Part No. 070-6697-01
Product Group 47

11A34
Four Channel Amplifier

Functional Test

Please check for CHANGE INFORMATION at the rear of this manual.

Second Edition JAN 1989

Tektronix®
COMMITTED TO EXCELLENCE

INSTRUMENT SERIAL NUMBERS

Each instrument manufactured by Tektronix has a serial number on a panel insert, tag, or stamped on the chassis. The first letter in the serial number designates the country of manufacture. The last five digits of the serial number are assigned sequentially and are unique to each instrument. Those manufactured in the United States have six unique digits. The country of manufacture is identified as follows:

B010000	Tektronix, Inc. Beaverton, Oregon, USA
G100000	Tektronix Guernsey, Ltd., Channel Islands
E200000	Tektronix United Kingdom, Ltd., London
J300000	Sony/Tektronix, Japan
H700000	Tektronix Holland, NV, Heerenveen, The Netherlands

Instruments manufactured for Tektronix by external vendors outside the United States are assigned a two digit alpha code to identify the country of manufacture (e.g., JP for Japan, HK for Hong Kong, etc.).

Printed in U.S.A.

Operators Safety Summary

The following general safety information applies to all operators and service personnel.

Terms

In Manuals

CAUTION statements identify conditions or practices that could result in damage to the equipment or other property.

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

As Marked On Equipment

CAUTION indicates a personal injury hazard not immediately accessible as one reads the marking, or a hazard to property including the equipment itself.

DANGER indicates a personal injury hazard immediately accessible as one reads the marking.

Symbols

In Manuals

 Static Sensitive Devices.

As Marked on Equipment

 DANGER — High voltage.

 Protective ground (earth) terminal.

 ATTENTION — refer to manual.

Warnings

Grounding the Instrument

This product is grounded through the grounding conductor of the mainframe power cord. To avoid electric shock, plug the mainframe power cord into a properly wired receptacle, where earth ground has been verified by a qualified service person, before making connections to the input or output terminals of the instrument. A protective-ground connection, by way of the grounding conductor in the mainframe power cord, is essential for safe operation.

Danger Arising From Loss of Ground

Upon loss of the protective-ground connection, all accessible conductive parts (including knobs and controls that may appear to be insulating), can render an electric shock.

Use the Proper Fuse

To avoid fire hazard, use only the fuse specified in the parts list for your product, and which is identical in type, voltage rating, and current rating.

Do Not Operate In Explosive Atmospheres

To avoid explosion, do not operate the instrument in an atmosphere of explosive gasses.

Do Not Remove Covers or Panels

To avoid personal injury, do not remove the protective covers. Do not operate this instrument without the panels or covers properly installed.

11A34 Incoming Inspection Procedure

The 11000-series mainframes contain precise internal references-a stable dc source for vertical and trigger circuits and a crystal oscillator for timing circuits-which are used for the self-calibration necessary to enter the Enhanced Accuracy mode. Plug-in units use the mainframe internal references for their self-calibration so the mainframe used in this procedure must be a verified instrument. The following procedure verifies the functionality of a plug-in unit by comparing vertical and horizontal measurement results with external standards while in the Enhanced Accuracy mode.

WARNING

To avoid personal injury, do not remove the protective side panels
Operate this instrument only when the panels are properly installed.

Using This Procedure

The following procedure is provided for the operator and should be performed with all instrument covers properly installed. Service requiring removal of the protective covers is not included in these procedures.

Conventions

Initial capital letters within the body of text identify front-panel controls, indicators, and connectors on associated test equipment (e.g., Amplitude). Words containing all capital letters identify those same types of items on the instrument (e.g., TRIGGER). Words in **bold** identify labels or pop-up menus appearing on the mainframe display (e.g., **Vert Offset, Peak-Peak**). Steps beginning with ***CHECK*** accomplish an electrical specification check.

Initialized Setting

At the beginning of most steps, the user is instructed to Initialize the instrument as part of the setup. The Initialize feature, available through the UTILITY menu, presets all instrument controls and functions to known values. Initializing the instrument at the beginning of a step eliminates the possibility of settings from previous steps 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 instrument features are located in the mainframe User's Reference manual or in the User's Reference Supplement.

The appropriate mainframe tutorial manual is strongly recommended to familiarize the first-time user with instrument controls and features.

Procedure Parts

The procedure is divided into the following parts which should be performed sequentially.

Part 1 Power-Up and Diagnostics

Part 2 Preliminary Settings and Warmup

Part 3 Enhanced Accuracy

Part 4 Overload

Part 5 Input Resistance

Part 6 Vertical Accuracy

Part 7 Bandwidth Limit

Part 8 AC Coupling

Part 9 Bandwidth

Inspecting Plug-in Units and Mainframes as a System

Newly acquired plug-in units and mainframes can be inspected as a system to reduce the overall inspection time. For system inspection, skip Parts 1, 2, and 3 of this procedure since they are performed in the mainframe procedure. See the mainframe Functional Test for more information. The mainframe procedure will tell you when to perform the plug-in unit procedure.

Test Equipment

Table 1 contains suggested test equipment for use with the Functional Test. Procedure steps are based on the test equipment examples given, but other equipment with similar specifications may be substituted. Test results, setup information, and related connectors and adapters may be altered by the use of different equipment.

Table 1
Test Equipment

Description	Minimum Specification	Examples of Applicable Test Equipment
Oscilloscope Mainframe 11000 Series	11301, 11302, 11401,	11402
NOTE — *The Amplifier/Mainframe combination will determine system bandwidth.*		
Calibration Generator	Square wave output, 0.25% accuracy, 1-2-5 ampl selection from 200 μV p-p to 100 V p-p, ~1 ms period, fast rise < 1 ns	TEKTRONIX PG 506 Calibration Generator with a TM 500-Series Power Module
High Frequency Sine Wave Generator	250 MHz to 1000 MHz, variable amplitude, 6 MHz reference	TEKTRONIX SG 504 Leveled Sine Wave Generator with a TM 500-Series Power Module
Power Supply	20 V at 400 mA with overcurrent protection.	TEKTRONIX PS 503A with a TM 500 Series Power Module
Digital Multimeter	5-1/2 digit, 0.01% dc volts and 0.1 % resistance acc, 4-wire resistance measurement.	Fluke 8842A
T Adaptor	Two female, one male BNC connectors	Tektronix Part 103-0030-00
Adapter (2 required)	BNC female to dual banana	Tektronix Part 103-0090-00
Coaxial Cable (2 required)	50 Ω, 42 inch, two male BNC connectors	Tektronix Part 012-0057-01

Part 1 Power-Up and Diagnostics

CAUTION

To avoid instrument damage, set the mainframe ON/STANDBY switch to STANDBY before installing or removing plug-in units.

SETUP

a. Install the 11A34 Amplifier to be inspected in the mainframe's LEFT compartment, then set the front-panel ON/STANDBY switch to ON.

PROCEDURE

Each time the front-panel ON/STANDBY switch is set to ON, the instrument performs comprehensive Diagnostics on all of its major circuits.

CAUTION

Turning the instrument power off during the execution of Diagnostic tests may result in losing some or all of the ***Non-Volatile RAM*** *data (such as stored settings, calibration constants, etc.). This could affect normal instrument operation in unpredictable ways.*

Any disturbance of the mainframe or plug-in unit front-panel controls may cause a false Diagnostic test failure.

Diagnostics

As the Diagnostics progress, relays will click and the screen will, at times, display various patterns. Successful completion of Diagnostics is indicated by return to normal operation or entry into the New Configuration Calibration state, as discussed below. Any failures cause the instrument to either display the Diagnostics menu, which indicates the failed test, or lockup and light a combination of the major-menu button labels. If a Diagnostics failure occurs, refer the instrument to a qualified service person.

New Configuration Calibration

When a plug-in unit is first installed in a mainframe or when one is moved to a different compartment in the mainframe, the instrument will be in a new configuration state. After the instrument runs the Diagnostics, it will recalibrate itself for the new configuration. During this calibration, the message **Powerup new configuration partial calibration occurring** will appear on the display. If the calibration is successful, as indicated by a message, the instrument will enter the normal operating mode.

Completion

When the instrument completes the Diagnostics and the New Configuration Calibration without a failure, then is has passed this part of the procedure.

Part 2 Preliminary Settings and Warmup

SETUP

The instrument should have entered the normal operating mode without any Diagnostic or New-Configuration Calibration failures.

PROCEDURE

Initialize Settings

a. Press the UTILITY menu button.

b. Select the initialize function from the Utility menu.

When **Initialize** is invoked, the instrument presets all functions and controls to known states. For more information on Initialized settings, see Initialize Function in Section 2 of the mainframe User's Reference manual.

Warmup

For the first 20 minutes after power-up, the instrument is in either **Warmup** or **New Configuration since Full Calibration** mode, depending on whether or not a plug-in unit has been added or removed since its last **Enhanced Accuracy** operation. In either case, the instrument is fully usable but its accuracy is not specified.

Part 3 Enhanced Accuracy

SETUP

The instrument should be in the normal operating mode.

PROCEDURE

a. After the instrument has been running for at least 20 minutes, press the instrument ENHANCED ACCURACY button. The prompt, "**Press ENHANCED ACCURACY again to confirm request,**" will appear on the display. Press the ENHANCED ACCURACY button again.

CAUTION

Turning the instrument power off during self calibration may result in losing some of the ***Non-Volatile RAM*** *data. This could cause diagnostic errors at the next power-up and affect normal instrument operation in unpredictable ways.*

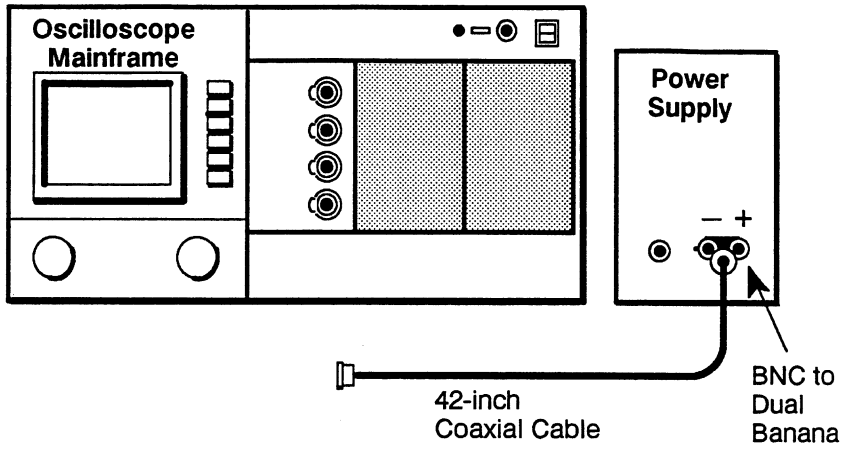
b. ***CHECK***—for a message indicating that the instrument began self-calibration.

c. ***CHECK***—for a message indicating successful self-calibration. The **EA** indicator will appear on the display when calibration is finished.

When displayed, the Enhanced Accuracy symbol (**EA**) indicates that the instrument is at its highest accuracy state. For more information about Enhanced Accuracy, see Enhanced Measurement Accuracy Indicator in Section 2 of the mainframe's User's Reference manual.

Part 4 Overload

SETUP



First Initialize the oscilloscope settings, then perform the following settings in the order listed:

11A34 Plug-In Unit:

Channel 1 display on/off ..... On

PS 503A Power Supply:

Volts ..... 20 V

Current Limit ..... 400 mA

6697-100

PROCEDURE

a. Set the input impedance to 50 Ω.

CAUTION

*In the following steps, **IMMEDIATELY** disconnect the cable at the input if the impedance does not change within 3 seconds.*

b. Connect the Power Supply to the CH 1 input.

c. ***CHECK***—that the input impedance goes to 1 MΩ (the current status is shown below the Impedance label).

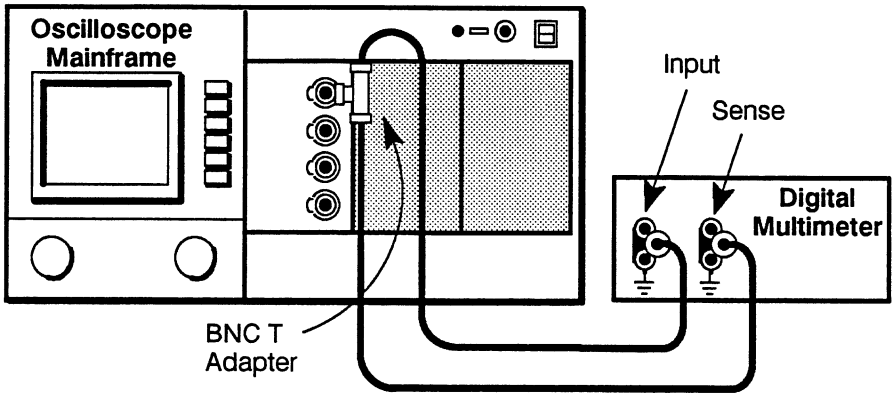
d. Disconnect the Power Supply at the input.

e. Set the Ch 2 display on/off to On.

f. Repeat steps a to e for all other input channels.

Part 5 Input Resistance

SETUP



First Initialize the oscilloscope settings, then perform the following settings in the order listed:

11A34 Plug-In Unit:

Channel 1 display on/off ..... On

Multimeter:

Resistance mode 4-Wire

6697-110

PROCEDURE

a. ***CHECK***—that the input resistance is 1 MΩ within ±5 kΩ.

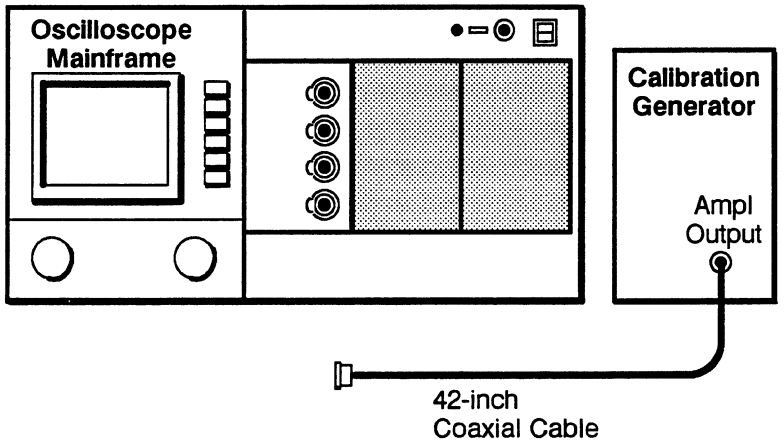
b. Set CH 1 **Impedance** to **50** Ω.

c. ***CHECK***—that input resistance is 50 Ω within ±0.5 Ω.

d. Repeat the Setup and steps a to c for the other input channels.

Part 6 Vertical Accuracy

SETUP



First Initialize the oscilloscope settings, then perform the following settings in the order listed.

11A34 Plug-In Unit:

Channel 1 display on/off ..... On

Calibration Generator:

Mode ..... Std Ampl

Amplitude Output ..... 5 V

Oscilloscope Mainframe:

Horizontal Size ..... 100 µs/division

Average N (if available) ..... **On**

6697-120

PROCEDURE

1. DC BALANCE CHECK

a. ***CHECK***—Set the Vertical Size to each position from 10 V through 5 mV and observe that the trace stays within ± 0.2 divisions of center. Then, set the Vertical Size to 2 and 1 mV and observe that the trace stays centered within ±1 division.

2. GAIN CHECK

b. Connect the Calibration Generator output to the CH 1 input.

c. Set the Vertical Size to 1 V/div.

d. Set the Vertical Offset to +2.5 V.

e. Select the **Peak-Peak** measurement, if available, or the vertical amplitude **Cursors** and measure the peak-peak amplitude of the waveform.

f. ***CHECK***—that the measurement is 5 V, plus or minus

90 mV for the 11301/11302, or
57 mV for the 11401/11402.

3. DC OFFSET CHECK

g. Set the Vertical offset to 5 V.

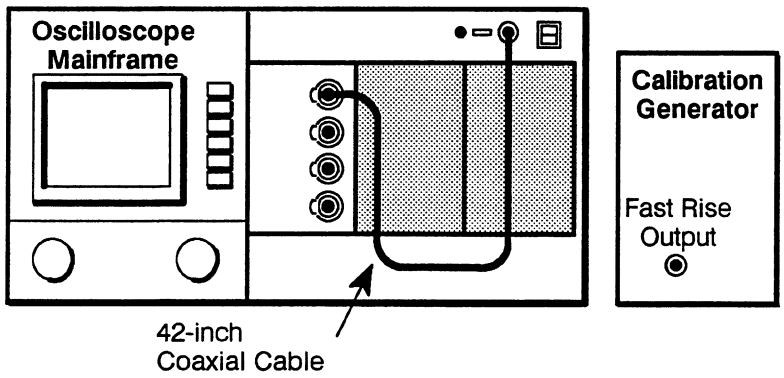
h. Set the Vertical Size to 100 mV.

i. ***CHECK***—that the top of the waveform is vertically centered within ±0.5 divisions.

j. Repeat the Setup and steps a through i for each channel.

Part 7 Bandwidth Limit

SETUP



First Initialize the oscilloscope settings, then perform the following settings in the order listed:

11A34 Plug-In Unit:

Channel 1 display on/off ..... On

Calibration Generator:

Period ..... 1 µs

Mode ..... Fast Rise

Oscilloscope Mainframe:

Horizontal Size ..... 5 ns/div

Horizontal Position ..... -25.5 ns

6697-130

PROCEDURE

a. On 11400 mainframes only, calibrate all input channels by connecting each channel to the CALIBRATOR with the coaxial cable and selecting the **Probes** function in the Utility major menu.

b. Connect the Calibration Generator Fast Rise output (rising edge) to CH 1 with the 42" coaxial cable.

c. Set the Input Impedance to 50 Ω.

d. Set the Vertical Size to 200 mV/div.

e. Set the Vertical Offset to -500 mV.

f. Set the Calibration Generator Amplitude to 1 V.

g. Select 100 MHz bandwidth limit.

h. Select the **Rise Time** measurement, if available.

i. ***CHECK***—that the rise time is between 2.45 and 4.55 ns.

j. Set the bandwidth limit to 20 MHz.

k. ***CHECK***—that the rise time is between 12.3 and 22.7 ns.

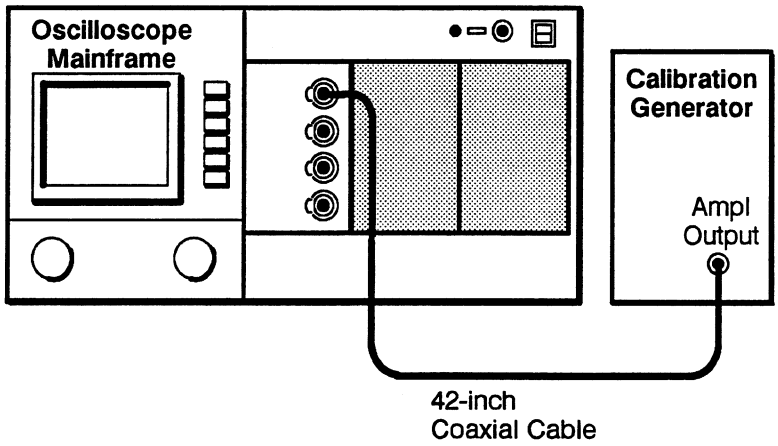
l. Set the current input channel display to Off.

m. Set the next channel's display on/off to On.

n. Repeat steps b to m for all channels.

Part 8 AC Coupling

SETUP



First Initialize the oscilloscope settings, then perform the following settings in the order listed:

11A34 Plug-In Unit:

Channel 1 display on/off ..... On

Calibration Generator:

Mode ..... Std Ampl

Amplitude ..... 5 V

Oscilloscope Mainframe:

Input Impedance ..... **50** Ω

Vertical Size ..... 500 mV/division

Horizontal Size ..... 100 µs/division

6697-140

PROCEDURE

a. ***CHECK***—that the bottom of the square wave is near the center graticule line.

b. Select AC Coupling for the CH 1 input.

c. ***CHECK***—that the waveform is about centered on the screen (duty cycle will cause some variation).

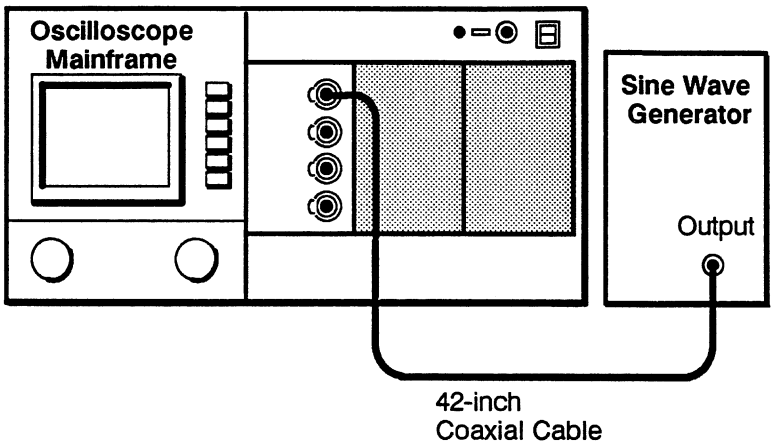
d. Set the CH 1 display on/off to Off.

e. Move coaxial cable to the CH 2 input and set its display on/off to On.

f. Repeat the Setup and steps a to e for each remaining channel.

Part 9 Bandwidth

SETUP



First Initialize the oscilloscope settings, then perform the following settings in the order listed:

11A34 Plug-In Unit:

Channel 1 display on/off ..... On

Sine Wave Generator:

Frequency ..... Ref (6 MHz)

Oscilloscope Mainframe:

Input Impedance ..... **50 Ω**

Vertical Size ..... 200 mV/division

Horizontal Size ..... 100 ns/division

6697-150

PROCEDURE

a. Select the Peak-Peak measurement, if available, or the Cursors to measure the peak-peak amplitude of the waveform.

b. Adjust the generator for 1.2 V peak-peak.

c. Set the Sine Wave Generator Frequency control to the maximum bandwidth frequency specified for the mainframe-plug-in combination. This limit is displayed as **HF Limit** (VERTICAL SIZE button) on the 11301/11302 or as **BW Limit** (WAVEFORM button) on the 11401/11402.

d. Adjust the Horizontal Size to display several cycles of the waveform.

e. ***CHECK***—that the measurement is at least 848 mV (70.7% of step b).

f. Set the CH 1 display on/off button to Off.

g. Move the coaxial cable to the CH 2 input and set its display on/off to On.

h. Perform the Setup and steps a to g for the remaining channels.