

11A71 Amplifier

Incoming Inspection Procedure

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

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INSTRUMENT SERIAL NUMBERS

Each instrument has a serial number on a panel insert, tag, or stamped on the chassis. The first number or letter 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:

| | |
|---------|--|
| B000000 | Tektronix, Inc. Beaverton, Oregon, USA |
| 1000000 | Tektronix Guernsey, Ltd., Channel Islands |
| 2000000 | Tektronix United Kingdom, Ltd., London |
| 3000000 | Sony/Tektronix, Japan |
| 7000000 | Tektronix Holland, NV, Heerenveen, The Netherlands |

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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.

11A71 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 AC Coupling
- Part 8 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 Incoming Inspection Procedure 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 Incoming Inspection Procedure. 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 |
| <i>NOTE – The Amplifier/Mainframe combination will determine system bandwidth.</i> | | |
| Calibration Generator | Square wave output, 0.25% accuracy, 1-2-5 ampl selection from 200 μ V p-p to 100 V p-p, \sim 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- $\frac{1}{2}$ 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 11A71 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 instruments 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 it 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.



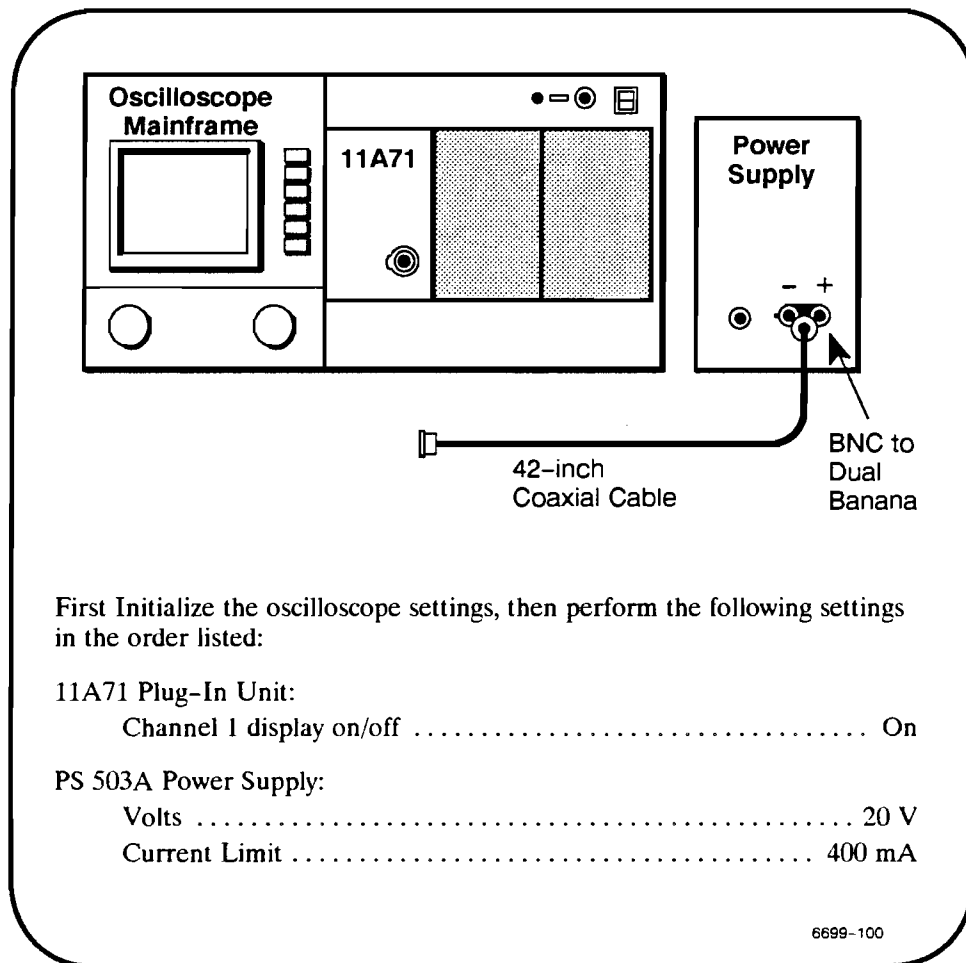
Turning the instrument power off during self calibration may result in losing some of the Non-Volatile RAM data. This could cause diagnostic errors at the next power-up and affect normal instrument operation in unpredictable ways.

- 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.

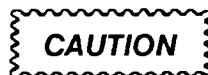
When displayed, the Enhanced Accuracy symbol (**EA**) indicates that the instrument is at its highest accuracy state. For more information about Enhanced Accuracy, see Enhanced Measurement Accuracy Indicator in Section 2 of the mainframe’s User’s Reference manual.

Part 4 Overload

SETUP



PROCEDURE

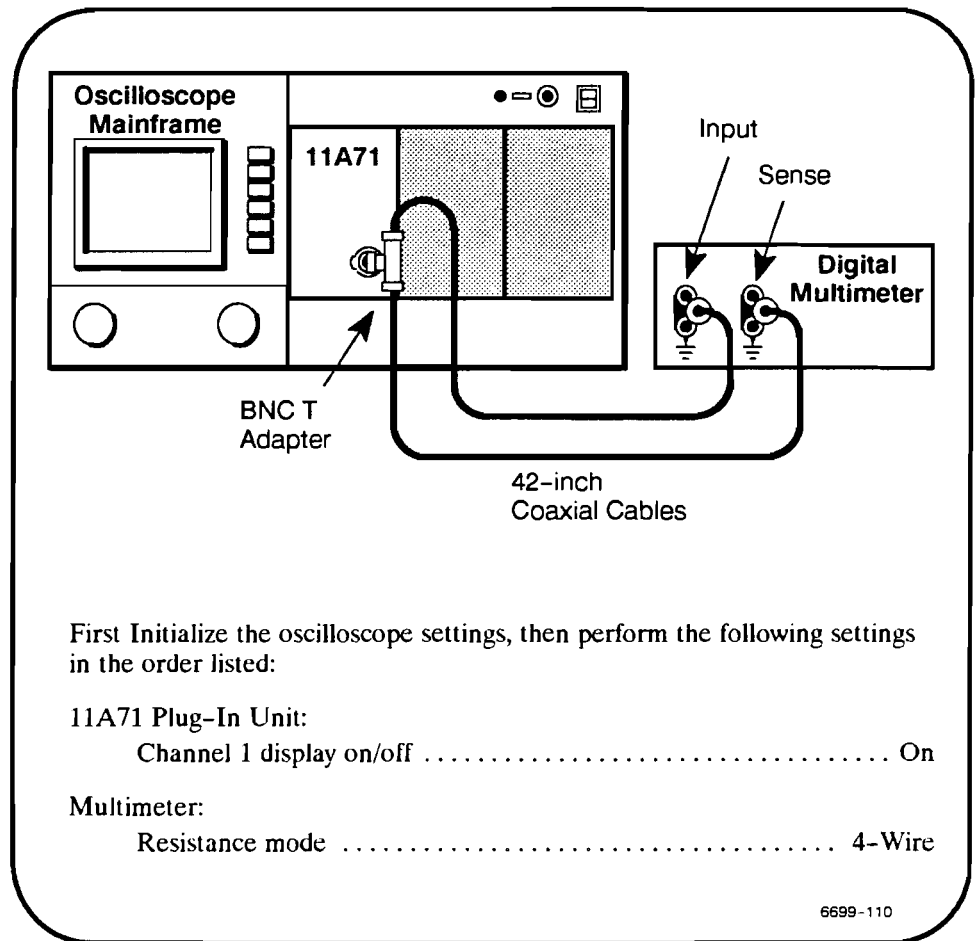


*In the following steps, **IMMEDIATELY** disconnect the cable at the input if the impedance does not change within 3 seconds.*

- Connect the Power Supply to input CH 1.
- CHECK**—that Coupling changes to OFF.
- Disconnect the Power Supply at the input.
- Set the Coupling back to DC.

Part 5 Input Resistance

SETUP

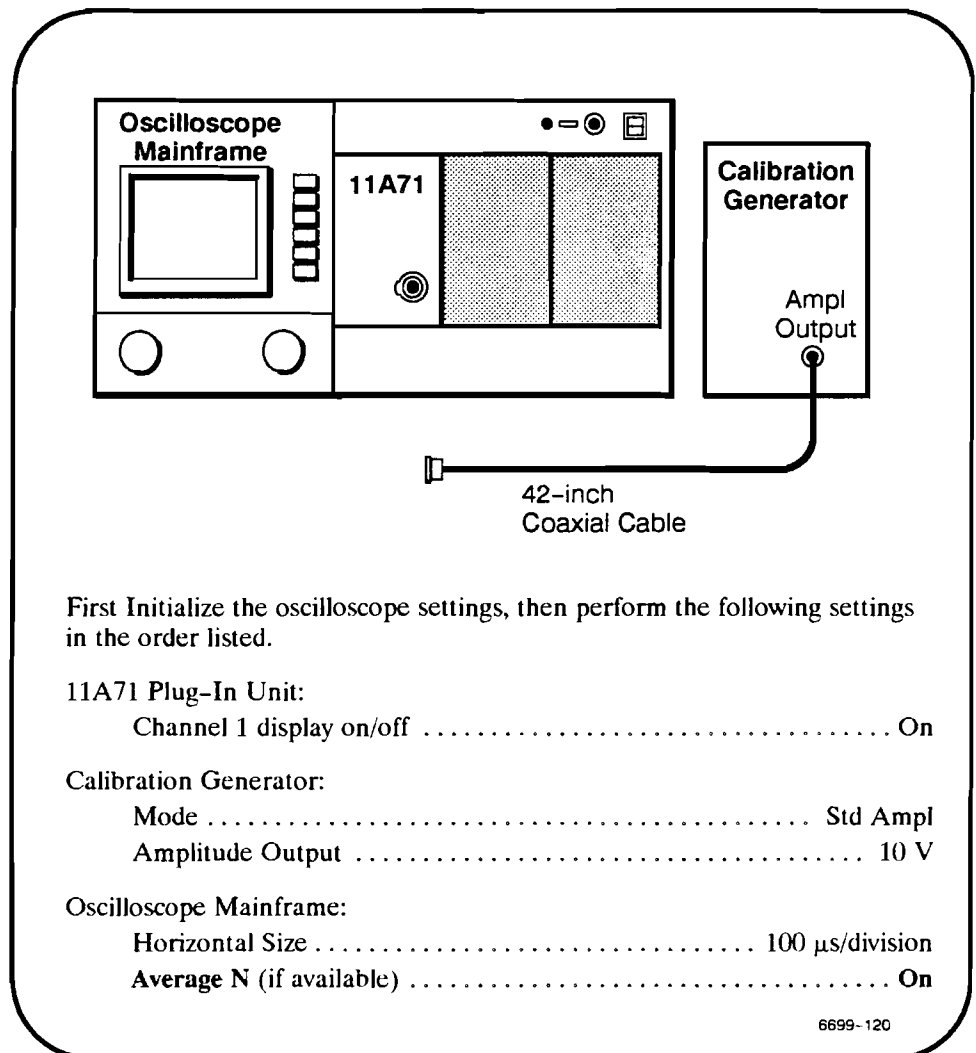


PROCEDURE

- a. **CHECK**— that the input resistance is $50\ \Omega$ within $\pm 0.5\ \Omega$.

Part 6 Vertical Accuracy

SETUP



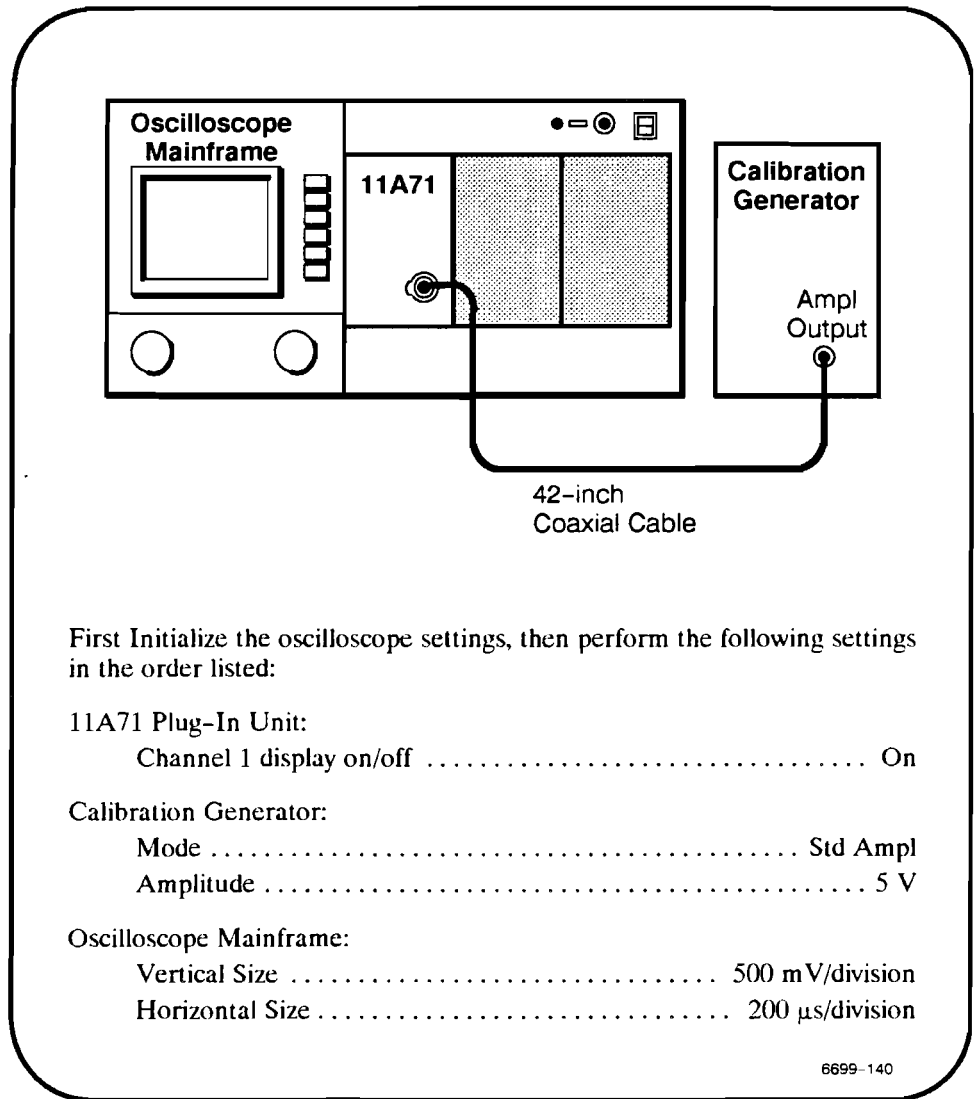
PROCEDURE

1. DC BALANCE CHECK
 - a. **CHECK**—Set Vertical Size to each position from 1 V to 10 mV and observe that the trace does not shift more than 0.2 div.
2. GAIN CHECK
 - b. Connect the Calibration Generator to the CH 1 input connector.
 - c. Set the Vertical Size to 1 V/div. (Note that the PG506 outputs 10 V but only 5 V p-p are seen at the 11A52 input due to loading by the 50 Ω input impedance.)
 - 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
 - 95 mV for the 11301/11302, or
 - 65 mV for the 11401/11402.

Part 7 AC Coupling

SETUP



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

11A71 Plug-In Unit:

Channel 1 display on/off On

Calibration Generator:

Mode Std Ampl

Amplitude 5 V

Oscilloscope Mainframe:

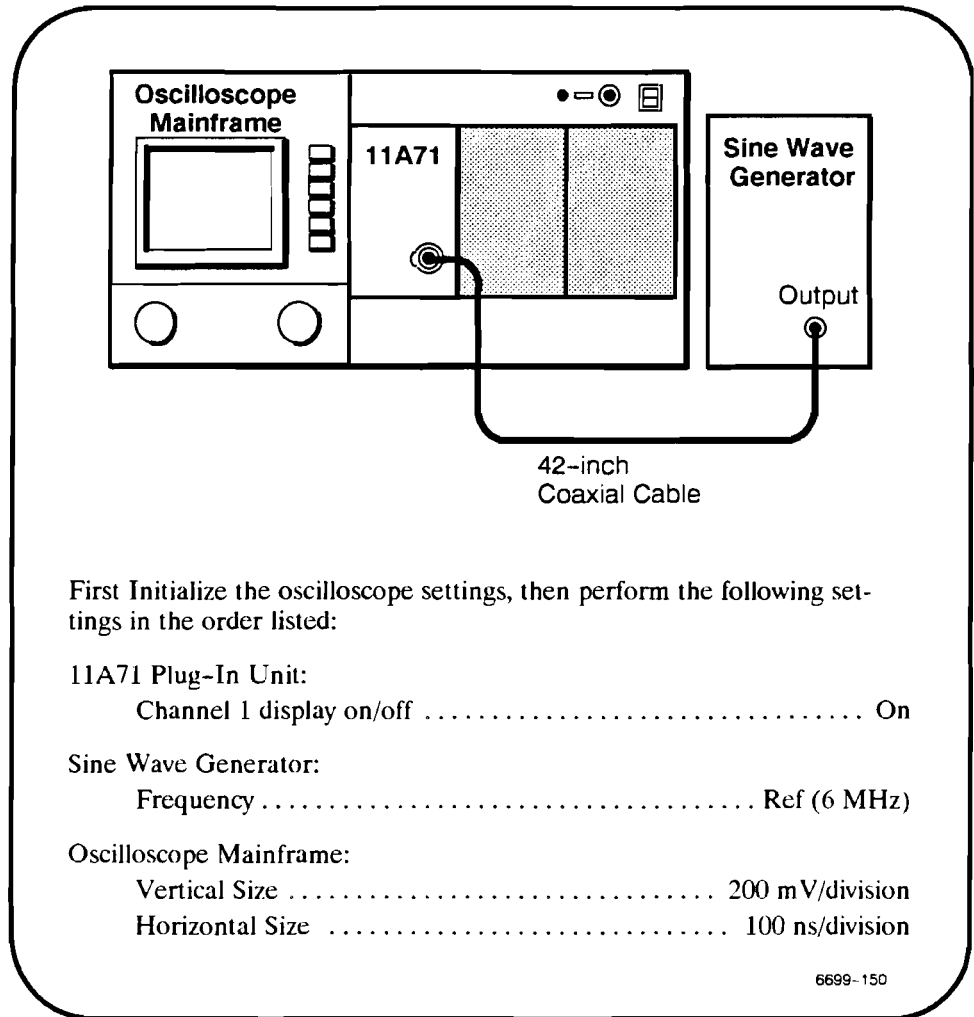
Vertical Size 500 mV/division

Horizontal Size 200 μ s/division

6699-140

Part 8 Bandwidth

SETUP



PROCEDURE

- Select the **Peak-Peak** measurement, if available, or the Cursors to measure the amplitude of the waveform.
- Adjust the generator for 1.2 V peak-peak.
- 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.
- Adjust the Horizontal Size to display several cycles of the waveform.
- CHECK** – that the peak-peak amplitude is at least 848 mV (70.7% of step b).

MANUAL CHANGE INFORMATION

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A single change may affect several sections. Since the change information sheets are carried in the manual until all changes are permanently entered, some duplication may occur. If no such change pages appear following this page, your manual is correct as printed.