

ALINCO

DATARADIO

DR-1200T

INSTRUCTION MANUAL



DR-1200T

ALINCO ELECTRONICS INC.

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INTRODUCTION

Thank you for purchasing the Alinco DR-1200T (US Model).
Alinco radios and other products are ranked as some of the finest in the world. Your DR-1200T has been manufactured and tested very carefully at the factory and will give you satisfactory operation for many years. We are confident that you will be very satisfied with your choice of this fine ALINCO radio.

ACCESSORIES

Carefully unpack your transceiver and you will find the standard accessories included:

Standard Accessories

- DC Power Cable
- Interface Cable

Optional Accessories

- Mobile Bracket
- Mobile Bracket Mounting Hardware
- Microphone for DR-1200T
- 4 pcs. of rubber foot

SPECIFICATIONS

■ General

Frequency Coverage	144.0 ~ 148.0 MHz
Antenna Impedance	50 ohm unbalanced
Power Requirements	13.8 volts D.C.
Receive Current	0.5 ampere (approx.)
Transmit Current	5.5 ampere (approx.)
Dimensions	5½ × 2 × 6¾ Inches
Weight	2.25 lbs.

■ Transmitter

Output Power	25 watts
Emission Mode	16F3
Modulation Type	Variable Reactance (True FM)
Maximum Frequency Deviation	± 5 kHz
Spurious Emission	Better than - 60 dB

■ Receiver

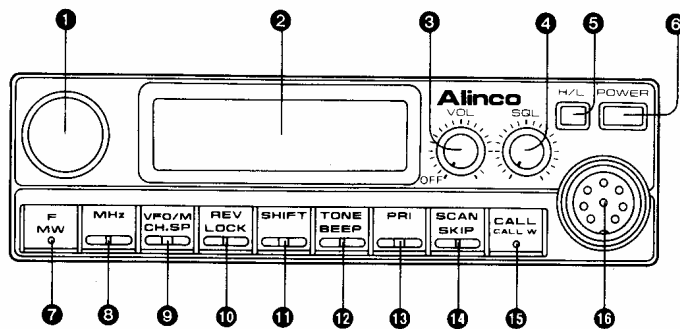
Receiver Type	Dual Conversion, Super Het.
Modulation Acceptance	16F3
Intermediate Frequency	10.7 MHz and 455 kHz
Sensitivity	12 dB SINAD less than 0.16 µV
Selectivity	Better than ± 6kHz at the - 6 dB points. Less than ± 12 kHz at the - 60 dB points.
Audio Frequency Output	2 watts into 8 ohm @ less than 10 % distortion.
Speaker Impedance	8 ohm

(For Ham Bands Only) Specifications and features are subject to change without notice or obligation.

OPERATION

CONTROL FUNCTIONS

Front Panel



1 Main Dial

Main dial is used to select the transmit/receive frequency, Memory Channel, Frequency Step, Tone Frequency, and Offset Frequency.

2 Display Panel

The LCD displays operation information such as transmit/receive frequencies, memory channel informations, offset, tone frequency etc. See page 6 for additional information.

3 VOL (Volume) Control

Turn the control clockwise to increase the volume, and turn it counterclockwise to decrease the volume.

4 SQL (Squelch) Control

The SQL control is used to eliminate noise during no signal periods. Normally this control is adjusted clockwise until the noise just disappears, and the BUSY indicator goes off. (Threshold level)

5 H/L (High/Low) Switch

This switch is used to select the desired transmitter output power level.

6 Power Switch

Press to turn on. Press again to turn off.

Function Keys (7 through 15)

NOTE: Commands underlined indicated in Blue on transceiver keys.

7 F (Function) Key

This is used to access secondary controlling function labeled in blue. i.e. MW, CH.SP, LOCK, BEEP, SKIP, and CALL W. See Function Operation pages 8-10.

MW is used with the F key to store data in memory. See Memory Pages 9-10.

8 MHz key

The MHz key is used to change the frequency up or down in one MHz steps.

Press the MHz key, and the decimal point and kHz digits will disappear from the display. The frequency in MHz will be changed by rotating the main dial or pressing the UP/DOWN buttons on the microphone. Press the MHz key again or the PTT switch to return the display to the complete frequency readout.

9 VFO/M (VFO/MEMORY) key

VFO/M is used to select VFO or Memory mode.

Press the VFO/M key to alternate between VFO and the Memory Channel mode.

CH.SP is used with the F key to select frequency steps for programming and scanning. See page 8.

10 REV (Reverse) key

REV is used to invert the TX and RX frequency in Repeater mode.

LOCK is used with the F key to disable the Function keys. See page 8.

11 SHIFT key

The SHIFT key is used to select the desired transmitter offset during repeater operation. When the key is pressed, the offset mode cycles from - to + to Dual to Simplex.

GREEN NC

12 TONE key

(CTCSS key)

The TONE key is used to:

A. Activate the Tone frequency selection process. See page 12.

B. Enable/Disable the Encode/Decode functions. See page 12.

The BEEP key is used with the F key to Enable/Disable the function confirmation tone. See page 8.

13 PRI (Priority) key

The PRI key is used to control Priority function. See pages 11-12.

14 SCAN key

The SCAN key is used to activate the frequency scan and memory scan functions. See pages 10-11.

The SKIP key is used with the F key to skip busy memory frequencies when scanning. See page 8.

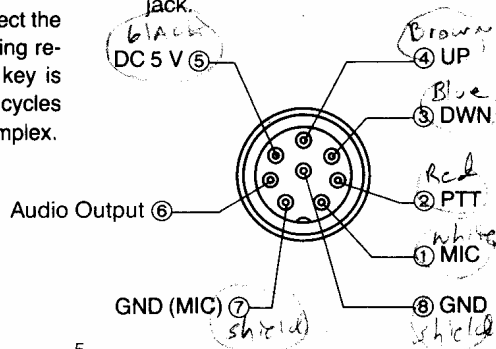
15 CALL key

The CALL key is used to bring Memory Channel "C" to the display. See page 9.

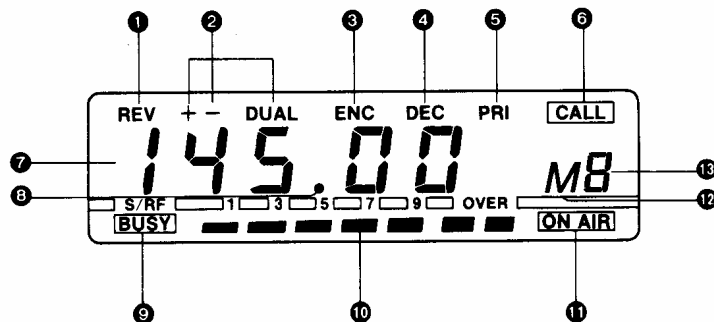
The CALL W is used to enter frequency into memory channel "C". See page 9.

16 Microphone Connector

Plug the interface cable into this jack.



Display



① REV (Reverse) Indicator

Turns on when the reverse function has been selected.

② Shift and Dual indicators

“+” or “-” indicator turns on during repeater offset operations. See page 13. “DUAL” indicator turns on during Dual operation. See page 14.

③ ENC (Encoder) indicator

Turns on to indicate that ENCODING TONE function is active.

④ DEC (Decoder) indicator

Turns on to indicate the DECODER (CTCSS) function is active.

⑤ PRI (Priority) Indicator

Turns on to indicate the PRIORITY function is active.

⑥ CALL Indicator

Turns on to indicate the CALL function is active.

⑦ Frequency display

Displays the transmit/receive frequency, Frequency Step, or Tone Frequency.

⑧ Decimal point indicator

Separates the MHz, and kHz. Flashes in Scan mode. Disappears in Memory skip mode.

⑨ BUSY indicator

On whenever the squelch is open or signal is received.

⑩ S/R/F Meter

This meter indicates the relative receive input signal strength and relative transmitter RF output.

⑪ ON AIR indicator

Turns on during transmit operations.

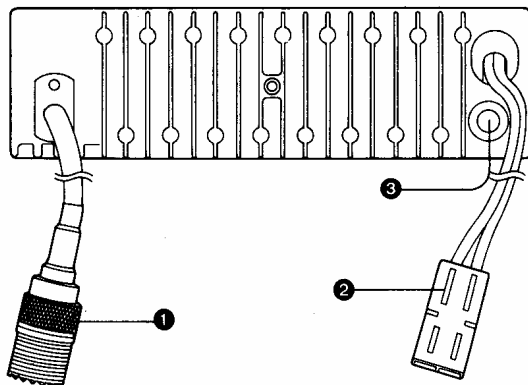
⑫ M (Memory) indicator

Turns on whenever the transceiver is in the Memory mode. Flashes to indicate programming in process.

⑬ Memory Channel Number display

Indicates the selected memory Channel Number.

REAR PANEL



① Antenna Connector

Used to connect the antenna to the set.

Use a PL259 antenna-plug with 50 ohm impedance.

② Power Connector

Connect the supplied power cable to this connector.

③ External Speaker Jack

When an external speaker (Imp.: 8 ohm) is used, connect it to this jack.

FUNCTION Operation

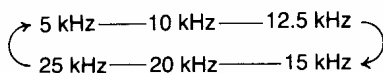
Whenever the F key is pressed, the "M" indicator will flash. You must complete the desired programming within 5 seconds, or the indicator goes off or stops flashing. In that case, you must press the F key again.

The F key is used with secondary functions printed in blue on the transceiver function keys.

1. Frequency Step Selection

The frequency step can be selected by using the following procedure:

- Press the VFO/M key to select the VFO mode.
- Press the F key and then press the CH.SP key.
- Select the desired frequency step using the Main Dial (or the microphone UP/DOWN buttons.) The example below shows the order, in which the Main Dial (or UP/DOWN buttons) will increase or decrease the spacing.



- Press the F key again or PTT switch to return to VFO mode.

2. Key Lock

- Press the F key, and then press the Lock key.
- The "L" indicator will replace the Memory number shown on right side of display.
- Stops all function keys except the PTT switch.
- To cancel this function, press the F key and the LOCK key again.

3. BEEP ON/OFF

- Press the F key, and then press the BEEP key.
- Repeating this procedure, beep will turn ON and OFF alternately.

4. Memory Skip

The Memory Channel Skip function allows you to temporarily skip unwanted Memory Channels during Memory Channel Scanning.

- Press the VFO/M key to select the Memory Channel mode.
- Select the Memory Channel that you want to skip using the Main Dial. (or the microphone UP/DOWN buttons.)
Press F key, and then press the SKIP key. The decimal point between MHz and kHz will disappear from the display.
- A frequency in memory without the decimal point will be skipped when scanning memories.
- To cancel Memory Channel Skip, press the F key and the SKIP key again.

5. CALL Channel Entry

- A. Select VFO mode by pressing the VFO/M key.
- B. Select the desired operating band and frequency.
- C. Press the F key, and then press the CALL W.
- D. When the CALL W is pressed, the frequency shown on the LCD will be stored into memory "C".
- E. Whenever CALL is pressed, Memory "C" will come to the display.
- F. To Change from CALL mode back to VFO or Memory, press the VFO/M key.

6. MEMORY

A lithium battery is installed to retain memory in the transceiver. Turning off the POWER switch, disconnecting power cable, or a power failure will not erase memory. The battery should last for approximately 5 years.

•Microprocessor Initialization

When you want to erase all programmed data, or if the display should show erroneous information, you should reset (initialize) the microprocessor using the following procedure:

1. Press and hold the F key and the VFO/M key at same time, and turn off the POWER switch. Now turn the POWER switch on again, while still holding buttons depressed.
2. Release the buttons—Factory programming is now in place.

•Memory Channel

This transceiver has 14 memory channels (1–9, A–E). In addition to serving as normal memory channels, some serve a dual purpose. The functions of the Memory Channels A–D are described below.

- A. Memory Channels A and B are used to store the Frequency limits for the Program Scan Function. For additional information, see Band Scan on page 11.
- B. Memory Channel C is used to store the CALL channel frequency.
- C. Memory Channel D is used to store the transmit frequency used for odd offset operation.

•Memory Channel Contents

Each Memory Channel is capable of storing:

- Frequency
- SHIFT status (Offset)
- TONE status, (Encode, Decode, and Frequency)
- Receive Frequency for odd offset operation. See page 14.

•Memory Entry

1. Press the VFO/M key to select the VFO mode.
2. Select the desired operating frequency.
3. Activate sub audible tone if it is required.
4. Press the F key. The "M" indicator will flash.

5. Select the desired Memory Channel using the Main Dial (or the microphone UP/DOWN buttons.)
6. Press the MW key during the "M" indicator is flashing. If the flashing stops before the MW key is pressed, you must press F key again in order to complete the desired function.

■ SCAN

The following scan options are available:

Program Scan (Limited Frequency Coverage in one band only)

Memory Scan

Band Scan

A. Programmable Scan

The scan frequency is determined by the frequencies stored in Memory Channels A and B.

The frequency stored in Memory Channel A and B must be different frequencies.

Before pressing the SCAN key, adjust the SQL control to the threshold level.

1. Determine the desired scan frequency range and enter the frequencies into Memory Channel A and B.
2. Press the VFO/M key to select the VFO mode, and also select the band of the stored frequencies.
3. Press the SCAN key to initiate scan.
4. To clear scanning, press the SCAN key.

B. Memory Scan

1. Press the VFO/M key to select the Memory Channel mode.
2. Before pressing the SCAN key, adjust the SQL control to the threshold level.
3. Press the SCAN key to initiate scan.
4. To clear scanning, press the SCAN key.

C. Band Scan

This scan will proceed over the entire tuning range of band.

1. Press the VFO/M key to select the VFO mode.
 2. Store the same frequencies into Memory Channels A and B.
 3. Before pressing the SCAN key, adjust the SQL control to the threshold level.
 4. Press the SCAN key to initiate scan.
 5. To clear scanning, press the SCAN key.
- The transceiver will stop on a busy channel until a signal drops. After a short delay the scan will resume.
 - If you want to resume scanning when the transceiver stops on a busy channel, rotate the Main Dial.

■ PRIORITY SCAN

The following Priority Scan options are available:

Memory Priority Scan
VFO Priority Scan
CALL Priority Scan

A. Memory Priority Scan

1. Store the desired priority frequency into any Memory.
2. Select VFO mode, and dial up the frequency you want to operate on.
3. Press the PRI key to initiate Memory Priority Scan.
The transceiver will scan the Priority in Memory Channel for 1 second out of 6 seconds and the VFO frequency for the remaining 5 seconds.
4. When a signal is present on the Priority Memory Channel, press the PRI key, and then press the VFO/M key. The Priority scan will stop and the Memory Channel will come to the display.

B. VFO Priority Scan

This function is the reverse of Memory Priority Scan.

1. Select VFO mode, and dial up the frequency to be scanned.
2. Select the desired Memory you want to operate on.
3. Press the PRI key to initiate VFO Priority Scan.
4. To cancel this scan, press the PRI key again.

C. CALL PRIORITY SCAN

1. Store the desired frequency for operation in Memory Channel "C".
2. Press the CALL key and then the PRI key.
3. The transceiver will scan the VFO for 1 second and the CALL Channel for 5 seconds alternately.

■ TONE FREQUENCY SELECTION

1. To select a Tone (CTCSS) Frequency, press the VFO/M key and select the VFO mode, then press the TONE key. The display will indicate a Tone Frequency in Hz.
2. Select the desired Tone Frequency using the Main Dial.
3. This press also enables/disables Encode/Decode activation. There are 37 CTCSS Tone Frequencies available as shown below.
4. Press any key to return to the receiver frequency display. The subaudible tone will be while transmitting.

Subaudible Tone Chart

Hz	Hz	Hz	Hz	Hz	Hz
67.0	85.4	107.2	131.8	162.2	203.5
71.9	88.5	110.9	136.5	167.9	210.7
74.4	91.5	114.8	141.3	173.8	218.1
77.0	94.8	118.8	146.2	179.9	225.7
79.7	100.0	123.0	151.4	186.2	233.6
82.5	103.5	127.3	156.7	192.8	241.8
					250.3



■ TONE SQUELCH (CTCSS)

This function allows you to remain squelched until the proper Tone Frequency is received. If you are on a busy frequency, this can be quite an aid.

1. Press the TONE key. The "ENC" will appear on the display panel. Press the TONE key again. The "DEC" will appear next to the "ENC".
2. Your radio will now remain squelched until the proper code is received. You should ensure all stations you wish to communicate with, use the same Tone Frequency.
3. To release the Tone Squelch function (Normal noise activate squelch), press the TONE key again. The "ENC" and "DEC" will disappear from the display.

■ REPEATER Operation

All amateur radio repeaters utilize a separate receiver and transmitter section. The receiver frequency may be either above or below the transmitter frequency.

This transceiver allows you to store the frequency, offset frequency (0.6, 1.6, 5.0 and 7.6 MHz.) and offset direction in Memory Channel (1-9 and A-E).

To select the desired transmitter offset direction, press the SHIFT key.

Each time you press the key, the radio will advance from one offset to the other, i.e. "-" to "+" to "Dual".

To select the desired transmitter offset, press the SHIFT key, and then rotate the Main Dial. Each time controls, the radio will advance through the following steps: "0" to "0.6" to "1.6" to

"5" to "7.6". After the offset has been stored, press any key, except the SHIFT key.

The normal display will return.

■ REVERSE Function

The REV key has been provided to allow you to reverse the transmit and receive frequencies. To use the Reverse function, press the REV key. The REV indicator will light in the display to remind you that you are working a reverse repeater pair.

To return to normal operation, press the REV key again.



TRANSMISSION

Caution

1. Ensure that an antenna with a low standing wave ratio (SWR) is attached to the antenna connector before attempting to transmit. Failure to provide proper termination may result in damage to the final amplifier section.
2. Always check to ensure the frequency is clear before transmitting.

A. Simplex Operation

1. Select the desired operating frequency using any of the methods described above.
2. Send command to transmit from your TNC. The ON AIR indicator will be lit.

B. Odd Offset Operation

—For other than 600 kHz, 1.6 MHz, 5.0 MHz and 7.6 MHz splits.

1. Select Memory "d" in memory mode.
2. Select VFO and dial up a transmit frequency required.
3. Press the F key then press the MW key to store the transmit frequency into memory "d".
4. While still in VFO mode dial up a receive frequency.
5. Press the SHIFT key to select offset, continue to press until transceiver cycles through +, - and Simplex to "Dual".

DATARADIO OPERATION

■ FOREWORD

PACKET RADIO has propelled Amateur radio into the era of computers with a quantum leap. Because of this rapid move into the world of digital communications, there are many new hams entering the hobby for the express purpose of using these digital modes that make use of the computer and associated software.

As a result of this rapid growth, many of these new amateurs found that it would require the use of the FM mobile unit, or a second VHF transceiver to access the large variety of Packet applications that exist, including; keyboard to keyboard networks, switches, nodes, DX spotting nets, BBSes, conference clusters, and much more enjoyment centered around the use of Packet radio.

With many of these Packet systems, the user can connect to distant stations in other cities, states, and countries using low powered transceivers. There is no need for super powered transceivers that run hundreds of watts.

Packet Radio is a mode of communications which makes use of a "store-and-forward" technique called; AX.25 protocol. This format provides error-free through-put of both ASCII, and binary, text or data between stations that are connected using the AX.25 protocol.

ALINCO attends hamfests throughout the United States, and the world. One of the subjects that seem to be on the mind of many Packeteers is; Where can they find an economical transceiver that will function well when used in the digital, or Packet modes?

ALINCO LISTENED TO YOUR REQUESTS, and ALINCO has responded with the kind of transceiver that is designed with the Packeteer in mind. First of all, the DR-1200T is engineered to provide optimum audio characteristics for the Mark and Space tones of 1200 and 2200 Hz. By using this approach with both the transmit and receive circuits, the DR-1200T can be utilized with both 1200 and 2400 bps.

The same high quality is built into the DR-1200T DataRadio as with all other ALINCO products, yet the cost of the DataRadio had to be considered, because for many Packet users this would be a second transceiver. In order to make the DR-1200T DataRadio more economical, the DR-1200T comes without a mobile mounting bracket, microphone, or accessories that are not needed in a Packet Radio environment. This does not mean the DataRadio is not suitable for use with FM voice operation.

As a matter of fact, the DR-1200T performs well in voice applications. An accessory kit that includes the microphone, and mobile mounting bracket is available as an option for the DR-1200T DataRadio.

INTERFACING YOUR ALINCO DR-1200 TO THE TNC

In an effort to minimize the new DR-1200 DataRadio owners time putting the station on the air, ALINCO is including the necessary interface cable with the transceiver connector already installed. This means that only the connector for the TNC end is needed to put the Packet station on the air. Many TNC manufacturers include the TNC connector as one of the supplied accessories.

Pin out connections for the DataRadio I/O connector are listed below. These connections are already wired and soldered at the DataRadio connector (female) end of the cable. The color coded wires identify the appropriate TNC signal connections.

Note:

If hum or noise is experienced on the transmitted packet signal, disconnect the shield connection at the TNC end of the cable. The gray wire at pin 8 will provide ground return for the PTT line, and no other ground are necessary. As an added benefit, ALINCO is supporting the new DR-1200 DataRadio owner by including some drawings that illustrate examples of how the DR-1200 is interfaced to many Packet Radio, Terminal Node Controllers (TNC).

Before beginning the interface, and setup procedures that are discussed in the next portion of this manual, it is recommended that you read the appendices in the final section of this manual. This will familiarize you with the transceiver, and best of all you will discover the many wonderful features that are a part of your ALINCO DR-1200 DataRadio.

Packet Operation of the ALINCO DR-1200 DataRadio

Using the interface configuration for your TNC, connect the DR-1200 to the TNC. Your TNC should already be interfaced to your Data Terminal Equipment (DTE). The DTE can consist of a "dumb" terminal, or a computer with the appropriate terminal software loaded.

The TNC should be configured for the correct hand-shaking between the computer/terminal, and the TNC. Most computers use "hardware" hand-shaking. If this is true in your situation, then set the TNC XFLOW to OFF. If you are using "software" hand-shaking, then set the XFLO to ON.

To begin operation of your Packet station, there are other TNC parameters which may need setting. As a rule the TNC manufacturer will supply the TNC with "DEFAULT" parameters which are acceptable. As you become

DR-1200 PIN NUMBER	WIRE COLOR	TNC Function
1	YELLOW W/Black Sleeve	AFSK OUTPUT
2	RED Push-To-Talk	PTT Control
6	ORANGE Rx AF	RECEIVE Audio
7	SHIELD	Shield/Ground
8	GRAY Ground	PTT Ground

familiar with your new station, and with the ALINCO DR-1200, you may determine that some adjustments of the TNC parameters are needed.

Before continuing; install your callsign into the TNC. At the command prompt (cmd:), enter your callsign in the following manner:

```
MYCALL [Your Call] <Enter>
```

Note:

Callsign installation may differ in some TNCs.

For openers we will set a few of the TNC parameters as follows:

TXDelay 30 to 40 (milliseconds)

TXD 35 is optimum for the DR-1200. In most applications, you may find that even faster TXDelay times are acceptable. This is because the ALINCO DR-1200 DataRadio has a very rapid receive to transmit transition period.

The following parameters are suggested, however, the TNC may have default parameters which can function without modification or change.

```
FRack 4 SCReenl 0 MCOM ON  
MCON OFF DWait 16 MRPT ON
```

Still other TNC parameters can be set to suit the users system, and mode of operation. It should be pointed out that these settings may also depend on the make and model of your terminal, and in some cases, the software. Ensure that an antenna, set for the VHF Packet portion of the band, is attached to the DR-1200. Make sure the DR-1200 is on the packet frequency that you wish to use, and check the transceiver "shift" or offset to be sure

it is set correct. Most Packet systems operate in the simplex mode, thus, there are no offsets and no "shifts" used.

If you are unable to contact a local Packet Users Group, or fellow packeteer to assist with your first contact, then try one of the national throughput frequencies like 145.010 MHz.

■ NOMINAL SETTINGS

In tests we've run on many TNC's, we've found that setting the volume control pointing to the left, or to 9:00 O'clock, will provide ample receive audio for decoding data by most TNC. As you become familiar with the transceiver and TNC, you may observe that less receive audio is needed... or in a few instances, your TNC may require slightly more AF. The squelch is set to a point where no noise (white/shot noise) is received through the speaker of the DR-1200T, or indicated by the DCD lamp on the TNC. Under normal operating conditions, we've noticed that a setting of 12:00 O'clock is sufficient to keep the noise subdued until a packet signal is present.

■ RECEIVING PACKET SIGNALS

Another way to set the volume and squelch with the TNC is to make all the correct interface connections, and with the system on and in the receive operating mode, turn the volume up about one fourth turn, or to about ten O'clock. Open the squelch by turning it all the way counter-clockwise, until noise is heard.

While watching the DCD, RCV, or CONV, LED (depending on the manufacturer) on the TNC, assuming the DCD lamp is illuminated, turn the volume control down until the DCD LED is no longer lit. Now slowly turn the volume control until it again illuminates. To be sure there is ample AF drive to the TNC, move the volume control slightly, more clockwise. This will ensure that enough audio is

present to provide optimum data decoding.

■ REMEMBER; TOO MUCH AUDIO IS AS BAD AS NOT ENOUGH!

Next turn the squelch up (clockwise) until the DCD LED extinguishes or goes off. As with the volume, close the squelch slightly more clockwise to be sure there is a solid squelch threshold.

If you are on a packet frequency, and there are packet signals present, your DR-1200T should be hearing the packet signals. If the terminal is connected and the TNC is properly configured, your station should be printing text on the screen or to the printer, if one is present.

■ TRANSMITTING PACKET

To operate (transmit) a packet station you should have a current amateur radio license that allows operating privileges within the spectrum that your DR-1200T is tuned to.

If the interface cables are properly wired and connected then we are ready to establish contact with another Packet station.

It is wise to solicit the help of another person who is already operating in the Packet modes. This way you will have someone who can listen for your signal, and guide you into the operating frequencies that are used for Packet in your area.

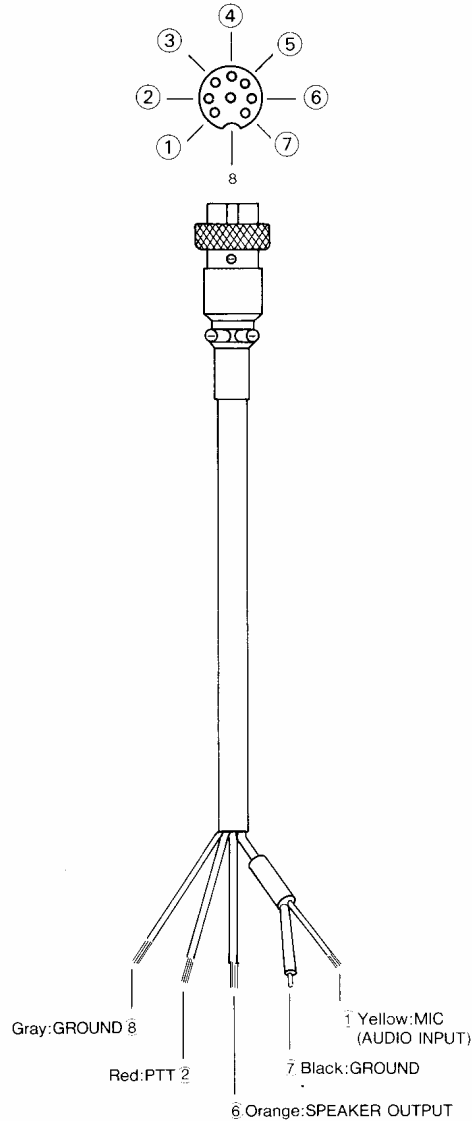
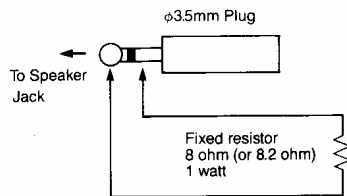
Although the ALINCO DR-1200T DataRadio is engineered to make use of limiting circuits that are designed to prevent over modulation (deviation),

INTERFACE CABLE

there are some TNCs which may drive the transmit audio circuitry too much. An indication that a problem such as this is present, would be noticed when a connect is tried to a nearby Packet station with no results. Often too much transmit deviation can cause the same problem as not enough transmit audio. The best audio level setting has been found to be in the range of 3.5 kHz to 4.5 kHz swing. All TNC, without exception, have provisions within their circuitry that allows the user to increase, or decrease the AFSK level(s) when necessary. It is advisable to have knowledge of which component inside the TNC, controls the audio output as it may be necessary to make an adjustment to the associated level control(s). Remember; this is the exception, and not the rule, less than 20 percent of all TNCs will require any adjustment at all.

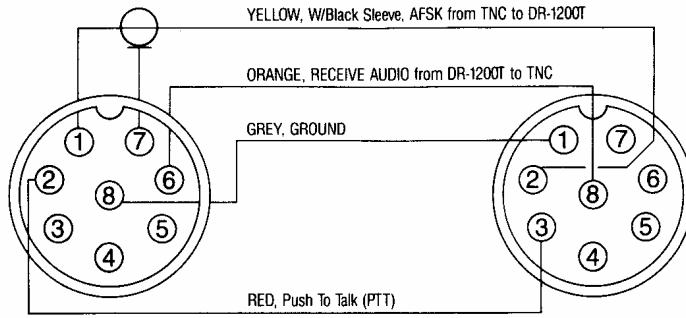
ADDITIONAL INFORMATION

To turn off audio signal from a speaker, you can plug dummy load as below.



Remarks: The number of cables are five and ③, ④, ⑤ are un-useful.

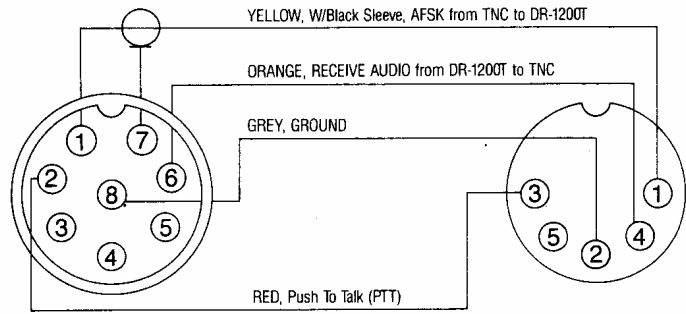
■ CONNECTION SAMPLES FOR PACKETS



ALINCO DR-1200T

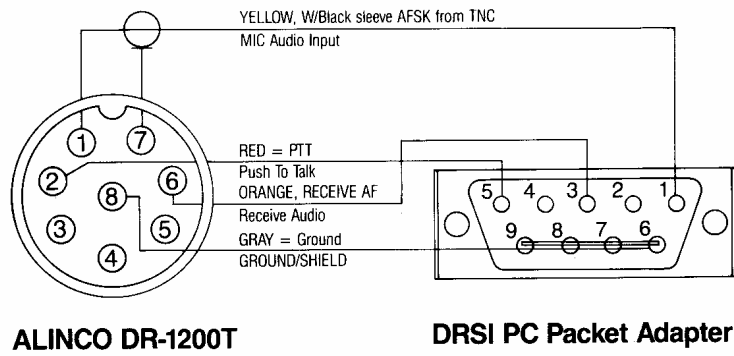
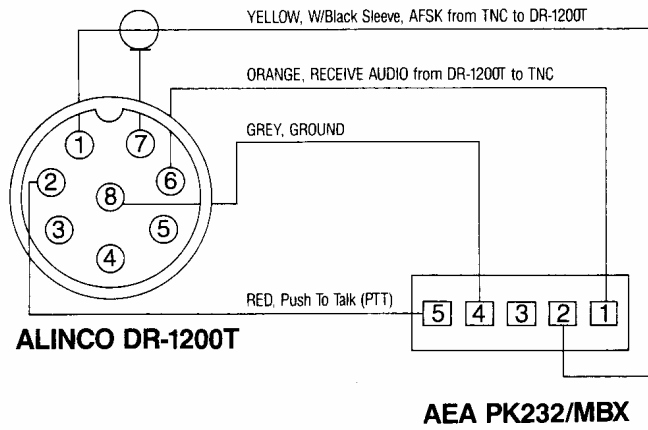
AEA PK-88

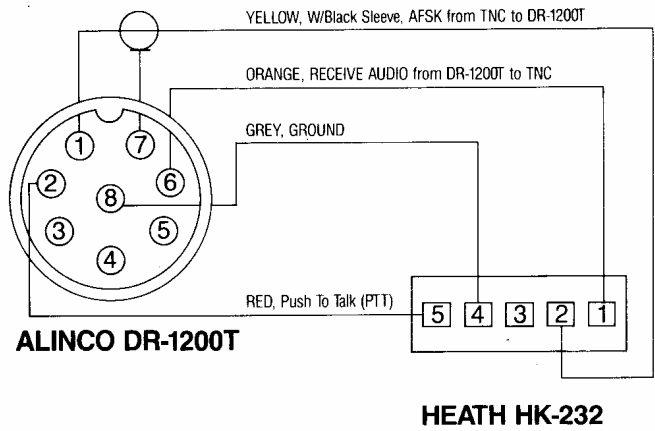
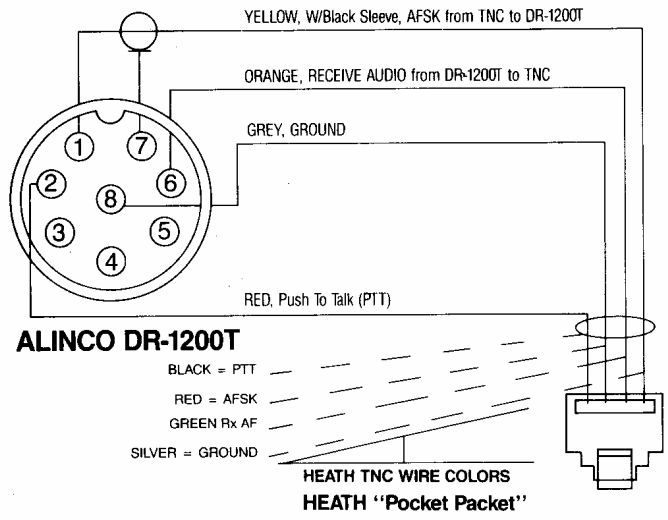
- 1 = YELLOW, W/Black Sleeve AFSK in
- 2 = RED, Push-To-Talk (PTT)
- 6 = ORANGE, RECEIVE Audio to TNC
- 8 = GRAY, Ground

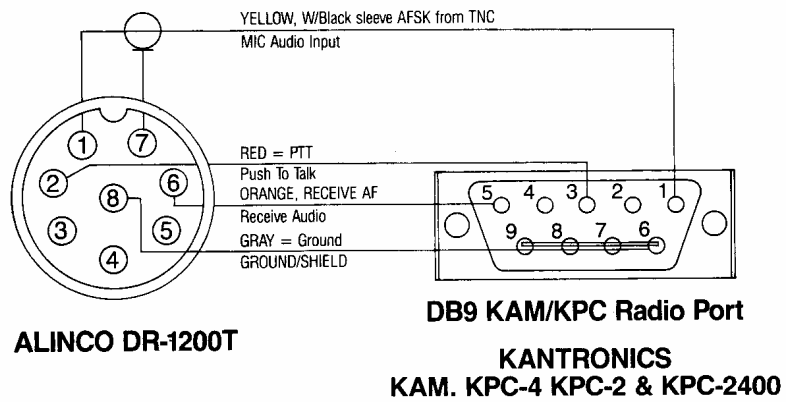
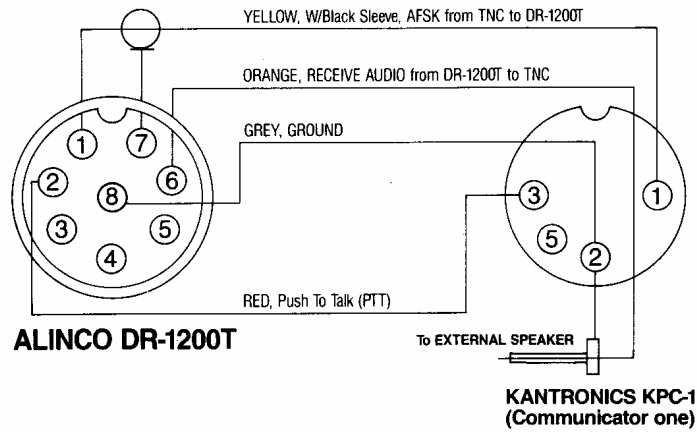


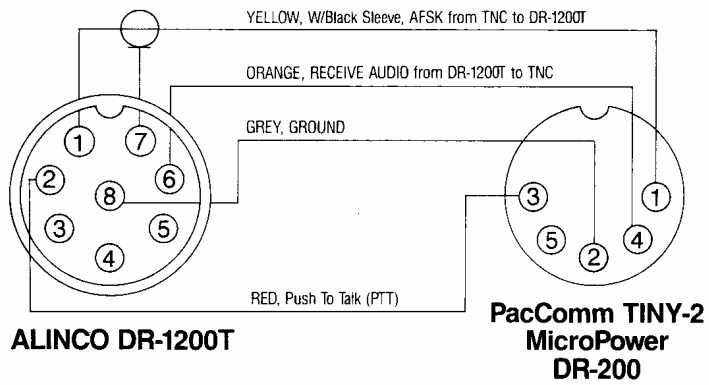
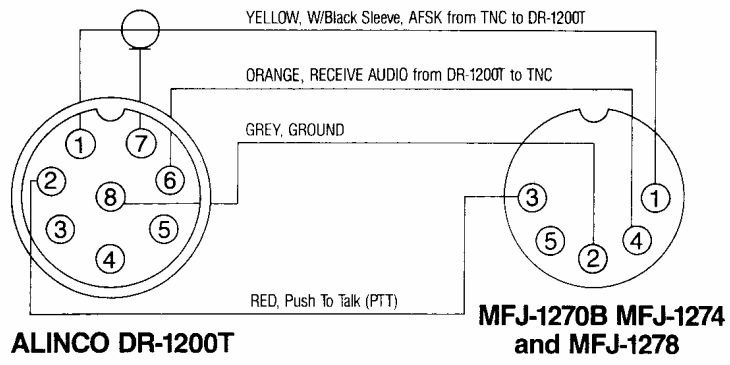
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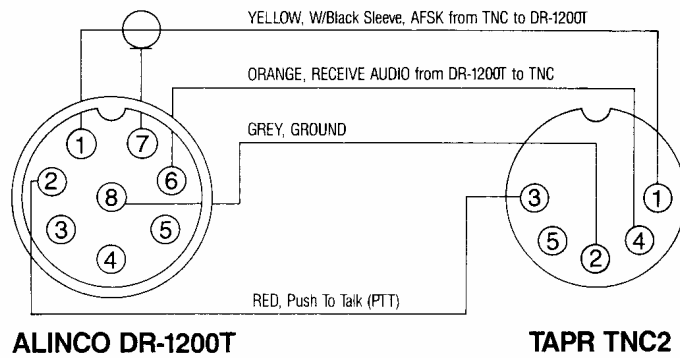
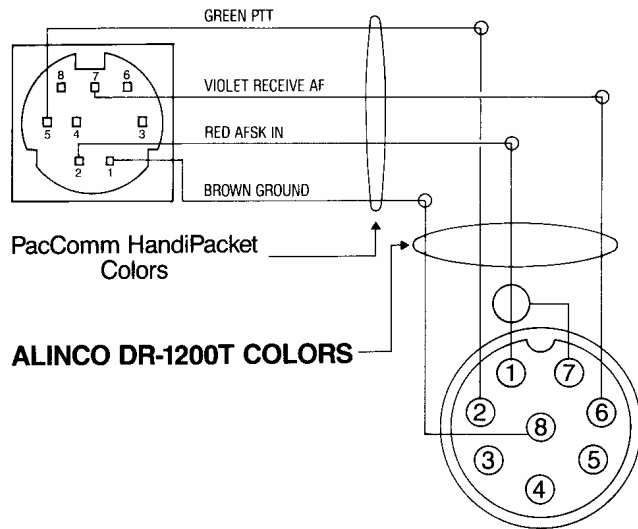
AEA PK-87











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