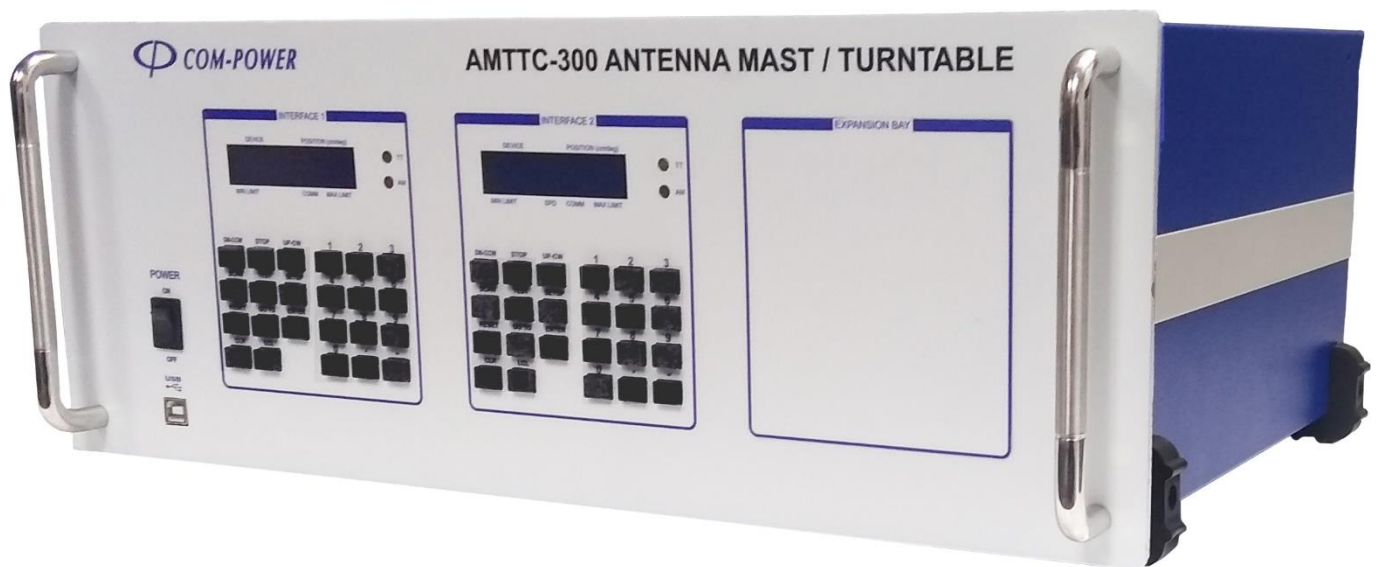


# OPERATIONAL MANUAL

## AMTTC-300 Antenna mast/Turn Table Controller



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## **INTRODUCTION**

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Com-Power model AMTTC-300 Antenna Mast/ Turn Table Controller provides Fully independent controller interface for different Com-Power positioner devices { Antenna Mast(s) / Turn Table(s)}.

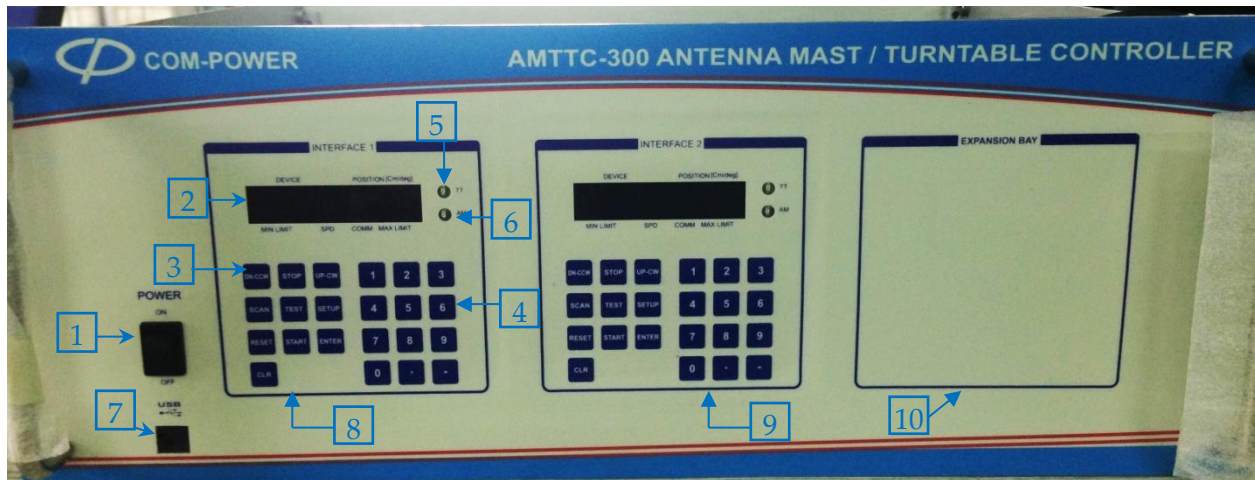
## PRODUCT SPECIFICATIONS

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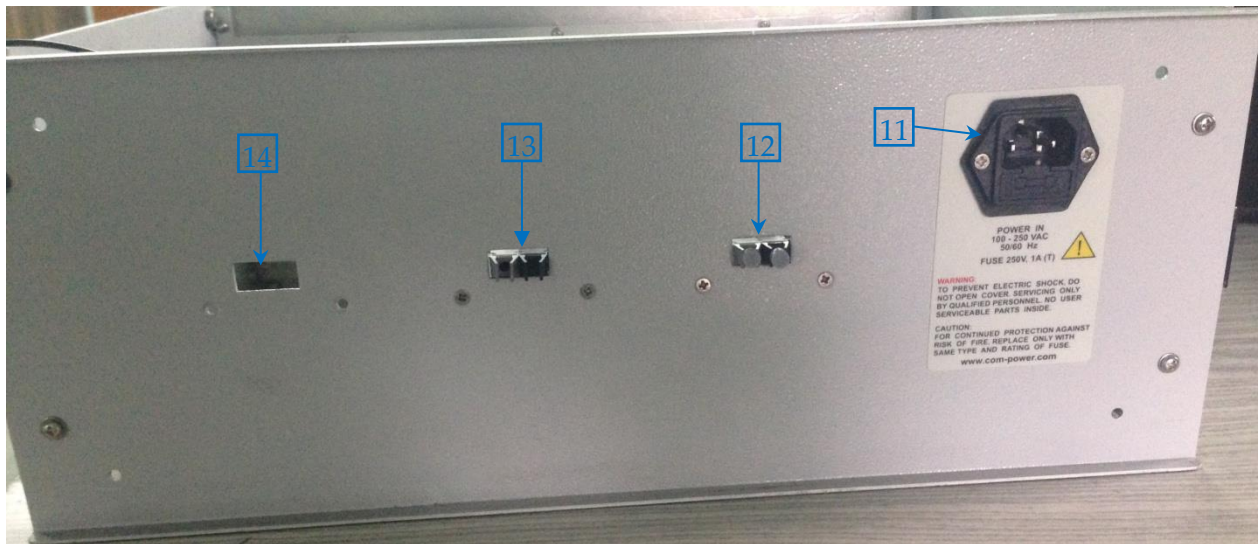
1. Dimensions : 482 mm x 340 mm x 177.6 mm (L x W x H)
2. Weight : 2 lbs.
3. Enclosure : Fully covered metal enclosure.
4. Mounting : Rack Mount or Standalone.
5. Display : Each channel provided with LCD. The LCD is 16-character x 2 lines.
6. Keypad : Each interface is provided with two keypads, one for numerical entry and a second for functions.
7. Electrical : 110VAC/230VAC 60Hz/50Hz.
8. Operating Temperature: 40°F to 104°F (5°C to 40°C)

## AMTTC-300 COMPONENTS

### Front Panel:



1. ON/OFF Switch.
2. 16 X 2 LCD Display.
3. Keypad to perform Different Functions.
4. Keypad for Entering Digits.
5. **TT LED:** LED become on when Turn Table is connected.
6. **AM LED:** LED become on when Antenna Mast is connected.
7. USB Interface.
8. Interface 1.
9. Interface 2.
10. Expansion Bay to add 3rd interface in this controller.

*Rear Panel:*

11. Power IN Socket: Port to connect 115Vac-230Vac 50/60 Hz power supply for the unit.
12. Fiber optical Interface to connect AM/TT to interface 1 of Front Panel.
13. Fiber optical Interface to connect AM/TT to interface 2 of Front Panel.
14. Bay To add Fiber optic interface for interface 3.

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## FRONT PANEL CONTROL

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### 1. LCD Display:

LCD Displays the current parameters, entries and any change in current position. The LCD is divided into following fields.

- a. **DEVICE:** Indicates device Name.
- b. **POSITION:** Current position/Actual position of the device in degree/cm as per type of device.
- c. **MIN LIMIT:** Defines Software minimum limit that blocks positioner from moving below this limit.
- d. **MAX LIMIT:** Defines Software minimum limit that blocks positioner from moving above this limit.
- e. **SPD:** Indicates speed of positioner. (Note: Only used for Turntable), For Antenna mast
- f. **COMM:** Defines way of communication
  - L: Local Communication
  - R: Remote Communication

### 2. Keypad:

#### a. Numerical Keypad:

The Numerical Display consists of the digits 0 to 9, a (-) key and a decimal key.

#### b. Functional keypad:

This keypad consists of several keys and the label of each key appears on Front Panel.

- **DN-CCW:**  
Moves the Positioner in a downwards/counter clockwise direction. It also scrolls through menu options after SETUP key has been pressed.
- **STOP:**  
Stops the Positioner motion or exits SETUP menu.
- **UP-CW:**  
Moves the Positioner in an upwards/clockwise direction. It also scrolls through menu options after SETUP key has been pressed.
- **SCAN:**  
Enables pre-configured scanning operation.
- **TEST:**  
Tests the Functions of positioners as well as communication between positioner and controller.
- **SETUP:**  
Activates the menu selection.
- **RESET:**  
Resets the status byte & Re-boots the controller when the key is pressed once, and if key is pressed twice the Controller parameters will be set to default values.
- **GOTO:**  
This key, in conjunction with the numerical keys, moves the positioner to a position specified by numerical entry.

- **ENTER:**  
Acknowledges the numerical entry in SETUP menu, pressing this key twice will toggle display position from current position to actual Position or vice versa.
- **CLEAR:**  
Clears the numerical entry from display.
- **LCL(local):**  
Enters Local mode if controller is in Remote mode, if not in Remote mode then does nothing.



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## OPERATING PROCEDURE

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### ❖ LOCAL OPERATION

1. Apply AC Power Supply to the Power IN Connector in Rear Panel.
2. Turn ON the switch of Power from the Front Panel.



3. Following messages will display on LCD.



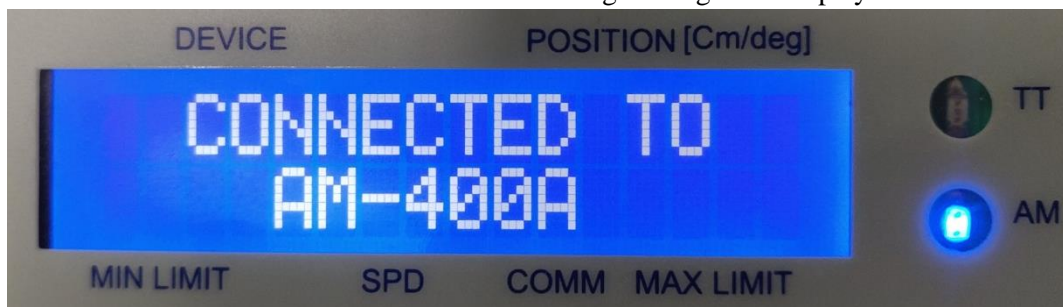
4. If TTW-400A / AM-400A is not connected than following message will display on LCD screen. This message will continuously display on LCD until any device is connected to the controller in Rare Panel.



5. If Turntable TTW-400A is connected than following message will display.



6. If Antenna Mast AM-400A is connected than following message will display.



7. To move positioner in UP/CW direction press **UP-CW** key and to move positioner in down/CCW direction press **DN-CCW** key. After pressing key, the display will keep auto updating the current position of the positioner.
8. To stop positioner press **STOP** key.

## SETUP MENU

9. To Set the different parameters of the positioner press **SETUP** key. After pressing setup key following message will appear as shown in below image.



- Press **DN-CCW** or **UP-CW** key to configure different parameter.
- Use numerical keys to set different values in different parameters.
- Press **ENTER** key to save set values the selected parameter.
- Use **STOP** key to exit setup menu or press **UP-CW** or **DN-CCW** to configure another parameter.
- Different parameters are as follow.
  - i. **Scan Min Limit**
    - Scan minimum limit is a position limit that blocks the positioner from moving below this position limit during a scan function.
    - Scan minimum limit must be selected within the soft limits and must be smaller than scan maximum limit.
  - ii. **Scan Max Limit**
    - Scan maximum limit is a position limit that blocks the positioner from moving above this position limit during a scan function.
    - Scan maximum limit must be selected within the soft limits and must be greater than scan minimum limit.
  - iii. **Speed [1,2,3]**
    - This option allows the user to select one of the 3 pre-defined speeds. Speed 1 is the lowest speed (For Turn Table only).
  - iv. **Soft min limit**
    - Software minimum limit is a position limit that blocks the positioner from moving below this position limit during normal function.
    - Software minimum limit must be less than software maximum limit.
    - Minimum soft min limit value is -720 without hard limits engaged, with hard limits engaged due to its rotational limitation the soft min limit is usable only up to -440 degrees.

- To set soft min limit value -720 user has to disengage the hard limit poles.
- v. Soft max limit**
  - Software maximum limit is a position limit that blocks the positioner from moving above this position limit during normal function.
  - Software maximum limit must be greater than software minimum limit.
  - Maximum soft min limit value is 720 without hard limits engaged, with hard limits engaged due to its rotational limitation the soft min limit is usable only up to 440 degrees.
- vi. Limit On/Off 1/0**
  - Limit ON option imposes the soft limits on positioner motion. The positioner can't move beyond the soft limit.
  - Limit OFF option removes the soft limits restriction on positioner motion.
  - This option is not available for antenna mast.
  - **The user must ensure that this option wouldn't cause cabling damage.**
- vii. Current position**
  - The current position is the current position of the Positioner
- viii. Scan Cycles**
  - The no. of scan cycles to be done in Scan operation.
- ix. Encoder Cal.**
  - Refers to the encoder calibration parameter. This setting is used to convert the encoder count values returned from a motor base into the corresponding centimeter or degree position reading. For Antenna mast, the number represents the number of encoder counts per meter. For turntables, it represents the number of counts per revolution. Using this parameter, a variety of standard, retrofit, and custom devices can be used. The encoder calibration factor is usually not changed unless the default value gives an error in getting proper position.
  - Default value for TTW-400A Turntable is 7680 and for AM-400A Antenna mast is 1746.
  - To save new value for encoder calibration, after entering the value from numeric keypad user has to press enter key twice.
  - If the new value is changed it will display under Encoder Cal.  
(Note : changing this value without its need may result in getting incorrect current position value. )
- x. Safety Timeout**
  - The Safety Timeout is for controller and positioner , it is the time within which there should be a valid communication between controller and positioner device, if no valid communication is done during this period then both positioner and controller will reset after this time.
  - The Timeout value should be between [1000, 6500] time in milliseconds.

## FUNCTIONAL OPERATION

### 1. UP-CW

- Pressing the UP-CW key starts moving the positioner in clockwise direction and upwards direction with respect to the positioner connected to it, and the current position will display & keep updating on the Controller in the TOP-right corner.
- Positioner will stop either the soft limit/hard limit is reached or the STOP key is pressed.

### 2. DN-CCW

- Pressing the DN-CCW key starts moving positioner in counter-clockwise direction and downwards direction with respect to the positioner connected to it, and the current position will display & keep updating on the AMTTC-300 in the TOP-right corner.
- Positioner will stop either the soft limit/hard limit is reached or the STOP key is pressed.

### 3. SCAN

- Pressing Scan key activates predefined scanning operation.
- whatever the current position is it will go to the Scan minimum or Scan maximum position which is nearest.
- Reaching to the minimum/maximum position it starts scanning either max to min or min to max till the no. of Scan cycles are not completed.

### 4. GOTO

- This function is used for go-to any position defined by user by numerical entry that is entered ranging in 0 - 360 degree for turntable and 0-400 for 4 meter Antenna mast .

### 5. TEST

- The self-Test can be performed by pressing **TEST** key on Front Panel.
- After pressing TEST key controller executes a test procedure by which it tests the Tx/Rx fiber optical links, positioner hard limits as well as the motor connection.

#### i. Tx/Rx Link:

- It will check the Tx and Rx link is ok or not. If Tx and RX link is ok than this test will be pass.
- If fiber optic link is down or the positioner has power outage than this test will be failed.

#### ii. Fwd Hard Limit

- This will check hard limit in positive direction is present or not. If present, this test is pass.
- Hard limit in positive direction is obstructing the motion in this direction.

#### iii. Rev Hard Limit

- This will check hard limit in negative direction is present or not. If present, this test is pass.
- Hard limit in negative direction is obstructing the motion in this direction.

#### iv. Encoder

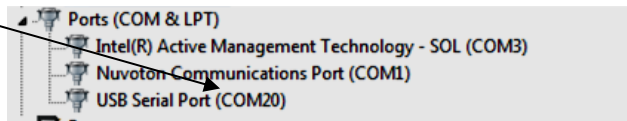
- This check weather encoder or motor is missing or not, and connection of motor is reversed or not. If all pass then and then this test will be pass.

### 6. RESET

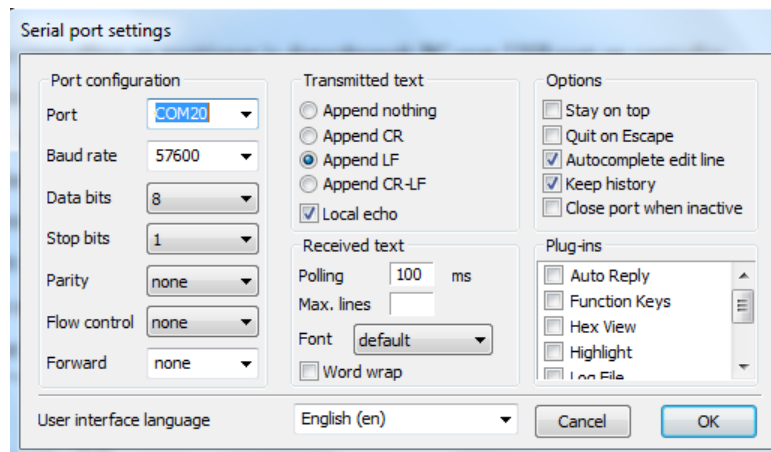
- Pressing RESET button controller will reset and resets status bytes in controller.

**❖ REMOTE OPERATION**

1. In remote mode the controlling on positioner is done through PC over USB port on controller.
2. Switch ON the controller and connect the USB cable to Controller to USB port on Front panel.
3. Connect Positioner device to controller over fiber optic port.
4. Wait until controller connects and gets all configuration parameters of positioner is received by the controller and is received by controller and displayed on LCD.
5. Check the com port at which the device is attached.
  - Check in device manager under Ports(COM & LPT) and find "USB Serial Port(COMxx)"
  - Here you can get Com port no, keep it noted.



6. If device is not detected in device manager.
  - I. Check the USB connection, if not connected properly, try reconnecting usb connector and then check it appeared in device manager.
  - II. After step I. the device is not detected, install the device driver manually,
  - III. Download device driver from below link.  
<https://www.ftdichip.com/Drivers/D2XX.htm>
  - IV. Install Driver manually from device manager.
7. Use serial terminal software "Termite" to send command, select com port, set baud rate is 56700 bps, 8 bit data, 1 stop bit, no parity bit. Set termite as shown in below image.



8. Now send command as per command list.
9. After sending any command to Controller, the controller will turn in to remote mode, in this mode user cannot use any key from keyboard except reset and LCL button.

## AMTTC-300 COMMAND LIST

### ❖ COMMAND FOR PROGRAMMING CONTROLLER AMTTC-300

1) CW

**Description :** Rotates turntable in clockwise direction.

**Syntax :** <interface ID>CMD<\n> ; e.g. "2CW\n"

**Response :** Ok

2) CCW

**Description :** Rotates turntable in counter clockwise direction.

**Syntax :** <interface ID>CMD<\n> ; e.g. "1CCW\n"

**Response :** Ok

3) UP

**Description :** Moves antenna Mast in upwards direction.

**Syntax :** <interface ID>CMD<\n> ; e.g. "3UP\n"

**Response :** Ok

4) DN

**Description :** Moves antenna Mast in downwards direction.

**Syntax :** <interface ID>CMD<\n> ; e.g. "1DN\n"

**Response :** Ok

5) TST

**Description :** Testing positioner functionality like motor connection, position sensor, hard limits and communication link .

**Syntax :** <interface ID>CMD<\n > ; e.g. "1TST\n"

**Response :** Ok

**Syntax :** <interface ID>CMD<space>?<\n> ; e.g. "2TST ?\n"

**Response :** TST=<value>

**Response Description :** The value will be 8-bit hexadecimal value in ASCII format.

D7	D6	D5	D4	D3	D2	D1	D0
Test Pass	-	-	Rev encoder test	Fwd Encoder test	Rev Hard limit	Fwd Hard limit	Comm. Link

Bit is set to '1' if Test pass else bit is reset to '0'.If complete test is passed then bit D7 will set to '1'. So after complete test pass value will be '0x9F'.

**6) SCN**

**Description :** Perform predefined scan operation.

**Syntax :** <interface ID>CMD<\n> ; e.g. "3SCN\n"

**Response :** Ok

**7) ST**

**Description :** Stops positioner movement.

**Syntax :** <interface ID>CMD<\n> ; e.g. "1ST\n"

**Response :** Ok

**8) DFLT**

**Description :** Restores default configuration in controller and Positioner Device.

**Syntax :** <interface ID>CMD<\n> ; e.g. "2DFLT\n"

**Response :** Ok

**9) ID**

**Description :** Returns Controller ID (Manufacturer, Model, Serial No., Firmware).

**Syntax :** <interface ID>CMD<space>?<\n> ; e.g. "2ID ?\n"

**Response :** ID = "Com-Power,AMTTC-300,xxxxxxxx,xx.xx"

**Response Description :** Response will be in string and xxxxxxxx, xx .xx is 8 digit serial No and 4 digit firmware version .

(Note : The response will be same for all interface ID.)

**10) GOTO**

**Description :** To move positioner in user defined position [min 0,max 360] for Turntable and [min0, max 400] for 4 meter Antenna mast. Value will be unsigned integer.

**Syntax :** <interface ID>CMD<space><value><\n> ; e.g. "3GOTO 180\n"

**Response :** Ok

**11) STO**

**Description :** Safety timeout for controller and positioner, this value will be the time within which there should be a communication between controller and positioner device if not so then the after this time the controller and positioner will reset. Value will be unsigned integer.

**Syntax :** <interface ID>CMD<space><value><\n> ; e.g. "2STO 3000\n"

**Response :** Ok

**Syntax :** <interface ID>CMD<space>?<\n> ; e.g. "1STO ?\n"

**Response :** STO=<value>

(Note : value is limited to 1000 to 6500.)



## 12) SMI

**Description :** Scan minimum value for scanning operation [min 0] for turntable and for antenna mast greater than or equal to software minimum limit. Value will be unsigned integer.

**Syntax :** <interface ID>CMD<space><value><\n> ; e.g. "1SMI 10\n"

**Response :** Ok

**Syntax :** <interface ID>CMD<space>?<\n> ; e.g. "1SMI ?\n"

**Response :** SMI = <value>

## 13) SMA

**Description :** Scan maximum value for scanning operation [max 360] for turntable and for antenna mast Less than or equal to software maximum limit. Value will be unsigned integer.

**Syntax :** <interface ID>CMD<space><value><\n> ; e.g. "3SMA 180\n"

**Response :** Ok

**Syntax :** <interface ID>CMD<space>?<\n> ; e.g. "2SMA ?\n"

**Response :** SMA = <value>

## 14) SOMI

**Description :** Set or enquire software minimum limit for positioner [min -720] for Turntable and [min 0] for antenna mast. Value will be signed integer.

**Syntax :** <interface ID>CMD<space><value><\n> ; e.g. "1SOMI -440\n"

**Response :** Ok

**Syntax :** <interface ID>CMD<space>?<\n> ; e.g. "3SOMI ?\n"

**Response :** SOMI = <value>

## 15) SOMA

**Description :** Set or enquire software maximum limit for positioner [max +720] for Turntable and [max 400] for 4 meter antenna mast. . Value will signed integer.

**Syntax :** <interface ID>CMD<space><value><\n> ; e.g. "2SOMA 440\n"

**Response :** Ok

**Syntax :** <interface ID>CMD<space>?<\n> ; e.g. "1SOMA ?\n"

**Response :** SOMA= <value>

## 16) SPD

**Description :** Set or enquire speed of positioner [1, 2, 3] (only turntable has variable speed). Setting speed for Antenna mast does nothing. Value will be unsigned integer.

**Syntax :** <interface ID>CMD<space><value><\n> ; e.g. "1SPD 2\n"

**Response :** Ok

**Syntax :** <interface ID>CMD<space>?<\n> ; e.g. "3SPD ?\n"

**Response :** SPD = <value>

**17) CP**

**Description :** Set or enquire current position. Response value will be a floating point value with one decimal point accuracy.

**Syntax :** <interface ID>CMD<space><value><\n> ; e.g. "1CP 120\n"

**Response :** Ok

**Syntax :** <interface ID>CMD<space>?<\n> ; e.g. "1CP ?\n"

**Response :** CP = <value>

**18) AP**

**Description :** Enquire Actual position. Response value will be a floating point value with one decimal point accuracy.

**Syntax :** <interface ID>CMD<space>?<\n> ; e.g. "1AP ?\n"

**Response :** AP = <value>

**19) SCY**

**Description :** Set or enquire scan cycle for scanning operation(min-0 max 999), and by setting 999 scan cycles it will set to infinite scanning. Value will be unsigned integer.

**Syntax :** <interface ID>CMD<space><value><\n> ; e.g. "1SCY 999\n"

**Response :** Ok

**Syntax :** <interface ID>CMD<space>?<\n> ; e.g. "2SCY ?\n"

**Response :** SCY = <value>

**20) CR**

**Description :** enable or disable / enquire software limit [1, 0]. Value will be unsigned integer.

**Syntax :** <interface ID>CMD<space><value><\n> ; e.g. "2CR 0\n"

**Response :** Ok

**Syntax :** <interface ID>CMD<space>?<\n> ; e.g. "1CR ?\n"

**Response :** CR = <value>

**21) CAL**

**Description :** Calibration factor of encoder (encoder count per revolution/Meter.). Value will be unsigned integer.

**Syntax :** <interface ID>CMD<space><value><\n> ; e.g. "3CAL 7680\n"

**Response :** Ok

**Syntax :** <interface ID>CMD<space>?<\n> ; e.g. "1CAL ?\n"

**Response :** CAL = <value>

**Response description :** Encoder calibration value for TTW-400A turntable is 7680 & for AM-400A antenna mast it is 1746)

(Note : Changing this value without its need will result in reading incorrect position. )

22) **OPC**

**Description :** Returns Operation Status of controller. Value will be Hexadecimal value .

**Syntax :** <interface ID>CMD<space>?<\n> ; e.g. "1OPC ?\n"

**Response :** OPC = <value>

**Response description :** Byte description mentioned below.

D7	D6	D5	D4	D3	D2	D1	D0
Limit Reached Status				Function Type		Motion	

D0	
0	Positioner is stall.
1	Positioner is Motion.

D3	D2	D1	
0	0	1	1 Clockwise/Upwards motion
0	1	0	2 Counter clockwise/ Downward motion
0	1	1	3 Scanning Function
1	0	0	4 GOTO Function
1	0	1	5 Self-Test Function
1	1	0	6 Manual switch is used to enable motion.

D4	D5	D6	D7	
1	0	0	0	Soft minimum limit reached. Motion not allowed ahead this limit.
0	1	0	0	Soft maximum limit reached. Motion not allowed ahead this limit.
0	0	1	0	Rev Hard limit reached. Motion not allowed ahead this limit.
0	0	0	1	Fwd Hard limit reached. Motion not allowed ahead this limit.

23) **DEV**

**Description :** Returns device type connected to specified interface ID. It will return a string .

**Syntax :** <interface ID>CMD<space>?<\n> ; e.g. "2DEV ?\n"

**Response :** OPC = <value>

**Response description** :- value is a string of 2 character “TT” for turntable and “AM” for antenna mast.

**Note :**

- 1) Every command send to controller is in string format over serial com port.
- 2) Interface ID is the address of interface with which we want to communicate, user had to send interface ID with every command, as mentioned in command details.
- 3) '\n' in every command is a special character for new line.
- 4) '?' symbol is to enquire for specified value from controller.

**❖ Error Note**

If there is any error for any send command then its response will be an error code.

- Error = 1 : Positioner Device not Connected to Controller.
- Error = 2 : Invalid Command.
- Error = 3 : Interface ID not available.