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PEARCE-SIMPSON

DIVISION OF **GLADDING** CORP.



BENGAL SSB

SECTION 1

GENERAL INFORMATION

DESCRIPTION

Your new PEARCE-SIMPSON PANTHER SSB is a compact, all-transistorized, 23 channel Citizens Band SSB/AM Transceiver. This radio is ideally suited for base and or mobile operation from 115 VAC or 12.6 VDC power source, either negative or positive. A 12 VDC power cord, a 117 VAC power cord and a mounting cradle are included with your PANTHER SSB. To provide the crystal-controlled, 23-channel operation, PEARCE-SIMPSON utilizes an all-transistor HetroSync™ circuit.

The receiver is a sensitive superheterodyne circuit featuring: Dual conversion, low noise RF stage, slide-o-tune, adjustable squelch, noise blanker, external speaker jack, and instantaneous selection of any of the 23 crystal controlled channels.

The transmitter section is designed around highly reliable silicon transistors and the HetroSync™ circuit. This circuit makes use of the output of three crystal-controlled oscillators which are beat together to produce the desired frequency. The transmitter final is a conservatively rated high gain RF power transistor.

Both transmitter and receiver work on upper sideband and lower sideband.

SPECIFICATIONS

GENERAL :

Channels	: 23 Channels, Crystal-Controlled AM, Upper Side Band and Lower Side Band
Frequency Range	: 26.965 MHz. to 27.255 MHz.
Frequency Control	: Synthesizer
Frequency Tolerance	: 0.025%
Frequency Stability	: 0.001%
Operating Temperature Range	: -20°C to +50°C
Primary Power	: Input Voltage— 13.8 VDC (EIA Standard) /117 VAC
Antenna	: 52-ohm Coaxial
Size	: 12-7/8" W × 5" H × 9-13/16" D
Weight	: 10 pounds

RECEIVER :

Sensitivity	: S.S.B.- Less than 0.3μV for 10db S + N/N A.M.- Less than 0.8μV for 10db S + N/N
Selectivity	: S.S.B.- 6db at 2.0 KHz., 60db at 5.5 KHz. A.M.- 6db at 10KHz., 50db at 20 KHz.
Spurious Rejection	: 50db minimum

Squelch Range : S.S.B.- Adjustable from 0.5 μ V to 1,000 μ V
 A.M.- Adjustable from 0.5 μ V to 1,000 μ V
 1st I.F. Frequency : S.S.B.- 7.8 MHz.
 A.M.- 7.8 MHz.
 2nd I.F. Frequency : A.M.- 455 KHz.
 Noise Blanker : Series gate type (uses F.E.T.)
 Slide-O-Tune Range : \pm 600 Hz.
 Audio Output Power : 3.5W

TRANSMITTER :

Power : S.S.B.- 15 watts, p.e.p.
 A.M.- 3.5 watts
 Modulation Capability : A.M.- 100%
 Spurious Harmonic Suppression : 50db minimum
 Carrier Suppression : S.S.B.- -40 db
 Unwanted Side Band : -40db
 Frequency Response : S.S.B.- 350 Hz. to 2,500 Hz.
 A.M.- 250 Hz. to 2,000 Hz.
 Output Impedance : 50 ohms (unbalanced)
 S.S.B. Filter : 7.8 MHz, Crystal lattice type, 6db
 at 2.1 KHz., 60db at 5.5 KHz.
 Automatic Load Control : Holds p.e.p. to 1 db increase w/ 10db
 (in case of Input)

DO NOT TRANSMIT WITH YOUR EQUIPMENT UNTIL YOU HAVE RECEIVED YOUR LICENSE FROM THE FCC. Illegal operation can result in severe penalties. Be sure that you have read and understand Part 95 of the FCC Rules and Regulations before operating your station.

FREQUENCIES AVAILABLE FOR CLASS D OPERATION

Channel	mc/s	Channel	mc/s	Channel	mc/s
1	26.965	9	27.065*	17	27.165
2	26.975	10	27.075*	18	27.175
3	26.985	11	27.085*	19	27.185
4	27.005	12	27.105*	20	27.205
5	27.015	13	27.115*	21	27.215
6	27.025	14	27.125*	22	27.225
7	27.035	15	27.135	23	27.255*
8	27.055	16	27.155		

*Channels available for communications between units of different stations.
 (In accordance with FCC Part 95 .41 (d) (2))

SECTION 2

INSTALLATION & INITIAL ADJUSTMENT

IMPORTANT

BEFORE DISCARDING ANY OF THE PACKING MATERIALS, EXAMINE THEM CAREFULLY FOR ITEMS YOU MAY HAVE OVERLOOKED.

INSTALLING FIXED STATION

For fixed station operation, plug the AC power cable into the back of the unit. Connect the antenna to the terminal on the back of the unit.

MOBILE STATION INSTALLATION

For mobile installation, the mounting cradle serves as a means of mounting your BENGAL SSB in any position and attitude which will be convenient to the user. After you have determined the most convenient location in your vehicle, hold the BENGAL SSB mounted in the cradle, in the exact location desired. If nothing will interfere with mounting it in the desired position, remove the cradle from the BENGAL SSB 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 installing of the mounting bolts.

POWER CONNECTION

The BENGAL SSB is constructed to be used in vehicles using both negative and positive grounds. The red power lead is to be connected to the positive terminal of the battery. The black lead is to be connected to ground. If the existing wiring is used, be sure that it is heavy enough to prevent voltage drop to the radio. A good source of positive battery voltage is at the accessory connection on the ignition switch. Using this as a power source insures the radio will be off when the ignition switch is turned "OFF", and power will be supplied to the radio when it is in the "ON" or "ACCESSORY" position.

ANTENNAS

BASE STATION

The directional beam type of antenna, used within its limitations, is the most effective type to deliver the stronger signals in a particular direction. Gain in one direction is achieved by concentrating the radiated energy into a beam much as the reflector in a flashlight in all other directions. This effect is also true when the antenna is used for receiving, resulting in reducing the signal strength of stations from other directions which might interfere with communications. This type of antenna is very desirable for communications with stations in a particular area. By the addition of rotator, you will be able to beam your signals in any direction.

NOTE : The reference of antenna efficiency is a standard dipole antenna. For example, a beam antenna listed as having 6 db gain means that it has 6 db of gain over a dipole (in the direction it is pointed). Each 3 db of gain is equal to doubling the power, therefore, 6 db would equal 4 times the power. A transmitter with 3 watts output would produce as strong a signal, with 6 db gain beam, as would a 12 watt transmitter feeding a dipole. Besides the gain achieved by the beaming of the signal, additional efficiency is obtained from the added, tuned elements.

When 360-degree coverage is needed for communicating with several stations in different directions, the ground plane type of antenna is very effective. This type affords excellent coverage for communicating with mobile stations which are constantly moving from one area to another.

A modification of this antenna is the colinear ground plane which is actually a form of a beam. This beaming effects of the antenna are in a vertical direction concentrating the energy nearer the ground and reducing the sky wave which would otherwise be lost.

For a base station, the whip antenna is the least desirable type and should be used only for very short range or when no other antenna can be installed in the space available. If it is necessary that the antenna be installed on, or adjacent to the equipment, a "V" or rabbit ear type is much more desirable.

POLARIZATION

For the most efficient communications, the antennas at each station should be mounted in the same plane, i.e. both should be vertical or both should be horizontal. Since a major use of Citizens Band Radio is communicating with mobile units which are equipped with vertically mounted whip antenna, the vertical plane is preferred.

TYPICAL AUTOMOBILE INSTALLATION

MOBILE INSTALLATION

Your BENGAL SSB has been adjusted at the factory to give optimum performance using a 52-ohm antenna. There are a number of 52-ohm antennas available for mobile citizens band use.

For an automobile installation, a whip may be used with good efficiency because the automobile acts as a counterpoise and reduces detuning effects. The mounting location also has a great effect on the efficiency.

The most efficient and practical installation is a full quarter wave whip mounted on the left rear deck of fender top midway between the rear window and bumper.

The so-called "short whip" is a less efficient antenna because the radiation area is reduced. However, full use of its capability may be achieved since a shorter antenna may be mounted in a more advantageous position on a automobile, such as in the middle of the top.

There are also newer mobile antennas on the market which are made to replace the entertainment radio antenna and are similar in appearance. These antennas serve three purposes: AM and FM entertainment broadcast reception and Citizens Band transmission and reception. With some of these antennas, it is possible to simultaneously transmit on CB and receive on AM broadcast with interaction. These antennas are quite efficient for all three types of operation when properly adjusted.

For a marine installation, the full-length quarter wave whip antenna is very efficient, however, it requires radials which make it hard to mount in small boats. Another excellent antenna is the coaxial sleeve type which requires no radial. A similar antenna is the centerloaded 1/2 wave which is about the same as the full length 1/4 wave whip and it requires no radials. Care must be used when choosing one of the shorted type antennas as considerable variation in efficiency will be found between the various makes and models. As a general rule, avoid those with short radiating elements because the greater the radiating area, the stronger the radiated signal will be.

Your PEARCE-SIMPSON dealer is prepared to offer advice and will help you choose the most desirable antenna for your needs.

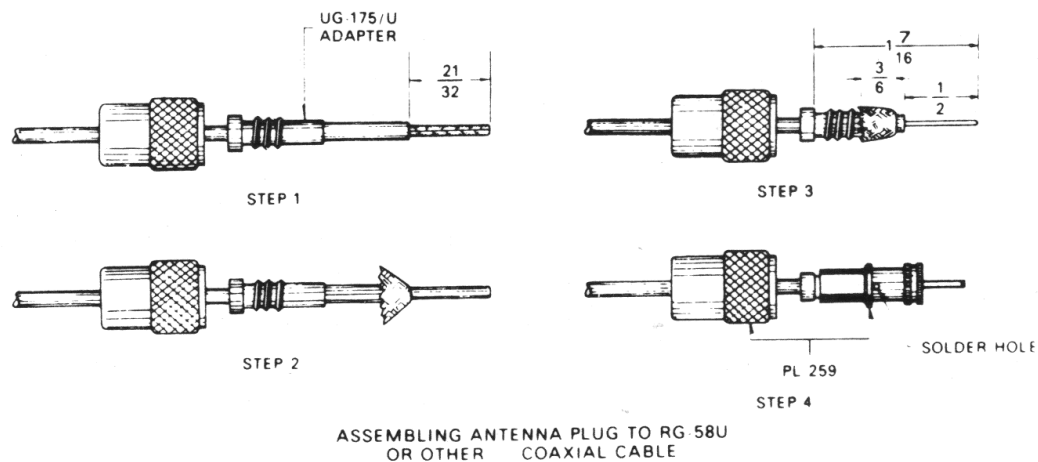


Figure 1

TRANSMISSION LINE

To connect an antenna to the transceiver, a 52-ohm coaxial transmission line is required. RG-8/U coax is recommended for length in excess of 50 feet and RG-58/U coax is recommended for length less than 50 feet to connect to the transceiver. The RG-8/U requires a PL-259 type connector and the RG-58/U coax requires a PL-259 connector with a UG-175/U adaptor. (See Figure 1 for assembling connector to RG-58/U.)

INSTALLATION ADJUSTMENTS

The output circuit of the **BENGAL SSB** transmitter has been factory adjusted to operate into any good 52-ohm antenna. No attempt should be made to tune the transmitter to the antenna. Instead, the antenna should be adjusted to present the lowest possible SWR (Standing Wave Ratio). A very low SWR means that the antenna is operating at maximum efficiency and will also mean that it is adjusted to 52 ohms. An improperly adjusted antenna causes standing waves to appear on the feed line. Since this feed line is a fixed 52 ohms, and cannot be adjusted, this mismatch appears at the transmitter. If the transmitter is adjusted to compensate for this mismatch, both it and the antenna will no longer be operating at peak efficiency. Since the transmitter has already been adjusted for 52 ohms output and the coaxial feed line has a fixed 52-ohm value, the only remaining element to be adjusted to this value is the antenna itself. When received, the antenna is probably cut as near as is possible to this value. The mounting location on the vehicle or building and surrounding objects affect the antenna however, and requires that it be adjusted to compensate for them. Many of the newer Citizens Band antennas provide means of adjusting them for lowest SWR. Instructions for doing so are included with the antenna. For such antennas as the full quarter wave length whip, it is necessary to carefully vary the length until the lowest SWR is obtained. For The built-in SWR bridge is ideal for this type of adjustment.

The **BENGAL SSB** will work into an antenna system having an SWR as high as 3:1. For best communications, you will want this figure as near 1:1 as possible so that the antenna will be operating at its best efficiency.

NOISE SUPPRESSION

The **BENGAL SSB** contains built-in automatic noise limiter on AM and noise blanker on AM and SSB, and input power filtering. In most vehicular installations, the noise suppression for the entertainment radio will be sufficient. Vehicles and boats not having this suppression may require that it be installed. In most cases, installation of distributor suppressors and generator condensers will be sufficient. In severe cases, the service of a qualified technician may be required. See your **PEARCE-SIMPSON** dealer for advice.

SECTION 3

OPERATING INSTRUCTIONS

Your BENGAL SSB operates on sixty-nine different channels. There are 23 AM channels, 23 upper sideband and 23 lower sideband. When in the AM mode, the BENGAL SSB will hear only signals being transmitted on double sideband with full carrier (AM). The unit may also receive SSB signals when on the AM mode but you will not be able to understand them. When operating in either of the SSB modes, strong AM signals may also be heard. It is recommended that you return to the AM mode if you wish to listen to these signals.

So that you will better understand the difference between AM, upper sideband and lower sideband, a simplified explanation of their characteristics is in order.

An AM signal consists of a carrier frequency and two sidebands, an upper and lower. Each sideband is an exact duplicate of the other. An AM receiver, when it detects an AM signal, filters out the carrier so that you hear only the intelligence on the sideband. If you listen to an AM signal when your receiver is in the sideband mode, the receiver will not reject the carrier frequency (unless the clarifier is tuned exactly right) and a steady tone will be heard as well as the intelligence. Therefore, for best reception of AM, your mode selector should be in the AM position.

When transmitting on single sideband, no carrier and only one sideband, either upper or lower, is being transmitted. When on AM, your receiver cannot take just this one sideband and change it into usable intelligence. You can recognize a sideband signal coming in on AM by its fluttering characteristic and its unintelligible sound. A signal transmitted on upper sideband can only be properly heard by a receiver tuned to the upper sideband. Such a signal will not be intelligible.

When listening to a sideband signal on the proper mode, it may sound either too high pitched or too low pitched. The reason for this is that your receiver may not be tuned to the exact same frequency as the transmitter it is listening to. For this reason, BENGAL SSB is equipped with a Clarifier. By turning this Clarifier, you slightly change the frequency of both your transmitter and receivers (within legal limits) so that reception will be in a normal tone.

CONTROLS AND INDICATORS

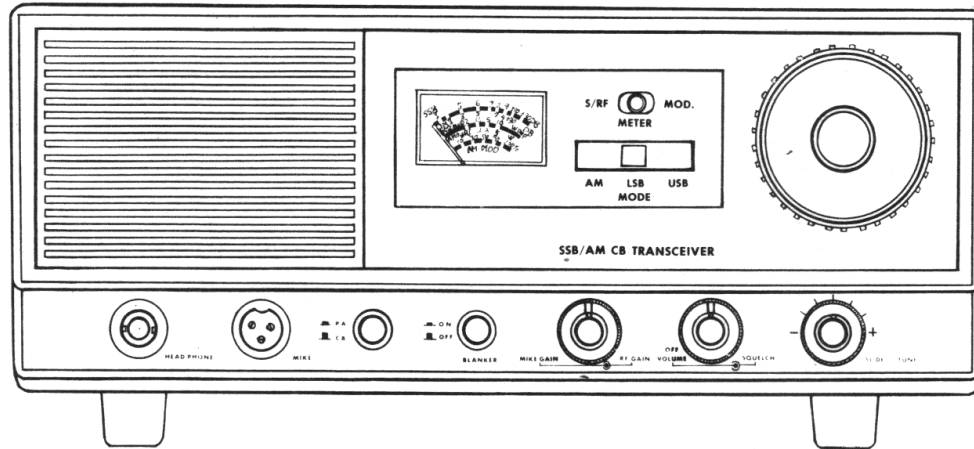


Figure 2

CHANNEL SELECTOR

The channel selector switch has 23 operating positions. This switch sets both transmit and receive frequencies simultaneously by switching the proper crystals into the PEARCE-SIMPSON HetroSync™ circuit for any of the 23 CB channels.

MODE SELECTOR

This selector enables you to select either of SSB modes (upper sideband or lower sideband) or AM. This switch changes both transmit and receive simultaneously on each mode.

VOLUME CONTROL AND ON-OFF SWITCH

This control turns the power ON and OFF, and adjust the loudness of received signal.

SQUELCH CONTROL

The squelch control is used to silence background noise (atmospheric or man-made noise) in the absence of a received radio signal. In the full counterclockwise position, the radio is un-squelched (no noise silencing at all). In the fully clockwise position, the unit is squelched for very strong signals.

RF GAIN CONTROL

This switch selects the strength of incoming signal. If too strong signal comes in, turn the control to counterclockwise. If you are listening weak signal, turn the control to clockwise.

NOISE BLANKER SWITCH

The noise blanker is desired to reduce excessive noise as electrical interference, ignition noise, etc. To operate, simply set the switch to "ON" position.

SLIDE-O-TUNE

This control allows you to vary the operating frequencies of both transmitter and receiver below and above the assigned frequency. This may be used for optimum tuning of both SSB and AM signals.

MIKE GAIN CONTROL

This control is used to vary the amount of modulation in transmit.

PA-CB SWITCH

This switch is to select the operating mode of either CB or PA.

PEARCE-SIMPSON'S EXCLUSIVE FIVE-WAY METER

This meter is exclusively designed by Pearce-Simpson to work in five different ways. Those functions are as follow:

1. S Meter: A change of one S unit indicates a change of 6 dB in signal level. The metering circuit is calibrated so that for 100 microvolts, the S meter will read S9. To operate, set the S/RF-MOD switch to "S/RF" position.
2. RF Output Meter: This shows relative RF power when transmitting. To operate, set the S/RF-MOD switch to "S/RF" position.
3. Modulation Meter: This shows relative transmitting modulation. To operate, set the S/RF-MOD switch to "MOD" position.
4. A receiver-on indicator: When the receiver is on, the meter lights up in amber color.
5. A transmitter-on indicator: When the transmitter is on, the meter lights up in red color.

SECTION 4 REPLACEMENT PARTS

SEMI CONDUCTORS

SYMBOL	DESCRIPTION	PARTS NUMBER
FET-1	2SK30-Y	Noise Amplifier for N.B.
FET-2	3SK22-Y	RF Amplifier
TR-1	2SC839H	AM 2nd Local
TR-2	2SC839H	AM Mixer
TR-3	2SC839H	AM 455 KHz. 1st Amplifier
TR-4	2SC839H	AM 455 KHz. 2nd Amplifier
TR-5	2SC839H	RX 1st Mixer
TR-6,8	2SC945R	SSB AGC Amplifier
TR-7	2SA733Q	SSB AGC Amplifier
TR-9,10	2SC945R	Squelch Amplifier
TR-11	2SC945R	AM AGC Amplifier
TR-12	2SC839H	1st Local Amplifier
TR-13	2SC839H	SSB TX/RX 7.8 MHz. Amplifier
TR-14	2SC839H	AM TX 7.8 MHz. Amplifier
TR-15	2SC839H	SSB/RX 7.8 MHz. Amplifier
TR-16	2SC945QL	1st AF Amplifier
TR-17	2SC945R	SSB AGC Amplifier & S-Meter Amplifier
TR-18	2SC839H	11 MHz. Local OSC
TR-19	2SC839H	AM/USB 7 MHz. Local OSC
TR-20	2SC839H	LSB 7 MHz. Local OSC
TR-21	2SC839H	Carrier OSC
TR-22	2SC839H	Buffer
TR-23	2SC945R	3rd Mike Amplifier
TR-24	2SC945R	2nd Mike Amplifier
TR-25	2SC1307	TX Final Amplifier
TR-26	2SC1306	TX Driver
TR-27	2SC710C	TX Pre-Driver
TR-28	2SC945R	AM RF Power Control
TR-29	2SC1096M	AM RF Power Control
TR-30,31	2SC1096M	AF Power Amplifier
TR-32	2SC735Y	AF Driver
TR-33	2SC945R	AF Pre-Amplifier
TR-34	2SC945R	1st Mike Amplifier
TR-35	2SD180M	AC Stabilizer
TR-36	2SC1096M	AC Stabilizer
TR-37	2SC945R	AC Stabilizer
I.C.	TA7045M	7.8 MHz./19 MHz. Mixer