



Instructions



RADIO CORPORATION OF AMERICA ENGINEERING PRODUCTS DIVISION CAMDEN, N. J.

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#### ERRATA IN IB-36160

INSTRUCTION BOOK FOR BW-4A AND BWU-4A TELEVISION DEMODULATORS

DISPOSITION: To be inserted in and become part of IB-36160.

1. Replace the tabulation on page 21 with the table on the last page of this errata.

2. On page 33, in the group of parts listed for the VHF CONVERTER, MI-34003, make the necessary changes to bring the PARTS LIST into agreement with the following tabulation:

Symbol No.		Description	Drawing No.	Stock No.
R2	Resistor,	27 ohms, ±10%, 1/2 watt.	82283-43	502027
R4		Same	Same	522010
<b>R</b> 12		Same	Same	502322
R15	Resistor,	100k ohms, ±10%, 1/2 watt.	82283-86	502410
R21		Same	Same	512333

3. On page 34, in the group of parts listed for the UHF CONVERTER, MI-34004, make the necessary changes to bring the PARTS LIST into agreement with the following tabulation:

Symbol No.	Description	Drawing No.	Stock No.	
CRL	Same	Same	95696	
R19	Same	Same	502322	
R21	Same	Same	512312	

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4. On page 34, the parts-list heading below the center of the page should read, "IF, VIDEO, AND POWER SUPPLY, MI-34002".

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5. In the group of parts listed for the IF, VIDEO AND POWER SUPPLY, MI-34002, make the necessary changes to bring the PARTS LIST into agreement with the following tabulation:

Symbol	No.	<u>М</u> ;	Description		Drawing No.	Stock No.
~~~	G		999 - The Control of	all a sharaha waxaa kababada dadadada		
CRL			Same		Same	76675
CR2			Same		942423-2	95696
J4			Same	- A	751500-3	204563
L13			Same		149484-503	
L14			Same		8825473-517	99185
L15			Same		149484-501	Same
L16			Same		149484-502	Same
R22			100k ohms, ±10%,		88283-86	502410
R28		Resistor,	100k ohms, ±10%,	1/2 watt.	Same	Same
			Same as 1	R22.		
R31			Same		Same	502347
R37			Same		Same	502068
R38			Same		Same	502075
R45			Same		Same	502147
R49			Same		Same	512333
R51			Same		Same	512327
R52			Same		Same	522318
R54		Resistor.	100k ohms, ±10%,	l watt.	Same	Same
	, R58		Same		Same	512068
R63			100k ohms, ±10%, 1	1/2 watt.	Same	Same
			Same as I			<b>J</b> G H C

6. Add the items listed in the following tabulation to the PARTS LIST for the IF, VIDEO, AND POWER SUPPLY, MI-34002.

Symbol No.	Description	Drawing No.	Stock No.	
	Connector, coaxial termination plug.	149475-1	54256	
	Connector, coaxial.	427992-501	56153	
	Connector, video output.	252868-1	66344	
	Connector, & contact.	727969-27	99213	
	Cord, power, 8 feet long.	399708-1	52556	

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7. Make the following changes in the schematic diagram on page 38:

(a) Change the value of R2 to 27 ohms.

(b) On the tube-socket diagram for channels 2 to 6, change the value of C23B to 18 mmf.

(c) On the tube-socket diagram for channels 2 to 6, delete C23A. There should be no connection between socket terminals 1 and 2.

8. In the instruction books for equipments bearing serial numbers 1023 and above, make the following changes in the schematic diagram on page 37:

(a) Remove the end of R19 which connects to the junction point between R20 and R21. Reconnect this end of R19 to the side of R21 which connects to terminal 14 of J4.

(b) Delete R20. Resistor, R21, should now be connected directly to C19.

- (c) Delete C20.
- (d) Change the value of R19 to 39k ohms.
- (e) Change the value of R21 to 5600 ohms.
- (f) Change the value of C26 to 510 mmf.

9. On page 34 of the instruction books for equipments bearing serial numbers 1023 and above, in the group of parts listed for the UHF CONVERTER, MI-34004, make the necessary changes to bring the PARTS LIST into agreement with the following tabulation:

Symbol No.	Description	Drawing No.	Stock No.
C20 C26 R19 R20 R21	Not Used Capacitor, 510 mmf, ±10%, mica. Resistor, 39k ohms, ±10%, 1/2 watt. Not Used Resistor, 5600 ohms, ±10%, 1 watt.	748252-248 82283-81 90496-71	90009 502339 512256

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# TABLE III

TYPICAL	OPERATING	VOLTAGES	·

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Symbol	Function	RCA			I	in Numb	ers			
		Tube Type	1	2	3	4	5	6	7	8
	IF, VIDE	O, AND .	POWER	SUPPLY	CHASS	IS				
V1 V2 V3 V4 V5 V6 V7 V8 V9 V10 V11 V12	First Buffer Second Buffer First IF Second IF Third IF Fourth IF Video Output Envelope Detector Amp Series Regulator D-C Amplifier Voltage Reference Rectifier	604 6086 6086 6086 6086 6086 6086 6087 6086 6087 6086 003 504	0 0 0 0 175 106	2 2 2 10 6.3ac 170 420 105	0 0 0 0 0 250	6.3ac 6.3ac 6.3ac 6.3ac 6.3ac 0 6.3ac 175 -	215 200 200 200 185 3 170 420 175 105	145 145 145 180 140 170 250 150 -	5 2 2 2 10 - 4 - 105 -	- - 199
		VHF CON	VERTE	R UNIT		2 T T 4				
V1 V2 V3	Oscillator, First Mult. Second Multiplier Mixer	6j6 <b>6</b> CB6 6AS6	120 -8 RF	180 2 2	0 0 0	6.3ac 6.3ac 6.3ac	-27 190 190	-10 200 100	0 2 -5	-
		UHF CON	VERTE	R UNIT		· · · ·				
V1 /2 V3	Oscillator, First Mult. Second Mult. and Third Mult. Buffer	6ј6 6вq7-А 6св6	120 190 0	180 -12 2	0	6.3ac 0 6.3ac	-27 6.3ac 200	-10 190 145	0 -13 2	0

All voltages measured with respect to ground with VoltOhmyst (RCA Type WV-97A)

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# ADDENDA TO IB-36160

# INSTRUCTION BOOK FOR BW-4A AND BWU-4A TELEVISION DEMODULATORS

DISPOSITION: To be inserted in and become part of IB-36160.

The following changes should be made in the instruction books for only those BW-4A and BWU-4A equipments bearing serial numbers 1086 and above.

1. On the IF, Video, and Power Supply Schematic Diagram on page 39, make the following changes:

- (a) Change the symbol number C4OA to C67.
  - (b) Change the value of C67 from 80 to 5 microfarads.
  - (c) Change the value of R37 from 68 to 39 ohms.
  - (d) Change the value of R39 from 15 K ohms, 1 W to 10 K ohms, 2 W.
  - (e) Change the value of R41 from 1200 to 3000 ohms.
  - (f) Change the value of R42 from 820 to 1800 ohms.
  - (g) Add a resistor in parallel with R42. The symbol number for this resistor should be R65. This resistor has a value of 1800 ohms, 2 watts.

2. In the IF, Video, and Power Supply Parts List on pages 35 and 36, make the necessary changes to bring the list into agreement with the following tabulation:

Syr	nbol	No.	Description	Drawing No.	Stock No.
	067		Capacitor: dry electrolytic, 5 mf /100% -10%, 350 v	442901-66	
	R37		Resistor: fixed, composition,	442901-00	28417
			39 ohm 45%, 1/2 w	82283-45	502039
	R39		Resistor: fixed, composition,		
	- 16-		10,000 ohm /5%, 2 w	99126-74	522310
	R41		Resistor: fixed, wire wound,		·
	R42		3000 ohu <u>/</u> 5%, 10 w	458574-58	97379
	747		Resistor: fixed, composition,		
	R65		1800 ohm ±5%, 2 w	99126-65	522218
	LOJ		Resistor: fixed, composition, 1800 ohm $\frac{1}{25\%}$ , 2 w. Same as R42	99126-65	522218

3. On page 21, in TABLE III, the voltages listed should be changed to agree with the following list:

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Symbol	Function	RCA Tube			Pin Numbers							
O MUOT	1 une 610m	Tube Type	1	2	3	4	5	6	7	g		
V3 V4 V5 V6	First IF Second IF Third IF Fourth IF	6CB6 6CB6 6CB6 6AK6	0000	2210	00000	5.4ac 5.4ac 5.4ac 6.0ac	200 200 200 185	145 145 145 180	2 2 2 10	1 1 1		
V7	Video Output	6AG7	0	6.3ac	0	0	1.9	148	0	108		

4. On page 15, following Step 8, and on page 16, following Step 11, add the following paragraphs:

As a result of the introduction of higher power TV transmitters, it has become apparent that the directional coupler furnishes excessive voltages to the r-f input of the demodulator even in the minimum penetration position.

In cases where the voltage required for a video presentation without sync compression cannot be obtained even at minimum penetration, it will be necessary to insert a 50-ohm attenuator pad at the r-f input jack of the demodulator. The value of the pad must at present be obtained by a cut and try method. The best procedure is to have several pads available, such as 10-db, 6-db, and 3-db, and to adjust the r-f input to get the proper video output presentation.

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TYPE BW-4A AND BWU-4A TELEVISION DEMODULATORS



# INSTRUCTIONS

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# FIRST AID

#### WARNING!

Operation of electronic equipment involves the use of high voltages which are dangerous to life. Operating personnel must at all times observe all safety regulations. Do not change tubes or make adjustments inside the equipment with voltage supply on. Under certain conditions dangerous potentials may exist in circuits with power controls in the off position due to charges retained by capacitors, etc. To avoid casualties, always discharge and ground circuits prior to touching them.

# 

#### ABOUT FIRST AID

Personnel engaged in the installation, operation and maintenance of this equipment or similar equipment are urged to become familiar with the following rules both in theory and in the practical application thereof. It is the duty of every radioman to be prepared to give adequate First Aid and thereby prevent avoidable loss of life.

#### PRONE-PRESSURE METHOD OF RESUSCITATION

- 1. PROTECT YOURSELF with dry insulating material.
- 2. BREAK THE CIRCUIT by opening the power switch or by pulling the victim free of the live conductor.

DON'T TOUCH VICTIM WITH YOUR BARE HANDS UNTIL THE CIRCUIT IS BROKEN.



- LAY PATIENT ON STOMACH, one arm extended, the other arm bent at elbow. Turn face outward resting on hand or forearm.
- REMOVE FALSE TEETH, TOBACCO OR GUM from patient's mouth.
- 5. KNEEL STRADDLING PATIENTS THIGHS. See (A).
- 6. PLACE PALMS OF YOUR HANDS ON PATIENT'S BACK with little fingers just touching the lowest ribs.
- 7. WITH ARMS STRAIGHT, SWING FORWARD gradually bringing the weight of your body to bear upon the patient. See (B).

8. SWING BACKWARD IMMEDIATELY to relieve the pressure. See (C).

- 9. AFTER TWO SECONDS, SWING FORWARD AGAIN. Repeat twelve to fifteen times per minute.
- 10. WHILE ARTIFICIAL RESPIRATION IS CONTINUED, HAVE SOMEONE ELSE:
  - (a) Loosen patient's clothing.
  - (b) Send for doctor.
  - (c) Keep patient warm.
- 11. IF PATIENT STOPS BREATHING, CONTINUE ARTIFICIAL RESPIRATION. Four hours or more may be required.
- 12. DO NOT GIVE LIQUIDS UNTIL PATIENT IS CONSCIOUS.

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# ELECTRICAL SPECIFICATIONS

#### **R-F CONVERTER UNIT**

Frequency Range	Channels 2 to 13 (BW-4A). Channels 14 to 83 (BWU-4A).
Input Required	Approximately 1 to 2 volts r-f
Output	Video carrier i-f frequency, 25 mc. Sound carrier i=f frequency, 20.5 mc.
Stability	Crystal frequency deviation less than $\pm 0.002$ percent.
IF AND VIDEO UNIT	
IF Bandwidth	<ol> <li>5 db down at 4 mc from video carrier with sound notch.</li> <li>5 db down at 5 mc from video carrier without sound notch.</li> <li>Video carrier frequency 25 mc at 6 db point.</li> <li>Curve corresponds to standard RTMA TV receiver characteristics.</li> </ol>
Low Frequency Response	Less than 2 percent tilt to 60-cycle square wave.
Transient Characteristics (100 kc square wave)	
Anticipatory undershoot	18 percent
Rise time (with sound notch) (without sound notch)	0.13 microseconds. 0.09 microseconds.
Ringing frequency (with sound notch) (without sound notch)	approx. 4.5 mc. greater than 5.5 mc.
Amplitude of first positive overshoot	10 percent.
Amplitude of first negative overshoot	6 percent.
Axis of cutoff transient	Does not deviate more than $-10\%$ or $+ 3\%$ of axis separation.

Second and following overshoots less than amplitude of first.

Sound Rejection

More than 50 db aural signal rejection at  $\pm 25$  kc deviation from carrier frequency

#### **TECHNICAL SUMMARY (Continued)**

Sensitivity

Output Voltage

#### ENVELOPE DETECTOR

Input

Output

#### POWER SUPPLY

Power Source

D-C Output Voltages

# MECHANICAL SPECIFICATIONS

IF, Video, and Power Supply Chassis

.

Height	14 inches.
Width	Standard 19 inch Rack Mounting.
Depth	9 inches.
Weight	30 pounds.

UHF or VHF R-F Converters (mounts on IF, Video, and Power Supply Chassis)

9-1/2 inches.
4-1/2 inches.
4-1/2 inches.
2 pounds.

Directional Coupler

Dimensions	3 inches x 2 inches x 2 inches.
Weight	2-3/8 pounds.

**Coupler Housing** 

TYPE	LENGTH	DESIGNED TO FIT
UHF (MI-19396-2)	6 in., flanged each end	3-1/8 in. 50 ohm UHF line
VHF (MI-19396-3)	9 in., unflanged	3-1/8 in. 51.5 ohm VHF line

Approximately 0.05 volts input for 1.5 volts peak sync output across 75 ohms.

Maximum 1.5 volts peak of sync across 75 ohms output impedance. Sync negative.

Maximum available (up to five volts).
Input connector internally terminated for VHF.
External pad used for UHF.
Transmitter to be modulated with video sweep signal.

Varies with input (may be observed on any standard oscilloscope).

105 to 125 vac, 50/60 cycles, 250 watts (3 amp slo-blo fuse).

250 volts (regulated).-10 volts (unregulated).-3 volts (unregulated).



#### OPERATING CONDITIONS

Ambient Temperature Relative Humidity 15<sup>°</sup>C to 45<sup>°</sup>C 0 to 95%

# TUBE AND GERMANIUM DIODE COMPLEMENT

# IF, Video, and Power Supply Unit

Symbol	RCA Tube Type	Function
V1	6C4	Sound Notch
V2	6C4	Sound Notch
V3	6CB6	First IF Amplifier
V4	6CB6	Second IF Amplifier
V5	6CB6	Third IF Amplifier
<b>V</b> 6	6AK6	Fourth IF Amplifier
V7	6AG7	Video Output
<b>V</b> 8	6AK6	Envelope Detector Amplifier
<b>V</b> 9	6AS7	Series Regulator
V10	6CB6	D-C Amplifier
V11	OC3	Voltage Reference Tube
V12	5 <b>V</b> 4	Rectifier
CR1	<b>1N64</b>	Video Detector
CR2	1N72 (G7C)	Envelope Detector

**VHF Converter Unit** 

V1         6J6           V2         6CB6 (Chan. 7-13)           V3         6AS6	Oscillator - First Multiplier Second Multiplier Mixer
---------------------------------------------------------------------------------	-------------------------------------------------------------

**UHF Converter Unit** 

V1 V2	6J6 6BQ7-A	Oscillator - First Multiplier Second Multiplier - Third Multiplier
V3	6CB6	Buffer
CR1	1N72 (G7A)	Mixer - Multiplier

The following items are included with the BW-4A and BWU-4A TV Demodulators.

#### TYPE BW-4A DEMODULATOR (ES-34006)

Qty.	Description	RCA Reference
1	IF, Video, and Power Supply Chassis	MI-34002
1	VHF RF Oscillator Converter	MI⊶34003
1	Directional Coupler	MI=19396=1
1	VHF Housing	MI-19396-3
1	Channel Frequency Crystal	MI⊶34008⊶A(*)
1	Cable Kit	MI⊶34013
**	Set of Spare Tubes	MI <b></b> ⊶34014
1	Instruction Book	<b>IB-36160</b>

#### TYPE BWU-4A TV DEMODULATOR (ES-34007)

Qty.	Description	RCA Reference
1	IF, Video, and Power Supply Chassis	MI-34002
1	UHF RF Oscillator Converter	MI⇔34004
1	Directional Coupler	MI⊶19396 <b>-</b> 1
1	UHF Housing	MI⊶19396⊶2
1	Channel Frequency Crystal	MI≕34008-A(*)
1	Cable Kit	MI⊶34013
**	Set of Spare Tubes	MI-34015
1	Instruction Book	IB-36160

\* Supplied for specific operating channel.

\*\*Supplied if specified on sales order.

#### RECOMMENDED TEST EQUIPMENT

The following, or equivalent, types of test equipment are recommended for tuning adjustments and, when required, realignment of the TV Demodulator.

#### **RF CONVERTER TUNING ADJUSTMENTS**

VoltOhmyst (RCA Type WV-97A) \$Plate Current Meter (RCA MI-21200-C1)

IF ALIGNMENT (In addition to preceding equipment)

Signal Generator (Measurements Model 80) Sweep Generator (RCA Type WR-59C) Television Calibrator (RCA Type WR-39C) Wideband Oscilloscope (Tektronix Type 524-D)

SOUND NOTCH ALIGNMENT (In addition to preceding equipment)

Audio Voltmeter, 0.01 Volts Full Scale (RCA Type WV-73A)

§ Required for UHF converter only.

#### INTRODUCTION

The vestigial sideband television broadcasting system which is standard in the United States, provides maximum utilization of the six-megacycle channel width. However, due to the attenuation of the lower sideband and the sharp cut-off of the higher sideband, distortion is introduced into the transmitted picture. This distortion is evidenced in the picture by leading whites, trailing smears, ringing, and loss of picture detail. While not usually discernable during normal program telecasting, these effects become clearly evident when a test pattern is used.

#### NOTE

This distortion is characteristic of the vestigial sideband method of transmission and is not a fault of the equipment.

The radiated vestigial sideband TV signal is such that approximately 0.75 mc of the lower sideband is transmitted with little attenuation. Upon demodulation, corresponding lower and upper sideband components are complementary and a demodulator input characteristic, similar to that shown by the linearly sloping dotted lines in Figure 6, is required to obtain uniform video amplitude response. This is the RTMA recommended receiver response curve for vestigial sideband reception.

With vestigial sideband transmission, cancelling of sideband components does not occur and phase distortion is present. Since a sharp white-to-black transition is equivalent to modulating the transmitter with a square wave, this phase distortion at low video frequencies alters the square wave response in the receiver so that a dip precedes the transition from white-to-black as shown in Figure 7. This dip may be observed as a leading white (whiter-than-white) immediately prior to a white-to-black picture change. See Figure 8. A dip precedes a transition from black-to-white also, but in this case the signal is driven into the blacker-than-black region and is not visible on the kinescope. The gradual slope of the transition line is the commonly observed trailing smear produced by sharply defined bordering half-tones.

Although these leading whites and trailing smears are introduced because of the suppression of the lower sideband, ringing and the associated lack of detail will be found in any practical television system as a result of the high frequency video cut-off characteristic and the associated high frequency time-delay. Ringing is evident in the square wave response as a ripple along the top of the square wave. In a high quality home receiver this appears as a multiple repeat adjacent to well defined picture elements. The rapid high frequency cut-off introduced by the receiver circuits results in the curtailment of certain high frequency components, and a relative time-delay error. Both influence the degree of ringing.

Picture detail (for well defined adjoining half-tone picture elements) is essentially determined by the rapidity of transitions of the kinescope. The square wave characteristic related to picture detail is the rise time or slope for the edge of the wave as shown in Figure 7. Since this slope is a function of the high frequency components, the higher the cut-off frequency in the system, the steeper the slope of the square wave response and the finer the resulting picture detail.

The Type BW-4A and BWU-4A Television Demodulators may be used to check radiated picture signal characteristics for compliance with applicable RTMA and FCC standards. Vertical wave form patterns will show low frequency spurious responses while the horizontal waveforms include depth of modulation, percent synchronizing signal, transient content, and white compression. Analyses of resolution may also be made by utilizing an adequate resolution chart.



Figure 1 - BWU-4A Television Demodulator

#### DESCRIPTION

#### GENERAL

The RCA Types BW-4A and BWU-4A Television Demodulators are designed to produce a video signal that, when applied to a master monitor, will permit visual observation of the signal delivered to the TV transmitting antenna. The picture information is equivalent to that obtainable from a high quality television receiver.

The type BW-4A equipment is used to cover the VHF television channels, 2 to 13, and the BWU-4A is used for UHF channels 14 to 83. These units are nearly identical except for circuit design in the r-f converter sections. See Figure 1.

#### CIRCUITS

The TV demodulator is basically a superheterodyne receiver designed for vestigial sideband reception and includes a crystal-controlled r-f to i-f frequency converter, a sound rejection circuit, four stages of i-f amplification, a video detector, and a video output stage. Refer to Figure 2. The frequency conversion circuits are assembled on a small, separate chassis, which is mounted on the main i-f and power supply chassis. See Figures 1, 12, and 14.

A directional coupler, MI-19396-1, designed to mount in a 3-1/8 inch transmission line, is included as part of the demodulator equipment. This coupler samples the transmitter output and supplies the resultant signal to the converter unit. Complete details of the directional coupler are included in the instruction book, IB-36169, supplied with it.

#### VHF Converter (Channels 2 to 13)

The BW-4A Converter (See Figure 19) contains a crystal controlled oscillator using one-half of a type 6J6 tube, V1. The second half of V1 is used as a frequency multiplier.

On channels 7 to 13, a second multiplier stage, V2, is required. When the converter is operated on channels 2 to 6, this second multiplier tube is removed from its socket and replaced by a plug-in capacitor. The r-f output frequency from the oscillator and multiplier section is then applied to the suppressor grid of the mixer tube, V3.

The TV transmitter signal is obtained from the directional coupler which may be inserted into the transmission line at any of several points between the vestigial sideband filter and the antenna. By installing the directional coupler in one of the feed lines between the diplexer and the antenna, mismatches in the line being monitored will be readily evident. With this installation, however, mismatches may not be detected in the second antenna feed line unless provision is made for sampling the signal in this line also.

Alternatively, the directional coupler may be inserted into the transmission line between the sideband filter and the diplexer. This location will not be as sensitive to antenna mismatch as the antenna feed line installation.

If a filterplexer is used, the directional coupler must be installed between the filterplexer and the antenna.

The transmitter signal is applied to the control grid of the mixer tube, V3, and may be varied in level by changing the penetration setting of the directional coupler. The i-f output circuit of the mixer is untuned and has no effect on the i-f frequency response.

9 4.



Figure 2 - BW-4A/BWU-4A Block Diagram

#### UHF Converter (Channels 14 to 83)

The BWU-4A converter includes a crystal oscillator and first multiplier stage using a type 6J6 tube, V1, as shown in Figure 18. The signal then passes through two additional multiplier stages using a type 6BQ7-A tube, V2, and is finally coupled to the crystal mixer, CR1.

The frequency of the injected local oscillator signal is one-half the frequency required for the operating channel since, in this case, the crystal acts as a frequency doubling device.

The TV signal is obtained from the directional coupler which should be located between the filterplexer and the antenna. This signal is injected into the mixer, CR1, at the same point as the local oscillator signal. The resultant i-f signal is applied to a type 6CB6 buffer stage which has a untuned output circuit.

#### I-F Amplifier and Power Supply

The schematic diagram of this unit is shown in Figure 20. The i-f amplifier, which includes tubes V3, V4, V5, and V6, uses a video carrier frequency of 25 megacycles and is stagger tuned for optimum brand width. A sound frequency rejection circuit peaked at 20.5 megacycles may be switched into the i-f input circuit when desired. This circuit includes tubes V1 and V2, and three bridged T networks. When the rejection network is switched out of the i-f circuit, a 10 db pad is automatically inserted to maintain a constant output level.

Output from the i-f section is applied to a type 1N64 crystal diode video detector, which then feeds the video signal to the output stage, V7.

Vestigial sideband transmission of television signals introduces a characteristic phase distortion into the detected video signal. Although not usually discernable during regular program telecasting, this distortion will be clearly evidenced by leading whites and trailing smears when a test pattern is used. See Figures 8 and 9. To correct this distortion, a phase compensating network is provided which may be switched into the video output circuit of tube V7 with the typical results shown in Figures 10 and 11.

A mechanical 50/60-cycle chopper, which may be controlled from a remote location, is included as part of the i-f section. When this chopper is energized, it will apply a negative cut-off bias to i-f amplifier tubes V4, V5, and V6 at a 50/60-cycle rate, and thereby provide a zero level base line on the monitor oscilloscope screen.

The output signal from the TV demodulator includes synchronizing pulses and video from the transmitted signal, and is intended to be coupled to the master monitor through a 75-ohm coaxial line.

The directional coupler may be connected through jack J3 to a long time-constant envelope detector, CR2, which feeds a low-frequency amplifier, V8. Switch S3 switches the output of V8 to the video output stage, V7. This detector circuit is used to enable observation of the television transmitter response envelope when the transmitter is modulated by a video sweep generator. See Figure 5.

Operating voltages for the entire unit are furnished by a regulated power supply mounted on the i-f chassis.

#### INSTALLATION

#### GENERAL

Carefully unpack the units comprising the TV demodulator and inspect them for possible damage incurred during shipment. The individual items are tabulated on the Equipment List at the front of this book and on the Master Item (MI) lists packed with the equipment.

Mount the converter unit (MI=34003 or MI=34004) on the main i-f and power supply chassis MI=34002 as shown in Figure 1. Make certain that the two-contact Jones power plug on the converter is inserted correctly into the corresponding socket, J4, on the i-f chassis.

Connect the IF INPUT jack, J1, on the i-f chassis to the corresponding CONVERTER OUTPUT jack using the i-f cable assembly supplied (MI-34002 item 2).

#### MOUNTING

The BW-4A and BWU-4A TV Demodulators have identical mounting dimensions and should be mounted in a standard relay rack in the transmitter room. The location should be such that not more than 75 feet of RG-9A/U coaxial cable (MI-34013 item 1) will be required to interconnect the demodulator and the directional coupler. Two cable connectors (MI-34013 item 2) are supplied.

Measure the a-c line voltage and connect the primary tap of transformer T1 accordingly. Select the tap that is either equivalent to, or the next tap higher than the line voltage. For example: use the 125 volt tap if the line voltage is 117 volts.

#### DIRECTIONAL COUPLER

Install the directional coupler housing in the preferred transmission line location, then mount and connect the directional coupler as described in the instruction book, IB-36169, supplied with it. See Figure 21.

#### TUNING ADJUSTMENTS

After the TV Demodulator has been properly installed, the r-f circuits must be adjusted for correct functioning at the operating frequency. During the following adjustment procedure, the directional coupler should be connected to the RF-INPUT jack of the converter.

Note that the slotted shafts of the tuning capacitors have one segment painted red. Additionally, + and - signs are marked on the chassis adjacent to each capacitor shaft. When the shaft is rotated so the red segment is nearest to the + mark, the capacity is maximum (plates meshed). With the red segment at the - mark, the capacity is minimum.

#### VHF CONVERTER (BW-4A)

- 1. Plug the channel frequency crystal, MI-34008-A(\*), into the socket on the converter chassis. The transmitter should not be operating at this time.
- 2. If the BW-4A TV Demodulator is to be used on channels 2 to 6, plug the capacitor unit (MI-34003 item 2) into socket X2 on the converter chassis.

For operation on channels 7 to 13, plug a type 6CB6 tube into socket X2.

\*Number determined by operating channel.

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- 3. Adjust the angle and penetration settings of the directional coupler probe in accordance with the instructions and charts in IB-36169.
- 4. Close switch S4 on the main chassis and allow the equipment to warm-up for at least thirty minutes.
- 5. Connect a VoltOhmyst (-30 volt d-c scale) from the OSC test point to ground.

Rotate capacitor C1, through its range while observing the meter indication. As the tuning capacity is increased, the voltage will gradually rise and then drop sharply. Set C1 slightly on the low capacity side of the point where the sharp drop occurs. If two peaks are obtained at different capacitor settings, use the setting nearest to the maximum capacity value.

6. On channels 2 to 6, connect the VoltOhmyst from the MIX. DR. test point to ground. Connect the master monitor to the VIDEO OUTPUT jack, J1, on the main chassis. Turn on the visual transmitter and apply a modulated r-f signal, at the channel frequency, to the converter input. Adjust the 1-MULT tuning capacitor, C7, until a picture is seen on the master monitor, then peak C7 for maximum meter indication.

On channels 7 to 13, connect the VoltOhmyst from the 1-MULT test point to ground. Tune the 1-MULT capacitor, C7, for peak indication on the meter. A peak may be obtained at two different capacitor settings, in this case, use the setting nearest the minimum capacity position.

In the remaining steps of this procedure, if the amplitude of the sync pulses exceeds one volt as shown on the master monitor oscilloscope, readjust the penetration setting of the directional coupler to reduce the input to the correct value.

7. On channels 2 to 6, set the 2-MULT capacitor, C13, at its minimum capacity position.

On channels 7 to 13, connect the VoltOhmyst from the MIX. DR. test point to ground. Tune the 2-MULT capacitor, C13 for peak meter indication which should be approximately -5 volts.

8. Readjust the penetration setting of the directional coupler to give an output voltage of one volt, peak of sync, at the master monitor. Adjust the angle setting to correspond with the value shown on the appropriate calibration chart, in IB-36169, for the operating frequency and penetration setting.

#### UHF CONVERTER (BWU-4A)

1. Refer to Table I and install the appropriate coils in the converter multiplier stages for the operating frequency. These coils must be mounted by inserting the ends into the capacitor terminals and soldering them in position.

It is important that resistors R12 and R16 (See Figures 15 and 18) be connected as near as possible to the exact electrical centers of coils L5 and L4 respectively. At this time, however, tentatively connect the resistors to the mechanical center of the coils. Final adjustment will be made later with the equipment operating.

	TABLE I	
BWU-4A	CONVERTER	COILS

COIL	CHANNELS	NO. OF TURNS
L4	14 to 28 29 to 44 45 to 64 65 to 83	4 3 2 1
L5, L6	14 to 43 44 to 83	5 3

- 2. Plug the channel frequency crystal into the socket provided on the converter chassis. The transmitter should not be operating at this time.
- 3. Adjust the angle and penetration settings of the directional coupler probe in accordance with the instructions in IB-36169.
- 4. Close switch S4 on the main chassis to apply power to the equipment and allow it to warm-up for at least thirty minutes.
- 5. Connect a VoltOhmyst (-30 volts d=c scale) from the OSC test point to ground. Adjust capacitor C1 as described in step 5 for the "VHF Converter Adjustment".
- 6. Connect the VoltOhmyst form the 1-MULT test point to ground. Adjust capacitor C7 for a peak meter reading. In some cases, two peaks will be obtained at different capacity settings. On channels 14 to 46 use the peak nearest the maximum capacity setting; on channels 47 to 83 use the peak nearest minimum capacity.
- 7. Connect the VoltOhmyst from the 2-MULT test point to ground. Adjust the 2-MULT capacitors, C9 and C16, for peak voltage indication.
- 8. Plug a Plate Current Meter (RCA MI-21200-C1) into the MIXER jack on the converter chassis to indicate crystal mixer current. Adjust the 3-MULT capacitor, C12, for peak meter indication (approximately 100).
- 9. Disconnect the Plate Current Meter then turn on the transmitter. If the amplitude of the sync pulses exceeds one volt as shown on the master monitor oscilloscope, readjust the penetration setting of the directional coupler to reduce the input to the correct value.
- 10. While observing the waveform on the master monitor oscilloscope, retune C12 slightly to obtain peak amplitude of sync pulses.
- 11. Readjust the penetration setting of the directional coupler to give an output voltage of one volt, peak of sync, at the master monitor, then readjust the angle setting to correspond with the value shown on the calibration chart in the instruction book for the operating frequency and penetration setting.
- 12. USING EXTREME CAUTION BECAUSE OF THE 250 VOLTS ON THE COILS, touch a small insulated screwdriver or similar loading device to the junction points between resistor R12 and coil L5, and between resistor R16, and coil L4. If the output waveform displayed on the master monitor oscilloscope is affected, move the resistor connection to the point where the least moticeable effect is obtained. Recheck adjustments made in steps 7 to 11.

In some cases, evidence of r-f from the sound carrier may be observed as a wide or "fuzzy" trace of the sync pulses on the monitor oscilloscope. The sound notch should then be adjusted for optimum rejection by slightly readjusting coils L1, L4, and L7 (see Figure 16) until the oscilloscope trace has maximum sharpness.

#### OPERATION

It is assumed that the BW-4A or BWU-4A Television Demodulator has been installed and adjusted in accordance with the instructions in the preceding sections of this book.

#### PROGRAM MONITORING

Set the demodulator unit control switches to the following positions:

S1	SOUND NOTCH IN
<b>S2</b>	PHASE COMPENSATOR OUT
<b>S</b> 3	ENV. DETDEMOD DEMOD
<b>S</b> 4	AC POWER ON

Turn on the power to the master monitor which is connected to the output of the TV demodulator. Allow the equipment to warm-up for several minutes then adjust the master monitor controls for the best picture. The picture on the monitor will be equivalent to that shown on the screen of a highquality home television receiver, and will enable observation of picture transmission faults. The amplitude and waveform of the synchronizing signal will be displayed on the monitor oscilloscope. By closing the chopper control switch, the chopper relay, K1, will be energized and provide a zero level base line on the oscilloscope for calibration reference.

During regular TV program transmission, the demodulator controls will be usually set as described previously to obtain a true replica of the transmitted picture. However, when it is desired to observe the overall quality of the entire system, the PHASE COMPENSATOR should be switched IN. Distortion caused by the single sideband method of transmission will then be reduced as summarized under "Description", and the system characteristics will be more evident.

When tests are to be made of the video transmitter outside of regular program periods, the aural transmitter may be shut down and the SOUND NOTCH on the TV demodulator switched OUT of the circuit.

#### ENVELOPE DETECTOR

The envelope detector is used to enable observation of the overall response envelope of the television transmitter when the transmitter is being modulated by a video sweep generator. For this application, disconnect the lead from the directional coupler to the converter unit at the converter r-f input jack. Reconnect this lead to the diode input jack, J3, on the i-f and power supply chassis. Connect the vertical input terminals of an oscilloscope to the 75 ohm termination resistor, MI-34002 item 3, which should be plugged into the video output jack, J2. Select a suitable horizontal sweep frequency for the oscilloscope. Place switch S3 in the ENV. DET. position, and the compensator switch S2 in the OUT position. The pattern on the oscilloscope should be similar to that shown in Figure 5.

#### MAINTENANCE

#### GENERAL

Maintenance of the BW-4A and BWU-4A Television Demodulators will be mainly concerned with keeping the unit clean and free from dust. Check the cable connections at intervals and retighten when necessary. Periodically test the tubes in the converter and main chassis and replace any that test below standard.

Typical operating voltages for the equipment are listed in Table III as an aid in trouble shooting.

#### VOLTAGE ADJUSTMENTS

- 1. Measure the a-c line voltage and connect the primary tap accordingly. Select the tap that is equivalent to, or the next tap higher than the line voltage.
- 2. Connect the power jack, J7, to the a-c line. Close the power switch, S4, and allow the unit to warm-up for approximately thirty minutes.
- 3. Connect a VoltOhmyst to pin 3 of tube V9 and adjust the voltage control, R50, for 250 volts.
- 4. Adjust the sliders on resistor R60 (see Figure 17) to obtain a voltage of -3 volts on the slider nearest the ground end of the resistor, and -10 volts on the remaining slider.
- 5. The voltage adjustments made in the preceding steps 3 and 4 tend to interact. Recheck them and readjust if necessary.

#### **RF CONVERTER ALIGNMENT**

Adjustment of the r-f converter circuits is described under the "Tuning Adjustments" section of this book.

If replacement of an oscillator crystal is required, the crystal frequency may be determined from the following formula:

crystal freq. (mc) =  $\frac{25 \text{ mc} + \text{visual carrier freq. (mc)}}{\text{multiplier factor (Table II)}}$ 

MULTIPLYING FACTORS								
Channels	2 to 6 (VHF) 7 to 13 (VHF)		14 to 46 (UHF)	47 to 83 (UHF)				
Multiplier Factor	3	6	16	24				

TABLE II

#### **I-F ALIGNMENT**

The i-f circuits have been properly aligned at the factory and will not ordinarily require readjustment unless tampered with. If realignment should be necessary, use the following procedure:

#### NOTE

Unless otherwise stated, all references are to components on the i-f, video, and power supply chassis. Check the tuning adjustments with all shields and covers in place.

- 1. Remove the short, i-f coupling cable between the CONVERTER OUTPUT jack on the r-f converter chassis and the IF-INPUT jack, J1, on the i-f, video, and power supply chassis. Connect the 75 ohm termination resistor (MI-34002 item 3) to the VIDEO OUTPUT jack, J2.
- 2. Temporarily solder a 50 ohm  $\pm 5$  percent, 1/2 watt non-inductive resistor from the IF-INPUT jack, J1, to ground.
- 3. Solder a 330 ohm damping resistor across the terminals of coils L10, L11, and L12.
- 4. Connect a suitable signal generator (covering a frequency range of 20 to 30 mc with 0.1 volt or greater output) to the IF-INPUT jack, J1.
- 5. Connect the d-c voltage leads of a VoltOhmyst across the detector load resistor, R34.

6. Set the control switches on the i-f chassis as follows:

<b>S</b> 1	SOUND NOTCH OUT	
S2	COMPENSATOR OUT	
<b>S</b> 3	ENV. DET DEMOD DEMOD.	

- 7. Close the power switch, S4, and allow the equipment to warm-up for at least thirty minutes.
- 8. Set the signal generator to 22.9 mc, and adjust the slug of the first i-f coil, L9, for peak indication on the VoltOhmyst.
- 9. Disconnect the 330 ohm resistor from inductance L10 and resolder it across L9.
- 10. Set the signal generator to 19.6 mc, and adjust the second i-f coil, L10, for peak meter indication.
- 11. Disconnect the 330 ohm resistor from L11 and resolder it across L10.
- 12. Set the signal generator to 24.35 mc, and adjust the third i-f coil, L11, for peak meter indication.
- 13. Disconnect the 330 ohm resistor from L12 and resolder it across L11.
- 14. Set the signal generator to 20.85 mc, and adjust the fourth i-f coil, L12, for peak meter indication.
- 15. Disconnect and remove all the 330 ohm resistors which were previously connected across the i-f coils.
- 16. Connect an i-f sweep generator, with a sweep range of approximately 10 mc and covering the frequency band of 20 to 30 mc, to the IF-INPUT jack, J1. Connect a television calibration oscillator to the same jack to serve as a marker signal source.

Connect an oscilloscope across the 75 ohm termination resistor, R38, at the VIDEO OUTPUT jack, J2.

17. With the sweep generator operating, observe the amplitude response curve on the oscilloscope. Referring to Figure 3, superimpose marker signals on the sweep signal at the indicated frequencies and, if necessary, make slight readjustments of L9, L10, L11, and L12 to obtain the desired response.

Use a low signal level for this adjustment to avoid overloading the i-f and video stages. If any of these stages are overloaded, grid current will flow through the corresponding grid resistor. The presence of this current can be determined by measuring the voltage drop with a VoltOhmyst. A test jack is provided on the main chassis (see Figure 16) which will enable an approximate measurement of overload conditions.

18. Disconnect the sweep generator and calibration marker oscillator.

#### SOUND NOTCH ALIGNMENT

- 1. Connect an i-f sweep generator and calibration marker oscillator to the IF-INPUT jack, J1, and switch S1 to the SOUND NOTCH IN position. Connect an oscilloscope across the 75 ohm termination resistor (R38) at the VIDEO OUTPUT jack, J2.
- 2. Tune the three "bridged T" network coils, L1, L4, and L7 to approximately the lowest possible frequency observable on the oscilloscope sweep pattern.
- 3. Set the marker oscillator to 20.5 mc and tune L1 for a notch in the sweep pattern at 20.5 mc.
- 4. Adjust the associated peaking coil, L2, for approximately flat response to about 21 mc as shown in the typical response curve, Figure 4.
- 5. Reture L1 from its previous setting (step 3) to the lowest possible frequency.
- 6. Adjust L4 for a notch in the sweep pattern at 20.5 mc. Adjust the associated peaking coil, L5, for flat response as was done for L2 in step 4.
- 7. Retune L4 to its lowest possible frequency.
- 8. Tune L7 for a notch in the sweep pattern at 20.5 mc and adjust coil L8 as was done for L2 in step 4.
- 9. Retune L1 and L4 until their notches coincide with the notch produced by L7 at 20.5 mc.
- 10. Retune L2, L5, and L8 to obtain as nearly as possible the typical i-f response with sound notch as shown in Figure 4.
- 11. Disconnect the sweep generator and marker oscillator. Connect an audiomodulated signal generator to the IF-INPUT jack. Connect an audio voltmeter to the VIDEO OUTPUT jack.
- 12. Set the signal generator to 23 megacycles and adjust its output voltage to a value just below the point at which overloading occurs in the i-f stages.
- 13. Use a heterodyne calibrator, set the signal generator accurately to 20.5 megacycles.
- 14. Retune L1, L4, and L7 for minimum indication on the audio voltmeter using the most sensitive scale. Recheck peaking coil adjustments with all shields and covers in place by use of the sweep generator and oscilloscope.

# TABLE IIITYPICAL OPERATING VOLTAGES

Symbol	Function	RCA Tube Type	Pin Numbers							
	Function		1	2	3	4	5	6	7	8
	IF, VIDEO, AND POWER SUPPLY CHASSIS									
V1 V2 V3 V4 V5 V6 V7 V8 V9 V10	Rectifier Series Regulator D-C Amplifier Voltage Reference First Buffer Second Buffer First IF Second IF Third IF Fourth IF	5V4 6AS7 6CB6 OC3 6C4 6C4 6CB6 6CB6 6CB6 6CB6 6AK6	175 106 0 0 0	105 2 2 2 -10	250 0 0 0 0 0 0	400ac 175 6. 3ac 6. 3ac 6. 3ac 6. 3ac 6. 3ac 6. 3ac 6. 3ac	420 175 105 215 202 202 202 185	400ac 250 150 147 147 147 180	105 5 -2 -2 -2 -2 10	450
V11 V12	Video Output Envelope Detector Amp.	6AG7 6AK6	6 0	6.3 169	0 0	0 6. 3ac	3 169	138 169	0 4	193
		VHF CONV	ERTE	RUN	IIT					
V1 V2 V3	Oscillator, First Mult. Second Multiplier Mixer	6J6 6CB6 6AS6	180 -0.8 0	120 2.1 2	0 0 0	6. 3ac 6. 3ac 6. 3ac	-4 192 192	-13 202 102	0 <b>⊶2</b> ⊸5	
UHF CONVERTER UNIT										
V1 V2	Oscillator, First Mult. Second Mult. and Third Mult.	6J6 6BQ7	190		000	6. 3ac 0	-27 6. 3ac		0 -13 ≂5	0
V3	Buffer	6CB6	0	5	0	6. 3ac	202	147	°⊐0	







Figure 4 - IF Amplifier Response, Sound Notch In

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Figure 5 - Demodulated Output of Envelope Detector



Figure 6 - Response With Notch (After Sideband Filter)



Figure 7 - Typical Square Wave Response (See Text)



Figure 8 - Picture Test Pattern, Phase Compensator Out



Figure 9 - Waveform With Phase Compensator Out



Figure 10 - Picture Test Pattern, Phase Compensator In



Figure 11 - Waveform With Phase Compensator In



Figure 12 - VHF Converter Unit, Top View

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Figure 13 - VHF Converter Unit, Bottom View

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If You Didn't Get This From My Site, Then It Was Stolen From... www.SteamPoweredRadio.Com



Figure 14 - UHF Converter Unit, Top View

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Figure 15 - UHF Converter Unit, Bottom View


Figure 16 - IF, Video, and Power Supply Unit, Top View

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Figure 17 - IF, Video, and Power Supply Unit, Bottom View

#### REPLACEMENT PARTS AND ENGINEERING SERVICE

When ordering replacement parts, please give symbol, description, and stock number of each item ordered.

The part which will be supplied against an order for a replacement item may not be an exact dupli-cate of the original part. However, it will be a satisfactory replacement differing only in minor

mechanical or electrical characteristics. Such differences will in no way impair the operation of the equipment.

The following tabulations list service parts, electron tube, and field engineering service ordering instructions according to the geographical location of the station.

SERVICE PARTS

STATION LOCATION	OBTAIN SERVICE PARTS FROM
Continental United States or Alaska	Local Broadcast Equipment Sales Representative, his office, or directly from the Service Parts Order Service, Bldg.60, 19th and Federal Streets, Camden 5, N. J. Emergency orders may be telephoned, telegraphed, or teletyped to RCA Emergency Service, Bldg.60, Camden, N.J. (Telephone: Woodlawn 3-8000).
Dominion of Canada	Local Broadcast Equipment Sales Representative, his office, or directly from RCA Victor Company Limited, 1001 Lenoir Street, Montreal, Quebec.
Outside of Continental United States, Alaska, and the Dominion of Canada	Local Broadcast Equipment Sales Representative, or Service Parts Order Service, RCA International Division, Gloucester, New Jersey. U.S.A.
	ELECTRON TUBES

STATION LOCATION	OBTAIN ELECTRON TUBES FROM
Continental United States or Alaska	Local Distributor or nearest of the following warehouses:
	34 Exchange Place Jersey City 2, New Jersey
	589 E. Illinois Street Chicago 11, Illinois
	420 S. San Pedro Street Los Angeles 13, California
Dominion of Canada	Local Broadcast Equipment Sales Representative, his office, or directly from RCA Victor Company Limited, 1001 Lenoir Street, Montreal, Quebec.
Outside of Continental United States, Alaska, and the Dominion of Canada	Local Distributor or from: Tube Department RCA International Division 30 Rockefeller Plaza New York 20, New York. U.S.A.

If for any reason, it is desired to return tubes, please return them to the place of purchase. If this is not convenient, please notify your RCA serving warehouse so that Return Authorization may be forwarded to you. PLEASE DO NOT RETURN TUBES DIRECTLY TO RCA WITHOUT AUTHORIZATION AND SHIPPING INSTRUCTIONS.

It is important that complete information regarding each tube (including type, serial number, hours of service and reason for its return) be given.

When tubes are returned, they should be shipped to the address specified on the Return Authorization form. A copy of the Return Authorization and also a Service Report for each tube should be packed with the tubes.

### FIELD ENGINEERING SERVICE\*

STATION LOCATION	REQUEST FIELD ENGINEERING SERVICE FROM
Continental United States or Alaska	Local Broadcast Equipment Sales Representative or the RCA Service Company, Inc., Broadcast Communications Service Division, Camden, N.J. Telephone: Woodlawn 3-8000.
Dominion of Canada	Local Broadcast Equipment Sales Representative, his office, or directly from RCA Victor Company Limited, 1001 Lenoir Street, Montreal, Quebec.
Outside of Continental United States, Alaska, and the Dominion of Canada	Chief Engineer RCA International Division 30 Rockefeller Plaza New York 20, New York, U.S.A.

\*Charges for field engineering service will be made at current rates.

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## PARTS LIST

## For Ordering Information See Page 32

	For Ordering motimation See Fage 52		
Symbol No.	Description	Drawing No.	Stock No.
	VHF CONVERTER, MI-34003		
C1	Capacitor, variable, 3.9 to 75 mmf	149476-5	99186
C2	Capacitor, 0.001 mf, button ceramic	449696-57	77252
C3	Capacitor 47 mmf, $\pm 10\%$ , mica	737817-223	59985
C4	Capacitor, 0.001 mf, $\pm 20\%$ , 500 volt, ceramic feedthru	8825449-1	99177
C5, C6	Capacitor 0.001 mf, button ceramic. Same as C2	449696-57	72252
C7 C7	Capacitor, variable, 2.9 to 36 mmf	149476 - 3	99187
C8	Capacitor 18 mmf. $\pm 10\%$ . mica	748252-213	97790
C9	Capacitor, 0.001 mf, $\pm 20\%$ , 500 volt, ceramic feedthru. Same as C4	8825449-1	99177
C10, C11, C12		737817-239	96518
C13	Capacitor, variable, butterfly, 3.2 to 11 mmf	455882-2	99191
C14	Capacitor, 0.001 mf, $\pm 20\%$ , 500 volt, ceramic feedthru. Same as C4	8825449-1	99177
C15	Capacitor, 18 mmf, $\pm 10\%$ , mica. Same as C8	748252-213	97790
C16, C17,	Capacitor, 0.001 mf, button ceramic. Same as C2	449696-57	77252
C18, C19	Cupucitor, of our may a local a local and		
C 20	Capacitor, 220 mmf, ±10%, mica. Same as C10	737817-239	96578
C21, C22	Capacitor, 0.001 mf, ceramic feedthru. Same as C4	8825449-1	99177
C 23	Capacitor, assembly		
C 23B	Capacitor, 18 mmf, $\pm 10\%$ , mica. Same as C8	748252 - 213	97790
J1	Receptacle	445813-2	54890
J2	Receptacle	433647-1	92180
L1	Not stocked by BCA		
L2	Choke, filament	941689-3	99188
L3	Not stocked by RCA		
L4	Choke, filament. Same as L2	941689-3	99188
L5	Not stocked by RCA		
L6	Choke, filament. Same as L2	941689-3	99188
P1	Plug, Jones, 2 contact, male	458545-3	99189
R1	Resistor, 27K ohms, $\pm 10\%$ , $1/2$ watt	82283-79	502327
R2	Resistor, 82 ohms, $\pm 10\%$ , $1/2$ watt	82283-49	502082
R3	Resistor, 10 ohms, $\pm 10\%$ , $1/2$ watt	82283-38	502010
R4	Resistor, 18K ohms, ±10%, 2 watt	991.26-77	39158
R5	Resistor, 100K ohms, $\pm 10\%$ , $1/2$ watt	82283-86	502410
R6	Resistor, 100K ohms, $\pm 10\%$ , $1/2$ watt. Same as R5	82283-86	502410
R7	Resistor, 10 ohms, $\pm 10\%$ , $1/2$ watt. Same as R3	82283-38	502010
R8	Resistor, 8200 ohms, ±10%, 2 watt	99126-73	522282
R9, R10	Resistor, 100K ohms, ±10%, 1/2 watt. Same as R5	82283-86	502410
R11	Resistor, 220 ohms, ±10%, 1/2 watt	82283-54	502122
R12	Resistor, 22K ohms, ±10%, 1/2 watt	82283-78	30492
R13	Resistor, 6800 ohms, ±10%, 2 watt	99126-72	522268
R14	Resistor, 100K ohms, ±10%, 1/2 watt. Same as R5	82283-86	502410
R15	Resistor, 15K ohms, ±10%, 1/2 watt	82283-76	36714
R16, R17	Resistor, 220 ohms, $\pm 10\%$ , $1/2$ watt. Same as R11	82283-54	502122
R18, R19,			
R20			
R21	Resistor, 33K ohms, ±10%, 1 watt	90496-80	38895
R22	Resistor, 390 ohms, ±10%, 1/2 watt	82283-57	30498
R23	Resistor, 18K ohms, $\pm 10\%$ , 2 watt. Same as R4	99126-77	39158
XY1	Socket, crystal	8885952-1	57025
XV1, XV2,	Socket, 7 pin miniature	737867-13	94925
XV1, XV2, XV3			
	Clip, crystal holding	8837459-1	98083
	Shield, tube for V3	99369-1	54428
	Shield, tube for V1 and V2	99369-2	54521
		L	
	UHF CONVERTER, MI-34004		
C1	Capacitor, variable, 3.9 to 75 mmf	149476-5	99186
C2	Capacitor, 0.001 mf, button ceramic	449696-57	77252
C3	Capacitor, 47 mmf, ±10%, mica	737817-223	59985
C4, C5	Capacitor, 0.001 mf, ±20%, 500 volt, ceramic feedthru	8825449-1	99177
C6	Capacitor, 0.001 mf, button ceramic. Same as C2	449696-57	77252
C7	Capacitor, variable, 2.9 to 36 mmf	149476-3	99187
	Capacitor, 18 mmf, ±10%, mica	748252-213	97790
C8	Capacitor, 18 mmi, $\pm 10\%$ , mica Capacitor, variable, butterfly, 3.2 to 11 mmf	455882-2	99191
C9	Capacitor, variable, butterily, 5.2 to 11 mini	748252-213	97790
C10	Capacitor, 18 mmf, ±10%, mica. Same as C8	8825449-1	99177
C11	Capacitor, 0.001 mf, $\pm 20\%$ , 500 volts, ceramic feedthru. Same as C4.	455882-9	99348
C12	Capacitor, variable, butterfly, 1.8 to 2.8 mmf	722401-51	99194
C13, C14	Capacitor, 0.5 mmf, ±0.25 mmf, tubular ceramic	8811295-1	99193
C15	Capacitor, 5 mmf, ±0.5 mmf, 500 volt, ceramic stand-off	0011230-1	00100

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	For Ordering Information See Page 32		
Symbol No.	Description	Drawing No.	Stock No.
C16 C17, C18 C19 C20 C21, C22	Capacitor, variable, butterfly, 3. 2 to 11 mmf Capacitor, 0.001 mf, button ceramic. Same as C2 Capacitor, 220 mf, $\pm 10\%$ , mica Capacitor, 0.001 mf, button ceramic. Same as C2 Capacitor, 0.001 mf, $\pm 20\%$ , 500 volt, ceramic feedthru. Same as C4	455882-2 449696-57 748252-239 449696-57 8825449-1 449696-57	99191 77252 72789 77252 99177
C 23, C 24, C 25, C 26 CR1 J1 J2 J3 J4 L1 L2 L3 to L6 L7 R1 R2 R3 R4 R5, R6 R7 R8 R9 R10 R11	Capacitor, 0.001 mf, button ceramic. Same as C2 Diode, germanium Jack, phone Receptacle, single contact, female Receptacle, single contact, male Plug, Jones, 2 contact, male Not stocked by RCA Choke, rf, insulated Not stocked by RCA Choke, insulated Resistor, 27K ohms, $\pm 10\%$ , 1/2 watt Resistor, 82 ohms, $\pm 10\%$ , 1/2 watt Resistor, 10 ohms, $\pm 10\%$ , 1/2 watt Resistor, 10 ohms, $\pm 10\%$ , 2 watt Resistor, 10 ohms, $\pm 10\%$ , 1/2 watt Resistor, 100K ohms, $\pm 10\%$ , 1/2 watt Resistor, 27K ohms, $\pm 10\%$ , 1/2 watt. Same as R3 Resistor, 27K ohms, $\pm 10\%$ , 1/2 watt. Same as R1	449696-57 1N72 185009-1 445813-2 433647-1 458545-3 941689-3 941689-11 82283-79 82283-86 82283-86 82283-86 82283-86 82283-86 82283-79 82283-79 82283-79 82283-50	77252 7903 54890 92180 99189 99188 99182 502327 502082 502010 502010 502010 502210 502410 502327 502410
R11 R12 R13, R14 R15 R16 R17 R18 R19 R20 R21 XV1 XV2 XV3 XY1	Resistor, 100 ohms, $\pm 10\%$ , $1/2$ wattResistor, 5600 ohms, $\pm 10\%$ , 2 wattResistor, 100K ohms, $\pm 10\%$ , 1/2 watt. Same as R5Not UsedResistor, 5600 ohms, $\pm 10\%$ , 2 watt. Same as R12Resistor, 330 ohms, $\pm 10\%$ , 1/2 wattResistor, 180 ohms, $\pm 10\%$ , 1/2 wattResistor, 22K ohms, $\pm 10\%$ , 1/2 wattResistor, 390 ohms, $\pm 10\%$ , 1/2 wattResistor, 12K ohms, $\pm 10\%$ , 1 wattSocket, 7 pin miniatureSocket, 7 pin miniatureSocket, rystalAttenuator, UHF, fixed, 10dbClip, crystal holdingShield, tube for XV2Shield, tube for XV1 and XV3	82283-50 99126-71 82283-86 99126-71 82283-56 82283-53 82283-53 82283-78 82283-57 90496-75 737867-13 737867-13 8885952-1 8879706-2 8837459-1 8858642-3 99369-2	$\begin{array}{c} 502110\\ 522256\\ 502410\\ \\ 522256\\ 502133\\ 502118\\ 30492\\ 30498\\ 522312\\ 94925\\ 99190\\ 94925\\ 57025\\ 99192\\ 98083\\ 57533\\ 54521\\ \end{array}$
	IF, VIDEO, AND BLOWER SUPPLY, MI-34002		
C1, C2 C3, C4 C5 C6, C7 C8, C9 C10 C11, C12 C13, C14, C15 C16 C17 C18, C19, C20 C21 C22 C23 C24, C25 C26 C27 C28 C29 C30, C31, C32	Capacitor, 220 mmf, $\pm 10\%$ , mica. Same as C5 Capacitor, 12 mmf, $\pm 5\%$ , mica Capacitor, 0.001 mf, button ceramic. Same as C3 Capacitor, 220 mmf, $\pm 10\%$ , mica. Same as C5 Capacitor, 12 mmf, $\pm 5\%$ , mica. Same as C17 Capacitor, 160 mmf, $\pm 5\%$ , mica. Same as C3 Capacitor, 0.001 mf, button ceramic. Same as C3 Capacitor, 220 mmf, $\pm 10\%$ , mica. Same as C5 Capacitor, 0.001 mf, button ceramic. Same as C5 Capacitor, 12 mmf, $\pm 5\%$ , mica. Same as C5 Capacitor, 12 mmf, $\pm 5\%$ , mica. Same as C3 Capacitor, 12 mmf, $\pm 5\%$ , mica. Same as C3 Capacitor, 12 mmf, $\pm 5\%$ , mica. Same as C3 Capacitor, 160 mmf, $\pm 5\%$ , mica. Same as C3 Capacitor, 0.001 mf, button ceramic. Same as C3	737817-333 449696-57 737817-239 737817-333 449696-57 737817-239 737817-333 449696-57 737817-239 748252-311 449696-57 737817-239 748252-311 737817-336 449696-57 737817-239 748252-311 737817-336 449696-57 748252-311 737817-336 449696-57 748252-311 737817-336 7817-336 7817-336 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366 7817-366	99160 77252 96518 99160 77252 96518 99160 77252 96518 59906 77252 96518 59906 99159 77252 96518 77252 96518 59906 99159 77252 96518 77252 96518 77252 96518 77252 96518 77252 96518 77252 96518 77252 96518 77252 96518 77252 96518 77252 96518 77252 96518 77252 96518 77252 96518 77252 96518 77252 96518 77252 96518 77252 96518 77252 96518 77252 96518 77252 96518 77252 96518 77252 96518 77252 96518 77252 96518 77252 96518 77252 96518 77252 96518 77252 96518 77252 96518 77252 96518 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 77252 7
C33 C34	Capacitor, 220 mmf, ±10%, mica. Same as C5 Capacitor, 12 mmf, ±5%, mica. Same as C17	737817-239 748252-311	96518 59906

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r or	Ordering	mormation	bee	Page	34

Symbol No.         Description         Drawing No.         Stock No.           C35         Capacitor, 5 mmf, 45%, mica.         748252-314         748252-314         99162           C37         Capacitor, 50 mmf, 45%, mica.         778152-305         99161           C37         Capacitor, 60 mmf, 400 volt, paper tubular         778118-148         99162           C37         Capacitor, 60 mmf, 400 volt, paper tubular         778118-175         732022-506         99176           C41         Capacitor, 10 m, 400 volt, electrolytic         44200-32         33406           C42         Capacitor, 10 m, 400, volt, electrolytic         44200-32         33406           C43         C44         Capacitor, 00 mf, 420, volt, electrolytic         735115-175         73511           C44         Capacitor, 00 mf, 420, volt, electrolytic         73515-175         73511         73511           C54         C48         C44         Capacitor, 00 mf, 450, volt, electrolytic         73515-175         73511           C56         C57         Capacitor, 00 mf, 450, volt, electrolytic         736218-84         99171           C56         C57         C50 volt, electrolytic         736218-84         99171           C56         C57         C562         C492017         642201-8		For Ordering Information See Page 32		
C36         Capacitor, 20 mmf, 45%, mica         74252-314         99162           C37         Capacitor, 0.47 mf, 400 volt, paper tubular         72252-314         99176           C38, C39         Capacitor, 750 mmf, 45%, mica         72252-514         99176           C40, C30, C40         Capacitor, 150 mmf, 40% of 0, nl, 300 volt, electrolytic         73451-95         73551           C42         Capacitor, 0.1 mf, 410%, d00 volt, electrolytic         737151-95         73551           C43, C44         Capacitor, 0.1 mf, 410%, mica         737815-95         99175           C44, C44         Capacitor, 600 mf, 410%, mica         737815-95         99175           C44         Capacitor, 0.001 mf, 420%, mica         737818-96         99175           C53         Capacitor, 0.001 mf, 420%, mica         737818-96         59512           C33, C54         Capacitor, 0.001 mf, 405%, mica         737818-96         59512           C56, C57         Capacitor, 0.001 mf, 405%, mica         825449-1         59175           C56, C57         Capacitor, 0.001 mf, 405%, mica         737818-96         59512           C68         Capacitor, 10001 mf, 407%, mica         77727         738418-96         59512           C68         Capacitor, 10001 mf, 407%, mica         77772         738418-96	Symbol No.	Description	Drawing No.	Stock No.
C38       C39       C39       C30       C39       C30       C	C35	Capacitor, 5 mmf, ±5%, mica	748252-305	99161
C38       C39       C39       C30       C39       C30       C	C36	Capacitor, 20 mmf, ±5%, mica	748252-314	99162
C38, C39       Capacitor, 750 mmf, 45%, mica       724230-506       99176         C40, C40, C40, C40, C40, C40, Capacitor, 0.1 mf, 410%, 400 volt, paper.       735715-175       735715-175         C41       Capacitor, 125 mf, 350 volt, electrolytic       735715-175       735715-175         C42, C44       Capacitor, 0.1 mf, 410%, mica       735715-175       735715-175         C43, C44       Capacitor, 600 mm, 410%, mica       73715-175       735817         C44, C44       Capacitor, 600 mm, 410%, mica       73715-175       735817         C44, C44       Capacitor, 600 mm, 410%, mica       728023-550       99175         C51, C52       Capacitor, 0.00 mf, 420%, 500 volt, ceramic feedhru. Same as C3       738181-298       1885149-1       99177         C55       Capacitor, 100 mf, 600 volt.       56877       777252       77252       77252         C61       C565       Capacitor, 100 mf, 45%, mica. Same as C3       738181-326       99159         C761       Capacitor, 100 mf, 45%, mica. Same as C3       7724280-41       99177         C762       Capacitor, 100 mf, 45%, mica. Same as C4       8285449-1       99177         C755       Capacitor, 100 mf, 45%, mica. Same as C3       777252       77252         C61       Diode, germanium       Sime as C4       8285449-1<	C37	Capacitor, 0.47 mf, 400 volt, paper tubular	737818-96	59512
C400, C400         Capacitor, 0.1 mf, ±10%, 400 volt, paper.         735715-175           C41         Capacitor, 0.1 mf, ±10%, 400 volt, paper.         735715-175           C42         Capacitor, 10 mf, ±10%, mica.         735715-175           C43, C44         Capacitor, 600 mmf, ±10%, mica.         735715-175           C45, C46         Capacitor, 0.0 mf, ±10%, mica.         735715-175           C46         Capacitor, 0.001 mf, ±20%, 500 volt. ceramic feedthru. Same as C41.         735718-175           C51, C52         Capacitor, 0.001 mf, ±20%, 500 volt. ceramic feedthru. Same as C48.         8825449-1         99177           C55, C54         Capacitor, 100 mf, ±500 relectrolytic.         8825449-1         99177           C56, C57         C56         Capacitor, 100 mf, ±500 mic.         Same as C3.         737817-323         99463           C66         Capacitor, 100 mf, ±500 mic.         Same as C3.         737817-325         99159           C676         Capacitor, 100 mf, ±500 mic.         Same as C3.         737817-325         99159           C78         C58         Capacitor, 100 mf, ±500 mic.         Same as C3.         737817-325         99159           C78         Capacitor, 100 mf, ±500 mic.         Same as C3.         737817-325         51800           C42         Colatacitor, 100 mf,	C38, C39		722022-506	99176
C41         Capacitor, 0.1 mf, ±10%, 400 volt, paper         73511-175         73511           C42         Capacitor, 0.1 mf, ±10%, 400 volt, paper. Same as C41         73711-175         73515-175           C45, C46         Capacitor, 0.1 mf, ±10%, mica.         73711-225         599865           C47         Capacitor, 0.001 mf, ±0%, 500 volt, ceramic feedthru         822449-1         99177           C56         C57         Capacitor, 0.01 mf, ±0%, 500 volt, ceramic feedthru.         822449-1         99177           C56         C57         Capacitor, 0.01 mf, ±0%, 500 volt, ceramic feedthru.         822449-1         99177           C56         C57         Capacitor, 0.00 mf, 10 volt, electrolytic         822449-1         99177           C56         C57         Capacitor, 160 mmf, ±5%, mica.         Same as C23         449666-57         77522           C68         Capacitor, 160 mmf, ±5%, mica.         Same as C23         448666-57         77525           C68         Capacitor, 160 mmf, ±5%, mica.         Same as C23         778171-36         99159           J1         Receptacle         448666-57         775252         54800           C78         C57         Capacitor, 0.001 mf, ubto eramic         Same as C23         778175-16         518000           J2         Rece	C40, C40A	Capacitor, 80 mf/60 mf/60 mf, 350 volt, electrolytic	442900-84	99184
C42       Capacitor, 125 mf, 350 volt, electrolytic.       93406         C43, C44       Capacitor, 47 mmf, 410%, mica.       735715-75         C45, C46       Capacitor, 47 mmf, 410%, mica.       732715-225         C47       Capacitor, 0.001 mf, 20%, 500 volt, ceramic feedthru       732715-256         C36       Capacitor, 0.01 mf, 120%, 500 volt, ceramic feedthru       73716-66         C36       Capacitor, 0.01 mf, 120%, 500 volt, ceramic feedthru.       8422449-1         C36       Capacitor, 0.01 mf, 120%, 500 volt, ceramic feedthru.       94428-4-1         C35       Capacitor, 0.001 mf, ceramic feedthru. Same as C4       94269-5         C55       Capacitor, 0.001 mf, ceramic feedthru. Same as C4       94366-7         C56       Capacitor, 0.001 mf, ceramic feedthru. Same as C3       77317-326         C66       Capacitor, 0.001 mf, uton ceramic. Same as C3       77317-326         C71       Diode, germanium       1184         10cd, germanium       1884       188494-1         21       Receptacle       727215-3         23       Gedespace       445813-2         24       Socket, 2 contact, female       727215-3         25       Socket, 2 contact, female       727215-3         26       Gedespace       98169	C40B, C40C			
C43, C44       Capacitor, 0.1 mf, ±10%, ±00 volt, paper. Same as C41       73711-175       735115-175         C45, C46       Capacitor, 6800 mmf, ±10%, mica.       737811-225       59985         C47       Capacitor, 6800 mmf, ±10%, mica.       737811-225       59985         C47       Capacitor, 0.00 mf, ±20%, 500 volt, ceramic feedthru       8822449-1       99177         C50       Capacitor, 0.01 mf, ±0%, 500 volt, ceramic feedthru.       8822449-1       99177         C53       C54       Capacitor, 0.00 mf, toti, electrolytic.       4820449       18017         C55       Capacitor, 0.00 mf, toti, electrolytic.       4820449-1       99177         C56       C59       Capacitor, 0.00 mf, toti, electrolytic.       4820449-1       99177         C56       C59       Capacitor, 160 mmf, ±5%, mica.       Same as C43       625449-1       99179         C60 to C55       Capacitor, 160 mmf, ±5%, mica.       Same as C3       449808-5       99164         C11       Receptacle       77217-335       1800       1872       54800         J2       Receptacle       77215-35       1800       1874       99163         J3       Receptacle       772765-26       99164       458444-4       99183         J4       Socket, 2 contact		Capacitor, 0.1 mf, ±10%, 400 volt, paper	735715-175	73551
C45, C46       Capacitor, 47 mmf, ±10%, mica.       77217-223       59985         C47, Capacitor, 0.001 mf, ±20%, 500 volt, ceramic feedthru.       72202-559       99175         C50, Capacitor, 0.01 mf, ±20%, 500 volt, ceramic feedthru.       8022449-1       99177         C51, C52       Capacitor, 0.01 mf, ±20%, 500 volt, ceramic feedthru.       8042249-1       99177         C53, C54       Capacitor, 0.01 mf, ±20%, 500 volt, ceramic feedthru.       8042249-1       99177         C53, C54       Capacitor, 0.01 mf, boutel.       8042249-2       18501         C55, C57       Capacitor, 0.01 mf, boutel.       80429-2       18501         C66       Capacitor, 0.01 mf, bouten ceramic feedthru.       80429-4       99177         C56       Capacitor, 160 mf, ±5%, mica.       Same as C3       77811-236       99159         C66       Capacitor, 160 mf, ±5%, mica.       Same as C2       77711-36       99159         C71       Fuegermalum       1N72       1N1       1N1       1N2         F1       Fuege, slo-blow, 3 amp. 3AG       96698-8       99164       445813-2       54890         J3       Receptacle       727215-5       51800       101       102       102       102       102       102       102       102       102       1				
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		Capacitor, 0.1 mf, $\pm 10\%$ , 400 volt, paper. Same as C41		
C48, C49       Capacitor, 0.47 mf, 400 volt, pager, tubular, Same as C37       8825440-1       99177         C51, C52       Capacitor, 0.47 mf, 400 volt, ceramic feedthru, Same as C48       8825440-1       99177         C55, C54       Capacitor, 0.001 mf, 250 volt, ceramic feedthru, Same as C48       8825440-1       99177         C55, C57       Capacitor, 0.001 mf, to volt, eeramic feedthru, Same as C48       8825440-1       99177         C56, C57       Capacitor, 0.001 mf, button ceramic feedthru, Same as C48       8825440-1       99177         C56, C57       Capacitor, 100 mmf, 45%, mica, Same as C23       449666-57       777817-336       99159         C68 to C52       Capacitor, 100 mmf, 45%, mica, Same as C23       737817-336       99159         C71       Fues, sol-bolw, 3 amp, 3AG       906698-8       99164         C72       Diode, germanium       1N74       1N72         C73       Receptacle       423647-1       92180         C73       Receptacle       423647-1       92180         C68       Contact, female       435647-1       92180         C74       Receptacle, ac       8815047-601       99173         C74       Receptacle, ac       8815047-601       99173         C81       Relay       8815047-601       99170 <td></td> <td>Capacitor, <math>47 \text{ mmf}</math>, <math>\pm 10\%</math>, mica</td> <td></td> <td></td>		Capacitor, $47 \text{ mmf}$ , $\pm 10\%$ , mica		
C50         Capacitor, 0.47 mf, 400 volt, paper, tubular. Same as C37		Capacitor, 6800 mmf, $\pm 10\%$ , mica		
C51, C52       Capacitor, 0.001 mf, 20%, 500 volt, ceramic feedthru, Same as C48       8825449-1       99177         C55       Capacitor, 500 mf, 15 volt, electrolytic       8825449-1       99177         C55       Capacitor, 0.001 mf, button ceramic feedthru, Same as C48       8825449-1       99177         C56       C57       Capacitor, 0.001 mf, button ceramic feedthru, Same as C48       8825449-1       99177         C60 to C65       Capacitor, 100 mmf, 45%, mica, Same as C2       449666-57       737817-336       99159         CR1       Diode, germanium       IN64       117       1172       1172         F1       Fuse, slo-blow, 3 amp, 3AG       996698-8       99164       445813-2       54890         J3       Receptacle       72725-3       1800       118       1172       1172         J4       Receptacle       72725-3       1800       118       1172       1172       118       1172       118       117       118       118       118       118       118       118       118       118       118       118       118       118       118       118       118       118       118       118       118       118       118       118       118       118       118       118 <t< td=""><td></td><td>Capacitor, 0.001 mi, ±20%, 500 volt, ceramic feedthru</td><td></td><td></td></t<>		Capacitor, 0.001 mi, ±20%, 500 volt, ceramic feedthru		
C53       Capacitor, 10 mf, 600 volt.       984629-8       18501         C55       Capacitor, 500 mf, 15 volt, electrolytic.       442601-45       58477         C56       Capacitor, 0.001 mf, ceramic feedfhru. Same as C3.       440606-57       77252         C66       Capacitor, 10 mf, 45%, mica. Same as C3.       737617-336       99159         C71       Diode, germanium       IN72       187       180668-8       99164         C12       Receptacle       445654-4       99169       11       1872         F1       Fuse, slo-blow, 3 ann, 3AG       180668-8       99164       445654-4       99189         12       Receptacle       425654-4       99186       16       172125-3       51800         14       Socket, 4 contact, female       727217-3       99165       16       17       180626-1       92180         15       Socket, 4 contact, female       727215-3       9180       16       16       1607720-1       99165         16       Connector       742565-1       92180       16       17       18092       11       19181       11       111       101       14       149475-1       99180       113       111       111       111       111       111		Capacitor, 0.47 mi, 400 volt, paper, tubular. Same as C37		
C55         Capacitor, 500 mf, 15 volt, electrolytic         442801-145         58477           C56, C59         Capacitor, 0.001 mf, ceramic feedthrus Same as C48         8825449-1         99177           C656, C59         Capacitor, 0.001 mf, button ceramic. Same as C3         449696-57         773817-336         99159           CR1         Diode, germanium         1N64         1N72         99177           F1         Fuse, sol-blow, 3 amp, 3AG         806698-8         99164         1N72           J2         Receptacle         727215-3         51800           J3         Receptacle         727215-3         51800           J4         Socket, 2 contact, female         458545-4         99164           J6         Connector         722655-1         8032           K1         Relay         19475-1         99180           L1         Coil, if         881503-501         99173           L3         Choke, rf, insulated         91168         19170           L4         Coil, if .         Same as L3         91168         19173           L4         Coil, if .         Same as L4         8815053-502         99173           L4         Coil, if .         Same as L4         8815047-503         99172 </td <td></td> <td>Capacitor, 0.001 mi, <math>\pm 20\%</math>, 500 volt, ceramic reduird, Same as C40</td> <td></td> <td></td>		Capacitor, 0.001 mi, $\pm 20\%$ , 500 volt, ceramic reduird, Same as C40		
C56, C57       Capacitor, 0.001 mf, ceramic feedthru. Same as C48       8825449-1       99177         C55       Capacitor, 0.001 mf, button ceramic. Same as C3       449696-57       77252         C66       Capacitor, 160 mf, $\pm 5\%$ , mica. Same as C3       1871       73117-336         CR2       Diode, germanium       1872         F1       Fuse, slo-blow, 3 amp. 3AG       886698-8       99164         J1       Receptacle       435447-1       92180         J2       Receptacle       435447-1       92180         J5       Socket, 4 contact, female       727215-3       51800         J5       Socket, 4 contact, female       727265-2       98165         J6       Connector       742565-1       9877         J7       Receptacle, ac       8815047-501       99170         L2       Coil, jeaking       8815047-501       99170         L3       Choke, rf, insulated. Same as L3       8815047-501       99173         L4       Coil, ji Same as L4       8815047-501       99170         L5       Coil, ji Same as L3       8815047-503       99170         L4       Coil, ji Same as L4       8815047-503       99171         L6       Cooke, rf, insulated. Same as L3		Capacitor, 500 mf 15 volt electrolytic		provide a secondaria
$\begin{array}{ccccc} C65 & C59 \\ C68 & C68 \\ C69 & Capacitor, 0.001 mf, button ceramic. Same as C3$		Capacitor, 0,001 mf, ceramic feedthru. Same as C48		
C66       Capacitor, 160 mmf, ±5%, mica. Same as C23       737817-336       99159         CR1       Diode, germanium       IN64         CR2       Diode, germanium       IN72         F1       Fuse, silo-blow, 3 amp, 3AC       896698-8       99164         J1       Receptacle       435447-1       92130         J2       Receptacle       737817-336       99164         J3       Receptacle       435447-1       92130         J4       Socket, 2 contact, female       742565-1       90165         J6       Connector       742565-1       9037         J4       Receptacle, ac       742565-1       9032         K1       Relay       801507-501       99170         L2       Coll, peaking       8815047-501       99173         L3       Choke, rf, insulated       Sel5047-501       99170         L4       Coll, jeaking, Same as L2       8815047-501       99170         L5       Coll, peaking, Same as L3       8815047-501       99170         L4       Coll, if. Same as L1       8815047-502       99171         L4       Coll, if. Same as L1       8815047-502       99174         L4       Coll, if. Same as L3       441689-11 <td></td> <td></td> <td></td> <td></td>				
C66       Capacitor, 160 mmf, ±5%, mica. Same as C23       737817-336       99159         CR1       Diode, germanium       IN64         CR2       Diode, germanium       IN72         F1       Fuse, silo-blow, 3 amp, 3AC       896698-8       99164         J1       Receptacle       435447-1       92130         J2       Receptacle       737817-336       99164         J3       Receptacle       435447-1       92130         J4       Socket, 2 contact, female       742565-1       90165         J6       Connector       742565-1       9037         J4       Receptacle, ac       742565-1       9032         K1       Relay       801507-501       99170         L2       Coll, peaking       8815047-501       99173         L3       Choke, rf, insulated       Sel5047-501       99170         L4       Coll, jeaking, Same as L2       8815047-501       99170         L5       Coll, peaking, Same as L3       8815047-501       99170         L4       Coll, if. Same as L1       8815047-502       99171         L4       Coll, if. Same as L1       8815047-502       99174         L4       Coll, if. Same as L3       441689-11 <td>C60 to C65</td> <td>Capacitor, 0.001 mf, button ceramic. Same as C3</td> <td>449696-57</td> <td>77252</td>	C60 to C65	Capacitor, 0.001 mf, button ceramic. Same as C3	449696-57	77252
$ \begin{array}{c cra} CR2 & Diode, germanium, IN72 & IN72 \\ F1 & Fuse, slo-blow, 3 amp, 3AG. & B70 & B$	C66	Capacitor, 160 mmf, $\pm 5\%$ , mica. Same as C23	737817-336	99159
$\begin{array}{c cccc} CR2 & Dicde, germanium, and the set of $		Diode, germanium	1N64	
J1Receptacle445813-254890J2Receptacle727215-351800J3Receptacle727215-351800J4Socket, 2 contact, female7272169-2699163J5Socket, 4 contact, female742565-193678J6Connector742565-193678J7Receptacle, ac8875725-19032K1Relay149475-199180L1Coil, if8874711-299180L2Coil, peaking8815047-50199173L3Choke, rf, insulated941689-1199182L4Coil, if. Same as L18815047-50199173L5Coil, peaking, Same as L28815053-50199173L6Choke, rf, insulated, Same as L3941689-1199182L7Coil, if. Same as L18815047-50199171L6Choke, rf91748815047-50299171L10Coil, if. Same as L98815047-50399172L11Coil, if. Same as L98815047-50399172L12Coil, if. Same as L08815047-50399172L13Choke, rf19918291689-1199185L14Choke, rf19918491899-11L15Choke, rf199182815047-503L14Choke, rf1991829172L15Choke, rf19918291172L16Choke, rf199182L17L18Choke, rf199182L17Choke, rf199183 <td></td> <td>Diode, germanium</td> <td>1N72</td> <td></td>		Diode, germanium	1N72	
J2Receptacle727215-351800J3Receptacle43847-192180J4Socket, 2 contact, female438545-499183J5Socket, 4 contact, female727969-2699165J7Receptacle, ac742265-18032K1Relay149475-199180L1Coil, if881503-50199173L3Choke, rf. insulated8815047-50199170L4Coil, if same as L18815047-50199170L5Coil, peaking8815053-50199170L6Choke, rf. insulated, same as L28815047-50199170L8Coil, if Same as L18815047-50199170L4Coil, if Same as L28815047-50199170L6Choke, rf. insulated, same as L3941685-10199170L8Coil, peaking8815047-50299171L10Coil, if.8815047-50299171L11Coil, if. Same as L98815047-50299171L12Coil, if. Same as L108815047-50299171L13Choke, rf149484-699169L14Choke, rf.149484-799185L14Choke, rf. insulated. Same as L3941689-1199182L19Reactor300 ohms, $\pm 10\%$ , $1/2$ watt.82283-5730498L17L18Choke, rf. insulated. Same as L3941689-1199182L14Choke, rf. insulated. Same as L3941689-1199182L19Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt.		Fuse, slo-blow, 3 amp. 3AG		99164
J3Receptacle433647-192180J4Socket, 2 contact, female435845-499183J5Socket, 4 contact, female727060-2699165J6Connector742665-193676J7Receptacle, ac887725-199181K1Relay149475-199181L2Coll, peaking8815047-50199170L3Choke, rf, insulated941689-1199182L4Coli, if. Same as L18815047-50199173L6Choke, rf, insulated, Same as L3941689-1199182L7Coil, peaking, Same as L3941689-1199182L6Choke, rf, insulated, Same as L3941689-1199182L7Coil, if. Same as L18815047-50399171L8Coil, if. Same as L98816047-50399171L10Coil, if. Same as L98816047-50399172L11Coil, if. Same as L108815047-50399172L12Coil, if. Same as L108815047-50399172L13Choke, rf149484-899169L14Choke, rf149484-799186L17L18Choke, rf, insulated, Same as L3941689-11L19Choke, rf, insulated, Same as L3941689-11114Choke, rf9182L23L24Relay9182L24Choke, rf9182L35Choke, rf, insulated, Same as L3941689-119182L14Choke, rf149484-691982Relstor,				
J4Socket, 2 contact, female $458545-4$ $99183$ J5Socket, 4 contact, female $727969-26$ $99165$ J6Connector $722665-1$ $803725-1$ $8032$ J7Receptacle, ac $7422665-1$ $803725-1$ $8032$ K1Relay $149475-1$ $99180$ L1Coli, if $801725-1$ $8032$ L2Coli, peaking $801603-501$ $99170$ L3Choke, rf. insulated $941889-11$ $99182$ L4Coli, if, Same as L2 $801503-501$ $99170$ L5Coli, peaking, Same as L2 $801503-501$ $99170$ L6Choke, rf. insulated, Same as L3 $941889-11$ $99182$ L7Coli, if.Same as L4 $801503-502$ $99171$ L9Coli, if. $8015047-501$ $99170$ L8Coli, peaking $8015047-502$ $99171$ L10Coli, if. $8015047-502$ $99171$ L12Coli, if. $8015047-502$ $99171$ L13Choke, rf. $81484-6$ $99169$ L14Choke, rf. $149484-7$ $99168$ L17L18Choke, rf. $149484-7$ $99168$ L17L18Choke, rf. insulated. Same as L3 $491689-11$ $99182$ L19Reastor, 390 ohms, $\pm10\%$ , $1/2$ watt. $82283-57$ $30498$ R2Resistor, 2700 ohms, $\pm5\%$ , $1/2$ watt. $82283-56$ $502133$ R5Resistor, 2700 ohms, $\pm5\%$ , $1/2$ watt. $82283-166$ $502227$ R6Resistor, 2				
J5 Socket, 4 contact, female				
J6Connector742565-193678J7Receptacle, ac.8875725-18032K1Relay149475-199181K2Relay8874711-299180L1Coil, if.8815047-50199170L2Coil, if. same as L18815047-50199170L4Coil, if. Same as L28815047-50199170L5Coll, peaking8815047-50199170L6Choke, rf. insulated. Same as L3941689-1199182L7Coil, if. Same as L18815047-50199170L8Coil, peaking8815047-50299174L9Coil, if. Same as L98815047-50299171L10Coil, if. Same as L98815047-50299171L11Coil, if. Same as L98815047-50299171L12Coll, if. Same as L98815047-50299171L13Choke, rf149484-899169L14Choke, rf149484-899167L15Choke, rf149484-799168L16Choke, rf, insulated. Same as L3941689-11L18Choke, rf, insulated. Same as L3941689-11L19Reactor442285-156407L23, L24R1Resistor, 390 ohms, $\pm 10\%$ , $1/2$ watt82283-56R2Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt.82283-56R4Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt.82283-169R4Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt.82283-169R6Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt. </td <td></td> <td>Socket, 2 contact, remain and a second secon</td> <td></td> <td></td>		Socket, 2 contact, remain and a second secon		
J7Receptacle, ac. $8875725-1$ $8032$ K1Relay. $149475-1$ $99181$ K2Relay. $149475-1$ $99181$ L1Coll, if. $8815047-501$ $99170$ L2Coll, peaking. $8815047-501$ $99170$ L3Choke, rf, insulated. $941689-11$ $99182$ L4Coll, if.Same as L1 $8815047-501$ $99170$ L5Coll, peaking.Same as L2 $8815047-501$ $99170$ L6Choke, rf, insulated.Same as L3 $941689-11$ $99182$ L7Coll, if.Same as L1 $8815047-501$ $99170$ L8Coll, jeaking.Same as L1 $8815047-501$ $99170$ L9Coll, if.Same as L1 $8815047-502$ $99171$ L10Coll, if.Same as L9 $8815047-503$ $99172$ L11Coll, if.Same as L10 $8815047-503$ $99172$ L12Coll, if.Same as L10 $8815047-503$ $99172$ L13Choke, rf $149484-8$ $99169$ $99169$ L14Choke, rf. $149484-7$ $99188$ L17L18Choke, rf, insulated. Same as L3 $941689-11$ $99182$ L23L24Resistor, 390 ohms, $\pm10\%$ , $1/2$ watt. $82283-57$ $30498$ R2Resistor, 300 ohms, $\pm10\%$ , $1/2$ watt. $82283-57$ $30498$ R2Resistor, 2700 ohms, $\pm5\%$ , $1/2$ watt. $82283-56$ $502133$ R5Resistor, 2700 ohms, $\pm5\%$ , $1/2$ watt. $82283-56$ $502133$ <td></td> <td></td> <td></td> <td></td>				
K1Relay149475-199181K2Relay8815047-50199170L2Coil, jeaking8815047-50199170L3Choke, rf, insulated941689-1199182L4Coil, jf. Same as L18815047-50199170L5Coil, jeaking8815047-50199170L6Choke, rf, insulated, Same as L28815047-50199170L6Coil, jeaking8815047-50199172L7Coil, jif. Same as L18815047-50199172L8Coil, jeaking8815047-50299171L9Coil, if.Same as L98815047-50299171L10Coil, if.Same as L98815047-50299171L11Coil, if.Same as L98815047-50299171L12Coil, if.Same as L98815047-50299171L13Choke, rf149484-899169L14Choke, rf149484-899167L15Choke, rf149484-899168L17L18Choke, rf199182L23L24Resistor, 390 ohms, $\pm 10\%$ , $1/2$ watt82283-57R4Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-57R5Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-56L23L24Resistor, 270 ohms, $\pm 10\%$ , $1/2$ watt82283-56R6Resistor, 270 ohms, $\pm 10\%$ , $1/2$ watt82283-56R7Resistor, 270 ohms, $\pm 10\%$ , $1/2$ watt82283-56R6Resistor, 270 ohms, $\pm 5\%$ , $1/2$ watt82283-56 <td></td> <td></td> <td></td> <td></td>				
K2Relay8874711-299180L1Coil, if.8815047-50199170L2Coil, peaking8815047-50199173L3Choke, rf, insulated991738815047-50199170L5Coil, peakingSame as L28815047-50199173L6Choke, rf, insulated, Same as L3941689-1199182L7Coil, if. Same as L18815047-50199170L8Coil, peaking8815047-50199170L9Coil, if.8815047-50299171L10Coil, if.8815047-50299171L11Coil, if.Same as L98815047-503L12Coil, if.Same as L18815047-503L13Choke, rf8815047-50399172L14Choke, rf149484-699167L15Choke, rf149484-799168L16Choke, rf149484-799167L17L18Choke, rf149484-799167L19Reactor114444-799168L19Reactor114444-799167L20L21L22Choke, rf1199182R21Resistor, 390 ohms, $\pm 10\%$ , $1/2$ watt82283-5630496R2Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt82283-56502133R5Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt82283-56502133R6Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-56502133R6Resistor, 300 ohms, $\pm 10\%$ , $1/2$ watt82283-56502133<				
L1Coil, if	K2	Relay		
L2Coil, peaking8815053-50199173L3Choke, rf, insulated941689-1199182L4Coil, if. Same as L18815047-50199170L5Coil, peaking. Same as L28815053-50199170L6Choke, rf, insulated. Same as L3941689-1199182L7Coil, if. Same as L18815047-50199170L8Coil, if. Same as L18815047-50299171L9Coil, if8815047-50299171L10Coil, if. Same as L98815047-50299171L11Coil, if. Same as L98815047-50399172L12Coil, if. Same as L108815047-50399172L13Choke, rf8815047-50399172L14Choke, rf149484-699169L15Choke, rf149484-799169L16Choke, rf149484-799169L17L18Choke, rf, insulated. Same as L3941689-1199182L19Reactor447226-156407L20L21L22Coo hms, $\pm 10\%$ , $1/2$ watt82283-169502227R4Resistor, 300 ohms, $\pm 10\%$ , $1/2$ watt.82283-169502237R5Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt.82283-169502237R6Resistor, 200 ohms, $\pm 10\%$ , $1/2$ watt.82283-169502237R6Resistor, 200 ohms, $\pm 10\%$ , $1/2$ watt.82283-169502237R6Resistor, 200 ohms, $\pm 5\%$ , $1/2$ watt.82283-169502237R6Resistor, 200 o	L1	Coil, if		
L4Coil, if. Same as L18815047-50199170L5Coil, peaking. Same as L28815053-50199173L6Choke, rf. insulated. Same as L3941689-1199182L7Coil, if. Same as L18815047-50199170L8Coil, peaking8815047-50299171L10Coil, if8815047-50299171L11Coil, if8815047-50399172L12Coil, if8815047-50399172L13Choke, rf.8815047-50399172L14Coke, rf.8815047-50399172L15Choke, rf.8815047-50399172L16Choke, rf.149484-699167L17L18Choke, rf.149484-799168L16Choke, rf.149484-799168L17L18Choke, rf.149484-799168L19Reactor149484-799162L20L21L22Choke, rf. insulated. Same as L3941689-11L23L24Resistor, 390 ohms, $\pm 10\%$ , $1/2$ watt82283-5730498R2Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-56502133R5Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt.82283-169502227R6Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt.82283-169		Coil, peaking	8815053-501	99173
L5Coil, peaking. Same as L28815053-501 $99173$ L6Choke, rf, insulated, Same as L3941689-11 $99182$ L7Coil, jf. Same as L18815047-501 $99170$ L8Coil, peaking8815047-502 $99171$ L10Coil, if8815047-502 $99171$ L11Coil, if. Same as L08815047-502 $99171$ L12Coil, if. Same as L108815047-502 $99171$ L13Choke, rf8815047-503 $99172$ L14Coike, rf8815047-503 $99172$ L15Choke, rf882473-517 $99168$ L14Choke, rf149484-6 $99167$ L16Choke, rf, insulated. Same as L3149484-7 $99168$ L17L18Choke, rf, insulated. Same as L3 $941689-11$ $99182$ L20L21, L22Choke, rf, insulated. Same as L3 $941689-11$ $99182$ L23, L24Resistor, 390 ohms, $\pm10\%$ , 1/2 watt $82283-169$ $502227$ R4Resistor, 2700 ohms, $\pm5\%$ , 1/2 watt. $82283-169$ $502227$ R5Resistor, 2700 ohms, $\pm5\%$ , 1/2 watt. Same as R2 $82283-169$ $502227$ R6Resistor, 2700 ohms, $\pm5\%$ , 1/2 watt. Same as R4 $82283-169$ $502227$ R6Resistor, 2700 ohms, $\pm5\%$ , 1/2 watt. Same as R4 $82283-142$ $561$ R10Resistor, 270 ohms, $\pm5\%$ , 1/2 watt. Same as R4 $82283-142$ $502133$ R6R9Resistor, 270 ohms, $\pm5\%$ , 1/2 watt. $82283-169$ $502227$ R11Resistor, 270 ohms, $\pm5\%$ , 1/			941689-11	99182
L6Choke, rf, insulated, Same as L3941669-1199182L7Coil, if, Same as L18815047-50199170L8Coil, if, Same as L18815047-50299171L9Coil, if8815047-50299171L10Coil, if, Same as L98815047-50299171L11Coil, if, Same as L98815047-50299171L12Coil, if, Same as L98815047-50399172L13Choke, rf8815047-50399172L14Choke, rf149484-899169L15Choke, rf149484-699167L16Choke, rf, insulated, Same as L3941689-1199182L19Reactor149484-799182L23, L24Resistor, 390 ohms, $\pm 10\%$ , $1/2$ watt82283-5730498R2Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-56502133R5Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ wattSame as R282283-169502227R6Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ wattSame as R482283-169502227R7Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ wattSame as R482283-169502227R6Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ wattSame as R482283-169502227R6Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-169502227R6Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-169502227R7Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-169502227R6Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-169502227<				
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		Coil, peaking. Same as L2		
L8Coil, peakingPeaking99174L9Coil, if8815047-50299171L10Coil, if8815047-50399172L11Coil, if. Same as L98815047-50399172L12Coil, if. Same as L108815047-50399172L13Choke, rf8815047-50399172L14Choke, rf149484-899185L15Choke, rf149484-699167L16Choke, rf, insulated. Same as L3149484-799182L19Reactor447226-156407L20, L21, L22,Choke, rf, insulated. Same as L3941689-1199182R1Resistor, 390 ohms, $\pm 10\%$ , $1/2$ watt82283-5730498R2Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-56502213R4Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt82283-56502213R5Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt82283-56502213R5Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-56502133R5Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-56502133R6Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-56502133R6Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-56502133R6Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-56502133R10Resistor, 270 ohms, $\pm 5\%$ , $1/2$ watt82283-56502133R11Resistor, 270 ohms, $\pm 5\%$ , $1/2$ watt82283-56502133R12Resistor, 180 ohms, $\pm 10\%$ , $1/2$ watt82283		Choke, rf, insulated. Same as L3		
L9Coil, if8815047-50299171L10Coil, if8815047-50299171L11Coil, if.Same as L98815047-50399172L12Coil, if.Same as L108815047-50399172L13Choke, rf8825473-51799185L14Choke, rf149484-699167L15Choke, rf149484-699167L16Choke, rf149484-799168L17, L18Choke, rf, insulated. Same as L3941689-1199182L20, L21, L22,Choke, rf, insulated. Same as L3941689-1199182L23, L24Resistor, 2700 ohms, $\pm 10\%$ , 1/2 watt82283-5730498R1Resistor, 2700 ohms, $\pm 10\%$ , 1/2 watt82283-169502227R3Resistor, 2700 ohms, $\pm 10\%$ , 1/2 watt.82283-169502227R4Resistor, 2700 ohms, $\pm 10\%$ , 1/2 watt. Same as R282283-169502227R6Resistor, 2700 ohms, $\pm 5\%$ , 1/2 watt.82283-169502227R7Resistor, 2700 ohms, $\pm 5\%$ , 1/2 watt. Same as R482283-169502227R7Resistor, 2700 ohms, $\pm 5\%$ , 1/2 watt.82283-169502227R7Resistor, 270 ohms, $\pm 5\%$ , 1/2 watt.82283-169502227R7Resistor, 270 ohms, $\pm 5\%$ , 1/2 watt.82283-1423561R8R9Resistor, 270 ohms, $\pm 5\%$ , 1/2 watt.82283-1423561R10Resistor, 270 ohms, $\pm 5\%$ , 1/2 watt.82283-169502227R11Resistor, 180 ohms, $\pm 10\%$ , 1/2 watt.82283-16950222		Coil, n. Same as L1		
L10Coil, if8815047-50399172L11Coil, if. Same as L98815047-50399172L12Coil, if. Same as L108815047-50399172L13Choke, rf8815047-50399172L14Choke, rf8825473-51799185L14Choke, rf149484-899169L15Choke, rf149484-799168L16Choke, rf, insulated. Same as L3149484-799168L19Reactor9917299172L20, L21, L22, Choke, rf, insulated. Same as L3941689-1199182L23, L24Resistor, 390 ohms, $\pm 10\%$ , $1/2$ watt941689-1199182R1Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-5730498R2Resistor, 2700 ohms, $\pm 10\%$ , 1 watt.82283-169502227R3Resistor, 330 ohms, $\pm 10\%$ , 1 watt.82283-169502227R6Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt.82283-169502227R6Resistor, 2700 ohms, $\pm 10\%$ , 1 watt.82283-169502227R6Resistor, 2700 ohms, $\pm 10\%$ , 1 watt.82283-169502227R7Resistor, 2700 ohms, $\pm 10\%$ , 1/2 watt.82283-14530929R11Resistor, 2700 ohms, $\pm 5\%$ , 1/2 watt.82283-14530929R11Resistor, 2700 ohms, $\pm 5\%$ , 1/2 watt.82283-14530929R11Resistor, 2700 ohms, $\pm 10\%$ , 1/2 watt.82283-38502113R13Resistor, 180 ohms, $\pm 10\%$ , 1/2 watt.82283-38502118R14Resistor, 22K ohms, $\pm 10\%$ , 1/2		Coil if		
L11Coil, if. Same as L98815047-50299171L12Coil, if. Same as L108815047-50399172L13Choke, rf8825473-51799185L14Choke, rf149484-899169L15Choke, rf149484-699167L16Choke, rf, insulated. Same as L3941689-1199182L20, L21, L22, L23, L24Choke, rf, insulated. Same as L3941689-1199182R2Resistor, 390 ohms, $\pm 10\%$ , $1/2$ watt82283-5730498R2Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-56502123R4Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt. Same as R390496-67512227R6Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt. Same as R482283-169502227R6Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt. Same as R482283-169502227R7Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt. Same as R482283-169502227R6Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt. Same as R482283-169502227R7Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt. Same as R482283-14530929R11Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt. Same as R582283-14530929R11Resistor, 180 ohms, $\pm 10\%$ , $1/2$ watt.82283-169502227R12Resistor, 180 ohms, $\pm 10\%$ , $1/2$ watt.82283-169502227R13Resistor, 180 ohms, $\pm 10\%$ , $1/2$ watt.82283-169502227R14Resistor, 22K ohms, $\pm 10\%$ , $1/2$ watt.82283-38502010R14Resistor, 22K ohms				
L12Coil, if. Same as L10Same as				
L13Choke, rf8825473-51799185L14Choke, rf149484-899169L15Choke, rf149484-699167L16Choke, rf149484-799168L17, L18Choke, rf, insulated. Same as L3941689-1199182L20, L21, L22, L23, L24Choke, rf, insulated. Same as L3941689-1199182R1Resistor, 390 ohms, $\pm 10\%$ , $1/2$ watt82283-5730498R2Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-169502227R3Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt90496-67512227R4Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-56502133R5Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt82283-169502227R6Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-169502227R6Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-56502133R7Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-169502227R6Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-169502227R7Resistor, 200 ohms, $\pm 5\%$ , $1/2$ watt82283-169502227R7Resistor, 200 ohms, $\pm 5\%$ , $1/2$ watt82283-1423681R10Resistor, 270 ohms, $\pm 5\%$ , $1/2$ watt82283-1423681R11Resistor, 270 ohms, $\pm 5\%$ , $1/2$ watt82283-169502227R11Resistor, 270 ohms, $\pm 5\%$ , $1/2$ watt82283-169502227R12Resistor, 180 ohms, $\pm 10\%$ , $1/2$ watt82283-169502227R13Resistor,				
L14Choke, rf149484-899169L15Choke, rf149484-699167L16Choke, rf149484-799168L17, L18Choke, rf, insulated. Same as L3941689-1199182L19Reactor447226-156407L20, L21, L22, L23, L24Choke, rf, insulated. Same as L3941689-1199182R1Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt82283-5730498R2Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-169502227R4Resistor, 330 ohms, $\pm 10\%$ , $1/2$ watt82283-56502133R5Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt. Same as R282283-169502227R6Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt. Same as R390496-67512227R4Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt. Same as R390496-67512227R6Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt. Same as R482283-169502227R6Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt. Same as R390496-67512227R7Resistor, 200 ohms, $\pm 10\%$ , $1/2$ watt. Same as R482283-169502227R6Resistor, 270 ohms, $\pm 5\%$ , $1/2$ watt82283-1423581R10Resistor, 270 ohms, $\pm 5\%$ , $1/2$ watt82283-14530929R11Resistor, 270 ohms, $\pm 5\%$ , $1/2$ watt82283-169502227R12Resistor, 10 ohms, $\pm 10\%$ , $1/2$ watt82283-38502010R13Resistor, 22K ohms, $\pm 10\%$ , $1/2$ watt82283-7850210R14Resistor, 22K ohms, $\pm 10\%$ , $1/2$ watt	L13			
L16Choke, rf.149484-799168L17, L18Choke, rf, insulated. Same as L3941689-1199182L19Reactor447226-156407L20, L21, L22,Choke, rf, insulated. Same as L3941689-1199182L23, L24Resistor, 390 ohms, $\pm 10\%$ , $1/2$ watt82283-5730498R2Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-169502227R3Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt90496-67512227R4Resistor, 330 ohms, $\pm 10\%$ , $1/2$ watt82283-56502133R5Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt. Same as R282283-56502133R6Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt. Same as R390496-67512227R7Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt. Same as R482283-56502133R6Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt. Same as R482283-169502227R10Resistor, 200 ohms, $\pm 5\%$ , $1/2$ watt.82283-1423581R10Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt.82283-14530929R11Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt.82283-169502227R12Resistor, 180 ohms, $\pm 10\%$ , $1/2$ watt.82283-38502118R13Resistor, 22K ohms, $\pm 10\%$ , $1/2$ watt82283-3850210R14Resistor, 22K ohms, $\pm 10\%$ , $1/2$ watt82283-78502322		Choke, rf	149484-8	99169
L17, L18Choke, rf, insulated. Same as L3941689-1199182L19Reactor447226-156407L20, L21, L22, L23, L24Choke, rf, insulated. Same as L3941689-1199182R1Resistor, 390 ohms, $\pm 10\%$ , 1/2 watt82283-5730498R2Resistor, 2700 ohms, $\pm 5\%$ , 1/2 watt82283-169502227R3Resistor, 2700 ohms, $\pm 10\%$ , 1/2 watt90496-67512227R4Resistor, 330 ohms, $\pm 10\%$ , 1/2 watt82283-56502133R5Resistor, 2700 ohms, $\pm 5\%$ , 1/2 watt. Same as R282283-169502227R6Resistor, 2700 ohms, $\pm 10\%$ , 1 watt. Same as R390496-67512227R7Resistor, 330 ohms, $\pm 10\%$ , 1/2 watt. Same as R482283-56502133R8, R9Resistor, 200 ohms, $\pm 5\%$ , 1/2 watt82283-1423581R10Resistor, 2700 ohms, $\pm 5\%$ , 1/2 watt82283-14530929R11Resistor, 2700 ohms, $\pm 5\%$ , 1/2 watt82283-169502227R7Resistor, 200 ohms, $\pm 5\%$ , 1/2 watt82283-14530929R11Resistor, 2700 ohms, $\pm 5\%$ , 1/2 watt82283-14530929R11Resistor, 100 ohms, $\pm 10\%$ , 1/2 watt82283-169502227R12Resistor, 180 ohms, $\pm 10\%$ , 1/2 watt82283-38502118R13Resistor, 22K ohms, $\pm 10\%$ , 1/2 watt82283-78502322R14Resistor, 22K ohms, $\pm 10\%$ , 1/2 watt82283-78502322			149484-6	99167
L19Reactor $447226-1$ $56407$ L20, L21, L22, L23, L24Choke, rf, insulated. Same as L3 $941689-11$ $99182$ R1Resistor, 390 ohms, $\pm 10\%$ , $1/2$ watt $82283-57$ $30498$ R2Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt $82283-169$ $502227$ R3Resistor, 330 ohms, $\pm 10\%$ , $1$ watt $90496-67$ $512227$ R4Resistor, 330 ohms, $\pm 10\%$ , $1/2$ watt $82283-169$ $502227$ R6Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt. $82283-56$ $502123$ R5Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt. $82283-56$ $502123$ R6Resistor, 2700 ohms, $\pm 10\%$ , $1$ watt.Same as R3 $90496-67$ $512227$ R6Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt.Same as R4 $82283-56$ $502133$ R8, R9Resistor, 200 ohms, $\pm 5\%$ , $1/2$ watt.Same as R4 $82283-142$ $3581$ R10Resistor, 270 ohms, $\pm 5\%$ , $1/2$ watt. $82283-142$ $30929$ R11Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt.Same as R5 $82283-145$ $30929$ R11Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt.Same as R5 $82283-145$ $30929$ R11Resistor, 180 ohms, $\pm 10\%$ , $1/2$ watt. $82283-53$ $502118$ R13Resistor, 10 ohms, $\pm 10\%$ , $1/2$ watt $82283-78$ $502322$ R14Resistor, 22K ohms, $\pm 10\%$ , $1/2$ watt $82283-78$ $502322$		Choke, rf		
L20, L21, L22, L23, L24Choke, rf, insulated. Same as L3941689-1199182R1Resistor, 390 ohms, $\pm 10\%$ , $1/2$ watt82283-5730498R2Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-169502227R3Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt90496-67512227R4Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt82283-56502133R5Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt. Same as R282283-56502133R6Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt. Same as R390496-67512227R6Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt. Same as R390496-67512227R7Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt. Same as R482283-56502133R8, R9Resistor, 200 ohms, $\pm 5\%$ , $1/2$ watt. Same as R482283-56502133R10Resistor, 270 ohms, $\pm 5\%$ , $1/2$ watt. Same as R582283-1423581R10Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt. Same as R582283-14530929R11Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt.82283-53502118R13Resistor, 180 ohms, $\pm 10\%$ , $1/2$ watt82283-38502010R14Resistor, 22K ohms, $\pm 10\%$ , $1/2$ watt82283-78502322		Choke, ri, insulated. Same as L3		
L23, L24Resistor, 390 ohms, $\pm 10\%$ , $1/2$ watt82283-5730498R1Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-169502227R3Resistor, 2700 ohms, $\pm 10\%$ , $1$ watt90496-67512227R4Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt82283-56502133R5Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt.82283-56502133R6Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt.82283-56502133R6Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt.82283-56502133R6Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt.8283-56502133R7Resistor, 330 ohms, $\pm 10\%$ , $1/2$ watt.8283-56502133R8, R9Resistor, 200 ohms, $\pm 5\%$ , $1/2$ watt.82283-1423581R10Resistor, 270 ohms, $\pm 5\%$ , $1/2$ watt.82283-14530929R11Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt.82283-169502227R12Resistor, 180 ohms, $\pm 10\%$ , $1/2$ watt.82283-53502118R13Resistor, 10 ohms, $\pm 10\%$ , $1/2$ watt82283-78502322		Choke of inculated from a I 2		and the second se
R1Resistor, 390 ohms, $\pm 10\%$ , $1/2$ watt82283-5730498R2Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-169502227R3Resistor, 2700 ohms, $\pm 10\%$ , $1$ watt90496-67512227R4Resistor, 330 ohms, $\pm 10\%$ , $1/2$ watt82283-56502133R5Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt. Same as R282283-69502227R6Resistor, 2700 ohms, $\pm 10\%$ , $1$ watt. Same as R390496-67512227R7Resistor, 2700 ohms, $\pm 10\%$ , $1/2$ watt. Same as R482283-56502133R8, R9Resistor, 200 ohms, $\pm 10\%$ , $1/2$ watt82283-56502133R10Resistor, 270 ohms, $\pm 5\%$ , $1/2$ watt82283-1423581R10Resistor, 270 ohms, $\pm 5\%$ , $1/2$ watt82283-14530929R11Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-169502227R12Resistor, 180 ohms, $\pm 10\%$ , $1/2$ watt82283-38502118R13Resistor, 10 ohms, $\pm 10\%$ , $1/2$ watt82283-385021010R14Resistor, 22K ohms, $\pm 10\%$ , $1/2$ watt82283-78502322		choke, ri, insulated. Same as L3	941089-11	99182
R2Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt82283-169502227R3Resistor, 2700 ohms, $\pm 10\%$ , 1 watt90496-67512227R4Resistor, 330 ohms, $\pm 10\%$ , $1/2$ watt82283-56502133R5Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt.82283-169502227R6Resistor, 2700 ohms, $\pm 10\%$ , 1 watt.82083-56502133R7Resistor, 2700 ohms, $\pm 10\%$ , 1 watt.82083-56502227R7Resistor, 330 ohms, $\pm 10\%$ , 1/2 watt.82083-56502133R8, R9Resistor, 200 ohms, $\pm 5\%$ , $1/2$ watt.82283-56502133R10Resistor, 270 ohms, $\pm 5\%$ , $1/2$ watt.82283-1423581R11Resistor, 270 ohms, $\pm 5\%$ , $1/2$ watt.82283-14530929R11Resistor, 100 ohms, $\pm 10\%$ , $1/2$ watt.82283-169502227R12Resistor, 180 ohms, $\pm 10\%$ , $1/2$ watt.82283-38502118R13Resistor, 10 ohms, $\pm 10\%$ , $1/2$ watt.82283-38502100R14Resistor, 22K ohms, $\pm 10\%$ , $1/2$ watt82283-78502322		Resistor, 390 ohms +10% 1/2 watt	82283-57	30498
R3Resistor, 2700 ohms, $\pm 10\%$ , 1 watt90496-67512227R4Resistor, 330 ohms, $\pm 10\%$ , 1/2 watt82283-56502133R5Resistor, 2700 ohms, $\pm 5\%$ , 1/2 watt. Same as R282283-169502227R6Resistor, 2700 ohms, $\pm 10\%$ , 1 watt. Same as R390496-67512227R7Resistor, 330 ohms, $\pm 10\%$ , 1/2 watt. Same as R482283-169502227R7Resistor, 200 ohms, $\pm 10\%$ , 1/2 watt. Same as R482283-56502133R8, R9Resistor, 200 ohms, $\pm 5\%$ , 1/2 watt.82283-1423581R10Resistor, 270 ohms, $\pm 5\%$ , 1/2 watt.82283-14530929R11Resistor, 270 ohms, $\pm 5\%$ , 1/2 watt.Same as R582283-14530929R12Resistor, 180 ohms, $\pm 10\%$ , 1/2 watt.82083-53502227R13Resistor, 10 ohms, $\pm 10\%$ , 1/2 watt82283-38502010R14Resistor, 22K ohms, $\pm 10\%$ , 1/2 watt82283-78502322				
R4Resistor, 330 ohms, $\pm 10\%$ , $1/2$ watt82283-56502133R5Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt.Same as R282283-169502227R6Resistor, 2700 ohms, $\pm 10\%$ , 1 watt.Same as R390496-67512227R7Resistor, 330 ohms, $\pm 10\%$ , $1/2$ watt.Same as R482283-56502133R8, R9Resistor, 200 ohms, $\pm 5\%$ , $1/2$ watt.Same as R482283-169502227R10Resistor, 200 ohms, $\pm 5\%$ , $1/2$ watt82283-1423581R11Resistor, 270 ohms, $\pm 5\%$ , $1/2$ watt.82283-14530929R11Resistor, 270 ohms, $\pm 5\%$ , $1/2$ watt.82283-169502227R12Resistor, 180 ohms, $\pm 10\%$ , $1/2$ watt.82283-53502118R13Resistor, 10 ohms, $\pm 10\%$ , $1/2$ watt.82283-78502322R14Resistor, 22K ohms, $\pm 10\%$ , $1/2$ watt.82283-78502322		Resistor, 2700 ohms, ±10%, 1 watt		
R5Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt. Same as R282283-169502227R6Resistor, 2700 ohms, $\pm 10\%$ , 1 watt. Same as R390496-67512227R7Resistor, 330 ohms, $\pm 10\%$ , $1/2$ watt. Same as R482283-56502133R8, R9Resistor, 200 ohms, $\pm 5\%$ , $1/2$ watt.82283-1423581R10Resistor, 270 ohms, $\pm 5\%$ , $1/2$ watt.82283-14530929R11Resistor, 270 ohms, $\pm 5\%$ , $1/2$ watt.82283-14530929R12Resistor, 180 ohms, $\pm 10\%$ , $1/2$ watt.82283-53502217R13Resistor, 10 ohms, $\pm 10\%$ , $1/2$ watt.82283-38502010R14Resistor, 22K ohms, $\pm 10\%$ , $1/2$ watt.82283-78502322		Resistor, 330 ohms, ±10%, 1/2 watt		
R6       Resistor, 2700 ohms, ±10%, 1 watt. Same as R3       90496-67       512227         R7       Resistor, 330 ohms, ±10%, 1/2 watt. Same as R4       82283-56       502133         R8, R9       Resistor, 200 ohms, ±5%, 1/2 watt       82283-142       3581         R10       Resistor, 270 ohms, ±5%, 1/2 watt       82283-142       30929         R11       Resistor, 270 ohms, ±5%, 1/2 watt.       82283-145       30929         R12       Resistor, 10 ohms, ±1%, 1/2 watt.       82283-169       502227         R12       Resistor, 10 ohms, ±1%, 1/2 watt.       82283-53       502118         R13       Resistor, 10 ohms, ±10%, 1/2 watt.       82283-78       502322         R14       Resistor, 22K ohms, ±10%, 1/2 watt.       82283-78       502322		Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt. Same as R2		and an and a second
R7Resistor, 330 ohms, $\pm 10\%$ , $1/2$ watt.Same as R482283-56502133R8, R9Resistor, 200 ohms, $\pm 5\%$ , $1/2$ watt82283-1423581R10Resistor, 270 ohms, $\pm 5\%$ , $1/2$ watt82283-14530929R11Resistor, 2700 ohms, $\pm 5\%$ , $1/2$ watt.82283-169502227R12Resistor, 180 ohms, $\pm 10\%$ , $1/2$ watt82283-53502118R13Resistor, 10 ohms, $\pm 10\%$ , $1/2$ watt82283-785022010R14Resistor, 22K ohms, $\pm 10\%$ , $1/2$ watt82283-78502322		Resistor, 2700 ohms, ±10%, 1 watt. Same as R3	90496-67	512227
R10       Resistor, 270 ohms, ±5%, 1/2 watt       30929         R11       Resistor, 2700 ohms, ±5%, 1/2 watt.       Same as R5         R12       Resistor, 180 ohms, ±10%, 1/2 watt       82283-169         R13       Resistor, 10 ohms, ±10%, 1/2 watt       82283-38         R14       Resistor, 22K ohms, ±10%, 1/2 watt       82283-78	and a second sec	Resistor, 330 ohms, $\pm 10\%$ , $1/2$ watt. Same as R4		
R11       Resistor, 2700 ohms, ±5%, 1/2 watt. Same as R5       82283-169       502227         R12       Resistor, 180 ohms, ±10%, 1/2 watt       82283-53       502118         R13       Resistor, 10 ohms, ±10%, 1/2 watt       82283-38       502010         R14       Resistor, 22K ohms, ±10%, 1/2 watt       82283-78       502322		Resistor, 200 ohms, $\pm 5\%$ , $1/2$ watt	and the second sec	
R12         Resistor, 180 ohms, ±10%, 1/2 watt         82283-53         502118           R13         Resistor, 10 ohms, ±10%, 1/2 watt         82283-38         502010           R14         Resistor, 22K ohms, ±10%, 1/2 watt         82283-78         502322		Resistor, 270 ohms, $\pm 5\%$ , $1/2$ watt		
R13         Resistor, 10 ohms, ±10%, 1/2 watt         82283-38         502010           R14         Resistor, 22K ohms, ±10%, 1/2 watt         82283-78         502322		Resistor, 2700 onms, $\pm 3\%$ , 1/2 watt. Same as R5		minder and her star
R14 Resistor, 22K ohms, ±10%, 1/2 watt 82283-78 502322	a state sector of	Resistor, 100 onms, $\pm 10\%$ , $1/2$ watt		
R15         Resistor, 4700 ohms, $\pm 10\%$ , 1/2 wat $62265-76$ $502322$ S15         Resistor, 4700 ohms, $\pm 10\%$ , 1 wat $512247$		Resistor 22K ohms $\pm 10\%$ 1/2 watt	and an and a second	and the same same same same
		Resistor, 4700 ohms, ±10%, 1 watt		
		,,,	50100 10	

## For Ordering Information See Page 32

	For Ordering Information See Page 32		
Symbol No.	Description	Drawing No.	Stock N
R16	Resistor, 1200 ohms, ±5%, 1/2 watt	82283-161	502212
R17	Resistor, 180 ohms, $\pm 10\%$ , $1/2$ watt. Same as R12	82283-53	502118
R18	Resistor, 10 ohms, ±10%, 1/2 watt. Same as R13	82283-38	502010
R19	Resistor, 22K ohms, ±10%, 1/2 watt. Same as R14	82283-78	502322
R20	Resistor, 3900 ohms, ±5%, 1/2 watt	82283-173	502239
R21	Resistor, 4700 ohms, ±10%, 1 watt. Same as R15	90496-70	512247
R22 R23	Resistor, 100K ohms, ±10%, 1 watt	90496-86	512410
R23	Resistor, 180 ohms, ±10%, 1/2 watt. Same as R12	82283-53	502118
R25	Resistor, 10 ohms, ±10%, 1/2 watt. Same as R13	82283-38	502010
R26	Resistor, 22K ohms, $\pm 10\%$ , $1/2$ watt. Same as R14 Resistor, 4700 ohms, $\pm 10\%$ , 1 watt. Same as R15	82283-78	502322
R27	Resistor, 4700 ohms, $\pm 10\%$ , 1 watt. Same as R15 Resistor, 4700 ohms, $\pm 5\%$ , 1/2 watt	90496-70	512247
R28	Resistor, 100K ohms, $\pm 0\%$ , $1/2$ watt	82283-175	502247
R29	Resistor, 820 ohms, ±10%, 1/2 watt	82283-86 82283-61	502410
R30	Resistor, 10 ohms, $\pm 10\%$ , $1/2$ watt. Same as R13	82283-38	502182
R31	Resistor, 47K ohms, $\pm 10\%$ , $1/2$ watt	82283-82	502010
R32	Resistor, 56000 ohms, ±5%, 1 watt	90496-177	30787 512256
R33	Resistor, 100 ohms, ±10%, 1/2 watt	82283-50	502110
R34	Resistor, 2200 ohms, ±5%, 1/2 watt	82283-167	502222
R35	Resistor, 1 megohm, ±10%, 1/2 watt	82283-98	502510
R36	Resistor, 120 ohms, ±10%, 1/2 watt	82283-51	502112
R37	Resistor, 68 ohms, $\pm 10\%$ , $1/2$ watt	82283-48	34763
R38	Resistor, 75 ohms, $\pm 5\%$ , $1/2$ watt	82283-132	34764
R39	Resistor, 15K ohms, $\pm 10\%$ , 1 watt	90496-76	512315
R40	Resistor, 100K ohms, $\pm 10\%$ , 1/2 watt. Same as R28	82283-86	502410
R41	Resistor, 1200 ohms, $\pm 5\%$ , 10 watt	443853-78	94772
R42	Resistor, 820 ohms, $\pm 10\%$ , 2 watt	99126-61	36746
R43	Resistor, 10K ohms, ±10%, 2 watt	99126-74	522310
R44	Resistor, 100 ohms, $\pm 10\%$ , $1/2$ watt. Same as R33	82283-50	502110
R45	Resistor, 470 ohms, $\pm 10\%$ , $1/2$ watt	82283-58	30499
R46	Resistor, 10K ohms, $\pm 10\%$ , 1/2 watt	82283-74	502310
R47	Resistor, 2200 ohms, $\pm 10\%$ , $1/2$ watt	82283-66	502222
R48	Resistor, 100 ohms, $\pm 10\%$ , $1/2$ watt. Same as R33	82283-50	502110
R49	Resistor, 33K ohms, ±5%, 1 watt	90496-195	38895
R50	Resistor, 5K ohms, variable, 2 watt	433196-18	52009
R51 R52	Resistor, 27K ohms, ±5%, 1 watt	90496-193	71990
R52 R53	Resistor, 18K ohms, ±10%, 2 watt	99126-77	39158
R54	Resistor, 56K ohms, ±10%, 1 watt	90496-83	51 <b>2</b> 356
R55, R56	Resistor, 100K ohms, ±10%, 1 watt. Same as R22	90496-86	512410
R57, R58	Resistor, 560 ohms, ±10%, 1 watt	90496-59	38884
R59	Resistor, 68 ohms, $\pm 10\%$ , 1 watt	90496-48	36976
R60	Resistor, 270K ohms, $\pm 10\%$ , 1 watt Resistor, 100 ohms, adjustable, $\pm 10\%$ , 50 watt	90496-91	19232
R61	Resistor, 1 meg. $\pm 5\%$ , $1/2$ watt	8815079-1	99166
R62	Resistor, 390 ohms, $\pm 5\%$ , $1/2$ watt	82283-231	502510
R63	Resistor, 100K ohms, $\pm 10\%$ , $1/2$ watt. Same as R28	82283-149	30498
R64	Resistor, 51 ohms, $\pm 5\%$ , 2 watt	82283-86 99126-128	502410
S1, S1A, S1B	Switch assembly, mycalex wafer, 3 section, 1 pos.	468233-1	522051
S2, S2A, S2B	Switch assembly, mycalex wafer, 1 section, 2 pos.	468228-1	$99163 \\ 99179$
S3	Switch assembly, mycalex wafer, 1 section, 2 pos.	468229-1	99179 99178
S4	Switch, toggle, ac	426780-7	48791
T1	Transformer, power	447213-1	56406
XF1	Receptacle, fuse	99088-2	48894
XK1	Socket, octal	99390-2	54414
XV1, XV2, XV	3 Socket, 7 pin miniature,	737867-13	94925
XV4, XV5, ' XV6			0 10 10
XV7	Socket. Same as XK1	99390-2	54414
XV8	Socket, 7 pin miniature. Same as XV1	737867-13	94925
XV9	Socket, octal. Same as XK1	99390-2	54414
XV10	Socket, 7 pin miniature. Same as XV1	737867-13	94925
XV11, XV12	Socket, octal. Same as XK1	99390-2	54414
	Knob	818739-1	7960
	Thumbscrew	8854872-4	99663
	CABLE KIT, MI-34013		
	Connector, type "N"	146978-502	96579



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D-166 000 REV. 3



Figure 19 - VHF Converter, Schematic Diagram



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Figure 20 - IF, Video, and Power Supply, Schematic Diagram



Figure 21 - BW-4A/BWU-4A Interconnections



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