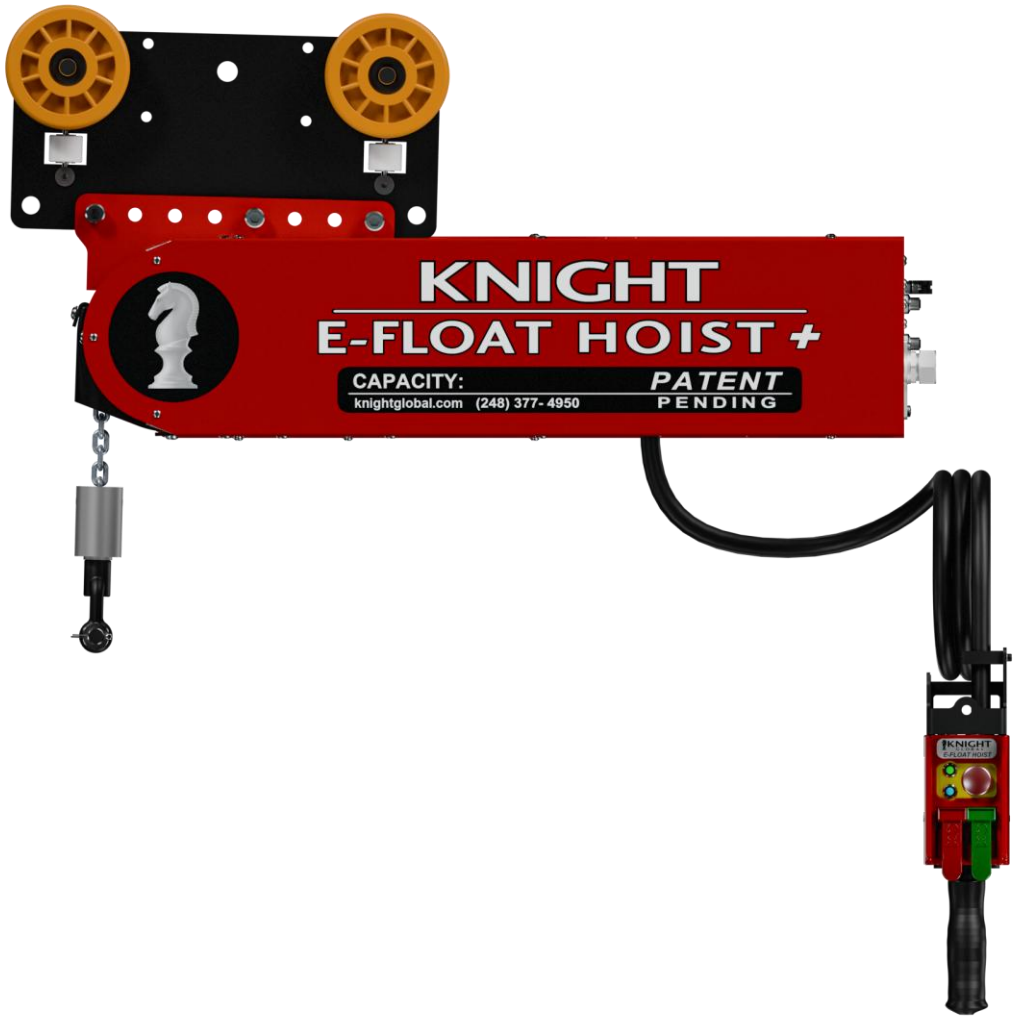
KNIGHT
GLOBAL

E-Float Hoist
Operation Manual



THIS MANUAL CONTAINS IMPORTANT INFORMATION REGARDING INSTALLATION, SAFETY, MAINTENANCE, AND OPERATION OF THE KNIGHT GLOBAL SERVO HOIST AND SHOULD BE AVAILABLE TO ALL PERSONNEL. RESPONSIBLE FOR USING THE HOIST.

REV: 001.202603

This manual provides important information for all personnel involved in the installation, operation, and maintenance of the Knight Global Servo Hoist.
All personnel must read this document before operating the equipment.

Every effort has been made to provide complete and accurate product information in this manual. However, due to product improvements and changes, discrepancies and omissions may be present.
Visit our website at www.knightglobal.com for the updated information on all our products.

It is the responsibility of the end user to exercise common sense and judgment when performing the tasks described in this manual. If any procedure seems inaccurate, incomplete, or unsafe please put the equipment in a safe condition and contact Knight Global service department for assistance. Knight service department's phone number is: (248) 377-4950 x246.

Throughout this manual there are steps and procedures that if not performed correctly can result in personal injury or equipment damage. The following signal words are used to identify the level of potential hazard.

	**WARNING** **Indicates a hazard which will cause severe injury, death, or substantial equipment damage.**

	**CAUTION** **Indicates a hazard which can or will cause injury or equipment damage.**

	**NOTE** **Notifies personnel of installation, operation or maintenance information which is important but not hazard related.**

	**NOTE** Knight Servo Manuals QR Code: 

1. Safety

Knight Global cannot be aware of or provide for all the procedures by which the Servo Hoist operations or repairs may be conducted and the hazards which may result from each method.
If operation or maintenance not specifically recommended by Knight Global is conducted, it must be ensured that product or personnel safety is not endangered by these actions. If not sure of an operation or maintenance procedure or step, personnel should place the Servo Hoist in a safe condition and contact a supervisor and/or Knight Global's service department for technical support.
Modifications to upgrade, re-rate or otherwise alter this equipment shall be authorized only by the original equipment manufacturer.

If a below-the-hook lifting device or sling is used with the Lift Assist, refer to:
ANSI/ASME B30.9 "Safety Standard for Slings", or
ANSI/ASME B30.20 "Safety Standard for Below-the-Hook Lifting Devices".

Electrical equipment described in this manual is designed and built in compliance with ANSI/NFPA 70, "National Electrical Code".
It is the responsibility of the system designer, system manufacturer, crane or rail manufacturer, installer, and user to ensure that the installation and associated wiring of the Servo Hoist and components are in compliance with ANSI/NFPA 70, and all applicable Federal, State and Local Codes.

Hazardous voltages are present in the Servo Hoist and components.
Only properly trained and competent personnel should perform inspections or repairs on the Servo Hoist or accessories.
Prior to performing any maintenance (mechanical or electrical) on the Servo Hoist, de-energize (disconnect) the main switch supplying power to the Servo Hoist.
Lock out the power supply following standard plant procedures.

Ensure that the installation, inspection, testing, maintenance, and operation are in compliance with ANSI/ASME B30.16 "Safety Standard for Overhead Hoists", OSHA Regulations, ANSI/NFPA 70, National Electric Code, and applicable ANSI/ASME standards.
This is the responsibility of the owner/operator.

All personnel that will install, operate, inspect, test, or maintain the hoist should read this manual and be familiar with all applicable portions of the referenced standards.

If clarification of any information in this manual or additional information is required, contact Knight Global.
Do not install, operate, inspect, test, or maintain the hoist unless all information is understood.

G. General Safety Precautions

- Do not operate the Servo Hoist before reading this technical manual.
- Allow only personnel trained in safety and operation of this Servo Hoist to operate the Servo Hoist.
- If the Servo Hoist is locked out or a “DO NOT OPERATE” sign is on the Servo Hoist or controls, do not operate the Servo Hoist until the lock or sign is removed by designated personnel.
- Do not use the Servo Hoist if hook’s safety latch has been sprung or broken.
- Before each shift or prior to use, inspect the Servo Hoist in accordance with the procedures defined in the Maintenance section of this manual.
- Never place your hand or fingers inside the throat area of a hook.
- Never operate a Servo Hoist with twisted, kinked, or damaged chain/cable.
- Only operate a Servo Hoist when the chain/cable is centered over the hook.
    - Do not “side pull” or “yard” the chain/cable.
- Do not force the hook into place by hammering.
- Ensure the load is properly seated in the saddle of the hook.
- Never run the chain/cable over a sharp edge.
- Always pay attention to the load when operating the Servo Hoist.
- Ensure no personnel are on the path of the suspended load.
- Do not lift the load over personnel.
- Never use a Servo Hoist for lifting or lowering people.
- Do not allow anyone to stand on a suspended load.
- Do not swing a suspended load.
- Never leave a suspended load unattended.
- Never cut or weld a suspended load.
- Do not operate a Servo Hoist if the chain/cable is jumping, jamming, overloading, or binding.
- Do not operate a Servo Hoist if it generates excessive noise.
- Avoid collisions or bumping of the Servo Hoist.
- Do not operate Servo Hoist when damaged or malfunctioning.
- Do not remove load or handling device until tension is released from the chain/cable.
- Discontinue operation of Servo Hoist after multiple unresolved faults.
    - A system fault would be signified by the red light on the Run-Stop button continuously flashing or the Run-Stop button having to be repeatedly reset.

H. Safety Devices

Motor Holding Brake

A motor holding braking system engages and holds the vertical axis in place in the event of a power outage or when the Run-Stop button is pressed.

Overload Capacity Protection

Protects the equipment and prevents the operator from lifting or moving more weight than the system is rated for. If the load weight exceeds the programmed capacity, the hoist will not lift any further until the excess load is removed. Downward motion is permitted when overloaded to allow the user to safely set the weight back down on a stable surface.

Run-Stop Push Button

Normally closed, twist-release style push button. Disables the servo drive when pressed by activating the drives Safe Torque Off (STO) mode. Button is reset by a quarter turn counterclockwise. Resetting the Run-Stop button also initiates a fault reset request.

Trolley Safety Cable

All Standard units have a trolley safety cable. This cable ensures the hoist will continue to be suspended if the supporting bolts fail.

Clevis Bolt Cotter Pin

All Standard units have a clevis bolt cotter pin. This pin ensures that bolt’s nut does not unthread from the fixture’s supporting bolt.

2. INSTALLATION

Prior to installation, visually inspect the E-Float Hoist for signs of damage or missing parts.

	**CAUTION** **Prior to installation, the chain must be lubed.** **Knight Global recommends the use of Chain Grease.** **The part number of the Chain grease tube is: 665 009 44.** **If Chain grease is not available, use SAE 50 to 90 EP oil or equivalent.** **Follow the procedure detailed in Section 4.4.3 "Chain Lubrication." of this manual.**

	**CAUTION** **Prior to placing this unit into service, the owners and user are advised to examine specific local and/or other regulations, including ANSI and OSHA regulations that may apply to the use of this product.**

	**WARNING** **A falling load can cause injury or death. Before installing this hoist read the "Safety" section of this manual.**

Follow all procedures in this section for installation and set-up of the Hoist.

Retain all product information supplied with the Hoist for future reference.

Ensure that the supporting structure can support the weight of the system and load. The structure should be able to support 300 percent of the combined weight of the Servo Hoist and load. Do not use a supporting structure that tilts the Servo Hoist to one side or the other.

For safe and proper installation into a rail system, refer to the installation manual provided by the rail system manufacturer.

When installation is complete and prior to placing the Hoist into operation, inspect the Servo Hoist following the instructions in Section 4.4.2.1 "Recommendations for Periodic Inspections" in the "Maintenance" section of this manual.

A. Introduction

Prior to installing and operating the Knight E-Float Hoist, all operators using this device should be familiar with the main components of the lifting system. (Refer to Figure 2-)

E-Float Hoist: The E-Float Hoist assembly is a powered lifting device. The Hoist assembly contains the servo motor with holding brake, gearbox, servo drive, 24 VDC Power Supply, regen resistor, chain/cable drum, and AC Plug.

19 Pin Cable Assembly: A 19-pin cable carries signals from the control handle to the Hoist. Some examples are: Analog load cell voltages, digital inputs and outputs including direction commands, Lift Mode, Float Mode, and Run-Stop signals. 19-pin cable is either a straight cable with a tether or a coil cable. Cable type is dependent on hoist control configuration.

Pendant Control Handle: The primary control interface between the operator and the lifting device.
The default pendant for the E-Float hoist is the analog OCI Pendant with two analog thumb levers which allow for variable speeds, one Red Run/Stop button, one green illuminated pushbutton and one blue illuminated pushbutton. There is also an ethernet connection for connecting to the hoist.

Inline Control Handle: The inline control handle includes a Loadcell connected to the handle to measure operator input. Handle also comes equipped with an enable trigger which allows up, and down motion based on the operator pulling down or lifting on the handle. Inline handle is equipped with a Red Run/Stop button, a green illuminated pushbutton and a blue illuminated pushbutton. Handle also includes an ethernet connection for connecting to the hoist.

Travel Indicator: This is an indicator on the Cable/Chain that indicates the maximum amount of chain or cable that can fit back into the hoist. All attachment accessories **MUST** be attached below this indicator.

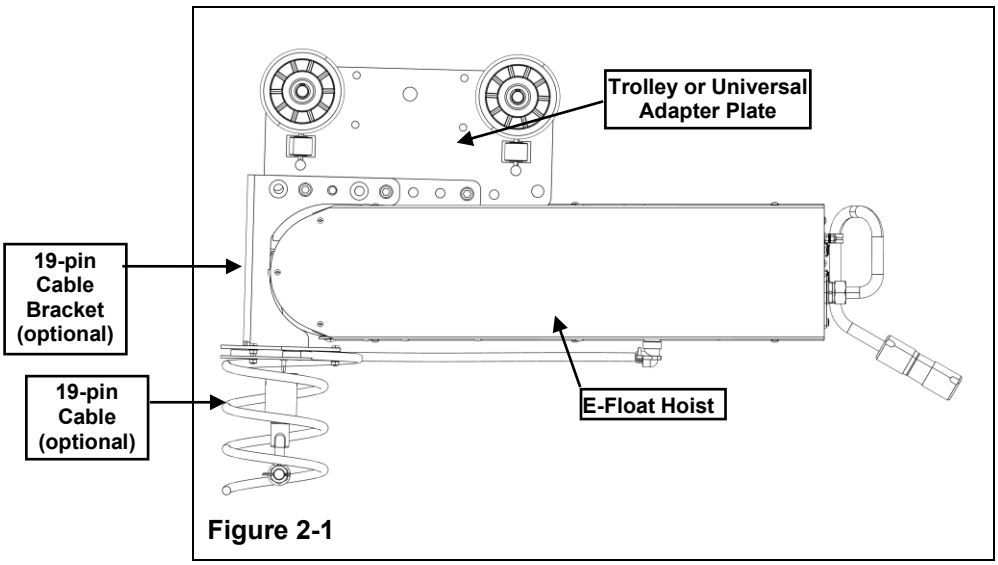


Figure 2-1

B. Initial Setup

Step 1: Unpacking

1) Unpack the Hoist. Lift the hoist carefully out of packaging.
2) Keep the accompanying documents with the hoist or near the site of operation.

Step 2: System Assembly

Knight E-Float Hoists are typically delivered pre-assembled; if not, read the following sections.

2a) Hoist Trolley Installation
2b) Safety Cable Installation
2c) 19-pin Straight Cable Installation
2d) Inline Handle Chain Installation
2e) Swivel Shackle Installation
2f) Cable Load Hook Installation

Step 2a) Standard Trolley Installation:

Prior to installation visually inspect the trolley for signs of damage or missing parts.

1) Attach the trolly to the Left side of the mounting bracket on top of the Servo Hoist. (See Figure 2-4)

2) Insert the (3) three ½-13x1½ ” (grade 8 or better) socket head cap screws (SHCS), (3) three ½” Nylock nuts and (3) three washers. (See figure 2-2)

3) Install the safety cable through the mounting bracket and the trolley mounting plate. (Refer to Step 2b “Safety Cable Installation”)
4) Roll hoist into rail system.

Step 2b) Trolley Installation with Coil Cable Bracket:

Prior to installation visually inspect the trolley for signs of damage or missing parts.

1) Attach the trolly to the Left side of the mounting bracket on top of the Servo Hoist. (See Figure 2-4)

2) Insert (2) ½-13x1½ ” (grade 8 or better) socket head cap screws (SHCS), (2) two Nylock nuts, and (2) washers are used to attach the trolly. (See Figure 2-3)

3) Attach the coil cable bracket to the right side of the mounting bracket on top of the Servo Hoist. There are (2) two included spacers that the bracket screws must pass through.(See Figure 2-4)

4) Insert (2) ½-13x2 ½” socket head cap screws (SHCS) through the bracket and spacers. Use the (2) included ½” Nylock nuts to secure the screws and tighten. This setup allows the cable bracket to be removed independent of the trolley.

NOTE

The load chain/cable should be centered in the Cable Bracket

5) Install the safety cable through the mounting bracket and the trolley mounting plate. (Refer to Step 2b “Safety Cable Installation”)
6) Roll hoist into rail system.

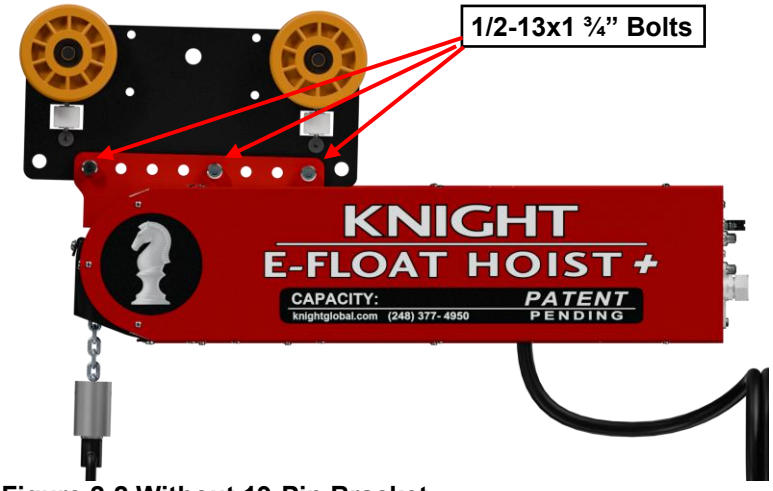


Figure 2-2 Without 19-Pin Bracket

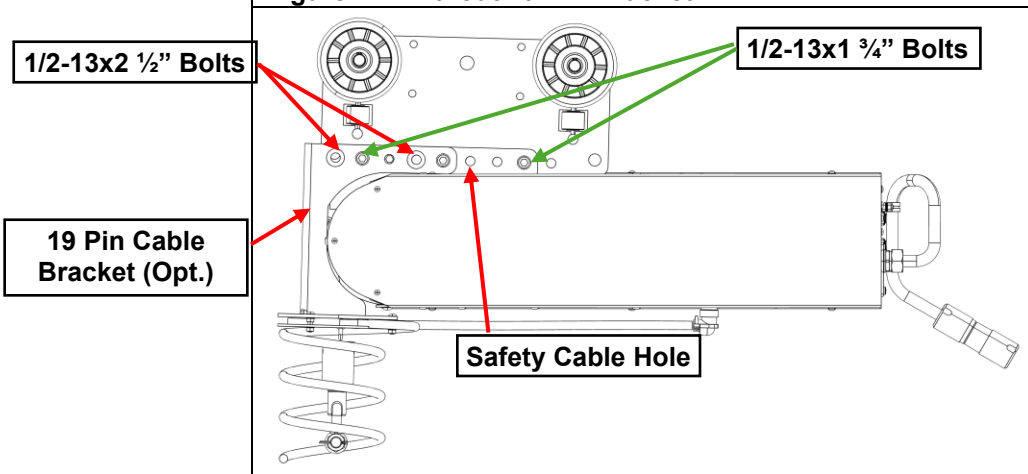


Figure 2-3 With 19-Pin bracket

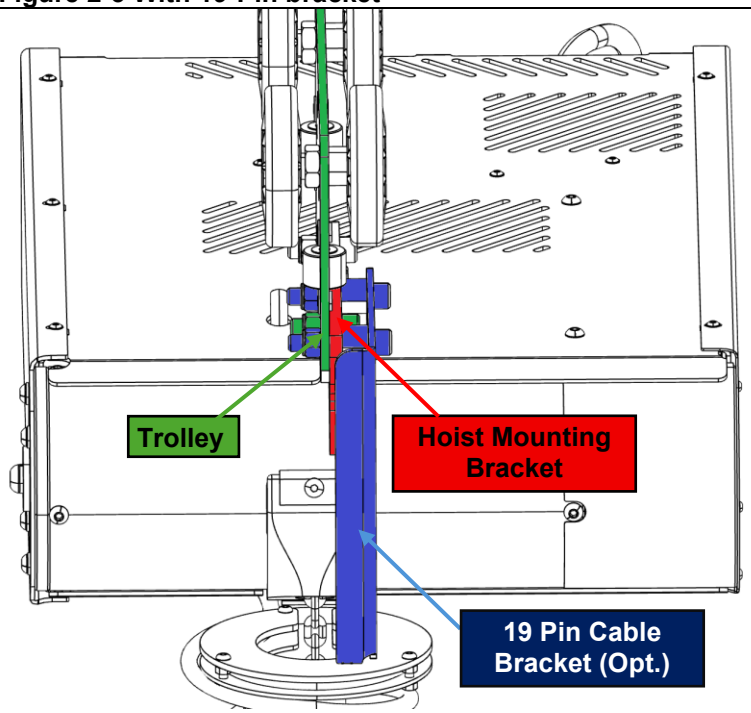


Figure 2-4

Step 2c) Safety Cable Installation:

1) Slide thimbles together. (Refer to Figure 2-5)
2) Slide (2) two Crosby cable clamps onto the cable.
3) Loop the end of cable around thimble and run the end through the Crosby clamps.
   - The cable saddle (forged part) rests on the “live” (longer) end of the cable.
   - The U-bolt rests on the “dead” (shorter) end of the cable. (Refer to Figure 2-6)
4) Tighten each nut on a single clamp, alternating sides. Repeat this procedure on the other clamp.
   - Each nut should be tightened to a minimum of 15 ft-lbs.
5) Follow the steps below for trolley or adapter plate.
6) Insert cable through the center hole on the trolley bracket which is attached to the hoist and place (2) two Crosby clamps on the other end of the cable. (Refer to Figure 2-7)
7) Secure the (2) two Crosby clamps snug to the thimble, repeating step 3.
8) Install the cable so that the Servo Hoist has a drop of not more than 1 in. [2.54 cm]
9) Trim excess cable and tape ends of cable to prevent fraying. (Refer to Figure 2-8)

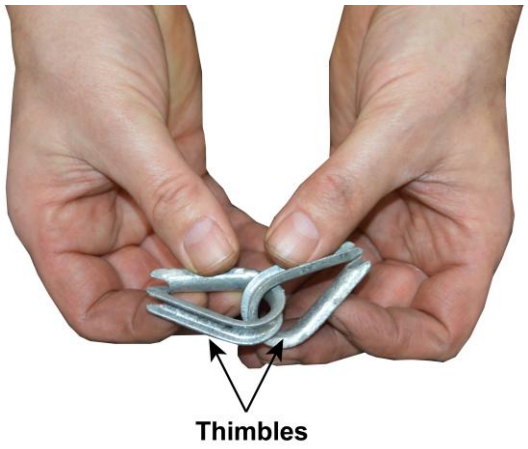


Figure 2-5

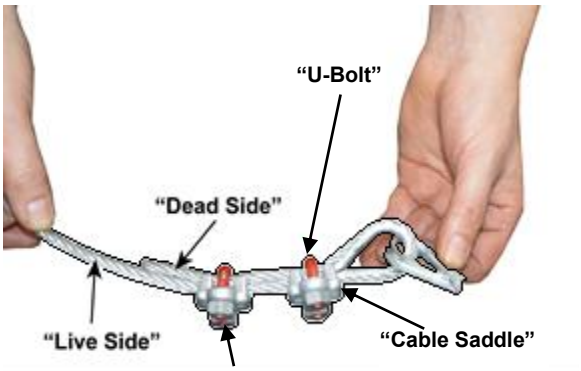


Figure 2-6

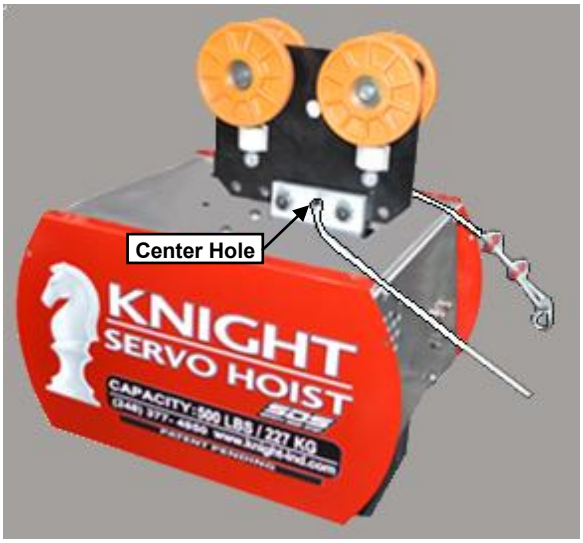


Figure 2-7

Figure 2-8

Step 2d) 19-pin Straight Cable Installation:

1) Ensure power is removed from hoist.
2) Connect the 19-pin connector to the bottom of the Servo Hoist. (Refer to Figure 2-9)
3) Secure cable to hoist by connecting the pendant tether cable to the eyelet.
4) Remove pendant cable clamp by removing 2 M4 screws. (Refer to Figure 2-11)
5) Pass 19-pin cable through the cable clamp.
6) Connect the 19-pin connector to the remote pendant.
7) Secure the 19-pin cable by tightening the M4 screws on the cable clamp.
8) Run the end of the cable through the pendant tether eye and pull until taut.
9) Slip the cable thimble onto the pendant tether eye. The thimble may be opened to engage the hook eye. Do not bend the thimble more than needed.
10) Lay the cable in the thimble and wrap the cable back onto itself above the hook forming an eye.
11) Remove the screws from the barrel clamp and attach the barrel clamp above the thimble, trapping both the “live” and “dead” cable in barrel clamp.
12) Tighten barrel clamp bolts, alternating between bolts until snug. After barrel clamp bolts are snug torque to 4.3 ft/lbs. [5.83 nm]. (See Figure 2-10 for final assembly)

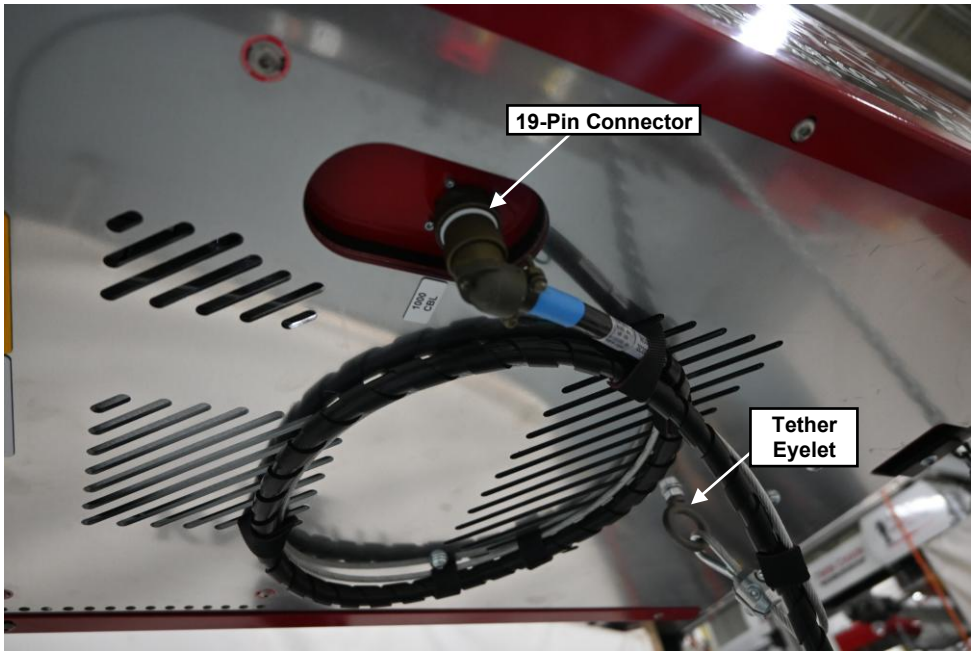


Figure 2-9

Figure 2-10 Pendant with dual analog levers P/N# KCA1214

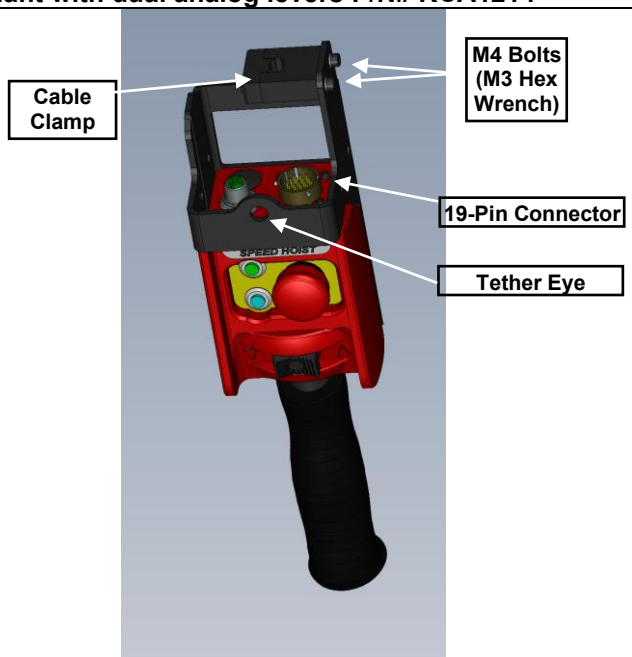


Figure 2-11 Pendant analog rocker switch P/N# KCA1213

Step 2e) 19-pin Coil Cable Installation:

1) Ensure power is removed from hoist.
2) Slide the 19-pin coil cable upward over the chain/cable and into the clamping assembly.
3) Connect the 19-pin connector to the bottom of the Servo Hoist. (See Figure 2-12)
4) Fit the coil cable into the channel in the upper portion of the bracket.
5) Fit the lower clamp plate over the (4) M6 bolts secured to the upper side of the bracket. (See Figure 2-13)
6) Secure the (4) four M6 nuts onto the bolts that pass through the clamping assembly from the bottom of the Servo Hoist. (Refer to Figure 2-14)

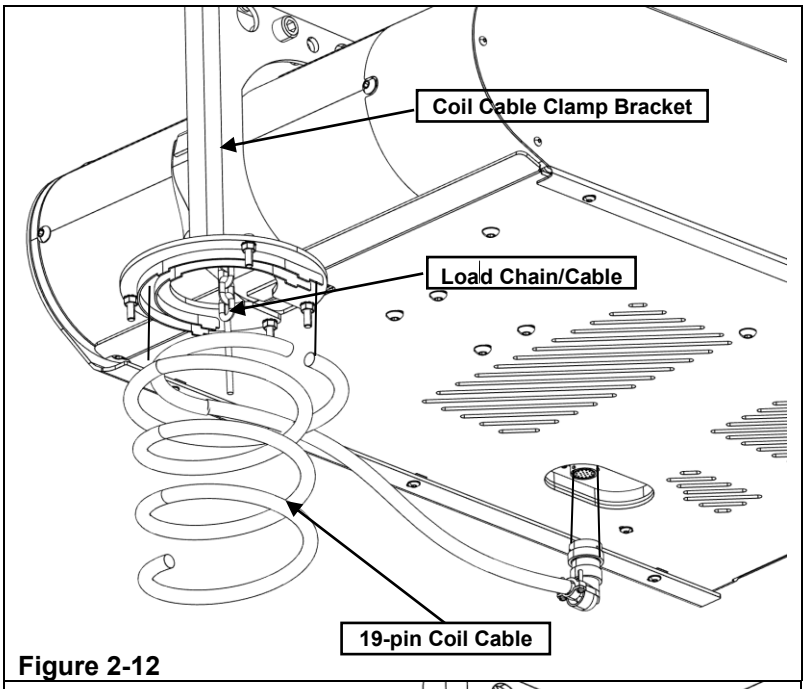


Figure 2-12

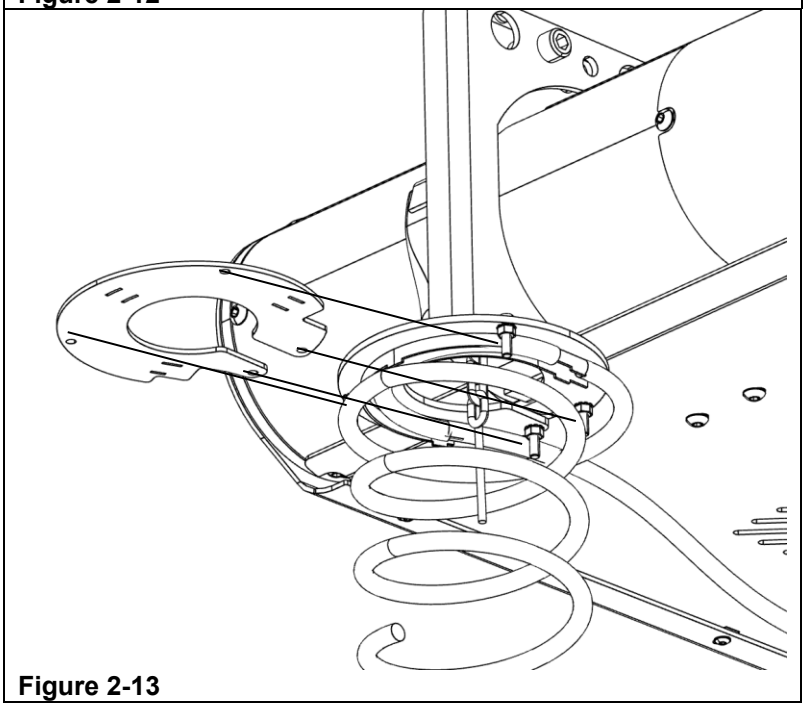


Figure 2-13

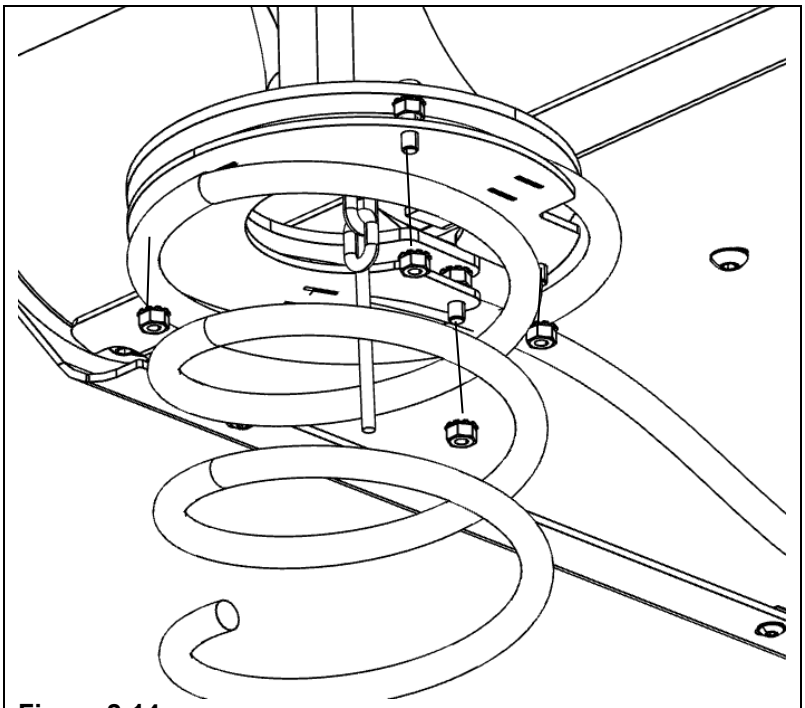


Figure 2-14

Step 2f) Inline Handle Chain Install:

Step 1. Thread chain through the coil cable.

Step 2. New hoists will arrive with the chain nest attached to the chain 12 inches below the travel indicator and any additional chain wrapped up.

Step 3. Connect the Inline Handle to the chain nest by aligning the indents on the shaft with the two holes in the bottom of the chain nest and inserting the Pins. (See Figure 2-14)

Step 4. Place the retaining plate over the pins and install the screws.

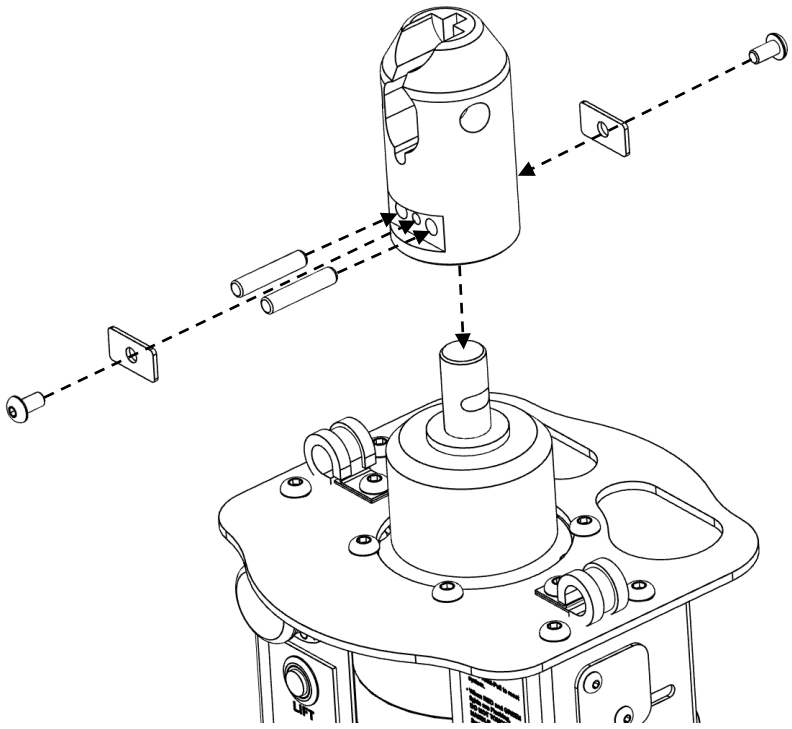


Figure 2-14

Step 5. Loosen the (2) two M4 screws holding the 19-pin receptacle and slide it out of the control handle's housing. (See Figure 2-15)

Step 6. Connect the 19-pin connector to the receptacle, slide it back into the control handle's housing and secure the (2) two M4 screws. (Refer to **Error! Reference source not found.**16)

Step 7. Secure the (2) two M6 bolts for each of the handle coil cable clamping rings located on top of the control handle. (Refer to **Error! Reference source not found.**15)

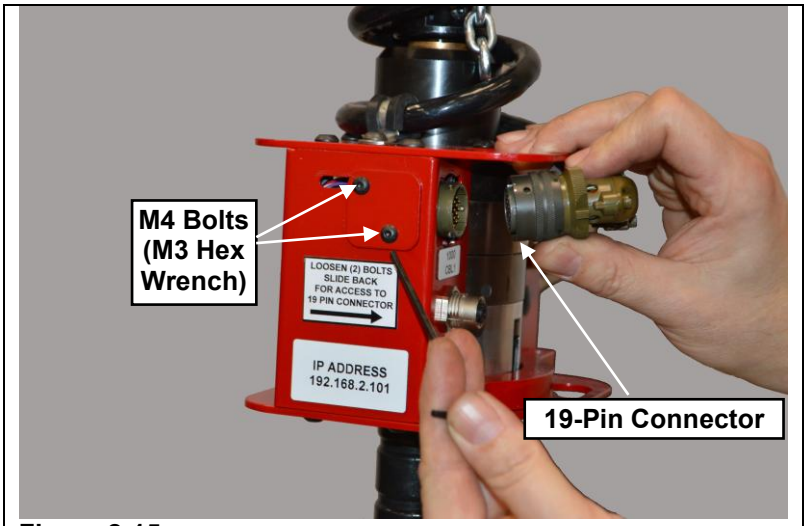


Figure 2-15

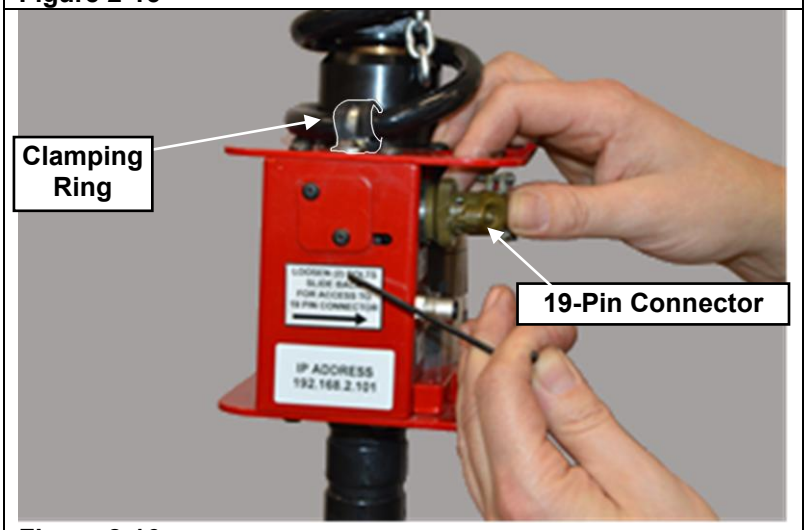


Figure 2-16

	CAUTION
⚠	**E-Float Hoists are limited to 80 inches of total travel. Keep this in mind when attaching any of the load accessories. Before cutting off any excess chain verify that hoist can reach all the heights required for your specific operation.**

Step 8. Make sure that any extra chain is secured and does not interfere with the operation of the hoist.

Step 9. Operate the hoist through the full height range required by the application. If the Hoist is unable to reach low enough, remove the retention screw and move the chain nest higher on the chain a few links and test again. If hoist does not reach low enough, move chain nest lower on the chain and test again. (See Figure 2-17)

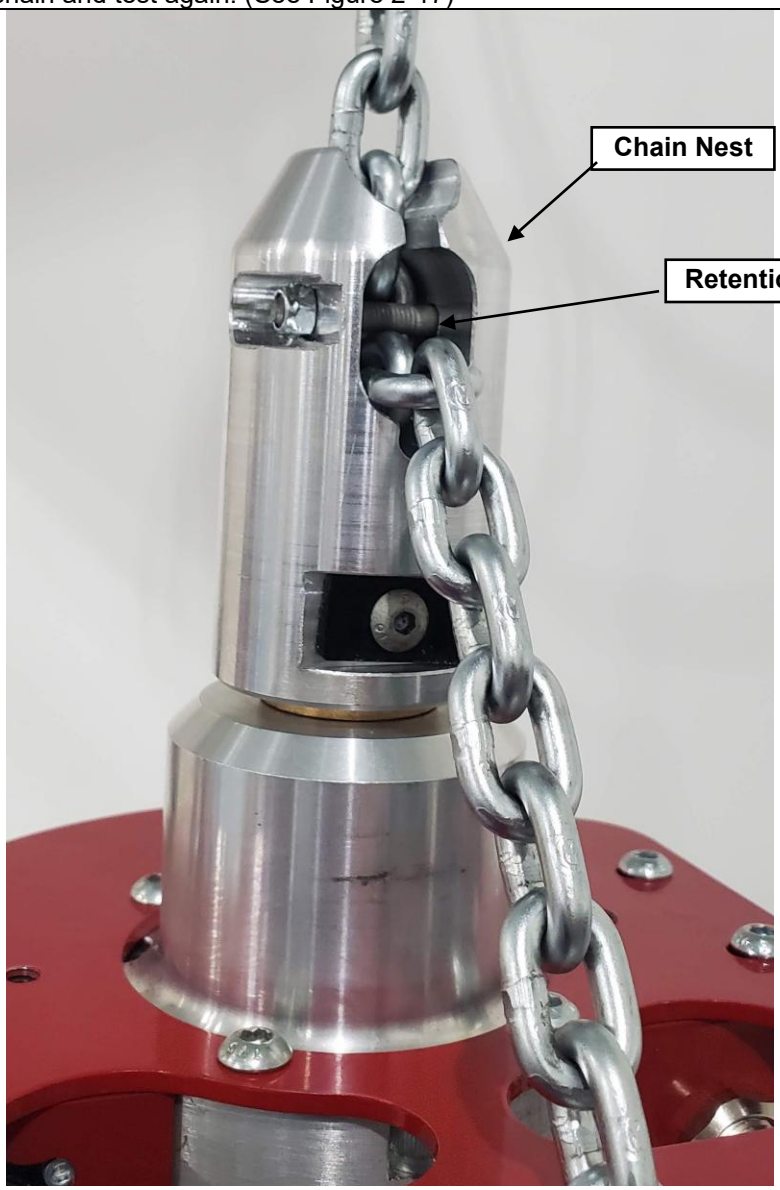


Figure 2-17

WARNING

Load Chain must have a minimum of 2 links below the travel indicator.
DO NOT CUT CHAIN ABOVE THE MINIMUM CHAIN LENGTH.

Step 10. When the correct chain position has been verified mark the first full link that is outside of the chain nest. (See Figure 2-18)

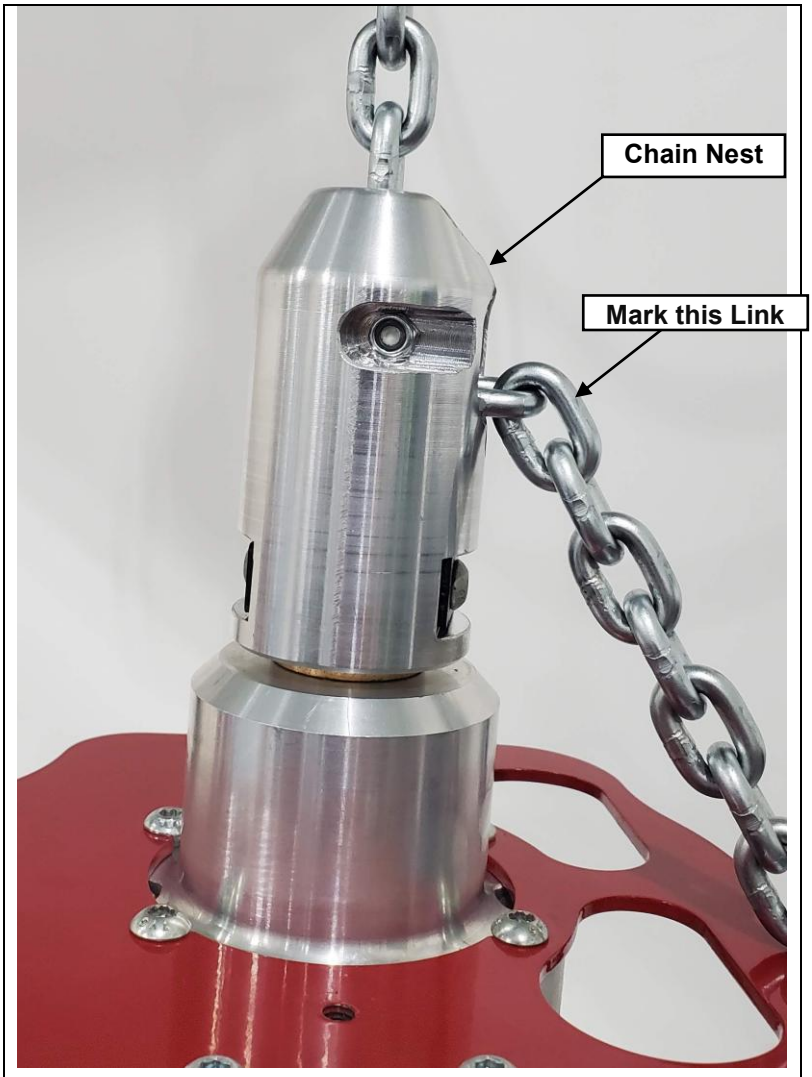


Figure 2-18

Step 11. Remove the chain from the chain nest and cut off the marked link.

Step 12. Place the load chain into the top portion of the chain nest and insert the screw provided thru chain nest in front of load chain's last link. This will be one link longer than previously installed allowing for a little slack at the lowest point to allow for removing the fixture from the part. (See Figure 2-19)

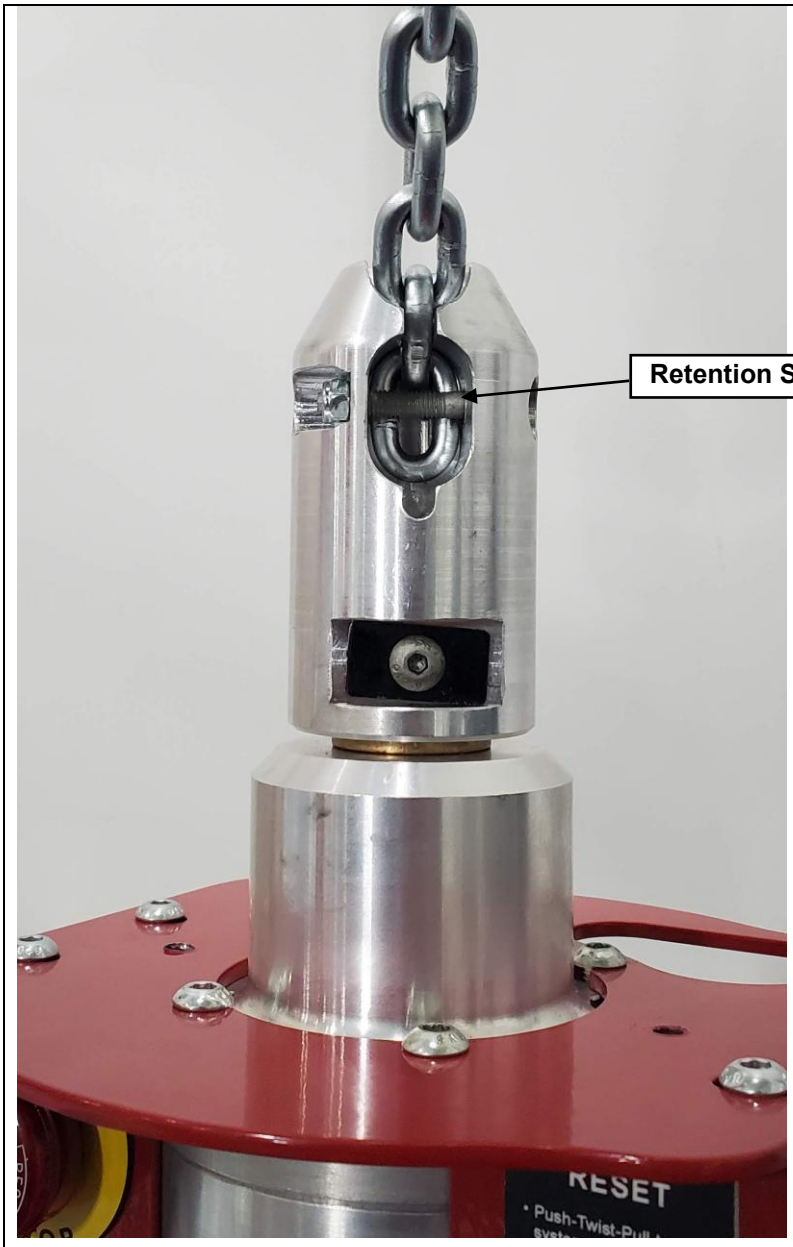


Figure 2-19

Step 13.

Step 2g) Swivel Shackle Installation:

Refer to figure 2-20 throughout this procedure.

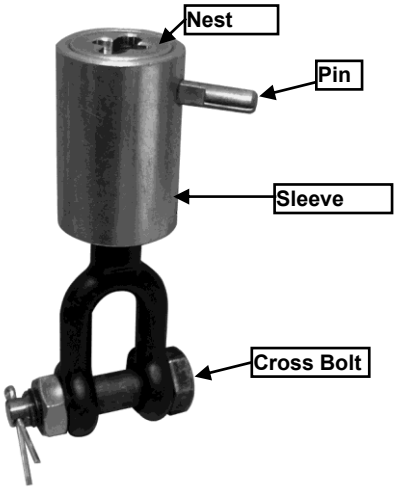


Figure 2-20

Step 1. Install the hoist onto rail or structure per manufacturer's instructions.

Step 2. Power on the Hoist.

Step 3. Jog the hoist in the down direction until you reach the down travel limit.

Step 4. Attach the fixture to the part. Ensure part is at lowest point of travel required.

	NOTE
	When attaching load, ensure free rotation of Cross Bolt

Step 5. Connect the swivel shackle to the fixture. Tighten the cross-bolt nut by hand and install cotter pin.

	CAUTION
	E-Float Hoists are limited to 80 inches of total travel. Keep this in mind when attaching any of the load accessories. Before cutting off any excess chain verify that hoist can reach all the heights required for your specific operation.

Step 6. Hold the hook upright and place chain alongside the swivel shackle assembly. Mark a chain link that is at least 2 in. [50mm] below the link that lines up with the pin. Ensure there is a minimum of (2) two links below the travel indicator. The extra length will prevent the chain from being taut when trying to release the part from the fixture.

WARNING

Load Chain must have a minimum of 2 links below the travel indicator.
DO NOT CUT CHAIN ABOVE THE MINIMUM CHAIN LENGTH.

Step 7. Cut the chain at the marked link with a bolt cutter or grinder.

	NOTE
	Before cutting the chain ensure the length is correct for the application. Extra chain length can be left if there are no height obstructions.

	WARNING
	Use proper safety equipment when cutting the chain to prevent injury.

Step 8. Insert the end link of the chain into the nest. Ensure the pin flats align with sides of the link.

Step 9. Tap the pin into the nest and chain link. Ensure the pin engages the link and does not bind. Tap the pin completely through the nest until the pin end is flush with the sleeve.

Step 2h) Cable Load Hook Installation:

Refer to Figure 2-21 throughout this process.

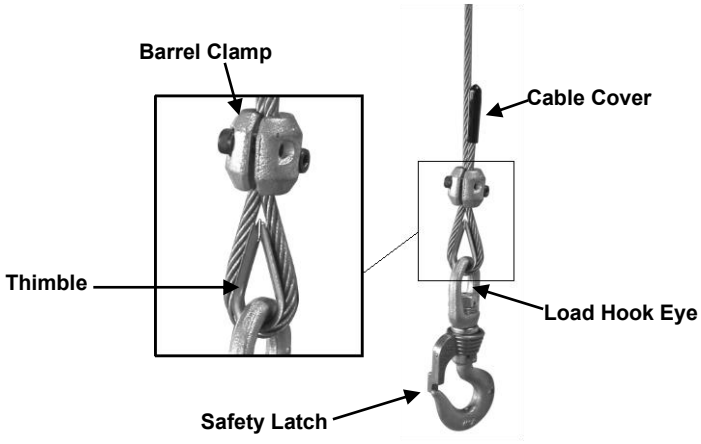


Figure 2-21

Step 1. Install the hoist onto rail or structure per manufacturer's instructions.

Step 2. Power on the Hoist.

Step 3. Jog the hoist in the down direction until you reach the down travel limit.

Step 4. Attach the fixture to the part. Ensure part is at lowest point of travel needed.

Step 5. Connect the load hook to the fixture. Ensure the hook is seated and the safety latch is fully closed.

Step 6. Run the end of the cable through the load hook eye and pull until taut.

Step 7. Release 2 in. [50mm] or more of slack in the cable. This will prevent the cable from being taut when trying to release the part from the fixture.

Step 8. Slip the cable thimble onto the load hook eye. The thimble may be opened to engage the hook eye. Do not bend the thimble more than needed.

Step 9. Lay the cable in the thimble and wrap the cable back onto itself above the hook forming an eye.

Step 10. Remove the screws from the barrel clamp and attach the barrel clamp above the thimble, trapping both the "live" and "dead" cable in barrel clamp.

Step 11. Tighten barrel clamp bolts, alternating between bolts until snug. After barrel clamp bolts are snug torque to 4.3 ft/lbs. [5.83 nm].

Step 12. Perform several cycles of the hoist with the fixture and part to ensure cable length is correct.

Step 13. Check the barrel clamp bolts to ensure they are tightened to the proper torque value.

Step 14. Trim excess cable approximately 1in. [25mm] from the barrel clamp. Place a cable cover or tape over the end of the cable to prevent fraying.

Step 3: Power Supply to Servo Hoist

Prior to installation, visually inspect the Servo Hoist for signs of damage or missing parts.

Power Requirements: Call a Knight Representative to obtain the correct power requirements for your system.
Standard: 240 VAC, Single Phase, 50/60 Hertz.

Refer to system specific documentation for any special power requirements.

1) The Servo Hoist power is connected using a twist lock plug (Refer to Figure 2-22: Standard) or fed by a hard-wired circuit, provided by end user (Refer to Figure 2-23: CE Compliant).
2) After power has been applied and the servo has finished its boot-up sequence, the red light on the Run-Stop button will illuminate.

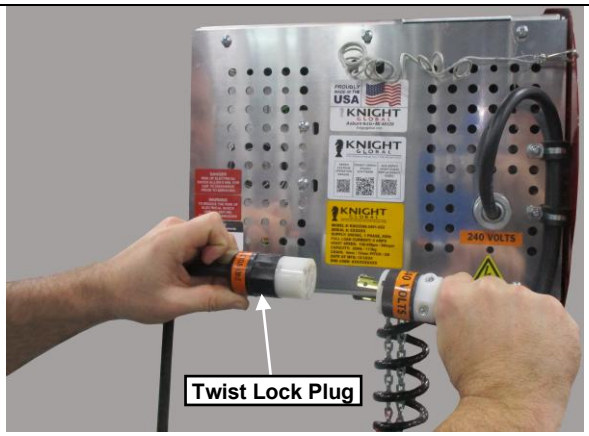


Figure 2-22: Standard

Figure 2-23: CE Compliant

Step 4: Releasing the Run-Stop button.

The Run-Stop button is engaged for shipping purposes.

1) Turn the Run-Stop button a quarter of a turn clockwise to release the Run-Stop and wait for red light to turn off. (Refer to Figure 2-24)
2) Please, refer to the Run-Stop mode functionality in Section 3.C. “Servo Hoist Functionality Modes” of this manual for more information.

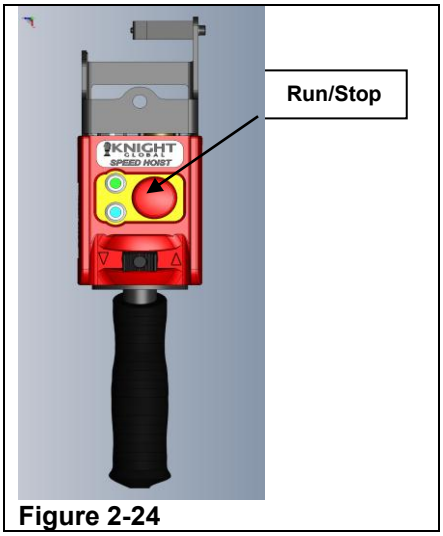


Figure 2-24

Step 5: Control Handle Set-up

There are (3) Three control handle configurations. This section discusses the correct setup of each of these.

5a) Analog Switch Handle Setup
5b) Inline Handle setup
5c) Digital Wireless Remote Up / Down Controller with Run-Stop

Step 5a) Analog Switch Handle setup:

1) Locate and connect the analog switch handle to the servo unit via the 19-pin cable. (Refer to Figure 2-25)
2) Press the analog switch either right or left to start chain movement. Pressing right on the switch moves the load up and pressing left on the switch moves the load down.
3) Continue moving to load until it is hanging at a comfortable height.

Figure 2-25

Step 5b) Inline Handle setup:

1) Hold the inline handle and trigger with one hand and hold the chain/cable away from the inline handle with other hand. (Refer to Figure 2-26)
2) Apply upward pressure on inline handle until the green light flashes.
3) Once green light starts flashing, release the inline handle and the GREEN light will illuminate.
4) Grasp the inline handle and apply upward pressure until the chain/cable starts feeding into the hoist. Continue this until the inline handle hangs vertically from the hoist at a comfortable height.

Figure 2-26

Step 5c) Digital Wireless Remote Up / Down Controller with Run-Stop:

1) Turn power switch from the 'OFF' position to the 'ON' position.
2) Turn the power switch from the 'ON' position to the momentary 'START' position. The switch will spring back to the 'ON' position. (See Figure 2-27)
3) Press the Up button until the green light on the Operator Control Interface (OCI) starts to flash. (See Figure 2-28)
4) Once the green light starts to flash on the OCI, release the Up button until the green light illuminates.
5) Press the Up button again until the chain/cable starts to feed into the hoist. Continue holding the Up button until the fixture is hanging from the hoist at an acceptable height.

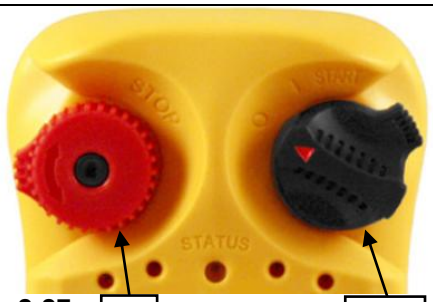


Figure 2-27

Figure 2-28

NOTE

A continuously flashing GREEN light shows a safe start activation fault. The system is sensing commanded motion during the Power-Up sequence.

Remedy

Analog Handle: Release the handle and verify that the GREEN light illuminates solid. If the GREEN light still flashes after the handle is released, refer to Section 7. "Troubleshooting".

Up/Down Pendant: Release both buttons and verify that the GREEN light illuminates solid. If the GREEN light still flashes after the button is released, refer to Section 7. "Troubleshooting".

Step 6: Test Hoist Movement

Test the Hoist movement by applying upward and downward pressure on the inline or fixture handle. If the system uses a discrete Up / Down handle, press the Up and Down levers to move the fixture up and down.

Step 7: Back-Up Software

Knight Servo Hoists are pre-programmed prior to delivery. It is good practice to back-up this software before first operation. Refer to Section 5.B. "Connecting to a Servo Hoist" for instructions on how to connect a laptop to the Servo Hoist and Section 5.C. "Backing up the Knight Servo Hoist Software" on how to back-up the servo's software.

Step 8: Software Adjustments (If necessary)

After making a back-up of the software in step 7, it may be necessary to adjust certain parameters in the software to ensure that the servo performs correctly for a specific application. Refer to the following first-time adjustments in Section 5. 'Software'.

- Verify the hoist's maximum weight. This is also known as the Up Stop weight of the hoist.
- Verify the hoist's minimum weight. This is also known as the Down Stop weight of the hoist.
- Verify the hoist's fixture weight.
- Verify that the analog handle is balanced.
- Verify that the encoder offset is correct.

3. OPERATION

A. Principle of Operation

The E-Float Hoist system receives a command to move up or down along the “Z” axis from any input force applied to the handles or by pressing the Up or Down levers.

B. Model Number

The E-Float Hoist model number designates the hoist type and its specifications. (See Figure 3-1)
The first set of letters show the type of hoist. Please refer to Table 3-1 for the Hoist
Type prefix letters. The numbers following the Servo Hoist Type prefix letters reference the system’s rated capacity. Next, is a number to show the stroke length. Next, is a single letter to show the style of the hoist, whether there are I/O receptacles on the end plate. The next (3) three numbers express the voltage rating, and the following number shows the phase of the system. The last (3) three digits are an
in-house control servo code.

The hoist’s model number and serial number is printed on the Knight identification label found on the hoist.

Letters	Servo Hoist Type *
KSBCxxx	Single Chain
KSBAxxx	Single Cable

Table 3-1

Letter	Style
S	Standard, Without I/O
P	Plus, With I/O

Table 3-2

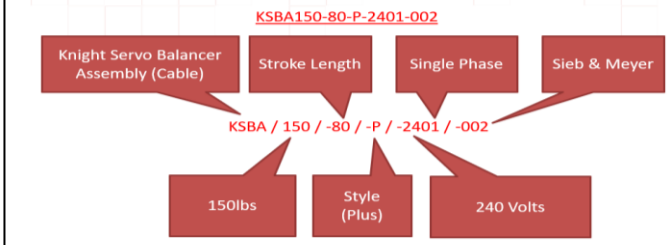


Figure 3-1: Servo Hoist Model Number Example

* For all models and specifications, refer to the website:

https://knightglobal.com/product/e-float-hoist/

Knight E-Float Hoist is available in Remote Pendant, Inline Handle, and Wireless control configurations.

	CAUTION
⚠	**E-Float Hoists are limited to 80 inches of total travel. Keep this in mind when attaching any of the load accessories. Before cutting off any excess chain verify that hoist can reach all the heights required for your specific operation.**

C. Servo Hoist Functionality Modes

Run-Stop

Step 1. Press the RUN-STOP button, found on the Operator Control Interface (OCI) module.

- Drive's STO is active and the holding brake is set.
- The Run-Stop button will turn on solid red.

Recovery:

Step 1. Reset the RUN-STOP button by twisting it a quarter of a turn clockwise.

Shut Down

Step 1. Press the RUN-STOP button, found on the Operator Control Interface (OCI).

Step 2. Follow the warning labels on the Servo Hoist and disconnect the power supplied to the unit.

Start Up

Step 1. Connect the power supply to the unit.

Step 2. Reset the RUN-STOP button by twisting it a quarter of a turn clockwise.

- The hoist will power up and depending on the hoist's configuration:
  i. Inline handle, the OCI's RED and GREEN indications will briefly flash when the system is ready to function.
  ii. Fixture or Digital Handle, no OCI lights flash.
- The unit will then default to No Mode: the OCI's GREEN, BLUE, and RED indicators will turn off.

No Mode

When the hoist powers up or if it is inactive for a continuous time, the unit will shift into energy saving mode. The factory default time is 10 minutes.
The holding brake will engage, and power is removed from the motor while No Mode is active.
When the unit is in No Mode, the OCI's GREEN, BLUE, and RED indicators will be off.

Lift Mode

Press the GREEN (Lift) button to place the Servo Hoist into Lift Mode.

- The GREEN (Lift) indicator will illuminate.

	NOTE
	**A continuously flashing GREEN light shows a safe start activation fault. The system is sensing commanded motion during the Power-Up sequence.** **Remedy** **Analog Handle: Release the handle and verify that the GREEN light illuminates solid. If the GREEN light still flashes after the handle is released, refer to Section 7. "Troubleshooting".** **Up/Down Pendant: Release both buttons and verify that the GREEN light illuminates solid. If the GREEN light still flashes after the button is released, refer to Section 7. "Troubleshooting".**

Systems with Inline Handle Style Lift Controls:

Step 1. Apply force to the handle in the desired direction of travel (upward or downward).
The travel speed of the fixture is proportional to the force applied to the handle.

Systems with Lever Style Pendant Lift Controls:

Step 1. Press the Up or Down lever to move the hoist in the desired direction.

Systems with Rocker Style Pendant Lift Controls:

Step 2. Move the rocker switch left or right to move the hoist in the desired direction.

	NOTE
	**If the hoist is in No Mode and a lift command is given to the system, the hoist will automatically go into Lift Mode.**

Float Mode

Step 1. Press the BLUE (Float) button to place the E-Float Hoist into Float Mode.

a. Float with Torque Feedback - When entering Float Mode using torque feedback instead of a load cell the load will make a small movement up and down to capture the snapshot weight.

b. Auto-Float Mode – When Auto-Float is enabled the hoist will enter Float Mode when the hoist is inactive for a defined length of time.

The BLUE (Float) indicator will illuminate.

Step 2. Apply pressure to the top of the part to move it down or lift the part to move it up.

Do not use the lift controls to move the part as this will place the hoist back into Lift Mode.

WARNING

An operator should never attempt to release a load while in Float mode. The operator must switch to Lift mode to release a load.

NOTE

If the Knight controls team programmed the hoist, it will never release or unclamp a part while it is in Float mode. The hoist will have to be switched to Lift mode for a part to be released or unclamped.

To change from Float Mode to Lift Mode, follow any of the steps below:

- Operate the lift controls. The hoist will automatically change to Lift Mode.
- Press the GREEN (Lift) push button and the unit will change into Lift Mode.

NOTE

The part must be picked up while the hoist is in Lift Mode and then the operator may place the Servo Hoist into Float Mode.

NOTE

Do not rest your hand on the part when pressing the Float push button. This can cause a bias or an incorrect zero value measurement to be processed and may cause unintended movement.

NOTE

Use of the Lift Mode controls will prevent the unit from staying in or changing to Float Mode.

Travel Limits

The user-defined top (Upper) and bottom (Lower) travel limits are listed on either of two screens depending on what mode the servo is in:

For Lift mode:

Located: KSS Screen: Start \ Setup \ Setup Shortcuts \ Lift Mode Travel Limits.

For Float Mode:

Located: KSS Screen: Start \ Setup \ Setup Shortcuts \ Float Mode Travel Limits.

NOTE

During operation (Lift or Float Mode) the hoist will ramp down in speed as the travel limits are approached.

NOTE

The absolute upper and lower travel limits are factory set to the physical limits of the Servo Hoist. Contact a Knight Global Representative for information about changes to these absolute limits.

Fault Mode

The Red light will flash.

Step 1. Press the RUN-STOP button, found on the Operator Control Interface (OCI).

- Drive's STO is active and the holding brake is set.
- The Run-Stop button will turn on solid red.

Recovery:

Step 1. Correct the situation that caused the fault.
Refer to Section 7.B. "System Activity screens including Faults, Warnings and Error Codes" for a list of common faults.

Step 2. Cycle the Run-Stop button.

4. MAINTENANCE

A. Inspection Overview:

The inspection procedures and recommendations in this manual are based on:

- ANSI/ASME B30.16 "Overhead Underhung and Stationary Hoists"
- ISO7592-1983 "Calibrated Round Steel Link Lifting Chains –
  - Guidelines to proper use and maintenance"

The following definitions and recommendations are from both specifications and pertain to the recommended inspection procedures in this manual.

Qualified Person: A person who, by possession of a recognized degree in an applicable field, or certificate of professional standing, or who by extensive knowledge, training, and experience, has successfully proven the ability to solve or resolve problems relating to the subject matter at work.

Designated Person: A person selected or assigned by the employer or the employer's representative as being competent to perform specific duties.

Abnormal Operating Conditions: Environmental conditions that are unfavorable, harmful, or detrimental to the operation of a hoist, such as excessively high or low ambient temperatures, exposure to weather, corrosive fumes, dust laden or moisture laden atmospheres, and hazardous locations.

B. Use of Chain/Cable Safely in Any Application

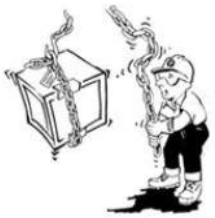
Balance: Know the Load - find the weight, center of gravity, angle and lift.	
Overload: Never Overload the Chain/Cable - check the working load limit on the identification tag.	
Knots, Twists and Kinks - Ensure chain/cable is not twisted, knotted, or kinked before lifting load. Chains/Cables should not be shortened with knots, bolts, or other make-shift devices.	
Sharp Edges - Protect chain/cable with padding when lifting sharp edged loads.	
Abrupt Movement - Lift and lower loads smoothly. Do not jerk.	
Extreme Temperatures - Do not expose alloy chain/cable to temperatures of 400°F or higher or -40°F or lower.	

Figure 4-1

C. Determining the Frequency of Chain/Cable Inspections

Knight recommends using load criteria and duty cycle data when deciding the frequency of inspections. Inspection frequency should be determined by a qualified person and is based on factors such as the severity of the environment the hoist is being used in, percentage of capacity lifts, cycle time and shock loading.
Each Servo Hoist should be rated individually and inspections performed following that rating.

Proper maintenance depends on an evaluation of the severity of usage to which the hoist and the chains/cables are subjected to in the specific application.

The overall determination of how often the hoist and chains/cables should be inspected is a combination of its Service Rating Load Criteria (4.3.1) and its Service Class or Duty Cycle (4.3.2).

a) Service Rating Load Criteria

Light Service: The Hoist is normally subjected to 25% of its maximum capacity.

Moderate Service: The Hoist is normally subjected to 50% of its maximum capacity.

Heavy Service: The Hoist is normally subjected to 75% of its maximum capacity.

Very Heavy Service: The Hoist is normally subjected to 90% of its maximum capacity.

b) Service Class (Duty Cycle)

Service Class is determined by the total number of cycles the system has performed. (Table 4-1)

- Service Class 0: 0 to 20,000 loaded cycles.
- Service Class 1: 20,001 to 100,000 loaded cycles.
- Service Class 2: 100,001 to 500,000 loaded cycles.
- Service Class 3: 500,001 to 2,000,000 loaded cycles.
- Service Class 4: over 2,000,000 loaded cycles.

Cycles Per Day	Desired Life (Years)				
	1	5	10	20	30
5	0	0	0	1	1
10	0	0	1	1	2
25	0	1	1	2	2
50	0	1	2	2	3
100	1	2	2	3	3
200	1	2	3	3	4
300	2	3	3	4	4
750	2	3	4	4	4
1,500	3	4	4	4	4

Table 4-1: Service Class

Example: If the system is performing 100 cycles per day, it will progress though Service Classes during its use:

1 year	26,000 cycles	Service Class 1
5 years	130,000 cycles	Service Class 2
10 years	260,000 cycles	Service Class 2
20 years	520,000 cycles	Service Class 3
30 years	780,000 cycles	Service Class 3

D. Type of Inspections

The inspection procedure is divided into two general classifications based upon the intervals at which the inspections should be performed for the hoist and chain/cable during regular use.
The general classifications are named as "frequent" and "periodic" with respective intervals between inspections as defined below.

In addition, visual observations shall be conducted during regular service for any damage or evidence of malfunction which might occur between regular inspections.

a) Frequent Inspection (Visual)

This is a visual examination of the hoist and its chain/cable by the operator or other designated personnel, without requiring records to be made. This inspection should be carried out at the following intervals:

A.	Light Service	or	Service Class 0 / 1	– Every **Month**
B.	Moderate Service	or	Service Class 2	– Every **Two Weeks**
C.	Heavy Service	or	Service Class 3	– Every **Week**
D.	Very Heavy Service	or	Service Class 4	– Every **Day**

Additionally, the operator should check the system continually during operation to ensure that no malfunctions are occurring (such as abnormal noises or binding of the chain/cable).

What to Look for During a Frequent Inspection

Operators should examine the chain/cable throughout its working length to detect any evidence of wear, distortion, or external damage. Equipment should be worked under a load as near as possible to the usual operating load, in both directions. The chain/cable should feed smoothly into and out of the Hoist.
Additionally, the operator should check the system continually during operation to ensure that no malfunctions occur.

Chain

- Check for visual signs or abnormal noises (grinding etc.) which would signal a potential problem.
- Ensure the load chain feeds through the hoist correctly.
- Ensure that the chain doesn’t bind, it is not excessively noisy, or it doesn’t “click” as it leaves the bottom of the Hoist.

Cable

- Inspect the cable for damage such as kinking, bird caging, core protrusion, main strand displacement, corrosion, and broken or cut strands. If any damage is shown do not use the hoist until corrective action is taken.
- The full extent of cable wear cannot be found by visual inspection. At any sign of wear, the cable should be inspected following the criteria in “Periodic Inspection”.

Recommendations for Frequent Inspections for Hoists (Visual)

- This is a visual examination by the operator or other designated personnel, without requiring records to be made. Inspection should be carried out at the following intervals recommended in Section D(a) 'Frequent Inspection (Visual)'.
- Additionally, the operator should check the system continually during operation to ensure that no malfunctions occur.

E-Float Hoist:

- Visually inspect the Hoist and ensure that it is in good general working order. Repair or replace any broken or missing parts.
- Cycle the Hoist and listen for any abnormal noises (grinding, etc.). If any abnormal noises are present, an inspection of the Servo Hoist must be performed.
- Inspect how the chain/cable feeds through the Hoist. If any binding is seen, clean and lubricate the chain (Refer to Section D(b) 'Periodic Inspection (Documented)'. If the problem persists replace the chain/cable.
- Cycle the Run-Stop button and ensure it functions correctly.

Load Clevis:

- Check the clevis for signs of wear.
- Ensure the load clevis is not cracked, nicked, or gouged. Replace the clevis, as necessary.
- Confirm all cotter pins and / or keepers are in place and in good condition.

If any of these abnormal conditions are present, the Servo Hoist should be taken out of service for a detailed inspection, and corrective actions should be taken by qualified maintenance personnel.

b) Periodic Inspection (Documented)

Perform the items listed in Section 'What to Look for During a Frequent Inspection' in addition to the items listed below. All findings from this inspection should be recorded.
Website location for the Periodic Inspection Checklist:
https://knightglobal.com/?s=Servo+System+Inspection+Checklist&site_section=site-search
This is a thorough examination of the hoist and its chain/cable conducted by a qualified person, making records of external conditions to provide a basis for the hoist's continuing evaluation.

This Inspection should be carried out at the following intervals:

A. Light Service or Service Class 0/1 – **Yearly**
(equipment stays in place).

B. Moderate Service or Service Class 2 – **Every Six Months**
(equipment stays in place unless external conditions show that disassembly should be done to allow detailed inspection).

C. Heavy Service or Service Class 3 – **Every Three Months**
(equipment stays in place unless external conditions show the disassembly should be done to allow detailed inspection).

D. Very Heavy Service or Service Class 4 – **Every Six Week**
(equipment stays in place unless external conditions show that disassembly should be done to allow detailed inspection).

Supporting Structure:

- Check for distortion, wear, and continued ability to support the load. Refer to manufacturers' instructions for overhead rail systems.

Rail Trolley (if applicable):

- Ensure wheels and side rollers run smoothly and are not excessively worn. Replace the wheels and side rollers, as necessary.
- Visually check the nylon at the bearing and along the face of the wheel for cracks.

Fasteners:

- Check all fasteners and ensure they are not loose, missing, or damaged.

Load Hook (if applicable):

- Inspect for cracks, wear, or damage.
- Inspect hook throat for spreading and proper safety latch engagement.
- Measure hook throat at wear points: greater than ten percent wear in any throat zone requires replacement. Refer to manufacturer's instructions for wear zone information.
- Inspect the hook eye or chain nest and sleeve for correct functionality.
  Also, each should rotate without binding and should not be damaged.

Valves, Timers, and Switches:

- Check during an operation cycle to ensure the sequence is working at greatest efficiency. Repair or replace if needed.

Wiring:

- Check for broken, loose, missing, and worn wires. Check all electrical cables for signs of age, wear, or damage, and make sure all connections are tight and secure. Repair or replace if needed.

Electrical Enclosures, Disconnect Boxes, and Circuit Breakers:

- Check for obvious signs of damage and repair or replace if needed.
- Verify disconnect is operational. Check for loose, bent, or broken components. Repair or replace if needed.
- Inspect for loose or broken terminals. Check for the presence of contaminants like dirt, dust, grease, or rust. Repair or replace if needed.

Recommendations for Periodic Inspections (KSBC)

Perform the inspection detailed under Section “What to Look for During a Frequent Inspection” of this manual.

Next, the chain/cable should be cleaned for inspection, using any cleaning method that will not cause damage.
Adequate lighting should be provided for the person inspecting the chain/cable.
The chain should be examined link by link for cracks, gouges, nicks, distortion, corrosion, deposits of foreign material, and for interlink wear. To inspect for wear at the interlink contact points, slack the chain, and rotate adjacent links to expose the inner surface of the link. If wear is seen or if elongation is suspected, measure the chain using Knight’s Load Chain Gauge (KSAA1033).

A. Chain Link Thickness

If chain is worn to less than the minimum allowable thickness (T), remove the chain from service. (See Figure 4-2)

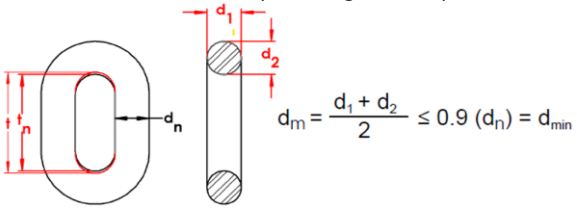


Figure 4-2

	4mm Chain Dimensions (mm)	5mm Chain Dimensions (mm)	7mm Chain Dimensions (mm)
t_n = Pitch (nominal)	12	15.1	21.25
d_n = Diameter (nominal)	4	5	7.1
t_{max} = Pitch (max)	Replace if ≥ 12.6	Replace if ≥ 19.86	Replace if ≥ 22.31
d_{min} = Diameter (min)	Replace if ≤ 3.6	Replace if ≤ 4.5	Replace if ≤ 6.4

Table 4-2: Chain Link Thickness

Chain Gauge Replacement Measurement for 4mm, 5mm & 7mm Load Chains

1. Decide which type of chain is being inspected, either 4mm, 5mm or 7mm, by placing a single link into the chain gauge where the arrows are found. (See Figure 4-3)
2. Raise the hoist to the full up position and mark the chain.
3. Lower the hoist to the full down position.
4. Select 13 links starting with the link that was marked in step 2.
5. The 13-selected links should fit loosely onto gauge's prongs as shown below.
6. Replace the load chain if the links do not fit onto the prongs or must be forced onto the gauge. This shows that the chain's length has increased by 2% or more and should be removed from service and replaced with a new chain.
7. Perform this inspection in multiple sections of the chain working up to the sprocket.

   NOTE: For the 7mm chain, select 7 links and follow the steps.

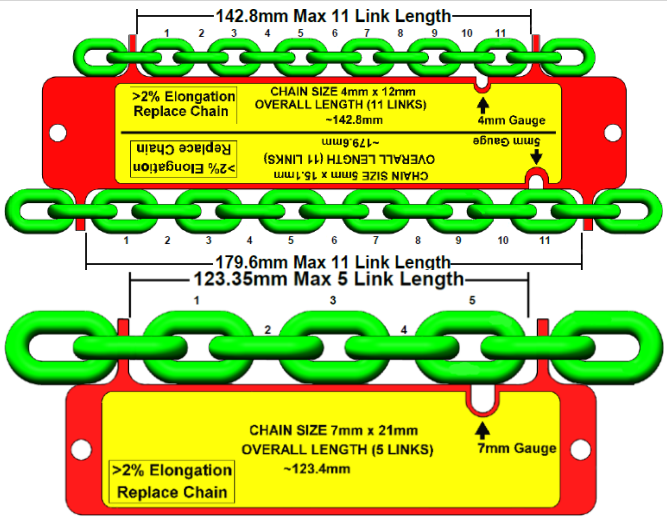


Figure 4-3 **P/N: KSAA1003**
P/N: KSAA1086

If Chain Gauge is Not Available

1. Select the part of chain just above the Load Monitoring Module (LMM); this will be an unworn, unstretched length of the load chain.
2. Suspend the chain vertically under tension. Use a caliper type gauge to measure the accumulated pitch of between 5 and 13 links.
3. Measure the same number of links throughout the used chain and calculate the percentage increase in length.
4. The chain should be replaced if the gauge length measured over any 5, 7, 9, 11, or 13 links exceeds that of the unused chain by 2%.

Rejection Criteria for Chain

The chain should be rejected and replaced if any of the following conditions are seen: (See Figure 4-4)

- Cracked or worn links.
- Severe nicks or gouges.
- Twisted or bent links.
- Severe corrosion.
- Deposits which cannot be removed.
- Increase in gauge length which exceeds the manufacturer's recommendations. In the absence of manufacturer's recommendations, the chain should be replaced if the gauge length measured over any 5, 7, 9, 11, or 13 links exceeds that of the unused chain by 2%.

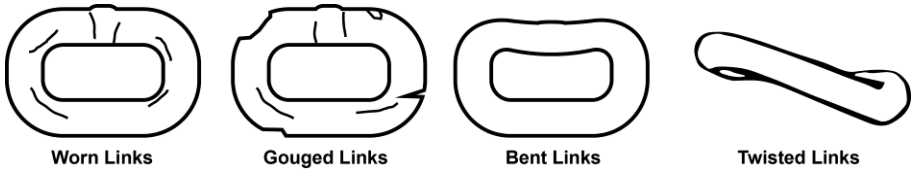


Figure 4-4

Recommendations for Periodic Inspections of Cable (KSBA)

Cable should be cleaned for inspection, using any cleaning method that will not cause damage. Adequate lighting should be provided for the person inspecting the cable. The inspection shall cover the entire length of the cable. The individual outer wires in the strands of the cable shall be visible to the person during the inspection.

A. Cable Thickness:

Measure the cable from crown to crown (See Figure below). This should be done each time under the same load and in the same location to ensure correct measurements throughout the life of the cable. Diameter of cable is 3/16 in.[4.7mm].

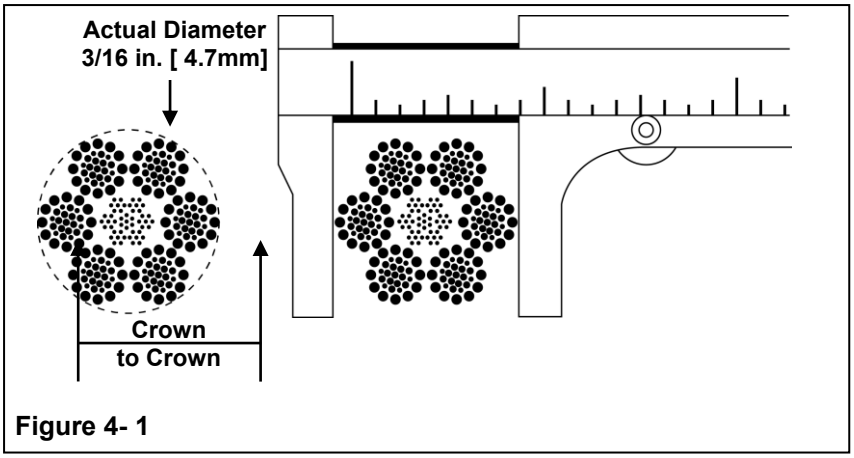
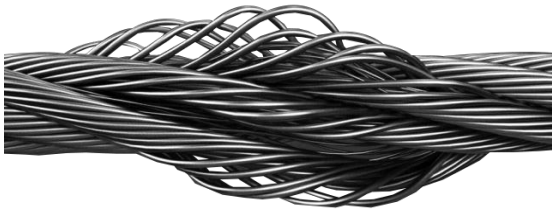


Figure 4- 1

Rejection Criteria for Cable

If the shackle or inline handle is still attached to the chain, remove it by following Steps 2e and 2f in Section 2: Installation.

- Excessive build-up of dirt.
- Twisted or bird caged wires.
- Corrosion.
- Deposits which cannot be removed.
- New cable has a diameter of 3/16 in. [4.7mm]. Decrease in cable diameter of more than .015 in. [0.4mm]. or if cable diameter is .1725 in. [4.3mm] or less, replace cable.



Bird Caged Cable

Recommended Record Keeping for Periodic Inspections

Adequate records as a part of periodic inspection are essential for the proper use of calibrated chain/cable. The chain/cable record should include a complete description and identification of the new chain/cable, the date and results of each inspection, the date and results of each test and the date and description of any maintenance.

The record is a continuous history of the chain/cable and shows that it has been regularly inspected and kept in good operating condition.

When the chain/cable is removed from service, a new record should be prepared for the replacement chain/cable.

E. Chain/Cable Lubrication:

Keep chain/cable well lubricated. Never use a hoist when the load chain/cable does not flow freely and smoothly into and out of the hoist, or when it makes noises indicative of binding or other malfunctions. Replace the chain/cable, and examine the spool and chain/cable guard, if it is visibly damaged in any way. Install a new guard if the old one is broken or distorted.

Clean, lubricate, and inspect the load chain/cable based on the frequent and periodic inspection criteria described in Sections 4.4.1 and 4.4.2. In a corrosive environment, lubricate more often than normal. Failure to keep a clean and well lubricated load chain/cable will result in rapid chain/cable wear that can lead to failure which can cause severe injury, death, or substantial property damage.

If required, clean the chain/cable with acid free solvent to remove rust or abrasive dust buildup before the chain/cable is lubricated.

CHAIN:
Lubricate chain without load on chain. This will allow lube to penetrate between links.
Lubricate each link of the chain with a light coat of SAE 50 to 90 EP oil or equivalent machine/gear oil. Ensure that oil is applied to the bearing surfaces of the load chain links. Wipe off excess oil from the load chain surfaces.

CABLE:
Lubricate entire length of cable with a penetrating lubricant. Knight recommends the use of high performance, extreme pressure, anti-wear food grade penetrating oil that penetrates and lubricates cable and all types of moving parts (ie. Lubriplate® 1241). Those sections of cable that are found over sheaves or otherwise hidden during inspection require special attention when lubricating the cable. The goal of lubricating the cable is to reduce internal friction and to prevent corrosion.

Prior to installation, the chain/cable must be lubed. Knight Global recommends the use of:
Chain grease. The part number of the Chain grease tube is: 665 009 44.
If Chain grease is not available, SAE 50 to 90 EP oil or equivalent may be used.
(See Figure 4-5: Chain Lubrication – P/N 665 009 44)

Lubricate hook and safety latch pivot points with same lubricant used on the load chain/cable.

	WARNING
⚠	**Failure to keep a clean and lubricated load chain/cable will void the manufacturer's warranty.**

Figure 4-5: Chain Lube – P/N 665 009 44

F. Labels and Tags:

- Ensure that all labels are intact and legible. Replace, as necessary. (See Figure 4-6)

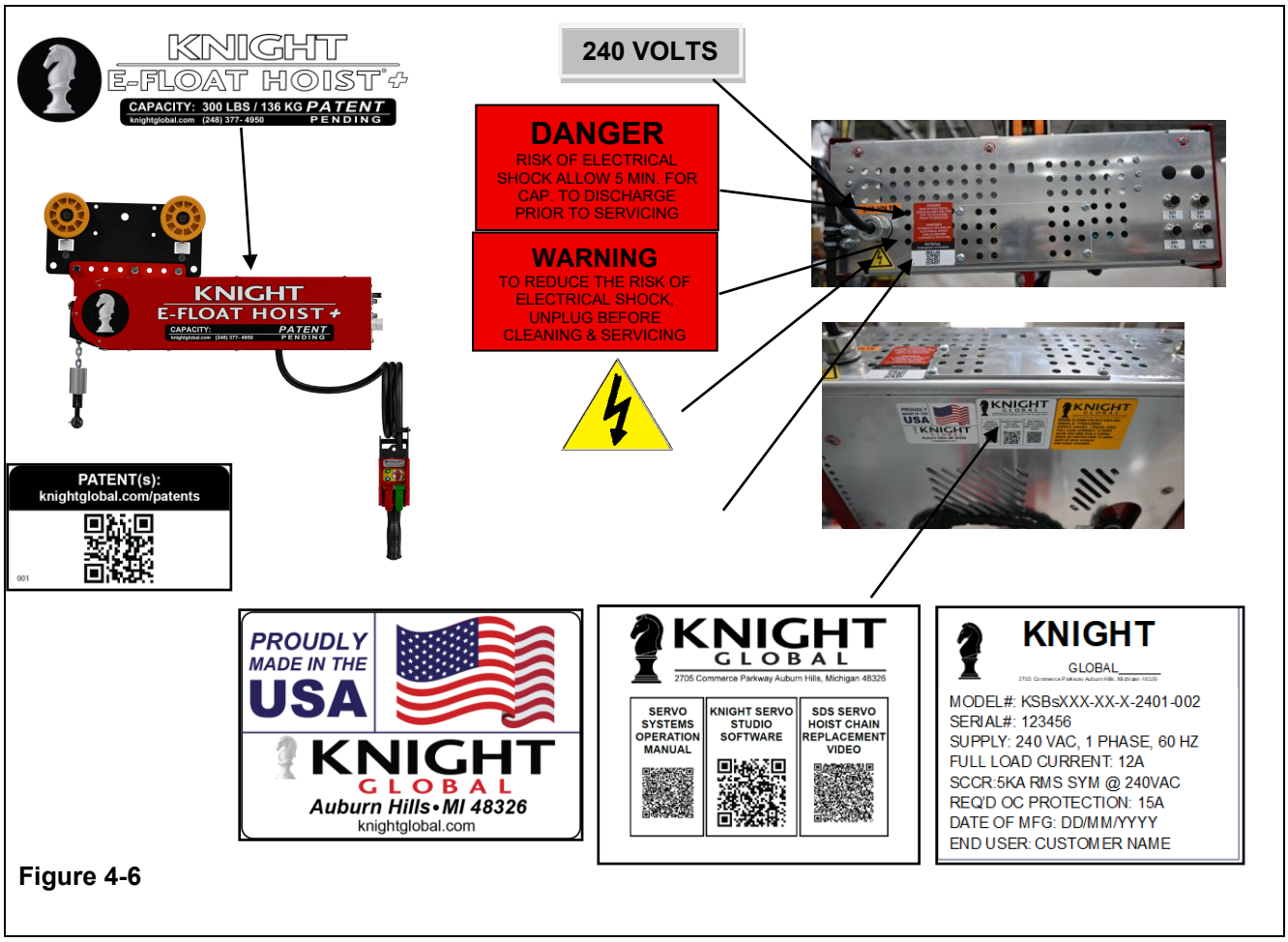


Figure 4-6

If any of the labels or warning tags listed above are missing, contact Knight Global at (248) 377-4950 x246 to order replacements.

G. Cable Replacement

The cable can be replaced with hoist in the installed location.

Step 1. Remove Chain/ Cable guide from hoist by removing two (2) 5/16-18 Button Head screws and sliding the chain/cable guard down the chain/cable (See Figure 4-5 & 4-6)

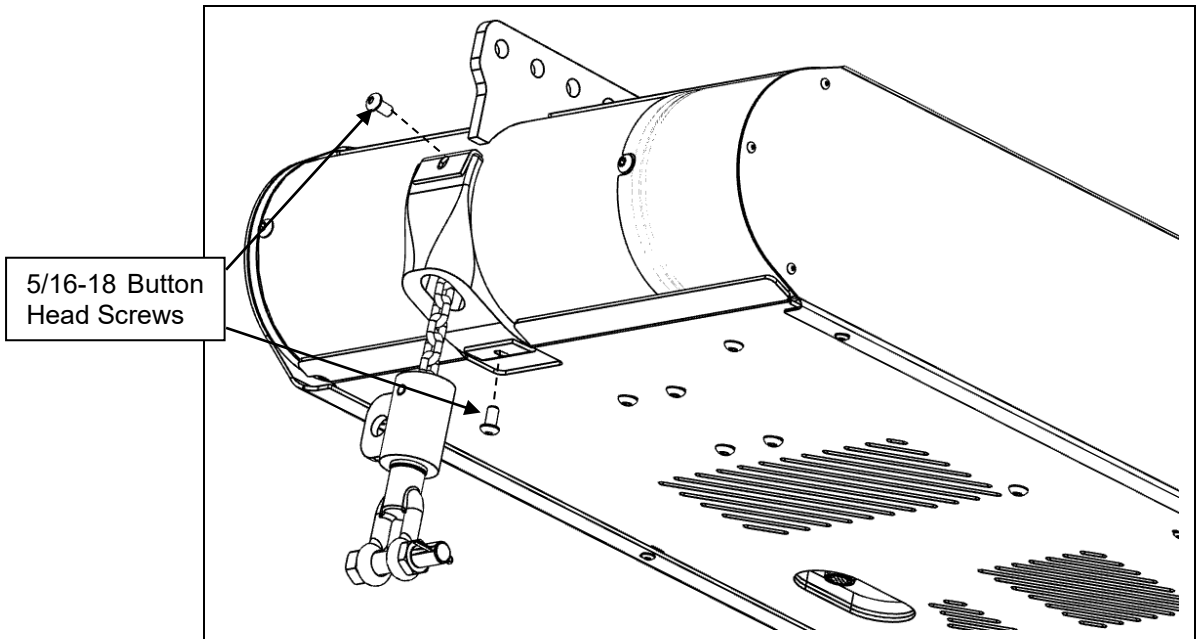


Figure 4-7

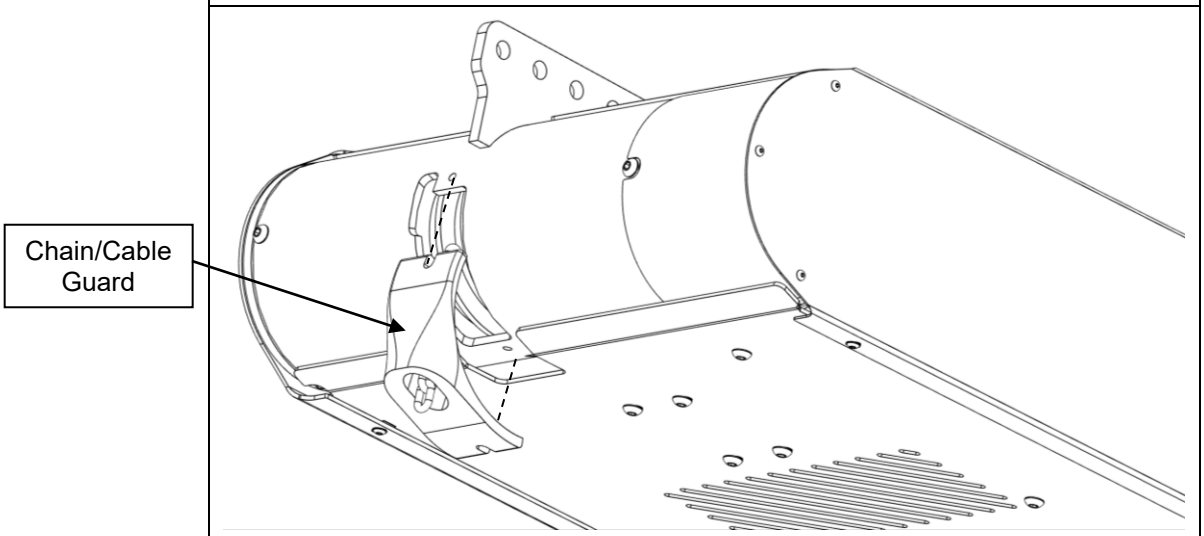


Figure 4-8

Step 2. Using Knight Servo Studio Motion -> Payout Mode -> GO TO CHAIN REPLACEMENT POSITION. (See Figure 4-7 & 4-8)

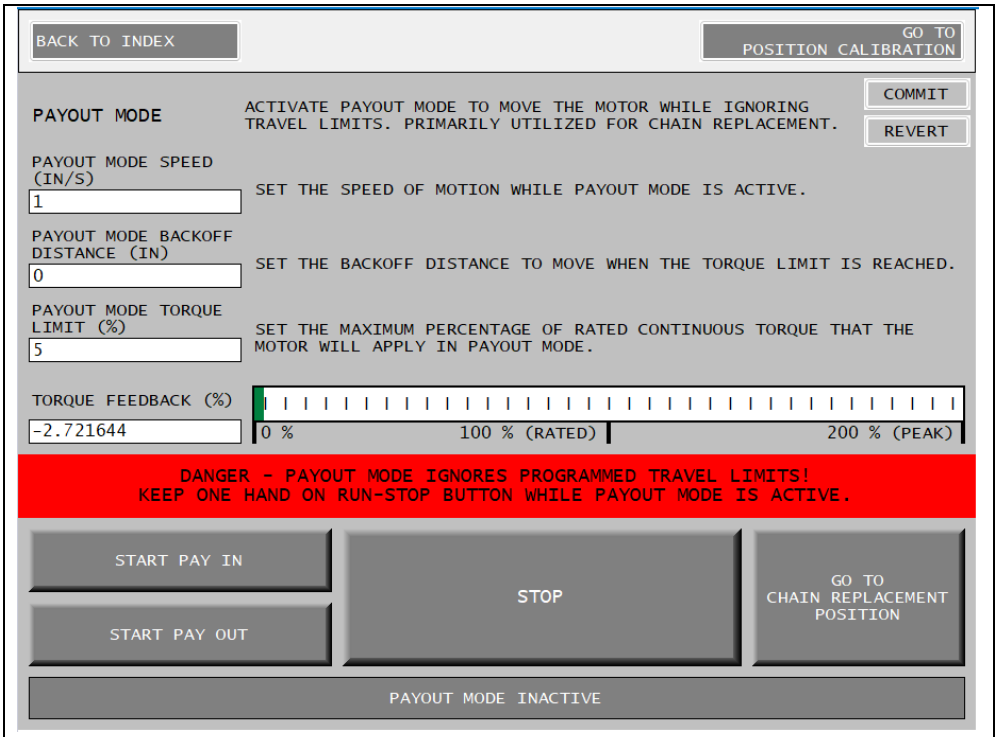


Figure 4-9

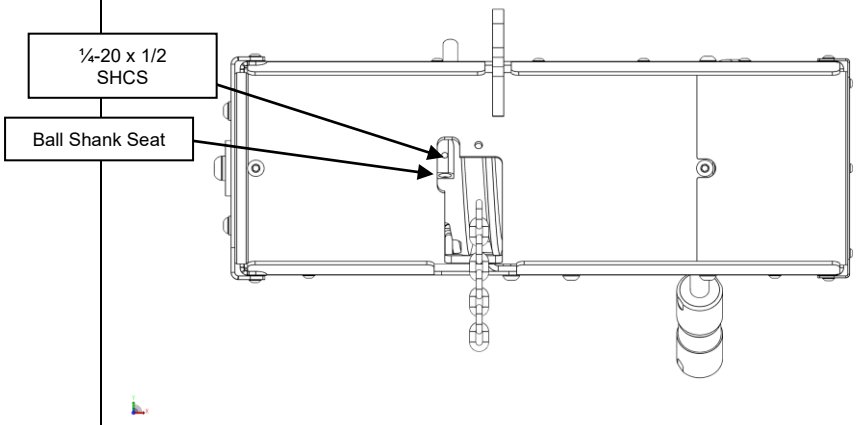


Figure 4-10

Step 3. Once the spool has rotated to the position shown in Figure 4-10, Press the Run/Stop Button and disconnect power from hoist.

Step 4. Make provisions to prevent movement of trolley if hoist is trolley mounted.

Step 5. Measure and record distance from hook throat to cable guide opening.

Step 6. Remove barrel clamp and load hook from cable.

NOTE

The ball shank should now be visible through the cable guide hole; Spool repositioning may be necessary to find the ball shank

Step 7. Remove 1/4-20 x 1/2 SHCS located above the ball shank from the hoist spool. (See Figure 4-11)

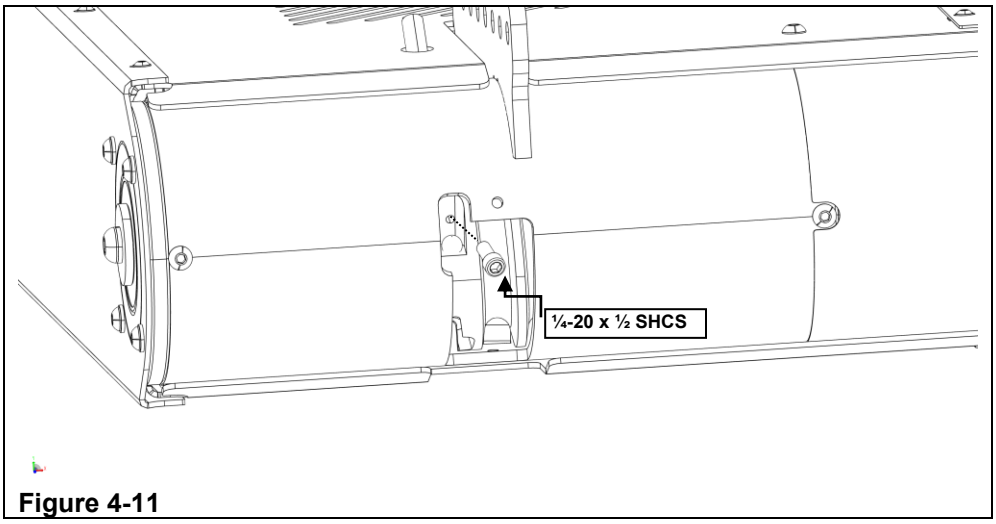


Figure 4-11

Step 8. Remove the ball shank from the ball shank seat. (See Figure 4-12

NOTE

The ball shank may need to be tapped out of the ball shank seat.

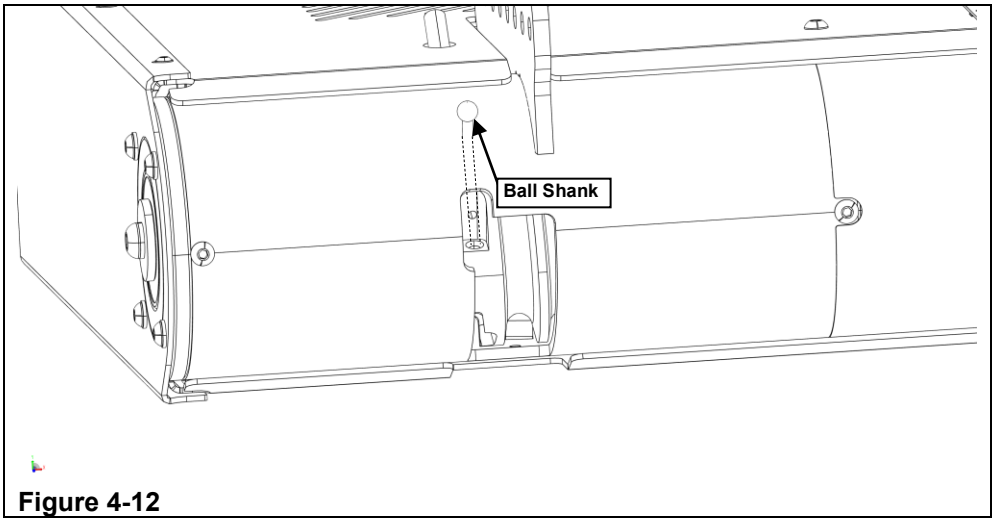


Figure 4-12

Step 9. Push the cable around the spool and remove the cable completely from the spool.

NOTE

If the cable end is frayed, cleanly cut cable above frayed end. At this step do not cut more than the minimum needed to get a clean end.

Step 10. Feed the cable through the ball shank seat until it comes out the bottom of the hoist. (See Figure 4-13 & 4-14)

Figure 4-13

Figure 4-14

Step 11. Use a finger to tuck the end of the cable inside of the hoist housing. (See Figure 4-15)

Figure 4-15

Step 12. Feed the cable into the hoist until the end comes out on the top side of the spool. (See Figure 4-16)

Figure 4-16

Step 13. Pull the cable all the way through until the ball shank is seated into the spool. (See Figure 4-17)

Figure 4-17

NOTE

If the ball shank does not seat, sharply tug on the cable to seat the ball shank in the spool and tap to fully seat.

Step 14. Reinstall 1/4-20 x 1/2 SHCS (if removed) into the hoist spool above the ball shank. (See Figure 4-28)

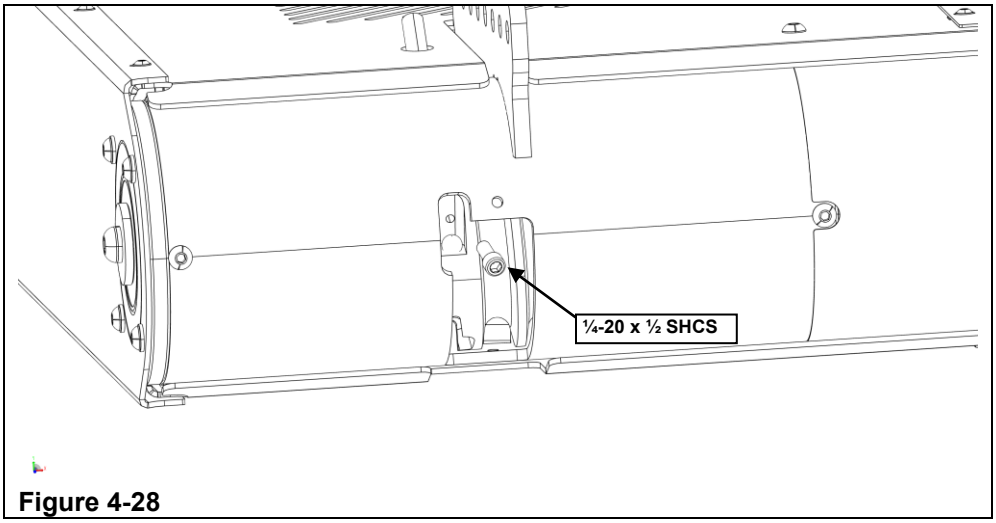


Figure 4-28

Step 15. Reinstall cable guide and cable guide clamp(s). (See Figures 4-7 & 4-8)

Step 16. Using dimension from step 5, reinstall hook on cable with barrel clamp and thimble. Refer to “Attaching the Load Hook” page 14.

Step 17. Reattach load and turn power supply on.

Step 18. Check system for proper operation and retighten fasteners after first loading.

H. Chain Replacement

Step 1. If the shackle or Inline Handle are still attached to the chain, remove these items by following steps 2e and 2f in Section 2: Installation.

1. Hoists equipped with a load cell will have a 19-pin coil cable and coil clamp bracket that will prevent full removal of chain guide. Once screws have been removed you can twist chain guide to the side for access to chain retention screw.

Step 2. Remove the chain/cable guide from hoist by removing two *(2) 5/16-18* button head screws and sliding the chain/cable guard down the chain (See Figure 4-19 & 4-20).

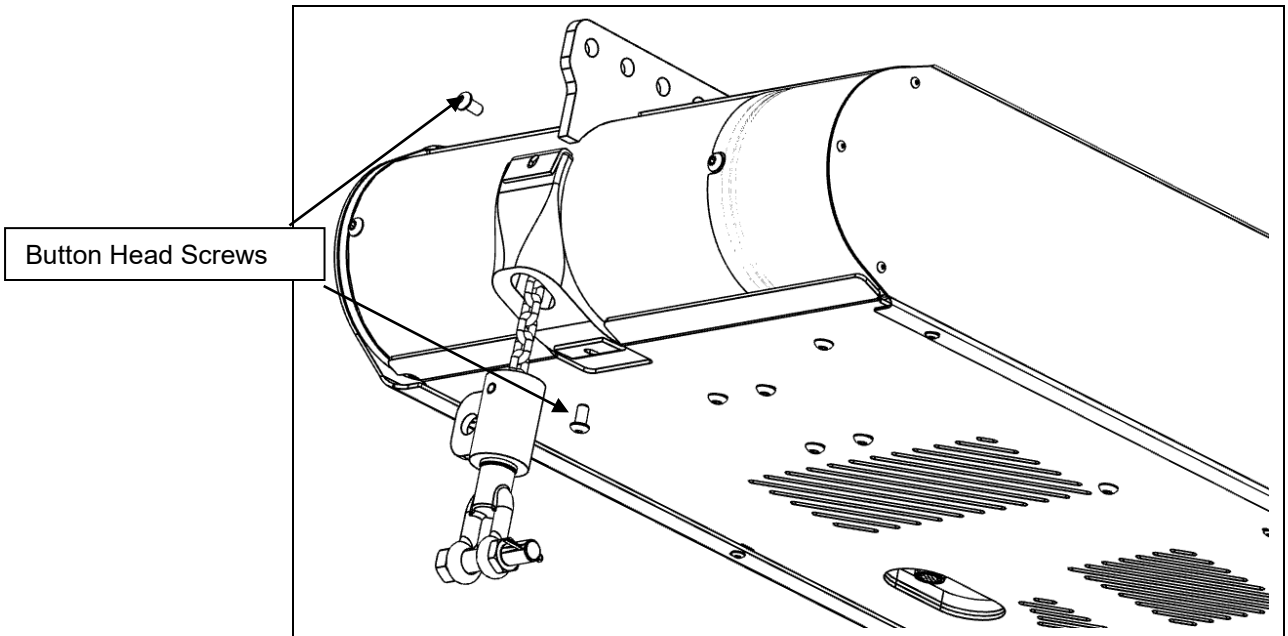


Figure 4-19

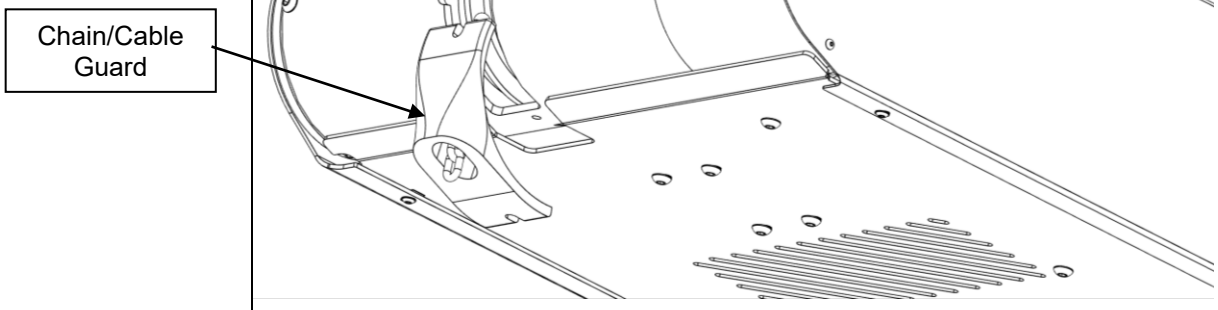


Figure 4-20

Step 3. Using Knight Servo Studio: Start -> Motion -> Payout Mode -> GO TO CHAIN REPLACEMENT POSITION. (See Figure 4-21)

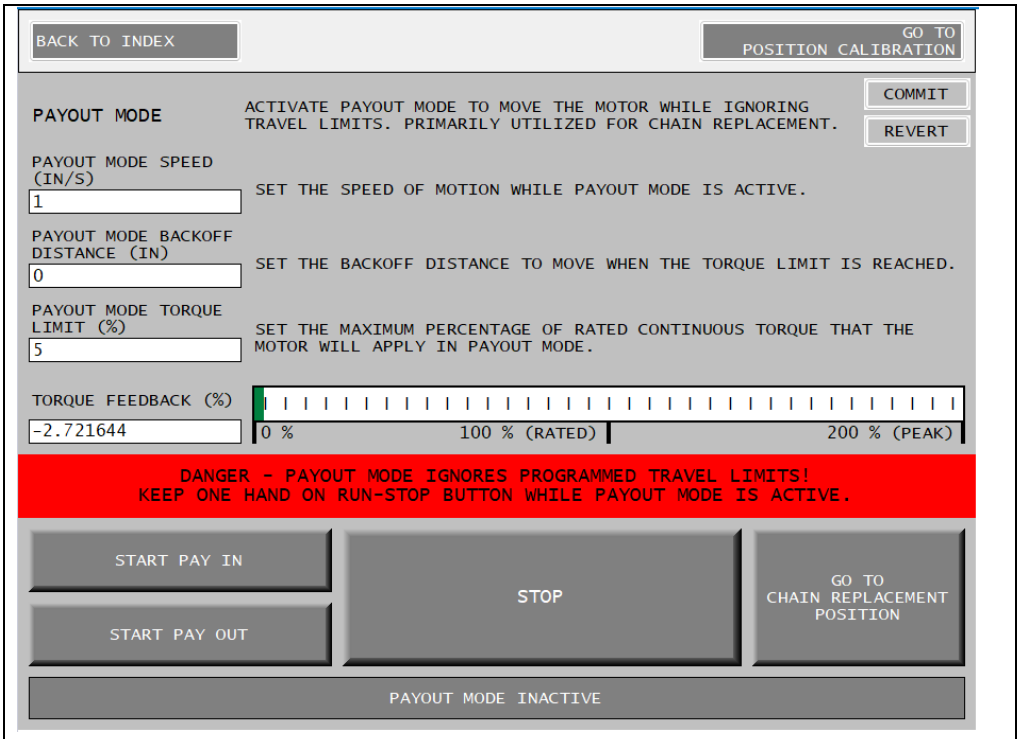


Figure 4-21

Figure 4-22

Step 4. Once the spool has rotated to the position shown in Figure 4-22, Press the Run/Stop Button and disconnect power from Hoist. Chain retention screw should now be visible through chain guide hole.

Step 5. Remove the chain retention screw (M6 Socket head cap screw) and washer that secures the chain to the spool. (See Figure 4-22)

Figure 4-23

Step 6. Without removing the second link from the spool notch, connect the chain feeder to the first chain link. (See Figure 4-23)

Step 7. Remove the second link from the spool notch. Slowly lower the chain, drawing the chain feeder into the spool, until the chain feeder exits the spool again. (See Figure 4-24 and 4-25)

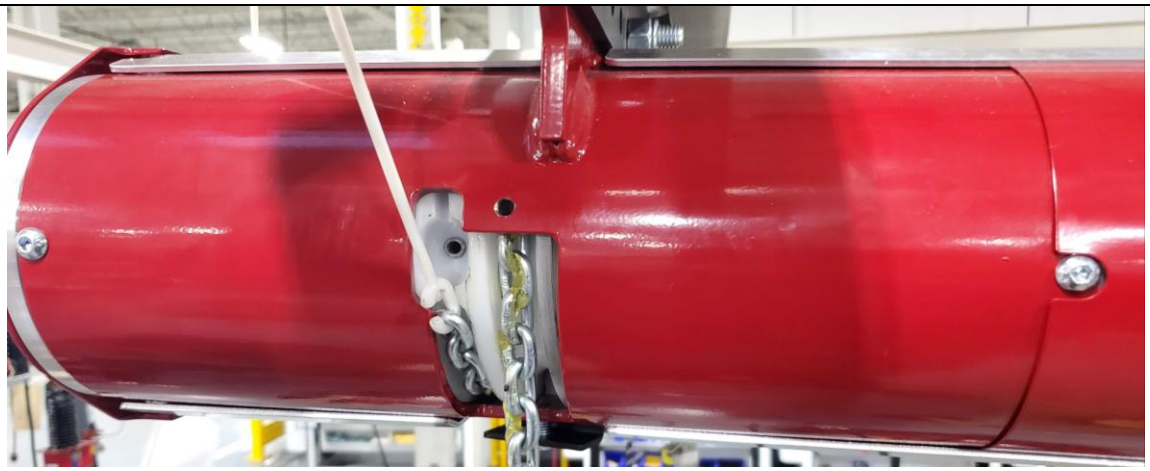


Figure 4-24

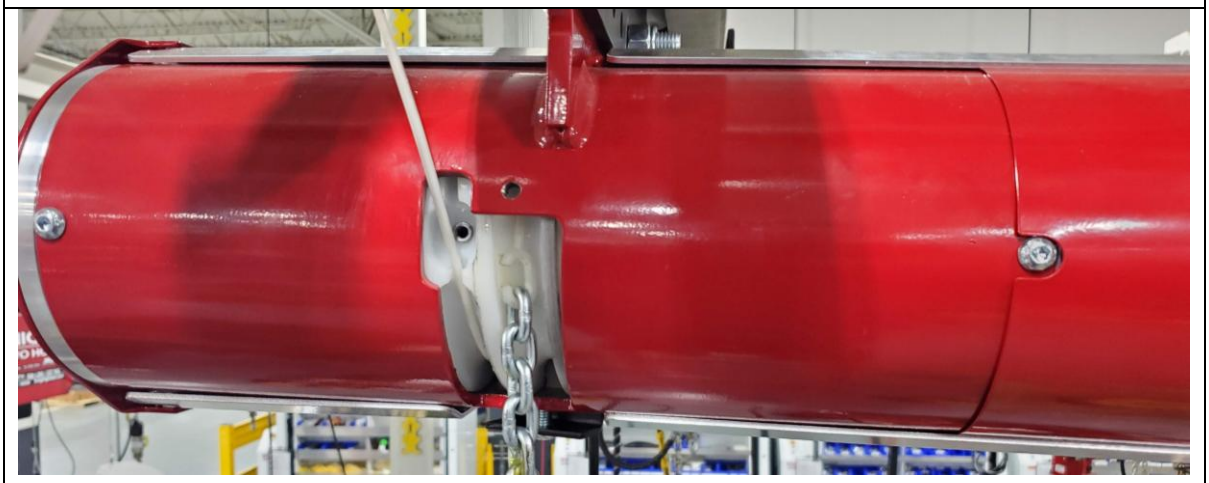


Figure 4-25

Step 8. While holding the chain feeder in position shown in Figure 4-25, remove the old chain and install the new chain onto the chain feeder.

Step 9. To install, pull chain feeder back through the spool. Pull enough chain out to install the second link back into the spool notch. (See Figure 4-26)

Figure 4-26

Step 10. Once the second link is fully seated in the spool notch, re-install the M6 screw and washer through the first link into the threaded hole in the spool. (See Figure 4-27)

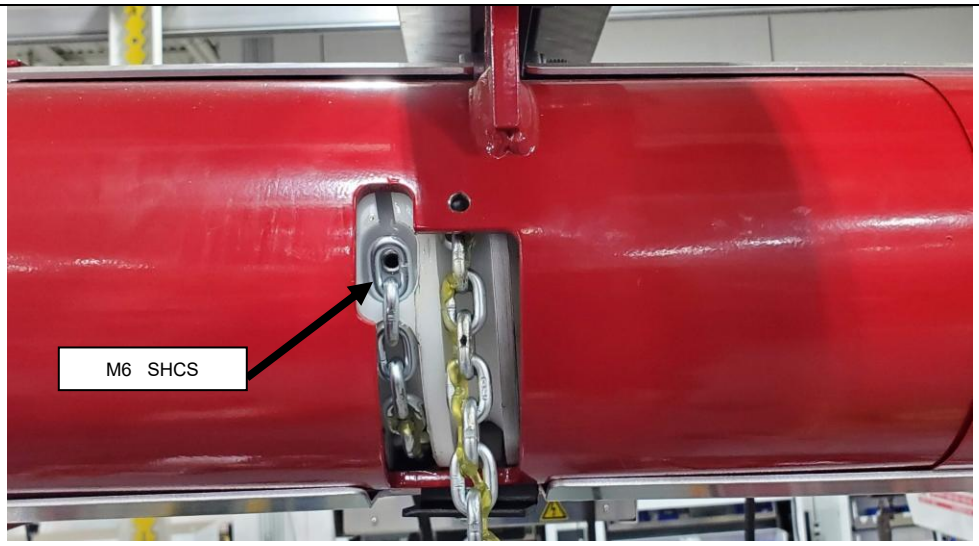


Figure 4-27

Step 11. Reinstall cable guide and cable guide clamp(s). (See Figures 4-7 & 4-8)

Step 12. Reinstall inline handle or shackle. (reference steps 2f and 2g from Section2: Installation)

Step 13. Reattach load and turn power supply on.

Step 14. Check system for proper operation and retighten fasteners after first loading.

	NOTE
	If hoist is equipped with an Inline Handle it will have a 19-pin coil cable bracket. The new chain will need to be fed through the cable and bracket before being attached to the drum.

5. SOFTWARE

There are several subjects related to the Servo Hoist's software that will be reviewed here:

5.A.) Getting Started
5.B.) Connecting to a Servo Hoist
5.C.) Backing up the Parameters from the Knight Servo Studio Software
5.D.) Backing up the Entire Knight Servo Hoist Software
5.E.) Restoring a *.KSA backup: Knight Servo Studio Software and Firmware
5.F.) Review the software's firmware and the servo's Hardware compatibility.
5.G.) Load a New Drive with Existing Software
5.H.) Check or Change Setup Values
5.I.) Encoder Offset Setup Procedure
5.J.) Operating Chain Payout Mode
5.K.) Accessing the Servo Hoist's Fault Log

In the following sections of the manual a shorthand is used to point to a particular screen in the Knight Servo Studio (KSS) program. This shorthand that explains how to find each screen or parameter in the KSS is explained below:

KSS Workspace tree location: Knight Work Order # \ Status \ System Status Bits

This means that in the 'Workspace' panel on the left-hand side of the screen, the '+' sign next to the Knight Work Order number needs to be pressed. This will expand the selection tree. Mouse down and press the '+' sign next to the 'Status' option and double-click on the 'System Status Bits' screen. This will open that screen, and any specific parameters can be inspected.

KSS Home screen location: Quick View panel \ Row 6 (Lower right-hand part of the screen)

This means that on the Knight Servo Studio's home screen there is a panel found in the lower right-hand part of the screen labeled 'Quick View'. The parameter in question is found on 'Row 6' of that panel.

If this is the first time the Servo Hoist is being set up, here is a list of functions to initially verify. The functions can be accessed from the Setup screens found here:

KSS Workspace tree location: Knight Work Order # \ Setup

1) The hoist's maximum allowed weight: This can be verified by following the instructions in Section 5.E. "Check or Change Setup Values" or by opening the 'WEIGHTS LIMITS' screen.
2) The hoist's minimum weight: This can be verified by following the instructions in Section 5.H. "Check or Change Setup Values" or by opening the 'WEIGHTS LIMITS' screen.
3) The hoist's fixture weight is correct: This can be verified by following the instructions in Section 5.H. "Check or Change Setup Values" or by opening the 'WEIGHTS LIMITS' screen.
4) The analog handle is balanced: This can be verified by following the instructions in Section 5.H. "Check or Change Setup Values" or by opening the 'ANALOG HANDLE CALIBRATION' screen.
5) The encoder offset procedure: This can be verified by following the instructions in Section 5.I. "Encoder Offset Setup Procedure" or by opening the 'POSITION CALIBRATION' screen.

A. Getting Started

Listed below are the hardware and software items needed to connect to a Knight Servo Hoist: (See Figure 5-1)

- A laptop running Microsoft Windows 7 or above. (Customer Supplied)
- Ethernet Cable with (1) RJ45 connector and (1) M12 4-pin connector.
- The Knight Servo Studio software package. This can be obtained by:

1. Ordering it from Knight with Ethernet Cable: P/N KCA1052.

Figure 5-1

2. Downloading it from Knight's website at:
   a. https://knightglobal.com/software/
      Click on the "Knight Servo Configuration Software" selection and download it.
   b. Use the QR code to download the Knight Servo Studio software. (See Figure 5-2)

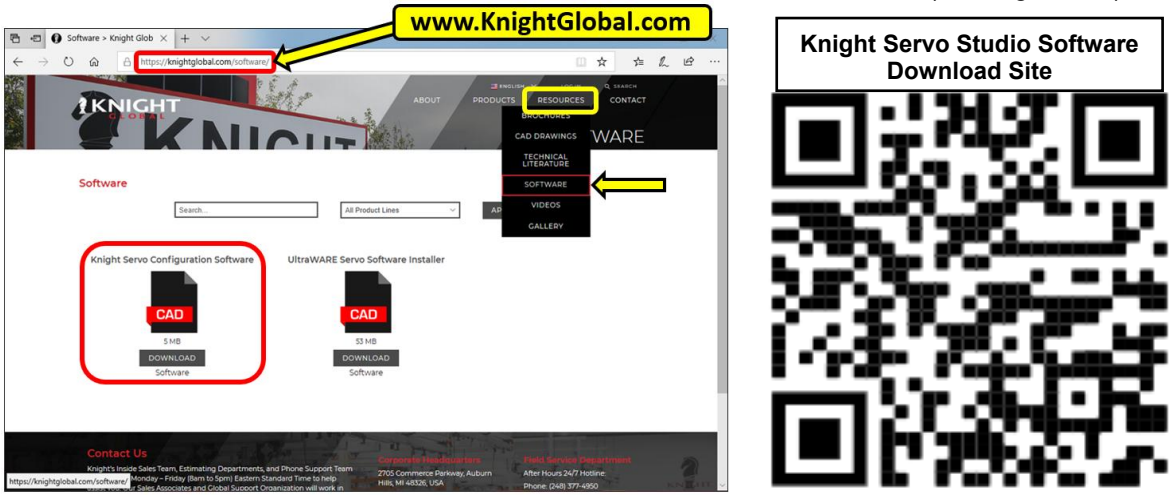


Figure 5-2

3. Downloading it from the KSH Unit.
   - Log onto the Servo Drive and open a web browser:
     Enter the network address: 192.168.2.101
   - Mouse over to the “Downloads” TAB and select the top choice:
     “Knight Servo Configuration Software Installer.msi” (See Figure 5-3)

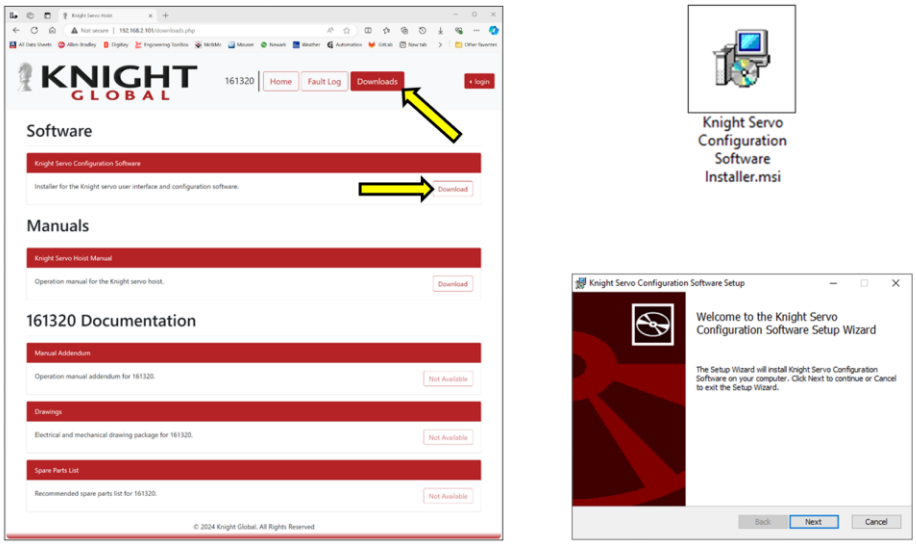


Figure 5-3

B. Connecting to an E-Float Hoist

The Knight Servo Studio Servo software is used to configure and troubleshoot the Knight Servo Hoist. The following steps are needed to start a connection between a computer running the Knight Servo Studio software and the Knight Servo Hoist:

<u>Knight Servo Studio Software Package Setup:</u>

Step 1. Set up the Ethernet communication settings for your laptop.

a. Using a Microsoft Windows based PC open the **Network and Sharing Center**.
b. Right click on **Local Area Connections**. Select **Properties**. (See Figure 5-4)

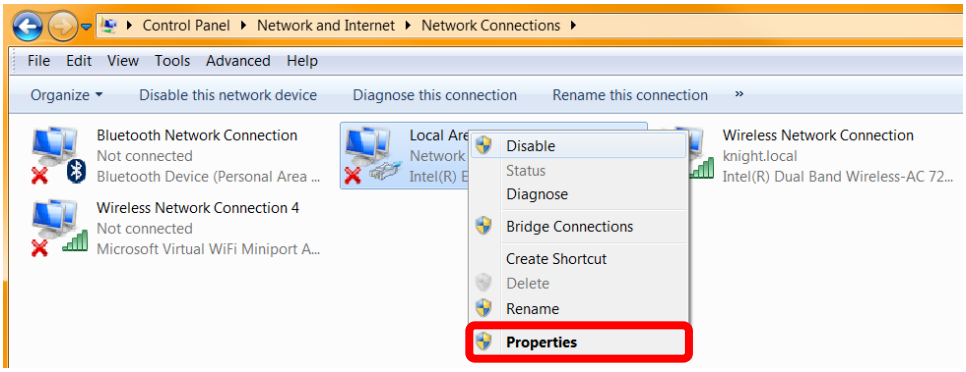


Figure 5-4

c. Select **Internet Protocol Version 4 (TCP/IPv4)**. Select **Properties**.

d. Select **Use the following IP address:**
Typically, the laptop's IP Address should be: 192.168.2.250 **OR**
Type the correct IP address and Subnet mask into the spaces provided and press 'OK.'
(See Figure 5-5)

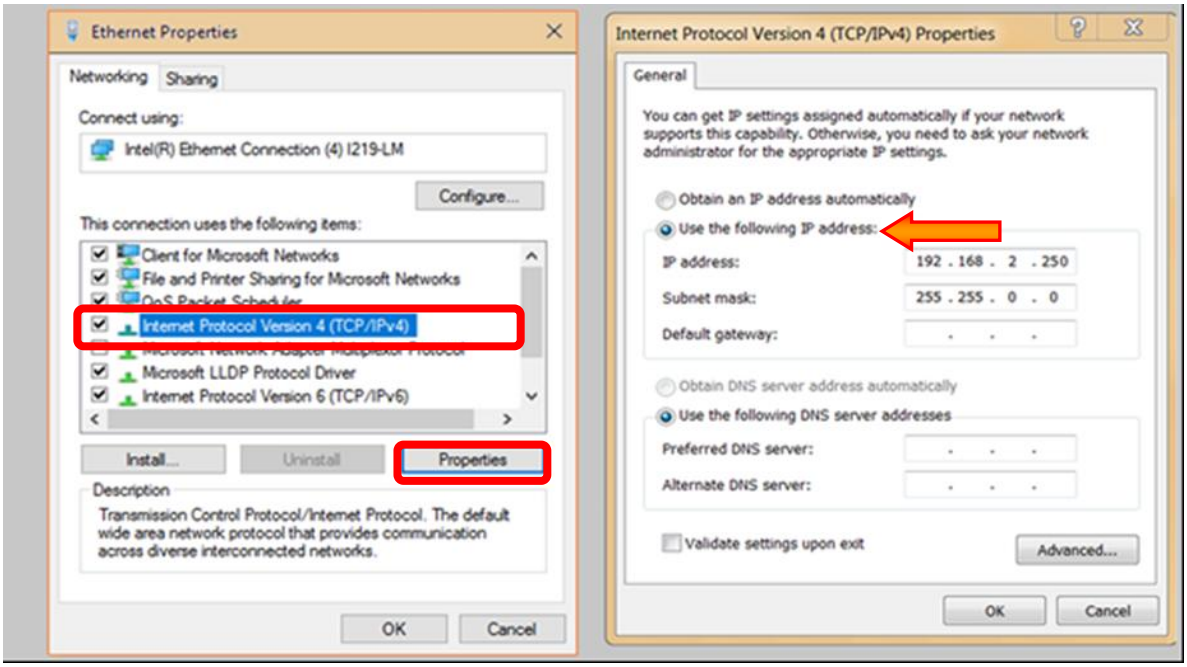


Figure 5-5

Step 2. Insert the USB card that was supplied with Servo Hoist into the laptop.

1. Double-click on the “ksh_sm_user.exe” icon to launch the Knight Servo Studio installation software. (See Figure 5-6)
2. Complete the installation process.

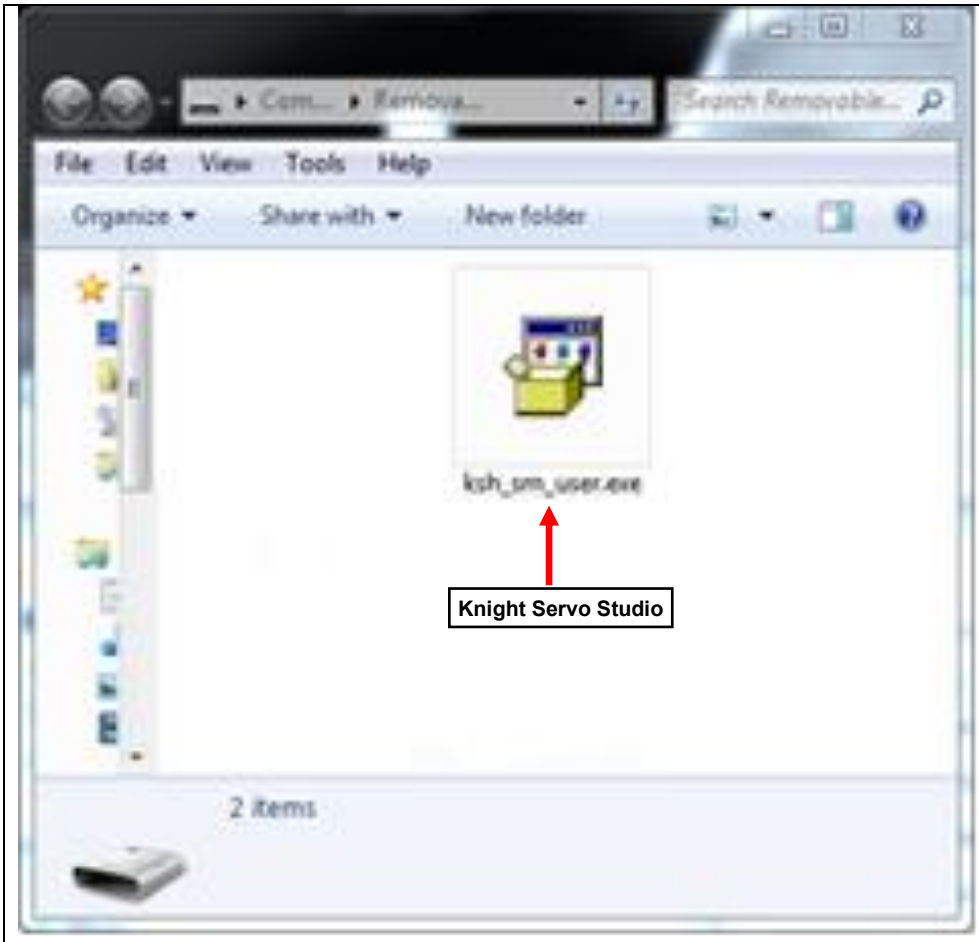


Figure 5-6

Step 3. Double click on the blue Knight Servo Studio software icon found on the desktop and allow the Knight Servo Studio software to load. (See Figure 5-7)

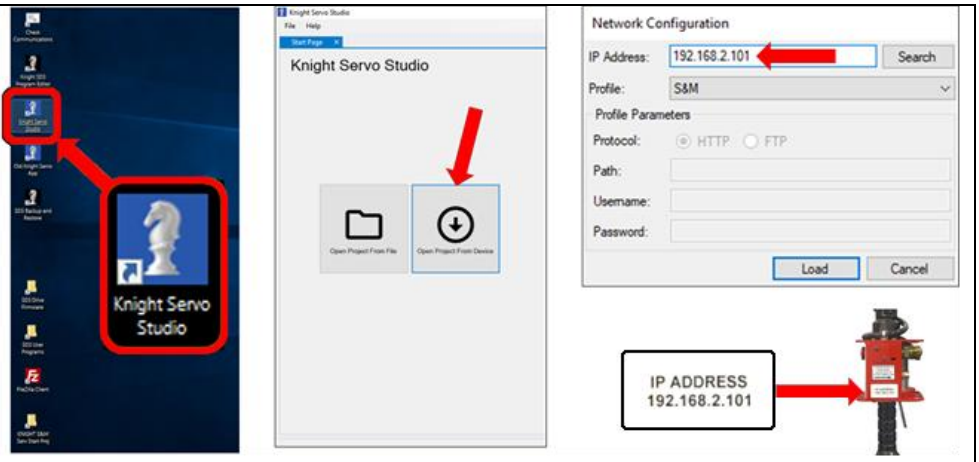


Figure 5-7

Step 4. When the software loads, choose the 'Open Project from Device' option. Input the correct IP Address into the Network Configuration box. The IP Address for the hoist will be found next to the M12 ENET receptacle located on the Load Monitoring Module or the Inline Handle, the address typically is: 192.168.2.101
(See Figure 5-7)

Step 5. Move the mouse to the right side of the screen and select the ‘Connect’ button. If the communications are working correctly the red ‘Disconnected’ indicator will appear green ‘Connected’ box. (See Figure 5-8)

If the Knight Servo Studio software does not connect to the hoist, recheck all the connections and ensure that the hoist has its 240VAC power connected.

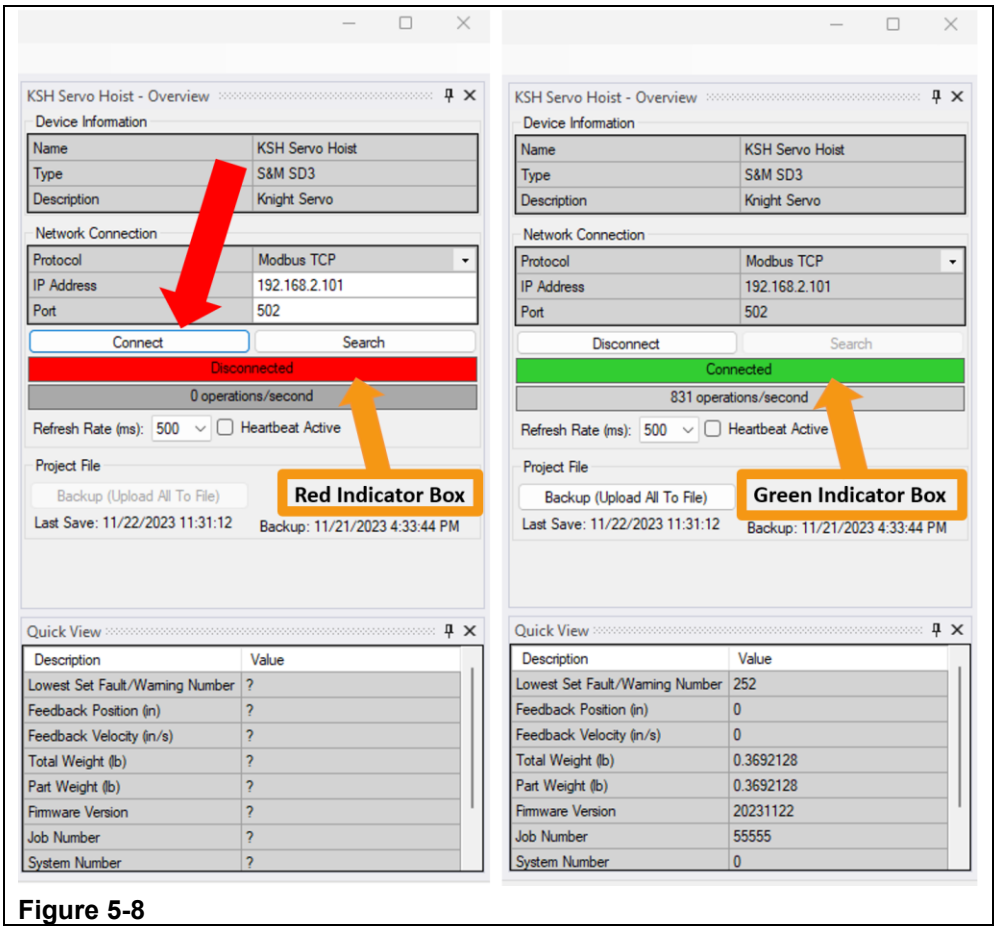


Figure 5-8

C. Backing up the Parameters from the Knight Servo Studio Software

The section will explain how to save the parameters found in the 'Knight Servo Studio' program (a .KSP file).
Ensure you are connected to the servo hoist.

- **Save the parameters found in the Knight Servo Studio's .KSP file:**

Step 1. Move the mouse to the left side of the screen and select the 'File' dropdown. Mouse down to 'Save to File' and select this function (See Figure 5-9)

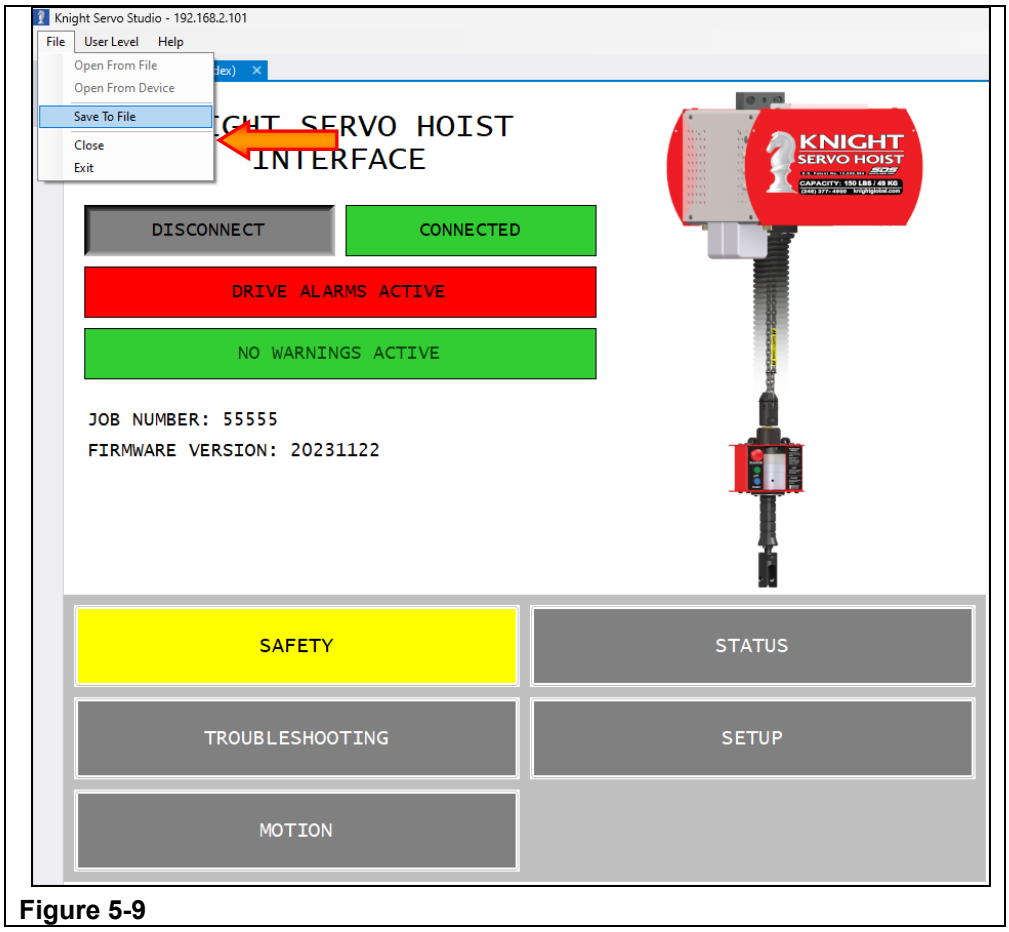


Figure 5-9

Step 2. Pick the filename and the location where the .KSP backup will be saved.

Step 3. When the progress bar on the right side of the screen has completed the parameter backup is done.

D. Backing up the Entire Knight Servo Hoist Software

The section will explain how to save a backup copy of the 'Knight Servo Studio' program (a .KSA file).

- **Save a copy of the Knight Servo Studio's .KSA file:**

Step 1. Start the "SD3 Backup and Restore" application by Double-Clicking on the "SD3 Backup and Restore" icon.(See Figure 5-10)

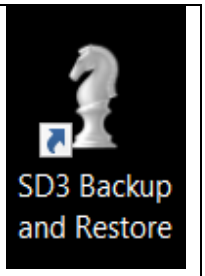


Figure 5-10

Step 2. Select the correct 'Network Interface' for your laptop. This may vary depending on your laptop's hardware configuration and may vary each time hardware is added to your laptop.

If the 'Local Interface' settings are correct, the values will show up as GREEN. (See Figure 5-11)

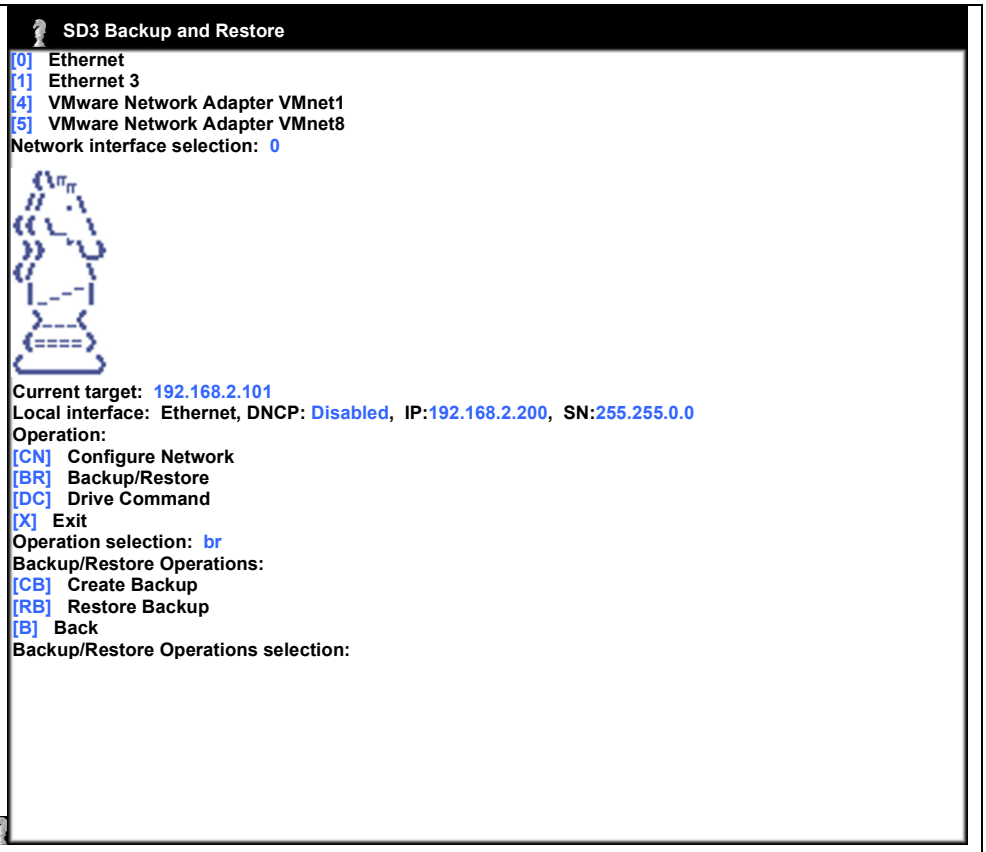


Figure 5-11

Step 3. Type in ‘br’ into the ‘Operation selection’ to access the ‘Backup/Restore’ menu.
Type in ‘cb’ in the ‘Backup/Restore Operation selection’ to start the ‘Create Backup’ function.
(See Figure 5-12)

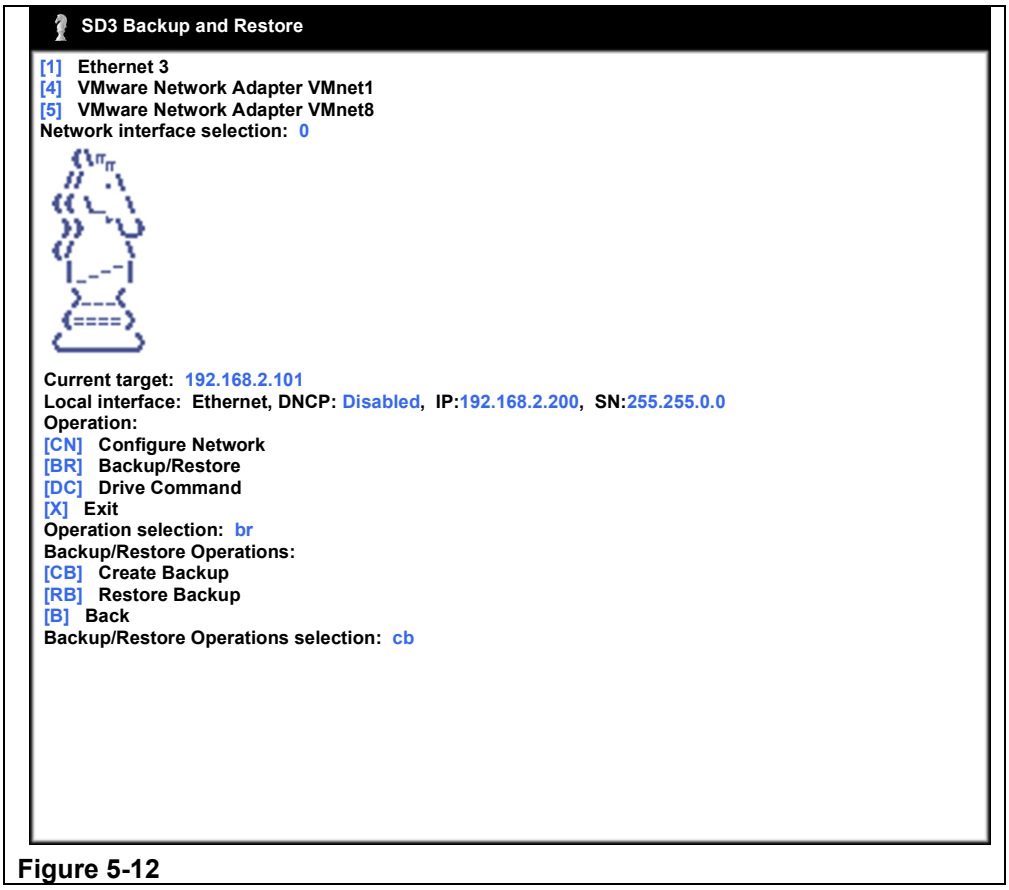


Figure 5-12

Step 4. Press the “Enter” button to allow the program to store the backup file on your laptop’s Desktop. (See Figure 5-13)

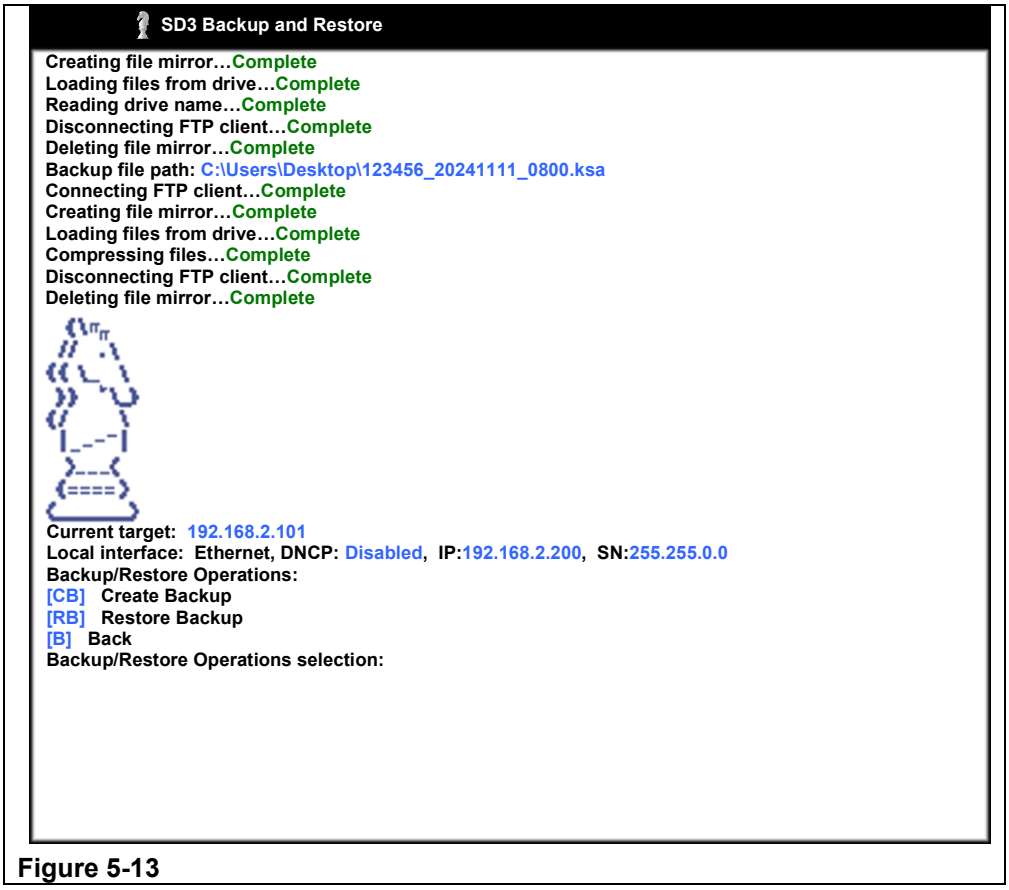


Figure 5-13

Step 5. When the backup process is complete, mouse to your Desktop and copy the backup file into an email.
Send a copy of the newly saved file to Knight's Servo Team at servos@knightglobal.com
(See Figure 5-14)

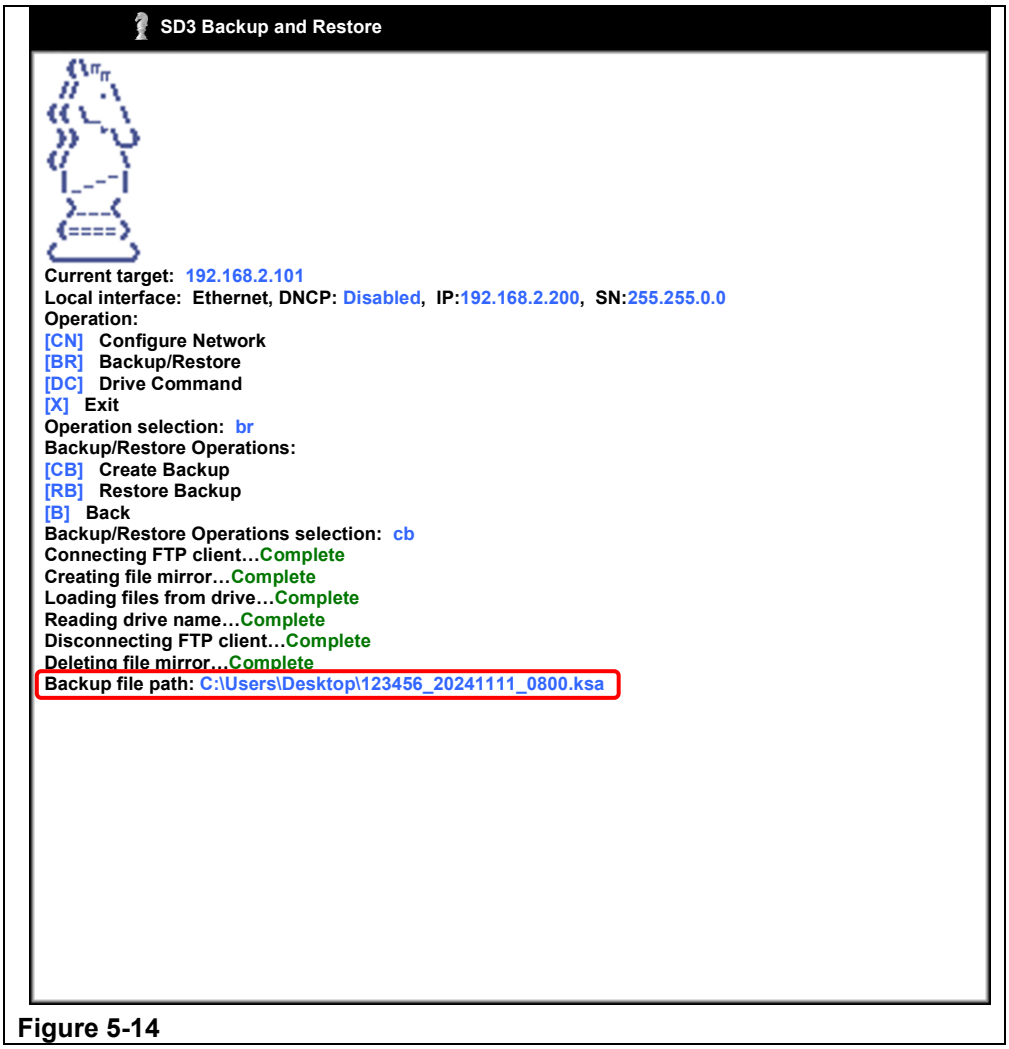


Figure 5-14

E. Restoring a .KSA backup: Knight Servo Studio Software and Firmware

The section will explain how to restore an entire copy of the 'Knight Servo Studio' program (a .KSA file).

- **Upload a copy of the Knight Servo Studio's using a .KSA file:**

Step 1. Start the "SD3 Backup and Restore" program by Double-Clicking on the correct Icon. (See Figure 5-15)

Figure 5-15

Step 2. Select the correct 'Network Interface' for your laptop. This may vary depending on the laptop's hardware configuration and may vary each time hardware is added to your laptop.

The system will display the IP Address of servo that the *.KSA will be uploaded to. (See Figure 5-16)

Figure 5-16

Step 3. The program will ask if you want to Create a Backup.
Type “Y” and a full system backup will be created.
The program will generate a backup path. Press “Enter” to save the backup on your desktop.
(See Figure 5-17)

Figure 5-17

Step 4. The program will inform you what will be uploaded to the servo:

a. Full system backup. This will replace the entire software package.

b. Partial system backup. This will only replace certain portions of the software.

Type “Y” and the application will upload the backup file to the servo.

(See Figure 5-18)

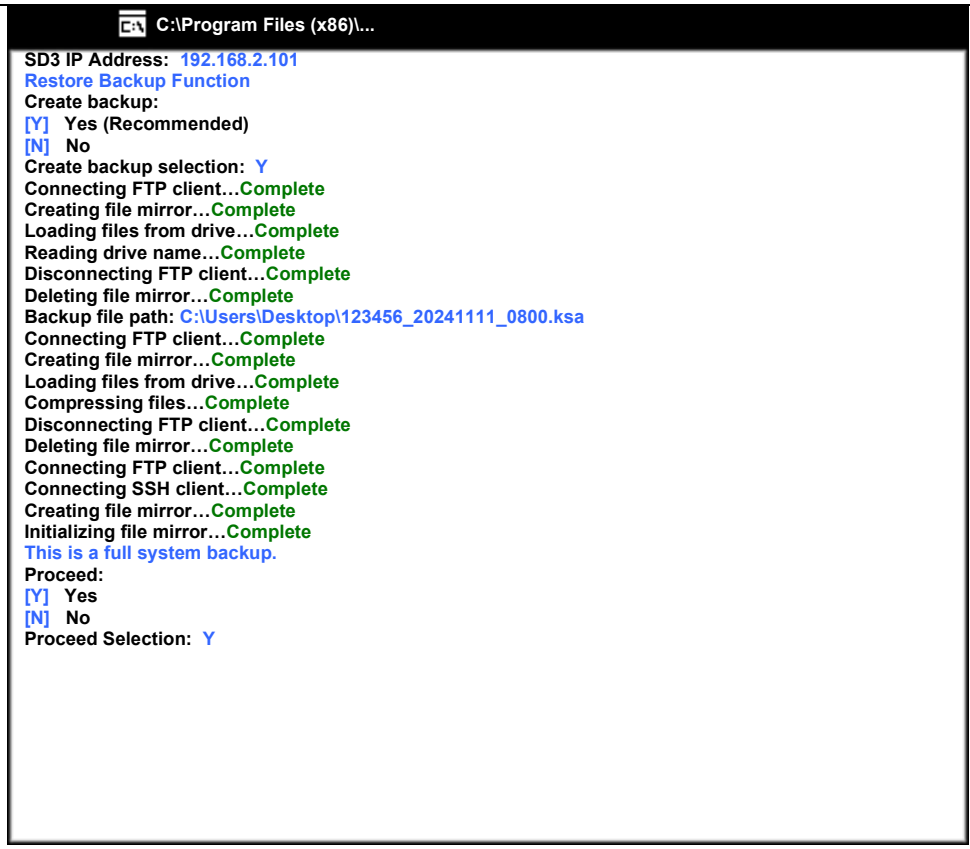


Figure 5-18

Step 5. When the upload procedure is complete, test the system and ensure that it functions correctly. If you have any questions, please contact your Knight representative or send an email to the Knight's Servo Team at servos@knightglobal.com. (See Figure 5-19)

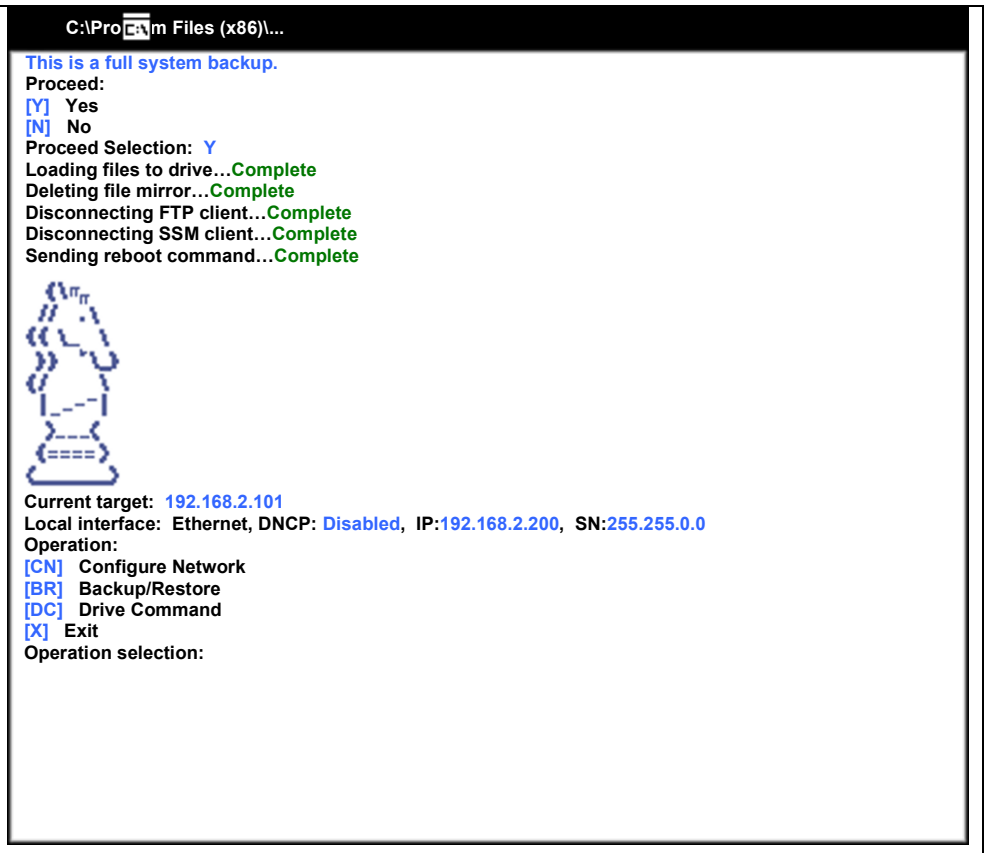


Figure 5-19

F. Review the Firmware and Hardware compatibility.

Before a New Servo Drive is installed, ensure that the Firmware is compatible with the new servo drive's Hardware version.

Step 1. To find the system's Firmware version open the Knight Servo Studio (KSS) and look at the "Quick View" screen found in the lower right-hand corner. (See Figure 5-20)

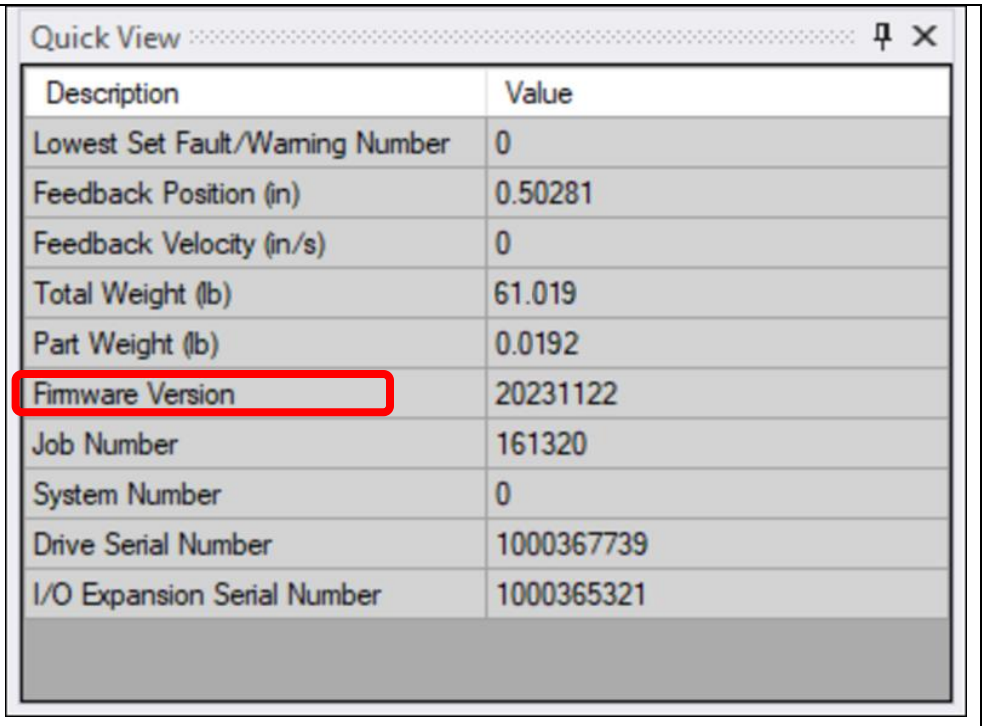


Figure 5-20

Step 2. The servo's Hardware version can be found on a label found on the side of the servo. (See Figure 5-21)

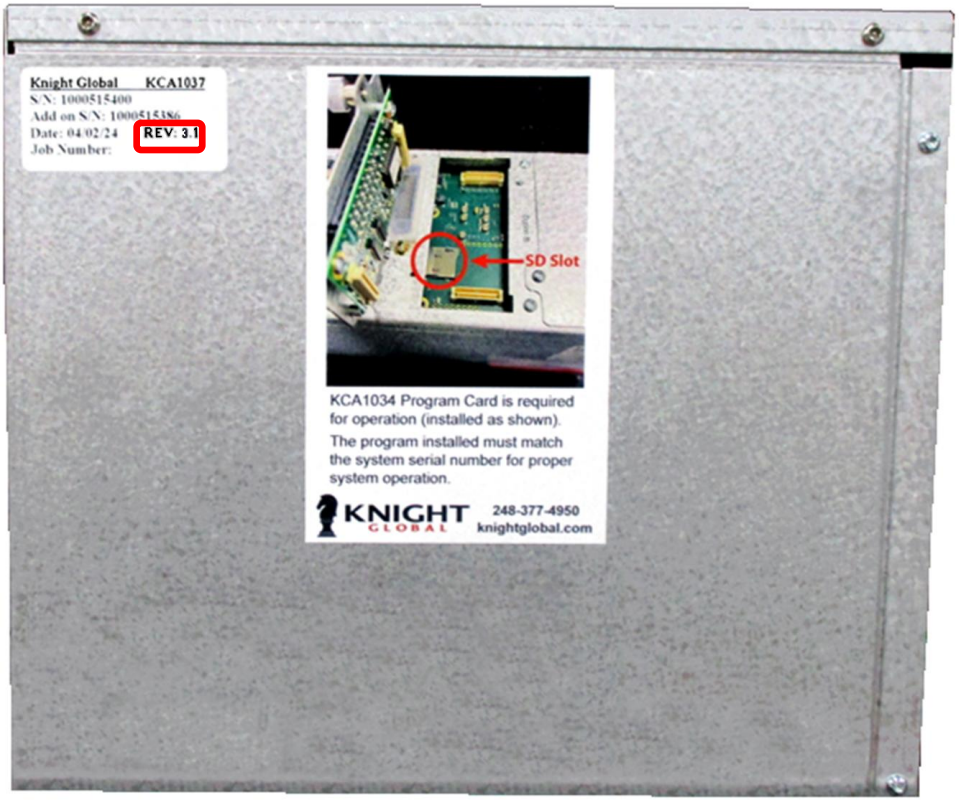


Figure 5-21

Step 3. Compare the Firmware to the Hardware version of the servo drive.

- If the new drive has a Hardware version of “V1”, any Firmware version will work.
- If the new drive has a Hardware version of “V2 or V3”, only certain Firmware versions will work. (See Figure 5-22)

Hardware Version	Firmware Compatability
V1 Drive	ANY.
V2 and V3	**20200311** and Newer.
	20190815 - 20200109 will boot, potential for encoder roll over on a power cycle.
	20180918 and Older will not boot.

Figure 5-22

Step 4. Considering the information shown above, the Firmware version is ‘20231122’ and the Hardware version is ‘3.1’. **This combination is a match**.

G. Load a New Drive with Existing Software

This section explains how to copy the Knight drive files from an old drive to a new drive.

Step 1. Lower the hoist, support fixture and part. So, no load is suspended from the hoist.

WARNING
There can be NO load suspended from the hoist prior to replacing a drive.

Step 2. Press the Run-Stop button.

Step 3. Remove the 240VAC power from the system.

Step 4. To remove the old Drive from the Enclosure, remove the (3) three 10-24 button head screws from the end of the hoist's enclosure. (See Figure 5-23)

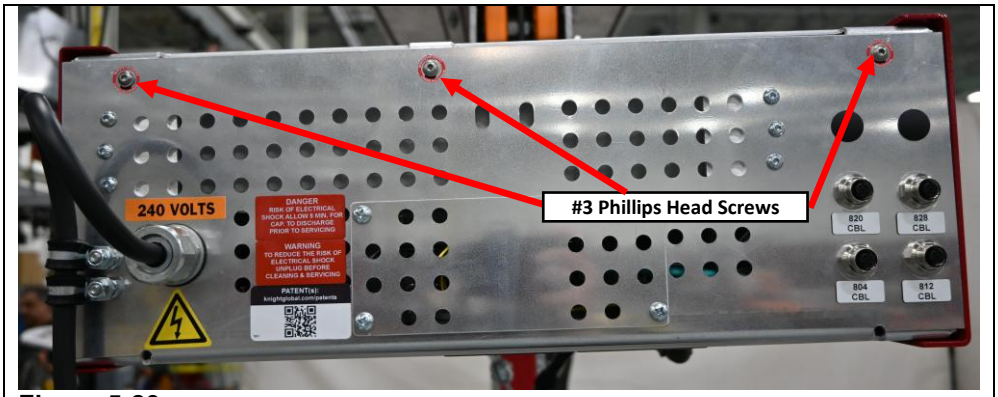


Figure 5-23

Step 5. Remove the (4) four 10-24 button head screw from the top of the hoist's enclosure. (See Figure 5-24)

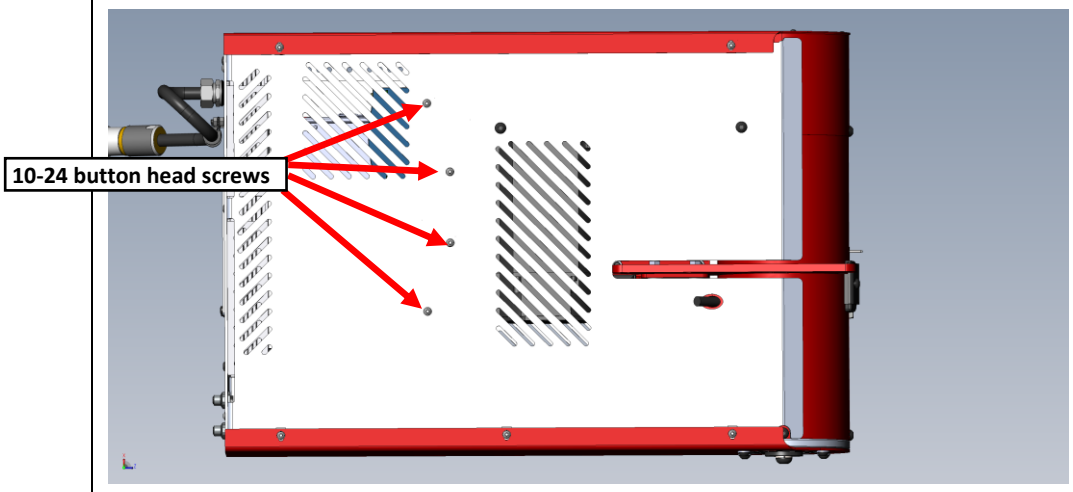


Figure 5-24

Step 6. Next removes the (3) three 10-24 button head screws from the bottom of the hoist's enclosure. (See Figure 5-25)

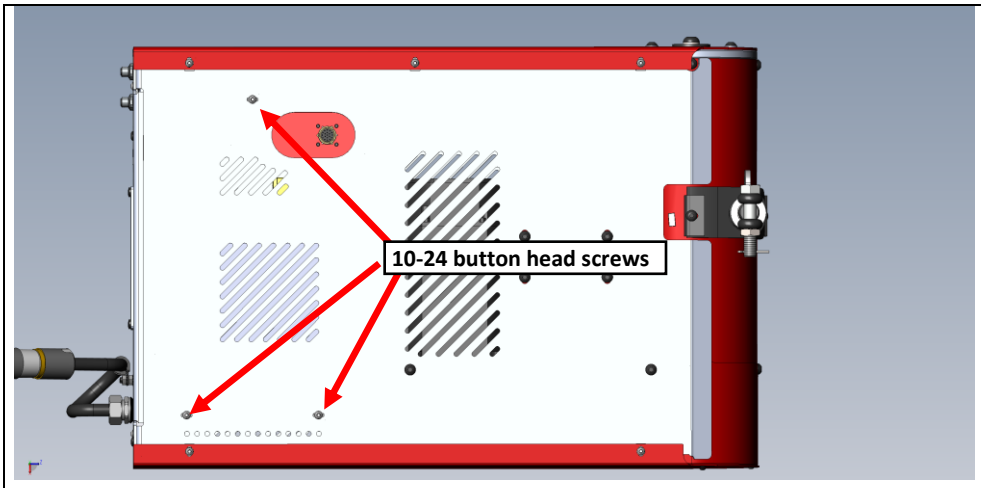


Figure 5-25

Step 7. Remove the Electronics mounting plate out from the hoist enclosure. (See Figure 5-26)

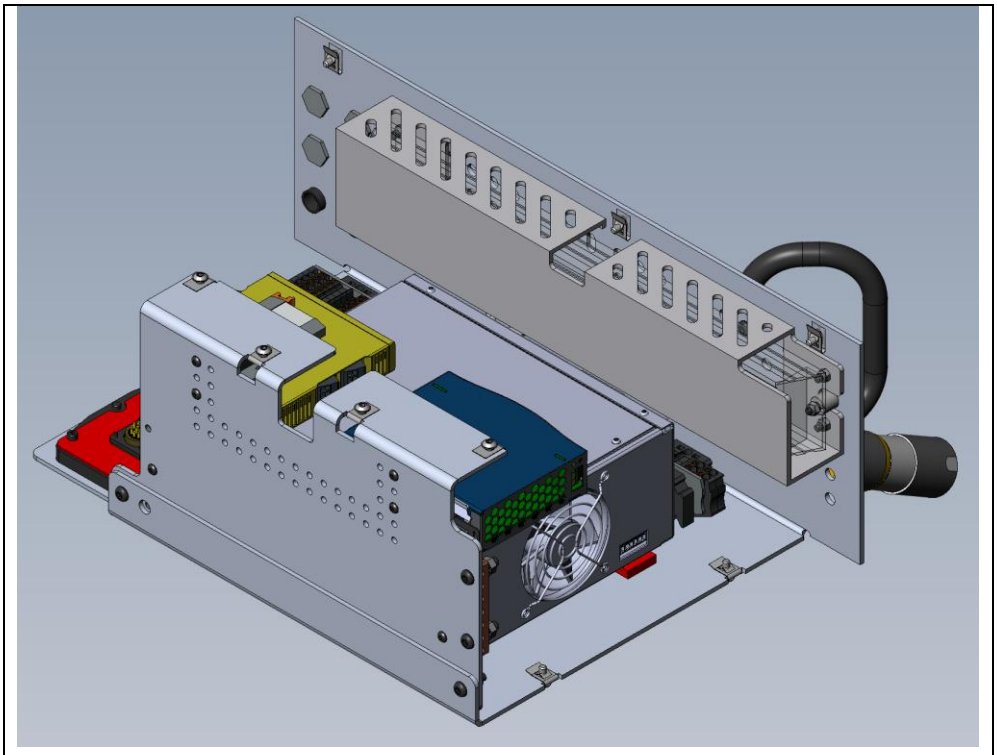


Figure 5-26

Step 8. Remove all the connectors attached to the servo drive: (See Figure 5-27)

- X20: 24-pin connector.
- X18: Encoder cable.
- X21: D-sub connector.
- X14: Ethernet connector.
- X25: 24-pin connector.

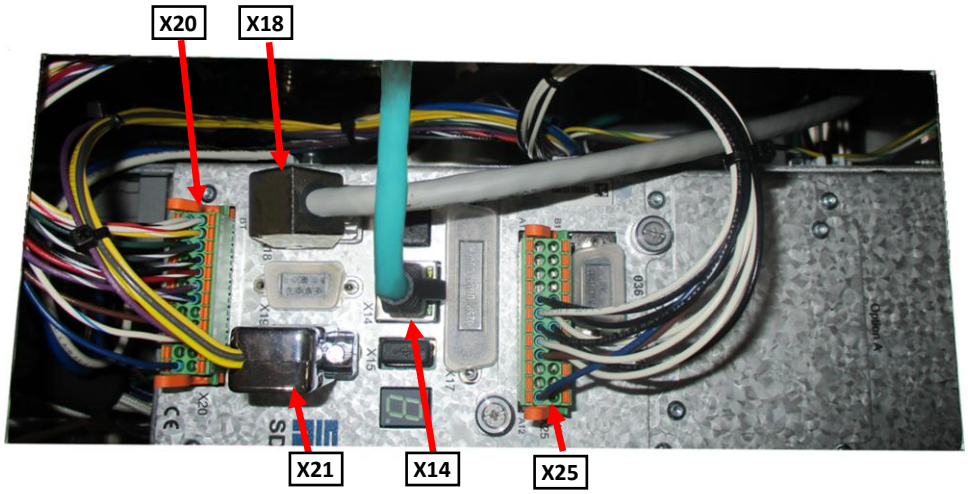


Figure 5-27

Step 9. Remove the (2) two 10mm nuts that secure the servo to the bottom plate using a metric deep well socket wrench. The (2) two button head bolts that the nuts thread onto are 6mm and if they back out use a 4mm Hex wrench to secure them.

Step 10. Remove all the connectors attached to the back and front panels of the servo drive:

- X45: Motor power connector.
- X63: Resistor connector.
- Motor Power Cable Ground.
- X44: Incoming power connector.
- X100: Safety connector.
- 4mm button head screw for grounding wire.

(See Figures 5-27 and 5-26)

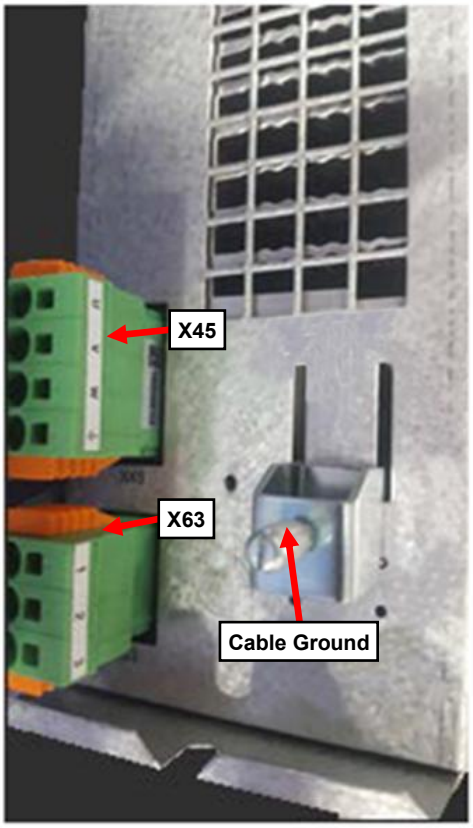


Figure 5-25

Figure 5-26

Step 11. Remove the I/O Modules from both old and new drives. Loosen the thumbscrews (if needed, use a #1 Philips) and carefully lift the I/O Module up off the servo unit. (See Figures 5-27)

Step 12. The SD card is accessible and visible in the old drive. (See Figures 5-28)

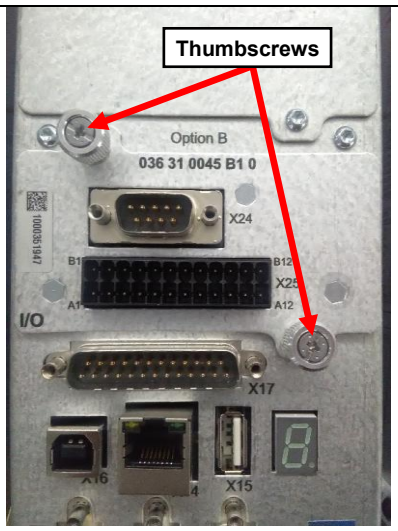


Figure 5-27

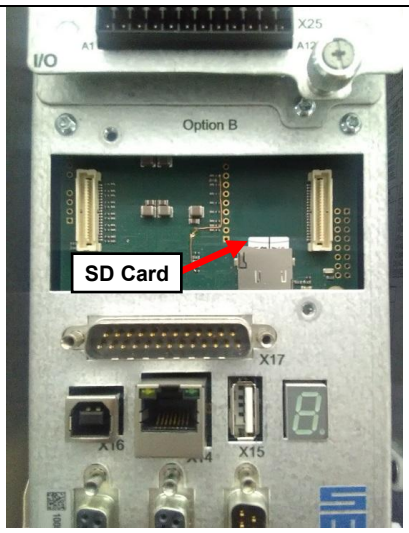


Figure 5-28

Step 13. Place your finger on the circuit board in front of the SD card. When the SD card is released, it will eject with enough force to move several inches. See note below. (See Figure 5-29)

Step 14. Eject the SD card by pressing it in with your other index finger and then allowing it to spring back. (See Figure 5-30)

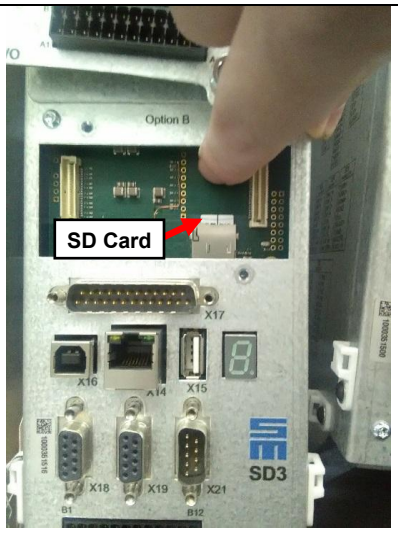


Figure 5-29

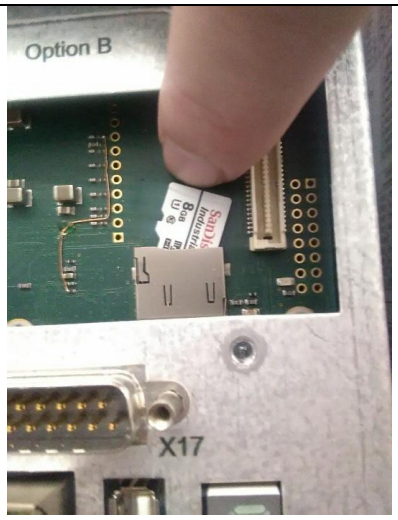


Figure 5-30

NOTE

When released, the SD card may spring out of the slot quickly. With nothing in front of the SD card, it may eject with enough force to move several inches and drop down inside the servo.

After the SD Card is released, if it doesn't move forward far enough to be removed from the slot, you may need to move your finger from the card more quickly.

Step 15. Label the SD card, store it in a safe and accessible location for replacement.

Step 16. Prepare the new Sieb and Meyer servo drive obtained from Knight Global for installation.

Step 17. Install the SD card into the new drive. This will guarantee that all the parameters that control the functionality of the system will be kept.

Step 18. Re-install the I/O module into the new drive. Do not apply an excessive amount of force. The I/O module should easily slide into place if it is lined up correctly. Tighten the thumbscrews fully by hand, before using a #1 Philips screwdriver. Ensure the screws do not strip when tightening.

Step 19. Re-secure the new drive to the bottom plate of the hoist's enclosure and reattach all the cable connectors:

- X20: 24-pin connector.
- X18: Encoder cable.
- X21: D-sub connector.
- X14: Ethernet connector.
- X25: 24-pin connector.
- X45: Motor power connector.
- X63: Resistor connector.
- Motor Power Cable Ground.
- X44: Incoming power connector.
- X100: Safety connector.
- 4mm button head screw for grounding wire.

Step 20. Reinstall the cover on top of the hoist's enclosure. (See Figure 5-23)

Step 21. Re-connect the 240VAC power to the drive.

Step 22. Depending on the system configuration: If the system has an Inline handle, the Run-Stop red light and the green light will flash on and off briefly when the Servo Hoist has reinitialized. If the system has a Fixture or Remote Two-Speed handle, it will enter No Mode. This will take 1-2 minutes after the unit has been powered up.

Step 23. Connect to the Servo Hoist by following Section 5.B. “Connecting to a Servo Hoist” procedure.

Step 24. Check for any Drive Faults or Warnings. A fault will be shown by an illuminated red box next to the fault’s description on the Active Fault screen. A warning will be shown by an illuminated yellow box next to the warning description See Section 7.B. for details. (See Figure 5-31)

Figure 5-31

KSS Workspace tree location: Knight Work Order # \ Status \ Drive Alarm/Warnings

Step 25. If the I/O devices connected to the I/O module are not working, verify that both X20 and X25 terminal blocks are correctly seated into the Remote I/O Module and the module is properly installed into the servo drive.

Step 26. If the unit doesn't work properly, follow the troubleshooting screens found in Knight Servo Studio under the Troubleshooting branch of Workspace directory tree. (See Figure 5-32)

Refer to Section 7 for a complete description of each screen listed on the directory tree below.

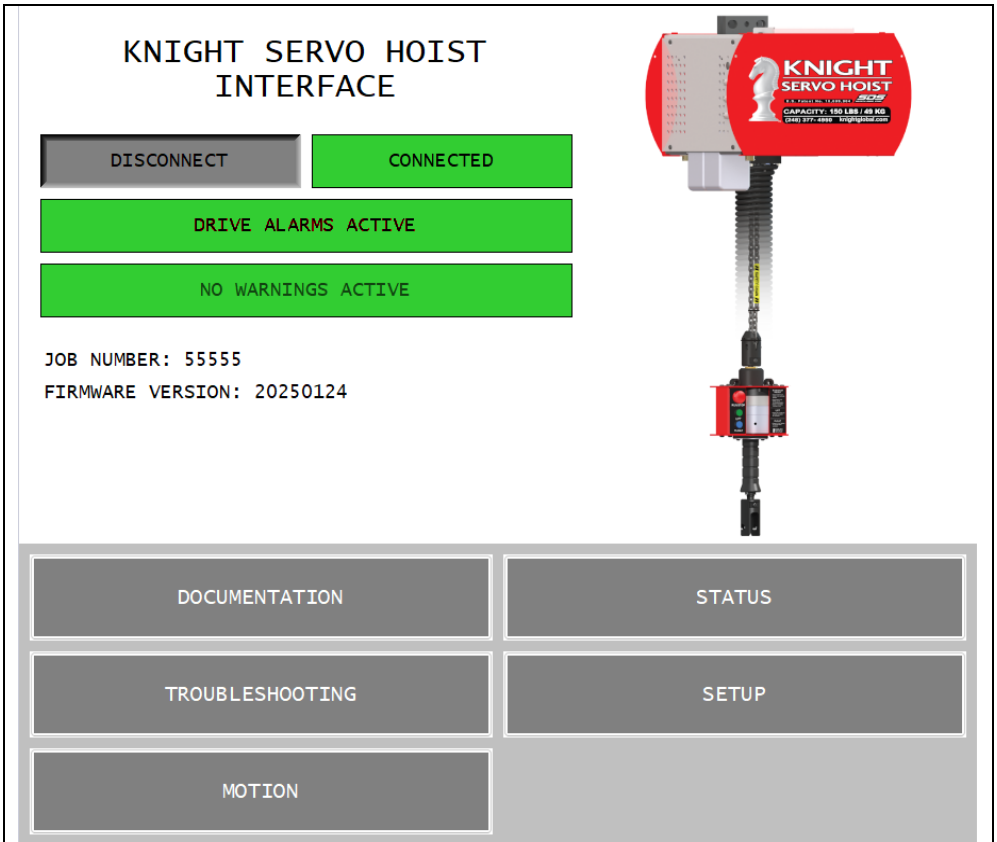


Figure 5-32

H. Check or Change Setup Values

The Knight Servo Studio Servo software can be used to set up the Knight servo drive. Follow these steps to configure the servo drive after a laptop has been connected to the system.
Refer to Section 5.B. “Connecting to a Servo Hoist”.

Step 1. Once connected to the hoist the Start Screen will be displayed. Begin by clicking on the Setup button.

Step 2. The Setup Index screen will be displayed (See Figure 5-33).

a. “Run Setup Procedure” Steps through the first setup process.

b. “Setup Shortcuts” takes you directly to specific standard setting page links.

c. “User Program” takes you to application specific custom pages for any custom job specific parameter settings.

SETUP INDEX screen: (See Figure 5-33)

Press the “SETUP” button on the ‘Start’ screen to display the ‘SETUP INDEX’ screen.

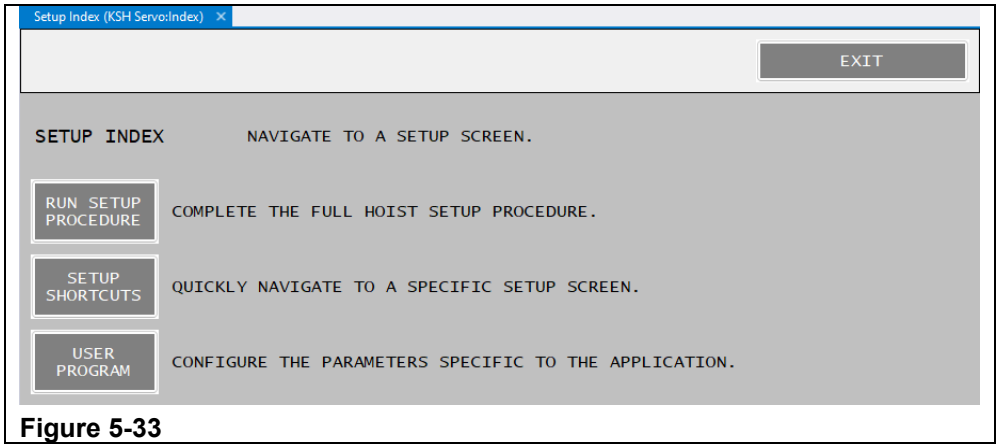


Figure 5-33

SETUP SHORTCUTS screen: (See Figure 5-34)

By pressing the “SETUP SHORTCUTS” button on the ‘SETUP INDEX’ screen, this screen will be displayed. This screen will allow you to easily display many software functions.

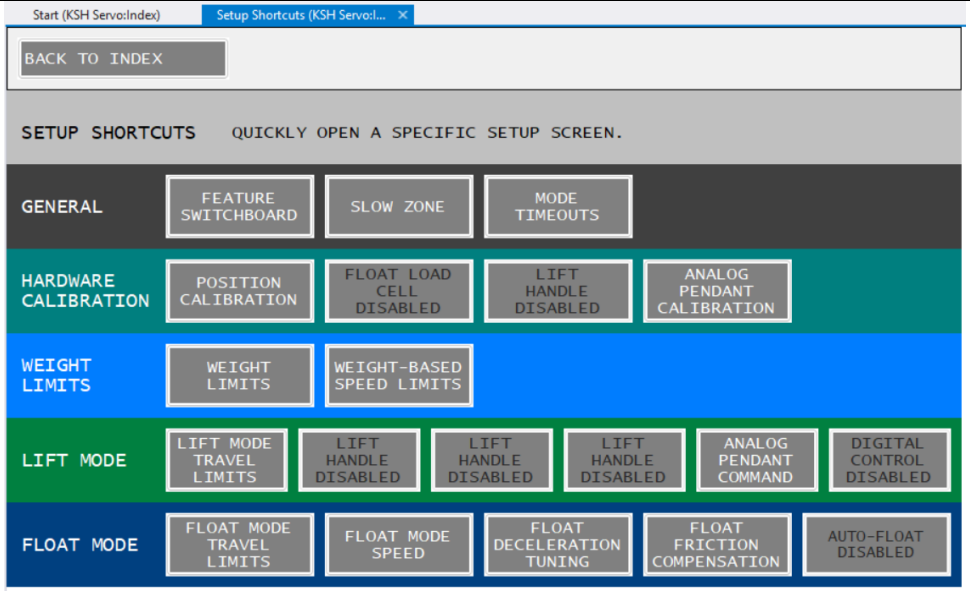


Figure 5-34

FEATURE SWITCHBOARD screen: (See Figure 5-35)

By pressing the “RUN SETUP PROCEDURE” button on the ‘SETUP INDEX’ screen the ‘FEATURE SWITCHBOARD’ screen will be shown.

This should only be changed with the help of Knight service personnel.

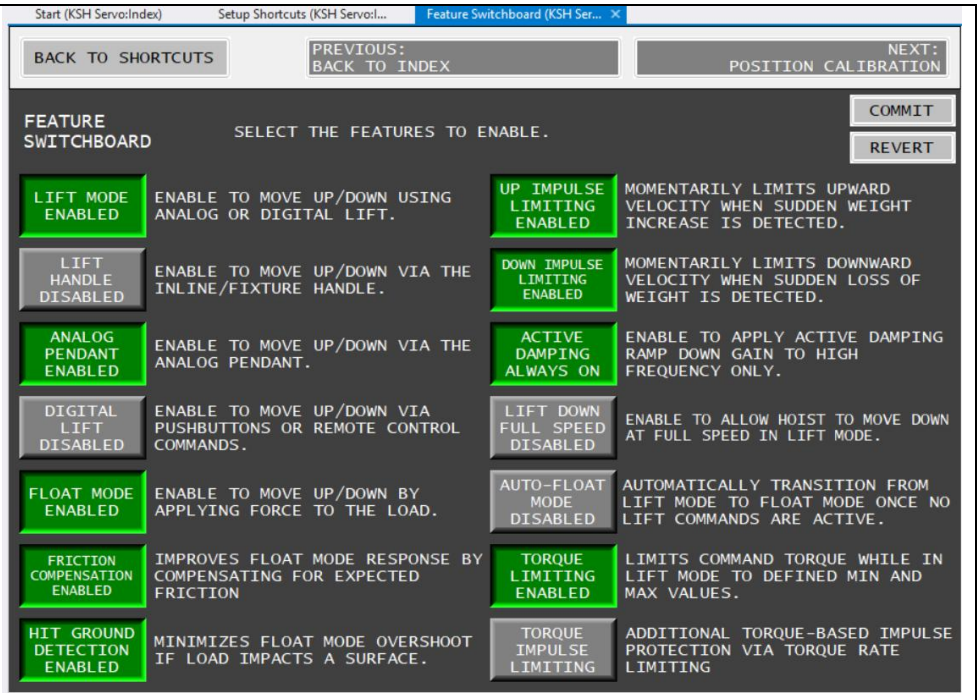


Figure 5-35

POSITION CALIBRATION screen: (See Figure 5-36)

Position Calibration tells the hoist where it is at. To do this you must first put the hoist into a known or "Home" position. Refer to Section "5.I. Encoder Offset Setup Procedure " to position the hoist correctly. Once the hoist is in position click on the "Set Home Position" button to tell the hoist it is in the "Home" position. The Feedback Position will update once the "Commit" button is clicked. Figure 5-36 shows the value for a cable hoist and Figure 5-37 shows a chain hoist.

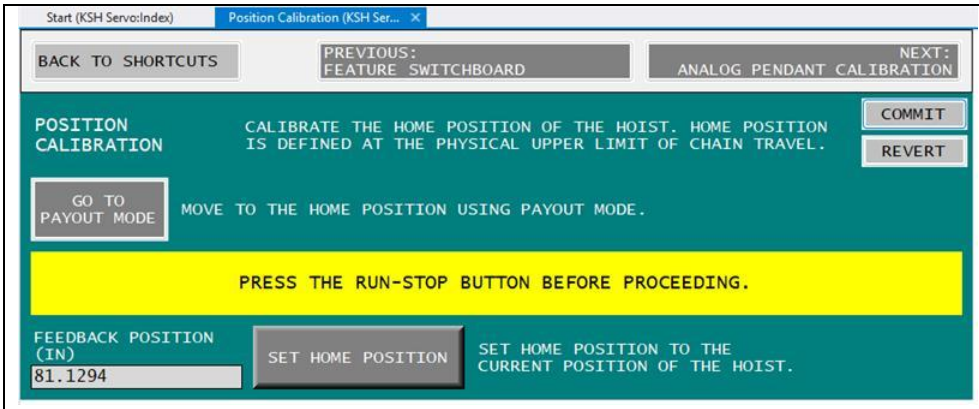


Figure 5-36

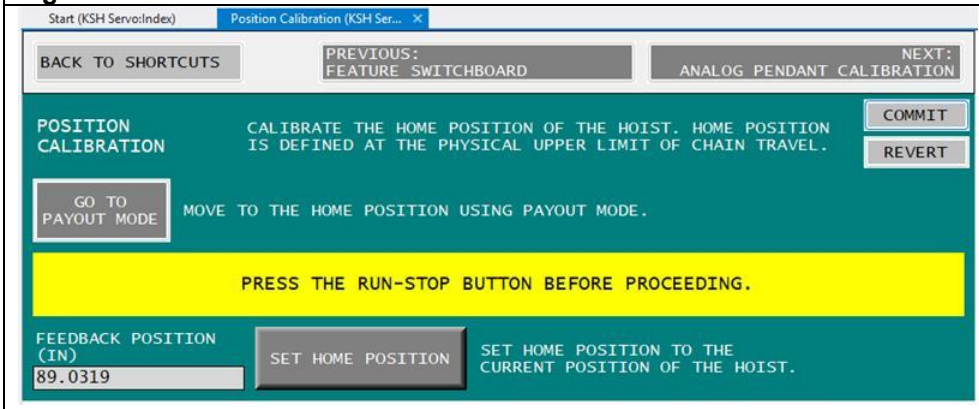


Figure 5-37

FLOAT LOAD CELL CALIBRATION screen**: (See Figure 5-37)

Float Load Cell setup: The 'SET FLOAT LOAD CELL BIAS' button should only be pressed if there is nothing hanging from the bottom of the Load Monitoring Module (LMM). This button is usually only pressed when the LMM has been replaced.

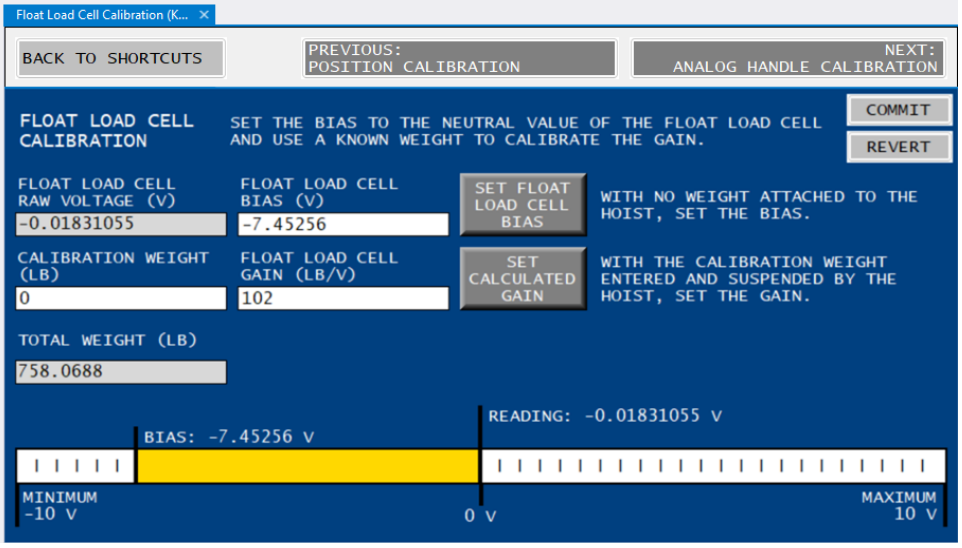


Figure 5-37

** **ONLY VISIBLE WHEN HOIST IS EQUIPED WITH FLOAT LOAD CELL.**

ANALOG HANDLE CALIBRATION screen**: (See Figure 5-38)

Analog Handle setup: This must be calibrated when there is no force applied to the handle.

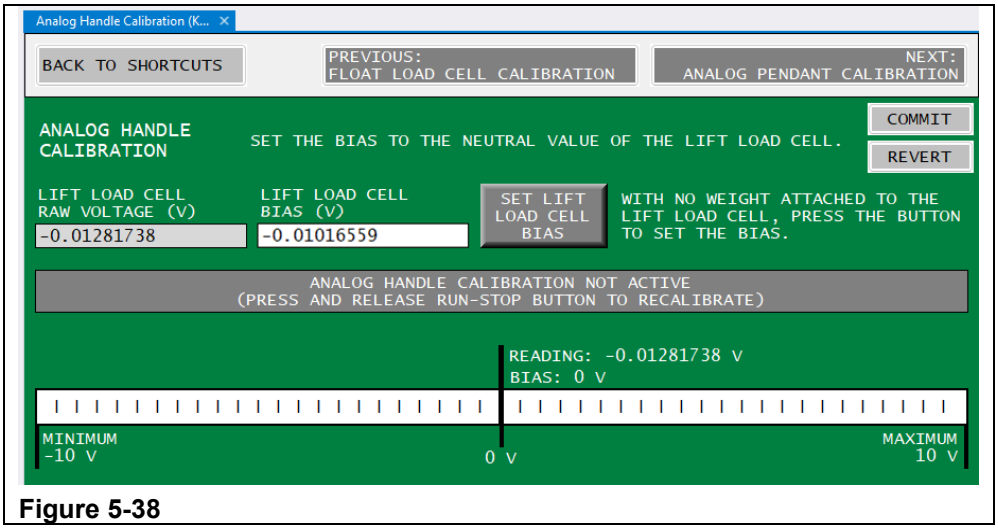


Figure 5-38

ANALOG PENDANT CALIBRATION screen: (See Figure 5-39)

Analog Pendant Calibration setup: This screen is used to calibrate a new analog pendant's voltage so it can be used to control the servo's up / down movement.

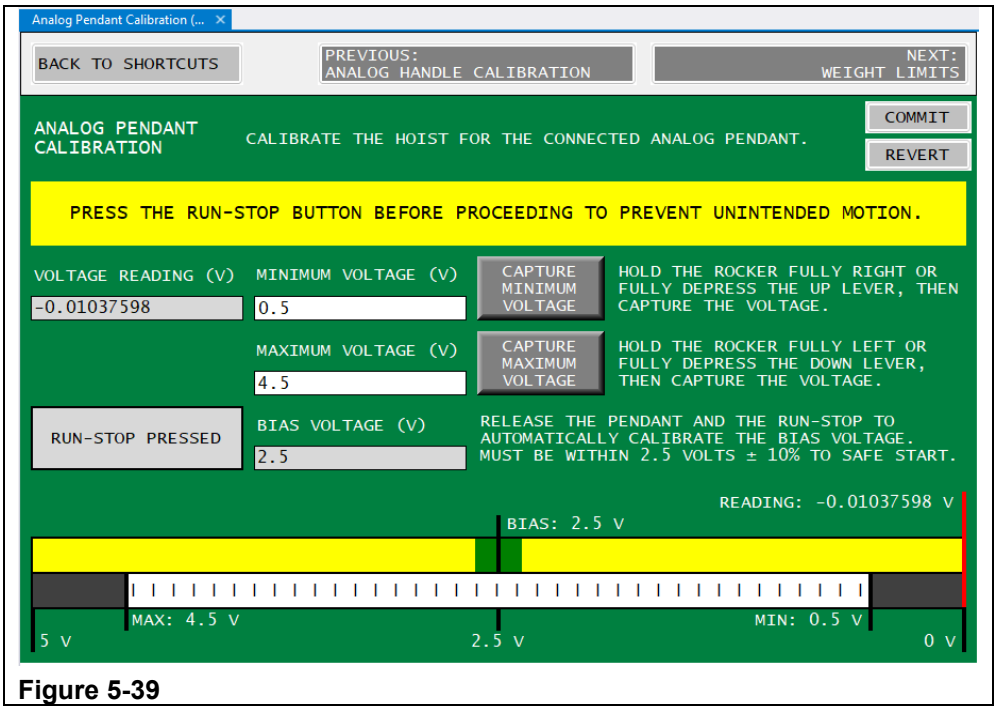


Figure 5-39

****ONLY VISIBLE WHEN HOIST IS EQUIPED WITH ANALOG FIXTUER OR INLINE HANDLE.**

WEIGHT LIMITS screen: (See Figure 5-40)

Fixture Weight setup: If the weight of the fixture changes, ensure that the fixture is hanging free without a part or any extra weight hanging from it and press the 'SET FIXTURE WEIGHT TO CURRENT WEIGHT' button to change the 'Fixture Weight (lb)' to the current 'Total Weight (lb)' displayed.

Maximum Total Weight: This is the total amount of weight that the servo will lift. If this value is exceeded the servo will stop moving upward (UpStop).

Minimum Part Weight: This is the amount of weight that the servo will set down on a surface. It also ensures that the servo will not pay out more chain/cable when the part is set down (DownStop).

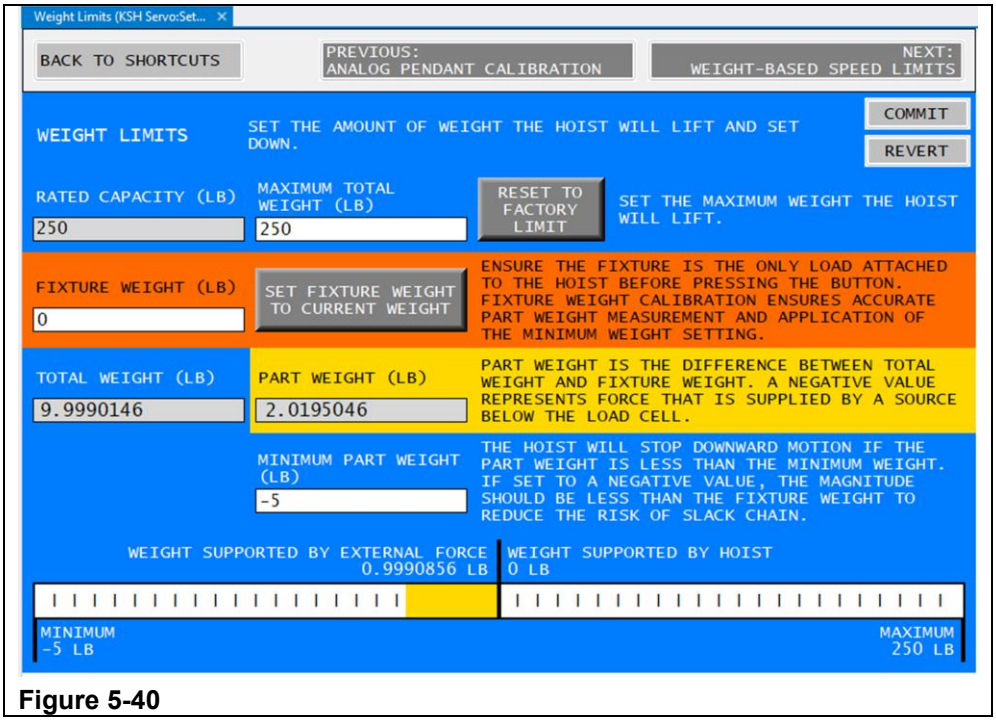


Figure 5-40

WEIGHT-BASED SPEED LIMITS screen: (See Figure 5-41)

Speed setup: These speeds take precedence over the speed limits set for either the analog or digital handles. These values should not be changed without direction from Knight personnel.

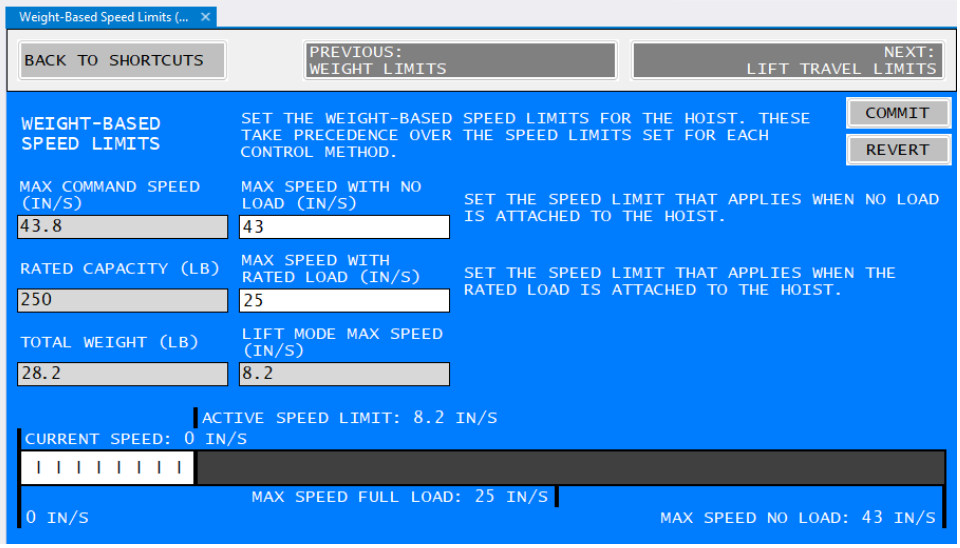


Figure 5-41

LIFT MODE TRAVEL LIMITS screen: (See Figure 5-42)

Upper / Lower limits: These rows display the absolute Upper and Lower Limits of the Servo Hoist.

The Upper limit starts just below the hoist plus the coil cable's stack up and is considered 0".

The Lower limit can NOT exceed the maximum length of the coil cable, i.e., an 8' coil cable = 96".

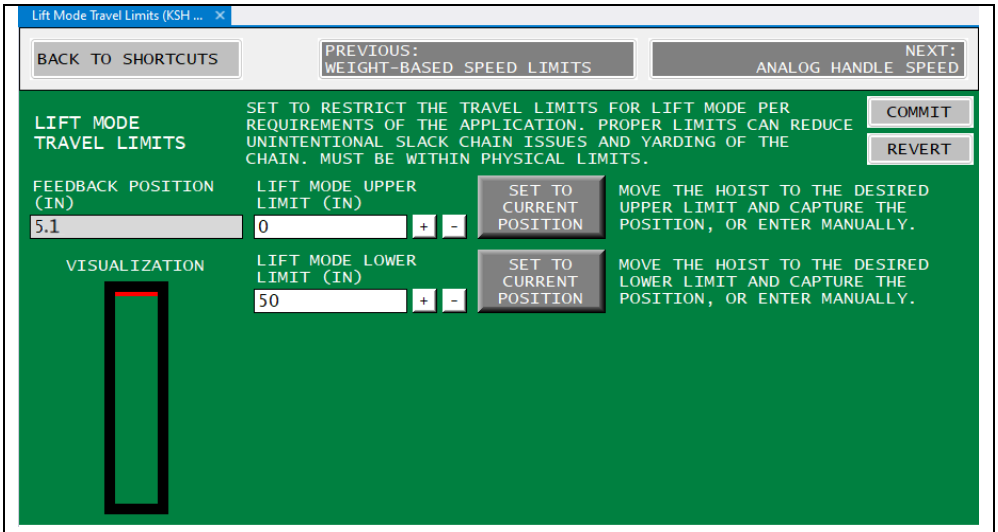


Figure 5-42

ANALOG PENDANT COMMAND screen: (See Figure 5-43)

Analog Pendant Command setup: This screen is used to configure the speeds and accelerations for the analog handle. Also, the number of speed bands or continuous speed increase can be set.

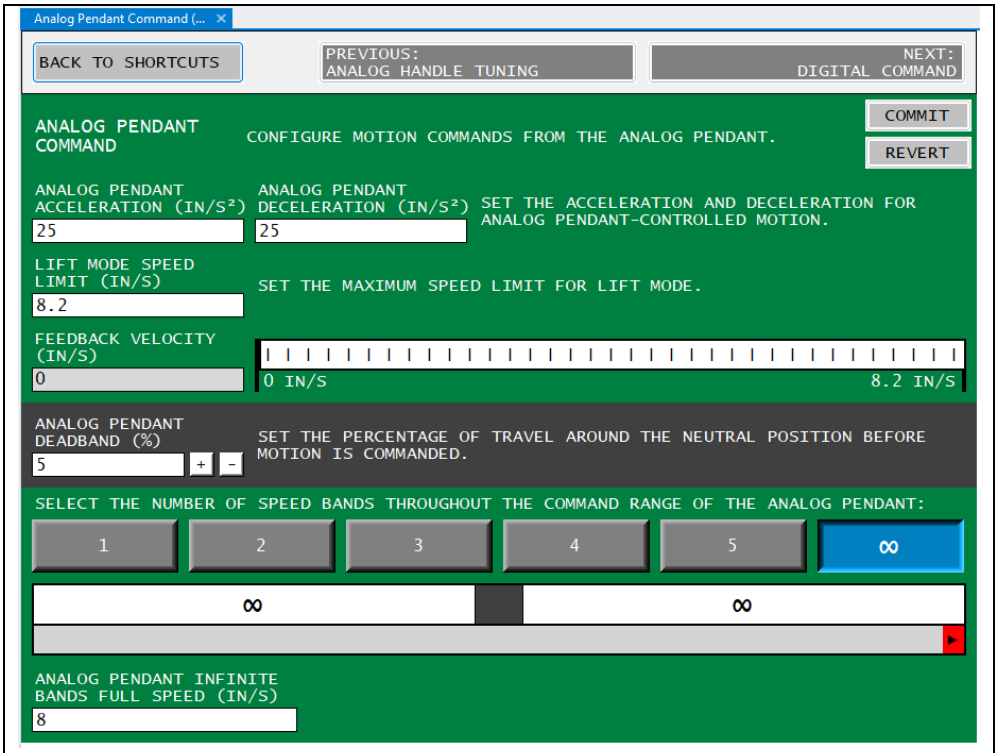


Figure 5-43

ANALOG HANDLE SPEED screen**: (See Figure 5-44)

Inline or Fixture Handle speeds: Set the speed and acceleration limits that apply to analog handle controls.

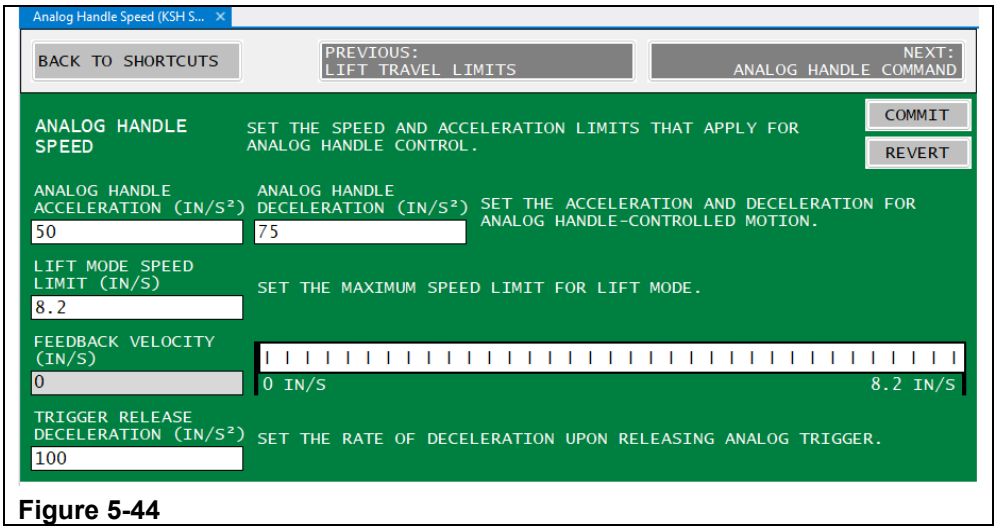


Figure 5-44

** **ONLY VISIBLE WHEN HOIST IS EQUIPED WITH ANALOG FIXTURE OR INLINE HANDLE.**

ANALOG HANDLE COMMAND screen**: (See Figure 5-45)

Inline or Fixture Handle commands: Configure the conditions needed to start a motion command from the analog handle.

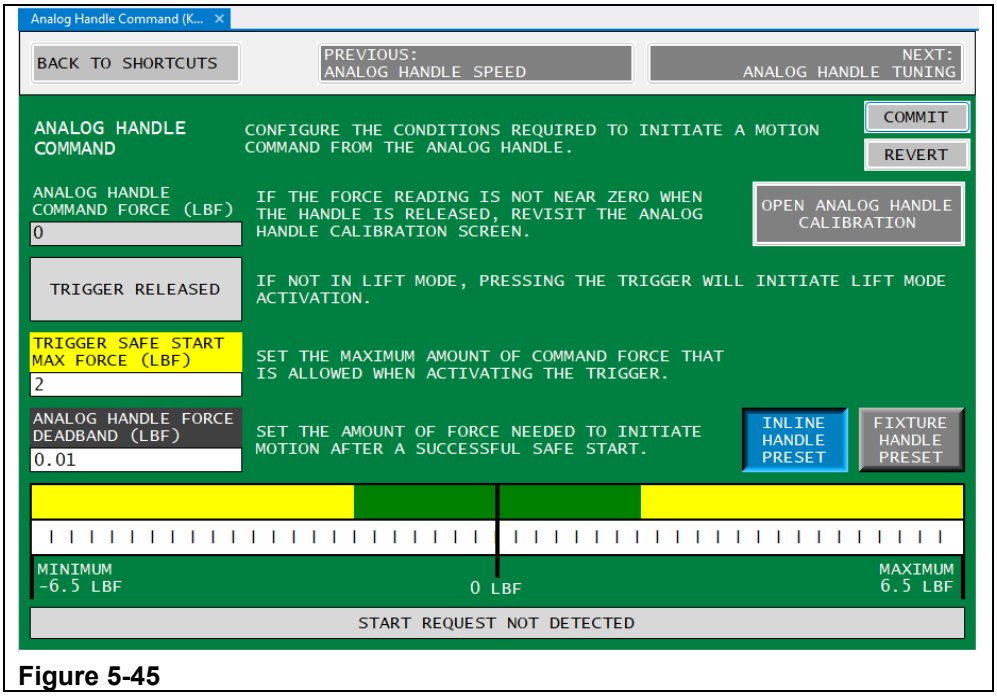


Figure 5-45

** **ONLY VISIBLE WHEN HOIST IS EQUIPED WITH ANALOG FIXTUER OR INLINE HANDLE.**

ANALOG HANDLE TUNING screen**: (See Figure 5-46)

Tune motion control with the analog handle.

Slow: Slower system response to analog handle input.

Normal: Standard system response to analog handle input.

Fast: Faster system response to analog handle input.

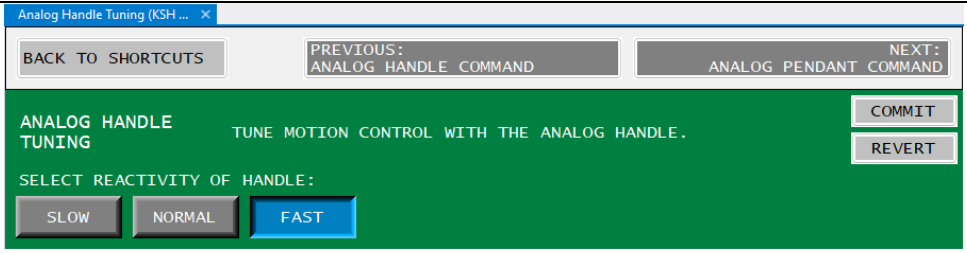


Figure 5-46

** **ONLY VISIBLE WHEN HOIST IS EQUIPED WITH ANALOG FIXTUER OR INLINE HANDLE.**

DIGITAL CONTROL COMMAND screen**: (See Figure 5-47)

Configure motion commands from the digital control input.

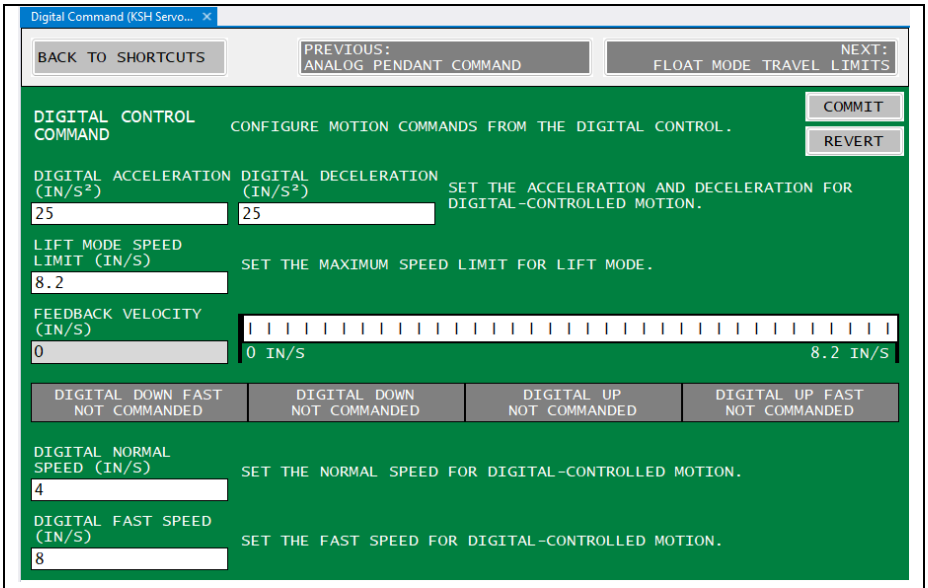


Figure 5-47

**** ONLY VISIBLE WHEN HOIST IS EQUIPED WITH DIGITAL PENDANT CONTROLS.**

FLOAT MODE TRAVEL LIMITS screen: (See Figure 5-48)

Set to restrict the travel limits for float mode per requirements of the application. Proper limits can reduce unintentional collisions. These settings are restricted by the overall travel limits.

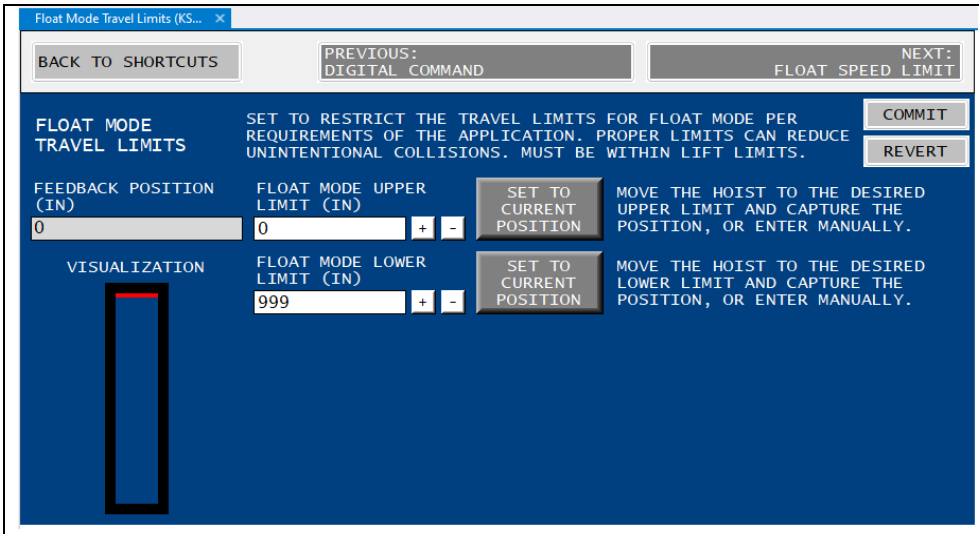


Figure 5-48

FLOAT MODE SPEED screen: (See Figure 5-49)

Set the speed and acceleration limits that apply for float mode.

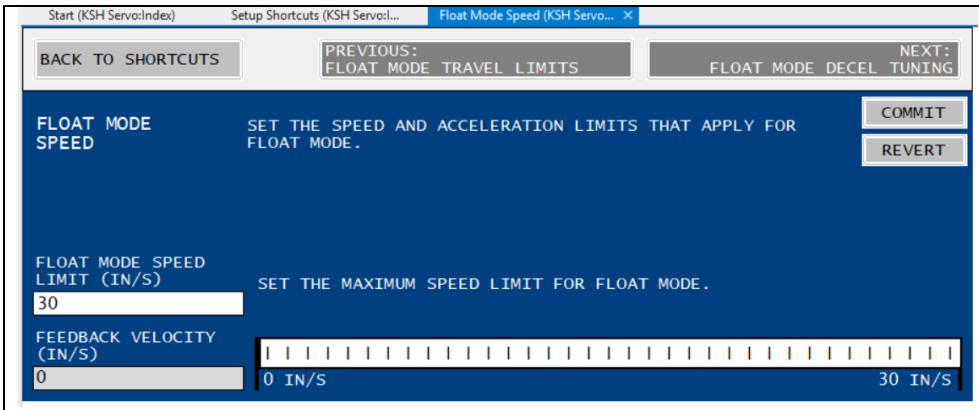


Figure 5-49

FLOAT MODE DECEL TUNING screen: (See Figure 5-50)

Configure the standard and rapid deceleration rates used when in Float Mode.

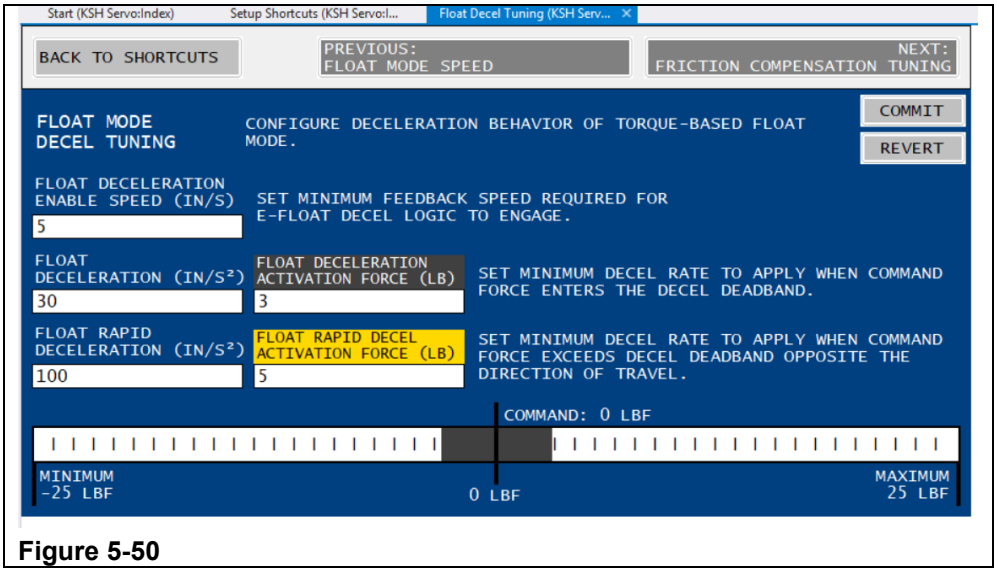


Figure 5-50

FRICTION COMPENSATION TUNING screen: (See Figure 5-51)

Configure the standard and rapid deceleration rates used when in Float Mode.

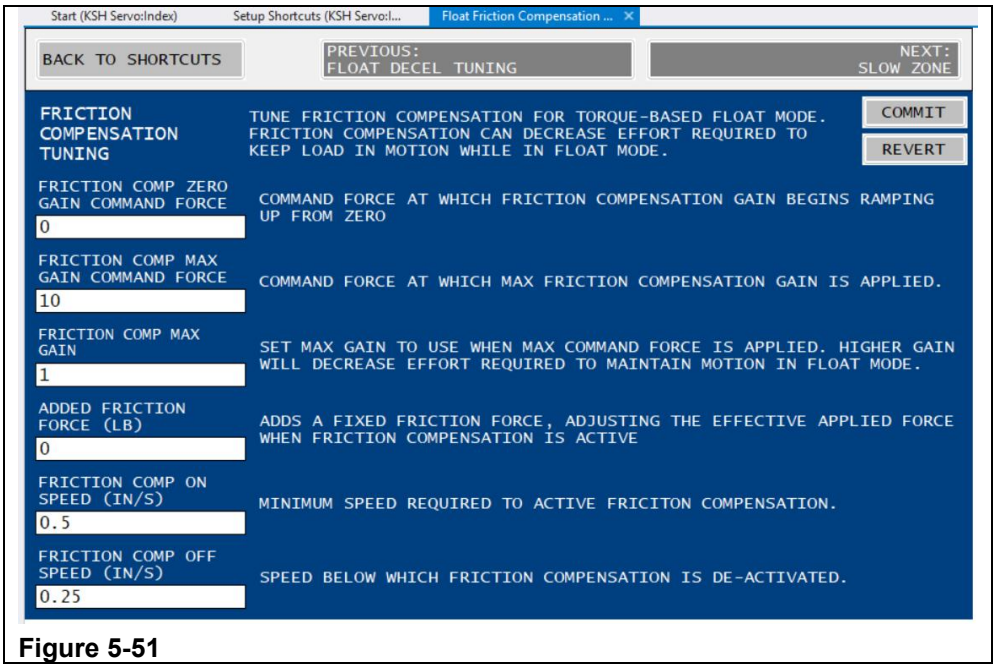


Figure 5-51

SLOW ZONE screen: (See Figure 5-52)

Configure a zone within the hoist's range of travel with a reduced speed limit in one or both directions of travel.

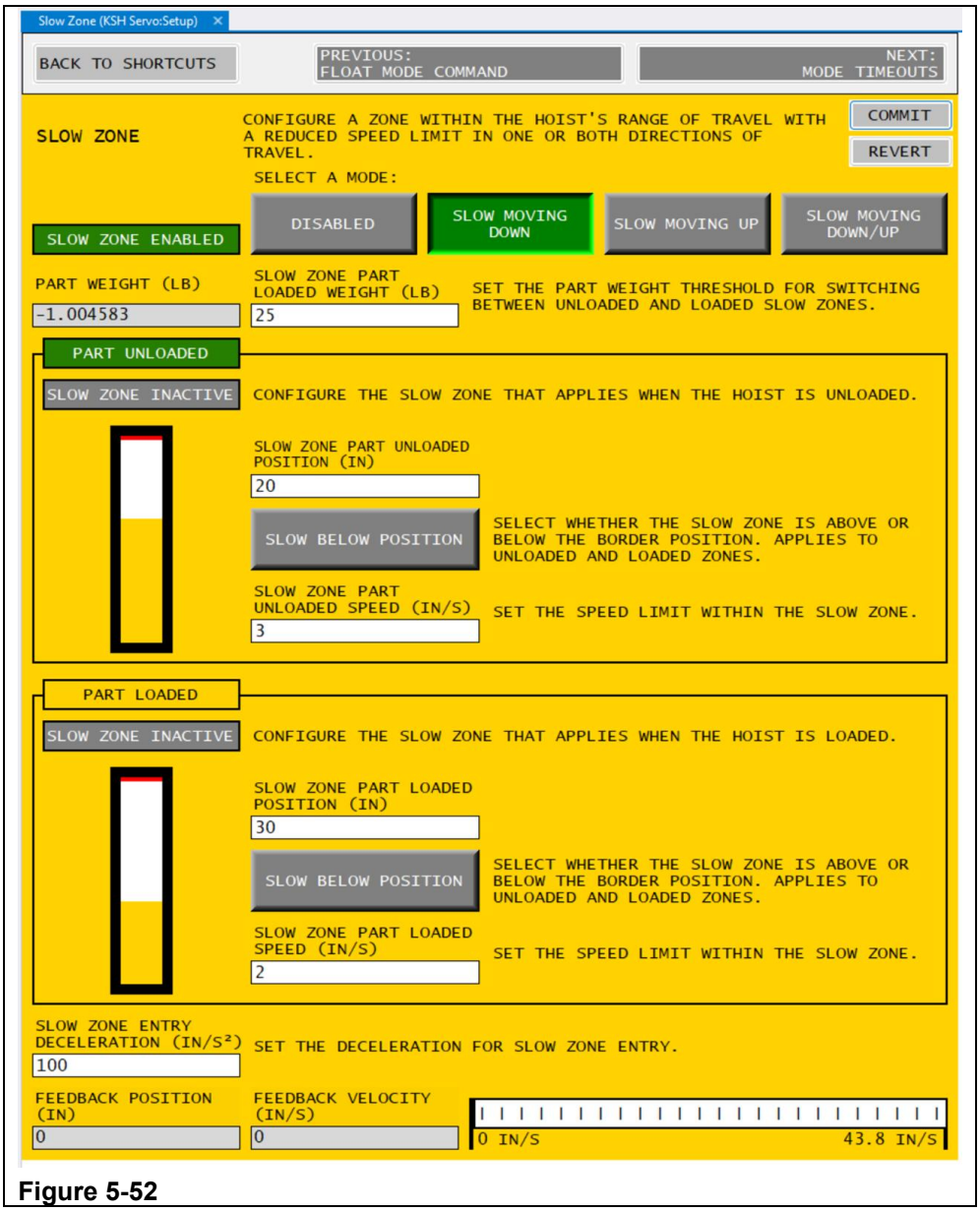


Figure 5-52

MODE TIMEOUTS screen: (See Figure 5-53)

Configure the timeout durations for each mode.

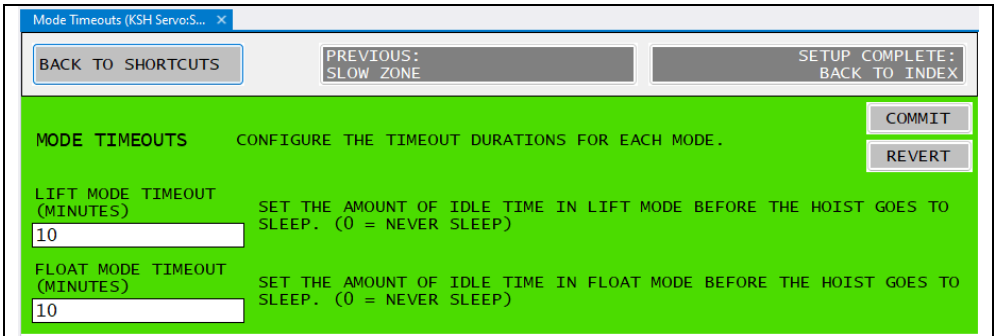


Figure 5-53

.

	NOTE
	If any of the selections are changed on any of the screens, the "COMMIT" must be clicked to have the values committed.

I. Encoder Offset Setup Procedure

The Knight Servo Studio Servo software can be used setup Encoder Offset position of the servo. Refer to Section 5.B. “Connecting to a Servo Hoist”.

Step 1. Homing process relies on the physical spool position. Spool **MUST** be aligned as shown in Figure 5-54.

Step 2. Bring up the “POSITION CALIBRATION” screen.

Step 3. Use “PAYOUT MODE” (Section J pg.84) to extend or retract the chain/cable until the correct homing position is reached. (See Figure 5-54)

Figure 5-54

Step 4. Once in position press the Run/Stop button.

Step 5. In the upper right corner of the “Payout Mode” screen click the button labeled “Go to Position Calibration” to return to the position calibration Screen

Step 6. Press the ‘SET HOME POSITION’ button. This will set the ‘Current Position (in)’ of the hoist to the ‘Home Position (in)’.
The ‘Commit’ button found on the upper Right-hand side of the panel will turn yellow.

Step 7. Press the ‘Commit’ button. This will set the current position of the hoist to its configured “Home” Position. (See Figure 5-55 for Cable and Figure 5-56 for chain)

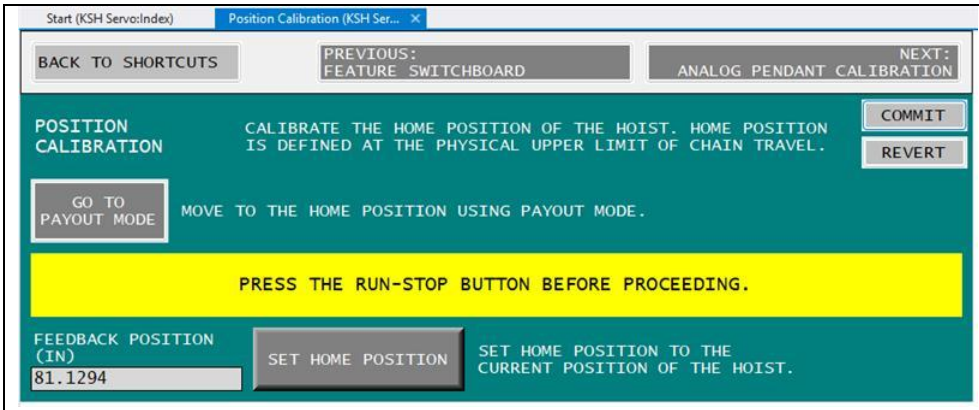


Figure 5-55

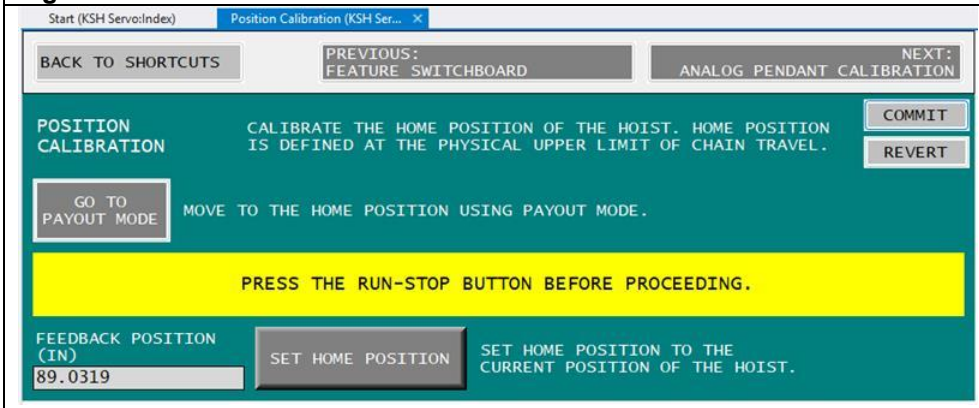


Figure 5-56

	CAUTION
⚠	**The 19-pin coil cable if equipped should not be fully compressed when the hoist is in the full up or zero position.** **There should be enough room below the servo so a two-inch (2”) spacer could be inserted between any two coils of the 19-pin coil cable when the hoist is in the full up position.**

J. Operating Payout Mode

The ‘Payout Mode’ can be started with the Knight Servo Software.

Step 1. From the “START” screen select the “MOTION” button. (See Figure 5-57)

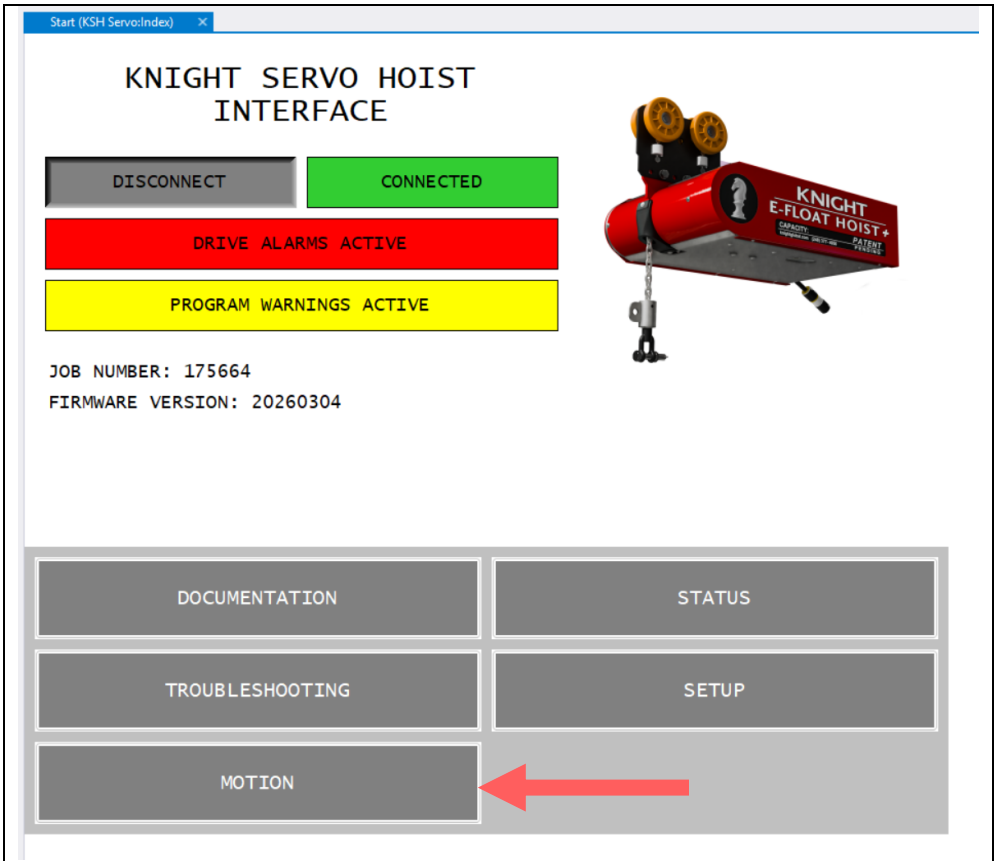


Figure 5-57

Step 2. From the “MOTION INDEX” screen click on the “PAYOUT MODE” button. (See Figure 5-58)

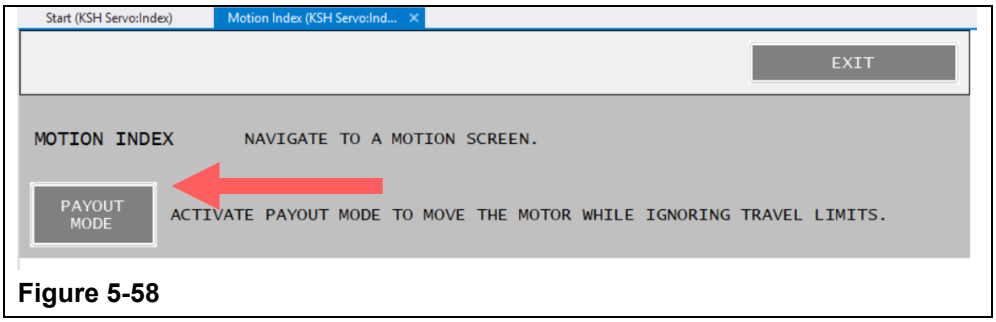


Figure 5-58

PAYOUT MODE screen: (See Figure 5-59)

PAYOUT MODE should only be used when homing the servo or replacing the chain/cable. Any load being supported by the servo must be removed prior to activating payout mode.

WARNING

PAYOUT MODE WILL BYPASS ALL PROGRAMMED TRAVEL LIMITS. TECHNICIAN MUST KEEP HAND ON RUN/STOP BUTTON AT ALL TIMES TO PREVENT OVER TRAVEL DAMAGING THE HOIST.

Row #1) Commit Row: If ANY of the values are changed, the 'Commit' button will turn yellow and must be pressed for that change to take effect.

Row #2) Set the 'PAYOUT MODE SPEED'. This should be set between 1 to 5. The 'Stop' button will stop the movement of the hoist.

Row #3) The 'PAYOUT MODE BACKOFF DISTANCE (in)'. When the torque limit is reached in either direction the hoist will reverse direction and travel this distance before stopping and cancelling payout mode. This is typically set between 0 and .5 inches.

Row #4) Set the 'PAYOUT MODE TORQUE LIMIT (%)'. This is the % of maximum motor torque allowed in PAYOUT MODE. The default is set to 10%; this may need to be increased for some applications. Value should not exceed 40%.

WARNING

The 'PAYOUT MODE TORQUE LIMIT (%)' THE DEFAULT IS SET TO 10%. DAMAGE MAY OCCUR TO THE SERVO OR PERSONNEL IF THIS VALUE IS SET TOO HIGH.

Row #5) The "TORQUE FEEDBACK (%)" is a real-time numerical display of the motor's torque. The scale is a visual representation of this value.

Row #6) The 'START PAY IN' button will start the chain/cable being wound back into the hoist.

The "START PAY OUT" button will start the chain/cable feeding out of the hoist.

The "STOP" will stop the hoist from moving.

The "GO TO CHAIN REPLACEMENT POSITION" button is unique to the E-Float hoist and will feed out chain/cable until the drum attachment point is in the access window.

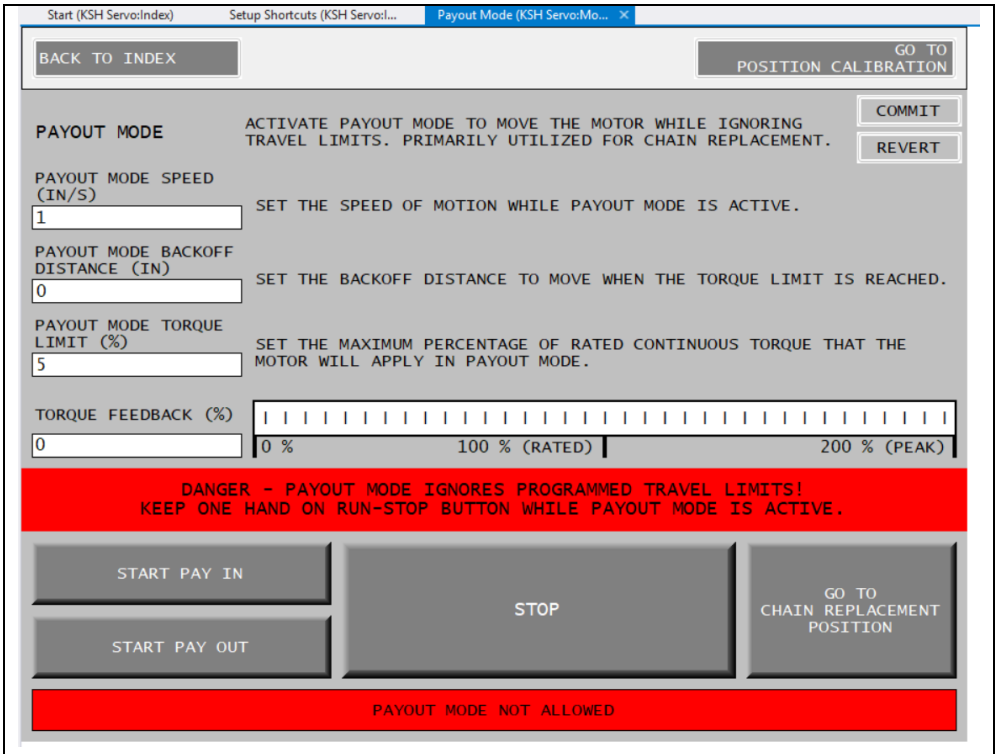

Start (KSH Servo:Index)
Setup Shortcuts (KSH Servo:I...
Payout Mode (KSH Servo:Mo...
BACK TO INDEX
GO TO POSITION CALIBRATION
PAYOUT MODE
ACTIVATE PAYOUT MODE TO MOVE THE MOTOR WHILE IGNORING TRAVEL LIMITS. PRIMARILY UTILIZED FOR CHAIN REPLACEMENT.
COMMIT
REVERT
PAYOUT MODE SPEED (IN/S)
1
SET THE SPEED OF MOTION WHILE PAYOUT MODE IS ACTIVE.
PAYOUT MODE BACKOFF DISTANCE (IN)
0
SET THE BACKOFF DISTANCE TO MOVE WHEN THE TORQUE LIMIT IS REACHED.
PAYOUT MODE TORQUE LIMIT (%)
5
SET THE MAXIMUM PERCENTAGE OF RATED CONTINUOUS TORQUE THAT THE MOTOR WILL APPLY IN PAYOUT MODE.
TORQUE FEEDBACK (%)
0
0 %
100 % (RATED)
200 % (PEAK)
DANGER - PAYOUT MODE IGNORES PROGRAMMED TRAVEL LIMITS!
KEEP ONE HAND ON RUN-STOP BUTTON WHILE PAYOUT MODE IS ACTIVE.
START PAY IN
START PAY OUT
STOP
GO TO CHAIN REPLACEMENT POSITION
PAYOUT MODE NOT ALLOWED

Figure 5-59

K. Accessing the Servo Hoist's Fault Log

The servo drive's Fault Log is accessible from its web page.

Step 1. Open a web browser and enter the hoist's IP Address in the address bar. The typical address is 192.168.2.101.

Step 2. The web page will be similar to Figure 5-60.

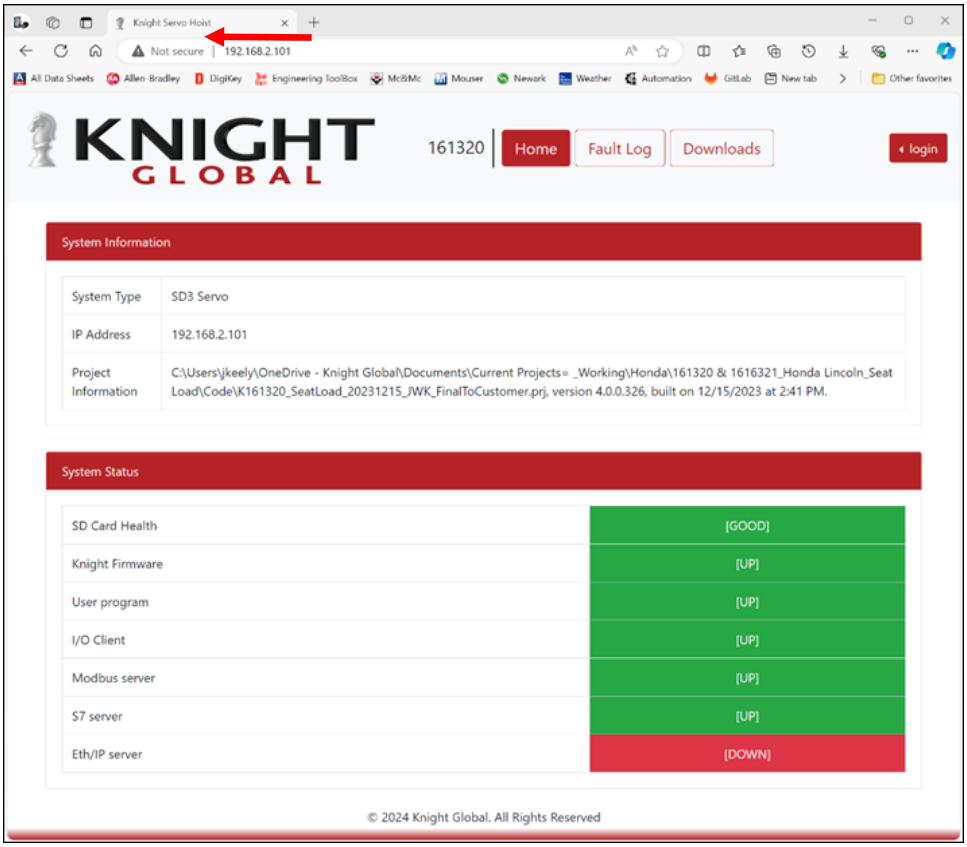


Figure 5-60

Step 3. Select the ‘Fault Logs’ button to see a list of all the faults recorded by the servo. Each fault will have a ‘Fault ID’, a ‘Description’, the time the fault occurred and the duration the fault lasted. (See Figure 5-61)

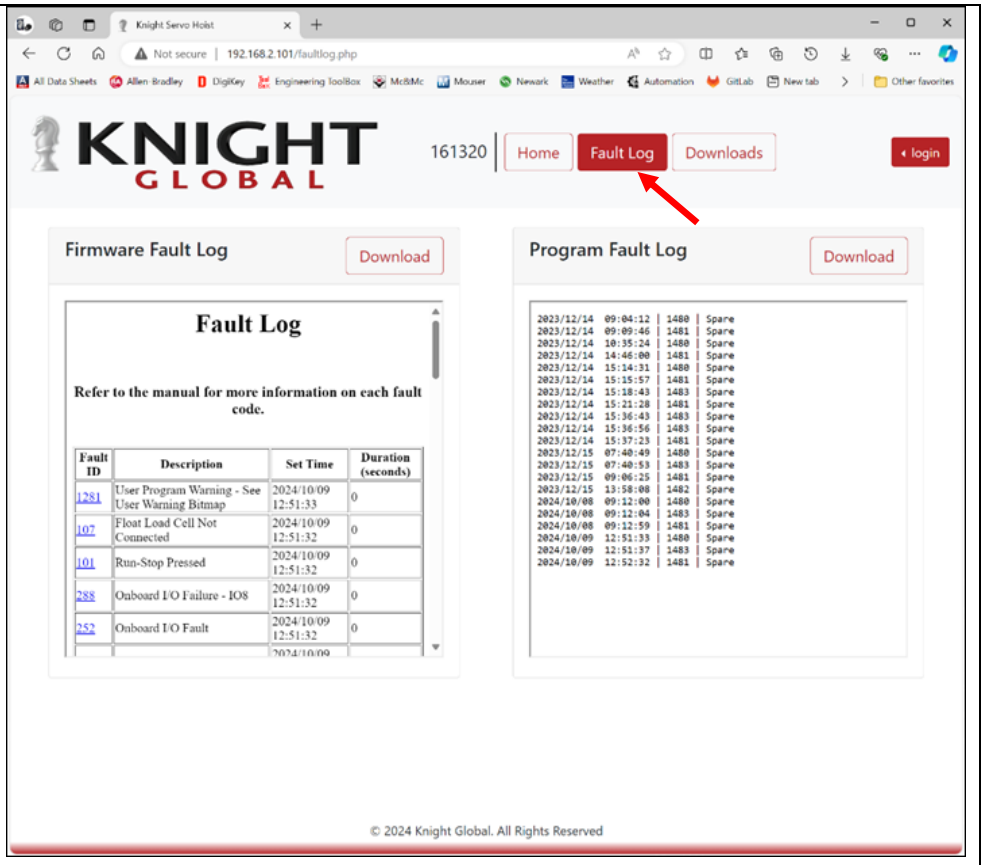


Figure 5-61

Step 4. Select the ‘Downloads’ button to see the available options to transfer information from the servo.

- Software: Knight Servo Configuration Software.
- Manual: Knight Servo Hoist Manual.
- Documentation:
  - Manual Addendum: Operation manual addendum for this system / job number.
  - Drawings: Electrical and mechanical drawings.
  - Spare Parts List: Recommended spare parts for this system / job number.

(See Figure 5-62)

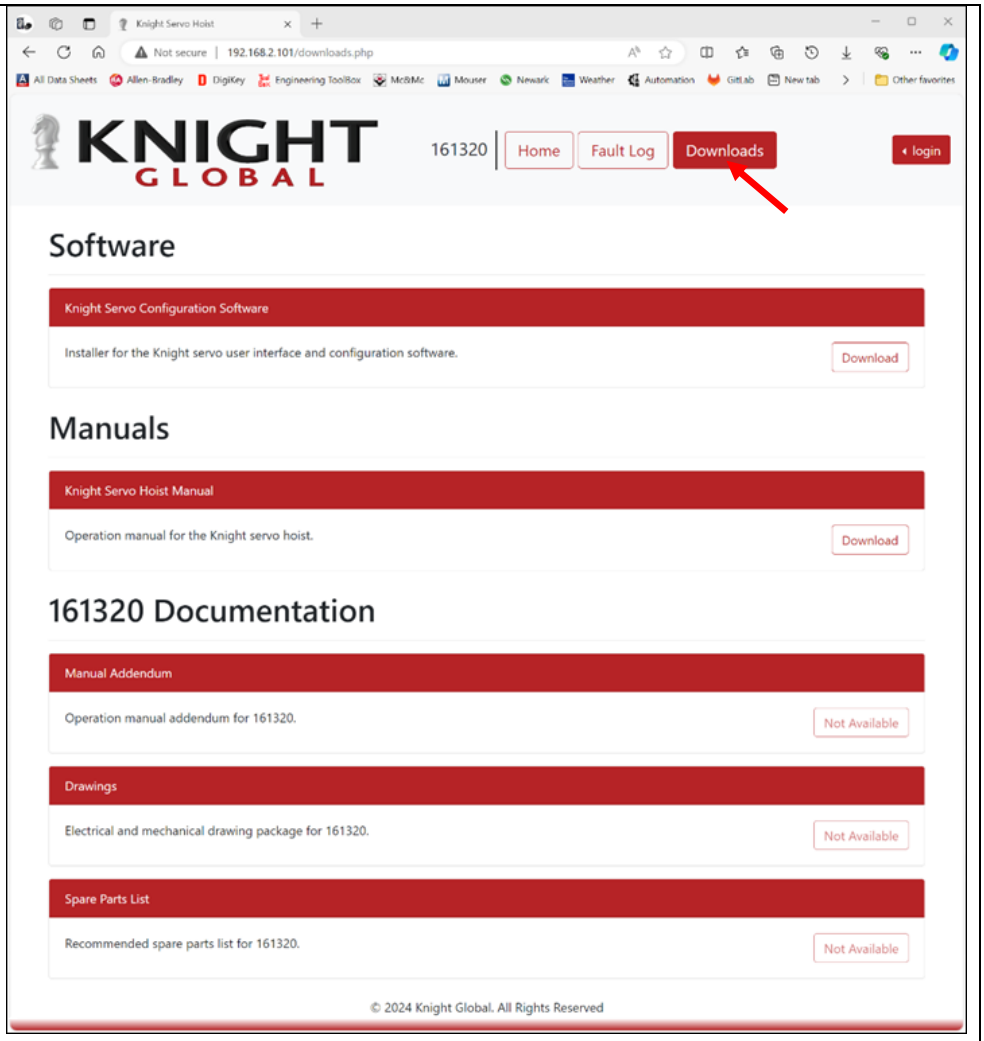


Figure 5-62

6. PARAMETER TABLES

There are several parameter status arrays described in this section:

6.A.) iSTS Status Array
6.B.) fSTS Status Array
6.C.) PRM1 Parameter Array
6.D.) User Retained Variables Parameter Array
6.E.) PRM2 Parameter Array

To access the parameter tables first you must access the Workspace Tree on the left side of the Knight Servo Studio window. (See Figure 6-1)

Step 1.) Place your cursor over the word Workspace, it will turn blue and click.

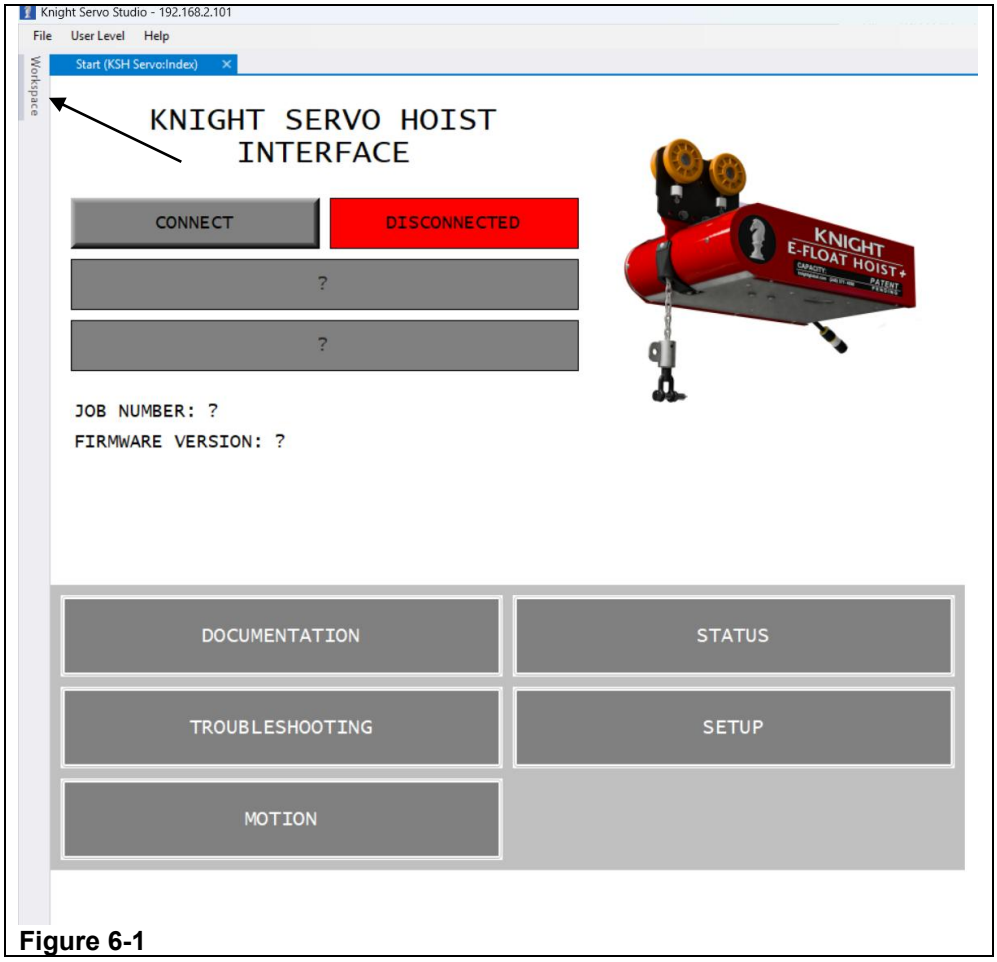


Figure 6-1

Step 2.) The Workspace tree will extend. (See Figure 6-2)
Customer hoists will display the job# at the top level of the tree. Expand the tree by clicking on the + next to the Job#.
Expand the Parameters and User Program branches by clicking on the + symbols.

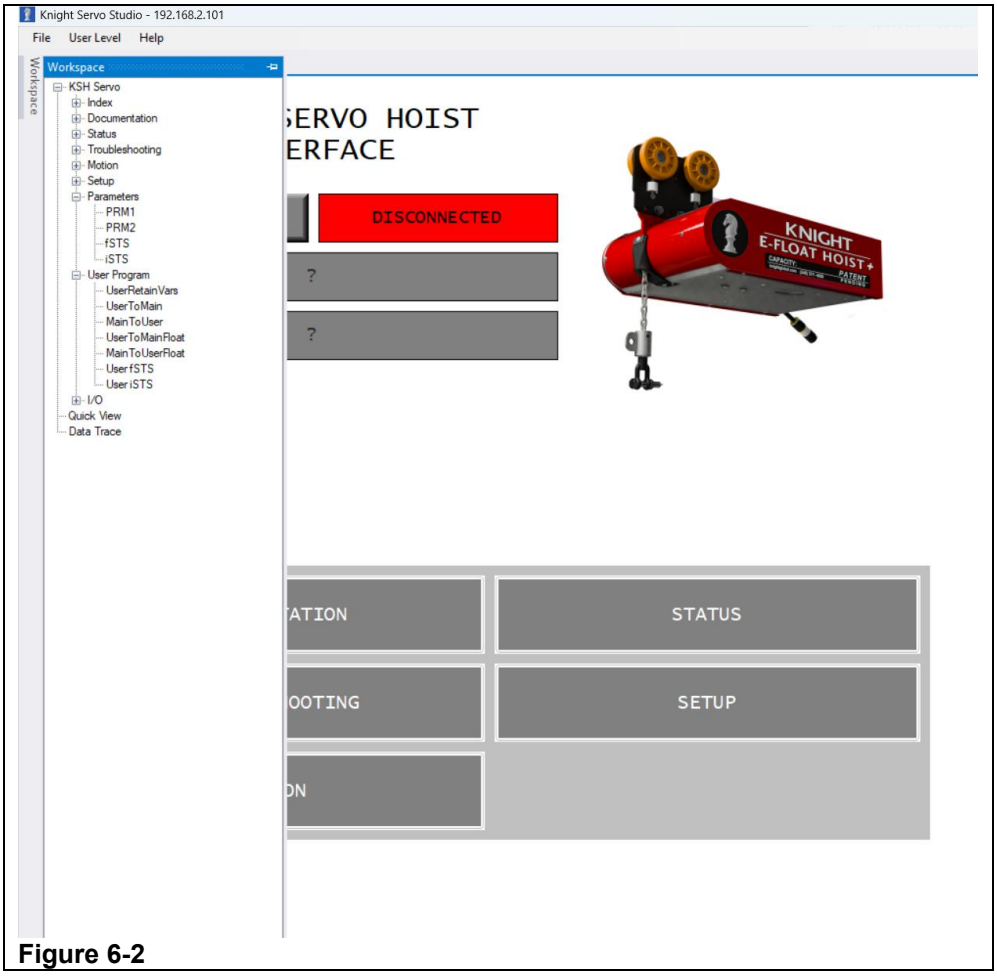


Figure 6-2

A. iSTS Status Array

This array is reserved for integer numbers.

Table[idx]	Parameter	Description	KSS Location
iSTS[00]	Firmware Version	This parameter displays the current firmware version of the servo's software.	Quick View panel \ Row 6 (Lower right-hand part of the screen)
iSTS[01]	Drive Serial Number	This parameter displays the serial number of the servo drive.	Quick View panel \ Row 9 (Lower right-hand part of the screen)
iSTS[02]	I/O Expansion Serial Number	This parameter displays the serial number of the I/O Expansion card installed on the servo drive.	Quick View panel \ Row 10 (Lower right-hand part of the screen)
iSTS[03]	FPGA Type	This parameter if for internal Knight use only.	
iSTS[04]	Configured Motor ID	This parameter if for internal Knight use only.	
iSTS[05]	Product Series	This parameter if for internal Knight use only.	
iSTS[06]			
iSTS[07]			
iSTS[08]	Firmware Up Time (sec)	This parameter displays time in seconds since the last time the drive was powered ON	
iSTS[09]			
iSTS[10]			
iSTS[11]			
iSTS[12]			
iSTS[13]			
iSTS[14]			
iSTS[15]	Last Measured Safety Relay Off Delay Time (ms)	This parameter if for internal Knight use only.	
iSTS[16]	Last Measured Brake Off Delay Time (ms)	This parameter if for internal Knight use only.	
iSTS[17]	Current Run-Stop Decel Time Setting (PRM3[91])	This parameter if for internal Knight use only.	
iSTS[18]	Recommended Run-Stop Decel Time (ms)	This parameter if for internal Knight use only.	
iSTS[19]			
iSTS[20]			
iSTS[21]	Drive STO Fault	This parameter if for internal Knight use only.	
iSTS[22]	Drive STO Status	This parameter if for internal Knight use only.	

Table[idx]	Parameter	Description	KSS Location
iSTS[23]	Servo Run/Stop	This parameter if for internal Knight use only.	
iSTS[24]	User Program Run/Stop	This parameter if for internal Knight use only.	
iSTS[25]	Enter Float Mode	This parameter displays the current status of the Enter Float Mode bit in the servo program	
iSTS[26]	Enter Lift Mode	This parameter displays the current status of the Enter Lift Mode bit in the servo program	
iSTS[27]	Jog Reverse/Up	This parameter displays the current status of the Jog Reverse bit in the servo program	
iSTS[28]	Jog Forward/Down	This parameter displays the current status of the Jog Forward bit in the servo program	
iSTS[29]	Jog Fast	This parameter displays the current status of the Jog Fast bit in the servo program	
iSTS[30]	Active Speed Band Request		
iSTS[31]			
iSTS[32]			
iSTS[33]			
iSTS[34]	Analog Trigger	This parameter displays the current status of the analog trigger bit in the servo program	
iSTS[35]	Lift Load Cell Calibrating	This parameter displays the current status of the lift Load cell calibration logic. 1 = Calibrating, 0 = Calibration complete	
iSTS[36]			
iSTS[37]			
iSTS[38]			
iSTS[39]			
iSTS[40]			
iSTS[41]	Blue Light	This parameter displays the current status of the blue Light output bit in the servo program	
iSTS[42]	Green Light	This parameter displays the current status of the green Light output bit in the servo program	
iSTS[43]	Red Light	This parameter displays the current status of the Red Light output bit in the servo program	
iSTS[44]			
iSTS[45]	Last Drive Error Code	This parameter displays the last Drive Error Code recorded by the drive	

Table[idx]	Parameter	Description	KSS Location
iSTS[46]	SD3 Power Error Code	This parameter displays the code for an active Drive Power Error	
iSTS[47]	SD3 Drive Error Code	This parameter displays the code for an active Drive Error	
iSTS[48]	Drive Flags Upper 32 bits	This parameter if for internal Knight use only.	
iSTS[49]	Drive Flags Lower 32 bits	This parameter if for internal Knight use only.	

B.fSTS Status Array

This Global Array is used as a status file to review the current state of the Servo Hoist.

These status parameters are listed in the fSTS array and can be displayed at:
KSS Workspace tree location: Knight Work Order # \ Status parameters \ fSTS \ Row xx.
Many of these status parameters have equivalent displays found on various Knight Servo Studio (KSS) screens. The location of these screens is listed at the end of each status parameter's description.
See Section 5. 'Software' for an explanation of the shorthand used.

Table[idx]	Parameter	Unit	Description	KSS location
fSTS[00]	Run/Stop	Boolean (0=Off, 1=On)	This status parameter displays a '1' if the Run-Stop button is in the run position and the 19-pin coil cable is connected to the Servo Hoist. It will be a '0' if the Run-Stop button is in the open condition or if the 19-pin coil cable is disconnected.	Start \ Status \ I/O Status
fSTS[01]	Lowest Set Fault/Warning Number	Fault ID #	This status parameter displays the current drive fault if one exists. If the number is between 1 and 310 then a drive fault has occurred and will be displayed on the Knight Servo Studio Active Fault screen. A complete list of faults is contained in this manual in Section 7 under the heading 'Error Codes'.	Quick View panel \ Row 1 (Lower right-hand part of the screen) Start \ Status \ Drive Alarms/ Warnings
fSTS[02]	(Fault 102) Bad Parameter #	Parameter #	If Fault 102 is active, this specifies the status parameter with an invalid value as a three-digit value. The first digit specifies the PRM status parameter table, and the second two digits specify the index within that table.	
fSTS[03]	Motor Max RPM (Read from Drive)	RPM	Specifies the maximum motor speed that is configured on the drive.	
fSTS[04]	Current Mode (0=none, 1=Lift, 2=Float, 3=Position, 4=Payout)	Choice (0 = No Mode/Sleep, 1=Lift Mode, 2=Float Mode, 3=Test Mode)	This status parameter displays the current operating mode of the hoist.	
fSTS[05]	Current Motion Time (s)	Seconds	This status parameter displays the time it took to complete the last cycle.	
fSTS[06]	Analog Input 0 (V)	Volts	This status parameter displays the value of Analog Input #0 for internal purposes.	

Table[idx]	Parameter	Unit	Description	KSS location
fSTS[07]	Analog Input 1 (V)	Volts	This status parameter displays the value of Analog Input #1 for internal purposes.	
fSTS[08]	Analog Input 2 (V)	Volts	This status parameter displays the value of Analog Input #2 for internal purposes.	
fSTS[09]	Analog Input 3 (V)	Volts	This status parameter displays the value of Analog Input #3 for internal purposes.	
fSTS[10]	Float Load Cell Raw Voltage (V)	Volts	This status parameter displays the analog voltage from the float load cell.	
fSTS[11]	Float Load Cell Filtered Voltage (V)	Volts	This status parameter displays an intermediate calculation of the force exerted on the float load cell.	
fSTS[12]	Float Load Cell Bias Voltage (V)	Volts	This status parameter displays an intermediate calculation of the force exerted on the float load cell.	
fSTS[13]	Float Load Cell Raw Weight Reading (lb)	Pounds	This status parameter displays an intermediate calculation of the force exerted on the float load cell.	
fSTS[14]	Float Mode Command Force (lbf) - LC	Pounds Force	A value generated when the operator puts a vertical force on the part holding fixture or part.	
fSTS[15]	Float Load Cell Total Weight (lb)	Pounds	This status parameter displays the entire weight measured by the Load Monitoring Module's load cell including the part, part holding fixture and any other material suspended below the Load Monitoring Module.	
fSTS[16]	Float Mode Weight Snapshot (lb) - LC	Pounds	This is the weight recorded when the hoist is put into Float mode.	
fSTS[17]	Float Load Cell Part Weight (lb)	Pounds	This status parameter displays the weight of the part hanging from the fixture or inline handle.	Quick View panel \ Row 6 (Lower right-hand part of the screen)
fSTS[18]	Float Load Cell Weight - Fixture Weight (lb)	Pounds	This status parameter displays the weight of the fixture, without a part, hanging from the hoist.	

Table[idx]	Parameter	Unit	Description	KSS location
fSTS[19]	Float Load Cell Scaled Value (lb)	Pounds	This status parameter displays an intermediate calculation of the force exerted on the float load cell.	
fSTS[20]	Lift Load Cell Raw Voltage (V)	Volts	Unfiltered or scaled analog voltage from the lift load cell.	
fSTS[21]	Lift Load Cell Filtered Voltage (V)	Volts	Filtered (More Stable) analog voltage from the lift load cell.	
fSTS[22]	Lift Load Cell Bias Voltage (V)	Volts	Recorded voltage reading with no weight supported by the hoist.	
fSTS[23]	Lift Load Cell Raw Weight Reading (lb)	Pounds	Feedback weight reading based on the Raw feedback from the Lift Load cell	
fSTS[24]	Lift Load Cell Adjusted Weight (lb)	Pounds	Feedback weight reading of the lift Loadcell adjusted by the Bias Voltage	
fSTS[25]	Lift Load Cell Weight, Raw (lb)	Pounds	Weight reading of the Lift Loadcell based on the unfiltered Raw voltage value	
fSTS[26]	Lift Load Cell Weight, Filtered (lb)	Pounds	Weight reading of the Lift Load Cell based on the filtered voltage value	
fSTS[27]	Lift Load Cell Command Force (lbf)	Pounds Force	Pounds of force applied to the lift handles by the operator	
fSTS[28]	Spare			
fSTS[29]	Motor Encoder Raw Position (in)	Inches	Unfiltered feedback motor encoder position.	
fSTS[30]	Feedback Position (in)	Inches	Filtered feedback motor encoder position.	
fSTS[31]	Command Velocity (in/s)	Inches per Second	Velocity command being sent to the drive	
fSTS[32]	Feedback Velocity (in/s)	Inches per Second	Motor feedback velocity	
fSTS[33]	2nd Float Load Cell Raw Voltage (V)	Volts	This status parameter displays the analog voltage from the 2nd float load cell.	
fSTS[34]	2nd Float Load Cell Filtered Voltage (V)	Volts	This status parameter displays an intermediate calculation of the force exerted on the 2nd float load cell.	
fSTS[35]	2nd Float Load Cell Bias Voltage (V)	Volts	This status parameter displays an intermediate calculation of the force exerted on the 2nd float load cell.	
fSTS[36]	Feedback Acceleration (in/s²)	Inches per second^2	The measure feedback acceleration of the hoist	
fSTS[37]	Lift Mode Command Velocity (in/s)	Inches per Second	Velocity command of Lift Mode sent to the drive	

Table[idx]	Parameter	Unit	Description	KSS location
fSTS[38]	Float Mode Command Velocity (in/s)	Inches per Second	Velocity command of Float Mode sent to the drive	
fSTS[39]	Lift Mode Max Speed (in/s)	Inches per Second	Active Maximum speed in Lift Mode	
fSTS[40]	Float Mode Max Speed (in/s)	Inches per Second	Active Maximum speed in Float Mode	
fSTS[41]	Max Motor Speed (in/s)	Inches per Second	Maximum Mechanical Speed of Hoist	
fSTS[42]	Max Command Speed (in/s)	Inches per Second	Maximum Command Velocity permitted	
fSTS[43]	Command Current (A)	Amps	This status parameter displays the instantaneous command current of the hoist.	
fSTS[44]	Power Cycle Counter	Integer Count	Total number of times the servo has been power cycled. Increments each time the servo drive power turned off and back on again.	
fSTS[45]	Total Program Run Time (days)	Days	Total number of days the servo program has been running.	
fSTS[46]	Total Distance (in)	Inches	Total distance travelled by the chain/cable in either direction.	
fSTS[47]	Lift Mode Distance (in)	Inches	This status parameter displays the total distance the servo has traveled while in Lift Mode.	
fSTS[48]	Float Mode Distance (in)	Inches	This status parameter displays the total distance the servo has traveled while in Float Mode.	
fSTS[49]	Position Mode Distance (in)	Inches	This status parameter displays the total distance the servo has traveled while in Position Mode.	
fSTS[50]	Active Upper Limit (in)	Inches	This status parameter displays the currently active Upper travel limit	
fSTS[51]	Active Lower Limit (in)	Inches	This status parameter displays the currently active Lower travel limit	
fSTS[52]	Active Up Stop Weight (lb)	Pounds	This status parameter displays the currently active Up Stop Weight	
fSTS[53]	Active Down Stop Weight (lb)	Pounds	This status parameter displays the currently active Down Stop Weight	

Table[idx]	Parameter	Unit	Description	KSS location
fSTS[54]	Lift Handle Command Force Limit (lbf)	Pounds Force	This Status parameter displays the largest amount of force that can be applied to the Lift handle before a fault is generated	
fSTS[55]	Calculated Lift Command Force (lb) *(Reference Only)	Pounds	This status parameter displays the maximum force needed to reach Lift mode Max Speed.	
fSTS[56]	Float Command Max Force (lb) - LC	Pounds	This status parameter displays the maximum force needed to reach Float mode Max Speed.	
fSTS[57]	Run-Stop Minimum Deceleration (in/s²)	Inches per second^2	This status parameter displays the smallest deceleration rate of the hoist when the Run-Stop button is pressed.	
fSTS[58]	Spare			
fSTS[59]	Spare			
fSTS[60]	Active Damping Low Frequency Out Velocity (in/s)	Inches per Second	*Reserved for internal use only.*	
fSTS[61]	Active Damping High Frequency Out Velocity (in/s)	Inches per Second	*Reserved for internal use only.*	
fSTS[62]	Active Damping Total Out Velocity (in/s)	Inches per Second	*Reserved for internal use only.*	
fSTS[63]	Final Command Output Velocity (in/s)	Inches per Second	This status parameter displays the target velocity for the hoist	
fSTS[64]	Handle Weight (lb)	Pounds	This status parameter displays the set weight of the handles attached to any lift handle load cell.	
fSTS[65]	Lift Handle Command Force (lbf)	Pounds Force	This status parameter displays the force that is currently being applied to the analog load cell handle.	
fSTS[66]	Analog Pendant Safestart Min Voltage (V)	Volts	This status parameter displays the Min Voltage threshold for capturing the Analog Pendant Bias.	
fSTS[67]	Analog Pendant Safestart Max Voltage (V)	Volts	This status parameter displays the Max Voltage threshold for capturing the Analog Pendant Bias.	
fSTS[68]	Spare			
fSTS[69]	Total Drive Power On Time (days)	Days	This status displays the total time in days that the Drive has been powered on.	

Table[idx]	Parameter	Unit	Description	KSS location
fSTS[70]	Total Program Run Time (days)	Days	This status parameter displays the total number of days the servo has been running on the current firmware.	
fSTS[71]	Spare			
fSTS[72]	Stress Relief Upper Limit (in)	Inches	This status parameter displays the upper travel limit for Stress Relief motion.	
fSTS[73]	Stress Relief Initial Position (in)	Inches	This status parameter displays the feedback position when captured when entering Stress Relief.	
fSTS[74]	Stress Relief Lower Limit (in)	Inches	This status parameter displays the lower travel limit for Stress Relief motion.	
fSTS[75]	Stress Relief Output Velocity (in/s)	Inches per Second	This status parameter displays the output velocity of stress relief control.	
fSTS[76]	Impulse Limiting Reference Signal (lbs)	Pounds	This status parameter displays the weight feedback signal being used to trigger impulse limiting.	
fSTS[77]	Impulse Limiting On Threshold (lbs)	Pounds	This status parameter displays the minimum weight needed to activate impulse limiting.	
fSTS[78]	Impulse Limiting Off Threshold (lbs)	Pounds	This status parameter displays the minimum weight needed to turn off impulse limiting if active.	
fSTS[79]	Spare			
fSTS[80]	Default Motor Max Accel/Decel (in/s²) (Calculated Value)	Inches per second^2	This status parameter displays the calculated maximum acceleration and deceleration values based on the connected motor parameters.	
fSTS[81]	Active Max Accel/Decel (in/s²)	Inches per second^2	This status parameter displays the maximum acceleration and deceleration rate that is allowed by the system.	
fSTS[82]	Default Max Velocity Following Error (in/s) (Calculated Value)	Inches per Second	This status parameter displays the calculated maximum velocity following error value based on the connected motor and drive parameters.	
fSTS[83]	Active Max Velocity Following Error (in/s)	Inches per Second	This status parameter displays the maximum velocity following error active in the program.	
fSTS[84]	Velocity Following Error (in/s)	Inches per Second	This status parameter displays the current velocity following error feedback from the drive.	

Table[idx]	Parameter	Unit	Description	KSS location
fSTS[85]	Ratchet Brake Backoff Move Time (sec)	Seconds	This status parameter displays the total time taken for the ratchet brake to release. (Only applies to systems equipped with a ratchet brake.)	
fSTS[86]	Ratchet Brake Prox Read Delay Time (sec)	Seconds	This status parameter displays the time from ratchet brake solenoid activation to ratchet brake release confirmation. (Only applies to systems equipped with a ratchet brake.)	
fSTS[87]	Ratchet Brake Sequence Step	Step #	This status parameter displays the number of attempts made to release the ratchet brake. System will generate a fault after 2 failed attempts. (Only applies to systems equipped with a ratchet brake.)	
fSTS[88]	Ratchet Brake Start Position (in)	Inches	This status parameter displays the captured feedback position prior to trying to release ratchet brake. Break Release is requested when hoist changes from no mode to Lift or Float mode.	
fSTS[89]	Ratchet Brake Target Position (in)	Inches	This status parameter displays the target position of ratchet brake backoff move.	
fSTS[90]	Spare			
fSTS[91]	Motor Rated Current (A)	Amps	This status parameter displays the servo motor's rated current value.	
fSTS[92]	Torque Feedback (%)	Percentage	This status parameter displays the instantaneous torque feedback percentage of servo motor's rated torque.	
fSTS[93]	Motor Feedback Current	Amps	This status parameter displays the instantaneous motor current reading.	
fSTS[94]	Drive Current Limit (Positive)	Percentage	This status parameter displays the positive current limit the drive will supply to the servo motor.	
fSTS[95]	Drive Current Limit (Negative)	Percentage	This status parameter displays the negative current limit the drive will supply to the servo motor.	

Table[idx]	Parameter	Unit	Description	KSS location
fSTS[96]	Max Float Load Cell Weight Reading (lb)	Pounds	This status parameter displays the calculated maximum weight the loadcell can read. This is based on the float load cell bias, gain, and a voltage range of ±10V. (Active only if system is configured with a Float Load Cell)	
fSTS[97]	Min Float Load Cell Weight Reading (lb)	Pounds	This status parameter displays the calculated minimum weight the loadcell can read. This is based on the float load cell bias, gain, and a voltage range of ±10V. (Active only if system is configured with a Float Load Cell)	
fSTS[98]	Max Encoder Reading (in)	Inches	This status parameter displays the maximum distance the servo motor can travel in the positive direction before encoder rollover.	
fSTS[99]	Min Encoder Reading (in)	Inches	This status parameter displays the maximum distance the servo motor can travel in the negative direction before encoder rollover occurs.	
fSTS[100]	Analog Pendant Raw Voltage (V)	Volts	This status parameter displays the raw feedback voltage of Analog Pendant	
fSTS[101]	Analog Pendant Filtered Voltage (V)	Volts	This status parameter displays the filtered Voltage feedback of analog pendant	
fSTS[102]	Spare			
fSTS[103]	Spare			
fSTS[104]	Spare			
fSTS[105]	Spare			
fSTS[106]	Spare			
fSTS[107]	Total Weight (lb)	Pounds	This status parameter displays the system’s total weight. Value reflects active weight measurement source (Float Load Cell or Motor Feedback)	
fSTS[108]	Part Weight (lb)	Pounds	This status parameter displays the system part weight. Value reflects active weight measurement source (Float Load Cell or Motor Feedback)	

Table[idx]	Parameter	Unit	Description	KSS location
fSTS[109]	Part Weight Touchy (lb)	Pounds	This status parameter displays the system touchy part weight (unfiltered). Value reflects active weight measurement source (Float Load Cell or Motor Feedback).	
fSTS[110]	Spare			
fSTS[111]	Spare			
fSTS[112]	Spare			
fSTS[113]	Spare			
fSTS[114]	Spare			
fSTS[115]	Spare			
fSTS[116]	Spare			
fSTS[117]	Spare			
fSTS[118]	Spare			
fSTS[119]	Spare			
fSTS[120]	Spare			
fSTS[121]	Spare			
fSTS[122]	Spare			
fSTS[123]	Auto-Float Entry Position (in)	Inches	This status parameter displays the feedback position at moment Auto-Float entry was triggered.	
fSTS[124]	Auto-Float Upper Limit (in)	Inches	This status parameter displays the Auto-Float maximum upward travel distance.	
fSTS[125]	Auto Float Lower Limit (in)	Inches	This status parameter displays the Auto-Float maximum downward travel distance	
fSTS[126]	Spare			
fSTS[127]	Spare			
fSTS[128]	Spare			
fSTS[129]	Torque Limiting Min Force Limit (lb)	Pounds	This status parameter displays the active minimum force for Torque limiting. Will switch between overall limit or the calculated Torque Impulse limit value (if enabled).	
fSTS[130]	Torque Limiting Max Force Limit (lb)	Pounds	This status parameter displays the active Maximum force for Torque limiting. Will switch between overall limit or the calculated Torque Impulse limit value (if enabled).	

Table[idx]	Parameter	Unit	Description	KSS location
fSTS[131]	Torque Limiting Min Force Velocity (in/s)	Inches per Second	This status parameter displays the upper Velocity limit based on active minimum force for Torque limiting. (E-Float only)	
fSTS[132]	Torque Limiting Max Force Velocity (in/s)	Inches per Second	This status parameter displays the lower Velocity limit based on active maximum force for Torque limiting. (E-Float only)	
fSTS[133]	Torque Impulse Limiting Upward Threshold (lb)	Pounds	This status parameter displays the calculated Max Weight for Torque impulse limiting based on current load conditions and parameter settings. (E-Float only)	
fSTS[134]	Torque Impulse Limiting Downward Threshold (lb)	Pounds	This status parameter displays the calculated Min Weight for Torque impulse limiting based on current load conditions and parameter settings. (E-Float only)	
fSTS[135]	Torque Limiting Min Overall Force Velocity (in/s)	Inches per Second	This status parameter displays the upper Velocity limit based on Overall Min Force parameter and current load conditions. (E-Float only)	
fSTS[136]	Torque Limiting Max Overall Force Velocity (in/s)	Inches per Second	This status parameter displays the lower velocity limit based on Overall maximum force parameter and current load conditions. (E-Float only)	
fSTS[137]	Torque Limit Overall Min Force	Pounds	This status parameter displays the system overall minimum force limit (E-Float only)	
fSTS[138]	Torque Limit Overall Max Force	Pounds	This status parameter displays the system’s overall maximum force limit (E-Float only)	
fSTS[139]	Spare			
fSTS[140]	Spare			
fSTS[141]	Spare			
fSTS[142]	Spare			
fSTS[143]	Spare			
fSTS[144]	Spare			
fSTS[145]	Spare			
fSTS[146]	Spare			
fSTS[147]	Spare			
fSTS[148]	Spare			
fSTS[149]	Spare			
fSTS[150]	Spare			

Table[idx]	Parameter	Unit	Description	KSS location
fSTS[151]	Spare			
fSTS[152]	Spare			
fSTS[153]	Spare			
fSTS[154]	Spare			
fSTS[155]	Spare			
fSTS[156]	Spare			
fSTS[157]	Spare			
fSTS[158]	Spare			
fSTS[159]	Spare			
fSTS[160]	Spare			
fSTS[161]	Spare			
fSTS[162]	Spare			
fSTS[163]	Spare			
fSTS[164]	Spare			
fSTS[165]	Spare			
fSTS[166]	Spare			
fSTS[167]	Spare			
fSTS[168]	Spare			
fSTS[169]	Spare			
fSTS[170]	Spare			
fSTS[171]	Spare			
fSTS[172]	Spare			
fSTS[173]	Spare			
fSTS[174]	Spare			
fSTS[175]	Spare			
fSTS[176]	Spare			
fSTS[177]	Spare			
fSTS[178]	Spare			
fSTS[179]	Spare			
fSTS[180]	Spare			
fSTS[181]	Spare			
fSTS[182]	Spare			
fSTS[183]	Spare			
fSTS[184]	Spare			
fSTS[185]	Spare			
fSTS[186]	Spare			
fSTS[187]	Spare			
fSTS[188]	Spare			
fSTS[189]	Spare			
fSTS[190]	Spare			
fSTS[191]	Spare			
fSTS[192]	Spare			

Table[idx]	Parameter	Unit	Description	KSS location
fSTS[193]	Spare			
fSTS[194]	Spare			
fSTS[195]	Spare			
fSTS[196]	Spare			
fSTS[197]	Spare			
fSTS[198]	Spare			
fSTS[199]	Spare			
fSTS[200]	Motor Reference Force (lb)	Pounds	This status parameter displays the command force for motor based on current control output and load.	
fSTS[201]	Motor Feedback Force Raw (lb)	Pounds	This status parameter displays the raw feedback force from motor.	
fSTS[202]	Motor Feedback Force Adjusted Raw (lb)	Pounds	This status parameter displays the raw Motor feedback adjusted for friction and inertia of the system.	
fSTS[203]	Motor Feedback Force Adjusted and Filtered (lb)	Pounds	This status parameter displays the filtered Motor feedback adjusted for friction and inertia of the system.	
fSTS[204]	Motor Feedback Force Acceleration Adjusted Raw (lb)	Pounds	This status parameter displays the raw Motor feedback adjusted for inertial forces from suspended load.	
fSTS[205]	Motor Feedback Force Acceleration Adjusted and Filtered (lb)	Pounds	This status parameter displays the filtered motor feedback adjusted for inertial forces from suspended load	
fSTS[206]	Motor Feedback Force Total Weight - Lift Load Cell Weight (lb)	Pounds	This status parameter displays the filtered Motor feedback with lift loadcell cancelation applied.	
fSTS[207]	Motor Feedback Force Total Weight (lb)	Pounds	This status parameter displays the final Total System Weight detected via motor feedback.	
fSTS[208]	Motor Feedback Force Part Weight (lb)	Pounds	This status parameter displays the final system Part Weight (total weight - fixture weight) detected via motor feedback.	
fSTS[209]	Motor Feedback Force Friction Force Calculation (lb)	Pounds	This status parameter displays the calculated frictional force based on current load and friction model.	
fSTS[210]				
fSTS[211]	Snapshot Upper Position Limit (in)	Inches	This status parameter displays the upper travel limit of snapshot move.	

Table[idx]	Parameter	Unit	Description	KSS location
fSTS[212]	Snapshot Entry Position (in)	Inches	This status parameter displays the feedback position at moment Snapshot move was triggered.	
fSTS[213]	Snapshot Lower Position Limit (in)	Inches	This status parameter displays the lower travel limit of snapshot move.	
fSTS[214]	Snapshot Output Velocity (in)	Inches	This status parameter displays the active output velocity of Snapshot capture command.	
fSTS[215]	Snapshot Touchy Weight (lb)	Pounds	This status parameter displays the snapshot touchy weight calculation, captured while in lift mode.	
fSTS[216]	Snapshot Steady Weight (lb)	Pounds	This status parameter displays the snapshot steady weight calculation, captured while in lift mode.	
fSTS[217]	Snapshot Jog Weight (lb)	Pounds	This status parameter displays the snapshot weight captured from performing snapshot jog move.	
fSTS[218]	Snapshot Target Weight (lb)	Pounds	This status parameter displays the final snapshot weight used for Float Mode control.	
fSTS[219]	Float Mode Weight Snapshot (lb) - TF	Pounds	This status parameter displays the actual float mode target weight. Will show fixed float target weight if active.	
fSTS[220]	Snapshot Peak Velocity Error (in/s)	Inches per Second	This status parameter displays the peak velocity error detected while performing snapshot validation.	
fSTS[221]	Snapshot Timeout (ms)	Milliseconds	This status parameter displays the max time allowed for snapshot jog and validation to complete.	
fSTS[222]	Snapshot Duration (ms)	Milliseconds	This status parameter displays the actual time taken for snapshot jog and validation to complete.	
fSTS[223]				
fSTS[224]	Float Mode Instantaneous Error Force (lb) - TF	Pounds	This status parameter displays the difference between floating weight reference and feedback weight	
fSTS[225]	Float Mode Command Force (lb) - TF	Pounds	This status parameter displays the filtered signal of difference between floating weight reference and feedback weight	

Table[idx]	Parameter	Unit	Description	KSS location
fSTS[226]	Float Mode Friction Compensation Applied Force (lb)	Pounds	This status parameter displays the amount of friction compensation applied to the float target weight.	
fSTS[227]	Float Mode Target Floating Force (lb)	Pounds	This status parameter displays the target float weight for torque-based float mode.	
fSTS[228]	Float Mode Target Velocity (in/s)	Inches per Second	This status parameter displays the raw target velocity from target float weight based on current parameters and load	
fSTS[229]	Float Mode Output Velocity (in/s)	Inches per Second	This status parameter displays the final output velocity from target float weight.	
fSTS[230]	Float Command Force Max (lb) - TF	Pounds	This status parameter displays the maximum command force value for Float Mode.	
fSTS[231]				
fSTS[232]	Position (Spool Revs)	Spool Revolutions	This status parameter displays the system position in spool revolutions (E-Float Only)	
fSTS[233]	Reverse Hard Limit	Inches	This status parameter displays the max Upward travel limit in user units (in) - (E-Float Only, based on travel limit parameters in spool revs)	
fSTS[234]	Forward Hard Limit	Inches	This status parameter displays the max Lower travel limit in user units (in) - (E-Float Only, based on travel limit parameters in spool revs)	
fSTS[235]	Home Position Offset	Inches	This status parameter displays the home offset position in user units (in)- (E-Float Only, based on parameter in spool revs)	
fSTS[236]	Chain Change Position	Inches	This status parameter displays the cable/Chian change position in user units (in) - (E-Float Only, based on parameter in spool revs)	
fSTS[237]				
fSTS[238]	Feed Constant		This status parameter displays the calculated feed constant value. Translates from final Revs from gearbox to User units	

Table[idx]	Parameter	Unit	Description	KSS location
fSTS[239]	Inches per Rev	Inches	This status parameter displays the calculated overall inches per motor rev value based on system configuration.	
fSTS[240]	Motor Feedback: Lbs per A	Pounds	This status parameter displays the calculated overall pounds per amp value based on system configuration	
fSTS[241]				
fSTS[242]	Drive Vel Ref (in/s)	Pounds	This status parameter displays the output velocity value from drive's velocity controller	
fSTS[243]	Reference Acceleration (in/s²)	Inches per second^2	This status parameter displays the acceleration value of Velocity Reference.	
fSTS[244]	Feedback Acceleration Filtered (in/s²)	Inches per second^2	This status parameter displays the acceleration value from encoder feedback.	
fSTS[245]	Feedback Jerk (in/s³)	Inches per second^2	This status parameter displays the jerk value based on feedback acceleration.	
fSTS[246]				
fSTS[247]				
fSTS[248]				
fSTS[249]				
fSTS[250]				
fSTS[251]				
fSTS[252]	Regen Circuit Power (W)	Watts	This status parameter displays the total power actively consumed by regen circuit.	
fSTS[253]				
fSTS[254]	Motor IIt		This status parameter displays the accumulated thermal energy in the motor	
fSTS[255]	Drive IIt		This status parameter displays the accumulated thermal energy in the drive	

C. PRM1 Parameter Array

This array stores the parameters that are most often adjusted by the end user. This list holds parameters used to fine tune the hoist's performance. It also holds configuration parameters that must be adjusted after maintenance to the servo, motor, or gearbox or after modification of the fixture or lift handle.

These parameters are listed in the PRM1 array and can be displayed at:
KSS Workspace tree location: Knight Work Order # \ Parameters \ PRM1 \ Row xx.

Many of these parameters have equivalent displays found on various Knight Servo Studio (KSS) screens. The location of these screens is listed at the end of each parameter's description.
See Section 5. 'Software' for an explanation of the shorthand used.

Table[idx]	Parameter	Units	Description	KSS Location
PRM1[00]	Spare			
PRM1[01]	Float Load Cell Calibration Weight (lb)	Pounds	This weight is used to verify the Float Load Cell Bias value.	
PRM1[02]	Lift Load Cell Calibration Weight (lb)	Pounds	This weight is used to verify the Lift Load Cell Bias value.	
PRM1[03]	Spare			
PRM1[04]	Spare			
PRM1[05]	Upper Limit (in)	Inches	This parameter sets the upper travel limit for the hoist. This value should be set to a number greater than or equal to zero. The home position or absolute physical top limit of the hoist's movement is set to zero inches.	Start\ Setup\ Setup Shortcuts\ Lift Mode Travel Limits
PRM1[06]	Lower Limit (in)	Inches	This parameter sets the lower travel limit for the hoist. This value should be set to the lowest physical limit of the hoist.	Start\ Setup\ Setup Shortcuts\ Lift Mode Travel Limits
PRM1[07]	Spare			
PRM1[08]	Handle Weight (lb)	Pounds	This parameter is not currently used for software calculations.	
PRM1[09]	Fixture Weight (lb)	Pounds	This parameter is used to show the static weight of all equipment hanging below the hoist's Load Monitoring Module (LMM). This equipment includes the hook, shackle, and fixture. This parameter must be adjusted if the fixture is changed or replaced.	Start\ Setup\ Setup Shortcuts\ Weight Limits
PRM1[10]	Spare			

Table[idx]	Parameter	Units	Description	KSS Location
PRM1[11]	Encoder Offset (in)	Inches	This parameter sets the offset that the hoist uses to compute its home position. It offsets the absolute encoder's zero position, so the hoist's zero position becomes the position at the physical upper limit of its travel. A setting of zero shows a non-absolute incremental motor and is only for compatibility with legacy systems. This parameter must be adjusted when the motor, gearbox or chain/cable are replaced.	Start\ Setup\ Setup Shortcuts\ Position Calibration
PRM1[12]	Deceleration Rate at Limits (in/s^2)	Inches per second^2	This parameter sets the rate of deceleration when the hoist reaches its top and bottom limits. The greater the number the quicker the hoist slows down when it approaches a limit.	
PRM1[13]	Spare			
PRM1[14]	Spare			
PRM1[15]	Spare			
PRM1[16]	Spare			
PRM1[17]	Spare			
PRM1[18]	Spare			
PRM1[19]	Spare			
PRM1[20]	Spare			
PRM1[21]	Maximum Total Weight (lb)	Pounds	This parameter sets the largest load that the Servo Hoist will lift. This includes the weight of the fixture and the part. Note: Value cannot exceed the value in PRM2:21	Start\ Setup\ Setup Shortcuts\ Weight Limits
PRM1[22]	Minimum Part Weight (lb)	Pounds	This parameter limits the load that the Servo Hoist will set down on a surface. In other words, once the weight supported by the hoist measures below this value, the Servo Hoist will not set down any more weight and hence will not pay out any more chain/cable.	Start\ Setup\ Setup Shortcuts\ Weight Limits
PRM1[23]	Lift Mode Timeout (minutes)	minutes	This parameter sets the length of time that the hoist will stay in Lift Mode unattended. When idle for longer than this specified time, the hoist will disable itself and revert to No Mode. If this variable is set to zero, the hoist will not switch from Lift Mode to No Mode.	Start\ Setup\ Setup Shortcuts\ Mode Timeouts

Table[idx]	Parameter	Units	Description	KSS Location
PRM1[24]	Lift Mode Speed Limit (in/s)	Inches per second	This parameter sets the maximum lift velocity for the Servo Hoist while in Lift Mode.	Start\ Setup\ Setup Shortcuts\ Analog Handle Speed Start\ Setup\ Setup Shortcuts\ Analog Pendant Command Start\ Setup\ Setup Shortcuts\ Digital Control
PRM1[25]	Spare			
PRM1[26]	Spare			
PRM1[27]	Spare			
PRM1[28]	Spare			
PRM1[29]	Lift Handle Force Sense (Float) (lbf)	Pounds Force	Before the hoist switches from Float Mode to Lift Mode, this amount of force must be registered on a fixture or inline handle. This parameter only applies to systems that do not have a trigger that enables Lift Mode.	Start\ Setup\ Setup Shortcuts\ Lift Handle Command
PRM1[30]	Lift Handle Force Sense (not Float) (lbf)	Pounds Force	Before the hoist switches from No Mode to Lift Mode, this amount of force must be registered on a fixture or inline handle. This parameter only applies to systems that do not have a trigger that enables Lift Mode.	Start\ Setup\ Setup Shortcuts\ Lift Handle Command
PRM1[31]	Lift Handle Force Deadband (lbf)	Pounds Force	This parameter sets the amount of input force that must be registered on a fixture or inline handle to start motion.	Start\ Setup\ Setup Shortcuts\ Lift Handle Command
PRM1[32]	Spare			
PRM1[33]	Spare			
PRM1[34]	Spare			
PRM1[35]	Spare			
PRM1[36]	Digital Fast Speed (in/s)	Inches per second	This parameter sets the maximum velocity for a hoist with discrete up/down controls. This parameter is used by the software when a digital lever is fully depressed.	Start\ Setup\ Setup Shortcuts\ Digital Command
PRM1[37]	Digital Normal Speed (in/s)	Inches per second	This parameter sets the minimum velocity for a hoist with discreet up/down controls. This parameter is used by the software when a digital lever is only depressed halfway.	Start\ Setup\ Setup Shortcuts\ Digital Command.

Table[idx]	Parameter	Units	Description	KSS Location
PRM1[38]	Digital Acceleration (in/s^2)	Inches per second^2	This parameter sets the acceleration for hoists with discrete up/down controls. Note: Applies to systems with up/down pendants or wireless transmitters only.	Start\ Setup\ Setup Shortcuts\ Digital Command
PRM1[39]	Digital Deceleration (in/s^2)	Inches per second^2	This parameter sets the deceleration for hoists with discrete up/down controls.	Start\ Setup\ Setup Shortcuts\ Digital Command
PRM1[40]	Spare			
PRM1[41]	Float Mode Upper Limit (in)	Inches	This parameter sets the upper travel limit for the hoist when it is in Float Mode. This is used to restrict the Float Mode travel to a position greater than the overall upper limit set in PRM1:5 'Upper Limit (in)'.	Start\ Setup\ Setup Shortcuts\ Float Mode travel Limits
PRM1[42]	Float Mode Lower Limit (in)	Inches	This parameter sets the lower travel limit for the hoist when it is in Float Mode. This is used to restrict the Float Mode travel to a position less than the overall lower limit set in PRM1:6 'Lower Limit (in)'.	Start\ Setup\ Setup Shortcuts\ Float Mode travel Limits
PRM1[43]	Float Mode Timeout (minutes)	minutes	This parameter sets the length of time that the hoist will stay in Float Mode unattended. When idle for longer than this specified time the hoist will disable and revert to No Mode. If this variable is set to zero, the hoist will not switch from Float Mode to No Mode.	Start\ Setup\ Setup Shortcuts\ Mode Timeouts
PRM1[44]	Float Mode Speed Limit (in/s)	Inches per second	This parameter sets the maximum velocity of the Servo Hoist when it is in Float Mode.	Start\ Setup\ Setup Shortcuts\ Float Mode Speed
PRM1[45]	Float Mode Deadband (lbf)	Pounds Force	This parameter sets the smallest amount of force that must be exerted on the fixture or part hanging from the bottom of the Load Monitoring Module to start motion while the hoist is in Float Mode.	Start\ Setup\ Setup Shortcuts\ Float Mode Command
PRM1[46]	Spare			
PRM1[47]	Analog Pendant Speed Band Selection		This parameter configures an analog pendant to vary speed linearly or set up to 5 different fixed speeds throughout the analog pendants command range.	Start\ Setup\ Setup Shortcuts\ Analog Pendant Command

Table[idx]	Parameter	Units	Description	KSS Location
PRM1[48]	Analog Pendant Infinite Bands Full Speed (in/s)	Inches per second	This parameter sets the maximum speed for analog pendant control in infinite bands mode.	Start\ Setup\ Setup Shortcuts\ Analog Pendant Command
PRM1[49]	Analog Pendant Band 1 Speed (in/s)	Inches per second	This parameter sets the Command speed of analog pendant while in speed band 1	Start\ Setup\ Setup Shortcuts\ Analog Pendant Command
PRM1[50]	Analog Pendant Band 2 Speed (in/s)	Inches per second	This parameter sets the Command speed of analog pendant while in speed band 2	Start\ Setup\ Setup Shortcuts\ Analog Pendant Command
PRM1[51]	Analog Pendant Band 3 Speed (in/s)	Inches per second	This parameter sets the Command speed of analog pendant while in speed band 3	Start\ Setup\ Setup Shortcuts\ Analog Pendant Command
PRM1[52]	Analog Pendant Band 4 Speed (in/s)	Inches per second	This parameter sets the Command speed of analog pendant while in speed band 4	Start\ Setup\ Setup Shortcuts\ Analog Pendant Command
PRM1[53]	Analog Pendant Band 5 Speed (in/s)	Inches per second	This parameter sets the Command speed of analog pendant while in speed band 5	Start\ Setup\ Setup Shortcuts\ Analog Pendant Command
PRM1[54]	Analog Pendant Acceleration (in/s^2)	Inches per $second^2$	This parameter sets the Acceleration rate applied to Analog Pendant control commands.	Start\ Setup\ Setup Shortcuts\ Analog Pendant Command
PRM1[55]	Analog Pendant Deceleration (in/s^2)	Inches per $second^2$	This parameter sets the Deceleration rate applied to Analog Pendant control commands.	Start\ Setup\ Setup Shortcuts\ Analog Pendant Command
PRM1[56]	Analog Pendant Minimum Voltage (V)	Volts	This parameter is the Minimum voltage range of Analog Pendant.	Start\ Setup\ Setup Shortcuts\ Analog Pendant Command

Table[idx]	Parameter	Units	Description	KSS Location
PRM1[57]	Analog Pendant Maximum Voltage (V)	Volts	This parameter is the Maximum voltage range of Analog Pendant.	Start\ Setup\ Setup Shortcuts\ Analog Pendant Command
PRM1[58]	Analog Pendant Bias Voltage (V)	Volts	This parameter is set to match the neutral voltage of the analog pendant's sensor when no operator input is applied. This is a physical property and should not be changed unless the analog pendant is replaced.	Start\ Setup\ Setup Shortcuts\ Analog Pendant Command
PRM1[59]	Analog Pendant Deadband (%)	Percentage	This parameter sets the percentage of travel around the neutral position, relative to the full travel range, before motion is commanded.	Start\ Setup\ Setup Shortcuts\ Analog Pendant Command
PRM1[60]	Spare			
PRM1[61]	Float Fixed Weight Max Up Travel (in)	Inches	Maximum distance the system can move upward from where float mode started when controlling a fixed weight.	
PRM1[62]	Float Fixed Weight Max Down Travel (in)	Inches	Maximum distance the system can move downward from the float mode entry point when floating a fixed weight.	
PRM1[63]	Float Fixed Weight Speed Limit (in/s)	Inches per Second	Maximum speed allowed when the system is floating a fixed weight.	
PRM1[64]	Auto-Float Max Up Travel (in)	Inches	Maximum distance the system can move upward from where Auto-Float mode started.	
PRM1[65]	Auto-Float Max Down Travel (in)	Inches	Maximum distance the system can move downward from where Auto-Float mode started.	
PRM1[66]	Spare			
PRM1[67]	Spare			
PRM1[68]	Spare			
PRM1[69]	Spare			
PRM1[70]	Spare			
PRM1[71]	Spare			
PRM1[72]	Spare			
PRM1[73]	Spare			
PRM1[74]	Spare			
PRM1[75]	Spare			
PRM1[76]	Spare			
PRM1[77]	Spare			

Table[idx]	Parameter	Units	Description	KSS Location
PRM1[78]	Slow Zone Mode (0 = off, 1 = down, 2 = up, 3 = both)	Choice (0=off, 1=down, 2=up, 3=up and down)	This parameter configures the hoist's automatic slow zone. This parameter works with the variables PRM1:79 to PRM1:84 to configure the automatic slow zone. 0 = Slow Zone feature is disabled. 1 = Program will automatically decrease the speed of the hoist only when moving down. 2 = Program will automatically decrease the speed of the hoist only when moving up. 3 = Program will automatically decrease the speed of the hoist when moving up or down.	Start\ Setup\ Setup Shortcuts\ Slow Zone
PRM1[79]	Slow Zone Part Loaded Weight (lb)	Pounds	This parameter sets the number of pounds that the system needs to register to show that a part is loaded on the fixture.	Start\ Setup\ Setup Shortcuts\ Slow Zone
PRM1[80]	Slow Zone Part Loaded Position (in)	Inches	This parameter sets the height that the hoist will start to run at a reduced speed when a part is loaded.	Start\ Setup\ Setup Shortcuts\ Slow Zone
PRM1[81]	Slow Zone Part Loaded Speed (in/s)	Inches per second	This parameter sets the reduced speed that the hoist runs at when a part is loaded, and it is below the PRM1:80 'Slow Zone Part Loaded Position' parameter	Start\ Setup\ Setup Shortcuts\ Slow Zone
PRM1[82]	Slow Zone Part Unloaded Position (in)	Inches	This parameter sets the height that the hoist will start to run at a reduced speed when a part is not loaded.	Start\ Setup\ Setup Shortcuts\ Slow Zone
PRM1[83]	Slow Zone Part Unloaded Speed (in/s)	Inches per second	This parameter sets the reduced speed that the hoist runs at when a part is not loaded, and it is below the PRM1:82 'Slow Zone Part Unloaded Position' parameter.	Start\ Setup\ Setup Shortcuts\ Slow Zone
PRM1[84]	Slow Zone Entry Deceleration (in/s^2)	Inches per $second^2$	This parameter sets the deceleration constant when the hoist approaches the slow zone and transitions from the normal speed to the reduced speed.	Start\ Setup\ Setup Shortcuts\ Slow Zone
PRM1[85]	Slow Zone Invert	Boolean (0=Off, 1=On)	The slow zone usually is only active when the hoist is below one the slow zone positions. This parameter changes the functionality of the slow zone so that it is active when the hoist is above the activation position.	Start\ Setup\ Setup Shortcuts\ Slow Zone
PRM1[86]	Spare			

Table[idx]	Parameter	Units	Description	KSS Location
PRM1[87]	Float Deceleration Enable Speed (in/s) - TF	Inches per second	Minimum movement speed needed before the system will apply deceleration control in torque-based float mode.	KSS Screen: Start\ Setup\ Setup Shortcuts\ Float Decel Tuning
PRM1[88]	Float Deceleration Activation Force (lb) - TF	Pounds	When force drops below this threshold (and speed is above the enable speed), standard deceleration begins.	KSS Screen: Start\ Setup\ Setup Shortcuts\ Float Decel Tuning
PRM1[89]	Float Deceleration Resume Bandwidth (lb) - TF	Pounds	Amount of force increase needed above the deadband to exit standard deceleration and resume normal operation.	
PRM1[90]	Float Deceleration (in/s^2) - TF	Inches per $second^2$	Deceleration rate applied when standard deceleration is active.	KSS Screen: Start\ Setup\ Setup Shortcuts\ Float Decel Tuning
PRM1[91]	Float Rapid Decel Activation Force (lb) - TF	Pounds	When force in the opposite direction exceeds this threshold (and speed is above the enable speed), rapid deceleration engages.	KSS Screen: Start\ Setup\ Setup Shortcuts\ Float Decel Tuning
PRM1[92]	Float Rapid Decel Resume Bandwidth (lb) - TF	Pounds	Amount of force decrease needed below the deadband to exit rapid deceleration and resume normal control.	
PRM1[93]	Float Rapid Deceleration (in/s^2) - TF	Inches per $second^2$	Deceleration rate applied when rapid deceleration is active.	KSS Screen: Start\ Setup\ Setup Shortcuts\ Float Decel Tuning
PRM1[94]	Float Deceleration Dwell Time (ms) - TF	milliseconds	Time delay before deceleration control activates after conditions are met.	
PRM1[95]	Float Decel OFF Speed (in/s) - TF	Inches per second	Speed threshold at which deceleration control turns off.	

D. User Parameter Arrays

User Retained Variables array displays all the user retained variables for the hoist. These parameters are assigned based on the individual application and will be outlined in a manual addendum included with the system. These parameters are listed in the User Retained Variables array and can be displayed at:
KSS Workspace tree location: Knight Work Order # \ User Program \ UserRetainVars \ Row xx

User iSTS array displays application specific integer status variables for the hoist. The first two status integers are listed below. The meaning of all other User iSTS parameters will be outlined in a manual addendum included with the system.
KSS Workspace tree location: Knight Work Order # \ User Program \ User iSTS

User iSTS[0]	Job Number	This parameter displays the Knight Job Number for the servo hoist system.	Quick View panel \ Row 7 (Lower right-hand part of the screen)
User iSTS[1]	System Number	If there are multiple systems related to the job number, this parameter displays the individual system number for the servo hoist system.	Quick View panel \ Row 8 (Lower right-hand part of the screen)

User fSTS array displays application specific real status variables for the hoist. The meaning of these parameters will be outlined in a manual addendum included with the system.
KSS Workspace tree location: Knight Work Order # \ User Program \ User iSTS

E. PRM2 Parameter Array

This array stores advanced parameters that affect the performance of the hoist. These parameters should only be adjusted with the aid of a Knight Representative.

These parameters are listed in the PRM2 array and can be displayed at:
KSS Workspace tree location: Knight Work Order # \ Parameters \ PRM2 \ Row xx.

Many of these parameters have equivalent displays found on various Knight Servo Studio (KSS) screens. The location of these screens is listed at the end of each parameter's description.
See Section 5. 'Software' for an explanation of the shorthand used.

WARNING

ALL variables in the PRM2 parameter list should NOT be manipulated without the aid of a Knight representative.

Table[idx]	Parameter	Units	Description	KSS Location
PRM2[00]	Spare			
PRM2[01]	Spare			
PRM2[02]	Spare			
PRM2[03]	Reverse Encoder Direction	Boolean (0=Off, 1=On)	This parameter sets the forward direction of the encoder. This is a physical property and should not be changed.	Start\ Setup\ Setup Shortcuts\ Mechanical (Knight Password ONLY)
PRM2[04]	Spare			
PRM2[05]	Gear Ratio	Integer	This parameter sets the gear ratio of the gear reducer. This is a physical property and should not be changed.	Start\ Setup\ Setup Shortcuts\ Mechanical (Knight Password ONLY)
PRM2[06]	Spare			
PRM2[07]	Lift Load Cell Gain (lb/V)	Pounds per Volt	This parameter sets the gain of the lift load cell. This is a physical property and should not be changed.	Start\ Setup\ Setup Shortcuts\ Analog Handle Calibration
PRM2[08]	Float Load Cell Gain (lb/V)	Pounds per Volt	This parameter sets the gain of the float load cell. This is a physical property and should not be changed.	Start\ Setup\ Setup Shortcuts\ Float Load Cell Calibration

Table[idx]	Parameter	Units	Description	KSS Location
PRM2[09]	Lift Load Cell Bias (V)	Volts	This parameter sets the value of the lift load cell's analog input when there is no external force exerted on the handle. This is a physical property and should not be changed unless the fixture or inline handle is replaced.	Start\ Setup\ Setup Shortcuts\ Analog Handle Calibration
PRM2[10]	Float Load Cell Bias (V)	Volts	This parameter sets the value of the float load cell's analog input when there is no external weight hanging from the Load Monitoring Module (LMM). This is a physical property and should not be changed unless the LMM is replaced.	Start\ Setup\ Setup Shortcuts\ Float Load Cell Calibration
PRM2[11]	Reverse Motor Direction	Boolean (0=Off, 1=On)	This parameter sets the direction of the servo motor. This is a physical property of the servo motor and should not be changed.	Start\ Setup\ Setup Shortcuts\ Mechanical (Knight Password ONLY)
PRM2[12]	Spare			
PRM2[13]	Max Velocity Following Error (in/s) (0 = calculated default value. See fSTS[82])	Inches per second	This parameter sets the maximum acceptable difference between the commanded speed and the feedback speed. This is used by the controller for detecting a velocity following error which generates a fault number of 104.	
PRM2[14]	Chain Pitch (mm)	millimeters	This parameter sets the pitch or length of each chain link. This is a physical property and should not be changed.	Start\ Setup\ Setup Shortcuts\ Mechanical (Knight Password ONLY)
PRM2[15]	Chain Links per Revolution	Number of Chain Links Per Rev	This parameter sets the size of the drive sprocket. This is a physical property and should not be changed.	Start\ Setup\ Setup Shortcuts\ Mechanical (Knight Password ONLY)
PRM2[16]	Fault Decel Rate (in/s²)	Inches per second^2	This parameter sets the deceleration rate of the hoist when a fault occurs. The minimum setting for this is 50in/s2.	

Table[idx]	Parameter	Units	Description	KSS Location
PRM2[17]	Lift Mode Allow Down Full Speed	Boolean (0=Off, 1=On)	Setting this parameter to a 1 (or ON) allows the hoist to travel at its maximum speed when lowering its load in Lift Mode. This speed is dynamically limited by the load weight when moving upwards in Lift Mode. Setting this to a 0 (or OFF) dynamically limits the speed when lifting and lowering in Lift Mode.	Start\ Setup\ Setup Shortcuts\ Feature Switchboard
PRM2[18]	Hard Stop Home Position (in)	Inches	This parameter displays the “real world” position after accepting a value by pressing the ‘SET HOME POSITION’ button on the ‘POSITION CALIBRATION’ screen.	Start\ Setup\ Setup Shortcuts\ Position Calibration
PRM2[19]	Spare			
PRM2[20]	Lift Mode Enable	Boolean (0=Off, 1=On)	This parameter is used to enable or disable Lift Mode.	Start\ Setup\ Setup Shortcuts\ Feature Switchboard
PRM2[21]	Spare			
PRM2[22]	Up Stop Resume Bandwidth (lb)	Pounds	*Reserved for internal use only.*	
PRM2[23]	Down Stop Resume Bandwidth (lb)	Pounds	*Reserved for internal use only.*	
PRM2[24]	Up/Down Stop Resume Time (ms)	milliseconds	*Reserved for internal use only.*	
PRM2[25]	Max Speed With No Load (in/s)	inches per second	The maximum permitted speed with no load supported by the hoist.	Start\ Setup\ Setup Shortcuts\ Weight-Based Speed Limits
PRM2[26]	Max Speed With Rated Load (in/s)	inches per second	The maximum permitted speed with Rated load supported by the hoist.	Start\ Setup\ Setup Shortcuts\ Weight-Based Speed Limits
PRM2[27]	Impulse Limiting Enable - Up	Boolean (0=Off, 1=On)	This parameter is used to enable the hoist’s impulse limiting code. When this code is enabled, the hoist will sense an instantaneous increase in weight registered by the float load cell and slow the hoist to reduce the impact on the system. Instead of suddenly moving the load upwards, the hoist senses the impulse and automatically slows down to a	Start\ Setup\ Setup Shortcuts\ Feature Switchboard

Table[idx]	Parameter	Units	Description	KSS Location
			controlled speed.	
PRM2[28]	Impulse Limiting Max Speed - Up (in/s)	inches per second	This parameter sets the speed that the hoist will slow to when impulse limiting is enabled, and a sudden movement is detected.	Start\Tuning \Impulse Limiting (Password Required)
PRM2[29]	Impulse Limiting Max Speed Time - Up (ms)	milliseconds	This parameter sets the duration that the slow speed will be active when impulse limiting is enabled, and a sudden movement is detected.	Start\Tuning \Impulse Limiting (Password Required)
PRM2[30]	Lift Handle Enable	Boolean (0=Off, 1=On)	This parameter is used to enable an analog handle. This parameter is enabled for systems that have an inline or fixture handle.	Start\ Setup\ Setup Shortcuts\ Feature Switchboard
PRM2[31]	Lift Handle Filter Bandwidth	Frequency	This parameter controls how quickly the hoist responds to force changes on the lift load cell. The larger the number the faster the hoist reacts to changes in force applied to the analog handle.	
PRM2[32]	Trigger Release Deceleration (in/s²)	Inches per second^2	This parameter controls how fast the hoist comes to a stop when an enable trigger is released. This only applies to hoists equipped with an analog lift handle and an enable trigger/button.	
PRM2[33]	Lift Handle Acceleration (in/s²)	Inches per second^2	This parameter sets the acceleration rate when using an analog lift handle for UP/DOWN control in Lift Mode.	
PRM2[34]	Lift Handle Deceleration (in/s²)	Inches per second^2	This parameter sets the deceleration rate when using an analog lift handle for lift handle for UP/DOWN control in Lift Mode.	
PRM2[35]	Lift Load Cell Force Limit (lb)	Pounds	This parameter sets the maximum lift command that can be given to the hoist via an analog handle without generating a fault. For example, if this parameter is set to 100lbs and a force of more than 100lbs is applied to the handle while the hoist is in Lift Mode then the software will generate a fault.	

Table[idx]	Parameter	Units	Description	KSS Location
PRM2[36]	Lift Cancel Gain	Real Number	This parameter controls how much of the force registered on the lift load cell is subtracted from the force seen on the float load cell when using a fixture handle.	
PRM2[37]	Spare			
PRM2[38]	Digital Control Enable	Boolean (0=Off, 1=On)	This parameter is used to enable a digital handle. This parameter is enabled for systems that have a single-speed or two-speed pushbutton control handle or a wireless transmitter pendant.	Start\ Setup\ Setup Shortcuts\ Feature Switchboard
PRM2[39]	Analog Pendant Enable	Boolean (0=Off, 1=On)	This parameter is used to enable or disable the analog pendant.	Start\ Setup\ Setup Shortcuts\ Feature Switchboard
PRM2[40]	Float Mode Enable	Boolean (0=Off, 1=On)	This parameter is used to enable or disable Float Mode.	Start\ Setup\ Setup Shortcuts\ Feature Switchboard
PRM2[41]	Spare			
PRM2[42]	Spare			
PRM2[43]	Spare			
PRM2[44]	Spare			
PRM2[45]	Float Mode Max Speed Scale Factor	Real Number	This factor is multiplied by PRM1:44 ‘Float Mode Speed Limit (in/s)’ to obtain the maximum speed of the hoist while it is in Float Mode. This value is normally a one. Any value above one will increase the hoist’s maximum speed and any value below one will reduce the hoist’s maximum speed.	
PRM2[46]	Spare			
PRM2[47]	Spare			
PRM2[48]	Spare			
PRM2[49]	Spare			
PRM2[50]	In Position Window	Inches	This parameter sets the distance from a target location the hoist must achieve to be considered “In Position”.	
PRM2[51]	Spare			
PRM2[52]	Spare			
PRM2[53]	Float Acceleration (in/s²)	Inches per second^2	This parameter sets the acceleration rate used by the hoist while in Float Mode.	
PRM2[54]	Float Deceleration (in/s²)	Inches per second^3	This parameter sets the deceleration rate used by the hoist while in Float Mode.	

Table[idx]	Parameter	Units	Description	KSS Location
PRM2[55]	Float Command Force Limit (lb)	Pounds	This parameter sets the largest float command that can be given to the hoist without generating a fault. For example, if this parameter is set to 100lbs and a force of more than 100lbs is applied to the fixture or part while the hoist is in Float Mode then the software will generate a fault.	
PRM2[56]	Spare			
PRM2[57]	Spare			
PRM2[58]	Spare			
PRM2[59]	Spare			
PRM2[60]	Float Proportional Gain Scale Factor	Real Number	This parameter sets the target velocity per unit of force exerted on the float load cell while the hoist is in Float Mode.	Start\ Setup\ Setup Shortcuts\ Float Mode Tuning (Advanced Password Required)
PRM2[61]	Float Filter Scale Factor	Real Number	This parameter sets how quickly the force applied to the load suspended from the Load Monitoring Module changes the float command speed.	Start\ Setup\ Setup Shortcuts\ Float Mode Tuning (Advanced Password Required)
PRM2[62]	Spare			
PRM2[63]	Float Force Filter Trim Scale Factor	Real Number	This parameter allows the hoist to respond quicker to a float motion input command. The higher the value, the easier it is to begin movement of the hoist while it is in Float Mode.	Start\ Setup\ Setup Shortcuts\ Float Mode Tuning (Advanced Password Required)
PRM2[64]	Max Speed for Jerk Limiting (in/s)	inches per second	This parameter controls the maximum velocity the hoist can be travelling at and still reset the "Hit Ground" bit while it is in Float Mode.	

Table[idx]	Parameter	Units	Description	KSS Location
PRM2[65]	Disable Gear Unlock Code	Boolean (0=Off, 1=On)	When this parameter is enabled, it limits the initial maximum velocity of Float Mode. After a delay, the hoist is allowed to ramp up towards its commanded velocity. When the hoist slows below the speed listed in PRM3[68] 'Gear Unlock Feedback Velocity (ips)', then the software will prevent any increase in speed over PRM3[67] 'Gear Unlock Command Velocity (ips)' for the length of time in PRM3[69] 'Gear Unlock Time (ms)'.	
PRM2[66]	Spare			
PRM2[67]	Auto-Float Enable	Boolean (0=Off, 1=On)	This parameter is used to enable and disable the Auto-Float function.	Start\ Setup\ Setup Shortcuts\ Feature Switchboard
PRM2[68]	Auto-Float Enter Float Dwell (ms)	milliseconds	This parameter sets the length of time the hoist must complete recording a valid weight snapshot weight.	
PRM2[69]	Auto-Float Entry Min Part Weight (lb)	Pounds	This parameter sets the smallest amount of part weight that must be suspended from the hoist for Auto-Float to start.	
PRM2[70]	Spare			
PRM2[71]	Enable Stress Relief Logic	Boolean (0=Off, 1=On)	This parameter is used to enable and disable the Stress Relief function.	Start\ Setup\ Setup Shortcuts\ Feature Switchboard
PRM2[72]	Enable Float Hit Ground Logic - TF	Boolean (0=Off, 1=On)	This parameter is used to enable and disable the Hit Ground detection logic for Torque-based Float Mode.	Start\ Setup\ Setup Shortcuts\ Feature Switchboard
PRM2[73]	Polynomial Weight Correction Factor 6		*Reserved for internal use only.*	
PRM2[74]	Polynomial Weight Correction Factor 5		*Reserved for internal use only.*	
PRM2[75]	Polynomial Weight Correction Factor 4		*Reserved for internal use only.*	
PRM2[76]	Polynomial Weight Correction Factor 3		*Reserved for internal use only.*	

Table[idx]	Parameter	Units	Description	KSS Location
PRM2[77]	Polynomial Weight Correction Factor 2		*Reserved for internal use only.*	
PRM2[78]	Polynomial Weight Correction Factor 1		*Reserved for internal use only.*	
PRM2[79]	Polynomial Weight Correction Factor 0		*Reserved for internal use only.*	
PRM2[80]	Touch Filter Bandwidth (rad/s)	radians per second	This parameter controls how quickly the system triggers a Down Stop or Up Stop in response to exceeding the minimum or maximum weight. The larger the number the more quickly the System responds.	
PRM2[81]	Steady Weight Filter Constant	Real Number	This parameter controls how quickly the "Steady Part Weight" value changes in response to changes in float load cell force. The larger the number the more quickly the hoist responds.	
PRM2[82]	Spare			
PRM2[83]	Active Damping Filter Constant (Low Frequency)	Real Number	This parameter is used in conjunction with PRM2:86 ‘Active Damping Gain (LF)’ to prevent low frequency oscillations occurring at the control handle.	
PRM2[84]	Spare			
PRM2[85]	Active Damping Filter Constant (High Frequency)	Real Number	This parameter is used in conjunction with PRM2:87 ‘Active Damping Gain (HF)’ to prevent high frequency oscillations occurring at the control handle.	
PRM2[86]	Active Damping Gain (Low Frequency)	Real Number	This parameter is used in conjunction with PRM2:83 ‘Active Damping Filter Constant (LF)’ to prevent low frequency oscillations occurring at the control handle.	
PRM2[87]	Active Damping Gain (High Frequency)	Real Number	This parameter is used in conjunction with PRM2:85 ‘Active Damping Filter Constant (HF)’ to prevent high frequency oscillations occurring at the control handle.	
PRM2[88]	Spare			
PRM2[89]	Spare			
PRM2[90]	Active Damping Min Gain - Lift	Real Number	This parameter sets the lowest point the velocity-based ramp-down multiplier can reach. This is only valid for Lift Mode.	

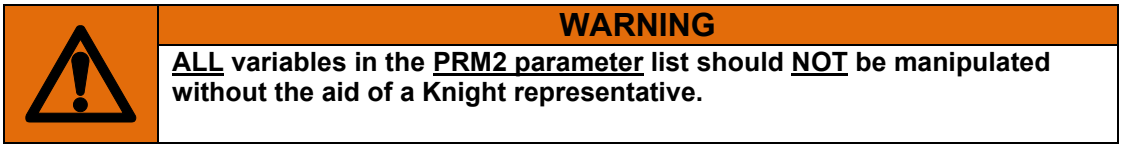
Table[idx]	Parameter	Units	Description	KSS Location
PRM2[91]	Active Damping Min Gain - Float	Real Number	This parameter sets the lowest point the velocity-based ramp-down multiplier can reach. This is only valid for Float Mode.	
PRM2[92]	Active Damping Always On	Boolean (0=Off, 1=On)	This parameter controls whether the low frequency Active Damping velocity is ramped down based on velocity. If the value is one (or ON), the hoist will only control the ramp function while it is moving down towards the ground. If the value is zero (or OFF), it will control the velocity in both directions. KSS Screen: Start\ Setup\ Setup Shortcuts\ Feature Switchboard.	Start\ Setup\ Setup Shortcuts\ Feature Switchboard
PRM2[93]	Active Damping Ramp Down Start Position (in)	Inches	This parameter sets the point at which the active damping velocity starts to ramp down based on position.	
PRM2[94]	Active Damping Ramp Down Min Gain Position (in)	Inches	This parameter sets the point at which the position-based ramp reaches its smallest multiplier value.	
PRM2[95]	Active Damping Ramp Down Min Gain	Real Number	This parameter sets the lowest point the position-based ramp-down multiplier can reach.	
PRM2[96]	Spare			
PRM2[97]	Spare			
PRM2[98]	2nd Float LC Gain (lb/V)	Pounds per Volt	This parameter sets the Gain value for the second float loadcell in a dual axis configuration.	
PRM2[99]	2nd Float LC Bias (V)	Volts	This parameter sets the voltage offset for the second float loadcell in a dual axis configuration. This is the value that stands for that no load is suspended from the hoist.	
PRM2[100]	Spare			
PRM2[101]	Impulse Limiting Enabled - Down	Boolean (0=Off, 1=On)	This parameter is used to enable the hoist's impulse limiting code for downward travel. When this code is enabled, the hoist will sense an instantaneous decrease in weight registered by the float load cell and slow the hoist to reduce the impact on the system. Instead of suddenly moving the load downwards, the hoist senses the impulse and automatically slows down to a controlled speed.	Start\ Setup\ Setup Shortcuts\ Feature Switchboard

Table[idx]	Parameter	Units	Description	KSS Location
PRM2[102]	Impulse Limit Max Speed - Down (in/s)	inches per second	This parameter sets the speed that the hoist will slow to when impulse limiting is enabled, and a sudden movement is detected.	
PRM2[103]	Impulse Limit Max Speed Time - Down (ms)	milliseconds	This parameter sets the duration that the slow speed will be active when impulse limiting is enabled, and a sudden movement is detected.	
PRM2[104]	Spare			
PRM2[105]	Enable Friction Compensation	Boolean (0=Off, 1=On)	This parameter is used to enable the hoist's friction compensation logic.	Start\ Setup\ Setup Shortcuts\ Feature Switchboard
PRM2[106]	Added Friction Force (lb)	Pounds	This parameter sets the amount of motor force that is needed to turn the drivetrain of the hoist.	Start\ Setup\ Setup Shortcuts\ Friction Compensation Tuning
PRM2[107]	Friction Comp Zero Gain Command Force	Pounds	This parameter sets the amount of motor force that is needed to turn the drivetrain of the hoist.	Start\ Setup\ Setup Shortcuts\ Friction Compensation Tuning
PRM2[108]	Friction Comp Max Gain Command Force	Pounds	This parameter sets the amount of motor force that is needed to turn the drivetrain of the hoist.	Start\ Setup\ Setup Shortcuts\ Friction Compensation Tuning
PRM2[109]	Friction Comp Max Gain	Real Number	This parameter sets the amount of motor force that is needed to turn the drivetrain of the hoist.	Start\ Setup\ Setup Shortcuts\ Friction Compensation Tuning
PRM2[110]	Friction Comp ON Speed (in/s)	inches per second	This parameter sets the amount of motor force that is needed to turn the drivetrain of the hoist.	Start\ Setup\ Setup Shortcuts\ Friction Compensation Tuning
PRM2[111]	Friction Comp OFF Speed (in/s)	inches per second	This parameter sets the amount of motor force that is needed to turn the drivetrain of the hoist.	Start\ Setup\ Setup Shortcuts\ Friction Compensation Tuning
PRM2[112]	Spare			

Table[idx]	Parameter	Units	Description	KSS Location
PRM2[113]	Float Speed Limit Ramp Min Weight (lb) - TF	Pounds	This parameter sets the total weight at which the float speed limit begins ramping down. This parameter is only valid when Toque Force Based Float Mode.	
PRM2[114]	Float Speed Limit Ramp Max Weight (lb) - TF	Pounds	This parameter sets the total weight at which the float speed limit reaches minimum value. This parameter is only valid when Toque Force Based Float Mode.	
PRM2[115]	Float Speed Limit at Ramp Min Weight (in/s) - TF	inches per second	This parameter sets the speed limit when total weight is at or below the value in PRM2:113. This parameter is only valid when Toque Force Based Float Mode.	
PRM2[116]	Float Speed Limit at Ramp Max Weight (in/s) - TF	inches per second	This parameter sets the speed limit when total weight is at the value in PRM2:114. This parameter is only valid when Toque Force Based Float Mode.	
PRM2[117]	Spare			
PRM2[118]	Torque Limiting Enable	Boolean (0=Off, 1=On)	This parameter is used to enable the hoist's torque limiting function.	Start\ Setup\ Setup Shortcuts\ Feature Switchboard
PRM2[119]	Max Force Limit (lb)	Pounds	This parameter sets the maximum force the motor can output. If the total weight suspended from the hoist exceeds this value the hoist will stop moving UP.	
PRM2[120]	Min Force Limit (lb)	Pounds	This parameter sets the minimum force the motor can output. If the total weight suspended from the hoist is below this value the hoist will stop moving DOWN.	
PRM2[121]	Spare			
PRM2[122]	Spare			
PRM2[123]	Torque Based Impulse Limiting Enable	Boolean (0=Off, 1=On)	This parameter is used to enable the use of Torque feedback instead of a float loadcell for Impulse limiting trigger.	Start\ Setup\ Setup Shortcuts\ Feature Switchboard
PRM2[124]	Torque Impulse Limit Offset - Up (lb)	Pounds	This parameter sets the force added to the motor reference to calculate the up/reverse torque impulse force limit.	

Table[idx]	Parameter	Units	Description	KSS Location
PRM2[125]	Torque Impulse Limit Filter Constant - Down	Frequency	This parameter sets the filter constant for the down/forward torque-based impulse force calculation to smooth rapid changes in motor force.	
PRM2[126]	Torque Impulse Limit Offset - Down (lb)	Pounds	This parameter sets the force subtracted from the motor reference when calculating the down/forward torque impulse limit.	

PRM2:127 through PRM2:255 – Spare



7. TROUBLESHOOTING

Several troubleshooting screens are described in this section:

7.A.) Troubleshooting Screens
7.B.) System Activity screens including Faults, Warnings and Error Codes
7.C.) Troubleshooting Inputs and Outputs
7.D.) Troubleshooting Chart

A. Troubleshooting Screens

Several troubleshooting screens are covered in this section. Each of these screens is listed below and can be accessed inside the Knight Servo Studio (KSS) software from:
KSS Screen: Start \ Troubleshooting

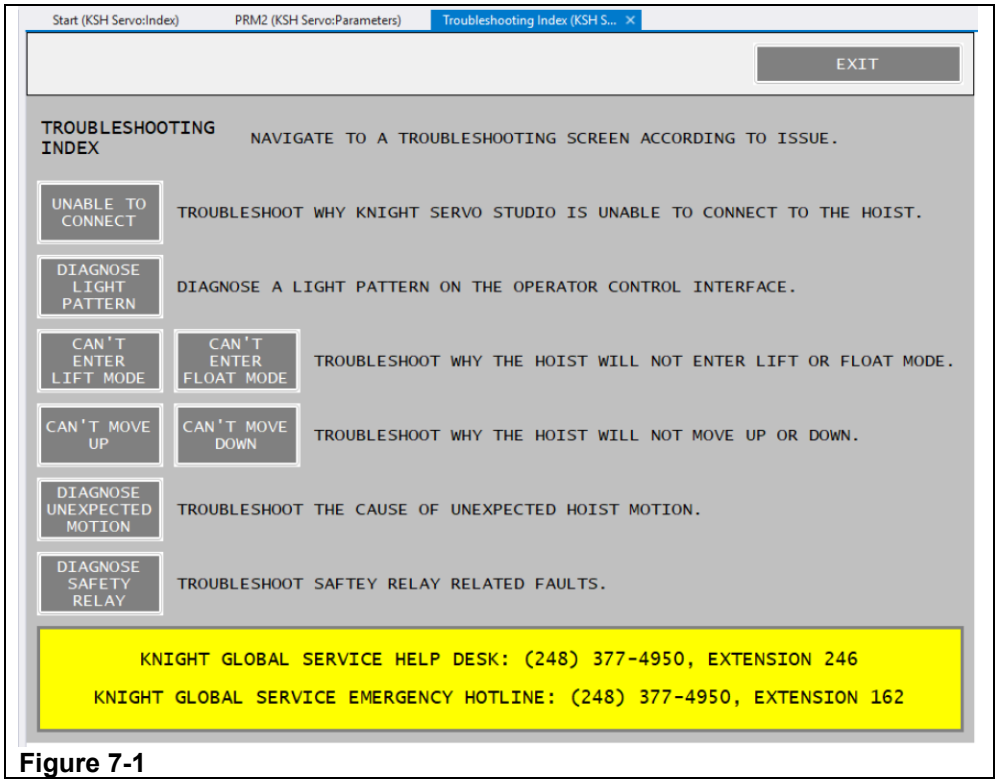


Figure 7-1

7a) Unable to Connect
7b) Diagnose Light Pattern
7c) Can’t Enter Lift Mode
7d) Can’t Enter Float Mode
7e) Can’t Move Up
7f) Can’t Move Down
7g) Diagnose Unexpected Motion
7h) Diagnose Safety Relay

See Section 5. ‘Software’ for an explanation of the shorthand used.

7a) Unable to Connect

This screen lists the steps to troubleshoot your laptop's network connection. (See Figure 7-2)

In Section (I), if there is a network connection problem, follow the steps below.

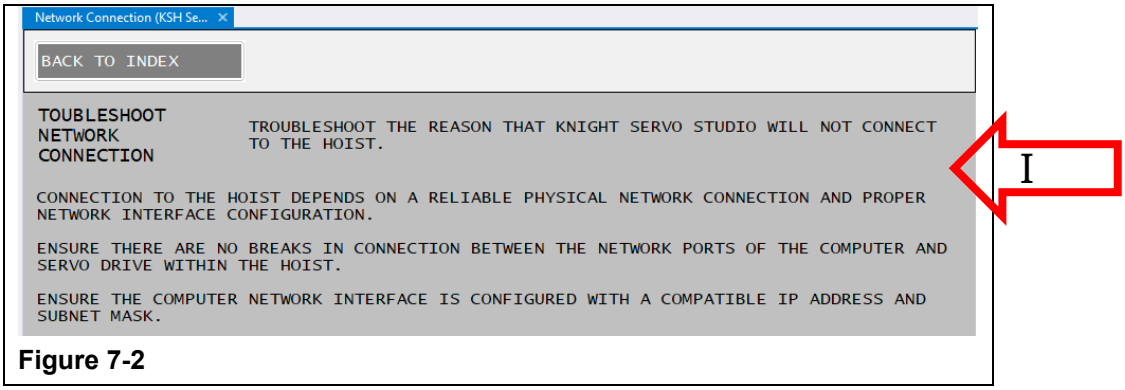


Figure 7-2

7b) Diagnose Light Pattern

This screen lists the different OCI Light patterns. (See Figure 7-3)
Clicking on the light pattern that matches the pattern currently flashing on the OCI.

Figure 7-3

1. **SOLID RED**

In Section (I), if the banner is green, there are no program faults.
If it is red, press the “INVESTIGATE PROGRAM ALARMS” button to examine the fault.
In Section (II), if the banner is green, the STO circuit is working correctly.
If it is red, press the “INVESTIGATION SAFETY RELAY” button to diagnose the problem.

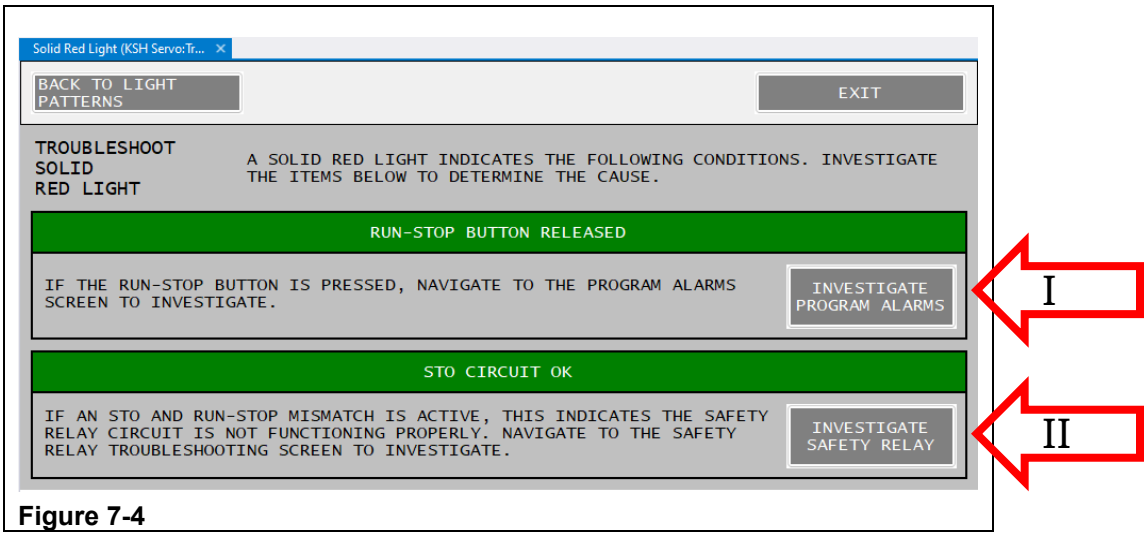


Figure 7-4

I. The “INVESTIGATE PROGRAM ALRMS” button navigates to the “PROGRAM ALARMS” screen (See Figure 7-5)

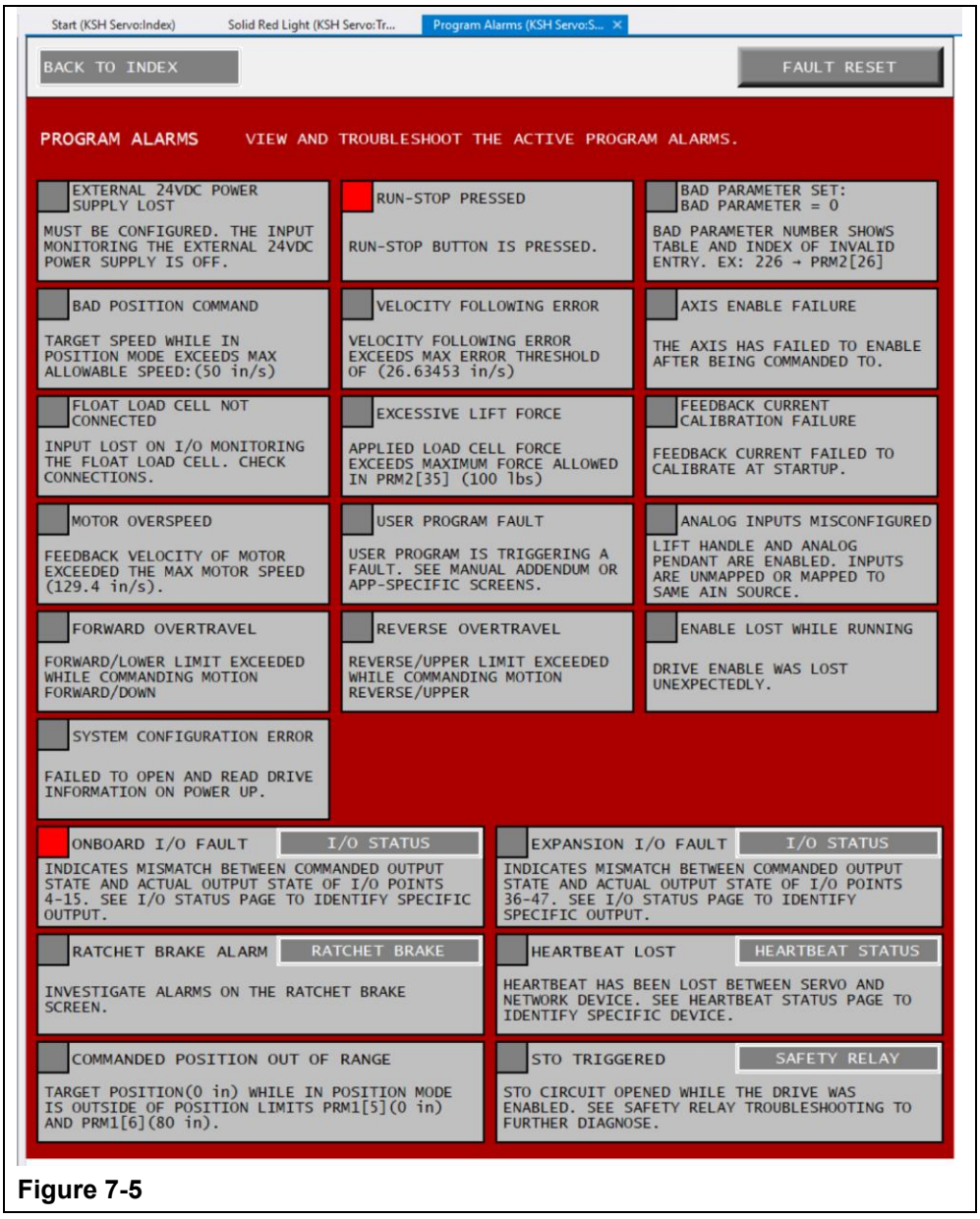


Figure 7-5

II. The “INVESTIGATE SAFETY RELAY” button navigates to the “TROUBLESHOOTING SAFETY RELAY” screen (See Figure 7-6)

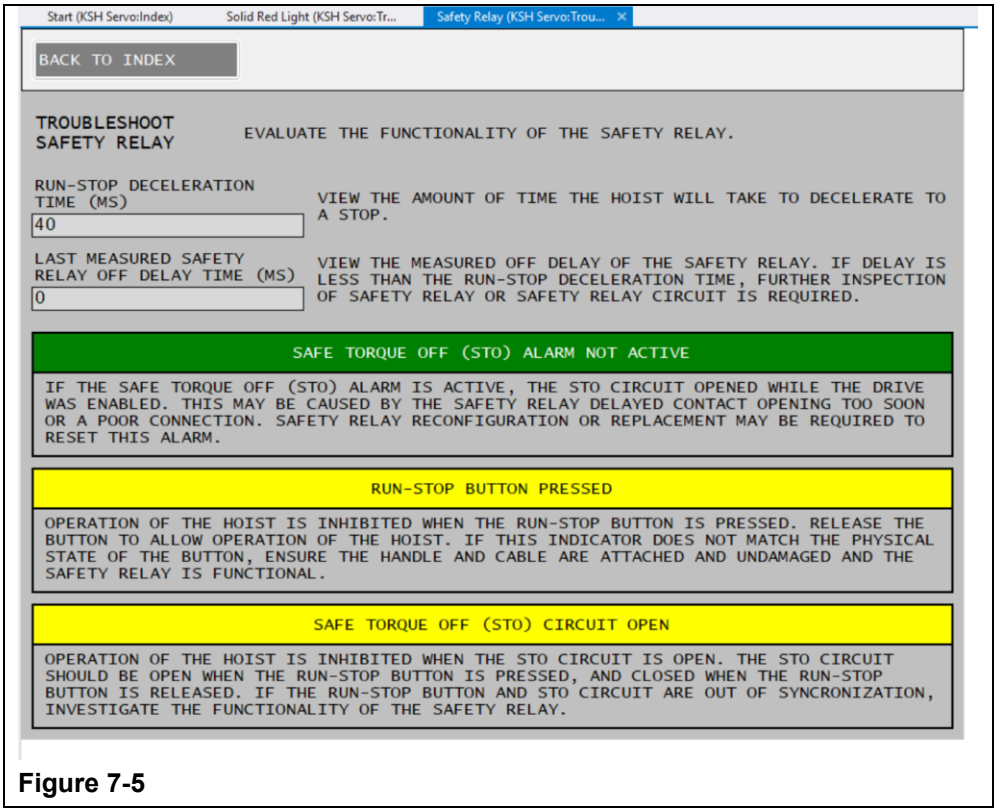


Figure 7-5

1) Line one is the length of time it will take the hoist to decelerate to a stop.
2) Line 2 is the last recorded delay time of the safety relay. This is the time between the when the Run stop is pressed until the drive is disabled. The delay gives the hoist time to come to a controlled stop and apply the holding brake and the motor is disabled.
3) Drive Safe Torque Off (STO) alarm status banner.
4) Run-Stop status
5) STO circuit status

2. **Solid Green Light screen**
This screen lists the reasons why the green light is on in a solid condition. (See Figure 7-6)

In Section (I), if this banner is green, the hoist is in lift mode.

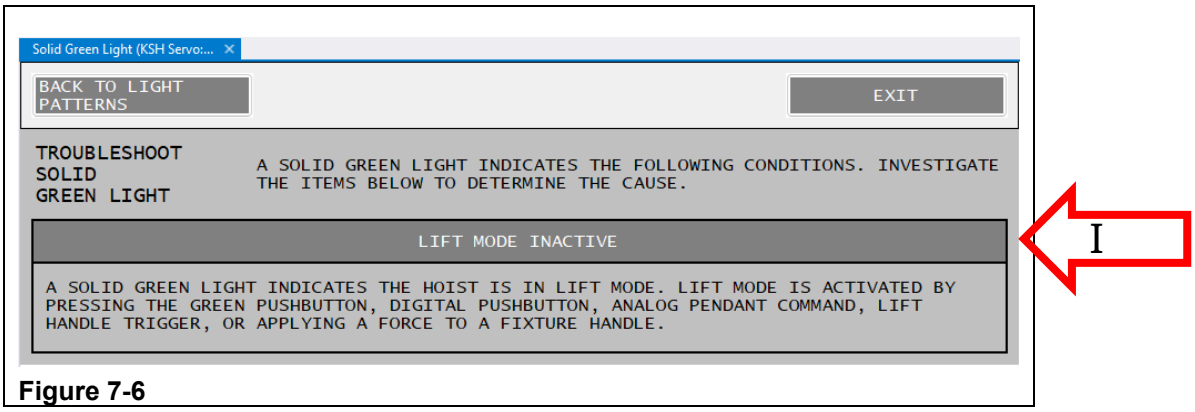


Figure 7-6

3. **Solid Blue Light screen**
This screen lists the reasons why the blue light is on in a solid condition. (See Figure 7-7)

In Section (I), if this banner is green, the hoist is in float mode.

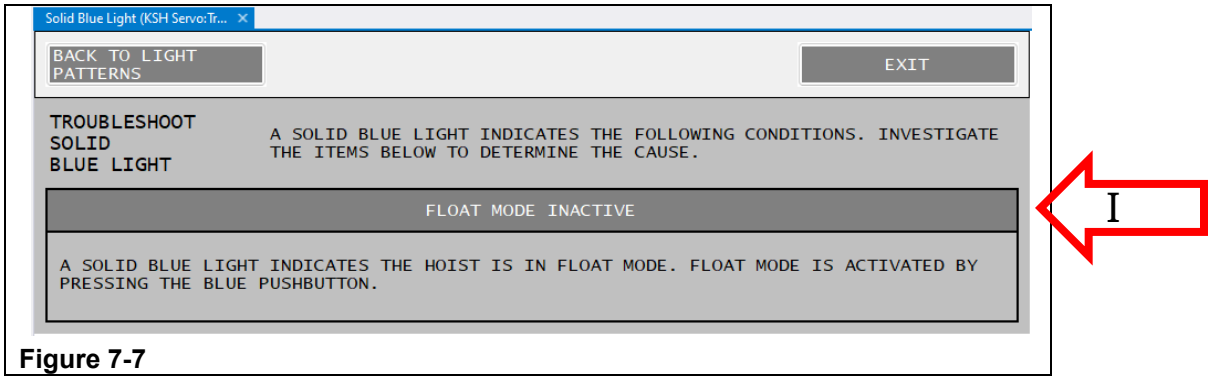


Figure 7-7

4. Solid Green/Blue Light screen

This screen lists the reasons why the blue light is on in a solid condition. (See Figure 7-5)

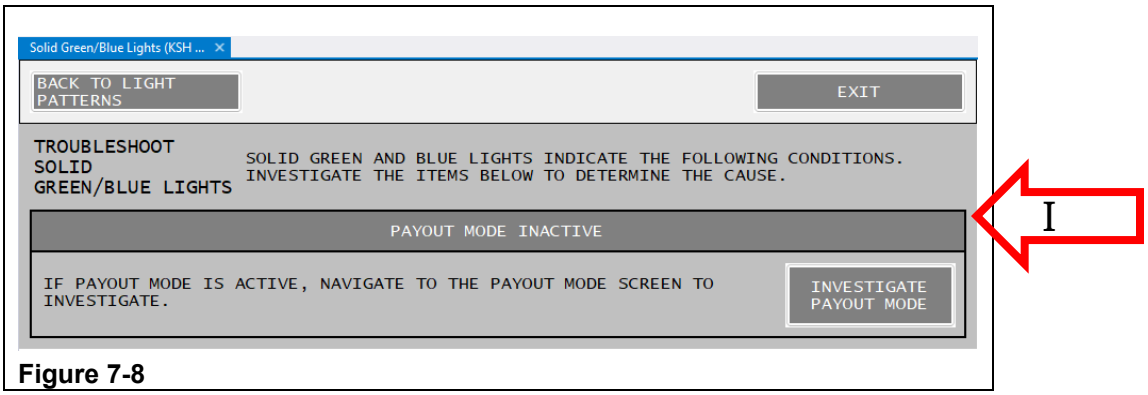


Figure 7-8

In Section (I), if this banner is green, the hoist is in payout mode.
If it is red, press the “INVESTIGATE PAYOUT MODE” button to navigate to the “PAYOUT MODE” screen. (See Figure 7- 9)

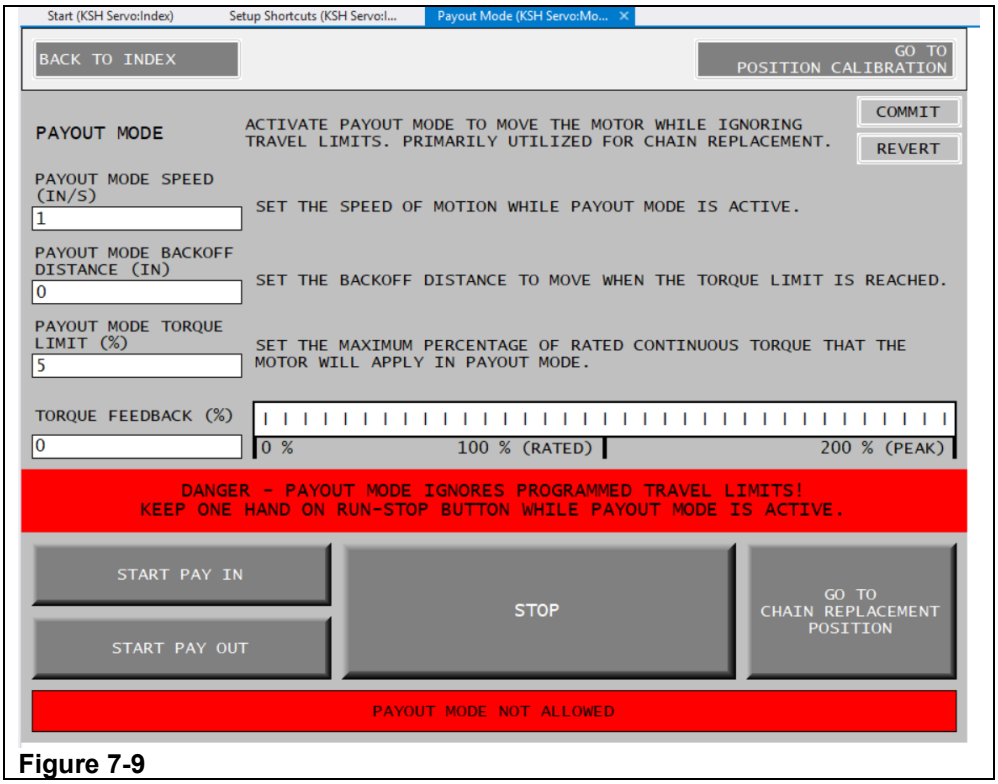


Figure 7-9

5. Alternating Red / Green Lights screen

This screen lists the steps to diagnose when the red and green lights are alternatively flashing.

In Section (I), follow the instructions below. (See Figure 7-8)

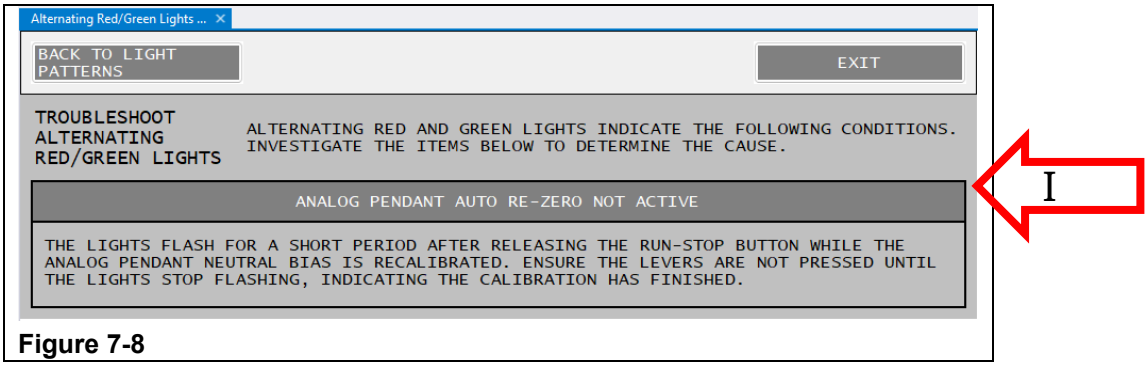


Figure 7-8

6. Flashing Red Light screen

This screen lists the steps to trace down the reason the hoist's red fault light is flashing. (See Figure 7-10)
In Section (I), if the indicator box is red then either a Fault or Warning is Active.
If the hoist's red light is flashing, match the speed of the flash: Slow or Fast.
Click on the corresponding picture.
In Section (II), a slow flashing light shows a Warning. Press the correct button to investigate a Drive or Program warning.
In Section (III), a fast-flashing light shows a Fault. Press the correct button to investigate a Drive or Program warning.

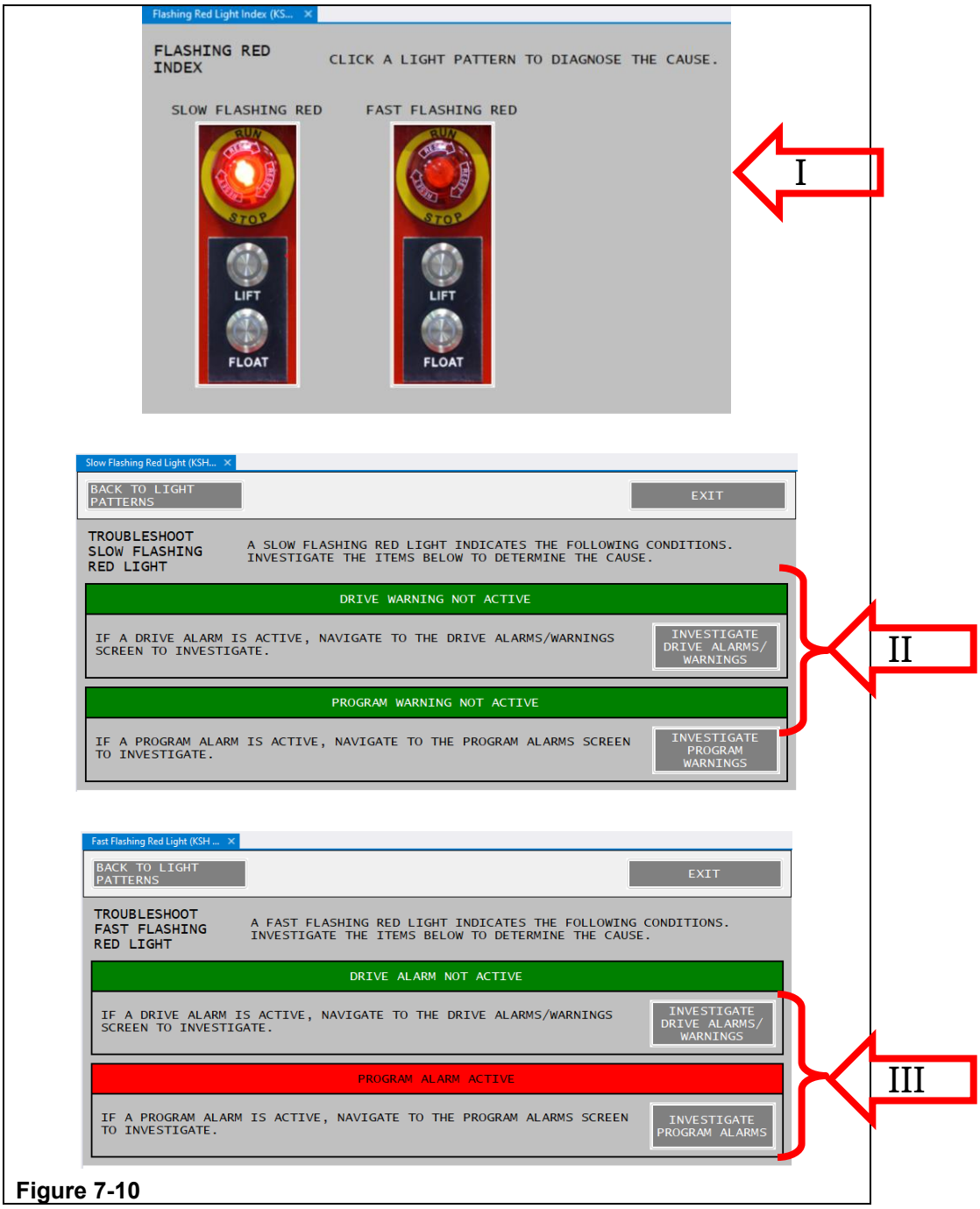


Figure 7-10

7. Flashing Green Light screen

This screen lists the steps to trace down the reason the hoist's green light is flashing.
This green light is referred to as the 'Lift Mode light' since it is normally illuminated during Lift Mode. (See Figure 7-11)

In Section (I), click the picture to bring up the troubleshooting screen.

If the hoist's green light is flashing, follow the steps listed on the screen below.

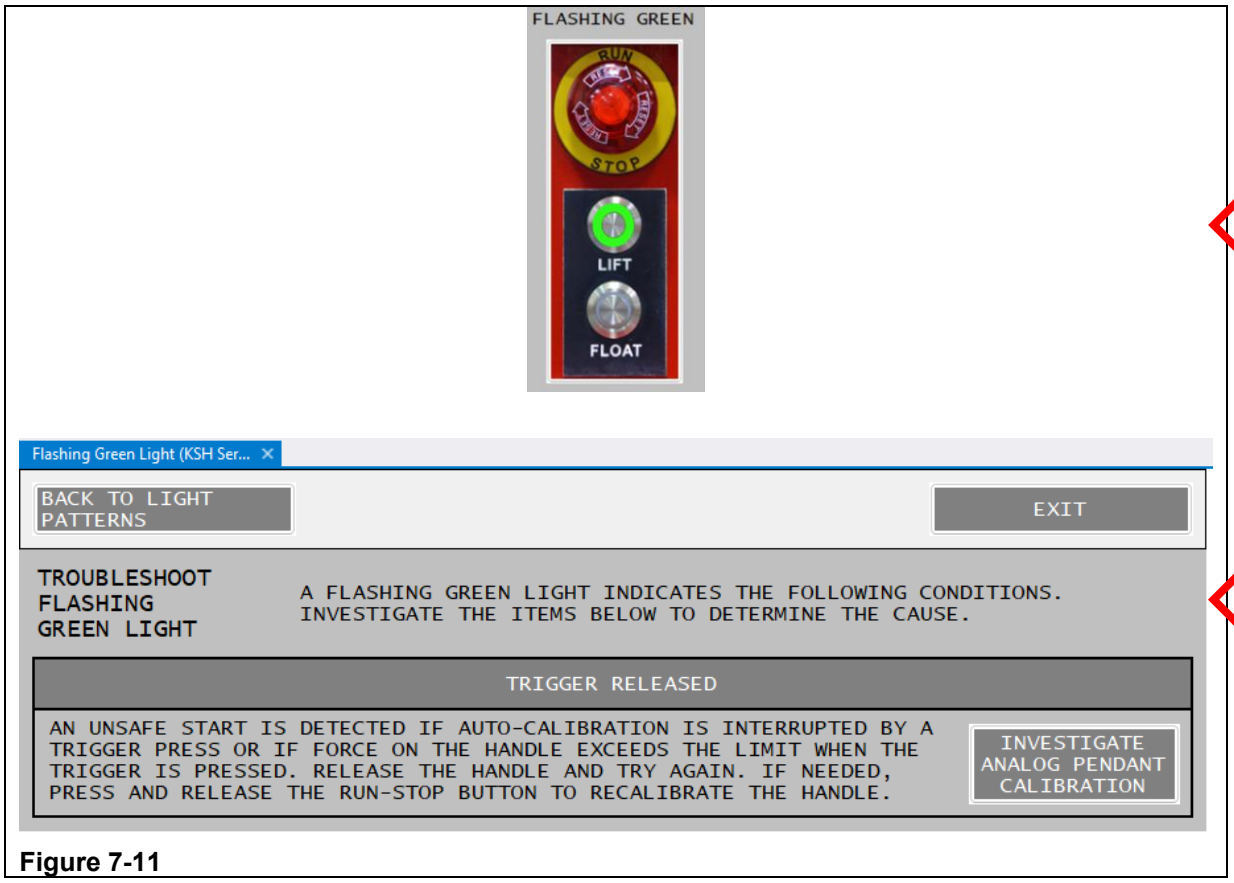


Figure 7-11

8. **All Lights Flashing screen.**
This screen lists the steps to diagnose when three lights are flashing.

In Section (I), follow the instructions below. (See Figure 7-12)

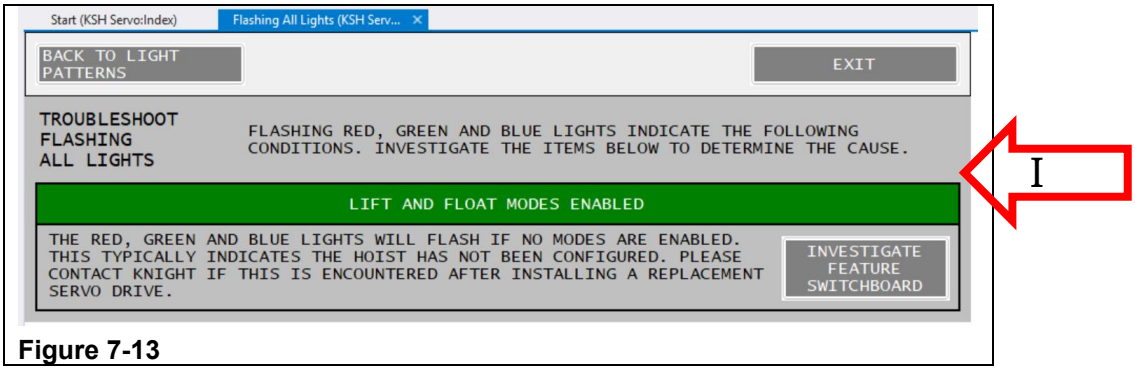


Figure 7-13

9. **Other Light Patterns screen.**
This screen lists the steps to diagnose when any other light pattern is displayed.

In Section (I), follow the instructions below. (See Figure 7-13)

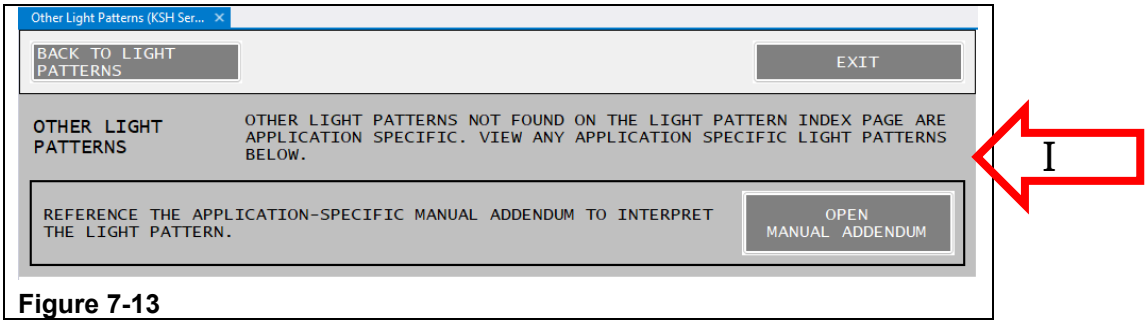


Figure 7-13

7c) Can't Enter Lift Mode screen.

This screen lists the steps to trace down the reason the hoist will not enter Lift Mode.

In Section (I), if the indicator box is green then the system is in Lift Mode, but if the indicator box is red then the system is NOT in Lift Mode.

If the hoist will not enter Lift Mode, ensure all conditions listed on the screen below are met. (See Figure 7-10)

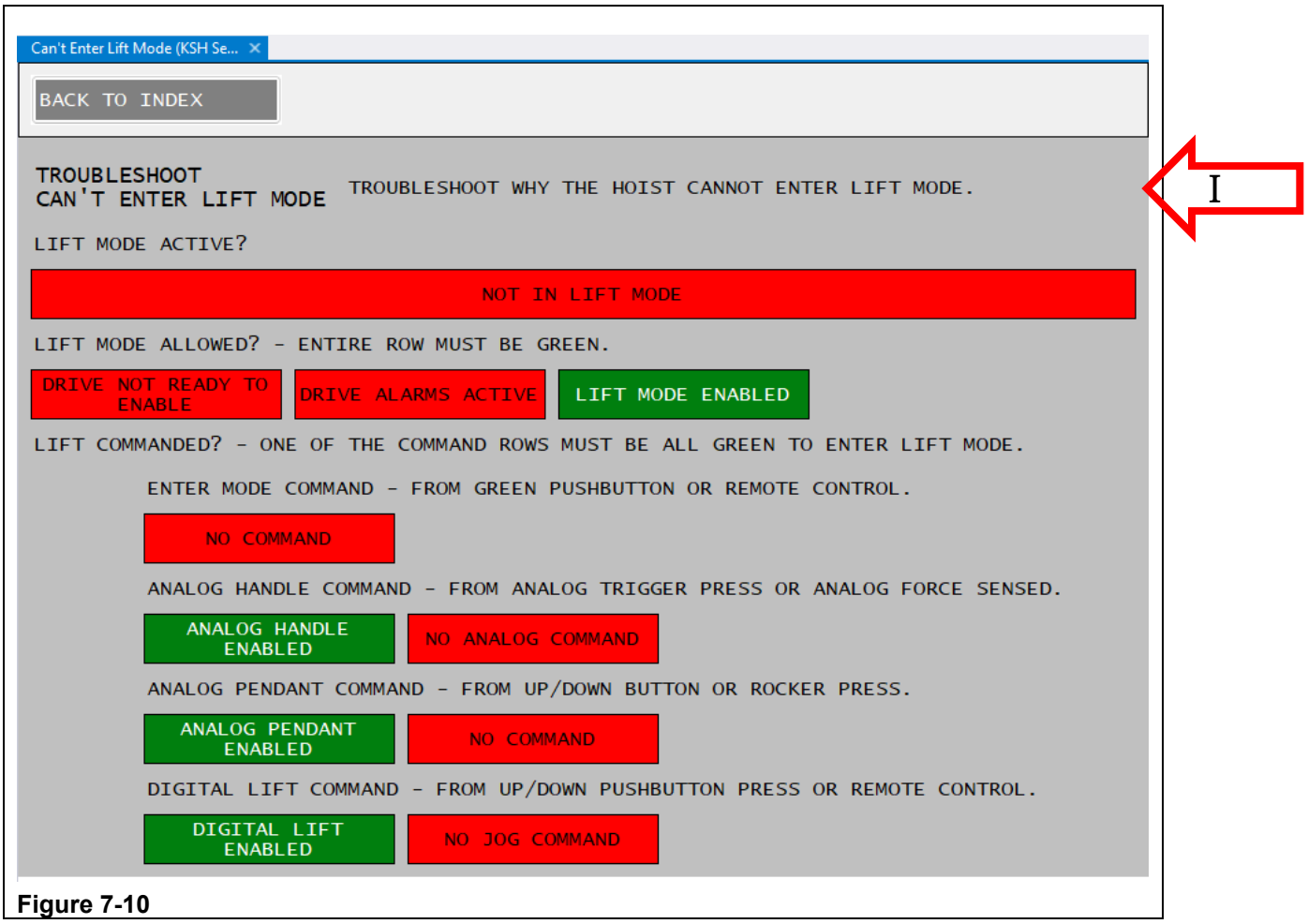


Figure 7-10

7d) Can't Enter Float Mode screen.

This screen lists the steps to trace down the reason the hoist will not enter Float Mode.

In Section (I), if the indicator box is green then the system is in Float Mode, but if the indicator box is red then the system is NOT in Float Mode.

If the hoist will not enter Float Mode, ensure all the conditions listed on the screen below are met. (See Figure 7-11)

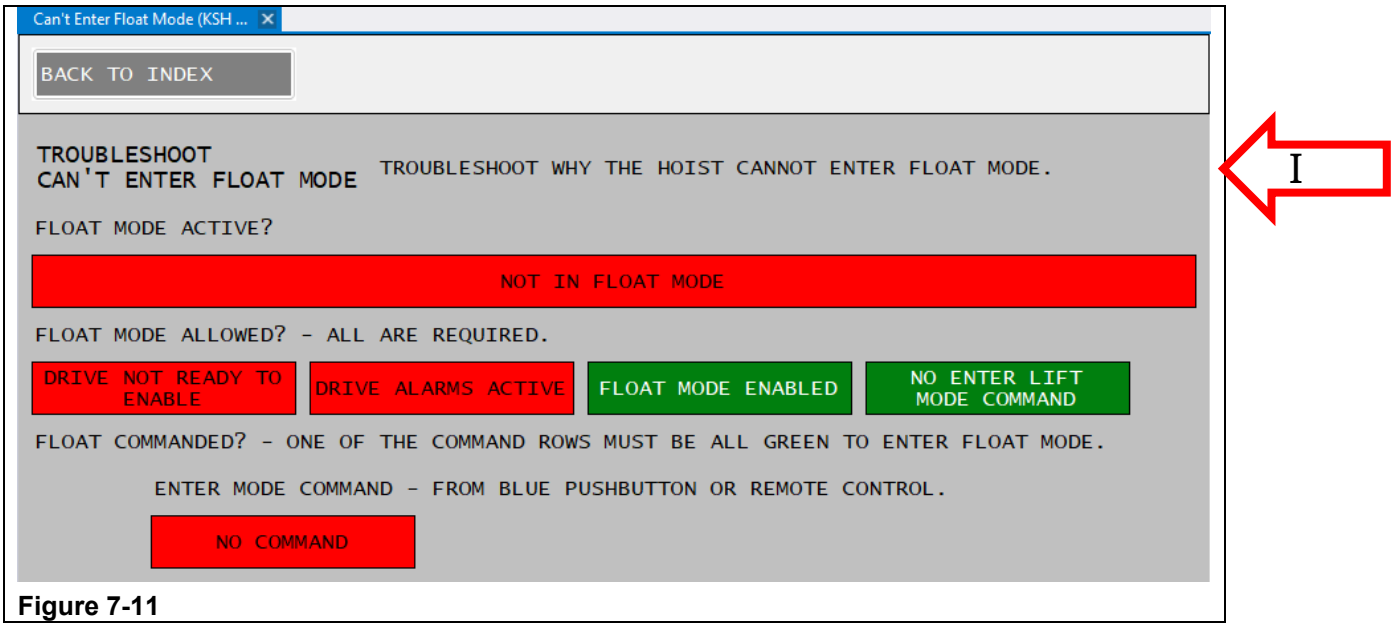


Figure 7-11

7e) Can't Move Up (Reverse) screen.

This screen lists the steps to trace down the reason the hoist won't move upwards towards the bottom of the servo.

In Section (I), if the indicator box is green then the function is on, but if the indicator box is grey then the function is off.
In Section (II), the current measured weight is shown as well as the maximum weight the hoist will lift.
In Section (III), the current position is shown as well as the upper limit of the hoist.
In Section (IV), both load cell voltages are shown in real time.
NOTE: If the hoist only has a digital up/down control handle, the 'Lift LC Voltage' will be zero.
In Section (V), if the indicator box is red then the hoist's Up Stop is active, but if it is grey the hoist's Up Stop is off. If the Up Stop is ACTIVE then the software is preventing the hoist from moving up.

If the hoist won't move up, ensure all conditions listed on the screen below are met.
(See Figure 7-12)

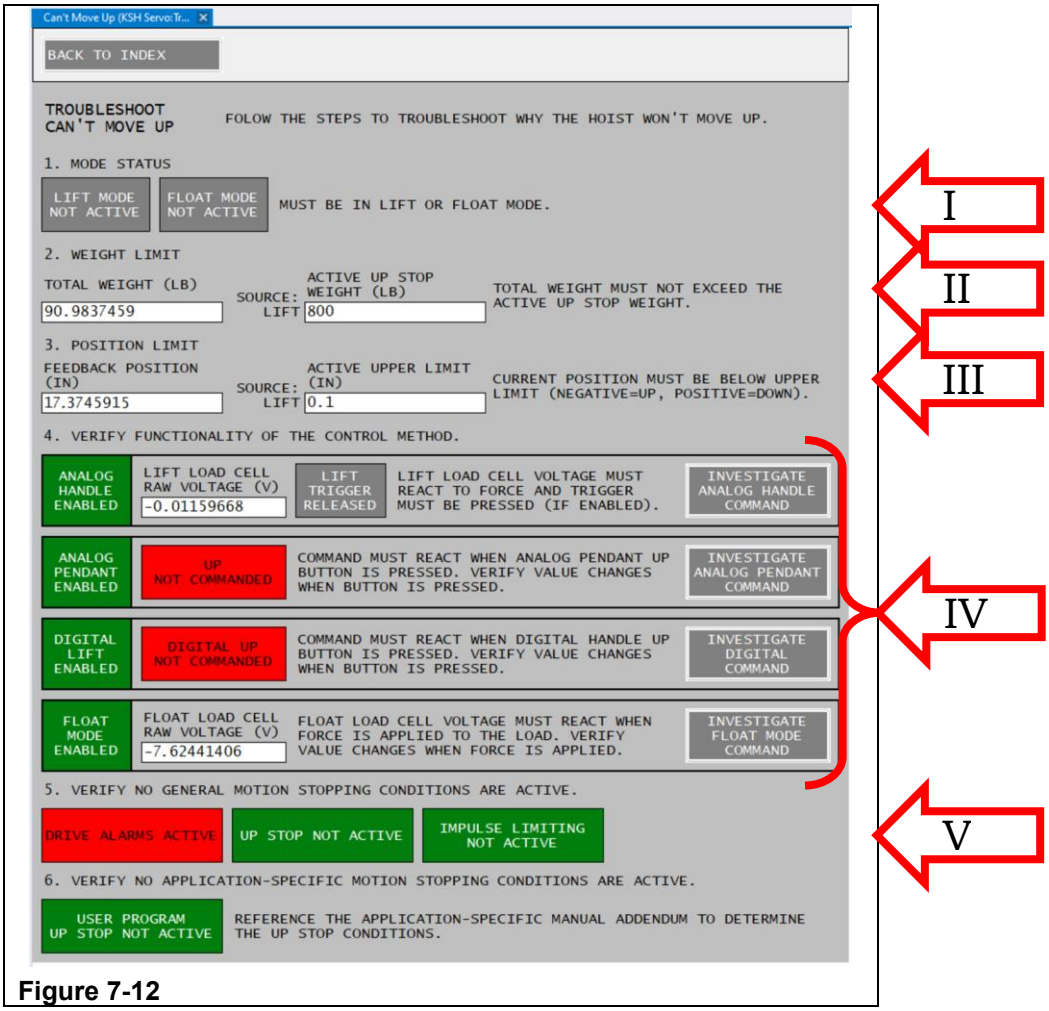


Figure 7-12

7f) Can't Move Down (Forward) screen.

This screen lists the steps to find the reason the hoist won't move down towards the facilities' floor.

In Section (I), if the indicator box is green then the function is on, but if the indicator box is grey then the function is off.
In Section (II), the current measured weight is shown as well as the total weight that the hoist will set down on a surface.
In Section (III), the current position is shown as well as the lower limit of the hoist.
In Section (IV), both load cell voltages are shown in real time.
NOTE: If the hoist only has a digital up/down control handle, the 'Lift LC Voltage' will be zero.
In Section (V), if the indicator box is red then the hoist's Down Stop is active, but if it is grey the hoist's Down Stop is off. If the Down Stop is active then the software is preventing the hoist from moving down.

If the hoist won't move down, ensure all the conditions listed on the screen below are met. (See Figure 7-13)

KSS Workspace tree location: Knight WO# \ Troubleshooting \ Can't Move Down

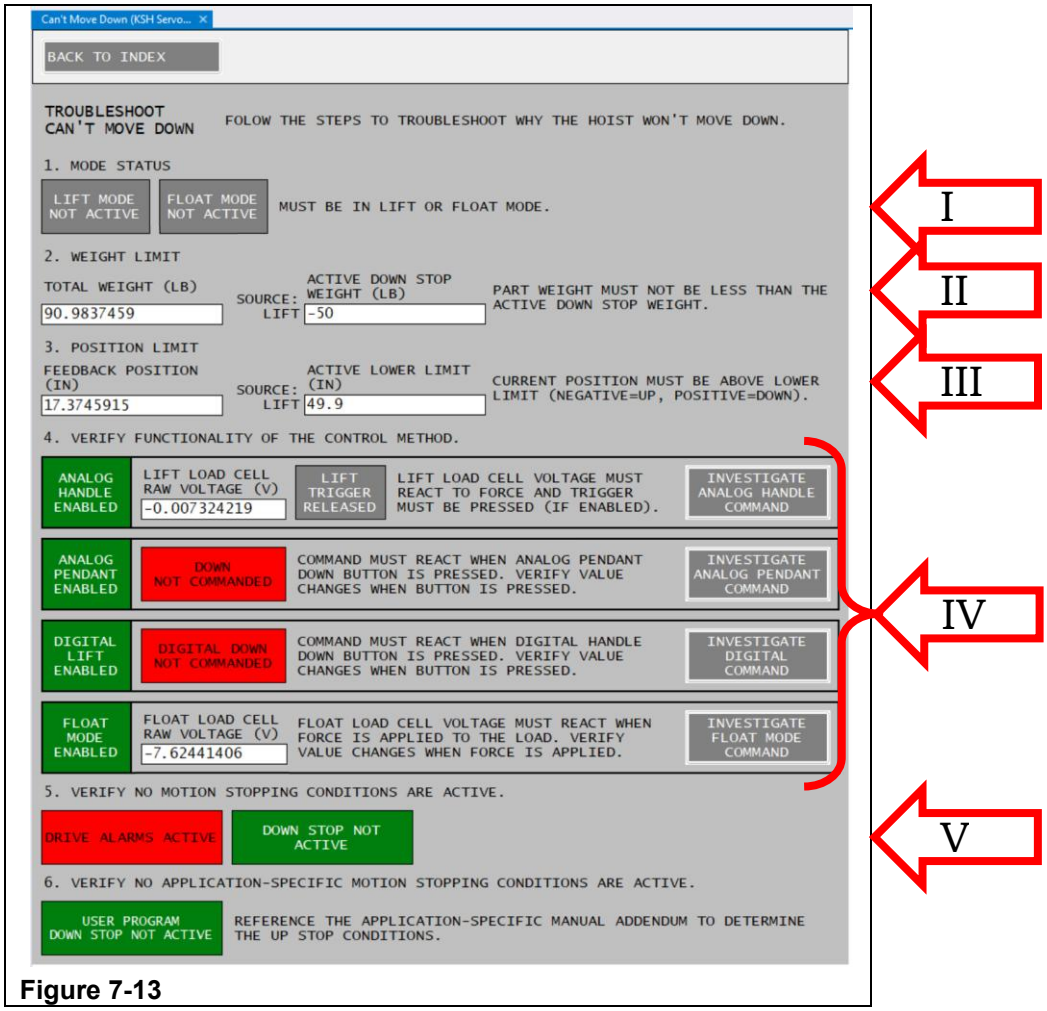


Figure 7-13

7g) Unexpected Motion screen

This screen lists the steps to diagnose any unexpected motion that occurs on the hoist.
(See Figure 7-14)

In Section (I), if this banner is green, there is not a command being issued from the analog handle.
If it is red, press the “INVESTIGATE ANALOG HANDLE COMMAND” button to examine the signal.

In Section (II), if this banner is green, the analog pendant is enabled.
If it is red, press the “INVESTIGATE ANALOG PENDANT COMMAND” button to examine the signal.

In Section (III), if this banner is green, there is a digital command active, either up or down.
If it is red, press the “INVESTIGATE DIGITAL COMMAND” button to examine the signal.

In Section (IV), if this banner is green, the float mode is active.
If it is red, press the “INVESTIGATE FLOAT MODE COMMAND” button to examine float mode.

KSS Workspace tree location: Knight WO# \ Troubleshooting \ Unexpected Motion

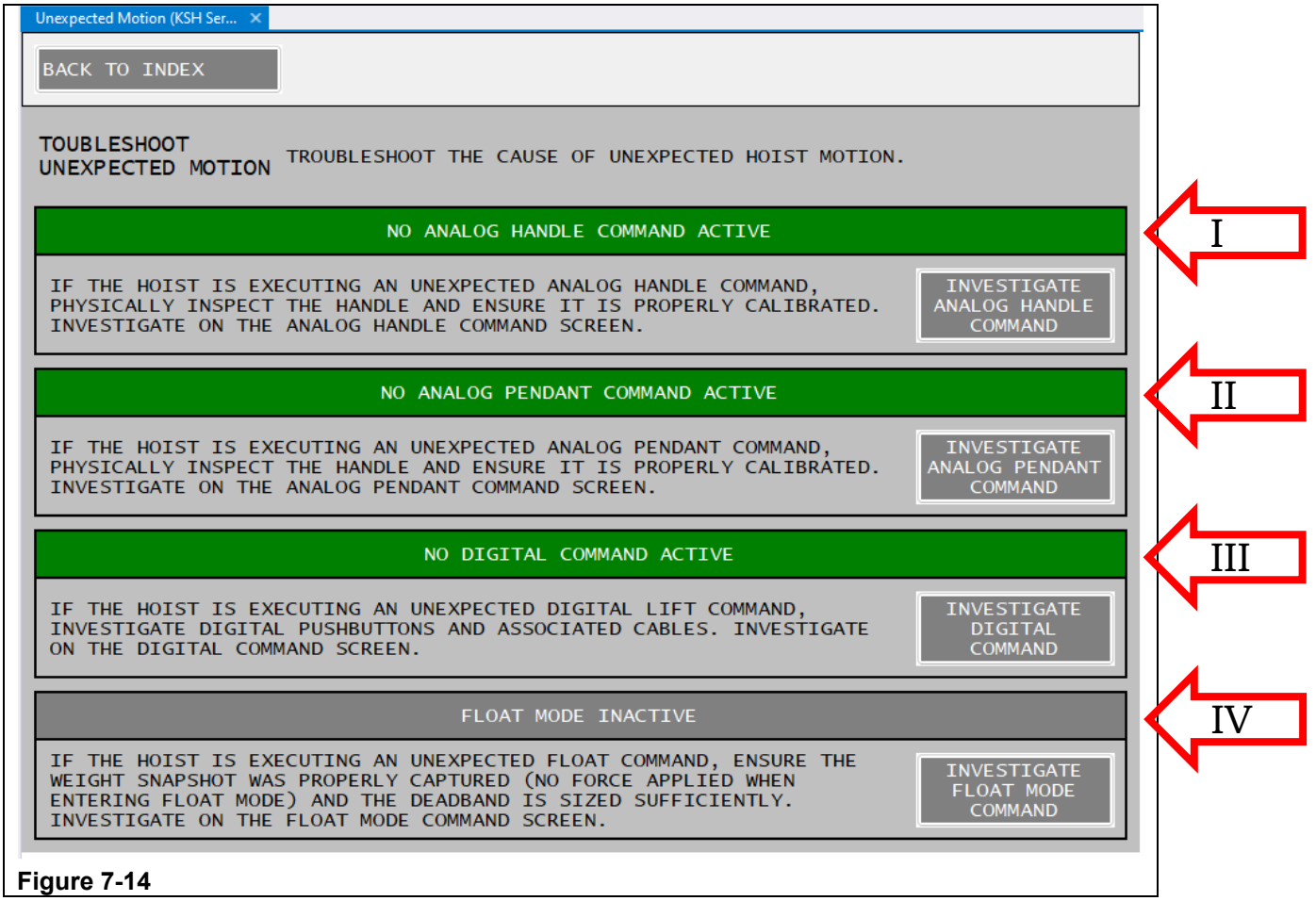


Figure 7-14

7h) Safety Relay screen

This screen lists the steps to diagnose any unexpected motion that occurs on the hoist.
(See Figure 7-15)

In Section (I), view the hoist's deceleration time and the last safety relay delay here.
In Section (II), if this banner is green, the safe torque off (STO) alarm is not active.
In Section (III), if this banner is green, then the Run-Stop button is released.
In Section (IV), if this banner is green, the safe torque off (STO) circuit is closed or operational.

KSS Screen: Start \ Troubleshooting \ Diagnose Safety Relay

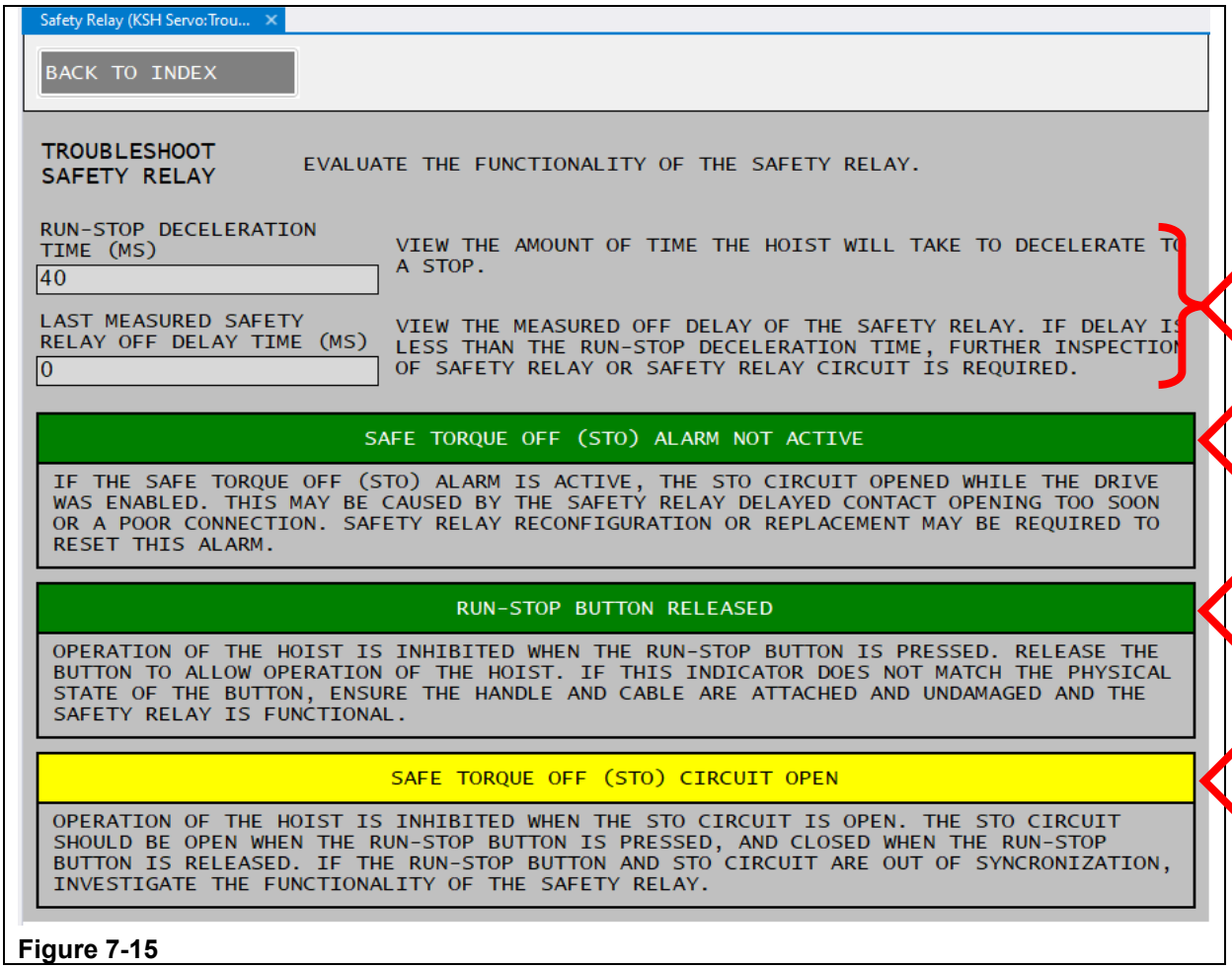


Figure 7-15

B. System Activity screens including Faults, Warnings and Error Codes

There are several System Activity screens covered in this section. Each of these screens is listed below and can be accessed inside the Knight Servo Studio (KSS) software from:

KSS Screen: Start \ Status \

7i) System Status screen
7k) I/O Status Screen
7m) Drive Alarms/Warnings screen
7n) Program Alarms screen
7o) Program Warnings screen
7p) Fault Log screen
7q) Heartbeat Status screen
7r) User Program Status screen
7s) Knight Error Codes
7t) Seib & Meyer Error Codes

7i) System Status screen

This screen shows many aspects of the hoist's systems in real time.

In Section (I), if the indicator box is green then the hoist's function is on,
If the indicator box is grey then the hoist's function is off or is not included with this hoist, and if the indicator box is red then function is in a fault or warning state.

This screen gives an overview of the hoist's readiness. (See Figure 7-16)

KSS Screen: Start \ Status \ System Status

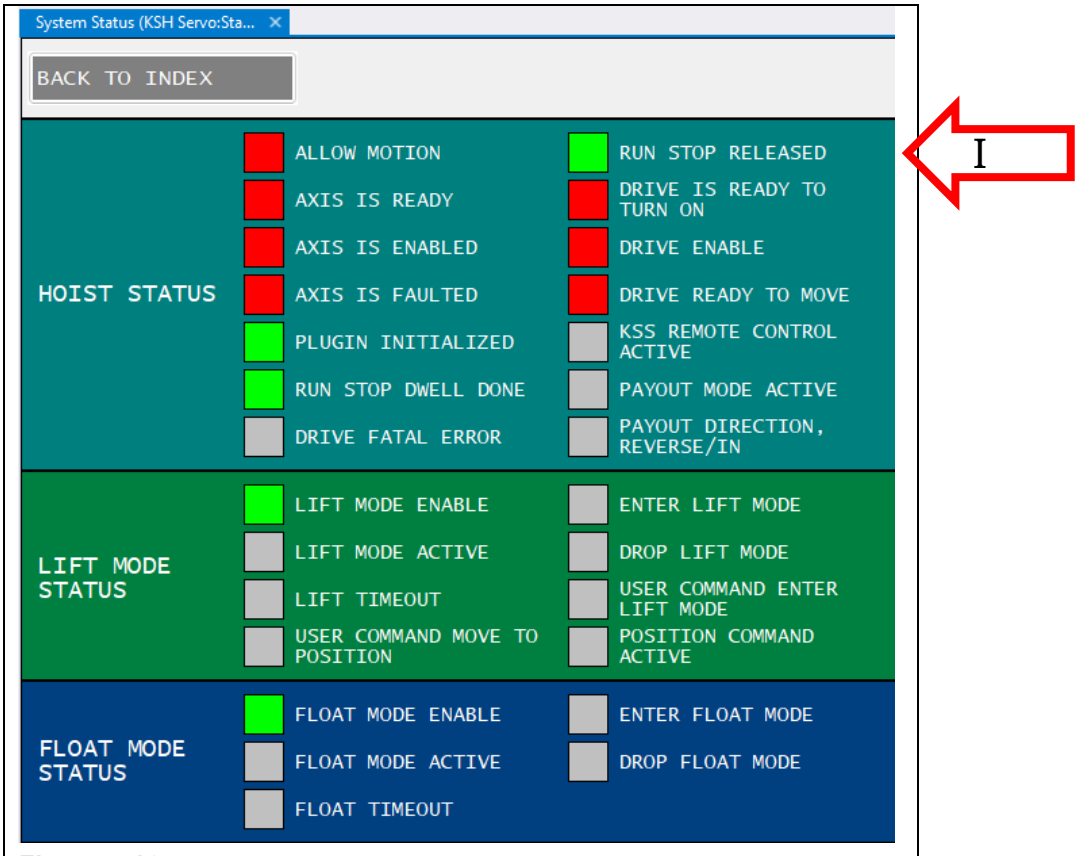


Figure 7-16

7k) I/O Status screen

This screen can be used to inspect the hoist's Inputs and Outputs. This screen can be accessed inside the Knight Servo Studio (KSS) software from:

KSS Workspace tree location: Knight Work Order # \ Status

This screen shows each of the onboard inputs and outputs.

In Section (I), see the legend for the indicator colors.

This screen graphically shows the status of each I/O point. (See Figure 7-18)

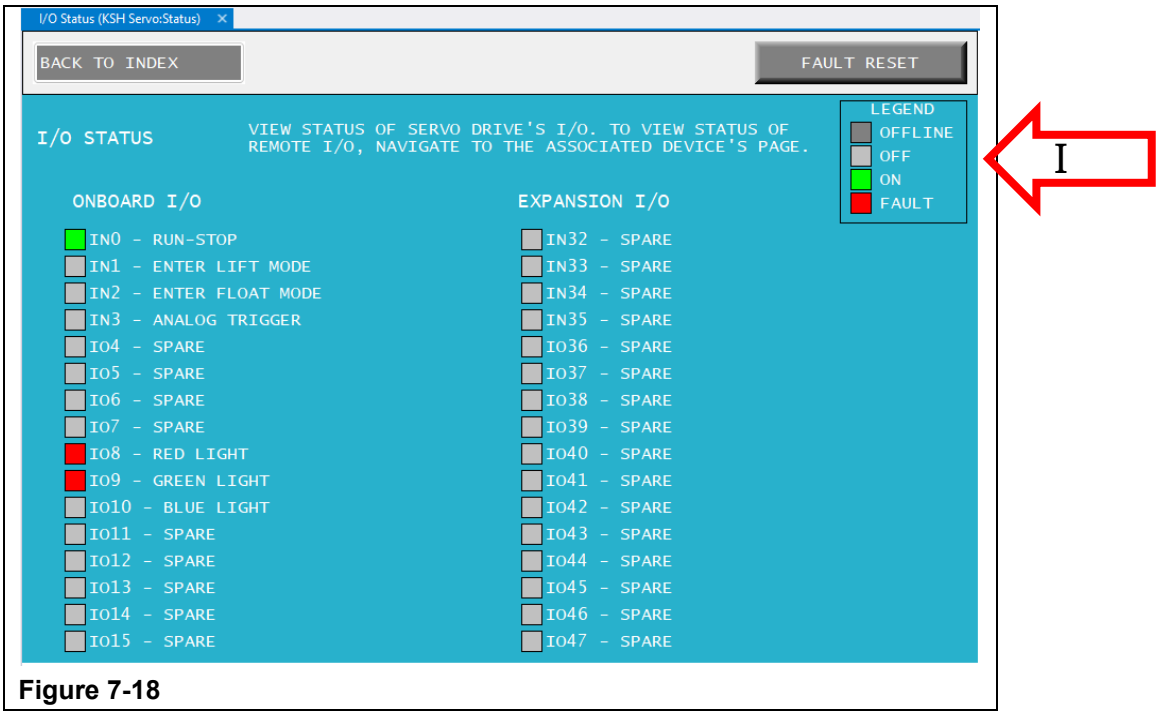


Figure 7-18

7m) Drive Alarms/Warnings screen

This screen shows all drive alarms and warnings that may be active on the hoist. (See Figure 7-19)

In Section (I), if the indicator box is red then that fault is active, but if the indicator box is grey then that fault is off or is not valid for the hoist.

This screen graphically shows if a fault is active. If a fault is active it will correspond to a particular fault code. This fault code can be easily viewed at:

KSS Home screen location: Quick View panel \ Row 1 (Lower right-hand part of the screen).
KSS Screen: Start \ Status \ Drive Alarms/Warnings

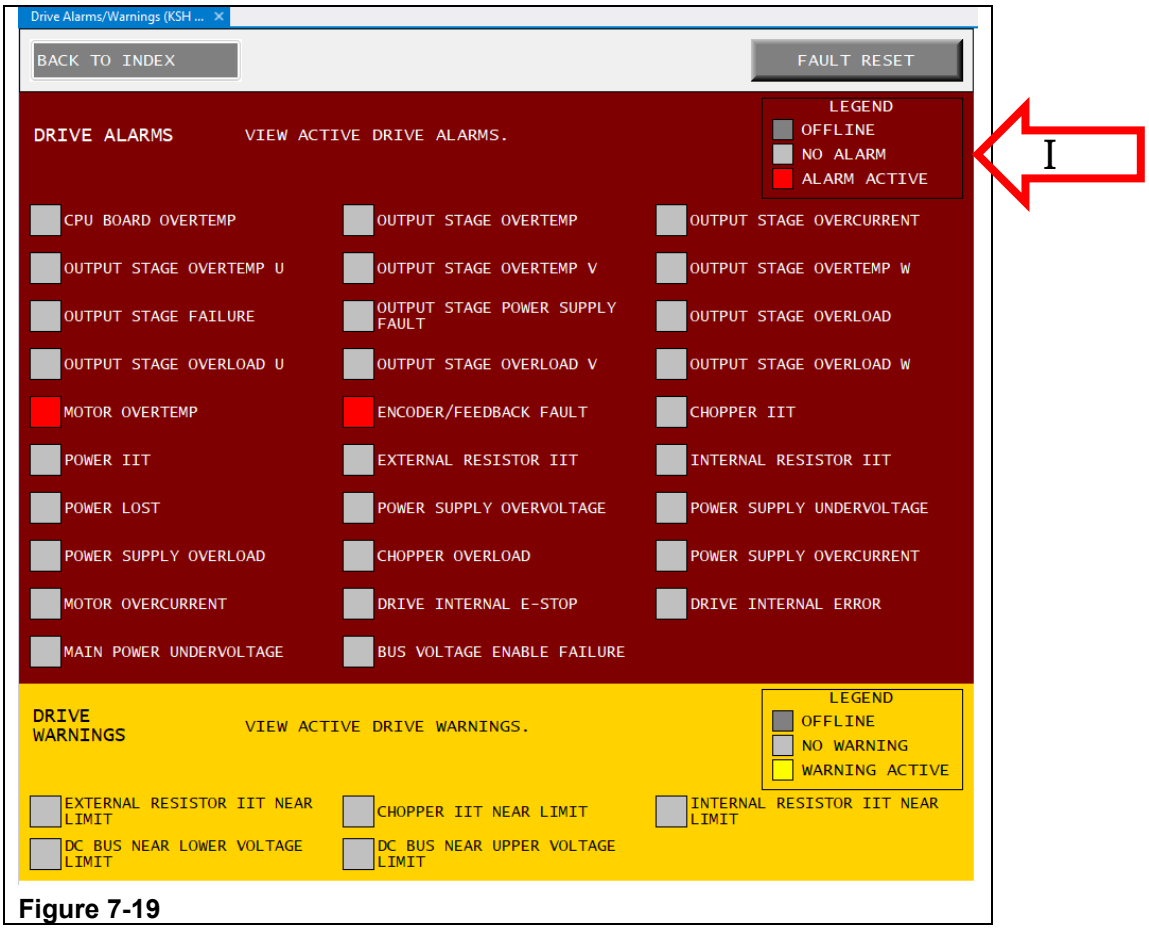


Figure 7-19

7n) Program Alarms screen

This screen shows all program alarms that may be active on the hoist. (See Figure 7-18)

Under Section (I), all program alarms are listed. If any indicators are RED, that fault is active.
Any available buttons for a fault will take you to a relevant page for further troubleshooting or information.

This screen graphically shows if a fault is active. If a fault is active it will correspond to a particular fault code.
This fault code can be easily viewed at:

KSS Home screen location: Quick View panel \ Row 1 (Lower right-hand part of the screen).
KSS Screen: Start \ Status \ Program Alarms

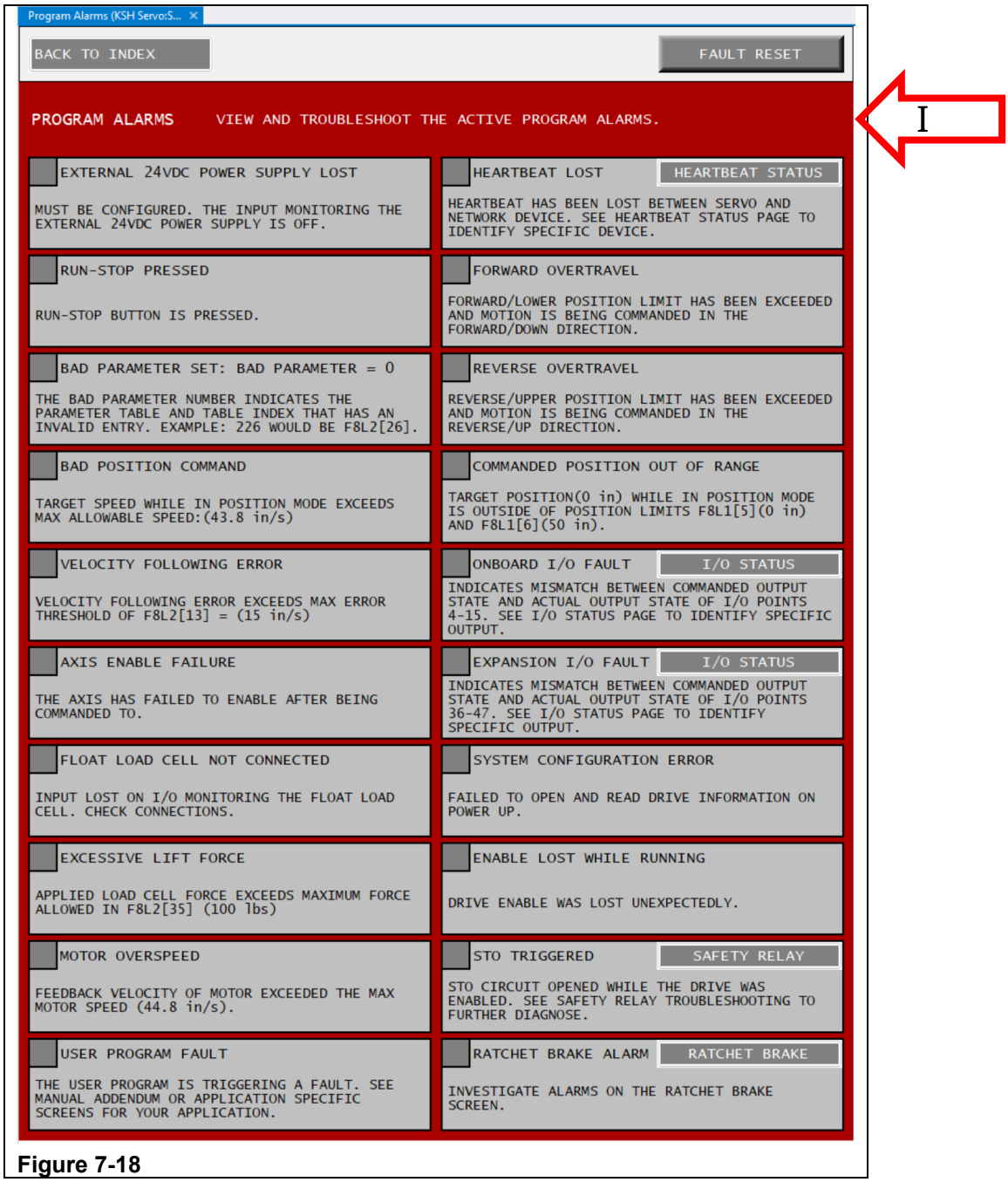


Figure 7-18

7o) Program Warnings screen

This screen shows all program Warnings that may be active on the hoist. (See Figure 7-19)

Under Section (I), all program warnings are listed. If any indicators are YELLOW, that warning is active.
The available buttons for a warning will open a relevant page for further troubleshooting or information.
KSS Screen: Start \ Status \ Program Warnings

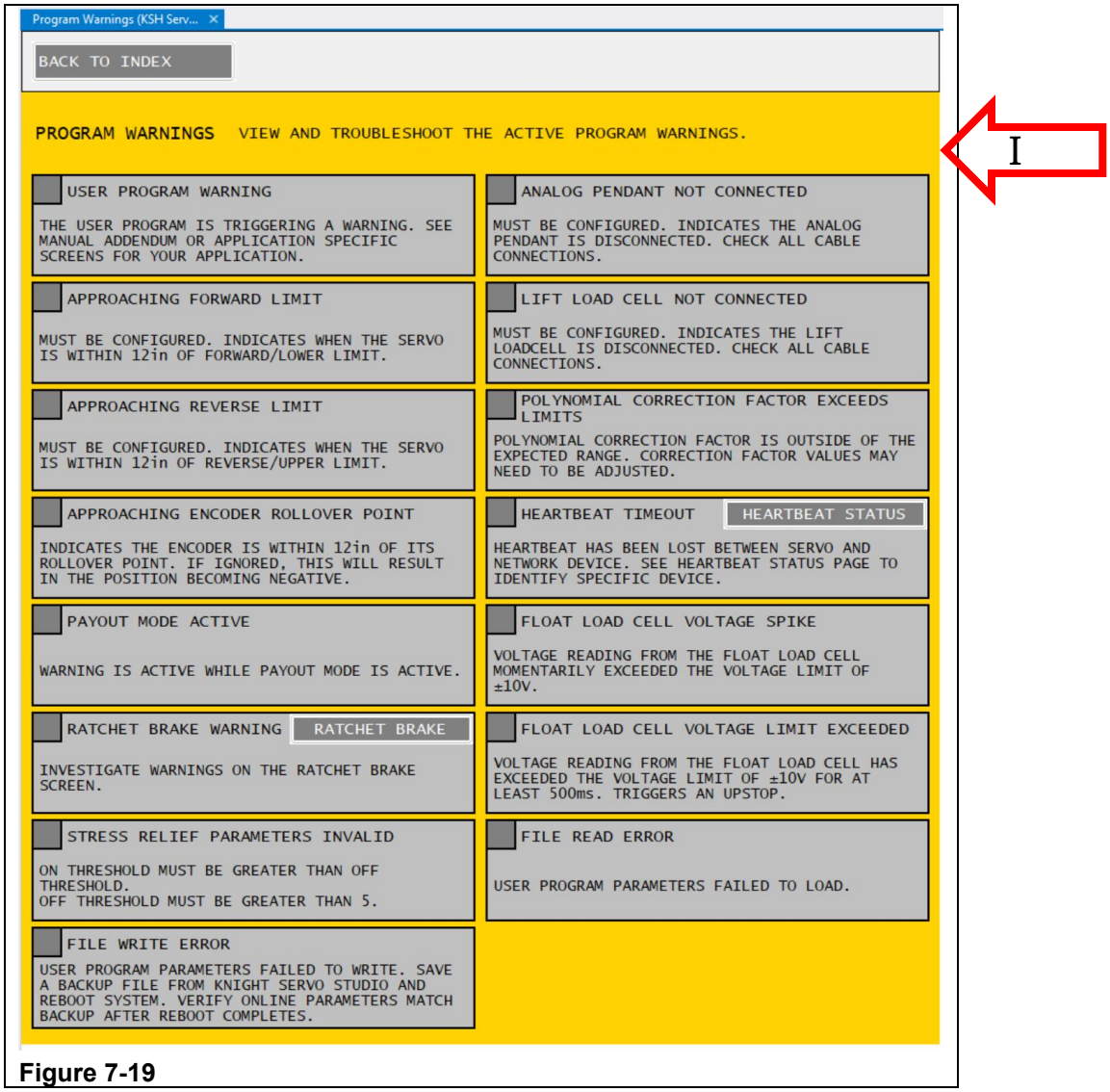


Figure 7-19

7q) Heartbeat Status screen

This screen shows the Heartbeat Status of any connected network device that may be active on the hoist. (See Figure 7-20)

Under Section (I), all Heartbeat faults are listed. This screen shows the Heartbeat Status of any connected network devices.

See the Legend found on the screen for the LED colors which show the status of the hardware connected to the servo by a Network connection.

KSS Screen: Start \ Status \ Heartbeat Status

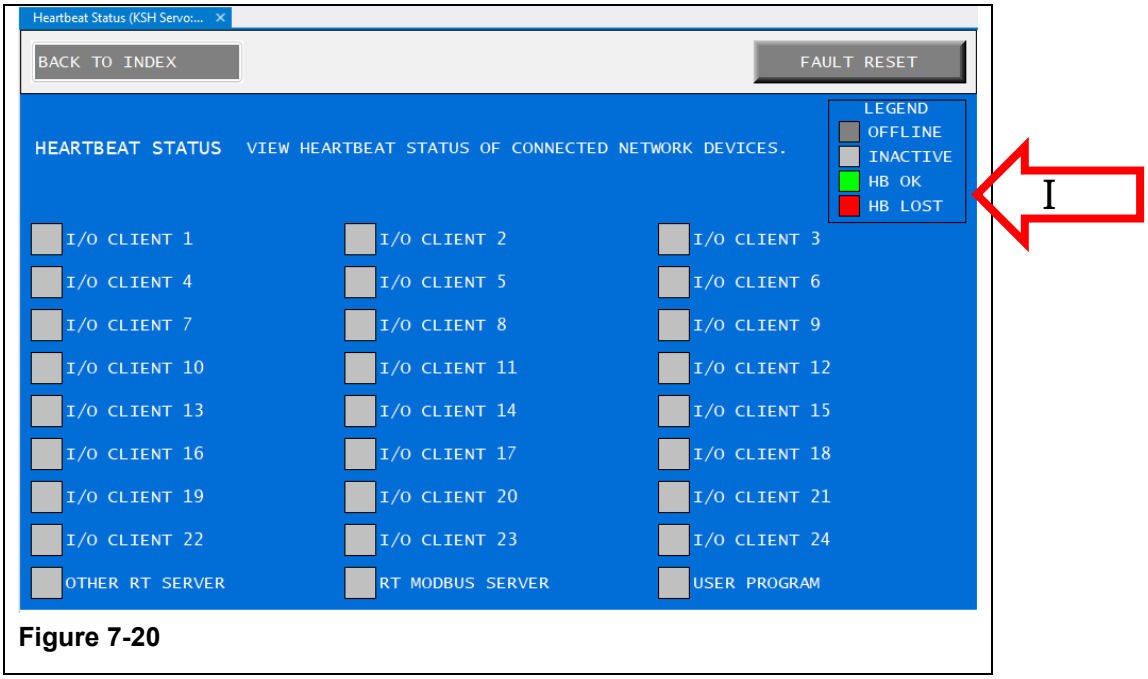


Figure 7-20

7r) User Program Status screen

This screen shows all the User Program Status variables that may be active on the hoist.
(See Figure 7-21).
Please note that if any of these values are active, the corresponding PRMx values will be overridden.

Under Section (I), Program Status variables are listed. If a LED is Green, that user variable is currently active.
If it is active, the current value will be displayed.
KSS Screen: Start \ Status \ User Program Status

Figure 7-21

7s) Knight Error Codes

These are the error codes that can be generated by the Knight firmware and are displayed within the Knight Servo Studio program is found here:

KSS Workspace tree location: Knight Work Order # \ Status \ Active Faults

Error Code	Description
100	External 24VDC Supply Lost
101	Run-Stop button pressed
102	Bad Parameters Set
103	Bad Position Command
104	Velocity Following Error
105	
106	Axis Enable Failure
107	Float Load Cell Not Connected
109	Excessive Lift Force Fault
111	Overspeed Fault
140	User Program Fault
150	Heartbeat Lost Fault
152	Illegal Encoder State
153	Forward Overtravel
154	Reverse Overtravel
160	Ratchet Brake Backoff Attempts Exceeded
161	Ratchet Brake Backoff Time Exceeded
162	Ratchet Brake Backoff Position Error
163	Ratchet Brake Pawl State Mismatch
164	Ratchet Brake Reverse Overtravel
165	Ratchet Brake Move Overtravel
166	Ratchet Brake Pawl Lost in Mode
167	Ratchet Brake Recovery Move Timeout
250	Commanded Position Out of Range
252	Onboard I/O Fault
253	Expansion I/O Fault
254	Payout Mode Active
255	Fatal Error
256	Output Stage Overcurrent Fault
257	Motor Overcurrent Fault
258	Output Stage Over temp.
259	CPU Board Over temp.
260	Output Overtemperature U Fault
261	Output Overtemperature V Fault
262	Output Overtemperature W Fault
263	Output Stage Failure Fault
264	Output Stage Power Supply Fault
265	Output Stage Overload Fault
266	Output Stage Overload U Fault
267	Output Stage Overload V Fault
268	Output Stage Overload W Fault
269	Motor Over temp.

Error Code	Description
270	Encoder/Feedback Fault
271	Chopper IIT
272	Power IIT
273	Power Lost
274	Internal Resistor IIT
275	External Resistor IIT
276	Power Supply Overload
277	Power Supply Undervoltage
278	Power Supply Overvoltage
279	Chopper Overload
280	Power Supply Overcurrent
281	Enable Lost While Running
282	SM Internal E-Stop
283	SM Internal Error
284	Onboard I/O #4 Fault
285	Onboard I/O #5 Fault
286	Onboard I/O #6 Fault
287	Onboard I/O #7 Fault
288	Onboard I/O #8 Fault
289	Onboard I/O #9 Fault
290	Onboard I/O #10 Fault
291	Onboard I/O #11 Fault
292	Onboard I/O #12 Fault
293	Onboard I/O #13 Fault
294	Onboard I/O #14 Fault
295	Onboard I/O #15 Fault
296	Expansion I/O #36 Fault
297	Expansion I/O #37 Fault
298	Expansion I/O #38 Fault
299	Expansion I/O #39 Fault
300	Expansion I/O #40 Fault
301	Expansion I/O #41 Fault
302	Expansion I/O #42 Fault
303	Expansion I/O #43 Fault
304	Expansion I/O #44 Fault
305	Expansion I/O #45 Fault
306	Expansion I/O #46 Fault
307	Expansion I/O #47 Fault
310	STO Triggered

7t) Sieb & Meyer Error Codes

The 7-segment display found on the front of the Sieb & Meyer SD3 servo drive displays internal error codes programmed by the manufacturer. These error codes are flashed on the display one digit at a time and are preceded by an “E”. For instance, the error “Supply Voltage Too Low” equates to Error Code 0132. The 7-segment display would flash an “E”, then a “0”, then a “1”, then a “3”, then a “2.”. This code will be repeated until the error is remedied.

The Knight fault codes displayed in Knight Servo Studio are the primary troubleshooting resource, but the Sieb & Meyer error codes are provided here for reference.

Error Code	Description
0002	Log File
0003	File Not Found
0004	Create XML File
0005	Real Time FIFO
0006	Install ISR
0007	Task Let
0008	ISR Install
0009	Shared Memory Not Found
0010	Undefined State
0011	Wrong Parameter Value
0012	Object Not Found
0013	Wrong Object Size
0014	Parameter File Not Found
0015	Type Plate File Not Found
0016	EEPROM Time Out
0017	EEPROM Check Sum
0018	No Valid Interrupt ID
0019	No Valid Serial Number
0020	Wrong Hardware ID Code
0021	Task Create
0022	Wrong Command
0023	Compensation File Not Found
0024	Command Canceled
0025	Machine Stop
0026	No PCIe Device
0027	FPGA Done Time Out
0028	FPGA Initialization Time Out
0029	Wrong File Format
0030	Mapping
0031	No Shared Memory Block
0032	No Plugin Found
0033	Shared Memory Block Not Found
0034	Shared Memory Block Size
0035	No Response
0036	Buffer Full
0037	Wrong Curve Count
0038	FPGA Wrong Version
0039	Wrong Product Name
0040	Wrong Product ID
0041	Wrong Product Version
0042	Wrong Product ID In Parameter File
0043	Create Object Dictionary File
0044	Create Device Configuration File
0045	Create Parameter Files

Error Code	Description
0046	Hardware File
0047	System Clock Not Set
0048	Motor Type
0049	Motor Control Mode
0073	Quit Reboot
0074	Quit Create Object Dictionary
0075	Quit Create Default Parameter
0076	Quit Program
0077	Quit Restart
0078	Quit IP
0079	Parameter Not Found
0080	Script Execution Fault
0081	Hardware Not Available
0082	FPGA Package File Not Found
0083	Slave Not Found
0112	IIT Power
0113	IIT Chopper Resistor
0114	Input Lost
0115	Undervoltage
0116	Overvoltage
0117	Chopper Overload
0118	DC-DC Converter Fault
0119	DC-DC Overload
0120	PFC Fault
0121	Preload Time
0122	Power Overload
0123	Preload
0124	Power Off
0125	DCO Voltage
0126	DC1 Voltage
0127	DC2 Voltage
0128	Safety Relay NOT Connected
0129	Chopper Resistor Too Low
0130	Chopper Power Too High
0131	Chopper Resistor Power Too High
0132	Supply Voltage Too Low
0133	Chopper Voltage Too Low
0134	Unknown Supply Type
0135	Supply Voltage Too High
0136	IIT Chopper Resistor 80
0137	Restart Application
0138	Incompatible FPGA File

Error Code	Description
0139	FPGA File Does Not Exist
0140	Power User Fault
0141	Power Busy
0142	IIT Chopper Resistor Internal
0143	IIT Chopper Resistor External
0144	IIT Chopper
0145	Chopper Voltage Level
0146	Power Ok
0147	Module Chopper Temperature
0148	Module Rectifier Temperature
0149	IDC Overload
0150	IIT DC Current
0160	Not Calibrated
0161	Profile
0162	Actual Position Not Destination Position
0163	SG Command Busy
0164	Not Operation Enabled
0165	Illegal Cal Method
0166	Illegal Drive Number
0167	Wrong Drive Type
0168	Not Ready to Switch On
0169	Wrong Start Condition
0170	Drive Parameter Fault
0171	Velocity Out of Limits
0172	Simulated Error
0173	Change On the Fly
0174	Not In Gantry Mode
0175	Wrong Master
0176	Emergency Stop
0177	Limit Switch P
0178	Limit Switch N
0179	Position Out of Limits
0180	Parameter Out of Limits
0181	Motor Temperature
0182	Heat Sink Temperature
0183	Drive Overload
0184	Drive Overvoltage
0185	Drive Undervoltage
0186	Power Stage Off
0187	Gantry Positions Not Equal
0188	Not In Hold Mode
0189	Power Stage On
0190	Acceleration Out of Limits
0191	Jerk Out of Limits
0192	Bad Switching
0193	Overload U
0194	Overload V
0195	Overload W
0196	Overload
0197	No Valid Parameter
0198	Output Stage Off

Error Code	Description
0199	IIT Motor
0200	IIT Output Stage
0201	Module U Temperature
0202	Module V Temperature
0203	Module W Temperature
0204	Water Temperature
0205	Ambient Temperature
0206	Feedback
0207	Over Speed
0208	Output Stage Enabled
0209	Limit Switch Input Not Enabled
0210	Brake Output Not Enabled
0211	Function Disabled
0212	Index Pulse Not Found
0256	NR No Tool
0257	NR Time Out
0258	NR Angle Too Low
0259	NR Angle Too High
0260	NR Torque Out of Range
0261	NR Friction Torque Too Low
0262	NR Friction Torque Too High
0263	NR Angle Max
0264	NR Current Too Low
0265	NR Current Too High
0266	NR Time Max
0267	NR Illegal Variant
0268	NR Illegal Section
0269	NR Unknown Tool
0270	NR No Transducer
0271	NR No Scanner
0272	NR Start Lost
0273	NR No Valid Section Type
0274	NR Offset Out of Range
307	Manual Stop
310	STO Triggered
0320	Network Invalid Telegram ID
0321	Network Zero Data
0322	Network CRC
0323	Network Synchronization
0324	Network Configuration
0325	Network NMT
0326	Network Addressing
0327	Network Node Guarding
0328	Network EEPROM
0329	Network Heartbeat
0330	Net Checksum
0331	Net No Data
0332	Net Wrong Data Count

Error Code	Description
0333	Net Telegram Id
0334	Net Telegram Length
0335	Net No Response
0337	Network Invalid AL Control
0338	Network Unknown AL Control
0339	Network Boot Not Supported
0340	Network No Valid Firmware
0342	Network Invalid Mbx Configuration
0345	Net No Valid Outputs
0346	Net Sync Error
0347	Net SM Watchdog
0349	Net Invalid Sm Out Cfg
0351	Network Invalid SM In Configuration
0361	Network Free Run Needs 3 Buffer Mode
0365	Network Fatal Sync Error
0368	Network Invalid Sync Configuration
0374	Network Sync Zero Cycle Time
0377	Network EE Error
0394	Unknown Command
0395	Access Not Allowed in Actual State
0396	No Access to External Controller
0397	Unknown Preselect
0398	Invalid Interface Id
0496	OEM
0559	OEM End
0640	TI Base
0641	TI Wrong State
0642	TI Command Not Supported
0643	TI Break Command
0644	TI Wrong Address
0645	TI Config Com Port
0646	TI Device Not Supported
0647	TI No Connection
0650	TI UART Config COM Port
0651	TI UART RX Buffer 0 Overflow
0652	TI UART RX Buffer 1 Overflow
0653	TI UART TX Buffer 0 Overflow
0654	TI UART TX Buffer 1 Overflow
0655	TI UART CRC Error

Error Code	Description
0656	TI UART Telegram Counter
0661	TI IIC Wrong Mode
0662	TI IIC Write Data
0663	TI IIC ACK
0664	TI IIC NACK
0665	TI IIC STOP
0666	TI IIC PSR
0667	TI IIC Device
0668	TI IIC res28
0669	TI IIC res29
0670	TI ZMDI IIC
0671	TI ZMDI Measurement
0672	TI ZMDI CRC Error
0673	TI ZMDI Command Not Supported
0674	TI Semaphore
0688	Short Circuit Earth Leakage
0689	Earth Leakage
0690	Earth Leakage L1
0691	Earth Leakage L2
0692	Earth Leakage L3
0693	Short Circuit
0694	Short Circuit L1
0695	Short Circuit L2
0696	Short Circuit L3
0697	Internal Current 1
0698	Interna Current 2
0699	Over Current Ramp Fct
0700	Over Current Sequence
0701	Continues Over Current Internal
0702	Continues Over Current Internal 1
0703	Continues Over Current Internal 2
0704	Short Circuit Earth Leakage Internal
0705	Earth Leakage Internal
0706	Short Circuit Internal
0707	Continues Over Current
0708	Continues Over Current 1
0709	Continues Over Current 2
0710	Short Circuit Earth Leakage Motor
0711	Earth Leakage Motor
0712	Earth Leakage U
0713	Earth Leakage V
0714	Earth Leakage W
0715	Short Circuit Motor
0716	Short Circuit Motor U
0717	Short Circuit Motor V
0718	Short Circuit Motor W
0719	Load Level IIt
0720	Load Level IIt Warning
0721	Mains Over Voltage

Error Code	Description
0722	Mains Over Voltage L1
0723	Mains Over Voltage L2
0724	Mains Over Voltage L3
0725	Mains Under Voltage
0726	Mains Under Voltage L1
0727	Mains Under Voltage L2
0728	Mains Under Voltage L3
0729	Phase Failure
0730	Phase Failure L1
0731	Phase Failure L2
0732	Phase Failure L3
0733	Phase Sequence
0734	Mains Frequency
0735	Mains Frequency Too Great
0736	Mains Frequency Too Small
0737	DC Link Over Voltage
0738	DC Link Over Voltage 1
0739	DC Link Over Voltage 2
0740	DC Link Under Voltage
0741	DC Link Under Voltage 1
0742	DC Link Under Voltage 2
0743	Load Error
0744	Output Over Voltage
0745	Output Over Voltage U
0746	Output Over Voltage V
0747	Output Over Voltage W
0748	Armature Circuit
0749	Armature Circuit Interrupted
0750	Field Circuit
0751	Field Circuit Interrupted
0752	Excess Ambient Temperature
0753	Too Low Ambient Temperature
0754	Supply Air Temperature
0755	Supply Air Outlet Temperature
0756	Excess Device Temperature
0757	Too Low Device Temperature
0758	Temperature Drive
0759	Excess Temperature Drive
0760	Too Low Temperature Drive
0761	Temperature Supply
0762	Excess Temperature Supply
0763	Too Low Temperature Supply
0764	Supply
0765	Supply Low Voltage
0766	Supply Voltage U1
0767	Supply Voltage U2
0768	Supply Voltage U3
0769	Supply Voltage U4
0770	Supply Voltage U5
0771	Supply Voltage U6
0772	Supply Voltage U7

Error Code	Description
0773	Supply Voltage U8
0774	SupplyVoltage_U9
0775	Supply Intermediate Circuit
0776	Control
0777	Measurement Circuit
0778	Computing Circuit
0779	Operating Unit
0780	Power Section
0781	Output Stage
0782	Chopper
0783	Input Stage
0784	Contacts
0785	Contact 1
0786	Contact 2
0787	Contact 3
0788	Contact 4
0789	Contact 5
0790	Fuses
0791	S1
0792	S2
0793	S3
0794	S4
0795	S5
0796	S6
0797	S7
0798	S8
0799	S9
0800	Hardware Memory
0801	Ram
0802	Rom E Prom
0803	EEProm
0804	Software Reset
0805	Data Record 01
0806	Data Record 02
0807	Data Record 03
0808	Data Record 04
0809	Data Record 05
0810	Data Record 06
0811	Data Record 07
0812	Data Record 08
0813	Data Record 09
0814	Data Record 10
0815	Data Record 11
0816	Data Record 12
0817	Data Record 13
0818	Data Record 14
0819	Data Record 15
0820	Loss Of Parameters
0821	Parameter Error
0822	Power
0823	Brake Chopper

Error Code	Description
0824	Failure Brake Chopper
0825	Over Current Brake Chopper
0826	Protective Circuit Brake Chopper
0827	Motor
0828	Motor Blocked
0829	Motor Error or Commutation Fault
0830	Motor Tilled
0831	Measurement Circuit1
0832	Sensor
0833	Tacho Fault
0834	Tacho Wrong Polarity
0835	Resolver 1 Fault
0836	Resolver 2 Fault
0837	Incremental Sensor 1 Fault
0838	Incremental Sensor 2 Fault
0839	Incremental Sensor 3 Fault
0840	Speed
0841	Position
0842	Computation Circuit
0843	Communication
0844	Serial Interface 1
0845	Serial Interface 2
0846	Data Storage
0847	Torque Control 1
0848	Excess Torque
0849	Difficult Start Up
0850	Stand Still Torque
0851	Insufficient Torque
0852	Torque Fault
0853	Velocity Speed Controller
0854	Position Controller
0855	Positioning Controller
0856	Following Error
0857	Reference Limit
0858	Sync Controller
0859	Winding Controller
0860	Process Data Monitoring
0861	Control 2
0862	Deceleration
0863	Sub Synchronous Run
0864	Stroke Operation
0865	Control 3
0866	Watchdog
0867	Main Voltage NOK
0868	Main Voltage Lost
0869	Charging Voltage Source
0870	No Option Module
0871	No Device Driver
0872	No Master Device
0873	No Slave Device
0874	No Configuration File

Error Code	Description
0875	Register Domain
0876	Register Syns
0877	Register Slave
0878	Activate Master
0879	Scan Bus Failed
0880	Create Domain
0881	Domain Data Pointer
0882	Pdo Config
0883	Slave Config
0884	Plugin Not Available
0885	Sdo Fault
0886	Option Not Enabled
0887	Object Access
0888	Motor Phase Lost
0889	Net Work State
0890	Object Not Found
0891	Config File Not Found
0892	Class Exists
0893	Instance Exists
0894	Attribute Exists
0895	Class Does Not Exist
0896	Instance Does Not Exist
0897	Attribute Does Not Exist
0898	Network Not Found
0899	Communication Error
0900	Option Not Available
0901	Option Not Available
0902	Option Not Available
0903	Already Configured
0904	Not Configured
0905	Socket Fault
0906	Option Not Available
0907	EEProm Write Error
0908	
0909	

C: Troubleshooting Chart

The Servo Hoist operation may be affected by a range of factors. If your hoist is not performing as well as expected, follow the table below to diagnose the problem. If unable to resolve the issue, contact the Knight Service Department at (248) 377-4950 x162 or via e-mail at service@knightglobal.com.

Problem	Cause	Solution
Hoist does not lift or lower	Power loss	Check circuit breaker, fuses, switches, and connections of all power lines. Check Run-Stop button, reset if necessary.
	Incorrect voltage	Check supply voltage and frequency of power supply to ensure it is correct for the Servo Hoist.
	Electrical fault	Secure power to the hoist; check all wiring and connections on the Servo Hoist.
	Program Fault	Connect to Knight Servo Studio and ensure there are no program faults
Hoist lifts but does not lower	"Lower Travel Limit" set incorrectly	Check parameter PRM1:06 “Forward / Lower Limit (in)”.
	Damaged pendant cord	Check each conductor in the pendant cable for continuity. Replace damaged cable as needed.
Hoist lowers but will not lift	"Upper Travel Limit" set incorrectly	Check parameter PRM1:05 “Reverse / Upper Limit (in)”.
	Damaged pendant cord	Check each conductor in the pendant cable for continuity. Replace damaged cable as needed.
	Hoist capacity exceeded	Reduce the weight of the load to within the rated or programmed capacity of the Servo Hoist.
	Low voltage in power supply	Find the cause of low voltage and restore voltage back to within +/-10% of required voltage supply.
Hoist does not lift at proper speed	Hoist capacity exceeded	Reduce the weight of the load to within the rated or programmed capacity of the Servo Hoist.
	Low voltage in power supply	Find the cause of low voltage and restore voltage back to within +/-10% of required voltage supply.
Hoist works intermittently	Open / Short circuit	Check circuits for loose connections or broken conductors. Repair or replace, as necessary.
	Damaged pendant cord	Check each conductor in the pendant cable for continuity. Replace damaged cable as needed.
	Damaged handle	Check each conductor in the pendant cable for continuity. Check connections and replace them if necessary. Replace damaged conductors as needed.
Continuously flashing green light using an Up/Down Pendant	Damaged pendant cord or switch	Check each conductor in the pendant cable for continuity. Check switch for correct functionality. Replace damaged part as needed.

8. SPARE PARTS LIST

Knight is continuously improving and updating its products, all product drawings and spare parts lists for this Servo Hoist are provided as supporting documentation accompanying this manual and delivered with the system.

9. DECOMMISSIONING A SERVO HOIST

Knight Servo Hoists have various materials which, at the end of the service life, must be disposed of or recycled (where appropriate), in accordance with statutory regulations.

Decommissioning:

	WARNING
	Knight Servo Hoists must be decommissioned by qualified personnel.

- Ensure there is not a load on the hoist.
- Remove power from hoist.
- Remove hoist from rail or support structure.
- If desired, Knight Global will properly dispose of the hoist.
  Contact a Knight Global representative to obtain a Return Material Authorization form.

10. KNIGHT'S PERFORMANCE WARRANTY

Knight warrants that its products and parts shall meet all applicable specifications, performance requirements, and be free from defects in material and workmanship for one year, (Servo Systems for (2) two years, Pneumatic Lift Tables for (5) five years), from the date of invoice, unless otherwise noted.

Knight warrants the Servo Hoist, Arms, and Tractors to be free from defects in material or workmanship for a period of two years or 6000 hours use from the date of shipment.

On design and build jobs, the customer is the owner of the equipment once they authorize shipment. The purchased equipment cannot be returned for reimbursement or credit.

Exclusions

This warranty shall not cover the failure or defective operation caused by inadequate training provided by customer regarding the operation and/ or maintenance of the tool, misuse, negligence, misadjustment, or any alteration not approved by Knight Global. Knight's obligation is limited to the replacement or repair of Knight's products at a location designated by Knight Global. Buyer is responsible for all associated internal removal and reinstallation costs as well as freight charges to and from Knight Global. Knight's maximum liability shall not in any case exceed the contract price for the products claimed to be defective.

Any field modification made to Knight Products or Systems without the written authorization by Knight Global shall void Knight's warranty obligation.

Any purchased components not manufactured by Knight Global and their specific individual warranties are not covered. Paint defects, scratches and marring from shipping are also excluded on all Knight Global products and products not manufactured by Knight Global.

Knight Distributors/ Agents are not authorized to circumvent or change any of these terms and/ or conditions of this warranty unless prior approval is received in writing by Knight Global Management. Verbal statements made by Knight Distributors/ Agents do not constitute warranties.

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11. APPENDIX A: USB LOCATION IN SERVO HOIST MANUAL

Location of Electronic Knight Servo Hoist Technical Manual and Documentation

Knight has migrated to a complete set of controls documentation in electronic format that is located on a USB drive, to reduce waste of natural resources. A USB drive is created for each Knight Servo System order and is placed inside the front cover of the Knight Servo Technical Manual binder which ships with each job. (See Figure 1 and Figure 2).

Knight Servo System Technical Manual and USB Drive

Figure 1

Figure 2

The typical folder layout structure of the Knight Servo System information on the USB drive is shown in. (Figure 3.)

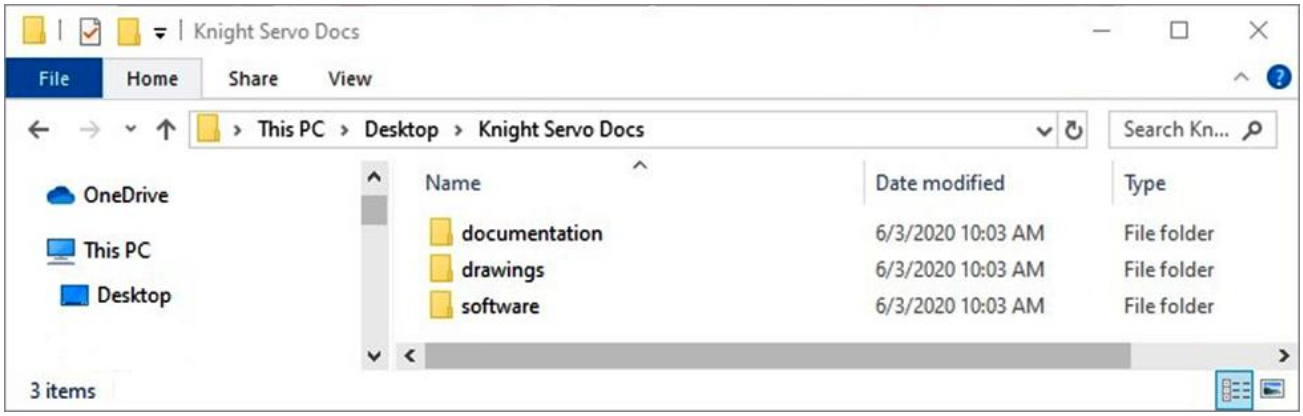


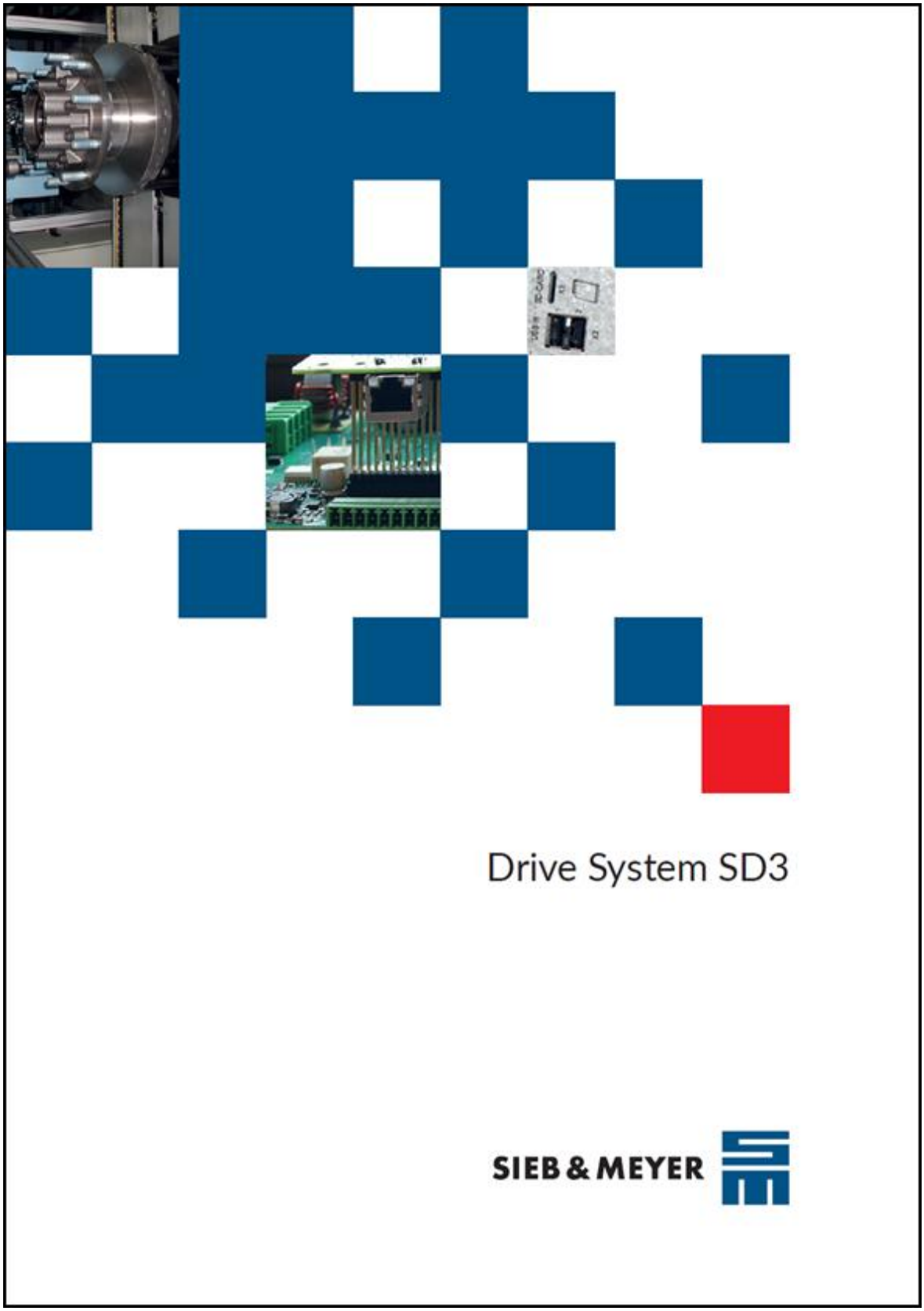
Figure 3

12. APPENDIX B: SERVO INFORMATION

In addition to the USB drive each binder includes the following:

- Printed set of controls drawings.
- Recommended Spare Parts List.
- Manual Addendum (if applicable).

13. APPENDIX C: Sieb & Meyer SD3 Drive System



Top Technology made in Germany

SIEB & MEYER was founded in 1962 and has been an internationally successful company in the field of industrial electronics since then. With 210 employees worldwide today, we develop and manufacture a broad spectrum of CNC and drive technology products. Our product range includes controllers for the machine construction and automation technology, servo amplifiers for various drives, frequency converters for high-speed applications and feed-in technology for renewable energy. Concentration on our core competence results in a worldwide leading position for controllers in the field of PCB drilling and routing machines. Close cooperation with our customers from the development up to the troublefree operation of our products is the basis of our quality philosophy. Highly qualified engineering teams and a modern manufacturing process lead to a maximum amount of innovations and flexibility in serving our customers. Worldwide service and customeroriented trainings are guaranteed with our headquarters in Lueneburg and our subsidiaries.

SIEB & MEYER

Drive System SD3 with Open System Architecture

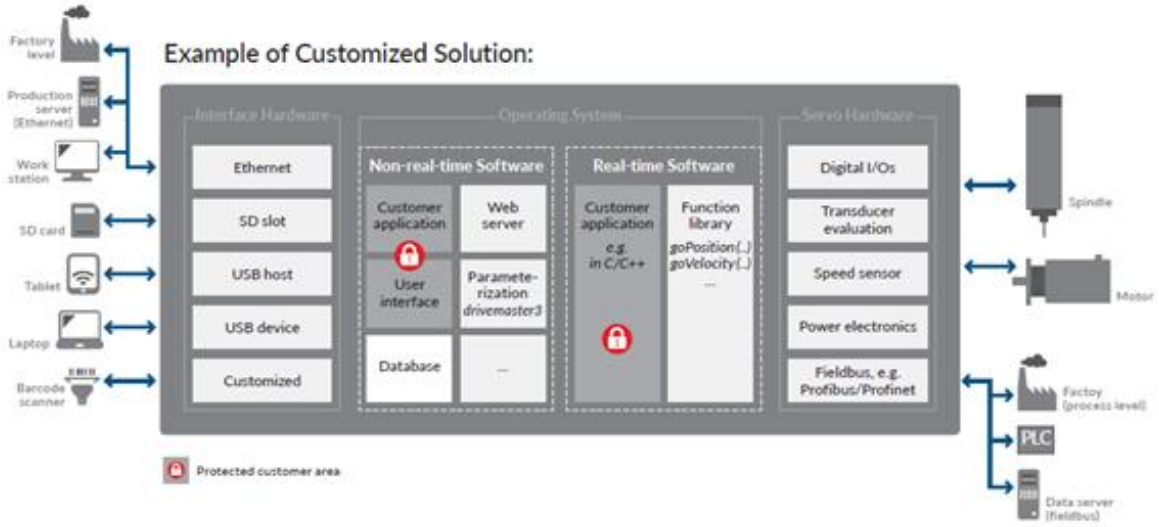
With the drive platform SD3 SIEB & MEYER offers a solution for complex drive tasks, e.g. for high-dynamic positioning applications or fastening and press applications operated by servo motors. Beside an open system architecture for almost all application-oriented control, drive and visualization tasks, the SD3 user benefits from the broad spectrum of additional function modules.

Know-how and Advantage over Competitors

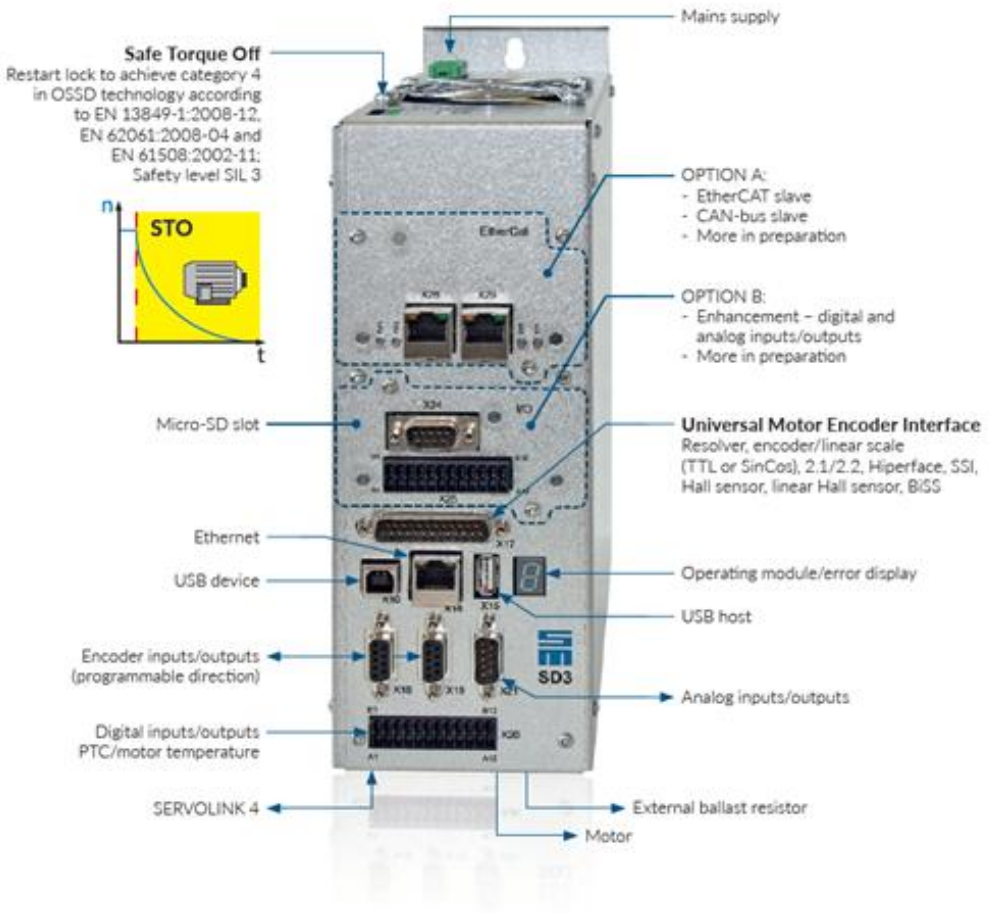
Drive amplifiers are often used to realize machining processes that require most of the know-how for the positioning profile and the evaluation of the process data. The drive platform SD3 by SIEB & MEYER offers the customers an individual solution including a protected application area. By means of the supplied function blocks the customer can focus on his core competence – the application programming relevant for the process.
This way the customer can distinguish himself from the competition. The task sharing during the development process results in a faster "time to market". SD3 is equipped with an open operating system that allows running other functions and programs of the customer at the same time. These are, for example, user interface, statistics, camera integration, communication and data storage. An operator panel can be connected directly via USB. This way an optimal visualization of the processes and a self-explanatory user interface can be created.

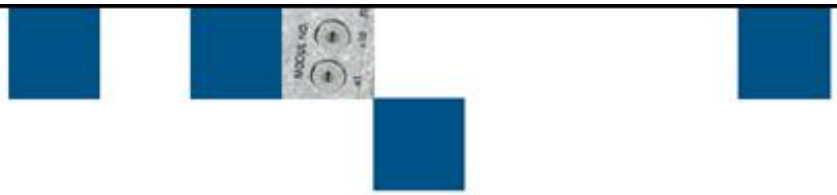
IoT Ready

By integrating an OPC-UA server SD3 offers a future-oriented platform that supports topics like Industry 4.0 or IoT.



The Interfaces of SD3



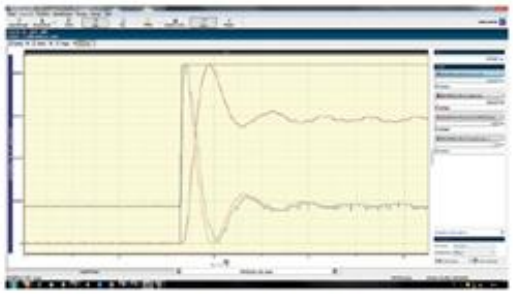


Technical Specifications of SD3

Device type	Rated power [1]	Rated current	Peak current/ time	Max. output voltage [1]	H x W x D	Weight	Cooling
Compact devices – 1 x 110...230 VAC supply voltage							
03631400DC	1.5 kVA	10 Arms	14 Arms/5 s	3 x 200 VAC	252 x 90 x 195	2.5 kg	Air
03631400EC	1.5 kVA	10 Arms	28 Arms/2 s	3 x 200 VAC	252 x 90 x 195	2.5 kg	Air
Compact devices – (3)1 x 110...230 VAC supply voltage							
03631490EC [3]	3.8 kVA (6.9 kVA) [2]	20 Arms	28 Arms/0.4 s	3 x 200 VAC	279 x 90 x 236	3.5 kg	Air
03631490IC [3]	3.8 kVA (6.9 kVA) [2]	20 Arms	56 Arms/0.4 s	3 x 200 VAC	279 x 90 x 236	3.5 kg	Air
Compact devices – 3 x 200...480 VAC supply voltage							
03631490EF [3]	9.7 kVA	14 Arms	28 Arms/0.4 s	3 x 410 VAC	279 x 90 x 236	3.9 kg	Air
03631490IF [3]	9.7 kVA	14 Arms	56 Arms/0.4 s	3 x 410 VAC	279 x 90 x 236	3.9 kg	Air
03631450EF [4]	15.9 kVA	23 Arms	28.3 Arms/5 s	3 x 410 VAC	390 x 181 x 178	7.8 kg	Air
03631450IF [4]	20.8 kVA	30 Arms	56.6 Arms/2 s	3 x 410 VAC	390 x 181 x 178	7.8 kg	Air
03631460IF [4]	24.2 kVA	35 Arms	56.6 Arms/5 s	3 x 410 VAC	460 x 190 x 220	13.7 kg	Air
03631460LF [4]	30.5 kVA	44 Arms	70.7 Arms/5 s	3 x 410 VAC	460 x 190 x 220	13.7 kg	Air
03631480MF [4]	55.4 kVA	80 Arms	113 Arms/3 s	3 x 410 VAC	429 x 272 x 265	19 kg	Air
03631480OF [4]	55.4 kVA	80 Arms	113 Arms/3 s	3 x 410 VAC	429 x 200 x 262	15 kg	Water

1) Rated power and max. output voltage for mains voltage/supply voltage (in bold)
2) Output at three-phase mains
3) NRTL certified
4) Devices in preparation

Software for Initial Operation and Parameterization: *drivemaster3*



The oscilloscope function allows optimization of the axes in the machine via the drive-setup-tool without additional measuring equipment.

The clear design of the software allows intuitive parameterization. The „Parameter-Wizard" guides the user step-by-step through the system configuration and allows intuitive setup of the device via help messages and comments.

Subject to changes and errors.

- CNC Controllers
- Drive Electronics
- Feed-in Technology

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Drive System SD3 • 11/17 Rev 03

NOTE

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