INTRODUCTION

SCPDA OVERVIEW

The ScopeCal Procedure Development Aid 1 (SCPDA) is a software package designed for use in generating an oscilloscope calibration procedure using the Tektronix CG 551AP Programmable Calibration Generator and any Tektronix 4050 Series Graphic Computing System (controller). SCPDA is easy to use and allows you maximum flexibility to design calibration procedures to fit your oscilloscope calibration requirements. In this manual, the word calibration describes a procedure which checks oscilloscope accuracy, and does not necessarily include adjustments.

In generating a calibration procedure using SCPDA, you decide the following for each measurement step in your procedure:

● How the controller configures the CG 551AP output to the test oscilloscope. You set the CG 551AP front panel controls for the desired output and the controller "learns" the settings.
● How the operator sets the oscilloscope controls.
● What tolerances you want for the measurement of oscilloscope performance.

In addition, you may choose the data logging media to receive the test data.

The SCPDA uses the information you input to the controller to generate your calibration procedure on a blank tape cartridge. The procedure on this cartridge is then used, with a 4050 Series controller and the CG 551AP, to check the accuracy of the oscilloscope for which you've designed the procedure. Programming knowledge is not needed to generate a procedure using SCPDA; however, familiarity with oscilloscope calibration and CG 551AP front panel operation are recommended.

Checking oscilloscope accuracy using an SCPDA-generated procedure requires only minimal knowledge of oscilloscope operation. For each measurement step, the oscilloscope control settings and the instructions to the operator are shown on the controller display. The controller configures the CG 551AP output via the GPIB. For many measurement steps, oscilloscope performance is measured by the CG 551AP and the percent of deviation is sent to the controller. The controller compares the deviation with tolerance limits already stored in the procedure program. (The operator sets the percent deviation using the CG 551AP variable units/div control.) For measurements for which the CG 551AP does not return a percent deviation (band pass and rise time, for instance) the operator may input data to the controller. When all steps are completed, calibration results may be sent to the selected logging devices.

Equipment Required for Procedure Generation

For procedure generation, the following equipment is required:

Tektronix CG 551AP Programmable Calibration Generator (with GPIB address switch set to 15 and message terminator switch set to LF/EOI).

Tektronix TM 500 Series GPIB-compatible Power Module (with at least 3 compartments)

Tektronix 4050 Series Graphic Computing System (4051, 4052, or 4054 with a minimum of 32 K memory)

GPIB Cable (Tektronix Part No. 012-0630-01)

Fig. 1-1 illustrates procedure generation equipment configuration.
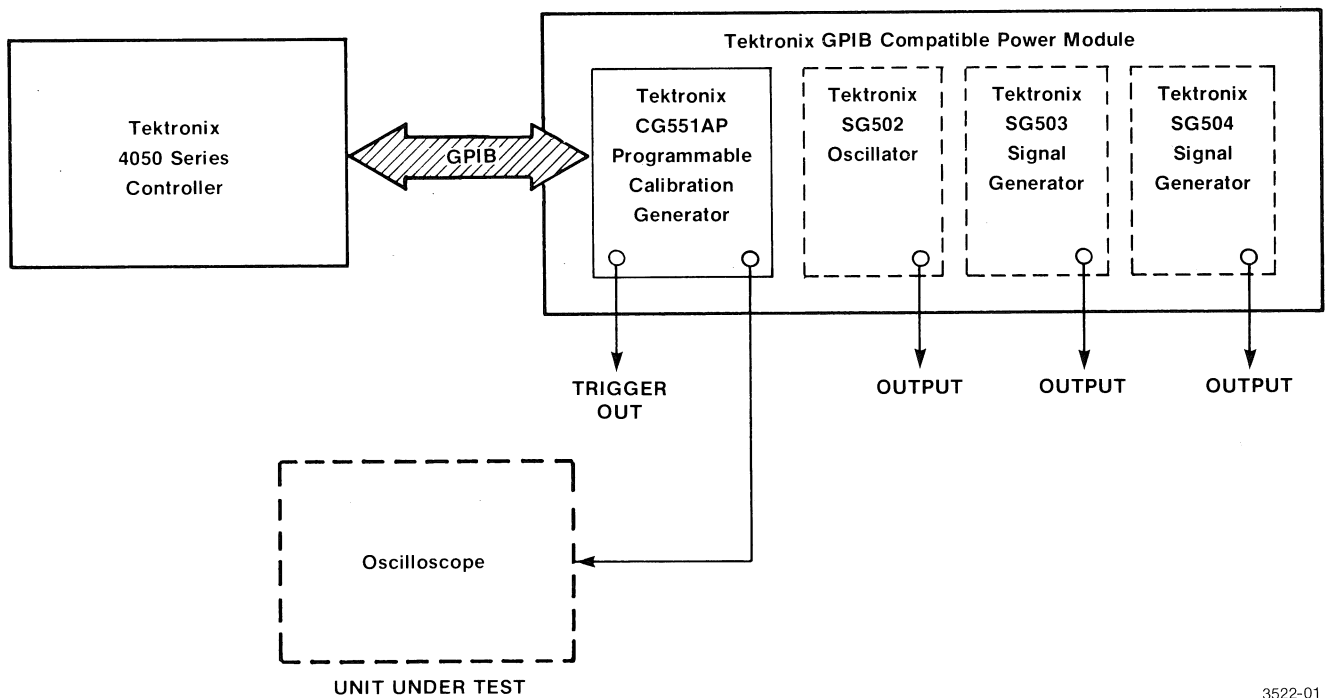
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Fig. 1-1. Equipment configuration for SCPDA procedure generation. Dashed outline indicates optional equipment.

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Optional Procedure Generation Equipment

CG 551AP Accessories:

Comparator Head

Remote Variable Head

Pulse Head

Oscilloscope and CG 551AP Output Cable Assembly

Signal Sources, such as the Tektronix SG 502, SG 503, SG 504

For procedure generation, you may add any nonprogrammable equipment as required in your procedure. Do not connect any programmable instruments to the GPIB during procedure generation. You can generate a procedure without the oscilloscope; however, it is recommended that you use the oscilloscope to verify that the CG 551AP front panel controls are correctly set for the desired output and that the oscilloscope control settings entered for each step are correct.

As SCPDA procedure can be designed to allow the operator to send calibration results to two logging devices. The logging devices are selected during procedure generation. One logging device from each of the following groups may be selected.

Human-readable logging devices:

1. Controller screen for hard copying or hand copying data.

2. Tektronix 4641 Matrix Printer (4050 Series option 10 required)

3. Tektronix 4642 Printer (4050 Series option 10 required)

Computer-readable devices:

1. Controller internal tape.

2. Tektronix 4924 Digital Cartridge Tape Drive

3. Tektronix 4907 File Manager

Appendix A contains additional information for logging calibration data to computer-readable devices and for retrieving logged data.

Equipment Required For Procedure Operation

Equipment configuration for operation of a previously generated SCPDA procedure is shown in Fig. 1-2. This configuration consists of the required and optional equipment used in procedure generation, the selected logging devices, and any additional programmable and nonprogrammable instruments necessary to perform oscilloscope calibration.

Up to 13 GPIB programmable instruments may be connected to the GPIB in addition to the CG 551AP; however, their functions can only be set via front panel controls. Only the CG 551AP and a GPIB compatible data logging medium can be programmed via the GPIB. The controller must know the addresses of any equipment connected to the bus in order to clear any SRQ's that might be asserted. Only SRQ's originated by the CG 551AP or the data logger will be serviced.
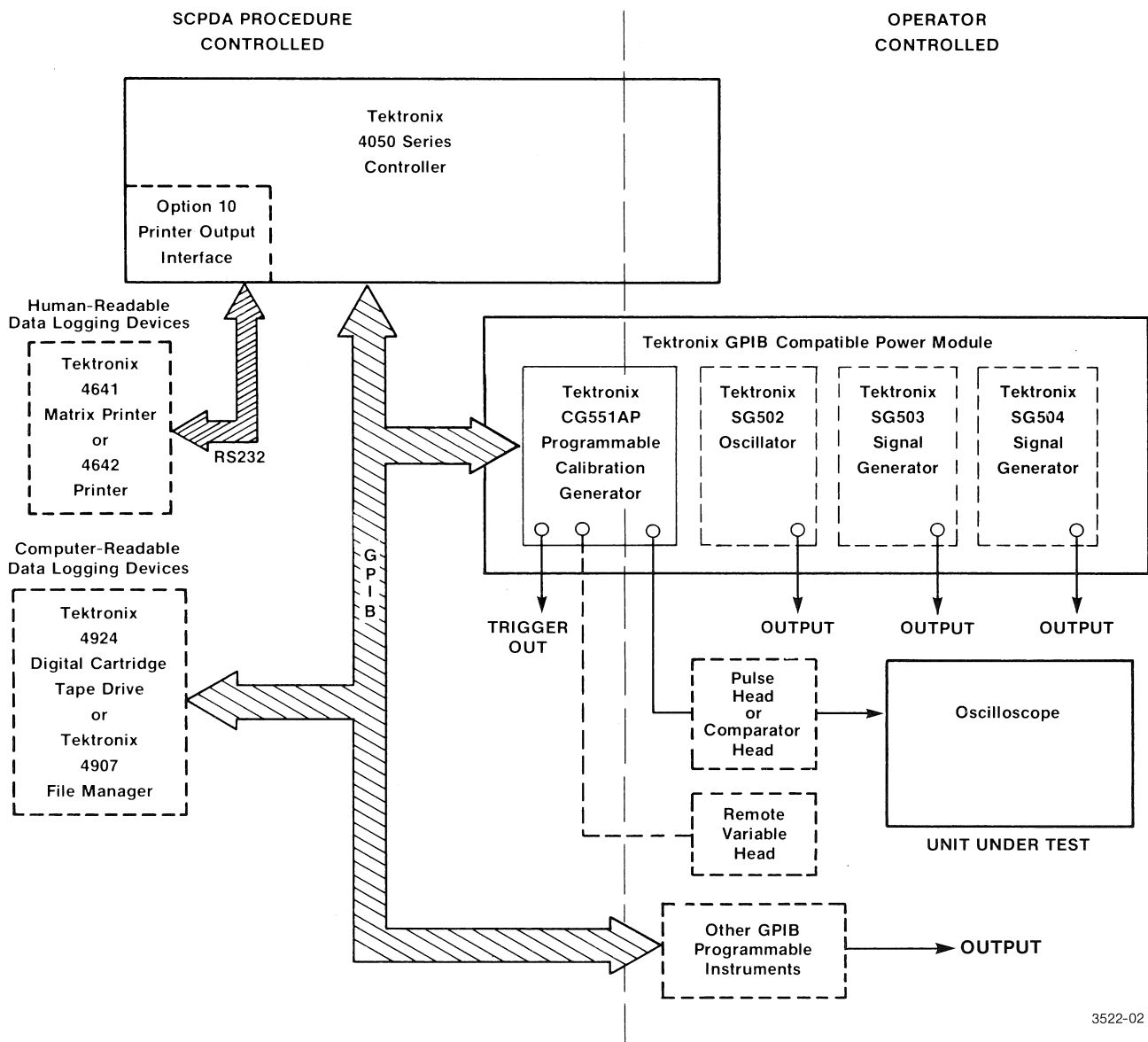
Fig. 1-2. Equipment configuration for oscilloscope calibration using an SCPDA-generated procedure. Dashed outline indicates optional equipment.

Overview of the SCPDA 1 Manual

The SCPDA manual is organized into five sections and two appendices, as follows:

Section 1 — Introduction - provides an overview of the purpose and implementation of SCPDA. Lists the required equipment and describes the use of the 4050 Series controller.

Section 2 — Procedure Generation - provides detailed information for generating a calibration procedure using SCPDA, the CG 551AP, and the 4050 Series controller. Also describes verifying the SCPDA generated calibration procedure.

Section 3 — Procedure Editing - describes the process of editing an SCPDA procedure.

Section 4 — Procedure Operation - guides an operator through the process of testing an oscilloscope using an SCPDA procedure.

Section 5 — Replaceable Parts List.

Appendix A — Data Logging Applications - contains information for using the data logging devices and for retrieving data stored on computer readable devices.

Appendix B — Logging & Compiling Forms - provides two forms for use in compiling procedure generation responses. Also contains forms for hand logging calibration data.

USING THE 4050 SERIES CONTROLLER

The 4050 Series Controller receives, stores, displays and transmits data. The controller accepts data from its keyboard, from magnetic tape cartridges, and from other instruments. It displays data on its screen and transmits data to another instrument or to magnetic tape.

There are three memories in the 4050 series controller. A permanent read only memory (ROM) contains the controller's intelligence; a large temporary random access memory (RAM) stores the data; a small temporary memory (Line Buffer) allows you to write information on the display screen and edit it before releasing the data to the RAM. Pressing the RETURN key transmits the displayed data to RAM.

The vertical rectangular opening on the front panel receives the magnetic tape cartridge and the direct view storage tube (screen) displays the data.

Installing the Tape Cartridge

Hold the tape cartridge between thumb and fingers of the right hand so that the metal side of the tape cartridge is resting against your fingers and the label end of the cartridge is toward the palm of your hand. Insert the cartridge about one inch into the tape slot on the right side of the controller screen. See Fig. 1-3. Push the cartridge into the slot slowly until the label end is flush with the front panel.

To remove the tape cartridge, press the EJECT button until the tape cartridge extends about one inch beyond the front panel and pull the cartridge out of the tape slot.

Fig. 1-3. Inserting the tape cartridge in the controller tape cartridge slot.