

RADIO TEST EQUIPMENT
MICROWAVE TEST SETS
J68392A TRANSMITTER-RECEIVER TEST SET
MAINTENANCE
RF AND IF SWEEP CONTROL UNIT

This section provides the voltage measurements and waveforms required for troubleshooting the RF and IF sweep control unit. The normal operating adjustments and routine maintenance requirements for this unit are provided in Section 104-415-501. The circuit description of the RF and IF sweep control unit is provided in Section 104-415-100. For latest circuit information, refer to CD-50566-01 and the schematic diagram on SD-50566-01.

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CHART 1
31-HZ OSCILLATOR FREQUENCY AND SHAPE CIRCUIT

Note: This chart is to be used when testing RF and IF sweep control units containing wiring boards manufactured in accordance with ED-50557-30. For units containing wiring boards manufactured in accordance with ED-50557-30, G2, refer to Chart 2.

This chart presents the voltages which should be present at the base, emitter, and collector of each transistor used in the 31-Hz oscillator portion of the RF and IF sweep control unit. Fig. 1 is the schematic diagram for this circuit. A typical circuit layout and the waveforms which should be present at various test points are shown in Fig. 2.

CHART 1 (Cont)

APPARATUS:

1—KS-14510, List 1 Volt-Ohm-Milliammeter (VOM)

STEP	PROCEDURE																				
1	<p>Turn the 31 CPS SHAPE control fully counterclockwise. Measure the voltages at Q5, Q6, Q7, and Q8.</p> <p><i>Note:</i> All measurements are made between the designated circuit element and ground. The indications shown below are typical voltages.</p> <table border="1" data-bbox="511 768 1128 978"> <thead> <tr> <th></th> <th>Q5</th> <th>Q6</th> <th>Q7</th> <th>Q8</th> </tr> </thead> <tbody> <tr> <td>Emitter</td> <td>-2.2</td> <td>-2.4</td> <td>-19.9</td> <td>-13.4</td> </tr> <tr> <td>Base</td> <td>-2.3</td> <td>-2.5</td> <td>-20.0</td> <td>-15.4</td> </tr> <tr> <td>Collector</td> <td>-21.5</td> <td>-20.4</td> <td>-40.0</td> <td>0</td> </tr> </tbody> </table>		Q5	Q6	Q7	Q8	Emitter	-2.2	-2.4	-19.9	-13.4	Base	-2.3	-2.5	-20.0	-15.4	Collector	-21.5	-20.4	-40.0	0
	Q5	Q6	Q7	Q8																	
Emitter	-2.2	-2.4	-19.9	-13.4																	
Base	-2.3	-2.5	-20.0	-15.4																	
Collector	-21.5	-20.4	-40.0	0																	

CHART 2

31-HZ OSCILLATOR FREQUENCY AND GAIN CIRCUIT

Note: This chart is to be used when testing RF and IF sweep control units containing wiring boards manufactured in accordance with ED-50557-30, G2. For units containing wiring boards manufactured in accordance with ED-50557-30, refer to Chart 1.

This chart presents the voltages which should be present at the base, emitter, and collector of each transistor used in the 31-Hz oscillator portion of the RF and IF sweep control unit. Fig. 3 is the schematic diagram for this circuit. A typical circuit layout and the waveforms which should be present at various test points are shown in Fig. 4.

APPARATUS:

1—KS-14510, List 1 Volt-Ohm-Milliammeter (VOM)

CHART 2 (Cont)

STEP	PROCEDURE																												
1	<p>Turn the 31 CPS LEVEL control fully counterclockwise. Measure the voltages at Q19, Q20, Q21, Q22, Q23, and Q24.</p> <p><i>Note:</i> All measurements are made between the designated circuit element and ground. The indications recorded below are typical voltages.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th style="text-align: center;">Q19</th> <th style="text-align: center;">Q20</th> <th style="text-align: center;">Q21</th> <th style="text-align: center;">Q22</th> <th style="text-align: center;">Q23</th> <th style="text-align: center;">Q24</th> </tr> </thead> <tbody> <tr> <td>Emitter</td> <td style="text-align: center;">-13.0</td> <td style="text-align: center;">-6.0</td> <td style="text-align: center;">-13.5</td> <td style="text-align: center;">-8.2</td> <td style="text-align: center;">-36.0</td> <td style="text-align: center;">-18.5</td> </tr> <tr> <td>Base</td> <td style="text-align: center;">-12.0</td> <td style="text-align: center;">-5.2</td> <td style="text-align: center;">-12.2</td> <td style="text-align: center;">-8.4</td> <td style="text-align: center;">-35.0</td> <td style="text-align: center;">-19.0</td> </tr> <tr> <td>Collector</td> <td style="text-align: center;">-5.0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">-6.9</td> <td style="text-align: center;">0</td> <td style="text-align: center;">-17.5</td> <td style="text-align: center;">0</td> </tr> </tbody> </table>		Q19	Q20	Q21	Q22	Q23	Q24	Emitter	-13.0	-6.0	-13.5	-8.2	-36.0	-18.5	Base	-12.0	-5.2	-12.2	-8.4	-35.0	-19.0	Collector	-5.0	0	-6.9	0	-17.5	0
	Q19	Q20	Q21	Q22	Q23	Q24																							
Emitter	-13.0	-6.0	-13.5	-8.2	-36.0	-18.5																							
Base	-12.0	-5.2	-12.2	-8.4	-35.0	-19.0																							
Collector	-5.0	0	-6.9	0	-17.5	0																							

CHART 3

IF TRACE START AND TRACE STOP CONTROL CIRCUIT

This chart presents the voltages which should be present at the emitter, base, and collector of each transistor used in the IF trace start and stop control portion of the RF and IF sweep control unit. For units containing wiring boards manufactured in accordance with ED-50557-30, refer to the schematic in Fig. 1 and the circuit layout shown in Fig. 2. The waveforms shown in Fig. 2 should be used as a guide for troubleshooting this portion of the circuit. For units containing wiring boards manufactured in accordance with ED-50557-30, G2, refer to the schematic shown in Fig. 3 and the circuit layout shown in Fig. 4.

APPARATUS:

1—KS-14510, List 1 Volt-Ohm-Milliammeter (VOM)

STEP	PROCEDURE
1	<p>Set the FUNCTION switch to IF-IF and turn the IF TRACE START and IF TRACE STOP controls fully counterclockwise. Measure the voltages at Q9, Q10, Q11, Q13, Q14, Q15, Q16, Q17, and Q18.</p> <p><i>Note:</i> All measurements are made between the designated circuit element and ground. The indications shown below are typical voltages.</p>

CHART 3 (Cont)

STEP	PROCEDURE									
		Q9	Q10	Q11	Q13	Q14	Q15	Q16	Q17	Q18
	Collector	-13.4	-18.0	-18.0	-19.3	-13.3	-13.3	-16.1	-16.1	-19.3
	Base	-15.4	-18.1	0	-21.0	-17.0	-12.8	-18.0	-17.1	-18.6
	Emitter	0	-16.4	-10.5	-17.0	-12.3	-9.5	-10.4	-12.4	-8.0

CHART 4

IF MARKER GENERATOR CIRCUIT

This chart presents the voltages which should be present at the emitter, base, and collector of each transistor used in the variable and fixed IF marker generator circuits. A typical schematic of the circuit is shown in Fig. 5.

APPARATUS:

1—KS-14510, List 1 Volt-Ohm-Milliammeter (VOM)

STEP	PROCEDURE						
1	<p>Turn the IF MARKER FREQ control fully counterclockwise. Using the VOM, measure the voltages at Q1.</p> <p><i>Note:</i> All measurements are made between the designated circuit element and ground. The indications shown below are typical voltages.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td>Emitter</td> <td>-4.6</td> </tr> <tr> <td>Base</td> <td>-7.0</td> </tr> <tr> <td>Collector</td> <td>0</td> </tr> </tbody> </table>	Emitter	-4.6	Base	-7.0	Collector	0
Emitter	-4.6						
Base	-7.0						
Collector	0						

CHART 4 (Cont)

STEP	PROCEDURE																
2	<p>Turn the IF MARKER AMPLITUDE control fully counterclockwise. Measure the voltages at Q2, Q3, and Q4.</p> <p><i>Note:</i> All measurements are made between the designated circuit element and ground. The indications shown below are typical voltages.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th style="text-align: center;">Q2</th> <th style="text-align: center;">Q3</th> <th style="text-align: center;">Q4</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Emitter</td> <td style="text-align: center;">-14.9</td> <td style="text-align: center;">-0.68</td> <td style="text-align: center;">-0.5</td> </tr> <tr> <td style="text-align: center;">Base</td> <td style="text-align: center;">-14.1</td> <td style="text-align: center;">-0.8</td> <td style="text-align: center;">-0.6</td> </tr> <tr> <td style="text-align: center;">Collector</td> <td style="text-align: center;">-0.75</td> <td style="text-align: center;">-15.5</td> <td style="text-align: center;">-12.2</td> </tr> </tbody> </table>		Q2	Q3	Q4	Emitter	-14.9	-0.68	-0.5	Base	-14.1	-0.8	-0.6	Collector	-0.75	-15.5	-12.2
	Q2	Q3	Q4														
Emitter	-14.9	-0.68	-0.5														
Base	-14.1	-0.8	-0.6														
Collector	-0.75	-15.5	-12.2														

CHART 5

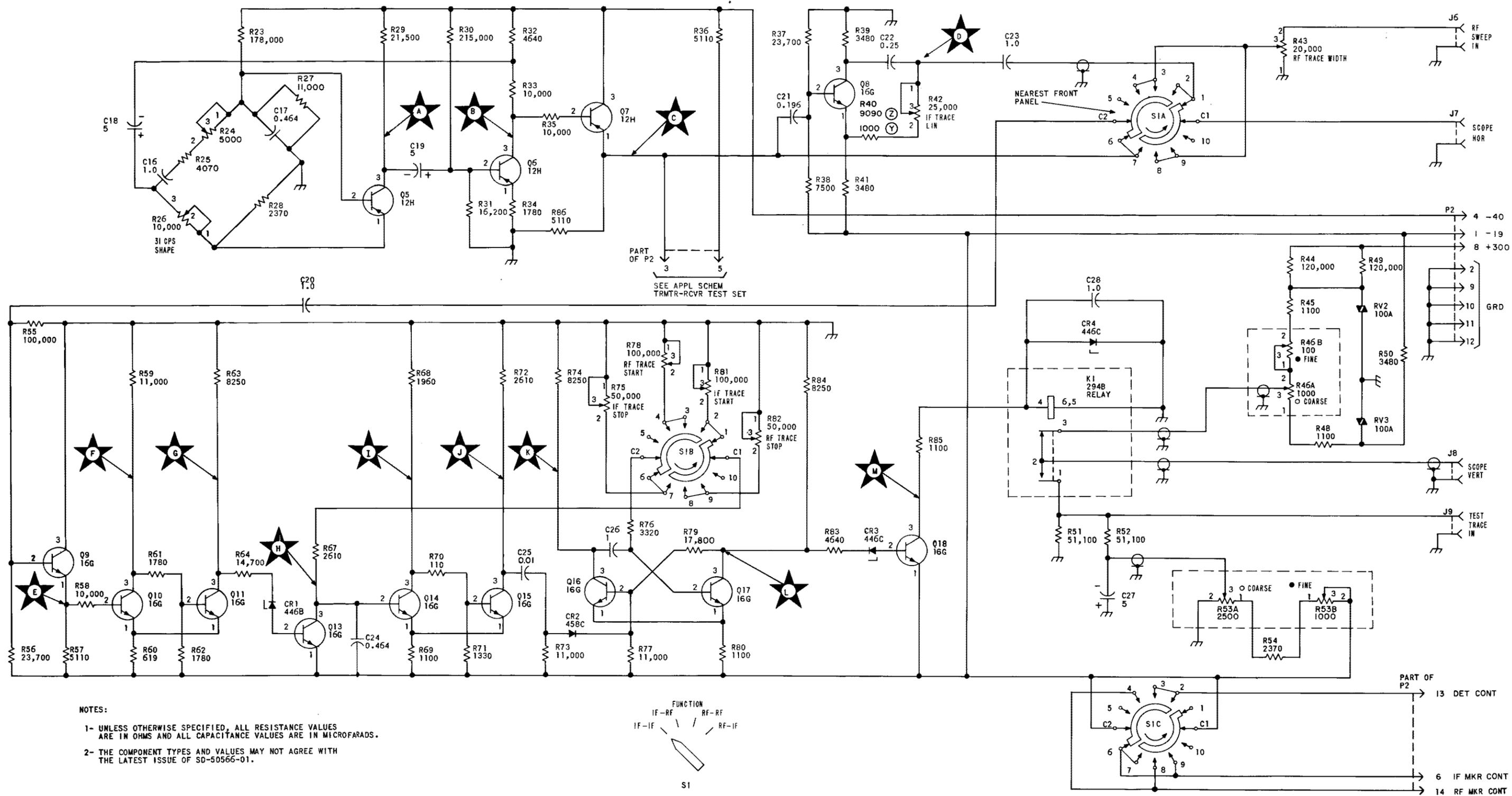
RF TRACE START, RF TRACE STOP, AND TRACE WIDTH CONTROL CIRCUIT

This chart presents the voltages which should be present at the emitter, base, and collector of each transistor used in the RF trace start, RF trace stop, and trace width control stages of the RF and IF sweep control unit. The schematic diagram of the circuit is shown in Fig. 1 and 3. For units containing wiring boards manufactured in accordance with ED-50557-30, the wiring diagram and waveforms shown in Fig. 2 should be used. For units containing wiring boards manufactured in accordance with ED-50557-30, G2, the wiring diagram and waveforms shown in Fig. 4 should be used.

APPARATUS:

1—KS-14510, List 1 Volt-Ohm-Milliammeter (VOM)

STEP	PROCEDURE
1	<p>Set the FUNCTION switch to RF-RF and turn the RF TRACE START and RF TRACE STOP controls fully counterclockwise. Measure the voltages at Q13, Q14, Q15, Q16, and Q17.</p> <p><i>Note:</i> All voltage measurements are made between the designated circuit element and ground. The indications shown below are typical voltages.</p>



NOTES:
 1- UNLESS OTHERWISE SPECIFIED, ALL RESISTANCE VALUES ARE IN OHMS AND ALL CAPACITANCE VALUES ARE IN MICROFARADS.
 2- THE COMPONENT TYPES AND VALUES MAY NOT AGREE WITH THE LATEST ISSUE OF SD-50566-01.

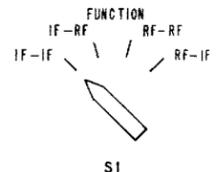


Fig. 1—Typical 31-Hz Oscillator, IF Trace Linearity, and Relay Drive Circuit of RF and IF Sweep Control Circuit (ED-50557-30)

COMPONENT DESIGNATION TABLE			
DESIG	CODE	VALUE	
RESISTORS			
R23	238A	178,000	OHMS
R25		4,070	
R27		11,000	
R28		2,370	
R29		21,500	
R30		215,000	
R31		16,200	
R32		4,640	
R33		10,000	
R34		1,780	
R35		10,000	
R36		5,110	
R37		23,700	
R38		7,500	
R39		3,480	
R40	Z OPT	9,090	
R41	238A	3,480	
R44	KS-13492, L-1	120,000	
R45	238A	1,100	
R48	238A	1,100	
R49	KS-13492, L-1	120,000	
R50	238A	3,480	
R55		100,000	
R56		23,700	
R57		5,110	
R58		10,000	
R59		11,000	
R40	Y OPT	1,000	
R60		619	
R61		1,780	
R62		1,780	
R63		8,250	
R64		14,700	
R67		2,610	
R68		1,960	
R69		1,100	
R70		110	
R71		1,330	
R72		2,610	
R73		11,000	
R74		8,250	
R76		3,320	
R77		11,000	
R79		17,800	
R80		1,100	
R83		4,640	
R84		8,250	
R85		1,100	
R86	238A	5,110	OHMS
CAPACITORS			
C16	590C	1.0	UF
C17	590C	0.464	
C18	601A	5	
C19	601A	5	
C20	596C	1.0	
C21	594C	0.196	
C22	542C	0.25	
C23	596C	1.0	
C24	596C	0.464	
C25	KS-19774, L-3	0.01	
C26	596C	1.0	UF
DIODES			
CR1	446B		
CR2	458C		
CR3	446C		
TRANSISTORS			
Q5	12H		
Q6	12H		
Q7	12H		
Q8	15G		
Q9			
Q10			
Q11			
Q13			
Q14			
Q15			
Q16			
Q17			
Q18	15G		
VARIABLES			
RV2	100A		
RV3	100A		

DATUM POINT C (FAR SIDE)

DATUM POINT A (FAR SIDE)

DATUM POINT B (FAR SIDE)

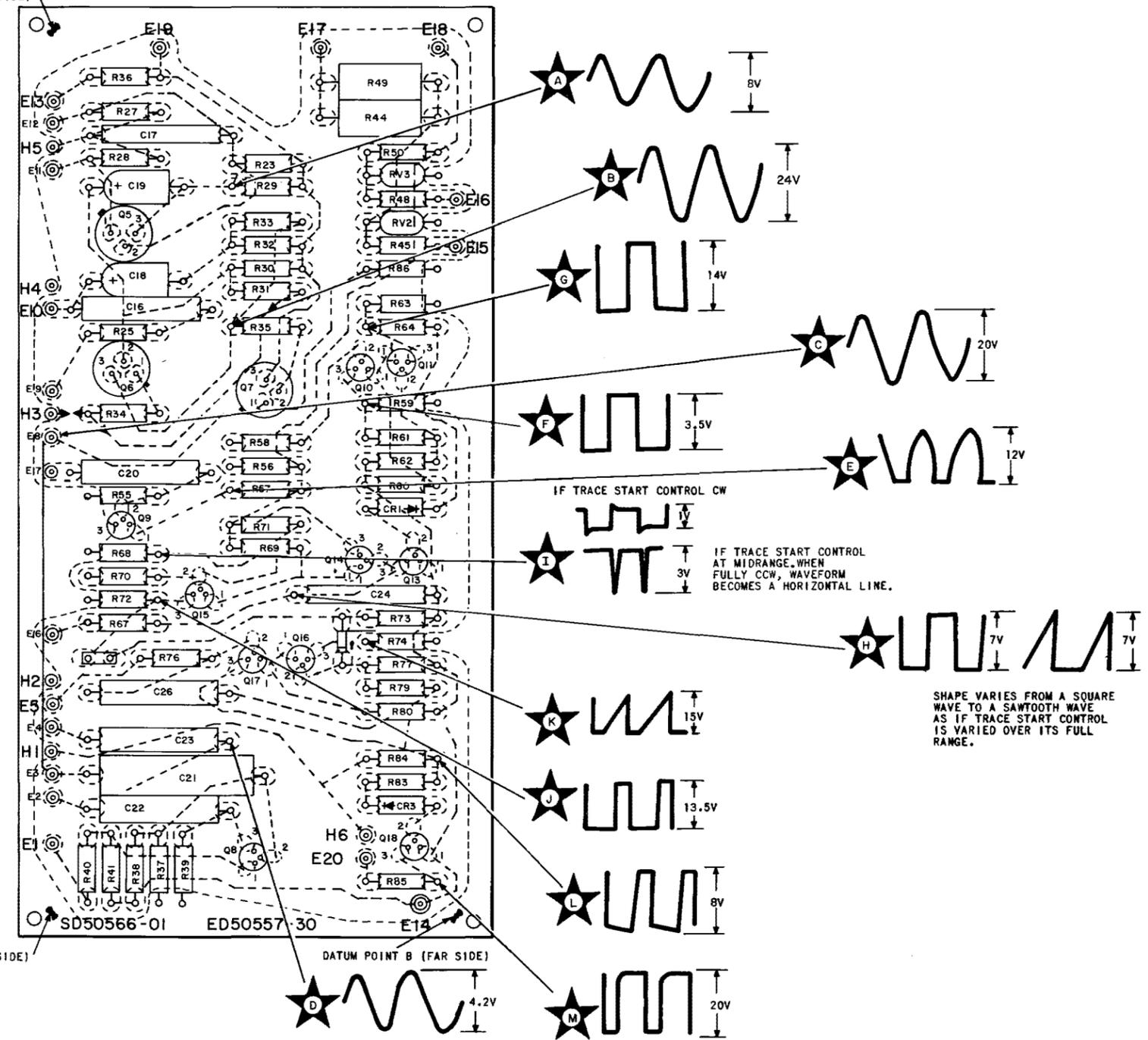
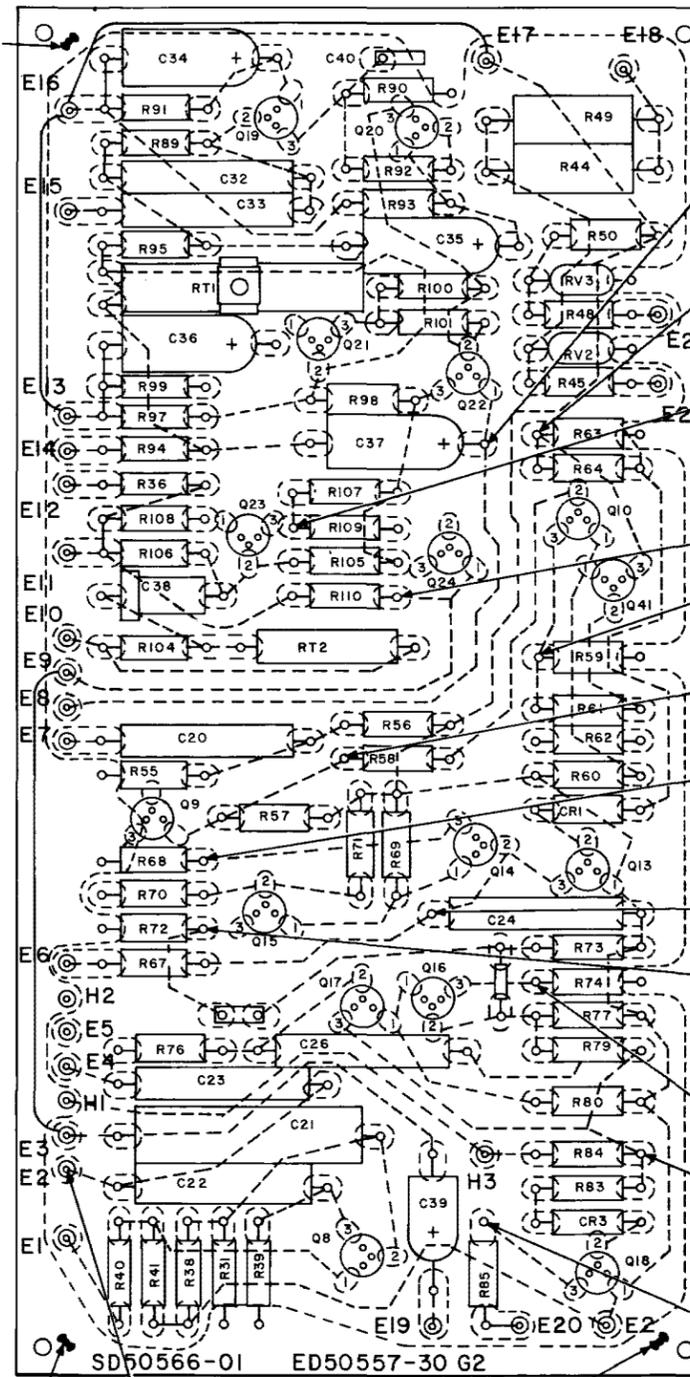


Fig. 2—Typical RF and IF Sweep Control Circuit Layout and Waveforms for Circuits Using ED-50557-30 Circuit Boards

COMPONENT DESIGNATION TABLE			
DESIG	CODE	VALUE	
RESISTORS			
R36	238A	5,110	OHMS
R37		23,700	
R38		7,500	
R39		3,480	
R40		3,010	
R41	238A	3,480	
R44	KS-13492, L-1	120,000	
R45	238A	1,100	
R48	238A	1,100	
R49	KS-13492, L-1	120,000	
R50	238A	3,480	
R55		100,000	
R56		23,700	
R57		5,110	
R58		10,000	
R59		11,000	
R60		619	
R61		1,780	
R62		1,780	
R63		8,250	
R64		14,700	
R67		2,610	
R68		1,950	
R69		1,100	
R70		110	
R71		1,330	
R72		2,610	
R73		11,000	
R74		8,250	
R76		3,320	
R77		11,000	
R79		17,800	
R80		1,100	
R83		4,640	
R84		8,250	
R85		1,100	
R89		11,000	
R90		4,640	
R91		4,640	
R92		10,000	
R93		4,640	
R94		7,500	
R95		825	
R97		23,700	
R98		48,700	
R99		4,640	
R100		6,190	
R101		10,000	
R104		7,500	
R105		100,000	
R106		8,250	
R107		14,700	
R108		1,780	
R109		10,000	
R110	238A	2,370	
CAPACITORS			
C20	596C	1	UF
C21	594C	0.196	
C22	542C	0.25	
C23	596C	1	
C24	596C	0.464	
C25	KS-19774, L-3	0.01	
C26	596C	1	
C32	596C	0.511	
C33	596C	0.511	
C34	602A	40	
C35		40	
C36		40	
C37	602A	40	
C38	KS-14337	4	
C39	601A	5	
C40	KS-19774, L-3	0.01	UF
DIODES			
CR1	446B		
CR2	458C		
CR3	446C		
THERMISTORS			
RT1	378		
RT2	9A		
TRANSISTORS			
Q8	16G		
Q9			
Q10			
Q11			
Q13			
Q14			
Q15			
Q16			
Q17			
Q18			
Q19			
Q20			
Q21			
Q22			
Q23			
Q24	16G		
VARIABLES			
RV2	100A		
RV3	100A		

DATUM POINT C (FAR SIDE)



DATUM POINT A (FAR SIDE)

DATUM POINT B (FAR SIDE)

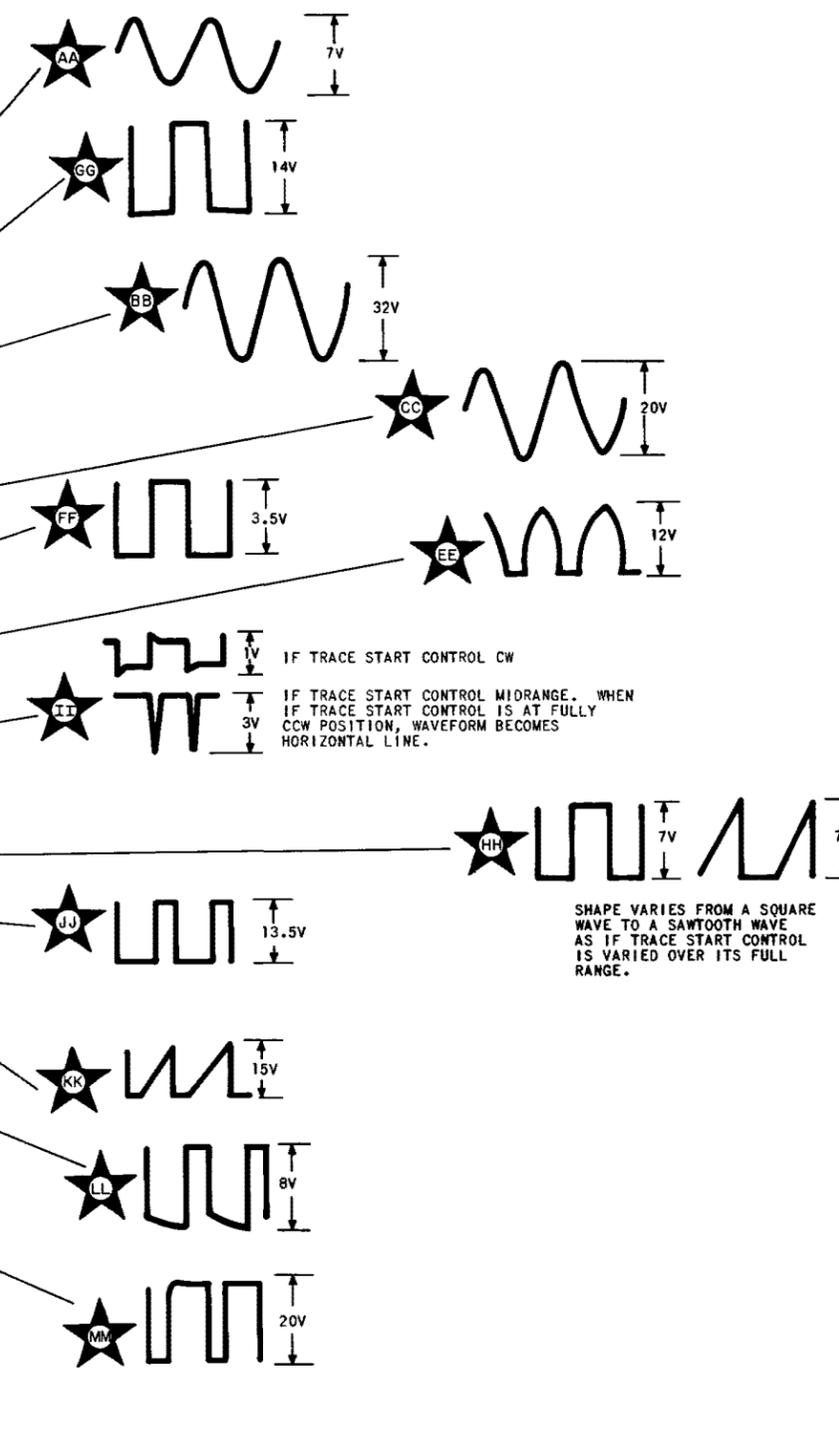
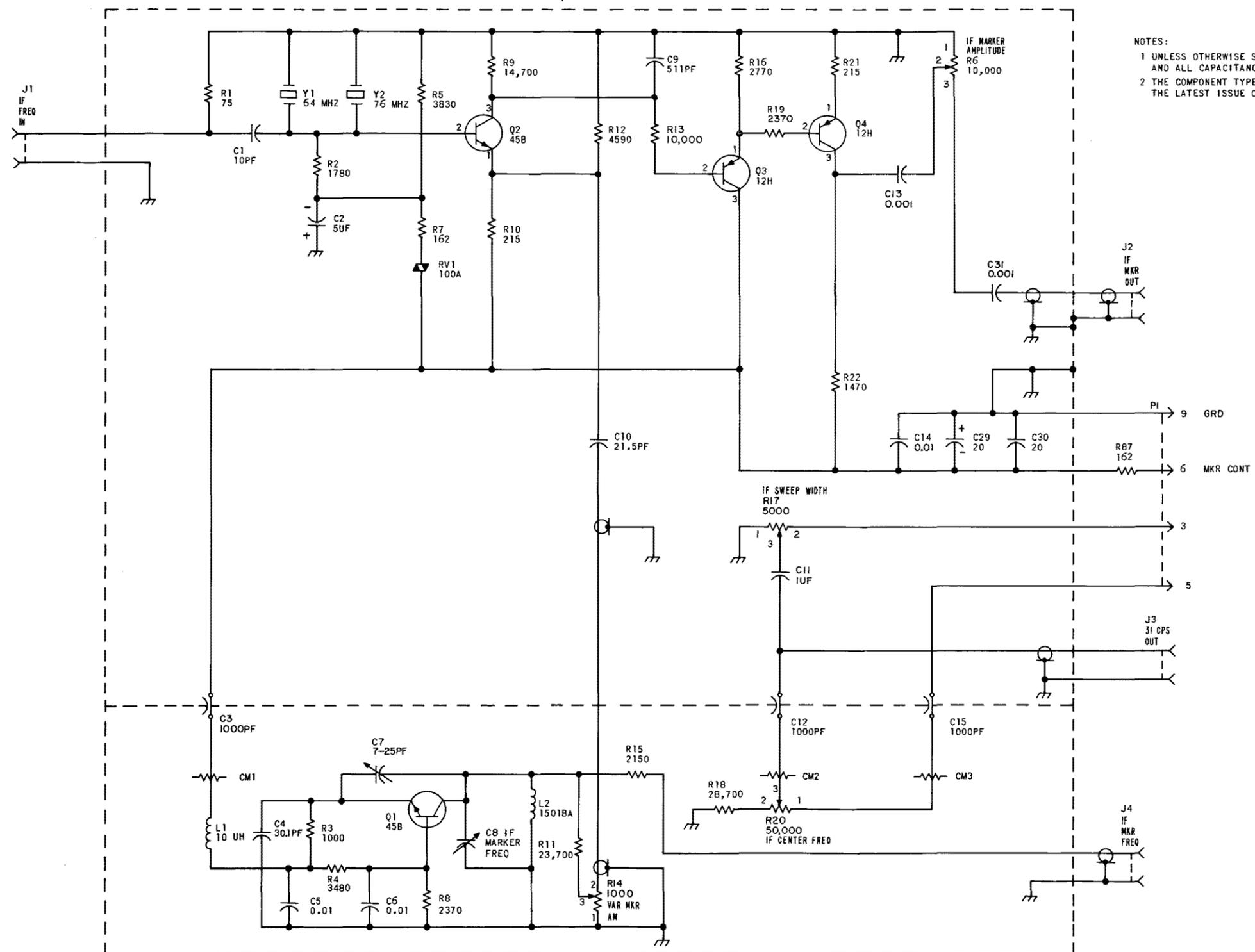


Fig. 4—Typical RF and IF Sweep Control Circuit Layout and Waveforms for Circuits Using ED-50557-30, G2 Circuit Boards



NOTES:
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SEE APPL SCHEM TRMTR-RCVR TEST SET

Fig. 5—Typical Marker Circuit of RF and IF Sweep Control