	74LS47PC	
U2	IC. Display. LED. 7 Segment. Red	885214	AAAAA	LTD-6910HR	
U3	Same as U2				
U4	Same as U1				
U5	Resistor Network. 100 ohm. ±2%. 10 Pin. 5 Resistors	808480	32997	4310R-102-101	
U6-U10	Same as U5				

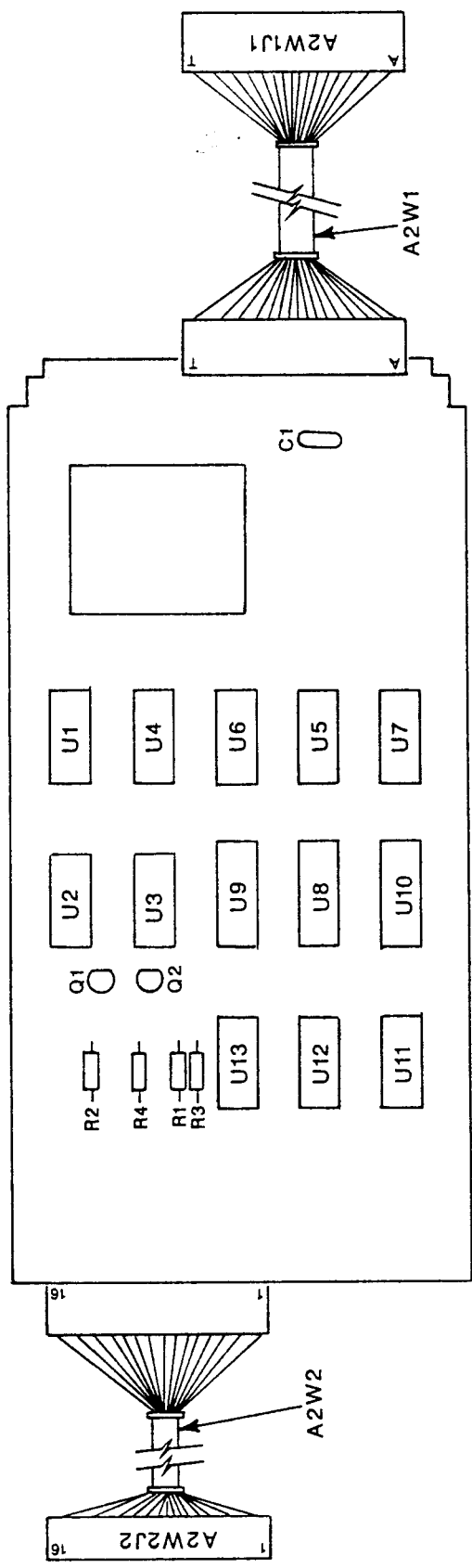


783849-F

Figure 4-3. Standard Display Circuit Card Assembly A1A1 (Option F1X).
Parts Location Diagram

Table 4-9. $\pm 180^\circ$ Digital Circuit Card Assembly A2 (Option F2X) - 783812

<u>Ref Des</u>	<u>Description</u>	<u>NAI P/N</u>	<u>FSCM</u>	<u>Mfr P/N</u>	<u>UOC</u>
A2W1	Cable Assembly	783815-1	07342	783815-1	
A2W1J1	Connector, 16 Pin	808521	22526	65039-021	
A2W2	Cable Assembly	783815-2	07342	783815-2	
A2W2J2	Connector, 16 Pin	808521	22526	65039-021	
C1	Capacitor, Ceramic, 0.01 uf, 100 V, $\pm 10\%$	808487	56289	CKR06BX103XL	
Q1	Transistor	807607	04713	2N4123	
Q2	Same as Q1				
R1	Resistor, Composition, 1.5 k, 1/4 W, $\pm 5\%$	802232	01121	CB1525	
R2	Resistor, Composition, 47 k, 1/4 W, $\pm 5\%$	801638	01121	CB4735	
R3	Same as R1				
R4	Same as R2				
U1	IC, CMOS, Hex Inverter	808090- MOS	04713	MC14069UBCP	
U2	IC, CMOS, NAND Gate, Tristate Inputs	808505- MOS	04713	MC14023BCP	
U3	IC, CMOS, Dual 4-Input NAND Gate	808506- MOS	04713	CM14012BCP	
U4	IC, CMOS, Quad 2-Input NAND Gate	808092- MOS	04713	MC14011BCP	
U5	IC, Low Power Complementer	807702- MOS	04713	MC14561BCP	
U6,U7	Same as U5				
U8	IC, NBCD Adder	807779- MOS	04713	MC14560BCP	
U9,U10	Same as U8				
U11	IC, CMOS, DST, Hex Non-Inverting TTL Buffer	807703- MOS	12040	74C902	
U12,U13	Same as U11				

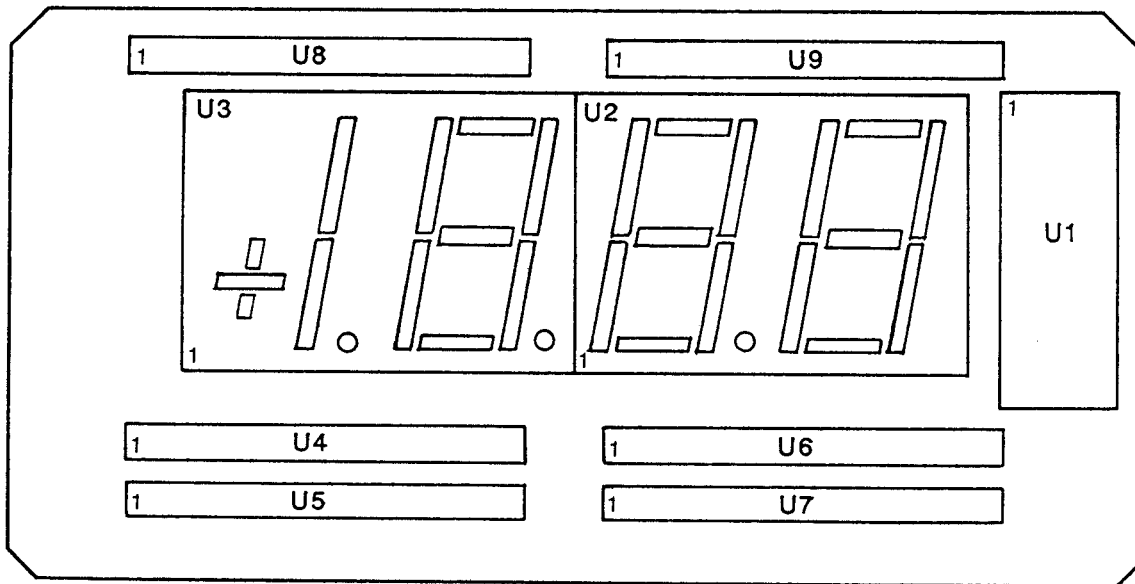


783612-J

Figure 4-4. +180° Digital Circuit Card Assembly A2 (Option F2X),
Parts Location Diagram

Table 4-10. $\pm 180^\circ$ Display Circuit Card Assembly A1A1 (Option F2X) - 783851

<u>Ref Des</u>	<u>Description</u>	<u>NAI P/N</u>	<u>FSCM</u>	<u>Mfr P/N</u>	<u>UOC</u>
U1	IC, TTL, Decoder/Driver	808501	01295	SN74LS347N	
U2	IC, Display, LED, 7 Segment, Red	885214	AAAAA	LTD6910HR Code H	
U3	IC, Display, LED, 7 Segment, Red, 1 1/2 Digit	885643	AAAAA	LTD6930HR Code H	
U4	Resistor Network 100 ohm, $\pm 20\%$ 10 Pin, 5 Resistor	808480	32997	4310R-102-101	
U5-U9	Same as U4				



783851-D

Figure 4-5. $\pm 180^\circ$ Display Circuit Card Assembly A1A1 (Option F2X).
Parts Location Diagram

Table 4-11. Variable Scale 0-9999 Circuit Card Assembly A3 (Option F3X) - 783823-1

<u>Ref Des</u>	<u>Description</u>	<u>NAI P/N</u>	<u>FSCM</u>	<u>Mfr P/N</u>	<u>UOC</u>
A3W1	Cable Assembly	783815-1	07342	783815-1	
A3W1J2	Connector, 16 Pin	808521	22526	65039-021	
A3W2	Cable Assembly	783815-2	07342	783815-2	
A3W2J1	Connector, 16 Pin	808521	22526	65039-021	
C1	Capacitor, Mica, 470 pf, 500 V, <u>+5%</u>	807257	72136	DM15BD471J	
C2	Capacitor, Ceramic, 1000 pf, 200 V, <u>+10%</u>	805788	81349	CK05BX102K	
C3,C4	Same as C2				
C5	Capacitor, Ceramic, 0.1 uf, 50 V, <u>+10%</u>	807730	81349	CK05BX104K	
C6-C9	Same as C5				
C10	Same as C2				
R1	Resistor, Composition, 3.3 k, 1/4 W, <u>+5%</u>	803388	01121	CB3325	
R2	Resistor, Composition, 1 k, 1/4 W, <u>+5%</u>	880084	01121	CB1025	
R3	Resistor, Composition, 47 k, 1/4 W, <u>+5%</u>	801638	01121	CB4735	
R4	Resistor, Composition, 10 k, 1/4 W, <u>+5%</u>	880092	01121	CB1035	
R5,R6	Same as R4				
U1	Switch, DIP, 20 Pin, 10 Piano Switches	808583	81073	76PSB10	
U2	Switch, DIP, 16 Pin, 8 Piano Switches	808582	81073	76PSB08	
U3	Resistor, Network, 100 k, 9 Resistors, SIP	808581	23223	750-101-R100K	
U4	Same as U3				

Table 4-11. Variable Scale 0-9999 Circuit Card Assembly A3 (Option F3X) - 783823-1
(Continued)

<u>Ref Des</u>	<u>Description</u>	<u>NAI P/N</u>	<u>FSCM</u>	<u>Mfr P/N</u>	<u>UOC</u>
U6	IC, CMOS, BCD Rate Multiplier	808571	04713	MC14527BCF	
U7-U10	Same as U6				
U11	IC, CMOS, Dual BCD Up Counter	808573	04713	MC14518BCP	
U12	IC, TTL, Octal D-Flip-Flop, Low Power Schottky	808576	01295	SN74LS374N	
U13	Same as U2				
U14	Same as U12				
U15	IC, CMOS, Programmable BCD Divide-By-N Counter	808572	04713	MC14522BCP	
U17	IC, CMOS, Resettable Monostable Multivibrator	808819	04713	MC14538BCP	
U18	Same as U17				
U19-U22	Same as U15				
U23	IC, CMOS, Hex Gate	808437	04713	MC14572BCP	
U24	IC, CMOS, Dual D-Flip-Flop	808575	04713	MC14013BCP	

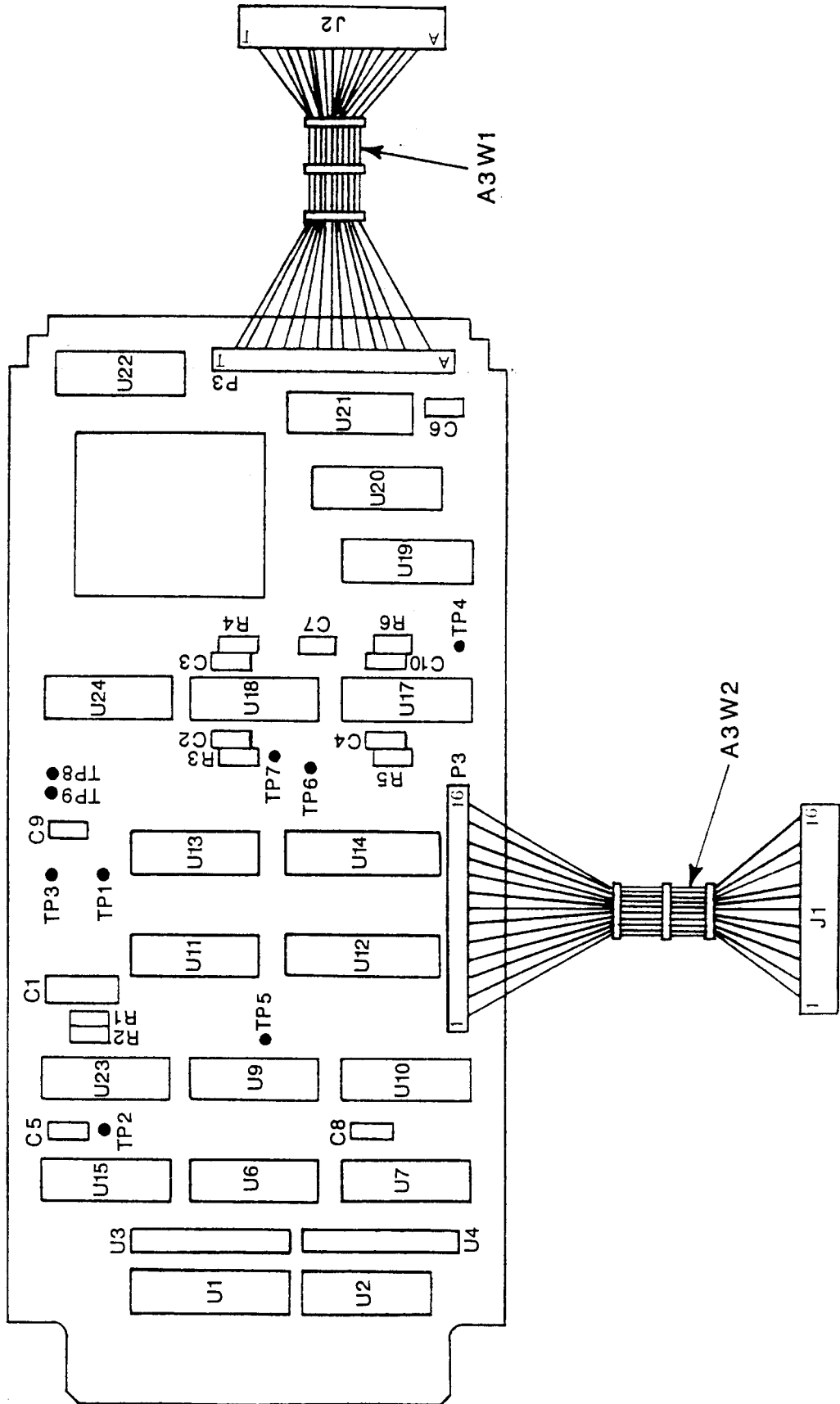


Figure 4-6. Variable Scale 0-9999 Circuit Card Assembly A3 (Option F3X),
Parts Location Diagram

Table 4-12. LED Dimmer Circuit Card Assembly A4 (Option FX1) - 783825

<u>Ref Des</u>	<u>Description</u>	<u>NAI P/N</u>	<u>FSCM</u>	<u>Mfr P/N</u>	<u>UOC</u>
C1	Capacitor, Mica, 750 pf, 300 V, $\pm 1\%$	807352	72136	DM15F751F	
C2	Same as C1				
C3	Capacitor, Ceramic, 0.01 uf, 100 V, $\pm 10\%$	808487	56289	CKR06BX103KL	
C4	Capacitor, EL, Tantalum, 33 uf, 35 V, $\pm 20\%$	800601	56289	1500336X003552	
Q1	Transistor, NPN	808190	5L401	2N3566	
Q2	Transistor, PNP, Power	808585	04713	2N3719	
R1	Resistor, Metal Film, 909 k, 1/4 W, $\pm 1\%$	808584	91637	CMF55 909KT1 1%	
R2	Resistor, Composition, 5.1 k, 1/4 W, $\pm 5\%$	880089	01121	CB5125	
R3	Resistor, Composition, 3 k, 1/4 W, $\pm 5\%$	880784	01121	CB3025	
R4	Resistor, Composition, 100 ohm, 1/2 W, $\pm 5\%$	880601	01121	EB1015	
R5	Resistor, Variable, 1 M, 2 1/4 W, $\pm 10\%$ (NOTE: Supplied loose - Requires customer installation)	808587	01121	JA1N056S105UA	
U1	IC, CMOS, Dual Retriggerable/ Resettable Monostable Multivibrator	808435	04713	MC14528BCP	

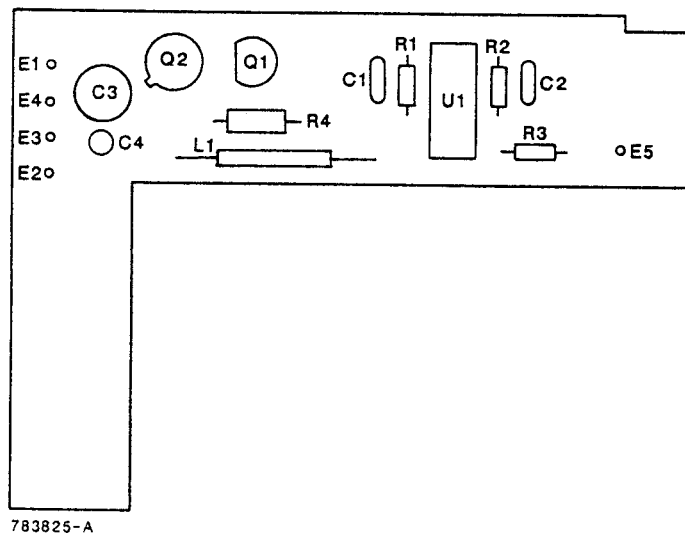


Figure 4-7. LED Dimmer Circuit Card Assembly A4 (Option FX1). Parts Location Diagram

Table 4-13. List of Manufacturers

<u>FSCM</u>	<u>Manufacturer's Name and Address</u>	<u>FSCM</u>	<u>Manufacturer's Name and Address</u>
01121	Allen-Bradley Co. 1201 S. 2nd Street Milwaukee, WI 53204	12040	National Semiconductor Corporation Commerce Drive P.O. Box 443 Danbury, CT 06810
01295	Texas Instruments 13500 North Central Expressway P.O. Box 225012 M/S 49 Dallas, TX 75265	18324	Signetics Corporation Military Products Div. 4130 S. Market Court Sacramento, CA 95834
02735	RCA - Solid State Route 202 Somerville, NJ 08876	23223	CTS Microelectronics Inc. P.O. Box 1278 Lafayette, IN 47902
04222	AVX Ceramics P.O. Box 867 Myrtle Beach, SC 29577	27264	Molex Inc. Corporate Headquarters 2222 Wellington Court Lisle, IL 60532
04713	Motorola, Inc. Semiconductor Products Inc. 5005 E. McDowell Road Phoenix, AZ 85008	28480	Hewlett-Packard Co. Corporate Headquarters 3000 Hanover Street Palo Alto, CA 94304
06001	General Electric Co. Electric Capacitor Product Section P.O. Box 1388 Columbia, SC 29201	30857	Varo Inc., Micro Circuit Prods. 900 North Shiloh Road Garland, TX 75040
06665	Precision Monolithics Inc. Sub. of Bourns Inc. 1500 Space Park Drive Santa Clara, CA 95050	30870	Republic Machinery Co., Inc. DBA Republic-Lagun Machine Tool Co. 1000 E. Carson Street P.O. Box 4586 Carson, CA 90749
06776	Robinson Nugent Inc. 800 E. 8th Street P.O. Box 1208 New Albany, IN 47150	32997	Bourns, Inc. Trimpot Division 1200 Columbia Avenue Riverside, CA 92507
07263	Fairchild Camera and Inst. Corp. Semiconductor Division 401 Ellis Street P.O. Drawer 7284 Mountain View, CA 94042	5L401	Solid State, Inc. 46 Farrand Street Bloomfield, NJ 07003-2516
07342	North Atlantic Industries, Inc. 60 Plant Avenue Hauppauge, NY 11788	50522	Monsanto Industrial Chemicals Co. 755 Page Mill Road Palo Alto, CA 94303

Table 4-13. List of Manufacturers (Continued)

<u>FSCM</u>	<u>Manufacturer's Name and Address</u>	<u>FSCM</u>	<u>Manufacturer's Name and Address</u>
56289	Sprague Electric 87 Marshall Street North Adams, MA 01247	75915	Tracor Littelfuse Inc. 800 E. Northwest Highway Des Plaines, IL 60016
70255	Alco Controls Div. Emerson Electric Co. 11911 Adie Road Maryland Heights, MO 63043	81073	Grayhill, Inc. P.O. Box 373 561 Hillgrove Avenue LaGrange, IL 60525
71785	TRW Inc. TRW Cinch Connectors Div. 1501 Morse Avenue Elk Grove, IL 60007	84171	Arco Electronics 400 Moreland Road Commack, NY 11725
72982	Murata Erie North America Inc. Erie Operations 645 W. 11th Street Erie, PA 16512	91662	Elco Corporation Maryland & Computer Ave. Willow Grove, PA 19090
		AAAAA	Lite-On Corp. (LITON) (USA) Parkway Business Ctr. 1, Suite 570 4951 Airport Pkwy. Dallas, Texas 75248

SECTION 5

UNIT SCHEMATICS

5-1 INTRODUCTION

This section contains schematic diagrams for the Model 800 Synchro Panel Meter.

<u>Figure</u>	<u>Title</u>	<u>Page</u>
5-1	Main Circuit Card Assembly (CCA) A1, Schematic Diagram	5-2
5-2	Standard Display CCA A1A1, Schematic Diagram	5-5
5-3	+180° Digital CCA A2, Schematic Diagram	5-6
5-4	+180° Display CCA A1A1, Schematic Diagram	5-7
5-5	Variable Scale 0-9999 CCA A3, Schematic Diagram	5-9
5-6	LED Dimmer CCA A4, Schematic Diagram	5-11

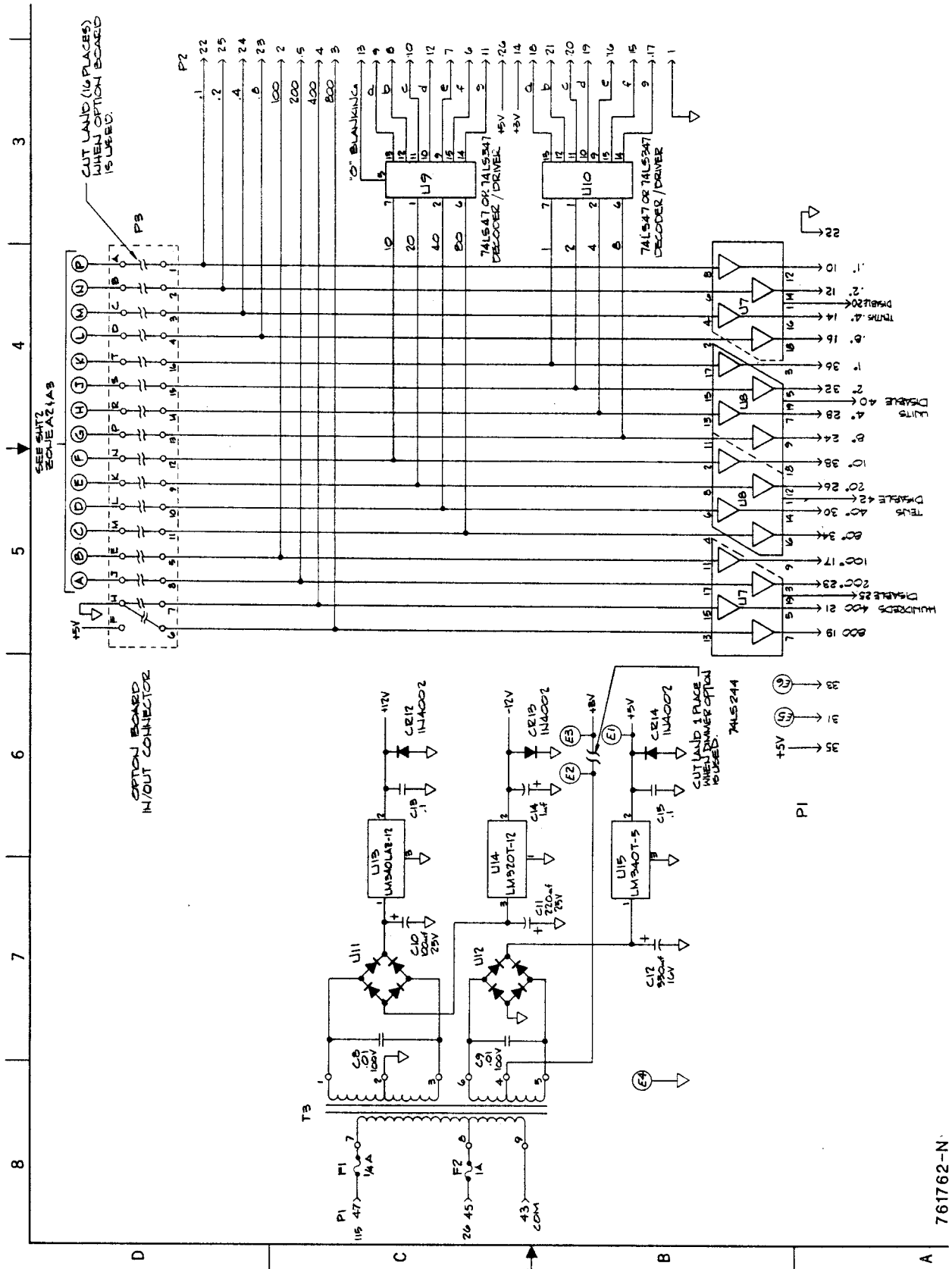
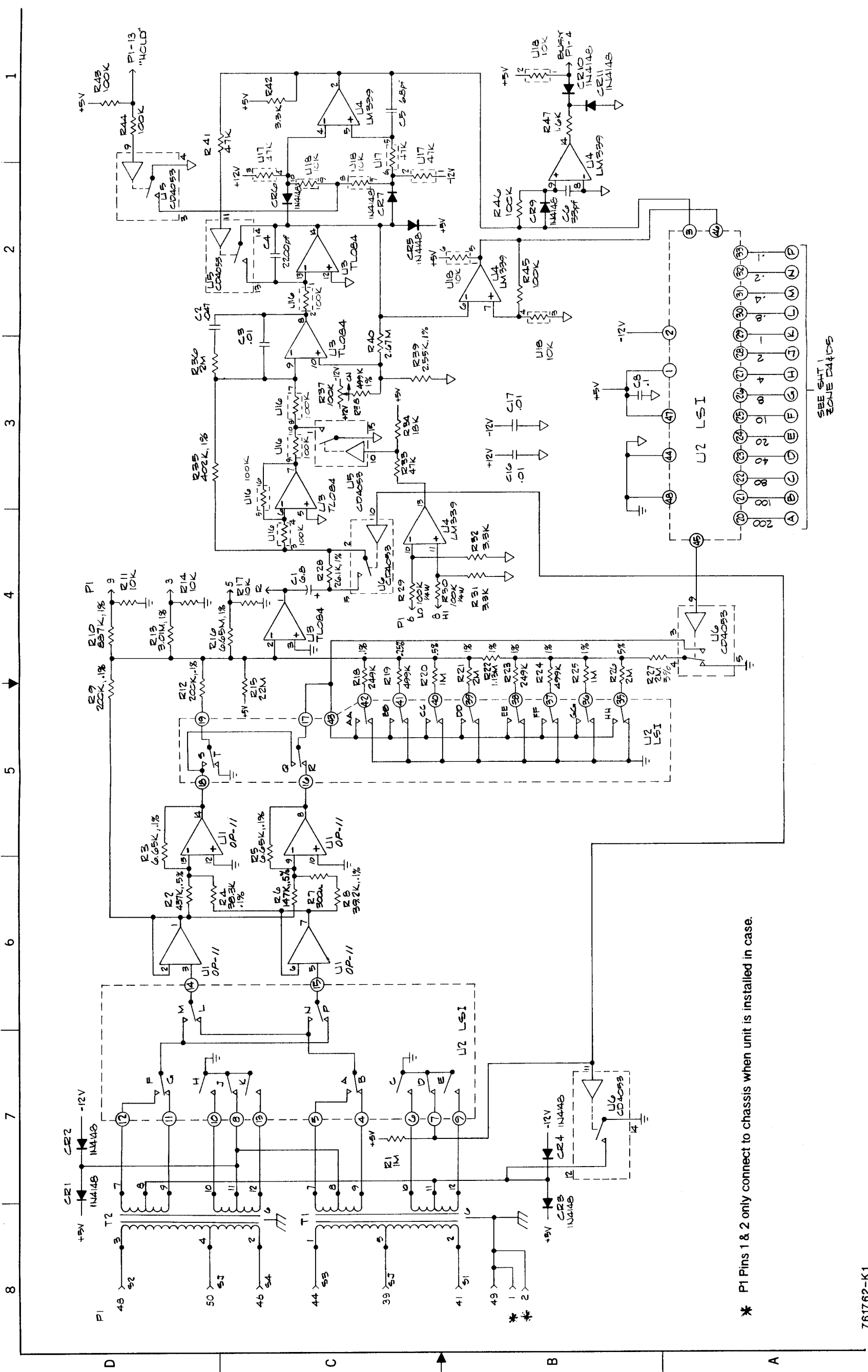


Figure 5-1. Main CCA A1, (Sheet 1 of 2), Schematic Diagram

761762-N



* P1 Pins 1 & 2 only connect to chassis when unit is installed in case.

761762-K1

Figure 5-1. Main CCA A1,
(Sheet 2 of 2),
Schematic Diagram

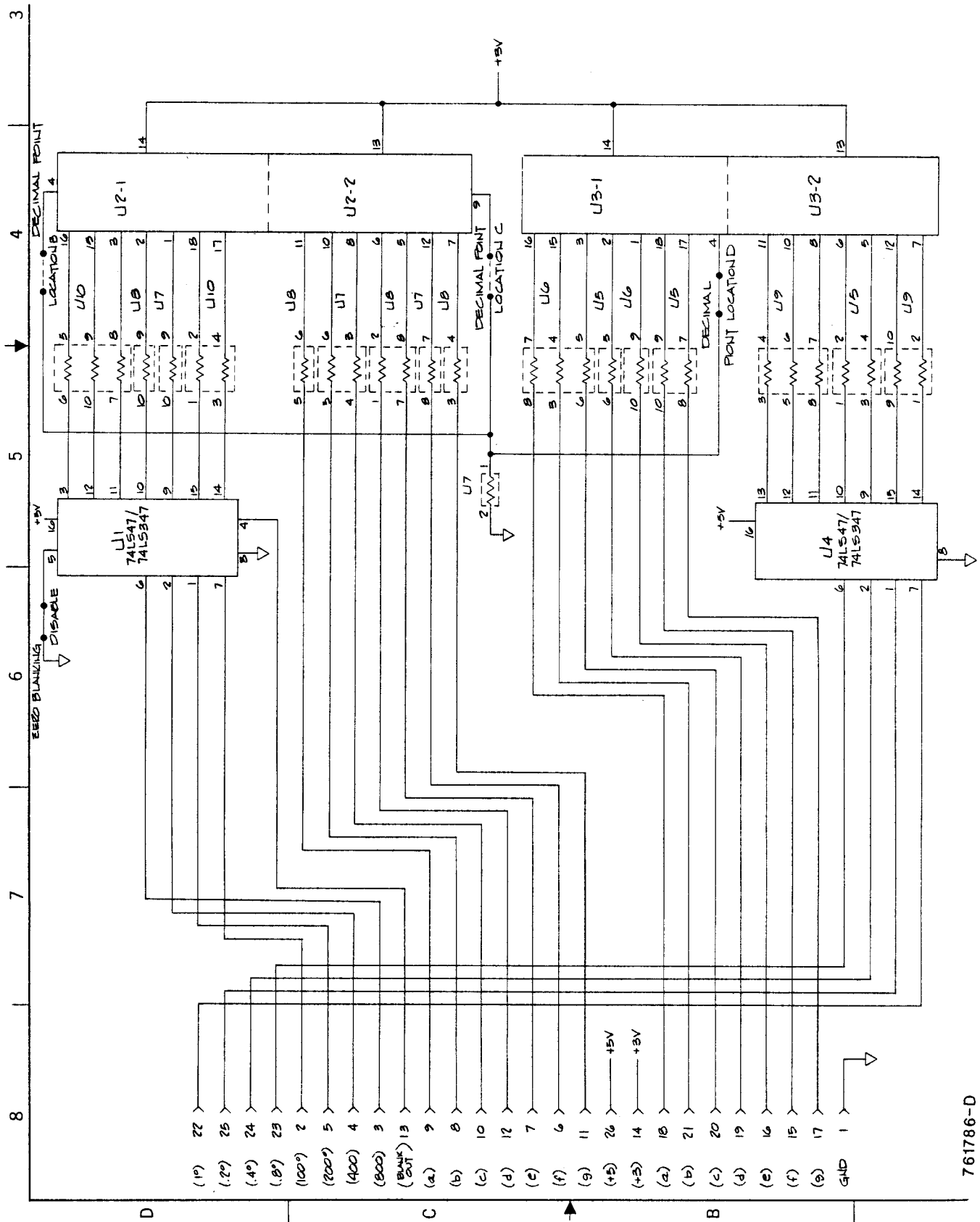


Figure 5-2. Standard Display CCA AL1, Schematic Diagram

761786-D

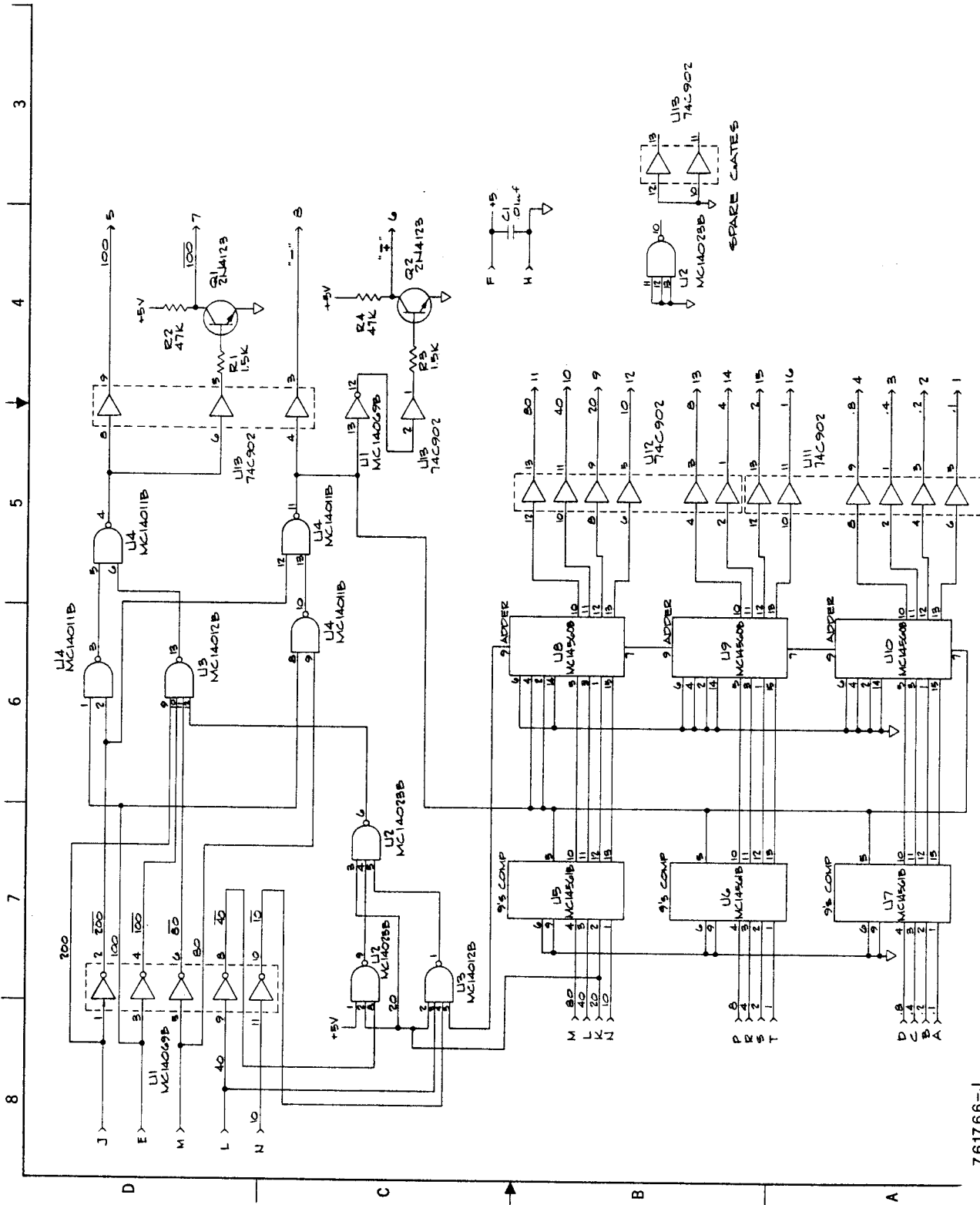


Figure 5-3. ±180° Digital CCA A2, Schematic Diagram

761766-J

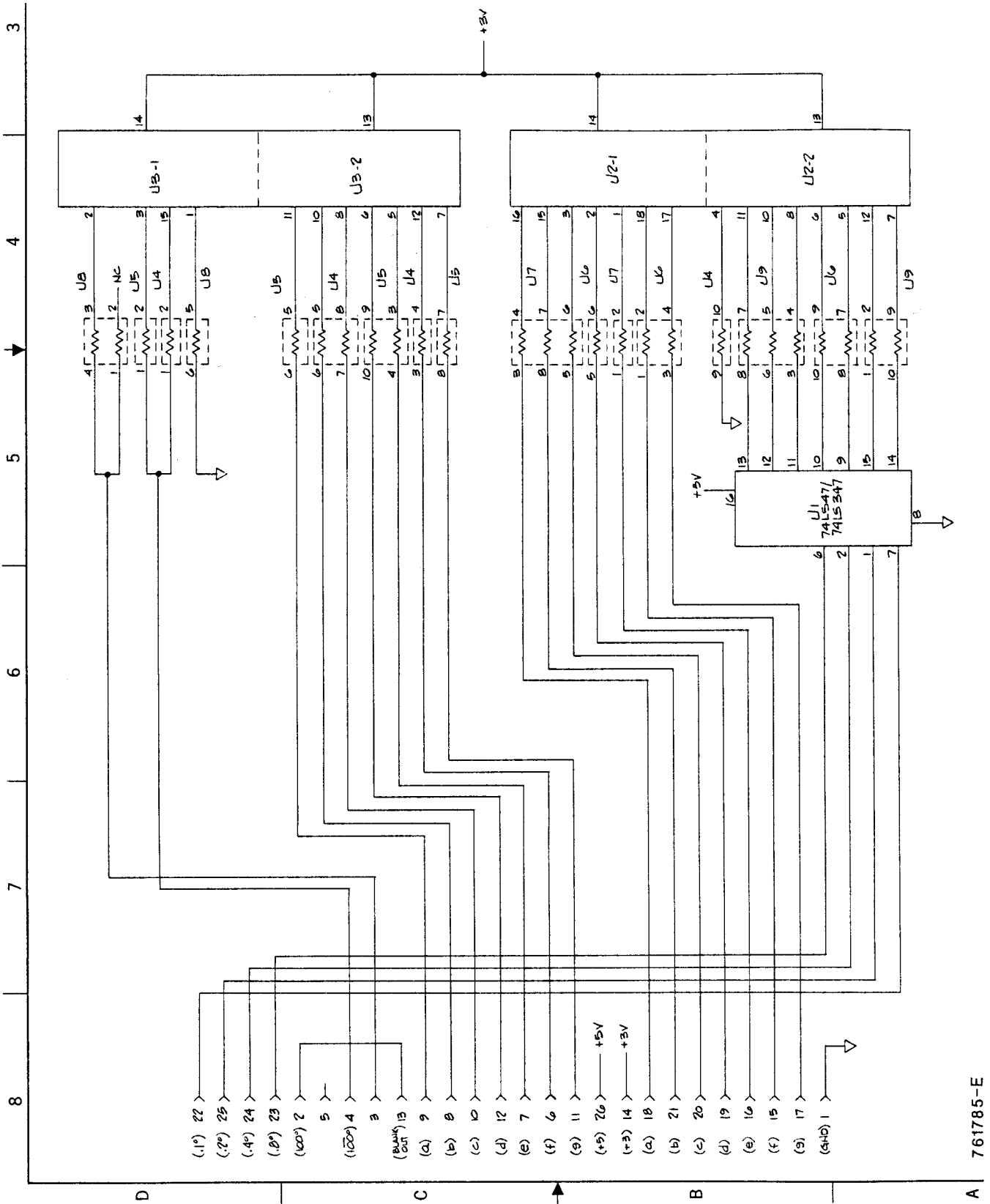


Figure 5-4. ±180° Digital CCA A1A1, Schematic Diagram

761785-E

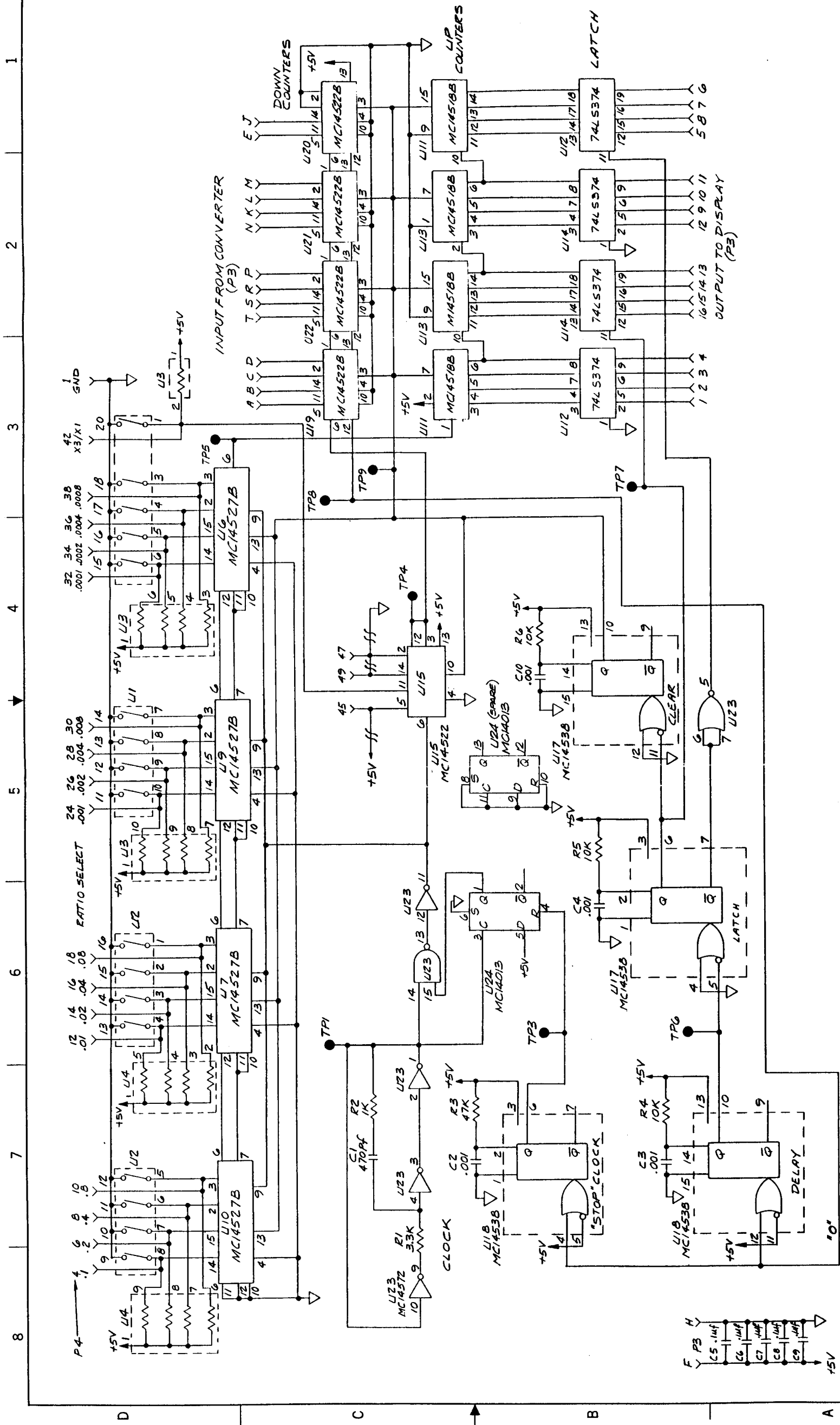


Figure 5-5. Variable Scale 0-9999 CCA A3, Schematic Diagram

Change 2 5-9/(5-10 blank)

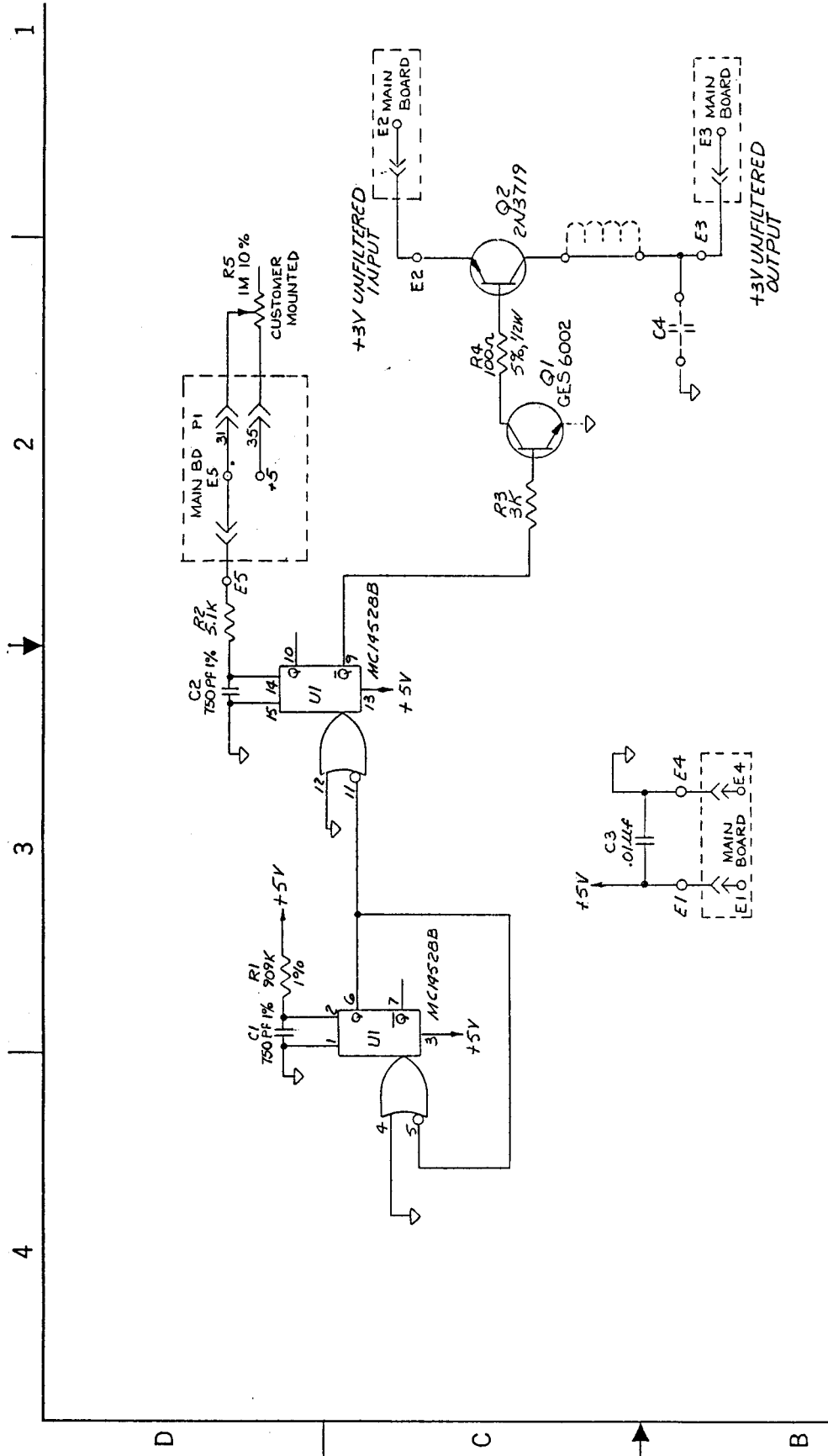


Figure 5-6. LED Dimmer CCA A4. Schematic Diagram

SECTION 6

UPDATE INFORMATION

6-1 INTRODUCTION

As NAI continues to improve the performance of the Model 800, corrections and modifica-

tions to the manual may be required. This section contains Product Revision Sheet (PRS) data which updates the unit to the most current configuration available.

DECLARATION OF CONFORMITY

We **NORTH ATLANTIC INSTRUMENTS, INC.**
170 WILBUR PL.
BOHEMIA, NY 11716-2416

declare under our sole responsibility that the product(s)

800 SERIES SYNCHRO PANEL METERS

to which this declaration relates is in conformity with the following standard(s) or other normative document(s):

EN 50081-1: 1992 EN 55022; CONDUCTED EMISSIONS
EN 55022; RADIATED EMISSIONS

EN 50082-1: 1992 IEC 801-2; 1984 ESD
IEC 801-3; 1984 RADIATED IMMUNITY
IEC 801-4; 1988 EFT BURST

EN 61010-1: 1993/A2: 1995 SAFETY

following the provisions of COUNCIL DIRECTIVE 89/336/EEC
73/23/EEC

Place Bohemia, NY, U.S.A.



(Signature)

Date 2-18-97

Daniel A. Palladino
(Full Name)

Quality Manager
(Position)