# Operation Manual

# SYNERGY 0.5

## LOW PROFILE TURNTABLE STRETCH WRAPPER

### SERIAL NUMBER

**Please refer to the serial number in all correspondence with Highlight or any Highlight Distributor. This identifies your machine and will help in our ability to quickly and efficiently respond to your needs.**

OPERATION MANUAL NUMBER: SYN0.5LPSTD2013 / JULY-2015 / JAN-2019

HIGHLIGHT INDUSTRIES, INC.
2694 Prairie St SW • Grand Rapids, MI 49519
(616) 531-2464 • (800) 531-2465 • fax (616) 531-0506
highlightindustries.com • info@highlightindustries.com

# Table of Contents

# Table of Figures

1

**Highlight Industries, Inc.**

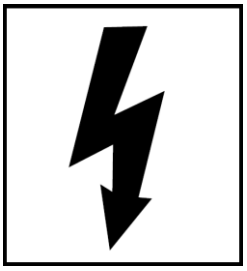
Synergy 0.5 Turntable Stretch Wrapper Operation Manual

# General Information

# Safety Messages

For the best result with the Synergy Turntable Stretch Wrapper, carefully read this manual and all of the warning labels attached to the equipment before installing and operating it, and follow instructions exactly. Keep this manual for machine reference.

## Definitions and Symbols

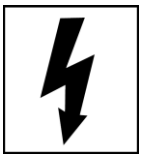


**High Voltage!**
This symbol indicates high voltage. It calls your attention to items or operations that could be dangerous to you or other persons operating the equipment. Read the message and follow the instructions carefully.

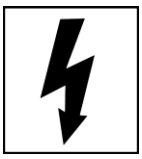
**Warning!**
This symbol indicates a potentially hazardous situation which, if not avoided, can result to bodily injury, or serious damage to the product.

**Notes**
This symbol indicates an area or subject of special merit, emphasizing the equipment's capabilities, common errors in operation or maintenance, or other special instructions that can provide benefits to users.

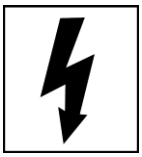
## General Precautions – Read These First!



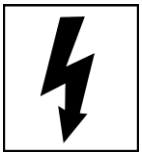
**High Voltage!**
Disconnect AC input power before checking components, performing maintenance, cleaning up, and when the machine is not in use. Do NOT connect or disconnect wires and connectors while power is applied to circuit.



**High Voltage!**
Wiring work should be carried out only by qualified personnel. Otherwise, there is a danger of electric shock or fire.



**High Voltage!**
The user is responsible for conforming to all applicable code requirements with respect to grounding all requirements. Do NOT use extension cords to operate the equipment.



**High Voltage!**
Motor control equipment and electronic controllers are connected to hazardous line voltages. When servicing drives and controllers, there may be exposed components with housings or protrusions at or above line potential. Extreme care should be taken to protect against shock.

**Warning!**
Loose clothing must NOT be worn while the machine is in operation. Stay clear of moving parts while the machine is running.

# Introduction and Warranty

## Introduction

Thank you for your purchase of a *Synergy 0.5* Turntable Stretch Wrapper! Designed for the high volume industrial user the Synergy 0.5 offers the flexibility to precisely adjust the level of film stretch to match the load-holding requirements.

## Limited Warranty

*Highlight Industries, Inc*. warrants its Synergy manufactured by it, and sold pursuant to this order, will be of merchantable quality, free from defects in material and workmanship as determined at the date of shipment, by generally recognized, applicable and accepted practices and procedures in the industry, for a period of three (3) years from the Highlight invoice date, under normal use and service.

When the Purchaser gives Highlight written notice of any alleged defect within the applicable warranty period, Highlight will, at its option repair or replace the same free of charge F.O.B. its manufacturing plant, installation not included. Equipment replaced under the warranty shall have the same warranty as new equipment but does not extend the warranty of the original equipment.

Satisfaction of this warranty, consistent with other provisions herein, will be limited to the replacement or repair or modification of, or issuance of a credit for, the equipment involved, at Highlight's option.

Highlight neither assumes nor authorizes any person to assume for it any other obligation in connection with the sale of Highlight's equipment.

This warranty shall not apply to any equipment which has been repaired or altered by un-authorized personnel in any way so as to, in the judgment of Highlight, affect serviceability, or which has been subjected to misuse, negligence, accident, or to equipment made by Highlight which has been operated in a manner contrary to Highlight's instructions.

In no event regardless of the cause, shall Highlight be liable for penalties or penalty clauses of any description or any damages resulting from loss of profits, use of products or for any incidental indirect or consequential damages, even if advised of the possibility of such damages. This limitation of Highlight's liability will apply regardless of the form of action, whether in contract or tort, including negligence. Any action against Highlight must be brought within twelve (12) months after cause of action accrues.

"This warranty in lieu of all other warranties whether expressed, implied or statutory including implied warranties of merchantability of fitness or extends only to the buyer or customer purchasing from Highlight Industries, Inc or an authorized distributor."

## About This Document

The purpose of this manual is to provide you with information necessary to install, operate, troubleshoot, and maintain the Synergy Turntable Stretch Wrapper. The audience for this manual should have basic knowledge of mechanical and electronic components, standard electrical wiring practices, and schematics symbols.

To guarantee safe operation of the equipment, carefully observe the safety messages throughout this manual. Keep this operating manual and distribute it to all users for reference.

## Application Assistance

If any assistance is desired, contact the distributor from whom you have purchased the unit, or call the number listed on the bottom of each page of this manual. To receive quick and proper technical support for the equipment you have purchased, please be prepared to provide the following information:

1. Machine Serial Number
2. Date of Purchase
3. Symptoms of any problems

# Revision History

| Revision | Revision Comment | Date of Revision |
|---|---|---|
| | Initial Release | April 2011 |
| | Updated turntable drawing – ref 2008 | Oct 2013-RDU |
| | Updated Film Diagram | July 2015-WBK |
| | Tension Knob Assembly added | Jan 2019-JMR |

2

**Highlight Industries, Inc.**

Synergy 0.5 Turntable Stretch Wrapper Operation Manual

# Specifications

# Specifications

## Machine Dimensions

| | Low Profile |
|---|---|
| Length (inch) | 95 |
| Width (inch) | 60 |
| Turntable Height from Floor (inch) | 3.25 |
| Operation Space (inch) | 105 L x 75 W |
| Maximum Pallet Size (inch) | 52 x 52 |
| Shipping Weight (lbs) | 1000 |

## Electrical Specifications

- 120VAC, 60Hz, Single Phase, 15Amp
- NEMA 12 Rated Electrical Enclosure
- Off the Shelf Components

## Turntable

- 4,000 lbs Maximum Turntable Load Capacity
- 12 RPM Maximum Turntable Speed
- 1/2 HP 3-Phase AC Motor
- 1/2 HP AC Frequency Drive

# System Overview Prints

**Note**
Shown below are STANDARD assembly drawings. It may not reflect your purchased system, especially when optional items are added. Refer to the Technical References section of the manual for more detailed information.

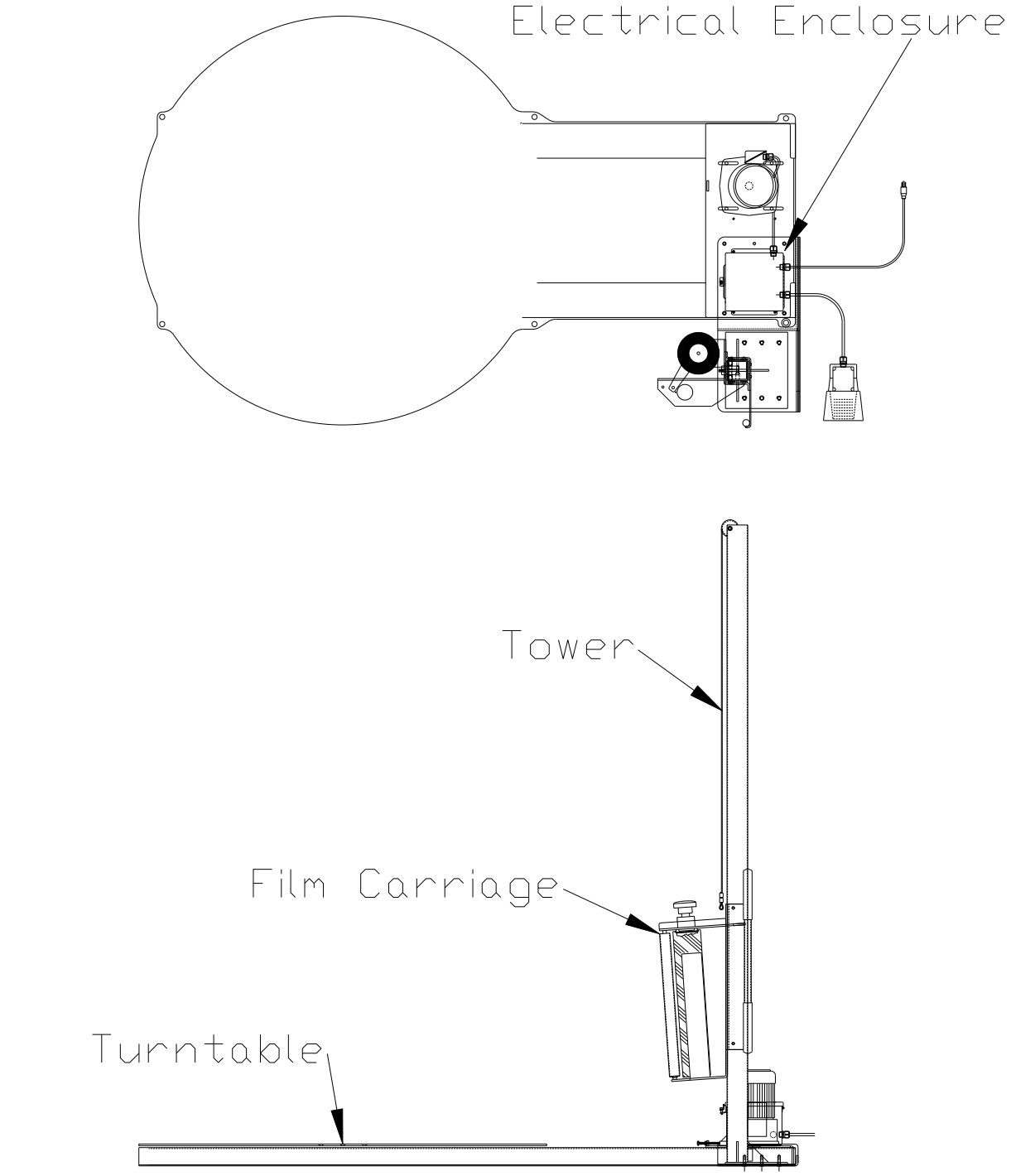



**Figure 1: Synergy 0.5 Low Profile, Side View**

3

**Highlight Industries, Inc.**

Synergy 0.5 Turntable Stretch Wrapper Operation Manual

# Installation & Adjustments

# Machine Placement

## Receiving and Inspections

The Synergy Turntable Stretch Wrapper has gone through quality control tests at the factory before shipment. Upon receiving, please do the following:

1. Inspect the entire machine for visual damage during shipment. If found, immediately report this damage to the trucking line. *Highlight Industries, Inc.* has taken every precaution during the packaging and loading of this equipment, however, it is YOUR RESPONSIBILITY to inspect for damage before installation.

2. Make sure the part or serial number indicated on the machine corresponds with the part number of your order.

## Positioning of the Machine

Place the Synergy Turntable Stretch Wrapper close to an area where you will be wrapping your loads. Make sure that there is sufficient room to load/unload the machine and that you do not stretch the power cable. Remember, you will need to plug the machine in to a 120VAC, 15-Amp outlet.

## Floor Weight Bearing/Stress Tolerance

The floor must be able to bear the weight of the machine, the weight of the maximum load, plus a safety factor. The floor must also be able to tolerate the stress of the machine's operation. If the fork trucks will operate on the same weight bearing area, add the weight of the trucks to the weight bearing stress tolerance requirements.

The Synergy can be installed on any type of floor constructions that meets the weight bearing and stress tolerance requirements.

**Warning!**
The Synergy must be anchored securely to the floor, using the type of anchor recommended for your floor.

# Machine Set-Up

## Unpacking and Moving the Machine

It is very important to read all instructions before undertaking any of these steps. The following steps should help achieving a safe and quick machine set-up.

1. Place the skidded machine close to the designated wrap area. Remove all shipping fasteners holding the machine to the pallet.
2. Place the forks of the forklift through the tubes provided on the base of the machine, remove the machine from the shipping skids, and place it in the designated wrap area.

**Warning!**
It is very important that the machine be leveled. Uneven floors will cause premature turntable support roller failure.

## Power and Control Wiring Checks

1. Using a volt meter, check the AC voltage coming to the machine and insure the proper voltage is present.

2. Plug the machine in and turn the Power Switch ON. Power should now be applied to the AC frequency drives.

# Frequency Drive Adjustments

An AC Frequency Drive is a device that controls the 3-phase AC motor's speed by varying the frequency and voltage sent to the motor. The Synergy Turntable Stretch Wrapper uses Schneider Electric Altivar 12 Adjustable Frequency Drives. Refer to the Electrical Schematic Drive Parameters Technical References section for detailed drive parameter settings. Refer to the drive manufacturer's manual provided on their CD provided with this machine for more detailed drive information.

## Altivar 12 Digital Keypad Description

The digital keypad includes the displays panel and the keypad. The display panel provides the parameter display and shows the operation status of the AC drive. The keypad provides programming and control interface.

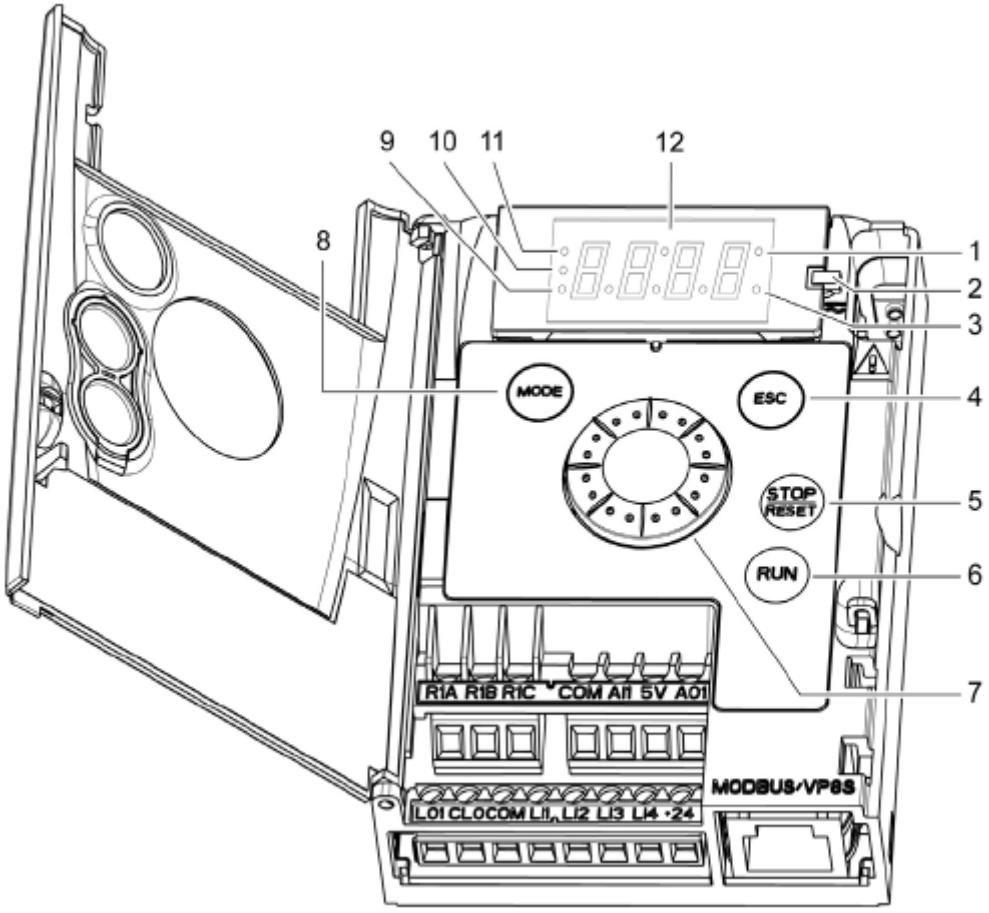



**Figure 2: Altivar 12 AC Drive Keypad**

**Keypad Description:**

1. Value LED. When illuminated it indicates when a numeric value is being displayed.

2. Charge LED. When illuminated it indicates when drive capacitors are fully charged.

3. Unit LED. When illuminated it indicates when a unit, such as AMPS, is being displayed.

4. ESC button. Exits a menu or parameter, or aborts the displayed value and returns to the previous value in the memory.

5. STOP button. Stops the motor. The run command will have to be cycled before the motor will be allowed to run again.

6. RUN button. Starts running the motor if the drive is configured for control by the drive keypad.

7. Jog Dial. Used for navigation of the menus. Turn clockwise or counterclockwise to scroll through the menu list and is used for selection/validation when the dial is pressed.

8. MODE button. Switches between the control/programming modes.

9. CONFIGURATION mode LED. When illuminated it indicates when a value can be changed.

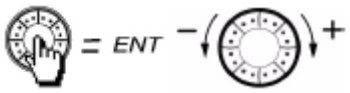
10. MONITORING mode LED. When illuminated it indicates when the display is monitoring the current status of the drive.

11. REFERENCE mode LED. When illuminated it indicates when the display is showing the speed reference value.

12. Four 7-Segment displays. The display of the drive for menus and settings.

## Menu Structure

To access the monitoring parameters, press the wheel on the face of the frequency drive. Using the wheel, scroll through the menu until the display shows Non (Mon) for monitoring mode. This gives the user access to all the monitoring parameters.




To access the complete set of drive parameters first press the wheel to access different modes. Using the wheel, scroll to “COnF” and press the wheel again; this will access different sets of parameters. Using the wheel, scroll to “FULL” and press the wheel; this will give the user access to the complete parameter set.

## Monitoring Parameters

| Code | Name/Description | Unit |
|---|---|---|
| LFr | External reference value:<br><br>External keypad or local force mode configured. Forced local reference FLOC page 61 set to LCC and Forced local assignment FLO page 61 different to nO.<br>Displays the speed reference coming from the remote keypad. This value is not visible in factory setting. | Hz |
| rFr | Output Frequency:<br><br>This function provides the estimated motor speed. It corresponds to the estimated motor frequency (on the motor shaft). In Standard law the Output frequency rFr is equal to stator frequency. In Performance law the Output frequency rFr motor speed is equal to the estimated motor speed.<br>Range: -400 to 400 Hz | Hz |
| LCr | Motor Current:<br><br>Estimation of the effective motor current from phase current measurements with an accuracy of 5%. During DC injection, the current displayed is the maximum value of current injected in the motor. | A |
| ULn | Main Voltage:<br><br>Line voltage from the point of view of the DC bus, motor running or stopped. | A |
| StAt | Product Status:<br><br>rdY – Drive Ready<br>rUn – Drive Running<br>ACC – Acceleration in progress<br>dEc – Deceleration in progress<br>dCb – DC injection braking in progress<br>CLi – Current limit<br>nSt – Freewheel stop control<br>Obr – Auto-Adapted deceleration<br>CtL – Controlled stop on mains phase loss<br>tUn – Auto-tuning in progress<br>FSt – Fast stop active<br>nLP – No line power | N/A |

## Programming Functions

All functions have been Highlight factory set and tested. The factory settings listed in this manual are the drive manufacturer's factory setting, not the Highlight Industries factory settings. Refer to the Electrical Schematic Drive Parameters page of the Technical References section for the Highlight factory settings. Some of the most commonly adjusted programmable functions (parameters) are listed below.

**Note**
Refer to the drive manufacturers Operation Manual or website for complete lists and explanations of the programming parameters.

**I_O Menu**

| Code | Sub-Code | Name/Description | Factory Setting |
|---|---|---|---|
| tCC | | Type of Control:<br><br>2C – 2-wire control<br>3C – 3-wire control | 2C |
| AI1- | AI1t | Analog Input 1 Type:<br><br>5U – 0-5VDC input voltage<br>10U – 0-10VDC input voltage<br>0A – 0-20mA current input | 5U |
| r1 | | Relay Output 1 Assignment:<br><br>nO – Not assigned<br>FLt – No error detected<br>rUn – Drive run | FLt |
| AO1- | AO1 | Analog Output 1 Assignment:<br><br>nO – Not Assigned<br>OCr – Motor current<br>OFr – Output Frequency | nO |
| | AO1t | Analog Output 1 Type:<br><br>10U – 0-10VDC<br>0A – 0-20mA<br>4A – 4-20mA | 0A |

**drC Menu**

| Code | Sub-Code | Name/Description | Adjustment Range | Factory Setting |
|---|---|---|---|---|
| bFr | | Standard Motor Frequency | 50/60 | 50 Hz |
| nPr | | Rated Motor Power (% of drive rated HP) | 0.5-1.2 | 1 |
| UnS | | Rated Motor Voltage | 100-480V | 230V |
| nCr | | Rated Motor Current | plate | Varies |
| FrS | | Rated Motor Frequency | 10-400Hz | 50 Hz |
| nSP | | Rated Motor Speed | 0-24000rpM | Varies |
| tFr | | Maximum Frequency | 10-400Hz | 72 Hz |
| Ctt | | Motor Control Type:<br><br>PErF – Performance, Sensorless Vector<br>Std – Standard, Volts/Hertz<br>PUNP – Pump, low torque | | Std |
| UFr | | IR Compensation:<br><br>Optimizes torque at very low speeds | 25-200% | 100% |
| SLP | | Slip Compensation | 0-150% | 100% |
| StA | | Frequency Loop Stability:<br><br>Adjusts overshoots and oscillations at the end of acceleration or deceleration. A higher number decreases oscillations | 0-100% | 20% |
| FLG | | Frequency Loop Gain:<br><br>Adjusts the slope of the speed increase. A lower number decreases oscillations. | 0-100% | 20% |
| tUn | | Motor Auto Tuning:<br><br>Automatically tunes the drive to the motor profile | nO/YES/dOnE | nO |

**CtL Menu**

| Code | Sub-Code | Name/Description | Factory Setting |
|---|---|---|---|
| Fr1 | | Speed Reference Channel 1:<br><br>AI1 – Terminal analog input<br>LCC – Remote Display<br>Ndb – Modbus<br>AIU1 – Jog dial (wheel) on drive | AI1 |
| CHCF | | Channel Configuration:<br><br>SIN – Not separate mode. Speed and run commands from the same source.<br>SEP – Separate mode. Speed and run commands from different sources. | SIM |
| Cd1 | | Command Channel 1 (run fwd/rev, stop):<br><br>Only appears if CHCF is set to SEP.<br>tEr – terminals<br>LOC – Local<br>LCC – Remote display<br>Ndb – Modbus | tEr |

**FUn Menu**

| Code | Sub-Code | Name/Description | Adjustment Range | Factory Setting |
|---|---|---|---|---|
| rPt- | ACC | Acceleration Time (seconds) | 0.0-999.9 s | 3.0 s |
| | dEC | Deceleration Time (seconds) | 0.0-999.9 s | 3.0 s |
| | brA | Decel Ramp Adaptation Assignment:<br><br>nO – Function inactive. (Used with dynamic braking)<br>YES – Automatically increases the deceleration time to prevent a DC bus overvoltage<br>dYnA – Most rapid deceleration possible without a dynamic braking resistor. | | YES |
| Stt- | Stt | Type of Stop:<br><br>rNP – Ramp Stop<br>FSt – Fast Stop<br>nSt - Freewheel | | rNP |
| rrS | | Reverse Direction Assignment:<br><br>nO – Function inactive<br>L1H – Input L1 active high | | nO |

| | | | | |
|---|---|---|---|---|
| | | L2H – Input L2 active high<br>L3H – Input L3 active high<br>L4H – Input L4 active high | | |
| AdC- | AdC | Automatic DC Injection:<br><br>nO – function inactive<br>YES – Time limited DC injection<br>Ct – Continuous DC injection | | YES |
| | SdC1 | Automatic DC Injection Current | 0-120% if nCr | 70% |
| | tdC1 | Automatic DC Injection Time (seconds) | 0.1-30 s | 0.5 s |
| PSS- | PS2 | Second Preset Speed Assignment:<br><br>nO – Function inactive<br>L1H – Input L1 active high<br>L2H – Input L2 active high<br>L3H – Input L3 active high<br>L4H – Input L4 active high | | nO |
| | SP2 | Second Preset Speed Reference | 0-400 Hz | 10 Hz |
| CLI- | CL1 | Current Limitation | 0.25-1.5 plate | varies |
| SPL- | LSP | Low Speed Setting (Hz) | 0-HSP | 0 Hz |
| | HSP | High Speed Setting (Hz) | LSP-tFr | 60 Hz |

**FLt Menu**

| Code | Sub-Code | Name/Description | Factory Setting |
|---|---|---|---|
| rSF | | Fault Reset Assignment:<br><br>nO – Function inactive<br>L1H – Input L1 active high<br>L2H – Input L2 active high<br>L3H – Input L3 active high<br>L4H – Input L4 active high | nO |
| Atr- | Atr | Automatic Restart:<br><br>nO – Function inactive<br>YES – Automatic drive restart after fault condition | nO |
| | tAr | Max automatic restart time | 5 min |
| FLr | | Flying Restart (Catch on the fly):<br><br>Restarts the motor at the estimated speed the motor is already going.<br>nO – Function inactive<br>YES – Function active | nO |
| tHt- | ItH | Motor Thermal Current | varies |

## Fault Detection

The AC drive has a comprehensive fault diagnostic system that includes several different alarms and fault messages. Once a fault is detected, the corresponding protective functions will be activated. The following faults are displayed as shown on the AC drive digital keypad display.

**Note**

Not all faults can be cleared by resetting from the drive keypad. Some faults can only be cleared by cycling power on the drive, and some faults cannot be reset at all.

| Code | Name | Possible Cause | Remedy |
|---|---|---|---|
| CrF1 | Precharge | Charging relay control fault or charging resistor damaged | • Turn the drive off and then back on again<br>• Check the connections<br>• Check the stability of the main supply<br>• Contact your local Schneider Electric<br>• representative |
| InFI | Unknown drive rating | The power card is different from the card stored | Contact your local Schneider Electric representative |
| InF2 | Unknown or incompatible power board | The power card is incompatible with the control card | Contact your local Schneider Electric representative |
| InF3 | Internal serial link | Communication interruption between the internal cards | Contact your local Schneider Electric representative |
| InF4 | Invalid industrialization zone | Inconsistent internal data | Contact your local Schneider Electric representative |
| InF9 | Current measurement circuit | Current measurement is not correct due to hardware circuit | Contact your local Schneider Electric representative |
| ---- | Problem of application Firmware | Invalid application firmware update using the Multi-Loader tool | Flash again the application firmware of the product |
| InFb | Internal thermal sensor detected fault | • The drive temperature sensor is not operating correctly<br>• The drive is in short circuit or open | Contact your local Schneider Electric representative |
| InFE | Internal CPU | Internal microprocessor | • Turn the drive off and then back on again<br>• Contact your local Schneider Electric representative |
| OCF | Overcurrent | • Parameters in the Motor Control menu (drC) are not set properly<br>• Inertia or load too high<br>• Mechanical locking | • Check the parameters<br>• Check the size of the motor/drive/load<br>• Check the state of the mechanism<br>• Connect line chokes<br>• Reduce the Switching Frequencies (SFr)<br>• Check the ground connection of drive, motor cable, and motor insulation |

| | | | |
|---|---|---|---|
| OCF<br>SCF1 | Motor short circuit<br>Ground short circuit | • Short-circuit or grounding at the drive output<br>• Ground fault during running status<br>• Commutation of motors during running status<br>• Significant current leakage to ground if several motors are in parallel | • Check the cables connecting the drive to the motor, and the motor insulation<br>• Connect motor chokes |
| SCF4 | IGBT short circuit | Internal power component short circuit detected at power on | Contact your local Schneider Electric representative |
| SOF | Over-speed | Instability or over-speed associated with the inertia of the application | • Check the motor<br>• Over-speed is 10% more than the maximum frequency (tFr). Adjust this parameter if necessary<br>• Add a braking resistor<br>• Check the size of the motor/drive/load<br>• Check the parameters of the speed loop (gain and stability) |
| tnF | Auto-Tuning | • Motor not connected to the drive<br>• One motor phase loss<br>• Special motor<br>• Motor is rotating | • Check that the motor/drive are compatible<br>• Check that the motor is present during auto-tuning<br>• If an output contactor is being used, close it during auto-tuning<br>• Check that the motor is completely stopped |
| LFFI | AI current lost fault | Detection if:<br>• Analog input AI1 is configured as current<br>• AI1 current scaling parameter of 0% is greater than 3mA<br>• Analog input current is lower than 2mA | Check the terminal connections |
| ObF | Over-braking | Braking too sudden or driving load | • Increase the deceleration time<br>• Install a module unit with a braking resistor if necessary<br>• Check the line supply voltage to be sure it is under the maximum |
| OHF | Drive overheat | Drive temperature too high | Check the motor load, the drive ventilation, and the ambient temperature. Wait for the drive to cool down before restarting. |
| OLC | Process overload | Process overload | Check the process and the parameters of the drive to be in phase |
| OLF | Motor overload | Triggered by excessive motor current | Check the setting of the motor thermal protection, check the motor load |

| | | | |
|---|---|---|---|
| OPF1 | 1 output phase loss | Loss of one phase at drive output | • Check the connections from the drive to the motor<br>• In case of downstream contactor, check the right connection, cable, and contactor |
| OPF2 | 3 output phase loss | • Motor not connected<br>• Motor power too low, below 6% of the drive nominal current<br>• Output contactor open<br>• Instantaneous instability in the motor current | • Check the connections from the drive to the motor<br>• Test on a low power motor or without a motor: In factory settings mode, motor phase loss detection is active Output Phase loss detection OPL = YES to check the drive in a test or maintenance environment, without having to use a motor with the same rating as the drive, deactivate motor phase loss detection Output Phase loss detection OPL = nO<br>• Check and optimize the following parameters: IR compensation (law U/F) UFr , Rated motor voltage UnS and Rated motor current nCr and perform an Auto-tuning tUn |
| OSF | Main overvoltage | • Line voltage too high<br>• Disturbed line supply | Check the line voltage |
| PHF | Input phase loss | • Drive incorrectly supplied or a fuse blown<br>• Failure of one phase<br>• 3-phase ATV12 used on a single-phase line supply<br>• Unbalanced load<br>• This protection only operates with the drive on load | • Check the power connection and the fuses.<br>• Use a 3-phase line supply.<br>• Disable the fault by setting Input Phase loss detection IPL |
| SCF5 | Load short circuit | • Short-circuit at drive output<br>• Short circuit detection at the run order or DC injection order if parameter IGBT test Strt is set to YES | Check the cables connecting the drive to the motor, and the motor's insulation |
| SLF1 | Modbus Communication | Interruption in communication on the Modbus network | • Check the connections of communication bus.<br>• Check the time-out (Modbus time out ttO parameter<br>• Refer to the Modbus user manual |
| SLF2 | SoMove Communication | Communication interruption with SoMove | • Check the SoMove connecting cable.<br>• Check the time-out |
| SLF3 | HMI Communication | Communication interruption with the external display terminal | Check the terminal connection |

| | | | |
|---|---|---|---|
| SPIF | PI Feedback detected fault | PID feedback below lower limit | • Check the PID function feedback<br>• Check the PI feedback supervision threshold LPI and time delay tPI |
| ULF | Process underload fault | • Process underload<br>• Motor current below the Application Underload threshold LUL parameter during a period set by Application underload time delay ULt parameter to protect the application. | Check the process and the parameters of the drive to be in phase |
| tJF | IGBT overheat | • Drive overheated<br>• IGBT internal temperature is too high according to ambient temperature and load | • Check the size of the load/motor/drive.<br>• Reduce the Switching frequency SFr.<br>• Wait for the drive to cool before restarting |
| CFF | Incorrect configuration | • HMI block replaced by an HMI block configured on a drive with a different rating<br>• The current configuration of customer parameters is inconsistent | • Return to factory settings or retrieve the backup configuration, if it is valid.<br>• If the fault remains after reverting to the factory settings, contact your local Schneider Electric representative |
| CFI | Invalid configuration | Invalid configuration<br>The configuration loaded in the drive via the bus or communication network is inconsistent. The configuration upload has been interrupted or is not fully finished. | • Check the configuration loaded previously.<br>• Load a compatible configuration |
| CHI2 | Download invalid configuration | Interruption of download operation with Loader or SoMove | • Check connection with Loader or SoMove.<br>• To reset the default re-start the download operation or restore the factory setting |
| USF | Undervoltage | • Line supply too low<br>• Transient voltage dip | Check the voltage and the parameters of Undervoltage Phase Loss Menu USb |

# Pre-Operation Adjustments

## Turntable Speed

The Turntable Speed setting is controlled by the round dial on the frequency drive inside the Electrical Enclosure. Press the dial, scroll the rEF, then set the speed in 0-100%. Press the dial again to set the speed. The maximum turntable speed is 12 rotations-per-minute (RPM).

Once all parameters are entered into the drive press ESC until you see RDY then press the dial once, you will see REF, press the dial once again, you will see a number value, turn the dial clockwise until the number stops at 100.

# Load Compression Testing

Load compression tests were designed to allow you to measure the force of the film against your product. These tests will allow you to fine tune the machine for the most secure products.

1. Place a product in the center of the wrap area.

2. Attach the film to the product.

3. Set the Film Force Friction to a moderate resistance.

4. Initiate a wrapping cycle by pressing the Start button on the operator panel. To test the load compression, allow the machine to complete one full cycle.

5. Using the tape measure provided in the *Highlight Field Test Kit FTK-4000*, determine as close as possible the center of one side of the product.

6. Attach the scale provided in the *Highlight Field Test Kit FTK-4000* kit to the center of the package by pushing the pointed end of the hook all the way through the stretch film. Grasp the other end of the scale, and pull it two inches away from the product.

7. Record the reading on the scale. To increase the load compression, increase the resistance on the friction pad, or decrease the resistance on the friction pad to decrease the load compression.

8. Remove all the stretch film from the product.

9. Repeat the above steps if additional adjustments are needed.

The final setting which best suits your load will remain the same until you change the Film Force Friction.

# Optional Scale Package

The optional scale package allows the user to quickly measure the weight of a package placed on the machine. To operate correctly and efficiently the scale needs to be configured with the correct settings. Below are instructions on how to re-configure the scale and the settings that have been pre-programmed. Re-configuring the scale is not required unless there is a problem with the existing scale or a new scale is added to the machine. Refer to the scale manual for more information.

**Note**
Changing the scale parameters to values other than the Highlight recommended values may result in poor scale operation.

## Navigating the Scale Menu

Step 1: Turn the scale display over so you are looking from above down at the back side of the scale and turn off the scale power.

Step 2: Remove the two small screws holding a small plate on the back of the scale.

Step 3: Looking down at the scale, move the switch under the plate to the right.

Step 4: Turn the scale power back on.

Step 5: Press the “PRINT / >>” button until the desired setting appears on the screen.

Step 6: Press the “ZERO” button to enter the parameter set-up.

Step 7: Press the “PRINT / >>” button until the display reads the correct setting and press the “SET / NET” button.

Step 8: Turn the power back off, move the switch under the plate to the left, and turn the power back on.

Step 9: Replace the screws on the back cover and retighten the scale swivel grips on the side.

Step 10: The scale is now ready to use.

## Highlight Recommended Configuration Values

**Note**
Changing the scale parameters to values other than the Highlight recommended values may result in poor scale operation.

| Name/Code | Description | Highlight Suggested Value |
|---|---|---|
| F1: Graduations | Specifies the number of full-scale graduations. Value should be consistent with legal requirements and environmental limits on the useful system resolution. | 5000 |
| F2: Span Gain | Span Gain is related to A/D integration time. The larger the span gain, the higher the internal resolution, but the slower the update speed. Note that the scale must be re-calibrated whenever this parameter is altered. See Appendix C in the scales manual for more information. | 100 |
| F3: Zero Track Band | Selects the range within which the scale will automatically zero. Note that the scale must be in a standstill to zero the scale. | 3 |
| F4: Zero Range | Selects the range within which the scale may be zeroed. Note that the indicator must be in standstill to zero the scale. | 100 |
| F5: Motion Band | Sets the level at which motion is detected by comparing the present display update with the previous one. If motion is not detected for two seconds or more, scale is in standstill and can process a Print or Zero command. Maximum value varies depending on local regulations | 1 |
| F6: Digital Filter | Averages weight readings to produce higher stability but the slower the indicator's response time. Choose 8 unless a very fast response is needed. | 8 |
| F7:Overload Limit | Selects the desired formula which determines the point at which the indicator shows overload. All selections are based on the primary unit selected in F8. | 2% |
| F8: Calibration Unit | Selects the primary base unit to be used in the calibration process. Also the default unit for normal operation. 1 = pounds, 2 = kilograms. | 1 |
| F9: Display Divisions | Determines the desired weight increments. Value should be consistent with legal requirements. | 1 |
| F10: Decimal Point | Determines the location of the decimal point. | 0 |
| F16:Zero Calibration | Places the scale in a Zero Calibration routine. See below. | See below. |
| F17: Span Calibration | Places the scale in a Span Calibration routine. See below. | See below. |

## Scale Calibrating Procedure

**Note**
Highlight Industries, Inc. calibrates the scale before shipment using known weights. The values stored in these settings are custom per scale and machine. Do not change these values unless directed to do so by Highlight personnel.

Step 1: Navigate the scale menu to parameter “F 16.”

Step 2: Press the “ZERO” button ONCE. This enters the Zero Calibration Menu. The display will momentarily show “C 0” followed by a value.

Step 3: After making sure that there are no test weights on the machine press the “ZERO” button again. The display will zero.

Step 4: Press the “SET / NET” button to save the zero point value. The display will show “EndC0” momentarily then revert to parameter F16.

Step 5: Navigate to parameter “F 17.”

Step 6: Press the “ZERO” button ONCE. This enters the Span Calibration Menu. The display will momentarily show “C 1” followed by a value with one flashing digit. This value will be zero with the decimal point parameter selected in F10.

Step 7: Place a known weight on the machine. Ensure that the test weight is below the maximum capacity of the scale and above 1% of the maximum capacity of the scale.

Step 8: Key in the weight of the test weight using the buttons on the screen. Press the “TARE / <<” button to select the digit to the left of the current position. Press “PRINT / >>” to select the digit to the right of the current position. Press “UNITS” to increase the value of the digit and press “ZERO” to decrease the value of a digit.

Step 9: Once the weight of the test weight is keyed in exactly, press the “SET / NET” button to save the value. If the calibration was successful the display will read “EndC1” momentarily, and then revert back to “F17”. If “Err0” is displayed the test weight is larger than the full capacity of the scale. If “Err1” is displayed the test weight is below 1% of the full capacity of the scale. If “Err2” is displayed the internal resolution of the scale is not high enough to accept the calibration value

4

**Highlight Industries, Inc.**

Synergy 0.5 Turntable Stretch Wrapper Operation Manual

# Operation Instructions

# Film Loading

Follow the procedure below to thread the film onto the Film Carriage.

1. Load the film roll over the three-inch round metal core. Be sure the roll is completely lowered and locked onto the bottom anti-rotation tab. Load the film so that the cling will be against the package.

2. Pull six to eight feet of film off the film roll.

3. Follow the diagram below and thread the film tail all the way through the rollers.

4. After threading, grab the film tail, pull it out, and attach to the load.

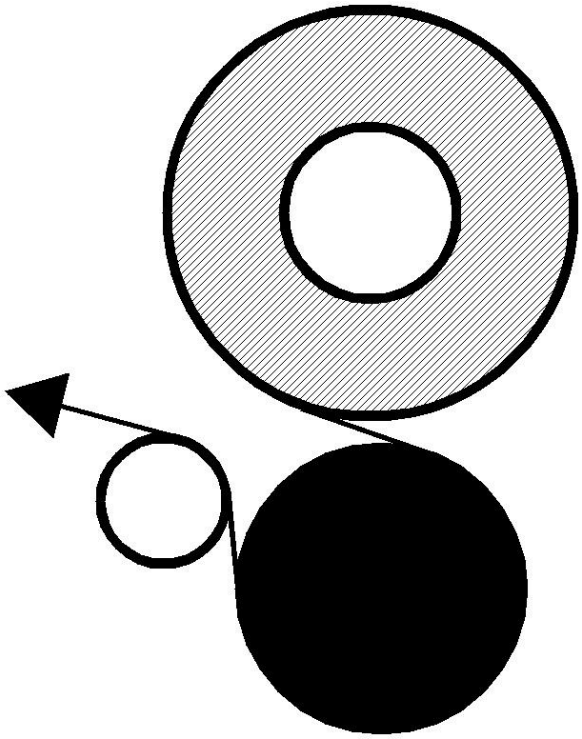


**Figure 3: Film Loading/Threading Diagram**

# Machine Operating Instructions

Simply step on the foot pedal to start the turntable rotating. Pressing on the footswitch again will turn the turntable off.

# Film Cutting

## Standard Film Cutting

After the product has been wrapped, it is suggested that the film be cut approximately 12 (twelve) inches past a corner and to wipe the film tail down or tuck it under another layer of film.

**Note**
To cut the film a film knife can be used or an operator can tear the film at a 45-degree angle to itself.

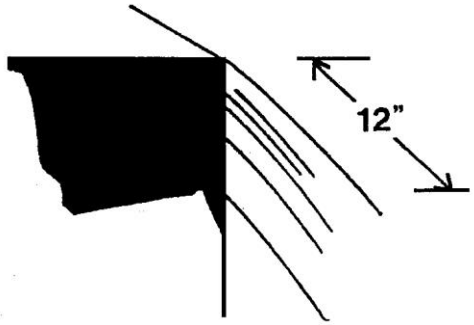



**Figure 4: Top View of Package, Film Cut Location**

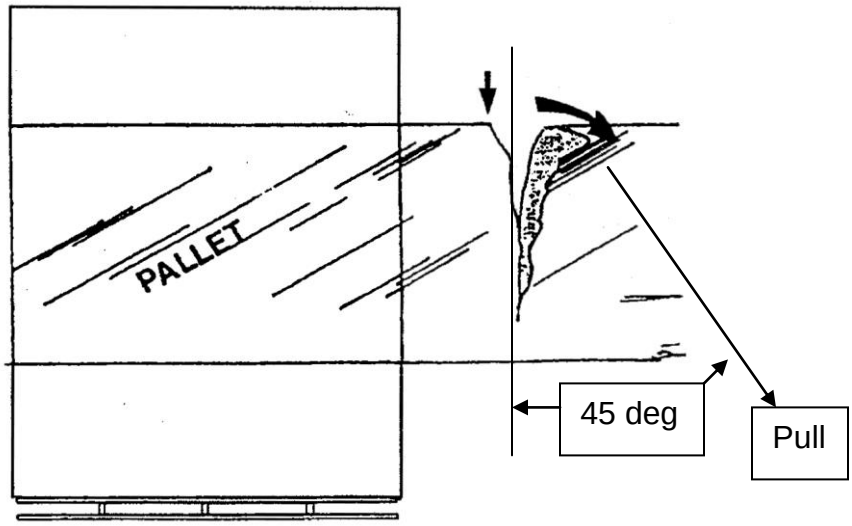



**Figure 5: Side View of Package, Film Tear Angle**

5

**Highlight Industries, Inc.**

Synergy 0.5 Turntable Stretch Wrapper Operation Manual

# Maintenance

# Preventative Maintenance

As with all machinery, proper attention and maintenance is the key to long component life, maximum performance, and safe operation. By spending a few minutes reading and following these preventive measures, you should reduce the downtime and prolong the life of your system.

It is important to understand that these maintenance schedules are minimum recommendations. *Highlight Industries, Inc.* cannot possibly know, evaluate, or advise the various trades in all schedules of periodic maintenance. Accordingly, anyone who maintains or services a stretch wrap machine must first satisfy himself/herself as to the schedules of preventive maintenance based on cycling operation and environmental locations.

**Warning!**
All maintenance operations require the equipment to be powered down and locked out for personnel safety.

## Lock-out/ Tag-out Procedures

Be sure that anyone performing any type of maintenance on this equipment is familiar with and is adhering to the lock-out/tag-out procedures set forth by the General OSHA or the State OSHA guidelines.

## Visual Checks

Visual checks should be conducted daily.

1. Keep the machine and surrounding area as clean as possible, especially near moving components.

2. Check for loose hardware, especially set screws located in: sprocket hubs, bearing hubs, and flanges.

3. Check for loose cotter pins.

4. Check for oil leaks around the speed reducers.

5. Check for dry seals at the bearings.

6. Check for loose electrical connections and for frayed cords and cables. Replace immediately any damaged cords and cables.

## Turntable Bearing Lubrication Table

The main turntable bearing should be lubricated with clean grease that conforms to NLGI EP-2 penetration. Wipe fittings clean before and after lubrication; rotate the turntable while lubricating. Thereafter, use the following recommendation for periodic lubricating:

| Shift Operation | Times Per Year |
|---|---|
| Single Shift | 4 |
| Double Shift | 8 |
| Triple Shift | 12 |

## Reducer

All gear reducers contain lubricating oil. A high-grade lubricant is required which is stable, anticorrosive, and highly resistant to oxidation. Drain and replace the oil in these reducers using the following recommended directions:

1. Remove the drain plug and drain the oil.
2. Replace the drain plug.
3. Remove the ‘level’ plug and ‘vent’ plug.
4. Fill the reducer through the ‘vent’ port.
5. Allow the excess to run out from the ‘level’ port.
6. Replace the ‘level’ plug.
7. Replace the ‘vent’ plug.

## Sprockets and Chains

All sprockets should be inspected for wear, and chains should be checked for proper tension and lubrication on a periodic basis. To do this procedure, the chain guards will have to be removed. If the slots in the reducer mount plate do not allow you to tension the chain, the chain is probably stretched and in need of replacement. Failure to do so will lead to premature sprocket failure. Any general-purpose chain lube should be sufficient for lubrication. Replace chain guards when preventative maintenance is complete.

## Miscellaneous Pivot and Rotating Bearings

All other bearings not mentioned previously should be greased bi-monthly using Mobile EP-2 or equivalent.

# Maintenance Schedule

| Part | Schedule | Service With |
|---|---|---|
| Turntable Reducer | Check for leaks and the overall condition of the gear motor once a week. | Sealed, should require no maintenance. |
| Turntable Chain Drive Tension (For Synergy Low Profile Only) | Check and adjust every three months. | |
| All pivot bearings | Initially first 1,000 cycles; every 10,000 cycles thereafter. | Mobil EP-2 grease |

**Note**
For additional maintenance information about specific components on the machine, refer to the components operation manuals shipped inside the main enclosure.

6

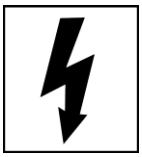
**Highlight Industries, Inc.**

Synergy 0.5 Turntable Stretch Wrapper Operation Manual

# Trouble-shooting

# Troubleshooting Guide

**Warning!**
Make sure that only qualified personnel will perform inspection, troubleshooting, and part replacement.



**High Voltage!**
Disconnect all power including external control power that may be present before servicing the frequency drive controllers. Wait three (3) minutes for the DC bus capacitors to discharge. The frequency drive controller display and/or LED's are not accurate indicators of the absence of DC bus voltage.

## Before You Start

The diagrams in this section will guide you in identifying typical problems while operating the Synergy Turntable Stretch Wrapper, and provide you with corresponding solution(s). Problems are divided in reference to the machine functions: power, turntable, film carriage, and film delivery.

If further assistance is required, contact the distributor from whom you have purchased the equipment, or call the number listed on the bottom page of this manual. To receive quick and proper technical support, please be prepared to provide the following information:

1. Machine serial number
2. Date of purchase
3. Symptoms of any problems

## General Troubleshooting Practices

1. Always adhere to the General OSHA or the State OSHA guidelines.
2. When working with machine wiring, take precautions to prevent contact with live wires.
3. Ensure that all wiring is securely fastened and that all terminals are tightened down properly.
4. Have a multi-meter nearby to be able to check for voltages and continuity on different portions of the machine circuitry.
5. Use the schematics provided in this manual to trace wiring and find components on the sub panel.

# Power Problems

| Problem | Possible Cause | Possible Solution |
|---|---|---|
| The machine does not power up. | The machine is not plugged in. | Plug the machine into a 120VAC, 15A outlet. |
| | The Power Switch is Off. | Turn the Power Switch on. |
| | The main circuit breaker is tripped or off. | Turn the breaker back on, or replace if necessary. |
| The display on a Frequency Drive is not on. | The drive circuit breaker is off. | Turn the breaker back on, or replace if necessary. |
| | The drive has malfunctioned. | Check wiring to the Frequency Drive, or replace if necessary. |

# Turntable Problems

| Problem | Possible Cause | Possible Solution |
|---|---|---|
| The turntable does not rotate. | The Frequency Drive is not on (the drive display is off). | See the Power Problems section. |
| | The Frequency Drive is faulted. | Record the fault code on the drive display and refer to the Frequency Drive Adjustments section of this manual or the drive manufacturer's manual. |
| | The turntable is mechanically restricted. | Check the condition of the motor, chain, and rollers under the turntable. Replace as necessary. |
| | The turntable motor is not wired correctly. | Check connections between the Frequency drive and the motor. Ensure the motor is wired for the correct voltage. Replace the motor as necessary. |
| | The Turntable foot switch has malfunctioned. | Check wiring to the switch and replace as necessary. |
| | The Frequency Drive has malfunctioned. | Check wiring to the Frequency Drive and replace as necessary. |
| | The parameters in the Frequency Drive are not set properly. | Refer to the Electrical Schematics in the Technical References section of this manual for Highlight Industries, Inc. factory drive settings. |

7

**Highlight Industries, Inc.**

Synergy 0.5 Turntable Stretch Wrapper Operation Manual

# Technical References

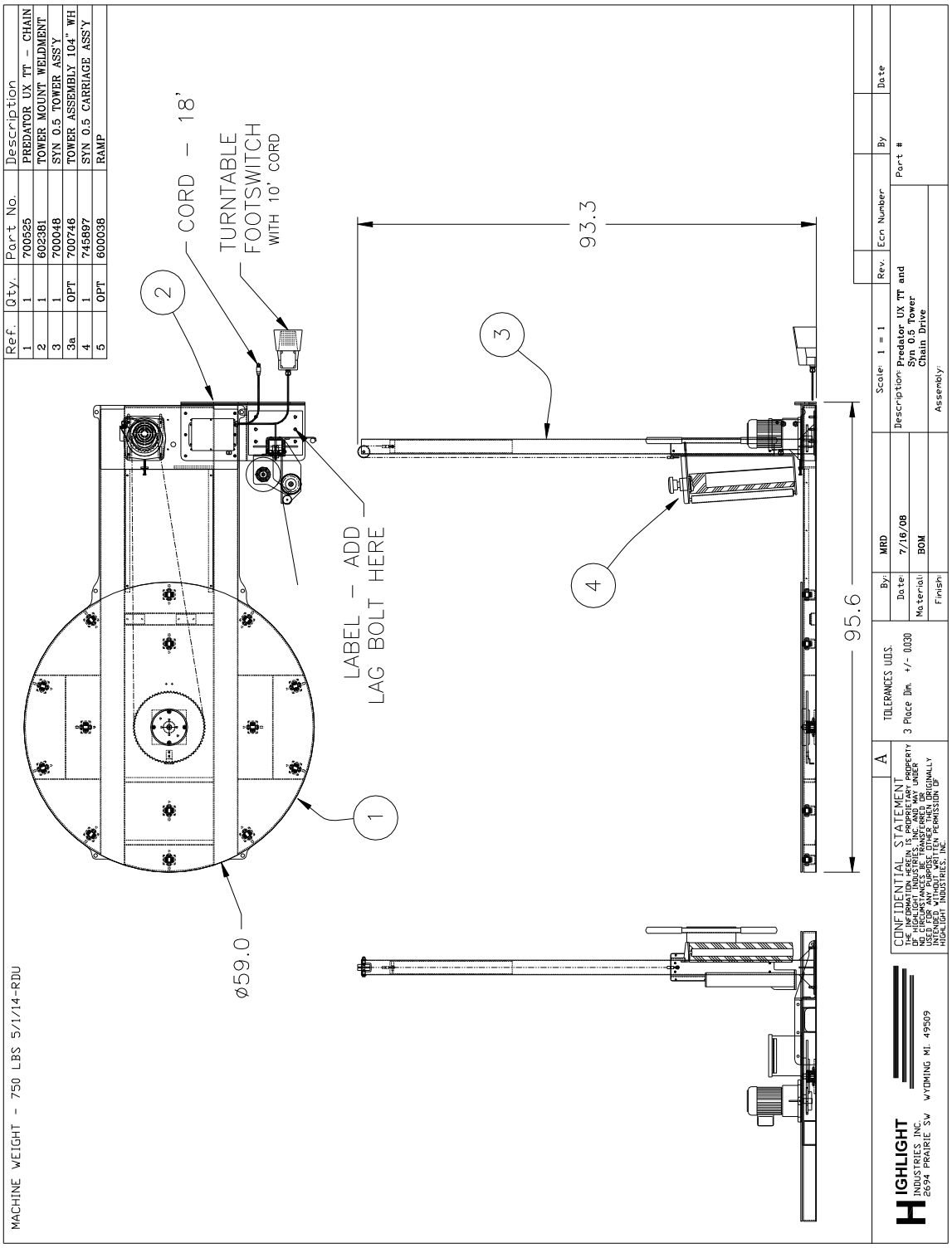
# Recommended Spare Parts

The table below provides the recommended spare parts list for the Synergy 0.5 Turntable Stretch Wrapper.

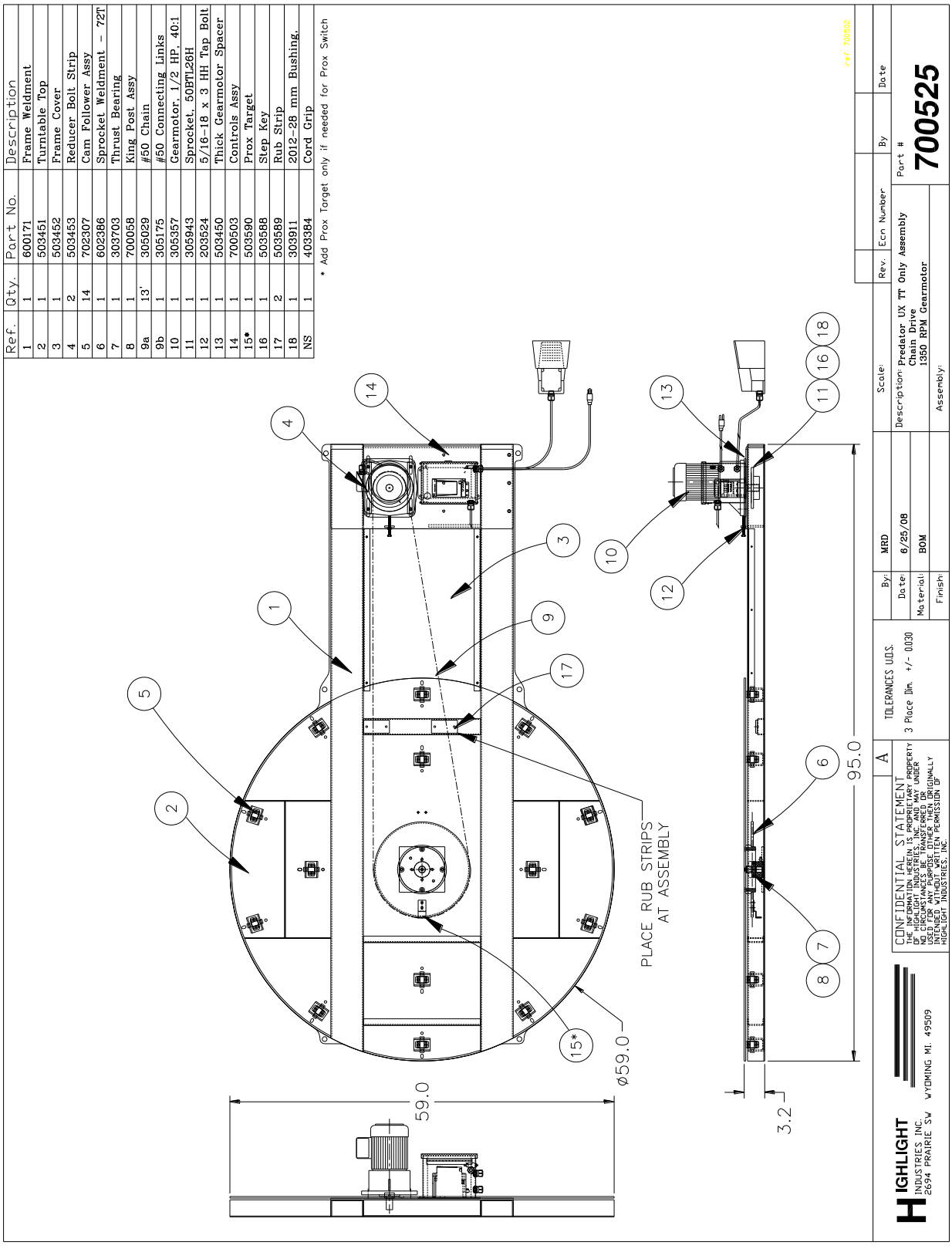
| Machine Section | HLI Part Number | Item Description | Qty |
|---|---|---|---|
| | | | |
| L.P Turntable | 305357 | GEARMOTOR, 1/2 HP | 1 |
| L.P Turntable | 702307 | CAM ROLLER AND SPINDLE ASSEMBLY | 4 |
| Carriage | 645906 | COATED ROLLER | 1 |
| Carriage | 520153 | FANTOM URETHANE BRAKE RING | 1 |
| Carriage | 305607 | BEARING, 7/8 ID | 1 |
| Carriage | 304207 | BEARING, 7/16” HEX | 1 |
| Electrical | 408467 | AC DRIVE ATV12 115V 1ph IN 230 VAC 3PH OUT 1/2 hp | 1 |
| Electrical | 403383 | FOOTSWITCH, MAINTAINED | 1 |

# Mechanical Drawings

## Low Profile System



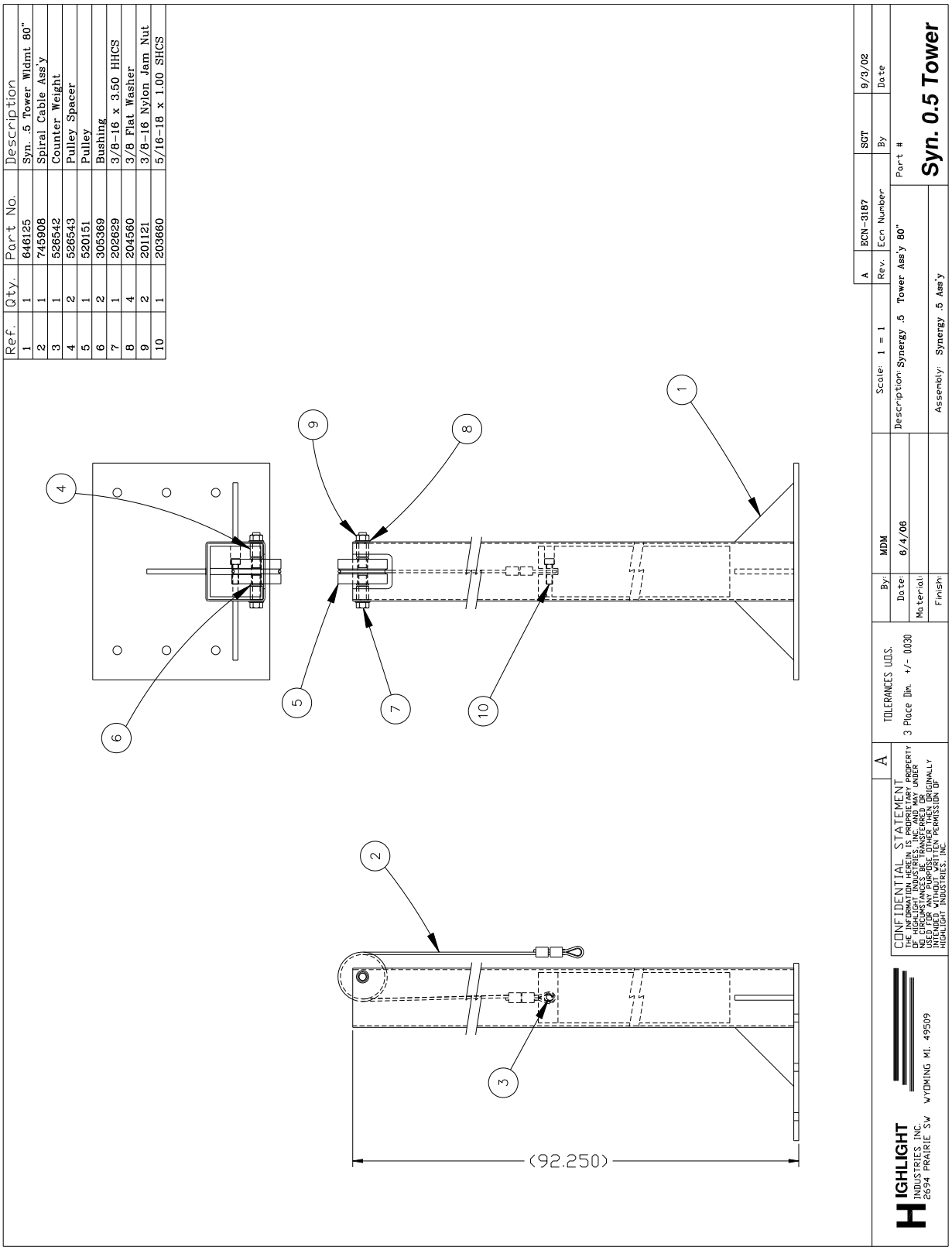
# Low Profile Turntable

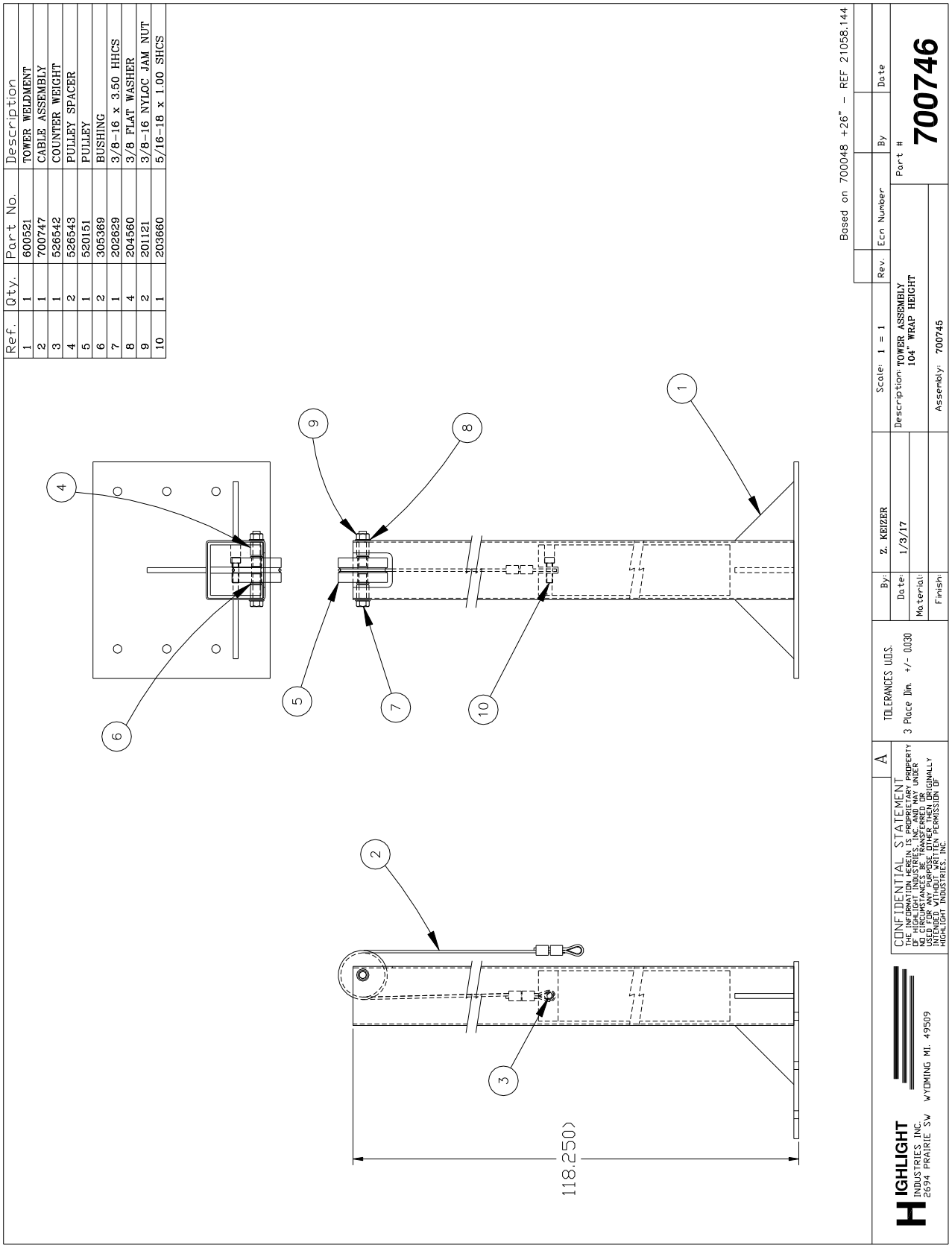



| Ref. | Qty. | Part No. | Description |
|---|---|---|---|
| 1 | 1 | 600171 | Frame Weldment |
| 2 | 1 | 503451 | Turntable Top |
| 3 | 1 | 503452 | Frame Cover |
| 4 | 2 | 503453 | Reducer Bolt Strip |
| 5 | 14 | 702307 | Cam Follower Assy |
| 6 | 1 | 602386 | Sprocket Weldment – 72T |
| 7 | 1 | 303703 | Thrust Bearing |
| 8 | 1 | 700058 | King Post Assy |
| 9a | 13' | 305029 | #50 Chain |
| 9b | 1 | 305175 | #50 Connecting Links |
| 10 | 1 | 305357 | Gearmotor, 1/2 HP, 40:1 |
| 11 | 1 | 305943 | Sprocket, 50BTL26H |
| 12 | 1 | 203524 | 5/16-18 x 3 HH Tap Bolt |
| 13 | 1 | 503450 | Thick Gearmotor Spacer |
| 14 | 1 | 700503 | Controls Assy |
| 15* | 1 | 503590 | Prox Target |
| 16 | 1 | 503588 | Step Key |
| 17 | 2 | 503589 | Rub Strip |
| 18 | 1 | 303911 | 2012-28 mm Bushing |
| NS | 1 | 403384 | Cord Grip |

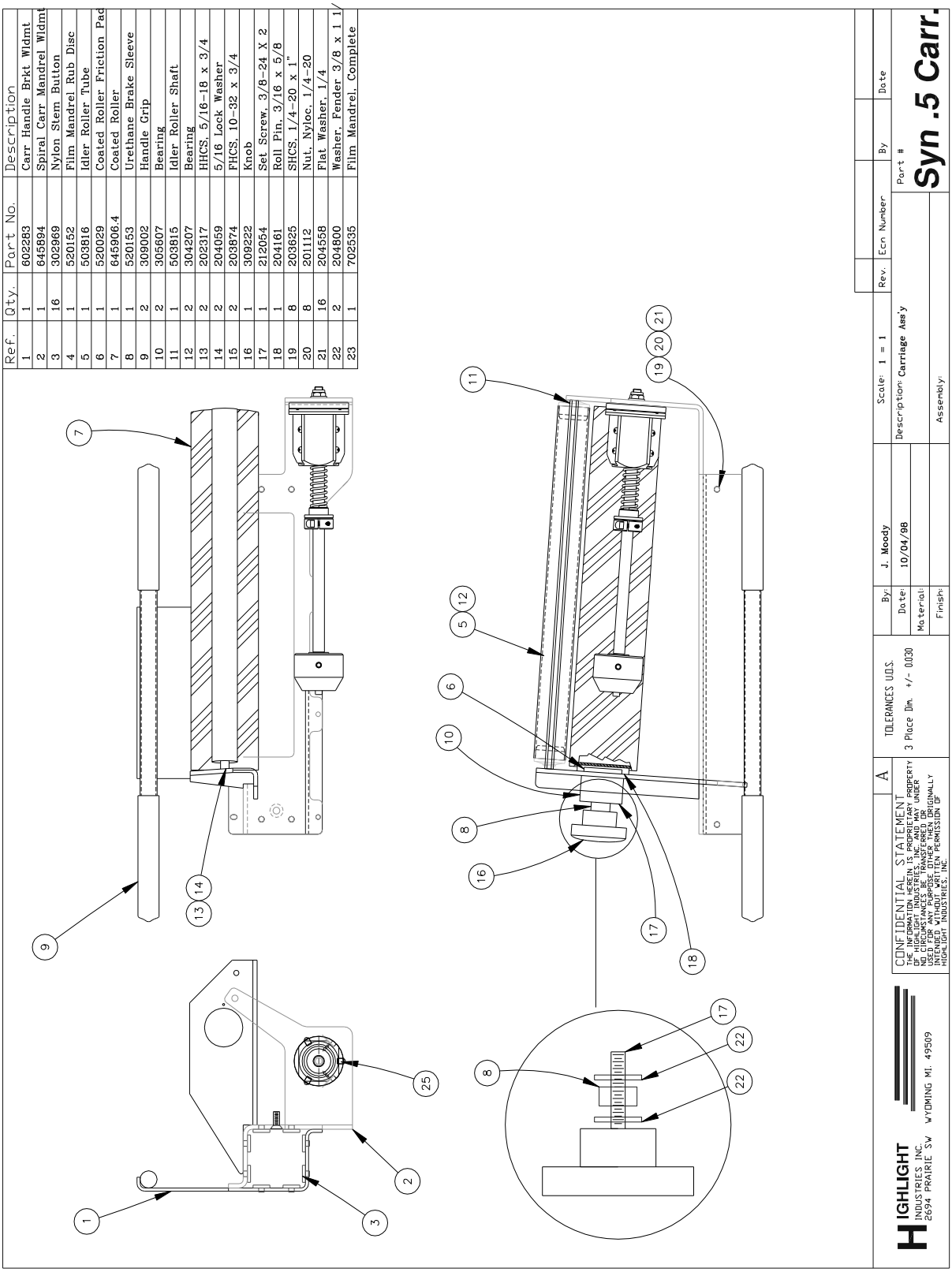
* Add Prox Target only if needed for Prox Switch

# Tower


Ref. | Qty. | Part No. | Description
1 | 1 | 646125 | Syn. .5 Tower Widmt 80"
2 | 1 | 745908 | Spiral Cable Ass'y
3 | 1 | 526542 | Counter Weight
4 | 2 | 526543 | Pulley Spacer
5 | 1 | 520151 | Pulley
6 | 2 | 305389 | Bushing
7 | 1 | 202629 | 3/8-16 x 3.50 HHCS
8 | 4 | 204560 | 3/8 Flat Washer
9 | 2 | 201121 | 3/8-16 Nylon Jam Nut
10 | 1 | 203660 | 5/16-18 x 1.00 SHCS
A | ECN-3187 | SGT | 9/3/02
Rev. | Ecn Number | By | Date
Scale: 1 = 1
Description: Synergy .5 Tower Ass'y 80"
Part #
Assembly: Synergy .5 Ass'y
Syn. 0.5 Tower
By: MDM
Date: 6/4/08
Material:
Finish:
TOLERANCES U.O.S.
3 Place Dim. +/- 0.030
CONFIDENTIAL STATEMENT
THE INFORMATION HEREIN IS PROPRIETARY PROPERTY OF HIGHLIGHT INDUSTRIES, INC. AND MAY NOT BE DISCLOSED, TRANSFERRED OR USED UNDER ANY PURPOSE OTHER THEN ORIGINALLY INTENDED WITHOUT WRITTEN PERMISSION OF HIGHLIGHT INDUSTRIES, INC.
HIGHLIGHT INDUSTRIES, INC.
2694 PRAIRIE SW WYOMING MI. 49509
(92.250)


Ref. Qty. Part No. Description
1 1 600521 TOWER WELDMENT
2 1 700747 CABLE ASSEMBLY
3 1 526542 COUNTER WEIGHT
4 2 526543 PULLEY SPACER
5 1 520151 PULLEY
6 2 305369 BUSHING
7 1 202629 3/8-16 x 3.50 HHCS
8 4 204560 3/8 FLAT WASHER
9 2 201121 3/8-16 NYLOC JAM NUT
10 1 203660 5/16-18 x 1.00 SHCS
Based on 700048 +26" - REF 21058.144
118.250
TOLERANCES U.O.S.
3 Place Dim. +/- 0.030
By: Z. KEIZER
Date: 1/3/17
Material:
Finish:
Description: TOWER ASSEMBLY
104" WRAP HEIGHT
Assembly: 700745
Scale: 1 = 1
Rev. Ecn Number By Date
Part # 700746
CONFIDENTIAL STATEMENT
HIGHLIGHT INDUSTRIES
INDUSTRIES, INC.
2694 PRAIRIE SW WYOMING MI. 49509

# Film Carriage



| Ref. | Qty. | Part No. | Description |
|---|---|---|---|
| 1 | 1 | 602283 | Carr Handle Brkt Wldmt |
| 2 | 1 | 645894 | Spiral Carr Mandrel Wldmt |
| 3 | 16 | 302969 | Nylon Stem Button |
| 4 | 1 | 520152 | Film Mandrel Rub Disc |
| 5 | 1 | 503816 | Idler Roller Tube |
| 6 | 1 | 520029 | Coated Roller Friction Pad |
| 7 | 1 | 645906.4 | Coated Roller |
| 8 | 1 | 520153 | Urethane Brake Sleeve |
| 9 | 2 | 309002 | Handle Grip |
| 10 | 2 | 305607 | Bearing |
| 11 | 1 | 503815 | Idler Roller Shaft |
| 12 | 2 | 304207 | Bearing |
| 13 | 2 | 202317 | HHCS, 5/16-18 x 3/4 |
| 14 | 2 | 204059 | 5/16 Lock Washer |
| 15 | 2 | 203874 | FHCS, 10-32 x 3/4 |
| 16 | 1 | 309222 | Knob |
| 17 | 1 | 212054 | Set Screw, 3/8-24 X 2 |
| 18 | 1 | 204161 | Roll Pin, 3/16 x 5/8 |
| 19 | 8 | 203625 | SHCS, 1/4-20 x 1" |
| 20 | 8 | 201112 | Nut, Nyloc, 1/4-20 |
| 21 | 16 | 204558 | Flat Washer, 1/4 |
| 22 | 2 | 204800 | Washer, Fender 3/8 x 1 1/ |
| 23 | 1 | 702535 | Film Mandrel, Complete |



TOLERANCES U.O.S.
3 Place Dim. +/- 0.030

By: J. Moody
Date: 10/04/08
Material:
Finish:

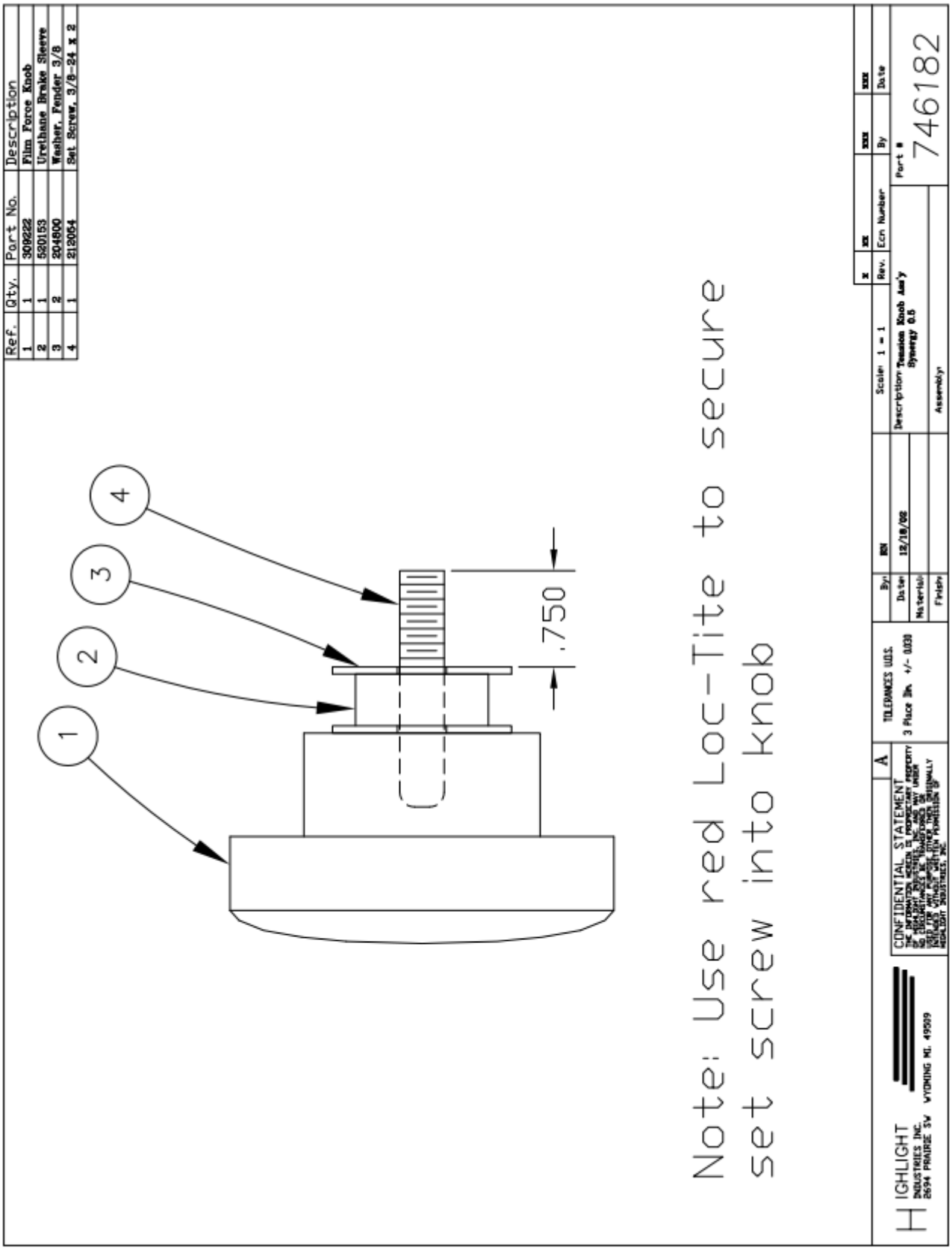
Scale: 1 = 1
Description: Carriage Ass'y
Assembly:

Rev. | Ecn Number | By | Date

Part #

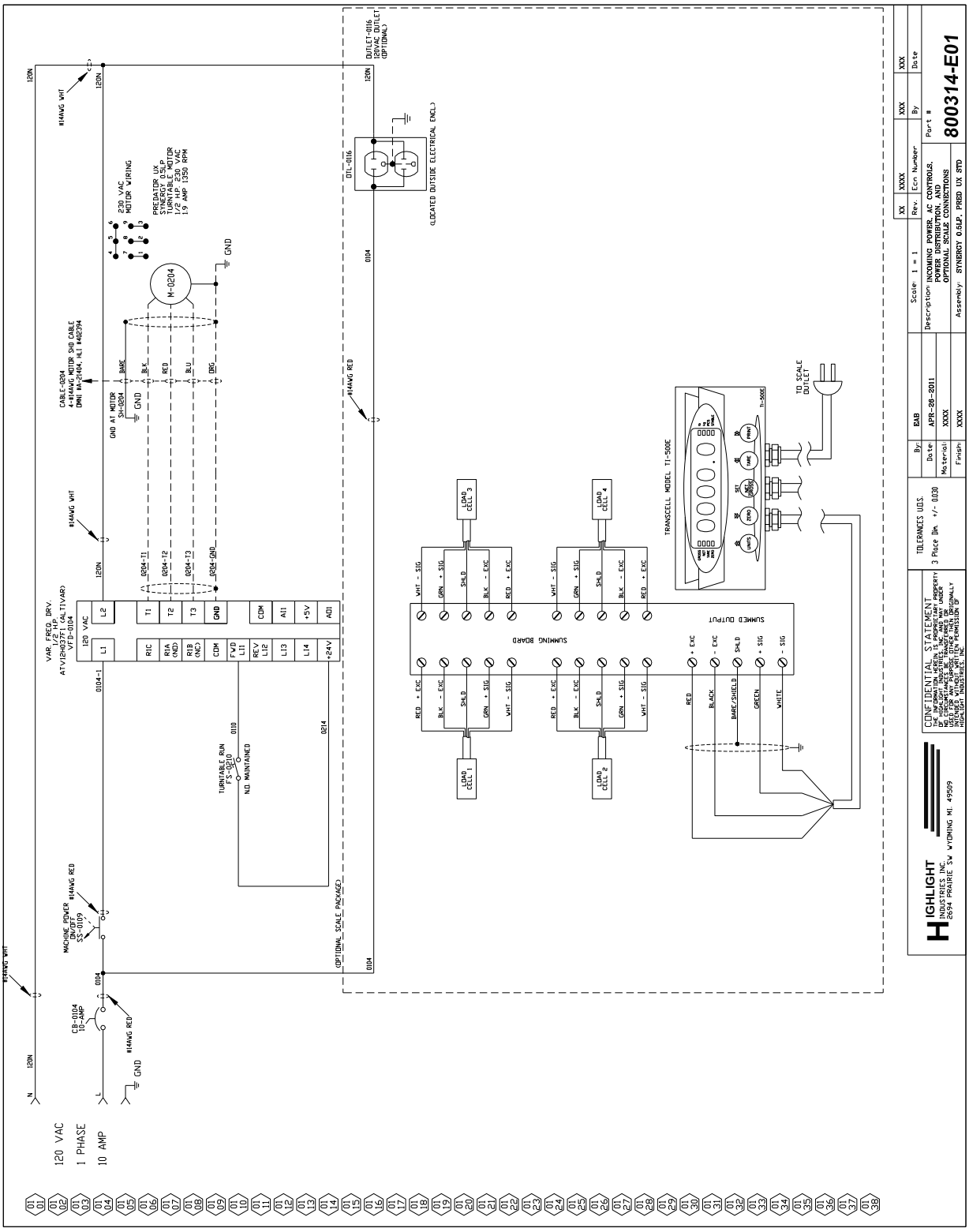
Syn .5 Carr.

HIGHLIGHT INDUSTRIES INC.
2694 PRAIRIE SW WYOMING MI. 49509


Ref. Qty. Part No. Description
1 1 309222 Film Force Knob
2 1 530153 Urethane Brake Sleeve
3 2 204900 Washer, Fender 3/8
4 1 212064 Set Screw, 3/8-24 x 2
1
2
3
4
.750
Note: Use red Loc-Tite to secure
set screw into knob
CONFIDENTIAL STATEMENT
HIGHLIGHT
INDUSTRIES INC.
2694 PRAIRIE SW WYOMING MI. 49509
TOLERANCES U.O.S.
3 Place Dec. +/- 0.030
Scale: 1 = 1
Description Tension Knob Assy
Synergy 0.5
Assembly
Part #
746182

# Electrical Drawings

## Electrical Schematics

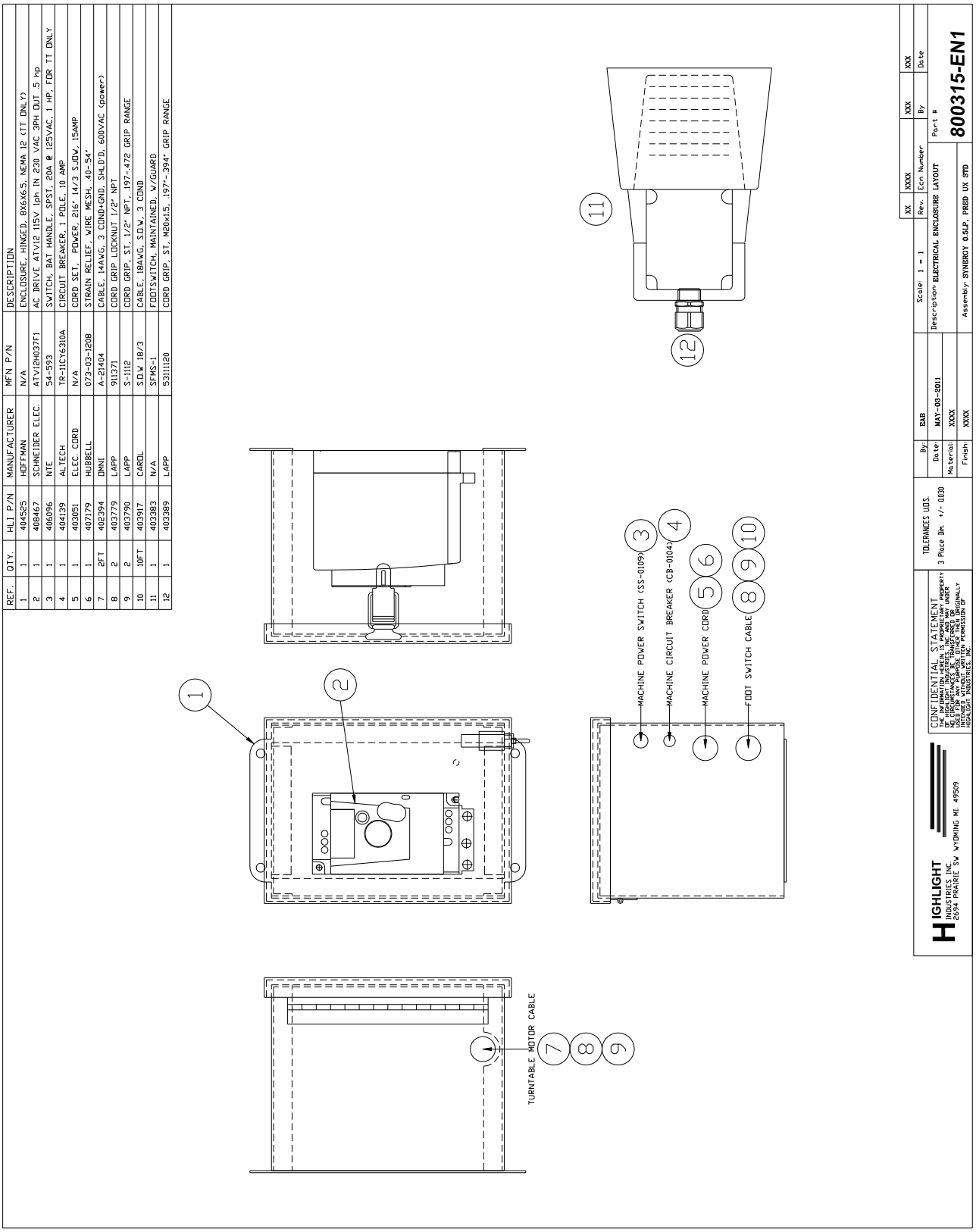


# ALTIVAR 12 DRIVE PROGRAMMING PARAMETERS

| Drive # | | | | | |
|---|---|---|---|---|---|
| **Function Controlled** | | | | | TURN-TABLE Drive |
| **Drive/Motor HP** | | | | | 0.5/0.5 |
| **Full Menu** | **Code** | **Code** | **Description** | **Default** | **Setting** |
| I/O | tCC | | Type of control (2 wire) | 2C | * |
| | AI1 | AI1t | Analog Input Type | 5U | * |
| | r1 | | Relay Output r1 | FLt | * |
| | tOL | | Application Overload Time Delay | 0 sec | * |
| | LOC | | Application Overload Threshold (% of nCr) | 90% | * |
| | AO1 | AO1 | Analog Output Assignment | nO | * |
| | | AO1t | Analog Output Type | 0A | * |
| drC | bFr | | Standard Motor Frequency | 50 Hz | 50 Hz |
| | nPr | | Motor Rated Power | PLATE | 0.37 |
| | CoS | | Rated Motor Cos Phi | PLATE | * |
| | UnS | | Nominal Motor Voltage | 230V | * |
| | nCr | | Motor Plate Current Rating | PLATE | 1.9 |
| | FrS | | Nominal Motor Frequency | 50 Hz | 50 Hz |
| | nSP | | Motor Speed Rating | PLATE | 1350 |
| | tFr | | Maximum Output Frequency | 72 Hz | 50 Hz |
| | Ctt | | Motor Control Type | Std | * |
| | UFr | | IR Compensation | 100% | * |
| | StA | | Frequency Loop Stability | 20% | * |
| | FLG | | Frequency Loop Gain | 20% | * |
| | tUn | | Motor Auto Tuning | nO | YES→No |
| CtL | Fr1 | | Speed Control Reference | AI1 | AIU1 |
| | CHCF | | Motor Control/Channel Configuration | SIM | SEP |
| | Cd1 | | Command Channel 1 | tEr | * |
| FUn | rPt | ACC | Acceleration Time (Seconds) | 3 | 2.0 |
| | | dEC | Deceleration Time (Seconds) | 3 | 2.0 |
| | | rPt | Ramp Shape Assignment | Lin | * |
| | | brA | Decel Ramp Adaption Assignment | YES | dYnA |
| | Stt | Stt | Type of Stop | rMP | * |
| | rrS | | Reverse Direction | nO | * |
| | AdC | AdC | Automatic DC Injection | YES | * |
| | | SdC1 | Automatic DC Injection Current | 70% | * |
| | | tdC1 | Automatic DC Injection Time | 0.5 sec | * |
| | CL1 | CL1 | Current Limitation | 1.5 In | * |
| | SPL | LSP | Low Speed (Min Hz) | 0 Hz | * |
| | | HSP | High Speed (Max Hz) | 60 Hz | 50 Hz |
| FLt | rSF | | Detected Fault Reset Assignment | nO | * |
| | AtR | Atr | Automatic Restart | nO | YES |
| | | tAr | Max Automatic Restart Time | 5 min | * |
| | FLr | | Flying Restart | nO | YES |
| | tHt | ItH | Motor Thermal Current | PLATE | 1.9 |

This table represents the Electrical Schematics Page 2

# Electrical Enclosure



8



# Notes