

# TIGER

TIGER 80

80-CHANNEL

Solid State Citizens Band  
SSB/AM Two-Way Radio



TIGER 80/SSB. (COBRA).  
UNIDEN CORPORATION, JAPAN



# Section I

## Introduction

### FREQUENCY RANGE

The TIGER 80 transceiver represents the most advanced SSB/AM two-way radios ever designed for use as Class D stations in the Citizens Radio Service. Your unit features advanced Phase Lock Loop (PLL) circuitry which is used in the AM mode and in the upper and lower single sideband modes, providing complete coverage of all 80 channels shown below.

LOW BAND		HIGH BAND	
Channel	Channel Frequency in MHz	Channel	Channel Frequency in MHz
1	26.965	1	27.415
2	26.975	2	27.425
3	26.985	3	27.435
4	27.005	4	27.455
5	27.015	5	27.465
6	27.025	6	26.475
7	27.035	7	27.485
8	27.055	8	27.505
9	27.065	9	27.515
10	27.075	10	27.525
11	27.085	11	27.535
12	27.105	12	27.555
13	27.115	13	27.565
14	27.125	14	27.575
15	27.135	15	27.585
16	27.155	16	27.605
17	27.165	17	27.615
18	27.175	18	27.625
19	27.185	19	27.635
20	27.205	20	27.655
21	27.215	21	27.665
22	27.225	22	27.675
23	27.255	23	27.705
24	27.235	24	27.685
25	27.245	25	27.695
26	27.265	26	27.715
27	27.275	27	27.725
28	27.285	28	27.735
29	27.295	29	27.745
30	27.305	30	27.755
31	27.315	31	27.765
32	27.325	32	27.775
33	27.335	33	27.785
34	27.345	34	27.795
35	27.355	35	27.805
36	27.365	36	27.815
37	27.375	37	27.825
38	27.385	38	27.835
39	27.395	39	27.845
40	27.405	40	27.855

The TIGER 80 has a vastly superior receiver which includes RF gain control, Automatic Noise Limiting, and Noise Blanking circuitry which is effective in both AM and SSB modes. The receiver also features increased protection against cross modulation, intermodulation and strong adjacent channel signals.

To obtain maximum performance from your transceiver, please carefully read the following descriptions and operating instructions.

# Section II

## Specifications

### GENERAL

Channels	80AM, 80LSB, 80USB.
Frequency Control	Phase Lock Loop (PLL) synthesizer.
Frequency Tolerance	0.005%.
Frequency Stability	0.001%.
Operating Temperature Range	-30°C to +50°C.
Microphone	Plug-in type; dynamic with push-to-talk switch and coiled cord.
Input Voltage	13.8 VDC nominal 15.9V max., 11.7V min. (positive or negative ground).
Current Drain	Transmit: AM and SSB, 3A maximum. Receive: Squelched, 500 mA; maximum audio output, 1A.
Size	2-9/32" H x 7-9/32" W x 9-5/64" D.
Weight	4.5 pounds.
Antenna Connector	UHF, SO239.
Semiconductors	41 transistors, 1 field effect transistor, 6 integrated circuits, 49 diodes and 2 light emitting diodes.
Meter	Illuminated; indicates relative power output and received signal strength.

## TRANSMITTER

Power Output	AM, 4 watts. SSB, 12 watts, PEP.
Modulation	AM, high-and low-level Class B.
Intermodulation Distortion	SSB:3rd and 5th order, more than -25dB. 7th and 9th order, more than -35dB.
SSB Carrier Suppression	More than-40dB.
Unwanted Sideband	More than-40dB.
Frequency Response	AM and SSB: 300 to 2500Hz.
Output Impedance	50 ohms, unbalanced.
SSB Filter	7.8 MHz. crystal lattice type:
Output Indicators	Meter shows relative RF output power: transmit LED shows red when transmitter is in operation. Receive LED shows green when receiver is in operation.

## RECEIVER

Sensitivity	SSB: Less than $5\mu$ V for 10dB (S+N)/N at greater than $\frac{1}{2}$ -watt of audio output. AM: Less than $1\mu$ V for 10dB (S+N)/N at greater than $\frac{1}{2}$ -watt of audio output.
Selectivity	SSB and AM:6dB @42KHz, 60dB@ 7.0KHz.
Image Rejection	More than 65dB.
IF Frequency	AM and SSB: 7.8 MHz.
Adjacent Channel Rejection	AM:-60dB, SSB:-65dB.
AM and SSB RF Gain Control	Adjustable for optimum signal reception.

Automatic Gain Control	(AGC) Less than 10dB change in audio output for inputs from 10 to 100,000 microvolts.
Squelch	Adjustable; threshold less than 0.5 $\mu$ V
Noise Blanker	RF type, effective on AM and SSB.
Clarifier Range	$\pm$ 1000 Hz.
Audio Output Power	4.5 watts into 4 ohms
Frequency Response	300 to 2000 Hz.
Distortion	Less than 10% at 2.5 watts output.
Built-in Speaker	8 ohms, round.
External Speaker (Not Supplied)	4-8 ohms; disables internal speaker when connected.

# Section III

## Installation

### LOCATION

Plan the location of the transceiver and microphone bracket before starting the installation. Select a location that is convenient for operation and does not interfere with the driver or passengers in the vehicle. In automobiles, the transceiver is usually mounted below the dash panel, with the microphone bracket beside it.

### MOUNTING AND CONNECTION

The TIGER 80 is supplied with a universal mounting bracket. When mounting the bracket and radio to your car, make sure it is mechanically strong. Also provide a good electrical connection to the chassis of the vehicle. Proceed as follows to mount the transceiver:

1. After you have determined the most convenient location in your vehicle, hold the TIGER 80 with mounting bracket in the exact location desired. If nothing will interfere with mounting it in the desired position, remove the mounting bracket and use it as a template to mark the location for the mounting bolts. Before drilling the holes, make sure nothing will interfere with the installation of the mounting bolts.
2. Connect the antenna cable plug to the standard receptacle on the rear panel. Most CB antennas are terminated with a type PL-259 plug and mate with the receptacle.
3. Connect the red DC power input wire (with the fuse) to +13.8 VDC. This wire extends from the rear panel. In automobile installation, +13.8 VDC is usually obtained from the accessory contact on the ignition switch. This prevents the set being left on accidentally when the driver leaves the car and also permits operating the unit without the engine running. Locate the accessory contact on most ignition switches by tracing the power wire from the AM broadcast receiver in the car.

4. Connect the black lead to 13.8 VDC. This is usually the chassis of the car. Any convenient location with good electrical contact (remove paint) may be used.
5. Mount the microphone bracket on the right side of the transceiver or near the transceiver, using two screws supplied. When mounting in an automobile, place the bracket under the dash so the microphone is readily accessible.

## IGNITION NOISE INTERFERENCE

Use of a mobile receiver at low signal levels is normally limited by the presence of electrical noise. The primary source of noise in automobile installations is from the generator and ignition system in the vehicle. Under most operating conditions, when signal level is adequate, the background noise does not present a serious problem. Also, when extremely low level signals are being received, the transceiver may be operated with vehicle engine turned off. The unit requires very little current and therefore will not significantly discharge the vehicle battery.

Even though the TIGER 80 has effective ANL and NB<sub>c</sub> circuitry, in some installations ignition interference may be high enough to make good communications impossible. The electrical noise may come from several sources. Many possibilities exist and variations between vehicles require different solutions to reduce the noise.

## ANTENNA

Since the maximum allowable power output of the transmitter is limited by the FCC, the antenna is one important factor affecting transmission distance. Only a properly matched antenna system will allow maximum power transfer from the 50 ohm transmission line to the radiating element. In mobile installations (cars, trucks, boats, etc.) an antenna system that is non-directional should be used.

A vertically polarized, quarter-wavelength whip antenna provides the most reliable operation and greatest range. Shorter, loaded-type whip antennas are more attractive, compact and adequate for applications where the maximum possible distance is not required. Also, the loaded whips do not present the problems of height imposed by a full quarter-wavelength whip.

Mobile whip antennas utilize the metal body of the vehicle as a ground plane. When mounted at a corner of the vehicle they are slightly directional, in the direction of the body of the vehicle. For all practical purposes, however, the radiation pattern is nondirectional. The slight directional characteristic will be observed only at extreme distances. A standard antenna connector (type 50 239) is provided on the transceiver for easy connection to a standard PL 259 cable termination.

If the transceiver is not mounted on a metal surface, it is necessary to run a separate ground wire from the unit to a good metal electrical ground in the vehicle. When installed in a boat, the transceiver will not operate at maximum efficiency without a ground plate, unless the vessel has a steel hull.

Before installing the transceiver in a boat, consult your dealer for information regarding an adequate grounding system and prevention of electrolysis between fittings in the hull and water.

## TUNING THE ANTENNA FOR OPTIMUM SWR

Since there is such a wide variety of base and mobile antennas, this section will strictly concern itself to the various types of mobile adjustable antennas.

Because the antenna length is directly related to the channel frequency, it must be tuned to resonate optimally all 80 channels of the transceiver. Channel 1 requires a longer antenna than Channel 80 because it is lower in frequency.

Due to the various methods of adjusting antennas for proper SWR we have chosen what we think is the optimum method:

### A. Antennas with adjustment screws (set screws).

1. Start with the antenna extended and tighten the set screw lightly enough so that the antenna can be lightly tapped with your finger for easy adjustment.
2. Set your TIGER 80 to Channel 40. Press the PTT (push-to-talk) switch, and tap the antenna (making it shorter). The SWR meter will show a lower reading each time the antenna is tapped. By continuing to shorten the antenna you will notice the SWR reading will reach a low point and then start rising again. This means that you have passed the optimum point for Channel 40. Extend the antenna a short distance and again follow the procedure above.

When the lowest point has been reached, switch to Channel 1 and then to Channel 80 and compare SWR readings. They should be almost equal.

**B. Antennas which must be cut to proper length.**

1. Follow the same procedure as above, but adjust the length by cutting in 1/8" increments until a good match is obtained.

Be very careful not to cut too much at one time, as once it is cut, it can no longer be lengthed.

The whip is easily cut by filing a notch all the way around and breaking the piece off with pliers.

**NOTE**

THE PROPER SETTING IS ACHIEVED WHEN THE SWR IS 1.5 OR BELOW, AND WHEN IT HAS THE SAME READING FOR CHANNELS 1 AND 80.

If you are having difficulties in adjusting your antenna, check the following:

- A. All doors must be closed when adjusting the antenna.
- B. Make sure the antenna base is grounded.
- C. Check your coaxial cable routing (it may be pinched when routed into the car).
- D. Try a different location on your car (keeping in mind the radiation pattern you wish).
- E. Is the antenna perfectly vertical?
- F. Try a different location in your neighborhood. Stay away from large metal objects when adjusting (metal telephone or light posts, fences, etc.)

**NOTE**

THE TIGER 80 will operate into an SWR of 2 to 1 indefinitely and sustain open or short-circuit conditions a maximum of 5 seconds at rated operating conditions.

**NOTE**

DO not attempt to operate this transceiver by connecting directly to 120 volts AC.

When the Power Pak is used with the transceiver for base station operation, any Citizens Band beam, dipole, ground plane or vertical antenna may be used. A ground plane vertical antenna will provide the most uniform horizontal coverage.

## **PUBLIC ADDRESS**

An external 4 ohm 4 watt or 8 ohm 3 watt speaker may be connected to the PA speaker jack located on the rear panel when the transceiver is used as a public address system. The speaker should be directed away from the microphone to prevent acoustic feed-back. Physical separation or isolation of the microphone and speaker must be used when operating the PA at high output levels.

# Section IV

## Operation

### CONTROLS AND INDICATORS

There are 8 controls and 3 indicators on the front panel of your TIGER 80.



#### A. CONTROL FUNCTIONS

- 1. OFF/ON VOLUME.** Turn clockwise to apply power to the unit and to set the desired listening level.
- 2. SQUELCH.** This control is used to cut off or eliminate receiver background noise in the absence of an incoming signal. For maximum receiver sensitivity it is desired that the control be adjusted only to the point where the receiver background noise or ambient background noise is eliminated. Turn fully counterclockwise then slowly clockwise until the receiver noise disappears. Any signal to be received must now be slightly stronger than the average received noise. Further clockwise rotation will increase the threshold level which a signal must overcome in order to be heard. Only strong signals will be heard at a maximum clockwise setting.
- 3. RF GAIN.** Adjust as required to optimize signal. This control is functional in both AM and SSB modes and is used primarily to optimize reception in strong signal areas. Gain is reduced by counterclockwise rotation of the control.
- 4. CLARIFIER** Allows variation of the receiver operating frequencies above and below the assigned frequency. Although this control is intended primarily to tune in SSB signals it may be used to optimize AM signals.

5. **MODE SWITCH(AM/USB/LSB SWITCH).** This switch selects AM(Amplitude Modulation), USB (Upper Side Band) or LSB (Lower Side Band) mode of operation. The Mode selector switch changes the mode of operation of both the transmitter and receiver simultaneously.
6. **CHANNEL SELECTOR.** This switch selects any one of forty Citizens Band channels desired. The selected channel appears on the LED readout.
7. **OFF/ANL/NB+ANL SWITCH.** In the ANL position only the automatic noise limiter in the audio circuits is activated. When the switch is placed in the NB+ANL position, the RF noise blanker also is activated. The RF noise blanker is very effective for repetitive impulse noise such as ignition interference.
8. **HI/LOW CH SWITCH** Selects the operating frequency. In the LOW-CH position, you can operate ordinary 40-CH frequency. In the HI-CH position, you can operate upper 40-CH frequency.

**9. PRESS-TO-TALK MICROPHONE.** The receiver and transmitter are controlled by the press-to-talk switch on the microphone. Press the switch and the transmitter is activated, release switch to receive. When transmitting, hold the microphone two inches from the mouth and speak clearly in a normal "voice". The radios come complete with a low-impedance 500-ohm dynamic microphone. For installation instructions on other microphones, See "ALTERNATE MICROPHONES AND INSTALLATION."

## **B. INDICATOR FUNCTIONS**

- 1. S-METER.** Swings proportionally to the strength of the incoming signal.
- 2. RF METER.** Swings proportionally to the RF output power.
- 3. RECEIVE/TRANSMIT INDICATOR.** The receive/transmit LED indicator is located next to the channel selector switch. When in receive, the LED will be green. When in transmit the LED will be red.
- 4. CHANNEL INDICATOR.** The selected channel appears on the LED readout.

## OPERATING PROCEDURE TO RECEIVE

1. Be sure that power source and antenna are connected to the proper connections before going to the next step.
2. Turn unit on by Tuning VOLUME control clockwise
3. Set the VOLUME for a comfortable listening level.
4. Set the MODE switch to the desired mode.
5. Listen to the background noise from the speaker. Turn the SQUELCH control slowly clockwise until the noise JUST disappears (no signal should be present). Leave the control at this setting. The SQUELCH is now properly adjusted. The receiver will remain quiet until a signal is actually received. Do not advance the control too far, or some of the weaker signals will not be heard.
6. Set the CHANNEL selector switch to the desired channel.
7. Set the RF gain control fully clockwise for maximum RF gain.
8. Adjust the CLARIFIER control to clarify the SSB signals or to optimize AM signals.

## OPERATING PROCEDURE TO TRANSMIT

1. Select the desired channel.
2. If the channel is clear, depress the push-to-talk switch on the microphone and speak in a normal voice.

### CAUTION

Be sure the antenna is properly connected to the unit before transmitting. Prolonged transmitting without an antenna or with a poorly matched antenna (high SWR, over 3) can cause damage to the transmitter.

## RECEIVING SSB SIGNALS

There are three types of signals presently used for communications in the Citizens Band: AM, USB, and LSB. When the MODE switch on your unit is placed in the AM position, only standard double-sideband, full carrier signals will be detected. An SSB signal may be recognized while in the AM mode by its characteristic "Donald Duck" sound and the inability of the AM detector to produce an intelligible output. The USB and LSB modes will detect upper sideband and lower sideband respectively, and standard AM signals.

SSB reception differs from standard AM reception in that the SSB receiver does not require a carrier or opposite sideband to produce an intelligible signal. A single-sideband transmitted signal consists only of the upper or the lower sideband and no carrier is transmitted. The elimination of the carrier from the AM signal helps to eliminate the biggest cause of whistles and tones heard on channels which make even moderately strong AM signals unreadable. Also, SSB takes only half of an AM channel, therefore two SSB conversations will fit into each channel, expanding the 80 channels to 160 channels. The reduction in channel space required also helps in the receiver because only half of the noise and interference can be received with 100% of the SSB signal.

An SSB signal may be received only when the listening receiver is functioning in the same mode. In other words, an upper sideband signal (USB) may be made intelligible only if the receiver is functioning in the USB position.

If a lower sideband (LSB) signal is heard when the receiver is in the USB mode, no amount of tuning will make the signal intelligible. The reason for this may be understood if you consider that when modulation is applied to the transmitter's microphone in the USB mode, the transmitter's output frequency is increased whereas in the LSB mode the transmitter's output frequency is decreased. The result in listening to the receiver is that when the MODE switch is in the proper position (either USB or LSB), a true reproduction of single tone of modulation will result, and if the tone is increased in frequency (such as a low-pitched whistle to a high-pitched whistle) you will hear the increase in the output tone of the receiver. If the incorrect mode is selected, an increase in tone of a whistle applied to the transmitter will cause a decrease in the resultant tone from the receiver.

Thus when a voice is used in place of a whistle or tone, in the proper listening mode the voice will be received correctly whereas in the incorrect mode, the voice will be translated backwards and cannot be made intelligible by

the voice lock control. When listening to an AM transmission, a correct sideband is heard in either mode since both upper and lower sideband are received.

Once the desired SSB mode has been selected, frequency adjustment may be necessary in order to make the incoming signal intelligible. the CLARIFIER control allows the operator to vary frequency above and below the exact-center frequency of the received signal. If the sound of the incoming signal is high or low pitched, adjust the operation of the CLARIFIER. Consider it as performing the same function as a phonograph speed control. When the speed is set too high, voices will be high-pitched and if set too low, voices will be low-pitched. Also, there is only one correct speed that will make a particular record produce the same sound that was recorded. If the record is played on a turntable that rotates in the wrong direction (opposite sideband) no amount of speed control CLARIFIER will produce an intelligible sound.

An AM signal received while listening in one of the SSB modes will produce a steady tone (carrier) in addition to the intelligence, unless the SSB receiver is tuned to exactly the same frequency by the CLARIFIER control. For simplicity it is recommended that the AM modes be used to listen to AM signals.

# Section VI

## Appendix

Citizens Band radio operators have largely adopted the "10-code" for standard questions and answers. Its use permits faster communications and better understanding in noisy areas. The following table lists some of the more common codes and their meanings.

### 10 CODE

Code	Meaning	Code	Meaning
10-1	Receiving poorly	10-29	Time is up for contact
10-2	Receiving well	10-30	Does not conform to FCC rules
10-3	Stop transmitting	10-32	I will give you a radio check
10-4	OK, message received	10-33	EMERGENCY TRAFFIC
10-5	Relay message	10-34	Trouble at this station
10-6	Busy, stand by	10-35	Confidential information
10-7	Out of service, leaving air	10-36	Correct time is
10-8	In service, subject to call	10-37	Wrencher needed at
10-9	Repeat message	10-38	Ambulance needed at
10-10	Transmission completed, standing by	10-39	Your message delivered
10-11	Talking too rapidly	10-41	Please turn to channel
10-12	Visitors present	10-42	Traffic accident at
10-13	Advise Weather/Road conditions	10-43	Traffic Tie up at
10-16	Make pick up at	10-44	I have a message for you
10-17	Urgent business	10-45	All units within range please report
10-18	Anything for us?	10-50	Break channel
10-19	Nothing for you, return to base	10-60	What is next message number?
10-20	My location is ii	10-62	Unable to copy, use phone
10-21	Call by telephone	10-63	Net directed to
10-22	Report in person to	10-64	Not clear
10-23	Stand by	10-65	Awaiting your next message/assignment
10-24	Completed last assignment	10-67	All units comply
10-25	Can you contact	10-70	Fire at
10-26	Discard last information		
10-27	I am moving to channel		
10-28	Identify your station		

## 10 CODE (Continued)

Code	Meaning	Code	Meaning
10-71	Proceed with transmission in sequence	10-91	Talk closer to mike
10-77	Negative contact	10-93	Check my frequency on this channel
10-81	Reserve hotel room for	10-94	Please give me a long count
10-82	Reserve room for	10-99	Mission completed, all units secure
10-84	My telephone number is		
10-85	My address is	10-200	Police needed at

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