

OMNI V.9

Functional Differences

By:

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N4PY

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**Note: This modification is not supported by or in anyway approved by
Ten-Tec, Inc. Persons performing this modification do so at their own risk.**

OMNI V N4PY EPROM Functional Differences

Up and Down arrow function -

For UP and DOWN of 100 KHZ press UP UP or DOWN DOWN.
Continued holding of the arrow key will continue to move 100 KHZ.

For quick split selection of a digit KHZ amount proceed as follows:

- 1) Press the UP or DOWN arrow for desired direction of split.
- 2) Press the digit key 1 to 9 corresponding to the split offset.

The alternate VFO will now have the main VFO amount plus the offset and split will be turned on.

Tuning Rates -

The tuning rate in CW, FSK with FAST off is now 1.2 KHZ per revolution. All other rates are unchanged.

Tuning rates are now as follows:

CW, FSK		
	STEP SIZE (HZ)	KHZ PER REV
NORM	10	1.2
FAST	10	4.8

LSB, USB		
	STEP SIZE (HZ)	KHZ PER REV
NORM	10	4.8
FAST	50	9.6

FM		
	STEP SIZE (HZ)	KHZ PER REV
NORM	100	24
FAST	500	48

Serial Port -

All the OMNI-VI CIV commands are implemented. This includes commands 00H to 19H.

In addition, the set mode commands (01h and 06H), allow the both the mode and filter to be set. Sending the filter data byte is optional. The filter data byte directly follows the mode byte. The values for the mode and filter data bytes are as follows:

<u>MODE</u>	<u>FILTER</u>
00 - LSB	01 - 2.4
01 - USB	02 - 2.4
02 - NOT USED	03 - 1.8
03 - CW	04 - .50
04 - FSK	05 - .25
05 - FM	06 - .25+NAR
	07 - .50+NAR
	08 - 1.8+NAR
	09 - 2.4+NAR

The get mode command (04H), also returns these values.

CIV Computer Address -

The CIV computer address is decimal 30 (or 1E in hex). This is the same as the ICOM 761.

Memory Tune -

Memory tune now sets the receiver to the memory values as they are tuned.

Band Registers -

Band registers are implemented the same as the OMNI-VI. Six meters is selected by pressing SHIFT 6. The initial default values for the band keys are:

160M	1.830 MHZ	.50 filter CW mode
80M	3.500 MHZ	.50 filter CW mode
40M	7.000 MHZ	.50 filter CW mode
30M	10.100 MHZ	.50 filter CW mode
20M	14.000 MHZ	.50 filter CW mode
17M	18.068 MHZ	.50 filter CW mode
15M	21.000 MHZ	.50 filter CW mode
12M	24.890 MHZ	.50 filter CW mode
10M	28.000 MHZ	.50 filter CW mode
6M	50.125 MHZ	2.4 filter USB mode

Alternate values are:

160M	1.840 MHZ	2.4 filter LSB mode
80M	3.800 MHZ	2.4 filter LSB mode
40M	7.200 MHZ	2.4 filter LSB mode
30M	10.000 MHZ	2.4 filter LSB mode
20M	14.200 MHZ	2.4 filter USB mode
17M	18.110 MHZ	2.4 filter USB mode
15M	21.225 MHZ	2.4 filter USB mode
12M	24.940 MHZ	2.4 filter USB mode
6M	50.090 MHZ	.50 filter CW mode

Direct Frequency Entry -

Direct frequency entry is implemented the same as the OMNI-VI.
The **ENTER** key must first be pressed.

Memory System -

There are now 16 general purpose memories, 8 split memories, 20 band register memories, and one scratch pad memory. The operation to store into a memory is as follows:

To store into the scratch pad memory:

Press VFO->M twice

To store into the next available memory:

Press VFO->M ENTER

To store into the next available memory above 7:

Press VFO->M UPARROW

This would be used for more permanent memories

To **clear the first 8** general purpose memories:
While in memory tune mode, press **SHIFT CLR/CLK**

Crystal Calibration Mode -

There is now a way to correct for crystal aging. To calibrate a specific band, proceed as follows:

- 1) Tune to the band and frequency of the known source signal. Mtune must be off for this procedure.
- 2) Tune the dial to read the exact frequency desired.
- 3) Press SHIFT TUNE.
- 4) Tune the signal in as accurately as possible. The display should not change while you are tuning. Take care to not tune the dial any more than is necessary.
- 5) When the signal is properly tuned, Press ENTER. This will exit the crystal calibrate procedure.

Please note that the scratch pad memory and alternate VFO will be set to the value of the current VFO when the procedure is complete.

Frequency Scan

The OMNI V will scan between 2 frequency limits by pressing the VCE key. To perform a frequency scan on a selected band:

- 1) Tune to the lower limit frequency.
- 2) Press SHIFT 1.
- 3) Tune to the higher limit.
- 4) Press SHIFT 9. The frequency scan limits are now set.
- 5) Press the VCE key.

The radio will now scan between the limits selected.

- To slow down the scan, press the DOWN ARROW.
- To speed up the scan, press the UP ARROW.
- To end the scan and return to the original frequency, press CLEAR.
- To end the scan and stay at the current frequency, press ENTER.

Display of date is now done with SHIFT VCE.

New VFO lock function

Pressing **SHIFT FAST** will lock the current VFO. The period in the last display digit will come on to show the VFO is locked. There is a separate lock status for each VFO. **Memory full** is no longer indicated on the display.

Clear Key allows spotting in CW mode

The **Clear Key** is now used to turn on sidetone for zero beating. This occurs only in CW mode. This requires an additional wire from pin 23 of the microprocessor to the sidetone enable pin. This must be run through a diode.

Omni V vs Omni V.9 Functional Differences

(Significant differences are shaded)

Function	Omni V	Omni V.9
Voice/Calendar VCE	Yes	Yes
24 Hour Clock	Yes	Yes
Date	Yes	Yes
Memory Full indication	Yes	Yes
WWV Reminder	Yes	No
Up / Down arrow Rates		
Normal	10 khz	100 khz
Fast	30 khz	100 khz
Tuning Rates (Hz)		
CW Normal / Fast	10 / 50	10 / 10
LSB & USB Normal / Fast	10 / 50	10 / 50
FM Normal / Fast	100 / 500	100 / 500
Knob Speed Tuning Rate Function	Yes	Yes
Serial Port	Atypical	Omni-VI CIV
Band Register Memories	No	Yes = 20
General Memories	Yes = 25	Yes - 16
Split Memories	No	Yes = 8
Scratch Pad Memory	Yes	Yes
Direct Frequency Entry	No	Yes
Crystal Calibration Mode	No	Yes
Frequency Scan	No	Yes
Frequency Lock	No	Yes
CW Spotting tone	No	Yes (additional hardware modification required)

Omni V.9

Supplement

**(Firmware Installation
and
Hardware Changes)**

Replace CPU

Remove the top cover and carefully remove the old CPU from its socket on the logic board. Carefully, align the new CPU such that the notch points toward the center of the Omni V and insert it into the 40 pin socket.

When you install the new chip, you may need to press the reset button on the side of the OMNI V.

Removal of the Omni V Keypad

You need to remove all the knobs (it takes quite a small Allen key) -yes ALL plus the nut for the tuning knob (remove the 'rubber' ring on the tuning knob carefully - the silver plastic ring on the front will come off with it) and the nut for the phones AND the 4 Phillips screws.

I found that I could rotate the panel on the POWER switch and mic wiring.

The key pad is held in with 8 (or is it 6) screws. (I suggest you make a sketch outlining how the tabs are configured - above the board or below it - I didn't and as a result the first time I re-assembled the keypad it would not tighten-up against the front panel). The top and bottom screws have little tabs that can be easily lost while the end screws have tabs that are glued (why I don't know) to the back of the front panel. (Two of mine came un-glued)

With the screws and plugs removed -- the panel (entire grey assembly) pushes out toward the front.

Another small 8 Phillips screws hold the back of the panel on (you need to remove the 2 screws near the tuning knob must be removed). After that its a mess to rearrange the keys and install them back into the panel and reverse the assembly process. Double check the key layout - you don't want to do this twice - and make sure all the LEDs are in the correct holes!

As I said - tedious but not difficult - take your time

Keypad layout for right side 18 keys.

VFO->M	M->VFO	CLRCLK	(no change on this row)
1	2	3	
160	80	40	
4	5	6	
30	20	17	
7	8	9	
15	12	10a	
	0		
ENTER	SHIFT	CLEAR	(new keys)
dn arrow	up arrow	vce	(no change on this row)

The numbers above the band buttons are added as stickers and are used for direct frequency entry. The new buttons are "enter", "shift", and "clear". The other band buttons are re-arranged as indicated. The 10b, 10c, and 10d buttons are no longer needed and can be relabelled ("enter", "shift" and "clear" or replaced if you're lucky enough to find new buttons). The new software can remember any part of the 10 meter band so only one 10 meter button is needed.

If you make no other changes, you will not get the CW spotting tone to work. The following hardware change is only necessary for the CW spotting tone.

CW Spotting Tone

I'll try to explain in words how to add the diode for the spotting tone.

Assume you are viewing the microprocessor board from the front of the radio. You will see the microprocessor chip that you are replacing. Toward the back of the board you will see a long blue socket for the voice board. About in the middle of this socket and slightly towards the front, you will see 5 resistors working their way from the blue socket towards the front. Solder a 12 inch thin wire to the left side of the resistor closest to the blue socket. The resistor is marked with a single black band as are the other 4 in this group.

Now look to the extreme left side and rear of the radio. You will see the side tone oscillator board. Look to the right side of this board and you will see connector 63. Solder the banded side of a small signal diode (almost any diode will work) to the "closest to the front connection" of connector 63. Solder the other end of this diode to the 12 inch wire. That's it.

Comport hardware modification

This mod causes send data and receive data to be on one line to perfectly emulate the ICOM CIV serial interface. You need to purchase a 14 pin chip of type 7417. This chip is available from Radio Shack as part #RSU 11389343. In the USA it costs \$1.19. This chip must be ordered at a Radio Shack as it is not a normal stocked item. You also need a small 1/4 watt 2200 ohm resistor.

Schematically this change goes on the logic board.

The buffers in the 7417 that I am using are as follows:

Buffer A, input pin 3, output pin 4.

Buffer B, input pin 5, output pin 6.

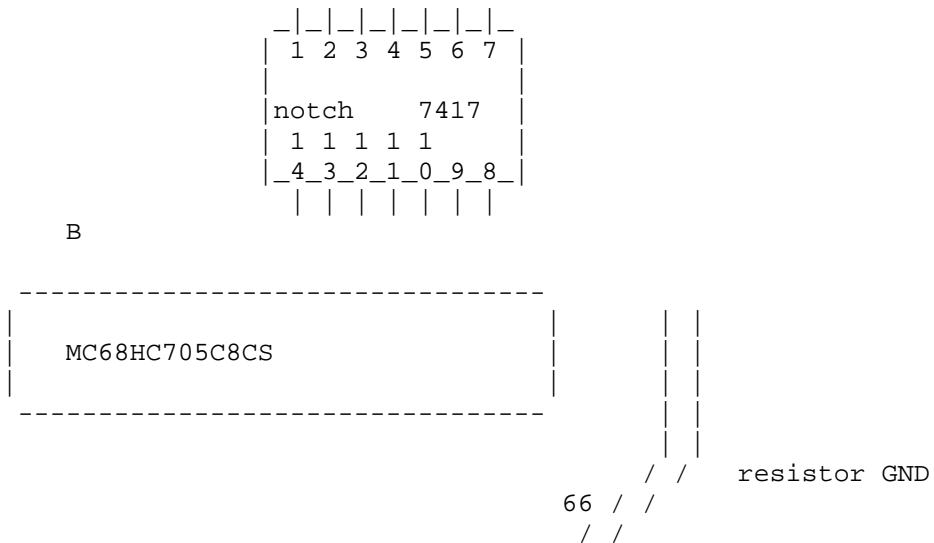
Pin 14 is for 5 volts, pin 7 is for ground.

If you look at your OMNI V schematic page 6-75, you will see the max232 chip in the upper left. Wires from pins 11 and 12 go to the right. At the junction, drop down a half inch and place an X on each wire. This represents the cut you make in the foil. Just above the cut, draw a short line connecting these 2 wires. This is the jumper. This goes to pins 4 and 5 of the chip. Below the cut, the wire from pin 11 (left) goes to pin 3 of the 7417, and the wire from pin 12 (right) goes to pin 6 of the 7417.

Pin 6 then goes to the 2200 ohm pullup to 5 volts.

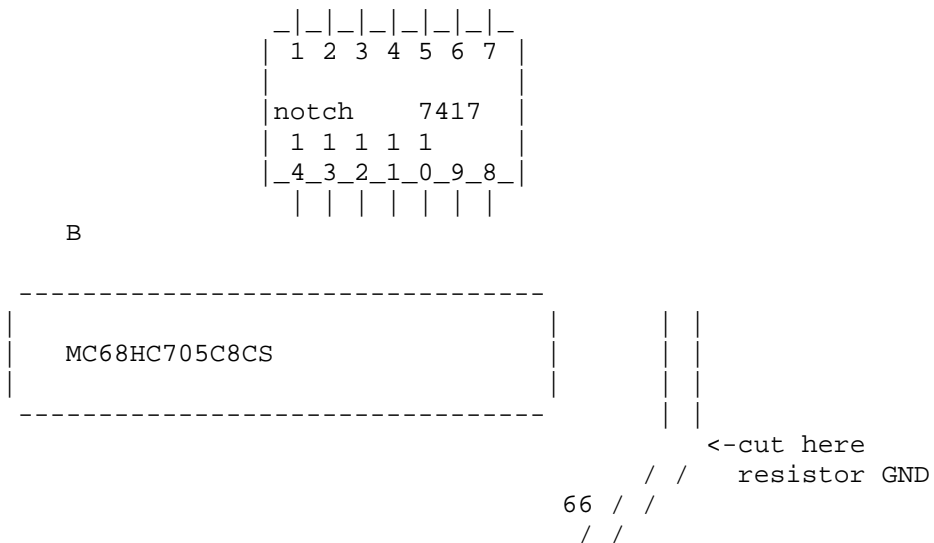
To implement the change:

With the top cover removed from the OMNI and viewing the main logic board from the front, there is a small area just in front of the blue voice socket and on the right side. I put some double sided mounting tape here and placed the 7417 UPSIDE down here with the notch pointing to the left and the pins pointing straight up. This is sometimes called a "dead bug" way of mounting a chip as it resembles a dead bug laying on its back.

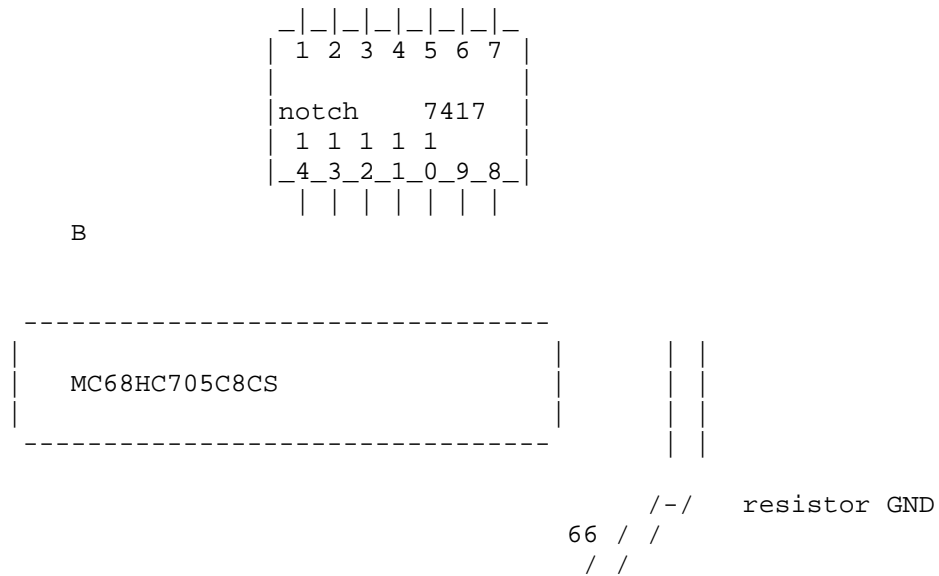


I have tried to show what this area looks like. Just to the right of the MC68HC chip are 2 vertical copper traces that come towards the front and then make a 45 degree turn towards the left. These traces go right through a connect to label marked "66".

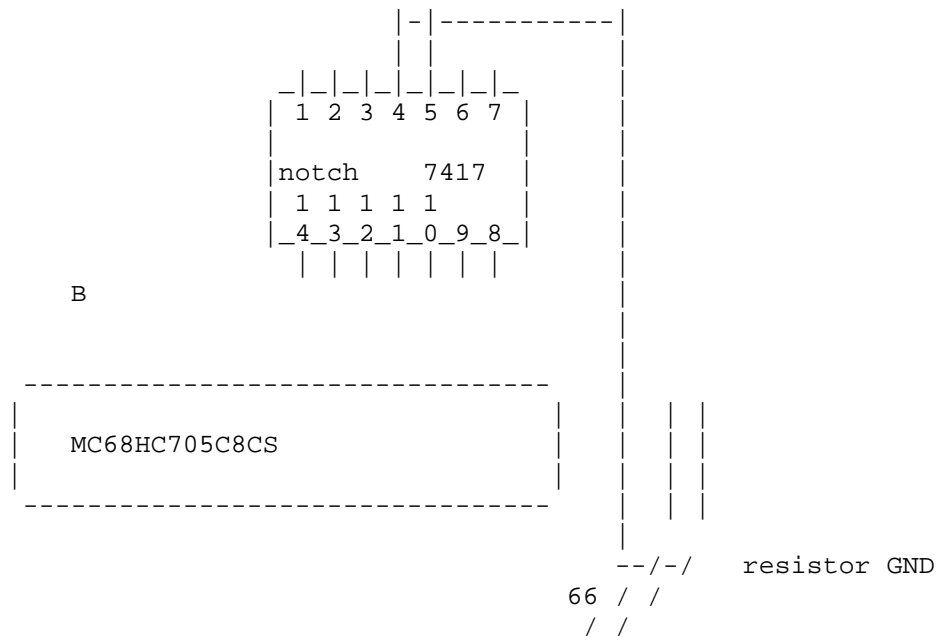
- 1) At the 45 degree bend you need to cut right through these 2 traces so that they make no electrical connection. In other words, these two traces become broken at the bend. It should look like this:



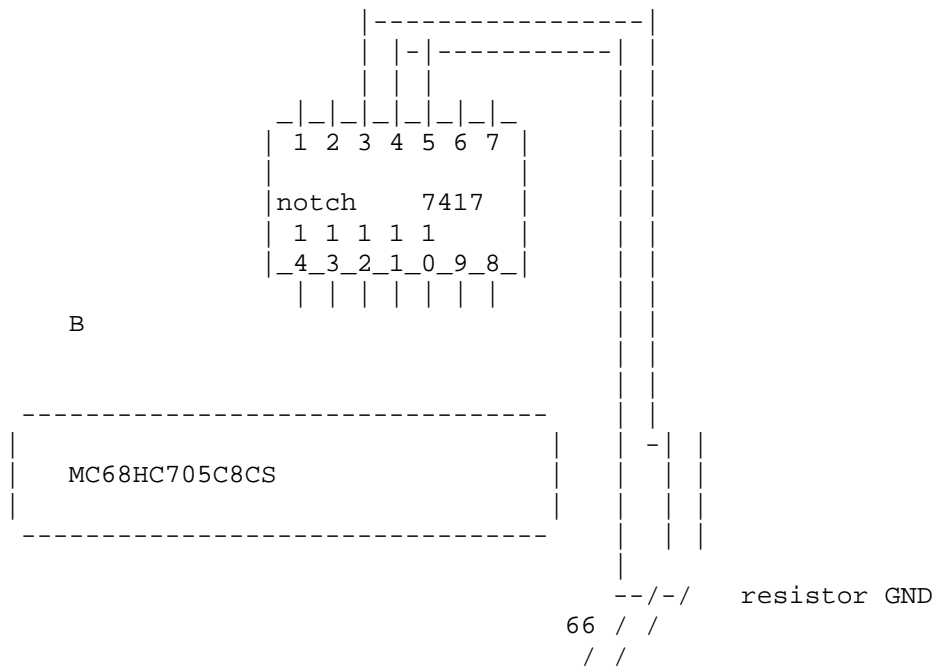
2) On the "66" side of the broken traces (diagonal part), you need to solder a jumper to connect these 2 traces together. It should look like this:



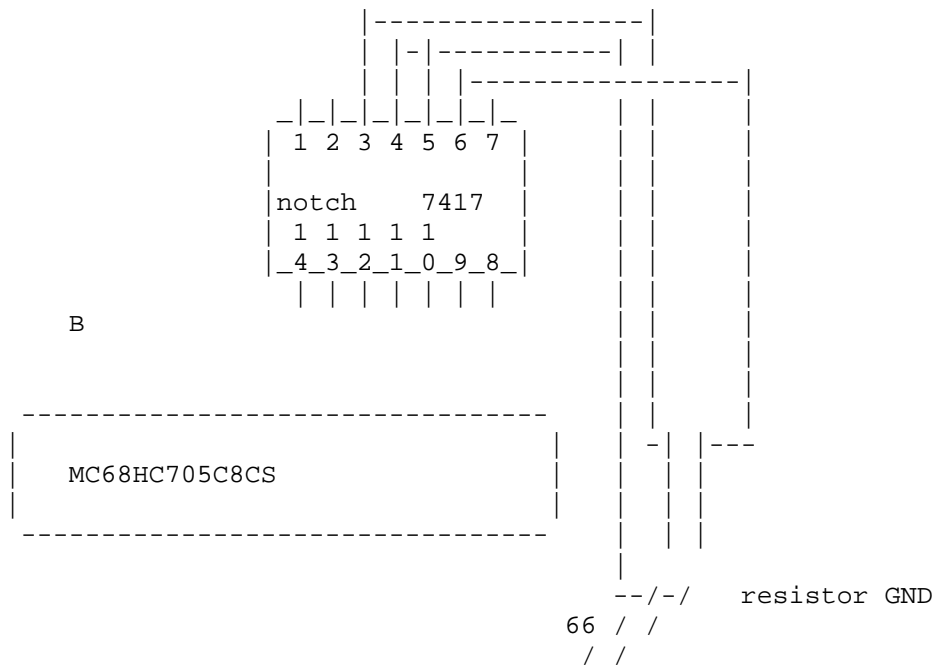
3) Solder to this jumper a wire that goes to pin 4 and 5 of the 7417 chip. It should look like this:



4) From the left vertical trace that was cut, solder a wire to pin 3 of the 7417 chip. It should look like this:

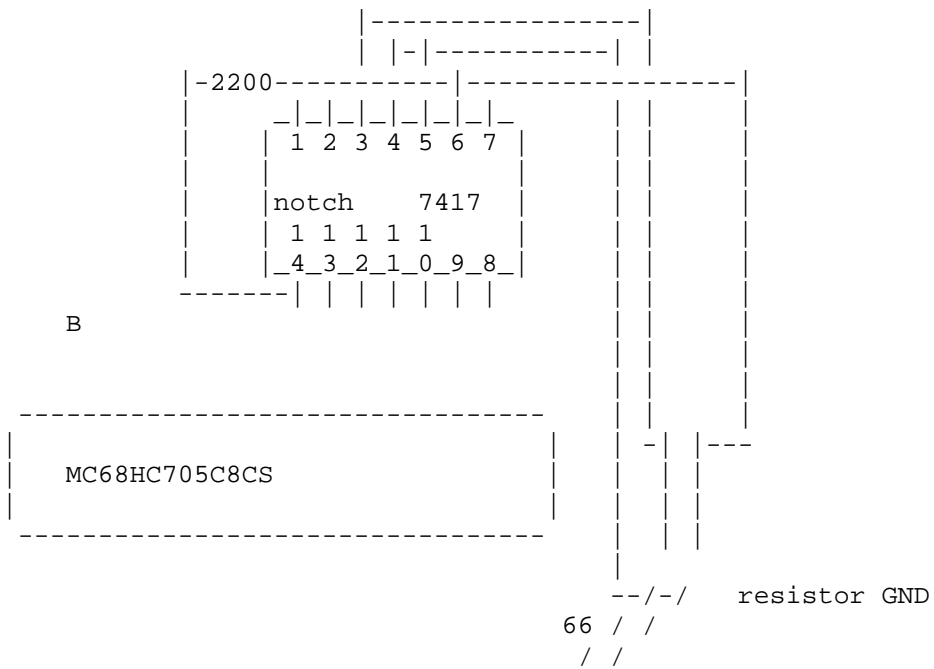


5) From the right vertical trace that was cut, solder a wire to pin 6 of the 7417 chip. It should look like this:

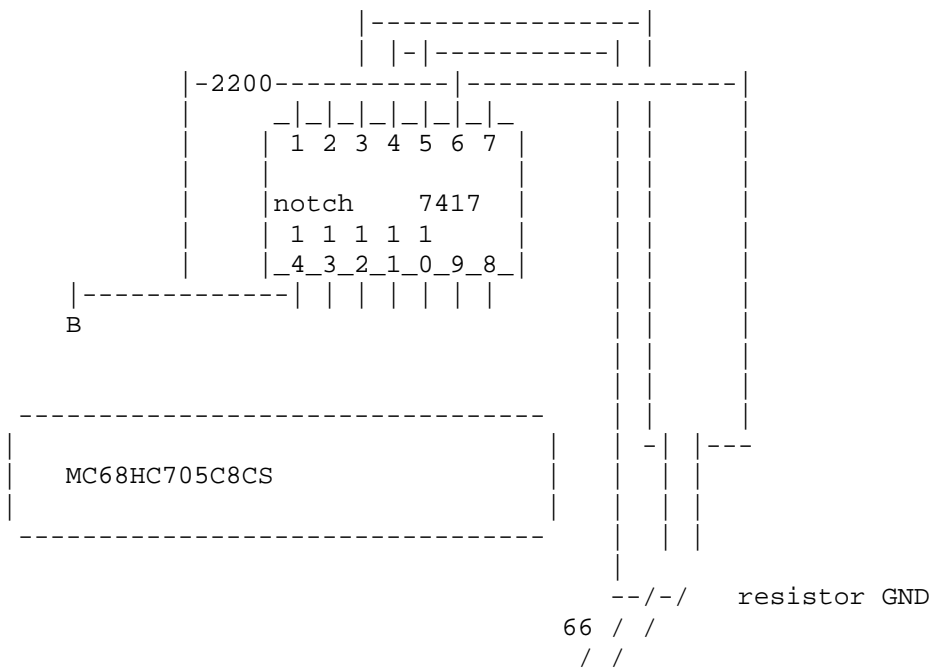


6) From pin 6 of the 7417 chip solder one end of the 2200 ohm resistor.

7) Solder the other end of this resistor to pin 14 of the 7417 chip. It should now look like this:

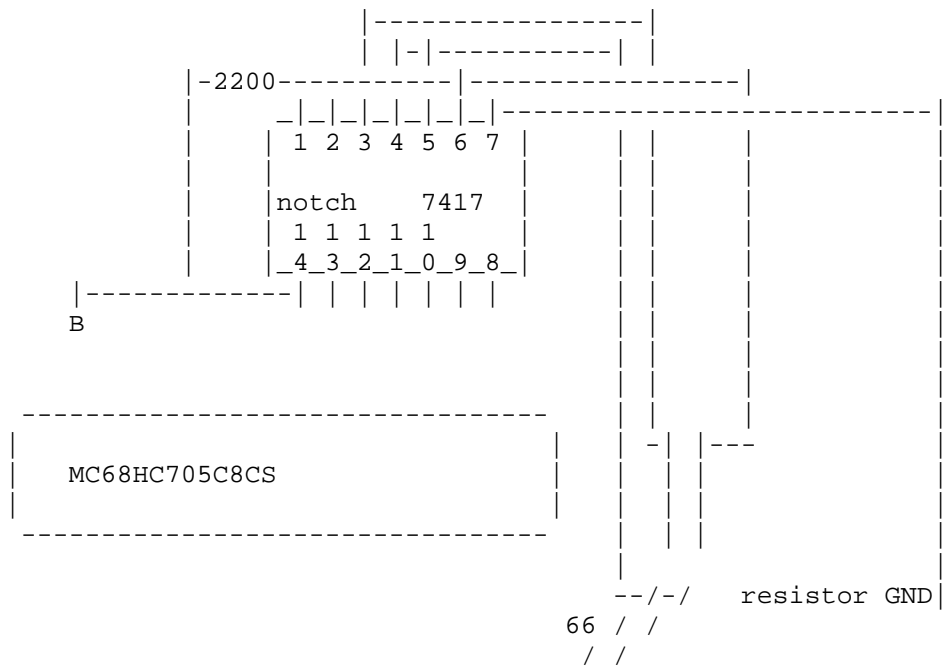


8) Solder another wire also to pin 14 of the chip and locate jumper B just to the left of the 7417 chip. Solder the other end of this wire to jumper B. It should now look like this:



9) Pin 7 of the chip needs to have a wire soldered to it and run to ground. I found a ground on the right side of the resistor that is just to the right of the "66" label. Therefore, solder a wire that goes from

pin 14 to the right side of the resistor just to the right of label "66".
This will now look like this:



That's it. This causes any serial data sent to the OMNI to be echoed back to the PC.