



PHOTOFACT[®] with

CIRCUITRACE[®]

For Supplier Address See PHOTOFACT Index

NOTE

ONLY THOSE PERSONS PROPERLY LICENSED ARE PERMITTED TO MAKE REPAIRS OR ADJUSTMENTS WHICH MAY RESULT IN ILLEGAL OPERATION. (REFER TO FCC RULES AND REGULATIONS PART 95, SUBPARTS C & D.)

The frequency of the transmitter should be checked periodically with a secondary frequency standard to insure proper and legal operation.

Best results will be obtained when adjusting the final RF output circuit if the antenna normally used is connected and the chassis is as nearly in the cabinet as possible.

Connect either 50-ohm dummy load or the normally used antenna system.



MODEL 13-893

ALIGNMENT INSTRUCTIONS

Suggested Alignment Tools:

ALL Tuneable Transformers and Coils

ALL Trimmer Caps

GC ELECTRONICS

#9440

#8290, 8868, 9087

MIDLAND MODEL 13-893

SYNTHESIZER

INDICATOR	CHANNEL	ADJUST	FREQUENCY	REMARKS
Frequency Counter	Any	CT7	7.8025MHz +5 -0Hz	Receiver in USB mode. Connect counter between TP6 and TP7.
RF Voltmeter	Any	T19		Receiver in USB mode. Connect voltmeter between TP6 and TP7. Adjust for maximum.
Frequency Counter	1	CT1	8.159MHz 8.1615MHz	Receiver in USB mode. Connect counter between TP4 and ground. Adjust for first frequency listed for each channel. With receiver in AM mode, check for second frequency listed. Repeat adjustment of first frequency if necessary
	5	CT2	8.209MHz 8.2115MHz	
	9	CT3	8.259MHz 8.2615MHz	
	13	CT4	8.309MHz 8.3115MHz	
	17	CT5	8.359MHz 8.3615MHz	
	21	CT6	8.409MHz 8.4115MHz	
	1	VR6	34.7675MHz	
	2		34.7775MHz	
	3		34.7875MHz	
	4		34.8075MHz	
				Receiver in USB mode. Connect counter between TP5 and ground. Set VR5 and VR4 to mid-range. Adjust VR6 for correct frequency on Channel 1. Check other channels for listed frequency, repeat adjustment on Channel 1 if necessary.

HOWARD W. SAMS & CO., INC. Indianapolis, Indiana 46206

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5CZ228

SYNTHESIZER(cont)

INDICATOR	CHANNEL	ADJUST	FREQUENCY	REMARKS
Frequency Counter	1		19.1625MHz	Receiver in LSB mode. Same as adjustment for VR6 above to check correct frequency.
	2		19.1725MHz	
	3		19.1825MHz	
	4		19.2025MHz	
RF Voltmeter	15	T14,T15, T16,T17, T18		Receiver to LSB mode. Voltmeter between TP5 and ground. Adjust for maximum.
	15	T7,T8,T9, T10,T11, T12,T13		Receiver to USB mode. Voltmeter between TP5 to ground. Adjust for maximum.

RECEIVER

Connect an AC VTVM or AF Wattmeter across speaker voice coil.
Adjustments made with 14-volt DC input.
Adjust volume control to obtain suitable reading.

SIGNAL GENERATOR	GEN FREQ	CHANNEL	ADJUST	REMARKS
High side thru .01uF to antenna jack, low side to ground.	27.115MHz, 1000Hz @ 30% modulation, output 0.5uV	13	T6,T5, T4,T3, T21,T1	Set mode switch to USB. Set clarifier to mid-range. Set NB to off. Set RF gain maximum clockwise. Adjust for maximum.

RECEIVER ADJUSTMENTS

Connect an AC VTVM or AF Wattmeter across speaker voice coil.
These adjustments made with 14-volt DC input.
Adjust volume control to obtain a suitable reading.

SIGNAL GENERATOR	GEN FREQ	CHANNEL	ADJUST	REMARKS
AGC High side thru .01uF to antenna jack, low side to ground.	27.115MHz, 1000Hz @ 30% modulation, output 50,000uV.	13	VR7	Set mode switch to USB. Adjust volume control to obtain 0 db. Decrease generator to 50uV. Adjust so that signal does not drop more than 10 db.
RF GAIN RANGE High side thru .01uF to antenna jack, low side to ground.	27.115MHz, 1000Hz, @ 30% modulation, output 0.3uV.	13	VR1	Set RF gain maximum clockwise. Set volume control for 0 db output. Disconnect generator. Adjust so that output drops 10 db or more.
SQUELCH RANGE High side thru .01uF to antenna jack, low side to ground.	27.115MHz, 1000Hz @ 30% modulation, output 1000uV.	13	VR8	Set squelch control fully clockwise. Adjust so that squelch just breaks.

RECEIVER ADJUSTMENTS(cont)

SIGNAL GENERATOR	GEN FREQ	CHANNEL	ADJUST	REMARKS
"S" METER High side thru .01uF to antenna Jack, low side to ground.	27.115MHz, 1000Hz @ 30% Modulation, output 100uV.	13	VR3	Set mode switch to USB. Adjust for "S9" on "S" meter.

TRANSMITTER

Connect an RF Wattmeter or 50-ohm, 25-watt dummy load to antenna connector.
Adjustments made with 14-volt DC input.

AM

INDICATOR	ADJUST	REMARKS
TVI TRAP TV (Ch. 2)	L5	Mode switch to AM. Key transmitter. Adjust for MINIMUM interference on TV.
FINAL INPUT POWER Connect 0-1500 DC milliammeter between L9 and L12.	L8	Adjust for 5 watts (maximum).

TRANSMITTER

Connect an RF Wattmeter or 50-ohm, 25-watt dummy load to antenna connector.
Adjustments made with 14-volt DC input.

SSB

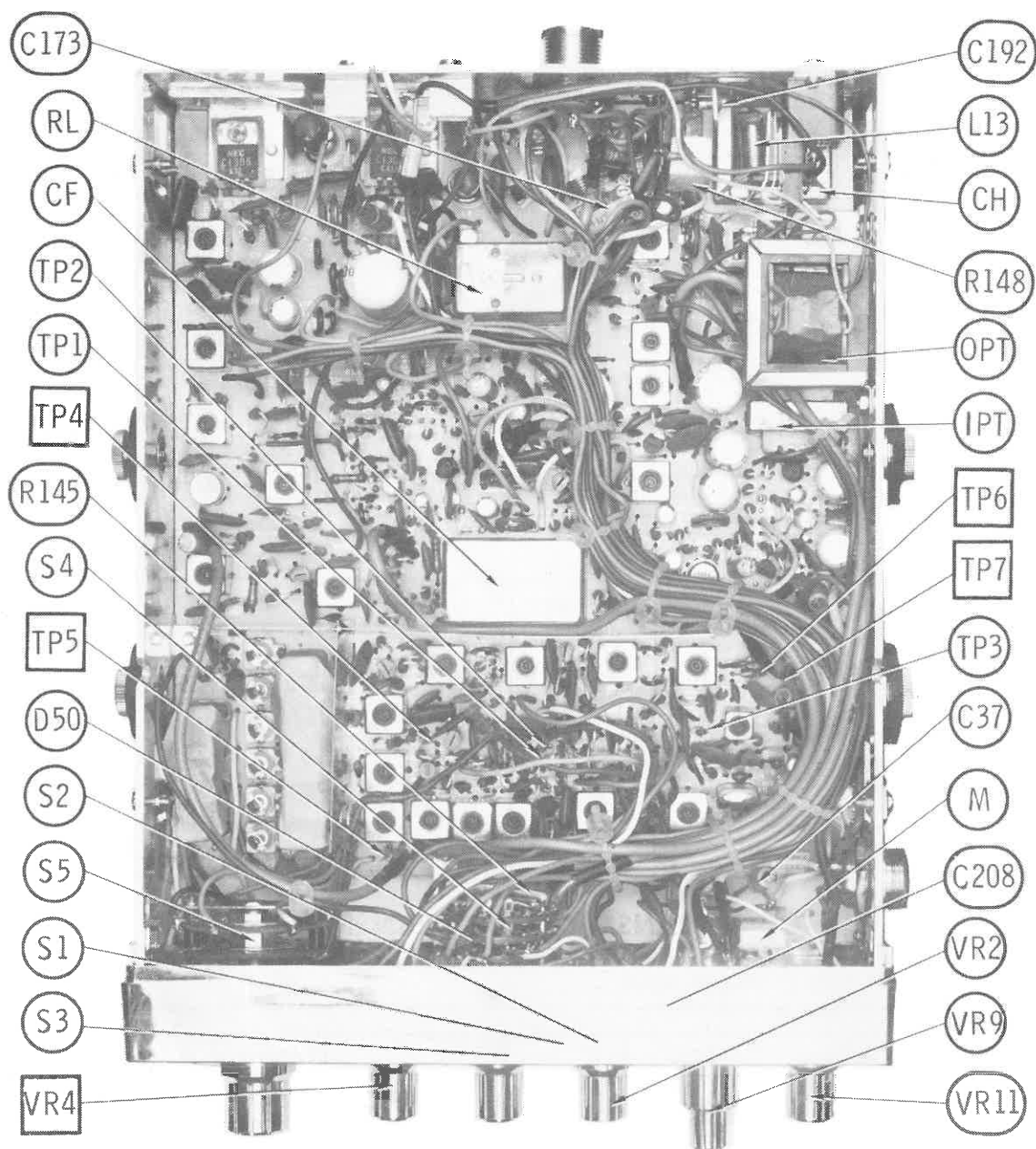
INDICATOR	ADJUST	REMARKS
CARRIER BALANCE Connect oscilloscope to antenna jack.	VR10	Short mic input. Set mode switch to LSB or USB. Key transmitter and adjust for MINIMUM on scope.
FINAL OUTPUT POWER RF Wattmeter	VR14	Inject a 4mV two-tone generator to mic input. Key transmitter. Adjust for less than 4-watts P.E.P.

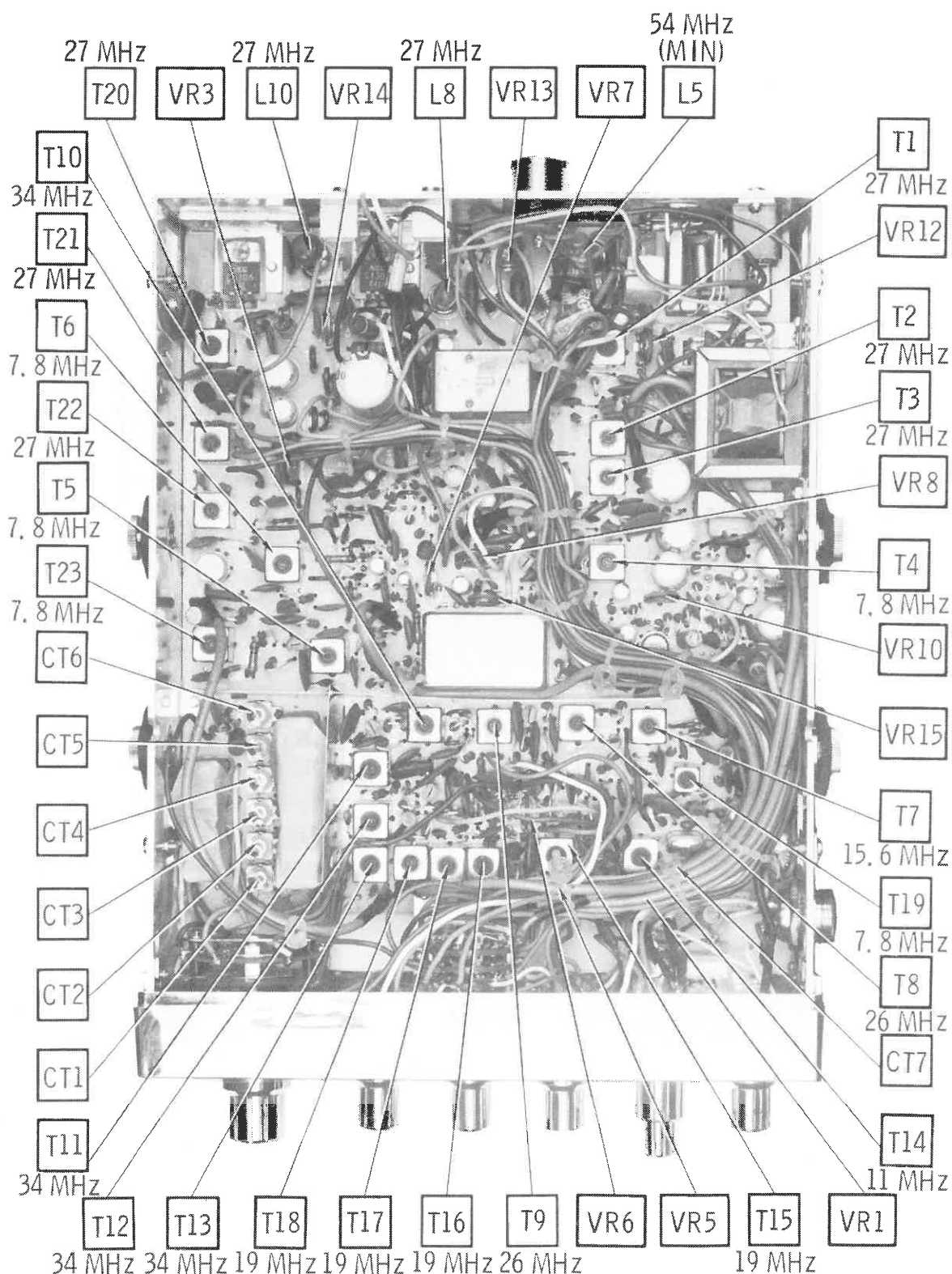
TRANSMITTER ADJUSTMENTS

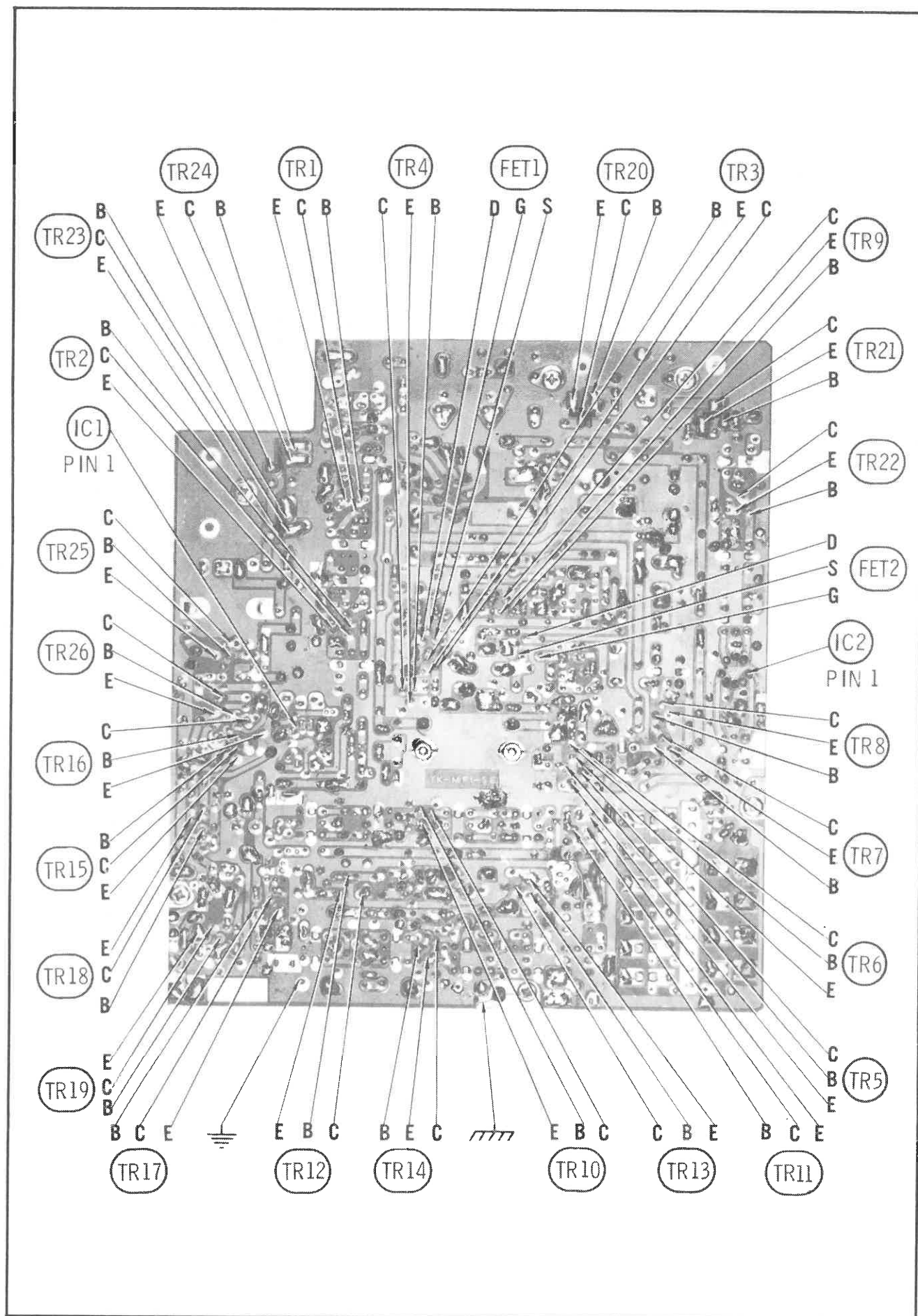
Connect an RF Wattmeter or 50-ohm, 25-watt dummy load to antenna connector.
Adjustments made with 14-volt DC input.

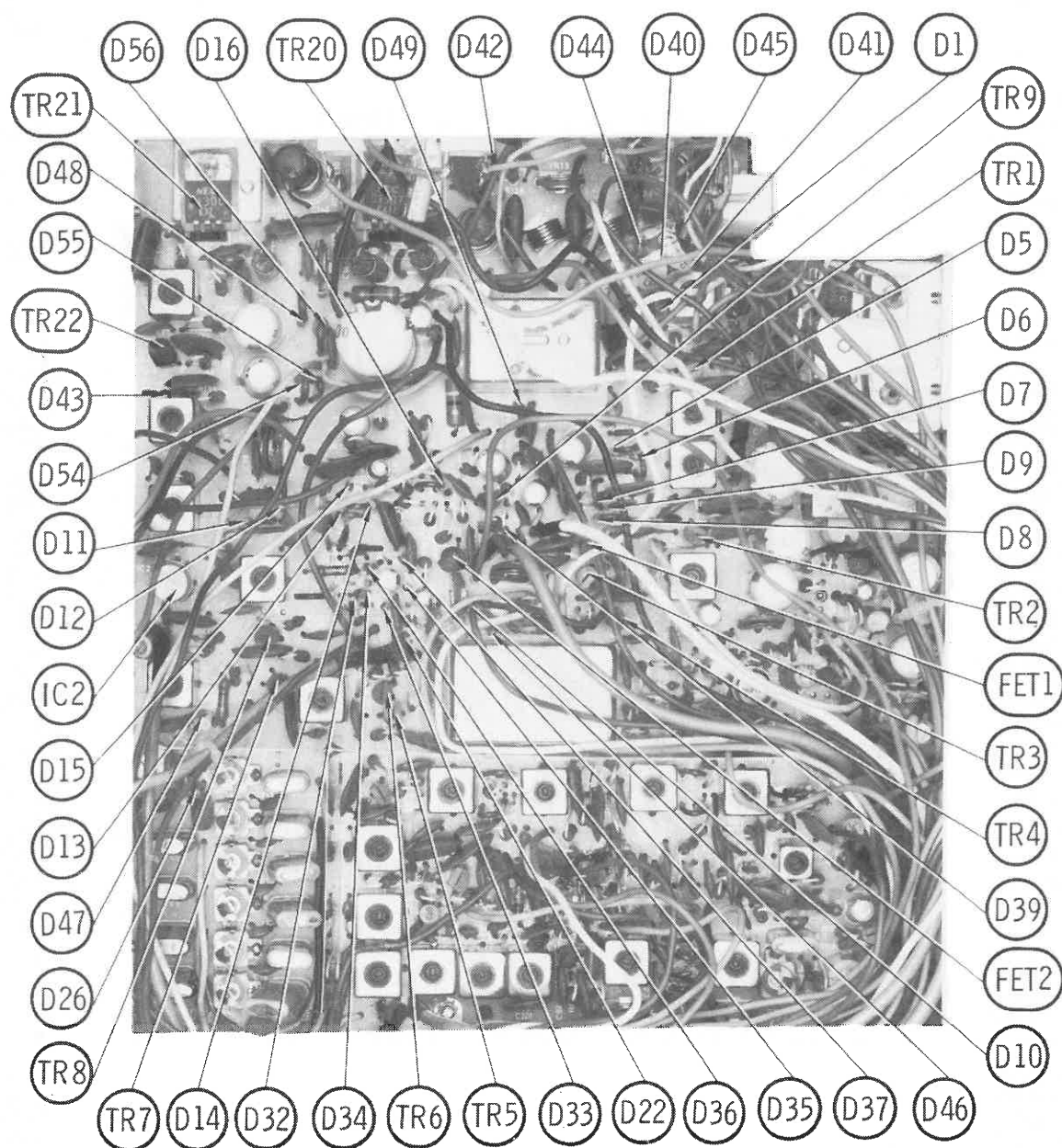
INDICATOR	ADJUST	REMARKS
ALC RF Wattmeter	VR15	Set mode switch to LSB. Inject a 1000Hz 50mV audio signal at mic input. Key transmitter. Adjust for 12.5 watts.
AMC Modulation Meter connect to antenna jack.	VR12	Set mode switch to AM. Inject a 1000Hz 40mV audio signal at mic input. Key transmitter. Adjust for 80% modulation maximum.
RF PANEL METER RF Wattmeter	VR13	Set mode switch to AM. Key transmitter. Adjust so that panel RF meter agrees with RF wattmeter.

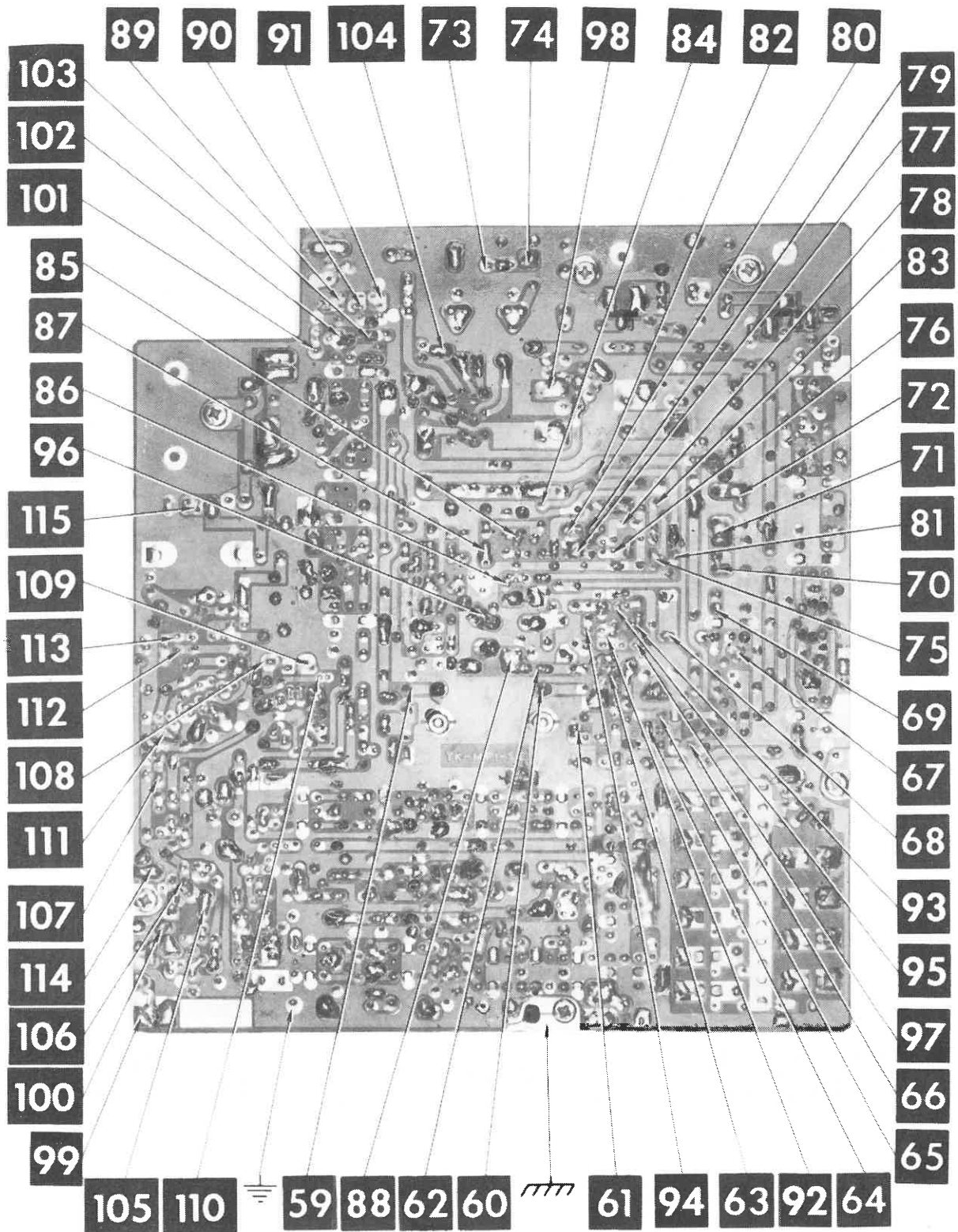
MIDLAND MODEL 13-893



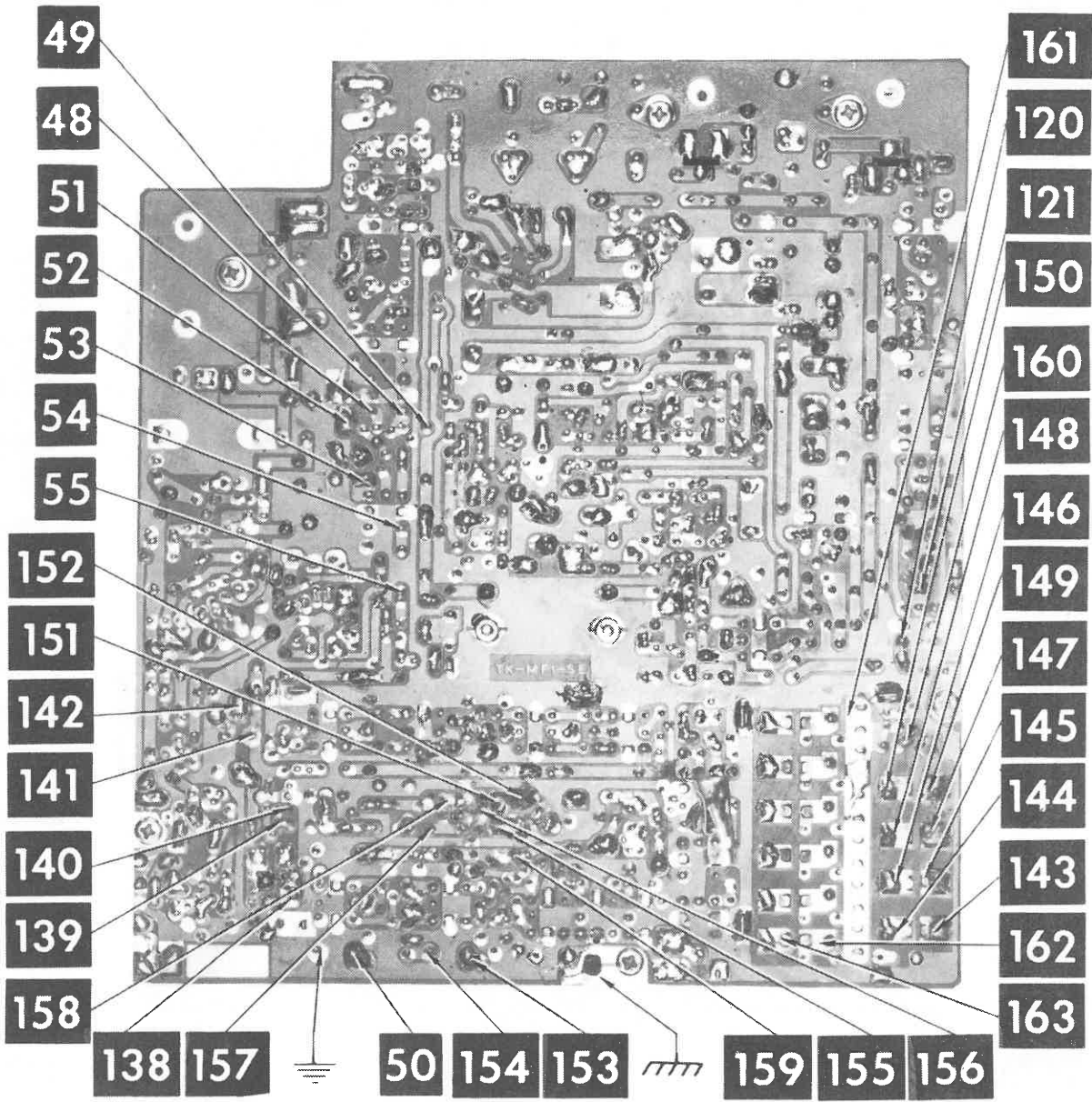


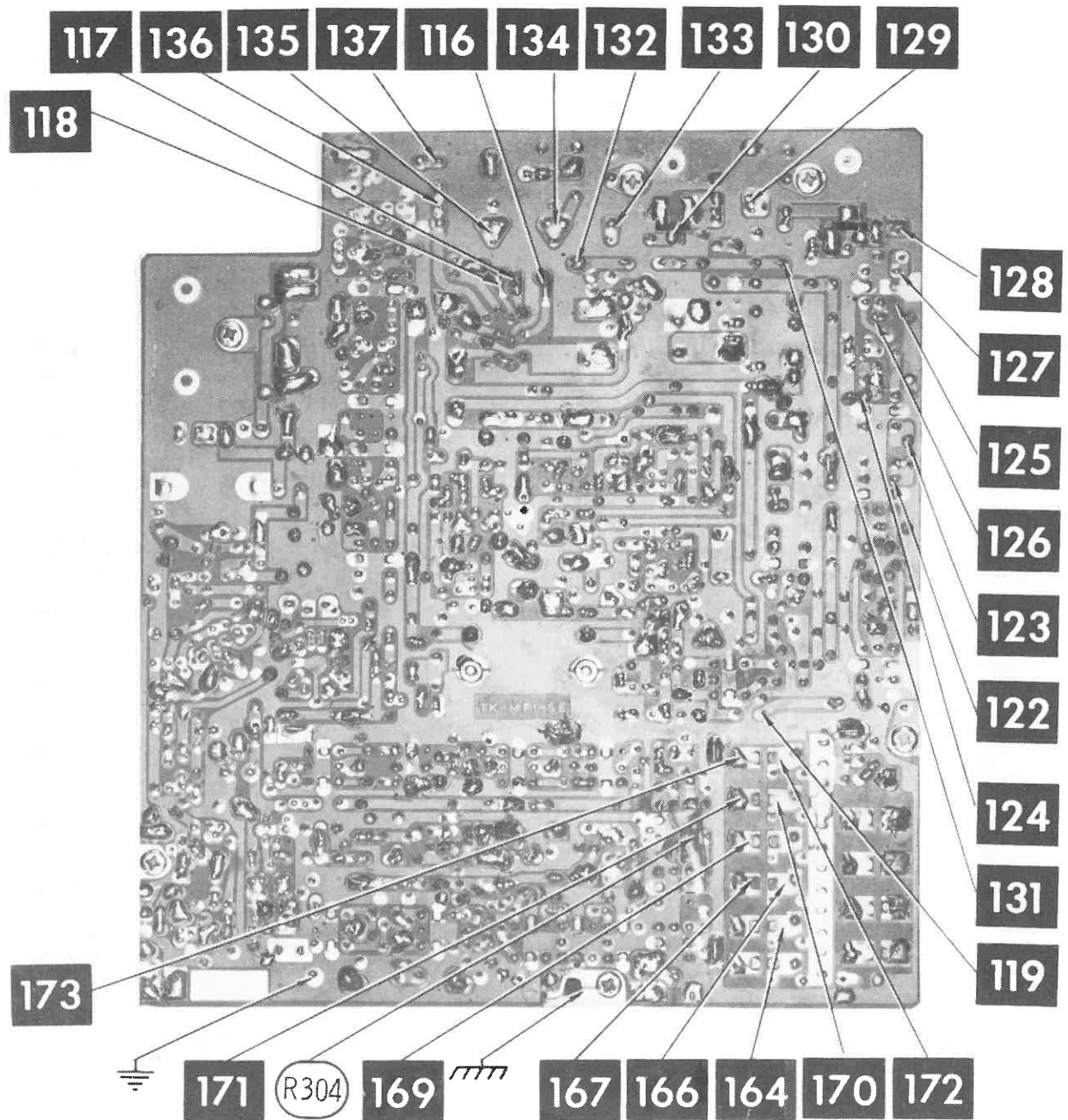


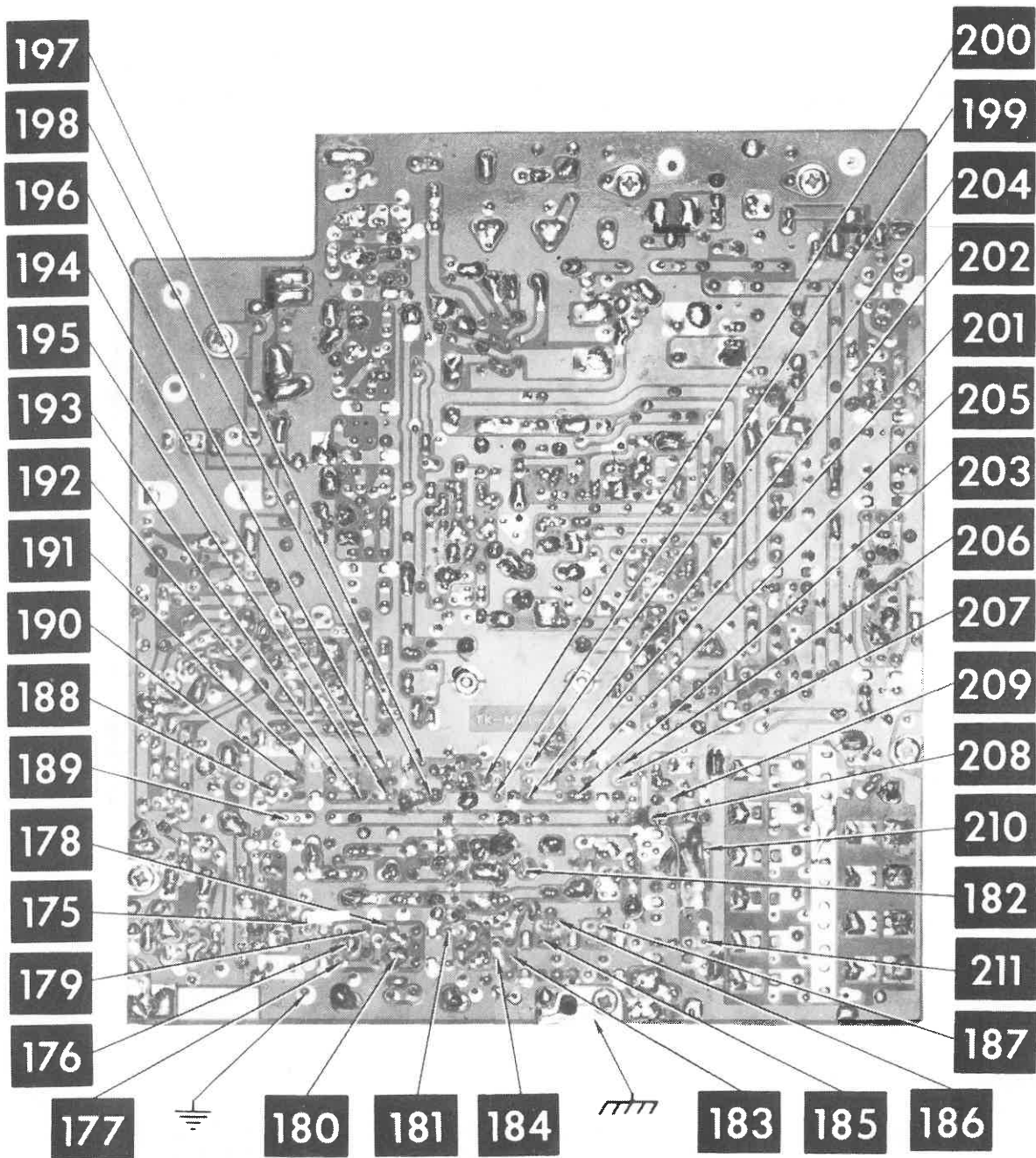




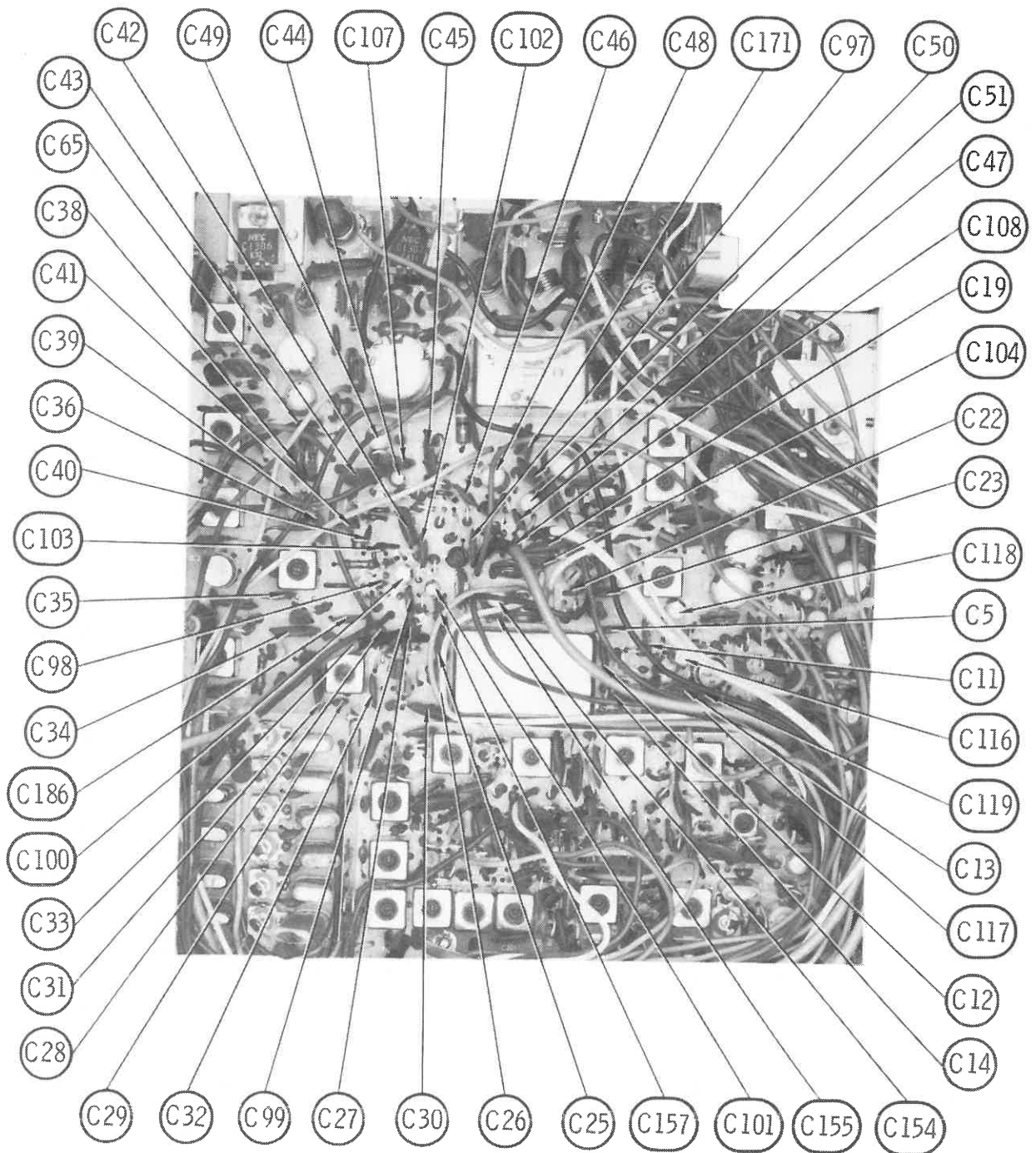
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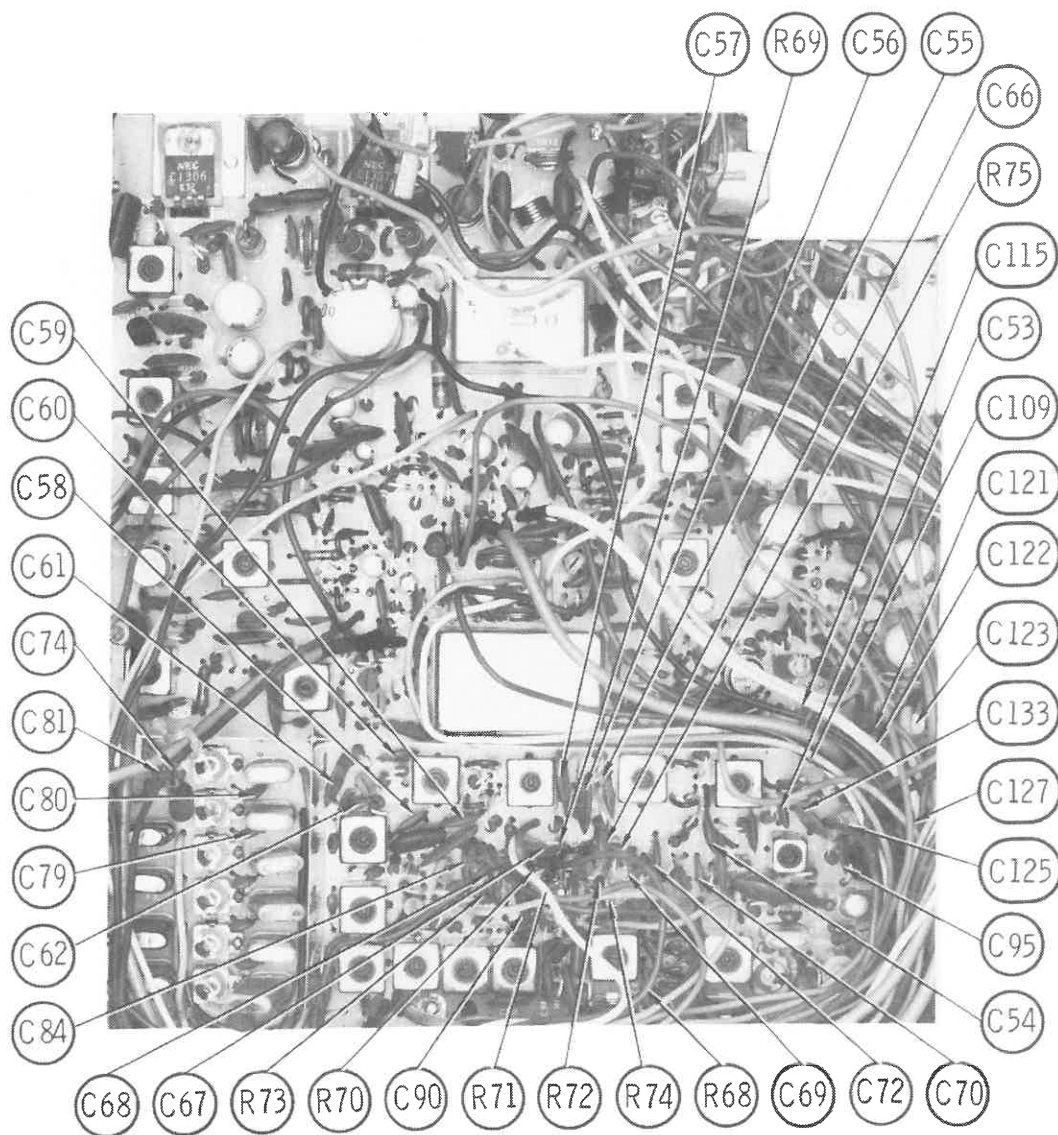


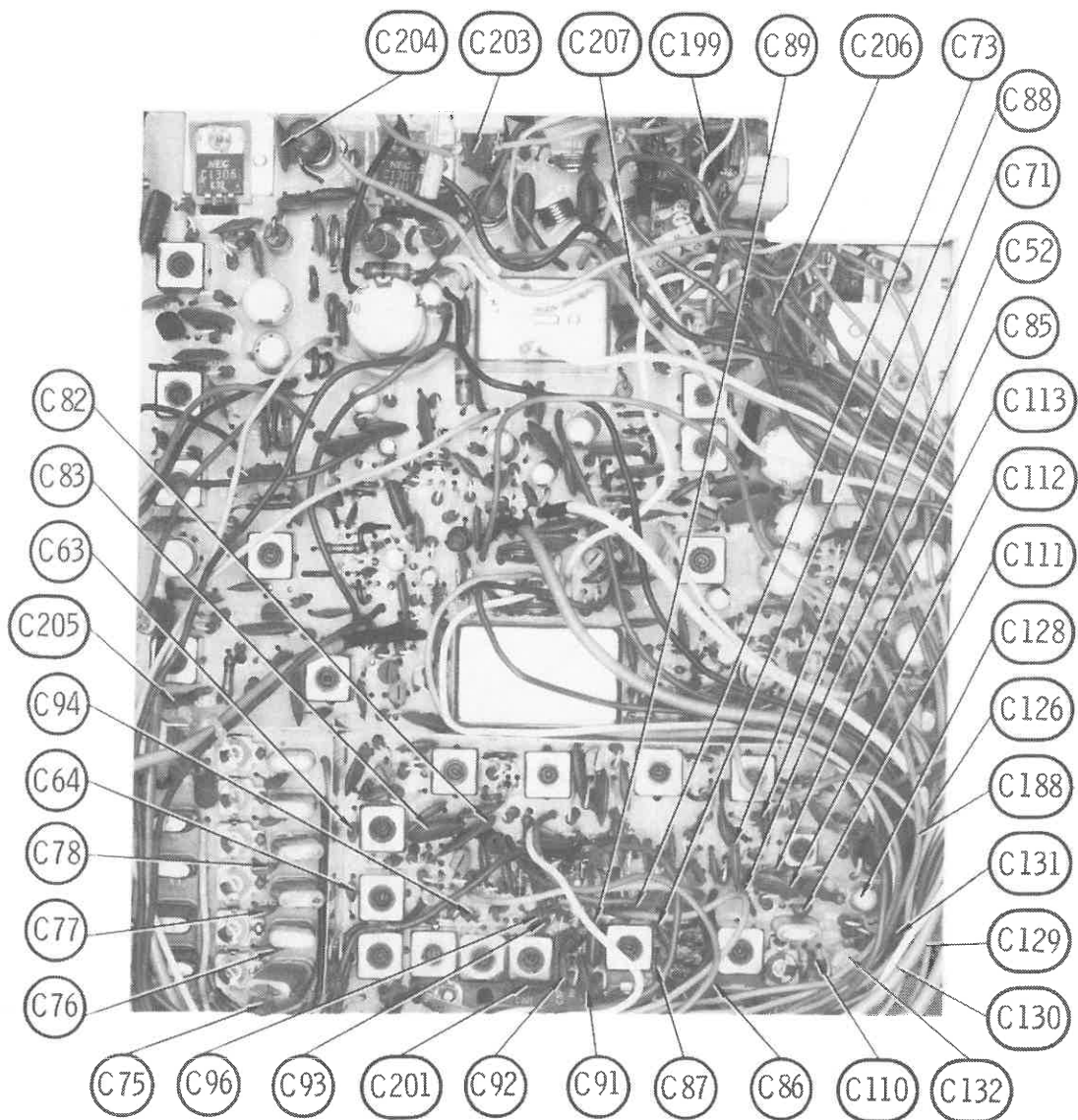


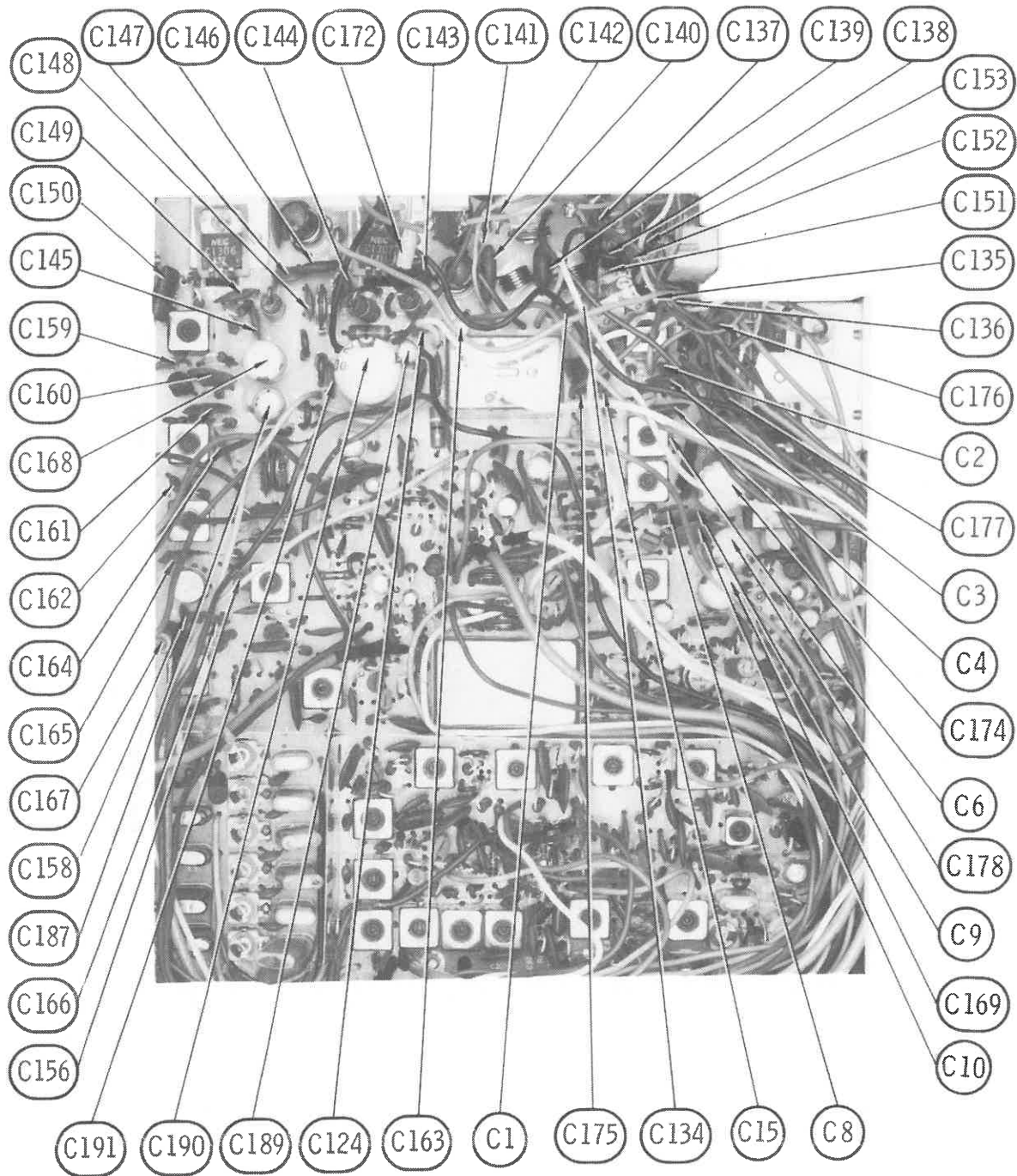


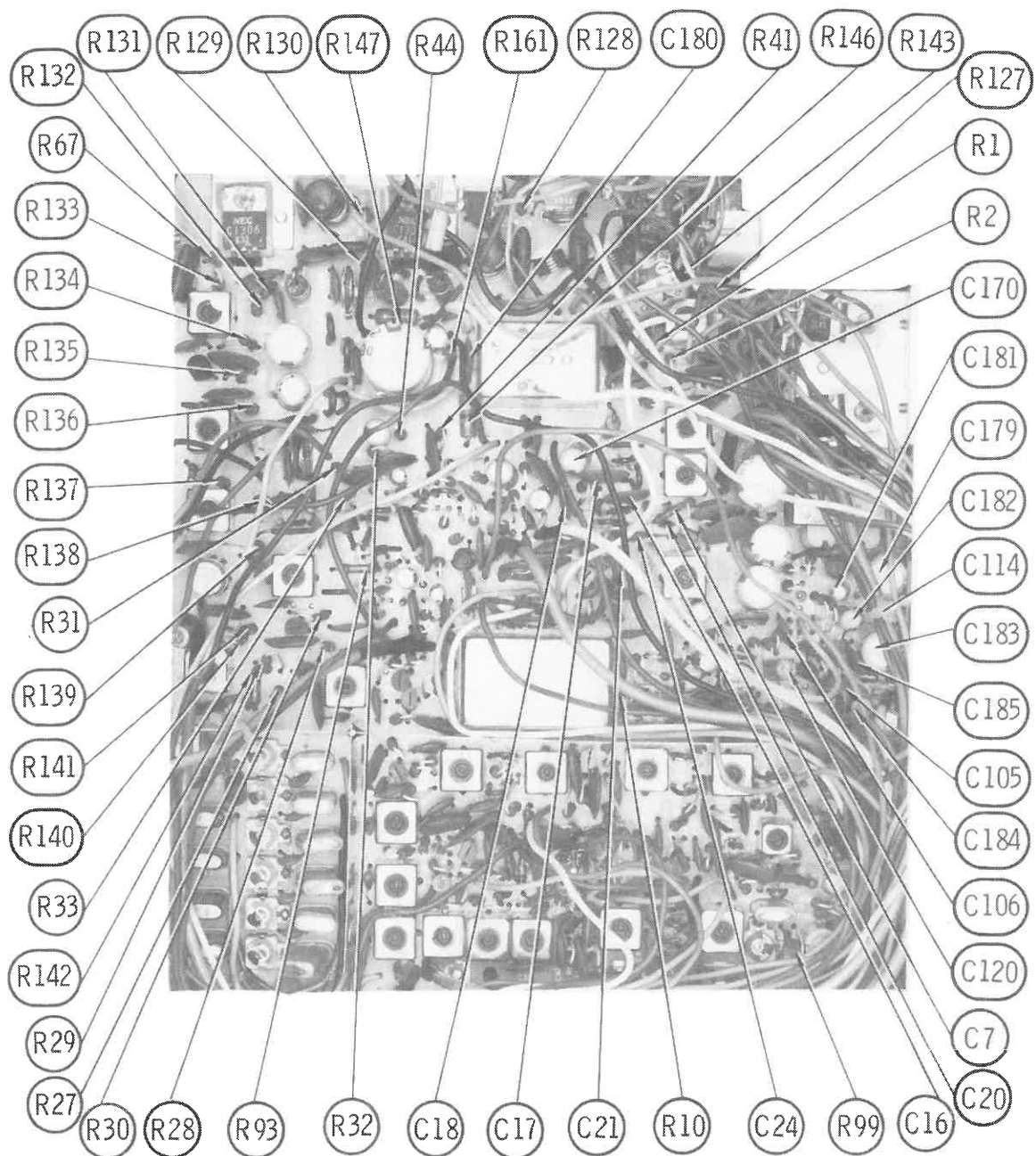
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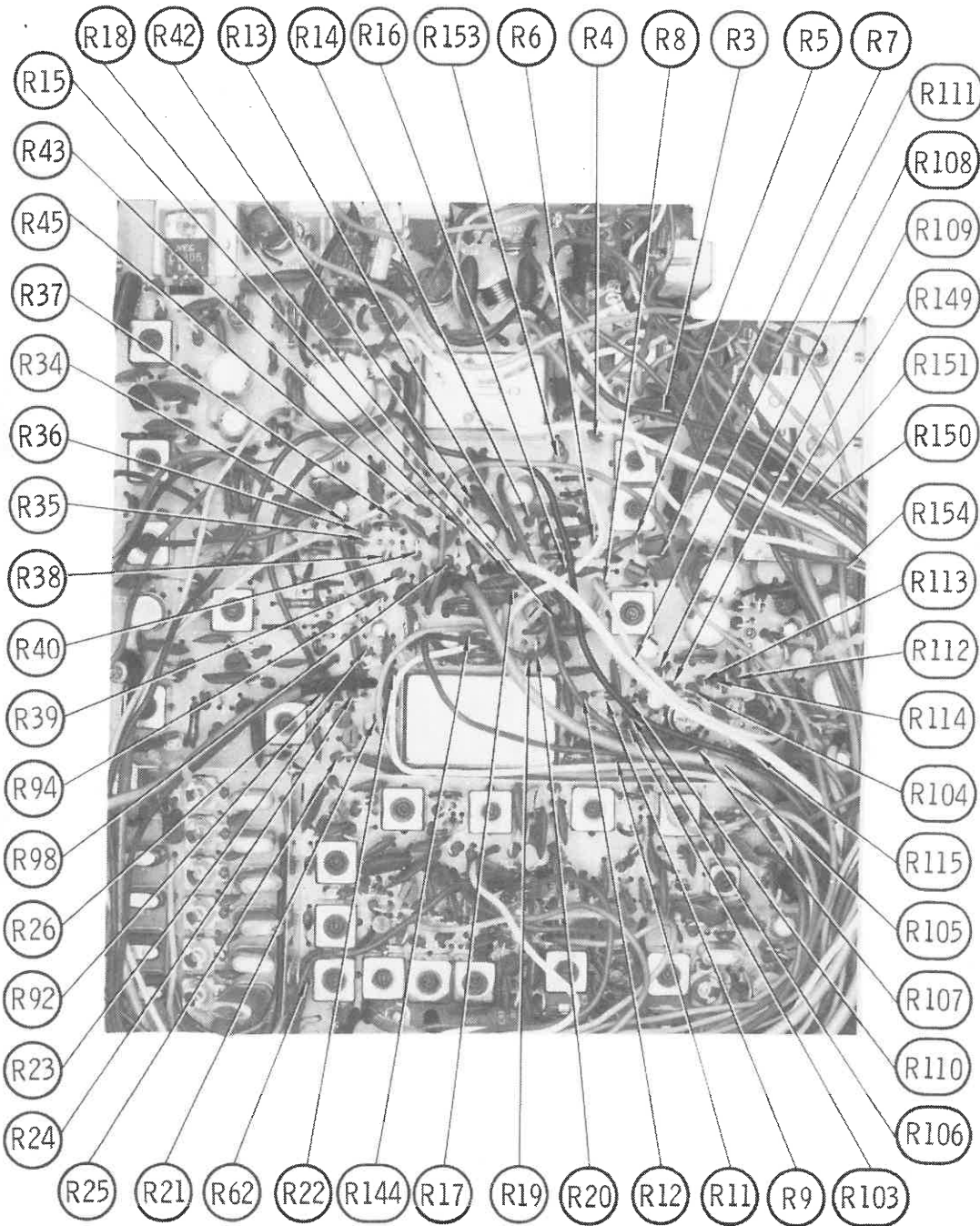




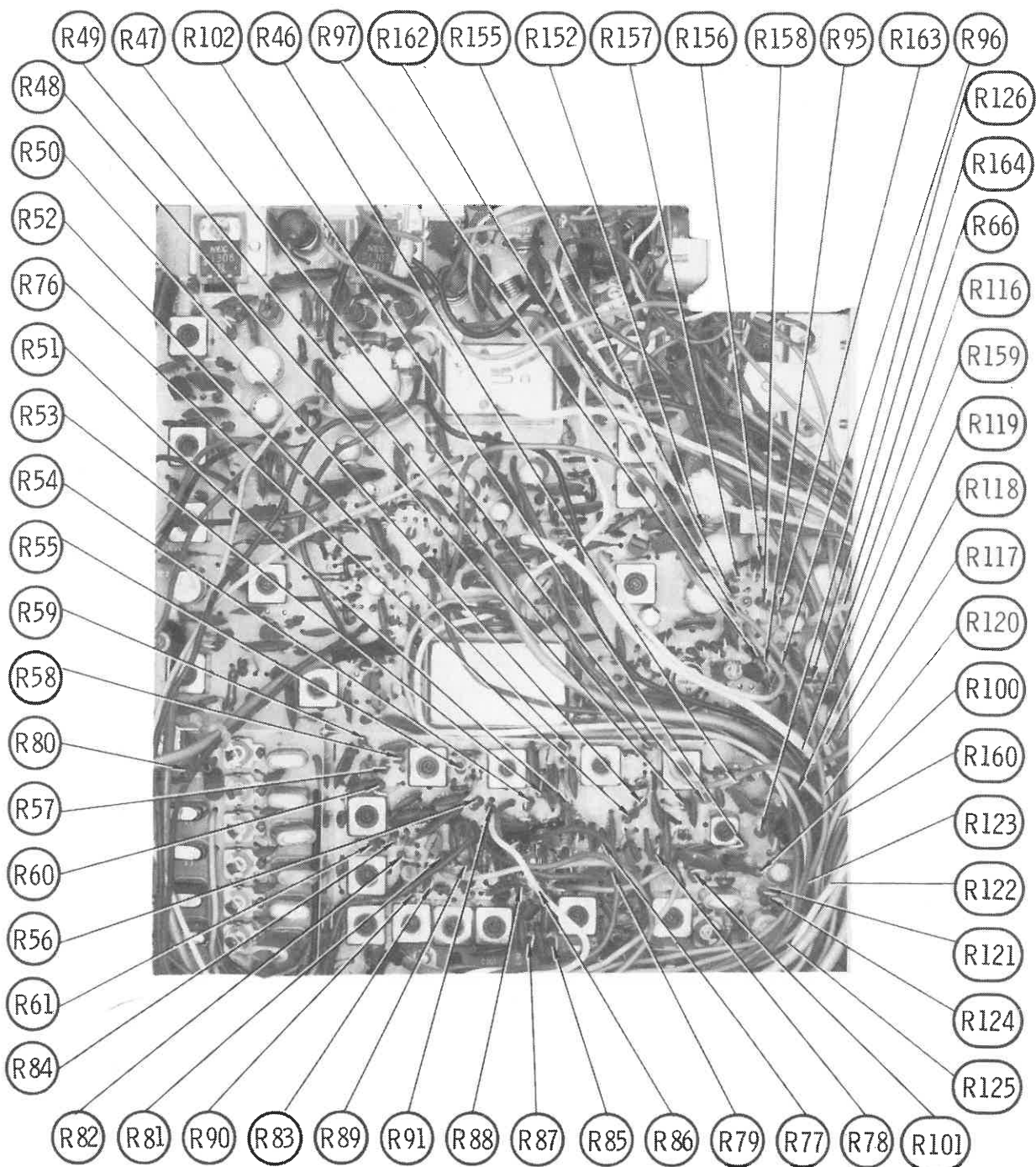


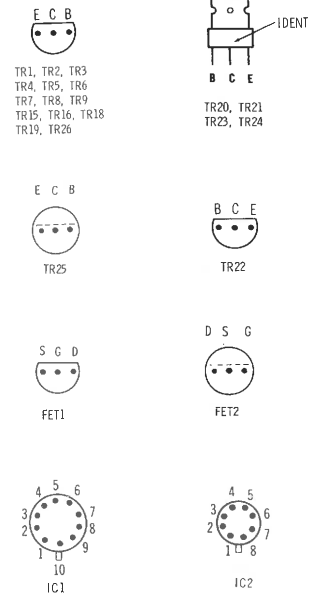
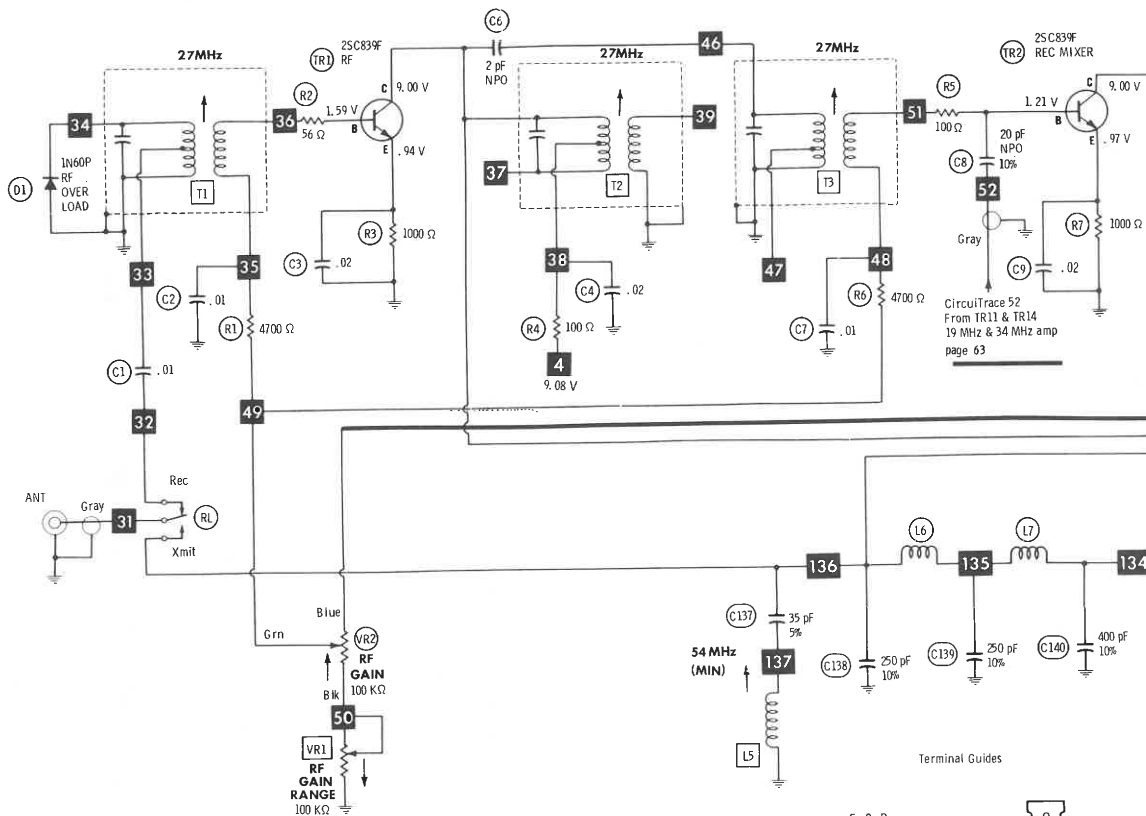






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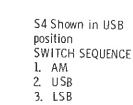


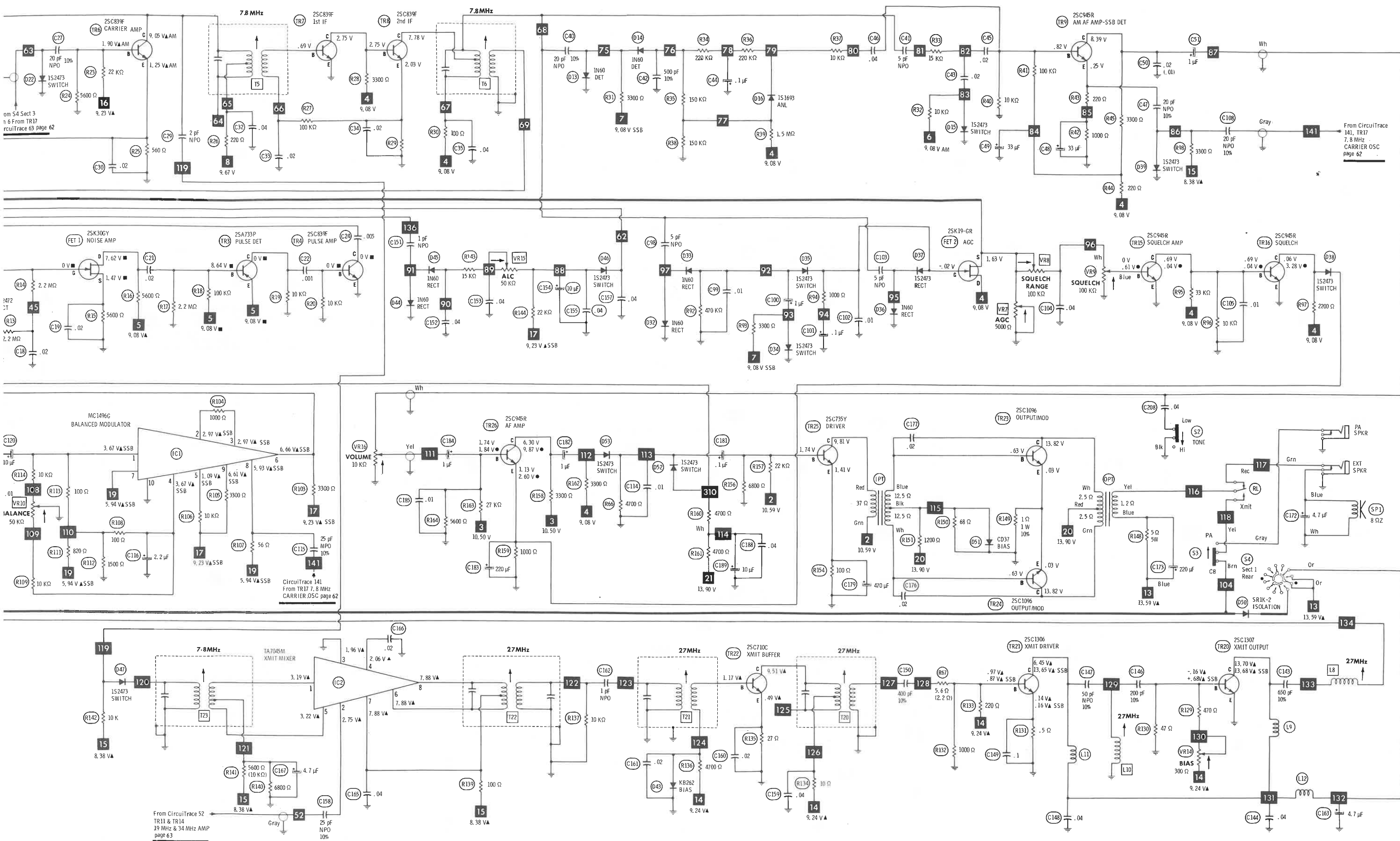


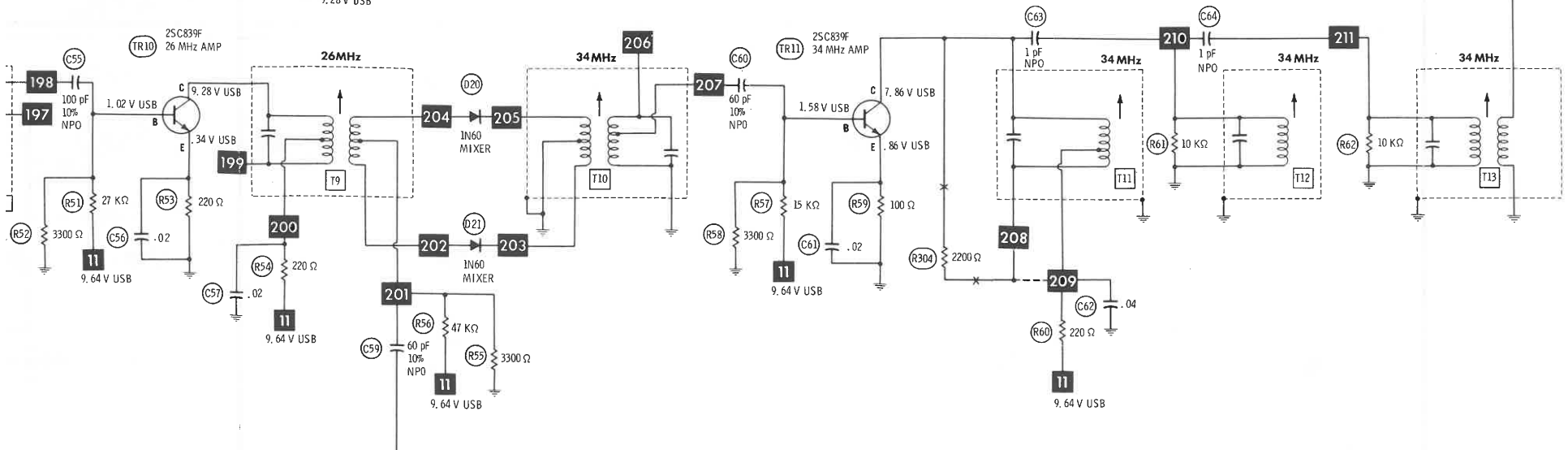
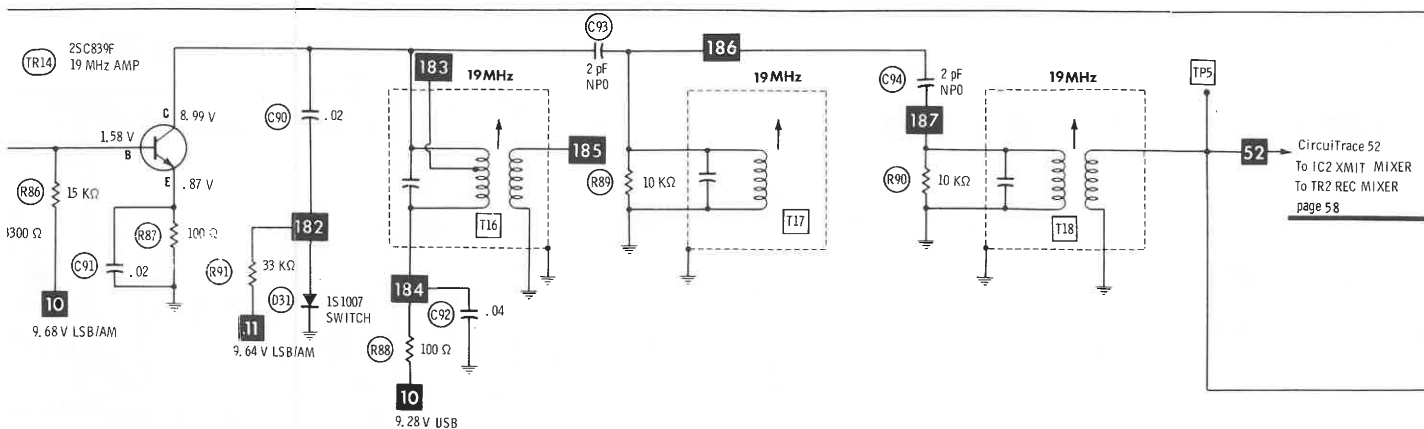
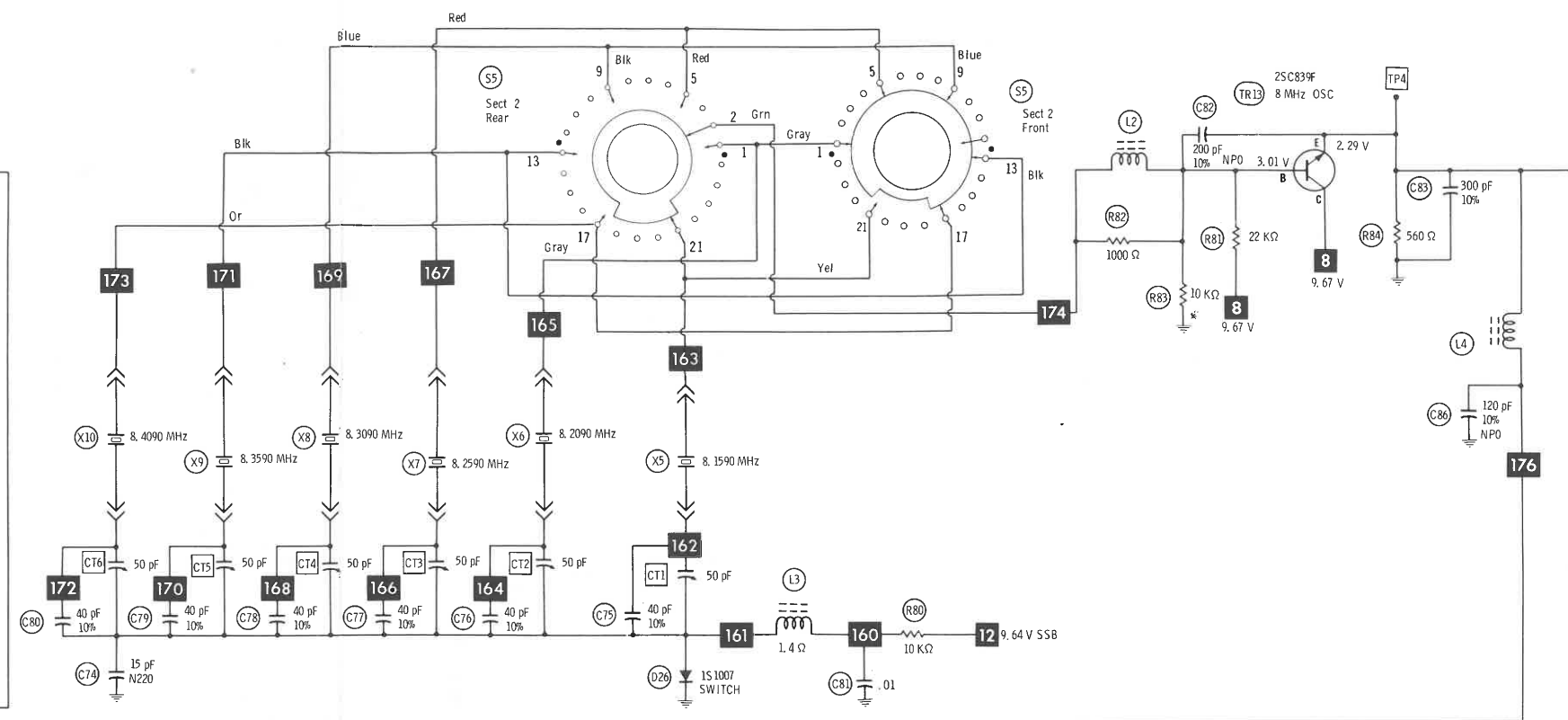
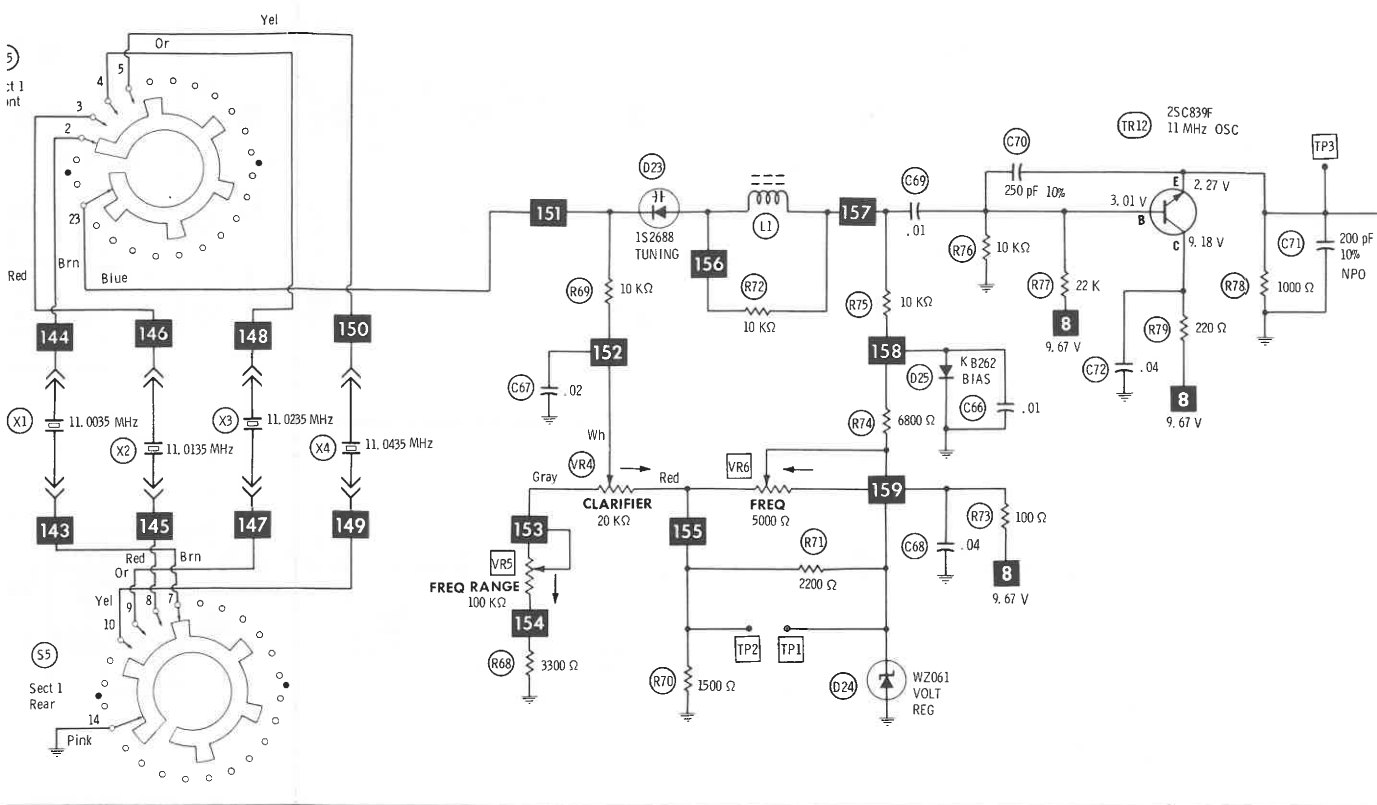
- ◆ 100% modulation.
- Noise blanker.
- ▲ Squelch control fully clockwise.
- Transmit.
- ▽ Indicates common tie point.
- ⏏ Indicates chassis.
- ⏏ Indicates ground. (Voltage reference unless otherwise noted).
- Indicates connection used in some versions.
- Indicates connection not used in some versions.
- * Omitted in some versions.
- ⊙ See parts list.
- ✳ Value varies; replace with original value.
- RF-IF coil resistance less than one ohm not given.
- Measurements taken with switching as shown unless otherwise noted.
- Values shown in () used in some versions.
- Resistors are 1/2 W. or less, 5% unless otherwise noted.
- Supply voltage maintained at rated value for measurements.
- Voltage measured with VTVM, no signal applied; controls adjusted for normal operation.
- Arrow on control indicates direction of advance.
- Numbers assigned to terminals may not be found on unit.

A PHOTOFAC STANDARD NOTATION SCHEMATIC
with **CIRCUITRACE**

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S5 Shown on CH.
No. 1
S4 Shown on USB
Switch sequence
1. AM
2. USB
3. LSB

Terminal Guides



TR10, TR11, TR12
TR13, TR14, TR17

Chan	Crystal Complement	Chan	Crystal Complement	Chan	Crystal Complement	Chan	Crystal Complement
1	X1 X5	7	X3 X6	13	X1 X8	19	X3 X9
2	X2 X5	8	X4 X6	14	X2 X8	20	X4 X9
3	X3 X5	9	X1 X7	15	X3 X8	21	X1 X10
4	X4 X5	10	X2 X7	16	X4 X8	22	X2 X10
5	X1 X6	11	X3 X7	17	X1 X9		
6	X2 X6	12	X4 X7	18	X2 X9	23	X4 X10

PARTS LIST AND DESCRIPTION

(When ordering parts, state Model, Part Number, and Description.)

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFR. PART No.	REPLACEMENT DATA							
			GENERAL ELECTRIC PART No.	INTERNATIONAL RECTIFIER PART No.	MALLORY PART No.	MOTOROLA PART No.	RAYTHEON PART No.	RCA PART No.	SPRAGUE PART No.	SYLVANIA PART No.
D1	1N60	09-306 019	1N60	1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109
D2	1S2473	09-306244	GE-300	D200	PTC214	HEPR0602	RE 52	SK3100	RT-218	ECG177
D3	1S2473	09-306244	GE-300	D200	PTC214	HEPR0602	RE 52	SK3100	RT-218	ECG177
D4	1S2473	09-306244	GE-300	D200	PTC214	HEPR0602	RE 52	SK3100	RT-218	ECG177
D5	1N60	09-306019	1N60	1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109
D6	1N60	09-306019	1N60	1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109
D7	1S2472	09-306219	1N60	1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109
D8	1N60	09-306019	1N60	1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109
D9	1N60	09-306019	1N60	1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109
D10	1S2473	09-306244	GE-300	D200	PTC214	HEPR0602	RE 52	SK3100	RT-218	ECG177
D11	1N60	09-306019	1N60	1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109
D12	1N60	09-306019	1N60	1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109
D13	1N60	09-306019	1N60	1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109
D14	1N60	09-306019	1N60	1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109
D15	1S2473	09-306244	GE-300	D200	PTC214	HEPR0602	RE 52	SK3100	RT-218	ECG177
D16	1S1693	09-306376	GE-504A	8D4	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116
D17	1N60	09-306019	1N60	1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109
D18	1N60	09-306019	1N60	1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109
D19	1N60	09-306019	1N60	1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109
D20	1N60	09-306019	1N60	1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109
D21	1N60	09-306019	1N60	1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109
D22	1S2473	09-306244	GE-300	D200	PTC214	HEPR0602	RE 52	SK3100	RT-218	ECG177
D23	1S2688	09-306374	GE-90	D201	PTC214	HEPR2503	RE 52	SK3126	RT-252	ECG177
D24	WZ061 6.2V Zener	09-306377	GEZD-6.2	Z1204	PTC503	HEPZ0408	RE 109	SK3058	RT-237	ECG137
D25	KB262	09-307081	GE-300	D200	PTC214	HEPR0602	RE 52	SK3100	RT-218	ECG177
D26	1S1007	09-306148	GE-511	D172	PTC216	HEPR3012	RE 55	SK3130	RT-203	ECG506
D27	1N60	09-306019	1N60	1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109
D28	1N60	09-306019	1N60	1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109
D29	1N60	09-306019	1N60	1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109
D30	1N60	09-306019	1N60	1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109
D31	1S1007	09-306148	GE-511	D172	PTC216	HEPR3012	RE 55	SK3130	RT-203	ECG506
D32	1N60	09-306019	1N60	1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109
D33	1N60	09-306019	1N60	1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109
D34	1S2473	09-306244	GE-300	D200	PTC214	HEPR0602	RE 52	SK3100	RT-218	ECG177
D35	1S2473	09-306244	GE-300	D200	PTC214	HEPR0602	RE 52	SK3100	RT-218	ECG177
D36	1N60	09-306019	1N60	1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109
D37	1S2473	09-306244	GE-300	D200	PTC214	HEPR0602	RE 52	SK3100	RT-218	ECG177
D38	1S2473	09-306244	GE-300	D200	PTC214	HEPR0602	RE 52	SK3100	RT-218	ECG177
D39	1S2473	09-306244	GE-300	D200	PTC214	HEPR0602	RE 52	SK3100	RT-218	ECG177
D40	1N60	09-306019	1N60	1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109
D41	1N60	09-306019	1N60	1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109
D42	1N60	09-306019	1N60	1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109
D43	KB262	09-307081	GE-300	D200	PTC214	HEPR0602	RE 52	SK3100	RT-218	ECG177
D44	1N60	09-306019	1N60	1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109
D45	1N60	09-306019	1N60	1N60	PTC206	HEPR9135	RE 47	SK3088	RT-263	ECG109
D46	1S2473	09-306244	GE-300	D200	PTC214	HEPR0602	RE 52	SK3100	RT-218	ECG177
D47	1S2473	09-306244	GE-300	D200	PTC214	HEPR0602	RE 52	SK3100	RT-218	ECG177
D48	CZ092 9.2V Zener	09-306375	GEZD-9.1	Z1210	PTC505	HEPZ0412	RE 114	SK3060	RT-240	ECG139
D49	CZ092 9.2V Zener	09-306375	GEZD-9.1	Z1210	PTC505	HEPZ0412	RE 114	SK3060	RT-240	ECG139
D50	SR1K-2	09-306160	GE-504A	8D4	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116
D51	CD37	09-306266	GE-300	D200	PTC214	HEPR0602	RE 52	SK3100	RT-218	ECG177
D52	1S2473	09-306244	GE-300	D200	PTC214	HEPR0602	RE 52	SK3100	RT-218	ECG177
D53	1S2473	09-306244	GE-300	D200	PTC214	HEPR0602	RE 52	SK3100	RT-218	ECG177
D54	CZ092 9.2V Zener	09-306375	GEZD-9.1	Z1210	PTC505	HEPZ0412	RE 114	SK3060	RT-240	ECG139
D55	WZ081 8.1V Zener	09-306378	GEZD-8.2	Z1208	ZB8.2	HEPZ0411	RE 112	SK3136	RT-257	ECG5072
D56	SR1K-2	09-306160	GE-504A	8D4	PTC201	HEPR0052	RE 49	SK3030	RT-213	ECG116
FET1	2SK30Y	09-305021(1)	GE-FET-1	FE-100	PTC151	HEPF0010	RE 46	SK3112	RT-176	ECG133
FET2	2SK19GR	09-305014	GE-FET-2	FE-100	PTC151	HEPF0010	RE 46	SK3112	RT-176	ECG133
IC1	MC1496G	09-308075	GE-FET-2	FE-100	PTC152	HEPF0021	RE 45	SK3116	RT-175	ECG132
IC2	TA7045M	09-308002			PTC744	HEP6050G			TVCN-48	ECG724
TR1	2SC839F	09-302124	GE-17	TR-24	PTC121	HEPS0015	RE 13	SK3018	RT-107A	ECG123A
TR2	2SC839F	09-302124	GE-17	TR-24	PTC121	HEPS0015	RE 13	SK3018	RT-107A	ECG123A
TR3	2SA733P	09-300080	GE-22	TR-88	PTC127	HEPS0019	RE 26	SK3114	RT-120	ECG159
TR4	2SC839F	09-302124	GE-17	TR-24	PTC121	HEPS0015	RE 13	SK3018	RT-107A	ECG123A
TR5	2SC839F	09-302124	GE-17	TR-24	PTC121	HEPS0015	RE 13	SK3018	RT-107A	ECG123A
TR6	2SC839F	09-302124	GE-17	TR-24	PTC121	HEPS0015	RE 13	SK3018	RT-107A	ECG123A
TR7	2SC839F	09-302124	GE-17	TR-24	PTC121	HEPS0015	RE 13	SK3018	RT-107A	ECG123A
TR8	2SC839F	09-302124	GE-17	TR-24	PTC121	HEPS0015	RE 13	SK3018	RT-107A	ECG123A
TR9	2SC945R	09-302125	GE-20	TR-24	PTC136	HEPS0015	RE 13	SK3124	RT-102	ECG123A
TR10	2SC839F	09-302124	GE-17	TR-24	PTC121	HEPS0015	RE 13	SK3018	RT-107A	ECG123A
TR11	2SC839F	09-302124	GE-17	TR-24	PTC121	HEPS0015	RE 13	SK3018	RT-107A	ECG123A
TR12	2SC839F	09-302124	GE-17	TR-24	PTC121	HEPS0015	RE 13	SK3018	RT-107A	ECG123A
TR13	2SC839F	09-302124	GE-17	TR-24	PTC121	HEPS0015	RE 13	SK3018	RT-107A	ECG123A
TR14	2SC839F	09-302124	GE-17	TR-24	PTC121	HEPS0015	RE 13	SK3018	RT-107A	ECG123A
TR15	2SC945R	09-302125	GE-20	TR-24	PTC136	HEPS0015	RE 13	SK3124	RT-107A	ECG123A
TR16	2SC945R	09-302125	GE-20	TR-24	PTC136	HEPS0015	RE 13	SK3124	RT-107A	ECG123A
TR17	2SC839F	09-302124	GE-17	TR-24	PTC121	HEPS0015	RE 13	SK3018	RT-107A	ECG123A
TR18	2SC945R	09-302125	GE-20	TR-24	PTC136	HEPS0015	RE 13	SK3124	RT-107A	ECG123A
TR19	2SC945R	09-302125	GE-20	TR-24	PTC136	HEPS0015	RE 13	SK3124	RT-107A	ECG123A
TR20	2SC1307	09-305137							RT-197	ECG236
TR21	2SC1306	09-305136	GE-66	TR-55	PTC110					ECG235
TR22	2SC710C	09-302012	GE-17	TR-24	PTC121	HEPS0016	RE 9	SK3018	RT-105	ECG107
TR23	2SC1096		GE-28	TR-55	PTC110	HEPS5000	RE 42	SK3054	RT-154	ECG186
TR24	2SC1096	09-302126(1)	GE-28	TR-55	PTC110	HEPS5000	RE 42	SK3054	RT-154	ECG186
TR25	2SC1096	09-302126(1)	GE-28	TR-55	PTC110	HEPS5000	RE 42	SK3054	RT-154	ECG186
TR26	2SC735Y	09-302040	GE-63	TR-21	PTC123	HEPS0014	RE 13	SK3124	RT-102	ECG123A
TR26	2SC945R	09-302125	GE-20	TR-24	PTC136	HEPS0014	RE 13	SK3124	RT-107A	ECG123A

(1) Used in some versions.

MIDLAND MODEL 13-893

PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

ELECTROLYTIC CAPACITORS

ITEM No.	RATING	REPLACEMENT DATA					
		MFGR. PART No.	ARCO PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.
C37	1 50V		RME-A-J-001	EP50-1	PC1-50	MTV1CB50	EV-1615
C44	.1 25V					TDC104M050EL	SD35-R109
C48	33 10V		ME-3-D-035	EP15-25	PC30-25	VTT33A10	EV-1125
C49	33 16V		ME-3-E-035	EP15-25	PC30-25	MTV30CB25	EV-1325
C51	1 50V		RME-A-J-001	EP50-1	PC1-50	MTV1CB50	EV-1615
C100	1 50V		RME-A-J-001	EP50-1	PC1-50	MTV1CB50	EV-1615
C101	.1 25V					TDC104M050EL	SD35-R109
C116	2.2 25V		RME-A-G-002	EP30-2	PC2-100	VTT2R2A50	EV-1317
C118	22 10V		ME-2-D-020	EP15-25	PC20-50	VTT22A16	EV-1224
C120	10 16V		RME-B-E-010	EP15-10	PC10-25	VTT10A25	EV-1222
C122	33 16V		ME-3-E-035	EP15-25	PC30-25	MTV30CB25	EV-1325
C123	33 10V		ME-3-D-035	EP15-25	PC30-25	VTT33A10	EV-1125
C125	1 50V		RME-A-J-001	EP50-1	PC1-50	MTV1CB50	EV-1615
C127	1 50V		RME-A-J-001	EP50-1	PC1-50	MTV1CB50	EV-1615
C128	1 50V		RME-A-J-001	EP50-1	PC1-50	MTV1CB50	EV-1615
C129	33 10V		ME-3-D-035	EP15-25	PC30-25	VTT33A10	EV-1125
C130	1 50V		RME-A-J-001	EP50-1	PC1-50	MTV1CB50	EV-1615
C132	47 10V		RME-E-E-050	EP15-50	PC50-16	MTV50CB15	EV-1226
C134	4.7 25V		RME-A-G-005	EP30-5	PC5-50	VTT4R7A50	EV-1319
C135	10 16V		RME-B-E-010	EP15-10	PC10-25	VTT10A25	EV-1222
C154	10 16V		RME-B-E-010	EP15-10	PC10-25	VTT10A25	EV-1222
C163	4.7 25V		RME-A-G-005	EP30-5	PC5-50	VTT4R7A50	EV-1319
C167	4.7 25V		RME-A-G-005	EP30-5	PC5-50	VTT4R7A50	EV-1319
C168	220 10V		RME-G-D-250	EP15-250	PC250-10	MTV250D10	EV-1145
C169	220 16V		RME-J-E-250	EP15-250	PC250-25	MTV250DE15	EV-1245
C170	33 16V		ME-3-E-035	EP15-25	PC30-25	MTV30CB25	EV-1325
C172	4.7 25V		RME-A-G-005	EP30-5	PC5-50	VTT4R7A50	EV-1319
C173	220 25V		RME-K-G-250	EP30-250	PC250-25	MTV250DJ25	EV-1345
C174	470 16V		RME-L-E-500	EP15-500	PC500-16	MTV500DN15	EV-1250
C178	220 16V		RME-J-E-250	EP15-250	PC250-25	MTV250DE15	EV-1245
C179	470 10V		RME-K-D-500	EP15-500	PC500-16	MTV500DN15	EV-1150
C181	.1 25V					TDC104M050EL	SD35-R109
C182	1 50V		RME-A-J-001	EP50-1	PC1-50	MTV1CB50	EV-1615
C183	220 6.3V		RME-F-B-250	EP6-250	PC250-10	MTV250DB10	EV-1145
C184	1 50V		RME-A-J-001	EP50-1	PC1-50	MTV1CB50	EV-1615
C187	330 10V		ME-8-E-250	EP15-250	WBR300-35	MTA300G50	EV-1245
C189	10 16V		RME-B-E-010	EP15-10	PC10-25	VTT10A25	EV-1222
C190	1000 25V		RME-P-G-1000	EP30-1000	WBR1000-25	MTA1000G25	EV-1360

CAPACITORS

ITEM No.	RATING	MFGR. PART No.	REPLACEMENT DATA				
			ARCO/ELMENCO PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.
C1	.01		CCD-103	DC-103	GP10000	MAG5011	2SS-S10
C2	.01		CCD-103	DC-103	GP10000	MAG5011	2SS-S10
C3	.02		CCD-203			GP120	56A-S20
C4	.02		CCD-203			GP120	56A-S20
C5	.04		CCD-403			GP140	56A-S40
C6	2 NPO		CCTO-2R2	DTZ-2R2	NP02P2	CN0522	10TCC-V22
C7	.01		CCD-103	DC-103	GP10000	MAG5011	2SS-S10
C8	40 10%		CCTO-390			CN0439	10TCC-Q39
C9	.02		CCD-203			GP120	56A-S20
C10	.02		CCD-203			GP120	56A-S20
C11	.01		CCD-103	DC-103	GP10000	MAG5011	2SS-S10
C12	.01		CCD-103	DC-103	GP10000	MAG5011	2SS-S10
C13	.01		CCD-103	DC-103	GP10000	MAG5011	2SS-S10
C14	.02		CCD-203			GP120	56A-S20
C15	20 NPO 10%		CCTO-200	DTZ-20	NP020	CN0420	10TCC-Q20
C16	.02		CCD-203			GP120	56A-S20
C17	.02		CCD-203			GP120	56A-S20
C18	.02		CCD-203			GP120	56A-S20
C19	.02		CCD-203			GP120	56A-S20
C20	5 NPO		CCD-203			GP120	56A-S20
C21	.02		CCTO-050			GP120	10TCC-V50
C22	.001		CCD-203			GP120	56A-S20
C23	.04		CCD-102	DD-102		GP210	10TS-D10
C24	.005		CCD-403			GP140	56A-S40
C25	.01		CCD-502			GP140	10TS-D50
C26	.001		CCD-103	DC-103	GP10000	MAG5011	2SS-S10
C27	20 NPO 10%		CCD-102	DD-102		GP210	10TS-D10
C28	.04		CCTO-200	DTZ-20	NP020	CN0420	10TCC-Q20
C29	2 NPO		CCD-403			GP140	56A-S40
C30	.02		CCTO-2R2	DTZ-2R2	NP02P2	CN0522	10TCC-V22
C31	.04		CCD-203			GP120	56A-S20
C32	.04		CCD-403			GP140	56A-S40
C33	.02		CCD-403			GP140	56A-S40
C34	.02		CCD-203			GP120	56A-S20
C35	.04		CCD-403			GP140	56A-S40

PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

CAPACITORS (cont)

ITEM No.	RATING	MFR. PART No.	REPLACEMENT DATA				
			ARCO/ELMENC	CENTRALAB	CORNELL-DUBILIER	MALLORY	SPRAGUE
			PART No.	PART No.	PART No.	PART No.	PART No.
C36	.01		CCD-103	DC-103	GP10000	MAG5011	2SS-S10
C38	.04		CCD-403			GP140	5GA-S40
C39	.04		CCD-403			GP140	5GA-S40
C40	20 NPO 10%		CCTO-200	DTZ-20	NP020	CN0420	10TCC-Q20
C41	5 NPO 10%		CCTO-050				10TCC-V50
C42	500 10%		DM15-501J		CD15FD501J03		
C43	.02		CCD-203			GP120	5GA-S20
C45	.02		CCD-203			GP120	5GA-S20
C46	.04		CCD-403			GP140	5GA-S40
C47	20 NPO 10%		CCTO-200	DTZ-20	NP020	CN0420	10TCC-Q20
C50	.02		CCD-203			GP120	5GA-S20
C52	.04		CCD-403			GP140	5GA-S40
C53	25 NPO 10%		CCTO-680	DTZ-25	NP025	CN0425	10TCC-Q25
C54	60 NPO 10%		CCTO-101	DTZ-68	NP068	CN0468	10TCC-Q68
C55	100 10%		CCD-203	DTZ-100	NP0100	CN0310	10TCC-T10
C56	.02		CCD-203			GP120	5GA-S20
C57	.02		CCD-203			GP120	5GA-S20
C58	.04		CCD-403			GP140	5GA-S40
C59	60 NPO 10%		CCTO-680	DTZ-68	NP068	CN0468	10TCC-Q68
C60	60 NPO 10%		CCTO-680	DTZ-68	NP068	CN0468	10TCC-Q68
C61	.02		CCD-203			GP120	5GA-S20
C62	.04		CCD-403			GP140	5GA-S40
C63	1 NPO					CN0510	10TCC-V10
C64	18 NPO		CCTO-180			CN0418	10TCC-Q18
C65	.04		CCD-403			GP140	5GA-S40
C66	.01		CCD-103	DC-103	GP10000	MAG5011	2SS-S10
C67	.02		CCD-203			GP120	5GA-S20
C68	.04		CCD-403			GP140	5GA-S40
C69	.01		CCD-103	DC-103	GP10000	MAG5011	2SS-S10
C70	250		DM10-251J		CD10FD251J03		
C71	200		CCD-201	DD-201	GP200	GP320	10TS-T20
C72	.04		CCD-403			GP140	5GA-S40
C73	.04		CCD-403			GP140	5GA-S40
C74	15 N220		*			*	10TCR-Q15
C75	40 10%		CCTO-390			CN0439	10TCC-Q39
C76	40 10%		CCTO-390			CN0439	10TCC-Q39
C77	40 10%		CCTO-390			CN0439	10TCC-Q39
C78	40 10%		CCTO-390			CN0439	10TCC-Q39
C79	40 10%		CCTO-390			CN0439	10TCC-Q39
C80	40 10%		CCTO-390			CN0439	10TCC-Q39
C81	.01		CCD-103	DC-103	GP10000	MAG5011	2SS-S10
C82	200 NPO 10%		CCD-201	DD-201	GP200	GP320	10TS-T20
C83	300 10%					GP140	5GA-S40
C84	.04		CCD-403			CN0412	10TCC-Q12
C85	12 NPO		CCTO-120	DTZ-120		CN0312	10TCC-T12
C86	120 NPO 10%		CCTO-121			*	10TCR-T10
C87	100 N220 10%		*			*	10TCR-T100
C88	100 N220 10%		*			*	424MC1300J501
C89	600		DM10-131J	CPR-130J	CD7FD131J03	SX313	5GA-S20
C90	.02		CCD-203			GP120	5GA-S20
C91	.02		CCD-203			GP120	5GA-S20
C92	.04		CCD-403			GP140	5GA-S40
C93	2 NPO		CCTO-2R2	DTZ-2R2	NP02P2	CN0522	10TCC-V22
C94	2 NPO		CCTO-2R2	DTZ-2R2	NP02P2	CN0522	10TCC-V22
C95	.02		CCD-203			GP120	5GA-S20
C96	.04		CCD-403			GP140	5GA-S40
C97	.04		CCD-403			GP140	5GA-S40
C98	5 NPO		CCTO-050				10TCC-V50
C99	.01		CCD-103	DC-103	GP10000	MAG5011	2SS-S10
C102	.01		CCD-103	DC-103	GP10000	MAG5011	2SS-S10
C103	5 NPO		CCTO-050				10TCC-V50
C104	.04		CCD-403			GP140	5GA-S40
C105	.01		CCD-103	DC-103	GP10000	MAG5011	2SS-S10
C106	.04		CCD-403			GP140	5GA-S40
C107	.04		CCD-403			GP140	5GA-S40
C108	20 NPO 10%		CCTO-200	DTZ-20	NP020	CN0420	10TCC-Q20
C109	12 NPO 10%		CCTO-120			CN0412	10TCC-Q12
C110	20 NPO 10%		CCTO-200	DTZ-20	NP020	CN0420	10TCC-Q20
C111	.001 10%		CCD-102	DD-102		GP210	10TS-D10
C112	150 10%		DM10-151J	CPR-150J	CD7FD151J03	SX315	424MC1500J501
C113	.04		CCD-403			GP140	5GA-S40
C114	.01		CCD-103	DC-103	GP10000	MAG5011	2SS-S10
C115	25 NPO 10%					CN0427	10TCC-Q27
C117	.04		CCD-403			GP140	5GA-S40
C119	.02		CCD-203			GP120	5GA-S20
C121	.01		CCD-103	DC-103	GP10000	MAG5011	2SS-S10
C124	.04		CCD-403			GP140	5GA-S40
C126	.01		CCD-103	DC-103	GP10000	MAG5011	2SS-S10
C133	.04		CCD-403			GP140	5GA-S40
C136	.04		CCD-403			GP140	5GA-S40
C137	35 NPO 5%					CN0439	10TCC-Q39
C138	250 10%		DM10-251J		CD10FD251J03		
C139	250 10%		DM10-251J		CD10FD251J03		
C140	400 10%		DM15-391J	CPR-390J	CD15FD391J03	SX339	424ME3900J501
C141	1 NPO					CN0510	10TCC-V10
C142	.04		CCD-403			GP140	5GA-S40
C143	650 10%		DM19-681J	CPR-680J	CD19FD681J03	SX368	424ME6800J501
C144	.04		CCD-403			GP140	5GA-S40
C145	.04		CCD-403			GP140	5GA-S40
C146	200 5%		DM10-201J	CPR-200J	CD10FD201J03	SX320	424ME2000J501
C147	50 NPO 10%		CCTO-510	DTZ-50	NP050	CN0450	10TCC-Q50
C148	.04		CCD-403			GP140	5GA-S40

MIDLAND MODEL 13-893

PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

CAPACITORS (cont)

ITEM No.	RATING	MFR. PART No.	REPLACEMENT DATA				
			ARCO/ELMENCO PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.
C149	.1		CCD-391	DC-104	MGP1	MAG5001	TG-P10
C150	400			DD-391	GP390	GP339	10TS-T39
C151	1 NPO					CN0510	10TCC-V10
C152	.04		CCD-403			GP140	5GA-S40
C153	.04		CCD-403			GP140	5GA-S40
C155	.04		CCD-403			GP140	5GA-S40
C156	.04		CCD-403			GP140	5GA-S40
C157	.04		CCD-403			GP140	5GA-S40
C158	25 NPO 10%			DTZ-25	NP025	CN0425	10TCC-Q25
C159	.04		CCD-403			GP140	5GA-S40
C160	.02		CCD-203			GP120	5GA-S20
C161	.02		CCD-203			GP120	5GA-S20
C162	1 NPO					CN0510	10TCC-V10
C164	.04		CCD-403			GP140	5GA-S40
C165	.04		CCD-403			GP140	5GA-S40
C166	.02		CCD-203			GP120	5GA-S20
C171	.04		CCD-403			GP140	5GA-S40
C175	.04		CCD-403			GP140	5GA-S40
C176	.1			DC-104	MGP1	MAG5001	TG-P10
C177	.1			DC-104	MGP1	MAG5001	TG-P10
C180	.04		CCD-403			GP140	5GA-S40
C185	.01		CCD-103	DC-103	GP10000	MAG5011	2SS-S10
C186	.04		CCD-403			GP140	5GA-S40
C188	.04		CCD-403			GP140	5GA-S40
C191	.04		CCD-403			GP140	5GA-S40
C192	.001		CCD-102	DD-102		GP210	10TS-D10
C199	.02		CCD-203			GP120	5GA-S20
C201	.1			DC-104	MGP1	MAG5001	TG-P10
C202	.1			DC-104	MGP1	MAG5001	TG-P10
C203	.1			DC-104	MGP1	MAG5001	TG-P10
C204	.1			DC-104	MGP1	MAG5001	TG-P10
C205	.1			DC-104	MGP1	MAG5001	TG-P10
C206	.1			DC-104	MGP1	MAG5001	TG-P10
C207	.1			DC-104	MGP1	MAG5001	TG-P10

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

CONTROLS (All wattages 1/2 watt, or less, unless listed)

ITEM No.	FUNCTION	RESISTANCE	REPLACEMENT DATA				
			MFR. PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	MALLORY PART No.	TRW PART No.
VR1	RF Gain Range	100K	13-161015	TSV-100K (2) or T-100K (2)	C-104 (2)	MTC15L1 (2)	X201R104B (2)
VR2	RF Gain	100K	13-160107				
VR3	"S" Meter	20K	31-161016	T-20K (2) or TSV-25K (2)	C-253 (2)	MTC24L1 (2)	X201R253B (2)
VR4	Clarifier	20K	13-160108				
VR5	Frequency Range	100K	13-161015	TSV-100K (2) or T-100K (2)	C-104 (2)	MTC15L1 (2)	X201R104B (2)
VR6	Frequency Adj.	5000	13-161017	TSV-5K (2) or T-5000 (2)	C-502 (2)	MTC53L1 (2)	X201R502B (2)
VR7	AGC Adj.	10K	13-161018	TSV-10K (2) or T-10K (2)	C-103 (2)	MTC14L1 (2)	X201R103B (2)
VR8	Squelch Range	100K	13-161015	TSV-100K (2) or T-100K (2)	C-104 (2)	MTC15L1 (2)	X201R104B (2)
VR9a	Squelch	100K	13-160109				
b	Volume/Switch	10K					
VR10	Balance	50K	13-161019	TSV-50K (2) or T-50K (2)	C-503 (2)	MTC54L1 (2)	X201R503B (2)
VR11	Mic Gain	10K	13-160110				
VR12	AMC	10K	13-161018	TSV-10K (2) or T-10K (2)	C-103 (2)	MTC14L1 (2)	X201R103B (2)
VR13	RF Power	100K	13-161015	TSV-100K (2) or T-100K (2)	C-104 (2)	MTC15L1 (2)	X201R104B (2)
VR14	Bias	300	13-161020	T-300 (2)		MTC32L1 (2)	X201R351B (2)
VR15	ALC	50K	13-161021	TSV-50K (2) or T-50K (2)	C-503 (2)	MTC54L1 (2)	X201R503B (2)

(2) Cut off one of the end terminals and bend to fit PC board.

RESISTORS (Power and Special)

ITEM No.	RATING	REPLACEMENT DATA		ITEM No.	RATING	REPLACEMENT DATA	
		WORKMAN PART No.	MFR. PART No.			WORKMAN PART No.	MFR. PART No.
R148	5 5W WM	5W-SQ5	77-208509				

PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

COILS (RF-IF)

ITEM No.	FUNCTION	REPLACEMENT DATA			REMARKS
		PART No.	OTHER IDENTIFICATION	MILLER PART No.	
L1	RF Choke (10uH)	13-176441			
L2	RF Choke (8.2uH)	13-176442			
L3	RF Choke (100uH)	13-176443			
L4	RF Choke (6.8uH)	13-176444			
L5	TVI Trap (54MHz)	13-094173			
L6	Xmit. Ant (27MHz)	13-094184			
L7	Pi Network (27MHz)	13-094184			
L8	Final Amp (27MHz)	13-094173			
L9	RF Choke	13-094185			
L10	Xmit Buffer (27MHz)	13-094173			
L11	RF Choke	13-094185			
L12	RF Choke	13-194185			
T1	Rec. Ant (27MHz)	13-094186			
T2	Rec. RF (27MHz)	13-094187			
T3	Rec. RF (27MHz)	13-094187			
T4	7.8MHz IF (7.8MHz)	13-094188			
T5	7.8MHz IF (7.8MHz)	13-090332			
T6	7.8MHz IF (7.8MHz)	13-090333			
T7	15.6MHz Mixer Input	13-094189			
T8	26MHz Mixer Output	13-094190			
T9	26MHz Mixer Input	13-094191			
T10	34MHz Input	13-094192			
T11	34MHz Interstage	13-094193			
T12	34MHz Interstage	13-094194			
T13	34MHz Output	13-094194			
T14	Balance Mixer Input	13-094195			
T15	Balance Mixer Output	13-094196			
T16	19MHz Input	13-093197			
T17	19MHz Interstage	13-094198			
T18	19MHz Output	13-094199			
T19	7.8MHz Osc. Output	13-170203			
T20	Xmit. RF Amp (27MHz)	13-094200			
T21	Xmit. Buffer Input (27MHz)	13-094201			
T22	Xmit. Mixer Output (27MHz)	13-094202			
T23	Xmit. Mixer Input (7.8MHz)	13-094203			

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FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA				NOTES
	CURRENT (Measured)	DC RES.	INDUCTANCE (0 CURRENT 1000~)	MFGR. PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD PART No.	
CH	1900mA	.2	2.6mH	13-178188 TF-041 (1)				(1) Number on unit.

TRANSFORMER (Driver)

ITEM No.	TURNS RATIO			REPLACEMENT DATA				NOTES
	PRI.	SEC. 1	SEC. 2	MFGR. PART No.	STANCOR PART No.	THORDARSON PART No.	TRIAD Part No.	
IPT	1.25	1		13-096170 7258 (1)				(1) Number on unit.

TRANSFORMER (Audio Output)

ITEM No.	IMPEDANCE		REPLACEMENT DATA			NOTES
	PRI.	SEC.	MFGR. PART No.	THORDARSON PART No.	TRIAD PART No.	
OPT	32	8	13-096171 TF-062 (1)			(1) Number on unit.

PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

SPEAKER

ITEM No.	TYPE	REPLACEMENT DATA		NOTES
		MFGR. PART No.	QUAM PART No.	
SP1	3 1/2" PM 8 ohms	13-06009		

FUSE DEVICES

ITEM No.	DESCRIPTION	REPLACEMENT DATA						
		PART No.		BUSS PART No.		LITTELFUSE PART No.		WORKMAN PART No.
		DEVICE	HOLDER	DEVICE	HOLDER	DEVICE	HOLDER	DEVICE
F1	2-Amp Fast-acting		13-158345	AGC2	HDJ	312002	150145	FG2-2

MISCELLANEOUS

ITEM No.	PART NAME	PART No.	NOTES
CF	Crystal Filter	13-179049	7.8MHz
M	Meter	13-200057	(MT-018) "S"/RF
RL	Relay	13-105022	(RL-002)
S1	Switch	13-183194	Noise Blanker
S2	Switch	13-183194	Tone
S3	Switch	13-183193	PA-CB
S4	Switch	13-183196	AM-USB-LSB
S5	Switch	13-180090	Channel Selector
X1	Crystals	13-128342	11.0035MHz
X2	Crystals	13-128343	11.0135MHz
X3	Crystals	13-128344	11.0235MHz
X4	Crystals	13-128345	11.0435MHz
X5	Crystals	13-128346	8.1590MHz
X6	Crystals	13-128347	8.2090MHz
X7	Crystals	13-128348	8.2590MHz
X8	Crystals	13-128349	8.3090MHz
X9	Crystals	13-128350	8.3590MHz
X10	Crystals	13-128351	8.4090MHz
X11	Crystals	13-128352	7.8025MHz
	Crystal Socket	13-159188	(SD-0105)

CABINETS & CABINET PARTS (When ordering specify model, chassis & color)

ITEM	PART No.	ITEM	PART No.
Cabinet, Top	13-010253	Knob, Channel	13-115105
Cabinet, Bottom	13-010254	Knob, RF/Gain, Selector, Clarifier	13-110171
Panel, Front	13-010252	Knob, Squelch	13-110173
Mounting Bracket	13-158344	Knob, Volume	13-110172
Microphone Hanger	13-158341	Dial Plate, Channel	13-020593

ACCESSORIES

ITEM	MFGR. PART No.	REMARKS
Microphone (Less Plug)	13-038062	
DC Power Cord	13-034074	