Model 7006-001

EMControl™ Positioner Controller Plug-In Card

User Manual

ETS-LINDGREN®
An ESCO Technologies Company

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Revision Record | MANUAL, EMCONTROL | Part #399348, Rev. B

Revision	Description	Date
A	Initial Release	May, 2014
B	Updated EMCenter models	June, 2014

Table of Contents

Notes, Cautions, and Warnings

	**Note:** Denotes helpful information intended to provide tips for better use of the product.
CAUTION	**Caution**: Denotes a hazard. Failure to follow instructions could result in minor personal injury and/or property damage. Included text gives proper procedures.
WARNING	**Warning**: Denotes a hazard. Failure to follow instructions could result in SEVERE personal injury and/or property damage. Included text gives proper procedures.

See the ETS-Lindgren *Product Information Bulletin* for safety, regulatory, and other product marking information.

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1.0 Introduction

The **ETS-Lindgren EMControl™ Positioner Controller Plug-in Card** is a versatile positioner controller which enables you to synchronize the simultaneous movements of up to two ETS-Lindgren positioning devices (for example, towers or turntables) and the on/off operation of an additional auxiliary device, such as a LISN or EUT.

EMControl allows a target location to be entered manually or under software control to redirect the device from its current location to another position. EMControl incorporates advanced acceleration and deceleration algorithms to accurately control variable, high speed drives.

Multiple EMControl cards can be utilized for applications with more than two positioning devices.

EMControl is designed for use with the EMCenter™ Modular RF Platform; for more information about EMCenter, see page 10.

EMControl is fully compatible with ETS-Lindgren towers and turntables manufactured in 2005 and later. Contact ETS-Lindgren for additional information.

EMCenter Modular RF Platform (Required)

The EMCenter Modular RF Platform is required for operation, and is sold separately.

Front Panel

Back Panel

The EMCenter may be controlled from a computer using these software products:

- ETS-Lindgren TILE!™ (Totally Integrated Laboratory Environment)
- ETS-Lindgren EMQuest™ Data Acquisition and Analysis Software
- Other test automation software

Contact ETS-Lindgren for ordering information.

Standard Configuration

- EMControl Positioner Controller Plug-in Card

Optional Items

- Fiber optic cable

ETS-Lindgren Product Information Bulletin

See the ETS-Lindgren *Product Information Bulletin* included with your shipment for the following:

- Warranty information
- Safety, regulatory, and other product marking information
- Steps to receive your shipment
- Steps to return a component for service
- ETS-Lindgren calibration service
- ETS-Lindgren contact information

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2.0 Maintenance

CAUTION

Before performing any maintenance, follow the safety information in the ETS-Lindgren *Product Information Bulletin* included with your shipment.

Maintenance of the EMControl card is limited to external components such as cables or connectors.

If you have any questions concerning maintenance, contact ETS-Lindgren Customer Service.

Maintenance of Fiber Optics

The fiber optic cables and connectors used with EMControl™ Positioner Controller Plug-in Card can be damaged from airborne particles, humidity and moisture, oils from the human body, and debris from the connectors they plug into. Always handle connectors and cables with care.

Fiber optic cables and connectors are easily broken if twisted or bent. Make sure the fiber optic cabling does not hang unsupported from where it connects to the EMControl card. Keep the cables as straight as possible from the connector to the protective sheath.

Following are additional guidelines to protect fiber optic cables.

Before performing any maintenance, disconnect the fiber optic cables from the unit and turn off power.

When disconnecting fiber optic cables, apply the included dust caps to the ends to maintain their integrity.

Before connecting fiber optic cables, clean the connector tips and in-line connectors.

Before attaching in-line connectors, clean them with moisture-free compressed air.

Failure to perform these tasks may result in damage to the fiber optic connectors or cables.

Service Procedures

For the steps to return a system or system component to ETS-Lindgren for service, see the *Product Information Bulletin* included with your shipment.

3.0 Specifications

For complete operating specifications, see the *EMCenter Modular RF Platform User Manual*.

Performance Specifications

Linear Resolution:	0.1 cm
Rotation Resolution:	0.1°
Form Factor:	Occupies one slot of EMCenter
Fiber Optic I/O:	• Device 1: In (1), Out (1) • Device 2: In (1), Out (1) • Auxiliary (2)

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4.0 EMControl Plug-In Card Installation

CAUTION

Before connecting any components, follow the safety information in the ETS-Lindgren *Product Information Bulletin* included with your shipment.

CAUTION

The EMControl card is designed to be used ONLY with the EMCenter. Do not use the card in combination with any other system.

Plug-In Card Installation

1. Determine in which empty slot in the EMCenter™ Modular RF Platform you want to install the EMControl™ Positioner Controller Plug-in Card. Looking at the back of the EMCenter, the slots are numbered 1 through 7 from left to right.
2. Remove the blind panel from the slot by removing the two screws at the top of the blind panel and the two screws at the bottom.
3. Carefully insert the EMControl card into the slot of the EMCenter. Tighten the four screws.
4. Turn on the EMCenter. The EMCenter will automatically detect the newly-installed EMControl card.
5. Depending on the test setup requirements, connect coaxial cables to the relay connections on the back panel of the EMCenter.
6. Connect the EMCenter to a personal computer using USB, RS-232, Ethernet, or IEEE (optional).
7. Plug the interlock into the connector on the back of the EMCenter.

The card installation is complete. You can control EMControl through the EMCenter touchscreen, with ETS-Lindgren TILE!™ (Totally Integrated Laboratory Environment), ETS-Lindgren EMQuest™ Data Acquisition and Analysis Software, and other test automation software packages. Contact ETS-Lindgren for additional information.

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5.0 Operation

CAUTION

Before placing into operation, follow the safety information in the ETS-Lindgren *Product Information Bulletin* included with your shipment.

CAUTION

Prior to operation, verify that the mains voltage is within the operating range of the equipment.

EMControl Connectors and Indicators

For information on connecting devices to EMControl, see the next section on page 20.

DEVICE 1 / DEVICE 2

The EMControl™ Positioner Controller Plug-in Card provides IN and OUT ports for connecting any combination of towers and turntables, up to two devices.

- Use **DEVICE 1** to connect a tower.
- Use **DEVICE 2** to connect a turntable.

AUX

EMControl provides two ports for connecting additional devices, such as LISNs (Line Impedance Stabilization Network) and EUTs (Equipment Under Test). They may be connected in any combination, up to two devices.

Use **AUX 1** and **AUX 2** to connect an additional device.

Connecting Devices to EMControl

DEVICE 1 / DEVICE 2: TOWERS AND TURNTABLES

To connect a tower or turntable to EMControl, use the dual fiber optic cable included with the device. The dual fiber optic cable provides two ST connectors at each end; either end can be connected to EMControl.

1. Plug an ST connector at one end of the fiber optic cable to the IN port of the device, and plug the ST connector at the other end to the OUT port on the EMControl card.
2. Plug the remaining ST connector at one end of the fiber optic cable to the OUT port of the device, and plug the remaining ST connector at the other end to the IN port on the EMControl card.

AUX: ADDITIONAL DEVICES

Connect additional devices such as LISNs and EUTs to the **AUX 1** and **AUX 2** ports on the EMControl card. Use **AUX 1** if connecting a single additional device.

Powering On and Off EMCenter

For information on using the EMCenter touchscreen, see the *EMCenter Modular RF Platform User Manual*.

POWER ON

If no devices are connected to EMControl, or if they are connected improperly, dashes will display on the screen when the power is turned on.

Verify all cards are installed correctly in the EMCenter. Verify all devices are properly connected to the EMControl card.

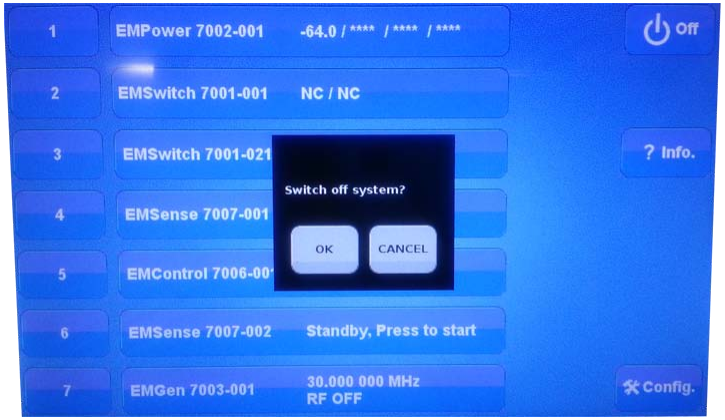
1. Plug the power cord from the mains inlet on the back panel of the EMCenter into a power outlet.
2. Plug the interlock jack into the interlock connector on the back panel of the EMCenter.
3. Turn the power switch located on the back panel of the EMCenter to the on position.

4. Touch anywhere on the EMCenter screen. It will take approximately 20 seconds to boot. The Information screen will flash, and then the Home screen will display.

Sample EMCenter Home Screen

POWER OFF

1. Press the **Off** button located on the EMCenter screen.



2. Press **OK** to switch off the system.

   The standby light located on the front panel of the EMCenter will flash, and then will illuminate steadily.

When the EMCenter is in standby mode, touch the screen anywhere to reboot.

3. Turn the power switch located on the back panel of the EMCenter to the off position.
4. Remove the power cord from the power connector on the back panel of the EMCenter.
5. Remove the interlock jack from the interlock connector on the back panel of the EMCenter.

Manual Control of EMControl

To control the movement of the connected positioning equipment and change settings, on the Home screen press the status box to the right of the slot number for the installed EMControl plug-in card (see page 22 for a sample Home screen). This will display the following EMControl screen:

Sample EMControl screen

Following is a description of each function you can perform from the EMControl screen:

- **Initiate Movement—**see page 25
- **Seek to a Specific Position for Connected Tower/Turntable—**see page 26
- **Stop Movement—**see page 26
- **Initiate Movement Between Upper and Lower Limit—**see page 26
- **Change Current Position—**see page 27
- **Change Speed—**see page 27
- **Control Auxiliary Devices—**see page 28
- **Change Other Settings—**see page 28
- **Define Speed Presets—**see page 30
- **Set Up Devices—**see page 31

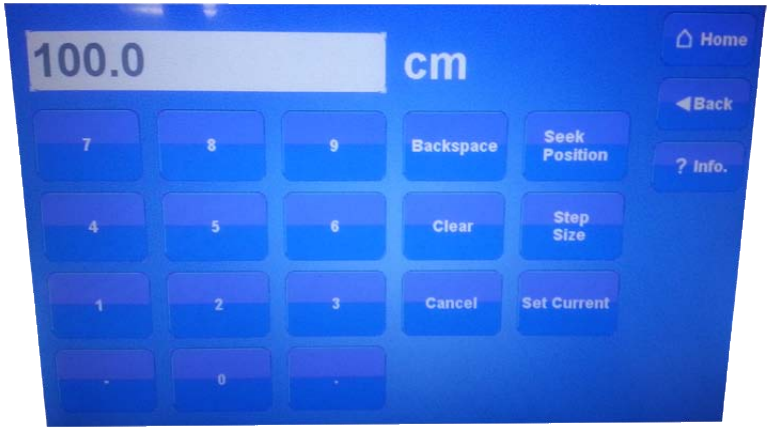
INITIATE MOVEMENT

From the EMControl screen use the Down button or Up button for a linear device like an antenna mast; use the CCW button or CW button for a rotational device like a turntable. Depending on the mode, these buttons will cause a different reaction. The mode can be set to **Jog**, **Step**, or **Run**.

- **Jog** mode—Movement continues as long as the button remains pressed. Releasing the button will stop the movement.
- **Step** mode—Each button push will result in motion defined by the step size. Step size is configured in **StepSize** on the Configuration screen; see *Change Other Settings* on page 28.
- **Run** mode—A button push initiates movement. Movement stops only when the **Stop** button is pressed.

Seek to a Specific Position for Connected Tower/Turntable

From the EMControl screen press the button displaying the current position. When the following Settings screen displays, enter the new number at the keypad, and then press **Seek Position** to move to this position.



EMControl Settings screen

Stop Movement

From the EMControl screen press **Stop**.

Initiate Movement Between Upper and Lower Limit

From the EMControl screen press **Scan** to initiate movement between the upper and lower limit for the number of cycles set in the **Scan Cycle Count** on the Configuration screen. Limits are also configured in the Configuration screen.

For information on the Configuration screen, see page 28.

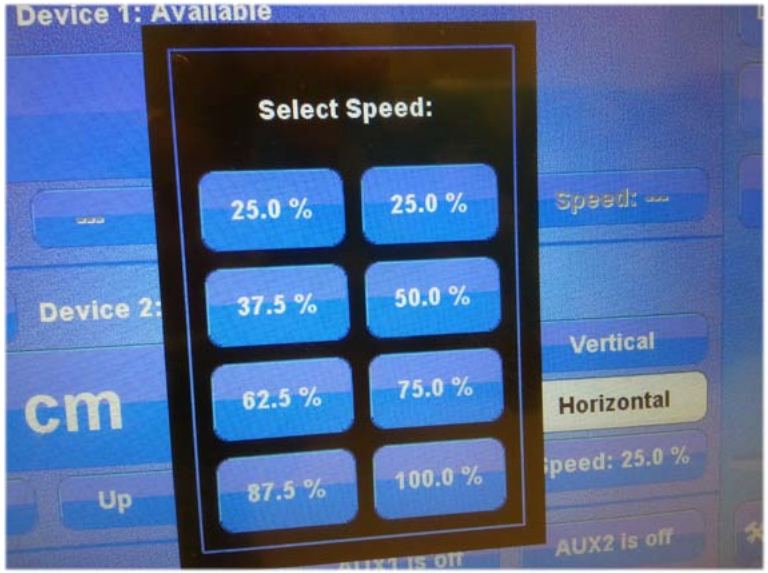
CHANGE CURRENT POSITION

From the EMControl screen press the button displaying the current position for the connected turntable or tower. When the Settings screen displays, enter the new number at the keypad, and then press **Set Current** to set this value as the current position.

CHANGE SPEED

Speed is expressed as a percentage of maximum speed; there are eight speeds to choose from. To change the speed, from the EMControl screen press **Speed** and then select the required speed from the Speeds screen.

The eight preset speeds available are configured by using the Speed Presets button in the Configuration screen. For information on Speed Presets, see page 30.



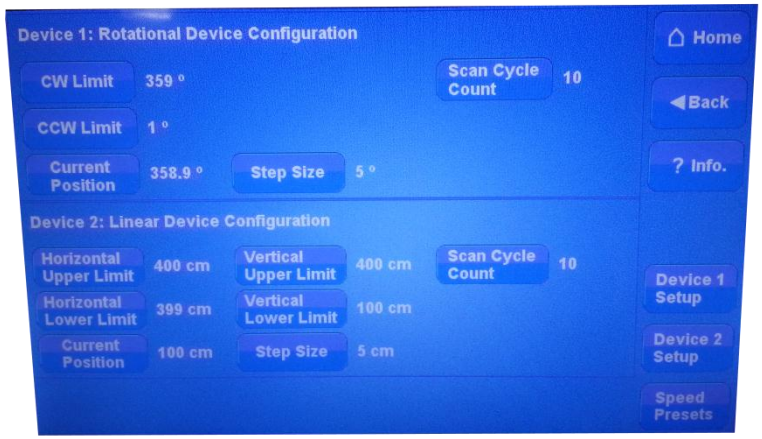
EMControl Speeds screen

CONTROL AUXILIARY DEVICES

To toggle the auxiliary ports 1 and 2 between on and off, from the EMControl screen press the AUX1 and AUX2 buttons.

CHANGE OTHER SETTINGS

To change other settings for the connected positioning equipment, from the EMControl screen press **Config** to display the following Configuration screen.



EMControl Configuration screen

Upper Limit/CW Limit
• Displays the current setting for the device. Upper limit is for towers and CW limit for turntables. • To change the current setting, press **Upper limit / CW Limit**, enter the new number at the keypad, and then press **degr.** (for turntable) or **cm** (for tower).

Lower Limit/CCW Limit
• Displays the current setting for the device. Lower Limit is for towers and CCW limit is for turntables. • To change the current setting, press **Lower limit/ CCW Limit**, enter the new number at the keypad, and then press **degr.** (for turntable) or **cm** (for tower).
Current Position
• Displays the current position for the device. • To change the current setting, press **Current position**, enter the new number at the keypad, and then press **degr.** (for turntable) or **cm** (for tower).
Scan Cycle Count
• Displays the scan cycle count, the number of times the positioner will move between the upper and lower limit while scanning. • To change the current setting press **Scan Cycle Count**, enter the new number at the keypad and press **Enter**.
Step Size
• Displays the step size, the number of degrees or cm the positioner will move in Step mode. • To change the current setting press **Step Size**, enter the new number at the keypad and press **Enter**.

Define Speed Presets

The Speed Presets screen enables you to define the eight speeds available for the positioner as a percentage of the maximum speed. Speeds can be preset for each device.

From the EMControl screen press **Config** to display the Configuration screen, and then press **Speed Presets** to access the Speed Presets screen.

Press **Speed**, use the keypad to enter the percentage of maximum speed, and then press the % button.

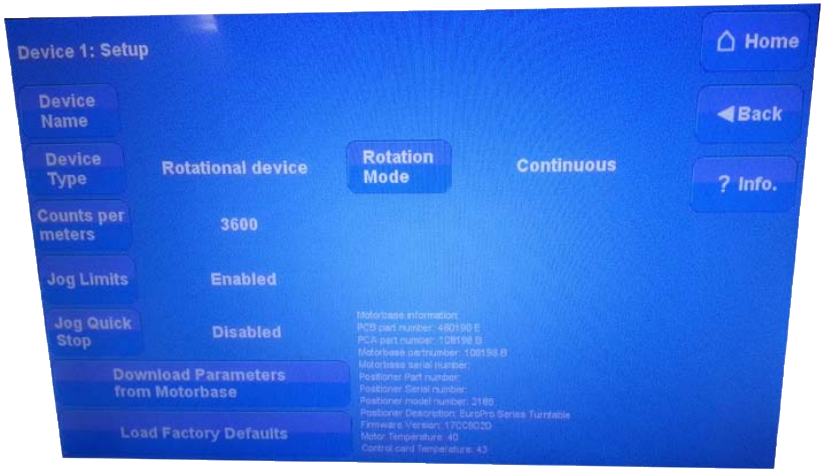
EMControl Speed Presets screen

The jog speed can be set to a value different from the other speeds. Set jog speed to **Disabled** to use the same speed in jog mode.

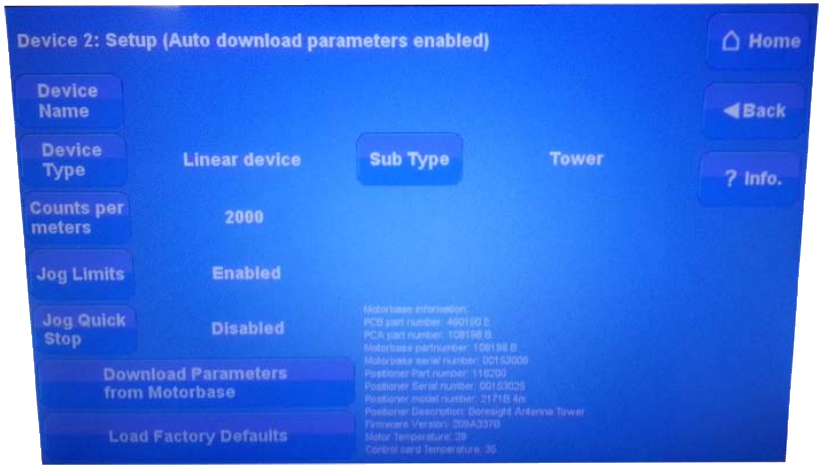
Device Acceleration sets the time to ramp up to the set speed from stop and the time to ramp down from set speed to stop. This can be set for each device individually. Press **Device Acceleration**, enter the time using the keypad, and then press **s** (seconds).

SET UP DEVICES

The Device Setup screen contains information about the device. From the EMControl screen press **Config** to display the Configuration screen, and then press **Device 1 Setup** or **Device 2 Setup**.



EMControl Device Setup screen (Device 1)



EMControl Device Setup screen (Device 2)

- Press **Device Name** to enter a custom name for the device.
- Press **Device Type** to select the type of device: linear (tower) or rotational (turntable). For rotational devices, a **Continuous** or **non-Continuous** mode sub-type can be selected; for linear devices a **Tower** or **Bore Sight Tower** sub-type can be selected**.**

In the continuous mode of operation a turntable is allowed unlimited movement. The counter readout is from 0 to 359.9 and the software limits are ignored. In the non-continuous mode, the turntable is restricted between upper and lower software limits.

All devices with an ETS-Lindgren motor base incorporate a counter or encoder. The number of counts per meter must be set to ensure accurate movement. Normally this number is factory-set and should not be changed.

In jog mode, users can select whether limits are respected. If **Jog Limits** is set to **Enabled**, movement is stopped when software limits are reached. If set to **Disabled**, movement can continue beyond software limits.

When **Jog Quick Stop** is disabled, stopping when in jog mode uses the device acceleration parameter to stop slowly. If **Jog Quick Stop** is enabled, releasing the button will result in an immediate stop.

For Bore Sight Towers, the distance to the equipment under test (**Bore Sight Distance**) and the correction (**Bore Sight Correction**) can be set. Bore Sight Correction can be **Standard**, **Alternate,** or **Dual-Mast**.

Press **Download Parameters** to download device parameters from the motor base and press **Load Factory Defaults** to use factory defaults.

6.0 EMControl Command Set

See *Detailed Description of Remote Commands* on page 34 for the commands that can be used with the EMControl™ Positioner Controller Plug-in Card. Each command must include a slot number and a device ID number as the prefix.

The prefix is **sd**,where:

s = the slot number of the EMControl in the EMCenter

d = the device ID

The EMControl has two devices, Device 1 and Device 2.
The device ID for Device 1 is **A**; the device ID for Device 2 is **B**.

For example, to send the **CP?** command to device 1 of the EMControl located in slot 6 of the EMCenter™ Modular RF Platform, the complete command would be:

6ACP?\n

To send the **CP?** command to device 2 of the EMControl located in slot 5, the complete command would be:

5BCP?\n

- Terminate each command with a carriage return (CR).
- Each response from the device is terminated with a carriage return (CR).

Detailed Description of Remote Commands

The following notation is used for each command:

Description: Description of the command function and any associated special information.

Devices: List of device types this command applies to.

- **Towers** refers to all linear positioning devices.
- **Turntables** refers to all rotational positioning devices

Syntax: **cmd <required parameter> [optional parameter]**

Parameter list: List of parameters and their descriptions (as required) with any associated special information.

Response: If applicable, description of expected response from queries, with any associated special information.

Example: Write **sdCMD PARM\n** : Command to write or query

- **s** : slot number of the EMControl in the EMCenter
- **d** : the device ID
- **CMD** command
- **PARM** parameters

Detailed Command List

ACC

Description: Sets acceleration.

Devices: Towers, turntables

Syntax: **ACC <accel>**

- **accel** : Desired acceleration. Valid values are in the range of 0.1 seconds to 30.0 seconds.

Example: Write **sdACC 2.0\n** : Set acceleration to 2.0 s

See Also: **ACC?**

ACC?

Description: Gets acceleration.

Devices: Towers, turntables

Syntax: **ACC?**

Response: **<accel>** : Acceleration between 0.1 seconds and 30.0 seconds

Example:

- Write **sdACC?\n**: Set acceleration to 2.0 s
- Read response
- Response is **2.0\n** : Acceleration is 2.0 s

See Also: **ACC**

AUX#

Description: Activates or deactivates specified auxiliary device

Devices: Auxiliary devices (command can be sent to towers or turntables)

Syntax: **AUX# <ON/OFF>**

- **#** : Desired auxiliary control device number. Valid values are in the range of 1–2.
- **ON/OFF** : Set the specified auxiliary port ON or OFF.

Example:

- Write **sdAUX1 ON\n** : Turn auxiliary 1 on
- Write **sdAUX2 OFF\n** : Turn auxiliary 2 off

See Also: **AUX#?**

AUX#?

Description: Queries the state of the specified auxiliary device control.

Devices: Auxiliary devices (command can be sent to towers or turntables)

Syntax: **AUX#?**

- **#** : Desired auxiliary control device number. Valid values are in the range of 1–2.

Response: **<number>** : Returns **1** if on, **0** if off

Example:

- Write **sdAUX1?\n** : Query state of auxiliary 1
- Read response
- Response is **1\n** : Auxiliary is on

See Also: **AUX#**

CAL

Description: Changes the encoder calibration setting of the device. Value must be between 1 and 9999. This number is the number of encoder counts per meter or revolution.

The default value for an ETS-Lindgren tower is 2000 counts per meter, and for an ETS-Lindgren turntable is 3600 counts per revolution.

This command is intended to allow automated configuration of the EMControl and should not be used by most programs.

Devices: Towers, turntables

Syntax: **CAL <XXXX>**

- **<XXXX>** : Integer value for the encoder calibration to be set. Leading zeroes are optional.

Example: Write **sdCAL 2000\n** : Set tower encoder to 2000 counts/meter

See Also: **CAL?**

CAL?

Description: Query the encoder calibration setting of the device. Value returned is between 1 and 9999. This number is the number of encoder counts per meter or revolution.

Devices: Towers, turntables

Syntax: **CAL?**

Example: Write **sdCAL?\n** : Query encoder cal

Read response

Response is **2000\n** : Encoder set to 2000 counts/meter

See Also: **CAL**

CC

Description: Instructs the turntable to move in the counterclockwise direction. This movement is limited by the counterclockwise limit.

Devices: Turntables

Syntax: **CC**

Example: Write **sdCC\n** : Direct turntable to rotate counterclockwise

See Also: **CW**

CL

Description: Changes the counterclockwise limit of the device. The specified value must be less than the clockwise limit and between –999 and 999.

Devices: Turntables

Syntax: **CL [+/–] XXX**

- **+** : Optional for positive values
- **–** : Necessary for negative values
- **XXX** : Decimal value for the counterclockwise limit to be set in degrees. Leading zeroes are optional.

Example: Write **sdCL –100\n** : Change CCW limit of the turntable to –100 degrees

See Also: **CL?**

CL?

Description: Queries the turntable counterclockwise limit. The value returned in XXX format. Negative values are preceded by a **–** (minus sign).

Devices: Turntables

Syntax: **CL?**

Response: **[-]XXX** : Value of the counterclockwise limit setting in degrees

Example:

- Write **sdCL?\n** : Query turntable counterclockwise limit
- Read response
- Response is **200\n** : Counterclockwise limit is 200 degrees

See Also: **CL**

CP

Description: Changes the current position of the device. Value must be between –999.9 and 999.9.

Devices: Towers, turntables

Syntax: **CP [+/-] XXX[.X]**

- **+** : Optional for positive values
- **–** : Necessary for negative values
- **XXX[.X]** : Decimal value for the current position to be set in centimeters for towers and degrees for turntables.
  .X is optional. Leading zeroes are optional.

Example: Write **sdCP 100.7\n** : Change tower current position to 100.7 cm

See Also: **CP?**

CP?

Description: Query the current position. The value returned is XXX.X format. Negative values are preceded by a **–** (minus sign). Towers return current position in centimeters, turntables return in degrees.

Devices: Towers, turntables

Syntax: **CP?**

Response: **[-]XXX[.X] DEGREES** or **CM** : Value of the current position in centimeters for towers or degrees for turntables

Example:

- Write **sdCP?\n** : Query tower current position

  Read response

  Response is **100.2 CM\n** : Current position is 100.2 cm

- Write **sdCP?\n**

  Read response

  Response is **200.5 DEGREES\n** : Current position is 200.5 degrees

See Also: **CP**

CW

Description: Instructs the turntable to move in the clockwise direction. This movement is limited by the clockwise limit

Devices: Turntables

Syntax: **CW**

Example: Write **sdCW\n** : Instruct turntable to rotate clockwise

See Also: **CC**, **ST**

CY

Description: Changes the cycle count for the device. The value must be between 0.0 and 999.5. A value of **0** or **000.0** represents an infinite scan count.

A cycle represents a full scan from limit to limit and back again starting at the closest limit. The addition of the 0.5 cycle steps allows the controller to scan between the limits an integral number of times instead of always performing an even number of scans from limit to limit.

Devices: Towers, turntables

Syntax: **CY XXX.X**

- **XXX.X** : Decimal value between 0.0 and 999.5 in steps of 0.5. Leading zeroes are optional.

Example:

- Write **sdCY 000\n** : Set cycle count of tower to infinite
- Write **sdCY 2.5\n** : Set the turntable to scan between its limits 2.5 times

See Also: **CY?**

CY?

Description: Queries the cycle count for the device. A four-digit value is returned between the value of 000.0 and 999.5. A value of 000.0 represents an infinite scan count.

Devices: Towers, turntables

Syntax: **CY?**

- **XXX.X** : Value of the scan cycle setting

Example:

- Write **sdCY?\n** : Query turntable cycle count
- Read response
- Response is **5\n** : Cycle count is 5

See Also: **CY**

DIR?

Description: Queries the motion direction for the device.

Devices: Towers, turntables

Syntax: **DIR?**

- **<direction>** : Value indicating the current motion of the queried device
- **+1** : Device is moving up/clockwise
- **0** : Device is stopped
- **–1** : Device is moving down/counterclockwise

Example:

- Write **sdDIR?\n** : Query tower motion direction

  Read response

  Response is **–1\n** : Device is moving down

- Write **sdDIR?\n** : Query turntable motion direction

  Read response

  Response is **1\n** : Turntable is moving clockwise

See Also: ***OPC?**

DN

Description: Instructs the tower boom to move in the down direction. This movement is limited by the lower limit.

Devices: Towers

Syntax: **DN**

Example: Write **sdDN\n** : Instruct the boom of the tower to move down

See Also: **ST**, **UP**

ERE

Description: Set Device Dependent Error Enable Register. Causes changes in the contents of the Device Dependent Error Enable Register.

Requires a decimal argument in binary form to set the register.

The bits of the argument correspond to the bits of the Device Dependent Error Register. Setting a bit in this register allows the corresponding bit in the Device Dependent Error Register to cause the DDE bit in the Status Byte Register to be set.

Devices: Towers, turntables

Syntax: **ERE XXXXX**

- **XXXXX** : Integer value representing a 16-bit binary number 0–65535

Example: Write **sdERE 64\n** : Allow a polarization violation to set the DDE bit of STB

See Also: **ERE?**, **ERR?**, ***STB?**

ERE?

Description: Query Device Dependent Error Enable Register. Prepares the controller to respond with the contents of the Device Dependent Error Enable Register when queried.

Value returned is an integer number in the range of 0 to 65535. This value, when expressed in binary form, represents bit values of the Device Dependent Error Enable Register.

Devices: Towers, turntables

Syntax: **ERE?**

- **<ERE bits>** : Integer value representing a 16-bit binary number 0–65535

Example:

- Write **sdERE?\n** : Query ERE register
- Read response
- Response **64\n** : Allow a polarization violation to set the DDE bit of STB

See Also: **ERE**, **ERR?**, ***STB?**

ERR?

Description: Query Device Dependent Error Register. Prepares the controller to respond to the contents of the Device Dependent Error Register when queried.

Value returned is a decimal in the range of 0 to 65535. This value, when expressed in binary form, represents the 16-bit value of the Device Dependent Error Register.

Upon reading this register, its contents will be cleared. As long as bits are set in this register, any commands related to device motion or position settings will generate an execution error.

Devices: Towers, turntables

Syntax: **ERR?**

Response: **<error bits>** : Integer value representing a 16-bit binary number 0–65535. The bits are defined as follows:

- **0 – Undefined**
- **1 – Parameters Lost** : Set at startup if the EMControl detects that previous settings have been lost.
- **2 – Motor Not Moving** : Indicates a device stuck condition. The controller automatically generates a STOP condition to protect the motor.
- **3 – Motor Not Stopping** : Indicates that the device failed to stop moving when commanded.
- **4 – Moving Wrong Direction** : Indicates that the device moved in the opposite direction of than commanded.
- **5 – Hard Limit Hit** : Indicates that the device is unable to move because it is at a hardware limit.
- **6 – Polarization Limit Violation** : Indicates that the tower was told to change polarization while it was outside the position limits specified for the new polarization.

ERR? Response (continued):

- **7 – Communication Lost** : Indicates that the controller is unable to communicate with the device over the fiber optic link.
- **8 – Flotation Violation** : Indicates that the air flotation turntable was told to turn flotation off while it was moving.
- **9 – Encoder Failure** : Indicates that the EMControl has detected device encoder behavior consistent with a fault in the encoder, its wiring, or connections.
- **10 – Undefined**
- **11 – Undefined**
- **12 – Undefined**
- **13 – Undefined**
- **14 – Undefined**
- **15 – Undefined**

Example:

- Write **sdERR?\n** : Query error register
- Read Response
- Response is **4\n** : Motor not moving

See Also: **ERE, ERE?, *STB?**

LH

Description: Changes the lower limit of the device for horizontal polarity. The specified value must be less than the upper limit for the horizontal polarization and between –999 and 999.

Devices: Towers

Syntax: **LH [+/-] XXX** : Decimal value for the lower limit to be set in centimeters. Leading zeroes are optional.

- **+** : Optional for positive values
- **–** : Necessary for negative values

Example: Write **sdLH 235\n** : Set horizontal polarity lower limit to 235 cm

See Also: **LH?**

LH?

Description: Queries the lower limit of the device for horizontal polarity. The value returned is in **XXX** format. Negative values are preceded by a **–** (minus sign).

Devices: Towers

Syntax: **LH?**

- **[–]XXX** : Value of the lower limit for horizontal polarization in centimeters

Example:

- Write **sdLH?\n** : Query horizontal lower limit
- Read response
- Response is **235\n** : Horizontal lower limit is 235 cm

See Also: **LH**

LL

Description: Changes the lower limit of the device. The specified value must be less than the upper limit and between –999 and 999.

This command simultaneously affects the horizontal and vertical limits.

Devices: Towers

Syntax: **LL [+/–] XXX**

- **+** : Optional for positive values
- **–** : Necessary for negative values
- **XXX** : Decimal value for the lower limit to be set in centimeters. Leading zeroes are optional.

Example: Write **sdLL 208\n** : Change both the horizontal and vertical polarization lower limits of the tower to 208 cm.

See Also: **LL?**

LL?

Description: Query the lower limit of the device. **LL?** returns the limit associated with the current polarization mode.

The value returned is in XXX format depending upon the current numeric mode. Negative values are preceded by a – (minus sign).

Devices: Towers

Syntax: **LL?**

Response: **[–]XXX** : Value of the lower limit for the current polarization in centimeters

Example:

- Write **sdLL?\n** : Query tower lower limit for current polarization
- Read response
- Response is **208\n** : Lower limit of the tower is 208 cm

See Also: **LL**

LV

Description: Changes the lower limit of the device for vertical polarity. The specified value must be less than the upper limit for the vertical polarization and between –999 and 999.

Devices: Towers

Syntax: **LV [+/–] XXX**

- **+** : Optional for positive values
- **–** : Necessary for negative values
- **XXX** : Decimal value for the lower limit to be set in centimeters. Leading zeroes are optional.

Example: Write **sdLV 95\n** : Set vertical polarity lower limit to 95 cm

See Also: **LV?**

LV?

Description: Queries the lower limit of the device for vertical polarity.

The value returned is in XXX format depending upon the current numeric mode. Negative values are preceded by a – (minus sign).

Devices: Towers

Syntax: **LV?**

Response: **[–]XXX** : Value of the lower limit for the vertical polarization in centimeters

Example:

- Write **sdLV?\n** : Query vertical lower limit
- Read response
- Response is **95\n** : Vertical lower limit is 95 cm

See Also: **LV**

MBSND

Description: Sets the sound mode of the motor base.

Devices: Towers, turntables

Syntax: **MBSND X**

- **X** is between 0 and 3

Example: Write **sdMBSND 1\n** : Set the sound mode to 1

See Also: **MBSND?**

MBSND?

Description: Queries the sound mode of the motor base.

Devices: Towers, turntables

Syntax: **MBSND?**

Response: **X** : Value of sound mode of the motor base

Example:

- Write **sdMSBND?\n** : Query sound mode
- Read response
- Response is **1\n** : Sound mode is 1

See Also: **MBSND**

PARM:BCT

Description: Sets the bore sight correction.

Devices: Bore Sight Towers

Syntax: **PARM:BCT X**

- **X** : Value of bore sight correction

  0 : Standard

  1 : Alternate

  2 : Dual-Mast

Example: Write **PARM:BCT 1\n** : Set bore sight correction to **Alternate**

See Also: **PARM:BCT?**

PARM:BCT?

Description: Queries the bore sight correction.

Devices: Bore Sight Towers

Syntax: **PARM:BCT?**

Response:

- **<correction>** : Value of boresight correction

  0 : Standard

  1 : Alternate

  2 : Dual-Mast

Example:

- Write **sdPARM:BCT?\n** : Query bore sight correction
- Read response
- Response is **1\n** : Bore sight correction is Alternate

See Also: **PARM:BCT**

PARM:LIMST

Description: Sets the step key limit.

Devices: Turntables, towers

Syntax: **PARM:LIMST X**

- **X** : Enable or disable step key limit

  0 : Disable

  1 : Enable

Example: Write **sdPARM:LIMST 0\n** : Disable step key limit

See Also: **PARM:LIMST?**

PARM:LIMST?

Description: Queries the step key limit.

Devices: Turntables, towers

Syntax: **PARM:LIMST?**

Response:

- **<limit>** : Value of step key limit

  0 : Disabled

  1 : Enabled

Example:

- Write **sdPARM:LIMST?\n** : Query bore sight correction
- Read response
- Response is **0\n** : Step key limit disabled

See Also: **PARM:LIMST**

PARM:QKST

Description: Sets the quick stop.

Devices: Turntables, towers

Syntax: **PARM:QKST X**

- **X** : Enable or disable quick stop

  0 : Normal deceleration

  1 : Fast deceleration

Example: Write **sdPARM:QKST 0\n** : Set normal deceleration

See Also: **PARM:QKST?**

PARM:QKST?

Description: Queries the quick stop parameter.

Devices: Turntables, towers

Syntax: **PARM:QKST?**

Response:

- **<quickstop>** : Value of quick stop parameter

  0 : Normal deceleration

  1 : Fast deceleration

Example:

- Write **sdPARM:QKST?\n** : Query the quick stop parameter
- Read response
- Response is **0\n** : Normal deceleration

See Also: **PARM:QKST**

PH

Compatibility: All

Description: Instructs a tower to change its boom polarization to horizontal.

Devices: Towers

Syntax: **PH**

Example: Write **sdPH\n** : Change boom polarization to horizontal

See Also: **P?**, **PV**

PV

Compatibility: All

Description: Instructs a tower to change its boom polarization to vertical.

Devices: Towers

Syntax: **PV**

Example: Write **sdPV\n** : Change boom polarization to vertical

See Also: **P?**, **PH**

P?

Description: Queries the polarization of the tower boom.

Devices: Towers

Syntax: **P?**

Response:

- **<polarization>** : Value indicating the polarization setting of the queried device

  0 : Vertical

  1 : Horizontal

Example:

- Write **sdP?\n** : Query tower boom polarization
- Read response
- Response is **1\n** : Polarization is horizontal

See Also: **PH**, **PV**

S#

Description: Changes the speed selection of a two-speed or variable speed device.

Devices: Turntables, towers

Syntax: **S#**

- **#** : For a two-speed device: 1=high, 2=low

  For variable speed devices: 1–8=preset speed selection

Example: Write **sdS1\n** : Change to high speed/preset 1

See Also: **S?**, **SS#**, **SS#?**

S?

Description: Queries the speed selection of a two-speed or variable speed device.

For a two-speed device, a single digit value of **1** is returned if in high-speed mode. Otherwise, a value of **2** is returned for low-speed mode.

For a variable speed device, returns a single digit value of 1–8 to report the currently-selected speed preset.

Devices: Turntables, towers

Syntax: **S?**

Response: **<speed select>** : Value between 1 and 8 indicating the currently-selected speed setting

Example:

- Write **sdS?\n** : Query turntable speed
- Read response
- Response is **3\n** : Speed setting is 3

See Also: **S#**, **SS#**, **SS#?**

SC

Description: Instructs the device to begin scanning between preset lower and upper limits. The number of scans performed is determined by the value of cycles (CY) parameter which must be set prior to issuing the scan command.

Devices: Turntables, towers

Syntax: **SC**

Example: Write **sdSC\n** : Put device in scan mode

See Also: **CY**, **CY?**, **SC?**

SC?

Description: Queries the device to determine if scan mode is active.

Devices: Turntables, towers

Syntax: **SC?**

Response:

- **<active>** : Value indicating if scan mode is active for the queried device

  0 : Device is not in scan mode

  1 : Device is scanning

Example:

- Write **sdSC?\n** : Ask device if it is scanning
- Read response
- Response is **1\n** : Scanning

See Also: **SC**

SEP

Description: Changes the separation distance between the mast and the EUT. This value may be 3, 10, or 30 meters. This value is used in the calculation of the adjusted height when in bore sight mode.

Devices: Bore Sight Towers

Syntax: **SEP**

- **XX** : 3, 10, or 30. Invalid values are ignored. Leading zeroes are optional.

Example: Write **sdSEP 03\n** : Change separation distance to 3 meters

See Also: **SEP?**

SEP?

Description: Query the separation distance between the mast and the EUT. Value returned is in the form of XXX. Values returned are 003, 010, or 030 meters.

Devices: Bore Sight Towers

Syntax: **SEP?**

Response:

- **<distance>** : Value of the bore sight separation distance. Valid return values are:

  003 : 3 meters

  010 : 10 meters

  030 : 30 meters

Example:

- Write **sdSEP?\n** : Query separation distance
- Read response
- Response is **3\n** : Separation distance is 3 m

See Also: **SEP**

SK

Description: Instructs the device to begin seeking the specified target value. The target must be located between the current upper/clockwise and lower/counterclockwise limits.

For a continuous rotation turntable or tuner, the device will seek the target value by the shortest possible path. Thus, a seek from 359.9 to 0.0 will rotate clockwise, not counterclockwise.

See the SKN, SKP, and SKR commands for other ways to control the seek direction.

Devices: Turntables, towers

Syntax: **SK [+/–] XXX[.X]**

- **+** : Optional for positive values
- **–** : Necessary for negative values
- **XXX[.X]** : Decimal value for the seek target in centimeters for towers and degrees for turntables. Leading zeroes are optional.

Example: Write **sdSK 100.0\n** : Instruct tower boom to seek 100.0 cm or turntable to seek 100.0 degrees

See Also: **SKN**, **SKP**, **SKR**, **TG**, **TG?**

SKN

Description: Instructs the device to begin seeking the specified target value in the negative (down/counterclockwise) direction only.

If the target is up/clockwise from the current position, no motion occurs. The target must be located between the current upper/clockwise and lower/counterclockwise limits.

This command is provided primarily to support continuous rotation turntables and reverberation paddles. It allows forcing the seek of a position from a particular direction. Thus, a SKN from 180.0 to 181.0 will rotate counterclockwise to reach the target value.

Devices: Turntables, towers

Syntax: **SKN [+/–] XXX[.X]**

- **+** : Optional for positive values
- **–** : Necessary for negative values
- **XXX[.X]** : Decimal value for the seek target in centimeters for towers and degrees for turntables. Leading zeroes are optional.

Example: Write **sdSKN 100.0/n** : Instruct tower boom to seek 100.0 cm if CP > 100.0 or turntable to seek 100.0 degrees if CP > 100.0 in continuous rotation mode

See Also: **SK**, **SKP**, **SKR**

SKP

Description: Instructs the device to begin seeking the specified target value in the position (up/clockwise) direction only.

If the target is down/ counterclockwise from the current position, no motion occurs. The target must be located between the current upper/clockwise and lower/counterclockwise limits.

This command is provided primarily to support continuous rotation turntables and reverberation paddles. It allows forcing the seek of a position from a particular direction. Thus, a SKP from 181.0 to 180.0 will rotate clockwise to reach the target value.

Devices: Turntables, towers

Syntax: **SKP [+/–] XXX[.X]**

- **+** : Optional for positive values
- **–** : Necessary for negative values
- **XXX[.X]** : Decimal value for the seek target in centimeters for towers and degrees for turntables. Leading zeroes are optional.

Example: Write **sdSKP 255.0\n**

Instruct tower boom to seek 255.0 cm if CP < 255.0 or turntable to seek 255.0 degrees if CP < 255.0 or ‘ in continuous rotation mode

See Also: **SK**, **SKN**, **SKR**

SKR

Description: Instructs the device to begin seeking the specified target value relative to the current position.

The specified value is added to the current position to obtain the target position. Thus, a positive value will cause up/clockwise motion and a negative value will cause down/counterclockwise motion. If the calculated target is not located between the current upper/clockwise and lower/counterclockwise limits, motion will continue in the target direction until a limit is hit.

Devices: Turntables, towers

Syntax: **SKR [+/–] XXX[.X]**

- **+** : Optional for positive values
- **–** : Necessary for negative values
- **XXX[.X]** : Decimal value for the distance to move from the current position. This value is in centimeters for towers and degrees for turntables. Leading zeroes are optional.

Example: Write **sdSKR 10.0\n**

Instruct tower boom to move up 10.0 cm from CP

Instruct turntable to move CW 10.0 degrees

See Also: **SK**, **SKP**, **SKN**

SPEED

Description: Sets the speed as a percentage of maximum speed.

Devices: Turntables, towers

Syntax: **SPEED XX.[X]**

- **XX.[X]** : Percentage of maximum speed

Example: Write **sdSPEED 54.3\n** : Change to 54.3% of max speed

See Also: **SPEED?**, **S?**, **SS#**, **SS#?**

SPEED?

Description: Queries the speed as a percentage of maximum speed.

Devices: Turntables, towers

Syntax: **SPEED?**

Response: **<speed >** : Value as a percentage of maximum speed

Example:

- Write **sdSPEED?\n**
- Read response
- Response is **25\n** : Speed is 25% of max speed

See Also: **SPEED**, **S#**, **SS#**, **SS#?**

SS#

Description: Sets a preset speed setting for a variable speed device.

Devices: Turntables, towers

Syntax: **SS# <speed>**

- **#** : A value from 1–8 to select the preset speed register to set.

There can be no white space between the command and the register number. However, there must be white space between the register number and the speed value.

- **<speed>** : Value from 0–255 representing the desired speed setting for the specified speed selection. A value of 0 represents the minimum available speed of the device, while a value of 255 represents the maximum. The actual speed of the device is given approximately by the formula:

Actual Speed = <speed> (MaxSpeed – MinSpeed) / 255 + MinSpeed

Example:

- Write **sdSS2 127\n** : Set speed 2 to half speed
- Write **sdSS5 63\n** : Set speed 5 to quarter speed

See Also: **S#**, **S?**, **SS#?**

SS#?

Description: Queries a preset speed setting for a variable speed device.

Devices: Turntables, towers

Syntax: **SS#?**

- **#** : A value from 1–8 to select the preset speed register to query

There can be no white space between the command, the number, and the question mark (?).

Response: **<speed setting>** : Value between 0 (minimum) and 255 (maximum) speed

Example:

- Write **sdSS7?\n** : Query speed preset #7
- Read response
- Response is **127\n** : Preset 7 is set to half max speed

See Also: **S#**, **S?**, **SS#**

ST

Description: Causes device motion to stop.

Devices: Turntables, towers

Syntax: **ST**

Example: Write **sdST\n** : Stops device motion

See Also: **CC**, **CW**, **DN**, **SC**, **SK**, **UP**

TT

Description: Selects turntable mode of operation. Allows the selection of normal, two speed, and air flotation turntables.

In the air flotation mode of operation, the UP/DOWN is controlled automatically by the EMControl, assuring that the table is floating before a movement is made.

This command is intended to allow automated configuration of the EMControl and should not be used by most programs.

Devices: Turntables, towers

Syntax: **TT <NRM/AIR/TWO> <CONT/NONCONT>**

- **NRM** : Normal turntable
- **AIR** : Air flotation turntable
- **TWO** : Two-speed turntable
- **CONT** : Continuous rotation turntable
- **NONCONT** : Non-continuous rotation turntable

Example: Write **sdTT NRM CONT\n** : Change device from a tower to a normal, continuous turntable

See Also: **TWR**, **TYP?**

TWR

Description: Selects tower mode of operation.

Allows the selection of both normal and bore sight towers. In the bore sight mode of operation, the separation distance is taken into account when reporting boom height.

This command is intended to allow automated configuration of the EMControl and should not be used by most programs.

Devices: Turntables, towers

Syntax: **TWR <NRM/BOR>**

- **NRM** : Normal tower
- **BOR** : Bore sight tower

Example: Write **sdTWR NRM\n** : Change device to a normal tower

See Also: **TT**, **TYP?**

TYP?

Description: Queries the current device type configuration.

Devices: Turntables, towers

Syntax: **TYP?**

Response: **<type string>** : String indicating the device type and configuration. Possible values are:

- **TWR NRM** : Tower, Normal
- **TWR BOR** : Tower, Bore sight
- **TT NRM CONT** : Turntable, Normal, Continuous rotation
- **TT NRM NONCONT** : Turntable, Normal, Non-Continuous rotation
- **TT AIR CONT** : Turntable, Air Flotation, Continuous rotation
- **TT AIR NONCONT** : Turntable, Air Flotation, Non-Continuous
- **TT TWO CONT** : Turntable, Two Speed, Continuous rotation
- **TT TWO NONCONT** : Turntable, Two Speed, Non-Continuous

Example:

- Write **sdTYP?\n** : Query device type
- Read response
- Response is **TWR BOR\n** : Tower Bore sight

See Also: **TT**, **TWR**

UH

Description: Changes the upper limit of the device for horizontal polarity. The specified value must be greater than the lower limit for horizontal polarization and between –999 and 999.

Devices: Towers

Syntax: **UH [+/–] XXX**

- **+** : Optional for positive values
- **–** : Necessary for negative values
- **XXX** : Decimal value for the upper limit to be set in centimeters. Leading zeroes are optional.

Example: Write **sdUH 300\n** : Set horizontal polarity upper limit to 300 cm

See Also: **UH?**

UH?

Description: Queries the upper limit of the device for horizontal polarity. The value returned is in XXX format. Negative values are preceded by a **–** (minus sign).

Devices: Towers

Syntax: **UH?**

Response: **[–]XXX** : Value of the upper limit for horizontal polarization in centimeters

Example:

- Write **sdUH?\n** : Query horizontal upper limit
- Read response
- Response is **300\n** : Horizontal polarity upper limit is 300 cm

See Also: **UH**

UL

Description: Changes the upper limit of the device. The specified value must be greater than the lower limit and between –999 and 999.

This command simultaneously affects the horizontal and vertical limits.

Devices: Towers

Syntax: **UL [+/–] XXX**

- **+** : Optional for positive values
- **–** : Necessary for negative values
- **XXX** : Decimal value for the upper limit to be set in centimeters. Leading zeroes are optional.

Example: Write **sdUL 400\n**: Change both the horizontal and vertical polarization upper limits of the tower to 400 cm

See Also: **UL?**

UL?

Description: Queries the upper limit of the device.

Returns the limit associated with the current polarization mode. The value returned is in XXX format. Negative values are preceded by a **–** (minus sign).

Devices: Towers

Syntax: **UL?**

Response: **[–]XXX** : Value of the upper limit for the current polarization in centimeters

Example:

- Write **sdUL?\n**: Query tower upper limit for current polarization
- Read response
- Response is **400/n** : Upper limit is 400 cm

See Also: **UL**

UP

Description: Instructs the tower boom to move in the up direction. This movement is limited by the upper limit.

Devices: Towers

Syntax: **UP**

Example: Write **sdUP\n** : Instructs the boom of the tower to move up

See Also: **DN**, **ST**

UV

Description: Changes the upper limit of the device for vertical polarity. The specified value must be greater than the lower limit for vertical polarization and between –999 and 999.

Devices: Towers

Syntax: **UV [+/–] XXX**

- **+** : Optional for positive values
- **–** : Necessary for negative values
- **XXX** : Decimal value for the upper limit to be set in centimeters. Leading zeroes are optional.

Example: Write **sdUV 355\n** : Set vertical polarity upper limit to 355 cm

See Also: **UV?**

UV?

Description:	Queries the upper limit of the device for vertical polarity. The value returned is in XXX format depending on the current numeric mode. Negative values are preceded by a **–** (minus sign).
Devices:	Towers
Syntax:	**UV?**
Response:	**[–]XXX** : Value of the upper limit for the vertical polarization in centimeters
Example:	• Write **sdUV?\n**: Query vertical upper limit • Read response • Response is **350\n** : Vertical upper limit is 350 cm
See Also:	**UV**

VS?

Description: Queries the variable speed capability of the device.

Devices: Turntables, towers

Syntax: **VS?**

Response:

- **<flag>** : Indicates if a device is capable of variable speed control

  0 : Device is not capable of variable speed control

  1 : Device supports variable speed

Example:

- Write **sdVS?\n** : Is device variable speed?
- Read response
- Response is **1\n** : Is a variable speed device

WL

Description: Changes the clockwise limit of the device. The specified value must be greater than the counterclockwise limit and between –999 and 999.

Devices: Turntables

Syntax: **WL [+/-] XXX**

- **+** : Optional for positive values
- **–** : Necessary for negative values
- **XXX** : Decimal value for the clockwise limit to be set in degrees. Leading zeroes are optional.

Example: Write **sdWL 90\n** : Change CW limit of the turntable to 90 degrees

See Also: **WL?**

WL?

Description: Queries the clockwise limit of the turntable. The value returned is in XXX format depending on the current numeric mode. Negative values are preceded by a **–** (minus sign).

Devices: Turntables

Syntax: **WL?**

Response: **[–]XXX** : Value of the clockwise limit setting in degrees

Example:

- Write **sdWL?\n** : Query turntable clockwise limit
- Read response
- Response is **300\n** : Clockwise limit is 300 degrees

See Also: **WL**

ZERO

Description: Initiates a zero reference scan for devices equipped with absolute zero reference pulses.

Devices: Turntables, towers

Syntax: **ZERO**

Example: Write **sdZERO\n** : Initiate zero scan

See Also: **ZERO?**

ZERO?

Description: Queries if the device is equipped with an absolute zero reference to determine if the ZERO command can be used.

Devices: Turntables, towers

Syntax: **ZERO?**

Response: **<flag>** : Indicates if a device supports zeroing

- **0** : Device does not support zeroing
- **1** : Device can execute ZERO function

Example: Write **sdZERO?\n** : Query zeroing capability

Read response

Response is **1\n** : Device supports ZERO function

See Also: **ZERO**

- IEEE commands for **Interface Clear** and **Clear** are not supported.
- IEEE status flags in either serial or parallel poll or as a service request are not supported.
- When IEEE communication is used, the first command/request should be ***IDN?\r**.

*CLS

Description:	Clear Status. Clears all Event Registers summarized in the Status Byte Register and places the controller in the Operation Complete Idle State.
Devices:	Turntables, towers
Syntax:	***CLS**
Example:	Write **sd*CLS\n** : Clear status registers
See Also:	***OPC**, ***RST**, ***STB?**

*ESE

Description: Set Standard Event Status Enable Register. Causes changes in the contents of the Standard Event Status Enable Register.

Requires an integer argument in binary form to set the register. The bits of the argument correspond to the bits of the Standard Event Status Register. Setting a bit in this register allows the corresponding bit in the Standard Event Status Register to cause the Event Status Bit in the Status Byte Register to be set.

Devices: Turntables, towers

Syntax: ***ESE XXX**

- **XXX** : Integer value representing eight-bit binary number 0–255

Example: Write **sd*ESE 16\n** : Allow an Execution Error to set the ESB

See Also: ***ESE?**, ***STB?**

*ESE?

Description: Query Standard Event Status Enable Register. Prepares the controller to respond with the contents of the Standard Event Status Enable Register when queried.

Value returned is an integer number in the range of 0 to 255. This value, when expressed in binary form, represents bit values of the Standard Event Status Enable Register.

Devices: Turntables, towers

Syntax: ***ESE?**

Response: **XXX** : Integer value representing the setting of the Event Status Enable Register

Example:

- Write **sd*ESE?\n** : Query ESE register
- Read response
- Response is **16\n** : Set to allow an execution error to set ESB

See Also: ***ESE**

*IDN?

Description: Identification query. Determines the nature of device located at a given address on the GPIB bus.

Prepares controller to respond with an ASCII character string when queried. The string returned (**ETS Lindgren, EMControl XXXX-XXX, N.N.N**) identifies this controller as an EMControl module.

The XXXX-XXX parameter is a placeholder for the device model number.

The N.N.N parameter is a placeholder for the firmware revision level.

Devices: Turntables, towers

Syntax: ***IDN?**

Response: ETS-Lindgren, EMControl XXXX-XXX, N.N.N

- N.N.N is the revision number
- XXXX-XXX is the model number

Example:

- Write **sd*IDN?\n** : Query the identification string
- Read response
- Response is **ETS-Lindgren, EMControl 7006-001, 1.5.0** : EMControl Model 7006-001, firmware version 1.5.0

*OPC?

Description: Query Operation Complete. Prepares controller to respond to a query with a single character message.

If the device has completed its motion, the message returned is **1**; otherwise, it is **0**.

This is a slight deviation from the ANSI/IEEE 488.2 standard for this command, which does not return a response until the operation is complete. That response is **1** always.

Devices: Turntables, towers

Syntax: ***OPC?**

Response:

- **<flag>** : Indicates if commanded motion is complete

  0 : Motion is complete

  1 : Device is in motion

Example:

- Write **sd*OPC?\n** : Query operation complete
- Read response
- Response is **1\n** : Motion is complete

See Also: ***OPC**, **DIR?**

*RST

Description: Reset. Resets the controller. Controller remains in remote mode. All moving devices are stopped immediately, and the command queue is cleared.

Devices: Turntables, towers

Syntax: ***RST**

Example: Write **sd*RST\n** : Reset turntable

See Also: ***CLS**

*SRE

Description: Set Service Request Enable Register. Changes contents of the Service Request Enable Register.

Requires an integer argument in the range of 0 to 255. This argument, when expressed in binary form, represents the value of the eight-bit Service Request Enable Register.

The bits of the argument (with the exception of bit 6 which is unused) correspond to the bits of the Status Byte Register. Setting a bit in this register allows the corresponding bit in the Status Byte Register to generate a Service Request.

Devices: Turntables, towers

Syntax: ***SRE XXX**

- **XXX** : Integer value representing eight-bit binary number 0–255

Example: Write **sd*SRE 32\n** : Allow the Event Status Bit to generate an SRQ

See Also: ***SRE?**, ***STB?**

*SRE?

Description: Query Service Request Enable Register. Prepares controller to respond with the contents of the Service Request Enable Register when queried.

The value returned is a decimal number in the range of 0 to 255. This value when expressed in binary form, when expressed in binary form, represents the value of the eight-bit Service Request Enable Register.

Devices: Turntables, towers

Syntax: ***SRE?**

Response: **XXX** : Integer value representing the setting of the Service Request Enable Register

Example:

- Write **sd*SRE?\n**: Query the value of the SRE
- Read response
- Response is **32\n** : Allow the Event Status Bit to generate an SRQ

See Also: ***SRE**

*STB?

Description: Query Status Byte. Prepares the controller to respond to the contents of the Status Byte Register when queried.

The value returned is a decimal in the range of 0 to 255. This value, when expressed in binary form, represents the eight-bit value of the Status Byte Register.

Devices: Turntables, towers

Syntax: ***STB?**

Response: **XXX** : Integer value representing the bits of the Status Byte Register. The bit pattern is as follows:

- **0 – Device Dependent Error (DDE)** : Set when the logical AND of the Device Dependent Error Register and the Device Dependent Error Enable Register is non-zero.
- **1 – Undefined**
- **2 – Undefined**
- **3 – Undefined**
- **4 – Message Available (MAV)** : Set when there is data in the device output queue waiting to be read over the GPIB.
- **5 – Event Status Bit (ESB)** : Set when the logical AND of the Event Status Register and the Event Status Enable Register is non-zero.
- **6 – Master Summary Status (MSS)** : Set when the logical AND of the remaining bits of the Status Byte Register and the Status Byte Enable Register is non-zero.
- **7 – Undefined**

Example:

- Write **sdSTB?\n** : Query status byte
- Read response
- Response is **16\n** : Message Available

See Also: **ERR?**, ***SRE**, ***SRE?**

*WAI

Description:	Wait to Continue. Causes the controller to place execution of the next GPIB command on hold while there are devices in motion. Once motion has ceased, the next command is executed normally. While a command is on hold, additional commands are not accepted. Normal operation will continue after the command on hold had been executed. Time out of the GPIB bus must be disabled before execution of *WAI command. The *OPC commands are a more program-friendly method of waiting for device motion to stop.
Devices:	Turntables, towers
Syntax:	***WAI**
Example:	Write **sd*WAI\n** : Wait for tower motion to stop
See Also:	***OPC?**

Error Codes

An error code is returned in response to an incorrect command or query.

Error Code	Description
ERROR 1	Wrong command
ERROR 2	Requested position too high
ERROR 3	Requested position too low
ERROR 4	Already in progress (scan is running)
ERROR 11	Invalid argument
ERROR 301	Buffer too small
ERROR 305	Device not connected
ERROR 350	Setting limited by lower limit
ERROR 351	Setting limited by upper limit
ERROR 352	Setting change not allowed
ERROR 353	Zeroswitch not installed
ERROR 354	Trigger not installed
ERROR 355 *	In upgrade information mode (motorupdate busy)

* Motorbase update is only supported in version 2.x and higher

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Appendix A: Warranty

See the *Product Information Bulletin* included with your shipment for the complete ETS-Lindgren warranty for your EMControl card.

DURATION OF WARRANTIES FOR EMCONTROL PLUG-IN CARD

All product warranties, except the warranty of title, and all remedies for warranty failures are limited to three years.

Product Warranted	Duration of Warranty Period
EMControl™ Positioner Controller Plug-in Card	3 Years

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Appendix B: EC Declaration of Conformity

ETS-Lindgren Inc. declares these products to be in conformity with the following standards, following the provisions of EMC-Directive 2004/108/EC:

EMControl Positioner Controller Plug-In Card

Emission:	EN 61326-1:2006, Class B Electrical equipment for measurement, control, and laboratory use.
Immunity:	EN 61326-1:2006, Industrial level, performance criteria A Electrical equipment for measurement, control, and laboratory use.

Technical Construction Files are available upon request.