

TMS (UNI-WINCH MINI)

Operations Manual



Hybrid Robotics REV1.3

Contents

Introduction:	2 2
Connecting to the TMS	3
Tether In/Out Button Operation:	5
Alternative Keyboard Shortcuts for Tether Control	5
Default Network Configuration	5
	5 ح
Step 1 – Ensure that Your Tether is Unloaded to its Minimum Extent:	6
Step 2 – Disengage the Drum Brake:	7
Step 3 – Manually Turn the Drum Back to the Zero Position:	8
Step 4 – Engage the Drum Brake:	9
Step 5 – Get TMS Back Into the Stopped State (Bug Workaround – Fix Coming):	10
Step 5 - Alternative Method:	11
Step 6 – Home TMS:	12
Step 7 – Remove Screws from the drum cover:	13
Step 8 – Remove Screws from the Levelwind Tensioner Assembly:	14
Step 9 – Remove the Levelwind Tensioner Assembly:	15
Step 10 – Remove the Spool Drum Cover and Tether:	16
Step 11 – Feed <i>Tether</i> up through through <i>Levelwind Carriage</i> :	17
Step 12 – Install the Levelwind Tensioner Assembly:	
Step 13 – Install flathead screws into the Levelwind Tensioner Assembly:	19
Step 14 – Wrap Tether Around Drum:	20
Step 15 – Install Drum Cover	21
Step 16 – Install Screws Into Drum Cover & Pull Loose Cable Through Levelwind:	22
Step 17 – Change Tether Diameter and Length in the User Interface:	23
Step 18 – Establish a Fresh Connection with the TMS (Bug Workaround – Fix Coming):	24
Step 19 – Home TMS:	25
Step 20 – Pay in the First Few Wraps of Tether:	26
Step 21– Manually Organize the Wraps so That the Tether Does Not Cross Over Itself:	27
Glossary	28
Pinouts	28
Standard Pinouts	28
External Proximity Endstop (If included)	28
Specifications:	29

Introduction:

Anatomy of a TMS



Connecting to the TMS

The standard TMS has two connectors on the housing: Power (20-30Vdc) and communications (Ethernet), as shown in the image below.



There are two connectors on the slipring for connecting the tether and decklead; see the image below.



A user friendly interface to con: × сŵ 🔿 🔷 tm: ۲ と 言 System Commands Controls System Info Voltage: 30.00V dict[[101, <Classes.SC25.SC25.SC25 object at 0x (80.AKB0.AKB0 object at 0xf508a238>]]) Current: 0.35A Disarm Power: 10.50W 26.60°C 327), (1a) r 5, 11,168 Current Layer: 100.309 8.10r nnically Braking nnically Braking 7), LS_V: (0.0), LS_WZ: (-7314), LS_D: (0), Cun 60.00m IMU Data Coming Soon. Coming Soon. 53.53m Tether at: 53.53m Max Tether: 57.47m Metric Imperial Download Clear 75 % A user friendly interface to cont × + Cmd Interface Menu System Commands Controls System Info bool stop Load Tether Voltage: 30.00V Disarm 10.50W 26.60°C Current Layer: 100.30% Diameter: 8.10mm king king 0), LS_WZ: (~7314), LS_D: (0), Cun Length: 60.00m IMU Data Coming Soon. Coming Soon 53.53m Tether at: 53.53m 57.47r System Message Log Metric Clear Download Reboot **Speed Control**

To access the control interface, navigate to *tmscontrol.local* in a web browser.

Tether In/Out Button Operation:

You can use a click-and-drag technique to continuously operate the Tether In or Tether Out function without holding down the button. Simply left-click and hold down on either the Tether In or Tether Out button, drag your mouse cursor away from the button, and then release. This action will 'lock' the command, allowing continuous operation without needing to press the button. You can left-click either button again or use the disarm function to stop the drum's motion. The drum will also automatically stop at the minimum or maximum extent of the drum load, provided it accurately knows its position.

Alternative Keyboard Shortcuts for Tether Control:

When the *tmscontrol.local* interface is the active window on your computer; you can utilize keyboard shortcuts for quick tether commands. Press the 'i' key to initiate a 'Tether In' command at the speed set on the slider bar, and press the 'o' key for a 'Tether Out' command at the preset speed. These shortcuts offer an efficient alternative to mouse clicks, streamlining the operation process.

Default Network Configuration

TMS Network Config:

- IP 192.168.2.37
- Subnet Mask: 255.255.255.0

Example Control Computer Network Config:

- IP 192.168.2.1
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.2.37

To change the TMS network settings, you can access the control computer's desktop using VNC Viewer at either the TMS IP address or tmscontrol.local.

Calibrate Definition

The calibrate button only homes the Levelwind Carriage position. If the Levelwind Carriage is not in the correct position or fails to switch directions, you should run a Calibration. It will follow the below steps to complete this:

- 1. Feed some cable up through the top of the Levelwind Carriage, giving some slack.
- 2. Travel to the Nearside Proximity Sensor.
- 3. Find Leadscrew 0 position.
- 4. Travel back to the correct position.
- 5. Then, feed the loose cable back through the bottom of the Levelwind Carriage.

You should pay out a few meters of cable after running a calibration to ensure a clean fill.

Change Tether

The following steps are instructions that will allow you to unload the last few degrees of the tether, home the *levelwind carriage*, and then change the tether to a different diameter. If you do not have tether loaded on the TMS, skip to **Step 7**.

Step 1 – Ensure that Your Tether is Unloaded to its Minimum Extent:

• It should look similar to the image below, with only a few wraps of tether towards the drum's near side extent.





Controls 1	System Commands	System Info
	disengage_brake (true)	
	System Log	Load Tether
Manual Auto	Revense PV: [-33990], PPos: (1877), L5, V: [-38.888], L5, W2: [3059743], L5, D: (1), CurrentLayer: (1) Cakulated Leadscrew Pos: [3052277] Courant. Leadscrew Pos: [200477] Reverse PV: [-3399], PPos: [3060, L5: V: [-35.302], L5 V: [-350238], L5 D: [1], CurrentLayer: (1) Cakulated Leadscrew Pos: [550003] Current Leadscrew Pos: [3839079] Leadscrew noutlino Is 19023. And deviated Lendon sevue from, Cacreaging Random In D.6. of ant	Voltage: 29.91V
Arm Disarm	apand, Reversa PV: (-329390), PPos: (1687), LS, V: (-37.668), LS, WZ: (1839079), LS, D: (I), CurrentLayer: (I) Calculated Landscrev Pos: (1807730) Current Landscrev Pos: (1734069)	Current: 0.43A
	leadscrew position is 73661.00 off desired location away from, Decreasing speed to 0.95 of set speed, Reverse PX-[-33900], PPos: [1673], L5_V: [-38.373], L5_V: 2: [1661320], L5_V: [1], CurrentLayer: [1] Calculated Landcrew Pos: [1682646] Current Landcrew Pac: [1628030]	Power: 12.96W
Tether Tether	Reverse PV: 133960, PPsc (145), L5, V; 138358, L5, W2 (1574545), L5, D; (I), CurrentLeyer: (I) Calculated Ladiscrev Pos: (B0594) Current Leadscrev Pos: (158882) leadscrev position is 65079.00 off desired location away from, Decreasing speed to 0.94 of set speed.	Temp: 47.80°C
In Out	Primary Motor Electrically Basking Revense PV: (Addoo), Ppee (piss)1, L2, V (38.568), L3, W2; (1318862), L5, D; (1), CurrentLeyer; (1) Calculated Landacreve Poe (1527768) Current Landacreve Poe; (1465993) Primary Motor Electrically Bealing	Current 1 Layer: 1
	Primary Motor Electrolechanically Brailing Primary Motor Electrolechanically Brailing Branpad Pro (B), Prove (1990), LL, V. (2000), LL, V.2 (M3803), LL, D: (1006/8034), CurrentLayer: (1) Carbulated Electron Proc (Electron) Carbulated Electron Proc (Electron)	Layer 9.50% Fill:
1/36/3634 01:55PM	Reverse PW 339700, PPos: (2860) L5: ½ (3.888), L5: W2: (34886)53, L5: D. (1), CurrentLayer: (1) Calculated Leadscrew Pos: (3380498) Current, Leadscrew Pos: (1423266) Reverse PV 339800, PPose (1984), L5: ½ (3.6464), L5: W2: (108123), L5: ½ (1), CurrentLayer: (1)	Diameter: 8.10mm
Caming Soon.	Celculated Leadscrew Poic (28023) Current Leadscrew Poic (230903) Reverse PV (13990), PPoic (1070), LS V (-40.424), LS VV (2127374), LS D: (1), CurrentLayer: (1) Calculated Leadscrew Poic (1186709) Current Leadscrew Poic (22794) Leadscrewentifies D: 690370 and Action Leadscrewent benches	Length: 60.00m
Billion	Reverse PV (-33996), PBoc (994), LLV (-40797), LLVZ (223706), LLC (1), CurrentLayout and the special Reverse PV (-33996), PBoc (994), LLV (-40797), LLVZ (223706), LLC (1), CurrentLayout and the Calculated Lendersw Pox (D64436) Current Lendersw Pox (223706) Lendersw position is 19234-00 of desired location towards, Increasing speed to 1.11 of set speed	Out: 59.35m
	Stoppod PV: (b), PPose, (B3), LS: V: (0.0), LS: V/2; (1223690), LS: D: (1), CurrentLayer; (1) Primary Motor Electrically Binking Primary Motor Electrically Binking Primary Motor Electrotically Binking	Max Tether: 60.71m
- O -	Download Clear	Metric Imperi
VI Designed by Jusin Digital Art &	100 %	Calibrate
		Reboot

- 1. Dropdown Menu Selection (Green Oval):
 - Locate and select *disengage_brake* from the dropdown menu.
- 2. Input in Text Box (Red Oval):
 - Type *true* in the provided text box.
- 3. Execute Command:
 - Press Enter to send the command.
- 4. Auditory Confirmation:
 - Listen for a click sound, indicating the brake has disengaged.

Step 3 – Manually Turn the Drum Back to the Zero Position:



- Manually turn the drum until there are no more full wraps of tether around the drum.
- Ensure the drum cover is facing the proximity sensors.
- Use the heatsink pattern as a guide to align the center of the cover side wheel with the thicker portion of the heatsink pattern, as shown in the images below.





8

Controls System Commands System Info false System Log Load Tether Voltage: 29.89V 01. LS. D: 5 V: (0.0) LS WZ: (7) 0.45A Disarm 13.45W Power: 45.83°C Temp: Current Layer: Layer Fill: 0.10% 8.10mm INU Data Caming Soor Coming Soor Length: 60.00m LS_D() 59.99m Max Tether: 60.71m Metric Imperi... Download Clear 100 %

Step 4 – Engage the Drum Brake:

- 1. Dropdown Menu Selection (Green Oval):
- Locate and select *disengage_brake* from the dropdown menu.
- 2. Input in Text Box (Red Oval):
 - Type *false* in the provided text box.
- 3. Execute Command:
 - Press Enter to send the command.
- 4. Auditory Confirmation:
 - Listen for a click sound, indicating the brake has engaged.

Step 5 – Get TMS Back Into the Stopped State (Bug Workaround – Fix Coming):

- 1. Power cycle the TMS
- 2. Wait for the TMS to finish booting. You will know it has finished if the telemetry values under System Information start updating.

Controls	System Commands	System Info
	find_home_position v bool	
	System Log	Load Tether
	Stating on layer_1 IndexDetected; (0) IndexDetected; (1)	Voltage: 30.02V
Arm Disarm	Launched Servor Launched Servor Primary Motor Electrically Baking Primary Motor Electrically Baking	Current: 0.56A
	Stopped PP (II) PPos (S), LS V (IO), LS VE (19973), LS D: (DOGB24), CurrentLayer: (I) Primary Motor ElectroMechanically Braking Primary Motor ElectroMechanically Braking	Power: 16.81W
	Stopped due to server maifunction, attempt to re-establish number 0 Stopped due to server maifunction, attempt to re-establish number 1 Stopped due to server maifunction, attempt to re-establish number 2 Stopped due to server maifunction, attempt to re-establish number 3	Temp: 31.51°C
Tether in Tether Out	Stopped due to server malfunction, attempt to re-establish number 4 Stopped due to server malfunction, attempt to re-establish number 5 Stopped due to server malfunction, attempt to re-establish number 6 Stopped due to server malfunction, attempt to re-establish number 7	Current 1 Layer: 1
	Stopped due to server maifunction, attempt to re-establish number 8 Stopped due to server maifunction, attempt to re-establish number 9 Primary Motor Walting for Lewi-Mind to Stop homing Home Command Readewide In LeadscreeWork.coverner	Layer Fill: 0.00%
2/6/2024 03:27PM	Tensioner Motor Walting for Levelwind to Stop homing Leadscrew Motor Worksoner.7873 Primary Motor Dealtion: 50 Homing Levelwind	Diameter: 5.88mm
IMU Data Coming Soon. Coming Soon.	Backing Away From Proximity Sensor Approaching Proximity Sensor Found Proximity Sensor	Length: 90.00m
Tether at:	Leadscrew Motor Workzone PreRest: 5908 Primary Motor Position PreRest: 5.0 Leadscrew Motor Workzone Positiest: 2409 Defense Motor Workzone Positiest: 2409 Defense Motor Review DestRest: 6.0	Out: 90.00m
<u><u><u></u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u></u>	Finding Home Volucion Positioner Save	Max Tether: 91.70m
	Tensioner Motor Sees Levelwind is Done Homing! Tether Diameter Changed to: 588mm, Tether Length: 90.0m	Metric Imperial
~=⊙ =•	Download Clear	Calibrate
HYBRID ROBOTICS	100 %	
		Reboot

Once the connection is established, left-click the *Clear* button under *System Log* and refresh the page. After refreshing, the *System Log* should look similar to the image below.

		System C	ommands		
stop	~ b	ool			
		Syster	n Log		
Motor P Oxf57d9; leadscre Tether P 35,599(), ('Degree ('By772.0 ('Cricrum 401.873) ('layer.3 ordered ('Tether, ('layer.6 Starting IndexDe IndexDe IndexDe IndexDe IndexDe Primary Primary	vrams YAML: ordereddict([[10], 120-); (0, <classes.ak80.ak80.a w_motor_starting_pos: 154, prin arams YAML: ordereddict([[Tet (Travel.Distance.Per, Turn; 65; Bange, Per, Layer, ordereddict ; 1696:00,] (1999; 75; 51696:0, 64; Greence.or, Layers, ordereddict (1994; 6, 438:481); (1ayer, 7; 10706; (1ayer, 27; .0131); (1ayer, 4', 0146); (1ayer, 5 .0133); (1ayer, 7', 17.0796); (1ayer, 27; .0130; (1ayer, 27; 1300; (</classes.ak80.ak80.a 	Classes SC25.SC25 SC25 K60 object at 0xf57d923 mary_motor_starting_po har_Diameter, S480, (T0 02), (Maximum_Numbe U([layer, 7, [0, 12923]), (r6 690), (1ayer, 6, 6, 66 670), (1ayer, 6, 6, 16 670), (1ayer, 7, 254, 062), (1ayer, 7, 5703))), (Max, Pay, Spe 7, 0.16), (1ayer, 6, 0.776), (1ayer, 7, 3080), (1ayer, 7, 0.912), (1ayer, 7, 0.16), (1ayer, 6, 0.776), (1ayer, 8, 0.7751), LS_D; (1006 kking	object at 0xf57d9208-), 8-)]) 5: 0.0 ther_Length; 90.0), (Pee or Layrer; 7), (End Wo yer; 2; 19224, 258470]), 0.775430], (Hayer; 7), (7), 4: 0.755403), (Hayer; 7), 7; 2; 231037), (Hayer; 7), 7; 2; 231037), (Hayer; 7), 7; 23, (14947; 5), 7), (14947; 5), (1494	(102, <classes.sc25.sc2 sl_Fill_Pellef, 4.59), (Turr rkzone; 10051824) (11ayer, 3) (25848,0, 3877) 7544.0, 904570)]]), 77982), (layer, 4:, 3649) 77982), (layer, 4:, 3640), (layer Tether Lengths, Per, De 16), (layer, 5, 129), (lay 16), (layer, 5, 129), (layer, 4) 30.0]])</classes.sc25.sc2 	5.5C25 object at nPerLayer', 1.0]), ('layer_4', 17), ('layer_5', 2', 0.116), gree, gree, r.7, 1322)))), 5', 14.426),
		Download			Clear
	_				75 %

Step 5 - Alternative Method:

- 1. **Manually Turn the Drum**: When we rotate the drum to the zero position, it temporarily disrupts the unit's 'officially stopped' state.
- 2. Re-engage System to Stopped State:
 - \circ Use the' tether in' button to reset the system without further drum adjustment.
 - Press ' tether in' briefly, for about 1-2 seconds, then release.
 - Repeat this process and monitor the system log.
 - Once the 'stopped' message appears in the system log, the system is back in its stopped state. It is highlighted in the image below.
 - This procedure is a workaround for a software bug, pending resolution in future updates.

Controls	System Commands	System Info
	disengage_brake v bool	
	System Log	Load Tether
anual Auto	renorative position in 77.50-0.500 art desired location away nom, Decreasing speed to U.A. or set	
	apara, Reverse VP, (20020), Ploc: (121), LS V(00), LS W2: (1223890), LS Dr.(10061824), CurrentLayer: (1) Reversative Leadscrew Pos: (124-076), Current Leadscrew Pos: (1223850) Leadscrew position & 823814.60 of desired location away from, Decreasing speed to 0.41 of set speed.	Voltage: 29.93V
Arm Disarm	Reverse PV: [-21430], PPois (269], LS_V: (0.0), LS_VIZ: (1223690), LS_D: (10061824), CurrentLayer: (1) Calculated Leadsrew Pois (246883) Current Leadsrew Pois (1223690) Jeadsrew position is 87580700 off desired location avex from Decreasion	Current: 0.47A
	speed, Reverse PV: (-36460), PPos: (22), L.S. V: (0.0), L.S. W2: (0225690), LS. D: (10066824), Currenti.syer: (1) Cakulated Leaderew Pos: (284327) Current Leaderew Pas: (1233690)	Power: 14.07W
	leadscrew position is 22353.00 off desired location away from, Decreasing speed to 0.34 of set speed, Deverse PV ListColl: Power (B2): LS V/ 0.01 LS V/210225606 LS Dr (2006)8241 Current awar (D	Temp: 46.07°C
in Tether	Calculated Leadersev Post (24488) Current Leadscrew Post (223690) leadersew position is 978701.00 off desired location away from, Decreasing speed to 0.38 of set	Current
	npnea, Reverse PV: [-16800], PPos: (132), LS V: (0.0), LS W2: (1223690), LS, D: (10061824), CurrentLayer: (1) Calculated Leadscrew Pos: (201013) Current, Leadscrew Pos: (1223690)	Layer:
	leadscrew position is 102257/00 off desired location away from, Decreasing speed to 0.28 of set speed. Reverse PV (17730), PPose (06), LS, V(100), LS, V2; (023000), LS, D; (006/1024), CurrentLayer; (1) Calculated Lasdicrew Pose (102400) Current Landscrew Pos; (172300) Calculated Lasdicrew Pose (102400) Current Landscrew Pos; (172300)	Layer 0.10% Fill:
1/36/3038 01.55PM	speed, Reverse P. (-14:220), PPos: (77), LS, V: (0.0), LS, W2: (122:69:0), LS, D: (1006/1824), CurrentLayer. (1) Cakiushad Landerzew Dec (1318/g Current Landerzew Dec (123:690)	Diameter: 8.10mm
g Soon.	lendscrew position in 102239-400 eff desired location www.ytrom, Decreasing speed to 0.23 of set speed. Reverse IVV: (10800), PPos: (36), LS VI (0.0), LS VI2: (1223690), LS D: (1006824), CurrentLayen (1) Calculated Lendersen Roc (10425) Current Lendersen Roc: (123260)	Length: 60.00m
50.59m	leadscrew position is 106265.00 off desired location away from, Decreasing speed to 0.32 of set speed, Devise Dis (4160) Door (34) 15 V/ 10 V 15 V/2 (1725900) 15 Dr (000154) Consolt aven (1	Out: 59.99m
	Calculated Leadscrew Pos: (9918) Current Leadscrew Pos: (123690) leadscrew position is 1124572.00 off desired location away from, Decreasing speed to 0.21 of set speed.	Max 60.71m Tether:
	Breeze PV: [-2670], PPor: [14], L5_V: (0.0), L5_V(22560), L5_C: [0068324], Currentayer: (1) Biopped PV: (0), PPor: [7], L5_V: (0.0), L5_V2: [1225600], L5_D: (10064824), CurrentLayer: (1)	Matula
HYEROBOTICS	Download Clear	Metric Imperia
rned by Jealn Digital Art &		Calibrate
	100 %	

Step 6 – Home TMS:

Controls <u>1</u>	System Commands		Systen	n Info
	find_home_position)		
	System Log		Load T	ether
	speed,			
	Reverse PV: 1-20020), PPos: [321], LS 'v: (0.0), LS 'V2: (1225690), LS D: (10061824), Calculated Leadscrew Pos: [344076] Current Leadscrew Pos: [1225690] leadscrew position is 829614.00 off desired location away from, Decreasing spec	CurrentLayer: (1) ed to 0.41 of set	Voltage:	29.93V
m Disarm	spena, Reverse PV: [-21430], PPos: (289), L5, V: (0.0), L5, VVZ: (1228/90), L5, D: (10061824), Calculated Leadscrew Pos: [346883] Current Leadscrew Pos: (1225/90) leadscrew position & \$67897.00 cf desired leads from Decreasion spen	CurrentLeyer: (1)	Current:	0.46A
	speed, Revense PV: (-26460), PPoe: (221), LS, V: (0.0), LS, WZ: (1223690), LS, D: (10061824), Calculated Leaducrev Poe: (294537) Current Leaducrev Poe: (1223690)	CurrentLayer: (1)	Power:	13.77W
	Ieedicrew position is 323253.00 off desired location away from, Decreasing spee Speed. Reverse PV: (16360), PPos: (182), LS. V: (0.0), LS. W2; (1225690), LS. D: (10061824), (Calculated Landscrew Poe: (246988) Current Leadscrew Pae, 12231690.	id to 0.34 of set CurrentLayer: (1)	Temp:	46.07°C
	leadscrew position is 978701.00 off desired location away from, Decreasing spee	d to 0.31 of set	Current	1.1
	speed, Reverse PV: [-)6800], PPos: [132], L5 V/ (0.0), L5 WZ: [1223690], L5 D: (10061824), / Calculated Leadscrew Pos: [201013] Current Leadscrew Pos: [1223690] https://doi.org/10.1001/001100000000000000000000000000	CurrentLayer: (1)	Layer:	1
	readsnew poston is 102297/00 01 desired incadun away non, becreasing spe speed, Reverse PV: [-17730], PPor: [96], L5_V: [0.0], L5_W2: (1223690), L5_D: (10061824), C Celculated Leadorew Por: [15200.00.0], therein Leadorew Por: [1233690]	umentLayer (1)	Layer Fill:	0.10%
1/36/3034 01.56PM	readuction postcon is relation of industried location away from, biotexacting species special. Reverse PV: [-14220], PPos: (77), LL.V: (0.0), LL.WZ: (723690), LL_D: (10061824), C circlustrate Landaceway Post; (731286) Current Landaceway Post; (723780)	urrentLayer (1)	Diameter:	8.10mm
ta Soon.	Ieedicrew position is 1992394-00 off desired location www.from, Decreasing aps speed, Reverse PV: (10800), PPos; (36), L5 V; (0.0), L5 W2; (122560), L5 D; (10063924), C Calculated Landsceware Dec IBA625 (Current Landsceme Dec; (122560)	and to 0.23 of set SumentLayer: (1)	Length:	60.00m
10.00m	leadscrew position is 1105265.00 off desired location away from, Decreasing spe- speed, Reverse PY: (-4160), PPost (24), L5 V: (0.0), L5 WZ: (1223650), L5 D: (10061824), C.	ed to 0.32 of set mentLayer: (1)	Out:	59.99m
	Calculated Leadscrew Pos: (99118) Current Leadscrew Pos: (123690) (eadscrew position is 1124572.00 off desired location away from, Decreasing spe- speed,	ed to 0.21 of set	Max Tether:	60.71m
	Revense PV: (-2670), PPos: (14), LS_V: (0.0), LS_W2: (1223690), LS_D: (10061824), Cu Stopped PV: (0), PPos: (7), LS_V: (0.0), LS_W2: (1223690), LS_D: (10061824), Curren	rrantLayer: (1) tLayer: (1)	(Harris)	Immovi
	Download	Clear	Metric	imperi.
HYBRICROBOTICS		and the second sec	Calib	rate
d by Jesin Digitel Art &		100.95	eand	

- 1. Dropdown Menu Selection (Green Oval):
 - Locate and select *find_home_position* from the dropdown menu.
- 2. Input in Text Box (Red Oval):
 - Type *true* in the provided text box.
- 3. Execute Command:
 - Press Enter to send the command.
- 4. Levelwind will travel to the nearside proximity sensor:
 - Wait to see the messages below appear in the system log

Homing Operation Complete! Primary Motor Sees Levelwind is Done Homing! Tensioner Motor Sees Levelwind is Done Homing!

Download

Clear

Step 7 – Remove Screws from the drum cover:

Use a 4mm hex drive.

Remove the five M5x20 socket head cap screws from the drum cover.





Step 8 – Remove Screws from the *Levelwind Tensioner Assembly*:

Use a 2mm hex drive.

Remove the two M3x12 flat head screws from the levelwind mount.





Step 9 – Remove the Levelwind Tensioner Assembly:

Pull Out: Carefully pull the Levelwind Tensioner Assembly out of the Levelwind Tensioner Backstop. It would help if you held onto the yellow area while you remove it to ensure that the assembly doesn't force itself apart due to the spring torsion.

Wiggle Gently: It might require a bit of maneuvering, so gently wiggle the Levelwind Tensioner Assembly to loosen it.





Step 10 – Remove the *Spool Drum Cover* and *Tether*:

Pull Off: Carefully pull the cover off of the Drum.

Remove Tether: Pull the tether out of the drum and through the bottom of the levelwind to remove the tether from the system.





Step 11 – Feed *Tether* up through through *Levelwind Carriage*:



Feed Tether: Feed the tether up through the bottom of the levelwind carriage.

Step 12 – Install the Levelwind Tensioner Assembly:

Insert the Levelwind Tensioner Assembly into the Levelwind Tensioner Backstop with the tether between the two wheels.





Step 13 – Install flathead screws into the *Levelwind Tensioner Assembly*:

- 1. Use a 2mm hex drive.
- 2. Install the two M3x12 flat head screws from the levelwind mount. These do not need to be very tight; 10in-lb of torque is plenty tight.







Step 14 – Wrap Tether Around Drum:

- 1. Plug the tether into the slipring (note: not visible here)
- 2. Secure the locking collar to the slipring (note: not visible here)
- 3. Wrap the tether around the drum, as shown below.

Note: The tether will likely need to be looped into the hole towards the nearside to make it safely around the bend.



Step 15 – Install Drum Cover

Install the Spool Drum Cover onto the Drum while holding the tether where it is. Putting the cover on can require a slight roll motion toward the tether output, as is shown in the image below.





Step 16 – Install Screws Into Drum Cover & Pull Loose Cable Through *Levelwind*:

- 1. Use a 4mm hex drive.
- 2. Install the five M5x20 socket head cap screws into the drum cover. These do not need to be very tight; 15in-lb of torque is plenty tight.





22

3. Pull any loose cable through the bottom of the *Levelwind Carriage* so there isn't any slack between the drum and the carriage.





1. Left-click on the Load Tether Button in your display's upper right-hand corner.

Note: You will only be able to change tether diamter or length if the TMS is at its zero position. Thus, after a *find_home_position* has been completed.



2. In the popup window, input your new tether specifications. In this case, we are using a tether diameter of 5.88mm and a tether length of 90m. Then click Apply.

find_home_position				
Load Tether				
Haver 3, 9,4561, Haver 4, 10,7821, Haver 5, 12,1081, Haver 6, 15,434111, FN	Terner Lendrn: 60.71241. Flendrn Terner Our.	×		
Tether Diameter: (mm)	5.88			
Tether Length: (m)	90			
Apply				
Stopped due to server malfunction, attempt to re-establish number 1 Stopped due to server malfunction, attempt to re-establish number 2				

3. This message appears in the *System Log* if it is set correctly.

Tether Diameter Changed	l to: 5.88mm, Tether Length: 90.0m	
	Download	Clear
		100 %

4. Power Cycle the TMS (Bug Workaround – Fix Coming)

Step 18 – Establish a Fresh Connection with the TMS (Bug Workaround – Fix Coming):

1. Wait for the TMS to finish booting. You will know it has finished if the telemetry values under System Information start updating.

Controls	System Commands	System	Info
	find_home_position v bool		
	System Log	Load Te	ther
Manual Auto	Starling on layw_] indexDetecte2 (0) indexDetecte2 (0)	Voltage:	30.02V
Arm Disarm	Launchind server Launchid Server Primary Motor Bectrically Braking Primary Motor Bectrically Braking	Current:	0.56A
	Stopped PP: (0), PPox (5), LS.Y. (00), LS.W2 (7873), LS.D: (0006824), CurrentLayer: (1) Primary Motor ElectroNechanically Backing Primary Motor ElectroNechanically Backing Stopped due to serve mail uncifus attempt to re-establish number 0	Power:	16.81W
Tether In Tether Out	Stopped due to server maifunction, attempt to re-establish number 1 Stopped due to server maifunction, attempt to re-establish number 2 Stopped due to server maifunction, attempt to re-establish number 3	Temp:	31.51°C
Tether out	Stopped due to server maifunction, attempt to re-establish number 4 Stopped due to server maifunction, attempt to re-establish number 5 Stopped due to server maifunction, attempt to re-establish number 6 Stopped due to server maifunction, attempt to re-establish number 7	Current Layer:	
	Stopped due to server maifunction, attempt to re-establish number 8 Stopped due to server maifunction, attempt to re-establish number 9 Primary Motor Walting for Levelwind to Stop homing	Layer Fill:	0.00%
2/6/2024	Home Commana Received in Leadscrewholds/Coverner Tensioner Motor Walling for Levelving to Stop homing Leadscrew Motor Workcone: 7873 Primary Motor Position: 5.0	Diameter:	5.88mm
IMU Data Coming Soon.	Homing Levelwind Backing Away From Proximity Sensor Approaching Proximity Censor	Length:	90.00m
Tether at:	Leadscrew Motor Workzone PreReset: 5908 Primary Motor Position PreReset: 50 Leadscrew Motor Workzone PositiReset: 2009	Out:	90.00m
90.00m	Primary Motor Position Positieset: 5.0 Finding Operation Completet Primary Motor See Lovelwind is Bone Hominal	Max Tether:	91.70m
	Tendioner Motor Sees Levelwind is Done Homing! Tether Diameter Changed to: 588mm, Tether Length: 900m	Metric	Imperial
<u>0</u>	Download Clear	Calibr	ate
HYERUROBOTICS		Dates	
UI Designed By Jasin Digital Art & Media		Rebo	στ

2. Once the connection is established, left-click the *Clear* button under *System Log* and refresh the page. After refreshing, the *System Log* should look like the image below.

stop v bool	stem Commands	
stop v bool		
	System Log	
Motor Params YAML: ordereddict([(101, <classes.5 0xf57d9220>), (0, <classes.ak80.ak80.ak80 obje<="" td=""><td>SC25.SC25.SC25 object at 0xf57d9208>), (102, <classes.sc25.sc25.s ct at 0xf57d9238>)])</classes.sc25.sc25.s </td><td>C25 object at</td></classes.ak80.ak80.ak80></classes.5 	SC25.SC25.SC25 object at 0xf57d9208>), (102, <classes.sc25.sc25.s ct at 0xf57d9238>)])</classes.sc25.sc25.s 	C25 object at
leadscrew_motor_starting_pos: 154, primary_mot	tor_starting_pos: 0.0	
Tether Params VAML: ordereddict([[Tether_Diam 35.989), (Travel_Distance_Per_Turr, 6602), (Max (Degree_Range_Per_Layer, ordereddict][[Ayer] 139772.0, 51695.0), (Jayer, 5, (51696.0, 64619.0), (Circumference_of_Layers), ordereddict][[Ayer], 401.873), (Jayer, 5, 438.818), (Jayer, 7, 475.763)]), (Jayer, 30, 133), (Jayer, 6, 404.6), (Jayer, 5, 50.61), (Circumfereddict), (Tether_Length_Per_Layer, ordereddict][(Jayer, Tether_Length_Per_Layer, 7, 17079)])), (Max_Tethere)	heter', 5.88), (Tether_Length', 90.0), ('Reel_Fill_Relief', 4.58), (TurnP immum_Number_of_Layers', 7), ('End_Workzone', 1006124), (F, (0.12523), (loyer', 7), (1254, 25847-0)), (layer 37, 125848.0, 38771.0 (layer. 6, (164620.0, 77543.0)), (layer, 73, 177544.0, 90467.0))))), ('254.032), (layer, 72, 29139), (layer, 73, 373982), (layer, 4, 364.927) (Max, Pay, Speed of, Spool', ordereddicti((layer, 7), 0.102), (layer, 2), (layer, 6, 0.76), (layer, 7, 9.119), (layer, 73, 1167), (layer, 6), (layer, 6), 0.76), (layer, 7), 1161, (layer, 6), 1161, (layer, 6), (layer, 6), 0.76), (1049, (layer, 7), 1164), (layer, 6), 1161, (layer, 6), (layer, 6), 0.76), (layer, 7), 1174), (layer, 4), 131, (layer, 5), Length, 137021), (Length, 1214), (layer, 5), (layer, 5), (layer, 6), 1076), (layer, 6), 1076), (layer, 6), (layer, 6), 1076), (layer, 7), 10702), (layer, 6), 11740, (layer, 6), (layer, 6), 11740, (l	erLayer', i]], ('layer_4', , ('layer_5', , 0.116), ee', _7', 1.322)]]), 14.426),
Starting on layer_1 IndexDetected: (0) IndexDetected: (1) Launched ServoDriver Launched Server Primary Motor Electrically Braking Primary Motor Electrically Braking Stopped PV: (0), PPox: (0), LS_VZ: (-77 Primary Motor ElectroMechanically Braking Primary Motor ElectroMechanically Braking	751), LS_D; [10061824), CurrentLayer: (1)	
Do	ownload	Clear

Step 19 – Home TMS:

Controls	System Commands	Systen	n Info
	find_home_position		
	System Log	Load T	ether
	speed,		
	Reverse IV-1/20020), IPDoc 3211, L5 V; (O.U. L5 WZ: (1223640), L5 C: (1005834), CurrentLayer: (1) Calculated Leadscreev Pos: (324075) Current Leadscreev Pos: (225660) leadscreev position is 623614.00 off desired location away from, Decreasing speed to 0.41 of set	Voltage:	29.93V
m Disarm	egneral, Revenue PV: (-21430), PPos: (269), LS, V: (0.0), LS_V/2: (322600), LS_D: (10061834), CumentLayer: (1) Calculated Leadecrev Pos: (246883) Cument Leadecrev Pos: (123680) (addresse position is \$75697.00 or (dasired leadent away from, Decreasing speed to 0.38 of set	Current:	0.46A
	speed. Reverse PV: (-26460), PPoc: (23), L.S. V: (0.0), L.S. W2: (1221680), L.S. D: (10061824), CurrentLayer: (1) Caklutad Lasdacrew Poc: (294327) Current Lasdacrew Pac: (1221680)	Power:	13.77W
	Ieedicrew position is 223532.00 off deviced location away from, Decreasing speed to 0.34 of set speed. Reverse PV: (H3560, PPos: (B22), LS V: (0.0), LS W2 (1223690), LS D: (D06/B24), CurrentLayer: (1) Citized Leadscreen Pos: (24369) Current Leadscreen Pos: (22369)	Temp:	46.07°C
	leadscrew position is 978701.00 off desired location away from, Decreasing speed to 0.31 of set	Current	100
	ispend, Reverse PV: (36800), PPos: (132), LS, V: (0.0), LS, WZ: (1228600), LS, D: (10068824), CurrentLayer: (1) Calculated Lapdocrew Pos: (2010)37 Current Lapdocrew Pos: (1225600) Jendsterwa position is 1022672.00 of decimed location pawa form Secretsing speed to 0.28 of set	Layer:	1
	speed. Reverse Priv (-17730), PPose (H), LS, V: (D/D), LS, V/Z: (1223090), LS, Dr (10001074), CurrentLayer: (1) Calculated Leadedrev Pose (REARD) Current Leadecrew Pos: (1223090) laaderway nodition is (1007040.00 df calcined lovation away from Decreasion speed to 0.35 of ost	Layer Fill:	0.10%
1/26/2023 01:56PM	speed, Reverse PV: (-14220), PPos: (77), LS. V; (0.0), LS. W2: (123690), LS. D; (10061824), CurrentLayer. (1) Calculated Leaducew Pos: (131286) Current Landscraw Pos: (1232690)	Diameter:	8.10mm
ta Soon.	leadscrew position is 1092394-00 off desired location away from, Decreasing speed to 0.73 of set opeod, Reverse PM: (N8800, PRoc. (6), LS V: (00), LS V2: (122560), LS D: (10051824), CurrentLayer: (1) Cisionized Leadscrease Dec. 199230: Uncert Leadscream Dec. 1735600;	Length:	60.00m
BRANN DE	Calculate Calculate (* 17 minute) Calculate Calculate Calculate (* 17 minute) Calculate (* 17 minute) Calculate Calculate (* 17 minute) Calculate (* 1	Out:	59.99m
	Calculated Lapdacrew Pos: [9918] Current Leadscrew Pos: [123690] leadscrew position is 1124572.00 off desired location away from, Decreasing speed to 0.21 of set speed,	Max Tether:	60.71m
	Havenue IVX: (20170), P9562 [14], L5_V*(0.0), L5_W2? (223840), L5_D: (10068024), CurrentLayer: (1 Stopped PV: (0), PFox [7], L5_V*(0.0), L5_W2? (223820), L5_D: (10068024), CurrentLayer: (1)	Metric	Imperi.
-MERICORATES	Download Clear	Constantial and a second	
		Calib	rate
id By Jasin Digital Art &	100 %	Callb	

- 1. Dropdown Menu Selection (Green Oval):
 - Locate and select *find_home_position* from the dropdown menu.
- 2. Input in Text Box (Red Oval):
 - Type *true* in the provided text box.
- 3. Execute Command:
 - Press Enter to send the command.
- 4. Levelwind will travel to the nearside proximity sensor:
 - Wait to see the messages below appear in the system log

Homing Operation Complete! Primary Motor Sees Levelwind is Done Homing! Tensioner Motor Sees Levelwind is Done Homing!

Download

Clear

1. Arm the System



2. Left-click and hold the *tether In* button until the *Layer Fill* is around 15%. Then *Disarm*



Step 21– Manually Organize the Wraps so That the Tether Does Not Cross Over Itself:

- 1. Pull a few inches of slack through the top of the levelwind to loosen the current wraps of cable.
- 2. Start wrapping the tether Around the Drum Manually so that the tether does not cross over itself.





3. While holding your organized cable, pull the *tether* slack back through the *Levelwind Carriage* so there is no slack between the *Levelwind Carriage* and the *Drum*.





4. You are loaded and ready to *tether In* the rest of your cable!

Glossary

Pinouts

Standard Pinouts

Below, you can find the standard connector pinouts on the TMS. They include the Tether/Decklead, Comms(Ethernet), and Power.



External Proximity Endstop (If included)

This is only included on TMS systems that have specifically requested this addon.

Note: Testing and certification of this addon is still underway.

Compatible Proximity Sensor Specs:

1. Type: NPN-NO (Normally Open)
 2. Operating Voltage: 10-30V



THE NAUTILUS



Tether Management System

HOUSING REV 1.4 DIMENSIONS ARE IN MILLIMETERS



COMMUNICATION	WEB INTERFACE & AFT
PHYSICAL	
WEIGHT (NO TETHER)	24кд
CONTINUOUS MOTOR TORQUE/MAX TORQUE	48nm /120nm
CONTINUOUS PULL FORCE (VARIES BASED ON TETHER DIAMETER AND	AMOUNT OF TETHER ON SPOOL) 40KGF
BRAKE HOLDING TORQUE	100nm
MAX PULL FORCE (DRUM STATIONARY WITH BRAKE APPLIED)	140кд
MAX SPOOL SPEED @ RATED TORQUE	24rpm
INPUT VOLTAGE	20-30vpc
TYPICAL CURRENT/PEAK CURRENT	0.5-10A/20A
COMPATIBLE TETHER DIAMETER RANGE	4-11mm (Rev1.4 & Later will be 4-15mm)
SLIP-RING SPECS	6 @ 24 VDC, 2 A / 2 @400 VDC,10 A
HOUSING REV1.3 DEPTH RATING (TESTED)	50м
HOUSING REV1.4 DEPTH RATING (TARGET)	1004

29