Rigmaster™ 1.0 User Guide

Rigmaster™ is a direct frequency entry terminal for Icom, Yaesu and Kenwood amateur radio equipment (transceivers and receivers) which support current manufacturer computer interfaces.

FEATURES

Rigmaster™ automatically selects the appropriate mode for any frequency according to the current band plans (see appendix 1). For FM operation it also automatically selects the correct repeater offset when a repeater frequency is entered.

Rigmaster™ is powered by two AA batteries. With normal use they should last about 2 years.

Rigmaster™ is future-proof. Changes to band plans and software upgrades to support new radios[1] can be easily downloaded to its microprocessor using the Windows™ program **RigmasterDL** (to be released when new Rigmaster software is released).

Rigmaster™ allows CI-V commands or channel numbers to be directly sent to Icom Radios.

Rigmaster™ is operated via its 12-character keypad. Digits 0 to 9 are used for data (frequency, channel number or CI-V command). The "*" key is the decimal point and "#" is the ENTER key.

[1]Providing new radios continue to utilise manufacturers' current computer interface protocols. Future computer interface protocols may be retrospectively included in software upgrades to the **Rigmaster™**.

INTERFACING TO THE RADIO

A single control cable connects the **Rigmaster™** to the radio's computer control connector. Only radios with a currently available computer control system (Icom CI-V, Yaesu CAT and Kenwood) can be controlled by the **Rigmaster™** . The older Icom CI-IV is *not* supported.

Note: Some radios such as the Yaesu FT847 and the Kenwood TS-480 will require a TTL to RS232 converter. Refer to your radio's manual for further information about this.

Cable:

A twin-conductor, shielded cable (Jaycar Cat WB-1504) approximately 1 metre long with appropriate connectors fitted as indicated below is required. Some common examples are described below. Consult your radio's operating manual for the proper connections to its computer interface.

Connectors:

At **Rigmaster™**:

3.5 mm stereo connector (Jaycar Cat PP-0130)
Red (**Rigmaster™** Serial Out) to tip
Yellow (**Rigmaster™** Serial In) to ring
Braid (Ground) to sleeve

At radio:

Icom all CI-V connectors: 3.5 mm mono connector (Jaycar Cat PP-0114)

Red & Yellow both to tip. CI-V is a bi-directional connection.
Braid (Ground) to sleeve

Yaesu FT-817 ACC Conector: 8 pin mini-DIN (Jaycar Cat PP-0370):

Red to RXD pin 5
Yellow to TXD pin 4
Braid (Ground) to GND pin 3

Kenwood remote connector: 6 pin line connector (Jaycar Cat PP-0308):

Red to (Serial In) PIN 3
Yellow (Serial Out) to PIN 2
Braid (Ground) to PIN 1

QUICK SET-UP

1. The **Rigmaster™** default setting is for an Icom IC-706Mk2G at 9600 BPS. IC-706MK2G users who have their baud rate set to 9600 (manufacturer's default setting) can proceed to step 4.

2. Set the transceiver to one of the supported baud rates of 1200, 4800, 9600, 19200, 38400 or 57600 bps. If the radio is an Icom, note its CI-V address and default baud rate. Refer to your radio's operating manual for this information.

3. Leave the transceiver switched on. Enter the key sequence **#8*rbaaa# where "r" is the radio code (see Table 1), "b" baud rate (see Table 2) and aaa is the Icom CIV address in **decimal** (See Table 3 for hexadecimal to decimal conversion). For Yaesu and Kenwood radios use the address 000.

RADIO	CODE
ICOM	0
YAESU	1
KENWOOD	2

Table 1. Radio codes

BAUD RATE	ENTER
1200	0
4800	1
9600	2
19200	3
38400	4
57600	5

Table 2. Baud Rate codes

Examples:

- For an Icom IC-706Mk2G at 9600 bps: **#8*02088#
- For an Icom IC-718 at 9600 bps: **#8*02094#
- For a Yaesu at 9600 bps: **#8*12000#
- For a Kenwood at 4800 bps: **#8*21000#

4. Connect a suitable interconnecting cable between the **Rigmaster™** and your radio. If you need to make one, refer to the section INTERFACING TO THE RADIO, above. Your **Rigmaster™** is now ready for use. It will remember its settings (even when batteries are removed) unless commanded to perform a re-set (see **Rigmaster™** COMMANDS).

ICOM addresses (Enter 000 for Yaesu or Kenwood)

Icom hexadecimal addresses must be converted to a **3 digit decimal number** as follows:

HEX	DECIMAL
00 - 09	000 – 009
0A – 0F	010 – 015
10 – 1F	016 – 031
20 – 2F	032 – 047
30 – 3F	048 – 063
40 – 4F	064 – 079
50 – 5F	080 – 095
60 – 6F	096 – 111
70 – 7F	112 - 127

Table 3 – Hexadecimal to Decimal conversion

Example:

- IC-735 : 04H = 004 decimal
- IC-275A/H : 10H = 016 decimal
- IC-706MK2G: 58H = 088 decimal

ENTERING FREQUENCIES

Frequencies are entered in MHz with the "*" key as the decimal point. To send a frequency to the radio, key in the frequency in MHz followed by the # key. Leading or trailing zeros may be omitted.

Example:

- 0*774# or *774# means 0.774 MHz or 774 kHz.
- 147*250# or 147*25# means 147.250 MHz

Pressing the decimal point (*) after entering a frequency will cause the **Rigmaster™** to clear its frequency buffer in preparation for a new frequency to be entered.

Example:

- 3*4* or *77* will cause a clear/reset of the frequency stored in the **Rigmaster™**.
- Pressing *# will always reset **Rigmaster™**
- Pressing the ENTER (#) key *before* a frequency has been entered does nothing.
- Pressing the ENTER (#) key *after* frequency has been previously sent causes a resend of the most recent keypad entry. This is handy if you have tuned away from a frequency and you want to return to it quickly.

MODULATION MODES

When a frequency is entered, the appropriate modulation mode for that frequency (according to the current band plans) will be also be sent.

If the frequency is a repeater frequency the correct frequency offset will also be sent.

Under normal operating conditions, no user intervention is required to change mode or simplex/duplex settings.

The frequency offsets and mode may be over-ridden by selecting a different mode or offset with the radio's own controls. Additionally, the auto-mode and/or repeater offset functions may be disabled in the **Rigmaster™**. *Refer to the section* **Rigmaster™ COMMANDS**.

CIV COMMANDS (ICOM only)

If an Icom radio is connected, the **Rigmaster™** may be commanded to send some of the more useful CIV commands (See Appendix 2. Note some of the codes have been modified slightly from the standard Icom codes and not all command combinations are possible).

Example:

- To set mode to LSB: **0600#
- To set mode to USB: **0601#
- To set VFOA mode: **0700#
- To set VFOB mode: **0701#
- To set to Mem mode: **08#

Rigmaster™ COMMANDS

Entering **# allows certain facilities to be toggled between ON and OFF. The radio type, baud rate, radio address set or a reset may be executed from the keypad without removing the battery.

To enter **Rigmaster™** commands press **# DIGIT#. The following list indicates the available commands:

0	toggles sending modulation mode (defaults to sending mode)
1	toggles sending modulation mode either before or after the frequency (defaults to before)
2	toggles between sending frequency or channel number (defaults to frequency)
3	toggles sending repeater offset direction (+ or -) (defaults to YES)
4	toggles sending repeater offset frequency (defaults to YES)
5	not allocated
6	not allocated
7	diagnostic
8	allows direct selection of the radio brand, baud rate & address/model.
9	causes a full reset of **Rigmaster™**

Example:

- Keying **#2# will change to sending channel numbers. Keying it again will revert to sending frequency.

- Keying **#8*rbaaa# will cause r to be the radio type, b the baud rate and aaa the Icom address (where aaa is the **decimal** equivalent of the CIV address (see Table 3). e.g. 58H = 088). Use this to change the **Rigmaster™ to** a different radio if desired.

Notes:

1. Command 8 must have 5 parameter bytes entered.

2. Command 8 should be used when changing the radio brand and/or model or baud rate (do not forget the * after the **#8, i.e. **#8*).

3. Command 9 should rarely be required except to get **Rigmaster™** back to its initial default state.

MEMORY CHANNELS – ICOM & KENWOOD ONLY

Rigmaster™ may be commanded to send either channel frequencies or memory numbers. *Note that this feature is not available in Yaesu radios.*

Kenwood radios must first be placed into memory mode via the radio's front panel control.

Icom radios can be commanded into memory mode through the **Rigmaster™** with the key sequence **08# or by using the radio's front-panel control.

The Rigmaster™ must also be put into memory mode. To do this, enter the key sequence **#02# . This toggles the Rigmaster™ into the SEND CHANNEL mode.

A two digit command for normal memory or a four digit command for special memory (as per the Icom standard) followed by a # is entered.

- 6# causes the radio to switch to the frequency in channel 6
- 88# causes the radio to switch to the frequency in channel 88
  0101# causes an Icom to go band edge 1b (not valid for Yaesu or Kenwood)

TROUBLESHOOTING

If the **Rigmaster™** fails to work as expected, either initially or at any other time, perform the following operations:

Firstly, check the obvious things like the batteries and interconnecting cables. If you have an Icom radio, ensure that the 3.5 mm *stereo* plug is inserted into the **Rigmaster™).**

Perform a full hardware reset by removing the batteries and re-fitting them after 10 seconds, then re-entering the code **#8#rbaaa# as described at step 3 of the QUICK SET-UP section. Be sure to enter the correct radio code, baud rate and address.

WARRANTY & DISCLAIMER

Your **Rigmaster™** has been individually tested prior to delivery and is warranted against manufacturing defects and component failures for a period of three months from the date of delivery.

No liability is accepted for inconvenience or damage to any equipment arising from the use or misuse of the **Rigmaster™**.

Should you encounter any apparent operating anomalies when using your **Rigmaster™** you are urged report them to Lee de Vries VK3PK at lee.devries@bigpond.com. Please provide a clear description of the apparent anomalies.

ALL RIGHTS RESERVED

Rigmaster™ is a registered trademark of Lee de Vries.

The circuit design and microprocessor code are copyright. Neither may be duplicated without prior permission from Lee de Vries VK3PK. The microprocessor code may not be copied or reverse-engineered.

Appendix 1

Amateur Band Plans incorporated in the **Rigmaster™** are in accordance with those listed in the 2005 Australian Callbook. Outside of the amateur bands the mode is generally in accordance with ITU allocations. A summary of the modes is presented in the table below.

From MHz.	To MHz.	Mode	Services
0.10	0.53	DIGITAL/USB	BEACONS & DIGITAL
0.53	1.8	AM	MF BROADCASTING
1.8	1.84	CW	160 METERS AMATEUR
1.84	1.875	LSB	
1.875	2.3	USB	
2.3	2.49	AM	120 METERS BROADCASTING
2.49	3.2	USB	WWV + SERVICES
3. 2	3.4	AM	90 METERS BROADCASTING
3.4	3.5	USB	
3.5	3.535	CW	80 METERS AMATEUR
3.535	3.8	LSB	
3.8	3.9	USB	
3.9	4.0	AM	75 METERS BROADCASTING
4.0	4.75	USB	
4.75	5.06	AM	60 METERS BROADCASTING & WWV
5.06	5.9	USB	
5.9	6.2	AM	49 METERS BROADCASTING
6.2	7.0	USB	
7.0	7.04	CW	40 METERS AMATEUR
7.04	7.3	LSB	
7.3	7.35	AM	41 METERS BROADCASTING
7.35	9.4	USB	
9.4	9.9	AM	31 METERS BROADCASTING
9.9	9.995	USB	
9.995	10.005	AM	WWV
10.005	10.1	USB	
10.1	10.115	CW	30 METERS AMATEUR WARC
10.115	10.14	USB	
10.14	10.15	DIGITAL/USB	
10.15	11.6	USB	
11.6	12.1	AM	25 METERS BROADCASTING
12.1	13.57	USB	
13.57	13.87	AM	22 METERS BROADCASTING
13.87	14.0	USB	
14.0	14.07	CW	20 METERS AMATEUR
14.07	14.1	DIGITAL/USB	
14.1	14.995	USB	
14.995	15.005	AM	WWV
15.005	15.1	USB	
15.1	15.8	AM	19 METERS BROADCASTING
15.8	17.48	USB	
17.9	18.068	USB	

From MHz.	To MHz.	Mode	Application
18.068	18.1	CW	18 METERS AMATEUR
18.1	18.11	DIGITAL/USB	
18.11	18.9	USB	
18.9	19.02	AM	15 METERS BROADCASTING
19.02	21.0	USB	
21.0	21.07	CW	15 METERS AMATEUR
21.07	21.125	DIGITAL/USB	
21.125	21.45	USB	
21.45	21.85	AM	13 METERS BROADCASTING
21.85	21.85	USB	
24.89	24.89	CW	
24.92	24.92	DIGITAL/USB	
24.93	25.6	USB	12 METERS WARC BAND + SERVICES
25.6	26.1	AM	11 METERS BROADCASTING
26.1	28.0	USB	
28.0	28.19	CW	10 METERS AMATEUR
28.19	29.51	USB	
29.51	29.62	FM SIMPLEX	
29.62	29.68	FM DUPLEX	NEGATIVE 100 KHz.
29.68	30.0	FM SIMPLEX	FM SIMPLEX SERVICES
30.0	50.0	USB	
50.0	50.1	CW	6 METERS AMATEUR
50.1	52.5	USB	
52.50	53.55	FM SIMPLEX	
53.55	54.0	FM DUPLEX	NEGATIVE 1 MHz.
54.0	56.0	FM SIMPLEX	
56.0	70.0	FM WIDE	TV BROADCASTING-
70.0	85.0	FM SIMPLEX	
85.0	108	FM WIDE	FM & TV BROADCASTING
108.0	136.0	AM	AIRCRAFT COMMUNICATION
136.0	144.0	FM SIMPLEX	
144.0	144.1	CW	
144.1	144.6	USB	2 METERS AMATEUR WEAK SIGNAL
144.6	146.6	FM SIMPLEX	
144.625	147.0	FM DUPLEX	NEGATIVE 600 KHz.
147.0	147.375	FM DUPLEX	POSITIVE 600 KHz
147.4	174.0	FM DUPLEX	FM SIMPLEX AMATEUR + TWO WAY
174.0	230.0	FM WIDE	
430.0	432.0	FM SIMPLEX	
432.0	432.10	CW	70 cm AMATEUR WEAK SIGNAL
432.1	433.075	USB	
433.075	438.0	FM SIMPLEX	
438.0	438.75	FM DUPLEX	NEGATIVE 5 MHz
438.75	439.275	FM SIMPLEX	
439.275	440.0	FM DUPLEX	NEGATIVE 5Mhz
444.0	526.0	FM SIMPLEX	
526.0	820.0	FM WIDE	
820.0	1270.0	FM SIMPLEX	TWO WAY RADIO & OTHER
1270.0	1272.0	USB	23 cm AMATEUR
1272.0	1293.0	FM SIMPLEX	
1293.0	1294.0	FM DUPLEX	NEGATIVE 20Mhz.
1294.0	1295.0	FM SIMPLEX	
1295.0	1296.1	CW	
1296.1	1297.0	USB	
1297.0	10000.0	FM SIMPLEX	VARIOUS

Appendix 2

ICOM CI-V codes (See Icom Operators manual for CIV details)

01 Memory to VFO (Originally ICOM command **0A**)
Memory to VFO

02 Scan start/stop (not tested) (Originally ICOM command **0E**)
00 Scan stop
01 Scan start

03 Split/Simplex/Duplex (Originally ICOM command **0F**)
00 Split OFF
01 Split ON
10 Simplex mode
11 Duplex mode
12 Duplex + mode

04 not implemented

05 not implemented

06 00 Set LSB
01 Set USB
02 Set AM
03 Set CW
04 Set RTTY
05 Set FM
06 Set WFM
07-09 not defined

07 Set to VFO
Select VFO mode
00 Set to VFO A
01 Set to VFO B
A0 VFO A=B (Cannot do this yet)
B0 Switch VFO A and B (Cannot do this yet)

08 Set to memory mode
Select Memory mode
mc Select Memory channel "mc"

09 Memory Write

10 Set tune step
00 10Hz TS
01 100 Hz TS
02 1 kHz TS
03 5 kHz TS
04 9 kHz TS
05 10 kHz TS
06 12.5 kHz TS
07 20 kHz TS
08 25 kHz TS
09 100 kHz TS

11 00 Attenuator OFF
10 -10 dB Attenuator ON
20 -20 dB Attenuator ON
30 -30 dB Attenuator ON

12 - 19 not implemented