

INSTRUCTION MANUAL

Serial Number 1211

NOTE

Beginning with Serial Number 1000, several modifications (not mentioned in the text) have been incorporated in the Type R116 for improved performance. This insert describes the changes resulting from the modifications.

**TYPE R116
PROGRAMMABLE
PULSE
GENERATOR**

Tektronix, Inc.

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070-0498-00

TYPE R116

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TEXT CORRECTIONS

Section 1 Characteristics

Page 1-1 Column 1

CHANGE: the Supplemental Information under Modes of Operation, Double, to read:

First pulse of pair starts at same time as pulse in Single mode: second pulse starts at end of delay interval; 100 ns minimum separation required between end of first pulse and start of second pulse (at baseline); characteristics of each pulse same as for Single mode.

Page 1-1 Column 2

CHANGE: the Supplemental Information under Input Signal Requirements, +Gate In Amplitude, to read:

Accidental overload +100 volts maximum.

Page 1-2 Column 1

CHANGE: the Performance Requirement under Output Signal Characteristics, Delay or Burst Time, to read:

50 ns to 550 μ s: Accuracy within 3% (± 10 ns) of switch and dial readings.

Page 1-2 Column 2

CHANGE: the Performance Requirement under Output Signal Characteristics, Amplitude, to read:

± 400 mV to ± 10 volts into 50Ω load: Accuracy as follows with respect to switch and dial readings on the respective ranges: Within 3% ± 50 mV on 1 V range; within 3% ± 25 mV on .5 V range; within 3% ± 15 mV on .2 V range.

CHANGE: the Performance Requirement under Output Signal Characteristics, Rise-time and falltime, to read:

10 ns to 100 μ s: Accuracy with respect to risetime or falltime switch and dial readings: Within 5% on 1 μ s and 100 nS ranges; within 10% on 10 nS and 1 nS ranges.

Dial indications of less than 10 nS risetime or falltime are uncalibrated.

CHANGE: the Performance Requirement under Output Signal Characteristics, Aberrations, overshoot or tilt, to read:

3% or less on 10-volt pulse, either positive-going or negative-going, with total peak-to-peak aberrations of 3% or less.

Page 1-3 Column 1

CHANGE: the Performance Requirement under Output Signal Characteristics, Dc Offset, to read:

-5 volts to +5 volts: Accuracy within $5\% \pm 100$ mV of switch and dial readings over range of DC OFFSET control.

Page 1-4 Column 2

DELETE: the following phrase from the Performance Requirement under Programming, Dc Offset Analog:

Accuracy within (100 mV of front-panel calibration plus error in program resistor). (NOTE: The accuracy requirement is covered by the Variable Operations Performance Requirement in column 1.)

CHANGE: the Information column under Environmental Characteristics, Maximum Altitude (Operating), to read:

10,000 feet.

Section 4 Circuit Description

Page 4-3

The Circuit Analysis given in the manual applies to the circuitry on the chassis of all Serial Numbers of Type R116s except as noted in this insert, and to the Series circuit cards originally included in the instrument. These are as follows:

Series A Function Program No. 2	Series B Period Generator
Series C Delay Generator	Series D Function Program No. 1
Series E Width Generator	Series F Pulse Shape Generator
Series G Output Amplifier	Series H Attenuator
Series I Power Supply.	

The following portion of this insert describes the changes resulting from modifications of the instrument at Serial Number 1000 and again at Serial Number 1084*. These changes include minor changes to the chassis and to some of the circuit cards, and major changes to other circuit cards. See the MAINTENANCE portion of this insert concerning the significance of Series letters and Model numbers of the plug-in circuit cards. Description changes are included here for the following Series circuit cards:

Series K Function Program No. 2; Series J Function Program No. 2
(compatible only with chassis Serial Numbers 1000 through 1083);

Series L Function Program No. 1; Series M Output Amplifier; and
Series N Attenuator.

One general circuit change at Serial Number 1084 is the inversion of switching polarity to provide better operation of the programming buffer amplifiers. This change causes the detailed block diagrams throughout the Circuit Description to indicate inverted switching polarity, as compared to the circuit diagrams in this insert. Another general change made at the same Serial Number is the relocation of the calibration adjustment of each analog circuit (e.g., R502 on Fig. 4-2) to the inside end of the corresponding switch, and elimination of the selected programming calibration resistor (e.g., R500 in Fig. 4-2).

Page 4-5 Column 1, line 1

CHANGE: the first complete sentence for instrument SN 1084-up to read:

(SN 1084-up) With the MODE switch set to GATED OUTPUT, the emitter of Q4 is connected to chassis ground through Q76 on the Series K Function Program No. 2 circuit card, enabling the gating amplifier.

Function Program Circuits

Page 4-5 Column 2

DELETE: the first full paragraph for instrument SN 1084-up, in column 2 and replace with the following:

(SN 1084-up) To enable this remote switching function, the PERIOD RANGE switch is set to REMOTE, connecting the emitters of the period range buffer amplifiers to the +9.5-volt supply through the MODE switch. Since the bases of the transistors are connected through resistors to the emitters, they are all held in cutoff with zero bias until one of the bases is

*Chassis SN 1080 was also modified as described for SN 1084-up.

connected to ground through the REMOTE PROGRAM connector and an external contact closure, forward biasing the base-emitter junction. Current through Q133 thus actuates the relay connected to the 10 μ s period timing capacitor (on the Period Generator circuit card), selecting this range of operation for the Period Generator.

Page 4-7

Column 1

ADD: the following at the end of the 4th paragraph under DELAY GENERATOR:
(SN 1084-up) Adjustment R513 (50 ns Delay) shown on the Interconnecting Diagram in this insert is adjusted in conjunction with C32 on the fastest delay timing range.

ADD: the following at the end of the 4th paragraph under WIDTH GENERATOR:
(SN 1084-up) Adjustment R523 (50 ns Width) shown on the Interconnecting Diagram in this insert is adjusted on the fastest width timing range.

Page 4-10

Column 1

CHANGE: the last sentence in column 1 to read:

The lower level of the waveform is clamped by current through D22 when the trailing edge of the pulse becomes more negative than the voltage at the emitter of Q24. This voltage is adjusted to the correct level during calibration by means of R25 (Baseline Clamp) on the Series M Output Amplifier card.

Page 4-10

Column 2

CHANGE: the 2nd paragraph under INVERTER, to read:

(Series M Output Amplifier card) The pulse signal applied to the base of Q44 through reed switch SW28A is inverted at the collector of Q44 to the output driver circuit. Gain of the inverter is adjusted to -1 by setting the gain of Q44 with the - Amplitude adjustment, R42. Zener diode D48 raises the output level of the inverter by about 9 volts to allow for signal inversion. The DC output level is adjusted by means of the -DC Level adjustment (R34) operating through the low-impedance voltage source of transistors Q33 and Q34, to set the signal level into the output amplifier between the same voltage limits in - polarity as in + polarity, though the waveshape is inverted.

Page 4-12 Column 1 (For instruments SN 1000-1083 only)

ADD: the following between the 3rd and 4th full paragraphs:

(SN 1000-1084) Transistors Q434 and Q484 provide current regulation for constant-current transistors Q464 and Q474. Transistor Q484 controls the base voltage of Q464 and Q474 by comparing the voltage at the junction of R466 and R467 to the reference voltage set by zener diode D460. If conduction through Q464 and Q474 tends to change as a result of a change in temperature or load, the change is felt at the base of Q484. Transistor Q484 amplifies and inverts this change, which is then applied through Q434 to the base circuit of Q464 and Q474, thus controlling their conduction and regulating the output current. For example, if conduction increases through Q464 and Q474, a positive-going voltage change is seen at the junction of R466 and R476. This positive change is inverted and amplified by Q484 and applied through Q434 as a negative-going signal to the bases of Q464 and Q474, decreasing their conduction and returning the current to normal.

Page 4-12 Column 1 (For instruments SN 1084-up)

DELETE: the first five full paragraphs and substitute the following:

(SN 1084-up) Refer to the Series N Output Amplifier schematic diagram in this insert and to the block diagram on page 4-11 of the manual. (Delete Q454 from the block diagram.) Approximately 100 mA of quiescent current flows through transistor Q464 with the POLARITY switch in + position. The amount of current through Q464 is determined by the + Offset Zero adjustment, R466. For zero volts offset, all of the 100 mA is conducted by transistor Q444 and none is delivered to the output load. To produce + or - DC offset in + polarity, current must be caused to flow from the current generator into the output load (and/or attenuator) or from the output load into the current generator. This is accomplished by varying current through the variable current generator by means of the DC OFFSET control. For + DC offset, current is increased through Q444, drawing up to 100 mA from the output load, in addition to the 100 mA from Q464. This offsets the DC voltage level of the output in the positive direction by as much as 5 volts (with the DC OFFSET control set at +5). For - DC offset, current is decreased through Q444. The current from Q464 that had been conducted through Q444 is therefore allowed to flow into the output load, offsetting the DC voltage level of the output in a negative direction.

When the Type R116 is set for a - polarity output pulse, the Output Amplifier draws approximately 200 mA in the quiescent condition. To provide zero offset voltage at the output when the negative-going pulse baseline is at zero, the offset current generator must provide the 200 mA of quiescent current for the Output Amplifier. This is accomplished by supplying an additional 200 mA through SW480 and the - Offset Zero adjustment (R476), with the POLARITY switch in the - position. (The - Variable supply is also raised by about 10 volts by connecting zener diode D430 into the circuit to adjust the output voltage to the correct level.)

In - polarity, when a pulse signal is applied to the Output Amplifier, the current may drop to nearly zero mA (with the AMPLITUDE MULTIPLIER control set to 10), causing current from the Offset Current Generator to flow into the output load. This current produces the negative-going voltage pulse at the output.

Offset in - polarity is produced in a similar manner to that in + polarity by increasing or decreasing current through Q444. For + DC offset in - polarity, current is increased through this transistor, drawing additional current from the load, thus offsetting the output voltage in the positive direction. For - DC offset in - polarity, current is decreased through Q444 and the current that had been diverted by Q444 flows from Q464 into the output load, offsetting the output voltage in a negative direction.

Current through Q464 is stabilized by regulating its base-emitter voltage with Q474. The emitter voltage of Q464 is compared by Q474 to the reference voltage established by zener diode D460. The loop is completed by returning the collector of Q474 to the base of Q464. Diodes D482 and D484 at the output of the current generator protect the collectors of Q444 and Q464 from large inductive transients generated when the Output Amplifier unloads.

The offset control voltage at the base of Q444 is set by the low impedance output from Q74 and Q64, a X1 amplifier. The input voltage to Q64 is in turn determined by the current through constant-current transistor Q38 and the setting of the DC OFFSET control (see Fig. 4-6). The range of the DC OFFSET control is adjusted by R32 (Offset Range). As the voltage to the base of Q444 is varied, the input voltage to the - Variable supply is also varied through D430 or D432, adjusting the

output of that supply. This keeps the collector voltage of the Offset Current Generator and Output Amplifiers nearly constant, regardless of DC offset, assuring that the pulse shape will not be affected by the offset.

Page 4-14 Column 1 (For instruments SN 1000-up)

CHANGE: "+12-Volt Supply" to "Relay-Power Supply" and replace the first paragraph with the following:

(SN 1000-up) The current for the relay-power supply is provided by diode bridge rectifier D410A, B, C, and D and filter capacitor C410, with the negative lead connected to chassis ground. The reference voltage of Q423 is set by zener diode D413 (also connected to chassis ground) and transistor Q413. Any change in the supply load will change the bias of Q423 and cause more or less collector current to flow. The supply voltage is thus held to approximately +9.5 volts.

Page 4-14 Column 2

DELETE: the last sentence of - Variable Supply, the 2nd paragraph, and replace with the following:

Voltage at the emitter of Q427 is held at about +0.6 volt by the drop across D426.

Page 4-14 (For instruments SN1000-up)

DELETE: the first sentence of - Variable Supply, the 3rd paragraph, and replace with the following:

(SN 1000-up) Comparator Q96 and Q106 compares the output of the -Variable Supply to the input control voltage from the offset current circuit.

For instruments SN 1000-up:

REPLACE: the 4th paragraph under -Variable Supply with the following:

(SN 1000-up) The input control voltage variations are coupled by the comparator circuit and emitter follower Q103 to the bases of complementary emitter followers Q437 and Q113. Diode D108 provides about 0.6 volt more base to collector voltage for Q106, and diode D103 produces a voltage difference between the bases of the complementary emitter

followers. Transistor Q113 usually does not conduct or conducts only slightly. However, in - polarity, when the -Variable supply output is very close to signal ground, Q113 provides the required output current to the load.

Section 5 Maintenance

Page 5-6 Column 1

CHANGE: Wiring Color Code, "+12-volt", to read "+9.5-volt" in the text and in Table 5-2.

Page 5-7 Column 1

DELETE: the Temperature Coefficient column in Table 5-3. The information given in this column is incorrect.

Page 5-7 Column 2

CHANGE: "+12-volt" in the NOTE under Troubleshooting Procedure to read: "+9.5-volt".

Component Location Photos

CAUTION

Install only plug-in circuit cards with the correct Series letter. The Series letter (e.g., J) is printed on the top front corner of the card and on the instrument chassis adjacent to the card holder. All other Series should be considered incompatible. Installation in any other position may damage the instrument or cause it to malfunction. Each Series may have various Model numbers, indicating that minor changes have been made in the circuitry. All cards with the same Series letter, regardless of Model number, are electrically interchangeable in the Type R116.

Page 5-10 Fig. 5-8, Function Program No. 2 card

The component locations given in Fig. 5-8 apply only to the Series A Model 1 Function Program No. 2 card. Component locations on the Series K Model 1 Function Program No. 2 Series K card are shown in Fig. 1 of this insert.

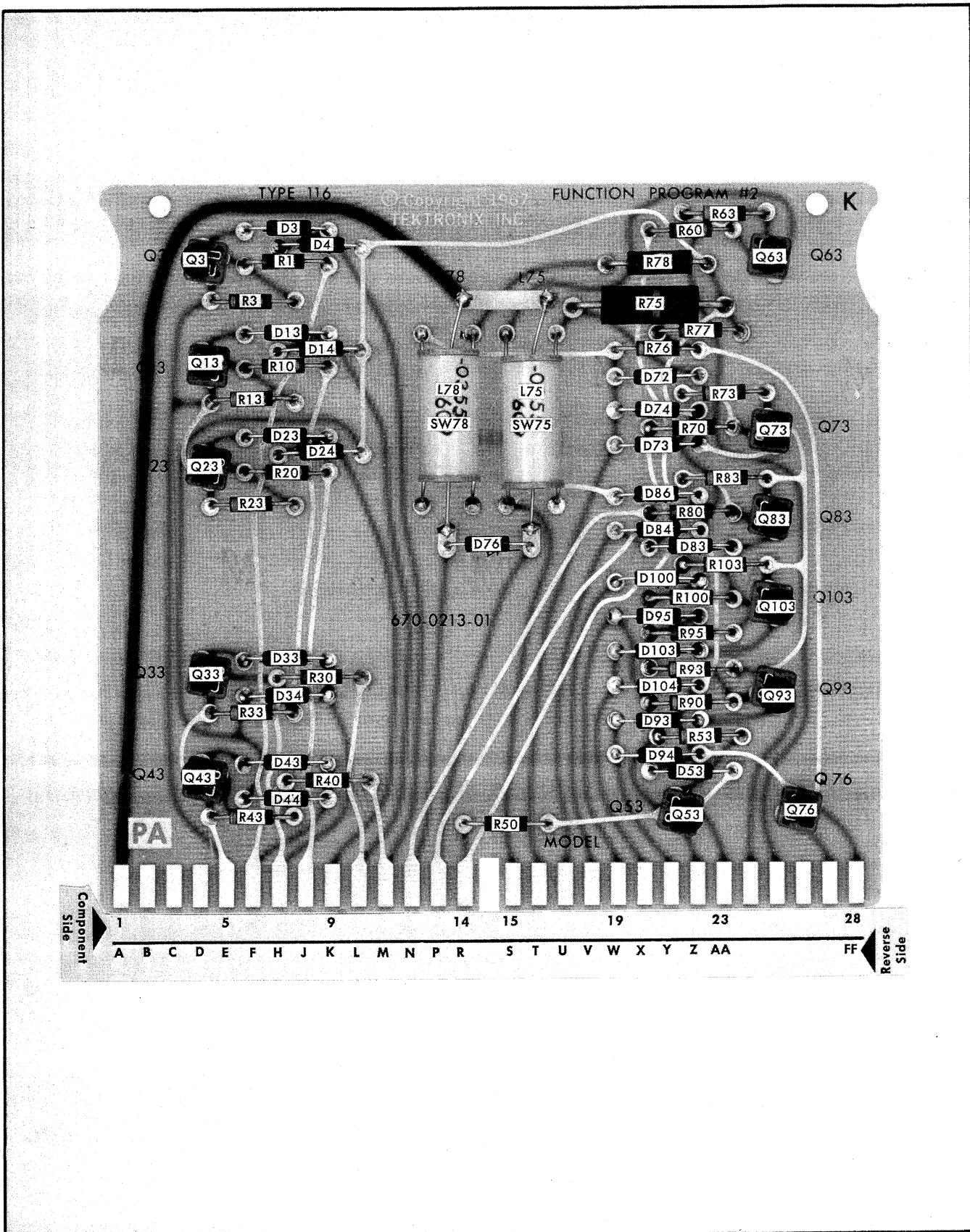


Fig. 1. Location of circuit components on Function Program No. 2 Series K Model 1 card.

C3/M12314/867

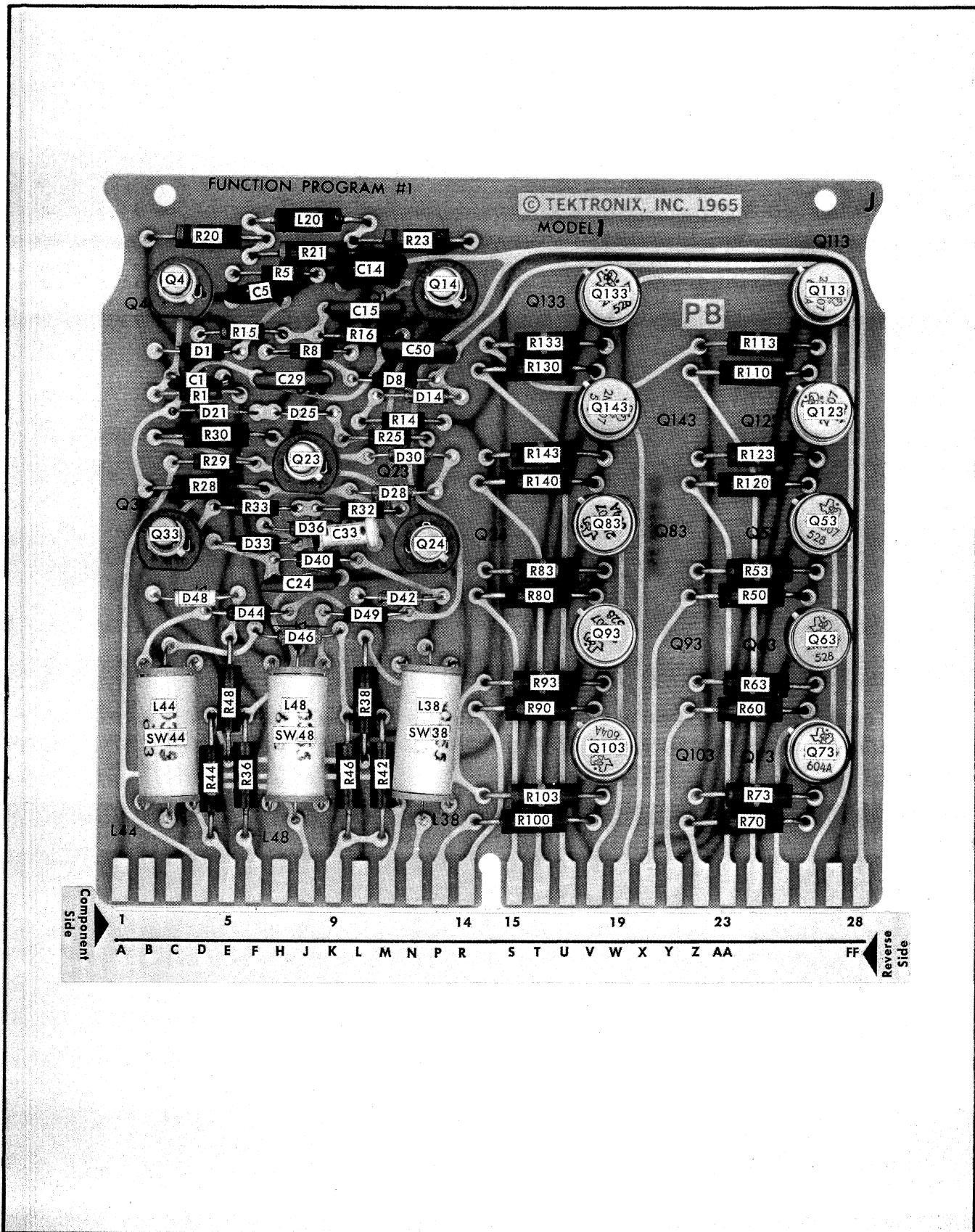


Fig. 2. Location of circuit components on Function Program No. 1 Series J Model 1 card.

C3/M12314/867

Page 5-11

Fig. 5-9, Period Generator card

Component locations shown in Fig. 5-9 apply to the Series B Models 1 and 2 Period Generator cards except that in Model 2 capacitor C20 has been removed and capacitor C97 has been added between signal ground and chassis ground (-Variable) on the back side of the circuit card.

Page 5-12

Fig. 5-9, Delay Generator card

Component locations on the Series C Delay Generator are the same for Models 1, 2, and 3, except as follows: In Model 2, ferrite bead L68 has been moved to the anode lead of D68 (the lower end of D68 in the photo); in Model 3, diode D27 has been added in series with D26 (at the upper end of D26 in the photo), and capacitor C2 has been added between the upper end of R3 (+7 V supply) and the center terminal (signal ground) at the lower end of SW58/L58.

Page 5-13

Fig. 5-11, Function Program No. 1 card

The component location photo in Fig. 5-11 applies only to the Series D Model 1 Function Program No. 1 card. Capacitor C14 should be shown between the anode (left) end of D14 and signal ground at the left end of C50 in the photo. Locations of components on the Series J Model 1 Function Program No. 1 card are shown in Fig. 2 of this insert, and those on the Series L Model 1 Function Program No. 1 card are shown in Fig. 3.

Page 5-14

Fig. 5-12, Width Generator card

Component locations shown in Fig. 5-12 apply to the Series E Models 1 and 2 Width Generator cards. Series E Model 3 is identical except that diode D27 has been added in series with D26 at the upper end of D26 in the photo.

Page 5-15

Fig. 5-13, Pulse Shape Generator card

The photo in Fig. 5-13 is of the Series F Model 1 Pulse Shape Generator card. Capacitor C74 has been removed and should not be shown in the photo. Component locations are the same on Series F Model 2 and 3 cards except as follows: In Model 2, ferrite beads L14, L24, L58, and L68 have been added around the collector leads of Q14, Q24, Q58, and Q68, respectively, on the transistor sockets; in Model 3, ferrite

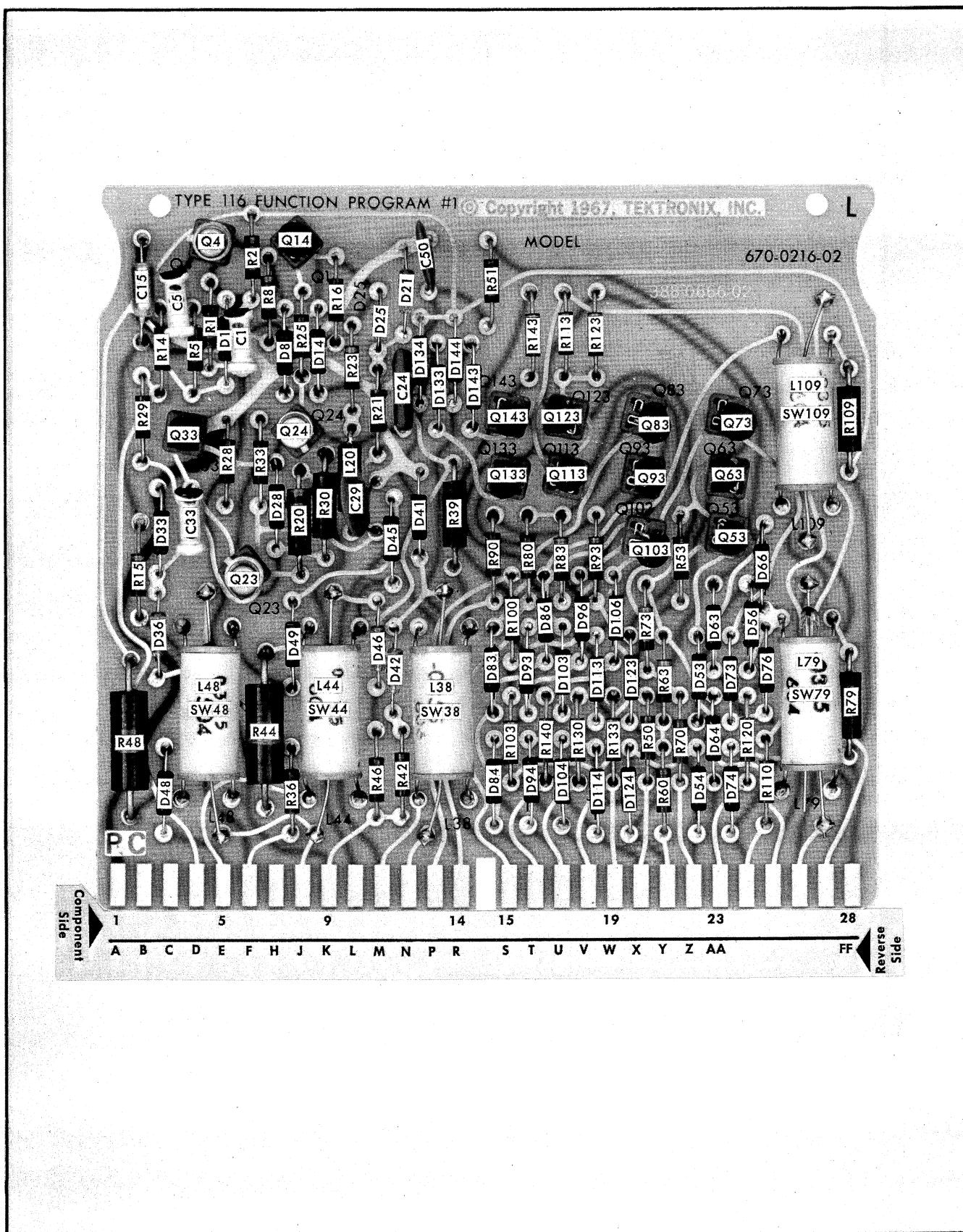


Fig. 3. Location of circuit components on Function Program No. 1 Series L Model 1 card.

C3/M12314/867

bead L⁴⁴ has been added around the emitter lead of Q⁴⁴ on the transistor socket and capacitor C120 has been removed.

Page 5-16 Fig. 5-14, Output Amplifier card

The component location photo in Fig. 5-14 applies only to the Series G Model 1 and 2 Output Amplifier cards. Resistor R⁴³ is located on the back side of the card between the lower end of C⁴⁴/D⁴⁴ and signal ground. Component locations on the Series M Model 1 Output Amplifier card are shown in Fig. 4 of this insert.

Page 5-17 Fig. 5-15, Attenuator card

Component locations shown in Fig. 5-15 apply to the Series H Model 1 and 2 and Series N Model 1 Attenuator cards, except that in Series H Model 1 bulbs B¹ and B⁴ are connected across resistors R¹ and R⁴, respectively.

Page 5-18 Fig. 5-16, Power Supply card

The component location photo in Fig. 5-16 applies to the Series I Model 1 Power Supply card. The Series I Model 2 card is similar except for the following additions:

D103 and D108 in series between the negative end of R103 and the emitter of Q103;

R92 between C92 and the base of Q96;

R102 between the base of Q106 and the emitter of Q113;

R104 between the base of Q113 and the junction of R103 and added diode D103;

R105 between the collector of Q106 and the base of Q103; and

R108 between the anode of added diode D108 and terminal H of the circuit card.

Resistors R12, R16, and R103 have been repositioned to accommodate these changes.

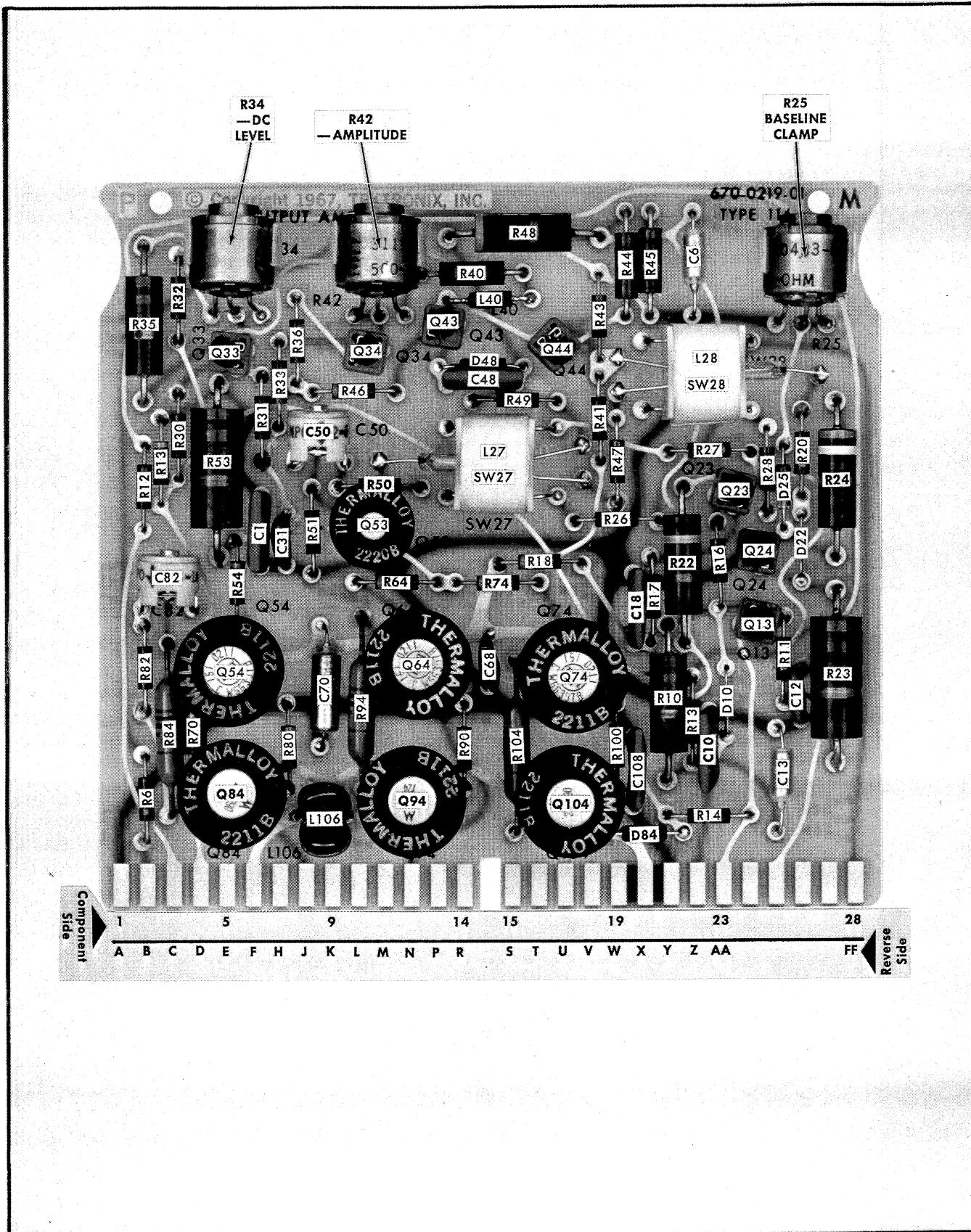


Fig. 4. Location of circuit components on Output Amplifier Series M Model 1 card.

Section 6

Performance Check

CHANGE: the following steps and tables from those with corresponding numbers given in the performance check procedure. Paragraphs that are not mentioned here should be left unchanged.

Page 6-2:

1a and 2a. Requirement--Correct amplitude into a 50Ω load over the range of the amplitude controls, with accuracy tolerance as follows: $\pm 3\% \pm 50$ mV on 1V range; $\pm 3\% \pm 25$ mV on .5 V range; $\pm 3\% \pm 15$ mV on .2 V range.

TABLE 6-1

(Change last 2 columns only)

Voltage	Maximum displacement from centerline
10 V $\pm 3\% \pm 50$ mV	± 1.75 cm
5 V $\pm 3\% \pm 25$ mV	± 1.75 cm
2 V $\pm 3\% \pm 15$ mV	± 1.5 cm
400 mV $\pm 3\% \pm 15$ mV	± 2.7 cm
1 V $\pm 3\% \pm 25$ mV	± 2.75 cm
2 V $\pm 3\% \pm 50$ mV	± 2.2 cm

Page 6-3:

3f. Check for--Test oscilloscope display of the pulse waveform with 4 cm of deflection, ± 3.5 mm (400 mV, $\pm 5\%$, ± 15 mV).

TABLE 6-2

(Change last 2 columns only)

Amplitude	
Voltage	Deflection
1 V, $\pm 5\% \pm 25$ mV	5 cm, ± 3.75 mm
2 V, $\pm 5\% \pm 50$ mV	4 cm, ± 3 mm

4c. Reset the following test oscilloscope controls:

Input Attenuation	1
Deflection Factor	20 mV/cm
Comparison Voltage	
Multiplier	4.000

4f. Check for--Test oscilloscope display of the pulse tops at the horizontal centerline, ± 1.75 cm (400 mV, $\pm 5\% \pm 15$ mV).

Page 6-4

4k. Check for--Test oscilloscope display of the pulse tops at the horizontal centerline, ± 1.76 cm (1.2 volts, $\pm 6\% \pm 15$ mV).

4p. Check for--Test oscilloscope display with pulse tops at the horizontal centerline, ± 1.35 cm (2 volts, $\pm 6\% \pm 15$ mV).

Page 6-5

8c. Set the following Type R116 controls:

Period Range	$10 \mu S$
Multiplier	1
Delay or Burst Time	
Range	$100 nS$
Multiplier	5
Width Range	$100 nS$
Multiplier	5
Trigger Source	INTERNAL

8h. Check for--Test oscilloscope display of the delayed output pulse displaced by approximately the delay time (0.75 cm or $1.5 \mu s$) from the 1-cm graticule line (see Fig. 6-5B).

Page 6-6

9c. Reset the following Type R116 controls:

MODE	REMOTE PROGRAM
DELAY OR BURST	
TIME RANGE	$100 nS$
MULTIPLIER	15
WIDTH RANGE	$100 nS$

Page 6-7:

11a. Requirement--Correct dc offset $\pm 5\% \pm 100$ mV into a 50Ω load over the range of the DC OFFSET control, in + and - polarity.

11g. Check for--Test oscilloscope display with the pulse baseline at the horizontal centerline, ± 2 cm (100 mV).

11i. Check for--Test oscilloscope display with the pulse baseline at the horizontal centerline, ± 2 cm (100 mV).

11j. Reset the following test oscilloscope controls:

Input Attenuation	10
Millivolts/Cm	20

11m. Check for--Test oscilloscope display with the pulse baseline at the horizontal centerline, ± 1.75 cm ($5\% + 100$ mV), as indicated in the Offset (Internal) column of Table 6-3. The checks on the 1V amplitude range cover the .5 V and .2 V ranges as well, since the attenuator was checked previously.

TABLE 6-3

DC OFF- SET	POLAR- ITY	Oscilloscope		Offset		
		Comp Voltage Mult.	Vc Range	Voltage	Baseline Displacement from Centerline	
					Internal	External
-5	+	5.000	-1.1	-5 V	± 1.75 cm ($5\% + 100$ mV)	± 2.5 cm ($8\% + 100$ mV)
-5	-	5.000	-1.1	-5 V	± 1.75 cm	± 2.5 cm
+5	-	5.000	+1.1	+5 V	± 1.75 cm	± 2.25 cm ($7\% + 100$ mV)
+5	+	5.000	+1.1	+5 V	± 1.75 cm	± 2.25 cm

12a. Requirement--Correct dc offset using program resistors, within 2% of front-panel operation ($+1\%$ program resistor tolerance).

12h. Check for--Test oscilloscope display with the pulse baseline at the horizontal centerline, ± 0.5 cm (103 mV).

Page 6-8:

12j. Check for--Test oscilloscope display with the pulse baseline at the horizontal centerline, ± 0.5 cm (103 mV).

12n. Check for--Test oscilloscope display with the pulse baseline at the horizontal centerline ± 2.5 cm (8% +100 mV), as given in the Offset (Remote) column of Table 6-3.

12p. Repeat steps 1 through n for the +5 settings of the DC OFFSET control given in Table 6-3. (The tolerances here are different from those in - polarity since the analog resistor is not in the circuit at maximum + offset.)

13b. Reset the following test oscilloscope controls:

Vc Range	0
Input Attenuation	100
Millivolts/Cm	10
Input Coupling	Gnd

Page 6-12:

TABLE 6-8
(Change Time Markers and Pulse Width Only)

Time Markers	Pulse Width	
	Time	Difference from Reference
5 μ s	50 μ s, $\pm 3\%$	± 1.5 mm over 5 cm
0.5 μ s	5 μ s, $\pm 3\%$	± 1.5 mm over 5 cm
50 ns	500 ns, $\pm 3\%$	± 1.5 mm over 5 cm
0.5 μ s	5.5 μ s, $\pm 3\%$	± 1.65 mm over 5.5 cm
5 μ s	55 μ s, $\pm 3\%$	± 1.65 mm over 5.5 cm
50 μ s	550 μ s, $\pm 3\%$	± 1.65 mm over 5.5 cm

Page 6-14:

24h. Set the sampling oscilloscope controls as follows:

Horizontal Display	X1
Amplitude Calibrator	Off
Equivalent Sweep Rate	0.1 μ s/cm, magnified from 0.2 μ s/cm
Triggering	+ External, 50 Ω AC
Sample Density	50/cm
Sweep Mode	Normal
Vert. Deflection Factor	200 mV/cm
Vertical Mode	B Only
Smoothing (both channels)	Counterclockwise
Noise-Risetime	Low Noise
Display	Normal

Page 6-15:

25a. Requirement--3% or less aberrations, either positive-going or negative-going, with total peak-to-peak aberrations of 3% or less, using minimum risetime and falltime and 10-volt amplitude, as observed on 50-ns wide and 500-ns wide pulses.

25c. Set the sampling oscilloscope equivalent sweep rate to 5 ns/cm (still magnified from 20 ns/cm).

25g. Check for--Sampling oscilloscope display of an overshoot of less than 1.5 cm (3%) above the pulse top or a short-time rounding of less than 1.5 cm (3%) below the pulse top. Total aberrations should be less than 1.5 cm (3%) peak-to-peak and the tilt of the pulse top should be not more than 1.5 cm (3%) over the 5 cm width of the pulse top (see Fig. 6-14A).

25i. Check for--Sampling oscilloscope display of the baseline with no more than 1.5 cm (3%) overshoot below the pulse baseline or no more than 1.5 cm (3%) of short-time rounding above the pulse baseline. Total aberrations should be no more than 1.5 cm (3%) peak-to-peak and the tilt of the baseline should be less than 1.5 cm (3%) over the 5 cm of horizontal displacement following the pulse.

26a. Requirement--Correct risetime and falltime over the range of the risetime and falltime controls, using 10 volt output amplitude, within 10% on 1 nS and 10 nS ranges, within 5% on 100 nS and 1 μ S ranges.

Page 6-17:

TABLE 6-10
(Change Risetime Falltime Range and Risetime or Falltime)

Risetime Falltime Range	Risetime or Falltime	
	Time	Display
1 ns	10 ns, $\pm 10\%$	5 cm, ± 5.0 mm
10 ns	100 ns, $\pm 10\%$	5 cm, ± 5.0 mm
100 ns	1 μ s, $\pm 5\%$	5 cm, ± 2.5 mm
1 μ s	10 μ s, $\pm 5\%$	5 cm, ± 2.5 mm
1 μ s	110 μ s, $\pm 5\%$	5.5 cm, ± 2.75 mm
100 ns	1.1 μ s, $\pm 10\%$	5.5 cm, ± 2.75 mm
10 ns	1.1 μ s, $\pm 10\%$	5.5 cm, ± 5.5 mm
1 ns	110 ns, $\pm 10\%$	5.5 cm, ± 5.5 mm

TABLE 6-11
(Change last 2 columns only)

Risetime and Falltime	
Time	Display
100 ns, $\pm 12\%$	5 cm, ± 6.0 mm
1 μ s, $\pm 7\%$	5 cm, ± 3.5 mm
10 μ s, $\pm 7\%$	5 cm, ± 3.5 mm

28c. Connect the shorting straps between the following points: Terminals 36 and 28, terminal 2 and the 1.74-k Ω resistor connected to terminal 31; terminal 3 and the 1.72-k Ω resistor connected to terminal 32.

28g. Check for--Test oscilloscope displays of the pulse indicating a risetime and falltime of 600 ns $\pm 13\%$ (6 cm ± 7.8 mm).

28k. Check for--Test oscilloscope display indicating a pulse risetime and falltime of 1.1 μ s $\pm 13\%$ (5.5 cm ± 6.5 mm).

Page 6-18:

29e. Reset the following Type R116 controls:

Mode	Single
Period	10 μ s
Multiplier	1
Delay or Burst Time	
Range	10 ns
Multiplier	10
Width Range	10 ns
Multiplier	5

29i. Set the sampling oscilloscope equivalent sweep rate to 50 ns/cm.

Section 7 Calibration Procedure

CHANGE: The following steps and tables from those with corresponding numbers given in the calibration procedure. Paragraphs that are not mentioned here should be left unchanged.

Page 7-3 Fig. 7-2

ADD: the following note:

CAUTION

Whenever working with the supply voltages at the REMOTE PROGRAM connector, be careful not to short the supplies together or to signal or chassis ground. These lines are not fused and, if shorted, can damage the power supply circuit.

(In Table 7-1, the resistance of R9 should be 1.74 k Ω .)

Page 7-3 CALIBRATION RECORD AND INDEX

CHANGE: the existing steps to read as follows:

2. Check Power Supply Voltages (Page 7-8).

- 27 volts ± 0.6 volt with respect to signal ground.
- 6.0 volts ± 0.5 volt with respect to signal ground.
- +7 volts ± 1 volt with respect to signal ground.
- Variable range from approximately -10 to -20 volts, with respect to signal ground, varied by DC OFFSET control.
- +9.5 volts ± 0.7 volt with respect to chassis ground.

7. Adjust +Amplitude (Page 7-13)

Correct Amplitude $\pm 3\% \pm 50$ mV at 10 volts and 2 volts.

8. Check Amplitude Accuracy (Page 7-14)

Correct amplitude $\pm 3\% \pm 50$ mV of amplitude in 1 V range; $\pm 3\% \pm 25$ mV of amplitude in .5 V range; $\pm 3\% \pm 15$ mV of amplitude in .2 V range.

Page 7-4 Pulse Shape Generator (Amplitude Section)

ADD: the following:

9A. Adjust Baseline Clamp (Series M card only)

Correct baseline level with offset current disconnected.

CHANGE: existing steps to read as follows:

10. Adjust -Amplitude (Page 7-16)

Correct amplitude of negative-going pulse $\pm 3\% \pm 50$ mV at 10 volts.

15. Adjust Offset Zero Levels (Page 7-19)

Zero offset ± 100 mV at 0 position of DC OFFSET control in + and - polarity.

16. Check Offset Accuracy (Page 7-20)

Correct DC offset $\pm 5\% \pm 100$ mV over range of DC OFFSET control in + and - polarity.

17. Check Remote Offset (Page 7-20)
Correct DC offset using program resistors, within 2% of front-panel calibration (+1% for program resistor tolerance).
19. Adjust Slow Risetime and Falltime (Page 7-22)
Correct risetime and falltime $\pm 5\%$ at 110 μ s and 10 μ s.
20. Check Slow Risetime and Falltime Accuracy (Page 7-24)
Correct risetime and falltime $\pm 5\%$ over range from 1 μ s to 110 μ s.
21. (SN 100-1083) Adjust +Pulse Overshoot (Page 7-24) or (SN 1084-up)
Adjust +Pulse Response (This insert): $\pm 3\%$ or less overshoot, aberrations or tilt, with total peak-to-peak aberrations of $\leq 3\%$ on front corner of minimum-risetime positive-going 50-ns width pulse.
22. Check Pulse Output Transient Response (Page 7-24) $\pm 3\%$ or less overshoot, aberrations or tilt in + and - polarity, with total peak to peak aberrations of $\leq 3\%$, using minimum risetime and falltime on 50-ns width and 500-ns width pulses.
23. Adjust Fast Risetime and Falltime (Page 7-26)
Correct risetime and falltime $\pm 10\%$ at 1 ns range X10 multiplier.
24. Check Fast Risetime and Falltime Accuracy (Page 7-27)
Correct risetime and falltime $\pm 10\%$ over range from 10 ns to 1.1 μ s.

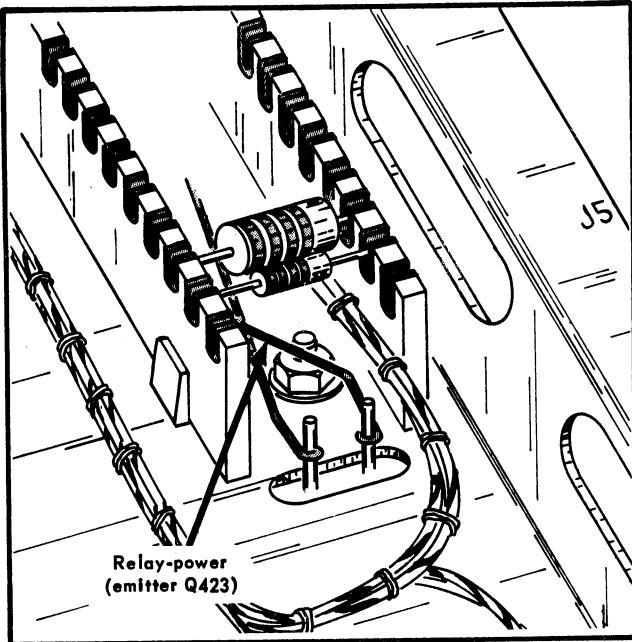
Page 7-5

29. Adjust Delay Timing (Page 7-33)
Correct delay timing $\pm 3\%$ (± 10 ns) at 100 μ s, 500 μ s, and 50 μ s.
30. Check Delay Accuracy (Page 7-34)
Correct timing $\pm 3\%$ (± 10 ns) over range of delay controls.

Page 7-8

DELETE: Asterisks and "+12 Volts" from Fig. 7-5:

ADD: Relay-power supply (located between signal ground and -27 volts as shown in the following drawing)



NOTE

All voltages except the relay-power supply are measured with respect to signal ground.

The relay-power supply is measured with respect to chassis ground.

Page 7-8

Step 2

CHANGE: to the following:

- 2k. Leave the negative lead of the meter connected to the chassis ground test point and move the positive lead of the meter to the relay power test point.
21. Check for--Meter reading of +9.5 volts ± 0.7 volt, with respect to chassis ground. This voltage may be measured with a 1% tolerance dc voltmeter.

Page 7-12 Preliminary Pulse Circuit Adjustments

ADD: Step 6A following Step 6

6A. Adjust Baseline Clamp (Series M card only)

6Aa. Reset the following Type R116 controls:

MODE	SINGLE
PERIOD RANGE	100 μ S
MULTIPLIER	2
WIDTH RANGE	10 μ S
MULTIPLIER	5

6Ab. Reset the following test oscilloscope controls:

Sweep Rate	20 μ s/cm
Vertical Display	A-Vc
Millivolts/Cm	10
Input Coupling	Gnd

6Ac. Free run the trace and position it to the horizontal centerline.

6Ad. Set the test oscilloscope Input Coupling switch to DC.

6Ae. Position the pulse baseline on the CRT horizontal centerline with the Type R116 DC OFFSET control.

6Af. Disconnect the offset current wire from the square-pin connector on the small ceramic strip at the top left rear of the chassis.
(This wire comes from J7, the Series M circuit card connector.)

6Ag. Check for--Test oscilloscope display with the pulse baseline 1.6 cm \pm 1.0 mm (1.6 V \pm 0.1 V) above the horizontal centerline.

6Ah. Adjust--R25 (BASELINE CLAMP) on the Output Amplifier circuit card (Series M) if the baseline level is not correct.

6Ai. Reconnect the offset current wire to the square-pin connector.

Page 7-13 Step 7

CHANGE: to the following:

- 7e. Check for--Test oscilloscope display of pulse tops with the flattest portion of the tops at the horizontal centerline ± 1.75 cm ($\pm 3\%$ of 10 V, ± 50 mV). See Fig. 7-12B for the test oscilloscope display.

Page 7-14

- 7k. Check for--Test oscilloscope display of the pulse tops with the flattest portion at the horizontal centerline ± 2.2 cm ($\pm 3\%$ of 2 V, ± 50 mV).

TABLE 7-3
(Change last 2 columns only)

Voltage	Maximum displacement from centerline
10 V $\pm 3\%$ ± 50 mV	± 1.75 cm
5 V $\pm 3\%$ ± 25 mV	± 1.75 cm
2 V $\pm 3\%$ ± 15 mV	± 1.5 cm
400 mV $\pm 3\%$ ± 15 mV	± 2.7 cm
1 V $\pm 3\%$ ± 25 mV	± 2.75 cm
2 V $\pm 3\%$ ± 50 mV	± 2.2 cm

Page 7-15 Step 9

CHANGE: to the following:

- 9d. Reset the test oscilloscope controls as follows:

Input Attenuation	1
Millivolts/Cm	20
Comparison Voltage	
Range	0
Multiplier	4.000

- 9g. Check for--Test oscilloscope display of the pulse tops at the horizontal centerline ± 1.25 cm ($\pm 5\%$ of 400 mV, ± 15 mV).

TABLE 7-4
(change last 2 columns only)

Voltage	Max. Displacement
1 V $\pm 5\%$ ± 25 mV	± 1.5 cm
1 V $\pm 5\%$ ± 50 mV	± 2.0 cm

- 9o. Check for--Test oscilloscope display of the pulse tops at the horizontal centerline ± 1.7 mm (1.2 V $\pm 6\%$ ± 15 mV).
- 9t. Check for--Test oscilloscope display with pulse tops at the horizontal centerline ± 1.35 cm (2 V $\pm 6\%$ ± 15 mV).

Page 7-16 Step 10

CHANGE: to the following:

10. Adjust -AMPLITUDE

- 10a. Test equipment setup is shown in Fig. 7-14.
- 10b. Reset the following test oscilloscope controls (Series M card only):

Input Attenuation	10
Millivolts/Cm	20
- 10c. Position the pulse baseline to the horizontal centerline of the test oscilloscope.
- 10d. Set the Vc Range switch to -1.1.
- 10e. Check for--Test oscilloscope display of the negative-going pulse tops (most negative excursions) at the horizontal centerline ± 1.75 cm (10 volts $\pm 3\%$ ± 50 mV).
- 10f. Adjust--R42 (-AMPLITUDE) on the Output Amplifier circuit card (Series G or M) if the negative-going amplitude is not correct. See Fig. 7-15 for the location of R42. Switch the Vc Range switch between the -1.1 and 0 positions while making the adjustment. When the -AMPLITUDE control is properly adjusted, the alternate appearances of the waveform top and baseline will be displayed at the same level on the graticule with the Vc Range switch in the two positions.
- 10g. If R42 requires adjustment, recheck steps b through e.
- 10h. Set the Vc Range switch to 0
- 10i. Disconnect the terminated cable from the vertical input of the test oscilloscope.

Page 7-17 Step 11

CHANGE: to the following:

- 11e. Connect the Channel A test probe tip to the end of R53 (the emitter of Q53) on the Output Amplifier circuit card (Series G or M). See Fig. 7-15.

11i. Adjust R34 (-DC LEVEL) on the Series G or M card if the signal level is not correct.

Page 7-18 Step 13

CHANGE: to the following:

13g. Check for--Test oscilloscope display of the pulse waveform with the pulse baseline at the horizontal centerline ± 1.7 cm.

13h. Adjust--R32 (Offset Range) on the attenuator circuit card (Series H 13. or N) if the offset range is not correct. See Fig. 7-18 for the location of R32.

Page 7-19 Steps 14 and 15

CHANGE: to the following:

14h. Check for--Test oscilloscope display with the pulse baseline at the horizontal centerline ± 1 cm.

15d. Check for--Test oscilloscope display with the pulse baseline at the horizontal centerline ± 1 cm (zero volts ± 100 mV) with the DC OFFSET control set exactly at 0.

15g. Check for--Test oscilloscope display with the baseline of the negative-going pulse at the horizontal centerline ± 1 cm (zero volts ± 100 mV).

Page 7-20 Steps 15, 17, and 18

CHANGE: to the follo

15j. Set the test oscilloscope Millivolts/Cm switch to 20

16c. Check for--Test oscilloscope display with the pulse baseline at the horizontal centerline ± 1.75 cm (5% ± 100 mV), as indicated in the Offset (Internal) column of Table 7-5. The checks on the 1 V amplitude range cover the .5 V and .2 V ranges as well, since the attenuator was checked previously.

TABLE 7-5

(Same as Table 6-3 in this insert).

- 17e. Check for--Test oscilloscope display with the pulse baseline at the horizontal centerline ± 0.5 cm (zero offset ± 103 mV).
- 17k. Check for--Test oscilloscope display with the pulse baseline at the horizontal centerline ± 2.5 cm (8% $+100$ mV), as given in the Offset (Remote) column of Table 7-5.
- 17m. Repeat steps i through k for the +5 settings of the DC OFFSET control given in Table 7-5. The tolerances here are different from those in - polarity since the analog resistor is not in the circuit at maximum + offset.

18b. Reset the following test oscilloscope controls:

Input Attenuation	100
Millivolts/Cm	10
Input Coupling	Gnd
Comparison Voltage Range	0

- 18h. Adjust--R54 (PROGRAM CLAMP) on the Series H or N card (see Fig. 7-18) for a compromise setting between the two polarities if the program clamp level is not correct in + and/or - polarity.

Page 7-24 Step 21

CHANGE: to the following:

- 21a. Disconnect the Type R116 output pulse from the test oscilloscope vertical input.

Page 7-25

- 21l. Check for--Sampling oscilloscope display with no more than 1.5 cm (3%) of overshoot above the pulse top or short-time rounding below the pulse top, and no more than 1.5 cm (3%) of aberrations or tilt over the 5 cm width of the pulse top. Total aberrations should be no more than 1.5 cm (3%) peak to peak.

- 21m. Adjust--C50 on Output Amplifier card Series G or M (see Fig. 7-25) if necessary to obtain the fastest rise possible and the squarest front corner on the pulse without causing overshoot at the front corner or aberrations on the pulse top.

ADD (Series M Output Amplifier card only):

21n. Adjust--C82 on the Series M Output Amplifier card to obtain the most level pulse top possible without causing overshoot or short-time rounding at the top of the pulse rise or aberrations on the pulse top.

CHANGE: Step 22 as follows:

- 22b. Check for--Sampling oscilloscope display with no more than 1.5 cm (3%) of overshoot below the baseline following the pulse or short-time rounding above the baseline. Total aberrations should be no more than 1.5 cm (3%) peak to peak and tilt of the baseline should be no more than 1.5 cm (3%) over the first 5 cm following the pulse.
- 22e. Check for--Sampling oscilloscope display with no more than 1.5 cm (3%) of overshoot above the pulse top or short-time rounding below the pulse top. Total aberrations should be no more than 1.5 cm (3%) peak to peak.

Page 7-27

DELETE: Steps 23s through 23hh.

ADD: 23ii. If risetime and/or falltime required adjustment, recheck the pulse shape and fast risetime and falltime adjustments as described in steps 21, 22, and 23.

DELETE: Reference to C74 in Fig. 7-26.

CHANGE: C72 reference in Fig. 7-26 to read:

C72 1nS range.

Page 7-28

CHANGE: the following

TABLE 7-7
Risetime and Falltime Accuracy Chart
(Change last 2 columns only)

Risetime or Falltime	
Time	Display
1.1 μ s \pm 10%	5.5 cm \pm 5.5 mm
110 ns \pm 10%	5.5 cm \pm 5.5 mm
100 ns \pm 10%	5 cm \pm 5.0 mm
10 ns \pm 10%	5 cm \pm 5.0 mm

24e. If the risetime and/or falltime are out of tolerance in any of the preceding checks, readjust C72 (see step 23) as required to bring the timing within tolerance over the 10 ns to 1.1 μ s range.

TABLE 7-8
Remote Risetime-Falltime Range Check
(Change last 2 columns only)

Risetime and Falltime	
Time	Display
100 ns $\pm 12\%$	5 cm ± 6.0 mm
100 ns $\pm 12\%$	5 cm ± 6.0 mm
1 μ s $\pm 7\%$	5 cm ± 3.5 mm
1 μ s $\pm 7\%$	5 cm ± 3.5 mm
10 μ s $\pm 7\%$	5 cm ± 3.5 mm
10 μ s $\pm 7\%$	5 cm ± 3.5 mm

Page 7-29

Step 25

- 25o. Reconnect the shorting straps between the following points: Terminals 36 and 28; terminal 2 and the 1.74-k Ω resistor connected to terminal 31; terminal 3 and the 1.74-k Ω resistor connected to terminal 32.
- 25s. Check for--Test oscilloscope displays of the pulse indicating a rise-time and falltime of 600 ns $\pm 13\%$ (6 cm ± 7.8 mm).
- 25t. Move the shorting straps connected to the 1.74-k Ω resistors on terminals 31 and 32 to the 3.40-k Ω resistors connected to the same terminals.
- 25x. Check for--Test oscilloscope display indicating a pulse risetime and falltime of 1.1 μ s $\pm 13\%$ (5.5 cm ± 6.5 mm).

Page 7-31

Step 26

ADD: Steps 26r through 26w for instruments SN 1084-up

- 26r. Set the test oscilloscope sweep rate magnifier to OFF or X1.
- 26s. Set the time-mark generator for a 10-ns marker output.
- 26t. Set the Type R116 WIDTH MULTIPLIER control to 5.
- 26u. Check for--Test oscilloscope display of a 50-ns pulse width within 5% of the reference waveform (± 2.5 mm over 5 cm).

- 26v. Adjust--R523 (50-ns Width) on the Type R116 chassis if the display is not correct.
- 26w. Reset the test oscilloscope sweep rate, time-mark generator and Type R116 controls as indicated in steps m, n and o and recheck the 50-ns width adjustments as described in steps p through v.

Page 7-34

Step 29

CHANGE: step 29 to read as follows:

- 29i. Check for--Test oscilloscope display of the double pulse with a delay period of 500 μ s, within 3% (+10 ns) of the reference waveform (± 1.5 mm over 5 cm).

CHANGE: steps 29l through 29p for instruments SN 1084-up to read:

- 29l. Set the test oscilloscope sweep rate to 0.1 μ s/cm.

- 29m. Reset the following Type R116 controls:

PERIOD RANGE	10 μ s
MULTIPLIER	1
DELAY OR BURST TIME	
RANGE	10 ns
MULTIPLIER	50
WIDTH RANGE	10 ns
MULTIPLIER	5

- 29n. Set the time-mark generator for a 50-ns marker output.

- 29o. (SN100-1084) Check for--Test oscilloscope display of the double pulse with a delay time of 500 ns, within 3% (± 10 ns) of the reference waveform (5 cm ± 2.5 mm).

- 29p. Adjust--C32 on the Series C card (see Fig. 7-32) if the delay time interval is not correct.

ADD: steps 29q through 29v for instruments SN 1084-up:

- 29q. Set the test oscilloscope sweep rate to 20 ns/cm (0.1 μ s/cm, magnified X5).

- 29r. Set the DELAY OR BURST TIME MULTIPLIER control to 10.

- 29s. Set the time-mark generator for a 10-ns marker output.

- 29t. Check for--Test oscilloscope display of the double pulse with a delay time of 100 ns, within 3% (± 10 ns) of the reference waveform (5 cm ± 6.5 mm).
- 29u. Adjust--R513 (50 ns Delay) on the Type R116 chassis if the delay time interval is not correct.
- 29v. Reset the test oscilloscope sweep rate and the Type R116 time-mark generator controls as indicated in steps l, m, and n, and recheck the 50-ns delay time adjustments as described in steps o through u.

Section 8 ELECTRICAL PARTS LIST

The following electrical parts list includes corrections to the parts list printed in the manual and additions to the parts list for new circuit card Series.

For the corrections, the following symbols are used in the SN/Model Range column:

X000 means the part was first added at this Serial Number or Model Number;

00X means the part was removed after this Serial Number or Model Number;

Complete parts lists are given for each added circuit card Series not given in the manual.

INSTRUMENT CHASSIS

Ckt. No.	Tektronix Part No.	Description	SN/Model Range
C464	283-0000-00	.001 μF	X1084-up
C484	283-0000-00	.001 μF	100-1083X
D482	152-0185-00	Silicon	Replaceable by 1N3605
D484	152-0185-00	Silicon	Replaceable by 1N3605
D570	*152-0075-00	Germanium	Tek Spec
D570	152-0185-00	Silicon	Replaceable by 1N3605
D572	*152-0075-00	Germanium	Tek Spec
D572	152-0185-00	Silicon	Replaceable by 1N3605
I485	*108-0417-00	110 μH	1000-1083X
Q434	151-0190-00	2N3904	X1000-1083X
Q444	*151-0134-00	Replaceable by 2N2905	100-1083
Q444	151-0227-00	2N3741	1084-up
Q454	*151-0134-00	Replaceable by 2N2905	100-1083X
Q464	*151-0136-00	Replaceable by 2N3053	100-1083
Q464	151-0226-00	2N3767	1084-up

Q474	*151-0136-00	Replaceable by 2N3053		100-1083
Q474	*151-0190-00	2N3904		1084-up
Q484	*151-0190-00	2N3904		X1000-1083X
R431	301-0271-00	270 Ω	1/2 W	5%
R431	301-0221-00	220 Ω	1/2 W	5%
R432	315-0103-00	10 kΩ	1/4 W	5%
R432	301-0622-00	6.2 kΩ	1/2W	5%
R444	307-0110-00	3 Ω	1/4 W	5%
R444	315-0470-00	47 Ω	1/4 W	5%
R450	307-0110-00	3 Ω		100-1083X
R460	302-0103-00	10 kΩ	1/2 W	1000-1083
R460	303-0102-00	1 kΩ	1 W	5%
R464	307-0110-00	3 Ω	1/4 W	5%
R464	315-0470-00	47 Ω	1/4 W	5%
R474	307-0110-00	3 Ω	1/4 W	5%
R480	301-0271-00	270 Ω	1/2 W	5%
R480	301-0221-00	220 Ω	1/2 W	5%
R500	Use 321-0135-00	249 Ω	Selected (nominal value)	100-1083X
R510	Use 321-0154-00	392 Ω	Selected (nominal value)	100-1083X
R513	311-0598-00	500 Ω	Var	X1084-up
R520	Use 321-0149-00	348 Ω	Selected (nominal value)	100-1083X
R523	311-0598-00	500 Ω	Var	X1084-up
R530	Use 321-0174-00	634 Ω	Selected (nominal value)	100-1083
R530	321-0162-00	475 Ω	Selected (nominal value)	1084-up
R550	321-0095-00	95.3 Ω	Selected (nominal value)	100-1083X
R560	321-0094-00	93.1 Ω	Selected (nominal value)	100-1083X
TK402	260-0246-00	Thermal Cutout 123° F		100-1083
TK402	260-0618-00	Thermal Cutout 140° F		1084-up

FUNCTION PROGRAM NO. 2 CARD--Series A

*670-0213-00 Complete Card (Compatible
with Chassis SN 100-1083)

FUNCTION PROGRAM NO. 2 CARD--Series K Model 1

*670-0213-01 Complete Card (Compatible
with Chassis SN 1084-up)

Diodes

D3	152-0185-00	Silicon	Replaceable by 1N3605
D4	152-0185-00	Silicon	Replaceable by 1N3605
D13	152-0185-00	Silicon	Replaceable by 1N3605
D14	152-0185-00	Silicon	Replaceable by 1N3605
D23	152-0185-00	Silicon	Replaceable by 1N3605
D24	152-0185-00	Silicon	Replaceable by 1N3605
D33	152-0185-00	Silicon	Replaceable by 1N3605
D34	152-0185-00	Silicon	Replaceable by 1N3605
D43	152-0185-00	Silicon	Replaceable by 1N3605
D44	152-0185-00	Silicon	Replaceable by 1N3605
D53	152-0185-00	Silicon	Replaceable by 1N3605
D73	152-0185-00	Silicon	Replaceable by 1N3605
D74	152-0185-00	Silicon	Replaceable by 1N3605
D76	152-0185-00	Silicon	Replaceable by 1N3605
D78	152-0185-00	Silicon	Replaceable by 1N3605
D83	152-0185-00	Silicon	Replaceable by 1N3605
D84	152-0185-00	Silicon	Replaceable by 1N3605
D86	152-0185-00	Silicon	Replaceable by 1N3605
D93	152-0185-00	Silicon	Replaceable by 1N3605
D94	152-0185-00	Silicon	Replaceable by 1N3605
D95	152-0185-00	Silicon	Replaceable by 1N3605
D100	152-0185-00	Silicon	Replaceable by 1N3605
D103	152-0185-00	Silicon	Replaceable by 1N3605
D104	152-0185-00	Silicon	Replaceable by 1N3605

Inductors

L75	*108-0355-00	Coil, Reed Drive
L78	*108-0355-00	Coil, Reed Drive

Transistors

Q3	151-0164-00	2N3702
Q13	151-0164-00	2N3702
Q23	151-0164-00	2N3702
Q33	151-0164-00	2N3702
Q43	151-0164-00	2N3702
Q53	151-0164-00	2N3702
Q63	151-0164-00	2N3702
Q73	151-0164-00	2N3702
Q76	151-0190-00	2N3904
Q83	151-0164-00	2N3702
Q93	151-0164-00	2N3702
Q103	151-0164-00	2N3702

Resistors

R1	315-0123-00	12 kΩ	1/4 W	Comp	5%
R3	315-0333-00	33 kΩ	1/4 W	Comp	5%
R10	315-0123-00	12 kΩ	1/4 W	Comp	5%
R13	315-0333-00	33 kΩ	1/4 W	Comp	5%
R20	315-0123-00	12 kΩ	1/4 W	Comp	5%
R23	315-0333-00	33 kΩ	1/4 W	Comp	5%
R30	315-0152-00	1.5 kΩ	1/4 W	Comp	5%
R33	315-0333-00	33 kΩ	1/4 W	Comp	5%
R40	315-0152-00	1.5 kΩ	1/4 W	Comp	5%
R43	315-0333-00	33 kΩ	1/4 W	Comp	5%
R50	315-0222-00	2.2 kΩ	1/4 W	Comp	5%
R53	315-0333-00	33 kΩ	1/4 W	Comp	5%
R60	315-0123-00	12 kΩ	1/4 W	Comp	5%

R63	315-0333-00	33 kΩ	1/4 W	Comp	5%
R70	315-0222-00	2.2 kΩ	1/4 W	Comp	5%
R73	315-0333-00	33 kΩ	1/4 W	Comp	5%
R75	303-0221-00	220 Ω	1 W	Comp	5%
R76	315-0472-00	4.7 kΩ	1/4 W	Comp	5%
R77	315-0102-00	1 kΩ	1/4 W	Comp	5%
R78	301-0221-00	220 Ω	1/2 W	Comp	5%
R80	315-0152-00	1.5 kΩ	1/4 W	Comp	5%
R83	315-0333-00	33 kΩ	1/4 W	Comp	5%
R90	315-0392-00	3.9 kΩ	1/4 W	Comp	5%
R93	315-0333-00	33 kΩ	1/4 W	Comp	5%
R95	315-0123-00	12 kΩ	1/4 W	Comp	5%
R100	315-0123-00	12 kΩ	1/4 W	Comp	5%
R103	315-0333-00	33 kΩ	1/4 W	Comp	5%

Switches

SW75	260-0552-00	Reed
SW78	260-0552-00	Reed

PERIOD GENERATOR CARD--Series B

C20	281-0509-00	15 pF	Cer	500 V	1X
C56	283-0032-00	470 pF	Cer	500 V	5% 1
C56	*283-0628-00	410 pF	Cer		2-up
C97	283-0080-00	.022 μF	Cer	25 V	2-up

Q74	151-0133-00	Selected from 2N3251	1
Q74	151-0221-00	2N4258	2-up

R20	301-0511-00	510 Ω	1/2 W	5%	1
R20	301-0101-00	100 Ω	1/2 W	5%	2-up

DELAY GENERATOR CARD - Series C

C2	283-0080-00	0.22 μ F	Cer	25 V	X3-up
D26	152-0304-00	Zener	1N968B	20 V	2
D26	152-0149-00	Zener	1N961B	10 V	3-up
D27	152-0149-00	Zener	1N961B	10 V	X3-up
D50	152-0141-00	Silicon	1N3605		1-2
D50	152-0322-00				3-up
D68	152-0008-00	Germanium			1-2
D68	152-0071-00	ED-20007			3-up
L68	276-0541-00				2
L68	276-0557-00	Core, ferrite toriod			3-up
Q73	*151-0133-00	Selected from 2N3251			1-2
Q73	151-0221-00	2N4258			3-up
R20	301-0242-00	2.4 k Ω	1/2 W	5%	1-2
R20	301-0162-00	1.6 k Ω	1/2 W	5%	3-up
R28	315-0272-00	2.7 k Ω	1/4 W	5%	1-2
R28	315-0362-00	3.6 k Ω	1/4 W	5%	3-up
R29	301-0111-00	110 Ω	1/2 W	5%	1-2
R29	301-0510-00	51 Ω	1/2 W	5%	3-up
R33	315-0101-00	100 Ω	1/4 W	5%	1-2
R33	307-0110-00	3 Ω	1/4 W	5%	3-up
R45	322-0612-00	500 Ω	1/4 W	1%	Prec 1-2
R45	322-0151-00	365 Ω	1/4 W	1%	Prec 3-up
R53	301-0511-00	510 Ω	1/2 W	5%	1-2
R53	321-0165-00	511 Ω	1/8 W	1%	3-up
R54	301-0102-00	1 k Ω	1/2 W	5%	1-2
R54	321-0209-00	1.47 k Ω	1/8 W	1%	3-up
R60	301-0681-00	680 Ω	1/2 W	5%	1-2
R60	321-0163-00	487 Ω	1/8 W	1%	3-up
R62	301-0112-00	1.1 k Ω	1/2 W	5%	1-2
R62	321-0165-00	511 Ω	1/8 W	1%	3-up

FUNCTION PROGRAM NO. 1 CARD--Series D

*670-0216-00 Complete Card (Compatible with
Chassis SN 100-999)

FUNCTION PROGRAM NO. 1 CARD--Series J

*670-0216-01 Complete Card (Compatible with
Chassis SN 1000-1083)

FUNCTION PROGRAM NO. 1 CARD--Series L Model 1

*670-0216-02 Complete Card (Compatible with
Chassis SN 1084-up)

Capacitors

C1	281-0511-00	22 pF	Cer
C5	281-0511-00	22 pF	Cer
C15	290-0267-00	1 μF	35 V
C24	283-0059-00	1 μF	25 V
C29	283-0004-00	.02 μF	150 V
C33	281-0638-00	240 pF	500 V
C50	283-0004-00	.02 μF	150 V

Diodes

D1	*152-0185-00	Silicon	Replaceable by 1N3605
D8	*152-0185-00	Silicon	Replaceable by 1N3605
D14	*152-0185-00	Silicon	Replaceable by 1N3605
D21	*152-0075-00	Germanium	Tek Spec
D25	152-0093-00	Tunnel	1N3716 4.7 mA
D28	*152-0185-00	Silicon	Replaceable by 1N3605
D33	*152-0185-00	Silicon	Replaceable by 1N3605
D36	*152-0075-00	Germanium	Tek Spec
D41	*152-0185-00	Silicon	Replaceable by 1N3605
D42	*152-0075-00	Germanium	Tek Spec
D45	*152-0185-00	Silicon	Replaceable by 1N3605
D46	*152-0075-00	Germanium	Tek Spec
D48	*152-0185-00	Silicon	Replaceable by 1N3605

D49	*152-0185-00	Silicon	Replaceable by 1N3605
D53	*152-0185-00	Silicon	Replaceable by 1N3605
D54	*152-0185-00	Silicon	Replaceable by 1N3605
D56	*152-0185-00	Silicon	Replaceable by 1N3605
D63	*152-0185-00	Silicon	Replaceable by 1N3605
D64	*152-0185-00	Silicon	Replaceable by 1N3605
D66	*152-0185-00	Silicon	Replaceable by 1N3605
D73	*152-0185-00	Silicon	Replaceable by 1N3605
D74	*152-0185-00	Silicon	Replaceable by 1N3605
D76	*152-0185-00	Silicon	Replaceable by 1N3605
D83	*152-0185-00	Silicon	Replaceable by 1N3605
D84	*152-0185-00	Silicon	Replaceable by 1N3605
D86	*152-0185-00	Silicon	Replaceable by 1N3605
D93	*152-0185-00	Silicon	Replaceable by 1N3605
D94	*152-0185-00	Silicon	Replaceable by 1N3605
D96	*152-0185-00	Silicon	Replaceable by 1N3605
D103	*152-0185-00	Silicon	Replaceable by 1N3605
D104	*152-0185-00	Silicon	Replaceable by 1N3605
D106	*152-0185-00	Silicon	Replaceable by 1N3605
D113	*152-0185-00	Silicon	Replaceable by 1N3605
D114	*152-0185-00	Silicon	Replaceable by 1N3605
D123	*152-0185-00	Silicon	Replaceable by 1N3605
D124	*152-0185-00	Silicon	Replaceable by 1N3605
D133	*152-0185-00	Silicon	Replaceable by 1N3605
D134	*152-0185-00	Silicon	Replaceable by 1N3605
D143	*152-0185-00	Silicon	Replaceable by 1N3605
D144	*152-0185-00	Silicon	Replaceable by 1N3605

Inductors

L20	108-0148-00	2.5 μ H
L38	108-0355-00	Coil, Reed Drive
L44	108-0355-00	Coil, Reed Drive
L48	108-0355-00	Coil, Reed Drive
L79	108-0355-00	Coil, Reed Drive
L109	108-0355-00	Coil, Reed Drive

Transistors

Q4	*151-0108-00	Replaceable by 2N2501
Q14	151-0221-00	2N4258
Q23	151-0108-00	Replaceable by 2N2501
Q24	151-0127-00	Selected from 2N2369
Q33	151-0221-00	2N4258
Q53	151-0164-00	2N3702
Q63	151-0164-00	2N3702
Q73	151-0164-00	2N3702
Q83	151-0164-00	2N3702
Q93	151-0164-00	2N3702
Q103	151-0164-00	2N3702
Q113	151-0164-00	2N3702
Q123	151-0164-00	2N3702
Q133	151-0164-00	2N3702
Q143	151-0164-00	2N3702

Resistors

R1	315-0222-00	2.2 kΩ	1/4 W	5%
R2	315-0103-00	10 kΩ	1/4 W	5%
R5	315-0152-00	1.5 kΩ	1/4 W	5%
R8	315-0332-00	3.3 kΩ	1/4 W	5%
R14	315-0272-00	2.7 kΩ	1/4 W	5%
R15	315-0301-00	300 Ω	1/4 W	5%
R16	315-0152-00	1.5 kΩ	1/4 W	5%
R20	301-0332-00	3.3 kΩ	1/2 W	5%
R21	315-0360-00	36 Ω	1/4 W	5%
R23	315-0330-00	33 Ω	1/4 W	5%
R25	315-0110-00	10 Ω	1/4 W	5%
R28	315-0102-00	1 kΩ	1/4 W	5%
R29	315-0100-00	10 Ω	1/4 W	5%
R30	301-0152-00	1.5 kΩ	1/2 W	5%
R33	315-0242-00	2.4 kΩ	1/4 W	5%
R36	315-0101-00	100 Ω	1/4 W	5%
R39	301-0221-00	220 Ω	1/2 W	5%

R42	315-0101-00	100 Ω	1/4 W	5%
R44	303-0221-00	220 Ω	1 W	5%
R46	315-0101-00	100 Ω	1/4 W	5%
R48	303-0221-00	220 Ω	1 W	5%
R50	315-0123-00	12 kΩ	1/4 W	5%
R51	315-0100-00	10 Ω	1/4 W	5%
R53	315-0333-00	33 kΩ	1/4 W	5%
R60	315-0123-00	12 kΩ	1/4 W	5%
R63	315-0333-00	33 kΩ	1/4 W	5%
R70	315-0123-00	12 kΩ	1/4 W	5%
R73	315-0333-00	33 kΩ	1/4 W	5%
R79	301-0271-00	270 Ω	1/2 W	5%
R80	315-0123-00	12 kΩ	1/4 W	5%
R83	315-0333-00	33 kΩ	1/4 W	5%
R90	315-0123-00	12 kΩ	1/4 W	5%
R93	315-0333-00	33 kΩ	1/4 W	5%
R100	315-0123-00	12 kΩ	1/4 W	5%
R103	315-0333-00	33 kΩ	1/4 W	5%
R109	301-0271-00	270 Ω	1/2 W	5%
R110	315-0123-00	12 kΩ	1/4 W	5%
R113	315-0333-00	33 kΩ	1/4 W	5%
R120	315-0123-00	12 kΩ	1/4 W	5%
R123	315-0333-00	33 kΩ	1/4 W	5%
R130	315-0123-00	12 kΩ	1/4 W	5%
R133	315-0333-00	33 kΩ	1/4 W	5%
R140	315-0123-00	12 kΩ	1/4 W	5%
R143	315-0333-00	33 kΩ	1/4 W	5%

Switches

SW38	260-0552-00	Reed
SW44	260-0552-00	Reed
SW48	260-0552-00	Reed
SW79	260-0721-00	Double Reed
SW109	260-0552-00	Reed

WIDTH GENERATOR CARD - Series E

C33	283-0113-00	56 pF	Cer	500 V	1-2
C33	*283-0629-00	62 μ F	Mica		3-up
D26	152-0304-00	Zener	1N968B	20 V	2
D26	152-0149-00	Zener	1N961B	10 V	3-up
D27	152-0149-00	Zener	1N961B	10 V	X3-up
R20	315-0242-00	2.4 k Ω	1/4 W	5%	1-2
R20	315-0132-00	1.3 k Ω	1/4 W	5%	3-up
R26	301-0272-00	2.7 k Ω	1/2 W	5%	1-2
R26	301-0362-00	3.6 k Ω	1/2 W	5%	3-up
R28	315-0111-00	110 Ω	1/4 W	5%	1-2
R28	307-0113-00	5.1 Ω	1/4 W	5%	3-up
R60	301-0681-00	680 Ω	1/2 W	5%	1-2
R60	321-0163-00	487 Ω	1/8 W	1%	Prec 3-up
R62	301-0112-00	1.1 k Ω	1/2 W	5%	1-2
R62	321-0165-00	511 Ω	1/8 W	1%	Prec 3-up

PULSE SHAPE GENERATOR CARD - Series E

C72	281-0096-00	5.5-18 pF	Air	Var	1-2
C72	281-0097-00	9-35 pF	Cer	Var	3-up
C74	281-0097-00	9-35 pF	Cer	Var	None (delete)
C120	290-0121-00	2 μ F	EMT	25 V	2-3X
L44	276-0528-00	Core, Ferramic Suppressor			X3-up
R72	315-0510-00	51 Ω	1/4 W	5%	1-2
R72	307-0113-00	5.1 Ω	1/4 W	5%	3-up
R122	315-0122-00	1.2 k Ω	1/4 W	5%	1-2
R122	315-0472-00	4.7 k Ω	1/4 W	5%	3-up

OUTPUT AMPLIFIER CARD--Series G

*670-0219-00 Complete Card (Compatible with
Chassis SN 100-1083)

OUTPUT AMPLIFIER CARD, Series G

C40 Use 281-0564-00 24 pF Cer Selected (nominal value)

OUTPUT AMPLIFIER CARD--Series M, Model 1
*670-0219-01 Complete Card (Compatible with
Chassis SN 1084-up)

Capacitors

C1	283-0059-00	1 μF	Cer	25 V	+80%-20%
C6	290-0267-00	1 μF		35 V	
C10	283-0059-00	1 μF	Cer	25 V	+80%-20%
C12	283-0080-00	.022 μF	Cer	25 V	
C13	290-0267-00	1 μF		35 V	
C18	283-0059-00	1 μF	Cer	25 V	+80%-20%
C31	283-0080-00	.022 μF	Cer	25 V	
C48	283-0059-00	1 μF	Cer	25 V	+80%-20%
C50	281-0089-00	2-8 pF	Var		
C68	283-0080-00	.022 μF	Cer	25 V	
C70	290-134-00	22 μF	Cer	15 V	
C82	281-0096-00	5.5-18 pF	Var		
C108	283-0059-00	1 μF	Cer	25 V	+80%-20%

Diodes

D10	*152-0322-00		
D22	*152-0322-00		
D25	152-0141-00	Silicon	1N3605
D48	152-0212-00	Zener	9 V
D84	*152-0185-00	Silicon	Replaceable by 1N3605

Coils

L27	108-0357-00	Reed Drive
L28	108-0357-00	Reed Drive
L40	108-0215-00	1.1 μ H
L106	*108-0417-00	110 μ H

Transistors

Q13	151-0221-00	2N4258	
Q23	151-0198-00	Silicon	MPS 918
Q24	151-0221-00	2N4258	
Q33	151-0188-00	2N3906	
Q34	151-0198-00	Silicon	MPS 918
Q43	151-0198-00	Silicon	MPS 918
Q44	151-0198-00	Silicon	MPS 918
Q53	151-0167-00	Silicon	XF737
Q54	151-0211-00	2N3866	
Q64	151-0211-00	2N3866	
Q74	151-0211-00	2N3866	
Q84	*151-0235-00	2N4890	
Q94	*151-0235-00	2N4890	
Q104	*151-0235-00	2N4890	

Resistors

R1	307-0106-00	4.7 Ω	1/4 W	5%
R6	315-0100-00	10 Ω	1/4 W	5%
R10	303-0182-00	1.8 k Ω	1 W	5%
R11	307-0113-00	5.1 Ω	1/4 W	5%
R12	315-0101-00	100 Ω	1/4 W	5%
R13	315-0100-00	10 Ω	1/4 W	5%
R14	315-0244-00	240 k Ω	1/4 W	5%
R16	315-0101-00	100 Ω	1/4 W	5%
R17	307-0113-00	5.1 Ω	1/4 W	5%
R18	315-0330-00	33 Ω	1/4 W	5%
R20	315-0510-00	51 Ω	1/4 W	5%
R22	303-0242-00	2.4 k Ω	1 W	5%
R23	305-0122-00	1.2 k Ω	2 W	5%

R24	303-0392-00	3.9 kΩ	1 W	5%
R25	311-0433-00	100 Ω		Var
R26	315-0270-00	27 Ω	1/4 W	5%
R27	315-0151-00	150 Ω	1/4 W	5%
R28	315-0181-00	180 Ω	1/4 W	5%
R30	315-0152-00	1.5 kΩ	1/4 W	5%
R31	315-0220-00	22 Ω	1/4 W	5%
R32	315-0221-00	220 Ω	1/4 W	5%
R33	315-0220-00	22 Ω	1/4 W	5%
R34	311-0480-00	500 Ω		Var
R35	303-0182-00	1.8 kΩ	1 W	5%
R36	315-0221-00	220 Ω	1/4 W	5%
R40	301-0561-00	569 Ω	1/2 W	5%
R41	315-0274-00	270 kΩ	1/4 W	5%
R42	311-0480-00	500 Ω		Var
R43	315-0153-00	15 kΩ	1/4 W	5%
R44	301-0752-00	7.5 kΩ	1/2 W	5%
R45	301-0821-00	820 Ω	1/2 W	5%
R46	315-0390-00	39 Ω	1/4 W	5%
R47	315-0620-00	62 Ω	1/4 W	5%
R48	303-0302-00	3 kΩ	1 W	5%
R49	315-0181-00	180 Ω	1/4 W	5%
R50	315-0181-00	180 Ω	1/4 W	5%
R51	307-0113-00	5.1 Ω	1/4 W	5%
R53	305-0112-00	1.1 kΩ	2 W	5%
R54	315-0330-00	33 Ω	1/4 W	5%
R64	315-0330-00	33 Ω	1/4 W	5%
R74	315-0330-00	33 Ω	1/4 W	5%
R70	307-0051-00	2.7 Ω	1/2 W	5%
R80	315-0330-00	33 Ω	1/4 W	5%
R82	315-0222-00	2.2 kΩ	1/4 W	5%
R84	301-0750-00	75 Ω	1/2 W	5%
R90	315-0330-00	33 Ω	1/4 W	5%
R94	301-0750-00	75 Ω	1/2 W	5%
R100	315-0330-00	33 Ω	1/4 W	5%
R104	301-0750-00	75 Ω	1/2 W	5%

Switches

SW27	260-0721-00	Reed, SPDT
SW28	260-0721-00	Reed, SPDT

ATTENUATOR CARD--Series H

*670-0220-00 Complete Card (Compatible with
Chassis SN 100-1083)

ATTENUATOR CARD--Series N Model 1

*670-0220-01 Complete Card (Compatible with
Chassis SN 1084-up)

Capacitors

C14	281-0512-00	27 pF	Cer	500 V	10%
C32	283-0003-00	0.01 μ F	Cer	150 V	
C40	283-0000-00	0.001 μ F	Cer	500 V	
C74	290-0121-00	2 μ F	EMT	25 V	

Diodes

D40	*152-0185-00	Silicon	Replaceable by 1N3605
D70	*152-0185-00	Silicon	Replaceable by 1N3605

Connector

J18	131-0391-00	50 Ω , coaxial, male
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Relays

K1	148-0025-00	Armature Relay	6 V DC
K4	148-0025-00	Armature Relay	6 V DC

Transistors

Q38	151-0164-00	2N3702
Q44	151-0164-00	2N3702
Q54	*151-0153-00	Replaceable by 2N2923
Q64	151-0164-00	2N3702
Q74	*151-0136-00	Replaceable by 2N3053

Resistors

R1	303-0680-00	68 Ω	1 W	5%
R4	303-0680-00	68 Ω	1 W	5%
R6	305-0510-00	51 Ω	2 W	5%
R7	305-0510-00	51 Ω	2 W	5%
R9	324-0097-00	100 Ω	1 W	Prec
R10	324-0097-00	100 Ω	1 W	Prec
R12	305-0101-00	100 Ω	2 W	5%
R13	305-0101-00	100 Ω	2 W	5%
R14	305-0101-00	100 Ω	2 W	5%
R16	323-0606-00	60 Ω	1/2 W	Prec
R17	323-0606-00	60 Ω	1/2 W	Prec
R18	323-0606-00	60 Ω	1/2 W	Prec
R20	323-0047-00	30.1 Ω	1/2 W	Prec
R30	315-0202-00	2 kΩ	1/4 W	5%
R32	311-0462-00	1 kΩ		Var
R35	315-0272-00	2.7 kΩ	1/4 W	5%
R38	315-0103-00	10 kΩ	1/4 W	5%
R42	301-0103-00	10 kΩ	1/2 W	5%
R44	301-0103-00	10 kΩ	1/2 W	5%
R46	301-0222-00	2.2 kΩ	1/2 W	5%
R54	311-0496-00	2.5 kΩ		Var
R56	315-0221-00	220 Ω	1/4 W	5%
R64	315-0273-00	27 kΩ	1/4 W	5%
R74	301-0222-00	2.2 k		

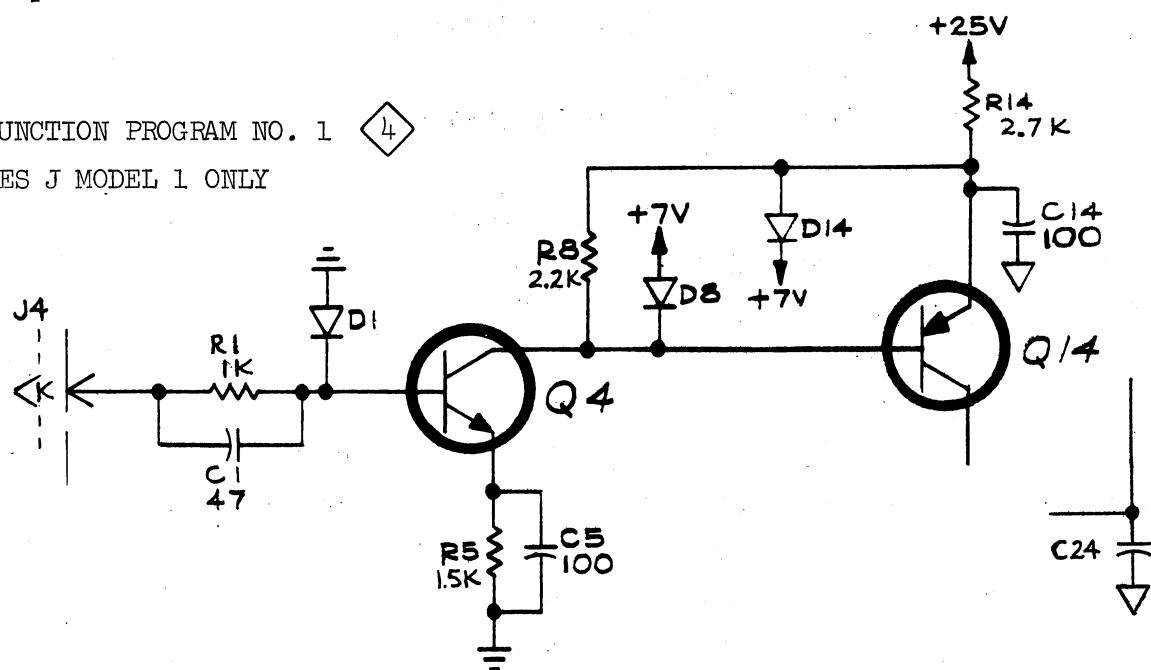
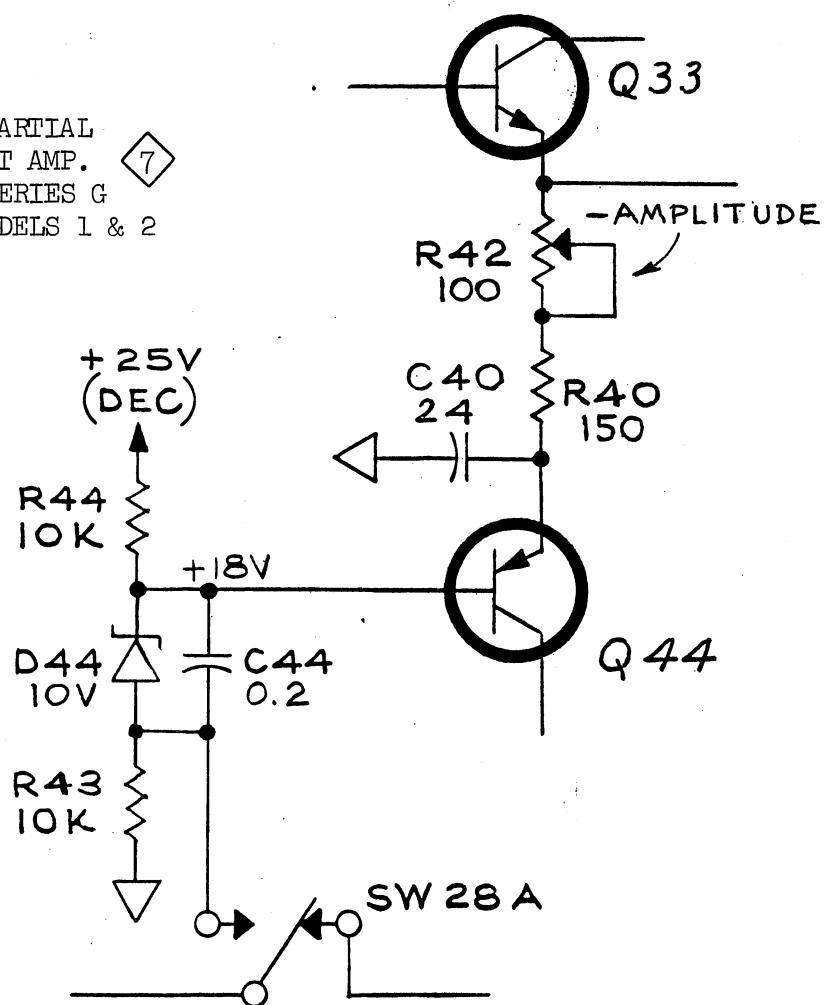
Section 9

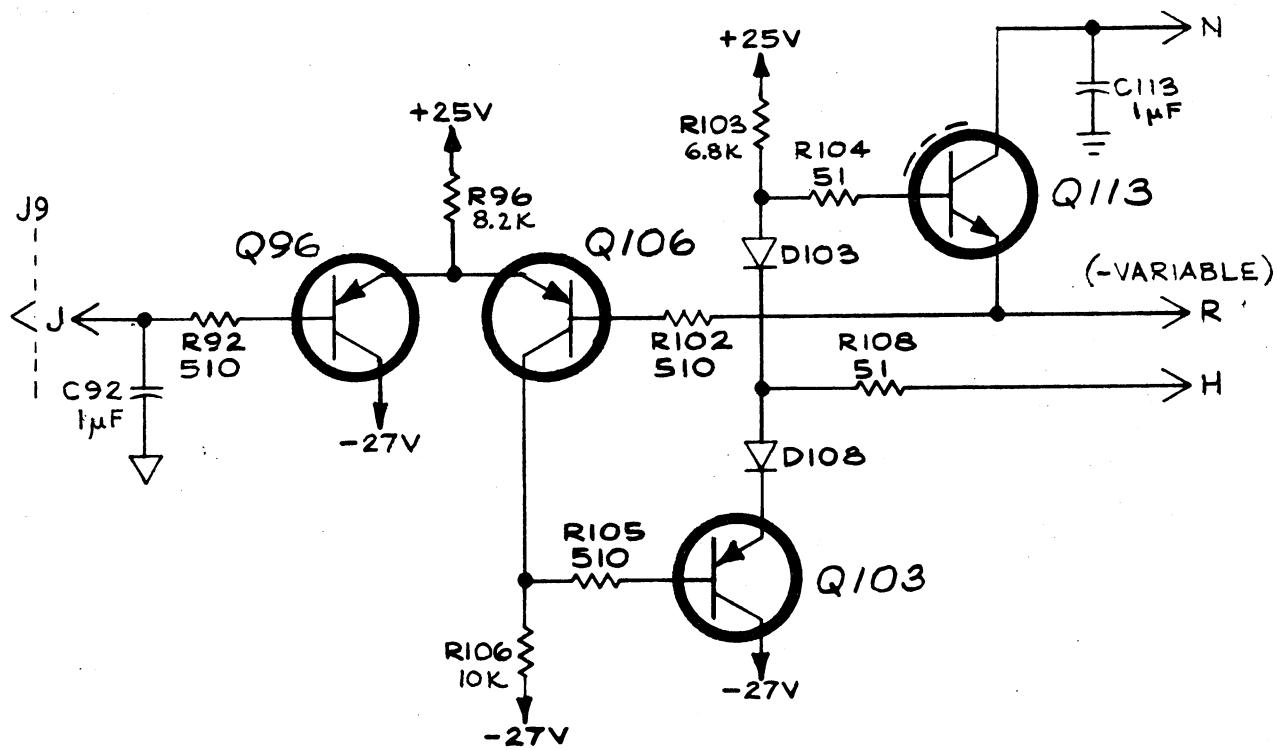
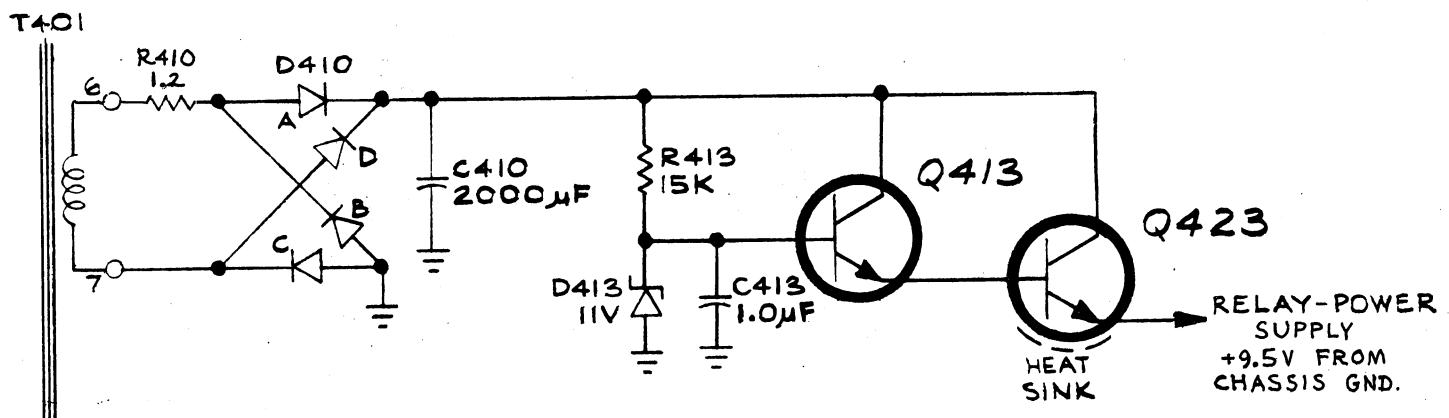
DIAGRAMS

The following schematics and partial schematics include corrections to the schematics in the manual and circuit changes made in the instrument after the manual was printed.

PARTIAL FUNCTION PROGRAM NO. 1 ◇ 4

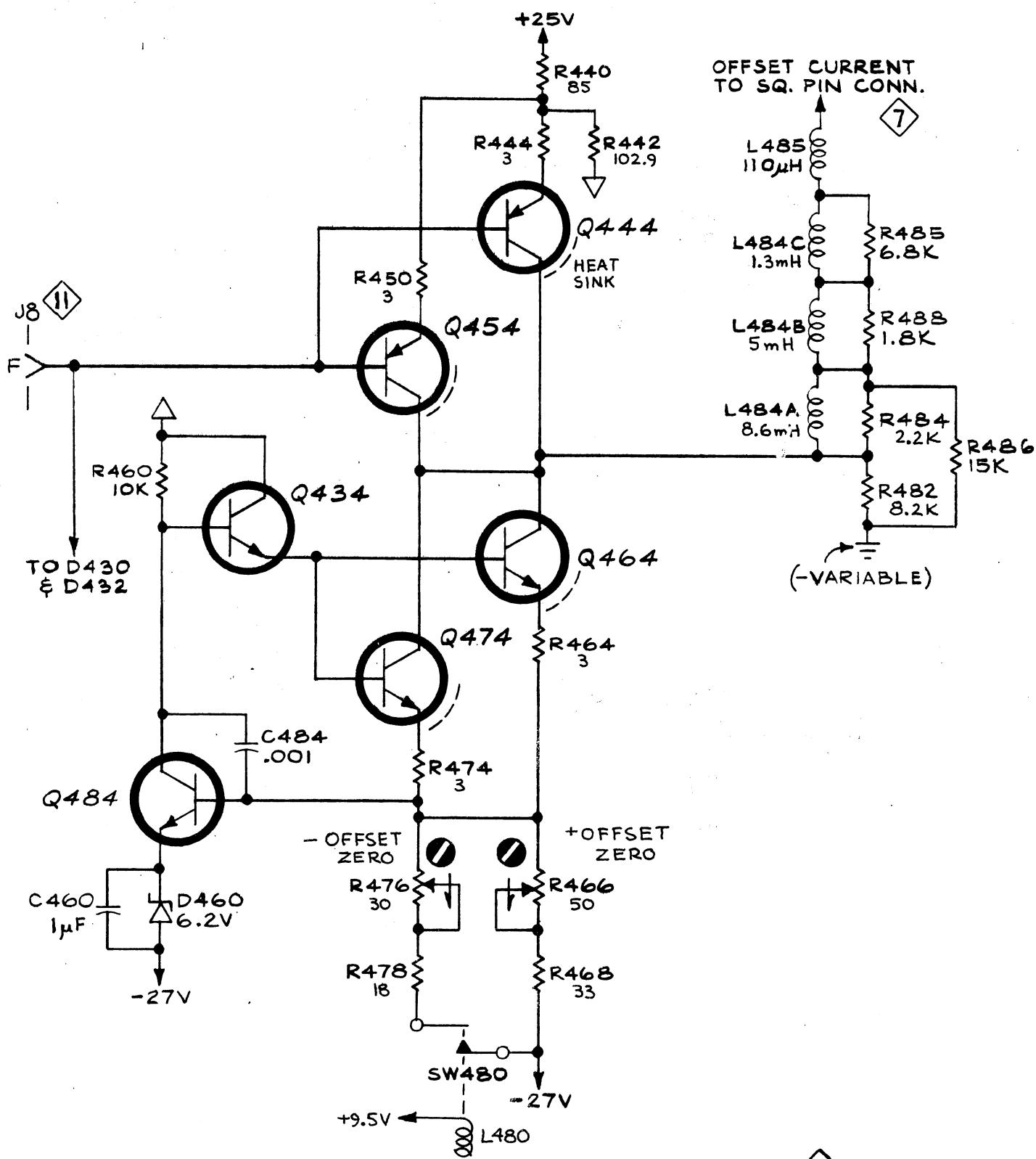
SERIES J MODEL 1 ONLY

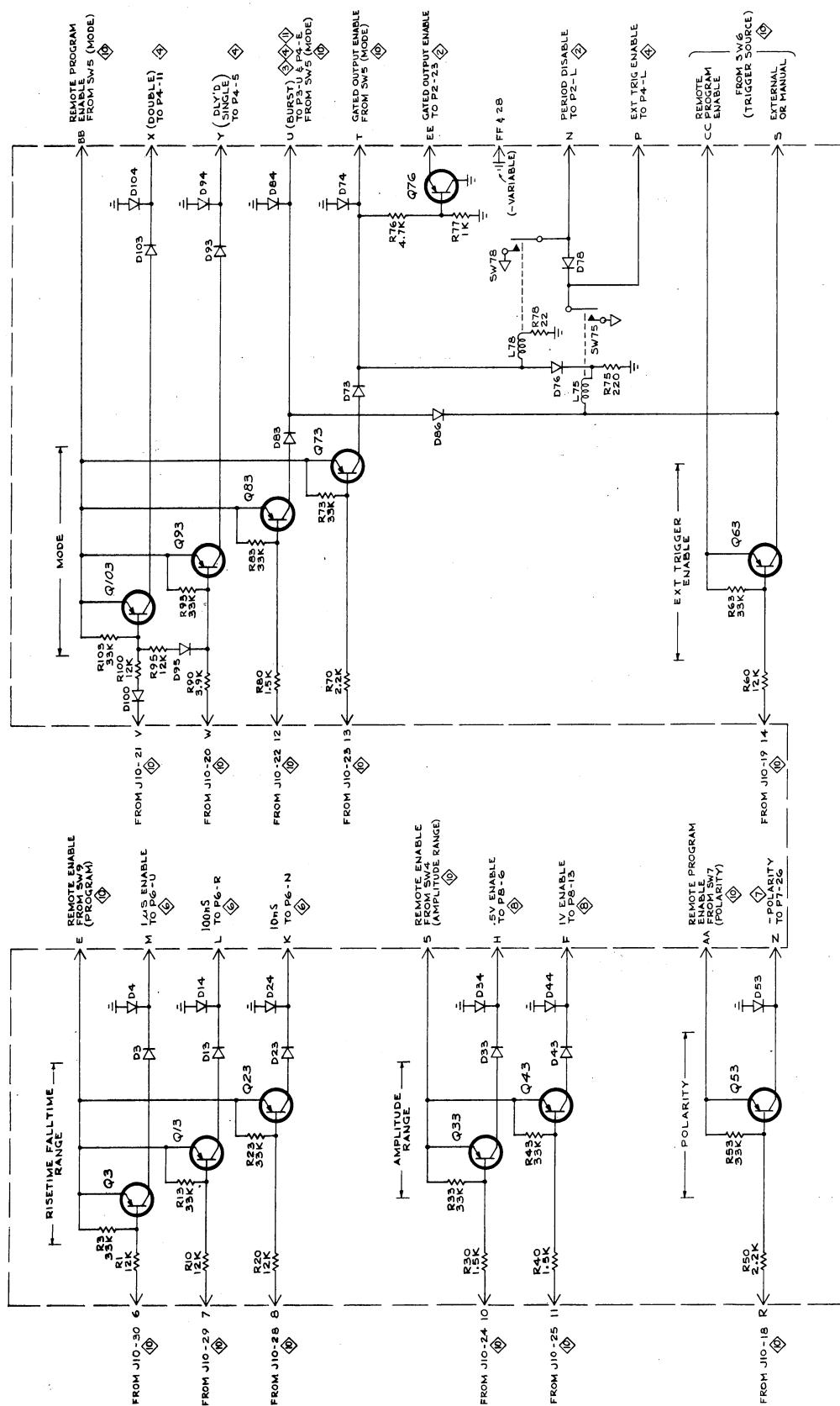
PARTIAL
OUTPUT AMP.
SERIES G
MODELS 1 & 2 ◇ 7



PARTIAL POWER SUPPLY 9
SERIES 1 MODEL 2 CARD
AND CHASSIS SN 1000-UP

C3/M12314/867



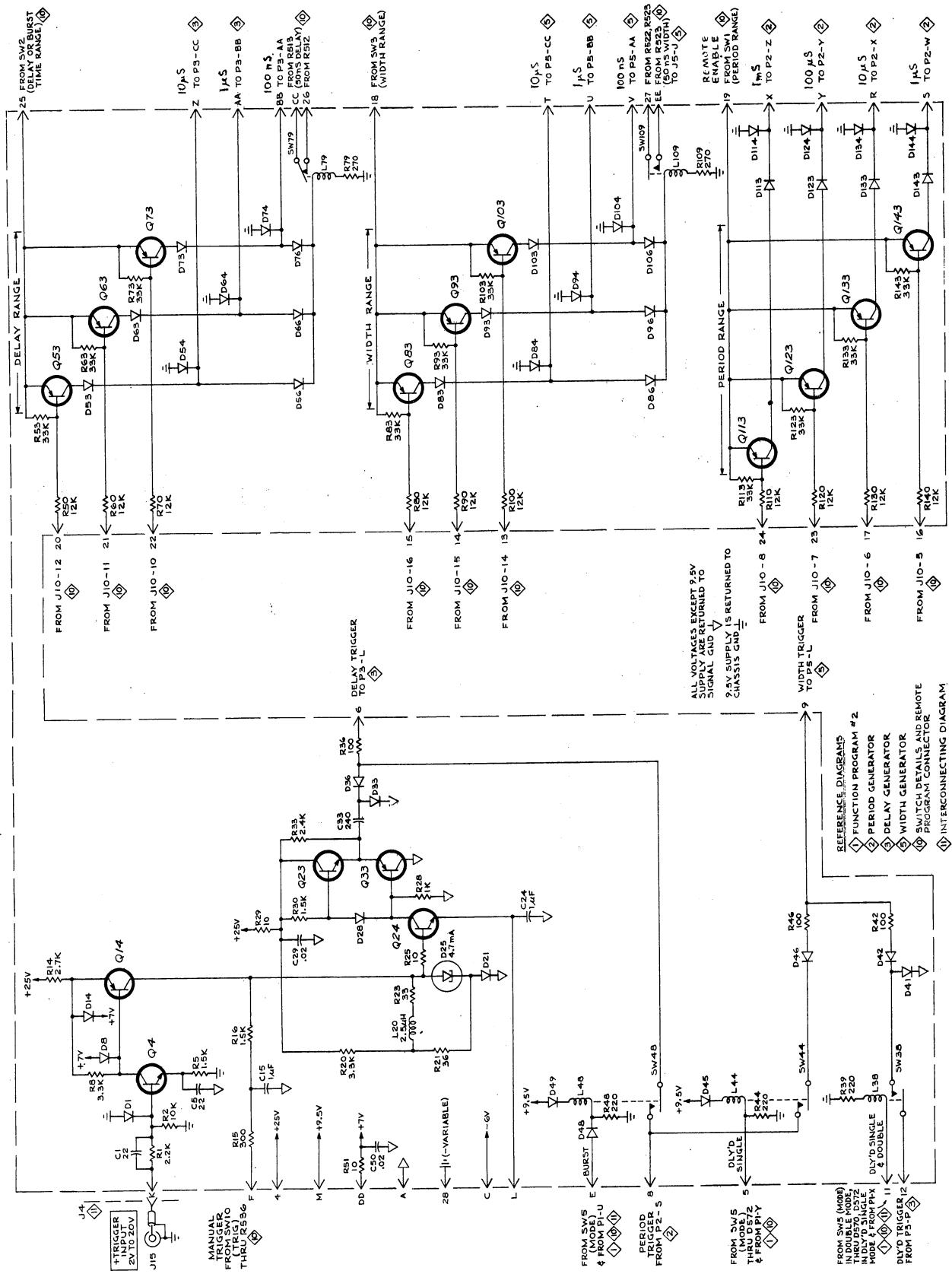


C3/M12314/867

SEE PARTS LIST FOR
SEMICONDUCTOR TYPES

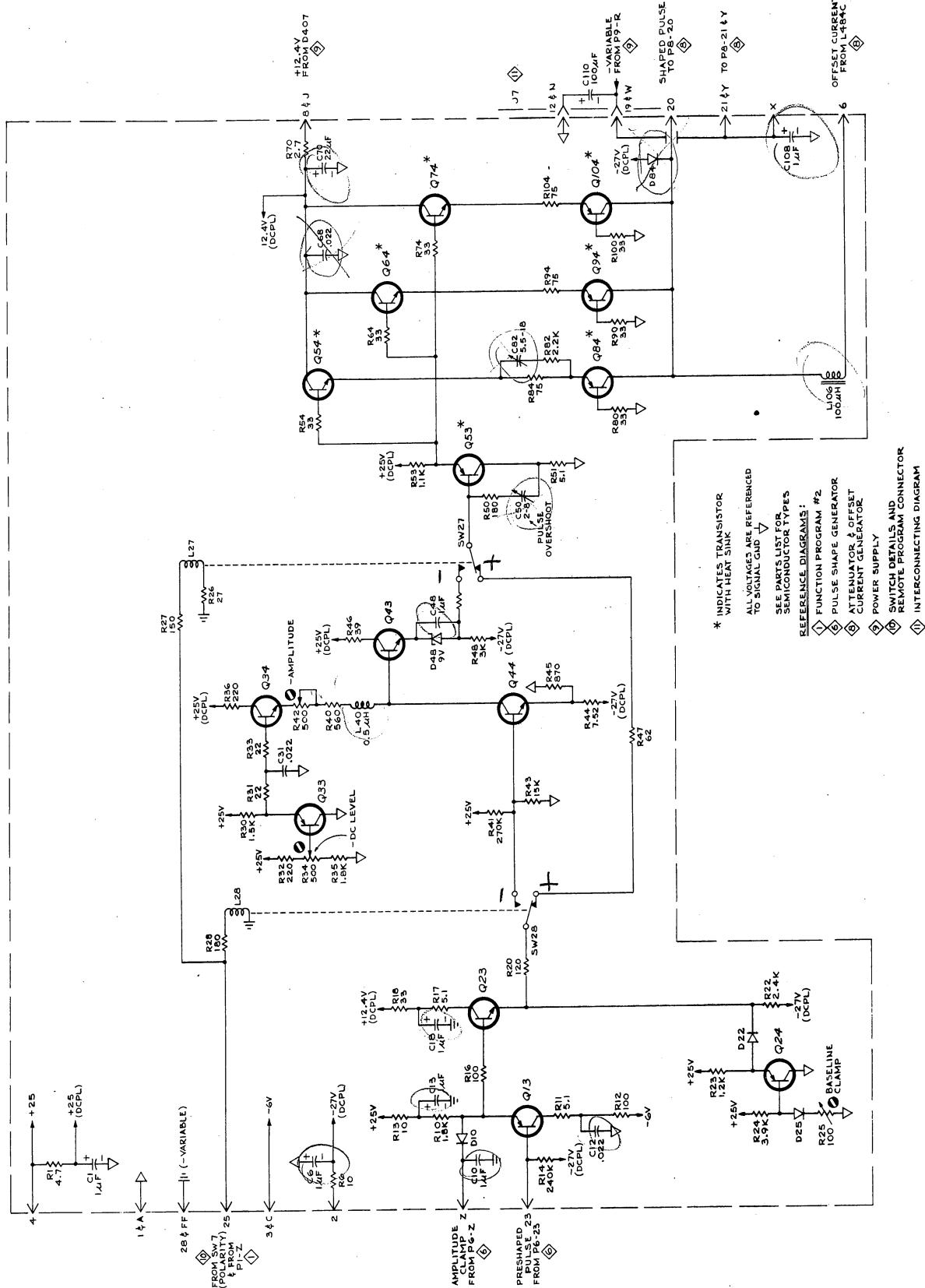
TYPE R116 PROGRAMMABLE PULSE GENERATOR

FUNCTION PROGRAM #2 MRH
SERIES K MODEL 1 167



TYPE R116 PROGRAMMABLE PULSE GENERATOR

FUNCTION PROGRAM #1 N27
SERIES L MODEL I



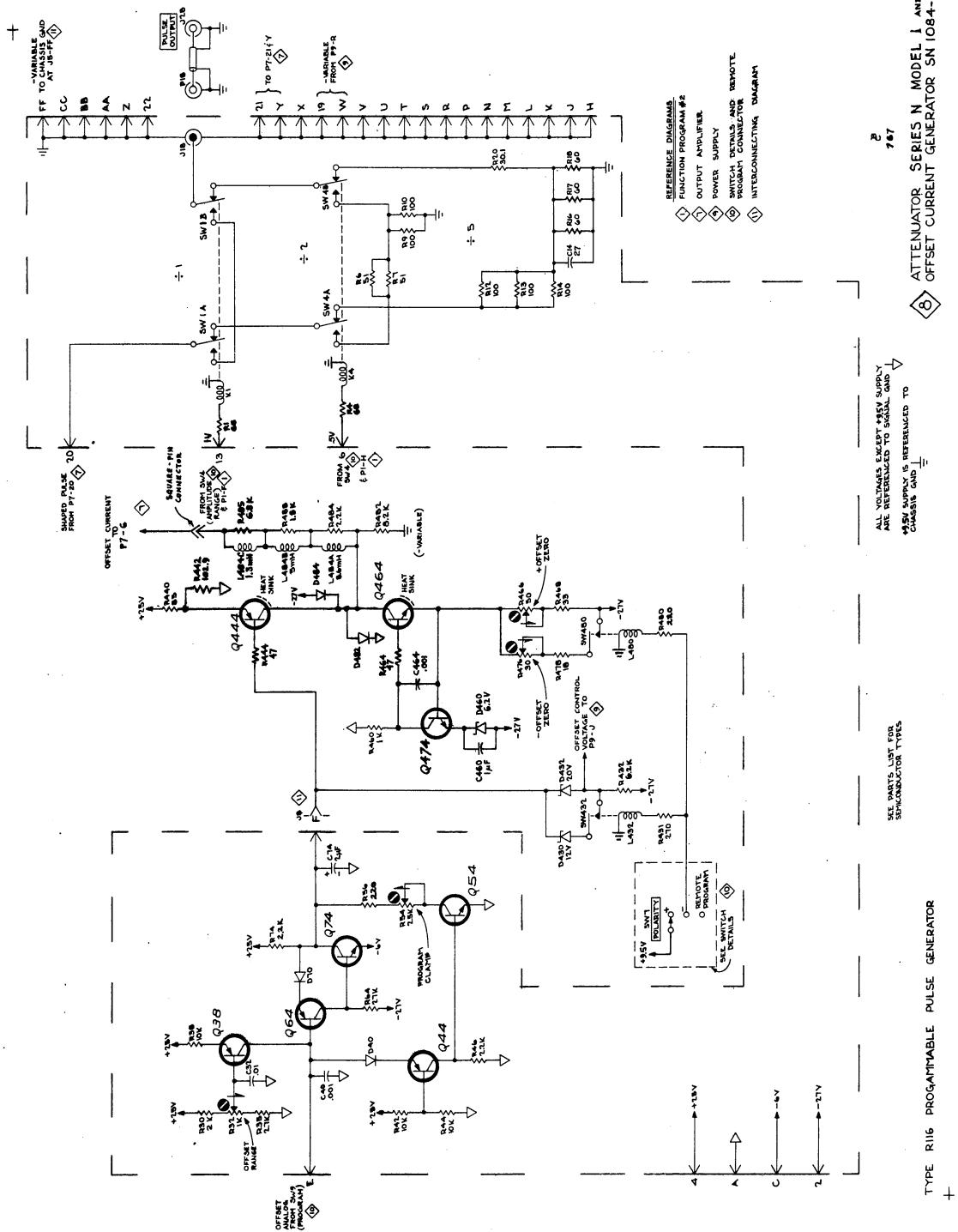
TYPE R116 PROGRAMMABLE PULSE GENERATOR

OUTPUT AMPLIFIER 7 MRH

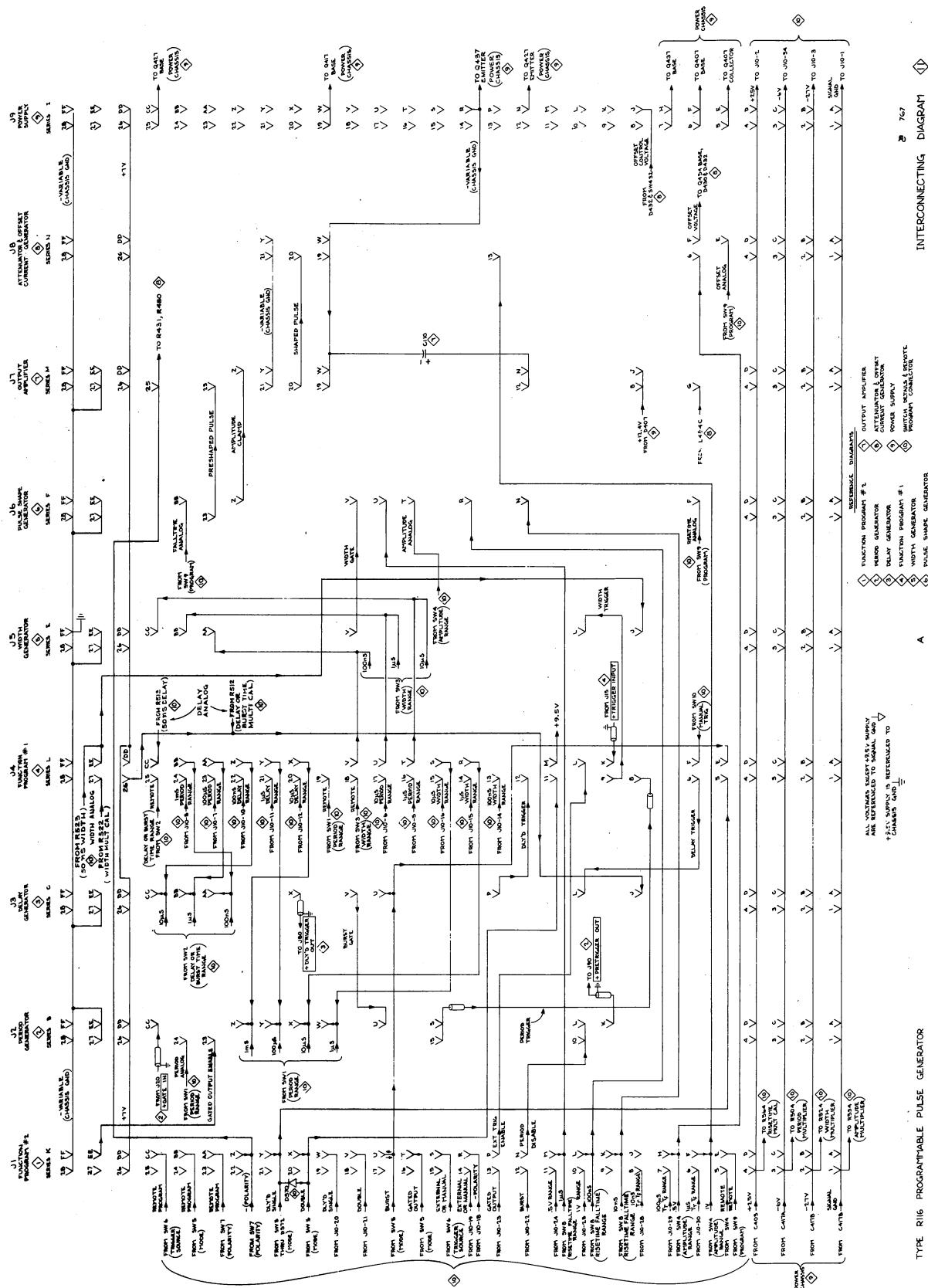
SERIES M MODEL I 767

- * INDICATES TRANSISTOR WITH HEAT SINK
- ALL VOLTAGES ARE REFERENCED TO SIGNAL GND
- SEE PARTS LIST FOR SEMICONDUCTOR TYPES
- REFERENCE DIAGRAMS:
- FUNCTION PROGRAM #2
- PULSE SHAPE GENERATOR
- ATTENUATOR & OFFSET CURRENT GENERATOR
- POWER SUPPLY
- SWITCH DETAILS AND REMOTE PROGRAM CONNECTOR
- INTERCONNECTING DIAGRAM

C3/M12314/867



C3/M12314/867



C3/M12314/867

ELECTRICAL PARTS LIST CORRECTION

REMOVE:

R536 315-0122-00 1.2 kΩ 1/4 W 5%

FUNCTION PROGRAM #2 CARD - SERIES K

ADD:

D75 152-0185-00 Silicon Replaceable by 1N3605 Model 2 - up

PERIOD GENERATOR CARD - SERIES B

CHANGE TO:

R92 301-0182-00 1.8 kΩ 1/2 W 5% Model 4 - up

R94 301-0471-00 470 Ω 1/2 W 5% Model 4 - up

FUNCTION PROGRAM #1 CARD - SERIES L

CHANGE TO:

C15 290-0175-00 10 μF EMT 35 V Model 2 - up

C29 283-0111-00 .1 μF Cer 50 V Model 2 - up

C50 290-0135-00 15 μF EMT 20 V Model 2 - up

R16 315-0392-00 3.9 kΩ 1/4 W 5% Model 2 - up

ADD:

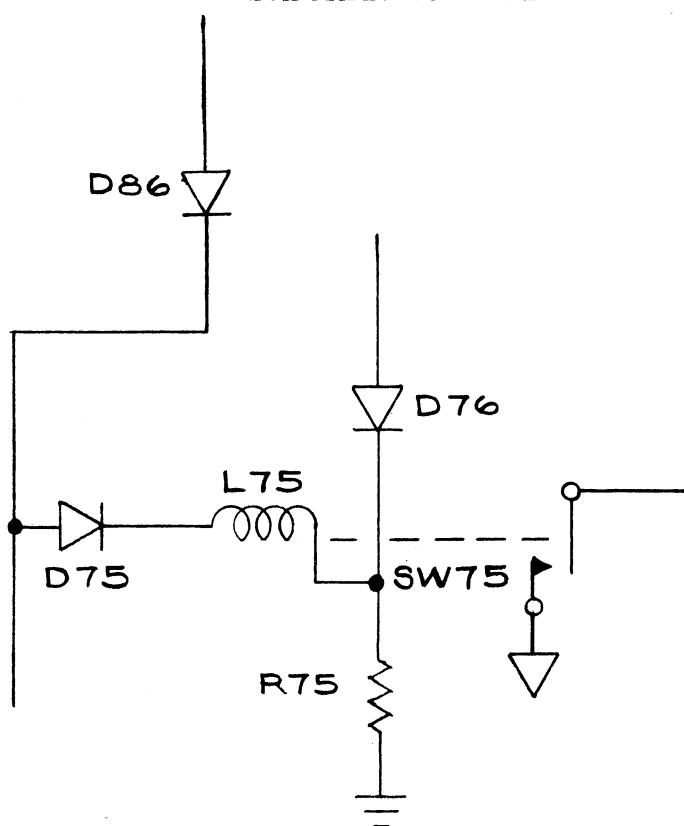
C2 283-0111-00 .1 μF Cer 50 V Model 2 - up

C19 281-0526-00 1.5 pF Cer 500 V Model 2 - up

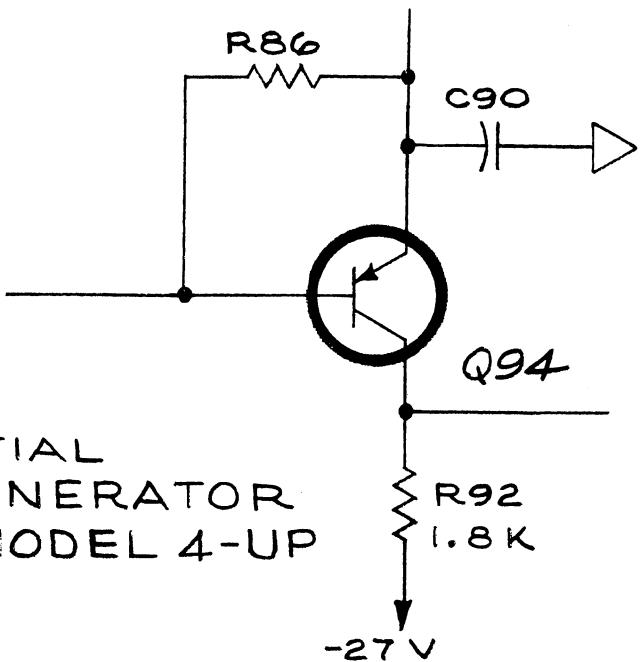
REMOVE:

C5 281-0511-00 22 pF Cer 500 V Model 2 - up

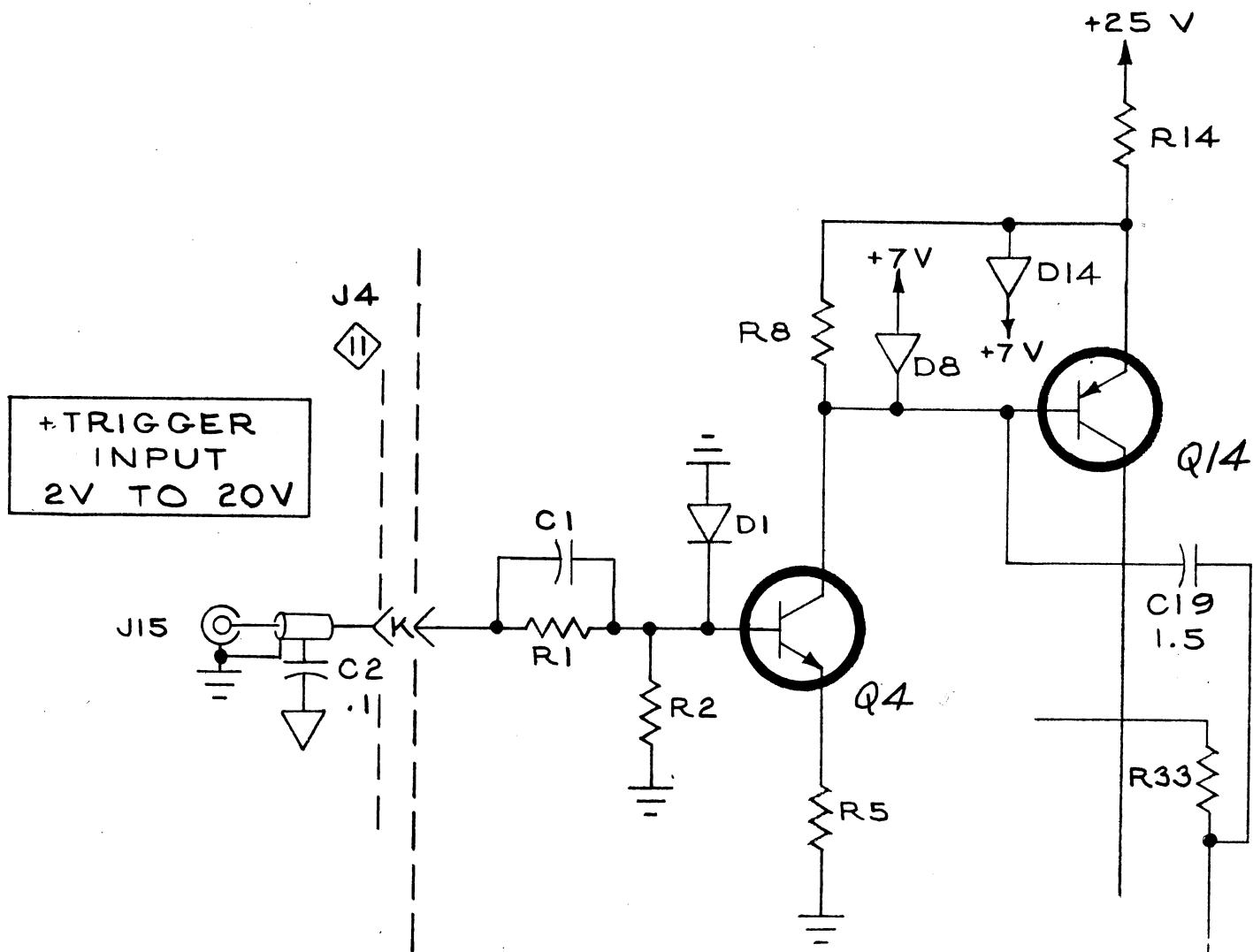
SCHEMATIC CORRECTIONS



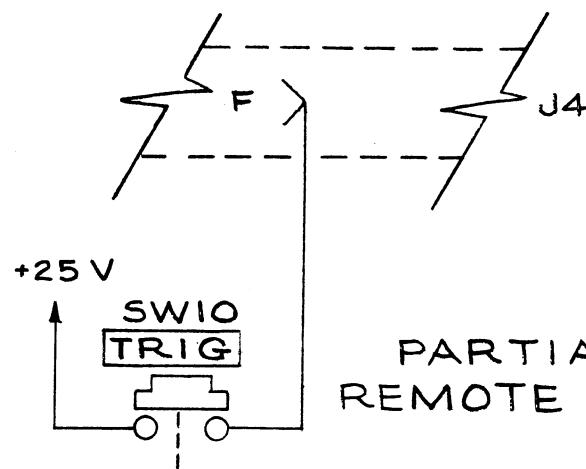
◇ PARTIAL
FUNCTION PROGRAM #2
SERIES K MODEL 2-UP
(REVISION TO M12314/867)



◇ PARTIAL
PERIOD GENERATOR
SERIES B MODEL 4-UP



PARTIAL
FUNCTION PROGRAM #1 ④
SERIES L MODEL 2-UP
(REVISION TO M12314/867)



PARTIAL SWITCH DETAILS AND
REMOTE PROGRAM CONNECTOR

⑩

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 R116

PARTS LIST CORRECTION

PERIOD GENERATOR CARD--Series B

CHANGE TO:

Q55	151-0108-00	Replaceable by 2N2501	Model 3 - up
Q74	151-0133-00	Selected from 2N3251	Model 3 - up

ATTENUATOR CARD--Series N

CHANGE TO:

R1	303-0510-00	51 Ω	1 W	5%	Model 2 - up
R4	303-0510-00	51 Ω	1 W	5%	Model 2 - up

M12,889/867

TYPE R116

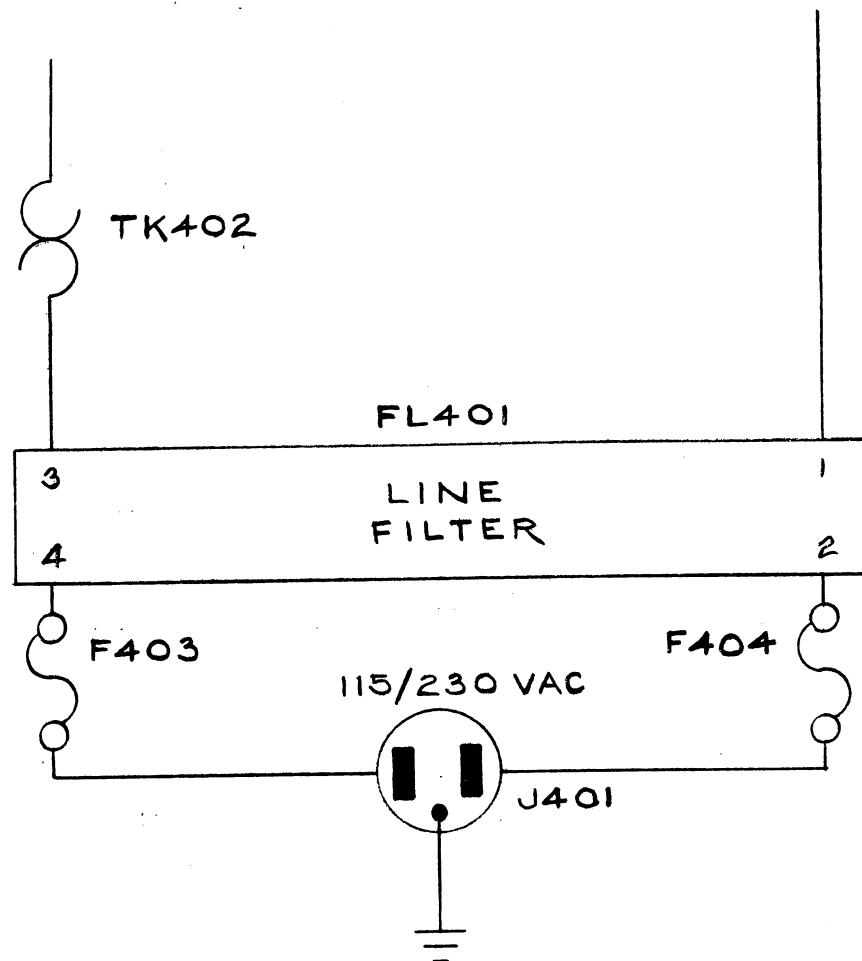
PARTS LIST CORRECTION

ADD:

F403 159-0053-00 5 A

F404 159-0053-00 5 A

SCHEMATIC CORRECTION



PARTIAL

POWER SUPPLY ◊

M12,981/967