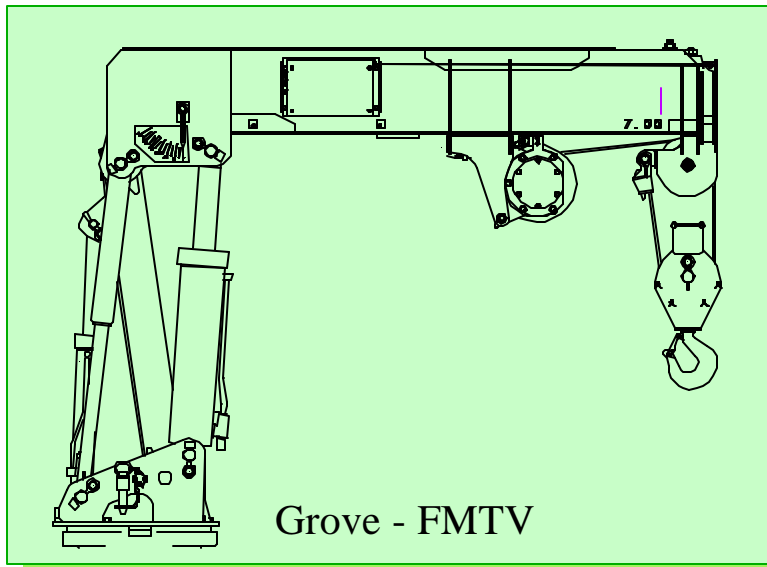




Overload Warning System DS 50



Trouble Shooting Manual Level 1 - Basics -

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Troubleshooting Manual PAT Overload Warning system DS 50 Level 1 -Basics-

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1. INTRODUCTION TO TROUBLESHOOTING THE PAT OVERLOAD WARNING SYSTEM DS 50

1.1. SYSTEM OUTLINE

The PAT Overload Warning System Model DS 50 is designed to disable all functions which may cause tipping or structural damage when the crane attempt to lift over its limits. These limits are specified in the load capacity chart provided by the crane manufacturer.

When the DS 50 system detects an overload condition the following crane functions are disabled immediately.

- a. telescope out
- b. boom up and boom down
- c. hoist up

To remove the overload condition the operator must achieve a safe working condition. This can be achieved by lowering the load and repositioning the crane or decreasing the radius by telescoping in. Observe that the radius can not be decreased by lifting the boom. The boom up function is also disabled while attempting to overload the crane.

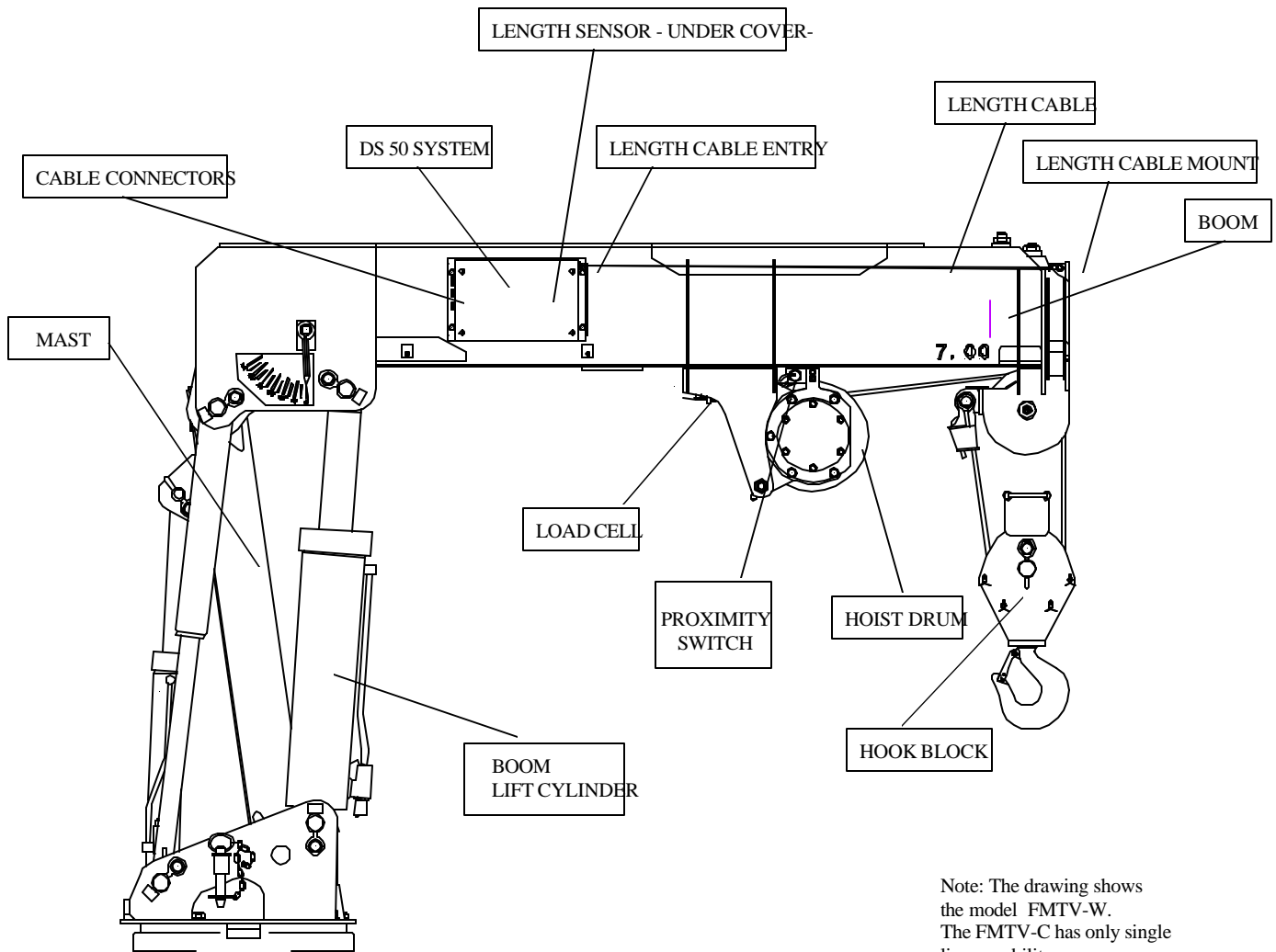
The system design allows you to operate the crane in an emergency situation or system failure without the DS 50 system in operation . In this situation leave the crane electric switch in the off position and operate the crane manually. The DS 50 Overload Warning System is not operative and can not warn the operator.

Warning

By switching the crane power switch off the DS 50 Overload Warning system is by-passed. Operating the crane without using the range diagram may result in property damage, injury or death.

The DS 50 system contains of a Central unit. The length sensor is part of the Central unit. The load cell is supporting the hoist drum and used to measure the load on hook.

1. INTRODUCTION TO TROUBLESHOOTING THE PAT OVERLOAD WARNING SYSTEM DS 50



Note: The drawing shows the model FMTV-W. The FMTV-C has only single line capability.

DRAWING 1 - SYSTEM LOCATION (FMTV-WRECKER)

1. INTRODUCTION TO TROUBLESHOOTING THE PAT OVERLOAD WARNING SYSTEM DS 50

1.2 SYSTEM OPERATION

The Microprocessor Central Unit operates as the control center of the system. The length cable is connected to the boom nose. During telescoping the length cable spools off a drum which turns the length potentiometer using a gear assembly. The length potentiometer is a variable resistor which varies linearly with the boom length. An angle sensor is built into the central unit which senses the boom angle. The load cell provides the signal to calculate the load on hook. The proximity switch located on the hoist drum switches to a different calibration factor during spooling off the hoist rope. This will allow a steady load calculation and compensates for the difference in the lever arm. All together the signals get processed in the central Microprocessor unit where actual and rated load are compared. Once the actual load exceeds the rated load the system de-energizes a relay and disables the appropriate crane functions.

1. INTRODUCTION TO TROUBLESHOOTING THE PAT OVERLOAD WARNING SYSTEM DS 50

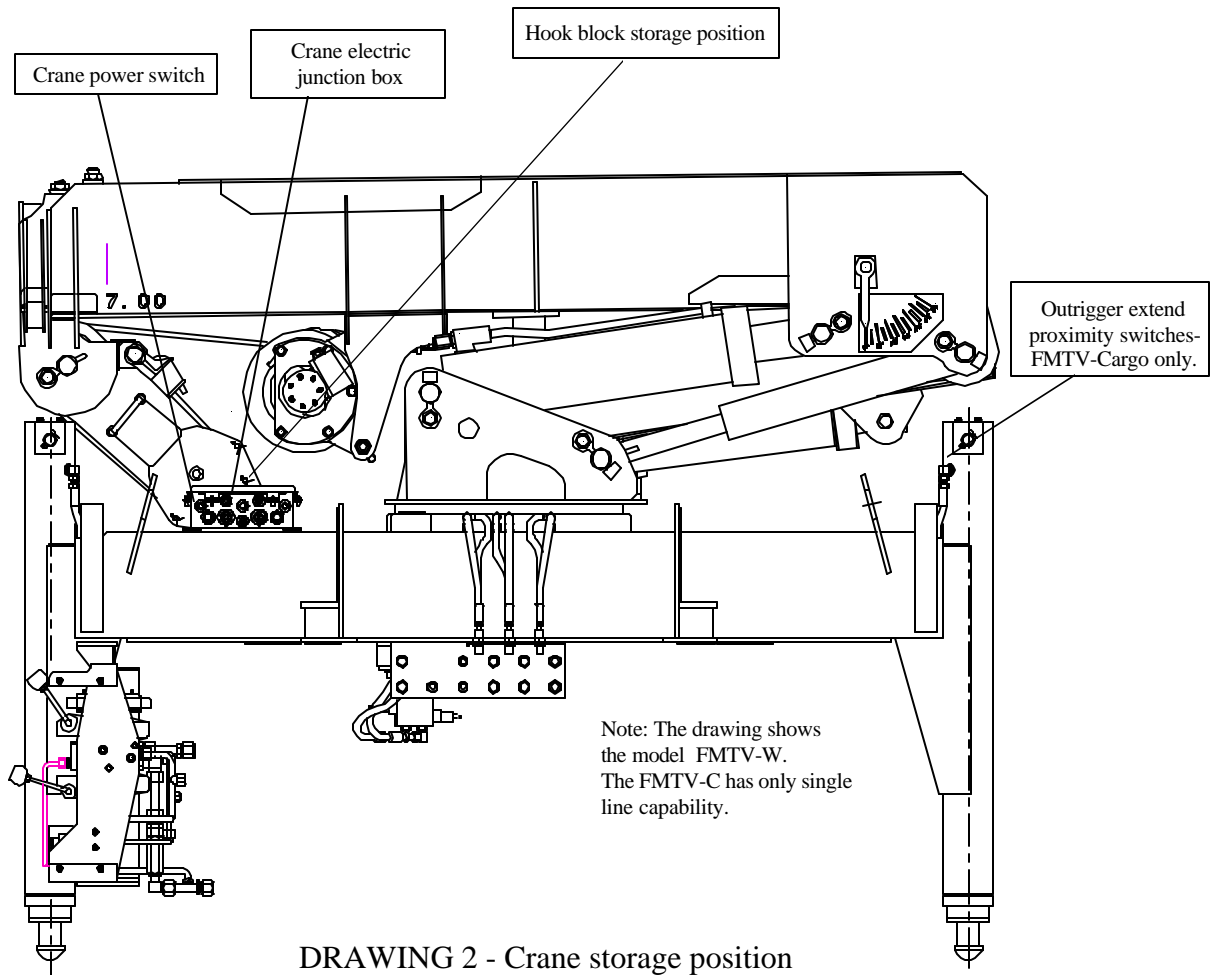
1.3. Troubleshooting Care

- Keep in mind that in troubleshooting high quality electronic components to use caution and necessary care while testing and measuring DS 50 components and circuits of the crane electric's.
- Tools and test equipment must be in good order and shall be inspected on a regular basis.
- Follow all safety instructions according to crane manufacturers handbooks and safety instructions. Obey recommended practice and safety standards applying to the job site.
- Secure the working area prior to testing and servicing the system.
- Never remove the load cell without firm support holding the hoist drum.
- Never let the length cable snap back to the central unit. The length sensor drum is under high tension.

Warning

DS 50 Overload Warning System service and repair work shall be performed by trained and authorized personal only.

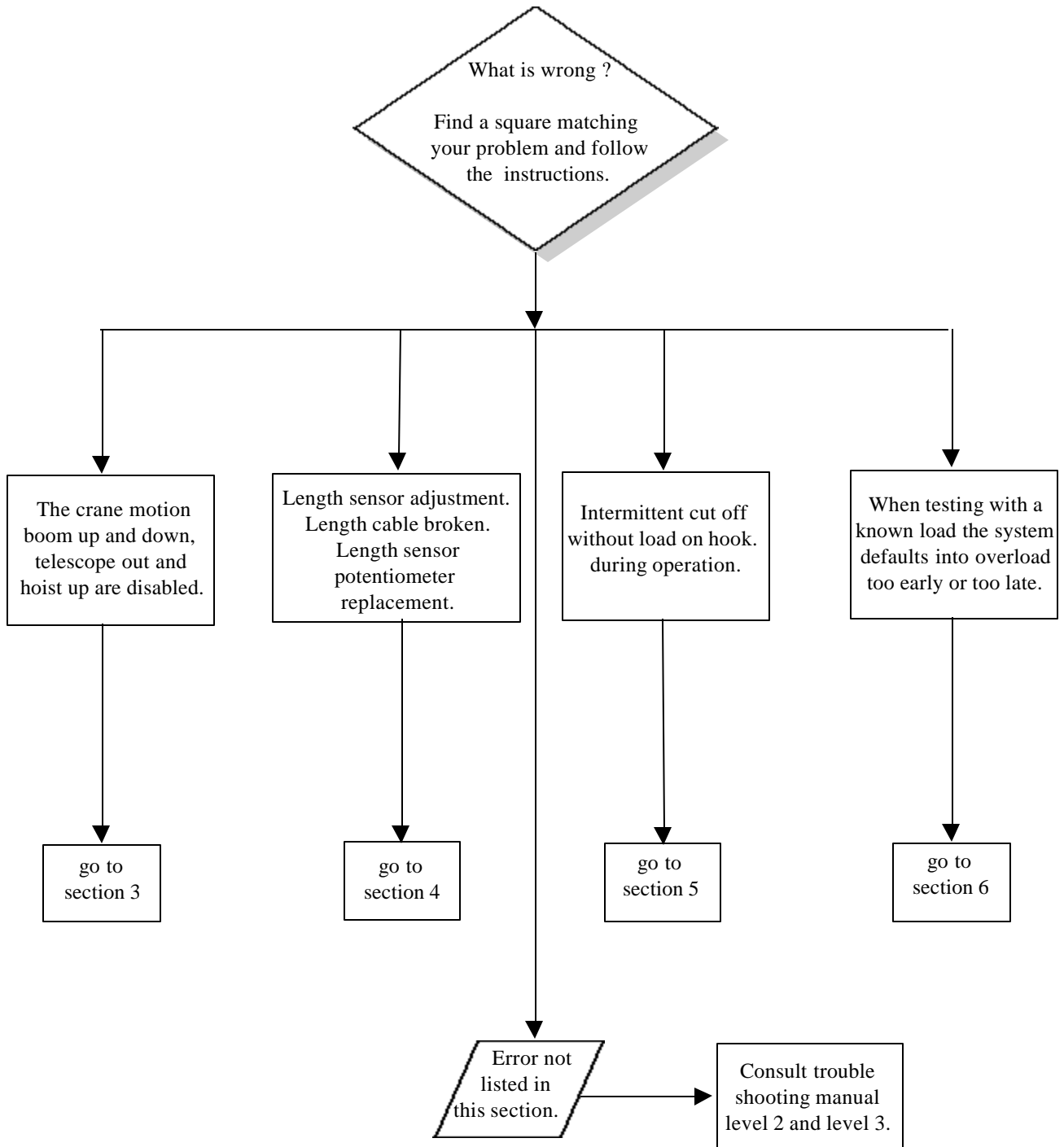
1. INTRODUCTION TO TROUBLESHOOTING THE PAT OVERLOAD WARNING SYSTEM DS 50



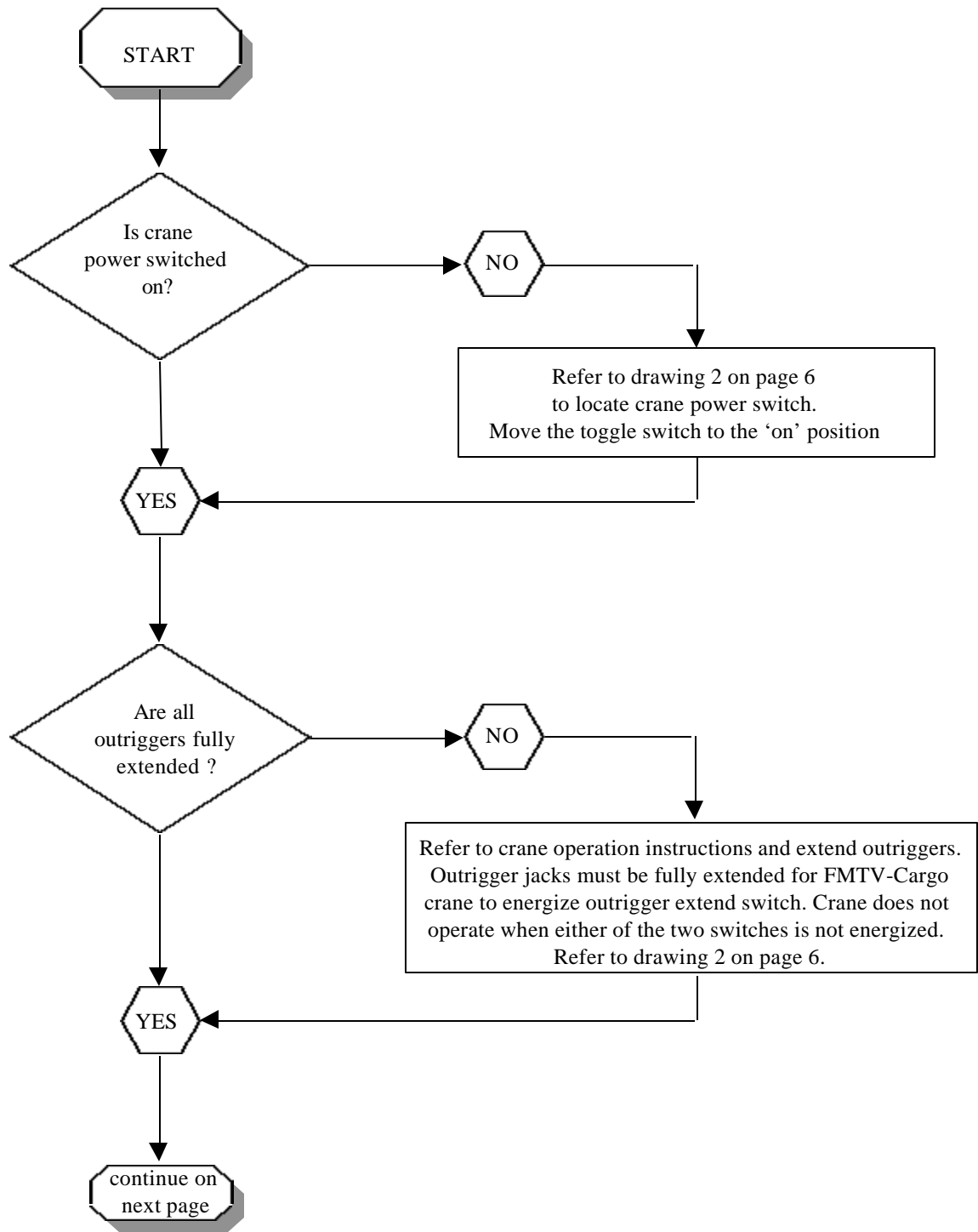
DRAWING 2 - Crane storage position

Caution !
Crane is shown folded for transportation.
For lifting operations the mast has to be in upright position
and the hook lifted out of the transportation storage.

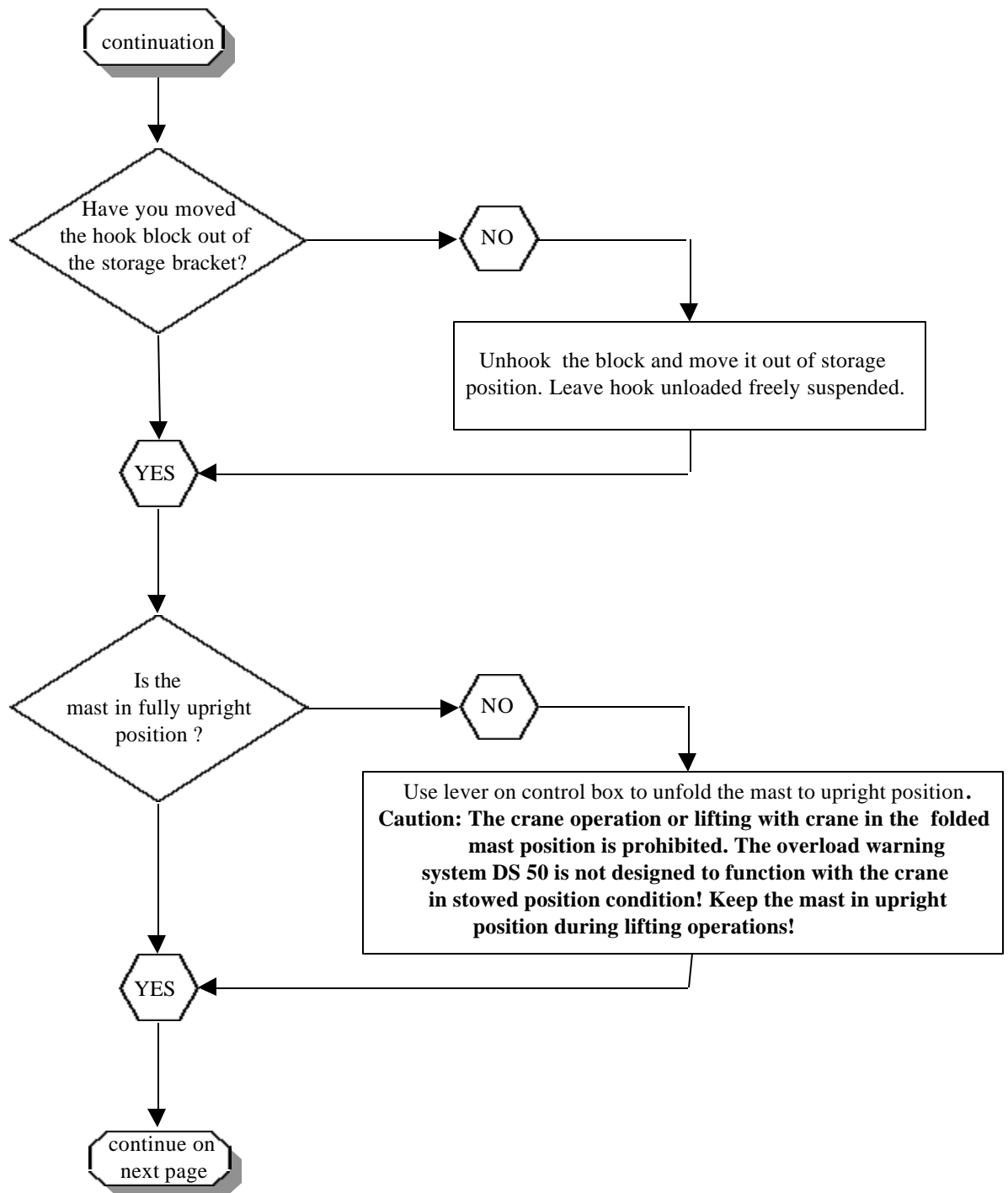
2. Getting started



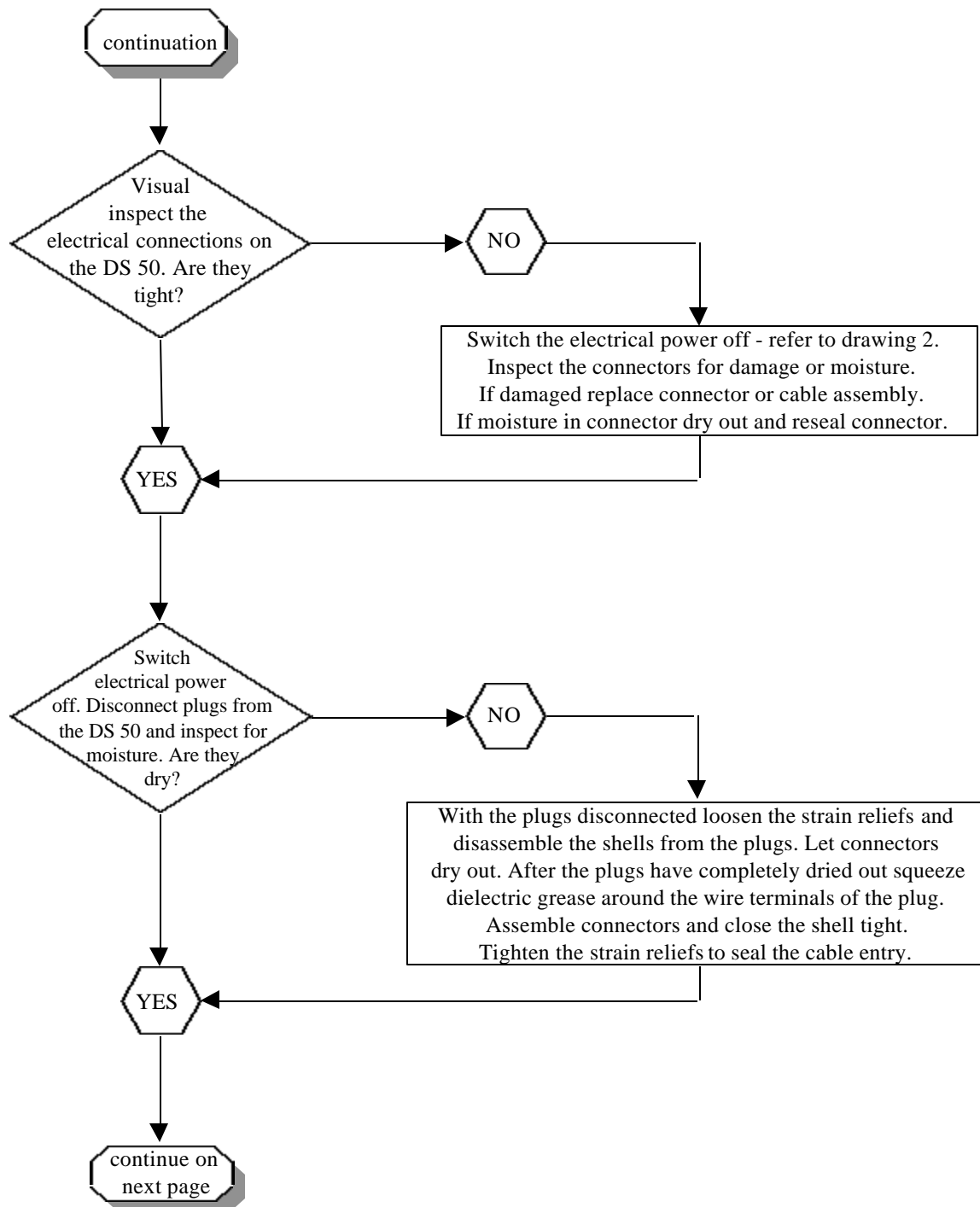
3. Crane functions boom up and down, telescope out and hoist up are disabled.



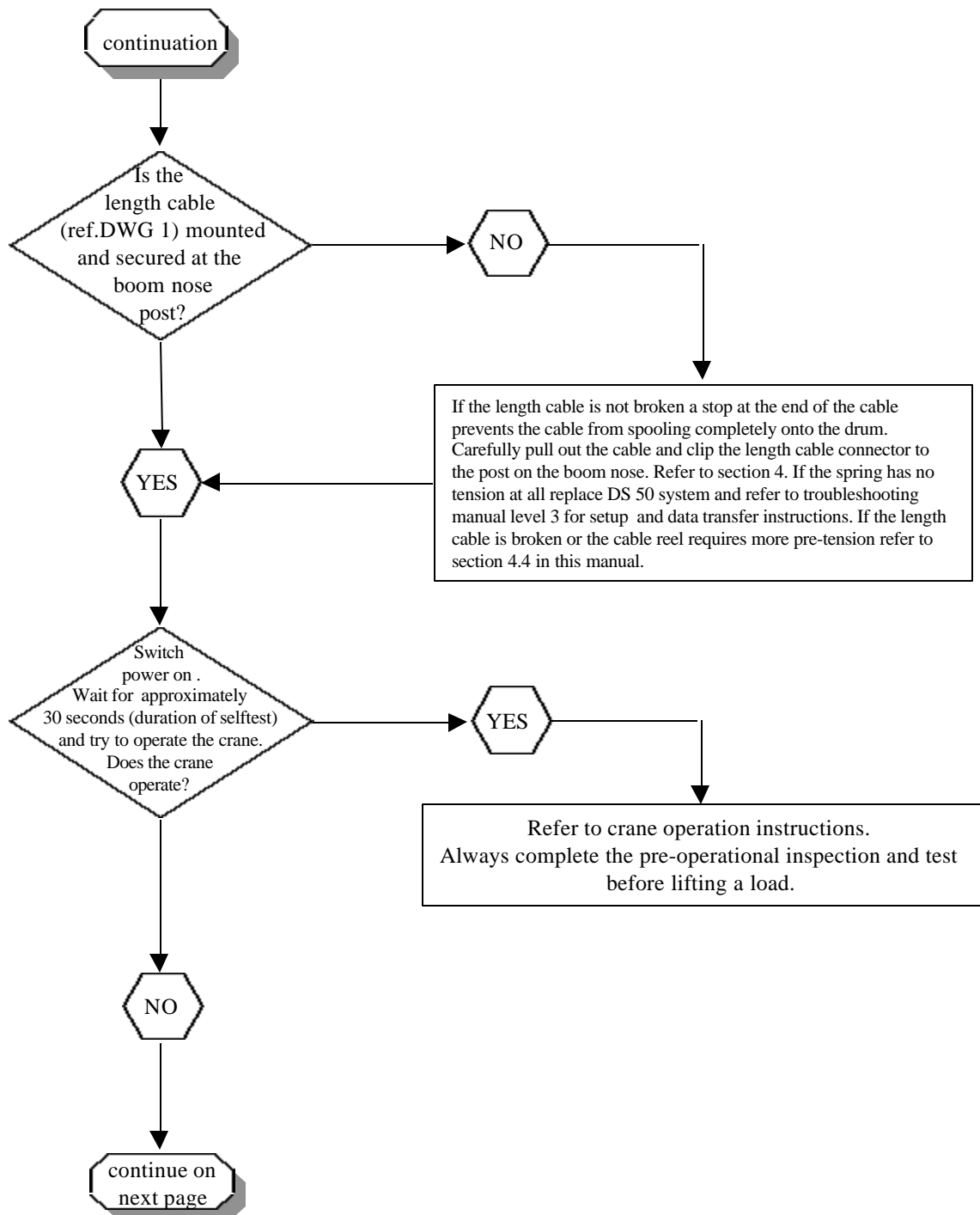
3. Crane functions boom up and down, telescope out and hoist up are disabled.



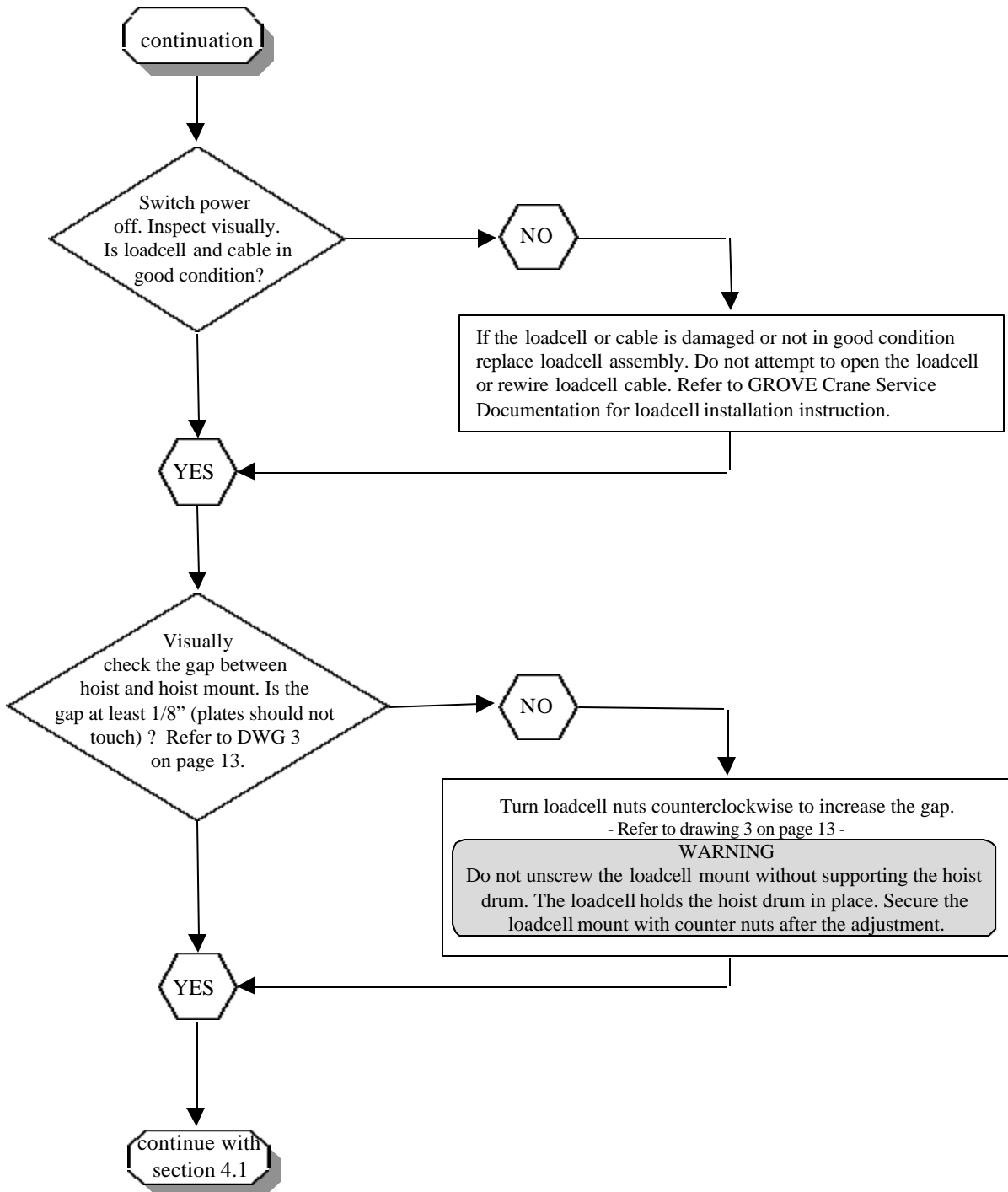
3. Crane functions boom up and down, telescope out and hoist up are disabled.



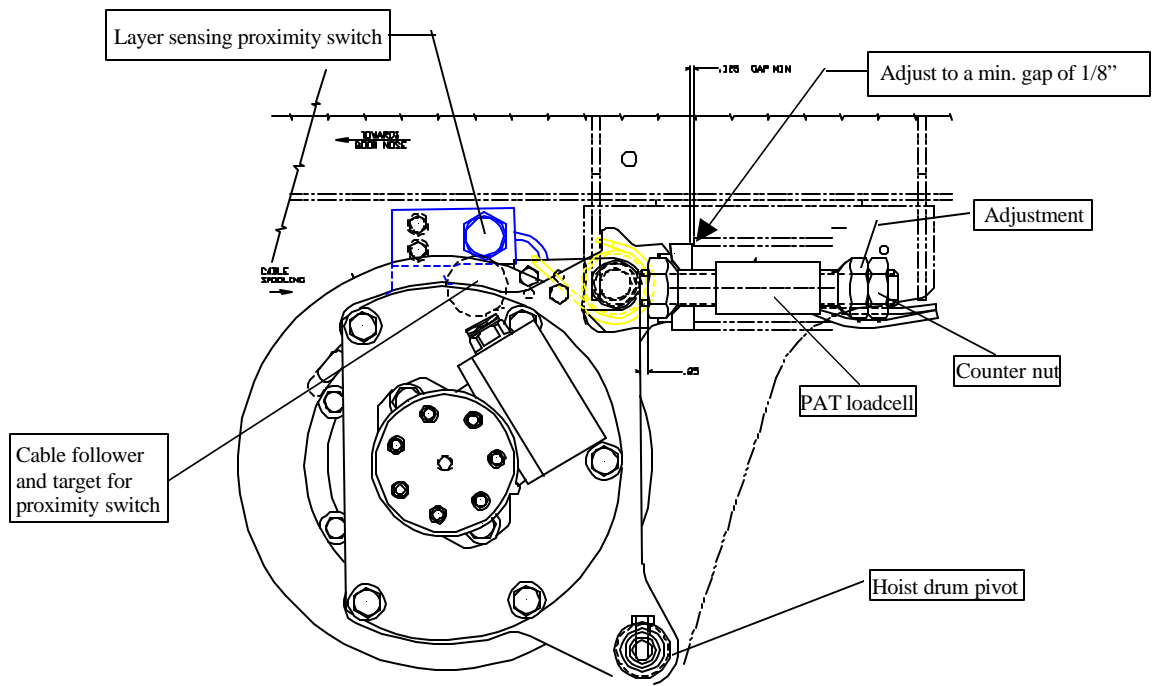
3. Crane functions boom up and down, telescope out and hoist up are disabled.



3. Crane functions boom up and down, telescope out and hoist up are disabled.



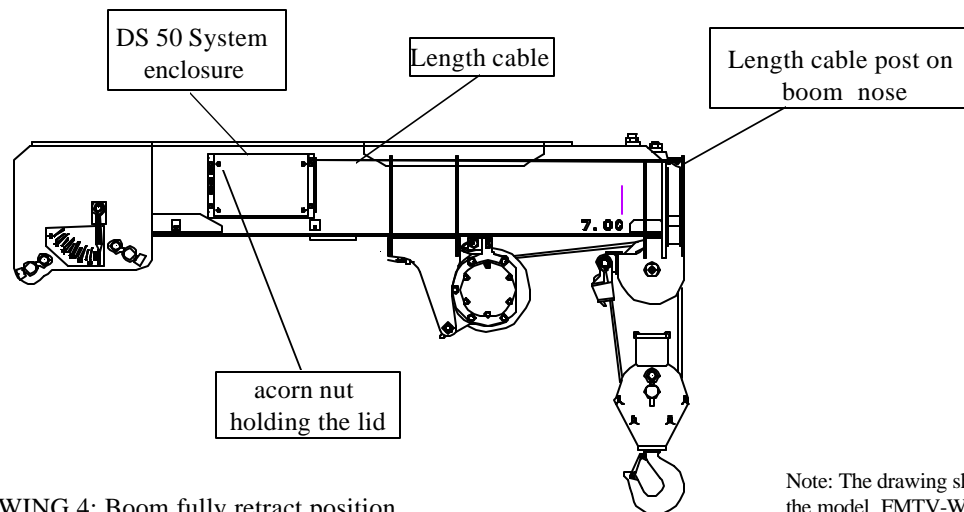
3. Crane functions boom up and down, telescope out and hoist up are disabled.



DRAWING 3 - Loadcell installation

4. 1 Length sensor adjustment

Switch power on and start the engine and engage the PTO. Retract the boom fully. Refer to drawing 4 on this page. -- If the boom does not retract, switch the power off, then push and use manual bypass valve while retracting. Refer to crane operational instructions to familiarize with the bypass.-- Retract the boom fully. Lower the boom to gain access to the DS 50 system and the boom nose. Switch the power off. Disconnect the 3 cables from the system. Remove the outer system lid carefully.



DRAWING 4: Boom fully retract position

Note: The drawing shows the model FMTV-W. The FMTV-C has only single line capability.

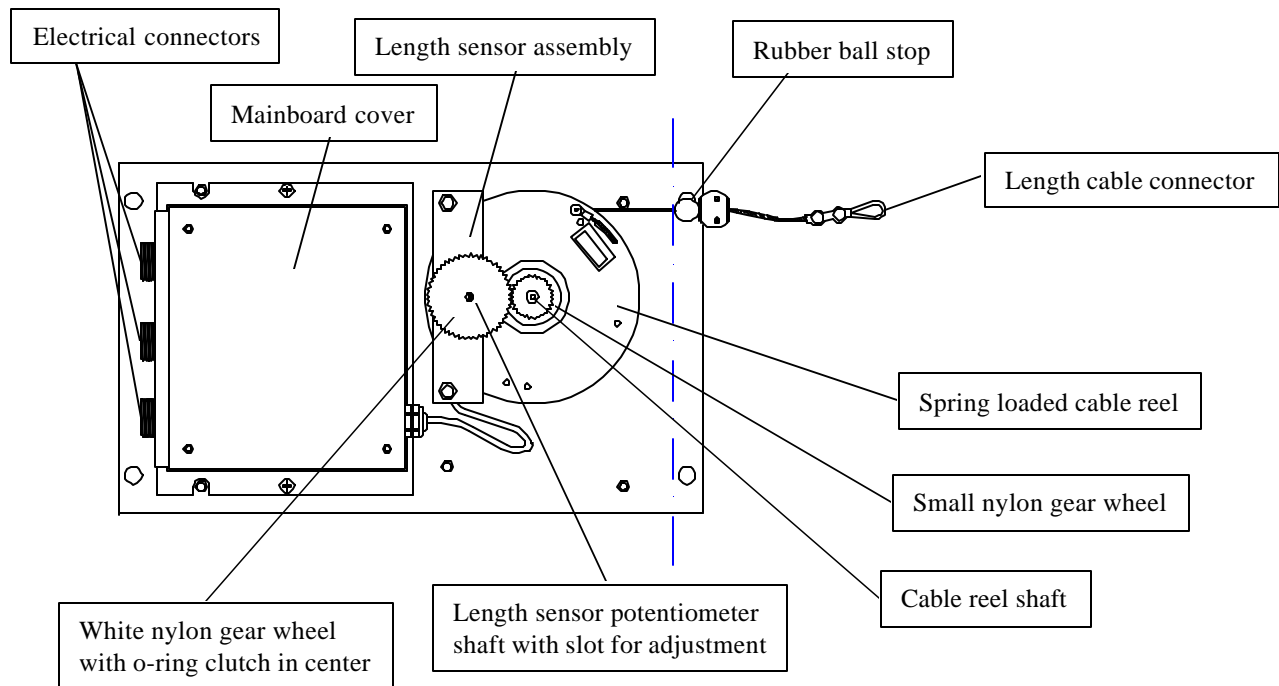
CAUTION: A green - yellow wire connects the ground (gnd) to the lid. The wire is connected to a “fast on” terminal inside the lid. Carefully disconnect the green - yellow wire from the connector before removing the lid completely.

4. 1 Length sensor adjustment

You can now see the length sensor assembly with the white gear assembly. The large nylon gear turns the length sensor potentiometer shaft. The clutch (two o-rings) in the center of the gearwheel protects the potentiometer from getting damaged in the event of a length cable breakage. The potentiometer shaft is adjustable. The length potentiometer requires 10 revolutions to adjust the potentiometer from its minimum to maximum resistance.

With caution unclip the length cable connector from the post on the boom nose. Hold on to the length cable and do not let the length cable snap off. Spool cable back on the drum in a straight line parallel to the boom to avoid a cable build up on one side of the cable reel. The de-spooling of the cable can cause damage to the length sensor assembly.

CAUTION: The length potentiometer is an electronic component and not designed to withstand large forces or moments. Carefully adjust the potentiometer only when instructed in this manual. Take special care when you approach the stops on either end. Use a precision screwdriver only to adjust the potentiometer. The clutch o-rings are lubricated by PAT to prevent the o-ring from seizing on the potentiometer shaft. Exactly follow the instruction in this manual on how to reset or replace the length sensor.



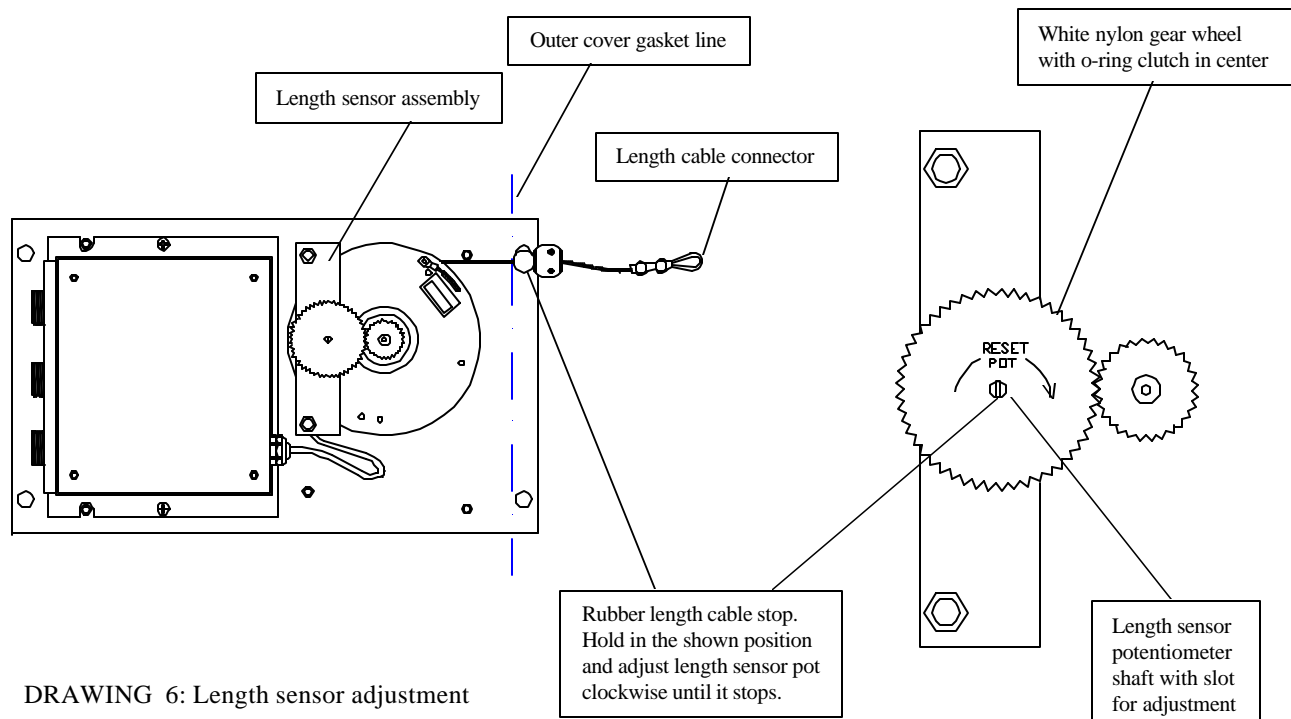
DRAWING 5: Length sensor and cable reel assembly

4. 1 Length sensor adjustment

WARNING

The cable drum is under high tension. Do not let the length cable spool back without supporting the cable and leading it back on the drum. Pay attention and watch that the wraps do not pile up on one side. De-spooling of the length cable can cause damage to the length sensor. Spooling the length cable without additional support may result in injury or damage. Use caution and protection when working with the length - cable under high tension.

Stop spooling the cable back when the rubber length cable stop reaches the outside cover mark. Refer to the drawing below to identify the stop line. Usually the outside cover gasket leaves a black line on the base plate. Use this line for orientation. Use a precision screwdriver to carefully turn the potentiometer shaft clockwise until it stops. During the adjustment keep the rubber length cable stop at the line as shown on drawing 5 and 6. Then carefully pull the length cable out in a straight line parallel to the boom and clip the length cable connector to the post on the boom. The mechanical length sensor adjustment is completed now.

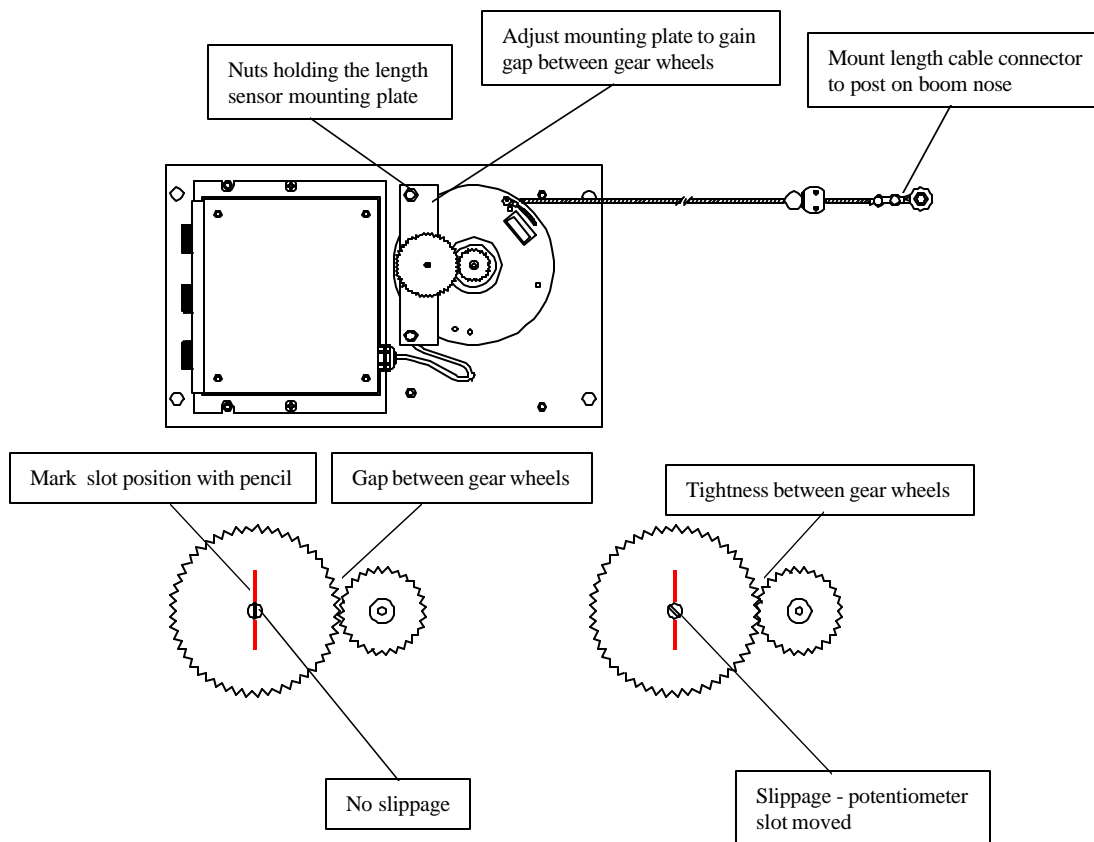


DRAWING 6: Length sensor adjustment

4. 1 Length sensor adjustment

Before telescoping the boom mark the length sensor potentiometer position . With a pencil mark the position of the potentiometer slot on the white nylon gear wheel. Refer to drawing 7.
Telescope the boom fully out. Then verify that the pencil mark agrees with the actual slot position.
Retract the boom completely and verify that the pencil mark agrees with the actual slot position.

If the pencil mark does not agree with the actual slot position the gear wheel has slipped on the potentiometer shaft. This indicates a tight fit between the two gear wheels. Loosen the two nuts holding the length sensor potentiometer mounting plate. Adjust the plate until a gap between the teeth of the two gear wheels is visible and you can move the large gear wheel back and forward slightly. Keep the mounting plate in place and tighten the two mounting screws. Mark length sensor potentiometer slot again and repeat the slippage test.



DRAWING 7: Length sensor gear adjustment

4. 1 Length sensor adjustment

NOTE: If system remains in Error after the length sensor potentiometer adjustment refer to section 4.2 or 4.3 in this book or continue with level 2 of troubleshooting.

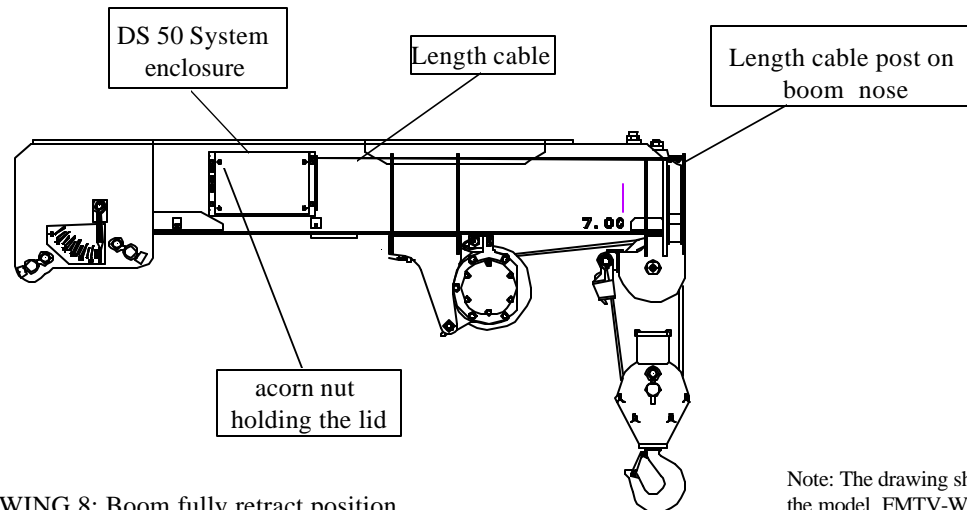
4.2 Length sensor potentiometer replacement

This section explains the replacement of the length potentiometer in the event of defect. Before replacing the component read section 4.1 and perform adjustment. Only when the adjustment and tests described in section 4.1 failed proceed with this section.

If you are not familiarized with soldering you should perform the "Length sensor assembly replacement" described in section 4.3 instead.

Switch power on, start the engine and engage the PTO. Retract the boom fully. Refer to drawing 8 on this page.

If the boom does not retract, switch the power off, then push and hold the manual bypass valve while retracting. Refer to crane operational instructions to familiarize with the bypass. Retract the boom fully. Lower the boom to gain access to the DS 50 system and the boom nose. Switch the power off. Disconnect the 3 cables from the system. Remove the outer system lid carefully.



DRAWING 8: Boom fully retract position and component location

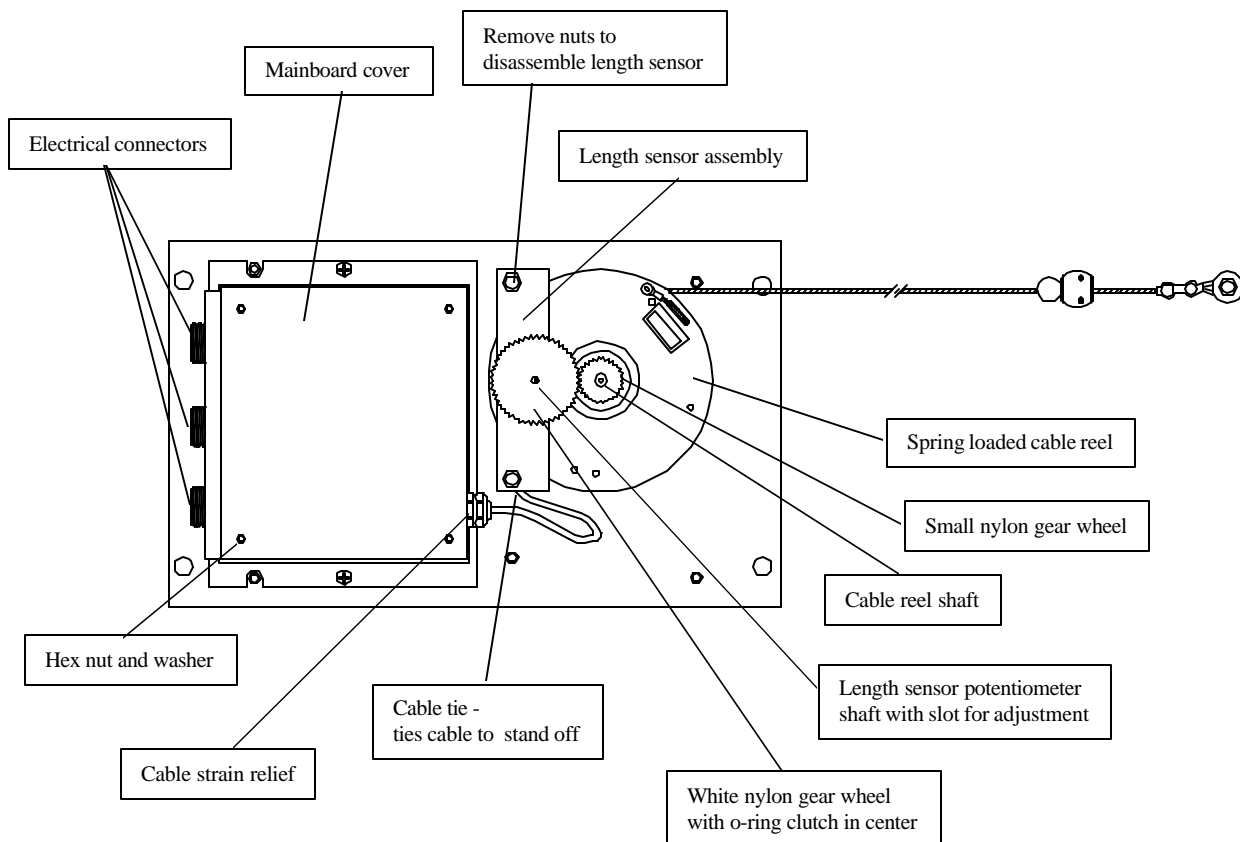
Note: The drawing shows the model FMTV-W. The FMTV-C has only single line capability.

CAUTION: A green - yellow wire connects the ground (gnd) to the lid. The wire is connected to a "fast on" terminal inside the lid. Carefully disconnect the green - yellow wire from the connector before removing the lid completely.

4. 2 Length sensor potentiometer replacement

WARNING

The cable drum is under high tension. Do not let the length cable spool back without supporting the cable and leading it back on the drum. Pay attention and watch that the wraps do not pile up on one side. De-spooling of the length cable can cause damage to the length sensor. Spooling the length cable without additional support may result in injury or damage. Use caution and protection when working with the length - cable under high tension.



DRAWING 9: Component orientation - section 4.2

4. 2 Length sensor potentiometer replacement

Step 1:

Carefully cut the cable tie which ties the potentiometer cable to the stand off. Refer to drawing 9 on page 20. Remove nuts holding the length sensor in place. Lift up the mounting plate. Carefully separate the white gear wheel from the potentiometer shaft by lifting the gear. The o-ring clutch allows the gear wheel to slide on the shaft.

Step 2:

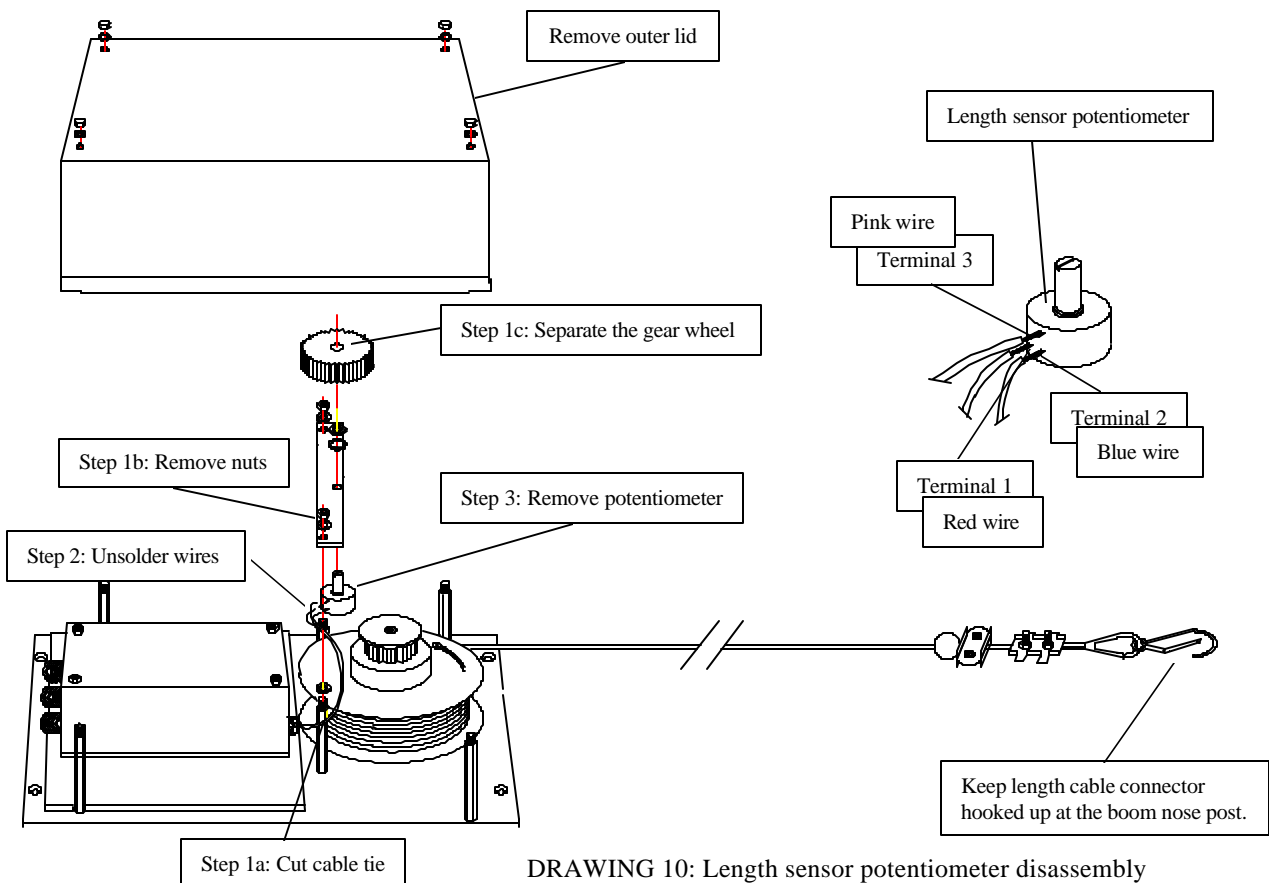
Push the heat shrink tubes from the potentiometer terminals.

De-solder the three wires (red, blue and pink) from the potentiometer. Caution - Do not overheat the electrical connections. Do not use a soldering iron higher than 25 Watt.

To support the mounting plate while soldering, you can slide the mounting bracket onto the stand off up-side down. Always record the connection of the wires before you take them off. Make a little sketch or table. The potentiometer terminals are marked with the numbers 1 through 3.

Step 3:

Remove the mounting plate from its support position and slide the mounting plate onto the stand off. Secure the mounting plate with the nuts. Use a 14mm wrench to unscrew the potentiometer nut. Remove the nut and the star washer from the potentiometer. Lift the mounting plate and slide the potentiometer out of its mounting hole.



DRAWING 10: Length sensor potentiometer disassembly

4. 2 Length sensor potentiometer replacement

Step 4:

Mount the new length sensor in the same location and position as the one you removed.. Pay attention to the locking washer. The pin of the washer must recess in the hole provided in the mounting bracket to avoid movement of the potentiometer body during operation. Use caution when tightening the potentiometer nut. Do not over- torque the nut. The maximum torque shall not exceed

CAUTION: Over tightening the potentiometer nut results in damage of the potentiometer.

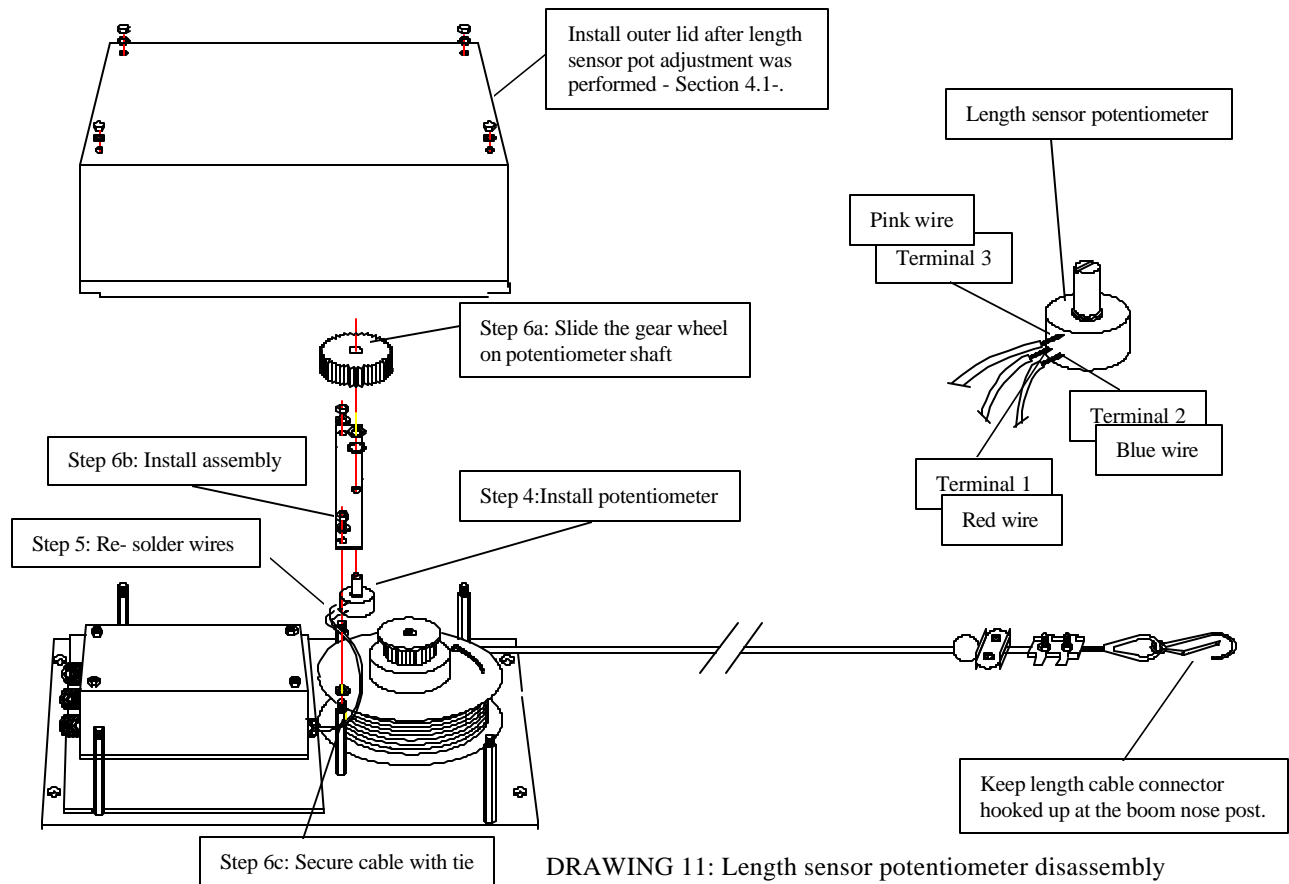
Step 5:

Slide heat shrink tube over the wire ends. Re-solder the wires. Observe the color code of the wires when soldering to the potentiometer terminals. Refer to drawing 11 on this page. Move the heat shrink tube over the potentiometer terminals and use a heat gun to shrink the tube.

CAUTION: Do not overheat potentiometer !

Step 6:

Carefully slide the large white nylon gear wheel onto the potentiometer shaft. Keep gear wheel at a 90 degree angle to the shaft while installing it. This avoid s excessive stress on the o-ring clutch. Install the whole assembly onto the mounting studs and tighten the nuts. Adjust mounting bracket to obtain a small gap between the two gear wheel teeth before tightening the nuts. Secure the potentiometer cable with cable ties. Perform the “Length sensor potentiometer adjustment” described in section 4.1 of this manual.

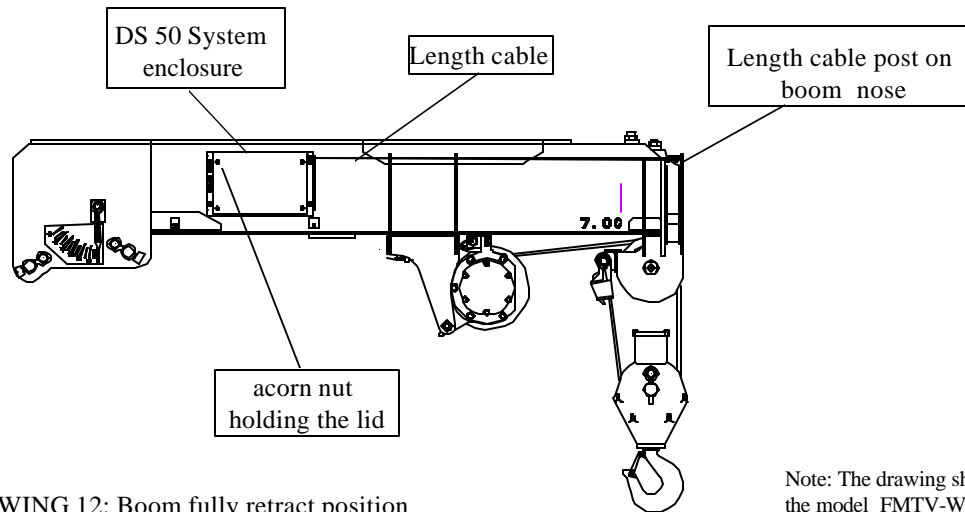


4.3 Length sensor assembly replacement

This section explains the replacement of the length sensor assembly in the event of a defect. Before replacing the assembly read section 4.1 and perform adjustment. Only when the adjustment and tests described in section 4.1 failed proceed with this section.

If you are familiarized with soldering you may replace the potentiometer of the assembly only. In that case proceed with section 4.2 “Length sensor potentiometer replacement”.

Switch power on, start the engine and engage PTO. Retract the boom fully. Refer to drawing 12 on this page.
-- If the boom does not retract, switch the power off and use manual valve to retract the boom. Refer to crane operational instructions to familiarize with the bypass.--
Retract the boom fully. Lower the boom to gain access to the DS 50 system and the boom nose.
Switch the power off. Disconnect the 3 cables from the system. Remove the outer system lid carefully.



DRAWING 12: Boom fully retract position and component location

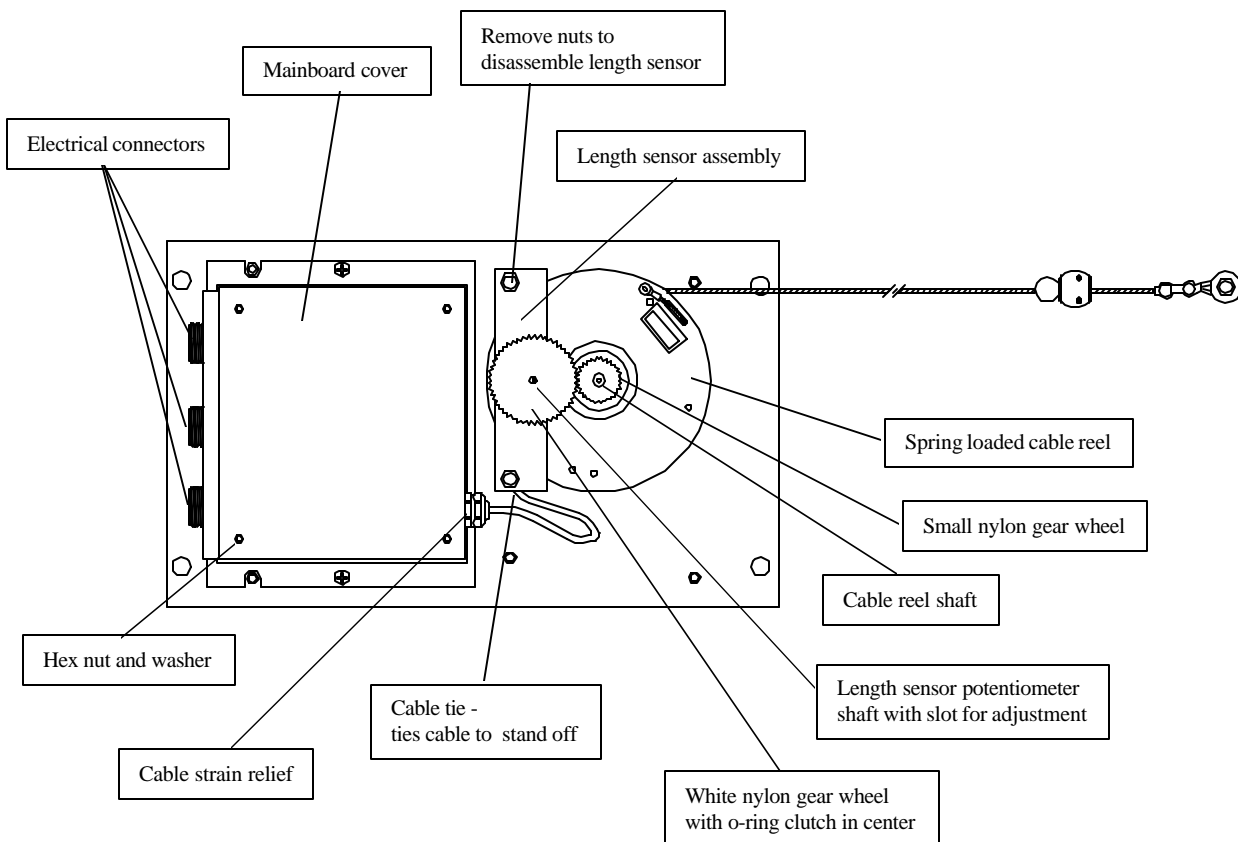
Note: The drawing shows the model FMTV-W. The FMTV-C has only single line capability.

CAUTION: A green - yellow wire connects the ground (gnd) to the lid. The wire is connected to a “fast on” terminal inside the lid. Carefully disconnect the green - yellow wire from the connector before removing the lid completely.

4.3 Length sensor assembly replacement

WARNING

The cable drum is under high tension. Do not let the length cable spool back without supporting the cable and leading it back on the drum. Pay attention and watch that the wraps do not pile up on one side. De-spooling of the length cable can cause damage to the length sensor. Spooling the length cable without additional support may result in injury or damage. Use caution and protection when working with the length - cable under high tension.



DRAWING 13: Component orientation - section 4.3

4.3 Length sensor assembly replacement

Step 1:

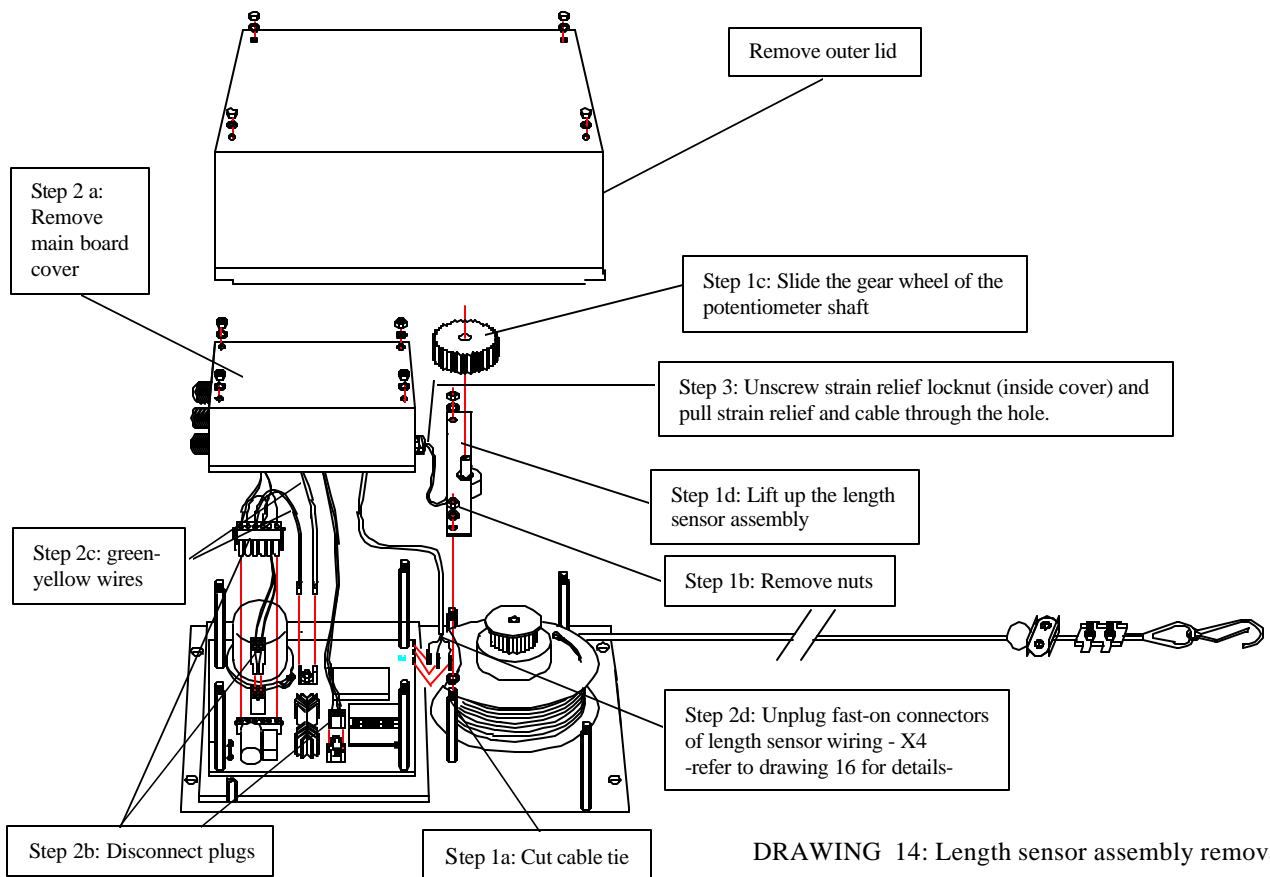
Carefully cut the cable tie which ties the the potentiometer cable to the stand off. Refer to drawing 14 on this page. Remove nuts holding the length sensor in place. Lift up the mounting plate. Carefully separate the white gear wheel from the potentiometer shaft by lifting the gear. The o-ring clutch allows the gear wheel to slide on the shaft.

Step 2:

Remove the hex nuts and washers holding the main board cover. Carefully lift the cover. Use caution - the internal wiring to the connectors in the cover is still plugged in. Lift the cover to unplug the connectors on the main board. Disconnect the brown, the white and the gray plug. Disconnect the two green yellow ground wires from the fast-on connectors in the center of the board. Use needle nose pliers to remove the length sensor wiring from terminal X4 on the main board. Remove complete cover with length sensor assembly from the system.

Step 3:

Support the cover on the bench and use a wrench to unscrew the strain relief locknut inside the cover. Remove strain relief with cable through the hole to separate the length sensor assembly from the cover.



DRAWING 14: Length sensor assembly removal

4.3 Length sensor assembly replacement

Step 4:

Feed the cable of the new length sensor assembly with fast-on connectors first through the strain relief hole in the cover. Push the threaded end of the strain relief through the hole. Slide the strain relief locknut over the cable end (with fast-on connectors first) move it up towards the strain relief. Tighten the strain relief locknut firmly. Secure the locknut with security paint or “lock tight” sealer.

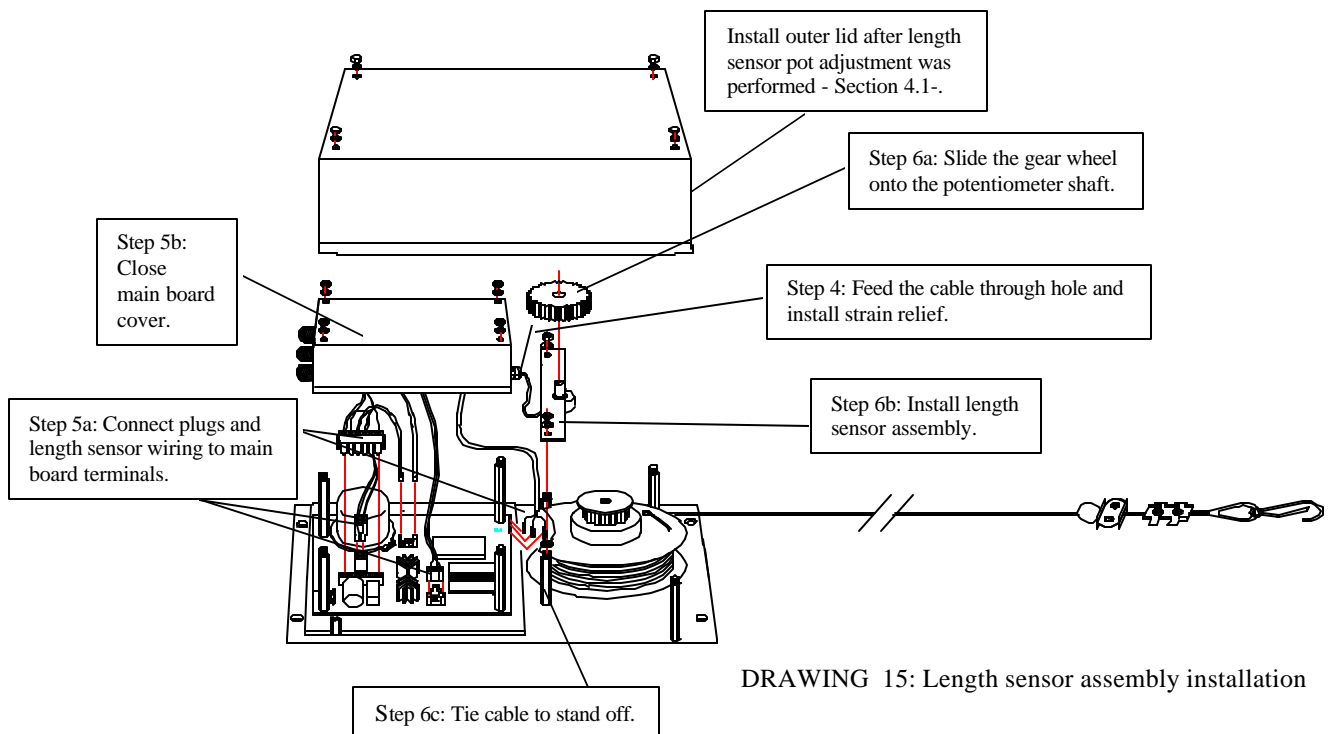
Step 5:

Use the drawing 16 to connect the fast-on connectors to terminal X4. Ensure tight connection to the terminals. Use needle nose pliers to slide the connector onto the terminal. Connect all other internal plugs into their sockets on the main board. Ensure the plugs are inserted correctly and tight. Check that the safety clips are latched in. Carefully slide the main board cover over the stand off. Once in place use the washers and nuts to seal the cover. CAUTION: Do not over tighten nuts.

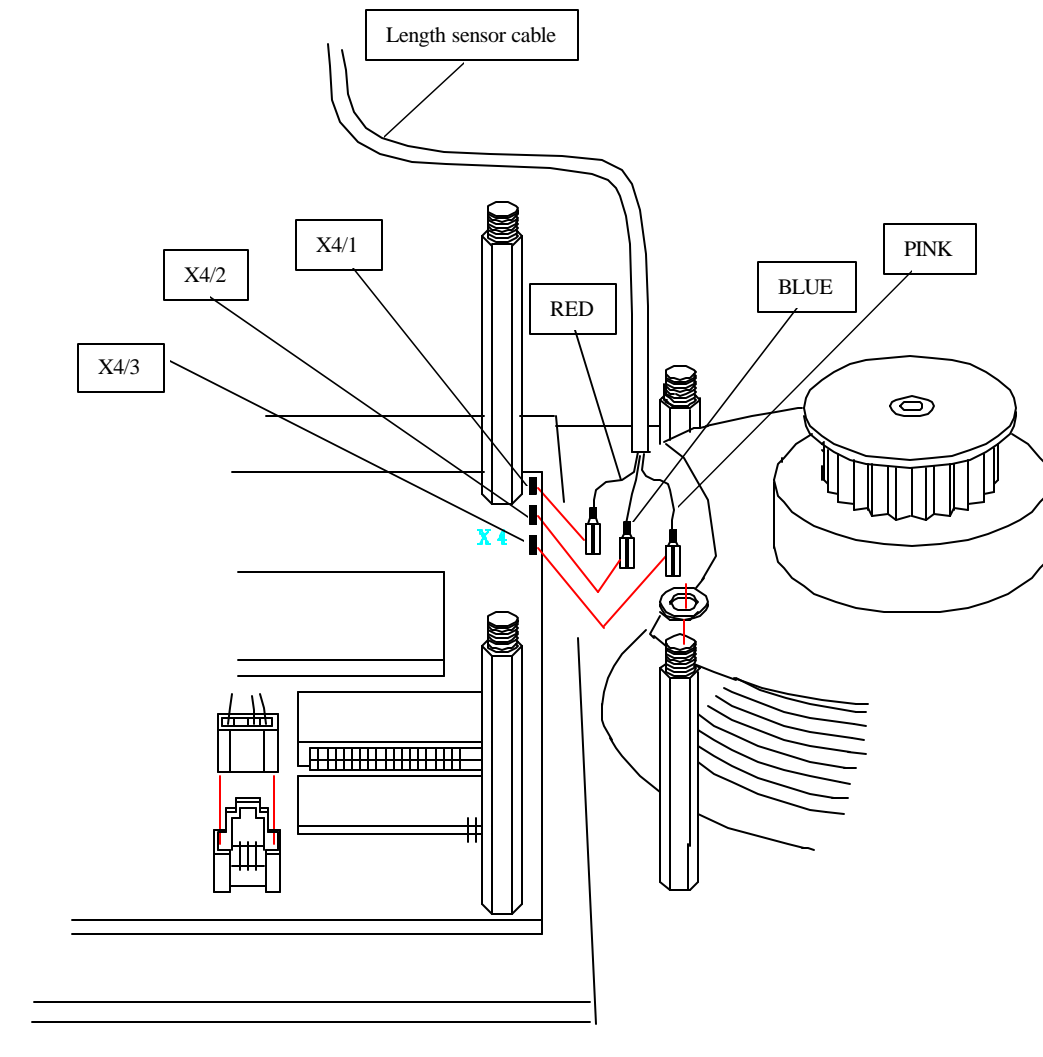
Step 6:

Slide the gear wheel back onto the potentiometer shaft. Pay attention to the 90 degree angle between gear wheel and potentiometer shaft while you slide the gear wheel onto the shaft. This will avoid too much stress onto the o-ring clutch.

Slide the whole length sensor assembly onto the stand off and secure it with the two washers and nuts. Adjust gear assembly to obtain the gap between the teeth before tightening the nuts. Refer to section 4.1 for instructions. Secure the wiring with cable ties. Perform the “Length sensor potentiometer adjustment” described in section 4.1 of this manual.



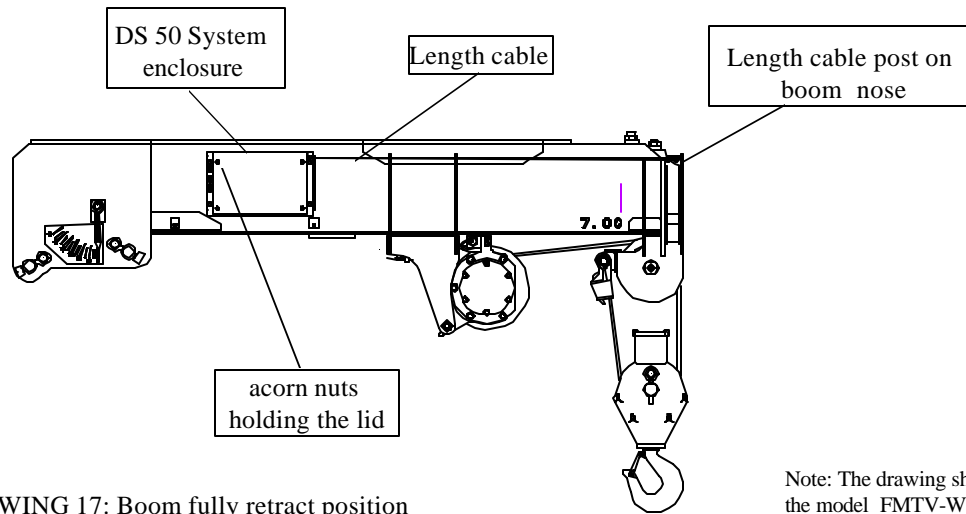
4. 3 Length sensor assembly replacement



DRAWING 16: Length sensor wiring - connection at X4 on main board.

4. 4 Length cable replacement

Switch power on, start the engine and engage PTO. Retract the boom fully. Refer to drawing 17 on this page.
-- If the boom does not retract, switch the power off, then push and hold the manual bypass valve while retracting. Refer to crane operational instructions to familiarize with the bypass.--
Retract the boom fully. Lower the boom to gain access to the DS 50 system and the boom nose.
Switch the power off. Disconnect the 3 cables from the system. Remove the outer system lid carefully.



DRAWING 17: Boom fully retract position and component location

Note: The drawing shows the model FMTV-W. The FMTV-C has only single line capability.

CAUTION: A green - yellow wire connects the ground (gnd) to the lid. The wire is connected to a “fast on” terminal inside the lid. Carefully disconnect the green - yellow wire from the connector before removing the lid completely.

4. 4 Length cable replacement

WARNING

The cable drum is under high tension. Do not let the length cable spool back without supporting the cable and leading it back on the drum. Pay attention and watch that the wraps do not pile up on one side. De-spooling of the length cable can cause damage to the length sensor. Spooling the length cable without additional support may result in injury or damage. Use caution and protection when working with the length - cable under high tension.

Step 1:

If the cable reel is still under tension secure the cable reel from turning with a pair of vice grips. With fully retracted boom unclip the length cable connector from the post at the boom nose.

Step 2:

Cut the cable close to the cable reel.

Remove the cable clamp, the length cable connector and the stop at the end of the cable.

NOTE: Since the whole cable is utilized replace the full cable length regardless of wraps left on the drum!

CAUTION: Wear leather gloves while holding the reel under tension!

Step 3:

Holding the cable reel carefully, opening the vice grips. Let the cable reel spool back until the spring tension is lost. If cable is wrapped around the length sensor clear length sensor first before open the vice grips.

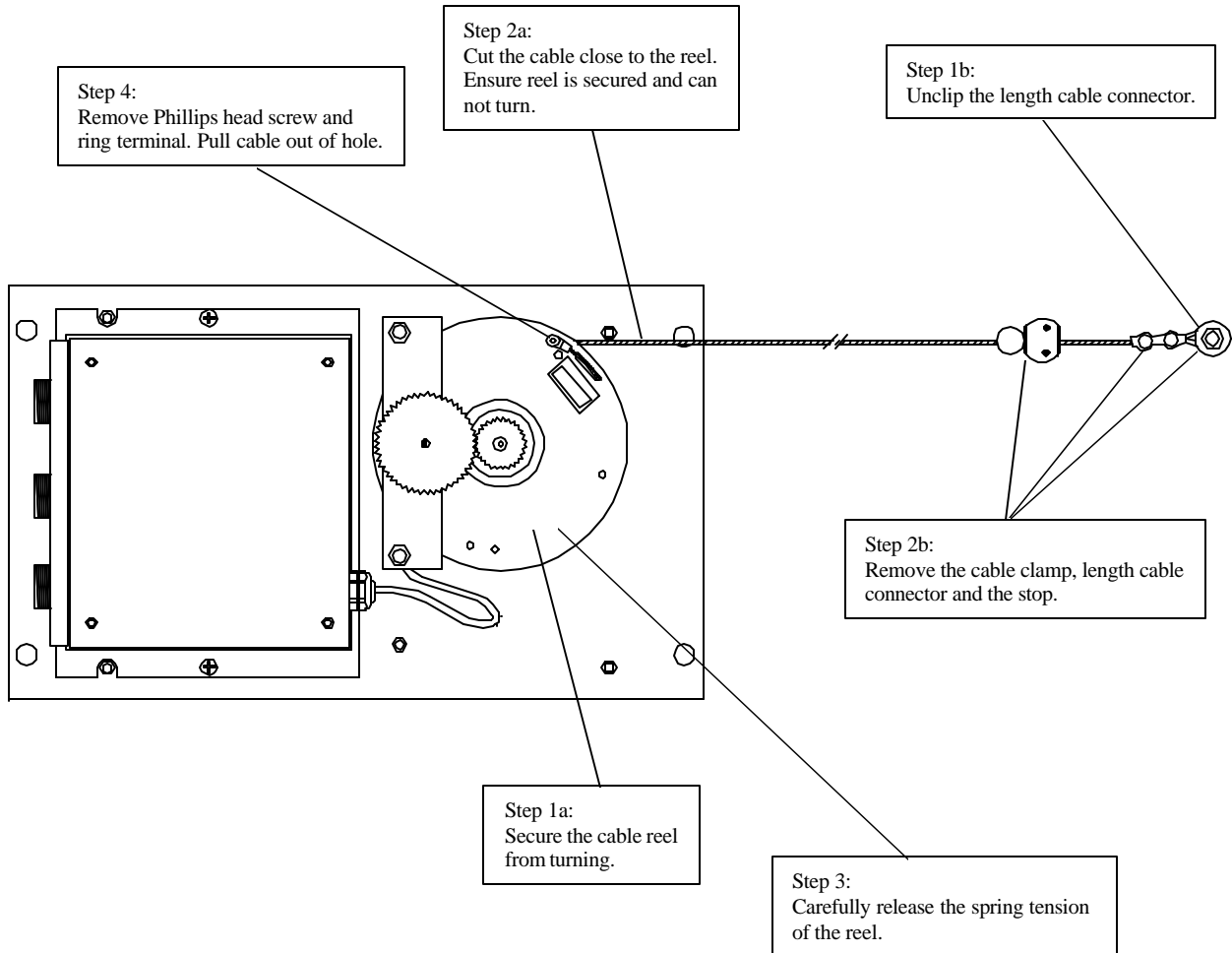
Step 4:

Remove the Phillips head screw and the ring terminal under the screw.

Pull out the remaining part of the damaged cable.

Refer to drawing 18 on next page for step 1- 4.

4. 4 Length cable replacement



DRAWING 18: Length cable disassembly

4. 4 Length cable replacement

WARNING

Use only length cable provided as a spare part by PAT or their authorized service network. The use of any other cable may results into system malfunction, personal injury or property damage.

Step 5:

Unwind the spare length cable on a flat surface (i.e. workshop floor). Take one end and feed it through the hole in the cable reel. Pull the cable approximately 10” (250 mm) out.

Step 6:

Strip the clear coating approximately 3/8” (10 mm) from the end. Slide a ring terminal over the stripped part of the cable. Crimp the ring terminal with a crimping tool. Use the Phillips head screw to fasten the ring terminal to the outside of the cable reel. Pull the length cable to remove any slack.

Step 7:

Carefully turn the cable reel counterclockwise to fill the drum. The spring is equipped with a clutch mechanism. Although the spring does not wind there is a little resistance and a noise when the spring slips every turn. Watch proper spooling while you turn the drum.

Step 8:

After you have spooled the cable on the drum secure the end of the cable with a piece of heavy duty tape (i.e. insulation tape, duct tape) on the drum. Now turn the reel (2) turns clockwise to obtain spring pre-tension.

Step 9:

Carefully unreel enough cable to install the stop, cable clamp and the length cable connector. Secure the reel from turning. Ensure the cable stays on the reel.

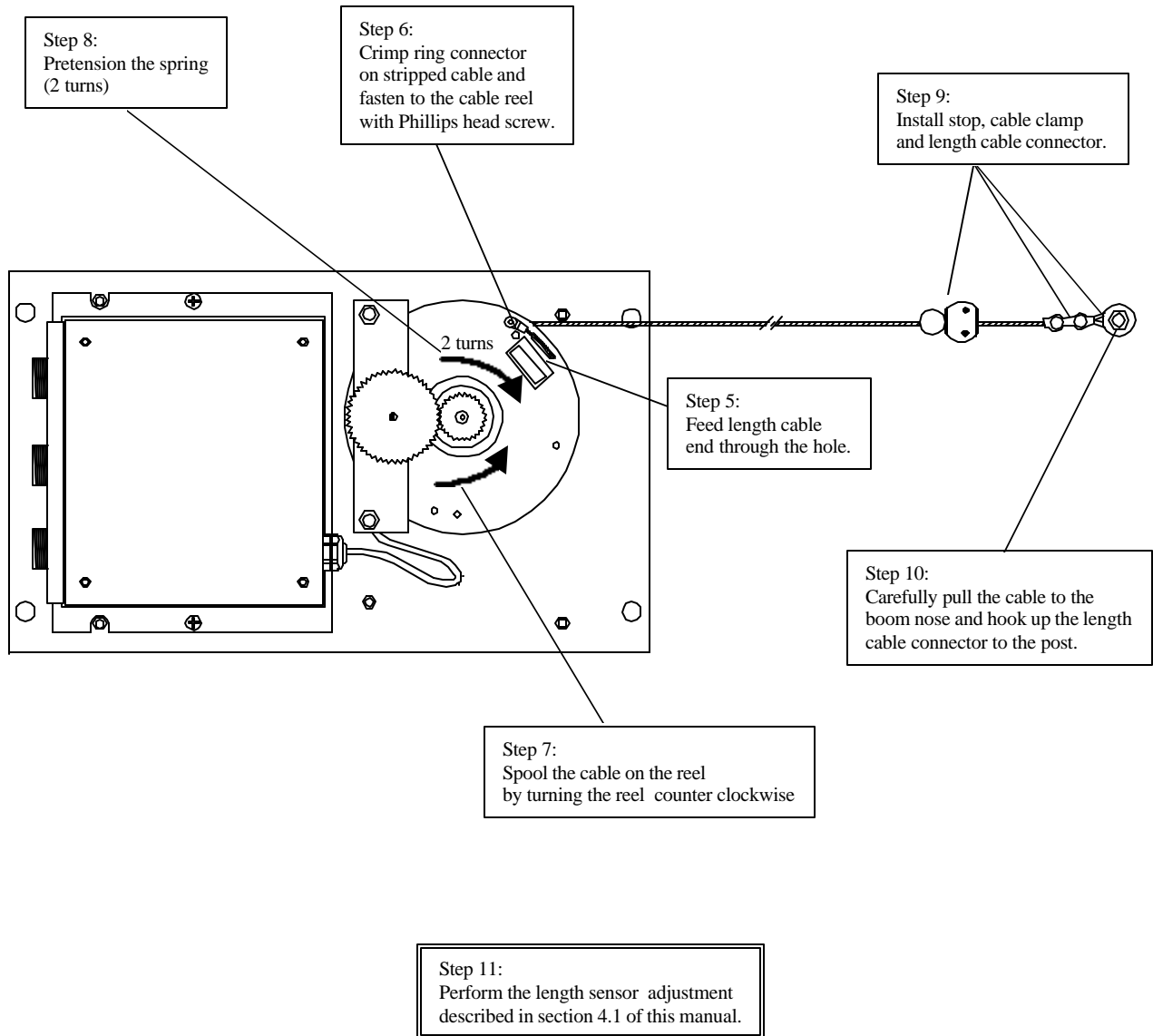
Step 10:

Carefully unreel the cable and hook up the length cable connector to the post on the boom nose. Telescope boom fully out and then fully in. When telescoping in observe the spooling on the reel.

Step 11: The length sensor adjustment is mandatory after length cable replacement. Proceed with section 4.1 “Length sensor adjustment”.

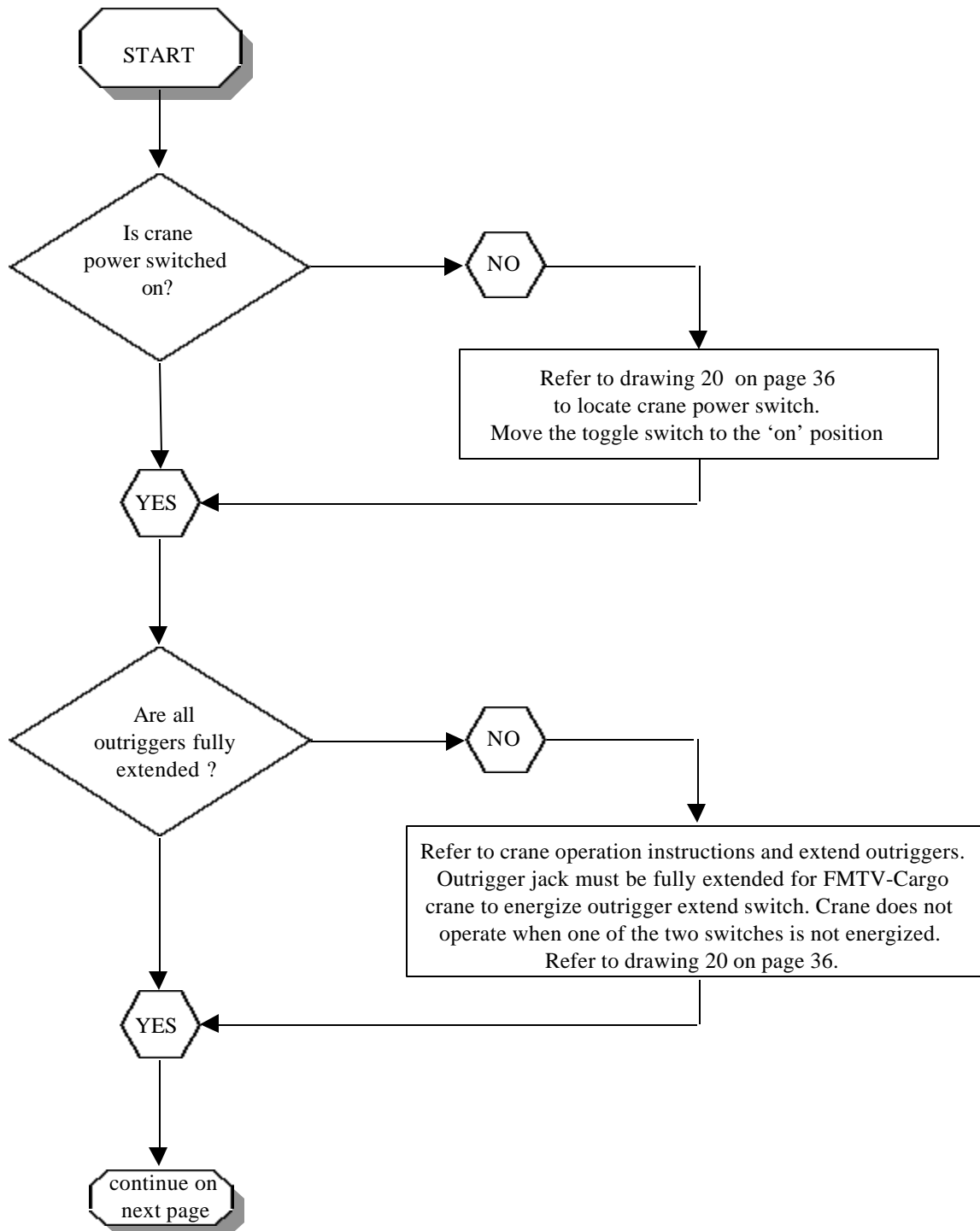
Refer to drawing 19 on next page for steps 5 - 10

4. 4 Length cable replacement

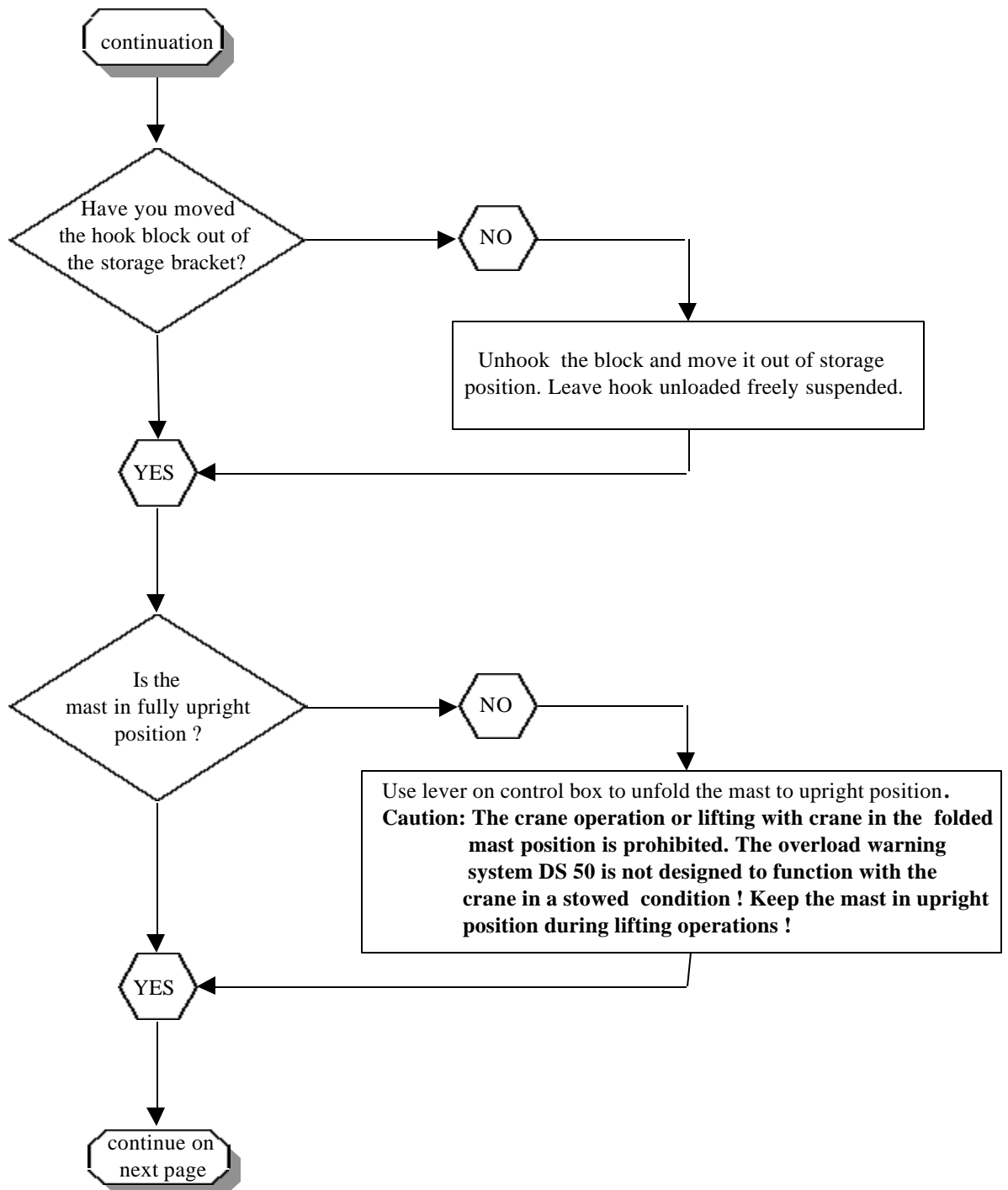


DRAWING 19: Length cable installation

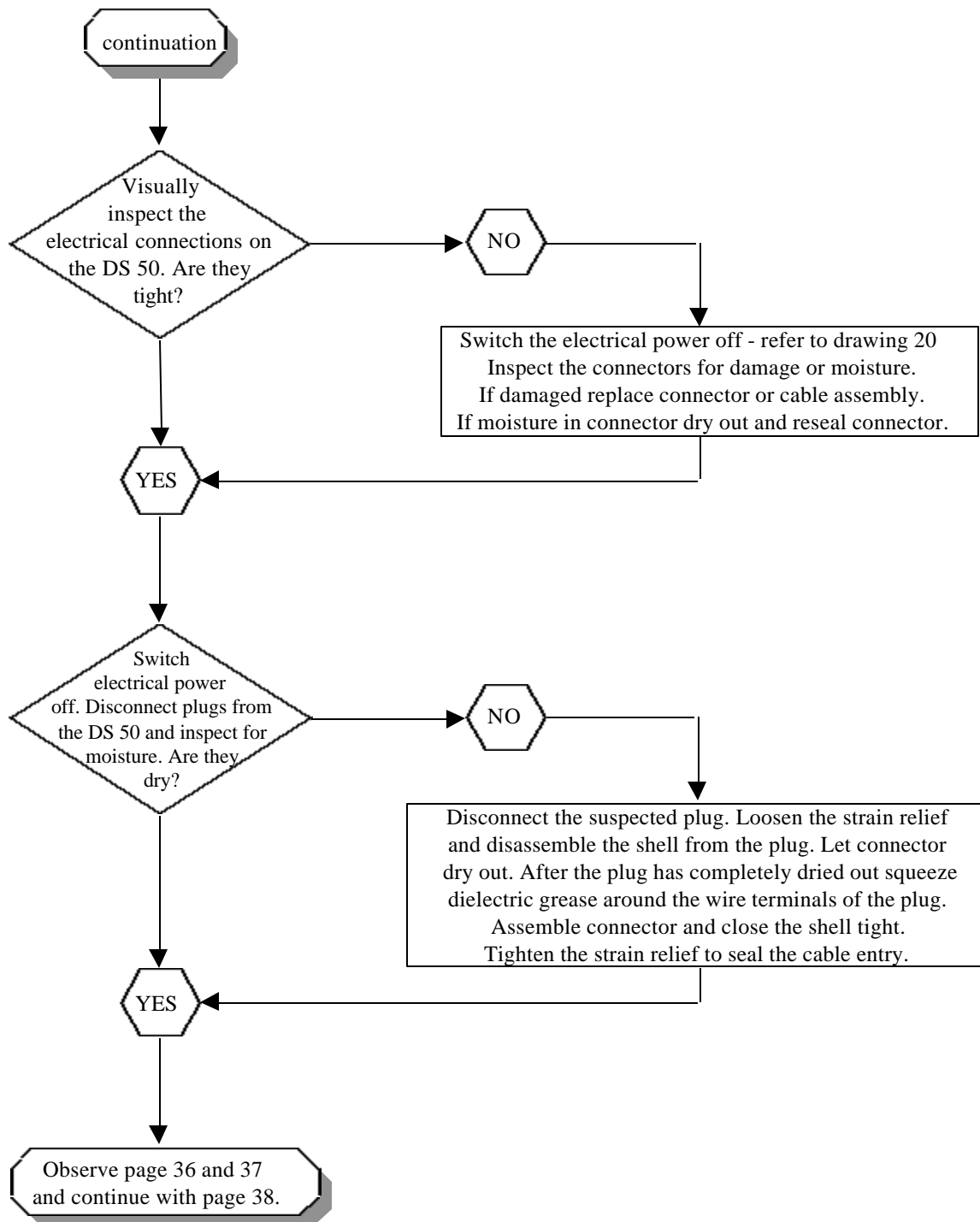
5. Intermittent cut off. No load on hook.



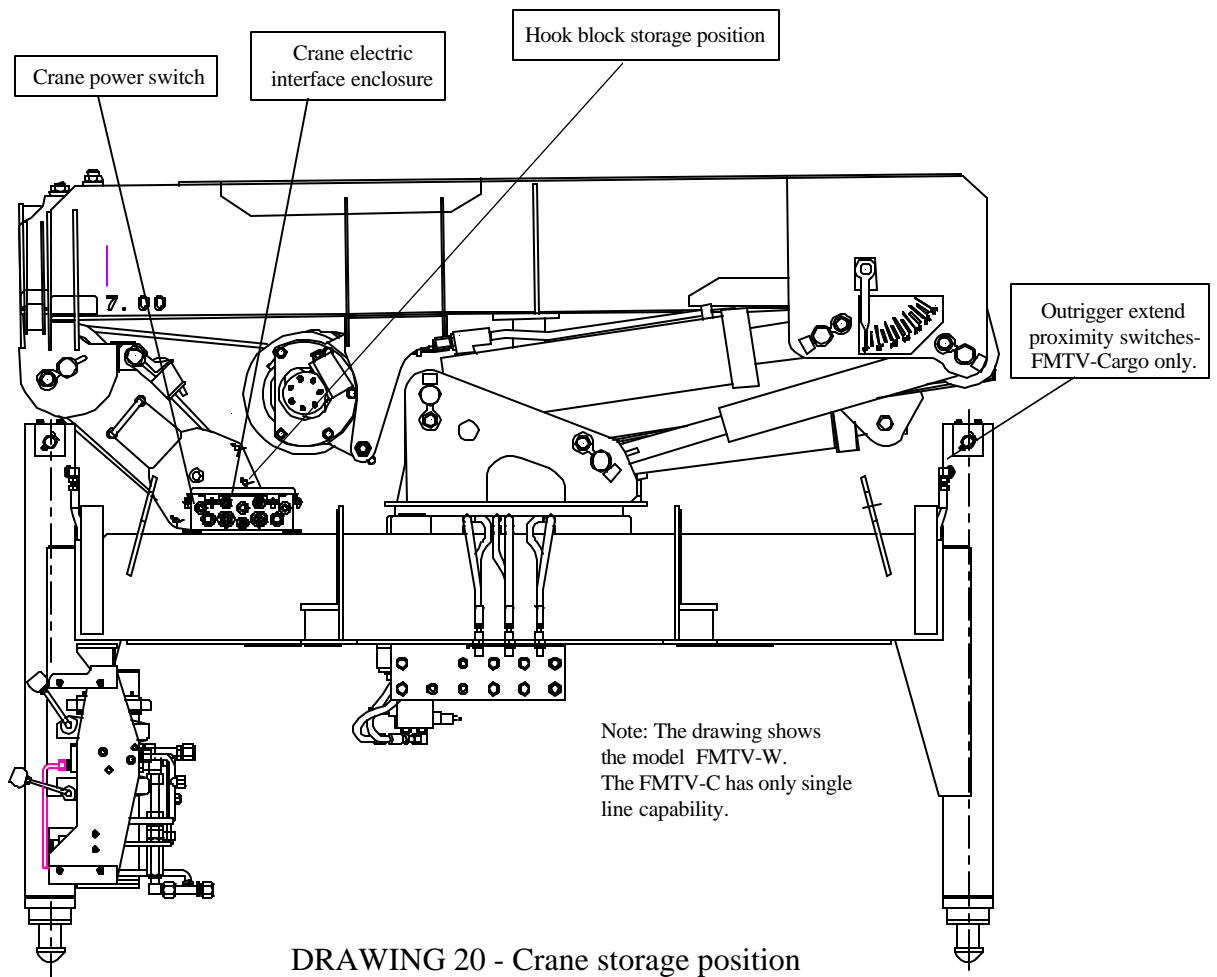
5. Intermittent cut off. No load on hook.



5. Intermittent cut off. No load on hook.



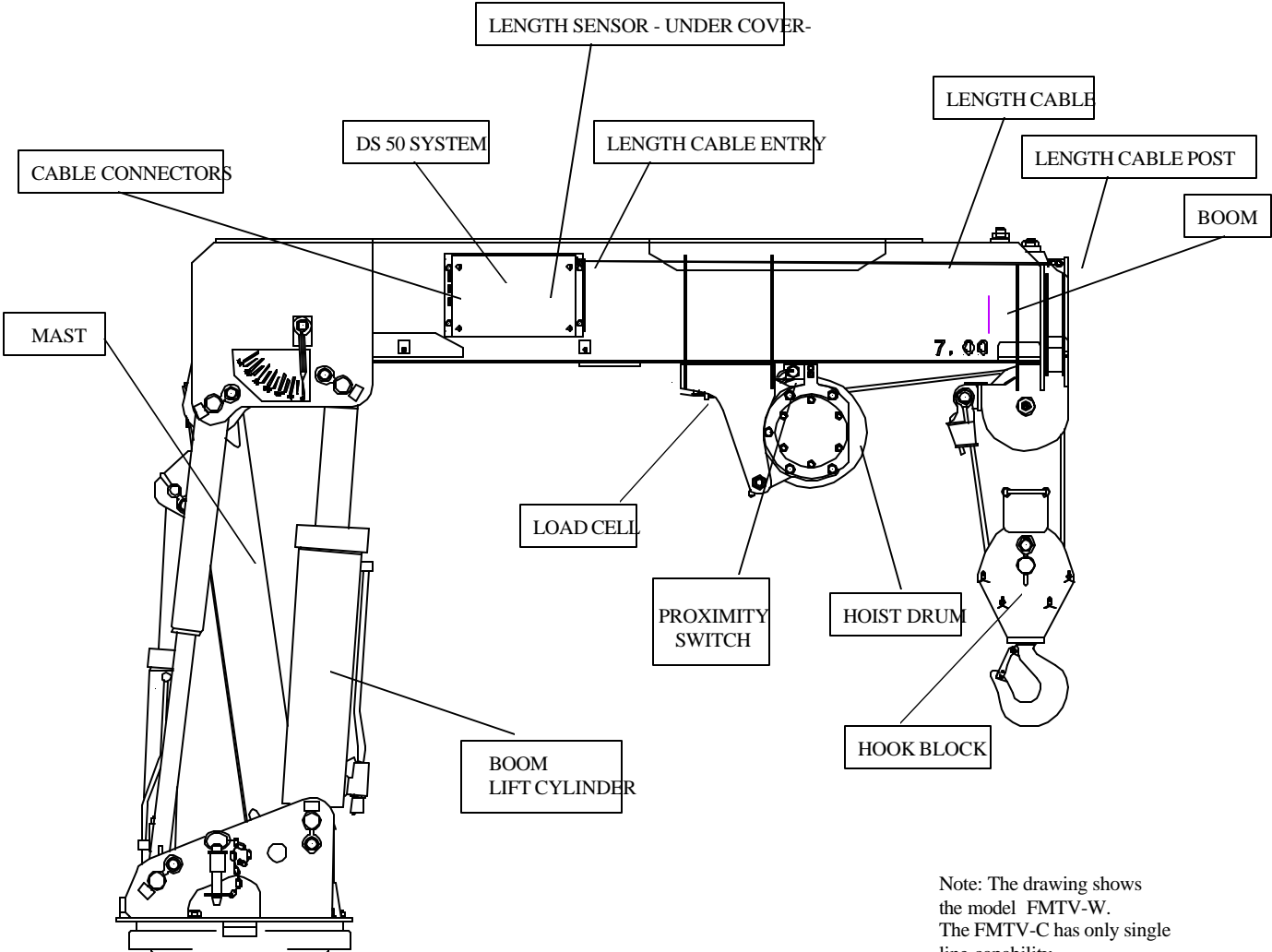
**5. Intermittent cut off.
No load on hook.**



DRAWING 20 - Crane storage position

Caution !
Crane is shown folded for transportation.
For lifting operations the mast has to be in upright position
and the hook lifted out of the transportation storage.

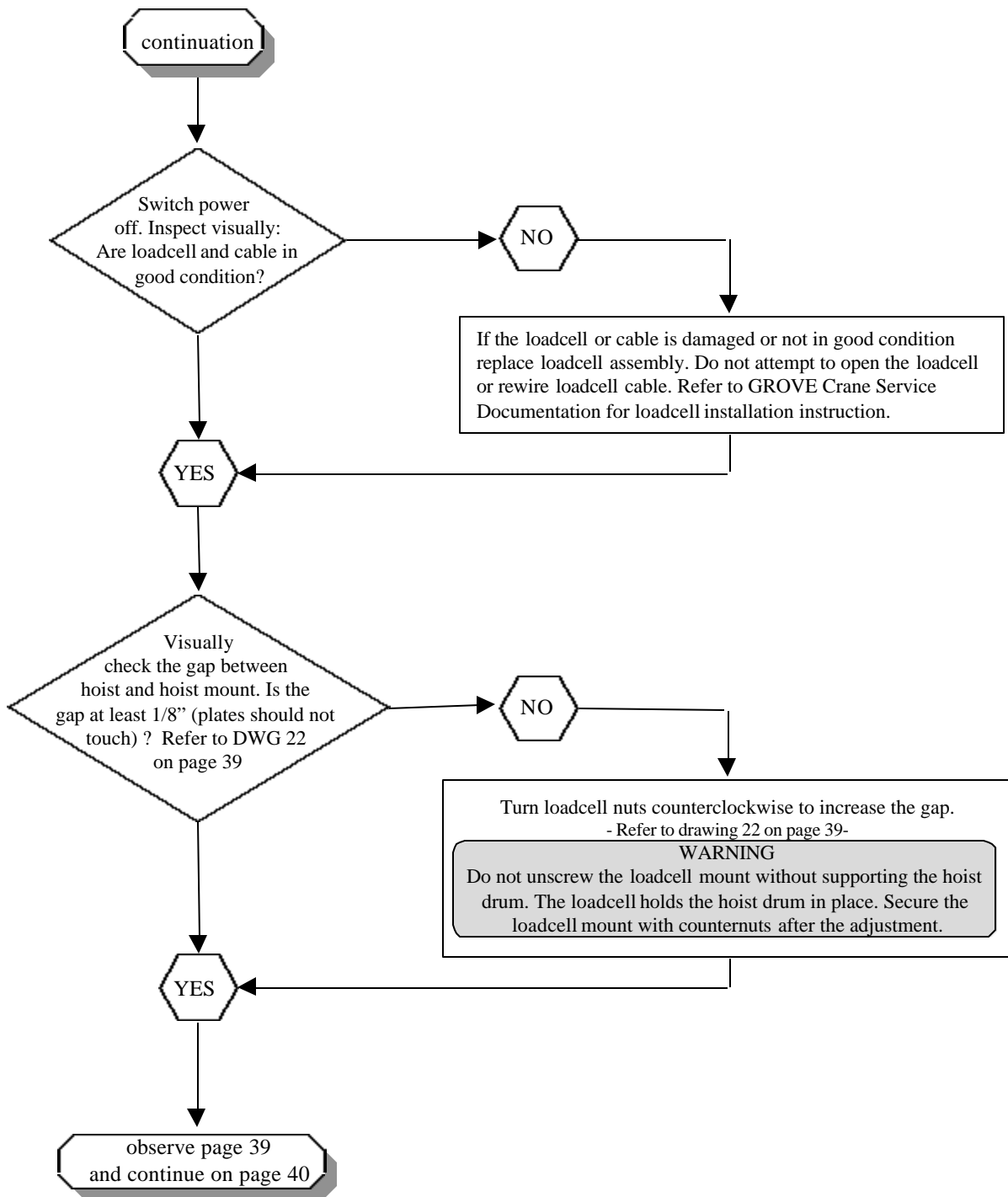
**5. Intermittent cut off.
No load on hook.**



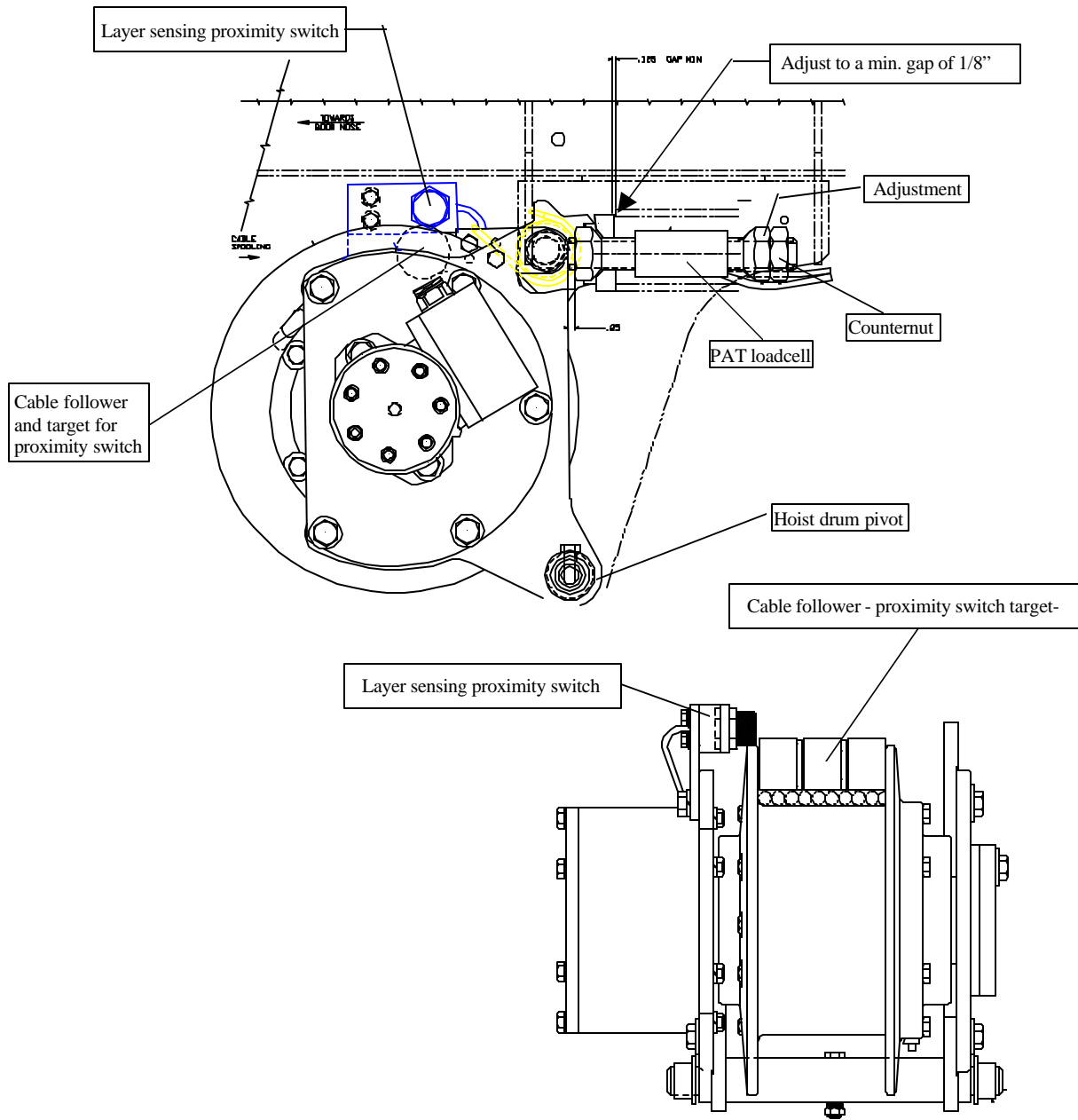
Note: The drawing shows the model FMTV-W. The FMTV-C has only single line capability.

DRAWING 21 -Upright mast position (FMTV-WRECKER)

5. Intermittent cut off. No load on hook.



**5. Intermittent cut off.
No load on hook.**

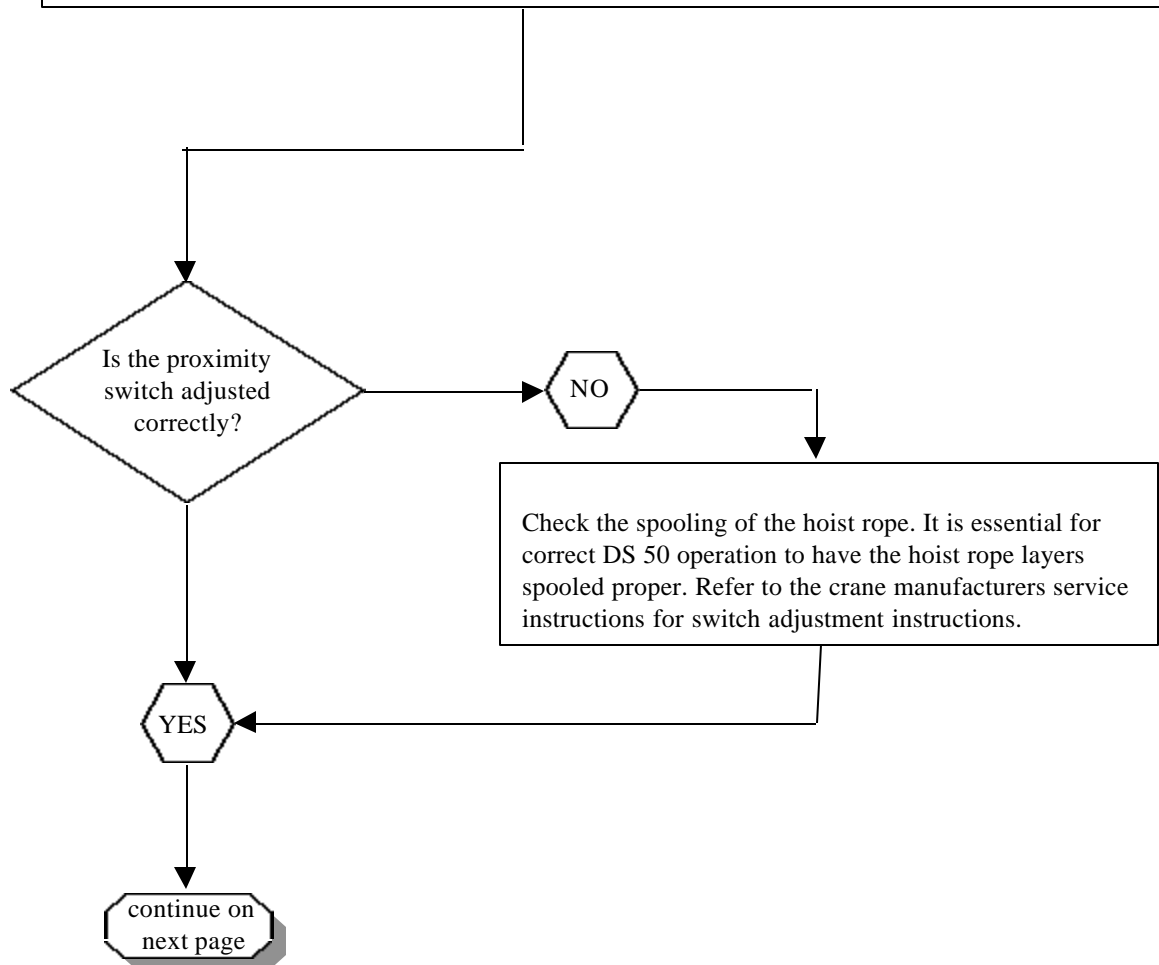


DRAWING 22 - Loadcell inspection and layer sensor installation

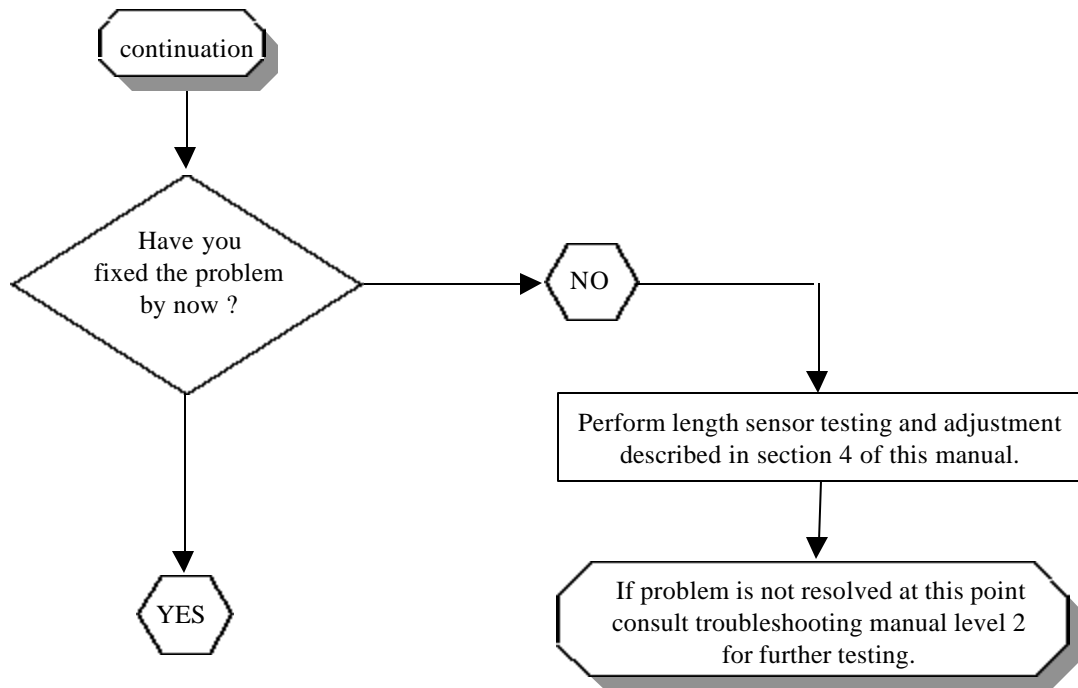
5. Intermittent cut off. No load on hook.

Continuation

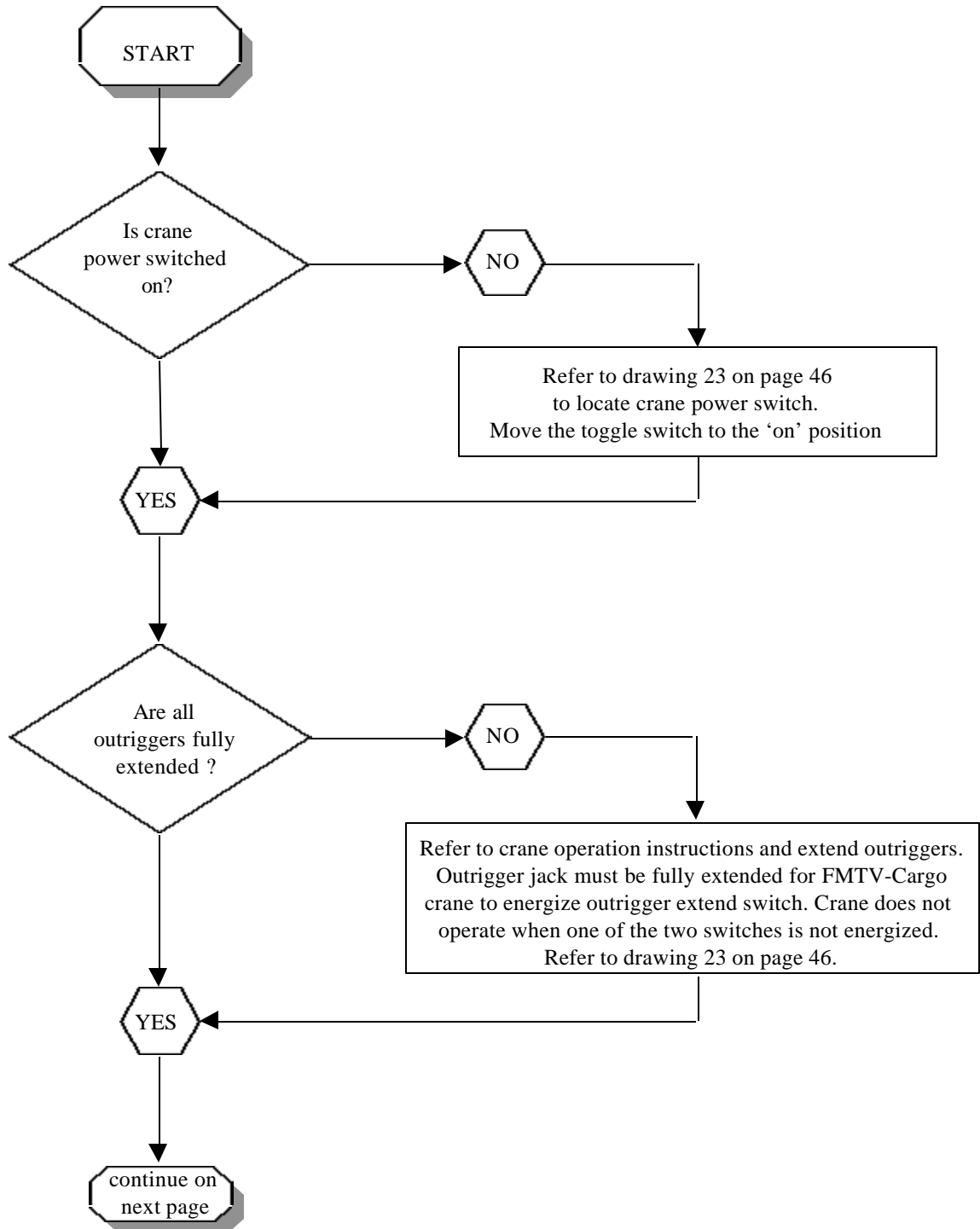
Refer to page 39 and locate the layer sensing proximity switch on the hoist drum. Check the switch adjustment. The cable follower is used as target. The switch shall sense more than one layer of hoist cable on the drum for the FMTV-C model and more than two layers on the drum for the FMTV-W model. Boom up to the highest angle position and telescope fully out. Then hoist down and watch that the cable follower is covering at least partially the sensing area of the switch. The gap between the proximity switch and the cable follower shall not exceed 1/8".
-Refer to crane manufacturers service instructions. For electrical testing refer to Troubleshooting Manual, Level 2.-



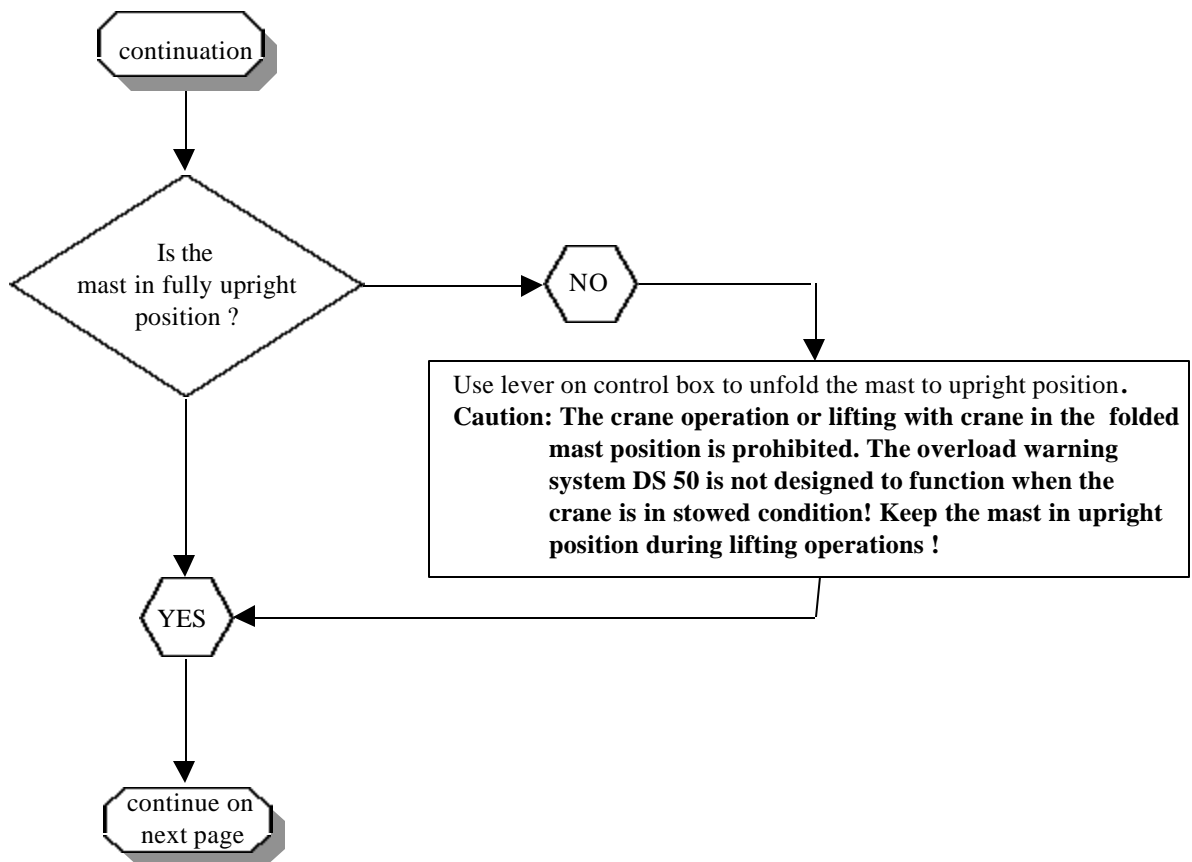
**5. Intermittent cut off.
No load on hook.**



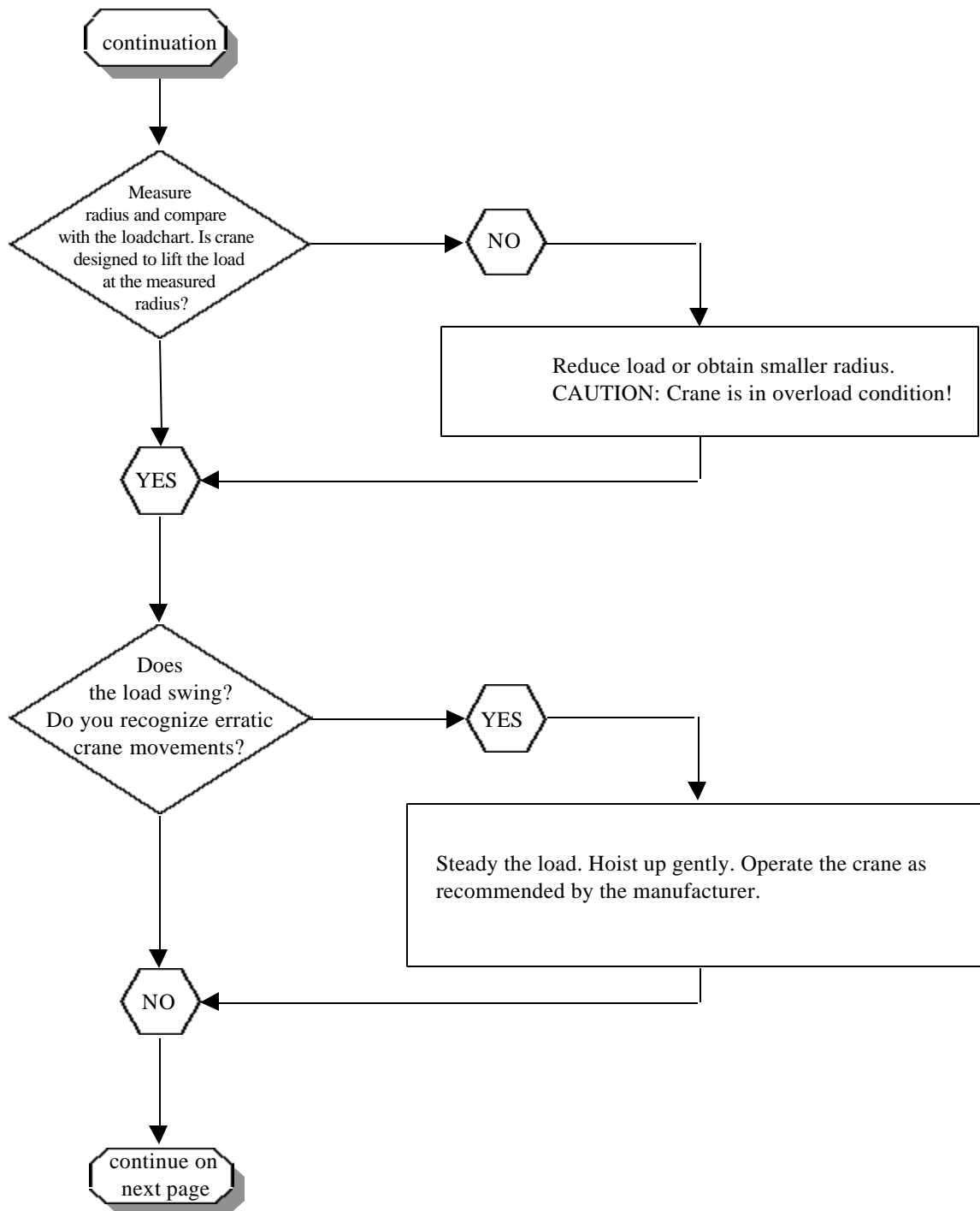
6. Cut off too early or too late. Load on hook



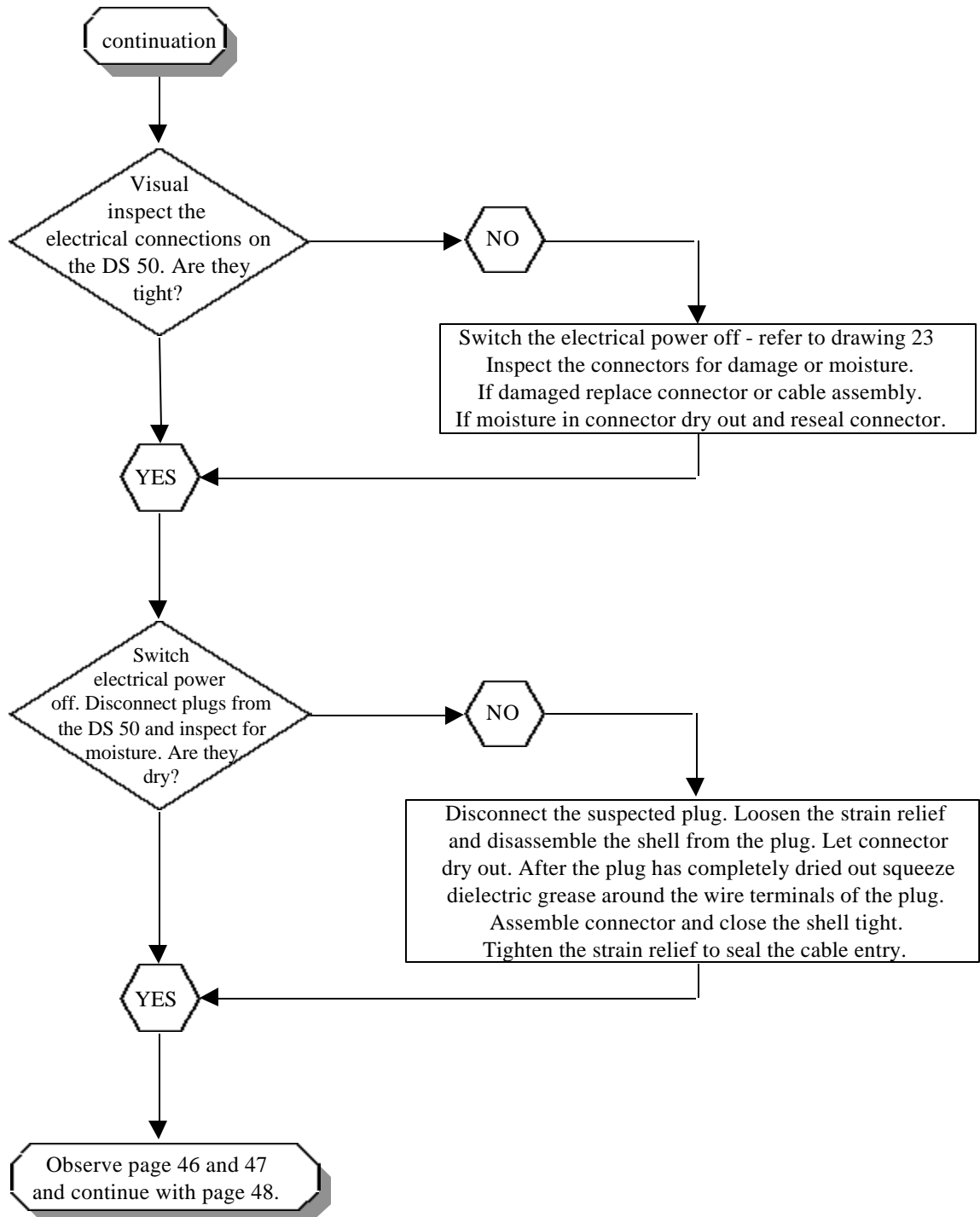
6. Cut off too early or too late. Load on hook



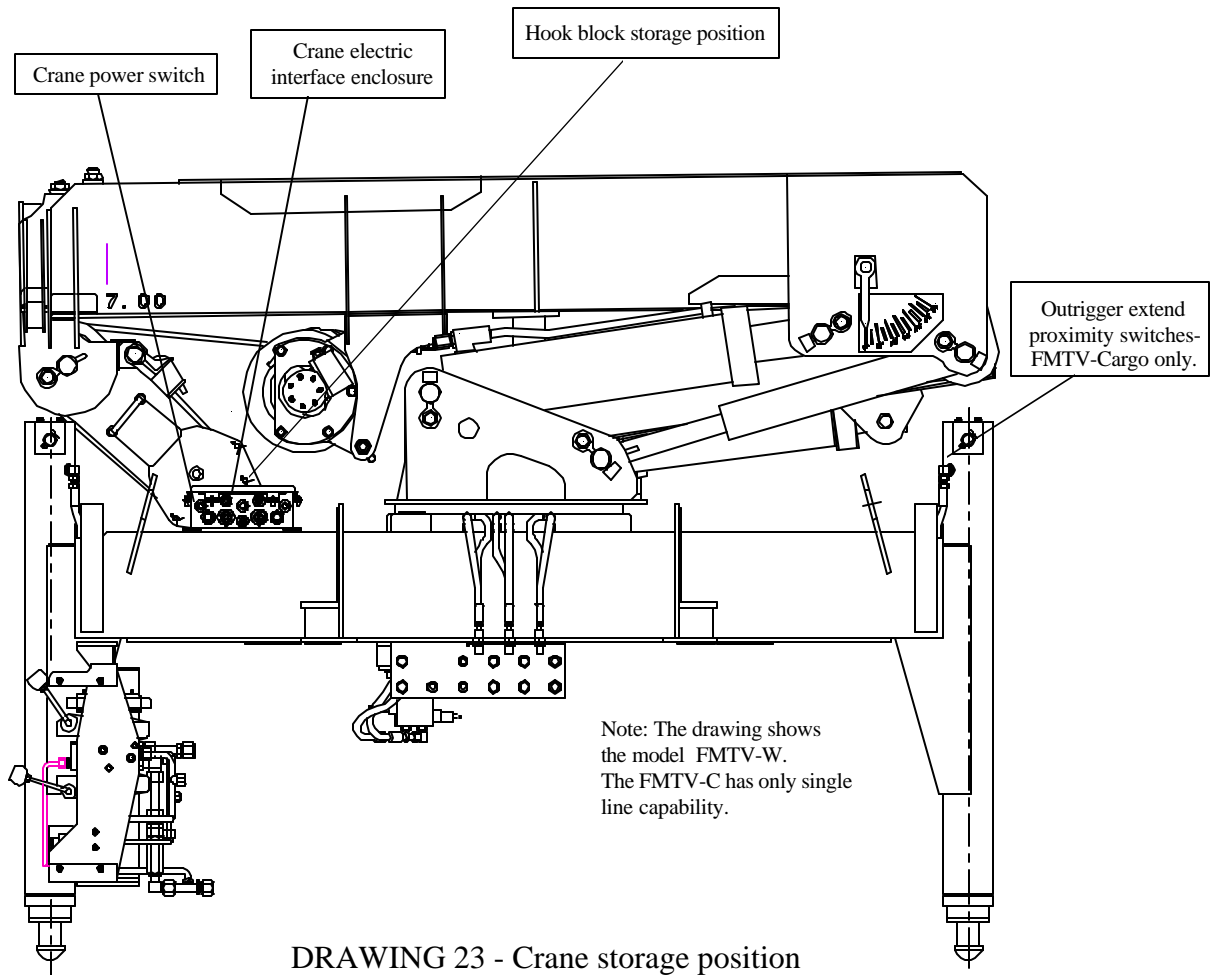
6. Cut off too early or too late. Load on hook



6. Cut off too early or too late. Load on hook



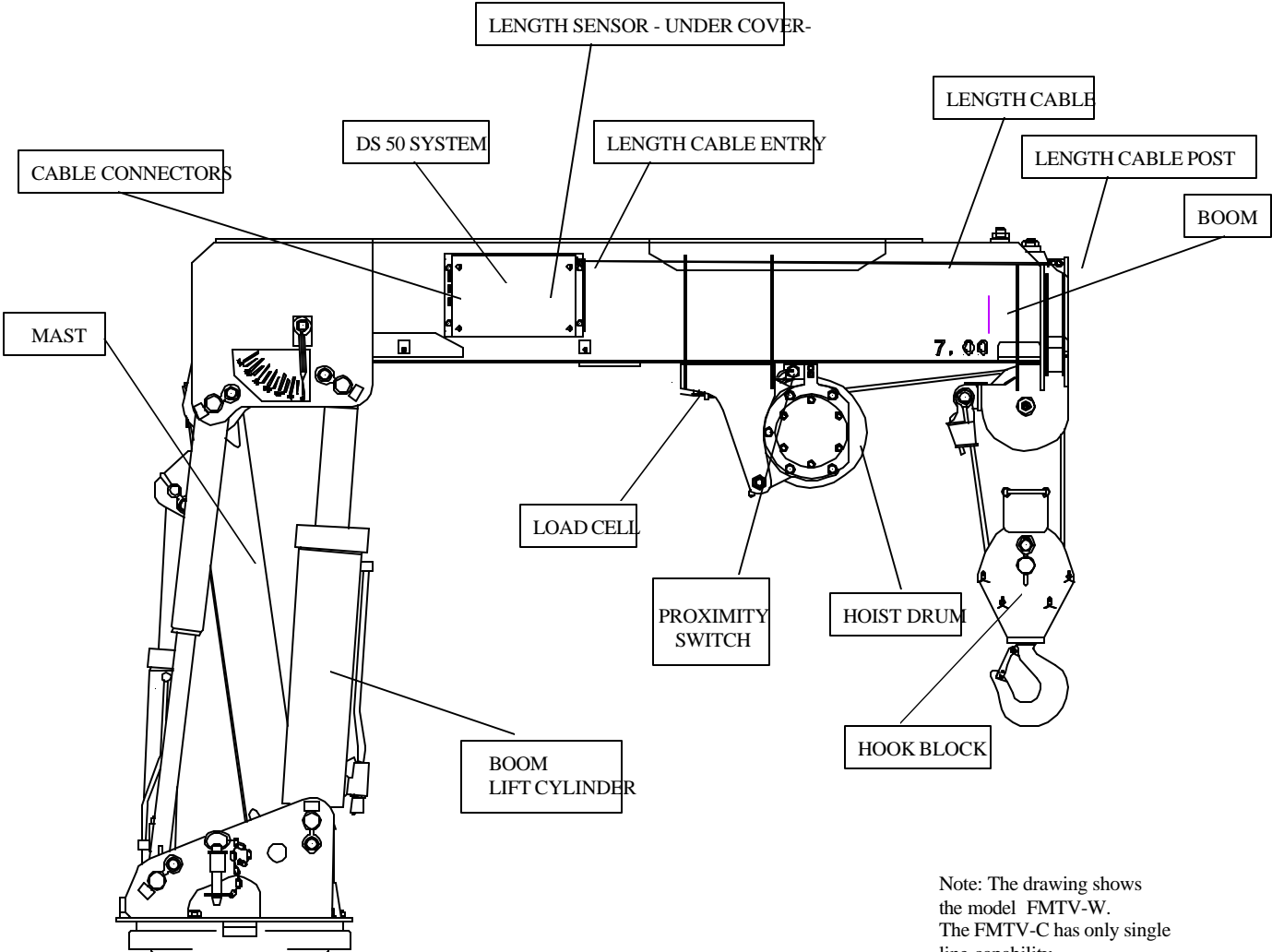
**6. Cut off too early or too late.
Load on hook**



DRAWING 23 - Crane storage position

Caution !
Crane is shown folded for transportation.
For lifting operations the mast has to be in upright position
and the hook lifted out of the transportation storage.

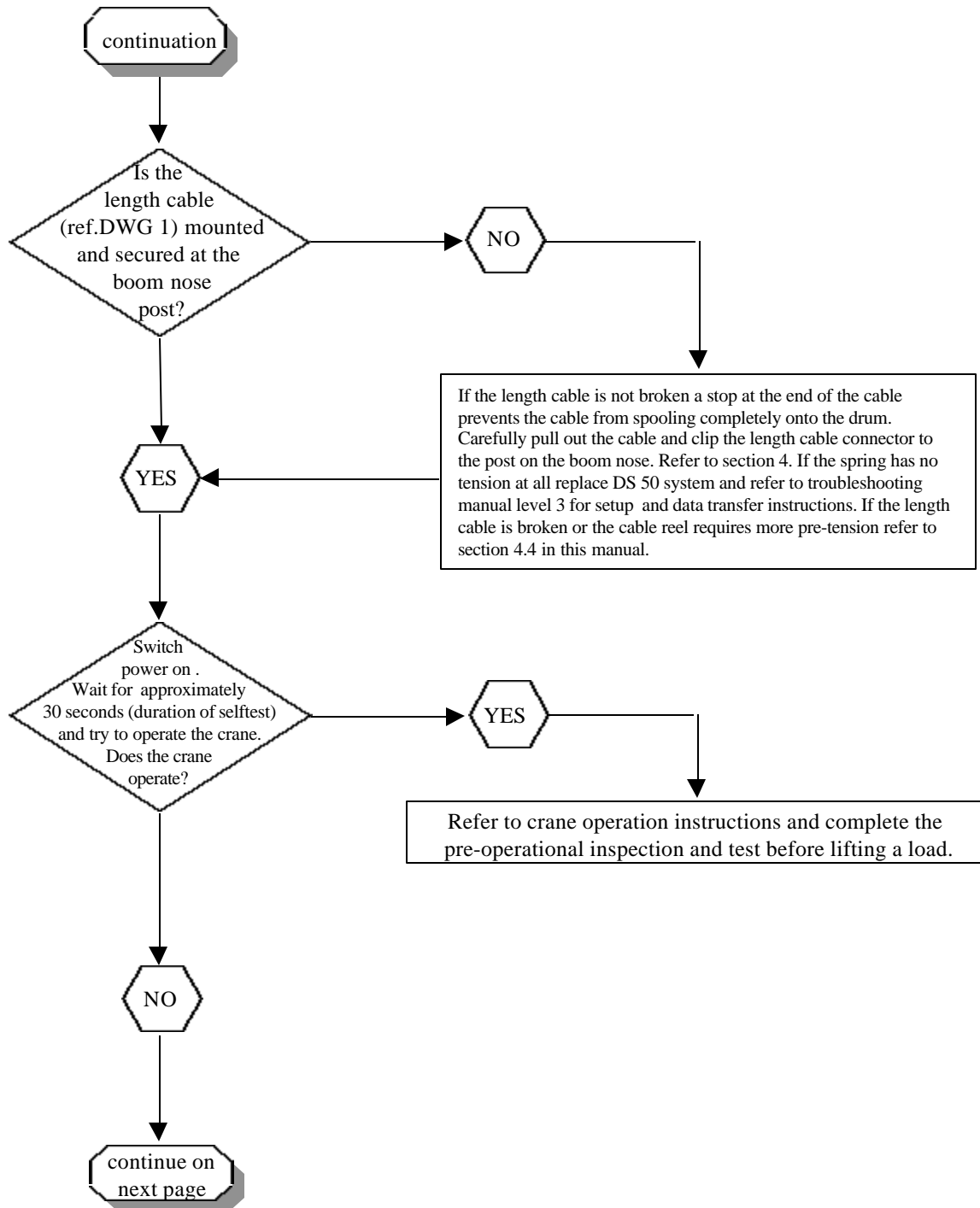
**6. Cut off too early or too late.
Load on hook**



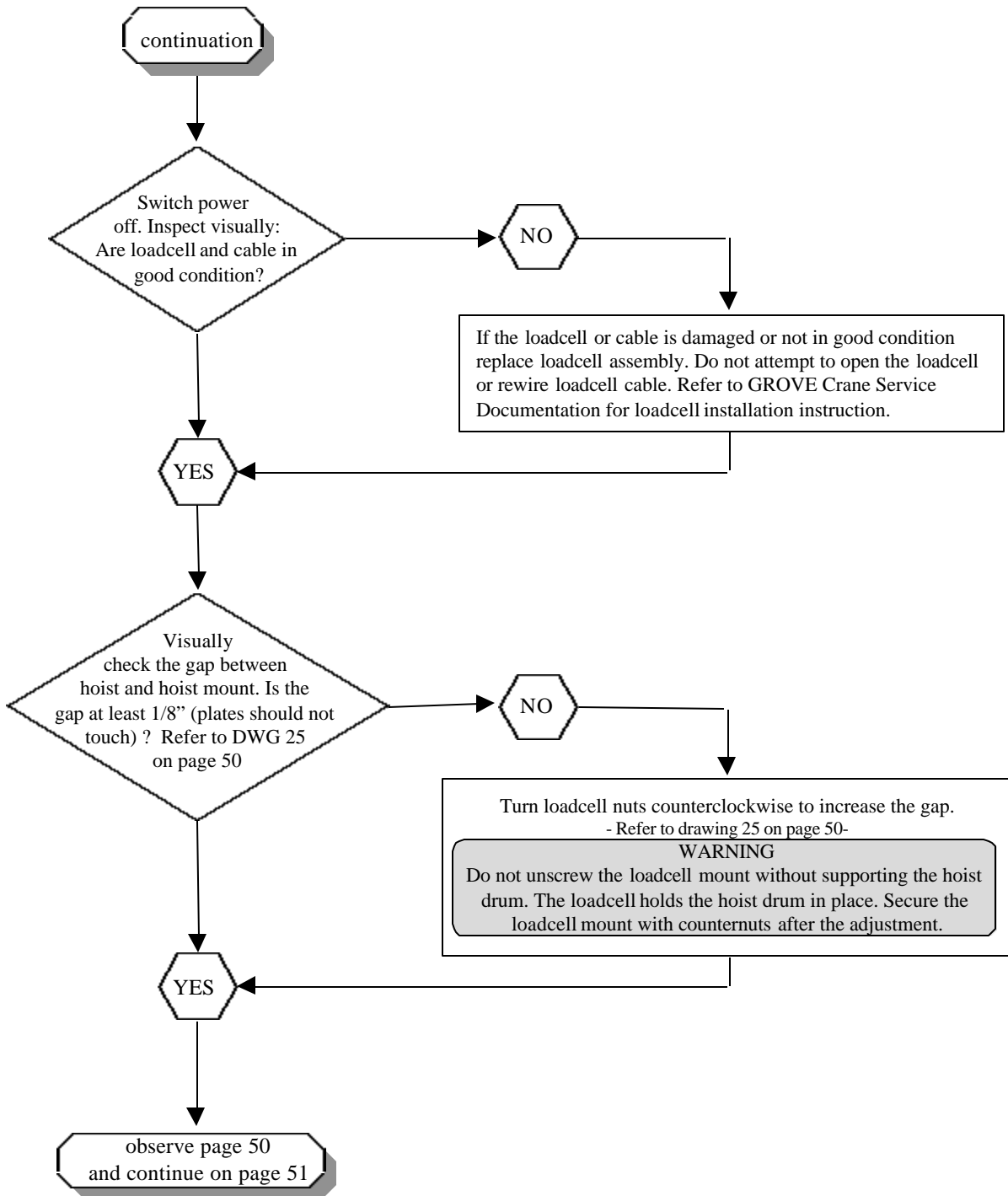
Note: The drawing shows the model FMTV-W. The FMTV-C has only single line capability.

DRAWING 24 -Upright mast position (FMTV-WRECKER)

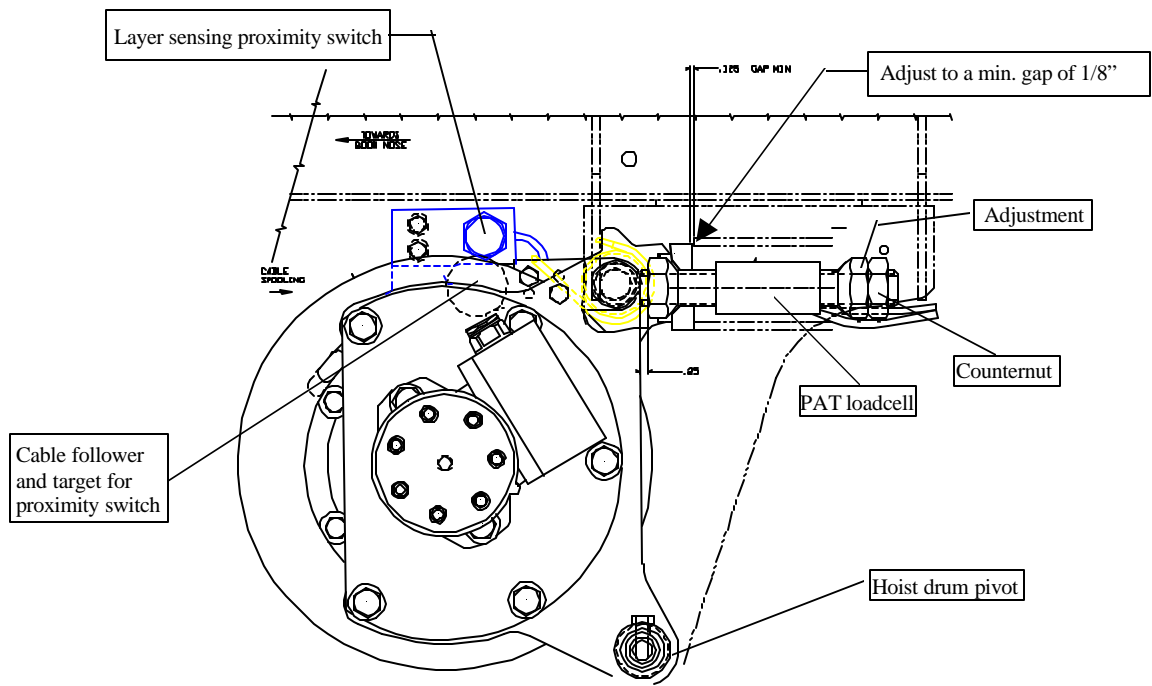
6. Cut off too early or too late. Load on hook



6. Cut off too early or too late. Load on hook

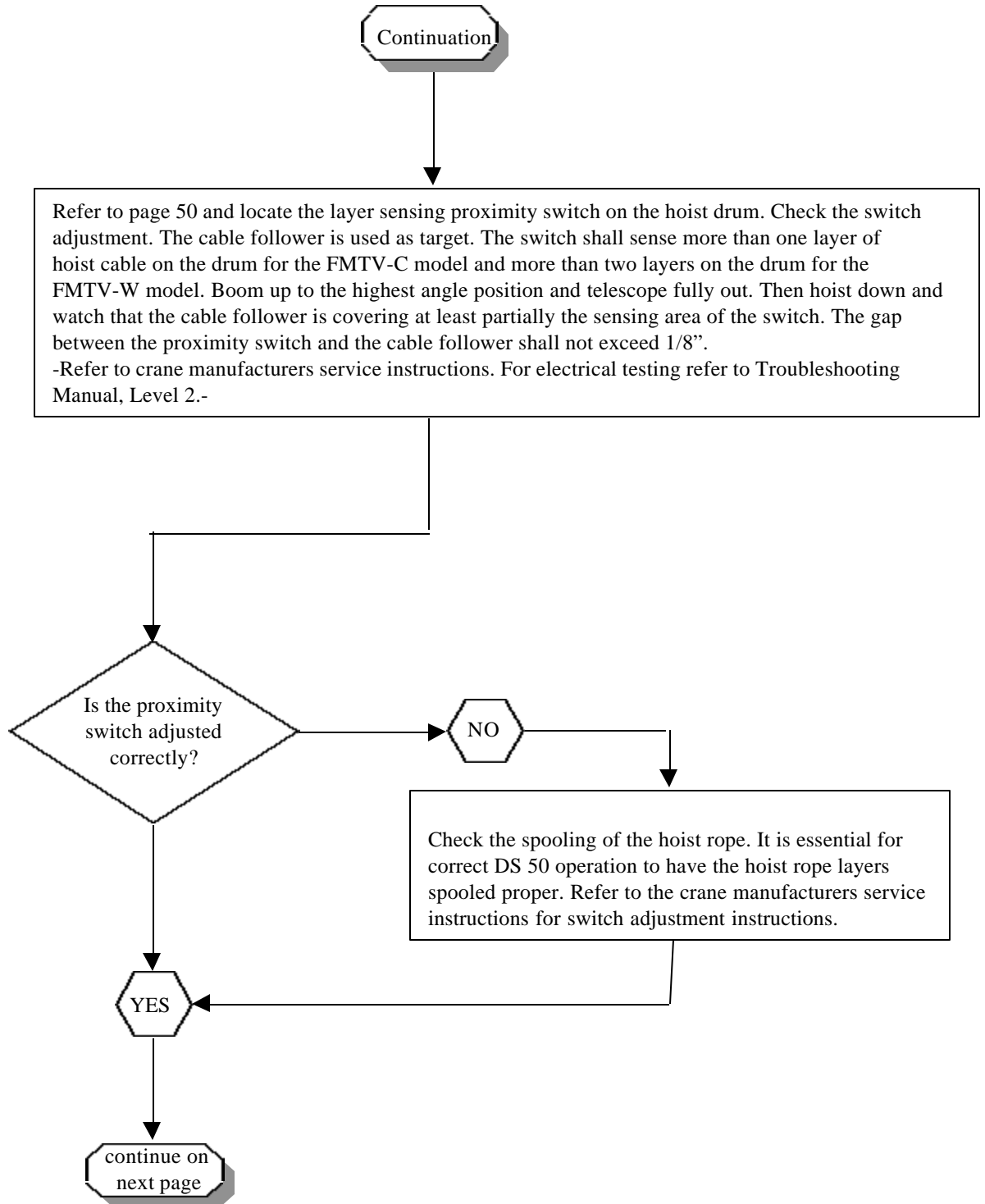


**6. Cut off too early or too late.
Load on hook**

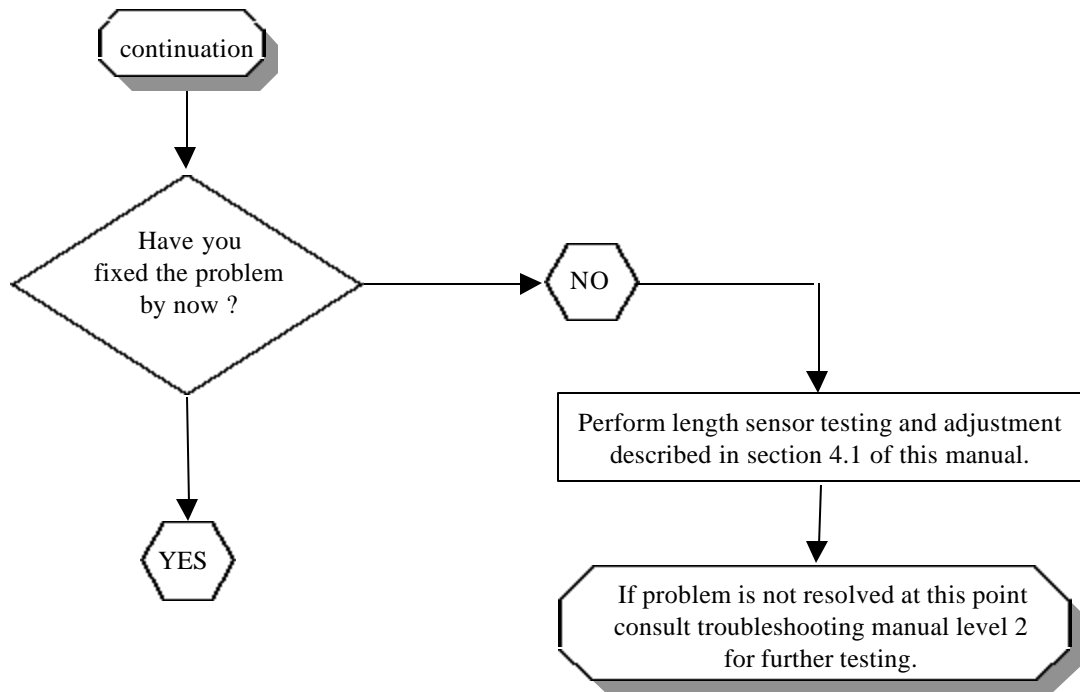


DRAWING 25 - Loadcell inspection and layer sensor installation

6. Cut off too early or too late. Load on hook



6. Cut off too early or too late. Load on hook



7. Maintenance

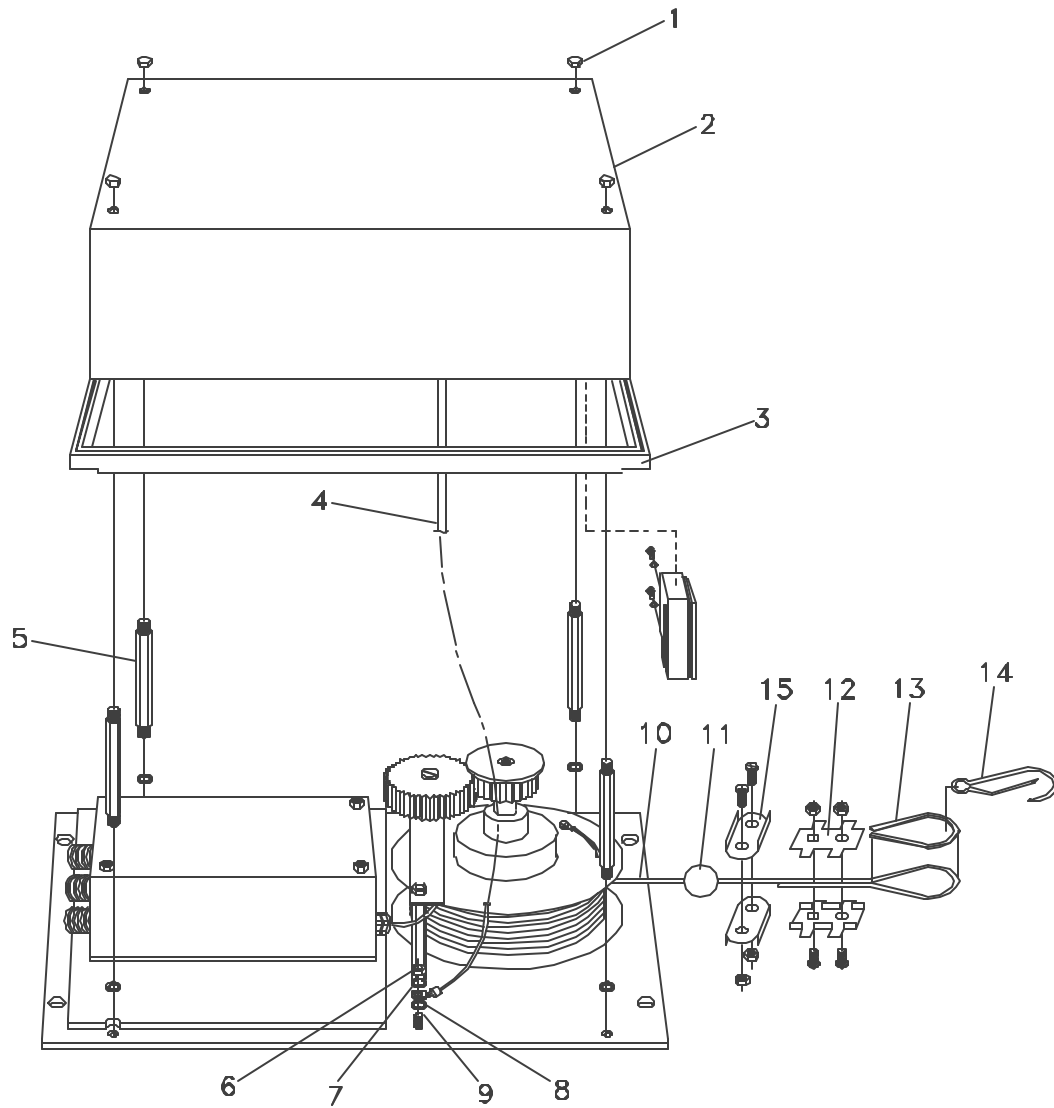
CAUTION

The following maintenance shall be performed by trained maintenance or service personal only.

1. Before lifting perform the pre-operational checks described in the crane operation instructions.
2. Daily inspect cables, systems hardware and length cable for damage or wear. Perform corrective action if needed.
3. Daily inspect the hoist rope spooling and the operation of the cable follower. Correct the problem prior to further operation.
4. Monthly inspect all mounting hardware for tight fit, such as screws, nuts, length cable mount to the boom nose, etc. Tighten all mounting hardware before proceeding with the crane operation.
5. Monthly inspect the loadcell mounting. Check the tightness of the key plate securing the loadcell nuts from turning. Correct the loadcell mounting and tighten all hardware.
6. Semi - annually perform a length transducer test as described in section 4. Remove the outer lid. Retract the boom completely. With a pencil mark the position of the length sensor potentiometer slot on the large gear wheel. Telescope several times out and in. Observe the position of the slot. The marking and the slot shall always agree. If not remove any excessive lubrication from the potentiometer shaft and re - adjust mechanically the gear assembly as described in section 4. Reset length sensor. Note: The o-rings inside the large gear wheel require lubrication. Do not remove the o-ring lubrication. Repeat the test. If the potentiometer still slips replace large gear wheel with o-ring clutch.
7. Semi - annually remove the lids and check the system for possible moisture accumulation. Replace the desiccant bags if they feel wet.

8. PARTS

8. SPARE PARTS



CENTRAL UNIT DS 50

8. SPARE PARTS

CENTRAL UNIT OSDS - DS50

PART NO: 024-050-060-001

NO.	PART NO.	QTY	DESCRIPTION
1	000-206-081-060	4	CAP NUT, DIN 91 7 -A2 E
2	024-050-050-001	1	COVER
3	020-915-100-715	1	GASKET
4	029-000-060-094	1	JUMPER CABLE
5	024-050-050-007	4	STAND-OFF, M5
6	031-300-100-221	1	NUT, M5
7	031-300-100-220	1	LOCKWASHER, M5
8	031-300-100-219	1	WASHER, M5
9	031-300-100-222	1	STAND-OFF, M5
10	000-673-020-001	1	LENGTHCABLE, SINGLE N.S.
11	002-130-505-170	1	RUBBER ENDSTOP BUFFER
12	000-217-032-002	1	CABLE CLAMP
13	000-217-048-404	1	THIMBLE END
14	000-217-100-005	1	QUICK DISCONNECT CLAMP
15	002-130-505-150	1	CABLE ENDSTOP
16	031-300-100-206	1	VCI DEVICE

8. SPARE PARTS

OSDS - DS50 LOAD CELL

PART NO: 046-004-060-001

NO.	PART NO.	QTY	DESCRIPTION
1	046-004-060-001	1	LOAD CELL

