

OMNI-VII

Model 588

Programmers

Reference

Guide

Revision 1.009



www.rfsquared.com



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Introduction

Ten-Tec has produced this document as a starting point for software developers undertaking the development of a PC based OMNI-VII (Model 588) Interface program. The Ten-Tec OMNI-VII DSP HF transceiver is a product that is defined more by firmware than hardware. As such, it is subject to change based on customer needs. It is advisable to check for a more recent update at the Ten-Tec firmware update site, www.rfsquared.com. This specification is intended for OMNI-VII Version 1.005 or later.

There are two levels of command interface protocols provided. The two levels of commands are designed for two different operating modes of the OMNI-VII.

The first Operating Mode is referred to as “RADIO MODE”. In “RADIO MODE” only the base level of commands is available, and they are available only on the Serial Interface. This is the command-set that is already utilized by the Jupiter in Jupiter mode. A few of these commands have a parameter list that is extended to encompass added items for that command. This makes the base level of the OMNI-VII in Radio Mode compatible with control programs that already exist. The purpose of “RADIO MODE” is for the radio user who wants to control the rig traditionally from the front panel. Changing frequencies, watching the Power Meter, switching bands, and adjusting the myriad of other controls, just like it is done with an Orion or Jupiter.

The second Operating Mode is referred to as “REMOTE MODE”. In order to get fully functional control of all of the OMNI-VII’s operating parameters, then it is necessary to operate the OMNI-VII in “REMOTE MODE”. In this mode, the full command set is available on the Ethernet interface, and also the serial port. The purpose for “REMOTE MODE” is to be able to control the radio 100% through the Serial and/or Ethernet interfaces. “REMOTE MODE” also provides for the audio streaming features of RIP and TRIP.

RIP is an acronym for Radio over IP. This is the receive audio that is heard via the OMNI-VII’s speaker. In the case of the REMOTE Mode radio, this audio is then RIP’d from the OMNI-VII via the Ethernet to a computer for playback on the computer’s speaker.

TRIP is an acronym for TRansmit audio over IP. Normally, transmit audio comes from a microphone on the radio and is transmitted over the air by the radio. In the instance of the Ethernet, it is the audio recorded on a microphone on a computer, and then transmitted on the Ethernet in a packet for the OMNI-VII to subsequently transmit over the air.

Since the OMNI-VII provides future growth for up to a total of 6 completely independent modes. It is possible that even further additions will be made to support the added capabilities of the other modes.

Holdings down a digit on the band stack keyboard of the front panel accesses each mode. For “RADIO MODE”, press and hold the “1” digit until you see the Version string including the word RADIO. For “REMOTE MODE”, press and hold the “2” digit until you see the Version string including the word REMOTE. If you accidentally press the wrong number (e.g. 3 through 6), then the OMNI-VII will tell you that this specific operating mode is not present. If this occurs, then you should turn off the OMNI-VII, and try again. If you accidentally press any other key, then you won’t see the radio version string displayed, instead you will have forced the radio to remain in “BOOT LOADER MODE”. Again, turn off the radio, and try again making sure you hold down the proper key to get to the proper mode.

To add more value to a remote based radio, the OMNI-VII has the capability of accepting Ethernet commands that are intended to be delivered to a serial device, such as a SteppIR Antenna Controller. This is referred to as “Serial Passthru”. The OMNI-VII also has the capability of being put into a mode where any data it receives in on the serial port, it can echo back to the Ethernet port. This is referred to as “Serial Echo”. This makes it possible for a remotely placed OMNI-VII to be capable of being a portal to controlling and getting status from other serial devices at the ham shack.

Another functionality that the OMNI-VII has is the ability to provide a way to send to the Serial Interface pod key presses. This functionality is invoked when the OMNI-VII receives a command to tell it to start “POD PASSTHRU”. From that moment on, anytime a pod key is pressed, the OMNI-VII will not process the key, but will send a notification out the serial port that a given POD key has been depressed. When released, notification is sent again out the serial port that the given POD key has been released. This allows control programs to extend the functionality of the radio with programs written on the PC. This functionality already exists in other TenTec Transceivers, namely the Orion, Orion2, and Jupiter and it is already in use by various control program codes available on the market today.

The command set described in this manual does not include the command set utilized by the OMNI-VII Boot/Loader program for programming the OMNI-VII. The command set described in this manual only covers the command set that is utilized for radio command and control functions.

Conventions Used in This Manual

Information contained in this document applies to firmware version 0.114 and later.

Numeric Types:

| | |
|------|---|
| 0x0A | Hexadecimal Numbers. |
| <dn> | 8 bit numbers |
| 10 | Decimal Number. |
| 'A' | ASCII character code. Example: ASCII 'A' is 0x41. |
| <CR> | a byte containing the value of <0x0d> for a carriage return |

Interface Settings

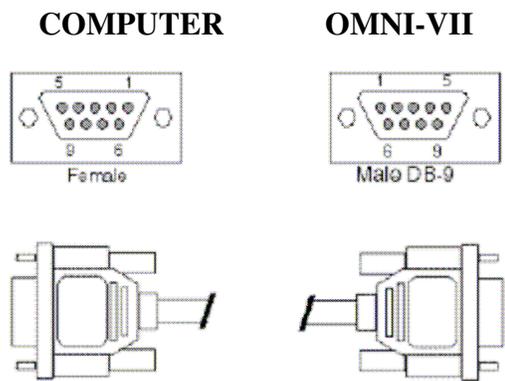
Serial Connection

The RS-232 serial interface on the OMNI-VII is handled via a 16C550 UART located on the DSP/Logic board. The interface parameters are fixed at 57,600 baud, No Parity, 8 Data bits, 1 Stop bit. The UART uses hardware handshaking to control the data flow between the PC and the radio. The host PC should be set to use RTS/CTS signaling.

This is the same regardless of whether the topic is command and control interface on the serial port or using the serial port for serial pass thru or serial echo modes.

The diagram below shows the wiring and associated signals for a 9 pin to 9 pin serial cable required to connect the OMNI-VII transceiver to a standard PC. If you purchase a pre-made serial cable it should be a straight through cable.

| Computer | Pin | OMNI-VII |
|-----------|-----|-----------------|
| CD. | 1 | N.C. |
| RXD | 2 | Serial Data Out |
| TXD | 3 | Serial Data In |
| DTR | 4 | N.C. |
| GND | 5 | GND |
| DSR | 6 | N.C. |
| RTS (out) | 7 | RTS (in) |
| CTS (in) | 8 | CTS (out) |
| RI | 9 | N.C. |



The serial port of the OMNI-VII is defined as a DCE terminal. Which means that it is meant to be connected to a Computers DTE terminal. Using a straight through RS-232 control line. If you wish to control another serial device, and if it is a DCE terminal type of a device also, then the cable you need to use is a null-modem RS232 Interface cable. If

the other device is a DTE, then you will need to use a standard straight RS232 interface cable.

In order to use the OMNI-VII in remote mode, but you intend on controlling the rig only by the serial port, then it is suggested that you disable the Ethernet activities of the OMNI-VII. Setting the first octet of the G8WAY IPADDR to 0 disables Ethernet activities.

Ethernet Connection

The Ethernet interface on the OMNI-VII is handled via a Realtek RTL8019AS Full Duplex Ethernet Controller located on the DSP/Logic board. This Network Interface Controller (NIC) is fully compliant with Ethernet II and IEEE802.3 10Base5, 10Base2, and 10BaseT. The full-duplex function of the NIC enables simultaneously transmission and reception on the twisted-pair link to a Full Duplex Ethernet switching hub. This feature not only increases the channel bandwidth from 10 to 20 Mbps but also avoids the performance degradation problem due to the channel contention characteristics of the Ethernet CSMA/CD protocol. This connection is configured for 10Mbps, so it is compatible with all 10/100 networks.

Depending upon how you want to connect your OMNI-VII to another computer via the Ethernet Interface, there are two types of cables that you can choose. If you remember, for serial communications, you either pick a standard serial cable or a null-modem serial cable. The same is true in principle for Ethernet connections. If you are going to connect the OMNI-VII directly to a computer, then you will need to use a “cross-over” Ethernet patch cable. If you are going to connect the OMNI-VII to a hub or router or gateway, then you will need to use a “standard” Ethernet patch cable.

In either case, you can use either a CAT-5E (350Mhz) high-speed patch cord, or you can use a CAT-6 Networking Cable. Either will satisfy the bandwidth requirements of the OMNI-VII. They both follow EIA/TIA 568B Wiring, and are equipped with RJ-45 connectors.

The OMNI-VII Command Set

The command set is extensive and every effort has been made to keep the individual commands as simple as possible. Although the OMNI-VII Serial interface operates at 57,600 baud and the Ethernet interface operates at 10Mbps short commands are used to keep the processing overhead to a minimum.

In general an OMNI-VII instruction is a series of ASCII characters which may be followed by data and then terminated by a carriage return <CR>. Command characters are case sensitive! In general, the query are identical to the set command except the command is prefixed with a '?' character.

The OMNI-VII interface requires that data be in a format compatible with each command. Programmers should ensure that the supplied data is correct. For the Serial interface, where a command is unrecognized or data is invalid the radio will send back a response consisting of the letter 'Z' followed by the first character of the command string that caused the error and finally, a carriage return <CR>. For the Ethernet Interface, there is no invalid command reply. So it is a best practice if a command is sent, then the associated query should also be used to verify the new setting.

Because the OMNI-VII is designed so that it could be reprogrammed in-system the command set presented here is subject to change or enhancement. We will make every effort to make the system backward compatible with existing documented commands whenever possible. However, the OMNI-VII is a HF TRASNCEIVER PLATFORM that could host a variety of radio services. Persons or companies developing control software for the OMNI-VII should not assume that the radio is operating original factory firmware but rather should always query the radio firmware revision to ensure compatibility.

There is one specialized query "?*" which is used to query all of the settings, returned in one response, relevant to the operating mode of the radio. In the Radio Mode, it will return all of the possible Radio Mode responses, and in Remote Mote, it will return all possible Remote Mode responses. If performed over the serial port, then this will be a series of properly formatted packets pertinent to each response. If performed over the Ethernet then this will be one single Ethernet Packet whose data contains all of the possible formatted packets pertinent to each response.

OMNI-VII Command Set Quick List

| Command | Set Format Query Format | Set Note Query return val | Radio Mode | Remote Mode |
|-------------------------|---------------------------------|--|------------|-------------|
| Set/Get Main Freq | *A<d3 d2 d1 d0> <CR> ?A <CR> | d3..d0 4-byte binary A<d3 d2 d1 d0> <CR> or @Afnnnnnnnn <CR> | X | X |
| ASCII Method | *A12345678<CR> ?A <CR> | up to 8 ASCII #s Get is 4 byte binary | | X |
| n.m ASCII | *An.m<CR> ?A <CR> | n.m ascii => n.mMHz Get is 4-byte binary | | X |
| Set/Get Sub Freq | *B<d3 d2 d1 d0><CR> ?B <CR> | d3..d0 binary A<d3 d2 d1 d0> <CR> | X | X |
| ASCII Method | *B12345678<CR> ?B <CR> | up to 8 ASCII #s Get is 4-byte binary | | X |
| n.m ASCII | *Bn.m<CR> ?B <CR> | n.m ascii => n.mMHz Get is 4-byte binary | | X |
| Set/Get AGC Mode | *GX<CR> ?G <CR> | X=ASCII '0' .. '3' AX <CR> | X | X |
| Set/Get Squelch | *H<d0><CR> ?H <CR> | range = 0..0x7f H<d0><CR> | X | X |
| Set/Get RFGain | *I<d0><CR> ?I <CR> | range = 0..0x7f I<d0><CR> | X | X |
| Set/Get Attenuator | *JX<CR> ?J <CR> | X=ASCII '0' .. '3' JX <CR> | X | X |
| Set/Get NB, NR, AN | *K nb nr an <CR> ?K <CR> | nb=0..7, nr=0..9, an=0..9 K nb nr an <CR> | X | X |
| Set/Get RIT/XIT | *L<d2><d1><d0><CR> ?L <CR> | <d2>=0..3, <d1d0>=+-8192 L<d2><d1><d0><CR> | | X |
| Set/Get MODE | *M VFOA VFOB<CR> ?M <CR> | VFOA/B=ASCII '0' .. '6' M VFOA VFOB <CR> | X | X |
| Set/Get Split State | *N <d0> <CR> ?N | Range = 0..1 N <d0> <CR> | X | X |
| Set/Get Passband Tuning | *P <d1 d0> <CR> ?P <CR> | d1 d0 = 2 byte binary P <d1 d0> <CR> | X | X |
| Get Mode Orion Form | ?RMM <CR> | @RMM <d0> <CR> | X | X |
| Set Transmit On/Off | *T <d1> <d0> <CR> | d1, d0 = binary | X | X |
| Set/Get AF | *U <d0> <CR> ?U <CR> | Range = 0..0x7f U<d0><CR> | X | X |

| Command | Set Format Query Format | Set Note Query return val | Radio Mode | Remote Mode |
|---------------------------|---|---|------------|-------------|
| Set/Get DSP RX Filter | *W <d0> <CR> ?W <CR> | Range = 0..0x24 W<d0><CR> | X | X |
| Where At | (Query only, without ?) XX <CR> | <0x0d><0x0d> “ RADIO START – xxxxxx” RADIO OR REMOTE <0x0d> | X | X |
| Get SUnit | ?S <CR> Also Supports “?F<CR>” On the first data byte returned, If the most significant bit = 1 means returning transmit power. If the most significant bit =0 means returning sunits. | [F or S] XXYY <CR> ASCII XX Sunits and YY dB above OR [F or S] <d1> <d2> <CR> d1<b7>=1 d1<b6..0>=forwardpower d0=reflected power | X | X |
| Set Audio Source | *C1A <d0> <CR> ?C1A <CR> | Range = 0..2 C1A <d0> <CR> | | X |
| Set Keyloop On/Off | *C1B <d0> <CR> ?C1B <CR> | Range = 0..1 C1B <d0> <CR> | | X |
| Get Ethernet Settings | Query ONLY ?T <CR> | MAC Address, RIP In Progress, RIP IP, Compression Level Supported | | X |
| Set/Get CW Rise/Fall Time | *C1C <d0> <CR> ?C1C <CR> | Range = 0..7 C1C <d0> <CR> | | X |
| Set/Get Mic Gain | *C1D <d0> <CR> ?C1D <CR> | Range = 0..0x7f C1D <d0> <CR> | | X |
| Set/Get Line Gain | *C1E <d0> <CR> ?C1E <CR> | Range = 0..0x7f C1E <d0> <CR> | | X |
| Set/Get Speech Processor | *C1F <d0> <CR> ?C1F <CR> | Range = 0..0x7f C1F <d0> <CR> | | X |
| Set FM CTCSS Tone | *C1G <d0> <CR> ?C1G <CR> | Range = 0 .. 0x31 C1G <d0> <CR> | | X |
| Set/Get RX Equalizer | *C1H <d0> <CR> ?C1H <CR> | Range = 0..0x7f – 20dB..20dB C1H <d0> <CR> | | X |
| Set/Get TX Equalizer | *C1I <d0> <CR> ?C1I <CR> | Range = 0..0x7f – 20dB..20dB C1I <d0> <CR> | | X |
| Set/Get | *C1J <d0> <CR> | Range = 0.0x17- | | X |

| Command | Set Format Query Format | Set Note Query return val | Radio Mode | Remote Mode |
|------------------------------------|------------------------------------|--|-----------------------|------------------------|
| Transmit Roll Off | ?C1J <CR> | 70Hz..300Hz C1J <d0> <CR> | | |
| Set/Get External T/R Delay | *C1K <d0> <CR> ?C1K <CR> | Range = 0.0x7f – 15ms..1s C1K <d0> <CR> | | X |
| Set/Get Sidetone Frequency | *C1L <d0> <CR> ?C1L <CR> | Range = 0.0x7f – 0..1270Hz C1L <d0> <CR> | | X |
| Set/Get CW QSK Delay | *C1M <d0> <CR> ?C1M <CR> | Range = 0.0x7f – 0..1s C1M <d0> <CR> | | X |
| Set/Get Transmitter Enable | *C1N <d0> <CR> ?C1N <CR> | Range = 0..1 (disable/enable) C1N <d0> <CR> | | X |
| Set/Get Sideband TX BW | *C1O <d0> <CR> ?C1O | Range = 0.0x10 – 4000..1000Hz C1O <d0> <CR> | | X |
| Set/Get Auto Tuner | *C1P <d0> <CR> ?C1P <CR> | Range = 0..1 (Not Installed / Installed) C1P <d0> <CR> | | X |
| Set/Get Sidetone Volume | *C1Q <d0> <CR> ?C1Q <CR> | Range = 0.0x7f – 0..1s C1Q <d0> <CR> | | X |
| Set/Get SPOT Volume | *C1R <d0> <CR> ?C1R <CR> | Range = 0.0x7f – 0..1s C1R <d0> <CR> | | X |
| Set/Get FSK Mark High/Low | *C1S <d0> <CR> ?C1S <CR> | Range = 0.1 = Low .. High C1S <d0> <CR> | | X |
| Set/Get I-F Filter Selection | *C1T <d0> <CR> ?C1T <CR> | Range = 0..0x05 C1T <d1> <d0> <CR> | | X |
| Set/Get I-F Filter Enable | *C1U <d0> <CR> ?C1U <CR> | Range = 0..0x03 C1U <d0> <CR> | | X |
| Set/Get Antenna Selection | *C1V <d0> <CR> ?C1V <CR> | Range = 0..0x03 C1V <d0> <CR> | | X |
| Set/Get Monitor | *C1W <d0> <CR> ?C1W <CR> | Range = 0.0x7f – 0..100% C1W <d0> <CR> | | X |
| Set/Get Power | *C1X <d0> <CR> ?C1X <CR> | Range = 0.0x7f – 0..100Watts C1X <power selected> <forward power> <reflected power> <CR> | | X |

| Command | Set Format Query Format | Set Note Query return val | Radio Mode | Remote Mode |
|---------------------------------------|------------------------------------|--|-----------------------|------------------------|
| Set/Get SPOT | *C1Y <d0> <CR> ?C1Y <CR> | Range = 0.0x01 Off, On C1Y <d0> <CR> | | X |
| Set/Get PreAmp | *C1Z <d0> <CR> ?C1Z <CR> | Range = 0.0x01 Off, On C1Z <d0> <CR> | | X |
| Set TUNER | *C2A <CR> | No parameters | | X |
| Get TUNER | ?C2A <CR> | C2A <d0> <CR> | | X |
| Set/Get Split State | *C2B <d0> <CR> ?C2B | Range = 0..1 C2B <d0> <CR> | | X |
| Set/Get VOXTRIP | *C2C <d0> <CR> ?C2C <CR> | Range = 0.0x7f C2C <d0> <CR> | | X |
| Set/Get ANTI VOX | *C2D <d0> <CR> ?C2D <CR> | Range = 0.0x7f C2D <d0> <CR> | | X |
| Set/Get VOX Hang | *C2E <d0> <CR> ?C2E <CR> | Range = 0.0x7f C2E <d0> <CR> | | X |
| Set/Get CW Keyer Mode | *C2F <d0> <CR> ?C2F <CR> | Range = 0.. 0x07 C2F <d0> <CR> | | X |
| Set/Get CW Weighting | *C2G <d0> <CR> ?C2G <CR> | Range = 0.. 0x7f C2G <d0> <CR> | | X |
| Set/Get Manual Notch On/Off | *C2H <d0> <CR> ?C2H <CR> | Range = 0.. 1 C2H <d0> <CR> | | X |
| Set/Get Manual Notch Center Frequency | *C2I <d0> <CR> ?C2I <CR> | Range = 0.. 0x7f C2I <d0> <CR> | | X |
| Set/Get Manual Notch Width | *C2J <d0> <CR> ?C2J <CR> | Range = 0.. 0x7f C2J <d0> <CR> | | X |
| Set CWChar to Transmit | *C2K X <CR> | Ascii Character | | X |
| Get CW Count | ?C2K <CR> | CWK <d0> <CR> d0 = 0..# chars remaining | | X |
| Set/Get Keyer Speed | *C2L <d0> <CR> ?C2L <CR> | Range =0..0x7f =0..63wpm C2L <d0> <CR> | | X |
| Set/Get VOX ON/OFF | *C2M <d0> <CR> ?C2M <CR> | Range =0..0x01 for Off/On C2M <d0> <CR> | | X |
| Set/Get DISPLAY ON/OFF | *C2N <d0> <CR> ?C2N <CR> | Range="0","1" for Off/On C2N <d0> <CR> | | X |
| Set/Get | *C2O <d0> <CR> | Range="0","1" for | | X |

| Command | Set Format Query Format | Set Note Query return val | Radio Mode | Remote Mode |
|-----------------|------------------------------------|---|-----------------------|------------------------|
| Speaker MUTE | ?C2O<CR> | UnMute / Mute C2O <d0> <CR> | | |
| TRIP Gain | *C2P <d0> <CR> ?C2P<CR> | Range="1","9" for shiftlvl C2P <d0> <CR> | | X |

RADIO MODE Command Set

In this section, we will explore the command set available on the Serial Interface when the radio is in RADIO MODE. Unless otherwise specified, queries use the same command letter, except that instead of an Asterisk, use a “?”. E.g. *A sets main frequency, ?A requests Main Frequency. Value returned is in same format as the command format for that value.

Frequency Tuning

Tuning the OMNI-VII is accomplished by two commands that provide the frequency entry into either the main or sub frequency. The frequency data is the desired frequency in Hz formatted as a 4-byte binary number.

Once this command is sent, follow it with a Frequency Query, because the OMNI-VII will limit the frequencies to supported ranges.

e.g. 100Hz to 299999999Hz, and 48000000Hz – 54000000Hz

Format: `* [‘A’ or ‘B’] <d3 d2 d1 d0> <CR>`

Where: `* = the ASCII ‘*’ symbol (0x2a)`
 `A = the ASCII ‘A’ character (0x41)`
 `B = the ASCII ‘B’ character (0x41)`
 `<d3..d0> = Frequency in Hz as a 4 byte binary number. The most significant byte is d3. The least significant byte is d0.`

Example1: `*A<0x00><0xe4><0xe1><0xc0><CR>` sets the main VFO to 15,000,000 Hz or 15 MHz.

Example2: `*B<0x00><0x5b><0x2b><0xd8><CR>` sets the sub VFO to 5,975,000 Hz or 5.975 MHz.

Example3: `*A<0x03><0x37><0xF9><0x81><CR>` requests to set the main VFO to 54,000,001Hz. However, the radio will limit it to 54,000,000Hz.

Note: In order to connect serially to a SteppIR Antenna Controller or CT Logger, the OMNI-VII needs to answer the serial ?A query with a different protocol.

When the menu item “SERIAL IF” = “OMNI-VII“,

 ?A returns the protocol as shown above. (always this form for Ethernet)

When the menu item “SERIAL IF” = “SteppIR/CT“,

 ?A returns @Afnnnnnnnn<CR> - nnnnnnnn is 8 ascii values representing the current frequency. Preceding zeros are included.

 @AF00120000<CR> means 120,000 Hz.

 The binary form A<d3,d2,d1,d0> is always returned for Ethernet queries.

AGC Mode Control

The Automatic Gain Control (AGC) Mode selections available in the OMNI-VII are SLOW, MEDIUM, FAST, or OFF. The AGC mode can be changed at any time to take advantage of changing band conditions. AGC can be turned OFF so that the receiver gain is then controlled manually by the RF Gain control.

Format: `*' 'G' <d0> <CR>`

Where: `*'` = the ASCII `'*` symbol (0x2a)
 `G` = the ASCII `'G'` character (0x47)
 `<d0>` = ASCII `'0'` (0x30) for OFF
 = ASCII `'1'` (0x31) for SLOW
 = ASCII `'2'` (0x32) for MEDIUM
 = ASCII `'3'` (0x33) for FAST

Example: `*G2<CR>` sets MEDIUM AGC Mode

Squelch (all mode)

The squelch is active in all modes. The adjustment range is 0 to 127 representing 0 to 100% range.

Format: `*' 'H' <d0> <CR>`

Where: `*'` = the ASCII `'*` symbol (0x2a)
 `H` = the ASCII `'H'` character (0x48)
 `<d0>` = 7 bit squelch selection (0x00 to 0x7f)

Example: `*H<0x08><CR>` sets squelch level to 8.

RF Gain

The relative RF gain can be controlled over a range of 0-127. A setting of 0 represents full RF Gain whereas a setting of 127 (0x7f) represents the minimum RF Gain level. Because this control directly affects the RF Hardware, this will directly affect S-Units responses and Squelch settings.

Format: `*' I' <d0> <CR>`

Where: `'*` = the ASCII `'*` symbol (0x2a)
 `I` = the ASCII `'I'` character (0x49)
 `<d0>` = 7 bit squelch selection (0x00 to 0x7f)

Example: `*I<0x7f><CR>` sets RF Gain to decimal 127 (100% maximum)

RF Attenuation Control

Three different levels of RF Attenuation can be switched in or out under software control. The attenuator applies approximately 6db, 12db, or 18 db of attenuation. Because this control directly affects the RF hardware this directly affects S-Unit responses and squelch settings.

Format: `*' J' <d0> <CR>`

Where: `'*` = the ASCII `'*` symbol (0x2a)
 `J` = the ASCII `'J'` character (0x4a)
 `<d0>` = ASCII `'0'` (0x30) for OFF
 = ASCII `'1'` (0x31) for 6db
 = ASCII `'2'` (0x32) for 12db
 = ASCII `'3'` (0x33) for 18db

Example: `*J2<CR>` sets 12db attenuation

Noise Blanker, Noise Reduction, and Automatic Notch

The Noise Blanker, Noise Reduction, and Automatic Notch are available for use in all modes. They can be used individually or together.

Format: `*'K' <d2> <d1> <d0> <CR>`

Where: `'*' = the ASCII '*' symbol (0x2a)`
 `K = the ASCII 'K' character (0x4B)`
 `<d2> = Noise Blanker State (0=off action 1-7)`
 `<d1> = Noise Reduction State (0=off action 1-9)`
 `<d0> = Auto Notch State (0=off action 1-9)`

Example: `*K<0x05><0x02><0x00><CR>`
 Sets Noise Blanker to 5, Noise Reduction to 2, Auto Notch Off.

Receive and Transmit Modes

The OMNI-VII supports AM, USB, LSB, CWU, CWL, AM, FM, and FSK modes.

Format: `*'M' <d1> <d0> <CR>`

Where: `'*' = the ASCII '*' symbol (0x2a)`
 `M = the ASCII 'M' character (0x4d)`
 `<d0> = setting for VFOA mode`
 `<d1> = setting for VFOB mode`
 = ASCII '0' (0x30) for AM Mode
 = ASCII '1' (0x31) for USB Mode
 = ASCII '2' (0x32) for LSB Mode
 = ASCII '3' (0x33) for CWU Mode
 = ASCII '4' (0x34) for FM Mode
 = ASCII '5' (0x35) for CWL Mode
 = ASCII '6' (0x36) for FSK Mode

Order maintains compatibility with Jupier Mode

Example1: `*M11<CR>` sets USB for VFO-A, USB for VFO-B
Example2: `*M35<CR>` sets CWU for VFO-A, CWL for VFO-B

Passband Tuning (PBT)

The passband tuning range of the OMNI-VII is +/-8192Hz. Setting the PBT to zero will turn the passband tuning control off. The data format is a 2 byte binary number which represents the PBT value in Hz.

Format: `*' 'P' <d1 d0> <CR>`

Where: `'*' = the ASCII '*' symbol (0x2a)`
 `P = the ASCII 'P' character (0x50)`
 `<d1-d0>= PBT frequency in Hz as a 2byte binary number. The most significant byte is d1. The least significant byte is d0.`

Example1: `*P<0x03><0x38><CR>` sets PBT to 1000Hz

Example2: `*P<0x00><0x00><CR>` sets PBT to Off.

AF (Audio Volume)

The relative Audio Volume can be controlled over a range of 0-127. A setting of 0 represents Audio Volume Off, whereas a setting of 127 (0x7f) represents the maximum Audio Volume setting of 100%.

Format: `*' 'U' <d0> <CR>`

Where: `'*' = the ASCII '*' symbol (0x2a)`
 `U = the ASCII 'U' character (0x55)`
 `<d0> = 7 bit Audio Volume selection (0x00 to 0x7f)`

Example: `*U<0x7f><CR>` sets Audio Volume to decimal 127 (100%)

Version – Query Only

The version of the software in the OMNI-VII can be retrieved with this command.

Format: '?' 'V' <CR>

Where: '?' = the ASCII '?' symbol (0x3F)
 V = the ASCII 'V' character (0x56)

Returns: "VER " ABCD "-588 " ["REMOTEx" or "RADIO x"] <CR>

Where: ABCD = ASCII A.BCD version number

Where: x in the Version String represents an indicator for MARS enabled or not.

If x = a blank, then Ham Band only transmit is permitted.

If x = 'M' then transmit is enabled for MARS frequencies.

Example: ?V<CR>

Returned: VER 1010-588 REMOTE means: Version 1.010 Remote HAM band transmit only.

Receive Filter

The receive filter selection for the OMNI-VII is a pre-defined set of 37 settings. They range from as narrow as 200Hz to as wide as 14000Hz.

Format: '*' 'W' <d0> <CR>

Where: '*' = the ASCII '*' symbol (0x2a)
 W = the ASCII 'W' character (0x57)
 <d0> = ID for a given Receive Filter Bandwidth.

| ID | Filter | ID | Filter | ID | Filter | ID | Filter |
|----|--------|----|--------|----|--------|----|--------|
| 0 | 14000 | 10 | 4000 | 20 | 2200 | 30 | 600 |
| 1 | 9000 | 11 | 3800 | 21 | 2000 | 31 | 500 |
| 2 | 8000 | 12 | 3600 | 22 | 1800 | 32 | 450 |
| 3 | 7500 | 13 | 3400 | 23 | 1600 | 33 | 400 |
| 4 | 7000 | 14 | 3200 | 24 | 1400 | 34 | 350 |
| 5 | 6500 | 15 | 3000 | 25 | 1200 | 35 | 300 |
| 6 | 6000 | 16 | 2800 | 26 | 1000 | 36 | 250 |
| 7 | 5500 | 17 | 2600 | 27 | 900 | 37 | 200 |
| 8 | 5000 | 18 | 2500 | 28 | 800 | | |
| 9 | 4500 | 19 | 2400 | 29 | 700 | | |

Example1: *W<0x03><CR> sets Receive Filtering to 7500Hz

Example2: *W<0x1A><CR> sets Receive Filtering to 26 or 1000Hz

Where – AT

This command simply performs a notify.

Format: XX <CR>

Where: X = the ASCII ‘X’ character (0x58)

Example: XX<CR>

Returns: “ RADIO START – RADIO ” <CR>
 or

Returns: “ RADIO START – REMOTE” <CR>

Note: The Boot Loader returns: “ DSP START” <CR>

Execution Control

The OMNI-VII has different execution events that are used in programming the radio or in restoring original defaults.

Format: Z<X> <CR>

Where: Z = the ASCII ‘Z’ character (0x5A)
 <X> = ASCII ‘Z’ – Forces the OMNI-VII into flash update mode
 <X> = ASCII “M” – Forces the OMNI-VII to do a Master Reset

Example: ZM<CR> Would force a master reset

SUNIT – Query Only

The OMNI-VII can report the signal strength of the receive hardware. This is not affected by the Attenuator setting, nor the Pre-Amp. It returns the S-Units in receive mode, and the forward / reflected power readings in transmit modes.

Format: '?' 'S' <CR> (or '?' 'F' <CR>)

Where: '?' = the ASCII '?' symbol (0x3F)
S = the ASCII 'S' character (0x53)

The most significant bit of the first data byte of the returned data indicates if the data is for the S-Unit or for the Transmitted Forward / Reflected Power. If the bit is 0, then the rig is in receive and the data is for the s-units. If bit is 1, then the rig is in transmit and the data is the forward power and reflected power.

Returns: "SABCD" <CR> (if in receive mode)

Where: AB= Number of S Units in ASCII.
CD = dB above the S Unit X in ASCII

1 Or –

Returns: "S" <0xMM> <0xNN> <CR> (if in transmit mode)

Where: <0xMM> <b7> = 1 means transmit mode.
<0xMM> <b6..0> = Forward Power in Watts.
<0xNN> = Reflected Power in Watts.
If <0xMM> <b6..0> = 0, the forward power hasn't been read yet.
If <0xNN> = 0, then the reflected power hasn't been read yet.

Example1: S0944 <CR> means 44 over S9

Example2: S<0xe4> <0x02> <CR> means the OMNI-VII is in transmit mode
Since <0xMM><b6..0> = 0x64, forward power = 100 watts
Reflected power = 2 watts, SWR can be calculated.

Example3: S<0x8f> <0x00> <CR> means the OMNI-VII is in transmit mode
Since <0xMM><b6..0> = 0x0f, forward power = 16 watts
Reflected power = not read yet. SWR cannot be calculated yet.

Note: it is possible to get an S-Unit value of 0. This occurs when the unit transitions from Transmit to Receive or from Receive to Transmit. Or it can occur when transitioning from the Menu to the main display. So if 0 is read, then ignore it.

Transmit

The OMNI-VII can be put into transmit mode by sending the Transmit Command. This command is available in the both RADIO mode and REMOTE Mode. It can be received via either the serial or Ethernet port. In RADIO mode, it only turns on and off transmits. In REMOTE mode, this command also turns on and off RIPping over the Ethernet. In REMOTE mode, it also sends the requested RIP and TRIP compression levels.

(RIP = Receive audio over IP, via the Ethernet)

(TRIP = Transmit audio over IP, via the Ethernet)

Format: `*` `T` <d1> <d0> <CR>

Where:

- `*` = the ASCII `*` symbol (0x2a)
- T = the ASCII `T` character (0x54)
- <d1> = b0 = 1 = Turn On RIPping (Ethernet ONLY)
 = 0 = Turn OFF RIPping (Ethernet ONLY)
- <d1> = b2 = 1 = Turn On Transmit (TRIP on Ethernet)
 = 0 = Turn OFF Transmit (TRIP on Ethernet)
- <d0> = b0 = 1 = Utilize 16 bit to 8 bit compression for TRIP
 = 0 = Utilize 16 bit format for TRIP
- <d0> = b1 = 1 = Utilize 16 bit to 8 bit compression for RIP
 = 0 = Utilize 16 bit format for RIP

Example: `*T` <0x04> <0x02> <CR> Turns on the Transmitter, Turns off RIPping, compressed RIP, 16 bit TRIP

NOTE: The audio that will be transmitted will be based on the following: If the command is received serially, then the audio source is based on the Audio Source selection. If the command is via the Ethernet, then the audio source will be assumed to be streamed audio received over the Ethernet. When this command is received by the OMNI-VII, the OMNI-VII will go into transmit mode and stay there until either it receives this command to turn off the transmitter, or a Transmit command to keep the transmitter on has not been received in 5 seconds. The same is true for RIPping. Therefore to keep the OMNI-VII RIPping, the command to RIP should be continually sent, once ever 4 seconds or so. In practice, the OMNI-VII One Plug Computer Program currently sends the given command twice every 2 seconds. This ensures that even with bad packet transfers on a busy or poor Ethernet, then the given RIP or TRIP command will make it within the 5-second timeout time period.

Split State – Radio Mode

The OMNI-VII permits you to transmit and receive on the main VFO frequency, or you can operate in a split mode where you can receive on the main VFO frequency and transmit on the sub VFO frequency.

Format: `*` `N` <d0> <CR>

Where: `*` = the ASCII `*` symbol (0x2a)
 N = the ASCII `N` character (0x4E)
 <d0> = 0 = SPLIT OFF
 = 1 = SPLIT ON

Example: `*N<0x00><CR>` turns off SPLIT state

Main Mode Query – Orion Format

In order to support CT Logger, there are two queries that need to be supported. One is the response to the Frequency Tuning Query (already defined in the Frequency Tuning section of this manual), and the other is the response to the ?RMM Main Mode Query. The ?RMM response format follows the values as identified for the Ten-Tec Orion.

Format: `?` `R` `M` `M` <CR>

Where: `?` = the ASCII `?` symbol (0x2a)
 R = the ASCII `R` character (0x4d)
 M = the ASCII `M` character (0x4d) (Note, the two M's are optional, ?R <CR> is all that is required in this query.)

The OMNI-VII will respond back with:

@ R M M "ASCII_MODE" <CR>

Where: ASCII_MODE =
 = ASCII '0' (0x30) for USBMode
 = ASCII '1' (0x31) for LSB Mode
 = ASCII '2' (0x32) for UCW Mode
 = ASCII '3' (0x33) for LCW Mode
 = ASCII '4' (0x34) for AM Mode
 = ASCII '5' (0x35) for FM Mode
 = ASCII '6' (0x36) for FSK Mode

Not the same as the OMNI-VII Response in OMNIVII mode. This is the same as the Orion Format.

Example1: @RMM6<CR> indicates the OMNI-VII is in FSK mode

Example2: @RMM3<CR> indicates the OMNI-VII is in LCW mode

REMOTE MODE Command Set

In this section, we will explore the command set available on the Serial Interface when the radio is in REMOTE MODE. Note: ALL of the commands that were available in RADIO MODE are also available in REMOTE MODE. Where these commands have differences, they will be shown in this section.

Ethernet Settings – Query Only

In Remote Mode, the Ethernet settings can be queried. This includes the MAC Address of the radio, the current state of RIPPING, and the IP Address of the Computer that the Radio is RIPPING with. The RIP items are provided so that they can be checked before trying to RIP, and if the radio is already RIPPING, then the new program should not attempt it. Otherwise, you will get very disjoint audio, going back and forth between the two attempted RIP'er computers. This is permitted by the radio, so that if the IP address of the source PC changes dynamically, then the Radio will keep up RIPPING to the new address as it comes in. This command also returns the compression level supported by the radio (comp).

Format: '?' 'T' <CR>

Where: '?' = the ASCII '?' symbol (0x3F)
T = the ASCII 'T' character (0x54)

Example: ?T<CR>

Returns: "T001945XXYYZZ" <n><ip3><ip2><ip1><ip0><comp><CR>

Where: 001945XXYYZZ = the MAC address of this OMNI-VII
<n> = 1 byte binary = 1 if the OMNI-VII is ripping; 0 if not
<ip3..ip0> = 4 byte binary IP address of the device that the
 OMNI-VII is RIPPING to.
<complevel> bit 0 = 1 supports 16 bit to 8 bit TRIP
 bit 1 = 1 supports 16 bit to 8 bit RIP

Example1: T00194566CB14 <0x00> <0xC0> <0xA8> <0x01> <0 x0F>
 <0x00> <CR>
 Means the MAC Address = 00:19:45:66:CB:14
 The OMNI-VII is NOT in use, It isn't RIPPING.
 The IP Address it was last RIPPING to was: 192.168.1.15
 Compression isn't supported.

Example2: T00194566CB14 <0x01> <0xC0> <0xA8> <0x01> <0 x7D>
 <0x03> <CR>
 Means the MAC Address = 00:19:45:66:CB:14
 The OMNI-VII IS in use, It isn't RIPPING.
 The IP Address it is RIPPING to is: 192.168.1.125
 RIP and TRIP compression are supported.

Frequency Tuning

Frequency Tuning Selection in REMOTE MODE permits entry of the frequency in the same format as is available in RADIO MODE, and also two more modes of ASCII entry. The 4-byte binary format requires the <CR> to be present at the 6th byte location (assuming the * is at location 1). In REMOTE MODE, the 6th byte is checked for a <CR>. If it is present, then it is assumed the value is still in the 4-byte binary number format. If it is not, then it is assumed to be in ASCII format. Two entry formats are allowed in ASCII, one includes a decimal point, and the other doesn't.

ASCIIFormat: `* ['A' or 'B'] ASCIIFreq <CR>`

Where: `*` = the ASCII `*` symbol (0x2a)
A = the ASCII `'A'` character (0x41)
B = the ASCII `'B'` character (0x42)
ASCIIFreq = at least 5 ascii characters, digits and/or commas

Example1: `*A12,345 <CR>` sets the main VFO to 12,345 Hz

Example2: `*B100 <CR>` WARNING, interpreted as 4-byte binary.

Example3: `*B930000 <CR>` would set the sub VBO to 930,000 Hz

DecimalFormat: `* ['A' or 'B'] decimalFreq <CR>`

Where: `*` = the ASCII `*` symbol (0x2a)
A = the ASCII `'A'` character (0x41)
B = the ASCII `'B'` character (0x42)
decimalFreq = at least 5 ascii characters, digits or 1 decimal point.

Example1: `*A12.345 <CR>` sets the main VFO to 12,345,000 Hz

Example2: `*B.9300 <CR>` sets the sub VFO to 0,930,000 Hz or 0.930 MHz.

NOTE: Queries to A or B ALWAYS return the frequencies in 4-byte binary format.

Receive / Transmit Offset

The OMNI-VII can adjust the current receive and or transmit frequency by a given offset amount from the base receive or transmit frequency. This single offset value has a range of 8192 to -8192Hz.

Format: `*` `L` <d2> <d1> <d0> <CR>

Where: `*` = the ASCII `*` symbol (0x2a)
L = the ASCII `L` character (0x4C)
<d2> = b0 = 1 = Turn on Receive Offset
 = 0 = Turn off Receive Offset
 = b1 = 1 = Turn on Transmit Offset
 = 0 = Turn off Transmit Offset
<d1> <d0> = The Offset amount in Hz signed value

Example1: *L<0x01> <0x0c><0xcc><CR> Offset to 3276, RIT On, XIT Off

Example2: *L<0x02> <0xf3><0x34><CR> Offset to -3276, RIT Off, XIT On

Audio Source

The audio source for the OMNI-VII can be selected as either the MIC, the back panel LINE input, or a summation of BOTH.

Format: `*` 'C1A' <d0> <CR>

Where: `*` = the ASCII '*' symbol (0x2a)
C1A = the ASCII 'C1A' characters (<0x43><0x31><0x41>)
<d0> = binary 0 for MIC
 = binary 1 for LINE
 = binary 2 for BOTH (summed)

Example: *C1A <0x01> <CR> sets the audio source to MIC

NOTE: The audio that is transmitted by the OMNI-VII when you are transmitting over the Internet (TRIPing), is the audio the OMNI-VII receives on the Ethernet from the computer. The OMNI-VII provides a feature, where if you select the audio input to be the MIC, you can control the MIC audio via the MIC GAIN. When TRIPing, the MIC GAIN will be applied to the TRIP audio when the audio source is set to MIC. Likewise, you control the LINE GAIN to control the LINE Input audio gain. When TRIPing, the LINE GAIN will be applied to the TRIP audio when the audio source is set to LINE. One may have a preferred setting for gain applied to the TRIP data when in sideband mode, and a preferred setting for gain applied to the TRIP Data when in FM mode. To achieve this, simply set the input source to MIC when TRIPing in SideBand, and set the MIC GAIN to the desired level. Likewise, when in FM, simply set the input source to LINE when TRIPing in FM, and set the desired LINE Level. Remember that the specific gain will be applied to the specific input when you are not TRIPing and wanting to use the MIC or LINE as audio inputs.

Keying Loop On/Off

The keying loop on the back panel of the OMNI-VII can be turned on or ignored.

Format: `*` 'C1B' <d0> <CR>

Where: `*` = the ASCII '*' symbol (0x2a)
C1B = the ASCII 'C1B' characters (<0x43><0x31><0x42>)
<d0> = binary 0 for Keying Loop Off (ignore it, key anyway).
 = binary 1 for Keying Loop On (wait for tx enable).

Example: *C1B <0x01> <CR> turns on the Keying Loop check before transmitting.

CW RISE/FALL TIME

The rise and fall time of the CW waveform can be programmed between 3ms and 10ms. This is measured from where the DSP begins transitioning the waveform from receive, through the raised cosine curve, up to the point where the CW keyed waveform is at maximum.

Format: `*` 'C1C' <d0> <CR>

Where: `*` = the ASCII '*' symbol (0x2a)
C1C = the ASCII 'C1C' characters (<0x43><0x31><0x43>)
<d0> = binary 0 for 3ms
 = binary 1 for 4ms
 = binary 2 for 5ms
 = binary 3 for 6ms
 = binary 4 for 7ms
 = binary 5 for 8ms
 = binary 6 for 9ms
 = binary 7 for 10ms

Example: *C1C <0x01> <CR> Sets the CW Rise/Fall time to 4ms.

Mic Gain

The relative Mic Gain can be controlled over a range of 0-127. A setting of 0 represents Mic Gain Off, whereas a setting of 127 (0x7f) represents the maximum Mic Gain setting of 100%.

Format: `*` 'C1D' <d0> <CR>

Where: `*` = the ASCII '*' symbol (0x2a)
C1D = the ASCII 'C1D' characters (<0x43><0x31><0x44>)
<d0> = 7 bit mic gain selection (0x00 to 0x7f)

Example: *C1D<0x7f><CR> sets Mic Gain to decimal 127 (100%)

Line Gain

The relative Line Gain can be controlled over a range of 0-127. A setting of 0 represents Line Gain Off, whereas a setting of 127 (0x7f) represents the maximum Line Gain setting of 100%.

Format: `*` 'C1E' <d0> <CR>

Where: `*` = the ASCII '*' symbol (0x2a)
C1E = the ASCII 'C1E' characters (<0x43><0x31><0x45>)
<d0> = 7 bit line gain selection (0x00 to 0x7f)

Example: *C1E<0x7f><CR> sets Line Gain to decimal 127 (100%)

Speech Processor

The relative amount of Speech Processing can be controlled over a range of 0-127. A setting of 0 represents the least amount of Speech processing, whereas a setting of 127 (0x7f) represents the maximum Speech Processing setting of 100%.

Format: `*' 'C1F' <d0> <CR>`

Where: `*' = the ASCII '*' symbol (0x2a)`
 `C1F = the ASCII 'C1F' characters (<0x43><0x31><0x46>)`
 `<d0> = 7 bit Speech Processing amount (0x00 to 0x7f)`

Example: `*C1F<0x7f><CR>` sets Speech Processor to decimal 127 (100%)

FM CTCSS Tones

The OMNI-VII has the ability to transmit FM CTCSS Tones when the device receiving the FM transmission requires the CTCSS tone. Available settings are OFF, or any of the 48 standard CTCSS access tones. The set of tones is the standard set as defined in the ARRL handbook.

Format: `*' 'C1G' <d0> <CR>`

Where: `*' = the ASCII '*' symbol (0x2a)`
 `C1G = the ASCII 'C1G' characters (<0x43><0x31><0x47>)`
 `<d0> = 7 bit FM CTCSS Select (0x00 to 0x32)`

| ID | Tone Hz |
|----|---------|----|---------|----|---------|----|---------|----|---------|
| 0 | OFF | 10 | 91.5 | 20 | 127.3 | 30 | 167.9 | 40 | 203.5 |
| 1 | 67.0 | 11 | 94.8 | 21 | 131.8 | 31 | 171.3 | 41 | 206.5 |
| 2 | 69.3 | 12 | 97.4 | 22 | 136.5 | 32 | 173.8 | 42 | 210.7 |
| 3 | 71.9 | 13 | 100.0 | 23 | 141.3 | 33 | 177.3 | 43 | 218.1 |
| 4 | 74.4 | 14 | 103.5 | 24 | 146.2 | 34 | 179.9 | 44 | 225.7 |
| 5 | 77.0 | 15 | 107.2 | 25 | 151.4 | 35 | 183.5 | 45 | 229.1 |
| 6 | 79.7 | 16 | 110.9 | 26 | 156.7 | 36 | 186.2 | 46 | 233.6 |
| 7 | 82.5 | 17 | 114.8 | 27 | 159.8 | 37 | 189.9 | 47 | 241.8 |
| 8 | 85.4 | 18 | 118.8 | 28 | 162.2 | 38 | 192.8 | 48 | 250.3 |
| 9 | 88.5 | 19 | 123.0 | 29 | 165.5 | 39 | 199.5 | 49 | 254.1 |

Example: `*C1G<0x03><CR>` sets CTCSS Tone to 71.9 Hz

RX Equalizer

The RX Equalizer is selectable in 1-dB steps from high pitched at -20 to essentially flat response at 0dB to very bassy at +20dB. These 41 steps are controlled over a range of 0-127. A setting of 0 represents the -20dB selection, a setting of 63 (0x3f) represents the flat response of 0dB, and a setting of 127 represents the +20dB selection.

Format: `*' 'C1H' <d0> <CR>`

Where: `*'` = the ASCII `'*` symbol (0x2a)
 `C1H` = the ASCII `'C1H'` characters (<0x43><0x31><0x48>)
 `<d0>` = 7 bit RX Equalizer setting (0x00 to 0x7f)

Example1: `*C1H<0x7f><CR>` sets RX Equalizer to 100% = +20dB

Example2: `*C1H<0x3f><CR>` sets RX Equalizer to 50% = 0dB

Note: The conversion factor used in the OMNI-VII is 3.097560975 to convert 0..127 into 0.41 which represents -20dB to 20dB

TX Equalizer

The TX Equalizer is selectable in 1-dB steps from high pitched at -20 to essentially flat response at 0dB to very bassy at +20dB. These 41 steps are controlled over a range of 0-127. A setting of 0 represents the -20dB selection, a setting of 63 (0x3f) represents the flat response of 0dB, and a setting of 127 represents the +20dB selection.

Format: `*' 'C1I' <d0> <CR>`

Where: `*'` = the ASCII `'*` symbol (0x2a)
 `C1I` = the ASCII `'C1I'` characters (<0x43><0x31><0x49>)
 `<d0>` = 7 bit TX Equalizer setting (0x00 to 0x7f)

Example1: `*C1I<0x7f><CR>` sets TX Equalizer to 100% = +20dB

Example2: `*C1I<0x00><CR>` sets TX Equalizer to 0% = -20dB

Note: The conversion factor used in the OMNI-VII is 3.097560975 to convert 0..127 into 0.41 which represents -20dB to 20dB.

Transmit Roll Off

The Transmit Roll Off can be set to 70-300Hz. This determine shwere the low end frequency responses of an SSB transmit signal begins to attenuate.

Format: `*` 'C1J' <d0> <CR>

Where: `*` = the ASCII '*' symbol (0x2a)
C1J = the ASCII 'C1J' characters (<0x43><0x31><0x4A>)
<d0> = 7 bit transmit roll off select (0x00 to 0x17)

Example: *C1J<0x10><CR> sets Transmit Roll Off to decimal 127 (100%)

| ID | RollOff |
|----|---------|----|---------|----|---------|----|---------|----|---------|
| 0 | 70 | 5 | 120 | 10 | 170 | 15 | 220 | 20 | 270 |
| 1 | 80 | 6 | 130 | 11 | 180 | 16 | 230 | 21 | 280 |
| 2 | 90 | 7 | 140 | 12 | 190 | 17 | 240 | 22 | 290 |
| 3 | 100 | 8 | 150 | 13 | 200 | 18 | 250 | 23 | 300 |
| 4 | 110 | 9 | 160 | 14 | 210 | 19 | 260 | | |

Example1: *C1J<0x03><CR> sets Transmit Roll Off to 100Hz

Example2: *C1J<0x00><CR> sets Transmit Roll Off to 70Hz

External T/R Delay

The External T/R Delay gives the operator the ability to keep the amplifier keyed longer. The value is selectable from 0 giving around a 15mS delay to 127 giving around a 1 second delay.

Format: `*` 'C1K' <d0> <CR>

Where: `*` = the ASCII '*' symbol (0x2a)
C1K = the ASCII 'C1K' characters (<0x43><0x31><0x4B>)
<d0> = 7 bit External T/R Delay Selection (0x00 to 0x7f)

Example1: *C1K<0x7f><CR> sets External T/R Delay to 100%

Example2: *C1K<0x00><CR> sets External T/R Delay to 0%

Sidetone Frequency

The Sidetone Frequency can be set to 0-1270Hz in 10 Hz steps.

Format: `*` 'C1L' <d0> <CR>

Where: `*` = the ASCII '*' symbol (0x2a)
C1L = the ASCII 'C1L' characters (<0x43><0x31><0x4C>)
<d0> = 7 bit Sidetone Frequency Selection (0x00 to 0x7f)

Example1: *C1L<0x64><CR> sets Sidetone Frequency to 1000 Hz

Example2: *C1L<0x28><CR> sets Sidetone Frequency to 400 Hz

CW QSK Delay

The CW QSK Delay adjusts the amount of time it takes for receive audio to be restored after finishing transmission of a CW dit/dah. The range is from 0, for full break in, up to 127 for maximum delay of about 1 second time. This control does not hold off the next transmit. Only sets the time that the next receive will be enabled providing that another transmit doesn't start during that timeframe.

Format: `*` 'C1M' <d0> <CR>

Where: `*` = the ASCII '*' symbol (0x2a)
C1M = the ASCII 'C1M' characters (<0x43><0x31><0x4D>)
<d0> = 7 bit CW QSK Delay Selection (0x00 to 0x7f)

Example1: *C1M<0x7f><CR> sets CW QSK Delay to 100% (1 second)

Example2: *C1M<0x00><CR> sets CW QSK Delay to 0% (full break-in)

Transmit Enable

This controls whether attempts to transmit will produce RF or not. It is possible to practice CW, listen to the sidetone, and not transmit. The range is from 0 for transmitter disabled, to 1 for transmitter enabled.

Format: `*` 'C1N' <d0> <CR>

Where: `*` = the ASCII '*' symbol (0x2a)
C1N = the ASCII 'C1N' characters (<0x43><0x31><0x4E>)
<d0> = binary 0 for Transmitter Disable
 = binary 1 for Transmitter Enable

Example: *C1N<0x00><CR> disables the transmitter RF output

Sideband Transmit Bandwidth

The Sideband Transmit Bandwidth can be set to 1000 – 4000Hz.

Format: `*` `C1O` <d0> <CR>

Where: `*` = the ASCII `*` symbol (0x2a)
C1O = the ASCII `C1O` characters (<0x43><0x31><0x4F>)
<d0> = 7 bit transmit bandwidth select (0x00 to 0x10)

Example: `*C1O<0x05><CR>` sets Sideband Transmit BW to 3000Hz

| ID | TX BW |
|----|-------|----|-------|----|-------|----|-------|----|-------|
| 0 | 4000 | 4 | 3200 | 8 | 2500 | 12 | 1800 | 16 | 1000 |
| 1 | 3800 | 5 | 3000 | 9 | 2400 | 13 | 1600 | | |
| 2 | 3600 | 6 | 2800 | 10 | 2200 | 14 | 1400 | | |
| 3 | 3400 | 7 | 2600 | 11 | 2000 | 15 | 1200 | | |

Auto Tuner

This controls whether the OMNI-VII will control the optional Auto Tuner or not. It is possible to have an Auto Tuner installed, yet you may want to force it to not use the Auto Tuner under certain conditions. The range is from 0 for Auto Tuner Not Installed, to 1 for Auto Tuner Installed. Not Installed forces the OMNI-VII to send the Auto Tuner Bypass control to the Auto Tuner, making sure that it is bypassed.

Format: `*' 'C1P' <d0> <CR>`

Where: `'*' = the ASCII '*' symbol (0x2a)`
 `C1P = the ASCII 'C1P' characters (<0x43><0x31><0x50>)`
 `<d0> = binary 0 for Auto Tuner Not Installed`
 `= binary 1 for Auto Tuner Installed`

Example: `*C1P<0x00><CR>` Disables using the Auto Tuner.

Sidetone Volume

The relative Sidetone Volume can be controlled over a range of 0-127. A setting of 0 represents Sidetone Off, whereas a setting of 127 (0x7f) represents the maximum Sidetone Volume setting of 100%.

Format: `*' 'C1Q' <d0> <CR>`

Where: `'*' = the ASCII '*' symbol (0x2a)`
 `C1Q = the ASCII 'C1Q' characters (<0x43><0x31><0x51>)`
 `<d0> = 7 bit sidetone volume selection (0x00 to 0x7f)`

Example: `*C1Q<0x3f><CR>` sets Sidetone Volume to decimal 63 (50%)

SPOT Volume

The relative SPOT Volume can be controlled over a range of 0-127. A setting of 0 represents SPOT Off, whereas a setting of 127 (0x7f) represents the maximum SPOT Volume setting of 100%.

Format: `*` 'C1R' <d0> <CR>

Where: `*` = the ASCII '*' symbol (0x2a)
C1R = the ASCII 'C1R' characters (<0x43><0x31><0x52>)
<d0> = 7 bit SPOT volume selection (0x00 to 0x7f)

Example: *C1R<0x3f><CR> sets SPOT Volume to decimal 63 (50%)

FSK Mark High/Low

This controls whether the OMNI-VII will transmit the MARK at High or at Low Frequency. The range is from 0 for Mark Low, to 1 for Mark High. The High Frequency is the frequency displayed in the transmit frequency, and the Low Frequency is 170Hz lower. The Mark/Space selection is via the rear input pins in the acc port.

Format: `*` 'C1S' <d0> <CR>

Where: `*` = the ASCII '*' symbol (0x2a)
C1S = the ASCII 'C1S' characters (<0x43><0x31><0x53>)
<d0> = binary 0 for Mark Low Frequency
 = binary 1 for Mark High Frequency

Example: *C1S<0x01><CR> Enables using the Mark at the High Frequency

I-F Filter Selection

The I-F Filter can be selected from 20kHz to 300Hz or even Automatic Selection based on the Receive Bandwidth selection.

Format: `*` 'C1T' <d0> <CR>

Where: `*` = the ASCII '*' symbol (0x2a)
C1T = the ASCII 'C1T' characters (<0x43><0x31><0x54>)
<d0> = binary 0 = 20kHz = binary 1 = 6kHz
 = binary 2 = 2.5kHz = binary 3 = 500kHz
 = binary 4 = 300Hz = binary 5 = Auto

Example1: `*C1T<0x02><CR>` sets I-F Selected to 2.5kHz

Note: the query returns two bytes. The first is the "I-F Selected", the second is the actual "I-F In Use". So you can see the user selection and the actual current status with the ?C1T Query. Follows same format for d0 as shown above.

I-F Filter Enable

Three of the I-F Filters can be removed. One is shipped standard with the radio, and two are optional. This command will enable the I-F Filter for use in the Automatic Mode of the I-F Filter Selection. If an I-F Filter is enabled, and if the I-F Selection is set to Auto, then the I-F Filter will be automatically switched in by the OMNI-VII software based upon the users Receive Bandwidth. The I-F automatically switched in will be the one with the bandwidth greater than or equal to the Receive Bandwidth. Hence, the I-F Filter switched in will always be greater than or equal to the DSP Receive Bandwidth.

Format: `*` 'C1U <d0> <CR>

Where: `*` = the ASCII '*' symbol (0x2a)
C1U= the ASCII 'C1U characters (<0x43><0x31><0x55>)
<d0> = 2 bit I-F Enable select (0x00 to 0x03)

Example: `*C1U<0x01><CR>` Enables 300Hz and Disables 500z

| d0 | b1 | b0 | 500 Hz | 300 Hz |
|----|----|----|----------|----------|
| 0 | 0 | 0 | Disabled | Disabled |
| 1 | 0 | 1 | Disabled | Enabled |
| 2 | 1 | 0 | Enabled | Disabled |
| 3 | 1 | 1 | Enabled | Enabled |

Antenna

The OMNI-VII has connections for two HF Transceiver Antennas, and one HF Receiver Antenna. These are referred to as ANT1, ANT2, and RXAUX on the radio selection menus.

Format: `*` `C1V` <d0> <CR>

Where: `*` = the ASCII `*` symbol (0x2a)
C1V= the ASCII `C1V` characters (<0x43><0x31><0x56>)
<d0> = binary 0 = RX=TX=ANT1
 = binary 1 = RX=TX=ANT2
 = binary 2 = RX=RXAUX, TX=ANT1
 = binary 3 = RX=RXAUX, TX=ANT2

Example1: `*C1V0<CR>` sets Receive and Transmit to ANT1

Example2: `*C1V2<CR>` sets Receive to RXAUX and Transmit to ANT1

Monitor

The relative Monitor can be controlled over a range of 0-127. A setting of 0 represents Monitor Off, whereas a setting of 127 (0x7f) represents the maximum Monitor setting of 100%.

Format: `*` `C1W` <d0> <CR>

Where: `*` = the ASCII `*` symbol (0x2a)
C1W = the ASCII `C1W` characters (<0x43><0x31><0x57>)
<d0> = 7 bit Monitor selection (0x00 to 0x7f)

Example: `*C1W<0x3f><CR>` sets Monitor to decimal 63 (50%)

Transmit Power

The relative Transmit Power can be controlled over a range of 0-127. A setting of 0 represents lowest power setting, and 127 (0x7f) represents maximum transmit power level. The OMNI-VII allows you to select 0...127, which represents 0..100 Watts. However, the lower value will be limited to no lower than 5Watts.

Format: `*' 'C1X' <d0> <CR>`

Where: `'*' = the ASCII '*' symbol (0x2a)`
 `C1X = the ASCII 'C1X' characters (<0x43><0x31><0x58>)`
 `<d0> = 7 bit Power selection (0x00 to 0x7f)`

Example: `*C1X<0x3f><CR>` sets Power to decimal 63 (50% = 50Watts)

Note: the query returns the power selected, plus the current forward power and reflected power.

Example: `?C1X<CR>` from Computer to OMNI-VII queries the Power Setting

Returns: `C1X<0x3f><0x3e><0x03><CR>` means the OMNI-VII is selected to transmit 50 watts, has forward power slightly less than 50 watts, and has reflected power of $3/127 * 100$ approx 2.36 watts reflected.

SPOT Tone On/Off

This controls whether the OMNI-VII will generate the SPOT Tone. The range is from 0 for SPOT Tone OFF, to 1 for SPOT Tone ON.

Format: `*' 'C1Y' <d0> <CR>`

Where: `'*' = the ASCII '*' symbol (0x2a)`
 `C1Y = the ASCII 'C1Y' characters (<0x43><0x31><0x59>)`
 `<d0> = binary 0 for SPOT Tone Off`
 `= binary 1 for SPOT Tone On`

Example: `*C1Y<0x01><CR>` Turns ON SPOT Tone.

PREAmp On/Off

This controls whether the OMNI-VII will engage the Pre-Amplifier or not. The range is from 0 for Pre-Amplifier OFF, to 1 for Pre-Amplifier ON.

Format: `*` 'C1Z' <d0> <CR>

Where: `*` = the ASCII '*' symbol (0x2a)
C1Z = the ASCII 'C1Z' characters (<0x43><0x31><0x5A>)
<d0> = binary 0 for PreAmp Off
 = binary 1 for PreAMp On

Example: *C1Z<0x01><CR> Turns the Pre-Amplifier ON.

Remote Tune

The OMNI-VII can be told to enter the TUNING state or exit the TUNING state by sending this command. There are no parameters for this command. Once initiated, the OMNI-VII performs exactly the same functions as if you had pushed the TUNE button locally. It is best for your application to send this command, and then read the corresponding query until the status shows that the TUNE cycle is complete.

Format: `*` 'C2A' <CR>

Where: `*` = the ASCII '*' symbol (0x2a)
C2A = the ASCII 'C2A' characters (<0x43><0x32><0x41>)

Example: *C2A<CR> Tells the OMNI-VII to start its tuning cycle

Example: *C2A<CR> Tells the OMNI-VII to start its tuning cycle

*C2A <CR> if the OMNI-VII is manually tuning, then this command will tell it to stop tuning.

Query Format: ?C2A<CR>

Radio Returns: C2A <d0> <CR>

Where: <d0> = bit 0 = 0 => Auto Tuner Not Enabled
 = 1 => Auto Tuner Enabled
 = bit 1 = 0 => Not Currently Tuning
 = 1 => Currently Tuning
 = bit 2 = 0 => Not Tuned / = Bypassed
 = 1 => Tuned

Split State – Extended Format

Split State Selection in REMOTE MODE is available in the same command format as in RADIO MODE using the *N ?N command query. Split State is also adjustable in the extended command set as follows: (This extended command gives no additional functionality over the N command. Only supported because existing programs use the extended format, and the radio command was added to support other programs)

Format: ****** 'C2B' <d0> <CR>

Where: ****** = the ASCII '*****' symbol (0x2a)
 C2B = the ASCII 'C2B' characters (<0x43><0x32><0x42>)
 <d0> = 0 = SPLIT OFF
 = 1 = SPLIT ON

Example: *C2B<0x00><CR> turns off SPLIT state

VOX TRIP Level

The relative VOX Trip Level can be controlled over a range of 0-127. A setting of 0 represents lowest Trip setting, and 127 (0x7f) represents maximum Trip level.

Format: ****** 'C2C' <d0> <CR>

Where: ****** = the ASCII '*****' symbol (0x2a)
 C2C = the ASCII 'C2C' characters (<0x43><0x32><0x43>)
 <d0> = 7 bit VOX Trip selection (0x00 to 0x7f)

Example: *C2C<0x3f><CR> sets VOX Trip to decimal 63 (50%)

ANTI VOX Level

The relative ANTI VOX Level can be controlled over a range of 0-127. A setting of 0 represents lowest Anti-VOX setting, and 127 (0x7f) represents maximum Anti-VOX.

Format: `*' 'C2D' <d0> <CR>`

Where: `'*' = the ASCII '*' symbol (0x2a)`
 `C2D = the ASCII 'C2D' characters (<0x43><0x32><0x44>)`
 `<d0> = 7 bit Anti-VOX selection (0x00 to 0x7f)`

Example: `*C2D<0x3f><CR>` sets Anti VOX to decimal 63 (50%)

VOX Hang Time

The relative VOX Hang Time can be controlled over a range of 0-127. A setting of 0 represents lowest VOX Hang Time, and 127 (0x7f) represents maximum VOX Hang.

Format: `*' 'C2E' <d0> <CR>`

Where: `'*' = the ASCII '*' symbol (0x2a)`
 `C2E = the ASCII 'C2E' characters (<0x43><0x32><0x45>)`
 `<d0> = 7 bit VOX Hang Time selection (0x00 to 0x7f)`

Example: `*C2E<0x3f><CR>` sets VOX Hang Time to decimal 63 (50%)

CW Keyer Mode

This controls whether the OMNI-VII internal keyer mode operates in Mode A or Mode B mode, or OFF

Format: `*` 'C2F' <d0> <CR>

Where: `*` = the ASCII '*' symbol (0x2a)
C2F = the ASCII 'C2F' characters (<0x43><0x32><0x56>)
<d0> b0 = Curtis Mode A
 b1 = Curtis Mode B
 b2 = Internal Keyer ON/Off

Example1: *C2F<0x01><CR> Sets to Curtis Mode A, Internal Keyer OFF
This is legal, means that the internal keyer mode is off, but if
changed to

Example2: *C2F<0x06><CR> Sets to Curtis Mode B, Internal Keyer ON

CW Keyer Weighting

The relative CW Keyer Weighting can be controlled over a range of 0-127. A setting of 0 represents lowest CW Keyer Weighting Time, and 127 (0x7f) represents maximum CW Keyer Weighting Time. For firmware version 1.022 onwards, this represents weighting of 0 to 50%. Prior firmware versions this was 0 to 24%.

Format: `*` 'C2G' <d0> <CR>

Where: `*` = the ASCII '*' symbol (0x2a)
C2G = the ASCII 'C2G' characters (<0x43><0x32><0x47>)
<d0> = 7 bit CW Keyer Weighting selection (0x00 to 0x7f)

Example: *C2G<0x7f><CR> sets CW Keyer Weighting to decimal 63
(50%)

Manual NOTCH On/Off

This controls whether the OMNI-VII Manual Notch is engaged or not.

Format: `*' 'C2H' <d0> <CR>`

Where: `'*' = the ASCII '*' symbol (0x2a)`
 `C2H = the ASCII 'C2H' characters (<0x43><0x32><0x48>)`
 `<d0> = binary 0 = Manual Notch OFF`
 `= binary 1 = Manual Notch ON`

Example: `*C2H<0x01><CR>` Turns ON Manual Notch

Manual NOTCH Center Frequency

The relative Manual NOTCH Center Frequency can be controlled over a range of 0-127. A setting of 0 represents lowest Manual NOTCH Center Frequency of 20 Hz, and 127 (0x7f) represents maximum Manual NOTCH Center Frequency of 4000Hz.

The formula is $40 * \text{MANNCHCF_Selected} + 20 \text{ Hz}$

Format: `*' 'C2I' <d0> <CR>`

Where: `'*' = the ASCII '*' symbol (0x2a)`
 `C2I = the ASCII 'C2I' characters (<0x43><0x32><0x49>)`
 `<d0> = 7 bit MANNCHCF_Selected selection (0x00 to 0x7f)`

Example: `*C2I<0x00><CR>` sets Manual Notch Center Frequency to 20Hz

Manual NOTCH Width

The relative Manual NOTCH Width can be controlled over a range of 0-127. A setting of 0 represents lowest Manual NOTCH Width of 10 Hz, and 127 (0x7f) represents maximum Manual NOTCH Width of 300Hz

The formula is $((315 - 10) / (127 - 1)) * \text{MANNCHWIDTH_Selected Hz}$

Format: `*' 'C2J' <d0> <CR>`

Where: `'*' = the ASCII '*' symbol (0x2a)`
 `C2J = the ASCII 'C2J' characters (<0x43><0x32><0x4A>)`
 `<d0> = 7 bit MANNCHWIDTH _Selected selection (0x00 to 0x7f)`

Example: `*C2J<0x00><CR>` sets Manual Notch Width to 10Hz

Internal Keyer Speed

The Internal Keyer Speed can be controlled with a range of 5..63wpm. The data range is 0..127, meaning that the value sent is $\text{Desired_Speed} * 127/63$. Setting the Desired_Speed to 0 through 4 is ignored in the OMNI-VII and limited to 5wpm.

Format: `*' 'C2L' <d0> <CR>`

Where: `'*' = the ASCII '*' symbol (0x2a)`
 `C2L = the ASCII 'C2L' characters (<0x43><0x32><0x4C>)`
 `<d0> = 7 bit character Desired_Speed`

Example1: `*C2L<0x0a><CR>` sets Desired_Speed to 5 wpm.

Example2: `*C2L<0x32><CR>` sets Desired_Speed to 25 wpm.

Example3: `*C2L<0x64><CR>` sets Desired_Speed to 50 wpm.

Example4: `*C2L<0x7f><CR>` sets Desired_Speed to 63 wpm.

VOX On/Off

VOX can be turned on and off.

Format: `*` 'C2M' <d0> <CR>

Where: `*` = the ASCII `*` symbol (0x2a)
C2M = the ASCII 'C2M' characters (<0x43><0x32><0x4D>)
<d0> = binary 0 = VOX OFF
 = binary 1 = VOX ON

Example1: *C2M<0x00><CR> sets VOX Off

Example2: *C2M<0x01><CR> sets VOX On

RADIO DISPLAY ON/OFF

The Display on the Radio can be turned on and off remotely.

Format: `*` 'C2N' <d0> <CR>

Where: `*` = the ASCII `*` symbol (0x2a)
C2N = the ASCII 'C2N' characters (<0x43><0x32><0x4E>)
<d0> = ASCII "0" = Display OFF
 = ASCII "1" = Display ON

Example1: *C2N0<CR> sets Display Off

Example2: *C2N1<CR> sets Display ON

RADIO SPEAKER ON/OFF

The Speaker on the Radio can be muted remotely. This also affects the external speaker connected to the SPKR jack on the back of the radio.

Format: `*` 'C2O' <d0> <CR>

Where: `*` = the ASCII '*' symbol (0x2a)
C2O = the ASCII 'C2O' characters (<0x43><0x32><0x4F>)
<d0> = ASCII "0" = Unmuted (speaker audio audible)
 = ASCII "1" = Muted (speaker audio muted)

Example1: *C2O0<CR> unmutes the internal/external speaker

Example2: *C2O1<CR> mutes the internal/external speaker

NOTE: The headphone audio is still present, and is unaffected by this command.

TRIP Gain

The shift level of the TRIP Gain can be adjusted remotely.

Format: `*` 'C2P' <d0> <CR>

Where: `*` = the ASCII '*' symbol (0x2a)
C2P = the ASCII 'C2P' characters (<0x43><0x32><0x50>)
<d0> = ASCII "1" .. "9"

Example: *C2P1<CR> sets shift level of the TRIP Gain to 1

Note: The default value for this item is 6. This was the value used in OMNI-VII 1.025 firmware before this feature was added in 1.026. If an invalid value is sent to the OMNI-VII, it will default it back to 6. So it is good practice that when you set the TRIP level, read it back and verify it is at the value that you had intended.

Operation with Optional 302 Remote Encoder

The optional 302 Remote Control provides the OMNI-VII with a remote tuning encoder direct frequency keypad and auxiliary function keys. The 302 connects to the REMOTE jack on the back of the OMNI-VII. The additional features provided by the 302 are actually contained within the OMNI-VII. The 302 Remote Encoder provides the physical knob, switches and encoder, while firmware in the OMNI-VII processes the input.

POD PASSTHRU Command

The OMNI-VII in REMOTE mode can be placed into a POD-PASSTHRU mode. This instructs the OMNI-VII to not operate on the key presses or encoder turns of the 302 Remote pod, but instead will pass them through to the Host PC via the Serial Interface.

To get into this mode, the Host PC can send a POD PASSTHRU command to the OMNI-VII. This command can either turn on or off POD PASSTHRU mode on the remote mode OMNI-VII.

Format: `*' Q' <d0> <CR>`

Where: `*' = the ASCII '*' symbol (0x2a)`
 `Q = the ASCII 'Q' character (0x51)`
 `<d0> = binary 0 to turn OFF POD PASSTHRU mode`
 `= binary 1 to turn ON POD PASSTHRU mode`

Example: `*Q<0x01><CR>` Turns on POD PASSTHRU Mode.

From then on, any Pod Key presses detected by the OMNI-VII will be sent in a POD PASSTHRU Notification on the serial port to a host PC. Any Pod Encoder turns detected by the OMNI-VII will be sent in a POD ENCODER Notification on the serial port to a host PC. A notification occurs for a key press, and a notification occurs for a key release. The design of the 302 prevents the activation of multiple keys and keys are non-repeating.

POD PASSTHRU Notification

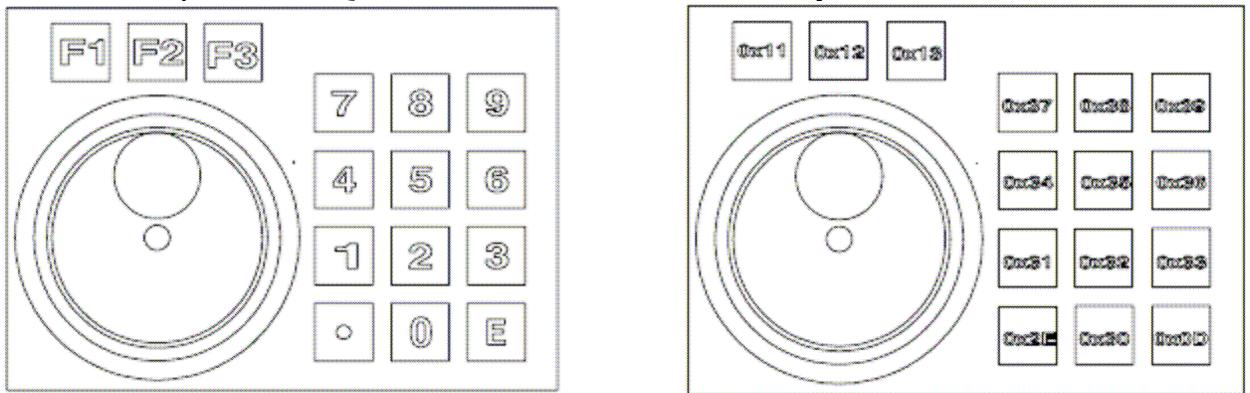
The format of the POD PASSTHRU Notification from the OMNI-VII to the computer via the serial port that a POD key has been pressed/released is as follows:

Format: 'Q' <d0> <CR>

Where: Q = the ASCII 'Q' character (0x51)
 <d0> = key press code...
 See Diagram Below.
 If b7 of d0 is low, then the key was depressed.
 If b7 of d0 is high, then the key was released.

Example1: Q<0x38><CR> means that the "8" key is depressed.

Example2: Q<0xb8><CR> means that the "8" key is released.



| Remote Key Label | Key Press Code | Remote Key Label | Key Press Code |
|------------------|----------------|------------------|----------------|
| F1 | 0x11 | 3 | 0x33 |
| F2 | 0x12 | 4 | 0x34 |
| F3 | 0x13 | 5 | 0x35 |
| “.” (Period) | 0x2e | 6 | 0x36 |
| E | 0x0d | 7 | 0x37 |
| 0 | 0x30 | 8 | 0x38 |
| 1 | 0x31 | 9 | 0x39 |
| 2 | 0x32 | | |

POD ENCODER Notification

The format of the POD ENCODER Notification from the OMNI-VII to the computer via the serial port that the POD Encoder has been turned is as follows:

Format: '!' <d0> <CR>

Where: ! = the ASCII '!' character (0x21)
 <d0> = signed number of encoder turns.

Example1: !<0x01><CR> means that the encoder was turned right one pulse.

Example2: !<0xff><CR> means that the encoder was turned left one pulse.

Note: Due to the architecture of the software within the OMNI-VII, it is highly likely that you will only ever receive +1 or -1 encoder pulses.

Serial Device Control via Ethernet

The OMNI-VII provides a way to control devices that are connected to the OMNI-VII's serial interface, by using the "Serial Pass Thru" command protocol on the Ethernet interface. It also allows the OMNI-VII to echo back out on the Ethernet Interface, data bytes it receives in on the serial interface port, "Serial Echo Mode". This interfacing makes it possible to control devices such as SteppIR Antenna controllers, serially controlled amplifiers, etc.

The serial port configuration is the same as it is for the command/control protocol:

- 57600 baud
- No Parity
- 8 Data Bits
- 1 Stop Bit

Serial Pass Thru

This command encapsulates a command stream that will be sent out the OMNI-VII's serial interface port.

Format: `*'E' <n> <nn..n1> <CR>`
E = the ASCII 'E' character (0x45)
<n> = binary number of items to send in this command
 LIMIT of <n> is 11.
<nn..n1> = binary the items to send in this command
 Range = 0..0xff

Example1: `*E<0x04> TEST <CR>` Instructs the OMNI-VII to send out on the serial interface port the following command stream "TEST"

Example2: Assume a SteppIR controller is connected to the OMNI-VII Serial Port.
`*E <0x0B> <<0x40, 0x41, 0x00, 0x20, 0x92, 0xAC, 0x00, 0x40, 0x31, 0x30, 0x0D>> <CR>` The data stream within the <<>> would instruct the SteppIR to set the antenna to 21.347MHz, 180 degrees. Refer to SteppIR interface spec for specifics on this or other commands at the SteppIR web site.

Serial Echo Mode

Serial Echo Mode will enable the OMNI-VII to take bytes received on the serial interface port and echo them to the Ethernet interface port.

To get into this mode, the Host PC can send a SERIAL_ECHO command to the OMNI-VII. This command can either turn on or off SERIAL_ECHO mode on the remote mode OMNI-VII. This mode is independent of whether Serial Passthru is in effect or not.

Format: `*' 'D' <d0> <CR>`

Where: `*' ' = the ASCII '*' symbol (0x2a)`
 `D = the ASCII 'D' character (0x46)`
 `<n> = binary 0 to turn off Serial Echo Mode`
 `= binary 1 to turn ON Serial Echo Mode`

Example1: `*D<0x01> <CR>` Instructs the OMNI-VII to enable Serial Echo Mode.

NOTE: There is no query for this command. Once it is turned on, then if any serial data byte comes in, it will be echoed to the Ethernet port on this same "D".

For the following example, assume you have a device Barney connected to the OMNI-VII's serial port that answers to the query "?H", with the string "HELLO"

Example:

From PC to OMNI-VII
 `*D<0x01><CR>` (Turns on serial pass echo mode)

From PC to OMNI-VII
 `*E<0x02> ?H <CR>` Instructs the OMNI-VII to send out on the serial interface port the following command stream "?H"

From OMNI-VII to Serial Interface Device (Barney)
 ?
 H

From Barney to OMNI-VII Serial Interface Port
 H

From OMNI-VII to PC via Ethernet Interface
 EH the E is the query type, the H is the character received.

From Barney to OMNI-VII Serial Interface Port

E

From OMNI-VII to PC via Ethernet Interface
EE

From Barney to OMNI-VII Serial Interface Port
L

From OMNI-VII to PC via Ethernet Interface
EL

From Barney to OMNI-VII Serial Interface Port
O

From OMNI-VII to PC via Ethernet Interface
EO

CWType

The OMNI-VII provides a way to help out with CW transmits in REMOTE mode. The OMNI-VII provides an interface command to send a CW Character. In order for this to work, the OMNI-VII's Internal Keyer needs to be turned on, either in Mode A or Mode B, and when this command is received, the CW Character will be clocked out given the selected CW speed, Rise/Fall, etc. The OMNI-VII One Plug program provides an interface for this feature. There is a CWType window, which is opened by a command button on the OMNI-VII One Plug Console window. When opened, and focus is on the CWType window, keyboard presses are interpreted into CW Characters to send to the OMNI-VII. In turn, if the OMNI-VII is in Remote mode, and if the Internal Keyer is turned on, then the characters will be transmitted out over the air in CW mode.

The OMNI-VII interface supports the standard alpha numeric character set for A through Z and 0 through 9. It also supports several special symbols, and some of these relate to known procedural signals.

| Symbol | Code group | Name | Procedural Signal |
|--------|------------|-----------------------|-------------------|
| “ | .-.-. | Quotation mark | AF |
| ‘ | .----. | Apostrophe | WG |
| (| -.--. | Open parenthesis | KN Back to you |
|) | -.-.- | Close parenthesis | KK |
| + | .-.-. | Plus sign | AR End of Message |
| * | ._..._ | Asterisk/Multiply | AS Wait |
| , | --..-- | Comma | MIM |
| - | -....- | Hyphen or single dash | DU |
| . | .-.-.- | Period | AAA |
| / | -.--. | Slant/Divide By | DN |
| : | ---..._ | Colon | OS |
| ; | .-.-.- | Semicolon | KR |
| = | -...- | Equal sign | BT Separator |
| ? | ..-.. | Question mark | IMI |
| @ | .-.-.- | At symbol | |
| _ | ..-.- | Underscore | IQ |
| ! | --- | Exclamation point | |
| > | ..._-- | | SK End of contact |
| < | .-.- | | AA All after |
| % | .-.- | | KA |
| & | ...- | | SN Understood |
| [| .-.- | | Warning |

Note1: The value for each is the ASCII character code for each.

Note2: The OMNI-VII handles ascii for upper and lower case characters, and converts them to the standard dit/dah pattern for that character (e.g. A and a both equal dit dah) So it is not necessary to convert key codes into either upper or lower case making keyboard entry possible.

Format: `*` `C2K` <count> CHAR <CR>

Where: `*` = the ASCII `*` symbol (0x2a)
C2K = the ASCII `C2K` characters (<0x43><0x32><0x4B>)
<count> = binary unique incremental counter for each digit sent
 starting = 0, ending = 0xff.
 Used by radio to know this is a new character.
 Allows you to send the same character multiple times
 to help ensure that the radio gets it
 Each change in the count means that it is a new character.
CHAR = Ascii Code for the character (0x00 to 0x7f)

Example1: *C2K<0x10>M<CR> tells the OMNI-VII to TX CW Character M
 *C2K<0x10>M<CR> tells the OMNI-VII to TX CW Character M
 Since we just got two of the same count, only one M will get
 transmitted.

Example2: *C2K<0x11>L<CR> tells the OMNI-VII to TX CW Character L
 *C2K<0x12>” “<CR> tells the OMNI-VII to TX a word space
 Both will get carried out, since the count is different.

Only thing the OMNI-VII looks for is that the count is different, if
so, then it will transmit out all characters.

The OMNI-VII does have a cache it will hold characters in, and
the amount of characters left is able to be read via the ?C2K
command. It will return a value <d0> which is the count of how
many slots are open.

Example1: ?C2K <CR> query from PC to OMNI-VII
Returns: C2K<0x10> <CR> OMNI-VII states there are 16 slots available in
 the CWType ahead buffer.

Ethernet Audio

The OMNI-VII in REMOTE MODE provides audio over the Ethernet. This is not available over the serial interface. This data is packed in a UDP packet.

RIP (Radio over IP) Introduction

RIP is the audio that goes from the OMNI-VII to the computer. This is the actual over the air received audio that the OMNI-VII is tuned to receive. This data is encapsulated within a UDP packet with the UDP port numbers set to the UDP Command Port +2. The command to turn on RIP uses this same UDP Command Port +2 port number also. This is required so that the RIP audio sent from the OMNI-VII will make it back to the computer through the hubs and routers.

TRIP (Transmit over IP) Introduction

TRIP is the audio that goes from the computer to the OMNI-VII. This is the actual audio that is generated by the computer sent to the OMNI-VII over the Ethernet that the OMNI-VII will transmit over the air. This data is encapsulated within a UDP packet with the UDP port numbers set to the UDP Command Port +4.

RIP Audio Packet Format

We do not cover Internet Protocols, please refer to other documents for that. We will cover the data as it pertains to the RIP Audio. The RIP audio is encapsulated in a UDP packet with the source and destination port numbers set to the UDP Command Port+2. The UDP Packet contains an RTP (Real Time Protocol) format packet that contains the audio. RTP is the format utilized by various commercial Voice Over IP programs already. The Header may include most recently measured Signal Strength if in receive mode, or it may include the most recent Transmit power levels. The format of the data is the same as what is returned in the S Unit and Power Level Queries. The first octet of the Header Information will indicate if this information is present or if it is standard RTP format. The format of the data packet used for OMNI-VII RIP is as follows for non-compressed audio:

| | | |
|---|--|---|
| Octet 0 | Header Information Version -> 2 Padding -> 0 Extension -> 0 | 0x80 = RTP Format |
| OR | | |
| Octet 0 | Header Information | 0x00 = Includes Signal Strength or Transmit Power Level |
| Octet 1 | Header Information Continued Marker -> 0 Payload Type 80d | 0x50 |
| Octet 2-3 | RTP Sequence Packet Counter (=last+1) | 0xnn 0xnn |
| Octet 4-7 | RTP TimeStamp Time Counter (=last+64) | 0xnn 0xnn 0xnn 0xnn |
| If Header Information Octet 0 = 0x80 then Octets 8 through 11 are RTP as follows: | | |
| Octet 8-11 | RTP Sync Source ID of the Radio (last 4 MAC digits) | 0x45 0xmm 0xnn 0xoo |
| Otherwise Octets 8 through 11 contain the Signal Strength or Power Levels "ABCD" of the SUNIT query defined previously in this specification. | | |
| Octet 12-139 | Audio Data 2 Octets => 1 16bit audio Total of 64 audio words | 0xnn... |

For compressed audio, the packet is of the same length, only difference is that each byte contains a complete 8 bit audio. 1 Octet => 1 8bit audio. Meaning this is a total of 128 audio bytes. The packets will come out at ½ the rate of the non-compressed audio, yielding a lower bandwidth requirement

TRIP Audio Packet Format

The TRIP audio is encapsulated in a UDP packet with the source and destination port numbers set to the UDP Command Port+4. The UDP Packet only contains a 16 bit counter and the actual audio to transmit data. The format of the data packet used for the OMNI-VII are as follows for non-compressed TRIP:

| | | |
|-------------|--------------------------|---------|
| Octet 0 | Packet Counter | 0xxx |
| | Packet Counter (=last+1) | |
| Octet 1-129 | Audio Data | 0xnn... |
| 3 | Octets => 1 16bit audio | |
| | Total of 64 audio words | |

For compressed audio, the packet is of the same length, only difference is that each byte contains a complete 8 bit audio. 1 Octet => 1 8bit audio. Meaning this is a total of 128 audio bytes. The packets will come out at 1/2 the rate of the non-compressed audio, yielding a lower bandwidth requirement

Ethernet Command/Query Format

The Ethernet Command/Query format is basically the same as the Command/Query protocol used on the Serial port. The main difference is that for the Ethernet, there is also a PassCode. The PassCode is 16 bits that precedes the standard Command/Query protocol. The PassCode is checked by the OMNI-VII and if it is incorrect, then the packet is ignored.

Format: <p1> <p0> 'standard command/query protocol'

Where: <p1..p0> = PassCode
'standard command/query protocol' = as defined in section:
'The OMNI-VII Command Set '

Example1: <0x00> <0x04> *A<0x00><0xe4><0xe1><0xc0><CR> sets the main VFO to 15,000,000 Hz or 15 MHz. Uses PassCode = 4

Example2: <0x07> <0xab> *B <0x00><0xe4><0xe1><0xc0><CR> sets the sub VFO to 15,000,000 Hz or 15 MHz. Uses PassCode = 1963

Document Revision History

| Date: | Revision: | Modifications |
|--------------------|-----------|--|
| March 7, 2007 | 1.001 | <ul style="list-style-type: none"> • Modified the Transmit Power to indicate that it not only returns selected power, but also forward and reflected power. • Added “ – REMOTE” or “ – RADIO “ text to the Where At query. • Modified S-Unit query to show that it returns s-Units during receive and power values during transmits. • Modified S-Unit query to show two bytes for the SUnit instead of only one byte. • Modified the Internal Keyer Speed to show the data value is 0..63wpm => 0..127. The data field should be Desired_Speed * 127/63. • Added VOX ON/OFF command/query. • Added POD ENCODER Notifications. • Added section on Ethernet Command/Query Format • Added reference stating that the Ethernet handlers can be disabled in REMOTE Mode by setting the first octet of the G8WAY IPADDR to 0. Provided for users who control the rig serially in remote mode. |
| June 5, 2007 | 1.002 | <ul style="list-style-type: none"> • Made Transmit command *T available in Radio mode also for logging programs • Added a second Set/Get Split so that the N variety is available in Radio mode also for logging programs. (C2B still supported in Remote mode) |
| July 19, 2007 | 1.003 | <ul style="list-style-type: none"> • Added Display On/Off Command • Added Compression Level supported in ?T query • Added Compression Requests to Transmit cmd. • Added reference to 8 bit compression |
| August 13, 2007 | 1.004 | <ul style="list-style-type: none"> • Added Speaker On/Off • Added documentation to indicate that the “?*” command is available to “query all” parameters. |
| September 13, 2007 | 1.005 | <ul style="list-style-type: none"> • Corrected Mode Values for FM, CWL, and FSK in “Receive and Transmit Modes” section |

| | | |
|-------------------|-------|---|
| October 16, 2007 | 1.006 | <ul style="list-style-type: none"> • Added example showing that the OMNI-VII will limit the requested frequency if it is out of the supported range. • Added notation of change of meaning of CW Weighting from version 1.022 onwards is now 0.0x7f = 0 to 50%. Was 0 to 24% for prior versions of firmware. |
| October 24, 2007 | 1.007 | <ul style="list-style-type: none"> • Added information on how ?A is handled with the different options for menu item “SERIAL IF”. This will be available in Firmware Revision 1.023. Sections modified include: Frequency Tuning OMNI-VII Command Set Quick List • Added Support for ?RMM for querying mode for CT Logging program. Sections modified/added include: OMNI-VII Command Set Quick List Main Mode Query – Orion Format • Added Note to “?C1T” query that it returns the I-F Filter that is currently in use as a second byte. Sections modified include: I-F Filter Selection |
| November 29, 2007 | 1.008 | <ul style="list-style-type: none"> • Modified Serial Pass Thru maximum number of bytes. Originally stated 21 and but is actually 11. Typo error. • Corrected Scaling error in documentation for CW Keyer Weighting. A value of 0x7f means 50% weighting. • Added the format for decoding the Signal Strength and Transmit levels to the RIP Data Packet. • Added indicator in Version Query to identify if the rig has MARS transmit capability or if it is restricted to ham bands only. |
| April 23, 2008 | 1.009 | <ul style="list-style-type: none"> • Modified query for FM CTCSS in the Quick List to show proper query ?C1G. • Added TRIP Gain to interface |