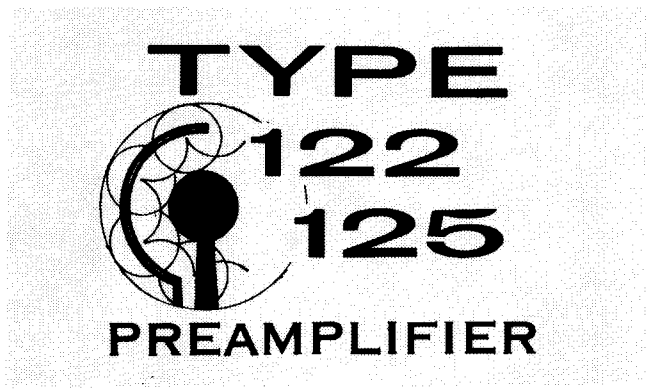
INSTRUCTION MANUAL



S. W. Millikan Way ● P. O. Box 500 ● Beaverton, Oregon ● Phone MI 4-0161 ● Cables: Tektronix

070-246

WARRANTY

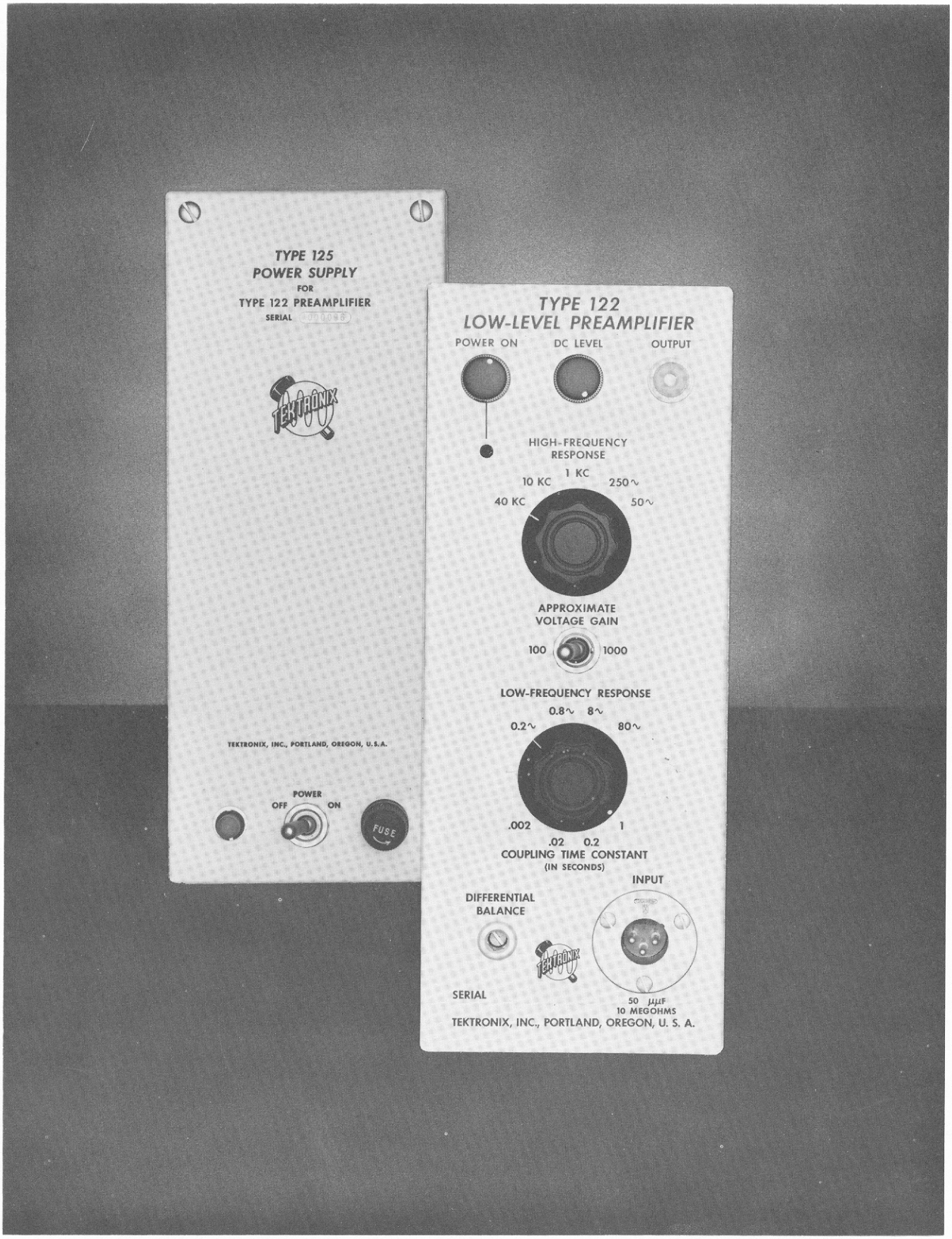
All Tektronix instruments are warranted against defective materials and workmanship for one year. Tektronix transformers, manufactured in our own plant, are warranted for the life of the instrument.

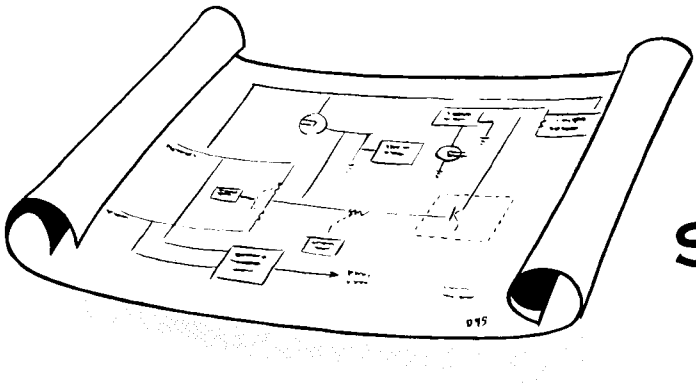
Any questions with respect to the warranty mentioned above should be taken up with your Tektronix Field Engineer.

Tektronix repair and replacement-part service is geared directly to the field, therefore all requests for repairs and replacement parts should be directed to the Tektronix Field Office or Representative in your area. This procedure will assure you the fastest possible service. Please include the instrument Type and Serial number with all requests for parts or service.

Specifications and price change privileges reserved.

CONTENTS


TYPE 125
POWER SUPPLY
FOR
TYPE 122 PREAMPLIFIER
SERIAL
TEKTRONIX, INC., PORTLAND, OREGON, U.S.A.
POWER
OFF
ON
FUSE
TYPE 122
LOW-LEVEL PREAMPLIFIER
POWER ON
DC LEVEL
OUTPUT
HIGH-FREQUENCY
RESPONSE
1 KC
10 KC
250∿
40 KC
50∿
APPROXIMATE
VOLTAGE GAIN
100
1000
LOW-FREQUENCY RESPONSE
0.8∿
8∿
0.2∿
80∿
.002
1
.02
0.2
COUPLING TIME CONSTANT
(IN SECONDS)
INPUT
DIFFERENTIAL
BALANCE
SERIAL
50 μμF
10 MEGOHMS
TEKTRONIX, INC., PORTLAND, OREGON, U. S. A.



SECTION 1

SPECIFICATIONS

General

The Tektronix Type 122 Preamplifier is a compact, ac-coupled three-stage battery-operated amplifier, offering a maximum voltage gain of 1000, with allowable input of .02 volts or less peak-to-peak at maximum gain.

At maximum bandwidth setting, frequency response of the Type 122 is essentially flat between 3-db points at a lower frequency limit of 0.16 cycles and a high-frequency limit of 40 kc. Separate low-frequency and high-frequency controls permit the bandwidth to be reduced to improve the signal-to-noise ratio where reduced bandwith is permissible.

The first two stages of the Type 122 are operated push-pull and are especially designed for precise balance. At frequencies above five cycles with careful setting of the front-panel DIFFERENTIAL BALANCE control, you can get an 80 to 100 db rejection ratio between in-phase and out-of-phase signals applied to the input grids.

By means of a frequency-compensated attenuator you can reduce the voltage gain by a factor of ten, to a gain of about 100. At the lower gain setting, a maximum input of 0.1 volt peak-to-peak is permissible.

At 1000X gain, a 20-volt peak-to-peak output signal is possible without hurting bandwidth, and at 100X gain 10 volt output signals are obtainable.

Shock mounting, careful bypassing and use of battery heater and plate supplies reduce microphonics, noise and hum to a minimum.

Characteristics

Frequency Response

Adjustable. Five high-frequency cutoff frequencies can be selected by means of a five-position front-panel switch, with 3-db points at 40 kc, 10 kc, 1 kc, 250 cycles, and 50 cycles. The selector switch inserts various low-pass, rc networks in the grid circuit of the output cathode follower.

Four low-frequency cutoff frequencies can be selected by means of a four-position front-panel switch with 3-db points at 0.2 cycles, 0.8 cycles, 8 cycles, and 80 cycles. This switch inserts various coupling-capacitor sizes between the second and third stages.

Input Impedance

Single ended, 10 megohms paralleled by 50 micromicrofarads. Push-pull, 20 megohms paralleled by 50 micromicrofarads.

Note: 50 micromicrofarads at 1 kc = 3 megohms.
50 micromicrofarads at 40 kc = 80 kilohms.

Output Impedance

1000 ohms, approximately, from a cathode follower.

Gain

Two-position switch selects approximate voltage gain of either 100 or 1000 times.

AC Input Level

0.02 volts maximum, peak to peak, at high-gain setting.

0.10 volts maximum, peak to peak, at low-gain setting.

DC Input Level

+or - 0.1 volt maximum at either gain setting.

AC Output Level

20 volts, peak to peak, at high-gain setting.
10 volts, peak to peak, at low-gain setting.

DC Output Level

The dc-voltage component can be adjusted to zero, for use with direct-coupled oscilloscopes.

Input Stage

15 microvolts or less, peak to peak, expressed as equivalent signal at input with both grids shroted to ground, depending on settings of FREQUENCY RESPONSE controls. With input circuit open circuited, 56 microvolts peak to peak.

Distortion

With output levels below 20 volts peak to peak at high-gain setting, or with output levels below 10 volts at low-gain setting, amplifier linearity is within 5 per cent.

Power Requirements

From batteries or Type 125, through a standard octal plug:

90 volts negative at 4 milliamps;
135 volts positive at 5 milliamps;
6.3 volts at 0.9 amps.

Vacuum-Tube Complement

1-12AX7 (specially selected for differential balance)

2-12AU7 (one specially selected for differential balance)

Accessories Supplied

Power cable and plugs, input plug, output cable.

Dimensions

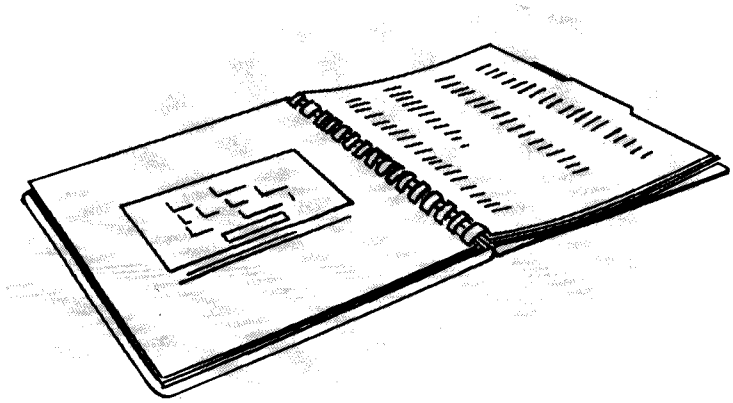
10-5/8 inches high by 4-1/2 inches wide by 6 inches deep.

Panel Markings

POWER ON	On-off , two-position switch controlling ungrounded heater lead, positive 135-volt lead, and negative 90-volt lead.
DC LEVEL	Potentiometer for adjusting average level of output signal to ground potential.
OUTPUT	UHF output connector to oscilloscope signal input, via coaxial cable.
HIGH FREQUENCY RESPONSE	Five-position switch which inserts any one of four capacitors into a single-section low-pass filter, permitting selection of five high-frequency response characteristics. No shunt capacitor is used in the fifth position. Three-db points are 40 kc, 10 kc, 1 kc, 250 cycles, and 50 cycles.
VOLTAGE GAIN	Two-position toggle switch permits selection of approximate voltage gain to be made of either 1000 times or 100 times. Switch inserts a 10-to-1 frequency-compensated attenuator between second and third stages of amplifier.
LOW FREQUENCY RESPONSE	Four-position switch inserts any one of four sizes of coupling capacitors between second and third stages, resulting in four low-frequency three-db frequencies of 0.2 cycles, 0.8 cycles, 8 cycles and 80 cycles. Also calibrated in rc time constants.

DIFF BALANCE	Potentiometer in cathode of first push-pull stage permits adjustment of relative gain of two sections of V1 for best possible rejection of in-phase signals.
INPUT	Three-contact receptacle for balanced signal-input connection. Pin 1, ground. Pin 3, positive input produces positive output. Pin 2, positive input produces negative output. When using single-ended input, the unused input terminal must be grounded.

SECTION 2



OPERATING INSTRUCTIONS

The Tektronix Type 122 Preamplifier can be operated in any normal indoor location or in the open if it is protected from moisture. If the instrument has been exposed to dampness leave it in a warm room until it is thoroughly dry before placing it in operation.

If the Type 122 is used continuously for the same application, and only one setting of the controls is required, check the instrument occasionally at all control settings to be sure it is in normal operating condition. Operation of the controls helps to prevent an accumulation of dirt or tarnish on their contacts.

Although the components are well supported and settings of the controls are stable to allow for portable operation, the Type 122 Preamplifier should not be subjected to excessive vibration or rough handling.

Power Connections

Power can be supplied to the Type 122 in two ways -- either from batteries or from a Type 125 Power Supply. In either event, the power is supplied to the Type 122 through the octal connector located on the top of the instrument. The power cable furnished with the Type 122 is equipped with an octal connector on one end and standard battery connectors on the other. Where power for the Type 122 is supplied from a Type 125, the inter-unit octal connector supplied with the Type 125 is used between the two instruments.

For battery-power operation of the Type 122, five 45-volt B batteries connected as shown on the circuit diagram will furnish proper B voltages. The five 3-prong bakelite plugs are designed to supply all the required high voltages when plugged into five 45-volt ratio B batteries such as Burgess Type M30. The two metal terminal lugs are designed to connect to 6-volt storage-battery terminals. The terminal attached to the red lead is the positive terminal. The terminal attached to the black lead is the negative terminal. The 6.3 volt heater supply should have an adequate ampere-hour capacity to provide 0.9 amp for the length of time that the instrument is operated.

When operating power for the Type 122 is furnished from a Type 125, the proper regulated voltages are furnished through the octal interconnecting cable.

Signal-Output Connections

The output cable supplied with the Type 122 is equipped with UHF connectors at each end. This cable will connect the OUTPUT of the instrument to the input of Tektronix Oscilloscopes using the same type of connector. Adjust the input sensitivity of the oscilloscope to some convenient value that will accommodate the full output of the amplifier (10 to 20 peak-to-peak volts depending on the gain setting).

If a direct-coupled oscilloscope is used with the Type 122 it will be necessary to consider the dc output level of the preamplifier. An easy way to check the dc level is to observe the position of the oscilloscope trace before the Type 122 is connected. Then connect it and allow it to warm up for a few minutes. With pins 2 and 3 of the INPUT connector grounded the trace should still be in the same place. If the trace has been deflected adjust the DC LEVEL control until it is returned to its original position.

Input Connections

The Type 122 is designed for differential input but single-ended input may be used if desired. Pins 2 and 3 of the INPUT connector are the two signal inputs and pin 1 is ground. A positive signal on pin 2 will cause a negative output and a positive signal on pin 3 will cause a positive output.

NOTE

An AC input signal of 0.10 volts peak to peak in the 100X position and 0.02 volts peak to peak in the 1000X position will drive the amplifier to full permissible output. A DC input level greater than +or- 0.1 volt will result in non-linear operation of the V1 stage. Input signals in excess of these will cause distortion of the waveform.

Differential Operation

In many applications, the desired signal is superimposed on an undesired signal such as line-frequency hum, etc. The balanced push-pull, or differential input of the Type 122 makes it possible in many cases to improve the ratio of desired to undesired signal. If a connection can be made to one input with both the desired and undesired signals, and to the other input with only the undesired signal, the undesired signal will be attenuated by outphasing. By careful adjustment of the DIFFERENTIAL BALANCE control the undesired signal output can be reduced 90 to 100 db.

Single-Ended Operation

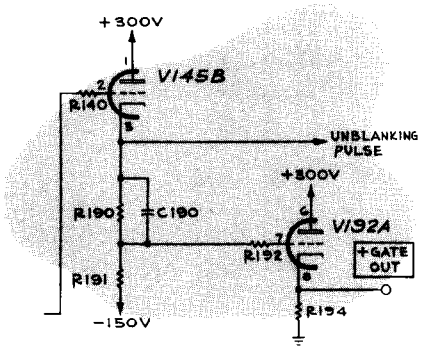
By connecting the signal source to one of the inputs and grounding the other input to the case, the preamplifier can be used as an ordinary amplifier.

Frequency Response

If the bandwith of the signal is such that undue waveform distortion will not result, interfering signals of frequencies above and below the pass band of the signal can be attenuated by adjusting the high- and low-frequency response of the preamplifier. The HIGH-FREQUENCY RESPONSE control will set the upper 3-db point at 40 kc, 10 kc, 1 kc, 250 cycles, or 50 cycles as indicated on the front panel. Similarly, the LOW - FREQUENCY RESPONSE control will set the lower 3-db point at 0.2, 0.8, 8 or 80 cycles. The LOW-FREQUENCY RESPONSE switch is also calibrated in rc time constants.

SECTION 3

CIRCUIT DESCRIPTION



Input Stage

The input stage is a push-pull common-cathode amplifier arranged to provide for signal connection to either or both grids. For single-ended input the unused grid must be grounded. Consider first the case with input terminal number three grounded and the signal applied between input terminal number two and ground. With this connection, V1A applies its signal to V2A through two paths. One path is direct from V1A plate through C2 to the grid of V2A. The other path is by means of V1A cathode which is tied to the cathode of V1B, from the plate of V1B through C4 to the grid of V2B, and from the cathode of V2B to the cathode of V2A. The resulting phases are such that the current in R11 is kept nearly constant and degeneration which would otherwise occur is practically eliminated. If the alternate single-ended input connection is used, with terminal number two grounded and the signal applied between terminal number three and ground, V2A receives its signal from the plate of V1A as before, but V1A gets its signal through its cathode from V1B. Again the phases are such that the current in R11 remains essentially constant, but the output signal from the plate has the opposite phase.

Differential Balance

For differential input with identical signals connected to both input terminals 2 and 3, practically no output will occur at V2A plate. The DIFFERENTIAL BALANCE control, a front-panel screwdriver adjustment, helps to accommodate for inequality in gain in the two halves of both V1 and V2. C1 at the plate of V1A, and C10 at the plate of V2B are adjustable to compensate for tube and component differences. An increase in the capacitance of C1 reduces the high-frequency response of V2A plate while C10 has the opposite effect. Both should be adjusted simultaneously for best high-frequency differential balance as is explained in the adjustment instructions.

Single-Ended Stages

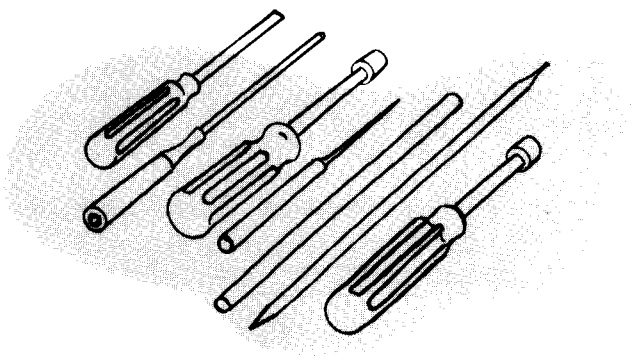
The remainder of the amplifier is single ended starting from the plate of V2A. The plate signal of V2A is coupled to the grid of V3A through coupling capacitors C5, C6, C7 or C8, which can be selected by means of SW1, a front-panel switch labled LOW-FREQUENCY RESPONSE. These capacitors, with R13 and R14, form a high-pass network whose low-frequency cutoff frequency depends on the size of the coupling capacitor. R13 and R14 form a ten-to-one voltage divider with high-frequency compensation provided by C11. A toggle switch labeled APPROXIMATE VOLTAGE GAIN on the front panel permits the input voltage to V3A to be taken either directly from the coupling capacitor or through the ten-to-one attenuator.

Plate output from V3A is applied to the grid of V3B through a low-pass network consisting or R20 as the series arm and C17, C18, C19, or C20 as the shunt arm. A five-position switch, SW3, labeled HIGH-FREQUENCY RESPONSE on the front panel selects any one of the shunt capacitors in four positions, and an open contact in the fifth position for highest frequency response. C21 around R20 extends the high-frequency response for the maximum switch position.

Output from V3B is taken from the cathode and is available at the front panel through a UHF coaxial connector.

The dc voltage of the cathode of V3B can by varied by means of R22, labeled DC LEVEL on the front panel, which adjusts the grid voltage by changing the voltage division of the voltage divider comprised of R19, R20, R21 and R22, connected between +130 volts and -86 volts.

R15, R16, R17 and R18 with C14, C15, C16, C12 and C13 are decoupling circuits.



SECTION 4

MAINTENANCE

Replacement of Components

Most of the components used in the construction of Tektronix instruments are standard parts obtainable from any well-stocked parts distributor. Some of the components carrying 1% and 2% tolerances may not be so readily obtainable but may be purchased from the manufacturer at these tolerances. The remainder of the low-tolerance components are standard 10%- and 20%-tolerance parts that are checked at the factory for proper value or performance. All replacement parts are available on order from the factory at current net prices but you can probably save time by purchasing standard parts locally. It is not feasible to attempt to check out low-tolerance parts or matched pairs without a reasonably large stock to choose from as the rejection percentage is quite high in most cases.

A Tektronix instruction manual will usually contain hand-made changes of diagrams, parts list, and text, appropriate only to the instrument it was prepared for. There are good reasons why this is true.

First, Tektronix engineers are continually working to improve our instruments. When the improved circuitry is developed or when better components become available, they are put into the instruments as soon as possible. As a result of constant improvement Tektronix instruments are always built as good as we can built them, but the changes caused by these improvements must frequently be entered by hand into the manual.

Second, when Tektronix instruments go through our exhaustive test procedure, technicians adjust them individually to obtain optimum operation. This kind of hand tailoring occasionally requires substitution of components differing from the nominal values printed in the manual.

Third, because of procurement difficulties, equivalent but different parts are sometimes used. Usually such parts are directly interchangeable with those originally specified. No alternate parts have been used which have adversely affected the instrument, and you were able to receive your instrument much earlier than you might have otherwise.

To assure that you will receive the correct replacement parts with the minimum of delay it is therefore important that you include the instrument serial number with your order, along with the instrument type and part numbers, of course. And as a further precaution, get ordering information from the instruction manual whose serial number agrees with the instrument.

Equivalent parts, supplied by the factory when the exact replacement parts ordered are not available, will be accompanied by an explanation and will be directly interchangeable in most cases.

Supply Voltages

The supply voltages required for the Type 122 Preamplifier are +135V, -90V, B supply and 6V heater supply. Although a 15% reduction of these voltages will not adversely affect the operation, the condition of dry batteries reduced by this amount will often cause objectionable noise and drift.

Balanced Tubes

The tubes used in the Type 122 are selected from stock to conform to a prescribed standard of dynamic balance and microphonic noise. The two sections of V1 should balance within five per cent and should have low microphonic sensitivity. The halves of V2 and V3 should balance within ten per cent. The microphonic sensitivity of the tubes in these two stages need not be as low as that of the first stage but should not be so high as to contribute noticeable noise.

Adjustments

Before the following adjustments are made, the Type 122 Preamplifier should be connected to an oscilloscope and both instruments should be allowed to operate long enough to reach a stable operating temperature.

Differential Balance

Adjustment of the DIFFERENTIAL BALANCE control should be made with the instrument connected to the oscilloscope. Connect a 60-cycle sine-wave voltage source between ground, and pins 2 and 3 of the INPUT connector. The input amplitude should not exceed .02 volts, the maximum permissible input for the 1000X gain position of the attenuator switch. After sufficient warm-up time has elapsed, adjust the DIFFERENTIAL BALANCE control for a null indication on the oscilloscope. The waveform at the null will contain only the harmonic-distortion products of the preamplifier.

High Frequency

Adjustment of the high-frequency balance adjustment should be made immediately after adjusting the DIFFERENTIAL BALANCE control, and without turning the instrument off between operations. With the attenuator switch in the 1000X position, connect a 40-kc sine-wave source between ground and pins 2 and 3 of the INPUT connector. The signal amplitude as before should not exceed the maximum permissible input. Adjust C1 and C10 (ceramic trimmers) simultaneously for null indication on the oscilloscope. The waveform at the null will again contain only the harmonic-distortion products of the preamplifier. These adjustments must be made with the cabinet removed, so the signal source should be reasonably well shielded from the Type 122. Use insulated polystyrene or bakelight adjusting tools, and a tuning shield is recommended to reduce hum or signal coupled into the instrument from the adjusting tools. The shield can be made from a piece of sheet metal, 16 inches by 10 inches, with properly located holes to permit access to C1, C10, and C11 with the adjusting tools. Bend the sheet to cover both sides of the preamplifier.

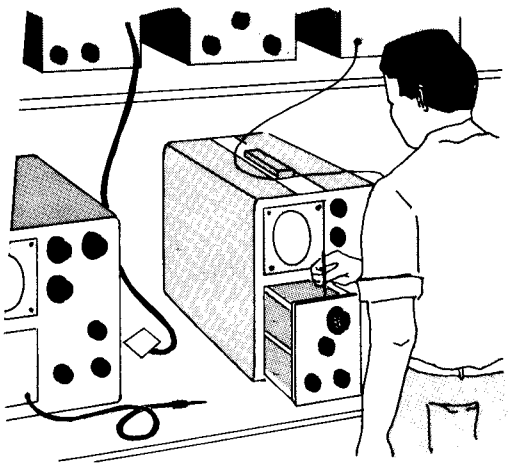
If high-frequency balance is not obtainable within the range of capacitors C1 and C10, the first-stage tube, V1, will probably be found at fault.

If the sine-wave generator is not available, an approximate balance can be obtained by means of a square-wave signal. A frequency of 1 kc is adequate. The output of a Tektronix Type 530 or 540-Series oscilloscope calibrator is excellent. The generator should be connected as previously described. Correct differential balance is indicated when the DIFFERENTIAL BALANCE control is adjusted so that "flat portions" of the square wave line up at the same level. Adjust C1 and C10 simultaneously until the "spikes" at the leading and trailing edges of the square wave are balanced out.

Transient Response and Attenuator Adjustment

Capacitors C1 and C10, which are used to set the high-frequency differential balance also control the response rise-time of the Type 122. The rise-time can be checked after balance adjustments are completed by applying a 1-kc square-wave signal to pin 3 of the INPUT connector with pin 2 grounded, with the GAIN switch in the 1000X position. The output waveform may show a slightly rounded leading edge. The rise-time can be improved and the upper frequency limit can be raised slightly by readjustment of C1 and C10, but this will no longer give optimum high-frequency differential balance.

After observing the front edge of the square wave as described in the preceding paragraph, change the gain switch to the 100X position and adjust the signal level or oscilloscope sensitivity to produce the same deflection on the cathode-ray tube. Adjust C11 to produce the same rounding or shape of the leading edge as was observed in the 1000X position.



SECTION 5

TYPE 125

SPECIFICATIONS

The Type 125 Power Supply is designed to provide the necessary operating voltages for one to four Type 122 Preamplifiers. Output voltages are coupled to the preamplifiers by interunit octal cables. Forced-air cooling is provided.

Output Voltages

+135 volts dc at 0-20 ma. +or- 3%
-90 volts dc at 0-20 ma. +or- 3%
-6 volts dc at .7-4 Amp. +or- 5%

Voltage Stability

The output voltages will remain within regulation when the input line voltage is varied between 105 and 125 volts, or between 210 and 250 volts. Voltage stability is typically within 10 mv/hr when the ambient temperature is constant.

Input Requirements

105 - 125 volts 50 - 60 cycles ac, or 210 - 250 volts, 50 - 60 cycles ac.

Dimensions

Maximum wattage requirements are approximately 110 watts.

13-1/2 inches long, 10-3/16 inches high, 4 inches wide.

Accessories Provided

Four - 36 inch Octal Interconnecting cables.

One - AC 3-wire power cord.

Instruction Manual

OPERATION With PREAMPLIFIER

Connect the Type 125 to a source of ac power. Connect the Type 125 to the Type 122 with the interunit octal cable. Turn the POWER switch of the Type 125 to ON and allow the units to warm up for a few minutes before using the preamplifier for measurements.

Changing Input Voltage

The schematic for the Type 125 shows the connections at the primary of the power transformer. Both the 117-volt and the 234-volt connections are shown.

To change from 117-volt operation remove the straps between pins 1 and 2 and between pins 3 and 4 of the power transformer. Connect a jumper between pins 3 and 2. Remove the solid black wire from terminal nine of the power transformer, or if you have one of the earlier models you must use an ohmmeter to find which of the wires in terminal nine goes to the fan motor. Take the wire that goes to the fan motor and move it to terminal two of the power transformer.

To change from 234 to 117-volt operation reverse the above procedure.

CIRCUIT DESCRIPTION

The Type 125 Power Supply is basically three regulated supplies fed from a single power transformer. Full wave rectifiers are used in each supply. A gaseous regulator tube in the +135-volt supply is used as the reference source for the supplies.

+135-Volt Supply

V619 provides a reference voltage which sets the voltage at the grid of V667A. V667A forms half a comparator circuit. V627B and its circuitry forms the other half of the comparator. A voltage divider formed by R631, R632, and R633 is connected between the output of the supply and ground. R632, the center number of the divider is adjustable. The grid of V627B is connected to R632.

The comparator circuit refers the fixed voltage from the gaseous regulator tube to that from the voltage divider. During calibration the adjustable member of the divider, R632, is set so the correct bias is applied by the comparator circuit to the grid of V627A, the Series-Regulator Tube.

Changes in the output voltage are measured by the comparator which applies voltage of correct phase and amplitude at the grid of V627A to correct the output.

-90-Volt Supply

Operation of the circuits controlling the output of the -90-Volt Supply are similiar to those in the +135-Volt Supply.

In the -90-Volt Supply the comparator is formed by V656A and V656B. The Series-Regulator Tube is V667B. In this circuit the voltage at the cathode of the Series-Regulator is at ground potential.

-6-Volt Supply

Reference voltage for the -6-Volt Supply is provided by a center-tapped voltage-divider, R687 - R688. Voltage at the center-tap of the divider controls the base of transistor Q684. This transistor amplifies changes in the output of the supply in the correct phase and amplitude to control the action of the three emitter-followers.

The emitter-followers are connected in series with the final stage, Q707, acting as the Series-Regulator. Q707 is paralleled by R707, which caries part of the output current.

RACK MOUNTING PRECAUTIONS

When the Type 122 Preamplifier and the Type 125 Power Supply are mounted together in a rack you may have ground loop current problems. In the later models of the Type 125 Power Supply, all of the grounds have been lifted and then connected through a 100 ohm resistor back to (ground) the third wire on the AC input connector. Pin eight of T601 however is tied directly to (ground) the third wire of the AC connector. With the procedure outlined above, most of the problems of ground loop currents have been alleviated.

The second problem that will be incurred when mounting the units in a rack is magnetic hum pickup. There are two ways to reduce this pickup somewhat. The first way is to separate the units physically by a distance of six inches to a foot. The second method is to put the Type 122 Preamplifier to the left of the Type 125 Power Supply in the rack. The left is as seen from the front of the units. It should be noted however that almost none of the pickup is coupled via the power supply voltages. The pickup which will affect your signals coming out of the Type 122 Preamplifier are either from ground currents or magnetic radiation.

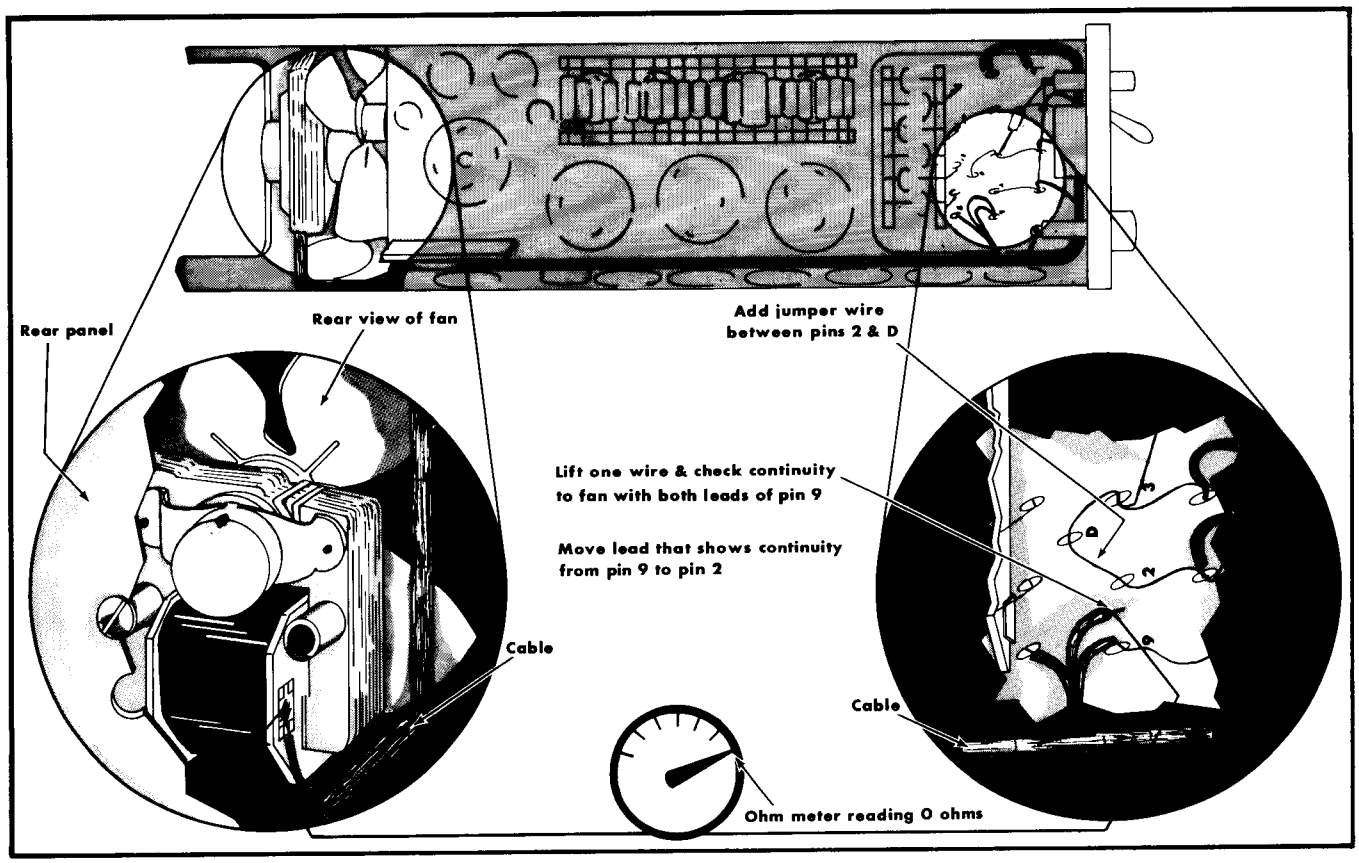
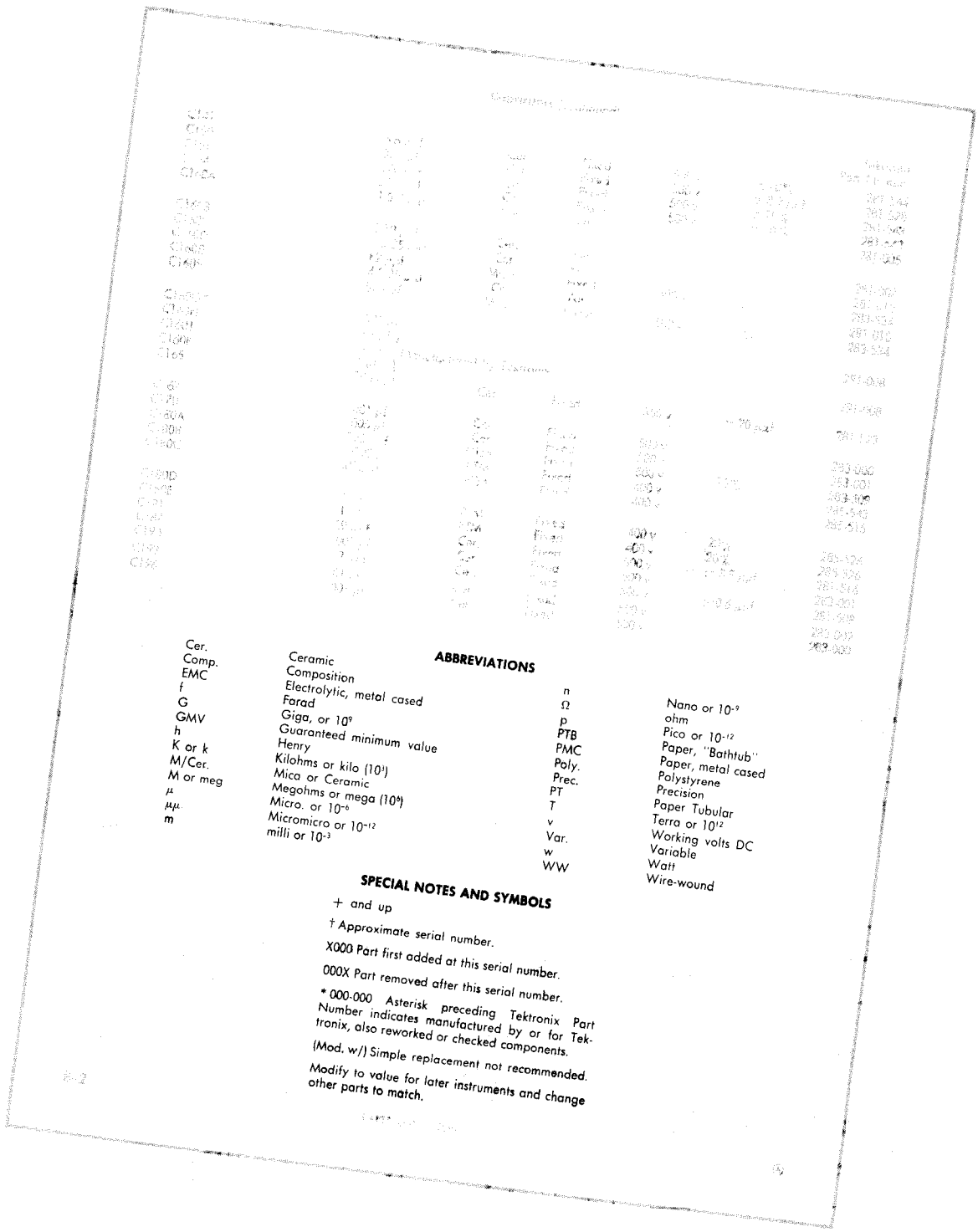


Fig. 5-1 Method for checking continuity of the fan lead.

PARTS LIST *and* DIAGRAMS



ABBREVIATIONS

Cer.	Ceramic	n	Nano or 10^{-9}
Comp.	Composition	Ω	ohm
EMC	Electrolytic, metal cased	p	Pico or 10^{-12}
f	Farad	PTB	Paper, "Bathtub"
G	Giga, or 10^{9}	PMC	Paper, metal cased
GMV	Guaranteed minimum value	Poly.	Polystyrene
h	Henry	Prec.	Precision
K or k	Kilohms or kilo (10^{3})	PT	Paper Tubular
M/Cer.	Mica or Ceramic	T	Terra or 10^{12}
M or meg	Megohms or mega (10^{6})	v	Working volts DC
μ	Micro. or 10^{-6}	Var.	Variable
μμ	Micromicro or 10^{-12}	w	Watt
m	milli or 10^{-3}	WW	Wire-wound

SPECIAL NOTES AND SYMBOLS

+ and up

† Approximate serial number.

X000 Part first added at this serial number.

000X Part removed after this serial number.

* 000-000 Asterisk preceding Tektronix Part Number indicates manufactured by or for Tektronix, also reworked or checked components.

(Mod. w/) Simple replacement not recommended. Modify to value for later instruments and change other parts to match.

HOW TO ORDER PARTS

Replacement parts are available through your local Tektronix Field Office.

Improvements in Tektronix instruments are incorporated as soon as available. Therefore, when ordering a replacement part it is important to supply the part number including any suffix, instrument type, serial number, plus a modification number where applicable.

If the part you have ordered has been improved or replaced, your local Field Office will contact you if there is a change in part number.

Type 122
PARTS LIST

Values fixed unless marked Variable.

Bulbs

			Tektronix Part Number
B25	X4050-up	NE-2 Neon	150-002

Capacitors

Tolerance ±20% unless otherwise indicated.

C1		3-12 μμf	Cer.	Var.	500 v		281-007
C2		.5 μf	PT		400 v		285-537
C3		4.7 μμf	Cer.		500 v		281-501
C4		.5 μf	PT		400 v		285-537
C5		.5 μf	PT		400 v		285-537
C6		.1 μf	PT		400 v		285-526
C7		.01 μf	PT		400 v		285-510
C8		.001 μf	PT		600 v		285-501
C9	101-4163X	22 μμf	Cer.				281-510
C10		7-45 μμf	Cer.	Var.	500 v		281-012
C11		.5-5 μμf	Poly	Var.	500 v		281-001
C12		20 μf	EMC		150 v	−20%+50%	290-008
C13		.1 μf	PT		400 v		285-526
C14		10 μf (1/3 3 x 10)	EMC		350 v	−20%+50%	290-032
C15		10 μf (1/3 3 x 10)					
C16		10 μf (1/3 3 x 10)					
C17		.01 μf	PT		400 v		285-510
C18		.0022 μf	Mica			10%	283-530
C19		470 μμf	Cer.				281-525
C20		27 μμf	Cer.		500 v		281-513
C21		12 μμf	Cer.		400 v	10%	281-506
C22		.1 μf	PT		400 v		285-526
C23		.1 μf	PT		400 v		285-526

Resistors

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

R1		100 k	½ w		Prec.	1%	309-045
R2		10 meg	½ w				302-106
R3		10 meg	½ w				302-106
R4		100 k	½ w		Prec.	1%	309-045
R5		500 ohms	2 w	Var.		20% DIFF. BALANCE	311-005
R6		200 k	½ w		Prec.	1%	309-051
R7	101-663	3.9 meg	½ w				302-395
	664-up	4.7 meg	½ w				302-475
R8	101-663X	1.5 meg	2 w	Var.			311-042
R9		4.7 meg	½ w				302-475

Resistors *(continued)*

							Tektronix Part Number
R10		100 k	½ w		Prec.	1%	309-045
R11		100 k	1 w				304-104
R12		100 k	½ w		Prec.	1%	309-045
R13		1.8 meg	½ w		Prec.	1%	309-020
R14		200 k	½ w		Prec.	1%	309-051
R15		4.7 k	½ w				302-472
R16		2.7 k	½ w				302-272
R17		1 k	½ w				302-102
R18		1 k	½ w				302-102
R19	101-3879	56 k	½ w				302-563
	3880-up	68 k	½ w				302-683
R20		470 k	½ w				302-474
R21		470 k	½ w				302-474
R22		500 k	2 w	Var.		DC LEVEL	311-034
R23		47 k	½ w				302-473
R24		1.5 k	½ w				302-152
R25	X4050-up	330 k	½ w				302-334

Switches

			unwired	wired
SW1	2 wafer 4 position Rotary	LOW FREQ. RESPONSE	260-029	262-009
SW2	Double Pole Double Throw Toggle	VOLTAGE GAIN		260-014
SW3	2 wafer 5 position Rotary	HIGH FREQ. RESPONSE	260-020	262-010
SW4	Triple Pole Single Throw Rotary	POWER		260-036

Vacuum Tubes

V1	12AX7	Input Amplifier	SELECTED	157-032
V2	12AU7	Intermediate Amplifier		154-041
V3	12AU7	Output Amplifier		154-041

Type 125
PARTS LIST

Values are fixed unless marked variable.

Bulbs

Ckt.	S/N Range		Desciption	Tektronix Part Number
B601		NE-2	Pilot Light	150-020

Capacitors

Tolerance ±20% unless otherwise indicated.

C610		2 x 200 μf	EMC	250 v	290-151
C618		.02 μf	Discap	600 v	283-006
C631		.01 μf	Discap	500 v	283-002
C635		20 μf	EMT	150 v	290-008
C640A,B		2 x 40 μf	EMC	250 v	290-040
C653		.02 μf	Discap	600 v	283-006
C668		.01 μf	Discap	500 v	283-002
C670		10,000 μf	EMC	25 v	290-148
C685		.01 μf	Discap	500 v	283-002
C709		100 μf	EMT	15 v	290-099

Diodes

D610A,B,C,D		1N2070			152-011
D640A,B,C,D		1N2070			152-011
D670A,B		1N1581C			152-042
D673	X401-up	Zener Diode	RT-6		152-016
D674		T12G			152-008

Fuses

F601		1.5 Amp	3 AG	Fast-Blo 117 v	159-016
F601		0.7 Amp	3 AG	Slo-Blo 234 v	159-040

Resistors

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

R601		68 k	½ w				302-683
R610		10 Ω	½ w				302-100
R616		10 k	½ w				302-103
R617		470 k	½ w				302-474
R618		1 k	½ w				302-102
R619		120 k	½ w				302-124
R620		56 k	½ w				302-563
R621		180 k	½ w				302-184
R622		120 k	½ w				302-124
R623		470 k	½ w				302-474
R625		1 k	½ w				302-102
R631		50 k	½ w		Prec.	1%	309-090
R632		10 k		Var.	WW	+135 Volts	311-015
R633		90 k	½ w		Prec.	1%	309-195
R640		10 Ω	½ w				302-100

Resistors *(continued)*

						Tektronix Part Number
R641		220 k	½ w			302-224
R650		237 k	1 w		1%	310-124
R651		40 k	½ w	WW	1%	308-085
R652		470 k	½ w			302-474
R653		1 k	½ w			302-102
R655		27 k	½ w			302-273
R656		2.2 k	½ w			302-222
R658		1 meg	½ w			302-105
R659		1 k	½ w			302-102
R666		2.2 k	½ w			302-222
R668		500 k	½ w	Prec.	1%	309-003
R669		300 k	½ w	Prec.	1%	309-125
R673	101-400X	150 Ω	½ w			302-151
R674	101-400	220 Ω	½ w			302-221
R674	401-up	2.2 k	½ w			302-222
R684		220 k	½ w			302-224
R685		1 k	½ w			302-102
R687		45 k	1 w	Prec.	1%	310-093
R688		1.95 k	½ w	Prec.	1%	309-208
R693		100 k	½ w			302-104
R703		100 Ω	½ w			302-101
R707		3 Ω	25 w	WW	5%	308-188

Switches

SW601	Toggle, POWER ON	260-134

Transformers

T601	L.V. Power Transformer	*120-208

Thermal Cutout

TK601	133° Thermal Cutout	260-208

Transistors

Q684	2N1381	151-039
Q693	2N1381	151-039
Q703	2N554	151-034
Q707	2N277	151-002

Vacuum Tubes

V619	OG3	154-291
V627	6GE8*	154-260
V656	ECF80/6BL8	154-278
V667	6BA8	154-163

*7734 May also be used in this circuit.

Type 122
Mechanical Parts List

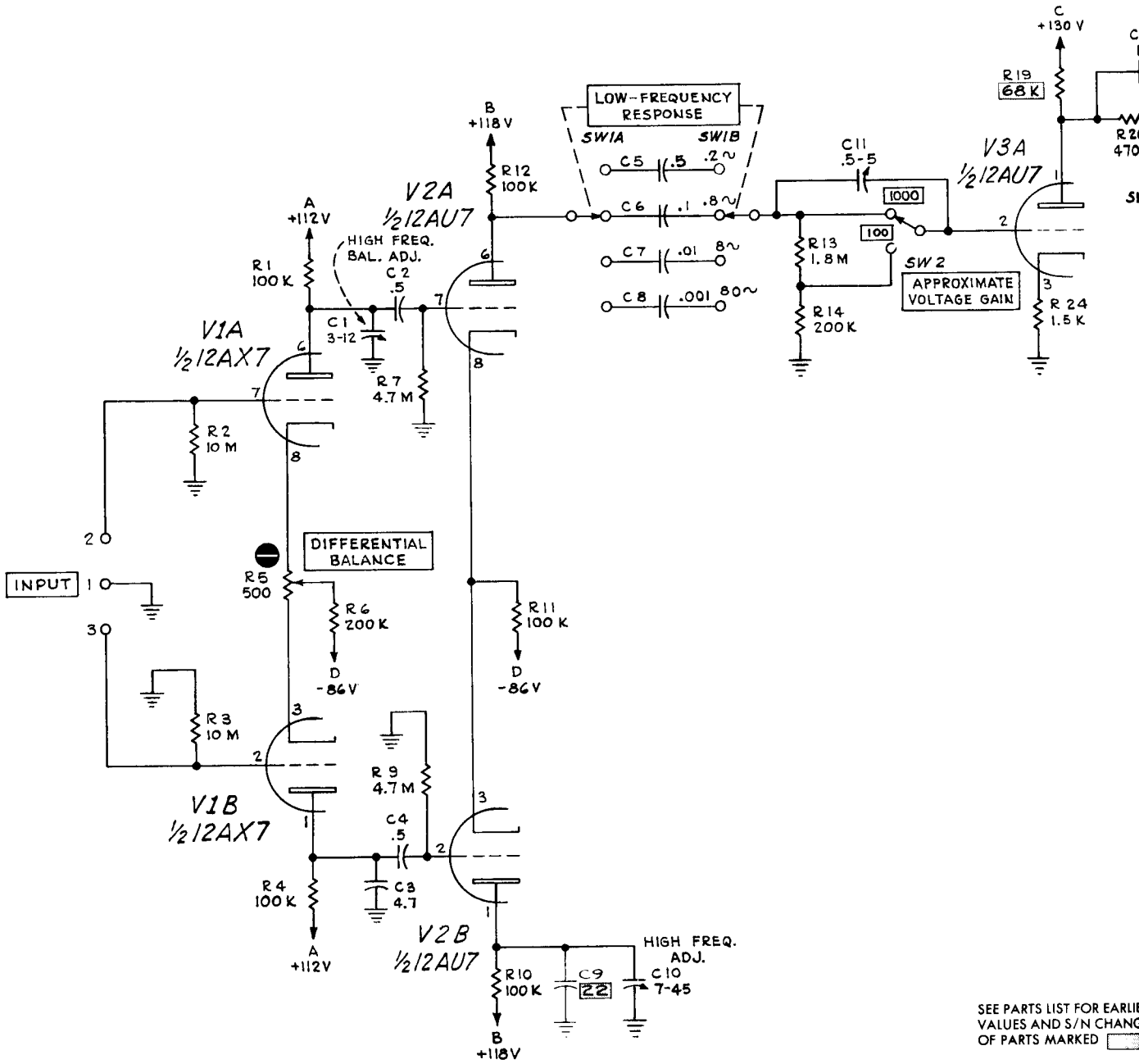
	Tektronix Part Number
ADAPTOR, POWER CORD, 3 WIRE TO 2 WIRE	103-013
BLOCK, WOOD BW12-56	391-002
BRACKET, 1 1/4 x 3 1/4 x 5/8	406-037
BUSHING, ALUM. 3/8-32 x 9/16	358-010
CABINET, BLUE VINYL FINISH	437-050
CABLE, HARNESS SN 101-4049	179-036
CHASSIS	441-285
CLAMP, CABLE 1/8" PLASTIC	343-001
CLAMP, CABLE 5/8" PLASTIC	343-007
CONNECTOR, CHASSIS MT. COAX 83-IRTY	131-012
CONNECTOR, CHASSIS MT. CANNON, XL-3-14	131-014
FRAME, FB 122 C 89	426-018
GROMMET, RUBBER 1/4"	348-002
HOLDER, NEON BULB SN 4050-up	352-008
KNOB, RAW, 4104	366-007
KNOB, REWORKED, RN 1450A WITH DOT	366-511
KNOB, REWORKED, 4104A WITH DOT	366-512
LOCKWASHER, STEEL INT. #4	210-004
LOCKWASHER, STEEL INT. #6	210-006
LOCKWASHER, STEEL POT INT. 3/8 x 1/2	210-012
LOCKWASHER, STEEL INT. 3/8 x 11/16	210-013
LUG, SOLDER SE4	210-201
LUG, SOLDER SE6	210-202
NUT, HEX, 4-40 x 3/16	210-406
NUT, HEX, 6-32 x 1/4	210-407
NUT, HEX, 3/8-32 x 1/2	210-413
NUT, KEPS, 6-32 x 5/16	210-457
NUT, SWITCH, 15/32 x 5/64, 12 SIDED	210-473
NUT, HEX, 3/8-32 x 1/2 x 11/16	210-494
PANEL, FRONT	333-587
PLATE, SUBPANEL	386-293
PLUG, 8 PIN, OCTAL-MOLDED	134-006
RING, SOCKET RETAINING	354-002
RING, LOCKING SWITCH 23/32 OD x 15/32 ID	354-055

	Tektronix Part Number
SCREW, 4-40 x 3/16 BHS	211-007
SCREW, 4-40 x 5/16 BHS	211-011
SCREW, 4-40 x 3/8 RHS	211-013
SCREW, 4-40 x 7/8 RHS	211-018
SCREW, 4-40 x 1 FHS	211-031
SCREW, 4-40 x 5/16 PAN HS W/LOCKWASHER	211-033
SCREW, 6-32 x 3/8 BHS	211-510
SCREW, 6-32 x 5/8 BHS	211-513
SCREW, 6-32 x 5/16 PHS W/LOCKWASHER	211-534
SCREW, 6-32 x 5/16 FHS 100°	211-538
SCREW, 6-32 x 3/8 PHILLIPS 100°	211-559
SHELL, RECESS MTG. 1 15/16 ID	205-001
SHOCKMOUNT, RUBBER 1/2" DIA. x 5/8 HI	348-007
SOCKET, STM9	136-014
SPACER, NYLON FOR CERAMIC STRIP SN 4050-up	361-008
STRIP, CERAMIC 7/16 x 5 NOTCHES, CLIP MTD. SN 4050-up	124-093
STRIP, CERAMIC 7/16 x 9 NOTCHES, CLIP MTD. SN 4050-up	124-095
TUBE, SPACING, .118 ID x 5/32 OD x 11/16 LG.	166-106
WASHER, STEEL 6L x 3/8	210-803
WASHER, STEEL .390 ID x 9/16 OD	210-840
WASHER, STEEL .119 ID x 3/8 OD	210-851
WASHER, STEEL FLAT, .470 ID x 21/32 OD	210-902

Type 125
Mechanical Parts List

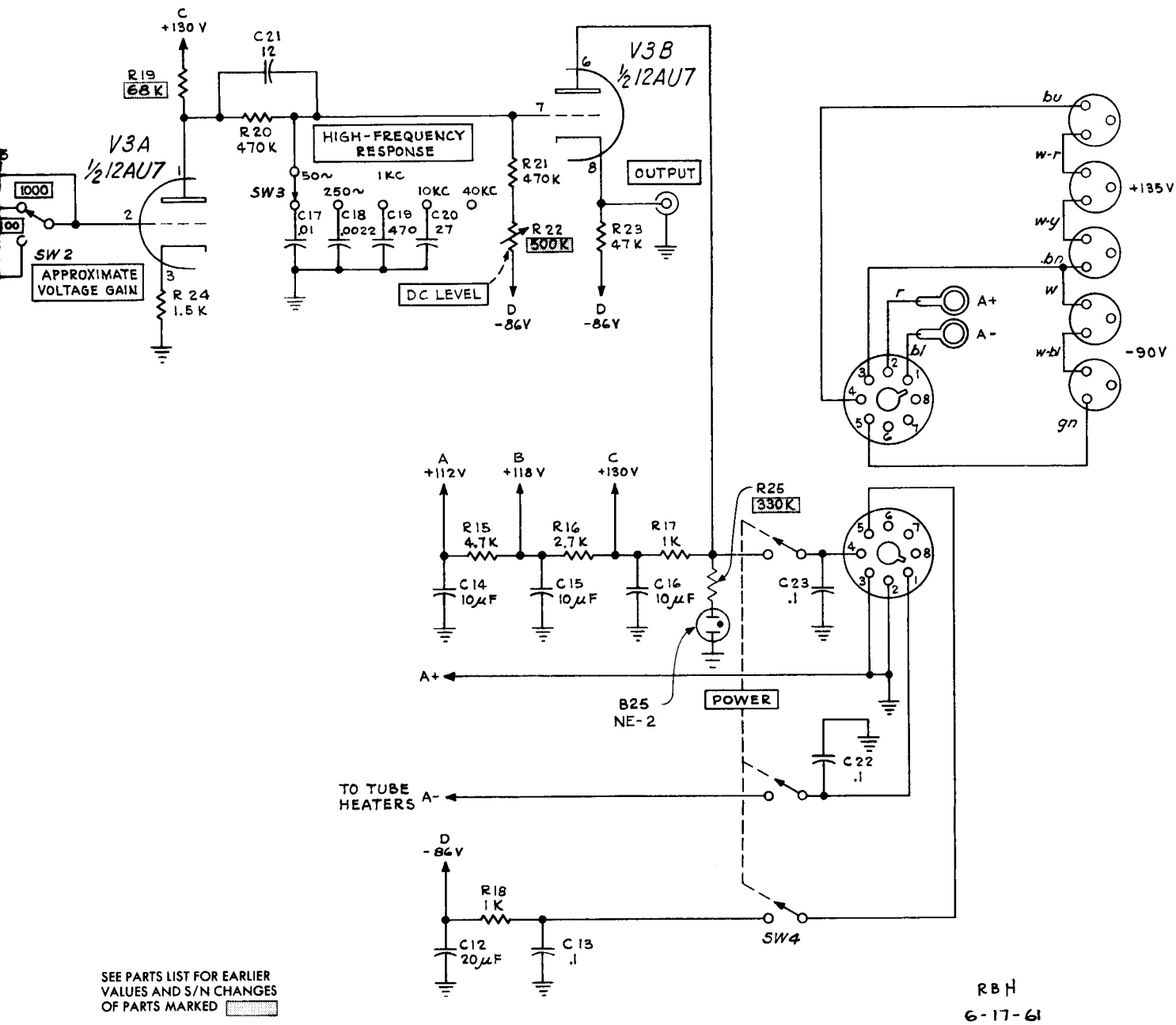
	Tektronix Part Number
ADAPTOR, POWER CORD	103-013
BAR, LEFT FRAME, 3/8 x 3/8 x 13 1/4	381-044
BRACKET, TRANSISTOR, MTG., .063 x 2 x 7/8 x 1 3/8	406-675
BRACKET, GROUNDING, .032 x 1 x 1/4 x 5/16	406-676
BRACKET, HEAT SYNC., .125 x 2 x 3 3/4 x 2 1/8 x 2 1/8	406-677
BUSHING, 3/8-32 x 9/16 x .412	358-010
BUSHING, INSULATOR, NYLON	358-114
CABINET, BLUE VINYL	437-063
CABLE, HARNESS, POWER #1	179-503
CABLE, HARNESS, POWER #2	179-504
CAP, RUBBER, 1 1/4 LONG	200-004
CLAMP, CAP. MTG.	343-065
CONNECTOR, CHASSIS MOUNTED 3 WIRE MOTOR BASE ASS'Y	131-150
CORD, POWER, 3 WIRE	161-010
FAN, BLADE	369-008
GROMMET, RUBBER, 3/8	348-004
HOLDER, FUSE	352-010
LOCKWASHER, INT. #6	210-006
LOCKWASHER, INT. #8	210-008
LOCKWASHER, INT. #10	210-010
LOCKWASHER, INT. 3/8 x 11/16	210-013
LUG, SOLDER, SE6, W/2 WIRE HOLES	210-202
LUG, SOLDER, SE10, LONG	210-206
MOTOR, FAN	147-008
NUT, HEX, 4-40 x 3/16	210-406
NUT, HEX, 6-32 x 1/4	210-407
NUT, HEX, 10-32 x 5/16	210-410
NUT, HEX, 15/32-32 x 9/16	210-414
NUT, KEPS, 8-32 x 11/32	210-458
NUT, HEX, 8-32 x 1/2 x 23/64 (25 W. RESISTOR MOUNTING)	210-462
NUT, 12 SIDED, 15/32-32 x 5/64	210-473
NUT, HEX, 3/8-32 x 1/2 x 11/16	210-494
PANEL, FRONT	333-640

	Tektronix Part Number
PLATE, TRANSISTOR, INSUL.	386-978
PLATE, COOLING FIN, .063 x 1 1/2 x 1/2 x 2	387-367
PLATE, TEFLON, .010 x 2 x 2 1/4	387-369
PLATE, HEAT SYNC. .125 x 2 x 2 1/4	387-370
PLATE, FRONT FRAME, .125 x 3 15/16 x 10 1/8	387-588
POST, BINDING, 5-WAY ASS'Y	129-036
RING, LOCKING SWITCH	354-055
SCREW, 4-40 x 1/4 FHS	211-023
SCREW, 2-56 x 5/16 RHS, PHILLIPS	211-057
SCREW, 6-32 x 5/16 BHS	211-507
SCREW, 6-32 x 3/8 BHS	211-510
SCREW, 6-32 x 5/8 BHS	211-513
SCREW, 6-32 x 5/16 PSS, W/LOCKWASHER	211-534
SCREW, 6-32 x 5/16 FHS, 100° CSK, PHILLIPS	211-538
SCREW, 6-32 x 3/8 FHS, 100°, CSK, PHILLIPS	211-559
SCREW, 8-32 x 5/16 BHS	212-004
SCREW, 8-32 x 3/8 BHS	212-023
SCREW, 8-32 x 1 3/4 FHS	212-037
SCREW, 8-32 x 3/8 THS, PHILLIPS	212-039
SCREW, 8-32 x 3/8 FHS, 100°, PHILLIPS	212-040
SCREW, 10-32 x 3/8 BHS	212-507
SCREW, 4-40 x 1/4 PHS, PHILLIPS, THREAD CUTTING	213-035
SCREW, 5-32 x 3/16 PHS, PHILLIPS, THREAD CUTTING	213-044
SOCKET, STM7G	136-008
SOCKET, STM8, GROUND	136-011
SOCKET, STM9G	136-015
SOCKET, 4 PIN, TRANSISTOR	136-095
SPACER, NYLON, 5/16, FOR CERAMIC STRIP	361-009
STRIP, CERAMIC, 3/4 x 9 NOTCHES, CLIP MOUNTED	124-090
TAG, VOLTAGE RATING	334-649
TAG, S/N INSERT	334-679
WASHER, STEEL, 5S x 9/32 x .025	210-803
WASHER, STEEL, 8S x 3/8 x .032	210-804
WASHER, BRASS, 25 W RESISTOR CENTERING	210-809
WASHER, FIBER, #6 SHOULDERED	210-811
WASHER, RUBBER, FOR FUSE HOLDER	210-873
WASHER, STEEL, .470 x 21/32 x .030	210-902



SEE PARTS LIST FOR EARLI
VALUES AND S/N CHANG
OF PARTS MARKED

AA1

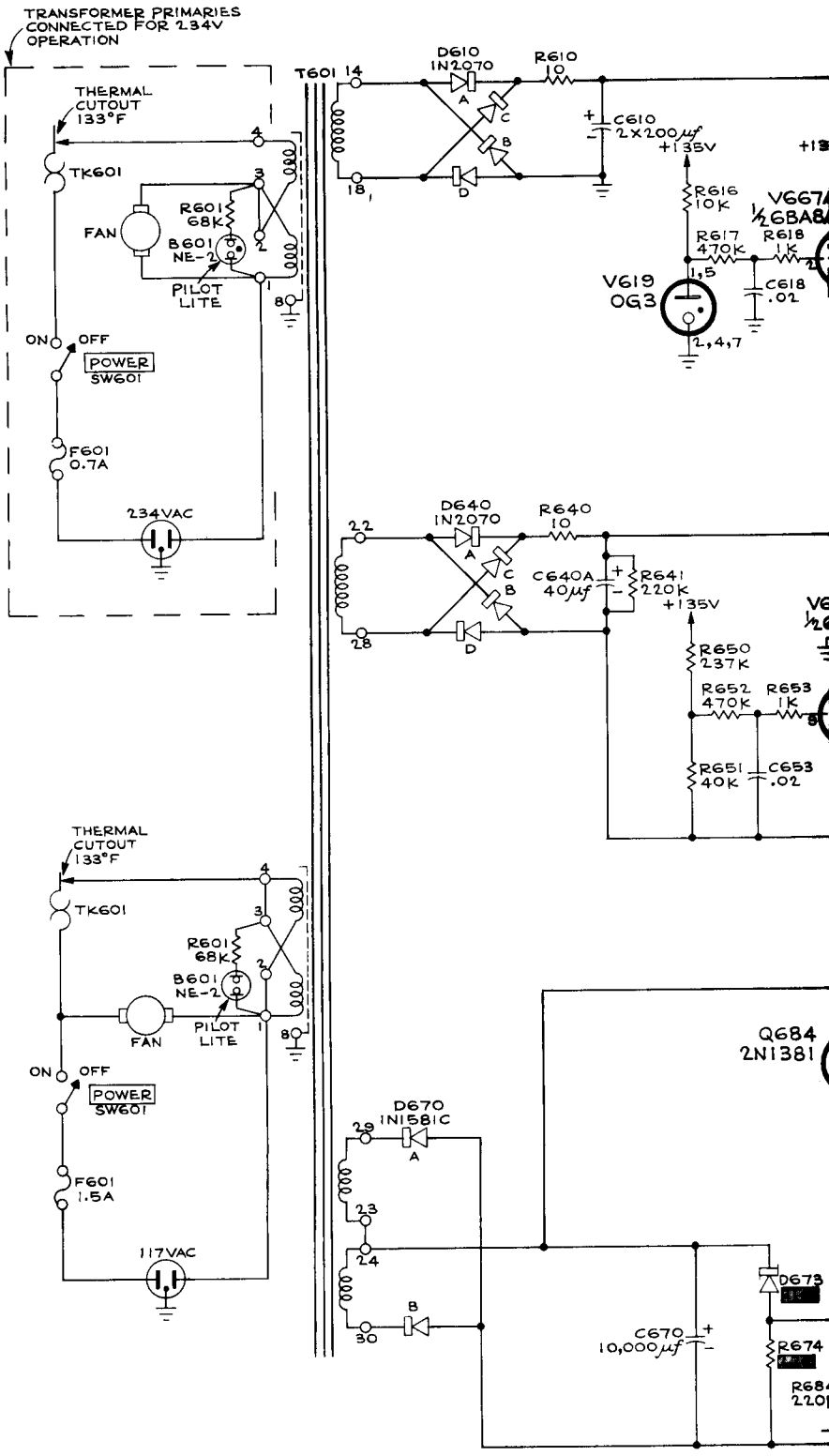


SEE PARTS LIST FOR EARLIER VALUES AND S/N CHANGES OF PARTS MARKED

RBH
6-17-61

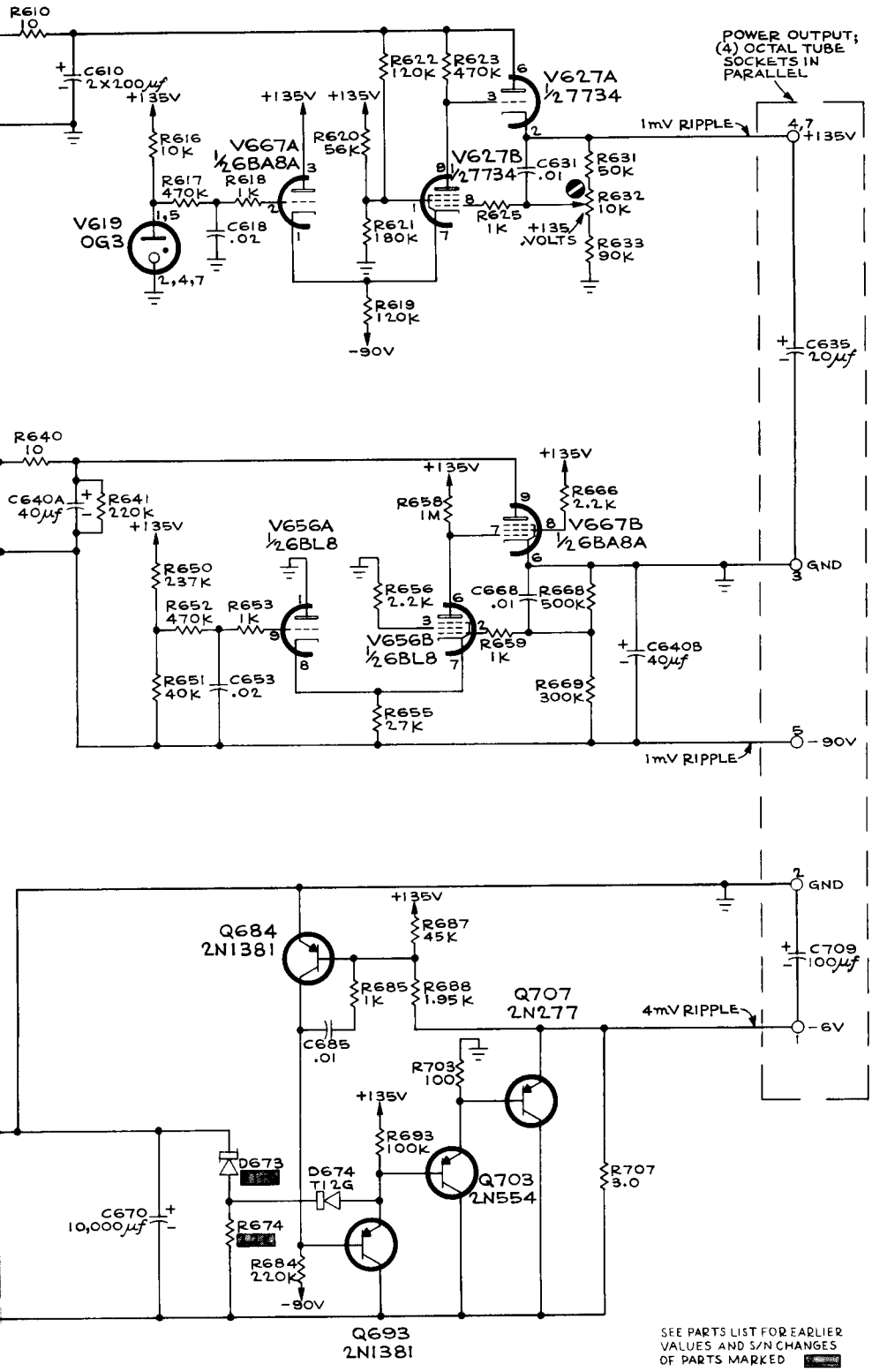
AA1

TYPE 122 LOW-LEVEL PREAMPLIFIER



NOTES:

1. ALL GROUND POINTS ARE RETURNED TO ONE COMMON GROUND.
2. TUBE HEATERS ARE SUPPLIED BY REGULATED -6V.



ED TO ONE COMMON GROUND.
REGULATED -6V.

9-14-61
TP

C

POWER SUPPLY

MANUAL CHANGE INFORMATION

At Tektronix, we continually strive to keep up with latest electronic developments by adding circuit and component improvements to our instruments as soon as they are developed and tested.

Sometimes, due to printing and shipping requirements, we can't get these changes immediately into printed manuals. Hence, your manual may contain new change information on following pages. If it does not, your manual is correct as printed.

TYPE 122/125
Parts List Correction (14)

125 Section

D610 A, B, C, D	should read	Silicon Diode	152-047
D640 A, B, C, D	should read	Silicon Diode	152-047