

MIDLAND
COMMUNICATIONS COMPANY[®]

INTEGRATED
CIRCUIT

MODEL 13-885

23-Channel SSB/AM Citizens Band Transceiver

OWNER'S GUIDE



FEDERAL COMMUNICATIONS COMMISSIONS REQUIREMENTS

Your new Midland 13-885 is a combination receiver-transmitter designed and built for licensed Class D operation on any of the 23 frequencies designated as citizens band channels by the Federal Communications Commission. You are required to read and understand Part 95 of the F.C.C. rules and regulations prior to operation of this unit. Part 95 regulations are available for \$2.00 from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. You are also required to complete F.C.C. form 505 and submit it to the F.C.C. in order to receive your license to operate this unit. F.C.C. regulations will be violated if you transmit with this unit prior to receipt of your license.

NOTE

The technical information, diagrams, and charts provided in this manual are supplied for the use of a qualified holder of a first or second class radiotelephone license in servicing this transceiver. It is the users responsibility to see that this unit is operating at all times in accordance with the F.C.C. Citizens Radio Service regulations.

If you install or service your own transceiver, do not attempt to make any transmitter tuning adjustment. Transmitter adjustments are prohibited by the F.C.C. unless you hold a first or second class radiotelephone license or are in the presence of a person holding such a license. A Citizens Band or Amateur license is not sufficient.

MIDLAND COMMUNICATIONS COMPANY HEREBY
CERTIFIES THAT THIS UNIT HAS BEEN DESIGNED
AND MANUFACTURED IN ACCORDANCE WITH VOL.
6, PART 95 OF THE CURRENT FCC RULES AND
REGULATIONS AS OF THE DATE OF MANUFACTURE.

OWNERS GUIDE

Your 13-885 is a versatile, professional quality transceiver and we strongly suggest that you read this Owners Guide carefully before operation so that you may receive full benefit from its many features.

SINGLE SIDEBAND

SSB (Single Sideband) is relatively new in Citizens Band Communications but has been highly effective in commercial, amateur and military usage for many years. It is a superior means of wireless communications allowing transmissions of greater distances with a minimum amount of interference and noise.

There are two types of single sideband transmissions, USB (Upper Sideband) and LSB (Lower Sideband). These might be described as half signals and due to the narrow band width required, will travel over greater distances at lower power than ordinary AM signals. Figure 1 below illustrates USB and LSB signals and the reference carrier line.

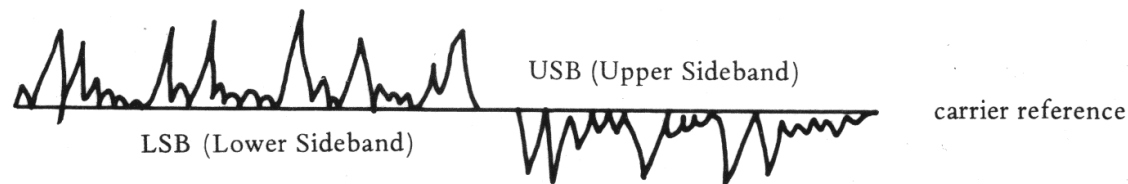
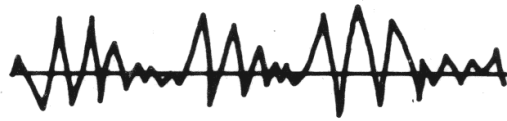


Figure 1

In the actual transmission of either USB or LSB, the carrier is removed. All of the modulation for a transmission is concentrated in either the Upper or Lower sideband. In the receiver, the carrier is reconstructed and the intelligence or modulated voice is then detected, amplified and converted into an audible sound heard at the speaker.

AM (Amplitude Modulation) has been the standard method of Citizens Band B reception and transmission for many years and most of the existing transceivers being used today are AM. Technically, Amplitude Modulation is Double Sideband (DSB). In this method of operation, a carrier is transmitted which is modulated or interrupted by voice on both positive and negative sides as represented by figure 2.



... (+) modulation
... carrier
--- (-) modulation

Figure 2

COMPATIBILITY

The 13-885 is designed to be completely compatible with all current modes of Class D operation, including single sideband, (upper or lower), double sideband, or conventional AM and is equipped with separate transmitter circuitry to provide high level AM (Amplitude Modulated) transmissions and True SSB (Single Sideband) transmissions. The receiver section is also capable of receiving AM and SSB. The mode of operation for both receiver and transmitter sections is automatically selected by the mode selector switch.

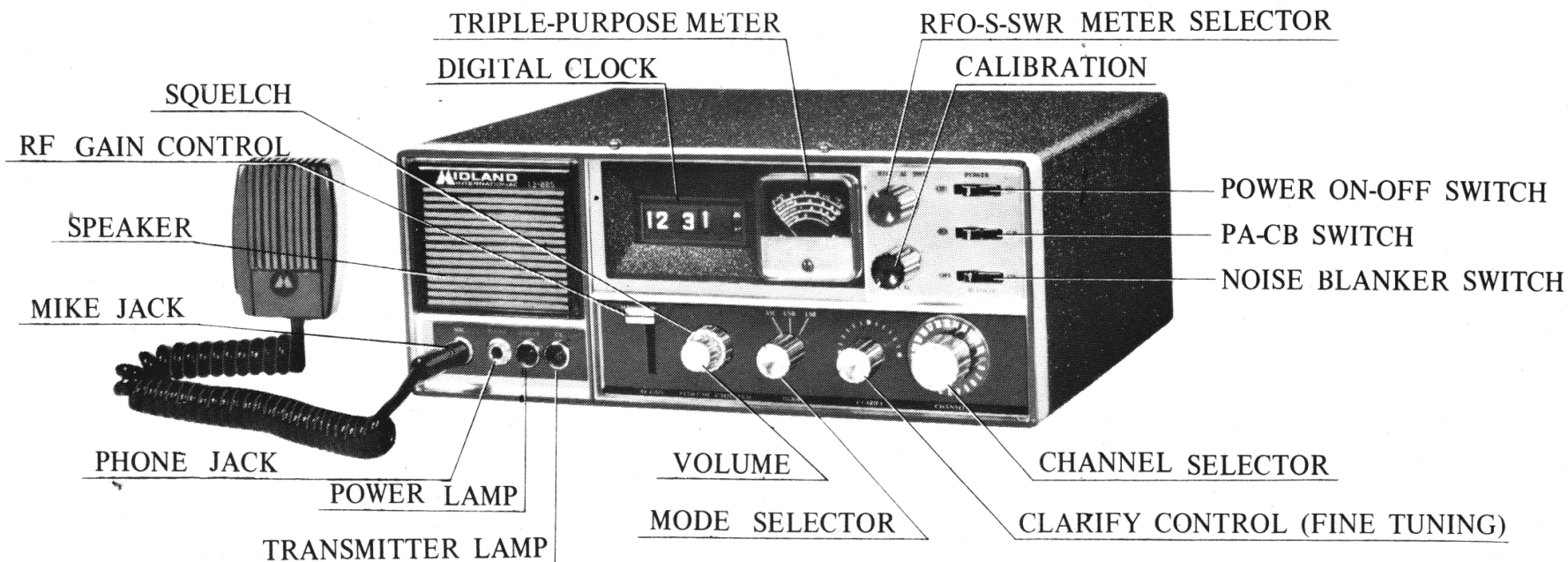


Figure 3

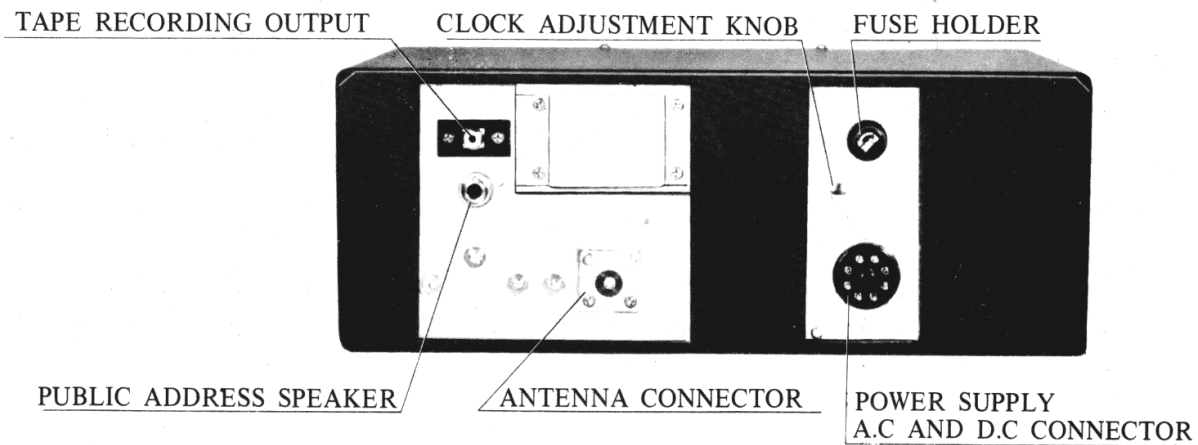


Figure 4

OPERATING CONTROLS AND FUNCTIONS (FIGURE 3)

POWER

This is the power on/off switch for the unit.

CHANNEL SELECTOR

Controls both transmitter and receiver frequencies simultaneously and may be set to any of the 23 positions indicated. All necessary crystals are supplied for full 23 channel operation.

VOLUME

Controls the sound output from the speaker when receiving. The volume control does not affect transmitting output.

R.F. GAIN

This controls the basic sensitivity of the receiver. Usually it should be set at maximum except when receiving very strong signals. Then, in order to prevent receiver overload and resultant distortion, the RF gain may be reduced to whatever point is necessary for good reception. This control does not affect transmitting output.

SQUELCH

Quiets the receiver when signals are not being received and allows a quiet standby operation. It functions only in the receive mode and does not affect the receiver volume when signals are being received. To adjust: When no signals are present, rotate the squelch control clockwise until the receiver is quieted. Incoming signals will automatically release the squelch. Careful adjustment is necessary as settings too far to the right will not allow weaker signals to release the squelch.

In the AM mode, the squelch is operated by the continuous carrier of the received signal. Therefore, it operates positively according to the presence of an incoming signal.

In SSB operation, however, the voice composition determines the intensity of the signal. When a signal is received, the voltage is held for 1–2 seconds in the circuit, then the squelch will open and you will hear the signal. When the signal stops, the squelch will remain open for 1–2 seconds before quieting the receiver. This is normal operation.

MODE SWITCH

Controls the mode of operation for the transmitter and receiver simultaneously and allows selection of conventional AM operation or SSB operation on either upper or lower sideband. In order to communicate with another transceiver, you must use the same operating mode. If you cannot tune in a SSB signal clearly by adjusting the clarifier control, you are probably using the wrong sideband. Switch to the other sideband and readjust the clarifier.

CLARIFIER

Allows a slight variation of transmit and receive frequency above and below the actual channel frequency. This operation is similar to a fine tuning control and while it is primarily intended for SSB operation, it also allows precise adjustment in the AM mode. The setting of this control is somewhat critical in the SSB mode and if it is not properly adjusted, the signals you receive will be distorted.

NOISE BLANKER

This switch activates a very effective type of noise elimination circuit. Generally in mobile use, the noise blanker is usually left on due to the higher noise levels encountered. In base station operation, the individual situation determines the need.

PA-CB

The 13-885 may also be used as a P.A. (public address) amplifier. Connect a suitable 8 or 16 ohm PA speaker to the proper rear panel jack, (Figure 4), place the PA-CB switch in the PA position and press the push-to-talk button on the microphone. For regular 2-way communications, the switch must be set to the CB position.

POWER LIGHT

This is the power indicator light and it will illuminate when the power on/off switch is turned on.

TX LIGHT

This is a transmit indicator light and will glow red when the push-to-talk button is pressed.

PHONE JACK

A headphone or external speaker may be used by connecting a suitable 8-16 ohm headphone or speaker to a standard 1/4" 2 circuit phone plug. When the plug is inserted into the phone jack, the built-in speaker is automatically disconnected.

TAPE RECORDING OUTPUT JACK

Connecting a tape recorder to this jack will allow you to record incoming signals. The output from this jack is not affected by the volume control so you may adjust the volume of the 13-885 without affecting the recording being made.

MICROPHONE PTT (Push-to-talk)

The microphone is the push-to-talk type and controls both the transmitter and receiver. To transmit, press and hold the push-to-talk switch on the microphone. Hold the microphone 2 to 3 inches from your mouth and speak in a normal tone of voice. To receive, release the push-to-talk switch.

CLOCK

The clock may be adjusted by a knob at the rear of the cabinet, (Figure 4). Pull this knob out and rotate clockwise to adjust. The clock does not affect the on/off operation of the unit. The clock works during 110V – 120 V operation only.

METER AND RFO/S – CAL – SWR SWITCH

This is a triple purpose meter. It measures relative incoming signal strength in S units when receiving, relative power output for SSB or AM when transmitting and VSWR (voltage standing wave ratio) for monitoring antenna match, condition and performance. To monitor incoming signal strength and relative power output during normal operation the control switch is set to the left position marked RFO/S.

VSWR FUNCTION AND CALIBRATE CONTROL

Whatever the type of antenna selected, it is important that it be properly adjusted and matched and the connecting transmission line be in good condition so as to avoid a high VSWR (voltage standing wave ratio). A VSWR over 2 to 1 results in reduced radiated power and may cause instability and damage to the final output stage of the transceiver. The built-in SWR bridge in the 13-885 should be used initially after antenna installation and periodically thereafter in order to insure that the antenna is in proper working order. VSWR should always be checked after a storm with high winds or icing conditions or whenever there is any reason to suspect the possibility of damage to the antenna or transmission line.

Refer to general operating instruction for specific instructions on how to measure VSWR.

POWER CABLES

Two power cables are supplied with this transceiver. The 110-120V AC cord terminates in a standard AC plug. The other cord is for 12-14V DC operation. Each cable must be used only for its original purpose. The DC cable may **not** be modified for AC operation by adding an AC plug and the AC cable may **not** be modified for DC operation by removing the AC plug. When using the 110-120V AC power cable, always attach it to the set before plugging it into 110-120V AC.

BASE STATION OPERATION

When the 13-885 is used as a base station, any Citizens Band beam, dipole, ground plane or vertical antenna may be used. A ground plane type antenna will provide good coverage, and since it is essentially non-directional, it is ideal in base station to mobile operation. From base station to base station or point-to-point operation a directional beam will give greater distance even under adverse conditions. The range of the transceiver also depends on the height of the antenna so whenever possible, select the highest location within F.C.C. limits. (These regulations limit the antenna height to 20 feet above an existing structure). Generally, a maximum of 26 feet of coax lead-in cable should be used due to line losses, however, a desirable antenna location may justify the loss developed by longer cable lengths. Oversized rubber boots are included in the accessory package and may be slipped on over the front feet to raise the front of the unit for more convenient desk top operation.

MOBILE INSTALLATION

Safety and operating convenience are the primary factors to consider when mounting any piece of equipment in an automobile. Be sure that the transceiver controls may be easily reached by the operator. Also be sure that connecting cables do not interfere with the operation of the brake, accelerator, etc.

POWER CONNECTION

When used in mobile operation, the vehicle's battery supplies the power.

CAUTION: The 13-885 is designed to be used in a 12 volt DC negative ground system only. If you are unsure of your vehicle's polarity, ask your dealer or local service station.

The red wire from the 13-885 is positive and may be connected directly to the positive or + battery terminal or to a fuse block or ignition switch or other convenient point.

The black wire is negative or ground and should be connected to a metal part of the vehicle body or frame or -battery terminal.

To insure proper operation, care should also be taken in attaching the transceiver and mounting bracket to the vehicle in such a way as to obtain good ground connection at this point.

MOBILE ANTENNAS

A vertical whip antenna is best suited for mobile operation. A nondirectional antenna should be used for best results in any case. The base-loaded whip antenna will normally provide effective communication or for greater range and more reliable operation a full quarterwave whip may be used. Either of these antennas use the metal car body as a ground plane and the shield of the base lead as well as the metal case of the transceiver should be grounded. A standard antenna connector (type SO-239) is provided on the transceiver for easy connection to a standard PL-259 coax plug. Following the antenna manufacturer's instructions carefully will insure proper operation. Of course the VSWR should be checked after installation and periodically thereafter.

GENERAL OPERATING INSTRUCTIONS

The explanations of operating controls and functions should be read and understood before actual operation of this transceiver.

1. Plug in the microphone and check to be sure that the antenna and power cables are properly connected.

CAUTION: Do not transmit until an antenna or suitable dummy load has been connected to the coax antenna output jack.

2. Set the RF gain control to maximum.
3. Set the channel selector to the desired channel.
4. Set the squelch control fully counterclockwise.
5. Set the PA-CB switch to the CB position.
6. Set the mode switch to the desired mode.
7. Set the meter switch to the RFO/S position.
8. Turn the set on and adjust the volume control to the desired level.
9. Adjust the clarifier control for the clearest reception of the desired signal.
10. To transmit, press and hold the push-to-talk switch on the microphone. Hold the microphone 2 to 3 inches from your mouth and speak in a normal tone of voice. To receive, release the push-to-talk switch.

SWR MEASUREMENTS

1. Adjust all controls as outlined in general operating instructions except set the meter switch to CAL and the mode switch to AM.

CAUTION: Make sure the antenna is connected.

2. Press the microphone switch and adjust the CAL (calibrate) control for a full scale reading on the bottom meter scale. Release the microphone switch.
3. Set the meter switch to SWR, press the microphone switch and the VSWR can be read on the bottom meter scale. A reading of 2 would indicate a VSWR of 2 to 1. Remember, a VSWR of more than 2 to 1 may be harmful to the transmitter final and the antenna should be adjusted. Any normal CB antenna properly installed and in good condition should have a VSWR of less than 1.5 to 1 and VSWR's of 1.2 to 1 are commonly attained.

SPECIFICATIONS

GENERAL

Circuitry:	34 transistors, 3 F.E.T.'s, 1 I.C., 54 diodes, 3 rectifiers
Frequency Control:	$\pm 0.005\%$ crystal
Channels:	23 – all supplied
Modes of Operation:	AM, Lower Sideband, Upper Sideband
Controls:	Power on/off, meter function selector, SWR calibration, PA/CB, noise blanker on/off, RF gain slide control, volume, variable squelch, AM/LSB/USB mode selector, clarity, mike push-to-talk, 23 – channel select, clock time set
Jacks and Connections:	Jacks for mike and headset; outputs for tape recorder and external 8-ohm PA speaker; connections for external 52-ohm antenna, AC or DC cables
Power Source:	110 volts AC, 12-volts DC
Speaker:	3-1/2" PM
Microphone:	Dynamic, push-talk, coiled cord
PA Audio Output:	3 watts
Size:	13" x 5" x 9-5/8"
Weight:	17 lbs.
Accessories Included:	AC cord, 12-volt DC cable, mike with coiled cord
Receiving System:	Dual conversion superheterodyne
Sensitivity:	AM: $5\mu\text{v}$ for 6 db (S+N)/N SSB: $.25\mu\text{v}$ for 6 db (S+N)/N
Selectivity:	AM: 6.0 KHz at -6 db SSB: 2.4 KHz at -6 db
Clarifier/Delta Tune:	± 600 Hz
Audio Output Power:	3 watts
Squelch Range:	0.5 to 500 microvolts
Intermediate Freq.:	1st conversion: 7.8 MHz 2nd conversion: 455 KHz

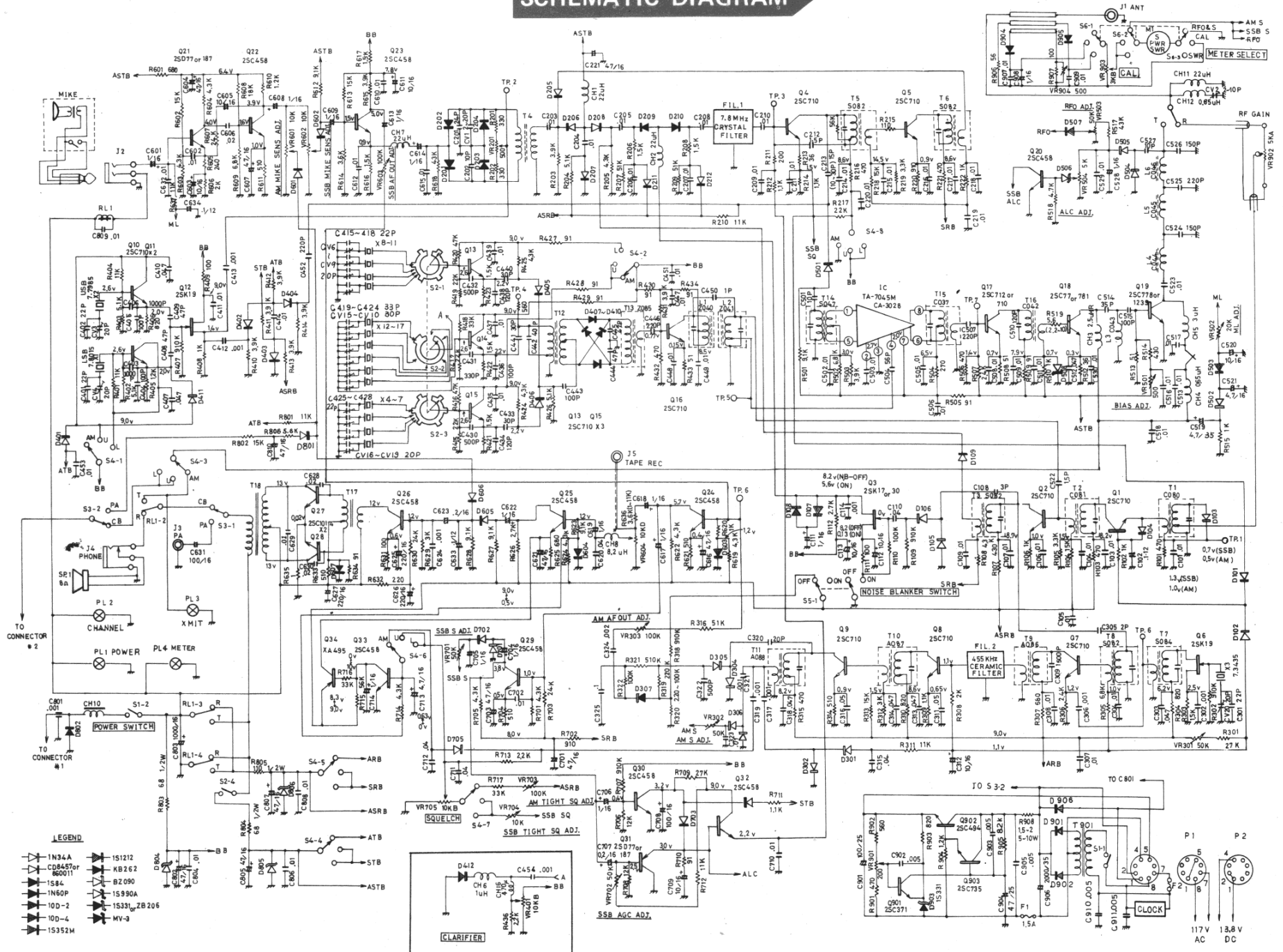
SSB TRANSMITTER

SSB Generation: Balanced modulation with 8-pole crystal lattice filter
Frequency Response: 300 to 2700 Hz at 6 db
RF Input Power: 15 watts Peak Envelope Power
Carrier Suppression: More than 40 db
Unwanted Suppression: More than 40 db
Harmonic Suppression: 50 db down

AM TRANSMITTER

RF Input Power: High Level Class B
RF Output Power: 5 watts
Harmonic Suppression: More than 3 watts
50 db down

SCHEMATIC DIAGRAM



WARRANTY POLICY

Midland Communications Company warrants each new Midland product to be free from defects in material and workmanship under normal use and service for a period of 90 days after delivery to the ultimate user and will replace or repair the product at our option, at no charge should it become defective and which our examination shall disclose to be defective and under warranty.

This warranty shall not apply to any Midland product which has been subject to misuse, neglect, accident, incorrect wiring not of our own installation, or to use in violation of instructions furnished by us, nor extended to units which have been repaired or altered outside of our factory.

This warranty does not cover carrying cases, earphones, batteries, antenna, broken or cracked cabinets, or any other accessory used in connection with this product.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our products.

Sales receipt must accompany product to validate the date of purchase.

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