



# PHOTOFACT<sup>®</sup>



TRADE NAME : Johnson Messenger Two  
 Models 242-162, 242-163 (Transceiver)  
 250-810, 250-811 (Selective Call Unit)

SUPPLIER : E. F. Johnson Co., Waseca, Minn.

TYPE SET : 10 Tube Transceiver  
 1 Tube - 2 Transistor Selective Call Unit

POWER SUPPLY : 110 - 120 Volts AC, 60 Cycle (or)  
 12 Volt Storage Battery

RATING : 75 Watts, .72 Amp. @ 117VAC (Transmit)  
 65 Watts, .64 Amp. @ 117VAC (Receive)

TUNING RANGE : Any 10 CB Channels 1 thru 23

JOHNSON MODELS 242-162/-163, 250-810/-811

**Suggested Alignment Tools:**

- A1 thru A8, A10, A11.....GENERAL CEMENT #8282, 8606, 8606L  
 WALSCO #2526, 2543, 2544
- A9, A12, A13, A14, A15..... GENERAL CEMENT #8271, 8722  
 WALSCO #2519
- A16, A17..... GENERAL CEMENT #5000, 5003, 5006  
 WALSCO #2515, 2516, 2518

**RECEIVER ALIGNMENT**

Connect DC VTVM from Point **A** to ground.

SIGNAL GENERATOR	CHANNEL	ADJUST	REMARKS
High side thru a .1mfd to pin 1 of V2 (Converter), low side to chassis. Tune to 455KC, 400% Mod.	Any	A1, A2, A3, A4, A5, A6, A7, A8	Adjust for maximum.
Across antenna terminals. Tune to channel frequency.	Center Channel Used.	A9	Adjust for maximum. Check other channels to be sure oscillator starts.
"	"	A10, A11, A12	Adjust for maximum.

**TRANSMITTER ALIGNMENT**

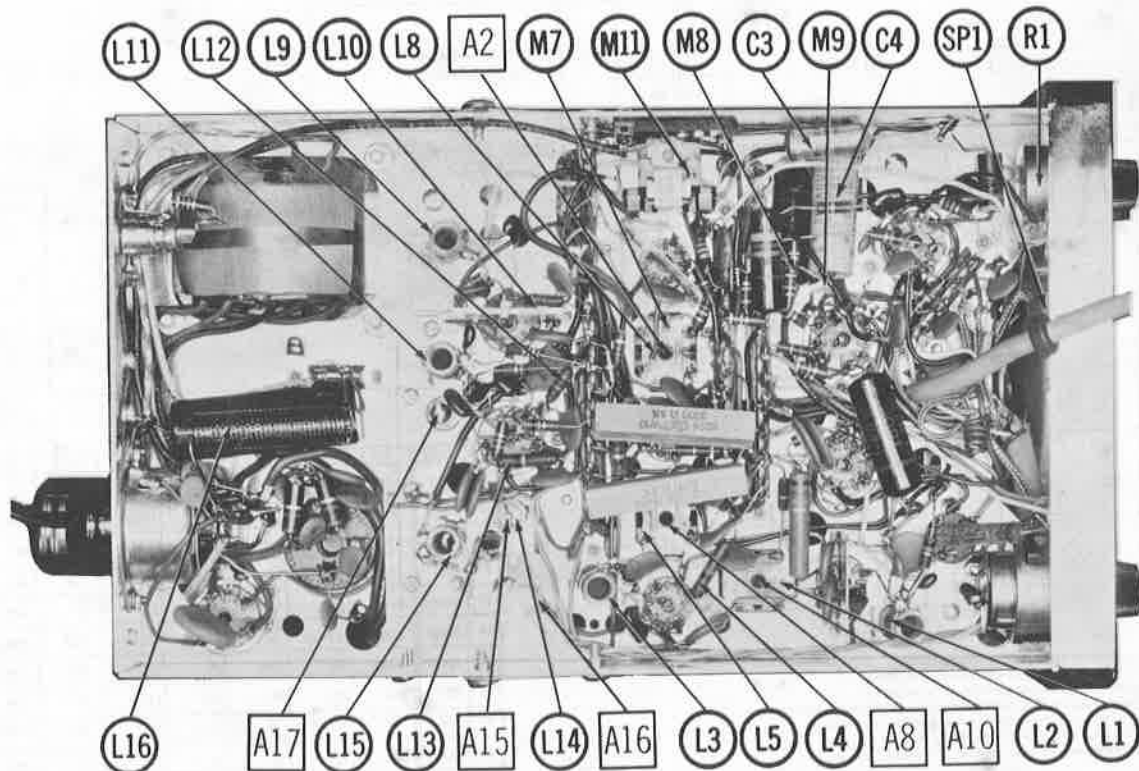
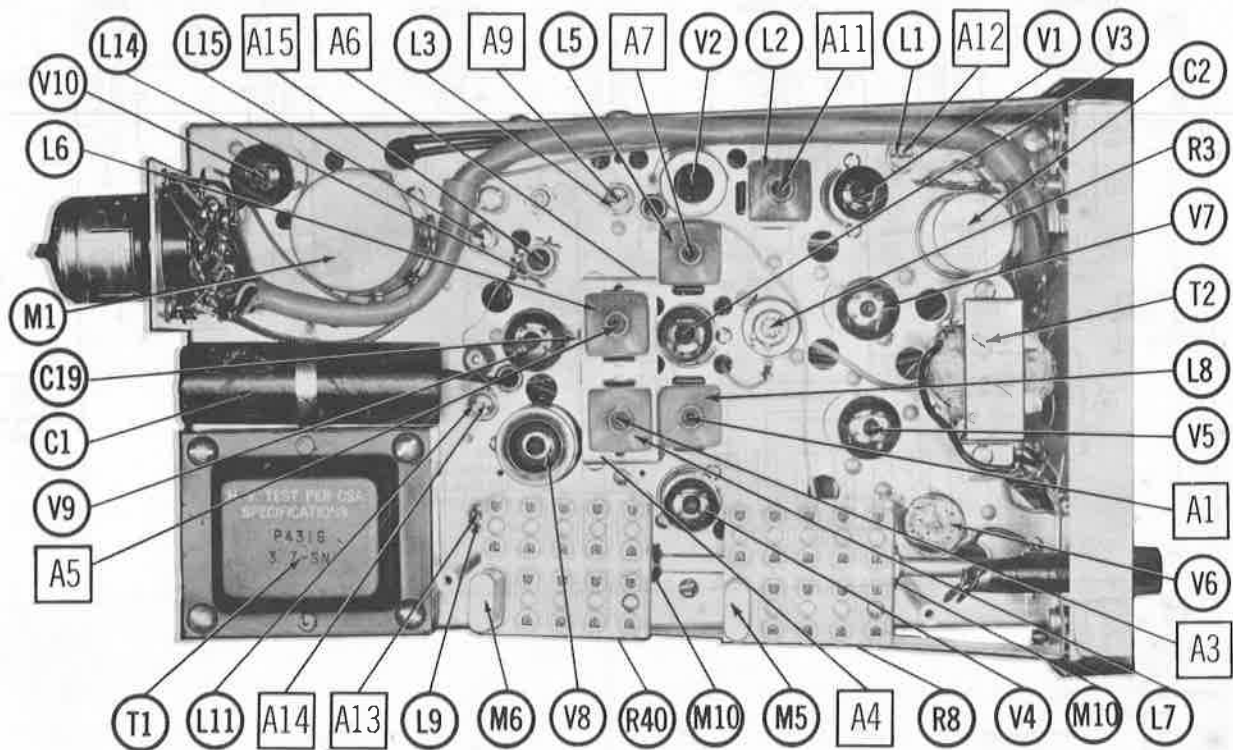
Only those persons properly licensed are permitted to make repairs or adjustments which may result in illegal operation. (Refer to FCC rules and regulations Part 19, Subpart D, Section 19.71).

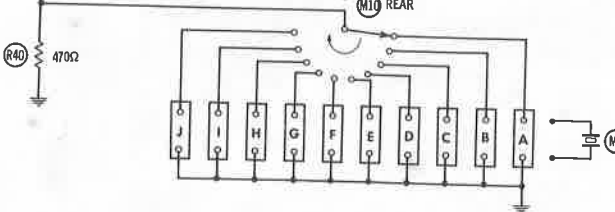
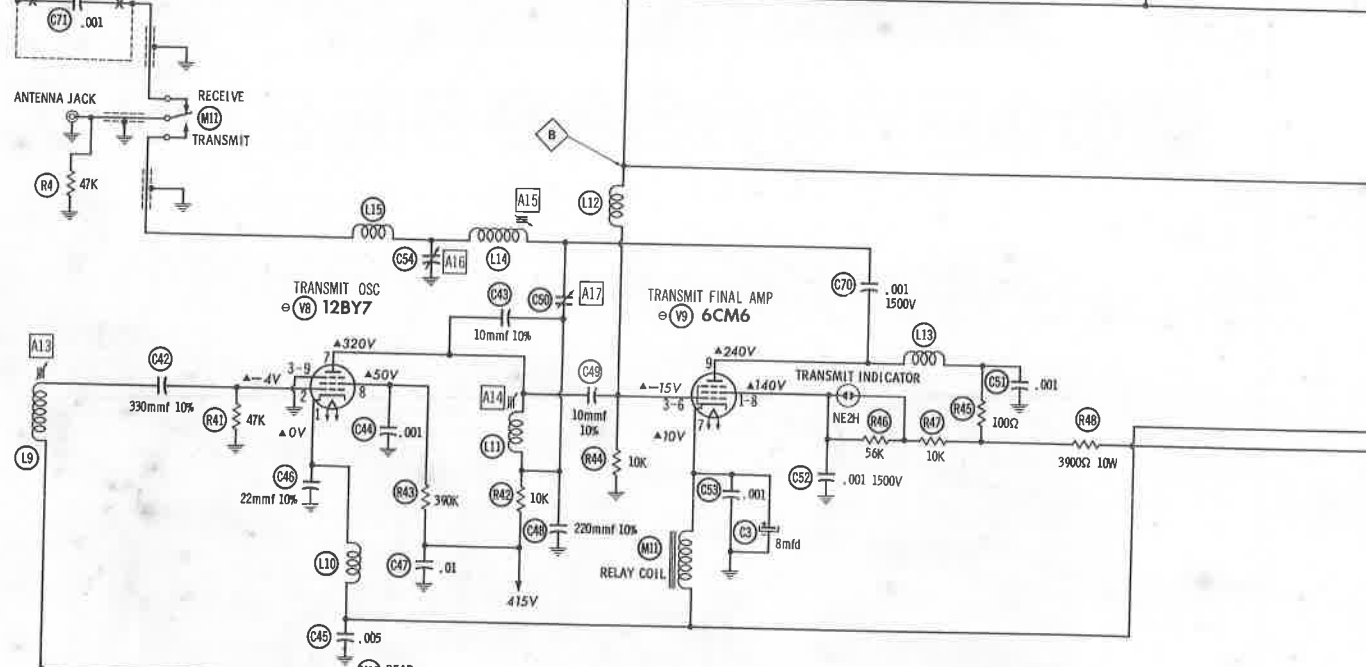
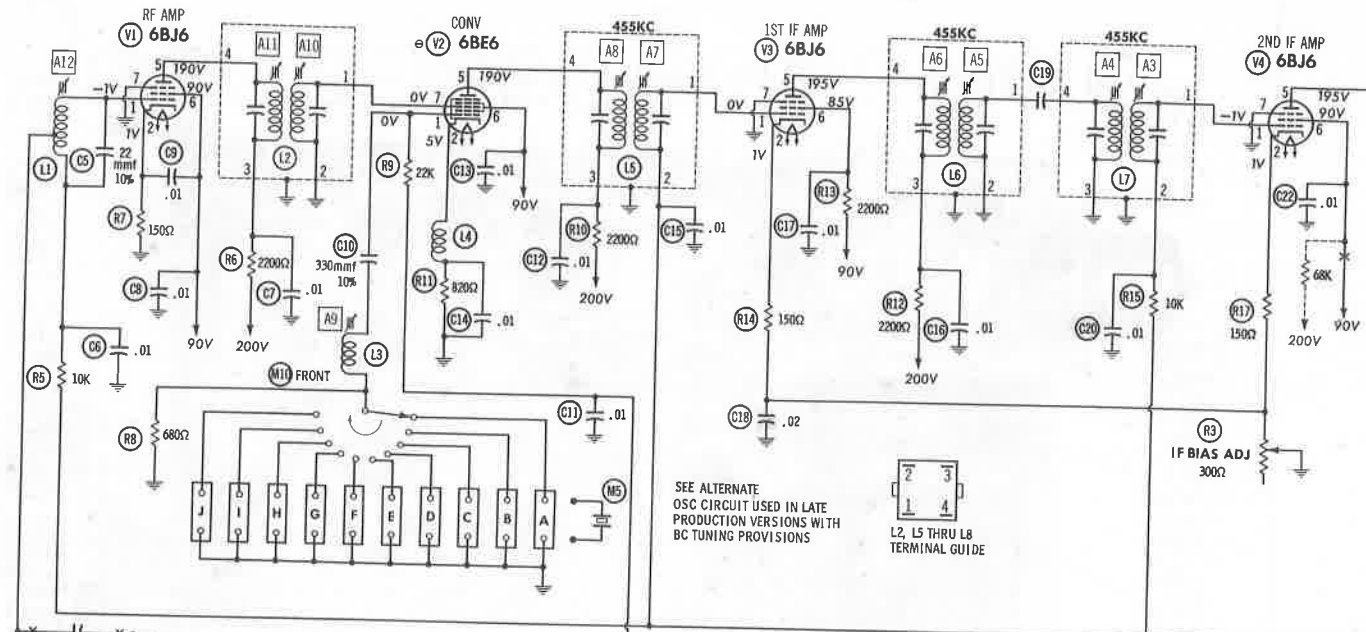
The frequency of the transmitter should be checked periodically with a secondary frequency standard to insure proper and legal operation.

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.

SIGNAL GENERATOR	CHANNEL	ADJUST	REMARKS
Connect DC VTVM from point <b>B</b> to ground.		A13, A14	Key transmitter. Adjust for maximum deflection. Check other channels to be sure oscillator starts each time.
Connect DC VTVM across R45 (V9 plate). Each volt indicated represents 10MA of plate current.		A15, A16	Key transmitter. Adjust A15 for MINIMUM (Resonance). Adjust A16 for 3 volts. Repeat adjustments. Make note of meter indication as A15 is adjusted. (See next step.)
Connect DC VTVM from point <b>B</b> to ground.		A17	If voltage increases as A15 is backed out, adjust A17 SLIGHTLY clockwise. Readjust A15. If voltage increases as A15 is turned in, adjust A17 SLIGHTLY counterclockwise. Readjust A15. A17 is adjusted correctly when meter indicates equal or no voltage rise each side of resonance. Readjust A13 thru A17.

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





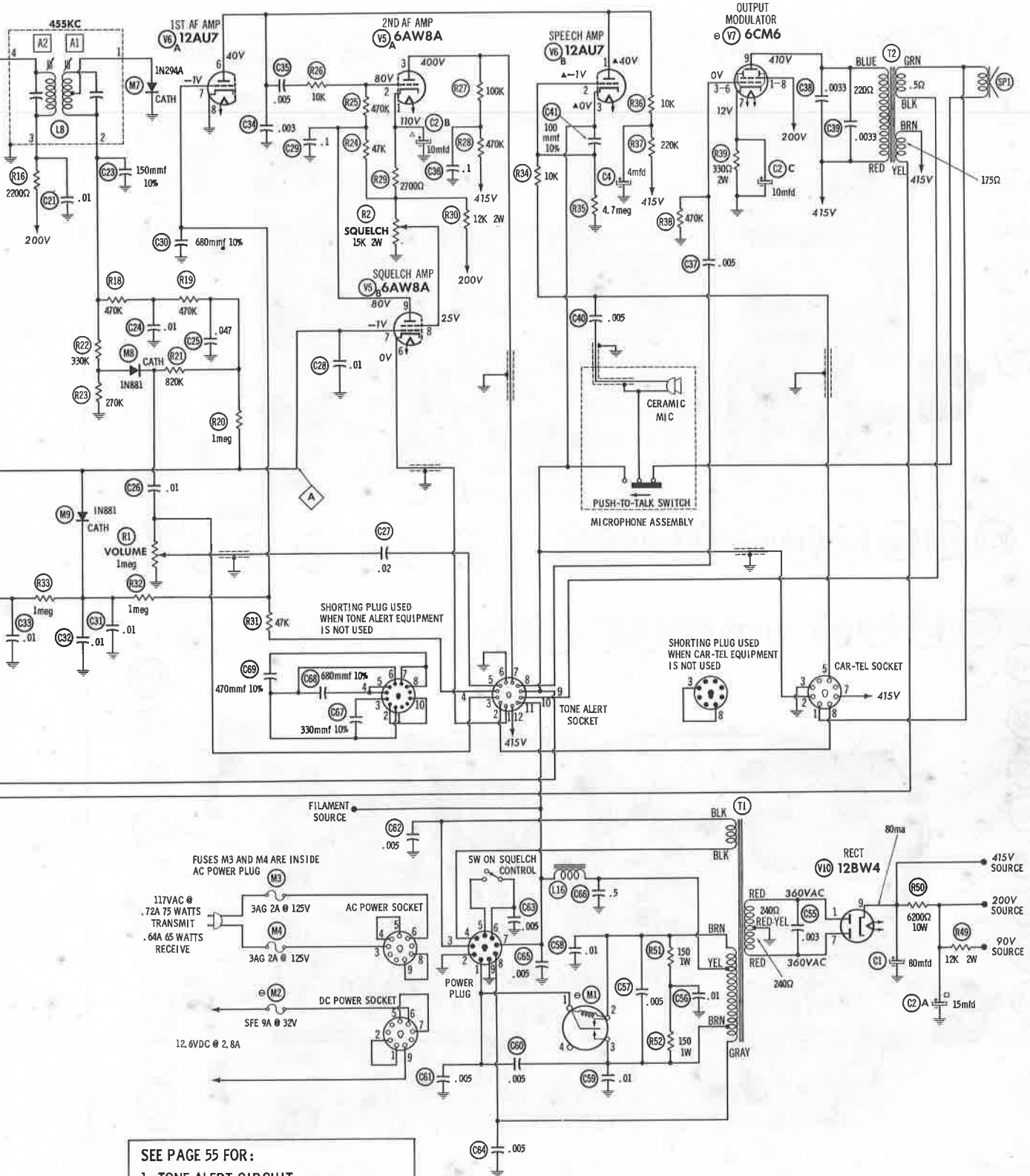
**RESISTANCE READINGS**

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6BJ6	2.5meg	150Ω	FIL	FIL	18400Ω	118K	0Ω		
V2	12BE6	30K	820Ω	FIL	FIL	18400Ω	118K	.1Ω		
V3	6BJ6	2.5meg	250Ω	FIL	FIL	18400Ω	120K	0Ω		
V4	6BJ6	2.5meg	250Ω	FIL	FIL	18400Ω	118K	0Ω		
V5	6AW8A	18K	500K	1570K	FIL	FIL	0Ω	815K	3000Ω	166K
V6	12AU7	1230K	4.7meg	Δ0Ω INF	FIL	FIL	1230K	2meg	0Ω	FIL
V7	12AB5	16200Ω	NC	470K	FIL	FIL	470K	330Ω	6200Ω	12200Ω
V8	7054	Δ5Ω	47K	0Ω	FIL	FIL	NC	110K	390K	0Ω
V9	7061	170K	TP	10K	FIL	FIL	10K	Δ325Ω	70K	14.2K
V10	12BW4	240Ω	NC	NC	TP	TP	NC	240Ω	NC	100K

ALL MEASUREMENTS MADE IN "RECEIVE" POSITION UNLESS OTHERWISE DESIGNATED.  
 Δ MEASURED IN "TRANSMIT" POSITION. NC NO CONNECTION TP TIE POINT  
 † MEASURED FROM PIN 9 OF V10.

- ⊙ See parts list for alternate value or application.
- 1. Voltage measurements taken with vacuum tube voltmeter.
- 2. All controls set for normal operation, no signal applied.
- 3. Measured values are from socket pin or terminal to common ground.
- 4. All terminals viewed from bottom unless otherwise designated.
- 5. Numbers assigned to terminals may not be found on the unit.
- 6. Supply voltage maintained at rated value for voltage readings.

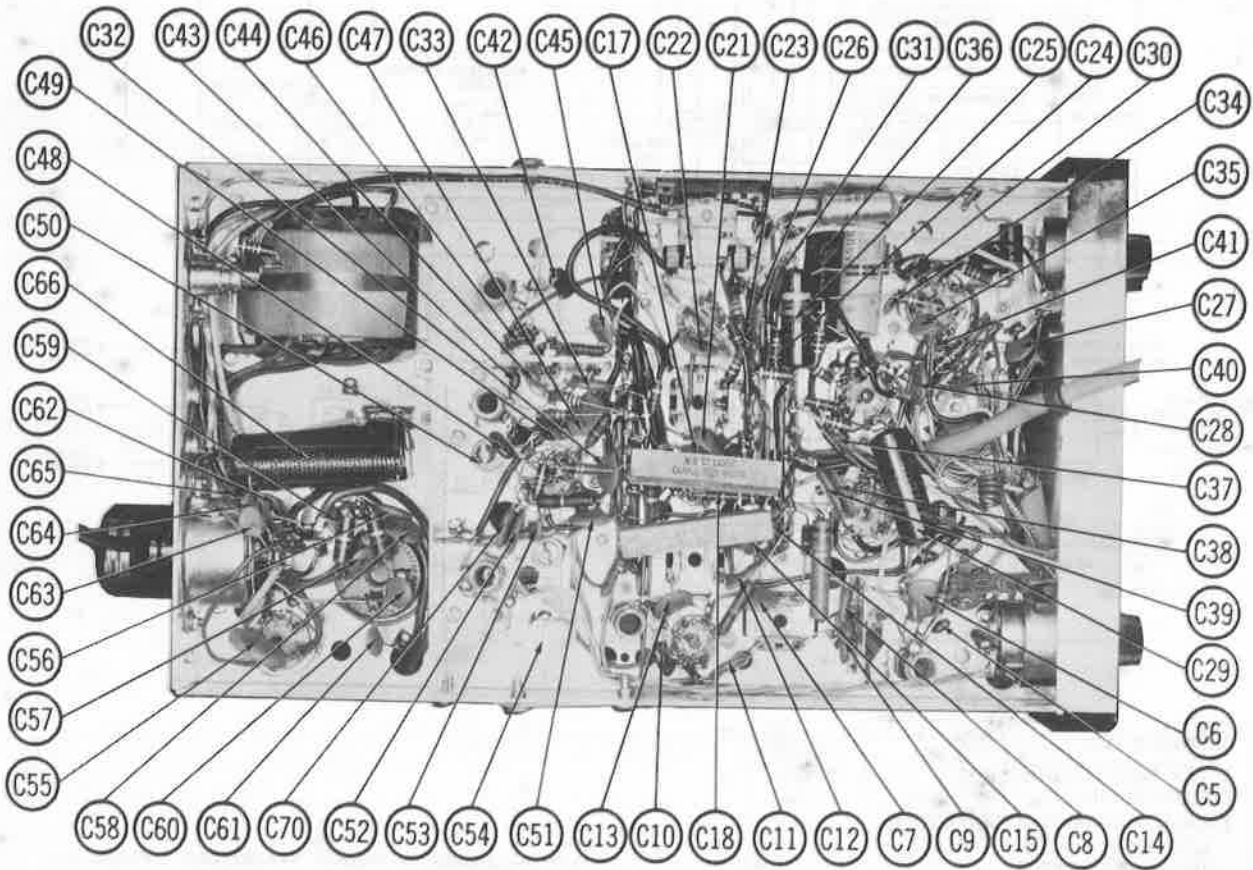
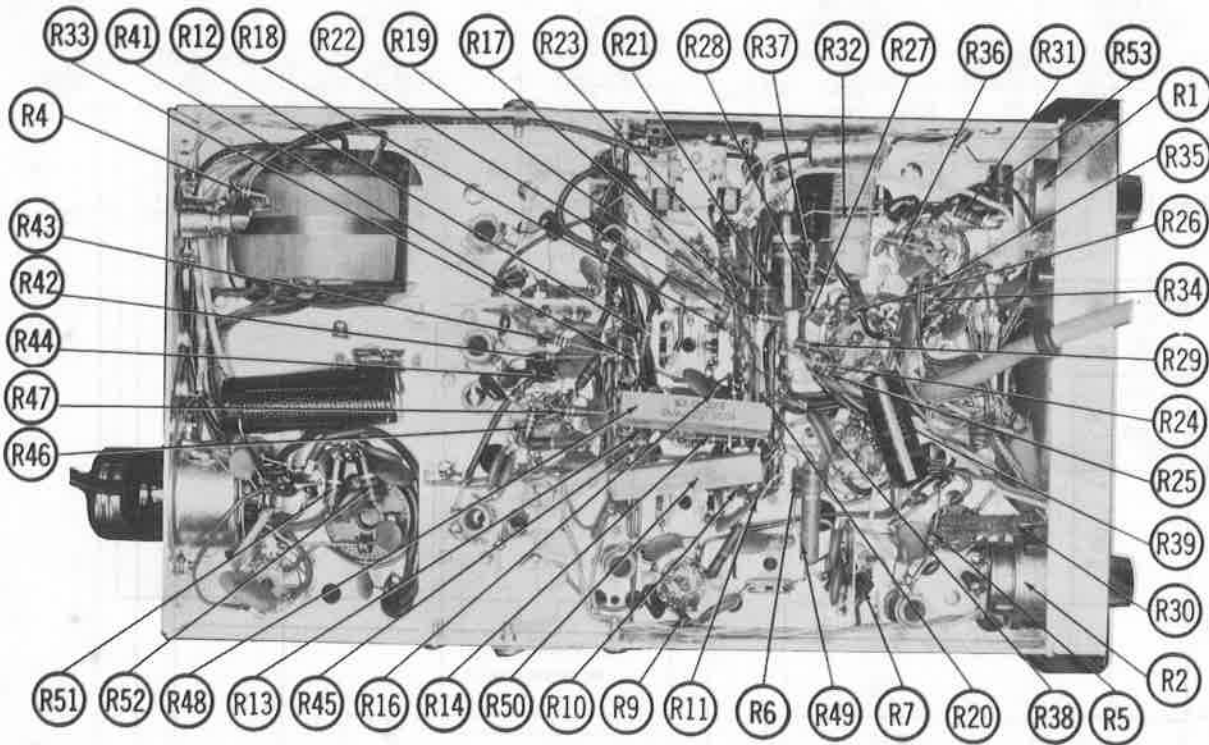
A PHOTOFAC STANDARD NOTATION SCHEMATIC  
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SEE PAGE 55 FOR:

1. TONE ALERT CIRCUIT.
2. FILAMENT CIRCUIT.
3. LOCAL OSCILLATOR CIRCUIT USED IN LATE VERSIONS WITH BROADCAST TUNING PROVISIONS.

JOHNSON MODELS 242-162/-163, 250-810/-811



# TRANSCEIVER PARTS LIST AND DESCRIPTION

## TUBES

ITEM No.	AMPEREX		GENERAL ELECTRIC		RCA		RAYTHEON		SYLVANIA	
	USE	TYPE	ITEM No.	USE	TYPE	ITEM No.	USE	TYPE	ITEM No.	USE
V1	RF Amp.	6B36	V6	Speech Amp. - 1st. AF Amp	12AU7	V7	Output-Modulator	12AB5 (6CM6)†		
V2	Conv.	12BE6 (6BE6) †	V8	Transmit - Oscillator	12BY7 (7054/ 8077) †	V9	Fual. RF	7061 (6CM6) †		
V3	1st IF Amp.	6B36	V10	Rectifier	12BW4					
V4	2nd IF Amp.	6AW8A								
V5	Squelch Amp. - 2nd AF Amp.									

† Used in 6-Volt Models.

## ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA					
	CAP.	VOLT.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	GENERAL ELECTRIC PART No.	GENERAL INSTRUMENT PART No.	MALLOY PART No.	SPRAGUE PART No.
C1	80	450	PRS1780	BR8045	TD-80-450	TC80	TVA-1716	
C2	15	300	AFH3-22	C0760	TMT-3292	FP938	TVL-3580	
C3	10	150	PRS1405	BBR8-150	TD-8-150	TC41	TVA-1405	
C4	8	150	PRS1600	BR435	TD-4-150	TC897	TVA-1601	
C5	4	350						

## FIXED CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA				
	CAP.	VOLT.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLOY PART No.	SPRAGUE PART No.
C5	22	100	ADM-15-220	TCZ-22	CM-15-220J	CNO-422	10TCC-Q22
C6	.01		BPD-01	DD-103	CCD-103	B-110	5HK-S10
C7	.01		BPD-01	DD-103	CCD-103	B-110	5HK-S10
C8	.01		BPD-01	DD-103	CCD-103	B-110	5HK-S10
C9	.01		BPD-01	DD-103	CCD-103	GP333	10TS-T33
C10	330	100	DI-330	DD-331	CCD-331	B-110	5HK-S10
C11	.01		BPD-01	DD-103	CCD-103	B-110	5HK-S10
C12	.01		BPD-01	DD-103	CCD-103	B-110	5HK-S10
C13	.01		BPD-01	DD-103	CCD-103	B-110	5HK-S10
C14	.01		BPD-01	DD-103	CCD-103	B-110	5HK-S10
C15	.01		BPD-01	DD-103	CCD-103	B-110	5HK-S10
C16	.01		BPD-01	DD-103	CCD-103	B-110	5HK-S10
C17	.01		BPD-01	DD-103	CCD-103	B-110	5HK-S10
C18	.02		BPD-02	DD-203	CCD-203	B-120	5HK-S20
C19	.56	mmf	BPD-01	DD-103	CCD-103	B-110	5HK-S10
C20	.01		BPD-01	DD-103	CCD-103	B-110	5HK-S10
C21	.01		BPD-01	DD-103	CCD-103	B-110	5HK-S10
C22	.01		BPD-01	DD-103	CCD-103	GP315	10TS-T15
C23	150	100	DI-150	DD-151	CCD-151	B-110	5HK-S10
C24	.01		P288N-047	DD-503	CCD-503	GEM-2147	2TM-S47
C25	.01		BPD-01	DD-103	CCD-103	B-110	5HK-S10
C26	.01		BPD-01	DD-103	CCD-103	B-110	5HK-S10
C27	.01		BPD-01	DD-103	CCD-103	B-110	5HK-S10
C28	.01		BPD-01	DD-103	CCD-103	B-110	5HK-S10
C29	1	400V	P488N-1	DF-104	4DF-5-104	GEM-401	4TM-P10
C30	680	100	BPD-01	DD-103	CCD-103	B-110	5HK-S10
C31	.01		BPD-01	DD-103	CCD-103	B-110	5HK-S10
C32	.01		BPD-01	DD-103	CCD-103	B-110	5HK-S10
C33	.003		BPD-003	DD-332	CCD-332	B-233	5HK-D33
C34	.005		BPD-005	DD-502	CCD-502	B-250	5HK-D50
C35	.005		P688N-1	DF-104	6DF-4-104	GEM-601	6TM-P10
C36	.005		BPD-005	DD-502	CCD-502	B-250	5HK-D50
C37	.005		BPD-005	DD-502	CCD-502	B-250	5HK-D50

## FIXED CAPACITORS (cont)

ITEM No.	RATING		REPLACEMENT DATA				REMARKS	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLOY PART No.	SPRAGUE PART No.
	CAP.	VOLT.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	GENERAL ELECTRIC PART No.	GENERAL INSTRUMENT PART No.							
C38	.0033		BPD-0033	DD-332	CCD-332	B-233	5HK-D33						
C39	.0033		BPD-0033	DD-332	CCD-332	B-233	5HK-D33						
C40	.005		BPD-005	DD-502	CCD-502	B-250	5HK-D50						
C41	100	10%	1469-100	TCN-100	CM-15E-101	MCE235	MS-31						
C42	330	10%	DI 330	LA10T33	CCD-331	GP333	10TS-T33						
C43	10	10%	NPO-S1 10	DD-102	CCD-102	GP410	10TS-Q10						
C44	.001		BPD-001	DD-102	CCD-102	B-210	5HK-D10						
C45	.005		BPD-005	DD-502	CCD-502	B-250	5HK-D50						
C46	22	10%	BPD-01	DD-103	CCD-103	B-110	5HK-S10						
C47	.01		DI-220	LA10T22	CCD-221	GF322	10TS-T22						
C48	220	10%	NPO-S1 10	DD-102	CCD-102	GP410	10TS-Q10						
C49	10	10%											
C50													
C51	.001	1500V	BPD-001	DD-102	CCD-102	B-210	5HK-D10						
C52	.001		BPD-001	DD-102	CCD-102	B-210	5HK-D10						
C53	.001		BPD-001	DD-102	CCD-102	B-210	5HK-D10						
C54													
C55	.003		BPD-0033	DD-332	CCD-332	B-233	5HK-D33						
C56	.01		BPD-01	DD-103	CCD-103	B-110	5HK-S10						
C57	.005		BPD-005	DD-502	CCD-502	B-250	5HK-D50						
C58	.01		BPD-01	DD-103	CCD-103	B-110	5HK-S10						
C59	.01		BPD-01	DD-103	CCD-103	B-110	5HK-S10						
C60	.005		BPD-005	DD-502	CCD-502	B-250	5HK-D50						
C61	.005		BPD-005	DD-502	CCD-502	B-250	5HK-D50						
C62	.005		BPD-005	DD-502	CCD-502	B-250	5HK-D50						
C63	.005		BPD-005	DD-502	CCD-502	B-250	5HK-D50						
C64	.005		BPD-005	DD-502	CCD-502	B-250	5HK-D50						
C65	.005		BPD-005	DD-502	CCD-502	B-250	5HK-D50						
C66	.5	200V	P288N-5	DD-502	CCD-502	GEM-205	2TM-P50						
C67	330	10%	DI 330	LA10T33	CCD-331	GF333	10TS-T33						
C68	470	10%	1468-00047	DAAC-2	CM-19B47M	MC244	1FM-344						
C69	.001	1500V	BPD-001	DD-102	CCD-102	UAC-210	30CA-D10						
C70	.001												
C71	.001												

## CONTROLS

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

ITEM No.	USE		REPLACEMENT DATA				
	RESISTANCE	WATTAGE	JOHNSON PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLOY PART No.
R1	Volume	1meg	22.1647	F2-1meg, SUD204 or (B-70)	A47-1meg-Z, RS-2	Q18-137, PQ or (BPD, CF76, S55, JCF74, W11-116, SK5, 76-11	UA116A, SL2500 or (BU16A, SL38, SL2500) or (US-3) R10ML, US-30
R2	Squelch & Switch	15K 2W	22.1932	WN-301 or (WW-301)	A43S-10K, RS-2	W11-102, SK5	VW300
R3	IF Bias	300Ω 2W			U99-300		

\* 'SNAPTROL'

## RESISTORS (Power and Special)

ITEM No.	RATING		REPLACEMENT DATA				
	RESISTANCE	WATTAGE	JOHNSON PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLOY PART No.
R48	3900Ω	10W	PW10-3900	10W-SQ-3900			
R49	5200Ω	10W	PW10-5200	10W-SQ-5200			

**JOHNSON MODELS 242-162/-163, 250-810/-811**

# TRANSCEIVER PARTS LIST AND DESCRIPTION (CONTINUED)

## COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA				NOTES
		JOHNSON PART No.	MERIT PART No.	MILLER PART No.	STANCOR PART No.	
L1	Antenna	22-1175-21				
L2	RF Bandpass	22-1623-1				
L3	Osc. Grid	23-1175-15				
L4	RF (20uh)	22-1549				
L5	1st IF	22-1964-1				
L6	2nd IF	22-1964-3				
L7	3rd IF	22-1964-2				
L8	4th IF	22-1964-2				
L9	Transmit Osc. Grid	23-1175-17				
L10	Cath. Choke(6.8uh)					
L11	Trans. Osc. Plate	23-1175-17				
L12	RF Choke(6.8uh)	22-1549				
L13	Plate Choke(20uh)	23-1175-24				
L14	Antenna Load	23-1175-23				
L15	Antenna Load	16-1456				
L16	Hash Choke(4uh)					

## TRANSFORMER (POWER)

ITEM No.	RATING	REPLACEMENT DATA			NOTES
		JOHNSON PART No.	MERIT PART No.	STANCOR PART No.	
T1	PRI. SEC. 1 SEC. 2 117VAC 18V Tap 720VCT ⑤ .72A ⑥ 12.6V CT ⑦ 12.6VCT, 1.2A ⑧ 2.8A	P4316			

## TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE	REPLACEMENT DATA			NOTES
		JOHNSON PART No.	MERIT PART No.	STANCOR PART No.	
T2	PRI. SEC. 1 SEC. 2 3-4Ω 4500Ω				

## SPEAKER

ITEM No.	TYPE	REPLACEMENT DATA		NOTES
		JOHNSON PART No.	QUAM PART No.	
SP1	3 1/2" PM 3-4Ω	22-1612	3A070T	

## VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FRE-QUENCY	REPLACEMENT DATA		NOTES
				JOHNSON PART No.	CORNELL-DUBILIER PART No.	
M1	Interrupter	12.6	115%	22-1570-1 ①	G1801 ①	① 12 Volt Version
	Interrupter	6.3	115%	22-1570-2 ②	1801 ②	② 6 Volt Version

## FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA			BUSS PART No.
			JOHNSON PART No.	HOLDER	FUSE	
M2	SFE	9A 32V	22-1590-4 ①		307009 (SFE 9A 32V)	155009
	SFE	20A 32V	22-1590-6 ②		311020 (SFE 20A 32V)	155020
M3	3AG	2A 125V	22-1257 ③		312002 (3AG 2A 125V)	AGC 2
M4	3AG	2A 125V	22-1257 ③		312002 (3AG 2A 125V)	AGC 2

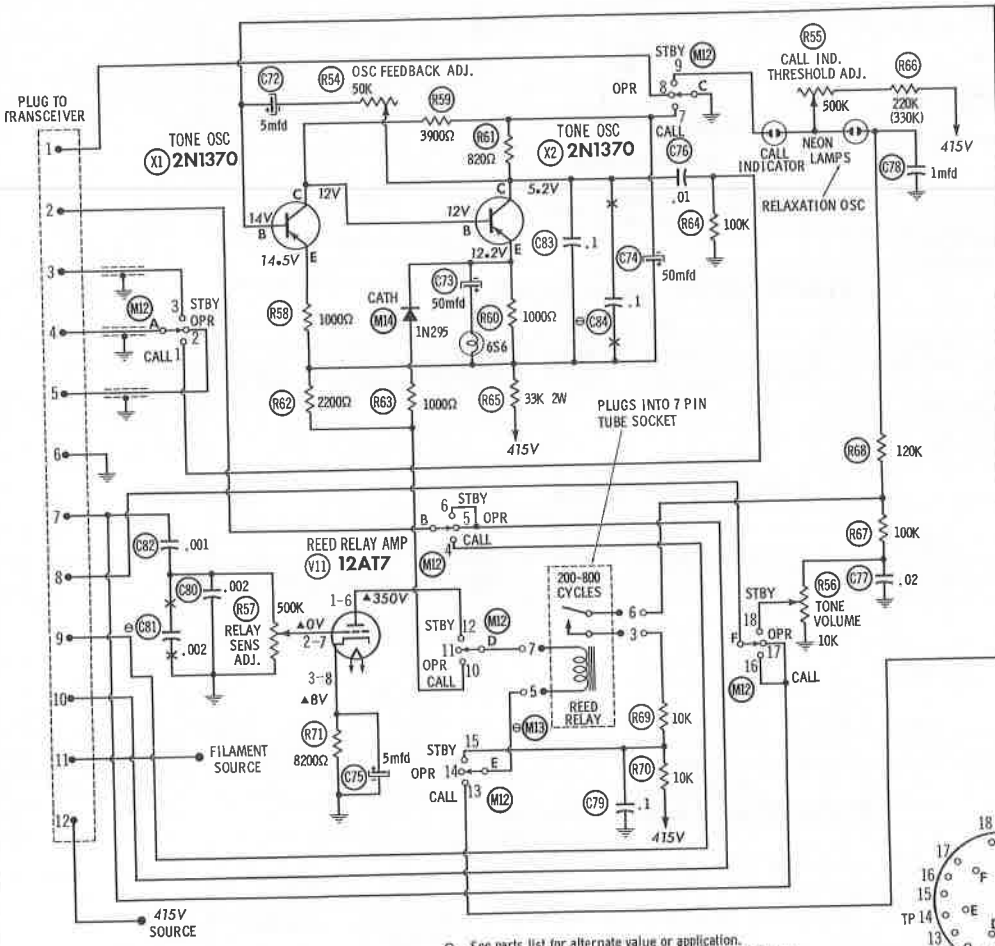
① 12 Volt Operation ② 6 Volt Operation ③ AC Operation.

## MISCELLANEOUS

ITEM No.	PART NAME	JOHNSON PART No.	NOTES
M5	Crystal		Receive (order by Frequency & Channel desired)
M6	Crystal		Transmit (Order by Frequency & Channel desired)
M7	Crystal Diode		Detector (IN294A)
M8	Crystal Diode		Squelch (IN881)
M9	Crystal Diode		Overload (IN881 or IN1138)
M10	Switch		Channel Selector, Rotary Wafer Type
M11	Relay		Receive-Transmit

## WIRING DATA

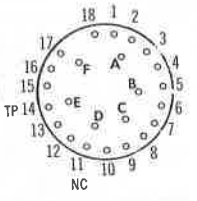
General-use Hook-up Wire	..... Use BELDEN No. 8530 (Solid) Available in 12 Colors
Shielded Antenna Lead	..... Use BELDEN No. 8524 (Stranded) Available in 12 Colors
	..... Use BELDEN No. 8214 (Lowest Loss (RG-8/U Type)
	..... Use BELDEN No. 8237 (Low Loss (RG-8/U))
Coiled Microphone Cable	..... Use BELDEN No. 8249 (Solid) Miniature (RG-58/U)
	..... Use BELDEN No. 8499 (Stranded) Miniature (RG-58A/U)
Ignition Noise Suppression	..... Use BELDEN No. 8488 (Single Conductor Shielded (Neoprene))
Bonding Strap	..... Use BELDEN No. 7300-Series Spurt-Plug Sets
	..... Use BELDEN No. 8661 (3/8 In.)



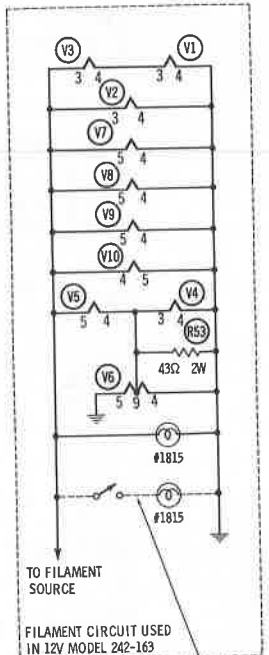
TONE ALERT CIRCUIT FOR MODELS: 250-810 AND 250-811

ALL VOLTAGES MEASURED IN CALL POSITION UNLESS OTHERWISE DESIGNATED  
 ▲ MEASURED IN EITHER STANDBY OR OPERATE POSITION

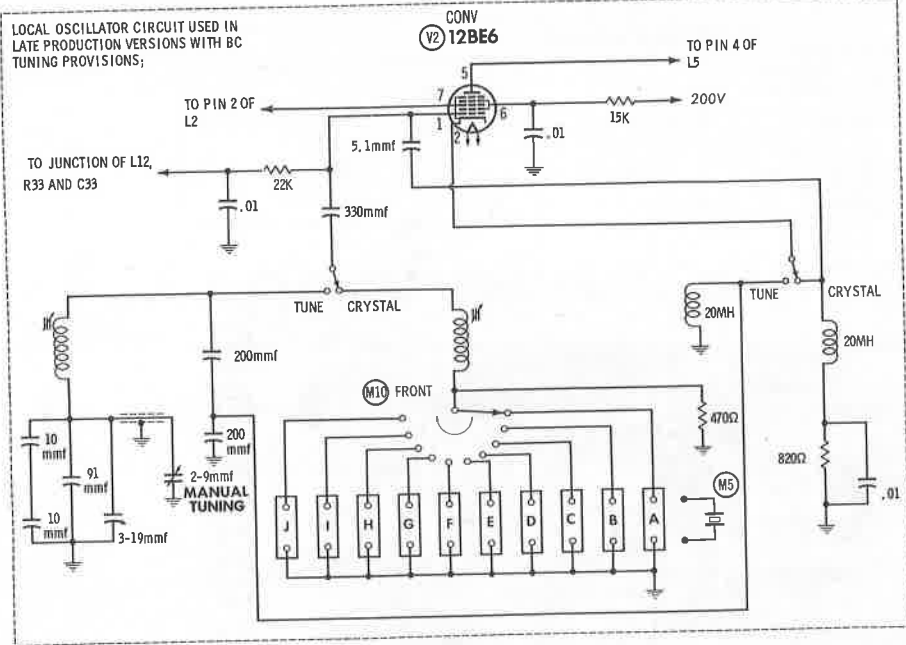
- ⊙ See parts list for alternate value or application.
- 1. Voltage measurements taken with vacuum tube voltmeter.
- 2. All controls set for normal operation, no signal applied.
- 3. Measured values are from socket pin or terminal to common ground.
- 4. All terminals viewed from bottom unless otherwise designated.
- 5. Numbers assigned to terminals may not be found on the unit.
- 6. Supply voltage maintained at rated value for voltage readings.
- 7. Resistance measurements not given because of the wide variation in internal resistance of transistor.



FUNCTION SWITCH (M12) TERMINAL GUIDE

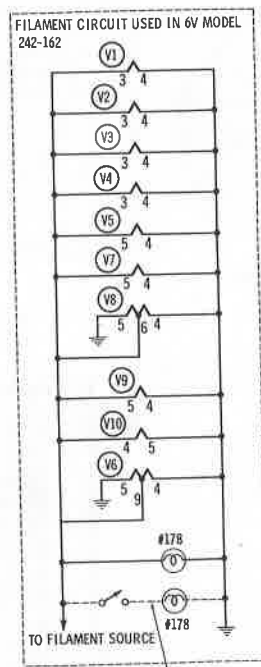


SWITCH AND BC INDICATOR LIGHT USED IN VERSIONS WITH BC TUNING PROVISIONS



A PHOTOFAC STANDARD NOTATION SCHEMATIC  
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JOHNSON MODELS 242-162/-163, 250-810/-811



SWITCH AND BC INDICATOR LIGHT USED IN VERSIONS WITH BC TUNING PROVISIONS

JOHNSON MODELS 242-162/-163, 250-810/-811



# TONE ALERT PARTS LIST AND DESCRIPTION TUBES

◆ AMPEREX ◆		GENERAL ELECTRIC ◆		RCA ◆		RAYTHEON ◆		SYLVANIA ◆	
ITEM No.	USE	TYPE		ITEM No.	USE	TYPE			
V11	Reed Relay Control Amp.	12AT7							

## TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA			NOTES
			DELCO PART No.	GENERAL ELECTRIC PART No.	RCA PART No.	
X1	2N1370	Oscillator				
X2	2N1370	Oscillator				PNP PNP

## ELECTROLYTIC CAPACITORS

ITEM No.	RATING		JOHNSON PART No.	REPLACEMENT DATA					
	CAP.	VOLT.		AEROVOX PART No.	CORNELL-DUBILIER PART No.	GENERAL ELECTRIC PART No.	GENERAL INSTRUMENT PART No.	MALLORY PART No.	SPRAGUE PART No.
C72	5	25	22.1734-2						
C73	50	3	22.1734-8						
C74	50	25	22.1734-9						
C75	5	25	22.1734-2						

## FIXED CAPACITORS

ITEM No.	RATING	REMARKS	REPLACEMENT DATA						
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.	
C76	.01								
C77	.02 50V								
C78	Imfd 200V								
C79	.1								
C80	.002								
C81	.002	Note 1							
C82	.001								
C83	.1 25V								
C84	.1 25V	Note 1							

Note 1. Not used when high frequency tone reeds are installed.

## CONTROLS

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

ITEM No.	USE	RESISTANCE	REPLACEMENT DATA				
			JOHNSON PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	CTS-IRC PART No.	MALLORY PART No.
R54	Feedback Adjust	50K	22-1890-2	TT-31 ①	B47-50K-S ①	B11-123, TM9, or (BU11, CF12, SS6, DC2)*	PTA54L ①
R55	Latch Light Adjust	500K	22-1890-3	TT-59 ①	B47-500K-S ①	B11-133, TM9, or (BU11, CF16, SS6, DC2)*	PTA55L ①
R56	Tone Volume	10K	22-1890-1	F2-10K, SN010, AK-38		B13-116, TM4, or (BU11, CF61, SS0)*	RU14A, SL37, SN1000
R57	Sensitivity Adjust	500K	22-1890-3	TT-59 ①	B47-500K-S ①	B11-133, TM9, or (BU11, CF16, SS6, DC2)*	PTA55L ①

\* "SNAPTROL"

① Cut off Shaft and Adjust from Rear.

## MISCELLANEOUS

ITEM No.	PART NAME	JOHNSON PART No.	NOTES
M12	Switch	22.1891	Standby-Operate-Call (Lever Type) Low Frequency Tone
M13	Tone Reed Relay	22.1889-1 thru 22.1889-26	
	Tone Reed Relay	22.1889-27 thru 22.1889-37	High Frequency Tone
M14	Diode	22.3901	1N295

