

# RMV ELECTRONICS INC.

## Application Note

<b>Application #:</b> 00023
<b>Date:</b> May 1994
<b>Status:</b> Final Version

**Description:** Using more than one ITC232-A on the same Serial Port

This App note has been super-seeded by the I/O-485 networked boards. However, should you choose to develop your own hardware using our integrated circuit ITC232-A, there are several ways of interfacing more than 1 ITC232-A to the same serial port. Attached are 2 examples, one using 4 bits of a parallel port and the other using the SPI. The systems are meant to allow multiplexing to 16 channels. If you wish to multiplex the serial port to 8 or less or 4 or less you can use other analog multiplexers instead (double multiplexers would allow you to use only 1 IC instead of 2).

Using a parallel port (Figure 1):

The principle is as follows: One board acts as master; all the others as slaves. The address of the master board is X15 on the analog multiplexers (U1 & U2). The master board is the only one which can select which board you are talking to. However, you can use that board for any other purpose provided you have 6 output lines available (in the example, PA0..PA4 & PA7). If you do not, you can always place an intermediate chip between the port and the lines and select it with just one other pin from another port or devote a master just to switching the other boards around. The master is given control whenever another board makes PA7 go from High to Low. This sends a pulse through C1..Cx to the 555 which is thus triggered hence selecting through A,B,C & D on U1 and U2 X15. Mind that you will not lose the OK message from the last board since the message is issued before the command takes place. Once switched to the master you can do 2 things: be patient and wait until the output of the 555 comes back Low (you could generate an INTL interrupt from the ITC232-A when that happens) or what is more practical, generate a Low pulse on PA4 thus resetting the timer (don't forget to bring PA4 High or to Hi-Z afterward). While, or before you pulse PA4, write ones to PA0..PA3 to retain control by the master, of the multiplexers after the 555 goes back to normal. Execute any tasks you might need with the master. Then, to choose another slave, just write the value of the next board to PA0..PA3.

At power-up, the first board connected to the serial port will be the one on X0. Thus, THIS board MUST exist! Configure all your ports as required and make sure PA7 is an output. Make it go High and then Low (remember only the pulses get through the capacitors!) thus triggering the 555. While pin 3 on LM555 is High, FIRST write 31 to PA (this makes PA0..PA4 all 1's) and THEN configure PA as outputs. This is because at power-up PA is all inputs. If you make it outputs before you write to it, the first value out will be 0 on all pins thus resetting the 555 before you have a good address (all 1's) in PA0..PA4. If you write PA first and then make it outputs they immediately appear with the value you wrote to it, following a configuration as outputs. Don't worry too much about the time constant for the 555. Make it long enough to be able to write and configure U3; you will reset it anyway.

PA7\_I15 is not really necessary, but helps if you are not sure about which device is operating the system. Just make a Low pulse on PA7. Whichever board is in command will relinquish it immediately to the master.

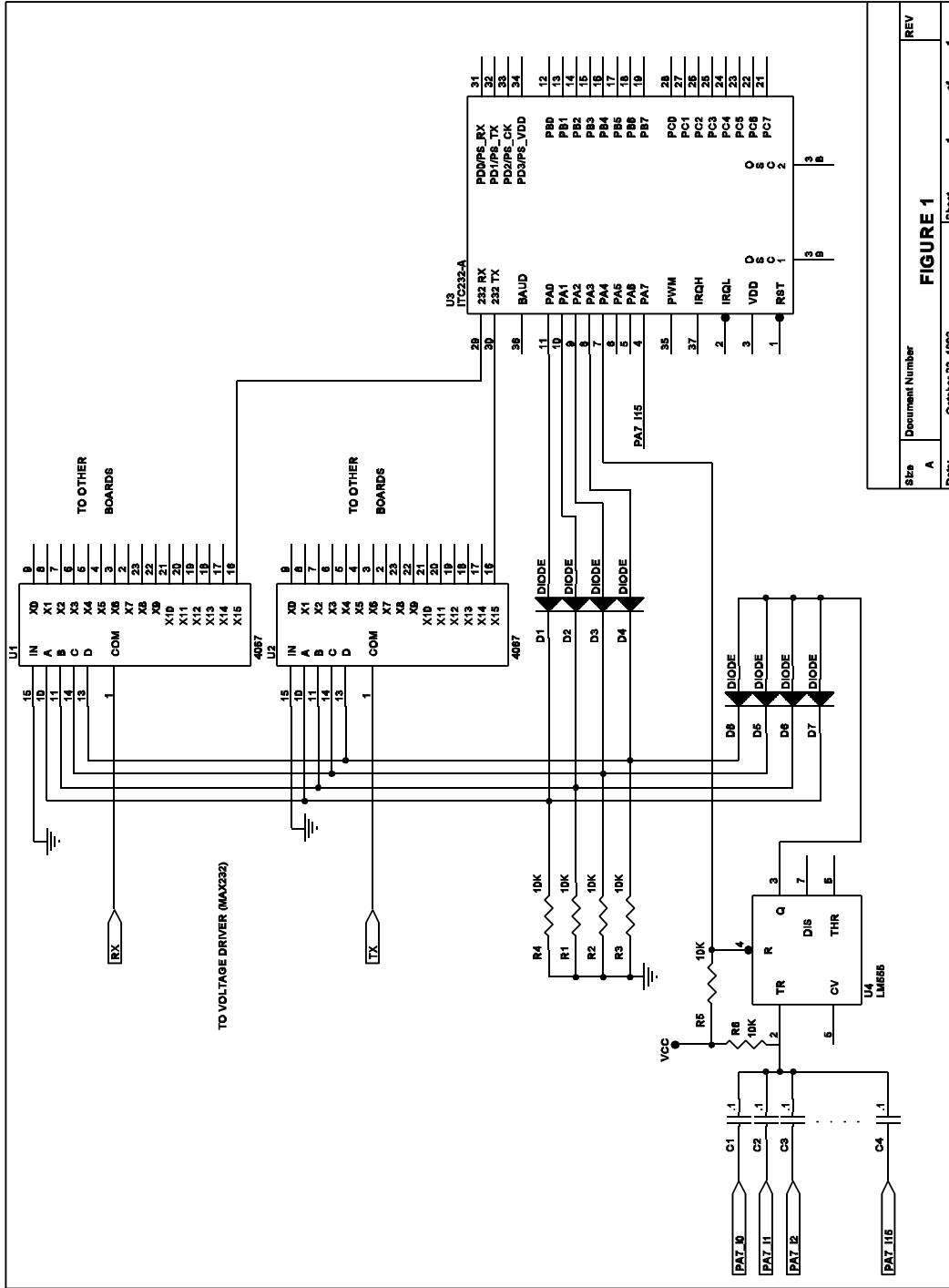
This configuration might benefit from assembling the master in a board designed for this purpose and we are open to any kind of possibilities should you wish us to develop some particular application. However the modifications can be implemented in our current boards. You will have to put together a small perforboard containing all but the ITC232-A in the circuit enclosed. Choose an I/O-232 to be the master. Cut the lines connecting the TX and RX lines from the ITC232-A to the voltage driver (MAX232 or TC232). Take these lines from the MAX232 to the 4067 multiplexers in the new board. Remove the MAX232 or TC232 from all the slave boards. Connect power and the X lines from the 4067 to the slave boards using discrete cables or a ribbon cable with a DIP connector that plugs in the MAX232 socket. Connect PA7 from each board to its corresponding capacitor on the board you assembled. Connect 232TX and 232RX from U3 in the master

board to X15 on the new board and you are in business!

Using the SPI (Figure 2):

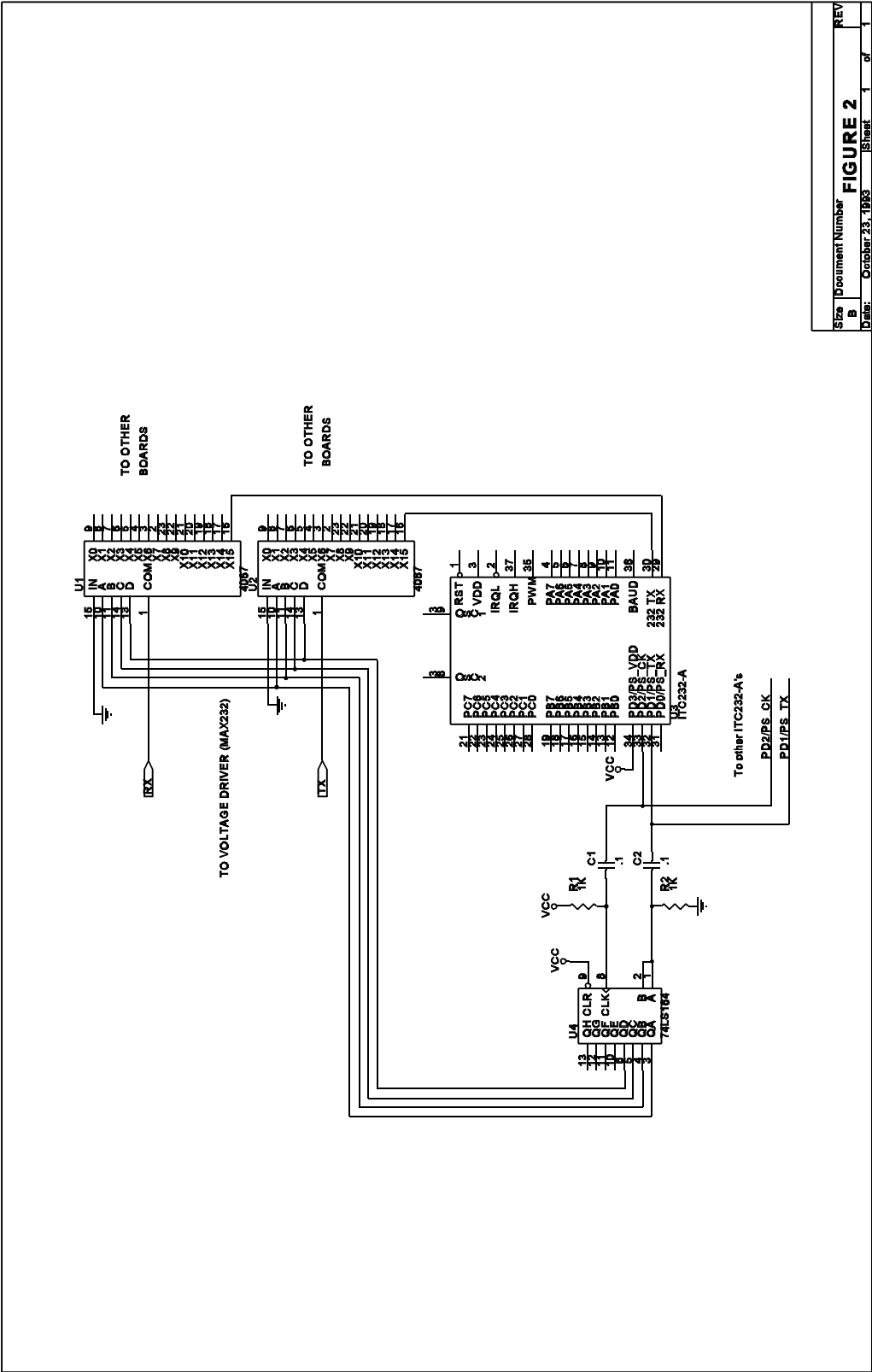
This other circuit is better than the previous and you should use it if you do not need the A/D converter in the I/O-232 board. Take it out and place a jumper cable to another board containing the 74LS164 and the 4067's. The general idea is to clock out the Serial Synchronic Port (PS), the address of the 4067 pair wanted. First you have to configure PS issuing PCSA132 [Enter] (Polarity Low, in phase). Then just write the address to select the 4067 channel and therefore the ITC232-A you are talking to.

For that, send PWS <address> [Enter]. The ITC232-A sends OK first and then carries out the command, thus you should be able to get the OK prompt before you get disconnected from that ITC232-A. This however might not be the case so try it (if it isn't the case then just do not wait for an OK, proceed with the next ITC232-A). C1, C2, R1 and R2 are necessary because after using PS the ITC232-A makes all of its pins inputs (PD). Here is a trick to know which ITC232-A you are talking to: Connect QA-Q on the 74164 to any parallel port. PD itself could be used if you only needed to discriminate between 8 ITC232-A's (in that case use a double 8 channel analog multiplexer thus eliminating one of the chips). Unfortunately PD3 must be connected to VCC but of course you could use 1 pin from PA, PB or PC to read the extra Q on the 74164 if you are multiplexing more than 8 channels. If you are using PD, connect the Q lines from the 74164 to PD via a 20K resistor. This will allow normal reading of the values in PD (command = PRD [Enter]) without interfering with the pulses coming out PS. Of course, reading the address on QA-Q will tell you which ITC232-A you are connected to.



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 FIGURE 1  
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Size B Document Number **FIGURE 2** REV 1  
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