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PHOTOFACT® Folder with **CIRCUITRACE™**



**ITT
MODEL 320**



**ITT
MODEL 320**

TRADE NAME	ITT Model 320		
MANUFACTURER	Distributor Products Div., International Telephone & Telegraph Corp., P. O. Box 99, Lodi, N. J.		
TYPE SET	AC-Battery Operated 18 Transistor Citizens Band Transmitter-Receiver		
POWER SUPPLY	110 - 120 Volts AC (or) 12 Volt Storage Battery		
RATING	9 Watts, .105 Amp. @117 Volts AC (Receive)	.36 Amp. @12.6 Volts DC (Receive)	
	17 Watts, .172 Amp. @117 Volts AC (Transmit)	.82 Amp. @12.6 Volts DC (Transmit)	
TUNING RANGE	Any 5 of Citizens Band Channels 1 thru 22		

NOTICE

ONLY THOSE PERSONS PROPERLY LICENSED ARE PERMITTED TO MAKE REPAIRS OR ADJUSTMENTS WHICH MAY RESULT IN ILLEGAL OPERATION. (REFER TO FCC RULES & REGULATIONS PART 19, SUBPART D, SECTION 19.71.)

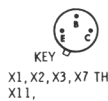
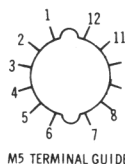
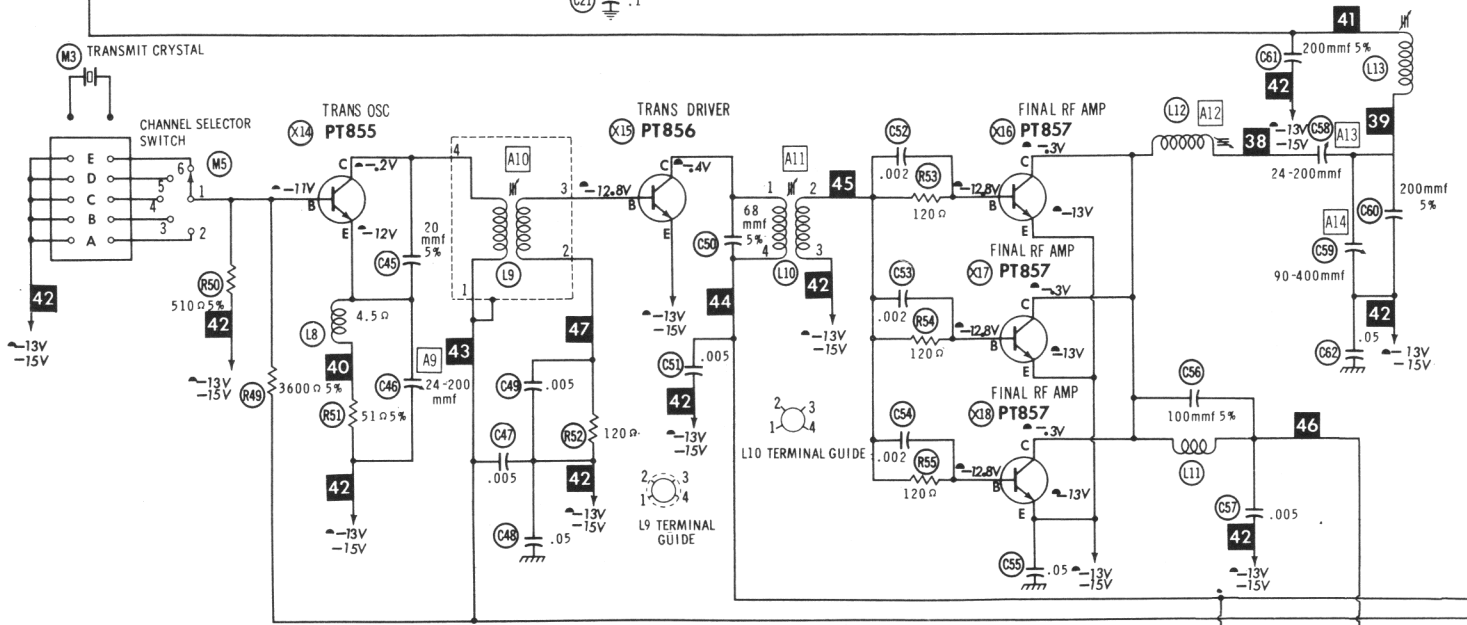
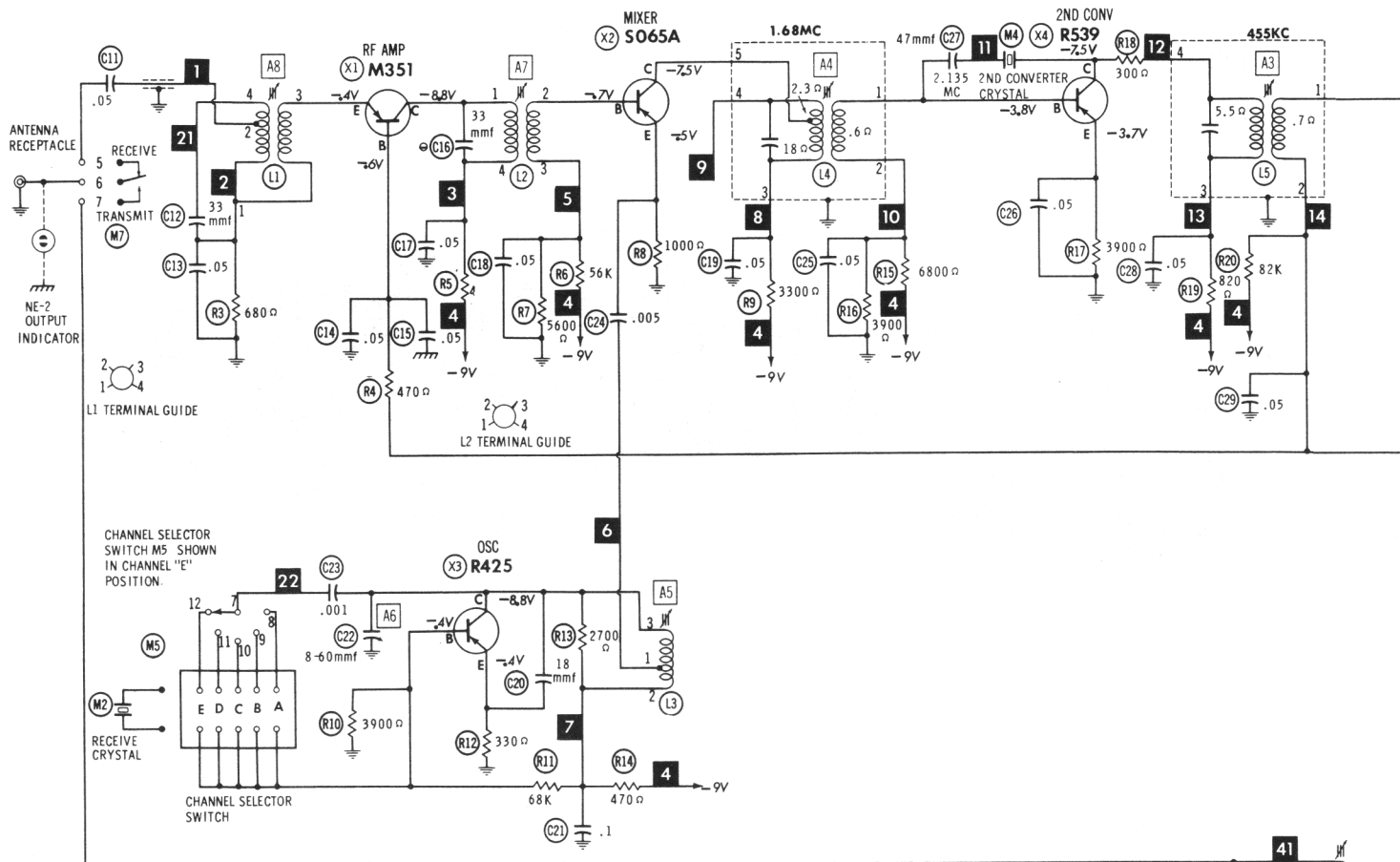
HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana



The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement LY846

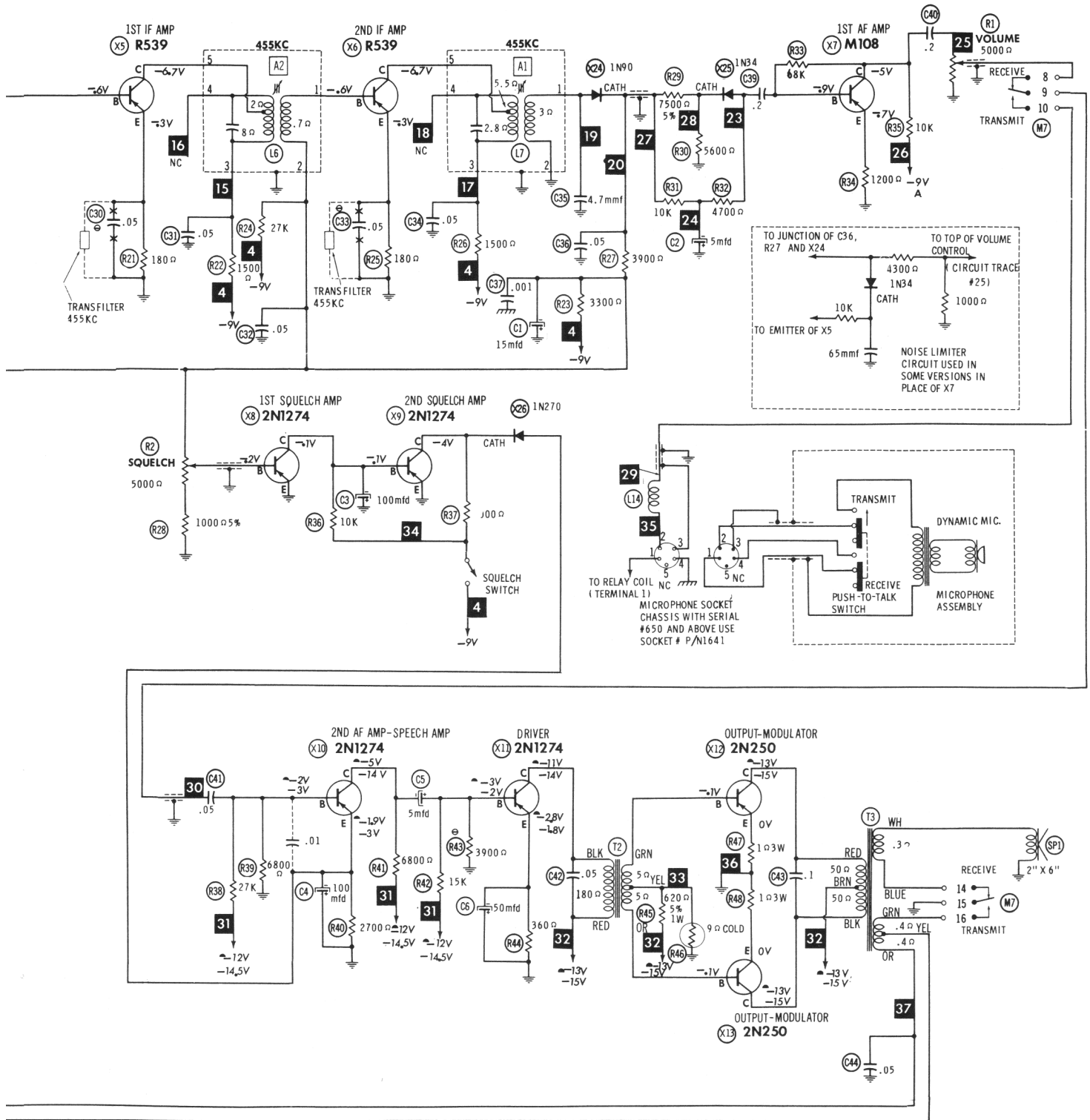
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A PHOTOFAC STANDARD NOTATION SCHEMATIC
with CIRCUITTRACE

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ALL MEASUREMENTS MADE IN RECEIVE POSITION UNLESS OTHERWISE DESIGNATED
 ● MEASURED IN TRANSMIT POSITION

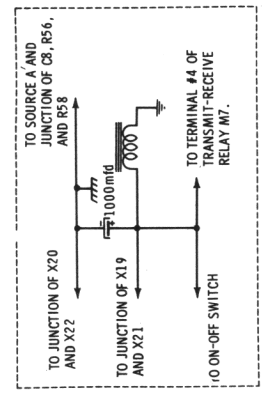
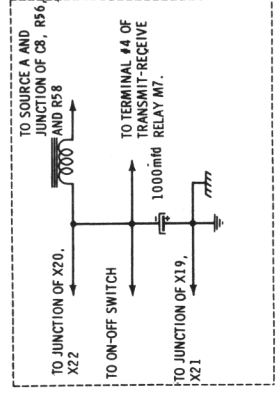
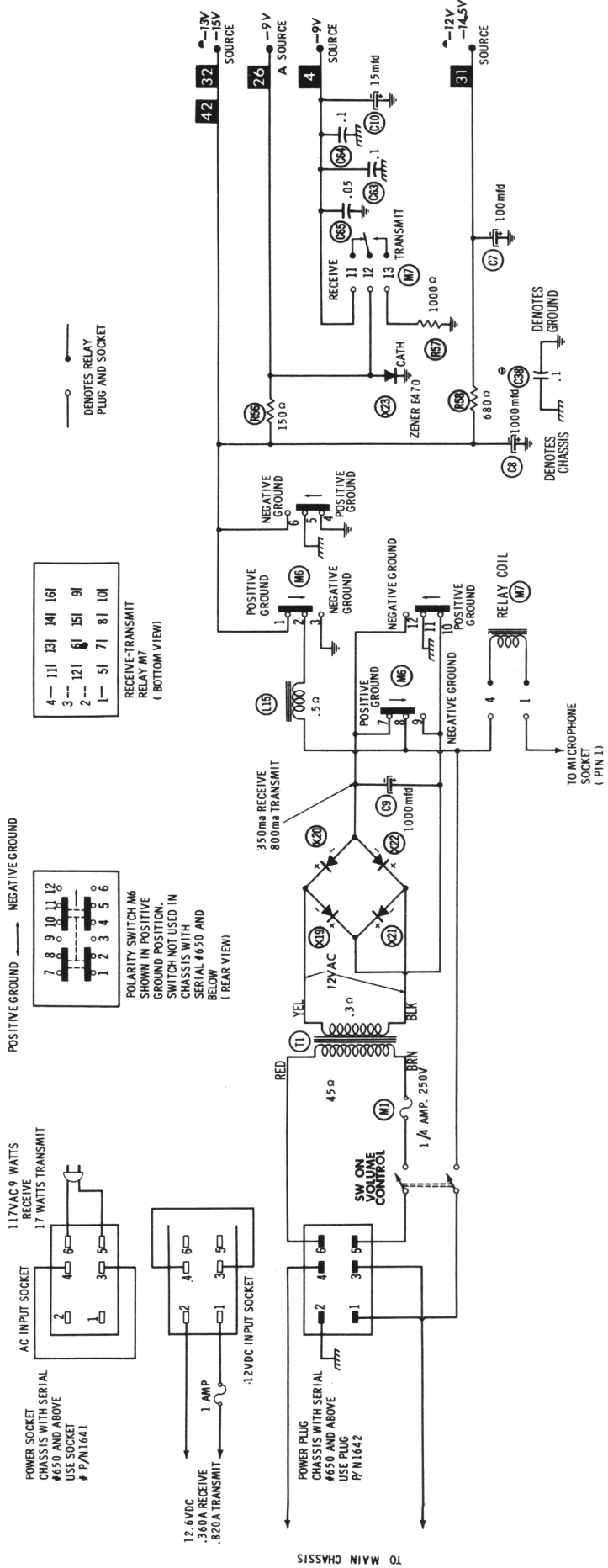
● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections or transistor terminals are shown as bottom views.
3. Measured values are from socket pin or terminal to common ground.
4. Nominal tolerance on component values makes possible a variation of $\pm 15\%$ in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

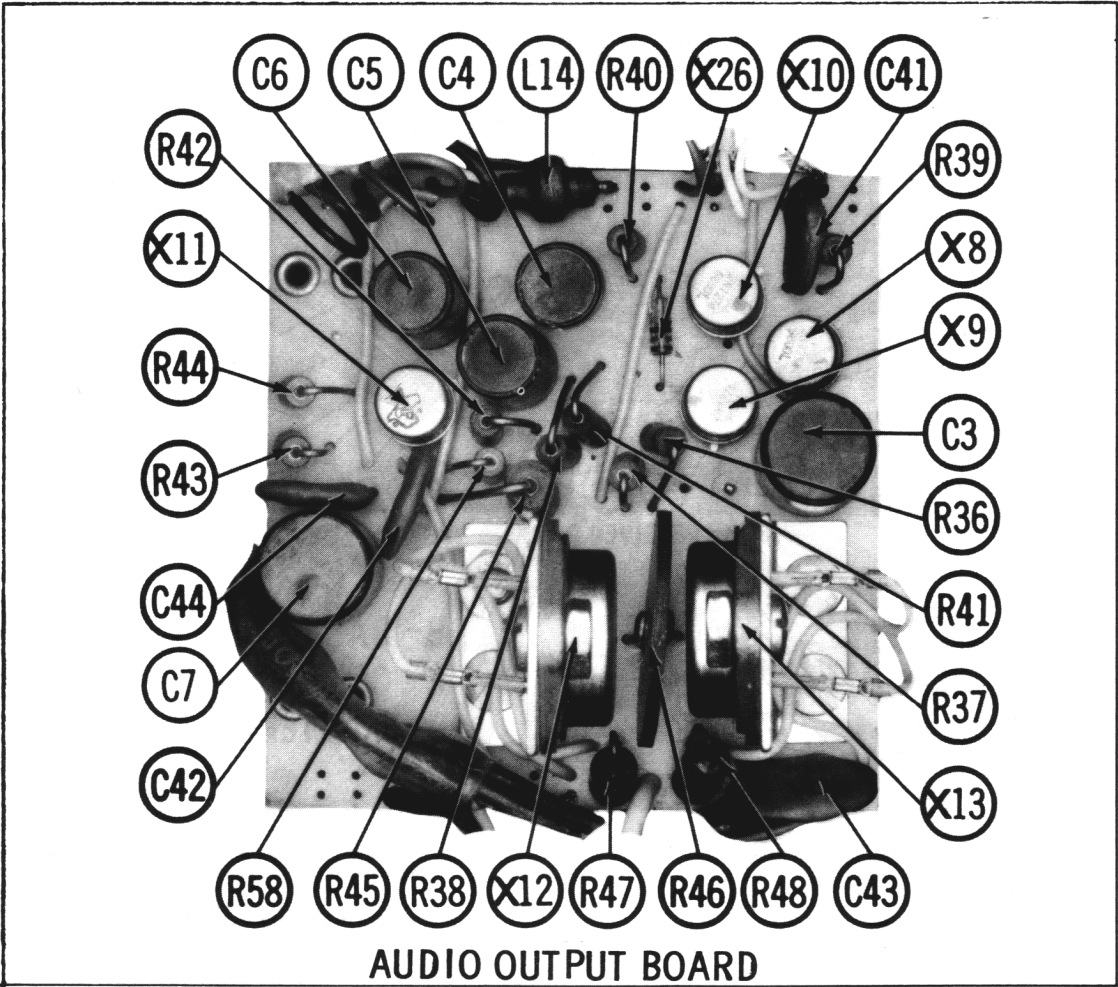
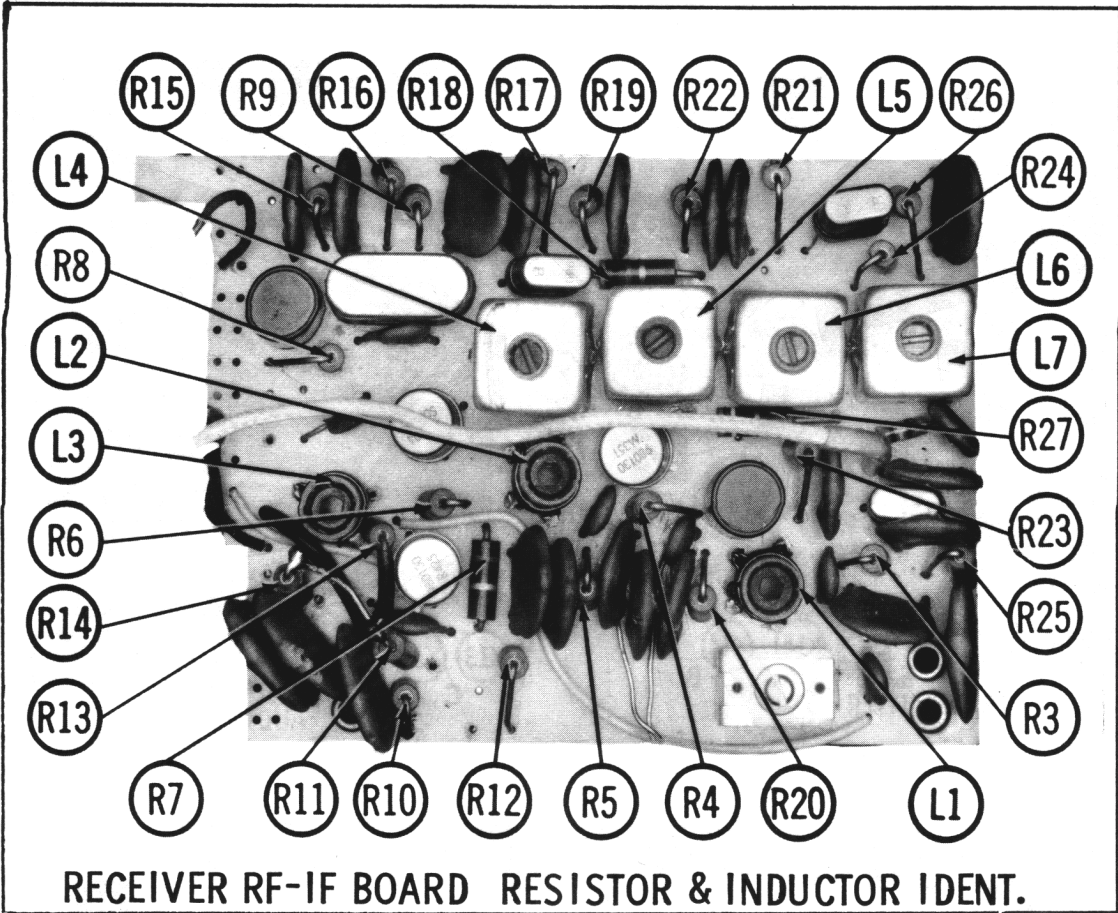
MAIN SCHEMATIC

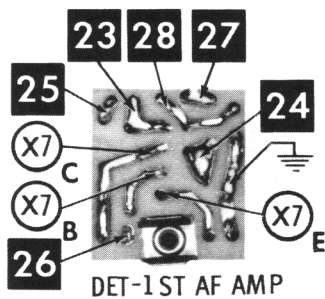
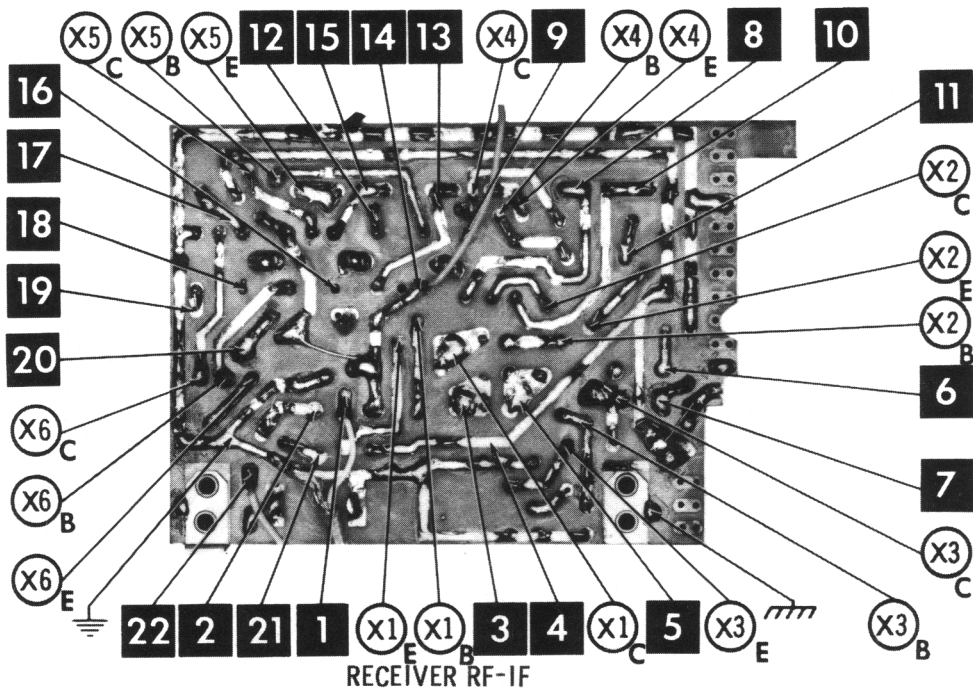
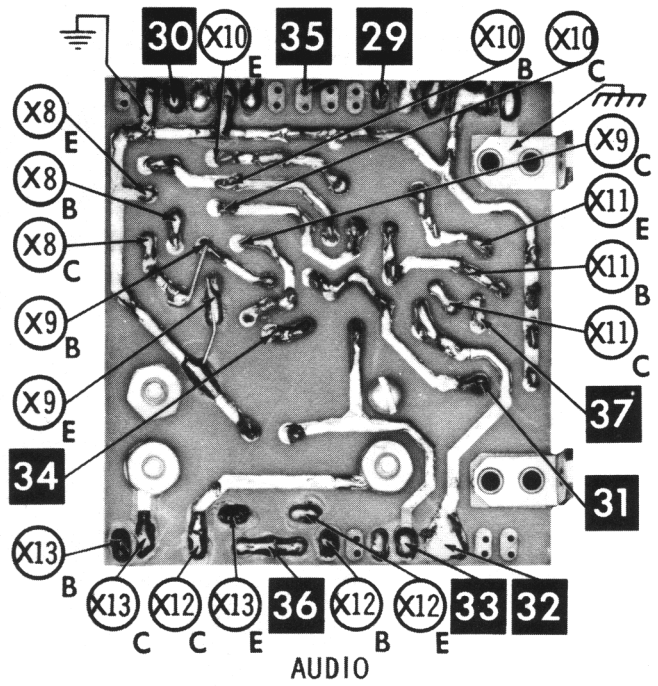
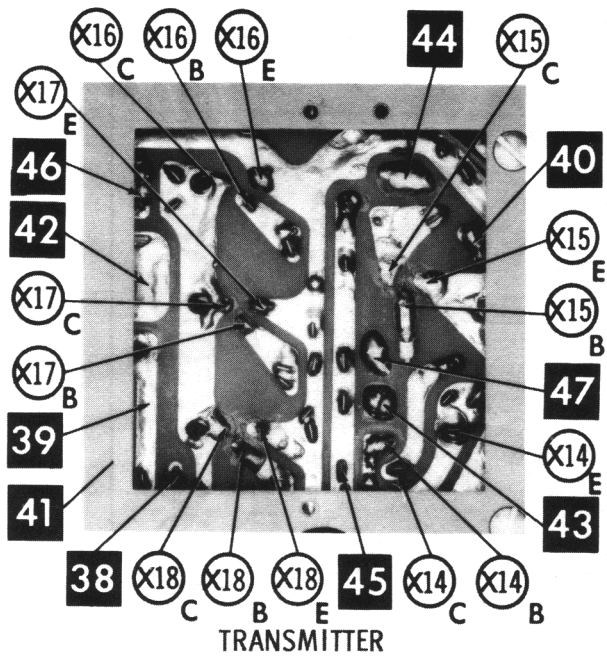


POSITIVE GROUND CIRCUIT USED IN CHASSIS WITH SERIAL #650 AND UP.

NEGATIVE GROUND CIRCUIT USED IN CHASSIS WITH SERIAL #650 AND UP.

POWER SUPPLY SCHEMATIC





B- BASE
 C- COLLECTOR
 E- EMITTER

ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED

A Howard W. Sams CIRCUITRACE® Photo

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Suggested Alignment Tools:

A1, A2, A3, A4.....	GENERAL CEMENT #5009, 8195, 8274, 8275, 8728, 8729, 8987, 8988, 8989 WALSCO #2515, 2531, 2532
A5, A7, A8, A10, A11, A14.....	GENERAL CEMENT #8282, 8606, 8606-L, 9295, 9440 WALSCO #2526, 2543, 2544, 2545
A6, A9, A12, A13.....	GENERAL CEMENT #5000, 5003, 5066, 8271, 8272, 8276, 8277, 8290, 8609, 8722, 9150, 9298 WALSCO #2515, 2516, 2518, 2519, 2525, 2541

RECEIVER ALIGNMENT

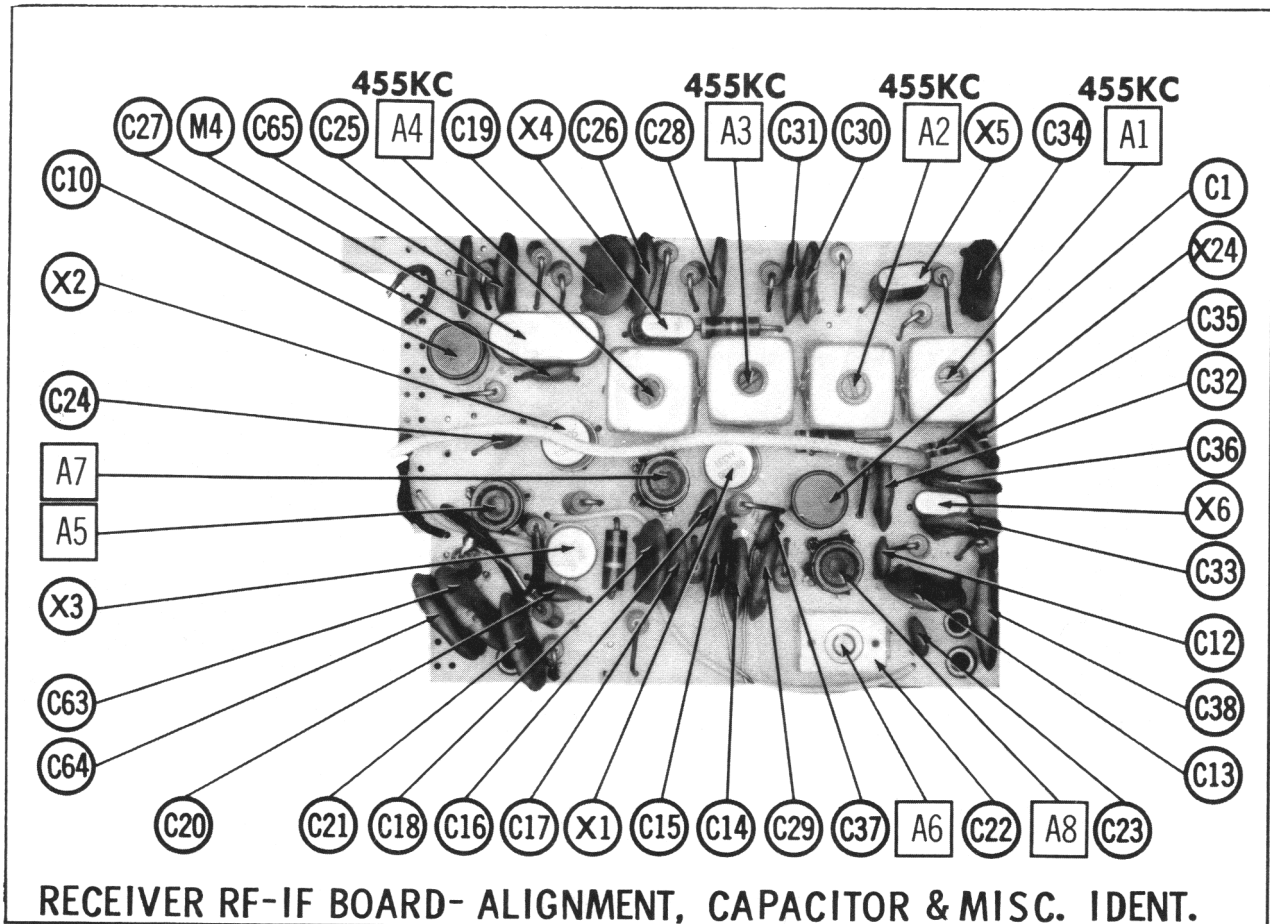
Connect output meter across voice coil.

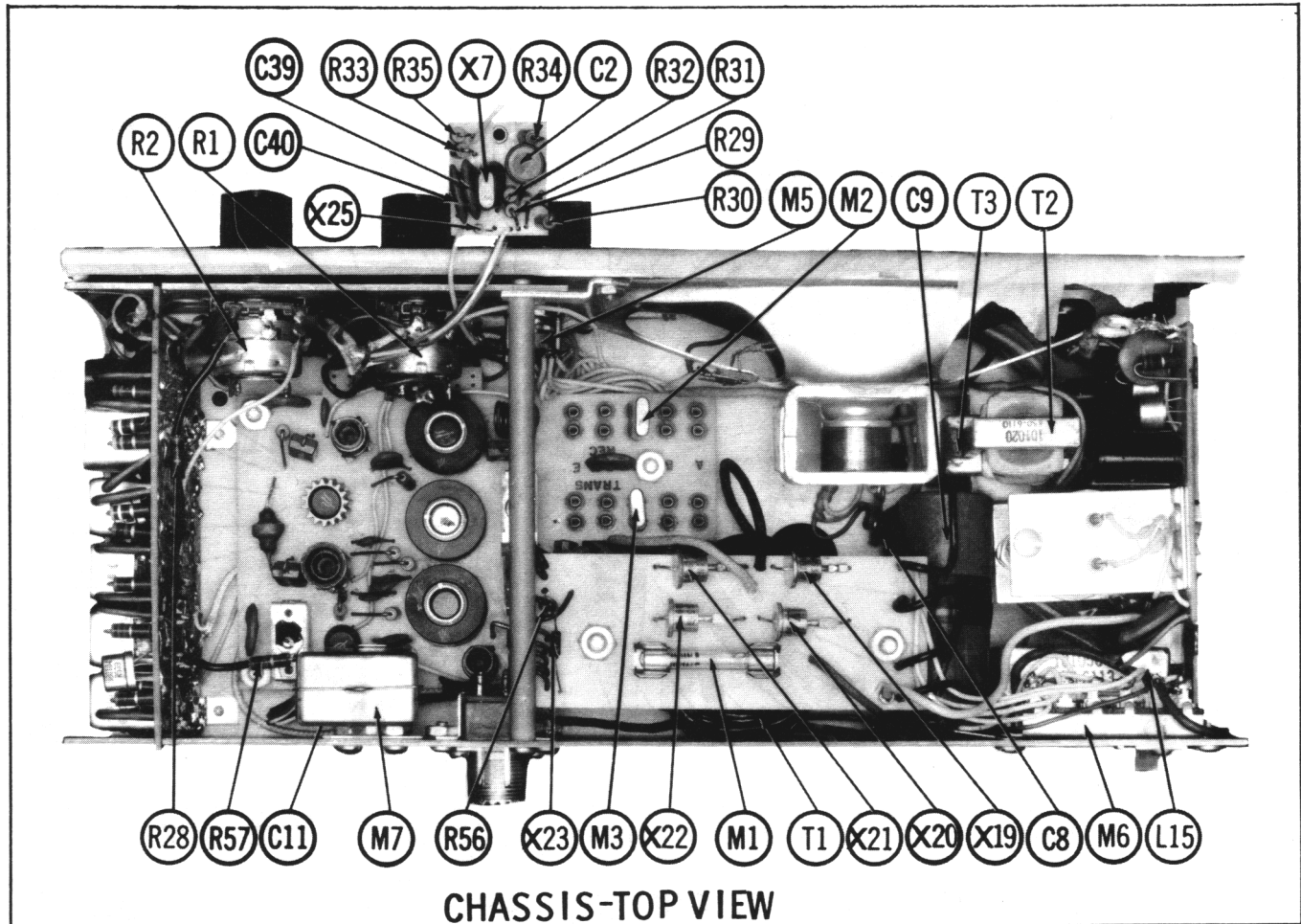
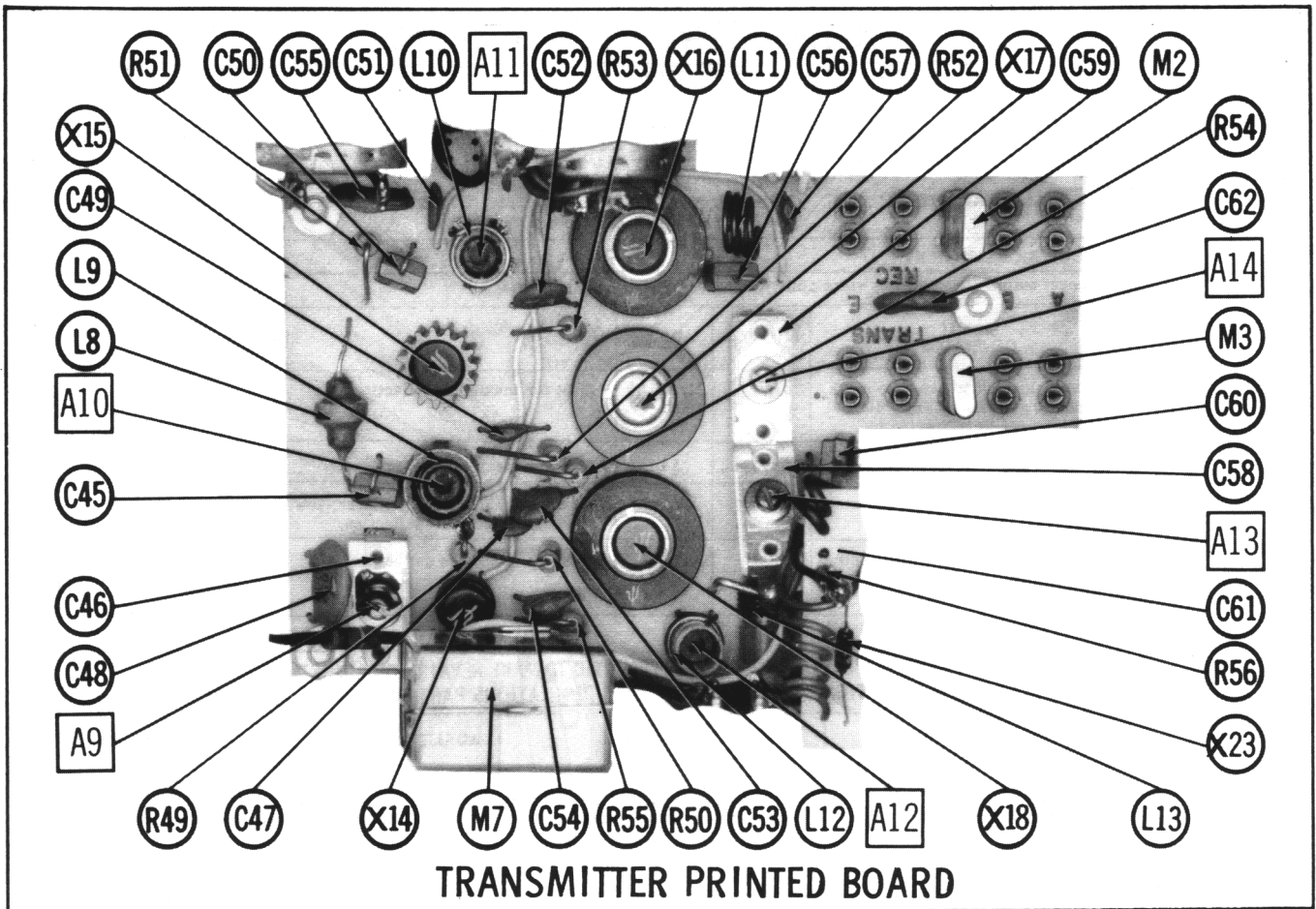
	SIGNAL GENERATOR	CHANNEL	ADJUST	REMARKS
1.	High side thru .05mfd to base of X2, low side to ground. (455KC, 400% Mod.)	Any	A1, A2, A3	Adjust for maximum deflection.
2.	Tune generator to 1.68MC (400% Mod.)	Any	A4	Adjust for maximum deflection.
3.	Not Used	Highest Used	A5, A6	Connect DC VTVM to X2 emitter, low side to ground. Adjust for maximum deflection.
4.	High side to antenna terminal, low side to ground. Tune generator to channel frequency.	Center Channel	A7, A8	Adjust for maximum deflection.

TRANSMITTER ALIGNMENT

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	SPECIAL INSTRUCTIONS	INDICATOR	ADJUST	REMARKS
1.	Place channel selector switch near center channel. Connect antenna or dummy load.	RF Wattmeter or Field Strength Meter. Remove shorting wire between pins 3 and 4 of power socket. Connect an 0-500 DC Milliammeter between these two pins.	A9, A10, A11, A12	Key transmitter. Adjust for maximum output. Milliammeter must not exceed 380MA. Reconnect shorting wire.
2.	Connect antenna.	RF Wattmeter or Field Strength Meter.	A13, A14	Adjust for maximum output.





PARTS LIST AND DESCRIPTION

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA		NOTES
			GENERAL ELECTRIC PART No.	RCA PART No.	
X1	M351	RF Amplifier	GE-1	2N1177	PNP
X2	S065A	Mixer	GE-1	2N1179	PNP
X3	R425	Oscillator	GE-1	2N1178	PNP
X4	R539	2nd Converter	GE-1	2N1426	PNP
X5	R539	1st IF Amplifier	GE-1	2N1180	PNP
X6	R539	2nd IF Amplifier	GE-1	2N1180	PNP
X7	M108	1st AF Amplifier	GE-2	2N406	PNP
X8	2N1274	1st Squelch Amplifier	GE-2	2N591	PNP
X9	2N1274	2nd Squelch Amplifier	GE-2	2N591	PNP
X10	2N1274	2nd AF Amp.-Speech Amp.	GE-2	2N591	PNP
X11	2N1274	Driver	GE-2	2N591	PNP
X12	2N250	Output-Modulator	GE-3	2N501	PNP
X13	2N250	Output-Modulator	GE-3	2N501	PNP
X14	PT855	Transmit-Oscillator	GE-3	2N501	PNP
X15	PT856	Transmit-Driver	GE-3	2N501	PNP
X16	PT857	Final RF Amplifier	GE-3	2N501	PNP
X17	PT857	Final RF Amplifier	GE-3	2N501	PNP
X18	PT857	Final RF Amplifier	GE-3	2N501	PNP

POWER RECTIFIERS & SIGNAL DIODES

ITEM No.	CURRENT RATING (Measured)	ORIGINAL Part or Type No.	RECTIFIERS		DIODES	NOTES
			RCA PART No.	SARKES TARZIAN PART No.		
X19	.800A	1403	IN3193	10H		
X20	.800A	1403	IN3193	10H		AC Rectifier (IN536)
X21	.800A	1403	IN3193	10H		
X22	.800A	1403	IN3193	10H		
X23		0624				Shunt Regulator (Zener Z470)
X24		1153				Audio Detector (IN90)
X25		1879				Noise Limiter. (IN94)
X26		1154				Squelch (IN270)

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP. VOLT.	ITT PART No.	REPLACEMENT DATA			
			AEROVOX PART No.	CORNELL-DUBILIER PART No.	GENERAL ELECTRIC PART No.	PYRAMID PART No.
C1	15	1013	BCD15015	ECPB409	MTI-10	MLV15-15
C2	5	12	BCD12005	ECPB405	MTI-3	MLV5-12
C3	100	12	BCD12100	ECPB417	MTI-19	MLV100-12
C4	100	3	BCD3100	ECPB405	MTI-22	MLV100-3
C5	5	15	BCD15005	ECPB405	MTI-3	MLV5-15
C6	50	6	BCD6050	ECPB415	MTI-15	MLV50-6
C7	100	12	BCD12100	ECPB417	MTI-19	MLV100-12
C8	1000	15	PR81230	BR1000-15	QTL-32	TD-1000-15
C9	1000	15	PR81230	BR1000-15	QTL-32	TD-1000-15
C10	15	103	BCD15015	ECPB409	MTI-10	MLV15-15

Note 1. Not used in some versions.

FIXED CAPACITORS

ITEM No.	RATING	REMARKS	REPLACEMENT DATA			
			AEROVOX PART No.	CORNELL-DUBILIER PART No.	ELMENDO PART No.	MALLORY PART No.
C11	.05		TTD-05	DDA-503	H-0555	GP433
C12	.33		TTD-33	DDA-330	L10Q33	CG-433
C13	.05		TTD-05	DDA-503	H-0555	GP433
C14	.05		TTD-05	DDA-503	H-0555	GP433
C15	.05		TTD-05	DDA-503	H-0555	GP433
C16	.33		TTD-33	DDA-330	L10Q33	CG-433
C17	.05		TTD-05	DDA-503	H-0555	GP433
C18	.05		TTD-05	DDA-503	H-0555	GP433

FIXED CAPACITORS (cont)

ITEM No.	RATING	REMARKS	REPLACEMENT DATA				
			AEROVOX PART No.	CORNELL-DUBILIER PART No.	ELMENDO PART No.	MALLORY PART No.	SPRAGUE PART No.
C19	.05		TTD-05	DDA-503	H-0555	GP418	TG-850
C20	.1		TTD-1	DD-180	L10Q18	GP418	5GA-Q18
C21	8-60		TTD-1	DA-104	H-05P1		TH-P10
C22	.001	#1417	DI-001	DM-102	H-05D1		5GA-D10
C23	.005		TTD-005	DDA-503	H-05D5	GP210	TH-D50
C24	.05		TTD-05	DDA-503	H-05S5	TA-250	TG-850
C25	.05		TTD-05	DDA-503	H-05S5		TG-850
C26	.05		TTD-05	DDA-503	H-05S5		TG-850
C27	47		DI-47	DDA-470	L10Q47	GP447	5GA-Q47
C28	.05		TTD-05	DDA-503	H-05S5		TG-850
C29	.05		TTD-05	DDA-503	H-05S5		TG-850
C30	.05		TTD-05	DDA-503	H-05S5		TG-850
C31	.05		TTD-05	DDA-503	H-05S5		TG-850
C32	.05		TTD-05	DDA-503	H-05S5		TG-850
C33	.05		TTD-05	DDA-503	H-05S5		TG-850
C34	.05		TTD-05	DDA-503	H-05S5		TG-850
C35	4.7		DI-4.7	TCZ-4R7			TG-850
C36	.05		TTD-05	DDA-503	H-05S5		TG-850
C37	.001		DI-001	DM-102	H-05D1	GP210	5GA-D10
C38	.1	(.2) †	TTD-1	DA-104	H-05P1		TH-P10
C39	.2	#1502	UK10-204				TH-P10
C40	.2	#1502	UK10-204				MS-42
C41	.05		TTD-05	DDA-503	H-05S5		TH-D50
C42	.05		TTD-05	DDA-503	H-05S5		TH-D50
C43	.1		TTD-1	DA-104	H-05P1		TH-D50
C44	.05		TTD-05	DDA-503	H-05S5		TH-D50
C45	20 5%	#1422	CM-15C-200	TCN-20	22R5Q2		MS-42
C46	24-200		TTD-005	DM-502	H-05D5	TA-250	TH-D50
C47	.005		TTD-005	DDA-503	H-05S5		TH-D50
C48	.05		TTD-05	DDA-503	H-05S5		TH-D50
C49	.005		TTD-005	DM-502	H-05D5		TH-D50
C50	68 5%		CM-15E-680	TCN-68	22R5Q68		MS-468
C51	.005		TTD-005	DM-502	H-05D5		TH-D50
C52	.002		TTD-002	DM-202	L10D2		5GA-D20
C53	.002		TTD-002	DM-202	L10D2		5GA-D20
C54	.002		TTD-002	DM-202	L10D2		5GA-D20
C55	.05		TTD-05	DDA-503	H-05S5		TH-D50
C56	100 5%		CM-15E-101	TCN-100	22R511	MCE235	MS-31
C57	.005		TTD-005	DM-502	H-05D5	TA-250	TH-D50
C58	24-200		TTD-005	DM-502	H-05D5		TH-D50
C59	90-400		CM-15E-201	TCN-200	22R5T2	MCE237	MS-32
C60	200 5%		CM-15E-201	TCN-200	22R5T2	MCE237	MS-32
C61	200 5%		TTD-05	DDA-503	H-05S5		TG-850
C62	.05		TTD-05	DDA-503	H-05S5		TG-850
C63	.1		TTD-1	DA-104	H-05P1		TH-P10
C64	.1		TTD-1	DA-104	H-05P1		TH-P10
C65	.05		TTD-05	DD-503	H-05S5		TG-850

† ITT Part Number.

‡ Alternate Value.

CONTROLS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	USE	RESISTANCE	REPLACEMENT DATA			
			ITT PART No.	CORNELL-DUBILIER PART No.	ELMENDO PART No.	MALLORY PART No.
R1	Volume, Power On-Off	5000Ω	1007	B-11, KR-2 or (F2-5000, SU204, KR-1)	Q13-114, 76-2	U-12, US27 or (UA53A, US42, SFI000)
R2	Squelch Squelch On-Off	5000Ω	1189	B-11, KR-1 or (F2-5000, SU204, KR-2)	Q13-114, 76-1	U-12, US26 or (UA53A, US41, SFI000)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA			
			ITT PART No.	CORNELL-DUBILIER PART No.	ELMENDO PART No.	MALLORY PART No.
R3	680Ω					
R4	470Ω					

PARTS LIST AND DESCRIPTION (CONTINUED)

RESISTORS (cont)

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REPLACEMENT DATA		ITEM No.	RATING	REPLACEMENT DATA	
		IRC PART No.	WORKMAN PART No.			IRC PART No.	WORKMAN PART No.
R7	5600Ω			R33	68K		
R8	1000Ω			R34	1200Ω		
R9	3300Ω			R35	10K		
R10	3900Ω			R36	10K		
R11	68K			R37	3000Ω		
R12	330Ω			R38	27K		
R13	2700Ω			R39	6800Ω		
R14	470Ω			R40	2700Ω		
R15	6800Ω			R41	6800Ω		
R16	3900Ω			R42	15K		
R17	3900Ω			R43	3900Ω		
R18	300Ω			R44	360Ω		
R19	820Ω			R45	620Ω 5% 1W		(2700Ω) †
R20	82K			R46	9Ω Cold		#1086
R21	180Ω			R47	1Ω 3W		
R22	1500Ω			R48	1Ω 3W		
R23	3300Ω			R49	3600Ω 5%		
R24	27K			R50	510Ω 5%		
R25	180Ω			R51	51Ω 5%		
R26	1500Ω			R52	120Ω		
R27	3900Ω			R53	120Ω		
R28	1000Ω 5%			R54	120Ω		
R29	7500Ω 5%			R55	120Ω		
R30	5600Ω			R56	150Ω		
R31	10K			R57	1000Ω		
R32	4700Ω			R58	680Ω		

ITT Part Number.

† Alternate Value.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA			ITEM No.	USE	REPLACEMENT DATA		
		ITT PART No.	Merit PART No.	Miller PART No.			Stancor PART No.	Workman PART No.	Notes
L1	Ant.	1396							
L2	RF	1397							
L3	Receiver Osc.	1398							
L4	1.68MC IF	1399							
L5	1st 455KC IF	1400							
L6	2nd 455KC IF	1018							
L7	3rd 455KC IF	1019							
L8	RF Choke (60uh)	1424							
L9	Transmit Osc.	1425							
L10	Transmit Driver	1426							
L11	Final	1427							
L12	Ant. Load	1428							
L13	Ant. Load	1429							
L14	RF Choke (50uh)	1424							

FILTER CHOKE

ITEM No.	RATINGS		REPLACEMENT DATA				ITEM No.	NOTES
	CURRENT (Measured)	DC RES. (Ω)	INDUCTANCE (1000-)	ITT PART No.	MERIT PART No.	STANCOR PART No.		
L15	.800A	.5Ω	175MH	1056				

TRANSFORMER (POWER)

ITEM No.	RATING		REPLACEMENT DATA				ITEM No.	NOTES
	PRI	SEC. 1	ITT PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.		
T1	117V@ .105A (-172A)*	12V@ .360A DC (-172A)*	1110					* Transmit

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO	REPLACEMENT DATA				ITEM No.	NOTES
		ITT PART No.	MERIT PART No.	STANCOR PART No.	THORDARSON PART No.		
T2	4:1	1020					

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE	REPLACEMENT DATA				ITEM No.	NOTES
		ITT PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.		
T3	100Ω CT	1021					

SPEAKER

ITEM No.	TYPE	REPLACEMENT DATA		ITEM No.	NOTES
		ITT PART No.	QUAM PART No.		
SP1	2" x 6" PM	1025			

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA				ITEM No.	NOTES
			ITT PART No.	Holder	FUSE	Holder		
M1	3AG S/B	1/4A 125V 1A	1085 ① 1437 ②	101094	313.250	121004	MDL1/4 4405	

① AC Power Supply.

② DC Power Supply.

MISCELLANEOUS

ITEM No.	PART NAME	ITT PART No.	NOTES
M2	Crystal		Receive
M3	Crystal		Transmit
M4	Crystal	1116	Specify Channel
M5	Switch	1028	2nd Converter (2 135MC)
M6	Switch	1121	Channel Selector (Rotary Type)
M7	Relay	1024	Polarity (2 Position Slide Type)
	Microphone	1682	Receive-Transmit (185Ω, 12VDC)

WIRING DATA

General-use Hook-up Wire Use BELDEN No. 8530 (Solid), Available in 12 Colors
 8524 (Stranded) Available in 12 Colors
 Shielded Antenna Lead Use BELDEN No. 8214 Lowest Loss (RG-8/U Type)
 8237 Low Loss (RG-8/U)
 Coiled Microphone Cable Use BELDEN No. 8497 3 Conductor - 1 Shielded for Press-to-Talk (Neoprene)
 Ignition Noise Suppression Use BELDEN No. 7300-Series Spark-Plug Sets
 Bonding Strap Use BELDEN No. 8661 (3/8 In.)