021-0374-00
GPIB DECODER

Please Check for
CHANGE INFORMATION
at the Rear of This Manual

Tektronix
COMMITTED TO EXCELLENCE

021-0374-00

TABLE OF CONTENTS

SECTION 1

1.1   Introduction

The 021-0374-00 GPIB Decoder is a 7000-series compatible plug-in designed to provide communication between the IEEE-488 bus and up to three programmable plug-ins such as the 7A16P, 7A29P and the 7B90P.

The decoder occupies a primary address on the bus while each programmable plug-in occupies an unique secondary address, 1 through 3. Acting as an interface between the IEEE-488 bus and the plug-ins, the decoder accepts IEEE-488 attention messages and directs device-dependent messages. Data flow is bi-directional.

1.2   Specifications

Power requirement for the 021-0374-00 is 5 volts +/- 5%.

NOTE
Tektronix Type 7854 is the only
7000-series mainframe with an
adequate regulated 5-volt supply
to power the decoder and program-
mable plug-ins.

IEEE Interface Function Subsets

Applicable IEEE-488 function subsets for the 021-0374-00 are:

Complete Source Handshake	SH1
Complete Acceptor Handshake	AH1
Extended Talker Function	TE6
Extended Listener Function	LE4
Complete Service Request Capability	SR1
Complete Remote/Local Function	RL1
No Parallel Poll	PP0
No Device Clear Function	DC0
No Controller Function	C0
No Device Trigger Capability	DT0

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The 021-0374-00 does not respond to the following
interface control messages:

    Parallel Poll Configure   PPC
    Parallel Poll Unconfigure   PPU
    Group Execute Trigger   GET
    Take Control   TCT

The 021-0374-00 does respond to the following interface
control messages:

    Serial Poll Enable   SPE
    Serial Poll Disable   SPD
    Interface Clear   IFC

1.3   Programming Summary

The 021-0374-00 complies with Tektronix codes and for-
mats. It directs traffic between the plug-ins and the
IEEE-488 bus but does not respond to device dependent
messages. Status information is passively relayed to the
bus. The decoder is incapa-ble of issuing its device-
error codes.

Commands and data are passed to and from the plug-ins in
the exact text and manner described in the following
manuals:

    7A16P Instruction Manual (Tek part number 070-2308-00)
    7A29P Instruction Manual (Tek part number 070-6442-00)
    7B90P Instruction Manual (Tek part number 070-2309-00)

7K Bus I/O
SA 1
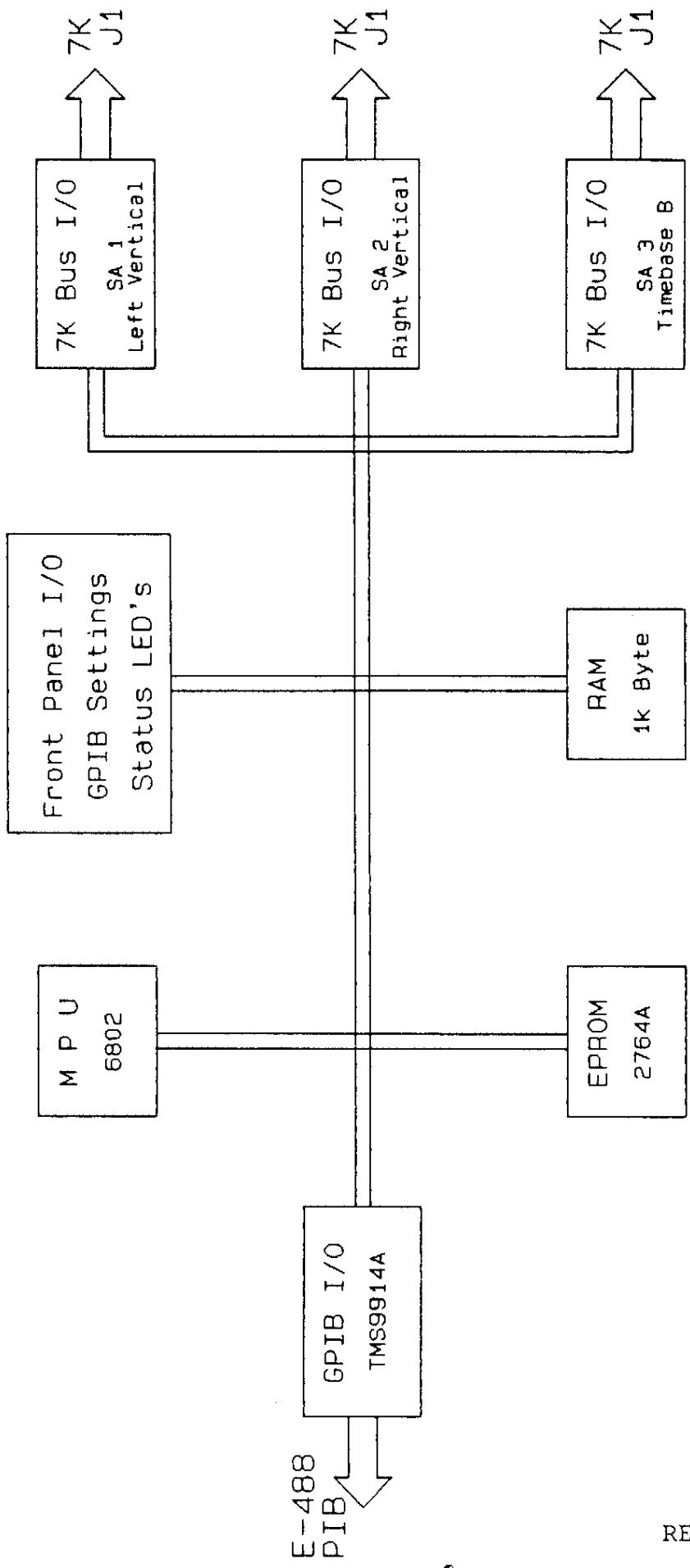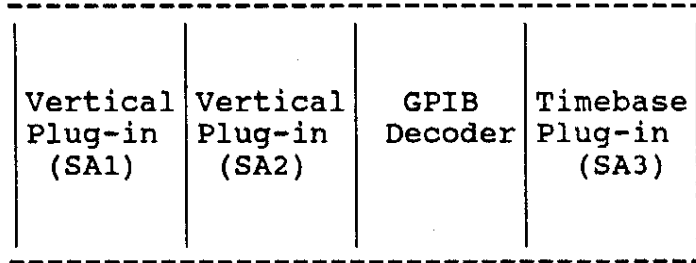Left Vertical

7K
J1

7K Bus I/O
SA 2
Right Vertical

7K
J1

7K Bus I/O
SA 3
Timebase B

7K
J1

Front Panel I/O
GPIB Settings
Status LED's

M P U
6802

RAM
1k Byte

EPROM
2764A

GPIB I/O
TMS9914A

E-488
PIB

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Figure 1-1. Decoder Block Diagram

Section 2   Installation

Fig. 2-1
Assembly Layout

```
------------------------------------------
|         |         |         |          |
|         |         |         |          |
| Vertical|Vertical |  GPIB   |Timebase  |
| Plug-in |Plug-in  | Decoder |Plug-in   |
|  (SA1)  | (SA2)   |         |  (SA3)   |
|         |         |         |          |
|         |         |         |          |
------------------------------------------
```
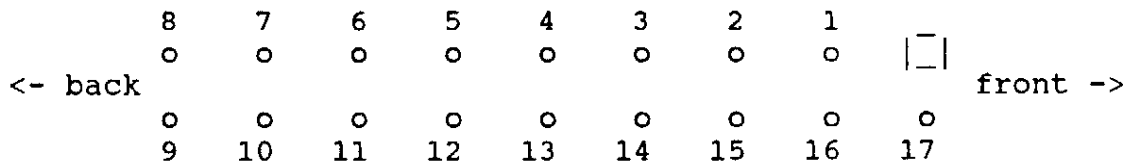
2.1   021-0374-00   GPIB Decoder

The positions of the Decoder (timebase A slot) and the 7B90P are critical since the 7854 mainframe defaults to timebase B when powered up.

Pole 1 of the front-panel DIP switch must be closed for GPIB operation. The primary address is set by poles 4 through 8 with pole 8 being the least significant bit (LSB).

The secondary addresses are hard-wired to the following connectors:

Connector	Sec. Address	Plug-in Connected	Note
J1030	1	Left Vertical	Closest to rear
J1040	2	Right Vertical	Optional
J1050	3	Timebase	Closest to front

Connectors J1030, J1040, and J1050 are pin-numbered as follows:

```
          8    7    6    5    4    3    2    1      _
          o    o    o    o    o    o    o    o   |_|
 <- back                                              front ->
          o    o    o    o    o    o    o    o    o
          9   10   11   12   13   14   15   16   17
```

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2.2   7A16P Vertical Amplifier Plug-ins

         To enable correct plug-in power up, install a jumper to P1622 located on the Programming Logic board, between U1620 and the edge connector.

         Corresponding to J1030 or J1040, the 7A16P connectors are pin-numbered as follows:

```
        J1410      J1510

    8    o          o   9
         o          o
         o          o
         o          o
         o          o
         o          o
         o          o
    1    o          o
                    o   17
```

2.3   7A29P Vertical Amplifier Plug-ins

         To enable correct plug-in power up, install a jumper to P4020 located near the rear of the Analog board.

         Corresponding to J1030 or J1040, the 7A29P connectors are pin-numbered as follows:

```
        J5020      J6020

    8    o          o   17
         o          o
         o          o
         o          o
         o          o
         o          o
         o          o
    1    o          o
                    o   9
```

2.4   7B90P Timebase Plug-in

         The following changes enable the plug-in to power up correctly:
(1) Install a jumper to P028 located on the Sweep Circuit board, close to the edge connector.

(2) Change zener diode VR330 to 7.5 V. The diode is located next to U430 on the Programming Circuit board.

Corresponding to J1050, the 7B90P connectors are pin-numbered as follows:

```
        J1410        J1510

      1  o          o  9
         o          o
         o          o
         o          o
         o          o
         o          o
         o          o
      8  o          o
                    o  17
```

2.5   Installation Procedure

(1) Place the plug-ins to be installed on a flat work surface.

(2) Remove plug-in side panels.

(3) Remove the rear-lower-left screw of each plug-in (except the left-most vertical). Install a metal latch with the same screw, but do not tighten.

(4) Observing connector pin 1 location, connect 24" cables:

Cable	From	To
8 conductor	J1030 of DECODER	J1410 of left VERTICAL
9 conductor	J1030 of DECODER	J1510 of left VERTICAL
8 conductor	J1040 of DECODER	J1410 of right VERTICAL(*)
9 conductor	J1040 of DECODER	J1510 of right VERTICAL(*)
8 conductor	J1050 of DECODER	J1410 of TIMEBASE
9 conductor	J1050 of DECODER	J1510 of TIMEBASE

(*) Right VERTICAL plug-in is optional.

(5) Disable the latch of the middle plug-in(s) by prying open the leaf spring and removing the plastic block.

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(6) Attach plug-ins by inserting the bent metal strip
    (concave side up) between adjacent top rails.
    Slide the flat metal strip between adjacent bottom
    rails. (Tighten the rail groove with a pair of pliers
    if necessary.)

(7) Position the plastic retainer as shown. After engaging
    the retainer in the rails between two adjacent plug-ins,
    insert a screwdriver blade in the slot and slide the
    retainer about an inch away from the front panels.

(8) Loosen the rear-lower-right screw of each plug-in
    (except the Timebase). Adjust the distance between
    adjacent rails to 1/4 + or - 1/32 inch, secure the metal
    latch and tighten the screw.

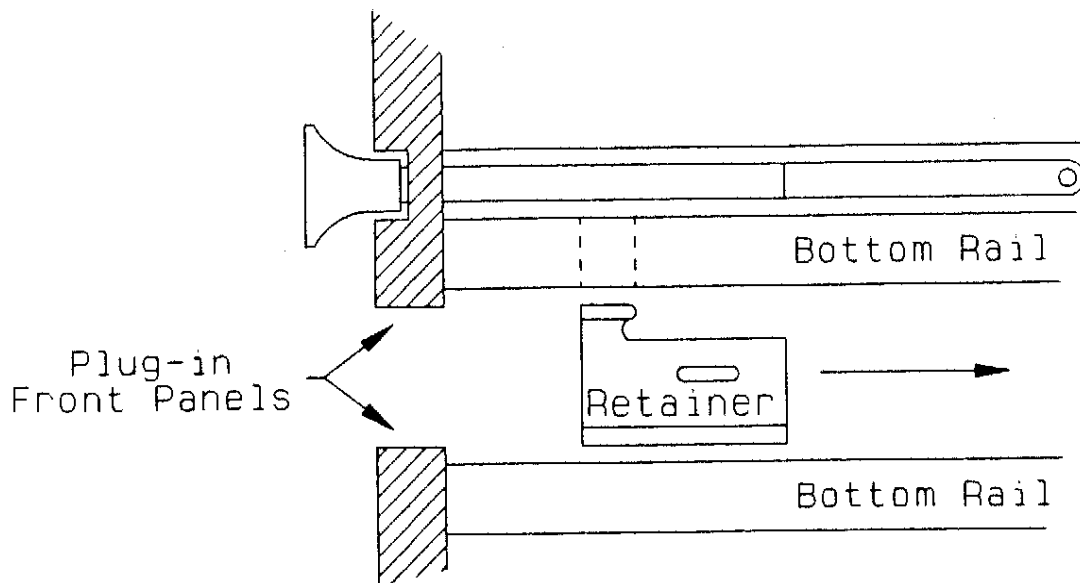(9) Re-install the left and right plug-in panels (one each).

Figure 2-2. Retainer Installation

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SECTION 3   OPERATION AND PROGRAMMING

3.1   Local Operation

Front-panel control, or LOCAL operation, of the plug-ins
is ready when the REM (REMOTE) indicator is off. If the
REM indicator is on, pressing the RTL (RETURN TO LOCAL)
button turns it off unless the plug-ins are under program
control. Since program control has priority over local
control, the external controller must relinguish control
before local operation can take place.

3.2   Program Control

The 7A16P, 7A29P and the 7B90P plug-ins retain all their
programmable features with the controller through the
decoder. Consult the plug-in manuals for description of
these features.

3.2.1   Addressing the plug-ins

To address a particular plug-in from the GPIB, both
primary and secondary addresses must be sent. The
primary address is determined by the switch settings on
the decoder front panel. Valid addresses are 0 to 30.
Primary address 31 is used to place the interface off-
line. Secondary addresses are hard-wired into the
decoder. Secondary address 1 (SA1) is reserved for the
left vertical plug-in. SA2 is reserved for the right
vertical, and SA3 the timebase. When and only when a
plug-in is addressed, the ADDR (ADDRESSED) indicator
turns on.

3.2.2   Messages to and from the plug-ins

After a plug-in has been addressed as either a "talker"
or a "listener", and the ATN line from the controller is
unasserted (indicating the end of ATTENTION MESSAGES),
the decoder allows DEVICE DEPENDENT MESSAGES to be sent
to and from the plug-ins. Device dependent messages may
be in low-level form and high-level form. The controller
may issue each form in two types:
COMMANDS -- to tell the plug-in to change a particular
            setting.
QUERIES -- to ask the plug-in to report its settings.

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3.2.2.1 Low-level messages

Low-level commands and queries are described in the 7A16P
7A29P and the 7B90P manuals.

3.2.2.2 High-level messages

Examples of high-level commands:

```
(7A16P)          BW   LIM
                 CPL  AC
                 VAR  OFF
                 POL  NOR

(7B90P)          SLO  POS
                 MAG  OFF
                 SRC  INT
```

Examples of high-level queries:

```
(7A16P)          BW?
                 CPL?
                 VAR?
                 POL?

(7B90P)          SLO?
                 MAG?
                 SRC?

(7A16P & 7B90P)  ID?
                 SET?
```

For a complete description of commands and queries,
consult the plug-in manuals.

3.2.3 Serial poll and SRQs

The controller finds out if an instrument requires
service by means of the SRQ (SERVICE REQUEST) line on the
GPIB bus. The controller determines which instrument on
the bus requires service as well as the nature of the
request by means of the SERIAL POLL made on the decoder.
A STATUS byte, or code, from a plug-in requesting service
reports to the 021-0374-00 and turns on the decoder front
panel SRQ indicator. The controller polls the decoder
and turns off the SRQ indicator. If the controller polls
the decoder in the absence of a SRQ, the STATUS code will
be 0.

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SERIAL POLL responses for each plug-in are described in detail in the plug-in manuals. Some of the responses are:

STATUS CODE (decimal)	MEANING
65	Power on
97	Command error (*)
98	Execution error
193	End of sweep (7B90P only)

(*) The vertical plug-in issues a command error SRQ when "talked with nothing to say".

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SECTION 4   CIRCUIT DESCRIPTION

4.1   Kernel

The 6802 microprocessor (U4050) contains on-board system clock and RAM. A 4-MHz crystal with divide-by-4 comprise the 1 MHz system clock. Since the on-board RAM is not used, the ENABLE input (pin 36) is grounded.

U4060 is the operating system EPROM. It occupies the top 8K of address space.

U4070 and U4072 make up the system RAM and occupy the bottom 1K of address space. U4070 is used by the lower nibble of data, and U4072 the upper nibble.

U4032 decodes Read Addresses.
U4042 decodes Write Addresses.

The miscellaneous logic gates within the address decoding circuit perform the timing synchronization between the system clock and the decoded address selection.

U2090A is the source of the power-up/reset signal. The RC network on pin 1 sets the clear pin low until the power supply settles, thereby prevents power-up spikes following the triggering of the flip-flop. The RC network on pin 3 clocks the flip-flop after the supply stabilizes and the microprocessor clock has run for more than 100 cycles. Once clocked, the Q output of the flip-flop drives the reset line high, and starts the system power-up sequence.

U3090, U4080 and U4090 form the GPIB interface.
U3090 (75160) and U4090 (75161) are data and control line transceiver compatible with the IEEE-488 1978 bus specification.
U4080 (9914AN) is a specialized PIA containing and executing the IEEE-488 states and state transitions.

4.2   Registers

The Data Write Register (U2020) passes data to the plug-ins. The Control Write Register (U2060) passes steering information (bits 0 and 1) to U3070B which enables the tri-state driver for the appropriate plug-in data bus.

Data Read Register (U3030 and U3032) passes plug-in data.
Since only one plug-in at a time can be made a talker,
The OR gates (U2032 and U3040) multiplex the 3 plug-in
data busses into a single register.

The 7K bus protocol is determined by the Control Write
Register (U2060), the Control Read Register (U3020), and
the flip-flop (U3072). For data flowing to a plug-in,
the protocol is a standard IEEE-488 3-wire handshake.
The handshake state machine is implemented in the system
firmware. For data flowing from a plug-in, the protocol
is a special 2-wire flagging type handshake. When data
is valid, the plug-in issues a SND pulse, and the Data
Read Register (U3030 and U3032) latches the data on the
trailing edge of the pulse. At the same time, U3072 is
clocked, verifying for the Control Read Register (U2060)
that SND has occurred. The firmware then reads the data,
issues 7KDAV signal, and clears U3072 by addressing the
U3070A base address (A000 in HEX).

U3070A creates 4 separate system clock length pulses,
each determined by an unique address access:
A000 (HEX) is the base address.
A002 (HEX) creates the 7KIFC signal that clears the plug-
in interfaces to their initial states.
A003 (HEX) loads the Data Read Register independently of
the SND signal to allow the firmware to read the data bus
when doing diagnostics.
A001 (HEX) clears the RTL (Return-To-Local) flip-flop
U2090, had it been activated.

U2080 is the Front-panel Read Register which reads the 8-
pole DIP-switch settings determining the primary address
of the on-line decoder. U2072 is the Front-panel Write
Register, and is used to illuminate the front-panel
status lights.

When the RTL switch is pushed, U2090 holds the momentary
switch occurrence to be read through the Control Read
Register (U3020). The inverter and RC network between
the momentary switch and U2090 is a debouncer.

4.3   Front Panel

The front panel consists of 3 status lights (Remote,
Addressed, SRQ asserted), a momentary switch, and an 8-
pole DIP switch for the following functions:
Pole 1, when closed, places the decoder on-line by
supplying VCC to the transceivers.
Pole 2 specifies LF/EOI mode or EOI ONLY mode.
Poles 4 through 8 reflect the primary address binary
number: Pole 4 is the most significant bit (MSB), and
pole 8 is the least significant bit (LSB).

The GPIB DECODER performs 7 internal checks during power-up.
Any detected error is indicated by the flashing front-panel
LED's in coded combinations summarized below:

GPIB DECODER ERROR TABLE

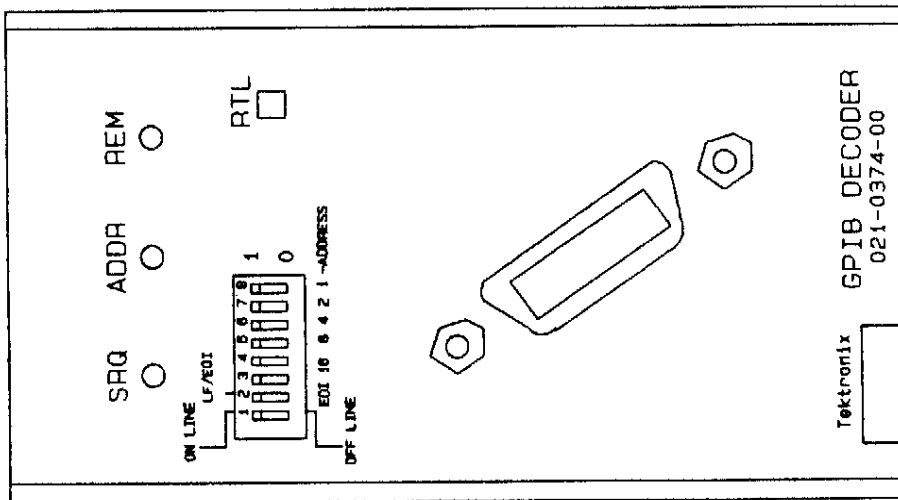| Front-panel LED				
SRQ	ADD	REM	#	TEST FAILURE
		*	1	ROM checksum
	*		2	RAM test
	*	*	3	9914 not present
*			4	7K control loop
*		*	5	7K data loop
*	*		6	RTL F/F
*	*	*	7	Send F/F

* Flashing LED

During the last five tests, an detected error cuases the
failed test to repeat.

Upon completion of power-up, the SRQ indicator is lit.
Failure of the SRQ indicator to light indicates the absence
of plug-in units.

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FRONT VIEW

SRQ ADDR REM

RTL

ON LINE

LF/EOI

1 2 3 4 5 6 7 8

1

EOI 16 8 4 2 1 ADDRESS

0

OFF LINE

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REPLACEABLE PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

LIST OF ASSEMBLIES

A list of assemblies can be found at the beginning of the Electrical Parts List. The assemblies are listed in numerical order. When the complete component number of a part is known, this list will identify the assembly in which the part is located.
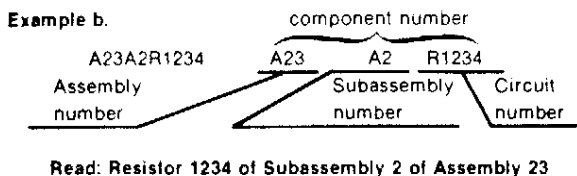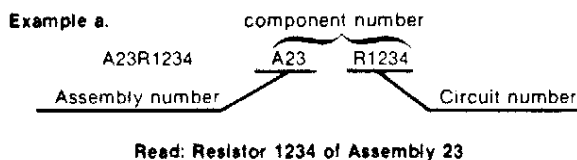
CROSS INDEX-MFR. CODE NUMBER TO MANUFACTURER

The Mfr. Code Number to Manufacturer index for the Electrical Parts List is located immediately after this page. The Cross Index provides codes, names and addresses of manufacturers of components listed in the Electrical Parts List.

ABBREVIATIONS

Abbreviations conform to American National Standard Y1.1.

COMPONENT NUMBER (column one of the Electrical Parts List)

A numbering method has been used to identify assemblies, subassemblies and parts. Examples of this numbering method and typical expansions are illustrated by the following:

Example a.　　component number

| A23R1234 | A23 | R1234 |

Assembly number　　　　　　Circuit number

Read: Resistor 1234 of Assembly 23

Example b.　　　component number

| A23A2R1234 | A23 | A2 | R1234 |

Assembly number　Subassembly number　Circuit number

Read: Resistor 1234 of Subassembly 2 of Assembly 23

Only the circuit number will appear on the diagrams and circuit board illustrations. Each diagram and circuit board illustration is clearly marked with the assembly number. Assembly numbers are also marked on the mechanical exploded views located in the Mechanical Parts List. The component number is obtained by adding the assembly number prefix to the circuit number.

The Electrical Parts List is divided and arranged by assemblies in numerical sequence (e.g., assembly A1 with its subassemblies and parts, precedes assembly A2 with its subassemblies and parts).

Chassis-mounted parts have no assembly number prefix and are located at the end of the Electrical Parts List.

TEKTRONIX PART NO. (column two of the Electrical Parts List)

Indicates part number to be used when ordering replacement part from Tektronix

SERIAL/MODEL NO. (columns three and four of the Electrical Parts List)

Column three (3) indicates the serial number at which the part was first used. Column four (4) indicates the serial number at which the part was removed. No serial number entered indicates part is good for all serial numbers.

NAME & DESCRIPTION (column five of the Electrical Parts List)

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S Federal Cataloging Handbook H6-1 can be utilized where possible.

MFR. CODE (column six of the Electrical Parts List)

Indicates the code number of the actual manufacturer of the part. (Code to name and address cross reference can be found immediately after this page.)

MFR. PART NUMBER (column seven of the Electrical Parts List)

Indicates actual manufacturers part number.

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CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
01295	TEXAS INSTRUMENTS INC SEMICONDUCTOR GROUP	13500 N CENTRAL EXPRESSWAY P O BOX 225012 M/S 49	DALLAS TX 75265
01536	TEXTRON INC CAMCAR DIV SEMS PRODUCTS UNIT	1818 CHRISTINA ST	ROCKFORD IL 61108
02660	BUNKER RAMO CORP AMPHENOL NORTH AMERICA DIV	2801 S 25TH AVE	BROADVIEW IL 60153
03508	GENERAL ELECTRIC CO SEMI-CONDUCTOR PRODUCTS DEPT	W GENESEE ST	AUBURN NY 13021
04222	AVX CERAMICS DIV OF AVX CORP	19TH AVE SOUTH P O BOX 867	MYRTLE BEACH SC 29577
04713	MOTOROLA INC SEMICONDUCTOR GROUP	5005 E MCDOWELL RD	PHOENIX AZ 85008
05397	UNION CARBIDE CORP MATERIALS SYSTEMS DIV	11901 MADISON AVE	CLEVELAND OH 44101
09922	BURNDY CORP	RICHARDS AVE	NORWALK CT 06852
11236	CTS OF BERNE INC	406 PARR ROAD	BERNE IN 46711
18324	SIGNETICS CORP	811 E ARQUES	SUNNYVALE CA 94086
19701	MEPCO/ELECTRA INC A NORTH AMERICAN PHILIPS CO	P O BOX 760	MINERAL WELLS TX 76067
22599	AMERACE CORP ESNA DIV	15201 BURBANK BLVD SUITE C	VAN NUYS CA 91411
27014	NATIONAL SEMICONDUCTOR CORP	2900 SEMICONDUCTOR DR	SANTA CLARA CA 95051
32997	BOURNS INC TRIMPOT DIV	1200 COLUMBIA AVE	RIVERSIDE CA 92507
34335	ADVANCED MICRO DEVICES	901 THOMPSON PL	SUNNYVALE CA 94086
57668	ROHM CORP	16931 MILLIKEN AVE	IRVINE CA 92713
58361	GENERAL INSTRUMENT CORP OPTOELECTRONICS DIV	3400 HILLVIEW AVE	PALO ALTO CA 94304
59492	QUARTZTEK INC.	P.O. BOX 14738	PHOENIX, AZ 85063
78189	ILLINOIS TOOL WORKS INC SHAKEPROOF DIVISION	ST CHARLES ROAD	ELGIN IL 60120
80009	TEKTRONIX INC	4900 S W GRIFFITH DR P O BOX 500	BEAVERTON OR 97077
81073	GRAYHILL INC	561 HILLGROVE AVE P O BOX 373	LA GRANGE IL 60525
87308	N L INDUSTRIES INC N L FASTENERS	BARKLEY RD P O BOX 1360	STATESVILLE NC 28677
TK0435	LEWIS SCREW CO	4114 S PEORIA	CHICAGO IL 60609

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A30	670-8258-00			CIRCUIT BD ASSY:ADDRESS SELECT	80009	670-8258-00
A30DS100	150-1036-00			LT EMITTING DIO:RED,650NM,40MA MAX	58361	Q6878/MV5074C
A30DS200	150-1036-00			LT EMITTING DIO:RED,650NM,40MA MAX	58361	Q6878/MV5074C
A30DS300	150-1036-00			LT EMITTING DIO:RED,650NM,40MA MAX	58361	Q6878/MV5074C
A30R200	307-0445-00			RES NTWK,FXD,FI:4.7K OHM,20%,(9)RES	32997	4310R-101-472
A30S100	263-0020-00		B010190	SWITCH PB ASSY:MOMENTARY	80009	263-0020-00
	263-0115-00	B010191				
A30S300	260-1721-00			SWITCH,ROCKER:8,SPST,125MA,30VDC	81073	76SB08S
A40	670-6810-00			CIRCUIT BD ASSY:GPIB DECODER	80009	670-6810-00
A40C1060	281-0773-00			CAP,FXD,CER DI:0.01UF,10%,100V	04222	MA201C103KAA
A40C1090	281-0775-00			CAP,FXD,CER DI:0.1UF,20%,50V	04222	MA205E104MAA
A40C2020	281-0773-00			CAP,FXD,CER DI:0.01UF,10%,100V	04222	MA201C103KAA
A40C2030	281-0773-00			CAP,FXD,CER DI:0.01UF,10%,100V	04222	MA201C103KAA
A40C2050	281-0773-00			CAP,FXD,CER DI:0.01UF,10%,100V	04222	MA201C103KAA
A40C2090	281-0773-00			CAP,FXD,CER DI:0.01UF,10%,100V	04222	MA201C103KAA
A40C3060	281-0773-00			CAP,FXD,CER DI:0.01UF,10%,100V	04222	MA201C103KAA
A40C4020	290-0531-00			CAP,FXD,ELCTLT:100UF,20%,10V	05397	T368C107M010AS
A40C4040	281-0773-00			CAP,FXD,CER DI:0.01UF,10%,100V	04222	MA201C103KAA
A40C4070	281-0773-00			CAP,FXD,CER DI:0.01UF,10%,100V	04222	MA201C103KAA
A40C4090	290-0531-00			CAP,FXD,ELCTLT:100UF,20%,10V	05397	T368C107M010AS
A40C4092	290-0167-00			CAP,FXD,ELCTLT:10UF,20%,15V	05397	T110B106M015AS
A40CR3090	152-0141-02			SEMICOND DVC,DI:SW,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A40CR3092	152-0141-02			SEMICOND DVC,DI:SW,SI,30V,150MA,30V	03508	DA2527 (1N4152)
A40R1030	307-0445-00			RES NTWK,FXD,FI:4.7K OHM,20%,(9)RES	32997	4310R-101-472
A40R1040	307-0445-00			RES NTWK,FXD,FI:4.7K OHM,20%,(9)RES	32997	4310R-101-472
A40R1050	307-0445-00			RES NTWK,FXD,FI:4.7K OHM,20%,(9)RES	32997	4310R-101-472
A40R1060	307-0675-00			RES NTWK,FXD,FI:9,1K OHM,2%1.25W	11236	750-101-R1K OHM
A40R1070	315-0271-00			RES,FXD,FILM:270 OHM,5%,0.25W	57668	NTR25J-E270E
A40R1072	315-0271-00			RES,FXD,FILM:270 OHM,5%,0.25W	57668	NTR25J-E270E
A40R1074	315-0271-00			RES,FXD,FILM:270 OHM,5%,0.25W	57668	NTR25J-E270E
A40R1080	315-0303-00			RES,FXD,FILM:30K OHM,5%,0.25W	19701	5043CX30K00J
A40R1090	315-0302-00			RES,FXD,FILM:3K OHM,5%,0.25W	57668	NTR25J-E03K0
A40R1092	315-0181-00			RES,FXD,FILM:180 OHM,5%,0.25W	57668	NTR25J-E180E
A40R2070	315-0302-00			RES,FXD,FILM:3K OHM,5%,0.25W	57668	NTR25J-E03K0
A40R2072	315-0302-00			RES,FXD,FILM:3K OHM,5%,0.25W	57668	NTR25J-E03K0
A40R2090	307-0445-00			RES NTWK,FXD,FI:4.7K OHM,20%,(9)RES	32997	4310R-101-472
A40R3040	315-0302-00			RES,FXD,FILM:3K OHM,5%,0.25W	57668	NTR25J-E03K0
A40R3070	315-0302-00			RES,FXD,FILM:3K OHM,5%,0.25W	57668	NTR25J-E03K0
A40R3090	315-0302-00			RES,FXD,FILM:3K OHM,5%,0.25W	57668	NTR25J-E03K0
A40R3092	315-0512-00			RES,FXD,FILM:5.1K OHM,5%,0.25W	57668	NTR25J-E05K1
A40R3094	315-0512-00			RES,FXD,FILM:5.1K OHM,5%,0.25W	57668	NTR25J-E05K1
A40R4040	315-0302-00			RES,FXD,FILM:3K OHM,5%,0.25W	57668	NTR25J-E03K0
A40U2020	156-0913-02			MICROCKT,DGTL:OCTAL D FF W/ENABLE,SCRN	01295	SN74LS377NP3
A40U2030	156-0956-02			MICROCKT,DGTL:OCTAL BFR W/3 STATE OUT,SCRN	01295	SN74LS244NP3
A40U2032	156-0718-03			MICROCKT,DGTL:TRIPLE 3-INP NOR GATE,SCRN	01295	SN74LS27NP3
A40U2040	156-0956-02			MICROCKT,DGTL:OCTAL BFR W/3 STATE OUT,SCRN	01295	SN74LS244NP3
A40U2042	156-0718-03			MICROCKT,DGTL:TRIPLE 3-INP NOR GATE,SCRN	01295	SN74LS27NP3
A40U2050	156-0956-02			MICROCKT,DGTL:OCTAL BFR W/3 STATE OUT,SCRN	01295	SN74LS244NP3
A40U2060	156-0913-02			MICROCKT,DGTL:OCTAL D FF W/ENABLE,SCRN	01295	SN74LS377NP3
A40U2062	156-0093-02			MICROCKT,DGTL:HEX INV BUFFER,SCRN	18324	N7416(NB OR FB)
A40U2070	156-0093-02			MICROCKT,DGTL:HEX INV BUFFER,SCRN	18324	N7416(NB OR FB)
A40U2072	156-0913-02			MICROCKT,DGTL:OCTAL D FF W/ENABLE,SCRN	01295	SN74LS377NP3
A40U2080	156-0914-02			MICROCKT,DGTL:OCT ST BFR W/3 STATE OUT,SCRN	01295	SN74LS240NP3
A40U2090	156-0388-03			MICROCKT,DGTL:DUAL D FLIP-FLOP,SCRN	01295	SN74LS74ANP3
A40U3020	156-0914-02			MICROCKT,DGTL:OCT ST BFR W/3 STATE OUT,SCRN	01295	SN74LS240NP3

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Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A40U3030	156-0914-02			MICROCKT,DGTL:OCT ST BFR W/3 STATE OUT,SCRN	01295	SN74LS240NP3
A40U3032	156-0913-02			MICROCKT,DGTL:OCTAL D FF W/ENABLE,SCRN	01295	SN74LS377NP3
A40U3040	156-0718-03			MICROCKT,DGTL:TRIPLE 3-INP NOR GATE,SCRN	01295	SN74LS27NP3
A40U3042	156-0382-02			MICROCKT,DGTL:QUAD 2 INP NAND GATE BURN	18324	N74LS00NB
A40U3070	156-0541-02			MICROCKT,DGTL:DUAL 2-TO 4-LINE DCDR/DEMUX	04713	SN74LS139NDS
A40U3072	156-0388-03			MICROCKT,DGTL:DUAL D FLIP-FLOP,SCRN	01295	SN74LS74ANP3
A40U3090	156-1414-02			MICROCKT,DGTL:OCTAL GPIB BUS XCVR,SCRN	27014	DS75160A N
A40U4030	156-0479-02			MICROCKT,DGTL:QUAD 2-INP OR GATE,SCRN	01295	SN74LS32NP3
A40U4032	156-0469-02			MICROCKT,DGTL:3/8 LINE DCDR,SCRN	01295	SN74LS138NP3
A40U4040	156-0382-02			MICROCKT,DGTL:QUAD 2 INP NAND GATE BURN	18324	N74LS00NB
A40U4042	156-0469-02			MICROCKT,DGTL:3/8 LINE DCDR,SCRN	01295	SN74LS138NP3
A40U4050	156-1342-00			MICROCKT,DGTL:NMOS,8 BIT W/CLOCK & RAM	04713	MC6802P
A40U4060	160-3533-00		B010190	MICROCKT,DGTL:NMOS,8192 X 8 EPROM,W/3 STATE OUT,PRGM	80009	160-3533-01
	160-3533-01	B010191				
A40U4070	156-1028-01			MICROCKT,DGTL:1024 X 4 STATIC RAM W/3 STATE OUT,SCRN	80009	156-1028-01
A40U4072	156-1028-01			MICROCKT,DGTL:1024 X 4 STATIC RAM W/3 STATE OUT,SCRN	80009	156-1028-01
A40U4080	156-1444-01			MICROCKT,DGTL:NMOS,GPIB INTFC CONTROLLER	01295	TMS9914A (NL
A40U4090	156-1415-01			MICROCKT,DGTL:OCTAL GPIB XCVR-MANAGEMENT	27014	DS75161A NA+
A40Y3060	158-0256-00			XTAL UNIT,QTZ:4.000MHZ 0.0025% SER	59492	150-6070

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Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345	Name & Description	Mfr. Code	Mfr. Part No.
					HARDWARE KIT INCLUDES:		
012-1139-00			3		.CABLE,INTCON:MAIN BD TO AUX BD	80009	012-1139-00
012-1140-00			3		.CABLE,INTCON:MAIN BD TO AUX BD	80009	012-1140-00
124-0444-00			3		.STRIP,METAL:TOP,9.0 L,AL	80009	124-0444-00
124-0445-00			3		.STRIP,METAL:BOTTOM,9.0 L,AL	80009	124-0445-00
344-0393-00			3		.CLIP,PLUG-IN:0.631 L,PLASTIC	80009	344-0393-00
346-0230-00			3		.STRAP,TIEDOWN:STAINLESS STEEL,0.885 L	80009	346-0230-00
012-1141-00			3		CABLE,INTCON:MAIN BD TO GPIB	80009	012-1141-00
012-1142-00			2		CABLE,INTCON:MAIN BD TO GPIB BD	80009	012-1142-00
105-0075-00			1		BOLT,LATCH:	80009	105-0075-00
105-0076-04			1		RELEASE BAR,LCH:PLUG-IN UNIT	80009	105-0076-04
129-1003-00			2		SPACER,POST:0.705 L,6-32 EXT/M3.5 X 6-6G INT,BRS,0.25 HEX	80009	129-1003-00
131-0346-01			1		CONN,RCPT,ELEC:24 CONTACT,FEMALE W/O FLOAT	02660	57-20240-2-398
136-0755-00			1		SKT,PL-IN ELEK:MICROCIRCUIT,28 DIP	09922	DILB28P-108
136-0757-00			1		SKT,PL-IN ELEK:MICROCIRCUIT,40 DIP	09922	DILB40P-108
210-0457-00			2		NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	78189	511-061800-00
211-0105-00			2		SCREW,MACHINE:4-40 X 0.188,FLH,100 DEG	TK0435	ORDER BY DESCR
211-0661-00			2		SCR,ASSEM WSHR:4-40 X 0.25,PNH,STL,POZ	01536	821-01655-024
213-0192-00			8		SCREW,TPG,TF:6-32 X 0.5,SPCL TYPE,FILH,STL	87308	ORDER BY DESCR
214-1054-00			1		SPRING,FLAT:0.825 X 0.322,SST	80009	214-1054-00
214-1061-00			1		CONTACT,ELEC:GROUNDING,CU BE	80009	214-1061-00
214-1095-00			1		PIN,SPRING:0.187 L X 0.094 OD,STL,CD PL	22599	52-022-094-0187
214-1280-00			1		SPRING,HLCPS:0.14 OD X 1.126 L,TWIST LOOP, MUSIC WIRE	80009	214-1280-00
220-0547-01			2		NUT BLOCK:4-40 X 0.282,NI SIL NP	80009	220-0547-01
333-2760-00			1		PANEL,FRONT:	80009	333-2760-00
337-1064-12			2		SHIELD,ELEC:SIDE FOR PLUG-IN UNIT	80009	337-1064-12
348-0235-00			2		SHLD GSKT,ELEK:FINGER TYPE,4.734 L	92101	ORDER BY DESCR
366-1058-00			1		KNOB:GRAY,0.625 X 0.255 X 0.485	80009	366-1058-00
386-1402-00			1		PANEL,REAR:	80009	386-1402-00
386-2929-00			1		PANEL,INTERFACE:MODULE,IEEE-488	80009	386-2929-00
426-0505-07			1		FR SECT,PLUG-IN:TOP	80009	426-0505-07
426-0603-06			1		FR SECT,PLUG-IN:BOTTOM	80009	426-0603-06
070-5193-00			1		MANUAL,TECH:021-0374-00,GPIB DECODER	80009	070-5193-00

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DIAGRAMS AND CIRCUIT BOARD ILLUSTRATIONS

Symbols

Graphic symbols and class designation letters are based on ANSI Standard Y32.2-1975.

Logic symbology is based on ANSI Y32.14-1973 in terms of positive logic. Logic symbols depict the logic function performed and may differ from the manufacturer's data.

The overline on a signal name indicates that the signal performs its intended function when it is in the low state.

Abbreviations are based on ANSI Y1.1-1972.

Other ANSI standards that are used in the preparation of diagrams by Tektronix, Inc. are:

Y14.15, 1966	Drafting Practices.
Y14.2, 1973	Line Conventions and Lettering.
Y10.5, 1968	Letter Symbols for Quantities Used in Electrical Science and Electrical Engineering.

American National Standard Institute
1430 Broadway
New York, New York 10018

Component Values

Electrical components shown on the diagrams are in the following units unless noted otherwise:

Capacitors = Values one or greater are in picofarads (pF). Values less than one are in microfarads (μF).

Resistors = Ohms (Ω).

───── **The information and special symbols below may appear in this manual.** ─────

Assembly Numbers and Grid Coordinates

Each assembly in the instrument is assigned an assembly number (e.g., A20). The assembly number appears on the circuit board outline on the diagram, in the title for the circuit board component location illustration, and in the lookup table for the schematic diagram and corresponding component locator illustration. The Replaceable Electrical Parts list is arranged by assemblies in numerical sequence; the components are listed by component number *(see following illustration for constructing a component number).

The schematic diagram and circuit board component location illustration have grids. A lookup table with the grid coordinates is provided for ease of locating the component. Only the components illustrated on the facing diagram are listed in the lookup table. When more than one schematic diagram is used to illustrate the circuitry on a circuit board, the circuit board illustration may only appear opposite the first diagram on which it was illustrated; the lookup table will list the diagram number of other diagrams that the circuitry of the circuit board appears on.
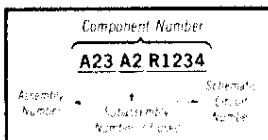
PARTS LOCATION GRID

	A	B

1	DS100	S20
		P1000
2	DS200	R10
	DS300	S10
3		

5193-1
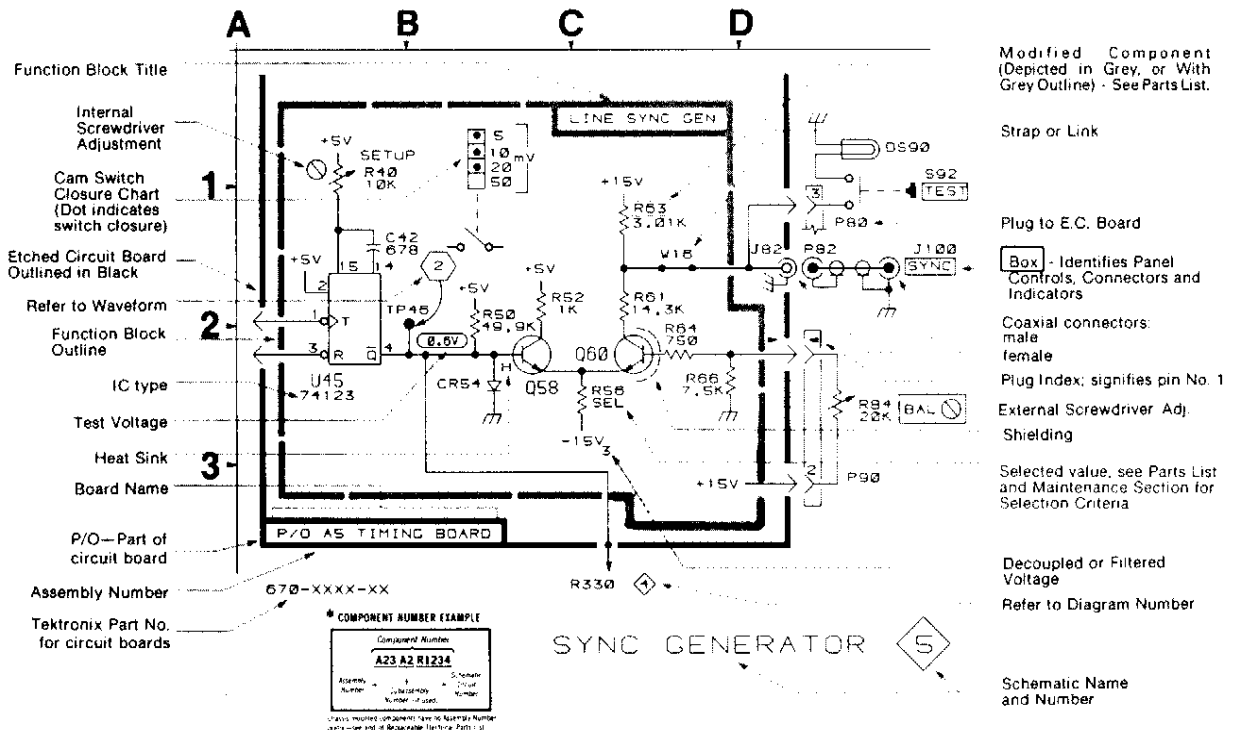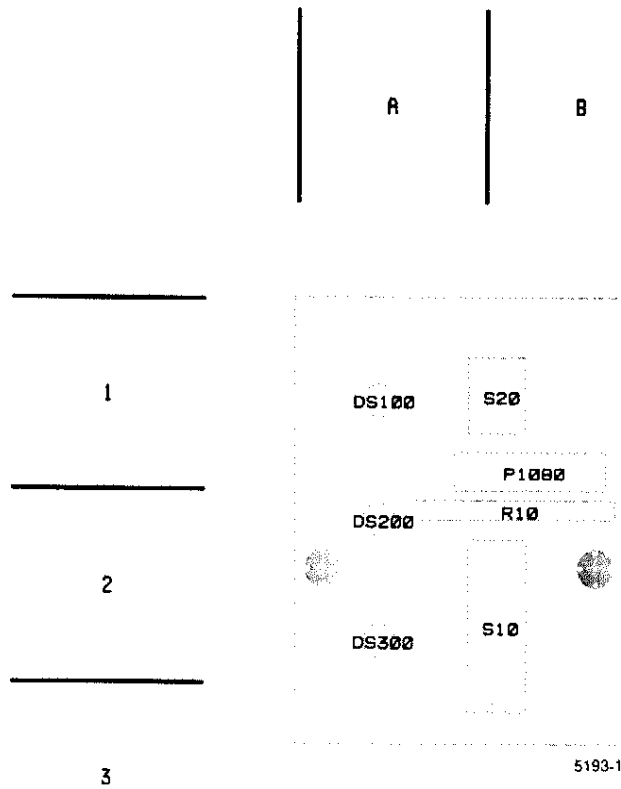
A30

Fig. 1. A30 Front Panel circuit board assembly.

⊗ Static Sensitive Devices
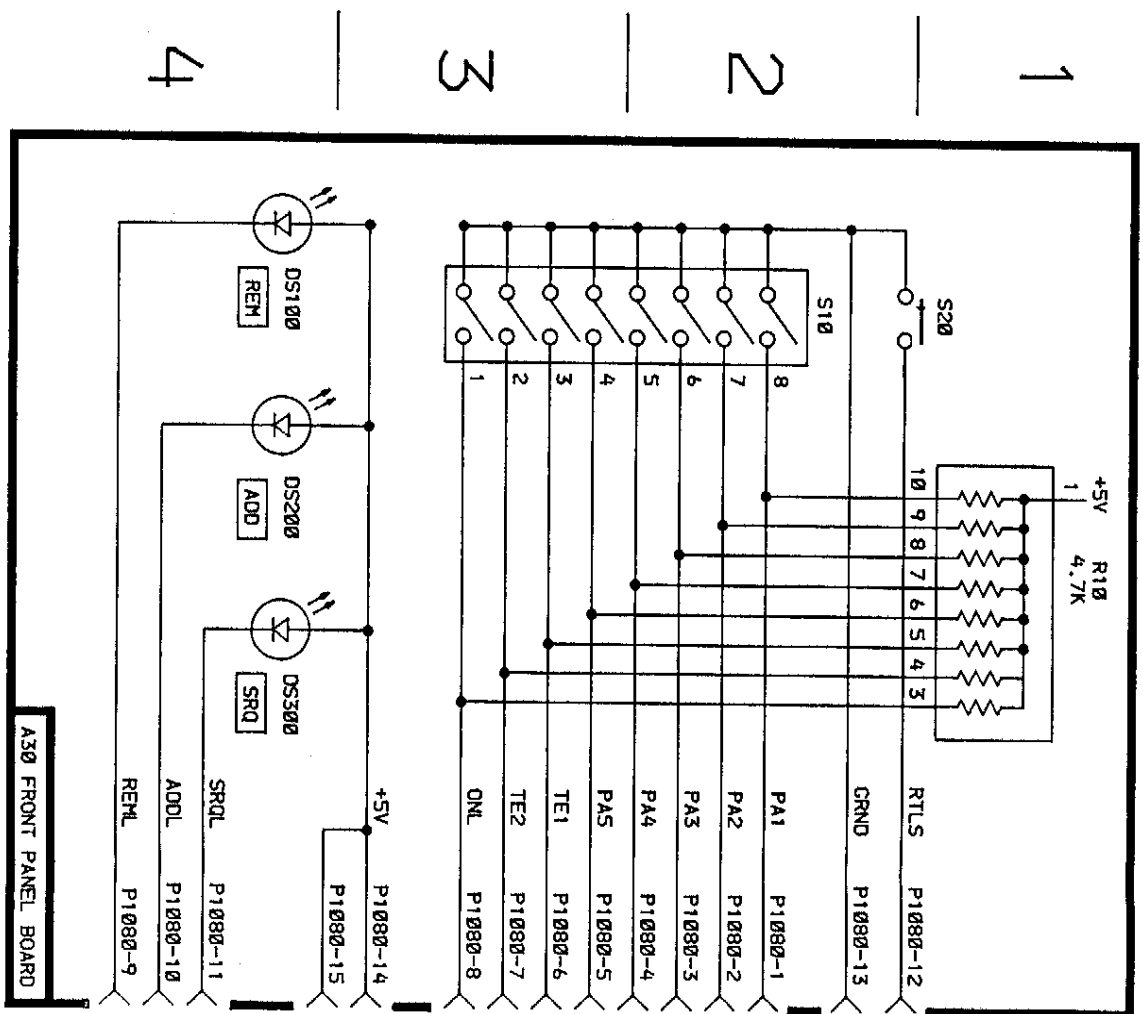*See Maintenance Section*

COMPONENT NUMBER EXAMPLE

Component Number
A23 A2 R1234

Assembly   Schematic
Number   Circuit
     Subassembly Number
     Number (if used)

Table 1
Component Reference Chart

CIRCUIT NUMBER	SCHEMATIC LOCATION	BOARD LOCATION
DS100	B4	A1
DS200	B4	A2
DS300	C4	A2
P1080	D1	B1
R10	B1	B2
S10	B2	B2
S20	B1	B1

021-0374-00

4 | 3 | 2 | 1

A | B | C | D | E | F

A30 FRONT PANEL BOARD

5193-4

REV AUG 1987

+5V
R10
4.7K

S10
S20

DS100 REM
DS200 ADD
DS300 SRQ
+5V

RTLS   P1080-12
GRND   P1080-13
PA1   P1080-1
PA2   P1080-2
PA3   P1080-3
PA4   P1080-4
PA5   P1080-5
TE1   P1080-6
TE2   P1080-7
ONL   P1080-8
+5V   P1080-14
SRQL   P1080-11
ADDL   P1080-10
REML   P1080-9
P1080-15

STATIC SENSITIVE DEVICES
SEE MAINTENANCE SECTION

COMPONENT NUMBER EXAMPLE

A23 A2 R1234

COMPONENT NUMBER

ASSEMBLY NUMBER
SUBASSEMBLY NUMBER (IF USED)
SCHEMATIC CIRCUIT NUMBER
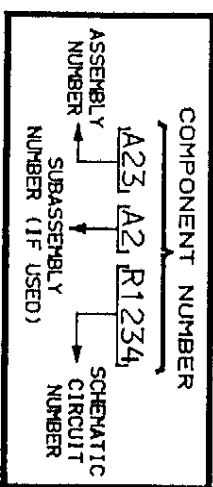
CHASSIS-MOUNTED COMPONENTS HAVE NO ASSEMBLY
NUMBER PREFIX—SEE END OF REPLACEABLE
ELECTRICAL PARTS LIST

021-0374-00

PARTS LOCATION GRID
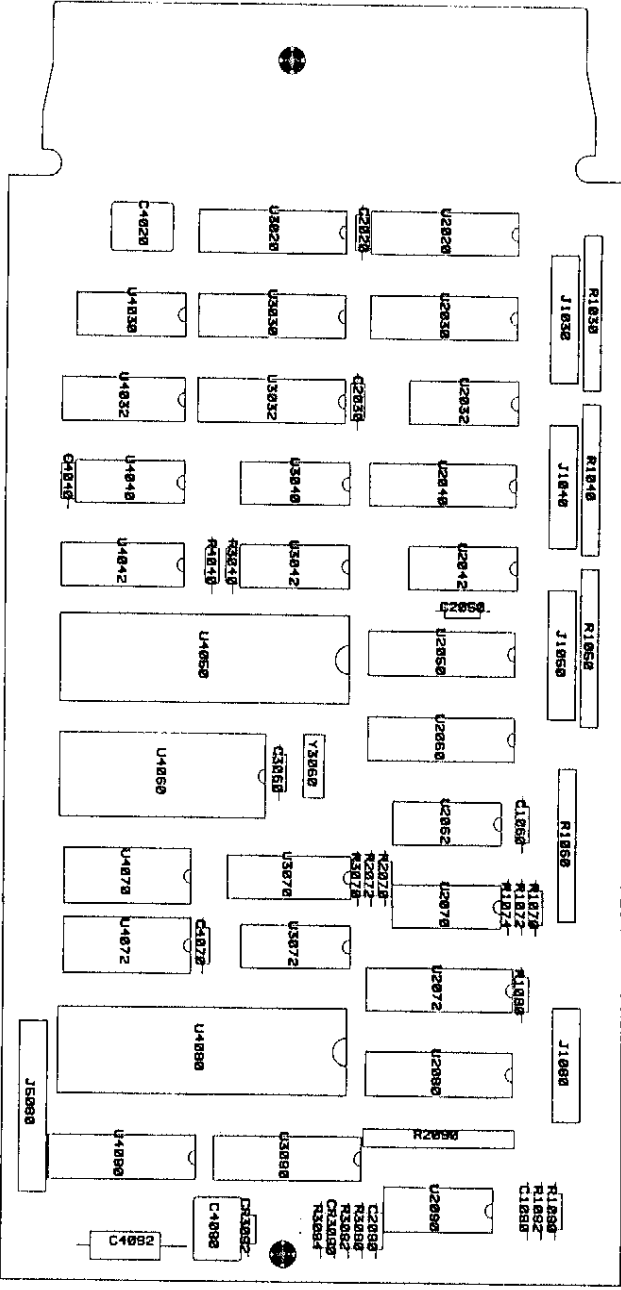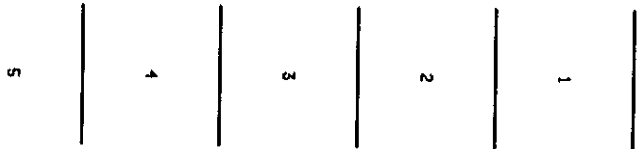
Fig. 2. A40 Main circuit board assembly.

A40