Meade Telescope Serial Command Protocol

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Introduction

This paper documents the Meade Telescope Serial Control Protocol used for remote command and control of Meade Telescopes. This command language contains a core of common commands supported by all telescopes. Due to different implementation and technological advances the commands have extensions that are not supported by all models. The differences are noted in the descriptive text for the commands.

As an extension to the Telescope Protocol beginning with the LX200GPS/Autostar II family, a possible response to any command is ASCII NAK (0x15). Should the telescope control channel be busy and unable to accept and process the command, a NAK will be sent within 10 msec of the receipt of the '#' terminating the command. In this event, the controller should wait a reasonable interval and retry the command.

Telescope Command Groupings:

		Supported			
Command Group	Command Designator Symbol	AutoStar	LX200<16"	LX 16"	AutoStar II
Alignment Query	<ACK>	x	x	x	x
Alignment*	A	x	x	x	x
Active Backlash	$B	-	-	-	x
Reticule Control*	B	x	p	p	x
Sync Control	C	p	p	p	x
Distance Bars	D	x	x	x	x
Fan*	f	-	-	p	x
Focus Control Commands	F	p	p	p	x
GPS Commands	g	-	-	-	x
Get Information	G	x	x	x	x
Home Position Commands*	h	x	-	x	x
Hour	H	x	x	x	x
Initialize Telescope	I	-	-	-	x
Library	L	p	p	p	x
Movement	M	x	p	x	x
High Precision	P	x	x	x	x
Smart Drive Control*	$Q	x	x	x	x
Quit Command	Q	x	x	x	x
Field De-rotator	r	-	-	p	x
Rate Control	R	p	p	p	x
Set Information	S	x	x	x	x
Tracking Frequency	T	p	p	p	x
User Format Control	U	p	x	x	x
Way point (Site)	W	x	x	x	x
Help Commands	?	-	x	x	-

Notes:

Commands accepted by the telescopes are shown in the table above indicated by an x entry. This means that the telescope will accept these commands and respond with a syntactically valid response where required. A "p" indicated only a subset of this command class is supported. Due to the differing implementations of the telescopes, some of the commands may provide static responses or may do nothing in response to the command. See the detailed description of the commands below to determine the exact behavior.

ACK - Alignment Query

ACK <0x06> Query of alignment mounting mode.

Returns:

- A If scope in AltAz Mode
- D If scope is currently engaged by the Autostar Updater Program [Autostar and Autostar II telescopes]
- L If scope in Land Mode
- P If scope in Polar Mode

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A - Alignment Commands

:Aa# Start Telescope Automatic Alignment Sequence [LX200GPS/RCX400 only]
Returns:
1: When complete (can take several minutes).
0: If scope not AzEl Mounted or align fails

:AL# Sets telescope to Land alignment mode
Returns: nothing

:AP# Sets telescope to Polar alignment mode
Returns: nothing

:AA# Sets telescope the AltAz alignment mode
Returns: nothing

$B – Active Backlash Compensation

:$BAdd#
Set Altitude/Dec Antibacklash
Returns Nothing

:$BZdd#
Set Azimuth/RA Antibacklash
Returns Nothing

B - Reticule/Accessory Control

:B+# Increase reticule Brightness
Return: Nothing

:B-# Decrease Reticule Brightness
Return: Nothing

:B<n># Set Reticle flash rate to <n> (an ASCII expressed number)
<n> Values of 0..3 for LX200 series
<n> Values of 0..9 for Autostar, LX200GPS and RCX400
Return: Nothing

:BDn# Set Reticule Duty flash duty cycle to <n> (an ASCII expressed digit) [LX200GPS/RCX400 Only]
<n> Values: 0 = On, 1..15 flash rate
Return: Nothing

C - Sync Control

:CL# Synchronize the telescope with the current Selenographic coordinates.

:CM# Synchronizes the telescope's position with the currently selected database object's coordinates.
Returns:
LX200's - a "#" terminated string with the name of the object that was synced.
Autostars & Autostar II - At static string: " M31 EX GAL MAG 3.5 SZ178.0'#"

D - Distnace Bars

:D# Requests a string of bars indicating the distance to the current target location.
Returns:
LX200's – a string of bar characters indicating the distance.
Autostars and Autostar II – a string containing one bar until a slew is complete, then a null string is returned.

f - Fan/Heater Commands

:f+# LX 16"– Turn on the tube exhaust fan

RCX – Turn on tube exhaust fan
LX200GPS/R – Turn on power to accessory panel
Autostar & LX200 < 16" – Not Supported
Returns: nothing

:f-# LX 16"– Turn off tube exhaust fan
RCX – Turn off tube exhaust fan
LX200GPS/R - Turn off power to accessory panel
Autostar & LX200 < 16" – Not Supported
Returns: Nothing

:fH<ddd>#
RCX – Sets corrector plate heater level, where <ddd> is a level from 0…100 percent duty cycle.
All others – Not supported
Returns - Nothing

:fp+# RCX – Turn on switched 12V panel power
All others – Not Supported
Returns: Nothing

:fp-# RCX – Turn off switched 12V panel power
All others – Not Supported
Returns: Nothing

:fT# LX200GPS/RCX400 – Return Optical Tube Assembly Temperature
RCX – Return OTA Temperature
Returns <sdd.ddd># - a '#' terminated signed ASCII real number indicating the Celsius ambient temperature.
All others – Not supported

:fC# RCX – Return Corrector Plate Temperature
Returns <sdd.ddd># - a '#' terminated signed ASCII real number indicating the Celsius ambient temperature.
All others – Not supported

F – Focuser Control

:F+# Start Focuser moving inward (toward objective)
Returns: None

:F-# Start Focuser moving outward (away from objective)
Returns: None

:FB# RCX400 – Query Focuser Busy Status
All others – Not supported
Returns 0 if focuser is idle
1 if focuser is moving

:FC<n/s/e/w> #
RCX- collimate command. Starts the corrector plate tilting in the specified direction. Use :FQ# to halt movement
All others – Not supported
Returns nothing

:FLD<n>#
RCX – Define current position as focuer preset <n> (1..9).
All others – unsupported
Returns – Nothing

:FLN<n><name>#
RCX - Assign focuser preset <n>(1..9) the <name> specificed.

All others – Unspported
Returns - Nothing

:FLS<n>#
RCX – Sync focuser to preset position <n>(1..9).
All others - unsupported
Returns - Nothing

:FPsDDDD#
LX200GPS/RCX400 – Pulse Focuser for the number of milliseconds specified in the signed number sDDDD. The range is limited to –65000 to +65000. Positive moves the focuser inward, negative moves the focuser outward.
RCX – Move focuser relative to its current position by the specified count
All others – Not supported
Returns: Nothing

:Fp# RCX – Query digital focuser position.
Returns a '#' terminated ASCII integer which is the current focuser position.
All others – Not Supported

:FQ# Halt Focuser Motion
Returns: Nothing

:FF# Set Focus speed to fastest setting
Returns: Nothing

:FS# Set Focus speed to slowest setting
Returns: Nothing

:F<n># Autostar, RCX & LX200GPS– set focuser speed to <n> where <n> is an ASCII digit 1..4
Returns: Nothing
All others – Not Supported

g – GPS/Magnetometer commands

:g+# LX200GPS/RCX400 Only - Turn on GPS
Returns: Nothing

:g-# LX200GPS/RCX400 Only - Turn off GPS

:gps# LX200GPS/RCX400 Only – Turns on NMEA GPS data stream.
Returns: The next string from the GPS in standard NEMA format followed by a '#' key

:gT# Powers up the GPS and updates the system time from the GPS stream. The process my take several minutes to complete. During GPS update, normal handbox operations are interrupted. [LX200GPS/RCX400 only]
Returns: '0' In the event that the user interrupts the process, or the GPS times out.
Returns: '1' After successful updates

G – Get Telescope Information

:G0# Get Alignment Menu Entry 0
Returns: A '#' Terminated ASCII string. [LX200 legacy command]

:G1# Get Alignment Menu Entry 0
Returns: A '#' Terminated ASCII string. [LX200 legacy command]

:G2# Get Alignment Menu Entry 0
Returns: A '#' Terminated ASCII string. [LX200 legacy command]

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:GA# Get Telescope Altitude
Returns: sDD*MM# or sDD*MM'SS#
The current scope altitude. The returned format depending on the current precision setting.

:Ga# Get Local Telescope Time In 12 Hour Format
Returns: HH:MM:SS#
The time in 12 format

:Gb# Get Browse Brighter Magnitude Limit
Returns: sMM.M#
The magnitude of the faintest object to be returned from the telescope FIND/BROWSE command.
Command when searching for objects in the Deep Sky database.

:GC# Get current date.
Returns: MM/DD/YY#
The current local calendar date for the telescope.

:Gc# Get Clock Format
Returns: 12# or 24#
Depending on the current telescope format setting.

:GD# Get Telescope Declination.
Returns: sDD*MM# or sDD*MM'SS#
Depending upon the current precision setting for the telescope.

:Gd# Get Currently Selected Object/Target Declination
Returns: sDD*MM# or sDD*MM'SS#
Depending upon the current precision setting for the telescope.

:GE# Get Selenographic Latitude
LX200gps/RCX Only
Returns: sDD*MM#
The selenographic Position of the telescope. If the scope is not presently pointed to the Moon the scope will return +99*99#

:Ge# Get Selenographic Longitude
LX200gps/RCX Only
Returns: sDDD*MM#
The selenogrphic position of the telescope. West Longitude is shown as negative. If the scope is not pointed at the Moon +999*99# will be returned.

:GF# Get Find Field Diameter
Returns: NNN#
An ASCII integer expressing the diameter of the field search used in the IDENTIFY/FIND commands.

:Gf# Get Browse Faint Magnitude Limit
Returns: sMM.M#
The magnitude or the brightest object to be returned from the telescope FIND/BROWSE command.

:GG# Get UTC offset time
Returns: sHH# or sHH.H#
The number of decimal hours to add to local time to convert it to UTC. If the number is a whole number the sHH# form is returned, otherwise the longer form is return.

:Gg# Get Current Site Longitude
Returns: sDDD*MM#
The current site Longitude. East Longitudes are expressed as negative

:GH# Get Daylght Savings Time [Autostar II only]
Returns:
1 - if Daylight savings time is in effect.
0 - if Daylight savings time is not in effect.

:Gh# Get High Limit
Returns: sDD*
The highest elevation above the horizon that the telescope will be allowed to slew to without a warning message.

:GL# Get Local Time in 24 hour format
Returns: HH:MM:SS#
The Local Time in 24-hour Format

:Gl# Get Larger Size Limit
Returns: NNN'#
The size of the smallest object to be returned by a search of the telescope using the BROWSE/FIND commands.

:GM# Get Site 1 Name
Returns: <string>#
A '#' terminated string with the name of the requested site.

:GN# Get Site 2 Name
Returns: <string>#
A '#' terminated string with the name of the requested site.

:GO# Get Site 3 Name
Returns: <string>#
A '#' terminated string with the name of the requested site.

:GP# Get Site 4 Name
Returns: <string>#
A '#' terminated string with the name of the requested site.

:Go# Get Lower Limit
Returns: DD*#
The minimum elevation of an object above the horizon to which the telescope will slew with reporting a "Below Horizon" error.

:Gq# Get Minimum Quality For Find Operation
Returns:

SU#	Super
EX#	Excellent
VG#	Very Good
GD#	Good
FR#	Fair
PR#	Poor
VP#	Very Poor

The mimum quality of object returned by the FIND command.

:GR# Get Telescope RA
Returns: HH:MM.T# or HH:MM:SS#
Depending which precision is set for the telescope

:Gr# Get current/target object RA
Returns: HH:MM.T# or HH:MM:SS
Depending upon which precision is set for the telescope

:GS# Get the Sidereal Time
Returns: HH:MM:SS#
The Sidereal Time as an ASCII Sexidecimal value in 24 hour format

:Gs# Get Smaller Size Limit
Returns: NNN'#
The size of the largest object returned by the FIND command expressed in arcminutes.

:GT# Get tracking rate
Returns: TT.T#
Current Track Frequency expressed in hertz assuming a synchonous motor design where a 60.0 Hz motor clock would produce 1 revolution of the telescope in 24 hours.

:Gt# Get Current Site Latitude
Returns: sDD*MM#
The latitude of the current site. Positive inplies North latitude.

:GVD# Get Telescope Firmware Date
Returns: mmm dd yyyy#

:GVN# Get Telescope Firmware Number
Returns: dd.d#

:GVP# Get Telescope Product Name
Returns: <string>#

:GVT# Get Telescope Firmware Time
returns: HH:MM:SS#

:Gy# Get deepsky object search string
Returns: GPDCO#
A string indicaing the class of objects that should be returned by the FIND/BROWSE command. If the character is upper case, the object class is return. If the character is lowercase, objects of this class are ignored. The character meanings are as follws:
G – Galaxies
P – Planetary Nebulas
D – Diffuse Nebulas
C – Globular Clusters
O – Open Clusters

:GZ# Get telescope azimuth
Returns: DDD*MM#T or DDD*MM'SS#
The current telescope Azimuth depending on the selected precision.

h – Home Position Commands

:hC# LX200GPS/RCX400 Only - Calibrate Home Position. This command causes a previously aligned telescope to seek the default home position, and remember its alignment relative to that home position. This command allows telescopes left in arbitrary positions to recover alignment using the :hF# command. Progress of this command can be checked with the :h?# command.

:hF# Autostar, LX200GPS/RCX400 and LX 16" Seeks the Home Position of the scope and sets/aligns the scope based on the encoder values stored in non-volatile memory
Returns: Nothing

:hIYYMMDDHHMMSS#

Bypass handbox entry of daylight savings, date and time. Use the values supplied in this command. This feature is intended to allow use of the LX200GPS/RCX400 from permanent installations where GPS reception is not possible, such as within metal domes. This command must be issued while the telescope is waiting at the initial daylight savings prompt.
Returns: 1 – if command was accepted.

:hN# LX200GPS/RCX400 only: Sleep Telescope. Power off motors, encoders, displays and lights. Scope remains in minimum power mode until a keystroke is received or a wake command is sent.

:hP# Autostar, LX200GPS/RCX400 and LX 16"Slew to Park Position
Returns: Nothing

:hS# LX200GPS/RCX400 and LX 16" – Sets the current scope position as the park position of the telescope. Subsequent to this command, a :hP# command will drive the scope to this mount relative position.
Returns: Nothing
LX200 – Ignored

:hW# LX200 GPS Only: Wake up sleeping telescope.

:h?# Autostar, LX200GPS/RCX400 and LX 16" Query Home Status
Returns:
0 Home Search Failed
1 Home Search Found
2 Home Search in Progress
LX200 Not Supported

H – Time Format Command

:H# Toggle Between 24 and 12 hour time format
Returns: Nothing

I – Initialize Telescope Command

:I# LX200 GPS Only - Causes the telescope to cease current operations and restart at its power on initialization.

L – Object Library Commands

:LB# Find previous object and set it as the current target object.
Returns: Nothing
LX200GPS/RCX400 & Autostar – Performs no function

:LCNNNN#
Set current target object to deep sky catalog object number NNNN
Returns : Nothing
LX200GPS/RCX400 & Autostar – Implemented in later firmware revisions

:LF# Find Object using the current Size, Type, Upper limit, lower limt and Quality contraints and set it as current target object.
Returns: Nothing
LX200GPS/RCX400 & Autostar – Performs no function

:Lf# Identify object in current field.
Returns: <string>#
Where the string contains the number of objects in field & object in center field.
LX200GPS/RCX400 & Autostar – Performs no function. Returns static string "0 - Objects found".

:LI# Get Object Information
Returns: <string>#
Returns a string containing the current target object's name and object type.
LX200GPS/RCX400 & Autostar – performs no operation. Returns static description of Andromeda Galaxy.

:LMNNNN#

Set current target object to Messier Object NNNN, an ASCII expressed decimal number.
Returns: Nothing.
LX200GPS/RCX400 and Autostar – Implemented in later versions.

:LN# Find next deep sky target object subject to the current constraints.
LX200GPS/RCX400 & AutoStar – Performs no function

:LoD# Select deep sky Library where D specifies
0 - Objects CNGC / NGC in Autostar & LX200GPS/RCX400
1 - Objects IC
2 – UGC
3 – Caldwell (Autostar & LX200GPS/RCX400)
4 – Arp (LX200GPS/RCX)
5 – Abell (LX200GPS/RCX)
Returns:
1 Catalog available
0 Catalog Not found
LX200GPS/RCX400 & AutoStar – Performs no function always returns "1"

:LsD# Select star catalog D, an ASCII integer where D specifies:
0 STAR library (Not supported on Autostar I & II)
1 SAO library
2 GCVS library
3 Hipparcos (Autostar I & 2)
4 HR (Autostar I & 2)
5 HD (Autostar I & 2)

Returns:
1 Catalog Available
2 Catalog Not Found

:LSNNNN#
Select star NNNN as the current target object from the currently selected catalog
Returns: Nothing
LX200GPS/RCX400 & AutoStar – Available in later firmwares

M – Telescope Movement Commands

:MA# Autostar, LX 16", LX200GPS/RCX400 – Slew to target Alt and Az
Returns:
0 - No fault
1 – Fault
LX200 – Not supported

:MgnDDDD#
:MgsDDDD#
:MgeDDDD#
:MgwDDDD#
Guide telescope in the commanded direction (nsew) for the number of milliseconds indicated by the unsigned number passed in the command. These commands support serial port driven guiding.
Returns – Nothing
LX200 – Not Supported

:Me# Move Telescope East at current slew rate
Returns: Nothing

:Mn# Move Telescope North at current slew rate
Returns: Nothing

:Ms# Move Telescope South at current slew rate
Returns: Nothing

:Mw# Move Telescope West at current slew rate
Returns: Nothing

:MS# Slew to Target Object
Returns:

0	Slew is Possible
1<string>#	Object Below Horizon w/string message
2<string>#	Object Below Higher w/string message

P - High Precision Toggle

:P# Toggles High Precsion Pointing. When High precision pointing is enabled scope will first allow the operator to center a nearby bright star before moving to the actual taget.
Returns: <string>

"HIGH PRECISION"	Current setting after this command.
"LOW PRECISION"	Current setting after this command.

$Q – Smart Drive Control

$Q# Toggles Smart Drive PEC on and off for both axis
Returns: Nothing
Not supported on Autostar

:$QA+# Enable Dec/Alt PEC [LX200GPS/RCX400 only]
Returns: Nothing

:$QA-# Enable Dec/Alt PEC [LX200GPS/RCX400 only]
Returns: Nothing

:$QS+# Enables SmartMount[LX200GPS/RCX400 only]
Returns: Nothing

:$QS-# Disables SmartMount[LX200GPS/RCX400 only]
Returns: Nothing

:$QU+# Enables SmartMount Update Mode[LX200GPS/RCX400 only]
Returns: Nothing

:$QU-# Disables SmartMount Update Mode[LX200GPS/RCX400 only]
Returns: Nothing

:$QZ+# Enable RA/AZ PEC compensation [LX200GPS/RCX400 only]
Returns: Nothing

:$QZ-# Disable RA/AZ PEC Compensation [LX200gpgs only]
Return: Nothing

Q – Movement Commands

:Q# Halt all current slewing
Returns:Nothing

:Qe# Halt eastward Slews
Returns: Nothing

:Qn# Halt northward Slews
Returns: Nothing

:Qs# Halt southward Slews
Returns: Nothing

:Qw# Halt westward Slews
Returns: Nothing

r – Field Derotator Commands

:r+# Turn on Field Derotator [LX 16" and LX200GPS/RCX400]
Returns: Nothing

:r-# Turn off Field Derotator, halt slew in progress. [Lx 16" and LX200GPS/RCX400]
Returns Nothing

R – Slew Rate Commands

:RC# Set Slew rate to Centering rate (2nd slowest)
Returns: Nothing

:RG# Set Slew rate to Guiding Rate (slowest)
Returns: Nothing

:RM# Set Slew rate to Find Rate (2nd Fastest)
Returns: Nothing

:RS# Set Slew rate to max (fastest)
Returns: Nothing

:RADD.D#
Set RA/Azimuth Slew rate to DD.D degrees per second [LX200GPS/RCX400 Only]
Returns: Nothing

:REDD.D#
Set Dec/Elevation Slew rate to DD.D degrees per second [LX200GPS/RCX400 only]
Returns: Nothing

:RgSS.S#
Set guide rate to +/- SS.S to arc seconds per second. This rate is added to or subtracted from the current tracking Rates when the CCD guider or handbox guider buttons are pressed when the guide rate is selected. Rate shall not exceed sidereal speed (approx 15.0417"/sec)[LX200GPS/RCX400 only]
Returns: Nothing

S – Telescope Set Commands

:SasDD*MM#
Set target object altitude to sDD*MM# or sDD*MM'SS# [LX 16", Autostar, LX200GPS/RCX400]
Returns:
1 Object within slew range
0 Object out of slew range

:SbsMM.M#
Set Brighter limit to the ASCII decimal magnitude string. SMM.M
Returns:
0 - Valid
1 – invalid number

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:SBn# Set Baud Rate n, where n is an ASCII digit (1..9) with the following interpertation

1	56.7K
2	38.4K
3	28.8K
4	19.2K
5	14.4K
6	9600
7	4800
8	2400
9	1200

Returns:

1 At the current baud rate and then changes to the new rate for further communication

:SCMM/DD/YY#

Change Handbox Date to MM/DD/YY

Returns: <D><string>

D = '0' if the date is invalid. The string is the null string.

D = '1' for valid dates and the string is "Updating Planetary Data# #"

Note: For LX200GPS/RCX400 this is the UTC data!

:SdsDD*MM#

Set target object declination to sDD*MM or sDD*MM:SS depending on the current precision setting

Returns:

1 - Dec Accepted

0 – Dec invalid

:SEsDD*MM#

Sets target object to the specificed selenographic latitude on the Moon.

Returns 1- If moon is up and coordinates are accepted.

0 – If the coordinates are invalid

:SesDDD*MM#

Sets the target object to the specified selenogrphic longitude on the Moon

Returns 1 – If the Moon is up and coordinates are accepted.

0 – If the coordinates are invalid for any reason.

:SfsMM.M#

Set faint magnitude limit to sMM.M

Returns:

0 – Invalid

1 - Valid

:SFNNN#

Set FIELD/IDENTIFY field diameter to NNN arc minutes.

Returns:

0 – Invalid

1 - Valid

:SgDDD*MM#

Set current site's longitude to DDD*MM an ASCII position string

Returns:

0 – Invalid

1 - Valid

:SGsHH.H#

Set the number of hours added to local time to yield UTC

Returns:

0 – Invalid

1 - Valid

:SHD#

Set Dightlight Savings Mode [Autostar II Only]. D=1 Sets Daylight savings. D=0 Clears Daylight savings.
Returns:

0 – Invalid
1 - Valid

:ShDD#

Set the minimum object elevation limit to DD#
Returns:

0 – Invalid
1 - Valid

:SlNNN#

Set the size of the smallest object returned by FIND/BROWSE to NNNN arc minutes
Returns:

0 – Invalid
1 - Valid

:SLHH:MM:SS#

Set the local Time
Returns:

0 – Invalid
1 - Valid

:SM<string>#

Set site 1's name to be <string>. LX200s only accept 3 character strings. Other scopes accept up to 15 characters.
Returns:

0 – Invalid
1 - Valid

:SN<string>#

Set site 2's name to be <string>. LX200s only accept 3 character strings. Other scopes accept up to 15 characters.
Returns:

0 – Invalid
1 - Valid

:SO<string>#

Set site 3's name to be <string>. LX200s only accept 3 character strings. Other scopes accept up to 15 characters.
Returns:

0 – Invalid
1 - Valid

:SP<string>#

Set site 4's name to be <string>. LX200s only accept 3 character strings. Other scopes accept up to 15 characters.
Returns:

0 – Invalid
1 - Valid

:SoDD*#

Set highest elevation to which the telescope will slew
Returns:

0 – Invalid
1 - Valid

:Sq#
Step the quality of limit used in FIND/BROWSE through its cycle of VP … SU. Current setting can be queried with :Gq#
Returns: Nothing

:SrHH:MM.T#
:SrHH:MM:SS#
Set target object RA to HH:MM.T or HH:MM:SS depending on the current precision setting.
Returns:
0 – Invalid
1 - Valid

:SsNNN#
Set the size of the largest object the FIND/BROWSE command will return to NNNN arc minutes
Returns:
0 – Invalid
1 - Valid

:SSHH:MM:SS#
Sets the local sidereal time to HH:MM:SS
Returns:
0 – Invalid
1 - Valid

:StsDD*MM#
Sets the current site latitude to sDD*MM#
Returns:
0 – Invalid
1 - Valid

:STTT.T#
Sets the current tracking rate to TTT.T hertz, assuming a model where a 60.0 Hertz synchronous motor will cause the RA axis to make exactly one revolution in 24 hours.
Returns:
0 – Invalid
1 - Valid

:SwN#
Set maximum slew rate to N degrees per second. N is the range (2..8)
Returns:
0 – Invalid
1 - Valid

:SyGPDCO#
Sets the object selection string used by the FIND/BROWSE command.
Returns:
0 – Invalid
1 - Valid

:SzDDD*MM#
Sets the target Object Azimuth [LX 16” and LX200GPS/RCX400 only]
Returns:
0 – Invalid
1 - Valid

T – Tracking Commands
:T+# Increment Manual rate by 0.1 Hz
Returns: Nothing

:T-# Decrement Manual rate by 0.1 Hz
Returns: Nothing

:TL# Set Lunar Tracking Rage
Returns: Nothing

:TM# Select custom tracking rate
Returns: Nothing

:TQ# Select default tracking rate
Returns: Nothing

:TDDD.DDDD#
Set Manual rate to the ASCII expressed decimal DDD.DDD. Based on a 60.0 Hz tracking as solar rate and 60.1643 as mean sidereal tracking rate.
Returns: '1'

U - Protocol Precision Toggle
:U# Toggle between low/hi precision positions
Low - RA displays and messages HH:MM.T sDD*MM
High - Dec/Az/El displays and messages HH:MM:SS sDD*MM:SS
Returns Nothing

V – PEC Readout
:VDNNNN#
Read out Dec PEC Table Entry [LX200 Classic 16" only]
Returns: D.DDDD
Rate Adjustment factor for worm segment NNNN. PecRate = TheoreticalRate * sD.DDD for this segment

:VRNNNN#
Read out RA PEC Table Entry [LX200 Classic 16" only]
Returns: D.DDDD
Rate Adjustment factor for worm segment NNNN. PecRate = TheoreticalRate * sD.DDD for this segment

W – Site Select
:W<n>#
Set current site to <n>, an ASCII digit in the range 1..4
Returns: Nothing

? – Help Text Retrieval
:??# Set help text cursor to the start of the first line.
Returns: <string>#
The <string> contains first string of the general handbox help file.

:?+# Retrieve the next line of help text
Returns: <string>#
The <string> contains the next string of general handbox help file

:?-# Retrieve previous line of the handbox help text file.
Returns: <string>#
The <string> contains the next string of general handbox help file