

Motorola MCS2000, VRM650 VRM850

The Motorola VRM 650/850 is nothing but a MCS2000 with a different control head. As shipped, the VRM is a MCS2000 Type II. The thing to watch out for is that the designator VRM 650/850 does not indicate the frequency band. Be careful, there are quite a few 800 MHz VRM listings on eBay. Make sure of the simple model number and if possible the FCC ID before purchasing. These radios can be very inexpensive and work quite well for Amateur digital applications. Below is a sample table of model numbers, FCC IDs and other data. There are quite a few variations. I will provide links to a couple of sites that will help decode the actual model number.

Name	Simple model	Actual Radio Model Number	FCC ID:	Frequency Range	Power Output
VRM650	F3451A	M01SKM9PW6AN	AZ492FT4825	450 – 470 MHz	40W
VRM850	F4451A	M01SKM9PW6AN	AZ492FT4825	450 – 470 MHz	40W
	F4455A		AZ492FT5765	800-870 MHz	15W
	F4454A		AZ492FT5773	800-870 MHz	35W

The BatLabs web site is one of the oldest on the Internet and provides quite a bit of information you will need to use the VRM in Amateur service. Here is the MCS2000 / GM900 information:

<http://www.batlabs.com/gm900.html>

Three other good sites for information about the MCS2000 are the Communications Support forum, K9OMW and the FCC ID lookup. These will help confirm the radio frequency etc.

<https://communications.support/forums/68-MTS2000-MCS2000>

<http://k9omw.com/mcs2000.html>

<https://fccid.io/search.php>

The first step whenever you want to convert a “Business Band” radio to Amateur service is to verify proper operation at the current configuration. Depending on your available test equipment, this may be somewhat of a challenge.

To program the radio for Amateur service will require the Motorola Programming software referred to as CPS. (Customer Programming Software) Thankfully, unlike some older Motorola equipment, the CPS is a Windows program and will run on a modern computer. The computer will need a serial port or USB to serial converter. You will also need a hardware programming interface. This is referred to as a RIB. (Radio Interface Box). You will need to build a programming cable to connect the RIB to the radio. Clone RIB prices have come down and you can find one on eBay for under \$30.

The software will only program the radio within the factory specified limits. The limits can be extended to cover Amateur service. Be aware, just because you can enter a frequency into the CPS does not mean the radio will operate at that frequency. In the case of the UHF MCS2000, the factory limits are 450-470 MHz I have not had a problem as low as 440 MHz

Hex edit to extend frequency range:

Lower Limit:

450.0000 = 80 74 D2 1A

Change to:

440.0000 = 00 DE 39 1A

430.0000 = 80 47 A1 19

420.0000 = 00 B1 08 19

Programming:

Enable VRM100

Disable the pre/de-emphasis

Pin	Legend	Signal	Ribbon Cable	Comment
1	SPKR +			
2	INT SPKR +			
3	SPKR -			
4	DIGITAL GND		3	
5	BUSY			
6	BUS +			
7	I/O 8			
8	I/O 5	COS		
9	EMERGENCY			
10	ANALOG GND			
11	FIL AUD OUT			Filtered Audio Out
12	AUX RX IN2			
13	MIC IN			
14	SW B +			
15	IGNITION			Ignition Sense
16	I/O 2			
17	LH RESET			
18	BUS -			
19	SCI RX DATA			
20	I/O 4			
21	I/O 3	PTT	5	PTT to MMDVM
22	RSSI OUT			
23	EXTERNAL MIC IN			
24	AUX TX IN2	TXAF	1 (Red Stripe)	TX audio from MMDVM
25	UNIV IO OUT	RXAF	2	RX audio to MMDVM

Do not use pin 11 for RX Audio it is filtered and not flat audio, so not useable for digital.

Pin 25 provides direct discriminator audio when VRM100 is enabled.