



THE
HICKOK

ELECTRICAL
INSTRUMENT
COMPANY

OPERATING INSTRUCTIONS
FOR
CATHODE RAY OSCILLOSCOPE
MODEL 675A

CHOICE OF THE EXPERTS
FOR SPEED, ACCURACY
and DEPENDABILITY...

STANDARD EIA GUARANTEE

The Hickok Electrical Instrument Company warrants instruments manufactured by it to be free from defective material or factory workmanship and agrees to repair such instruments which, under normal use and service, disclose the defect to be the fault of our manufacturing. Our obligation under this warranty is limited to repairing any instrument or test equipment which proves to be defective, when returned to us transportation prepaid, within 90 days from the date of original purchase, and provided the serial number has been made known to us promptly for our records.

This warranty does not apply to any of our products which have been repaired or altered by unauthorized persons or service stations in any way so as, in our judgment, to injure their stability or reliability, or which have been subject to misuse, negligence, or accident, or which have had the serial number altered, effaced or removed. Neither does this warranty apply to any of our products which have been connected, installed, or adjusted otherwise than in accordance with the instructions furnished by us. Accessories, including all vacuum tubes not of our manufacture, used with this product are not covered by this warranty.

This warranty is in lieu of all other warranties expressed or implied, and no representative or person is authorized to assume for us any other liability in connection with the sale of our products.

Parts will be made available for a minimum period of five years after the manufacture of this equipment has been discontinued. Parts include all materials, charts, instructions, diagrams, accessories, etc., which have been furnished in the standard model.

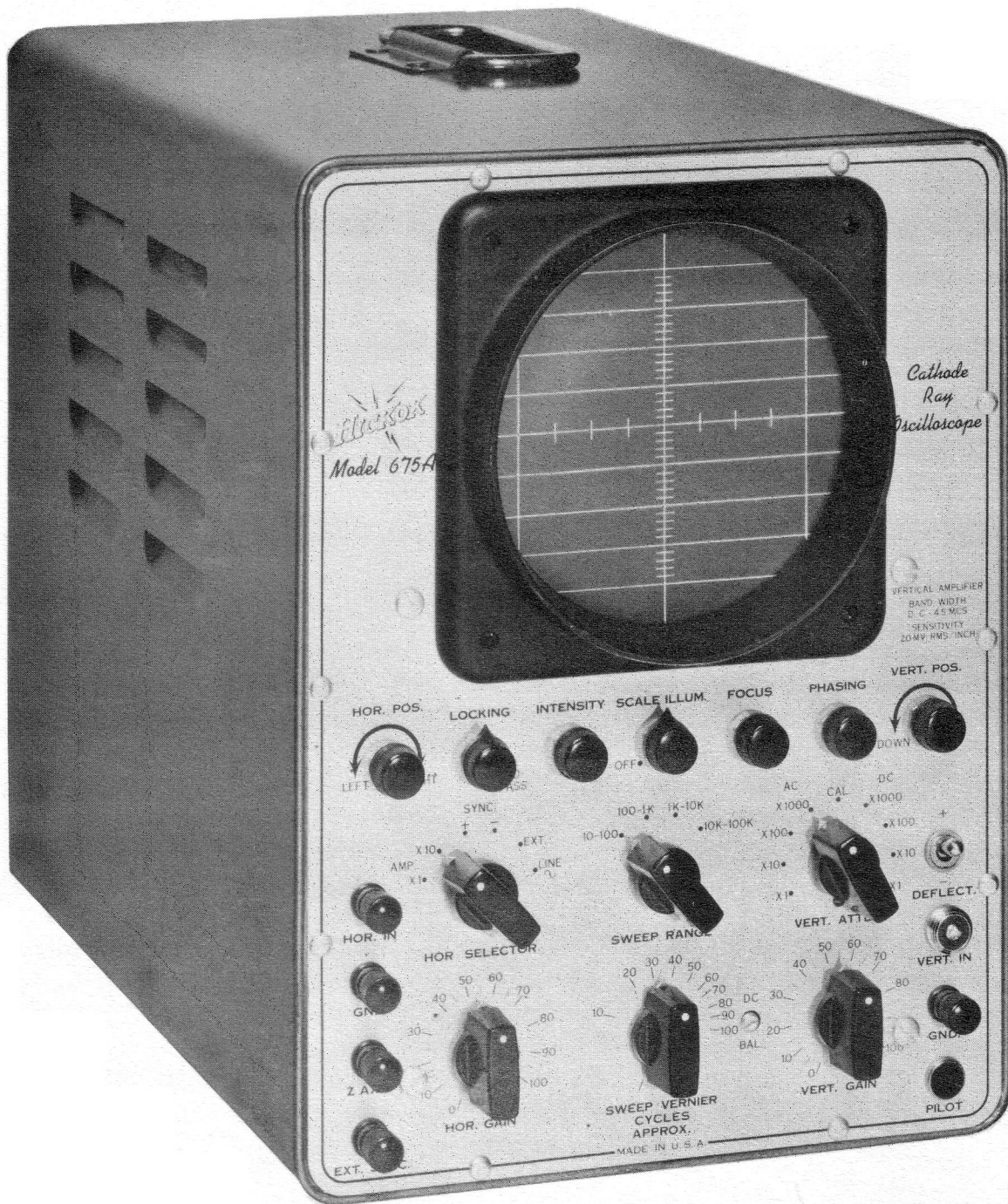
RETURNING EQUIPMENT FOR REPAIR

Before returning any equipment for service, under warranty or otherwise, the factory must first be contacted giving the nature of the trouble. Instructions will then be given for either correcting the trouble or returning the equipment. Upon authorization, this equipment should be forwarded directly to the Hickok factory address, 10636 Leuer Avenue, Cleveland, Ohio, or to a designated service station in your locality. All correspondence pertaining to repairs should be directed to the Hickok office address, 10514 Dupont Avenue, Cleveland 8, Ohio, or to the authorized service station designated.

REGISTRATION CARD

The above guarantee is contingent upon the attached registration card being returned to the factory immediately upon receipt of the equipment.

THE HICKOK ELECTRICAL INSTRUMENT COMPANY
Cleveland, Ohio



SECTION 1

TECHNICAL DATA

EQUIPMENT SUPPLIED (One Complete Unit)

QUAN.	NAME	STYLE	STOCK NO.	DIMENSIONS	WEIGHT
1	Oscilloscope	675A	902-260	9-7/8"x13 $\frac{1}{2}$ "x17 $\frac{1}{4}$ "	35 lbs.
1	Instruction Book		2490-275	8-1/2"x11"	
1	Probe, shielded RG62/U cable terminated on one end with single button female mike connector and terminated on the other end with a combination direct through and 10 to 1 capacity dividing probe.		16970-30	36"	

TECHNICAL CHARACTERISTICS

1.1 POWER SUPPLY REQUIRED:

- (a) Voltage: 115V \pm 10%.
- (b) Frequency: 50 to 400 c. p. s.
- (c) Power consumption: 100 watts at 115 volts.
- (d) Primary fuse: 1-1/2 amp Slo-Blo.
- (e) Secondary fuse: 1/4 amp.

1.2 DEFLECTION SENSITIVITY:

- (a) Vertical amplifier: 0.020 volts RMS/inch.
- (b) Vertical amplifier with probe in low capacity position: 0.200 volts RMS/inch.
- (c) Horizontal amplifier: 0.250 volts RMS/inch.

1.3 INPUT IMPEDANCE:

- (a) Vertical amplifier without probe: 1 meg, 40 mmf.
- (b) Vertical amplifier with probe in direct through (Hi) position: 1 meg, 80 mmf.
- (c) Vertical amplifier with probe in capacity divide (Lo) position: 10 meg, less than 10 mmf.
- (d) Horizontal amplifier: 1 meg 25 mmf.
- (e) Z axis: 2.2 meg.
- (f) Ext. sync: 1,000 ohms.

1.4 MAXIMUM INPUT VOLTAGES

(a) Vertical input:

	Atten:		Max. Input Voltage
	Position	Probe on "HI"	Probe on "LO"
X1	1	volt RMS	10 volts RMS
X10	10	volt RMS	100 volts RMS
X100	100	volt RMS	1000 volts RMS
X1000	600	volt peak	2000 volts peak

(b) Horizontal input:

	Atten.	Max. Input Voltage
	Position	
X1	50	volts RMS
X10	600	volts peak

(c) Z axis: Max. input voltage - 100 volts peak.

(d) Ext. sync: Max. input voltage - 50 volts D. C., 20 volts RMS A. C.

1.5 FREQUENCY RANGE:

(a) Vertical amplifier:

- (1) Frequency response: D. C. to 4.5 mc. (within 3 db). Flat through the color burst frequency (3.58 mc.)
- (2) Pulse response: Rise time of .08 microseconds.
- (3) Attenuator: Frequency compensated decade steps of 1 to 1, 10 to 1, 100 to 1 and 1000 to 1 in both A C and D C positions.
- (4) Gain control: Non-frequency discriminating 10 to 1 gain control.

(b) Horizontal amplifier:

- (1) Frequency response: 1 c.p.s. to 450 KC (within 3 db.)
- (2) Attenuator: Frequency compensated decade steps of 1 to 1 and 10 to 1.
- (3) Gain control: Frequency compensated 10 to 1 gain control.

1.6 TIME BASE GENERATOR:

- (a) Frequency: Frequency coverage from 10 c.p.s. to 100 KC, in four calibrated decade ranges, with vernier control of 1 to 10, as follows:

10 c.p.s. to 100 c.p.s.
100 c.p.s. to 1 KC.
1 KC. to 10 KC.
10 KC. to 100 KC.

- (b) Time base expansion: Time base expansion of ten times full screen (40 inches) with complete positioning of expanded trace.

- (c) Writing speed: The wide frequency coverage together with expansion will produce writing speeds variable from 25,000 microseconds per inch (based on 4 inches) or 10,000 microseconds per CM (based 10 CM) to 0.25 microseconds per inch (based on 40 inches) or 0.1 microseconds per CM (based on 100 CM.)

1.7 VOLTAGE CALIBRATION:

A clipped 60 cycle line frequency calibration signal of 100 millivolts peak to peak is provided on the 5th position of the vertical attenuator switch for use in calibrating the

vertical amplifier. The amplitude is stable and independent of any input line variations.

1.8 TRACE REVERSAL:

A switch is provided for reversing the polarity of the vertical trace.

1.9 LINE SWEEP:

A phaseable (approx. 180°) line frequency signal is provide on

the last position of the horizontal selector switch for use as horizontal sweep.

1.10 ADDITIONAL FEATURES:

- (a) Illuminated, calibrated screen backed with a green filter for reducing reflections caused by incidental illumination. Illumination is adjustable.
- (b) Shock mounted amplifiers.

1.11 TUBE COMPLEMENT:

<u>REF. SYMBOL</u>	<u>TYPE</u>	
V101A	6AN8	Pent. Sect. Vertical Input Amplifier
V101B	6AN8	Triode Sect. Vertical Intermediate Cathode Follower
V102A	6AN8	Pent. Sect. Vertical Input Amplifier
V102B	6AN8	Triode Sect. Vertical Intermediate Cathode Follower
V103	12BY7	Vertical Output Amplifier
V104	12BY7	Vertical Output Amplifier
V105A	12AV7 6AW8	Sweep Circuit Oscillator Discharge Tube
V105B	12AV7	Triode Sect. Horizontal Input Cathode Follower
V106A	6AW8	Pent. Sect. Sweep Circuit Oscillator Linearization Pentode
V106B	6AW8 12AV7	Sweep Circuit Oscillator Sync. Injector
V107A	6AN8	Pent. Sect. Horizontal Output Amplifier
V107B	6AN8	Triode Sect. Sweep Circuit Oscillator Multivibrator
V108A	6AN8	Pent. Sect. Horizontal Output Amplifier
V108B	6AN8	Triode Sect. Sweep Circuit Oscillator Multivibrator
V109	1V2	High Voltage Rectifier
V110	6AX5	Low Voltage Rectifier
V111	5UP1*	Cathode Ray Tube

*NOTE: Either the type 5UP& or 5UP11 Cathode Ray Tube can be ordered in place of the 5UP1 which is supplied in the standard Model 675A instrument, as these tubes are completely mechanically and electrically interchangeable. This will, of course, result in a slight increase in cost.

SECTION II

OPERATION

2.1 GENERAL

If this instrument is connected to the proper power source, as outlined in the Technical Data sheet, and if no other connections are made to the instrument, it is impossible to damage it with any settings of the panel controls.

In the case of an instrument where input terminals are involved, such as an oscilloscope, reference should be made to the Technical Data sheet for maximum input voltages that can be applied to the input terminals.

In the case of an instrument where output terminals are involved, such as a signal generator, care should be taken not to apply external voltages to the output terminals as this might result in damage to the internal circuits.

CAUTION

CARE SHOULD BE TAKEN WHEN OPERATING THIS INSTRUMENT WITH THE CASE REMOVED AS THERE ARE HIGH AND DANGEROUS VOLTAGES PRESENT. IN THE CASE OF OSCILLOSCOPES, CARE SHOULD BE TAKEN IN HANDLING CATHODE RAY TUBE, AS FRACTURING OR SHATTERING OF THIS TUBE COULD BE DANGEROUS TO THE OPERATOR.

2.2 CONTROLS AND THEIR FUNCTIONS

a. Cathode Ray Tube Controls

1. SCALE ILLUMINATION: The extreme counterclockwise position of this control functions as the on-off switch. The rest of the rotation controls the illumination of the calibrated screen on the face of the cathode ray tube.

2. INTENSITY: A control of the intensity of the cathode ray beam.
3. FOCUS: A control of the focusing of the cathode ray beam to produce a finely defined pattern.

NOTE: Set the FOCUS and INTENSITY controls for the smallest spot with the minimum readable brilliance in order to preserve the life of the tube. Do not leave a spot or trace in one place for a very long period of time as it may burn the part of the screen. When the trace is not being observed, the INTENSITY control should be adjusted until the spot or trace disappears.

b. Vertical Controls

1. VERTICAL ATTENUATOR: A coarse control of the vertical input voltages of the vertical amplifier. The first and last four positions divide the input voltage by factors of 1, 10, 100 and 1000 AC and DC respectively. On the fifth position, marked CAL, a clipped 60 cycle line frequency signal of 100 millivolts peak to peak is injected for use in calibrating the vertical amplifier. This signal is stable and independent of any input line voltage variations.
2. VERTICAL GAIN: A vernier control of the sensitivity of the vertical amplifier. This control is so designed as to reduce the sensitivity by a factor of ten and thus will never reduce the deflection to absolute zero.

3. VERTICAL D. C. BALANCE: A control to eliminate the vertical shift in positioning with the gain control setting. This is a screwdriver adjustment located midway between the vertical gain control and the sweep vernier control on the front panel. To adjust, set the vertical gain control at maximum and position the beam to the center of the screen with the vertical positioning control. Next, readjust the vertical gain control to minimum and re-center the beam vertically with the D. C. balance control. When adjusted properly, there should be no D. C. shift in positioning, as the vertical gain control is adjusted.
4. VERT. POS., DOWN-UP: A control of the vertical position of the cathode ray pattern. Be sure that the beam has been properly centered before trying to interpret patterns.
5. DEFLECT, + -: A polarity reversal switch which changes the polarity of the vertical amplifier. In the plus position, a plus-going waveform will deflect the beam upward. In the minus position, a plus-going waveform will deflect the beam downward. This switch can be used conveniently for matching an observed waveform with published data.

NOTE: Always use the maximum vertical attenuator setting which will give satisfactory display.

c. HORIZONTAL CONTROLS

1. HOR. SELECTOR: A control of the horizontal sweep of the electron beam. The first two positions divide the input voltage applied to the horizontal input terminal by factors of 1 and 10 respectively. The third, fourth and fifth position apply the sawtooth generated from the internal sweep circuit oscillator to the horizontal amplifier and provide this sawtooth

with plus and minus internal and external synchronization respectively. In these three positions, the horizontal deflection is a linear time base progressing from left to right at a constant rate and then returning to the left side almost instantaneously to start the next sweep. In the sixth position, the horizontal sweep is of the waveform and frequency of the A. C. power line (usually a 60-cycle sine wave.)

2. HOR. GAIN: A vernier control of the sensitivity of the horizontal amplifier. This control is so designed as to reduce the sensitivity by a factor of approximately ten and thus will never reduce the deflection to absolute zero. See note below.
3. HOR. POS., LEFT-RIGHT: A control of the horizontal position of the cathode ray pattern. See note below.
4. PHASING: This control is effective only when the HOR. SELECTOR is in the LINE position. It is used to adjust the phase of the line frequency signal applied to the horizontal amplifier. Its range is approximately 180° , however, the other quadrant may be obtained by reversing the line plug.

NOTE: The horizontal positioning and gain control networks have been designed for convenience in operation in the two sweep positions of the horizontal selector. The horizontal amplifier has been provided with ten times full screen expansion at all sweep frequencies in order that an effective job can be done in observing all the fine detail of composite video test signals required to do modern television servicing and in particular color television servicing. At minimum

gain, the horizontal amplifier and sweep circuit oscillator produce four inches of trace, and at maximum gain produce forty inches of trace. The horizontal positioning control has been linked electrically to the horizontal gain control in such a manner as to produce four inches of positioning with four inches of trace, and forty inches of positioning at maximum gain where there is forty inches of trace. This has the effect of producing expansions symmetrically around the center line of the screen, no matter where the positioning control is set. In other words, after the composite is locked in with minimum horizontal gain based on a four-inch trace, the positioning control should be rotated to bring the desired section of the composite directly under the center line of the screen. By rotating the horizontal gain control toward maximum, the portion of the composite that appears under the center line, will expand about the center line, eliminating the problem of requiring to hunt for the desired portion of the trace after it has been expanded. It should be noted that when using the oscilloscope with the horizontal selector in one of the amplifier or the line position, the horizontal signal will also expand around the center line, and the horizontal positioning will also be affected by the horizontal gain control.

d. Sweep Circuit Controls

1. SWEEP RANGE: A control providing four ranges of sweep frequency, 10 to 100 cycles, 100 to 1000 cycles, 1000 to 10,000 cycles and 10,000 to 100,000 cycles respectively.
2. SWEEP VERNIER CYCLES APPROX.: A vernier control of the frequency of the sawtooth sweep within the range covered by any one position of the sweep range control is calibrated to approximately 20% and thus the frequency can be read directly off the panel with the application of the proper multiplication factor in accordance with the setting on the sweep range control.

3. LOCKING: A variable control of the amount of locking voltage fed to the sweep circuit oscillator.

NOTE: To prevent distortion, use as little locking voltage as possible to cause the image to remain stationary.

2.3 TERMINALS

- a. Vert. In: A single button chassis microphone connector for injecting the signal into the vertical amplifier. This connector will accept the termination on the probe assembly supplied with this instrument.
- b. Gnd.: A binding post connected directly to the chassis of the instrument.
- c. Hor. In: A binding post for injecting a horizontal input signal to the horizontal amplifier.
- d. Gnd.: A binding post connected directly to the chassis of the instrument.
- e. Z Axis: A binding post permitting the Z axis or intensity of the beam to be modulated by application of an external voltage to this binding post.
- f. Ext. Sync.: A binding post connection to be used when synchronizing the sweep circuit oscillator from an external source of voltage. The horizontal selector switch should be in the Extr. position.

2.4 PROBE

This instrument is supplied with a combination high and low capacity probe. With the push switch on the probe in the high capacity position, it acts merely as a shielded input cable. With the switch in the low capacity position, it becomes a capacity dividing probe for use with critical circuits where capacity loading is a problem. The loading capacity

in this position is below 10 mmf. and the signal is attenuated 10 to 1. These probes are adjusted for the proper frequency compensation in the factory; however, if it should ever be necessary to adjust the compensation, the following procedure should be followed. Loosen the sleeve nut on the pointer and screw the pointer in or out until the proper compensation of a 1 KC square

wave has been achieved. Then tighten up the sleeve nut to lock this adjustment. In making this adjustment, it is important not to loosen the knurled nut at the end of the probe next to the sleeve nut.

SECTION III

MAINTENANCE

3.1 GENERAL

CAUTION

CARE SHOULD BE TAKEN WHEN OPERATING THIS INSTRUMENT WITH THE CASE REMOVED AS THERE ARE HIGH AND DANGEROUS VOLTAGES PRESENT. IN THE CASE OF OSCILLOSCOPES, CARE SHOULD BE TAKEN IN HANDLING CATHODE RAY TUBE, AS FRACTURING OR SHATTERING OF THIS TUBE COULD BE DANGEROUS TO THE OPERATOR.

As this Hickok instrument has been built under the high standards and quality of materials which has made Hickok famous, no maintenance other than routine replacement of tubes should be necessary. It is suggested that, should the instrument need maintenance other than routine replacements, the factory be contacted in accordance with "Returning Equipment for Repair".

All vacuum tubes are operated at, or below, their normal ratings to insure long life and uniform service. All tubes are easily accessible after the chassis has been removed from the case. To remove chassis from the case, simply remove the 10 screws around the edge of the main panel and the 4 screws in the bottom of the case.

This instrument is protected with fuses as indicated on the schematic and in the parts list. In order to afford proper

protection for this instrument, no other fuses should be used except those indicated.

The cathode ray tube requires care in use and care in handling. Care should always be taken that the beam is not left in one spot for long periods of time as the screen may become burned or streaked. Adjust the beam for minimum readable brilliance and smallest spot to increase tube life.

CAUTION

HANDLE WITH CARE. Breakage of this tube, which contains a high vacuum, may result in injury from flying glass. Do not strike or scratch the tube. Never subject to more than moderate pressure when installing in or removing from equipment.

To remove the cathode ray tube, loosen the clamp on the base, opening it up far enough to allow the removal of the u-metal shield, then slide the tube backwards out of the bezel allowing the neck to push on through the clamp. Then, tipping the front of the tube upward, finish removing it by pulling forward.

3.2 ADJUSTMENTS

None of the following adjustments should be attempted until this instrument has been operating a sufficient length of time to assure that it is at its normal operating temperature. These adjustments should be made with a line voltage of 115 volts.

a. Calibration Controls - Vertical Amplifier.

1. BIAS, R110: and VERT. POS. CAL., R200:

Set VERT. GAIN at Max.

Set VERT. ATTEN. to X1000.

Set VERT. POS. control to its approximate mechanical center.

Center Beam with R200.

Adjust R110 until voltage between pins 6 and 7 on V101A and V102A is 45 volts. If beam moves from center of screen, re-adjust R200 as above.

2. BAL., R115: From the previous panel control settings, rotate the gain control to minimum and re-center the beam with R115 located on the front panel.

3. Amp. Frequency compensation.

With the VERT. GAIN control at minimum, the amplifier is compensated for the proper frequency response by the insertion of the blue lead compensators into the center of the final vertical plate load resistors R138 and R139. These compensators should always be inserted at approximately equal depths. With the gain control at maximum, the plus polarity of

the amplifier is again compensated for the proper frequency response by the adjustment of trimmer condenser C109 which is toward the outside of the board.

With the gain control at maximum, the minus polarity of the amplifier is again compensated for the proper frequency response by the adjustment of trimmer condenser, C110, which is toward the inside of the board.

4. Attenuator Frequency Compensation, C102, C103, C104.

When the VERT. ATTEN. is in the X10, X100, or X1000 AC or DC positions, it is frequency compensated by the adjustment of trimmer condensers C102, C103, and C104, respectively. These condensers are located on the vertical attenuator switch.

b. Calibration Controls - Horizontal Amplifier.

1. BAL., R172:

Set HOR. SELECTOR to X10.

Set HOR. GAIN at max.

Set HOR. POS. control to electrically center the trace.*

*NOTE: Due to the presence of the earth's magnetic field, when the oscilloscope is removed from the case, the electrical center of the tube does not coincide with the mechanical center. To find the electrical center, short between the horizontal deflection plate leads located in the upper left hand corner at the rear of the oscilloscope.

Rotate the HOR. GAIN to minimum and adjust R172 to re-center the beam to the electrical center of the tube.

2. Frequency Compensation.

With the HOR. GAIN control at maximum the amplifier is compensated for the proper frequency response by the insertion of the blue lead compensator into the center of the final vertical plate load resistor, R174, located toward the inside of the board.

c. Calibration Controls - Sweep Circuit Oscillator.

1. SWEEP LEVEL R176, SWEEP AMPLITUDE R198, STABILITY R187:

Set HOR. SELECTOR to EXT.

Set LOCKING to minimum.

Set HOR. GAIN to minimum.

Set SWEEP RANGE to 100-1K.

Set SWEEP VERNIER to maximum.

Adjust R176 and R198 to produce a 3-inch trace symmetrically around the electrical center of the tube. In making this adjustment, it may be necessary to adjust R187 to retain oscillation. R187 should be adjusted to maintain oscillation throughout the entire frequency range.

2. LOW FREQ. CAL. - R196; HIGH FREQ. CAL. - R188:

Set HOR. SELECTOR to Ext.

Set HOR. GAIN to minimum.

Set VERT. ATTEN. to "Cal".

Set VERT. GAIN to max.

Set SWEEP RANGE to 10-100.

Set LOCKING to minimum.

Adjust R196 for 6 sine waves when the Sweep Vernier is set on 10.

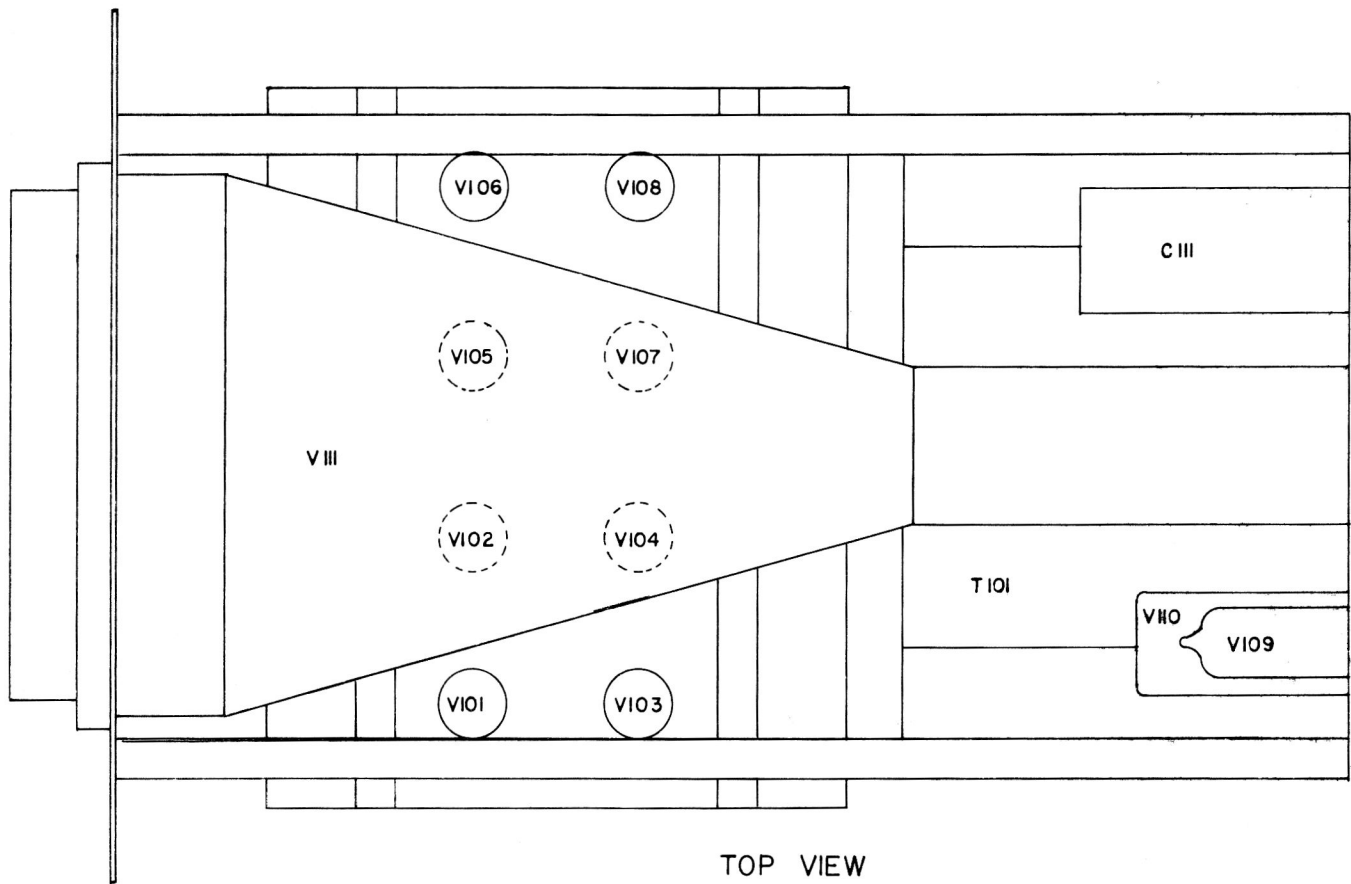
Adjust R188 for a 3-to-2 Lissajous pattern when the Sweep Vernier is set on 90. Repeat these adjustments until both ends of the Sweep Vernier are calibrated.

d. Calibration Controls - Miscellaneous

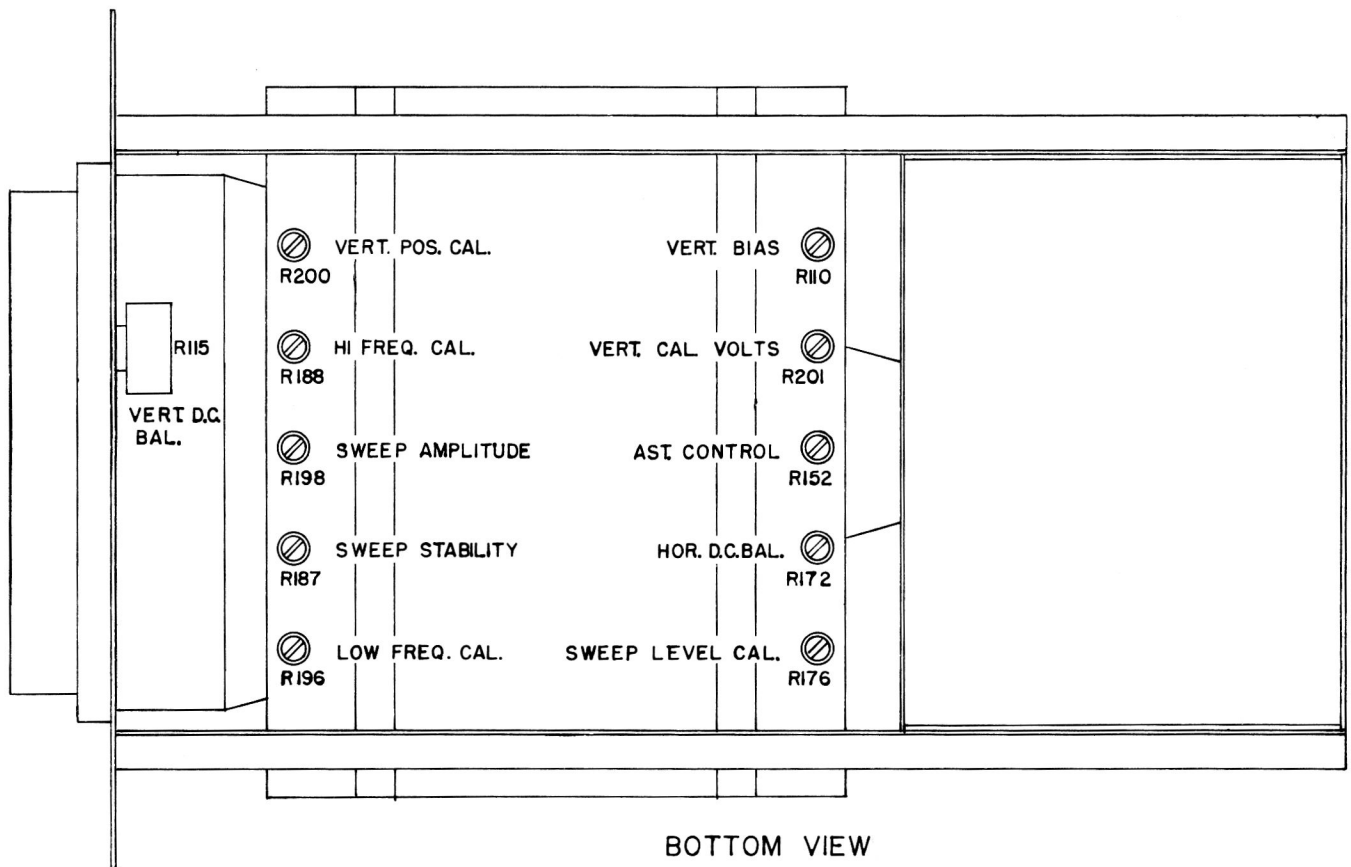
1. AST. ADJ. R152: This control is adjusted to provide a clearly defined trace over the entire tube face.

2. CAL. "E" ADJ. R201: This control is adjusted to provide 0.1 volts peak to peak for calibration of the vertical amplifier.

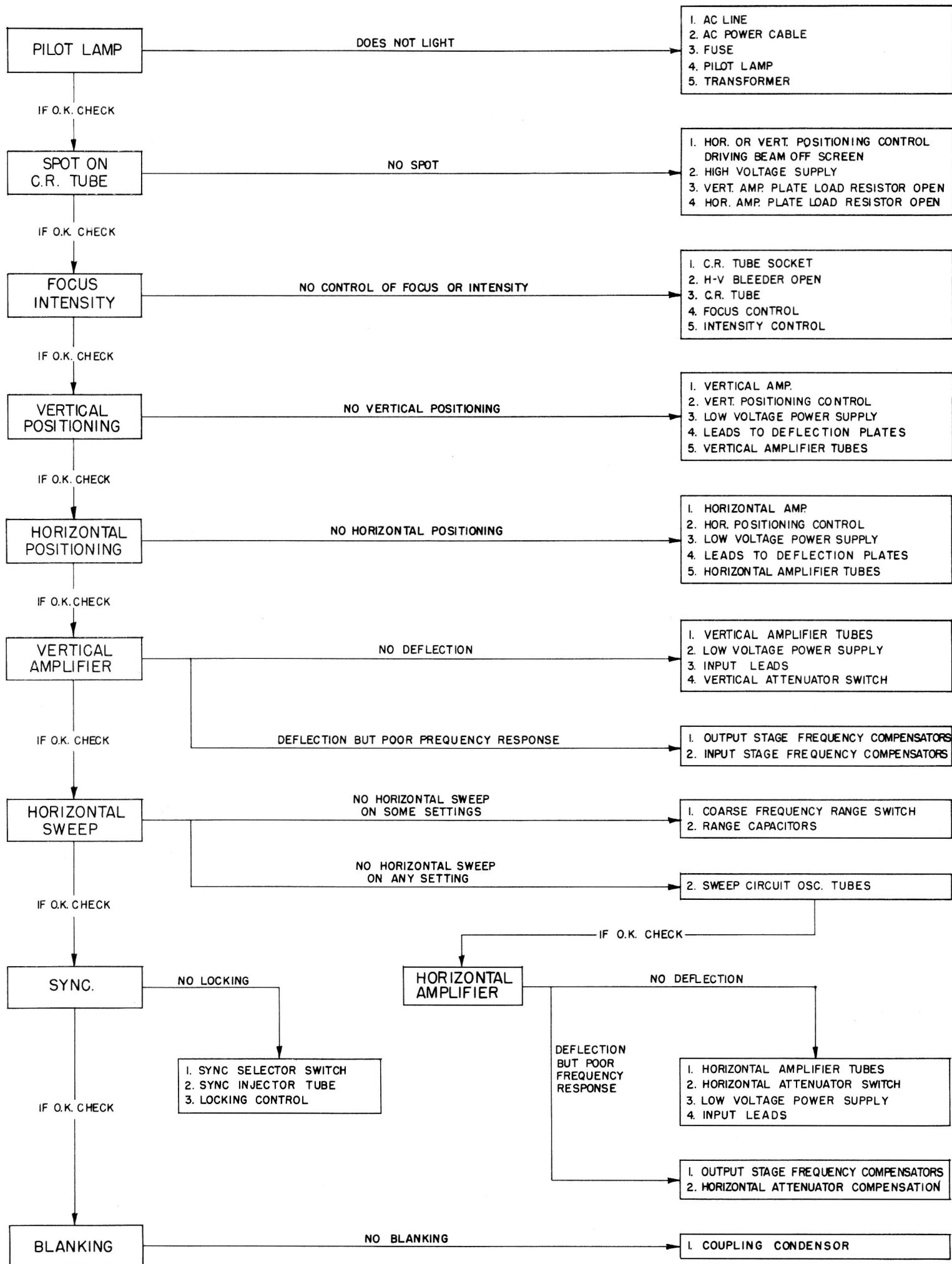
NOTE: When the oscilloscope is operating normally in its case, the horizontal trace should expand symmetrically around the center hair line. BAL. control R172 can be adjusted to provide this symmetrical expansion without affecting any of the other adjustments.



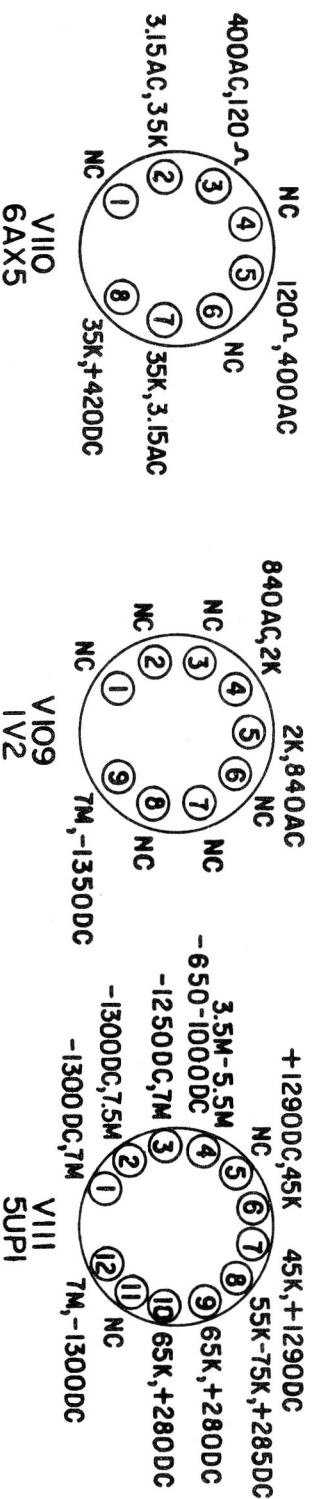
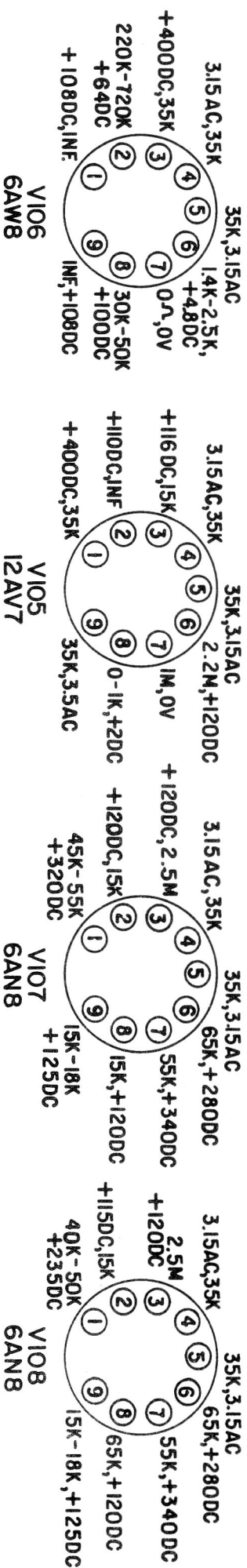
TOP VIEW



BOTTOM VIEW



VRD-675A



HICKOK ELECTRICAL INSTR. CO.
CLEVELAND 8, OHIO

ALL MEASUREMENTS: (MADE FROM A B-17 V POINT)	HORIZONTAL POSITION IN ELECTRICAL CENTER
IISAC - 120 WATTS	HORIZONTAL SEL.-INT.
VERTICAL GAIN - ZERO	HORIZONTAL GAIN-ZERO
VERTICAL ATTEN.- XI	VERTICAL POSITION AT MECH. CENTER
SWEEP RANGE - 10-100	VERTICAL DEFLECTION IN + POLARITY
SWEEP VERNIER-60	
HICKOK 209A VTVM	

PARTS LIST FOR MODEL 675A

Note: There is a minimum billing charge of \$1.50 for any one parts order.

Prices will be furnished upon request.

Hickok Code No.	Name and Description	Symbol Ref.
2360-56	Binding Post: #38 Ensign, black	J102 thru J106
3085-38	Capacitor: 20-20-20-20 mfd, 450 volts, electrolytic	C111, C112
3085-61	Capacitor: 25 mfd, 25 volt, electrolytic, Astron MM25-25	C148
3095-9	Capacitor: 1000 mmf, 500 volt, mica	C125
3095-64	Capacitor: 68 mmf, 500 volt, mica	C126, C136
3095-90	Capacitor: 1200 mmf, 500 volt, mica	C118
3105-164	Capacitor: .1 mfd, 2500 volt, paper	C120, C121
3105-204	Capacitor: 1 mfd, 200 volt, paper	C123
3105-205	Capacitor: .01 mfd, 400 volt, paper	C124
3105-207	Capacitor: .1 mfd, 600 volt, paper	C128
3105-216	Capacitor: .01 mfd, 200 volt, paper	C107
3110-69	Capacitor: .1 mfd, 500 volt, disk ceramic	C101
3110-7	Capacitor: .005 disk ceramic	C113, C114, C117, C122, C131, C133, C134, C135, C137, C138, C139, C140, C141, C142, C144, C145, C147
3110-12	Capacitor: 1000 mmf, ceramic	C106, C146
3110-21	Capacitor: 100 mmf, ceramic	C105, C130
3110-38	Capacitor: 220 mmf, ceramic	C115, C116
3110-62	Capacitor: .003 mfd, 3000 VDCW, disk ceramic	C119, C132
3115-17	Capacitor: 1.5-10 mmf, trimmer	C102, C103, C104
3105-210	Capacitor: .1 mfd, 200 volt, paper	C147
19450-66	spring for trimmer	C109, C110, C127
19055-205	screw for trimmer	C129
3250-33	Choke: 125 mil., Power Filter	L103
3250-68	Choke: 15 microhenrys, Video Peaking	L101, L102
3475-29	Connector: Single button Chassis Mike	J101
3475-64	Connector: Cathode Ray Tube	
6900-9	Fuse: 1-1/2 amp, Slo-Blo, 3AG	F101
6900-20	Fuse: 1/4 amp. 3AG	F102
11500-11	Knob: bar type with pointer	
11505-68	Knob: small round with pointer	
11505-72	Knob: small round	
12270-22	Lamp: #51 GE	I101 thru I105
12270-26	Lamp: Neon, NE2	N101, N102, N103, N104

PARTS LIST FOR MODEL 675A

Note: There is a minimum billing charge of \$1.50 for any one parts order.
Prices will be furnished upon request.

Hickok Code No.	Name and Description	Symbol Ref.
16925-147	Potentiometer: 2 meg, 20%, 1 watt, linear, carbon	R142
16925-215	Potentiometer: 100K, 20%, 1/2 watt, linear, carbon	R152
16925-222	Potentiometer: 1K, 20%, 1/2 watt, linear, carbon	R188, R198
16925-225	Potentiometer: 50K, 20%, 1/2 watt, linear, carbon	R196
16925-242	Potentiometer: 3K, 20%, 1/2 watt, linear, carbon	R172, R200 R110
16925-243	Potentiometer: 10K, 20%, 1/2 watt, inverse log taper, carbon	R116
16925-244	Potentiometer: 10K, 20%, 2 watt, linear, wirewound	R176
16925-245	Potentiometer: 15K, 20%, 1/2 watt, linear, carbon	R201
16925-246	Potentiometer: 25K, 20%, 1/2 watt, linear, carbon	R129
16925-247	Potentiometer: 25K, 20%, 1/2 watt, inverse log taper carbon	R169
16925-248	Potentiometer: 50K, 20%, 1/2 watt, linear, carbon	R164
16925-249	Potentiometer: 100K, 20%, 1/2 watt, log taper, carbon	R154
16925-250	Potentiometer: 500K, 20%, 1/2 watt, linear, carbon	R187
16925-251	Potentiometer: 500K, 20%, 1 watt, linear, carbon	R140
16925-252	Potentiometer: 10 ohm, 20%, 2 watt, linear, wirewound on-off switch	R155-S105
16925-260	Potentiometer: 1K, 20%, 1/2 watt, linear, carbon	R189
16925-354	Potentiometer: 1K, 1/2 watt, 20%, linear, carbon, with on-off switch	R191
16925-265	Potentiometer: 1K, 20%, 1/2 watt, linear, carbon	R115
16970-30	Probe: Complete probe assembly with lead and conductor	
18410-152	Resistor: 15 ohm, 10%, 1/2 W	R160, R167 R177, R179 R182
18410-472	Resistor: 47 ohm, 10%, 1/2 watt	R112, R113, R122, R133, R134, R135, R136, R180,
18411-102	Resistor: 100 ohm, 10%, 1/2 W	R106, R107, R130, R131, R193, R194,
18412-102	Resistor: 1000 ohm, 10%, 1/2 W	R203
18412-101	Resistor: 1K, 5%, 1/2 W	R105
18412-122	Resistor: 1.2K, 10%, 1/2 W	R114, R117, R158
18412-472	Resistor: 4.7K, 10%, 1/2 W	R183
18412-562	Resistor: 5.6K, 10%, 1/2 W	R170, R171
18413-101	Resistor: 10K, 5%, 1/2 W	R104
18413-102	Resistor: 10K, 10%, 1/2 W	R165, R166
18413-151	Resistor: 15K, 5%, 1/2 W	R118, R119, R163

PARTS LIST FOR MODEL 675A

Note: There is a minimum billing charge of \$1.50 for any one parts order.

Prices will be furnished upon request.

Hickok Code No.	Name and Description	Symbol Ref.
18413-221	Resistor: 22 K, 5%, 1/2 W	R125, R128
18413-272	Resistor: 27 K, 10%, 1/2 W	R206
18413-332	Resistor: 33 K, 10%, 1/2 W	R151
18413-331	Resistor: 39 K, 10%, 1/2 W	R185
18413-391	Resistor: 39 K, 5%, 1/2 W	R162
18413-471	Resistor: 47 K, 5%, 1/2 W	R199, R192, R147
18413-682	Resistor: 68 K, 10%, 1/2 W	R108
18414-111	Resistor: 110 K, 5%, 1/2 W	R103, R157
18414-122	Resistor: 120 K, 10%, 1/2 W	R153
18414-152	Resistor: 150 K, 10%, 1/2 W	R144
18414-182	Resistor: 180 K, 10%, 1/2 W	R149
18414-221	Resistor: 220 K, 5%, 1/2 W	R126, R127
18414-332	Resistor: 330 K, 10%, 1/2 W	R186
18414-392	Resistor: 390 K, 10%, 1/2 W	R145
18415-101	Resistor: 1 meg, 5%, 1/2 W	R101, R102, R156
18415-102	Resistor: 1 meg, 10%, 1/2 W	R184, R204
18415-222	Resistor: 2.2 meg, 10%, 1/2 W	R181, R195
18415-272	Resistor: 2.7 meg, 10%, 1/2 W	R148
18415-562	Resistor: 5.6 meg, 10%, 1/2 W	R150
18421-152	Resistor: 150 ohms, 10%, 1 W	R111
18422-332	Resistor: 3.3 K, 10%, 1 W	R202
18422-511	Resistor: 5.1 K, 5%, 1 W	R120, R121
18424-102	Resistor: 100 K, 10%, 1 W	R146
18424-121	Resistor: 120 K, 5%, 1 W	R168
18424-332	Resistor: 330 K, 10%, 1 W	R205
18425-102	Resistor: 1 meg, 10%, 1 W	R141
18425-332	Resistor: 3.3 meg, 10%, 1 W	R143
18431-562	Resistor: 560 ohms, 10%, 2W	R109
18432-751	Resistor: 7.5 K, 10%, 2W	R161
18433-102	Resistor: 10 K, 10%, 2W	R178
18433-152	Resistor: 15 K, 10%, 2 W	R159
18433-182	Resistor: 18 K, 10%, 2W	R123, R124, R173
18434-102	Resistor: 100 K, 10%, 2 W	R197
18575-174	Resistor: 5.6 K, 10%, 10 W	R138, R139
18575-151	Resistor: 7.5 K, 10%, 5 W	R137
18575-152	Resistor: 25 K, 10%, 10W	R174, R175
18575-75	Resistor: 3 K, 10%, 10W	R132
19350-30	Socket: Octal	
19350-192	Socket: 9 pin	
19350-226	Socket: 9 pin for printed circuit	
19911-54	Switch: Toggle DPDT	S102
19912-327	Switch: Rotary, 3 pole, 9 position, 2 section	S101
19912-306	Switch: Rotary, 2 pole, 4 position, 1 section	S104
19912-331	Switch: Rotary, 5 pole, 6 position, 2 section	S103

PARTS LIST FOR MODEL 675A

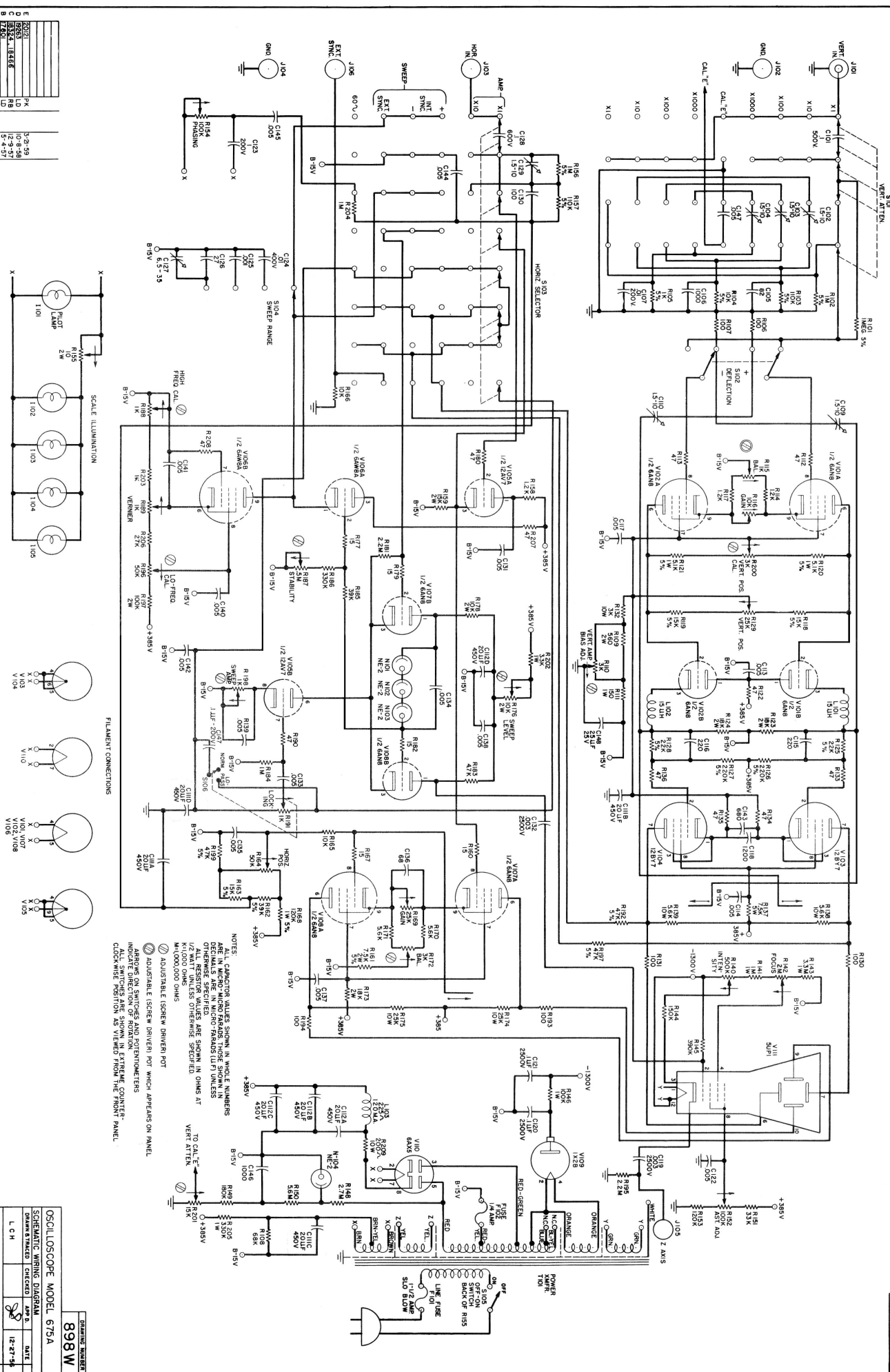
Note: There is a minimum billing charge of \$1. 50 for any one parts order.

Prices will be furnished upon request.

Hickok Code No.	Name and Description	Symbol Ref.
20800-165	Transformer: Power	T101
20875-67	Tube: 5UP1	V111
20875-86	Tube: 1V2	V109
20875-88	Tube: 6AX5	V110
20875-138	Tube: 6AW8	V106
20875-129	Tube: 6AN8	V101, V102, V107, V108
20875-116	Tube: 12AV7	V105
20875-130	Tube: 12BY7	V103, V104

NOTE: When ordering parts or materials for this instrument, the serial number must be given in order to identify properly the material required.

NOTES

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