13-3 Short cut text entry, keypad with ⇦⇨⇧⇩ keys

Text may also be entered using a combination of the keypad and ⇦ ⇨ ⇧ ⇩ keys.

While in a text input menu, ꓤꓮꓰꓢꓢꓺꓵ (F) for flashing "**FUNC**" legend then refer to the following table.

Look for the required character in the table then PUSH the key shown to the horizontal-left followed by the ⇦ ⇨ ⇧ ⇩ key shown above the required character (do not push both keys together). The first key push will produce a character on the screen which will be replaced with the required character when the second key is pushed, the cursor with then move one place to the right.

📖**Note:** The CASE SHIFT (♦ Aa) key is used to access lower case letters.

		♦	♠	♣	♥
			2. PUSH this key second		
	(1 AK)	1	A∕a	K∕k	U∕u
	(2 BL)	2	B∕b	L∕1	V∕v
	(3 CM)	3	C∕c	M∕m	W∕w
	(4 DN)	4	D∕d	N∕n	X∕x
1. PUSH this key first	(5 EO)	5	E∕e	O∕o	Y∕y
	(6 FP)	6	F∕f	P∕p	Z∕z
	(7 GQ)	7	G∕g	Q∕q	ö
	(8 HR)	8	H∕h	R∕r	ü
	(9 IS)	9	I∕i	S∕s	&
	(0 JT)	0	J∕j	T∕t	␣

Example: To select the letter "**N**" ꓤꓮꓰꓢꓢꓺꓵ (F) until the *flashing* "**FUNC**" is displayed.

ꓤꓴꓢꓞ (4 DN), the number "**4**" will be displayed, ꓤꓴꓢꓞ ⇦, the desired "**N**" character will be displayed and the cursor will move one position to the right. The *flashing* "**FUNC**" legend will continue to flash, if it is not required further ꓤꓴꓢꓞ (F) for it to be removed from the LCD.

Example: To select the letter "**e**" ꓤꓮꓰꓢꓢꓺꓵ (F) until the *flashing* "**FUNC**" is displayed.

ꓤꓴꓢꓞ (5 EO), the number "**5**" will be displayed, ꓤꓴꓢꓞ (♦ Aa) to instruct the CPU that a lower case letter is required (CASE SHIFT) ꓤꓴꓢꓞ ⇧, the desired "**e**" character will be displayed and the cursor will move one position to the right. The *flashing* "**FUNC**" legend will continue to flash, if it is not required further ꓤꓴꓢꓞ (F) for it to be removed from the LCD.

(14) Configuration menu

The configuration (CONFIG) menu is used to set fundamental operating parameters and other variables which do not appear in any other menu heading.

BEEP	Confirmation & error tone
LAMP	LCD & keypad illumination
CONTRAST	LCD contrast adjustment
POWER-SAVE	Delay & cycle power save
AUTO PWR-OFF	Auto inactivity power off
REMOTE BPS	RS232 baud rate
RMT-ID	Computer control address
FREQ DISP	Frequency readout on/off
WRITE PROT	Global write protect
OPENING MESSAGE	Change the power-up message

14-1 CONFIG BEEP

The AR8200 emits confirmation 'beeps' while the keypad and side keys are used. A 'HIGH' pitched beep indicates correct operation while a 'LOW' pitched beep indicates that an error or unexpected entry has taken place. The volume of the beep is independent of the main volume control and can be separately defined. It is recommended that the beep facility be enabled, especially in the early days while gaining familiarity of the receiver.
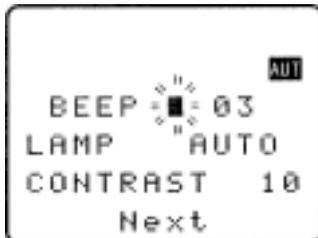
Beep is setup in the CONFIG menu. To access the config menu ⌐ JSHG ⌐ (F) ¹USH∃ (7 GO). The first item in the

config menu is "**BEEP**", the **default is beep on** with a volume level of 09. Use the main dial or ⇦ ⇨ keys to vary beep level between the range of OFF and 01 to 09 with 09 being the loudest. The

(PASS) key may be used as a short cut to 05.

⌐ JSHG (ENT) to accept the data and return to a standard display. Alternatively ¹USH∃ (G FAR)

to abort entry or ¹USH∃ ⇩ to move to the next item on the config menu (LAMP).

14-2 CONFIG LAMP

The AR8200 is equipped with high intensity green LEDs to illuminate the LCD and front panel keypad when operating in areas of low level lighting.

While the AR8200 is switched on and connected to an external power source such as the charger or d.c. lead, the lamp will be PERMANENTLY ON and *cannot be switched off*. The lamp will go out when the AR8200 is switched off (when the batteries are being charged etc).

The lamp may be configured in three ways:

AUTO
This setting is relevant when operating from internal batteries only. The lamp will automatically illuminate when the front panel and side panel keys are used. The lamp will remain illuminated for a further five second after the last key push and will then switch off. This is a good compromise setting for best visibility and battery life.

CONT
This setting is relevant when operating from internal batteries only. The lamp will CONTinuously illuminate the front panel and side panel keys. The lamp will only extinguish when the AR8200 is switched off. Of course continuous operation of the lamp will drain the internal batteries more quickly.

OFF
This setting is relevant when operating from internal batteries only. The lamp remains permanently extinguished, this is useful to maintain maximum battery life when used in areas of high light levels.

The LAMP is setup in the CONFIG menu. To access the config menu ⁲USH⹃ (F) ⁲JSHG⹗

(7 ⹐0) , ⁲JSHG⹗ ⇩ to move the cursor to the "**LAMP**" selection point. Use the main dial or ⇦ ⇨ keys to toggle the lamp between AUTO (default), CONT and OFF. The (PASS) key may be used as a short cut to AUTO.

⁲USH⹃ (ENT) to accept the data and return to a standard display. Alternatively ⁲JSHG⹗ (G FAR) to abort entry or ⁲USH⹃ ⇩ to move to the next item on the config menu (CONTRAST).

14-3 CONFIG CONTRAST

The AR8200 is equipped with variable LCD contrast which is adjustable in 32 steps to provide best visibility under different viewing angles, extremes of ambient light & temperature (and between sets due to variation).

The default setting for contrast is 14. The display generally becomes too dark to read around 20 and too feint around 02, the (PASS) key may be used as a short cut to 14.

The CONTRAST is setup in the CONFIG menu. To access the config menu ⁲USH⹃ (F)

⁲USH⹃ (7 ⹐0) , ⁲JSHG⹗ ⇩ twice to move the cursor to the "**CONTRAST**" selection point. Use the main dial or ⇦ ⇨ keys to vary the contrast level to achieve best visibility.

⁲USH⹃ (ENT) to accept the data and return to a standard display. Alternatively ⁲JSHG⹗ (G FAR) to abort entry or ⁲USH⹃ ⇩ to move to the next item on the config menu (POWER-SAVE).

14-4 CONFIG Power save

The POWER SAVE facility may be used to help the receiver to operate for longer periods of time between battery recharging. Power save is default OFF to prevent confusion while the AR8200 is in a "dormant" cycle as the receiver is effectively asleep and only wakes up for short periods to check for activity before going to sleep and becoming dormant again.

> 📖**Note:** While in a dormant state (waiting to cycle), the AR8200 behaves sluggishly.

When power save is ON, the AR8200 will automatically switch 'off and on' but the display will appear permanently on as only the AR8200 "receive" circuitry is switched off and on (switching the receiver off for short periods of time is what saves power!), the microprocessor is left on permanently but in a reduced operating condition.

When activated, two parameters may be varied to affect the way the receiver behaves, these are "**DELAY**" and "**CYCLE**".

> **DELAY:** This parameter determines how long the AR8200 will remain active before going to sleep and becoming dormant and is timed from when the squelch last closed or keypad was last used. The available range is 01 to 30 seconds plus OFF (default off). When OFF, the power save does not operate. The (PASS) key may be used as a short cut to OFF.

> **CYCLE:** When the receiver becomes dormant (delay has expired), the cycle parameter determines how long the AR8200 will remain dormant before its 'wake up' period begins. If a transmission takes place while dormant it will be missed, if however a transmission occurs during the wake up period, the AR8200 will continue to monitor until the transmission ends and DELAY / CYCLE takes place again. The available range is 0.5 to 9.5 seconds (default 3.0 seconds). The (PASS) key may be used as a short cut to 3.0 seconds.
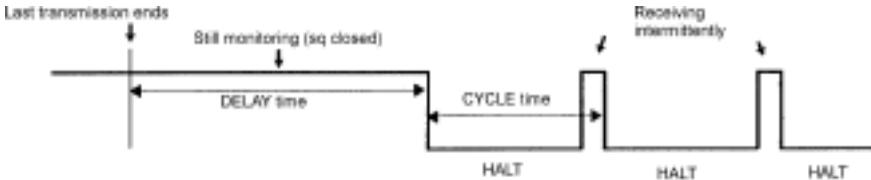

DELAY: Time between the last signal ended and the power save started
CYCLE: The time between 'wake up' monitoring periods

The POWER SAVE parameters are setup in the CONFIG menu. To access the config menu PUSH (F) PUSH (7 GO). PUSH ⇩ three times to move the cursor to the POWER SAVE "**DELAY**" selection point. Use the main dial or ⇦ ⇨ keys to vary the delay value, the (PASS) key may be used as a short cut to OFF.

PUSH ⇩ to move the cursor to the POWER SAVE "**CYCLE**" selection point.
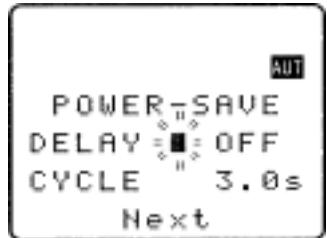
Use the main dial or ⇦ ⇨ keys to vary the cycle value, the ⁧PASS⁩ key may be used as a short cut to 3.0 seconds.

ᴾᵁˢᴴ⁐ ⁧ENT⁩ to accept the data and return to a standard display. Alternatively ᴾᵁˢᴴ⁐ ⁧CLEAR⁩ to abort entry or ᴾᵁˢᴴ⁐ ⇩ to move to the next item on the config menu (AUTO PWR-OFF).

14-5 CONFIG Auto power off

An auto power off facility is available to switch the AR8200 off automatically after a programmable period of squelch inactivity, this prevents the batteries from becoming flat when monitoring a completely inactive frequency.

> 📖**Note:** Be careful how you use auto power off as it might catch you out one day (if a short auto-power-off period has been set), auto power off setting is not cancelled with power off / on… if the AR8200 appears to switch itself off for no reason, check to make sure that you haven't enabled auto power off (there is no associated LCD legend).

AUTO POWER OFF is setup in the CONFIG menu. To access the config menu ᴾᵁˢᴴ⁐ ⁧F⁩ ᴾᵁˢᴴ⁐ ⁧7 CO⁩ ᴾᵁˢᴴ⁐ ⇩ five times to move the cursor to the "**AUTO PWR-OFF**" selection point. Use the main dial or ⇦ ⇨ keys to vary the time between 0.5 hours to 9.5 hours in 0.5 hr increments, the ⁧PASS⁩ key may be used as a short cut to OFF.

```
                              AUT
AUTO  PWR-OFF
  AT  SQ  OFF
 ▪       0.5HR
    Next
```

When the AR8200 squelch closes, the CPU will wait the length of time programmed in auto-power-off before automatically switching the AR8200 off. If the squelch opens again before auto switch off time has elapsed, the radio will not power down and the counter will be reset (i.e. an open squelch defeats auto power off).

ᴾᵁˢᴴ⁐ ⁧ENT⁩ to accept the data and return to a standard display. Alternatively ᴾᵁˢᴴ⁐ ⁧CLEAR⁩ to abort entry or ᴾᵁˢᴴ⁐ ⇩ to move to the next item on the config menu (REMOTE BPS).

14-6 CONFIG REMOTE BPS

The REMOTE BPS menu is used to configure the RS232 computer control settings as it is important that they exactly match those of an associated computer connection or another AR8200 (connected via the option socket and optional leads).

The REMOTE BPS parameters are setup in the CONFIG menu. To access the config menu ᴾᵁˢᴴ⁐ ⁧F⁩ ᴾᵁˢᴴ⁐ ⁧7 CO⁩

ᴾᵁˢᴴ⁐ ⇩ six times to move the cursor to the "**REMOTE BPS**" selection point. Use the main dial or ⇦ ⇨ keys to vary the RS232 baud rate between 4800bps, 9600bps and 19200bps. The ⁧PASS⁩ key may be used as a short cut to the default of 9600bps.

```
                              AUT
 ▪   REMOTE  BPS
  9600   19200
RMT-ID      00
    Next
```
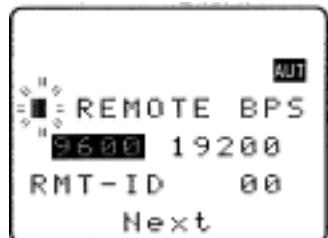
⌐JSHG⌐ ⇩ to move the cursor to the "**RMT-ID**" selection point. Use the main dial or ⇦ ⇨ keys change the AR8200 RS232 IDENTIFICATION ADDRESS when multiple units are connected to the same port.

It is possible to connect up to 99 units at once, each radio being assigned a different address. The value is adjustable between 00 and 99, the default is 00. The (PASS) key may be used as a short cut 00.

> 📖**Important note:** It is extremely important to set the RMT-ID to **00** for normal operation
> of the RS232 connection and clone of data between radios.

⌐JSHG⌐ (ENT) to accept the data and return to a standard display. Alternatively ⌐USH⌐ (CLEAR)
to abort entry or ⌐USH⌐ ⇩ to move to the next item on the config menu (FREQ DISP).
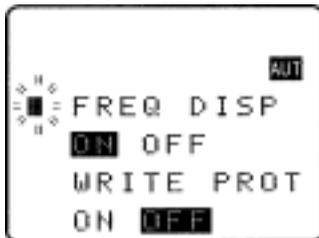
14-7 CONFIG FREQ DISP

It is possible to instruct the AR8200 NOT to display frequencies while in memory read, search and scan modes (should you wish for prying eyes not to see specifically what you are listening to). Liberal use of 'text comments' is recommended if you disable frequency display (turned it off) unless you choose to have really anonymous operation!

> 📖**Note:** Frequency display will be provided in VFO and VFO search and VFO scan even with
> the frequency display disabled.

The FREQUENCY DISPLAY parameters are setup in the CONFIG menu. To access the config menu ⌐JSHG⌐ (F) ⌐JSHG⌐ (7 GHz).

⌐JSHG⌐ ⇩ eight times to move the cursor to the "**FREQ DISP**" selection point. Use the main dial or ⇦ ⇨ keys to toggle between ON and OFF. The (PASS) key may be used as a short cut to ON (which is default).

```
              AUT
  FREQ DISP
  ON  OFF
  WRITE PROT
  ON  OFF
```

⌐JSHG⌐ (ENT) to accept the data and return to a standard display. Alternatively ⌐JSHG⌐
(CLEAR) to abort entry or ⌐USH⌐ ⇩ to move to the next item on the config menu (WRITE PROT).

14-8 CONFIG GLOBAL write protect

It is possible to globally write protect the entire AR8200 data storage, this prevents memory entry, search bank programming, loading of data via the option socket, loading of data from the optional EM8200 etc. **Use this feature carefully.**

Should you wish to leave your AR8200 safe in the knowledge that no-one will 'mess it up' (well maybe!)… toggle global write protect on.

The global "**WRITE PROTECT**" status is setup in the CONFIG menu. To access the config menu ⌐JSHG⌐ (F) ⌐USH⌐ (7 GHz). ⌐JSHG⌐ ⇩ nine times to move the cursor to the "**WRITE PROT**" selection point.

Use the main dial or ⇦ ⇨ keys or (PASS) key to toggle between ON and OFF (the default is off).

ᴾᵁSH⌐ (ENT) to accept the data and return to a standard display. Alternatively ᴾᵁSH⌐ (CLEAR)

to abort entry or ᴾᵁSH⌐ ⇩ to move to the next item on the config menu (OPENING MESSAGE).

14-9 CONFIG Opening message

It is possible to display a welcome message while the AR8200 is powering up and collating its 'boot-up' information. There are three options for opening message:

> **NORM**
> Normal message is displayed at switch-on: **WELCOME TO THE NEW WORLD OF AR8200**.
>
> **QUICK**
> Blank screen at switch-on.
>
> **USER**
> Four lines of 12 characters may be entered for display at switch-on. Initially they are configured for you to enter OWNERS name and PHONE NUMBER but all lines may be over-written.

The "**OPENING MESSAGE**" is setup in the CONFIG menu.

To access the config menu ᴾᵁSH⌐ (F) ᴾᵁSH⌐ (7 ᴳᴼ) .

ᴾᵁSH⌐ ⇩ ten times to move the cursor to the

"**OPENING MESSAGE**" selection point. Use the main dial or ⇦ ⇨ keys to toggle between **NORM** / **QUICK** / **USER**.

The (PASS) key may used as a short cut to NORM (which is the default).

ᴾᵁSH⌐ (ENT) to accept the data and return to a standard display

or ᴾᵁSH⌐ (CLEAR) to abort entry.

Alternatively if you have selected **USER** and wish to change the text comment ᴾᵁSH⌐ ⇩ to access the text input menu for the opening menu.

You may change all four lines of text in the usual manner. Please refer to **section 12-1** of this manual for further information regarding text input.

ᴾᵁSH⌐ (ENT) to accept the data and return to

a standard display or ᴾᵁSH⌐ (CLEAR) to abort

entry. When the AR8200 is switched off and back on again, the new opening message will be displayed.
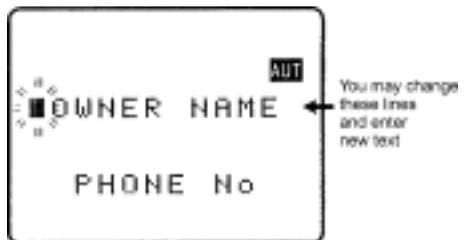
(15) Band scope

The AR8200 is equipped with a flexible band scope function which is capable of graphically displaying band activity. The maximum frequency span width is 10 MHz, you may zoom in on activity to a span width of 100 kHz. Centre frequency is displayed and a marker may be manipulated to ascertain the frequency of activity using the graphical display. One trace may be saved to memory for recall at a later time and may be overwritten at will. The trace may also be saved and loaded from the optional EM8200 external memory slot card.

⚲**Note: Priority** operation is **disabled** when the band scope is in operation. Audio is muted. The optional **RU8200** is **inoperative** when the band scope is in operation.

It is suggested that the band scope facility is 'experimented with' on a constantly active band such as VHF Band-II broadcast.

15-1 Starting the band scope

To start the band scope 「USH「⎇ (SCOPE). The frequency span width will be set to 10 MHz with the last frequency displayed in 2VFO, search, scan or memory read mode being used as the centre frequency. AUDIO IS MUTED.
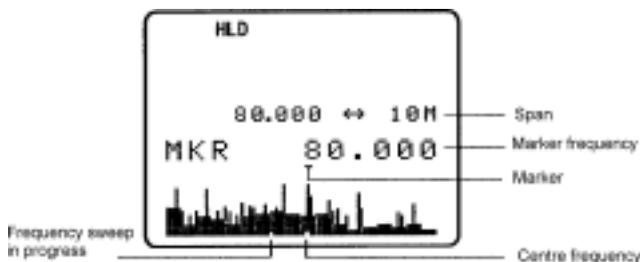
The **centre frequency** is displayed in the top left of the LCD, one pixel will be missing from the centre of the graphical base line indicating centre frequency position.

A progress **cursor** which comprises of a single pixel on the graphical base line travels from left to right updating the band scope display… this confirms that the band scope is IN OPERATION (especially useful when a trace is simply being updated or no signals have been located).

The **frequency span width** is displayed in the upper right corner of the LCD, at default this is 10 MHz.

The **frequency marker** legend "**MKR**" is displayed on the second line of the LCD, the marker is also represented graphically by an upturned triangle (initially placed above-centre of the graphical trace). When first activated, the centre and marker frequencies are the same (but may be altered).

The **graphical trace** is built-up from left to right. If no transmissions are encountered the display will simply form a horizontal line around two pixels in height. When activity is located, vertical lines are produced on the LCD, the stronger the signal the higher the line.

⚲**Important: To monitor** the transmission of the marker frequency PRESS⎇ **and hold** the ⎇MON key. The progress of the scope is halted when the ⎇MON key is held. Squelch setting has no effect on the band scope trace.

15-2 Exit from band scope

To exit the band scope ᴾᵁˢᴴ⟲ (␣ᴱᴿᶜᴴ␣) or (␣ˢᶜᴬᴺ␣) or (␣2ᵛᶠᴼ␣).

15-3 Setting frequency span width (waveform enlargement)

The frequency span width may be adjusted between the limits of 10 MHz (default) to 100 kHz using the ⇧ ⇩ keys. The span widths available are:

10 MHz	35s for full trace approx.	*Resolution is 10 kHz with a 12 kHz IF filter selected (NFM or AM) so that one pixel represents 140 kHz at maximum signal strength*
5 MHz	20s for full trace approx.	
2 MHz	10s for full trace approx.	
1 MHz	6s for full trace approx.	
500 kHz	3s for full trace approx.	
200 kHz	6s for full trace approx.	*Resolution is 2 kHz with a 3 kHz filter (USB, LSB, CW)*
100 kHz.	3s for full trace approx.	

When the frequency span width is altered, the trace restarts. ᴾᵁˢᴴ⟲ (␣ˢᶜᴼᴾᴱ␣) to refresh the trace from the start.

15-4 Moving the marker

To move the marker position use the ⇦ ⇨ keys, the channel step will be dependant upon the span width resolution. To monitor the marker frequency ᴾᴿᴱˢˢ⟳ **and hold** the ⟲ ᴹᴼᴺ key. The progress of the scope is halted when the ⟲ ᴹᴼᴺ key is held.

15-5 Marker to strongest signal (peak search)

To simplify operation, it is possible to 'jump the marker' to the strongest signal of the current graphical trace (peak search). ᴾᴿᴱˢˢ⟳ and hold the (␣ˢᶜᴼᴾᴱ␣) key until the "★" legend is displayed indicating that the marker is set to the strongest graphical signal. ᴾᴿᴱˢˢ⟳ **and hold** the ⟲ ᴹᴼᴺ key to monitor the selected frequency. The ⇦ ⇨ keys may be used to hop between the strongest few transmissions. ᴾᴿᴱˢˢ⟳ (␣ˢᶜᴼᴾᴱ␣) to disable peak search, the "★" will be removed from the LCD.

> 📖**Note:** If no signal is found above the background level (or if there hasn't been time allowed for a trace to form), peak search will not operate and an error beep will be emitted (if beep is enabled). This facility cannot be used with a span width of 100 kHz.

15-6 Entering a new centre frequency

To enter a new centre frequency, simply tap the wanted frequency into the keypad. The legend "**CENTRE FREQ**" will be displayed on the top line of the LCD with entry taking place on the second line.

To complete entry in MHz format ꟼUSH꙰ (ENT). The marker will be automatically set to the centre frequency but the frequency span width will be unchanged.

15-7 Transfer of marker frequency to VFO

There are two ways in which the marker frequency may be transferred to VFO for long term monitoring.

Transfer to 2VFO retaining VFO data

ꟼUSH꙰ (F) ꟼUSH꙰ (2VFO) to move marker frequency to 2VFO, receive mode and step are those of the VFO.

Transfer to single VFO with 10 kHz tuning step

Hold the ⟳ ᵛᶠᵒ **key then** ꟼUSH꙰ (ENT) to transfer marker frequency to single VFO, receive will be that used in VFO mode but the tuning step will always be 10 kHz to allow sensible re-tuning in VFO mode for best reception of the transferred marker frequency

15-8 Peak hold

The PEAK HOLD facility is used to build up an image of band activity over a period of time, the display is not totally cleared each time a trace is made, only strong signals are added.

To toggle PEAK HOLD on/off ꟼUSH꙰ (F) ꟼUSH꙰ (SCOPE), the "**HLD**" legend confirms when peak hold is active.

The ⇦ ⇨ keys may be used to move the marker position and ⟳ ᵛᶠᵒ key may be held to monitor activity on the marker frequency.
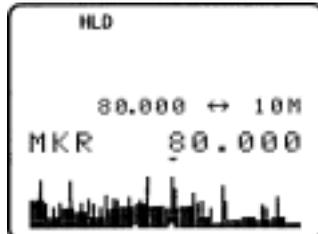

15-9 Saving active trace to memory

To save the current trace to internal memory (for later retrieval) ꟼRESS꙱ (ENT). It is suggested that the peak hold facility be employed before saving a trace so that it provides more meaningful information.

If the optional EM8200 is used, it possible to save four further traces to external memory. Refer to *section 18-6-7* of this manual for further information regarding this feature.
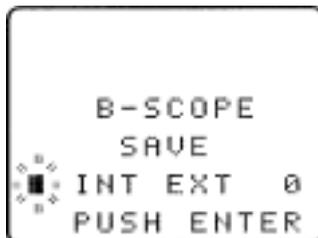
15-10 Loading stored band scope traces from memory

Providing a trace has been previously stored to memory, it is possible to recall it to display using the key sequence ⊓⊔SH⊒ (F) PRESS⊹ (B-SCOPE). The legend "**RCV**" (in the place of "**MKR**") indicates that a stored trace is currently being displayed.

The AR8200 will no longer sweep the frequency range but the ◯ key may still be used to monitor the marker frequency. Key in a new centre frequency to return to a real time band scope.

It is possible to move the marker across the graphical trace using the ⇦ ⇨ keys. Waveform enlargement is available by changing the frequency sweep width using the ⇧ ⇩ keys.

If the optional EM8200 is used, it possible to load any one of four further traces from external memory. Refer to **section 18-6-7** of this manual for further information regarding this feature.

```
    B-SCOPE
     LOAD
  ■ INT EXT   0
    PUSH ENTER
```

(16) Sleep ⊕

It is possible to instruct the AR8200 to automatically switch-off after a predetermined time, this is particularly useful if you know that you may be called away from the receiver or listen to it while in bed and don't want the batteries to become completely flat.

Use the key sequence ⁷ⱢSH⧢ (F) PRESS⧢ (● Aa) to accesses the SLEEP menu.

Use the main dial, ⇦ ⇨ keys or (PASE) key to toggle sleep on/off. For convenience SLEEP is default ON when this menu is accessed so that you have simply to access and exit the menu for sleep to be activated.
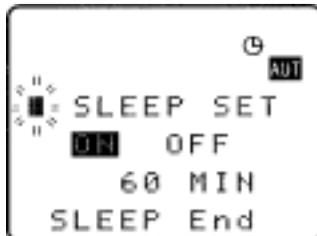
Either ⁷ⱢSH⧢ (ENT) to save the changes and exit the menu

or ⁷ⱢSH⧢ ⇩ to move the cursor to the sleep TIME menu. Use the main dial to set sleep time in 1s increments or ⇦ ⇨ keys to increment in 10 seconds, the range is between 1 and 120 minutes, (PASE) is a short cut to 60 minutes (default).

```
              ⊕
               AUT
  ■  SLEEP  SET
  ON    OFF
       60  MIN
  SLEEP  End
```

The AR8200 will automatically switch off after the programmed time has elapsed.

To accept the data and activate sleep ⁷ⱢSH⧢ (ENT). The display will return to standard format and the circular CLOCK legend ⊕ will be displayed to remind you that automatic power off will take place.

The next time that the AR8200 is powered on, the sleep facility will be automatically cancelled.

(17) Option socket

The option socket is mounted on the right hand side of the cabinet underneath the 12V d.c. input socket. The socket is protected from dust by a grey rubberised case stopper which is hinged toward the front of the cabinet. Gently lift the stopper from the rear edge to reveal the D-shaped metallic socket. Be careful to keep dust and dirt from this socket and to prevent liquid entering the AR8200 via this socket. Ensure that no conductive material is allowed to short circuit the socket which may damage the receiver.
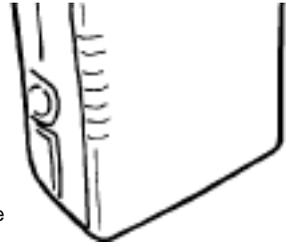
The option socket has three main uses:

1. Connection of the optional CR8200 tape **re**cording lead
2. Connection of the optional CO8200 data **clo**ne lead
3. Connection of the optional CC8200 **c**omputer **c**ontrol lead with level shift (available with imperial (PC98) & metric (DOSV) screws)

Other signals are available via the option socket including detector output, mute and AGC. Typical pin-out of the optional leads are as follows:

RED	**+4.2V**
BLACK	**RXD**
BLUE	**GROUND**
BROWN	**MUTE**
ORANGE	**AGC**
SHIELD	**GROUND**
WHITE	**TXD**
YELLOW	**GROUND**
GREEN	**AUDIO OUT**
GREY	**DETECTOR OUT**
PURPLE	**GROUND**

Output levels are as follows:

MUTE	CMOS (0V or 5V)
AUDIO OUT	Constant level into greater than 10k OHMS
DETECTOR OUT	Available in NFM & SFM, impedance 10k OHMS
AGC	3.5V to 0.5V, impedance 10k OHMS
RS232C	TXD + RXD (levels to drive a level shift converter)
	📖**Note:** The voltage output level to drive external RS232 is deliberately below 'H' level. If connecting to an external I.C., you must be aware of latch status.
PSU	4.2V at 20mA

17-1 RS232 operation

Connect the optional CC8200 computer control lead to the option socket and connect to a computer. The command protocol is provided with the CC8200 on floppy disk as an Adobe Acrobat PDF file.

The RS232 parameters may be defined using the CONFIG menu. Baud rates (transfer speed) may be set to 4800, 9600 or 19200bps. It is also possible to set an 'address' to facilitate connection of up to 99 AR8200 to a single port for custom operation, the addresses may be set between the limits of 01 to 99 with 00 representing single radio operation.

When operating from external RS232, the legend ⊙ will be displayed on the LCD. Please refer to **section 14-6** of this manual for information on the CONFIG menu settings.

17-2 CLONE of data via the option socket

It is possible to copy data (clone) between two AR8200 receives using the optional CO8200 clone lead, no computer is required.

> 📖**Note:** As clone of data takes a while, it is suggested that the receivers are connected to external power or at least that the NiCads are FULLY charged while cloning data. Do not prematurely terminate the clone of data in any way or data corruption may occur… do not switch either AR8200 off, disconnect the CO8200 or disconnect power. Data can be copied in either direction but the EM8200 is not supported, only INTERNAL data can be copied between radios.

Connect each radio to the CO8200 lead and switch them on. The following table indicates the facilities available:

ALL DATA	All data is transferred from one radio to the other (approx. 8 minutes 30 seconds)
SEARCH BANK	A specific search bank is copied to the same or different bank number of the second radio (approx. 3 seconds)
ALL SEARCH	All search banks are copied from one radio to the other keeping bank numbers the same (approx. 1 minute 30 seconds)
MEM BANK	A specific memory bank is copied to the same or different bank number of the second radio. Ensure that the memory banks have the same sizes allocated (dynamic memory bank resizing) or data may be lost (approx. 30 seconds)
ALL MEM	All memory banks are copied from one radio to the other keeping bank numbers the same. Memory banks are handled as a 'pair' (A/a, B,b etc). If memory banks are not the same size (dynamic memory bank resizing), some data will be lost. (approx. 5 minutes)

17-2-1 How to clone data

Ensure that the RS232 baud rate is set to the same speed for both radios and that the address is set to 00 on both units (refer to **section 14-6** of this manual for information on the CONFIG menu settings).

```
COPY 232C
LOAD SAVE
ALL-DATA
   Next
```

a) Pick the radio which you wish to copy TO (target)

First decide which unit will be used to receive (LOAD) the data.

ᴾᵁSH⅊ (F) PRESS.⅄ (ᴅ ᴊᴛ) to access the "**COPY RS232C**" menu. The (ᴘᴀss) key acts as a toggle between "**LOAD**" and "**SAVE**" (the default is LOAD), alternatively use the main dial or ⇦ ⇨ keys to select **LOAD**.

b) Decide WHAT you want to copy

ᴾᵁSH⅊ the ⇩ key to move down the COPY RS232C menu, the cursor will be flashing to the left of the item "**ALL-DATA**".   If you want to load **ALL DATA** ᴾᵁSH⅊ (ENT); alternatively use the main dial or ⇦ ⇨ keys to select the type of data you wish to load (copy) from the other radio. ᴾᵁSH⅊ (ENT).

The bottom two rows of the LCD will display the legends "**LOADING !!**" and a number. The number will start counting downward when the copy process starts (when the other radio has been instructed to SAVE), the more data you have selected, the higher the number… for ALL-DATA the number will typically be 448.
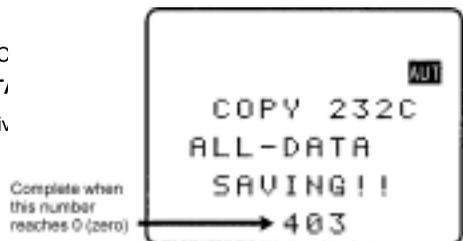
Data CLONE
of search or
memory banks
between
2 x AR8200

A   A

COPY

B   A
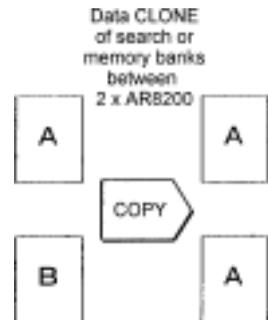
c) Configure the radio used to SAVE

On the second radio, ᴾᵁSH⅊ (F) PRESS.⅄ (ᴅ ᴊᴛ) to access the "**COPY RS232C**" menu.

The (ᴘᴀss) key acts as a toggle between "**LOAD**" and "**SAVE**" (the default is LOAD), alternatively use the main dial or ⇦ ⇨ keys to select **SAVE**.

ᴾᵁSH⅊ the ⇩ key to move down the COPY RS232C cursor will be flashing to the left of the item "**ALL-DATA** want to load **ALL DATA** ᴾᵁSH⅊ (ENT), alternativ the main dial or ⇦ ⇨ keys to select the type of data you wish to save (send) to the other radio. **It is most important that the type of data selected is IDENTICAL on both radios.** ᴾᵁSH⅊

```
            AUT
COPY  232C
ALL-DATA
SAVING!!
   → 403
```

Complete when
this number
reaches 0 (zero)

(ENT).

The bottom two rows of the LCD will display the legends "**SAVING !!**" and a number which will start

counting downward to indicate that the copy process (clone of data) has started. When the number reaches *zero* the copy process will have completed, both radios will revert to standard displays.

📖**Note:** If you make a mistake during programming, it is possible to ⅂∪SH-⌐ the

⸢⌐ F∧R⸥ key to exit the menu. However, be careful and get it right in the first place… this is the best way of avoiding the possibility of data corruption.

Write protect

Individual memory channel protect and search bank protect status is ignored, however global protect will prevent data being cloned between radios.

(18) Slot card socket

The slot card is located in the bottom of the AR8200 cabinet and protected from dust etc by a door which is hinged toward the back edge of the cabinet. To access the socket place the AR8200 on its back and open the front edge of the protective door. Be careful to keep dust and dirt from this socket and to prevent liquid entering the AR8200 via this socket. Ensure that no conductive material is allowed to short circuit the socket which may damage the receiver.

18-1 Optional slot cards

Any 'one' optional card may be fitted at any time. Do not use anything other than the 'genuine' AOR slot cards.

The slot card has five main uses:

1.	VI8200	Voice inverter (analogue) in 157 steps
2.	CT8200	CTCSS squelch & search
3.	TE8200	Tone eliminator in 256 steps
4.	RU8200	Chip based recording and playback, 20 seconds approx.
5.	EM8200	External extended memory, backup 4,000 memories, 160 search banks (can hold as much data as 4 x AR8200)

Signal types depend upon the slot card fitted, these include:

- 4.2V PSU
- GROUND
- CARD RECOGNITION
- AUDIO IN
- AUDIO OUT
- CARD CONTROL IN
- CARD CONTROL OUT

Insert the card as illustrated
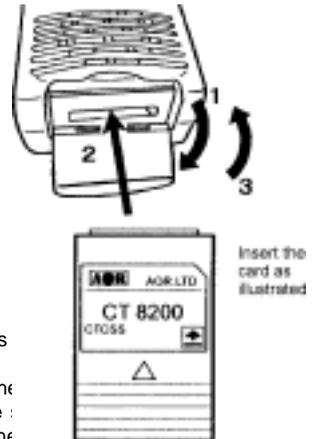
18-1-1 Fitting the slot card

Always switch the AR8200 off when inserting slot card. To access the socket place the AR8200 on its back and open the front edge of the protective door. With the AR8200 keypad facing upward, hold the slot card so that its label also faces upward. An arrow printed on the slot card indicates the direction of entry into the AR8200, insert the connector end of the slot card into the AR8200 (the end you will be left holding has groves to help grip). Without using excessive force, use a thumb to push the slot card fully into the body of the AR8200 until it is slightly recessed into the bottom of the receiver. Close the hinged slot card compartment cover.

📖**Note:** The AR8200 will automatically recognise each optional slot card, there is no need to initialise the option (except for the EM8200, see later).

When slot cards are fitted, the AR8200 menu system dynamically changes to reflect the slot card

currently fitted. If however the AR8200 'thinks' that a slot card option is fitted when it isn't, access the slot card menu and disable the option.

You may wish to leave certain items selected if they are not affecting current operation in order to minimise reprogramming when slot cards are inter-changed at a later time.

18-1-2 Removing the slot card

Always switch the AR8200 off when removing a slot card. To access the socket place the AR8200 on its back and open the front edge of the protective door. An EJECT slider is mounted on the left hand side of the AR8200 cabinet. With the AR8200 keypad facing upward slide the EJECT control toward the side keys of the AR8200, the thumb is best for this purpose… hold the thumb of the other hand one or two centimetres (one inch) from the bottom of the slot card to prevent it shooting out of the AR8200 and falling on the floor.

The stiffness of the cards varies and may be tighter when used for the first few times, the EJECT slider needs quite a push but don't use excessive force or tools!
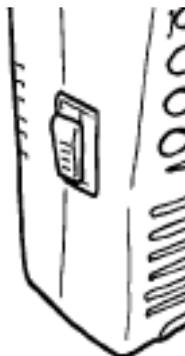
18-2 VI8200 optional voice inverter slot card

The VI8200 enables the AR8200 to recover intelligible audio from certain types of analogue transmission which would otherwise sound scrambled. They operate by splitting up the audio spectrum and 'flipping' the upper and lower tones around a certain frequency point. The VI8200 enables 157 different 'flip points' to be selected in the frequency range of 2.4 kHz to 5.6 kHz.

Insert the VI8200 slot card and switch the AR8200 on, select VFO mode.

PRESS ⊟ (CLEAR) to access the slot card option menu. The AR8200 will have recognised that the VI8200 has been fitted so will present the voice inverter menu.

The legend "**VOICE INVERT**" confirms selection of the voice inverter menu. PUSH the (PASS) key to toggle the voice inverter on/off (default **on**). Use the main dial or ⇧ ⇩ keys to make selection of tone in 157 steps from 0 to 156, the ⇦ ⇨ keys are used to increment selection by 10.

To accept the data input (when audio is intelligible) PUSH (ENT), alternatively to abort entry PUSH (CLEAR).

Refer to the relationship table between value and 'flip' frequency:

Frequency (kHz)	2.4	2.8	3.2	3.6	4.0	4.4	4.8	5.2	5.6	6.0	6.15
Inverter value	0	37	64	86	102	116	128	138	146	154	156

When the voice inverter has been activated and you exit from the voice inverter menu back to VFO, the legend "**v 68**" will be displayed in the bottom right corner of the LCD. The legend "**v**" indicates that the

inverter is active while the legend "**68**" indicates the current 'flip' value in use.

To speed up the toggling of voice inverter, PRESS ⊕ (☐ FAR) to effectively toggle the voice inverter option on/off. This is achieved as the default is set to voice inverter ON (by accessing the voice inverter menu) so that every time the voice inverter menu is accessed, the voice inverter is automatically activated.
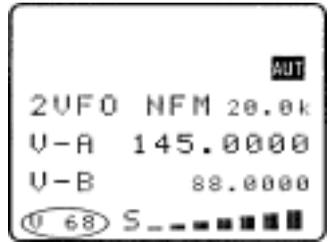
1. For example, assume that the voice inverter is currently OFF. PRESS ⊕ (☐ FAR) to access the voice inverter menu, the voice inverter menu cursor will move to "ON".

2. PUSH ⊕ (☐ FAR) to revert to VFO mode with the voice inverter on.

3. PRESS ⊕ (☐ FAR) to immediately toggle the voice inverter off.

The sequence then repeats each time you PRESS ⊕ (☐ FAR).

&**Note:** Using the voice inverter to monitor normal transmissions will cause them to distort and sounds rather like tuning across a busy short wave band using USB.

18-3 CT8200 optional CTCSS slot card

The CT8200 enables the AR8200 to search for 50 CTCSS tones which may be in use on the current receive frequency and to save a specific CTCSS tone (from the 50 tones available) into each VFO, each search bank and every memory channel individually. CTCSS is used by many amateur band repeaters, public utilities and private mobile radio services where shared resources are used, CTCSS ensures that operators only hear traffic intended for them.

Insert the CT8200 slot card and switch the AR8200 on, select VFO mode.

PRESS ⊕ (☐ FAR) to access the slot card option menu. The AR8200 will have recognised that the CT8200 has been fitted so will present the CTCSS menu.

The legend "**CTCSS**" confirms selection of the CTCSS menu. PUSH ⊕ the (PASS) key or use the ⇧ ⇩ keys to toggle the CTCSS facility between **OFF** / **ON** / **SRCH** (default is off). To abort entry and exit the menu PUSH ⊕ (☐ FAR).

&**Note:** You won't be able to audibly hear a CTCSS tone due to the low frequencies employed and audio characteristics of the AR8200 (and other receivers).

18-3-1 CTCSS tone squelch

While in the CTCSS menu, ꝰ⃝USH⃝꒜ (PASS) to activate the CTCSS facility (the LCD legend "ON" is displayed in reverse highlight).

Use the main dial or ⇦ ⇨ keys to make selection of CTCSS tone from the 50 available, the value cannot be adjusted when the menu is set to "OFF". The current CTCSS tone is displayed on the last-but-one line of the LCD, the legend "★" is displayed to the left of the CTCSS frequency when the current receive frequency is using the displayed CTCSS tone, this assists manual selection of the correct tone.

To accept the data input ꝰ⃝USH⃝꒜ (ENT), alternatively to abort entry ꝰ⃝USH⃝꒜ (CLEAR). The selected CTCSS tone may be used in VFO (separate CTCSS tones may be held in each VFO) and independent CTCSS tones saved in each search bank and memory channel.
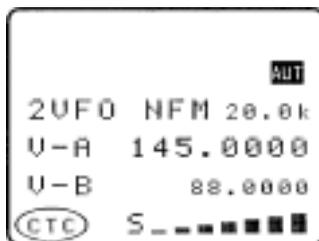
While in VFO, the legend "**CTC**" is displayed in the lower left corner of the LCD to indicate that CTCSS is active. The audio will be completely muted until a transmission occurs which contains the specified CTCSS tone even when the squelch is set fully anti-clockwise (open), it is normal for the occasional 'splutter' to be produced as 'CTCSS type fingerprints' naturally occur in everyday transmissions and background noise.

Scan & search banks: It is even possible to scan & search with the squelch open when CTCSS is active but scan/search rates will be reduced significantly. To achieve the best speeds, set the squelch until the "**S**" legend is extinguished in the usual manner.

Refer to the CTCSS table of available tones:

94.8	100.0	103.5	107.2	110.9
114.8	118.8	123.0	127.3	131.8
136.5	141.3	146.2	151.4	156.7
162.2	167.9	173.8	179.9	186.2
192.8	203.5	210.7	218.1	225.7
233.6	241.8	250.3	67.0	71.9
74.7	77.0	79.7	82.5	85.4
88.5	91.5	97.4	69.4	159.8
165.5	171.3	177.3	183.5	189.9
196.6	199.5	206.5	229.1	254.1

To switch CTCSS off, access the CTCSS menu ꝰ⃝PRESS⃝꒜ (CLEAR) ꝰ⃝USH⃝꒜ (PASS) to highlight the legend "**OFF**" then ꝰ⃝USH⃝꒜ (ENT).

18-3-2 CTCSS search

If you are uncertain what CTCSS frequency is in use, but you think there may be one present, you may

use the CTCSS SEARCH facility to discover what frequency is employed.

Place the AR8200 into VFO mode then ꓘRESS⋛

ꓷ FAR to access the CTCSS menu.

ꓑUSH⋛ PASS to highlight the "**SRCH**" legend

then ꓑUSH⋛ ENT to accept the input and exit
the menu.
The LCD legend "**CT-S**" will be displayed in the
bottom left corner of the LCD to indicate that CTCSS SEARCH is in operation. While in 2VFO mode, the standby frequency will be replaced with the legend
"**CTCSS 205.5 Hz**" when a CTCSS tone of 205.5 Hz has been located, otherwise the appropriate CTCSS frequency will be displayed.
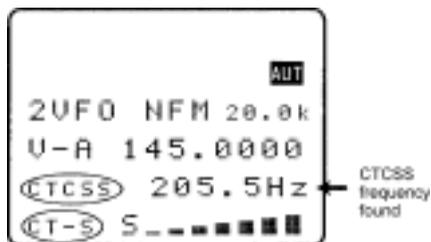
Each memory channel, VFO and search bank can hold different CTCSS frequencies and different settings of CTCSS squelch and CTCSS search (i.e. you can have CTCSS search active in VFO but CTCSS squelch active in memory channels).

If you are uncertain where CTCSS may occur and wish to experiment with CTCSS search, simply activate the CTCSS SEARCH facility while monitoring a broadcast frequency (such as Band-II) which has a rich audio range (playing music etc).

&**Note:** As CTCSS search has to check all 50 possible frequencies, it may take up to 15 seconds for the CTCSS tone to be identified.

## 18-4 TE8200 optional tone eliminator slot card

The TE8200 enables the AR8200 to ignore certain transmission tones which would otherwise stop the scan and search processes. Pilot tones are often transmitted by public utility services and railways making their transmissions troublesome and fatiguing to monitor without the use of the TE8200. There are 256 values for the tone eliminator ranging from 0 to 255 representing a frequency range of 0.4 kHz to 4.2 kHz.

Insert the TE8200 slot card and switch the AR8200 on, select VFO mode.

ꓘRESS⋛ ꓷ FAR to access the slot card option menu. The AR8200 will have recognised that the TE8200 has been fitted so will present the tone eliminator menu.

The legend "**TONE ELMT**" confirms selection of the tone eliminator menu. ꓑUSH⋛ the PASS key to
toggle the tone eliminator on/off (default off). Use the main dial or ⇧ ⇩ keys to make selection of tone in 256 steps from 0 to 255, the ⇦ ⇨ keys are used to increment selection of tone in increments of 10.

When selecting the value, the legend "★" will be displayed to
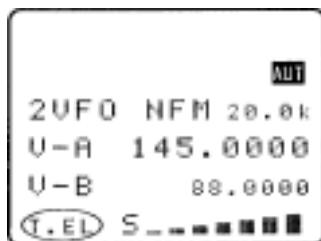
the left of the numeric value to indicate that the displayed tone value is contained in the current receive frequency, this greatly eases location of the offending tone frequency to allow scan and search to continue.

To accept the data input ⁿᵁˢᴴⁿ꜀ᵇ (ENT), alternatively to abort entry ⁿᵁˢᴴⁿ꜀ᵇ (CLEAR). When active, the LCD legend "**T.EL**"
will be displayed in the bottom left corner of the LCD.

Refer to the table to reconcile value with frequency:

Frequency (kHz)	0.4	0.6	1.0	1.4	1.8	2.2	2.6	3.0	3.4	3.8	4.2
Tone value	0	70	160	190	210	220	230	237	240	245	248
	-	-	-	-	-	-	-	-	-	-	-
	60	110	170	200	220	230	235	240	245	248	250

Tone eliminator setting and value may be held separately in each VFO, search bank and memory channel.

The squelch should be set to threshold in the usual manner. Operation continues as normal with the tone eliminator active, however if a transmission is encountered which
contains a 'pilot tone' which matches the current setting of the tone eliminator, the squelch will close allowing the scan and search processes to continue…
i.e. the AR8200 will NOT think that it has found an active receive frequency or blank carrier.

    📖**Note:** The tone eliminator **does not** remove whistles from the loudspeaker, it purely allows scan & squelch to continue unhindered.

18-5 RU8200 optional record & playback slot card

The RU8200 enables around 20 seconds of audio to be recorded to a chip within the RU8200 for playback at a later time. The chip may be recorded to time and time again overwriting the previous recordings. The recording may be played back over and over, very useful if you have grabbed an interesting recording! The RU8200 may be used in VFO, scan, search and memory read modes.

Insert the RU8200 slot card and switch the AR8200 on, select VFO mode.

ⁿᴾᴿᴱˢˢꞏ꜀ᵇ (CLEAR) to access the slot card option menu. The AR8200 will have recognised that the RU8200 has been fitted so will present the record / playback menu.

The legend "**RECORDER**" confirms selection of the record & playback menu. ⁿᵁˢᴴⁿ꜀ᵇ the (PASS) key
or use the main dial or ⇦ ⇨ ⇧ ⇩ keys to toggle between "**REC**"
and "**PLAY**" representing record and playback.

ⁿᵁˢᴴⁿ꜀ᵇ (ENT) to accept the selection and return to the
previous menu or ⁿᵁˢᴴⁿ꜀ᵇ (CLEAR) to abort.

Recording and playback can be carried out while the AR8200 is in VFO, scan or search mode.
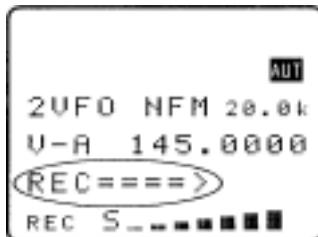
18-5-1 Recording

While in the record & playback menu select "**REC**" and

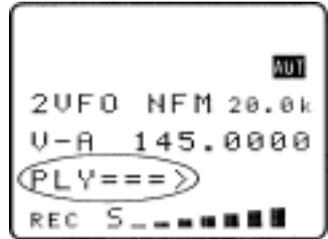ᴾUSH⚡ (ENT).   The LCD will return to its previous display with the legend "**REC**" in the bottom left corner of the LCD to show that the RU8200 is active. If the squelch is currently open, recording will take place immediately, otherwise recording will take place next time the squelch opens.

While recording is in progress, the second line from the bottom of the LCD (usually displaying the standby frequency in 2VFO mode) changes to a progress bar "**REC =====>**" indicating that recording is in progress. Once started, the recording process continues for about 20 seconds and the legend "**End**" is displayed when the recording process is complete. Once started recording contin-

ues even if the squelch closes but you may ᴾUSH⚡ the

(Ⓠ FAR) key half way through a recording to stop it from

recording 20 seconds of nothing! ᴾUSH⚡ the (Ⓠ FAR) key
after recording has ended to clear the recording related text
from the LCD.

       ⌦**Note:** RU8200 recording is disabled when the band
   scope facility is operational.

18-5-2 Playback

It is assumed that you have already made a recording. While in the record & playback menu select
"**PLAY**" and ᴾUSH⚡ (ENT).   The LCD will return to its previous display with the legend "**PLY**" in
the bottom left corner of the LCD to show that the RU8200 is active. Playback will start instantly.

While playback is in progress, the second line from the bottom of the LCD (usually displaying the
standby frequency in 2VFO mode) changes to a progress bar "**PLY =====>**"
indicating that playback is in progress. Once started, the playback process
continues for about 20 seconds and the legend "**End**" is displayed when the
playback is complete.

You may ᴾUSH⚡ the (Ⓠ FAR) key to cancel playback or clear the recording
related text from the LCD.

       ⌦**Note:** No liability in any form will be accepted in respect of
       recordings made using the RU8200 option.
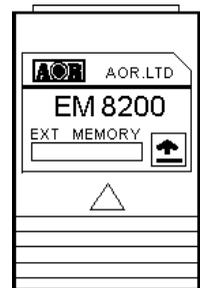
18-6 EM8200 optional external extended memory slot card

The EM8200 enables the whole 1,000 memory channels in 20 banks and 40 program search banks
to be backed up to the EM8200. In fact the EM8200 can hold the entire contents of the AR8200
including environmental operating data and band scope FOUR times in EM8200 locations 0, 1, 2 &
3. It is not necessary to save ALL data, you can specifically choose what data is to be backed up
and to which location.

📖**Note:** You cannot scan or search the backup information, data
must be loaded back into the AR8200 before these processes can be activated.

📖**Important note:** Never remove the EM8200 with the AR8200 switched on, especially
while data is being saved / loaded to and from the AR8200 or data corruption may occur.
Saving all data takes some time, it is recommended that external power be used while
copying large volumes of data to / from the EM8200 (or at least be sure that the batteries
are well charged). No liability in any form will be accepted in respect of data saved
to / loaded from the EM8200 option.

📖**Note regarding write protect:** If the write protect has been **globally** set to ON

(ALL PROTECT) in the configuration menu (⬛ᴶᎦᎻᏀᶠ (ꟼ) ꟼᎦᎻᎦᵮ (▾ GO)), data load will

be unsuccessful and no data will be loaded. Individual memory channel protect, memory
bank protect and search bank protect will be ignored during data load from the EM8200.

📖**Note regarding possible NOISE:** A small increase in 'noise' may be noticed while the
EM8200 option is fitted inside the AR8200, this will disappear when the EM8200 is removed
from the receiver. If signals are very weak or noise is a problem, temporarily remove the
EM8200 option.

The following table indicates the data types which may be saved to / loaded from the EM8200:

1	**ALL-DATA**	All memories, search banks, band scope and environment data
2	**ALL-MEM**	All memory channels
3	**MEM-BANK**	One specified memory bank
4	**ALL-SRCH**	All search banks
5	**SRCH-BANK**	One specified search bank
6	**B-SCOPE**	Band scope data

## 18-6-1 Initialising (formatting) the EM8200 before use

The EM8200 has been tested during manufacture but is not fully formatted. Before you use the EM8200
for saving real data, you must format the memory, this only needs to be carried out once in the life of the
EM8200 (similar to formatting a computer disk drive).

To format the memory, simply execute a SAVE ALL to each of the four memory locations of the EM8200
(0, 1, 2 & 3).

If you do not format the memory, you will still be able to carry out SAVE ALL (item 1 in the table) but the
specific data saves (items 2, 3, 4, 5 & 6 will not operate). If you do not format the memory and later
attempt to use a specific memory save or load, an error beep will sound (if beep is enabled).

To access the COPY EXT-MEM menu (which is used for the EM8200 data save / load and has been
selected dynamically in place of the COPY RS232C menu as the AR8200 recognises that the EM8200 is

fitted) ⬛ᴶᎦᎻᏀᶠ (ꟼ) ꟼᎡᎬᏚᏚᵮ (O IT) . Four significant lines of menu are displayed:

1   **COPY EXT-MEM**   Indicates that the EM8200 COPY menu has been accessed

2   **LOAD SAVE 0**   Select **save to** or **load from** the EM8200 and EM8200

bank number (0, 1, 2 & 3)

3   **ALL-DATA**   Type of data to be saved / loaded

4   **Next**   Access to further menu items

COPY EXT-MEM

LOAD SAVE 0

ALL-DATA

Next

EM8200 external bank (BLOCK) number
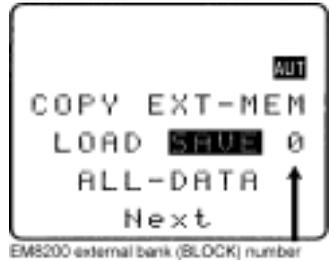
First select the "**SAVE**" option, ²|SH:3F 【 PASS 】 to toggle between load and save.

Next select the EM8200 bank you wish to save, the first time select "**0**" using the ⇦ ⇨ keys (later you will need to select 1, 2 & 3 to fully format the EM8200).
The type of data will already be default to "ALL-DATA" so no action is required.

²|SH:3F 【 ENT 】 to start the data save. The legend
"**EXT-MEM SAVING !!**" will be displayed with the exclamation marks flashing to indicate that saving is in progress. The save process will take over 20 seconds to complete. Once the save is complete, the LCD will revert to its previous display (VFO, scan or search etc).

Now repeat the ALL-DATA save to EM8200 locations 1, 2 and 3 to complete the formatting process.

18-6-2 EM8200 ALL-DATA save and load

Before loading data from the EM8200 it is recommended that ALL DATA save be used to make a copy of the AR8200 into one of the EM8200 memory locations (i.e. keep one as a temporary copy of your current AR8200 data).

EXT-MEM
SAVING!!

Save ALL-DATA

Access the COPY EXT-MEM menu using the key sequence ²|SH:3F 【F】 PRESS:4 【 0 JT 】

Select the "**SAVE**" option, ²|SH:3F 【 PASS 】 to toggle between load and save. Next select the EM8200 bank you wish to save using the ⇦ ⇨ keys (0, 1, 2 or 3). The type of data will already be default to "**ALL-DATA**" so no action is required.

²|SH:3F 【 ENT 】 to start the data save. The legend "**EXT-MEM SAVING !!**" will be displayed with the exclamation marks flashing to indicate that saving is in progress. The save process will take over 20 seconds to complete. Once the save is complete, the LCD will revert to its previous display (VFO, scan or search etc).

Load ALL-DATA

It is presumed that you have already saved ALL DATA to one of the four EM8200 memory locations.

Make sure that global write protect is not set or the data load will be unsuccessful and no data will be loaded.

Access the COPY EXT-MEM menu using the key sequence ꓹ꜔ꓸꓼꓵꓸ (ꓰ) ꓿ꓰꓼꓼꓽꓸꓹ (ꓳ ꓸꓲꓔ).

Select the "**LOAD**" option, ꓹ꜔ꓸꓼꓵꓸ (ꓓꓸꓰꓼꓼ) to toggle between load and save. Next select the EM8200 bank you wish to load using the ⇦ ⇨ keys (0, 1, 2 or 3). The type of data will already be default to "**ALL-DATA**" so no action is required.

ꓹ꜔ꓸꓼꓵꓼ (ꓰꓠꓔ) to start the data load. The legend "**EXT-MEM LOADING !!**" will be displayed with the exclamation marks flashing to indicate that loading is in progress.
The load process will take over 20 seconds to complete. Once the load is complete, the AR8200 will power off/on and the LCD will revert to its previous display (VFO, scan or search etc).

18-6-3 EM8200 ALL-MEM save and load

It is not necessary to save and load all of the data at times when you do not wish your search banks etc over-written. Instead use ALL-MEM to overwrite all memory banks in one go but to leave the search banks etc unchanged.

Save ALL-MEM (all memory banks)

Access the COPY EXT-MEM menu using the key sequence ꓹ꜔ꓸꓼꓵꓸ (ꓰ) ꓿ꓰꓼꓼꓽꓸꓹ (ꓳ ꓸꓲꓔ).

Select the "**SAVE**" option, ꓹ꜔ꓸꓼꓵꓸ (ꓓꓸꓰꓼꓼ) to toggle between load and save. Next select the EM8200 bank you wish to save using the ⇦ ⇨ keys (0, 1, 2 or 3). ꓹ꜔ꓸꓼꓵꓼ the ⇩ key to move the cursor to the left of the "**ALL-DATA**" legend, use the ⇦ ⇨ keys to select "**ALL-MEM**".

ꓹ꜔ꓸꓼꓵꓼ (ꓰꓠꓔ) to start the memory data save. The legend "**EXT-MEM SAVING !!**" will be displayed with the exclamation marks flashing to indicate that saving is in progress. The memory save process will take over 10 seconds to complete. Once the save is complete, the LCD will revert to its previous display (VFO, scan or search etc).

Load ALL-MEM (all memory banks)

It is presumed that you have already saved memory data to one of the four EM8200 memory locations. Make sure that global write protect is not set or the data load will be unsuccessful and no data will be loaded.

Access the COPY EXT-MEM menu using the key sequence ꓹ꜔ꓸꓼꓵꓸ (ꓰ) ꓿ꓰꓼꓼꓽꓸꓹ (ꓳ ꓸꓲꓔ).

Select the "**LOAD**" option, ⊐⎿SH⎾⊊ (PASS) to toggle between load and save. Next select the EM8200 bank you wish to load using the ⇦ ⇨ keys (0, 1, 2 or 3). ⊐⎿SH⎾⊊ the ⇩ key to move the cursor to the left of the "**ALL-DATA**" legend, use the ⇦ ⇨ keys to select "**ALL-MEM**".

⊐⎿SH⎾⊊ (ENT) to start the data load. The legend "**EXT-MEM LOADING !!**" will be displayed with the exclamation marks flashing to indicate that loading is in progress. The memory load process will take over 20 seconds to complete. Once the load is complete, the LCD will revert to its previous display (VFO, scan or search etc).

18-6-4 EM8200 MEMORY BANK save and load

The memory data 'saved or loaded' can be specific to one bank only. Memory banks must be saved and loaded as a pair i.e. A/a, B/b, C/c etc.

Save MEM-BANK (one specific memory bank)

Access the COPY EXT-MEM menu using the key sequence ⊐⎿SH⎾⊊ (F) PRESS (0 JT)

Select the "**SAVE**" option, ⊐⎿SH⎾⊊ (PASS) to toggle between load and save. Next select the EM8200 bank you wish to save using the ⇦ ⇨ keys (0, 1, 2 or 3). ⊐⎿SH⎾⊊ the ⇩ key to move the cursor to the left of the "**ALL-DATA**" legend, use the ⇦ ⇨ keys to select "**MEM-BNK**". ⊐⎿SH⎾⊊ the ⇩ key to move the cursor to the right of the legend "**MEM-BNK**" to enable selection of the desired memory bank to save. Use the main dial, ⇦ ⇨ keys or keypad to select the desired memory bank.

⊐⎿SH⎾⊊ (ENT) to start the memory data save. The legend "**EXT-MEM SAVING !!**" will be displayed with the exclamation marks flashing to indicate that saving is in progress. The memory save process will take a couple of seconds to complete. Once the save is complete, the LCD will revert to its previous display (VFO, scan or search etc).

Load MEM DATA (all memory banks)

It is presumed that you have already saved memory data to one of the four EM8200 memory locations. Make sure that global write protect is not set or the data load will be unsuccessful and no data will be loaded.

Access the COPY EXT-MEM menu using the key sequence ⊐⎿SH⎾⊊ (F) PRESS (0 JT)

Select the "**LOAD**" option, ⊐⎿SH⎾⊊ (PASS) to toggle between load and save. Next select the EM8200

bank you wish to save using the ⇦ ⇨ keys (0, 1, 2 or 3). ⁻.|SH⊊⁻ the ⇩ key to move the cursor to

the left of the "**ALL-DATA**" legend, use the ⇦ ⇨ keys to select "**MEM-BNK**". ⁻|SH-⊊⁻ the ⇩ key to

move the cursor to the right of the legend "**MEM-BNK**" to enable selection of the desired memory
bank to load. Use the main dial, ⇦ ⇨ keys or keypad to select the desired memory bank.

⁻.|SH⊊⁻ ([ENT]) to start the memory data load. The legend "**EXT-MEM LOADING !!**" will be displayed
with the exclamation marks flashing to indicate that loading is in progress. The memory load process will
take a couple of seconds to complete. Once the load is complete, the LCD will revert to its previous
display (VFO, scan or search etc).

18-6-5 EM8200 ALL-SRCH save and load

It is not necessary to save and load all of the data at times when you do not wish your memory banks etc
over-written. Instead use ALL-SRCH to overwrite all search banks in one go but to leave the memory
banks etc unchanged.

Save ALL-SRCH (all search banks)

Access the COPY EXT-MEM menu using the key sequence ⁻.|SH⊊⁻ ([F]) PRESS-⊿ ([0.JT]).

Select the "**SAVE**" option, ⁻|SH-⊊⁻ ([PASS]) to toggle between load and save. Next select the EM8200

bank you wish to save using the ⇦ ⇨ keys (0, 1, 2 or 3). ⁻.|SH⊊⁻ the ⇩ key to move the cursor to the

left of the "**ALL-DATA**" legend, use the ⇦ ⇨ keys to select "**ALL-SRCH**".

⁻.|SH⊊⁻ ([ENT]) to start the search data save. The legend "**EXT-MEM SAVING !!**" will be displayed
with the exclamation marks flashing to indicate that saving is in progress. The search save process will
take a few seconds to complete. Once the save is complete, the LCD will revert to its previous display
(VFO, scan or search etc).

Load ALL-SRCH (all search banks)

It is presumed that you already have search data in one of the four EM8200 memory locations. Make
sure that global write protect is not set or the data load will be unsuccessful and no data will be loaded.

Access the COPY EXT-MEM menu using the key sequence ⁻.|SH⊊⁻ ([F]) PRESS-⊿ ([0.JT]).

Select the "**LOAD**" option, ⁻|SH-⊊⁻ ([PASS]) to toggle between load and save. Next select the EM8200

bank you wish to load using the ⇦ ⇨ keys (0, 1, 2 or 3). ⁻.|SH⊊⁻ the ⇩ key to move the cursor to the

left of the "**ALL-DATA**" legend, use the ⇦ ⇨ keys to select "**ALL-SRCH**".

⁻.|SH⊊⁻ ([ENT]) to start the data load. The legend "**EXT-MEM LOADING !!**" will be displayed with the
exclamation marks flashing to indicate that loading is in progress. The search load process will take a
few seconds to complete. Once the load is complete, the LCD will revert to its previous display (VFO,
scan or search etc).

18-6-6 EM8200 SEARCH BANK save and load

The search data 'saved or loaded' can be specific to one bank only.

Save SRCH-BANK (one specific search bank)

Access the COPY EXT-MEM menu using the key sequence ⁹USH꜄ ⒡ PRESS⨪ (0 JT).

Select the "**SAVE**" option, ⁹USHG꜄ (PASS) to toggle between load and save. Next select the EM8200

bank you wish to save using the ⇦ ⇨ keys (0, 1, 2 or 3). ⁹USHG꜄ the ⇩ key to move the cursor to the

left of the "**ALL-DATA**" legend, use the ⇦ ⇨ keys to select "**SRCH -BANK**".

⁹USH꜄ the ⇩ key to move the cursor to the right of the legend "**SRCH-BANK**" to enable selection

of the desired search bank to save. Use the main dial, ⇦ ⇨ keys or keypad to select the desired
search bank.

⁹USH꜄ (ENT) to start the search data save. The legend "**EXT-MEM SAVING !!**" will be displayed

with the exclamation marks flashing to indicate that saving is in progress. The search save process will
take a couple of seconds to complete. Once the save is complete, the LCD will revert to its previous
display (VFO, scan or search etc).

Load SRCH-BANK (one specific search bank)

It is presumed that you have already saved search data to one of the four EM8200 memory locations.
Make sure that global write protect is not set or the data load will be unsuccessful and no data will be
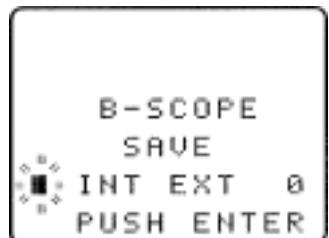loaded.

Access the COPY EXT-MEM menu using the key sequence ⁹USH꜄ ⒡ PRESS⨪ (0 JT).

Select the "**LOAD**" option, ⁹USHG꜄ (PASS) to toggle between load and save. Next select the EM8200

bank you wish to load using the ⇦ ⇨ keys (0, 1, 2 or 3). ⁹USHG꜄ the ⇩ key to move the cursor to the

left of the "**ALL-DATA**" legend, use the ⇦ ⇨ keys to select "**SRCH-BANK**". ⁹USH꜄ the ⇩ key to move

the cursor to the right of the legend "**SRCH-BANK** " to enable selection of the desired search bank to
load. Use the main dial, ⇦ ⇨ keys or keypad to select the desired search bank.

⁹USH꜄ (ENT) to start the search data load. The legend "**EXT-MEM LOADING !!**" will be displayed

with the exclamation marks flashing to indicate that loading is in progress. The search load process will
take a couple of seconds to complete. Once the load is complete, the LCD will revert to its previous
display (VFO, scan or search etc).

18-6-7 EM8200 internally stored band scope save and load

It is possible to save the internally stored band scope to the
EM8200 external memory locations 0, 1,
2, 3 or 4 using the "**COPY EXT-MEM**" menu. If a band scope

```
        B-SCOPE
          SAVE
      ■ INT EXT   0
       PUSH ENTER
```

trace is currently 'actively' displayed on the LCD while in BAND SCOPE mode, it may also be saved to external memory.

Save B-SCOPE

To save the internally stored band scope to external memory, access the COPY EXT-MEM menu using the key sequence

⌐JSHG͡F (F) PRESS.5 (0.JT).

```
EXT-MEM
SAVING!!
```

Select the "**SAVE**" option, ⌐JSH-3F (PASS) to toggle between load and save.

Next select the EM8200 bank you wish to save using the ⇦ ⇨ keys (0, 1, 2 or 3).

⌐JSHG͡F the ⇩ key to move the cursor to the left of the
"**ALL-DATA**" legend, use the ⇦ ⇨ keys to select "**B-SCOPE**".

⌐JSHG͡F (ENT) to start the band scope data save. The legend "**EXT-MEM SAVING !!**" will be
briefly displayed, the save process will only take a second to complete. Once the save is complete, the LCD will revert to its previous display (VFO, scan or search etc).

Load B-SCOPE (for future display)

It is presumed that you have already saved band scope data to one of the four EM8200 memory locations. Make sure that global write protect is not set or the data load will be unsuccessful and no data will be loaded. It is also possible to load a band scope trace directly into the band scope display for immediate viewing, this is explained at the end of this section.

If you wish to retain any currently displayed band scope, save it to one of the four locations in the external EM8200.

Access the COPY EXT-MEM menu using the key sequence ⌐JSHG͡F (F) PRESS.5 (0.JT).

Select the "**LOAD**" option, ⌐JSH-3F (PASS) to toggle between load and save. Next select the EM8200

bank you wish to save using the ⇦ ⇨ keys (0, 1, 2 or 3). ⌐JSHG͡F the ⇩ key to move the cursor to the
left of the "**ALL-DATA**" legend, use the ⇦ ⇨ keys to select "**B-SCOPE**".

⌐JSHG͡F (ENT) to start the band scope data load. The legend "**EXT-MEM LOADING !!**" will be briefly
displayed, the band scope load process will only take a second
to complete. Once the load is complete, the LCD will revert to
its previous display (VFO, scan or search etc).

Recalling a stored band scope for viewing

The loaded band scope may be recalled to LCD, the key
sequence depends upon whether the EM8200 is still fitted or
not.

```
  B-SCOPE
   LOAD
∎ INT EXT   0
 PUSH ENTER
```

With EM8200 'not' fitted: Use the key sequence ⊃⌐SH⌐ (F) PRESS ⌐ (SCOPE) to recall the loaded band scope to LCD.

With EM8200 fitted: Use the key sequence ⊃⌐SH⌐ (F) PRESS ⌐ (SCOPE) to access the band scope load menu, the legend "**B-SCOPE LOAD**" will be displayed.

⊃⌐SH⌐ the (PASS) key to toggle the memory selection between INTERNAL "**INT**" and EXTERNAL "**EXT**", the default is "**EXT**". As band scope data has been transferred to internal memory select "**INT**". ⊃⌐SH⌐ (ENT) to recall the trace to LCD.

Loading a band scope directly from external memory for viewing

It is possible to load a band scope directly from EM8200 external memory for immediate display on the LCD. Use the key sequence ⠂⡦⠓⡃⠗ (F) ⡏⡗⡓⡕⡒⡥ (⡖⡕⡅⡏⡓⡅) to access the band scope load menu, the legend "**B-SCOPE LOAD**" will be displayed.

⠂⡦⠓⡃⠗ the (⡒⡍⡌⡓⡓) key to toggle the memory selection between INTERNAL "**INT**" and EXTERNAL "**EXT**", the default is "**EXT**". Select "**EXT**" then use the main dial or ⇦ ⇨ keys to select one of the EM8200 memory locations (0, 1, 2 or 3). ⠂⡦⠓⡃⠗ (⡅⡌⡏) to recall the trace directly to the LCD for immediate viewing.

&📖**Note:** For further information regarding the band scope, please refer to *section 15* of this manual.

(19) Trouble shooting

Should the AR8200 appear to act strangely, check out the following suggestions to see if the problem can be overcome. Failing this, switch off the AR8200, disconnect any external power connection and remove one battery from the radio (if you have batteries fitted). Wait for at least 30 seconds then re-fit the battery (if in use) or re-connect the external power and switch the radio on again with a ⡏⡒⡅⡓⡓⡕ of the (⡐⡵⡒) key.

Check to see if the problem has cleared.

19-1 Soft reset of microprocessor

If removing power and switching the AR8200 off / on does not help, try a soft reset of the microprocessor.

Soft reset is achieved by powering-up the radio with the (⡇ ⡆⡁⡒) key held, do not release the (⡇ ⡆⡁⡒) key until the opening message has performed and a frequency is displayed in 2VFO mode.

All scan & search environments are cleared, bank link is set off and the receiver frequency will be set to 88.000 MHz for both VFO-A and VFO-B. The beep will be enabled and set to default as will lamp and LCD contrast. All memory and search bank data will be intact.

19-2 Other trouble shooting suggestions

AR8200 will not power on. Check that the set is connected to external power (12V d.c.) or that batteries are fitted and are fully charged.

There is no audio. It may simply be that the squelch is closed or volume is turned down. ⡏⡒⡅⡓⡓⡕ **and hold** the (⡳⡍⡃⡙ key and adjust the volume to a comfortable level. Ensure that no external loudspeaker, headphone or earphone is in use. Check that the band scope is not in operation.

AR8200 display is strange and there is no audio. Check that the band scope is not in operation, ⠂⡦⠓⡃⠗ (⡚⡖⡅⡎)

There is no receive. Check that a suitable aerial is connected to the AR8200 and the attenuator is not switched on (ATT legend). Check that VOICE squelch is not in use (VSQ legend), check that LEVEL squelch (LSQ legend) is not in operation.

Intermittent receive. Check that priority is not engaged and the band scope is not in operation. Ensure that POWER SAVE is not enabled in the CONFIG menu.

Strange audio. Ensure that you are using the correct receive mode and are tuned to the centre of the signal. In most cases the AR8200 can automatically select the correct parameters. PRESS 🔁 3.cm to select auto-mode.

No frequency display. If all other LCD characters appear normal check that the FREQ DISP facility is not set OFF in the CONFIG menu.

LCD is dim. Check that the contrast is set to a sensible level (not too low) in the CONFIG menu (around 10). An LCD test facility is provided. **Power-up the AR8200 while holding** 0 JT PRESS 🔁 PWR to switch off the test.

LCD legends are all shown. Check that the contrast is set to a sensible level (not too high) in the CONFIG menu (around 10).

Cannot save any data. Ensure that write protect is not set. It is also possible for data not to be saved if the batteries are very low in charge.

Cannot enter frequencies. Ensure that you are entering frequencies in MHz format between the range of 0.100 MHz and 2040.000 MHz.

Keypad inoperative. Ensure that the key lock is not engaged (key symbol on the LCD). PRESS 🔁 the K L key to toggle keylock on / off.

Keypad and operation is sluggish. Ensure that POWER SAVE is not enabled in the CONFIG menu.

No SCAN. Check that you have memory data saved and that all channels are not locked out (PASS).

No SEARCH. Check that you have search data programmed and that all frequencies are not locked out (PASS).

19-3 Trouble shooting - Take note of the following

Select scan cannot operate in conjunction with **mode scan**. Select scan is disabled when priority is engaged.

Priority is disabled when the band scope is in operation. If a long **DELAY time** is set, priority 'eats' away at delay time causing it to shorten. If the optional CT8200 slot card is in use, **CTCSS SEARCH** cannot operate with priority engaged due to the required CTCSS search time being quite long.

When **POWER SAVE** is on, response from the AR8200 may be sluggish and there will be periods of no receive.

If the ⌐¹ᴹᴱᴺᵁ key is being used to display a frequency with **FREQUENCY OFFSET** in use, this offset frequency cannot be stored into memory.

The **squelch** may not operate promptly (as you may expect) when monitoring in **USB, LSB, CW and NAM modes** due the narrow bandwidths employed. This is a fundamental characteristic of the squelch circuit. Audio may remain even though the "**S**" squelch legend may have disappeared for a couple of seconds. It is suggested that LEVEL squelch be used as an alternative in this situation.

There are no internal operator adjustments. In the unlikely event of servicing being required, please contact your dealer for technical assistance.

(20) Optional accessories

Slot cards:

Five slot cards are available, only one may be fitted at a time.

    1. **VI8200**   Voice inverter (analogue) in 157 steps.
    2. **CT8200**   CTCSS squelch & search.
    3. **TE8200**   Tone eliminator in 256 steps.
    4. **RU8200**   Chip based recording and playback, 20 seconds approx.
    5. **EM8200** External extended memory, backup 4,000 memories, 160 search banks
                      (can hold as much data as 4 x AR8200).

Leads:

Three leads are available for use with the option socket.

    1. **CR8200**   tape **rec**ording lead.
    2. **CO8200**   data **clo**ne lead.
    3. **CC8200**   **c**omputer **c**ontrol lead with level shift
                      (available with imperial (PC98) & metric (DOSV) screws) and supplied
                      with RS232 protocol listing in PDF format.

Aerials:

There are many suitable aerials available on the market, these include.

DA900	VHF/UHF flexible whip 245mm in length.
TW500	VHF/UHF telescopic which aerial. Comprises of six sections, extends to 625mm in length.
MA500	VHF/UHF whip aerial on magnetic base with 4m of coaxial cable. Base is 85mm in diameter, total height is 720mm. Coverage is 25 to 1300 MHz.
DA3000	16 element discone aerial with 15 of coax. Coverage is 30 MHz to 2 GHz.
SA7000	Passive twin element wide band aerial with 15m of coax. Coverage is 30 kHz to 2 GHz.
LA320	Desktop loop aerial 1.6 MHz to 15 MHz. Optional elements available for LW & MW. Supplied with BNC lead.
ABF125	VHF airband filter for increased adjacent channel selectivity.

(21) Aerial (antenna), earths & propagation

The subject of aerial choice and earth can be quite complex. There are many advantages and disadvantages to consider before connecting an external aerial to your receiver. One interesting phenomena is that aerial theory and practice can be surprisingly different. Keeping common sense in mind it is one of the few remaining areas for listeners to easily experiment and often achieve fantastic results.

Whip aerial
The supplied semi-flexible whip aerial should give adequate results for general hand-held operation on the VHF and UHF bands. A longer wire aerial or telescopic whip should be considered for listening to the short wave bands. The AR8200 is supplied with a ferrite bar aerial for medium wave reception, for best results, rotate the receiver as the bar aerial is directional.

Mounting location
It is important to mount any external aerial as high as possible and in clear space although this is more important at VHF frequencies than for short wave. If possible the aerial should have a clear path to the horizon. Results are usually disappointing when an installation is in a loft space.

Long wire aerials
For short wave reception a random length of long wire approximately 10 to 20 metres in length forms a good compromise. The wire should be connected to the centre pin of a BNC plug then connected to the BNC aerial input on the top of the AR8200. If possible try to locate the receiver close to a window so that the wire has the shortest and most direct run from the rear of the receiver to the outside world.

Discone
For wide coverage in the VHF-UHF bands a compromise has to be met and the most popular aerial is a discone (AOR DA3000). Their appearance is like a large spider or umbrella without the covering material, the better models have about 16 elements. Typical usable coverage starts from about 25 MHz and extends continuously to 500 MHz 1300 MHz or even 2000 MHz. The coverage peaks and dips throughout it's range as the elements interact to provide the widest possible coverage. Due to their necessary construction discone aerials are a little prone to "wind noise" due to vibration and possible damage in severe gales.

Filters
A VHF civil AIRBAND FILTER is available (ABF125), this will help minimise the possible effects of breakthrough when listening to VHF airband in Band-II VHF high signal areas or when connected to external aerials.

Earth systems
A separate EARTH connection made to the outer (braid) connector of the BNC plug may improve aerial efficiency and reduce noise. Suitable earth points include connection to a water pipe, central heating radiator or external earth rod. If fitting a separate external earth rod, consider the implications carefully if your mains supply uses Protective Multiple Earth (PME) system. If in doubt consult an experienced electrician. Connecting an external earth wire may greatly reduce the local noise encountered when listening on the short wave bands. It is very important to provide a good earth should you use an aerial tuning unit.

A short length of thick gauge earth wire may be connected to a nearby central heating radiator or water pipe but **never use a gas pipe for earthing**. Ideally a separate earth rod should be used but the length between the receiver and rod becomes restrictive, if too long the earth system may well "pick up" noise rather than remove it.

Propagation

VHF and UHF transmissions generally only propagate relatively short distances when compared to short wave signals. For all intents and purposes they may be considered as line-of-sight plus a bit.

Where as point to point communication between mobile users or when in built up areas may only be a couple of kilometres, aircraft at heights of 30,000 feet may be heard for many tens of kilometres (100 to 300 with the right conditions).

Unlike VHF and UHF transmissions which generally propagate only on a localised basis (to the horizon plus a small amount), short wave transmissions may travel for many thousands of kilometres. Depending upon the frequency in use, time of day, season of the year and sun spot activity, transmissions may propagate completely around the World.

Luckily the frequency spectrum of short wave is often reflected back down to Earth by the upper layer of the Earth's atmosphere called the ionosphere. When the reflected signals reach the Earth again they may either be received or reflected back up into space. If lucky, they will be reflected by the ionosphere yet again down toward the Earth providing reception into another and possibly more distant location. Depending upon the time of day and desired skip distance, different frequencies will be selected by Radio Amateurs and commercial users such as Oceanic Air Traffic.

(22) Specification

Frequency Range:	500 kHz to 2040 MHz (Actual frequency input 100 kHz to 2040 MHz, performance between 100 kHz to 530 kHz is not guaranteed).
Receive Modes:	WFM, NFM, SFM, WAM, AM, NAM, USB, LSB, CW

Sensitivity:

500 kHz ~ 2.0 MHz
    AM: 3.50 µV (10dB S/N)
2.0 MHz ~ 30 MHz
    SSB: 1.50 µV (10dB S/N)
    AM: 2.50 µV (10dB S/N)
30 MHz ~ 470 MHz
    SSB: 0.30 µV (10dB S/N)
    AM: 0.70 µV (10dB S/N)
    NFM: 0.35 µV (12dB SINAD)
    WFM: 1.00 µV (12dB SINAD)
470 MHz ~ 1 GHz
    NFM: 0.50 µV (12dB SINAD)
    WFM: 1.50 µV (12dB SINAD)
1.0 GHz ~ 1.3 GHz
    NFM: 1.00 µV (12dB SINAD)
1.3 GHz ~ 2.039 GHz
    NFM: 2.50 µV (12dB SINAD)

Selectivity:			
	SSB/NAM	3kHz (-6dB),	9kHz (-60dB)
	AM/SFM	9kHz (-6dB),	20kHz (-40dB)
	WAM/NFM	12kHz (-6dB),	25kHz (-40dB)
	WFM	150kHz (-3dB),	380kHz (-20dB)

Power Consumption:	190mA (nominal), 145mA (stand by), 25mA (power save). *4 x AA internal cells* or 12V d.c. external supply
Dimensions:	61(W) x 143(H) x 39(D) mm
Weight:	196g (335g including NiCads)
Memory channels:	1,000 (20 banks)
Select scan channels:	50
Priority channels:	1