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.

**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
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
- \( \leq 55\ \text{ps} \) optical impulse response (FWHM) with the SD-24 and SD-26,
- \( \leq 60\ \text{ps} \) 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
- \( \leq 28.5\ \text{ps} \) 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

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.
Performance Check

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

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

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

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 the 1 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](image)

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.
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

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

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

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dynamic Range</td>
<td>5 nW to 5 mW</td>
</tr>
<tr>
<td>Linear Response Range</td>
<td>&lt;5 μW mean, &lt;25 mW peak</td>
</tr>
<tr>
<td>Range 1</td>
<td></td>
</tr>
<tr>
<td>Range 2</td>
<td>&lt;5 mW mean, &lt;25 mW peak</td>
</tr>
</tbody>
</table>
### Table B–2: SD-42 Optical-to-Electrical Converter Head Power Meter Characteristics (Cont.)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td></td>
</tr>
<tr>
<td>Range 1</td>
<td>1 V/mW</td>
</tr>
<tr>
<td>Range 2</td>
<td>1 V/μW</td>
</tr>
</tbody>
</table>

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

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

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

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

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

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dynamic Range</td>
<td>5 nW to 5 mW</td>
</tr>
<tr>
<td>Linear Response Range</td>
<td>&lt;5 μW mean, &lt;25 mW peak</td>
</tr>
<tr>
<td>Range 1</td>
<td></td>
</tr>
<tr>
<td>Range 2</td>
<td></td>
</tr>
<tr>
<td>Sensitivity</td>
<td>1 V/mW</td>
</tr>
<tr>
<td>Range 1</td>
<td></td>
</tr>
<tr>
<td>Range 2</td>
<td>1 V/μW</td>
</tr>
</tbody>
</table>
## Table B–6: SD-46 Optical-to-Electrical Converter Head Environmental and Mechanical Characteristics

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

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.

<table>
<thead>
<tr>
<th>Column</th>
<th>Column Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Figure &amp; Index Number</td>
<td>Items in this section are referenced by figure and index numbers to the exploded view illustrations that follow.</td>
</tr>
<tr>
<td>2</td>
<td>Tektronix Part Number</td>
<td>Use this part number when ordering replacement parts from Tektronix.</td>
</tr>
<tr>
<td>3 and 4</td>
<td>Serial Number</td>
<td>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.</td>
</tr>
<tr>
<td>5</td>
<td>Qty</td>
<td>This indicates the quantity of parts used.</td>
</tr>
<tr>
<td>6</td>
<td>Name &amp; Description</td>
<td>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.</td>
</tr>
<tr>
<td>7</td>
<td>Mfr. Code</td>
<td>This indicates the code of the actual manufacturer of the part.</td>
</tr>
<tr>
<td>8</td>
<td>Mfr. Part Number</td>
<td>This indicates the actual manufacturer’s or vendor’s part number.</td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>Mfr. Code</th>
<th>Manufacturer / Address</th>
<th>City, State, Zip Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>TK0392</td>
<td>NORTHWEST FASTENER SALES INC 7923 SW CIRRUS DRIVE</td>
<td>BEAVERTON OR 97005–6448</td>
</tr>
<tr>
<td>TK0435</td>
<td>LEWIS SCREW CO 4300 S RACINE AVE</td>
<td>CHICAGO IL 60609–3320</td>
</tr>
<tr>
<td>TK1163</td>
<td>POLYCAST INC 9888 SW TIGARD ST</td>
<td>TIGARD OR 97223</td>
</tr>
<tr>
<td>00261</td>
<td>GENERAL ELECTRIC CO FOOD SERVICE EQUIPMENT BUSINESS DEPT.</td>
<td>CHICAGO HEIGHTS IL 60411</td>
</tr>
<tr>
<td>80009</td>
<td>TEKTRONIX INC 14150 SW KARL BRAUN DR PO BOX 500</td>
<td>BEAVERTON OR 97077–0001</td>
</tr>
</tbody>
</table>

### Replaceable Parts List

<table>
<thead>
<tr>
<th>Fig. &amp; Index Number</th>
<th>Tektronix Part Number</th>
<th>Serial No. Effective</th>
<th>Serial No. Discont’d</th>
<th>Qty</th>
<th>Name &amp; Description</th>
<th>Mfr. Code</th>
<th>Mfr. Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-5-1</td>
<td>366–0673–00</td>
<td>1</td>
<td></td>
<td></td>
<td>KNOB:O.096 ID X 0.24 OD X 0.299H</td>
<td>TK1163</td>
<td>ORDER BY DESC</td>
</tr>
<tr>
<td>–2</td>
<td>211–0087–01</td>
<td>5</td>
<td></td>
<td></td>
<td>SCREW,MACHINE:2–56 X 0.188,FLH,82 DEG,STL</td>
<td>TK0435</td>
<td>ORDER BY DESC</td>
</tr>
<tr>
<td>–3</td>
<td>200–3658–00</td>
<td>1</td>
<td></td>
<td></td>
<td>COVER,CONNECTOR:FC,W/CHAIN</td>
<td>80009</td>
<td>200365800</td>
</tr>
<tr>
<td>–4</td>
<td>211–0405–00</td>
<td>1</td>
<td></td>
<td></td>
<td>SCREW,MACHINE:2–56 X 0.375,TRH,SST</td>
<td>TK0392</td>
<td>TO BE ASSIGNED</td>
</tr>
<tr>
<td>–5</td>
<td>210–1171–00</td>
<td>2</td>
<td></td>
<td></td>
<td>WASHER,SHLDR:0.12 ID X 0.143 OD X 0.07 D</td>
<td>00261</td>
<td>A7148516P2</td>
</tr>
</tbody>
</table>
Figure C–1: Replaceable Mechanical Parts
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  SD-42, B–3–B–4, B–7

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