

# AMERITRON ARI-500

AUTOMATIC BAND SWITCH FOR THE ALS-500M/ALS-600 AMPLIFIERS

## INSTRUCTION MANUAL



# AMERITRON

116 WILLOW ROAD  
STARKVILLE, MS 39759 USA  
662-323-8211

# Contents

Introduction.....	2
Features .....	2
Specifications.....	2
Installation .....	3
Operating ALS-500RC with the ARI-500 .....	3
ARI-500 Transceiver Compatibility .....	3
Interfacing ARI-500 to Radio for Keying and Band Data .....	4
Interfacing to Icom Radios .....	4
Interfacing to Yaesu Radios .....	5
Interfacing to the Elecraft K3 .....	6
Interfacing to Kenwood Radios .....	6
Operation .....	8
Technical Assistance.....	9
Schematic.....	10
ARI-500 Transceiver Interface Cables.....	13
Warranty .....	13

## Ameritron ARI-500

### Introduction

Congratulations on choosing the Ameritron ARI-500 Automatic Band Switch for the Ameritron ALS-500M (Ser. No. 13049 and higher) and ALS-600 (Ser. No. 14378 and higher) amplifiers. The ARI-500 is designed to automatically select the correct frequency range on these amplifiers by reading the frequency information or band data from the transceiver. This automatic switch is compatible with most ICOM, Yaesu, and Kenwood transceivers, and the Elecraft K3 transceiver. Some other radios may also be compatible.

### Features

- PWR: Green LED indicates the amplifier and transceiver are connected correctly
- LINK: Red LED indicates information is being received from transceiver. Flashing red indicates information is NOT being received.
- RADIO: RJ-45 Jack for interfacing to the transceiver.
- AMP A/B: RJ-45 Jacks for interfacing to the ALS-500M or ALS-600 Amplifier
- REMOTE A/B: RJ-45 Jacks for use with the optional ALS-500RC Remote Control Head
- Standby/Operate Toggle switch

### Specifications

Receives DC power through the ALS-500M/600 interface cables.

Dimensions 4.5" W x 1.5" H x 4.25 D

Weight 0.4 lbs

## Installation

The ARI-500 connects to the REMOTE A/B jacks on the front of the amplifier. Two RJ-45 cables are supplied to connect jack A and B from the ARI-500 to the REMOTE A/B jacks on the ALS-500M or ALS-600.

1. Place the ARI in a suitable location.
2. Ensure the amplifier power switch is OFF and the amplifier's frequency select switch is in the REMOTE position.
3. Plug one of the patch cords into AMP A on the ARI-500. Route the other end to the amplifier and connect it to the REMOTE A amplifier input.
4. Plug the other patch cord into AMP B on the ARI-500. Route the other end to the amplifier and connect it to the REMOTE B amplifier input.

## Operating ALS-500RC with the optional ARI-500

Skip this section and go to **ARI-500 Transceiver Compatibility** if the ALS-500RC is not used.

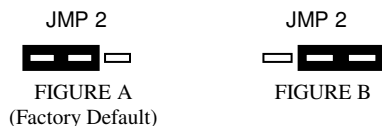
The optional ALS-500RC Remote Control Head can be used with the ARI-500. The ALS-500RC provides current metering (ALS-500M) or RF power output metering (ALS-600), TX and O/L (Fault) indications of the amplifier, and O/L resetting of the amplifier via the ALS-500RC ON/OFF switch by cycling power on the ALS-500M, or operating as a OPERATE/STANDBY switch with the ALS-600.

To use the ALS-500RC Remote Control Head with the ARI-500:

- 1) Connect a RJ-45 patch cable to Remote port A of the ARI-500.
- 2) Connect the other end of this RJ-45 cable to port A of the ALS-500RC remote.
- 3) ALS-500RC Port B is not used in this application.

**Note:** JMP 2 inside the ARI-500 must be set as described below when the ALS-500RC is used:

- 1) JMP 2 in the 1-2 position (Fig. A): Factory default. Must be strapped this way when the ALS-500RC is NOT used.
- 2) JMP 2 in the 2-3 position (Fig. B): Strapping position when using the ALS-500RC. The Current/RF Power Meter, Power, TX and O/L indicators are all functional. The ARI-500 Auto O/L Reset (Fig. C) is automatically disabled. The ALS-500RC POWER switch turns the ALS-500M power ON and OFF, and functions as the ALS-600 OPERATE/STANDBY switch. Manually reset O/L on both amplifiers by switching the ALS-500RC's POWER Switch OFF and then ON. When the ALS-500RC POWER is switched ON, it takes about four seconds for the ALS-500 to turn on or the ALS-600 to reset.



**Note:** JMP 2 **MUST** be in the Factory Default position (FIGURE A) if the ALS-500RC Remote Control Head is **NOT** used.

**Note:** JMP 3 should be set to OFF (Figure C) when using the ALS-500RC, as the ALS-500RC provides manual reset functionality.

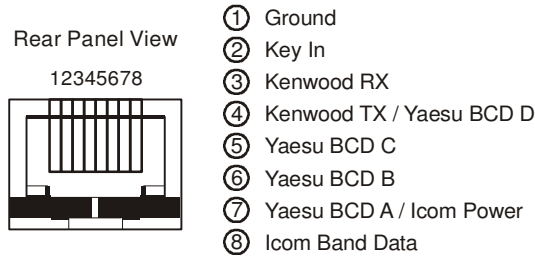
## ARI-500 Transceiver Compatibility

The ARI-500 is compatible with most ICOM, Kenwood and Yaesu radios for reading band data information and detecting transmitter keying. Additionally, the ARI-500 low drive current keying interface is compatible with virtually any transceiver's amplifier keying output. Newer Kenwood radios have a DB-9 male connector for computer control. Serial data is read from this port to get the band data. ICOM Transceivers use a "step voltage" for band data. A voltage of 0-8 volts is output from the band data pin of the accessory jack. Yaesu, older Kenwood, and Elecraft K3 radios output band data in a 4-line BCD format (the Unified Microsystems plan).

Many other transceivers use the 4-line BCD standard as well. Check your transceiver's instruction manual to see if this is the case. If so, it will also be compatible with the ARI-500.

### Interfacing the ARI-500 to Radio for Keying and Band Data

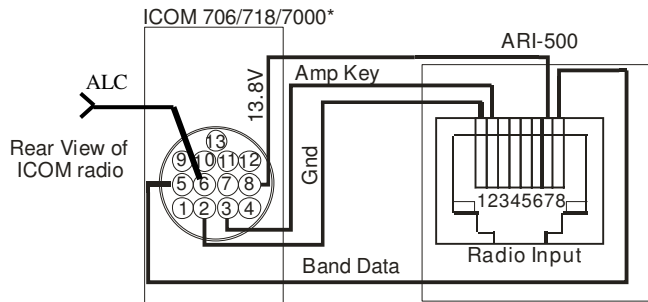
The ARI-500 RADIO input connection is a RJ-45 jack with specific connections for each radio brand. The diagram below shows the pin-out of the RADIO input jack. See the specific sections below for more information on interfacing to each particular radio brand.



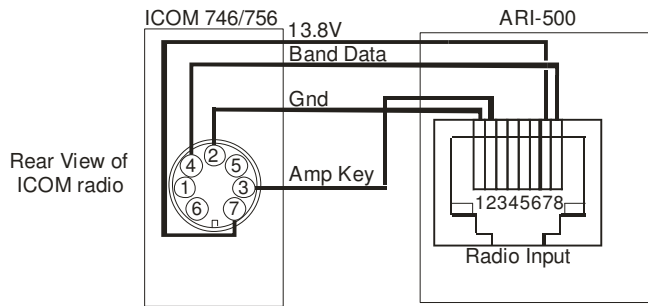
**NOTE: Multiple radios cannot be simultaneously connected to the ARI-500. The ARI-500 is designed to operate with only ONE radio.**

### Interfacing to ICOM Radios

In order to retrieve band data from ICOM radios, the ARI-500 must be connected to the band data voltage output. This can be found on the ACC jack on the back of the radio. This 13- or 7-pin jack has the band data voltage, amp-key out (goes to ground when the radio is transmitting), ALC input, and ground. The diagrams below show the connections required between ICOM radios and the ARI-500. Connection to an ICOM IC-7000 requires an ICOM approved modification. Follow the instructions in your IC-7000 user's manual (page 140) to make the modification. Ameritron will not be held liable for any damage caused by this modification to an IC-7000 transceiver. Also note the ALC connection on the IC-706/7000/718 as this is only available on the ICOM accessory connector. ALC is available on a separate phono jack on the IC-746/756.



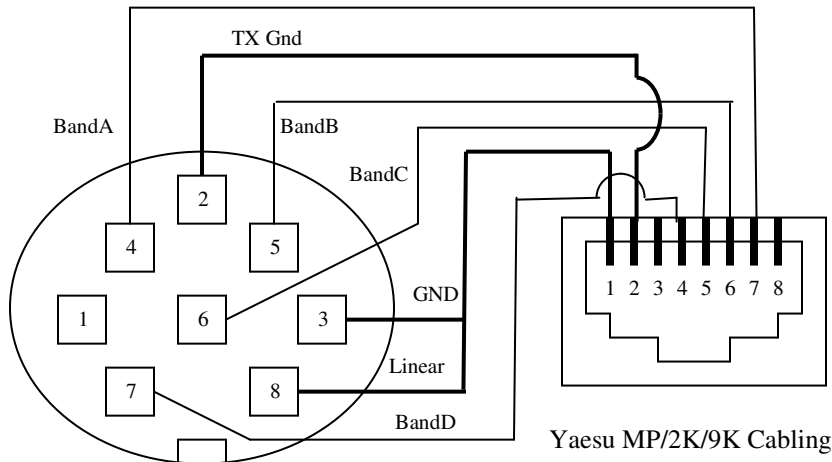
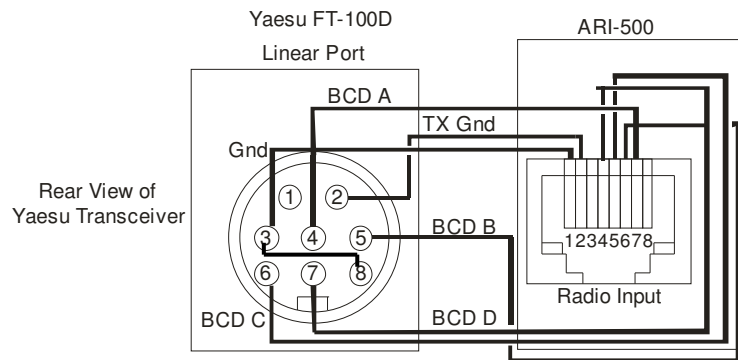
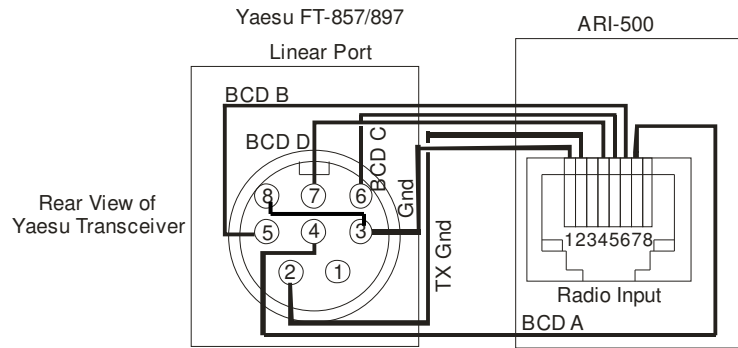
\*IC-7000 requires modification for ARI-500 operation. See paragraph above.



Connection	ARI-500 Radio Input
Band Data Voltage	Pin 8
Icom Power (13.8V)	Pin 7
Amp Key / HSend	Pin 2
Ground	Pin 1

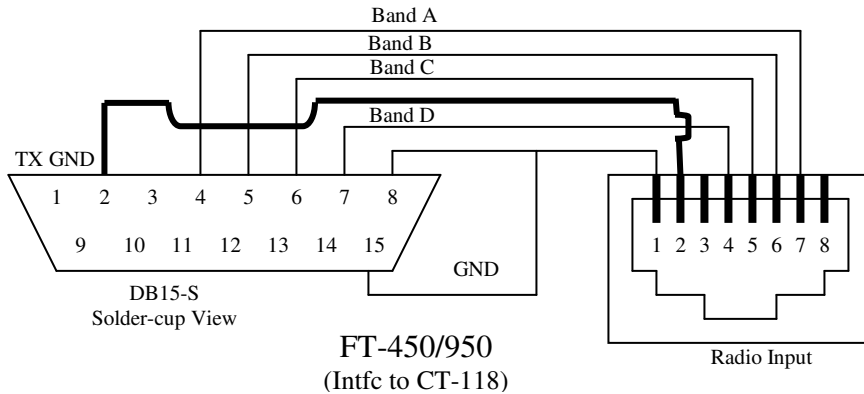
### Interfacing to Yaesu Radios

Yaesu radios output band information using a 4-line BCD format. The band data lines are found on the BAND DATA connector or LINEAR port on most Yaesu radios. Some Yaesu radios share the CAT port with the LINEAR port. The radio must be configured so that the port is in LINEAR mode or the band data information will not be sent to the ARI-500. Check your radio's manual to determine the proper configuration of the LINEAR port. The diagrams below show popular Yaesu connections to the ARI-500. Double check your radio's manual to ensure the correct Band Data connections. Please note that Pin 8 on the Yaesu connector (TX-INH) must be connected to ground, Pin 3 on the FT-MP/2000/9000 series of radios. This connection is optional on the FT-857/897/100 radios.



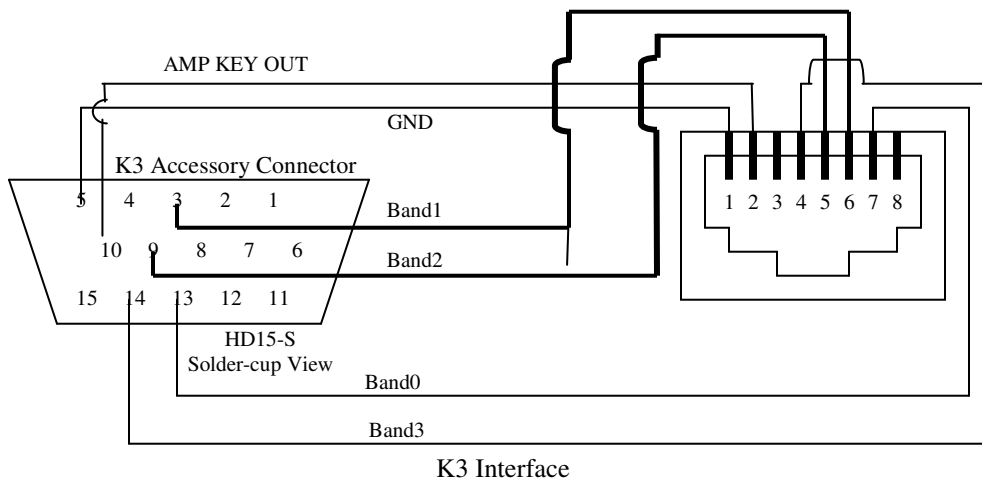
Connection	ARI-500 Radio Input	Yaesu Linear Socket
Band Data A	Pin 7	Pin 4
Band Data B	Pin 6	Pin 5
Band Data C	Pin 5	Pin 6
Band Data D	Pin 4	Pin 7
Amp Key / TX GND	Pin 2	Pin 2
Ground	Pin 1	Pin 3/8

The Yaesu FT-450/950 transceivers provide Band Data, ALC, and AMP Keying from a 10-pin MiniDIN connector on the back of these radios. These connectors are very difficult to find, therefore it is best to purchase the Yaesu CT-118 Band Data cable (~ \$40 from most suppliers), and then construct the cable below to interface from the CT-118 to the ARI-500.



### Interfacing to the Elecraft K3 Transceiver

The Elecraft K3 outputs band information using the standard 4-line BCD format. Since about SN2370, all K3 radios have pull-up resistors on the K3 Band Data lines (required). Check the K3 modification page at [www.elecraft.com](http://www.elecraft.com) for the modification for earlier K3 radios.

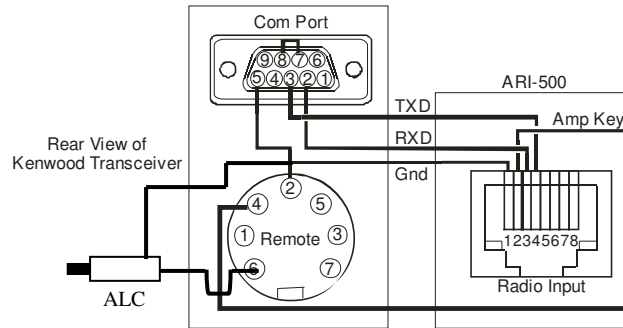


Connection	ARI-500 Radio Input	K3 Accessory Socket
Band Data A	Pin 7	Pin 13
Band Data B	Pin 6	Pin 3
Band Data C	Pin 5	Pin 9
Band Data D	Pin 4	Pin 14
Amp Key / TX GND	Pin 2	Pin 10
Ground	Pin 1	Pin 5

### Interfacing to Kenwood Radios

The Computer port (CAT) is used to retrieve the frequency of the radio. When the ARI-500 is first turned on, the “Auto Information” (AI) command is sent to the radio. This command causes the Kenwood radio to output the state of the radio (frequency, mode, etc) anytime the state has changes. The ARI-500 then uses the frequency to determine the appropriate band and then selects the correct antenna. The diagram below shows how to connect a Kenwood radio with a DB-9M COM port to the ARI-500. **Note that pins 7 and 8 (RTS, CTS) on the Kenwood port must be connected together.** This ensures that the Kenwood will send the status information to the ARI-500. There is one second delay from when the status of the radio changes until it is sent out over the serial connection. The Remote port on the back of Kenwood radios has the amp-key line needed for the ARI-500, and the ALC input from the amplifier if you wish to use it. Refer to the Kenwood manuals and turn on the amplifier keying relay and set the BAUD rate to 9600.

Kenwood TS-570. TS-870. TS-2000.



**ARI-500 (Radio Input) RJ-45 Connector Wiring**

- Pin 1 Ground connects to pin 1 of Radio Com port and pin 2 of Radio Remote Connector
- Pin 2 Amp key connects to pin 4 of Radio Remote Port.
- Pin 3 (RXD) connects to pin 2 of Radio Com Port
- Pin 4 (TXD) connects to pin 3 of Radio Com Port.
- Pin 5 not connected.
- Pin 6 not connected.
- Pin 7 not connected.
- Pin 8 not connected.
- Pin 9 not connected.

Note: Pins 7 and 8 on the Kenwood Com Port must be connected together. This ensures the radio will send information to the ARI-500.

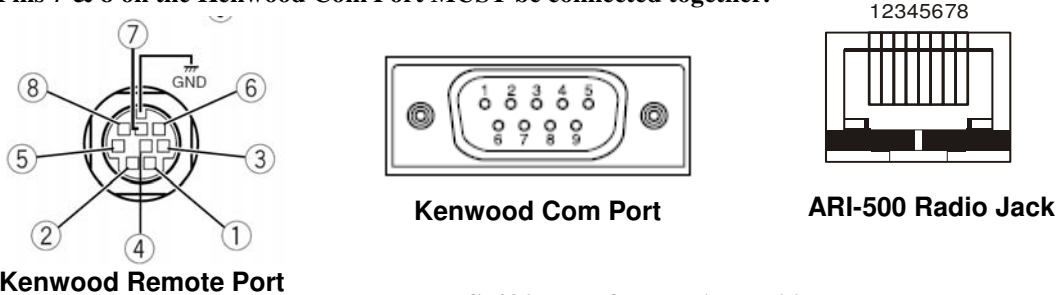
**Kenwood TS570/870/2000 Interface to ARI-500**

Connection	ARI-500 Radio Input	Kenwood Com Port	Kenwood Remote Port
Kenwood RXD	Pin 3	Pin 2	N/C
Kenwood TXD	Pin 4	Pin 3	N/C
Amp Key	Pin 2	N/C	Pin 4
Ground	Pin 1	Pin 5	Pin 2
ALC	N/C	N/C	Pin 6

**Note: Pins 7/8 on the Kenwood Com Port must be connected together.**

**Interfacing to the Kenwood TS-480 Radio**

The pin number connections are the same as for the TS-2000/570/870, but the TS-480 uses an 8-pin MiniDIN connector on the Remote Port. **Pins 7 & 8 on the Kenwood Com Port MUST be connected together.**



**Kenwood TS-480 Interface to ARI-500**

Connection	ARI-500 Radio Input	Kenwood Com Port	Kenwood Remote Port
Kenwood RXD	Pin 3	Pin 2	N/C
Kenwood TXD	Pin 4	Pin 3	N/C
Amp Key	Pin 2	N/C	Pin 4
Ground	Pin 1	Pin 5	Pin 2 & Shield
ALC	N/C	N/C	Pin 6

The ARI-500 receives band information over the serial interface, while amplifier keying comes from the remote port. The serial communications settings are 9600 bps and the linear amplifier relay must be turned on and must be setup on the radio for the ARI-500 to function properly. The serial communications setting is *Menu 56* and needs to be set to **9600**. The amplifier relay setting is *Menu 28* and should be set to option **2**.

## Operation

Set the amplifier's Frequency Select Switch to the REMOTE position. The amplifier frequency band will now be controlled by the transceiver through the ARI-500. The amplifier will also now be keyed through the ARI-500. The relay jack on the back of the amplifier is not used. The green PWR LED and the red LINK LED will glow steadily when the ARI-500 amplifier interface cables are connected properly and data is being received from the transceiver. If the transceiver is off or data is not being sent, the PWR LED will flash on for about one second when amplifier power is turned on, and the LINK LED will flash continuously

**Toggle Switch:** This switch in the down position will place the amplifier into standby. Up position will place amplifier into operate. **Note:** This switch must be in the down position when powering up the ALS-1300 to prevent a load fault command.

**Note:** The ALS-600 will be placed in OPERATE whenever keying is applied through the ARI-500 regardless of the STANDBY-OPERATE switch position on the amplifier. If the ALS-500RC Remote Control Head is used, the ALS-600 may be taken off line with the ALS-500RC POWER switch (ARI-500 JMP2 must be strapped 2-3, FIGURE B, when the ALS-500RC is used).

**Note:** JMP 2 **MUST** be in the Factory Default position (FIGURE A) if the ALS-500RC Remote Control Head is **NOT** used.

The ALS-500M/600 Power On/Off switch operates the same as without the ARI-500M. If the Remote ALS-500RC is used, refer to **Operating the ALS-500RC with the ARI-500**.

The ARI-500 has an Auto Reset for the amplifier's load fault (O/L). When the amplifier goes into load fault mode, the ARI-500 will wait 5 seconds and then reset the amplifier's LOAD FAULT circuitry by cycling the ALS-500M amplifier's power OFF and back ON (the ALS-500M amplifier's power switch must be in the OFF position for the Auto Load Fault reset to work), or by remotely cycling the ALS-600 OPERATE/STANDBY function. The ARI-500 will reset the amplifier overload up to 3 times in a 5-minute period. If the amplifier load faults more than 3 times in a 5 minute period, the amplifier's power must be manually switched off to reset. Strap JMP3 to OFF to disable the Auto Reset feature (see Figure C).

**Note:** If Auto Reset is disabled, power must be manually cycled on both the ALS-500M and ALS-600 to re-set the load fault circuitry (or cycle the POWER switch on the ALS-500RC if used).

**Note:** When the ALS-500RC is used with the ARI-500, the ARI-500 Auto Reset feature is automatically disabled. Manual reset is performed with the ALS-500RC POWER switch. Strap JMP3 to OFF (Figure C).

## 22.5 to 30 MHz (10/12 Meter) Operation

The ARI-500 has a jumper labeled JMP1. JMP1 is for operation on frequencies between 22.5 and 30 MHz (AUX). The factory default is in the OFF position. The OFF position prevents the amplifier from operating when the transceiver is in the 10/12 Meter band. Move JMP1 to ON if the amplifier has the 12/10 Meter kit installed. See Fig C.



FIGURE C

The PWR and Link indicator lights illuminate steadily when the transceiver and amplifier are connected and turned on. The red LED marked LINK will blink rapidly if the ARI-500 RADIO jack is not receiving information from the transceiver.

### Note About Kenwood Radios

Since the Radio Control Port is used to get the band information from the radio, the radio must be switched on first before powering up the ARI-500. Upon power up, the ARI-500 sends the Auto Information (AI) command to the Kenwood radio. This instructs the Kenwood to send the radio's status information anytime it changes. Failure to do this will result in the radio not receiving this command and the ARI-500 not detecting a properly connected radio. Anytime the status of the radio changes, there is a one second delay before the new information is sent over the serial line to the ARI-500. This causes the switch to appear to respond slowly to the band changes. This is a result of the delay from the Kenwood radio, **NOT** the ARI-500. **Note: Kenwood Com Port pins 7 & 8 must be connected together.**



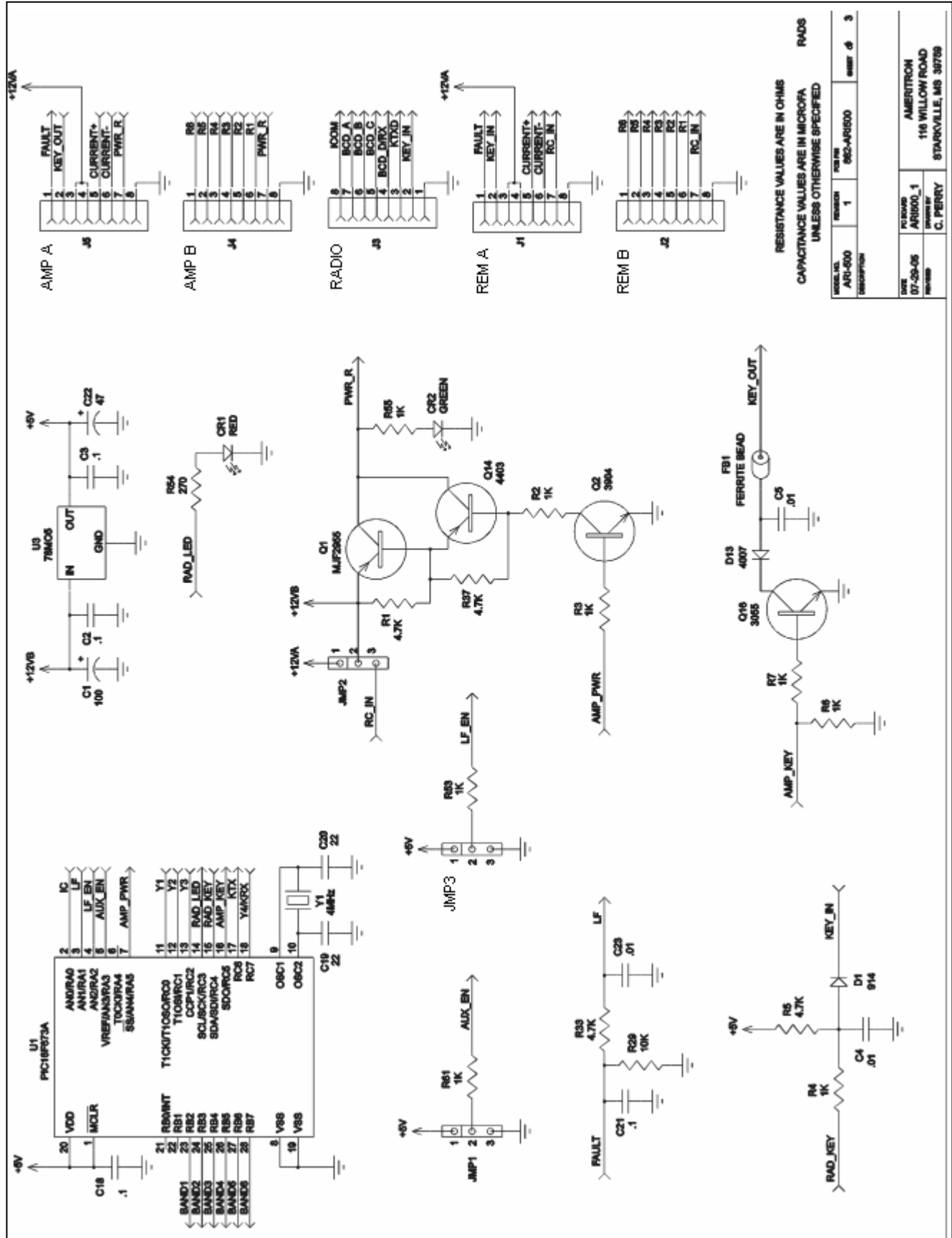
## Technical Assistance

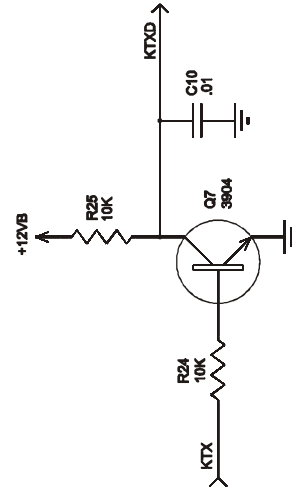
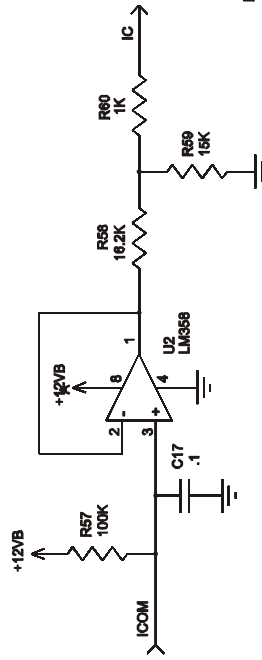
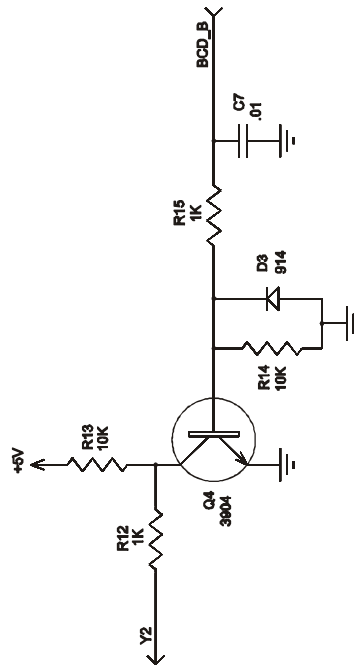
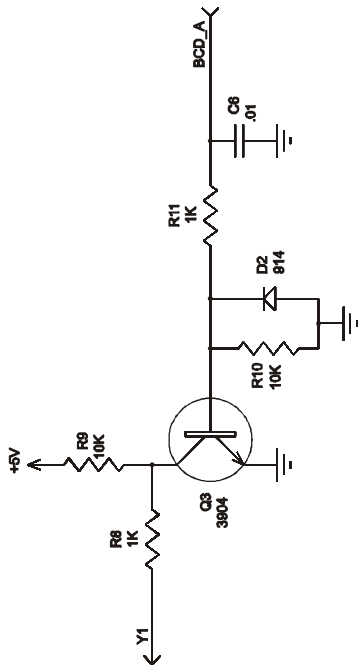
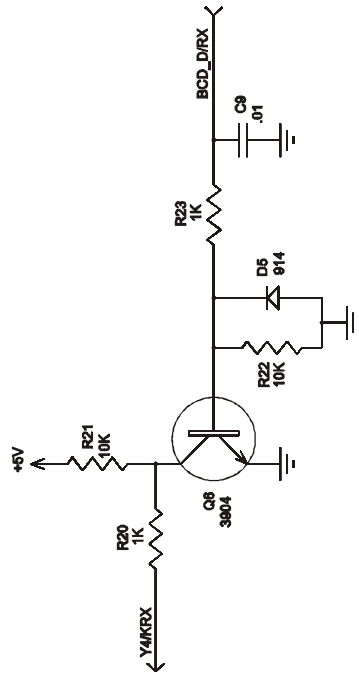
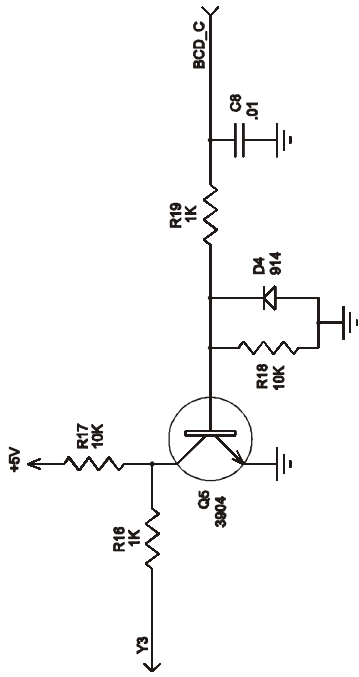
If you have any problem with this unit, first check the appropriate section of this manual. If the manual does not reference your problem or reading the manual does not solve your problem, call *Ameritron* at **662-323-8211**. We can only help if you have your ARI-500 manual, radio manual, and information about your station available during the call.

*We strongly recommend calling Ameritron with any questions*, but questions can also be mailed directly to Ameritron at 116 Willow Road, Starkville, MS 39759 or Faxed to 662-323-9810. Please be aware that MFJ is a separate facility, and as such does not always offer the best assistance with Ameritron products. Be sure to send a complete description of the problem, explain how this unit is being used, and include a complete description of your station.

### NOTES:

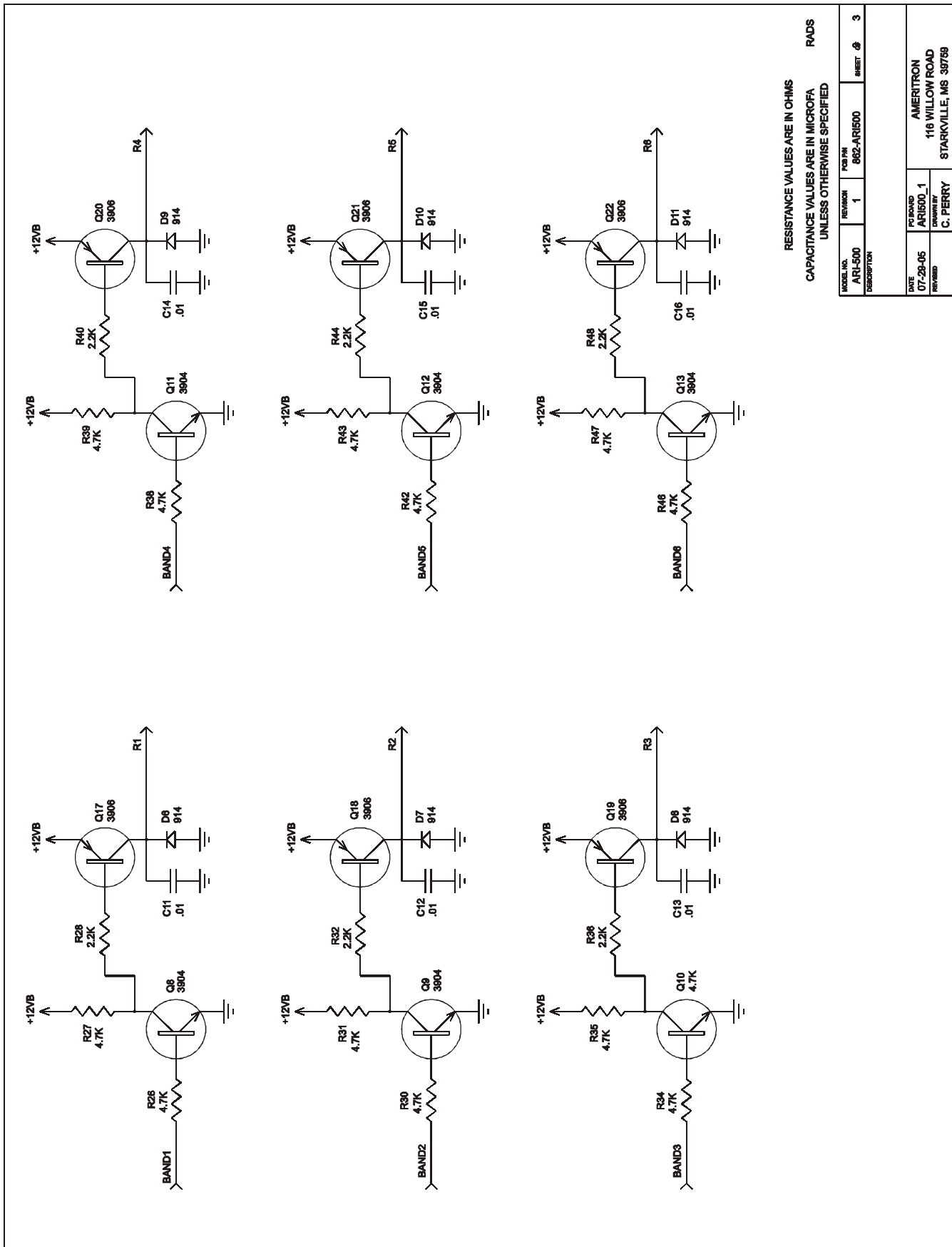
Schematic





RESISTANCE VALUES ARE IN OHMS  
CAPACITANCE VALUES ARE IN MICROFA  
UNLESS OTHERWISE SPECIFIED

MODEL NO.	ARI-500	REVISION	1	PCB PIN	862-ARI600	SHEET #	3
DESCRIPTION	Description						
DATE	07-29-05	PC BOARD	ARI500_1	AMERITRON			
DESIGNED BY	C. PERRY	DRAWN BY	C. PERRY	116 WILLOW ROAD			
REVISED				STARKVILLE, MS 39759			



RESISTANCE VALUES ARE IN OHMS  
CAPACITANCE VALUES ARE IN MICROFA  
UNLESS OTHERWISE SPECIFIED

MODEL NO. ARI-500	REVISION 1	PCB INI 682-ARI500	SHEET # 3
DESCRIPTION			
DATE 07-28-05	PCB BAND ARI500_1	AMERITRON 116 WILLOW ROAD STARKVILLE, MS 39759	
DESIGNED BY C. PERRY	CHECKED BY		

## ARI-500 TRANSCEIVER INTERFACE CABLES

- RJ-DB97DK for Kenwood
- RJ-13D for the ICOM IC-706/718 and IC-7000
- RJ-7DI for all other Icoms
- RJ-8D for Yaesu
- Check with Ameritron for cable details additional cables as they become available

## DISCLAIMER

Information in this manual is designed for **user purposes only** and is **not** intended to supersede information contained in customer regulations, technical manuals/documents, positional handbooks, or other official publications. The copy of this manual provided to the customer will **not** be updated to reflect current data.

Customers using this manual should report errors or omissions, recommendations for improvements, or other comments to Ameritron 116 Willow Road, Starkville, MS 39759. Phone: (662) 323-8211; FAX: (662) 323-6551. Business hours: M-F 8-4:30 CST.

### AMERITRON

116 Willow Road  
Starkville, MS 39759 USA  
662-323-8211

### LIMITED WARRANTY

Ameritron warrants to the original purchaser that this product shall be free from defects in material or workmanship for one year from the date of original purchase.

During the warranty period, Ameritron (or an authorized Ameritron service facility) will provide free of charge both parts and labor necessary to correct defects in material or workmanship.

To obtain such warranty service, the original purchaser must:

- (1) Complete and send in the Warranty Registration Card.
- (2) Notify Ameritron or its nearest authorized service facility, as soon as possible after discovery of a possible defect, of:
  - (a) the model number and serial number, if any;
  - (b) the identity of the seller and the approximate date of purchase;
  - (c) a detailed description of the problem, including details on the equipment.
- (3) Deliver the product to the Ameritron or the nearest authorized service facility, or ship the same in its original container or equivalent, fully insured and with shipping charges prepaid.

Correct maintenance, repair, and use are important to obtain proper performance from this product. Therefore, carefully read the Instruction Manual. This warranty does not apply to any defect that Ameritron determines is due to:

- (1) Improper maintenance or repair, including the installation of parts or accessories that do not conform to the quality and specifications of the original parts.
- (2) Misuse, abuse, neglect or improper installation.
- (3) Accidental or intentional damage.

**All implied warranties, if any, terminate one (1) year from the date of the original purchase.**

The foregoing constitutes Ameritron's entire obligation with respect to this product, and the original purchaser and any user or owner shall have no remedy and no claim for incidental or consequential damages. Some states do not allow limitations on how long an implied warranty lasts or do not allow the exclusion or limitation of incidental or consequential damage, so the above limitation and exclusion may not apply to you.

This warranty gives specific legal rights and you may also have other rights, which vary from state to state.