SYSTRON DONNER
Member THORN EMI Group

MODEL 6245B/6246B

INSTRUMENT DIVISION

MICROWAVE FREQUENCY COUNTER

DOCUMENT NO. 120081-01

OPERATING AND SERVICE MANUAL

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WARRANTY POLICY

I Warranty

Systron Donner Instrument Division warrants that at the time of shipment the products manufactured by Systron Donner and sold hereunder will be free from defects in material and workmanship and will conform to the current specifications published by Systron Donner's Instrument Division.

II Warranty

A **The warranty period will be one year from the date of shipment. This warranty is extended only to the original buyer.**

III Warranty Adjustments

A. If any defect within this warranty appears, Purchaser shall notify Seller immediately.

B Systron Donner agrees to repair or furnish a replacement for, but not install, any product which within the standard warranty shall, upon test and examination by Systron Donner, prove defective within the above warranty period.

C No product will be accepted for return or replacement without prior approval of Systron Donner. Upon such authorization and in accordance with instructions of Systron Donner, the product will be returned to the manufacturing location, shipping charges prepaid by Purchaser.

IV Exclusions from Warranty

A The foregoing warranty is in lieu of and excludes all other expressed or implied warranties of merchantability or fitness or otherwise.

B Systron Donner will not be liable for any special or consequential damages or for loss, damages or expense directly or indirectly arising from the use of the products, or any inability to use them either separately or in combination with any other equipment or material, or from any other cause.

C The warranty does not extend to any product manufactured by Systron Donner which has been subjected to misuse, neglect, accident, improper installation or to use in violation of instructions furnished by Systron Donner.

D The warranty does not extend to or apply to any unit which has been repaired or altered at any place other than Systron Donner; by persons not expressly approved by Systron Donner; not to any unit, the serial number of which has been removed or defaced or Changed.

E This warranty applies to new equipment only and will cover repaired or replacement items only to the extent of the balance remaining of the items original warranty period noted in Paragraph II.

F All freight charges will be paid for by the Purchaser.

June, 1985

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LIST OF EFFECTIVE PAGES

(Revision/Configuration Control Document)

The 6245B/6246B Microwave Frequency Counters Operating and Service Manual is a revision/configuration controlled document. Original pages are date coded 9-85; pages changed in the future will be indicated according to respective revision date(s).

Total number of pages in this publication is 186, consisting of the following:

Page No.	Issue Date
Title	
Warranty	1985
Proprietary Rights Statement	1985
List of Effective Pages - A	1-89
Table of Contents - i	9-85
Table of Contents - ii	12-85
Table of Contents iii - iv	1-89
1-1 - 1-4	9-85
2-1 - 2-4	9-85
3-1 - 3-17/(3-18 blank)	9-85
4-1 - 4-25/(4-26 blank)	9-85
5-1 - 5-12	9-85
6-1 - 6-22	9-85
6-19A - 6-22A	1-89
6-23 - 6-66	9-85
7-1 - 7-19	9-85
7-18A - 7-19A	1-89
7-20 - 7-44	9-85

TABLE OF CONTENTS

CHAPTER		PAGE
1 - GENERAL INFORMATION		
1-1	Introduction	1-1
1-4	Manual Effectivity	1-1
1-6	General Description . . .	1-1
1-11	Specifications	1-2
1-13	Standard Options	1-4
1-15	Available Accessories . .	1-5
1-17	Items Furnished, Required.	1-5
2 - INSTALLATION		
2-1	Introduction	2-1
2-3	Receiving Inspection . . .	2-1
2-7	Installation	2-1
2-9	Power	2-1
2-13	Cooling	2-1
2-15	Option 05 IEEE-488 Data Interchange	2-1
2-17	Storage And Shipment . . .	2-1
3 - OPERATION		
3-1	Introduction	3-1
3-3	Accuracy Of Measurements .	3-1
3-7	Internal Osc. Stability .	3-1
3-13	Front Panel Functions. . .	3-2
3-15	Rear Panel Functions . . .	3-5
3-17	Operating Characteristics.	3-6
3-19	Operating Ranges	3-6
3-21	Resolution and Blanking. .	3-6
3-23	FM Characteristics	3-6
3-25	Dynamic Range and Overload Protection	3-6
3-28	Operating Procedures . . .	3-7
3-30	10 Hz to 100 MHz A INPUT Operation	3-7
3-32	100 MHz to 512 MHz B INPUT Operation	3-7
3-34	500 MHz to 26.6 GHz C INPUT Operation	3-7
3-36	Self Test Operation . . .	3-9
3-38	Data Interface Option 05 .	3-9
3-42	IEEE STD-488 Subsets Implemented	3-9
3-44	Bus Organization	3-10
3-49	Bus Operation	3-11
3-58	Typical Measurement System	3-15
3-62	IEEE-488 Controller. . . .	3-16

CHAPTER		PAGE
3 - OPERATION (Cont'd)		
3-66	SD 3530 Program	3-17
3-67	HP 9825 Program	3-17
3-68	Commodore PET Program . .	3-17
4 - PRINCIPLES OF OPERATION		
4-1	Introduction	4-1
4-3	Functional Block Description	4-1
4-6	Timebase	4-1
4-12	Input Signal Conditioning.	4-2
4-18	Counter Logic	4-2
4-22	Display	4-5
4-26	FLACTO Channel	4-5
4-36	System Interface	4-6
4-38	Circuit Description . . .	4-6
4-41	A1, Interconnect PC Assembly	4-6
4-45	A2, Display PC Assembly. .	4-7
4-56	A3, Amp/Prescaler PC Assembly	4-7
4-62	A4, Bus Interface PC Assembly Option 05	4-10
4-70	A5, Counter Interface PC Assembly Option 05	4-13
4-77	A6, Timebase Logic PC Assembly	4-13
4-89	A7, Counter Logic PC Assembly	4-17
4-94	A8, Display Logic PC Assembly	4-17
4-110	A10, FLACTO Logic PC Assembly	4-21
4-116	A11, Local Oscillator/ Shifter PC Assembly . . .	4-21
4-122	A12, LIF/NIF PC Assembly .	4-24
4-126	A13, Timebae Oscillator PC Assembly	4-24
5 - MAINTENANCE		
5-1	Introduction	5-1
5-3	Test Equipment Required .	5-1
5-6	Performance Test Procedures	5-2
5-8	Instrument Self Test . . .	5-2
5-11	A Input Test	5-2

TABLE OF CONTENTS (Cont'd)

CHAPTER		PAGE
5 - MAINTENANCE (Cont'd)		
5-14	B Input Test	5-3
5-18	C Input Test	5-3
5-22	Time Base Stability/Time Base Out	5-4
5-26	External Time Base Test	5-5
5-30	Data Interface Option 05 Test	5-5
5-36	Alignment Procedures	5-6
6 - REPLACEABLE PARTS		
6-1	Introduction	6-1
6-3	Part Ordering Information.	6-1
6-6	Parts Lists	6-1
	6245B/6246B Microwave Counter Assembly	6-5
	Shipping Kit	6-6
	Test Assembly	6-7
	Test Kit	6-8
	Top Cover W/Handle and RFI Assembly	6-9
	Universal Counter Assembly	6-10
	Bottom Cover W/Feet and RFI Assembly	6-11
	Front Panel Assembly	6-12
	Rear Panel Assembly	6-13
	A1, Interconnect PC Assembly	6-15
	A2, Display PC Assembly	6-16
	A3, Amp/Prescaler PC Assembly	6-19
	A6, Timebase Logic PC Assembly	6-23
	A7, Counter Logic PC Assembly	6-25
	A8, Display Logic PC Assembly	6-28
	A10, FLACTO Logic PC Assembly	6-30
	A11, LO/Shifter PC Assembly	6-34
	A12, LIF/NIF PC Assembly	6-40
	Feature 01, Oscillators	6-44
	Feature 01, Option 08 Std Timebase Oscillator PC Assembly	6-45
	Feature 01, Option 13 High Stability Oscillator Assembly	6-46
	Feature 02, Input Power	6-47
	Feature 03, Control	6-48
	Feature 03, Option 05 IEEE Std Assembly	6-49
	Feature 03, Option 05 A4, Bus Interface PC Assembly	6-50
	Feature 03, Option 05 A5, Counter Interface PC Assembly	6-53
	Feature 03, Option 05 Programmable Switch (S4) PC Assembly	6-55
	Accessory List 04	6-56
	Accessory 04, Single Rack Mount	6-57
	Accessory List 05	6-58
	Accessory 05, Dual Rack Mount Assembly	6-59
	Accessory List 06	6-60
	Accessory List 07	6-61
	Accessory 07, Extender PC Assembly	6-62
	Accessory List 08	6-63
	Accessory 08, Extender PC Assembly	6-64
	Accessory List 08	6-65
	Accessory 09, Rear Stand Kit	6-66
7 - DRAWINGS		
7-1	Introduction	7-1

LIST OF FIGURES

FIGURE		PAGE
3-1	Gating Ambiguity	3-1
3-2	Front Panel	3-3
3-3	Rear Panel	3-3
3-4	FM Characterisitcs	3-7
3-5	Dynamic Operating Range	3-7

CHAPTER PAGE

LIST OF FIGURES (Cont'd)

3-6 GPIB Interface Capabilities and Bus Structure 3-10
3-7 Typical Test System . . . 3-15
4-1 Functional Block Diagram 4-3
4-2 Display (A2) Block Diag. 4-8
4-3 100 MHz Amp (A3) A/B Input Block Diagram 4-9
4-4 512 MHz Prescaler (A3) A/B Input Block Diagram . . . 4-9
4-5 Bus Interface (A4) Block Diagram 4-11
4-6 Counter Interface (A5) Block Diagram 4-14
4-7 Timebase Logic (A6) Block Diagram 4-16
4-8 Counter Logic (A7) Block Diagram 4-18
4-9 Display Logic (A8) Block Diagram 4-19
4-10 FLACTO Logic (A10) Block Diagram 4-22
4-11 Local Oscillator/Shifter (A11) Block Diagram . . . 4-23
4-12 LIF/NIF (A12) Block Diagram 4-25
5-1 LLO Amplitude Adjustment. 5-10
5-2 DET Waveform - LO High End Adjustment. 5-11
5-3 A12 DET Waveform - LO Low End Adjustment. 5-11
5-4 Ramp Limit Adjustment . . 5-11
5-5 A12 DET Waveform. 5-12
5-6 Discriminator Output. . . 5-12
5-7 Squelch Waveform. 5-12
7-1 Model 6245B Features and Options Product Tree. . . 7-3
7-2 Model 6246B Features and Options Product Tree. . . 7-4
7-3 Block Diagram (Sheet 1) . 7-5
7-4 Block Diagram (Sheet 2) . 7-6
7-5 Universal Counter Assy. . 7-7
7-6 6245B Test Assembly . . . 7-8
7-7 6246B Test Assembly . . . 7-9
7-8 Top Cover Assembly. . . . 7-10
7-9 Bottom Cover Assembly . . 7-11
7-10 Front Panel Assembly. . . 7-12
7-11 Rear Panel Assembly . . . 7-13

FIGURE PAGE

LIST OF FIGURES (Cont'd)

7-12 A1, Interconnect PCB Assembly. 7-15
7-13 A2, Display PCB Assembly. 7-16
7-14 A2, Display Schematic . . 7-17
7-15 A3, Amp/Prescaler PCB Assembly. 7-18
7-16 A3, Amp/Prescaler Schematic 7-19
7-15A A3, Amp/Prescaler PCB Assembly 7-18A
7-16A A3, Amp/Prescaler Schematic. 7-19A
7-17 A4, Bus Interface PCB Assembly. 7-20
7-18 A4, Bus Interface PCB Schematic 7-21
7-19 A5, Counter Interface PCB Assembly. 7-22
7-20 A5, Counter Interface PCB Schematic 7-23
7-21 A6, Timebase Logic PCB Assembly. 7-24
7-22 A6, Timebase Logic PCB Schematic 7-25
7-23 A7, Counter Logic PCB Assembly. 7-26
7-24 A7, Counter Logic PCB Schematic 7-27
7-25 A8, Display Logic PCB Assembly (sht 1). 7-29
7-26 A8, Display Logic PCB Assembly (sht 2). 7-30
7-27 A8, Display Logic PCB Schematic 7-31
7-28 A10, FLACTO Logic PCB Assembly (sht 1). 7-33
7-29 A10, FLACTO Logic PCB Assembly (sht 2). 7-34
7-30 A10 FLACTO Logic PCB Schematic 7-35
7-31 A11, LO/Shifter PCB Assy. 7-36
7-32 A11, LO/Shifter Schematic 7-37
7-33 A12, LIF/NIF PCB Assembly 7-38
7-34 A12, LIF/NIF Schematic. . 7-39
7-35 A13, Timebase Oscillator PCB Assembly. 7-40

TABLE OF CONTENTS (Cont'd)

CHAPTER PAGE

LIST OF FIGURES (Cont'd)

7-36 A13, 10 MHz Timebase Osc. PCB Schematic 7-41
7-37 Option 13 High Stability Oscillator Assembly . . . 7-42
7-38 Option 05 IEEE-488 Assembly. 7-43
7-39 Program Switch PCB Assy . 7-44

LIST OF TABLES

TABLE PAGE

1-1 Specifications 1-2
1-2 Standard Options 1-4
1-3 Available Accessories. . 1-5
2-1 IEEE-488 Data Interchange Connector. 2-2
2-2 Program Format IEEE-488 Data Interchange 2-2
2-3 Output Sequence IEEE-488 Data Interchange 2-3
2-4 BCD Output Interchange . 2-4

TABLE PAGE

LIST OF TABLES (Cont'd)

3-1 Front Panel Functions. . 3-2
3-3 Rear Panel Functions . . 3-5
3-3 GPIB Interface Connector 3-11
3-4 Talk/Listen Address Assignments vs ASCII Character 3-12
3-5 IEEE STD-488 DIO Code to ASCII Character. 3-13
3-6 Program Format 3-14
3-7 GPIB Output Data Format. 3-14
4-1 Function/Assembly Cross Reference. 4-1
4-2 Management Bus Functions 4-10
4-3 Transfer Bus Functions . 4-12
5-1 Recommended Test Equipment. 5-1
5-2 Local Oscillator/Shifter (A11) Initial Adjustment 5-6
5-3 LIF/NIF (A12) Initial Adjustment 5-7
5-4 Final Adjustment 5-8
6-1 Manufacturer's Code-to-Name Index. 6-2
7-1 List of Drawings 7-1

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CHAPTER 1

GENERAL INFORMATION

1-1. INTRODUCTION

1-2. Ths manual contains information relating to the installation and operation of the Systron Donner 6245B/6246B Microwave Frequency Counters.

1-3. The information contained in this manual is divided into front matter and seven descriptive chapters, as indicted in the following format:

Front Matter: includes the title page, warranty policy, proprietary rights statement, list of effective pages and table of contents.

Chapter 1 General Information: contains a general description of the 6245B/6246B Counters, including specifications, standard options available, accessories available and safety practices.

Chapter 2 Installation: provides receiving inspection, installation criteria, initial turn-on/confidence check, GPIB system interface and preparation for reshipment.

Chapter 3 Operation: describes the front and rear panel controls, indicators and connectors. It also includes instrument operation, both local front panel control and remote via GPIB.

Chapter 4 Theory of Operation: contains a detailed functional/circuit description of the 6245B/6246B Counters which will assist technical personnel in the performance of troubleshooting and/or calibration procedures.

Chapter 5 Maintenance: describes the steps required for routine maintenance, inspection, alignment and performance verifications.

Chapter 6 Replaceable Parts: are listed in this chapter, along with part ordering information, manufacturer's part numbers and manufacturer's code-to-name index.

Chapter 7 Drawings: provides schematic, assembly and component location diagrams for maintenance and troubleshooting.

1-4. MANUAL EFFECTIVITY

1-5. Information contained in this operating manual is date-coded at the bottom of each page. A summary of these date codes is in the List of Effective Pages (A Page) located within the front matter of this manual. Any future changes to this manual will be reflected in the List of Effective Pages.

1-6. GENERAL DESCRIPTION

1-7. The 6245B/6246B Frequency Counters are precision test instruments that measure frequencies from 20 Hz to 26.5 GHz with features that incude: high FM tolerance, high sensitivity, 52 dB Dynamic operating range and complete coverage of the frequency range with no complicated tuning. IEEE Systems Interface is available as Option 05.

1-8. The 6245B/6246B measures frequencies from 10 Hz to 26.5 GHz in three ranges on two separate inputs. The low range channel (A/B INPUT) makes direct measurements from 10 Hz to 100 MHz. The mid range channel (A/B INPUT) makes prescaled measurements to 512 MHz. Microwave inputs to 18 GHz (26.5 GHz for the 6245B) are measured precisely and automatically by the use of the FLACTO* (Frequency Locked Automatic Computing Transfer Oscillator) technique on the C INPUT channel.

1-9. A highly visibly 10-digit display features leading zero suppression, automatically positioned decimal point, off scale, gate and remote indicators for unambiguous display of the measurement. An overload alarm for the C INPUT channel blinks the digital display when excessive input power is sensed. Any input level greater than +20 dBm will activate the overload alarm. Other features include front panel mounted input connectors and operator controls including test, manual reset and recycle rate.

1-10. Option 05 provides full IEEE-488 capability. Talk/Listen or Talk Only mode may be selected. Other options include a higher stability oscillator for those applications requiring even greater stability.

1-11. SPECIFICATIONS

1-12. Table 1-1 lists the specifications applicable to both the 6245B/6246B.

Table 1-1. Specifications

FREQUENCY MEASUREMENT	
Frequency Range	
A/B Input low range:	10 Hz to 100 MHz.
A/B Input mid range:	100 MHz to 512 MHz.
C Input:	500 MHz to 20 GHz (6245B). 500 MHz to 26.5 GHz (6246B).
A/B Input Direct	
Range:	10 Hz to 100 MHz.
Sensitivity:	25 mV rms.
Maximum Input:	250 V rms 10 Hz to 10 kHz. 50 V rms 10 kHz to 2 MHz. 5 V rms 2 MHz to 100 MHz.
Impedance:	1M/25 pF.
Coupling:	ac.
Resolution:	1 Hz to 10 kHz selected in decade steps 1,10,100,1 k, and 10 k.
Accuracy:	±1 count ±time base accuracy.
Display:	Ten digit readout in MHz with automatically positioned decimal point. Leading zeros are suppressed.
Connector:	BNC female.
A/B Input ÷4 Prescaled	
Range:	100 MHz to 512 MHz.
Sensitivity:	-25 dBm.
Maximum Input:	+27 dBm, fuse protected.
Operative Dynamic Range:	52 dB.
Impedance:	50 Ω nominal.
Coupling:	ac.
Resolution:	1 Hz to 10 kHz selectable in decade steps 1,10,100,1k, and 10 k.
Accuracy:	±1 count ±time base accuracy.
Display:	Ten digit readout in MHz with automatically positioned decimal point. Leading zeros are suppressed.
Connector:	BNC female.

Table 1-1. Specifications (Cont'd)

Table 1-1.
Specifications (Cont'd)

C Input FLACTO	
Range:	500 MHz to 20 GHz (6245B) 500 MHz to 26.5 GHz (6246B)
Sensitivity:	-25 dBm 500 MHz to 12.4 GHz. -20 dBm 12.4 GHz to 20 GHz. -15 dBm 20 GHz to 26.5 GHz.
Maximum Useable Input:	+20 dBm prior to acquisition. +27 dBm after acquisition.
Maximum Input W/O damage:	+30 dBm.
Operative Dynamic Range:	55 dB to 12.4 GHz. 50 dB to 20 GHz. 45 dB to 26.5 GHz.
Acquisition Time:	<60 ms + (1/RXN). (N = Input Frequency ÷ 100 MHz)
Amplitude Discrimination of two frequencies:	20 dB amplitude separation (10 dB typical).
AM Tolerance:	Any modulation index provided the minimum voltage of the signal is not less than the specified sensitivity.
FM Tolerance:	Frequency and rate dependent, typically >100 MHz (p-p) at rates to 10 kHz, decreasing to >10 MHz at 10 MHz rate.
VSWR:	<2:1 to 10 GHz. <2.5:1 to 18 GHz. <3:1 to 26.5 GHz.

Table 1-1.
Specifications (Cont'd)

Kick Back Noise:	-65 dBm typical.
Impedance:	50 Ω nominal.
Coupling:	ac.
Connector:	Type N female (6245B) Type SMA (6246B)
Resolution:	1 Hz to 10 kHz selectable in decade steps 1,10,100,1 k, and 10 k.
Accuracy:	±2 counts ±time base accuracy.
Display:	Ten digit readout in MHz with automatically positioned decimal point. Leading zeros are suppressed.
TIME BASE	
Crystal Frequency:	10 MHz, TCXO.
Time Base Stability:	Aging per month ±3 x 10^{-7}. Temperature ±1 x 10^{-6} over 0°C to 50°C range. Line variation ±5 x 10^{-8} for ±10% change.
Time Base Output:	1 MHz OUT (rear panel) 1 V p-p into 50 Ω.
External Time Base Input:	1 MHz or 10 MHz. 1 V rms into 500 Ω, automatic selection.
Internal/ External:	Switch selectable (rear panel) internal or external time base.

Table 1-1.
Specifications (Cont'd)

GENERAL	
Readout Display:	0.4"LED 10-digit in-line readout with decimal point. Automatic leading zero suppression. Gate indicator, Off Scale indicator for overflow and Remote indicator. Flashing display denotes pending overload (>20 dBm) or overload (>27 dBm).
Test:	Self test feature measures and displays 1 MHz time base frequency.
Lamp Test:	Illuminates all segments (shows 8s) on all digits, decimal points and GATE, OS REM indicators.
Reset:	Manual and Automatic.
Recycle Rate:	Continuously variable, 50 ms to 5 s plus Hold, time between measurement samples.
Operating Temperature:	0°C to 50°C.
Power Requirements:	100/115 or 200/230 V ±10%, 48 to 440 Hz, 35 W.
Dimensions:	4.75"H x 8.375"W x 13.5" D (120.65mm H x 212.725 mm W x 342.9mm D.
Weight:	12 lbs net; 20 lbs shipping (5.4431 kg net; 9.0719 kg shipping).

1-13. STANDARD OPTIONS

1-14. Table 1-2 lists the standard options available for the 6245B/6246B Counters. Full descriptions, drawings and parts lists are included in respective chapters of this manual.

Table 1-2. Standard Options

Option	Description
05	Data interchange: This system interface option provides full TALK/LISTEN or TALK only data interchange in accordance with IEEE Std-488 1978.
13	Time Base Oscillator: Increases time base stability to <±5 parts in 10^{-10} per 24 hours.
	Aging Rate After Warm-Up:
	<±5 parts in 10^{-10}/24 hours.
	Maximum Warm-Up for Off Periods to 1 Week:
	72 hours.
	Frequency Retrace for Off Periods to approximately 24 hours:
	1 hour typical to reach <±5 parts in 10^{-9}.
	Short-Term Aging Rate:
	±5 parts in 10^{-11} rms for 1 second average.
	Temperature Variation:
	<±2 parts in 10^{-10}/°C typical. Maximum; ±4 parts in 10^{-9} over a 20°C change within the range of -20°C to +55°C.
	10% Line Voltage Change from Specifications:
	±2 parts in 10^{-10}.
	Long-Term Aging Rate:
	±1.5 parts in 10^{-8} for 30 days.

1-15. AVAILABLE ACCESSORIES

1-16. The available accessories that maybe ordered with the 6245B/6246B Frequency Counters are listed in Table 1-3.

1-17. ITEMS FURNISHED, REQUIRED

1-18. The Counters are supplied with a detachable power cord SD part number 102407 which is the only required item not contained within the Tools and Test Equipment as required for maintenance and calibration listed in Chapter 5.

Table 1-3.
Available Accessories

Description	Part Number
Single Rack Mount Kit	06787402
Dual Rack Mount Kit	06787502
Carrying Case	067876
10 pin PC Extender Card	06778701
22 pin PC Extender Card	06776601
Rear Panel Stand Kit	075321
Spare Fuses, FR, 5 each	057245

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CHAPTER 2

INSTALLATION

2-1. INTRODUCTION

2-2. The 6245B/6346B Microwave Frequency Counter is shipped in operational condition, and is essentially ready for use as received. This chapter contains unpacking, inspection and installation information to aid in setting up the instrument for immediate use.

2-3. RECEIVING INSPECTION

2-4. As soon as the instrument is received, check the carton for evidence of damage or rough handling. If damage is found, or suspected, notify the carrier and your Systron Donner representative. Open the shipping container only in their presence.

2-5. Use care is removing the instrument from the container. Check immediately for loose or broken knobs, bent or broken connectors and dents or scratches on the panel surfaces. If damage of any nature is found, refer to the warranty instructions in the front of this manual.

2-6. All Systron Donner instruments must pass rigid inspection tests before leaving the plant. However, upon receipt, a receiving inspection test should be performed after unpacking to ensure that the instrument is still operational. (Refer to Chapter 3 for complete operating instructions.)

2-7. INSTALLATION

2-8. The 6245B/6246B Counters are designed for bench or systems operation. Rack mounting hardware is available from Systron Donner

2-9. Power

2-10. The instrument is provided with a 3-conductor power cord which grounds the unit when connected through a compatible grounding outlet. If a standard ground output is not available, a 3-conductor adapter must be used which provides the necessary grounding connection.

2-11. The unit operates from an AC power source of either 115 or 230 V, at 48 to 400 Hz. Taps on the power transformer are provided to accomodate these voltages ±10%.

2-12. The unit is normally factory wired for 115 V operation. Refer to Block Diagram 08312901 sheet 2 for transformer wiring details. Also be certain the proper fuse is installed, .75 A for 115 V or .375 A for 230 V.

2-13. Cooling

2-14. The unit is cooled by radiating heat directly to the outside air via cooling vents. Do not obstruct these vents during instrument operation.

2-15. OPTION 05 IEEE-488 DATA INTERCHANGE

2-16. This option allows the instrument to be connected to any system using the IEEE-488 interface. Data interchange connections are made to a rear panel 24-pin connector and related address switches. Table 2-1 defines the input/output pin configuration, Table 2-2 program format data and Table 2-3 defines output data.

2-17. STORAGE AND RESHIPMENT

2-18. Environmental conditions during storage and shipment should be limited to a maximum temperature of 85°C and a minimum temperature of -20°C.

2-19. To protect the instrument during shipment or storage, use the best packaging methods available. Contact your nearest Systron Donner field office for materials similar to those used in the original factory package. Contract packing companies are also available to pro-

vide custom - packaging service on short notice. General packaging instructions are as follows:

1. Attach a tag to the unit indicating the model and serial number, name and address of owner, and a summary of the service or repairs required.

2. Wrap the instrument in heavy paper or plastic prior to placing it into the shipping container.

3. Select a strong carton or wooden box to house the instrument.

4. Use an adequate layer of shock absorbing material on all sides of the instrument and protect the front panel with additional layers of cardboard. Be certain there is no movement of the instrument within the container.

5. Seal the package with strong tape or metal bands. Mark the shipping container FRAGILE-DELICATE INSTRUMENT to ensure careful handling.

Table 2-1.
IEEE-488 Data Interchange Connector

Pin	Function
1	DIO 1 Bit
2	DIO 2 Bit
3	DIO 3 Bit
4	DIO 4 Bit
5	EOI
6	DAV
7	NRFD
8	NDAC
9	IFC
10	SRQ
11	ATN
12	SHIELD (Gnd)
13	DIO 5 Bit
14	DIO 6 Bit
15	DIO 7 Bit
16	DIO 8 Bit
17	REN
18	Gnd DIO 6 return
19	Gnd DIO 7 return
20	Gnd DIO 8 return
21	Gnd IFC
22	Gnd SRQ return
23	Gnd ATN return
24	Gnd

Notes:
1. DIO = data input/output
2. EOI = end or identify
3. DAV = data valid
4. NRFD = not ready for data
5. NDAC = not data accepted
6. IFC = interface clear
7. SRQ = service request
8. ATN = attention (wake-up)
9. REN = remote enable
10. Gnd refers to the signal ground return of the reference contact.

Table 2-1. (Cont'd)
IEEE-488 Data Interchange Connector

Table 2-2. Program Format IEEE-488 Data Interchange

Byte	Program Bits 7	6	5	4	3	2	1	ASCII Character	Function
1	1	0	0	0	0	0	0	@	10 kHz Resolution
	1	0	0	0	0	0	1	A	10 kHz Resolution
	1	0	0	0	0	1	0	B	1 kHz Resolution
	1	0	0	0	0	1	1	C	100 Hz Resolution
	1	0	0	0	1	0	0	D	10 Hz Resolution
	*1	0	0	0	1	0	1	E	1 Hz Resolution
	1	0	0	0	1	1	0	F	1 Hz Resolution
	1	0	0	0	1	1	1	G	1 Hz Resolution

Table 2-2. Program Format IEEE-488 Data Interchange (Cont'd)

Byte	Program Bits 7	6	5	4	3	2	1	ASCII Character	Function
2	1	0	0	1	0	0	0	H	FREQ A INPUT
	1	0	0	1	0	0	1	I	FREQ B INPUT
	1	0	0	1	0	1	0	J	FREQ C INPUT
	*1	0	0	1	0	1	1	K	TEST
3	1	0	0	1	1	0	0	L	HOLD
	1	0	0	1	1	0	1	M	RECYCLE
4	1	0	0	1	1	1	0	N	SAMPLE
	1	0	0	1	1	1	1	O	RESET

*Wake up states.
Program Subsets: SH1,AH1,T7,TE0,L4,LE0,SR0,RL1,PP0,DC0,DT1,C0.

Table 2-3. Output Sequence IEEE-488 Data Interchange

Byte	Program Bits 7	6	5	4	3	2	1	ASCII Character	Function
1	0	1	0	0	0	0	0	SP	Not Offscale
1	0	1	1	1	1	1	1	?	Offscale
2	0	1	1	x	x	x	x	0 - 9	10^9 Digit MSD
3	0	1	1	x	x	x	x	0 - 9	10^8 Digit MSD
4	0	1	1	x	x	x	x	0 - 9	10^7 Digit MSD
5	0	1	1	x	x	x	x	0 - 9	10^6 Digit MSD
6	0	1	1	x	x	x	x	0 - 9	10^5 Digit MSD
7	0	1	1	x	x	x	x	0 - 9	10^4 Digit MSD
8	0	1	1	x	x	x	x	0 - 9	10^3 Digit MSD
9	0	1	1	x	x	x	x	0 - 9	10^2 Digit MSD
10	0	1	1	x	x	x	x	0 - 9	10^1 Digit MSD
11	0	1	1	x	x	x	x	0 - 9	10^0 Digit MSD
12	1	0	0	0	1	0	1	E	Exponent Pointer
13	0	1	0	1	0	1	1	+	Exponent Sign
14	0	1	1	0	x	x	x	0 - 4	Exponent Value
15	0	0	0	1	1	0	1	CR	Carriage Return
16	0	0	0	1	0	1	0	LF	Line Feed

Table 2-4.
BCD Output Interface

Pin	Function
1	10^0 Bit 1
2	10^0 Bit 2
3	10^1 Bit 1
4	10^1 Bit 2
5	10^2 Bit 1
6	10^2 Bit 2
7	10^3 Bit 1
8	10^3 Bit 2
9	10^4 Bit 1
10	10^4 Bit 2
11	10^5 Bit 1
12	10^5 Bit 2
13	10^6 Bit 1
14	10^6 Bit 2
15	10^7 Bit 1
16	10^7 Bit 2
17	10^8 Bit 1
18	10^8 Bit 2
19	10^9 Bit 1
20	10^9 Bit 2
21	Decimal Bit 1
22	Decimal Bit 2
23	EOG
24	O.S. (Off Scale)
25	N.C.
26	10^0 Bit 4
27	10^0 Bit 8
28	10^1 Bit 4

Table 2-4.
BCD Output Interface (Cont'd)

Pin	Function
29	10^1 Bit 8
30	10^2 Bit 4
31	10^2 Bit 8
32	10^3 Bit 4
33	10^3 Bit 8
34	10^4 Bit 4
35	10^4 Bit 8
36	10^5 Bit 4
37	10^5 Bit 8
38	10^6 Bit 4
39	10^6 Bit 8
40	10^7 Bit 4
41	10^7 Bit 8
42	10^8 Bit 4
43	10^8 Bit 8
44	10^9 Bit 4
45	10^9 Bit 8
46	Decimal Bit 4
47	Decimal Bit 8
48	INHIBIT RESET
49	N.C.
50	Ground

EOG = End Of Gate
N.C. = No Connection

Logic levels are +5 V (nominal) positive true, TTL compatible.

CHAPTER 3

OPERATION

3-1. INTRODUCTION

3-2. This chapter contains a description of the 6245B/6246B Microwave Frequency Counters front and rear panel controls, indicators and connectors. General operating instructions are included in this chapter, along with information about factors affecting the accuracy of frequency measurements.

3-3. ACCURACY OF MEASUREMENTS

3-4. Digital measuring instruments are subject to a ±1 count ambiguity in the least significant digit of the display. This error is possible because the signal counted is not coherent (synchronized) with the time base pulses that control the signal gate. As illustrated in Figure 3-1, the first or last cycle of the input signal may, or may not, pass through the signal gate during the selected measurement interval.

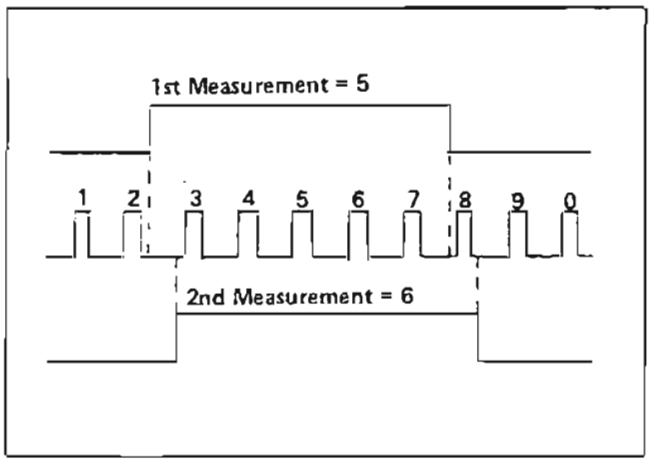

Figure 3-1. Gating Ambiguity

3-5. As the measured frequency is increased, the percent of error due to the ±1 count ambiguity is reduced since it becomes less significant compared to the total count. In any case, the maximum percentage of error is a function of the frequency measured and the number of pulses counted: i.e. the time base selected, and may be expressed:

$$\text{MAX \% error} = \frac{100}{fT} \leq 100\%$$

3-6. Where: f is the frequency measured in Hz and T is the selected time base in seconds. Thus, to measure 1 MHz with a ±0.001% maximum gating error, the RESOLUTION switch must be set to the 10 Hz position.

3-7. INTERNAL OSCILLATOR STABILITY

3-8. The gating precision, and therefore the accuracy of the count, is dependent upon the stability of the internal oscillator.

3-9. In the standard instrument, the oscillator is initially set to within ±1 part in 10^7 of a 1 MHz frequency standard having at least an order of magnitude higher stability.

3-10. Deviation of the oscillator from this frequency then becomes a function of several factors; the most significant being time. Due to certain processes in the frequency determining elements of the oscillator, an "aging" rate is established which can be measured and specified for the oscillator. The aging rate is specified to be less than ±3 parts in 10^7 per month. Generally, this aging rate decreases with time (providing the instrument reamins continuously energized). The error due to oscillator instability may be estimated from:

$$\text{Max \% error} = (\pm 3/10^7 \times M) \times 100$$

3-11. Where: M is the number of months since last calibrated.

3-12. Oscillator stability is also a function of line voltage and temperature; except for the time immediately after

calibration, their effect will be several orders of magnitude less than the effect of aging and may be neglected. To achieve the highest accuracy of measurement, the followig considerations apply:

1. Maintain the instrument plugged in and continuously energized.

2. Maintain constant environmental conditions.

3. Monitor or regulate line voltage.

4. Calibrate instrument at intervals consistent with maximum allowable error.

3-13. FRONT PANEL FUNCTIONS

3-14. Table 3-1 describes the controls, connectors and indicators on the front panel (Figure 3-2) of the instrument.

Table 3-1.
Front Panel Functions

Index	Name	Description
1	ON OFF/STBY	Power switch. The ON (pressed) position connects primary power to T1, energizing the unit. The STBY position deenergizes the unit, but maintains power to the High Stability Oscillator (Option 13) if installed. In units without the High Stability Oscillator Option, STBY is analogous to OFF.
2	Status Annunciators	Three LED annunciators adjacent to the LSD of the displayed count indicate the status of the measurement gate, off scale count and remote/local control.
	GATE	This annunciator is lit during measurement gate time. Gate time is a function of the MODE/RESOLUTION (6) selected.
	O.S.	O.S. annunciator will light to indicate an off scale count, i.e. a count where the MSD of the count overflows the 10-digit display. The digits that are displayed are correct. An off scale condition occurs when measureing signals ≥10 GHz to RESOLUTION of 1 Hz.
	REM	REM annunciator will be lit if the Counter is remotely controlled from the IEEE-488 bus. The REM annunciator is part of data interchange Option 05.
3	Digital Display	Ten-digit LED array displays frequency count, MHz to the left of the decimal point. Decimal point position is a function of MODE/RESOLUTION (6). Leading zeros are suppressed. The displayed count is updated at the selected RECYCLE RATE (4). The display blinks when C INPUT signals exceed +20 dBm.

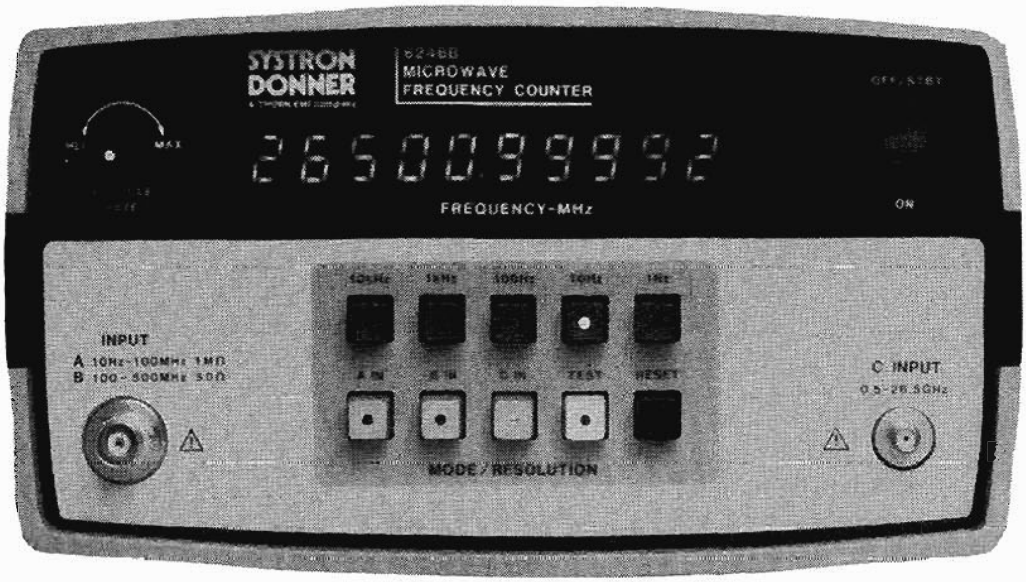

Figure 3-2. Front Panel

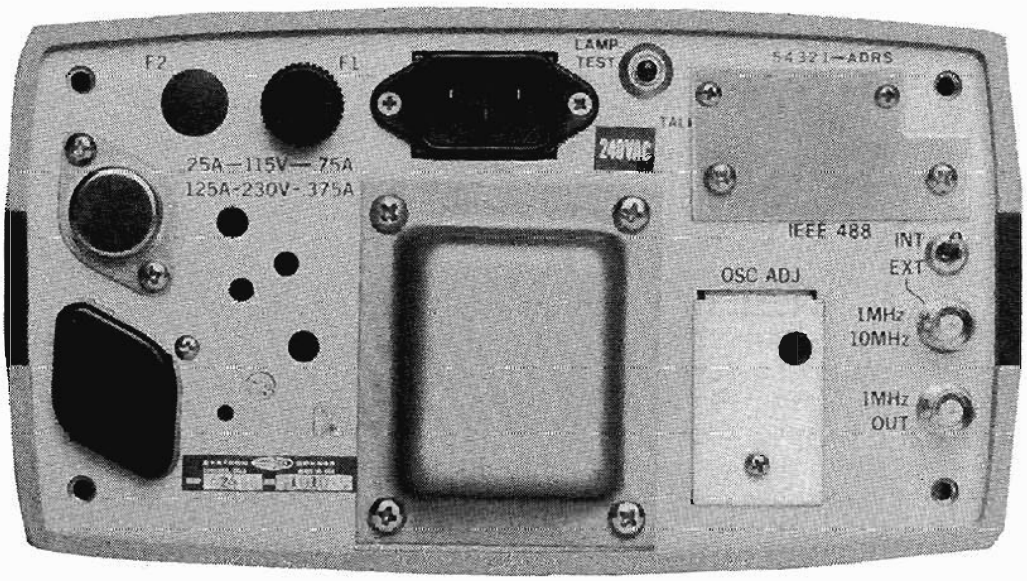

Figure 3-3. Rear Panel

Table 3-1.
Front Panel Functions (Cont'd)

Index	Name	Description
4	RECYCLE RATE	Adjusts sample rate from 50 ms (MAX) to 5 s (MIN). The HOLD position (fully CCW to detent) inhibits the automatic reset and the last measurement is held indefinitely.
5	INPUT A 10 Hz-100 MHz	BNC female (J101) terminates input signals into 1 M/25 pF.
	B 100-512 MHz	BNC female terminates input signals into 50 ohm. A fuse (part of J101) protects the B INPUT channel from overloads.
6	MODE/ RESOLUTION	Nine interlocking push-to-activate switches. Four are used to select one of three frequency ranges or the self-test feature. When pressed, the selected switch disengages any previous FREQUENCY MHz selection. The other five switches are used to select one of five resolution ranges. When pressed, the selected switch disengages any previous RESOLUTION selection. Resolution determines the decimal point position and

Table 3-1.
Front Panel Functions (Cont'd)

Index	Name	Description
6	Cont'd	the value of the LSD in the display.
	A IN	Enables A INPUT (5) and programs Counter to process signals in the 10 Hz to 100 MHz range.
	B IN	Enables B INPUT (5) and programs Counter to process signals in the 100 to 512 MHz range.
	C IN	Enables C INPUT (7) and programs Counter to process signals in the .5 to 20 GHz (6245B) or .5 to 26.5 GHz (6246B) range.
	TEST	Disables external signal input and applies a 1 MHz self-test signal to the Counter circuitry. Display will read 1 MHz when TEST switch is pressed.
	RESET	Momentary switch, resets the Counter circuits and initiates a new measurement cycle. Press to reset.
	1 Hz	Maximum resolution, sets gate time to 1 sec (A IN), 4 sec (B IN) or 1 sec x N (C IN). Display will read GMMMM.kkkHHH with leading zeros suppressed.

Table 3-1.
Front Panel Functions (Cont'd)

Index	Name	Description
	10 Hz	Sets gate time to 100 ms (A IN), 400 ms (B IN) or 100 ms x N (C IN). Display will read GGMMM.kkkHH with leading zero suppressed.
	100 Hz	Sets gate time to 10 ms (A IN), 40 ms (B IN) or 10 ms x N (C IN). Display will read -GGMMM.kkkH with leading zeros suppressed.
	1 kHz	Sets gate time to 1 ms (A IN), 4 ms (B IN) or 1 ms x N (C IN). Display will read --GGMMM.kkk with leading zeros suppressed.
	10 kHz	Minimum resolution, sets gate time to 100 µs (A IN), 400 µs (B IN) or 100 µs x N (C IN). Display will read ---GGMMM.kk with leading zeros suppressed.
7	C INPUT .5-20 GHz (6245B)	Type N female (J102) terminates input signals into 50 Ω.
	C INPUT .5-26.5 GHz (6246B)	SMA female (J102) terminates input signals into 50 Ω.

Table 3-2.
Rear Panel Functions

Index	Name	Description
1	F2	Auxiliary power fuse, used only if High Stability Oscillator Option 13 is installed. Use the correct fuse, .25 A fuse for 115 Vac operation or .125 A fuse for 230 Vac operation.
2	F1	Main power fuse. Use .75 A fuse for 115 V ac operation or .375 A fuse for 230 V ac operation.
3	Line Power Receptacle	Accepts 3-wire 115/230 V ac line power input. An integral line filter minimizes interference from noise on the line.
4	LAMP TEST	Pushbutton switch tests display functions. When pressed digital display shows 8.8.8.8.8.8.8.8.8.8. and GATE, O.S. and REM will be lit.
5	IEEE-488 INTERFACE (P/O Option 05)	S9 selects the PROG (Program) or TALK ONLY mode. Full data handshake functions are enabled when PROG is selected. Selecting TALK ONLY provides measurement data out to the bus, but inhibits other interface functions. S4 through S8 are used to assign the Counter a specific 5-bit address on the interface bus. Valid

3-15. REAR PANEL FUNCTIONS

3-16. Table 3-2 describes the controls, connectors and indicators on the rear panel (Figure 3-3) of the instrument.

Table 3-2.
Rear Panel Functions (Cont'd)

Index	Name	Description
5	Cont'd	address are 00000 through 11110 (0 through 30).
6	IEEE-488 INTERFACE Connector (P/O Option 05)	Standard 24-pin IEEE 488 interface connector (J106).
7	TB INT/ EXT	Toggle switch (S3) selects the internal 10 MHz oscillator or an external 1 MHz/10 MHz input (via J104) to drive the Counters timebase circuitry.
8	1 MHz/ 10 MHz Connector	BNC female (J104) accepts external frequency standard inputs of 1 MHz or 10 MHz at 1 V rms. The J104 input is enabled with the TB INT/EXT switch (7) is in EXT.
9	1 MHz OUT	BNC female (J105) provides an auxiliary 1 MHz convenience output.
10	OSC ADJ	Rear panel access to internal oscillator adjustment(s). Access plate configuration varies slightly depending on oscillator option installed.

3-17. OPERATING CHARACTERISTICS

3-18. The following paragraphs describe the operating range, resolution and blanking, FM tolerance, dynamic range and overload characteristics of the 6245B/6246B.

3-19. Operating Ranges

3-20. There are three operating ranges available; 10 Hz to 100 MHz, 100 to 512 MHz and .5 to 26.5 GHz (20 GHz for the 6245B). Frequencies in the low range 10 Hz to 100 MHz are input to the A INPUT channel and measured directly. Frequencies in the mid-range 100 to 512 MHz are input to the B INPUT channel and are prescaled (divide-by-4) then measured directly. For frequencies above 500 MHz measurements are made using the C INPUT, employing the FLACTO (Frequency Locked Automatic Computing Transfer Oscillator) technique.

3-21. Resolution and Blanking

3-22. Resolution is defined as the value represented by the LSD. Resolution from 1 Hz to 10 kHz in decade steps is available. Blanking removes leading zeros on the digit display, providing an unambiguous readout of the MSD to the left of the decimal point.

3-23. FM Characteristics

3-24. The 6245B/6246B will measure carrier frequencies in the presence of high levels of frequency modulation, phase modulation or residual noise. The FM Characteristics are in a function of the modulation rate and carrier frequency as shown in Figure 3-4.

3-25. Dynamic Range and Overload Protection

3-26. The 6245B/6246B provides superior sensitivity for low power signals along with high power protection. Operative dynamic range is a term used to define the range of input power, maximum power without damage and pending overload indications. Figure 3-5 depicts these parameters. Valid readings may be obtained over a dynamic range of 47 to 52 dB (6245B) or 42 to 52 dB (6246B);

-25 to +27 dBm to 12.4 GHz, -20 to +27 dBm to 20 GHz and -15 to +27 GHz at 26.5 GHz.

3-27. At approximately +20 dBm (100 mW) an overload indicator is activated causing the digital display to blink. The readings are correct and the instrument can be operated up to a maximum signal input of +27 dBm.

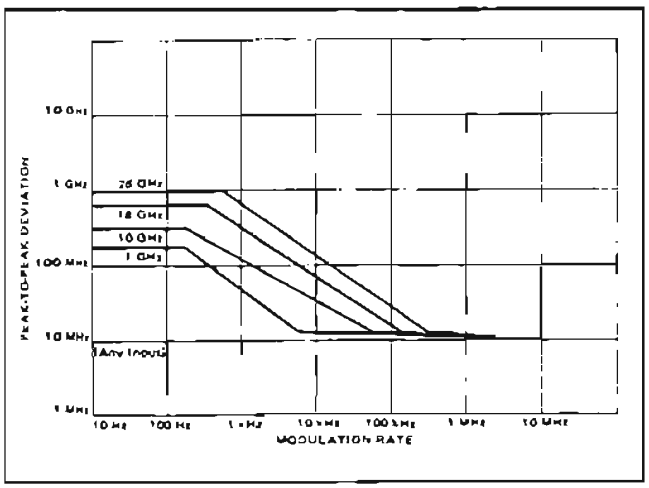

Figure 3-4. FM Characteristics

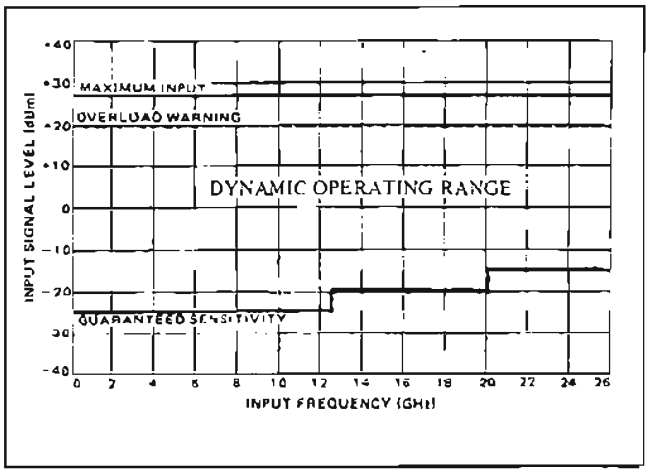

Figure 3-5. Dynamic Operating Range

3-28. OPERATING PROCEDURES

3-29. Prior to operation, ensure that T1 is wired for the applied AC input If High Stability Oscillator Option 13 is installed, allow at least 1 hour for warm-up.

3-30. 10 Hz to 100 MHz A INPUT Operation

3-31. To measure input signals in this band set the Counter controls as follows:

Rear Panel

INT/EXT(7)	Placed in the internal position If an external time base oscillator is to be used, set switch to EXT position and connect a 1 V rms 1 MHz or 10 MHz reference signal to the 1 MHz/10 MHz connector.

Front Panel

ON/STBY(1)	Press to ON.
MODE/RESOLUTION(6)	Press A IN to engage. Press to engage 10 kHz,1 kHz, 100 Hz,10 Hz or 1 Hz as appropriate.
RESET	Press to reset the instrument.
Signal Input	Connect a suitable signal source to the (5) INPUT connector. Minimum signal strength is 25 mV rms, maximum is 5 V rms to 250 V rms depending on input frequency. The display will read the input frequency in MHz to the resolution selected.
RECYCLE RATE(4)	Adjust to desired sample rate. To hold a particular measurement rotate control fully CCW to the detent (HOLD) position.

3-32. 100 MHz to 512 MHz B INPUT Operation

3-33. To measure the input signals in this band, set the Counter controls as follows:

Rear Panel	Rear panel controls operate as described for A Input paragraph 3-30.
Front Panel	
ON/STBY(1)	Press to ON.
MODE/RESOLUTION(6)	
	Press B IN to engage
	Press to engage 10 kHz,1 kHz,100 Hz,10 Hz or 1 Hz as appropriate.
RESET	Press RESET to reset the instrument.
Signal Input	Connect a suitable signal source to the B INPUT connector. Minimum signal strength is -25 dBm and maximum is +27 dBm. The display will read the input frequency in MHz to the reslution selected.
RECYCLE RATE(4)	Adjust to desired sample rate. To hold a particular measurement rotate control fully CCW to the detent (HOLD) position.

3-34. 500 MHz to 26.6 GHz C INPUT Operation

3-35. To measure the input signals in this band, set the Counter controls as follows:

Rear Panel	Rear panel controls operate as described for A Input paragraph 3-30.
Front Panel	
ON/STBY(1)	Press to ON.
MODE/RESOLUTION(6)	
	Press C IN to engage.
	Press to engage 10 kHz,1 kHz,100 Hz,10 Hz or 1 Hz as appropriate.
RESET	Press to reset the instrument.
Signal Input	Connect a suitable signal source to the C INPUT connector. Minimum signal strength -10 to -25 dBm depending on frequency and a maximum of +20 dBm (+27 dBm after acquisition). The display will read the input frequency in MHz to the resolution selected on a maximum of 10 digits with leading zeros suppressed. Should the input signal exceed +20 dBm (approximately) the display will blink to indicate a potential overload. If the input exceeds the count capsacity of the count chain the O.S. (off-scale) indicator will illuminate.
RECYCLE RATE(4)	Adjust to desired sample rate. To hold a particular measurement rotate control fully CCW to the detent (HOLD) position.

3-36. Self Test Operation

3-37. The following procedure performs an operational check on the instrument and may be used as a confidence check for maintenance purposes, incoming inspection, troubleshooting, etc.

Rear Panel	Rear panel controls operate as described for A Input paragraph 3-30.
Front Panel	
ON/STBY(1)	Press to ON.
MODE/RESOLUTION(6)	Press TEST to engage.
	Successively press to engage each switch and observe the display for the following readout.

10 kHz	1.00
1 kHz	1.000
100 Hz	1.0000
10 Hz	1.00000
1 Hz	1.000000

RESET	Press RESET to reset the instrument.
RECYCLE RATE(4)	With resolution set to 10 kHz observe the GATE LED and rotate the rate control from maximum to minimum. Note that the GATE LED off time increases as the control is rotated CCW.
	Rotate the control (4) to engage the HOLD position. Press RESET and observe that the GATE LED illuminates only once.
LAMP TEST(4)	Press and hold, rear panel pushbutton switch (4), to test the 10-digit display GATE,O.S. and REM indicators. The digital display will will read 8.8.8.8.8.8.8.8.8.8.

3-38. DATA INTERFACE OPTION 05

3-39. The General Purpose Interface Bus (GPIB) permits operation of the Counter from any data bus which conforms to IEEE STD-488. All front panel switch functions other than POWER can be controlled by the GPIB.

3-40. The Counter may be used in two different modes of operation, Programmed or Talk Only as selected by the PROG/TALK ONLY switch on the rear panel.

3-41. The Counter may be used on-line or off-line (Remote or Local). When in the Remote mode, connected to the GPIB and commanded to Remote, the Counter may be programmed by sending device dependent commands during the Counters Listen mode of operation. The Counter will ignore any command not addressed to it. When the Counter is addressed to TALK, data is transmitted in a 16-byte output message.

3-42. IEEE STD-488 Subsets Implemented

3-43. The following is a list of the subset configuration of the Counter's GPIB.

SH1	Source Handshake, Full
AH1	Acceptor Handshake, Full
T7	Talk, Basic Talker, Unaddressed if MLA, TON function
TE0	Extender Talker, None
L4	Listen, Basic Listener, Unaddressed if MTA
LE0	Extender Listener, None
SR0	Service Request, None
RL2	Remote Local, No LLO
PP0	Parallel Poll, None
DC0	Device Clear, None
DT1	Device Trigger, Full
C0	Controller, None

3-44. Bus Organization

3-35. The GPIB is organized into three sets of signal lines:

1. Data bus - 8 signal lines (7 are actively used by the Counter).

2. Data byte transfer control bus - 3 signal lines.

3. Interface management control bus - 5 signal lines (3 are actively used by the Counter).

3-46. Figure 3-6 shows the GPIB structure and its interface capabilities. The bus interface lines are assigned IEEE STD-488 mnemonics which are defined as follows:

DAV: Data Valid, indicates the availability of data on the DIO lines.

NRFD: Not Ready for Data, indicates when the device is ready to accept data.

ATN: Attention, indicates how the data on the DIO lines is to be interpreted, and which devices will respond to the data.

IFC: Interface Clear, is used to set the interface system, and the devices connected to it into a known quiescent state.

NDAC: Not Data Accepted, indicates when the data received was accepted.

SRQ*: Service Request, is used to request service from a controller.

REN: Remote Enable, is used by a controller device (in conjunction with other messages generated in the local logic) to place the Frequency Counter in the Remote Mode of opertion.

EOI*: End Or Identify, is used to indicate the end of a data transfer or, with the ATN line to execute a polling sequence.

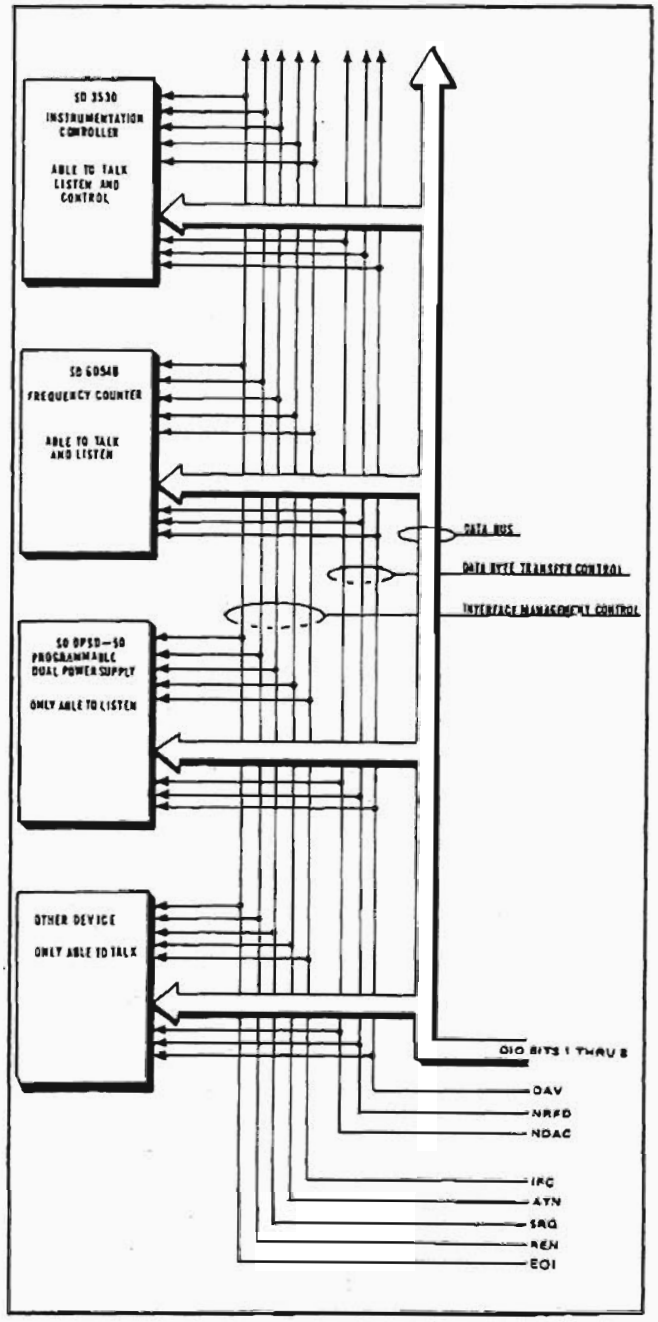

Figure 3-6. GPIB Interface Capabilities and Bus Structure

*These lines are not used by the Models 6245B/6246B Frequency Counters and are supplied with terminations only.

NOTE

For complete details on electrical, mechanical and timing requirements refer to IEEE STD-488 1978

3-48. Table 3-3 provides the pin designation for the Rear Panel GPIB 24-pin connector.

Table 3-3.
GPIB Interface Connector

Pin No.	IEEE Std-488 Mnemonic
1	DIO1
2	DIO2
3	DIO3
4	DIO4
5	EOI (not used)
6	DAV
7	NRFD
8	NOAC
9	IFC
10	SRQ (not used)
11	ATN
12	GND (shield)
13	DIO5
14	DIO6
15	DIO7
16	DIO8 (not used)
17	REN
18	GND (DIO6 return)
19	GND (DIO7 return)
20	GND (DIO8 return)
21	GND (IFC return)
22	GND (SRQ return)
23	GND (ATN return
24	GND (logic)

3-49. Bus Operation

3-50. The Frequency Counter may be used on-line or off-line as selected by the rear panel PROG/TALK ONLY slide switch. When placed into its on-line configuration (Counter connected to the GPIB via its rear panel connector and the PROG/TALK ONLY switch set to PROG), the Counter may be controlled by an instrumentation controller, a calculator or any other devices that are IEEE Std-488 compatible controllers. When power is applied to the Counter, IEEE circuits "wake-up" to the following conditions.

1. TEST mode (ASKII K) and the DIO1 through DIO7 lines are set in their tri-state mode.

2. The Resolution is 1 Hz (ASCII E).

3. The RECYCLE control function is selected (ASCII M).

3-51. The "Handshake" sequence functions as follows:

1. The IFC command is issued by the controller device and will cause the Counter to monitor the GPIB for further instructions; all data transmission is terminated. If the Counter was addressed as a Listener, or Talker, it will be unaddressed. The DIO1 through DIO7 lines will go to the tri-state mode.

2. The REN command is issued by the controller device. If the Counter receives its Listen address while the REN line is active, the Counter will enter its Remote mode wake up state and listen for programming data. All front panel controls will become inoperative.

3. When the REN line goes inactive, the Counter will enter its Local mode and the Counter's front panel controls will become operative.

3-52. The addressing process is controlled by the GPIB ATN line and functions as follows:

1. The Counter is addressed to Talk or Listen by the controller issuing its assigned Talk or Listen address while the ATN line is set active.

2. If the Counter was addressed to Talk, and the controller issues a Talk address other than the Counters assigned to Talk address the Counter will automatically deselect itself as a Talker.

3. If the Counter was addressed to Talk, and the controller issues the Counter's Listen address, the Counter

will automatically deselect itself as a Talker and assign itself to Listen.

4. If the Counter was address to Listen, and the Unlisten (UNL) ASCII ? command is issued by the controller, the Counter will deselect as a Listener.

5. If the Counter was addressed to Listen and the controller issues its Talk addess, the Counter will automatically deselect itself as a Listener, and be reassigned as a Talker.

6. If the controller issues an untalk (UNT) ASCII - command, the Counter will automatically deselect as a Talker.

3-53. The Talk and Listen addresses are selected by the rear panel 5-digit address switch. The setting of this switch determines which talk address and the corresponding Listen address will be assdigned to the Counter. Thirty-one Talk/Listen addresses may be assigned, refer to Table 3-4 for the addresses to ASCII Code format.

Table 3-4. Talk/Listen Address Assignments vs ASCII Character

Address Switch Settings 5	4	3	2	1	ASCII Character Listen	Talk
0	0	0	0	0	SP	@
0	0	0	0	1	!	A
0	0	0	1	0	"	B
0	0	0	1	1	#	C
0	0	1	0	0	$	D
0	0	1	0	1	%	E
0	0	1	1	0	&	F
0	0	1	1	1	'	G
0	1	0	0	0	(	H
0	1	0	0	1	)	I
0	1	0	1	0	*	J
0	1	0	1	1	+	K

Table 3-4. Talk/Listen Address Assignments vs ASCII Character (Cont'd)

Address Switch Settings 5	4	3	2	1	ASCII Character Listen	Talk
0	1	1	0	0	,	L
0	1	1	0	1	-	M
0	1	1	1	0	.	N
0	1	1	1	1	/	O
1	0	0	0	0	0	P
1	0	0	0	1	1	Q
1	0	0	1	0	2	R
1	0	0	1	1	3	S
1	0	1	0	0	4	T
1	0	1	0	1	5	U
1	0	1	1	0	6	V
1	0	1	1	1	7	W
1	1	0	0	0	8	X
1	1	0	0	1	9	Y
1	1	0	1	0	:	Z
1	1	0	1	1	;	[
1	1	1	0	0	<	\
1	1	1	0	1	=	]
1	1	1	1	0	>	^
*1	1	1	1	1	?	_

*Not to be device assigned. Refer to note.

NOTE

A 1-1-1-1-1 address must not be assigned to any device interfacing the bus; these addresses are reserved for the unlisten ASCII (?) and the untalk ASCII (_) commands.

3-54. The IEEE STD-488 Multiline Interface Messages relate to an ASCII code. Table 3-5. provides the IEEE STD -488 DIO bit to ASCII code relationship.

Table 3-5. IEEE STD-488
DIO Code to ASCII Character

IEEE Std-488 DIO Bit 7	6	5	4	3	2	1	ASCII Character Listen	Talk
0	1	0	0	0	0	0	SP	
0	1	0	0	0	0	1	!	
0	1	0	0	0	1	0	"	
0	1	0	0	0	1	1	#	
0	1	0	0	1	0	0	$	
0	1	0	0	1	0	1	%	
0	1	0	0	1	1	0	&	
0	1	0	0	1	1	1	'	
0	1	0	1	0	0	0	(	
0	1	0	1	0	0	1	)	
0	1	0	1	0	1	0	*	
0	1	0	1	0	1	1	+	
0	1	0	1	1	0	0	,	
0	1	0	1	1	0	1	-	
0	1	0	1	1	1	0	.	
0	1	0	1	1	1	1	/	
0	1	1	0	0	0	0	0	
0	1	1	0	0	0	1	1	
0	1	1	0	0	1	0	2	
0	1	1	0	0	1	1	3	
0	1	1	0	1	0	0	4	
0	1	1	0	1	0	1	5	
0	1	1	0	1	1	0	6	
0	1	1	0	1	1	1	7	
0	1	1	1	0	0	0	8	
0	1	1	1	0	0	1	9	
0	1	1	1	0	1	0	:	
0	1	1	1	0	1	1	;	
0	1	1	1	1	0	0	<	
0	1	1	1	1	0	1	=	
0	1	1	1	1	1	0	>	
0	1	1	1	1	1	1	?	
1	0	0	0	0	0	0		@
1	0	0	0	0	0	1		A
1	0	0	0	0	1	0		B
1	0	0	0	0	1	1		C
1	0	0	0	1	0	0		D
1	0	0	0	1	0	1		E
1	0	0	0	1	1	0		F
1	0	0	0	1	1	1		G
1	0	0	1	0	0	0		H
1	0	0	1	0	0	1		I
1	0	0	1	0	1	0		J
1	0	0	1	0	1	1		K
1	0	0	1	1	0	0		L

Table 3-5. IEEE STD-488
DIO Code to ASCII Character (Cont'd)

IEEE Std-488 DIO Bit 7	6	5	4	3	2	1	ASCII Character Listen	Talk
1	0	0	1	1	0	1		M
1	0	0	1	1	1	0		N
1	0	0	1	1	1	1		O
1	0	1	0	0	0	0		P
1	0	1	0	0	0	1		Q
1	0	1	0	0	1	0		R
1	0	1	0	0	1	1		S
1	0	1	0	1	0	0		T
1	0	1	0	1	0	1		U
1	0	1	0	1	1	0		V
1	0	1	0	1	1	1		W
1	0	1	1	0	0	0		X
1	0	1	1	0	0	1		Y
1	0	1	1	0	1	0		Z
1	0	1	1	0	1	1		[
1	0	1	1	1	0	0		\
1	0	1	1	1	0	1		]
1	0	1	1	1	1	0		^
1	0	1	1	1	1	1		_

3-55. The Counter can be programmed by sending device dependent messages during the Counters Listen mode of operation. Device independent commands are received by the Counter at any time during its operation. The Counter will ignore any device dependent or independent command for which it has not been designed or programmed to respond to.

3-56. The device dependent data is programmed into the Counter in serial bytes consisting of 7-parallel bits. Table 3-6 provides the Program Format. The data bytes can be entered in any order and need not be sequenced.

3-57. The Counter outputs the measurement data when in its talk mode in a 16-byte, 7-bit format in byte serial, bit parallel sequence. Table 3-7 provides the data output sequence as it relates to the data output format and equivalent ASCII Characters.

Table 3-6. Program Format

Byte	Program Bits 7 6 5 4 3 2 1	ASCII Character	Function
1	1 0 0 0 0 0 0	@	10 Hz Resolution
	1 0 0 0 0 0 1	A	10 Hz Resolution
	1 0 0 0 0 1 0	B	1 kHz Resolution
	1 0 0 0 0 1 1	C	100 Hz Resolution
	1 0 0 0 1 0 0	D	10 Hz Resolution
	*1 0 0 0 1 0 1	E	1 Hz Resolution
	1 0 0 0 1 1 0	F	1 Hz Resoltuion
	1 0 0 0 1 1 1	G	1 Hz Resolution
2	1 0 0 1 0 0 0	H	FREQ A INPUT
	1 0 0 1 0 0 1	I	FREQ B INPUT
	1 0 0 1 0 1 0	J	FREQ C INPUT
	*1 0 0 1 0 1 1	K	TEST
3	1 0 0 1 1 0 0	L	HOLD
	*1 0 0 1 1 0 1	M	RECYCLE
4	1 0 0 1 1 1 0	N	SAMPLE
	1 0 0 1 1 1 1	O	RESET

*Wake up state.

Program Subsets: SH1,AH1,T7,TE0,L4, LE0,SR0,RL2,PP0, DC0,DT1,C0.

Notes:

1. Groups 1, 2 and 3 are latched - will retain bit function selected in each group as long as instrument is in REMOTE.

2. HOLD - can talk whenever MTA and EOC are true.

Table 3-6. Program Format (Cont'd)

Notes (Cont'd):

3. RECYCLE - can talk only after EOC goes high after MTA true.

4. REMOTE - (REN + MLA) or a Function Select (ASCII @ through K entry). Reset Counter for approximately 400 ms.

5. TALK ONLY - after each EOC, Counter will store data until data is readout on the GPIB.

Table 3-7. GPIB Output Data Format

Byte	Program Bits 7 6 5 4 3 2 1	ASCII Character	Function
1	0 1 0 0 0 0 0	SP	Not Offscale
1	0 1 1 1 1 1 1	?	Offscale
2	0 1 1 x x x x	0-9	10^9 digit MSD
3	0 1 1 x x x x	0-9	10^8 digit
4	0 1 1 x x x x	0-9	10^7 digit
5	0 1 1 x x x x	0-9	10^6 digit
6	0 1 1 x x x x	0-9	10^5 digit
7	0 1 1 x x x x	0-9	10^4 digit
8	0 1 1 x x x x	0-9	10^3 digit
9	0 1 1 x x x x	0-9	10^2 digit
10	0 1 1 x x x x	0-9	10^1 digit
11	0 1 1 x x x x	0-9	10^0 digit LSD
12	1 0 0 0 1 0 1	E	Exponent Pointer
13	0 1 0 1 0 1 1	+	Exponent Sign
14	0 1 1 0 x x x	0-4	Exponent Value
15	0 0 0 1 1 0 1	CR	Carriage Return
16	0 0 0 1 0 1 0	LF	Line Feed

Note: Reading expressed in Hz.
Example ?xxxxxxxxxx E+0 CR LF
= xxxxxxxxxx 10^0 off scale
Input Frequency = 10 to 26 GHz

3-58. Typical Measurement System

3-59. A typical system is shown in Figure 3-7 to illustrate the capabilily of the GPIB system to provide a variety of instrumentation system needs. Two examples of possible event sequences, to accomplish specific measurement tasks using the GPIB system are provided as follows:

3-60. Event Sequence 1: Basic Data Returned to the Controller

1. Controller initializes the interface system by issuing the IFC command.

2. Controller sends the listen address of the programmable Power Supply, followed by program data for that device.

3. Controller sends the unlisten command (UNL) as an ASCII?, then the listen address for the next device, followed by the program data for it.

4. Event 3 is repeated until each device of interest for the test has been addressed and programmed, then the Controller issues an unlisten command (UNL).

5. Controller sends the listen address of the selected measurement device (for example the 6245B/6246B Frequency Counter), then the program data to initiate a measurement.

6. Controller issues another UNL command, addresses itself to listen, then sends the talk address of the measurement device.

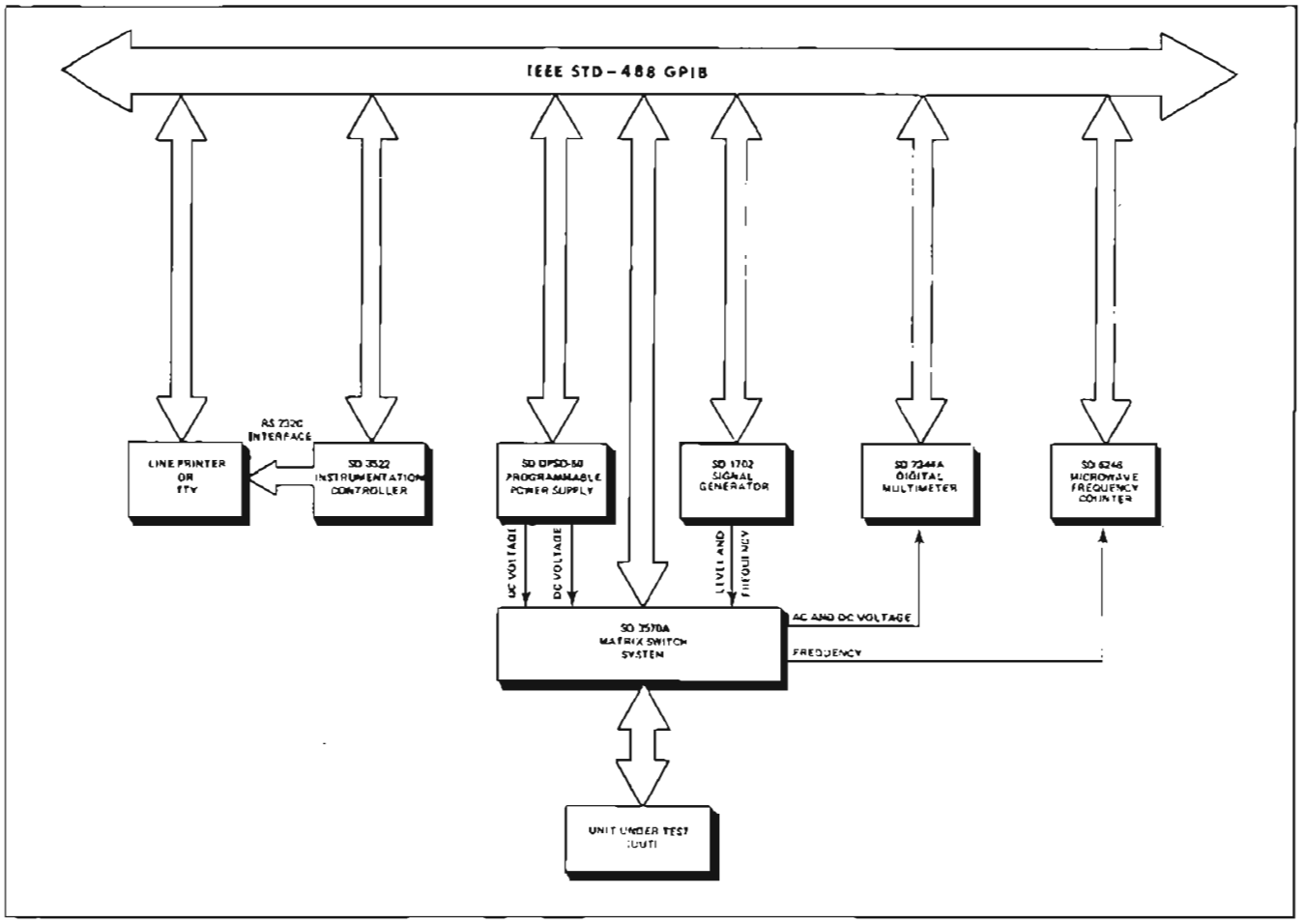

Figure 3-7. Typical Test System

7. Upon completion of its measurement cycle the Frequency Counter enters its talk mode and sends the measurement result (basic data) to the Controller that is the addressed listener.

8. The controller displays the measurement data on its CRT and transmits it via the RS232C Interface to the line printer or teletype to generate a "hard copy" of the test results.

3-61. Event Sequence 2: Basic Data Directed to the Line Printer or TTY

1. Controller initializes the interface system by issuing the IFC command.

2. Controller causes all devices to set their internal conditions to a predefined state by issuing a DCL (device clear) mesage as an ASCII DC4.

3. Controller sends the listen address of the programmable power supply, followed by program data for that device.

4. Controller sends the unlisten command, (UNL) as an ASCII?, then the listen address for the next device, followed by the program data for it.

5. Event 4 is repeated until each device of interest for the test has been addressed and programmed, then the controller issues an unlisten command UNL.

6. Controller sends the listen address of the selected measurement device (for example 6245B/6246B Counter), then the program data to initiate a measurement.

7. Controller sends another UNL command, then the listen address of the line printer to teletype, followed by the talk address of the Counter.

8. Upon completion of its measurement cycle the Counter enters its talk mode and sends the measurement result (basic data) to the line printer or teletype.

NOTE

If the controller were to address both the line printer or teletype and itself, the resulting basic data would be accepted by both devices, even though the two may have different transfer rates at which the data can be accepted.

3-62. IEEE-488 Controller

3-63. The 6245B/6246B Counter may be controlled by a Controller that is IEEE STD-488 compatible. The following are some typical examples using Systron-Donner's 3522 or 3530 Controller, Hewlett Packard's 9825 and Commodore's PET.

3-64. The Controller is connected to the 6245B/6246B Counter via the GPIB cable and is programmed as to their addresses by the rear panel

3-65. Program Example: Set Counter address to 01010,PROGRAM/TALK ONLY to PROG. (Address = i.e. ASCII*). Note: <xxx> indicates a single Keystroke.

STEP

1. Clear.

2. Prepare Controller for bus operation.

3. Program Counter to:

	Remote
Resolution	10 kHz
Mode	A Input
Control Function	HOLD

4. Program Counter to: Sample

5. Read answer from Counter and display answer.

3-66. SD 3530 Program

Step	Entry	Function
1.	BUS CLR <New Line>	Performs Program Example Step 1.
2.	BUS REM <New Line>	Performs Program Example Step 2.
3.	BUS OUT "?*", "AHL",0 <New Line>	Performs Program Example Step 3.
4.	BUS OUT "?*", "N" , 0 <New Line>	Performs Program Example Step 4.
5.	BUS IN"?J",A$, CHR$(10):PRINT A$ <New Line>	Performs Program Example Step 5.

3-67. HP 9825 program

Step	Entry	Function
1.	<Erase> <Execute> <Reset>	Performs Program Example Step 1
2.	dim A $[20] <Execute>	Performs Program Example Step 2.
3.	wrt 710,"AHL" <Execute>	Performs Program Example Step 3.

3-67. HP 9825 program (cont'd)

Step	Entry	Function
4.	wrt 710,"N" <Execute>	Performs Program Example Step 4.
5.	red 710,A$; <Execute>	Performs Program Example Step 5.

3-68. Commodore PET program

Step	Entry	Function
1.	NEW <Return>	Performs Program Example Step 1.
2.	10 OPEN 1,10 <Return>	Performs Program Example Step 2.
3.	20PRINT#1,"AHL" <Return>	Performs Program Example Step 3.
4.	30PRINT#1,"N" <Return>	Performs Program Example Step 4.
5.	40INPUT#1,A$: IFST=2Goto40 <Return> 50PRINTA$ <Return> RUN <Return>	Performs Program Example Step 5.

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CHAPTER 4

PRINCIPLES OF OPERATION

4-1. INTRODUCTION

4-2. This chapter describes the principles of operation of the 6245B/6246B Microwave Frequency Counter. First, a functional block level description is presented, keyed to Figure 4-1. The block level description is generalized, covering the functional blocks within the Counter and the signal flow between them. Secondly, a circuit level description is presented, keyed to individual assembly block diagrams (Chapter 4) and assembly schematics (Chapter 7). The circuit description is more detailed and provides information for troubleshooting to the component level.

4-3. FUNCTIONAL BLOCK DESCRIPTION

4-4. Refer to the Functional Block Diagram, Figure 4-1 for the following discussion. The block level description of the Counters is divided into 6 functional areas, as shown in Table 4-1. Each function is described in terms of input, output and signal conversion. A function may include more than one hardware assembly. Table 4-1 shows the correlation between a function and its hardware assemblies.

4-5. Figure 4-1 presents a functional view of the 6245B/6246B, and considerable hardware detail is omitted for clarity. See Schematics in Chapter 7 for complete hardware interconnect data, includinging front and rear panel controls.

4-6. TIMEBASE

4-7. The measurement accuracy of a Frequency Counter is a function of its timebase accuracy. The 6245B/6246B timebase is derived from either an internal (10 MHz) or external (1 MHz or 10 MHz) frequency standard. The internal 10 MHz standard is generated by Timebase Oscillator Assembly A13. The standard A13 Assembly is a TCXO (Temperature Compensated Crystal Oscillator). An Optional A13 Assembly is available, offering greater accuracy/stability. (Refer to Table 1-2, Option 13.) External frequency standards of either 1 MHz or 10 MHz can be connected via J104 on the rear panel. The appropriate frequency standard is selected by rear panel switch S3 (INT/EXT).

Table 4-1.
Function/Assembly Cross Reference

Para.	Function	Assembly No.
4-6	Timebase	A13 Timebase Oscillator A6 Timebase Logic
4-12	Input Signal Conditioning	A3 100 MHz Amp and 512 MHz Prescaler
4-18	Counter Logic	A7 Counter Logic
4-22	Display	A2 Display A8 Display Logic
4-26	FLACTO Channel	A10 FLACTO Logic A11 LO/Shifter
4-34	Systems Interface (Option 05)	A4 Bus Interface A5 Counter Interface

NOTE: A1 Interconnect Assembly (motherboard) is implied in all functions.

4-8. Timebase Logic Assembly A6 determines the Counters measurement gate time from the selected frequency standard, based on front panel MODE/RESOLUTION settings. Gate time is defined by the $\overline{\text{START}}$ and STOP outputs of A6. Gate times range from 100 µs (10 kHz resolution) to 1 sec (1 Hz resolution) for A IN signals. Measurement gate time are extended x4 for

B IN signals, compensating for the ÷4 frequency prescaling in the A3 Assembly. Gate times for C IN signals are the product of the basic gate time xN, where N is the selected harmonic number of the local oscillator. Gate times for C IN signals can range from <1 ms to >2 min.

4-9. The decimal point position in the display is determined by the 3-bit DP output from A6. Digits to the left of the decimal point are read directly in MHz. The decimal point will move to the left as RESOLUTION is increased. The 3-bit decimal point code is also sent to A4 the Optional IEEE-488 Interface.

4-10. A Counter self-test signal, T 1 MHz, is generated by the A6 Assembly when the front panel TEST switch is pressed. The T 1 MHz self-test signal exercises the Counter Logic A7, Display Logic A8 and Display A2 Assemblies. A 1 MHz output from the Counter is provided at J105 on the rear panel.

4-11. When processing C IN signals, the basic gate time (100 µs to 1 sec) is multiplied by N. The $\overline{TB}$ (100 kHz) output of A6 is divided by N in Assembly A10 and fed back to A6 as $\overline{TBEN}$ (Timebase Enable). That is, $\overline{TBEN} = \overline{TB}/N$. Assuming a RESOLUTION of 1 Hz (1 sec gate time) and N = 80, the Counters actual gate time will be 80 sec.

4-12. INPUT SIGNAL CONDITIONING

4-13. The 6245B/6246B accurately measures input frequencies from 10 Hz to 18/26.5 GHz, at input power levels from -25 dBm to +27 dBm. Three seperate channels provide the necessary signal conditioning to cover this range.

4-14. A IN signals (10 Hz to 100 MHz) connected to J101 are amplified by the A3 Assembly, then sent to the A7 Assembly as A SIG. Diodes in the input circuitry of A3 limit the input signal to a safe level.

4-15. B IN signals (100 to 512 MHz) also connected to J101 are prescaled (÷4) and * amplified by Assembly A3, then sent to the A7 Assembly as B SIG. Since B SIG is 1/4 the B IN frequency, the Counters gate time is extended (x4) to get the correct count.

4-16. C IN signals (.5 to 26.5 GHz) connected to J102 are processed by the FLACTO (Frequency Lock Automatic Computing Transfer Oscillator) channel then sent to the A7 Assembly as C SIG. C SIG is some subharmonic (N) of C IN. The Counters gate time is extended (x10) to get the correct count. (FLACTO is discussed in detail in paragraph 4-26.)

4-17. The detector output (DET) of Divider/Detector U4 is amplified (A11 Assembly) and fed back to U4 as a level (LEVEL) control signal. An increase in the C IN signal level causes a corresponding increase in the attenuation of the PIN Leveler in U4. The feedback, and therefore the signal level into the FLACTO channel, is adjustable from A11. A sample of the detector output of U4 blinks the Counters display if the C IN signal exceeds approximately +20 dBm. This overload alarm is calibrated from A10.

4-18. COUNTER LOGIC

4-19. The frequency of an input signal is determined by counting the number of cycles that occur during a specific gate time. The A7 Assembly performs this counting function in the 6245B/6246B. The three signal conditioning channels provide the unknown frequency input to A7. A 1 MHz self-test signal from A6 is available as a confidence check. The appropriate RF input is selected via the front panel FREQUENCY switches.

4-20. The measurement gate time for A7 is controlled by the $\overline{START}$ and STOP inputs from A6. Gate time is a function of the MODE and RESOLUTION selected. Gate time ranges are 100 µs to 1 sec (A IN), 400 µs to 4 sec (B IN) or 500 µs to >2 min (C IN). The accuracy of the count out of A7 depends on the accuracy of gate time.

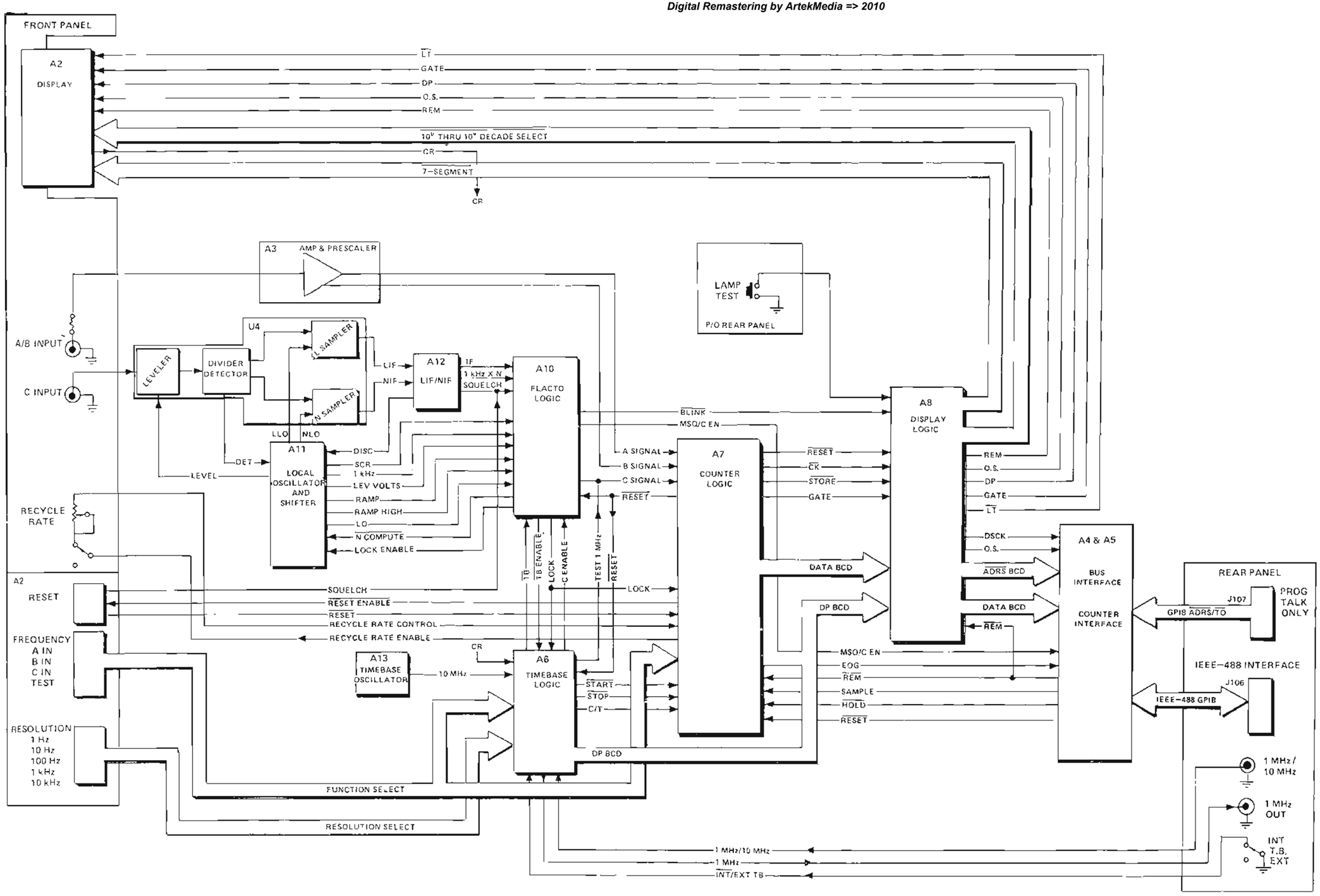

Figure 4-1.

Functional Block Diagram

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4-21. The output count from A7 consists of a 2-digit BCD value and a series of CK pulses. Each CK pulse occuring during gate time advances the displayed count 100 Hz (10^2). The instantaneous BCD value at the end of gate time determined the two least significant digits (10^1 - 10^0) of the count. The STORE output from A7 (end of gate time) loads the count to A8. A RESET is also generated at the end of gate time to clear the applicable circuitry for the next count.

4-22. DISPLAY

4-23. The Counters output is displayed on a 10-digit LED array, driven by the A8 Assembly. The display incorporates leading zero suppression. The decimal point position in the display is determined by the RESOLUTION selected. Frequency is read directly, MHz to the left of the decimal point. Three annunciator LEDs in the display inform the operator when the GATE is open, if the count exceeds the display capacity (OS) or if the Counter is remotely controlled via the IEEE-488 bus (REM). Pressing the LAMP TEST switch, located on the rear panel, will cause the display to read 8.8.8.8.8.8.8.8.8.8. and the GATE, O.S. and REM LED to illuminate.

4-24. A8 processes the count input from A7 and outputs the appropriate scan format to A2. A8 sends a 7-segment code to A2 to specify the character (0-9) to be displayed. This 7-segment input is common to the 10 LEDs, only one of which will be enabled. LEDs are enabled via the 10 LED select lines. The scan sequence is left to right across the display, MSD to LSD. A clock on A8 controls the scan timing, ≈1 ms per LED or 10 ms for one complete scan. The BLINK input to A8 blinks the 10-digit display if the C IN signal exceeds +20 dBm.

4-25. The A8 Assembly also provides an output to the IEEE-488 interface via the optional A4/A5 Assemblies. The character to be displayed (0-9) is sent to A4/A5 in BCD format. The specific digit position to be scanned is sent as a 4-bit address. The DS CK (Display Clock) output from A8 determines the scan rate of count data onto the interface bus (same as front panel scan rate).

4-26. FLACTO CHANNEL

4-27. Microwave frequencies (.5-26.5 GHz) applied to the C INPUT (J102) cannot be processed directly by the Counters digital circuitry. The FLACTO technique is used to prescale (divide) the C INPUT signal by N. the appropriate subharmonic of C INPUT (C SIG) is then counted by A7 and displayed. N is the harmonic relationship between the local oscillator and C INPUT. N will have a value ≥5 but ≤255. Since C SIG = C INPUT/N, measurement gate time is extended (xN) to normalize the total count to Hz (cycles per second). That is, if C SIG is the 40th subharmonic of C INPUT, then the basic gate time (100 µs - 1 sec) is multiplied by 40. The folowing paragraphs describe the FLACTO circuitry in detail.

4-28. FLACTO channel circuitry includes U4 consisting of PIN Leveler, a Divider/ Detector and Samplers (mixers), and plug-in Assemblies A10 through A12. The unknown frequency (C INPUT) is divided into two signal paths by the Divider and sent to the samplers. L Sampler is in the freuency lock path and is driven by the Lock Local Oscillator (LLO) output of A11. N Sampler is in the N computing path and is driven by the N Local Oscillator (NLO) output of A11. The samplers generate a range of harmonics (≥5 but ≤255) from their respective local oscillator inputs, which are then mixed with the C INPUT. The difference frequency output from the L Sampler is the lock path IF (LIF). The differencece frequency output from the N Sampler is the N computing path IF (NIF).

4-29. The LLO Output of A11 if typically <105 MHz by >85 MHz. The NLO output of A11 tracks 1 kHz higher than LLO. Therefore, NLO = LLO + 1 kHz. The difference between LIF and NIF in kHz is the harmonic (N) being used, where NIF >LIF. That is, if NIF=5.080 MHz and LIF=5.000 MHz, then the Local Oscillator Harmonic (N) is 80.

4-30. Prior to a frequency lock, a ramp generator on A11 sweeps it from 105 MHz towards 85 MHz. The swept LLO generates a range of harmonics in L Sampler which mix with the C INPUT. The optimum mixing frequency (LLO x N) for a lock is determined by a discriminator on A12. A lock will occur only if LIF is 1-13 MHz. As the optimum mixing frequency is approached, the discriminator (DISC) output of A12 overrides the sweep ramp on A11, driving the local oscillator towards a lock. The DISC output of A12 controls the local oscillator frequency of A11 as long as lock is maintained.

4-31. Once frequency lock is established, the squelch (SQ) output of A12 enables FLACTO Logic Assembly A10. A10 computes the harmonic (N) by counting the 1 kHz x N output from A12. Assuming an 1 kHz x N output of 80 kHz, N = 80. When N has been computed, A10 sends N compute to A11.

4-32. Once N has been computed, A10 outputs a C SIG that is an exact submultiple (N) of the C INPUT signal. This is accomplished by subtracting IF/N from LO. C SIG is then normalized to Hz (cycles per second) by counting it N times. That is, the gate time is extended x N. Assuming 1 Hz resolution (gate time = 1 sec) and N = 80, total gate time would be 80 sec.

4-33. Gate time for a C INPUT signal is established by A10. The 100 kHz $\overline{TB}$ input to A10 is divided by N and sent back to A6 as $\overline{TBEN}$. Therefore, $\overline{TBEN} = \overline{TB}/N$. As a result, the basic gate time (determined by the resolution selected) is extended x N.

4-34. SYSTEM INTERFACE (Option 05)

4-35. The 6245B/6246B can be configured as part of a measurement system, via the optional IEEE-488 interface hardware. The option consists of the A4 Bus Interface Assembly, the A5 Counter Interface Assembly, Interface Cable Assembly and a programming switch, S4.

4-36. All front panel controls (except ON OFF/STBY) are disabled/overridden when the Counter is remotely controlled from the IEEE-488 bus. The REM indicator on the front panel will be lit when the bus has control. The Counter's 5-bit bus address is set via rear panel switches.

4-37. Display Logic Assembly A8 outputs frequency measurement data to A4/A5. The BCD output represents the value (0-9) of the digit being sent. The $\overline{ADRS}$ output dedetermines which of the 10-digits (10^9-10^0) is being sent. The ADRS output provides the same scan format (MSD to LSD) and scan rate 1 ms/character, 10 ms/scan) as the front panel display. The front panel display remains operative even when the Counter is under remote control.

4-38. CIRCUIT DESCRIPTION

4-39. The following circuit level descriptions are presented in Assembly number order (A1-A13) for quick reference.

4-40. The block diagrams present a simplified functional view of an Assembly, and some detail may be omitted for clarity; the schematics in Chapter 7 represent the actual circuitry.

4-41. A1, Interconnect PC Assembly

4-42. Refer to Interconnect/Block Diagram 08312901 for the following discussion. A1 serves as the instrument's motherboard providing electrical interface between the front and rear panels, 8 plug-in Assemblies and the timebase oscillator. Pin designations are shown on the schematic. Signal mnemonics are defined in the circuit descriptions.

4-43. The power supply circuitry is contained on the A1 PC Assembly. The Block Diagram (sheet 2) shows the transformer hookup for various line voltage inputs. Power supply regulators U1 and U2 are mounted on the rear panel for optimum cooling and heat transfer.

4-44. High Stability Oscillator (Option 13) requires a +15 Vdc supply. The components for this supply are shown inside the dotted lines on Sheet 1. Line fuse F2 is part of this option. Instruments using the standard Timebase Oscillator Assembly will have a chassis blank installed in the F2 position.

4-45. A2, Display PC Assembly

4-46. Refer to Figure 4-2 and Schematic 08306301 for the following discussion. Display PC Assembly A2 contains the 10-digit LED frequency display and three LED annunciators; GATE, O.S. (Off-Scale) and REM (Remote). All data, control and power input to A2, are from the A8 Display Logic PC Assembly (see para. 4-95).

4-47. The 10 seven-segment LEDs are enabled sequentially, left to right, MSD to LSD by transistors Q10 through Q1 (housed in Integrated Circuits U1, U2 and U3). A low input (≈0 V) to the base of the selected transistor turns it on, connecting the +5 Vdc enabling voltage to the corresponding seven-segment LED.

4-48. The numerical value to be displayed is applied in a 7-segment format on the $\overline{a}$ through $\overline{g}$ lines. A low turns the corresponding segment of the LED on. The data on the $\overline{a}$ through $\overline{g}$ lines is updated at the scan rate, as each of the 7-segment LEDs is enabled.

4-49. The position of the decimal point in the display is a function of the RESOLUTION selected from the front panel As the resolution of the measurement is increased, the decimal point moves toward the left. (Read MHz to the left of the decimal point.)

Resolution =										
10 kHz	-	-	-	G	G	M	M	M.	k	k
1 kHz	-	-	G	G	M	M	M.	k	k	k
100 Hz	-	G	G	M	M	M.	k	k	k	H
10 Hz	G	G	M	M	M.	k	k	k	H	H
1 Hz	G	M	M	M.	k	k	k	H	H	H

4-50. The decimal point is enabled by driving the base of Q11 (part of U4) high at the appropriate time during the scan cycle.

4-51. The GATE annunciator LED is on during gate time, enabled by a high input to CR1. Measurement gate time increases as resolution is increased. Gate time for B INPUT frequencies is x4. Gate time for C INPUT frequencies is xN.

Resolution	Gate Time
10 kHz	100 µs
1 kHz	1 ms
100 Hz	10 ms
10 Hz	100 ms
1 Hz	1 sec

4-52. The REM annunciator is illuminated when the Counter is being controlled via the IEEE-488 bus. A high on the base of Q14 (part of U4) turns REM on.

4-53. The O.S. indicator is illuminated whenever the count exceeds the display 10-digit capacity. This occurs when 1 Hz resolution is selected and the count is 10 GHz or greater. In this case the MSD of the 11-digit number (10,000,000,000 Hz) will not be displayed, and the O.S. annunciator will be on. The remaining digits on the display will be correct. A high input to the base of Q13 (part of U4) lights the O.S. annunciator.

4-54. When the rear panel LAMP TEST is pressed by the operator, an "8" will appear in all 10 positions of the display. In addition, $\overline{LT}$ goes low, enabling the decimal point in all 10 positions and lighting the GATE, O.S. and REM indicators.

4-55. Leading zeros are suppressed by logic within counter U7 on the A8 Display Logic PC Assembly.

4-56. A3, Amp/Prescaler PC Assembly

4-57. Refer to Figures 4-3, 4-4 and schematic 08306201 for the following discussion. The A3 Assembly provides the necessary signal conditioning for the Counters A INPUT channel (10 Hz - 100 MHz).

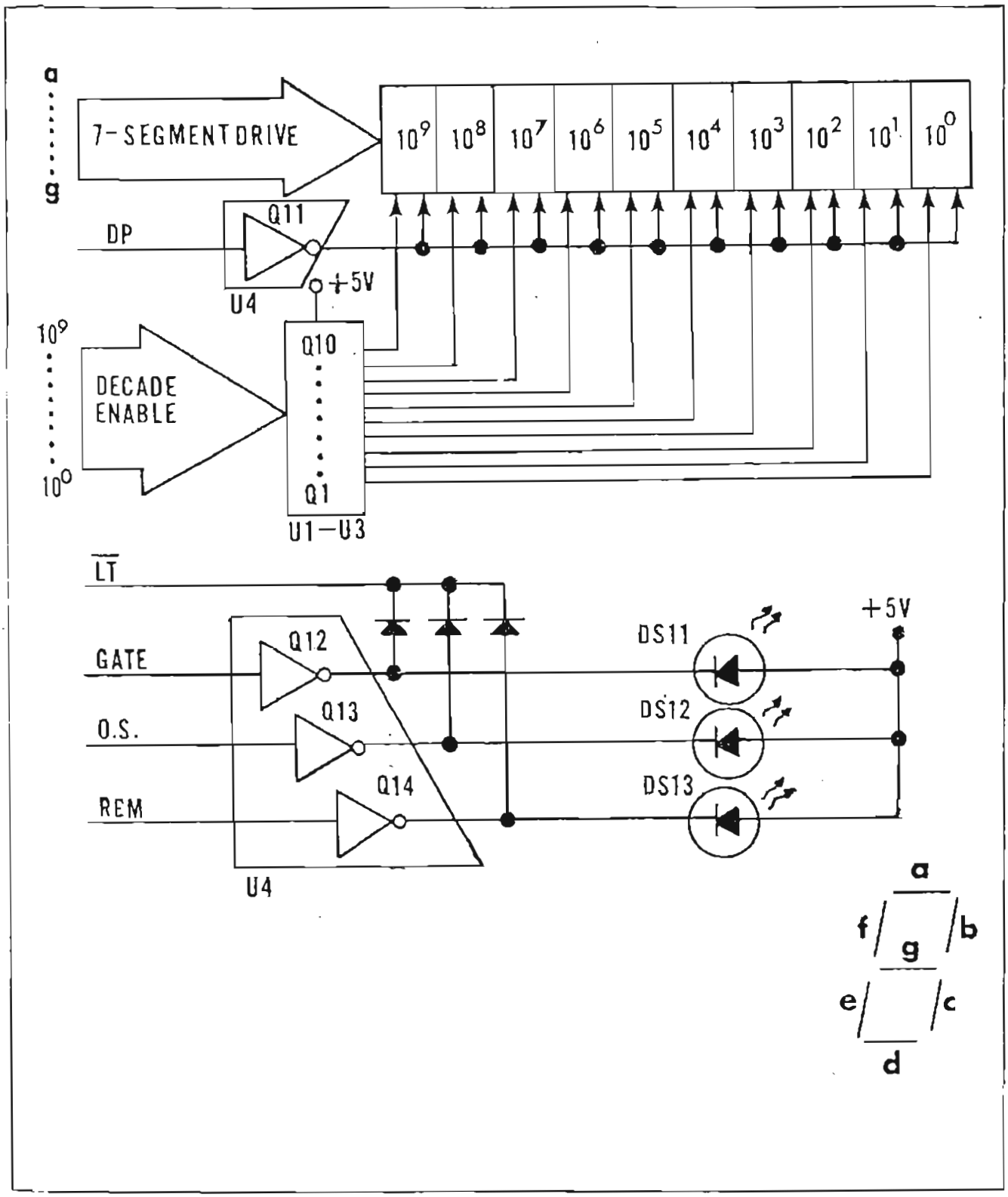

Figure 4-2. Display (A2) Block Diagram

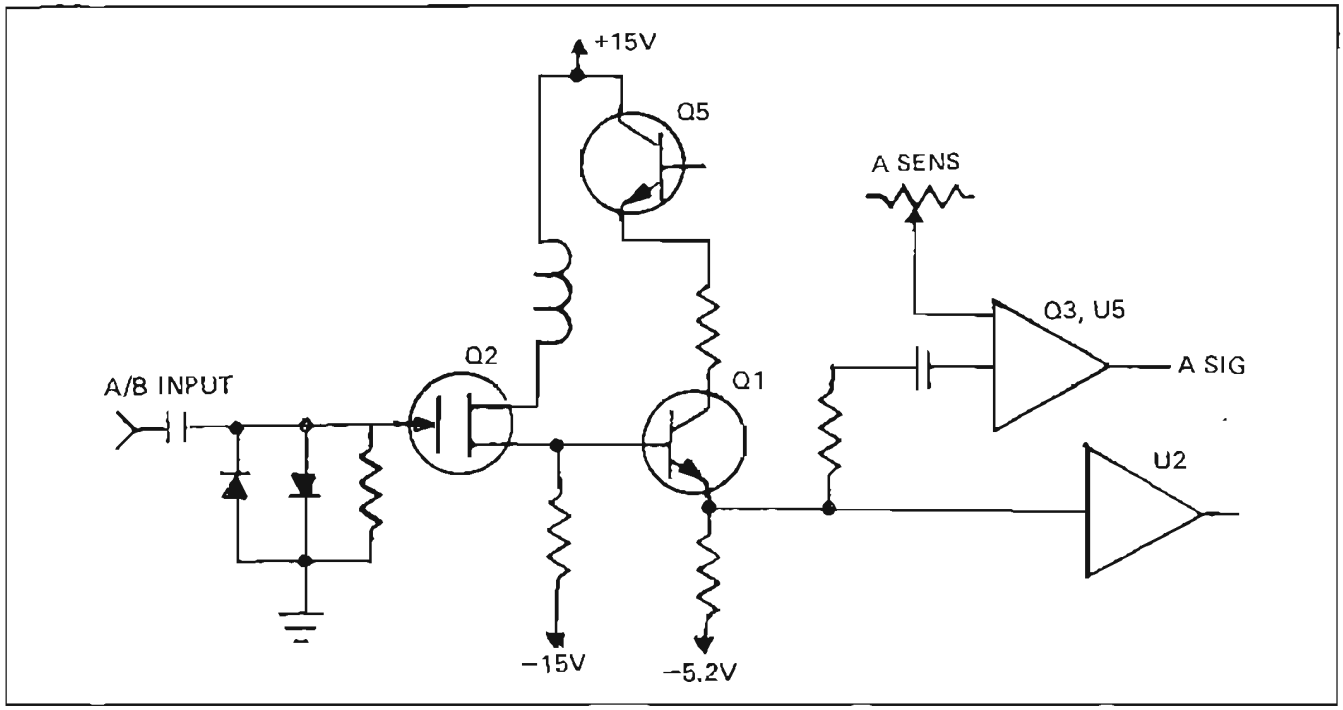

Figure 4-3. 100 MHz Amplifier (A3) A/B Input Block Diagram

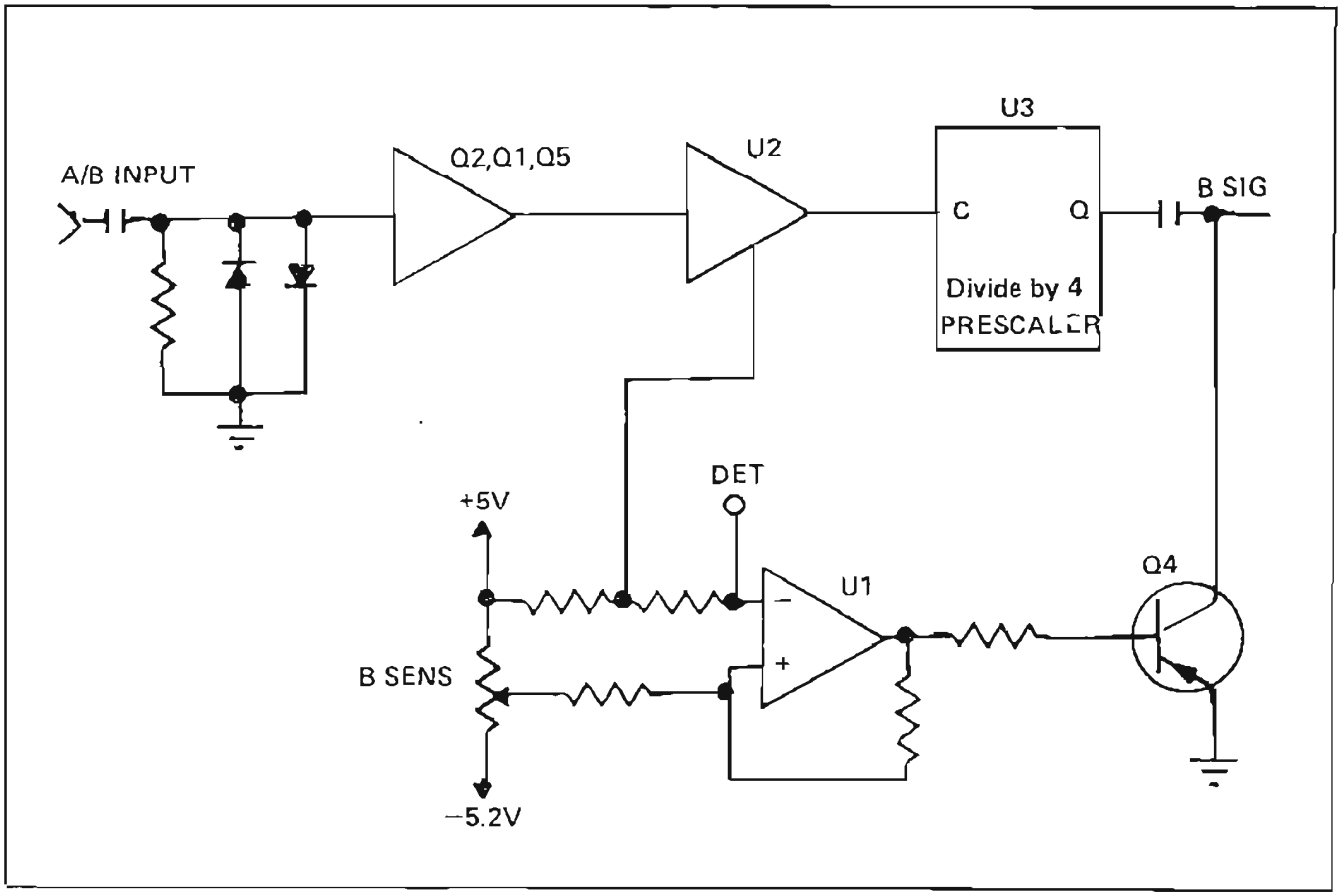

Figure 4-4. 512 MHz Prescaler (A3) A/B Input Block Diagram

Assembly A3 contains a dual FET input stage (Q2) an emitter follower (Q1) and a linear amplifier (U5).

4-58. Diodes CR4 and CR5 limit the maximum signal swing felt at the gate of Q2. The amplified A signal output at U5-8 (P1-X) provides the A SIG input to A7. R8 is adjusted for a stable count with an input signal level of -27 to -30 dBm.

4-59. The Prescaler provides the necessary signal conditioning for the Counters B INPUT (100 - 512 MHz). This circuitry contains a linear amplifier U2, a ÷4 prescaler and an adjustable sensitivity threshold circuit. A fuse incorporated in the front panel INPUT connector (J101) protects A3 from input signals greater than +28 dBm. Diodes in the input circuitry limit the maximum signal swing.

4-60. The RF amplifier output (100-512 MHz) drives ÷4 prescaler U3. The output of U3 (25-130 MHz) provides the B SIG input to the A7 PC Assembly. Whenever B IN is selected at the front panel, gate time is extended by x4. Extending the measurement gate time (x4) compensates for the frequency prescaling (÷4), thereby normilizing the count to Hz (cycles per second).

4-61. Sensitivity adjustment R1 sets the sensitivity threshold for the B INPUT channel, via comparator U1. If input signal power is below the threshold point the output of U1 will be low. A low out of U1 causes Q4 to conduct, clamping the B SIG output of A3 to ground. As the B INPUT signal power increases, the inverting input to U1 (DET) will go negative. At the threshold point the positive going output of U1 cuts Q4 off, removing the clamp on the B SIG line. R1 is adjusted for a stable count with a B INPUT signal level between -27 and -30 dBm.

4-62. A4, Bus Interface PC Assembly Option 05

4-63. The Option 05 IEEE-488 systems interface, consisting of plug-in Assemblies A4 and A5, interface connector and program/address switches S4 through S9, is shown in the Block Diagram (sheet 2). Refer to Figure 4-5 and the A4 Schematic 08312201 for the following circuit descriptions.

4-64. The 16-line IEE-488 interface bus is terminated by bi-directional bus transceivers U5,U11,U16. Data direction on the bus (talk/listen) is determined by the state of $\overline{\text{TALK}}$. When the $\overline{\text{TALK}}$ line is low, the transceiver routes data from the Counter to the bus. That is, the Counter "talks" to the bus. When the $\overline{\text{TALK}}$ line is high data from the bus is routed into the Counter.

4-65. The state of the $\overline{\text{TALK}}$ line is a function of control inputs from an external bus controller. Eight of the sixteen interface lines are dedicated to management and transfer bus functions. Tables 4-2 and 4-3 define these functions. It should be noted that SRQ and EOI are always high, since they are terminated on A4. Remember that by definition a high (+5 V) on the interface bus represents a 0, while a low (0 V) represents a 1.

Table 4-2.
Management Bus Functions

The Management Bus is a group of five signal lines which are used to control data transfers over the Data Bus. Signal definitions are as follows:	
Signal	**Definition**
Attention (ATN)	Activated by the Controller when instruments/peripheral devices are being assigned as listeners and talkers.

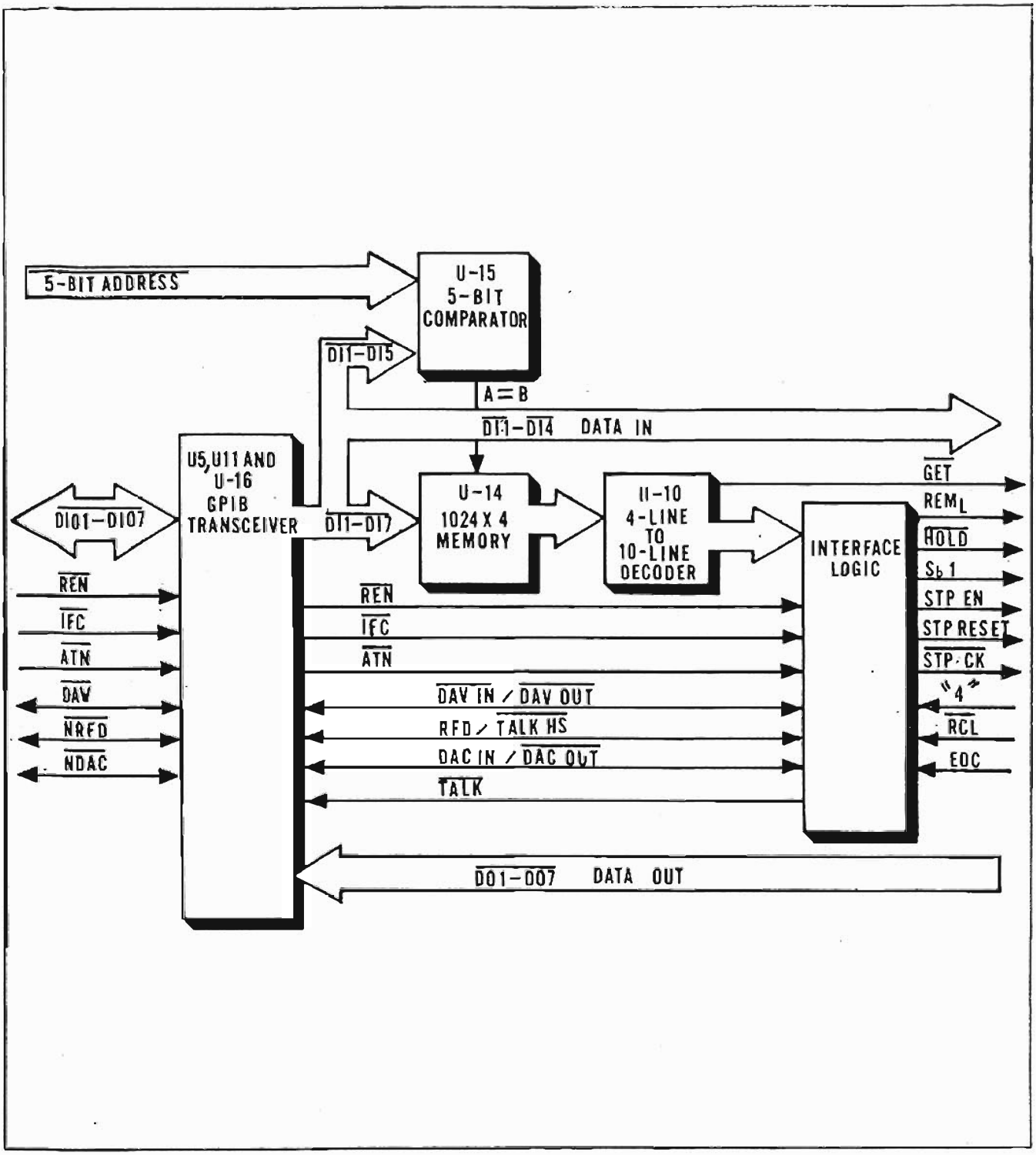

Figure 4-5. Bus Interface (A4) Block Diagram

Table 4-2.
Management Bus Functions (Cont'd)

Signal	Definition
*Service Request (SRQ)	Any devices on the bus can request the attention of the Controller by setting SRQ. The Controller could then execute a serial poll to see which device is requesting service.
Interface Clear (IFC)	The IFC signal is activated by the Controller to place all interface circuitry in a predetermined quiescent (wake-up) state.
Remote Enable (REN)	REN enables all devices on the bus to operate under remote control via messages received over the bus.
*End or Identify (EOI)	The EOI signal is used by a talker to indicate the end of a data transfer sequence. The talker activates EOI as the last byte of data is transmitted.

*These lines are terminated high on A4.

Table 4-3. Transfer Bus Functions

A handshake sequence is executed between a talker and listeners over the Transfer Bus each time a byte is transferred over the Data Bus. Transfer Bus lines are as follows:

Signal	Definition
Not Ready For Data (NRFD)	The NRFD signal indicates that one or more assigned listeners are/are not ready to receive the next data byte. When all assigned listeners have released NRFD, this tells the talker to place the next data byte on the Data Bus.
Data Valid (DAV)	The DAV line is activated by a talker after placing a data byte on the Data Bus and informs each listener to read the data byte.
Data Not Accepted (NDAC)	The NDAC line is held until each listener reads the data byte currently being transmitted over the Data Bus. When all listeners have read the data byte, the talker takes the byte off the Data Bus.

Table 4-3.
Transfer Bus Functions (Cont'd)

4-66. Address and instruction data to the Counter is input via seven of the eight data in/out lines. DIO8 is terminated high on A4, which represents a 0 on the interface bus. When used in a system, the Counter is assigned a 5-bit address. The appropriate address is entered via slide switches S4-S8 on the rear panel. The Counter will only respond to instructions intended for its address. U15 compares the address on the bus (DIO1-DIO5) to its assigned address. If the addresses match, U15 sends a high ADD COMP (address compares) to U14.

4-67. U14 is a 1024 x 4 PROM, whose 10-bit address input consists of DIO1-DIO7, $\overline{ATN}$, ADD COMP and $\overline{MLA}_L$. Unrecognized or invalid input addresses generate a 0000 output from U14. U10 decodes the 4-bit input and generates a low on 1 of its 9 output lines. U10 outputs are defined as follows:

0 = $\overline{GTL}$ = Go To Local
1 = $\overline{GET}$ = Groups Execute Trigger
2 = $\overline{SPE}$ = Serial Poll Enable
3 = $\overline{SPD}$ = Serial Poll Disable
4 = $\overline{UNT}$ = Untalk
5 = $\overline{UNL}$ = Unlisten
6 = $\overline{MLA}$ = My Listen Address
7 = $\overline{MTA}$ = My Talk Address

4-68. The remaining logic circuitry on A4 generates the following outputs to A5:

$\overline{HOLD}$	=	Hold (counter)
$\overline{REM_L}$	=	Remote Latch
STP EN	=	Step Enable
STP RESET	=	Step Reset
Sb1	=	Status Bit 1
$\overline{STP\ CK}$	=	Step Clock

4-69. Outputs from the Counter to the interface bus are encoded on the A5 Assembly and routed onto the bus via the $\overline{D01}$-$\overline{D07}$ inputs to the bus transceiver (U5,U11,U16). $\overline{TALK}$ must be low to transfer data onto the bus.

4-70. A5, Counter Interface PC Assembly (Option 05)

4-71. The optional IEEE-488 systems interface, consisting of plug-in Assemblies A4 and A5, interface connector and program/address switches S4 -S9. Refer to Figure 4-6 and Schematic 08312101 for the following circuit description of the A5 Assembly.

4-72. Control inputs from the bus to to the Counter determine the Counter's Frequency and Resolution. The following truth table defines remote frequency selection:

Data Inputs D12	D11	U14 Out (Pin)	Range Selected
0	0	1	A
0	1	2	B
1	0	3	C
1	1	4	T(TEST)

4-73. The following truth table defines remote resolution selection:

Data Inputs D13	D12	D11	U13 Out (Pin)	Resolution Selected
0	0	0	1	10 kHz
0	0	1	2	10 kHz
0	1	0	3	1 kHz
0	1	1	4	100 kHz
1	0	0	5	10 Hz
1	0	1	6	1 Hz
1	1	0	7	1 Hz
1	1	1	9	1 Hz

4-74. Transferring the Counters output to the bus requires 16 8-bit bytes. Bytes 2 through 11 contain the value of digits 10^9 through 10^0 respectively. Only seven of the eight bits are generated on A5. D08 is hardwired high (equivalent to 0 on the bus) on A4.

4-75. The count, in BCD format, is loaded into U17 at memory locations determined by the $\overline{ADRS}$ input. As long as U11 pin 1 (SEL) is high, the $\overline{ADRS}$ input is routed to U17. As $\overline{ADRS}$ counts down from 1001 to 0000 the 10-digit count is loaded in U17.

4-76. After loading the count into U17, U11 is switched to its A input by a low on pin 1. Counter U12 is initially loaded with 0000. The $\overline{STP\ CK}$ (Step Clock) input to U12 increments the count, which increments the address input to U17. Since $\overline{WE}$ (Write Enable) is now high, each memory location addressed by U12 is read onto the bus.

4-77. A6, Timebase Logic PC Assembly

4-78. Refer to Figure 4-7 and Schematic 08312001 for the following discussion. Timebase Logic Assembly A6 generates the START and STOP control signals that determine the Counter's gate time. Since gate time effects Counter accuracy, START and STOP are derived from a known frequency standard. Assembly A6 also generates a precise 1 MHz test frequency, used to condfidence check the Counter circuitry. Gate time and the decimal point position in the display are a function of

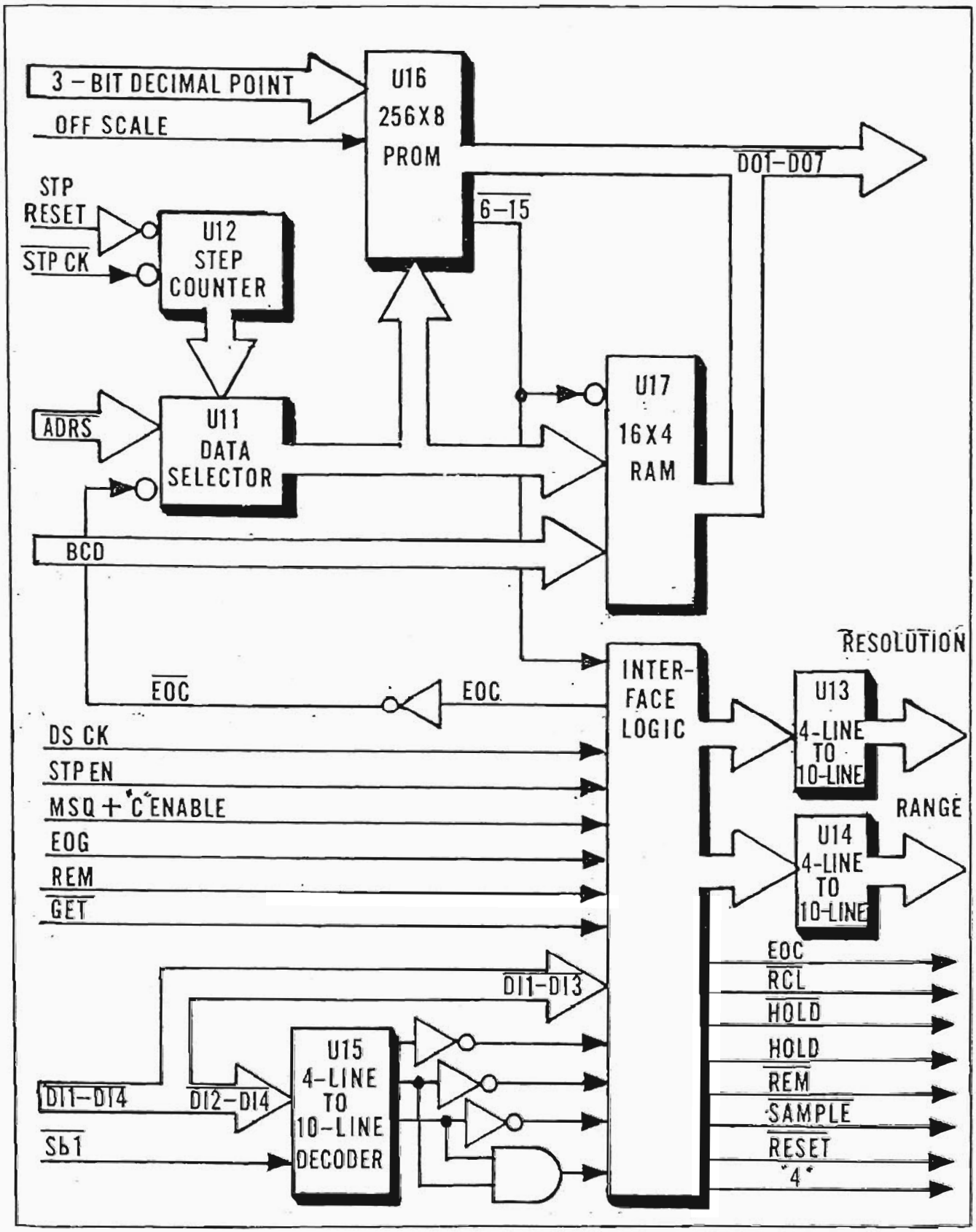

Figure 4-6. Counter Interface (A5) Block Diagram

the resolution selected by the operator. Assembly A6 provides a 3-bit output to Assemblies A5 and A8 that defines the decimal point position.

4-79. All timing outputs from Assembly A6 are derived from a known frequency standard. The operator may select either the INT (internal) or an EXT (external) standard via S3 on the Counter's rear panel. Quad NAND gate U17 provides the switching logic that routes either the internal (10 MHz) or external (1 MHz/10 MHz) standard to U10.

4-80. The 10 MHz frequency standard input is scaled to 1 MHz by ÷10 counter U10. The 1 MHz output from U10 provides a test signal input to Assembly A7, via Q3, when the front panel TEST switch is pressed. The 1 MHz output is also routed to J105 on the rear panel, via Q2.

4-81. The frequency standard input also drives dual retriggerable monostable multivibrator U6. A 10 MHz input will constantly retrigger U6, holding its $\overline{Q}$ output at pin 4 high. This high to U11 pin 2 and 12 routes the ÷10 output of U10 to the input of U5. If a 1 MHz external standard is used, the Q output of U6 goes low. This low to U11 pins 2 and 12 isolates the output of ÷10 counter U10 and enables a bypass path around it. The net result is that a 10 MHz standard is divided by 10, while a 1 MHz standard is routed directly to U5.

4-82. The 1 MHz signal at U11 pin 6 is scaled to 100 kHz by ÷10 counter U5. This 100 kHz is routed to FLACTO Logic Assembly A10 as $\overline{TB}$. If the Counter's MODE/RESOLUTION switches are in the A IN or TEST position the 100 kHz signal is routed to the five BCD counters; U7, U1 and U12. However, if B IN is selected at the front panel, the 100 kHz is scaled to 25 kHz by ÷4 counter U4. The timebase is extended by x4 to compensate for the ÷4 scaling of the B INPUT signal on the 512 MHz Prescaler Assembly A9. When C IN is selected, the gate time is extended xN.

4-83. Gate time is determined by the $\overline{START}$ and STOP outputs of U14. The measurement period begins on the 1st negative transition of $\overline{START}$ and runs until the next positive transition of STOP. The gate time is a function of which of the ÷10 counter outputs are selected by U13. Assuming a 100 kHz input to U7 pin 1, the ÷10 counter outputs are:

U7 pin 6	10 kHz/100 µs
U7 pin 14	1 kHz/1 ms
U1 pin 14	100 Hz/10 ms
U1 pin 6	10 Hz/100 ms
U12 pin 6	1 Hz/1 sec

4-84. When the Counter's B INPUT is selected, the 25 kHz at U7 pin 1 generates the folowing 10 Counter outputs:

U7 pin 6	2.5 kHz/400 µs
U7 pin 14	250 Hz/4 ms
U1 pin 14	25 Hz/40 ms
U1 pin 6	2.5 Hz/400 ms
U12 pin 6	.25 Hz/4 sec

4-85. Eight-channel data selector U13 selects one of the five 10 counter outputs, depending on which one of the five MODE/RESOLUTION pushbuttons is pressed on the front panel. The RESOLUTION switch inputs are encoded by U14 and U15. The encoded output is:

RESOLUTION	C	B	A
10 kHz	0	1	0
1 kHz	0	1	1
100 Hz	1	0	0
10 Hz	1	0	1
1 Hz	1	1	0

4-86. The end of gate time occurs on the next positive transition of STOP. STOP is already high because of the low out of U12 pin 11, the result of reset following the previous gate period. When the selected gate period times out, the negative going output from U13 drives U12 pin 11 high. The next positive transition of $\overline{START}$ (running at 100 kHz)

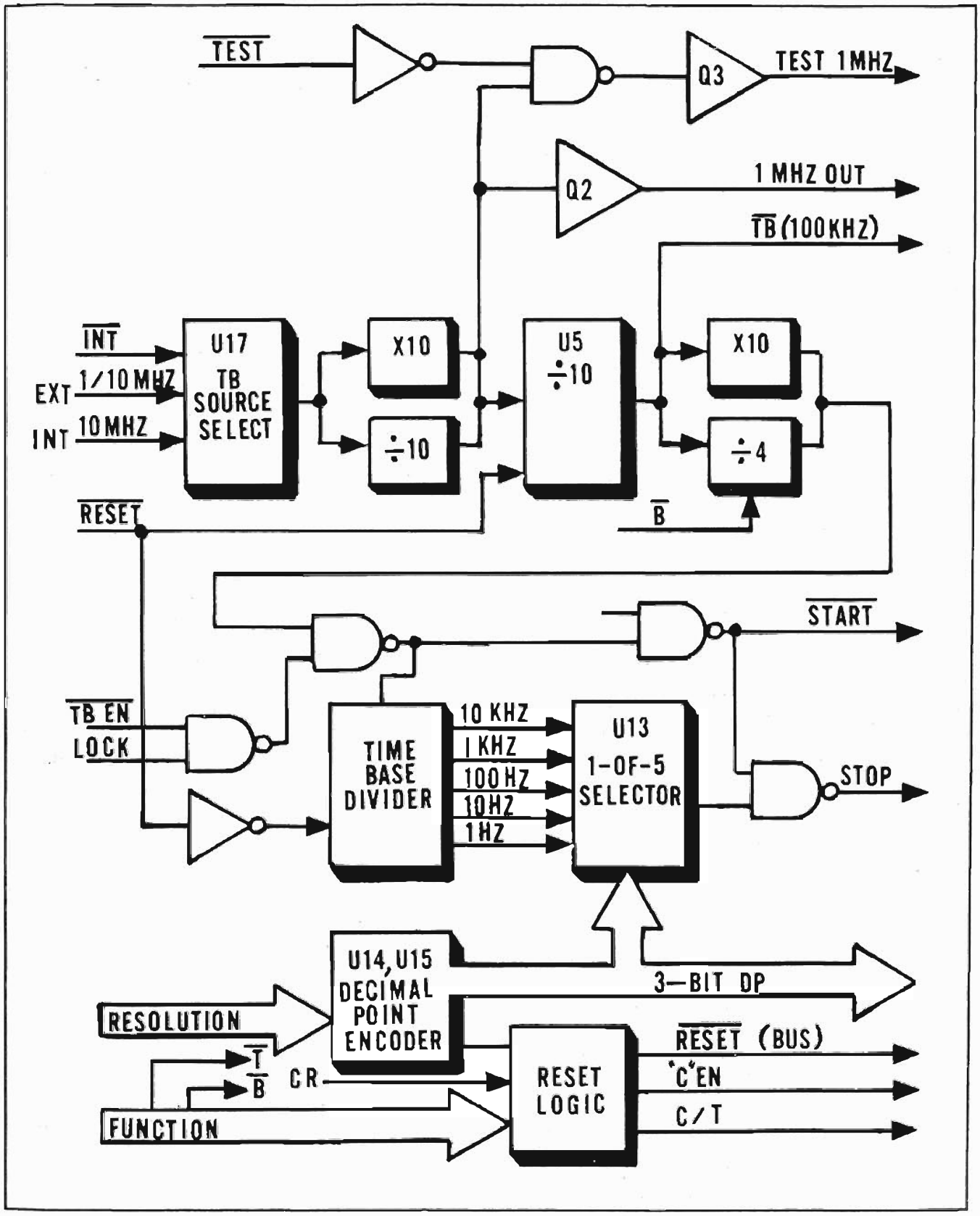

Figure 4-7. Timebase Logic (A6) Block Diagram

causes STOP to go low. After 5 μs (1/2 cycle at 100 kHz) the negative transition of START causes STOP to go high again. It is this positive going transition of STOP that determines the end of gate time.

4-87. The 3-bit resolution code driving data selector U13 is also sent to Assembly A8, where it determines the decimal point position within the display.

4-88. Reset multivibrator U8 outputs a low RESET to Counter Logic Assembly A7 whenever any of the MODE/RESOLUTION pushbutton selections are changed by the operator.

4-89. A7, Counter Logic PC Assembly

4-90. Refer to Figure 4-8 and Schematic 06760101 for the following discussion. Signal selection and gating is provided by U15. One of four input signals (A SIG, B SIG, C SIG or TEST) is selected for counting, depending on which front panel MODE/RESOLUTION pushbutton is pressed. U15 passes the selected signal to the counting circuitry only during gate time. Gate time is defined by the START and STOP inputs to dual flip-flops U5. The QA (pin 2) output of U5 goes high at START time, enabling U15. The QB (pin 15) output of U5 goes high at STOP time and disables U15 holding its output low. Resetting U5 causes the output of U15 to go high until the next START input.

4-91. The gated output of U15 is sent to BCD counters U8 and U12. Since U8 is a high speed ECL device, U14 is required to translate logic levels to TTL for the following circuitry. U12 is incremented one count for every 10 counts into U8. The output of these two BCD counters provide the instantaneous value of the two least significant digits of the 10-digit count (10^0 and 10^1).

4-92. The Q_C and Q_D outputs of U12 are ORed by U1 and sent to Display Logic Assembly A8 as CK IN (Clock In). Each CK IN represents 100 cycles of the selected input frequency. The squarewave output at U1 pin 11 is high for 50 cycles and low for 50 cycles of the input frequency. Each negative transition of CK IN increments the Counter on A8 by 100.

4-93. At the end of gate time STORE is sent to A8 to load its counter. RESET is sent to the A6, A8 and A10 Assemblies to reset appropriate circuity for the next count. EOG (End-of-Gate) is sent to the optional A5 Assembly (Option 05) to reset it for the next count.

4-94. A8, Display Logic PC Assembly

4-95. Refer to Figure 4-9 and Schematic 06769401 for the following discussion. Display Logic Assembly A8 provides time multiplexed LED drive to the Display Assembly A2, (part of the Front Panel Assembly). Display information is routed to the front panel via A8-J1 and a 26-line ribbon cable. The BCD equivalent of the display information is time multiplexed and routed to the optional IEEE-488 Interface Assembies, A4 and A5.

4-96. Inputs to the A8 Assembly include frequency information and control from Counter Logic Assembly A7, and decimal point data from Timebase Assembly A6. Frequency information is applied to the A8 Assembly in two formats. The two LSDs (10^1 and 10^0) are in BCD format, and are latched via U10. The remaining eight digits (10^9 through 10^2) of the 10-digit display are derived by counting the negative transitions of CK IN (Clock In) with counter U7.

4-97. The frequency to be displayed is accumulated during gate on time. Prior to gate time, counter U7 is reset to zero and the BCD inputs to latch U10 are zero. Counter U7 is an eight decade up counter that increments one count for each negative transition of CK IN occuring during gate time. At the end of gate time STORE goes low and latches the accumulated count in U7 and U10.

4-98. The accumulated 10-digit count is read out of U7 and U10 at a scan rate

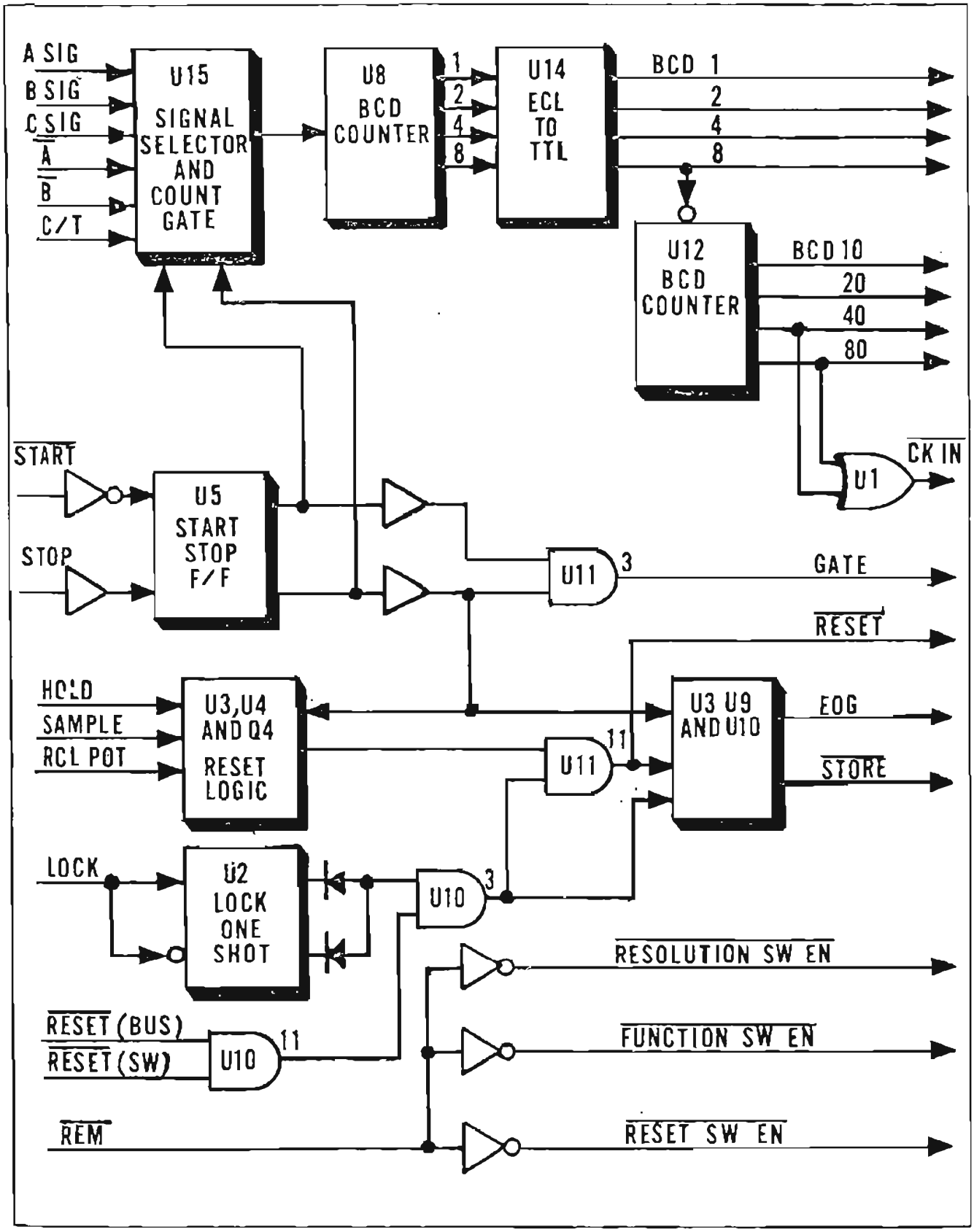

Figure 4-8. Counter Logic (A7) Block Diagram

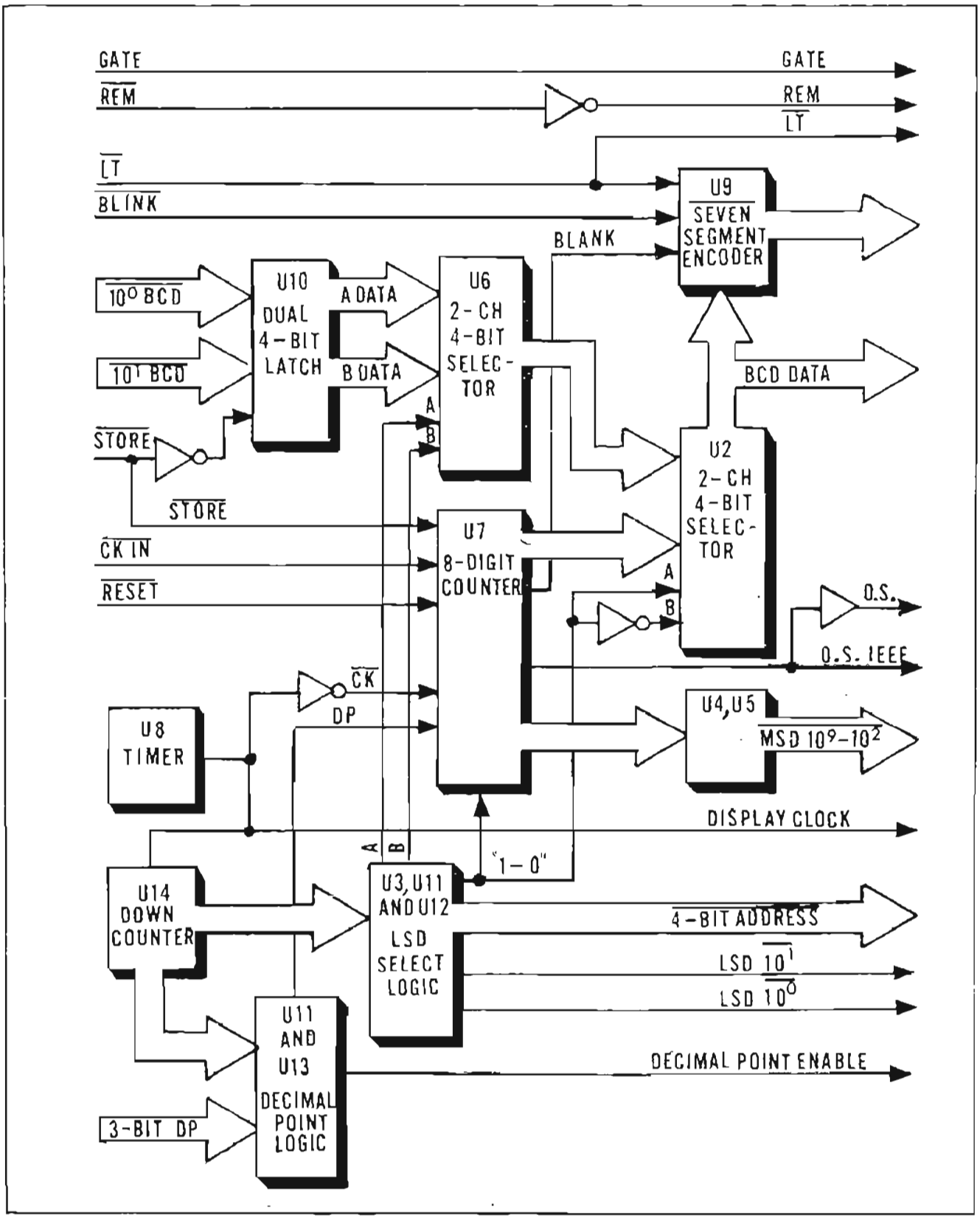

Figure 4-9. Display Logic (A8) Block Diagram

determined by timer U8. The scan direction is from the MSD (10^9) towards the LSD (10^0). Data selectors U2 and U6 route the appropriate BCD data to seven-segment decoder U9.

4-99. The scan sequence is controlled by BCD up/down counter U14. U14 is hardwired to count down, 1001 to 0000. Counts 1001 and 0000 correspond to the eight MSDs of the 10-digit display. During these eight counts the output of U11 pin 10 is low. Inverter U5 applies a high to the B select input of U2, and the BCD output of counter U7 is routed to seven-segment decoder U9.

4-100. When U14 decrements to 0001, the output of U11 pin 10 goes high, switching U2 to its A inputs. At the same time the output of U3 pin 11 is high, switching U6 to its B inputs. Under these conditions the BCD representation of the 10^1 digit is routed to U9. On the count of 0000 U3 pin 10 goes high, switching U6 to its A inputs. This routes the LSD 10^0, to U9. The next count out of U14 is 1001, and a new scan cycle is initiated.

4-101. The BCD form of each digit is converted to seven-segment LED format by U9. Segments to be lit are driven by a low out of U9.

4-102. Display multiplexing is implemented by scanning the 10-digit display from left to right, MSD to LSD. Only one of the ten LEDs is enabled at any given time. The eight MSD digits are enabled sequentially by the DS7 through DS0 outputs of counter U7. The two LSD digits are enabled by U3 pin 11 and U3 pin 10, corresponding to U14 counts of 0001 and 0000. A low out at the appropriate pin of J1 (8 through 18) is required to enable the selected LED.

4-103. The decimal point position in the display is determined by the resolution selected at the front panel (or via the IEEE-488 interface). As greater resolution is selected, the decimal point moves to the left on the display. Decimal point position data is generated by Timebase Logic Assembly A6, and input to the A8 Assembly via pins 19, 18 and 17, respectively. Pin 19 is the MSB (most significant bit) of the decimal position code. The following position codes are generated for the five resolution steps:

10 kHz	=	010
1 kHz	=	011
100 Hz	=	100
10 Hz	=	101
1 Hz	=	110

4-104. The decimal point is enabled on the display when U11 pin 9 goes high. This occurs when the count out of U14 corresponds to the 3-digit position input from the A6 Assembly. The decimal point position for the five resolution steps are:

Resolution =

10 kHz	-	-	-	G	G	M	M	M.	k	k
1 kHz	-	-	G	G	M	M	M.	k	k	k
100 Hz	-	G	G	M	M	M.	k	k	k	H
10 Hz	G	G	M	M	M.	k	k	k	H	H
1 Hz	G	M	M	M.	k	k	k	H	H	H

4-105. It is possible to count a frequency that exceeds the range of the display. This occurs when 1 Hz resolution is selected and the count exceeds 10 GHz. When this occurs the overflow output of counter U7 goes high, lighting the O.S. (Off Scale) indicator on the front panel. Conversely, leading zeros are suppressed by internal logic on counter U7.

4-106. A lamp test function is operable from the rear panel. When LAMP TEST is pressed, the low (ground) at U9 pin 3 causes all segments to light, displaying a series of "8"s.

4-107. The $\overline{\text{BLINK}}$ input to U9 is from the level detection circuit on FLACTO Logic Assembly A10. When the signal level at the C INPUT to the counter exceeds +20 dBm, the display blinks to warn the operator.

4-108. The GATE indicator is illuminated on the display during gate on time. Assembly A8 provides a jumper for this signal. The REM (Remote) indicator is illuminated when the IEEE-488 interface has control of the Counter. Assembly A8 inverts this sigal via U5.

4-109. If Option 05 is installed, the display data is also sent to the Interface Bus via Assemblies A4 and A5. The BCD output of U2 provides the digit value to the interface. The inverted output of U14 provides the scanning to the interface. As explained above, the scan format is from the MSD (10^9) towards the LSD (10^0). Timer U8 provides the display clock for the interface.

4-110. A10, FLACTO Logic PC Assembly

4-111. Refer to Figure 4-10 and Schematic 06759901 for the following discussion. FLACTO Logic Assembly A10 computes the local oscillator harmonic (N) being mixed with the C INPUT signal. Once N is computed, it is used to extend the gate time and scale the IF input, such that the C SIG output of A10 is an exact submultiple of C INPUT.

4-112. The value of N is embedded in the 1 kHz x N input from A12. This input can have a range of 5 to 225 kHz, corresponding to N=5 to N=255. The 1 kHz x N input is gated through ÷16 counter U19 by a 16 ms enable gate. The count out of U19 is accumulated by N counter U17, which stores N for the following operations.

4-113. A ÷N counter, consisting of U9 and U16, extends measurement gate time x N. The 100 kHz TB input from A6 is counted down by N and sent back to A6 as TB EN. N COMP (N Computed) must be high to enable the TB EN output. The net result is that gate time (defined by START and STOP) out of A6 is multiplied by N.

4-114. A second ÷N counter, consisting of U14 and U15, divides the IF input by N and subtracts this quantity (IF/N) from the LO input. Since the C INPUT frequency is equal to (LO xN)-IF, C SIG is equal to LO -(IF/N). The C SIG output is then counted by Assembly A7.

4-115. A sample of the C INPUT signal level is used to generate a visual overload alarm. If the LEV VOLTS input exceeds a preset threshold (+20 dBm) U22 enables timer U24, which then blinks the front panel display. The threshold point is adjusted by A10R18 (LEV ADJ).

4-116. A11, Local Oscillator/Shifter PC Assembly

4-117. Refer to Figure 4-11 and Schematic 06759801 for the following discussion. The A11 Assembly generates two local oscillator outputs, LLO and NLO, to samplers L and N. LLO is the mixer input to sampler L, part of the lock channel. NLO is the mixer input to sampler N, part of the N (harmonic) computing channel. The frequency range of the LLO output is 85-105 MHz. NLO always tracks 1 kHz higher than LLO.

4-118. The A11 Assembly operates in either swept or locked mode. Prior to acquisition of a C INPUT signal, a ramp generator sweeps the local oscillator from high to low (105-85 MHz). Harmonics of the swept local oscillator (LLO) mix with the C INPUT signal, generating a swept LIF output from the Sampler. As the optimum mixing frequency is approached, the discriminator (DISC) input to A11 over-rides the ramp and locks A11 on frequency. If the frequency lock is lost, A11 reverts to the swept mode to reacquire the signal.

4-119. The local oscillator output is shifted +1 kHz by U6 and U7 and sent to the N Sampler as NLO. this 1 kHz offset is the key to computing the harmonic (N) of the local oscillator. After N has been computed, the N COMP input from A10 disables the NLO output.

4-120. The LO and LLO outputs from A11 are on the same frequency. The LO output

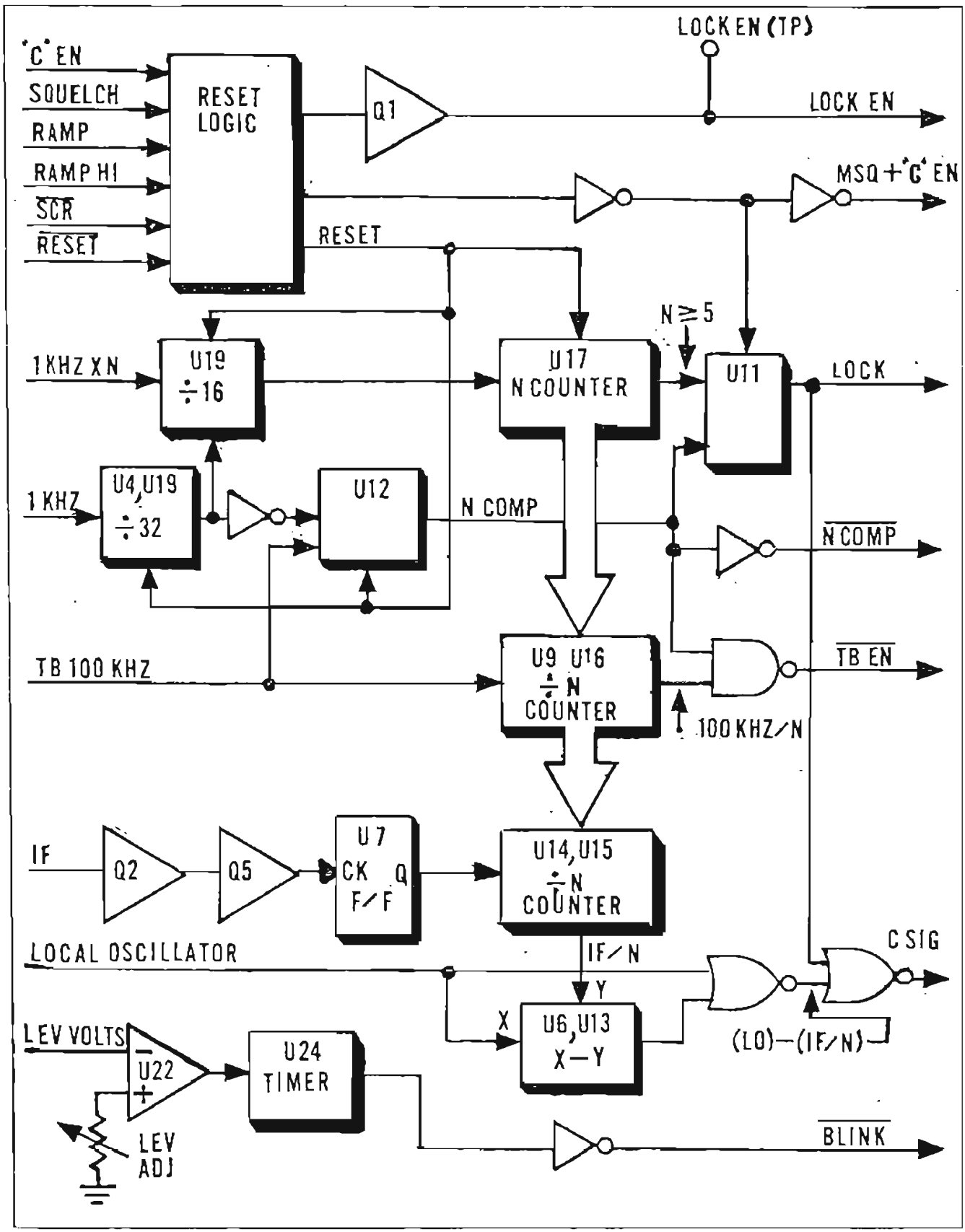

Figure 4-10. FLACTO Logic (A10) Block Diagram

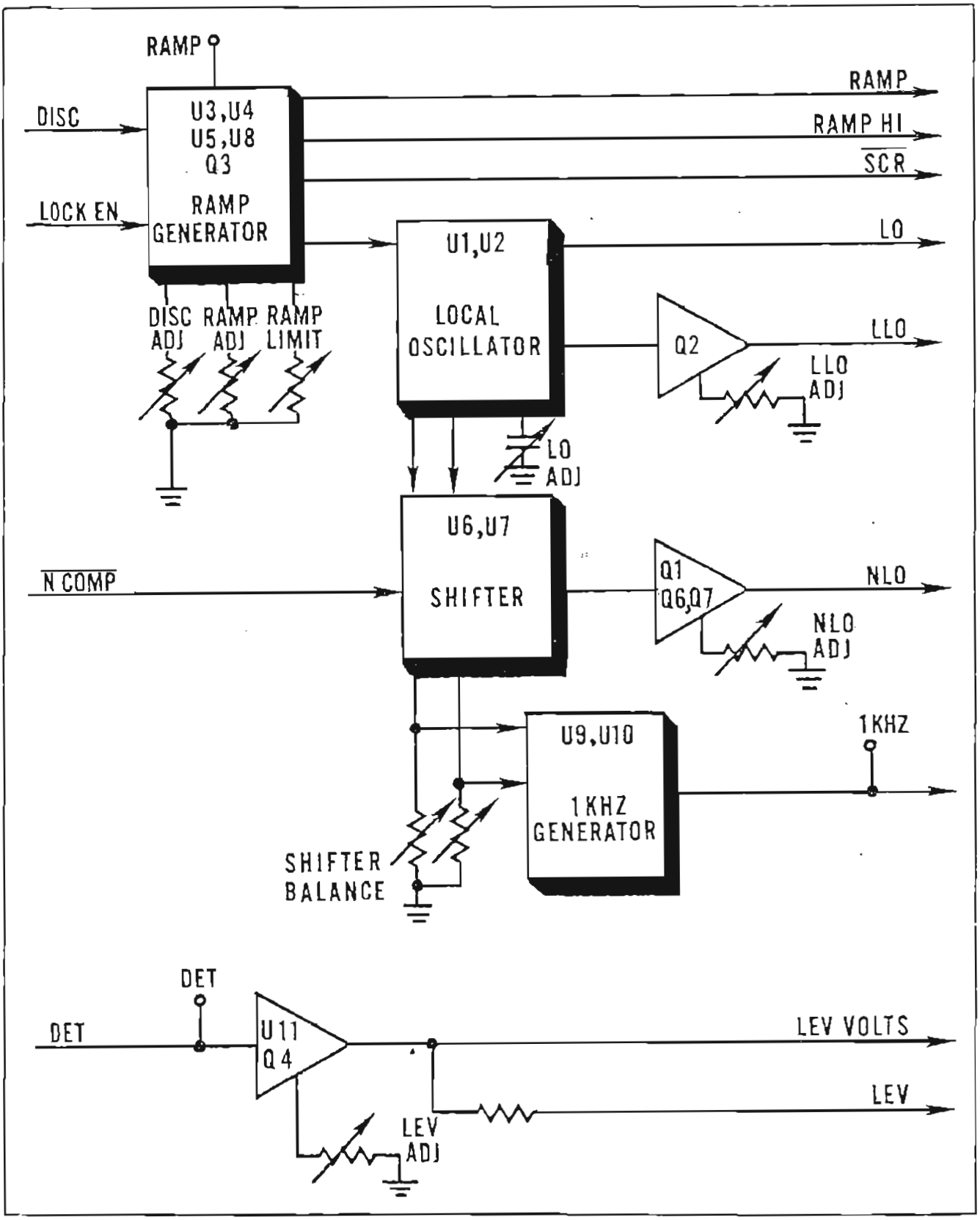

Figure 4-11. Local Oscillator/Shifter (A11) Block Diagram

is sent to A10 where IF/N is subtracted from it. therefore, LO - (IF/N) = C SIG, an exact subharmonic of the C INPUT.

4-121. Leveling for the C INPUT channel is provided by U11 and Q4. The detector output of the divider/detector (part of U4) provides a sample of the C INPUT power level to comparator U11. R72 sets the reference input to U11. If the C INPUT signal level exceeds the preset level, U11 turns Q4 on. The negative going collector output of Q4 is fed back (via R77) to PIN leveler (part of U4) as level control (LEV). As the C INPUT signal level increases past the reference level, the negative going LEV output increases the attenuation of the PIN leveler, holding C INPUT within a preset power range. The LEV VOLTS output from Q4 is sent to A10, where it generates a BLINK output to Display Logic Assembly A8 when the C INPUT exceeds +20 dBm.

4-122. A12, LIF/NIF PC Assembly

4-123. Refer to Figure 4-12 and Schematic 06759701 for the following discussion. Assembly A12 processes the IF outputs from the L and N Samplers. Prior to acquisition, the LIF input to discriminator U1 will be sweeeping. As the optimum mixing frequency is approached, the LIF input to U1 generates a DISC output to A11. The DISC output over-rides the ramp generator on A11 and switches the local oscillator from the swept mode to the locked mode.

4-124. The pin 10 output from discriminator U1 is detected and applied to the inverting input of U2. The squelch (SQ) output from U2 provides an enabling input to A10. The squelch threshold is adjusted via R15. If a frequency lock has occured, IF out at the collector of Q5 will be within 1-13 MHz. The IF output is sent to A10, where it is divided by N and subtracted from LO.

4-125. The NIF and LIF input frequencies are compared by IF amplifier and quadrature detector U4. The output frequency at pin 1 of U4 is 1 kHz x N. That is, if the output of U4 is 160 kHz, N= 160. The 1 kHz x N output is sent to A10 where a counter solves for N. Since N must be ≥ 5 but ≤ 255, the output of U4 will be ≥ 5 by ≤ 255 kHz.

4-126. A13, Timebase Oscillator Assembly

4-127. Assembly A13 provides a stable 10 MHz output from which other timing waveforms are derived. The Counters accuracy can be upgraded by substituting Option 13 in place of the standard A13 Assembly.

4-129. Block Diagram 08312901 shows the applicable connections to A13 and Option 13. Option 13 is a high-stability oscillator with integral ovens.

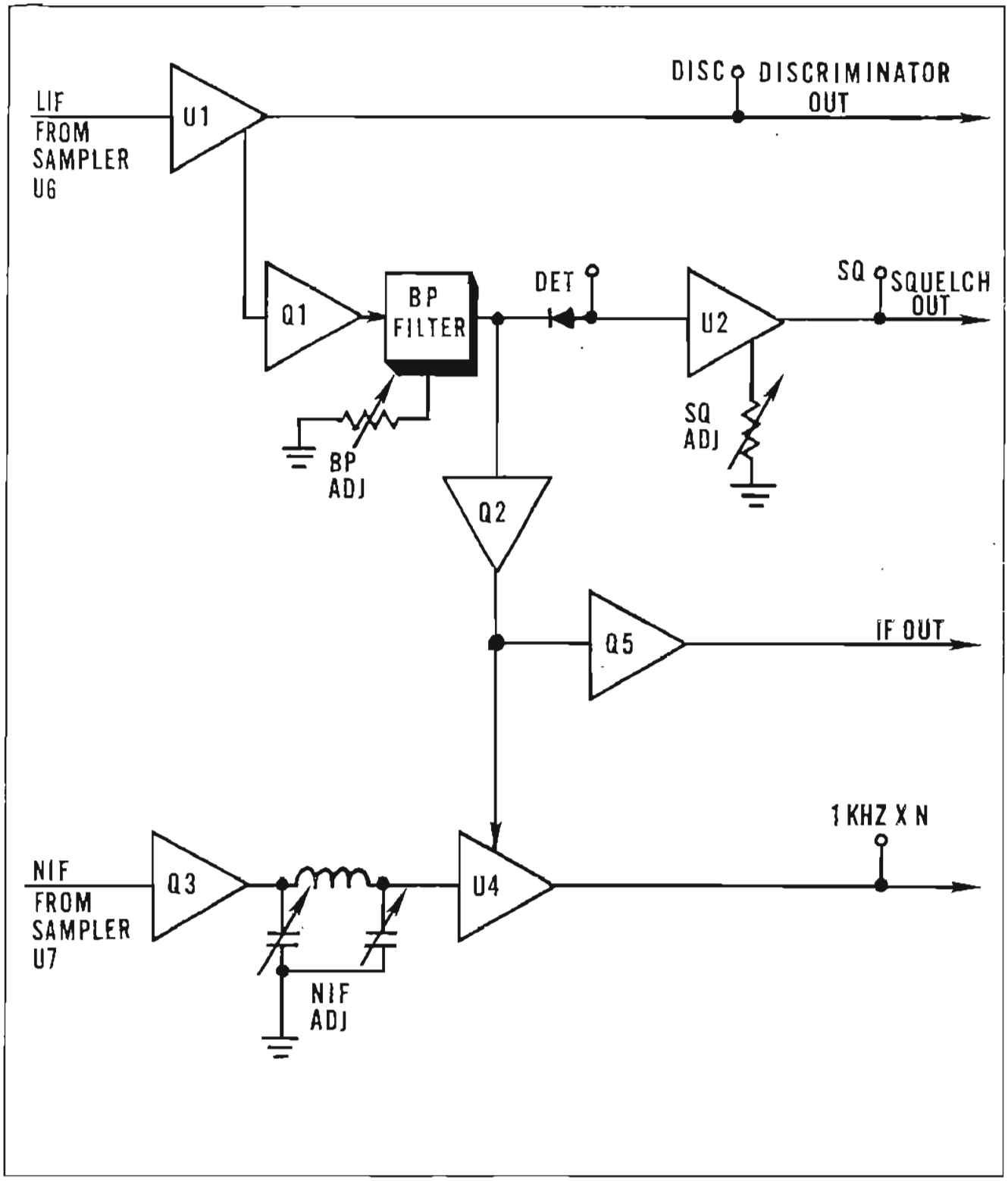

Figure 4-12. LIF/NIF (A12) Block Diagram

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CHAPTER 5

MAINTENANCE

5-1. INTRODUCTION

5-2. This chapter contains alignment/adjustment procedures for the 6245B/6246B Microwave Frequency Counters.

5-3. TEST EQUIPMENT REQUIRED

5-4. Table 5-1 lists the recommended test equipment required to align and troubleshoot the 6245B/6246B Counters.

Table 5-1. Recommended Test Equipment

Type	Critical Specifications	Recommended Model
1. Digital Multimeter	±0.1%, ac,dc	SD 7141A
2. Frequency Standard		General Tech 304B
3. Frequency Synthesizer	2.0 GHz - 26.0 GHz	SD 1600 Series
4. Oscilloscope	100 MHz Bandwidth 0.1 µsec sweep	Tektronix 7704
5. Power Amplifier	+20 dBm Output at 500 MHz	EIN503L
6. Power Meter	+20 dBm	Boonton 920
7. Signal Generator	10 Hz - 10 MHz	HP651B
8. Signal Generator	100 Hz - 1 GHz	SD 1702
9. Signal Generator	2 GHz - 18 GHz	SD 540B W/527A-17 plug in
10. Signal Generator	18 GHz - 26 GHz	SD 504B W/570 plug-in adapter and 5018 plug-in or HP 938A W/ HP 626A.
11. Sweep Generator	20 MHz - 1400 MHz	Wavetek 2001, or SD 540B W/5008-1 plug-in.

5-5. The following denotes typical power supply resistance readings with reference to chassis ground.

L or N to Ground (AC Connector)	>10 MΩ
L to N (AC Connector)	Approximately 14 Ω
+8 V to Ground	>1 kΩ
-8 V to Ground	Approximately 475 Ω
+18 V to Ground	>1 kΩ
-18 V to Ground	Approximately 500 Ω
+5 V to Ground	>200 Ω
-5.2 V to Ground	Approximately 50 Ω
+15 V to Ground	1-2 kΩ
-7.2 V to Ground	Approximately 500 Ω

5-6. PERFORMANCE TEST PROCEDURES

5-7. The performance test procedures provide verification of specifications and proper operation of the Counters. This procedure may be utilized for incoming inspection and troubleshooting.

5-8. Instrument Self Test

5-9. The following procedure performs an operational self test which includes timebase, resolution, count chain and display circuitry using the internal reference oscillator as a signal source. No special test equipment is required for this test.

Set Counter controls:

OFF/STBY ON switch to ON.

TEST switch to engage.

MODE/RESOLUTION successively press to engage each switch and observe display for following readout.

10 kHz . . .	1.00
1 kHz . . .	1.000
100 Hz . . .	1.0000
10 Hz . . .	1.00000
1 Hz . . .	1.000000

RESET	Press to reset the instrument.
RECYCLE RATE	With resolution set to 10 kHz observe the GATE LED and rotate the control from MAX to HOLD. Note that the GATE LED off time increases as the control is rotated CCW.
HOLD	Specifications: Continuously variable from 50 ms to 5 s plus HOLD. Rotate the RECYCLE RATE control to the HOLD detente. Press RESET and observe that GATE LED illumnates only once.
LAMP TEST (rear panel)	Press and hold to test the 10-digit display, GATE, O.S. and REM indicators. All 10-digits will indicate an "8" with all decimal points GATE, O.S. and REM LEDs illuminated.

5-10. If the Counter fails any of the above steps repair may be required.

5-11. A Input Test

5-12. The following procedure performs an operational check of the 20 Hz to 100 MHz A Input. Signal generators numbered (7) and (8) from Table 5-1 are required for these tests.

Procedure:	Measure low frequency inputs from 20 Hz to 100 MHz at 25 mV rms.
Specifications:	
Range:	10 Hz to 100 MHz.
Sensitivity:	25 mV rms.
Impedance:	1 M/25 pF.
Coupling:	ac.
Input Connector:	BNC female.
Accuracy:	±1 count ±time base accuracy.
Maximum Input:	250 V rms, 10 Hz to 10 kHz. 50 V rms, 10 kHz to 2 MHz. 5 V rms, 2 MHz to 100 MHz.

Set the Counter Controls as follows:

Set ON OFF/STBY switch to ON.

Press A IN frequency range switch.

Select MODE/RESOLUTION switch as required.

Adjust RECYCLE RATE to desired sample rate.

Set INT/EXT T.B. switch to INT.

5-13. Connect Signal Generator (7) to A Input BNC connector with 50 Ω termination at the Counter end. Adjust signal generator for a 25 mV rms output level. While observing the display, vary the signal generator frequency output 10 Hz through 10 MHz, maintaining 25 mV rms output level. Repeat procedure above using 100 Hz to 1 GHz signal generator (8) from 10 MHz to 100 MHz at 25 mV rms output level. The Counter should display all frequencies.

5-14. B Input Test

5-15. The following procedure performs an operational check of the 100 MHz to 512 MHz B Input. Sweep generator (11) listed in Table 5-1 may be used for this test.

Procedure:	Measure intermediate frequency inputs from 100 MHz to 512 MHz at -25 dBm.
Specifications:	
Range:	100 MHz to 512 MHz.
Sensitivity:	-25 dBm.
Inpedance:	50 Ω nominal.
Coupling:	ac.
Input Connector:	BNC female
Maximum Input:	+27 dBm, fuse protected.
Operative Dynamic Range:	52 dB.
Accuracy:	±1 count ±time base accuracy.

Set Counter controls as follows:

Set ON OFF/STBY switch to ON.

Press B IN frequency range switch.

Select MODE/RESOLUTION switch as required.

Adjust RECYCLE RATE to desired sample rate.

Set INT/EXT T.B. switch to INT.

5-16. Connect sweep signal generator (11) to B Input BNC connector. Adjust signal generator for -25 dBm output level. While observing the display set the signal generator frequency output to sweep from 100 MHz to 512 MHz while maintaining a -25 dBm output level. The Counter should display all frequencies.

5-17. If the Counter fails any of the above steps, repair may be required.

5-18. C Input Test

5-19. The following procedure performs an operational check of the 500 MHz to 18 GHz (6245B) or 500 MHz to 26.5 GHz (6246B) C Input. Signal Generators (9), (10) and (11) listed in Table 5-1 may be used for this test.

Procedure:	Measure high frequency input signals, 500 MHz to 12.4 GHz at -25 dBm; 12.4 GHz to 20 GHz at -20 dBm; 18 GHz to 26.5 GHz at -15 dBm.
Specifications:	
Range:	500 MHz to 18 GHz (6245B); 500 MHz to 26.5 GHz (6246B)
Sensitivity:	-25 dBm 500 MHz to 12.4 GHz. -20 dBm 12.4 GHz to 20 GHz. -15 dBm 20 GHz to 26.5 GHz.
Impedance:	50 Ω nominal.

Coupling:	ac.
Kick Back Noise:	-65 dBm typical.
Connector:	Type N female (6245B) Type SMA (6246B)
Maximum Usable Input:	+20 dBm prior to acquisition. +27 dBm after acquisition.
Maximum Input Without damage:	+30 dBm.
Operative Dynamic Range:	52 dB to 12.4 GHz. 47 dB to 20 GHz. 42 dB to 26.5 GHz.
Acquisition Time:	<60 ms +(1/RXN) N = Input frequency ÷100 MHz.
Amplitude Discrimination of two frequencies:	20 dB amplitude separation (10 dB typical)
AM Tolerance:	Any modulation index provided the minimum voltage of the signal is not less than the specified sensitivity.
FM Tolerance:	Frequency and rate dependent, typically >100 MHz (p-p) at rates to 10 kHz, decreasing to >10 MHz at 10 MHz rate.
VSWR:	<2:1 to 10 GHz. <2.5:1 to 20 GHz. <3:1 to 26.5 GHz.
Accuracy:	±2 counts ±time base accuracy.

Set Counter controls as follows:

Set ON OFF/STBY switch to ON.
Press C IN frequency range switch.
Select MODE/RESOLUTION switch as required.
Adjust RECYCLE RATE to desired sample rate.
Set INT/EXT T.B. switch to INT.

5-20. Connect 20 MHz to 1400 MHz sweep generator (11) to C INPUT connector. Apply 500 MHz to 1400 MHz while maintaining minimum signal level output of -25 dBm. Apply 2 GHz to 18 GHz (9), and 18 GHz to 26.5 GHz (6246B) (10) while maintaining minimal signal output levels of -10 dBm to -25 dBm depending on frequency. Check maximum signal level of +20 dBm (+27 dBm after acquisition) at various selected frequencies. The Counter should display all frequencies. Should the input signal exceed approximately +20 dBm the display will blink to indicate a potential overload. The display will read the input frequency in MHz to the resolution selected on a maximum of 10 digits with leading zeros suppressed.

5-21. If the Counter fails any of the above steps, repair may be required.

5-22. Time Base Stability/Time Base Out

5-23. The following procedure will test short term time base reference oscillator stability for the instruments' standard TCXO (Temperature Compensated Crystal Oscillator). A frequency standard and an oscilloscope as listed in Table 5-1 are required to perform this test.

Procedure:	Measure the reference 1 MHz oscillator out on an oscilloscope synced to a frequency standard.
Specifications:	
Crystal Frequency:	10 MHz, TCXO
Stability:	Aging per month ±3 x 10^{-7}.
Temperature:	±1 x 10^{-6} over 0°C to 50°C range.
Line Variation:	±5 x 10^{-8} for ±10%.
Time Base Output:	1 MHz OUT (rear panel)
External Time Base Input:	1 MHz to 10 MHz. 1 V rms into 500 Ω.

Set Counter controls as follows

Set ON OFF/STBY switch to ON.

INT/EXT T.B. switch to INT.

5-24. Connect frequency standard to oscilloscope External Trigger. Connect Counters' 1 MHz OUT to oscilloscope and observe the oscilloscope sweep. Adjust for stable oscilloscope triggering and observe the rate of change. The aging rate per day is 1×10^{-8}. A 1 cm/s drift indicates an error of 1 part in 10^{-8} (0.01 PPM).

5-25. If the Counter fails any of the above steps, repair may be required.

5-26. **External Time Base Test**

5-27. The following procedure will test the intruments' ability to accept either an 1 MHz or 10 MHz External Time Base Input.

Procedure:	Observe that unit gates with an external time bae of 1 MHz and 10 MHz at approximately 1 V rms.
Specifications:	
External Time Base Input:	1 MHz or 10 MHz. 1 V rms into 500 Ω.

Set Counter controls as follows:

Set ON OFF/STBY switch to ON.

Press Instrument TEST.

INT/EXT T.B. switch to EXT.

Select 100 Hz MODE/RESOLUTION.

5-28. With instrument TEST engaged and T.B. switch to EXT, observe that unit does not gate. Inject a 1 MHz, then a 10 MHz signal at approximately 1 V rms into the External Time Base Input and observe that the unit gates.

5-29. If the Counter fails either of these steps, repair may be required.

5-30. **Data Interface Option 05 Test**

5-31. The following procedure is used to test the GPIB (General Purpose Interface Bus) interface circuits. Prior to initiating GPIB tests, ensure that the instrument is fully functional by itself. A controller that is IEEE STD-488 compatible and signal generators as listed in Table 5-1 are required for these tests.

Procedure:	Perform a functional check of the Counter while connected to the GPIB and set to Remote mode of operation.
Specifications:	For all electrical, mechanical and timing requirements, refer to IEEE-488 1978.

Set Counter controls as follows:

ON OFF/STBY switch to OFF.

INT/EXT T.B. switch to INT.

PROG/TALK ONLY slide switch (rear panel) to PROG.

Set ADDRESS slide switches (rear panel) to the address assigned to the Counter.

5-32. Connect a suitable IEEE-488 Controller via Interconnect Cable to standard 24-pin connector J106 on rear panel of unit under test. Connect appropriate signal generators to selected A, B and C inputs.

5-33. Set ON OFF/STBY switch to ON. With power applied to the Counter, IEEE circuits "wake-up" to the following conditions:

Test Mode selected.
Resolution is 1 Hz.
Recycle control function selected.

5-34. Verify the operation of the GPIB by performing the procedures as outlined in paragraph 3-49 for all functions listed in Table 3-6, also referring to data output format of Table 3-7.

5-35. If the Counter fails any of the above steps, repair may be required.

5-36. ALIGNMENT PROCEDURES

5-37. The following procedures describe the alignment/adjustment of the 6245B/6246B Counters.

5-38. If a particular alignment/adjustment does not meet the parameters specified in Tables 5-2 through 5-4, repair may be necessary.

Table 5-2. Local Oscillator/Shifter (A11) Initial Adjustments

Step	Adjust	Observe (Test Point)	Procedure
1	A11R72 LEV ADJ	A11 DET Test Point	Connect signal generator(8) to C INPUT. Set signal generator for 500-600 MHz output at -10 dBm. Connect DVM(1) to A11 DET Test Point. Adjust A11R72 for a 4 mV display. This adjustment sets the feedback to the PIN Leveler in the C INPUT Channel.
2		A10 LOCK EN Test Point	Ground A10 LOCK EN (Lock Enable) Test Point. Grounding this Test Point holds the LOCK EN output of A11 low, preventing the FLACTO circuitry from locking on the C INPUT signal.

Table 5-2. Local Oscillator/Shifter (A11) Initial Adjustments (Cont'd)

Step	Adjust	Observe (Test Point)	Procedure
		A11 RAMP Test Point	Connect scope(4) horizontal input to A11 RAMP Test Point. Set horizontal gain to 0.5 V/div. Scope sweep is now synchronized to RAMP output of A11.
3*	A11R38 A11R40 Shifter Balance		R38 and R40 are single turn potentiometers, adjust each to its center position.
4*	A11R36 LLO ADJ	A12 DET Test Point	Set signal generator(8) for 500-600 MHz output at -35 dBm. Connect scope probe to A12 DET Test Point. Set vertical gain to 0.2 V/div. Adjust A11C15,R14 and R36 for even beats (see figure 5.1).
5*	A11R83 NLO	A12 1 kHz x N Test Point	Connect scope probe to A12 1 kHz x N Test Point. Set vertical gain to 2 V/div. Turn A11R83 fully CCW, then turn CW until clean beats are displayed on scope. Note position of A11R83 now turn it 1/8 turn past the point where clean beats were obtained.

*Omit these steps if C INPUT is operational.

Table 5-2. Local Oscillator/Shifter (A11) Initial Adjustments (Cont'd)

Step	Adjust	Observe (Test Point)	Procedure
6	A11C15 LO ADJ	A12 DET Test Point	Set signal generator(8) for 105 MHz output at -30 dBm. Connect scope probe to A12 DET Test Point. Set vertical gain to 0.2 V/div. Adjust A11C15 for zero beat at the top of the ramp (see Figure 5-2). This adjustment sets the high limit of the local oscillator.
7	A11R14 RAMP ADJ	A12 DET Test Point	Set signal generator(8) for 85 MHz output at -30 dBm. Connect scope probe to A12 DET Test Point. Set vertical gain to 0.2 V/div. Adjust A11R14 for zero beat at the bottom of the ramp (see Figure 5-3). This adjustment sets the low limit of the local oscillator.
8	A11R61 RAMP LIMIT	A10U3 Test Point pin 6	Connect scope probe to A10U3, pin 6. Set vertical gain to 2 V/div. Adjust A11R61 CCW until positive pulse just appears (see Figure 5-4) then adjust 1/8 turn CW.

Table 5-3. LIF/NIF (A12) Initial Adjustments

Step	Adjust	Observe (Test Point)	Procedure
1	A12R7 BP ADJ	A12 DET Test Point	Remove signal input from C INPUT channel. Remove the LEV cable from PIN leveler. Set signal generator (7) to 6.5 MHz, and connect to level input of PIN Leveler and adjust level as required. (Note: Increase level to see markers. Decrease level to see waveforms.) Set signal generator(8) for 400 MHz output at -35 dBm. Connect scope probe to A12 DET test point. Set vertical gain to 0.2 V/div. Adjust A12R7 for the same detector voltage at 6.5 and 13 MHz (see Figure 5-5). Increase signal by 3 dB and note linear increase in DET voltage. (Decrease value of R3 as required to decrease gain). Change scope horizontal Volts/Div to 0.2 for greater resolution. Note horizontal position of 13 MHz marker. Remove 6.5 MHz input and replace LEV cable.

Table 5-3. LIF/NIF (A12)
Initial Adjustments (Cont'd)

Step	Adjust	Observe (Test Point)	Procedure
2		A12 DISC	Connect scope probe to A12 DISC Test Point. Set vertical gain to 2 V/div. Check for linear discriminator output up to 13 MHz marker position (see Figure 5-6).
3	A12C35 A12C36 NIF ADJ	A12 1 kHz x N	Set signal generator(8) for 400 MHz output at -10 dBm. Connect scope probe to A12 1 kHz x N test point. Set vertical gain to 2 V/div. Adjust A12C35 and C36 for best response up to 13 MHz marker position, while lowering signal generator output gradually to approximately -40 dBm. The 1 kHz x N should be approximately 5 V p-p.
4	A12R15 SQ ADJ	A12 SQ Test Point	Set signal generator(8) for 400 MHz output at -36 dBm. Connect scope probe to A12 SQ Test Point. Set vertical gain to 2 V/div. Adjust A12R15 so that each squelch just drops out in the center (see Figure 5-7).

Table 5-4. Final Adjustments

Step	Adjust	Observe (Test Point)	Procedure
1	A11R11 DISC ADJ	A12 DET Test Point	Remove ground from A10 LOCK EN Test Point. Verify that scope horizontal input is still connected to A11 RAMP test point. Set horizontal gain to 0.5 V/div. Set signal generator(8) to 400 MHz at -33 dBm. Adjust A11R11 for a lock at 6.5 MHz, denoted by an intensified spot at the center of upper right beat (see Figure 5-5).
2	A11R36 LLO ADJ	A12 DET Test Point	Set signal generator(9) for 18 GHz output at low level (300 mV beats). Set scope horizontal gain to 0.5 V/div. Adjust A11R36 for best even beats over entire ramp, without decreasing beats at the top of the range (right most portion of display). Increase signal generator(9) output to 0 dBm. Verify that baseline on display shifts less than 200 mV for C INPUT signals from 12-18 GHZ (12-26.5 GHz for 6246B). Press RESET.

Table 5-4.
Final Adjustments (Cont'd)

Step	Adjust	Observe (Test Point)	Procedure
3	A11R83 NLO	A12 1 kHz x N Test Point	Trigger scope from A11 1 kHz test Point. Connect scope probe to A12 1 kHz x N test point. Set signal generator(9) for 18 GHz at -15 dBm.
	A11R38 A11R40 Shifter Balance		Press TEST. Press RESET as required. Adjust A11R83,R38 and R40 for best 1 kHz x N signal (least modulation) when locked at top 1/3 of ramp. Repeat at 26.5 GHz for 6246B.
4	A10R18 OVLD	Digital Display	Connect output of signal generator(8) to input of power amplifier(5). Connect output of power amplifier through a 6 dB pad, to C INPUT of unit via power meter(6). Set signal generator(8) to 500 MHz and slowly increase output to +20 dBm, as displayed on power meter(6). Adjust A10R18 until display starts blinking. Reduce signal by 2 dB and verify that display stops blinking. Repeat measurement to verify that visual alarm activates at +20 dBm.

Table 5-4.
Final Adjustments (Cont'd)

Step	Adjust	Observe (Test Point)	Procedure
5	A12R15 SQ ADJ	Digital Display	Check sensitivity from .5 to 20 GHz (26.5 GHz for 6246B). Sensitivity for C INPUT channel should be 2 dB or greater than instrument specification across the band (Table 1-1). Adjust A12R15 as required, but not more than 2 dB.
6	A3R8 A SENS	Digital Display	Connect signal generator(8) to A/B INPUT. Select A IN. Tune generator to 100 MHz at 22 dBm. Adjust A3R8 (100 MHz Amp gain adjust) for best operation, denoted by stable count display, while lowering level (typical -30 dBm). Connect signal generator(7) to A/B INPUT. Tune generator from 10 Hz to 10 MHz at -22 dBm. Verify correct operation. Repeat with signal generator(8) from 10 MHz to 100 MHz.
7	A3R1 B SENS	A3 DET Test Point	Connect sweep/signal generator(11) RF output to A/B INPUT. Connect scope horizontal to sweeper horizontal output BNC. Set scope horizontal gain to 2 V/div.

Table 5-4.
Final Adjustments (Cont'd)

Step	Adjust	Observe (Test Point)	Procedure
7	Cont'd		Set veritical gain to 0.1 V/Div. Connect vertical scope probe to DET test point on A3. Set sweeper to sweep from 95 MHz to 520 MHz at -30 dBm. Select B IN. Verify that DET test point is 100 mV or better across the band. Note the least sensitive frequency. Apply the least sensitivity fre-

Table 5-4.
Final Adjustments (Cont'd)

Step	Adjust	Observe (Test Point)	Procedure
7	Cont'd		quency at -30 dBm and adjust A3R1 fully CW then slowly CCW until unit displays the least sensitive frequency. Decrease the generator output by ≈2 dB and verify that the display reads all zeros. Increase the generator output until the display starts to read. Verify that the level is ≈-30 dBm and is displaying a stable reading.

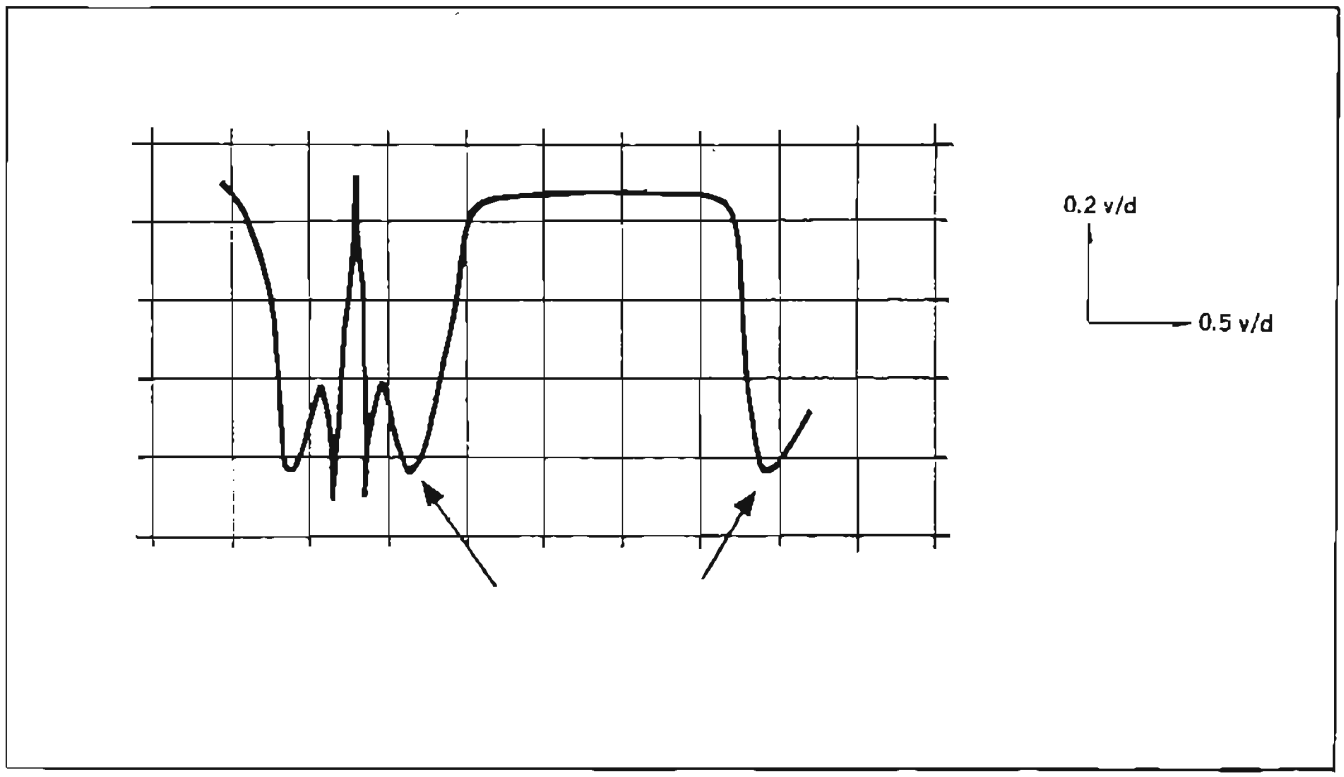

Figure 5-1. LLO Amplitude Adjustment

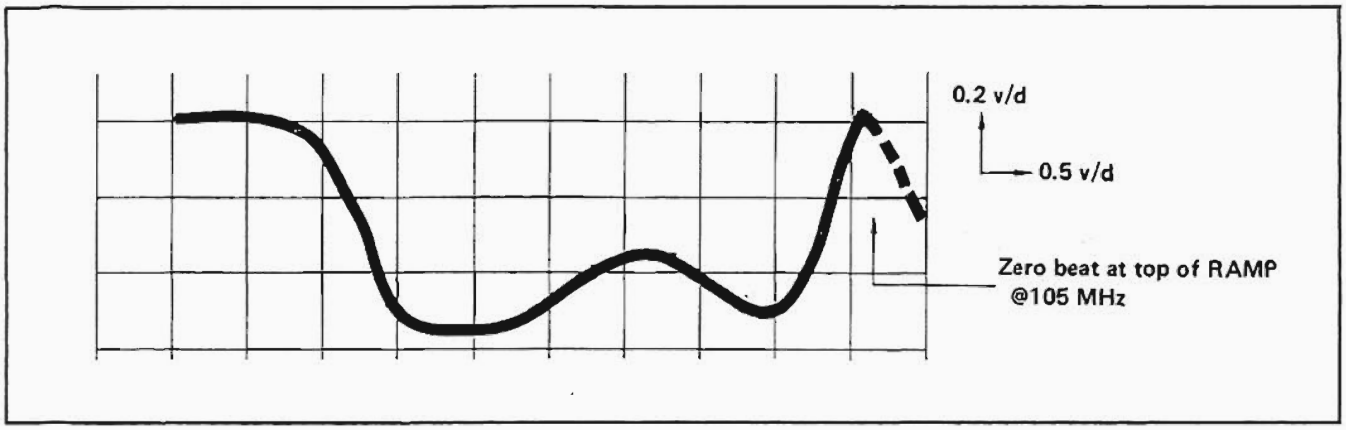

Figure 5-2. DET Waveform - LO High End Adjustment

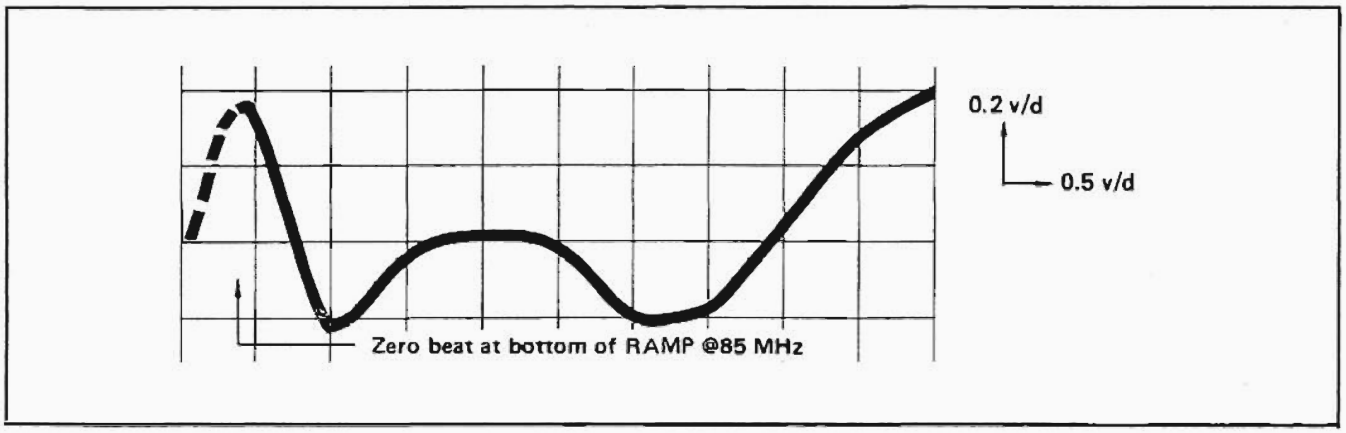

Figure 5-3. A12 DET Waveform - LO Low End Adjustment

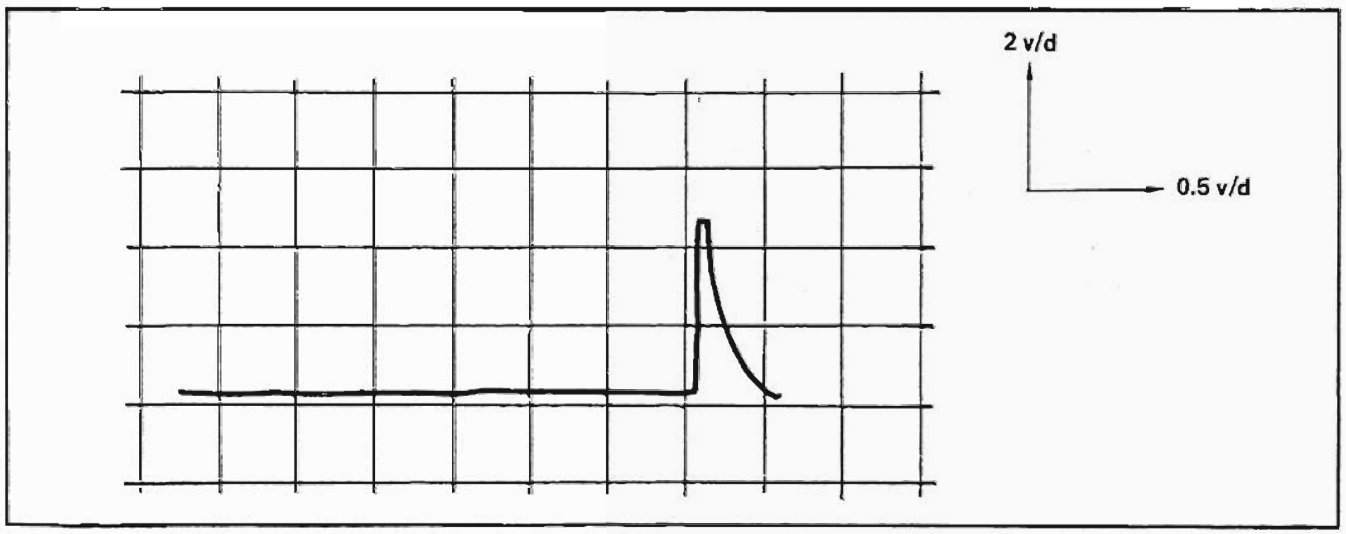

Figure 5-4. Ramp Limit Adjustment

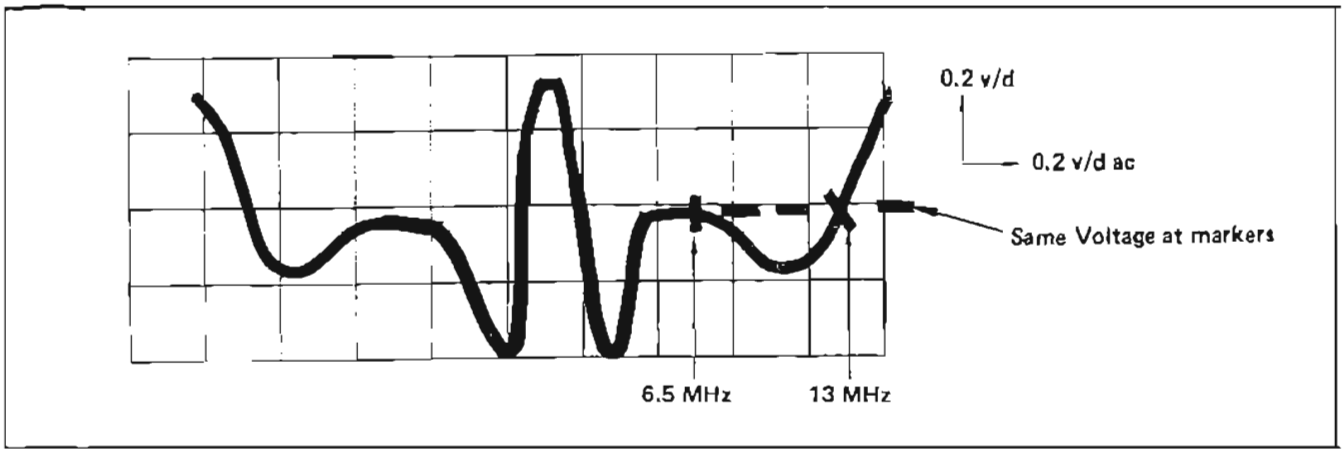

Figure 5-5. A12 DET Waveform

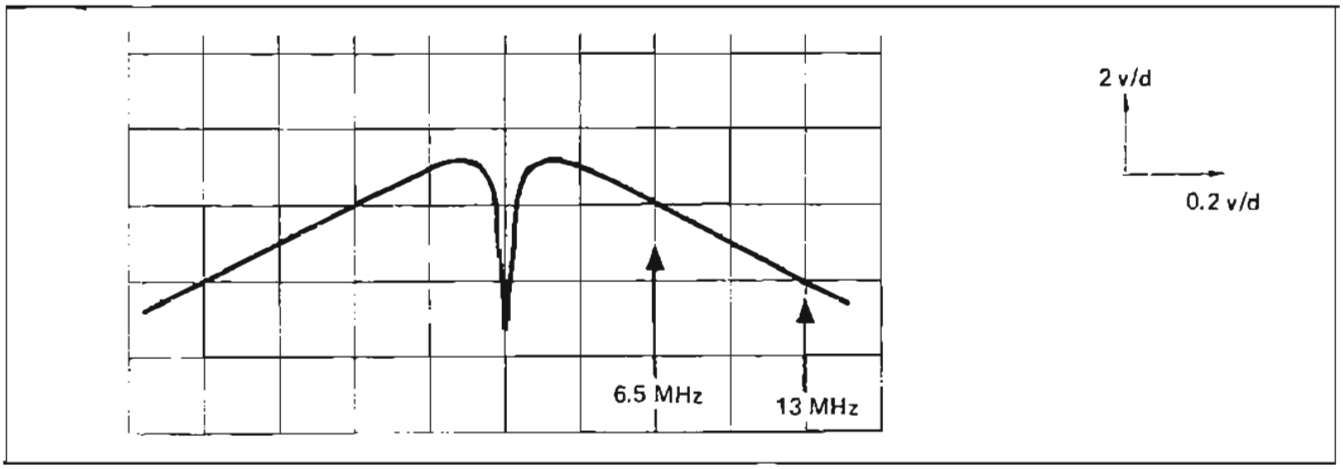

Figure 5-6. Discriminator Output

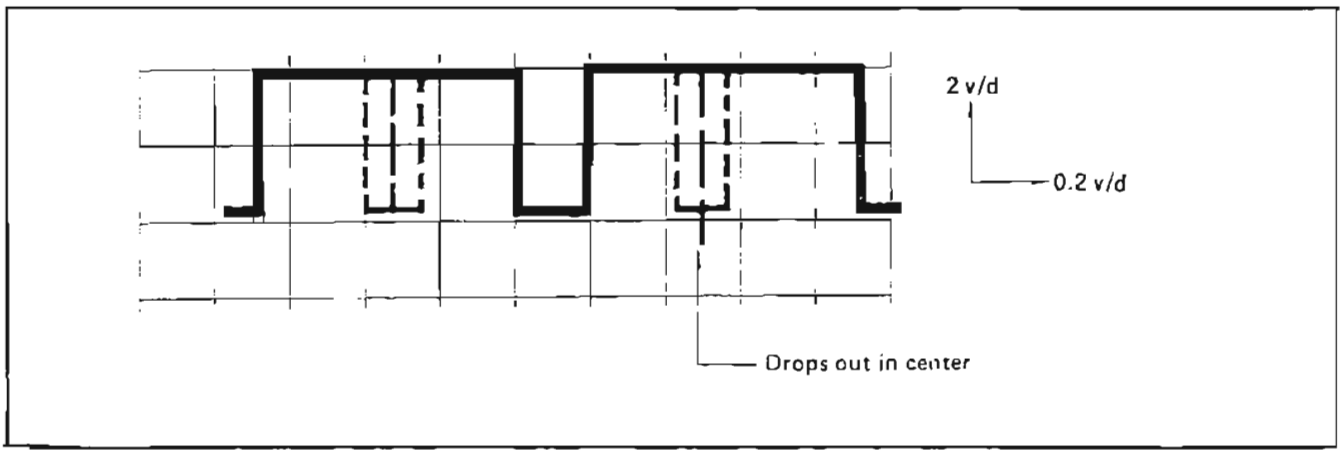

Figure 5-7. Squelch Waveform

CHAPTER 6

REPLACEABLE PARTS

6-1. INTRODUCTION

6-2. This chapter contains the parts lists for each assembly in the 6245B/6246B Counters. Chapter 7 shows the assemblies where the listed parts are installed. Ordering information is included and should be used when purchasing parts from the factory. Explanation of the column listings and Table 6-1 Manufacturer's Code-To-Name Index are also included.

6-3. PART ORDERING INFORMATION

6-4. To order a part from the Replaceable Parts List, state the Systron Donner part number, indicate the quantity required and address the order to the nearest Systron Donner Sales or Service Center.

6-5. To order a part not listed in the Replaceable Parts List, state the instrument model number, serial number, the description and function of the part and the number of parts required. Address the order to the nearest Systron Donner Sales or Service Center.

6-6. PARTS LISTS

6-7. The replaceable parts lists are placed in top breakdown assembly order. Each column provides specific information relating to the listed parts as follows:

(1) FIND: This is the find number column and list those numbers as called out on the respective assembly drawings.

(2) SD STOCK NUMBER: The Systron Donner part number is listed in this column.

(3) COMPONENT NOMENCLATURE AND DESCRIPTION: Component names and specifications are provided in this column and include value, tolerance, wattage rating, working voltage, construction, etc.

(4) REFERENCE DESIGNATOR: Reference designators applicable to assemblies/schematics are listed in alpha-numeric order.

(5) QUANTITY: This quantity, appearing after an item entry, indicates the number of times the component is used in that assembly.

(6) MANUFACTURER'S CODE: H4-2 Federal Supply Code numbers are listed to identify component manufacturers. A Manufacturers Code-To-Name Index is provided in this chapter for cross reference.

(7) MANUFACTURER'S PART NUMBER: True manufacturer part numbers are listed in this column.

Table 5-1. Manufacturer's Code-To-Name Index

Mfr. Code	Manufacturer Name	Address	Zip Code
00213	Nytronics Components Group Inc.	Darlington, SC	29532
01121	Allen Bradley Co.	Milwaukee, WI	53203
01295	Texas Instruments Inc. Semiconductor Group	Dallas, TX	75265
02763	Grippe Machining and Mfg. Co.	Roseville, MI	48066
03508	General Electric Co. Semiconductor Products Div.	Auburn, NY	13021
04222	AVX Ceramics Div.-AVX Corp.	Myrtle Beach, SC	29577
04713	Motorola Semiconducts Prod. Inc.	Phoenix, AZ	85008
05574	Viking Connectors Inc.	Chatsworth, CA	91311
06090	Raychem Corp.	Menlo Park, CA	94025
06540	Amatom Electronic Hardware Division of Mite Corp.	New Haven, CT	06515
06776	Robinson Nugent Inc.	New Albany, IN	47150
07263	Fairchild Camera and Instrument Corp. Semiconductor Div.	Mountain View, CA	94042
07700	Technical Wire Products Inc.	Cranford, NJ	07016
07933	Raytheon Co. Semiconductor Div.	Mountain View, CA	94042
08289	Delbert Blinn Co. Inc.	Pomona, CA	91769
08547	R.G. Wallace Co. Inc.	Carson, CA	90749
09353	C and K Components Inc.	Newton, MA	02158
11237	CTS Keene Inc.	Paso Robles, CA	93446
12136	Philadelphia Handle Co. Inc.	Camden, NJ	08103
15912	T and B Ansley Corp.	Los Angeles, CA	90031
16179	M/A-Com Omni Spectra Inc. Microwave Component Division	Farmington, MI	48024
16733	Cablewave Systems Inc.	New Haven, CT	06473
17856	Siliconix, Inc.	Santa Clara, CA	95054
18324	Signetics Corp. Military Products Division	Sacramento, CA	95834
21847	TRW Microwave-Subsidiary of TRW	Sunnyvale, CA	94086
24335	Cooper Laboratories Inc.	Wayne, NJ	07470
27014	National Semiconductors Corp.	Santa Clara, CA	95051
27556	IMB Electronic Prod. Inc.	Santa Fe Springs, CA	90670
28480	Hewlett-Packard Co. Corp.	Palo Alto, CA	94304
28520	Heyman Molded Products	Kenilworth, NJ	07033
29454	Johanson Dielectrics Inc.	Burbank, CA	91505
30146	Symbex Corp. Subsidiary Asso.Enterprises	Painesville, OH	44077
31433	Union Carbide Corp. Electronics Division	Greenville, SC	29606
32159	West-Cap Arizona	Tucson, AZ	85706
50316	Mini-Systems	Attelboro, MA	02761
51167	Aries Electronics	Frenchtown, NJ	08825
51642	Centre Engineering Inc.	State College, PA	16801
52542	Systron Donner Corp. Instrument Div.	Concord, CA	94518
53387	Minnesota Mining and Mfg. Co. Electronics Products Division	St. Paul MN	55101

Table 6-1. Manufacturer's Code-To-Name Index (Cont'd)

Mfr. Code	Manufacturer Name	Address	Zip Code
55210	Gettig Engineering and Mfr.	Spring Mill, PA	16875
55261	LSI Computer System Inc.	Melville, NY	11747
55566	RAF Electronic Hardware Inc.	Stratford, CT	06497
56289	Sprague Electric Co.	North Adams, MA	01247
59730	Thomas and Betts Corp.	Iowa City, IA	52240
70903	Belden Corp.	Geneva, IL	60134
71279	Midland-Ross Corp. Cambridge Division	Cambridge, MA	02140
71400	Bussman Div. of McGraw-Edison Co	St. Louis, MO	63178
71590	Centralab Inc.	Fort Dodge, IA	50501
71707	Coto Corp.	Providence, RI	02905
72136	Electro Motive Corp.	Florence, SC	
72982	Murata Erie North American Ins.	Erie, PA	16512
73138	Beckman Instruments Inc. Helipot Div.	Fullerton, CA	92634
73559	Carlingswitch Inc.	West Hartford, CT	06110
75037	Minnesota Mining and Mfg Co. Electro Products Division	St. Paul, MN	55101
75915	Tracor Littlefuse Inc.	Des Plaines, IL	60016
76381	Minnesota Mining and Mfg. Co.	St. Paul, MN	55101
77969	Rubbercraft Corp. of Calif. Ltd.	Torrance, CA	90507
78189	Illinois Tool Works Inc. Shakeproof Division	Elgin, IL	60120
78526	West-Cap Arizona	Tucson, AZ	85706
79963	Zierick Mfg. Co.	Mt. Kisco, NY	10549
80294	Bourns Instruments Inc.	Riverside, CA	92506
81073	Grayhill Inc.	La Grange, IL	60525
81349	MIL Specifications		
81483	International Rectifier Semiconductor Division	Los Angeles, CA	90069
85480	Weckesser Co. Inc. Div. of W.H. Brady Co.	Milwaukee, WI	60641
86928	Seastrom Mfg. Co. Inc.	Glendale, CA	91201
88245	Winchester Electronics Litton Systems-USECO Div.	Van Nuys, CA	91409
91418	Radio Materials Corp.	Chicago, IL	60646
96906	MIL Specifications		
96733	San Fernando Electric Mfg. Co.	San Fernando, CA	91341
98291	Sealectro Corp.	Mamaroneck, NY	15044

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REPLACEABLE PARTS LIST

TITLE 6245B/6246B Microwave Counter Assembly 083125 Rev A

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
		1,2	KIT, Shipping	52542	083132	083132	1
		1	ASSEMBLY, Test	52542	08312601	08312601	1
		2	ASSEMBLY, Test	52542	08312801	08312801	1
		1,2	FEATURE 01	52542	07759201	07759201	1
		1,2	FEATURE 02	52542	07768301	07768301	1
		1,2	FEATURE 03	52542	07759301	07759301	1
		1,2	ACCESSORY, 04	52542	07754306	07754306	1
		1,2	ACCESSORY, 05	52542	07754305	07754305	1
		1,2	ACCESSORY, 06	52542	07754304	07754304	1
		1,2	ACCESSORY, 07	52542	07754303	07754303	1
		1,2	ACCESSORY, 08	52542	07754302	07754302	1
		1,2	ACCESSORY, 09	52542	07754301	07754301	1

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE: Shipping Kit 083132 Rev A

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
7		1,2	ASSEMBLY, Top Cover W/Handles and RFI	52542	067714	067714	1
8		1,2	CORD, AC Power 8'	70903	17500	102407	1
10		1,2	SCREW, PHMS 6-32 x 3 Type I Recessed Thread	08547	By Description	10063248	4
11		1,2	WASHER, Int Tooth No. 6	96906	MS35333-71	100647	4
12		1,2	EXTENDER, Chassis	52542	067594	067594	2

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE Test Assembly

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
		1	ASSEMBLY, Test Rev A	52542	08312601	08312601	Ref
		2	ASSEMBLY, Test Rev A	52542	08312801	08312801	Ref
		1,2	ASSEMBLY, Universal Counter	52542	08312901	08312901	1
		1	KIT, Test	52542	083130	083130	1
		2	KIT, Test	52542	083131	083131	1

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE Test Kit

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
		1	KIT, Test Rev A	52542	083130	083130	Ref
		2	KIT, Test Rev A	52542	083131	083131	Ref
2		1	FAB, Dec Panel	52542	083116	083116	1
2		2	FAB, Dec Panel	52542	083057	083057	1
3	J102	1	CONNECTOR, Type N	16179	21011	101185	1
3	J102	2	CONNECTOR, SMA	52542	07789701	07789701	1
4		1	NUT, Kep 4-40	78189	511-041800-00	100941	4
4		2	FAB, Mtg. Plate	52542	067633	067633	1
5	S1	1	SWITCH	73559	621-12919	123446	1
5		2	NUT, Kep 4-40	78189	511-041800-00	100941	4
6	S1	2	SWITCH	73559	621-12919	123446	1
7		1,2	SPACER, OSM	52542	077168	077168	1

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE Top Cover W/Handle and RFI Assembly 067714 Rev D

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
3		1,2	TAPE, Foam	76381	4304	100814	A/R
4		1,2	COVER, Gray Top	52542	067703	067703	1
5		1,2	SCREW, PHMS 6-32 x 1/4	96906	MS51957-26	10063204	6
6		1,2	CLAMP	52542	067709	067709	1
7		1,2	WASHER, Split No. 6	96906	MS35338-136	100712	6
8		1,2	HANDLE	12136	1879-376-370	100891	1
9		1,2	SCREEN, RFI	52542	067912	067912	1
10		1,2	SCREW, PHMS 4-40 x 3/8	96906	MS51957-15	10062606	2
11		1,2	TAPE, Foam	76381	4504	117946	A/R

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE Universal Counter Assembly 08312901 Rev A

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
1		1,2	ASSEMBLY, Bottom Cover W/Feet and RFI	52542	067715	067715	1
2		1,2	ASSEMBLY, Front Panel	52542	08305801	08305801	1
3		1,2	ASSEMBLY, Rear Panel	52542	08306601	08306601	1
4	A1	1,2	ASSEMBLY, Interconnect PC	52542	08306401	08306401	1
5	A2	1,2	ASSEMBLY, Display PC	52542	08306301	08306301	1
6		1,2	ASSEMBLY, Flat Cable	52542	08311801	08311801	1
7	U4	1,2	MODULE, Downconverter	52542	07752001	07752001	1
8	U9	1,2	PLUG, Termination SMA 50Ω	16179	20020P	102969	1
9		1,2	ASSEMBLY, Semi-Rigid Cable	52542	08311901	08311901	1
10		1,2	FAB, Display Shield	52542	083104	083104	1
16		1,2	SCREW, PHMS 6-32 x 7/16	96906	MS51957-29	10063207	6
17		1,2	SCREW, PHMS 6-32 x 1/4	96906	MS51957-26	10063204	6
18		1,2	SCREW, PHMS 4-40 x 1/4	96906	MS51957-13	10062604	4
19		1,2	SCREW, PHMS 6-32 x 3/8	96906	MS51957-28	10063206	2
21		1,2	WASHER, Flat No. 6	96906	MS15795-805	100704	12
22		1,2	WASHER, Flat No. 4	96906	MS15795-803	100703	4
23		1,2	WASHER, Split No. 6	96906	MS35338-136	100712	14
24		1,2	WASHER, Split No. 8	96906	MS35338-137	100713	6
28	A3	1,2	ASSEMBLY, Amp/Prescaler PC	52542	08306201	08306201	1
29	A6	1,2	ASSEMBLY, Timebase Logic PC	52542	08312001	08312001	1
30	A7	1,2	ASSEMBLY, Counter Logic PC	52542	06760101	06760101	1
31	A8	1,2	ASSEMBLY, Display Logic PC	52542	06769402	06769402	1
33	A10	1,2	ASSEMBLY, FLACTO Logic PC	52542	06759901	06759901	1
34	A11	1,2	ASSEMBLY, LO/Shifter PC	52542	06759901	06759901	1
35	A12	1,2	ASSEMBLY, LIF/NIF PC	52542	06759701	06759701	1
37		1,2	FAB, Down Converter Bracket	52542	083088	083088	1
38		1,2	SCREW, PHMS 4-40 x 5/16	96906	MS51957-14	10062605	2
39		1,2	NAMEPLATE	52542	03711201	03711201	1
40		1,2	NAMEPLATE	52542	03711202	03711202	1
41		1,2	TIE, Cable	96906	MS3367-4-9	100753	2
42		1,2	GASKET, RFI Round	07700	20-51210	103274	7

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE Bottom Cover W/Feet and RFI 067715 Rev C

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
10		1,2	COVER, Bottom	52542	067704	067704	1
12		1,2	FOOT	52542	057064	057064	4
13		1,2	FOOT	77969	4460	103880	4
14		1,2	BAIL	52542	057132	067132	1
15		1,2	SPACER	06540	8211-SS-0632	116535	4
16		1,2	WASHER, Split No. 6	96906	MS35338-136	100712	4
17		1,2	SCREW, PHMS 6-32 x 5/8	96906	MS51957-31	10063210	4
19		1,2	GASKET, RFI Round	07700	20-51210	103274	7

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE Front Panel Assembly 08305801 Rev A

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
1		1,2	FAB, Sub-Panel Front	52542	083058	083058	1
5	J101	1,2	CONNECTOR	16733	CD701938-002	117080	1
6	R101/ S101	1,2	RESISTOR, Variable W/Switch	52542	102103	102103	1
7		1,2	KNOB, Ring Skirt 1/8-Shaft	07933	50-2WD-1G	102764	1
8		1,2	LUG, Solder	79963	501-.120	102827	2
9		1,2	NUT, Hex 4-40	96906	MS35649-244	100707	2

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE Rear Panel Assembly 08306601 Rev A

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
1		1,2	FAB, Rear Panel	52542	075114	075114	1
2		1,2	PLATE, Cover	52542	075177	075177	1
3		1,2	PLATE, Osc Cover	52542	075011	075011	1
4	T1	1,2	TRANSFORMER	52542	057532	057532	1
5		1,2	COVER, Transformer	52542	10367701	1036770-1	1
6	FL1	1,2	FILTER, RFI 3A 250V	05245	3EF1	102461	1
7	XF1	1,2	FUSE POST	75915	345002	117381	1
8	XU1	1,2	SOCKET, Transistor TO-3	06776	MD-3452-G	830099	2
	XU2	1,2	Same as XU1				
9	U1	1,2	INTEGRATED CIRCUIT Voltage Regulator 3A	27014	LM323K	117258	1
10	U2	1,2	INTEGRATED CIRCUIT Voltage Regulator	27014	LM345K-5.2	117259	1
11	C8 thru C11	1,2	CAPACITOR, Tant 1 µF 10%, 35 V	56289	150D105X9035A2	100082	4
12	J104	1,2	CONNECTOR, BNC	81349	UG-1094/U	101155	2
	J105	1,2	Same as J104				
13	S3	1,2	SWITCH, Toggle	09353	7101-S-Y-Z-Q	102310	1
14		1,2	NUT, Dress	09353	B7099	100893	1
15		1,2	FAB, Transistor Bracket	52542	067708	067708	2
16		1,2	INSULATOR, Transistor TO-3	08289	DM-103	102940	1
21		1,2	PLUG, Button	28520	P-500	117498	1
22		1,2	SCREW, PHMS 6-32 x 3/16	96906	MS51957-25	10063203	2
23		1,2	SCREW, PHMS 4-40 x 3/8	96906	MS51957-15	10062606	4
24		1,2	SCREW, PHMS 8-32 x 1-3/4	96906	MS51957-52	10064228	1
25		1,2	SCREW, PHMS 6-32 x 1/4	96906	MS51957-26	10063204	2
26		1,2	SCREW, PHMS 6-32 x 1/2	96906	MS51957-30	10063208	4
27		1,2	SCREW, PHMS 8-32 x 1-1/2	96906	MS51957-51	10064224	3
28		1,2	WASHER, Flat No. 4	96906	MS15795-803	100703	2
30		1,2	WASHER, Split No. 6	96906	MS35338-136	100712	6
31		1,2	WASHER, Flat No. 8	96906	MS15795-807	100705	3
32		1,2	LUG, Solder	79963	501-.120	102827	1
33							
34		1,2	NUT, Hex 4-40	96906	MS35649-244	100707	1
35		1,2	CLAMP, Cable	95987	3/16	102931	1
36		1,2	NUT, Hex 8-32	78189	51-101800-01	100940	5
37		1,2	WASHER, Split No. 4	96906	MS35338-135	100711	3
38		1,2	INSULATOR, Trans.		A22-2003	117932	1
39		1,2	WASHER, Flat No.6	86928	5714-34-32N	112604	2

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE Rear Panel Assembly 08306601 (Cont'd)

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
40		1,2	NUT, Kep 4-40	78189	511-041800-00	100941	2
41	F1	1,2	FUSE, .75 A	75915	313.750	100603	1
42		1,2	SCREW, PHMS 4-40 x 7/16	96906	MS51957-16	10062607	1
43		1,2	NUT, Hex 4-40	80205	NAS671C4	100622	1
44	S1	1,2	SWITCH, Pushbutton Black	81073	30-3 W/Dressnut	102347	1
45		1,2	NUT, Dress 1/4-32	81073	30C1023	100920	1

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE A1, Interconnect PC Assembly 08306401 Rev A

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
4		1,2	BOARD, PC	52542	083064	083064	1
	C1	1,2	CAPACITOR, El Can 2200 µF, 63 V	52542	11950701	11950701	2
	C2	1,2	CAPACITOR, El Can 4700 µF 20%, 35 V	72136	35RPE4700	11958801	2
	C3	1,2	Same as C1				
	C4	1,2	Same as C2				
	CR5	1,2	DIODE, Rectifier 400 V	02735	1N5395	100413	4
	CR6	1,2	Same as CR5				
	CR7	1,2	Same as CR5				
	CR8	1,2	Same as CR5				
	CR9	1,2	DIODE, Rectifier 50 V	59993	30S05	103252	4
	CR10	1,2	Same as CR9				
	CR11	1,2	Same as CR9				
	CR12	1,2	Same as CR9				
	XA2 thru XA8	1,2	CONNECTOR, PC Edge	05574	3KH22/1CD12	117847	10
	XA10 thru XA12	1,2	Same as XA2				
	XA5B	1,2	CONNECTOR, PC Edge	05574	3KH10/1CDD12	117848	1
24		1,2	JUMPER	55210	L-2007-1	102879	
25		1,2	SPACER				
26		1,2	SPACER, Swage 4-40	71279	1300-9	100492	4
27		1,2	GUIDE, PC	52542	08310101	08310101	1
28		1,2	SCREW, PHMS 4-40 x 5/16	96906	MS51957-14	10062605	2
29		1,2	WASHER, Split No. 4	96906	MS35338-135	100711	2
30		1,2	WASHER, Flat No. 4	96906	MS15795-803	100703	2

Used On Code: 1 = 6245B; 2 = 6246B

TITLE A2, Display PC Assembly 08306301 Rev A

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
4		1,2	BOARD, PC	52542	083063	083063	1
	C1	1,2	CAPACITOR, DP Ceramic 0.1 µF 20%, 50 V	56289	2C37Z5U104M050B	100178	1
	C2	1,2	CAPACITOR, Ceramic .05 µF +80-20%, 12 V	71590	UK10-503	100122	11
	C3	1,2	Same as C2				
	C4	1,2	Same as C2				
	C5	1,2	Same as C2				
	C6	1,2	Same as C2				
	C7	1,2	CAPACITOR, Tant 1 µF 10%, 35 V	56289	196D105X9035HA1	103716	3
	C8	1,2	CAPACITOR, Ceramic 4700 pF 20%, 100 V	04222	3418100C472M	117569	2
	C9	1,2	Same as C2				
	C10	1,2	Same as C2				
	C11	1,2	CAPACITOR, DP Ceramic .001 µF 10%, 100 V	04222	3418100C102K	117568	9
	C12	1,2	Same as C11				
	C13	1,2	Same as C11				
	C14	1,2	Same as C11				
	C15	1,2	Same as C11				
	C16	1,2	Not Used or Same as C2				
	C17	1,2	Same as C8				
	C18	1,2	Same as C2				
	C19	1,2	Same as C7				
	C20	1,2	Same as C2				
	C21	1,2	Same as C2				
	C22	1,2	Same as C11				
	C23	1,2	Same as C11				
	C24	1,2	Same as C11				
	C25	1,2	Same as C11				
	C26	1,2	Same as C2				
	C27	1,2	Same as C7				
	CR1	1,2	DIODE, Signal 50 V	03508	1N4151	100385	6
	CR2	1,2	Same as CR1				
	CR3	1,2	Same as CR1				
	CR4	1,2	Same as CR1				
	CR5	1,2	Same as CR1				
	CR6	1,2	Same as CR1				

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE A2, Display PC Assembly 08306301 (Cont'd)

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
	DS1 thru DS10	1,2	DISPLAY, Selected	52542	10317201	10317201	10
	DS11	1,2	LED, Red		BU1170-4BR	123453	3
	DS12	1,2	Same as DS11				
	DS13	1,2	Same as DS11				
	J1	1,2	CONNECTOR, PC	30146	922584-26	117340	1
	R1 thru R12	1,2	RESISTOR, CC 33 k 5%, 1/4 W	01121	CB3335	101576	13
	R13	1,2	RESISTOR, CC 120 Ω 5%, 1/4 W	01121	CB1215	101717	3
	R14	1,2	Same as R13				
	R15	1,2	Same as R13				
	R16	1,2	RESISTOR, CC 10 MΩ 5%, 1/4 W	01121	CB1065	101564	1
	R17	1,2	RESISTOR, CC 100 k 5%, 1/4 W	01121	CB1045	101558	2
	R18	1,2	RESISTOR, CC 3.3 k 5%, 1/4 W	01121	CB3325	101559	1
	R19	1,2	RESISTOR, CC 1 k 5%, 1/4 W	01121	CB1025	101569	4
	R20	1,2	Same as R17				
	R21	1,2	RESISTOR, CC 47 Ω 5%, 1/4 W	01121	CB4705	101560	1
	R22	1,2	Same as R19				
	R23	1,2	Same as R1				
	R24	1,2	RESISTOR, CC 12 k 5%, 1/4 W	01121	CB1235	101565	5
	R25	1,2	Same as R24				
	R26	1,2	Same as R24				
	R27	1,2	Same as R24				
	R28	1,2	Same as R24				
	R29	1,2	Same as R19				
	R30	1,2	Same as R19				
	RN1	1,2	RESISTOR, Module 9-12 k	01121	410A123	119175	1
	S1	1,2	SWITCH, PB Assembly	52542	123447	123447	5
	S2	1,2	Same as S1				
	S3	1,2	Same as S1				
	S4	1,2	Same as S1				
	S5	1,2	Same as S1				

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE A2, Display PC Assembly 08306301 (Cont'd)

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
	S6	1,2	SWITCH, PB Assembly		39-22102	123448	3
	S7	1,2	Same as S6				
	S8	1,2	Same as S6				
	S9	1,2	SWITCH, PB Assembly		39-22101	123449	1
	S10	1,2	SWITCH, PB Assembly		39-22504	123450	1
	U1	1,2	INTEGRATED CIRCUIT, LIN Quad PNP Darlington		TA61	123439	3
	U2	1,2	Same as U1				
	U3	1,2	Same as U1				
	U4	1,2	INTEGRATED CIRCUIT, LIN Quad NPN Darlington		TA60	123438	1
	U5	1,2	INTEGRATED CIRCUIT, TTL MSI 4 -S/-R Latch	01295	SN74279N	103983	2
	U6	1,2	INTEGRATED CIRCUIT, TTL SSI Hex Inverter	27014	DM74LS367AN	116429	2
	U7	1,2	INTEGRATED CIRCUIT, TTL SSI Quad 2-Input NAND Gate	01295	SN74LS00N	103130	1
	U8	1,2	INTEGRATED CIRCUIT Quad Comparator	27014	LM339AN	11940501	1
	U9	1,2	Same as U5				
	U10	1,2	INTEGRATED CIRCUIT, TTL SSI 8-Input NAND Gate	01295	SN74LS30N	103971	1
	U11	1,2	INTEGRATED CIRCUIT, SSI Quad 4-Input NAND Gate	01295	SN74LS20N	103969	1
	U12	1,2	Same as U6				
	U13	1,2	INTEGRATED CIRCUIT, TTL SSI 4 2-Input NAND Gate	01295	SN74LS03N	116647	1
	XDS1 thru XDS10	1,2	SOCKET, IC 14-pin		14-8620-10WR	123454	10
	XDS11 thru XDS13	1,2	SOCKET, Strip-Line 2-pos.	51167	2-7450-10	123463	3

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE A3, Amp/Prescaler PC Assembly 08306201 Rev A

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
4		1,2	BOARD, PC	52542	083062	083062	1
	C1	1,2	CAPACITOR, DP Ceramic 1 µF 20%, 50 V	56289	2C37Z5U105M050B	100176	1
	C2	1,2	CAPACITOR, Tant 10 µF 10%, 10 V	56289	196D106X9020JA1	103715	2
	C3	1,2	CAPACITOR, Tant 1 µF 10%, 35 V	56289	196D105X9035HA1	103716	6
	C4	1,2	CAPACITOR, DP Ceramic 0.01 µF 20%, 100 V	04222	SR201C103MAA	117570	16
	C5	1,2	Same as C4				
	C6	1,2	CAPACITOR, DP Ceramic 3.3 pF 5%, 100 V	96733	DR44BY3R3CP	11964501	1
	C7	1,2	Same as C4				
	C8	1,2	Same as C4				
	C9	1,2	Same as C4				
	C10	1,2	Same as C4				
	C11	1,2	CAPACITOR, DP Ceramic 4.7 pF 100 V	71590	CN10A4R7D	117358	1
	C12	1,2	Same as C4				
	C13	1,2	Same as C4				
	C14	1,2	Same as C4				
	C15	1,2	Same as C4				
	C16	1,2	Selected in Test				
	C17	1,2	Same as C3				
	C18	1,2	CAPACITOR, Mylar .1 µF 10%, 600 V	27556	2R2G104K	117506	1
	C19	1,2	Same as C4				
	C20	1,2	CAPACITOR, Tant 22 µF 20%, 25 V	31433	T362C226M025AS	112281	4
	C21	1,2	CAPACITOR, DP Ceramic 15 pF 5%, 100 V	96733	DB44BY150J	117624	1
	C22	1,2	Same as C4				
	C23	1,2	Same as C4				
	C24	1,2	Same as C20				
	C25	1,2	Same as C2				
	C26	1,2	Same as C4				
	C27	1,2	Same as C3				
	C28	1,2	Same as C3				
	C29	1,2	Same as C3				
	C30	1,2	Same as C3				

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE A3, Amp/Prescaler PC Assembly 08306201 Rev D

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
4		1,2	BOARD, PC	52542	083062	083062	1
	C1	1,2	CAPACITOR, DP Ceramic 1 µF 20%, 50 V	56289	2C37Z5U105M050B	100176	1
	C2	1,2	CAPACITOR, Tant 10 µF 10%, 10 V	56289	196D106X9020JA1	103715	2
	C3	1,2	CAPACITOR, Tant 1 µF 10%, 35 V	56289	196D105X9035HA1	103716	6
	C4	1,2	CAPACITOR, DP Ceramic 0.01 µF 20%, 100 V	04222	SR201C103MAA	117570	17
	C5	1,2	Same as C4				
	C6	1,2	CAPACITOR, DP Ceramic 6.8 pF 5%, 100 V	51642	100-100-NP0-689-C	123662	1
	C7	1,2	Same as C4				
	C8	1,2	CAPACITOR, Ceramic 1000 pF 20%, 50 V	71590	CW15C102M	100251	8
	C9	1,2	Same as C4				
	C10	1,2	Same as C4				
	C11	1,2	CAPACITOR, DP Ceramic 4.7 pF 100 V	71590	CN10A4R7D	117358	1
	C12	1,2	Same as C4				
	C13	1,2	Same as C4				
	C14	1,2	Not Used				
	C15	1,2	Same as C4				
	C16	1,2	Selected in test				
	C17	1,2	Same as C3				
	C18	1,2	CAPACITOR, Mylar 0.1 µF 10%, 600 V	27556	2R2G104K	117506	1
	C19	1,2	Same as C4				
	C20	1,2	CAPACITOR, Tant 22 µF 20%, 25 V	31433	T362C226M025AS	11228101	4
	C21	1,2	CAPACITOR, DP Ceramic 10 pF 5%, 100 V	96733	DB44BY100J	117621	2
	C22	1,2	Same as C4				
	C23	1,2	Same as C4				
	C24	1,2	Same as C20				
	C25	1,2	Same as C2				
	C26	1,2	Same as C4				
	C27	1,2	Same as C3				
	C28	1,2	Same as C3				
	C29	1,2	Same as C3				
	C30	1,2	Same as C3				

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE A3, Amp/Prescaler PC Assembly 08306201 (Cont'd)

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
	C31	1,2	Same as C4				
	C32	1,2	CAPACITOR, DP Ceramic 0.1 µF 20%, 50 V	56289	2C37Z5U104M050B	100178	1
	C33	1,2	Same as C20				
	C34	1,2	Same as C4				
	C35	1,2	Same as C20				
	CR1	1,2	DIODE, Signal 50 V	03508	1N4151	100385	1
	CR2	1,2	DIODE, Signal 20 V	28480	5082-2810	103346	4
	CR3	1,2	Same as CR2				
	CR4	1,2	Same as CR2				
	CR5	1,2	Same as CR2				
	K1	1,2	RELAY, Reed 5 V	71707	CR2203-5-40	117230	1
	L1	1,2	INDUCTOR, Fixed 0.06 µH	06560	10150-2	101322	1
	L2	1,2	INDUCTOR, Fixed 10 µH 10%	00213	WEE-WEE-10	101317	2
	Q1	1,2	TRANSISTOR, SINPN 15 V	04713	2N6304	103171	2
	Q2	1,2	TRANSISTOR, JFET N-Channel	17856	2N5564	117184	1
	Q3	1,2	Same as Q1				
	Q4	1,2	TRANSISTOR, SINPN 40 V	04713	2N3906	101378	1
	Q5	1,2	TRANSISTOR, SINPN 25 V	07263	PN3565-18	101371	1
	R1	1,2	RESISTOR, Variable 1 k 20%, 1/2 W	80294	3329W-1-102	101893	2
	R2	1,2	RESISTOR, CC 1.8 Ω 5%, 1/4 W	01121	CB1825	101602	2
	R3	1,2	RESISTOR, CC 1 MΩ 5%, 1/4 W	01121	CB1055	101605	2
	R4	1,2	RESISTOR, CC 5.1 k 5%, 1/4 W	01121	CB5125	101541	1
	R5	1,2	Same as R2				
	R6	1,2	RESISTOR, CC 100 k 5%, 1/4 W	01121	CB1045	101558	2
	R7	1,2	RESISTOR, CC 4.7 k 5%, 1/4 W	01121	CB4725	101598	2
	R8	1,2	Same as R1				
	R9	1,2	RESISTOR, CC 560 Ω 5%, 1/4 W	01121	CB5615	101583	1
	R10	1,2	RESISTOR, CC 130 Ω 5%, 1/4 W	01121	CB1315	101627	2
	R11	1,2	RESISTOR, CC 100 Ω 5%, 1/4 W	01121	CB1015	101609	4
	R12	1,2	RESISTOR, CC 1 k 5%, 1/4 W	01121	CB1025	101569	2

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE A3, Amp/Prescaler PC Assembly 08306201 (Cont'd)

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
	C31	1,2	Same as C4				
	C32	1,2	CAPACITOR, DP Ceramic 0.1 µF 20%, 50 V	56289	2C37Z5U104M050B	100178	1
	C33	1,2	Same as C20				
	C34	1,2	Same as C4				
	C35	1,2	Same as C20				
	C36 thru C39	1,2	Same as C8				
	C40	1,2	Same as C4				
	C41	1,2	Same as C8				
	C42	1,2	Same as C4				
	C43	1,2	Same as C8				
	C44	1,2	Same as C4				
	C45	1,2	Same as C8				
	C46	1,2	Not Used				
	C47	1,2	Same as C21				
	CR1	1,2	DIODE, Signal 50 V	03508	1N4151	100385	2
	CR2	1,2	DIODE, Signal 20 V	28480	5082-2810	103346	4
	CR3	1,2	Same as CR2				
	CR4	1,2	Same as CR2				
	CR5	1,2	Same as CR2				
	CR6	1,2	DIODE, Signal 70 V	28480	5082-2800	100442	2
	CR7	1,2	Same as CR6				
	CR8	1,2	Same as CR1				
	K1	1,2	RELAY, Reed 5 V	71707	CR2203-5-40	117230	1
	L1	1,2	INDUCTOR, Fixed 0.06 µH	06560	10150-2	101322	1
	L2	1,2	INDUCTOR, Fixed 10 µH 10%	00213	WEE-WEE-10	101317	2
	L3	1,2	Same as L2				
	L4	1,2	INDUCTOR, Fixed 0.33 µH 10%	06560	4416-7K	101324	1
	Q1	1,2	TRANSISTOR, SINPN 15 V	04713	2N6304	103171	2
	Q2	1,2	TRANSISTOR, JFET N-Channel	17856	2N5564	117184	1
	Q3	1,2	Same as Q1				
	Q4	1,2	TRANSISTOR, SINPN 40 V	04713	2N3906	101378	1
	Q5	1,2	TRANSISTOR, SINPN 25 V	07263	PN3565-18	101371	1
	R1	1,2	RESISTOR, Variable 1 k 20%, 1/2 W	80294	3329W-1-102	101893	2
	R2	1,2	RESISTOR, CC 1.8 Ω 5%, 1/4 W	01121	CB1825	101602	2
	R3	1,2	RESISTOR, CC 2.2 MΩ 5%, 1/4 W	01121	CB2255	101618	1
	R4	1,2	RESISTOR, CC 5.1 k 5%, 1/4 W	01121	CB5125	101541	12
	R5	1,2	Same as R2				

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE	A3, Amp/Prescaler PC Assembly 08306201 (Cont'd)						
ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
	R13	1,2	RESISTOR, CC 68 Ω 5%, 1/4 W	01121	CB6805	101690	2
	R14	1,2	Same as R11				
	R15	1,2	RESISTOR, CC 12 k 5%, 1/4 W	01121	CB1235	101565	1
	R16	1,2	RESISTOR, CC 470 Ω 5%, 1/4 W	01121	CB4715	101625	2
	R17	1,2	RESISTOR, CC 270 Ω 5%, 1/4 W	01121	CB2715	101542	2
	R18	1,2	RESISTOR, CC 3.3 k 5%, 1/4 W	01121	CB3325	101559	2
	R19	1,2	Same as R11				
	R20	1,2	Same as R18				
	R21	1,2	Same as R3				
	R22	1,2	Same as R11				
	R23	1,2	Same as R17				
	R24	1,2	Same as R6				
	R25	1,2	RESISTOR, CC 220 Ω 5%, 1/4 W	01121	CB2215	101566	1
	R26	1,2	RESISTOR, CC 1.5 k 5%, 1/4 W	01121	CB1525	101577	1
	R27	1,2	RESISTOR, CC 680 k 5%, 1/4 W	01121	CB6815	101669	1
	R28	1,2	Same as R10				
	R29	1,2	Same as R16				
	R30	1,2	Same as R13				
	R31	1,2	RESISTOR, CC 22 k 5%, 1/4 W	01121	CB2235	101572	1
	R32	1,2	Same as R12				
	R33	1,2	RESISTOR, CC 4.7 Ω 5%, 1/4 W	01121	CB47G5	101796	1
	R34	1,2	RESISTOR, CC 6.8 k 5%, 1/4 W	01121	CB6825	101544	1
	R35	1,2	Same as R7				
	R36	1,2	RESISTOR, CC 33 k 5%, 1/4 W	01121	CB3335	101576	1
	TP1	1,2	TERMINAL, Press	98921	001-1007	100575	1
	U1	1,2	INTEGRATED CIRCUIT, LIN MSC Differential Volt Comparator	01295	SN72311P	103943	2
	U2	1,2	INTEGRATED CIRCUIT 512 MHz Prescaler	52542	07715702	07715702	1

Used On Code: 1 = 6245B; 2 = 6246B

TITLE A3, Amp/Prescaler PC Assembly 08306201 (Cont'd)

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
	R6	1,2	RESISTOR, CC 100 k 5%, 1/4 W	01121	CB1045	101558	2
	R7	1,2	RESISTOR, CC 4.7 k 5%, 1/4 W	01121	CB4725	101598	2
	R8	1,2	Same as R1				
	R9	1,2	RESISTOR, CC 560 Ω 5%, 1/4 W	01121	CB5615	101583	1
	R10	1,2	Not Used				
	R11	1,2	RESISTOR, CC 100 Ω 5%, 1/4 W	01121	CB1015	101609	4
	R12	1,2	RESISTOR, CC 1 k 5%, 1/4 W	01121	CB1025	101569	2
	R13	1,2	RESISTOR, CC 150 Ω 5%, 1/4 W	01121	CB1515	101615	2
	R14	1,2	Same as R11				
	R15	1,2	RESISTOR, CC 12 k 5%, 1/4 W	01121	CB2235	101572	2
	R16	1,2	RESISTOR, CC 470 Ω 5%, 1/4 W	01121	CB4715	101625	2
	R17	1,2	RESISTOR, CC 270 Ω 5%, 1/4 W	01121	CB2715	101542	2
	R18	1,2	RESISTOR, CC 3.3 k 5%, 1/4 W	01121	CB3325	101559	2
	R19	1,2	Same as R11				
	R20	1,2	Same as R18				
	R21	1,2	RESISTOR, CC 1 MΩ 5%, 1/4 W	01121	CB1055	101605	1
	R22	1,2	Same as R11				
	R23	1,2	Same as R17				
	R24	1,2	Same as R6				
	R25	1,2	RESISTOR, CC 220 Ω 5%, 1/4 W	01121	CB2215	101566	1
	R26	1,2	RESISTOR, CC 1.5 K 5%, 1/4 W	01121	CB1525	101577	1
	R27	1,2	RESISTOR, CC 680 K 5%, 1/4 W	01121	CB6815	101669	1
	R28	1,2	RESISTOR, CC 130 Ω 5%, 1/4 W	01121	CB1315	101627	1
	R29	1,2	Same as R16				
	R30	1,2	RESISTOR, CC 68 Ω 5%, 1/4 W	01121	CB6805	101690	1
	R31	1,2	Same as R15				
	R32	1,2	Same as R12				
	R33	1,2	RESISTOR, CC 4.7 Ω 5%, 1/4 W	01121	CB47G5	101796	1
	R34	1,2	RESISTOR, CC 6.8 k 5%, 1/4 W	01121	CB6825	101544	1
	R35	1,2	Same as R7				

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE A3, Amp/Prescaler PC Assembly 08306201 (Cont'd)

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
	U3	1,2	INTEGRATED CIRCUIT, Divide-by-4 Counter	02735	CA3199	11993501	1
	U4	1,2	Same as U1				
	U5	1,2	INEGRATED CIRCUIT, LIN Diff. Voltage Comparator	24335	AD9685BH	119956	1
	U6	1,2	INTEGRATED CIRCUIT Voltage Regulator	04713	MC79L15ACP	117261	1
	U7	1,2	INTEGRATED CIRCUIT Voltage Regulator	04713	MC78L15ACP	117260	1
147		1,2	CABLE, Coax Assembly	52542	08311701	08311701	1
148		1,2	SCREW, PHMS 4-40 x 5/16	96906	MS51957-14	10062605	2
149		1,2	WASHER, Flat No. 4	86928	5610-21-62	112608	2
150		1,2	FAB, Shield	52542	083069	083069	1
151		1,2	SCREW, PHMS 4-40 x 1/4	96906	MS51957-13	10062604	6
152		1,2	WASHER, Flat No. 4	80205	NAS620-42	100683	8
153		1,2	WASHER, Split No. 4	96906	MS35338-135	100711	8
154		1,2	CONNECTOR, PC	06776	PS-404-40-2	118860	6

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE A3, Amp/Prescaler PC Assembly 08306201 (Cont'd)

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
	R36	1,2	RESISTOR, CC 33 K 5%, 1/4 W	01121	CB3335	101576	1
	R37	1,2	RESISTOR, CC 180 Ω 5%, 1/4 W	01121	CB1815	101668	1
	R38	1,2	Not Used				
	R39	1,2	Same as R13				
	R40	1,2	Not Used				
	R41	1,2	RESISTOR, CC 330 Ω 5%, 1/4 W	01121	CB3315	101536	1
	R42	1,2	RESISTOR, CC 33 Ω 5%, 1/4 W	01121	CB3305	101731	1
	TP1	1,2	TERMINAL, Press	98921	001-1007	100575	1
	U1	1,2	INTEGRATED CIRCUIT, LIN MSC Differential Volt Comparator	01295	SN72311P	103943	2
	U2	1,2	INTEGRATED CIRCUIT 512 MHz Prescaler	52542	07715702	07715702	1
	U3	1,2	INTEGRATED CIRCUIT, Divide-by-4 Counter	02735	CA3199	11993501	1
	U4	1,2	Same as U1				
	U5	1,2	INTEGRATED CIRCUIT, LIN Diff. Voltage Comparator	24335	AD9685BH	119956	1
	U6	1,2	INTEGRATED CIRCUIT Voltage Regulator	04713	MC79L15ACP	117261	1
	U7	1,2	INTEGRATED CIRCUIT Voltage Regulator	04713	MC78L15ACP	117260	1
	U8	1,2	INTEGRATED CIRCUIT Amp Hybrid .1-600 MHz	04713	MWA210	123663	1
	U9	1,2	INTEGRATED CIRCUIT Amp Hybrid	04713	MWA110	116928	1
	U10	1,2	INTEGRATED CIRCUIT Amp Hybrid	04713	MWA120	116929	1
147		1,2	CABLE, Coax Assembly	52542	08311701	08311701	1
150		1,2	FAB, Shield	52542	083069	083069	1
151		1,2	SCREW, PHMS 4-40X1/4	96906	MS51957-13	10062604	6
152		1,2	WASHER, Flat No. 4	80205	NAS620-42	100683	6
153		1,2	WASHER, Split nO. 4	96906	MS35338-135	100711	6
154		1,2	WASHER, Nylon .225ID .363OD .007TH	86928	5622-26-7	101117	3

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE A6, Timebase Logic PC Assembly 08312001 Rev A

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
6		1,2	BOARD, PC	52542	083120	083120	1
	C1	1,2	CAPACITOR, Ceramic .01 µF +80-20%, 100 V	91418	BT0.01P80M20%	100103	2
	C2	1,2	CAPACITOR, DP Ceramic 0.1 µF 20%, 50 V	56289	2C37Z5U104M050B	100178	2
	C3	1,2	CAPACITOR, DM 22 pF 5%, 500 V	72136	DM15ED220J0	100068	1
	C4	1,2	CAPACITOR, Ceramic .001 µF 20%, 1 kV	91418	TYPE B	100076	1
	C5	1,2	Same as C1				
	C6	1,2	Same as C2				
	C7	1,2	CAPACITOR, Tant 1 µF 10%, 35 V	56289	196D105X9035HA1	103716	1
	C8 thru C16	1,2	CAPACITOR, Ceramic .05 µF +80-20%, 12 V	71590	UK10-503	100122	9
	CR1	1,2	DIODE, Signal 50 V	03508	1N4151	100385	3
	CR2	1,2	Same as CR1				
	CR3	1,2	Same as CR1				
	Q1	1,2	TRANSISTOR, SINPN 15 V	07263	PN4275-18	102716	2
	Q2	1,2	Same as Q1				
	Q3	1,2	TRANSISTOR, SIPNP 12 V	07263	PN4258-18	102675	1
	R1	1,2	RESISTOR, CC 120 k 5%, 1/8 W	01121	BB1245	101825	1
	R2	1,2	RESISTOR, CC 12 k 5%, 1/8 W	01121	BB1235	101975	7
	R3	1,2	RESISTOR, CC 470 Ω 5%, 1/4 W	01121	CB4715	101625	2
	R4	1,2	RESISTOR, CC 12 k 5%, 1/4 W	01121	CB1235	101565	2
	R5	1,2	Same as R3				
	R6	1,2	RESISTOR, CC 22 k 5%, 1/8 W	01121	BB2235	101797	2
	R7	1,2	Same as R6				
	R8	1,2	RESISTOR, CC 330 Ω 5%, 1/4 W	01121	CB3315	101536	1
	R9	1,2	RESISTOR, CC 47 Ω 5%, 1/4 W	01121	CB4705	101560	1
	R10	1,2	Same as R3				

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE A6, Timebase Logic PC Assembly 08312001 (Cont'd)

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
	R11	1,2	RESISTOR, CC 100 k 5%, 1/4 W	01121	CB1045	101558	1
	R12	1,2	Not Used				
	R13	1,2	Same as R2				
	R14	1,2	Same as R2				
	R15	1,2	Same as R2				
	R16	1,2	Same as R2				
	R17	1,2	Same as R2				
	R18	1,2	Same as R2				
	R19	1,2	RESISTOR, CC 100 k 5%, 1/8 W	01121	BB1045	101976	2
	R20	1,2	Same as R19				
	R21	1,2	Same as R4				
	U1	1,2	INTEGRATED CIRCUIT, CMOS Dual BCD Up Counter	04713	MC145188BCP	103339	3
	U2	1,2	Not Used				
	U3	1,2	INTEGRATED CIRCUIT, CMOS Hex Inverter Buffer	04713	MC14049UBCP	103217	1
	U4	1,2	INTEGRATED CIRCUIT, CMOS Presettable Binary Counter	01295	MC74LS197N	103165	1
	U5	1,2	INTEGRATED CIRCUIT, TTL MSI Presettable BCD Counter	01295	SN74LS196N	103164	2
	U6	1,2	INTEGRATED CIRCUIT, TTL SSI Dual Retrigger One Shot MV	01295	SN74LS123N	103976	1
	U7	1,2	Same as U1				
	U8	1,2	INTEGRATED CIRCUIT, CMOS Dual Monostable Multiplier	04713	MC14528BCP	045289	1
	U9	1,2	INTEGRATED CIRCUIT, CMOS Quad 2-Input NAND Gate	04713	MC14011BCP	103937	2
	U10	1,2	Same as U5				
	U11	1,2	INTEGRATED CIRCUIT, TTL SSI Quad 2-Input NAND Gate	01295	SN74LS00N	103130	3
	U12	1,2	Same as U1				
	U13	1,2	INTEGRATED CIRUCIT, COMS 8-Channel Data Selector	04713	MC14512BCP	103942	
	U14	1,2	Same as U11				
	U15	1,2	INTEGRATED CIRCUIT, TTL SSI 3 3-Input NAND Gate	01295	SN74LS10N	103968	1
	U16	1,2	Same as U9				
	U17	1,2	Same as U11				
	U18	1,2	RESISTOR, Module 4-12 k	52542	045008	045008	2
	U19	1,2	Same as U18				

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE A7, Counter Logic PC Assembly 06760101 Rev C

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
6		1,2	BOARD, PC	52542	067601	067601	1
	C1	1,2	CAPACITOR, Tant 4.7 µF 20%, 20 V	56289	196D475X0035JA1	106513	1
	C2	1,2	CAPACITOR, Ceramic .01 µF +80-20%, 100 V	91418	BT0.01P80M20%	100103	5
	C3	1,2	Same as C2				
	C4	1,2	Same as C2				
	C5	1,2	Same as C2				
	C6	1,2	CAPACITOR, Ceramic .001 µF 20%, 1 kV	91418	TYPE B	100076	1
	C7	1,2	CAPACITOR, Tant 1 µF 10%, 35 V	56289	196D105X9035HA1	103716	3
	C8	1,2	Same as C2				
	C9	1,2	Same as C7				
	C10	1,2	Same as C7				
	C11 thru C19	1,2	CAPACITOR, Ceramic .05 µF +80-20%, 12 V	71590	UK10-503	100122	9
	C20	1,2	CAPACITOR, DP Ceramic 0.01 µF 20%, 100 V	04222	SR201C103MAA	117570	2
	C21	1,2	Same as C20				
	CR1	1,2	DIODE, Signal 50 V	03508	1N4151	100385	3
	CR2	1,2	Same as CR1				
	CR3	1,2	Same as CR1				
	R1	1,2	RESISTOR, CC 15 k 5%, 1/8 W	01121	BB1535	101698	3
	R2	1,2	Same as R1				
	R3	1,2	RESISTOR, CC 220 Ω 5%, 1/8 W	01121	BB2215	101798	1
	R4	1,2	RESISTOR, CC 150 Ω 5%, 1/8 W	01121	BB1515	101702	1
	R5	1,2	RESISTOR, CC 390 Ω 5%, 1/8 W	01121	BB3915	101708	1
	R6	1,2	RESISTOR, CC 130 Ω 5%, 1/8 W	01121	BB1315	101914	1
	R7	1,2	RESISTOR, CC 12 k 5%, 1/8 W	01121	BB1235	101975	8
	R8	1,2	RESISTOR, CC 82 Ω 5%, 1/8 W	01121	BB8205	101800	1
	R9	1,2	RESISTOR, CC 1 k 5%, 1/8 W	01121	BB1025	101711	6
	R10	1,2	Same as R7				

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE A7, Counter Logic PC Assembly 06760101 (Cont'd)

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
	R11	1,2	Same as R9				
	R12	1.2	RESISTOR, CC 10 k 5%, 1/8 W	01121	BB1035	101697	4
	R13	1,2	RESISTOR, CC 3.9 k 5%, 1/4 W	01121	BB3925	101714	2
	R14	1,2	Same as R9				
	R15	1,2	RESISTOR, CC 100 k 5%, 1/8 W	01121	BB1045	101976	3
	R16	1,2	Same as R1				
	R17	1,2	RESISTOR, CC 47 Ω 5%, 1/8 W	01121	BB4705	101707	1
	R18	1,2	Same as R12				
	R19	1,2	RESISTOR, CC 22 k 5%, 1/8 W	01121	BB2235	101797	4
	R20	1,2	Same as R7				
	R21	1,2	Same as R19				
	R22	1,2	Same as R19				
	R23	1,2	Same as R12				
	R24	1,2	Same as R19				
	R25	1,2	Same as R7				
	R26	1,2	Not Used				
	R27	1,2	Same as R15				
	R28	1,2	Same as R9				
	R29	1,2	Same as R15				
	R30	1,2	RESISTOR, CC 470 k 5%, 1/8 W	01121	BB4745	101955	1
	R31	1,2	Same as R13				
	R32	1,2	Same as R9				
	R33	1,2	Same as R7				
	R34	1,2	Same as R7				
	R35	1,2	Same as R7				
	R36	1,2	RESISTOR, CC 560 Ω 5%, 1/8 W	01121	BB5615	101710	1
	R37	1,2	Same as R9				
	R38	1,2	Same as R12				
	R39	1,2	Same as R7				
	U1	1,2	INTEGRATED CIRCUIT, TTL SSI Quad 2-Input OR Gate	01295	SN74LS32N	103972	1
	U2	1,2	INTEGRATED CIRCUIT, CMOS Dual Monostable Multiplier	04713	MC14528BCP	045289	2

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE A7, Counter Logic PC Assembly 06760101 (Cont'd)

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
	U3	1,2	Same as U2				
	U4	1,2	INTEGRATED CIRCUIT, LIN MSC Wide Range Timer	18324	NE555V	045208	1
	U5	1,2	INTEGRATED CIRCUIT, ECL Dual D M-S Flip-Flop	04173	MC10131P	045239	1
	U6	1,2	INTEGRATED CIRCUIT, LIN MSC Differential Volt Comparator	01295	SN72311P	103943	2
	U7	1,2	Same as U6				
	U8	1,2	INTEGRATED CIRCUIT, ECL MSI 2 5 Counter >100 MHz	04713	MC10138P	103837	1
	U9	1,2	INTEGRATED CIRCUIT, TTL SSI Hex Inverter	01295	SN74LS05N	116113	1
	U10	1,2	INTEGRATED CIRCUIT, CMOS Quad 2-Input AND Gate	04713	MC14081BCP	116101	1
	U11	1,2	INTEGRATED CIRCUIT, TTL SSI Quad 2-Input AND Gate	01295	SN74LS08N	103967	1
	U12	1,2	INTEGRATED CIRCUIT, TTL MSI Presettable BCD Counter	01295	SN74LS196N	103164	1
	U13	1,2	INTEGRATED CIRCUIT, ECL Quad TTL to ECL Translator	04713	MC10124L	045228	1
	U14	1,2	INTEGRATED CIRCUIT, ECL Quad Translator	04713	MC10125L	045226	1
	U15	1,2	INTEGRATED CIRCUIT, ECL 4 2-Input NOR Gate	04713	MC10100P	103712	1
	U16	1,2	INTEGRATED CIRCUIT Resistor Modual 4-12 k	52542	045008	045008	4
	U17	1,2	Same as U16				
	U18	1,2	Same as U16				
	U19	1,2	Same as U16				

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE A8, Display Logic PC Assembly 06769402 Rev A

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
6		1,2	BOARD, PC	52542	067694	067694	1
	C1	1,2	CAPACITOR, Tant 1 µF 10%, 35 V	56289	196D105X9035HA1	103716	1
	C2	1,2	CAPACITOR, Ceramic .01 µF 20%, 50 V	71590	UK50-103	117351	1
	C3	1,2	CAPACITOR, DM 22 pF 5%, 500 V	72136	DM15ED220JO	100068	2
	C4	1,2	Same as C3				
	C5	1,2	CAPACITOR, Tant 220 µF 10%, 10 V	56289	196D227X9010TA1	103497	1
	C6 thru C9	1,2	CAPACITOR, Ceramic .05 µF +80-20%, 12 V	71590	UK10-503	100122	4
	CR1	1,2	DIODE, Signal 50 V	03508	1N4151	100385	3
	CR2	1,2	Same as CR1				
	CR3	1,2	Same as CR1				
	R1	1,2	RESISTOR, CC 56 k 5%, 1/4 W	01121	BB5635	101823	1
	R2	1,2	RESISTOR, CC 100 k 5%, 1/8 W	01121	BB1045	101976	2
	R3	1,2	Same as R2				
	R4	1,2	RESISTOR, CC 12 k 5%, 1/8 W	01121	BB1235	101975	1
	R5	1,2	RESISTOR, CC 10 k 5%, 1/8 W	01121	BB1035	101697	2
	R6	1,2	Same as R5				
	R7 thru R13	1,2	RESISTOR, CC 47 Ω 5%, 1/8 W	01121	BB4705	101707	7
	U1	1,2	INTEGRATED CIRCUIT, CMOS Inverted Buffer	04713	MC14050BCP	103492	1
	U2	1,2	INTEGRATED CIRCUIT, CMOS 4-bit AND/OR Selector	04713	MC145198CP	045288	2
	U3	1,2	INTEGRATED CIRCUIT, CMOS Quad 2-Input AND Gate	04713	MC14081BCP	116101	1
	U4	1,2	INTEGRATED CIRCUIT, CMOS Hex Inverter Buffer	04713	MC14049UBCP	103217	3
	U5	1,2	Same as U4				
	U6	1,2	Same as U4				
	U7	1,2	INTEGRATED CIRCUIT, MOS Counter Latch	55261	LS7030	117851	1

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE A8, Display Logic PC Assembly 06769402 (Cont'd)

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
	U8	1,2	INTEGRATED CIRCUIT, LIN MSC Wide Range Timer	18324	NE555V	045208	1
	U9	1,2	INTEGRATED CIRCUIT, TTL MIS BCD 7-Segment Decoder	01295	SN74247N	103314	1
	U10	1,2	INTEGRATED CIRCUIT, CMOS 2-4 Bit Latch	04713	MC14508BCP	117257	1
	U11	1,2	INTEGRATED CIRCUIT, CMOS 3 3-Input AND Gate	02735	MC14073BE	103941	1
	U12	1,2	Same as U4				
	U13	1,2	INTEGRATED CIRCUIT, CMOS 4 2-Input Ex NOR Gate	04713	MC14077B	117672	1
	U14	1,2	INTEGRATED CIRCUIT, CMOS BCD Presettable Up-Down Ctr	04713	MC14510BCP	045287	1
	XU7	1,2	SOCKET, IC 40-pin	73803	C88-40-01	117159	1
	XU10	1,2	SOCKET, IC 24-pin	73803	C84-24-02	103845	1
57		1,2	CONNECTOR, Pin	30146	929838-01-13	117889	1

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE A10, FLACTO Logic PC Assembly 06759901 Rev F

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
6		1,2	BOARD, PC	52542	067599	067599	1
	C1	1,2	CAPACITOR, Tant 1 µF 10%, 35 V	56289	196D105X9035HA1	103716	1
	C2	1,2	CAPACITOR, Mica 100 pF, 5%	72136	DM15FD101JG	100173	2
	C3	1,2	CAPACITOR, Ceramic .1 µF +80-20%, 10 V	71590	UK10-104	100120	1
	C4	1,2	CAPACITOR, Ceramic 1000 pF 20%, 50 V	71590	CW15C102M	100251	7
	C5	1,2	CAPACITOR, Mica 33 pF 5%, 500 V	72136	DM15ED330J0	100175	1
	C6	1,2	Same as C4				
	C7	1,2	Same as C4				
	C8	1,2	Same as C4				
	C9 thru C15	1,2	CAPACITOR, Ceramic .05 µF +80-20%, 12 V	71590	UK10-503	100122	10
	C16	1,2	Same as C4				
	C17	1,2	Same as C4				
	C18	1,2	CAPACITOR, Tant 10 µF 10%, 20 V	56289	150D106X9020B2	100063	1
	C19	1,2	CAPACITOR, Tant 100 µF 20%, 10 V	56289	150D107X9010R2	100119	1
	C20	1,2	Same as C9				
	C21	1,2	Same as C9				
	C22	1,2	Same as C2				
	C23	1,2	Same as C4				
	CR1	1,2	DIODE, Signal 50 V	03508	1N4151	100385	4
	CR2	1,2	Same as CR1				
	CR3	1,2	Same as CR1				
	CR4	1,2	Same as CR1				
	J1	1,2	CONNECTOR, RF Rectangular	98291	51-053-0000	103173	1
	Q1	1,2	TRANSISTOR, SINPN 40 V	04713	2N3906	101378	4
	Q2	1,2	TRANSISTOR, SINPN 15 V	07263	PN4275-18	102716	3
	Q3	1,2	Same as Q2				
	Q4	1,2	Same as Q1				
	Q5	1,2	Same as Q2				

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE A10, FLACTO Logic PC Assembly 06759901 (Cont'd)

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
	R1	1,2	RESISTOR, CC 2.0 M 5%, 1/8 W	01121	BB2205	101959	1
	R2	1,2	RESISTOR, CC 10 k 5%, 1/8 W	01121	BB1035	101697	14
	R3	1,2	RESISTOR, CC 6.8 k 5%, 1/8 W	01121	BB6825	101716	1
	R4	1,2	RESISTOR, CC 1 k 5%, 1/8 W	01121	BB1025	101711	4
	R5	1,2	Same as R2				
	R6	1,2	Same as R4				
	R7	1,2	RESISTOR, CC 4.7 k 5%, 1/8 W	01121	BB4725	101792	2
	R8	1,2	Same as R2				
	R9	1,2	RESISTOR, CC 390 Ω 5%, 1/8 W	01121	BB3915	101708	1
	R10	1,2	Same as R2				
	R11	1,2	Same as R2				
	R12	1,2	Same as R2				
	R13	1,2	RESISTOR, CC 1 M 5%, 1/8 W	01121	BB1055	101695	1
	R14	1,2	Same as R2				
	R15	1,2	Same as R2				
	R16	1,2	Same as R7				
	R17	1,2	Same as R2				
	R18	1,2	RESISTOR, Variable 10 k 20%, 1/2 W	80294	3329W-1-103	101937	1
	R19	1,2	RESISTOR, CC 2.7 k 5%, 1/8 W	01121	BB2725	101803	1
	R20	1,2	Same as R2				
	R21	1,2	RESISTOR, CC 100 k 5%, 1/8 W	01121	BB1045	101976	1
	R22	1,2	RESISTOR, CC 100 Ω 5%, 1/8 W	01121	BB1015	101701	2
	R23	1,2	Same as R2				
	R24	1,2	RESISTOR, CC 470 Ω 5%, 1/8 W	01121	BB4715	101709	3
	R25	1,2	Same as R2				
	R26	1,2	RESISTOR, CC 56 k 5%, 1/4 W	01121	BB5635	101823	1
	R27	1,2	Same as R4				
	R28	1,2	RESISTOR, CC 3.0 k 5%, 1/8 W	01121	BB3025	101913	1

Used On Code: 1 = 6245B; 2 = 6246B

TITLE A10, FLACTO Logic PC Assembly 06759901 (Cont'd)

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
	R29	1,2	RESISTOR, CC 3.3 k 5%, 1/8 W	01121	BB3325	101713	1
	R30	1,2	RESISTOR, CC 220 Ω 5%, 1/8 W	01121	BB2215	101798	2
	R31	1,2	Same as R22				
	R32	1,2	Same as R30				
	R33	1,2	RESISTOR, CC 220 k 5%, 1/8 W	01121	BB2245	102040	1
	R34	1,2	RESISTOR, CC 330 Ω 5%, 1/8 W	01121	BB3315	101704	7
	R35	1,2	Same as R34				
	R36	1,2	Same as R34				
	R37	1,2	Same as R34				
	R38	1,2	Same as R2				
	R39	1,2	Same as R4				
	R40	1,2	Same as R24				
	R41	1,2	Same as R24				
	R42	1,2	Same as R2				
	R43	1,2	RESISTOR, CC 18 k 5%, 1/8 W	01121	BB1835	101699	2
	R44	1,2	Same as R43				
	R45	1,2	Same as R34				
	R46	1,2	Same as R34				
	R47	1,2	Same as R34				
	U1	1,2	INTEGRATED CIRCUIT, TTL SSI Quad 2-Input OR Gate	01295	SN74LS32N	103972	1
	U2	1,2	INTEGRATED CIRCUIT, CMOS Quad 2-Input AND Gate	04713	MC14081BCP	116101	2
	U3	1,2	INTEGRATED CIRCUIT, CMOS Quad 2-Input OR Gate	04713	MC14071BCP	103940	1
	U4	1,2	INTEGRATED CIRCUIT, CMOS Dual D Flip-Flop	04713	MC14013BCP	103199	4
	U5	1,2	Same as U4				
	U6	1,2	INTEGRATED CIRCUIT, ECL Dual D M-S Flip/Flop	04713	MC10231L	045227	3
	U7	1,2	INTEGRATED CIRCUIT, TTL SSI Dual D Flip-Flop	01295	SN74LS74AN	103132	1
	U8	1,2	INTEGRATED CIRCUIT, CMOS Hex Inverter Buffer	02735	MC14049BCP	103717	2

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE A10, FLACTO Logic PC Assembly 06759901 (Cont'd)

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
	U9	1,2	INTEGRATED CIRCUIT, CMOS Programmable 1/N	04713	MC14526BCP	117144	2
	U10	1,2	Same as U2				
	U11	1,2	Same as U4				
	U12	1,2	Same as U4				
	U13	1,2	Same as U6				
	U14	1,2	INTEGRATED CIRCUIT, TTL SSI Sync Binary Up/Down Counter	01295	SN74LS191N	103982	2
	U15	1,2	Same as U14				
	U16	1,2	Same as U9				
	U17	1,2	INTEGRATED CIRCUIT, CMOS 12 Bit Binary Counter	04713	MS14040BCP	117143	1
	U18	1,2	Same as U8				
	U19	1,2	INTEGRATED CIRCUIT, CMOS Dual 4-Bit Up Counter	04713	MC14520BCP	117278	1
	U20	1,2	INTEGRATED CIRCUIT, ECL Quad 2-Input NOR Gate	04713	MC10102P	103025	1
	U21	1,2	INTEGRATED CIRCUIT, LIN MSC Diff. Volt Comparator	01295	SN72311P	103943	3
	U22	1,2	Same as U21				
	U23	1,2	Same as U21				
	U24	1,2	INTEGRATED CIRCUIT, LIN MSC Wide Range Timer	18324	NE555V	045208	1
	U25	1,2	INTEGRATED CIRCUIT, TTL SSI Dual Retrigger One Shot MV	01295	SN74LS123N	103976	1
	U26	1,2	Same as U6				
120		1,2	TERMINAL, Press	98921	001-1007	100575	2

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE A11, LO/Shifter PC Assembly 06759802 Rev A

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
6		1,2	BOARD, PC	52542	067598	067598	1
	C1	1,2	CAPACITOR, DM 220 pF 5%, 500 V	72136	DM15FD221J0	100220	2
	C2	1,2	CAPACITOR, Ceramic .033 µF 20%, 25V	71590	UK25-333	100333	1
	C3	1,2	CAPACITOR, Mica 56 pF 5%, 500 V	72136	DM15ED560J0	100179	1
	C4	1,2	CAPACITOR, Mica 100 pF 5%, 500 V	72136	DM15FD101J0	100173	2
	C5	1,2	Same as R4				
	C6	1,2	CAPACITOR, Ceramic 1000 pF 20%, 50 V	71590	CW15C102M	100251	12
	C7	1,2	Not Used				
	C8	1,2	Same as C6				
	C9	1,2	CAPACITOR, DM 150 pF 5%, 500 V	72136	DM15FD221J0	100219	2
	C10	1,2	Same as C6				
	C11	1,2	Same as C6				
	C12	1,2	Same as C6				
	C13	1,2	CAPACITOR, Tant 100 µF 20%, 10 V	56289	150D107X9010R2	100119	3
	C14	1,2	CAPACITOR, Chip 0.056 µF 20%, 100 V	96733	SB31BX563MP	100257	2
	C15	1,2	CAPACITOR, Variable 1-5 pF 100 V	72982	513-012A1-5	103935	1
	C16	1,2	CAPACITOR, Tant 1 µF 10%, 35 V	56289	150D105X9035A2	100082	2
	C17	1,2	Same as C16				
	C18	1,2	CAPACITOR, Ceramic .01 µF 20%, 50 V	71590	UK50-103	117351	1
	C19	1,2	Same as C1				
	C20	1,2	CAPACITOR, Mica 2000 pF 5%, 500 V	72136	DM19FD202J0	100117	1
	C21	1,2	CAPACITOR, Ceramic 4700 pF 20%, 500 V	59660	801-000-Z5U-472M	100077	1
	C22	1,2	Same as C6				
	C23	1,2	CAPACITOR, Ceramic .1 µF +80-20%, 10 V	71590	UK10-104	100120	6
	C24	1,2	Same as C13				
	C25	1,2	Same as C23				

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE A11, LO/Shifter PC Assembly 06759802 (Cont'd)

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
	C26	1,2	Same as C23				
	C27	1,2	Same as C6				
	C28	1,2	Same as C6				
	C29	1,2	Same as C13				
	C30	1,2	CAPACITOR, DP Ceramic 0.1 µF 20%, 50 V	56289	2C37Z5U104M050B	100178	1
	C31	1,2	Same as C6				
	C32	1,2	Same as C23				
	C33	1,2	Same as C23				
	C34	1,2	Same as C6				
	C35	1,2	Same as C23				
	C36	1,2	Same as C9				
	C37	1,2	Same as C6				
	C38	1,2	Same as C14				
	C39	1,2	Same as C6				
	CR1	1,2	DIODE, Signal 70 V	28480	5082-2800	100442	2
	CR2	1,2	DIODE, Signal 50 V	03508	1N4151	100385	4
	CR3	1,2	Same as CR2				
	CR4	1,2	Same as CR1				
	CR5	1,2	DIODE, Variable	04713	SMV1266	100453	1
	CR6	1,2	Not Used				
	CR7	1,2	Same as CR2				
	CR8	1,2	Same as CR2				
	L1	1,2	INDUCTOR, Wire Loop	52542	067831	067831	1
	L2	1,2	INDUCTOR, Fixed 270 µH		DKM-270	117094	2
	L3	1,2	Same as L2				
	L4	1,2	CORE, Toroi	02114	56-590-65/3B	100686	1
	L5	1,2	INDUCTOR, Bead Mod	52542	112420	112420	2
	L6	1,2	Same as L5				
	Q1	1,2	TRANSISTOR, SINPN 20 V	02735	2N5109	106591	2
	Q2	1,2	Same as Q1				
	Q3	1,2	TRANSISTOR, JFET N-Channel	01295	2N4393	101417	1
	Q4	1,2	TRANSISTOR, SINPN	04713	MPS-A12	101396	1
	Q5	1,2	TRANSISTOR, SINPN 40 V	04713	2N3906	101378	1
	Q6	1,2	TRANSISTOR, SINPN 12 V	04713	2N5179	101388	11
	Q7	1,2	TRANSISTOR, SINPN 40 V	04713	2N3904	101377	1

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE	A11, LO/Shifter PC Assembly 06759802 (Cont'd)						
ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
	R1	1,2	RESISTOR, CC 56 k 5%, 1/4 W	01121	CB5635	101670	2
	R2	1,2	RESISTOR, CC 10 k 5%, 1/8 W	01121	BB1035	101697	4
	R3	1,2	Same as R2				
	R4	1,2	RESISTOR, CC 680 Ω 5%, 1/8 W	01121	BB6815	101972	1
	R5	1,2	RESISTOR, CC 6.8 k 5%, 1/8 W	01121	BB6825	101716	1
	R6	1,2	RESISTOR, CC 100 k 5%, 1/8 W	01121	BB1045	101976	2
	R7	1,2	RESISTOR, CC 120 k 5%, 1/4 W	01121	CB1245	101580	1
	R8	1,2	RESISTOR, CC 110 k 5%, 1/4 W	01121	CB1145	101617	1
	R9	1,2	RESISTOR, CC 120 k 5%, 1/8 W	01121	BB1245	101825	1
	R10	1,2	RESISTOR, CC 47 Ω 5%, 1/4 W	01121	CB4735	101574	1
	R11	1,2	RESISTOR, Variable 10 k 10%, .5 W	80294	3299P-1-103	117974	1
	R12	1,2	Same as R6				
	R13	1,2	RESISTOR, CC 56 k 5%, 1/4 W	01121	BB5635	101823	
	R14	1,2	RESISTOR, Variable 100 k 20%, 1/2 W	80294	3329W-1-104	101934	1
	R15	1,2	RESISTOR, CC 1 k 5%, 1/8 W	01121	BB1025	101711	2
	R16	1,2	Same as R2				
	R17	1,2	RESISTOR, CC 33 k 5%, 1/4 W	01121	CB3335	101576	2
	R18	1,2	Same as R17				
	R19	1,2	RESISTOR, CC 680 k 5%, 1/4 W	01121	CB6845	101675	1
	R20	1,2	RESISTOR, CC 10 k 5%, 1/4 W	01121	CB1035	101570	2
	R21	1,2	RESISTOR, CC 22 k 5%, 1/4 W	01121	CB2235	101572	1
	R22	1,2	RESISTOR, CC 13 k 5%, 1/4 W	01121	CB1335	101594	1
	R23	1,2	RESISTOR, CC 100 Ω 5%, 1/4 W	01121	CB1015	101609	5

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE A11, LO/Shifter PC Assembly 06759802 (Cont'd)

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
	R24	1,2	RESISTOR, CC 330 Ω 5%, 1/4 W	01121	CB3315	101536	8
	R25	1,2	RESISTOR, CC 330 Ω 5%, 1/8 W	01121	BB3315	101704	2
	R26	1,2	Same as R25				
	R27	1,2	Same as R24				
	R28	1,2	Same as R24				
	R29	1,2	RESISTOR, CC 270 Ω 5%, 1/8 W	01121	BB2715	101703	2
	R30	1,2	RESISTOR, CC 470 Ω 5%, 1/4 W	01121	CB4715	101625	4
	R31	1,2	Same as R30				
	R32	1,2	Same as R29				
	R33	1,2	Same as R24				
	R34	1,2	RESISTOR, CC 180 Ω 5%, 1/4 W	01121	CB1815	101668	1
	R35	1,2	RESISTOR, CC 18 Ω 5%, 1/8 W	01121	CB1805	101727	1
	R36	1,2	RESISTOR, Variable 50 Ω 20%, .5 W	80294	3386H-1-500	117934	1
	R37	1,2	RESISTOR, CC 220 Ω 5%, 1/4 W	01121	CB2215	101566	1
	R38	1,2	RESISTOR, Variable 10 k 20%, 1/2 W	80294	3329W-1-103	101937	3
	R39	1,2	RESISTOR, CC 4.7 k 5%, 1/4 W	01121	CB4725	101598	4
	R40	1,2	Same as R38				
	R41	1,2	Same as R39				
	R42	1,2	RESISTOR, CC 2.7 k 5%, 1/4 W	01121	CB2725	101599	2
	R43	1,2	Same as R42				
	R44	1,2	RESISTOR, CC 220 Ω 5%, 1/8 W	01121	BB2215	101798	4
	R45	1,2	Same as R44				
	R46	1,2	Same as R44				
	R47	1,2	Same as R44				
	R48	1,2	Same as R24				
	R49	1,2	Same as R24				
	R50	1,2	Same as R23				
	R51	1,2	Same as R23				
	R52	1,2	Same as R23				

Used On Code: 1 = 6245B; 2 = 6246B

TITLE A11, LO/Shifter PC Assembly 06759802 (Cont'd)

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
	R53	1,2	Same as R23				
	R54	1,2	Same as R24				
	R55	1,2	Same as R24				
	R56	1,2	Same as R30				
	R57	1,2	Same as R30				
	R58	1,2	Same as R20				
	R59	1,2	Same as R2				
	R60	1,2	RESISTOR, CC 8.2 k 5%, 1/8 W	01121	BB8225	101799	2
	R61	1,2	Same as R38				
	R62	1,2	Same as R39				
	R63	1,2	RESISTOR, CC 220 k 5%, 1/4 W	01121	CB2235	101610	2
	R64	1,2	Same as R63				
	R65	1,2	RESISTOR, CC 16 k %, 1/4 W	01121	CB1635	101593	1
	R66	1,2	RESISTOR, CC 1.5 k 5%, 1/4 W	01121	CB1525	101577	1
	R67	1,2	Same as R39				
	R68	1,2	Same as R15				
	R69	1,2	RESISTOR, CC 1 k 5%, 1/4 W	01121	CB1025	101569	1
	R70	1,2	Same as R1				
	R71	1,2	RESISTOR, CC 27 k 5%, 1/8 W	01121	BB2735	101952	1
	R72	1,2	RESISTOR, Variable 1 k 20%, 1/2 W	80294	3329W-1-102	101893	2
	R73	1,2	RESISTOR, CC 330 k 5%, 1/8 W	01121	BB3345	102014	1
	R74	1,2	Not Used				
	R75	1,2	RESISTOR, CC 4.7 k 5%, 1/8 W	01121	BB4725	101742	1
	R76	1,2	RESISTOR, CC 47 Ω 5%, 1/8 W	01121	BB4705	101707	1
	R77	1,2	RESISTOR, CC 12 Ω 5%, 1/4W	01121	CB1205	101756	1
	R78	1,2	RESISTOR, CC 180 Ω 5%, 1/8 W	01121	BB1815	101720	1
	R79	1,2	RESISTOR, CC 130 Ω 5%, 1/8 W	01121	BB1315	101914	1
	R80	1,2	RESISTOR, CC 100 Ω 5%, 1/8 W	01121	BB1015	101701	2

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE A11, LO/Shifter PC Assembly 06759802 (Cont'd)

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
	R81	1,2	RESISTOR, CC 18 Ω 5%, 1/8 W	01121	CB1805	101727	1
	R82	1,2	RESISTOR, CC 270 Ω 5%, 1/4 W	01121	CB2715	101542	1
	R83	1,2	Same as R72				
	R84	1,2	RESISTOR, CC 150 Ω 5%, 1/8 W	01121	BB1515	101702	1
	R85	1,2	Same as R80				
	R86	1,2	RESISTOR, CC 33 Ω 5%, 1/8 W	01121	BB3305	101811	1
	U1	1,2	INTEGRATED CIRCUIT, ECL SSI Triple Line Receiver	04713	MC10216L	045276	2
	U2	1,2	INTEGRATED CIRCUIT, ECL Dual D M-S Flip/Flop	04713	MC10231L	045227	1
	U3	1,2	INTEGRATED CIRCUIT, LIN MSC Differential Volt Comparator	01295	SN72311P	103943	3
	U4	1,2	INTEGRATED CIRCUIT Operational Amplifier	02735	CA3130T	103231	2
	U5	1,2	Same as U3				
	U6	1,2	INTEGRATED CIRCUIT, ECL 3-Exclusive OR/NOR Gate	04713	MC10107P	103179	1
	U7	1,2	Same as U1				
	U8	1,2	Same as U4				
	U9	1,2	INTEGRATED CIRCUIT Operational Amplifier	27014	LM324N	103198	1
	U10	1,2	Same as U3				
	U11	1,2	INTEGRATED CIRCUIT Operational Amplifier	27014	LM201AH	025758	1
181		1,2	TERMINAL, Press	98921	001-1007	100575	3
183		1,2	TIE, Cable	96906	MS3367-4-9	100753	1
184		1,2	JUMPER	55210	L-2007-1	102879	2
186		1,2	ASSEMBLY, Coax Cable	52542	06783001	06783001	3
187		1,2	ASSEMBLY, Coax Cable	52542	06783003	06783003	1
192		1,2	ASSEMBLY, Coax Cable	52542	08313501	08313501	1

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE A12, LIF/NIF PC Assembly 06759701 Rev G

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
6		1,2	BOARD, PC	52542	067597	067597	1
	C1	1,2	CAPACITOR, Tant 1 µF 10%, 35 V	56289	196D105X9035HA1	103716	9
	C2	1,2	Same as C1				
	C3	1,2	CAPACITOR, DP Ceramic 0.1 µF 20%, 50 V	56289	2C37Z5U104M050B	100178	11
	C4	1,2	CAPACITOR, Ceramic 1000 pF 20%, 50 V	71590	CW15C102M	100251	4
	C5	1,2	Same as C1				
	C6	1,2	Same as C3				
	C7	1,2	Same as C3				
	C8	1,2	Same as C3				
	C9	1,2	CAPACITOR, Mica 47 pF 5%, 500 V	72136	DM15ED470J0	100171	1
	C10	1,2	Not Used				
	C11	1,2	CAPACITOR, DM 330 pF 5%, 500 V	72136	DM15FD331J0	100276	2
	C12	1,2	Same as C1				
	C13	1,2	CAPACITOR, Ceramic .01 µF 20%, 50 V	71590	UK50-103	117351	2
	C14	1,2	Same as C1				
	C15	1,2	CAPACITOR, Ceramic 2200 pF 20%, 200V	32159	RH06CX222M	100124	1
	C16	1,2	CAPACITOR, DM 82 pF 5%, 500 V	72136	DM15ED820J0	100172	1
	C17	1,2	Not Used				
	C18	1,2	Same as C4				
	C19	1,2	CAPACITOR, Ceramic 0.1 µF 10%, 50 V	32159	G505BX104K	100155	1
	C20	1,2	Same as C1				
	C21	1,2	Same as C3				
	C22	1,2	Same as C4				
	C23	1,2	Same as C4				
	C24	1,2	Same as C13				
	C25	1,2	Same as C3				
	C26	1,2	Same as C3				
	C27	1,2	CAPACITOR, DM 33 PF 5%, 500 V	71236	DM15ED330J0	100175	1
	C28	1,2	Same as C1				
	C29	1,2	Same as C3				
	C30	1,2	Same as C3				

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE A12, LIF/NIF PC Assembly 06759701 (Cont'd)

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
	C31	1,2	CAPACITOR, DM 68 pF 5%, 500 V	72136	DM15ED680J0	100239	1
	C32	1,2	Same as C1				
	C33	1,2	Same as C1				
	C34	1,2	CAPACITOR, Ceramic .1 µF +80-20%, 10 V	71590	UK10-104	100120	2
	C35	1,2	CAPACITOR, Variable 7-40 pF	72982	518-000G7-40	117855	2
	C36	1,2	Same as C35				
	C37	1,2	Same as C11				
	C38	1,2	Same as C34				
	C39	1,2	CAPACITOR, Ceramic .001 µF 20%, 1 kV	91418	TYPE B	100076	1
	C40	1,2	Same as C3				
	C41	1,2	Same as C3				
	CR1	1,2	DIODE, Signal 70 V	28480	5082-2800	100442	2
	CR2	1,2	Same as CR1				
	CR3	1,2	Not Used				
	CR4	1,2	DIODE, Signal 50 V	03508	1N4151	100385	1
	L1	1,2	INDUCTOR, Fixed 100 µH 10%	00213	WEE-WEE-100	101320	2
	L2	1,2	INDUCTOR, Fixed 1.2 µH, 10%	00213	WEE-1.2	103334	1
	L3	1,2	INDUCTOR, Fixed 6.8 µH 10%	00213	WEE-6.8	101300	1
	L4	1,2	INDUCTOR, Fixed 1.5 µH	00213	WEE-WEE-1.5	101326	1
	L5	1,2	INDUCTOR, Fixed 1000 µH 5%	00213	WEE-1000	101303	2
	L6	1,2	INDUCTOR, Fixed 1.8 µH	00213	WEE-WEE-10	103187	1
	L7	1,2	INDUCTOR, Fixed 10 µH 10%	00213	WEE-WEE-10	101317	2
	L8	1,2	Same as L1				
	L9	1,2	INDUCTOR, Fixed 470 µH 10%	00213	WEE-WEE-470	101321	1
	L10	1,2	Same as L7				
	L11	1,2	Same as L5				
	Q1	1,2	TRANSISTOR, SINPN 15 V	07263	PN4275-18	102716	2
	Q2	1,2	Same as Q1				
	Q3	1,2	TRANSISTOR, SIPNP 12 V	07263	PN4258-18	102675	2
	Q4	1,2	TRANSISTOR, SINPN 40 V	04713	2N3904	101377	1
	Q5	1,2	Same as Q3				
	R1	1,2	RESISTOR, CC 100 Ω 5%, 1/4 W	01121	CB1015	101609	2
	R2	1,2	RESISTOR, CC 180 Ω 5%, 1/8 W	01121	BB1815	101720	1

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE A12, LIF/NIF PC Assembly 06759701 (Cont'd)

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
	R3	1,2	RESISTOR, CC 1.8 k 5%, 1/8 W	01121	BB1825	101712	2
	R4	1,2	RESISTOR, CC 3.9 k 5%, 1/4 W	01121	BB3925	101714	3
	R5	1,2	RESISTOR, CC 220 Ω 5%, 1/8 W	01121	BB2215	101798	3
	R6	1,2	RESISTOR, CC 100 Ω 5%, 1/8 W	01121	BB1015	101701	3
	R7	1,2	RESISTOR, Variable 500 Ω 20%, 1/2 W	80294	3329H-1-101	101910	1
	R8	1,2	Same as R6				
	R9	1,2	RESISTOR, CC 22 Ω 5%, 1/8 W	01121	BB2205	101706	1
	R10	1,2	RESISTOR, CC 330 Ω 5%, 1/8 W	01121	BB3315	101704	1
	R11	1,2	RESISTOR, CC 270 Ω 5%, 1/4 W	01121	CB2745	101769	1
	R12	1,2	RESISTOR, CC 27 k 5%, 1/8 W	01121	BB2735	101952	1
	R13	1,2	RESISTOR, CC 470 k 5%, 1/8 W	01121	BB4745	101955	1
	R14	1,2	RESISTOR, CC 10 k 5%, 1/8 W	01121	BB1035	101697	4
	R15	1,2	RESISTOR, Variable 5 k 10%, 1/2 W	73138	62PAR5K	101845	1
	R16	1,2	Same as R4				
	R17	1,2	Not Used				
	R18	1,2	Same as R5				
	R19	1,2	Same as R14				
	R20	1,2	Same as R14				
	R21	1,2	RESISTOR, CC 1 k 5%, 1/4 W	01121	CB1025	101569	2
	R22	1,2	RESISTOR, CC 680 Ω 5%, 1/8 W	01121	BB6815	101972	2
	R23	1,2	Same as R4				
	R24	1,2	RESISTOR, CC 1 k 5%, 1/8 W	01121	BB1025	101711	1
	R25	1,2	Same as R1				
	R26	1,2	Same as R14				
	R27	1,2	Same as R3				
	R28	1,2	Same as R21				

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE A12, LIF/NIF PC Assembly 06759701 (Cont'd)

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
	R29	1,2	Same as R6				
	R30	1,2	RESISTOR, CC 22 k 5%, 1/8 W	01121	BB2235	101797	1
	R31	1,2	RESISTOR, CC 100 k 5%, 1/8 W	01121	BB1045	101976	2
	R32	1,2	Same as R31				
	R33	1,2	RESISTOR, CC 27 k 5%, 1/8 W	01121	BB2735	101952	1
	R34	1,2	Not Used				
	R35	1,2	RESISTOR, CC 68 Ω 5%, 1/8 W	01121	BB6805	101700	1
	R36	1,2	Same as R22				
	R37	1,2	Not Used				
	R38	1,2	Not Used				
	R39	1,2	Same as R5				
	U1	1,2	INTEGRATED CIRCUIT, LIN TV/FM Sound System	04713	MC1357P	045216	2
	U2	1,2	INTEGRATED CIRCUIT, LIN MSC Diff. Volt Comparator	01295	SN72311P	103943	1
	U3	1,2	INTEGRATED CIRCUIT Voltage Regulator	04713	MC78L12ACP	117013	2
	U4	1,2	Same as U1				
	U5	1,2	Same as U2				
129		1,2	ASSEMBLY, Coax Cable	52542	06783001	06783001	2
133		1,2	SPACER, Swage 4-40	55566	3804-B-440-B-15	100973	3
135		1,2	SHIELD, Can	52542	067758	067758	3
137		1,2	SHILED, Can	52542	06775901	06775901	2
140		1,2	SCREW, FHMS 4-40 x 1/4	96906	MS24693-C2	10072004	3
141		1,2	SCREW, FHMS 4-40 x 5/16	96906	MS24693-C3	10072005	3
145		1,2	TERMINAL, Press	98921	001-1007	100575	4
147		1,2	SHIELD, Can	52542	06775902	06775902	1

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE	Feature 01, Oscillator 07759201 Rev A						
ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
1		1,2	ASSEMBLY, Option 08 Std Timebase Oscillator	52542	07538601	07538601	A/R
3		1,2	ASSEMBLY, Option 13 High Stability Oscillator	52542	08312401	08312401	A/R

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE **Feature 01, Option 08 Std Timebase Oscillator PC Assembly 07538601 Rev B**

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
5		1,2	FAB, PC Board	52542	075386	075386	1
	C1	1,2	CAPACITOR, Tant 1 µF 10%, 35 V	56289	196D105X9035HA1	103716	2
	C2	1,2	Same as C1				
	U1	1,2	INTEGRATED CIRCUIT Voltage Regulator	04713	MC78L05ACP	117101	1
	Y1	1,2	OSCILLATOR, TCXO 10 MHz	52542	100033	100033	1
13		1,2	TERMINAL, Swage	88245	1309B-1	100508	3
14		1,2	SPACER, Swage	06540	9545B-A-0632-17	103881	4

Used On Code: 1 = 6245B; 2 = 6246B

TITLE **Feature 01, Option 13 High Stability Oscillator Assembly 08312401 Rev A**

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
	C12	1,2	CAPACITOR, Tant 1 µF 10%, 35 V	56289	150D105X9035A2	100082	2
	C13	1,2	Same as C12				
	CR1	1,2	DIODE, Rectifier 400 V	02735	1N5395	100413	4
	CR2	1,2	Same as CR1				
	CR3	1,2	Same as CR1				
	CR4	1,2	Same as CR1				
	T2	1,2	TRANSFORMER	52542	067295	067295	1
	U3	1,2	INTEGRATED CIRCUIT Voltage Regulator 15 V	07263	UA7815KC	045282	1
	Y1	1,2	OSCILLATOR	52542	057829	057829	1
	XF2	1,2	FUSE POST	75915	345002	117381	1
	XU3	1,2	SOCKET, Transistor TO-3	06776	MD-3452-G	830099	1
34		1,2	SCREW, PHMS 4-40 x 1	96906	MS51957-21	10062616	2
36		1,2	SCREW, PHMS 6-32 x 5/16	96906	MS51957-27	10063205	4
37		1,2	SCREW, PHMS 6-32 x 1/2	96906	MS51957-30	10063208	2
38		1,2	WASHER, Split No. 6	96906	MS35338-136	100712	6
39		1,2	WASHER, Flat No. 6	96906	MS15795-805	100704	4
40		1,2	WASHER, Flat No. 4	96906	MS15795-803	100703	2
41		1,2	NUT, Kep 4-40	78189	511-041800-00	100941	2
44		1,2	WASHER, Nylon Flat No. 6	86928	5610-44-31	112609	1
46		1,2	FUSE, Slo-Blo 3AG 1/4A	71400	MDL 1/4	100600	2

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE **Feature 02, Input Power 07768301 Rev A**

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
		1,2	OPTION 01, 50-60 400 Hz/100 V	52542	07767101	07767101	A/R
		1,2	OPTION 02, 50-60 400 Hz/115 V	52542	07766401	07766401	A/R
		1,2	OPTION 03 50-60 400 Hz/125 V	52542	07767001	07767001	A/R
		1,2	OPTION 04 50-60 400 Hz/215 V	52542	07766901	07766901	A/R
		1,2	OPTION 05 50-60 400 Hz/225 V	52542	07766801	07766801	A/R
		1,2	OPTION 06 50-60 400 Hz/230 V	52542	07766601	07766601	A/R
		1,2	OPTION 07 50-60 400 Hz/240 V	52542	07766701	07766701	A/R

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE	Feature 03, Control 07759301 Rev A						
ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
		1,2	OPTION 05 IEEE Std 488	52542	08312301	08312301	A/R

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE **Feature 03, Option 05 IEEE Std 488 Assembly 08312301 Rev A**

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
16	A4	1,2	ASSEMBLY, Bus Interface PC	52542	08312201	08312201	1
17	A5	1,2	ASSEMBLY, Counter Interface PC	52542	08312101	08312101	1
19	S4	1,2	ASSEMBLY, Program Switch PC	52542	07768001	07768001	1
21		1,2	SPACER, M-F 6-32	52542	075197	075197	2
22		1,2	ASSEMBLY, Interface Cable	52542	075244	075244	1
26		1,2	ASSEMBLY, Switch Cable	52542	075243	075243	1
30		1,2	WASHER, Split No. 4	96906	MS35338-135	100711	2
31		1,2	SCREW, PHMS 4-40 x 3/8	96906	MS51957-15	10062606	2
32		1,2	WASHER, Split No. 8	96906	MS35338-137	100713	2

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE			Feature 03, Option 05 A4, Bus Interface PC Assembly 08312201 Rev A				
ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
6		1,2	FAB, PC Board	52542	083122	083122	1
	C1	1,2	CAPACITOR, Ceramic .1 µF +80-20%, 10 V	71590	UK10-104	100120	1
	C2	1,2	CAPACITOR, DM 100 pF 5%, 500 V	72136	DM15FD101J0	100173	6
	C3	1,2	Same as C2				
	C4	1,2	Same as C2				
	C5	1,2	Not Used				
	C6	1,2	Same as C2				
	C7	1,2	Same as C2				
	C8	1,2	Same as C2				
	C9	1,2	CAPACITOR, Ceramic .05 µF +80-20%, 12 V	71590	UK10-503	100122	4
	C10	1,2	Same as C9				
	C11	1,2	Same as C9				
	C12	1,2	Same as C9				
	C13	1,2	CAPACITOR, DP Ceramic 2.0 nF 5%, 100 V	51642	200-100-C0G202J	117783	1
	CR1	1,2	DIODE, Signal 50 V	03508	1N4151	100385	3
	CR2	1,2	Same as CR1				
	CR3	1,2	Same as CR1				
	Q1	1,2	Not Used				
	Q2	1,2	TRANSISTOR, SINPN 40 V	04713	2N3904	101377	2
	Q3	1,2	Same as Q2				
	R1	1,2	RESISTOR, CC 3.0 k 5%, 1/8 W	01121	BB3025	101913	4
	R2	1,2	Same as R1				
	R3	1,2	Same as R1				
	R4	1,2	RESISTOR, CC 6.2 k 5%, 1/8 W	01121	BB6225	101740	4
	R5	1,2	Same as R4				
	R6	1,2	Same as R4				
	R7	1,2	RESISTOR, CC 100 k 5%, 1/8 W	01121	BB1045	101976	1
	R8	1,2	RESISTOR, CC 12 k 5%, 1/8 W	01121	BB1235	101975	8
	R9	1,2	RESISTOR, CC 47 k 5%, 1/8 W	01121	BB4735	101694	4
	R10	1,2	RESISTOR, CC 68 k 5%, 1/8 W	01121	BB6835	101822	1

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE	Feature 03, Option 05 A4, Bus Interface PC Assembly 08312201 (Cont'd)						
ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
	R11	1,2	Not Used				
	R12	1,2	Same as R9				
	R13	1,2	RESISTOR, CC 22 k 5%, 1/8 W	01121	BB2235	101797	2
	R14	1,2	Same as R8				
	R15	1,2	Same as R1				
	R16	1,2	Same as R4				
	R17	1,2	Same as R9				
	R18	1,2	Same as R9				
	R19	1,2	Same as R8				
	R20	1,2	Same as R8				
	R21	1,2	Same as R13				
	R22	1,2	Same as R8				
	R23	1,2	Same as R8				
	R24	1,2	Same as R8				
	R25	1,2	Same as R8				
	U1	1,2	INTEGRATED CIRCUIT, CMOS Hex Inverter Buffer	04713	MC14049UBCP	103217	2
	U2	1,2	INTEGRATED CIRCUIT, TTL SSI 3 3-Input NAND Gate	01295	SN74LS10N	103968	1
	U3	1,2	INTEGRATED CIRCUIT, CMOS Dual D Flip-Flop	04713	MC14013BCP	103199	2
	U4	1,2	Same as U1				
	U5	1,2	INTEGRATED CIRCUIT, TTL 4-Bus Driver/Receiver	04713	MC3446P	117021	3
	U6	1,2	INTEGRATED CIRCUIT, CMOS Quad 2-Input NAND Gate	04713	MC14011BCP	103937	1
	U7	1,2	INTEGRATED CIRCUIT, CMOS Quad 2-Input AND Gate	04713	MC14081BCP	116101	1
	U8	1,2	INTEGRATED CIRCUIT, CMOS 4 R-S NAND Latch	04713	MC14044B	117379	1
	U9	1,2	INTEGRATED CIRCUIT, CMOS 3 3-Input AND Gate	02735	MC14073BE	103941	1
	U10	1,2	INTEGRATED CIRCUIT BCD to DEC Decoder	01295	SN74LS42N	103131	1
	U11	1,2	Same as U5				
	U12	1,2	Same as U3				
	U13	1,2	INTEGRATED CIRCUIT, CMOS Quad 2-Input OR Gate	04713	MC14071BCP	103940	1
	U14	1,2	INTEGRATED CIRCUIT, PROM	52542	075027		
	U15	1,2	INTEGRATED CIRCUIT 5 Bit Comparator	07263	93L24PC	117020	1

Used On Code: 1 = 6245B; 2 = 6246B

TITLE Feature 03, Option 05 A4, Bus Interface PC Assembly 08312201 (Cont'd)

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
	U16	1,2	Same as U5				
	U17	1,2	RESISTOR, Module 4-12 k	52542	045008	045008	1
	XU14	1,2	SOCKET, IC	71279	703-1318-01-0410	117878	1
95		1,2	CONNECTOR, PC	30146	922584-26	117340	1
96		1,2	CONNECTOR, PC	30146	929836-01-07	116575	1

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE	Feature 03, Option 05 A5, Counter Interface PC Assembly 08312101 Rev A						
ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
6		1,2	FAB, PC Board	52542	083121	083121	1
	C1	1,2	CAPACITOR, DM 220 pF 5%, 500 V	72136	DM15FD221JO	100220	1
	C2	1,2	CAPACITOR, DM 10 pF 5%, 500 V	72136	DM15CD100JO	100253	1
	C3	1,2	CAPACITOR, Tant 1 µF 10%, 35 V	56289	196D105X9035HA1	103716	1
	C4 thru C9	1,2	CAPACITOR, Ceramic .05 µF +80-20%, 12 V	71590	UK10-503	100122	6
	C10	1,2	CAPACITOR, Ceramic .01 µF 20%, 50 V	71590	UK50-103	117351	2
	C11	1,2	Same as C10				
	CR1 thru CR5	1,2	DIODE, Signal 50 V	03508	1N4151	100385	5
	R1	1,2	RESISTOR, CC 12 k 5%, 1/8 W	01121	BB1235	101975	2
	R2	1,2	RESISTOR, CC 100 k 5%, 1/8 W	01121	BB1045	101976	5
	R3	1,2	Same as R2				
	R4	1,2	Same as R2				
	R5	1,2	Same as R1				
	R6	1,2	Same as R2				
	R7	1,2	Same as R2				
	U1	1,2	INTEGRATED CIRCUIT, CMOS Retriggerable MV	05713	MC14538BCP	116948	2
	U2	1,2	INTEGRATED CIRCUIT, CMOS Quad 2-Input OR Gate	04713	MC14071BCP	103940	1
	U3	1,2	INTEGRATED CIRCUIT, CMOS Quad 2-Input NAND Gate	04713	MC14011BCP	103937	1
	U4	1,2	INTEGRATED CIRCUIT, CMOS Quad 2-Input AND Gate	04713	MC14081BCP	116101	1
	U5	1,2	INTEGRATED CIRCUIT, CMOS Hex Inverter Buffer	04713	MC14049UBCP	103217	2
	U6	1,2	INTEGRATED CIRCUIT, CMOS Dual BCD Up Counter	04713	MC145188BCP	103339	1
	U7	1,2	INTEGRATED CIRCUIT, CMOS Quad Dual Flip Flop	04713	MC14175BCP	117533	1

Used On Code: 1 = 6245B; 2 = 6246B

TITLE **Feature 03, Option 05 A5, Counter Interface PC Assembly 08312101 (Cont'd)**

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
	U8	1,2	INTEGRATED CIRCUIT, CMOS Dual D Flip-Flop	04713	MC14013BCP	103199	2
	U9	1,2	Same as U5				
	U10	1,2	Same as U8				
	U11	1,2	INTEGRATED CIRCUIT, TTL MSI 4-2:1 Multiplexer	01295	SN74LS157N	117249	1
	U12	1,2	INTEGRATED CIRCUIT, TTL MSI Presettable Binary Counter	01295	SN74LS197	103165	1
	U13	1,2	INTEGRATED CIRCUIT, TTL MSI 4-10 Line Decoder	01295	SN74LS145	103369	3
	U14	1,2	Same as U13				
	U15	1,2	Same as U13				
	U16	1,2	INTEGRATED CIRCUIT, PROM	52542	075026	075026	1
	U17	1,2	INTEGRATED CIRCUIT, TTL RAM Open Collector	01295	SN7489N	103219	1
	U18	1,2	INTEGRATED CIRCUIT, Resistor Module 4-12 k	52542	045008	045008	3
	U19	1,2	Same as U18				
	U20	1,2	Same as U18				
	U21	1,2	Same as U1				
	W1	1,2	JUMPER	55210	L-2007-1	102879	1
	XU16	1,2	SOCKET, IC 20-pin	71279	703-1320-01-0410	117879	1
	XU17	1,2	SOCKET, IC 16-pin	71279	703-1316-01-0410	117041	1

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE **Feature 03, Option 05 Programmable Switch (S4) PC Assembly 07768001 Rev A**

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
3		1,2	FAB, PC Board	52542	077680	077680	1
5	S4	1,2	SWITCH, 6-pos DIP	11237	206-6NO MARK	116569	1
6	J1	1,2	CONNECTOR, PC	30146	929836-01-07	116575	1
7		1,2	BEAD, Glass .100 ODx.045		By Description	102838	4
8		1,2	SPACER, Swage 4-40	71279	1300-9	100492	2

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE Accessory List 04 07754306 Rev A

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
		1,2	SINGLE RACK MOUNT	52542	06787402	06787402	1

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE **Accessory 04, Single Rack Mount 06787402 Rev B**

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
3		1,2	FAB, Rack Mt. Shelf	52542	067933	067933	1
4		1,2	FAB, Rack Mt. Panels	52542	06793405	06793405	1
5		1,2	HANDLE, Rectangualr Black	06540	11351-A-0832-2	100927	1
9		1,2	SCREW, PHMS 8-32 x 1/2	96906	MS51957-45	10064208	4
11		1,2	SCREW, Th. Cut 10-24 x 1/2	39307	By Description	119235	4
12		1,2	WASHER, Flat No. 8	96906	MS15795-807	100705	4
13		1,2	WASHER, Split No. 8	96906	MS35338-137	100713	4
14		1,2	WASHER, Flat No. 10	96906	MS15795-808	100648	4
15		1,2	WASHER, Split No. 10	96906	MS35338-138	100714	4

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE	Accessory List 05 07754305 Rev A						
ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
		1,2	DUAL RACK MOUNT	52542	06787502	06787502	1

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE: Accessory 05, Dual Rack Mount Assembly 06787502 Rev B

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
3		1,2	FAB, Shelf Rack Mount	52542	067933	067933	1
4		1,2	FAB, Panel Rack Mount	52542	06793402	06793402	1
5		1,2	HANDLE, Rectangualr Black	06540	11351-A-0832-2	100927	1
9		1,2	SCREW, PHMS 8-32 x 1/2	96906	MS51957-45	10064208	4
11		1,2	SCREW, Th. Cut 10-24 x 1/2	39307	By Description	119235	4
12		1,2	WASHER, Flat No. 8	96906	MS15795-807	100705	4
13		1,2	WASHER, Split No. 8	96906	MS35338-137	100713	4
14		1,2	WASHER, Flat No. 10	96906	MS15795-808	100648	4
15		1,2	WASHER, Split No. 10	96906	MS35338-138	100714	8

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE Accessory List 06 07754304 Rev A

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
		1,2	CASE, Equipment W/Extra Foam Padding	52542	067876	067876	1

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE Accessory List 07 07754303 Rev A

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
		1,2	ASSEMBLY, Extender PC 10-pin	52542	06778701	06778701	1

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE	Accessory 07, Extender PC Assembly 06778701 Rev A						
ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
1		1,2	FAB, PC Board	52542	067787	067787	1
2		1,2	CONNECTOR, PC Edge	52542	117933	117933	1

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE Accessory List 08 07754302 Rev A

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
		1,2	ASSEMBLY Extender PC 22-pin	52542	06776601	06776601	1

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE	Accessory 08, 22-pin Extender PC Assembly 06776601 Rev B						
ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
1		1,2	FAB, PC Board	52542	067766	067766	1
2		1,2	CONNECTOR, PC Edge	05574	3KH22/1CN12	117929	1

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE Accessory List 09 07754301 Rev A

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
		1,2	REAR STAND KIT	52542	075321	075321	1

Used On Code: 1 = 6245B; 2 = 6246B

REPLACEABLE PARTS LIST

TITLE **Accessory 09, Rear Stand Kit 075321 Rev A**

ITEM	REF	USED ON	COMPONENT DESCRIPTION	MFR'S CODE	MANUFACTURER'S PART NUMBER	SD STOCK NUMBER	T/Q
3		1,2	SPACER	52542	075176	075176	4
4		1,2	FOOT, Rubber	70903	9102J	100854	4
5		1,2	LINE CORD	16428	17506	117644	1
7		1,2	WASHER, Split No. 10	96906	MS35338-138	100714	4
8		1,2	WASHER, Split No. 6	96906	MS35338-136	100712	4
9		1,2	WASHER, Flat No. 6	86928	5710-23-10	100662	4
10		1,2	SCREW, PHMS 6-32 x 3/4	96906	MS51957-32	10063212	4

Used On Code: 1 = 6245B; 2 = 6246B

CHAPTER 7

DRAWINGS

7-1. INTRODUCTION

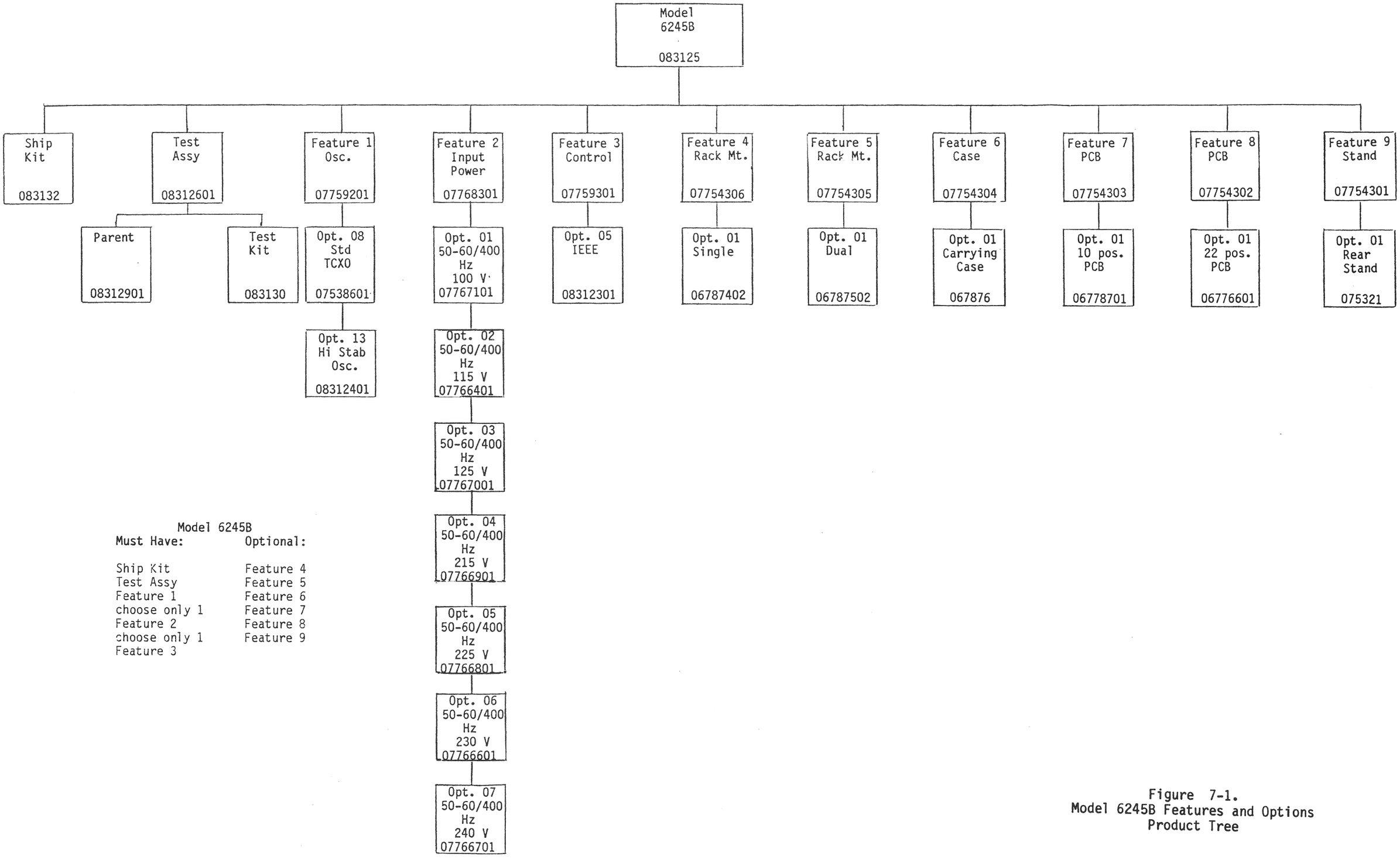
7-2. This chapter contains the assembly and schematic drawings for the Model 6245B/6246B Microwave Frequency Counter. The parts lists contained in Chapter 6 relates to the reference designation callouts on the drawings. Table 6-1 provides a list by figure number of the drawings, with title, drawing number and page number.

Table 7-1. List of Drawings

Figure Number	Drawing Title	Drawing Number	Page Number
7-1	Model 6245B Features and Options Product Tree	- -	7-3
7-2	Model 6246B Features and Options Product Tree	- -	7-4
7-3	6245B/6246B Block Diagram (Sheet 1)	08312901	7-5
7-4	6245B/6246B Block Diagram (Sheet 2)	08312901	7-6
7-5	Universal Counter Assembly	08312901	7-7
7-6	6245B Test Assembly	08312601	7-8
7-7	6246B Test Assembly	08312801	7-9
7-8	Top Cover Assembly	067714	7-10
7-9	Bottom Cover Assembly	067715	7-11
7-10	Front Panel Assembly	08305801	7-12
7-11	Rear Panel Assembly	08306601	7-13
7-12	A1, Interconnect PC Assembly	083065401	7-15
7-13	A2, Display PC Assembly	08306301	7-16
7-14	A2, Display PC Assembly Schematic	08306301	7-17
7-15	A3, Amp/Prescaler PC Assembly	08306201	7-18
7-16	A3, Amp/Prescaler PC Assembly Schematic	08306201	7-19
7-17	A4, Bus Interface PC Assembly	08312201	7-20
7-18	A4, Bus Interface PC Assembly Schematic	08312201	7-21
7-19	A5, Counter Interface PC Assembly	08312101	7-22
7-20	A5, Counter Interface PC Assembly Schematic	08312101	7-23
7-21	A6, Timebase Logic PC Assembly	08312001	7-24
7-22	A6, Timebase Logic PC Assembly Schematic	08312001	7-25
7-23	A7, Counter Logic PC Assembly	06760101	7-26
7-24	A7, Counter Logic PC Assembly Schematic	06760101	7-27
7-25	A8, Display Logic PC Assembly (Sheet 1)	06769402	7-29
7-26	A8, Display Logic PC Assembly (Sheet 2)	06769402	7-30
7-27	A8, Dispaly Logic PC Assembly Schematic	06769401	7-31
7-28	A10, FLACTO Logic PC Assembly (Sheet 1)	06759901	7-33
7-29	A10, FLACTO Logic PC Assembly (Sheet 2)	06769901	7-34
7-30	A10, FLACTO Logic PC Assemby Schematic	06769901	7-35

Table 7-1. List of Drawings (Cont'd)

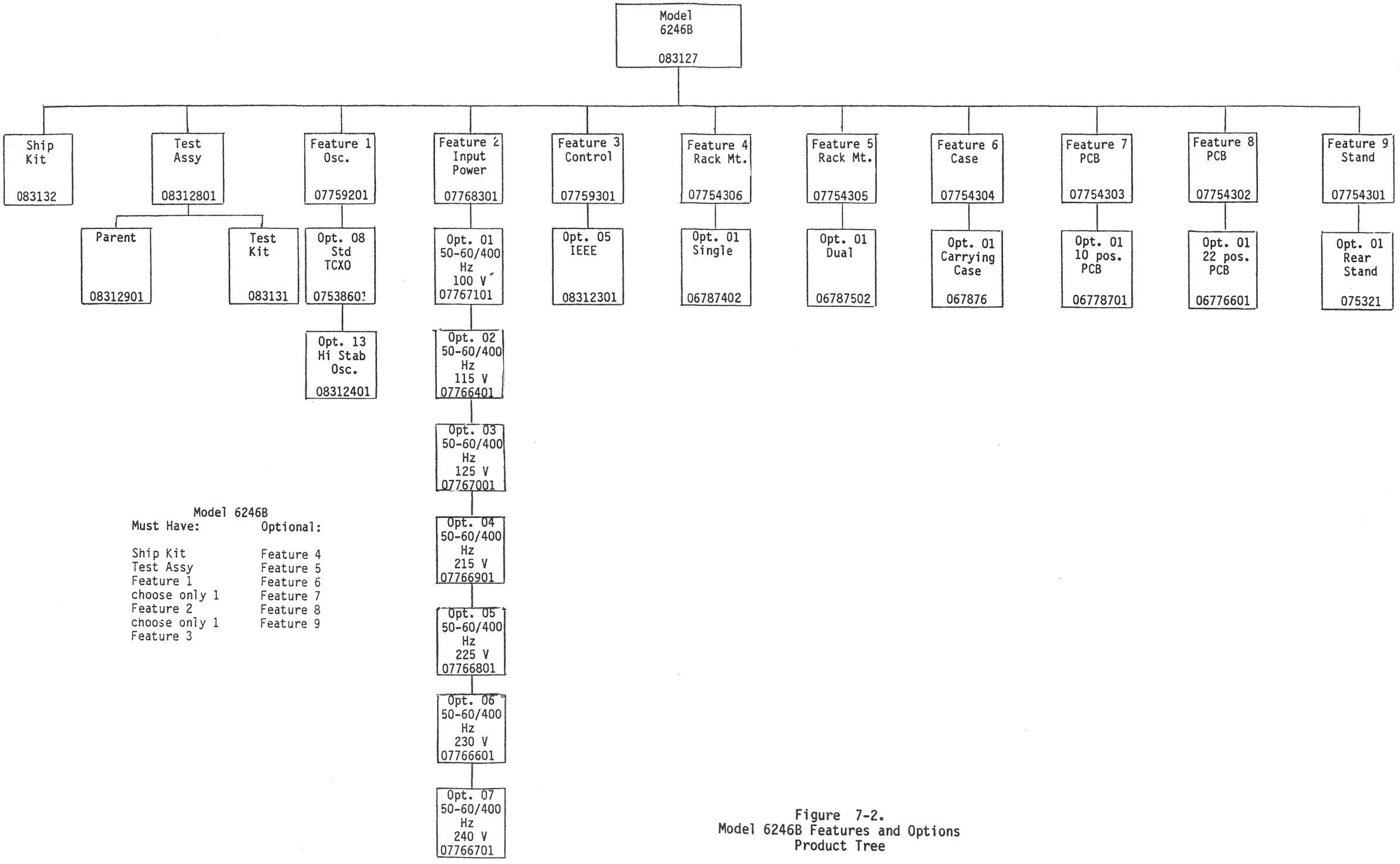
Figure Number	Drawing Title	Drawing Number	Page Number
7-31	A11, LO/Shifter PC Assembly	06759802	7-36
7-32	A11, LO/Shifter PC Assembly Schematic	06759801	7-37
7-33	A12, LIF/NIF PC Assembly	06759701	7-38
7-34	A12, LIF/NIF PC Assembly Schematic	06759701	7-39
7-35	A13, Timebase Oscillator PC Assembly	07538601	7-40
7-36	A13, 10 MHz Timebase Oscillator Schematic	075386	7-41
7-37	Option 13, High Stability Oscillator Assembly	08312401	7-42
7-38	Option 05, IEEE-488 Assembly	08312301	7-43
7-39	Program Switch PC Assembly	07768001	7-44



Model 6245B

Must Have:	Optional:
Ship Kit	Feature 4
Test Assy	Feature 5
Feature 1	Feature 6
choose only 1	Feature 7
Feature 2	Feature 8
choose only 1	Feature 9
Feature 3	

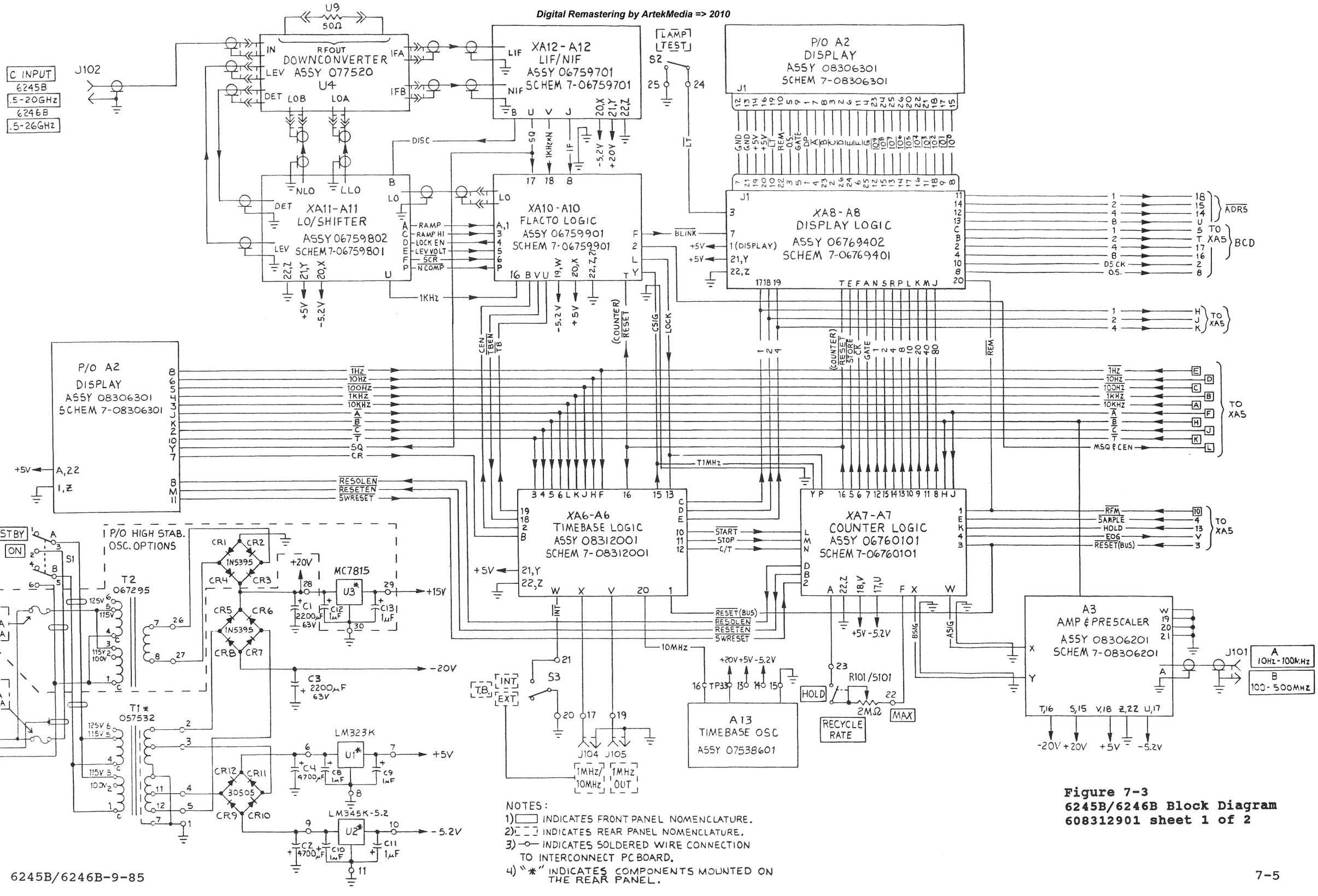
Figure 7-1.
Model 6245B Features and Options
Product Tree



Model 6246B

Must Have:	Optional:
Ship Kit	Feature 4
Test Assy	Feature 5
Feature 1	Feature 6
choose only 1	Feature 7
Feature 2	Feature 8
choose only 1	Feature 9
Feature 3	

Figure 7-2.
Model 6246B Features and Options
Product Tree



NOTES:
1) ▭ INDICATES FRONT PANEL NOMENCLATURE.
2) ▭ INDICATES REAR PANEL NOMENCLATURE.
3) —o— INDICATES SOLDERED WIRE CONNECTION TO INTERCONNECT PC BOARD.
4) "*" INDICATES COMPONENTS MOUNTED ON THE REAR PANEL.

Figure 7-3
6245B/6246B Block Diagram
608312901 sheet 1 of 2

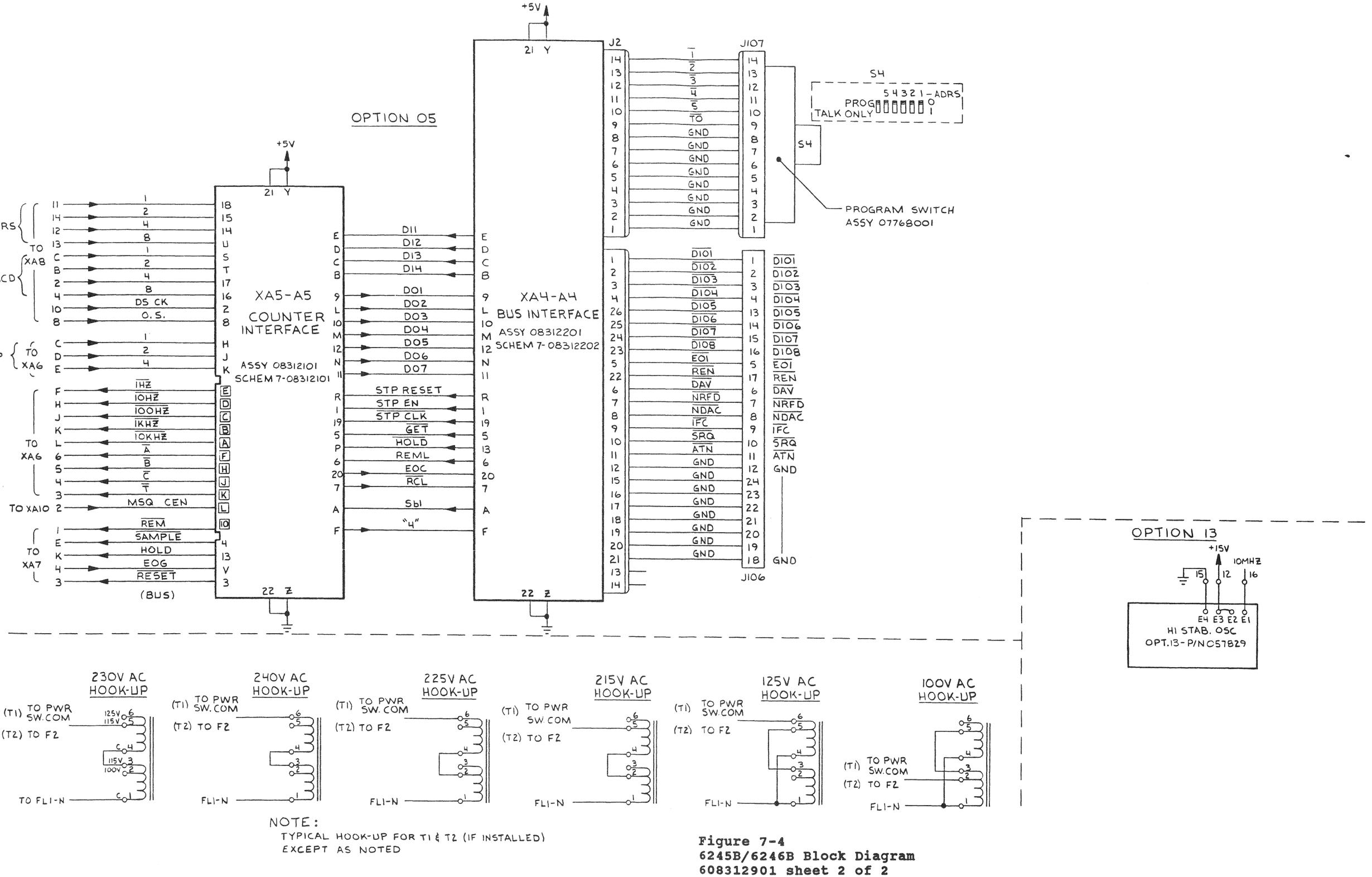
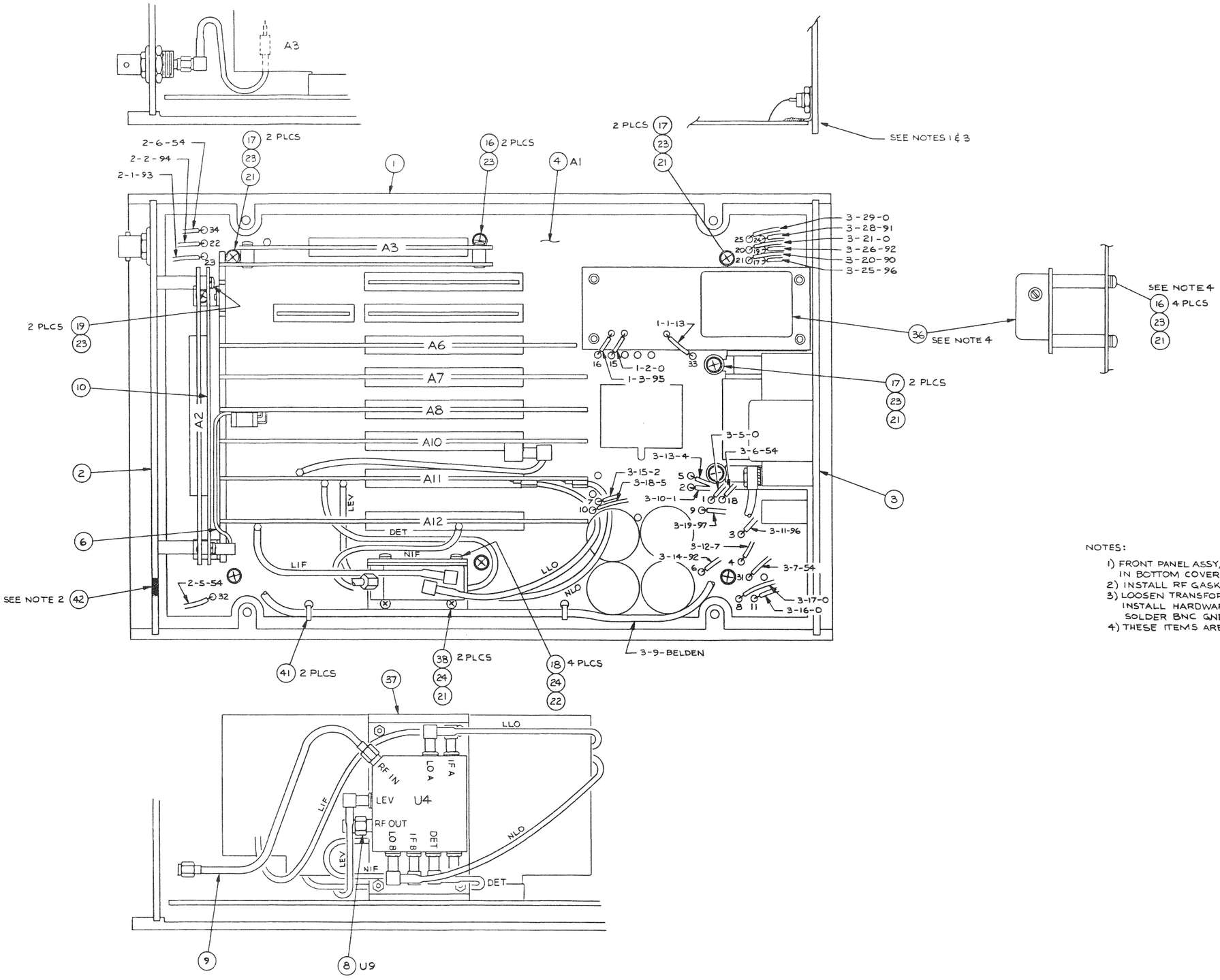


Figure 7-4
6245B/6246B Block Diagram
608312901 sheet 2 of 2

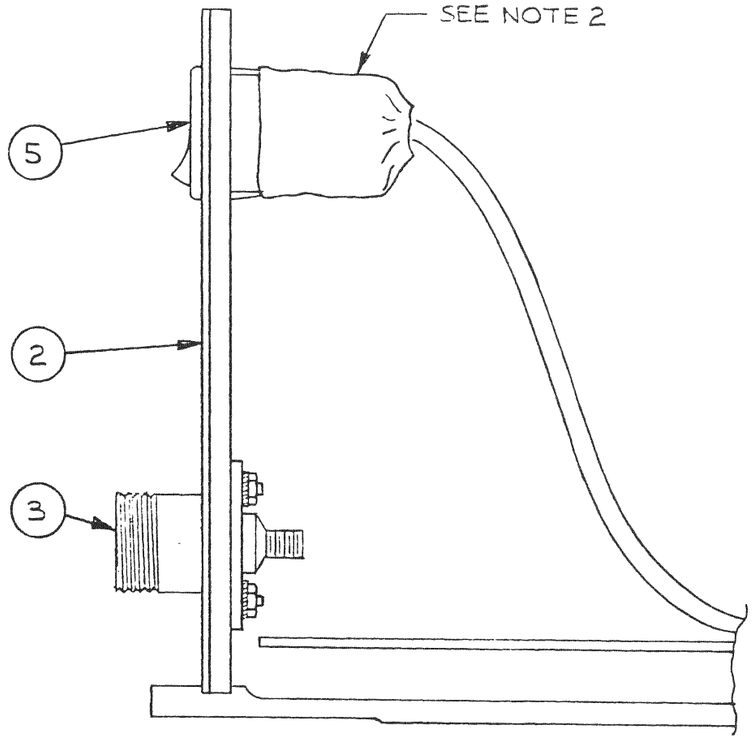


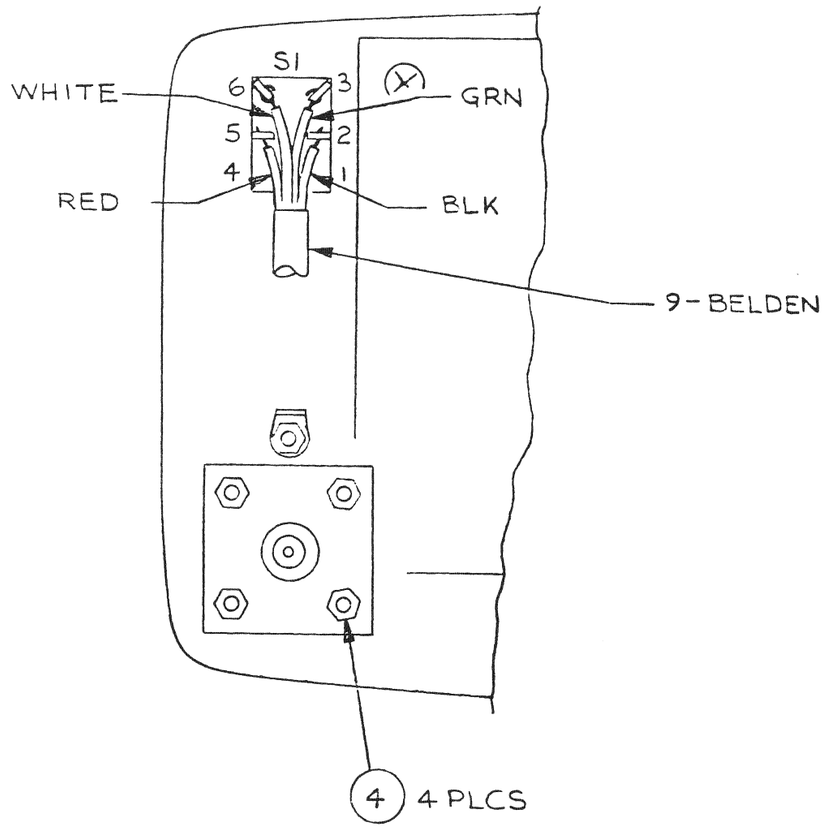
W/L CHART		
REF. NO.	PART NO.	TITLE
1	508312901	UNIV. COUNTER ASSY W/L
2	508305801	FRONT PANEL ASSY W/L
3	508306601	REAR PANEL ASSY W/L

NOTES:

1) FRONT PANEL ASSY, REAR PANEL ASSY, & INTERCONNECT PC ASSY MUST BE INSTALLED IN BOTTOM COVER TO ASSURE PROPER MECHANICAL ALIGNMENT.
2) INSTALL RF GASKET & SEAT INTO SLOT WITH FRONT PANEL.
3) LOOSEN TRANSFORMER MTG SCREWS & SEAT REAR PANEL ASSY IN SLOT IN COVER, INSTALL HARDWARE MOUNTING INTERCONNECT BD. TO TRANSFORMER BRACKETS. SOLDER BNC GND LUG TO GND PLANE ON INTERCONNECT BD.
4) THESE ITEMS ARE USED ON STD. TCXO.

Figure 7-5
Universal Counter Assembly
08312901

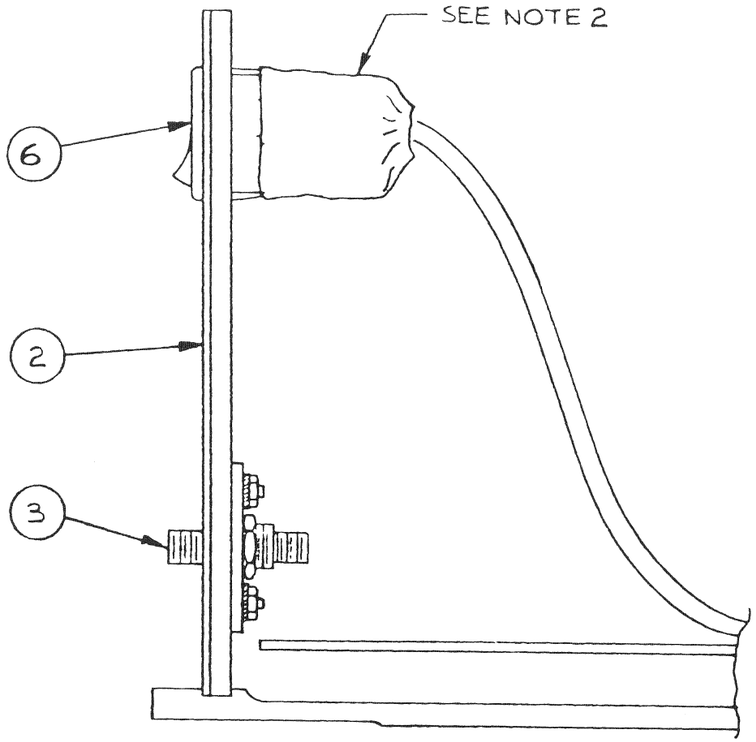


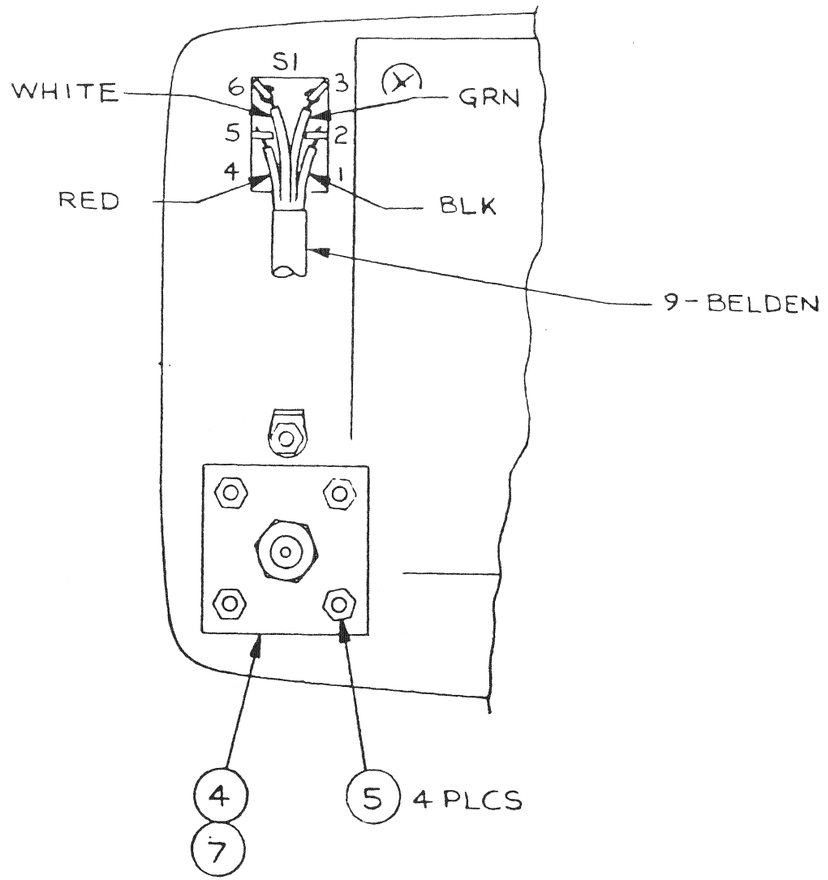


NOTES:

1) REF. 083130, TEST KIT 6245B
   REF. 508306601, REAR PANEL ASSY W/L.
2) COVER TERMINALS OF S1 WITH SHRINK TUBE
   & FULLY COVER S1 WITH SHRINK TUBE (P/N 123082, 1½" LG).

Figure 7-6
6245B Test Assembly
08312601





NOTES:

1) REF. 083131, TEST KIT 6246B
   REF. 50830660I, REAR PANEL ASSY W/L.
2) COVER TERMINALS OF S1 WITH SHRINK TUBE & FULLY COVER S1 WITH SHRINK TUBE (P/N 123082, 1½" LG).

Figure 7-7
6246B Test Assembly
08312801

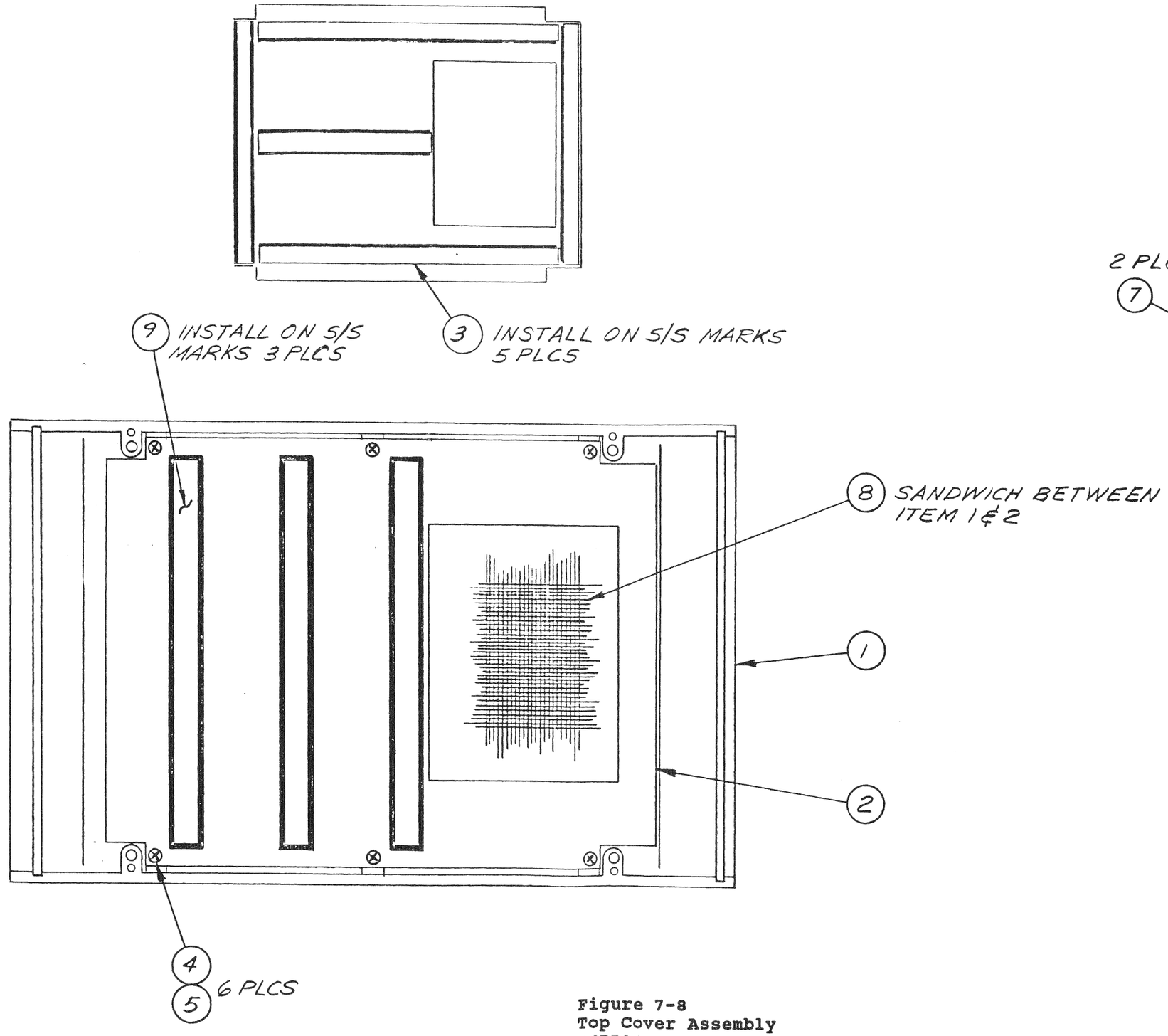


Figure 7-8
Top Cover Assembly
067714

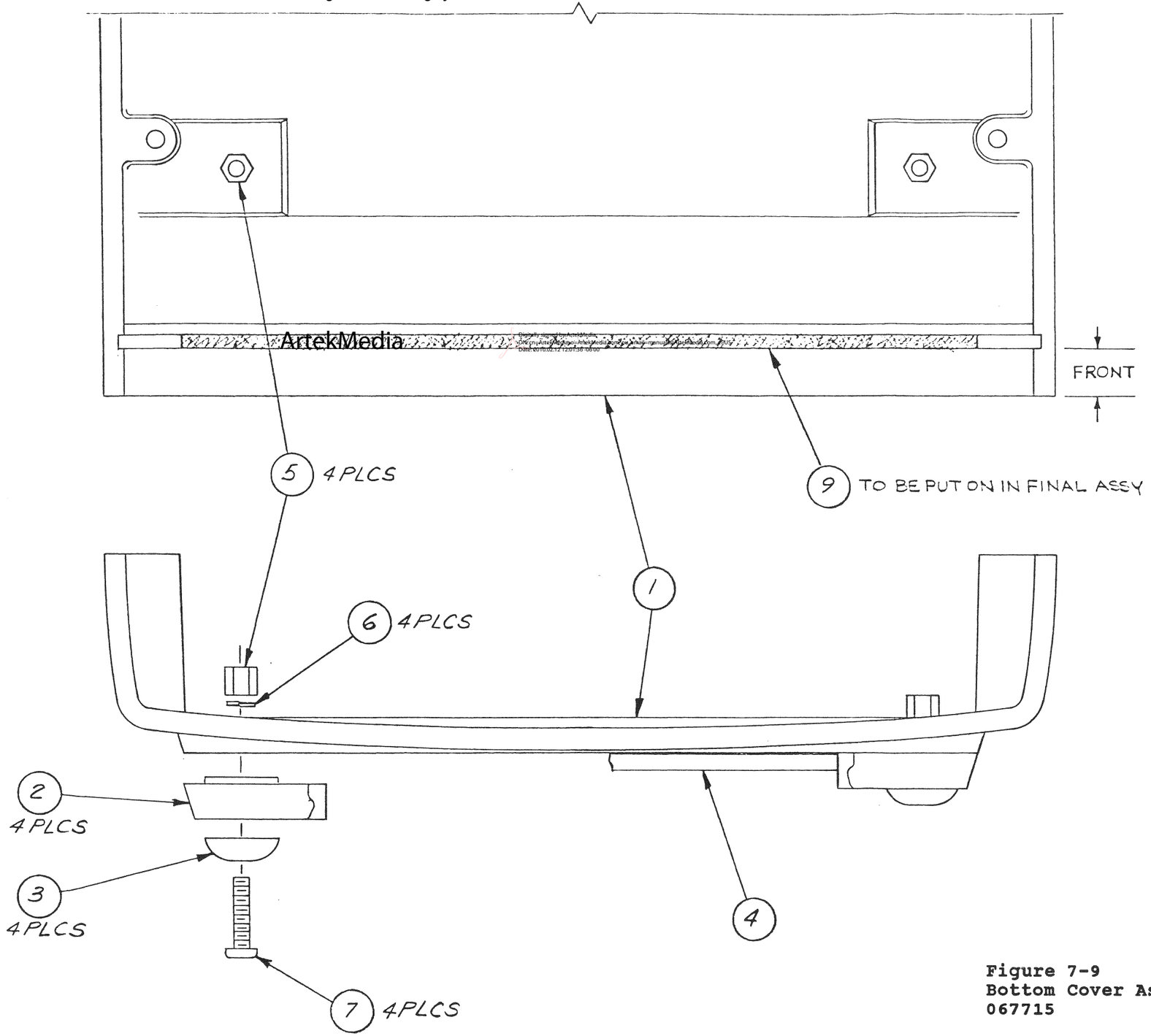


Figure 7-9
Bottom Cover Assembly
067715

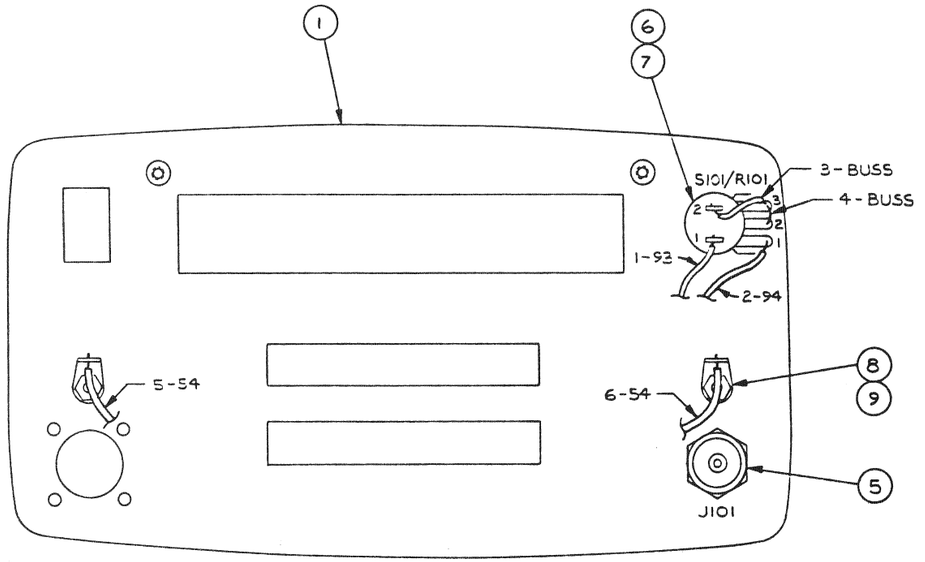
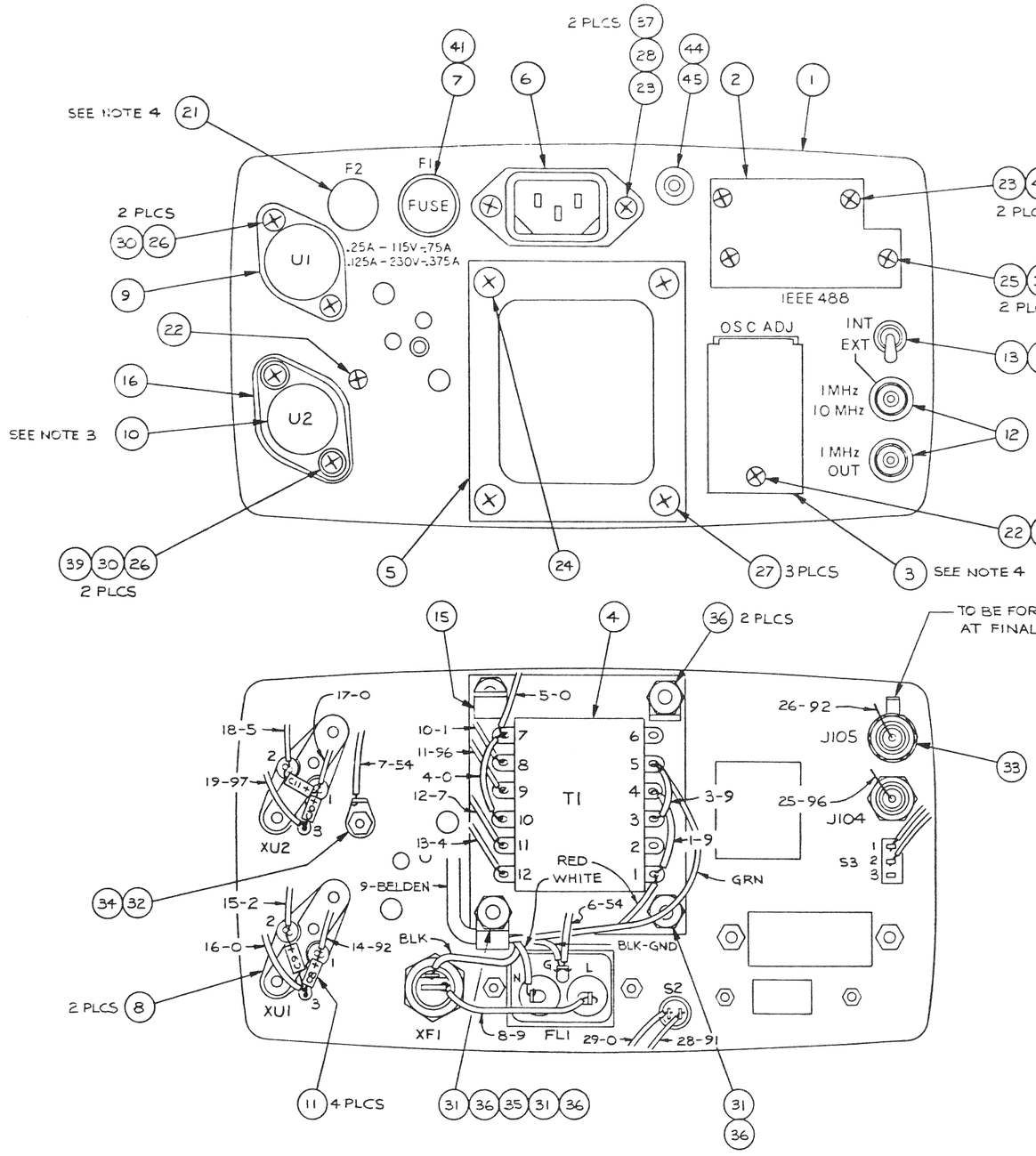


Figure 7-10
Front Panel Assembly
08305801



NOTES:

1) FULLY COVER FL1 WITH SHRINK TUBING (P/N 123082, 2" LONG) FROM REAR PANEL TO END OF TERMINALS. COVER TERMINALS OF XF1 & T1 WITH SHRINK TUBE.
2) APPLY THERMAL COMPOUND UNDER U1 & U2.
3) TRANSISTOR INSULATOR (ITEM #38) NOT SHOWN. INSTALL AFTER CHECKING U2 FOR SHORTING TO REAR PANEL.
4) THESE ITEMS NOT USED ON OPTION 13.
5) REF. A 50830660I, REAR PANEL ASSY W/L.

Figure 7-11
Rear Panel Assembly
08306601

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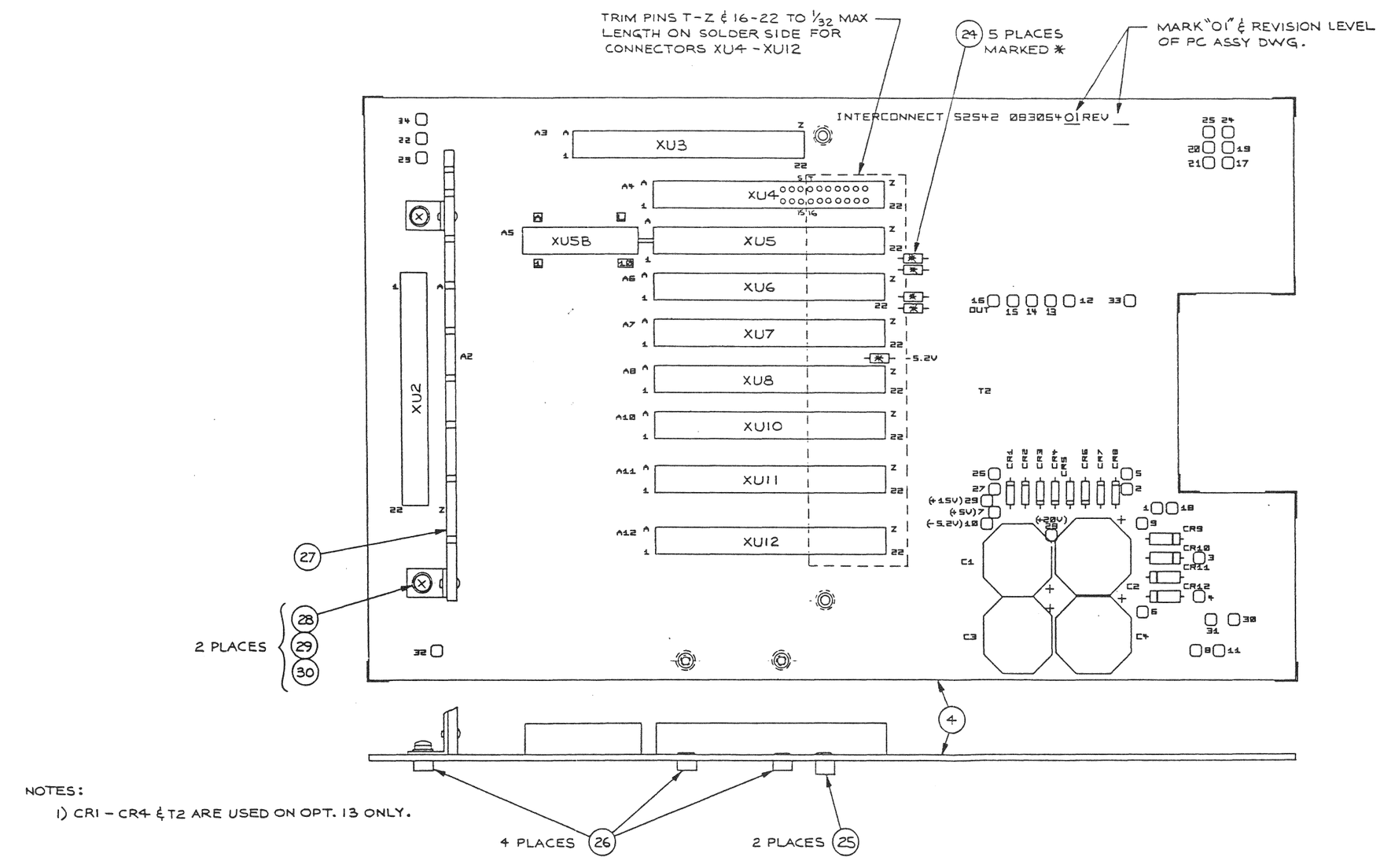
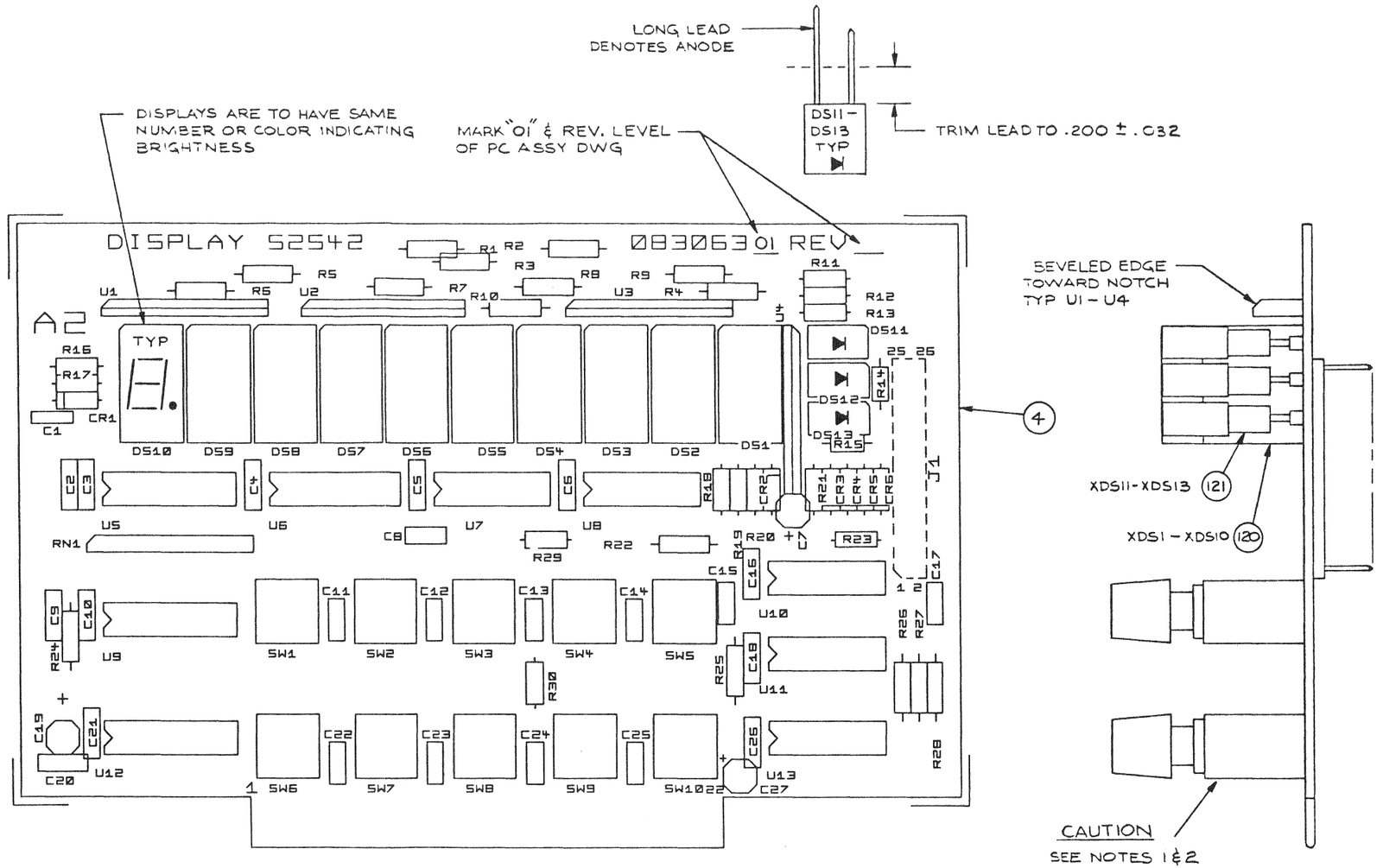


NOTES:

1) CR1 – CR4 & T2 ARE USED ON OPT. 13 ONLY.

Figure 7-12
A1, Interconnect PCB Assembly 08306401



NOTES:

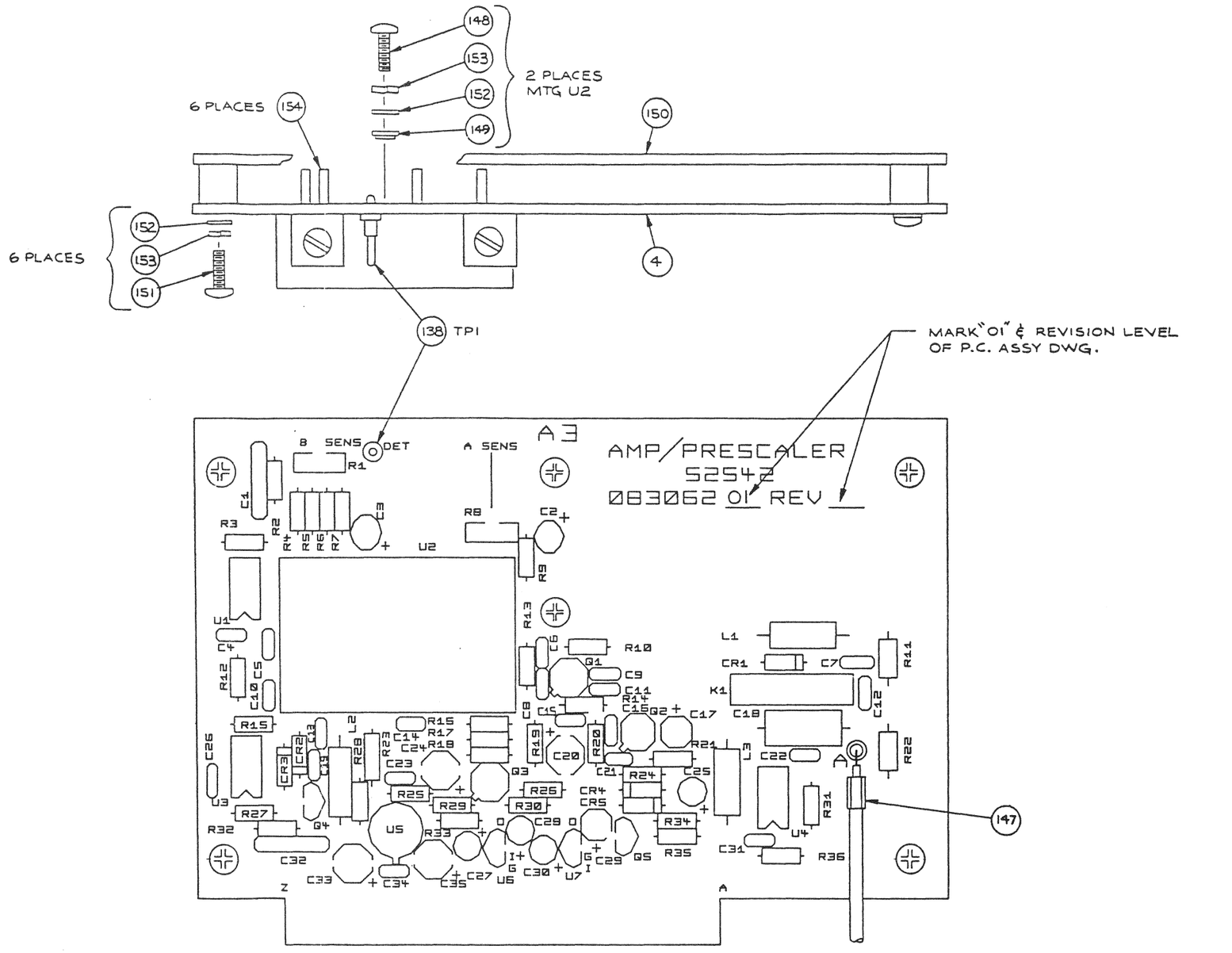
1) ALL PUSH BUTTON SWITCHES MUST BE FLAT AGAINST P.C. BOARD.
2) S1 - S10 & J1 ARE TO BE HAND SOLDERED AND HAND CLEANED;
   CLEAN SOLDER SIDE ONLY USING ALCOHOL;
   DO NOT CONTAMINATE SWITCHES WHEN CLEANING.
3) USE GLASS BEADS ONLY ON CAPS WHOSE LEADS ARE BENT.

Figure 7-13
A2, Display PCB Assembly
08306301

I.C. TABLE				
NO	TYPE	+5V DISPLAY	+5V	GND
U1	TA61	1,10	–	–
U2	TA61	1,10	–	–
U3	TA61	1,10	–	–
U4	TA6Ø	1,10	–	–
U5	74LS279	–	16	8
U6	74LS367	–	16	8
U7	74LSØØ	–	14	7
U8	LM339	–	3	12
U9	74LS279	–	16	8
U10	74LS3Ø	–	14	7
U11	74LS2Ø	–	14	7
U12	74LS367	–	16	8
U13	74LSØ3	–	14	7

NOTES: UNLESS OTHERWISE SPECIFIED
1. ALL RESISTOR VALUES ARE IN OHMS 1/4W, 5%.
2. ALL CAPACITOR VALUES ARE IN μf.
3. CR8 THRU CR16 ARE PART OF SW1 THRU SW9.
4. [ ] INDICATES FRONT PANEL NOMENCLATURE.

Figure 7-14
A2, Display PCB Assy
Schematic 08306301

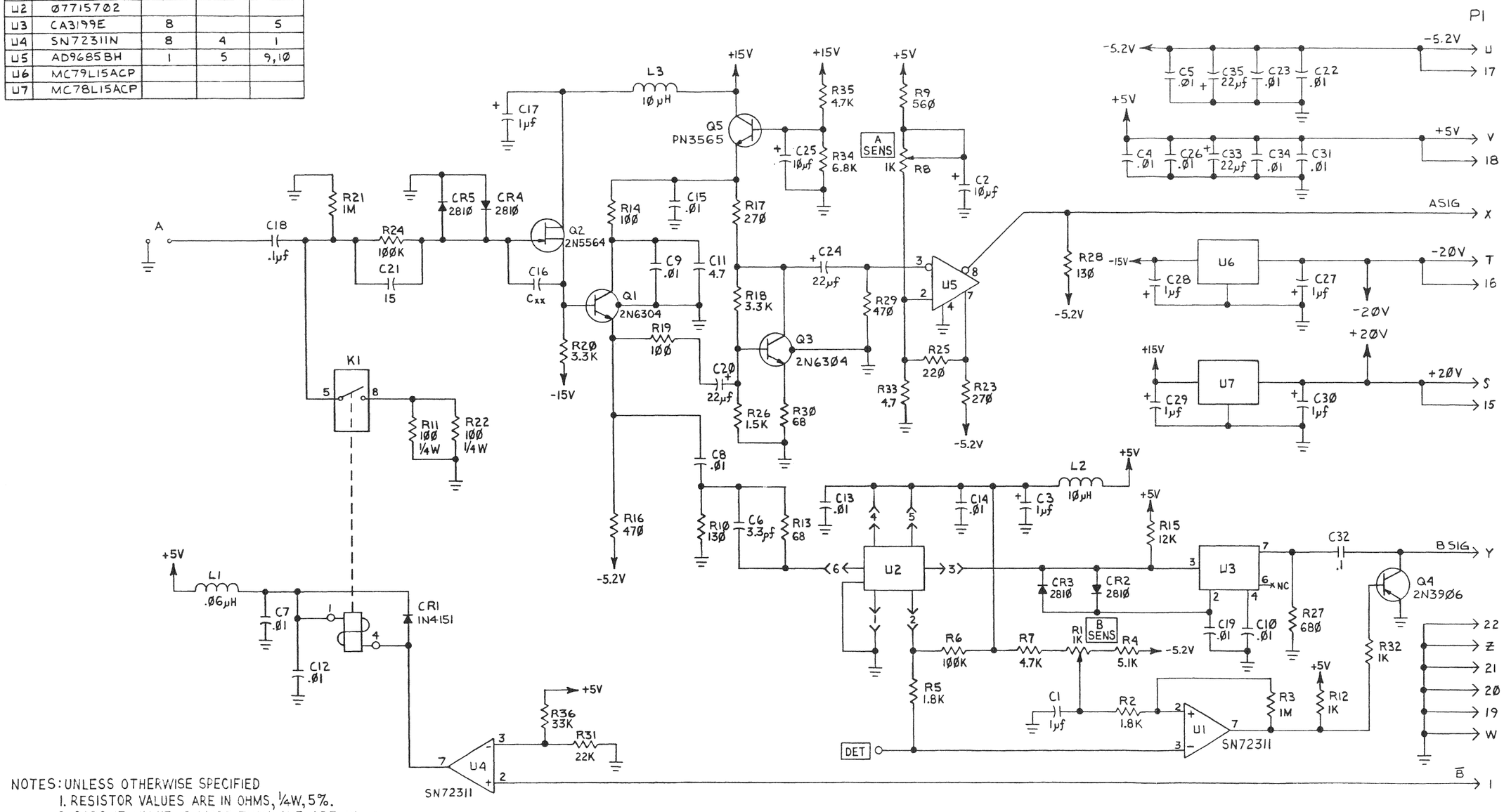


NOTES:

1) USE GLASS BEADS ONLY ON CAPS WHOSE LEADS ARE BENT.

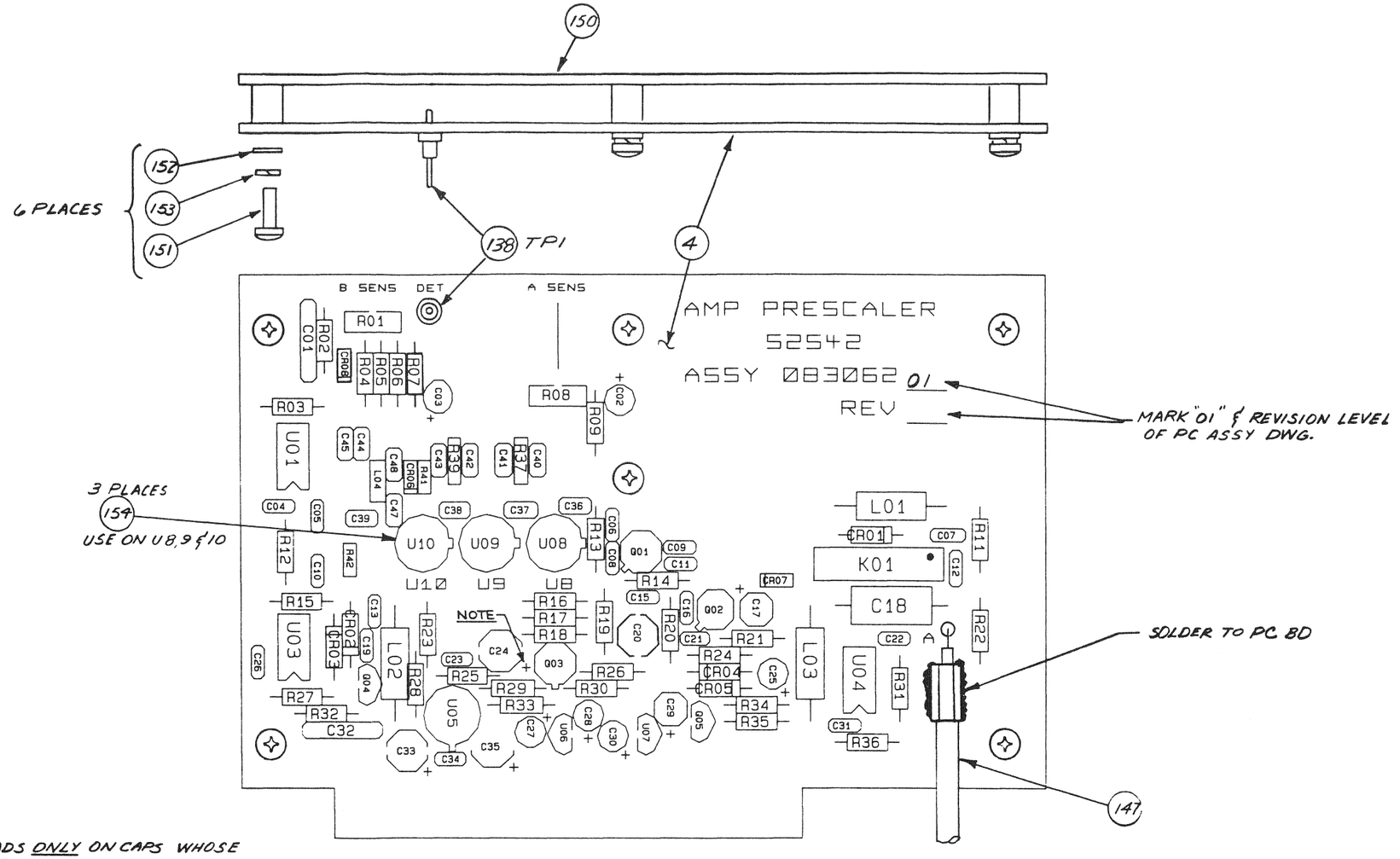
Figure 7-15
A3, Amp/Prescaler PCB
Assembly 08306201

	TYPE	+5V	-5.2V	GND
U1	SN72311N	8	4,1	
U2	Ø7715702			
U3	CA3199E	8		5
U4	SN72311N	8	4	1
U5	AD9685BH	1	5	9,1Ø
U6	MC79L15ACP			
U7	MC78L15ACP			



NOTES: UNLESS OTHERWISE SPECIFIED
1. RESISTOR VALUES ARE IN OHMS, ¼W, 5%.
2. CAPS, IF VALUE IS MORE THAN ONE ARE IN pf.
   CAPS, IF VALUE IS LESS THAN ONE ARE IN µf.

Figure 7-16
A3, Amp/Prescaler PCB Assy
Schematic 08306201

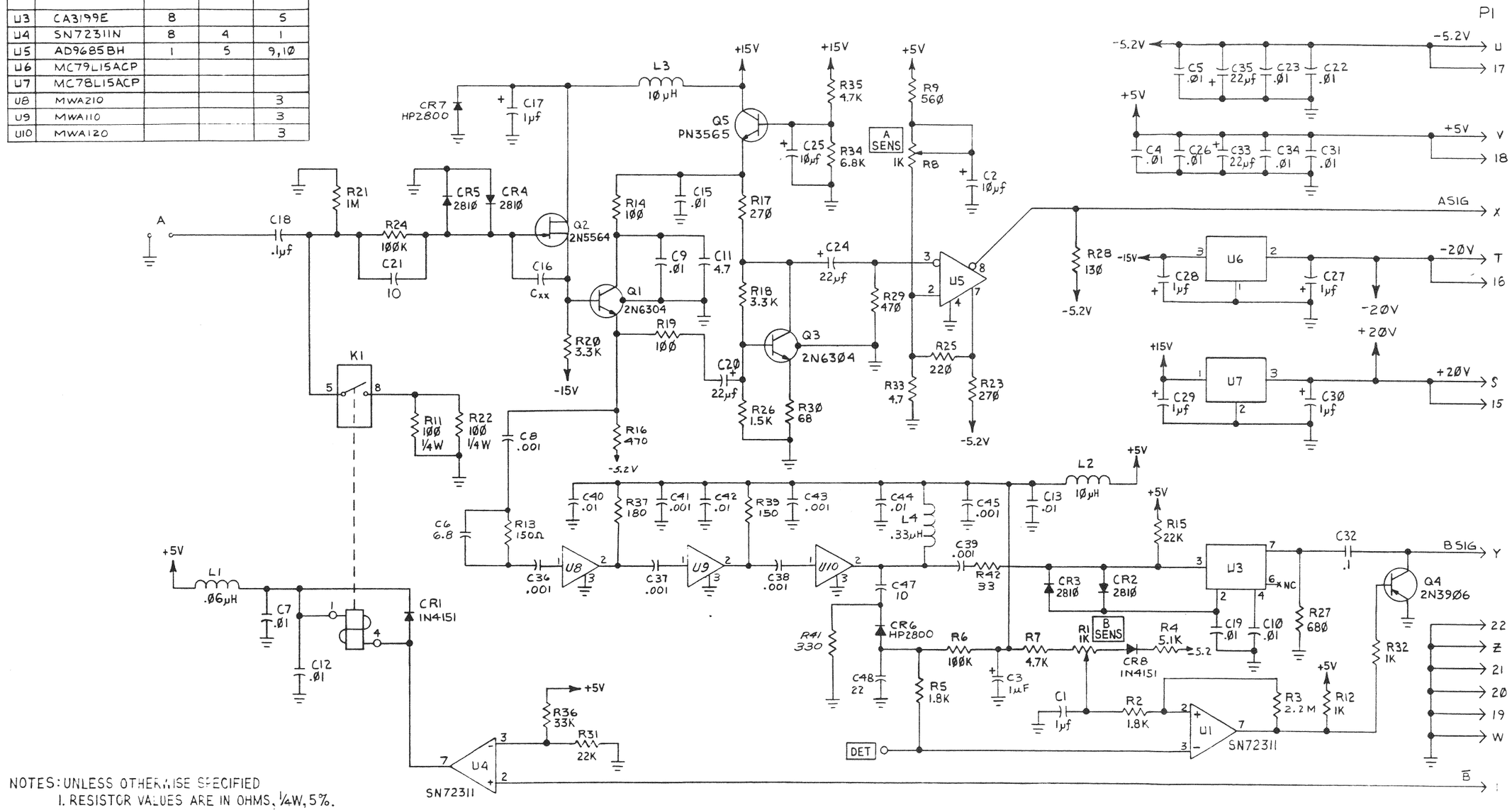


NOTES:

1) USE GLASS BEADS ONLY ON CAPS WHOSE LEADS ARE BENT.

Figure 7-15A
A3, Amp/Prescaler PCB
Assembly 08306201

	TYPE	+5V	-5.2V	GND
U1	SN72311N	8	4,1	
U3	CA3199E	8		5
U4	SN72311N	8	4	1
U5	AD9685BH	1	5	9,10
U6	MC79L15ACP			
U7	MC78L15ACP			
U8	MWA210			3
U9	MWA110			3
U10	MWA120			3



NOTES: UNLESS OTHERWISE SPECIFIED
1. RESISTOR VALUES ARE IN OHMS, ¼W, 5%.
2. CAPS, IF VALUE IS MORE THAN ONE ARE IN pf.
   CAPS, IF VALUE IS LESS THAN ONE ARE IN µf.

Figure 7-16A
A3, Amp/Prescaler PCB Assy
Schematic 08306201

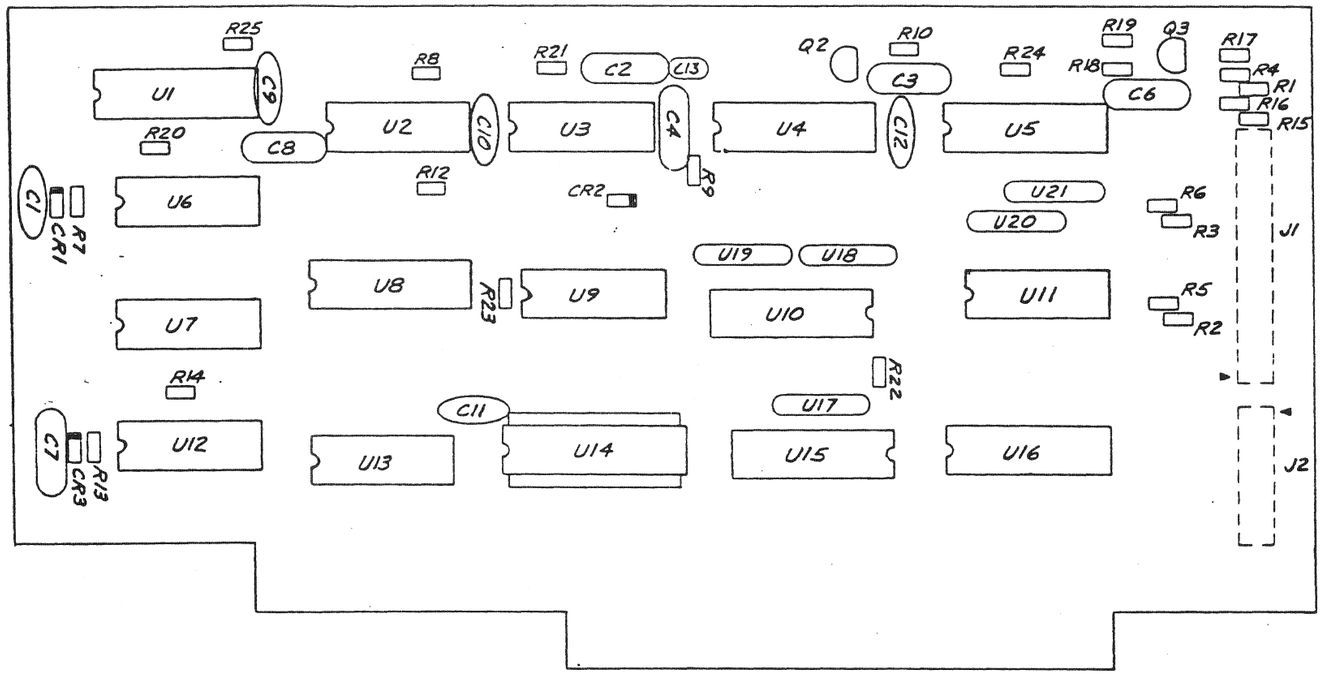
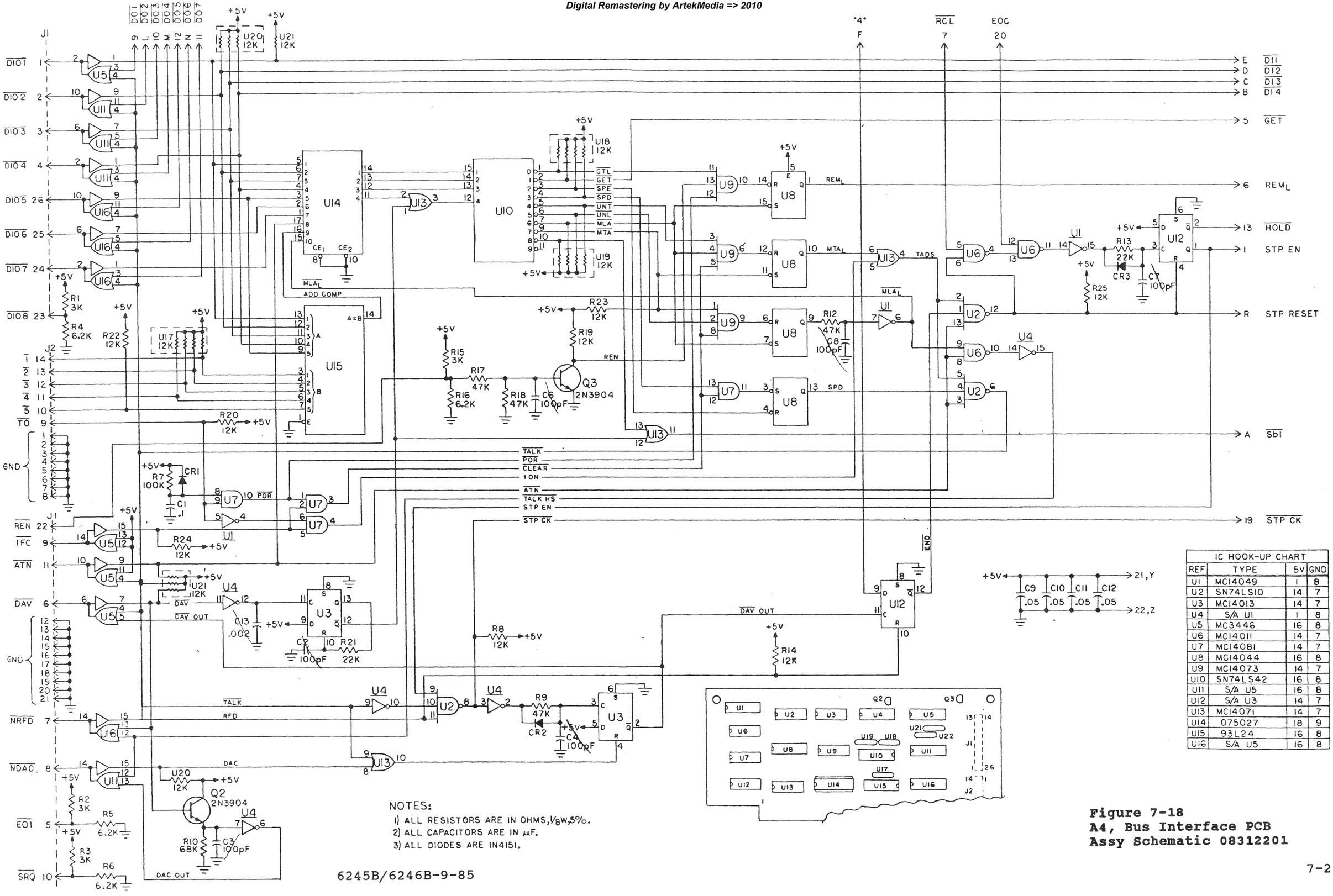


Figure 7-17
A4, Bus Interface PCB
Assembly 08312201



IC HOOK-UP CHART			
REF	TYPE	5V	GND
U1	MC14049	1	8
U2	SN74LS10	14	7
U3	MC14013	14	7
U4	S/A U1	1	8
U5	MC3446	16	8
U6	MC14011	14	7
U7	MC14081	14	7
U8	MC14044	16	8
U9	MC14073	14	7
U10	SN74LS42	16	8
U11	S/A U5	16	8
U12	S/A U3	14	7
U13	MC14071	14	7
U14	075027	18	9
U15	93L24	16	8
U16	S/A U5	16	8

NOTES:
1) ALL RESISTORS ARE IN OHMS, 1/8W, 5%.
2) ALL CAPACITORS ARE IN μF.
3) ALL DIODES ARE IN4151.

6245B/6246B-9-85

Figure 7-18
A4, Bus Interface PCB
Assy Schematic 08312201

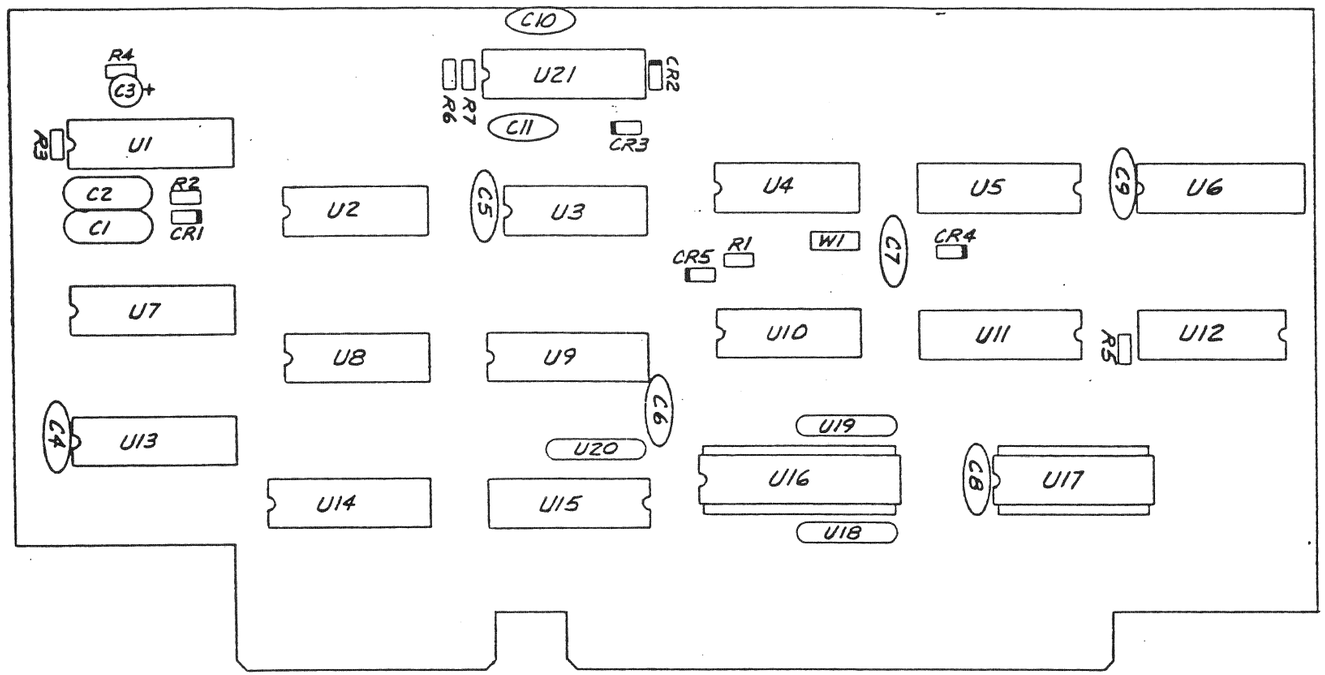


Figure 7-19
A5, Counter Interface PCB
Assembly 08312101

I.C. TABLE			
REF NO.	TYPE	+5V	GND
U1	MC 14538B	16	8
U2	MC 14071B	14	7
U3	MC 14011B	14	7
U4	MC 14081B	14	7
U5	MC 14049B	1	8
U6	MC 14518B	16	8
U7	MC 14175B	16	8
U8	MC 14013B	14	7
U9	S/A U5	1	8
U10	S/A U8	14	7
U11	SN74LS157	16	8
U12	SN74LS197	14	7
U13	SN74LS145	16	8
U14	S/A U13	16	8
U15	S/A U13	16	8
U16	075026	20	10
U17	SN7489	16	8
U21	S/A U1	16	8

NOTES: UNLESS OTHERWISE SPECIFIED,
1. ALL RESISTORS ARE IN OHMS, 1/8W, 5%.
2. ALL CAPACITORS ARE IN MICROFARADS.

Figure 7-20
A5, Counter Interface PCB
Assy Schematic 08312101

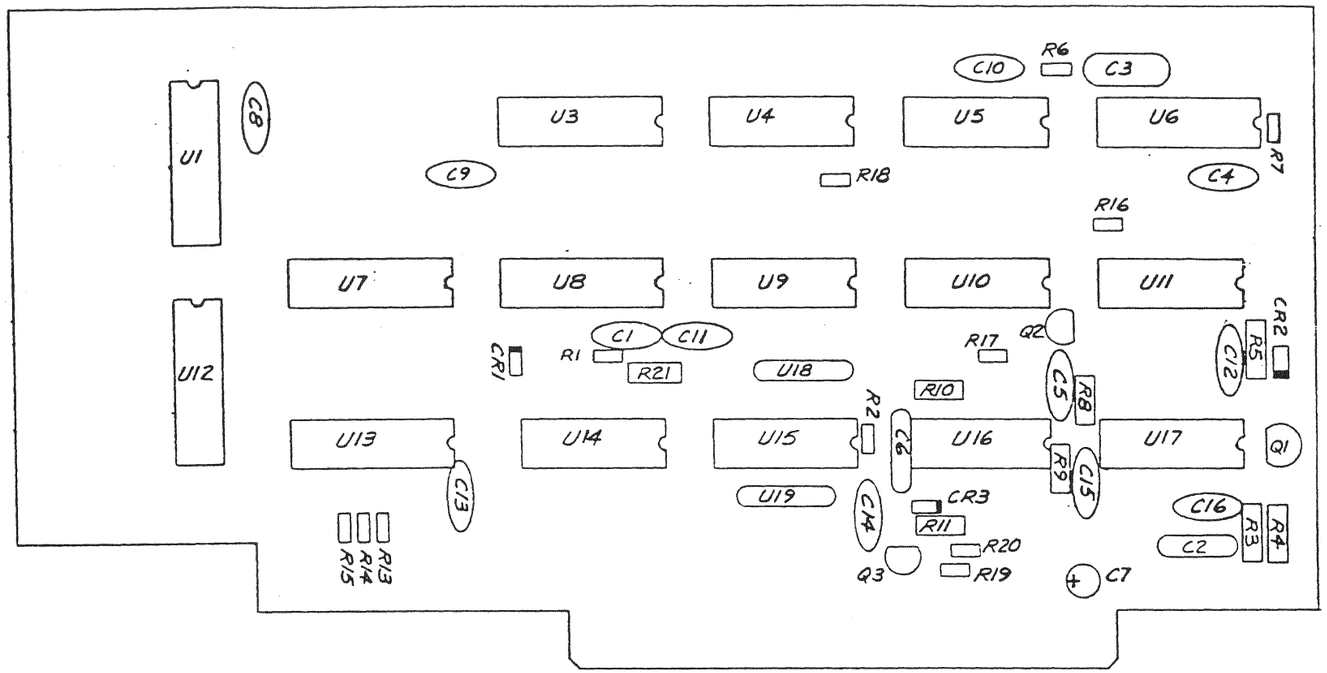


Figure 7-21
A6, Timebase Logic PCB
Assembly 08312001

IC POWER HOOK-UP			
REF	TYPE	+5V	GND
U1	MC14518	16	8
U2	NOT USED		
U3	MC14049	1	8
U4	SN74LS197	14	7
U5	SN74LS196	14	7
U6	SN74LS123	16	8
U7	S/A U1	16	8
U8	MC14528	16	8
U9	MC14011	14	7
U10	S/A U5	14	7
U11	SN74LS00	14	7
U12	S/A U1	16	8
U13	MC14512	16	8
U14	S/A U11	14	7
U15	SN74LS10	14	7
U16	S/A U9	14	7
U17	S/A U11	14	7

NOTES:

1) ALL RESISTOR VALUES ARE IN OHMS, 1/8W, 5%.
2) ALL CAPACITOR VALUES ARE IN µF.
3) ALL DIODES ARE IN4151.

Figure 7-22
A6, Timebase Logic PCB
Assy Schematic 08312001

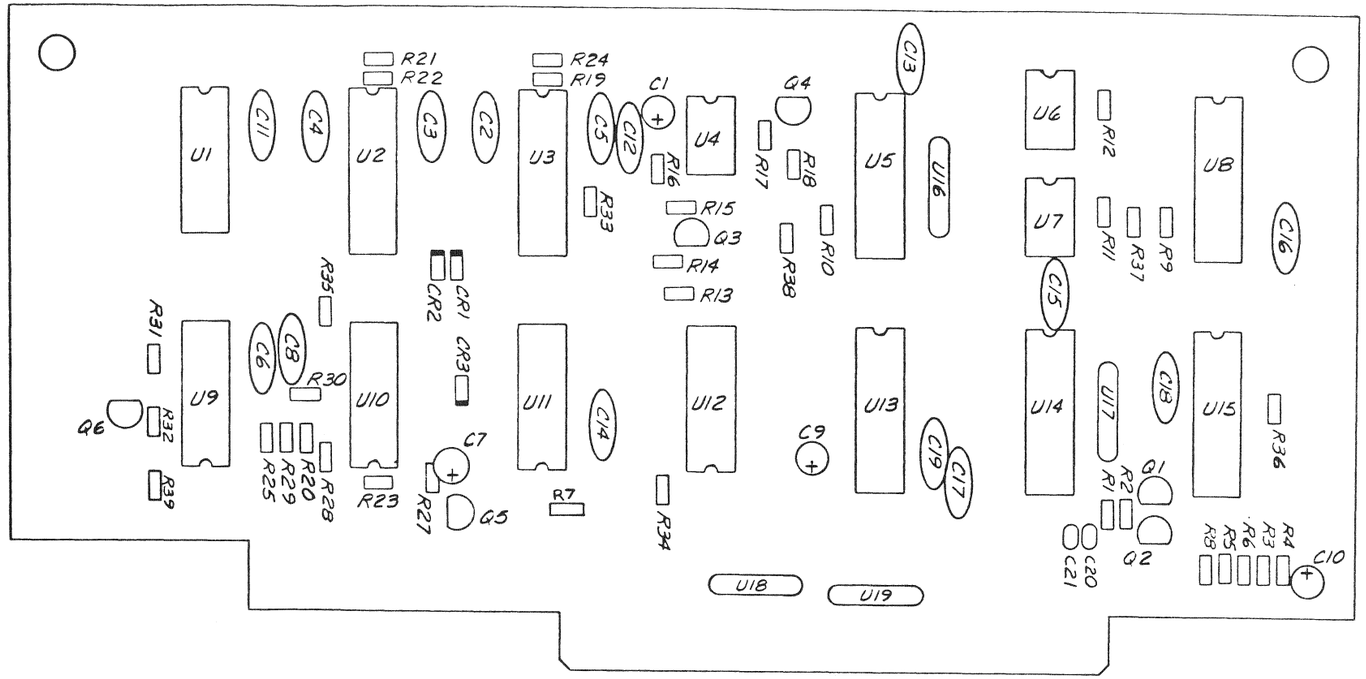


Figure 7-23
A7, Counter Logic PCB
Assembly 06760101

REF	TYPE	+5V	GND	-5.2V
U1	SN74LS32	14	7	
U2	MC14528	16	8	
U3	S/A U2	16	8	
U4	NE555	8	1	
U5	MC10131		1,16	8
U6	SN72311	8		4
U7	S/A U6	8		4
U8	MC10138		4,16	8
U9	SN74LS05	14	7	
U10	MC14081	14	7	
U11	SN74LS08	14	7	
U12	SN74LS196	14	7	
U13	MC10124	9	16	8
U14	MC10125	9	16	8
U15	MC10100		1,16	8

NOTES: (EXCEPT AS NOTED)
1. RESISTOR VALUES IN OHMS 1/8W, 5%
2. CAPACITOR VALUES IN µF
3. DIODES ARE IN4151
4. TRANSISTORS ARE 2N3906

Figure 7-24
A7, Counter Logic PCB
Assy Schematic 06760101

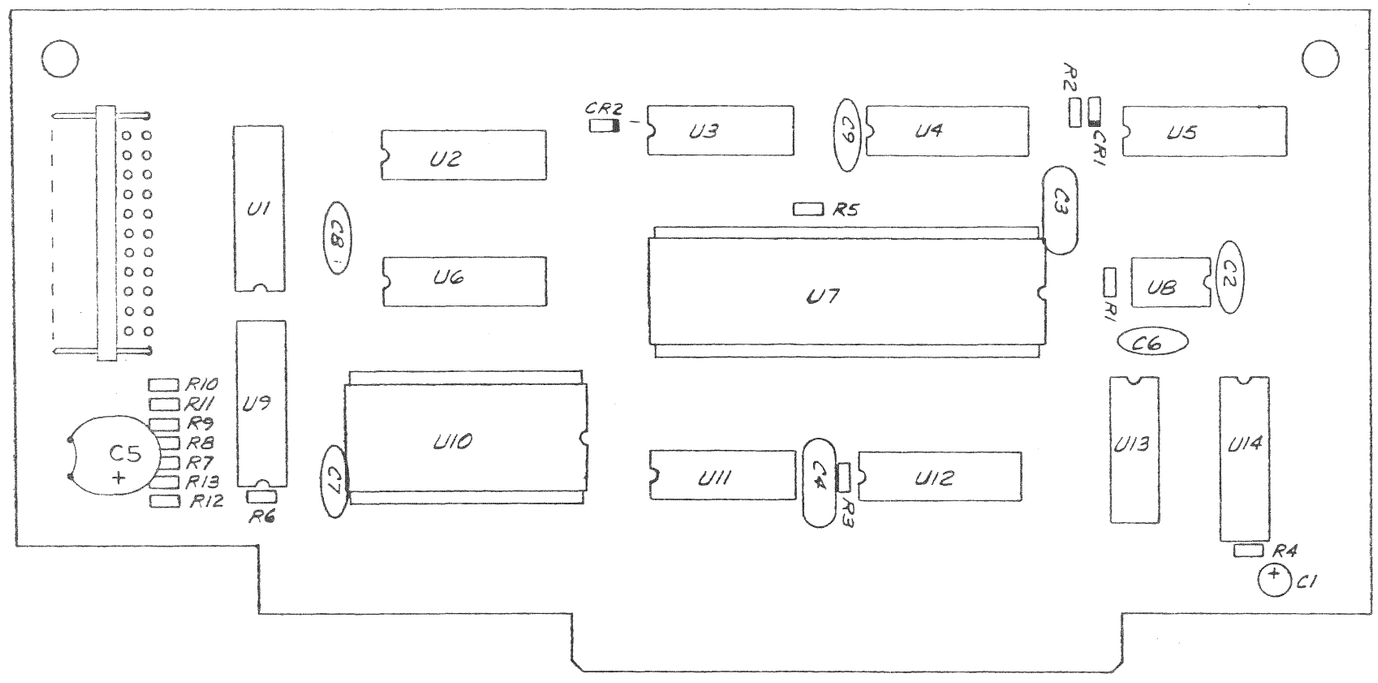


Figure 7-25
A8, Display Logic PCB
Assembly 06769402 sheet 1 of 2

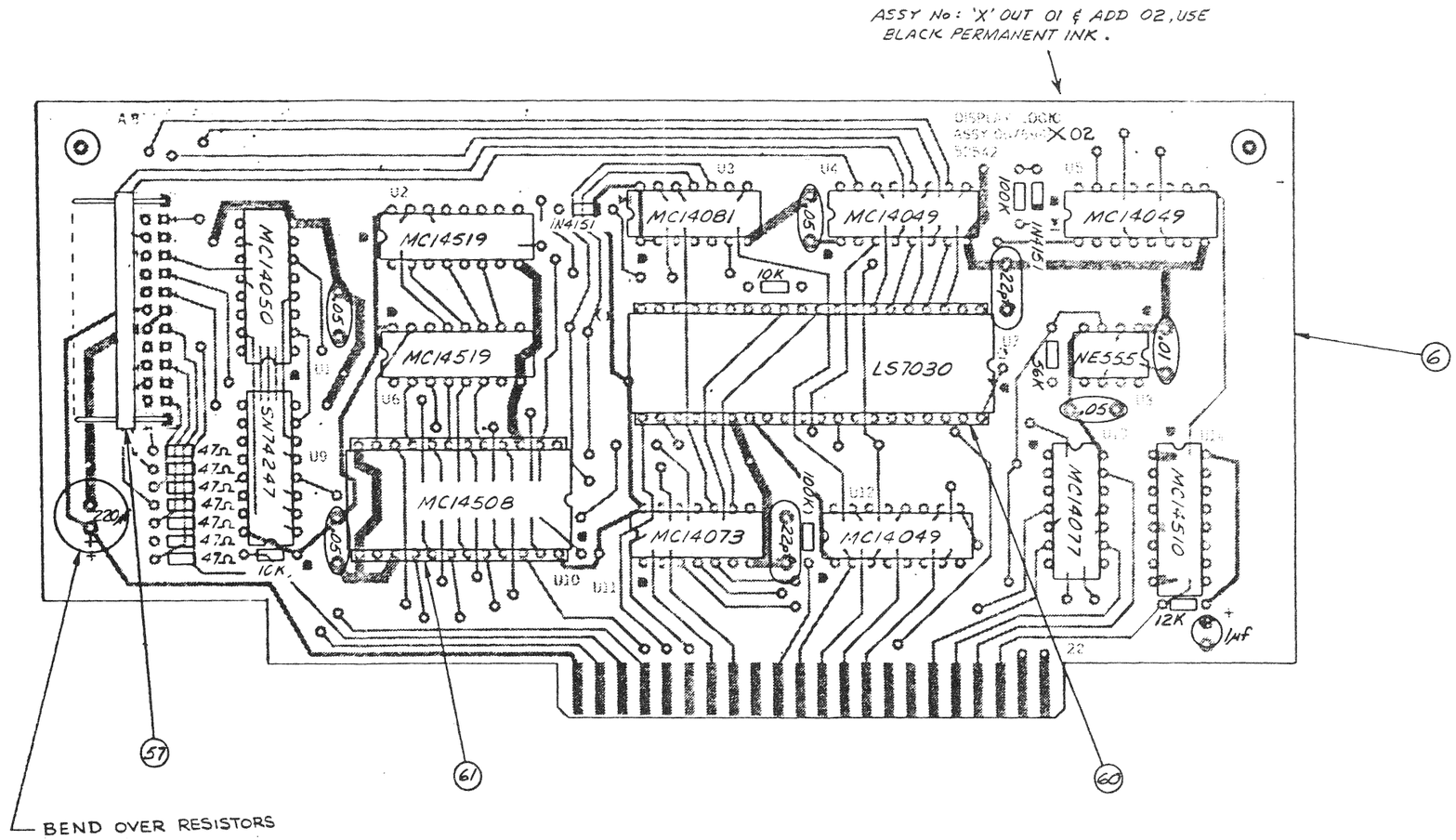
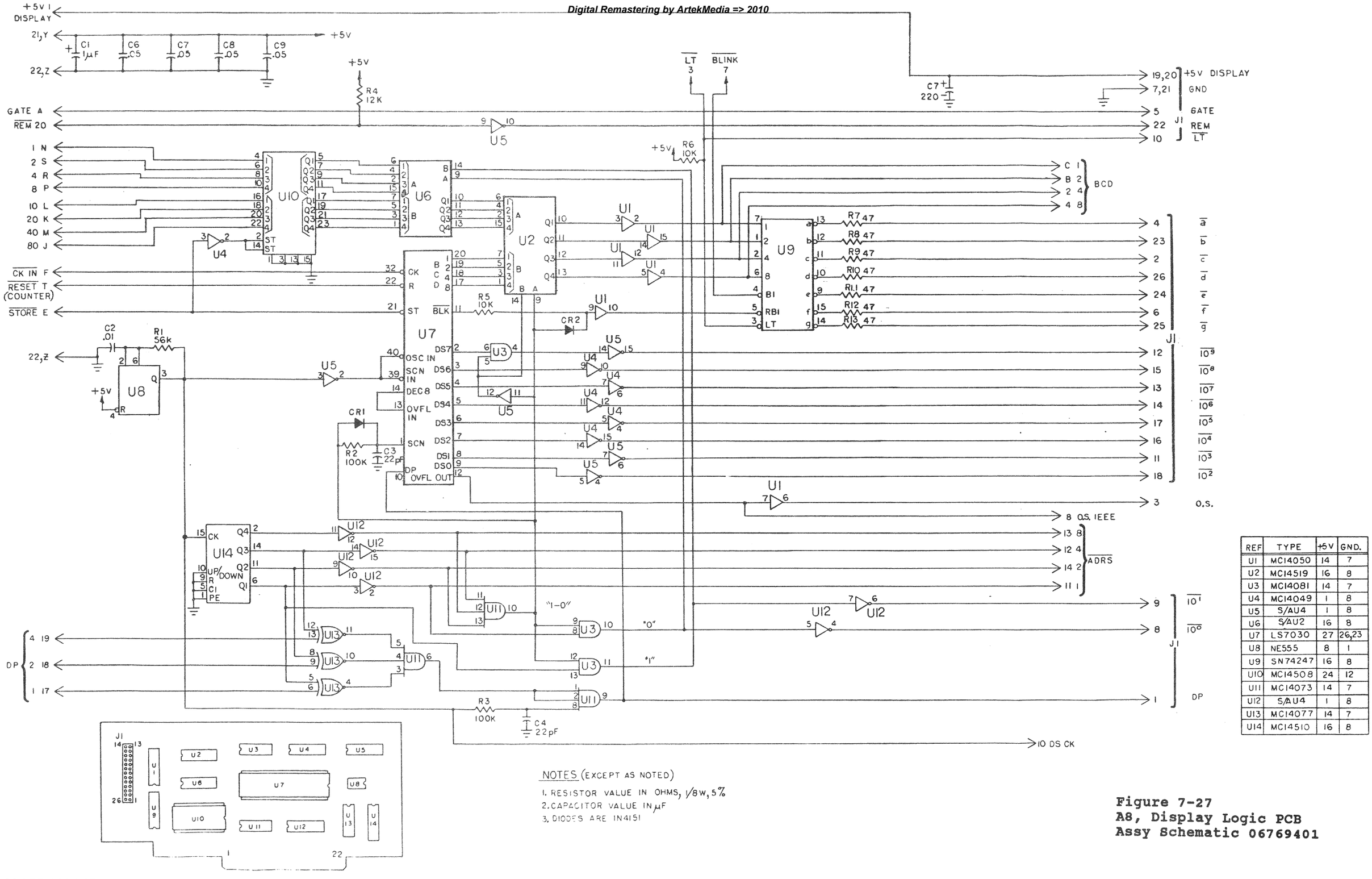


Figure 7-26
A8, Display Logic PCB
Assembly 06769402 sheet 2 of 2



REF	TYPE	+5V	GND.
U1	MC14050	14	7
U2	MC14519	16	8
U3	MC14081	14	7
U4	MC14049	1	8
U5	S/AU4	1	8
U6	S/AU2	16	8
U7	LS7030	27	26,23
U8	NE555	8	1
U9	SN74247	16	8
U10	MC14508	24	12
U11	MC14073	14	7
U12	S/AU4	1	8
U13	MC14077	14	7
U14	MC14510	16	8

NOTES (EXCEPT AS NOTED)

1. RESISTOR VALUE IN OHMS, 1/8W, 5%
2. CAPACITOR VALUE IN µF
3. DIODES ARE IN4151

Figure 7-27
A8, Display Logic PCB
Assy Schematic 06769401

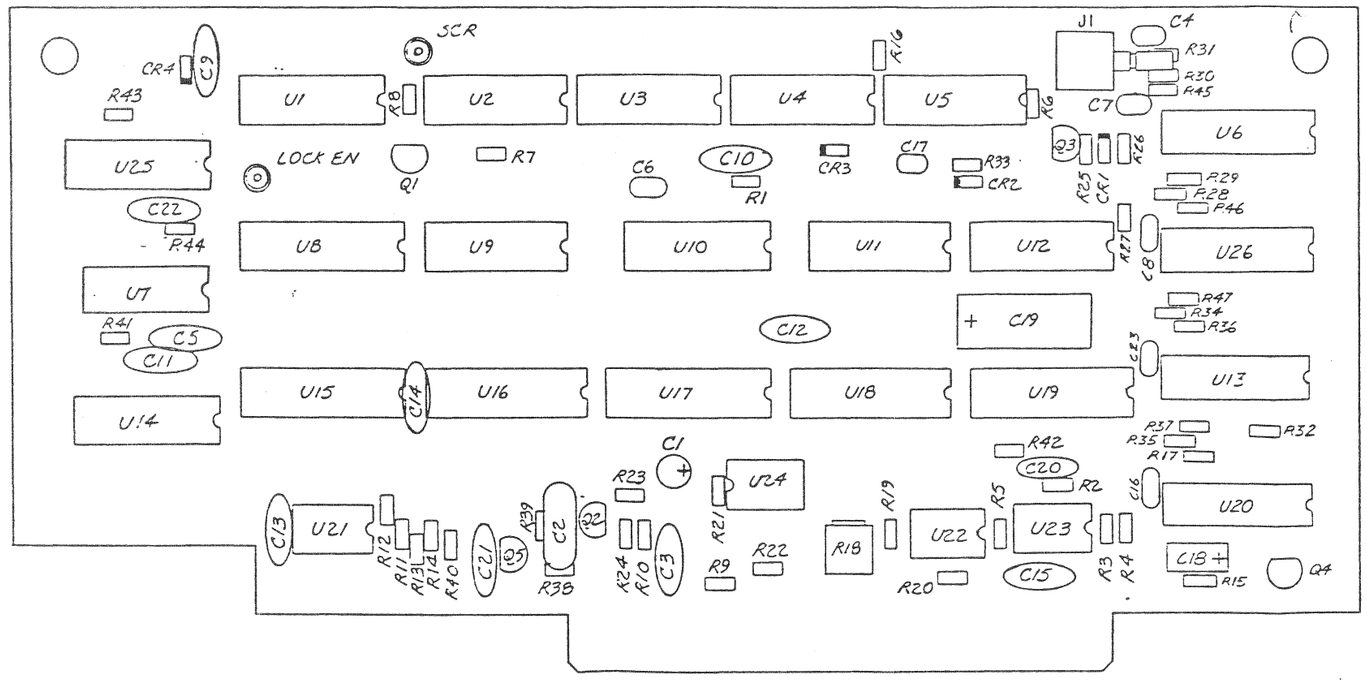


Figure 7-28
A10, FLACTO Logic PCB
Assembly 06759901 sheet 1 of 2

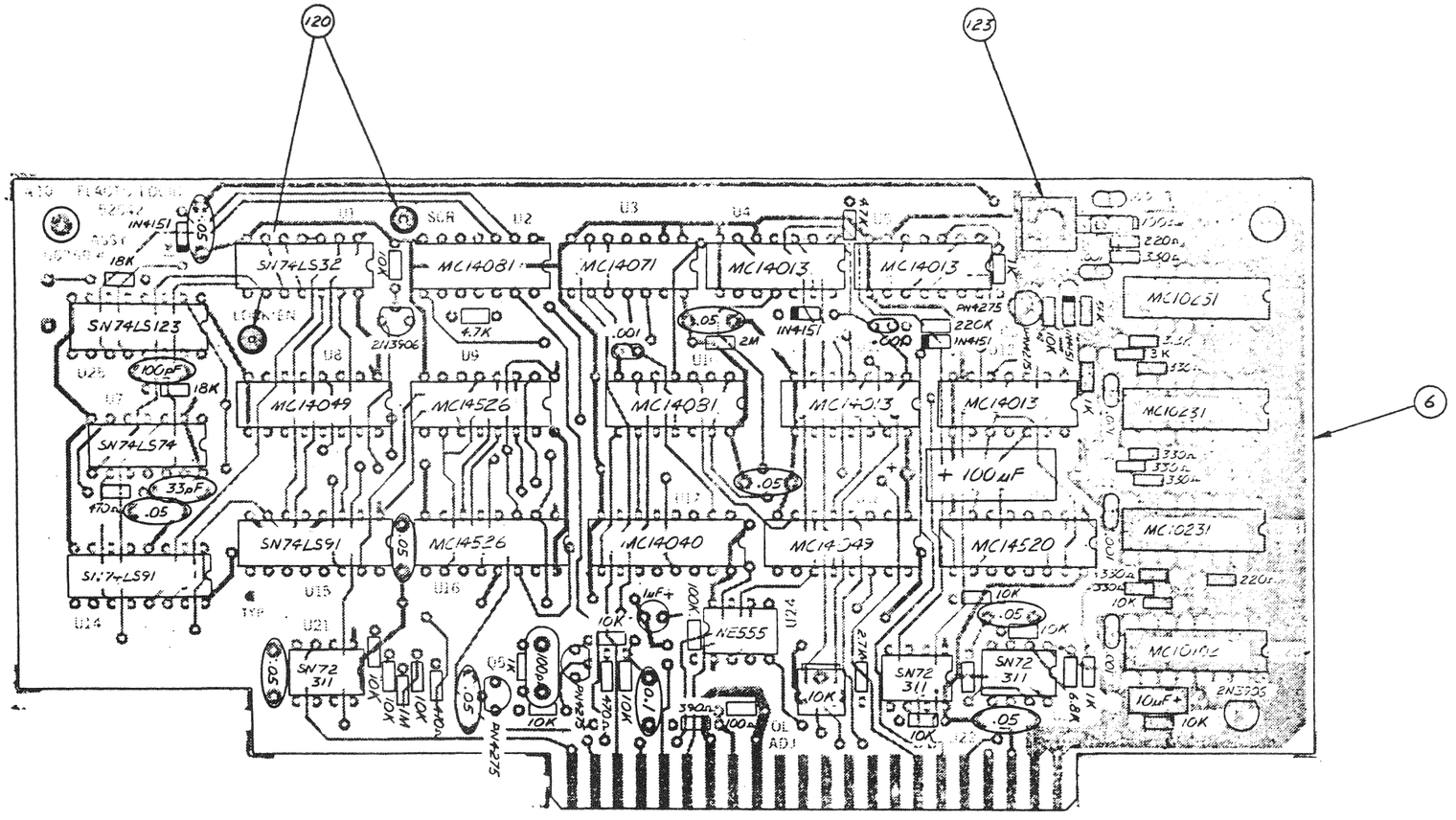


Figure 7-29
A10, FLACTO Logic PCB
Assembly 06759901 sheet 2 of 2

I.C. TABLE				
REF NO.	TYPE	+5V	GND	-5.2V
U1	74LS32	14	7	
U2,U10	MC14081	14	7	
U3	MC14071B	14	7	
U4,U5,U11,U12	MC14013	14	7	
U6,U26	MC10231		1,16	8
U7	SN74LS74	14	7	
U8,U18	MC14049	1	8	
U9,U16	MC14526	16	8	
U13	MC10231		1,16	8
U14,U15	74LS191	16	8	
U17	MC14040	16	8	
U20	MC10102		1,16	8
U21,U22,U23	SN72311	8	1	4
U24	NE555	8	1	
U25	74LS123	16	8	
U19	MC14520	16	8	

NOTES: (EXCEPT AS NOTED)

1. RESISTORS: VALUE IN OHMS POWER 1/8W TOLERANCE 5%
2. CAPACITORS: CAPACITY IN MICROFARADS

Figure 7-30
A10, FLACTO Logic PCB
Assy Schematic 06759901

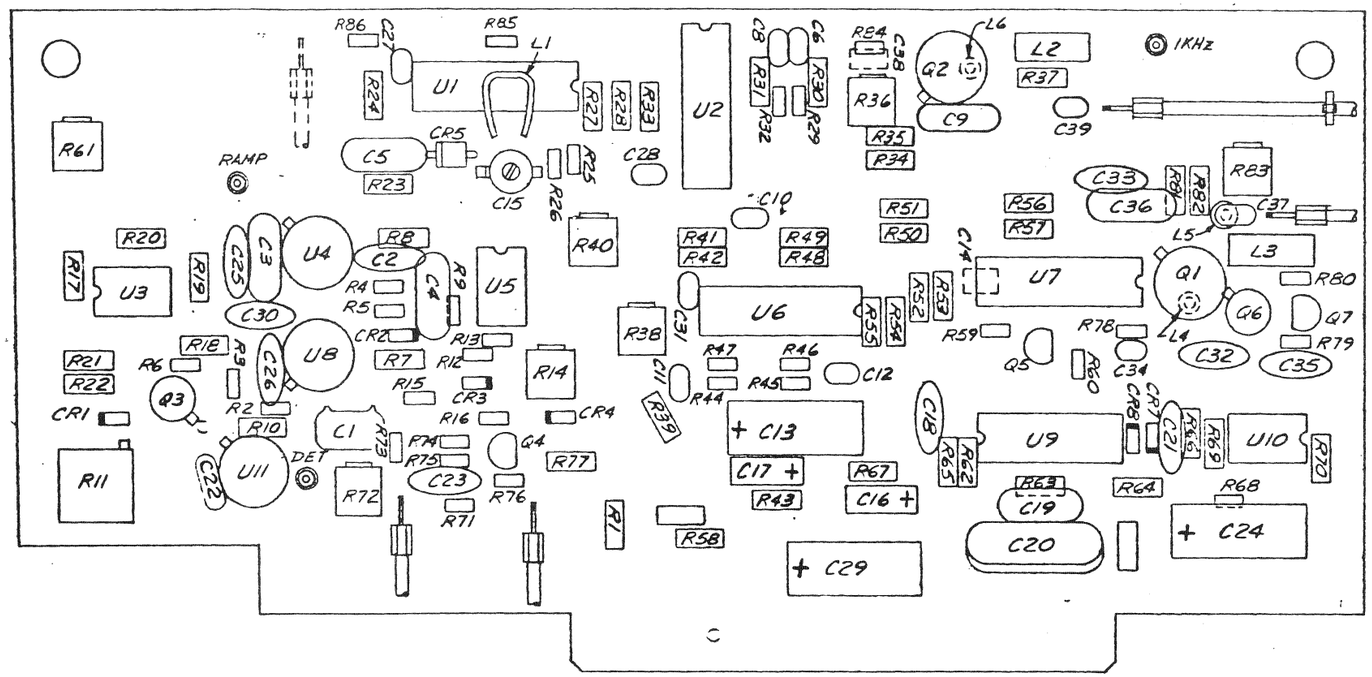
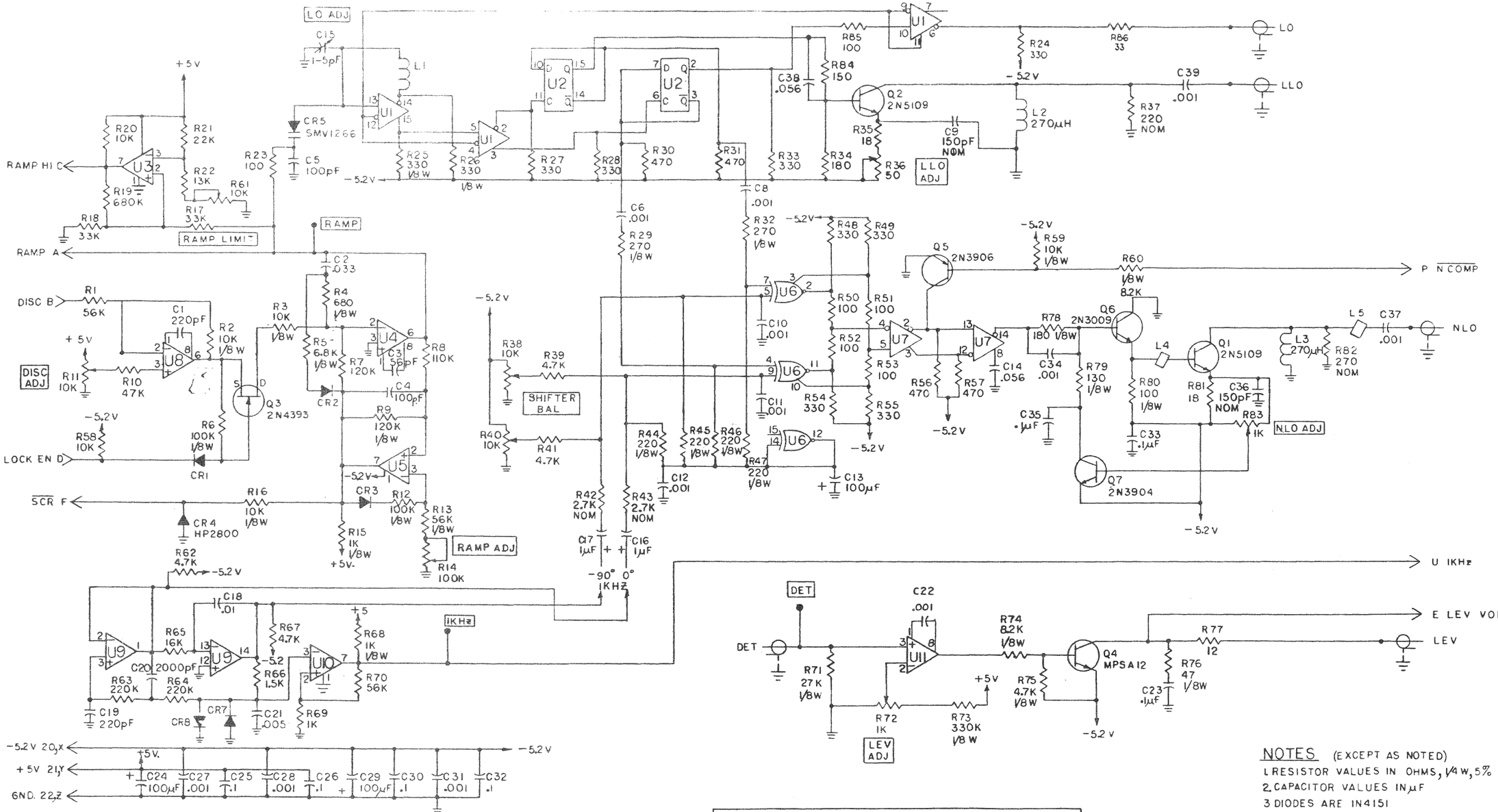
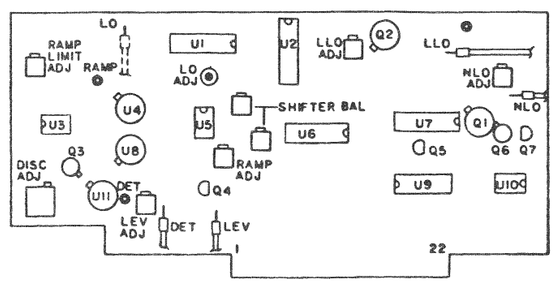


Figure 7-31
A11, LO/Shifter PCB
Assembly 06759802



IC	DESCRIPTION	+5V	-5.2V	GND.
U1	MC10216	—	8	1,16
U2	MC10231	—	8	1,16
U3	SN72311P	8	4	
U4	CA3130T	7	4	
U5	S/A U3	8	4	
U6	MC10107	—	8	1,16
U7	S/A U1	—	8	1,16
U8	S/A U4	7	4	
U9	LM124	4	11	
U10	S/A U3	5	4	
U11	LM301AH	7	4	



NOTES (EXCEPT AS NOTED)
1. RESISTOR VALUES IN OHMS, 1/4 W, 5%
2. CAPACITOR VALUES IN µF
3. DIODES ARE IN4151

Figure 7-32
A11, LO/Shifter PCB
Assy Schematic 06759801

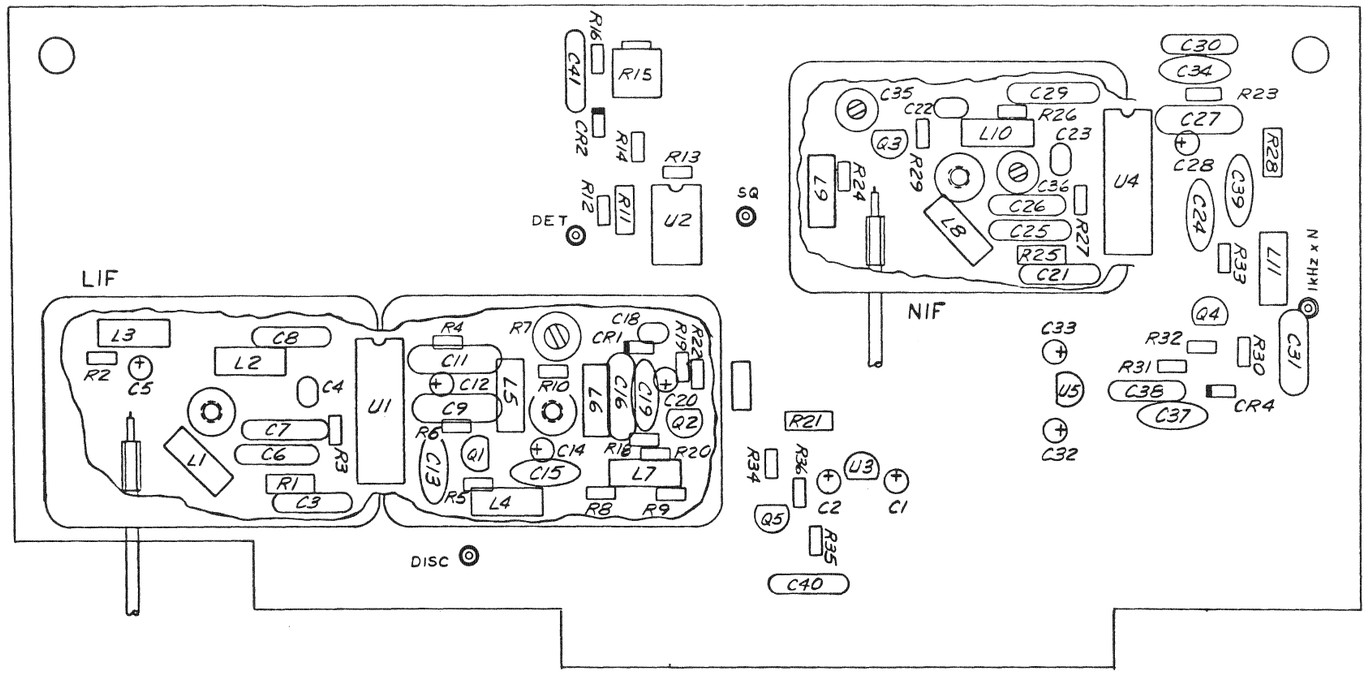
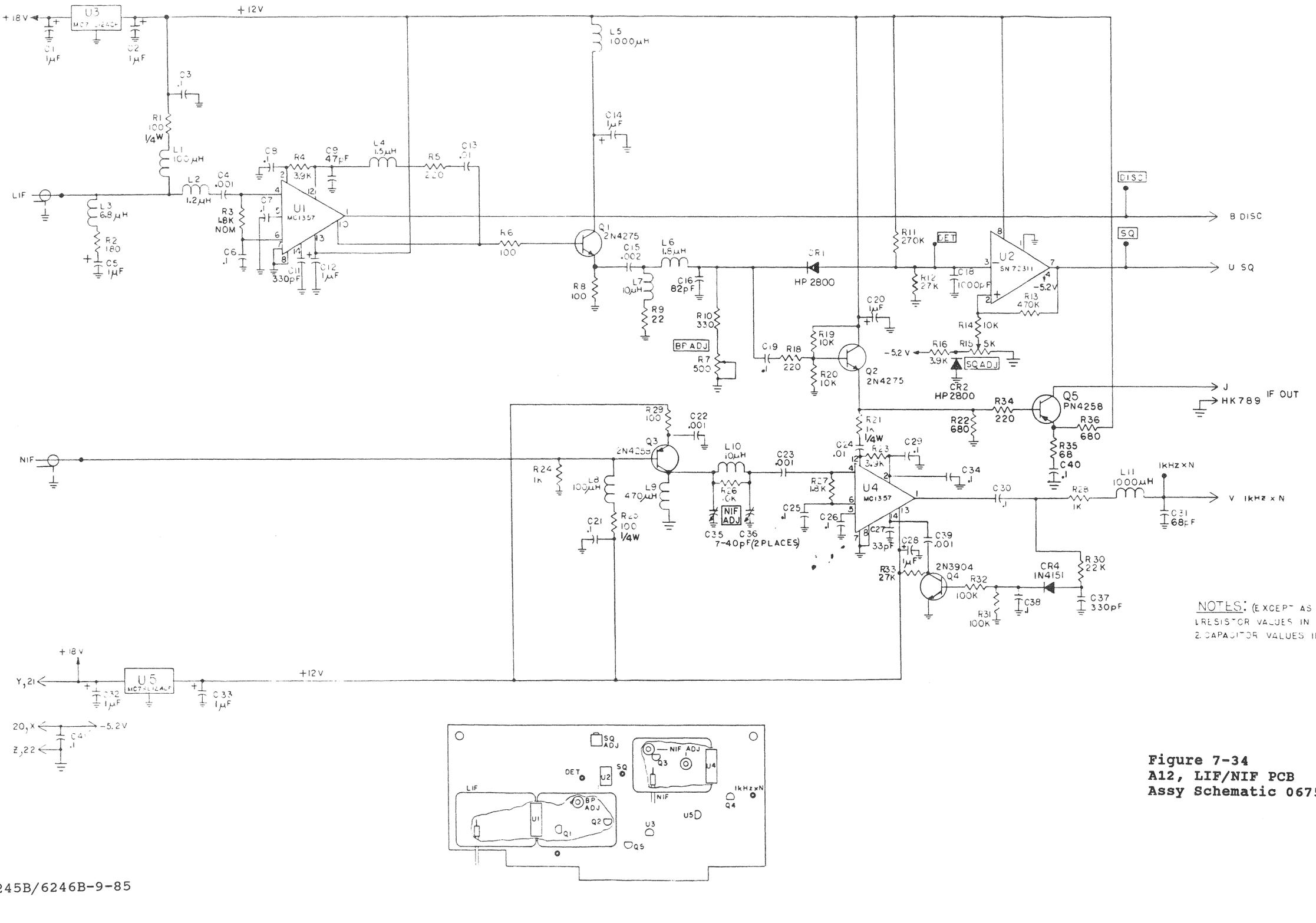
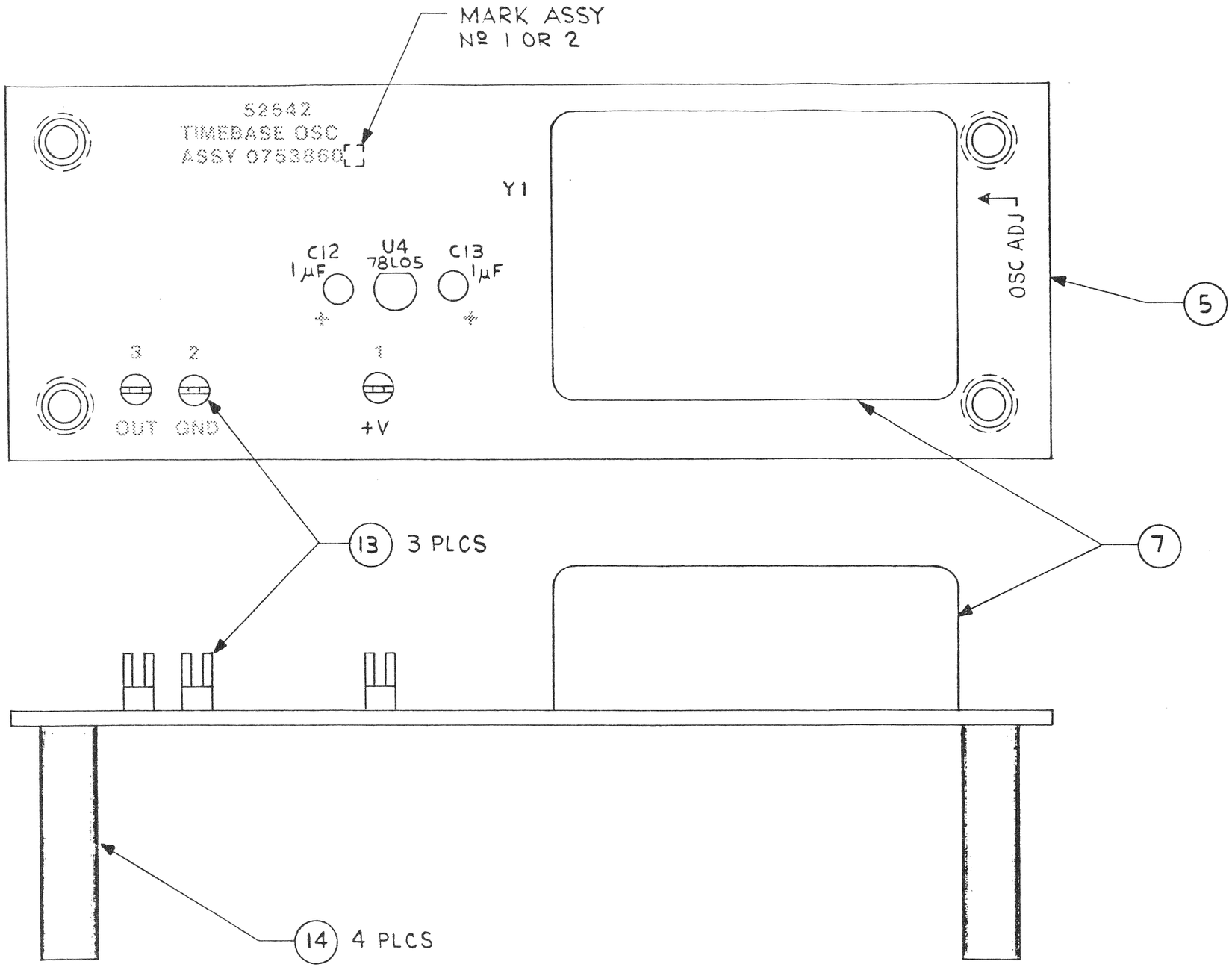


Figure 7-33
A12, LIF/NIF PCB
Assembly 06759701



NOTES: (EXCEPT AS NOTED)
1. RESISTOR VALUES IN OHMS, 1/8W, 5%.
2. CAPACITOR VALUES IN µF.

Figure 7-34
A12, LIF/NIF PCB
Assy Schematic 06759701



ASSY	P/L
07538601	P07538601
07538602	P07538602

Figure 7-35
A13, Timebase Oscillator PCB
Assembly 075386XX

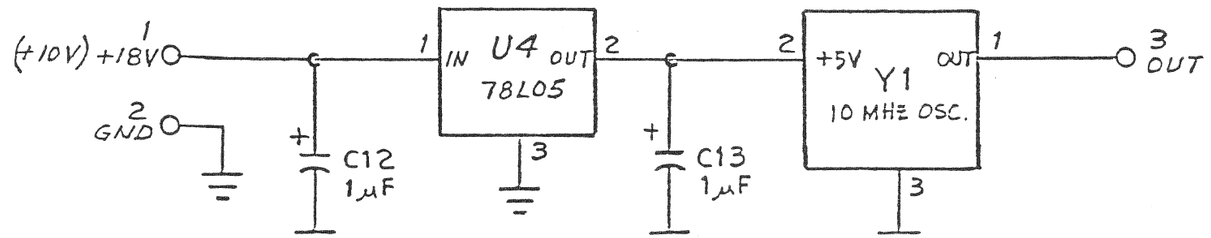
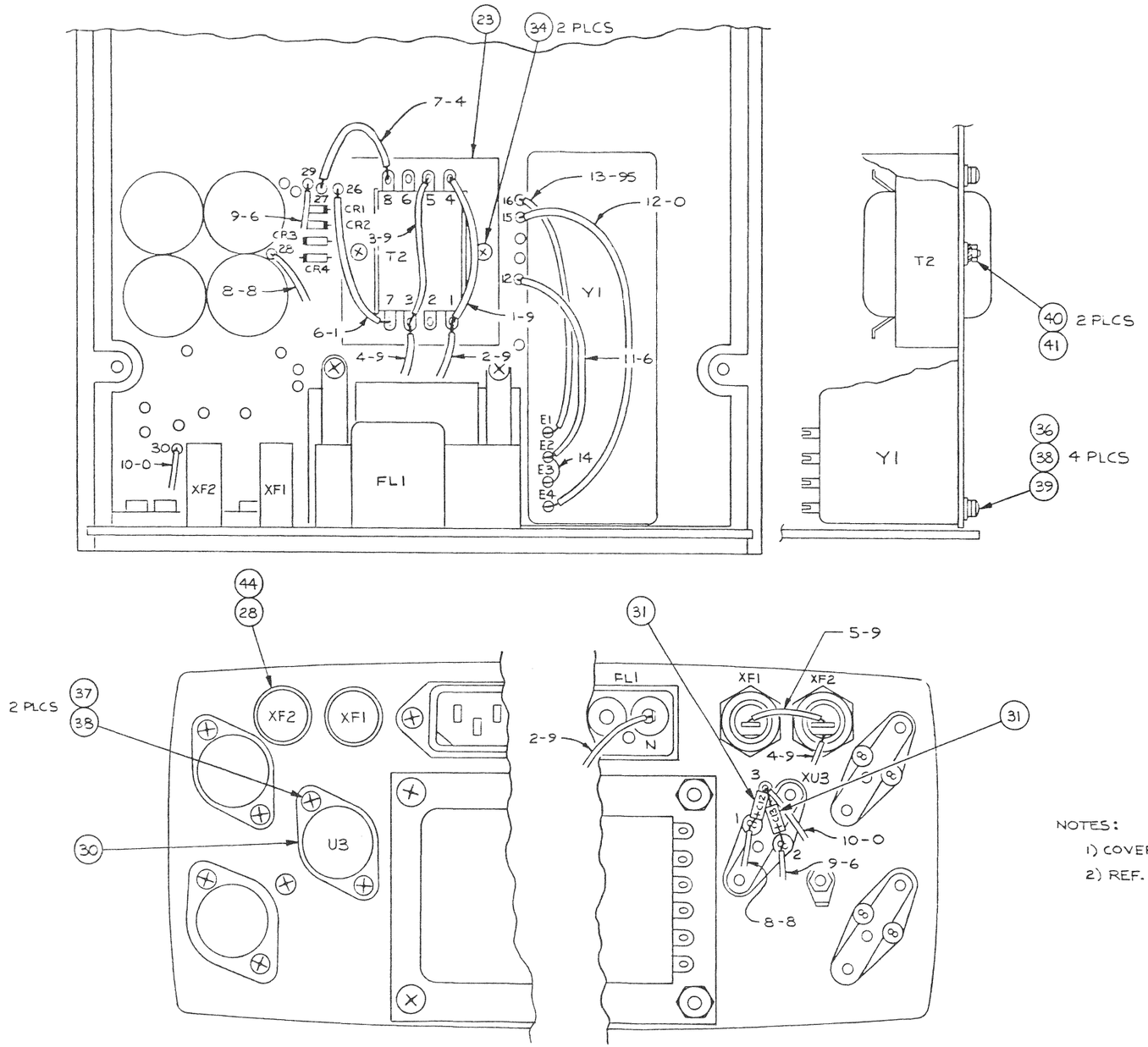


Figure 7-36
A13, 10 MHz Timebase Oscillator
PCB Assy Schematic 075386



NOTES:

1) COVER TERMINALS OF XF2 & T2 WITH SHRINK TUBE.
2) REF. 508312401, OPT. 13 ASSY W/L.

Figure 7-37
Option 13, High Stability
Oscillator Assy 08312401

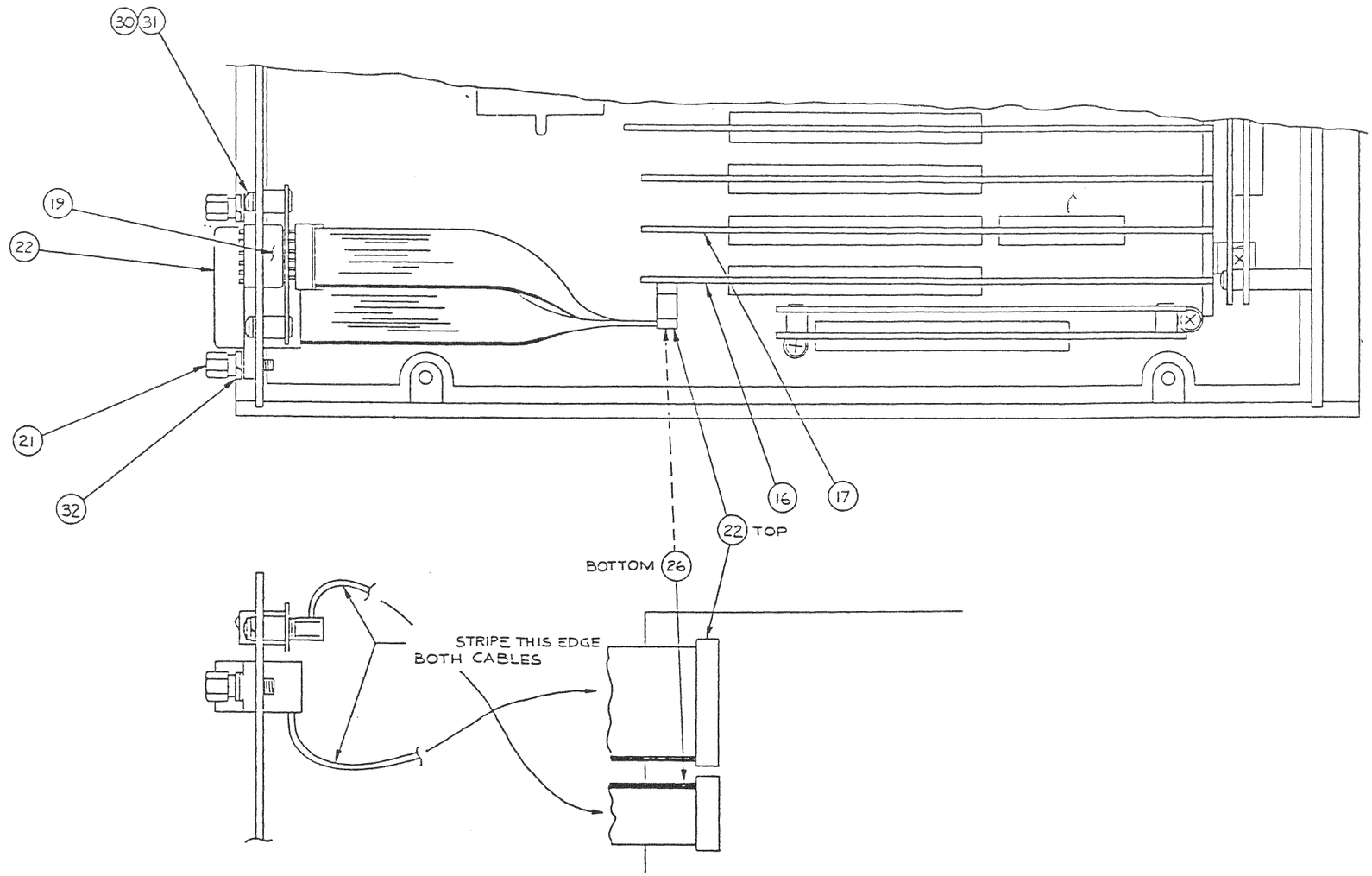


Figure 7-38
Option 05, IEEE-488
Assembly 08312301

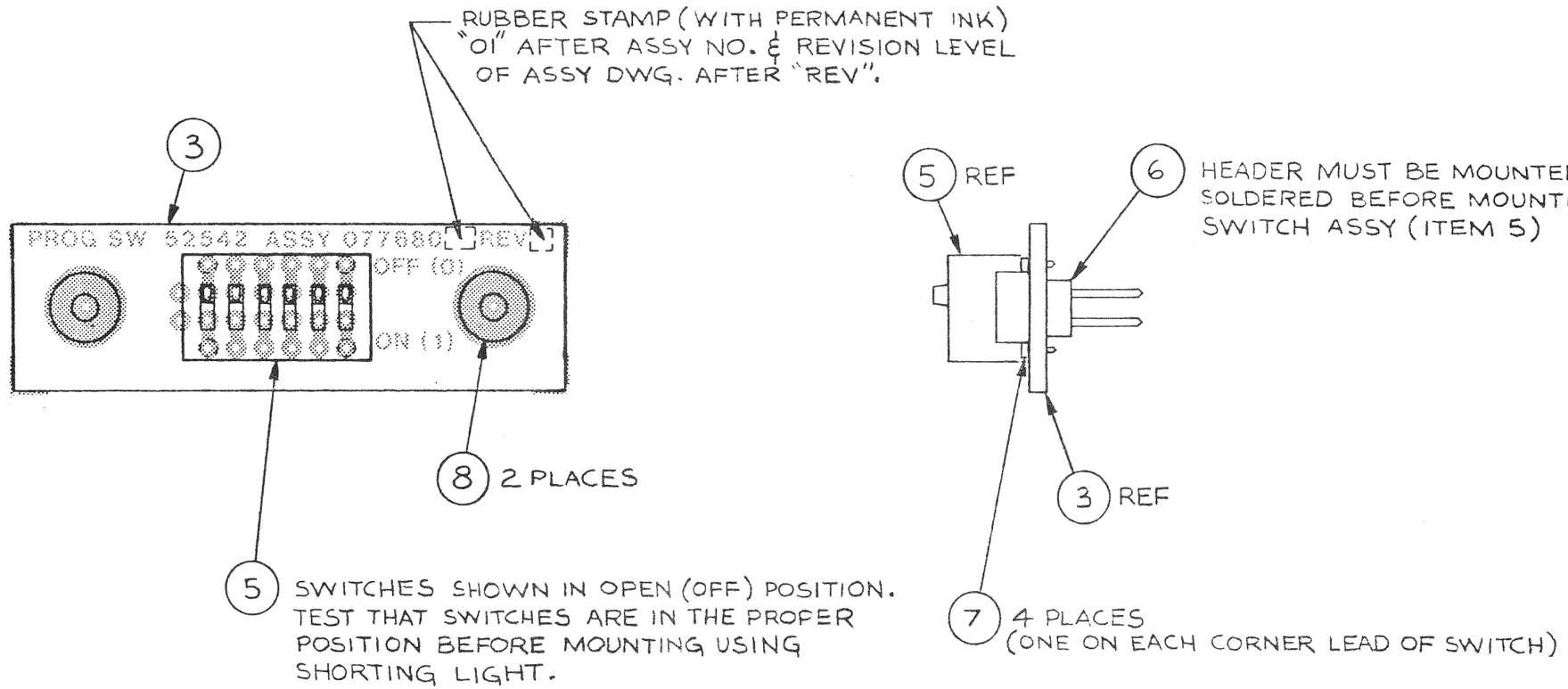


Figure 7-39
Program Switch PCB
Assembly 07768001