

# KRIS 23+

## INSTALLATION AND OPERATING INSTRUCTIONS



CEDARBURG, WI 53012

# SPECIFICATIONS

## TRANSMITTER

Plate Power Input to Final Modulation	5 watts
Harmonic Suppression	AM; up to 100% capability
Carrier Deviation	Better than 55 db down
Antenna Match	Better than .005%
	50-75 ohms

## RECEIVER

Sensitivity	.8 uV for 10 db S + N to N ratio
Selectivity	6 Khz bandwidth -6 db
Intermediate Frequency	1st IF-11.275 Mhz; 2nd IF-455 Khz
Image Rejection	-75 db
Audio Output	4 watts
External Speaker Impedance	4-8 ohms

## COMMON

Power Supply	105-120 volts, 50/60 cycles AC; 12 volts DC
Power Consumption	AC -80 watts
	DC -3 1/2 amps rec.; 4 amps trans.
Dimensions	12" W x 5" H x 8 1/4" D
Net Weight	17 lbs

## TUBES & SEMI-CONDUCTORS

V1	6BL8	RF amp/1st Mixer
V2	6BL8	2nd Mixer/2nd Osc.
V3	6BA6	IF Amp (455 Khz)
V4	6BA6	IF Amp (455 Khz)
V5	12AX7	1st Audio/Modulator/Mic Preamp
V6	6BQ5	Audio Output/Modulator
V7	6GH8	Local Osc.
V8	6GH8	Converter/1st Osc.
V9	6BA6	Buffer Amp
V10	6BQ5	RF Power Amp
V11	12AT7	Buffer/Synthesizer
D1, D2	1N60/1N34	Meter Rectifier
D3	1S1588	Det/AVC
D4	1S72	ANL
D5	10D1	Squelch bias
D6	10D4	Mod. booster
D7	10D4	Mod. Limiter
D8, D9	10D4	Absorber
D10, D11	10D6	B + Rectifier
D12	10D6	Bias Supply Rectifier

# LICENSING INSTRUCTIONS

The Kris 23 Plus is a complete Citizens Band Two-Way radio station. It may be employed for any communication purpose covered by Volume VI, part 95 – Citizens Radio Service of F.C.C. Rules and Regulations. Copies of Volume VI are available for \$1.25 from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.

It is illegal to operate the transmitter section of this transmitter prior to receiving a valid station license and call sign. Application for a station license and call sign is made on F.C.C. Form 505, which is available from any F.C.C. Field Office. No examination is necessary to receive a Citizens Band license.

The Kris 23 Plus has been designed for the person who wants full coverage on the Citizens Band channels. It will provide economical and reliable radio communication if installed and operated in accordance with instructions contained herein.

## GENERAL DESCRIPTION

### Receiver Section

The Kris 23 Plus is designed to receive AM signals in the 26.965 to 27.255 MHz Citizens Band. The circuit is a highly sensitive and selective dual-conversion super-heterodyne type with one RF and two IF amplifiers. Full 23 channels, crystal-controlled operation is provided by a frequency-synthesized circuit consisting of 12 crystals.

The receiver section includes an S Meter for reading signal strength, an adjustable squelch control to eliminate background noise when no signal is being received, an automatic noise limiter to suppress atmospheric and man-made interference, and a band spread which has a range of 2.5 KHz, which permits reception of stations that are transmitting slightly off frequency.

### Transmitter Section

The transmitter is designed to transmit AM signals in the 26.965 to 27.255 MHz Citizens Band. The crystal synthesized circuit used in the receive section is common to the transmitter, and provides full 23 channel crystal-controlled operation. A push-to-talk ceramic microphone controls the reliable relay switching. Plate modulation with 100% capability is used with up to 5 watts plate power input to the final RF stage. An RF meter indicates relative RF power at the antenna during the transmit mode when the meter switch is in the appropriate position.

# BASE STATION INSTALLATION

## AC POWER CONNECTION

Select the AC power cord and attach the 8 – pin connector to the 8 – pin connector at the rear of the unit. ALWAYS LINE UP THE KEY WAY PROPERLY BEFORE PUSHING THE CABLE CONNECTOR ONTO THE TRANSCEIVER. DO NOT ATTEMPT TO FORCE THE CONNECTOR ONTO THE PINS, WHEN IT IS PROPERLY LINED UP, THE CONNECTOR WILL SLIP ON EASILY. MAKE CERTAIN THE TRANSCEIVER IS OFF (THE SWITCH IS LOCATED AT THE EXTREME COUNTER CLOCKWISE POSITION OF THE VOLUME CONTROL), THEN INSERT THE AC PLUG INTO THE AC OUTLET. FOR PROTECTION, THE AC INPUT TO THE TRANSCEIVER IS FUSED WITHIN THE UNIT.

## MICROPHONE CONNECTION

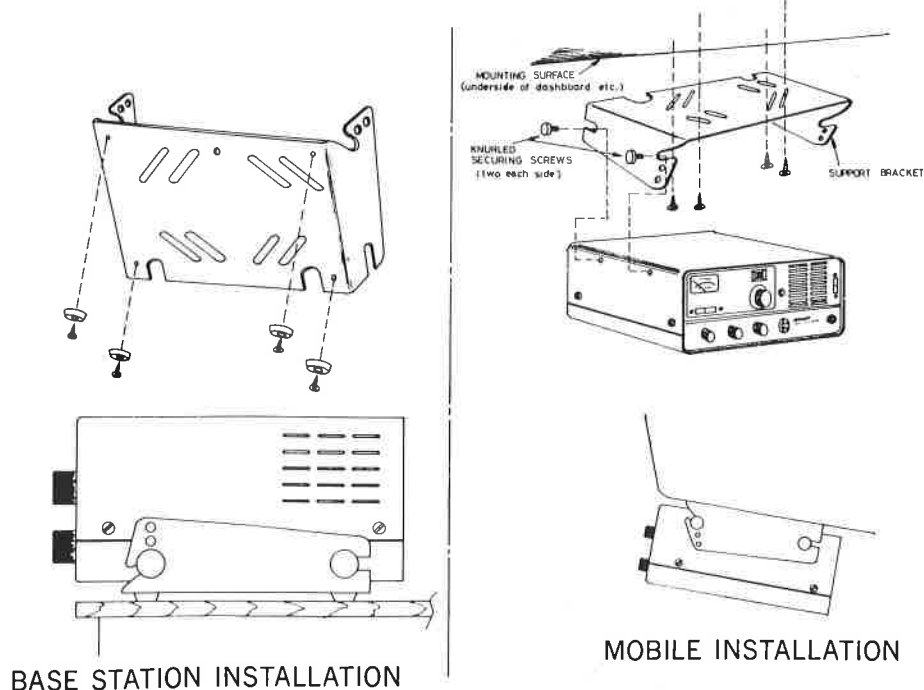
Attach the four pin connector at the end of the microphone coil cord into the transceivers microphone connector in the center of the front panel. Be certain that it is secured firmly with the knurled ring.

## ANTENNA CONNECTION

The antenna lead-in cable (RG-58U or RG8U) should be terminated with a PL-259 type coaxial connector which should then be attached to the antenna connector at the rear of the transceiver.

## MOUNTING BRACKET

The mobile mounting bracket may be used in a base installation by attaching it to the underside of the transceiver. When so used the four rubber feet may be attached with a bracket. This will allow the transceiver to be set at an angle, providing a better view of the front panel.



# MOBILE INSTALLATION

## TRANSCEIVER LOCATION

Before installing the Kris 23 Plus in the car, truck, boat, etc... make certain to use a location which permits the driver to operate the controls of the unit without interfering with his driving functions. The transceiver can be mounted to the underside of the instrument panel, on the floor, or above the drivers head if in a truck cab. Remove the bracket from the transceiver by loosening the four (4) knurled screws at the sides. Using the bracket as a pattern, locate the positions of the screws and drill holes for the four (4) self-threading screws which are provided.

After mounting the bracket, secure the transceiver to the bracket by means of a large narrow screws.

## DC POWER CONNECTION

**CAUTION:** THE KRIS 23 PLUS IS DESIGNED FOR USE ONLY IN VEHICLES EMPLOYING A NEGATIVE GROUND SYSTEM. DO NOT USE IN POSITIVE GROUND VEHICLES!

The red wire in the DC power cable should be connected to the positive battery source of the vehicle. This lead is fused for 8 amps. Points normally available for connection are the accessory posts on the ignition switch, the accessory side of the fuse block, or directly to the positive lead of the vehicles battery. The black lead should be connected to any metal portion of the vehicle chassis.

When the red and black leads have been properly connected, the 8-pin connector of the DC power cord should then be attached to the power connector at the rear of the transceiver. Always line up the keyway properly before pushing the cable connector into the transceiver. Do not attempt to force the connector onto the pins, when properly lined up the connector will slip on easily.

## MICROPNONE CONNECTION

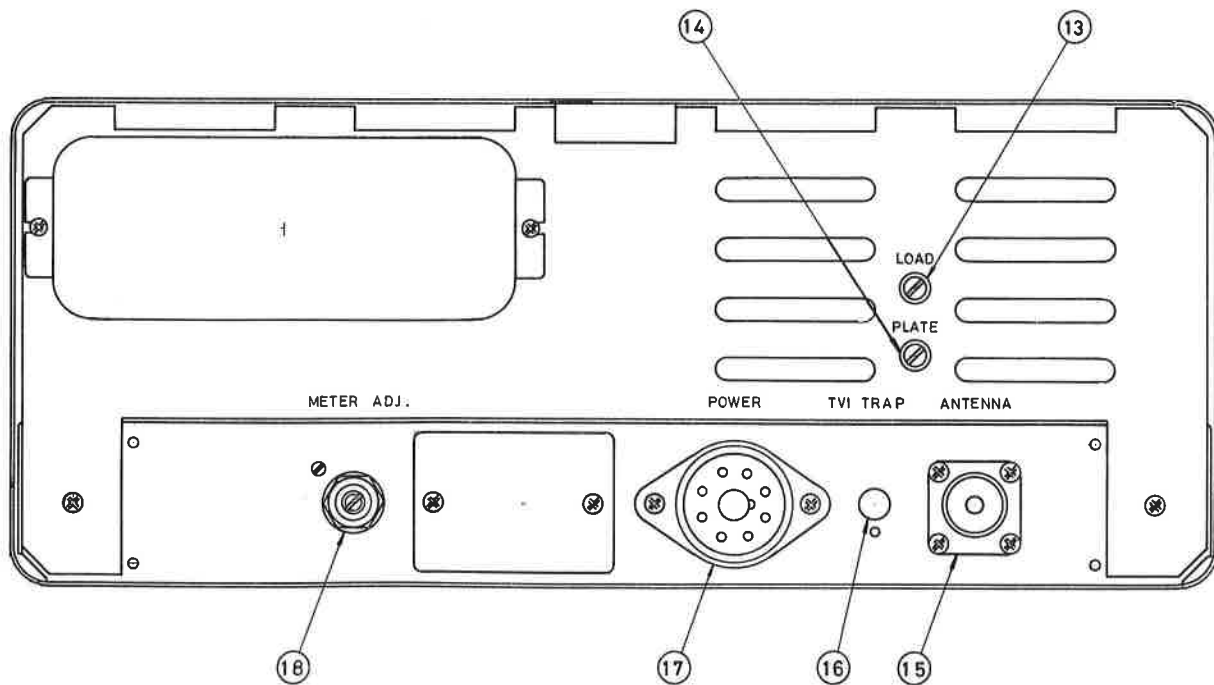
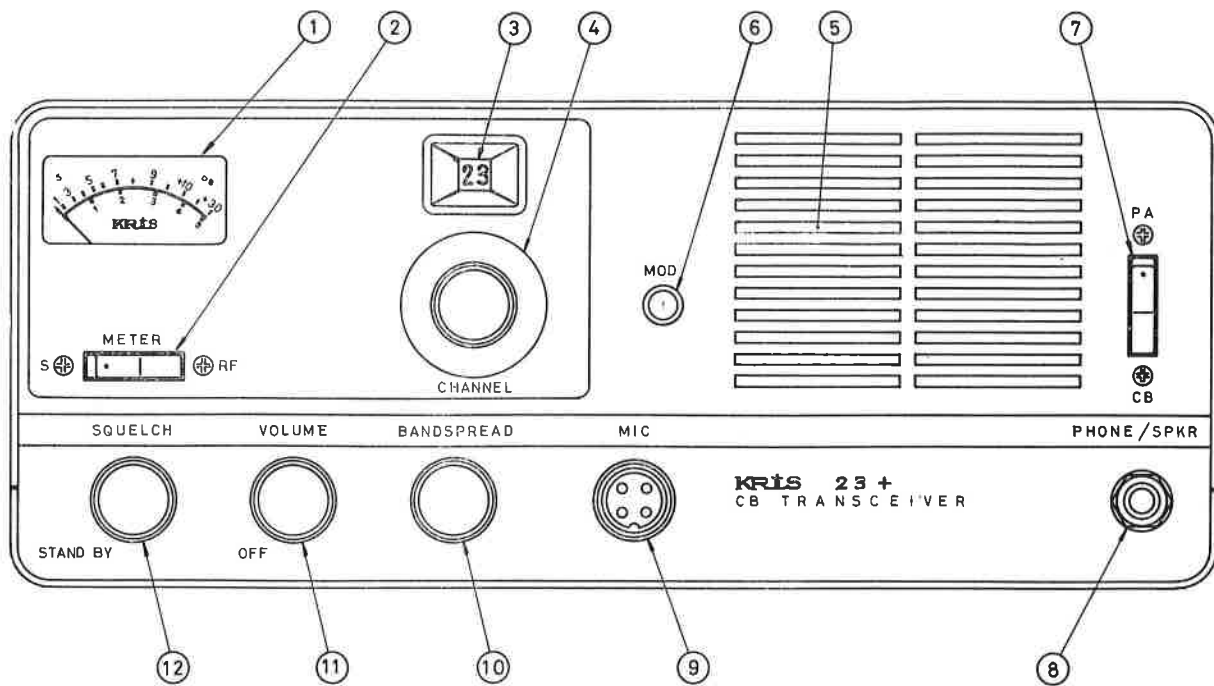
Attach the 4-pin connector at the end of the microphones coil cord to the microphone connector in the center of the transceivers front plate. Secure it firmly by means of the narrowed securing ring.

## ANTENNA

The type of antenna best suited for mobile operation is a vertically polarized whip which can be either of the loaded type, or a full quarter wave. Both types use a metal body of the vehicle as a ground plane. The antenna can be mounted on the trunk deck, either of the rear fenders or on the roof. When purchasing your mobile antenna, you will find full instructions for installation included with the antenna.

For optimum results of the mobile installation, the length of the coaxial cable should be ideally 11" 9" or multiples thereof. However, length other than multiples can provide optimum results if the antenna used can be tuned.

The lead-in cable should be terminated with a PL-259 Coaxial Connector which is then attached to the antenna connector at the rear of the transceiver.



# OPERATING CONTROLS

- 1.) Illuminated Meter – indicates strength of incoming signal in "S" units; or RF antenna power of the transmitter.
- 2.) Meter Selector Switch – when in "S" position meter reads "S" units; when in RF position meter reads RF power.
- 3.) Channel Indicator – illuminated dial shows channel to which the transceiver is set.
- 4.) Channel Selector – rotating switch selects any one of 23 CB channels.
- 5.) Speaker – 5" round speaker mounted behind front plate.
- 6.) Modulation Indicator – operates when the unit is in the transmit position, light glows brighter as modulation reaches 100%.
- 7.) PA-CB Switch – CB position provides normal CB operations. PA position permits use of the transceiver as a public address system when in the transmit mode. When in the receive mode, the PA position enables you to monitor over the external speaker.
- 8.) Phone Jack – standard phone jack for external speaker or headphones. Insertion of the plug into the jack automatically silences the internal speaker.
- 9.) Microphone Connector – four pin connector for push-to-talk microphone provided with the unit.
- 10.) Band Spread – Enables you to "tune-in" stations that are off frequency.
- 11.) Volume/On-Off Switch – controls output level from the speaker. When in the full counter clockwise position it operates as a power switch.
- 12.) Squelch Control – this control is used to block out background noise when no signal is on the channel. Squelch is adjustable with higher sensitivity in the full clockwise position.
- 13.) Load Control –
- 14.) Plate Control – these two controls should be alternately adjusted to indicate maximum power on the meter when the meter is in the RF position.
- 15.) Antenna Connector – this connector will accept a standard PL-259 from your base or mobile antenna.
- 16.) TVI Trap – this is an adjustable network inserted with the antenna. When tuned correctly it suppresses television interference.
- 17.) Power Connector – this connector connects to either the AC or DC power cord.
- 18.) Meter Adjust – this adjustment adjusts the needle of the "S" Meter.

# OPERATING INSTRUCTIONS

## RECEIVE MODE

Place the PA CB Switch in the CB position. Rotate the squelch control to the extreme counter clockwise position (without operating the stand-by switch), and select desired channel. Rotate the volume control knob until the on/off switch clicks, and the unit is in the on position. The meter light will glow softly. Advance the volume control about 50%. After approximately 20 seconds the tubes will warm up and you will hear the characteristic rushing sound of the receiver. Adjust the volume control to a comfortable listening level.

## SQUELCH ADJUSTMENT

The squelch control is used to eliminate background noise when there are no signals present on the channel. To adjust the squelch control select a channel where there is no signal. Turn the volume up to a fairly high level. Rotate the squelch control clockwise until the background noise disappears. This point is called the "squelch threshold"; and at this squelch position the receiver will be quite when there is no signal on the channel, but an incoming signal will be able to overcome the squelch action and be heard. This control is variable, and as it is advanced the squelch action is increased and consequently a stronger signal is required to break the threshold. To receive extremely weak signals or to disable the squelch circuit, merely turn the control fully counter-clockwise — do not operate the stand-by switch.

In the stand-by position of the squelch control the high voltages in the transceiver are switched off but the tube filament voltages are maintained. This reduces power consumption when the unit is not in actual use, while allowing the unit to remain in a "warmed-up" condition ready for instant use when needed.

## BAND SPREAD

The band spread control has a range of approximately 2.5 KHz; and can be used for tuning in a station that is slightly off frequency. The switch can be rotated either clockwise or counter clockwise to fine-tune stations that are either high or low in frequency. When using this control, tune for the best reception and the highest "S" meter reading.

## S/RF METER

The meter is associated with a rocker switch which places it either in the "S" meter or RF Meter position.

During the receive mode, the "S" meter provides a relative indication of the signal strength of incoming signals. The S meter circuit has been preadjusted at the factory to indicate "S-9" with 100 microvolts at the antenna input. The "S" meter should read "0" when in a receive position and with no antenna connected. To adjust if the meter is not at the "0" position, adjust the "Meter Adjust" grove at the rear of the set.

In the transmit mode, the meter will read relative antenna power output when the rocker switch is in the "RF" position. The RF meter will read a true value only when the transceiver is connected to a 50-ohm resistive load. If the antenna and transmission line do not offer such a load, the meter reading will be inaccurate.



## **TRANSMIT MODE**

IT IS ILLEGAL TO OPERATE THE TRANSMITTER SECTION OF THIS TRANSCEIVER PRIOR TO RECEIVING A VALID STATION LICENSE AND CALL SIGN. PART 95 OF THE F.C.C. RULES AND REGULATIONS DEALING WITH THE CITIZENS RADIO SERVICE MUST BE OBTAINED, READ AND UNDERSTOOD.

Before using the unit to transmit, make sure that the "PA-CB" switch is in the CB position. Select the channel on which you want to operate, making certain that there is no other traffic on that channel. To transmit, simply press the microphone button, then while holding it at approximately a 45 degree angle, speak into it at a normal voice level. If the meter switch is in the "RF" position it will indicate that you are radiating a signal. The modulation indicator light should flicker, indicating that you are modulating the carrier.

When the unit is transmitting, the receiver is silent — consequently reception is impossible when you are in the transmit mode. In like fashion, your signal cannot be heard by another station when it is transmitting. Each station must take its turn.

## **PUBLIC ADDRESS OPERATION**

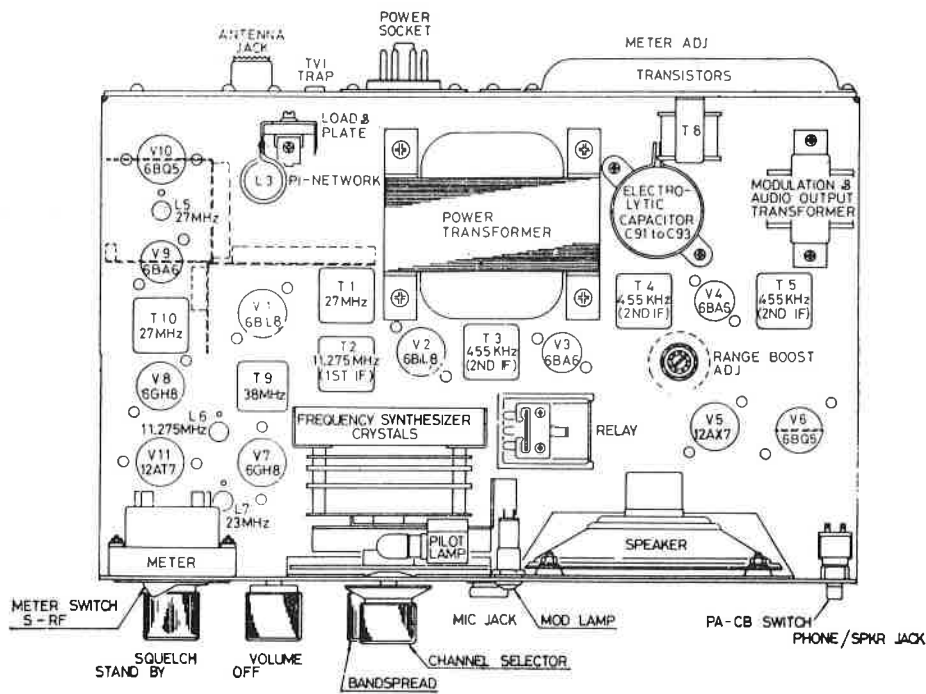
Provision has been made for utilizing the Kris 23 Plus for public address operation. For PA, connect an external 4-8 ohm speaker into the phone jack in the front of the unit. Set the "PA - CB" switch to PA, and press the push-to-talk button on the microphone and talk into it as you would when transmitting on a CB channel. Your voice will be heard on the external speaker it will not radiate into your antenna.

The phone jack may also be used to connect a headset for normal CB operations. When headsets are plugged into the phone jack, the loud speaker is automatically silenced.

## **WARNING**

FCC REGULATIONS REQUIRE THAT ANY ADJUSTMENT MADE TO THE TRANSMITTER MUST BE MADE UNDER THE SUPERVISION OF, OR BY, A PERSON HOLDING A VALID FIRST OR SECOND CLASS RADIO TELEPHONE OPERATOR'S LICENSE.

As an aid to the service technician, this manual contains a complete voltage chart, a layout diagram identifying components, a schematic diagram, and a functional block diagram. Also included are instructions for aligning receiver and transmitter sections.



## SIMPLE TROUBLE SHOOTING

### TUBES

Tubes may be checked in a do-it-yourself tube tester in a neighborhood store, or may be taken to a service shop for testing. Replace any weak or defective tubes with new ones of identical type. Before replacing tubes in the transceiver, refer to the diagram (on a following page) which shows the correct tube location.

### SOLID-STATE DC POWER SUPPLY

This transceiver employs a solid-state (2-transistor) power supply circuit during 12 volts DC operation (no vibrator is used). The transistors, which are located on the rear panel, have been treated with a light protective coating to avoid possible oxidation. Under no circumstances should the transistors be allowed to come into contact with the vehicle chassis, metal brackets, etc. This will cause a short-circuit and may destroy the transistors.

### PILOT LAMPS

There are two pilot lamps used in the transceiver. One of these is built into the meter, and the other provides illumination for the channel dial plate. Both are run considerably below their maximum rating and should therefore last almost indefinitely.

### FUSES

The 12-volt DC power cable uses an "in-line" fuse. The value of this fuse is 8 amp. Provision has also been made for fusing the primary circuit during 117 volt AC operation by means of a 2 amp fuse located within the transceiver (remove bottom cover for access to the fuse).

In the event of complete failure (tube filaments and pilot lamps not lighting), the fuse should always be checked first. If it has failed, replace only with one of a similar rating. Repeated failure of a fuse would indicate a serious fault in the transceiver which should be investigated.

# RECEIVER ALIGNMENT

## 455 KHz IF ADJUSTMENT

Connect the transceiver to a power source and attach the microphone. Turn volume to its mid-position squelch at minimum and the PA switch in the CB position. Set FINE TUNING to the mid-position (normal) and the CHANNEL selector to channel 13.

Connect an AC voltmeter (VTVM) across the speaker terminals in the transceiver. Alternatively, the meter can be connected to the "Phone" jack by means of a standard phone plug.

Connect a 455 KHz signal generator (modulated 30% at 1KHz.) to pin 8 of V2 (6BL8). Make certain the output frequency of the generator is within 1 KHz of 455 KHz. Increase generator output until the VTVM reads approximately 0.5 volts.

Adjust the top and bottom tuning cores of T3, T4 and T5 for maximum output. Reduce generator output progressively as circuits come into line so that VTVM reading does not exceed about 0.5 volts. When no further increase can be obtained by adjusting the cores, disconnect the signal generator and proceed with the 11.275 MHz IF adjustments.

## 11.275 MHz IF ADJUSTMENT

Connect the signal generator to pin 9 of V1 (6BL8), with the VTVM connected to the speaker terminals. Make sure the Fine Tuning control is in the normal, center position. Tune the generator in the vicinity of 11.275 MHz until a maximum reading is obtained on the VTVM. Reduce generator output level until the meter reads about 0.5 volts. Adjust top and bottom cores of T2 for maximum reading, reducing generator output if necessary so that reading does not exceed 0.5 volts.

## SECOND OSCILLATOR

The second oscillator V2B (6BL8) is crystal-controlled. The Fine Tuning control permits fine tuning of the receiver and has a total range of about 2.5KHz. A normally functioning oscillator will develop approximately -1.5 to -8 volts at pin 9 of V2B. Differences in individual crystal activity will cause a variation in grid voltage for crystal to crystal.

## **LOCAL OSCILLATOR**

The master local oscillator, V7B, is crystal-controlled and is used during both transmit and receive. A normally functioning oscillator will develop approximately  $-4.5$  volts at pin 9 of V7B (see voltage charge). Differences in individual crystal activity will cause a variation in the voltage measured at this point.

A local oscillator is tuned as follows: adjust the bottom core of L7 for maximum negative reading at pin 9 of V7B with the channel selector switch set to channel 23, then back off from peak in a clockwise direction to about 70% of the maximum reading. Check all channels for activity. A defective crystal will produce zero voltage at pin 9 in four consecutive channels.

After this adjustment has been made, check transmitter output frequency to make sure it is within FCC specification on all channels. Readjust L7 if necessary.

## **SYNTHESIZER, 2nd LOCAL OSCILLATOR**

The synthesizer (V11B) is used during both transmit and receive. A normally functioning oscillator will develop approximately  $-0.3$  volts at V7A pin 2 (see voltage chart), depending upon crystal activity. The output from V7A and the output from V7B produce a 38 MHz output in the plate circuit of V11B, T9 being tuned to this frequency.

## **RF ADJUSTMENTS**

When it has been ascertained that all oscillators are functioning normally, connect the signal generator (modulated 30% at 1KHz) to the antenna connector. Use RG58/U or equivalent 52 ohm cable. Set generator output to approximately  $10 \mu\text{V}$ , and switch receiver to channel 13. Tune the generator around 27.115 MHz until a signal is heard in the receiver. Adjust the generator output frequency for maximum output voltage reading on the VTVM (at speaker terminals). Adjust the top and bottom tuning cores of T1 for maximum output.

## **"S" METER ADJUSTMENT**

After receiver alignment has been completed, adjust VR1 for a "S-9" reading on the "S" meter with  $100 \mu\text{V}$  at the antenna input and transceiver set to channel 13..

# TRANSMITTER ALIGNMENT

The detailed operation and alignment of the local oscillator and synthesizer has been covered previously. Both oscillators are used for the transmit operation.

In the receive mode, B+ is removed from V8 and V9 and a large bias is applied to the grid of the RF power output tube V10. In the transmit mode, B+ is removed from V1, V2, V3 and V4 in the receiver and applied to V8 and V9 in the transmitter. The bias formerly applied to V10 is removed.

**NOTE:** Connect a 50 OHM dummy load to antenna connector before proceeding (use two 100 ohm 2 watt resistors in parallel).

Connect VTVM (with AC probe) to pin 1 of V9. With mike button pressed, adjust T10 for maximum reading on channel 13. A reading of approximately 1.4 volts is normal. Failure to obtain any reading may indicate trouble in the 11.275 MHz converter stage. If the receiver is normal, it is likely that the trouble lies beyond T9, in which case V8 or the 11.275 MHz crystal should be suspected. After this adjustment has been made, check transmitter output frequency to make sure it is within FCC specification on all channels. Readjust L6 if necessary.

Connect VTVM (with series resistor) to pin 2 of V10. Adjust L5 for maximum reading on channel 13. A reading of approximately -15 volts is normal. At this point, check all channels with an RF wattmeter connected to the antenna connector. Make sure that there is approximately equal power output on all channels. If output is low on some channels, slightly re-adjust L5 for equal reading on all channels.

## MAXIMUM RF OUTPUT

CV5 (Load) and CV4 (Plate) should now be adjusted for maximum power output on the RF wattmeter. Adjustment of CV4 and CV5 affects the power input to the final amplifier. Remember, maximum RF input power has been set at 5 watts by the FCC. Power input may be determined as follows: Check the voltage across resistor R79 (1K, 2W) - it should not exceed 19 volts. This figure has been arrived at on the basis of an average of 223 volts on the plate with 19 mA plate current -  $223 \times 0.019 = 4.24$  watts.

If the voltage measured across R79 is higher than 19 volts, set CV5 fully clockwise and then peak CV4 for maximum. Now adjust CV5 clockwise until reading of 19 volts is measured across R79.

## MODULATION ADJUSTMENT

Connect a modulation monitor to the transceiver. Connect the shield lead of an audio generator to a ground point on the transceiver. Connect the "hot" center lead of the generator in series with a .05 mfd condenser to pin 1 of the microphone jack. Set generator frequency to 1KHz. and adjust same to 40 mv. output. Adjust VR4 to produce 80% modulation. To recheck the adjustment of VR4, adjust the generator output (5mv) so that the modulation monitor indicates 50%.

**NOTE:** Following the above steps will produce 100% modulation on speech. In no case shall modulation exceed 100%.

## CRYSTAL FREQUENCY CHART

The following chart indicates which two crystal frequencies are used for each of the 23 channels:

	23.290 MHz	23.340 MHz	23.390 MHz	23.440 MHz	23.490 MHz	23.540 MHz
14.950 MHz	1	5	9	13	17	21
14.960 MHz	2	6	10	14	18	22
14.970 MHz	3	7	11	15	19	
14.990 MHz	4	8	12	16	20	23

## TV INTERFERENCE TRAP

This transceiver contains a built-in adjustable network in series with the antenna. When tuned correctly, it suppresses television interference. This network is a filter which offers little opposition to the transmitter frequency but will help eliminate the second harmonic radiation.

Turn on a TV receiver that you can see from your transmitting location, and tune to one of the three lower TV channels that has a station-operating in your vicinity. If you notice a "cross-hatch" or "wavy line" pattern on the screen while you are transmitting, it will be necessary to adjust the RF network coil slug screw (L1) in rear of cabinet, to eliminate or minimize this interference. This will usually only be necessary when the transmitter antenna is located near the TV antenna, or that of a neighbor.

## **SERVICE**

In the event that your Kris 23+ requires service — either in or out of warranty — we suggest that you return it to the dealer from which it was purchased.

In the event that you return it directly to Kris, Inc., pack the unit in its original carton. If the original carton is not available, make certain that you use a sturdy carton with sufficient shredded paper or other packing material to prevent shipping damage.

Include a letter with the unit indicating what is wrong with the transceiver. **DO NOT SHIP BY PARCEL POST.** Use Railway Express. **SHIP PREPAID.** Mark the carton "FRAGILE"; and clearly address the carton as follows:

Service Department  
Kris, Inc.  
Cedarburg, Wisconsin 53012

# VOLTAGE CHART

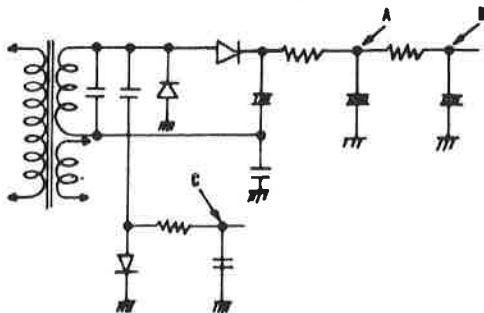
1. All readings taken with VTVM from chassis (negative) to point indicated.
2. Input to transceiver set at 117 volts AC. Similar readings are obtained with 12.6 volts DC input.
3. Transceiver set to channel 13.
4. PA switch in CB position, VOLUME and SQUELCH at minimum (counter-clockwise), FINE TUNING in center (normal) position.
5. 50 ohm dummy load connected to antenna connector.
6. Readings on individual units may vary by as much as  $\pm 20\%$

NDV = No detectable voltage. NC = No connection. NM = Not measurable.

## TUBE VOLTAGES

TUBE	MODE	PIN NUMBERS									
		1	2	3	4	5	6	7	8	9	
6BL8 V1	TR REC	100	NDV	90	H	H	240	0.8	3.5	NDV	
6BL8 V2	TR REC	30	NDV	125	H	H	115	2.3	0	-5 *	
6BA6 V3	TR REC	NDV	0	H	H	230	78	0.9			
6BA6 V4	TR REC	NDV	0	H	H	230	65	0.9			
12AX7 V5	TR REC	90 90	NDV NDV	0.9	H H	H H	90 85	NDV NDV	0.7 0.65	NC NC	
6BQ5 V6	TR REC	NC NC	NDV NDV	4.7 5.3	H H	H H	NC NC	250 270	NC NC	200 215	
6GH8 V7	TR REC	65 70	-0.3* -0.3*	65 70	H H	H H	100 115	0.06 0.06	0 0	-4.5* -5.0*	
6GH8 V8	TR REC	100	-0.4*	110	H	H	180	2.0	0	-1.7*	
6BA6 V9	TR REC	NDV	0	H	H	210	80	1.8			
6BQ5 V10	TR REC	NC	-15 *	2.0	H	H	NC	NM	NC	223	
12AT7 V11	TR R C	100 110	NDV NDV	0 0	H H	H H	100 110	NDV NDV	0 0		

\* Measured with 1 megohm resistor in series with DC probe. Reading may vary at grid pins, depending on crystal activity.



Point	TR	REC
A	255 V	269 V
B	197 V	218 V
C	-94 V	-117 V



