INSTRUCTION MANUAL

Serial Number ____________

TYPE 567 READOUT OSCILLOSCOPE

Tektronix, Inc.
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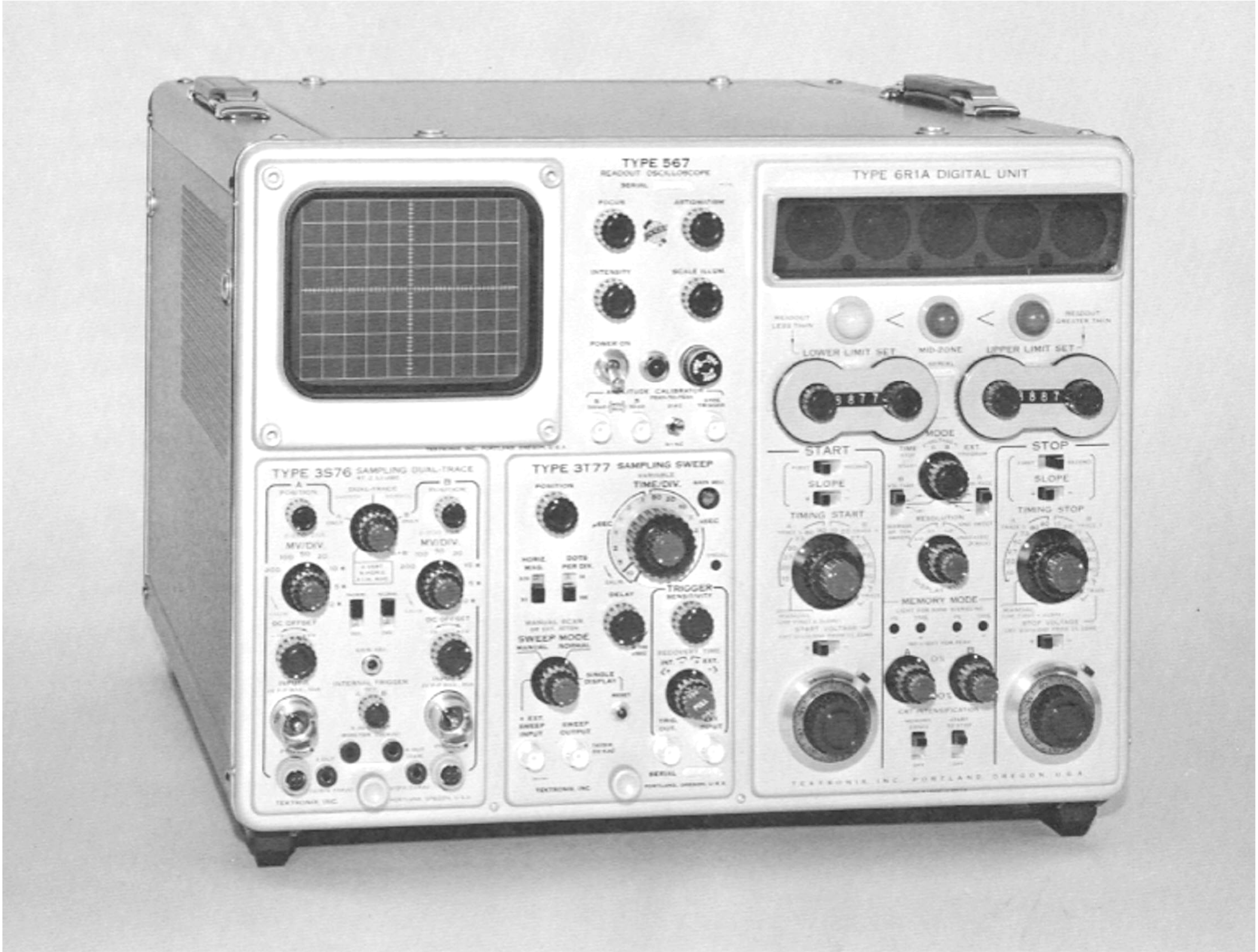

TYPE 567
READOUT OSCILLOSCOPE
TYPE 6R1A DIGITAL UNIT
LOWER LIMIT SET
MID-ZONE
UPPER LIMIT SET
START
STOP
SLOPE
TIMING START
TIMING STOP
MEMORY MODE
TYPE 3S76 SAMPLING DUAL-TRACE
MV/DIV.
DC OFFSET
TYPE 3T77 SAMPLING SWEEP
TIME/DIV.
POSITION
TRIGGER
SWEEP MODE
TEKTRONIX INC. PORTLAND OREGON U.S.A.

SECTION 1
CHARACTERISTICS

General Information

The Tektronix Type 567 Readout Oscilloscope is the power supply and indicator unit for a complete system that provides digital readout of signal information. The two smaller plug-in cells accept any of the Tektronix 2 or 3 Series plug-in units. The large plug-in cell accepts the Tektronix 6 Series digital units. The digital units are compatible with some (but not all) of the 2 or 3 Series units. See your Tektronix Field Engineer for details. Without the digital unit, the Type 567 will operate in the normal oscilloscope manner. With the digital unit, the system can readout its own display of risetime, amplitude or time difference for either conventional voltage-time displays or sampling equivalent-time displays. The system provides "go, no-go" signals, and can be programmed automatically using up to three Tektronix Type 262 Programmers.

ELECTRICAL CHARACTERISTICS

Power Supplies

Electronically regulated for stable operation with widely varying line voltages and loads.

Line voltage requirements—105 to 125 volts, or 210 to 250 volts, rms, 50 to 60 cps, single-phase ac.

Power—Approximately 400 watts when using the Type 3S76, 3T77 and 6R1A Plug-In Units.

Fuse—4 Amp Fast-Blow for 117 volts, 2 Amp Fast-Blow for 234 volts.

Cathode-Ray Tube

Type—T5032-2-1 (S/N 1999-up)
T5610-31 (S/N 750-1998)
T5031-2 (S/N 101-749)

Phosphors—Standard phosphors as listed above, others available as listed with accessories at end of this section.

Unblanking—Deflection type, dc coupled.

Accelerating potential—Approximately 3.5 kv.

Usable viewing area—8 divisions vertical by 10 divisions horizontal.

Deflection plate deflection factors (nominal at 3.5 kv)

	(S/N 1999-up	(S/N 101-1998)
Vertical—	19.5 volts/div	22.8 volts/div
Horizontal—	18.4 volts/div	18.4 volts/div

Graticule

Internal within crt (S/N 1999-up)

External plastic (S/N 101-1998)

Illumination—Variable edge lighting.

Markings—Marked in 8 vertical and 10 horizontal 1-centimeter divisions with 2-millimeter markings on the centerlines.

Amplitude Calibrator

(S/N 2060-up). A square wave with accurate time duration and amplitude; intended for use when setting the vertical and horizontal plug-in units front-panel calibrate controls. Two output frequencies, an accurate 20 kc and an approximate 1 kc. The 1-kc square wave is valuable when adjusting low-frequency attenuator probes.

Output Voltage—Separate BNC connectors produce ground-referenced 0.5 and 5 volts peak to peak when loaded (one or both at the same time) by 100 k or greater. Same connectors provide 50 and 500 mv peak to peak when loaded (one at a time) by 50 ohms.

Accuracy—Voltage accurate to ±2% peak to peak into 100 k or greater loads. Voltage accuracy into 50 Ω depends on load resistor: ±2% peak to peak when 50 Ω is within 1% at one output connector at a time.

Frequency of 20-kc square wave is within 0.1% when the 1-kc square wave is within +80% and —40%; symmetry not specified for either frequency.

+Pre Trigger—A short-duration, ground-referenced, positive pulse at least 600 mv peak to peak into 100 k or greater, that occurs approximately 1/4 cycle ahead of each plus rise of square-wave signal. Amplitude is reduced by 50 Ω load, but +Pre Trigger signal is intended for externally triggering the time-base units of sampling systems not employing an internal trigger pickoff.

All three output connectors of the Amplitude Calibrator are short-circuit proof. External short circuits will not damage the calibrator circuits.

(S/N 101-299). Waveform—Square waves at line frequency.

Output Voltage—0.05, 0.5, 5 and 50 volts, peak to peak into 1 meg or greater load, one at a time.

Accuracy—Peak-to-peak amplitude of square waves within 3% of indicated voltage.

(S/N 300-2059). Above characteristics plus 100-mv peak-to-peak square wave available from 0.5 jack when loaded with ±1% 50 Ω.

Ventilation

Forced, filtered air. A thermal relay interrupts instrument power in the event of overheating. Fan remains on if thermal relay opens during 117-volt operation. Fan turns off if thermal relay opens during 234-volt operation. Temperature of the thermal relay must drop about 15° F before power will be restored.

MECHANICAL CHARACTERISTICS

The Type 567 is constructed with aluminum-alloy chassis and cabinet. Cabinet is finished with a durable blue vinyl plastic. The unit sits on short anti-slide neoprene feet.

Cabinet dimensions—Height 13⅝", width 17", depth 23".

Accessories

Information on accessories for use with this instrument is included at the rear of the mechanical parts list.

SECTION 3
CIRCUIT DESCRIPTION

General Information

The Type 567 Oscilloscope consists of three major parts: the low-voltage power supplies, the crt circuits, and the Amplitude Calibrator. The oscilloscope is essentially an indicator and power supply for the plug-in units used with the instrument. Vertical and horizontal plug-in units drive the deflection plates of the crt directly, and also drive the digital unit.

The low-voltage power supplies provide outputs of —100, —12.2, +20, +125, and +300 volts.

The crt circuits contain the high-voltage power supply and crt. The high-voltage supply provides regulated 3.3-kv potential to the crt cathode.

The Amplitude Calibrator generates square waves with calibrated amplitudes at either 20 kc or 1 kc. The calibrator square waves are used as a convenient signal source to verify the calibration of the vertical, horizontal, and digital plug-in units.

Low-Voltage Power Supplies

Low-voltage power supplies of the Type 567 supply all the power to the high-voltage power supply, the Amplitude Calibrator, and the three plug-in units. Each regulated output voltage is stable over the line voltage range of 105 to 125 volts rms, or 210 to 250 volts rms, centered at either 117 or 234 volts 50 to 60 cps. The supplies will remain within regulation for line-voltage distortion up to about 5%.

All regulated power supplies are referenced to V609 of the —100-volt supply; the output voltage of the —100-volt supply is the reference voltage for all other regulated supplies.

Vertical and horizontal plug-in units use power from all but the +20-volt supply. The +20-volt supply is used by the digital unit and can be used externally through the digital unit (Type 6R1 or 6R1A J34-G) at currents up to 500 ma.

Three of the power supplies include shunt resistors that allow more current to be drawn than can be handled by the series regulators alone. A discussion of power-supply loads and shunts is included in the section on Operating Instructions.

—100-Volt Power Supply

Line voltage is applied through fuse F601 and the thermal cutout relay TK601 to the primary windings of T601. This energizes the secondary windings of T601. Terminals 19 and 20 of T601 apply power to a full-wave bridge rectifier consisting of D602A, B, C, and D. The unregulated output of the rectifier circuit is applied to the —100-volt regulator circuit and through the interconnecting plugs to the plug-in units.

Voltage regulator tube V609 maintains the grid of V616B at approximately —85 volts. The voltage at the grid of V616A is obtained from a divider between ground and the —100-volt output of the regulator. V616 is a cathode-coupled difference amplifier which compares the voltage at the grid of V616A against the fixed —85 volts at the grid of V616B. Potentiometer R624 sets the output of the power supply at —100 volts.

If the output voltage tends to change from —100 volts, a sample of the change is applied through the divider to the grid of V616A. This error signal is amplified and inverted by V616A and applied to the base of Q624. Q624 amplifies and inverts the error signal and applies it to the grid of series regulator V627A. The change in grid voltage of V627A changes the voltage drop across the tube and causes the output voltage to return to normal.

Capacitor C625 increases the ac loop gain of the regulator circuit. Its function is to quickly compensate for rapid changes in the output voltage. The higher ac loop gain provided by C625 also reduces ripple at the output of the regulator. C626 aids in reducing the ac output impedance of the —100-volt supply.

+125-Volt Power Supply

A full-wave bridge rectifier circuit from terminals 33 and 34 of T601 supplies power to the +125-volt regulator circuit and to the plug-in units through the interconnecting plugs. The +125-volt supply compares its own output voltage with the —100-volt supply through the resistive voltage divider R674-R675. The divider supplies a voltage near ground to the grid of V664. If the output voltage from the regulator changes, a portion of this change is applied through the divider to the grid of error amplifier V664. The error signal is amplified by V664 and applied to the grids of series regulator V677. The change in voltage at the grids of V677 changes the voltage drop across V677 and compensates for the change in output voltage.

The screen supply for V664 is obtained primarily from the output of the regulator circuit. R665 applies ripple from the unregulated bus to the screen as a signal voltage. The ripple is amplified and helps to reduce ripple appearing on the output.

Capacitor C674 is used to increase the ac loop gain of the regulator circuit. This allows the circuit to recover rapidly from sudden changes in output voltage. The increased ac loop gain also helps to reduce the ripple at the output of the regulator. C676A reduces the ac impedance of the +125-volt supply. Resistors R671 and R676 in the cathodes of the series regulator V677 tend to balance the current through the two sections of the tube.

On all Type 567s S/N 300-up, the +125-volt supply is adjustable by R667 and R668. The —100-volt supply must be adjusted to the correct voltage before adjusting R668 to set the +125-volt supply to the correct value.

+300-Volt Power Supply

A full-wave bridge rectifier circuit from terminals 31 and 32 of T601 supplies +165 unregulated dc volts that are added to the unregulated +235 volts (of the +125-volt regulated supply) to provide a total of +400 volts to the +300-volt regulator and to the crt circuit. A voltage divider between the regulator output and —100 volts, supplies a voltage near ground to the grid of V684. If the output voltage from the regulator changes, a portion of this change is applied through the divider and C694 to the grid of error amplifier V684. The error signal is amplified and inverted and applied to the grid of series regulator V627B. The change in voltage at V627B grid changes V627B conduction and compensates for the change in output voltage.

The screen supply for V684 is obtained from both the +400-volt unregulated lead and from the regulated +300 volts. R685 applies ripple voltage from the unregulated lead as a signal to V684 screen to help reduce ripple voltage appearing in the regulated output.

Capacitor C694 supplies fast changes in output voltage to the grid of error amplifier V684, reducing the ac output impedance of the regulator circuit. C676B also aids to reduce the ac impedance of the +300-volt supply.

On all Type 567s S/N 300-up, the +300-volt power supply is adjustable by R696 and R698. Both the —100- and +125-volt power supplies must be adjusted before calibrating R698.

—12.2-Volt Power Supply

The —12.2-volt regulator is similar to the —100-volt regulator except that it uses transistors instead of tubes. A full-wave rectifier consisting of D632A and B provides unregulated dc voltage to the regulator. A divider between —100 volts and ground is used to provide a constant —12 volts for the base of Q634. The output voltage of the regulator, appearing at the emitter of Q634, is compared to the voltage at the base. Because of this circuit arrangement, the voltage at the base of Q634 sets the output voltage of the supply.

Normally, the voltage at the emitter and base of Q634 will be nearly the same. If the voltage at the emitter changes because of a change in the supply output voltage, this changes the current through the transistor. This in turn produces a change in the collector voltage of Q634 and in the base voltage of Q644. The change at the base of Q644 is amplified at the collector and applied to the base of the series regulator transistor Q647. The change in base voltage of Q647 changes the voltage drop across Q647 in such a direction as to compensate for the change in output voltage, and the output then returns to normal.

As an example, if the output of the supply starts to go more negative, this causes Q634 to conduct more heavily. This produces a drop in the voltage at the collector of Q634 and at the base of Q644. The drop in voltage at the base of Q644 also causes this transistor to conduct more heavily, causing its collector voltage to change in the positive direction. The more positive voltage at the base of Q647 increases the voltage drop across Q647, thereby decreasing the output voltage of the supply to normal.

Fuse F647 is used to protect Q647 in the event the output is accidentally overloaded. Capacitor C646 reduces ripple voltage at the output of the regulator circuit.

On all Type 567s S/N 300-up, the —12.2-volt supply is adjustable by R630, R631, and R632. Both the —100- and +125-volt power supplies must be adjusted before calibrating R631.

+20-Volt Power Supply

Full-wave bridge rectifier D652A, B, C, and D rectifies voltage from terminals 11 and 12 of T601 and supplies power to the +20-volt regulator circuit. A voltage divider between +125 volts and ground sets the base of Q654 near +20 volts. The output voltage of the supply, appearing at the emitter of Q654, is compared to the voltage at the base.

If the supply voltage changes, the bias and conduction of Q654 is changed. Supply voltage changes are then amplified and inverted and applied to the base of emitter-follower Q653. Q653 provides current gain to the correcting signal and drives the base of Q657 to change its conduction and bring the output voltage back to normal. C654 provides a low ac impedance to Q654 base, reducing the supply ac output impedance. C656 and C657 also aid to reduce the supply ac output impedance.

Fuse F657 protects Q657 in the event the output is accidentally overloaded.

On all Type 567s S/N 300-up, the +20-volt supply is adjustable by R650 and R651. R650 is connected between the —12.2- and the output of the +20-volt supply. Thus, the —12.2- and +125-volt power supplies must both be adjusted to the correct voltage before adjusting R650 to set the +20-volt supply to the correct value.

High-Voltage Power Supply

Unregulated +400 volts from the +300-volt power supply is applied to the high-voltage oscillator, V800. V800 and its associated circuitry is a modified Hartley oscillator. C802 and the primary winding of T801 form the tuned circuit in the plate of V800. The oscillator operates at approximately 35 kc. High-voltage transformer T801 provides the high voltages and heater voltages for the rectifiers.

One secondary winding of T801 and rectifier V822 form a half-wave rectifier circuit which supplies approximately —3.3 kv to the cathode of the crt. A separate secondary winding of T801 and V832 supply a floating negative voltage for the control grid of the crt.

A voltage divider between the —3.3-kv output of V822 and +300 volts supplies voltage to the focusing grid of the crt and also applies a sample of the power-supply output to the high-voltage regulator circuit. Potentiometer R841 sets the high voltage. If the output voltage changes from this set value, a portion of the change appears at the grid of V814B as an error signal. The error signal is amplified by V814B and V814A and applied to the screen grid of the High Voltage Oscillator V800. The change in screen voltage on the oscillator causes either an increase or a decrease in the amplitude of the oscillations. The change in amplitude of the oscillations is always in a direction to compensate for the error in the output voltage.

The output voltage from V832 is not regulated directly, but is regulated indirectly by the operation of the V800 screen grid regulator loop.

Capacitor C842 greatly increases the ac loop gain of the high-voltage regulator circuit. This permits the regulator to quickly compensate for rapid changes in the output voltage.

Crt Circuits

Voltage for the control grid of the crt is obtained from R834 and R833 at the output of the control grid power supply. By varying the setting of the INTENSITY control R834, the voltage at the control grid relative to the cathode can be changed to provide the desired display brightness. Beginning with S/N 249, neon glow tubes B852-B853 were added. The bulbs ignite only when the INTENSITY control is fully counterclockwise. Thus, both the grid and cathode of the crt are protected from arcing.

Voltage for the focus grid of the crt is obtained from potentiometer R845. The Astigmatism element receives its voltage from potentiometer R864. Varying both R845 and R864 affects the crt spot size.

The presence and intensity of the crt beam is controlled by signals from each of the three plug-in units used with the Type 567. The oscilloscope uses deflection unblanking during the sweep interval. In this method an additional pair of deflection plates in the crt electron gun deflects the beam off the screen except during the sweep. When the horizontal sweep is triggered, the unblanking signal is applied from the time-base unit through terminal 13 of J21 to one of the unblanking deflection plates. The unblanking signal then moves the electron beam rapidly on screen for the duration of the sweep. The beam is then deflected off screen again until time for the next sweep.

Chopped mode blanking signals from a multi-trace vertical plug-in unit are applied through terminal 24 of J11 to the cathode of the crt. These blanking signals are used to blank switching transients which result when the plug-in unit is operated in the chopped mode. Chopped blanking prevents the chopping transients from being displayed on the crt at normal intensity.

Intensity brightening of the crt trace by either the digital unit or a two-sweep time-base unit is accomplished by coupling brightening signals to the reference voltage for the crt grid-voltage supply. The brightening signal from the digital unit changes the overall grid supply voltage through terminal 15 of J32. The brightening signal from the two-sweep timing unit changes the overall grid supply voltage through terminal 14 of J21. Two diodes, D836 and D837, provide a low-impedance return for the crt grid circuit, reducing intensity modulation caused by any normal power-supply ripple. Diode D835 disconnects +125 volts applied to terminal 14 of J21 by some plug-in units.

Sharply differentiated blanking pulses from the vertical sampling unit are applied to the crt cathode through terminal 24 of J11 to turn off the crt beam between sampling dots. Thus, the crt beam is blanked between dots, avoiding possible display confusion.

A beam rotator coil around the crt is used to align the oscilloscope trace with the horizontal graticule markings. The magnetic field set up by the coil deflects the electron beam up on one side of the crt and down on the other. By varying the strength and direction of the field with the CRT BEAM ROTATOR control, the trace can be aligned with the graticule markings.

Amplitude Calibrator (S/N 2060-up)

The Amplitude Calibrator is a two-frequency signal source that is crystal controlled at 20 kc and rc time-constant controlled at approximately 1 kc. An astable multivibrator drives both a divide-by-two bistable multivibrator and a positive slope differentiator circuit. Square waves of known amplitude at the front-panel connectors come from the ÷2 circuit, and positive pretrigger pulses come from the differentiator circuit. The ÷2 circuit clamps off the differentiator every other astable cycle. Thus, the positive pretrigger pulse is generated approximately ¼ cycle before each positive portion of the output square wave.

Selection of output frequency is by a front-panel 20 KC-≈1 KC toggle switch. The switch is open for 20-kc operation, but is closed for 1-kc operation. 20-kc operation places a series-mode 40-kc crystal in the feedback path. 1-kc operation places a 0.0033 μf capacitor across the crystal, making feedback capacitive and the frequency rc controlled.

Astable Oscillator. Q900 and Q914 form a common-emitter astable multivibrator. The regenerative feedback circuit consists of the common connection of the two transistor emitters, and the crystal (Y905) from Q900 collector to Q914 base for 20-kc operation, or C904-D904 in parallel with the crystal for 1-kc operation. D904 is reverse biased (for 20-kc operation) by the voltage divider R912-R914; thus C904 is effectively switched out of the circuit. D904 is forward biased when SW915 connects R915 in parallel with R912, connecting C904 in parallel with Y905. Both circuit conditions are shown in simplified form in Fig. 3-1.

Fig. 3-1a shows the active circuit elements for 20-kc operation. Note the parallel resistance value with equivalent voltage source for R908 and R909. The +21 volts is the value of divider voltage when no current is drawn through either R905 or R906. If either base draws current through its 20-k resistor, the +21 volts acts as if it has a 16.6-k source resistance. Fig. 3-1b shows the active circuit elements for 1-kc operation. D904 is a low resistance when it is forward biased placing C904 in parallel with Y905.

Fig. 3-2 shows four astable circuit waveforms during 1-kc operation. D904 and C904 are drawn between waveforms for study purposes. Note that D904 is forward biased when Q900 collector is positive, but reverse biased when Q900 collector is near ground; C904 receives a charge while Q900 collector is positive, but loses its charge when Q900 collector is near ground.

A 2-kc operation cycle is as follows: Assume Q900 collector has just gone positive. D904 connects C904 from Q900 collector to Q914 base. Q914 base is taken about 12.6 volts more positive (due to previous C904 18-volt charge) cutting Q914 off. Q900 collector low resistance connects C904 between +15 volts and +32.6 volts at the junction of Q914 base and R905. Q914 base draws no current, so C904 begins to discharge through R905 and Q900 collector. Point #1 of Fig. 3-2 has just been reached. As Q914 base wave-

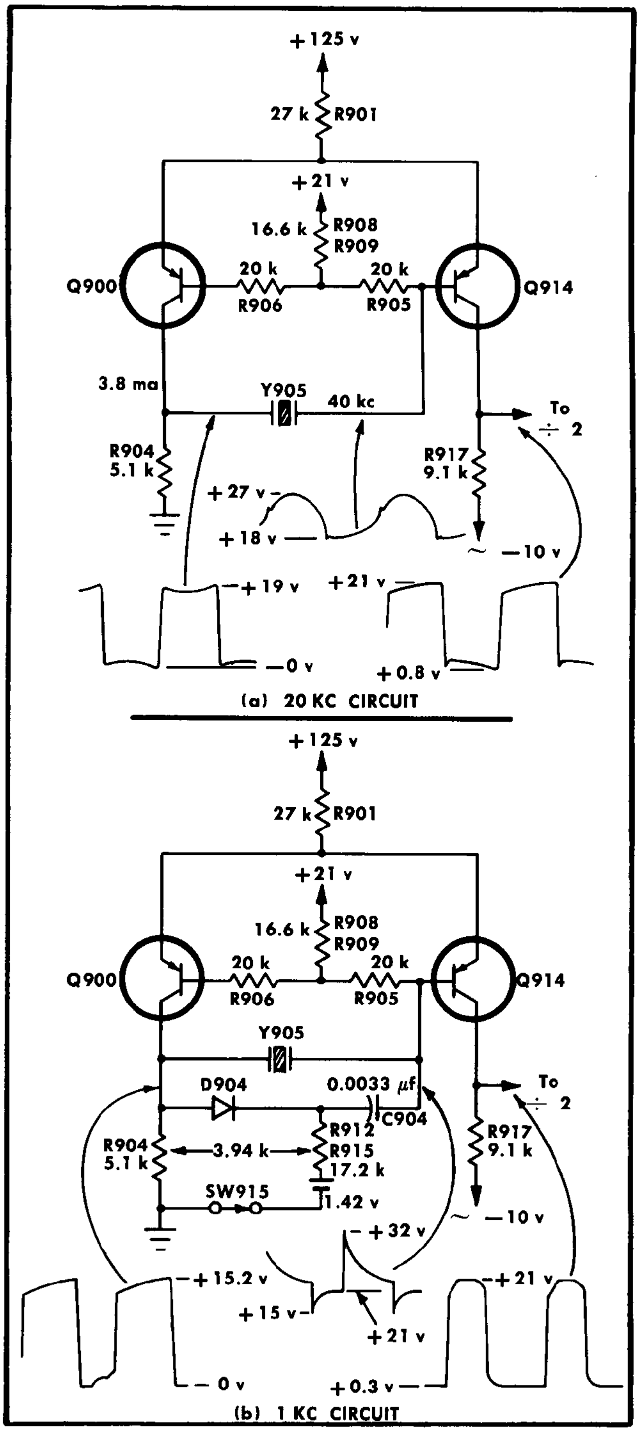


Fig. 3-1. Simplified Amplitude Calibrator astable circuits.

form drops toward +21 volts, Q900 collector voltage is prevented from quite reaching +15.2 volts. The fast drop of Q914 base waveform and slow rise of Q900 collector waveform are due to C904 discharge. As the base of Q914 reaches +22.5 volts (point #2 of Fig. 3-2) Q914 begins to conduct, adding to the current of common emitter resistor R901. Regenerative action follows immediately as Q914 emitter carries Q900 emitter toward reverse bias. Q900 collector falls as its emitter is taken negative, disconnecting D904 from C904. C904 is now connected at one end to about +1.42 volts through the equivalent resistance of 17.2 k (parallel resistance value of R912 and R915), and to the base of Q914 at the other end. The charge on C904 limits its fall at D904 cathode to about +8 volts because Q914 base begins to draw current when the base reaches +15 volts. The parallel resistance of R912-R915 and the base current of Q914 recharge C904. As the current through R912-R915 decreases (nearing point #3 of Fig. 3-2) the current through Q914 decreases letting the common emitter voltage go positive, causing Q900 to again conduct. Q900 conduction begins and its collector rises about 2.5 volts before D904 again connects the regenerative feedback circuit so the astable will flip. As D904 conducts, fast regenerative action turns Q914 off and Q900 on. The cycle is complete and C904 begins to discharge to repeat the process.

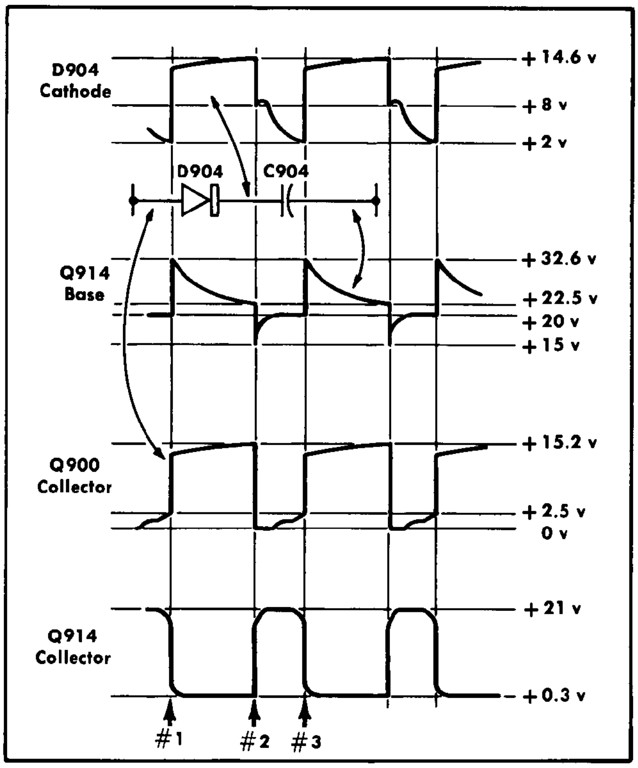


Fig. 3-2. Astable multivibrator waveforms during 1-kc operation.

A 40-kc operation cycle follows the same sequence of events, except that Y905 is the feedback element between Q900 collector and Q914 base and D904 is reverse biased all the time. Y905 is an open circuit at all frequencies other than its series resonant frequency of 40 kc. The waveform at the base of Q914 in Fig. 3-1a shows the crystal sine wave nature when Q914 is cut off. Base current of Q914 flattens off the waveform bottom as Y905 provides turn-on base current during the time Q914 conducts.

Once 40-kc oscillation is established, the crystal assumes a mechanical vibration at the rate of oscillation. At the time the operator switches from 20-kc to 1-kc operation the crystal mechanical vibration is seen to die out during the first few

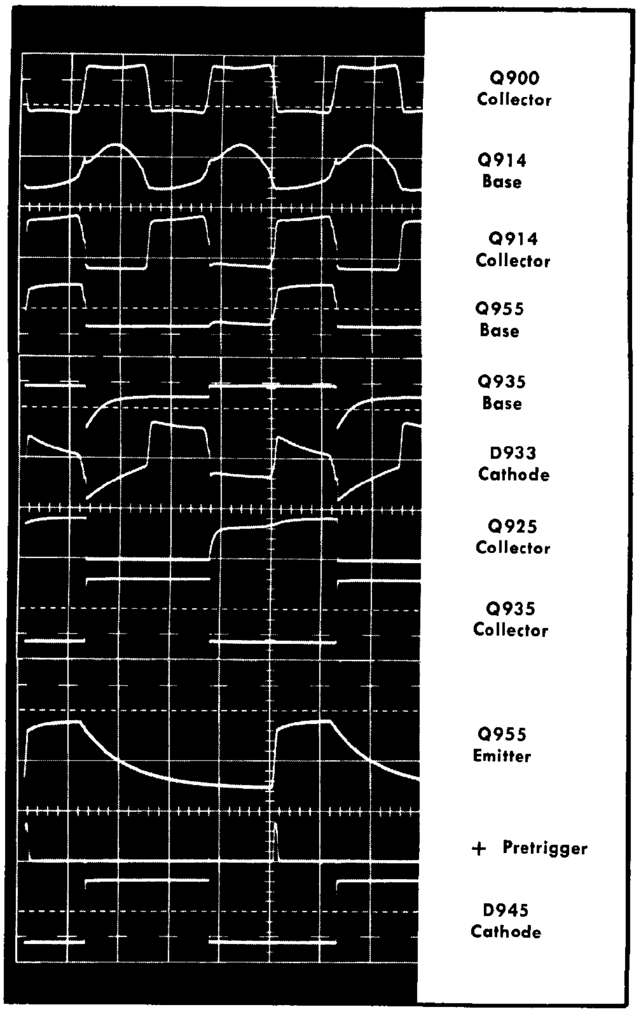


Fig. 3-3. Amplitude Calibrator time diagram. Operation at 20 kc (partial graticule shown).

moments of 1-kc operation. Actually, the crystal aids in coupling energy when the astable is operating at 2 kc because the rapid voltage changes at each switching time contain high frequencies. The crystal then "locks in" the 2-kc oscillations causing the 1-kc output signal to be very stable. The actual frequency of 1-kc output cannot be specified tightly because the crystal's ability to lock-in 2-kc oscillations is dependent upon transistor beta and other variables.

÷2 Multivibrator. Q925 and Q935 form a triggerable bistable multivibrator that divides the astable output frequency by two. It drives the output voltage divider and controls the +Pre Trigger emitter-follower Q955. The time relationships of several points throughout the whole Amplitude Calibrator are shown in Figs. 3-3 and 3-4. Each figure is made up of three multiple-exposure photographs made by externally triggering the test oscilloscope to guarantee time coincidence of each waveform; voltage amplitudes are uncalibrated.

Assume Q925 is conducting and is saturated so its collector voltage is less than a volt positive. Voltage divider R925-R937 from Q925 collector to Q935 base sets Q935 base at about −1.5 volts, assuring that Q935 is completely cut off. D935 in Q935 collector circuit permits the output voltage divider to disconnect from R934-R935. D935 anode voltage is about +5.5 volts and its cathode and Q935 collector are at about +20.2 volts. Q935 collector voltage is set by the output voltage divider. Thus, D935 assures that the output voltage divider will not be loaded by the ÷2 circuit during the positive portion of the output signal. The output voltage is adjusted by R943, and is completely independent of the ÷2 circuit.

Q925 conduction draws current through both its normal collector load R924, and through R952-D953-D954-R954 to bias D951 and Q955 to cutoff. When D951 is cut off, Q955 cannot receive positive pulses from the astable circuit.

The ÷2 multivibrator switches states whenever the astable output goes negative. R922 holds D923 cathode slightly negative in respect to its anode, but not conducting. As the astable output goes negative, C923 couples a turn-off pulse through D923 to the base of Q925. (D933 was held about 7 volts reverse biased with Q935 cut off.) As Q925 starts

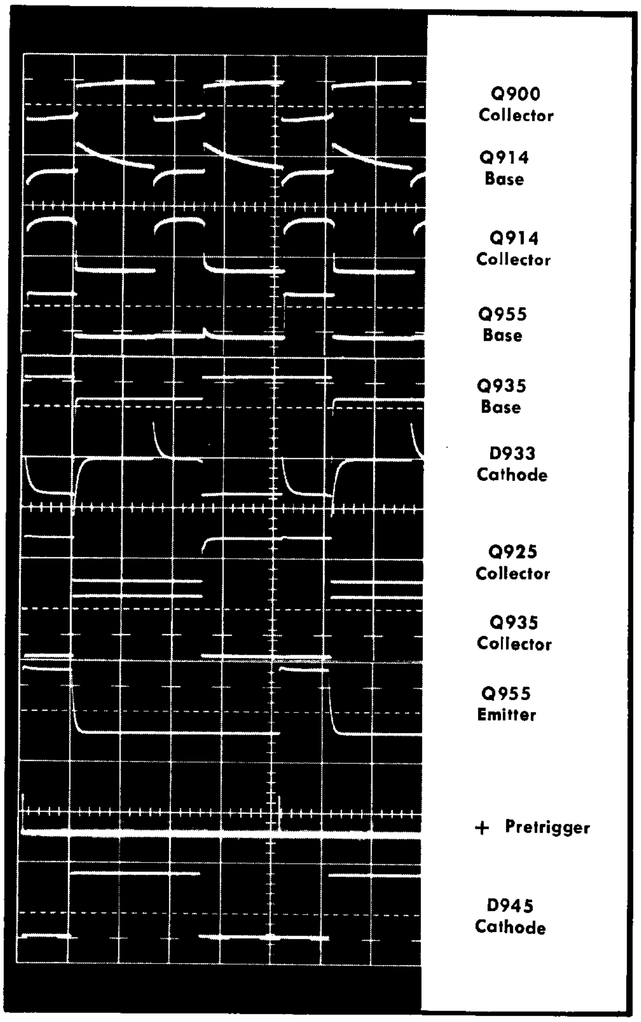


Fig. 3-4. Amplitude Calibrator time diagram. Operation at 1 kc (partial graticule shown).

to turn off, its collector voltage rises positive, C925 applies turn-on bias to Q935 base and the ÷2 circuit switches. Regenerative feedback is applied to Q925 base by Q935 collector and C935.

Q935 collector now rests at less than +0.2 volt, close enough to ground that D945 of the output divider carries no current. Q935 collector current passes through both its normal collector load R934 and the series resistance of R940-R941-R943.

Q925 is cut off and its collector rests at +5 volts. The ÷2 circuit will change states the next time the astable output goes negative and the cycle will repeat.

+Pre Trigger circuit. The +Pre Trigger circuit is an emitter-follower and differentiator circuit that responses to positive signals from the astable circuit if Q925 is cut off. When Q925 is conducting, D951 anode is held at about +1.5 volts preventing any positive signal from being applied to the base of Q955. Thus it is that a +Pre Trigger pulse is formed only when the output signal is at ground and Q925 is cut off. D954 allows Q925 collector to rise for rapid switching of the ÷2 circuit. C954 serves as a low impedance so any stored charge in D954 will not be applied to Q955 base. C954 also releases Q955 base slowly as R954 charges C954 so Q925 positive change does not reach Q955 base as a signal. D953 disconnects C954 from Q955 base so signals can couple through D951 and turn on the emitter-follower. Q955 emitter faithfully follows every other positive astable output pulse. C957 differentiates Q955 emitter signal and D959 couples only the positive pulse to the output. Any negative change at Q955 emitter, from either the astable signal drop or from Q925 collector pulling down, is stopped from reaching the output by D959.

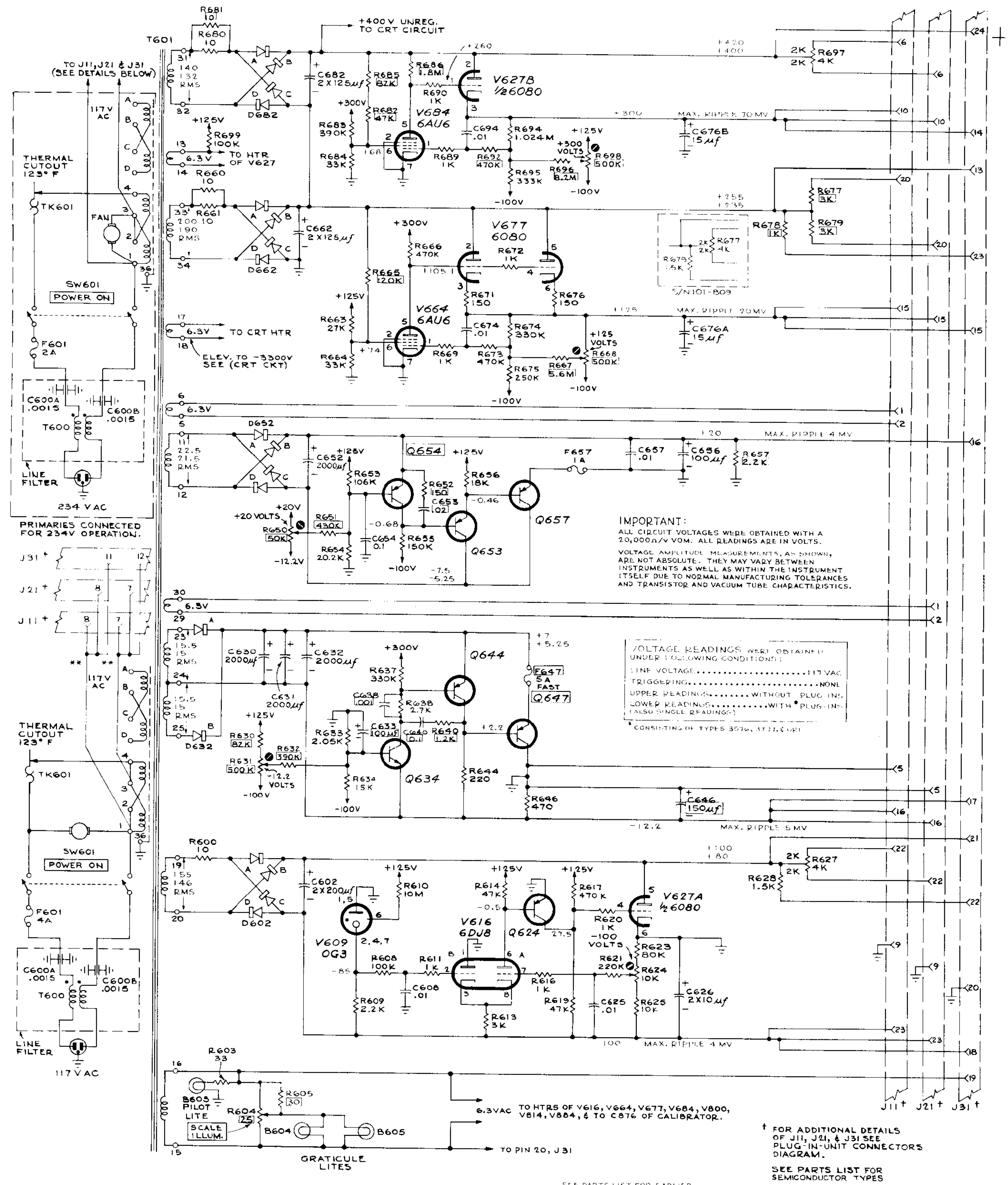
Amplitude Calibrator (S/N 101-299)

The calibrator consists of a bistable multivibrator, V884A and V884B, which is triggered at the line frequency by a 6.3-volt ac signal applied to the cathode of V884A. The signal at the cathode of V884A switches the multivibrator between its two states. When V884A is conducting, the low voltage at its plate cuts off V884B. Or, when V884B is conducting, its low plate voltage lowers the grid voltage of V884A sufficiently to cut V884A off. Thus, both tubes do not conduct at the same time.

When V884A is cut off, the voltage at the control grid and cathode of V884B is determined by the setting of the CAL AMPL control, R871. This determines the maximum voltage level reached by the square-wave output. The square waves start at ground at the time V884B is cut off and reach the maximum amplitude established by R871 when V884A is cut off. The CAL AMPL control is adjusted to give the appropriate output square-wave amplitudes via the output divider R885 through R889.

Amplitude Calibrator (S/N 300-2049)

R890 was added at S/N 300 so the 0.5 output jack will provide a 100-mv peak-to-peak signal into 50 ohms. No other alterations were made and the circuit description is the same as above.



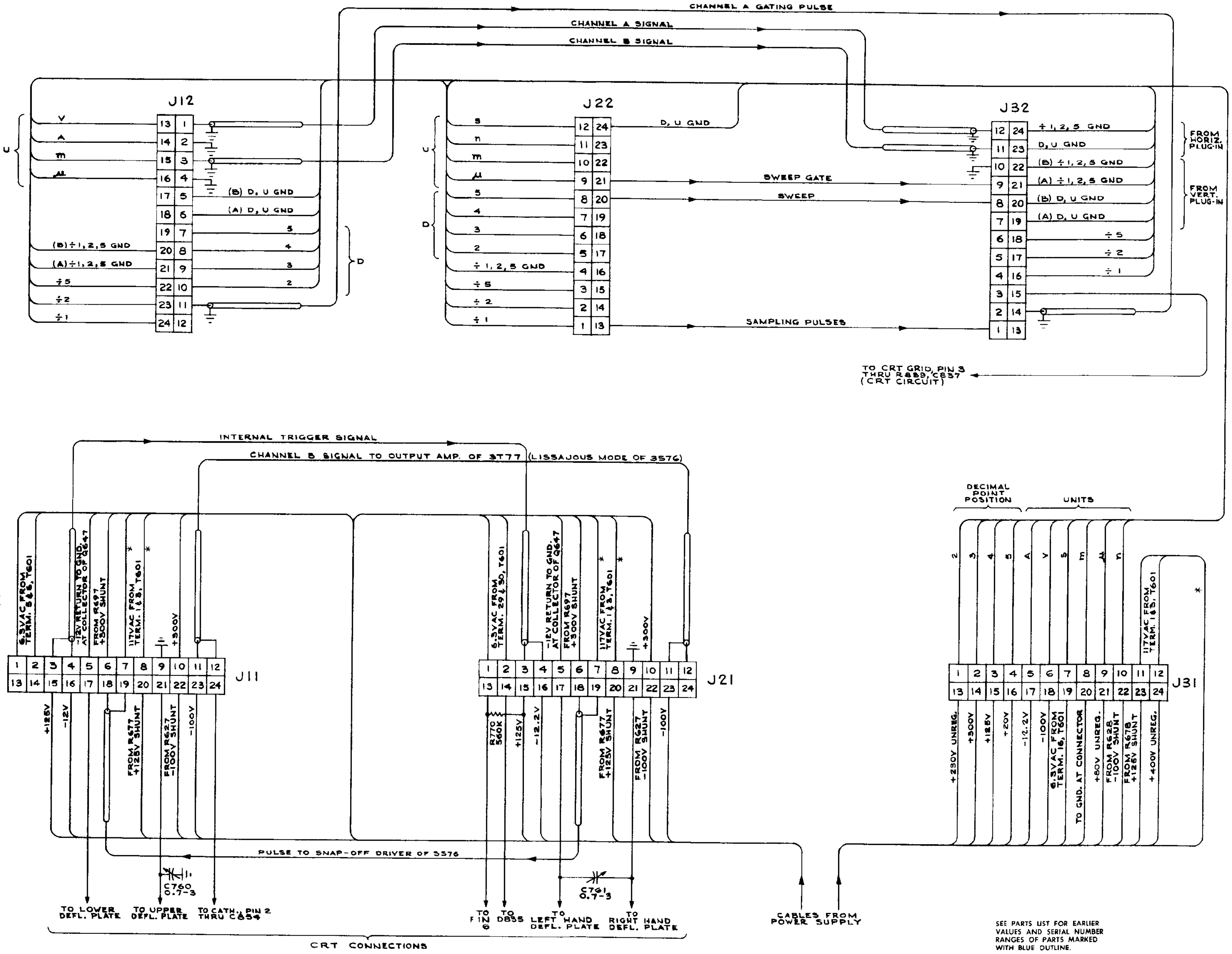
SEE PARTS LIST FOR EARLIER VALUES AND S/N CHANGES OF PARTS MARKED WITH BLUE OUTLINE

TYPE 567 READOUT OSCILLOSCOPE

** DENOTES CONNECTIONS REMOVED AT S/N 3060 & UP

POWER SUPPLY

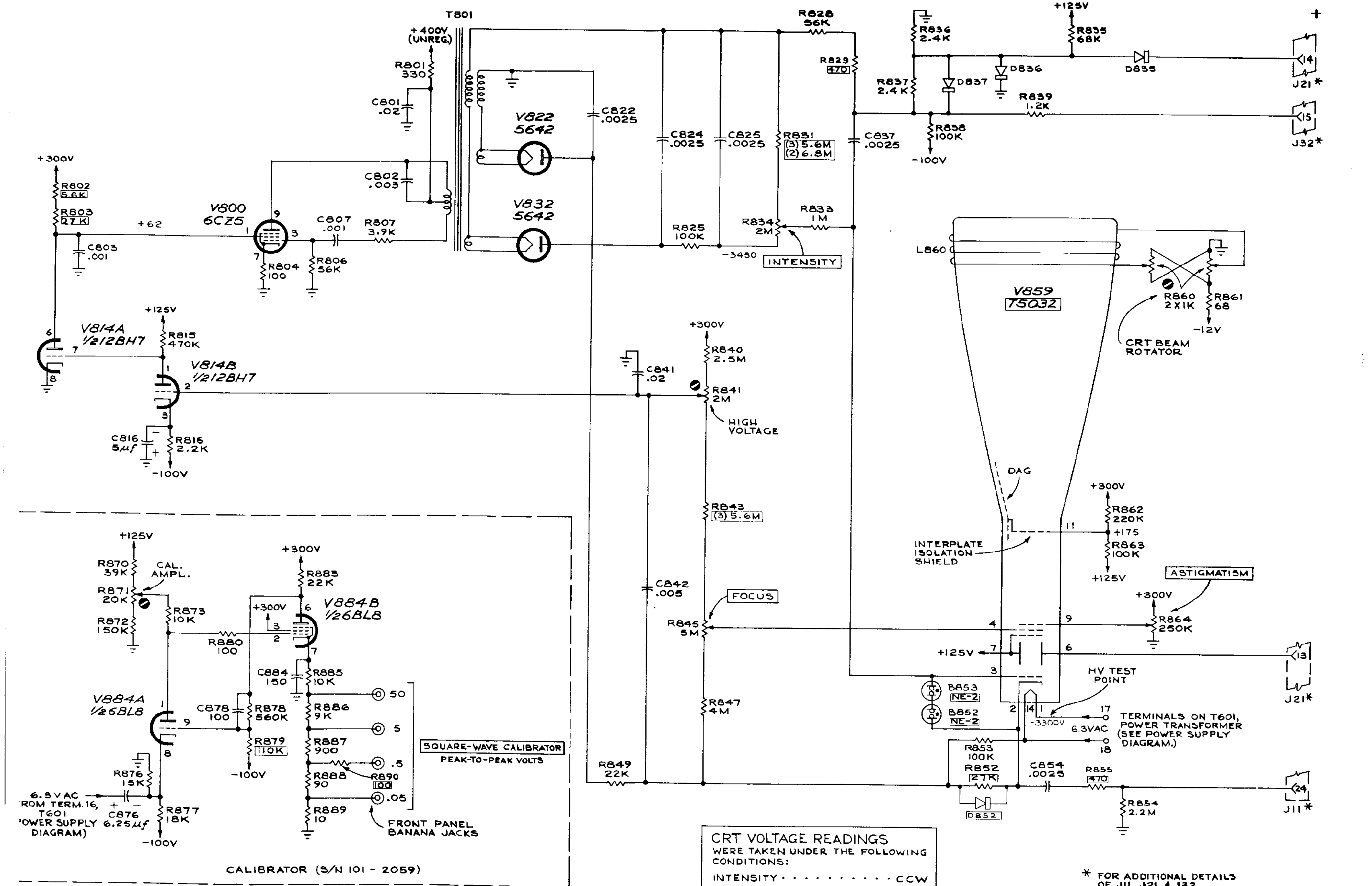
968



567 READOUT OSCILLOSCOPE

* DENOTES CONNECTIONS REMOVED AT S/N3060 & UP

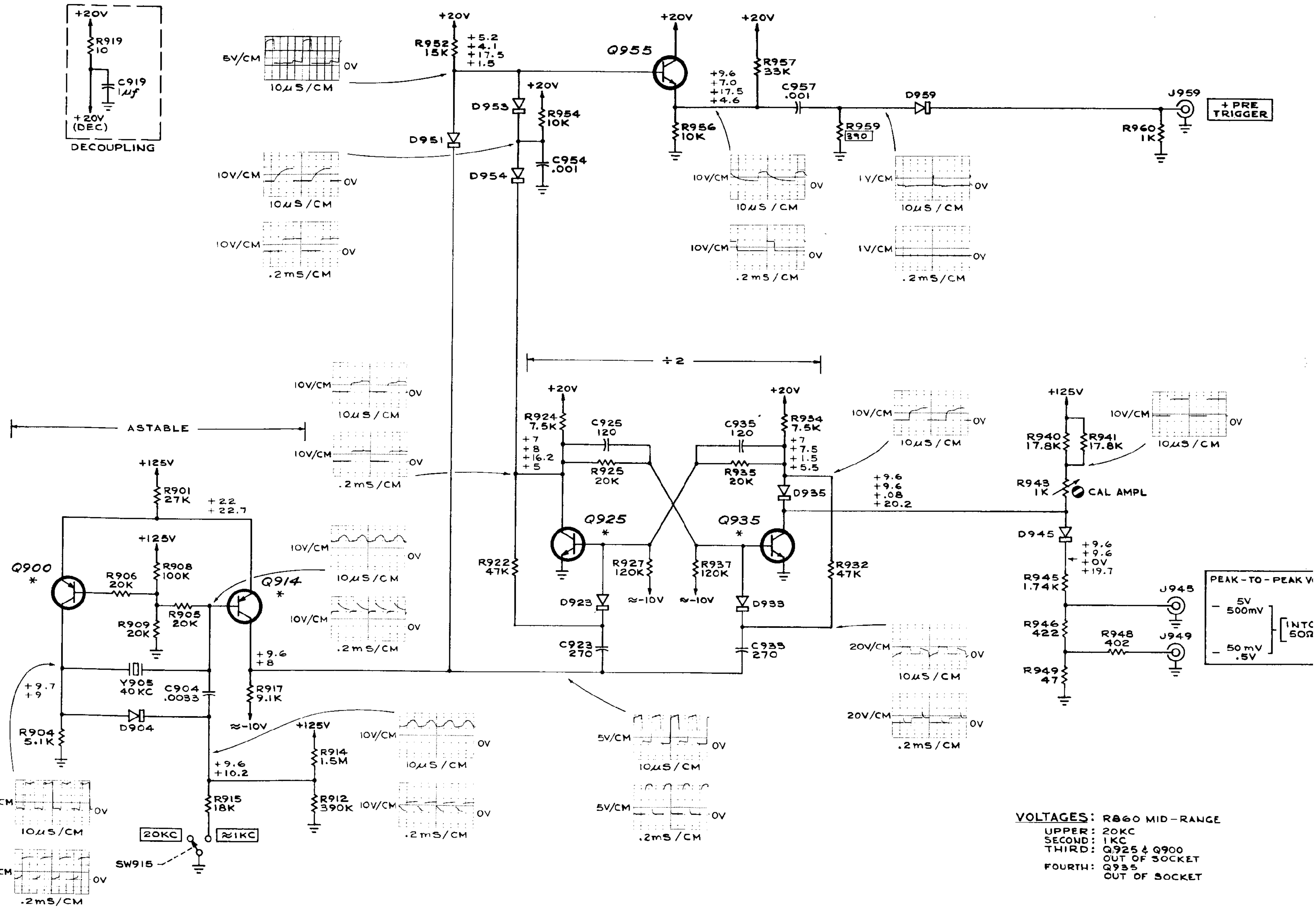
MRH
168



CRT VOLTAGE READINGS
WERE TAKEN UNDER THE FOLLOWING CONDITIONS:
INTENSITY . . . . CCW

ALSO SEE IMPORTANT NOTE ON PWR. SPLY. DIAG.

* FOR ADDITIONAL DETAILS OF J11, J21, & J32 SEE PLUG-IN-UNIT CONNECTORS DIAGRAM.



+20V
R919
10
C919
1μf
+20V
(DEC)
DECOUPLING
+20V
R952
15K
+5.2
+4.1
+17.5
+1.5
5V/CM
0V
10μS/CM
D953
+20V
R954
10K
D951
C954
.001
D954
10V/CM
0V
10μS/CM
10V/CM
0V
.2mS/CM
Q955
+20V
+20V
R957
33K
+9.6
+7.0
+17.5
+4.6
C957
.001
D959
J959
+ PRE
TRIGGER
R956
10K
R959
390
R960
1K
10V/CM
0V
10μS/CM
10V/CM
0V
.2mS/CM
1V/CM
0V
10μS/CM
1V/CM
0V
.2mS/CM
÷2
ASTABLE
10V/CM
0V
10μS/CM
10V/CM
0V
.2mS/CM
+20V
R924
7.5K
C925
120
R925
20K
+7
+8
+16.2
+5
+20V
R934
7.5K
C935
120
R935
20K
+7
+7.5
+1.5
+5.5
D935
Q925
Q935
R922
47K
R927
120K
R937
120K
R932
47K
≈-10V
≈-10V
D923
D933
C923
270
C933
270
10V/CM
0V
10μS/CM
+9.6
+9.6
+.08
+20.2
+125V
R940
17.8K
R941
17.8K
R943
1K
CAL AMPL
10V/CM
0V
10μS/CM
D945
+9.6
+9.6
+0V
+19.7
R945
1.74K
R946
422
R948
402
R949
47
J945
J949
PEAK-TO-PEAK V
5V
500mV
50mV
.5V
INTO
50Ω
20V/CM
0V
10μS/CM
20V/CM
0V
.2mS/CM
+125V
R901
27K
+22
+22.7
+125V
R908
100K
Q900
*
R906
20K
R909
20K
R905
20K
Q914
*
10V/CM
0V
10μS/CM
10V/CM
0V
.2mS/CM
+9.6
+8
R917
9.1K
≈-10V
+9.7
+9
Y905
40KC
C904
.0033
D904
R904
5.1K
+125V
R914
1.5M
+9.6
+10.2
R915
18K
R912
390K
20KC
≈1KC
SW915
10V/CM
0V
10μS/CM
10V/CM
0V
.2mS/CM
5V/CM
0V
10μS/CM
5V/CM
0V
.2mS/CM
5V/CM
0V
10μS/CM
5V CM
0V
.2mS/CM
VOLTAGES: R860 MID-RANGE
UPPER: 20KC
SECOND: 1KC
THIRD: Q925 & Q900 OUT OF SOCKET
FOURTH: Q935 OUT OF SOCKET