TEKTRONIX®

7A13
DIFFERENTIAL COMPARATOR

SN B200000-up

INSTRUCTION MANUAL

Tektronix, Inc.
P.O. Box 500
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Serial Number ____________________

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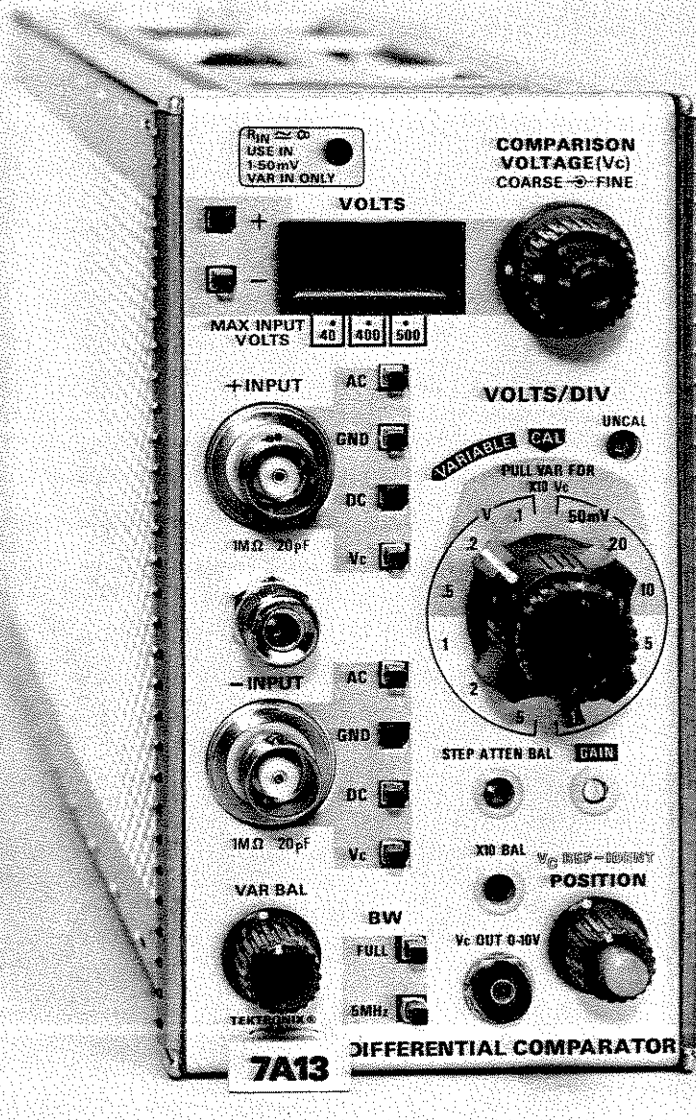

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Fig. 1-1. 7A13 Differential Comparator.

SPECIFICATION

Introduction

The 7A13 Vertical Plug-In is a DC coupled differential comparator with excellent common-mode rejection and medium gain characteristics for medium level applications. The 7A13 is designed for use in Tektronix 7000 series oscilloscopes. It may be used as a differential input preamplifier or conventional preamplifier in addition to its use as a comparator.

In the differential input mode, the dynamic range allows the application of common-mode signals up to +10 or −10 volts to be applied to the unit without attenuation. Common-mode rejection ratio of at least 20,000:1 at DC to 100 kHz permits measurements of differential signals less than 1 mV in amplitude on 10 volt common-mode signals.

When used as a differential comparator, the 7A13 has an effective offset range of 10,000 divisions.

Electrical Characteristics

The electrical characteristics described in Table 1-1 are valid over the stated environmental range of instruments calibrated at an ambient temperature of +20° C to +30° C and after a 20-minute warmup period unless otherwise noted.

TABLE 1-1

ELECTRICAL CHARACTERISTICS

Characteristic	Performance Requirement
Deflection Factor (VOLTS/DIV) Calibrated Range	1 mV/Div to 5 V/Div, 12 steps in a 1, 2, 5 sequence
Gain Ratio Accuracy	Within 1.5% of GAIN adjusted at 1 mV/Div
Uncalibrated (Variable)	Continuously variable: extends deflection factor to at least 12.5 V/Div

TABLE 1-1 (cont)

Characteristic	Performance Requirement
Common Mode Signal Range 1 mV/Div to 50 mV/Div;	At least +10 V and −10 V
$X10\ V_C$ In 10 mV/Div to 50 mV/Div; $X10\ V_C$ Out	At least +100 V and −100 V
0.1 V/Div to 0.5 V/Div; $X10\ V_C$ In	
0.1 V/Div to 0.5 V/Div; $X10\ V_C$ Out	At least +500 V and −500 V
1 V/Div to 5 V/Div $X10\ V_C$ In	At least +500 V and −500 V
Frequency Response (8 Div Reference) FULL Bandwidth Upper Limit	See Table 1-4, System Characteristics
AC (Capacitive) Coupled Input Lower Bandwidth Frequency	10 Hz or less
5 MHz Bandwidth	DC to 5 MHz within 500 kHz
Overdrive Recovery (1X Attenuator at 1 mV/Div)	Recovers to within 2 mV in 1 μs (and 1 mV in 0.1 ms) after a pulse of +10 V or −10 V, or less, regardless of pulse duration.

TABLE 1-1 (cont)

Characteristic	Performance Requirement
Common Mode Rejection Ratio 1 mV/Div to 50 mV/Div X10 V_c In DC to 100 kHz	See Fig. 1-2. At least 20,000:1, 20 V P-P or less test signal
100 kHz to 1 MHz	At least 10,000:1, 10 V P-P or less test signal
1 MHz to 20 MHz	Decreases to 500:1 at 10 MHz with 1 V P-P, then 200:1 at 20 MHz at 1 V P-P. See Fig. 1-2.
10 mV/Div to 50 mV/Div; X10 V_c Out;	
0.1 V/Div to 5 V/Div; X10 V_c In or Out	
DC to 10 kHz	At least 2,000:1
AC Coupled at 60 Hz	At least 500:1
Maximum Input Voltage DC (Direct) Coupled DC + Peak AC 1 mV/Div to 50 mV/Div; X10 V_c In	40 VDC, 40 V Peak AC, 1 kHz or less
10 mV/Div to 50 mV/Div; X10 V_c Out	400 VDC, 400 V Peak AC, 1 kHz or less
0.1 V/Div to 0.5 V/Div; X10 V_c In	
0.1 V/Div to 0.5 V/Div; X10 V_c Out	500 VDC. 500 V Peak AC, 1 kHz or less
1 V/Div to 5 V/Div; X10 V_c In	
AC (Capacitive Coupled Input	500 VDC

TABLE 1-1 (cont)

Characteristic	Performance Requirement
Input R and C Resistance	1 MΩ ±0.15%
Capacitance	Approximately 20.0 pF
R and C Product	Within ±1% between all deflection factors.
Maximum Gate Current 0°C to +35°C Both Inputs	0.2 nA or less (0.2 Div at 1 mV/Div)
+35°C to +50°C Both Inputs	2 nA or less (2 Div at 1 mV/Div)
DC Drift Drift With Time (Ambient Temperature and Line Voltage Constant)	
Short Term	1 mV P-P or less or 0.1 Div or less (whichever is greater) any 1 minute interval within 1 hour after 20 minutes from turn-on.
Long Term	1 mV P-P or less or 0.1 Div (whichever is greater) during any hour after the first hour and 20 minutes from turn-on.
Drift With Ambient Temperature Line Voltage Constant)	2 mV/10°C or less, 0.2 Div/10°C or less (whichever is greater)
Amplifier Crosstalk	1% or less shift within 20 ns of step of fast rise squarewave when switching undriven input from GND to AC or DC
Displayed Noise Tangentially Measured)	400 µV or less at 1 mV/Div in Type 7700-Series indicator oscilloscope
Comparison Voltage Range	0 V to ±10 V
Accuracy	± (0.1% of setting +3 mV)
Electrical Zero	0.5 mV or less
V_c OUT Resistance	2 kΩ to 5.5 kΩ

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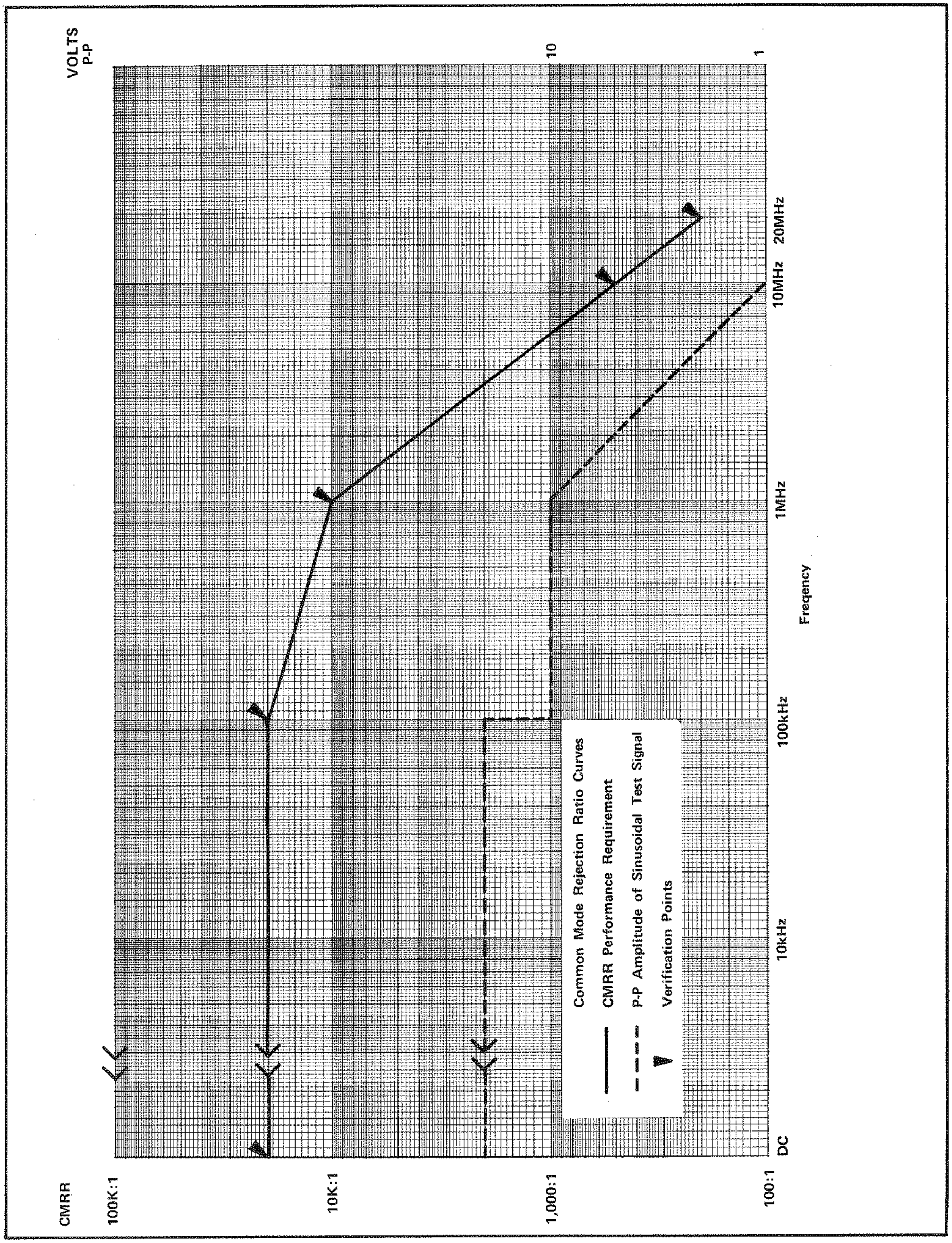


Fig. 1-2. Common mode rejection ratio graph. It pertains to 1 mV/Div through 20 mV/Div deflection factors.

TABLE 1-2

7A13 tested alone (separate from oscilloscope mainframe)

ENVIRONMENTAL CHARACTERISTICS

Characteristic	Performance Requirements
Temperature Operating	0°C to +50°C
Storage	−55°C to +75°C
Altitude Operating	15,000 feet
Storage	50,000 feet
Transportation	Qualified under National Safe Transit Committee test procedure 1A, Category II.

TABLE 1-3

PHYSICAL CHARACTERISTICS

Size	Fits all 7000-Series plug-in compartments.
Weight	3.1 Pounds (1.4 kilograms).

System Characteristics

The system characteristics listed in Table 1-4 specify the performance of the plug-in with various combinations of probes and in various indicator oscilloscopes.

TABLE 1-4

SYSTEM CHARACTERISTICS

(Indicator Oscilloscope: 7500-Series with P6053B Probe.)

		[1]Accuracy (%)			Sig Out	
BW (MHz)	T_r (ns)	[2]EXT CAL	[3]INT CAL	[4]INT CAL	BW (MHz)	T_r (ns)
75	4.7	1.5	2.5	3.5	55	6.4
75	4.7	1.5	2.5	3.5	55	6.4

(Indicator Oscilloscope: 7700-Series with P6053B Probe.)

100	3.5	1.5	2.5	3.5	55	6.4
100	3.5	1.5	2.5	3.5	55	6.4

[1]Accuracy percentages apply to all deflection factors. Plug-in GAIN must be set at the deflection factor designated at the applicable position of the VOLTS/DIV switch. When a probe is used, the GAIN must be set with the calibration signal applied to the probe tip.

[2]EXTernal CALibrator, 0°C to +50°C: The plug-in GAIN is set (within 10°C of the operating temperature) using an external calibrator signal whose accuracy is within 0.25%.

[3]INTernal CALibrator, +15°C to +35°C: The plug-in GAIN is set using the oscilloscope's own calibrator and the instrument is operating within the +15°C to +35°C range.

[4]INTernal CALibrator, 0°C to +50°C: The plug-in GAIN is set (within 10°C of the operating temperature) using the oscilloscope's own calibrator, and the instrument is operating within the 0°C to +50°C range.

OPERATING INSTRUCTIONS

INTRODUCTION

This section opens with a brief functional description of the front panel controls and connectors (see Fig. 2-1). Following the front-panel description is a familiarization procedure and finally a general discussion of the operation of the 7A13.

FRONT-PANEL DESCRIPTION

$R_{in} \approx \infty$ 1-50 mV VAR IN ONLY Lamp — Illuminates when switch S10, located on left side of plug-in, is turned cw. This indicates a + INPUT and − INPUT impedance of approximately infinity whenever the VOLTS/DIV switch is set between 1 and 50 mV, VARIABLE knob is pushed in and 1X probe is used.

NOTE

With VOLTS/DIV switch set from .1 V to 5 V, lamp remains on but input impedance is ≈1 MΩ and the input attenuator is uncompensated.

COMPARISON VOLTAGE (V_C)

+ and − Pushbuttons — Selects polarity of comparison voltage.

VOLTS DISPLAY — Reads out the equivalent voltage selected by the COMPARISON VOLTAGE (V_C) COARSE, FINE, VOLTS/DIV, and PULL VAR for X10 V_C controls.

COARSE Control — Varies the V_C voltage from zero to ten volts.

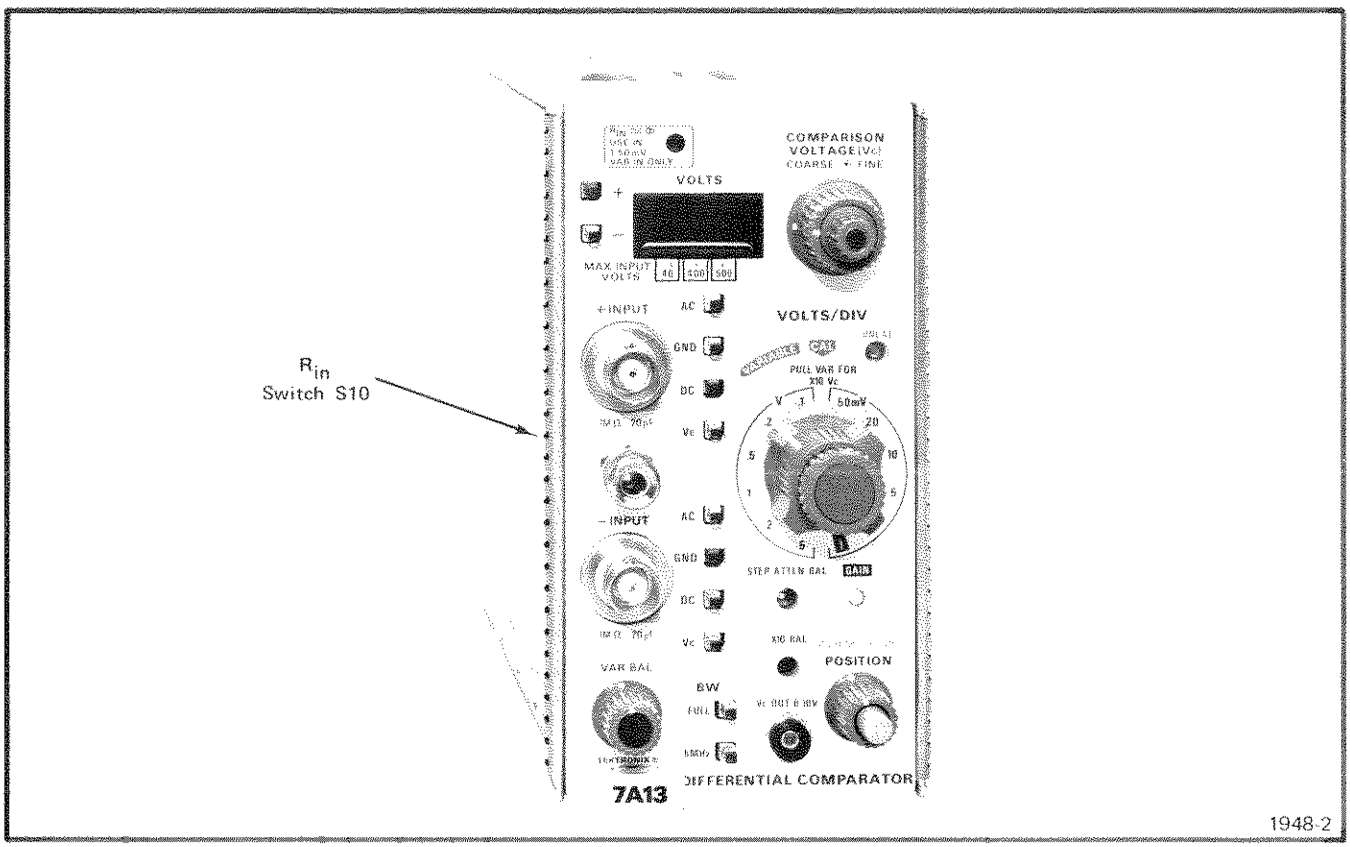


Fig. 2-1. Front panel of 7A13 and location of R_{in} switch S10.

FINE Control	Provides more precise control of the V_c voltage.
+ INPUT Connector	Provides a means of connection for signal measurement. It also contains a third contact for probe attenuation information. This enables proper deflection factor display on the CRT screen, and proper volts display on 7A13.
+ INPUT Mode Switch	Selects AC, DC, GND or V_c Mode of coupling for the − INPUT channel.
VOLTS/DIV Switch	Selects one of twelve volts per division calibrated deflection factors.
VOLTS/DIV VARIABLE CONTROL	Selects an uncalibrated deflection factor somewhere between the twelve settings. A minium of 2.5 times the VOLTS/DIV switch setting is provided. The UNCAL lamp lights when the VARIABLE control is out of the CAL detent.
PULL VAR FOR X10 V_c Switch	Extends the deflection factor of the VOLTS/DIV Switch. This occurs only for 10, 20, and 50 mV/DIV and .1, .2, and .5 V/DIV settings of the VOLTS/DIV switch.
− INPUT Connector	Same as for + INPUT connector.
INPUT Mode Switch	Selects AC, DC, GND or V_c Mode of coupling for the − INPUT channel.
STEP ATTEN BAL Adjustment	Adjusts for no vertical trace movement as the VOLTS/DIV switch setting is varied from 10 to 50 mV/DIV.
GAIN Adjustment	Adjusts the amplifier gain for display of four divisions upon receipt of a 4 mV signal when the VOLTS/DIV switch is set to 1 mV and the VARIABLE control is set to CAL.

X10 BAL Adjustment	Adjusts for no vertical trace movement as VARIABLE (VOLTS/DIV) knob is pulled out.
VAR BAL Control	Adjusts for no vertical trace movement as VARIABLE (VOLTS/DIV) knob is varied throughout its range.
Release Latch	Pull to withdraw plug-in from indicator oscilloscope.
BW Switch	Selects either the FULL bandwidth or 5 MHz.
V_c OUT 0-10 V Jack	Provides a convenience outlet for the comparison voltage.
POSITION Control	Positions display vertically on the CRT face.
V_c REF-IDENT Pushbutton	Internally disconnects both signals and applies V_c to both inputs. Readout display is replaced by the word "IDENTIFY".

TEST SETUP CHART

Fig. 2-2 shows a drawing of the front panel controls and connectors. This chart can be reproduced and used as a test setup record for special measurements and applications, or it may be used as a training aid for operation of the 7A13.

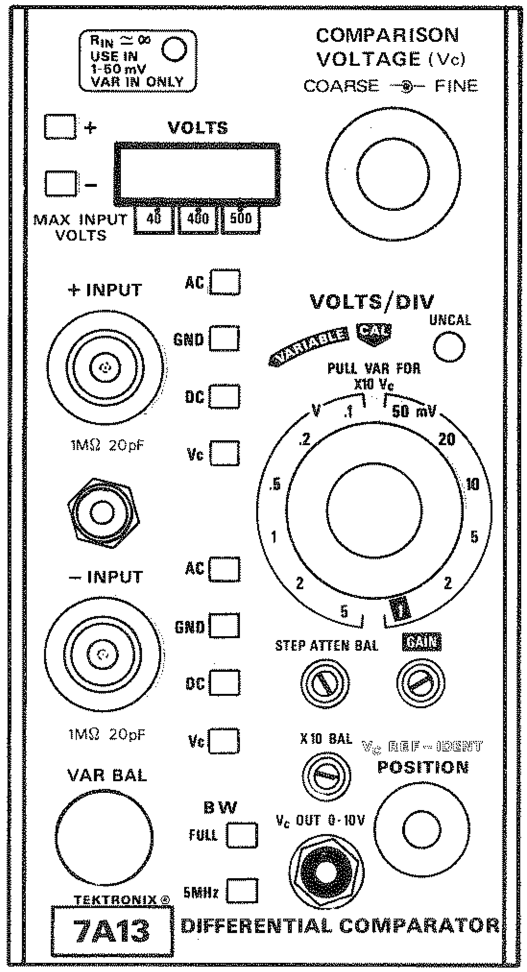
FAMILIARIZATION PROCEDURE

First-Time Operation

The following steps are intended to help get the trace on the CRT screen quickly and to prepare the unit for immediate use. These steps are intended to acquaint you with some of the basic functions of the 7A13.

1. Insert the unit into the oscilloscope vertical plug-in compartment.

7A13 DIFFERENTIAL COMPARATOR SETUP CHART



(1113) 1948-3

DATA:

Fig. 2-2. Test set-up chart.

2. Set the 7A13 front panel controls as follows:

COMPARISON VOLTAGE (V_C) Polarity	Pushbutton canceled
+ INPUT Mode	Gnd
− INPUT Mode	Gnd
VOLTS/DIV	1 V
VARIABLE	In (CAL)
STEP ATTEN BAL	As is
GAIN	As is
X10 BAL	As is
VAR BAL	As is
BW	5 MHz
POSITION	Midrange

3. Turn the Intensity control fully counterclockwise and turn the oscilloscope Power ON. Preset the time-base plug-in controls for a .5 ms/div sweep rate and automatic triggering.

4. Wait about five minutes for the 7A13 and the oscilloscope to warm up.

NOTE

About five minutes is sufficient warmup time when using the 7A13 for short-term DC measurements. For long-term DC measurements using the lower deflection factors, allow at least one hour.

5. Adjust the Intensity control for normal viewing of the trace. The trace should appear near the graticule center.

6. Using the POSITION control, position the trace two divisions below graticule center. Set VOLTS/DIV to 1 mV position.

NOTE

If trace is off screen, perform Front Panel Adjustments outlined below.

7. Vary the VARIABLE control throughout its range while observing the CRT trace.

8. Adjust VAR BAL so that there is no trace movement while varying the VARIABLE control.

9. Vary the VOLTS/DIV switch from 10 mV to 50 mV while observing the CRT trace.

10. Adjust STEP ATTEN BAL so that the trace does not move while varying the VOLTS/DIV switch.

11. Set the VOLTS/DIV switch to 10 mV. Pull out the PULL VAR FOR X10 V_C range knob while observing the CRT trace.

12. Adjust X10 BAL so that there is no trace movement while moving the PULL VAR FOR X10 V_C range knob in and out.

13. Repeat steps 7 through 12 until optimum settings are achieved.

14. Push in the PULL VAR FOR X10 V_C Range knob and set the VOLTS/DIV switch to 1 mV; position the trace two divisions below graticule center.

15. Apply a 4 mV peak-to-peak calibrator signal through a coaxial cable to the + INPUT connector on the 7A13.

16. For DC coupled, single-ended operation, set the + INPUT Mode Switch to DC. The display should be 4 divisions of square wave amplitude.

NOTE

If the display amplitude is not 4 divisions, adjust GAIN control until it is.

17. For AC coupled, single-ended operation, reposition the display to place the bottom of the display at the graticule center line.

18. Set the + INPUT Mode switch to AC and note that the display shifts downward about two divisions to its average level.

19. Disconnect the calibrator signal from the + INPUT connector. Set both the + and − INPUT Mode switches to GND.

Front Panel Adjustments

These adjustments must be accomplished each time the 7A13 is placed in a different oscilloscope and should be checked in the given sequence prior to any critical measurement of waveforms.

Preset 7A13 controls as follows:

COMPARISON VOLTAGE	
+ INPUT Mode	GND
− INPUT Mode	GND
VOLTS/DIV	1 V
VARIABLE	In (CAL)
STEP ATTEN BAL	Midrange or as is
GAIN	As is
X10 BAL	Midrange or as is
VAR BAL	Midrange or as is
BW	5 MHz
POSITION	Midrange

Allow 20 minutes warmup time.

VAR BAL Adjustment

1. Set the VOLTS/DIV switch to 1 mV.

2. Vary the VARIABLE control throughout its range while observing the CRT trace.

3. Adjust VAR BAL so that there is no trace movement while varying the VARIABLE control.

STEP ATTEN BAL Adjustment

1. Vary the VOLTS/DIV switch from 10 mV to 50 mV while observing the CRT trace.

2. Adjust STEP ATTEN BAL so that the trace does not move while varying the VOLTS/DIV switch.

X10 BAL Adjustment

1. Set the VOLTS/DIV switch to 10 mV. Pull out the PULL VAR FOR X10 V_C Range knob while observing the CRT trace.

2. Adjust X10 BAL so that there is no trace movement while moving the knob in and out.

3. Repeat all balance adjustments until optimum settings are achieved.

GAIN Adjustment

1. Using the POSITION control, position the CRT trace two divisions below graticule center.

2. Set VOLTS/DIV to 1 mV position.

3. Apply a 4 mV peak-to-peak calibrator signal through a coaxial cable to the + INPUT connector on the 7A13.

4. Set the + INPUT Mode switch to DC.

5. Adjust GAIN control so that the display is four divisions of square wave amplitude with the bottom of the display at the reference established in step 1.

GENERAL OPERATING INFORMATION

Signal Connection

In general, probes offer the most convenient means of connecting signals to the inputs of the 7A13. The Tektronix probes are shielded to prevent pickup of electrostatic interference. A 10X attenuator probe offers a high input impedance and allows the circuit under test to perform very close to normal operating conditions. (For further information on the use of probes, see Use of Attenuator Probes in this section of the manual, and in the probe instruction manual).

In high-frequency applications requiring maximum overall bandwidth, use a coaxial cable terminated at both ends in the characteristic impedance of the cable. To maintain the high-frequency characteristics of the applied signal, use high-quality, low-loss cable. Resistive coaxial attenuators can be used to reduce reflections if the applied signal has suitable amplitude.

High-level, low-frequency signals can be connected directly to the 7A13 input with short unshielded leads. This coupling method works best for signals below about one kilohertz and deflection factors above one volt/division. When this method is used, establish a common ground between the 7A13 and the equipment under test (common ground provided by line cords is usually inadequate). Attempt to position the leads away from any source of interference to avoid errors in the display. If interference is excessive with unshielded leads, use a coaxial cable, probe, or differential amplifier operation. (Differential amplifier operation may require special considerations for signal connections. See Differential Operation in this section of the manual).

Bandwidth Limiter

The BW (bandwidth) switch provides a method of reducing interference from unwanted high-frequency signals when viewing low-frequency signals. With the FULL button pressed, the full bandwidth capabilities of the amplifier are available. When the 5 MHz button is pressed, the upper −3 dB bandwidth point of the amplifier is limited to about 5 MHz. The unwanted high-frequency signals are reduced in the displayed waveform.

Display Identification

When the 7A13 V_C REF-IDENT button is pressed, the signal is internally disconnected. This feature is particularly useful when the 7A13 is used with an indicator unit designed for use with more than one vertical amplifier.

When using an oscilloscope system equipped with the readout feature, the 7A13 deflection factor is displayed on the CRT. When the V_C REF-IDENT button is pressed, the readout information pertaining to the 7A13 is replaced by the word IDENTIFY.

R_{in} Switch

The R_{in} switch S10 (located on left side of the unit) selects the input resistance to ground (+ and − INPUT simultaneously) to be either 1 MΩ or $\approx\infty$. The R_{in} switch is normally set to the 1 MΩ position. A front-panel lamp is illuminated to indicate when the R_{in} switch is set to $\approx\infty$.

The high input impedance obtained by setting R_{in} to $\approx\infty$ is useful for measuring voltages in high-impedance circuits where minimum loading is necessary, and the voltage to be measured is within the 10 volt range of the 7A13. Differential comparator operation is used to make the measurement. At null, the comparison voltage is equal to the voltage being measured.

Several precautions must be observed when using the $\approx\infty$ position of the R_{in} switch (1) the VOLTS/DIV control must be set to one of the six positions from 1 to 50 mV; (2) the VARIABLE (VOLTS/DIV) knob must be pushed to the IN position; (3) the INPUT Mode switch of the signal channel must be set to DC.

If the external device does not provide a DC return path for the input FET gate, an external resistance (adequately shielded) must be connected between the input connector and ground.

CALIBRATED DIFFERENTIAL COMPARATOR OPERATION

Introduction

When one of the INPUT switches is set to V_C and the other is set to AC or DC, the 7A13 is operating as a calibrated differential comparator or slide-back voltmeter. The calibrated comparison voltage V_C, can be added differentially to the input signal to obtain a null. For linear operation, Table 1-1 in the Specification section lists the maximum input signal or voltage that can be applied to the 7A13 INPUT connector at a given VOLTS/DIV switch position.

In differential comparator operation the calibrated DC comparison voltage is internally applied, to differentially offset any unwanted portion of the applied signal. This allows measurements of relatively small AC or DC signals riding on top of relatively large AC or DC signals.

The DC comparison voltage is set by the two COMPARISON VOLTAGE (V_C) controls: COARSE and FINE.

Equivalent V_C

When a signal is applied to the 7A13 INPUT connector(s), it is attenuated in the Input Attenuators before being applied to the + or − Input stage. In contrast, the V_C Supply voltage is not attenuated, but is applied (via relays) directly to the Input stage.

Direct application of the V_C to the Input stage makes the +10 V V_C appear equivalent to the product of the V_C and the attenuation factor of the Input Attenuator. Likewise, the use of an attenuator probe multiplies the V_C by the attenuation factor of the probe.

V_C LED Readout

The front panel, light-emitting-diode VOLTS readout array displays the four-digit V_C value selected by the COMPARISON VOLTAGE (V_C) COARSE and FINE controls. The decimal point placement is switched automatically by internal circuitry for display of the equivalent V_C. Special probes that correct the V_C display (by changing decimal point placement) for the probe attenuation may be used. Attenuator probes not so equipped may be used with the instrument, but the VOLTS display will not be correct. The operator must take this into account when viewing the VOLTS display.

V_C OUT 0-10 V Jack

The V_C OUT 0-10 V jack, mounted on the front panel of the 7A13, permits monitoring of the comparison voltage. The voltage at the jack is set up by the COMPARISON VOLTAGE (V_C) COARSE and FINE controls, and polarity switch. Impedance is 2 kΩ to 5.5 kΩ.

When monitoring the voltage at the jack, the voltage is not affected if an "infinite-impedance type" voltmeter (such as a digital voltmeter or any null type meter which draws negligible current) is used for monitoring purposes.

If the V_C OUT 0-10 V jack is loaded by an external meter, the comparison voltage available at the jack and applied to the input of the amplifier will not be the same as indicated by the VOLTS display.

Differential Operation

Differential measurements are made by applying the signals to the + INPUT and − INPUT connectors. Then, both input Mode switches should be set to the same position: AC or DC, depending on the method of signal coupling desired. When using the 7A13 for differential operation, only the voltage difference between the two signals is amplified and displayed. Common-mode signals (signals that are common in amplitude, frequency, and phase) are rejected and not displayed.

The 7A13 differential input provision may be used to eliminate interfering signals such as AC line-frequency hum. Single-ended measurements often yield unsatisfactory information because of interference resulting from ground-loop currents between the oscilloscope and the device under test.

These limitations of single-ended measurements are virtually eliminated in differential measurements. A differential measurement is made by connecting each of the two inputs to selected points in the test circuit. Since the chassis of the 7A13 need not be connected in any way to the test circuit, there are few limitations to the selection of these test points.

Amplitude and Common-Mode Rejection

In the text which follows, the term "Input Signal Range" means the common-mode operating range of voltage through which the amplifier will produce a usable output. This should not be confused with the maximum (non-destructive) input voltage, which is related to the breakdown limits of the amplifier components.

Factors That Affect CMRR

Frequency. Since the common-mode output voltage is a factor of phase differences as well as gain between channels, the frequency of the input common-mode signal has a direct bearing on the CMRR. Generally, as the frequency of the input signal increases, the CMRR decreases. (Exception: with AC-coupled input, the CMRR will become higher as frequency is increased from DC to over 100 Hz.)

Source Impedance. The specified CMRR assumes that the points being measured have identical source impedance. The source impedance and the amplifier input impedance form an RC divider which determines the portion of the signal that appears across the amplifier input, and the apparent effect on CMRR.

The user may desire to construct a graph of CMRR versus frequency for specific applications where the source or signal tranporting lead impedances are unbalanced.

Signal Transporting Leads. A principal requirement for maximum CMRR is that the signals arrive at the amplifier's two inputs with no change in phase or amplitude. Slight differences in attenuation factors, or phase shift between two input attenuators may reduce the CMRR 20% or more.

Attenuator probes extend the usable voltage range of a differential amplifier by reducing the input signal level below the maximum common-mode input voltage. However, a reduction in the apparent CMRR will usually occur because of component value differences within the probes. (See Use of Attenuator Probes in this section).

Ground Connections. Proper grounding reduces signals generated from ground loop currents. It is usually best to electrically connect the probe or signal lead shields together at the probe body or signal source, but not to the instrument ground.

USE OF ATTENUATOR PROBES

General

Attenuator probes reduce the resistive and capacitive loading of the signal source and extend the measurement range to include substantially higher voltages. Passive attenuator probes having different attenuation factors as well as special-purpose types are available from Tektronix, Inc.

Special probes that correct the oscilloscope deflection factor display, VOLTS display, and MAX INPUT VOLTS indicator to match probe attenuation may be used. (The + and − INPUT connectors have an outer ring that is connected to the Probe Sensing circuit). Attenuator probes not so equipped may be used with the instrument, but they will not operate the sensing circuit. Therefore, the operator must supply the probe attenuation factor for measurements involving the three indicators affected.

NOTE

If two probes with different attenuation are connected to the INPUT connectors (e.g., 10X and 100X), the deflection factor readout, V_C *Display, and MAX INPUT VOLTS indicator will be corrected for the probe with the larger division ratio (100X).*

Probe Selection

The P6055 probe is recommended for measurements where CMRR up to 20,000:1 must be maintained (100:1 at 20 MHz). The attenuation ratio is adjustable to X10 to compensate for differences in input resistance of the amplifier.

The P6053B probe is recommended for measurements requiring the full bandwidth of the 7A13 (see Table 1-4 in the Specification section). The P6053B also has the sensing capability for deflection factor and V_C Display readout compatibility.