Programmer's Manual

Communication with the robot through the USB port

The robot has a USB port next to the power jack at the rear of the robot. You will need a USB 5-pin mini cable to connect to the robot. You will also need to install a device driver to talk with the robot. The best way to install the device driver is to install it from the **Software Update Page**.

Communication to a robot through a terminal emulator

Commands can be sent to a real robot via a terminal emulator. The robot is running an API command interpreter on the USB port. Connection to the robot is made through a USB cable. The driver converts the USB port connection to a Com port connection. This allows you to use any terminal emulator program (such as Hyperterm or TeraTerm) to communicate with the robot. Use the following procedure:

1. Turn on the robot and connect the USB 5 pin mini cable between your computer and your robot.

2. Bring up the Terminal Emulator program.

3. Find the COM port that the robot is connected to. This is usually the last one on the list. The communication parameters (Baud, start/stop bits, parity, etc.) are unimportant. They apply only to a real COM port.

4. Type GetVersion. If you are connected to the robot, then it will echo back each character that you type. Hit the enter key. The robot will now process the command and supply a response.

5. Now type help to get a list of available commands.

Command Syntax

Commands are matched with a case insensitive method. Partial word match is supported. You only need to type in enough letters of the command to make it unique. Commands have a flexible format. In the strictly non-sequenced format, the syntax consists of only 3 elements:

Cmd – This is the command name.
Flag – Flags are always initialized to zero. Specifying a flag on the command line sets the flag to one.
ParamName ParamValue – The ParamName specifies what parameter the next argument (ParamValue) is.

Flags and Param(Name/Value) pairs can be specified on the command line in any order. All Flags and ParamNames are matched with a case insensitve method. Partial word match is supported. You only need to type in enough letters of the Flag or ParamName to make it unique. In a less verbose format, the user can omit the ParamName from the Param(Name/Value) pairs. However, this format requires that all ParamValues are specified in the correct sequence. This sequence is the sequence shown in the Usage command. Unnamed ParamValues are assigned in sequence to the earliest ParamName in the sequence that does not already have a value assigned.

Response Syntax

All responses will have a control-Z (^Z) at the end of the response string. Command responses are in the form of CSV spread sheets. E.G. GetVersion returns:

Component,Major,Minor,Build
Product Model,XV-11,,
Serial Number,AAAnnnnnAA,0000000,D
Software,6,1,13328
LDS Software,V1.0.0,,
LDS Serial,XXX-YYY,,
MainBoard Vendor ID,1,,

MainBoard Serial Number,99,,
MainBoard Version,0,8,
Chassis Version,-1,,
UIPanel Version,-1,,

The first line of text is the column labels. Each line afterwards is composed of a row label, a comma, and then data associated with that label. The order and number of the rows and columns is not gauranteed to stay the same from release to release. The labels used will not be changed, but new rows and columns may be added anywhere. The application should parse the full response into rows and columns, and look up the particular value by matching its row and column names in the table.

Table of Robot Application Commands

Command	Description
Clean	Starts a cleaning by simulating press of start button.
DiagTest	Executes different test modes. Once set, press Start button to engage. (Test modes are mutually exclusive.)
GetAccel	Get the Accelerometer readings.
GetAnalogSensors	Get the A2D readings for the analog sensors.
GetButtons	Get the state of the UI Buttons.
GetCalInfo	Prints out the cal info from the System Control Block.
GetCharger	Get the diagnostic data for the charging system.
GetDigitalSensors	Get the state of the digital sensors.
GetErr	Get Error Message.
GetLDSScan	Get scan packet from LDS.
GetLifeStatLog	Get All Life Stat Logs.
GetMotors	Get the diagnostic data for the motors.
GetSchedule	Get the Cleaning Schedule. (24 hour clock format)
GetSysLog	Get System Log data.
GetTime	Get Current Scheduler Time.
GetVersion	Get the version information for the system software and hardware.
GetWarranty	Get the warranty validation codes.
Help	Without any argument, this prints a list of all possible cmds. With a command name, it prints the help for that particular command
PlaySound	Play the specified sound in the robot.
RestoreDefaults	Restore user settings to default.
SetDistanceCal	Set distance sensor calibration values for min and max distances.
SetFuelGauge	Set Fuel Gauge Level.
SetLCD	Sets the LCD to the specified display. (TestMode Only)
SetLDSRotation	Sets LDS rotation on or off. Can only be run in TestMode.
SetLED	Sets the specified LED to on,off,blink, or dim. (TestMode Only)
SetMotor	Sets the specified motor to run in a direction at a requested speed. (TestMode Only)
SetSchedule	Modify Cleaning Schedule.
SetSystemMode	Set the operation mode of the robot. (TestMode Only)
SetTime	Sets the current day, hour, and minute for the scheduler clock.
SetWallFollower	Enables/Disables wall follower
TestMode	Sets TestMode on or off. Some commands can only be run in TestMode.
Upload	Uploads new program to the robot.

Detailed Command Descriptions

Command: Clean

Description: Starts a cleaning by simulating press of start button.
Usage: Clean [House] [Spot] [Stop]
Options:

Flag	Description
House	(Optional) Equivalent to pressing 'Start' button once. Starts a house cleaning. (House cleaning mode is the default cleaning mode.)
Spot	(Optional) Starts a spot clean.
Stop	Stop Cleaning.

Return Format: None

Command: DiagTest

Description: Executes different test modes. Once set, press Start button to engage. (Test modes are mutually exclusive.)
Usage: DiagTest [TestsOff] [DrivePath] [DriveForever] [MoveAndBump] [DropTest] [AutoCycle] [OneShot] [BrushOn] [VacuumOn] [LDSOn] [AllMotorsOn] [DisablePickupDetect] [DrivePathDist <DrivePathDist_value>] [DriveForeverLeftDist <DriveForeverLeftDist_value>] [DriveForeverRightDist <DriveForeverRightDist_value>] [DriveForeverSpeed <DriveForeverSpeed_value>] [Speed <Speed_value>] [BrushSpeed <BrushSpeed_value>]
Options:

Flag	Description
TestsOff	Stop Diagnostic Test and clears all diagnostic test modes.
DrivePath	Sets DrivePath TestMode. Press start button to start. Robot travels straight by commanded distance as path. Mutually exclusive with other diagtest modes. Use 'TestsOff' option to stop.
DriveForever	Sets DriveForever TestMode. Press start button to start. Robot drives continuously. Mutually exclusive with other diagtest modes. Use 'TestsOff' option to stop.
MoveAndBump	Sets Move and Bump TestMode. Press start button to start. Executes canned series of motions, but will react to bumps. Mutually exclusive with other diagtest modes.
DropTest	Enables DropTest. Robot drives forward until a drop is detected. Mutually exclusive with other diagtest modes.
AutoCycle	DropTest argument to enable automatic restart of the test. The robot will drive backwards and then forward until a drop is detected until the test is over.
OneShot	Only executes test once.
BrushOn	Turns on brush during test. May conflict with motor commands of test so use carefully!
VacuumOn	Turns on vacuum during test. May conflict with motor commands of test so use carefully!

LDSOn	Turns on LDS during test. May conflict with motor commands of test so use carefully!
AllMotorsOn	Turns on brush, vacuum, and lds during test. May conflict with motor commands of test so use carefully!
DisablePickupDetect	Ignores pickup (wheel suspension). By default, pickup detect is enabled and stops the test.
DrivePathDist	Distance in mm
DriveForeverLeftDist	Use next arg to set left wheel dist for DriveForever test. Requires DriveForeverRightDist as well. The ratio of this value to DriveForeverRightDist determines turn radius.
DriveForeverRightDist	Use next arg to set right wheel dist for DriveForever test. Requires DriveForeverLeftDist as well. The ratio of this value to DriveForeverLeftDist determines turn radius.
DriveForeverSpeed	Use next arg to set turn speed of outer wheel for DriveForever test in mm/s.
Speed	DropTest argument to set the robot speed in mm/s.
BrushSpeed	DropTest argument to set the speed of the brush in rpm.

Return Format: None

Command: GetAccel

Description: Get the Accelerometer readings.
Usage: GetAccel
Options: None
Return Format:

```
Label,Value PitchInDegrees,  0.00 RollInDegrees,  0.00 XInG, 0.000 YInG, 0.000 ZInG,
0.000 SumInG, 0.000
```

Command: GetAnalogSensors

Description: Get the A2D readings for the analog sensors.
Usage: GetAnalogSensors [raw] [stats]
Options:

Flag	Description
raw	Return raw analog sensor values as milliVolts. (Default is sensor values in native units of what they measure.)
stats	Return stats (avg,max,min,dev,cnt) of raw analog sensor values as milliVolts. (Implies 'raw' option)

Return Format:

```
'GetAnalogSensors' produces:  SensorName,Value WallSensorInMM,34585
BatteryVoltageInmV,19761 LeftDropInMM,60 RightDropInMM,60 RightMagSensor,0
LeftMagSensor,0 XTemp0InC,28 XTemp1InC,28 VacuumCurrentInmA,1342 ChargeVoltInmV,0
NotConnected1,0 BatteryTemp1InC,20 NotConnected2,0 CurrentInmA,3493 NotConnected3,0
```

```
BatteryTemp0InC,20  'GetAnalogSensors raw' produces:  SensorName,SignalVoltageInmV
WallSensorInMM,0 BatteryVoltageInmV,2574 LeftDropInMM,3296 RightDropInMM,3296
RightMagSensor,0 LeftMagSensor,0 XTemp0InC,1759 XTemp1InC,1759 VacuumCurrentInmA,322
ChargeVoltInmV,0 NotConnected1,0 BatteryTemp1InC,1759 NotConnected2,0
CurrentInmA,992 NotConnected3,0 BatteryTemp0InC,1759  'GetAnalogSensors stats'
produces:  SensorName,Mean,Max,Min,Cnt,Dev WallSensorInMM,0,0,0,50,0
BatteryVoltageInmV,2574,2574,2574,50,0 LeftDropInMM,3296,3296,3296,50,0
RightDropInMM,3296,3296,3296,50,0 RightMagSensor,0,0,0,50,0 LeftMagSensor,0,0,0,50,0
XTemp0InC,1759,1759,1759,50,0 XTemp1InC,1759,1759,1759,50,0
VacuumCurrentInmA,322,322,322,50,0 ChargeVoltInmV,0,0,0,50,0
NotConnected1,0,0,0,50,0 BatteryTemp1InC,1759,1759,1759,50,0
NotConnected2,0,0,0,50,0 CurrentInmA,992,992,992,50,0 NotConnected3,0,0,0,50,0
BatteryTemp0InC,1759,1759,1759,50,0
```

Command: GetButtons

Description: Get the state of the UI Buttons.
Usage: GetButtons
Options: None
Return Format:

```
Button Name,Pressed BTN_SOFT_KEY,0 BTN_SCROLL_UP,0 BTN_START,0 BTN_BACK,0
BTN_SCROLL_DOWN,0
```

Command: GetCalInfo

Description: Prints out the cal info from the System Control Block.
Usage: GetCalInfo
Options: None
Return Format:

```
Parameter,Value LDSOffset,0 XAccel,0 YAccel,0 ZAccel,0 RTCOffset,0 LCDContrast,43
RDropMin,-1 RDropMid,-1 RDropMax,-1 LDropMin,-1 LDropMid,-1 LDropMax,-1 WallMin,-1
WallMid,-1 WallMax,-1
```

Command: GetCharger

Description: Get the diagnostic data for the charging system.
Usage: GetCharger
Options:

Flag	Description

Return Format:

```
Charger Variable Name, Value Label,Value FuelPercent,100 BatteryOverTemp,0
ChargingActive,0 ChargingEnabled,0 ConfidentOnFuel,0 OnReservedFuel,0 EmptyFuel,0
BatteryFailure,0 ExtPwrPresent,0 ThermistorPresent[0],0 ThermistorPresent[1],0
BattTempCAvg[0],103 BattTempCAvg[1],103 VBattV,0.21 VExtV,0.00 Charger_mAH,0
MaxPWM,65536 PWM,-858993460
```

Command: GetDigitalSensors

Description: Get the state of the digital sensors.
Usage: GetDigitalSensors
Options: None
Return Format:

```
Digital Sensor Name, Value SNSR_DC_JACK_CONNECT,0 SNSR_DUSTBIN_IS_IN,1
SNSR_LEFT_WHEEL_EXTENDED,0 SNSR_RIGHT_WHEEL_EXTENDED,0 LSIDEBIT,0 LFRONTBIT,0
RSIDEBIT,0 RFRONTBIT,0
```

Command: GetErr

Description: Get Error Message.
Usage: GetErr [Clear]
Options:

Flag	Description
Clear	Dismiss the reported error.

Return Format:

```
If an error currently exists, then report the error message. Otherwise no msg.
Possible Error Msgs are:  1 - WDT 2 - SSEG LED 3 - BTN LED 4 - BACK LED 5 - FLASH 10
- BattNominal 11 - BattOverVolt 12 - BattUnderVolt 13 - BattOverTemp 14 -
BattShutdownTemp 15 - BattUnderCurrent 16 - BattTimeout 17 - BattTempPeak 18 -
BattFastCapacity 19 - BattMACapacity 20 - BattOnReserve 21 - BattEmpty 22 -
BattMismatch 23 - BattLithiumAdapterFailure 207 - I had to reset my system. Please
press START to clean 217 - Please unplug my Power Cable when you want me to clean.
218 - Please unplug my USB Cable when you want me to clean. 219 - Please set
schedule to ON first. 220 - Please set my clock first. 222 - Please put my Dirt Bin
back in. 223 - Please check my Dirt Bin and Filter. Empty them as needed. 224 - My
Brush is overheated. Please wait while I cool down. 225 - My Battery is overheated.
Please wait while I cool down. 226 - I am unable to navigate. Please clear my path.
227 - Please return me to my base. 228 - My Bumper is stuck. Please free it. 229 -
Please put me down on the floor. 230 - I can't charge. Try moving the base station
to a new location 231 - My Left Wheel is stuck. Please free it from debris. 232 - My
Right Wheel is stuck. Please free it from debris. 233 - I have an RPS error. Please
visit web support. 234 - My Brush is stuck. Please free it from debris. 235 - My
Brush is overloaded. Please free it from debris. 236 - My Vacuum is stuck. Please
visit web support. 237 - Please Check my filter and Dirt Bin 238 - My Battery has a
critical error. Please visit web support. 239 - My Brush has a critical error.
Please visit web support. 240 - My Schedule is now OFF 241 - I can't shut down while
I am connected to power. 243 - A Software update is available. Please visit web
support. 244 - My SCB was corrupted. I reinitialized it. Please visit web support.
245 - Please Dust me off so that I can see.
```

Command: GetLDSScan

Description: Get scan packet from LDS.
Usage: GetLDSScan
Options:

Flag	Description

Return Format:

```
360 output lines of LDS Scan Angle, Distance code in MM, normalized spot intensity,
and error code. Followed by 2 status variable pairs. Example:
AngleInDegrees,DistInMM,Intensity,ErrorCodeHEX 0,221,1400,0 1,223,1396,0
2,228,1273,0 (. . .) 359,220,1421,0 ROTATION_SPEED (in Hz, Floating Point),5.00
```

Command: GetLifeStatLog

Description: Get All Life Stat Logs.
Usage: GetLifeStatLog
Options: None
Return Format:

```
Multiple LifeStat logs are output, from the oldest to the newest.   Note that only
the non-zero entries are printed.  runID,statID,count,Min,Max,Sum,SumV*2
0,LS_RunDate,3,-3,0,0x0,0x0 0,LS_A2D0,3,-2,2,0x3,0x3 0,LS_A2D1,3,-1,4,0x6,0xc
0,LS_A2D2,3,0,6,0x9,0x1b 0,LS_A2D3,3,1,8,0xc,0x30 0,LS_A2D4,3,2,10,0xf,0x4b
0,LS_A2D5,3,3,12,0x12,0x6c 0,LS_A2D6,3,4,14,0x15,0x93 0,LS_A2D7,3,5,16,0x18,0xc0
0,LS_A2D8,3,6,18,0x1b,0xf3 0,LS_A2D9,3,7,20,0x1e,0x12c 0,LS_A2D10,3,8,22,0x21,0x16b
0,LS_A2D11,3,9,24,0x24,0x1b0 0,LS_A2D12,3,10,26,0x27,0x1fb
0,LS_A2D13,3,11,28,0x2a,0x24c 0,LS_A2D14,3,12,30,0x2d,0x2a3
0,LS_A2D15,3,13,32,0x30,0x300 0,LS_LDROP_MM,3,14,34,0x33,0x363
0,LS_RDROP_MM,3,15,36,0x36,0x3cc 0,LS_CLEANTYPE,3,16,38,0x39,0x43b
0,LS_ERROR_BRUSH_OVERTEMP,3,17,40,0x3c,0x4b0
0,LS_ERROR_BATTERY_OVERTEMP,3,18,42,0x3f,0x52b
0,LS_ERROR_LWHEEL_STUCK,3,19,44,0x42,0x5ac
0,LS_ERROR_RWHEEL_STUCK,3,20,46,0x45,0x633 0,LS_ERROR_LDS_JAMMED,3,21,48,0x48,0x6c0
0,LS_ERROR_BRUSH_STUCK,3,22,50,0x4b,0x753 0,LS_ERROR_VACUUM_STUCK,3,23,52,0x4e,0x7ec
0,LS_ERROR_BRUSH_SLIP,3,24,54,0x51,0x88b 0,LS_ERROR_VACUUM_SLIP,3,25,56,0x54,0x930
0,LS_ERROR_BATTERY_CRITICAL,3,26,58,0x57,0x9db
0,LS_ERROR_LDROP_STUCK,3,27,60,0x5a,0xa8c 0,LS_ERROR_RDROP_STUCK,3,28,62,0x5d,0xb43
0,LS_ERROR_WARNING,3,29,64,0x60,0xc00 0,LS_ERROR_SHUTDOWN,3,30,66,0x63,0xcc3
0,LS_NEW_BATTERY,3,31,68,0x66,0xd8c 0,LS_ERROR_WDT,3,32,70,0x69,0xe5b
0,LS_LDS_DotTooWide,3,33,72,0x6c,0xf30 0,LS_LDS_DoubleDot,3,34,74,0x6f,0x100b
0,LS_LDS_TooNear,3,35,76,0x72,0x10ec 0,LS_LDS_OutOfCal,3,36,78,0x75,0x11d3
0,LS_LDS_TooFar,3,37,80,0x78,0x12c0 0,LS_LDS_TooDim,3,38,82,0x7b,0x13b3
0,LS_LDS_NoReading,3,39,84,0x7e,0x14ac 0,LS_LDS_TooSlow,3,40,86,0x81,0x15ab
0,LS_LDS_EncoderSkip,3,41,88,0x84,0x16b0 0,LS_LDS_DumbPanavision,3,42,90,0x87,0x17bb
0,LS_LDS_SunBlind,3,43,92,0x8a,0x18cc 0,LS_LDS_NoDot,3,44,94,0x8d,0x19e3
0,LS_LDS_BadArg,3,45,96,0x90,0x1b00 0,LS_LDS_NoMatch,3,46,98,0x93,0x1c23
0,LS_LDS_Abort,3,47,100,0x96,0x1d4c 0,LS_LDS_Escape,3,48,102,0x99,0x1e7b
0,LS_LDS_LaserCharging,3,49,104,0x9c,0x1fb0
0,LS_LDS_LaserPhotoTrip,3,50,106,0x9f,0x20eb
0,LS_LDS_LaserEncoderTrip,3,51,108,0xa2,0x222c
0,LS_LDS_LaserClockTrip,3,52,110,0xa5,0x2373
0,LS_LDS_LaserDebugTrip,3,53,112,0xa8,0x24c0
0,LS_LDS_LaserOverCurrent,3,54,114,0xab,0x2613
0,LS_LDS_LaserOverPWM,3,55,116,0xae,0x276c
0,LS_LDS_LaserPhotoStuck,3,56,118,0xb1,0x28cb
0,LS_LDS_LaserCurrentStuck,3,57,120,0xb4,0x2a30
0,LS_LDS_LaserOverTemp,3,58,122,0xb7,0x2b9b
0,LS_LDS_LaserFlakyPhoto,3,59,124,0xba,0x2d0c
0,LS_LDS_LaserFlakyCurrent,3,60,126,0xbd,0x2e83
0,LS_LDS_ReservedCode,3,61,128,0xc0,0x3000 0,LS_ERROR_DFLT_APP,3,62,130,0xc3,0x3183
0,LS_ERROR_CORRUPT_SCB,3,63,132,0xc6,0x330c
0,LS_ERROR_BRUSH_CRITICAL,3,64,134,0xc9,0x349b
0,LS_ERROR_DECK_DEBRIS,3,65,136,0xcc,0x3630 0,LS_DOCKED,3,66,138,0xcf,0x37cb
0,LS_LMAG,3,67,140,0xd2,0x396c 0,LS_RMAG,3,68,142,0xd5,0x3b13
0,LS_ALERT_RETURN_TO_BASE,3,69,144,0xd8,0x3cc0
0,LS_ALERT_RETURN_TO_BASE_PWR,3,70,146,0xdb,0x3e73
0,LS_ALERT_RETURN_TO_START,3,71,148,0xde,0x402c
0,LS_ALERT_RETURN_TO_CHARGE,3,72,150,0xe1,0x41eb
0,LS_ALERT_DUST_BIN_FULL,3,73,152,0xe4,0x43b0
```

```
0,LS_ALERT_BUSY_CHARGING,3,74,154,0xe7,0x457b
0,LS_ALERT_RECOVERING_LOCATION,3,75,156,0xea,0x474c
0,LS_ALERT_CHARGING_POWER,3,76,158,0xed,0x4923
0,LS_ALERT_CHARGING_BASE,3,77,160,0xf0,0x4b00
0,LS_ALERT_CONNECT_CHRG_CABLE,3,78,162,0xf3,0x4ce3
0,LS_ERROR_DISCONNECT_CHRG_CABLE,3,79,164,0xf6,0x4ecc
0,LS_ERROR_DUST_BIN_EMPTIED,3,80,166,0xf9,0x50bb
0,LS_ERROR_DUST_BIN_MISSING,3,81,168,0xfc,0x52b0
0,LS_ERROR_DUST_BIN_FULL,3,82,170,0xff,0x54ab
0,LS_ERROR_UNABLE_TO_NAVIGATE,3,83,172,0x102,0x56ac
0,LS_ERROR_UNABLE_TO_RETURN_TO_BASE,3,84,174,0x105,0x58b3
0,LS_ERROR_BUMPER_STUCK,3,85,176,0x108,0x5ac0
0,LS_ERROR_PICKED_UP,3,86,178,0x10b,0x5cd3
0,LS_ERROR_RECONNECT_FAILED,3,87,180,0x10e,0x5eec 0,LS_WALL_MM,3,88,182,0x111,0x610b
0,LS_LDROP,3,89,184,0x114,0x6330 0,LS_RDROP,3,90,186,0x117,0x655b
0,LS_LSBUMP,3,91,188,0x11a,0x678c 0,LS_LFBUMP,3,92,190,0x11d,0x69c3
0,LS_RFBUMP,3,93,192,0x120,0x6c00 0,LS_RSBUMP,3,94,194,0x123,0x6e43
0,LS_LDS_Corruption,3,95,196,0x126,0x708c
0,LS_ERROR_DISCONNECT_USB_CABLE,3,96,198,0x129,0x72db
```

Command: GetMotors

Description: Get the diagnostic data for the motors.
Usage: GetMotors [Brush] [Vacuum] [LeftWheel] [RightWheel] [Laser] [Charger]
Options:

Flag	Description
Brush	Return Brush Motor stats.
Vacuum	Return Vacuum Motor stats.
LeftWheel	Return LeftWheel Motor stats.
RightWheel	Return RightWheel Motor stats.
Laser	Return LDS Motor stats.
Charger	Return Battery Charger stats.

Return Format:

```
If no flags are specified, then all motors are reported on. Parameter,Value
Brush_MaxPWM,65536 Brush_PWM,-858993460 Brush_mVolts,1310 Brush_Encoder,0 Brush_RPM,
-858993460 Vacuum_MaxPWM,65536 Vacuum_PWM,-858993460 Vacuum_CurrentInMA,52428
Vacuum_Encoder,0 Vacuum_RPM, 52428 LeftWheel_MaxPWM,65536 LeftWheel_PWM,-858993460
LeftWheel_mVolts,1310 LeftWheel_Encoder,0 LeftWheel_PositionInMM,0 LeftWheel_RPM,-
13108 RightWheel_MaxPWM,65536 RightWheel_PWM,-858993460 RightWheel_mVolts,1310
RightWheel_Encoder,0 RightWheel_PositionInMM,0 RightWheel_RPM,-13108
Laser_MaxPWM,65536 Laser_PWM,-858993460 Laser_mVolts,1310 Laser_Encoder,0 Laser_RPM,
52428 Charger_MaxPWM,65536 Charger_PWM,-858993460 Charger_mAH, 52428
```

Command: GetSchedule

Description: Get the Cleaning Schedule. (24 hour clock format)
Usage: GetSchedule [Day <Day_value>]
Options:

Flag	Description

Day	Day of the week to get schedule for. Sun=0,Sat=6. If not specified, then all days are given.

Return Format:

```
Schedule is Enabled Sun 00:00 - None - Mon 00:00 - None - Tue 00:00 R Wed 00:00 R
Thu 00:00 R Fri 00:00 H Sat 00:00 H
```

Command: GetSysLog

Description: Get System Log data.
Usage: GetSysLog
Options: None
Return Format:

```
(Unimplemented) Sys Log Entries: Run, Stat, Min, Max, Sum, Count, Time(ms)
```

Command: GetTime

Description: Get Current Scheduler Time.
Usage: GetTime
Options: None
Return Format:

```
DayOfWeek HourOf24:Min:Sec Example: Sunday 13:57:09
```

Command: GetVersion

Description: Get the version information for the system software and hardware.
Usage: GetVersion
Options: None
Return Format:

```
Component,Major,Minor,Build ModelID,0,XV11, ConfigID,1,, Serial
Number,AAAnnnnnAA,0000000,D Software,2,1,15499 BatteryType,1,NIMH_12CELL,
BlowerType,1,BLOWER_ORIG, BrushSpeed,0,, BrushMotorType,1,BRUSH_MOTOR_ORIG,
SideBrushType,1,SIDE_BRUSH_NONE, WheelPodType,1,WHEEL_POD_ORIG,
DropSensorType,1,DROP_SENSOR_ORIG, MagSensorType,1,MAG_SENSOR_ORIG,
WallSensorType,1,WALL_SENSOR_ORIG, Locale,1,LOCALE_USA, LDS Software,V1.0.0,, LDS
Serial,XXX-YYY,, LDS CPU,F2802x/cd00,, MainBoard Vendor ID,1,, MainBoard Serial
Number,99,, MainBoard Version,15,0, ChassisRev,-1,, UIPanelRev,-1,,
```

Command: GetWarranty

Description: Get the warranty validation codes.
Usage: GetWarranty
Options: None
Return Format:

```
00000000 0000 962d3a58
```

Command: Help

Description: Without any argument, this prints a list of all possible cmds.
With a command name, it prints the help for that particular command
Usage: Help [Cmd <Cmd_value>]
Options:

Flag	Description
Cmd	(Optional) Next argument is command to show help for. If Cmd option not used, help gives list of all commands.

Return Format:

```
'Help' Generates: Help - Without any argument, this prints a list of all possible
cmds. With a command name, it prints the help for that particular command Clean -
Starts a cleaning by simulating press of start button. DiagTest - Executes different
test modes. Once set, press Start button to engage.
(Test modes are mutually exclusive.) GetAccel - Get the Accelerometer readings.
GetAnalogSensors - Get the A2D readings for the analog sensors. GetButtons - Get the
state of the UI Buttons. GetCalInfo - Prints out the cal info from the System
Control Block. GetCharger - Get the diagnostic data for the charging system.
GetDigitalSensors - Get the state of the digital sensors. GetErr - Get Error
Message. GetLDSScan - Get scan packet from LDS. GetLifeStatLog - Get All Life Stat
Logs. GetMotors - Get the diagnostic data for the motors. GetSchedule - Get the
Cleaning Schedule. (24 hour clock format) GetSysLog - Get System Log data. GetTime -
Get Current Scheduler Time. GetVersion - Get the version information for the system
software and hardware. GetWarranty - Get the warranty validation codes. PlaySound -
Play the specified sound in the robot. RestoreDefaults - Restore user settings to
default. SetDistanceCal - Set distance sensor calibration values for min and max
distances. SetFuelGauge - Set Fuel Gauge Level. SetMotor - Sets the specified motor
to run in a direction at a requested speed. (TestMode Only) SetTime - Sets the
current day, hour, and minute for the scheduler clock. SetLED - Sets the specified
LED to on,off,blink, or dim. (TestMode Only) SetLCD - Sets the LCD to the specified
display. (TestMode Only) SetLDSRotation - Sets LDS rotation on or off. Can only be
run in TestMode. SetSchedule - Modify Cleaning Schedule. SetSystemMode - Set the
operation mode of the robot. (TestMode Only) SetWallFollower - Enables/Disables wall
follower TestMode - Sets TestMode on or off. Some commands can only be run in
TestMode. Upload - Uploads new program to the robot.  'Help Clean' Generates: Clean
- Starts a cleaning by simulating press of start button.     House - (Optional)
Equivalent to pressing 'Start' button once. Starts a house cleaning. (House cleaning
mode is the default cleaning mode.)     Spot - (Optional) Starts a spot clean.
Stop - Stop Cleaning.
```

Command: PlaySound

Description: Play the specified sound in the robot.
Usage: PlaySound [SoundID <SoundID_value>] [Stop]
Options:

Flag	Description
SoundID	Play the sound library entry specified by the number in the next argument. Legal values are:

	0 – Waking Up 1 – Starting Cleaning 2 – Cleaning Completed 3 – Attention Needed 4 – Backing up into base station 5 – Base Station Docking Completed 6 – Test Sound 1 7 – Test Sound 2 8 – Test Sound 3 9 – Test Sound 4 10 – Test Sound 5 11 – Exploring 12 – ShutDown 13 – Picked Up 14 – Going to sleep 15 – Returning Home 16 – User Canceled Cleaning 17 – User Terminated Cleaning 18 – Slipped Off Base While Charging 19 – Alert 20 – Thank You
Stop	Stop playing sound.

Return Format: None

Command: RestoreDefaults

Description: Restore user settings to default.
Usage: RestoreDefaults
Options: None
Return Format: None

Command: SetDistanceCal

Description: Set distance sensor calibration values for min and max distances.
Usage: SetDistanceCal [DropMinimum] [DropMiddle] [DropMaximum] [WallMinimum] [WallMiddle] [WallMaximum]
Options:

Flag	Description
DropMinimum	Take minimum distance drop sensor readings. Mutually exclusive of DropMiddle and DropMax.
DropMiddle	Take middle distance drop sensor readings. Mutually exclusive of DropMinimim and DropMax.
DropMaximum	Take maximum distance drop sensor readings. Mutually exclusive of DropMinimum and DropMiddle.
WallMinimum	Take minimum distance wall sensor readings. Mutually exclusive of WallMiddle and WallMax.
WallMiddle	Take middle distance wall sensor readings. Mutually exclusive of

	WallMinimim and WallMax.
WallMaximum	Take maximum distance wall sensor readings. Mutually exclusive of WallMinimim and WallMiddle.

Return Format:

```
Label,Value RDropCalA2DMin,-1 RDropCalA2DMid,-1 RDropCalA2DMax,-1 LDropCalA2DMin,-1
LDropCalA2DMid,-1 LDropCalA2DMax,-1 WallCalA2DMin,-1 WallCalA2DMid,-1
WallCalA2DMax,-1
```

Command: SetFuelGauge

Description: Set Fuel Gauge Level.
Usage: SetFuelGauge [Percent <Percent_value>]
Options:

Flag	Description
Percent	Fuel Gauge percent from 0 to 100

Return Format: None

Command: SetLCD

Description: Sets the LCD to the specified display. (TestMode Only)
Usage: SetLCD [BGWhite] [BGBlack] [HLine <HLine_value>] [VLine <VLine_value>] [HBars] [VBars] [FGWhite] [FGBlack] [Contrast <Contrast_value>]
Options:

Flag	Description
BGWhite	Fill LCD background with White
BGBlack	Fill LCD background with Black
HLine	Draw a horizontal line (in foreground color) at the following row.
VLine	Draw a vertical line (in foreground color) at the following column.
HBars	Draw alternating horizontal lines (FG,BG,FG,BG,...), across the whole screen.
VBars	Draw alternating vertical lines (FG,BG,FG,BG,...), across the whole screen.
FGWhite	Use White as Foreground (line) color
FGBlack	Use Black as Foreground (line) color
Contrast	Set the following value as the LCD Contrast value into NAND. 0..63

Return Format: None

Command: SetLDSRotation

Description: Sets LDS rotation on or off. Can only be run in TestMode.
Usage: SetLDSRotation [On] [Off]
Options:

Flag	Description
On	Turns LDS rotation on. Mutually exclusive with Off.
Off	Turns LDS rotation off. Mutually exclusive with On.

Return Format: None

Command: SetLED

Description: Sets the specified LED to on,off,blink, or dim. (TestMode Only)
Usage: SetLED [BacklightOn] [BacklightOff] [ButtonAmber] [ButtonGreen] [LEDRed] [LEDGreen] [ButtonAmberDim] [ButtonGreenDim] [ButtonOff]
Options:

Flag	Description
BacklightOn	LCD Backlight On (mutually exclusive of BacklightOff)
BacklightOff	LCD Backlight Off (mutually exclusive of BacklightOn)
ButtonAmber	Start Button Amber (mutually exclusive of other Button options)
ButtonGreen	Start Button Green (mutually exclusive of other Button options)
LEDRed	Start Red LED (mutually exclusive of other Button options)
LEDGreen	Start Green LED (mutually exclusive of other Button options)
ButtonAmberDim	Start Button Amber Dim (mutually exclusive of other Button options)
ButtonGreenDim	Start Button Green Dim (mutually exclusive of other Button options)
ButtonOff	Start Button Off

Return Format: None

Command: SetMotor

Description: Sets the specified motor to run in a direction at a requested speed. (TestMode Only)
Usage: SetMotor [LWheelDist <LWheelDist_value>] [RWheelDist <RWheelDist_value>] [Speed <Speed_value>] [Accel <Accel_value>] [RPM <RPM_value>] [Brush] [VacuumOn] [VacuumOff] [VacuumSpeed <VacuumSpeed_value>] [RWheelDisable] [LWheelDisable] [BrushDisable] [RWheelEnable] [LWheelEnable] [BrushEnable]
Options:

Flag	Description
LWheelDist	Distance in millimeters to drive Left wheel. (Pos = forward, neg = backward)
RWheelDist	Distance in millimeters to drive Right wheel. (Pos = forward, neg = backward)
Speed	Speed in millimeters/second. (Required only for wheel movements)
Accel	Acceleration in millimeters/second. (Used only for wheel movements. Defaults to 'Speed'.)
RPM	Next argument is the RPM of the motor. Not used for wheels, but applied to all other motors specified in the command line.
Brush	Brush motor forward (Mutually exclusive with wheels and vacuum.)

VacuumOn	Vacuum motor on (Mutually exclusive with VacuumOff)
VacuumOff	Vacuum motor off (Mutually exclusive with VacuumOn)
VacuumSpeed	Vacuum speed in percent (1-100).
RWheelDisable	Disable Right Wheel motor
LWheelDisable	Disable Left Wheel motor
BrushDisable	Disable Brush motor
RWheelEnable	Enable Right Wheel motor
LWheelEnable	Enable Left Wheel motor
BrushEnable	Enable Brush motor

Return Format: None

Command: SetSchedule

Description: Modify Cleaning Schedule.
Usage: SetSchedule [Day <Day_value>] [Hour <Hour_value>] [Min <Min_value>] [House] [None] [ON] [OFF]
Options:

Flag	Description
Day	Day of the week to schedule cleaning for. Sun=0,Sat=6. (required)
Hour	Hour value 0..23 (required)
Min	Minutes value 0..59 (required)
House	Schedule to Clean whole house (default) (Mutually exclusive with None)
None	Remove Scheduled Cleaning for specified day. Time is ignored. (Mutually exclusive with House)
ON	Enable Scheduled cleanings (Mutually exclusive with OFF)
OFF	Disable Scheduled cleanings (Mutually exclusive with ON)

Return Format:

```
Schedule is Enabled Sun 00:00 - None - Mon 00:00 - None - Tue 00:00 R Wed 00:00 R
Thu 00:00 R Fri 00:00 H Sat 00:00 H
```

Command: SetSystemMode

Description: Set the operation mode of the robot. (TestMode Only)
Usage: SetSystemMode [Shutdown] [Hibernate] [Standby]
Options:

Flag	Description
Shutdown	Shut down the robot. (mutually exclusive of other options)
Hibernate	Start hibernate operation.(mutually exclusive of other options)

Standby	Start standby operation. (mutually exclusive of other options)

Return Format: None

Command: SetTime

Description: Sets the current day, hour, and minute for the scheduler clock.
Usage: SetTime [Day <Day_value>] [Hour <Hour_value>] [Min <Min_value>] [Sec <Sec_value>]
Options:

Flag	Description
Day	Day of week value Sunday=0,Monday=1,... (required)
Hour	Hour value 0..23 (required)
Min	Minutes value 0..59 (required)
Sec	Seconds value 0..59 (Optional, defaults to 0)

Return Format: None

Command: SetWallFollower

Description: Enables/Disables wall follower
Usage: SetWallFollower [Enable] [Disable]
Options:

Flag	Description
Enable	Enable wall follower
Disable	Disable wall follower

Return Format: None

Command: TestMode

Description: Sets TestMode on or off. Some commands can only be run in TestMode.
Usage: TestMode [On] [Off]
Options:

Flag	Description
On	Turns Testmode on. Mutually exclusive with Off.
Off	Turns Testmode off. Mutually exclusive with On.

Return Format: None

Command: Upload

Description: Uploads new program to the robot.
Usage: Upload [dump] [code] [sound] [LDS] [xmodem] [size <size_value>] [noburn] [readflash] [reboot]
Options:

Flag	Description
dump	Dump the contents of the upload save area.

code	Upload file is the main application. (Mutually exclusive with sound, LDS)
sound	Upload file is a sound module. (Mutually exclusive with code, LDS)
LDS	Upload file is an LDS module. (Mutually exclusive with sound, code)
xmodem	Use xmodem protocal when transmitting upload module
size	data size to upload to device.
noburn	test option -- do NOT burn the flash after the upload.
readflash	test option -- read the flash at the current region.
reboot	Reset the robot after performing the upload.

Return Format: None