VR-5000 Communication Receiver
CAT Information

DATA Rate setting   (This function cannot control form CAT)

1. Set baud rate to such as ""4,800/9,600/57,600 bps," per the following steps:

(1) Press the **[F]** key momentarily, then press the **[ENT(SET)]** key.

(2) Rotate the **DIAL** knob to set the cursor to the **"CAT RATE"** menu option, then press the **[ENT(SET)]** key.

(3) Rotate the **DIAL** knob to set the cursor to the desired rate (4800/9600/57600 bps), then press the **[ENT(SET)]** key.

(4) Confirm that the cursor is on the **"END"** menu option, then press the **[ENT(SET)]** key.

(5) Confirm that the cursor is on the **"WRITE"** menu option, then press the **[ENT(SET)]** key.

2. Turn the radios off.

3. Connect the a (D-SUB 9-pin) RS-232C cross cable (not supplied) between the CAT jack on the rear panels of the radio to your PC.

CAT Data Protocol

Serial data is passed via the CAT jack on the rear panel of the radio at 4800, 9600, or 57600 bits/sec. All commands sent from the computer to the receiver consist of five-byte blocks, with up to 200 ms between each byte. The last byte sent in each block is the instruction opcode, while the first four bytes of each block are arguments: either parameters for that instruction, or dummy values (required to pad the block out to five bytes): Each byte sent consists of one start bit, 8 data bits, no parity bit and two stop bits:
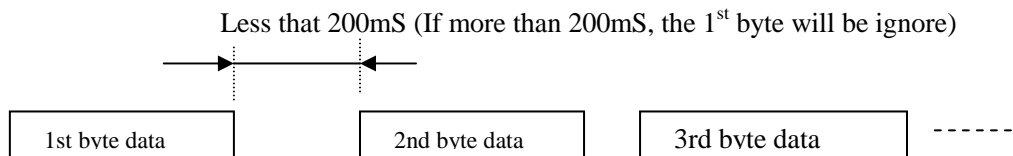
CAT Data Byte Format

    Data Speed : 4800, 9600, 57600 bps
    Start bit   :   1
    Data   :   8 bits data
    Stop bit   :   2

Start Bit	0	1	2	3	4	5	6	7	Stop Bit	Stop Bit

CAT 5-Byte Command Structure

Parameter1	Parameter 2	Parameter 3	Parameter 4	Command Data

There are three instruction opcodes for the **VR-5000**, listed in the table below. Most of these duplicate menu programming settings or options, or else emulate front panel button functions. Notice that several instructions require no specific parameters. However, every Command Block sent to the radio must always consist of five bytes.

Less that 200mS (If more than 200mS, the 1st byte will be ignore)

1st byte data		2nd byte data	3rd byte data	- - - - - -

The CAT control program you are writing must construct the 5-byte block, by selecting the appropriate instruction opcode, organizing the parameters, if any, and providing un-used (dummy) argument bytes for padding the block to its required 5-byte length (the dummy bytes can contain any value). The resulting five bytes are then sent, opcode last, from the computer to the **VR-5000** CPU via the serial port and CAT jack on the radio rear panel.

VR-5000 Communication Receiver
CAT Information

Opecode Command DATA

Function	Parameter				C	Description
CAT on/off	*	*	*	*	P1	P1=00:ON,　P1=80:OFF
Set Frequency	F1	F2	F3	F4	P1	P1=01:Main RCVR,P1=31:Sub-RCVR (See note1)
Receiving Mode	M1	M2	*	*	P1	P1=07:Main RCVR,P1=37:Sub-RCVR (See Table1 and Table2)
Receiver Status	*	*	*	*	E7	S-meter, Squelch and etc. (See Note2)

Note1: Frequency data

   For example, reception at 439.700MHz
   (i)   Divide reception frequency by 10
      $439.700 (MHz)/10 = 43.970 \times 10^6$ -----(1)
   (ii) Convert DEC to HEX number
      43.970×10^6 → _29EEDD0
   (iii)   Build 4 bytes data from 29EEDD0
      like,　 [02] [9E] [ED] [D0]

Table1: M1 Parameters

M1 Parameters			
00	LSB	44	WAM
01	USB	48	WFM
02	CW	84	AM-N
04	AM	88	FM-N

Table2: M2 Parameters

M2	Parameters						
21	20 Hz	43	5 kHz	14	12.5 kHz	05	100 kHz
02	100 Hz	53	6.25 kHz	24	20 kHz	45	500 kHz
42	500 Hz	63	9 kHz	35	25 kHz	---	
03	1 kHz	04	10 kHz	44	50 kHz	---	

   For Example: Main Receiver Mode = USB and 1DIAL step is 100 Hz
   [01] [02] [*] [*] [*] [07]

Note3: Receiver Status response data structure (1 byte data)

Bit structure

| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

S-Meter data (5 bits)

Squelch Status data (1 bit)
   0 = Squelch OFF (Audio mute)
   1 = Squelch ON (Audio un-mute)
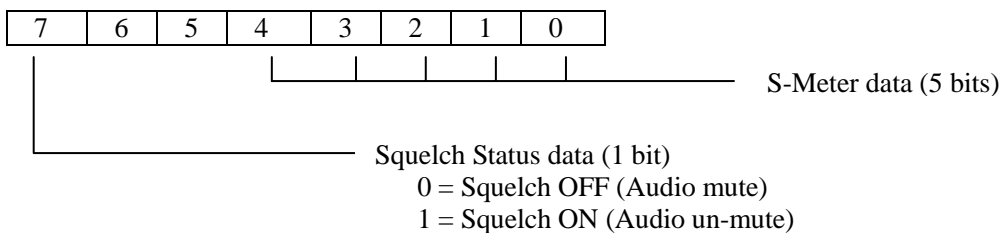
DATA sending protocol

Frequency data will be rounded depend on Mode setting, therefore set new receive frequency must be following order.

Mode and Step (5 bytes)　　　　Frequency data (5bytes)

Between two data block over 200mS
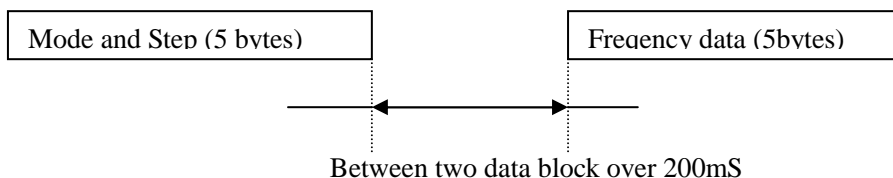
Hidden Menu procedures.

SQL and S-Meter Adjustments

1)   Turn the receiver off.
2)   Press and hold **[F]** and **[SCAN]** keys; while holding them in, press and hold the **[PWR]** switch until the radio powers on. You are now in the alignment mode.
3)   Set the receiver to 145.10000 MHz, with 100 kHz frequency steps.
4)   Connect the RF Signal Generator to the antenna jack.
5)   Press the **[M/S]** button to select the main VFO which should be tuned to 145.10000.

FM-N Mode Squelch Level Adjustment (Main Band)

1) Set the receiver to the FM-N mode.
2) Press the **[SCAN]** button to select "**Set M-SQL THRESH (FM)**".
3) Tune the signal generator to the same as the radio with +/- 3.5 kHz deviation @ 1 kHz tone modulation, and set the output level for –5dBu at the antenna jack, then press the **[ENT]** button.
4) Press the **[SCAN]** button to select "**Set M-SQL TIGHT (FM)**".
5) Tune the signal generator to same frequency as radio with +/- 3.5 kHz deviation @ 1kHz tone modulation, and set the output level for +10 dBu, then press the **[ENT]** button.

AM Mode Squelch Level Adjustment (Main Band)

1) Set the receiver to AM mode.
2) Press the **[SCAN]** button to select "**Set M-S THRESH (AM)**".
3) Tune the signal generator to the same as the receiver with 400 Hz tone modulation, and set the output level for –5 dBu then press the **[ENT]** button.
4) Press the **[SCAN]** button to select "**Set M-S TIGHT (AM)**".
5) Tune the SG to the same as radio with 400 Hz tone modulation and set the output for +10dBu then press the **[ENT]** button.

FM-N Mode S-Meter Adjustment (Main Band)

1) Set the rcvr to the FM-N mode.
2) Press the **[SCAN]** button to select "**Set MAIN S-METER 1**".
3) Tune the SG to the same as radio with +/- 3.5 kHz deviation @ 1 kHz tone modulation and set the output level for –5 dBu the press the **[ENT]** button.
4) Set the radio to the AM mode.
5) Press the **[SCAN]** button to select "**Set MAIN-S METER 5**".
6) Tune the SG to the same as radio with 400 Hz tone modulation and set the output level to +20 dBu then press the **[ENT]** button.

FM-W Mode Squelch Level Adjustment (Main Band)
1) Set the radio to WFM mode.
2) Press the **[SCAN]** button to select "**Set M-S THRESH (WFM)**".
3) Tune the SG to the same as radio with +/-22.5 kHz deviation @ 1kHz tone modulation and set the output level to +5 dBu then press the **[ENT]** button.

4) Press the **[SCAN]** button to select "**Set M-S TIGHT (WFM)**".
5) Tune the SG to the same as radio with +/-22.5 kHz deviation @ 1kHz tone modulation and set the output level for +15 dBu then press the **[ENT]** button.

FM-W Mode S-Meter Adjustment (Main Band)
1) Set the radio to the WFM mode.
2) Press the **[SCAN]** button to select "**Set M.S-METER 1 (WFM)**".
3) Tune the SG to the same as radio with +/-22.5 kHz deviation @ 1 kHz tone modulation and set the output level for +8 dBu then press the **[ENT]** button.
4) Press the **[SCAN]** button to select "**Set M.S-METER 5 (WFM)**".
5) Tune the SG to the same as radio with +/-22.5 kHz deviation @ 1kHz tone modulation and set the output level for +30 dBu and press the **[ENT]** button.

Press the [M/S] button to select the SUB vfo band

FM-N Mode Squelch Level Adjustment (SUB Band)
1) Set the radio to 145.10000 MHz with 100 kHz steps.
2) Set to FM-N mode.
3) Press the **[SCAN]** button to select "**Set S-SQL THRESH (FM)**".
4) Tune the SG to same as radio with +/-3.5 kHz deviation @ 1 kHz tone modulation and set the output level to –3dBu and press the **[ENT]** button.
5) Press the **[SCAN]** button to select "**Set S-SQL TIGHT (FM)**".
6) Tune the SQ to the same as radio with +/-3.5kHz deviation @ 1kHz tone modulation and set the output level to +10 dBu then press the **[ENT]** button.

AM Mode Squelch Level Adjustment (Sub Band)
1) Set the radio to the AM mode.
2) Press the **[SCAN]** button to select "**Set SUB S THRESH (AM)**".
3) Tune the SG to the same as radio with 400 Hz tone modulation and set the output level to –3 dBu then press the **[ENT]** button.
4) Press the **[SCAN]** button on the panel to select "**Set SUB S TIGHT (AM)**".
5) Tune the SG to same as radio with 400 Hz tone modulation and set the output to +10 dBu then press the **[ENT]** button.

FM-N Mode S-Meter Adjustment (SUB Band)
1) Set the radio to the FM-N mode.
2) Press the **[SCAN]** button to select "**Set SUB S-METER1**".
3) Tune the SG to the same as radio with +/-3.5kHz deviation @ 1 kHz tone modulation and set the output level to –3 dBu then press the **[ENT]** button.
4) Press the **[SCAN]** button to select "**Set SUB S-METER 5**".
5) Tune the SG to the same as radio with +/- 3.5kHz deviation @ 1kHz tone modulation and set the output level to +20 dBu and then press the **[ENT]** button.

Press the **[SCAN]** button to select "**Set LEVEL END**" and then press the **[ENT]** button.

You are done!

As you can see, you really need a decent signal generator to complete this procedure.
I did not have one so I improvised!
I used an HT tuned to the proper freq. And hooked it to a dummy load and then just played with the distance between the HT and the vr5000.
It took a couple of runs through the complete procedure but my VR5000 is now functioning very well.

Programmable (Band Limit) Memory Scan (PMS)

This feature, a more refined and useful form of VFO scanning, allows you to establish sub-band limits for scanning. This allows you to monitor only a portion of the wide frequency range of the VR-5000, instead of sweeping the entire spectrum from 100 kHz to 2.6 GHz.

Programmable Memory Scan utilizes a pair of frequencies to establish the upper and lower scanning limits within special memories. Here is the procedure for setting up limited band scanning:

Programming

1. Press the [F] key momentarily, then press the [PMS(PMS SET)] key to enable the storage of the frequency pair into a PMS memory.

2. The cursor will be pointing at the "PMS CH" menu option; press the [ENT(SET)] key.

3. If you want to program the frequency pair into the currently-selected PMS register (shown on the right edge of the display), proceed to the next step; if you wish to choose a different PMS register, press [ENT(SET)], then use the [▼(◄)/▲(►)] keys to select a different memory register number. Then press [ENT(SET)] to move on to the next step.

4. Rotate the DIAL knob to set the cursor to the "PMS TAG" menu option.

5. Press the [ENT(SET)] key to enable the programming of the name tag to the PMS memory. To attach an alpha/numeric name tag to the PMS memory, program the alpha-numeric "label" using the DIAL knob and keypad, as described previously; if you don't want to label this frequency pair register, press the [ENT(SET)] key again.

6. When you have complete the creation of the label, press the [ENT(SET)] key.

7. Now it's time to set up the band limits. Rotate the DIAL knob to set the cursor to the "START F" menu option, then press the [ENT(SET)] key.

8. Set the VFO frequency to the Lower sub-band limit, then press the [ENT(SET)] key. If you programmed the frequency using the keypad, press the [ENT(SET)] key again.

9. Confirm that the cursor is on the "END F" menu, then press the [ENT(SET)] key.

10. Set the VFO frequency to the Upper sub-band limit, then press the [ENT(SET)] key. If you programmed the frequency using the keypad, press the [ENT(SET)] key again.

11. Rotate the DIAL knob to set the cursor to the "END" menu option, then press the [ENT(SET)] key.

12. Confirm that the cursor is on the "WRITE" menu option, press the [ENT(SET)] key.

13. The PMS memory programming process for this register is now completed.

Note: 50 PMS memories are available. You therefore can set upper and lower operation limits on a number of bands, if you like. Each PMS memory register, remember, stores both the lower and upper frequency limits.

Operation (Current PMS Register)

1. Press the [PMS(PMS SET)] key to initiate PMS scanning in an upward direction.

2. If the scanner encounters a signal strong enough to open the squelch, the scanner will halt and pause on that frequency. Scanning will resume according to the protocol you selected in the previous discussion.

3. To change to a different PMS frequency pair, press the numerical keys on the keypad corresponding to the PMS register you wish to use. For example, if you are on PMS register "00" and wish to use PMS register "03," press [0] $\Rightarrow$ [3] while PMS scanning is engaged. Scanning will begin on the new register without further action.

4. To reverse the direction of the scan (i.e. toward a lower frequency, instead of a higher frequency), turn the DIAL knob one click in the counter-clock direction or press the [▼(◄)] key momentarily while the VR-5000 is scanning. To revert to scanning toward a higher frequency once more, rotate the DIAL knob one click clockwise or press the [▲(►)] key momentarily.

5. Press the [V/M(MW)] key to disable the PMS scanner, and return to VFO mode.