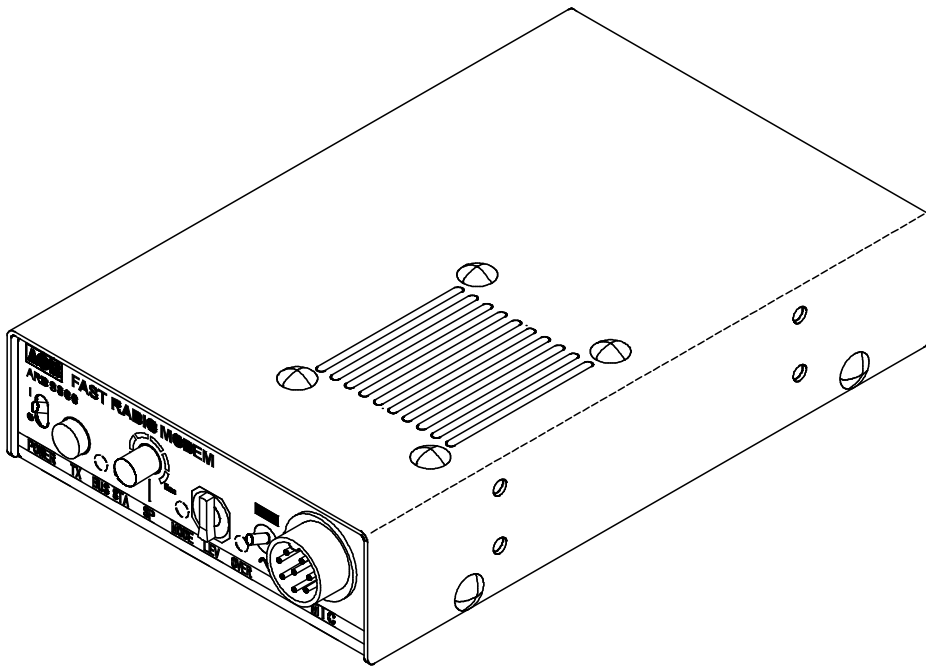# ARD9800

FAST RADIO MODEM

Multi-Mode and Digital Voice Interface

Operating manual

AOR, LTD.

Thank you for purchasing the AOR **ARD9800** Multimode And Digital Voice Interface.

The **ARD9800** is designed to convert your HF radio equipment to a multi mode and digital voice radio without performing any modifications to your transceiver.

Please read through this instruction manual and familiarize yourself with the operation of the **ARD9800**. We suggest you to keep this instruction manual for future reference.

We believe you will enjoy using the **ARD9800** as an enhancement to your enjoyment of amateur radio.

AOR, LTD.

Features:

- Digital voice communications using existing analog 2 way radios. The ARD9800 uses the same audio frequencies (300 Hz ~ 2500 Hz) as microphone audio to modulate the voice signal. This allows you to use an analog radio as a digital voice transceiver.

- Digital voice communications in the Single Side Band (SSB) mode. The automatic frequency clarifier function adjusts frequency drift automatically in the SSB mode. (Approximately up to +/- 125 Hz). Utilizes the ODFM (Multi Carrier Modulation) circuit that is effective against Multi-path or Selective Fading.

- Automatic digital receive. Automatic voice signal detector recognizes the received signal as analog or digital, automatically switching to the appropriate mode.

- Digital Slow Scan TV (SSTV). Built-in video capture function (NTSC or PAL depending on version). Compresses the signal into our original adaptive JPEG. Send and receive images (similar to analog slow scan TV, but higher resolution) in the Digital mode. Built-in video output connector (NTSC or PAL depending on version) allows viewing the picture on an external monitor.

- Built-in high grade Vocoder (AMBE). Uses high grade digital voice compression to deliver quality digital voice communications.

- Built-in FEC error correction. A powerful error correction circuit delivers stable and reliable communications.

- Data communications on the HF band Data communication is possible on the HF (High frequency) bands at no extra cost. (Speed may be limited by regulations in certain jurisdictions.)

- Small and compact unit. Easy to operate. Simply connect the ARD9800 to the microphone jack. No complicated or risky radio modifications are necessary.

- Utilizes a uniquely designed high performance DSP (Digital Signal Processor) engine.

- Battery operation possible for field use.

Precautions

To prevent fire, personal injury, or unit damage, please observe the following precautions:

- Do not attempt to adjust this unit unless instructed to do so by this manual.
- Do not expose the unit to direct sunlight or place the unit close to heating appliances.
- Do not place the unit in excessively dusty, humid or wet areas.
- We are not responsible for any damages to the radio equipment due to improper settings or interface.
- We are not responsible for any loss of communications due to an unexpected change in propagation or the operating environment.

Table of Contents

Supplied Accessories

The following items are provided in the box:

Accessory	Quantity
Microphone	1
PC interface cable	1
Speaker Cable	1
DC Power cable	1
8P metal plug (for radio cable)	1
Instruction manual	1

Controls and Functions

Front Panel
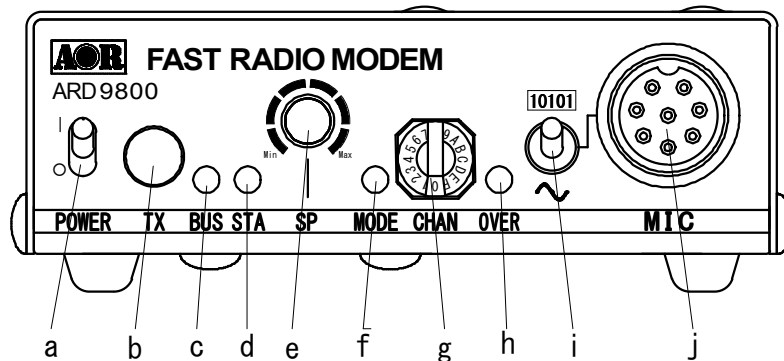
a. **Power on/off switch**

b. **TX switch**

Press this switch to capture image and send. When the Video Through Function is activated (AVT command is ON), pressing this switch will enable output of the video signal connected to the Video Input to be bypassed to the video output so that you can monitor the video image. Press this switch again to capture the image and then transmit it through the radio equipment.

When the Video Through Function is de-activated (AVT command is OFF), pressing this switch will automatically capture the video image and then transmit it through the radio equipment.

Refer to : Operation -- Digital Image Communication at page 20 for details.

c. **2 color LED**

Illuminated red	The unit is in the transmit mode
Blinking red	In the digital communication mode, it blinks while the header information is being sent. (approximately one (1) second)
Illuminated Green	The unit is in the receive mode
Unlit	The unit is in the receive standby mode or in the analog voice receive mode.

d. **Status LED (STA LED)**

It is lit when unsent data remains in the memory.
It is lit with *orange color* when Video Through Faction is activated in digital video communication mode.
It is not lit when Video Through Function is deactivated by the dedicated command (AVT_OFF) though PC. Because, TX switch activates a sequential faction of capturing and transmission.

It is also lit with orange color when unsent data is remained in the memory in the data transmission mode.

e. **Speaker volume adjustment**

Adjustment for internal speaker output level. When an external speaker is connected, external speaker level is also adjusted.

f. **Operation Mode LED (3 colors)**

Indicates the current operation mode:

Green color	Digital Voice mode
Red Color	Analog Voice mode
Orange Color	Data Communication mode
Not lit	Digital Image Communication mode

g. **Transmitting channel (Rotary Switch)**

It consists of 16 channels. Each channel can be programmed with a Transmitting ID for distant station, NetMask, etc. Freely programmable depending on the communications scheme.

h. **Overload indicator**

Lit when the microphone input is overloaded.
A proper microphone input level will light the LED from time to time when speaking into the microphone at a normal voice level. The microphone level can be changed by adjusting the microphone level controller.

Refer to Level Adjustment - Output Level to Radio Transceiver at page16 for details.

i. **Mode switch**

Select the Digital voice mode (10101) or the Analog voice mode (~) When the Analog voice mode (~) is selected, ordinary analog voice communications will be made. In the receive mode, however, the ARD9800 will automatically detect the mode of the incoming signal and decode signals accordingly. The LED indicates the appropriate operation mode.

j. **Microphone connector**

Connect the supplied microphone to this connector. Below are the pin assignments of the connector.

1. Speaker output (SP-OUT)
   Monitor output signal is present at this pin.
2. BIAS
   Power source for an electric condenser type of microphone. 5V DC through 2.2KΩ resistor.
3. GND
   Chassis ground
4. TX
   Grounding this pin will enable the transmit mode.
   (Same operation as the TX switch on the front panel.)

5. D/A

   Grounding this pin will force the unit to the digital voice communication mode. When this pin is left open, the operation mode will be set by the mode switch on the front panel.

6. MIC PTT

   PTT (Push To Talk) input.

7. MIC GND

   Microphone ground signal

8. MIC IN

   Microphone signal input

Rear Panel
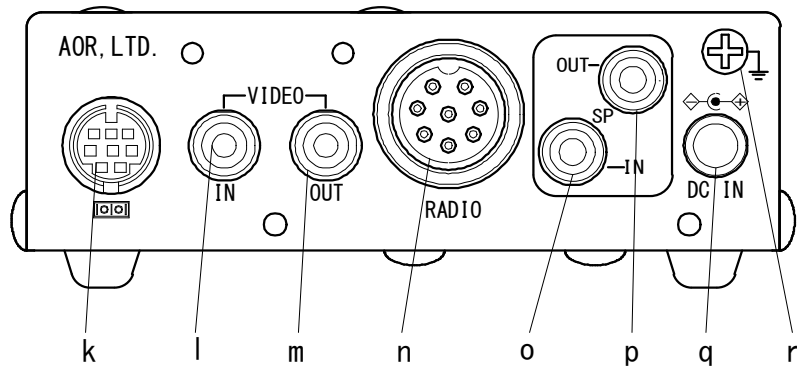
k. **Communication Connector (mini DIN 8 pin)**

A communication connector for PC (RS-232C)

Pin Number	Signal	Signal Direction
1	TX	ARD9800----->PC
2	DTR	ARD9800----->PC
3	DSR	ARD9800<-----PC
4	GND	GND
5	RX	ARD9800<-----PC
6	RTS	ARD9800----->PC
7	CTS	ARD9800<-----PC
8	NC	No Connection
Shell	FG	Frame ground

Baud Rate:	9600bps
Data Length:	8
Start bit:	1
Stop bit:	1
Parity:	None
Synchronization:	Asynchronous
Flow control:	Hardware

l. **VIDEO - IN connector (75Ω)**
   Connect a video signal source such as a digital camera.

m. **VIDEO – OUT connector (75Ω)**
   Connect a video monitor to this connector to monitor the received image or a picture to be sent.

n. **RADIO Connector**
   Using the supplied 8 pin connector, connect the ARD9800 to your radio equipment. You will need to wire a cable according to the microphone connector specifications of your radio (refer to your radio's manual).
   Below are the pin assignments of the ARD9800 connector.

Pin number	Signal	Details
1	MIC GND	Microphone ground
2	MIC OUT	Microphone Output
3	PTT (H)	PTT (Push To Talk) output (High level)
4	PTT (L)	PTT (Push To Talk) output (Low level)
5	NC	No connection
6	NC	No connection
7	GND	Ground
8	NC	No connection

   Note: MIC GND and GND must not be connected together in the ARD9800 connector, or RF feedback will result.

o. **SP IN Connector (3.5 mm mono jack)**
   Connect to the radio equipment's speaker jack. (Input level: 0.5 V – 5 V p-p)

   GND   SIGNAL
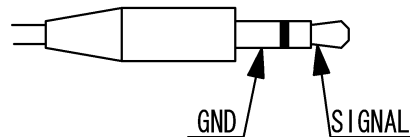
   Note: Output signal from the accessory connector of the radio may not be high enough to use for this purpose.

p. **SP OUT Connector (3.5 mm mono jack)**
   Connect an external speaker to this jack to disable internal speaker.

   GND   SIGNAL
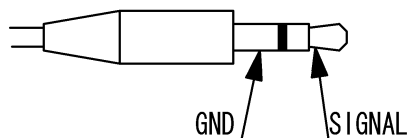
q. **DC IN Connector (EIAJ Type 4)**
   Connect to a regulated power supply. (10.7 ~ 16.0 V DC, Center pin – positive)

For lower voltage battery operation, set the internal jumper terminal for battery operation, and then connect external batteries.

Warning: If you have changed the internal jumper for low-voltage battery operation, battery voltage must be within the range of 5.6 ~ 6.5 VDC. DO NOT apply 12.0 V or severe damage will result, and the warranty will be void!

Note: There is no low battery voltage detector built-into the ARD9800.

r. **FG Screw**
    Frame ground

Top Panel
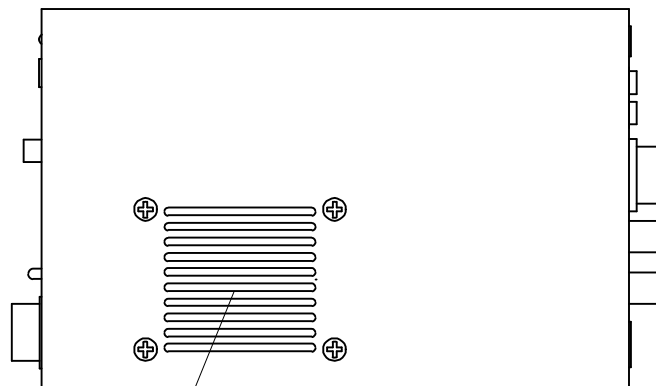
s. **Internal Speaker**

Internal View

(PCB design subject to changes.)
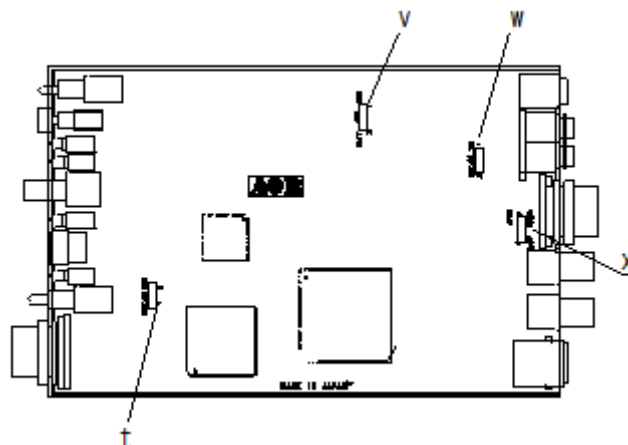
t. **Factory setting jumper**
    Must be set between 2-3.   (Do not change this setting at any time.)

v. **Battery operation selector**

   Place the jumper between 1 – 2 (NOR) for normal operation. Change it
between 2-3 (BATT) for battery operation.

   Warning: If you have changed the internal jumper for low-voltage battery
operation, battery voltage must be within the range of 5.6 ~ 6.5 VDC. DO NOT
apply 12.0V or severe damage will result, and the warranty will be void!

   Note: There is no low battery voltage detector built-into the ARD9800.

w. **Internal speaker setting**

   Jumper setting
   1 – 2   Activates internal speaker (default)
   2 -- 3   Disable internal speaker
            Speaker output is available from the pin #1 of the microphone
            Connector.

   *Note: The SP OUT (external speaker output) has priority regardless of the
   above jumper setting.*

x**. Output level setting**

   Jumper setting
      1 – 2   Normal level (default)   (LOW)
       2 – 3   High level (HIGH)
            In case the microphone output level is too low to drive your radio
            equipment, place the jumper to the 2-3 position.

   Refer to Presetting - Microphone Level at page 16 for details.

Bottom View

y

y. **Output Level Adjustment**

   *Refer to Presetting - Output level to Radio Transceiver at page 15 for
   details*

Interfacing the ARD9800

Connection to a Radio

Before using your ARD9800, you will first need to wire the cable between your radio equipment and the ARD9800.
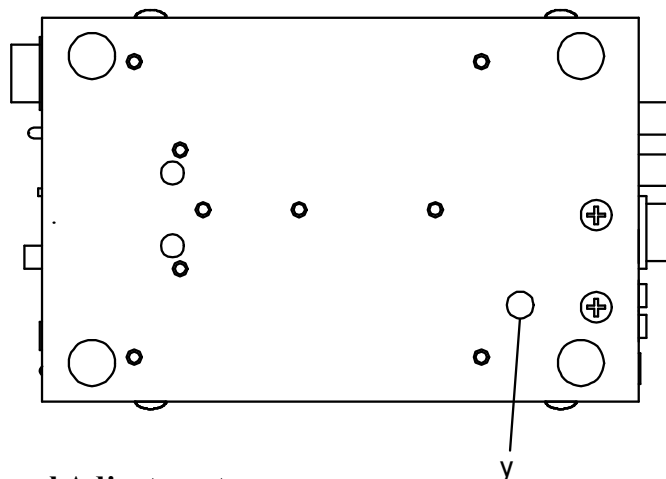
For your convenience, an 8-pin of a microphone connector for the ARD9800 is included. You will need to prepare, however, your own microphone connector for your radio equipment.

Below are the pin assignments of the 8-pin RADIO connector on the rear panel of the ARD9800.

Pin number	Signal	Details
1	MIC GND	Microphone ground
2	MIC OUT	Microphone Output
3	PTT (H)	PTT (Push To Talk) Output (H level)
4	PTT (L)	PTT (Push To Talk) Output (Low level)
5	NC	No connection
6	NC	No connection
7	GND	Ground
8	NC	No connection

```
      ARD9800                          RADIO EQUIPMENT

 ·RADIO Connector                            MIC GND
                                             MIC IN
      1  MIC GND                              PTT IN
      2  MIC OUT                              PTT GND
      3  PTT(H)                               GND
      4  PTT(L)
      5  NC                                   EXTERNAL SPEAKER OUT
      6  NC                                   GND
      7  GND
      8  NC
      Shel

 ·SP IN Connector

      Signal
      GND
```
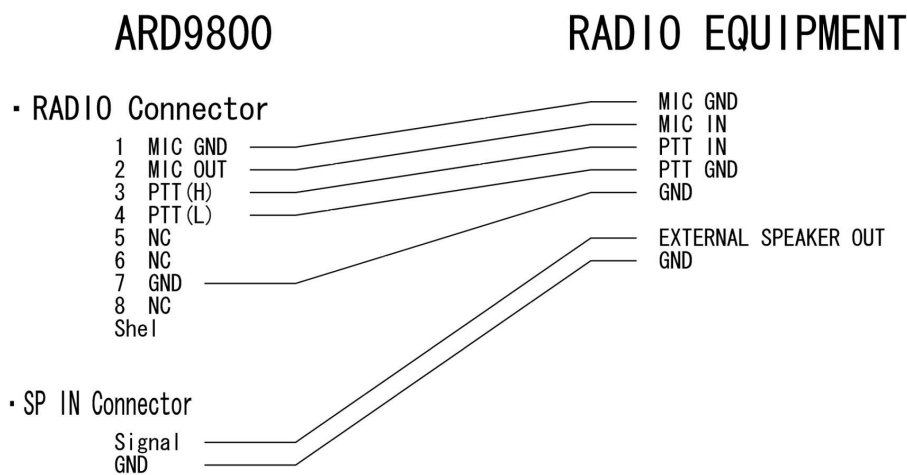
> *Note: MIC GND and GND must not be connected together in the ARD9800 connector, or RF feedback will result.*

> *Both a microphone plug and a cable for your radio transceiver are required to be prepared at the user side.*

Connection to a Microphone

A speaker microphone is included with your ARD9800. However, if you wish to use your own microphone with the ARD9800, you may do so by wiring your microphone to the ARD9800. Below are the pin assignments of the microphone connector of the ARD9800.

1. SP-OUT (Speaker output)
    Monitor output signal is present at this pin.
2. BIAS
    Power source for an electric condenser type microphone.
    5V DC through 2.2K Ω resistor
3. GND
    Chassis ground
4. TX
    Grounding this pin will allow to transmit .
    (Same operation of the TX switch on the front panel.)
5. D/A
    Grounding this pin will force the ARD9800 to the Digital voice communication mode. When this pin is left open, the operation mode will be set by the mode switch on the front panel.
6. MIC PTT
    PTT (Push To Talk) input.
7. MIC GND
    Microphone ground signal
8. MIC IN
    Microphone signal input

Connection to a PC

A PC interface cable is included with the ARD9800. Parameter settings can be made by using terminal software.

Refer to Control Commands at page 22 for details

Connection to a Power Supply

To operate your ARD9800, use a regulated power supply. The operating voltage must be within the range of 10.7 ~ 16.0 V DC (approximately 200mA).

A DC power cable is also included with the ARD9800.

Color	Polarity
RED	Positive (+)
BLACK	Negative (-)

Warning: If you have changed the internal jumper for low-voltage battery operation, supplied voltage must be within the range of 5.6 ~ 6.5 VDC. DO NOT apply 12.0 V or severe damage will result, and the warranty will be void!

Note: There is no low battery voltage detector built-into the ARD9800.

.

Connection to an External Speaker

If an external speaker is desired, connect it to the SP OUT jack. This will also disable the internal speaker.
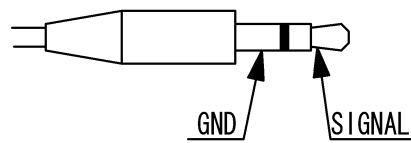
Presetting

Output Level to Radio Transceiver

This level has to be supplied properly to the radio transceiver for operation.

1. Connect the supplied hand microphone to the ARD9800 first. Then connect your radio to the RADIO terminal on the ARD9800 by using your prepared connection cable certainly. Turn ON the ARD9800.

2. Make sure that the **output level adjusting volume** (y) is set to minimum.

3. Select **the mode switch** (i) to [**10101**] position as digital.

4. Press PTT switch on the supplied hand microphone.

5. Adjust microphone gain control on the radio transceiver to suitable level. Particularly, it is recommended to adjust the level that activates ALC function. If the ALC function activates too much, it might create audio distortion. As a result, the communication with a distant station might be compromised.

6. Adjust the **output level** located on the bottom side of the ARD9800 when the microphone gain control on the radio transceiver does not adjust for sufficient level.

7. If the microphone gain is still not enough even though you proceeded as per step (6.), **turn OFF the ARD9800 first and go to step (8).**

8. Remove the upper cover of the ARD9800 and locate the jumper pin for <u>**Output level setting.**</u> Change the jumper pin (The default is inserted between 1-2) to 2-3 for high level. Put the cover back into place.

    Proceed again with steps 1 to 6.

9. If the microphone gain is still not enough, set the ATT command to OFF with a terminal software . Then try again steps 1 to 6.

Microphone Level

The microphone level has been properly adjusted at the factory with the provided microphone. Therefore, no further adjustment is needed for normal operation.

If you wish to use your own microphone, you will need to wire your microphone connector to match the pins of the ARD9800, and then adjust the microphone level as described in the following steps:

1. Connect your microphone to the Microphone connector on the ARD9800.
   (Note: The microphone cable to the radio MUST be unplugged at this time.)

2. Select **the mode switch** (i) to [**10101**] position as digital.

3. Select [0=zero] of transmitting channel **[CHAN].**

4. Turn ON the ARD9800 while pressing the **TX** switch. It will be blinked Status LED with orange color. It indicates the ARD9800 is now placed into microphone level adjusting mode.

5. You can speak into a microphone by pressing PTT button. Rotate the transmitting channel **[CHAN]** to clockwise until the **[OVER]** LED is lit in some times synchronizing to the speaking level.

6. After you recognize the suitable microphone level at the above stage, press **TX** switch while pressing PTT button. The TX LED will be lit in orange color and it is now memorized this new setting value in digital mode.

7. Release the PTT button and select Mode switch to **analog (~)** position.

8. The microphone level adjustment in Analog mode is normally not required. Then press TX switch while pressing PTT button.

   However, if audio signal level is weak at the distant station, you can take same process from 1 to 4 as above even though it is for analog mode. And press TX switch while pressing PTT button to confirm with the new setting value.

9. Turn the power OFF of the ARD9800 to terminate the microphone level adjusting mode.

User ID Setting

The ARD9800 provides a function of user ID that allows assigning an own identifying number. In operation with digital mode, you can assign the ID number for the specified destination's station along with NETMASK (Group Code) and SQUELCH (DCS) functions together. **This function is only effective in digital mode.**

TX Channel Setting

The ARD9800 provides 16 channels (**A~F, 0~9**). You can assign each channel for ID, NETMASK and SQUELCH parameters individually. Depending on scene your communications, you can select the channel number. Take following steps to perform the channel setting.

1. Connect the supplied PC interface cable between ARD9800 and PC.

2. Set up terminal software on your PC.

3. Select the TX channel [**CHAN**] where you want to assign the ID, NETMASK and SQUELCH parameters.

4. In the command prompt of the terminal software, type **ACP<CR>.**

   For example,

   cmd>ACP<CR>
   CH:A_ID:BBBBB_NM:CCCCC_MD:D

   cmd>

<CR>	Carriage Return to confirm the command entry.
A	Channel number that you selected [**CHAN**] switch.
_	Space
BBBBB	Destination ID. You can only assign the number of 00000 to 99999.
CCCCC	Assign the NETMARK activity. You can only select 0 (=zero) or 1.

                         1= Activate
                         0= Deactivate

   Note that 1 indicates as F on the terminal software.

D	Activate or Deactivate Digital Squelch function.

                         1= Activate
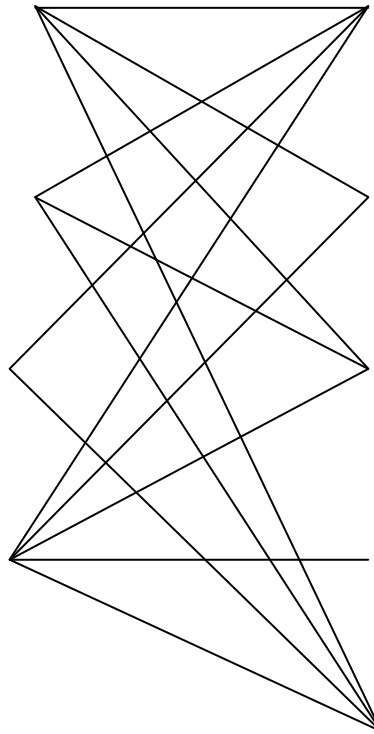   0= Deactivate

Communication pattern

Tx 1
ID:12345
NM:FFF00
MD:1

Tx2
ID:12345
NM:FFFF0
MD:1

Tx3
ID:12345
NM:FFFFF
MD:1

Tx4
ID:12345
NM:FFFFF
MD:0

Rx 1
UID:12345
MD:1

Rx 2
UID:12355
MD:1

Rx3
UID:12348
MD:1

Rx4
UID:13345
MD:1

Rx5
UID:12345
MD:0

Note: All adjustments must be properly performed before operation.

Operation

Voice Communication

Your ARD9800 is capable of Digital Voice Communications and Analog Voice Communication. In the receive mode, the ARD9800 will automatically recognize the type of communication, and set the appropriate operation mode.
In the transmit mode, the operation mode can be selected by using the front Mode switch.

Digital Voice Communication

Set the mode switch [10101 - ~] upward to the digital mode position. [10101]
Press and hold the PTT switch of the microphone. The STA (Status) LED will flash for about 0ne (1) second while sending a data header signal. When the LED stops flashing, speak into the microphone normally.

Analog Voice Communication

Set the mode switch [10101 - ~] downward to the analog mode position. [~]
Press and hold the PTT switch of the microphone, and speak into the microphone normally.

Data Communication

Run a terminal software program to control the ARD9800, and to enter control commands.

Refer to Control Commands at page 22 for details

Two different types of data, ASCII data or binary data, can be used.
Both data can be mixed as communication data.

Receive

Enter the command [ACO] to go into the converse mode.
The received valid data will be decoded and displayed on the PC screen.

If received data is missing, (which may occur during poor propagation conditions) "garbage" data may be displayed on the PC screen.

Transmit

Enter the command [ACO] to go into the converse mode. Type text from the keyboard, then hit the enter key at the end of the text.

NNNNNNNN [CR]

NNNNNNNN	ASCII character
[CR]	Carriage Return

Note: The maximum data length is 2046 bytes per packet.

To send binary data, add [FE] (hexadecimal) to a header and footer with the data.

FE BBBBBBBBBBBBBBBB FE

BBBBBBBBBBBBBBBB   Binary data
FE   ID as a binary data

Note: If you need to insert the data [FE] in hexadecimal in the middle of the text, convert it into two (2) bytes of hexadecimal data.

FE → FDD8

If you need to insert the data [FD] in hexadecimal in the middle of the text, convert it into two (2) bytes of hexadecimal data.

FD → FDDD

Note: The maximum data length is 2046 bytes per packet.

At the receive side, the data will be automatically decoded and displayed on the PC screen. If the [ALF] command is set ON, the LF (line feed) code will be added at the end of received data.

Digital Image Communication

Receive
When valid digital image data is received, it will be decoded and output as a video image from the VIDEO OUT connector.

If received data is missing during a transmission, that portion will be displayed as invalid (like noise).

Transmit
Push the TX switch to send the image.
(When pin - 4 of the microphone connector is grounded, the ARD9800 starts sending the image.)

Note: When the Video Through Function is activated (**AVT command is ON**= **default**), pressing the TX switch will enable output of the video signal connected to the Video Input to also be sent to the video output, so that you can monitor the video image. Press the TX switch again to capture the image and then transmit it through the radio equipment.
When the Video Through Function is de-activated (**AVT command is OFF**), pressing the TX switch will automatically capture the video image and then transmit it through the radio equipment.

The Progress indicator will display on the monitor during image transmission.

Specifications

Modulation Method	OFD	Bandwidth: 300 Hz ~ 2.5 KHz, 36 carriers
	Symbol Rate	20 mS (50 Baud)
	Guard Interval	4 mS
	Tone Space	62.5 Hz
	Individual Tone Modulation Method	36 carrier: DQPSK(3.6K)
Auto Frequency Offset	+/- 125 Hz	
Error Correction	Data: Reed Solomon + Vitabi Decoder Voice: Golay + Hamming	
Header	1 second, 3 tone + BPSK training pattern for synchronization	
Digital Audio	AMBE ® 2020 Coder/Decoder	
Mode Selection	Receive: Automatic selection Transmit: Data communication mode: Automatic exchange according to TX request from PC Digital voice mode: Manual select by the mode switch Digital Image mode: Manual select by pressing the TX switch Analog voice mode: Manual select by the mode switch	
Video Compression	AOR original JPEG format	
Video Input/output	NTSC or PAL depending on version	
Power Requirement	10.7 ~ 16 V DC (Approximately 200 mA @ 12 V DC) 6.0 V DC with battery operation (5.6 ~ 6.5 V DC)	
Communication	RS-232C Asynchronous, 9600 bps (setting / data) 115.2 kbps (image)	
I/O Connectors	Microphone: 8 – pin metal Radio: 8 – pin metal PC interface: Mini 8 – pin DIN Video In/Out: RCA Speaker In/Out: 3.5 mm mono jack Power: EIAJ type 4	
Dimension	100 (w) x 32 (h) x 156 (d) (mm) 4 (w) x 1.3 (h) x 6.2 (d) (inch) Projections not included Weight: Approximately 600 g (1 lb – 5 oz)	

Specifications subject to change without prior notice for product improvement or modification.

Control Commands

Interfacing to a PC

Using the supplied PC interface cable, connect one end to the COM connector at the rear panel (marked as [10101]) and the other to the serial port of a PC.

NOTE: Make sure that your PC's serial port is active. Check for correct hardware and software settings!

Below are the pin assignments of the COM connector of the ARD9800.

<table>
<tr><td colspan="2" align="center"><u>ARD9800   COM connector</u></td><td align="center"><u>Serial connector to the PC (D-Sub 9 – pin)</u></td></tr>
<tr><td align="center">Pin #</td><td></td><td align="center">Pin #</td></tr>
<tr><td align="center">1</td><td>------------------------</td><td align="center">2</td></tr>
<tr><td align="center">2</td><td>------------------------</td><td align="center">6</td></tr>
<tr><td align="center">3</td><td>------------------------</td><td align="center">4</td></tr>
<tr><td align="center">4</td><td>------------------------</td><td align="center">5</td></tr>
<tr><td align="center">5</td><td>------------------------</td><td align="center">3</td></tr>
<tr><td align="center">6</td><td>------------------------</td><td align="center">8</td></tr>
<tr><td align="center">7</td><td>------------------------</td><td align="center">7</td></tr>
<tr><td align="center">8</td><td>------------------------</td><td align="center">1</td></tr>
<tr><td align="center">GND</td><td>------------------------</td><td align="center">GND</td></tr>
</table>

Terminal Settings

Communication Speed:	9600 bps
Data Length:	8 bit
Start Bit:	1
Stop Bit:	1
Parity:	None
Flow Control:	Hardware
Local Echo:	None
Specifications:	RS-232C compatible

Command Format

Run a terminal software program, and then turn on the power to the ARD9800. The following message should appear on the PC screen:

cmd>

This indicates the ARD9800 is ready to accept commands from the PC.

Each command consists of three (3) alphabetical characters.

cmd>CCC_NN [CR]

CCC: Command   (Must be a capital letter)
_: Space
NN: Parameter
[CR]:   Carriage Return

Entering a command without a parameter will display the current parameter (value) setting.

cmd>CCC[CR]

If an invalid parameter or command is entered, the ARD9800 will respond as follows:

cmd>
?
cmd>

Command List

Command	Function
AAQ	Send VIDEO In signal to VIDEO OUT (to a monitor screen) Capture image into memory of the ARD9800
ACO	Enter the Converse mode
ACP	TX channel settings
ADC	List the current commands
ADS	Display current settings
AFC	Activate AFC (Automatic Frequency control) function
AHL	Set the duration of the synchronization header
ALF	Add the LF (Line Feed) code at the end of the CR code
ARA	Monitor both digital/analog voice signal or monitor digital voice only
ATT	Select output level for the radio equipment
ATX	Send digital image
AVT	Activate the Video through function when capturing an image
AVR	Display the current firmware version

Command details

AAQ	
Function	Send VIDEO In signal to VIDEO OUT port (to the monitor screen) Capture image into memory of the ARD9800
Default	None
Format	AAQ {0 / 1} [CR]
Parameter	1: Send VIDEO In signal to a VIDEO OUT (to the monitor screen) 0: Capture image into memory of the ARD9800
Details	While AVT command is OFF, [AAQ 0] will be accepted. Entering AAQ[CR] will respond with the current status. AAQ ON --- Video signal is passed to the VIDEO OUT port AAQ OFF ---- Video signal is not passed to VIDEO OUT port
Example	AAQ_0 [CR]

ACO	
Function	Change from the Command mode to the Converse mode
Default	None
Format	ACO [CR]
Parameter	None
Details	Change from the Command mode (while cmd> appears on the PC screen) into the Converse mode. In the Converse mode, data from the PC keyboard can be sent. To return to the Command mode, enter [Ctrl – C] (holding the Control key while entering the C.)
Example	ACO [CR]

ACP	
Function	Assign parameters on each TX channel
Default	CH:* ID:00000 NM:00000 MD:0
Format	ADC_ [00000-99999][CR]
Parameter	00000 – 99999 (No other figures are acceptable.) Place: 1/0 (No other figures are acceptable) 0----- Deactivate 1----- Activate NM----- NetMask MD----- Digital Squelch
Details	The ARD9800 provides a function of user ID that allows assigning an own identified number. In operation with digital mode, you can assign the ID number for the specified destination's station along with NETMASK (Group Code) and SQUELCH (DCS) functions together. **This function is only effective in digital mode.** The ARD9800 provides 16 channels (**A~F, 0~9**). You can assign each channel for ID, NETMASK and SQUELCH parameters individually. Depending on your communications scheme, you can select the channel number.
Example	In case of scene as: Channel: 8 Destination ID :12345 Netmask: 11100 Squelch: 1 (= activate) ACP_12345_11100_1[CR]

ADC	
Function	List the current commands
Default	None
Format	ADC [CR]
Parameter	None
Details	Lists the current commands
Example	ADC [CR]

ADS	
Function	Display current settings
Default	Headerlen : 1.00 AFC = ON Analog : ON
Format	ADS [CR]
Parameter	None
Details	Displays the current parameter settings
Example	ADS [CR]

AFC	
Function	Activate AFC (Automatic Frequency control) function
Default	On
Format	AFC {ON/OFF} [CR]
Parameter	ON: Activates the AFC function OFF: Deactivates the AFC function
Details	Must be set to ON for the SSB mode Set to OFF for the FM mode
Example	AFC_ON [CR]

AHL	
Function	Set the duration of the synchronization header
Default	100 (1 second)
Format	AHL {050 – 198} [CR]
Parameter	050 – 198 (0.02 incremental)
Details	Sets the duration of the synchronization header {100} represents 1.00 second.
Example	AFC_146 [CR] → Set duration to 1.46 seconds.

ALF	
Function	Add the LF (Line Feed) code at the end of the CR code
Default	ON
Format	ALF {ON/OFF} [CR]
Parameter	ON : Add the LF code at the end of the CR code OFF : The LF will not be added to the end of the CR code
Details	When this command is set to ON, it facilitates the entry of new data from the transmit terminal, as a new line is automatically started (and the previous line is automatically sent).
Example	ALF_ON [CR]

ARA	
Function	Monitor both digital/analog voice signals or monitor digital voice only
Default	ON
Format	ARA_ {ON/OFF} [CR]
Parameter	ON : Monitor digital voice and Analog voice OFF : Monitor Digital voice only
Details	Monitor both digital/analog voice signal or monitor digital voice only
Example	ARA_ON [CR]

ATT	
Function	Selects the output level to the radio equipment
Default	ON
Format	ATT_ {ON/OFF} [CR]
Parameter	ON : Lower level OFF : Higher level
Details	Selects the output level to the radio equipment
Example	ATT_ON [CR]

ATX	
Function	Send digital image
Default	None
Format	ATX [CR]
Parameter	None
Details	An image must be captured and stored into memory before it can be sent.
Example	ATX [CR]

AVT	
Function	Activate the Video through function when capturing an image
Default	ON
Format	AVT_ {ON/OFF} [CR]
Parameter	ON : Activate the Video through function OFF : Deactivate the Video through function
Details	When the AVT command is ON, pressing the TX switch will enable output of the video signal connected to the Video Input to be passed to the video output port so that you can monitor the video image. Press the TX switch again to capture the image and then transmit it through the radio equipment. When the AVT command is OFF, pressing the TX switch will automatically capture the video image and then transmit it through the radio equipment.
Example	AVT_ON [CR]

AVR	
Function	Display the current firmware version
Default	None
Format	AVR [CR]
Parameter	None
Details	Displays the current firmware version
Example	AVR [CR]