KNIGHT
GLOBAL

Speed Hoist Maintenance and Operation Manual

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

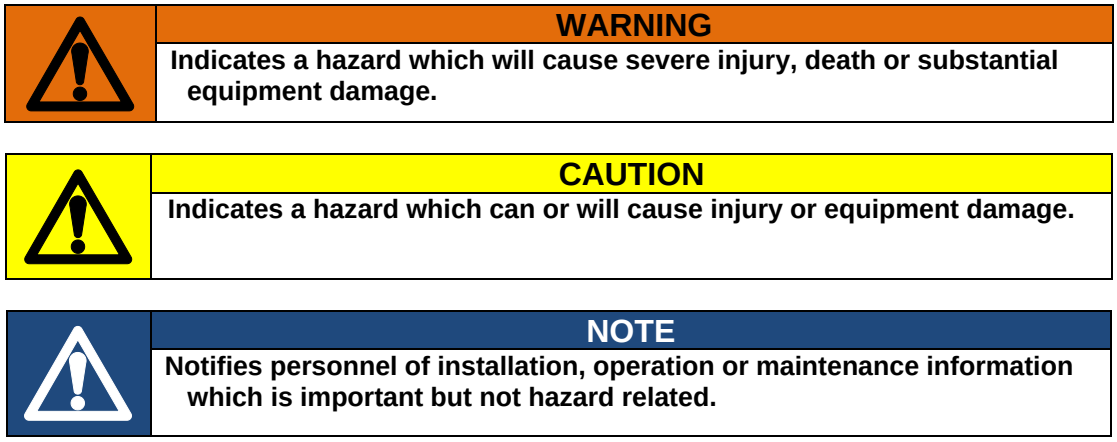
REV: 006-202201

This manual provides important information for all personnel involved in the installation, operation and maintenance of the Knight Global Speed 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) 375-7962.

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.



1. SAFETY

Knight Global cannot be aware of or provide for all the procedures by which the Speed 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 Speed Hoist in a safe condition and contact a supervisor and/or the Knight Global 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 Speed Hoist, 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 are 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 Speed Hoist and components are in compliance with ANSI/NFPA 70, and all applicable Federal, State and Local Codes.

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

A. General Safety Precautions

- Do not operate the Speed Hoist before reading this technical manual.
- Allow only personnel trained in safety and operation of this Speed Hoist to operate the Speed Hoist.
- If the Speed Hoist is locked out or a “DO NOT OPERATE” sign is on the Speed Hoist or controls, do not operate the Speed Hoist until the lock or sign is removed by designated personnel.
- Do not use the Speed Hoist if the hook’s safety latch has been sprung or broken.
- If the Speed Hoist utilizes a hook, ensure the hook’s safety latch is engaged before operating the hoist.

- Before each shift or prior to use, inspect the Speed 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 Speed Hoist with twisted, kinked or damaged chain.
- Only operate a Speed Hoist when the chain is centered over the hook. Do not “side pull” or “yard” the chain.
- 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 over a sharp edge.
- Pay attention to the load at all times when operating the Speed Hoist.
- Ensure no personnel are in the path of the load.
- Do not lift the load over personnel.
- Never use a Speed 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 Speed Hoist if the chain is jumping, jamming, overloading or binding.
- Do not operate a Speed Hoist if it is generating excessive noise.
- Avoid collisions or bumping of the Speed Hoist.
- Do not operate a Speed Hoist when damaged or malfunctioning.
- Do not remove load or handling device until tension is released from the chain.
- Discontinue operation of a Speed 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.

B. 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.

Run-Stop Push Button

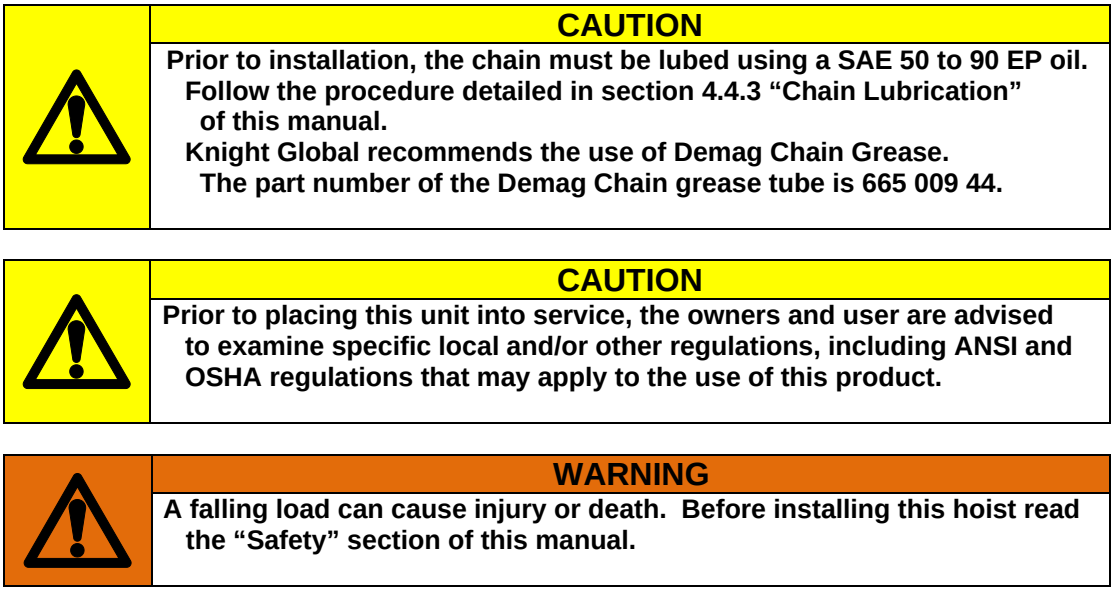
If an operator needs to stop motion immediately, the operator may push the Run-Stop button. The system will not function until it is reset. To reset the system from the Run-Stop condition, the operator turns the button clockwise to release it from the depressed position.

Safety Drop Stop (SDS) Chain

All Standard units have a Safety Drop Stop (SDS) chain included. The SDS Chain moves up and down the vertical axis with the load chain. It provides load stabilization in the event of a catastrophic load chain failure. This unique feature has a US Patent NO. 10,099,904 awarded as of 2018.

2. INSTALLATION

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



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

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

Ensure that the supporting structure is able to support the weight of the system and load. The structure should be able to support 300 percent of the combined weight of the Speed Hoist and load. Do not use a supporting structure that tilts the Speed 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 Speed Hoist into operation, inspect the Speed Hoist following the instructions in section 4.4.2.1 “Recommendations for Periodic Inspections” in the “Maintenance” portion of this manual.

A. Introduction

Prior to installing and operating the Knight Speed Hoist, all operators using this device should be familiar with the main components of the lifting system. (Refer to Figure 2-1)

Speed Hoist: The Speed Hoist assembly is a powered lifting device. The upper drive assembly contains the servo motor with holding brake, gearbox, servo drive, power contactor, 24 VDC Power Supply, regen board, chain bucket, chain guide assembly, and AC Plug.

Control Handle: The main interface between the operator and the lifting device. The handle includes an analog switch for up / down control of the hoist.

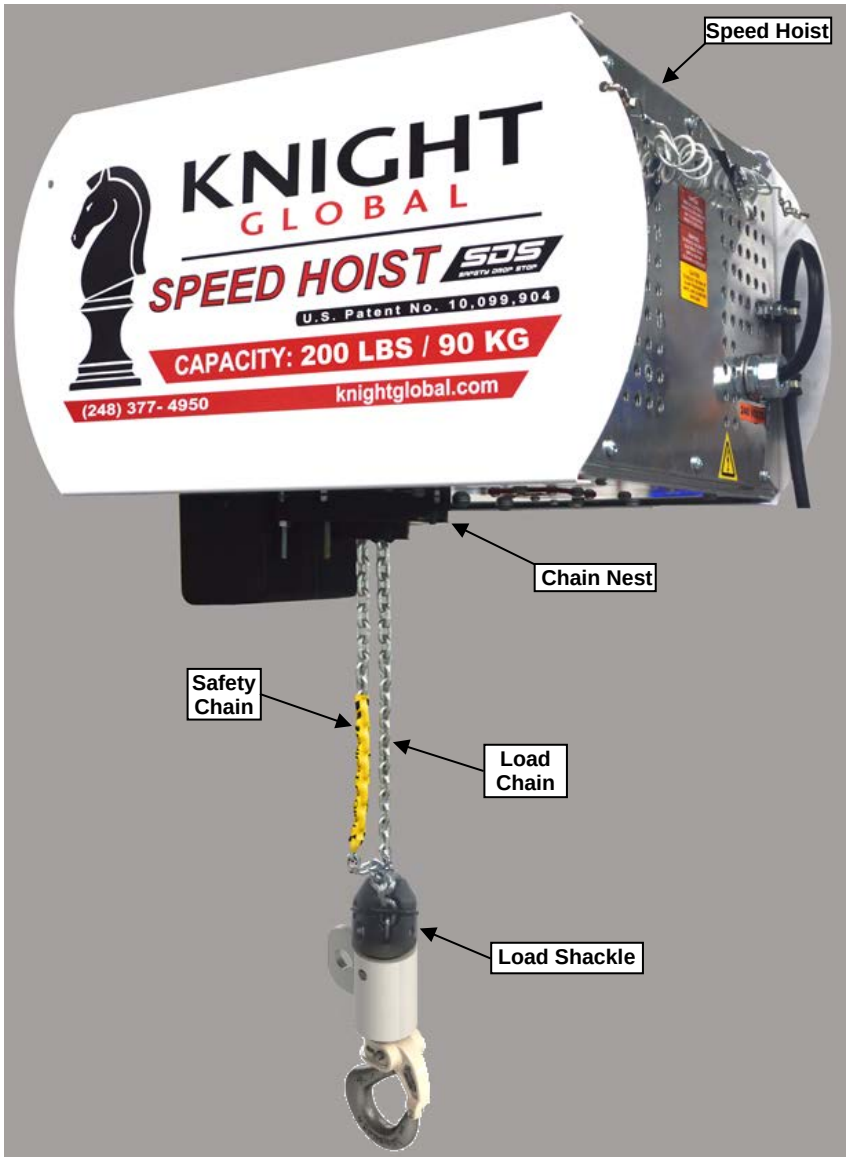


Figure 2-1

B. Initial Setup

Step 1: Unpacking

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

Step 2: System Assembly

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

2a) Speed Hoist Trolley Installation
2b) Safety Cable Installation
2c) 4mm and 5mm Chain Installation

Step 2a) Speed Hoist Trolley Installation:

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

1) Slide the trolley or adapter plate into the trolley mounting plate on top of the Speed Hoist. (Refer to Figure 2-2)
   NOTE: Ensure that the spacer plate is placed next to the mounting plate on the same side with the bolt heads when the trolley is assembled.

	CAUTION
	Ensure that there is a (2) two-point connection when using the universal adapter plate to hang the hoist from a structure. (Refer to Figure 2-3)

2) Insert the (2) two ½-13x1¾" (grade 8 or better) socket head cap screws (SHCS) and (2) two washers.

	NOTE
	The trolley should be mounted offset of the load distribution.

3) Secure the (2) two SHCS with (2) two ½-13 reverse lock nuts. As each bolt is tightened, the reverse lock nut will get drawn into its slot and get trapped there.
4) Install the safety cable through the Speed trolley or adapter and the trolley mounting plate. (Refer to Step 2b "Safety Cable Installation")
5) Roll hoist into rail system.

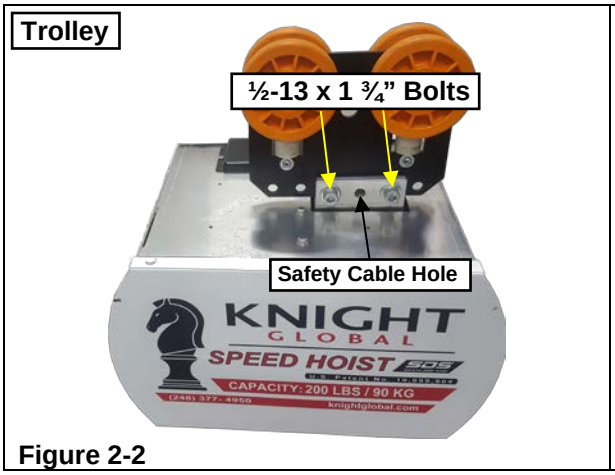


Figure 2-2

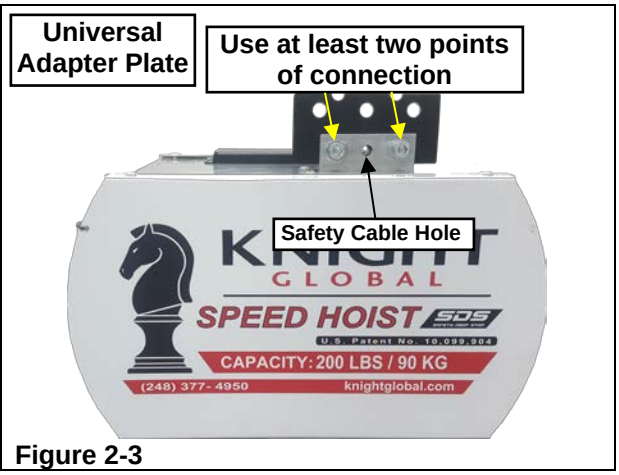


Figure 2-3

Step 2b) Safety Cable Installation:

1) Slide thimbles together. (Refer to Figure 2-4)
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 2-5)
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 2-6)
7) Secure the (2) two Crosby clamps snug to the thimble, repeating step 3.
8) Install the cable so that the Speed 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 2-6)

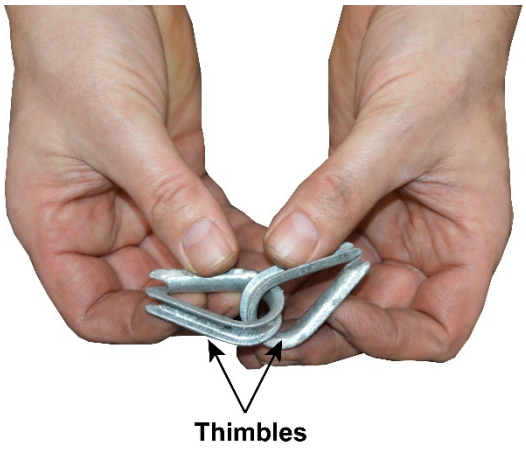


Figure 2-4

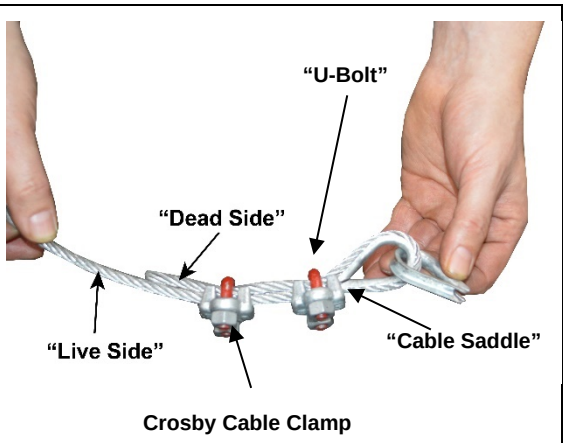


Figure 2-5

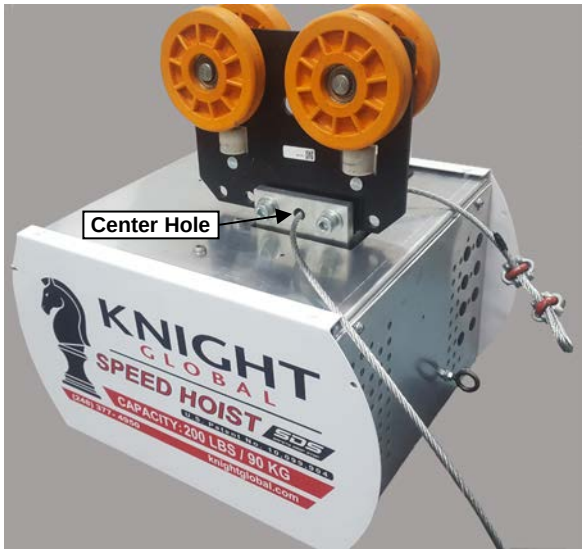


Figure 2-6

Figure 2-7

Step 2c) 4mm and 5mm Chain Installation:

CAUTION

DO NOT CUT CHAIN TO SHORTEN IT! The chain will be reeled into the hoist in Section 2, Step 5 "Control Handle Set-up".

1) Place the load chain into the top portion of the chain nest and insert the bolt provided thru chain nest in front of load chain's last link. An M4 Allen wrench is required if the Hoists' capacity is 200 or 400lbs. Otherwise, both the M4 and then M5 Allen wrenches will be required. (Refer to Figure 2-8)
2) Ensure that both chains are parallel with no twists from the gear box down to the chain nest.
3) Install the last link of the Safety Drop Stop (SDS) chain into the lower portion of the chain nest in front of the load chain. Ensure that the SDS chain is kept parallel to the load chain.
4) Install the bolt provided into the bottom bolt hole in the chain nest and through the last link in the SDS chain. (Refer to Figure 2-9)
5) Ensure that the large O-ring is fitted into the groove of the chain nest and the small O-ring is just above the chain nest but below the safety chain ID tag. (Refer to Figure 2-10)
6) Figure 2-11 shows the completed installation of both chains into the chain nest.

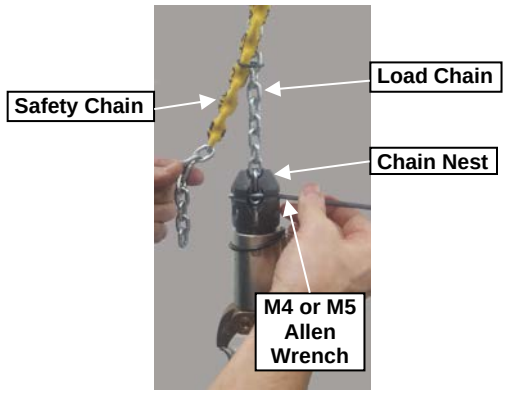


Figure 2-8

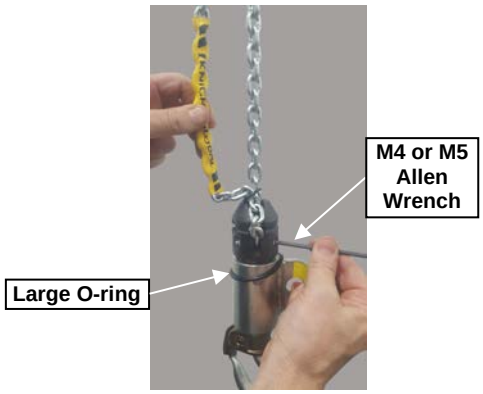


Figure 2-9

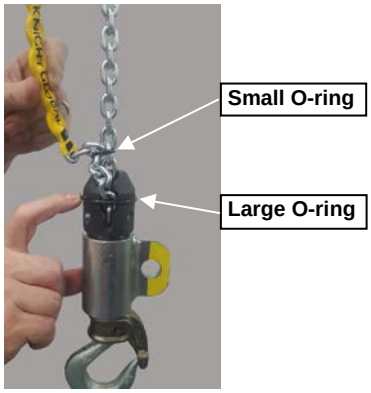


Figure 2-10

Figure 2-11

Step 3: Power Supply to Speed Hoist

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

Power Requirements: 240 VAC, 20 A, Single Phase, 50/60 Hertz or
480 VAC, 10 A, Three Phase, 50/60 Hertz depending on how the unit was ordered.
Call a Knight Representative to obtain the correct power requirements for your system. Power Requirements are posted also on the job tag and electrical prints.

Refer to system specific documentation for any special power requirements.

1) Ensure the Run-Stop button is depressed prior to supplying power to the unit.
2) The Speed Hoist power is connected by a twist lock plug (Refer to Figure 2-12: Standard) or fed by a hard-wired circuit, provided by end user (Refer to Figure 2-13: CE Compliant).
3) The red light on the Run-Stop button will illuminate when the Hoist has completely powered up.

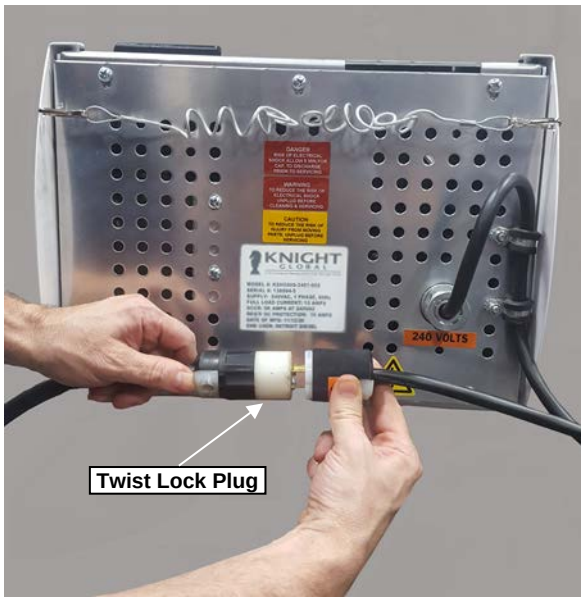


Figure 2-12: Standard

Figure 2-13: CE Compliant

Step 4: Releasing the Run-Stop button

The Run-Stop button is engaged for shipping purposes.

1) Turn 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 2-14)
2) Please, refer to the Run-Stop mode functionality in section 3.D. “Speed Hoist Functionality Modes” of this manual for more information.

Figure 2-14

Step 5: Control Handle check

ANALOG SWITCH HANDLE SETUP:

1) Locate and connect the analog switch handle to the servo unit via the 12-pin cable. (Refer to Figure 2-15)
2) Press the analog switch either right or left to initiate 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 2-15

Step 6: Test Hoist Movement

Test the Speed Hoist movement by moving the analog switch on the handle. The system should move up and down freely.

Step 7: Back-Up Software

Knight Speed Hoists are pre-programmed prior to delivery. It is a good practice to back-up this software before initial operation. Refer to the section 5. 'Software' portion of this manual for instructions to connect to the Speed Hoist and to back-up the 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 Hoist performs correctly for a specific application. Refer to section 5. 'Software' to setup the Speed Hoist with the Knight Servo Software.

- The Knight Servo Software will lead you through the steps to initially setup the Speed Hoist.

3. OPERATION

A. Principle of Operation

The Speed Hoist system receives a command to move up or down along the “Z” axis from the control handle.

B. Model Number

The Speed Hoist model number* designates the Speed Hoist type and its specifications. (Refer to Figure 3-1)

- The first set of letters indicate the type of Speed Hoist.
- The numbers following the Speed Hoist Type prefix letters reference the system’s rated capacity.
- The first “S” designates that the system is a Speed type Hoist.
- The second “S” designates our Safety Drop Stop feature. **
- The next (3) three numbers indicate the voltage
- The following number indicates the phase of the system.
- The last (3) three digits are a Knight controller code.

The hoist’s model number* and serial number can be found on the Knight identification label located on the Speed Hoist.

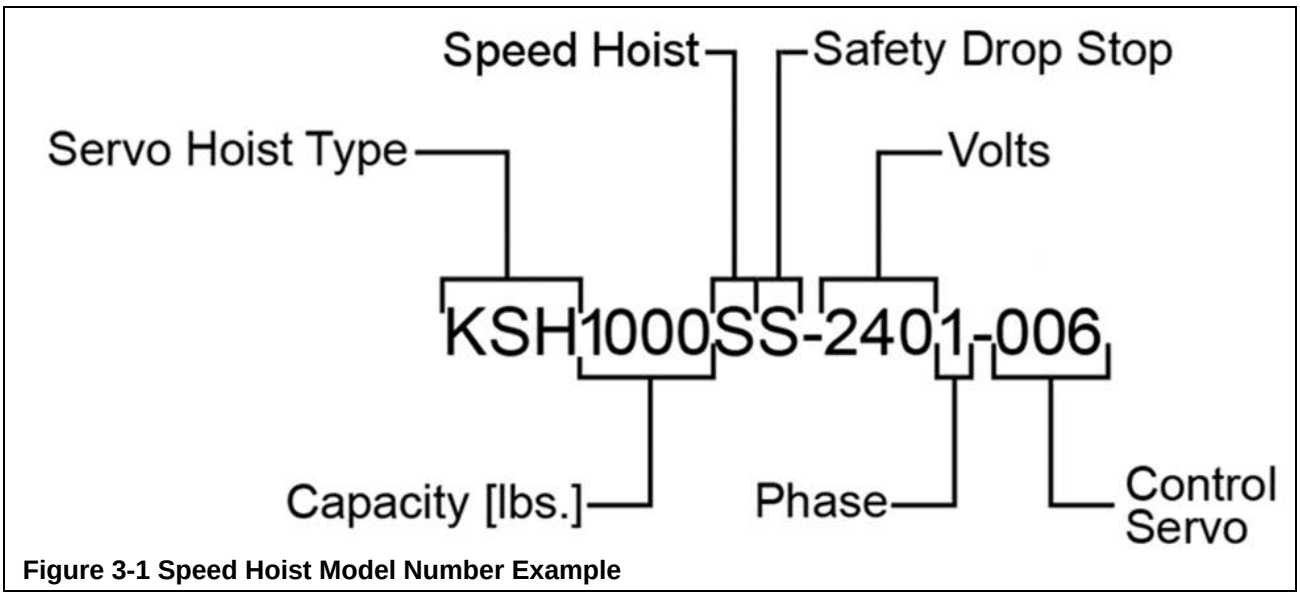


Figure 3-1 Speed Hoist Model Number Example

* For all models and specifications, refer to the website: www.knightglobal.com/product/sds-speed-hoist.

** All Knight Speed Hoists include a Safety Drop Stop chain that travels with the load chain to support the fixture in the event of a catastrophic load chain failure.

C. Speed Hoist Control Configuration:

Figure 3-2: Speed Hoist

D. Speed Hoist Functionality Modes

Run-Stop

Step 1. Press the RUN-STOP button, located on the handle.
- Motion is stopped and the motor's holding brake is set.
- The Run-Stop light will stay illuminated after the button is pressed.

Step 2. Reset the RUN-STOP button by twisting it a quarter of a turn clockwise.
- The Run-Stop and green lights will briefly flash.

Shut Down

Step 1. Press the RUN-STOP button, located on the handle.

Step 2. Follow the warning labels on the Speed 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 the handle's RED and GREEN lights will briefly flash when the system is ready to function.
- The unit will then default to Lift Mode: the RED indicator will turn off.

No Mode

No mode can be triggered if the hoist is inactive for set time period. By default, this time out feature is turned off. When in No Mode, the holding brake will engage and power will be removed from the motor. When the unit is in No Mode, the RED indicator will be off.

Fault Mode

The Red light will flash.

Step 1. Press the RUN-STOP button, located on the handle.
- Motion is stopped and the motor's holding brake is set.
- The RUN-STOP button will illuminate 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. Follow the Start Up procedure to restore power to the unit.

4. MAINTENANCE

A. CHAIN INSPECTION

4.1 Inspection Overview

The inspection procedures and recommendations in this manual are based on ANSI/ASME B30.16 “Overhead Underhung and Stationary Hoists” and 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 demonstrated the ability to solve or resolve problems relating to the subject matter at hand.

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.

4.2 Use of Chain Safely in Any Application

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

Figure 4-1

4.3 Determining the Frequency of Chain Inspections

Knight recommends utilizing load criteria and duty cycle data when determining the frequency of inspections. Inspection frequency should be identified 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 Speed Hoist should be rated individually and inspections performed in accordance with that rating.

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

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

4.3.1 Service Rating Load Criteria

Light Service: Hoist and chains normally subjected to light loads and very rarely to maximum loads.

Moderate Service: Hoist and chains normally subjected to moderate loads but fairly frequently to maximum loads.

Heavy Service: Hoist and chains normally subjected to loads of heavy magnitude and frequently to maximum loads.

Very Heavy Service: Hoist and chains regularly subjected to maximum loads.

4.3.2 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
1,000	2	3	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

4.4 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 chains during regular use. The general classifications are herein designated 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.

4.4.1 Frequent Inspection (Visual)

This is a visual examination of the hoist and its chains 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).

4.4.1.1 What to Look for During a Frequent Inspection

Operator should examine the chain throughout its working length to detect any evidence of wear, distortion or external damage. Equipment should be operated under a load as near as possible to the usual operating load, in both directions and observe the functioning of the chain. The chain should feed smoothly into and out of the servo.
Additionally, the operator should check the system continually during operation to ensure that no malfunctions are occurring.

- Check for visual signs or abnormal noises (grinding etc.) which would indicate a potential problem.
- Ensure controls function properly and return to neutral when released.
- Ensure the load chain feeds through the hoist correctly.
- Ensure that the chain doesn’t bind, is excessively noisy or “clicks” as it leaves the bottom of the servo.

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

4.4.2 Periodic Inspection (Documented)

This is a thorough examination of the hoist and its chains 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 remains in place).

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

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

D. Very Heavy Service or Service Class 4 – **Every Six Weeks**
(equipment remains in place unless external conditions indicate that disassembly should be done to permit detailed inspection).

4.4.2.1 Recommendations for Periodic Inspections

Perform the inspection detailed under section 4.4.1.1 "What to Look for During a Frequent Inspection" of this manual.

Next, the chains 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. 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, slacken the chain and rotate adjacent links to expose the inner ends of the link. If wear is observed or if elongation is suspected, measure the chain.
Knight recommends using the Knight Chain Gauge (sold separately) for quick GO / NO GO checks of chain length.

A. Chain Link Thickness

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

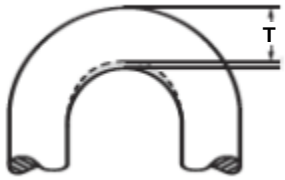


Figure 4-2

Minimum Allowable Chain Link Thickness at Any Point

Nominal Chain Size		Minimum Thickness "T"	
Inches	mm	Inches	mm
.157	4.0	.137	3.48
.196	5.0	.171	4.35

Table 4-2

B. Chain Gauge Replacement Measurement for 4mm Load Chains

1. Raise the hoist to the full up position and mark the chain.
2. Lower the hoist to the full down position.
3. Select 13 links starting with the link that was marked in step 2.
4. The 13-selected links should fit loosely onto gauge prongs as shown below. If links number 1 and 13 do not fit onto prongs or have to be forced into selection, replace the load chain. This length has increased by 2% or more and should be removed from service and replaced with new chain.
5. Perform this inspection in multiple sections of the chain working up to the sprocket.

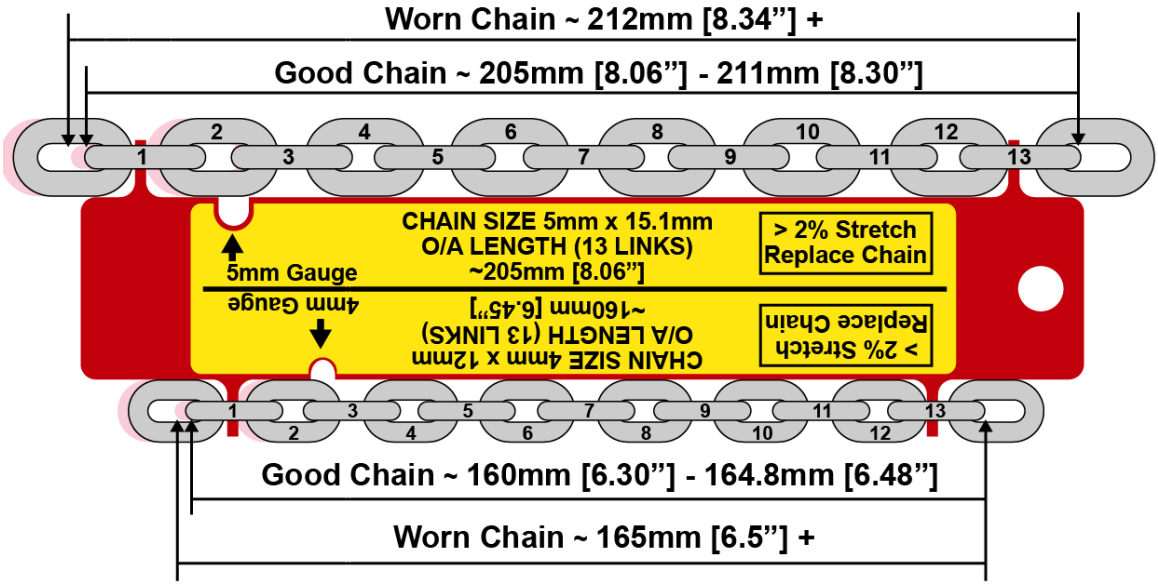


Figure 4-3

C. If Chain Gauge is Not Available

- Select an unworn, un-stretched length of the load chain.
- Suspend the chain vertically under tension. Use a caliper type gauge to measure the accumulated pitch of between 5 and 13 links.
- Measure the same number of links throughout the used chain and calculate the percentage increase in length.
- The chain should be replaced if the gauge length measured over any 5, 7, 9, 11, or 13 links as appropriate exceeds that of the unused chain by 2%.

D. Rejection Criteria

The chain should be rejected and replaced if any of the following conditions are observed: (Refer to 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 as appropriate exceeds that of the unused chain by 2%.

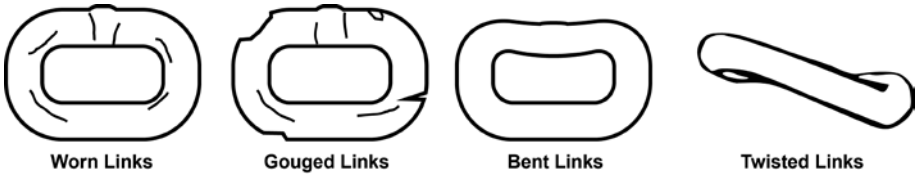


Figure 4-4

4.4.2.2 Recommended Record Keeping for Periodic Inspections

Adequate records as a part of periodic inspection are essential for the proper use of calibrated chains. The chain record should include a complete description and identification of the new chain, 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 and shows that it has been regularly inspected and maintained in good operating condition.

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

4.4.3 Chain Lubrication:

Keep chain well lubricated. Never operate a hoist when the load chain does not flow freely and smoothly into and out of the gear box assembly or when it makes noises indicative of binding or other malfunctions. Replace the chain if it is visibly damaged in any way.

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

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

Lubricate each link of the chain with a light coat machine or gear oil. Knight recommends using Demag Chain Grease (P/N 665 009 44). Ensure that oil is applied to all roller chain links and rollers. Wipe off excess oil from the roller chain surfaces.
(Refer to Figure 4-5: Chain Lubrication – P/N 665 009 44)

If Demag Chain Grease is not available, SAE 50 to 90 EP oil or equivalent may be used. Substitute a dry lubricant for use in dusty environments.

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

Lubricate chain without load on chain. This will allow lube to penetrate between links.

WARNING

Failure to maintain clean and lubricated load chain will void the manufacturer's warranty.

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

4.4.4 Load Chain Replacement:

Care should be taken to re-install the chain without any twists down the entire chain's length between the gear box and its anchored end in the chain nest. Proper orientation of the entering link should be established since a twist cannot be corrected except by removing and re-installing the chain.

Refer to Section 4.6 "Load and Safety Drop Stop Chain Replacement (Normal Maintenance)" for further instructions on how to replace load chain.

4.4.5 Graphite Lubrication Stick:

The Knight Speed Hoist includes a graphite lubrication stick (Lube Stick) located inside the chain guide. This Lube Stick helps to keep both the load and safety chains lubricated, but is NOT intended to replace normal lubrication practices.

A new Lube Stick can be "dropped" into the Lube Stick recess hole when there is 2.5" of space left inside the hole. Replacement Lube Stick part number: KSHD1017. (Refer to Figure 4-6)

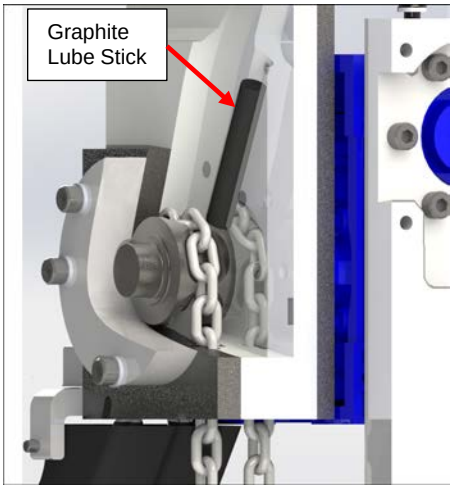


Figure 4-6

B. PREVENTATIVE MAINTENANCE FOR KNIGHT SPEED HOIST

4.5 Speed Hoists Inspections

4.5.1 Recommendations for Frequent Inspections for Speed 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 4.4.1 'Frequent Inspection (Visual)'.

Additionally, the operator should check the system continually during operation to ensure that no malfunctions are occurring.

4.5.1.1 Speed Hoist:

- Visually inspect the Speed Hoist and ensure that it is in good general working order. Repair or replace any broken or missing parts.
- Cycle the Speed Hoist and listen for any abnormal noises (grinding, etc.). If any abnormal noises are evident, an inspection of the Speed Hoist must be performed.
- Inspect how the chain feeds through the Speed Hoist. If any binding is evident, clean and lubricate the chain (Refer to section 4.4.2 'Periodic Inspection (Documented)'. If the problem persists replace the chain.
- Cycle the Run-Stop button and ensure it functions correctly.

4.5.1.2 Load Shackle:

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

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

4.5.2 Periodic Inspection (Documented)

Perform the items listed in the section 4.4.1.1. 'What to Look for During a Frequent Inspection' in addition to the items listed below. All findings from this inspection should be recorded.

4.5.2.1 Supporting Structure:

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

4.5.2.2 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.

4.5.2.3 Fasteners:

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

4.5.2.4 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.

4.5.2.5 Valves, Timers, and Switches:

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

4.5.2.6 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.

4.5.2.7 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.

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

4.5.2.8 Labels and Tags:

- Ensure that all labels are intact and legible. Replace as necessary. (Refer to Figure 4-7)

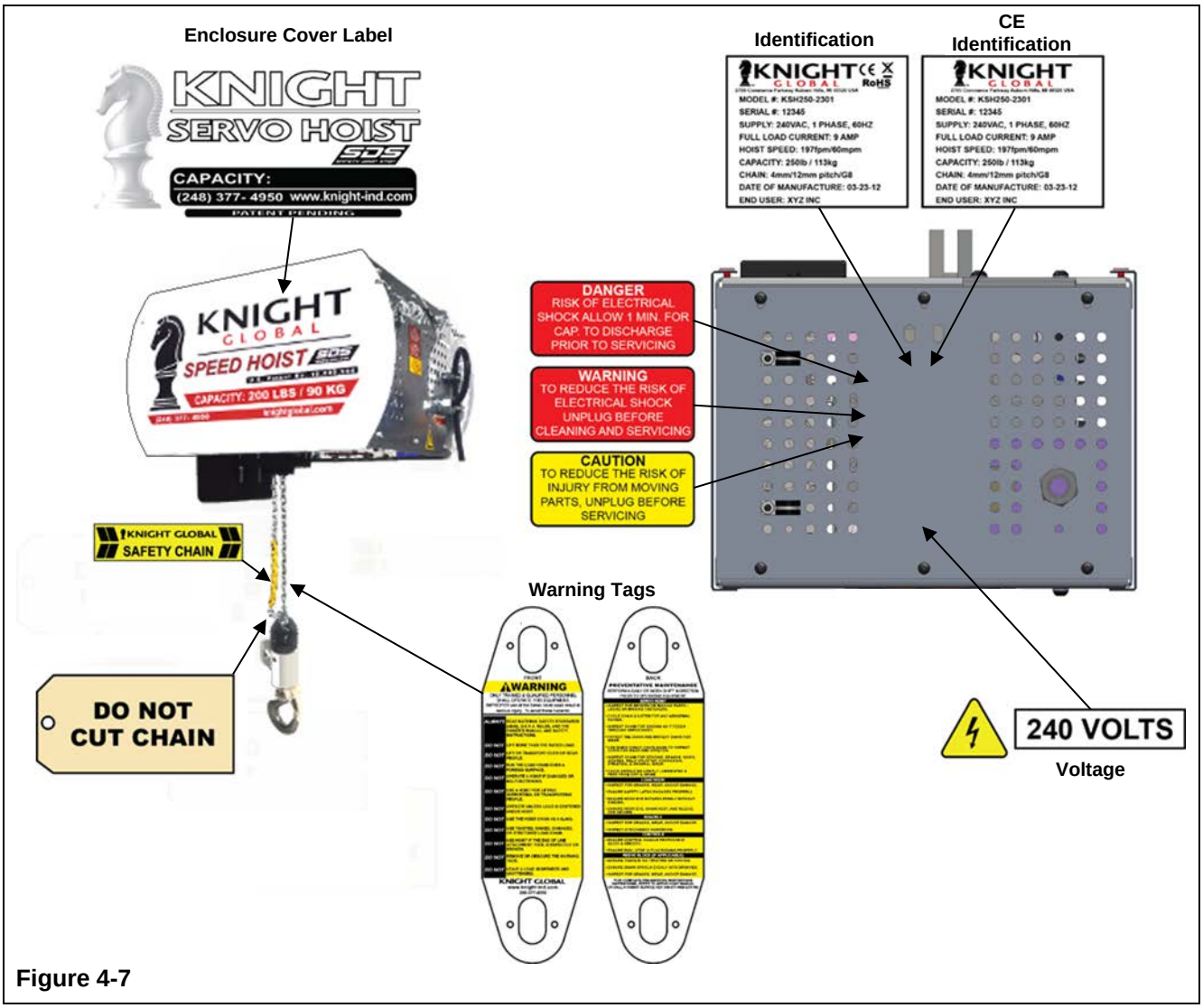
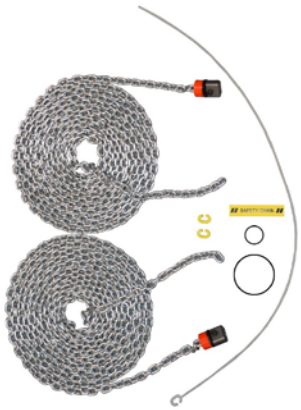


Figure 4-7

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

4.6 Load and Safety Drop Stop Chain Replacement (Normal Maintenance)

The materials required for the chain replacement are shown in Figure 4-8:



SDS REPLACEMENT CHAIN KIT
#KDSA1010 (4mm Chain)
#KDSA1011 (5mm Chain)

(2) Steel Grade (80) Chains.
(2) Chain End Stop assemblies.
(2) Interface links to assist in installing the chain.
(1) Chain Installation Tool.
(1) Safety Chain Identification Sleeve
(1) Small O-Ring.
(1) Large O-Ring.

Figure 4-8

Step 1. Raise the chain nest and hook to its full up position.

Step 2. Measure the distance from the top of the chain nest to the bottom of the Speed Hoist. (Refer to Figure 4-9)

Step 3. Record this measurement because it will be used in section 4.6.1 Resetting the Encoder Offset.

Date of Replacement	Measurement
_____	_____ in.
_____	_____ in.
_____	_____ in.
_____	_____ in.
_____	_____ in.

Figure 4-9

Step 4. Move the shackle down to a comfortable working height.

Step 5. Remove ALL of the load that is attached to the hoist under the shackle. This includes the part and the system's fixture.

Step 6. Push the RUN-STOP button and its RED light will illuminate.

Step 7. Disconnect the input power supplied to the Speed Hoist.

WARNING

Wait for the capacitors to discharge. It will typically take about (6) six minutes for the capacitors to fully discharge.

Step 8. Remove both chains from the chain nest. The bottom bolt releases the Safety Drop Stop (SDS) chain and the top bolt releases the Load chain.

A M4 Allen wrench will be required (Refer to Figure 4-10)

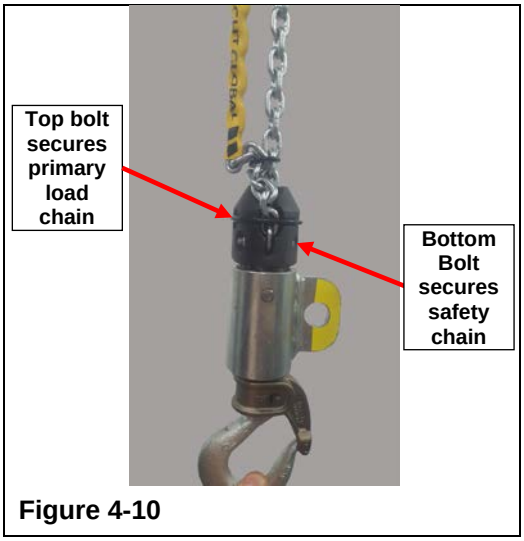


Figure 4-10

Step 9. Remove the bottom bolt and the SDS chain first and then remove the top bolt and load chain. Ensure that the control handle or load cell assembly is supported before the load chain is disengaged from the chain nest.

Step 10. Remove the side covers from Speed Hoist. (Refer to Figure 4-11)

a. Remove the (2) two M6 screws on the bottom of each of the covers.

b. Lift cover upwards off the pins.

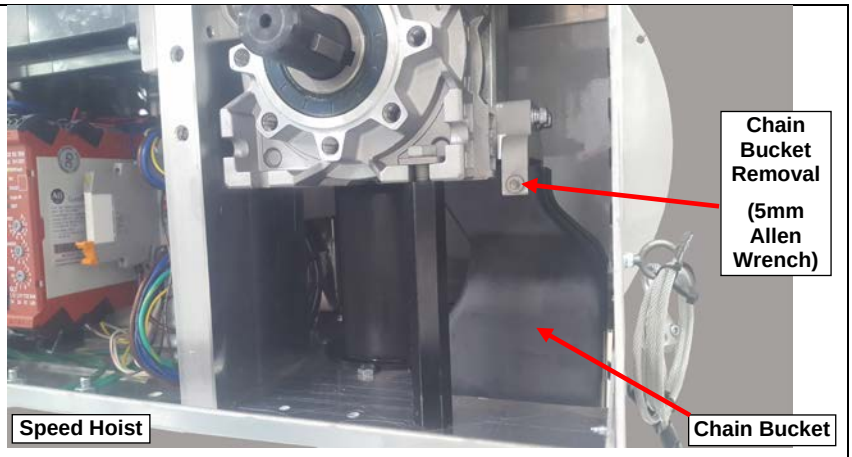


Figure 4-11

Step 11. While supporting the chain buckets, remove the (1) one M5 retainer bolt that secures both chain buckets inside of the Speed Hoist. (Refer to Figure 4-12)

Figure 4-12

Step 12. Remove both chain buckets through the bottom of the Speed Hoist.

Step 13. Remove both chains from their individual chain buckets.

Step 14. Remove both of the end-stop assemblies from the each of the old load and Safety Drop Stop (SDS) chains.

Step 15. Connect both of the old chains together with the both of new chains by using both of the yellow chain interface links. (Refer to Figure 4-13)

Figure 4-13

Step 16. To enable the chain pay-out sequence, use the Payout Mode inside the Knight Servo Studio (KSS). Press the “PAY IN” button to move the chains upward. Press the “STOP” button when the new chains have fully moved the gear box. See Chapter 5.E. Step 20.

Step 17. Stop the pay-out mode by pressing the Run-Stop button or the “Stop” button located on the Payout Mode screen when the yellow interface chain links have moved through the gearbox and are at an acceptable height to reattach the shackle.

Step 18. Remove input power from the Speed Hoist, allowing enough time for the system to discharge.

Step 19. Lubricate both the load and the Safety Drop Stop (SDS) chains per section 4.4.3 ‘Chain Lubrication’.

Step 20. Reinstall both chains into each of their correct chain buckets.

Step 21. Reinstall the chain buckets back into the Speed hoist.

Step 22. Reinstall the Speed hoist side covers.

Step 23. The SDS chain needs to be cut to the correct length so it has slack in it when the load chain is properly connected.

Step 24. Ensure that both chains are parallel with no twists from the gear box down to their respective ends.

Step 25. Count down seven links from the end of the load chain. Cut the seventh link so the SDS chain is six links longer than the load chain. (Refer to Figure 4-14)

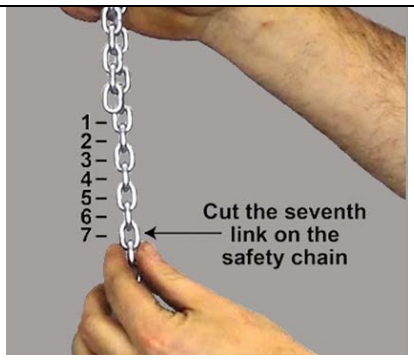


Figure 4-14

Step 26. Install the safety chain identification sleeve on the SDS chain and then heat shrink it to the SDS chain on the eighth link up from the bottom of the SDS chain. (Refer to Figure 4-15)

Figure 4-15

Step 27. Reinstall the new small O-ring around both the load and SDS chains.

Step 28. Reinstall both chains back through the center of the coil cable.

Step 29. Ensure that both chains are parallel to each other and have NO twists in them when they are installed into the chain nest. (Refer to Figure 4-16)

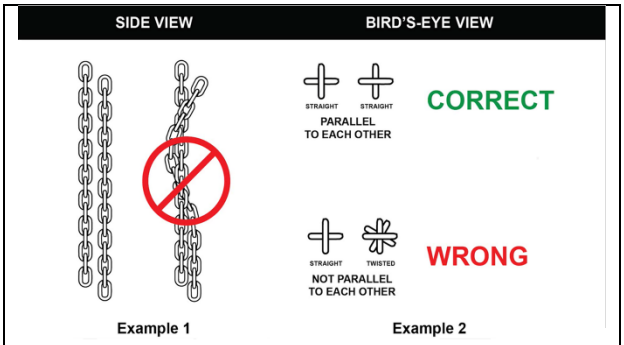


Figure 4-16

Step 30. First, the last link of the load chain is installed into the top slot of the chain nest. The chain must be kept parallel with no twists. The bolt is installed in front of the last link of the load chain and into the chain nest. (Refer to Figure 4-17)

Figure 4-17

Step 31. Next, the last link of the SDS chain is installed into the bottom slot of the chain nest. The chain must be kept parallel with no twists. The bolt is installed through the last link of the SDS and into the chain nest. (Refer to Figure 4-18)

Figure 4-18

Step 32. Reinstall the large O-ring into the groove located on the chain nest.

Step 33. Move the small O-ring down so it is just above the top of the chain nest.

Step 34. The Speed hoist may now be repowered and tested.

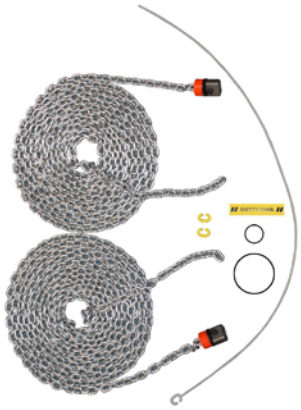
4.6.1 Resetting the Encoder Offset

Please refer to the Position Calibration screen found in section 5.E Step 25.

	WARNING
	Do NOT raise the Speed Hoist's shackle above the recorded measurement obtained in Step 3 of section 4.6 'Load and Safety Drop Stop Chain Replacement (Normal Maintenance)' or damage may be done to the Hoist.

4.7 Broken Chain Replacement

If the Load chain is broken, and has come out of the chain guide, Use the steps in this section along with those in section 4.6 to reinstall a new chain. The materials required for the chain replacement are shown in Figure 4-19:



SDS REPLACEMENT CHAIN KIT
#KDSA1010 (4mm Chain)
#KDSA1011 (5mm Chain)

(2) Steel Grade (80) Chains.
(2) Chain End Stop assemblies.
(2) Interface links to assist in installing the chain.
(1) Chain Installation Tool.
(1) Safety Chain Identification Sleeve
(1) Small O-Ring.
(1) Large O-Ring.

Figure 4-19

Step 1. Connect the old SDS chain to the new SDS chain using one of the yellow interface links. (Refer to Figure 4-20)

Figure 4-20

Step 2. To enable the chain pay-out sequence, use the Payout Mode inside the Knight Servo Studio (KSS). Press the “PAY IN” button to move the chains upward. Press the “STOP” button when the new chains have fully moved the gear box. See Chapter 5.E. Step 20.

Step 3. Stop the pay-out mode by pressing the Run-Stop button or the “Stop” button located on the Payout Mode screen when the yellow interface chain links have moved through the gearbox and are at an acceptable height to reattach the shackle.

Step 4. Using the chain installation tool, locate the load chain pocket opening on the bottom of the gear box. (Refer to Figure 4-21)

Figure 4-21

Step 5. Using the chain installation tool, feed it completely through the gear box.

Step 6. Connect the new load chain to the chain installation tool.

Step 7. Pull the chain installation tool until the load chain just enters the gear box chain pocket opening.

Step 8. Ensure that the new load chain is aligned correctly so that it will enter the gear box properly.

Step 9. Ensure that there is tension on the chain replacement tool so that it is pulled into the gear box when the payout mode is started.

Step 10. Restart the pay-out mode by following the procedure listed in Step 2 above.

Step 11. This will feed the new load chain and SDS chain through the gear box.

Step 12. When the new load chain is long enough to attach to the chain nest, press the Run-Stop button to stop the pay-out mode. Follow the rest of the chain replacement steps starting with step 17 in section 4.6.

5. SOFTWARE

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

5.A.) Getting Started
5.B.) Connecting to a Speed Hoist
5.C.) Backing up the Knight Speed Hoist Software
5.D.) Loading New Hardware with Software
5.E.) Review the Hoist's Knight Servo Studio Software
5.F.) Accessing the Speed Hoist's Fault Log

In the next few sections of the manual a shorthand is used to point to a particular screen in the Knight Servo Studio (KSS) program.

First Time Adjustments:

If the Speed Hoist is being set up for the first-time, use our Knight Servo Studio software and press the "Setup" button located in the lower left-hand corner of the Start screen. Follow all of the steps to set up the Speed Hoist.
KSS Workspace tree location: Knight WO# \ Setup \ …

A. Getting Started

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

- 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.

Note: The Knight Servo Studio software and an Ethernet Cable can be ordered from Knight: P/N KCA1052.

Figure 5-1

B. Connecting to a Speed Hoist

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

Knight Servo Studio Software Package Setup:

Step 1. Setup 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**. (Refer to Figure 5-2)

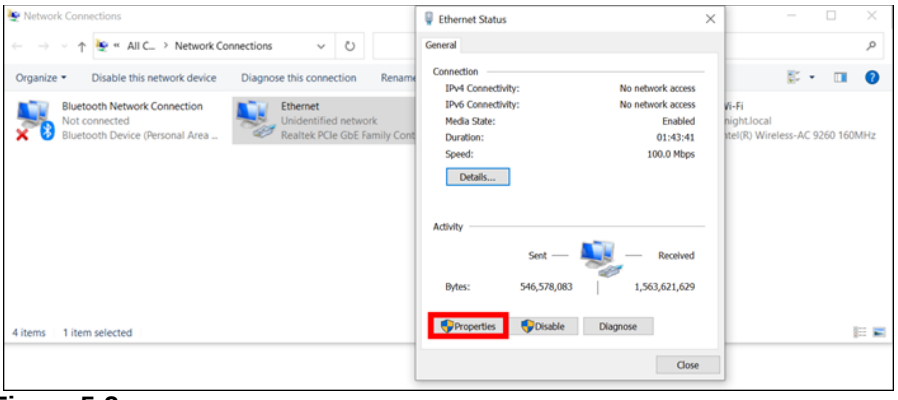


Figure 5-2

c. Select **Internet Protocol Version 4 (TCP/IPv4)**. Select **Properties**.
d. Select **Use the following IP address:**

In most cases the laptop's IP Address should be: 196.168.2.250
Type the correct IP address and Subnet mask into the spaces provided and press the 'OK' button. (Refer to Figure 5-3)

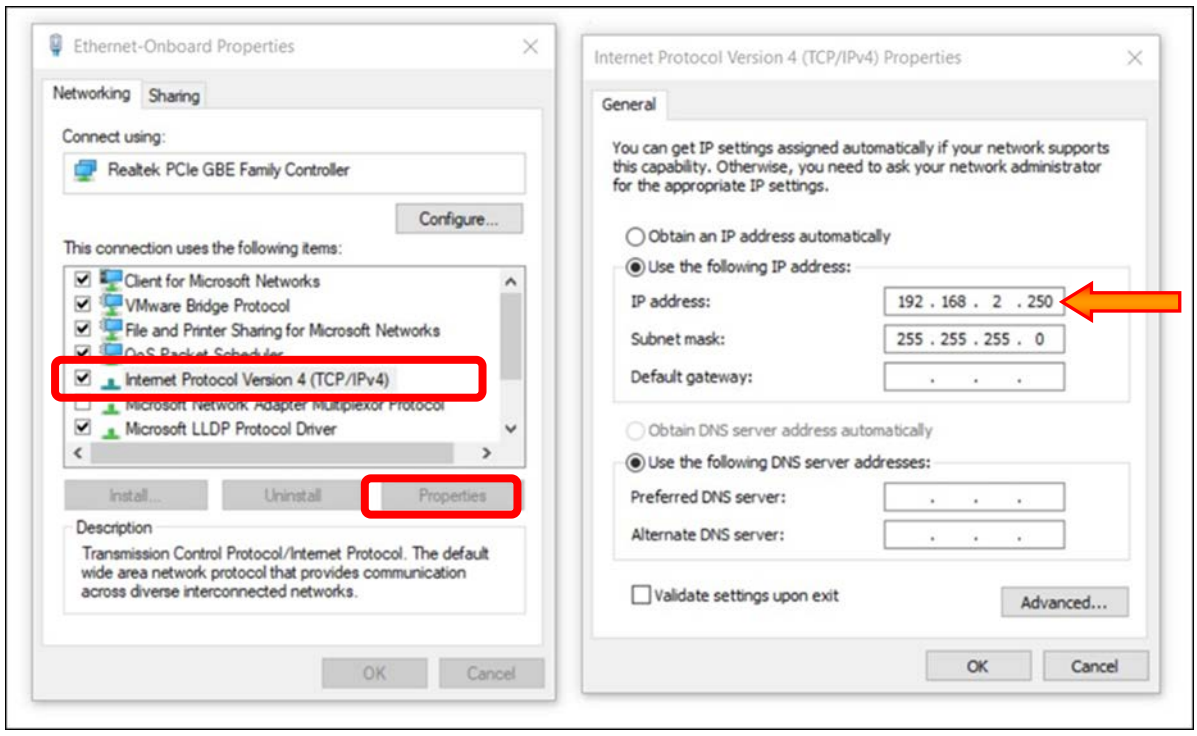


Figure 5-3

Step 2. Insert the USB card that was supplied with Speed Hoist into the laptop.
Double-click on the “Knight Servo Configuration Software Installer.msi” icon to launch the Knight Servo Studio installation software. (Refer to Figure 5-4)

Figure 5-4

Step 3. Double click on the blue Knight Servo Studio software icon located on the desktop and allow the Knight Servo Studio software to load.

Step 4. When the software loads, choose the ‘Open Project from Device’ option.
The standard IP Address is automatically loaded into the Network Configuration box.
The IP Address for the hoist will be located on a label next to the M12 ENET receptacle located on the Control Handle. Change this if required. (Refer to Figure 5-5)

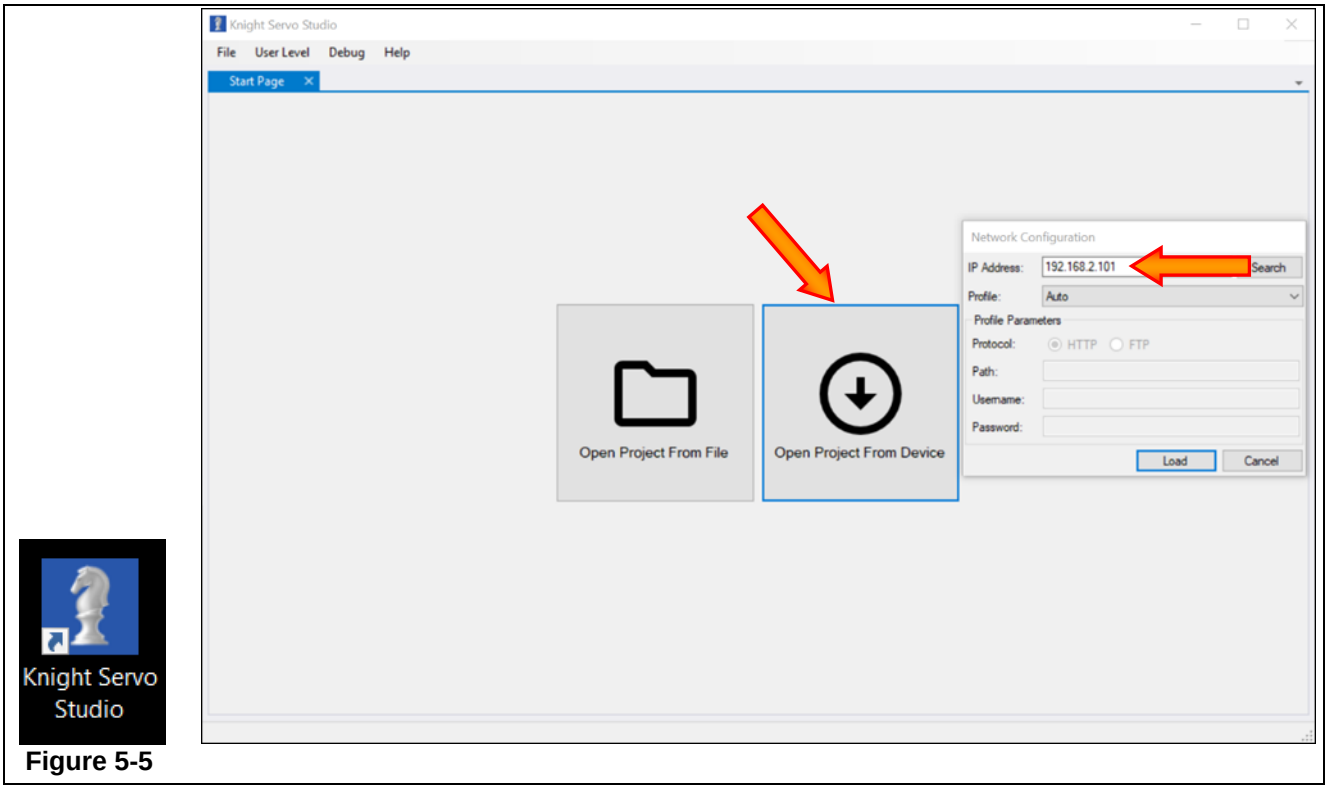


Figure 5-5

Step 5. Move the mouse to the right side of the screen and select the 'Connect' button. If the communications are operating correctly the red 'Disconnected' box will turn to a green 'Connected' box. (Refer to Figure 5-6)

NOTE: If the Knight Servo Studio software does not connect to the hoist, recheck all of the connections and ensure that the hoist has its correct input power connected. This may be either 240VAC or 480VAC depending on the unit.

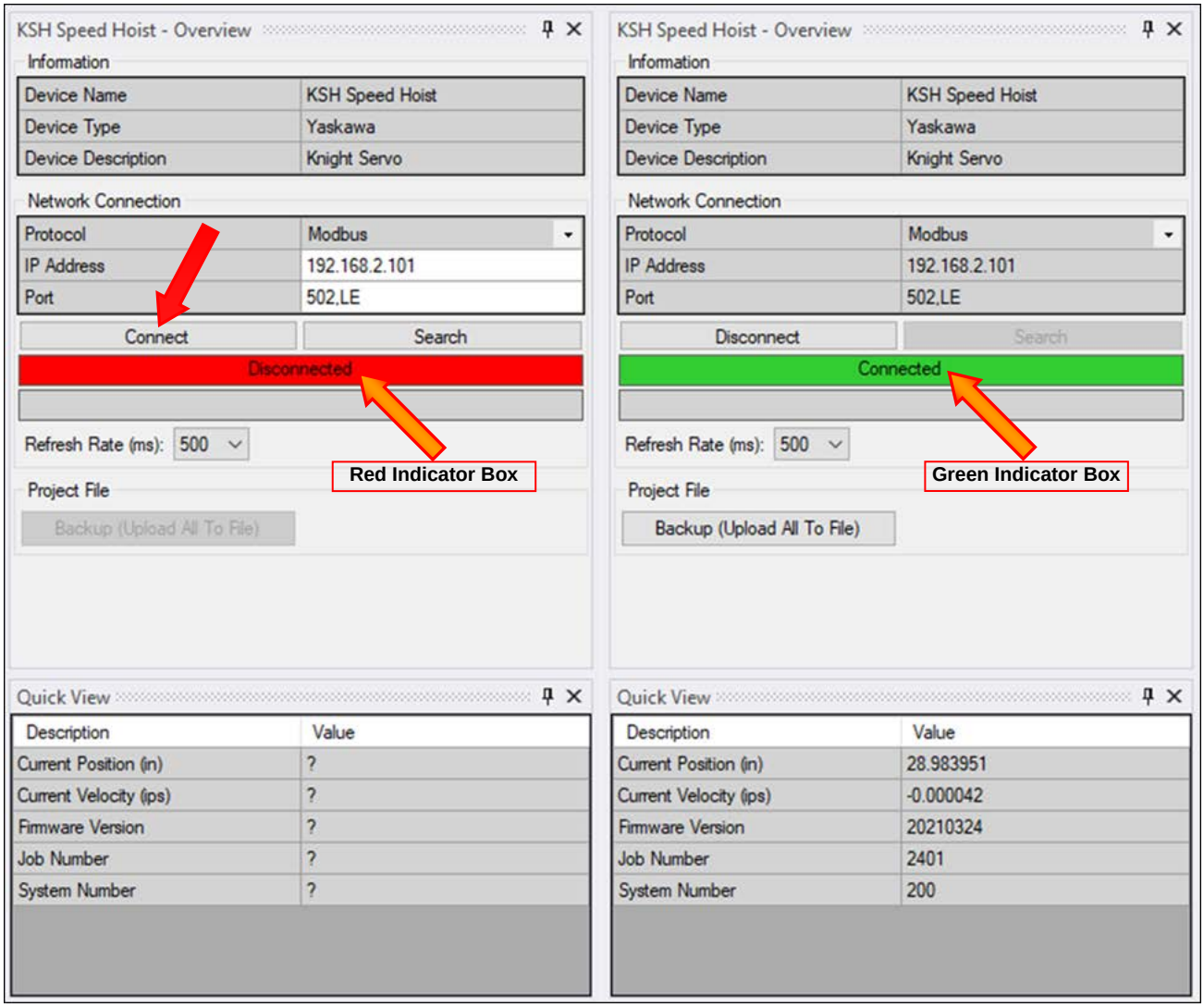


Figure 5-6

C. Backing up the Knight Speed Hoist Software

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

Save a copy of the Knight Servo Studio's .KSP file and Create a Yaskawa Backup Archive .ZIP:

Step 1. Mouse up to the top menu bar located on the left-hand side of the screen and select 'File'. Highlight the 'Save To File' option and select it. (Refer to Figure 5-7)

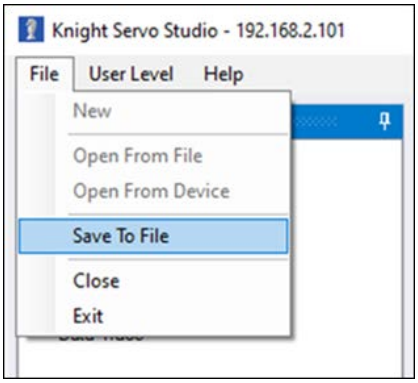


Figure 5-7

Step 2. Select a folder where to save the backup copy of the file. Ensure the Knight Work Order number is included in the filename. (Refer to Figure 5-8)
Knight suggests that a 'Controls' folder be created as well as subdirectories for each servo.
The hoist's Work Order number should be used as the name for these new subdirectories.
i.e. \Controls\123748.

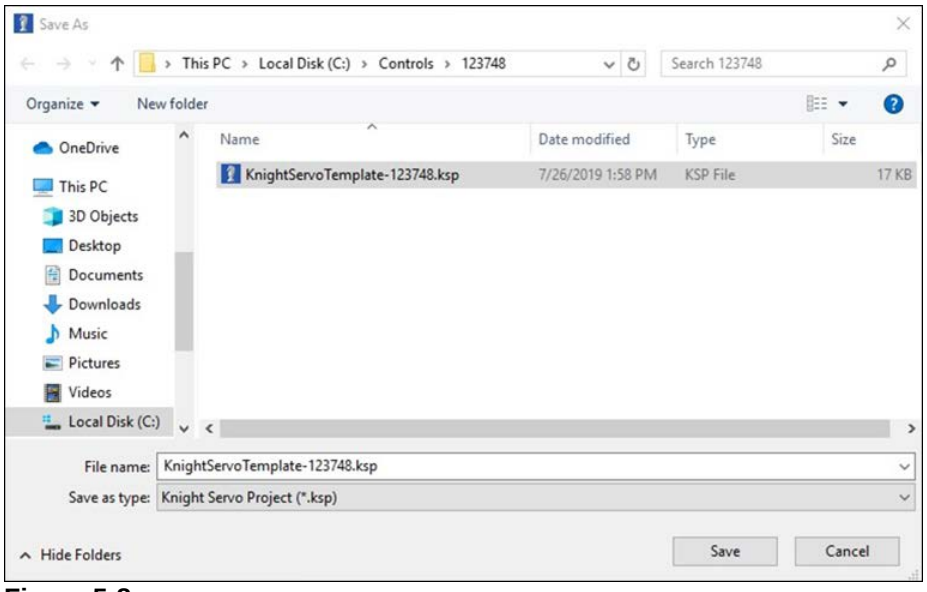


Figure 5-8

Step 3. Send a copy of the newly saved file to Knight's Servo Team at servos@knightglobal.com.
This completes the Knight Speed Studio portion of the backup procedure, please continue to the Yaskawa Servo backup procedure in the next step.

Step 4. Create a new archive file for this newly setup system. This will copy information from the Yaskawa PLC to your laptop:

Step 5. Communicate with the Yaskawa PLC controller: (Refer to Figure 5-9)

a. While connected to the hoist open a web browser. (Google Chrome is preferred)
b. Browse to the address for the Yaskawa PLC: 192.168.2.101
c. The 'User' pulldown allows the "Log In" screen to be selected:

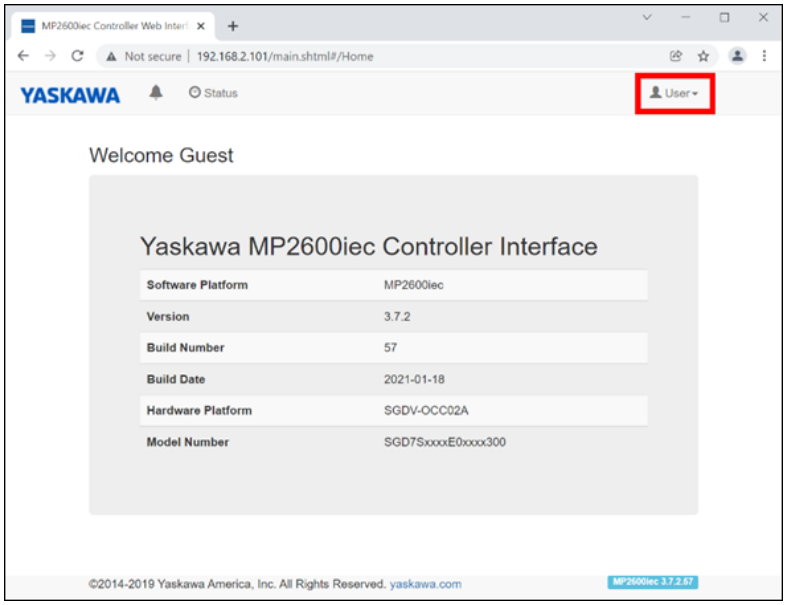


Figure 5-9

Step 6. Log into the Yaskawa controller. (Refer to Figure 5-10)

To 'Log In' to the Yaskawa drive the following values need to be entered in at the "Log In" Dialog Box: (Note: These are the default Yaskawa values)

User Name: Admin
Password: MP2600

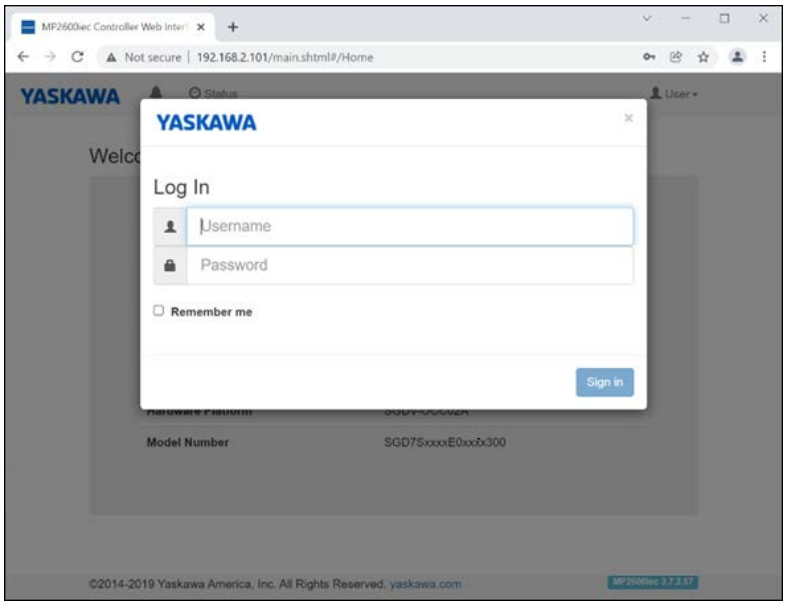


Figure 5-10

Step 7. Below is the Welcome Screen with the Yaskawa default settings when logged-in as Admin. (Refer to Figure 5-11).

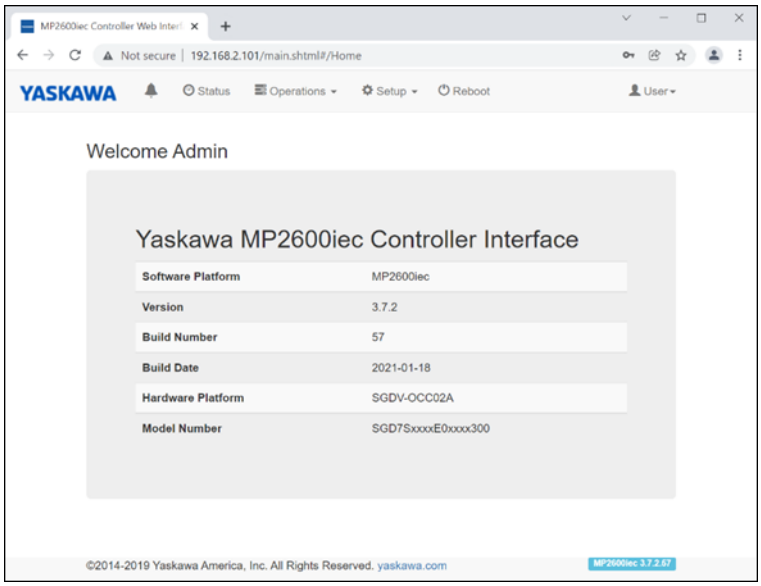


Figure 5-11

Step 8. To create a new archive file, return to the web browser. (Refer to Figure 5-12)

a. Go to the 'Setup' pulldown menu and select "Archive".
b. On the 'Archive' page select "Receive".

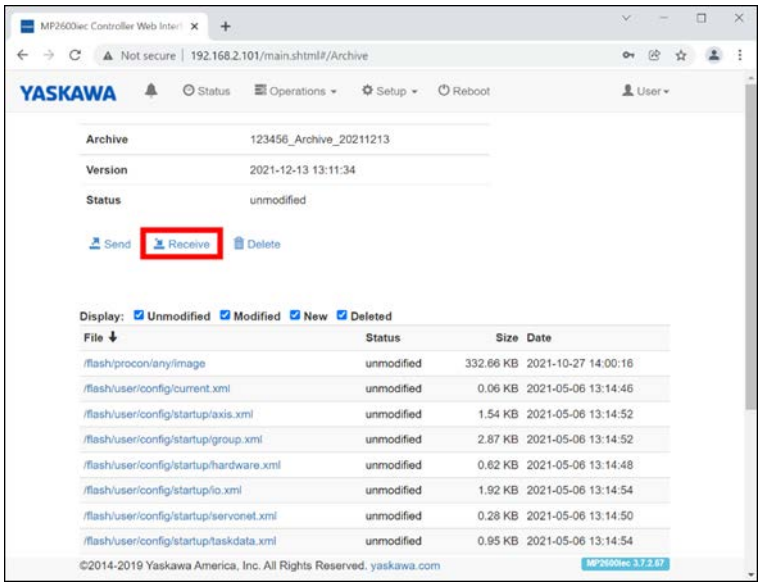


Figure 5-12

Step 9. Enter the name of the archive file and click the “Receive” button. **ONLY click the button ONCE!!!** (Refer to Figure 5-13)

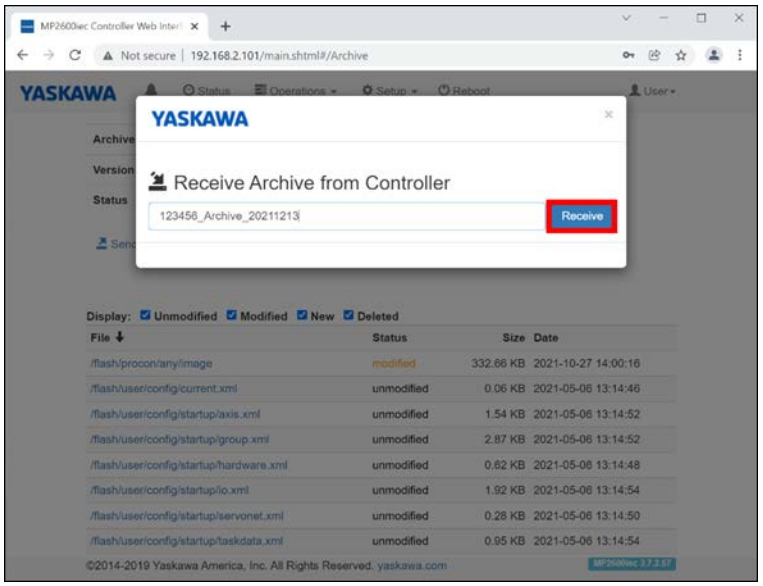


Figure 5-13

Step 10. A tan colored status banner be displayed indicating the current status “Downloading Archive…”. Allow this to complete. (Refer to Figure 5-14)

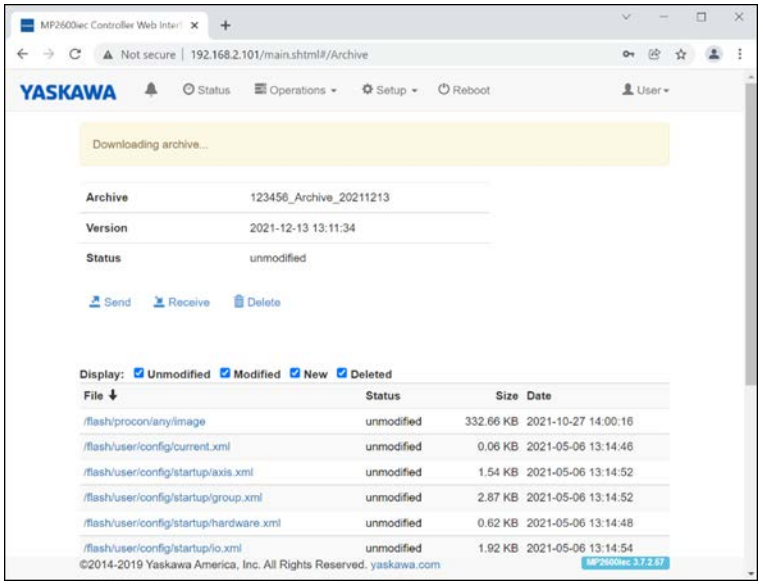


Figure 5-14

Step 11. Once finished downloading the Archive file will be save to: This PC\Downloads, unless specified elsewhere.

Step 12. Send a copy of the newly saved Archive (zip) file to Knight’s Servo Team at servos@knightglobal.com.

Step 13. You have completed the Yaskawa Servo Backup procedure.

D. Loading New Hardware with Existing Software

Yaskawa PLC / Drive and Motors, can be replaced in the field and the process for each will be explained in this section.

If the need to replace the Yaskawa PLC / Drive should arise, a new PLC will need to be purchased from Knight directly. This PLC will be shipped as a preassembled unit and will need to be preloaded with the appropriate software at Knight. Any update Archives will be specific to an individual PLC and are tracked based upon the hoist that it was originally shipped with.

WARNING

Installing an incorrect Archive will cause a Hardware Mismatch and cause the hoist to cease normal operation.

Step 1. Lower the hoist's support fixture and part so that no load is suspended from the hoist.

WARNING

There can be NO load suspended from the hoist prior to replacing a hardware component.

Step 2. Press the Run-Stop button.

Step 3. Remove the input power from the system.

Step 4. If possible, it is recommended to bring the hoist to ground level to replace the components listed in this section. All components listed will need to be replaced with an exact match to ensure functional requirements in order to run correctly.

- Motors can be replaced per Knight procedures: This will cause a loss of position and can be corrected by following the 'Reset Absolute Encoder' procedure (see 5.E Step 32).
- Drives can be replaced per Knight procedures: This will cause a loss of position and can be corrected by restoring the Drive Parameters stored in the PLC via the web browser. Once drive parameters have been restored, the 'Reset Absolute Encoder' procedure will be required as well to re-establish the appropriate drive motor relationship.
- Related cabling of the Motor, MechatroLink, Ethernet, etc.… should not require any direct programming procedures unless they caused a corruption of data in another device.

Step 5. Procedure for configuration and recovery with new hardware.

a. If you replaced the PLC / Drive, or need to update the Archive on the PLC, please log into the Yaskawa Admin Panel as shown in section 5.C steps 5, 6 and 7. Continue to follow the appropriate steps listed in that section.

b. If you are updating the PLC Archive with a new one supplied by Knight, the correct Archive files should already be loaded. If you are installing an Archive as a patch supplied by Knight, or reinstalling one previously saved from the same PLC/Hoist combination, follow the steps listed below, otherwise skip to step 5.D.d. “Drive Parameter verification and installation.”

i. Go to the ‘Setup’ pulldown menu of the Yaskawa website page and select “Archive”. (Refer to Figure 5-15)

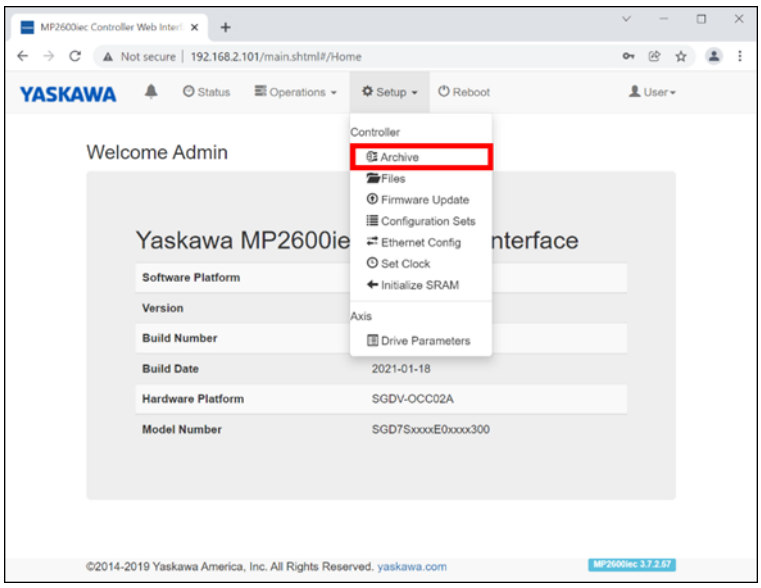


Figure 5-15

ii. The ‘Send’ option has the ability to do a “Clean install (deletes existing files)” or “Add/replace only”.

iii. The preferred method is typically to select the “Clean Install” radio button and then press the “+Add archive” Link.

iv. Select the location of where the .ZIP file is located on your laptop by using the ‘Open’ dialog box.

v. Select the “Send” option, located on the right-hand side of the ‘Send Archive to Controller’ dialog box. (Refer to Figure 5-16)

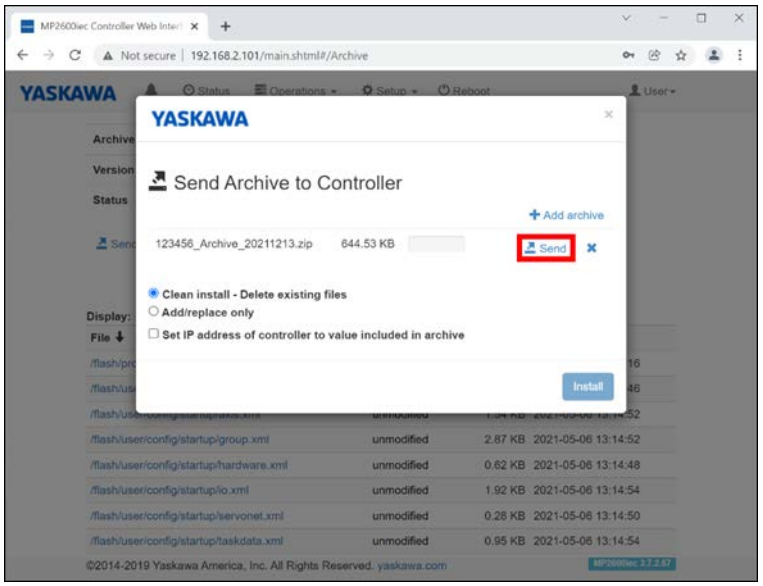


Figure 5-16

vi. When the send progression bar to the left of the Send option is complete, then press the “Install” pushbutton in the lower right-hand corner of this Dialog box. Allow the Archive to fully install. (Refer to Figure 5-17)

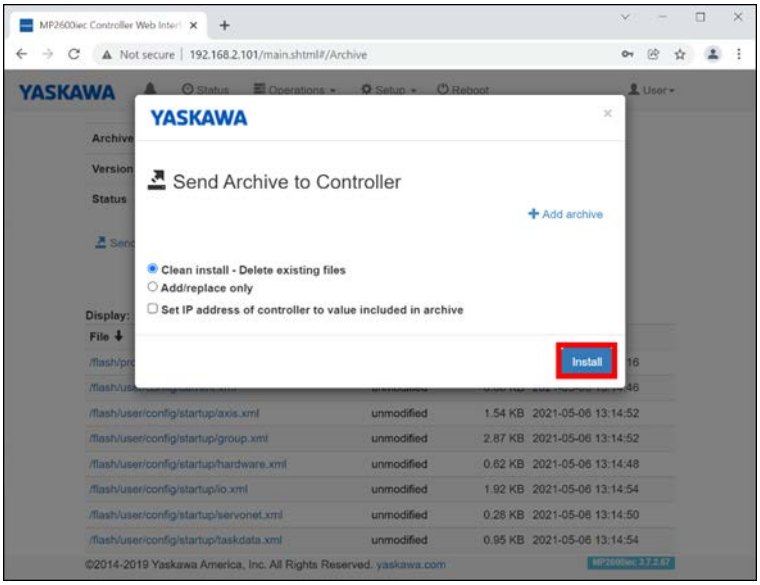


Figure 5-17

vii. Once the tan colored banner “Installing Archive…” disappears, press the ‘Reboot’ button. (Refer to Figure 5-18)

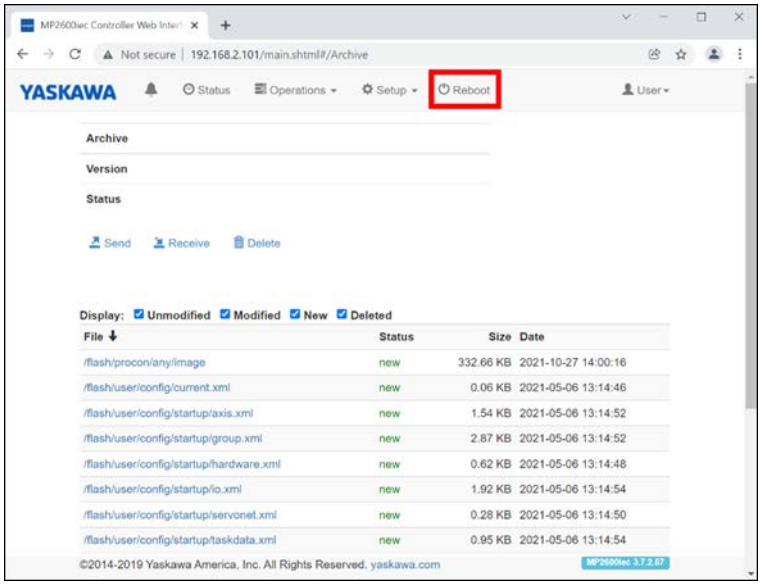


Figure 5-18

viii. On the ‘Reboot’ pop-up screen, press the “Reboot” button. This will make all of the recent changes persistent in the Yaskawa controller. (Refer to Figure 5-19)

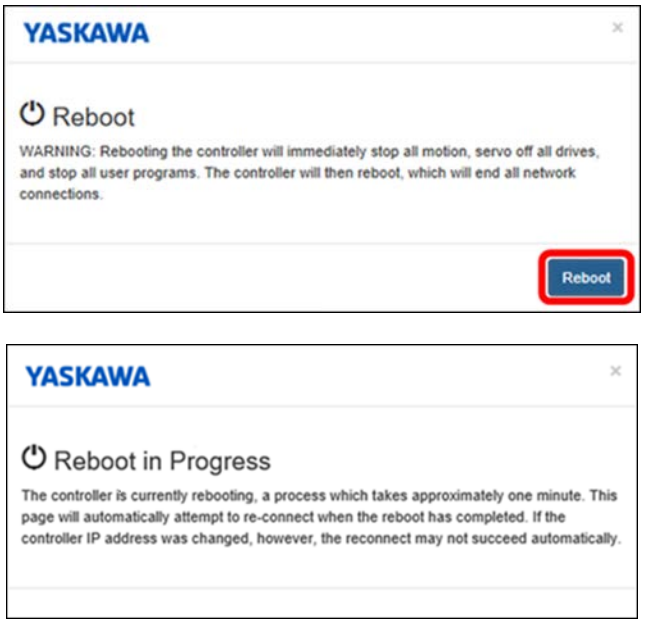


Figure 5-19

ix. After the reboot is finished, you will have to log back into the Yaskawa drive.

c. Drive Parameter verification and installation is required if you have updated the PLC or replaced the Drive.

i. From the 'Setup' pulldown menu of the Yaskawa website page, select the "Drive Parameters" option. (Refer to Figure 5-20)

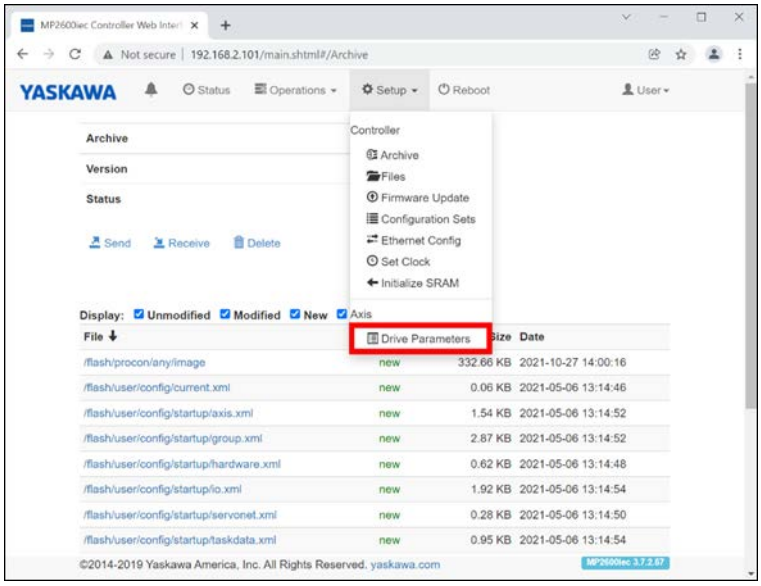


Figure 5-20

ii. The User Drive Parameters will initially show a "Not Verified" result. Click on the "Verify" to check the loaded 'User Parameters' parameters. The result will show as "Verified" or "MISMATCH(Pn###)". Any mismatch result means the User Parameters must be written from the PLC to the Drive.

NOTE: Pn825 will occasional show up as a mismatch drive parameter, this should be disregarded. This is not random, but has to do with monitoring different parameters in the hoist on a rotating basis.

iii. Make sure to use the "Write" command under 'User Parameters' column and ***NOT*** the one under the 'Factory Default Parameters' column. (Refer to Figure 5-21)

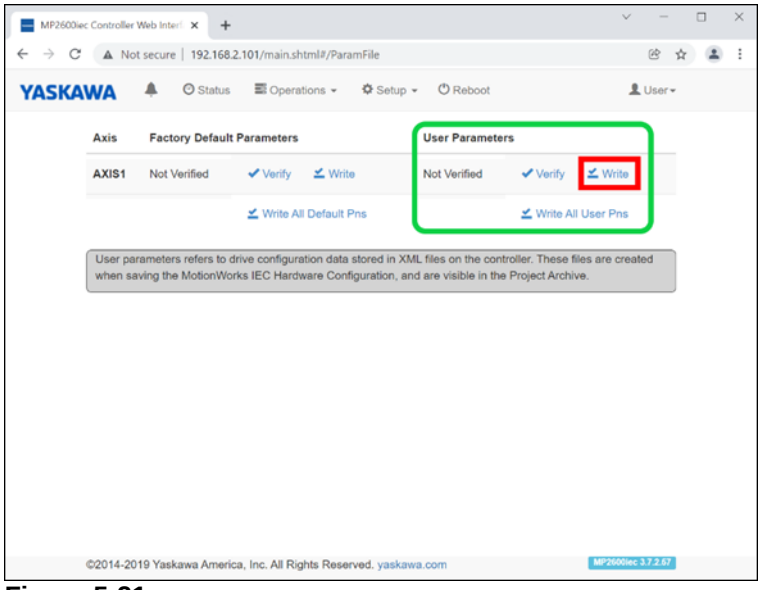


Figure 5-21

iv. In the ‘Write parameters’ dialog box press the “Write” button. (Refer to Figure 5-22)

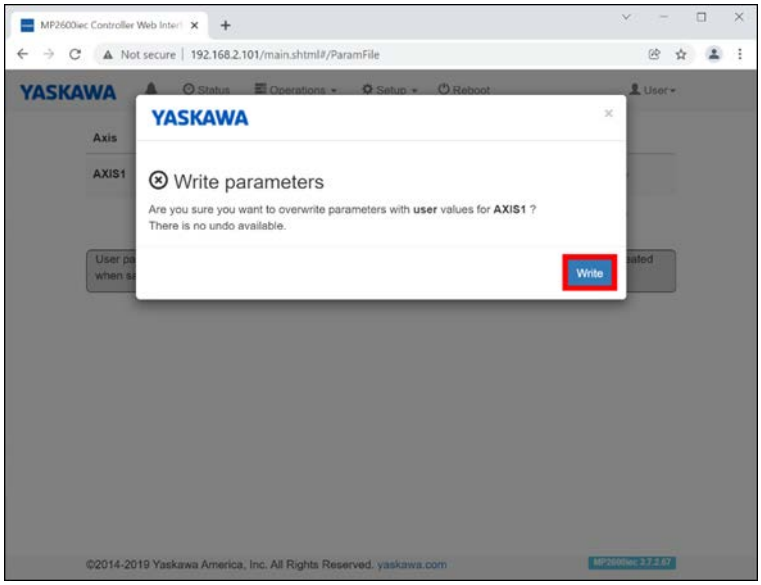


Figure 5-22

v. Confirm that the ‘User Parameters’ write function is “Verified” by pressing the ‘Verify’ button. (Refer to Figure 5-23)

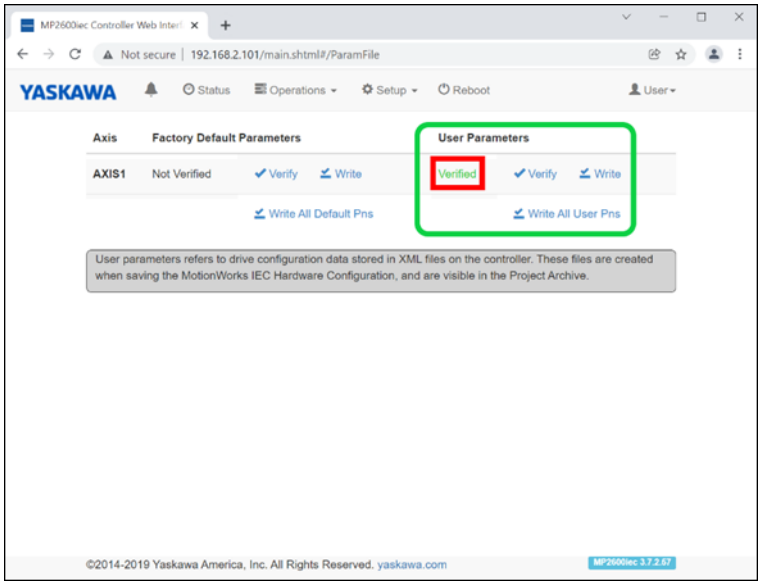


Figure 5-23

vi. Unplug the power to the servo, wait 30 seconds and plug back in power.

vii. Your PLC / Drive, I/O, and motor should all be functional and ready to be setup for your application.

E. Review the Hoist's Knight Servo Studio Software

The Knight Servo Studio Servo software can be used to setup the Knight servo drive.
Refer to section 5.B. "Connecting to a Speed Hoist".

Step 1. When you are connected to the hoist, this screen will be shown: (Refer to Figure 5-24)

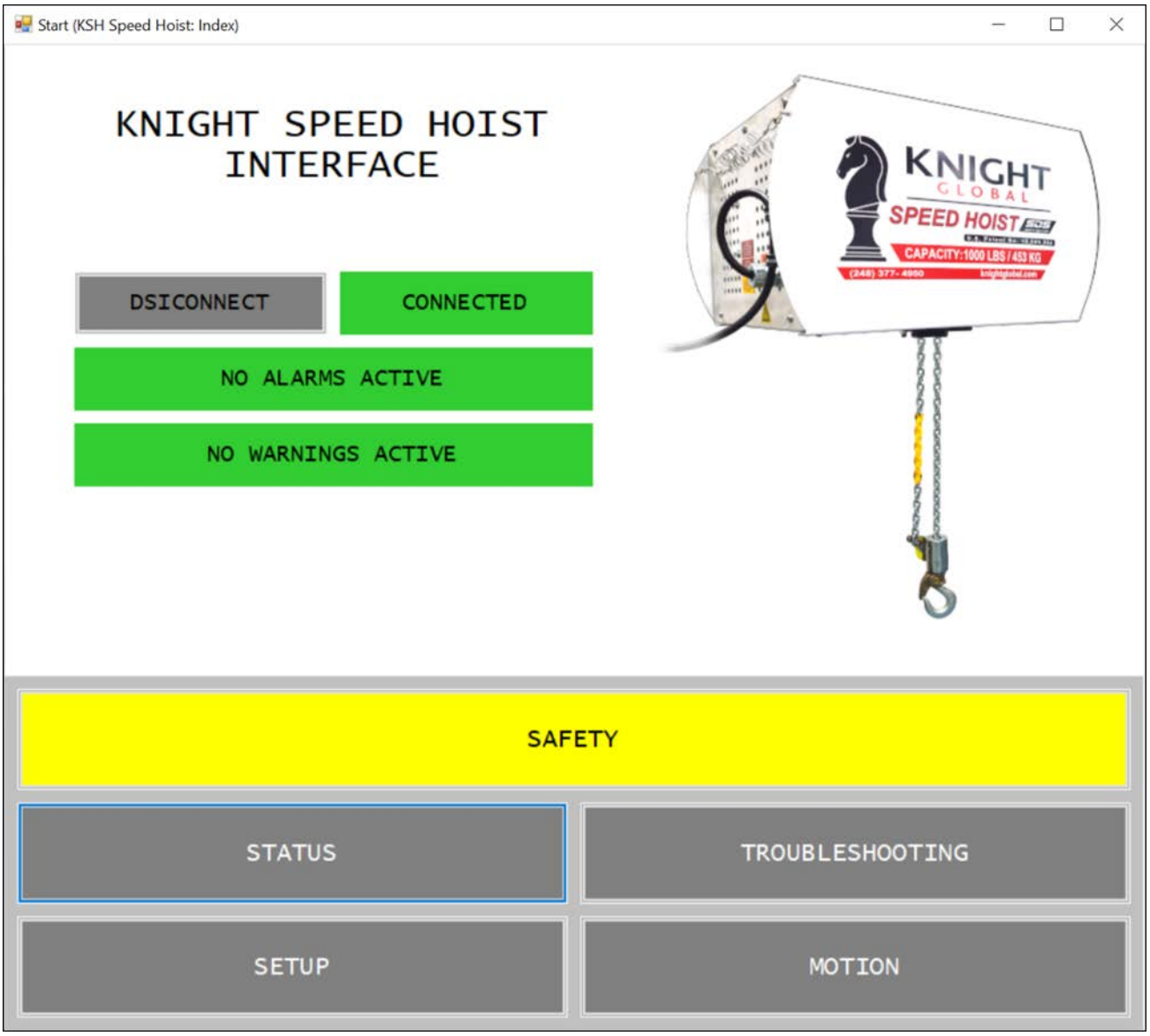


Figure 5-24

Start screen: (Refer to Figure 5-24)

Upper) The interface allows the user to Connect/Disconnect to and from the hoist. The connection, Alarm, and Warning states are also shown.

Lower) There are (5) five buttons that will display different overview screens for the Servo Hoist.

- Safety – Requirements to use the hoist correctly.
- Status – Screens that show the condition of the hoist.
- Troubleshooting – Screens that help diagnose common problems the hoist may experience.
- Setup – Screens that allow all of the hoist's parameters to be initially set up.
- Motion – Screens that allow for additional movement options to control the hoist in specific situations.

Step 2. Press the “SAFETY” button on the Start screen.
Step 3. Review the information on this screen. Anyone who will be operating or doing maintenance on the hoist is required to review this information. (Refer to Figure 5-25)

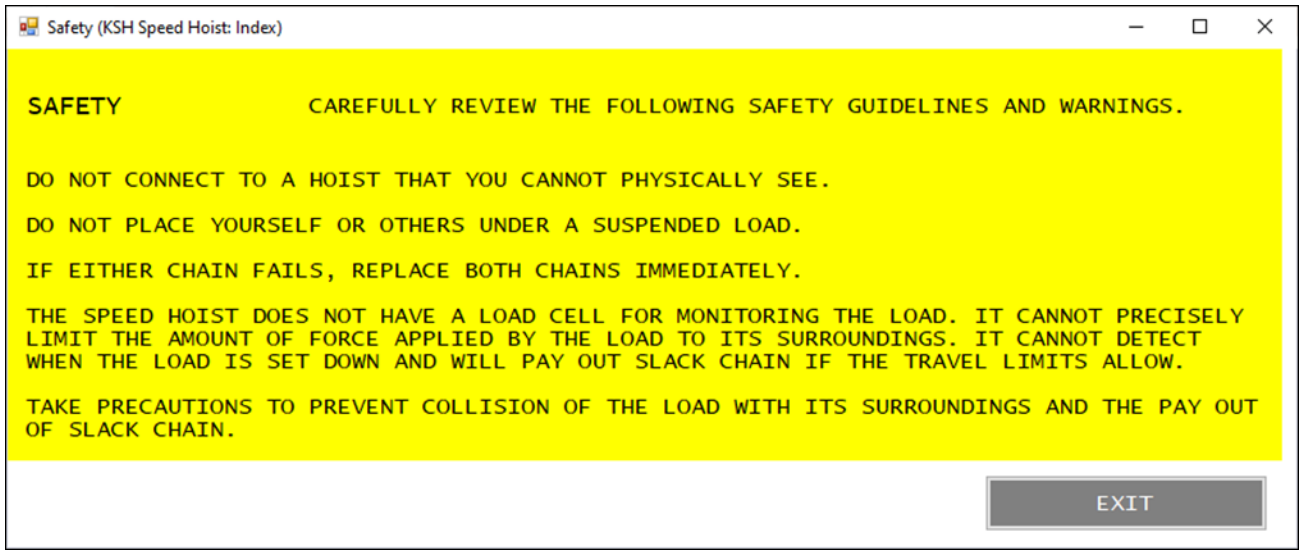


Figure 5-25

Step 4. Press the “STATUS” button on the Start screen.

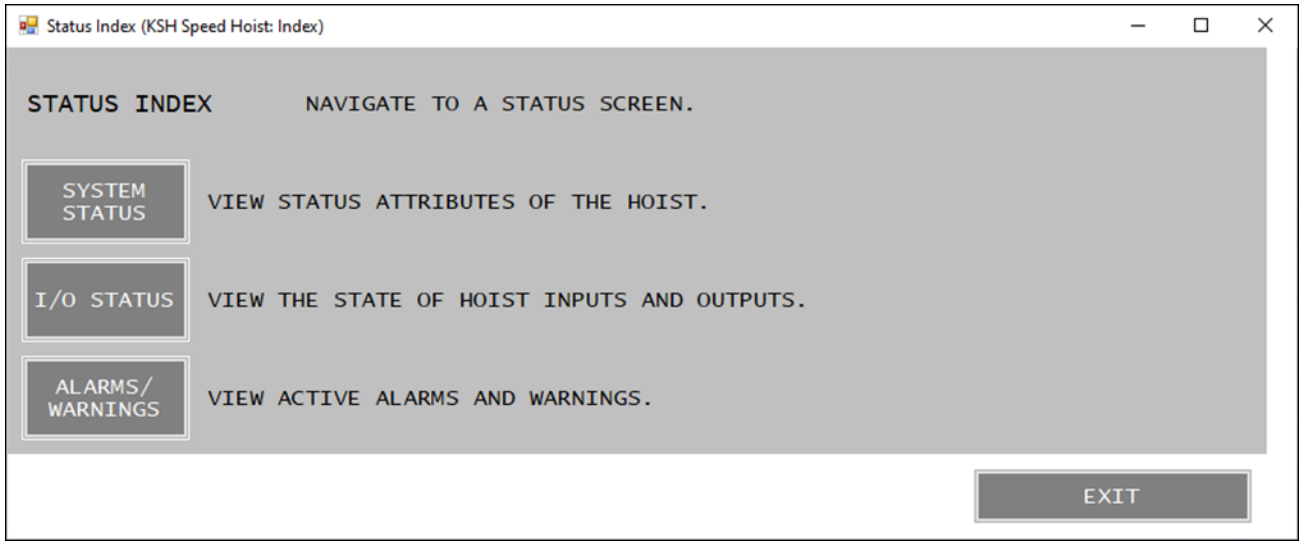


Figure 5-26

Status Index screen: (Refer to Figure 5-26)

Row #1) The ‘SYSTEM STATUS’ button will display a screen showing the status of the hoist and its modes.

Row #2) The ‘I/O STATUS’ button will display a screen showing the inputs and outputs of the hoist.

Row #3) The ‘ALARMS / WARNINGS’ button will display a screen showing any active Drive Alarms or Warnings occurring in the hoist.

Button) Press the ‘EXIT’ button to close out of this screen.

Step 5. Press the “SYSTEM STATUS” button on the STATUS INDEX screen.

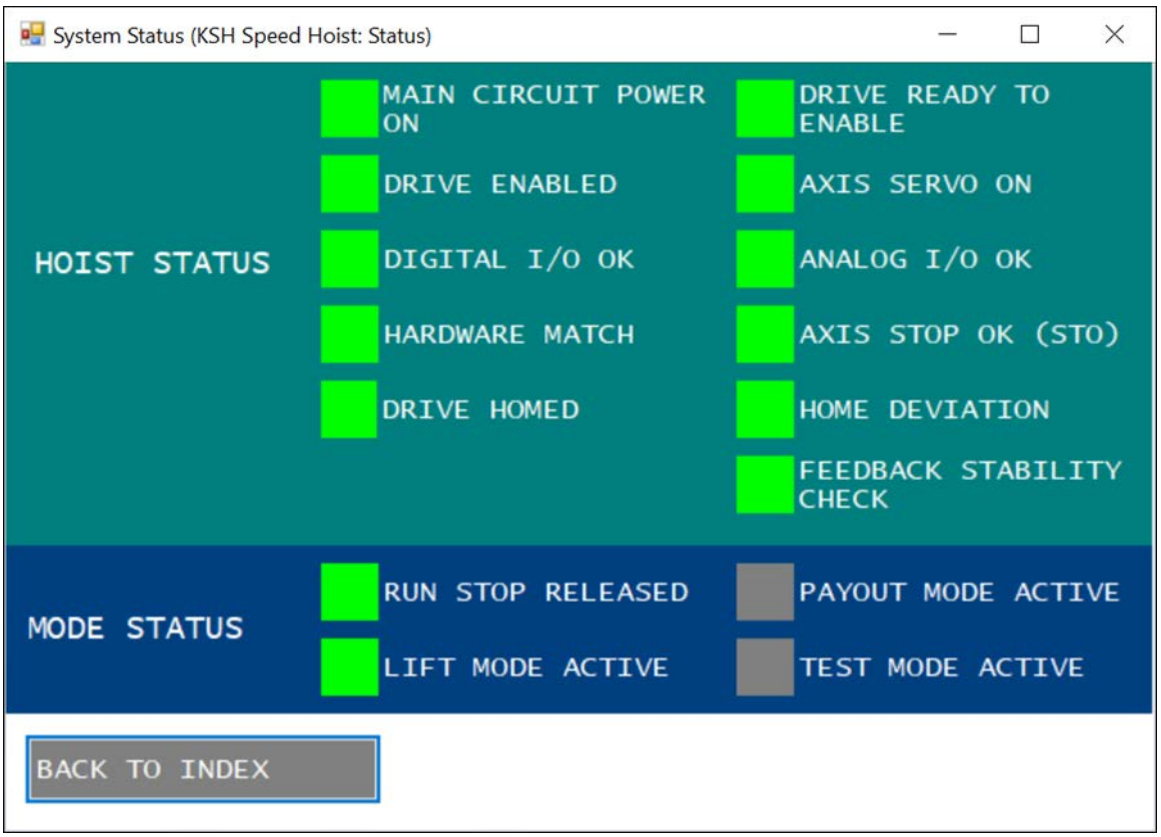


Figure 5-27

System Status screen: (Refer to Figure 5-27)

Upper) The upper section of this screen shows the status of the hoist.
If the indicator box is Green, the object is ON, if the box is Gray the object is OFF and if the box is Red then the object is disabled or faulted.

Lower) The lower section of this screen shows the status of the software modes of the hoist.
If the indicator box is Green, the object is active, if the box is Gray the object is inactive.

Button) Press the ‘BACK TO INDEX’ button to return to the STATUS INDEX screen.

Step 6. Press the “I/O STATUS” button on the STATUS INDEX screen.

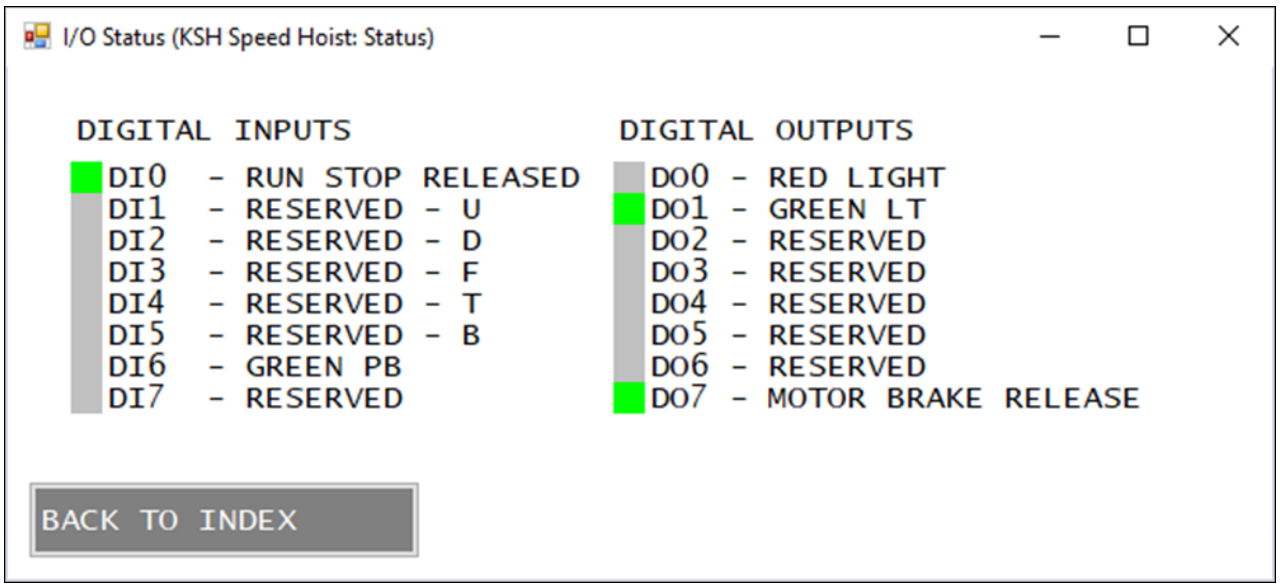


Figure 5-28

I/O Status screen: (Refer to Figure 5-28)

Upper) The indicator boxes to the left of the digital input or output description will change color if they activate. If the box is Green, the I/O point is ON, if the box is Gray the I/O point is OFF.

Button) Press the ‘BACK TO INDEX’ button to return to the STATUS INDEX screen.

Step 7. Press the “ALARMS / WARNINGS” button on the STATUS INDEX screen.

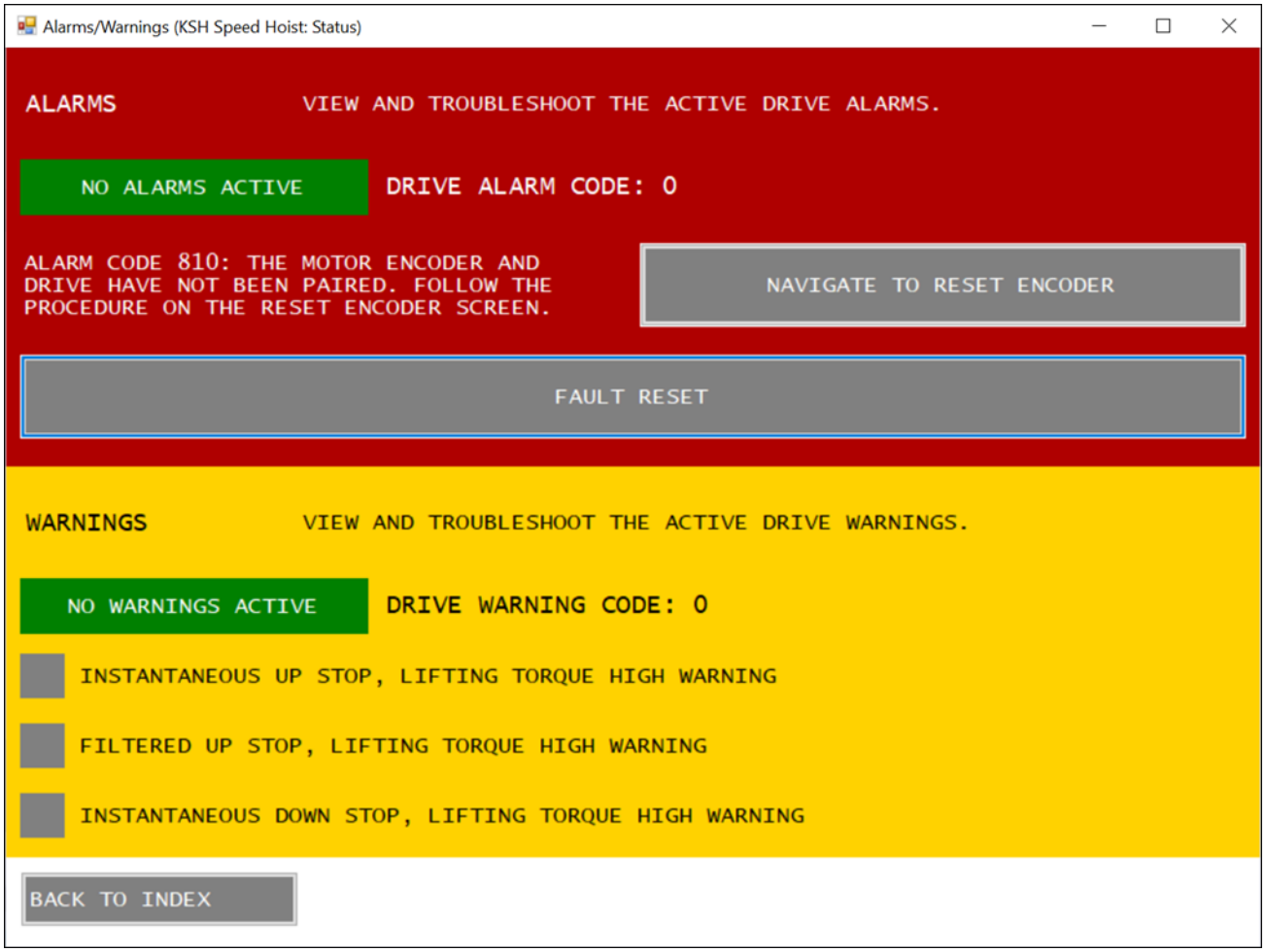


Figure 5-29

Alarms / Warnings screen: (Refer to Figure 5-29)

Upper) The upper section of this screen shows any Drive Alarms that are active. The current Alarm can be reset by pressing the “FAULT RESET” button.

Lower) The lower section of this screen shows any Drive Warnings that are active. The Up Stop and Down Stop warnings will illuminate yellow when active.

Button) Press the ‘BACK TO INDEX’ button to return to the STATUS INDEX screen.

Step 8. Press the “TROUBLESHOOTING” button on the Start screen.

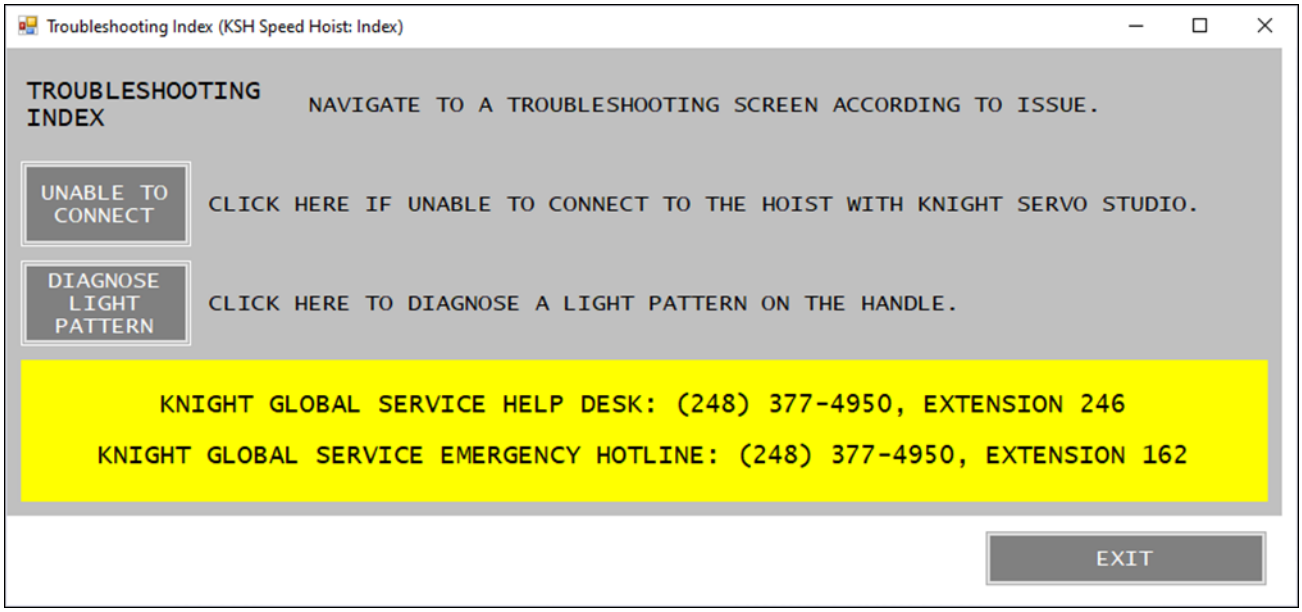


Figure 5-30

Troubleshooting Index screen: (Refer to Figure 5-30)

Row #1) The ‘UNABLE TO CONNECT’ button will display a screen showing the troubleshooting steps to help resolve any connection issues.

Row #2) The ‘DIAGNOSE LIGHT PATTERN’ button will display a screen showing the indicator light patterns for the red and green lights.

Button) Press the ‘EXIT’ button to close out of this screen.

Step 9. Press the “UNABLE TO CONNECT” button on the TROUBLESHOOTING INDEX screen.

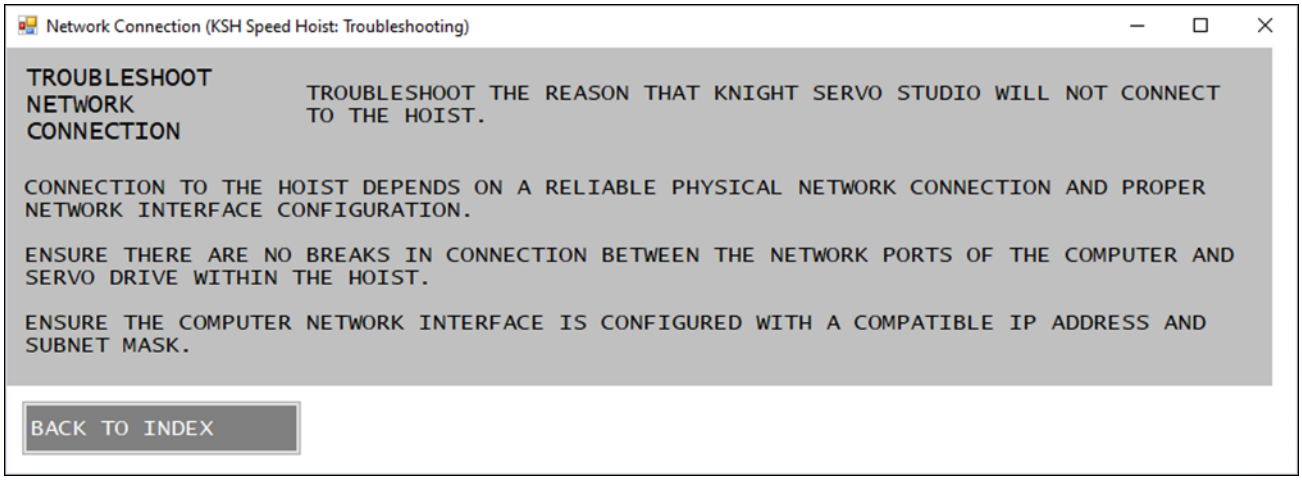


Figure 5-31

Network Connection screen: (Refer to Figure 5-31)

Row #1) Follow the steps listed on the screen to troubleshoot connection issues.

Button) Press the ‘BACK TO INDEX’ button to return to the TROUBLESHOOTING INDEX screen.

Step 10. Press the “DIAGNOSE LIGHT PATTERN” button on the TROUBLESHOOTING screen.

Figure 5-32

Light Pattern Index screen: (Refer to Figure 5-32)

Row #1) Press the ‘SOLID RED’ button to bring up “Solid Red Light” screen.
Press the ‘SOLID GREEN’ Button to bring up “Solid Green Light” screen.

Row #2) Press the ‘FLASHING RED’ button to bring up “Flashing Red Light” screens.
Press the ‘FLASHING GREEN’ button to bring up “Flashing Green Light” screen.

Row #3) Press the ‘ALTERNTING RED/GREEN’ button to bring up “Alternating Red/Green Lights” screen.
Press the ‘FLASHING RED/GREEN’ button to bring up “Flashing Red/Green Lights” screen.

Button) Press the ‘BACK TO INDEX’ button to return to the TROUBLESHOOTING INDEX screen.

Step 11. Press the “SOLID RED” button on the LIGHT PATTERN INDEX screen.

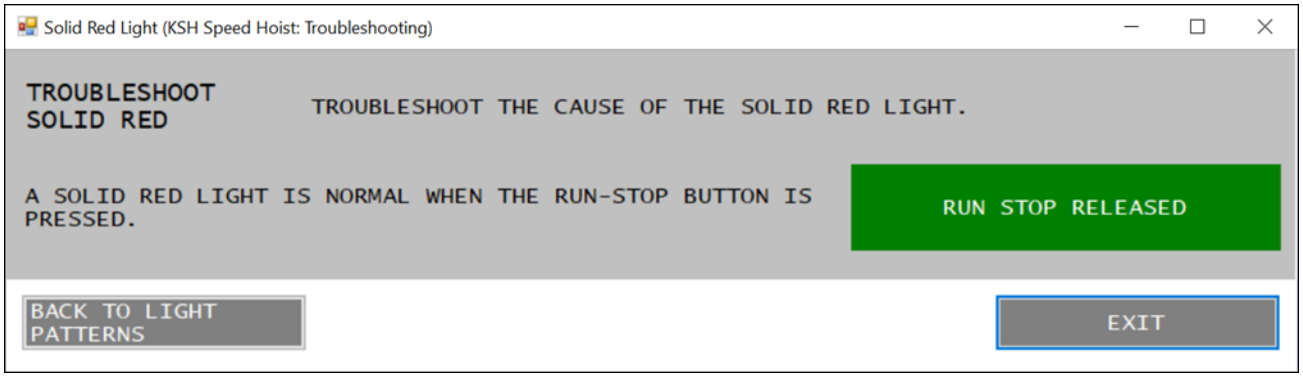


Figure 5-33

Solid Red Light screen: (Refer to Figure 5-33)

Row #1) Follow the steps listed on the screen to troubleshoot the cause.

Buttons) Press the ‘BACK TO LIGHT PATTERNS’ button to return to the LIGHT PATTERN INDEX screen.
Press the ‘EXIT’ button to close out of this screen.

Step 12. Press the “SOLID GREEN” button on the LIGHT PATTERN INDEX screen.

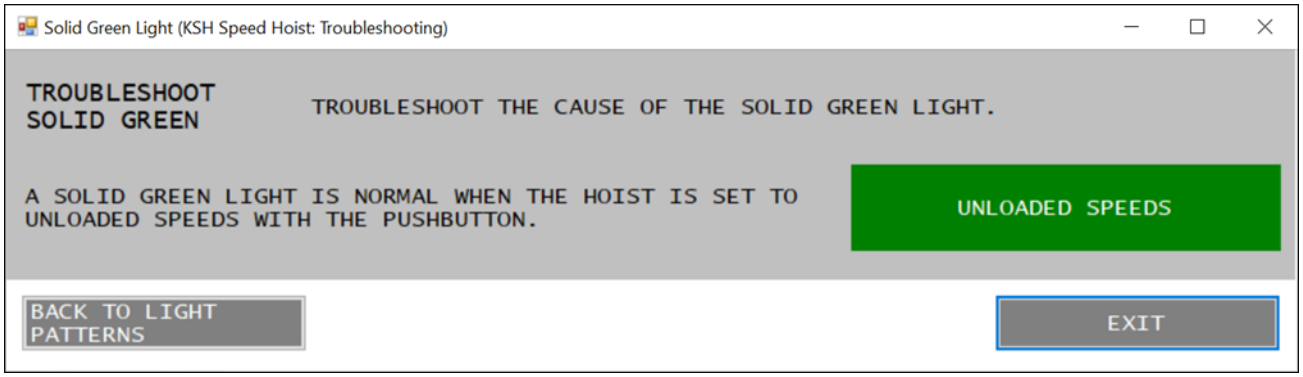


Figure 5-34

Solid Green Light screen: (Refer to Figure 5-34)

Row #1) Follow the steps listed on the screen to troubleshoot the cause.

Buttons) Press the ‘BACK TO LIGHT PATTERNS’ button to return to the LIGHT PATTERN INDEX screen.
Press the ‘EXIT’ button to close out of this screen.

Step 13. Press the “FLASHING RED” button on the LIGHT PATTERN INDEX screen.

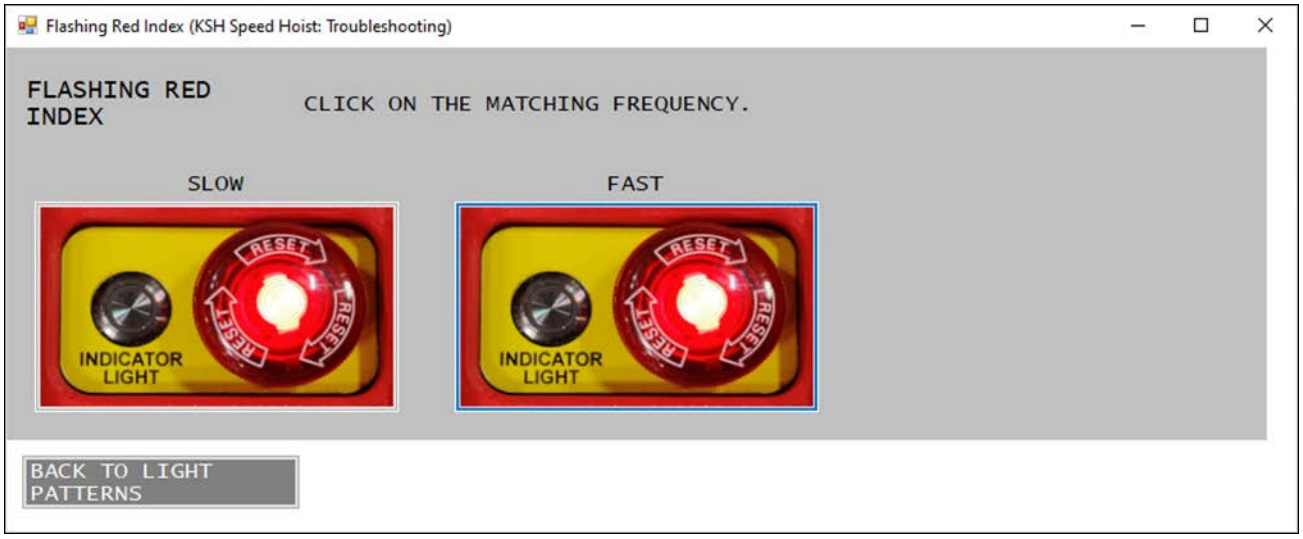


Figure 5-35

Flashing Red Index screen: (Refer to Figure 5-35)

Row #1) Press the ‘SLOW’ button to show the “TROBULESHOOT SLOW FLAHSING RED” screen.
Press the ‘FAST’ button to show the “TROBULESHOOT FAST FLAHSING RED” screen.

Buttons) Press the ‘BACK TO LIGHT PATTERNS’ button to return to the LIGHT PATTERN INDEX screen.

Step 14. Press the “SLOW” button on the FLASHING RED INDEX screen.

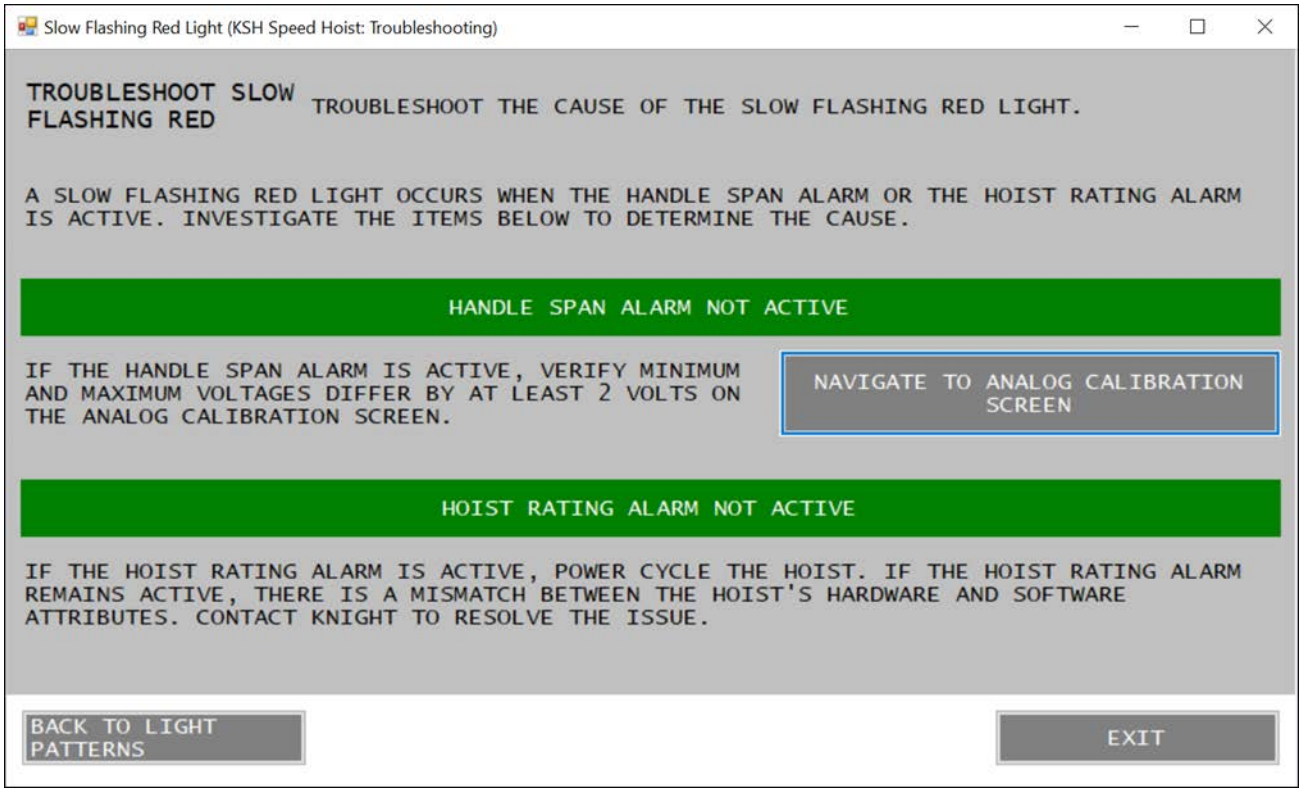


Figure 5-36

Slow Flashing Red Light screen: (Refer to Figure 5-36)

Row #1) Follow the steps listed on the screen to troubleshoot the cause.

Buttons) Press the ‘BACK TO LIGHT PATTERNS’ button to return to the LIGHT PATTERN INDEX screen.
Press the ‘EXIT’ button to close out of this screen.

Step 15. Press the “FAST” button on the FLASHING RED INDEX screen.

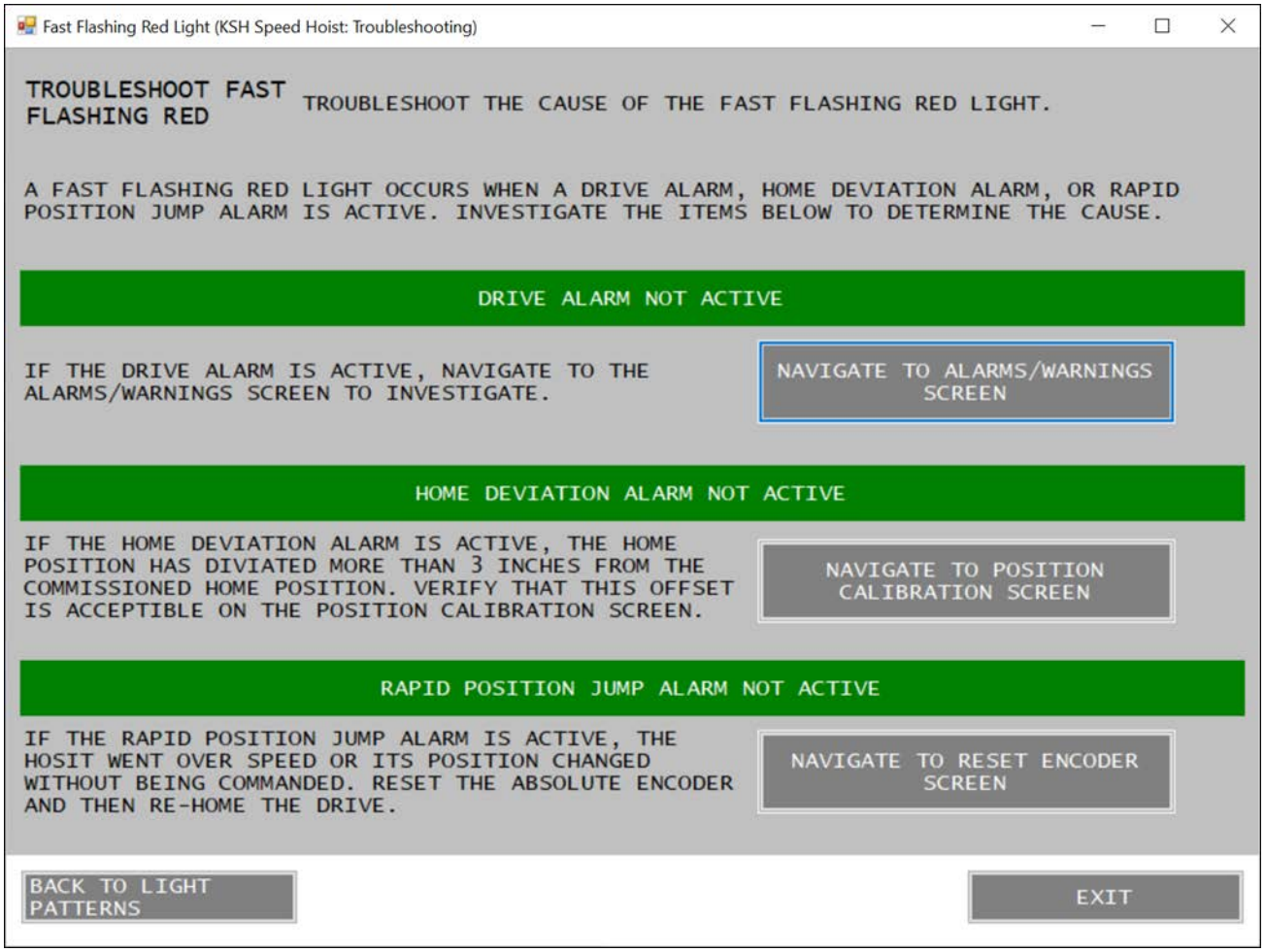


Figure 5-37

Fast Flashing Red Light screen: (Refer to Figure 5-37)

Row #1) Follow the steps listed on the screen to troubleshoot the cause.

Buttons) Press the ‘BACK TO LIGHT PATTERNS’ button to return to the LIGHT PATTERN INDEX screen.

Press the ‘EXIT’ button to close out of this screen.

Step 16. Press the “FLASHING GREEN” button on the LIGHT PATTERN INDEX screen.

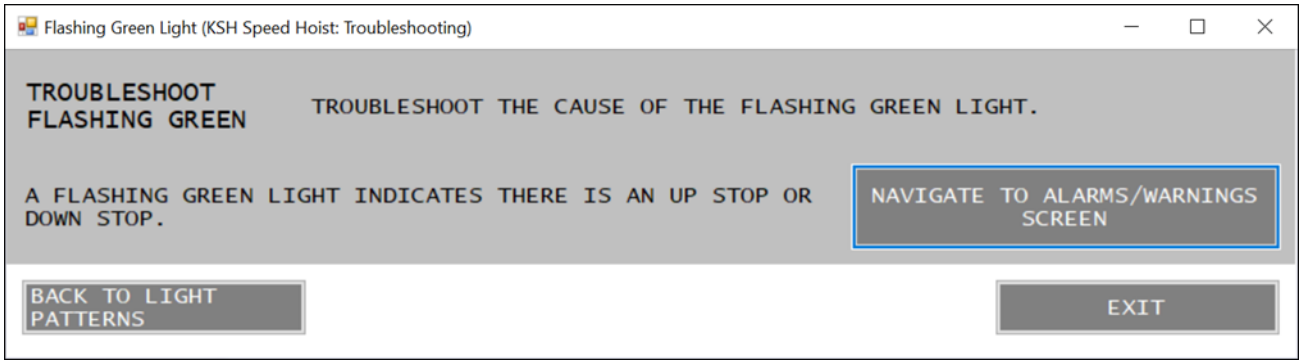


Figure 5-38

Flashing Green Light screen: (Refer to Figure 5-38)

Row #1) Follow the steps listed on this screen to troubleshoot the cause.

Buttons) Press the ‘BACK TO LIGHT PATTERNS’ button to return to the LIGHT PATTERN INDEX screen.
Press the ‘EXIT’ button to close out of this screen.

Step 17. Press the “ALTERNATING RED/GREEN” button on the LIGHT PATTERN INDEX screen.

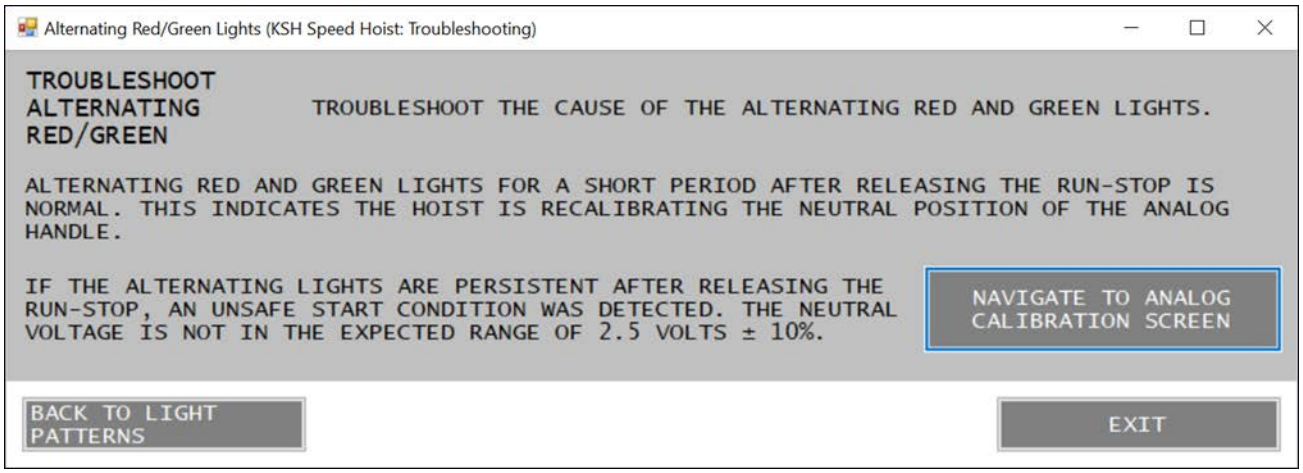


Figure 5-39

Alternating Red/Green Lights screen: (Refer to Figure 5-39)

Row #1) Follow the steps listed on this screen to troubleshoot the cause.

Buttons) Press the ‘BACK TO LIGHT PATTERNS’ button to return to the LIGHT PATTERN INDEX screen.
Press the ‘EXIT’ button to close out of this screen.

Step 18. Press the “FLASHING RED/GREEN” button on the LIGHT PATTERN INDEX screen.

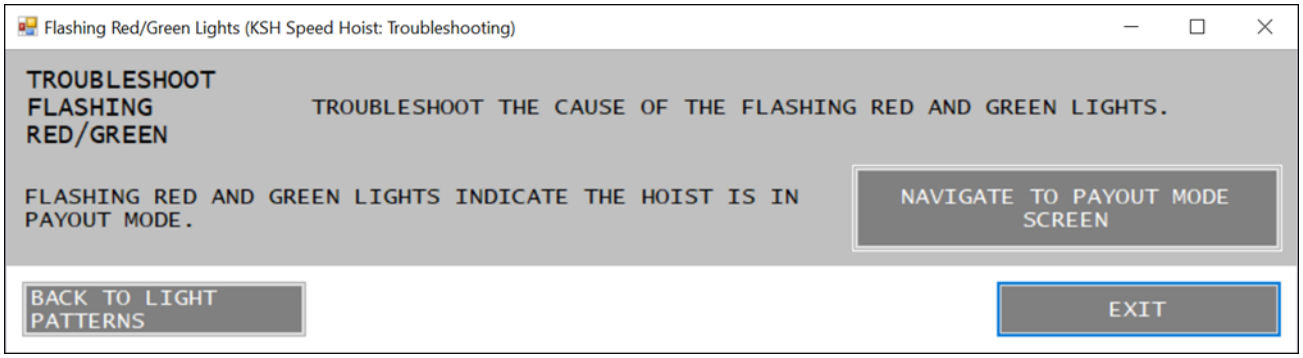


Figure 5-40

Flashing Red / Green Lights screen: (Refer to Figure 5-40)

Row #1) Follow the steps listed on this screen to troubleshoot the cause.

Buttons) Press the ‘BACK TO LIGHT PATTERNS’ button to return to the LIGHT PATTERN INDEX screen.
Press the ‘EXIT’ button to close out of this screen.

Step 19. Press the “MOTION” button on the Start screen.

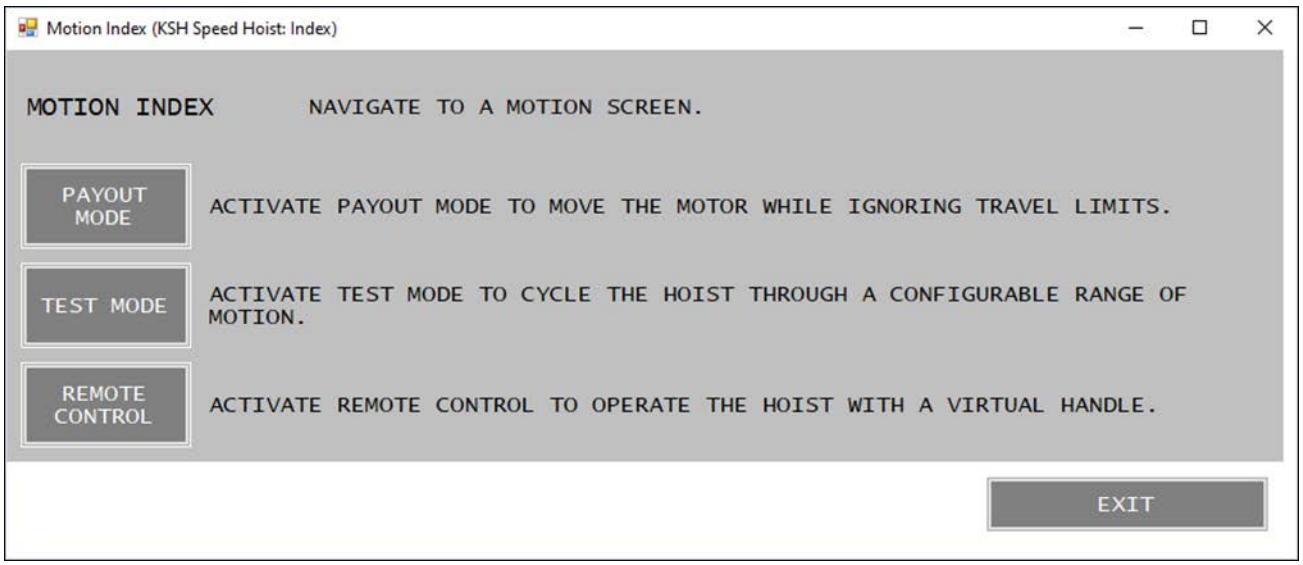


Figure 5-41

Motion Index screen: (Refer to Figure 5-41)

Row #1) The ‘PAYOUT MODE’ button will display the chain payout screen.

Row #2) The ‘TEST MODE’ button will display the Test Mode screen.

Row #3) The ‘REMOTE CONTROL’ button will display the remote-control screen.

Button) Press the ‘EXIT’ button to close out of this screen.

Step 20. Press the “PAYOUT MODE” button on the MOTION INDEX screen.

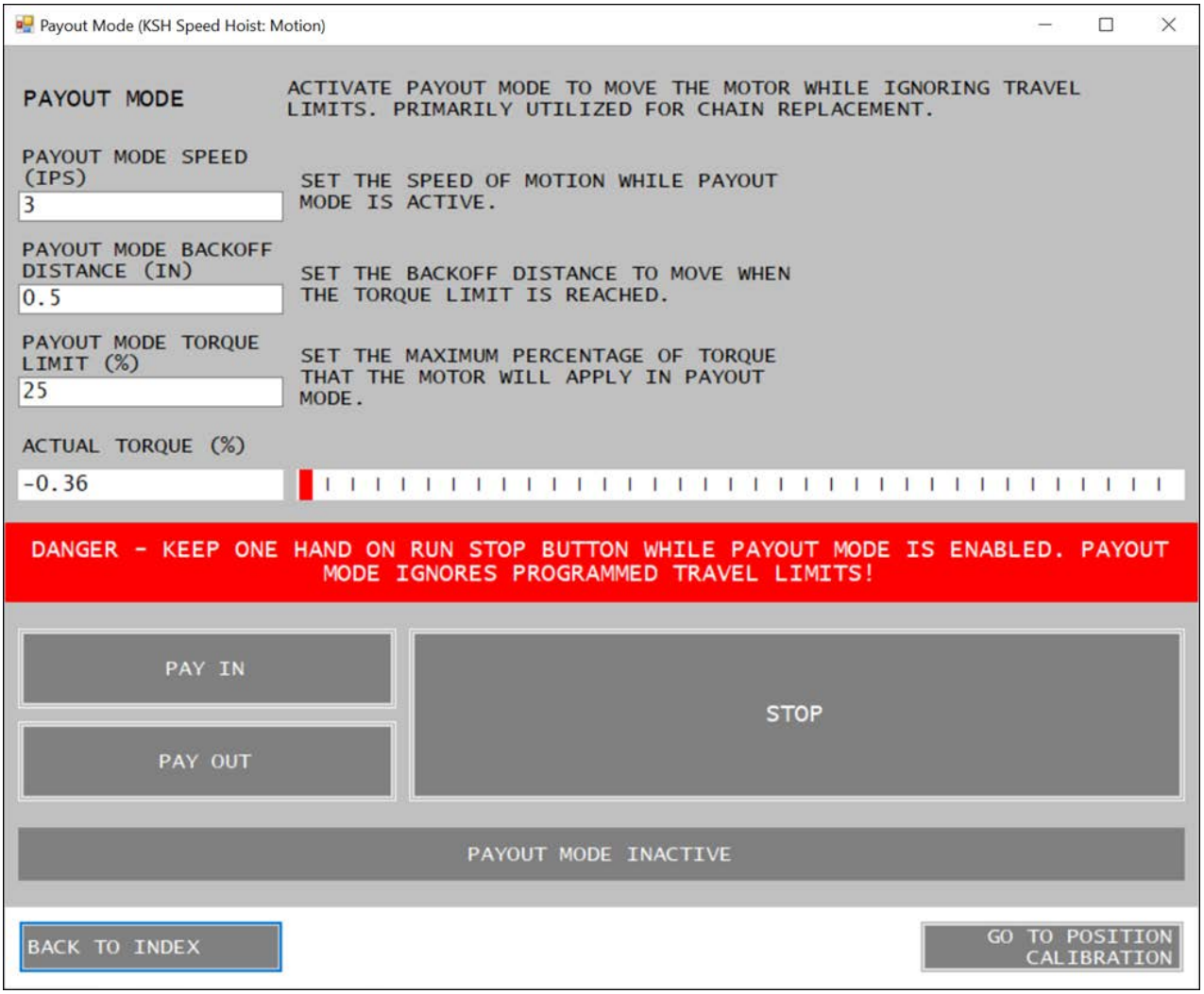


Figure 5-42

Payout Mode screen: (Refer to Figure 5-42)

CAUTION
Payout Mode is completely independent of travel and position limits. Even with limited torque, improper use can cause damage to the hoist and/or cables.

NOTE
Payout Mode uses Torque Limited Speed and is not intended for normal use. The most common use is during chain replacement.

Row #1) The ‘PAYOUT MODE SPEED (IPS)’ display shows the speed that will be commanded while Payout Mode is active. Payout Mode is limited to a maximum 5 Inches per Second.

(Refer to Figure 5-42)

Row #2) The 'PAYOUT MODE BACKOFF DISTANCE (IN)' display shows the position amount that will be used in the opposite direction of travel if the torque limit is reached. This is normally intended to unbind or release tension during chain replacement. Setting this to zero will leave the gearbox in a bound condition, which is usually undesirable.

CAUTION

Use Caution if setting the back-off distance higher than necessary as this move will use the full peak torque settings of the drive and motor. This is intended to release any bind created but should be used only for that purpose.

WARNING

Torque limits set higher than 30% can cause damage or injury and should only be used with due caution.

Row #3) The 'PAYOUT MODE TORQUE LIMIT (%)' display shows the amount of torque that the motor will be limited to in Payout Mode when paying in chain, or paying out chain.

Row #4) The 'ACTUAL TORQUE (%)' display shows the amount of torque that the motor is running at.

Row #5) The 'PAY IN' button will issue a reverse/upward direction command.
There is normally a 3 second delay after issuing the command before motion starts.

Row #6) The 'PAY OUT' button will issue a run in forward/downward direction command.
There is normally a 3 second delay after issuing the command before motion starts.

Row #7) The 'PAYOUT MODE INACTIVE' indicator will change to 'PAYOUT MODE ACTIVE' when the hoist is moving in Payout Mode.

Buttons) Press the 'BACK TO INDEX' button to return to the MOTION INDEX screen.
Press the 'GO TO POSITION CALIBRATION' to go to that screen.

Step 21. Press the “TEST MODE” button on the MOTION INDEX screen.

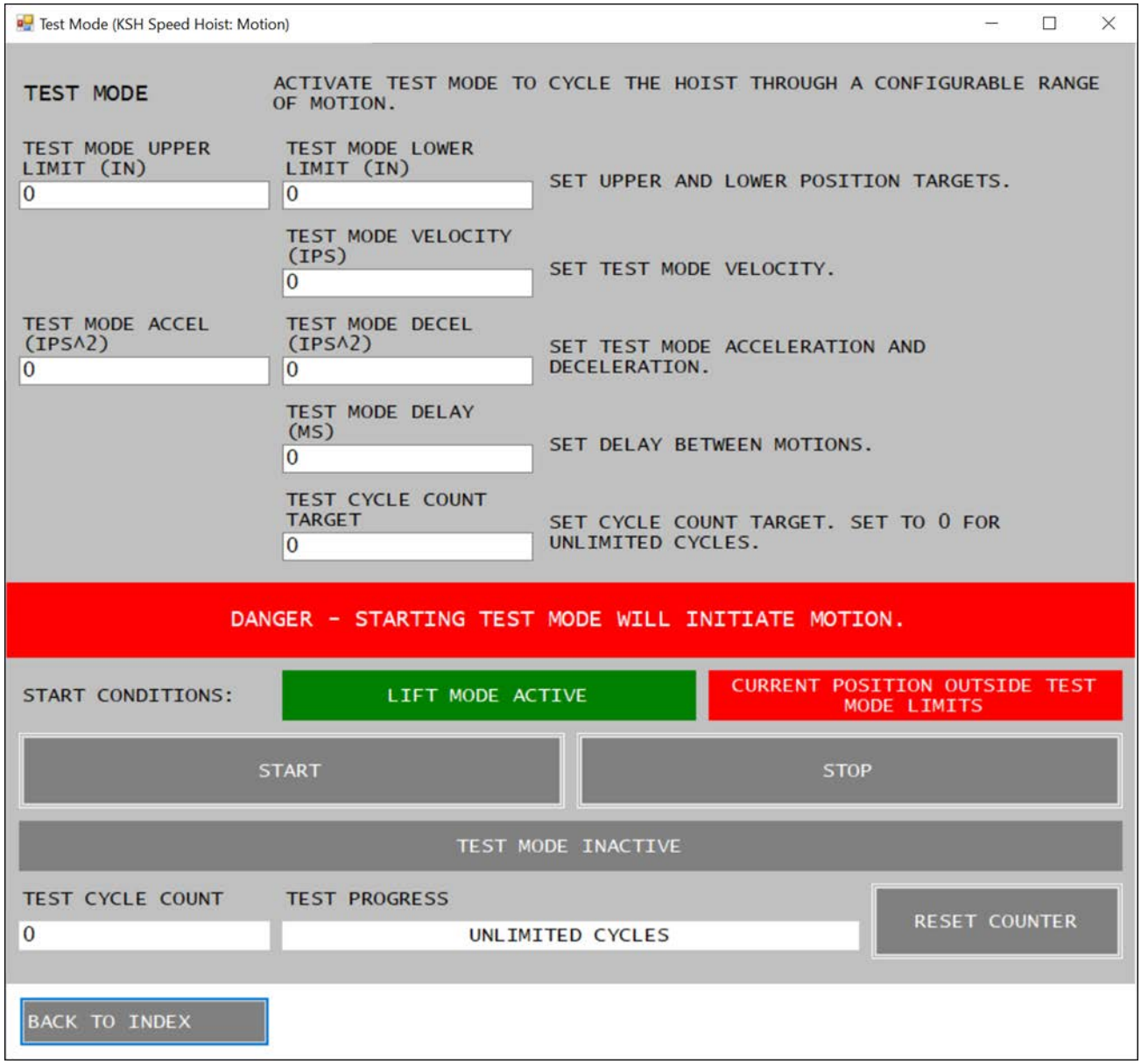


Figure 5-43

Test Mode screen: (Refer to Figure 5-43)

Row #1) The ‘TEST MODE UPPER LIMIT (IN)’ display shows the upper limit that the hoist will travel to while in Test Mode.
The ‘TEST MODE LOWER LIMIT (IN)’ display shows the lower limit that the hoist will travel to while in Test Mode.
Note: When the ‘Start’ button is pressed, the servo will move to the upper limit and then continue the test cycle.

Row #2) The ‘TEST MODE VELOCITY (IPS)’ display shows the speed that will be commanded while Test Mode is active. Test Mode is limited to a maximum 25 Inches per Second.

(Refer to Figure 5-43)

Row #3) The 'TEST MODE ACCEL (IPS^2)' display shows the acceleration setpoint for the hoist while in Test Mode.
The 'TEST MODE DECEL (IPS^2)' display shows the deceleration setpoint for the hoist while in Test Mode.
NOTE: The higher the number placed into the 'ACCEL' or 'DECEL' input text box, the quicker the hoist will come to a stop. The lower the number, the more distance the hoist will take to slow down so it will start slowing down sooner.

Row #4) The 'TEST MODE DELAY (MS)' value should equal or exceed the time it takes for the servo to move from the upper limit to the lower limit during the test cycle. If the Test Mode Velocity is set to 10 in/sec and it moves a total of 50 inches, the delay should be set to a minimum of 5000ms or a five second delay.

Row #5) The 'TEST CYCLE COUNT TARGET' display shows the number of test cycles the hoist will perform. The hoist will automatically stop cycling when it reaches this number of cycles.

Row #6) The hoist's test mode starting conditions are displayed here as indicators.

Row #7) The 'START' and 'STOP' buttons are used to begin and end the test cycle.

Row #8) The 'TEST MODE INACTIVE' indicator will change to 'TEST MODE ACTIVE' when the hoist is moving in test mode.

Row #9) The current number of test mode cycles will be displayed here.
The progress bar will keep track of the cycle count.
The "RESET COUNTER" button will reset the number of test counts.

Button) Press the 'BACK TO INDEX' button to return to the MOTION INDEX screen.

Step 22. Press the “REMOTE CONTROL” button on the MOTION INDEX screen.

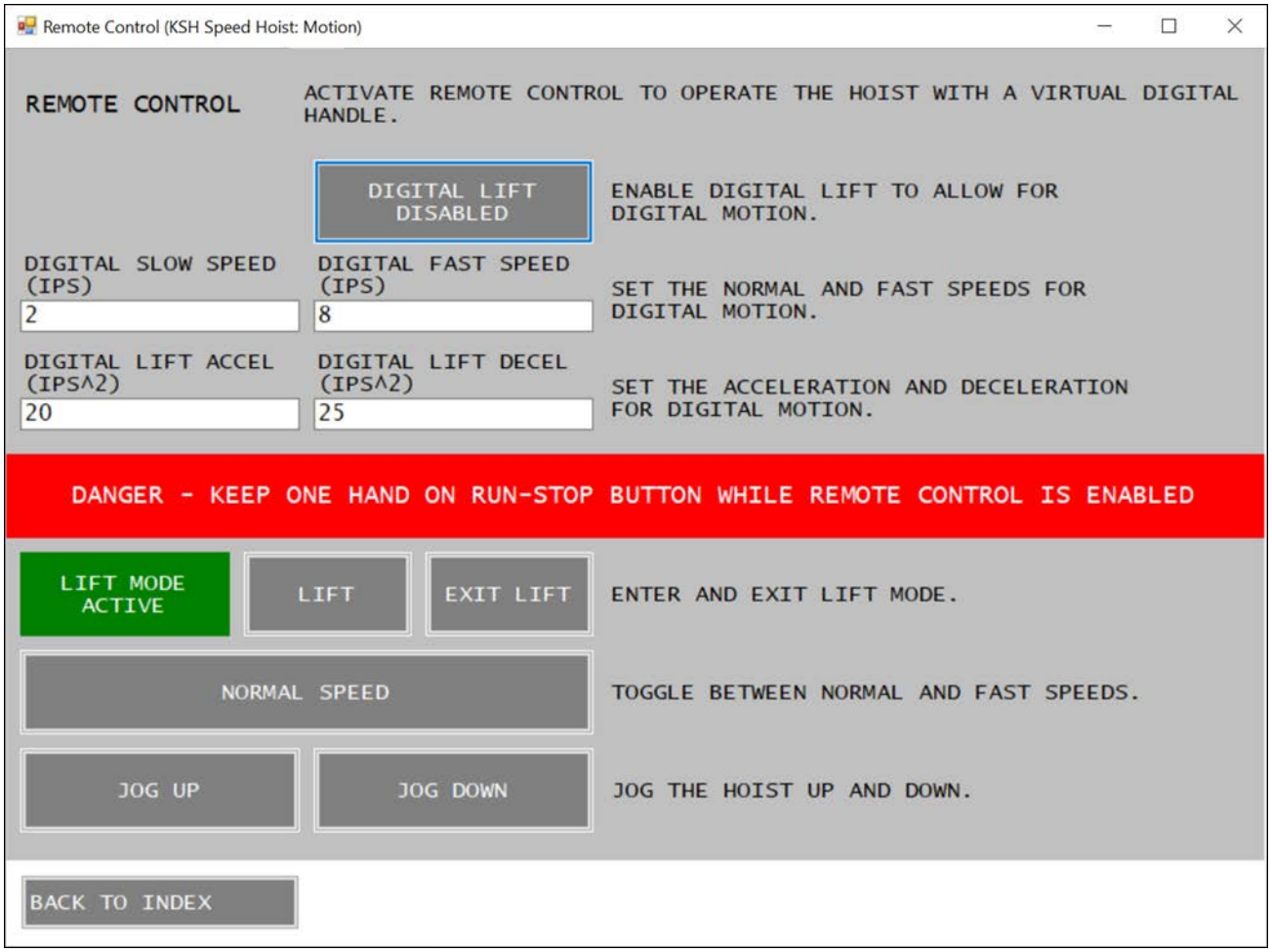


Figure 5-44

Remote Control screen: (Refer to Figure 5-44)

Row #1) The ‘DIGITAL LIFT ENABLE’ button must be pressed for the Remote-Control functions to operate.

Row #2) The ‘DIGITAL SLOW SPEED (IPS)’ display shows the command velocity for the slow jog function.
The ‘DIGITAL FAST SPEED (IPS)’ display shows the command velocity for the fast jog function.

Row #3) The ‘DIGITAL ACCELERATION (IPS^2)’ display shows the acceleration setpoint for digital commanded velocity.
The ‘DIGITAL DECELERATION (IPS^2)’ display shows the deceleration setpoint for digital commanded velocity. This value should be set equal to or higher than the acceleration setpoint for digital commanded velocity.

Row #4) The ‘LIFT MOVE INACTIVE’ indicator will change to ‘LIFT MOVE ACTIVE’ when the hoist is in Lift Mode.
The ‘LIFT BUTTON’ will cause the hoist to go into Lift mode.
The ‘EXIT LIFT’ will cause the hoist to go out of Lift Mode.

Row #5) The ‘SLOW SPEED’ button will toggle the hoist’s digital movement from ‘SLOW SPEED’ to ‘FAST SPEED’.

Row #6) The ‘JOG DN’ button move the chain downwards as long as the button is active.
The ‘JOG UP’ button move the chain upwards as long as the button is active.

Button) Press the ‘BACK TO INDEX’ button to return to MOTION INDEX screen.

Step 23. Press the “SETUP” button on the Start screen.

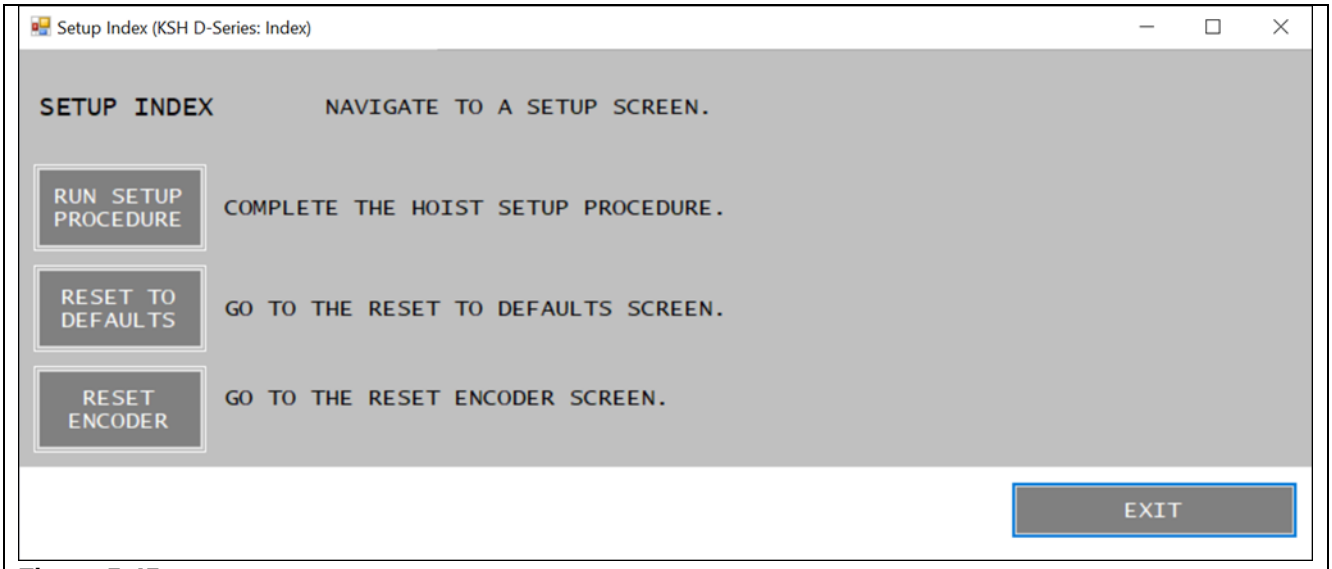


Figure 5-45

Setup Index screen: (Refer to Figure 5-45)

Row #1) The ‘RUN SETUP PROCEDURE’ button will display the first screen of the setup procedure to setup the hoist’s parameters.

Row #2) The ‘RESET TO DEFAULTS’ button will display a screen to set all the hoist’s parameters to factory default.

Row #3) The ‘RESET ENCODER’ button will display a screen to reset the motor’s encoder.

Button) Press the ‘EXIT’ button to close out of this screen.

Step 24. Press the “RUN SETUP PROCEDURE” button on the SETUP INDEX screen.

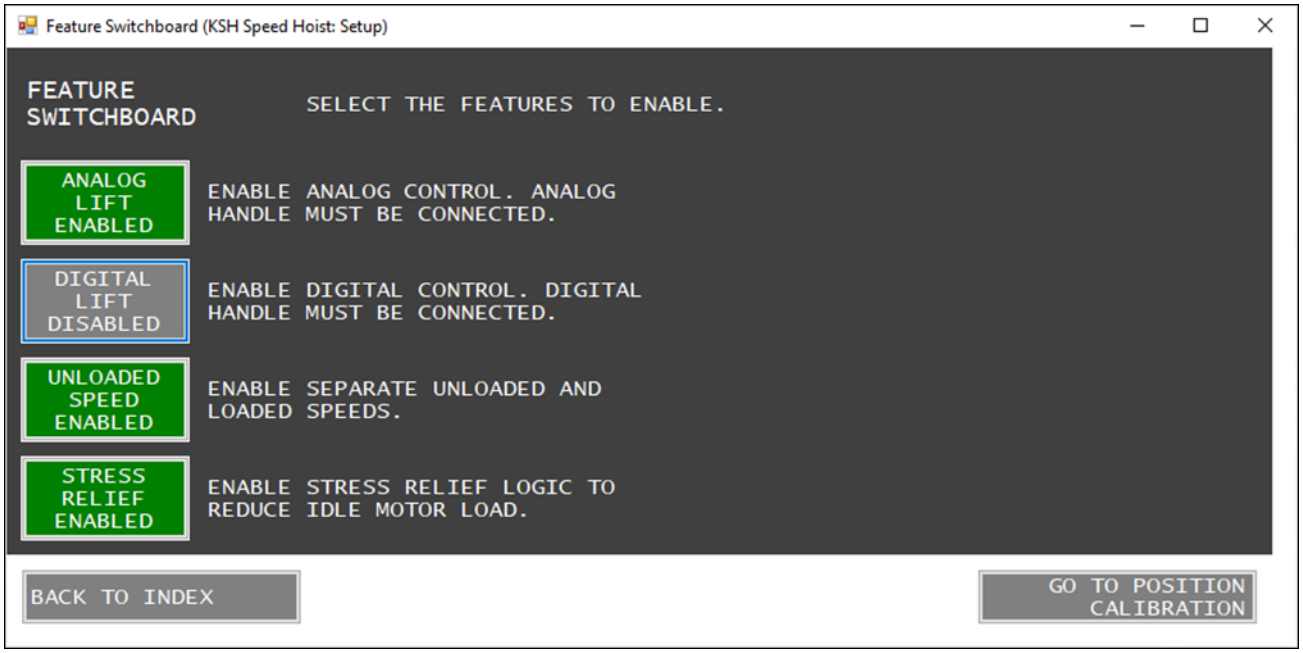


Figure 5-46

Feature Switchboard screen: (Refer to Figure 5-46)

Row #1) The ‘ANALOG LIFT ENABLE’ button should be green or in the ON condition by default. This is required to use the Analog Lift Handle as a directional control.

Row #2) The ‘DIGITAL LIFT DISABLED’ button will disable and enable the digital control function of the hoist.

Row #3) The ‘UNLOADED SPEED ENABLED’ button should be green or in the ON condition by default.
This feature enables separate speeds for both the loaded and unloaded conditions of the hoist.

Row #4) The ‘STRESS RELIEF ENABLE’ button should be green or in the ON condition by default.
This feature is occasionally used for very specific situations to load adjust the gearbox.

Buttons) Press the ‘BACK TO INDEX’ button to return to the SETUP INDEX screen.
Press the ‘GO TO POSITION CALIBRATION’ to progress to the next setup step.

Step 25. Press the “GO TO POSITION CALIBRATION’ button on the FEATURE SWITCHBOARD screen.

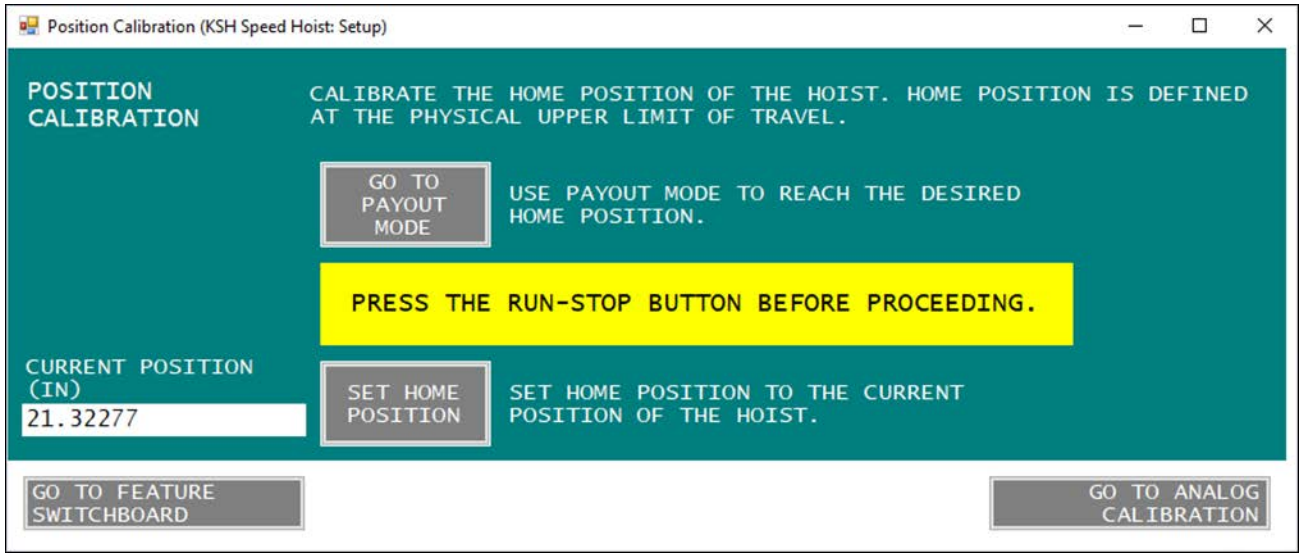


Figure 5-47

Position Calibration screen: (Refer to Figure 5-47)

Row #1) The ‘GO TO PAYOUT MODE’ button displays the Payout Mode screen.

Row #2) The ‘CURRENT POSITION (IN)’ display shows the hoist’s current position.
Pressing the “SET HOME POSITION’ button will set the displayed encoder position of the hoist’s to zero or Home position.

Buttons) Press the ‘GO TO FEATURE SWITCHBOARD’ button to return to the previous screen.
Press the ‘GO TO ANALOG CALIBRATION’ to progress to the next setup step.

Note) In most cases, the hoist should be moved up to its upper most position before the “SET HOME POSITION” button is pressed.

Step 26. Press the “GO TO ANALOG CALIBRATION” button on the POSITION CALIBRATION screen.

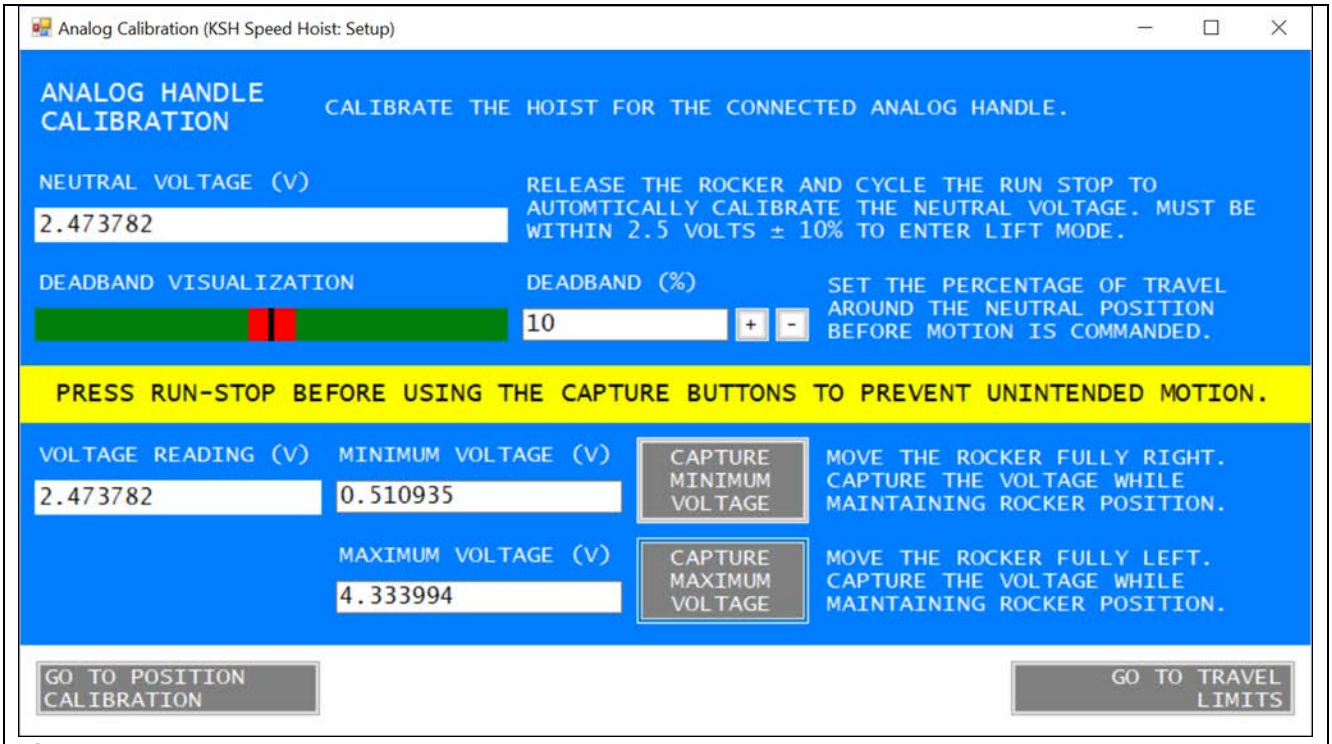


Figure 5-48

Analog Calibration screen: (Refer to Figure 5-48)

Row #1) The ‘NEUTRAL VOLTAGE (V)’ display shows the voltage of the analog switch while it is in its neutral or rest position.

Row #2) The dead band of the analog switch is shown in the Red portion of the bar.
The width of the dead band can be set with “+” and “-“ buttons.

Row #3) The ‘VOLTAGE READING (V)’ display shows the current voltage reading of the analog switch
The ‘MINIMUM VOLTAGE (V)’ of the analog switch is displayed here.
Move the analog switch fully to the right and press the ‘CAPTURE MINIMUM VOLTAGE’ button to set the minimum voltage.

Row #4) The ‘MAXIMUM VOLTAGE (V)’ of the analog switch is displayed here.
Move the analog switch fully to the left and press the ‘CAPTURE MAXIMUM VOLTAGE’ button to set the maximum voltage.

Buttons) Press the ‘GO TO POSITION CALIBRATION’ button to return to the previous screen.
Press the ‘GO TO TRAVEL LIMITS’ to progress to the next setup step.

Step 27. Press the “GO TO TRAVEL LIMITS” button on the ANALOG CALIBRATION screen.

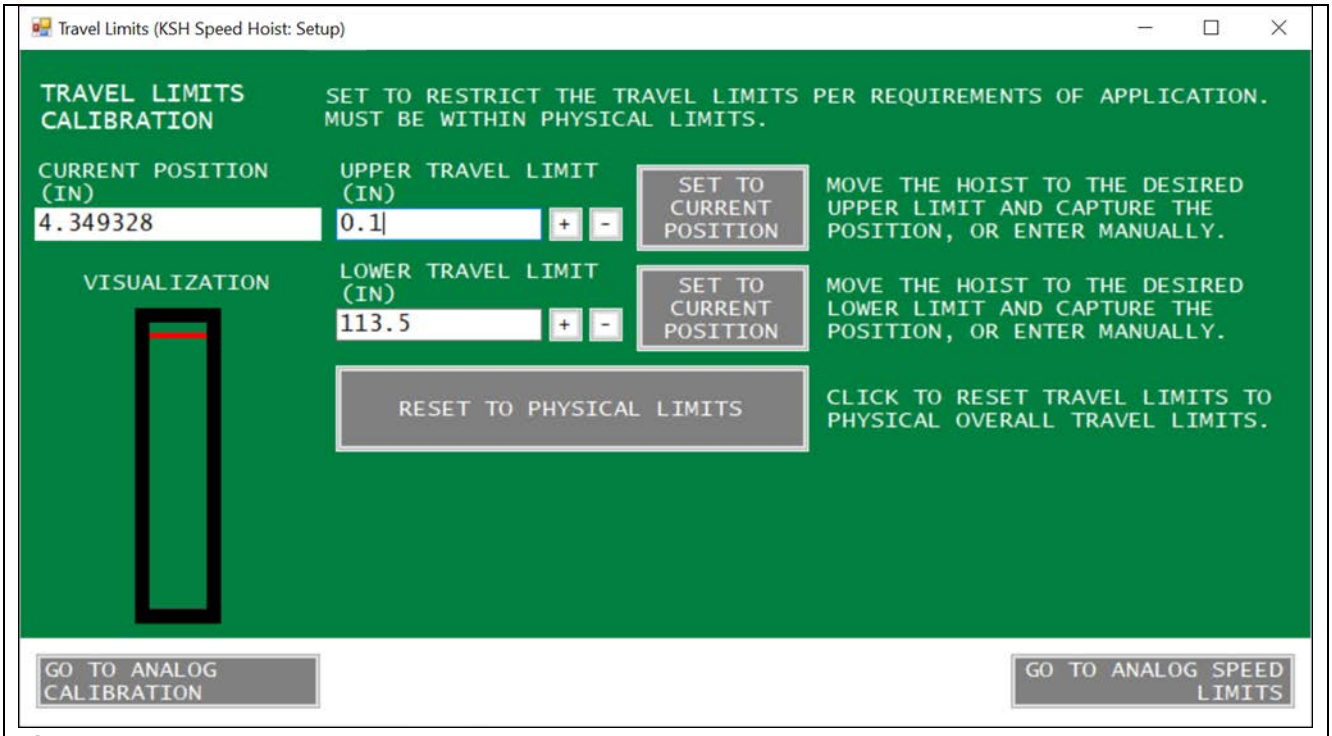


Figure 5-49

Travel Limits screen: (Refer to Figure 5-49)

Row #1) The ‘CURRENT POSITION (IN)’ display shows the vertical height measurement of the hoist. The zero position of the hoist is close to the bottom of the hoist.
The ‘UPPER TRAVEL LIMIT (IN)’ of the hoist is entered here. The “+” and “-“ buttons will increase or decrease this value by 1” per button-press.
The upper ‘SET TO CURRENT POSITION’ button will set the Upper Travel Limit of the hoist to the Current Position of the hoist.

Row #2) The vertical ‘VISUALIZATION’ bar shows the available travel limits of the hoist in Green.
The ‘LOWER TRAVEL LIMIT (IN)’ of the hoist is entered here. The “+” and “-“ buttons will increase or decrease this value by 1” per button-press.
The lower ‘SET TO CURRENT POSITION’ button will set the Lower Travel Limit of the hoist to the Current Position of the hoist.

Row #3) The ‘RESET TO PHYSICAL LIMITS’ button will set the hoist’s Travel Limits to its Physical Limits.

Buttons) Press the ‘GO TO ANALOG CALIBRATION’ button to return to the previous screen.
Press the ‘GO TO ANALOG SPEED LIMITS’ to progress to the next setup step.

Step 28. Press the “GO TO ANALOG SPEED LIMITS” button on the TRAVEL LIMITS screen.

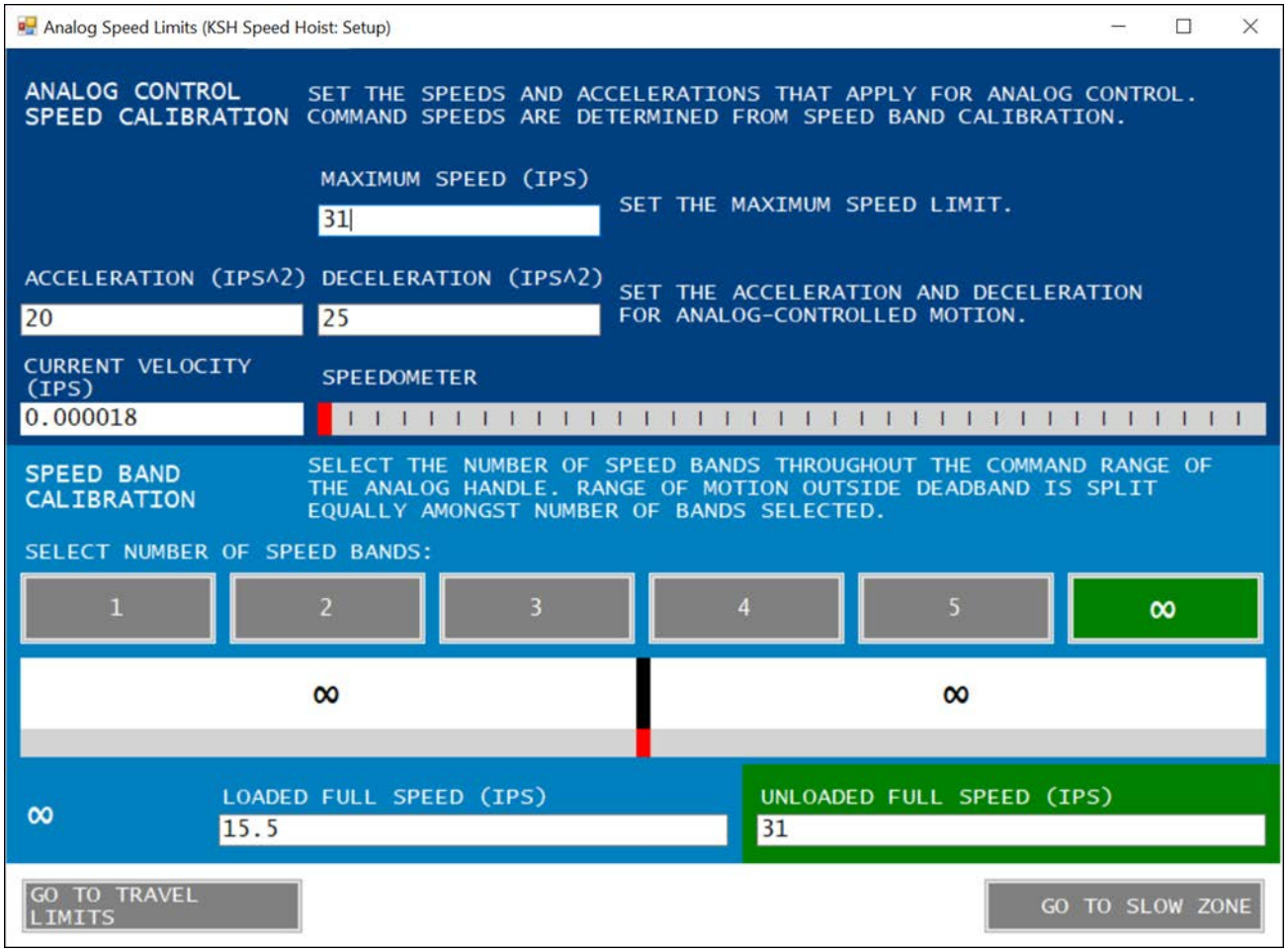


Figure 5-50

Analog Speed Limits screen: (Refer to Figure 5-50 and to Figure 5-51)

Row #1) The ‘MAXIMUM SPEED (IPS)’ display shows the fastest that the hoist may move.

Row #2) The maximum acceleration and deceleration of the hoist while using an analog handle are listed here. The higher the number the faster the hoist will accelerate or decelerate.

Row #3) The current speed of the hoist is shown on the “CURRENT SPEED (IPS)’ display and the horizontal ‘SPEEDOMETER’ bar.

Row #4) The ‘SPEED BAND CALIBRATION’ portion of the screen deals with how the analog switch is used to deliver signals to the hoist and thereby move the hoist up and down.

The ‘SELECT NUMBER OF SPEED BANDS’ buttons define how the analog switch’s signals are interpreted by the hoist.

- The ‘Infinity’ symbol on the right-hand side of the row is normally set from the factory. This allows the user to infinitely very the speed of the hoist from ZERO to the maximum speed set in the software.
- The ‘1’ selection divides the full throw of the analog switch into one zone: This makes the analog handle behave as a single speed digital button. There is only one speed as the hoist travels up and down.
- The ‘2’ selection divides the full throw of the analog switch into two zones: This makes the handle operate in a digital 2 speed mode *
- The ‘3’ selection divides the full throw of the analog switch into three zones: Band 1, Band 2, and Band 3. *
- The ‘4’ selection divides the full throw of the analog switch into four zones: Band 1, Band 2, Band 3, and Band 4. *
- The ‘5’ selection divides the full throw of the analog switch into five zones: Band 1, Band 2, Band 3, Band 4, and Band 5. *

(Refer to Figure 5-50 and to Figure 5-51)

(*) Note: The distance from the switch's neutral position to its extreme left or right position is divided into the number of sections or 'Bands' that are selected here. For the best operation of the hoist, please ensure that the speed increments listed in the 'Bands' are equally divided between ZERO and maximum speed of the hoist. This will ensure that as the switch moves to the left or right, the speed of the hoist will increase smoothly as the switch passes from one 'Band' to the next.

Row #5) The horizontal bar is a visual representation of the selection above. The Red line will show you where the analog switch is with its throw and thereby what speed the hoist will move.

Row #6) Input the Loaded and Unloaded speeds for BAND #1 here.

Row #7) Input the Loaded and Unloaded speeds for BAND #2 here.

Row #8) Input the Loaded and Unloaded speeds for BAND #3 here.

Row #9) Input the Loaded and Unloaded speeds for BAND #4 here.

Row #10) Input the Loaded and Unloaded speeds for BAND #5 here.

Buttons) Press the 'GO TO TRAVEL LIMITS' button to return to the previous screen. If DIGITAL LIFT is enabled on the FEATURE SWITCHBOARD screen, press the 'GO TO DIGITAL SPEED LIMITS' button to go to that screen.

Step 29. Press the “GO TO DIGITAL SPEED LIMITS” button on the ANALOG SPEED LIMITS screen.

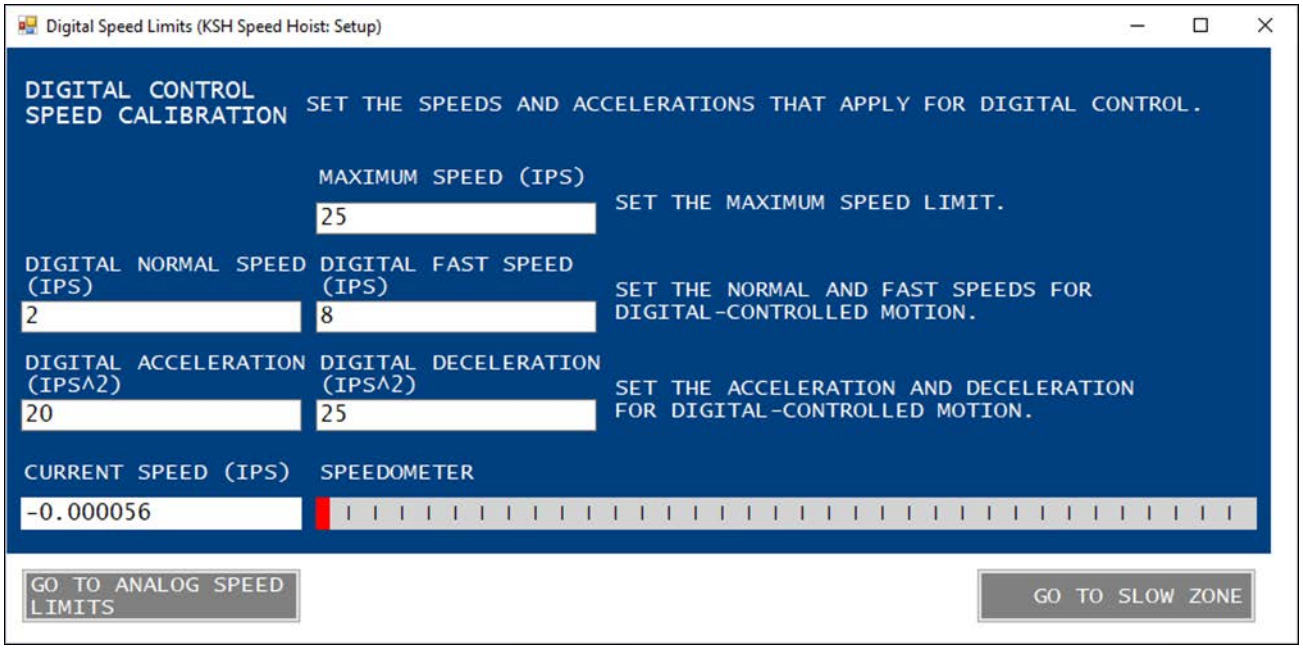


Figure 5-52

Digital Speed Limits screen: (Refer to Figure 5-52)

Row #1) The ‘MAXIMUM SPEED (IPS)’ display shows the fastest that the hoist may move.

Row #2) The ‘DIGITAL NORMAL SPEED (IPS)’ and ‘DIGITAL FAST SPEED (IPS)’ of the hoist while it is using a digital control handle is listed here.

Row #3) The maximum acceleration [‘DIGITAL ACCELERATION (IPS^2)’] and deceleration [‘DIGITAL DECELERATION (IPS^2)’] of the hoist while using a digital handle are listed here. The higher the number the faster the hoist will accelerate or decelerate.

Row #4) The current speed of the hoist is shown on the “CURRENT VELOCITY (IPS)’ display and the horizontal ‘SPEEDOMETER’ bar.

Buttons) Press the ‘GO TO ANALOG SPEED LIMITS’ button to return to the previous screen.
Press the ‘GO TO SLOW ZONE’ to progress to the next setup step.

Step 30. Press the “GO TO SLOW ZONE” button on the ANALOG SPEED LIMITS or the DIGITAL SPEED LIMITS screen.

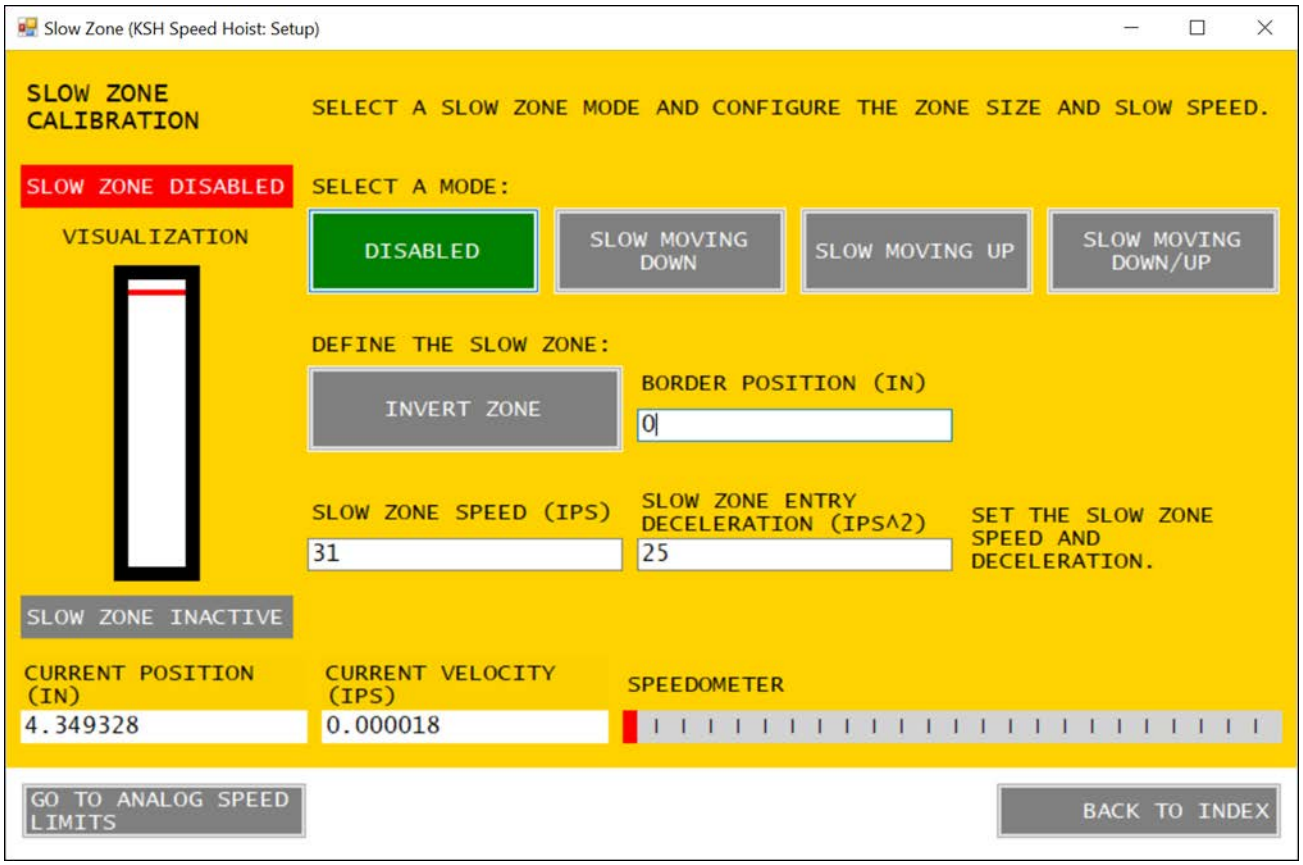


Figure 5-53

Slow Zone screen: (Refer to Figure 5-53)

Row #1) The vertical ‘VISUALIZATION’ bar shows the Slow Zone in yellow. The red band is the hoist’s location within its Travel Limits. The indicator under the bar will turn Green and state “SLOW ZONE ACTIVE” when the hoist is inside the Slow Zone.
The ‘DISABLED’ button will ensure the hoist does not use a Slow Zone.
The ‘SLOW MOVING DOWN’ button activates a Slow Zone only when the hoist is moving downwards and crosses the ‘BORDER POSIITON (IN)’.
The ‘SLOW MOVING UP’ button activates a Slow Zone only when the hoist is moving upwards and crosses the ‘BORDER POSIITON (IN)’.
The ‘SLOW MOVING DOWN AND SLOW MOVING UP’ button activates a Slow Zone when the hoist is moving either direction and crosses the ‘BORDER POSIITON (IN)’.

Row #2) The ‘INVERT ZONE’ button will change the slow zone to being above the setpoint as opposed to below it.
The ‘BORDER POSITION (IN)’ display is the height at which the hoist goes into or out of Slow Zone.

Row #3) The ‘SLOW ZONE SPEED’ is the velocity that the hoist will automatically decelerate to when the hoist crosses the ‘BORDER POSIITON (IN)’ in the direction selected on the above buttons.
The ‘ZONE ENTRY DECELERATION (IPS^2)’ value represents the speed that the hoist decelerates when it crosses the ‘BORDER POSIITON (IN)’ in the direction selected on the above buttons. The larger the number, the fasters the hoist decelerates.

Row #4) The current position and speed of the hoist is shown on the respective ‘CURRENT POSITION (IN)’, ‘CURRENT VELOCITY (IPS)’ displays, and the horizontal ‘SPEEDOMETER’ bar.

Buttons) Press the ‘GO TO ANALOG SPEED LIMITS’ button to return to the previous screen.
Press the ‘BACK TO INDEX’ to complete the setup process.

Step 31. Press the “RESET TO DEFAULTS’ button on the SETUP INDEX screen.

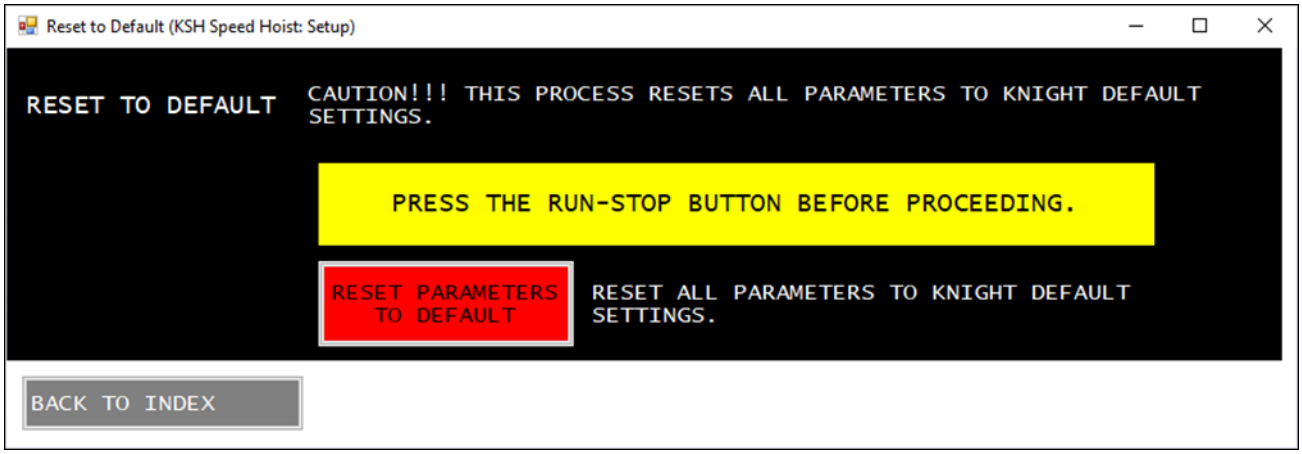


Figure 5-54

Reset to Default screen: (Refer to Figure 5-54)

Row #1) Ensure that the Run-Stop button is pressed before resetting all of the parameters to default.

Row #2) Press the “RESET PARAMETERS TO DEFAULT’ button will reset all of the hoist’s parameters to their factory defaults. If the hoist does not operate after this is accomplished, then it is experiencing a mechanical or electrical issue.

Buttons) Press the ‘BACK TO INDEX’ button to return to the Start screen.

Step 32. Press the “RESET ENCODER” button on the SETUP INDEX screen.

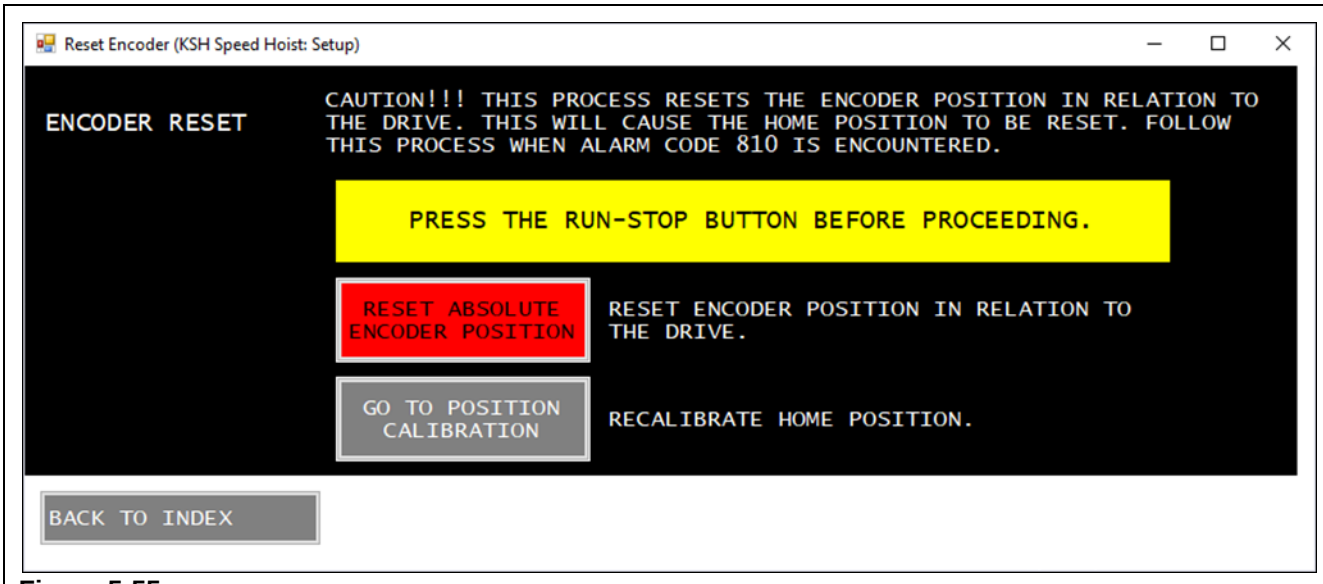


Figure 5-55

Reset Encoder screen: (Refer to Figure 5-55)

Row #1) Ensure that the Run-Stop is pressed before resetting the absolute encoder’s position.

Row #2) Pressing the ‘RESET ABSOLUTE ENCODER POSITION’ will reset the encoder position in relation to the drive and the zero ‘Home’ position will need to be established again (see Step 18). This will also reset the Yaskawa Alarm Code 810.

Row #3) The ‘GO TO POSITION CALIBRATION’ button goes to the Position Calibration screen.

Button) Press the ‘BACK TO INDEX’ button to return to the SETUP INDEX screen.

F. Accessing the Servo Hoist's Fault Log

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

Step 1. Open your web browser and enter the hoist's IP Address in the address bar. This will be 192.168.2.101 in most cases.

Step 2. Click on the "Bell" icon.

Step 3. The web page displayed will be similar to what is shown in Figure 5-56. The information shown listed under the 'Alarms History' TAB includes the 'Error Class', '(Axis) Error Id', 'Source', 'Timestamp', and 'Description'.

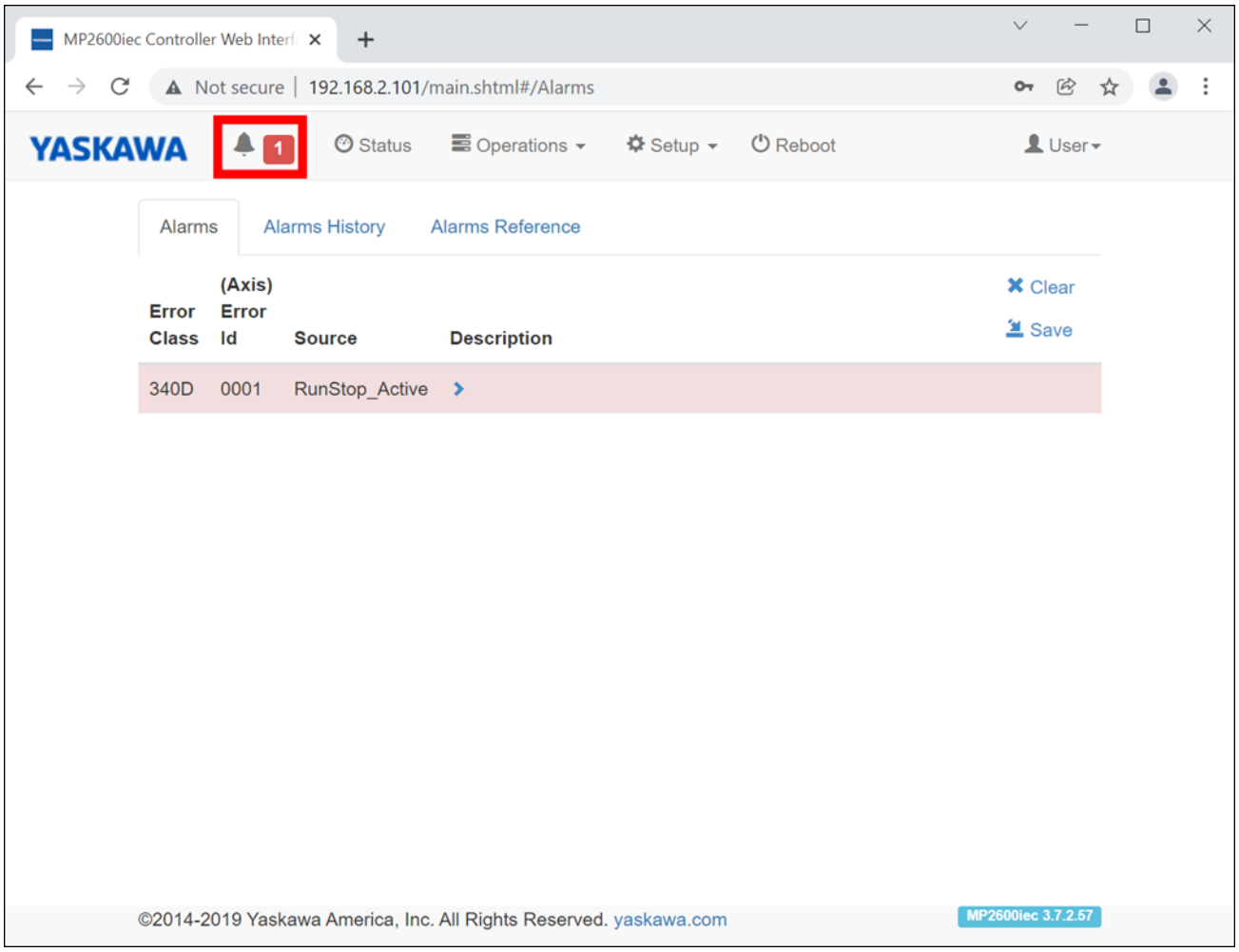


Figure 5-56

Step 4. To receive a more complete description of the fault, click on the ‘Alarms Reference’ TAB. Find the row that has the matching ‘Error Class’ and ‘(Axis) Error Id’ of the fault in question. (Refer to Figure 5-57)

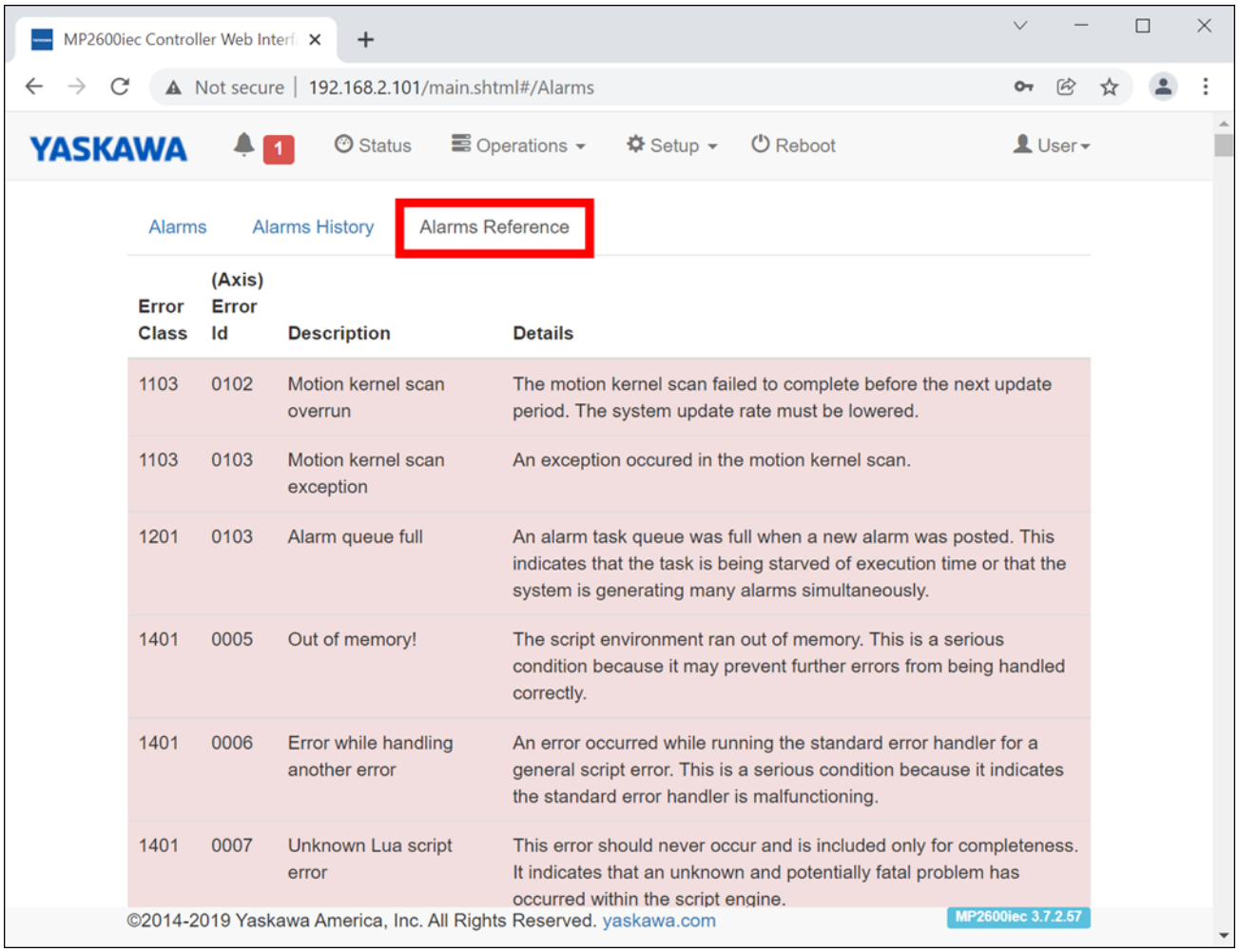


Figure 5-57

Step 5. Any Drive Fault that is currently affecting the system can be found on the screen:
KSS Workspace tree location: Knight WO# \ Status \ Alarms/Warnings. (Refer to Figure 5-58)

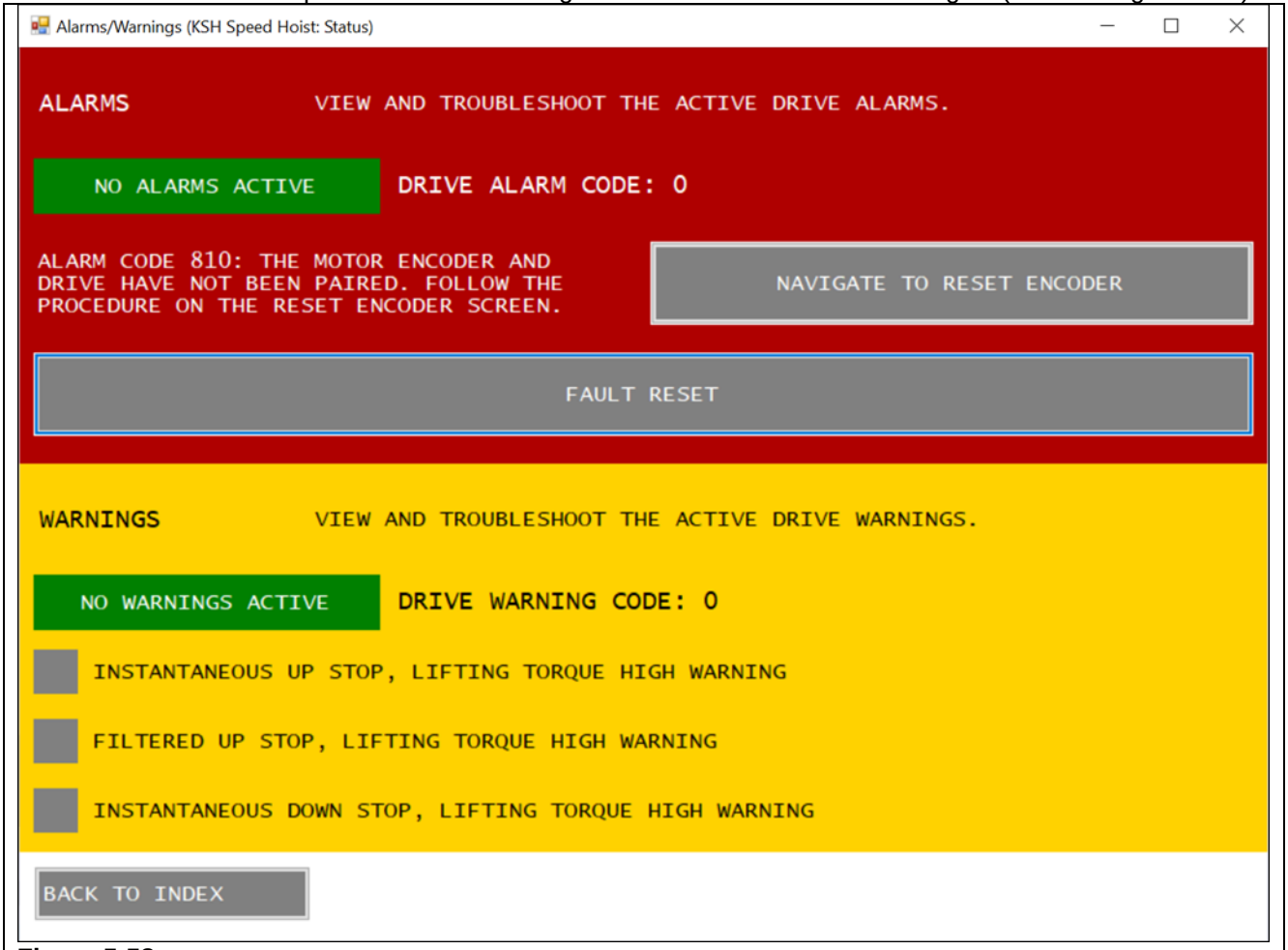


Figure 5-58

Alarms/Warning screen: (Refer to Figure 5-58)

Row #1) The 'DRIVE ALARM CODE' displays the current Fault code generated by the hoist. The software will automatically list the Fault code in Hex so it can be easily found on the web page.

Row #2) The 'DRIVE WARNING CODE' displays the current Warning code generated by the hoist. The software will automatically list the Fault code in Hex so it can be easily found on the web page.

Row #3) The "FAULT RESET" button will reset all system faults and warnings. If the fault or warning has been correct, these displays will show a "0".

Row #4) The 'Instantaneous UpStop' display is ON when is a sudden spike in motor torque is detected while moving in the up direction. This usually results from a jerk on the load such as an impact or taking up slack in the chain to fast.

Row #5) The 'Filtered UpStop' display is ON when a sustained average torque over a set amount is detected. This usually results from trying to lift too much weight.

Row #6) The 'Instantaneous DownStop' display is ON when a sudden spike in motor torque is encountered while moving in the down direction. This typically results from the chain stops hitting the guide plates or the chain being tangled inside of the chain bucket and lodging against the guide plates.

6. PARAMETER DESCRIPTIONS

Many of these parameters have equivalent displays located 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.

These references are for the Knight Servo Studio software version: 2.1.1

There are several parameter status arrays described in this section:

- 6.A.) bPRM Parameter Array
- 6.B.) bSTS Status Array
- 6.C.) iPRM Parameter Array
- 6.D.) iSTS Status Array
- 6.E.) dPRM Parameter Array
- 6.F.) dSTS Status Array
- 6.G.) tPRM Parameter Array
- 6.H.) fPRM Parameter Array
- 6.I.) fSTS Status Array

A. bPRM Parameter Array

This parameter array lists the settable Boolean Parameter variables of the Speed Hoist that are made available to Knight Servo Studio (KSS).

The parameters listed in the bPRM array are Boolean bits being sent to and from the hoist to the Knight Servo Studio and are displayed at:
KSS Workspace tree location: Knight WO# \ Parameters \ bPRM.

bPRM:0 – Fault Reset
Variable Units: Boolean (0=Off, 1=On)
Description: Command bit sent from KSS to the drive to reset current faults.
KSS Workspace tree location: Knight WO# \ Status \ Alarms/Warnings \ Row 3.

bPRM:1 – Spare

bPRM:2 – Exit Mode
Variable Units: Boolean (0=Off, 1=On)
Description: Command sent from KSS telling the host to exit its current mode.
KSS Workspace tree location: Knight WO# \ Motion \ Remote Control \ Row 4.

bPRM:3 – Lift Mode Request
Variable Units: Boolean (0=Off, 1=On)
Description: Request from KSS to enter Lift Mode.
KSS Workspace tree location: Knight WO# \ Motion \ Remote Control \ Row 4.

bPRM:4 – Spare

bPRM:5 – Pay In
Variable Units: Boolean (0=Off, 1=On)
Description: Command from KSS to start feeding chain into the hoist.
KSS Workspace tree location: Knight WO# \ Motion \ Payout Mode \ Row 5.

bPRM:6 – Pay Out
Variable Units: Boolean (0=Off, 1=On)
Description: Command from KSS to start feeding chain out of the hoist.
KSS Workspace tree location: Knight WO# \ Motion \ Payout Mode \ Row 6.

bPRM:7 – Pay Mode Stop
Variable Units: Boolean (0=Off, 1=On)
Description: Command from KSS to stop Pay out mode from feeding chain into or out of the hoist.
KSS Workspace tree location: Knight WO# \ Motion \ Payout Mode \ Row 5/6.

bPRM:8 – Spare

bPRM:9 – Test Mode Stop
Variable Units: Boolean (0=Off, 1=On)
Description: Command sent from KSS to hoist to stop Test Mode.
KSS Workspace tree location: Knight WO# \ Motion \ Test Mode \ Row 7.

bPRM:10 – Test Mode Start
Variable Units: Boolean (0=Off, 1=On)
Description: Command sent from KSSS to the hoist to start Test Mode.
KSS Workspace tree location: Knight WO# \ Motion \ Test Mode \ Row 7.

bPRM:11 – Test Counter Reset
Variable Units: Boolean (0=Off, 1=On)
Description: Command sent from KSS telling the hoist to reset the test counter to zero.
KSS Workspace tree location: Knight WO# \ Motion \ Test Mode \ Row 9.

bPRM:12 – Spare

bPRM:13 – Digital Up
Variable Units: Boolean (0=Off, 1=On)
Description: A Digital Up command from KSS. The 'JOG UP' button on the Remote Control screen has been pressed.
KSS Workspace tree location: Knight WO# \ Motion\ Remote Control \ Row 6.

bPRM:14 – Digital Down
Variable Units: Boolean (0=Off, 1=On)
Description: A Digital Down command from KSS. The 'JOG DOWN' button on the Remote Control screen has been pressed.
KSS Workspace tree location: Knight WO# \ Motion\ Remote Control \ Row 6.

bPRM:15 – Digital Fast
Variable Units: Boolean (0=Off, 1=On)
Description: The 'FAST' Button on the Remote Control screen has been toggled on.
KSS Workspace tree location: Knight WO# \ Motion\ Remote Control \ Row 5.

bPRM:16 – Set Home Position
Variable Units: Boolean (0=Off, 1=On)
Description: The 'SET HOME POSITION' button on the Position Calibration screen has been pressed.
KSS Workspace tree location: Knight WO# \ Setup \ Position Calibration \ Row 2.

bPRM:17 – Spare

bPRM:18 – Capture Handle Minimum Voltage
Variable Units: Boolean (0=Off, 1=On)
Description: The 'CAPTURE MINIMUM VOLTAGE' button on the Analog Calibration screen has been pressed.
KSS Workspace tree location: Knight WO# \ Setup \ Analog Calibration \ Row 3.

bPRM:19 – Capture Handle Maximum Voltage
Variable Units: Boolean (0=Off, 1=On)
Description: The 'CAPTURE MINIMUM VOLTAGE' button on the Analog Calibration screen has been pressed.
KSS Workspace tree location: Knight WO# \ Setup \ Analog Calibration \ Row 4.

bPRM:20 – Spare

bPRM:21 – Reset to Factory Chain
Variable Units: Boolean (0=Off, 1=On)
Description: The 'RESET TO FACTORY DEFAULTS' button on the Physical Limits screen has been pressed.
KSS Workspace tree location (User Level = Advanced): Knight WO# \ Setup \ Physical Limits \ Row 3.

bPRM:22 – Set Overall Upper Travel Limit
Variable Units: Boolean (0=Off, 1=On)
Description: The 'SET TO CURRENT POSITION' button on the Physical Limits screen has been pressed.
KSS Workspace tree location (User Level = Advanced): Knight WO# \ Setup \ Physical Limits Row 1.

bPRM:23 – Set Overall Lower Travel Limit
Variable Units: Boolean (0=Off, 1=On)
Description: The 'SET TO CURRENT POSITION' button on the Physical Limits screen has been pressed.
KSS Workspace tree location (User Level = Advanced): Knight WO# \ Setup \ Physical Limits \ Row 2.

bPRM:24 – Reset Lift to Overall Limits
Variable Units: Boolean (0=Off, 1=On)
Description: The 'RESET TO PHYSICAL LIMITS' button on the Travel Limits screen has been pressed.
KSS Workspace tree location: Knight WO# \ Setup \ Travel Limits \ Row 3.

bPRM:25 – Set Lift Upper Travel Limit
Variable Units: Boolean (0=Off, 1=On)
Description: The 'SET CURRENT POSITION' button on the Travel Limits screen has been pressed.
KSS Workspace tree location: Knight WO# \ Setup \ Travel Limits \ Row 1.

bPRM:26 – Set Lift Lower Travel Limit
Variable Units: Boolean (0=Off, 1=On)
Description: The 'SET CURRENT POSITION' button on the Travel Limits screen has been pressed.
KSS Workspace tree location: Knight WO# \ Setup \ Travel Limits \ Row 2.

bPRM:27 through bPRM:31 – Spare

bPRM:32 – Enable Stress Relief
Variable Units: Boolean (0=Off, 1=On)
Description: The 'STRESS RELIEF ENABLE' button on the Feature Switchboard screen has been pressed.
KSS Workspace tree location: Knight WO# \ Setup \ Feature Switchboard \ Row 4.

bPRM:33 – Enable Unloaded Speed Mode
Variable Units: Boolean (0=Off, 1=On)
Description: The 'UNLOADED SPEED ENABLED' button on the Fixture Switchboard screen has been turned on, enabling the hoist to cycle at a faster set speed when the hoist is unloaded. This is accomplished by reading the torque output of the motor.
KSS Workspace tree location: Knight WO# \ Setup \ Feature Switchboard \ Row 3.

bPRM:34 – Slow Zone Invert
Variable Units: Boolean (0=Off, 1=On)
Description: The slow zone usually is only initiated when the hoist is Below the slow zone heights. This parameter changes the functionality of the slow zone so that it initiates when the hoist is Above the stated heights.
KSS Workspace tree location: Knight WO# \ Slow Zone \ Row 2.

bPRM:35 through bPRM:36 – Spare

bPRM:37 – Enable Digital Lift Mode
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter is used to enable or disable DIGITAL Lift Mode. This is not standard in the Speed Hoist, but is required to be on if attempting to move the hoist using remote digital control from the Remote Control screen in KSS.
KSS Workspace tree location: Knight WO# \ Setup \ Feature Switchboard \ Row 3.
KSS Workspace tree location: Knight WO# \ Motion \ Remote Control \ Row 1

bPRM:38 – Enable Analog Lift Mode
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter is used to enable or disable ANALOG Lift Mode. This is the standard function for control of the Speed Hoist utilizing the analog rocker switch.
KSS Workspace tree location: Knight WO# \ Setup \ Feature Switchboard \ Row 1.
bPRM:39 – Spare

bPRM:40 – Speed Band Infinite Request
Variable Units: Boolean (0=Off, 1=On)
Description: This Parameter toggles on and then off when the Infinite button is pressed.
KSS Workspace tree location: Knight WO# \ Setup \ Analog Speed Limits \ Row 4.

bPRM:41 – Speed Band 1 Request
Variable Units: Boolean (0=Off, 1=On)
Description: The '1' button on the Analog Speed Limits screen has been pressed.
KSS Workspace tree location: Knight WO# \ Setup \ Analog Speed Limits \ Row 4.

bPRM:42 – Speed Band 2 Request
Variable Units: Boolean (0=Off, 1=On)
Description: The '2' button on the Analog Speed Limits screen has been pressed.
KSS Workspace tree location: Knight WO# \ Setup \ Analog Speed Limits \ Row 4.

bPRM:43 – Speed Band 3 Request
Variable Units: Boolean (0=Off, 1=On)
Description: The '3' button on the Analog Speed Limits screen has been pressed.
KSS Workspace tree location: Knight WO# \ Setup \ Analog Speed Limits \ Row 4.

bPRM:44 – Speed Band 4 Request
Description: The '4' button in Row #6 of the Analog Speed Limits screen has been pressed.
KSS Workspace tree location: Knight WO# \ Setup \ Analog Speed Limits \ Row 4.

bPRM:45 – Speed Band 5 Request
Variable Units: Boolean (0=Off, 1=On)
Description: The '5' button on the Analog Speed Limits screen has been pressed.
KSS Workspace tree location: Knight WO# \ Setup \ Analog Speed Limits \ Row 4.
bPRM:46 through bPRM:95 – Spare

bPRM:96 – Reset to Knight Default
Variable Units: Boolean (0=Off, 1=On)
Description: The 'RESET PARAMETERS TO DEFAULT' button on the Reset to Default screen has been pressed.
KSS Workspace tree location: Knight WO# \ Setup \ Reset to Default \ Row 2.

bPRM:97 – Absolute Encoder Position Reset
Variable Units: Boolean (0=Off, 1=On)
Description: The 'RESET ABSOLUTE ENCODER POSITION' is being pressed. This resets the encoder position in relation to the drive, and the zero 'Home' position will need to be established again immediately after taking this step. DO NOT operate the Hoist without setting or validating the zero or home position.
KSS Workspace tree location: Knight WO# \ Setup \ Reset Encoder \ Row 1.

bPRM:98 – Set Commission Offset
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter is used to record the encoder offset when the system is commissioned.

bPRM:99 – Set New Encoder Offset
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter is used to acknowledge that the Home Position has deviated more than 3" and to set this new offset.
KSS Workspace tree location: Knight WO# \ Setup \ Position Calibration \ Row 4.
bRPM:100 through bPRM:111 – Spare

B. bSTS Status Array

This parameter array lists the Boolean Status variables of the Speed Hoist that are made available to the Knight Servo Studio (KSS).

The parameters listed in the bSTS array are Boolean bits being sent from the hoist to the Knight Servo Studio and are displayed at:
KSS Workspace tree location: Knight WO# \ Parameters \ bSTS.

bSTS:0 – Run-Stop Released
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the Run-Stop button is in the run position and the 12-pin coil cable is connected to the Speed Hoist. It will be a '0' if the Run-Stop button is pressed in or if the 12-pin coil cable is disconnected.
KSS Workspace tree location: : Knight WO# \ Status \ System Status \ Row 7.

bSTS:1 – Ready to Enable.
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive is error free and ready to enter a mode.
KSS Workspace tree location: Knight WO# \ Status \ System Status \ Row 1.

bSTS:2 – Drive is Enabled
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive is in a mode, the brake is released, and the hoist is ready for motion.
KSS Workspace tree location: Knight WO# \ Status \ System Status \ Row 2.

bSTS:3 – Axis Alarm Active
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive is experiencing an axis fault.
KSS Workspace tree location: Knight WO# \ Status \ Alarms/Warnings \ Row 1.

bSTS:4 – Axis Stop NOT OK Signal
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's Safe Torque Off circuit is not closed. The Drive will display "HBB" on its 7-segment display if this fault occurs.
KSS Workspace tree location: Knight WO# \ Status \ System Status \ Row 4.

bSTS:5 – Axis Main Circuit Power On
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive is powered on by Line Voltage AC Power.
KSS Workspace tree location: Knight WO# \ Status \ System Status \ Row 1.

bSTS:6 – Axis Servo On
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive is in an on condition.
KSS Workspace tree location: Knight WO# \ Status \ System Status \ Row 2.

bSTS:7 – Axis Warning Active
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive is experiencing an axis warning.
KSS Workspace tree location: Knight WO# \ Status \ Alarms/Warnings \ Row 4.

bSTS:8 – Analog I/O OK
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's analog input and outputs have no faults.
KSS Workspace tree location: Knight WO# \ Status \ System Status \ Row 3.

bSTS:9 – Digital I/O OK
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive is communicating with the VIPA remote I/O.
KSS Workspace tree location: Knight WO# \ Status \ System Status \ Row 3.

bSTS:10 – Drive Homed
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive home position has been established.
KSS Workspace tree location: Knight WO# \ Status \ System Status \ Row 5.

bSTS:11 – Hoist Rating Alarm
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the is a mismatch between the system's hardware and software attributes.
KSS Workspace tree location: Knight WO# \ Troubleshooting \ Slow Flashing Red Light \ Row 4.

bSTS:12 – Rapid Position Jump
Variable Units: Boolean (0=Off,1=On)
Description: This parameter displays a '1' if the servo drive has detected motion that was not commanded or an over speed condition.
KSS Workspace tree location: Knight WO# \ Status \ Alarms/Warnings \ Row 6.

bSTS:13 – Hardware Match
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the system has passed the validation check.
KSS Workspace tree location: Knight WO# \ Status \ System Status \ Row 4.

bSTS:14 – Drive Warning Active
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive is experiencing a warning. The warning code will be listed on Row #4 of the screen.
KSS Workspace tree location: Knight WO# \ Status \ Alarms/Warnings \ Row 4.

bSTS:15 – Drive Alarm Active
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive is experiencing a fault. The fault code will be listed on Row #1 of the screen.
KSS Workspace tree location: Knight WO# \ Status \ Alarms/Warnings \ Row 1.

bSTS:16 – Lift Mode Active
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive is currently in Lift mode.
KSS Workspace tree location: Knight WO# \ Status \ System Status \ Row 8.

bSTS:17 – Speed Hoist Unloaded Active
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive is currently in Unloaded mode.

bSTS:18 – Payout Mode Active
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive is currently in Payout mode.
KSS Workspace tree location: Knight WO# \ Status \ System Status \ Row 7.

bSTS:19 – Payout Allowed
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if all of the servo drive's hardware and software are ready to go into Payout mode.

bSTS:20 – Test Mode Active
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive is currently in Test mode.
KSS Workspace tree location: Status \ System Status \ Row 8.

bSTS:21 – Test Mode Allowed
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive may enter Test mode.

bSTS:22 – Test Counts Complete
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the Test mode has competed the number of cycles listed in 'CYCLE COUNT TARGET' display.
KSS Workspace tree location: Knight WO# \ Motion \ Test Mode \ Row 9.

bSTS:23 – Spare

bSTS:24 – Slow Zone Enabled
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's software is set up to automatically process a slowdown zone.
KSS Workspace tree location: Knight WO# \ Setup \ Slow Zone \ Row 1.

bSTS:25 – Up Stop Instant
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the actual torque of the motor exceeds the Up Stop Instant set point.
KSS Workspace tree location: Knight WO# \ Status \ Alarms/Warnings \ Row 5.

bSTS:26 – Up Stop RMS
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the filtered torque of the motor exceeds the Up Stop Filtered set point.
KSS Workspace tree location: Knight WO# \ Status \ Alarms/Warnings \ Row 6.

bSTS:27 – Down Stop Instant
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the actual torque of the motor exceeds the Down Stop Instant set point.
KSS Workspace tree location: Knight WO# \ Status \ Alarms/Warnings \ Row 7.

bSTS:28 – Handle Span Alarm
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the minimum and maximum voltages do not differ by at least 2 volts on the Analog Calibration screen.
KSS Workspace tree location: Knight WO# \ Troubleshooting \ Slow Flashing Red Light \ Row 2.

bSTS:29 – Digital Up
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if there is a digital up command.

bSTS:30 – Digital Down
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if there is a digital down command.

bSTS:31 – Digital Fast
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if there is a digital fast command.

bSTS:32 – Up Stop Active
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive has stopped moving up due to several possibilities. The maximum capacity of the hoist has been exceeded or certain software conditions have been met.
KSS Workspace tree location: Knight WO# \ Status \ Alarms/Warnings \ Row 5.

bSTS:33 – Down Stop Active
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive has stopped moving down due to several possibilities. The minimum weight of the hoist has been reached or a certain software condition have been met.
KSS Workspace tree location: Knight WO# \ Status \ Alarms/Warnings \ Row 7.

bSTS:34 – Spare

bSTS:35 – Immediate Stop Active
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's software has initiated an Immediate Stop.

bSTS:36 – Slow Zone Active
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the Slow Zone is enabled (bSTS:24 'Slow Zone Enabled') and the control handle has reached the loaded or unloaded slow zone height.
KSS Workspace tree location: Knight WO# \ Setup \ Slow Zone \ Row 1.

bSTS:37 – Spare

bSTS:38 – Home Deviation
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's home position has deviated more than 3 inches from the commissioned home position.
KSS Workspace tree location: Knight WO# \ Status \ System Status \ Row 5.

bSTS:39 – Spare

bSTS:40 – Speed Band Infinite Indicator
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the 'SELECT NUMBER OF SPEED BANDS:' is set to Infinite
KSS Workspace tree location: Knight WO# \ Setup \ Analog Speed Limits \ Row 4.

bSTS:41 – Speed Band 1 Indicator
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the number of speed bands is set to '1' through '5'
KSS Workspace tree location: Knight WO# \ Setup \ Analog Speed Limits \ Row 4.

bSTS:42 – Speed Band 2 Indicator
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the number of speed bands is set to '2' through '5'
KSS Workspace tree location: Knight WO# \ Setup \ Analog Speed Limits \ Row 4.

bSTS:43 – Speed Band 3 Indicator
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the number of speed bands is set to '3' through '5'
KSS Workspace tree location: Knight WO# \ Setup \ Analog Speed Limits \ Row 4.

bSTS:44 – Speed Band 4 Indicator
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the number of speed bands is set to '4' through '5'
KSS Workspace tree location: Knight WO# \ Setup \ Analog Speed Limits \ Row 4.

bSTS:45 – Speed Band 5 Indicator
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the number of speed bands is set to '5'
KSS Workspace tree location: Knight WO# \ Setup \ Analog Speed Limits \ Row 4.

bSTS:46 though bSTS:95 – Spare

bSTS:96 – M1-DI-0 Run Stop Released
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's module #1's digital input #0 - 'RUN STOP RELEASED' is ON.
KSS Workspace tree location: Knight WO# \ Status \ I/O Status \ Row 1.

bSTS:97 – M1-DI-1 Reserved
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's module #1's digital input #1 is ON.
KSS Workspace tree location: Knight WO# \ Status \ I/O Status \ Row 2.

bSTS:98 – M1-DI-2 Reserved
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's module #1's digital input #2 is ON.
KSS Workspace tree location: Knight WO# \ Status \ I/O Status \ Row 3.

bSTS:99 – M1-DI-3 Reserved
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's module #1's digital input #3 is ON.
KSS Workspace tree location: Knight WO# \ Status \ I/O Status \ Row 4.

bSTS:100 – M1-DI-4 Spare
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's module #1's digital input #4 is ON.
KSS Workspace tree location: Knight WO# \ Status \ I/O Status \ Row 5.

bSTS:101 – M1-DI-5 Spare
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's module #1's digital input #5 is ON.
KSS Workspace tree location: Knight WO# \ Status \ I/O Status \ Row 6.

bSTS:102 – M1-DI-6 Spare
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's module #1's digital input #6 - 'GREEN PB' is ON.
KSS Workspace tree location: Knight WO# \ Status \ I/O Status \ Row 7.

bSTS:103 – M1-DI-7 Spare
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's module #1's digital input #7 is ON.
KSS Workspace tree location: Knight WO# \ Status \ I/O Status \ Row 8.

bSTS:104 – M2-DI-0 Spare
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's module #2's digital input #0 is ON.
KSS Workspace tree location: Knight WO# \ Status \ I/O Status \ Row 1.

bSTS:105 – M2-DI-1 Spare
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's module #2's digital input #1 is ON.

bSTS:106 – M2-DI-2 Spare
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's module #2's digital input #2 is ON.

bSTS:107 – M2-DI-3 Spare
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's module #2's digital input #3 is ON.

bSTS:108 – M2-DI-4 Spare
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's module #2's digital input #4 is ON.

bSTS:109 – M2-DI-5 Spare
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's module #2's digital input #5 is ON.

bSTS:110 – M2-DI-6 Spare
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's module #2's digital input #6 is ON.

bSTS:111 – M2-DI-7 Spare
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's module #2's digital input #7 is ON

bSTS:112 – M3-DO-0 Red Light
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's module #3's digital output #0 – 'RED LIGHT' is ON.
KSS Workspace tree location: Knight WO# \ Status \ I/O Status \ Row 1.

bSTS:113 – M3-DO-1 Green Light
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's module #3's digital output #1 – 'GREEN LT' is ON.
KSS Workspace tree location: Knight WO# \ Status \ I/O Status \ Row 2.

bSTS:114 – M3-DO-2 Spare
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's module #3's digital output #2 is ON.
KSS Workspace tree location: Knight WO# \ Status \ I/O Status \ Row 3.

bSTS:115 – M3-DI-3 Spare
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's module #3's digital output #3 is ON.
KSS Workspace tree location: Knight WO# \ Status \ I/O Status \ Row 4.

bSTS:116 – M3-DI-4 Spare
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's module #3's digital output #4 is ON.
KSS Workspace tree location: Knight WO# \ Status \ I/O Status \ Row 5.

bSTS:117 – M3-DI-5 Spare
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's module #3's digital output #5 is ON.
KSS Workspace tree location: Knight WO# \ Status \ I/O Status \ Row 6.

bSTS:118 – M3-DI-6 Spare
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's module #3's digital output #6 is ON.
KSS Workspace tree location: Knight WO# \ Status \ I/O Status \ Row 7.

bSTS:119 – M3-DO-7 Motor Brake Release
Variable Units: Boolean (0=Off, 1=On)
Description: This parameter displays a '1' if the servo drive's module #3's digital output #7 – 'MOTOR BRAKE RELEASE' is ON.
KSS Workspace tree location: Knight WO# \ Status \ I/O Status \ Row 8.

bSTS:120 through bSTS:127 – Spare

C. iPRM Parameter Array

This parameter array lists the Integer Parameter variables of the Speed Hoist that are made available to the Knight Servo Studio (KSS).

The parameters listed in the iPRM array are integer values being sent from the Knight Servo Studio to the hoist and are displayed at:
KSS Workspace tree location: Knight WO# \ Parameters \ iPRM.

iPRM:0 – Slow Zone Mode
Variable Units: Choice (0=off, 1=down, 2=up, 3=up and down)
Description: This parameter configures the hoist's automatic slow zone.
This parameter works with the variables fPRM:52 to fPRM:57 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.
KSS Workspace tree location: Knight WO# \ Setup \ Slow Zone \ Row 2.

NOTE: If using this function, all parameters (fPRM:52 to fPRM:57) must be non-zero for the Slow Zone to function correctly.

iPRM:1 through iPRM:7 – Spare

D. iSTS Parameter Array

This parameter array lists the Integer Status variables of the Speed Hoist that are made available to the Knight Servo Studio (KSS).

The parameters listed in the iSTS array are integer values being sent from the hoist to the Knight Servo Studio and are displayed at:
KSS Workspace tree location: Knight WO# \ Parameters \ iSTS.

iSTS:0 – Drive Warning ID
Variable Units: Software Warning Code
Description: This parameter displays any warning codes that the system is currently experiencing. Please see section 5.F. 'Accessing the Speed Hoist's Fault Log' for instructions on how to access the servo's fault history.
KSS Workspace tree location: Knight WO# \ Status \ Alarms/Warnings \ Row 4.

iSTS:1 – Drive Alarm ID
Variable Units: Software Alarm Code
Description: This parameter displays any fault codes that the system is currently experiencing. Please see section 5.F. 'Accessing the Speed Hoist's Fault Log' for instructions on how to access the servo's fault history.
KSS Workspace tree location: Knight WO# \ Status \ Alarms/Warnings \ Row 1.

iSTS:2 – System Number
Description: This parameter displays a second portion of the Knight Global Job Number. The system number increments if there are multiple hoists on the same job number. This second portion always follows the Knight Global Job Number preceded by a dash.
Example: If a '2' is displayed here, then the system's full job number would be: 186042-2
KSS Home screen location: Quick View panel \ Row 6 (Lower right-hand portion of the screen)

iSTS:3 through iSTS:7 – Spare

E. dPRM Parameter Array

This parameter array lists the Double Integer Parameter variables of the Speed Hoist that are made available to the Knight Servo Studio (KSS).

The parameters listed in the dPRM array are double integer values being sent from the Knight Servo Studio to the hoist and are displayed at:
KSS Workspace tree location: Knight WO# \ Parameters \ dPRM.

dPRM:0 – Test Cycle Count Target
Variable Units: Integer
Description: This parameter controls the number of cycles that the servo will execute in Test Mode after it is initiated unless a stop or fault occurs. Setting this parameter to zero will result in the servo not automatically stopping during Test Mode.
KSS Workspace tree location: Knight WO# \ Motion \ Test Mode \ Row 5.

dPRM:1 through dPRM:7 – Spare

F. dSTS Parameter Array

This parameter array lists the Double Integer Parameter variables of the Speed Hoist that are made available to the Knight Servo Studio (KSS).

The parameters listed in the dSTS array are Double Integer values being sent from the hoist to the Knight Servo Studio and are displayed at:
KSS Workspace tree location: Knight WO# \ Parameters \ dSTS.

dSTS:0 – Firmware Version
Variable Units: Integer
Description: This parameter displays the firmware version that the servo is currently running.
KSS Home screen location: Quick View panel \ Row 4 (Lower right-hand portion of the screen).

dSTS:1 – Product ID
Variable Units: Integer
Description: This parameter displays the Product ID of the system.

dSTS:2 – Job Number
Variable Units: Integer
Description: This parameter displays the Knight Global Job Number of the system. Example: 186042.
KSS Home screen location: Quick View panel \ Row 5 (Lower right-hand portion of the screen)

dSTS:3 – Test Cycle Count
Variable Units: Integer
Description: This parameter displays the current count or number of cycles the servo has performed while in Test Mode. This count is resettable.
KSS Workspace tree location: Knight WO# \ Motion \ Test Mode \ Row 9.

dPRM:4 through dPRM:7 – Spare

G. tPRM Parameter Array

This parameter array lists the Timer Parameter variables of the Speed Hoist that are made available to the Knight Servo Studio (KSS).

The parameters listed in the tPRM array are Timer values being sent from the hoist to the Knight Servo Studio and are displayed at:
KSS Workspace tree location: Knight WO# \ Parameters \ tPRM.

tPRM:0 – Test Mode Delay (ms)
Variable Units: Milliseconds
Description: This parameter sets the time delay between upward and downward cycles of the hoist while it is in Test Mode. The hoist will move up, delay at its upper position for this number of milliseconds, move down and then delay at its lower position for this number of milliseconds.
KSS Workspace tree location: Knight WO# \ Motion \ Test Mode \ Row 5.

tPRM:1 – Spare

tPRM:2 – Lift Mode Timeout (ms)
Variable Units: Milliseconds
Description: This parameter sets the length of time that the hoist will stay in Lift Mode without receiving a command. 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 automatically switch from Lift Mode to No Mode.

tPRM:3 through tPRM:31 – Spare

H. fPRM Parameter Array

This parameter array lists the Floating-Point Parameter variables of the Speed Hoist that are made available to the Knight Servo Studio (KSS).

The parameters listed in the fPRM array are Floating-Point values being sent from the Knight Servo Studio to the hoist and are displayed at:
KSS Workspace tree location: Knight WO# \ Parameters \ fPRM.

fPRM:0 – Overall Reverse/Upper Limit
Variable Units: Inches
Description: 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.
NOTE: All measurements increase in value as the fixture moves downward towards the ground.
KSS Workspace tree location (User Level = Advanced): Knight WO# \ Setup \ Physical Limits \ Row 1.

fPRM:1 – Overall Forward/Lower Limit
Variable Units: Inches
Description: This parameter sets the lower travel limit for the hoist. This value should be set to the lowest height you wish the hoist to be able to travel in any mode, but should never exceed the length of the Chains.
NOTE: All measurements increase in value as the fixture moves downward towards the ground
KSS Workspace tree location (User Level = Advanced): Knight WO# \ Setup \ Physical Limits \ Row 2.

fPRM:2 – Lift Mode Reverse/Upper Limit
Variable Units: Inches
Description: This parameter sets the upper travel limit for the hoist. This is used to restrict the travel to a position greater than or equal to the overall upper limit set in fPRM:0 'Overall Reverse/Upper Limit'.
NOTE: All measurements increase in value as the fixture moves downward towards the ground.
KSS Workspace tree location: Knight WO# \ Setup \ Travel Limits \ Row 1.

fPRM:3 – Lift Mode Forward/Lower Limit
Variable Units: Inches
Description: This parameter sets the lower travel limit for the hoist. This is used to restrict the travel to a position less than or equal to the overall lower limit set in fPRM:1 'Overall Forward/Lower Limit'.
NOTE: All measurements increase in value as the fixture moves downward towards the ground.
KSS Workspace tree location: Knight WO# \ Setup \ Travel Limits \ Row 2.

fPRM:4 – Spare

fPRM:5 – Handle Deadband Percentage
Variable Units: Percentage
Description: This parameter sets the percentage of motion from the neutral position of the analog switch. This will determine how much movement is needed before motion is commanded.
KSS Workspace tree location: Knight WO# \ Setup \ Analog Calibration \ Row 2.

fPRM:6 – Handle Minimum Voltage
Variable Units: Volts
Description: This parameter shows the Minimum voltage of the analog switch when it is moved fully right.
KSS Workspace tree location: Knight WO# \ Setup \ Analog Calibration \ Row 3.

fPRM:7 – Handle Maximum Voltage
Variable Units: Volts
Description: This parameter shows the Maximum voltage of the analog switch when it is moved fully left.
KSS Workspace tree location: Knight WO# \ Setup \ Analog Calibration \ Row 4.

fPRM:8 – Spare

fPRM:9 – Loaded Speed Infinite Band
Variable Units: Inches per second
Description: This parameter sets the maximum velocity for the Infinite Speed Band while the hoist is loaded.
KSS Workspace tree location: Knight WO# \ Setup \ Analog Speed Limits \ Row 6.

fPRM:10 – Unloaded Speed Infinite Band
Variable Units: Inches per second
Description: This parameter sets the maximum velocity for the Infinite Speed Band while the hoist is unloaded.
KSS Workspace tree location: Knight WO# \ Setup \ Analog Speed Limits \ Row 6.

fPRM:11 – Loaded Speed 1
Variable Units: Inches per second
Description: This parameter sets the maximum velocity for Speed Band 1 while the hoist is loaded.
KSS Workspace tree location: Knight WO# \ Setup \ Analog Speed Limits \ Row 6.

fPRM:12 – Loaded Speed Band 2
Variable Units: Inches per second
Description: This parameter sets the maximum velocity for Speed Band 2 while the hoist is loaded.
KSS Workspace tree location: Knight WO# \ Setup \ Analog Speed Limits \ Row 7.

fPRM:13 – Loaded Speed Band 3
Variable Units: Inches per second
Description: This parameter sets the maximum velocity for Speed Band 3 while the hoist is loaded.
KSS Workspace tree location: Knight WO# \ Setup \ Analog Speed Limits \ Row 8.

fPRM:14 – Loaded Speed Band 4
Variable Units: Inches per second
Description: This parameter sets the maximum velocity for Speed Band 4 while the hoist is loaded.
KSS Workspace tree location: Knight WO# \ Setup \ Analog Speed Limits \ Row 9.

fPRM:15 – Loaded Speed Band 5
Variable Units: Inches per second
Description: This parameter sets the maximum velocity for Speed Band 5 while the hoist is loaded.
KSS Workspace tree location: Knight WO# \ Setup \ Analog Speed Limits \ Row 10.

fPRM:16 – Unloaded Speed Band 1
Variable Units: Inches per second
Description: This parameter sets the maximum velocity for Speed Band 1 while the hoist is unloaded.
KSS Workspace tree location: Knight WO# \ Setup \ Analog Speed Limits \ Row 6.

fPRM:17 – Unloaded Speed Band 2
Variable Units: Inches per second
Description: This parameter sets the maximum velocity for Speed Band 2 while the hoist is unloaded.
KSS Workspace tree location: Knight WO# \ Setup \ Analog Speed Limits \ Row 7.

fPRM:18 – Unloaded Speed Band 3
Variable Units: Inches per second
Description: This parameter sets the maximum velocity for Speed Band 3 while the hoist is unloaded.
KSS Workspace tree location: Knight WO# \ Setup \ Analog Speed Limits \ Row 8.

fPRM:19 – Unloaded Speed Band 4
Variable Units: Inches per second
Description: This parameter sets the maximum velocity for Speed Band 4 while the hoist is unloaded.
KSS Workspace tree location: Knight WO# \ Setup \ Analog Speed Limits \ Row 9.

fPRM:20 – Unloaded Speed Band 5
Variable Units: Inches per second
Description: This parameter sets the maximum velocity for Speed Band 5 while the hoist is unloaded.
KSS Workspace tree location: Knight WO# \ Setup \ Analog Speed Limits \ Row 10.

fPRM:21 through fPRM:26 – Spare

fPRM:27 – Lift Mode Speed Limit
Variable Units: Inches per second
Description: This parameter sets the maximum lift velocity for the hoist while in Lift Mode.
KSS Workspace tree location: Knight WO# \ Setup \ Analog Speed Limits \ Row 1.
KSS Workspace tree location: Knight WO# \ Setup \ Digital Speed Limits \ Row 1.

fPRM:28 – Digital Fast Speed
Variable Units: Inches per second
Description: This parameter sets the command velocity of the hoist when a digital up or down command is processed and the parameter bPRM:15 ‘Digital Fast’ is set to a ‘1’.
KSS Workspace tree location: Knight WO# \ Setup \ Remote Control \ Row 2.
KSS Workspace tree location: Knight WO# \ Setup \ Digital Speed Limits \ Row 2.

fPRM:29 – Digital Slow Speed
Variable Units: Inches per second
Description: This parameter sets the command velocity of the hoist when a digital up or down command is processed and the parameter bPRM:15 ‘Digital Fast’ is set to a ‘0’.
KSS Workspace tree location: Knight WO# \ Setup \ Remote Control \ Row 2.
KSS Workspace tree location: Knight WO# \ Setup \ Digital Speed Limits \ Row 2.

fPRM:30 – Digital Lift Accel
Variable Units: Inches per second^2
Description: This parameter sets the command acceleration for the hoist when a digital up or down command is initiated.
KSS Workspace tree location: Knight WO# \ Setup \ Remote Control \ Row 3.
KSS Workspace tree location: Knight WO# \ Setup \ Digital Speed Limits \ Row 3.

fPRM:31 – Digital Lift Decel
Variable Units: Inches per second^2
Description: This parameter sets the command deceleration for the hoist when a digital up or down command is completed.
KSS Workspace tree location: Knight WO# \ Setup \ Remote Control \ Row 3.
KSS Workspace tree location: Knight WO# \ Setup \ Digital Speed Limits \ Row 3.

fPRM:32 – Analog Lift Accel
Variable Units: Inches per second^2
Description: This parameter sets the acceleration of the hoist when using analog up/down controls such as the control handle.
KSS Workspace tree location: Knight WO# \ Setup \ Analog Speed Limits \ Row 2.

fPRM:33 – Analog Lift Decel
Variable Units: Inches per second^2
Description: This parameter sets the deceleration of the hoist when using analog up/down controls such as the control handle.
KSS Workspace tree location: Knight WO# \ Setup \ Analog Speed Limits \ Row 2.

fPRM:34 through fPRM:38 – Spare

fPRM:39 – Test Mode Reverse/Upper Limit
Variable Units: Inches
Description: This parameter sets the upper travel limit for the hoist when it is moving in Test Mode. This is used to restrict the Test Mode travel to a position greater than the overall upper limit set in fPRM:0 'Overall Reverse/Upper Limit'.
KSS Workspace tree location: Knight WO# \ Motion \ Test Mode \ Row 1.

fPRM:40 – Test Mode Forward/Lower Limit
Variable Units: Inches
Description: This parameter sets the lower travel limit for the hoist when it is moving in Test Mode. This is used to restrict the Test Mode travel to a position less than the overall lower limit set in fPRM:1 'Overall Forward/Lower Limit'.
KSS Workspace tree location: Knight WO# \ Motion \ Test Mode \ Row 1.

fPRM:41 – Test Mode Velocity
Variable Units: Inches per second
Description: This parameter sets the velocity of the hoist while it is in Test Mode.
KSS Workspace tree location: Knight WO# \ Motion \ Test Mode \ Row 2.

fPRM:42 – Test Mode Accel
Variable Units: Inches per second^2
Description: This parameter sets the acceleration of the hoist while it is in Test Mode.
KSS Workspace tree location: Knight WO# \ Motion \ Test Mode \ Row 3.

fPRM:43 – Test Mode Decel
Variable Units: Inches per second^2
Description: This parameter sets the deceleration of the hoist while it is in Test Mode.
KSS Workspace tree location: Knight WO# \ Motion \ Test Mode \ Row 3.

fPRM:44 through fPRM:47 – Spare

fPRM:48 – Payout Mode Torque Limit (%)
Variable Units: Percentage
Description: This parameter sets the maximum torque that is generated by the servo motor while the servo is in Payout Mode.
KSS Workspace tree location: Knight WO# \ Motion \ Payout Mode \ Row 3.

fPRM:49 – Payout Mode Speed (ips)
Variable Units: Inches per second
Description: This parameter sets the velocity of the hoist while the servo is in Payout Mode.
KSS Workspace tree location: Knight WO# \ Motion \ Payout Mode \ Row 1.

fPRM:50 – Payout Backoff Distance (in)
Variable Units: Inches
Description: This parameter sets the distance the hoist will attempt to move in the opposite direction after the payout mode's torque limit has been exceeded. This is typically a small distance intended to reduce the binding effect experienced during chain replacement or upon reaching the end of the chain or chain stop.
KSS Workspace tree location: Knight WO# \ Motion \ Payout Mode \ Row 2.

fPRM:51 through fPRM:52 – Spare

fPRM:53 – Upward Slow Zone Position (in)
Variable Units: Inches
Description: This parameter sets the height that the hoist will start to run at a reduced speed in the upward direction.
This parameter is only processed if the Slow Zone is turned on. i.e. [iPRM:0 'Slow Zone Mode' is '2' or '3'].
NOTE: The current position of the hoist is visible in fSTS:0 'Current Position (in)' or on the KSS Home screen location: Quick View panel \ Row 1 (Lower right-hand portion of the screen).
KSS Workspace tree location: Knight WO# \ Setup \ Slow Zone \ Row 3.

fPRM:54 – Spare

fPRM:55 – Slow Zone Part Speed
Variable Units: Inches per second
Description: This parameter limits the speed of the hoist when it is within a set Slow Zone
This parameter is only processed if the Slow Zone is turned on. i.e. [iPRM:0 'Slow Zone Mode' is non-zero].
KSS Workspace tree location: Knight WO# \ Setup \ Slow Zone \ Row 4.

fPRM:56 – Downward Slow Zone Position (in)
Variable Units: Inches
Description: This parameter sets the height that the hoist will start to run at a reduced speed in the downward direction.
This parameter is only processed if the Slow Zone is turned on. i.e. [iPRM:0 'Slow Zone Mode' is '1' or '3'].
NOTE: The current position of the hoist is visible in fSTS:0 'Current Position (in)' or on the KSS Home screen location: Quick View panel \ Row 1 (Lower right-hand portion of the screen).
KSS Workspace tree location: Knight WO# \ Setup \ Slow Zone \ Row 3.

fPRM:57 – Slow Zone Max Decel
Variable Units: Inches per second^2
Description: This parameter sets the deceleration constant when the hoist approaches the slow zone and transitions from the normal speed to the reduced speed.
This parameter is only processed if the Slow Zone is turned on. i.e. [iPRM:0 'Slow Zone Mode' is non-zero].
KSS Workspace tree location: Knight WO# \ Setup \ Slow Zone \ Row 4.

fPRM:58 through fPRM:79 – Spare

I. fSTS Status Array

This parameter array lists the Floating-Point Status variables of the Speed Hoist that are made available to the Knight Servo Studio (KSS).

The parameters listed in the fSTS array are Floating-Point values being sent from the hoist to the Knight Servo Studio and are displayed at:
KSS Workspace tree location: Knight WO# \ Parameters \ fSTS.

fSTS:0 – Current Position (in)
Variable Units: Inches
Description: This parameter shows the height of the control handle at this moment. It is measured in inches downward from where the zero position was set.
KSS Workspace tree location: Setup \ Position Calibration \ Row 4.
KSS Home screen location: Quick View panel \ Row 1 (Lower right-hand portion of the screen).

fSTS:1 – Analog Handle Bias
Variable Units: Volts
Description: This parameter shows the analog switch's current set neutral voltage.
KSS Workspace tree location: Knight WO# \ Setup \ Analog Calibration \ Row 1.

fSTS:2 – Analog Handle Raw Voltage (V)
Variable Units: Volts
Description: This parameter shows the actual voltage of the rocker switch on the analog handle.
KSS Workspace tree location: Knight WO# \ Setup \ Analog Calibration \ Row 3.

fSTS:3 – Feedback Torque (%)
Variable Units: Percentage
Description: This parameter shows the servo motor's live Feedback Torque.

fSTS:4 through fSTS:7 – Spare

fSTS:8 – Active Reverse/Upper Limit (in)
Variable Units: Inches
Description: This parameter shows the set minimum upper travel limit of the hoist.

fSTS:9 – Active Forward/Lower Limit (in)
Variable Units: Inches
Description: This parameter shows the set maximum lower travel limit of the hoist.

fSTS:10 – Command Velocity (ips)
Variable Units: Inches per second
Description: This parameter displays the instantaneous commanded velocity of the hoist.

fSTS:11 – Current Velocity (ips)
Variable Units: Inches per second
Description: This parameter displays the current feedback velocity of the hoist.
KSS Home screen location: Quick View panel \ Row 2 (Lower right-hand portion of the screen).

fSTS:12 – Spare

fSTS:13 – Encoder Offset Record
Variable Units: Inches
Description: This parameter displays the recorded offset of the encoder at the hoist's home position.
KSS Workspace tree location: Knight WO# \ Setup \ Position Calibration \ Row 3.

fSTS:14 – Active Encoder Offset
Variable Units: Inches
Description: This parameter displays the active offset of the encoder at the hoist's home position.
KSS Workspace tree location: Knight WO# \ Setup \ Position Calibration \ Row 4.

fSTS:15 – Commissioned Encoder Offset
Variable Units: Inches
Description: This parameter displays the offset of the encoder at the hoist's home position when the system was commissioned

fSTS:16 through fSTS:127 – Spare

7. TROUBLESHOOTING

There are several troubleshooting screens 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

There are several Troubleshooting 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 Workspace tree location: Knight WO# \ Troubleshooting \ …

7.1) Unable to Connect
7.2) Solid Red Light screen
7.3) Solid Green Light screen
7.4) Slow Flashing Red Light screen
7.5) Fast Flashing Red Light screen
7.6) Flashing Green Light screen
7.8) Alternating Red/Green Lights screen
7.9) Flashing Red/Green Lights screen

7.1) Unable to Connect

This screen lists the steps to trace down the reason why Knight Servo Studio is unable to connect to the hoist. (Refer to Figure 7-1)

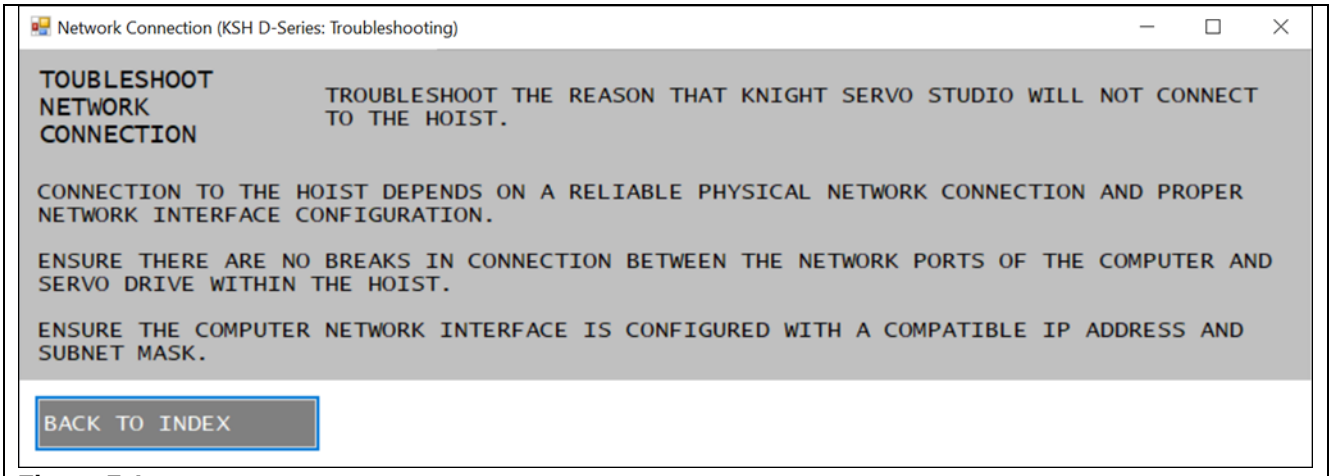


Figure 7-1

7.2) Solid Red Light screen

This screen lists the steps to trace down the reason why the hoist's red light is solid.

In section(I), if the indicator box is green then the Run-Stop is released, but if the indicator box is red then the Run-Stop has been pressed.

If the hoist's red light is solid then follow the steps listed on the screen.
(Refer to Figure 7-2)

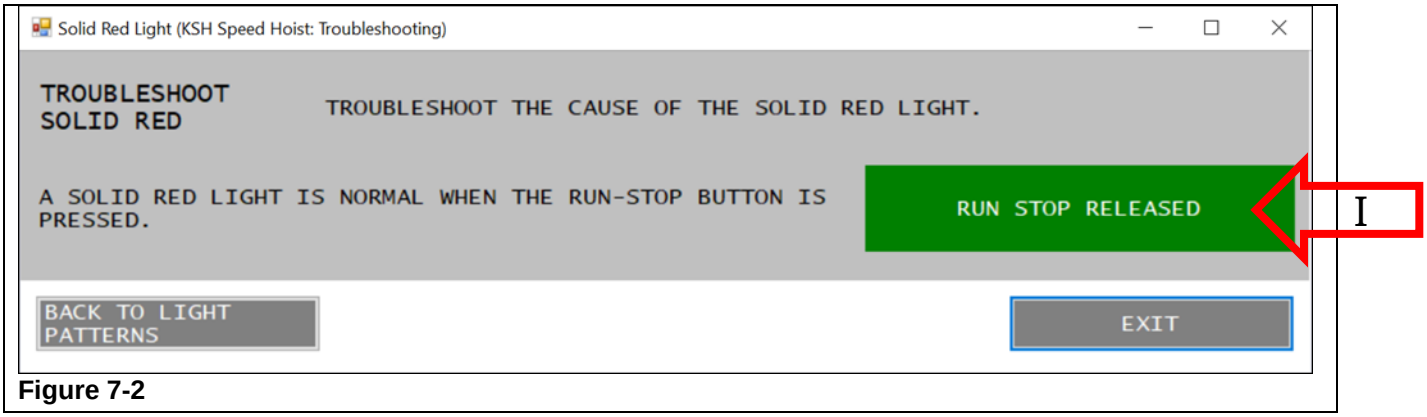


Figure 7-2

7.3) Solid Green Light screen

This screen lists the steps to trace down the reason why the hoist's green light is solid.

In section(I), if the indicator box is green then the hoist's operating in the set unloaded speeds, but if the indicator box is red then the hoist is operating in the set loaded speeds.

If the hoist's green light is solid then follow the steps listed on the screen below.
(Refer to Figure 7-3)

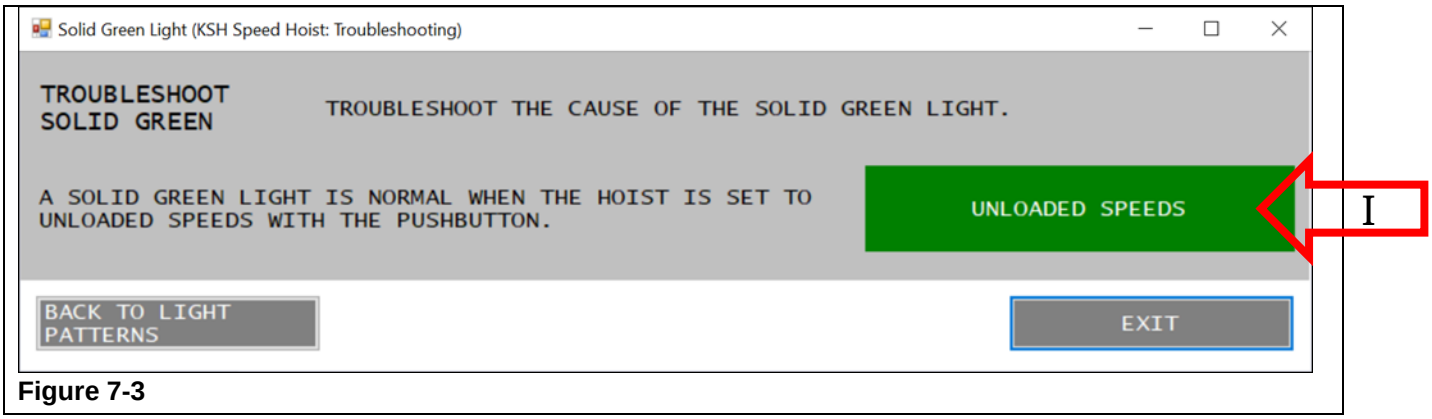


Figure 7-3

7.4) Slow Flashing Red Light screen

This screen lists the steps to trace down the reason why the hoist's red light is flashing slowly.

In section (I), if the indicator banner is green then the Handle Spam Alarm is not active, but if banner the is red then the Handle Span Alarm is active.

In section (II), is the navigation button to go to the Analog Calibration screen.

In section (III), if the indicator banner is green then the Hoist Rating Alarm is not active, but if the banner is red then the Hoist Rating Alarm is active.

If the hoist's red light is flashing slowly, follow the steps to clear the active alarm(s) on the screen. (Refer to Figure 7-4)

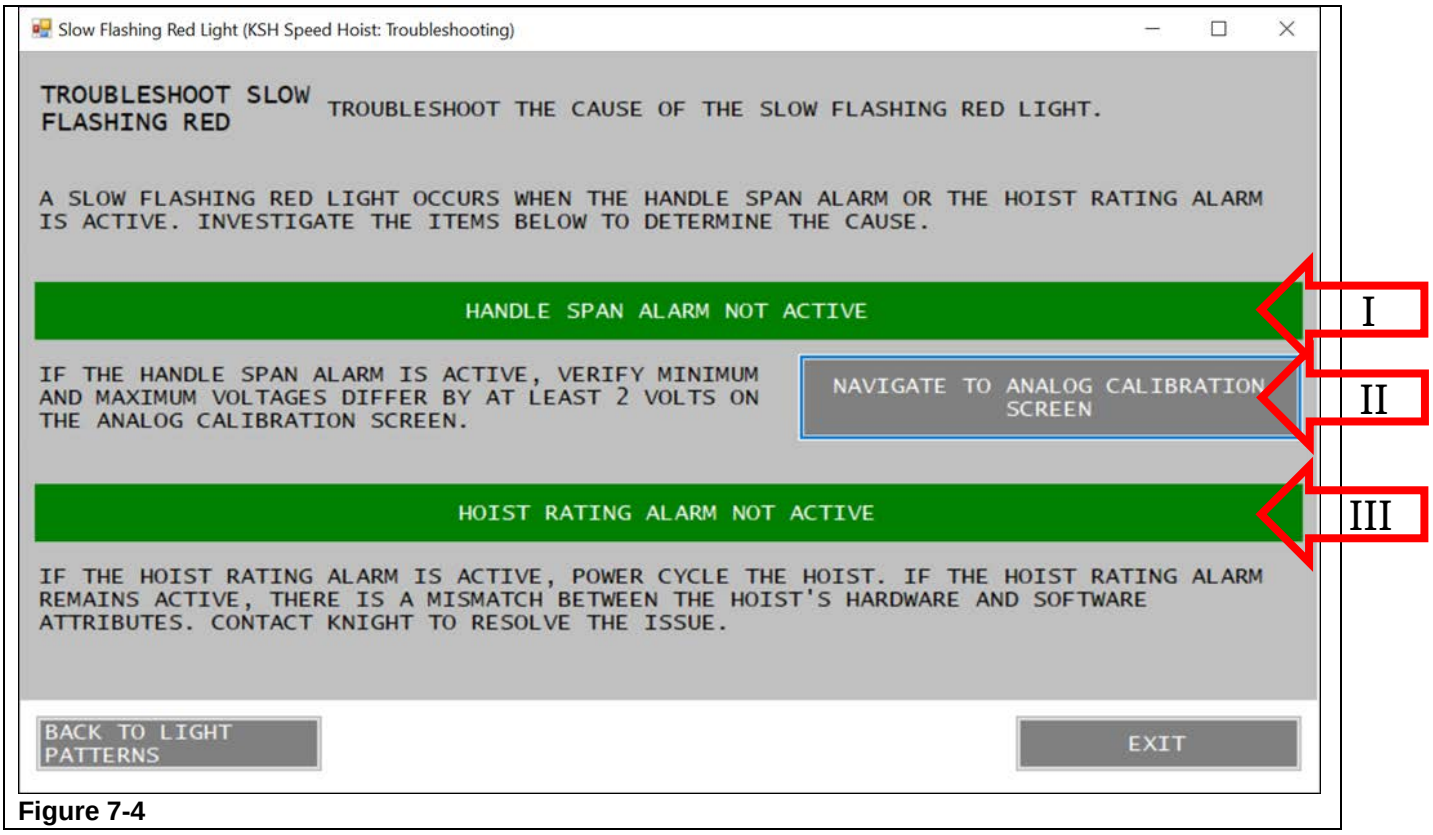


Figure 7-4

7.5) Fast Flashing Red Light screen

This screen lists the steps to trace down the reason why the hoist's red light is flashing fast.

In section (I), if the indicator banner is green then the Drive Alarm is not active, but if banner the is red then the Drive Alarm is active.

In section (II), is the navigation button to go to the Alarms / Warning screen.

In section (III), if the indicator banner is green then the Home Deviation Alarm is not active, but if the banner is red then the Home Deviation Alarm is active.

In section (IV), is the navigation button to go to the Position Calibration screen.

In section (V), if the indicator banner is green then the Rapid Position Jump Alarm is not active, but if the banner is red then the Rapid Position Jump Alarm is active.

In section (VI), is the navigation button to go to the Reset Encoder screen.

If the hoist's red light is flashing fast, follow the steps clear the active alarm(s) on the screen (Refer to Figure 7-5)

Also, refer to section 5.F. 'Accessing the Servo Hoist's Fault Log' for instructions on how to access the system's fault log through the servo's web page.

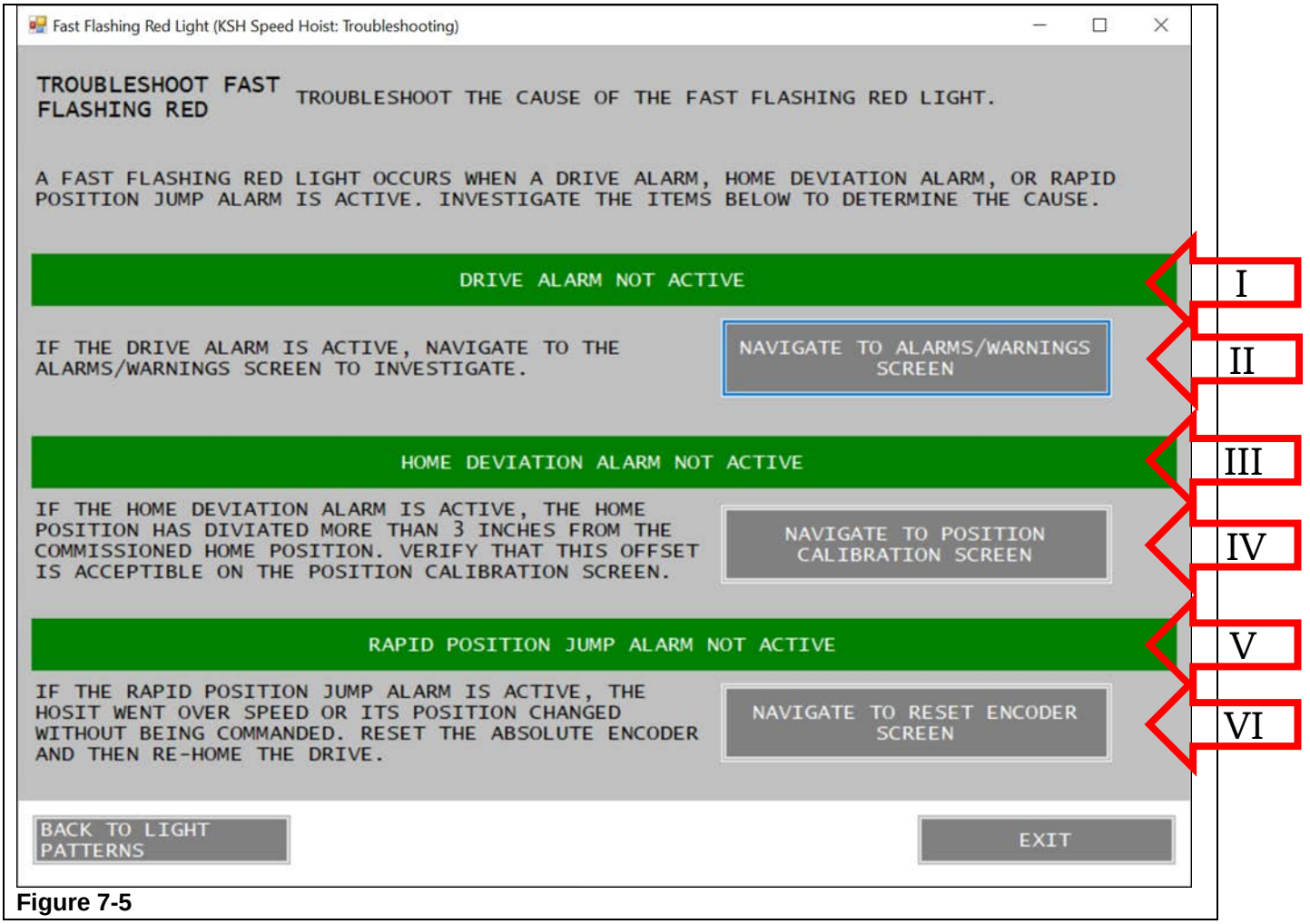


Figure 7-5

7.6) Flashing Green Light screen

This screen lists the steps to trace down the reason why the hoist's green light is flashing.

In section (I), is the navigation button to go to the Alarms / Warnings screen.

If the hoist's green light is flashing, press the 'NAVIGATE TO ALARMS/WARNINGS SCREEN' button. (Refer to Figure 7-6)

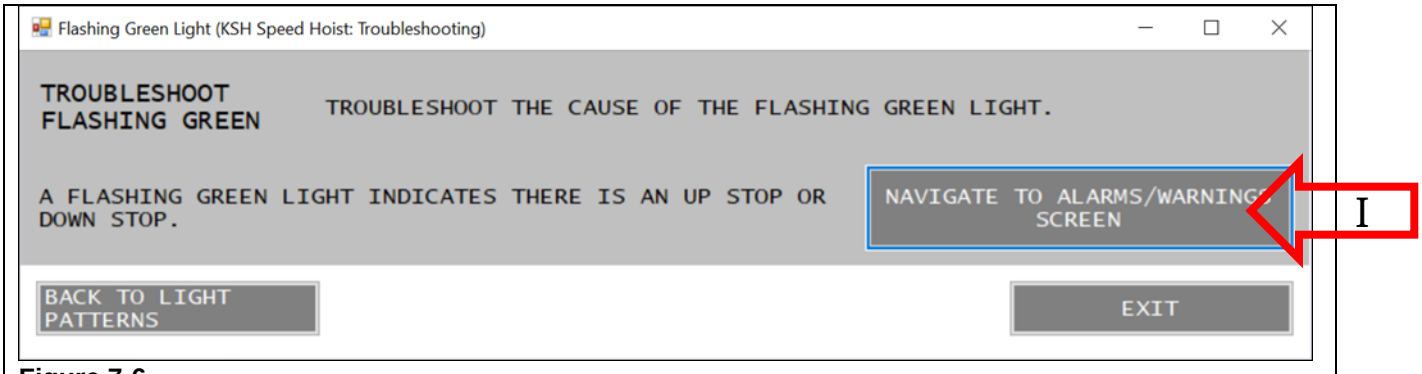


Figure 7-6

7.7) Alternating Red/Green Lights screen

This screen lists the steps to trace down the reason why the hoist's red and green lights are flashing in an alternating pattern.

In section(I), is the navigation button to go to the Analog Calibration screen.

If the hoist's red and green lights are flashing in an alternating pattern then follow the steps listed on the screen below (Refer to Figure 7-7)

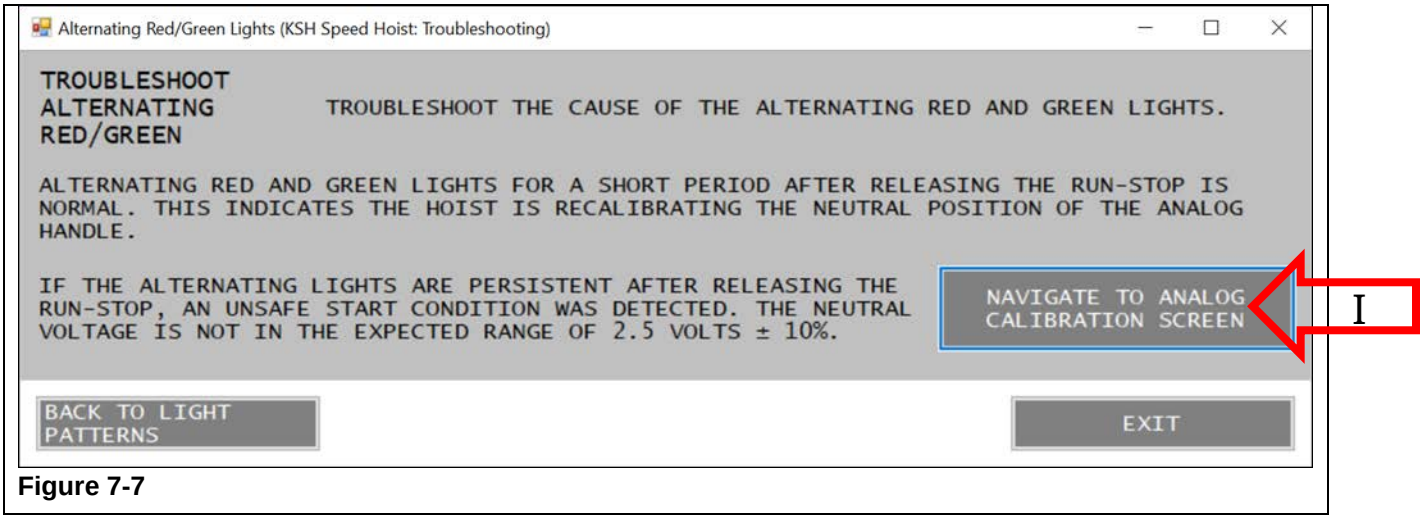


Figure 7-7

7.8) Flashing Red/Green Lights screen

This screen lists the steps to trace down the reason why the hoist's red and green lights are flashing.

In section (I), if the indicator box is gray then the hoist's Payout Mode is not active, but if the indicator box is green then Payout Mode is currently active.

If the hoist's red and green lights are flashing follow the steps listed on the screen below. (Refer to Figure 7-8)

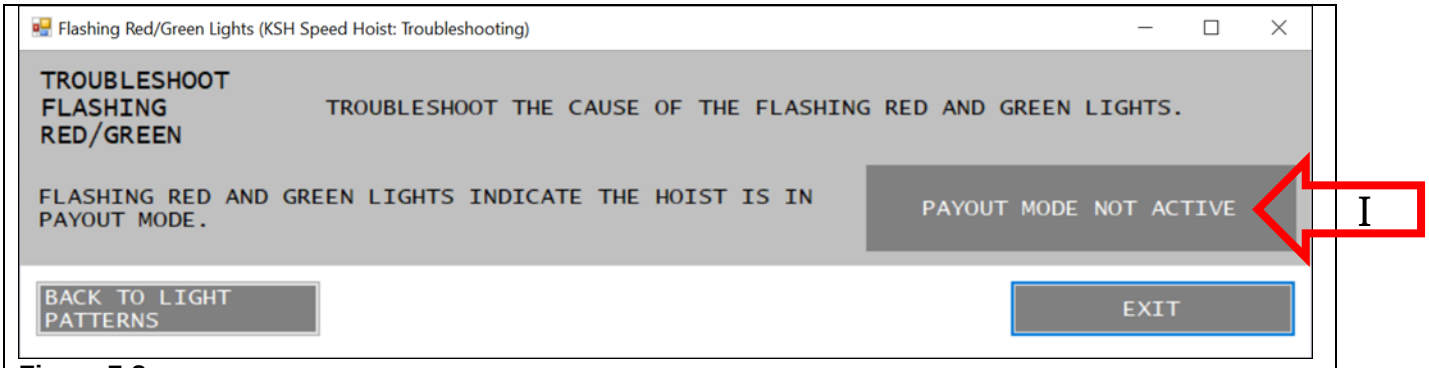


Figure 7-8

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 Workspace tree location (Knight WO# \ System Status \ …)

7.9) System Status screen
7.10) Active Alarms and Warnings screen

7.9) 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 that particular hoist's function is on, but if the indicator box is gray or red then that particular hoist's function is off or faulted.
In section (II), if the indicator box is green then that particular hoist's function is on, but if the indicator box is gray or red then that particular hoist's function is off.

This screen gives an overview of the hoist's readiness. (Refer to Figure 7-9)

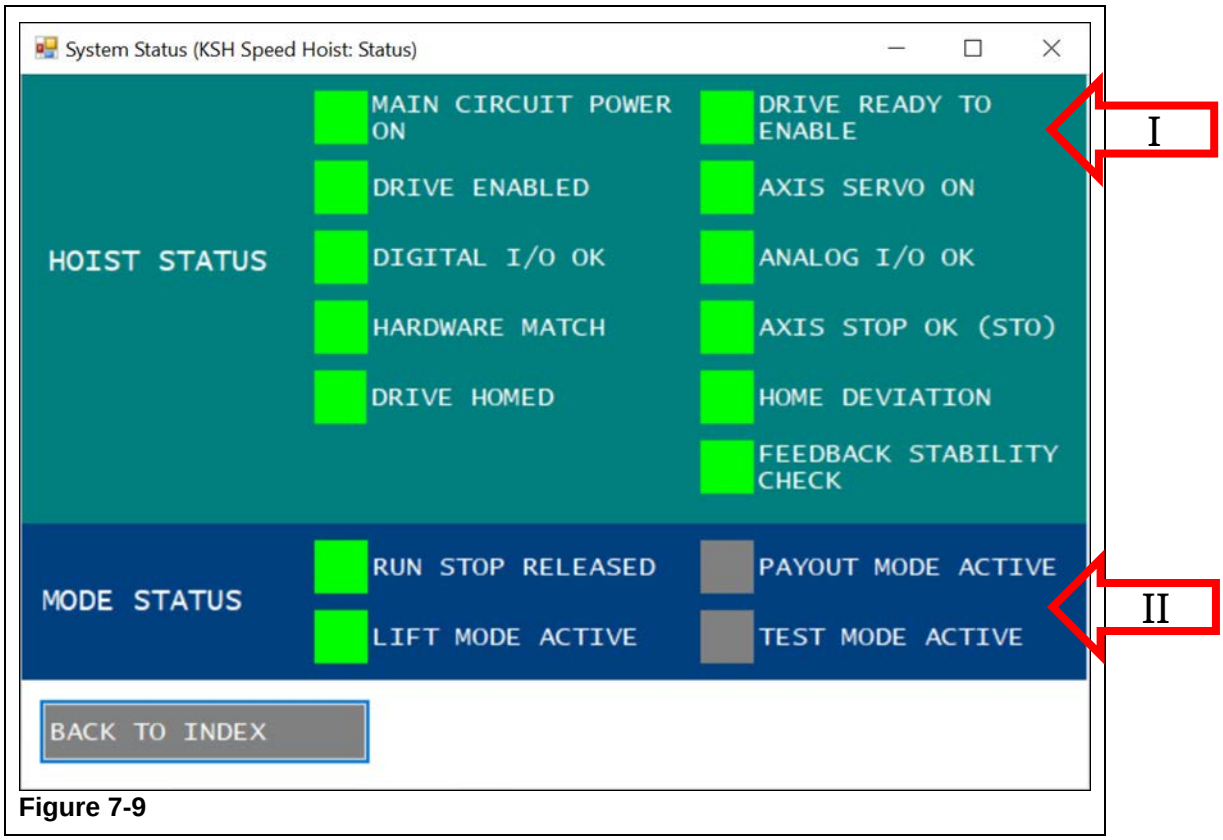


Figure 7-9

7.10) Active Alarms and Warnings screen

This screen shows all alarms or faults as well as any warnings that may be active on the hoist.

In section (I), if the 'DRIVE ALARM' indicator box is red then an alarm is active and an alarm code will be listed. If the indicator box is green then there are no active drive alarms.
In section (II), if the 'DRIVE WARNING' indicator box is yellow then that alarm is active and an alarm code will be listed. If the indicator box is green then there are no active warnings.
In section (III), if the indicator box is yellow then that particular user warning is on, but if the indicator box is gray then that particular warning is off.

This screen gives an overview of active drive alarms and warnings. (Refer to Figure 7-10)

Also, refer to section 5.F. 'Accessing the Speed Hoist's Fault Log' for instructions on how to access the system's fault log through the servo's web page.

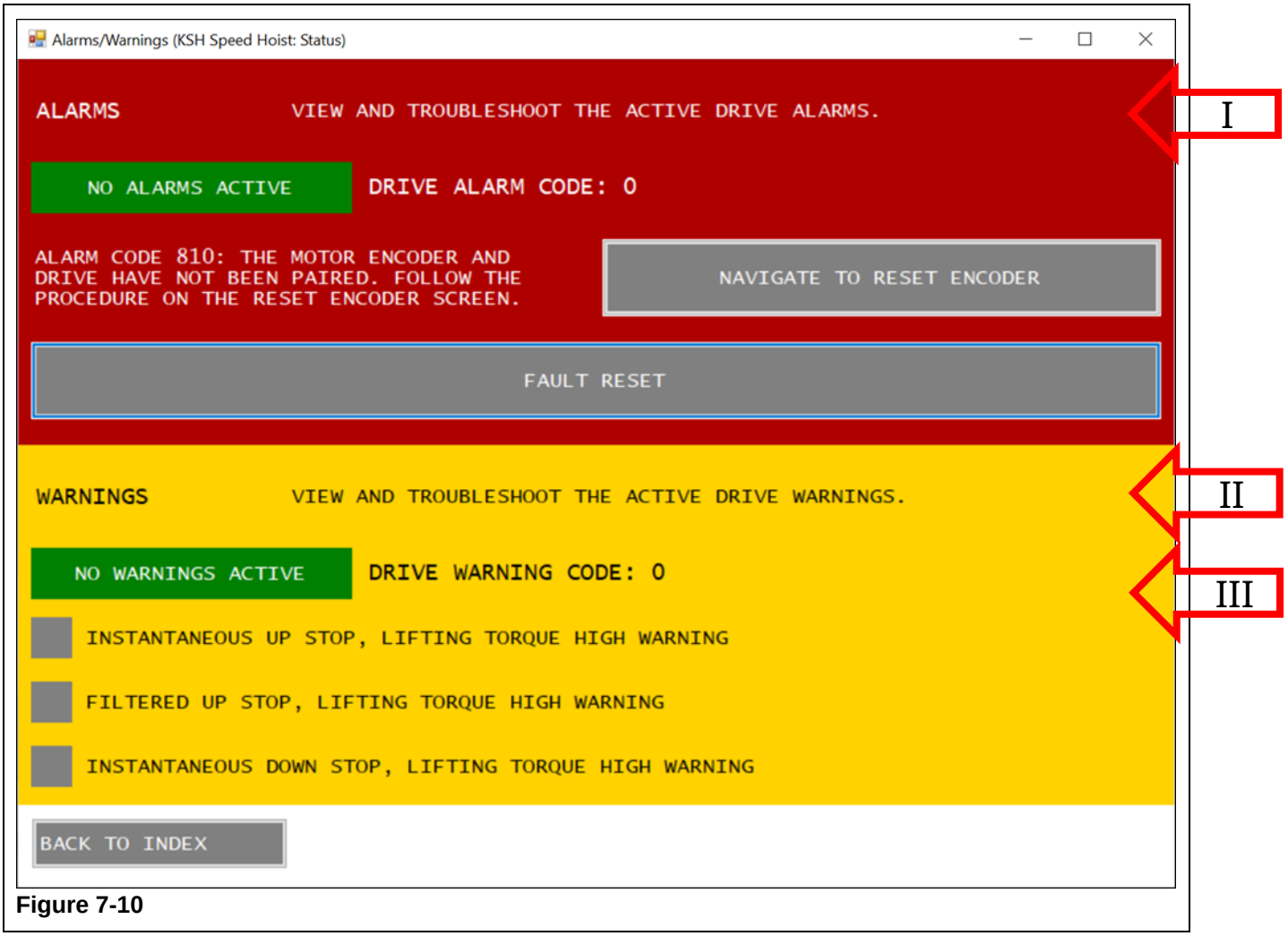


Figure 7-10

C. Troubleshooting Inputs and Outputs

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: Status \ I/O Status.

7.11) I/O Status Screen

7.11) I/O Status screen

This screen shows each of the onboard inputs and outputs.

In section (I), if the indicator box is green then that I/O point is ON, but if that indicator box is gray then that I/O point is OFF. (Refer to Figure 7-11)

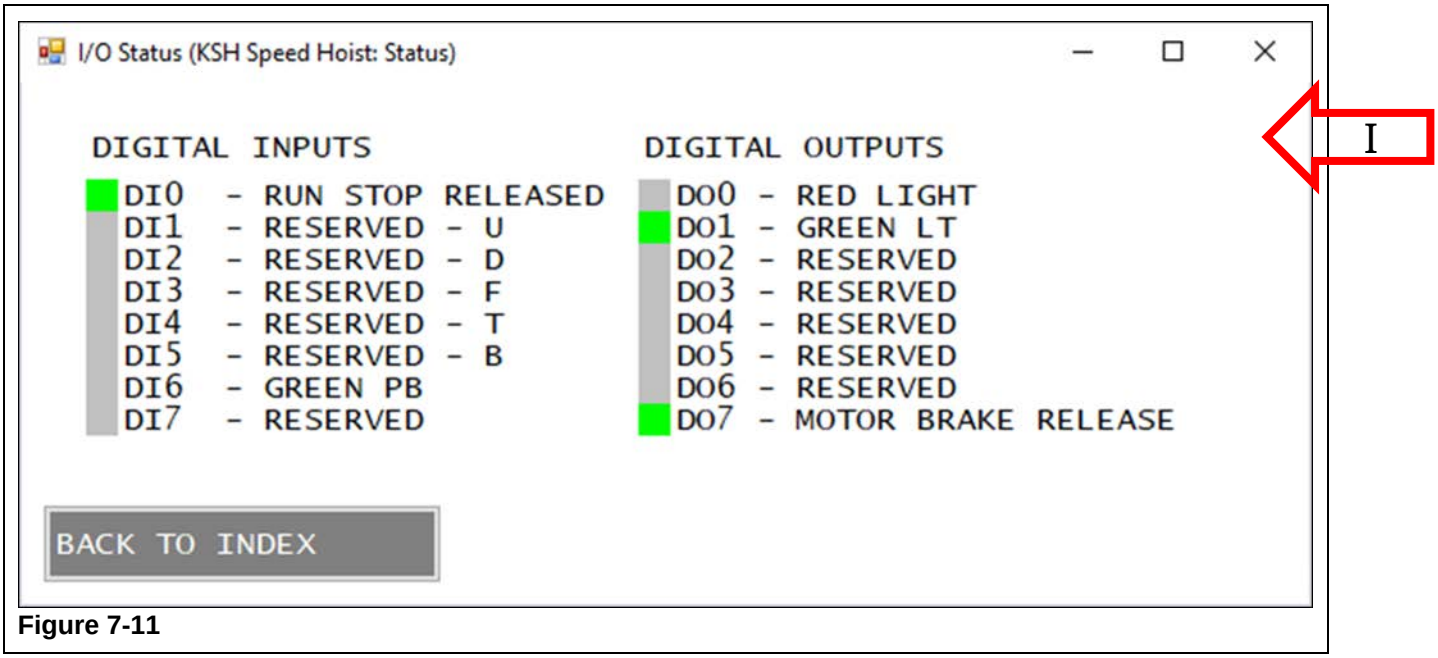


Figure 7-11

Troubleshooting Chart

The Speed Hoist operation may be affected by various 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 Global Service Department at 248-375-7962 or via e-mail at service@knightglobal.com.

Problem	Cause	Solution
Hoist does not lift or lower	Power loss	Check 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 Speed Hoist.
	Electrical fault	Secure power to the hoist; check all wiring and connections on the Speed Hoist.
	Hoist capacity exceeded	Reduce the weight of the load to within the rated or programmed capacity of the Speed Hoist.
Speed Hoist lifts but does not lower	"Lower Limit" set incorrectly	Check parameters: fPRM:1 'Overall Forward/Lower Limit', fPRM:3 'Lift Mode Forward/Lower Limit',
	Damaged pendent cord	Check each conductor in the pendent cable for continuity. Replace damaged cable as required.
Speed Hoist lowers but will not lift	"Top Limit" set incorrectly	Check parameters: fPRM:0 'Overall Reverse/Upper Limit', fPRM:2 'Lift Mode Reverse/Upper Limit',
	Damaged pendent cord	Check each conductor in the pendent cable for continuity. Replace damaged cable as required.
	Hoist capacity exceeded	Reduce the weight of the load to within the rated capacity of the Speed Hoist.
	Low voltage in power supply	Determine the cause of low voltage and restore voltage back to within +/-10% of required voltage supply.
Speed 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 Speed Hoist.
	Low voltage in power supply	Determine the cause of low voltage and restore voltage back to within +/-10% of required voltage supply.
Speed Hoist operates intermittently	Open / Short circuit	Check circuit for loose connections or broken conductors. Repair or replace as necessary.
	Damaged pendent cord	Check each conductor in the pendent cable for continuity. Replace damaged cable as required.
	Damaged handle	Check each conductor in the pendent cable for continuity. Replace damaged conductors as required. Check connections and replace if necessary.

Table 7-12

8. SPARE PARTS LIST

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

9. DECOMMISSIONING OF A SERVO HOIST

Knight Speed Hoists contain 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 Speed 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 Speed 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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KNIGHT GLOBAL

KNIGHT GLOBAL
2705 Commerce Parkway
Auburn Hills, MI 48326
Phone 248-377-4950 | Fax 248-377-2135

For additional copies of the literature contact: salesorders@knightglobal.com
For technical questions contact: servos@knightglobal.com
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