

Instructions

Tektronix

067-1232-00

Impedance Matching Power Divider

070-5555-00

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IMPEDANCE MATCHING POWER DIVIDER

Introduction

The Power Divider divides the power of a signal which has been input from a 50 Ω signal source to a 50 Ω port (REF) and a 75 Ω port. The 75 Ω port tracks the 50 Ω REF port.

Specifications

The following describes the electrical characteristics for the Power Divider:

Characteristic	Performance Requirement	Supplemental Information
Frequency Range	DC to 1000 MHz	
Loss from input port to REF port at 50 MHz	7.8 dB, ± 0.5 dB	
Loss from REF port to 75 Ω port	3.5 dB, ± 0.20 dB	
75 Ω port to REF port		dBmV = REF port (dBm), +45.23, ± 0.2
Maximum input		+25 dBm
Connectors		50 Ω bnc 50 Ω bnc 75 Ω bnc all female
Return loss	> 20 dB	
Roll-off input port to REF port (REF-DC)		≤ 0.7 dB

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Performance Check

WARNING

The following servicing instructions are for use by qualified personnel only. To avoid personal injury, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.

Test Equipment Needed		
Equipment	Characteristics	Recommendation
Signal Generator	100 kHz to 18 GHz; frequency response ± 1.0 dB	Hewlett-Packard Model 8620C
RF Plug-in	0.01 GHz to 2.4 GHz	Hewlett-Packard Model 86222A
Power Meter	50 MHz to 1000 MHz, -30 dBm to +10 dBm	Hewlett-Packard Model 436A
Power Sensor	50 Ω , 100 kHz to 4 GHz	Hewlett-Packard Model 8482A
Power Sensor	75 Ω , 100 kHz to 2 GHz	Hewlett-Packard Model 8483A
VSWR Bridge	10 MHz to 1 GHz, 50 Ω	Wiltron Model 62BF50
VSWR Bridge	10 MHz to 1 GHz, 75 Ω	Wiltron Model 62B75
Terminations (2)	50 Ω	Tektronix Part No. 011-0123-00
Min-Loss Attuator	75 Ω :50 Ω	Tektronix Part No. 011-0057-01
Attenuator	50 Ω , 5X, (14 dB)	Tektronix Part No. 011-0060-02
50 Ω Adaptor	bnc female-bnc female	Tektronix Part No. 103-0028-00
50 Ω Adaptor	bnc male-bnc male	Tektronix Part No. 103-0029-00

To obtain accurate measurements, the Power Sensor has to be calibrated several times in this performance check. When calibration is asked for, proceed as follows:

- a. Set the Cal Factor switch according to the reference on the Power Sensor.
- b. Push Sensor Zero.
- c. Calibrate the Sensor using the internal calibrator.
- d. Do not change the Cal Factor switch.

NOTE

The 75 Ω terminator consists of one of the 50 Ω terminations connected to the female end of the min-loss attenuator.

1. Check loss from 50 Ω port to REF port at 50 MHz, and loss from REF port to 75 Ω port.
 - a. Connect the 75 Ω sensor to the power meter and calibrate the power sensor as outlined above.
 - b. Set up the test equipment as shown in Step C of Figure 1:
 1. Connect the 50 Ω attenuator to the signal generator.
 2. Set the signal generator for approximately 0 dBm output at the attenuator.
 3. Connect the 50 Ω port on the Power Divider to the attenuator.
 4. Connect the 75 Ω power sensor to the 75 Ω port on the Power Divider.
 5. Connect a 50 Ω terminator to the 50 Ω REF port.
 - c. Enter the power meter readings in column A of Table 1 for all rows.
 - d. Set up the test equipment as shown in Step A of Figure 1:
 1. Remove the Power Divider and connect the 75 Ω power sensor to the 50 Ω attenuator on the signal generator.
 - e. Enter the power meter readings in column D of Table 1 for all rows.
 - f. Connect the 50 Ω power sensor to the power meter and calibrate the power sensor as outlined above.
 - g. Set up the test equipment as shown in Step A of Figure 1:
 1. Connect the 50 Ω power sensor to the 50 Ω attenuator on the signal generator.
 - h. Enter the power meter readings in column C of Table 1 for all rows.
 - i. Set up the test equipment as shown in Step B of Figure 1:
 1. Connect the Power Divider's 50 Ω port to the 50 Ω attenuator.
 2. Connect the 50 Ω power sensor to the 50 Ω REF port.
 3. Connect the 75 Ω terminator to the 75 Ω port on the Power Divider.
 - j. Enter the power meter readings in column B of Table 1 for all rows.
 - k. Calculate data for the following columns:
 1. Column E = B - C
 2. Column F = A - B + C - D - C(@ 50 MHz) + D(@50 MHz)
 3. Column G = F - F(@50 MHz).

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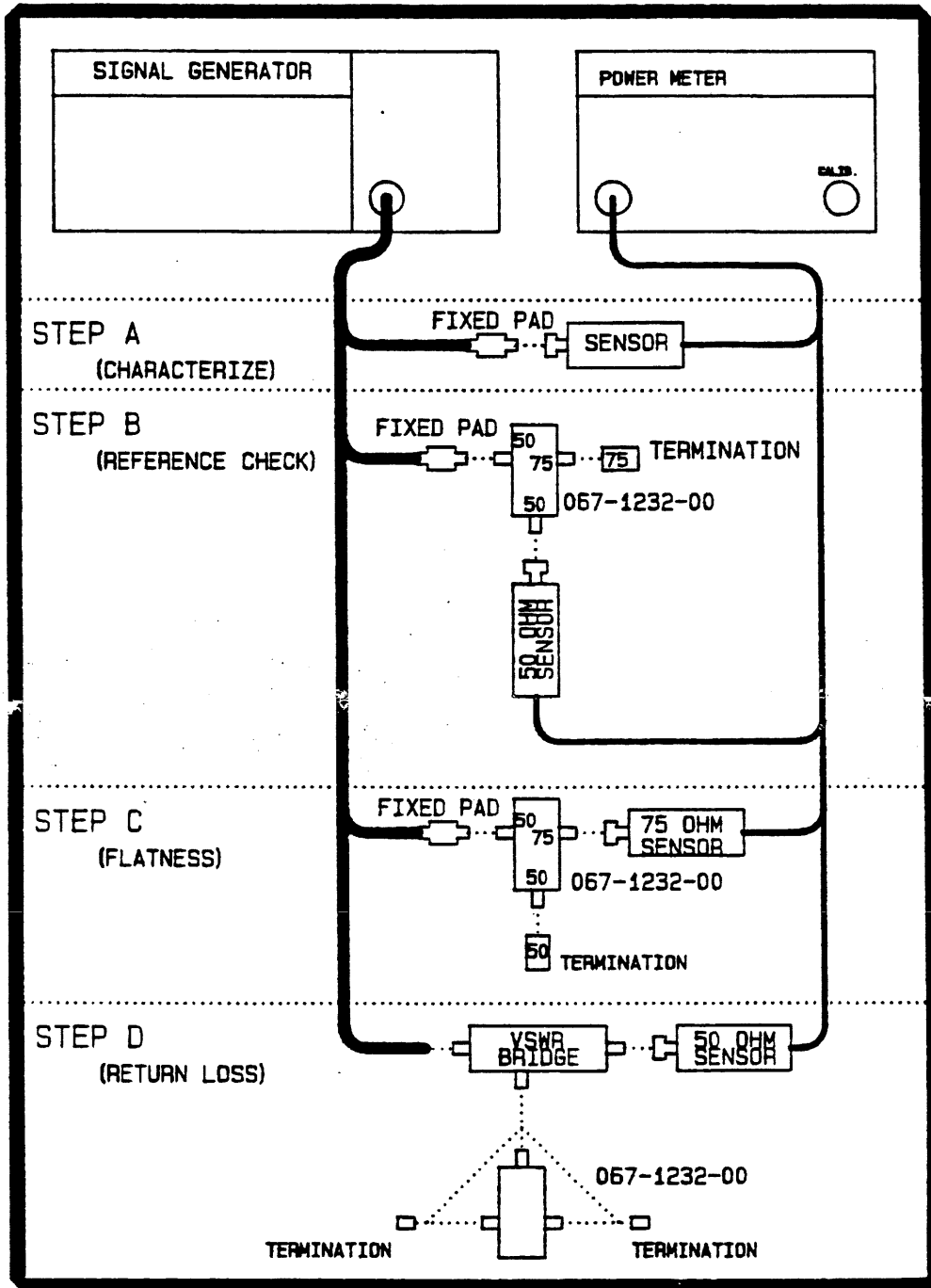


FIGURE 1. POWER DIVIDER TEST EQUIPMENT SETUP

Table 1. Check Flatness Specifications

	A	B	C	D	E	F	G
Gen Freq (MHz)	Power Divider 75 Ω port	Power Divider 50 Ω REF port	Reference 50 Ω power sensor	Reference 75 Ω power sensor	Input to 50 Ω REF port (-7.8 dB +0.5dB, -1.2dB)	50 Ω REF to 75 Ω port (-3.5 dB, ± 0.2 dB)	50 Ω REF to 75 Ω port deviation from 75 Ω @50 MHz (≤ 0.20 dB)
50							
100							
200							
300							
400							
500							
600							
700							
800							
900							
1000							

1. Disconnect all devices from the signal generator.

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2. Check return loss

- a. See Step D of Figure 1 for test equipment set up.
- b. Connect the 50 Ω VSWR bridge RF-In connector to the signal generator.
- c. Connect the 50 Ω power sensor to the VSWR bridge RF-Out connector.
- d. Do not connect anything to the Device-under-test port of the VSWR bridge.
- e. Enter the power meter readings in column A of Table 2 for all rows.
- f. Connect the Power Divider's 50 Ω port to the Device-under-test port of the VSWR bridge, and properly terminate the remaining ports of the Power Divider.
- g. Enter the power meter readings in column B of Table 2 for all rows.
- h. Connect the Power Divider's 50 Ω REF port to the Device-under-test port of the VSWR bridge, and properly terminate the remaining ports of the Power Divider.
- i. Enter the power meter readings in column C of Table 2 for all rows.
- j. Connect the 75 Ω VSWR bridge RF-In connector to the signal generator.
- k. Connect the 50 Ω power sensor to the VSWR bridge RF-Out connector.
- l. Do not connect anything to the Device-under-test port of the VSWR bridge.
- m. Enter the power meter readings in column D of Table 2 for all rows.
- n. Connect the Power Divider's 75 Ω port to the Device-under-test port of the VSWR bridge, and properly terminate the remaining ports of the Power Divider.
- o. Enter the power meter readings in column E of Table 2 for all rows.
- p. Calculate data for the following columns:
 1. Column F = A - B
 2. Column G = A - C
 3. Column H = D - E

Table 2. Check Return Loss Specifications

	A	B	C	D	E	F	G	H
Gen Freq MHz	50 Ω VSWR bridge reference	VSWR Power Divider 50 Ω port	VSWR Power Divider 50 Ω REF port	75 Ω VSWR bridge reference	VSWR Power Divider 75 Ω port	Normalized 50 Ω port return loss (>20 dB)	Normalized 50 Ω REF port return loss (>20 dB)	Normalized 75 Ω port return loss (>20 dB)
50								
100								
200								
300								
400								
500								
600								
700								
800								
900								
1000								

q. Disconnect all test equipment.

This concludes the Performance Check of the Impedance Matching Power Divider.

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Maintenance

Surface-Mounted Components

Surface-mounted components (SMC's) have been used in this instrument. These SMC's are mounted directly onto the circuit board, rather than through holes in the PCB.

Surface-mounted resistors have no visible identification, though their value can be measured with an Ohm Meter.

Replacement

A Hot Air Machine, such as Hart Model 200A manufactured by Nu-Concept Computer Systems Incorporated of Colmar, Pennsylvania, is recommended for unsoldering and soldering surface-mounted components.

Another method to remove and solder SMC's is by hand, using a hot air gun and a pair of tweezers.

1. Unsolder the component. Do not apply too much heat. The pad connecting the device to the circuit board may be lifted.
2. Clean the board with isopropyl alcohol.
3. Solder the SMC. SMC's are pretinned, and should be soldered onto the board with solderpaste rather than solder.

CAUTION

If you use a soldering iron, use one with a small tip. After applying the solderpaste, touch the corner of the pad with the iron to fasten the component. Avoid touching the component with the hot soldering iron. Thermal shock causes hairline cracks that are not visible to the eye.

NOTE

Solderpaste has a shelflife of 9 months when stored at room temperature. It can be used up to six months if it stored under refrigeration.

Solderpaste should be at room temperature before use.

Replacing Parts

When trying to gain access to the circuit board, firmly grasp the bnc connector while loosening the nut that holds it to the housing. The bnc connectors are soldered onto the board, and the solder joints can easily be damaged when torque is applied.

When the unit is ready to be reassembled, be sure to match the 75 Ω bnc connector with the 75 Ω nomenclature on the case.

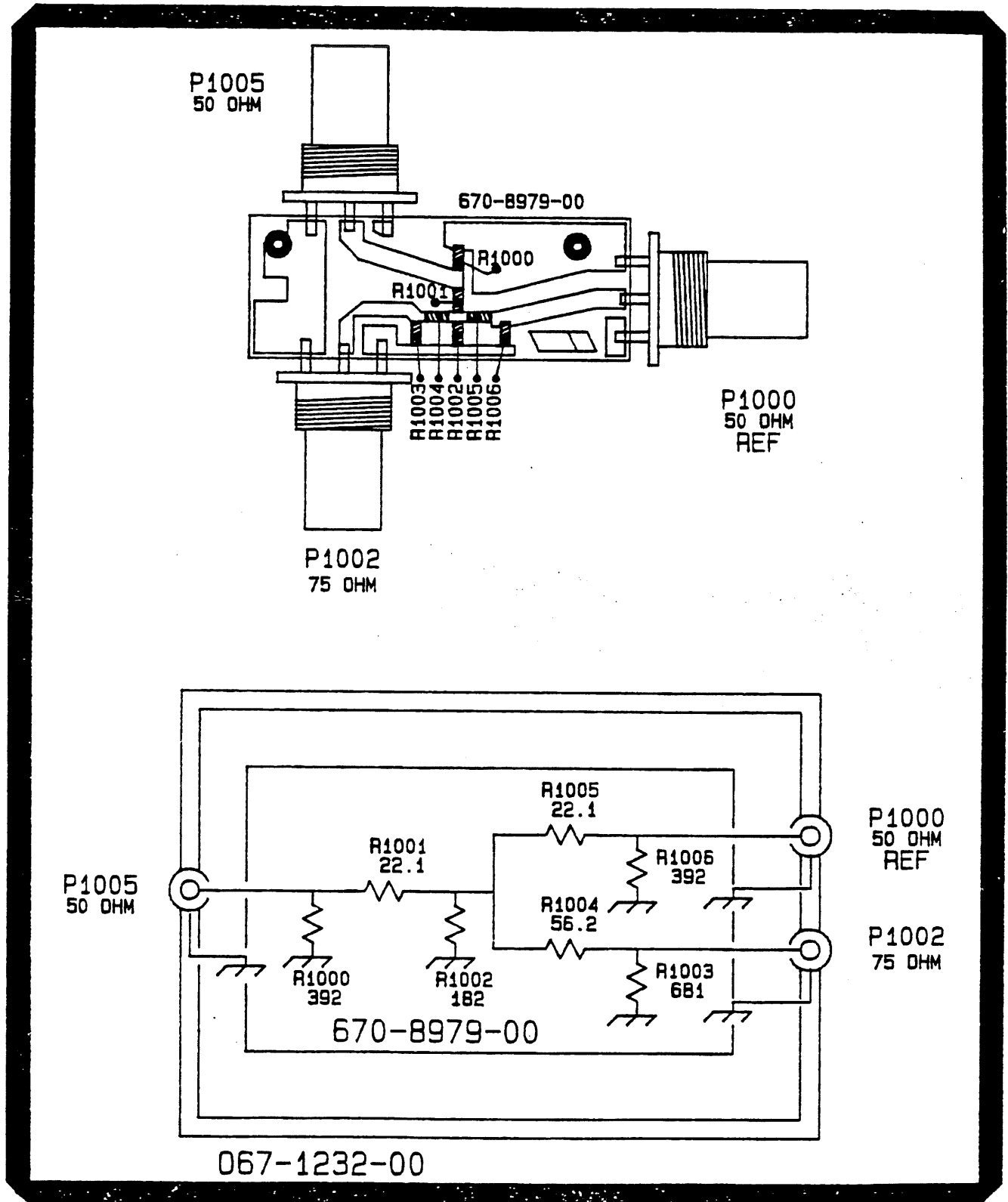


FIGURE 2. POWER DIVIDER CIRCUIT BOARD & SCHEMATIC



REPLACEABLE ELECTRICAL 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

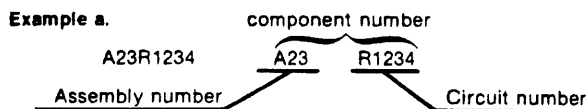
The Mfr. Code Number to Manufacturer index for the Electrical Parts List is located immediately after this page. The Cross Index provides codes, names and addresses of manufacturers of components listed in the Electrical Parts List.

ABBREVIATIONS

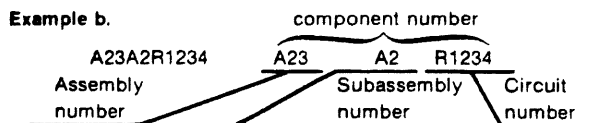
Abbreviations conform to American National Standard Y1.1.

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:



Read: Resistor 1234 of Assembly 23



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.

Replaceable Electrical Parts - 067-1232-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A1	670-8979-00		CIRCUIT BD ASSY:POWER DIVIDER	80009	670-8979-00
A1R1000	321-5013-00		RES,FXD,FILM:392 OHM,1%,0.125M	01121	BCK3920FT
A1R1001	321-5004-00		RES,FXD,FILM:22.1 OHM,1%,0.125M	01121	BCD22R1FT
A1R1002	321-5009-00		RES,FXD,FILM:182 OHM,1%,0.125M	01121	BCK1820FT
A1R1003	321-5016-00		RES,FXD,FILM:681 OHM,1%,0.125M	01121	BCK6810FT
A1R1004	321-5044-00		RES,FXD,FILM:56.2 OHM,1%,0.125M	01121	BCD56R2FT
A1R1005	321-5004-00		RES,FXD,FILM:22.1 OHM,1%,0.125M	01121	BCD22R1FT
A1R1006	321-5013-00		RES,FXD,FILM:392 OHM,1%,0.125M	01121	BCK3920FT

CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
01121	ALLEN-BRADLEY CO	1201 SOUTH 2ND ST	MILWAUKEE WI 53204
80009	TEKTRONIX INC	4900 S M GRIFFITH DR P O BOX 500	BEAVERTON OR 97077

REPLACEABLE MECHANICAL 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.

ITEM NAME

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.

FIGURE AND INDEX NUMBERS

Items in this section are referenced by figure and index numbers to the illustrations.

INDENTATION SYSTEM

This mechanical parts list is indented to indicate item relationships. Following is an example of the indentation system used in the description column.

```

1 2 3 4 5           Name & Description
Assembly and/or Component
Attaching parts for Assembly and/or Component
-----
Detail Part of Assembly and/or Component
Attaching parts for Detail Part
-----
Parts of Detail Part
Attaching parts for Parts of Detail Part
-----

```

Attaching Parts always appear in the same indentation as the item it mounts, while the detail parts are indented to the right. Indented items are part of, and included with, the next higher indentation. The separation symbol - - - - - indicates the end of attaching parts.

Attaching parts must be purchased separately, unless otherwise specified.

ABBREVIATIONS

#	INCH	ELCTRN	ELECTRON	IN	INCH	SE	SINGLE END
ACTR	NUMBER SIZE	ELEC	ELECTRICAL	INCAND	INCANDESCENT	SECT	SECTION
ADPTR	ACTUATOR	ELCTLT	ELECTROLYTIC	INSUL	INSULATOR	SEMICON	SEMICONDUCTOR
ALIGN	ADAPTER	ELEM	ELEMENT	INTL	INTERNAL	SHLD	SHIELD
AL	ALIGNMENT	EPL	ELECTRICAL PARTS LIST	LPHLDR	LAMPHOLDER	SHLDR	SHOULDERED
AL	ALUMINUM	EOPT	EQUIPMENT	MACH	MACHINE	SKT	SOCKET
ASSEM	ASSEMBLED	EXT	EXTERNAL	MECH	MECHANICAL	SL	SLIDE
ASSY	ASSEMBLY	FIL	FILLISTER HEAD	MTG	MOUNTING	SLFLKG	SELF-LOCKING
ATTEN	ATTENUATOR	FLEX	FLEXIBLE	NIP	NIPPLE	SLVG	SLEEVING
AWG	AMERICAN WIRE GAGE	FLH	FLAT HEAD	NON WIRE	NOT WIRE WOUND	SPR	SPRING
BD	BOARD	FLTR	FILTER	OB	ORDER BY DESCRIPTION	SO	SQUARE
BRKT	BRACKET	FR	FRAME or FRONT	OD	OUTSIDE DIAMETER	SST	STAINLESS STEEL
BRS	BRASS	FSTNR	FASTENER	OVH	OVAL HEAD	STL	STEEL
BRZ	BRONZE	FT	FOOT	PH BRZ	PHOSPHOR BRONZE	SW	SWITCH
BSHG	BUSHING	FXD	FIXED	PL	PLAIN or PLATE	T	TUBE
CAB	CABINET	GSKT	GASKET	PLSTC	PLASTIC	TERM	TERMINAL
CAP	CAPACITOR	HDL	HANDLE	PN	PART NUMBER	THD	THREAD
CER	CERAMIC	HEX	HEXAGON	PNH	PAN HEAD	THK	THICK
CHAS	CHASSIS	HEX HD	HEXAGONAL HEAD	PWR	POWER	TNSN	TENSION
CKT	CIRCUIT	HEX SOC	HEXAGONAL SOCKET	RCPT	RECEPTACLE	TPG	TAPPING
COMP	COMPOSITION	HLCPS	HELICAL COMPRESSION	RES	RESISTOR	TRH	TRUSS HEAD
CONN	CONNECTOR	HLEXT	HELICAL EXTENSION	RGD	RIGID	V	VOLTAGE
COV	COVER	HV	HIGH VOLTAGE	RLF	RELIEF	VAR	VARIABLE
CPLG	COUPLING	IC	INTEGRATED CIRCUIT	RTNR	RETAINER	W/	WITH
CRT	CATHODE RAY TUBE	ID	INSIDE DIAMETER	SCH	SOCKET HEAD	WSHR	WASHER
DEG	DEGREE	IDNT	IDENTIFICATION	SCOPE	OSCILLOSCOPE	XFMR	TRANSFORMER
DWR	DRAWER	IMPLR	IMPELLER	SCR	SCREW	XSTR	TRANSISTOR

Replaceable Mechanical Parts - 067-1232-00

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Discont	Qty	12345	Name & Description	Mfr. Code	Mfr. Part No.	
1-1	200-3108-00			1		COVER, FRONT:AL,067-1233-00 (ATTACHING PARTS)	80009	200-3108-00	
-2	211-0180-00			4		SCR,ASSEM MSHR:2-56 X 0.25,PNH,BRS,NP,POZ (END ATTACHING PARTS)	TK0435	ORDER BY DESCR	
-3	200-3107-00			1		COVER,BACK:AL,496 OPT 07 (ATTACHING PARTS)	80009	200-3107-00	
-4	211-0180-00			4		SCR,ASSEM MSHR:2-56 X 0.25,PNH,BRS,NP,POZ (END ATTACHING PARTS)	TK0435	ORDER BY DESCR	
-5	-----			1		CKT BOARD ASSY:POWER DIVIDER (SEE A1 REPL)			
-6	131-1727-00			2		.CONN,RCPT,ELEC:BNC,FEMALE	24931	28JR262-1	
-7	131-1691-00			1		.CONN,RCPT,ELEC:BNC,FEMALE	24931	28JR269-1	
-8	380-0758-00			1		HSG,PMR DIVIDER:AL,496 OPT 07	80009	380-0758-00	
STANDARD ACCESSORIES									
-9	103-0254-00			1		ADAPTER,CONN:BNC MALE TO MALE,75 OHM	80009	103-0254-00	
	070-5555-00			1		MANUAL,TECH:POWER SPLITTER	80009	070-5555-00	

CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
24931	SPECIALTY CONNECTOR CO INC	2620 ENDRESS PLACE P O BOX 0	GREENWOOD IN 46142
80009	TEKTRONIX INC	4900 S M GRIFFITH DR P O BOX 500	BEAVERTON OR 97077
TK0435	LENIS SCREM CO	4114 S PEDRIA	CHICAGO IL 60609

