EDITS PRO – Control Unit V1.0

PC Protocol

The serial port RS232 is used to send commands instructions to the controller.

The serial port must be configured as follows:

9600 bauds, no parity, 8 data bits, 1 stop bit.

Most of the instructions which are sent to the controller are composed of 4 bytes, the others are composed of 2 bytes.

The 4-bytes instruction starts with an initialization byte, followed by a control byte, an address byte and finally a data byte.

The 2-bytes instruction starts with an initialization byte, followed only by a control byte.

As soon as it receives a byte, the controller sends it back to the PC like an “echo” or sends an information byte, depending on the instruction. It is important, for the reliability of the transmission, to wait for the “echo” byte from the controller before sending the next one to it.

Switch or locomotive commands

It is possible to consider a trit as the combination of two bits and to represent a package of Motorola information as follows:

TA1		TA2		TA3		TA4		TC1		TD1		TD2		TD3		TD4	
A1	A2	A3	A4	A5	A6	A7	A8	C1	C2	D1	D2	D3	D4	D5	D6	D7	D8

The two bits A1, A2 define the trit of address TA1.

When the PC transmits this information to the controller, the bits A1 to A8 are included within one byte. The data bits D1 to D8 are also transmitted within one byte.

The trit C1-C2, when aimed at locomotive decoder, enables (C1=1 and C2=1) or disables (C1=0 and C2=0) the function F0 (directional function, i.e. front lights). If the instruction is aimed at a switch or signal decoder, this trit is considered as a fifth address trit, usually set to 0.

This trit is included in a byte which also contains the type of device to control: locomotive or fixed device (switch or signal decoder).

The 4 bytes of an instruction look like this:

Initialization byte

0	0	1	1	0	1	1	1

Control byte

0	0	0	0	1	L / S	C2	C1

Address byte

A8	A7	A6	A5	A4	A3	A2	A1

Data byte

D8	D7	D6	D5	D4	D3	D2	D1

In the control byte, 'L / S' = 0 means that the command is aimed at a locomotive where as 'L / S' = 1 means it is aimed at a signal or switch decoder.

The tables in appendices show the values of the address and data bytes.

As soon as the controller receives this instruction, it sends it cyclically to the rails, until it receives a new one. Note that each byte received by the controller is sent back to the PC like an echo.

Locomotive command

Let's take the example of a command to the locomotive with address 15 (01X0 on trits 1-4); The F0 function is disabled (trit5 = 0) and the speed is 12 (trits 6-9). The bytes to be sent to the controller are the following (new Motorola format):

00110111	-	00001000	-	00110100	-	01011000
Initialization		Control		Address		Data

Switch or signal command

The address byte is with Motorola format (see appendix 1). In nearly all cases, the fifth trit is 0 (C1=0 and C2=0).

The control byte of the switches commands is as follows.

[D7, 8] = 1 → coil enabled (D7 = 1 and D8 = 1)
[D7, 8] = 0 → coil disabled (D7 = 0 and D8 = 0)

	D6	D5	D4	D3	D2	D1
Output 1	0	0	0	0	0	0
Output 2	0	0	0	0	1	1
Output 3	0	0	1	1	0	0
Output 4	0	0	1	1	1	1
Output 5	1	1	0	0	0	0
Output 6	1	1	0	0	1	1
Output 7	1	1	1	1	0	0
Output 8	1	1	1	1	1	1

Let's take the following example. To energize the coil of a switch connected to the output 4 of a switch decoder with address 25, the bytes to be sent to the controller are the following:

00110111	-	00001100	-	00010111	-	11001111
Initialization		Control		Address		Data

In order to avoid the burning of the coil, it is needed to de-energize the coil some time after (~0,5s) with the following command:

00110111	-	00001100	-	00010111	-	00001111
Initialization		Control		Address		Data

Programming manual controllers

There is a set of instructions to program the manual controllers.
The sequence is the following:

Initialization byte

0	0	1	1	0	1	1	1

Control byte

0	0	0	1	P	R3	R2	R1

Address byte

A8	A7	A6	A5	A4	A3	A2	A1

Data byte

T	O / N	F / B	F4	F3	F2	F1	F0

The number of the manual controller is configured as indicated in the table below:

	R3	**R2**	**R1**
Controller 1	0	0	0
Controller 2	0	0	1
Controller 3	0	1	0
Controller 4	0	1	1
Controller 5	1	0	0
Controller 6	1	0	1
Controller 7	1	1	0
Controller 8	1	1	1

In the control byte, the bit 'P' = 0 means the address modification is temporary and is no longer valid after a power-down. The bit 'P' = 1 means the address modification is permanent.

The address byte contains, in the Motorola format, the address of the concerned controller.

The data byte contains the information about the status which is requested for the manual controller.

The bit 'T' = 1 requests a temporary transfer of the commands from the active software controller to the manual controller number 1. The bit 'T' = 0 gives the control back to the software controller.
The bit 'O / N' corresponds to the Motorola format (Old or New) used in the temporary transfer above mentioned. For the new format (like Edits Pro decoders), the bit 'O/N' = 0.

The bit 'F/B' corresponds to the direction of travel (only with new format): 0 = forward; 1 = reverse.

The initialization byte and control byte are sent back to the PC without any change, where as the address byte and the data byte represent the status of the manual controller before being programmed.

Reading return-signalling modules

The reading of the detection modules is performed by a 2-bytes instruction, as follows.

Initialization byte

0	0	1	1	0	1	1	1

Control byte

0	0	1	D5	D4	D3	D2	D1

The bits D1 to D5 define the module to be read, according to the following table.

	D5	**D4**	**D3**	**D2**	**D1**
Module 1	0	0	0	0	0
Module 2	0	0	0	0	1
.....	...	...	...	...	...
Module 31	1	1	1	1	0
Module 32	1	1	1	1	1

The initialization byte and control byte are sent back to the PC without any change. Then, the control unit answers with an information byte. Each bit of this byte represents the status of an input of the connected detection module.

Return byte

D8	D7	D6	D5	D4	D3	D2	D1

APPENDIX 1

Address bytes (old and new Motorola format)

Address	Byte
0	00000000
1	00000011
2	00000001
3	00001100
4	00001111
5	00001101
6	00000100
7	00000111
8	00000101
9	00110000
10	00110011
11	00110001
12	00111100
13	00111111
14	00111101
15	00110100
16	00110111
17	00110101
18	00010000
19	00010011
20	00010001
21	00011100
22	00011111
23	00011101
24	00010100
25	00010111
26	00010101

Address	Byte
27	11000000
28	11000011
29	11000001
30	11001100
31	11001111
32	11001101
33	11000100
34	11000111
35	11000101
36	11110000
37	11110011
38	11110001
39	11111100
40	11111111
41	11111101
42	11110100
43	11110111
44	11110101
45	11010000
46	11010011
47	11010001
48	11011100
49	11011111
50	11011101
51	11010100
52	11010111
53	11010101

Address	Byte
54	01000000
55	01000011
56	01000001
57	01001100
58	01001111
59	01001101
60	01000100
61	01000111
62	01000101
63	01110000
64	01110011
65	01110001
66	01111100
67	01111111
68	01111101
69	01110100
70	01110111
71	01110101
72	01010000
73	01010011
74	01010001
75	01011100
76	01011111
77	01011101
78	01010100
79	01010111
80	01010101

APPENDIX 2

Data bytes (new Motorola format)

Direction FORWARD		
Speed	**Binary**	**Decimal**
0	10001000	136
1	10001001	137
2	10001100	140
3	10001101	141
4	10011000	152
5	10011001	153
6	10011100	156
7	10011101	157
8	01001000	72
9	01001001	73
10	01001100	76
11	01001101	77
12	01011000	88
13	01011000	89
14	01011100	92
15	01011101	93

Direction REVERSE		
Speed	**Binary**	**Decimal**
0	10100010	162
1	10100011	163
2	10100110	166
3	10100111	167
4	10110010	178
5	10110011	179
6	10110110	182
7	10110111	183
8	01100010	98
9	01100011	99
10	01100110	102
11	01100111	103
12	01110010	114
13	01110011	115
14	01110110	118
15	01110111	119

F1 “stop”		
Speed	**Binary**	**Decimal**
0	00001010	10
1	00001011	11
2	00001110	14
3	00100111	39
4	00011010	26
5	00011011	27
6	00011110	30
7	00011111	31
8	01001010	74
9	01001011	75
10	01001110	78
11	01001111	79
12	01011010	90
13	01011011	91
14	01011110	94
15	01011111	95

F2 “stop”		
Speed	**Binary**	**Decimal**
0	00100000	32
1	00100001	33
2	00100100	36
3	00100101	37
4	00110010	50
5	00110001	49
6	00110100	52
7	00110101	53
8	01100000	96
9	01100001	97
10	01100100	100
11	01100101	101
12	01110000	112
13	01110001	113
14	01110100	116
15	01110101	117

F3 “stop”		
Speed	**Binary**	**Decimal**
0	00101000	40
1	00101001	41
2	00101100	44
3	00101101	45
4	00111000	56
5	00111001	57
6	00110110	54
7	00111101	61
8	01101000	104
9	01101001	105
10	01101100	108
11	01101101	109
12	01111000	120
13	01111001	121
14	01111100	124
15	01111101	125

F4 “stop”		
Speed	**Binary**	**Decimal**
0	00101010	42
1	00101011	43
2	00101110	46
3	00101111	47
4	00111010	58
5	00111011	59
6	00111110	62
7	00110111	55
8	01101010	106
9	01101011	107
10	01101110	110
11	01101111	111
12	01111010	122
13	01111011	123
14	01111110	126
15	01111111	127

F1 “start”		
Speed	**Binary**	**Decimal**
0	10001010	138
1	10001011	139
2	10001110	142
3	10001111	143
4	10011010	154
5	10011011	155
6	10011110	158
7	10011111	159
8	11001010	202
9	11001011	203
10	11001110	206
11	11001101	205
12	11011010	218
13	11011011	219
14	11011110	222
15	11011111	223

F2 “start”		
Speed	**Binary**	**Decimal**
0	10100000	160
1	10100001	161
2	10100100	164
3	10100101	165
4	10110000	176
5	10110001	177
6	10110100	180
7	10110101	181
8	11100000	224
9	11100001	225
10	11100100	228
11	11100101	229
12	11011000	216
13	11011001	217
14	11011100	220
15	11011101	221

F3 “start”		
Speed	**Binary**	**Decimal**
0	10101000	168
1	10101001	169
2	10101100	172
3	10101101	173
4	10111000	184
5	10111001	185
6	10111100	188
7	10111101	189
8	11101000	232
9	11101001	233
10	11101100	236
11	11101101	237
12	11111000	248
13	11111001	249
14	11110100	244
15	11111101	253

F4 “start”		
Speed	**Binary**	**Decimal**
0	10101010	170
1	10101011	171
2	10101110	174
3	10101111	175
4	10111010	186
5	10111011	187
6	10111110	190
7	10111111	191
8	11101010	234
9	11101011	235
10	11101110	238
11	11101111	239
12	11111010	250
13	11111011	251
14	11111110	254
15	11110101	245