

# SECTION O

## OPTIONS

O-1. This section provides descriptions, specifications (where applicable), schematic diagrams and component locators, for the options available for use with the EIP 371 Source Locking Microwave Counter.

<u>OPT</u>	<u>DESCRIPTION</u>
03	OVEN STABILIZED OSCILLATOR ( $5 \times 10^{-9}$ )
04	OVEN STABILIZED OSCILLATOR ( $1 \times 10^{-9}$ )
05	OVEN STABILIZED OSCILLATOR ( $5 \times 10^{-10}$ )
06	PROGRAMMABLE OFFSETS
07	REMOTE PROGRAMMING
09	BCD OUTPUT
10	REAR PANEL INPUT CONNECTORS
11	BAND II DELETED
13	RACK MOUNT/CHASSIS SLIDES
17	GENERAL PURPOSE INTERFACE BUS*

\* See separate manual

NOTE: Options 01, 02, and 12 are not used with the 371 Source Locking Counter.

# OPTIONS 03, 04, AND 05 HIGH STABILITY TIME BASE (OVEN STABILIZED CRYSTAL OSCILLATOR)

## O3-1. DESCRIPTION

O3-2. Three Oven Stabilized Oscillators are available as options for certain EIP Autohet Counters. Specifications for the three options are listed in Table O3-1. These options reduce the counter inaccuracy (see Section 6) due to both temperature and time.

O3-3. When either Option 03, 04, or 05 is installed, the TCXO (A116) is removed from the Reference Oscillator PC Board (A108), and components are added to A108 and Counter Chassis A1 (see Section 9, Figure 9-10). The added components include Oven Oscillator power transformer A114T1, 28 Vdc Oven Power Supply A114, and connector A108J3.

O3-4. The 28 volt Power Supply is on and operating as long as the counter is plugged into an active source of AC power, irrespective of the counter's POWER On/Off switch. Primary wiring of the oven oscillator power transformer is shown in Section 9, Figure 9-9. The balance of the circuit is conventional: full-wave bridge rectifier CR1, filter C1, regulator U1, series pass transistor Q1, protective diodes CR1-CR3, and voltage control R3.

CHARACTERISTIC	OPTION 03	OPTION 04	OPTION 05
AGING RATE/24 HOURS (After 72 hour warm-up)	$<   5 \times 10^{-9}  $	$<   1 \times 10^{-9}  $	$<   5 \times 10^{-10}  $
SHORT TERM STABILITY ( 1 second average)	$< 1 \times 10^{-10} \text{ rms}$		
0° to +50° C TEMPERATURE STABILITY	$<   6 \times 10^{-8}  $	$<   3 \times 10^{-8}  $	$<   3 \times 10^{-8}  $
±10% LINE VOLTAGE CHANGE	$<   5 \times 10^{-10}  $	$<   2 \times 10^{-10}  $	$<   2 \times 10^{-10}  $

TABLE O3-1  
SPECIFICATIONS  
OVENIZED OSCILLATOR OPTIONS

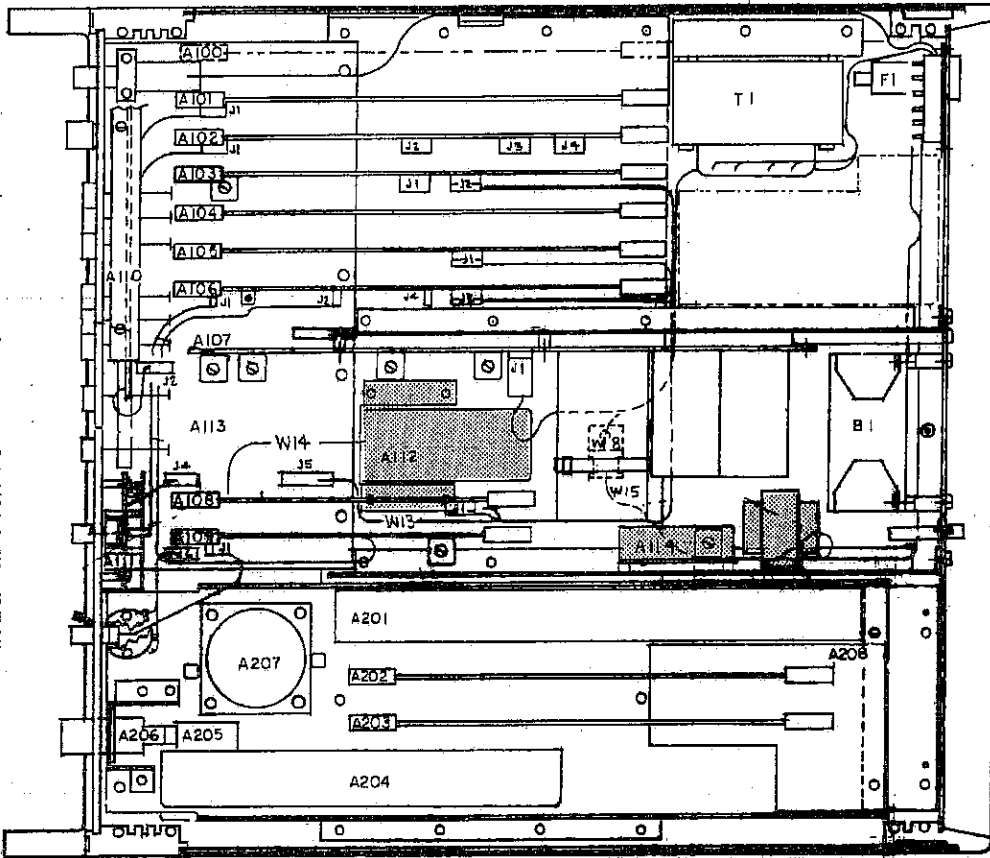
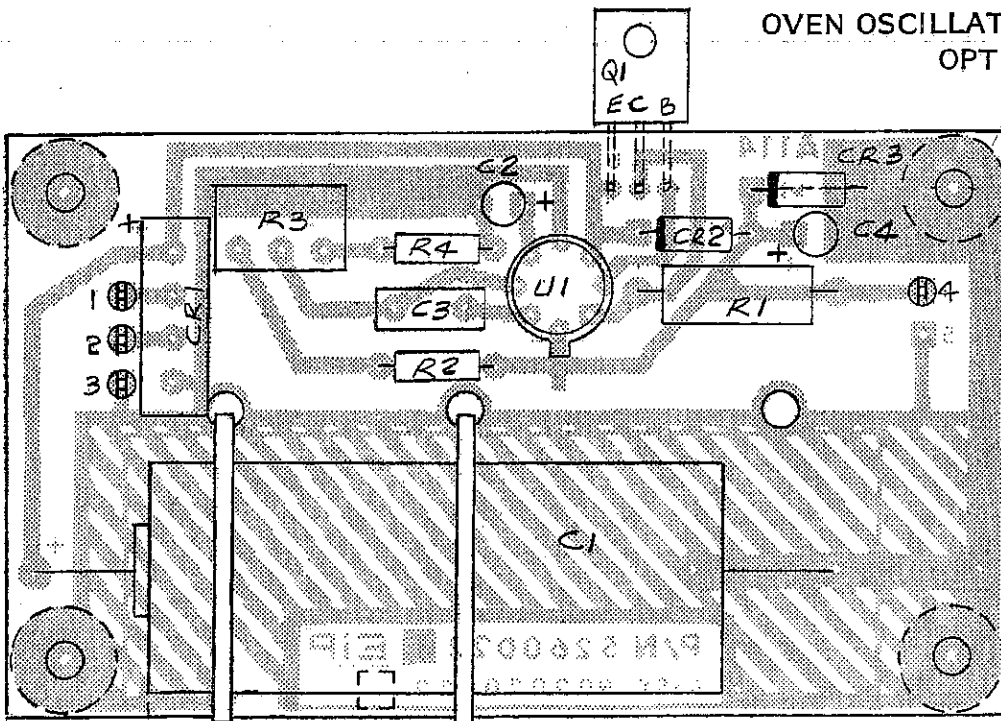


FIGURE O3-1A  
 COMPONENT LOCATORS  
 OVEN OSCILLATOR POWER SUPPLY  
 OPTIONS 03, 04, 05





# OPTION 06 PROGRAMMABLE OFFSETS

## O6-1. GENERAL DESCRIPTION

O6-2. This option allows the displayed reading of any frequency to be increased or decreased by any number in 100 kHz increments.

O6-3. For positive offsets, the desired number may be programmed directly on 24 input lines (4-line BCD code on each of six digits). Activating the OFFSET ENABLE command will then cause the reading to be offset by the programmed frequency.

O6-4. Negative offsets require that the nines complement of the number be programmed and that the OFFSET MINUS command be activated. The nines complement of a number is obtained by subtracting the number from 99.9999 GHz.

O6-5. All inputs are programmed by ground contact closure or application of a TTL "0" level. Pin connections are shown in Table O6-1.

## O6-6. CIRCUIT DESCRIPTION

O6-7. Circuitry required for the option is contained on two PC boards. Programming Option Board A115 contains the inverters used as buffers for the input information. Offset Control Unit A100 contains the remaining control circuitry.

O6-8. The six digit offset input is used to directly preset the six DCUs on Count Chain 2 (A102). This then requires that the 3 MSD information from the Converter (in Band III operation) must be serially added to the preset information. This is the major function of the Offset Control unit.

O6-9. The second function of the unit is to provide a single pulse to the 100 kHz DCU of A102 during negative offset.

O6-10. During SEQUENCE GENERATOR "0", 3 MSD information from the Converter is preset into U6, U7, and U8. The OFFSET LOAD command is generated (U2 pin 6) and, if OFFSET MINUS is low (negative offset), U4B is set.

O6-11. At SEQUENCE GENERATOR "1", U3A is enabled and divides the input 2.5 MHz clock to 1.25 MHz. U3B inhibits the sequence generator and enables U4A. The first clock pulse triggers U4A which activates the GATE X 100 MHz signal and operates a single ADD X 100 kHz pulse if negative offset is selected. Clock pulses then simultaneously appear at the ADD X 100 MHz output and the COUNT DOWN input to U6. Pulses continue until U6, U7, and U8 have counted down to zero. U3B is then reset, which in turn resets U4A, ends the cycle, and removes the SEQUENCE GENERATOR INHIBIT.

O6-12. Programming connector type: Amphenol 57-40500, 50 pin female. Mating connector: Amphenol 57-30500, 50 pin male.

J3 Pin	Function
14	Ground
15	Offset Enable
26	10 <sup>5</sup> A (100 kHz)
27	10 <sup>5</sup> B (200 kHz)
28	10 <sup>5</sup> C (400 kHz)
29	10 <sup>5</sup> D (800 kHz)
30	10 <sup>6</sup> A (1 MHz)
31	10 <sup>6</sup> B (2 MHz)
32	10 <sup>6</sup> C (4 MHz)
33	10 <sup>6</sup> D (8 MHz)
34	10 <sup>7</sup> A (10 MHz)
35	10 <sup>7</sup> B (20 MHz)
36	10 <sup>7</sup> C (40 MHz)
37	10 <sup>7</sup> D (80 MHz)
38	10 <sup>8</sup> A (100 MHz)
39	10 <sup>8</sup> B (200 MHz)
40	10 <sup>8</sup> C (400 MHz)
41	10 <sup>8</sup> D (800 MHz)
42	10 <sup>9</sup> A (1 GHz)
43	10 <sup>9</sup> B (2 GHz)
44	10 <sup>9</sup> C (4 GHz)
45	10 <sup>9</sup> D (8 GHz)
46	10 <sup>10</sup> A (10 GHz)
47	10 <sup>10</sup> B (20 GHz)
48	10 <sup>10</sup> C (40 GHz)
49	10 <sup>10</sup> D (80 GHz)
50	Offset Plus/Minus

TABLE O6-1  
J3 CONTACT GROUNDING FOR  
PROGRAMMABLE OFFSET  
OPTION 06

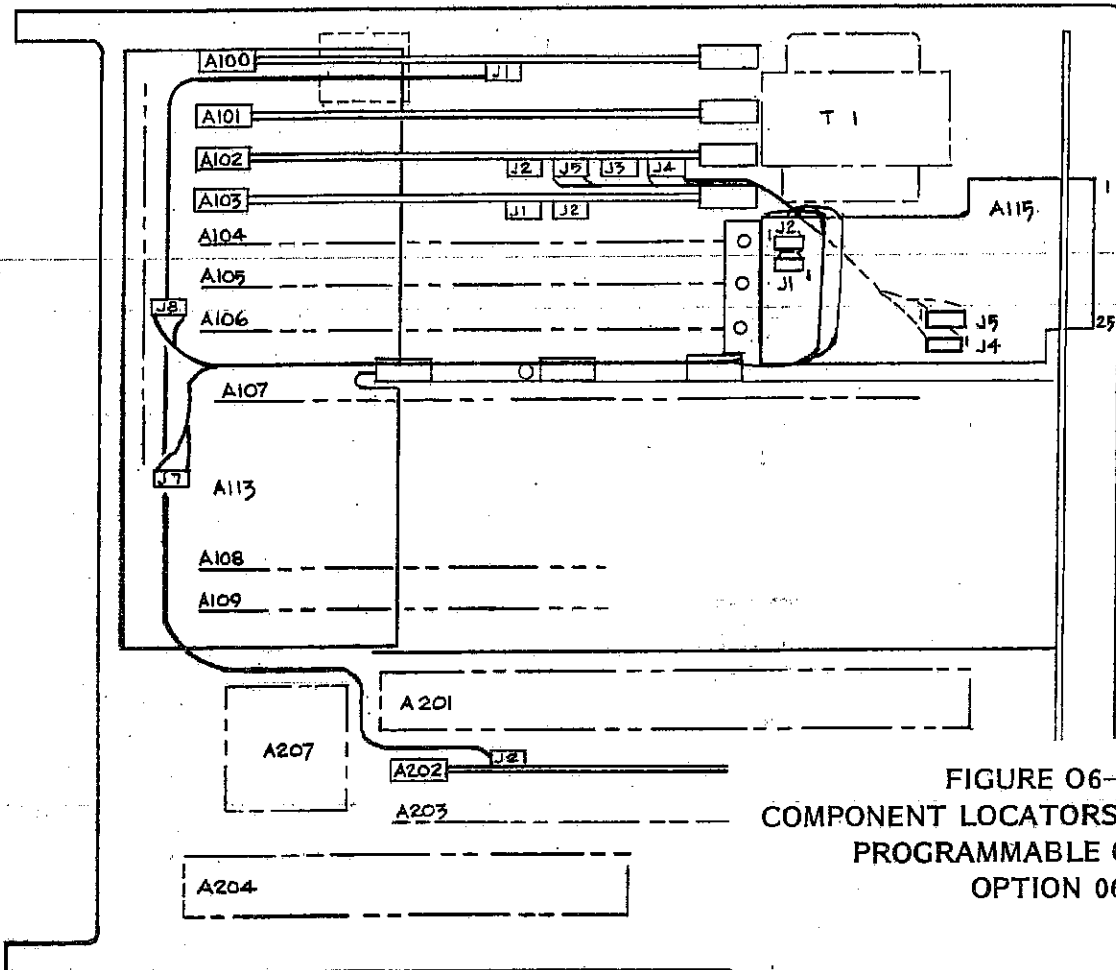
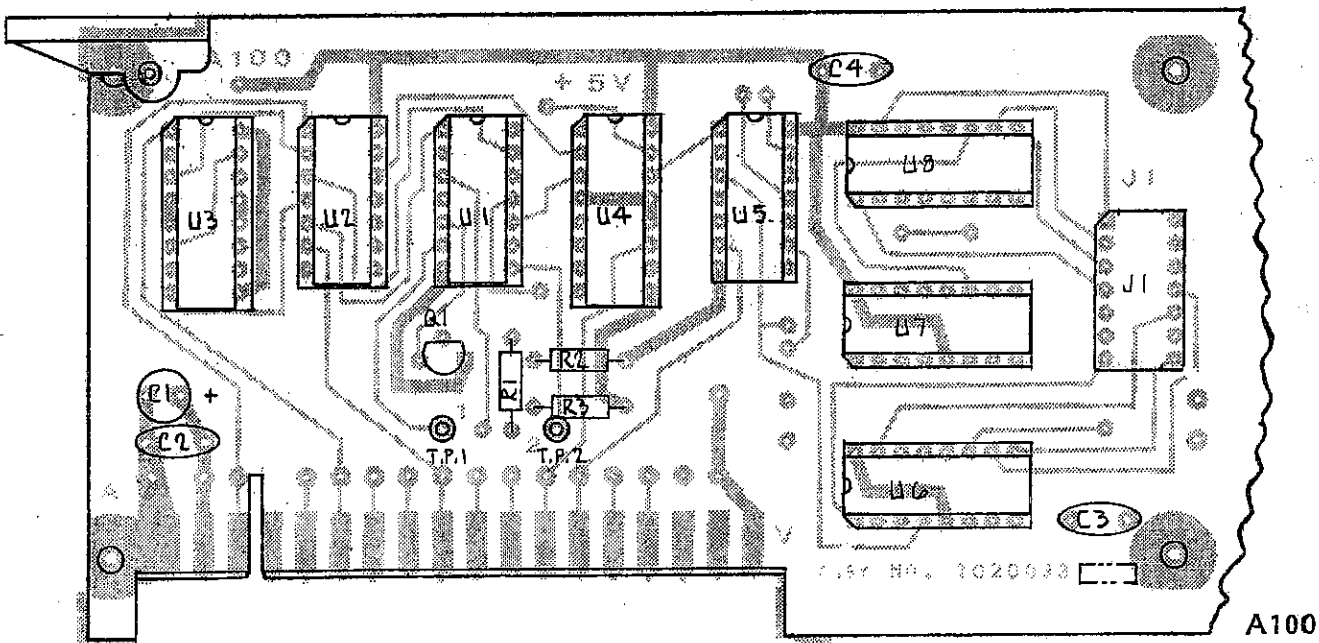


FIGURE 06-1A  
 COMPONENT LOCATORS (A100 & A115)  
 PROGRAMMABLE OFFSETS  
 OPTION 06

Refer to Option 07, Figure 07-1 for Component  
 Locator and Schematic Diagram for A115 Pro-  
 gramming Board.



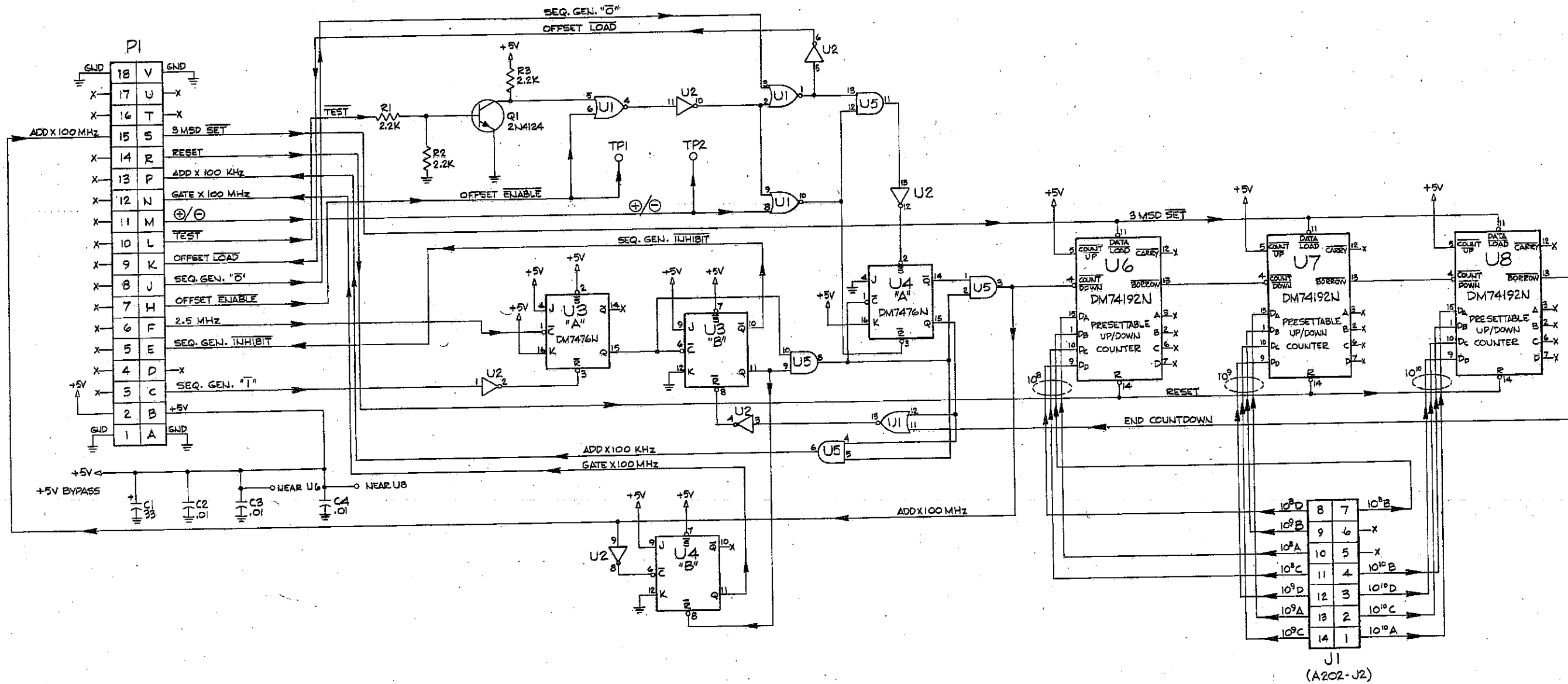


FIGURE 06-1B  
 SCHEMATIC DIAGRAM  
 PROGRAMMABLE OFFSETS  
 OPTION 06

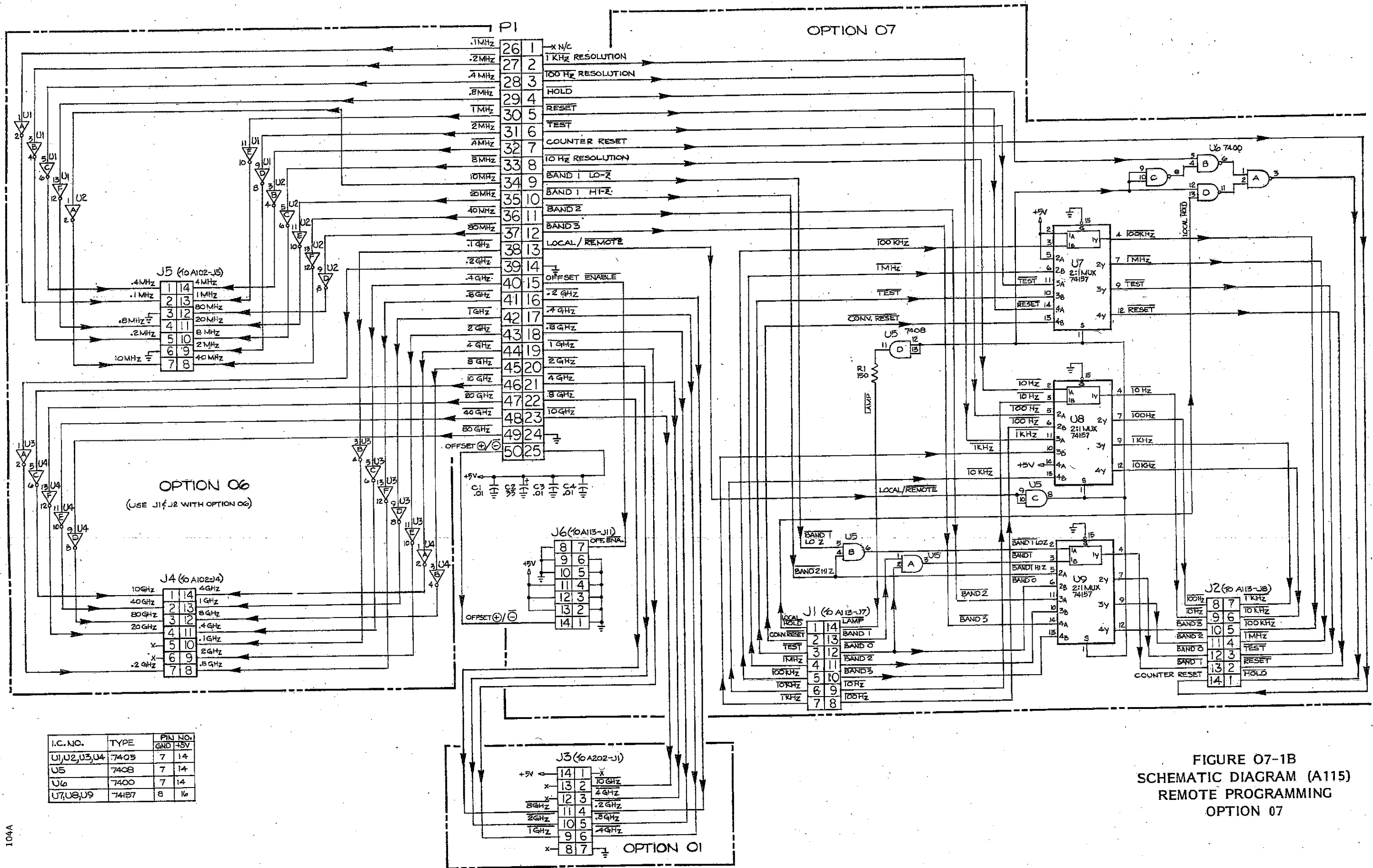


FIGURE 07-1B  
SCHEMATIC DIAGRAM (A115)  
REMOTE PROGRAMMING  
OPTION 07

I.C. NO.	TYPE	PIN NO. GND +5V
U1, U2, U3, U4	7405	7 14
U5	7408	7 14
U6	7400	7 14
U7, U8, U9	74157	8 16



# OPTION 07

## REMOTE PROGRAMMING

### O7-1. GENERAL DESCRIPTION

O7-2. Most of the functions which are normally controlled from the front panel of the counter may be remotely programmed by this option. These functions are:

- a. 10 Hz RESOLUTION
- b. 100 Hz RESOLUTION
- c. 1 kHz RESOLUTION
- d. HOLD
- e. RESET
- f. TEST
- g. BAND I SELECT
- h. BAND II SELECT
- i. BAND III SELECT

O7-3. In addition to the front panel controls, an additional command: COUNTER RESET is also available. This command resets the counter and initiates a new reading without resetting the Converter.

O7-4. The LOCAL/REMOTE input activates the remote functions. This and all remote commands are activated by ground contact closure or a TTL "0" level. Pin connections to the rear panel are shown in Table O7-1.

### O7-5. CIRCUIT DESCRIPTION

O7-6. In the standard instrument, all front panel control switches are returned to ground through a jumper cable between A113J7 and J8. With Option 07, the jumper cable is removed, and cables from J7 and J8 connect to Remote Programming board A115. Switch returns are grounded through circuits on A115 in the LOCAL mode. In REMOTE, a series of multiplexers disable the front panel switches and enable the remote control lines.

O7-7. The remote programming circuit contains 13 two-input multiplexers, each of which has one input connected to a front panel switch return, and one input connected to the REMOTE PROGRAMMING connector. When the LOCAL/REMOTE line (J3 pin 13) is grounded, the multiplexers effectively open the ground connections of the front panel controls, allowing remote control of functions shown in Table O7-1.

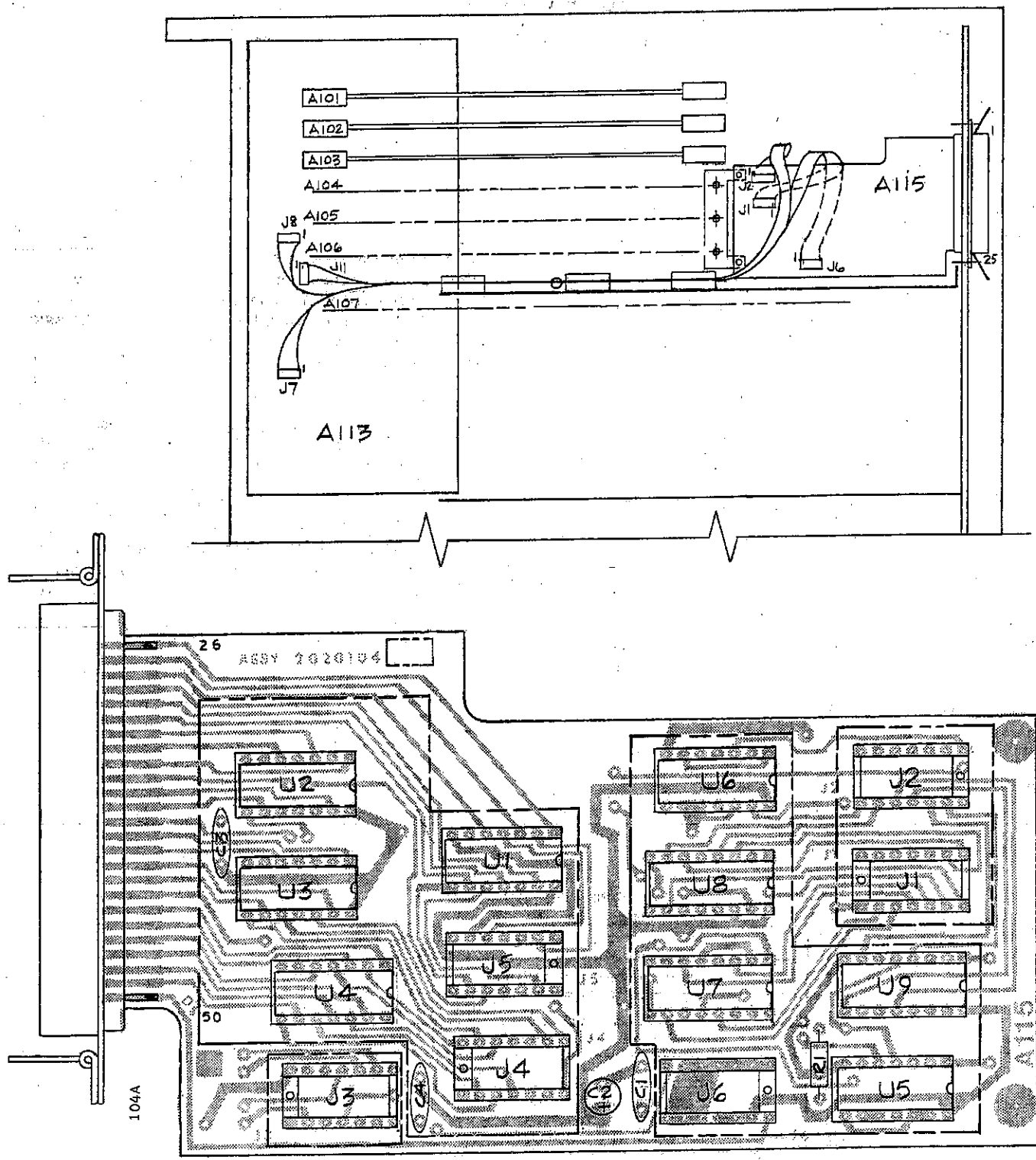
O7-8. If the HOLD is not energized, front panel SAMPLE RATE determines cycle time. In remote operation, front panel HOLD is ineffective.

O7-9. If none of the RESOLUTION switches are grounded, the counter will operate with a one second gate.

O7-10. Programming connector type: Amphenol 57-40500, 50 pin female. Mating connector: Amphenol 57-30500, 50 pin male.

J3 Pin No.	Function
1	No Connection
2	1 kHz Resolution
3	100 Hz Resolution
4	<u>Hold</u>
5	<u>Reset</u>
6	<u>Test</u>
7	Counter Reset
8	10 Hz Resolution
9	<u>Band I, Lo-Z</u>
10	<u>Band I, Hi-Z</u>
11	<u>Band II</u>
12	<u>Band III</u>
13	Local/Remote
14	Ground

TABLE O7-1  
J3 CONTACT GROUNDING FOR  
REMOTE PROGRAMMING  
OPTION 07



NOTE: COMPOSITE PCB ASSEMBLY FOR OPTIONS 01, 06, AND 07. ONLY A PORTION OF COMPONENTS SHOWN MAY BE USED ON ANY ONE OPTION.

FIGURE 07-1A  
 COMPONENT LOCATORS (A115)  
 REMOTE PROGRAMMING  
 OPTION 07

Pin No.	Function	Pin No.	Function	Pin No.	Function
1	10 <sup>1</sup> A	18	10 <sup>9</sup> B	34	10 <sup>5</sup> C
2	10 <sup>1</sup> B	19	10 <sup>10</sup> A	35	10 <sup>5</sup> D
3	10 <sup>2</sup> A	20	10 <sup>10</sup> B	36	10 <sup>6</sup> C
4	10 <sup>2</sup> B	21	10 <sup>0</sup> A	37	10 <sup>6</sup> D
5	10 <sup>3</sup> A	22	Inhibit	38	10 <sup>7</sup> C
6	10 <sup>3</sup> B	23	10 <sup>0</sup> B	39	10 <sup>7</sup> D
7	10 <sup>4</sup> A	24	- Ref	40	10 <sup>8</sup> C
8	10 <sup>4</sup> B	25	+ Ref	41	10 <sup>8</sup> D
9	10 <sup>5</sup> A	26	10 <sup>1</sup> C	42	10 <sup>9</sup> C
10	10 <sup>5</sup> B	27	10 <sup>1</sup> D	43	10 <sup>9</sup> D
11	10 <sup>6</sup> A	28	10 <sup>2</sup> C	44	10 <sup>10</sup> C
12	10 <sup>6</sup> B	29	10 <sup>2</sup> D	45	10 <sup>10</sup> D
13	10 <sup>7</sup> A	30	10 <sup>3</sup> C	46	10 <sup>0</sup> C
14	10 <sup>7</sup> B	31	10 <sup>3</sup> D	47	10 <sup>0</sup> D
15	10 <sup>8</sup> A	32	10 <sup>4</sup> C	48	Print Command
16	10 <sup>8</sup> B	33	10 <sup>4</sup> D	49	No Connection
17	10 <sup>9</sup> A			50	Ground

NOTE: The 10<sup>0</sup> bit is the least significant digit, and corresponds to the 1 Hz output. A, B, C, and D, are the 1, 2, 4, and 8, bits of each binary coded decimal output digit.

TABLE 09-2  
 J2 CONTACT GROUNDING FOR  
 BCD DIGITAL OUTPUT  
 OPTION 09

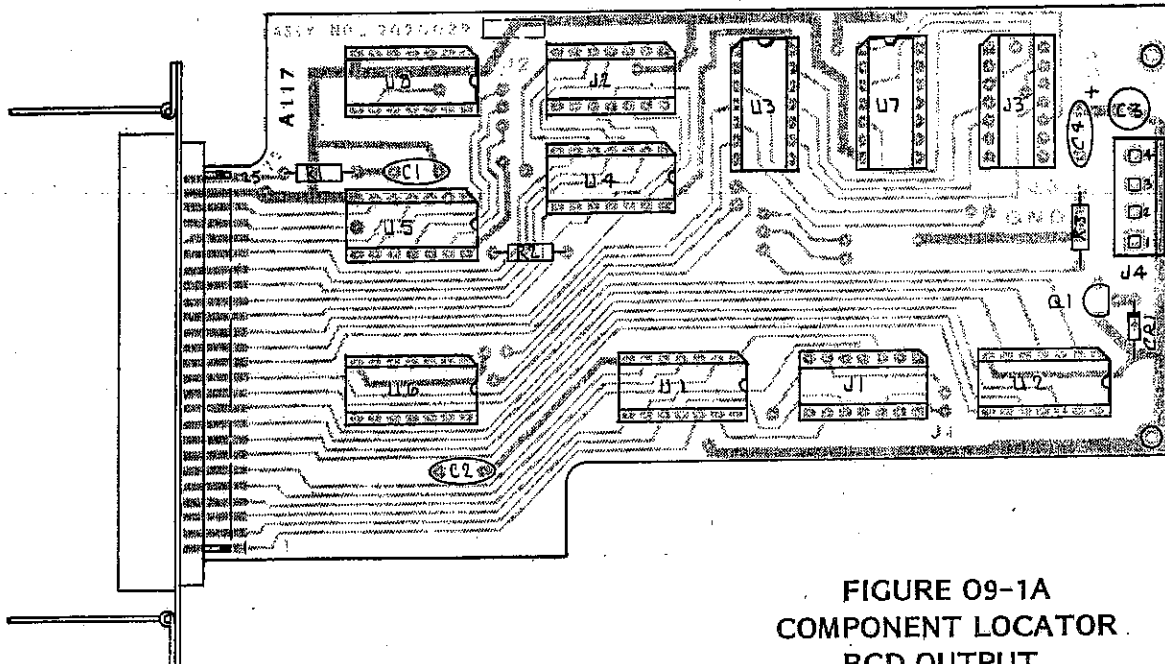


FIGURE 09-1A  
 COMPONENT LOCATOR  
 BCD OUTPUT  
 OPTION 09

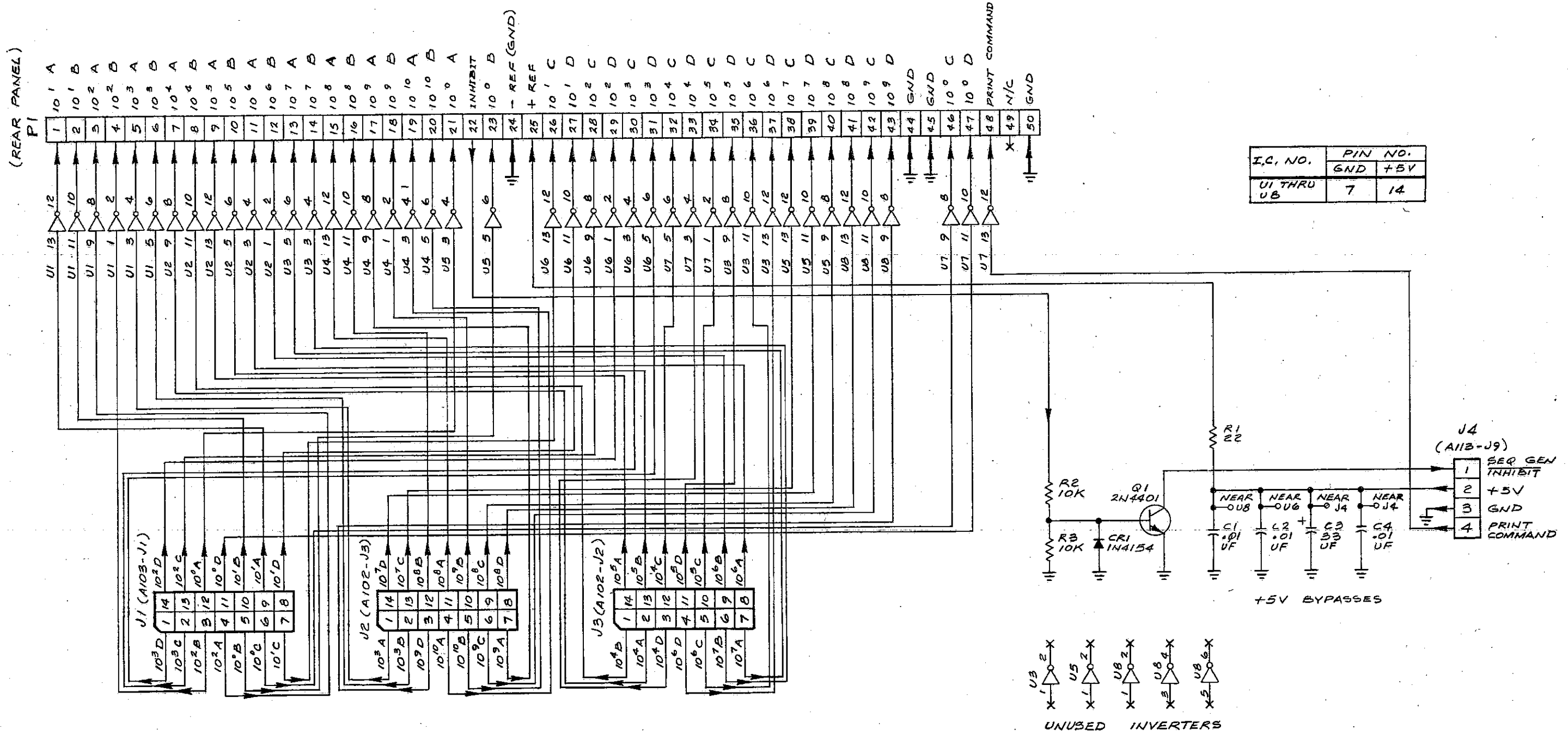


FIGURE 09-1B  
SCHEMATIC DIAGRAM  
BCD OUTPUT  
OPTION 09

## OPTION 10 REAR PANEL INPUTS

### O10-1. DESCRIPTION

O10-2. Band I input connector and Preamplifier (A111), and Band II input connector, moved to rear panel. Converter assembly is reversed end-for-end, to place the Band III input connector at rear panel. All specifications remain as stated for front panel connectors.

## OPTION 11 BAND II DELETED

### O11-1. DESCRIPTION

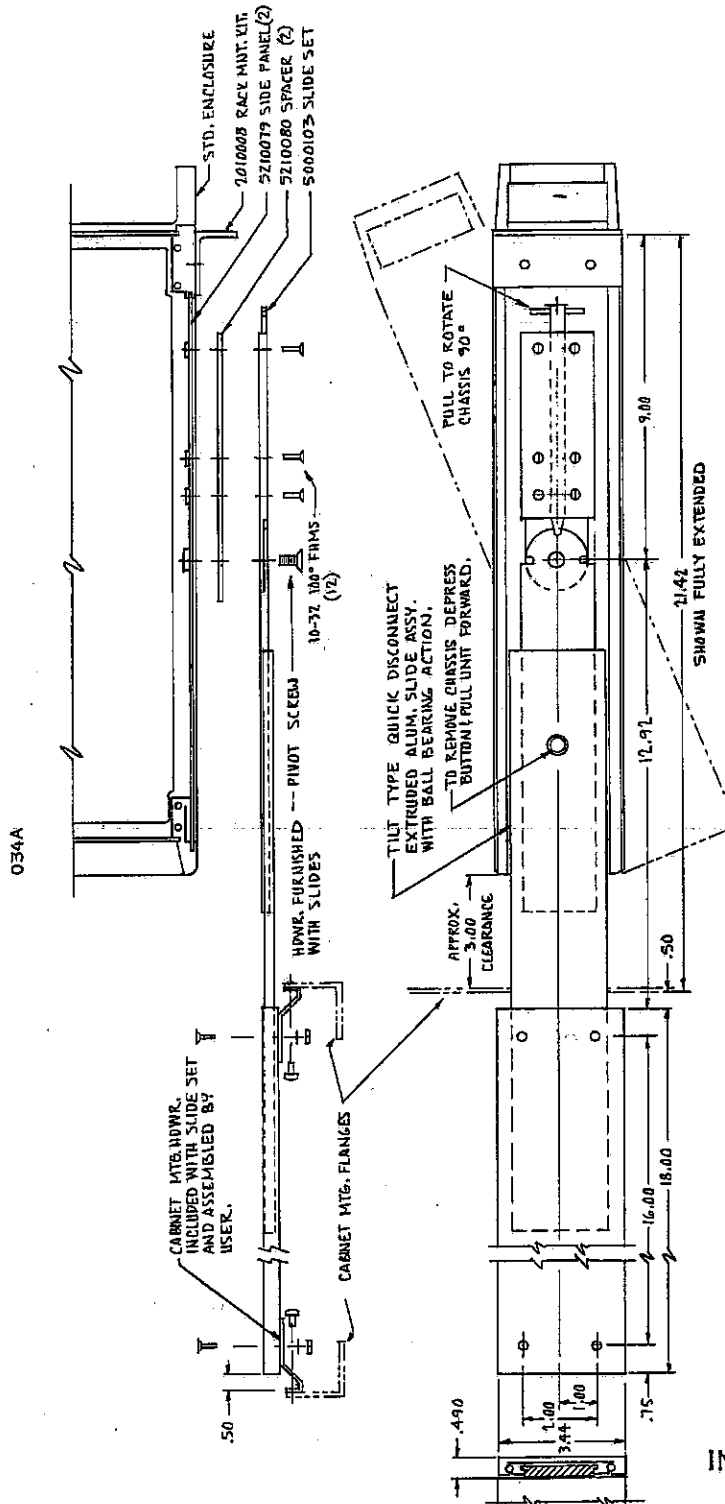
O11-2. Band II input connector and Prescaler (A109) removed. Delete all manual references to Band II operation and components.

## OPTION 12 350D BAND III FREQUENCY RANGE EXTENDED

### O12-1. DESCRIPTION

O12-2. Band III frequency range of 350D extended through use of factory selected components to 825 MHz to 13.5 GHz. Sensitivity between 12.4 GHz and 13.5 GHz is -20 dBm (22 mV rms). All other specifications remain as stated in the manual.

# OPTION 13 RACK MOUNT/CHASSIS SLIDES



**NOTES:**

1. ALL MOUNTING HARDWARE AND HOLE SPACING CONFORMS TO MIL-STD-189.
2. TO INSTALL SLIDES IN FIELD: REMOVE TOP COVER AND TOP FRAME. MOUNT SPECIAL SIDE PANELS (P/N: 5210079) IN PLACE OF STANDARD PANELS.

**FIGURE O13-1  
INSTALLATION DIAGRAM  
OPTION 13**

## OPTION 10 REAR PANEL INPUTS

### O10-1. DESCRIPTION

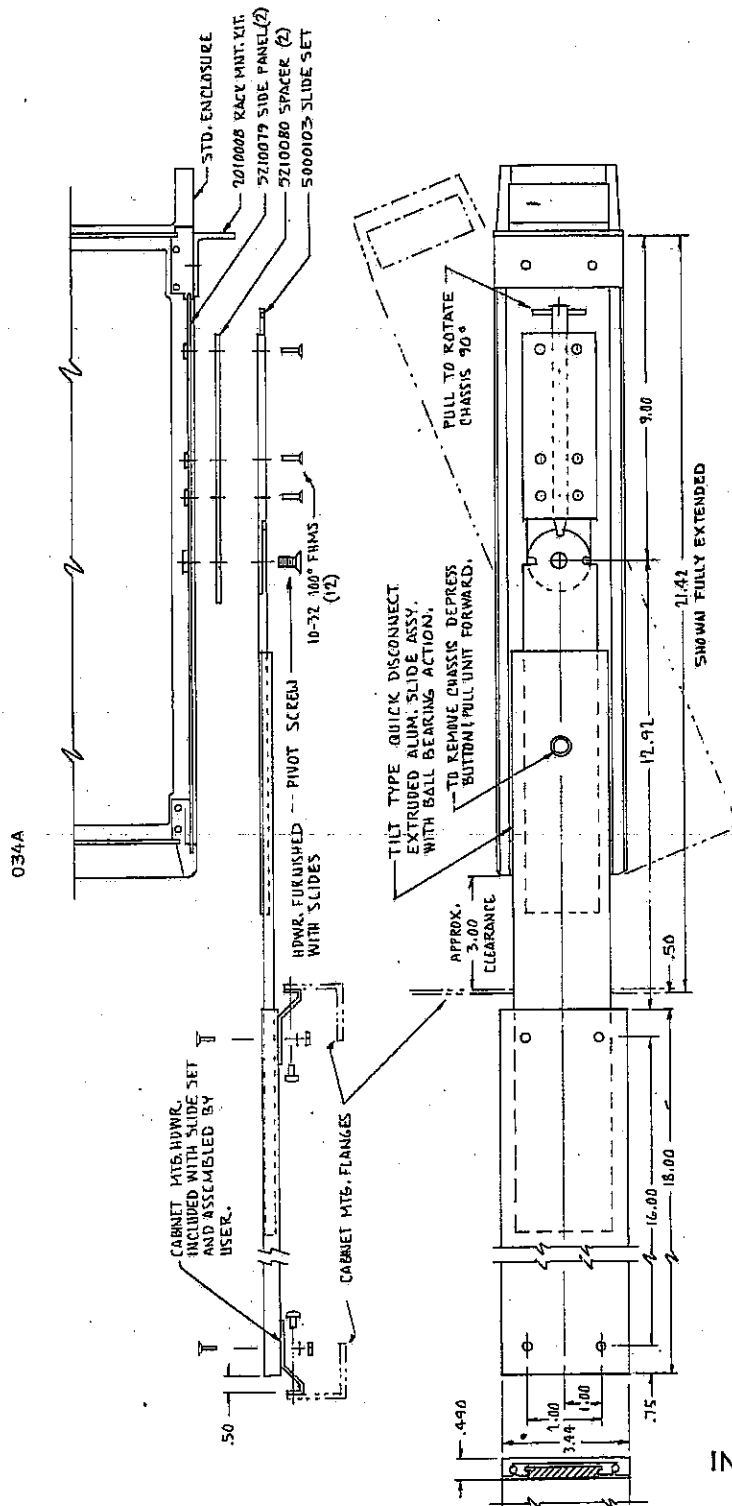
O10-2. Band I input connector and Preamplifier (A111), and Band II input connector, moved to rear panel. Converter assembly is reversed end-for-end, to place the Band III input connector at rear panel. All specifications remain as stated for front panel connectors.

## OPTION 11 BAND II DELETED

### O11-1. DESCRIPTION

O11-2. Band II input connector and Prescaler (A109) removed. Delete all manual references to Band II operation and components.

# OPTION 13 RACK MOUNT/CHASSIS SLIDES



**NOTES:**

1. ALL MOUNTING HARDWARE AND HOLE SPACING CONFORMS TO MIL-STD-189.
2. TO INSTALL SLIDES IN FIELD: REMOVE TOP COVER AND TOP FRAME. MOUNT SPECIAL SIDE PANELS (P/N: 5210079) IN PLACE OF STANDARD PANELS.

**FIGURE O13-1  
INSTALLATION DIAGRAM  
OPTION 13**



EIP COUNTER REPAIR AND RETURN FORM

TO FACILITATE REPAIRS, PLEASE ANSWER ALL QUESTIONS AND RETURN THIS FORM WITH COUNTER TO: EIP INCORPORATED, 3230 SCOTT BOULEVARD, SANTA CLARA, CA 95051.

MODEL NO. \_\_\_\_\_ SERIAL NO. \_\_\_\_\_

1. Briefly describe trouble symptoms: \_\_\_\_\_
2. Check frequency range in which trouble occurred:  
 Band I \_\_\_\_\_ Band I \_\_\_\_\_  
 20 Hz-135 MHz \_\_\_\_\_ 10-300 MHz \_\_\_\_\_ Band II \_\_\_\_\_ Band III \_\_\_\_\_
3. Would the counter show the correct display in the TEST position? Yes \_\_\_\_\_ No \_\_\_\_\_
4. What was the approximate ambient temperature? \_\_\_\_\_ °F.
5. Did failure occur at turn on, or after some period of time? Turn on \_\_\_\_\_. After \_\_\_\_\_ hours.
6. At what frequency (ies) did counter fail to operate? \_\_\_\_\_
7. What was the input power level at failure? \_\_\_\_\_ dBm (or mW).
8. Was the rear panel INT/EXT switch in the INT position? Yes \_\_\_\_\_ No \_\_\_\_\_
9. What type of signal generator (or signal source) was being monitored by the counter at the time of failure? \_\_\_\_\_
10. Please sketch (on the other side of this sheet), the test or operational set-up in use when the counter failed, and any additional comments regarding this instrument.
11. In the event counter repair cost is not covered under the EIP standard warranty, please complete the following:
  - a. Maximum allowable charge without further customer approval: \$ \_\_\_\_\_
  - b. P.O. No. \_\_\_\_\_ Date \_\_\_\_\_ Buyer \_\_\_\_\_
  - c. Billing address: \_\_\_\_\_
12. Name of person making this report (PLEASE PRINT): \_\_\_\_\_

Your phone number: (Area Code: \_\_\_\_\_ ) \_\_\_\_\_ Ext: \_\_\_\_\_

CUSTOMER INFORMATION

SHIPPING INFORMATION

OWNER \_\_\_\_\_  
 ADDRESS \_\_\_\_\_  
 CITY \_\_\_\_\_  
 STATE \_\_\_\_\_ ZIP \_\_\_\_\_  
 COUNTRY \_\_\_\_\_

SHIP TO \_\_\_\_\_  
 ADDRESS \_\_\_\_\_  
 CITY \_\_\_\_\_  
 STATE \_\_\_\_\_ ZIP \_\_\_\_\_  
 COUNTRY \_\_\_\_\_

# MANUAL CHANGE INFORMATION

## MODEL 371

At EIP we continually strive to keep up with the latest electronic developments by adding circuit and component improvements to our instruments as soon as they are developed and tested.

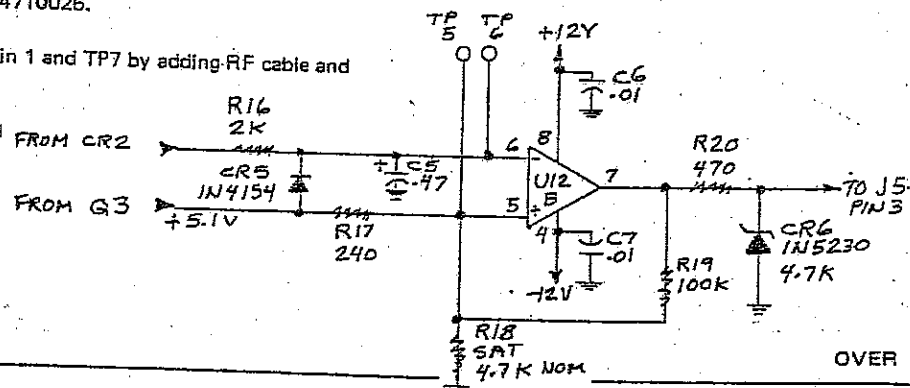
Sometimes, due to printing and shipment requirements, we can't get these changes immediately into printed manuals. As a result, your instrument may contain some or all of the changes listed below.

**PAGE NUMBER**

- 7-2 Change paragraph 7-16b to read "Set source to 845 MHz at -10dBm."
- 8-7 Assy A1, Basic Counter, change B1 (FAN) to part number 5000151.
- 8-7 A104 Control 2 (2020010), change R28 to part number 4010243.
- 8-8 A105 Control 1 (2020009), add C26, part number 2250999.  
change R17 to part number 4130182.
- 8-8 A106 High Frequency (2020106), change CR7 to part number 20704154  
Change Q5 to part number 4704393  
Change Q7 to part number 4710022  
Change R5 & R6 to part number 4130620  
Delete R22, not used  
Change R56 to part number 4130680
- 8-9 A107 Power Supply (2020077), Change C9 & C13 to part number 2300023.  
Change R20 to part number 4130999
- 8-11 A201 Source Amplifier (2020091), Change R55 to part number 4130112  
Change R56 to part number 4130101
- 8-12 A202 Converter Control 2 (2020116), Add C28 part number 2300005  
Change R63 to part number 4130242  
Add R78 part number 4130102
- 8-12 A203 Converter Control 1 (2020115), Change L1, now part of PCB  
Change L2 to part number 3510001  
Add L12, part number 3510012
- 8-13 A203 continued, add R84, part number 4010111
- 8-13 A204 Video Amplifier (2020045), Change C20 to part number 2250016  
Change C26 to part number 2250009  
Change L10 to part number 3510006  
Add L21, part number 3510005

- 9-15 Change value of R28 to 24K.
- 9-19 Add C26 between U20 pin 13 and U19 pin 4.
- 9-21 Change R5 & R6 value to 62 ohms, 2%.  
Change R13 & R15 value to 820 ohms.  
Change Q5 to 2N4393.  
Change Q16 to part number 4710026.  
Change R72 value to 20.  
Change output from U12A pin 1 and TP7 by adding RF cable and connector labeled P2.  
Delete R22

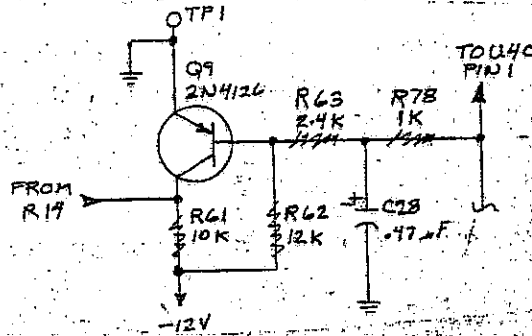
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OVER

PAGE NUMBER

- 9-23 Power Supply (5500077), Change C9 & C13 value to 33, 20V.  
Change Q7 & Q10 to MJE3055  
Change R20 to 5.6K, 2% SAT.
- 9-35 Source Amplifier (5500091), Change R55 value to 1.1K  
Change R56 value to 100
- 9-37 Converter Control 2 (5500116), Add C28 & R78, and change R63 value as illustrated below.



- 9-41 Converter Control 1 (5500115), Change R83 value to 24K, 2%.
- 9-27. Prescaler (5500019), delete C14.