# 067-0596-00 CALIBRATION FIXTURE

Chopped Voltage Reference
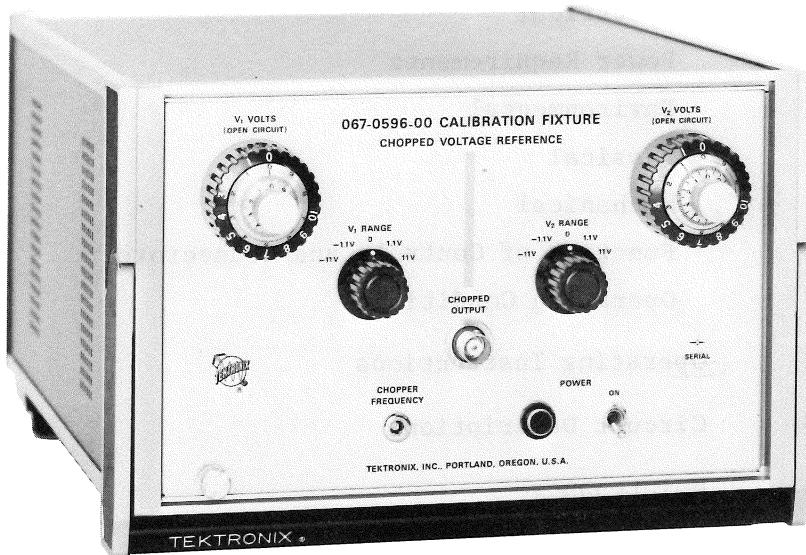
The Chopped Voltage Reference provides two precise voltages for differential amplitude measurements. This calibration fixture is specifically designed for use with the Tektronix Type 1A5 Differential Amplifier in measuring television waveform amplitudes.

The output waveform is derived by mechanically switching between the two precision voltage sources. Using chopped voltages instead of a fixed DC level eliminates long-term level shifts in differential amplifiers usually caused by junction temperature changes.

Because of loading effects of external circuits connected to the Chopped Voltage Reference Output, corrections will have to be used to determine the actual settings of V_1 VOLTS or V_2 VOLTS dials for the desired output voltages. The table, Section 10, corrects for 1 megohm loading.

CONTENTS

SECTION 1

CHARACTERISTICS

ELECTRICAL

Characteristic	Performance Limits
Chopped Output	
Accuracy	Within 0.2 mV of the indicated V_1 or V_2 VOLTS (OPEN CIRCUIT)
Frequency Range	Less than 15 Hz to greater than 100 Hz. Set to 60 Hz
Noise	Less than 2 mV

POWER REQUIREMENTS

Characteristic	Performance Limits
Line Voltage	
Selector switch on rear panel	
115 VAC	104 to 126 volts RMS
230 VAC	208 to 252 volts RMS
Line Current	0.1 A (maximum) at 115 V, 48 Hz
Power Consumption	4 watts maximum
Line Frequency	48 to 65 Hz
Fuse	
115 VAC	0.2 A Slo Blo
230 VAC	0.1 A Slo Blo

ENVIRONMENTAL

Characteristic	Performance Limits
Temperature	Performance requirements listed apply over a temperature range of 15°C to 35°C
Warm Up Time	5 minutes at 25°C

A

PHYSICAL

Characteristic	Information
Construction	
Chassis	Aluminum Alloy
Cabinet	Aluminum Alloy with blue-vinyl finish
Panel	Aluminum Alloy with anodized finish
Circuit Board	Glass-Epoxy finish

MECHANICAL

Characteristic	Information
Over-all Dimensions	
Height	6 inches
Width	9 inches
Depth	13 inches
Weight	8 lb, 3 oz
Connectors	
Front Panel	BNC

FRONT PANEL CONTROLS AND CONNECTORS

V_1 VOLTS (Open Circuit)

Selects the voltage within the range set by the V_1 RANGE switch. Outer
knob selects first digit and 10 turn dial selects three digits.

V_2 VOLTS (Open Circuit)

Selects the voltage within the range set by the V_2 RANGE switch. Outer
knob selects first digit and 10 turn dial selects three digits.

V_1 RANGE

Selects V_1 VOLTS range and polarity.

V_2 RANGE

Selects V_2 VOLTS range and polarity.

CHOPPED OUTPUT

BNC connector for chopped output signal.

OPERATING CONDITIONS

There are certain conditions that must be met before the performance limits
specified are valid.

The instrument must be calibrated at an ambient temperature between +20°C
and +30°C.

Unless otherwise noted, the instrument must be operating for at least 20
minutes within the environmental limits listed in Section 2.

The instrument is intended to be operated from a power source with its neutral
at or near ground (earth) potential. It is not intended for operation from
two phases of a multi-phase system, or across the legs of a single-phase, three
wire system.

NOTES

SECTION 2

OPERATING INSTRUCTIONS

The Chopped Voltage Reference consists of two identical voltage sources with
a mechanical chopper alternately switching between the two sources. When
used with a Differential Input Oscilloscope, signal voltages may be measured
very accurately by comparing the unknown signal with the Chopped Voltage Re-
ference. The measurement is made by adding (or subtracting), with the Dif-
ferential Amplifier, the chopped reference amplitude to the unknown signal.
This is particularly useful for accurately measuring incremental amplitudes
in complex waveshapes such as a television color bar signal.
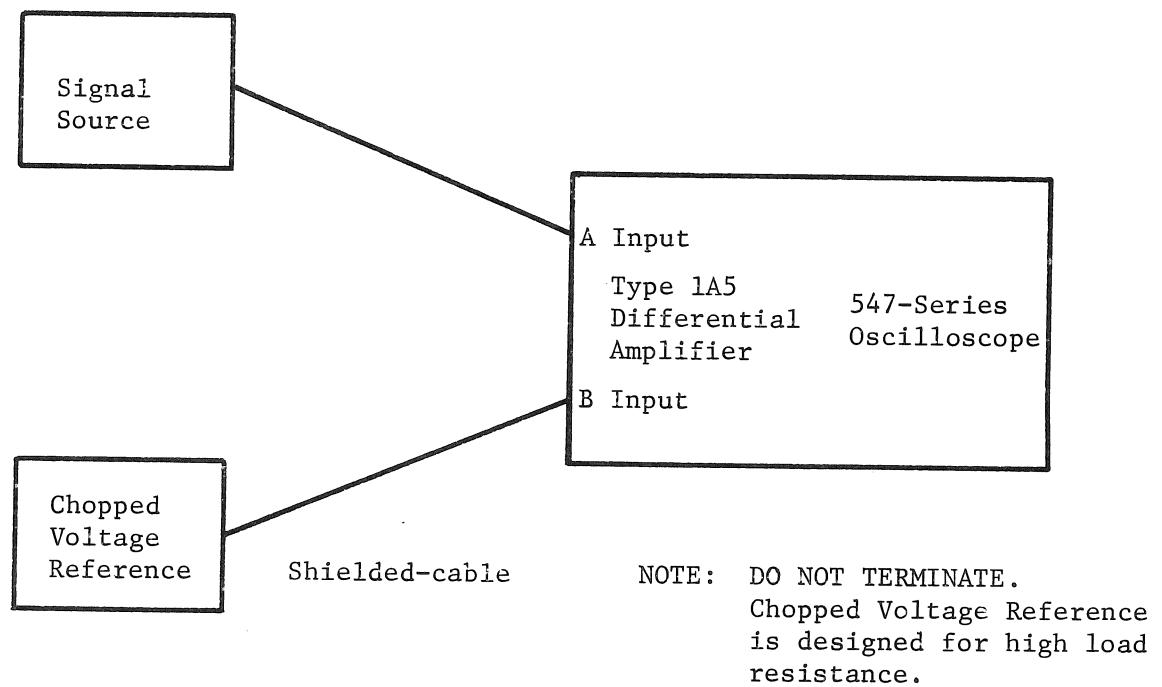
Figure 3-1

TEST EQUIPMENT SETUP

MEASURING THE AMPLITUDE OF AN UNKNOWN SIGNAL

Connect the Chopped Voltage Reference and Differential Amplifier as shown in Figure 3-1. With the Differential Amplifier input grounded, and free-running trace, establish a convenient zero reference with the Oscilloscope position control. Set V_1 RANGE and V_1 VOLTS to the approximate value of the voltage to be measured; set V_2 RANGE to zero. Apply the unknown signal and the Chopped Voltage Reference to the inputs of the Differential Amplifier, DC coupled. Trigger the Oscilloscope from the unknown signal; the Chopped Voltage Reference should run asynchronously with the unknown signal. Adjust V_1 VOLTS until the desired portion of the unknown signal is at the zero reference previously established. The switch and dial reading is the voltage of the unknown signal.

> NOTE: The switch and dial readings are open circuit voltages. The readings must be corrected for loading of the Differential Amplifier input resistance. Section 8 provides a correction table for 1 megohm loads such as the Type 1A5. Corrections for loads other than 1 megohm can be calculated; see page 2-5.

The Differential Amplifier displays the difference between the two input signals, $V_{reference}$ and $V_{unknown}$. When $V_{reference}$ is adjusted so that $V_{unknown}$ is at the zero position on the graticule, then

$$V_{unknown} - V_{reference} = 0$$
$$\text{and} \quad V_{unknown} = V_{reference}$$

The attenuator of the Differential Amplifier may be set for any deflection factor (within the limitations of the Amplifier) thus increasing the ability to resolve amplitude measurements to a much higher accuracy than the oscilloscope alone.

This technique is essentially the same as using the comparison voltage feature of the Type 1A5 Differential Amplifier except that the Chopped Voltage Reference has a higher degree of accuracy.

An example of this measurement is illustrated by figures 3-2 and 3-3. Figure 3-2 is the unknown signal; the zero reference has been established. Applying the Chopped Voltage Reference results in the display of Figure 3-3. The upper waveform is the original unknown signal. The lower waveform is displayed by the Chopped Voltage Reference V_1; the fourth step is at the zero reference, thus the amplitude of that step is the V_1 VOLTS dial reading.

For this example, V_1 VOLTS dial reading is 0.64210, or 642.10 mV. Referring to Section 8, the nearest actual reading is 642.18; the absolute error is 3.1880. Rounding and subtracting, 642.10 - 3.19 = 638.91 mV actual output voltage into 1 megohm load. Therefore, the amplitude of the fourth step is 638.91 mV.

A

MEASURING THE AMPLITUDE OF MODULATION RIDING ON A DC LEVEL

Connect the Chopped Voltage Reference and Differential Amplifier as shown in Figure 3-1. With the Differential Amplifier inputs grounded and free-running trace, establish a convenient zero reference with the Oscilloscope position control. Apply the unknown signal and the Chopped Voltage Reference to the inputs of the Differential Amplifier, DC coupled. Trigger the Oscilloscope from the unknown signal; the Chopped Voltage Reference should run asynchronously with the unknown signal. Adjust V_1 RANGE and V_1 VOLTS, and V_2 RANGE and V_2 VOLTS such that the top and bottom of the desired modulation just meet at the zero reference previously established. The Differential Amplifier displays the difference between the two signals,

$$(V_{DC} + V_{AC\ peak}) - (V_1\ Reference) = 0$$

$$(V_{DC} - V_{AC\ peak}) - (V_2\ Reference) = 0$$

Subtracting these two equations,

$$V_{DC} + V_{AC\ peak} - V_1\ Reference - V_{DC} + V_{AC\ peak} + V_2\ Reference = 0$$

Reducing terms,

$$2\ V_{AC\ peak} - 1\ V_1\ Reference + V_2\ Reference = 0$$

Rearranging,

$$V_{AC\ peak-to-peak} = V_1\ Reference - V_2\ Reference$$

The peak-to-peak AC voltage or modulation is the difference between the two Chopped Voltage References.

   NOTE: The switch and dial readings are open circuit voltages. The
          readings must be corrected for loading of the Differential
          Amplifier input resistance. Section 8 provides a correction
          table for 1 megohm leads such as the Type 1A5. Corrections
          for loads other than 1 megohm can be calculated; see page 2-5.

An example of this measurement technique is illustrated by Figures 3-4 and 3-5. Figure 3-4 is the unknown signal with modulation riding on a DC level. For this example, the modulation on the third modulated step is measured. In Figure 3-5 the zero reference was established at the graticule centerline. V_1 VOLTS and V_2 VOLTS were adjusted for the top and bottom of the modulation to just touch the zero reference line (and each other). The difference between V_1 and V_2 is the modulation amplitude.

For this example, V_1 VOLTS dial reading is +0.6358 or 635.8 mV and V_2 VOLTS dial reading is +0.0602 or 60.2 mV from the tables, Section 8,

	V_1	V_2
Actual Output mV	633.00	60.00
Actual Reading mV	636.12	60.15
Absolute Error mV	3.1270	0.1581

Thus, Actual Output V_1 = 635.8 − 3.1 = 632.7 mV

V_2 = 60.2 − 0.15 = 60.05 mV

The peak-to-peak modulation amplitude is $V_1 - V_2$ or 632.7 − 60.05 = 572.7 mV.

DETERMINING ACTUAL OUTPUT VOLTAGE

The Chopped Voltage Reference RANGE and VOLTS are calibrated as open circuit voltages only. The loading effects of oscilloscope input circuits must be considered to determine the actual output voltage.

Since most oscilloscopes have a 1 megohm input resistance, a correction table is provided in Section 8, which gives the actual dial readings for actual output voltages in 1 mV increments from 0 mV to 1099 mV. Also included is the absolute error in mV (absolute error = actual reading - actual output). The absolute error may be used for interpolation between 1 mV increments.

The table is written in millivolts and can be used directly with the 1.1 V RANGE for V_1 and V_2. For the 11 V RANGE of V_1 and V_2, multiply the numbers in the table by 10.

For example, to set 368.0 mV actual output voltage at the input of the Differential Amplifier, the actual reading would be 369.62.

Or, to set 216.8 mV actual output voltage into 1 megohm, the actual reading would be 216.8 + 0.7205 = 217.52.

If a load resistance other than 1 megohm is to be used with the Chopped Voltage Reference, the value of V_1 VOLTS or V_2 VOLTS compensated for that load can be calculated from the following:

$$X = \frac{-B + \sqrt{B^2 - 4AC}}{2A}$$

Where X = Actual Reading of ten-turn dial

A = 49.4 V

B = 12.1 R_L - 60.5 V + 2 NV

C = 12.1 NV + 12.1 VR_L + 12.1 V - UN^2 + 12.1 NR_L

V = Desired output voltage in volts

N = Actual reading of 11 position switch (0 through 10)

R_L = Load resistance in kΩ

A
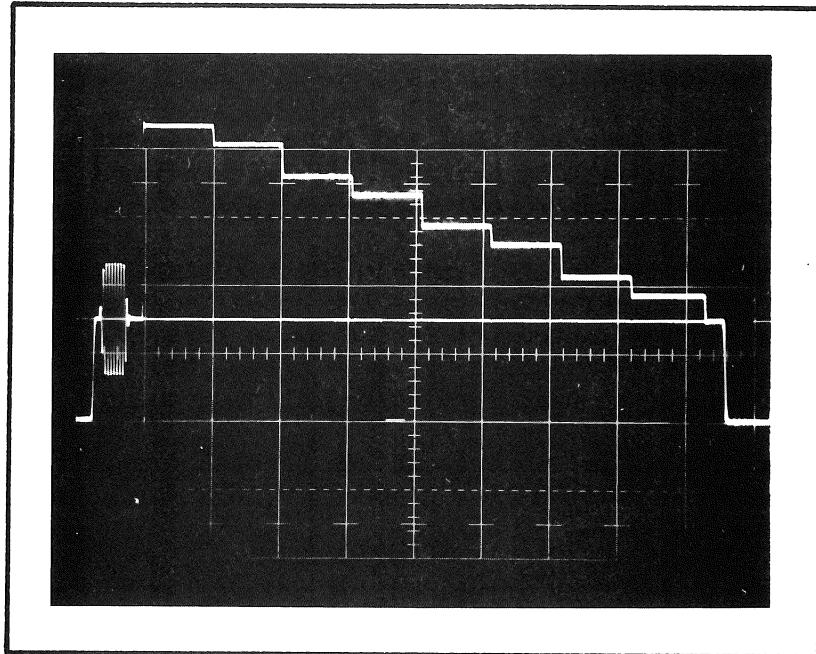
Figure 3-2

Unknown Signal; Zero Reference 1 cm Below Graticule Center
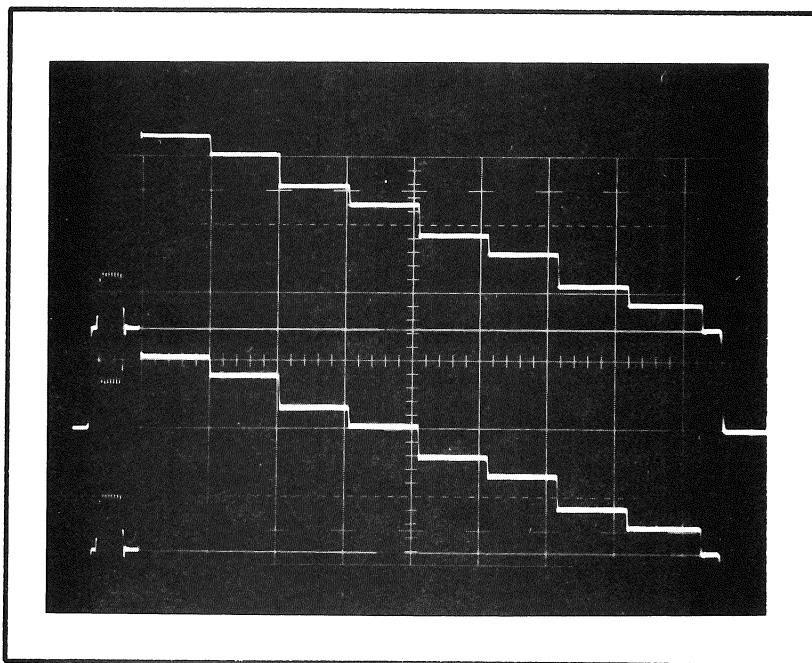
Figure 3-3

Measuring the Amplitude of the Fourth Step with the Chopped Voltage Reference
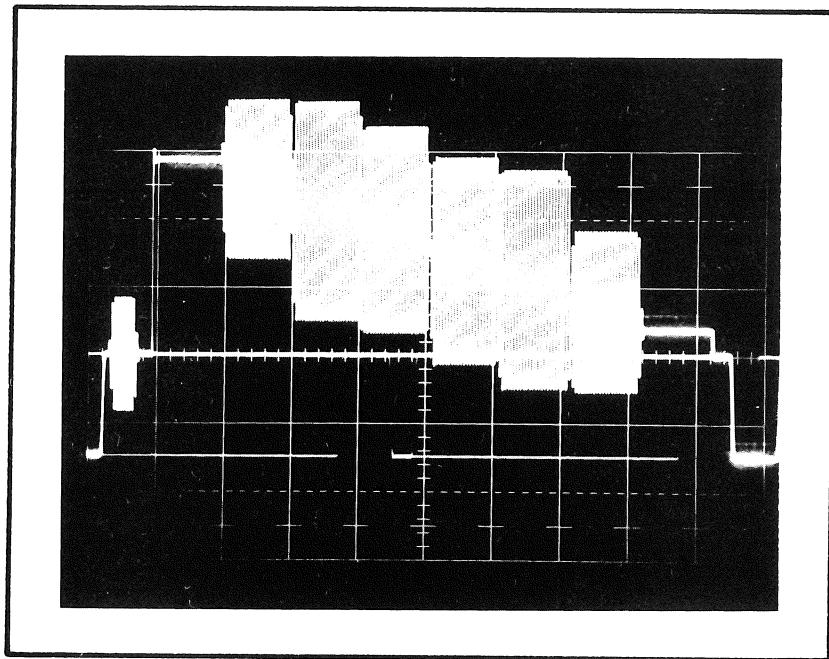
Figure 3-4

Unknown Signal with Modulation; Zero Reference at Graticule Center
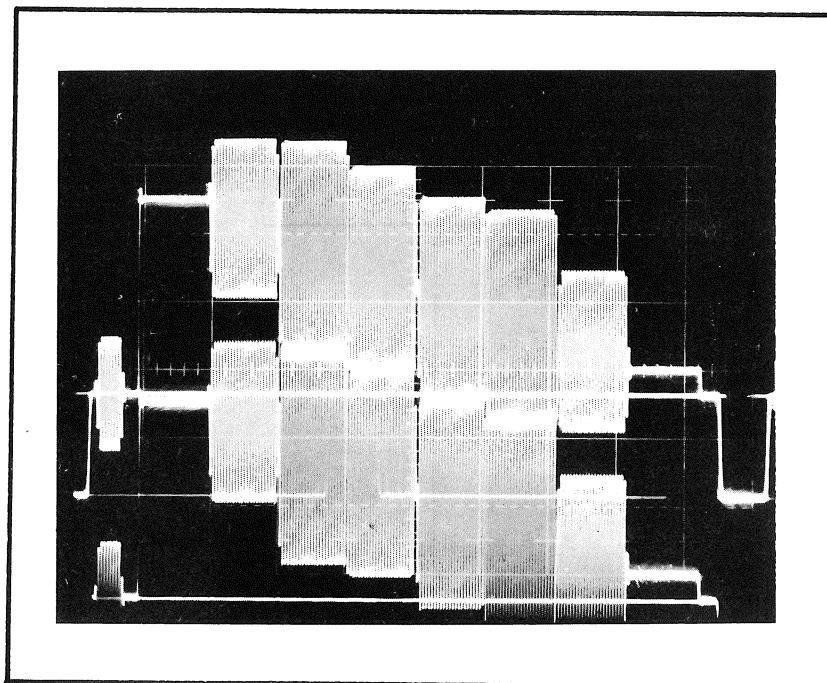
Figure 3-5

Measuring the Peak-to-Peak Amplitude of Third Modulation Steps with the
Chopped Voltage Reference

BLOCK DIAGRAM
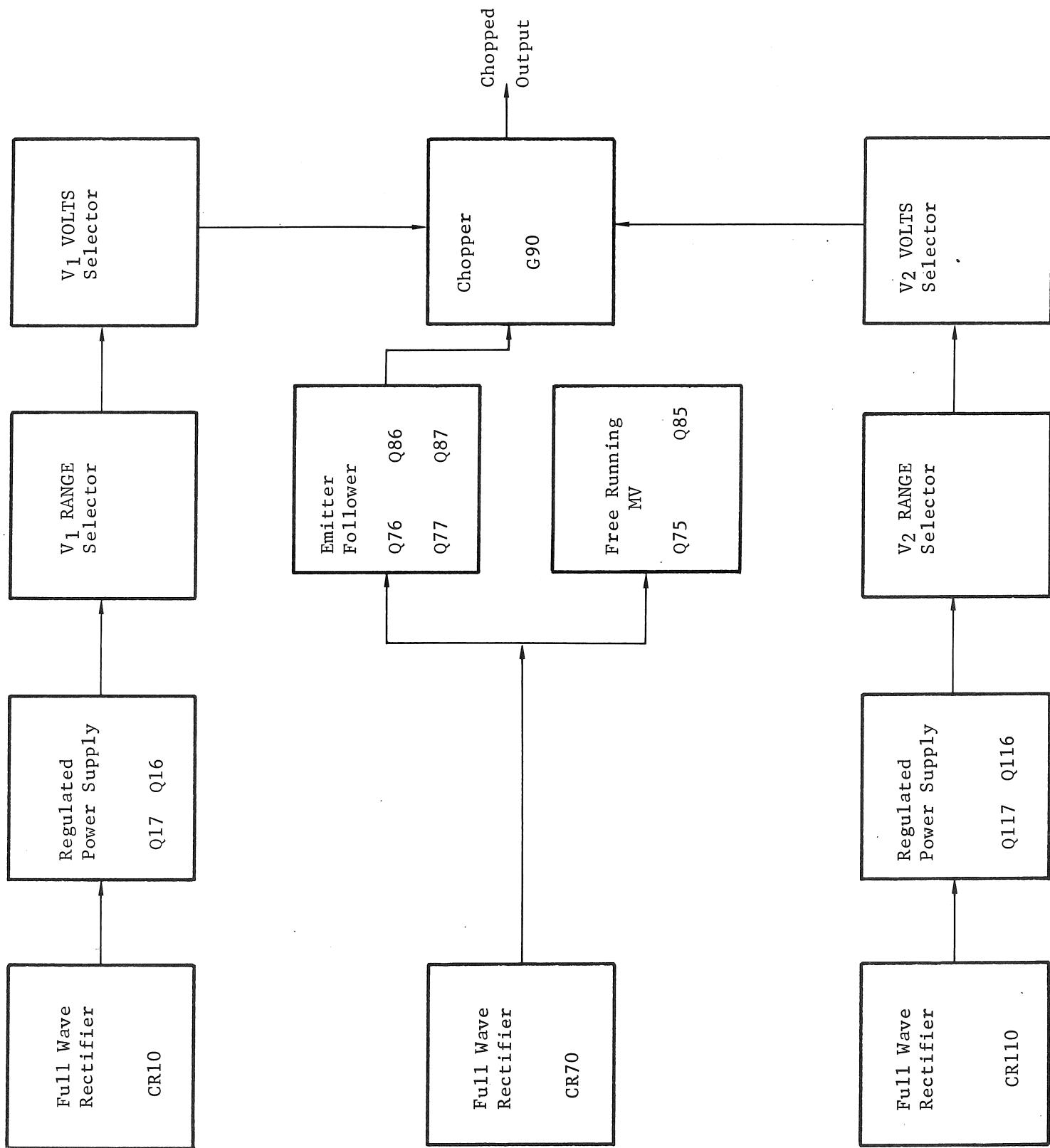
SECTION 3

CIRCUIT DESCRIPTION

POWER SUPPLY

Power Input:

Power is applied to the primary winding of transformer T1 via the POWER switch S1, fuse F1, voltage selector switch S2 and the Range Selector S3. The voltage selector switch S2 connects the split primaries of T1 in parallel for 115 volts range of operation, or in series for 230 volt range. A second line fuse, F2, is connected into the circuit when the voltage selector switch is placed in the 230 volts position to provide the correct protection for 230 volt operation. The current rating of F2 is one half of F1. The Range Selector switch S3 allows the instrument to regulate properly on higher or lower than normal line voltages. Each half of the primary has taps above and below the 115 volts (230 V) point. As the Range Selector switch is moved from Lo to M and then to Hi, more turns are added to the primary windings. Therefore, whether the primary voltage has increased or decreased, the secondary voltage can be maintained at a nearly constant level.

V_1 and V_2 Reference Voltage circuits are identical. The following discussion uses V_1 supply circuit numbers; the V_2 circuit numbers are the range from 100 to 159.

Supply:

The basic purpose of the supply is to provide a constant regulated 7.5 mA current for VR30. Q17 is a series regulator which provides a constant regulated voltage at its emitter. The current through VR30 is set by R15 and is equal to the current through R21 minus 1 mA, which flows through the output attenuator circuit. Since the voltage on one side of R21 is held constant by the voltage regulator circuit and the voltage on the opposite side is held constant by VR30 voltage drop the current is constant. Q16 is the voltage comparator stage for the supply and uses VR30 for a reference. Q16A detects any change in the output voltage of Q17 through the divider composed of R13, R15, and R17. VR11 provides approximate regulation for the collector supply of Q16A.

R23 makes the base driving impedance of Q16B equal to the impedance seen by the base of Q16A to provide temperature compensation.

C21 and C16 provide high frequency compensation. C23 attenuates AC error signals at the base of Q16B.

The operating voltage for the multivibrator is developed from an unregulated supply consisting of CR70, R71, and C71.

Voltage Reference Range:

The voltage range circuitry consists of R30, R31, R33, R37. This portion of the V_1 RANGE switch selects the range of voltage applied to V_1 VOLTS controls.

R30 is selected to set the voltage within the adjustment range of the V_1 CAL control R31.

When the V_1 RANGE is set to +1.1 or -1.1, a precision divider network consisting of R33 and R37 reduces the voltage to 10:1.

When the V_1 RANGE switch (SW30) is set to the +11 or +1.1 position, (VR30) cathode connects to the plug (+) side of the supply to provide the plus (+) voltage to the output circuitry. VR30 anode connects to ground.

When the V_1 RANGE switch is set to 0, -1.1 V, or -11 V, VR30 cathode connects to ground and its anode connects to the minus (-) side of the supply to provide the minus (-) voltage to the output circuitry.

Reference Voltage Output Circuit

The reference voltage output circuit is composed of the (V_1) VOLTS combination control (SW57) and (R57) with associated circuitry. The V_1 VOLTS control is a combination of two controls: (1) Switch SW57 selects the first digit within the range set by the V_1 RANGE switch, and (2) the 10-turn potentiometer (R57) selects the remaining digits.

A string of twelve resistors (R41 through R52) makes up the main divider. This portion of the reference voltage output circuitry could be called a hybrid Kelvin-Verley bridge. The reference voltage is applied to the top end of the divider and the bottom end is grounded. A shunt divider consisting of R55, R56, and R57 is connected across two of the resistors in the main divider by means of SW57. The equivalent resistance of the shunted portion of the main divider is equal to 1 K.

The TRACKING control (R56) provides the means for setting the shunt resistance accurately.

Switch SW57 has 11 positions to permit switching the shunt divider across two resistors at a time along the string of resistors in the main divider. Each position corresponds to one digit of voltage. Variable control (R57) in the shunt circuit is the vernier control for dividing the reference voltage further so smaller divisions of the voltage can be resolved. For example, if the V_1 RANGE switch is set to +11, SW57 is set to 6, and R57 is set to 1 - 25, the reference voltage reading is +6.125 volts.

A

Chopper Drive Circuit

Q75 and Q85 make up a free running multivibrator whose frequency can be adjusted by R77. If a wider range of frequencies than can be reached by the adjustment of R77 is desired, C75 and C85 are mounted so they can easily be removed and other values of capacitors can be selected.

Q76, Q77, Q86, and Q87 are emitter followers that take the outputs from the collectors of Q75 and Q85 and provide enough drive to run the chopper (G90). G90 switches between the reference voltage set by V_1 VOLTS and V_2 VOLTS.

NOTES

SECTION 4

MAINTENANCE

GENERAL INFORMATION

Introduction

This portion of the manual contains a complete calibration procedure for the 067-0596-00 Calibration Fixture. The instrument will not often require a complete, start-from-scratch calibration, but will need occasional adjustments as components age or are replaced.

Calibration is a valuable part of preventive maintenance, since many types of minor troubles may be discovered and corrected before they become serious enough to disable the instrument. Also, certain troubles can be easily isolated to a particular section of the instrument by attempting calibration.

This section includes a list of all instruments required to calibrate the Type 067-0596-00 Calibration Fixture, a check out list, and a step-by-step calibration procedure. The check out list is, essentially, a short form calibration check; it has the same sequence of steps and the same limits on checks or adjustments as the calibration procedure. This list may be used to quickly check performance or locate faulty circuits.

It will be assumed in this manual that appropriate interconnections and necessary adapters are available.

It will also be assumed that a control will be left in the position indicated on the previous step unless otherwise indicated.

All front-panel control labels of the 067-0596-00 Calibration Fixture or test instrument are in capital letters (V_1 RANGE), etc. Internal adjustment labels are identified by an R or C number (R156, V_2 Tracking).

Visual Inspection

The instrument should be visually inspected occasionally for such defects as poor connections, broken or damaged parts, improperly seated transistors, and heat damaged parts. The remedy for most of these defects is not obvious. A heat damaged part is usually the symptom of some defect that is not obvious. The cause of overheating should be determined and corrected before the part is replaced, otherwise the damage may be repeated.

Transistor Checks

Periodic preventive maintenance checks on the transistors are not recommended. Satisfactory operation of the instrument in all respects is adequate assurance that the transistors are performing properly.

Recalibration

To insure that the 067-0596-00 Calibration Fixture maintains its accuracy, check the calibration after each 500 hours of operation or every six months if used intermittently. Complete calibration instructions appear later in this section.

The calibration procedure can also be helpful in isolating troubles in the instrument. Also, minor troubles in the instrument that may not be apparent during normal operation may be revealed and corrected during calibration.

Ordering Parts

Many of the components are standard electronic parts that may be purchased locally. However, all standard parts in the instrument can be obtained from Tektronix through your local Tektronix Field Engineer or Field Office. Before ordering, consult the parts list of this manual to determine the value, tolerance, and rating required. Some of the parts used are not standard parts and may or may not be available for replacement. Consult any particular replacement with your local Tektronix Field Engineer or Field Office.

A

CALIBRATION

Equipment Required:

TEKTRONIX Instruments

1   TYPE 76TU LINE-VOLTAGE CONTROL UNIT
1   TYPE 540 series OSCILLOSCOPE
1   TYPE 1A5 DIFFERENTIAL AMPLIFIER

Accessories

1   50 Ω BNC Coax Cable (012-0057-01)
1   P6006 BNC 10X PROBE (010-0127-00)

Other Equipement

1   Differential Voltmeter (John Fluke Model 825A or equivalent)
1   20,000 Ω/VDC Multimeter

CHECK OUT LIST

☐   1.   Check Power Supply Resistance to Ground

SUPPLY	APPROX. RESISTANCE
V_1 Supply	4 kΩ from pin T to pin N
V_2 Supply	4 kΩ from pin AA to pin N
Multi-Vibrator	1 kΩ from pin X to chassis ground

☐   2.   (a)   Check Accuracy and Regulation of Power Supply.

SUPPLY	VOLTS	ACCURACY	REGULATION	RIPPLE
V_1 (across R21)	8.5	0.1%	Less than 5 mV change with line voltage	≈ 5 mV
V_2 (across R121)	8.5	0.1%	Less than 5 mV change with line voltage	≈ 5 mV
Chopper Drive	≈9			

(b)   Check Line Voltage Selector Switch for 230 V Operation.

☐   3.   Check for an Output at all positions of V_1 and V_2 VOLTS setting.

☐   4.   Chopper Frequency: ≈60 Hz

A   ☐   5.   Chopped Output Noise: 2 mV or less

CALIBRATION PROCEDURE

1. PRESET

    a. Set the Chopped Voltage Reference controls as follows:

V_1 VOLTS	0-0-0
V_2 VOLTS	0-0-0
V_1 RANGE	0
V_2 RANGE	0
POWER	ON

2. POWER SUPPLY

    a. Check 9 V Supply

    Monitor the voltage at Pin X.

    Apply power to the 067-0596-00 via a TYPE 76TU LINE VOLTAGE CONTROL UNIT. Set the line voltage to 115 V.

    Check that the voltage at pin X reads approximately 9 V.

    b. Check V_1 and V_2 Voltage Regulation: 5 mV or less.

    Connect the differential voltmeter across R21. Set the differential voltmeter to 8.5 V. Adjust R15 for 8.5 V.

    Vary the line voltage between 104 VAC and 126 VAC and check that the voltage acorss R21 does not change more than 5 mV.

    Connect the differential voltmeter across R121 and adjust R115 for 8.5 V.

    Vary the line voltage between 104 VAC and 126 VAC and check that the voltage across R121 does not change more than 5 mV.

    Change the Line Voltage Range (rear panel) to Hi and repeat the voltage check for both channels while varying the line voltage between 112 VAC and 136 VAC.

    Change the Line Voltage Range to Lo and repeat the voltage check for both channels while varying the line voltage between 90 VAC and 110 VAC.

    Return the Line Selector Range to M and line voltage to 115 VAC.

    Remove the differential voltmeter.

    c. Supply Ripple

    Connect a shorting strap from Pin N of IC board to chassis ground.

    Connect a 10X probe from A INPUT of the Type 1A5 to the emitter of Q17. Check for approximately 5 mV ripple. Move probe to emitter of Q117 and check for approximately 5 mV of ripple.

A

CALIBRATION   (CONT)

2.   (cont)

   d.   Check 230 V operation.

   Connect a 10X probe to Pin 11 of the power transformer. Note the ripple
   amplitude. Change the Line Voltage Range to 230 V operation. The ripple
   amplitude should be one-half the previously noted amplitude. Remove 10X
   probe and return Line Voltage Range to 115 V operation.

   Remove ShorTing STrap from Pin N to Chassis ground.

3.   CONSTANT CURRENT SETUP FOR V_1 and V_2.

   a.   Adjust VR30 Current (R15) to within 0.1%.

   Set the differential voltmeter to +8.5 V. Connect the differential volt-
   meter across R21. Turn V_1 RANGE to 11 V. Adjust R15 for a null reading
   on the meter.

   b.   Adjust VR 130 Current (R115) to within 0.1%.

   Connect the differential voltmeter across R121. Turn V_2 RANGE to 11 V.
   Adjust R115 for a null reading on the meter.

   Remove voltmeter.

4. V_1 and V_2 CAL SETUP

   a.   Adjust V_1 Cal (R31) to within 1 mV.

   Remove chopper (G90).

   Set V_1 RANGE to 11 V and V_1 VOLTS to 11.000 (10-10-0).

   Set the differential voltmeter to +11 volts. Connect the voltmeter be-
   tween gnd *on* the CHOPPED OUTPUT jack and pin AI.

   Adjust R31 (lower pot on V_1 RANGE switch) for a null reading on the meter.
   (If R31 has insufficient range, select R30.)

   Turn V_1 RANGE OFF.

   b.   Adjust V_2 Cal (R131) to within 1 mV.

   Set V_2 RANGE to 11 V and V_2 VOLTS to 11.000 (10-10-0).

   Connect the differential voltmeter to pin AH.

   Adjust R131 (upper pot on V_2 RANGE switch) for a null reading on the meter.
   (If R131 has insufficient range, select R130.)

5. V_1 and V_2 TRACKING

   a.   Adjust V_2 Tracking (R156) to within 0.2 mV.

   Set V_2 VOLTS to 1.000 (0-10-0). Set differential voltmeter to +1 volt.

   Adjust R156 (lower pot on V_2 RANGE switch) for a null reading on the meter.

   Turn V_2 RANGE to 0.

A

CALIBRATION   (CONT)

5.   (cont)

   b.   Adjust V_1 Tracking (R56) to within 0.2 mV.

   Set V_1 RANGE to 11 V and V_1 VOLTS to 1.000 (0-10-0). Reconnect the differential voltmeter to pin AI.

   Adjust R56 (upper pot on V_1 RANGE switch) for a null reading on the meter.

   There is interaction between steps 4 and 5, repeat as necessary.

6.   REFERENCE VOLTAGE ACCURACY

   a.   Check V_1 and V_2 Reference Voltage Accuracy: Within 0.03% $\pm$1 mV with VOLTS set to 0.000 (0-0-0).

   Set V_2 RANGE off and use the following chart to determine the reference voltage accuracy.

V_1 VOLTS	Dial	Differential Voltmeter Reading	Max Deviation from Null
0.000	0-0-0	0.0 V	$\pm$1.0 mV
1.000	1-0-0	1.0 V	$\pm$1.3 mV
2.000	2-0-0	2.0 V	$\pm$1.6 mV
3.000	3-0-0	3.0 V	$\pm$1.9 mV
4.000	4-0-0	4.0 V	$\pm$2.2 mV
5.000	5-0-0	5.0 V	$\pm$2.5 mV
6.000	6-0-0	6.0 V	$\pm$2.8 mV
7.000	7-0-0	7.0 V	$\pm$3.1 mV
8.000	8-0-0	8.0 V	$\pm$3.4 mV
9.000	9-0-0	9.0 V	$\pm$3.7 mV
10.000	10-0-0	10.0 V	$\pm$4.0 mV
0.100	0-1-0	0.1 V	$\pm$1.5 mV
0.200	0-2-0	0.2 V	$\pm$2.0 mV
0.300	0-3-0	0.3 V	$\pm$2.0 mV
0.400	0-4-0	0.4 V	$\pm$2.0 mV
0.500	0-5-0	0.5 V	$\pm$2.0 mV
0.600	0-6-0	0.6 V	$\pm$2.0 mV
0.700	0-7-0	0.7 V	$\pm$2.0 mV
0.800	0-8-0	0.8 V	$\pm$2.0 mV
0.900	0-9-0	0.9 V	$\pm$2.0 mV
1.000	0-10-0	1.0 V	$\pm$2.0 mV

   Set V_1 RANGE off and turn V_2 RANGE to 11 V. Connect the differential voltmeter to pin AH. Check V_2 VOLTS using same chart as used for checking V_1 VOLTS.

CALIBRATION (CONT)

6. (cont)

b. Readjust V_2 Cal (R131) to within 0.2 mV.

Set V_2 RANGE to 1.1 V and V_2 VOLTS to 11.000 (10-10-0). Connect the differential voltmeter to pin AH.

Adjust R131 (upper pot on V_2 RANGE switch) for a null reading on the meter. Turn V_2 RANGE off.

c. Readjust V_1 Cal (R31) to within 0.2 mV.

Set V_1 RANGE to 1.1 V and V_1 VOLTS to 11.000 (10-10-0). Connect the differential voltmeter to pin AI.

Adjust R31 (lower pot on V_1 RANGE switch) for a null reading on the meter.

d. Readjust V_1 Tracking (R56) to within 0.2 mV.

Set V_1 VOLTS to 1.000 (0-10-0). Set the differential voltmeter to 0.1 V.

Adjust R56 (upper pot on V_1 RANGE switch) for a null reading on the meter. Turn V_1 RANGE off.

e. Readjust V_2 Tracking (R156) to within 0.2 mV.

Turn V_2 RANGE to 1.1 V and V_2 VOLTS to 1.000 (0-10-0). Connect the differential voltmeter to AH.

Adjust R156 (lower pot on V_2 RANGE switch) for a null reading on the meter.

7. COMPARISON VOLTAGE DIVIDERS

a. Check V_2 10:1 Divider: Within 0.04%.

Set the differential voltmeter to +11 V. Set V_2 RANGE to 11 V and V_2 VOLTS to 11.000 (10-10-0).

Check for reading on the differential voltmeter of 11.000 V within 4.4 mV.

b. Check V_2 Reference Voltage 10:1 Divider: Within 0.04%.

Switch V_2 RANGE to -11 V. Set polarity of the differential voltmeter to -.

Check for 11 W within 4.4 mV on the voltmeter.

Switch V_2 RANGE to -1.1 V. Set the differential voltmeter to 1.1 V.

Check for a reading on the voltmeter of 1.1 V within 0.44 mV.

Turn V_2 RANGE off.

A

CALIBRATION   (CONT)

7.   (cont)

c.   Check V_1 Reference Voltage 10:1 Divider: Within 0.04%.

Set the differential voltmeter to +11 V.   Set V_1 RANGE to 11 V and V_1 VOLTS to 11.000 (10-10-0).

Connect the differential voltmeter to pin AI.

Check for 11.000 V within 4.4 mV on the voltmeter.

d.   Check V_1 (-) Reference Voltage 10:1 Divider: Within 0.04%.

Set V_1 RANGE to -11 V.   Set polarity of the differential voltmeter to -.

Check for a reading on the voltmeter of 11.000 V within 4.4 mV.

Switch V_1 RANGE to -1.1 V.   Set differential voltmeter to -1.1 V.

Check for a reading on the voltmeter of -1.100 V within 0.44 mV.

Remove differential voltmeter.

Replace chopper (G90).

8.   CHOPPER OUTPUT

a.   Chopper Frequency (R77)

Connect a coax cable from CHOPPED OUTPUT to the Type 1A5.

Check range of CHOPPER FREQUENCY from 15 Hz to 100 Hz.   Set CHOPPER FREQUENCY to 60 ∿.

b.   Check CHOPPED OUTPUT Noise: 2 mV or less

With CHOPPED OUTPUT to A INPUT of the Type 1A5 put VOLTS/CM to 1 mV, A INPUT to AC.   Set the 067-0596-00 V_1 RANGE to 1.1 V, V_1 AMPLITUDE to 5.000 (5-0-0), V_2 RANGE to 1.1 V and V_2 AMPLITUDE to 5.000 (5-0-0).

Check for 2 mV or less noise as observed on the test scope (disregard switching transients).

Check for an output at all positions of V_1 and V_2 RANGE settings.

A

NOTES

CIRCUIT BOARD

A

CIRCUIT BOARD

R119
R117
R113
C116
R115
CR110
AC
AB
C121
Q115
Q116
Q117
R111
VR111
R123
R121
AA
AD
C123
AE
Z

R130
A
B
C
D

E1831XB
TYPE 067-0596-00
388-1303-00

CR75
C85
R88
C89
G
H
Q75
R75
R85
AH
Q85
Q86
AI
C75
CR85
C88
R78
L
M
C87
G90

Y
X
W
V
R71
CR70

U
C23
AF

T
R11
Q26
VR11
CR12
Q16
R21
R23
AG
C2
C16
R13
R15
R17
R19
S
R
CR10
+
−

© Copyright 1968,
TEKTRONIX, INC.

R30
Q
P
O
N

A
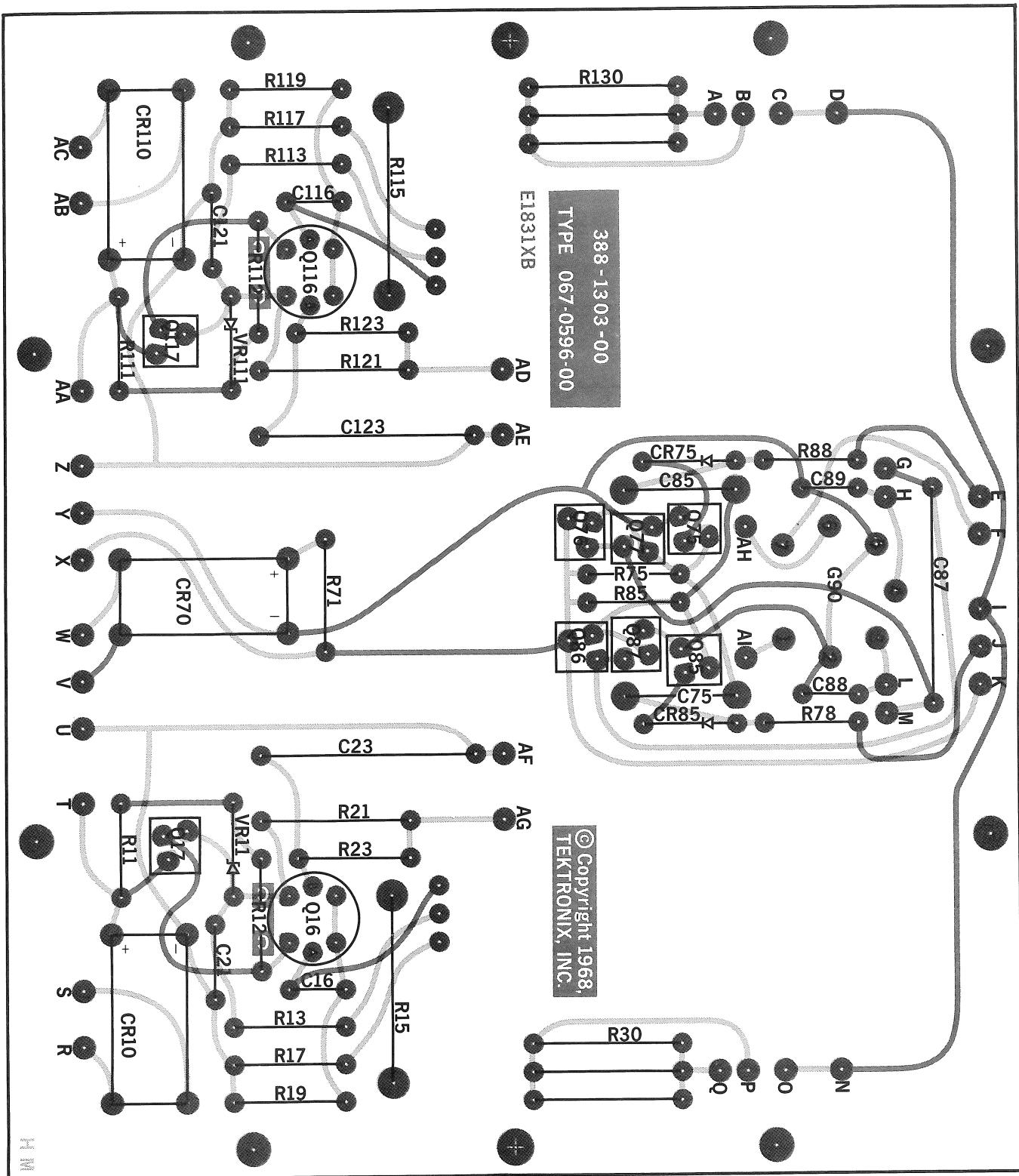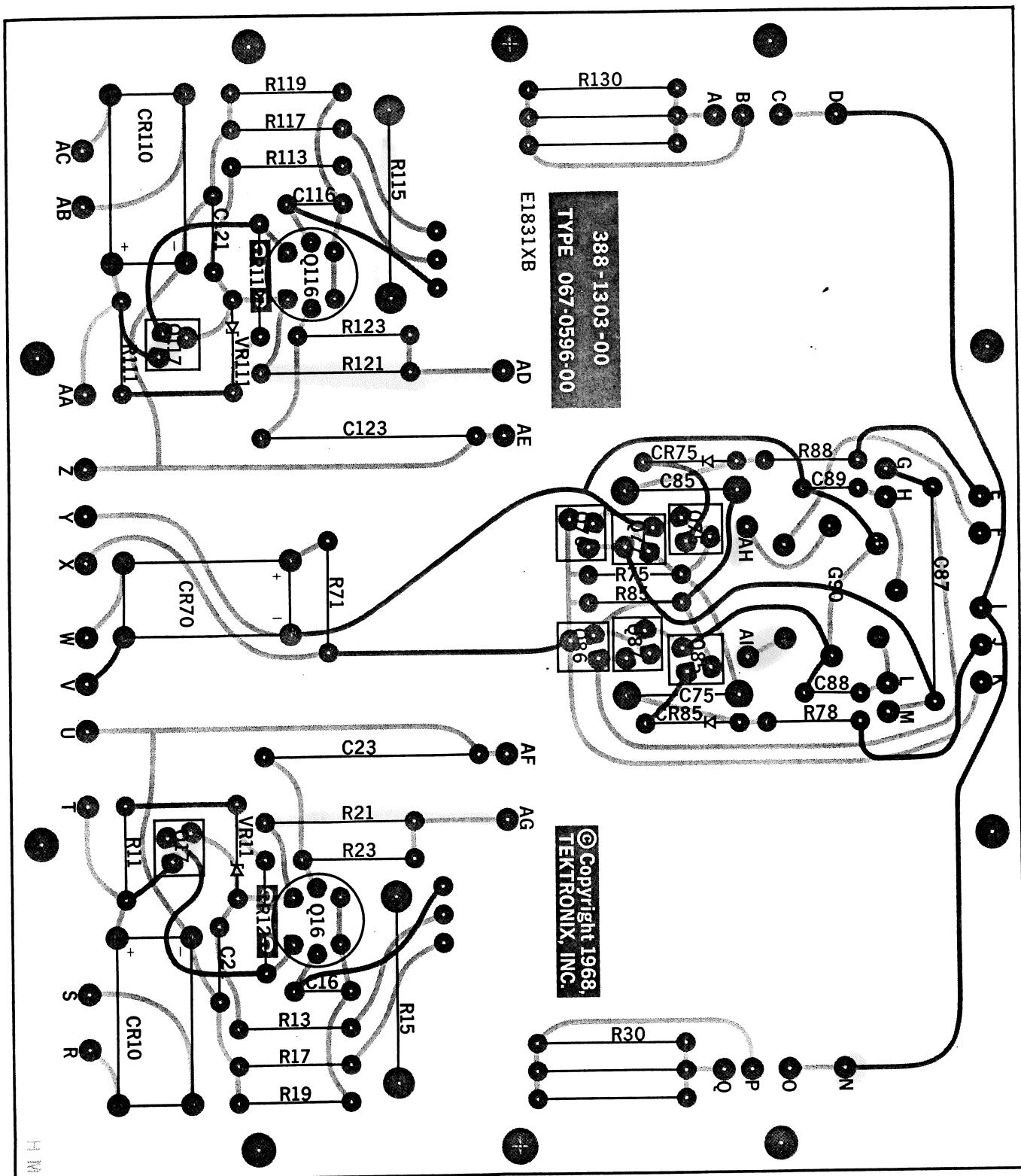
SCHEMATIC DIAGRAMS
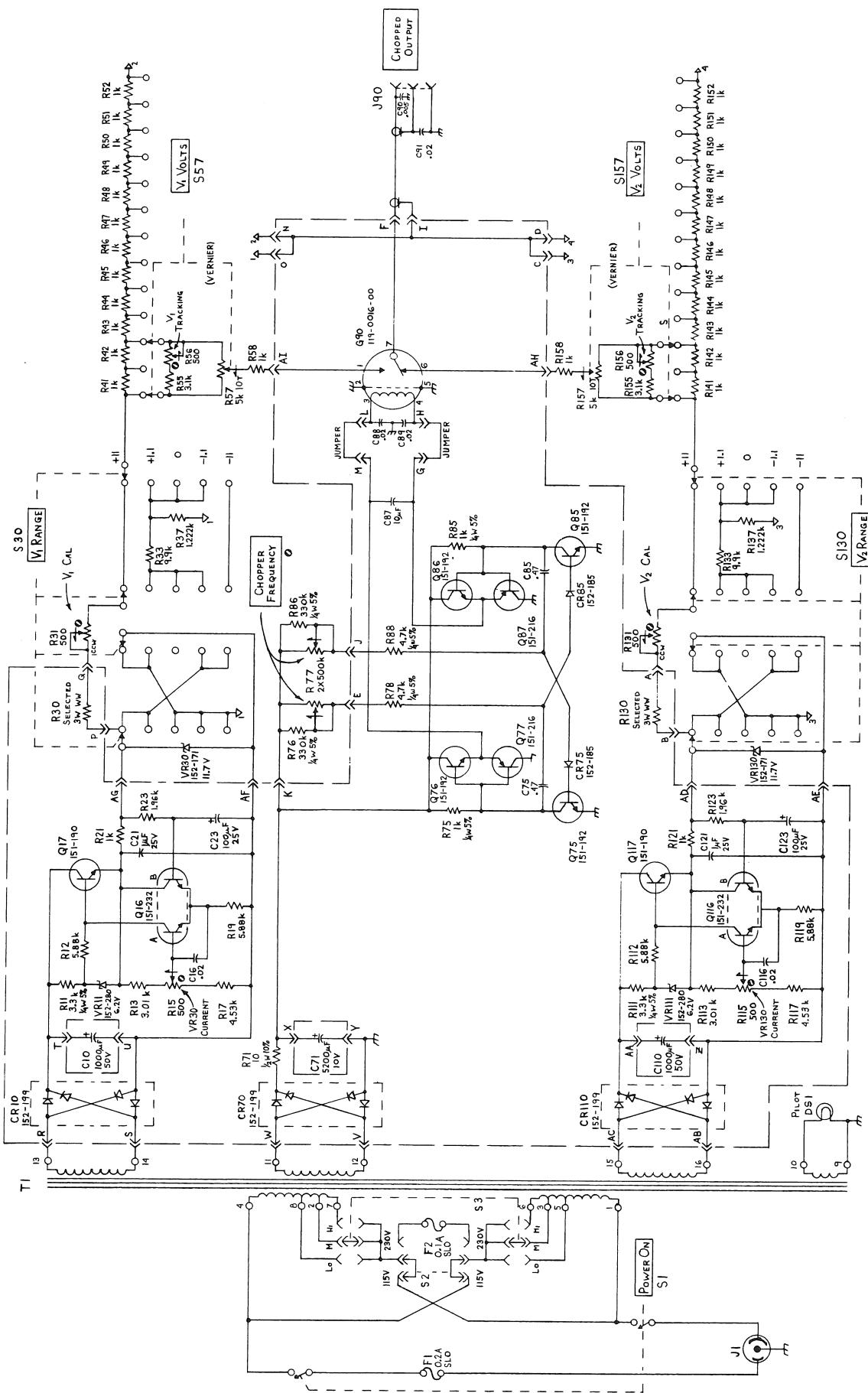
NOTES

SECTION 6

ELECTRICAL PARTS LIST

Values are fixed unless marked Variable.

Ckt. No.	Tektronix Part No.	Serial/Model No. Eff	Disc	Description

Bulb

DS1	150-0065-00			Incandescent, 10 V, 40 mA green lens

Capacitors

Tolerance ±20% unless otherwise indicated.

Ckt. No.	Part No.	Value	Type	Voltage	Tol.
C10	290-0122-00	1000 µF	Elect.	50 V	
C16	283-0004-00	0.02 µF	Cer	150 V	
C21	283-0059-00	1 µF	Cer	25 V	+80%-20%
C23	290-0215-00	100 µF	Elect.	25 V	
C71	290-0403-00	5200 µF	Elect.	10 V	+75%-10%
C75	290-0244-00	0.47 µF	Elect.	35 V	5%
C85	290-0244-00	0.47 µF	Elect.	35 V	5%
C87	290-0290-00	10 µF	Elect.	25 V	
C88	283-0004-00	0.02 µF	Cer	150 V	
C89	283-0004-00	0.02 µF	Cer	150 V	
C90	283-0110-00	0.005 µF	Cer	150 V	
C91	283-0004-00	0.02 µF	Cer	150 V	
C110	290-0122-00	1000 µF	Elect.	50 V	
C116	283-0004-00	0.02 µF	Cer	150 V	
C121	283-0059-00	1 µF	Cer	25 V	+80%-20%
C123	290-0215-00	100 µF	Elect.	25 V	

Semiconductor Device, Diodes

CR10	152-0199-00	Rectifier Bridge MDA 962-3	
CR70	152-0199-00	Rectifier Bridge MDA 962-3	
CR75	*152-0185-00	Silicon	Replaceable by 1N4152
CR85	*152-0185-00	Silicon	Replaceable by 1N4152
CR110	152-0199-00	Rectifier Bridge MDA 962-3	
VR11	152-0280-00	Zener 1N753A 400 mW, 6.2 V, 5%	
VR30	152-0171-00	Zener 1N944 11.7 V, 5%	
VR111	152-0280-00	Zener 1N753A 400 mW, 6.2 V, 5%	
VR130	152-0171-00	Zener 1N944 11.7 V, 5%	

Values are fixed unless marked Variable.

Ckt. No.	Tektronix Part No.	Serial/Model No. Eff	Disc	Description			

Fuses

| F1 | 159-0044-00 | | | 2/10 A 3 AG | Slo-Blo | | |
| F2 | 159-0048-00 | | | 1/10 A 3 AG | Slo-Blo | | |

Chopper

| G90 | 119-0016-00 | | | Chopper, Airpax 175 | | | |

Connectors

| J1 | 131-0171-00 | | | Motor base, 3 wire | | | |
| J90 | 131-0274-00 | | | BNC | | | |

Transistors

Q16	151-0232-00			Silicon	Dual		
Q17	151-0190-00			Silicon	2N3904		
Q75	151-0192-00			Silicon	Replaceable by MPS 6521		
Q76	151-0192-00			Silicon	Replaceable by MPS 6521		
Q77	151-0216-00			Silicon	Replaceable by MPS 6523		
Q85	151-0192-00			Silicon	Replaceable by MPS 6521		
Q86	151-0192-00			Silicon	Replaceable by MPS 6521		
Q87	151-0216-00			Silicon	Replaceable by MPS 6523		
Q116	151-0232-00			Silicon	Dual		
Q117	151-0190-00			Silicon	2N3904		

Resistors

Resistors are fixed, composition, ±10% unless otherwise indicated.

R11	315-0332-00			3.3 kΩ	1/4 W		5%
R12	321-0625-00			5.88 kΩ	1/8 W	Prec	1%
R13	321-0239-00			3.01 kΩ	1/8 W	Prec	1%
R15	311-0484-00			500 Ω, Var			
R17	321-0256-00			4.53 kΩ	1/8 W	Prec	1%

Values are fixed unless marked Variable.

Ckt. No.	Tektronix Part No.	Serial/Model No. Eff	Disc	Description			

Resistors (cont)

Ckt. No.	Tektronix Part No.			Description			
R19	321-0625-00			5.88 kΩ	1/8 W	Prec	1%
R21	308-0435-00			1 kΩ	3 W	WW	0.25%
R23	321-0221-00			1.96 kΩ	1/8 W	Prec	1%
R30	Selected						
R31	311-0484-00			500 Ω, Var			
R33	308-0326-00			9.9 kΩ	1/8 W	WW	0.01%
R37	308-0324-00			1.2222 kΩ	1/8 W	WW	0.01%
R41 thru R52	308-0323-00			1 kΩ	1/4 W	(matched set of 12)	
R55	308-0316-00			3.1 kΩ	1/2 W	WW	1%
R56	311-0484-00			500 Ω, Var			
R57	311-0360-00			5 kΩ, Var			
R58	302-0102-00			1 kΩ	1/2 W		
R71	302-0100-00			10 Ω	1/2 W		
R75	315-0102-00			1 kΩ	1/4 W		5%
R76	315-0334-00			330 kΩ	1/4 W		5%
R77	311-0400-00			2 x 500 kΩ, Var			
R78	315-0472-00			4.7 kΩ	1/4 W		5%
R85	315-0102-00			1 kΩ	1/4 W		5%
R86	315-0334-00			330 kΩ	1/4 W		5%
R88	315-0472-00			4.7 kΩ	1/4 W		5%
R111	315-0332-00			3.3 kΩ	1/4 W		5%
R112	321-0625-00			5.88 kΩ	1/8 W	Prec	1%
R113	321-0239-00			3.01 kΩ	1/8 W	Prec	1%
R115	311-0484-00			500 Ω, Var			
R117	321-0256-00			4.53 kΩ	1/8 W	Prec	1%
R119	321-0625-00			5.88 kΩ	1/8 W	Prec	1%
R121	308-0435-00			1 kΩ	3 W	WW	0.25%
R123	321-0221-00			1.96 kΩ	1/8 W	Prec	1%
R130	Selected						
R131	311-0484-00			500 kΩ, Var			

Values are fixed unless marked Variable.

Ckt. No.	Tektronix Part No.	Serial/Model No. Eff	Disc	Description				

Resistors   (cont)

Ckt. No.	Tektronix Part No.			Description				
R133	308-0326-00		9.9 kΩ		1/8 W	WW	0.01%
R137	308-0324-00		1.2222 kΩ		1/8 W	WW	0.01%
R141 thru R152	308-0323-00		1 kΩ		1/4 W (matched set of 12)		
R155	308-0316-00		3.1 kΩ		1/2 W	WW	1%
R156	311-0484-00		500 Ω, Var				
R157	311-0360-00		5 kΩ, Var				
R158	302-0102-00		1 kΩ		1/2 W		

Switches

Wired or Unwired

Ckt. No.	Tektronix Part No.		Type	Description	
S1	260-0834-00		Toggle	POWER ON	
S2[1]					
S3[1]					
S30 Wired	*262-0879-00		Rotary	V_1 RANGE	
S30	260-0633-00		Rotary	V_1 RANGE	
S57 Wired	*262-0880-00		Rotary	V_1 AMPLITUDE	
S57	260-0712-00		Rotary	V_1 AMPLITUDE	
S130 Wired	*262-0879-00		Rotary	V_2 RANGE	
S130	260-0633-00		Rotary	V_2 RANGE	
S157 Wired	*262-0880-00		Rotary	V_2 AMPLITUDE	
S157	260-0712-00		Rotary	V_2 AMPLITUDE	

Transformer

Ckt. No.	Tektronix Part No.		Description
T1	E*120-0618-00		Power, chop voltage reference

[1] See Mechanical Parts List.   Line Voltage Selector Body.

A

NOTES

FIG. 1 EXPLODED
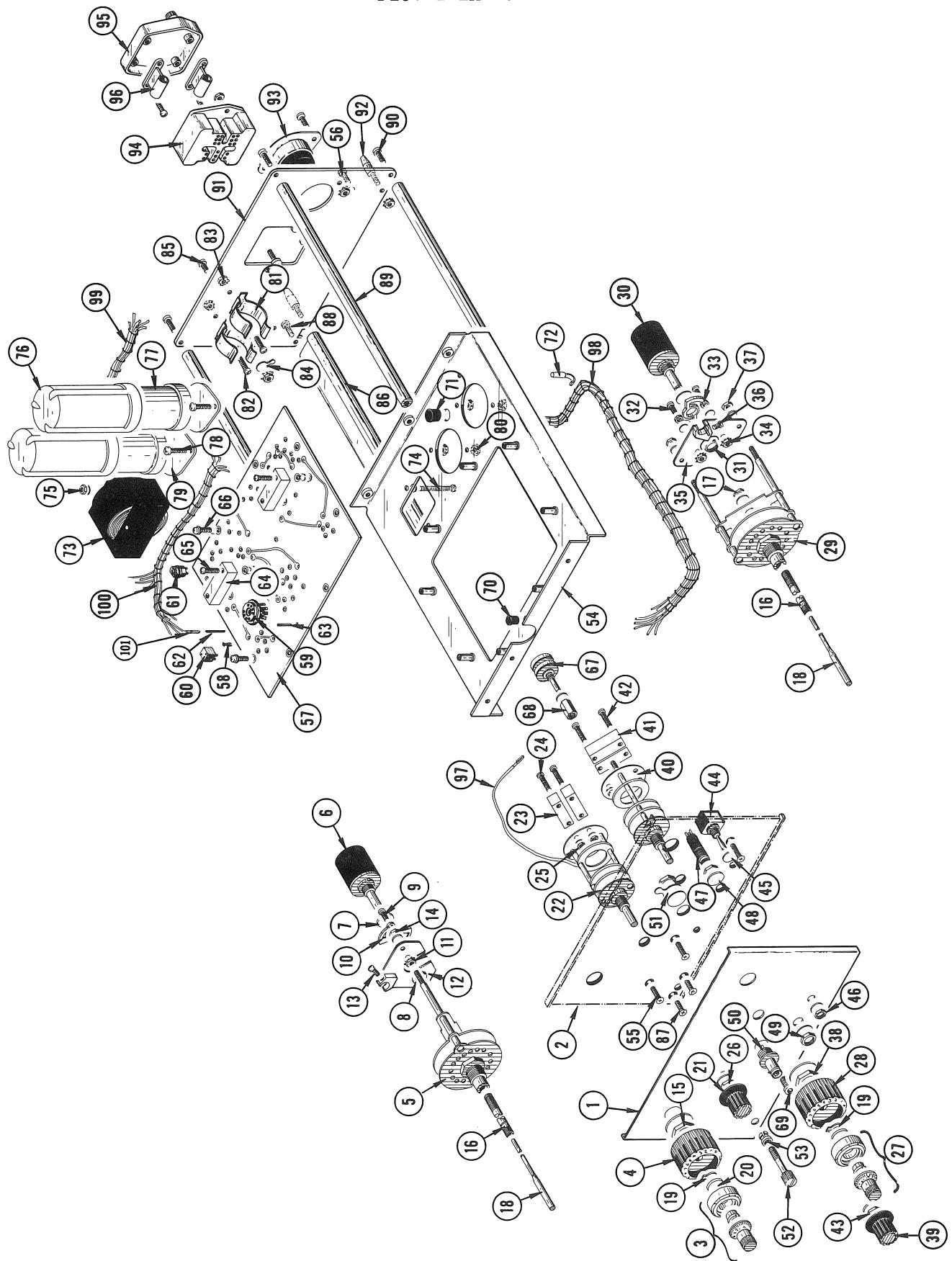
SECTION 7

MECHANICAL PARTS LIST
FIG. 1 EXPLODED

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Disc	Qty	1 2 3 4 5	Description
1-1	E333-1225-01			1		PANEL, front
-2	E386-1583-00			1		SUB-PANEL, front
-3	331-0152-00			1		DIAL, w/o brake -- V_1 VOLTS
-4	366-0324-00			1		KNOB, charcoal -- V_1 VOLTS
	- - - - -			-		knob includes:
	213-0022-00			2		SCREW, set, 4-40 x 3/16 inch, HSS
-5	E262-0880-00			1		SWITCH, wired -- V_1 VOLTS
	- - - - -			-		switch includes:
	260-0712-00			1		SWITCH, unwired
	213-0075-00			2		SCREW, set, 4-40 x 3/32 inch, HSS
-6	- - - - -			1		RESISTOR, variable
	- - - - -			-		mounting hardware: (not included w/resistor)
-7	210-0012-00			1		LOCKWASHER, internal, 3/8 ID x 1/2 inch OD
-8	210-0413-00			1		NUT, hex., 3/8-32 x 1/2 inch
-9	211-0097-00			2		SCREW, 4-40 x 5/16 inch, PHS
	210-0004-00			2		LOCKWASHER, internal, #4
-10	426-0289-00			1		MOUNT, plastic
-11	210-0586-00			2		NUT, keps, 4-40 x 1/4 inch
-12	337-0360-00			1		SHIELD
	- - - - -			-		shield includes:
-13	211-0094-00			1		SCREW, 4-40 x 1/2 inch, THS
	- - - - -			-		mounting hardware: (not included w/shield)
	210-0017-00			2		LOCKWASHER, split, #5
-14	210-0449-00			2		NUT, hex., 5-40 x 1/4 inch
	- - - - -			-		mounting hardware: (not included w/switch)
	210-1010-00			1		WASHER, flat, 0.643 ID x 0.875 inch OD
-15	210-0579-00			1		NUT, hex., 5/8-24 x 3/4 inch
-16	384-0362-00			2		SHAFT, dial index, 2.750 inches long
	- - - - -			-		mounting hardware for each:
	- - - - -			-		(not included w/shaft)
	210-0046-00			1		LOCKWASHER, internal, 0.261 ID
	- - - - -			-		x 0.400 inch OD
-17	210-0583-00			2		NUT, hex., 1/4-32 x 5/16 inch
-18	384-0364-00			2		SHAFT, dial index, 3.852 inches long
-19	354-0184-00			2		RING, retaining
-20	210-0853-00			2		WASHER, flat, 17/64 ID x 1/2 inch OD

A

FIG. 1 EXPLODED   (cont)

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Disc	Qty	1 2 3 4 5	Description
1-21	366-0173-00			1		KNOB, charcoal -- V_1 RANGE
	- - - - -			-		knob includes:
	213-0004-00			1		SCREW, set, 6-32 x 3/16 inch, HSS
-22	E 262-0879-00			1		SWITCH, wired -- V_1 RANGE
	- - - - -			-		switch includes:
	260-0633-00			1		SWITCH, unwired
-23	- - - - -			2		RESISTOR, variable
	- - - - -			-		mounting hardware for each:
	- - - - -			-		(not included w/resistor)
-24	211-0089-00			2		SCREW, 2-56 x 3/8 inch, RHS
	210-0001-00			2		LOCKWASHER, internal, #2
-25	210-0405-00			2		NUT, hex., 2-56 x 3/16 inch
	- - - - -			-		mounting hardware: (not included w/switch)
	210-0840-00			1		WASHER, flat, 0.390 ID x 9/16 inch OD
-26	210-0413-00			1		NUT, hex., 3/8-32 x 1/2 inch
-27	331-0152-00			1		DIAL, w/o brake -- V_2 VOLTS
-28	366-0324-00			1		KNOB, charcoal -- V_2 VOLTS
	- - - - -			-		knob includes:
	213-0022-00			2		SCREW, set, 4-40 x 3/16 inch, HSS
-29	E 262-0880-00			1		SWITCH, wired -- V_2 VOLTS
	- - - - -			-		switch includes:
	260-0712-00			1		SWITCH, unwired
	213-0075-00			2		SCREW, set, 4-40 x 3/32 inch, HSS
-30	- - - - -			1		RESISTOR, variable
	- - - - -			-		mounting hardware:
	- - - - -			-		(not included w/resistor)
	210-0012-00			1		LOCKWASHER, internal, 3/8 ID x 1/2 inch (
-31	210-0413-00			1		NUT, hex., 3/8-32 x 1/2 inch
-32	211-0097-00			2		SCREW, 4-40 x 5/16 inch, PHS
	210-0004-00			2		LOCKWASHER, internal, #4
-33	426-0289-00			1		MOUNT, plastic
-34	210-0586-00			2		NUT, keps, 4-40 x 1/4 inch

A

FIG. 1 EXPLODED   (cont)

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Disc	Qty	1 2 3 4 5	Description
1-35	337-0360-00			1		SHIELD
	- - - - - -			-		shield includes:
-36	211-0094-00			1		SCREW, 4-40 x 1/2 inch, THS
	- - - - - -			-		mounting hardware: (not included w/shield)
	210-0017-00			2		LOCKWASHER, split, #5
-37	210-0449-00			2		NUT, hex., 5-40 x 1/4 inch
	- - - - - -			-		mounting hardware: (not included w/switch)
	210-1010-00			1		WASHER, flat, 0.643 ID x 0.875 inch OD
-38	210-0579-00			1		NUT, hex., 5/8-24 x 3/4 inch
-39	366-0173-00			1		KNOB, charcoal -- V_2 RANGE
	- - - - - -			-		knob includes:
	213-0004-00			1		SCREW, set, 6-32 x 3/16 inch, HSS
-40	E262-0879-00			1		SWITCH, wired -- V_2 RANGE
	- - - - - -			-		switch includes:
	260-0633-00			1		SWITCH, unwired
-41	- - - - - -			2		RESISTOR, variable
	- - - - - -			-		mounting hardware for each:
	- - - - - -			-		(not included w/resistor)
-42	211-0089-00			2		SCREW, 2-56 x 3/8 inch, RHS
	210-0001-00			2		LOCKWASHER, internal, #2
	210-0405-00			2		NUT, hex., 2-56 x 3/16 inch
	- - - - - -			-		mounting hardware: (not included w/switch)
	210-0840-00			1		WASHER, flat, 0.390 ID x 9/16 inch OD
-43	210-0413-00			1		NUT, hex., 3/8-32 x 1/2 inch
-44	260-0834-00			1		SWITCH, toggle -- ON
	- - - - - -			-		mounting hardware: (not included w/switch)
-45	210-0046-00			1		LOCKWASHER, internal, 0.261 ID
	- - - - - -			-		x 0.400 inch OD
	210-0940-00			1		WASHER, flat, 1/4 ID x 3/8 inch OD
-46	210-0562-00			1		NUT, hex., 1/4-40 x 5/16 inch
-47	136-0164-00			1		SOCKET, light
	- - - - - -			-		mounting hardware: (not included w/socket)
	210-0413-00			1		NUT, hex., 3/8-32 x 1/2 inch
-48	210-0012-00			1		LOCKWASHER, internal, 3/8 ID x 1/2 inch OD
	210-0978-00			1		WASHER, flat, 3/8 ID x 1/2 inch OD
-49	220-0480-02			1		NUT, plain, 3/8-32 x 0.438 inch

FIG. 1 EXPLODED (cont)

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	No. Disc	Qty	1 2 3 4 5	Description
1-50	131-0274-00			1		CONNECTOR, insulated, BNC, female,
	- - - - - -			-		w/hardware
	- - - - - -			-		mounting hardware:
	- - - - - -			-		(not included w/connector)
-51	210-0241-00			1		LUG, terminal
-52	214-0553-00			1		LATCH SCREW
-53	358-0255-00			1		BUSHING, latch screw
-54	E 441-0883-00			1		CHASSIS
	- - - - - -			-		mounting hardware: (not included w/chassis)
-55	211-0538-00			3		SCREW, 6-32 x 5/16 inch, 100° csk, FHS
-56	211-0507-00			3		SCREW, 6-32 x 5/16 inch, PHS
-57	E 670-0300-00			1		ASSEMBLY, circuit board
	- - - - - -			-		assembly includes:
	E 388-1303-00			1		BOARD, circuit
-58	131-0639-00			4		CONTACT, electrical
-59	136-0058-00			1		SOCKET, tube, 7 pin
-60	136-0220-00			8		SOCKET, transistor, 3 pin
-61	136-0235-00			2		SOCKET, semiconductor, 6 pin
-62	131-0608-00			11		TERMINAL, pin, 0.365 inch long
-63	131-0589-00			24		TERMINAL, pin, 0.500 inch long
-64	- - - - - -			2		RESISTOR, variable
	- - - - - -			-		mounting hardware for each:
	- - - - - -			-		(not included w/resistor)
-65	211-0089-00			2		SCREW, 2-56 x 3/16 inch, RHS
	210-0001-00			2		LOCKWASHER, internal, #2
	210-0405-00			2		NUT, hex., 2-56 x 3/16 inch
	- - - - - -			-		mounting hardware: (not included w/assembly)
-66	211-0116-00			8		SCREW, sems, 4-40 x 5/16 inch, PHB
-67	- - - - - -			1		RESISTOR, variable
	- - - - - -			-		mounting hardware: (not included w/resistor)
	210-0046-00			1		LOCKWASHER, internal, 0.261 ID
	- - - - - -			-		x 0.400 inch OD
-68	210-0471-00			1		NUT, hex., 1/4-32 x 5/16 inch
-69	358-0054-00			1		BUSHING

FIG. 1 EXPLODED   (cont)

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Disc	Q t y	1 2 3 4 5	Description
1-70	348-0055-00			1		GROMMET, plastic, 1/4 inch diameter
-71	348-0056-00			1		GROMMET, plastic, 3/8 inch diameter
-72	E343-0213-00			1		CLAMP, cable, plastic
-73	- - - - - -			1		TRANSFORMER
	- - - - - -			-		mounting hardware:
	- - - - - -			-		(not included w/transformer)
-74	211-0019-00			2		SCREW, 4-40 x 1 inch, RHS
	210-0906-00			4		WASHER, fiber, 1/8 ID x 13/64 inch OD
-75	210-0406-00			2		NUT, hex., 4-40 x 3/16 inch
-76	200-0293-00			2		COVER, capacitor, plastic, 1.365 ID
	- - - - - -			-		x 2 9/16 inches long
-77	- - - - - -			2		CAPACITOR
	- - - - - -			-		mounting hardware for each:
	- - - - - -			-		(not included w/capacitor)
-78	211-0507-00			2		SCREW, 6-32 x 5/16 inch, PHS
-79	386-0254-00			1		PLATE, fiber, large
-80	210-0457-00			2		NUT, keps, 6-32 x 5/16 inch
-81	344-0118-00			2		CLIP, capacitor mounting
	- - - - - -			-		mounting hardware for each:
	- - - - - -			-		(not included w/clip)
-82	211-0507-00			1		SCREW, 6-32 x 5/16 inch, PHS
-83	210-0457-00			1		NUT, keps, 6-32 x 5/16 inch
-84	210-0202-00			1		LUG, solder, SE #6
	- - - - - -			-		mounting hardware: (not included w/lug)
	210-0457-00			1		NUT, keps, 6-32 x 5/16 inch
-85	211-0507-00			1		SCREW, 6-32 x 5/16 inch, PHS
-86	351-0089-02			1		RAIL, guide
	- - - - - -			-		mounting hardware not included w/rail
-87	211-0538-00			2		SCREW, 6-32 x 5/16 inch, 100° csk, FHS
-88	212-0008-00			1		SCREW, 8-32 x 1/2 inch, PHS
	214-0680-00			1		PIN, locating

A

FIG. 1 EXPLODED (cont)

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Disc	Qty	1 2 3 4 5 Description
1-89	385-0181-00			3	ROD, spacer
	- - - - - -			-	mounting hardware for each:
	- - - - - -			-	(not included w/rod)
-90	212-0008-00			1	SCREW, 8-32 x 1/2 inch, PHS
-91	386-1582-00			1	PANEL, rear
-92	214-0680-00			1	PIN, locating
	- - - - - -			-	mounting hardware: (not included w/pin)
	210-0458-00			1	NUT, keps, 8-32 x 11/32 inch
-93	131-0171-00			1	CONNECTOR, motor base, 3 wire
	- - - - - -			-	mounting hardware:
	- - - - - -			-	(not included w/connector)
	211-0507-00			2	SCREW, 6-32 x 5/16 inch, PHS
	210-0457-00			2	NUT, keps, 6-32 x 5/16 inch
-94	204-0279-00			1	BODY, line voltage selector
	- - - - - -			-	mounting hardware: (not included w/body)
	210-0006-00			2	LOCKWASHER, internal, #6
	210-0407-00			2	NUT, hex., 6-32 x 1/4 inch
-95	200-0762-00			1	COVER, line voltage selector
	- - - - - -			-	cover includes:
-96	352-0102-00			2	HOLDER, fuse
	- - - - - -			-	mounting hardware for each:
	- - - - - -			-	(not included w/holder)
	213-0088-00			2	SCREW, thread forming, #4 x 1/4 inch, PHS
-97	131-0621-00			23	CONNECTOR, terminal, female
-98	179-1391-00			1	CABLE HARNESS, line voltage
-99	179-1392-00			1	CABLE HARNESS, AC
-100	179-1390-00			1	CABLE HARNESS, chassis
	- - - - - -			-	cable harness includes:
-101	131-0621-00			12	CONNECTOR, terminal, female

A
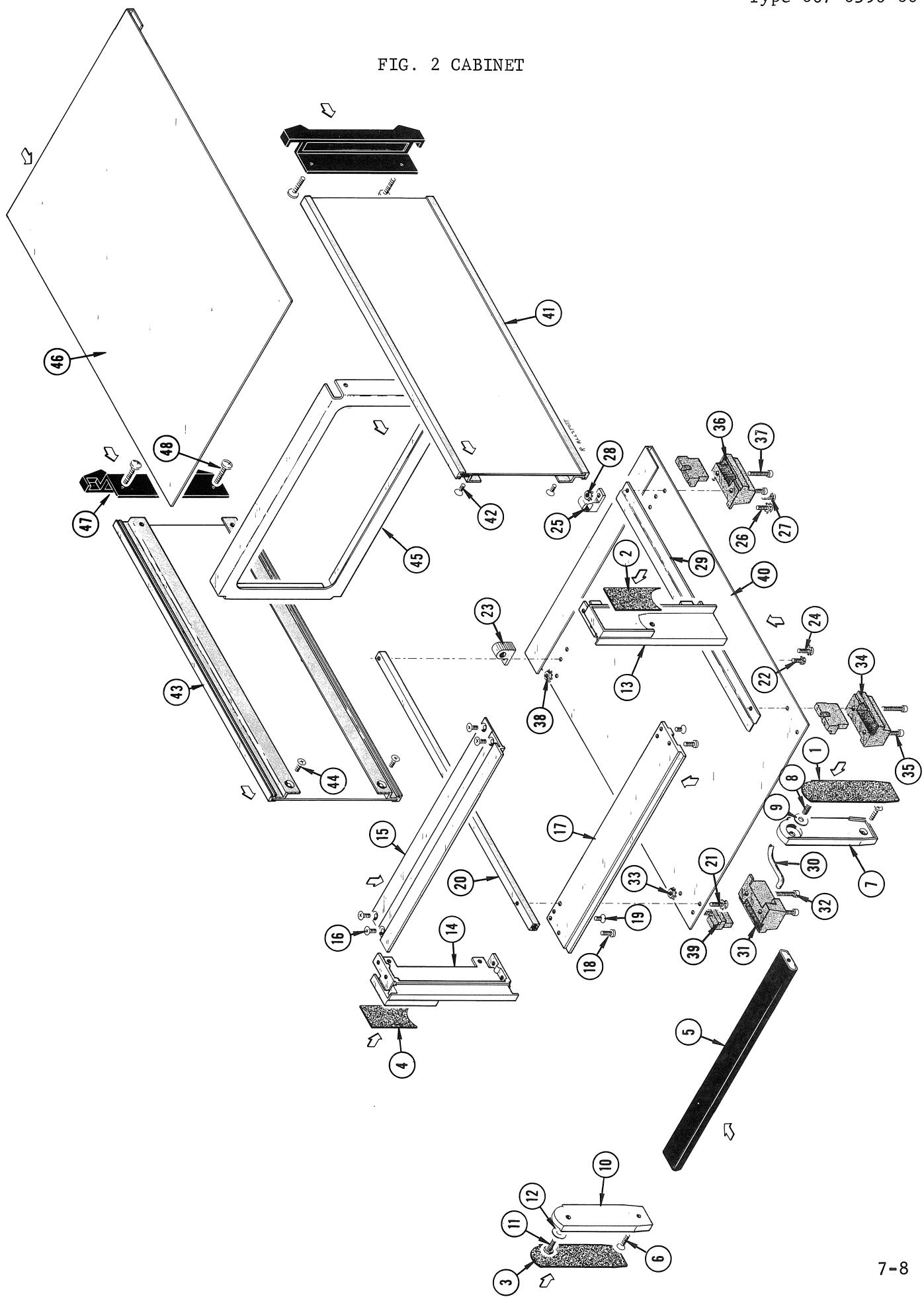
FIG. 2 CABINET

FIG 2 CABINET

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Disc	Qty	1 2 3 4 5	Description
2-	437-0077-01			1		ASSEMBLY, cabinet
	- - - - -			-		assembly includes:
-1	377-0122-00			1		INSERT, handle pivot, right
-2	377-0120-00			1		INSERT, frame, right
-3	377-0123-00			1		INSERT, handle pivot, left
-4	377-0121-00			1		INSERT, frame, left
-5	367-0052-00			1		HANDLE
	- - - - -			-		mounting hardware: (not included w/handle)
-6	212-0040-00			2		SCREW, 8-32 x 3/8 inch, 100° csk, FHS
-7	367-0050-00			1		PIVOT, handle, right
	- - - - -			-		mounting hardware: (not included w/pivot)
-8	214-0554-00			1		BOLT, hinge, 10-32 x 0.468 inch, HHS
-9	214-0558-00			1		WASHER, thrust, 5/16 ID x 1/2 inch OD
-10	367-0051-00			1		PIVOT, handle, left
	- - - - -			-		mounting hardware: (not included w/pivot)
-11	214-0554-00			1		BOLT, hinge, 10-32 x 0.468 inch, HHS
-12	214-0558-00			1		WASHER, thrust, 5/16 ID x 1/2 inch OD
-13	426-0252-00			1		FRAME, front, right
-14	426-0253-00			1		FRAME, front, left
-15	426-0255-00			1		FRAME, front, top
	- - - - -			-		mounting hardware: (not included w/frame)
-16	212-0002-00			4		SCREW, 8-32 x 1/4 inch, 100° csk, FHS
-17	426-0254-00			1		FRAME, front, bottom
	- - - - -			-		mounting hardware: (not included w/frame)
-18	212-0004-00			2		SCREW, 8-32 x 5/16 inch, PHS
-19	212-0002-00			2		SCREW, 8-32 x 1/4 inch, 100° csk, FHS
-20	351-0095-00			1		GUIDE, left
	- - - - -			-		mounting hardware: (not included w/guide)
-21	212-0023-00			1		SCREW, 8-32 x 0.375 inch, PHS
	210-0007-00			1		LOCKWASHER, external, #8
-22	211-0510-00			1		SCREW, 6-32 x 3/8 inch, PHS
	210-0005-00			1		LOCKWASHER, external, #6
-23	358-0293-01			1		BUSHING, plug-in securing, left
	- - - - -			-		mounting hardware: (not included w/ bushing)
	- - - - -			-		
-24	212-0001-00			1		SCREW, 8-32 x 1/4 inch, PHS
	210-0007-00			1		LOCKWASHER, external, #8

A

FIG. 2 CABINET (cont)

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Disc	Qty	1 2 3 4 5	Description
2-25	358-0294-01			1		BUSHING, plug-in securing, right
	- - - - - -			-		mounting hardware: (not included
	- - - - - -			-		w/bushing)
-26	212-0001-00			1		SCREW, 8-32 x 1/4 inch, PHS
	210-0007-00			1		LOCKWASHER, external, #8
-27	211-0510-00			1		SCREW, 6-32 x 1/2 inch, PHS
	210-0005-00			1		LOCKWASHER, external, #6
-28	210-0457-00			1		NUT, keps, 6-32 x 5/16 inch
-29	351-0094-00			1		GUIDE, right
-30	348-0072-00			1		FOOT, flip stand
-31	348-0073-00			1		FOOT, bail limiting, left front
	- - - - - -			-		mounting hardware: (not included w/foot)
-32	211-0532-00			2		SCREW, 6-32 x 3/4 inch, Fil HS
-33	210-0457-00			1		NUT, keps, 6-32 x 5/16 inch
-34	348-0074-00			1		FOOT, bail limiting, right front
	- - - - - -			-		mounting hardware: (not included w/foot)
-35	211-0532-00			2		SCREW, 6-32 x 3/4 inch, Fil HS
-36	348-0073-00			1		FOOT, bail limiting, right rear
	- - - - - -			-		mounting hardware: (not included w/foot)
-37	211-0532-00			2		SCREW, 6-32 x 3/4 inch, Fil HS
	348-0074-00			1		FOOT, bail limiting, left rear (not shown)
	- - - - - -			-		mounting hardware: (not included w/foot)
	211-0532-00			2		SCREW, 6-32 x 3/4 inch, Fil HS
-38	210-0457-00			1		NUT, keps, 6-32 x 5/16 inch
-39	377-0119-00			4		INSERT, foot
-40	386-0147-01			1		CABINET BOTTOM
-41	386-0148-00			2		CABINET SIDE
	- - - - - -			-		mounting hardware for each:
	- - - - - -			-		(not included w/cabinet side)
-42	212-0002-00			2		SCREW, 8-32 x 1/4 inch, 100° csk, FHS
-43	386-0139-00			1		PLATE, rear
-44	386-0149-00			1		PLATE, top
-45	348-0075-00			2		FOOT, rear guard
	- - - - - -			-		mounting hardware for each:
	- - - - - -			-		(not included w/foot)
-46	212-0004-00			2		SCREW, 8-32 x 5/16 inch, PHS

A

FIG. 3 STANDARD ACCESSORIES
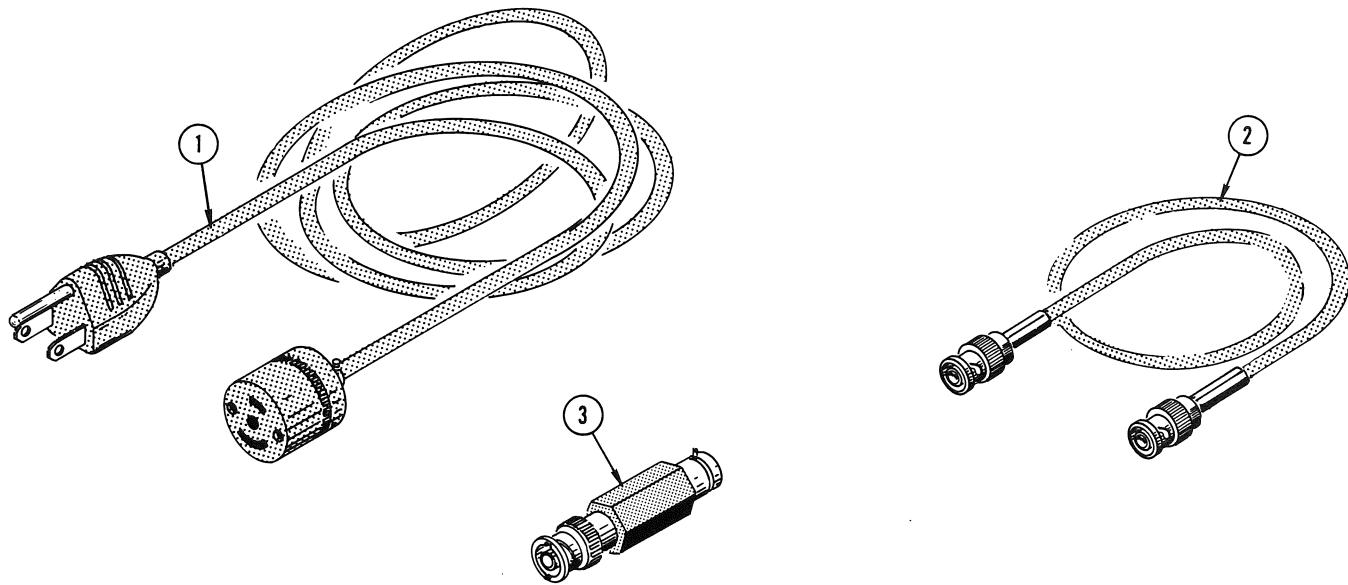
Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Disc	Qty	1 2 3 4 5	Description
3-1	161-0036-00			1		CABLE ASSEMBLY, power, 7 1/2 feet long
-2	012-0159-00			1		CABLE, special purpose, BNC
-3	011-0103-02			1		TERMINATION, coaxial, 75 Ω
	062-1094-00			2		MANUAL, instruction (not shown)

TABLES

CORRECTION VALUES FOR ERROR DUE TO 1 MEGOHM LOAD

ACTUAL OUTPUT MV	0.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00
ACTUAL READING MV	0.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.01	9.01
ABSOLUTE ERROR MV	0.0000	0.0000	0.0019	0.0033	0.0046	0.0062	0.0076	0.0093	0.0109	0.0127

ACTUAL OUTPUT MV	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00
ACTUAL READING MV	10.01	11.01	12.01	13.02	14.02	15.02	16.02	17.02	18.03	19.03
ABSOLUTE ERROR MV	0.0145	0.0165	0.0184	0.0205	0.0227	0.0249	0.0271	0.0294	0.0318	0.0342

ACTUAL OUTPUT MV	20.00	21.00	22.00	23.00	24.00	25.00	26.00	27.00	28.00	29.00
ACTUAL READING MV	20.03	21.03	22.04	23.04	24.04	25.04	26.05	27.05	28.05	29.06
ABSOLUTE ERROR MV	0.0367	0.0393	0.0418	0.0445	0.0472	0.0498	0.0526	0.0554	0.0582	0.0611

ACTUAL OUTPUT MV	30.00	31.00	32.00	33.00	34.00	35.00	36.00	37.00	38.00	39.00
ACTUAL READING MV	30.06	31.06	32.06	33.07	34.07	35.07	36.08	37.08	38.08	39.09
ABSOLUTE ERROR MV	0.0640	0.0669	0.0698	0.0728	0.0757	0.0787	0.0818	0.0848	0.0878	0.0909

ACTUAL OUTPUT MV	40.00	41.00	42.00	43.00	44.00	45.00	46.00	47.00	48.00	49.00
ACTUAL READING MV	40.09	41.09	42.10	43.10	44.10	45.10	46.11	47.11	48.11	49.12
ABSOLUTE ERROR MV	0.0939	0.0969	0.1000	0.1030	0.1060	0.1090	0.1121	0.1151	0.1180	0.1210

ACTUAL OUTPUT MV	50.00	51.00	52.00	53.00	54.00	55.00	56.00	57.00	58.00	59.00
ACTUAL READING MV	50.12	51.12	52.12	53.13	54.13	55.13	56.14	57.14	58.14	59.14
ABSOLUTE ERROR MV	0.1240	0.1269	0.1298	0.1327	0.1355	0.1383	0.1411	0.1438	0.1465	0.1492

ACTUAL OUTPUT MV	60.00	61.00	62.00	63.00	64.00	65.00	66.00	67.00	68.00	69.00
ACTUAL READING MV	60.15	61.15	62.15	63.15	64.16	65.16	66.16	67.16	68.17	69.17
ABSOLUTE ERROR MV	0.1518	0.1543	0.1568	0.1593	0.1617	0.1640	0.1663	0.1685	0.1707	0.1728

ACTUAL OUTPUT MV	70.00	71.00	72.00	73.00	74.00	75.00	76.00	77.00	78.00	79.00
ACTUAL READING MV	70.17	71.17	72.17	73.18	74.18	75.18	76.18	77.18	78.18	79.18
ABSOLUTE ERROR MV	0.1748	0.1768	0.1787	0.1804	0.1822	0.1838	0.1854	0.1868	0.1882	0.1895

ACTUAL OUTPUT MV	80.00	81.00	82.00	83.00	84.00	85.00	86.00	87.00	88.00	89.00
ACTUAL READING MV	80.19	81.19	82.19	83.19	84.19	85.19	86.19	87.19	88.19	89.19
ABSOLUTE ERROR MV	0.1907	0.1918	0.1928	0.1937	0.1945	0.1951	0.1957	0.1962	0.1965	0.1968

ACTUAL OUTPUT MV	90.00	91.00	92.00	93.00	94.00	95.00	96.00	97.00	98.00	99.00
ACTUAL READING MV	90.19	91.19	92.19	93.19	94.19	95.19	96.19	97.19	98.19	99.19
ABSOLUTE ERROR MV	0.1969	0.1969	0.1968	0.1965	0.1962	0.1957	0.1950	0.1942	0.1933	0.1923

A

ACTUAL OUTPUT MV	ACTUAL READING MV	ABSOLUTE ERROR MV
100.00	100.19	0.1926
101.00	101.19	0.1994
102.00	102.20	0.2062
103.00	103.21	0.2130
104.00	104.21	0.2198
105.00	105.22	0.2266
106.00	106.23	0.2335
107.00	107.24	0.2403
108.00	108.24	0.2471
109.00	109.25	0.2539
110.00	110.26	0.2607
111.00	111.26	0.2675
112.00	112.27	0.2743
113.00	113.28	0.2810
114.00	114.28	0.2878
115.00	115.29	0.2945
116.00	116.30	0.3012
117.00	117.30	0.3079
118.00	118.31	0.3145
119.00	119.32	0.3211
120.00	120.32	0.3277
121.00	121.33	0.3343
122.00	122.34	0.3408
123.00	123.34	0.3473
124.00	124.35	0.3537
125.00	125.36	0.3601
126.00	126.36	0.3664
127.00	127.37	0.3727
128.00	128.37	0.3789
129.00	129.38	0.3851
130.00	130.39	0.3912
131.00	131.39	0.3973
132.00	132.40	0.4032
133.00	133.40	0.4092
134.00	134.41	0.4150
135.00	135.42	0.4208
136.00	136.42	0.4265
137.00	137.43	0.4322
138.00	138.43	0.4378
139.00	139.44	0.4432
140.00	140.44	0.4486
141.00	141.45	0.4540
142.00	142.45	0.4592
143.00	143.46	0.4643
144.00	144.46	0.4694
145.00	145.47	0.4743
146.00	146.47	0.4792
147.00	147.48	0.4840
148.00	148.48	0.4886
149.00	149.49	0.4932
150.00	150.49	0.4976
151.00	151.50	0.5019
152.00	152.50	0.5062
153.00	153.51	0.5103
154.00	154.51	0.5143
155.00	155.51	0.5181
156.00	156.52	0.5219
157.00	157.52	0.5255
158.00	158.52	0.5290
159.00	159.53	0.5324
160.00	160.53	0.5356
161.00	161.53	0.5387
162.00	162.54	0.5417
163.00	163.54	0.5445
164.00	164.54	0.5472
165.00	165.54	0.5498
166.00	166.55	0.5522
167.00	167.55	0.5544
168.00	168.55	0.5565
169.00	169.55	0.5585
170.00	170.56	0.5603
171.00	171.56	0.5619
172.00	172.56	0.5634
173.00	173.56	0.5647
174.00	174.56	0.5659
175.00	175.56	0.5669
176.00	176.56	0.5677
177.00	177.56	0.5683
178.00	178.56	0.5688
179.00	179.56	0.5691
180.00	180.56	0.5692
181.00	181.56	0.5691
182.00	182.56	0.5689
183.00	183.56	0.5684
184.00	184.56	0.5678
185.00	185.56	0.5670
186.00	186.56	0.5660
187.00	187.56	0.5648
188.00	188.56	0.5634
189.00	189.56	0.5618
190.00	190.56	0.5600
191.00	191.55	0.5580
192.00	192.55	0.5557
193.00	193.55	0.5533
194.00	194.55	0.5507
195.00	195.54	0.5478
196.00	196.54	0.5448
197.00	197.54	0.5415
198.00	198.53	0.5380
199.00	199.53	0.5342

A

ACTUAL OUTPUT MV	200.00	201.00	202.00	203.00	204.00	205.00	206.00	207.00	208.00	209.00
ACTUAL READING MV	200.53	201.55	202.56	203.57	204.58	205.59	206.60	207.62	208.63	209.64
ABSOLUTE ERROR MV	0.5388	0.5509	0.5628	0.5747	0.5864	0.5981	0.6098	0.6213	0.6327	0.6440
ACTUAL OUTPUT MV	210.00	211.00	212.00	213.00	214.00	215.00	216.00	217.00	218.00	219.00
ACTUAL READING MV	210.65	211.66	212.67	213.68	214.69	215.70	216.72	217.73	218.74	219.75
ABSOLUTE ERROR MV	0.6553	0.6664	0.6775	0.6884	0.6992	0.7099	0.7205	0.7310	0.7414	0.7517
ACTUAL OUTPUT MV	220.00	221.00	222.00	223.00	224.00	225.00	226.00	227.00	228.00	229.00
ACTUAL READING MV	220.76	221.77	222.78	223.79	224.80	225.81	226.81	227.82	228.83	229.84
ABSOLUTE ERROR MV	0.7618	0.7718	0.7817	0.7914	0.8011	0.8105	0.8199	0.8291	0.8382	0.8471
ACTUAL OUTPUT MV	230.00	231.00	232.00	233.00	234.00	235.00	236.00	237.00	238.00	239.00
ACTUAL READING MV	230.85	231.86	232.87	233.88	234.88	235.89	236.90	237.91	238.92	239.92
ABSOLUTE ERROR MV	0.8559	0.8645	0.8730	0.8813	0.8895	0.8975	0.9054	0.9131	0.9206	0.9280
ACTUAL OUTPUT MV	240.00	241.00	242.00	243.00	244.00	245.00	246.00	247.00	248.00	249.00
ACTUAL READING MV	240.93	241.94	242.94	243.95	244.96	245.96	246.97	247.98	248.98	249.99
ABSOLUTE ERROR MV	0.9352	0.9422	0.9490	0.9557	0.9622	0.9685	0.9746	0.9805	0.9863	0.9918
ACTUAL OUTPUT MV	250.00	251.00	252.00	253.00	254.00	255.00	256.00	257.00	258.00	259.00
ACTUAL READING MV	250.99	252.00	253.00	254.01	255.01	256.02	257.02	258.02	259.03	260.03
ABSOLUTE ERROR MV	0.9972	1.0023	1.0073	1.0121	1.0166	1.0210	1.0251	1.0290	1.0328	1.0363
ACTUAL OUTPUT MV	260.00	261.00	262.00	263.00	264.00	265.00	266.00	267.00	268.00	269.00
ACTUAL READING MV	261.03	262.04	263.04	264.04	265.05	266.05	267.05	268.05	269.05	270.05
ABSOLUTE ERROR MV	1.0396	1.0426	1.0455	1.0481	1.0505	1.0526	1.0546	1.0563	1.0577	1.0590
ACTUAL OUTPUT MV	270.00	271.00	272.00	273.00	274.00	275.00	276.00	277.00	278.00	279.00
ACTUAL READING MV	271.06	272.06	273.06	274.06	275.06	276.06	277.06	278.05	279.05	280.05
ABSOLUTE ERROR MV	1.0600	1.0607	1.0612	1.0615	1.0615	1.0612	1.0607	1.0599	1.0589	1.0576
ACTUAL OUTPUT MV	280.00	281.00	282.00	283.00	284.00	285.00	286.00	287.00	288.00	289.00
ACTUAL READING MV	281.05	282.05	283.05	284.04	285.04	286.04	287.04	288.03	289.03	290.03
ABSOLUTE ERROR MV	1.0561	1.0543	1.0522	1.0499	1.0472	1.0443	1.0412	1.0377	1.0340	1.0300
ACTUAL OUTPUT MV	290.00	291.00	292.00	293.00	294.00	295.00	296.00	297.00	298.00	299.00
ACTUAL READING MV	291.02	292.02	293.01	294.01	295.00	295.99	296.99	297.98	298.98	299.97
ABSOLUTE ERROR MV	1.0257	1.0211	1.0162	1.0111	1.0056	0.9999	0.9938	0.9874	0.9808	0.9738

A

ACTUAL OUTPUT MV	ACTUAL READING MV	ABSOLUTE ERROR MV
300.00	300.99	0.9901
301.00	302.00	1.0068
302.00	303.02	1.0233
303.00	304.03	1.0397
304.00	305.05	1.0559
305.00	306.07	1.0719
306.00	307.08	1.0878
307.00	308.10	1.1034
308.00	309.11	1.1189
309.00	310.13	1.1342
310.00	311.14	1.1493
311.00	312.16	1.1642
312.00	313.17	1.1790
313.00	314.19	1.1935
314.00	315.20	1.2078
315.00	316.22	1.2220
316.00	317.23	1.2359
317.00	318.24	1.2496
318.00	319.26	1.2632
319.00	320.27	1.2765
320.00	321.28	1.2896
321.00	322.30	1.3025
322.00	323.31	1.3151
323.00	324.32	1.3276
324.00	325.33	1.3398
325.00	326.35	1.3518
326.00	327.36	1.3636
327.00	328.37	1.3752
328.00	329.38	1.3865
329.00	330.39	1.3976
330.00	331.40	1.4084
331.00	332.41	1.4190
332.00	333.42	1.4294
333.00	334.43	1.4396
334.00	335.44	1.4495
335.00	336.45	1.4591
336.00	337.46	1.4685
337.00	338.47	1.4776
338.00	339.48	1.4865
339.00	340.49	1.4952
340.00	341.50	1.5035
341.00	342.51	1.5117
342.00	343.51	1.5195
343.00	344.52	1.5271
344.00	345.53	1.5344
345.00	346.54	1.5415
346.00	347.54	1.5482
347.00	348.55	1.5547
348.00	349.56	1.5610
349.00	350.56	1.5669
350.00	351.57	1.5726
351.00	352.57	1.5780
352.00	353.58	1.5831
353.00	354.58	1.5879
354.00	355.59	1.5924
355.00	356.59	1.5966
356.00	357.60	1.6005
357.00	358.60	1.6042
358.00	359.60	1.6075
359.00	360.61	1.6106
360.00	361.61	1.6133
361.00	362.61	1.6157
362.00	363.61	1.6178
363.00	364.61	1.6196
364.00	365.62	1.6211
365.00	366.62	1.6223
366.00	367.62	1.6232
367.00	368.62	1.6237
368.00	369.62	1.6240
369.00	370.62	1.6239
370.00	371.62	1.6235
371.00	372.62	1.6227
372.00	373.62	1.6216
373.00	374.62	1.6202
374.00	375.61	1.6185
375.00	376.61	1.6164
376.00	377.61	1.6140
377.00	378.61	1.6112
378.00	379.60	1.6081
379.00	380.60	1.6047
380.00	381.60	1.6009
381.00	382.59	1.5968
382.00	383.59	1.5923
383.00	384.58	1.5875
384.00	385.58	1.5823
385.00	386.57	1.5767
386.00	387.57	1.5708
387.00	388.56	1.5646
388.00	389.55	1.5580
389.00	390.55	1.5510
390.00	391.54	1.5436
391.00	392.53	1.5359
392.00	393.52	1.5278
393.00	394.51	1.5193
394.00	395.51	1.5105
395.00	396.50	1.5013
396.00	397.49	1.4917
397.00	398.48	1.4817
398.00	399.47	1.4713
399.00	400.46	1.4606

ACTUAL OUTPUT MV	400.00	401.00	402.00	403.00	404.00	405.00	406.00	407.00	408.00	409.00
ACTUAL READING MV	401.49	402.51	403.53	404.55	405.57	406.59	407.61	408.63	409.65	410.67
ABSOLUTE ERROR MV	1.4966	1.5175	1.5380	1.5583	1.5784	1.5982	1.6177	1.6369	1.6558	1.6745

ACTUAL OUTPUT MV	410.00	411.00	412.00	413.00	414.00	415.00	416.00	417.00	418.00	419.00
ACTUAL READING MV	411.69	412.71	413.72	414.74	415.76	416.78	417.79	418.81	419.82	420.84
ABSOLUTE ERROR MV	1.6929	1.7110	1.7289	1.7464	1.7637	1.7806	1.7973	1.8137	1.8298	1.8455

ACTUAL OUTPUT MV	420.00	421.00	422.00	423.00	424.00	425.00	426.00	427.00	428.00	429.00
ACTUAL READING MV	421.86	422.87	423.89	424.90	425.91	426.93	427.94	428.96	429.97	430.98
ABSOLUTE ERROR MV	1.8610	1.8762	1.8910	1.9056	1.9198	1.9338	1.9474	1.9607	1.9736	1.9863

ACTUAL OUTPUT MV	430.00	431.00	432.00	433.00	434.00	435.00	436.00	437.00	438.00	439.00
ACTUAL READING MV	431.99	433.01	434.02	435.03	436.04	437.05	438.06	439.07	440.08	441.09
ABSOLUTE ERROR MV	1.9986	2.0106	2.0223	2.0336	2.0446	2.0553	2.0656	2.0756	2.0852	2.0945

ACTUAL OUTPUT MV	440.00	441.00	442.00	443.00	444.00	445.00	446.00	447.00	448.00	449.00
ACTUAL READING MV	442.10	443.11	444.12	445.12	446.13	447.14	448.14	449.15	450.16	451.16
ABSOLUTE ERROR MV	2.1035	2.1121	2.1203	2.1282	2.1358	2.1430	2.1498	2.1563	2.1624	2.1681

ACTUAL OUTPUT MV	450.00	451.00	452.00	453.00	454.00	455.00	456.00	457.00	458.00	459.00
ACTUAL READING MV	452.17	453.17	454.18	455.18	456.19	457.19	458.19	459.20	460.20	461.20
ABSOLUTE ERROR MV	2.1735	2.1785	2.1831	2.1874	2.1913	2.1948	2.1979	2.2006	2.2030	2.2049

ACTUAL OUTPUT MV	460.00	461.00	462.00	463.00	464.00	465.00	466.00	467.00	468.00	469.00
ACTUAL READING MV	462.20	463.20	464.20	465.20	466.20	467.20	468.20	469.20	470.20	471.20
ABSOLUTE ERROR MV	2.2065	2.2077	2.2085	2.2089	2.2089	2.2085	2.2077	2.2065	2.2050	2.2029

ACTUAL OUTPUT MV	470.00	471.00	472.00	473.00	474.00	475.00	476.00	477.00	478.00	479.00
ACTUAL READING MV	472.20	473.19	474.19	475.19	476.18	477.18	478.17	479.17	480.16	481.16
ABSOLUTE ERROR MV	2.2005	2.1977	2.1945	2.1908	2.1868	2.1823	2.1774	2.1721	2.1663	2.1602

ACTUAL OUTPUT MV	480.00	481.00	482.00	483.00	484.00	485.00	486.00	487.00	488.00	489.00
ACTUAL READING MV	482.15	483.14	484.13	485.13	486.12	487.11	488.10	489.09	490.08	491.07
ABSOLUTE ERROR MV	2.1536	2.1466	2.1391	2.1312	2.1229	2.1141	2.1049	2.0953	2.0852	2.0747

ACTUAL OUTPUT MV	490.00	491.00	492.00	493.00	494.00	495.00	496.00	497.00	498.00	499.00
ACTUAL READING MV	492.06	493.05	494.04	495.02	496.01	497.00	497.98	498.97	499.95	500.94
ABSOLUTE ERROR MV	2.0638	2.0523	2.0405	2.0282	2.0154	2.0022	1.9885	1.9744	1.9598	1.9447

A

ACTUAL OUTPUT MV	ACTUAL READING MV	ABSOLUTE ERROR MV
500.00	502.00	2.0080
501.00	503.03	2.0324
502.00	504.05	2.0564
503.00	505.08	2.0800
504.00	506.10	2.1033
505.00	507.12	2.1463
506.00	508.14	2.1489
507.00	509.17	2.1711
508.00	510.19	2.1929
509.00	511.21	2.2144
510.00	512.23	2.2355
511.00	513.25	2.2562
512.00	514.27	2.2766
513.00	515.29	2.2965
514.00	516.31	2.3161
515.00	517.33	2.3353
516.00	518.35	2.3541
517.00	519.37	2.3726
518.00	520.39	2.3906
519.00	521.40	2.4082
520.00	522.42	2.4255
521.00	523.44	2.4423
522.00	524.45	2.4588
523.00	525.47	2.4749
524.00	526.49	2.4905
525.00	527.50	2.5058
526.00	528.52	2.5206
527.00	529.53	2.5350
528.00	530.54	2.5491
529.00	531.56	2.5627
530.00	532.57	2.5759
531.00	533.58	2.5886
532.00	534.60	2.6010
533.00	535.61	2.6129
534.00	536.62	2.6245
535.00	537.63	2.6355
536.00	538.64	2.6462
537.00	539.65	2.6564
538.00	540.66	2.6662
539.00	541.67	2.6756
540.00	542.68	2.6846
541.00	543.69	2.6931
542.00	544.70	2.7011
543.00	545.70	2.7087
544.00	546.71	2.7159
545.00	547.72	2.7227
546.00	548.72	2.7290
547.00	549.73	2.7348
548.00	550.74	2.7402
549.00	551.74	2.7451
550.00	552.74	2.7496
551.00	553.75	2.7537
552.00	554.75	2.7572
553.00	555.76	2.7604
554.00	556.76	2.7630
555.00	557.76	2.7652
556.00	558.76	2.7669
557.00	559.76	2.7682
558.00	560.76	2.7690
559.00	561.76	2.7693
560.00	562.76	2.7692
561.00	563.76	2.7686
562.00	564.76	2.7675
563.00	565.76	2.7659
564.00	566.76	2.7638
565.00	567.76	2.7613
566.00	568.75	2.7583
567.00	569.75	2.7548
568.00	570.75	2.7508
569.00	571.74	2.7463
570.00	572.74	2.7414
571.00	573.73	2.7359
572.00	574.73	2.7300
573.00	575.72	2.7236
574.00	576.71	2.7166
575.00	577.70	2.7092
576.00	578.70	2.7013
577.00	579.69	2.6928
578.00	580.68	2.6839
579.00	581.67	2.6745
580.00	582.66	2.6645
581.00	583.65	2.6541
582.00	584.64	2.6431
583.00	585.63	2.6316
584.00	586.61	2.6197
585.00	587.60	2.6072
586.00	588.59	2.5942
587.00	589.58	2.5806
588.00	590.56	2.5666
589.00	591.55	2.5520
590.00	592.53	2.5369
591.00	593.52	2.5213
592.00	594.50	2.5052
593.00	595.48	2.4885
594.00	596.47	2.4713
595.00	597.45	2.4536
596.00	598.43	2.4354
597.00	599.41	2.4166
598.00	600.39	2.3973
599.00	601.37	2.3774

ACTUAL OUTPUT MV	600.00	601.00	602.00	603.00	604.00	605.00	606.00	607.00	608.00	609.00
ACTUAL READING MV	602.47	603.50	604.52	605.55	606.57	607.60	608.63	609.65	610.67	611.70
ABSOLUTE ERROR MV	2.4728	2.5002	2.5271	2.5535	2.5795	2.6051	2.6302	2.6548	2.6790	2.7027

ACTUAL OUTPUT MV	610.00	611.00	612.00	613.00	614.00	615.00	616.00	617.00	618.00	619.00
ACTUAL READING MV	612.72	613.74	614.77	615.79	616.81	617.83	618.85	619.87	620.89	621.91
ABSOLUTE ERROR MV	2.7259	2.7487	2.7709	2.7928	2.8141	2.8350	2.8554	2.8753	2.8947	2.9136

ACTUAL OUTPUT MV	620.00	621.00	622.00	623.00	624.00	625.00	626.00	627.00	628.00	629.00
ACTUAL READING MV	622.93	623.95	624.96	625.98	627.00	628.01	629.03	630.04	631.06	632.07
ABSOLUTE ERROR MV	2.9321	2.9501	2.9675	2.9845	3.0010	3.0170	3.0325	3.0475	3.0620	3.0760

ACTUAL OUTPUT MV	630.00	631.00	632.00	633.00	634.00	635.00	636.00	637.00	638.00	639.00
ACTUAL READING MV	633.08	634.10	635.11	636.12	637.13	638.14	639.15	640.16	641.17	642.18
ABSOLUTE ERROR MV	3.0895	3.1025	3.1150	3.1270	3.1384	3.1494	3.1598	3.1697	3.1791	3.1880

ACTUAL OUTPUT MV	640.00	641.00	642.00	643.00	644.00	645.00	646.00	647.00	648.00	649.00
ACTUAL READING MV	643.19	644.20	645.21	646.21	647.22	648.23	649.23	650.24	651.24	652.24
ABSOLUTE ERROR MV	3.1964	3.2042	3.2115	3.2183	3.2246	3.2303	3.2355	3.2402	3.2443	3.2479

ACTUAL OUTPUT MV	650.00	651.00	652.00	653.00	654.00	655.00	656.00	657.00	658.00	659.00
ACTUAL READING MV	653.25	654.25	655.25	656.25	657.25	658.25	659.25	660.25	661.25	662.25
ABSOLUTE ERROR MV	3.2509	3.2535	3.2554	3.2569	3.2578	3.2581	3.2579	3.2571	3.2558	3.2540

ACTUAL OUTPUT MV	660.00	661.00	662.00	663.00	664.00	665.00	666.00	667.00	668.00	669.00
ACTUAL READING MV	663.25	664.24	665.24	666.24	667.23	668.23	669.22	670.21	671.21	672.20
ABSOLUTE ERROR MV	3.2516	3.2486	3.2451	3.2410	3.2364	3.2312	3.2254	3.2191	3.2122	3.2048

ACTUAL OUTPUT MV	670.00	671.00	672.00	673.00	674.00	675.00	676.00	677.00	678.00	679.00
ACTUAL READING MV	673.19	674.18	675.17	676.16	677.15	678.14	679.13	680.12	681.11	682.09
ABSOLUTE ERROR MV	3.1967	3.1881	3.1790	3.1692	3.1589	3.1481	3.1366	3.1245	3.1119	3.0987

ACTUAL OUTPUT MV	680.00	681.00	682.00	683.00	684.00	685.00	686.00	687.00	688.00	689.00
ACTUAL READING MV	683.08	684.07	685.05	686.04	687.02	688.00	688.99	689.97	690.95	691.93
ABSOLUTE ERROR MV	3.0849	3.0706	3.0556	3.0401	3.0240	3.0073	2.9900	2.9721	2.9536	2.9345

ACTUAL OUTPUT MV	690.00	691.00	692.00	693.00	694.00	695.00	696.00	697.00	698.00	699.00
ACTUAL READING MV	692.91	693.89	694.87	695.85	696.83	697.80	698.78	699.76	700.73	701.71
ABSOLUTE ERROR MV	2.9148	2.8945	2.8737	2.8522	2.8301	2.8075	2.7842	2.7603	2.7358	2.7107

A

ACTUAL OUTPUT MV	ACTUAL READING MV	ABSOLUTE ERROR MV
700.00	702.83	2.8393
701.00	703.86	2.8691
702.00	704.89	2.8984
703.00	705.92	2.9271
704.00	706.95	2.9553
705.00	707.98	2.9829
706.00	709.01	3.0100
707.00	710.03	3.0365
708.00	711.06	3.0625
709.00	712.08	3.0879

ACTUAL OUTPUT MV	ACTUAL READING MV	ABSOLUTE ERROR MV
710.00	713.11	3.1127
711.00	714.13	3.1370
712.00	715.16	3.1607
713.00	716.18	3.1838
714.00	717.20	3.2064
715.00	718.22	3.2284
716.00	719.24	3.2498
717.00	720.27	3.2707
718.00	721.29	3.2909
719.00	722.31	3.3106

ACTUAL OUTPUT MV	ACTUAL READING MV	ABSOLUTE ERROR MV
720.00	723.32	3.3298
721.00	724.34	3.3483
722.00	725.36	3.3663
723.00	726.38	3.3837
724.00	727.40	3.4005
725.00	728.41	3.4167
726.00	729.43	3.4324
727.00	730.44	3.4474
728.00	731.46	3.4619
729.00	732.47	3.4757

ACTUAL OUTPUT MV	ACTUAL READING MV	ABSOLUTE ERROR MV
730.00	733.48	3.4890
731.00	734.50	3.5017
732.00	735.51	3.5138
733.00	736.52	3.5252
734.00	737.53	3.5361
735.00	738.54	3.5464
736.00	739.55	3.5561
737.00	740.56	3.5652
738.00	741.57	3.5737
739.00	742.58	3.5816

ACTUAL OUTPUT MV	ACTUAL READING MV	ABSOLUTE ERROR MV
740.00	743.58	3.5888
741.00	744.59	3.5955
742.00	745.60	3.6015
743.00	746.60	3.6070
744.00	747.61	3.6118
745.00	748.61	3.6160
746.00	749.61	3.6196
747.00	750.62	3.6226
748.00	751.62	3.6250
749.00	752.62	3.6267

ACTUAL OUTPUT MV	ACTUAL READING MV	ABSOLUTE ERROR MV
750.00	753.62	3.6278
751.00	754.62	3.6283
752.00	755.62	3.6282
753.00	756.62	3.6275
754.00	757.62	3.6261
755.00	758.62	3.6241
756.00	759.62	3.6215
757.00	760.61	3.6182
758.00	761.61	3.6143
759.00	762.60	3.6098

ACTUAL OUTPUT MV	ACTUAL READING MV	ABSOLUTE ERROR MV
760.00	763.60	3.6047
761.00	764.59	3.5989
762.00	765.59	3.5925
763.00	766.58	3.5854
764.00	767.57	3.5777
765.00	768.56	3.5694
766.00	769.56	3.5604
767.00	770.55	3.5508
768.00	771.54	3.5406
769.00	772.52	3.5297

ACTUAL OUTPUT MV	ACTUAL READING MV	ABSOLUTE ERROR MV
770.00	773.51	3.5181
771.00	774.50	3.5059
772.00	775.49	3.4931
773.00	776.47	3.4796
774.00	777.46	3.4655
775.00	778.45	3.4507
776.00	779.43	3.4353
777.00	780.41	3.4192
778.00	781.40	3.4024
779.00	782.38	3.3850

ACTUAL OUTPUT MV	ACTUAL READING MV	ABSOLUTE ERROR MV
780.00	783.36	3.3670
781.00	784.34	3.3483
782.00	785.32	3.3289
783.00	786.30	3.3089
784.00	787.28	3.2882
785.00	788.26	3.2669
786.00	789.24	3.2449
787.00	790.22	3.2222
788.00	791.19	3.1989
789.00	792.17	3.1749

ACTUAL OUTPUT MV	ACTUAL READING MV	ABSOLUTE ERROR MV
790.00	793.15	3.1502
791.00	794.12	3.1249
792.00	795.09	3.0989
793.00	796.07	3.0722
794.00	797.04	3.0449
795.00	798.01	3.0169
796.00	798.98	2.9882
797.00	799.95	2.9588
798.00	800.92	2.9288
799.00	801.89	2.8981

A

ACTUAL OUTPUT MV	800.00	801.00	802.00	803.00	804.00	805.00	806.00	807.00	808.00	809.00
ACTUAL READING MV	803.05	804.08	805.11	806.14	807.17	808.20	809.23	810.26	811.29	812.31
ABSOLUTE ERROR MV	3.0554	3.0872	3.1184	3.1489	3.1787	3.2080	3.2365	3.2644	3.2917	3.3183

ACTUAL OUTPUT MV	810.00	811.00	812.00	813.00	814.00	815.00	816.00	817.00	818.00	819.00
ACTUAL READING MV	813.34	814.36	815.39	816.41	817.44	818.46	819.48	820.50	821.52	822.54
ABSOLUTE ERROR MV	3.3443	3.3696	3.3942	3.4182	3.4415	3.4642	3.4862	3.5075	3.5282	3.5482

ACTUAL OUTPUT MV	820.00	821.00	822.00	823.00	824.00	825.00	826.00	827.00	828.00	829.00
ACTUAL READING MV	823.56	824.58	825.60	826.62	827.63	828.65	829.66	830.68	831.69	832.71
ABSOLUTE ERROR MV	3.5675	3.5862	3.6042	3.6215	3.6382	3.6542	3.6695	3.6841	3.6980	3.7113

ACTUAL OUTPUT MV	830.00	831.00	832.00	833.00	834.00	835.00	836.00	837.00	838.00	839.00
ACTUAL READING MV	833.72	834.73	835.74	836.75	837.76	838.77	839.78	840.79	841.80	842.80
ABSOLUTE ERROR MV	3.7239	3.7358	3.7470	3.7576	3.7674	3.7766	3.7851	3.7929	3.8000	3.8064

ACTUAL OUTPUT MV	840.00	841.00	842.00	843.00	844.00	845.00	846.00	847.00	848.00	849.00
ACTUAL READING MV	843.81	844.81	845.82	846.82	847.82	848.83	849.83	850.83	851.83	852.83
ABSOLUTE ERROR MV	3.8122	3.8172	3.8215	3.8252	3.8282	3.8304	3.8320	3.8329	3.8330	3.8325

ACTUAL OUTPUT MV	850.00	851.00	852.00	853.00	854.00	855.00	856.00	857.00	858.00	859.00
ACTUAL READING MV	853.83	854.82	855.82	856.82	857.81	858.81	859.80	860.80	861.79	862.78
ABSOLUTE ERROR MV	3.8313	3.8293	3.8267	3.8233	3.8193	3.8145	3.8091	3.8029	3.7960	3.7885

ACTUAL OUTPUT MV	860.00	861.00	862.00	863.00	864.00	865.00	866.00	867.00	868.00	869.00
ACTUAL READING MV	863.78	864.77	865.76	866.75	867.73	868.72	869.71	870.70	871.68	872.67
ABSOLUTE ERROR MV	3.7802	3.7712	3.7614	3.7510	3.7399	3.7280	3.7154	3.7021	3.6881	3.6734

ACTUAL OUTPUT MV	870.00	871.00	872.00	873.00	874.00	875.00	876.00	877.00	878.00	879.00
ACTUAL READING MV	873.65	874.64	875.62	876.60	877.58	878.56	879.55	880.52	881.50	882.48
ABSOLUTE ERROR MV	3.6580	3.6418	3.6249	3.6073	3.5890	3.5699	3.5502	3.5297	3.5084	3.4865

ACTUAL OUTPUT MV	880.00	881.00	882.00	883.00	884.00	885.00	886.00	887.00	888.00	889.00
ACTUAL READING MV	883.46	884.44	885.41	886.39	887.36	888.33	889.31	890.28	891.25	892.22
ABSOLUTE ERROR MV	3.4638	3.4404	3.4163	3.3914	3.3659	3.3395	3.3125	3.2847	3.2562	3.2270

ACTUAL OUTPUT MV	890.00	891.00	892.00	893.00	894.00	895.00	896.00	897.00	898.00	899.00
ACTUAL READING MV	893.19	894.16	895.13	896.10	897.06	898.03	899.00	899.96	900.93	901.89
ABSOLUTE ERROR MV	3.1970	3.1663	3.1348	3.1027	3.0697	3.0361	3.0017	2.9666	2.9307	2.8941

A

	900	901	902	903	904	905	906	907	908	909
ACTUAL OUTPUT MV	900.00	901.00	902.00	903.00	904.00	905.00	906.00	907.00	908.00	909.00
ACTUAL READING MV	903.06	904.10	905.13	906.16	907.19	908.22	909.25	910.28	911.31	912.34
ABSOLUTE ERROR MV	3.0687	3.1021	3.1347	3.1666	3.1978	3.2282	3.2579	3.2868	3.3150	3.3424

	910	911	912	913	914	915	916	917	918	919
ACTUAL OUTPUT MV	910.00	911.00	912.00	913.00	914.00	915.00	916.00	917.00	918.00	919.00
ACTUAL READING MV	913.36	914.39	915.42	916.44	917.46	918.49	919.51	920.53	921.55	922.57
ABSOLUTE ERROR MV	3.3691	3.3951	3.4202	3.4447	3.4684	3.4913	3.5135	3.5349	3.5556	3.5755

	920	921	922	923	924	925	926	927	928	929
ACTUAL OUTPUT MV	920.00	921.00	922.00	923.00	924.00	925.00	926.00	927.00	928.00	929.00
ACTUAL READING MV	923.59	924.61	925.63	926.64	927.66	928.67	929.69	930.70	931.72	932.73
ABSOLUTE ERROR MV	3.5946	3.6130	3.6306	3.6475	3.6636	3.6790	3.6936	3.7074	3.7204	3.7327

	930	931	932	933	934	935	936	937	938	939
ACTUAL OUTPUT MV	930.00	931.00	932.00	933.00	934.00	935.00	936.00	937.00	938.00	939.00
ACTUAL READING MV	933.74	934.75	935.76	936.77	937.78	938.79	939.79	940.80	941.80	942.81
ABSOLUTE ERROR MV	3.7443	3.7550	3.7650	3.7742	3.7827	3.7904	3.7973	3.8035	3.8088	3.8134

	940	941	942	943	944	945	946	947	948	949
ACTUAL OUTPUT MV	940.00	941.00	942.00	943.00	944.00	945.00	946.00	947.00	948.00	949.00
ACTUAL READING MV	943.81	944.82	945.82	946.82	947.82	948.82	949.82	950.82	951.82	952.81
ABSOLUTE ERROR MV	3.8173	3.8203	3.8226	3.8241	3.8248	3.8248	3.8240	3.8224	3.8200	3.8168

	950	951	952	953	954	955	956	957	958	959
ACTUAL OUTPUT MV	950.00	951.00	952.00	953.00	954.00	955.00	956.00	957.00	958.00	959.00
ACTUAL READING MV	953.81	954.80	955.80	956.79	957.78	958.78	959.77	960.76	961.75	962.74
ABSOLUTE ERROR MV	3.8129	3.8082	3.8027	3.7964	3.7894	3.7815	3.7729	3.7635	3.7533	3.7423

	960	961	962	963	964	965	966	967	968	969
ACTUAL OUTPUT MV	960.00	961.00	962.00	963.00	964.00	965.00	966.00	967.00	968.00	969.00
ACTUAL READING MV	963.73	964.71	965.70	966.69	967.67	968.66	969.64	970.62	971.60	972.58
ABSOLUTE ERROR MV	3.7306	3.7180	3.7047	3.6906	3.6757	3.6600	3.6435	3.6262	3.6081	3.5893

	970	971	972	973	974	975	976	977	978	979
ACTUAL OUTPUT MV	970.00	971.00	972.00	973.00	974.00	975.00	976.00	977.00	978.00	979.00
ACTUAL READING MV	973.56	974.54	975.52	976.50	977.48	978.45	979.43	980.41	981.38	982.35
ABSOLUTE ERROR MV	3.5697	3.5492	3.5280	3.5060	3.4832	3.4596	3.4352	3.4100	3.3841	3.3573

	980	981	982	983	984	985	986	987	988	989
ACTUAL OUTPUT MV	980.00	981.00	982.00	983.00	984.00	985.00	986.00	987.00	988.00	989.00
ACTUAL READING MV	983.32	984.30	985.27	986.24	987.21	988.18	989.14	990.11	991.08	992.04
ABSOLUTE ERROR MV	3.3297	3.3014	3.2722	3.2423	3.2115	3.1800	3.1477	3.1145	3.0806	3.0459

	990	991	992	993	994	995	996	997	998	999
ACTUAL OUTPUT MV	990.00	991.00	992.00	993.00	994.00	995.00	996.00	997.00	998.00	999.00
ACTUAL READING MV	993.01	993.97	994.93	995.89	996.86	997.82	998.78	999.73	1000.69	1001.65
ABSOLUTE ERROR MV	3.0104	2.9740	2.9369	2.8990	2.8603	2.8208	2.7805	2.7393	2.6974	2.6547

A

ACTUAL OUTPUT MV	ACTUAL READING MV	ABSOLUTE ERROR MV
1000.00	1002.82	2.8268
1001.00	1003.86	2.8615
1002.00	1004.89	2.8953
1003.00	1005.92	2.9283
1004.00	1006.96	2.9605
1005.00	1007.99	2.9918
1006.00	1009.02	3.0223
1007.00	1010.05	3.0519
1008.00	1011.08	3.0807
1009.00	1012.10	3.1086
1010.00	1013.13	3.1358
1011.00	1014.16	3.1620
1012.00	1015.18	3.1875
1013.00	1016.21	3.2120
1014.00	1017.23	3.2358
1015.00	1018.25	3.2587
1016.00	1019.28	3.2807
1017.00	1020.30	3.3019
1018.00	1021.32	3.3223
1019.00	1022.34	3.3418
1020.00	1023.36	3.3605
1021.00	1024.37	3.3783
1022.00	1025.39	3.3953
1023.00	1026.41	3.4114
1024.00	1027.42	3.4267
1025.00	1028.44	3.4411
1026.00	1029.45	3.4547
1027.00	1030.46	3.4674
1028.00	1031.47	3.4793
1029.00	1032.49	3.4904
1030.00	1033.50	3.5006
1031.00	1034.50	3.5099
1032.00	1035.51	3.5184
1033.00	1036.52	3.5260
1034.00	1037.53	3.5328
1035.00	1038.53	3.5387
1036.00	1039.54	3.5438
1037.00	1040.54	3.5480
1038.00	1041.55	3.5514
1039.00	1042.55	3.5539
1040.00	1043.55	3.5556
1041.00	1044.55	3.5564
1042.00	1045.55	3.5563
1043.00	1046.55	3.5555
1044.00	1047.55	3.5537
1045.00	1048.55	3.5511
1046.00	1049.54	3.5476
1047.00	1050.54	3.5433
1048.00	1051.53	3.5382
1049.00	1052.53	3.5321
1050.00	1053.52	3.5252
1051.00	1054.51	3.5175
1052.00	1055.50	3.5069
1053.00	1056.49	3.4995
1054.00	1057.48	3.4892
1055.00	1058.47	3.4780
1056.00	1059.46	3.4660
1057.00	1060.45	3.4531
1058.00	1061.43	3.4394
1059.00	1062.42	3.4248
1060.00	1063.40	3.4093
1061.00	1064.39	3.3930
1062.00	1065.37	3.3758
1063.00	1066.35	3.3578
1064.00	1067.33	3.3389
1065.00	1068.31	3.3192
1066.00	1069.29	3.2986
1067.00	1070.27	3.2772
1068.00	1071.25	3.2548
1069.00	1072.23	3.2317
1070.00	1073.20	3.2076
1071.00	1074.18	3.1827
1072.00	1075.15	3.1570
1073.00	1076.13	3.1304
1074.00	1077.10	3.1029
1075.00	1078.07	3.0746
1076.00	1079.04	3.0454
1077.00	1080.01	3.0154
1078.00	1080.98	2.9845
1079.00	1081.95	2.9527
1080.00	1082.92	2.9201
1081.00	1083.88	2.8866
1082.00	1084.85	2.8523
1083.00	1085.81	2.8171
1084.00	1086.78	2.7810
1085.00	1087.74	2.7441
1086.00	1088.70	2.7063
1087.00	1089.66	2.6677
1088.00	1090.62	2.6282
1089.00	1091.58	2.5879
1090.00	1092.54	2.5467
1091.00	1093.50	2.5046
1092.00	1094.46	2.4617
1093.00	1095.41	2.4179
1094.00	1096.37	2.3732
1095.00	1097.32	2.3277
1096.00	1098.28	2.2814
1097.00	1099.23	2.2342
1098.00	1100.18	2.1861
1099.00	1101.13	2.1372

A