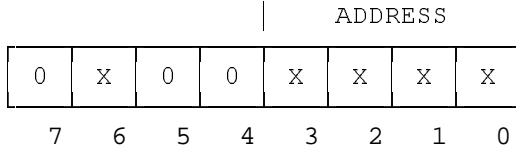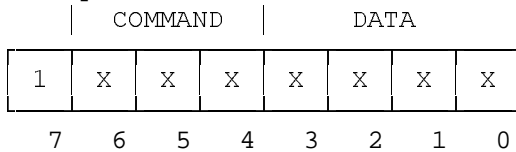# PROTOCOL USED FOR VS-2016 (BC-2016) COMMUNICATION (RS-232)

Communication with the VS-2016 is done using two bytes of information as defined below. The rate of data is 9600 baud, with no parity, 8 data bits and one stop bit.

```
1st byte
                            |      ADDRESS      |
        +---+---+---+---+---+---+---+---+
        | 0 | X | 0 | 0 | X | X | X | X |
        +---+---+---+---+---+---+---+---+
          7   6   5   4   3   2   1   0

2nd byte
            |   COMMAND    |    DATA     |
        +---+---+---+---+---+---+---+---+
        | 1 | X | X | X | X | X | X | X |
        +---+---+---+---+---+---+---+---+
          7   6   5   4   3   2   1   0
```

DETAILED DESCRIPTION

1st byte

1st byte - bits 0..3 - ADDRESS.
These bits describe the number of the target machine.

Machine number	1st byte, bits 3	2	1	0	
1	0	0	0	0	MASTER
2	0	0	0	1	
3	0	0	1	0	
4	0	0	1	1	
5	0	1	0	0	
6	0	1	0	1	
7	0	1	1	0	
8	0	1	1	1	SLAVES
9	1	0	0	0	
10	1	0	0	1	
11	1	0	1	0	
12	1	0	1	1	
13	1	1	0	0	
14	1	1	0	1	
15	1	1	1	0	
16	1	1	1	1	

1st byte - bit 6 - destination bit.
When sending a message FROM the PC to the switcher, this bit should be 0. When the switcher sends a message TO the PC this bit should be 1.

1st byte - bits 4,5,7 - should be set to 0.

2nd byte - bits 0..3 - DATA.
These bits describe the input which is to be connected to the output.

```
Input to be      2nd byte, bits
  connected      3    2    1    0
_____
      1          0    0    0    0
      2          0    0    0    1
      3          0    0    1    0
      4          0    0    1    1
      5          0    1    0    0
      6          0    1    0    1
      7          0    1    1    0
      8          0    1    1    1
      9          1    0    0    0
     10          1    0    0    1
     11          1    0    1    0
     12          1    0    1    1
     13          1    1    0    0
     14          1    1    0    1
     15          1    1    1    0
     16          1    1    1    1
```

2nd byte - bits 4..6 - COMMAND.

```
   COMMAND                2nd byte, bits
                          6    5    4
_____
Set input to output       0    0    0
Set output off            0    0    1
Get status                0    1    0
Get machine type          0    1    1
```


How to use the protocol:
 1) To change the input that is connected to the output, set
    the bits as below:
    *1st byte
    ADDRESS - Set the number of the controlled machine (machine number 1-16).

    *2nd byte
    DATA - Set the new input number which is to be connected to the output.
    COMMAND - Set the bits of COMMAND "Set input to output"
              (000).

    REPLY - The reply to this command is identical to the two bytes which were
            sent, except that bit 6 of the 1st byte = 1 (destination bit).

 2) To disconnect all inputs from the output, set the bits as below:
    *1st byte
    ADDRESS - Set the number of the controlled machine
              (machine number 1 - 16).

```
        *2nd byte
        DATA - don't care.
        COMMAND - put the bits of COMMAND "Set output off" (001).

        REPLY - The reply to the COMMAND "Set output off" is
                identical to the two bytes which were sent, except
                that bit 6 of the 1st byte = 1 ( destination bit ).

    3) To get the status of a machine, ie, which input is
       connected to the output or if the output is disconnect from
       the inputs, set the bits as below:
       *1st byte
       ADDRESS - Set the number of the controlled machine
                 (machine number 1 - 16).

       *2nd byte
       DATA - don't care.
       COMMAND - Set the bits of COMMAND "Get status" (010).

       REPLY - There are two types of reply for the command
               "Get status":
           (1) An input is connected to the output.
               The reply is the same as the reply of COMMAND -
               "Set input to output" (the DATA location contains
               the number of the input that is connected to the
               output).
           (2) All the inputs are disconnected from the output.
               The reply in this case is the same as the reply of
               COMMAND - "Set output off".

    4) To get the machine type (code of machine type), set the
       bits as below:
       *1st byte
       ADDRESS - Set the number of the target machine (machine
                 number 1 - 16).

       *2nd byte
       DATA - don't care.
       COMMAND - Set the bits of the COMMAND "Get machine type"
                 (011).

       REPLY - The reply of the command "Get machine type" is
               identical to the two bytes which were sent, except
               that bit 6 of the 1st byte =  1 (destination bit),
               and the machine type is present in the 2nd byte at
               DATA location.
               For the machine 2016, the machine type is 0A(hex)
               (1010B).


   NOTE:
If a button on the machine is pressed, and the "reply switch" is
off (dip switch BANK 2 switch 5), the machine sends two bytes of
information to the PC - the same reply bytes that you would have
received if you sent the COMMAND: "Set input to output".
```