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FUSION ROBOTS - SYSTEM PROTOCOL Version 5.05c

The **FUSION** CD/DVD auto loading system communicates with other devices through two RS232 and one TTL port.
Two external DB9 male connectors are provided for the COM ports and a DB9 female connector for the TTL port.
COM 1, (JP2) is the default ports of the system and it's used mainly for connections to a host computer.
COM 2, (JP3) is the secondary port of the system and it's mainly used to connect a printer's tray controller port.
TTL, (P1) is for Inkjet printer "Tray Port". A DB9-M to MiniDIN6-M cable is required.
The factory default settings for both COM ports are:

Baud rate = 38400; N-8-1; Flow Control = Xon / Xoff; Terminal Emulation = ANSI; Local echo = off.

- For direct communication with the Fusion Autoloader, use Windows Hyper Terminal with the above settings.
- The system will accept commands from a host computer in two different modes. The <Esc> key toggles between these two modes:
  1) **DIRECT Mode** (factory default), only single-character commands are accepted. Every character sent is a command. The commands are executed as soon as they are sent (no "Enter" is necessary). The system boots up in this mode and will return to this mode every time the power is cycled.
  2) **STRING Mode**, single-character as well as multi-character macro commands are accepted. The <Enter> key must be sent for the command to be executed. Used for MACRO UPLOAD, development and testing.
- For Macro File upload please use STRING mode only. In Windows Hyper Terminal, after switching to STRING mode, from the menu select "Transfer", "Send Text File". In the browser window, change the "Files of Type" to "All files *.*" then brows to the Macro File's location and select the desired Macro file, click "Open" to upload (send) the file.
- The default "signup string" for the units is **"Mediatechnics", "FUSION-nn", "X5.1n"** (company, type, version #). This string is sent back to the host computer in response to the "V" command.

NOTE: * New commands for Independent bin control. It will only work on systems with firmware version 5.06 or higher

SYSTEM COMMANDS for DIRECT mode

A	User Prog.	ACCEPT	– Accept good Disc after successful copying ("a" when Rimage tray open)
a	User Prog.	ACCEPT	– Same as "A"
B	System	Display Flags	– 1st two digits => F8-F16 (binary), 2nd two => F0-F7; IB1=0000, IB2=0001, IB3=0002.
b	System	InstPos Set	– Sets the instant arm position before all Picks & after all Drops. Use it w/ 'p' to read position
C	System	CALIBRATE	– Calibrate the robot (moves all motors to their home position)
c	User Prog.	CALIBRATE	– Same as "C"
D	User Prog.	Pick IB2	– *Pick up a disc from IB2 and go to top. Do nothing if there is disc in the picker!
d	User Prog.	Place IB2	– *Place one Disc from the Picker into IB2. Error B2 if there is no disc in the picker!
E	System	ERASE	– Use "ERASE" all upper case to delete all Macros from the systems memory
e	User Prog.		
F	System	Reset Fags	– Reset flags 0-7, like the Input Bins, to their default value (0)
f	System	Reset Fags	– Reset flags 0-15 to their default value (0)
G	User Prog.	Pick DR	– *Pick up a disc from an open Drive/Printer Tray and go to top
g	User Prog.	Place DR	– *Place one Disc from the Picker onto Drive/Printer Tray. Error B2 if there is no disc in the picker!
H	User Prog.	Pick IB3	– *Pick up a disc from IB3 and go to top. Do nothing if there is disc in the picker!
h	User Prog.	Place IB3	– *Place one Disc from the Picker into IB3. Error B2 if there is no disc in the picker!
I	User Prog.	INSERT	– *Place one Disc from the Picker or the active IB onto the open Drive Tray
i	User Prog.	INSERT	– Same as "I"
J	User Prog.	ALIGN	– Same as "I" but will not drop the Disc for drive tray alignment
j	User Prog.	INSERT-sk	– Insert with shake
K	System	ECHO Toggle	– Toggle the local Echo of the system off and on
k	User Prog.		
L	System	LOAD	– Upload a Macro Command Set file (txt) through the COM port
l	System	LOAD	– Upload a Macro Command Set file (txt) through the COM port
M	System	IB assign	– IB assignment 00 (normal) 01 (IB1) 02 (IB2) – toggle (for PX only)
m	User Prog.	Shake Toggle	– Toggles the "SHAKE" mode (Pick up disc shaking) ON and OFF
N	User Prog.	Pick IB1	– *Pick up a disc from IB1 and go to top. Do nothing if there is disc in the picker!
n	User Prog.	Place IB1	– *Place one Disc from the Picker into IB1. Error B2 if there is no disc in the picker!
O	User Prog.	OUTPUT	– Pick Disc from Drive Tray and Place it into the active IB
o	User Prog.	Place OB	– *Place one Disc from the Picker into OB. Error B2 if there is no disc in the picker!
P	System	POSITION	– Display the step positions address for all motors
p	System	InstPos Read	– Display the instant step positions for all motors (set by 'b')
Q	System	Print ERROR	– Display the last Macro and will point out the place where the error occurred
q	User Prog.		
R	User Prog.	REJECT	– *Place one Disc from the Picker into Reject Bin. Error B2 if there is no disc in the picker!
r	User Prog.		–
S	System	STATUS	– Display the system status (see status codes for detail)
s	User Prog.		
T	User Prog.	Pick IB4	– *Pick up a disc from IB4 and go to top. Do nothing if there is disc in the picker!
t	User Prog.	Place IB4	– *Place one Disc from the Picker into IB4. Error B2 if there is no disc in the picker!

U	User Prog.			
u	User Prog.			
V	System		Macro Version	– Display the Macro Command Set version number and the “signup string”
v	User Prog.			
W	User Prog.			
w	User Prog.			
X	System		Display Photos	– Display the present status of the Photo sensors
x	System			
Y	User Prog.			
y	User Prog.			
Z	User Prog.		Auto cycle	– Mechanical auto cycle, I – A. One drive tray must be opened for this to work.
z	User Prog.		n/u	–
Esc	System		Mode toggle	– Toggle between the DIRECT mode and the STRING mode
0	System		Printer Buffer	– Printer – Print Buffer
1	System		Tray In	– Printer – Close the Printer Tray
2	System		Tray Out	– Open the Printer Tray
3	System		PT Status	– Display the Printer Tray status (C0, C2, C3, C4, C9)
4	System		IB Status	– Display the Input Bins status C5=IB1, C6=IB2, C7=IB3
5	System		n/u	–
6	System		n/u	–
7	System		Mode Status	– Display the command mode status (01 = DIRECT mode, 02 = STRING mode)
8	System		Reserved	– Internal use
9	System		n/u	–
!	System		Reserved	– Internal use
"	System		Reserved	– Internal use
#	System		Reserved	– Returns the printer code
CTRL_C		System	STOP	– Running, Abort – STOP all actions unconditionally

STATUS and ERROR CODES

The system will respond to all commands received as follows:

- "X" => Command recognized and executed successfully.
- "E" => Command recognized and executed unsuccessfully, ERROR. An error code will be set and it can be viewed (retrieved) with the "S" command. "3", "4" and "7" are also status retrieving commands. All errors are 2 digits ASCII encoded Hex code.
- "?" => Unrecognized command.

00 – (S) Status OK.
01 – (7) Status OK - DIRECT Mode.
02 – (7) Status OK - STRING Mode.
10 – (S) Stepper motor command time out.
20 – (S) All Input Bins are empty. 'I' only!
21 – (S) – Input Bin jam. Can't pickup disc from stack. Picker arm misaligned.
22 – (S) – Input Bin jam. disc stock, 3 retries, can't pickup disc from IB.
2A – (S) Bin #1 (IB1) is empty
2B – (S) Bin #2 (IB2) is empty
2C – (S) Bin #3 (IB3) is empty
2D – (S) Bin #4 (IB4) is empty
30 – (S) Accept error. Can't accept disc, no open tray was detected.
40 – (S) Syntax error. A command was sent without clearing the user error.
50 – (S) Reject error. Can't reject disc, a tray is open.
51 – (S) *Reject Bin full.
60 – (S) Insert error. Can't insert disc, no open tray was detected.
70 – (S) Insert error, disc was dropped from the Picker at the Drive position
71 – (S) Insert error, disc was dropped from the Picker during Shake.
72 – (S) Insert error, disc was dropped from the Picker after pick up, on the way up.
73 – (S) Insert error, disc was NOT picked up by the Picker.
80 – (S) Calibration error.
90 – (S) Accept error, disc was dropped from the Picker.
91 – (S) Accept error, can't pick up disc, it is stock in the tray.
A0 – (S) Active Output Bin is full. 'A' only
A1 – (S) Bin #1 (IB1) is full
A2 – (S) Bin #2 (IB2) is full
A3 – (S) Bin #3 (IB3) is full
A4 – (S) Bin #4 (IB4) is full
A5 – (S) Bin #5 (OB) is full
B0 – (S) Disc pickup error, disc was not detected in the tray. Drive or printer tray is empty.
B1 – (S) Disc pickup error, there is already a disc in the Picker.
B2 – (S) Disc placement error, there is NO disc in the Picker.
B3 – (S) Disc placement error, can't drop disc from the Picker.
C0 – (3) Printer ERROR, printer tray Jam.
C1 – (3) Printer busy, the printer tray is in motion
C2 – (3) Printer Status OK, the tray is OPEN.
C3 – (3) Printer Status OK, the tray is CLOSED, disc is NOT in the tray.
C4 – (3) Printer Status OK, the tray is CLOSED, disc is in the tray.
C5 – (4) Input Bin 1 is active.
C6 – (4) Input Bin 2 is active.
C7 – (4) Input Bin 3 is active.
C8 – (S) Printer ERROR, no Ribbon in the printer.
C9 – (S) Printer tray OPEN, disc in the tray, status OK. (Prism printer only)
D0 – (S) NU
E0 – (S) NU - Unit Off line.
F0 – (S) Syntax / semantic error in macro definition (INTERNAL USE)

********** END **********