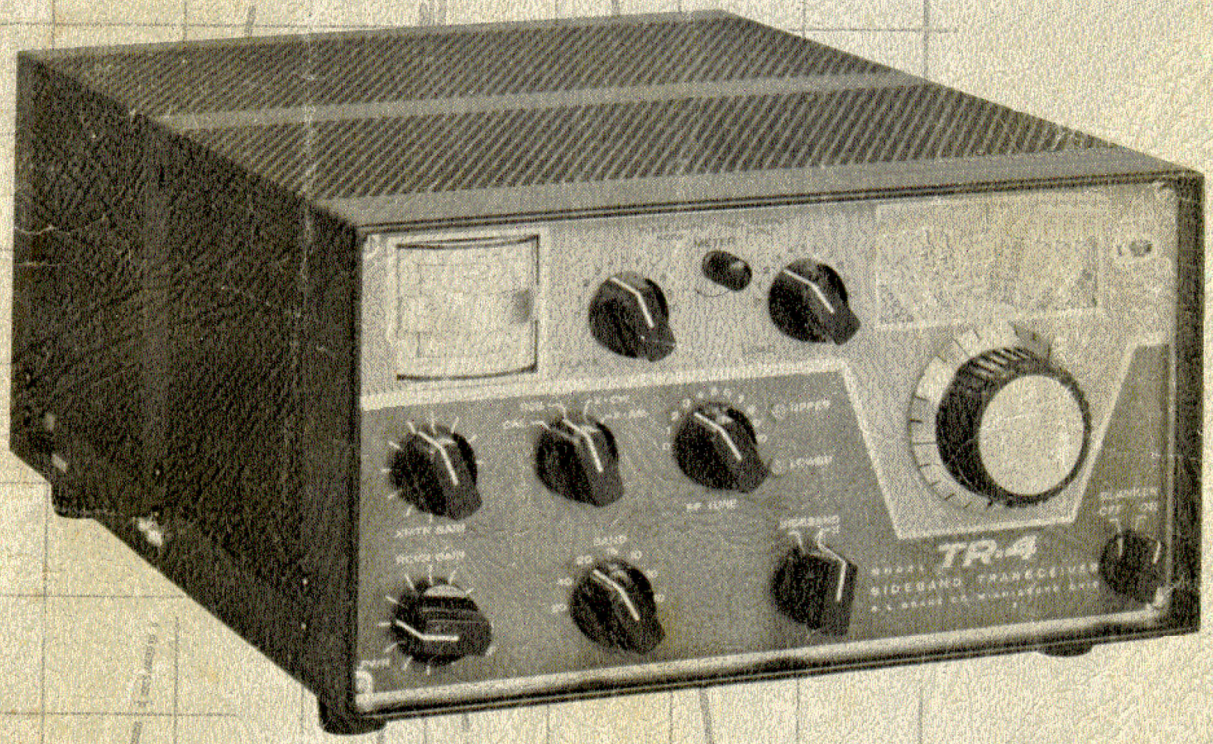
SERVICE MANUAL

R. L. DRAKE • MODEL

TR-4

SIDEBAND TRANSCEIVER



PREFACE

The information on this CD was derived from a TR-4 built to the 27500 schematic.

Examination of other versions of TR-4 schematics shows that there were very few changes over the eight known schematics. Although there are “additional” Resistor and Capacitor designators used in later versions, most are related to variations in the PTO to accommodate different active devices, and some are related to the four tube type changes over the life of the design. The device changes are tabulated in Figure 1.

All known schematic versions are included on this CD, which should enable the user to locate a specific component from an earlier version. The small underchassis boards remain almost identical through the versions, with an occasional change in a component value.

The first TR-4 schematic I have found carries a date of 7/15/65, and a s/n of 16050. The chassis is the copper-plated steel used throughout the early 4 Series equipment. This version still has the 4-Pole “soupcan” filter manufactured by Tedford, and the open frame, wired-in relay used in the TR-3. The sideband filter was changed to a 4-Pole hermetically sealed unit manufactured by TYCO at the end of 1965. I have only seen two of these filters, both in the 18000 s/n range.

The next documented version dated 2/5/66, s/n 19500, still showed the “dual” sideband filters, and the single TYCO unit appeared in units up until around 24000. The first individual USB and LSB "twin" filters, made by C-F Networks and painted gray, began to show up around 23000, but have been spotted in a few much earlier units. I suspect these earlier outliers are retrofits, either by Drake or by their owners. The schematic wasn’t changed to show twin filters until the last TR-4 version, dated 1/7/73, s/n 32001.

Another schematic with a date of 9/6/67 and s/n of 27000 shows the PTO change from the bipolar to FET oscillator device and the addition of the “B” style neon indicator behind the skirt of the Main Tuning knob. The front panel "above the belt" lettering was also changed from natural aluminum to black, making it MUCH easier to see. This version also was the first to have a top cover on the Final compartment cage.

The schematic dated 10/8/68, s/n 28500 is very similar, and the twin filters were changed to blue painted, manufactured by TYCO.

The only change in the block diagram occurred in the schematic dated 8/11/70, s/n 30500. A single transistor Audio preamp stage was added for additional AF gain.

The 34-NB Noise Blanker was available as a factory installed option beginning in late 1965. When it was installed in early units with the "soupcan" filter, an additional board designated "NBK" was required. This board consisted of two toroidal transformers at the input and output of the noise blanker board to transform the 2.2k ohm impedance of that filter assembly to the 500 ohm impedance of the NB. The later twin filter units were 500 ohm impedance and the NBK board was no longer required.

Unlike the majority of Amateur Radio equipment in use today, this equipment, like most of the era, operates on very high voltages. These voltages are exposed and easily accessible when covers are removed for servicing. Contact with these voltages can be dangerous, even lethal, and safe practices must always be followed when working on these units. The author hereby disclaims any liability for injury to persons or property that may result while using the information presented herein.

The information on this CD has been gathered from many sources. Special thanks to Bill Frost of R L Drake Company, THE source of Drake information for many years, who has always gone out of his way to make it available to us.

TR-4 Service Supplement
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Drake TR-4/C Versions Tubes & Transistors

Model	Version	S/N	Schematic Date	V1	V2	V3	V4	V5	V6	V7	V8	V9
TR-4	1	16050	July 15, 1965	6EA8	12AV6	6EA8	6HS6	12BA6	12BY7A	12BA6	6JB6	6JB6
TR-4	2	19500	February 5, 1966	6EA8	12AV6	6EA8	6EJ7	12BA6	12BY7A	12BA6	6JB6	6JB6
TR-4	3	26000	January 5, 1967	6EA8	12AV6	6EA8	6EJ7	12BA6	12BY7A	12BA6	6JB6	6JB6
TR-4	4	27000	September 6, 1967	6EA8	12AV6	6EA8	6EJ7	12BA6	12BY7A	12BA6	6JB6	6JB6
TR-4	5	27500	April 6, 1968	6EA8	12AV6	6EA8	6EJ7	6BA6	12BY7A	12BA6	6JB6	6JB6
TR-4	6	28500	October 8, 1968	6EA8	12AV6	6EA8	6EJ7	6BZ6	12BY7A	12BA6	6JB6	6JB6
TR-4	7	30500	August 11, 1970	6EA8	12AV6	6EA8	6EJ7	6BZ6	12BY7A	12BA6	6JB6	6JB6
TR-4	8	32001	January 7, 1973	6EA8	12AV6	6EA8	6EJ7	6BZ6	12BY7A	12BA6	6JB6	6JB6
TR-4	C	34XXX	March 24, 1973	6EA8	12AV6	6EA8	6EJ7	6BZ6	12BY7A	12BA6	6JB6	6JB6
TR-4	C	35161	March 14, 1974	6EA8	12AV6	6EA8	6EJ7	6BZ6	12BY7A	12BA6	6JB6	6JB6
TR-4	C	38800	April 7, 1975	6EA8	12AV6	6EA8	6EJ7	6BZ6	12BY7A	12BA6	6JB6	6JB6
TR-4	C	42500	November 1, 1976	6EA8	12AV6	6EA8	6EJ7	6BZ6	12BY7A	12BA6	6JB6	6JB6

Model	Version	S/N	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19	V20
TR-4	1	16050	6JB6	12BA6	12BA6	12AX7	13DE7	12BA6	6GX6	6AQ5A	12AX7	6EV7	0A2
TR-4	2	19500	6JB6	12BA6	12BA6	12AX7	13DE7	12BA6	6GX6	6AQ5A	12AX7	6EV7	0A2
TR-4	3	26000	6JB6	12BA6	12BA6	12AX7	13DE7	12BA6	6GX6	6AQ5A	12AX7	6EV7	0A2
TR-4	4	27000	6JB6	12BZ6	12BA6	12AX7	13DE7	12BA6	6GX6	6AQ5A	12AX7	6EV7	0A2
TR-4	5	27500	6JB6	6BZ6	12BA6	12AX7	13DE7	12BA6	6GX6	6AQ5A	12AX7	6EV7	0A2
TR-4	6	28500	6JB6	6BZ6	12BA6	12AX7	13DE7	12BA6	6GX6	6AQ5A	12AX7	6EV7	0A2
TR-4	7	30500	6JB6	6BZ6	12BA6	12AX7	13DE7	12BA6	6GX6	6AQ5A	12AX7	6EV7	0A2
TR-4	8	32001	6JB6	6BZ6	12BA6	12AX7	13DE7	12BA6	6GX6	6AQ5A	12AX7	6EV7	0A2
TR-4	C	34XXX	6JB6	6BZ6	12BA6	12AX7	13DE7	12BA6	6GX6	6AQ5A	12AX7	6EV7	0A2
TR-4	C	35161	6JB6	6BZ6	12BA6	12AX7	13DE7	12BA6	6GX6	6AQ5A	12AX7	6EV7	0A2
TR-4	C	38800	6JB6	6BZ6	12BA6	12AX7	13DE7	12BA6	6GX6	6AQ5A	12AX7	6EV7	0A2
TR-4	C	42500	6JB6	6BZ6	12BA6	12AX7	13DE7	12BA6	6GX6	6AQ5A	12AX7	6FQ7	0A2

Model	Version	S/N	Q1	Q2	Q3	Q4	Q5
TR-4	1	16050	2N3394	2N3394			
TR-4	2	19500	2N3858	2N3858			
TR-4	3	26000	2N706	2N3858			
TR-4	4	27000	2N706	2N3858	2N3877A		
TR-4	5	27500	TIS34	2N3858	2N3877	2N3394	
TR-4	6	28500	TIS34	2N3858	2N3877	2N3394	
TR-4	7	30500	2N5950	2N3563	AT5059	2N3394	2N3877
TR-4	8	32001	2N5950	2N3563	AT5059	2N3394	2N3877
TR-4	C	34XXX	2N5950	2N3563	AT5059	2N3394	2N3877
TR-4	C	35161	2N5950	2N3563	AT5059	2N3394	2N3877
TR-4	C	38800	2N5950	2N3563	AT5059	2N3394	2N3877
TR-4	C	42500	2N5950	2N3563	AT5059	2N3394	2N3877

Model	Version	S/N	Schematic ID
TR-4	1	16050	7156516050
TR-4	2	19500	256619500
TR-4	3	26000	156726000
TR-4	4	27000	966727000
TR-4	5	27500	466827500
TR-4	6	28500	1086828500
TR-4	7	30500	8117030500
TR-4	8	32001	177332001
TR-4	C	34XXX	3247334???
TR-4	C	35161	3147435161
TR-4	C	38800	4077538800
TR-4	C	42500	11017642500

Notes:
1. S/N is first unit in each Version
2. Shaded number indicates device change from previous version
3. Version 1 has wired-in T-R relay, "Soupcan" 4-pole filter, no top on PA cage
4. Version 2 has TYCO hermetically sealed dual 4-pole filter
5. Version 3 has two gray painted 8-pole filters
6. Version 4 has B Line style PTO-in-use indicator behind tuning knob skirt, FET PTO, PA cage top
7. Version 7 has two blue painted 8-pole filters, NB socket and front panel knob, SS AF preamp
8. C Version has alodined chassis, PTO-in-use indicator to the right of main dial window, dual dial tuning assembly, two silver 8-pole filters

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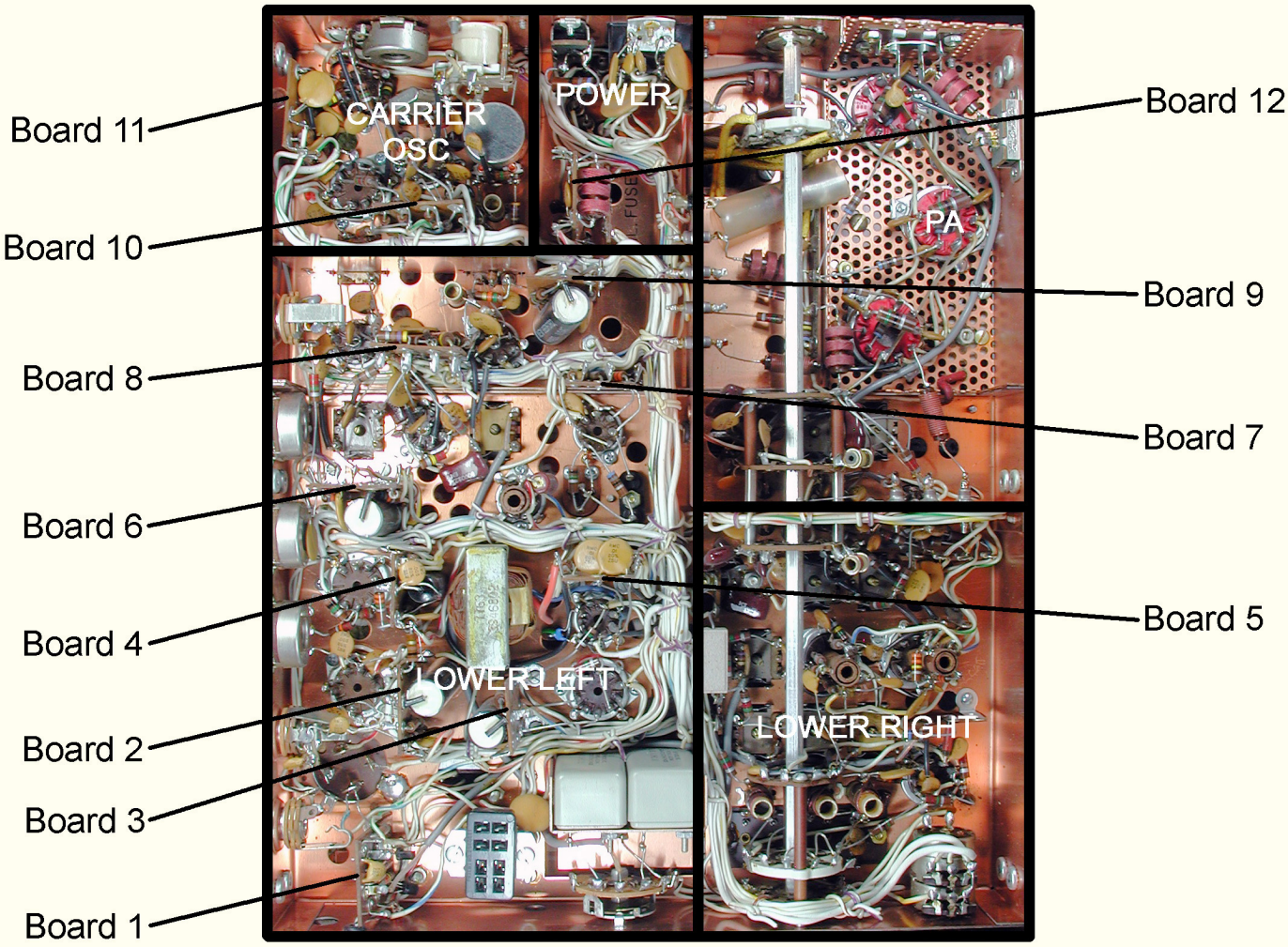

R L DRAKE TR-4
Board Locator

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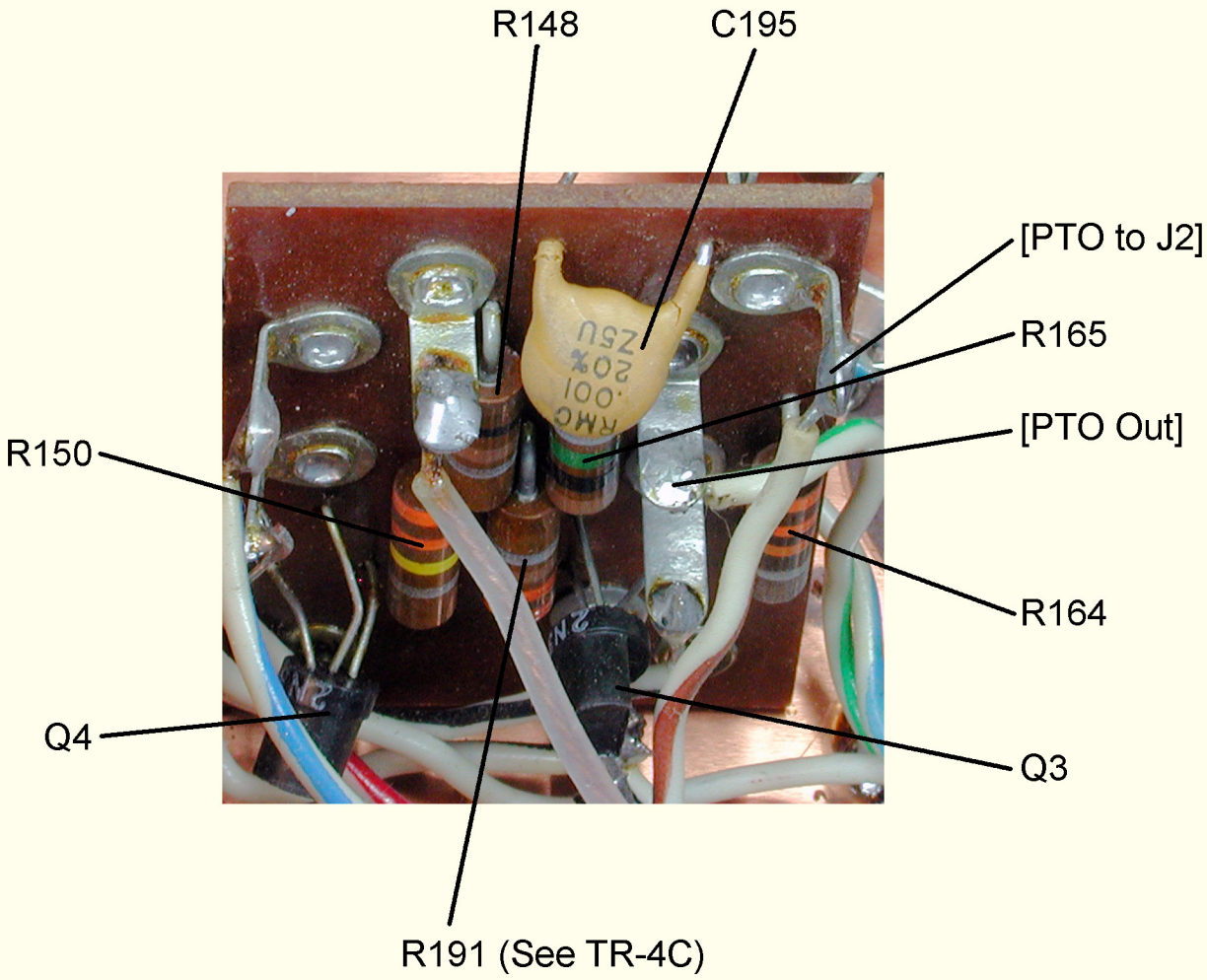
Figure 2



PTO, Indicator,
Ext PTO Control

R L DRAKE TR-4
Board 1

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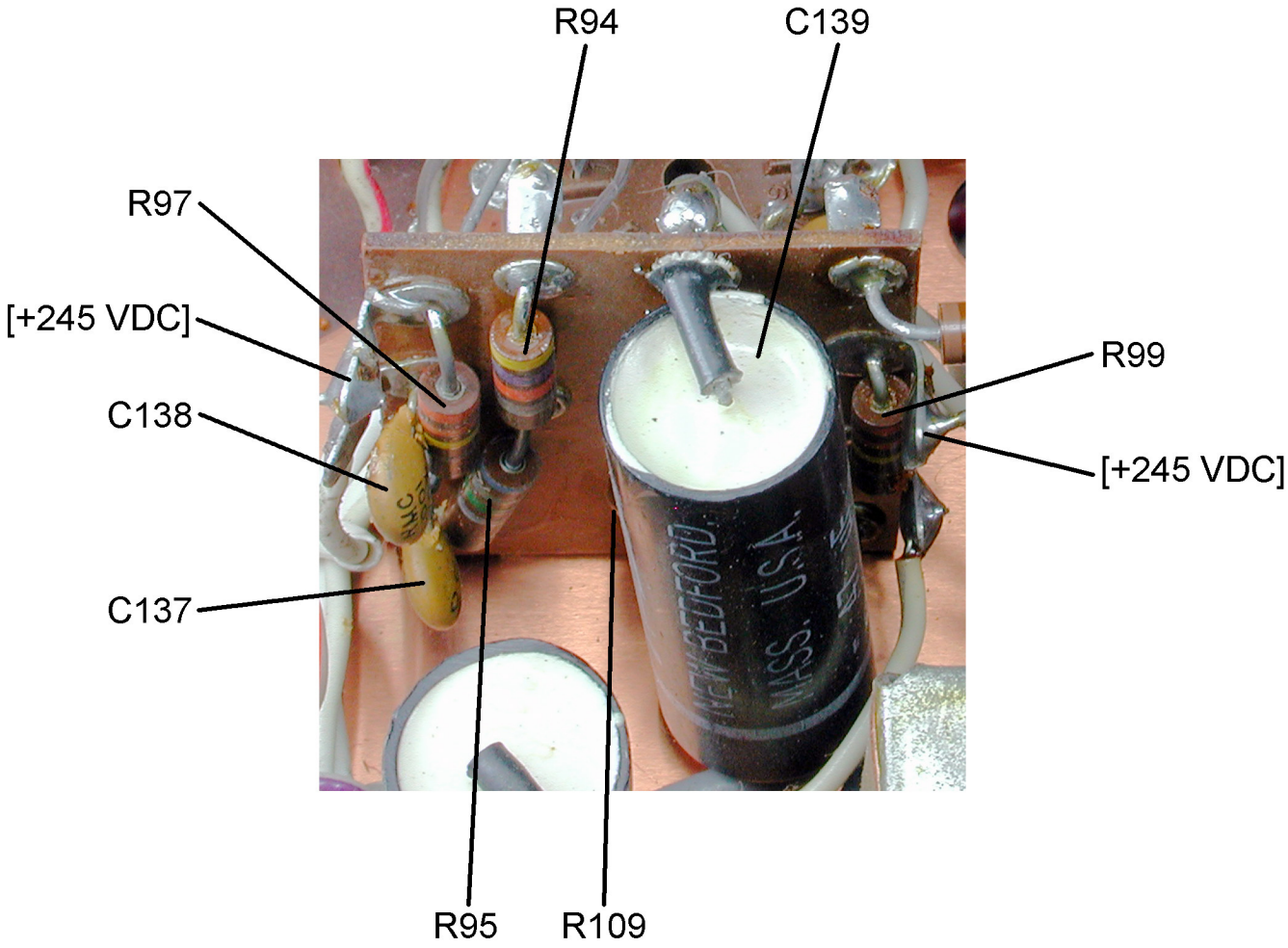

Mike Amp

R L DRAKE TR-4
Board 2

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AM Screen
Modulator

R L DRAKE TR-4
Board 3

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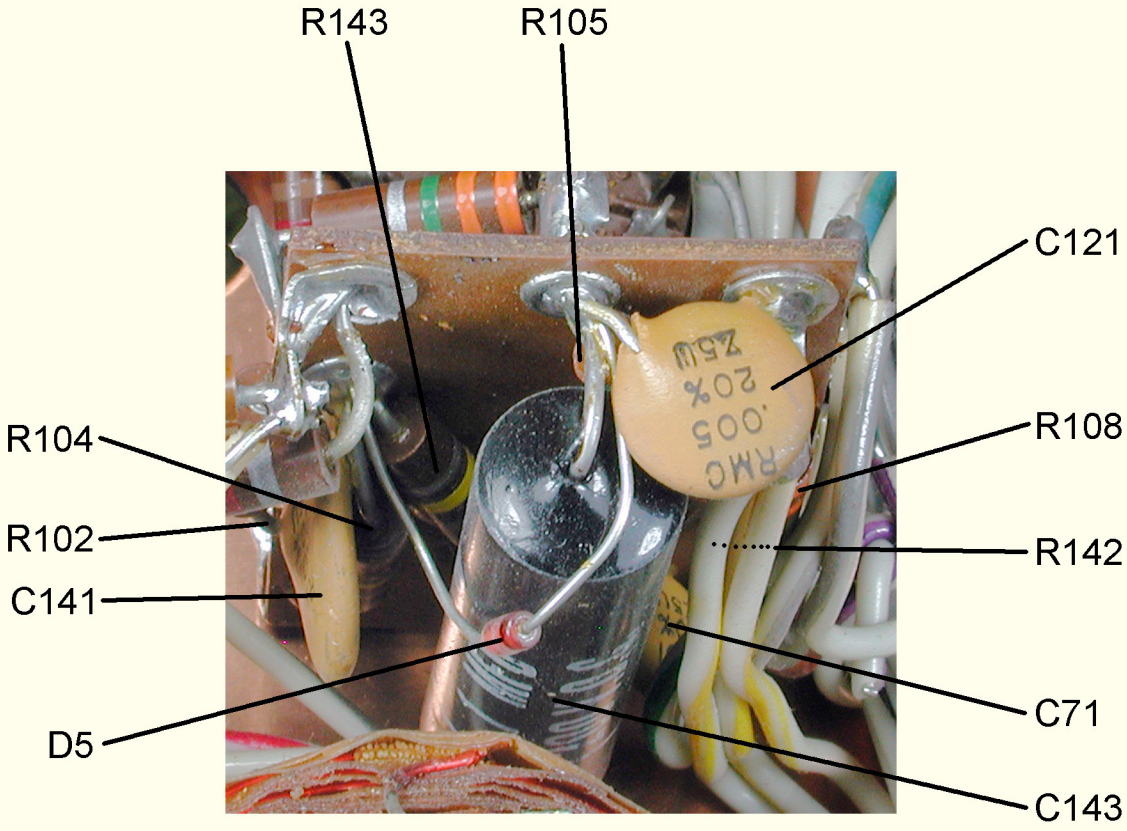

VOX

R L DRAKE TR-4
Board 4

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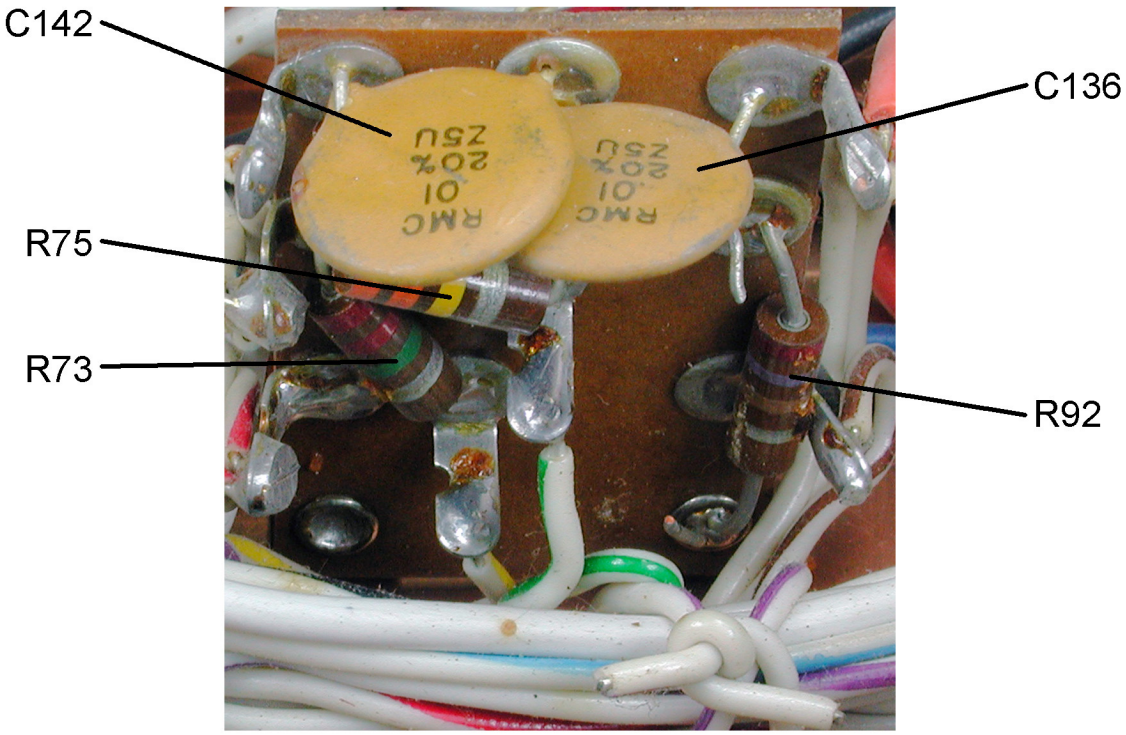

AF Output

R L DRAKE TR-4
Board 5

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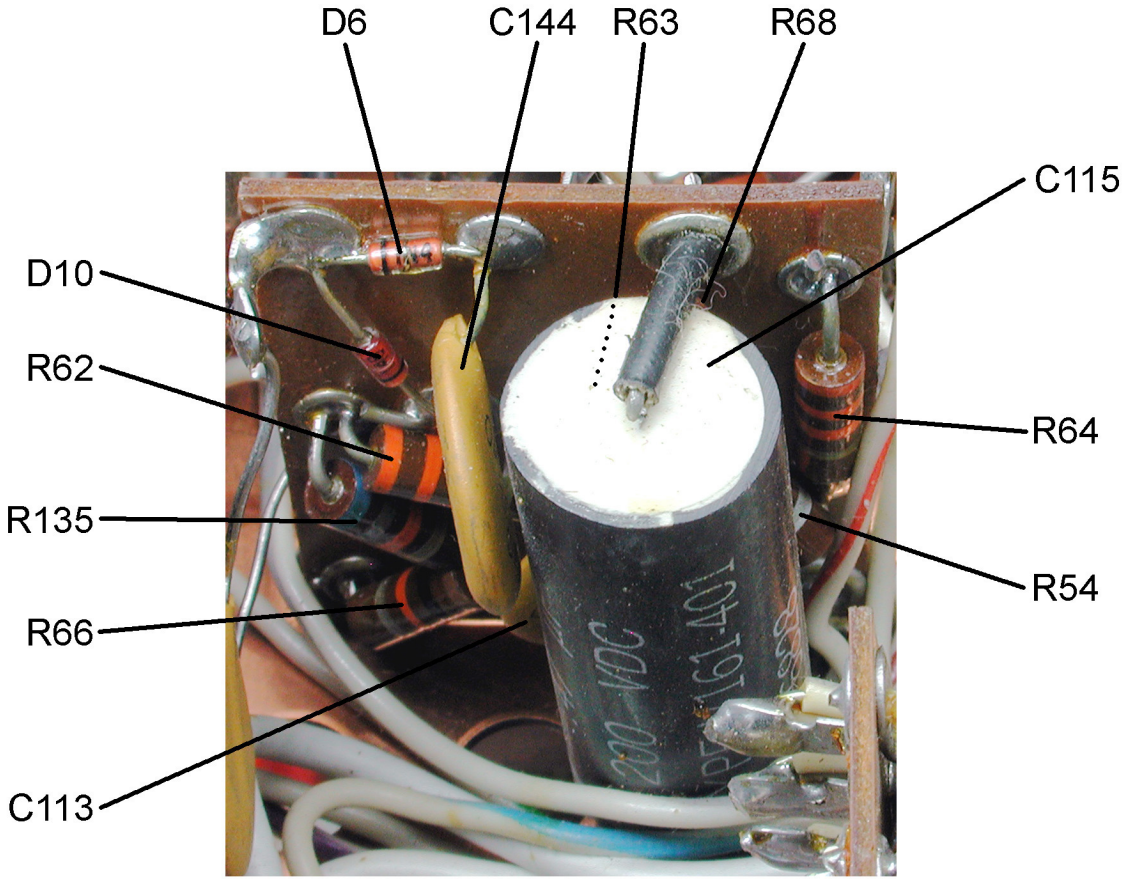

RCVR AGC, ANTI-VOX

R L DRAKE TR-4
Board 6

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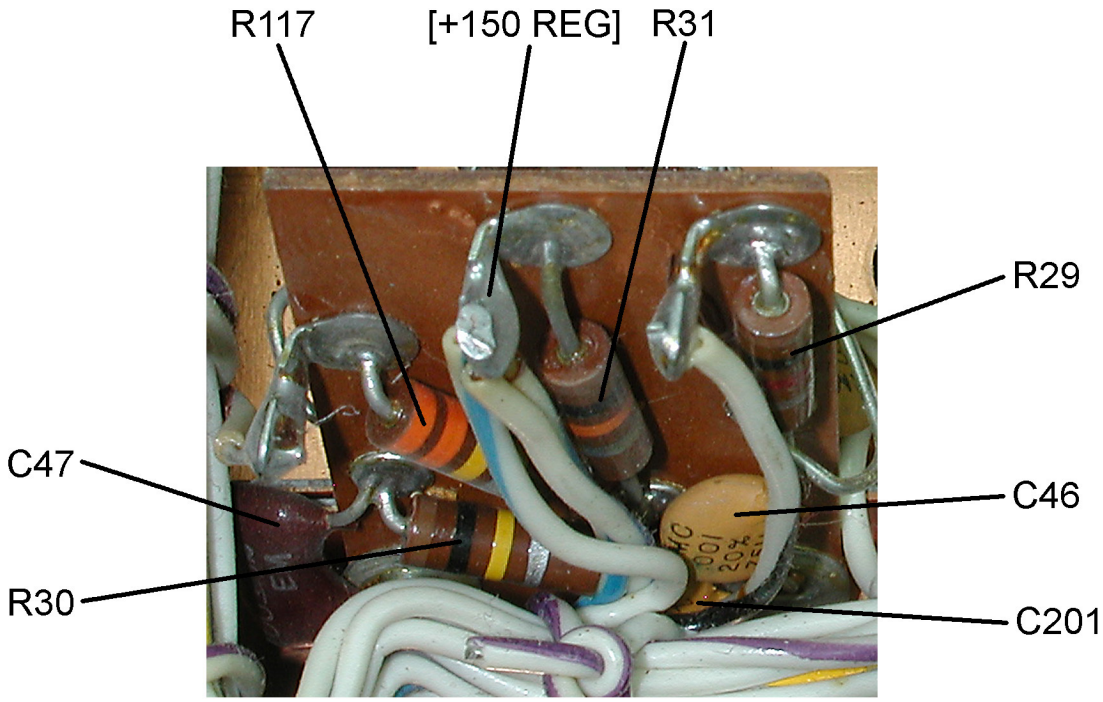

100 KHZ CALIBRATOR

R L DRAKE TR-4
Board 7

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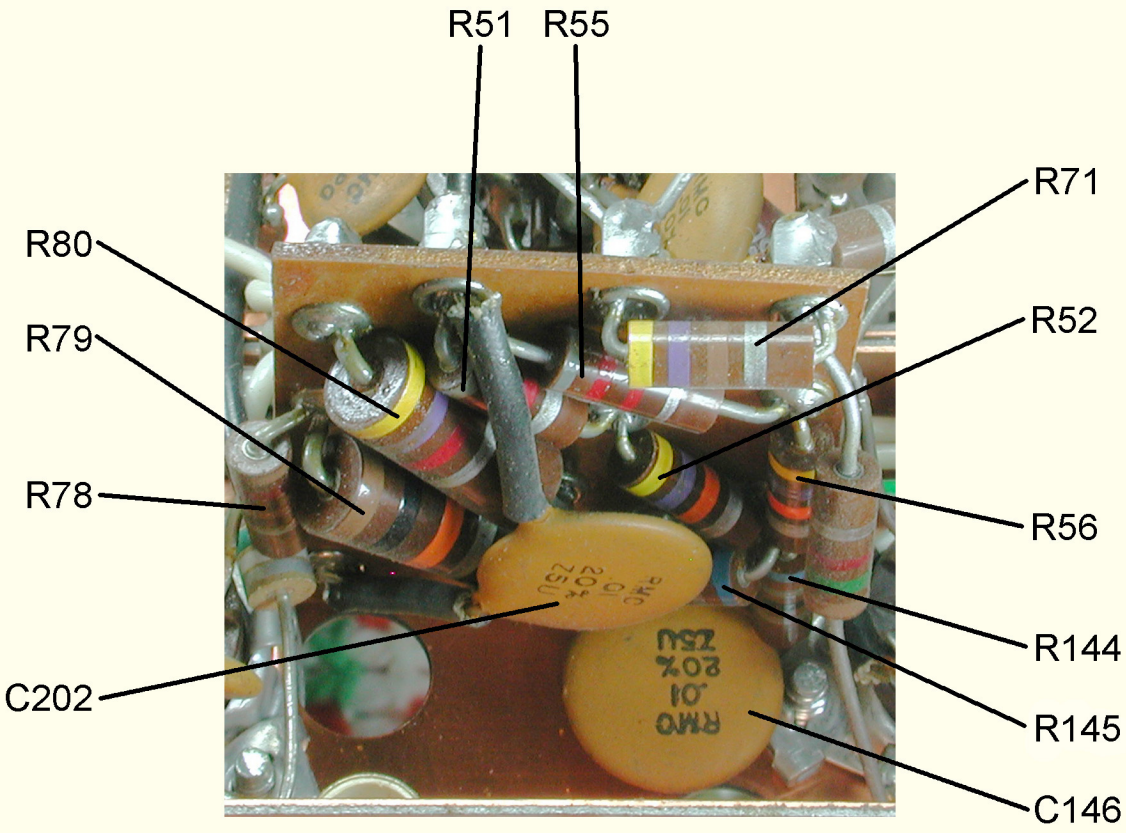

RCVR IF, XMIT IF

R L DRAKE TR-4
Board 8

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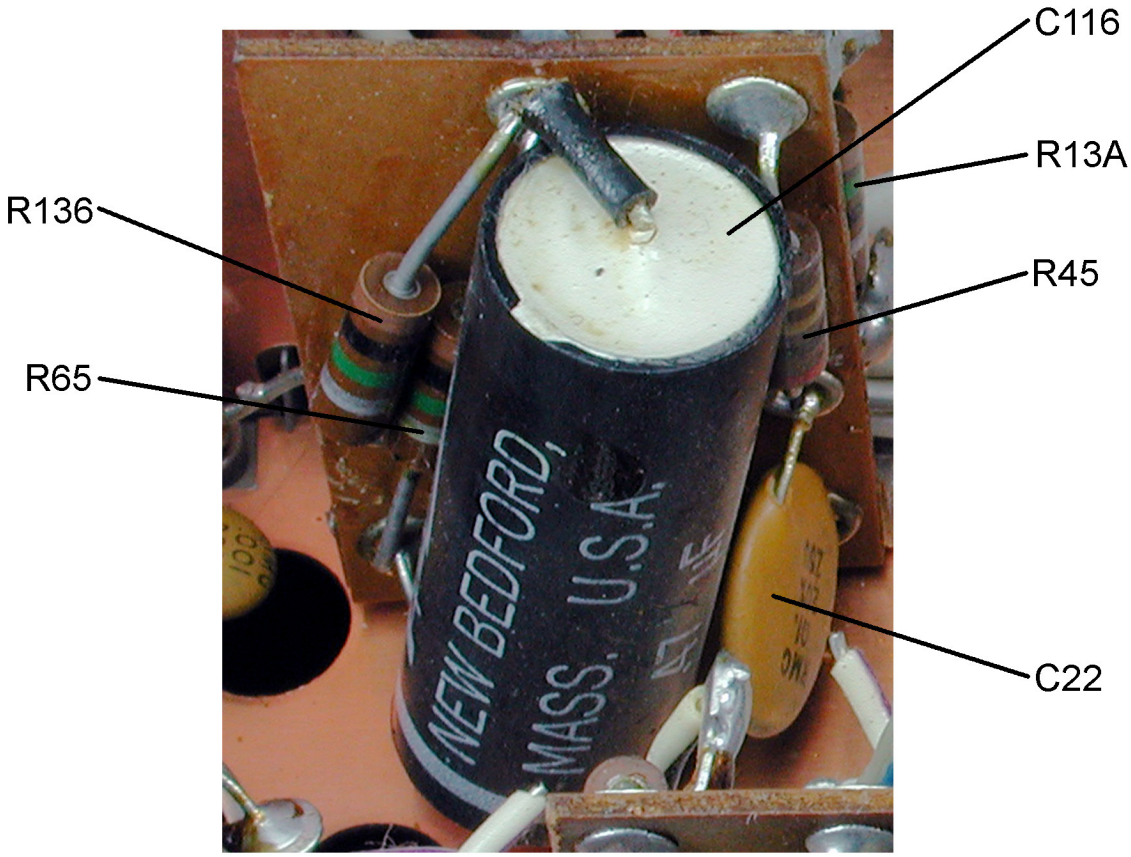

XMIT ALC, METER SHUNT

R L DRAKE TR-4
Board 9

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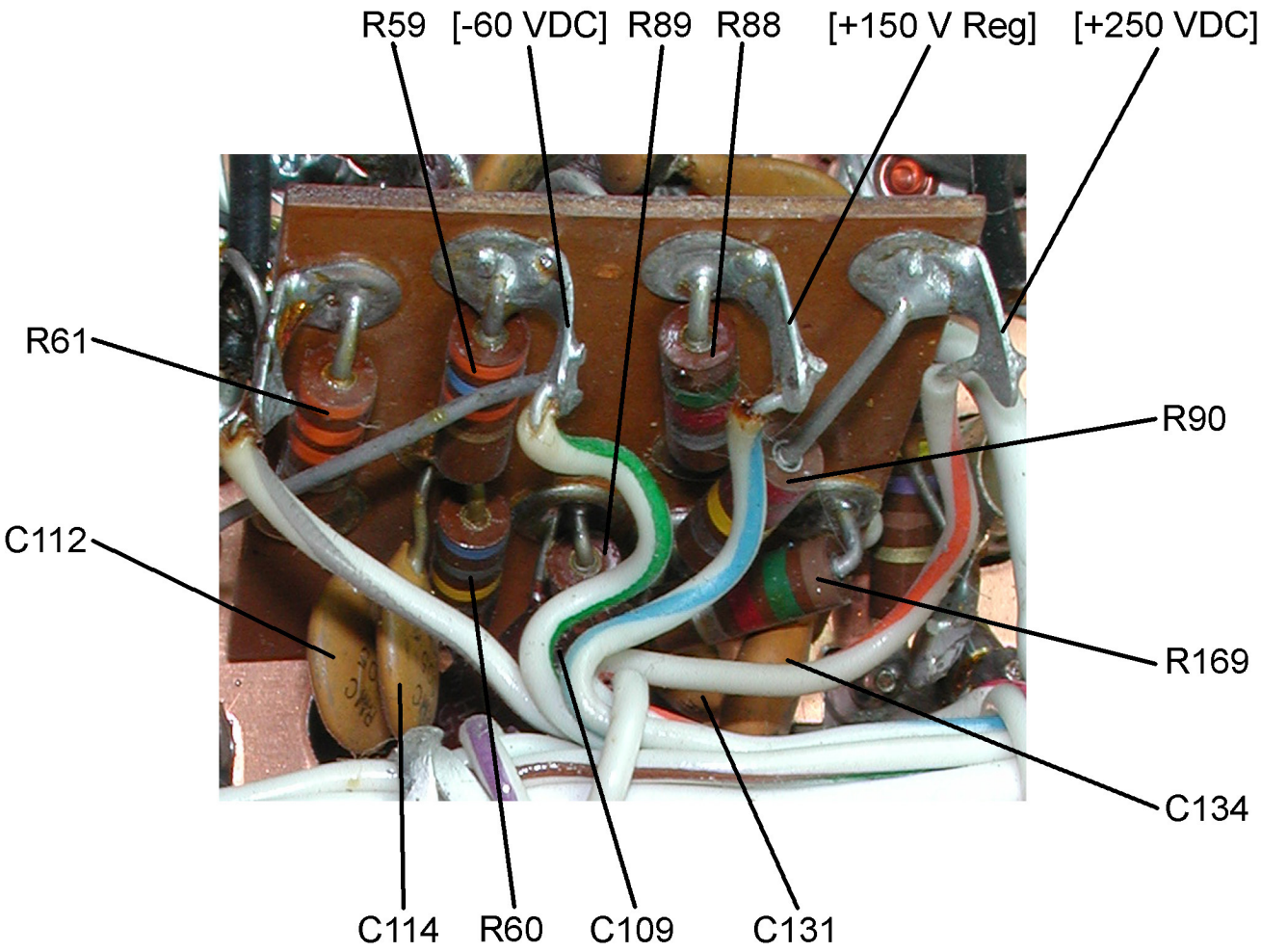

RCVR AGC, CARRIER OSC

R L DRAKE TR-4
Board 10

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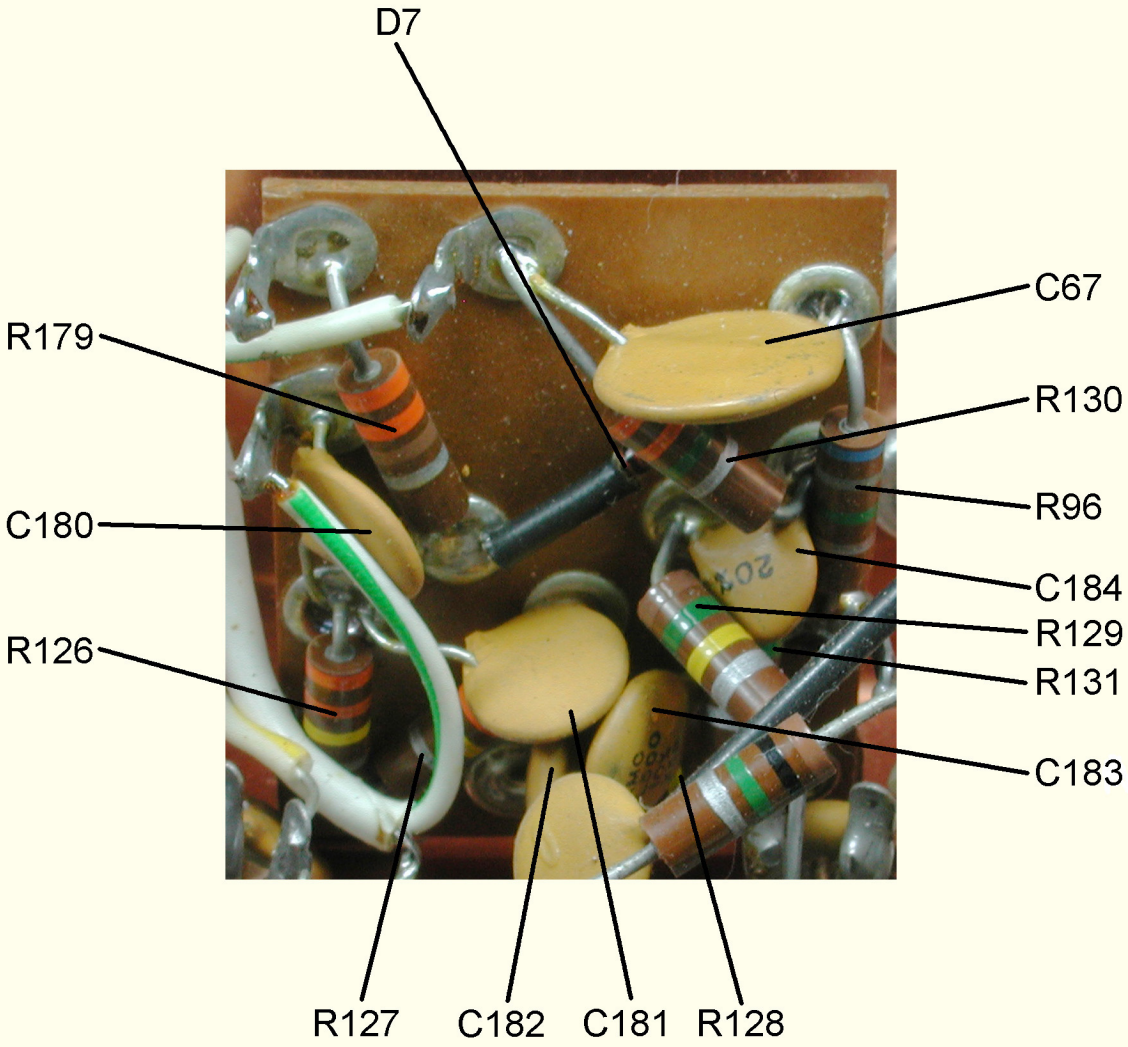

VOX, SIDETONE

R L DRAKE TR-4
Board 11

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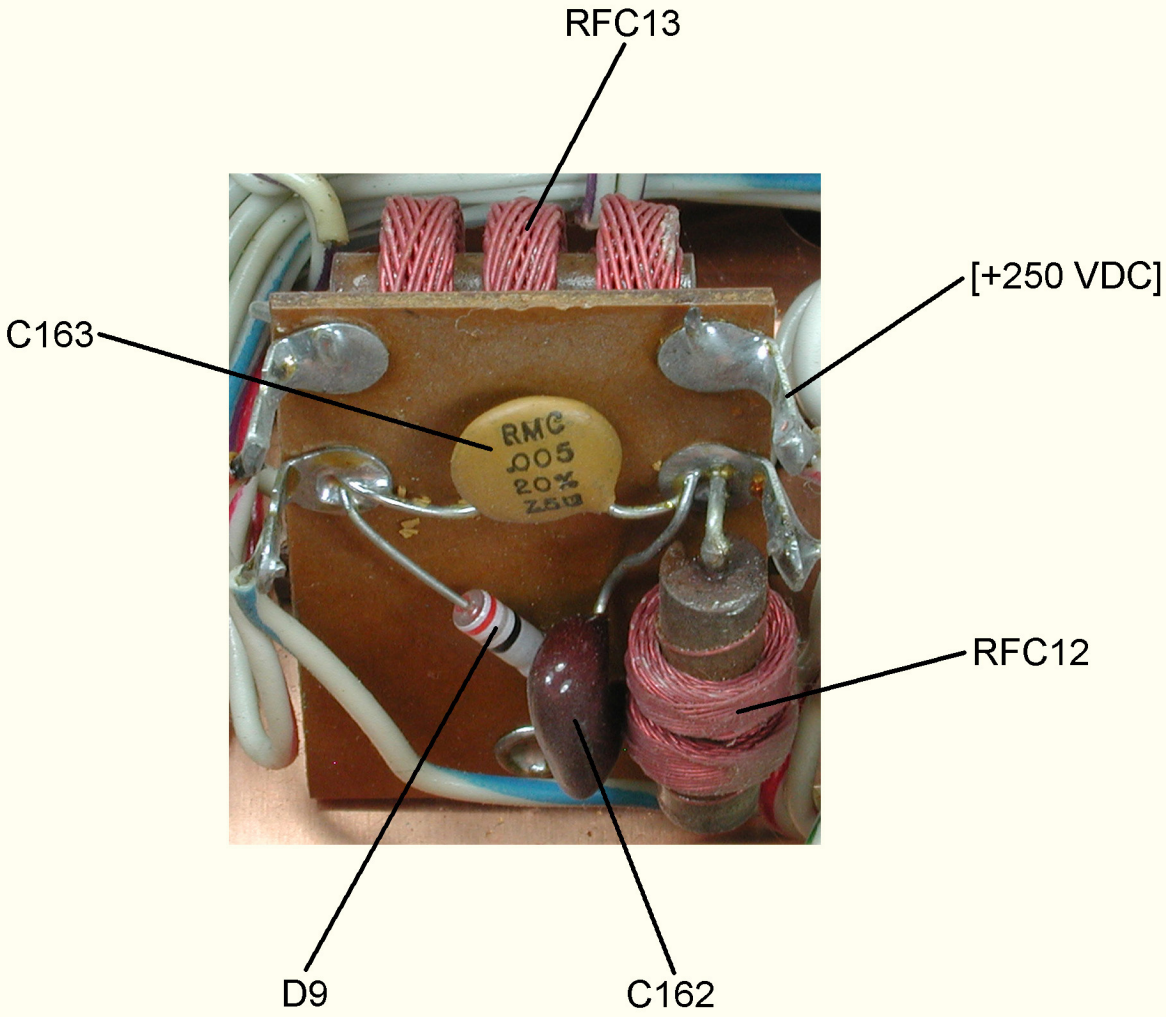

+250 FILTER
OUTPUT METER

R L DRAKE TR-4
Board 12

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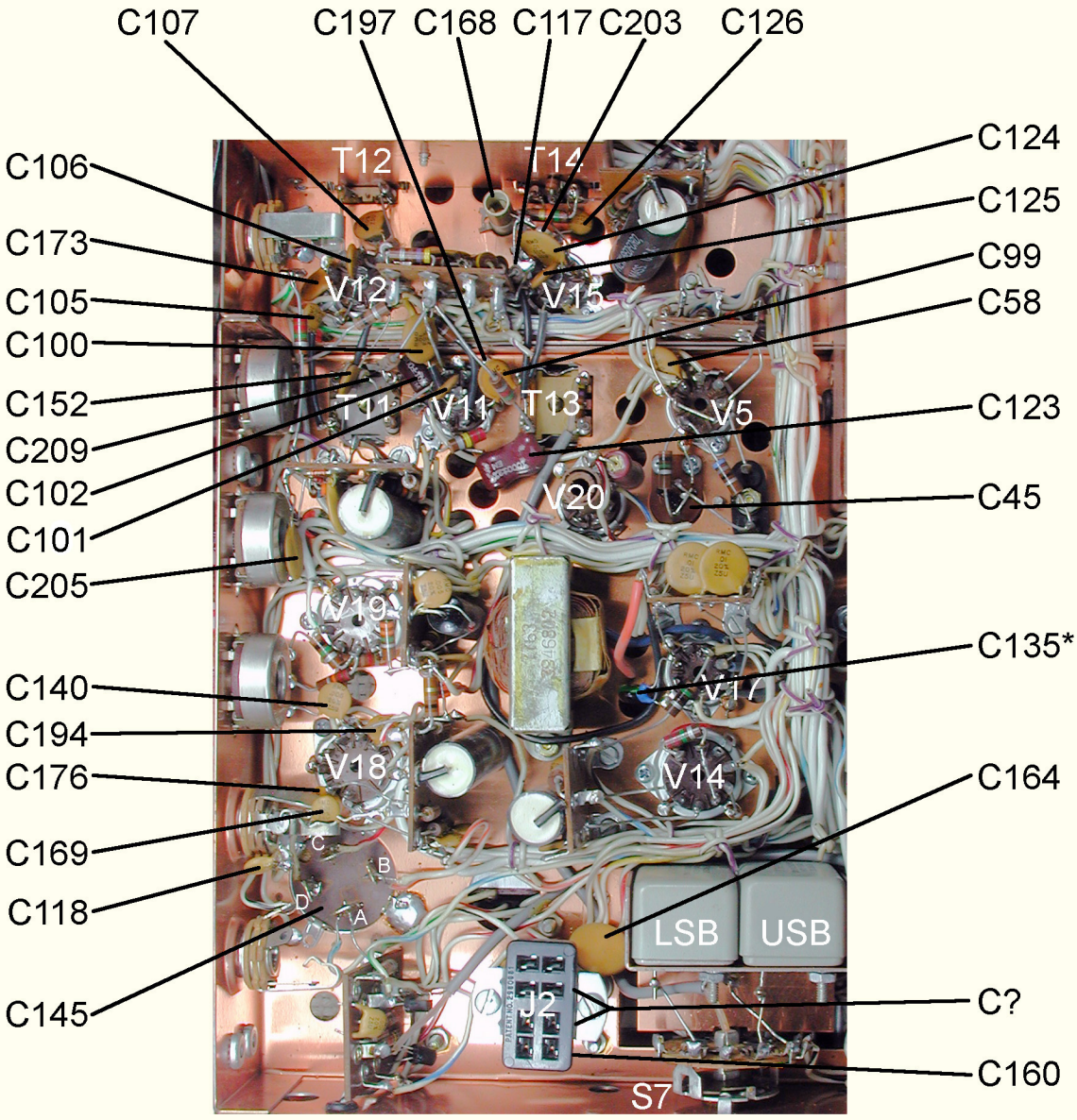

* NOTE: Repair. Original is on Board 5, across R92.

CAPACITORS

R L DRAKE TR-4
Lower Left Chassis

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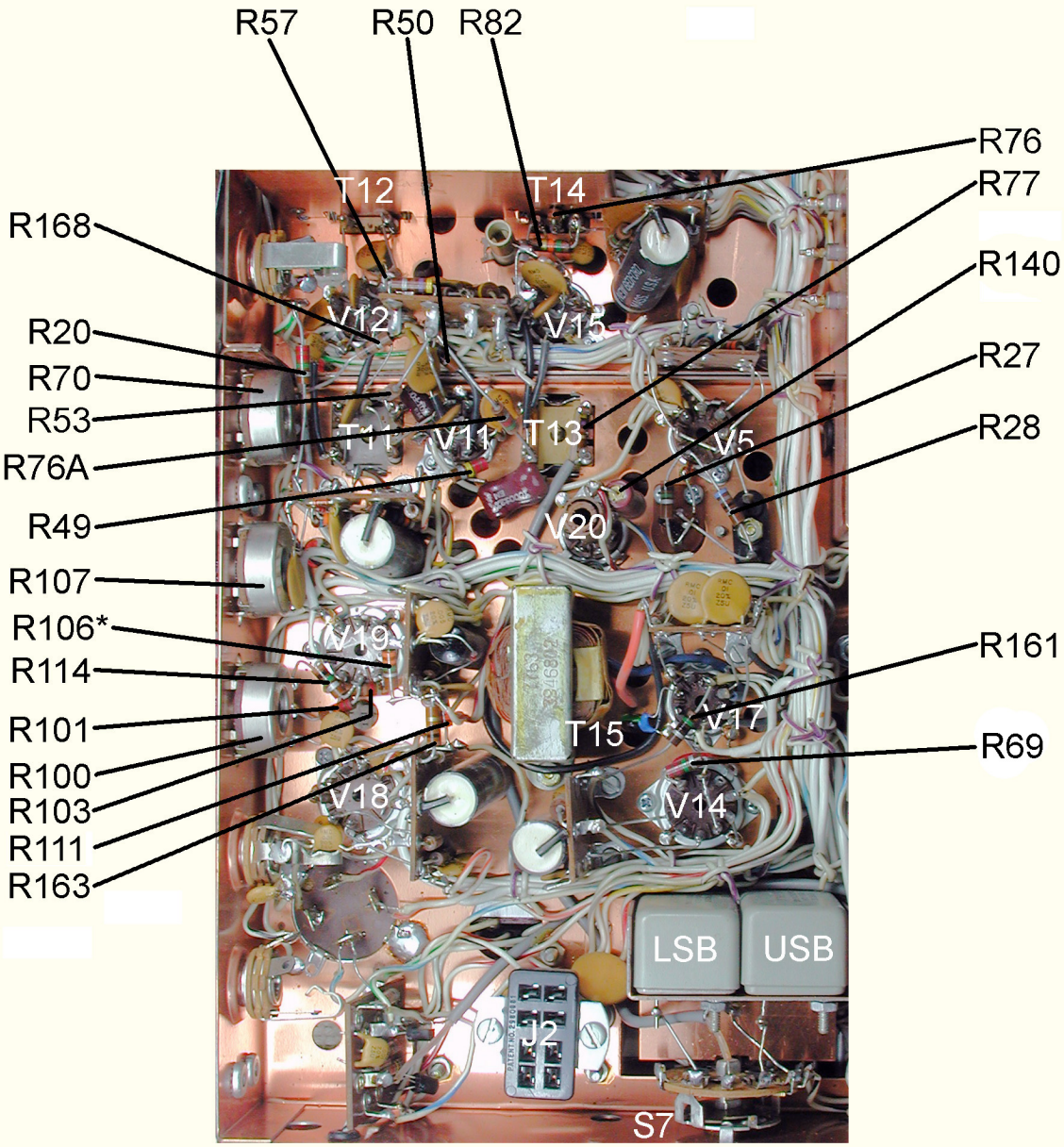

* NOTE: VOX Delay Adjust

RESISTORS

R L DRAKE TR-4
Lower Left Chassis

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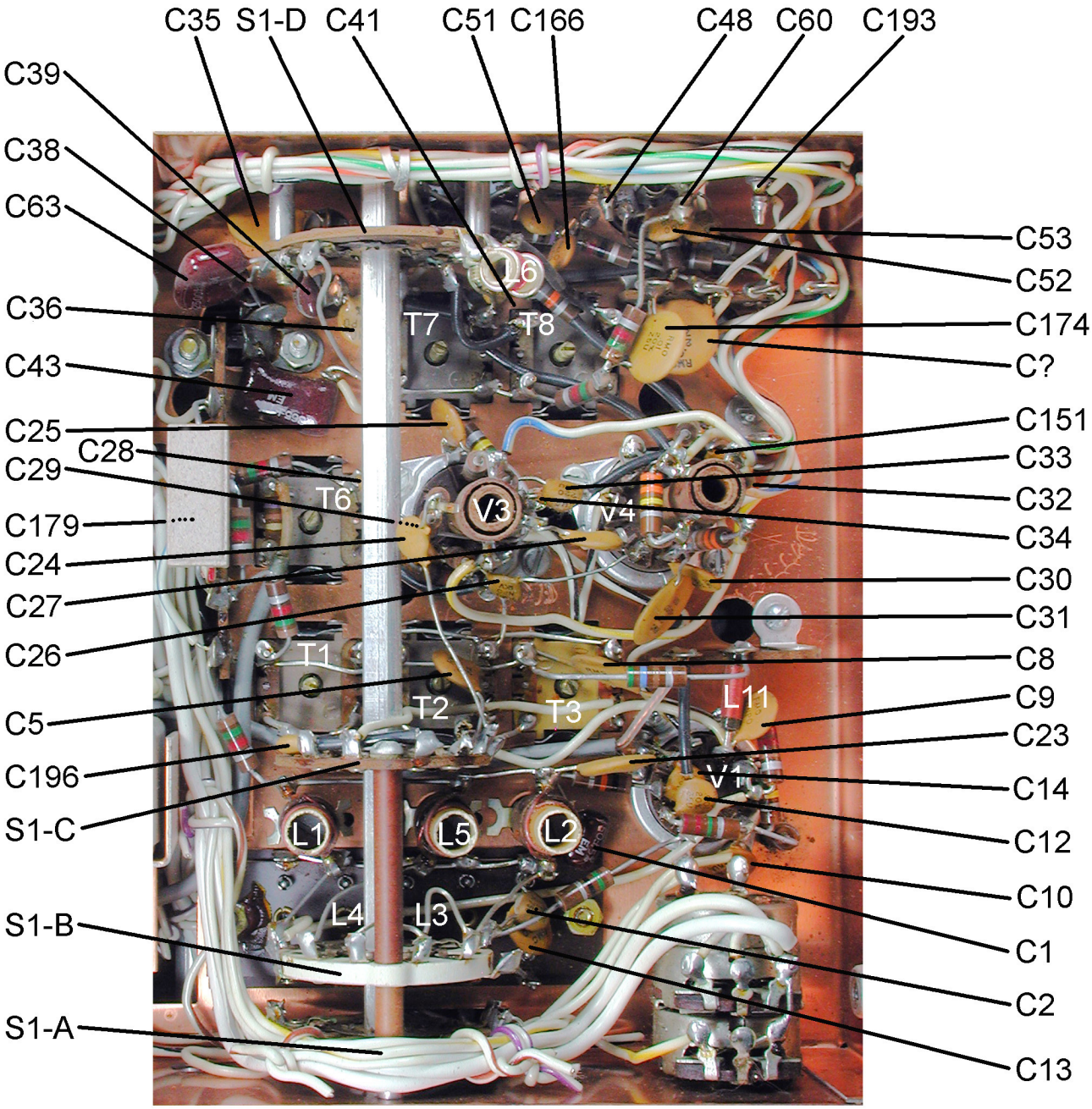

LOWER RIGHT CHASSIS
CAPACITORS

R L DRAKE TR-4
Lower Right Chassis

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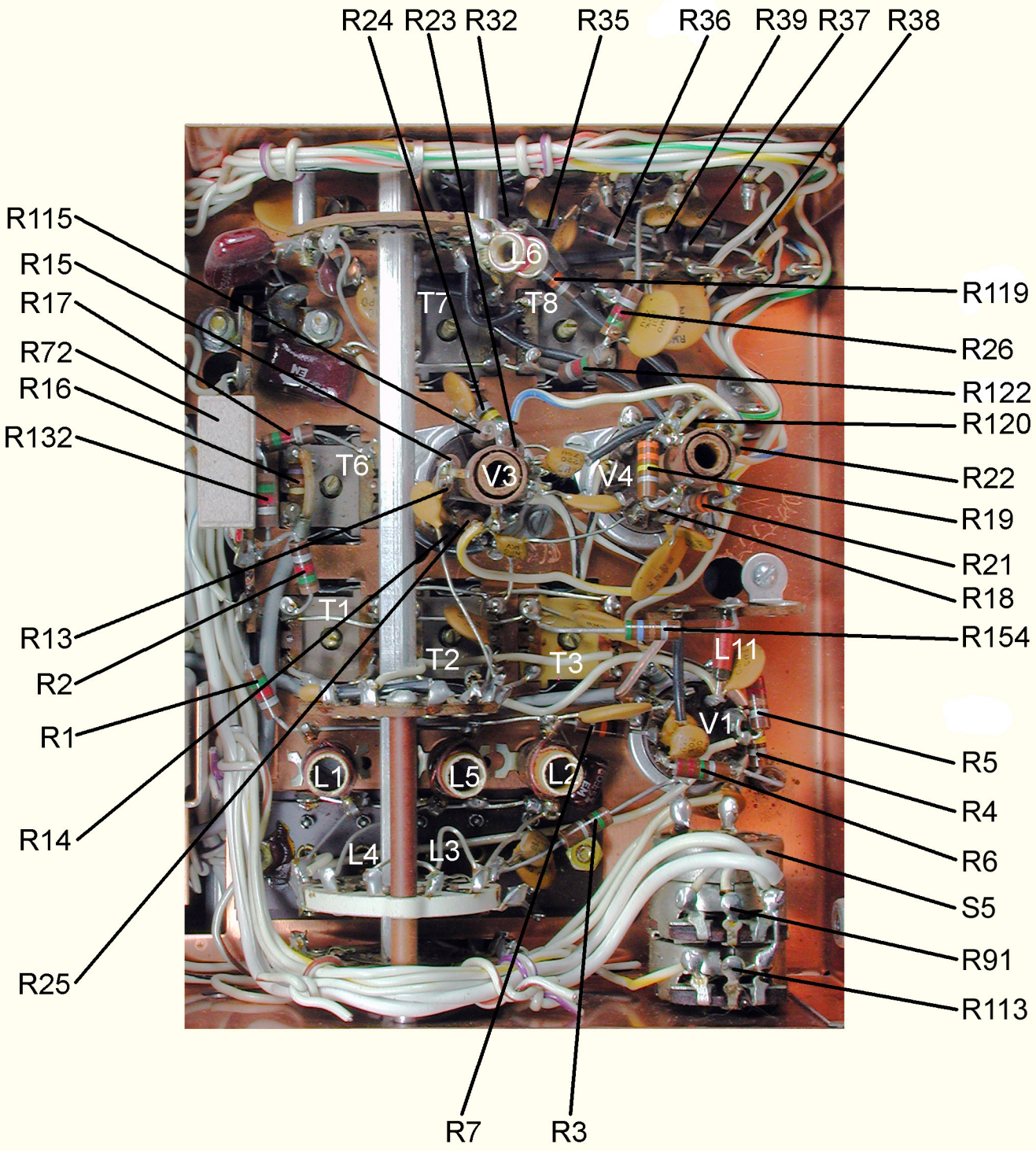

LOWER RIGHT CHASSIS
RESISTORS

R L DRAKE TR-4
Lower Right Chassis

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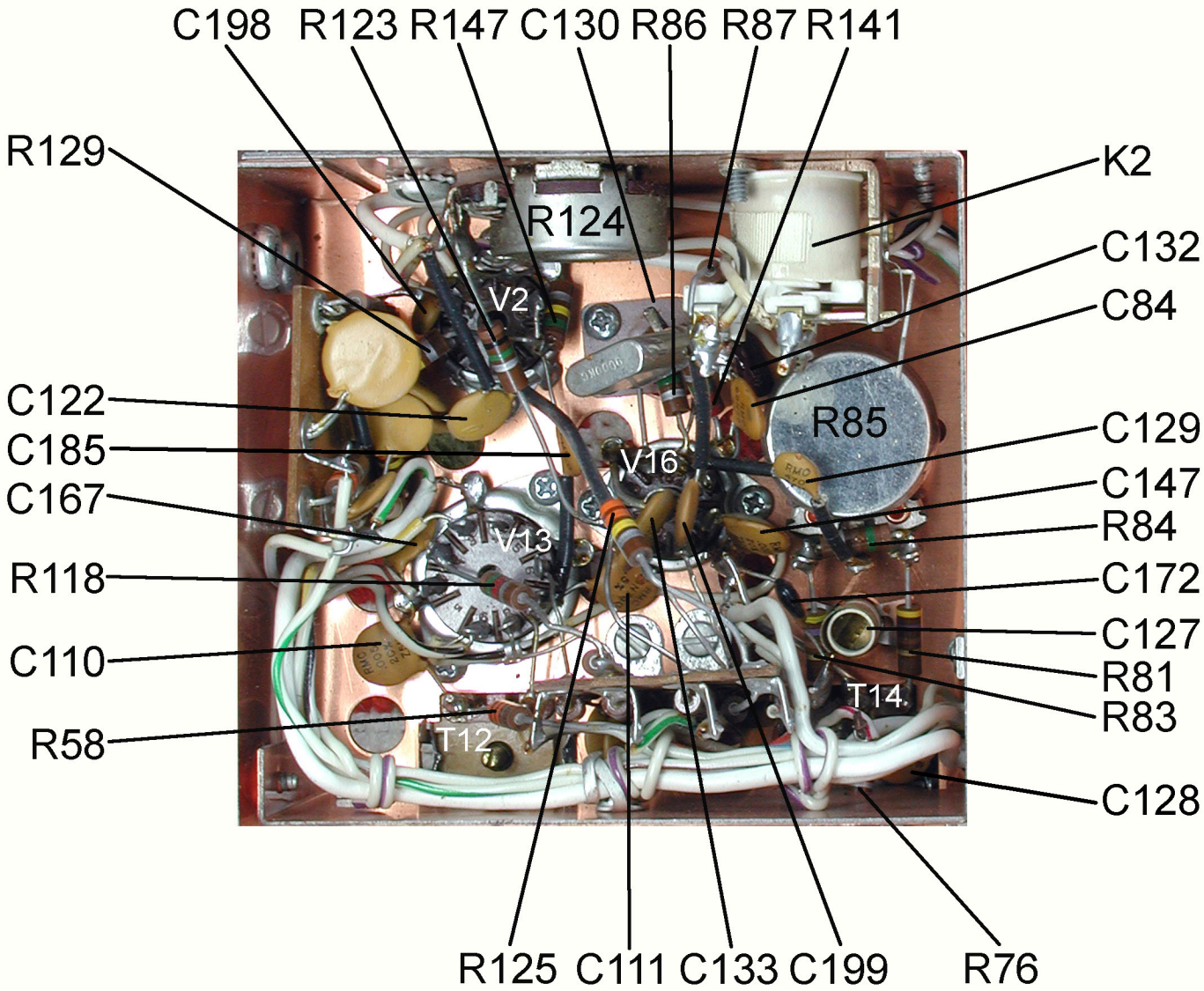

Balanced Modulator, XMIT IF, Sidetone Osc,
BFO-Prod Det, Detector-1st AF Amplifier

R L DRAKE TR-4
Carrier Oscillator

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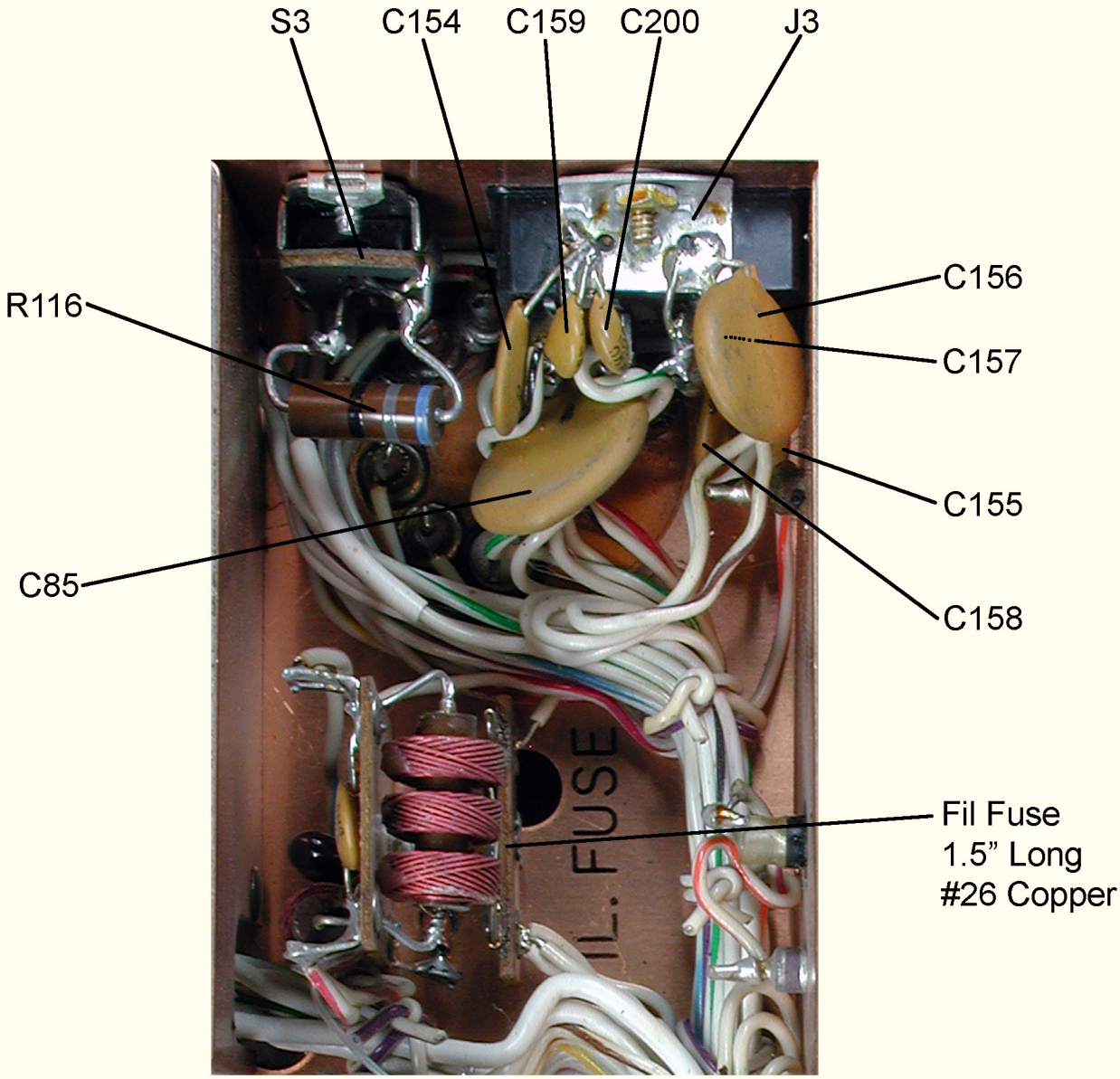

R L DRAKE TR-4
Power Compartment

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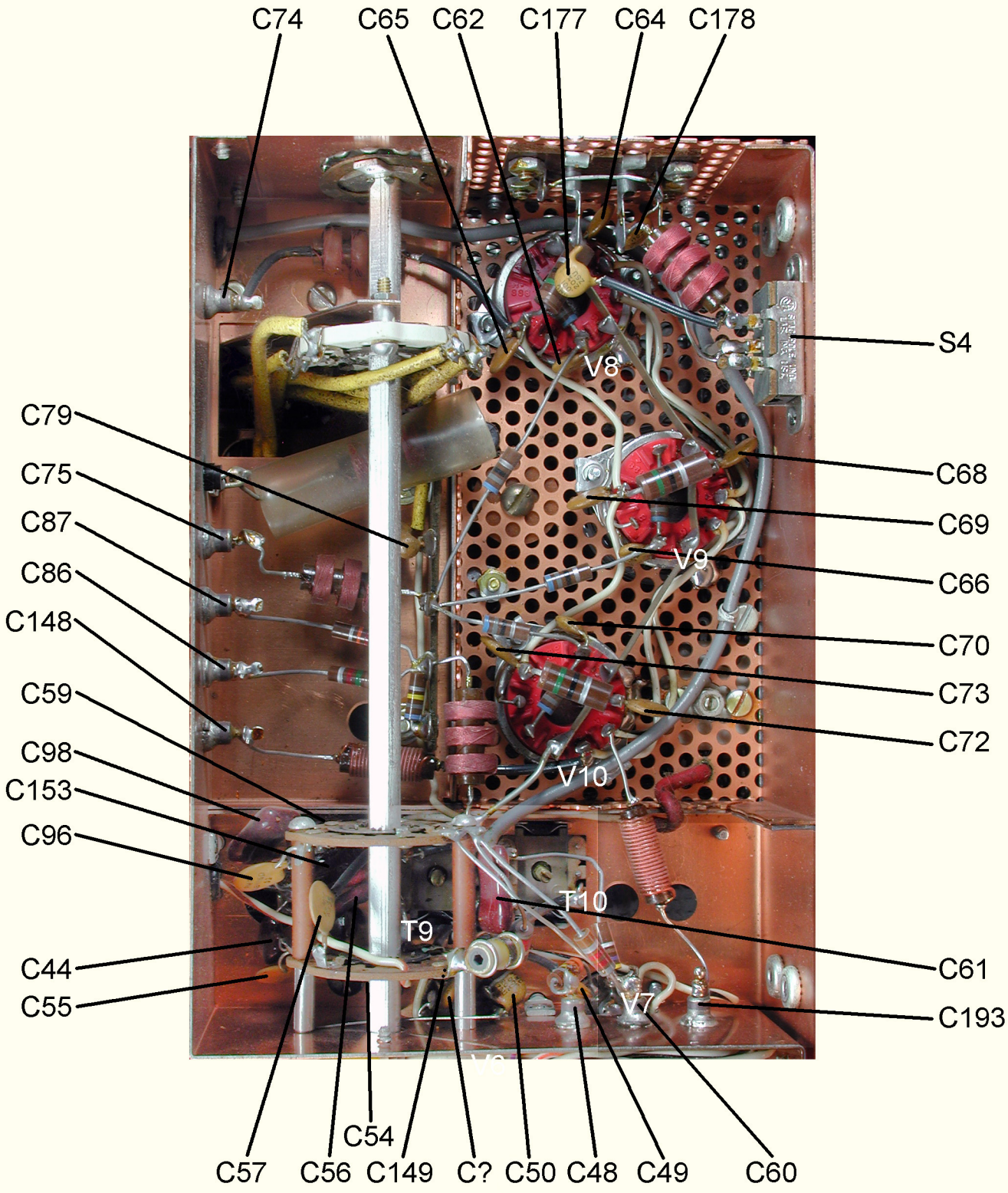

PA BOTTOM
CAPACITORS

R L DRAKE TR-4
PA Bottom

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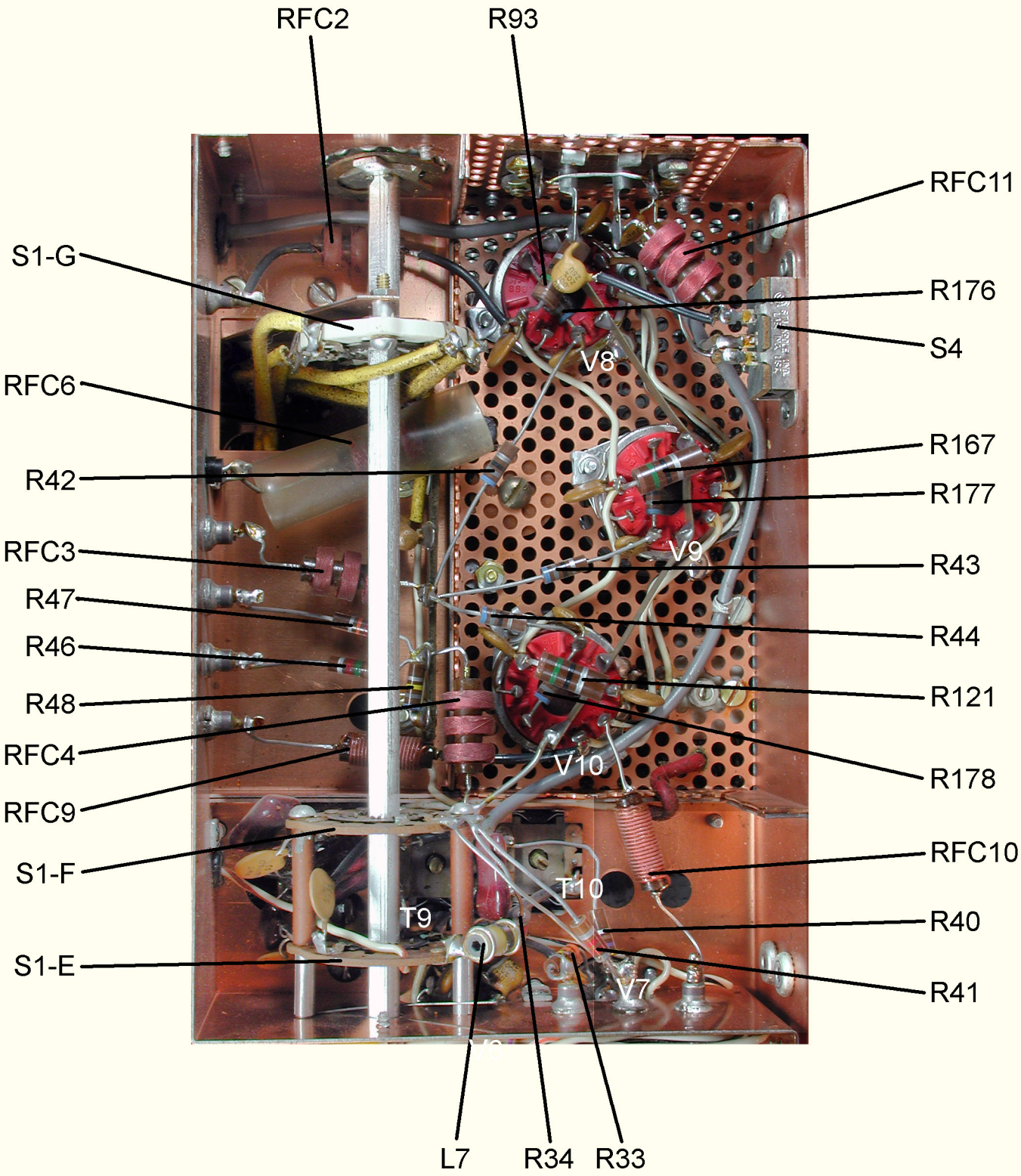

PA BOTTOM - R

R L DRAKE TR-4
PA Bottom

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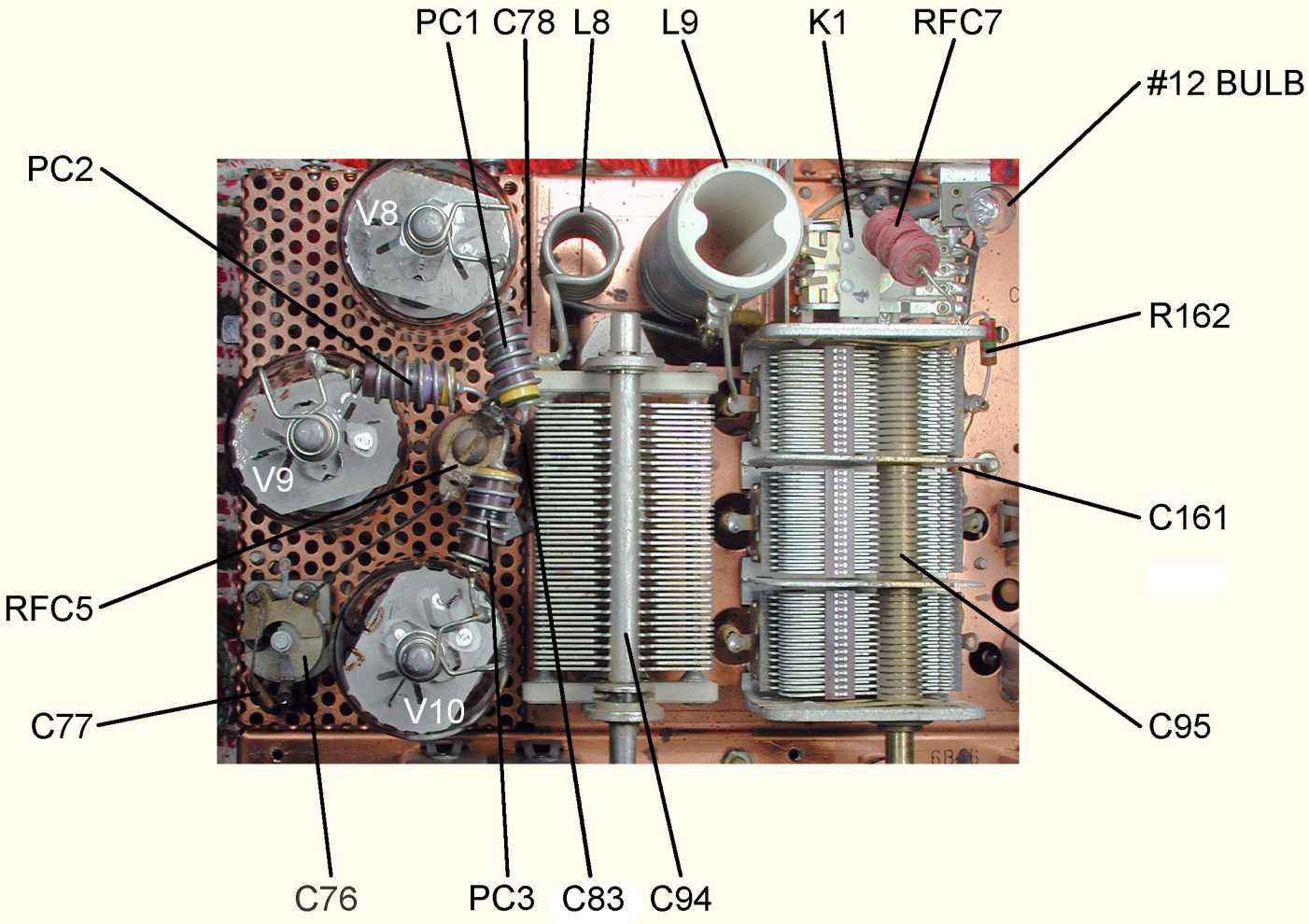

R L DRAKE TR-4
PA Top

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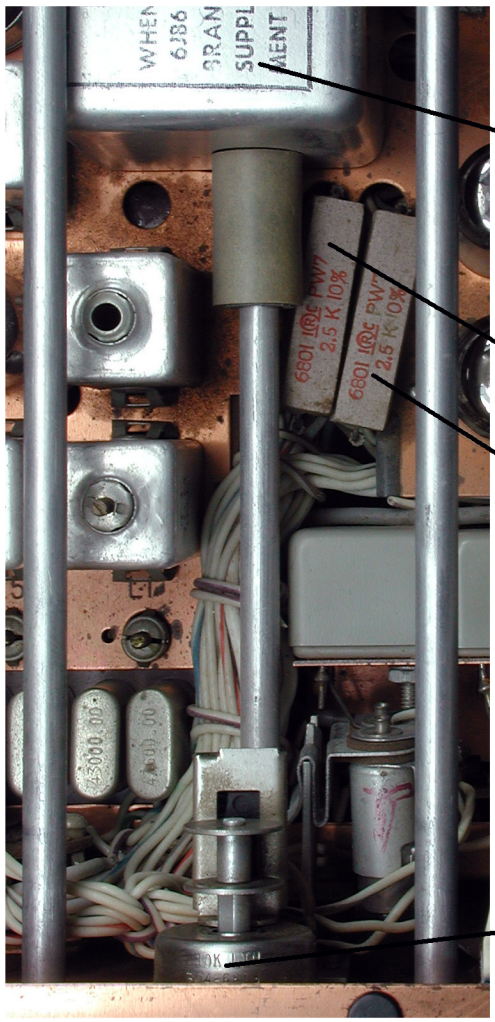

R L DRAKE TR-4
Chassis Top

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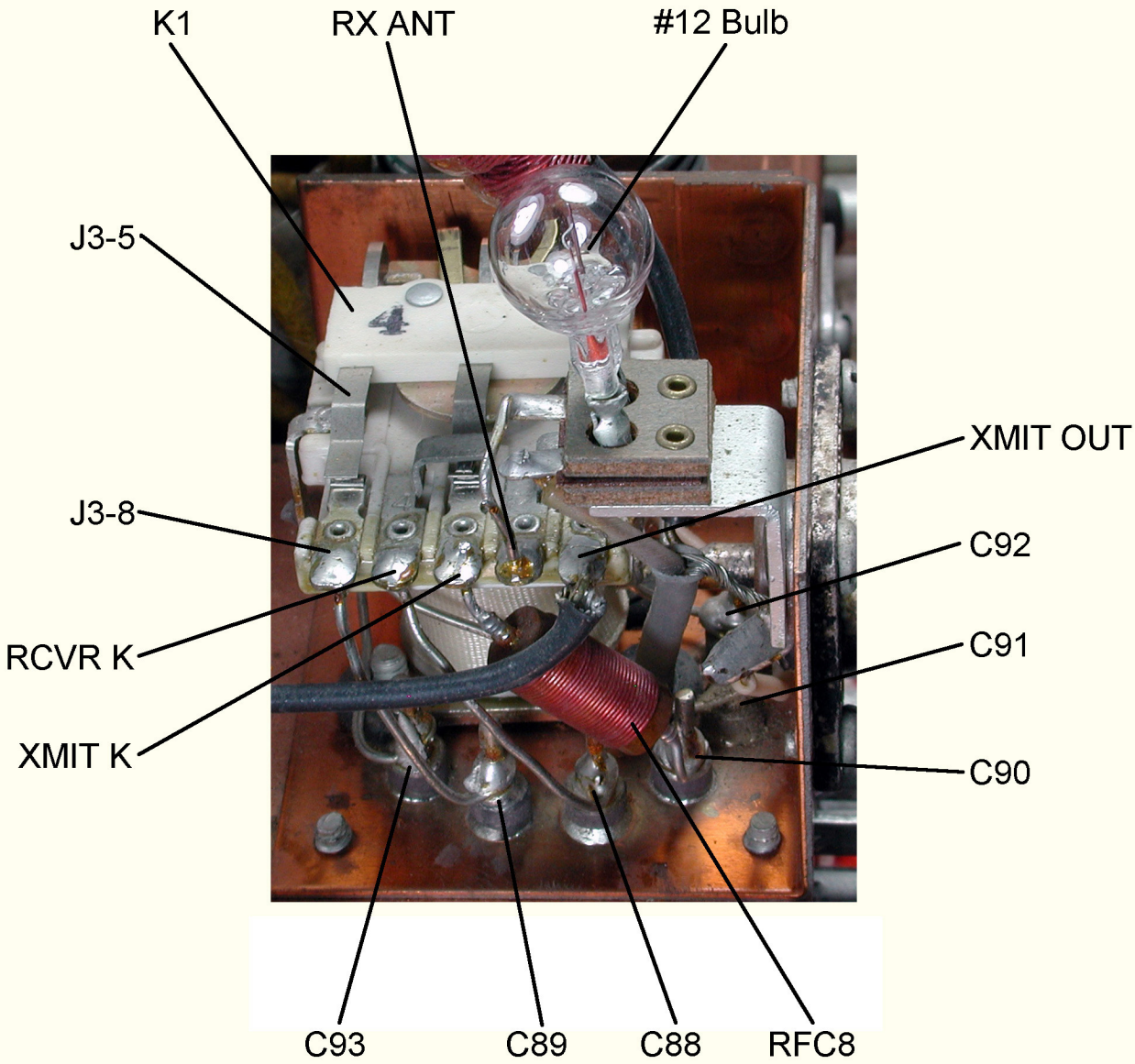

R L DRAKE TR-4
Relay K1

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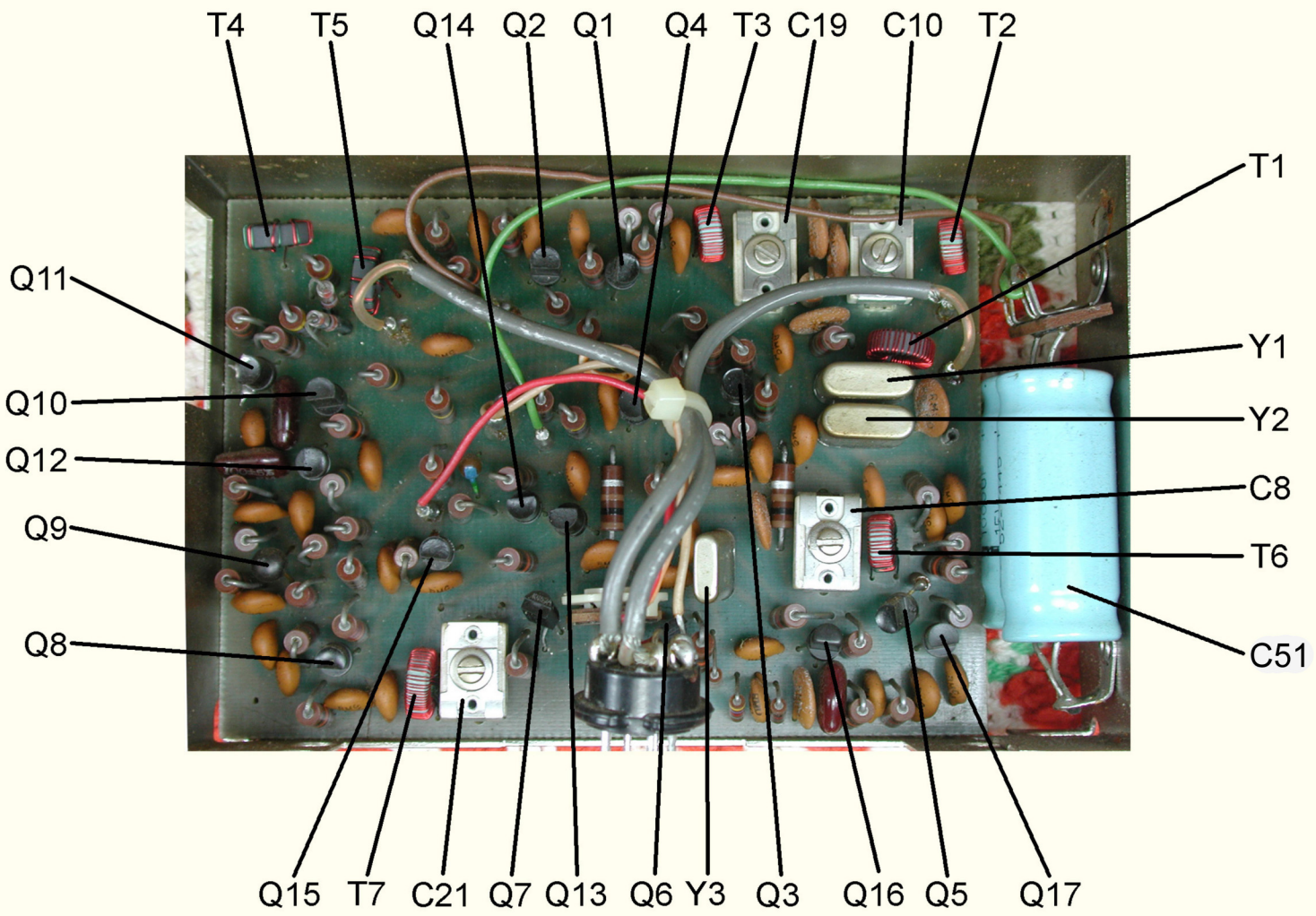

COMPONENT SIDE

R L DRAKE TR-4
34-PNB Noise Blanker

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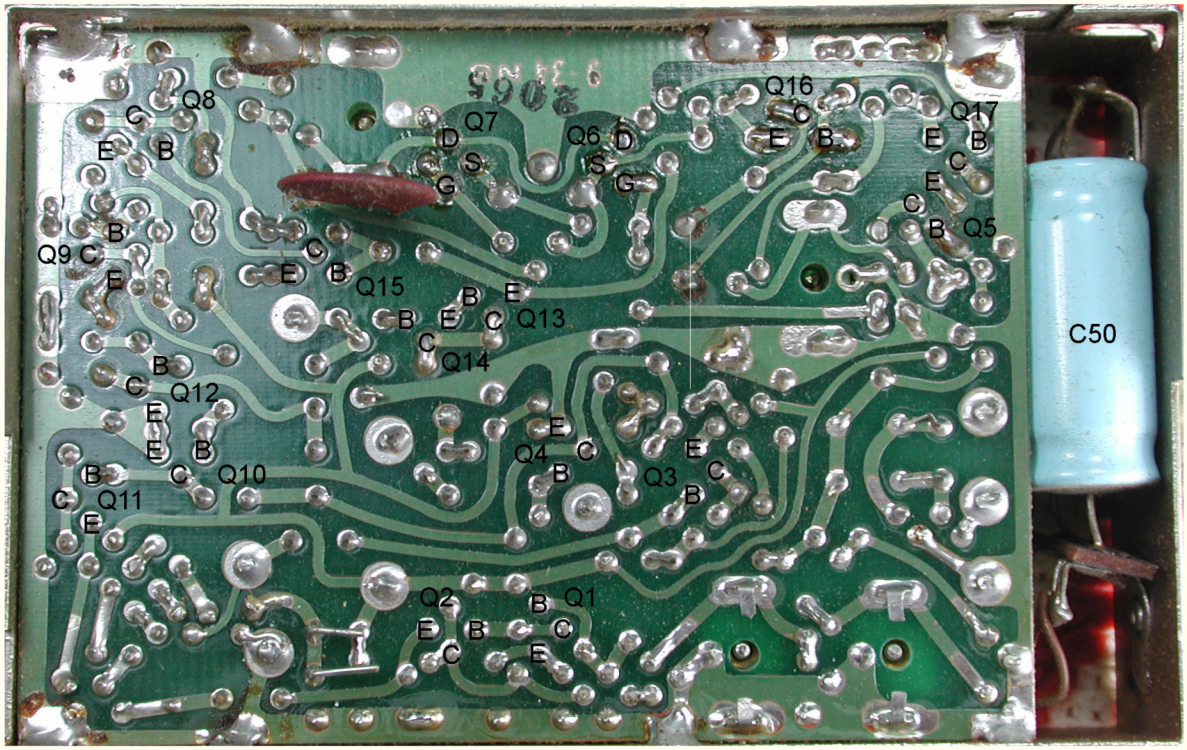

Device	E	B	C	Device	E	B	C	Device	G	D	S
Q1	2	2	8	**Q11**	6.5	7	13	**Q6**	0	11	0.8
Q2	7.5	8	12	**Q12**	0	2	5	**Q7**	0	11	0.92
Q3	13	12	13	**Q13**	4	4.5	13				
Q4	0	0	13	**Q14**	4.5	5	13				
Q5	13	3.5	4	**Q15**	3.2	4	3.5				
Q8	3.5	4	10.5	**Q16**	3.5	4	10				
Q9	3.5	4	10	**Q17**	3	3.5	3				
Q10	0	0	7								

Data Courtesy
Bill Frost, R L Drake Co.

R L DRAKE TR-4
34-PNB Noise Blanker

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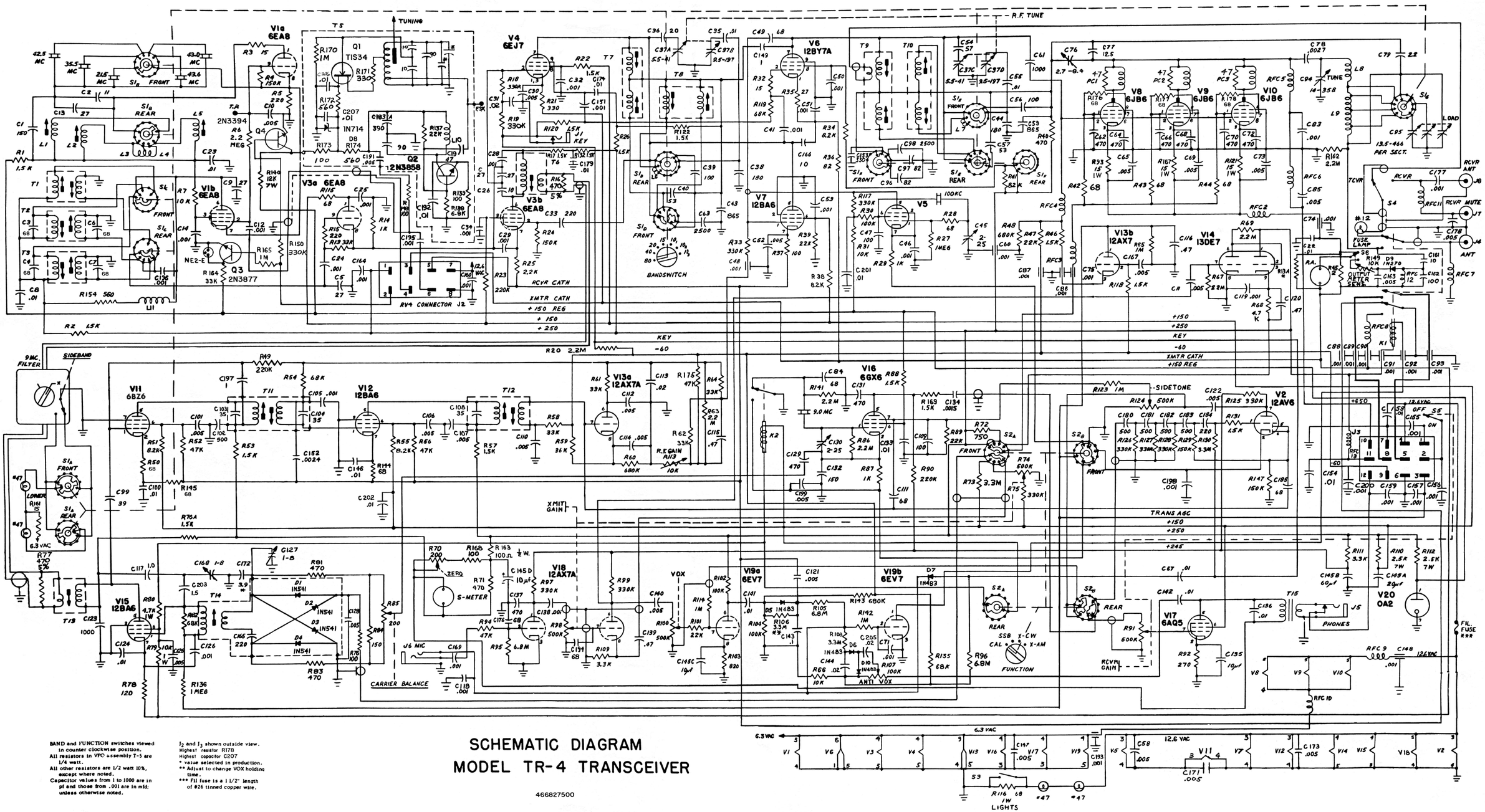

BAND and FUNCTION switches viewed in counter clockwise position.
All resistors in VFO assembly T-5 are 1/4 watt.
All other resistors are 1/2 watt 10%, except where noted.
Capacitor values from 1 to 1000 are in pf and those from .001 are in mfd; unless otherwise noted.

J_2 and J_3 shown outside view.
Highest resistor R178
Highest capacitor C207
* value selected in production.
** Adjust to change VOX holding time.
*** Fil fuse is a 1 1/2" length of #26 tinned copper wire.

SCHEMATIC DIAGRAM
MODEL TR-4 TRANSCEIVER

466827500

ID	Location	Page	Value	Unit	W	Tol.	Type
R1	LR-R	16	1.5k	Ohms	0.5	10%	CC
R2	LR-R	16	1.5k	Ohms	0.5	10%	CC
R3	LR-R	16	15	Ohms	0.5	10%	CC
R4	LR-R	16	150k	Ohms	0.5	10%	CC
R5	LR-R	16	220	Ohms	0.5	10%	CC
R6	LR-R	16	2.2M	Ohms	0.5	10%	CC
R7	LR-R	16	10k	Ohms	0.5	10%	CC
R8	N/A	N/A					
R9	N/A	N/A					
R10	N/A	N/A					
R11	N/A	N/A					
R12	N/A	N/A					
R13	LR-R	16	33k	Ohms	0.5	10%	CC
R13A	B9	9	Selected		0.5	10%	CC
R14	LR-R	16	1k	Ohms	0.5	10%	CC
R15	LR-R	16	220	Ohms	0.5	10%	CC
R16	LR-R	16	470	Ohms	0.5	5%	CC
R17	LR-R	16	1.5k	Ohms	0.5	10%	CC
R18	LR-R	16	330k	Ohms	0.5	10%	CC
R19	LR-R	16	330k	Ohms	0.5	10%	CC
R20	LL-R	14	2.2M	Ohms	0.5	10%	CC
R21	LR-R	16	330	Ohms	0.5	10%	CC
R22	LR-R	16	1.5k	Ohms	0.5	10%	CC
R23	LR-R	16	220k	Ohms	0.5	10%	CC
R24	LR-R	16	150k	Ohms	0.5	10%	CC
R25	LR-R	16	2.2k	Ohms	0.5	10%	CC
R26	LR-R	16	1.5k	Ohms	0.5	10%	CC
R27	LL-R	14	1M	Ohms	0.5	10%	CC
R28	LL-R	14	68	Ohms	0.5	10%	CC
R29	B7	7	1k	Ohms	0.5	10%	CC
R30	B7	7	100k	Ohms	0.5	10%	CC
R31	B7	7	10k	Ohms	0.5	10%	CC
R32	LR-R	16	15	Ohms	0.5	10%	CC
R33	PAB-R	20	330k	Ohms	0.5	10%	CC
R34	PAB-R	20	8.2k	Ohms	0.5	10%	CC
R35	LR-R	16	27	Ohms	0.5	10%	CC
R36	LR-R	16	82	Ohms	0.5	10%	CC
R37	LR-R	16	100	Ohms	0.5	10%	CC
R38	LR-R	16	8.2k	Ohms	0.5	10%	CC
R39	LR-R	16	22k	Ohms	0.5	10%	CC
R40	PAB-R	20	470	Ohms	0.5	10%	CC
R41	PAB-R	20	8.2k	Ohms	0.5	10%	CC
R42	PAB-R	20	68	Ohms	0.5	10%	CC
R43	PAB-R	20	68	Ohms	0.5	10%	CC
R44	PAB-R	20	68	Ohms	0.5	10%	CC
R45	B9	9	2	Ohms	0.5	5%	CC
R46	PAB-R	20	1.5k	Ohms	0.5	10%	CC
R47	PAB-R	20	22k	Ohms	0.5	10%	CC
R48	PAB-R	20	680k	Ohms	0.5	10%	CC
R49	LL-R	14	220k	Ohms	0.5	10%	CC
R50	LL-R	14	68	Ohms	0.5	10%	CC

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ID	Location	Page	Value	Unit	W	Tol.	Type
R51	B8	8	8.2k	Ohms	0.5	10%	CC
R52	B8	8	47k	Ohms	0.5	10%	CC
R53	LL-R	14	1.5k	Ohms	0.5	10%	CC
R54	B6	6	68k	Ohms	0.5	10%	CC
R55	B8	8	8.2k	Ohms	0.5	10%	CC
R56	B8	8	47k	Ohms	0.5	10%	CC
R57	LL-R	14	1.5k	Ohms	0.5	10%	CC
R58	CO	17	33k	Ohms	0.5	10%	CC
R59	B10	10	36k	Ohms	0.5	10%	CC
R60	B10	10	680k	Ohms	0.5	10%	CC
R61	B10	10	33k	Ohms	0.5	10%	CC
R62	B6	6	33k	Ohms	0.5	10%	CC
R63	B6	6	2.2M	Ohms	0.5	10%	CC
R64	B6	6	33k	Ohms	0.5	10%	CC
R65	B9	9	1M	Ohms	0.5	10%	CC
R66	B6	6	10k	Ohms	0.5	10%	CC
R67	B3	3	22M	Ohms	0.5	10%	CC
R68	B3	3	4.7k	Ohms	0.5	10%	CC
R69	LL-R	14	2.2M	Ohms	0.5	10%	CC
R70	LL-R	14	200	Ohms			ZERO
R71	B8	8	470	Ohms	0.5	10%	CC
R72	LR-R	16	750	Ohms	5	10%	WW
R73	B5	5	3.3M	Ohms	0.5	10%	CC
R74	Front Panel	N/A	500k	Ohms			XMIT GAIN
R75	B5	5	330k	Ohms	0.5	10%	CC
R76	CO - LL-R	14, 17	100	Ohms	0.5	10%	CC
R76A	LL-R	14	1.5k	Ohms	0.5	10%	CC
R77	LL-R	14	470	Ohms	0.5	5%	CC
R78	B8	8	120	Ohms	0.5	10%	CC
R79	B8	8	10k	Ohms	1	10%	CC
R80	B8	8	4.7k	Ohms	1	10%	CC
R81	CO	17	470	Ohms	0.5	10%	CC
R82	LL-R	14	68k	Ohms	0.5	10%	CC
R83	CO	17	470	Ohms	0.5	10%	CC
R84	CO	17	150	Ohms	0.5	10%	CC
R85	CO	17	200	Ohms			Trimpot
R86	CO	17	2.2M	Ohms	0.5	10%	CC
R87	CO	17	1k	Ohms	0.5	10%	CC
R88	B10	10	1.5k	Ohms	0.5	10%	CC
R89	B10	10	22k	Ohms	0.5	10%	CC
R90	B10	10	220k	Ohms	0.5	10%	CC
R91	LR-R	16	500k	Ohms			AF GAIN
R92	B5	5	270	Ohms	0.5	10%	CC
R93	PAB-R	20	15	Ohms	1	10%	CC
R94	B2	2	47k	Ohms	0.5	10%	CC
R95	B2	2	6.8M	Ohms	0.5	10%	CC
R96	B11	11	6.8M	Ohms	0.5	10%	CC
R97	B2	2	330k	Ohms	0.5	10%	CC
R98	Front Panel	N/A	500k	Ohms			XMTR GAIN
R99	B2	2	330k	Ohms	0.5	10%	CC
R100	LL-R	14	500k	Ohms			VOX GAIN

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ID	Location	Page	Value	Unit	W	Tol.	Type
R101	LL-R	14	22k	Ohms	0.5	10%	CC
R102	B4	4	100k	Ohms	0.5	10%	CC
R103	LL-R	14	820	Ohms	0.5	10%	CC
R104	B4	4	100k	Ohms	0.5	10%	CC
R105	B4	4	6.8M	Ohms	0.5	10%	CC
R106	LL-R	14	3.3M	Ohms	0.5	10%	CC
R107	LL-R	14	100k	Ohms			ANTI VOX
R108	B4	4	3.3M	Ohms	0.5	10%	CC
R109	B2	2	3.3k	Ohms	0.5	10%	CC
R110	Chassis Top	22	2.5k	Ohms	7		WW
R111	LL-R	14	3.3k	Ohms	0.5	10%	CC
R112	Chassis Top	22	2.5k	Ohms	7		WW
R113	LR-R	16	10k	Ohms			RF GAIN
R114	LL-R	14	1M	Ohms	0.5	10%	CC
R115	LR-R	16	68	Ohms	0.5	10%	CC
R116	PC	18	68	Ohms	1	10%	CC
R117	B7	7	330k	Ohms	0.5	10%	CC
R118	CO	17	1.5k	Ohms	0.5	10%	CC
R119	LR-R	16	68k	Ohms	0.5	10%	CC
R120	LR-R	16	1.5k	Ohms	0.5	10%	CC
R121	PAB-R	20	15	Ohms	1	10%	CC
R122	LR-R	16	1.5k	Ohms	0.5	10%	CC
R123	CO	17	1M	Ohms	0.5	10%	CC
R124	CO	17	500k	Ohms			SIDETONE
R125	CO	17	330k	Ohms	0.5	10%	CC
R126	B11	11	330k	Ohms	0.5	10%	CC
R127	B11	11	330k	Ohms	0.5	10%	CC
R128	B11	11	330k	Ohms	0.5	10%	CC
R129	CO	17	150k	Ohms	0.5	10%	CC
R130	B11	11	3.3M	Ohms	0.5	10%	CC
R131	B11	11	1.5k	Ohms	0.5	10%	CC
R132	LR-R	16	1.5k	Ohms	0.5	10%	CC
R133	N/A	N/A					
R134	N/A	N/A					
R135	B6	6	68k	Ohms	0.5	10%	CC
R136	B9	9	1M	Ohms	0.5	10%	CC
R137	PTO	N/A	22k	Ohms	0.5	10%	CC
R138	PTO	N/A	6.8k	Ohms	0.5	10%	CC
R139	PTO	N/A	100	Ohms	0.5	10%	CC
R140	LL-R	14	12k	Ohms	7W		WW
R141	CO	17	2.2M	Ohms	0.5	10%	CC
R142	B4	4	1M	Ohms	0.5	10%	CC
R143	B4	4	680k	Ohms	0.5	10%	CC
R144	B8	8	68	Ohms	0.5	10%	CC
R145	B8	8	68	Ohms	0.5	10%	CC
R146	N/A	N/A					
R147	CO	17	150k	Ohms	0.5	10%	CC
R148	B1	1	100	Ohms	0.5	10%	CC
R149	Chassis Top	22	10k	Ohms	0.5		OUTPUT SENS
R150	B1	1	330k	Ohms	0.5	10%	CC
R151	N/A	N/A					

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ID	Location	Page	Value	Unit	W	Tol.	Type
R152	N/A	N/A					
R153	N/A	N/A					
R154	LR-R	16	560	Ohms	0.5	10%	CC
R155	N/A	N/A					
R156	N/A	N/A					
R157	N/A	N/A					
R158	N/A	N/A					
R159	N/A	N/A					
R160	N/A	N/A					
R161	LL-R	14	15	Ohms	0.5	10%	CC
R162	PA-T	21	2.2M	Ohms	0.5	10%	CC
R163	LL-R	14	100	Ohms	0.5	10%	CC
R164	B1	1	33k	Ohms	0.5	10%	CC
R165	B1	1	1M	Ohms	0.5	10%	CC
R166	N/A	N/A					
R167	PAB-R	20	15	Ohms	1	10%	CC
R168	LL-R	14	100	Ohms	0.5	10%	CC
R169	B10	10	1.5k	Ohms	0.5	10%	CC
R170	PTO	N/A	1M	Ohms	0.5	10%	CC
R171	PTO	N/A	330	Ohms	0.5	10%	CC
R172	PTO	N/A	560	Ohms	0.5	10%	CC
R173	PTO	N/A	100	Ohms	0.5	10%	CC
R174	PTO	N/A	560	Ohms	0.5	10%	CC
R175	PTO	N/A	47k	Ohms	0.5	10%	CC
R176	PAB-R	20	68	Ohms	0.5	10%	CC
R177	PAB-R	20	68	Ohms	0.5	10%	CC
R178	PAB-R	20	68	Ohms	0.5	10%	CC
R179	B11	11	330	Ohms	0.5	10%	CC
R191	B1	1	330	Ohms	0.5	10%	CC

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ID	Location	Page	Value		V	Tol.	Type
C1	LR-C	15	150	pF	500	5%	Dipped Mica
C2	LR-C	15	11	pF	1000	5%	N750 - D Ceramic
C3	Inside T2	15	68	pF	1000	5%	NPO - D Ceramic
C4	Inside T3	15	68	pF	1000	5%	NPO - D Ceramic
C5	LR-C	15	27	pF	1000	5%	NPO - D Ceramic
C6	Inside T2	15	68	pF	1000	5%	NPO - D Ceramic
C7	Inside T3	15	68	pF	1000	5%	NPO - D Ceramic
C8	LR-C	15	.01	uF	1000	20%	Z5U - D Ceramic
C9	LR-C	15	27	pF	1000	5%	NPO - D Ceramic
C10	LR-C	15	.005	uF	1000	20%	Z5U - D Ceramic
C11	B3	3	.005	uF	1000	20%	Z5U - D Ceramic
C12	LR-C	15	.001	uF	1000	20%	Z5U - D Ceramic
C13	LR-C	15	27	pF	500	5%	Dipped Mica
C14	LR-C	15	.001	uF	1000	20%	Z5U - D Ceramic
C15	N/A	N/A					
C16	N/A	N/A					
C17	N/A	N/A					
C18	N/A	N/A					
C19	N/A	N/A					
C20	N/A	N/A					
C21	N/A	N/A					
C22	B9	9	.01	uF	1000	20%	Z5U - D Ceramic
C23	LR-C	15	.01	uF	1000	20%	Z5U - D Ceramic
C24	LR-C	15	.001	uF	1000	20%	Z5U - D Ceramic
C25	LR-C	15	.001	uF	1000	20%	Z5U - D Ceramic
C26	LR-C	15	10	pF	1000	5%	NPO - D Ceramic
C27	LR-C	15	27	pF	1000	5%	NPO - D Ceramic
C28	LR-C	15	.001	uF	1000	20%	Z5U - D Ceramic
C29	LR-C	15	.001	uF	1000	20%	Z5U - D Ceramic
C30	LR-C	15	.005	uF	1000	20%	Z5U - D Ceramic
C31	LR-C	15	.02	uF	1000	20%	Z5U - D Ceramic
C32	LR-C	15	.001	uF	1000	20%	Z5U - D Ceramic
C33	LR-C	15	220	pF	1000	20%	Z5U - D Ceramic
C34	LR-C	15	.001	uF	1000	20%	Z5U - D Ceramic
C35	LR-C	15	.01	uF	1000	20%	Z5U - D Ceramic
C36	LR-C	15	20	pF	1000	5%	NPO - D Ceramic
C37A	Chassis Top	22	5.5-41	pF			Air Variable
C37B	Chassis Top	22	25-197	pF			Air Variable
C37C	Chassis Top	22	5.5-41	pF			Air Variable
C37D	Chassis Top	22	25-197	pF			Air Variable
C38	LR-C	15	180	pF	500	5%	Dipped Mica
C39	LR-C	15	100	pF	500	5%	Dipped Mica
C40	Inside T7	15	53	pF	1000	5%	NPO - D Ceramic
C41	LR-C	15	.001	uF	1000	20%	Z5U - D Ceramic
C42	N/A	N/A					
C43	LR-C	15	865	pF	500	5%	Dipped Mica
C44	PAB-C	19	180	pF	500	5%	Dipped Mica
C45	LL-C	13	2-25	pF			Erie 557 C Trimmer
C46	B7	7	.001	uF	1000	20%	Z5U - D Ceramic
C47	B7	7	100	pF	500	5%	Dipped Mica
C48	LR-C - PAB-C	15, 19	.001	pF	500	20%	FT

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ID	Location	Page	Value		V	Tol.	Type
C49	PAB-C	19	68	pF	1000	5%	N750 - D Ceramic
C50	PAB-C	19	.001	uF	1000	20%	Z5U - D Ceramic
C51	LR-C	15	.001	uF	1000	20%	Z5U - D Ceramic
C52	LR-C	15	.005	uF	1000	20%	Z5U - D Ceramic
C53	LR-C	15	.001	uF	1000	20%	Z5U - D Ceramic
C54	PAB-C	19	57	pF	1000	5%	NPO - D Ceramic
C55	PAB-C	19	.01	uF	1000	20%	Z5U - D Ceramic
C56	PAB-C	19	100	pF	1000	5%	Dipped Mica
C57	PAB-C	19	53	pF	1000	5%	N330 - D Ceramic
C58	LL-C	13	.005	uF	1000	20%	Z5U - D Ceramic
C59	PAB-C	19	865	pF	1000	5%	Dipped Mica
C60	LR-C - PAB-C	15, 19	.001	pF	500	20%	FT
C61	PAB-C	19	1000	pF	500	2%	Dipped Mica
C62	PAB-C	19	470	pF	1000	20%	Z5U - D Ceramic
C63	LR-C	15	2500	pF	500	5%	Dipped Mica
C64	PAB-C	19	470	pF	1000	10%	X5F - D Ceramic
C65	PAB-C	19	.005	uF	1000	20%	Z5U - D Ceramic
C66	PAB-C	19	470	pF	1000	20%	Z5U - D Ceramic
C67	B11	11	.01	uF	1000	20%	Z5U - D Ceramic
C68	PAB-C	19	470	pF	1000	10%	X5F - D Ceramic
C69	PAB-C	19	.005	uF	1000	20%	Z5U - D Ceramic
C70	PAB-C	19	470	pF	1000	20%	Z5U - D Ceramic
C71	B4	4	.001	uF	1000	20%	Z5U - D Ceramic
C72	PAB-C	19	470	pF	1000	10%	X5F - D Ceramic
C73	PAB-C	19	.005	uF	1000	20%	Z5U - D Ceramic
C74	PAB-C	19	.001	uF	500	20%	FT
C75	PAB-C	19	.001	uF	500	20%	FT
C76	PAT	21	2.7-8.4	pF			Air Variable
C77	PAT	21	12.5	pF	2000	5%	NPO - D Ceramic
C78	PAT	21	.0027	uF	2000	10%	Z5U - D Ceramic
C79	PAB-C	19	2.2	pF	1000	5%	Tubular Ceramic
C80	N/A	N/A					
C81	N/A	N/A					
C82	N/A	N/A					
C83	PAT	21	.001	uF	2000	20%	Z5U - D Ceramic
C84	CO	17	68	pF	1000	5%	N750 - D Ceramic
C85	PC	18	.005	uF	2000	20%	Z5U - D Ceramic
C86	PAB-C	19	.001	uF	500	20%	FT
C87	PAB-C	19	.001	uF	500	20%	FT
C88	T-R	22	.001	uF	500	20%	FT
C89	T-R	22	.001	uF	500	20%	FT
C90	T-R	22	.001	uF	500	20%	FT
C91	T-R	22	.001	uF	500	20%	FT
C92	T-R	22	.001	uF	500	20%	FT
C93	T-R	22	.001	uF	500	20%	FT
C94	PAT	21	14-358	pF			TUNE
C95	PAT	21	13.5-466	pF			LOAD (4 Section)
C96	PAB-C	19	82	pF	500	5%	Dipped Mica
C97	N/A	N/A					
C98	PAB-C	19	2500	pF	500	5%	Dipped Mica
C99	LL-C	13	39	pF	1000	5%	NPO - D Ceramic

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ID	Location	Page	Value		V	Tol.	Type
C100	LL-C	13	.01	uF	1000	20%	Z5U - D Ceramic
C101	LL-C	13	.005	uF	1000	20%	Z5U - D Ceramic
C102	LL-C	13	500	pF	500	5%	Dipped Mica
C103	Inside T11	13	35	pF	1000	5%	NPO - D Ceramic
C104	Inside T11	13	35	pF	1000	5%	NPO - D Ceramic
C105	LL-C	13	.001	uF	1000	20%	Z5U - D Ceramic
C106	LL-C	13	.005	uF	1000	20%	Z5U - D Ceramic
C107	LL-C	13	.005	uF	1000	20%	Z5U - D Ceramic
C108	Inside T11	13	35	pF	1000	5%	NPO - D Ceramic
C109	B10	10	100	pF	500	5%	Dipped Mica
C110	CO	17	.005	uF	1000	20%	Z5U - D Ceramic
C111	CO	17	68	pF	1000	5%	N750 - D Ceramic
C112	B10	10	.005	uF	1000	20%	Z5U - D Ceramic
C113	B6	6	.02	uF	100	+80-20%	Z5U - D Ceramic
C114	B10	10	.005	uF	1000	20%	Z5U - D Ceramic
C115	B6	6	0.47	uF	200	10%	FILM
C116	B9	9	0.47	uF	200	10%	FILM
C117	LL-C	13	1.0	pF	500	10%	NPO - T Ceramic
C118	LL-C	13	.001	uF	1000	20%	Z5U - D Ceramic
C119	B3	3	.001	uF	1000	20%	Z5U - D Ceramic
C120	B3	3	0.47	uF	200	10%	FILM
C121	B4	4	.005	uF	1000	20%	Z5U - D Ceramic
C122	CO	17	.005	uF	1000	20%	Z5U - D Ceramic
C123	LL-C	13	1000	pF	500	5%	Dipped Mica
C124	LL-C	13	.01	uF	1000	20%	Z5U - D Ceramic
C125	LL-C	13	.005	uF	1000	20%	Z5U - D Ceramic
C126	LL-C	13	.001	uF	1000	20%	Z5U - D Ceramic
C127	CO	17	1-8	pF			Piston Trimmer
C128	CO	17	.005	uF	1000	20%	Z5U - D Ceramic
C129	CO	17	470	pF	1000	20%	Z5U - D Ceramic
C130	CO	17	2-25	pF			Erie 557 C Trimmer
C131	B10	10	470	pF	1000	20%	Z5U - D Ceramic
C132	CO	17	150	pF	500	5%	Dipped Mica
C133	CO	17	.01	uF	1000	20%	Z5U - D Ceramic
C134	B10	10	.0015	uF	1000	20%	Z5U - D Ceramic
C135	LL-C	13	10	uF	25	10%	Dipped Tantalum
C136	B5	5	.01	uF	1000	20%	Z5U - D Ceramic
C137	B2	2	470	pF	1000	20%	Z5U - D Ceramic
C138	B2	2	.001	pF	1000	20%	Z5U - D Ceramic
C139	B2	2	0.47	uF	200	10%	FILM
C140	LL-C	13	.005	uF	1000	20%	Z5U - D Ceramic
C141	B4	4	.01	uF	1000	20%	Z5U - D Ceramic
C142	B5	5	.01	uF	1000	20%	Z5U - D Ceramic
C143	B4	4	0.1	uF	200	10%	FILM
C144	B6	6	.02	uF	100	+80-20%	Z5U - D Ceramic
C145A	LL-C	13	20	uF	250	+80-20%	Twist-Lok Electro
C145B	LL-C	13	60	uF	250	+80-20%	Twist-Lok Electro
C145C	LL-C	13	10	uF	25	+80-20%	Twist-Lok Electro
C145D	LL-C	13	10	uF	250	+80-20%	Twist-Lok Electro
C146	B8	8	.01	uF	1000	20%	Z5U - D Ceramic
C147	CO	17	.005	uF	1000	20%	Z5U - D Ceramic

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ID	Location	Page	Value		V	Tol.	Type
C148	PAB-C	19	.001	uF	1000	20%	Z5U - D Ceramic
C149	PAB-C	19	1	pF	500	10%	NPO - T Ceramic
C150	N/A	N/A					
C151	LR-C	15	.001	uF	1000	20%	Z5U - D Ceramic
C152	LL-C	13	.0024	uF	1000	20%	Z5U - D Ceramic
C153	PAB-C	19	330	uF	1000	20%	Z5U - D Ceramic
C154	PC	18	.01	uF	1000	20%	Z5U - D Ceramic
C155	PC	18	.001	uF	1000	20%	Z5U - D Ceramic
C156	PC	18	.001	uF	1000	20%	Z5U - D Ceramic
C157	PC	18	.001	uF	1000	20%	Z5U - D Ceramic
C158	PC	18	.001	uF	1000	20%	Z5U - D Ceramic
C159	PC	18	.001	uF	1000	20%	Z5U - D Ceramic
C160	LL-C	13	.001	uF	1000	20%	Z5U - D Ceramic
C161	PAT	21	10	pF	1000	5%	NPO - D Ceramic
C162	B12	12	100	pF	500	5%	Dipped Mica
C163	B12	12	.005	uF	1000	20%	Z5U - D Ceramic
C164	LL-C	13	.001	uF	1400	20%	Z5U - D Ceramic
C165	Inside T14	17, 13	220	pF	100	5%	NPO - D Ceramic
C166	LR-C	15	10	pF	1000	5%	NPO - D Ceramic
C167	CO	17	.005	uF	1000	20%	Z5U - D Ceramic
C168	LL-C	13	1-8	pF			Piston Trimmer
C169	LL-C	13	.001	uF	1000	20%	Z5U - D Ceramic
C170	N/A	N/A					
C171	N/A	N/A					
C172	CO	17	3.9*	pF	1000	5%	NPO - D Ceramic
C173	LL-C	13	.005	uF	1000	20%	Z5U - D Ceramic
C174	LR-C	15	.01	uF	1000	20%	Z5U - D Ceramic
C175	N/A	N/A					
C176	LL-C	13	68	pF	1000	5%	N750 - D Ceramic
C177	PAB-C	19	.001	uF	1000	20%	Z5U - D Ceramic
C178	PAB-C	19	.005	uF	1000	20%	Z5U - D Ceramic
C179	LR-C	15	.01	uF	1000	20%	Z5U - D Ceramic
C180	B11	11	500	pF	1000	10%	X5F - D Ceramic
C181	B11	11	500	pF	1000	10%	X5F - D Ceramic
C182	B11	11	500	pF	1000	10%	X5F - D Ceramic
C183	B11	11	500	pF	1000	10%	X5F - D Ceramic
C183A	Inside PTO		390		1000	5%	NPO - D Ceramic
C184	B11	11	220	pF	1000	20%	Z5U - D Ceramic
C185	LL-C	13	68	pF	1000	5%	N750 - D Ceramic
C186	N/A	N/A					
C187	N/A	N/A					
C188	N/A	N/A					
C189	N/A	N/A					
C190	N/A	N/A					
C191	Inside PTO		.005	uF	1000	20%	Z5U - D Ceramic
C192	Inside PTO		.01	uF	1000	20%	Z5U - D Ceramic
C193	LR-C - PAB-C	15, 19	.001	uF	500	20%	FT
C194	LL-C	13	68	pF	1000	5%	N750 - D Ceramic
C195	B1	1	.001	uF	1000	20%	Z5U - D Ceramic
C196	LR-C	15	.001	uF	1000	20%	Z5U - D Ceramic
C197	LL-C	13	1	pF	500	10%	NPO - T Ceramic

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ID	Location	Page	Value		V	Tol.	Type
C198	CO	17	.001	uF	1000	20%	Z5U - D Ceramic
C199	CO	17	.005	uF	1000	20%	Z5U - D Ceramic
C200	PC	18	.001	uF	1000	20%	Z5U - D Ceramic
C201	B7	7	.01	uF	1000	20%	Z5U - D Ceramic
C202	B8	8	.01	uF	1000	20%	Z5U - D Ceramic
C203	LL-C	13	1.5	pF	500	10%	NPO - T Ceramic
C204	N/A	N/A					
C205	LL-C	13	.02	uF	100	+80-20%	Z5U - D Ceramic
C206	Inside PTO		.01	uF	1000	20%	Z5U - D Ceramic
C207	Inside PTO		.01	uF	1000	20%	Z5U - D Ceramic
C209	LL-C	13	1	pF	500	10	NPO - T Ceramic

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ID	Location	Device	Page	Description	Replacement
D1	Inside T14	1N541	13, 17	Germanium Signal Diode	1N5711
D2	Inside T14	1N541	13, 17	Germanium Signal Diode	1N5711
D3	Inside T14	1N541	13, 17	Germanium Signal Diode	1N5711
D4	Inside T14	1N541	13, 17	Germanium Signal Diode	1N5711
D5	B4	1N483	4	GP Silicon Switching Diode	1N4148
D6	B6	1N483	6	GP Silicon Switching Diode	1N4148
D7	B11	1N483	11	GP Silicon Switching Diode	1N4148
D8	Inside PTO	1N714	N/A	10V 0.25W Zener Diode	1N4740
D9	RB	1N270	22	Germanium Signal Diode	1N4148
D10	B6	1N483	6	GP Silicon Switching Diode	1N4148

ID	Location	Device	Page	Description	Replacement
Q1	Inside PTO	TIS34	N/A	N-Channel JFET	2N5950
Q2	Inside PTO	2N3858	N/A	Silicon Small Signal Transistor	2N3904
Q3	B1	2N3877	1	Silicon Small Signal Transistor	2N5550
Q4	B1	2N3394	1	Silicon Small Signal Transistor	2N3904

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ID	Location		Page	Description
T1	LR		15, 16	10M Injection
T2	LR		15, 16	15M Injection
T3	LR		15, 16	40M Injection
T4	N/A			
T5	N/A			
T6	LR		15, 16	Filter Match
T7	LR		15, 16	80 / 20M Mixer
T8	LR		15, 16	40 / 10 Mixer
T9	PA-B		20	80 / 20 M RF
T10	PA-B		20	40 / 10M RF
T11	LL		13, 14	Receiver 2nd IF
T12	LL / CO		13, 14, 17	Receiver 1st IF
T13	LL		13, 14	Filter Match
T14	LL / CO		13, 14, 17	Balanced Modulator
T15	LL		13, 14	AF Output

ID	Location	Device	Page	Description
K1	RB	T/R Relay		P&B (Tyco) R10-E1-Y4-V2.5k (Minor Modification)
K2	CO	Car. Shift Relay		SPDT - 12 VDC coil (1600 ohms)

ID	Location		Page	Description
L1	LR		15, 16	Slug Tuned Coil
L2	LR		15, 16	Slug Tuned Coil
L3	LR		15, 16	Wire Loop
L4	LR		15, 16	Wire Loop
L5	LR		15, 16	Slug Tuned Coil
L6	LR		15, 16	Increment Coil
L7	PA-B		20	Increment Coil
L8	PA-T		21	RF Plate Coil - 10M
L9	PA-T		21	RF Plate Coil
L10	Inside PTO		N/A	
L11	LR		15, 16	Solenoid RFC - 15 uHy
PC1	PA-T		21	47 Ohm, 2W CC w/ 6 t #22 Space Wound
PC2	PA-T		21	47 Ohm, 2W CC w/ 6 t #22 Space Wound
PC3	PA-T		21	47 Ohm, 2W CC w/ 6 t #22 Space Wound

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ID	Location		Page	Description
RFC1	N/A			
RFC2	PA-B		20	3-Pi Air Core - 750 uHy
RFC3	PA-B		20	3-Pi Air Core - 750 uHy
RFC4	PA-B		20	3-Pi Air Core - 750 uHy
RFC5	PA-T		21	RF Choke - Final Plate - 130 uHy
RFC6	PA-B		20	3-Pi Air Core - 750 uHy - Insulated Cover
RFC7	PA-T		21	3-Pi Air Core - 750 uHy
RFC8	Relay K1		22	Solenoid RFC - 2.5 uHy
RFC9	PA-B		20	Solenoid RFC - 0.750 uHy
RFC10	PA-B		20	Solenoid RFC - 0.750 uHy
RFC11	PA-B		20	3-Pi Air Core - 750 uHy
RFC12	B12		12	2-Pi Air Core - 500 uHy
RFC13	PC		18	3-Pi Air Core - 120 uHy

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TR-4 Troubleshooting

Bill Frost, R. L. Drake Co.

TR-4 TRANSMITTER

SSB, Distortion on transmit signal:
- (1) C-116 leaky.
- (2) 9 MC carrier oscillator not centered.
- (3) Defective diode in balanced modulator.
- (4) V-6 soft.

SSB Flat topping on transmit signal:
- (1) V-13 defective.
- (2) C-116 shorted.
- (3) V-8, V-9, V-10 soft.

AM, No carrier:
- (1) K-2 defective.

AM, No modulation:
- (1) V-14

VOX Operation, relay cycles Anti-VOX control has no effect:
- (1) D-6
- (2) (2) V-19
- (3) (3) Anti VOX Pot corroded.

X-CW, Relay chatters, key up:
- (1) V-4 or V-6 leaky.

X-CW, Keys O.K. But relay drops out with no time delay, VOX control has no effect:
- (1) D-7

Plate meter reads full scale, spurious oscillation on all bands (taking off). S-meter reads up scale 50 to 60/9 :
- (1) Receiver cathode line shorted to ground.

SSB, AM, Feedback in receiver when transmitting:
- (1) Adjust C-168 for null with unit is SSB mode, receiver and transmitter gain at 3 o'clock, VOX gain CCW, audio tone fed to mike amplifier stage.

SSB, AM, excessive RF feedback in receiver when transmitting:
- (1) Check grounding system
- (2) SWR

Excessive carrier persists after adjustment of R-85 and C-127:
(1) Defective D-l, D-2, D-3, or D-4 in balanced modulator.

SSB. Cannot set VOX but PTT functions normal , Relay will not close when switched to X-CW:
(1) D-5

X-CW. Relay will not close. SSB, functions normal using PTT or VOX:
(1) V-2
(2) Sidetone oscillator not running.

No relative output indication when unit is loaded:
(1) D-9, check antenna VSWR.

SSB, Hum on transmit signal:
(1) Check shield lead at mike cable.
(2) Check coaxial leads from mike amplifier stage to balanced modulator for loose ground shield. NOTE: Lead from C-139 to S2A, from S2A, to R-76.

SSB, Hum on transmit and received signal:
(1) C-145

X-CW, SSB, AM, decrease in transmitter output:
(1) V-8, V-9, V-10.
(2) V -6

SSB, decrease in transmitter output:
(1) V-18
(2) V-15
(3) Switch to X-CW mode, advance transmitter gain to about 11 o'clock, peak T-14.

Low output SSB, AM , CW
(1) Change V-8, V-9, V-10. Reneutralize.

TR-4 RECEIVER

Receiver. No indication on S-meter of signal strength or very low S-meter readings:
(1) Turn receiver RF gain completely CCW, S-meter should read 50 to 60/9. If S-meter pointer does not move meter movement is probably open, If S-meter reads up scale but less than 50/9, change V-11.

S-meter zero, adjustment very erratic:
(1) S-meter zero potentiometer (R-70) corroded.

S-meter reading up scale and cannot be zeroed:

(1) C-135 shorted, V-17 drawing excessive current.

S-meter pointer pegs to right (60/9) and does not return to normal resting point:

(1) Center contact on relay K-1 burned or pitted. Receiver cathode circuit open.

S-meter pegs to left, Receiver dead:

(1) Transmitter cathode short

(2) Plate meter leads shorted going into meter housing.

Receiver, Only very strong signals audible, very low S-meter readings:

(1) Antenna relay (K-1) contact corroded.

(2) Fuse lamp open.

(3) Receiver coaxial from relay (K-l) to T-9 shorted.

(4) Receiver coil at T-9 open.

(5) TCVR switch in RCVR position.

Low receiver sensitivity:

(1) V-13 leaky, high residual AVC voltage

(2) V-11, V-12, V-7.

(3) T-11, T-12 not peaked.

Receiver, weak audio:

(1) C-135 Open

(2) V-17

(3) C-136 partial short.

Receiver, SSB, audio distortion:

(1) V-2 cathode qrounded (2) 9Mc oscillator off frequency, adjust C-130 for same noise pitch on USB and LSB or use signal generator, couple 9 Mc signal to control grid of V-12, zero heat oscillator by adjusting C-130. If oscillator cannot be zeroed, change 9 MC crystal.

Receiver, relay closes when in receive mode:

(1) C-142 partial short

(2) V-19.

SSB, X-CW, AM. No crystal oscillation. Output on 40, 15 , and 10 meter bands.

(1) V-1

(2) Tune L-1, L-2, and L-5 on appropriate bands for maximum negative voltage at TP.

SSB, 40, 15, and 10 meter bands. Sudden shift in frequency of 50 Kc's or more from 100 Kc crystal calibrator check points:

(1) Crystal is spurious. Replace.

Receiver, excessive popping noise in receiver:

(1) C-78 leaky.

Receiver dead, Resistors R-168 and R -71 burnt:

(1) S-meter shorted (2) Meter leads pinched where going into meter housing.

Frequency jump or shift 1 or 2 Kc, both transmit and receive :

(1) PTO cover loose

(2) Zener diode in PTO bad (check Zener voltage).

(4) K-2 has bad contacts.