CIR Industries Astro 200A Owner's Manual

OPERATION AND MAINTENANCE MANUAL FOR THE ASTRO 200A

CIR INDUSTRIES, INC.

OPERATION AND MAINTENANCE MANUAL
FOR THE
ASTRO 200A SSB TRANSCEIVER

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Welcome to the ranks of ASTRO 200A owners! This manual has been prepared to help you get the most pleasure from your transceiver. It contains information about operating procedures, technical specifications, theory of operation and instructions for calibration, service and repair. We urge you to read it from cover to cover before applying power to this transceiver.

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19.0 DIGITAL SYNTHESIZER DETAILED DISCUSSION

A. Major Loop

B. Minor Loop

C. Up/Down Counter

D. Bandedge Decoder

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LIMITED WARRANTY

CIR Industries, Inc. warrants to the original purchaser that this product shall be free from defects in material (except RF output transistors) and workmanship under normal use and service for 6 (six) months from the date of retail purchase. CIR will, free of charge, repair or replace, at its option, any part (s) which are found to have become defective through normal use, provided that the transceiver is returned prepaid within 6 (six) months from date of purchase to: CIR Industries, Inc., 1648 N. Magnolia Ave., El Cajon, California, 92020, Attention: Customer Service.

To obtain such warranty service, the original purchaser must return the appropriate warranty card to CIR within 10 days after purchase, or send with your transceiver a copy of proof of purchase (sales receipt). Transceivers returned without proof of purchase, and with no warranty card on file, will be serviced "Out of Warranty" at our prevailing service rates.

This warranty does not apply to any article which has been subjected to misuse, neglect or accident, or a transceiver that has been serviced by anyone

other than CIR. This warranty contains the entire obligation of CIR and no other warranties expressed or implied or statutory are given. In no event shall CIR be liable for consequential damages.

WARNING NOTE

DO NOT APPLY POWER TO THIS TRANSCEIVER

UNTIL THIS MANUAL IS READ AND UNDERSTOOD.

PROPRIETARY STATEMENT

1.0 INTRODUCTION

The ASTRO-200A is a digitally tuned 80M-10M SSB transceiver. The built-in digital synthesizer with LED readout provides over 40,000 crystal controlled frequencies with 100Hz resolution. By pressing a momentary switch, the operator tunes the transceiver without dial moving parts. The frequency accuracy can be calibrated to WWV with the built-in 10MHz WWV receiver. No crystal calibration is necessary. Total RF bandpass filtering is built-in to provide maximum protection for TVI and harmonic suppression. Selectable USB or LSB along with extended band coverage offers additional flexibility. Excellent selectivity is achieved with an 8 pole crystal filter if the IF circuitry. CW operation features include semi break-in CW with adjustable delay and sidetone. VOX, noise blanker, squelch, and variable speech processing circuitry complete the total line of built-in operational capability.

2.0 SPECIFICATIONS

General Specifications: Frequency Coverage
(In 100Hz Steps)

3.5000 MHz	to	3.9999 MHz
7.0000 MHz	to	7.4999 MHz
14.0000 MHz	to	14.4999 MHz
21.0000 MHz	to	21.4999 MHz
28.0000 MHz	to	29.9999 MHz

Frequency Control: Stable digital frequency synthesizer with crystal reference oscillator, 100Hz digital readout resolution. 20Hz drift, after warm-up. Frequency accuracy calibration equal to WWV. Additional FINE tuning control allows ±50Hz for continuous band coverage.

External Frequency Control: Rear socket for external VFO or synthesizer input for crossband operation. Frequency input coverage same as that with built-in synthesizer.

Modes of Operation: SSB with selectable sideband. CW with automatic 1KHz offset on transmit. Semi break-in with adjustable delay and sidetone is standard.

Power Input Required: 12-14 VDC negative ground only. (No damage 10V-15VDC). 20 Ampere peak current.

Electromagnetic Interference:
Transmit:

a. 5 element TVI low pass filter at antenna connector.
b. 3 element low pass filter for each band except 10M has 5 element low pass filter.

Receive:

a. 2 pole bandpass filter for each band.
b. 5 element 10 meter low pass filter at antenna connector.

Dimensions: 2.8" H x 9.5" W x 12.1" D
(Depth includes heatsink).
7.2cm x 24.13cm x 30.8cm
(Depth includes heatsink).
Weight 8 pounds (3.6kg).

Rear Panel Connectors:

Accessory Connector

Pin Number	Function
1	Key
2	13.6VDC Switched Output
3	Transistor Switch, open Collector ("on" in transmit)
4	Receiver-on, 8VDC
5	Mod in
6	Ground
7	Ext. LO input (1V P-P)
8	External ALC
9	Ext. LO gate 12VDC = Ext. LO on
10	Audio Output 1 Watt into 8 ohms

Power Connector	Function
1	Ground
2	Ground
3	13.6VDC Input
4	13.6VDC Output, Switched
5	13.6VDC to Power Amp
6	13.6VDC to Power Amp

Antenna Connector: UHF type.

Audio Output Connector: RCA phono type.

Typical Receiver Specifications:
Circuit Design: Direct conversion to 5.6MHz IF using double balanced mixer. Exceptional immunity to overload and cross modulation.

Sensitivity: 0.3μV for 10dB $\frac{S+N}{N}$

Selectivity: Crystal ladder 8 pole filter. Bandwidth 2700Hz @ 6dB down, 4300 @ 60dB down. 1.6 shape factor.

Image Rejection: 50dB.

Internally Generated Spurious Response: 0.5μV equivalent input signal.

AGC: 6dB change in audio level over input range of 1.0μV to .1V (100dB).

Audio Output: 1 Watt available @ <10% distortion, 300-3000Hz, 8 ohms.

Meter: S-Unit from 1-9, 20, 40, and 50dB over S-9.

Typical Transmitter Specifications:
Circuit Design: Broadband design to eliminate the need for tuning. Excellent harmonic and TVI suppression. ALC; Provision for external ALC input, positive going.

Frequency Control: By synthesizer with 6 digit readout to 100Hz. Fine frequency control allows adjustment ±50Hz from indicated frequency.

Power Input: 200 Watts PEP input at 13.6VDC input.

Power Output: 100 Watt PEP into 50 Ohm non-reactive load at 13.6VDC input, 80M through 15M. 80 watt PEP 10M band.

Unwanted Sideband Rejection: >60dB down at 1000Hz audio.

Harmonic Output: >45dB below peak power level.

Carrier Suppression: >50dB down.

Spurious Output: >45dB below peak power level.

Transmit Control for SSB: PTT and VOX standard.

CW Transmit: Semi break-in with sidetone standard. Automatic 1KHz offset on transmit frequency.

Microphone Input: 50K ohm input impedance.

Microphone Provided: Dynamic Mike, 500 ohm impedance with up-down tuning provided.

Audio Response: 300 to 3000Hz ±6dB.

Meter: Reads ALC on transmit, or forward and reflected power. Full scale equals 100W output into 50 Ohm non-reactive load in forward power position.

Cooling: Large capacity heat sink fins supplied. For SSTV, RTTY, and semi-continuous transmit, forced air cooling such as a small muffin fan on heat sink fins required.

3.0 REQUIREMENTS FOR OPERATION

A. AC Operation

The ASTRO-200A Transceiver requires +13.6VDC at up to 20 amperes in transmit mode. For operation from 110/220 VAC at 50/60Hz the matching Speaker/Power Supply is recommended.

If other than the recommended power supply is used the following requirements must be met by the power supply to assure satisfactory performance:

1. Output voltage 13.6VDC
2. Load Regulation 13.0VDC @ 20 amp

3. Ripple 0.25Vpp @ 20 amp

Note: All parameters measured at input connector of transceiver.

B. DC Operation

For operation from battery supplies (with or without alternator/generator charging) several points must be noted for proper operation:

1. Excessive noise on the power leads may cause damage due to over voltage or reverse voltage. Large voltage transients may be caused by activating motors, solenoids, and similar electromechanical devices connected to the same battery supply.

2. Because of the large currents (up to 20 amps) required by the power amplifier it is not possible to switch the transmitter supply on and off with the front panel power switch. Voltage for the transmitter power amplifier is supplied directly from Pins 5 and 6 of the power connector. This connection allows a leakage current of up to 50ma to flow at all times the transceiver is connected to the battery. This could discharge the battery if the unit is left connected for extended periods without charging.

3. The large current requirements also prohibit

the use of a series reverse polarity protection diode in the set. Please note:

> WARNING - CONNECTION OF DC SUPPLY VOLTAGE WITH REVERSED POLARITY WILL DESTROY THE TRANSMITTER POWER AMPLIFIER AND CAUSE SERIOUS DAMAGE TO THE TRANSCEIVER.

In a mobile application the operator may wish to install an external reverse polarity protection circuit. A typical circuit is shown below (figure 3-1). A power cable assembly, part number MPC-200, is available from your CIR dealer. This assembly provides the power connector, built-in diode, inline fuse and 10 foot power leads.

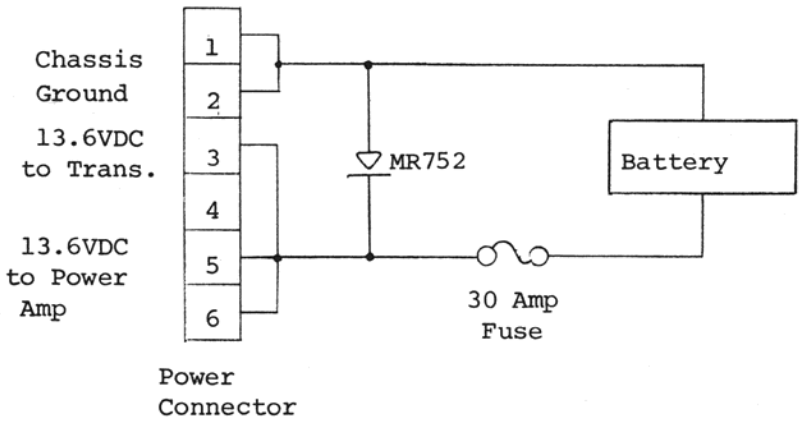


Figure 3-1

4. The transceiver is rated for operation at 13.6VDC; the normal operation voltage of a 12.6VDC battery system with alternator/generator operating. In a typical mobile application the transceiver may be several feet from the battery power source. For completely satisfactory operation (but at reduced peak transmitter power) the supply voltage at the transceiver power connector should never drop below 12.0VDC. For safe operation the resistance of the power leads should not exceed 0.04 ohms. Listed below is the maximum recommended length of power lead vs wire gauge. Remember the length listed is total wire length; the distance to the battery is only one half this distance (hot lead and its return).

Gauge	Total Length
8	60 feet
10	39 feet
12	24 feet
14	15 feet
16	10 feet

C. Antenna

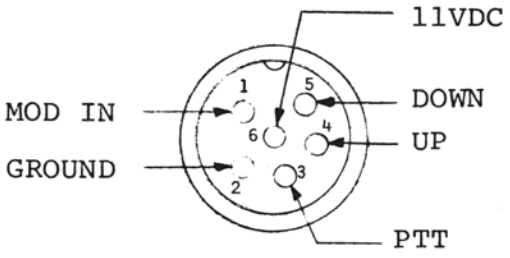
The ASTRO-200A transceiver is provided with a forward and reflected power meter for approximate VSWR readings. The antenna may be of any type selected by the operator, provided the VSWR is 2:1 or less. For antennas that are not designed with a VSWR of 2:1 or less

an antenna matching network should be installed between the transceiver and the antenna. For tune up procedure see section 6 paragraph B, Transmitter Tuning.

D. Microphone

The microphone input is high impedance, approximately 50K ohms. Almost any standard microphone will provide satisfactory performance. The transceiver is supplied with a microphone that has self-contained tuning controls for slow scanning and single 100Hz step tuning.

If the operator should prefer a desk or other type microphone a mating connector type NC-518 wired to the microphone cable according to figure 3-2 is required. It is necessary to use a four wire microphone with the microphone pair connected to "MOD IN" and "GROUND", and the key pair connected to "11VDC" and "PTT".



NOTE: FOR TUNING 11VDC IS CONNECTED TO UP OR DOWN BY SWITCH CONTACTS

FIGURE 3-2

E. Speaker/Headphones

Transceiver audio output is available to drive an external speaker from either a RCA type jack directly below the accessory connector or from pin 11 of the accessory connector. Speaker impedance should be between 3.2 and 8 ohms nominal.

The available Speaker/Power Supply unit has a speaker matched to the transceiver audio system. The Speaker/ Power Supply unit has preassembled cables for audio and main power. The ASTRO-200A system Interconnect Diagram details these functions.

4.0 INSTALLATION

A. Accessories included in Package

1. Microphone with attached connector.
2. Accessory mating connector (86CP11).
3. Power mating connector (S306CCT).
4. RCA phone plug.
5. Owners Manual.

B. Location/Ventilation

1. Fixed. The transceiver is designed to be table top mounted in any available location. The only limitations are associated with transmitter power amplifier cooling. The heatsink provided is adequate for normal voice communication, however

space must be allowed around the unit for convection cooling. It is recommended that a clear space of at least 2 inches above and to the rear of the heat-sink be provided.

For continuous or semicontinuous transmitter operation a small fan should be used to force cooling air over the heatsink. For best cooling efficiency the fan should be located below the heatsink with airflow directed upward through the heatsink fins.

2. Mobile. A simple mobile mounting bracket is available. Or the operator may choose to fabricate his own. In any case the only critical factors are:

a. Maintain cooling space as mentioned above.

b. Mount unit in a manner to minimize shock and vibration. Using the available mobile mount, installation in cars and trucks should be simple and trouble free.

c. Power connection should be made per Requirements for Operation section; item 3.0B, DC OPERATION.

C. Cabling

1. Antenna. The antenna connector on the transceiver is UHF type. Connection to the antenna should be made with coaxial cable of 50 ohm characteristic impedance. For runs up to 50 feet RG58A/U cable, or equivalent, is recommended. For runs

greater than 50 feet RG8A/U, or equivalent, is recommended for best performance.

2. Power. See Requirements for Operation section.

3. Grounding. For best performance the transceiver should be grounded to a good earth ground by the grounding screw located just below the accessory connector. The ground lead should be as short as practical. The lead should be made from 14 gauge wire or equivalent.

D. Linear Amplifier Interface

The ASTRO-200A will interface directly with linear amplifiers which require grounding a positive voltage; for example, provide a ground for a relay coil in the linear. Pin 3 of the accessory connector is a transistor open collector to be used to provide the ground for the linear relay coil. Since pin 3 is a transistor used as a switch to chassis ground it has certain operating limitations:

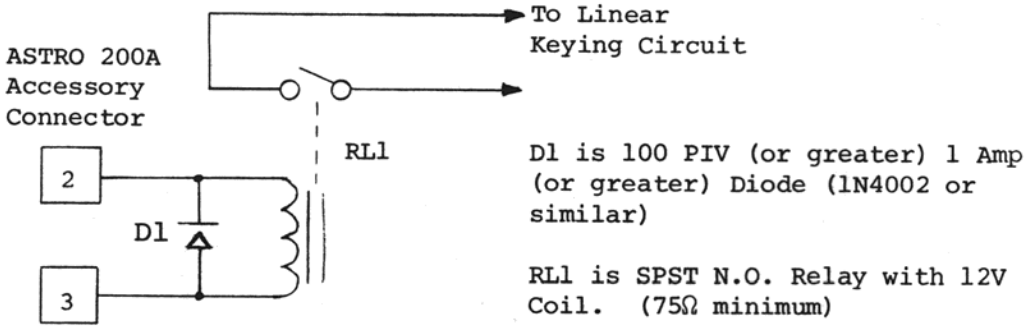
1. Voltage applied to pin 3 must not exceed 35VDC with transistor switch off ("receive" mode of transceiver).

2. Current into pin 3 must not exceed 200 ma with transistor switch on ("transmit" mode of transceiver). Most linear amplifier relay coils fall within these

operating bounds.

If the linear amplifier keying requires the connection of a negative voltage, an external relay must be used.

The circuit shown below can be used to provide the needed relay contacts.



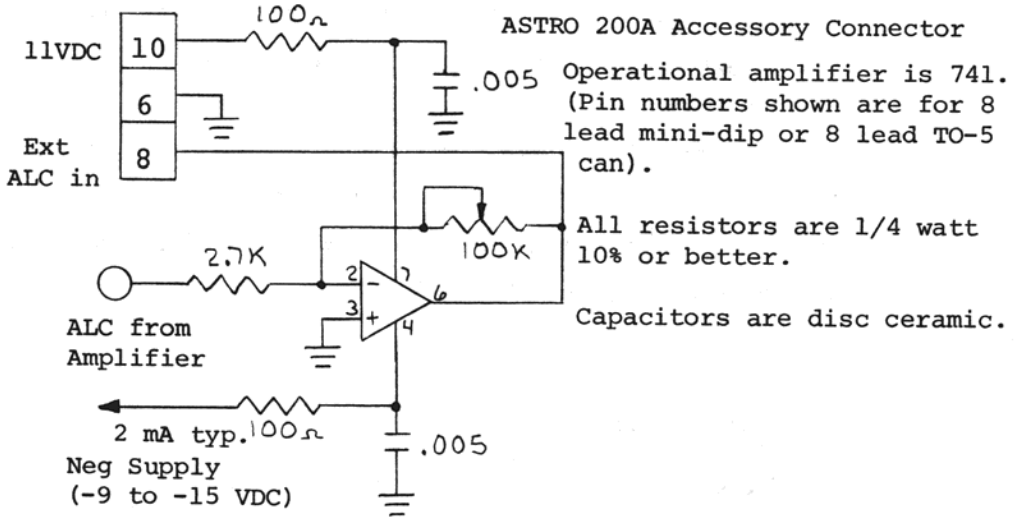
ALC Considerations

The ASTRO-200A requires a positive-going voltage to reduce transmitter power. Although the internal ALC system is disabled in the CW mode, the external ALC input is still active. In many applications use of external ALC is not necessary; the ASTRO-200A internal ALC, and Mic gain controls can be used to set the

drive to correct power for the linear amplifier.

In cases where external ALC is necessary the following information will illustrate proper interface circuits.

Most linear amplifiers designed for use with tube type exciters have a negative going ALC output signal. The circuit below can be used to convert the negative signal from the amplifier to a positive signal required by the ASTRO-200A. After installation, adjust the variable resistor for proper operation.



Suggested methods of obtaining the required negative voltage.