

RSS-NIR Filter/Grating Inserter Motor Drive Initialization Scripts

The default for the Serial Port Mode of an ION motor drive out of the box is 57.6kbs, 1 stop bit, no parity, and “point to point mode”. This means only one drive can be connected to the host at this time, the address field in the command packet must be zero, and the address field in the response packet is omitted.

Refer to the Magellan Motion Processor Users Guide sections 12.3.6 and 12.3.7 for information regarding the timing requirements for packets to be recognized as complete.

The structure of the command packets are explained in section 12.3.2 of the Magellan Motion Processor Users Guide and summarized for RSS-NIR use here:

Address – 1 byte – Always 0x00 when in “point to point mode”

Checksum – 1 byte - two’s complement of the sum of the other bytes in the packet

Axis – 1 byte – Always 0x00 for RSS-NIR

Instruction – 1 byte

Data – 0-6 bytes

The checksum is explained in section 12.3.4 of the Magellan Motion Processor Users Guide and copied here:

The serial checksum is calculated by summing all bytes in the packet (not including the checksum) and negating (i.e., taking the two’s complement of) the result. The lower eight bits of this value are used as the checksum. To check for a valid checksum, all bytes of a packet should be summed (including the checksum byte), and if the lower eight bits of the result are zero, then the checksum is valid.

For example, if a command packet is sent to motion processor address 3, containing command 0177h (**SetMotorCommand** for axis 2) with the one-word data value 1234h, then the checksum will be calculated by summing all bytes of the command packet ($03h + 01h + 77h + 12h + 34h = C1$) and negating this to find the checksum value (3Fh). On receipt, the motion processor will sum all bytes of the packet, and if the lower eight bits of the result are zero, then it will accept the packet ($03h + 3Fh + 01h + 77h + 12h + 34h = 100h$).

Note that the response packets do not contain the address byte when the drive serial port mode is point to point mode.

The structure of the response packets are explained in section 12.3.2 of the Magellan Motion Processor Users Guide and summarized for RSS-NIR use here:

Address – 1 byte – Omitted when in “point to point mode”

Status – 1 byte – 0x00 if command was interpreted as interpreted correctly and valid

Checksum – 1 byte – two’s complement of the sum of the other bytes in the packet

Data – 0-6 bytes

If the status field returns non-zero, the value returned is an instruction error. Refer to the Magellan Motion Processor Users Guide, section 12.2.5 to decode the nature of the instruction error. The command **GetInstructionError** will also return the instruction error but will clear the instruction error fault bit as well.

For a description of the data parameters refer to section 5.2 of the Magellan Motion Processor Programmers Command Reference. The commands/instructions are listed in alphabetical order and have links to quickly bring up the desired instruction definition.

Communications Initialization

This script needs to be executed for each new motor drive before any other script. The effects of this script are stored in nonvolatile memory in the drive, so it only needs to be run once ever.

To initialize the serial port mode in the drive, send the commands listed below and verify the responses.

1. **NOP** – to verify physical communications link

Command Packet

Address	0x00	Always in Point to Point Mode
Checksum	0x00	Two’s complement of the least significant byte of sum of the rest of the packet.
Command	0x00, 0x00	Command = GetVersion

Response Packet

Address	N/A	Omitted in Point to Point Mode
Status	0x00	If non-zero, decode instruction error
Checksum	0x00	Two’s complement of the least significant byte of sum of the rest of the packet.

- a. Timeout Exception - Drive may be out of synchronism with host packet timing. Wait 2 ms and transmit another 0x00. Repeat for 10 retries checking for a response packet each time.

- b. Retry Exception - Drive may already be in Multi-drop mode and expect a leading address other than zero in the command packet. Repeat this step polling the address range to find which address it is.

2. **GetVersion** – to verify motor drive device type and firmware version

Command Packet

Address	0x00	Always in Point to Point Mode
Checksum	0x71	Two's complement of the least significant byte of sum of the rest of the packet.
Command	0x00, 0x8F	Command = GetVersion

Response Packet

Address	N/A	Omitted in Point to Point Mode
Status	0x00	If non-zero, decode instruction error
Checksum	0x41	Two's complement of the least significant byte of sum of the rest of the packet.
Data 1	0x99	Product Family = ION, Motor = Any type on ION
Data 2	0x11	# of axis supported = 1, # of chips = 1
Data 3	0x00	Customization = 0,
Data 4	0x15	ProductVersion = 0, MajorSoftwareVersion = 1, MinorSoftwareVersion = 5

- a. Timeout Exception – Drive may already be in Multi-drop mode and respond with a leading address. Recheck packet assuming the first byte is an address.

3. **SetOperatingMode** - to disable the drive

Command Packet

Address	0x00	Always in Point to Point Mode
Checksum	0x9B	Two's complement of the least significant byte of sum of the rest of the packet.
Command	0x00, 0x65	Command = SetOperatingMode
Data 1	0x00	Reserved

Data 2	0x00	Disable axis and all control modules
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Response Packet

Address	N/A	Omitted in Point to Point Mode
Status	0x00	If non-zero, decode instruction error
Checksum	0x??	Two's complement of the least significant byte of sum of the rest of the packet.

4. **GetOperatingMode** – to verify the drive is disabled

Command Packet

Address	0x00	Always in Point to Point Mode
Checksum	0x9A	Two's complement of the least significant byte of sum of the rest of the packet.
Command	0x00, 0x66	Command = GetOperatingMode

Response Packet

Address	N/A	Omitted in Point to Point Mode
Status	0x00	If non-zero, decode instruction error
Checksum	0x00	Two's complement of the least significant byte of sum of the rest of the packet.
Data 1	0x00	Reserved
Data 2	0x00	Disable axis and all control modules

5. **SetSerialPortMode** – to change the serial port mode to Multi-drop mode and set communications port parameters

Command Packet

Address	0x00	Always in Point to Point Mode
Checksum	0x??	Two's complement of the least significant byte of sum of the rest of the packet.
Command	0x00, 0x8B	Command = SetSerialPortMode

Data 1	0b?????000	Select address,
Data 2	0x84	Protocol = Multi-drop mode, Stop bits = 1, Parity = None, Baud rate = 57.6kbs

Response Packet

Address	0x??	Drive address (now in Multi-drop mode)
Status	0x00	If non-zero, decode instruction error
Checksum	0x??	Two's complement of the least significant byte of sum of the rest of the packet.

6. **GetSerialPortMode** – to verify the serial port mode is in Multi-drop mode and communications port parameters are working

Command Packet

Address	0x??	Drive address (now in Multi-drop mode)
Checksum	0x??	Two's complement of the least significant byte of sum of the rest of the packet.
Command	0x00, 0x8C	Command = GetSerialPortMode

Response Packet

Address	0x??	Drive address (now in Multi-drop mode)
Status	0x00	If non-zero, decode instruction error
Checksum	0x??	Two's complement of the least significant byte of sum of the rest of the packet.
Data 1	0b?????000	Selected address
Data 2	0x84	Protocol = Multi-drop mode, Stop bits = 1, Parity = None, Baud rate = 57.6kbs

Drive Initialization

This script ensures that the drive is disabled and then sets all the motor drive constants that do not require motor motion.