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User Manual

Tektronix

SD-42 & SD-46
Optical to Electrical Converter Heads

070-8671-01

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General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it.

Only qualified personnel should perform service procedures.

While using this product, you may need to access other parts of the system. Read the *General Safety Summary* in other system manuals for warnings and cautions related to operating the system.

Injury Precautions

Ground the Product

This product is indirectly grounded through the grounding conductor of the mainframe power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

Do Not Operate in Explosive Atmosphere

To avoid injury or fire hazard, do not operate this product in an explosive atmosphere.

Safety Terms and Symbols

Terms in This Manual

These terms may appear in this manual:



WARNING. *Warning statements identify conditions or practices that could result in injury or loss of life.*



CAUTION. *Caution statements identify conditions or practices that could result in damage to this product or other property.*

Terms on the Product

These terms may appear on the product:

DANGER indicates an injury hazard immediately accessible as you read the marking.

WARNING indicates an injury hazard not immediately accessible as you read the marking.

CAUTION indicates a hazard to property including the product.

Symbols on the Product

The following symbols may appear on the product:



DANGER
High Voltage



Protective Ground
(Earth) Terminal



ATTENTION
Refer to
Manual



Double
Insulated

Getting Started

Getting Started

The SD-42 Optical-to-Electrical Converter Head and SD-46 Optical-to-Electrical Converter Head are high-performance optical heads for use in the 11800 Series Digital Sampling Oscilloscopes (including the SM-11 Multi-channel Unit) and the CSA 803 Communications Signal Analyzer. The SD-42/SD-46 Optical-to-Electrical Converter Heads are used with SD-22, SD-24, and SD-26 Sampling Heads. The SD-42/SD-46 converts an optical signal into an electrical signal which serves as the input to an SD Series Sampling Head.

The SD-42 Optical-to-Electrical Converter Head provides the following features:

- DC to 6.4 GHz optical bandwidth
- ≤55 ps optical impulse response (FWHM) with the SD-24 and SD-26, ≤60 ps optical impulse response (FWHM) with the SD-22
- 1000 nm to 1700 nm Spectral Response
- Mean Optical Power Monitor function

The SD-46 Optical-to-Electrical Converter Head provides the following features:

- DC to 20 GHz optical bandwidth
- ≤28.5 ps optical impulse response (FWHM) with the SD-24 and SD-26
- 1200 nm to 1650 nm Spectral Response
- Mean Optical Power Monitor function

Connector Care

The front of the SD-42/SD-46 Optical-to-Electrical Converter Head has a precision 3.5 mm connector for attaching the optical head electrical signal output to the lower input connector of an adjacent SD-24 or SD-26. These are high-precision connectors with a higher mechanical tolerance than standard SMA connectors. Never attach a cable to a plug-connector if the cable has a worn or damaged connector — damage may result.

Use extra care when attaching or removing a cable from the connectors. Turn only the nut, *do not* turn the cable. When attaching a cable to the Optical-to-Electrical Converter Head, align the connectors carefully before turning the nut. Use light, finger pressure to make this initial connection. Then tighten the nut lightly with a wrench.

For best repeatability and to prolong the life of connectors, use a torque wrench and tighten the connection to the range of 7–10 lb-in (79–112 N-cm).

The front of the SD-42/SD-46 has a precision FC/PC optical connector receptacle. This is for attaching a fiber optic signal cable. This connector receptacle has a locating keyway. To ensure repeatable connections, it is important to align this keyway on the connector and connector receptacle before tightening the nut. The nut should be tightened with light, finger pressure only. The connector receptacle must be kept free of dirt and dust. The cover cap should be replaced whenever the unit is not in use or a fiber is not connected.

Installation

The SD-42/SD-46 Optical-to-Electrical Converter Head fits into the front panel of an 11800 Series Digital Sampling Oscilloscope or a CSA 803 Communications Signal Analyzer. See Figure 1–1.

The SD-42/SD-46 Optical-to-Electrical Converter Head converts optical signals to electrical signals to be sampled. At least one sampling head must be installed in the oscilloscope for the instrument to sample signals.

For the converted output signal from the SD-42/SD-46 to be sampled, the output of the SD-42/SD-46 must be connected to the input of an SD-24 or SD-26 Sampling Head (the SD-42 can also be connected to an SD-22). To accomplish this using the U-link provided with the SD-42/SD-46, the SD-24 or SD-26 must be in the plug-in slot immediately to the right of the slot occupied by the SD-46. The output of the SD-42/SD-46 is then connected to the lower input of the SD-24 or SD-26.

To install a plug-in, first switch off the oscilloscope. Then place the plug-in in a compartment and slowly push it in with firm pressure. Once the plug-in is seated, turn the screw shaft on the plug-in to tighten the plug-in in place.

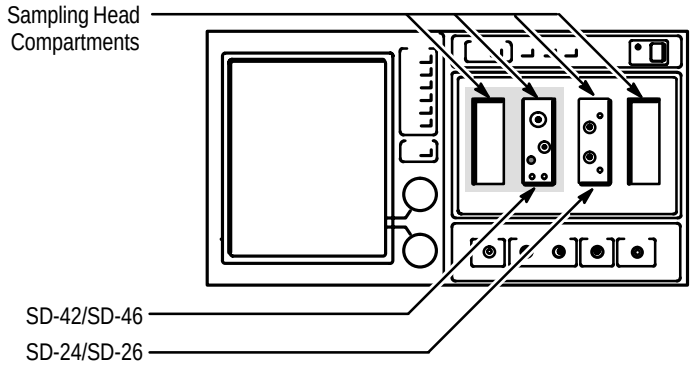


Figure 1–1: Sampling Head Compartments in a CSA 803 Communications Signal Analyzer

Operating Basics

Operating Basics

The Figure 2–1 shows the front panel of the SD-42 Optical-to-Electrical Converter Head and identifies the button, lights, and connectors (the SD-46 is the same except for specification differences).

The SD-42 has an FC/PC connector receptacle for optical signal input, a precision 3.5 mm connector for electrical signal output, two 2 mm sockets for mean power monitor output, a mean power monitor SELECT RANGE button, and two range/range overload indicator lights.

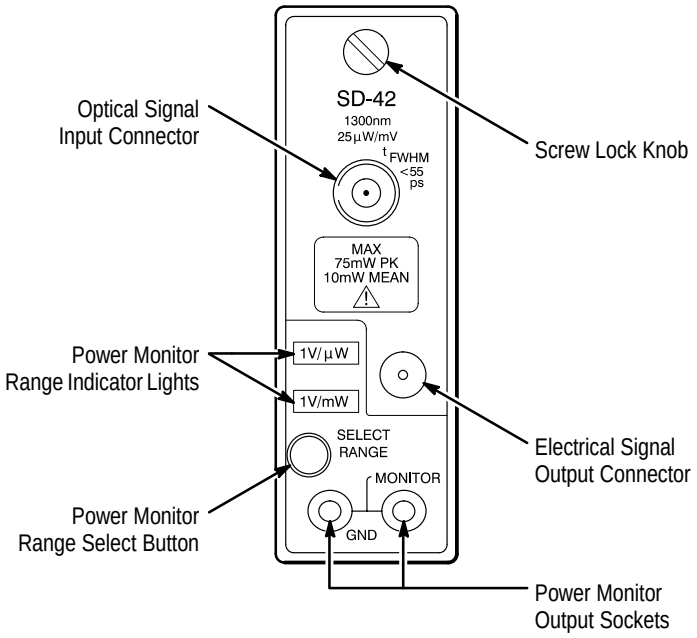


Figure 2–1: SD-42 Front Panel

Connecting Signals

The signal to be sampled must be coupled via a fiber optic cable (which must be a single-mode cable for calibrated response) terminated with an FC/PC style optical connector. This may be direct from the device-under-test/signal source or can be accomplished using optional cable accessories. A fiber terminated by an FC/PC style connector is connected to the FC/PC style input on the front of the SD-42/46. Care must be taken to ensure alignment of the key on the FC/PC connector with the keyway of the connector receptacle.

Mean Power Monitor

The SD-42/46 Mean Optical Power Monitor allows you to monitor the mean optical power coupled into the optical input using a digital voltmeter. The two 2 mm MONITOR sockets on the front of the SD-42/46 can be connected to most common digital voltmeters using the two 2 mm to 4 mm cables supplied with the SD-42/46. The monitor has two ranges, 1 V/μW and 1 V/mW (calibrated at 1300 nm for single-mode fibers) enabling mean optical input powers from 5 nW to 5 mW to be measured.

***NOTE**. The signal output of the SD-42/46 must be connected to a sampling head or a 50 Ω terminator for the power monitor to function.*

Buttons and Lights

The front panel of the SD-42/46 has a SELECT RANGE button and two range/range overload indicator lights. Pressing and releasing the SELECT RANGE button changes the range of the mean power monitor. The range indicator light glows green beneath the chosen range on the front panel, either 1 V/μW and 1 V/mW. If the mean optical input power is above the maximum for that range (that is, 5 μW for the 1 V/μW range or 5 mW for the 1 V/mW range) the green light will be replaced by a red range overload light. If the red light is illuminated while the monitor is in the 1 V/μW range, press the RANGE SELECT button to change the monitor to the 1 V/mW range. If the red light is illuminated in the 1 V/mW range, an optical attenuator should be fitted in the optical path before the converter. Under overload conditions, the output signal from the SD-42/46 may be degraded, and the mean power monitor reading will be meaningless.



***CAUTION.** Under no circumstances should optical powers above 10 mW mean or 75 mW peak be applied to the input of the SD-42/46 Optical-to-Electrical Converter Head.*

Calibration

The SD-42 Optical-to-Electrical Converter Head is calibrated for response to optical signals with wavelength of 1300 nm ±20 nm. Optical signals with wavelengths in the range of 1000 nm to 1700 nm can be analyzed using the SD-42 with the responsivity as a function of wavelength being given in

Figure B–2. This responsivity curve is applicable to both the displayed waveform and the mean power monitor output.

The SD-46 Optical-to-Electrical Converter Head is calibrated for response to optical signals with wavelength of 1300 nm ±20 nm. Optical signals with wavelengths in the range of 1200 nm to 1650 nm can be analyzed using the SD-46 with the responsivity as a function of wavelength being given in Figure B–4. This responsivity curve is applicable to both the displayed waveform and the mean power monitor output.

Reference

Performance Check

Use the following procedure to check that your SD-42/SD-46 Optical-to-Electrical Converter Head is performing within specifications.

Test Equipment Requirement

Table 3–1 is a list of equipment required to accomplish the Incoming Inspection Procedure. Test equipment recommended is the minimum necessary to provide accurate results; therefore, substitute equipment must meet or exceed the specifications of the equipment listed. Detailed operating instructions for test equipment are not contained in this procedure. Should additional operating information be needed, refer to the appropriate test equipment instruction manual.

Table 3–1: Test Equipment Required

Item Description	Performance Requirement	Recommended Example
Oscilloscope	Tektronix Digital Sampling Oscilloscope	Tektronix 11801A or CSA 803
Sampling Head		Tektronix SD-22/SD-24/SD-26
Digital Multimeter		Tektronix DM 504A
Optical Impulse Generator	1300 nm wavelength, FWHM ≤30 ps, 60 ns pretrigger	Tektronix OIG 502
Optical Attenuator	Single mode, 1300 nm, 0–60 dB	Tektronix OA 5002
Power Supply for OA 5002, OIG 502, and DM 504A		Tektronix TM5006 Power Module
CW Laser Source	1300 nm, FC/PC connections	Tektronix ECL-to-Light Kit (part number 802–9249–06) using the LDM 1301 Laser Module from Photonic Packaging Technology Co.
Power Supply for CW Laser Source		Tektronix PS 503A
Coaxial cable	for pulse trigger, BNC connections	Tektronix part number: 012–0482–00
Optical fiber cable	Single mode, FC/PC connections	Tektronix part number: 174–1387–00
BNC-SMA adapter		Tektronix part number: 015–1018–00

Using This Procedure

This procedure allows you to perform a basic optical inspection on the SD-42/SD-46 Optical-to-Electrical Converter Head with a minimum number of steps.

Conventions

In these procedures, the following conventions are used:

- CAPITAL letters within the text identify front-panel controls, indicators, and connectors (for example, SELECT RANGE) on the plug-in heads and oscilloscope.
- **Bold** letters identify menu labels and display messages.
- Initial Capital letters identify connectors, controls, and indicators (for example, On) on associated test equipment.

In some steps, the first word is italicized to identify a step that contains a performance verification and/or an adjustment instruction. For example, if *Check* is the first word in the title of a step, an electrical specification is checked. If *Adjust* appears in the title, the step involves an electrical adjustment.

Initialized and Stored Settings

At the beginning of most steps, the user is instructed to initialize the oscilloscope. The **Initialize** feature, located in the **UTILITY** major menu, presets all oscilloscope controls and functions, excluding the calibration constants, to default values. Initializing at the beginning of each part eliminates the possibility of settings from the previous parts causing erroneous or confusing results.

Menu Selections and Measurement Techniques

Details on measurement techniques and instructions for making menu selections are generally not included in this procedure. Comprehensive descriptions of menus and oscilloscope features are located in the oscilloscope User manual. Specific information on the SD Series Sampling Heads (SD-22/SD-24/SD-26) are located in the sampling head Installation/User manual.

Limits and Tolerances

The limits and tolerances given in these procedures are for the Optical-to-Electrical Converter Head under test only. Test equipment error is not included except as noted.

Preparation

Before proceeding with the following checks, allow sufficient warm-up time for test equipment to stabilize (typically 20 minutes). The ambient temperature must be between 20° C and 30° C.

Optical Power Monitor Check

The Optical Power Monitor function of the SD-42/SD-46 does not use any of the oscilloscope functions. However the oscilloscope must be switched on and the electrical output of the SD-42/SD-46 must be terminated, preferably using the high-performance U-link connected to an adjacent SD-24/26.



WARNING. *Avoid eye exposure to the output of open-ended fibers/connectors. Ensure all fibers are terminated prior to turning on an optical source.*

1. Connect the equipment as shown in Figure 3–1.

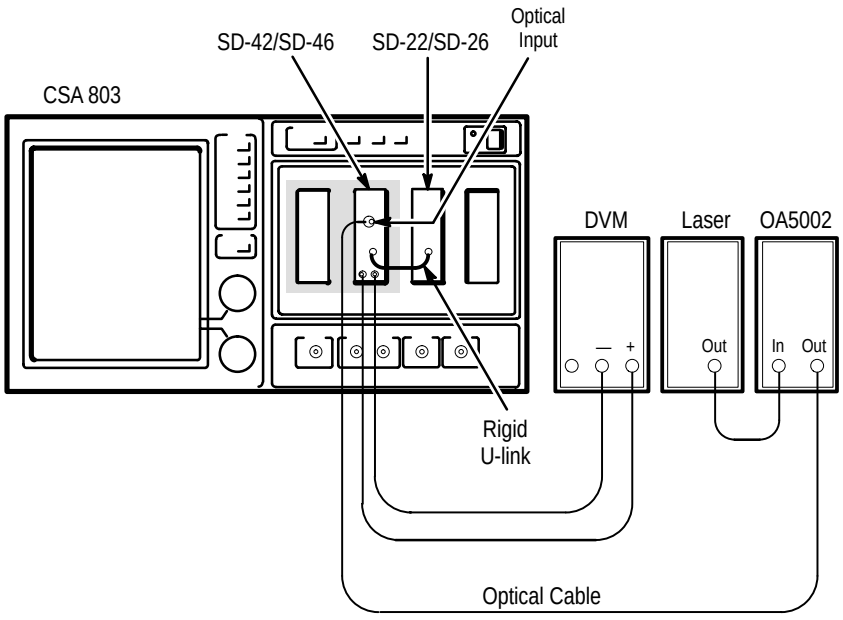


Figure 3–1: Setup to Check Optical Power Monitor Operation

2. Switch on the CW laser source.

3. Set the digital voltmeter as follows:

DC Volts
Autoranging (or 200 mV)

4. On the SD-42/SD-46, using SELECT RANGE, set the range to 1 V/mW.

5. Adjust the optical attenuator until the digital multimeter reads 100 mV. There is now 100 μW of power incident on the SD-42/SD-46 input.

6. Increase the setting of the optical attenuator by 30 dB.

7. On the SD-42/SD-46 use SELECT RANGE to select the1 V/μW range.

8. *Check* that the digital multimeter reads 100 mV ±20 mV, which is equivalent to 100 nW of optical input power.

Pulse Amplitude and Pulse Width Check

This procedure checks the pulse width and the pulse amplitude.

WARNING. *Avoid eye exposure to the output of open-ended fibers/connectors. Ensure all fibers are terminated prior to turning on an optical source.*

1. Connect the equipment as shown in Figure 3–2.

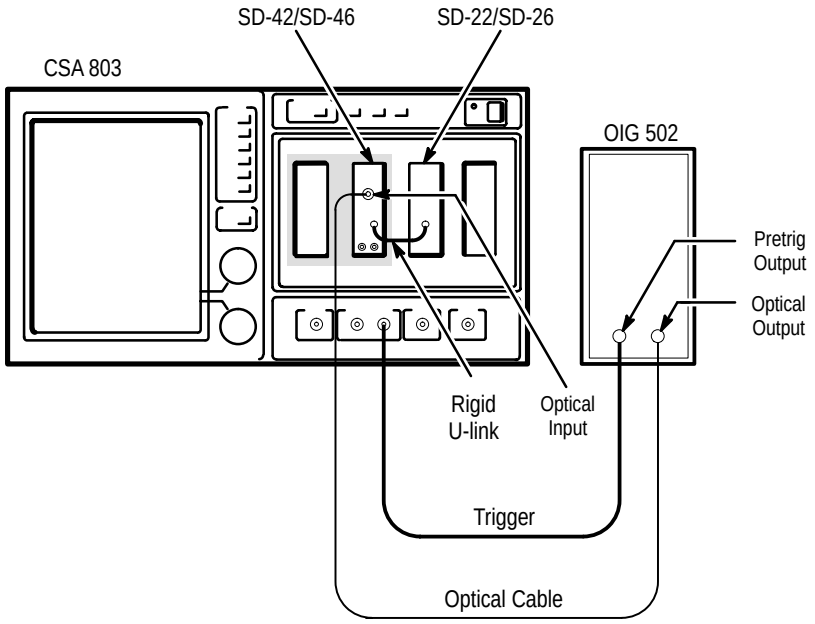


Figure 3–2: Setup to Check Pulse Width and Pulse Amplitude

2. Switch on the OIG 502.

3. Initialize the oscilloscope.

4. On the sampling head lower channel, press SELECT CHANNEL, so that the channel is ON.

5. Touch the vertical icon and adjust the **Vert. Size** to 100 mV/division. This setting is equivalent to 3.5 mW/division optical (100 mV/div × 35 μW/mV).

6. Touch the horizontal icon and adjust the **Main Size** to 10 ns/division. The screen display shows a 100 ns window starting approximately 50 ns from the trigger edge.
7. Adjust the **Main Pos.** to position the pulse on the left-hand side of the screen.
8. Expand the **Main Size** to display the pulse.
9. Check that the displayed pulse width is <62 ps and the pulse amplitude is >200 mV peak.

To take measurements from the displayed waveform, refer to the User Reference manual for the oscilloscope.

Appendices

Appendix A: Accessories

Some accessories are included with the SD-42/SD-46. If you wish to purchase optional accessories, or purchase additional standard accessories, see a Tektronix products catalog or contact your local Tektronix field representative.

Standard Accessories

- The *SD-42 & SD-46 Optical to Electrical Converter Heads User Manual* (Tektronix part number 070–8671–00) is this manual.
- 50 Ω Semi-rigid “U” link, Tektronix part number 174–1635–00.
- Red, 2 mm to banana lead, 1 m length, Tektronix part number 012–1286–00.
- Black, 2 mm to banana lead, 1 m length, Tektronix part number 012–1287–00.

Optional Accessories

Optical Cables, Single Mode, 2 meter, 8/125 micron

- FC/PC to Diamond 2.5, Tektronix part number 174–1497–00.
- FC/PC to Diamond 3.5, Tektronix part number 174–1385–00.
- FC/PC to ST, Tektronix part number 174–1386–00.
- FC/PC to FC/PC, Tektronix part number 174–1387–00.
- FC/PC to Biconic, Tektronix part number 174–1388–00.

Appendix B: Specifications

SD-42 Characteristics

The following specifications apply at 25° C ±5° C; calibrated for use with a single-mode fiber input at 1300 nm.

Table B–1: SD-42 Optical-to-Electrical Converter Head Pulse Characteristics

Characteristic	Performance
Response Bandwidth	DC – 6.4 GHz
Wavelength Range	1000 to 1700 nm
Optical Impulse Response Speed	55 ps max Full Width Half Maximum
Conversion Factor	25 mW/V
Conversion Gain	40 mV/mW
Equivalent Display Noise	
with SD-22	10 μW_{RMS} typical
with SD-24/SD-26	33 μW_{RMS} typical (unity dot response) <15 μW_{RMS} typical (with smoothing)
Aberrations (Step Response)	<15% peak to peak in the first 400 ps following pulse input
Linear Response Range	<25 mW peak power <5 mW mean power
Maximum Nondestructive Input	75 mW peak power 10 mW mean power

Table B–2: SD-42 Optical-to-Electrical Converter Head Power Meter Characteristics

Characteristic	Performance
Dynamic Range	5 nW to 5 mW
Linear Response Range	
Range 1	<5 µW mean, <25 mW peak
Range 2	<5 mW mean, <25 mW peak

Table B–2: SD-42 Optical-to-Electrical Converter Head Power Meter Characteristics (Cont.)

Characteristic	Performance
Sensitivity	
Range 1	1 V/mW
Range 2	1 V/µW

Table B–3: SD-42 Optical-to-Electrical Converter Head Environmental and Mechanical Characteristics

Characteristic	Performance
Weight	205 g (0.45 lbm)
Height	71 mm (2.9 inches)
Width	23 mm (0.95 inch)
Depth	95 mm (3.9 inches)
Ambient Temperature	
Operating	0° C to 50° C (32° F to 122° F)
Nonoperating	–55° C to +75° C (–67° F to +167° F)
Altitude	
Operating	to 4.5 km (15,000 ft.)
Nonoperating	to 15 km (50,000 ft.)
Humidity	to 95% relative humidity at up to 50° C (122° F)
Electromagnetic Compatibility	Meets FCC Part 15J Class B

SD-46 Characteristics

The following specifications apply at 25° C ±5° C; calibrated for use with a single-mode fiber input at 1300 nm.

Table B–4: SD-46 Optical-to-Electrical Converter Head Pulse Characteristics

Characteristic	Performance
Response Bandwidth	DC – 20 GHz
Wavelength Range	1200 to 1650 nm
Optical Pulse Response Speed	22 ps max Full Width Half Maximum
Conversion Factor	35 mW/V
Conversion Gain	29 mV/mW
Equivalent Display Noise	
with SD-22	≤16 μW_{RMS} typical
with SD-24/SD-26	≤46 μW_{RMS} typical
Aberrations	<10% peak to peak in the first 400 ps following pulse input
Linear Response Range	≤25 mW peak power ≤5 mW mean power
Maximum Operating Input	25 mW peak power 5 mW average power

Table B–5: SD-46 Optical-to-Electrical Converter Head Power Meter Characteristics

Characteristic	Performance
Dynamic Range	5 nW to 5 mW
Linear Response Range	
Range 1	<5 µW mean, <25 mW peak
Range 2	<5 mW mean, <25 mW peak
Sensitivity	
Range 1	1 V/mW
Range 2	1 V/µW

Table B–6: SD-46 Optical-to-Electrical Converter Head Environmental and Mechanical Characteristics

Characteristic	Performance
Weight	205 g (0.45 lbm)
Height	71 mm (2.9 inches)
Width	23 mm (0.95 inch)
Depth	95 mm (3.9 inches)
Ambient Temperature	
Operating	0° C to 50° C (32° F to 122° F)
Nonoperating	–55° C to +75° C (–67° F to +167° F)
Altitude	
Operating	to 4.5 km (15,000 ft.)
Nonoperating	to 15 km (50,000 ft.)
Humidity	to 95% relative humidity at up to 50° C (122° F)
Electromagnetic Compatibility	Meets FCC Part 15J Class B

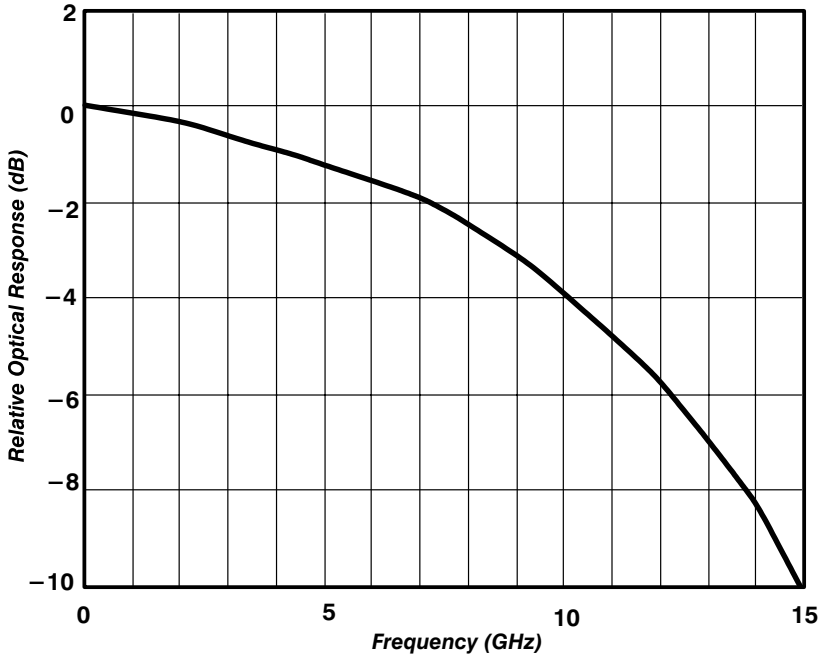


Figure B–1: SD-42 Frequency Response Curve

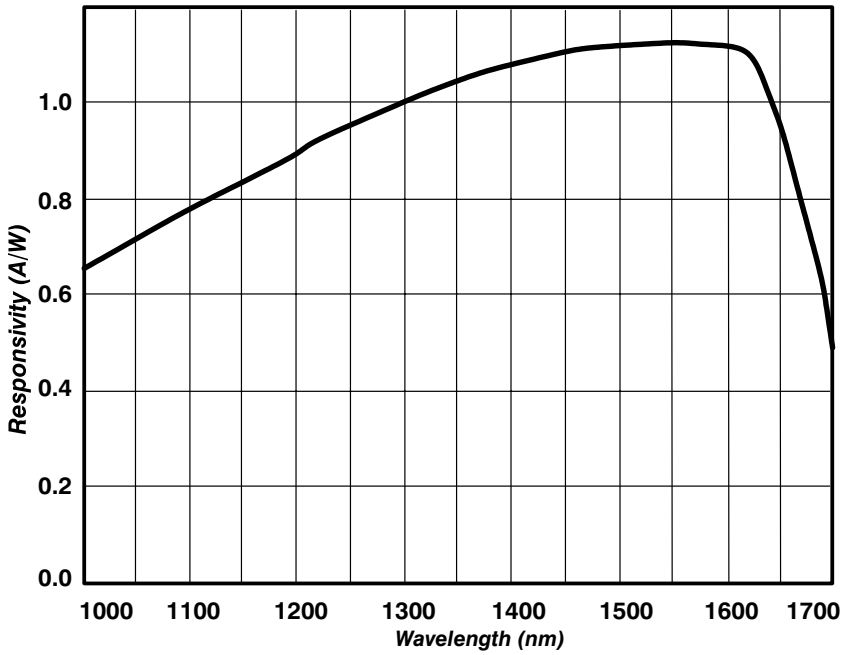


Figure B–2: SD-42 Responsivity vs. Wavelength Curve

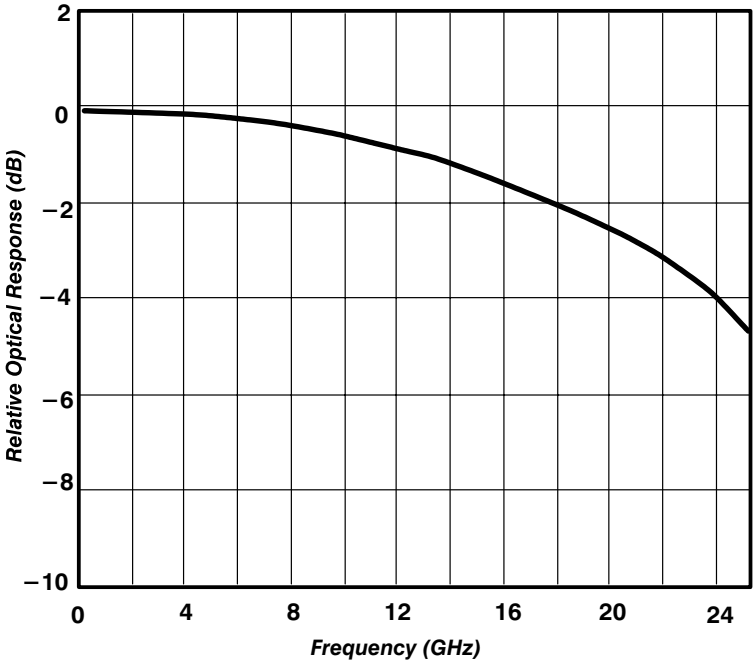


Figure B–3: SD-46 Frequency Response Curve

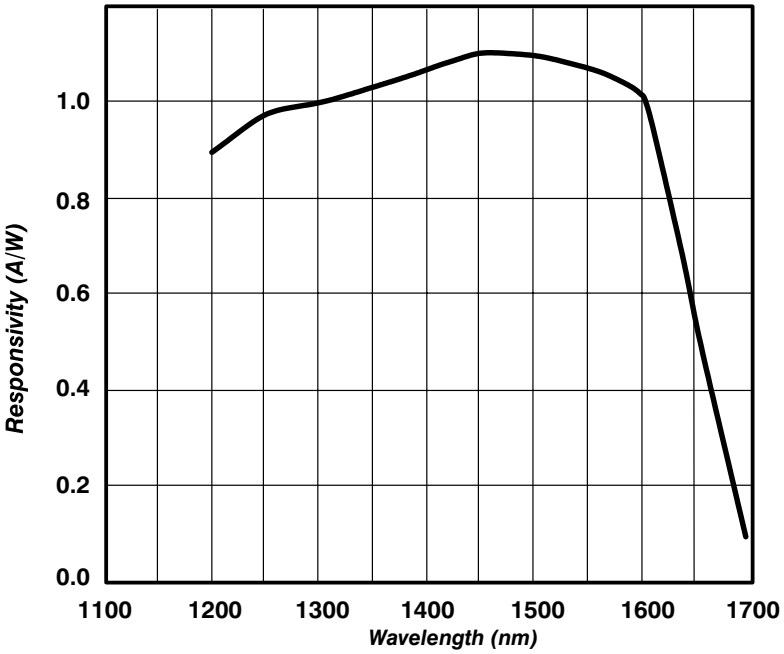


Figure B–4: SD-46 Responsivity vs. Wavelength Curve

Appendix C: Replaceable Parts

This section contains a list of the components that are replaceable for the SD-42/SD-46 Optical-to-Electrical Converter Heads. Use this list to identify and order replacement parts.

Parts Ordering Information

Replacement parts are available through your local Tektronix field office or representative.

Changes to Tektronix products are sometimes made to accommodate improved components as they become available and to give you the benefit of the latest improvements. Therefore, when ordering parts, it is important to include the following information in your order.

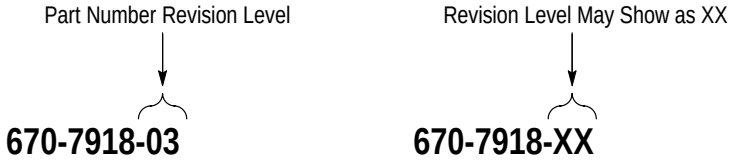
- Part number (see Part Number Revision Level below)
- Instrument type or model number
- Instrument serial number
- Instrument modification number, if applicable

If you order a part that has been replaced with a different or improved part, your local Tektronix 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.

Part Number Revision Level

Tektronix part numbers contain two digits that show the revision level of the part. For most parts in this manual, you will find the letters XX in place of the revision level number.



When you order parts, Tektronix will provide you with the most current part for your product type, serial number, and modification (if applicable). At the time of your order, Tektronix will determine the part number revision level needed for your product, based on the information you provide.

Module Servicing

Modules can be serviced by selecting one of the following three options. Contact your local Tektronix service center or representative for repair assistance.

Module Exchange. In some cases you may exchange your module for a remanufactured module. These modules cost significantly less than new modules and meet the same factory specifications. For more information about the module exchange program, call 1-800-TEK-WIDE, extension 6630.

Module Repair and Return. You may ship your module to us for repair, after which we will return it to you.

New Modules. You may purchase replacement modules in the same way as other replacement parts.

Using the Replaceable Parts List

This section contains a list of the mechanical and/or electrical components that are replaceable for the <instrument>. Use this list to identify and order replacement parts. The following table describes each column in the parts list.

Parts List Column Descriptions

Column	Column Name	Description
1	Figure & Index Number	Items in this section are referenced by figure and index numbers to the exploded view illustrations that follow.
2	Tektronix Part Number	Use this part number when ordering replacement parts from Tektronix.
3 and 4	Serial Number	Column three indicates the serial number at which the part was first effective. Column four indicates the serial number at which the part was discontinued. No entries indicates the part is good for all serial numbers.
5	Qty	This indicates the quantity of parts used.
6	Name & Description	An item name is separated from the description by a colon (:). Because of space limitations, an item name may sometimes appear as incomplete. Use the U.S. Federal Catalog handbook H6-1 for further item name identification.
7	Mfr. Code	This indicates the code of the actual manufacturer of the part.
8	Mfr. Part Number	This indicates the actual manufacturer's or vendor's part number.

Abbreviations

Abbreviations conform to American National Standard ANSI Y1.1–1972.

Mfr. Code to Manufacturer Cross Index

The table titled Manufacturers Cross Index shows codes, names, and addresses of manufacturers or vendors of components listed in the parts list.

Manufacturers Cross Index

Mfr. Code	Manufacturer	Address	City, State, Zip Code
TK0392	NORTHWEST FASTENER SALES INC	7923 SW CIRRUS DRIVE	BEAVERTON OR 97005–6448
TK0435	LEWIS SCREW CO	4300 S RACINE AVE	CHICAGO IL 60609–3320
TK1163	POLYCAST INC	9898 SW TIGARD ST	TIGARD OR 97223
00261	GENERAL ELECTRIC CO FOOD SERVICE EQUIPMENT BUSINESS DEPT	14TH AND ARNOLD STS	CHICAGO HEIGHTS IL 60411
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077–0001

Replaceable Parts List

Fig. & Index Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Qty	Name & Description	Mfr. Code	Mfr. Part Number
A-5-1	366–0673–00			1	KNOB:O.096 ID X 0.24 OD X 0.299H	TK1163	ORDER BY DESC
–2	211–0087–01			5	SCREW,MACHINE:2–56 X 0.188,FLH,82 DEG,STL	TK0435	ORDER BY DESC
–3	200–3658–00			1	COVER,CONNECTOR:FC,W/CHAIN	80009	200365800
–4	211–0405–00			1	SCREW,MACHINE:2–56 X 0.375,TRH,SST	TK0392	TO BE ASSIGNED
–5	210–1171–00			2	WASHER,SHLDR:0.12 ID X 0.143 OD X 0.07 D	00261	A7148516P2
					STANDARD ACCESSORIES		
	012–1286–00			1	CABLE,INTCON:1ML,2MM JACK TO BANANA,RED	80009	012128600
	012–1287–00			1	CABLE,INTCON:1ML,2MM JACK TO BANANA,BLK	80009	012128700
	174–1635–00			1	CABLE ASSY,RF:50 OHM COAX,80.0MM L	80009	174163500
	070–8671–00			1	MANUAL,TECH:USER,SD42/SD46	80009	070867100
					OPTIONAL ACCESSORIES		
	174–1385–00			1	CA ASSY,FBR OPT:SGL MODE,2M L (FC/PC TO DIAMOND 3.5)	80009	174138500
	174–1386–00			1	CA ASSY,FBR OPT:SINGLE MODE,2M L (FC/PC TO ST)	80009	174138600
	174–1387–00			1	CA ASSY,FBR OPT:SGL MODE,2M L (FC/PC TO FC/PC)	80009	174138700
	174–1388–00			1	CA ASSY,FBR OPT:SGL MODE,2M L (FC/PC TO BICONIC)	80009	174138800
	174–1497–00			1	CA ASSY,FBR OPT:SINGLE MODE,2M L (FC/PC TO DIAMOND 2.5)	80009	174149700

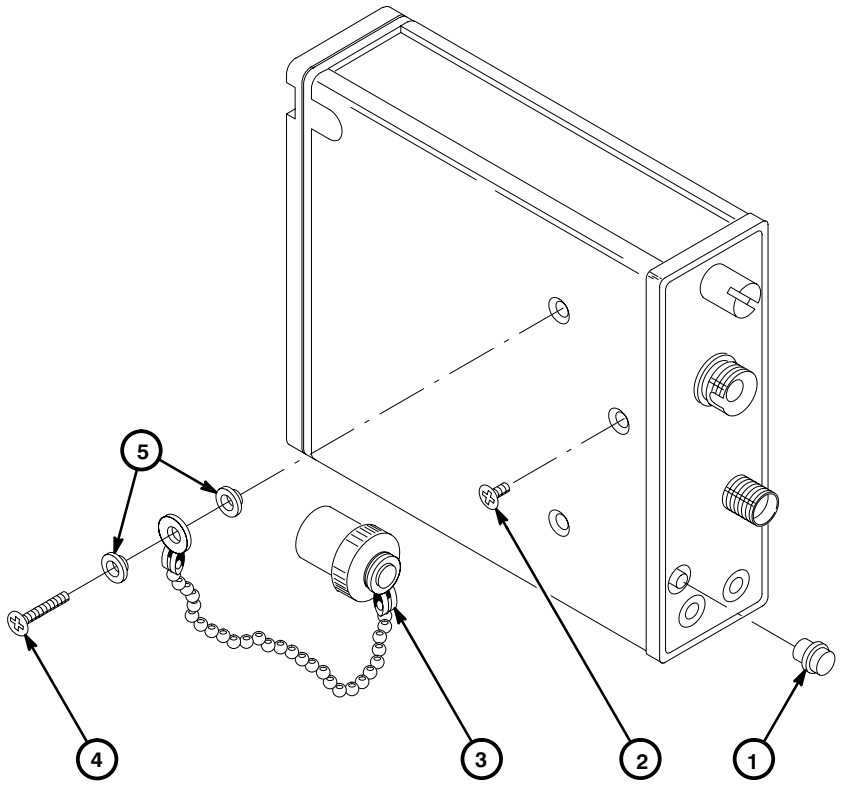


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