

Discriminator output in FM and WFM

The standard FM (NFM) discriminator / detector output is available from the side AUX connector, its the GREY colour wire if using the optional OS8200 cable. The signal is picked from pin-9, IC302 (TA31136).

This connection will not provide discriminator / detector output in WFM mode because the demodulation is handled by two different devices. To obtain discriminator output on WFM, you will have to take a tap from pin-21 on IC303 (CXA1611N).

Alternatively it may be worth a look at pin-6 of the AUX socket which is labelled 'audio out'. This has only one further active stage and a 0.1 cap. It is well before the main audio amp so it may be okay for feeding a sound card without too much limitation, it should also be active in all modes.

RU8200 with AFC active and AR8200MK3

The operating manual in respect of the RU8200 operation with the AR8600 was incorrect, a revision may be viewed on the AR8600 technical bulletin section of the AOR UK web site, it is worth a look –

Feedback from an AR8200MK3 owner suggests compatibility issues with the RU8200/AR8200MK3 when the AFC (Automatic Frequency Control) feature is used. When recording is started and AFC is active (in VFO or memory mode), the record process is immediately terminated and the word 'End' is displayed.

This report has been confirmed in the AOR UK workshop and a report has been passed to AOR Japan (the manufacturer).

[August 2003]

Digital reception, AR8200 and other receivers

While it is possible to produce receivers capable of receiving certain digital transmissions, there are technical and legal complications.

Technical:

Transmissions such as GSM employ long encryption keys (unless you know what they are set to, it is very difficult to crack the code). DAB employs a bandwidth of about 1.4MHz and DECT phones use ten channels with a bandwidth of about 1MHz (much wider than the final I.F. of a conventional receiver).

Legal:

Some time ago we tentatively approached the UK Radiocommunications Agency regarding reception of certain digital transmissions. They categorically stated that such a move would be fought in the similar way to 'film-net decoders' in the early days of satellite transmissions. While scanning receivers have legitimate usage, one specifically designed for the decoding of licensed encryption transmissions would not be deemed to have legitimate alternative usage so would be outlawed.

In practical terms, some commercial grade DSP receivers have the capability to decode digital transmissions, but price pushes the products beyond the reach of most hobbyists.

Certainly there appears 'less' to listen to from year to year, for some this is a greater challenge, for others a point of dismay. Even commercially organisations are pursuing very accurate DF techniques with frequency coherent receivers as an alternative to digital decoding (although a few are even reconstructing WAP).

It is very unlikely that the AR8200 (or any other receiver of a similar type) will be adaptable in any way for digital reception.

*If you are looking for information on **TRUNKED RADIO**, take a look at the trunked radio information home page at <http://www.trunkedradio.net>*

The AR8200 has been designed & manufactured by our associate company in Japan:

AR8200 write protect

If you are unable to write data to your AR8200, you may have WRITE PROTECT enabled. There are effectively three ways you may have restricted the writing of data (refer to the manual for details). First check the following:

Global write protect (config menu):

[F] [7] [DOWN-ARROW nine times] use the DIAL or side arrow or PASS key to turn the flag off (black square surrounding the white lettering OFF) press [ENT].

Memory bank write protect (scan menu):

[F] [hold-SCAN] [DOWN-ARROW four times] select bank using side arrow, use the DIAL or side arrow or PASS key to turn the flag off (black square surrounding the white lettering OFF) press [ENT].

Individual memory channel protect (edit menu):

[F] [8] [DOWN-ARROW ten times], select the memory channel, [DOWN-ARROW], use the DIAL or side arrow or PASS key to turn the flag off, press [ENT].

Clear all protect flags in one go (see P99):

[F] [hold-9] [DOWN-ARROW five times] wait for confirmation message 'CH PROTECT' then push [PASS].

It is possible to SOFT RESET the AR8200 by holding [CLEAR] as you switch the unit on, there is no other reset but it may be worth removing external power and batteries for 30 seconds as this will re-boot the CPU. There is no hard reset.

Failing this, it is possible to re-load the system data using a modified EM8200 card 'service tool' which is held in the UK workshop... but use of this is very infrequency, try the above first.

AR8200 and Nickel Metal Hydride batteries (NiMH)

The charging requirements for NiCad & NiMH batteries are different (constant voltage / constant current). The internal charging circuit of the AR8200-1 / AR8200-2 is designed specifically for NiCad batteries.

While there are many internet comments suggesting that use of NiMH batteries does not cause damage to the AR8200, we have had about three instances where the rear of the receiver has been badly melted where NiMH have been used.

Here in the UK workshop we have attempted to recreate the failure condition without success, try as we may we cannot cause the batteries to overheat the receiver... so it remains something of a mystery.

For this reason, we cannot endorse the use of NiMH batteries while connected to external DC but there is no reason why they cannot be charged using a separate external specialist charger then inserted into the radio.

AR8200 MK3

The AR8200 MK3 is supplied with 1500mAh NiMH batteries, this provides longer operation between charges... some geographical areas are also in the process of banning NiCads due to 'green environmental' considerations of recycling the heavy cadmium metal.

The following text has been extracted from the MK3 addendum on the subject of batteries:

The batteries supplied with the AR8200 have been changed. To ensure that a completely full charge is established, please assume the full charge time as follows, this replaces the reference given on page 19 section 1-6-4 of the English language operating manual.

- AR8200 NiCads, 700mAh 12 hour charge
- Mk2 NiCads, 1000mAh 14 hour charge
- **Mk3 NiMH, 1500mAh 22 hour charge**

The AR8200 receiver employs standard 'AA' size batteries, so a range of different types can be used (NiCad, NiMH, alkaline etc). For this reason, the charging circuit cannot be optimised for any one specific type. It is most important that you do not over-charge the batteries and do not keep topping them up without first running them down. If the batteries are flat, do not attempt to 'charge and operate' the radio for the first hour of charging, this would lead to an increase in internal heat generated by the AR8200. Do not connect an external power supply, mobile power lead or charger if dry / alkaline batteries are fitted.

In order to provide the optimum level of charge and life-span from the NiMH batteries (Nickel Metal Hydride) supplied with the Mk3, **use of a specialist dedicated external battery charger is recommended**, they are readily available from electrical suppliers. The AR8200 is not designed to charge rechargeable alkaline batteries.

AR8200 Battery low indicator

A battery low level is detected by the microprocessor by comparing its regulated supply voltage to the voltage provided at pin 77 by the resistors R538 and R539 (33k and 100k).

These resistors are connected directly between battery voltage and ground with the feed to the microprocessor taken from the centre point between them. The comparison battery voltage presented at the microprocessor is therefore about ¾ of true battery voltage. This comparison voltage can therefore fall below the microprocessors regulated supply voltage of 4.5v well before the supply voltage starts to fall. The battery low indication therefore occurs at the same point every time.

This generally gives a battery low voltage indication at between 4.3 and 4.8 volts, varying from set to set slightly depending upon the exact resistor values and type and condition of the batteries being used. With the above in mind, the length of time between battery low indication and the set stopping working altogether may be between a few minutes and half an hour or so.

Tailoring the resistor values will alter the battery low indication point but will not alter the actual usable battery life.

If problems are experienced with only a short time before low battery indication, it is unlikely to be due to a fault in the battery low detection circuit but more than likely is due to a fault at some other point in the battery circuit. Any additional resistance in the battery path will result in such problems.

Possible faulty areas are:-

- Poor contact between the batteries and spring terminals.
- Poor contact between the end battery terminals and the PCB.
- Loss of contact between the switched contacts in the external power socket (the battery negative supply is fed through these).

AR8200 RS232 commands for multi-radio operation

It is possible to connect several AR8200 radio receivers together by fabricating a diode buffer (using the optional OS8200 AUX cable) and assign a unique ID to each radio for multi-radio targeted RS232 control, only one RS232 level shift circuit is required.

The English language RS232 protocol listing is slightly incorrect regarding the ID format, it suggests a HEX value to represent the ID of each radio from 01 to 99 (default is ID 00 where no 'RS232 ON' command is required)... however the ID format is simply a two digit decimal ASCII value.

For example, to set an **ID** of '**02**', first use the AR8200 radio CONFIG menu to set ID=02 then load HyperTerminal and use the command:

```
^A02 <CR-LF>
```

Hold the **CONTROL KEY**, while holding the CONTROL key press **A** (in upper case, so have the CAPS LOCK ON). Release both keys, now press **0** (zero) then **2** (two) then the **ENTER** key.

When control of the desired radio is achieved (ID=02 in this example), the DOT (RS232 remote) legend appears on the LCD of the AR8200 and it may be controlled via computer in the usual manner. As you pass the different ID addresses via the RS232 port, each AR8200

will display and extinguish the DOT (RS232 remote) legend as RS232 communication is made and severed depending on the ID addresses used.

To elaborate on the cable requirement, simply insert an 1N4148 or similar diode in series with the RX and TX lines of each radio (taking note of polarisation, to make a diode buffered RX/TX data bus - just like nodes in amateur radio packet systems), then use a single RS232 level shift circuit to swap from TTL to RS232.

As you exceed about 4 x AR8200, the load will get too large for simple diode buffering, so the levels will require active buffering (for example use a MAX232 for each radio and diode common connect the RS232 lines).

CR8200 - tape record lead / interface

A problem when using the CR8200 has been reported to us when used in conjunction with the latest AR8200 Series-2 receiver (radio audio muted). The problem is due to a recent reassignment of the AUX connector on the latest AR8200-2 (the AR8200-1 and early AR8200-1 work fine).

The fix is very simple. Pull the cover off the CR8200 (the label is attached to the top cover), its just finger-tight. Gently roll the PCB to expose the wires, **cut the BLUE and PURPLE wire** making sure that the ends don't short against anything... that's it!

In the past, we have encountered one CR8200 where the audio output wire was soldered in backward (centre went to earth and earth to centre)... if used with grounded equipment this would have resulted in no audio - just something to check for.

The above has now been carried through to production stock of CR8200 so no modifications should be necessary.

Thanks to www.aoruk.com