

U ***SER MANUAL***

Hydraulic Force Control

***Carton Clamp on
Raymond 4250 Truck
(2017), Kit 6923464***

Manual Number 6923662

**cascade[®]
corporation**

Cascade is a Registered Trademark of Cascade Corporation

CONTENTS

	Page
OVERVIEW	1
INSTALLATION	2
Prepare Attachment Valve	2
HFC Valve	3
Equalizer Valve	3
Heavy Load Override Valve	3
Hoses	4
Wiring	5
Disabling HFC System	8
SETUP	9
OPERATION	11
TROUBLESHOOTING	12
GLOSSARY	14

HYDRAULIC FORCE CONTROL (HFC)

This manual provides installation instructions for the Cascade Hydraulic Force Control (HFC) system for Carton Clamps. If you need additional information or assistance, contact Cascade Corporation. Refer to the back cover.

What The System Does

The HFC system enables Cascade Carton Clamps to automatically apply clamp force proportional to weight of the load. This system will reduce the chance of damage caused by excessive clamp force.

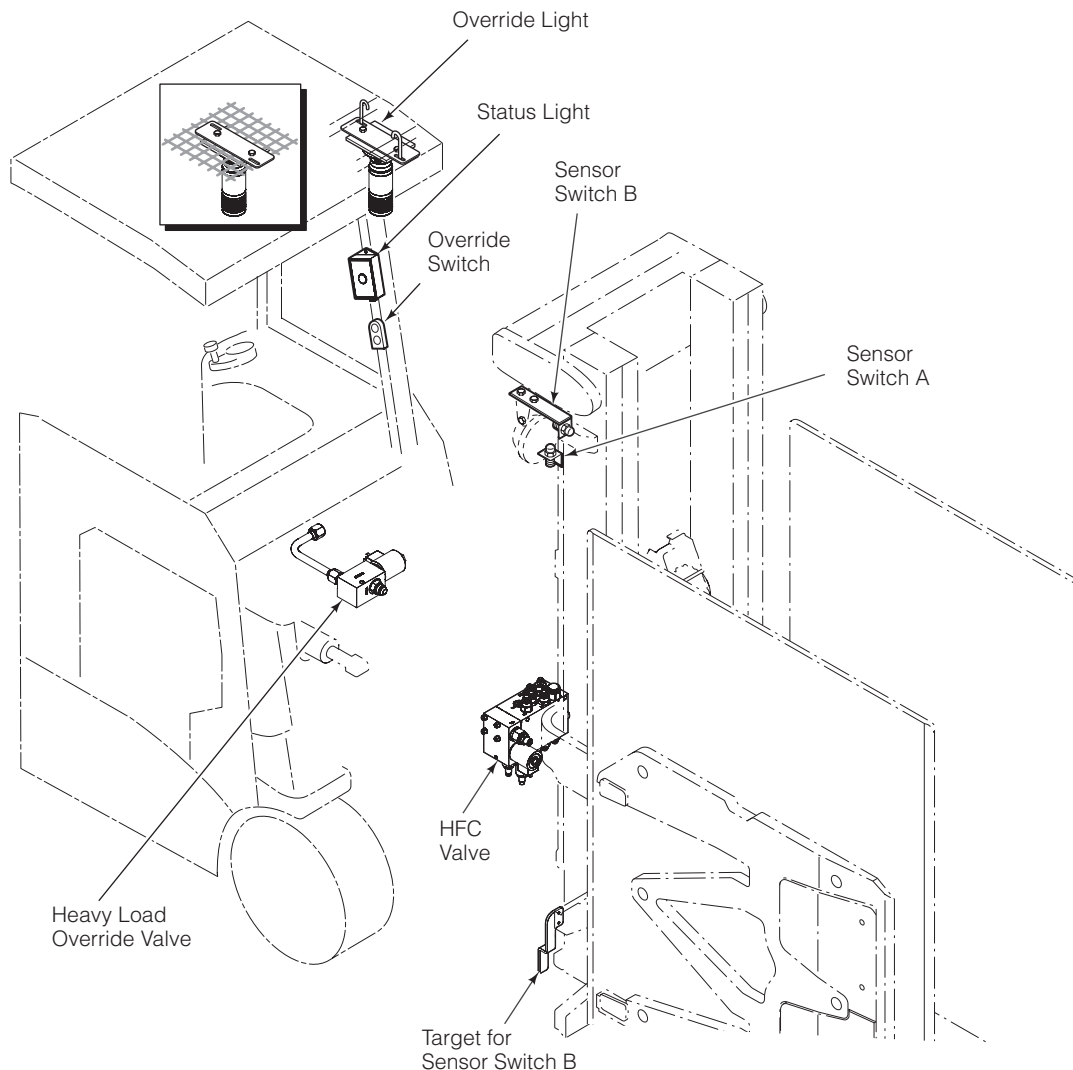
How The System Works

An initial no-slip starting pressure is applied to the load when it is first clamped. As the load is lifted, the HFC system increases clamp force and applies a consistent clamp force proportional to load weight. The hoist system provides pressure to the HFC to increase clamp pressure as hoist pressure increases.

Prior to Installation

The system can be calibrated to balance the clamp force relationship of clamp capacity and truck size. The truck HOIST pressure should be equal to or higher than clamp pressure to properly clamp the load. Total weight equals load weight plus clamp weight.

Confirm that the truck size is compatible with the clamp capacity. Available maximum hoist pressure with load weight (combined maximum size load and weight of the clamp) should be determined in freelif. The hoist pressure determined needs to be within 10% of the clamping pressure required to clamp the heaviest load.



INSTALLATION

PREPARE ATTACHMENT VALVE



WARNING: Before removing hydraulic lines or components, relieve pressure in the hydraulic system. Turn truck off and open the truck auxiliary control valve(s) several times in both directions.

WARNING: Follow all recommended safety practices including chaining the freelif mast to the mainlift crossmember when mast is raised.

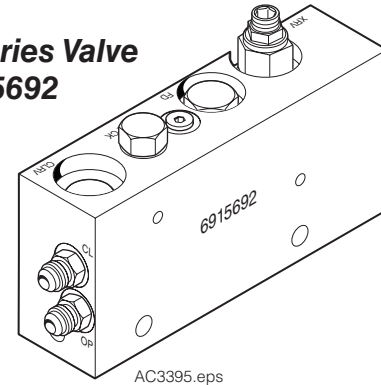
IMPORTANT: J-Series attachments equipped with valve 6915692 do not require the installation of the setscrew or pipe plug included in the HFC kit.

- 1 Open attachment arms to frame width.
- 2 Disconnect the hydraulic hoses from the valve CLAMP (CL), OPEN (OP), SIDESHIFT RIGHT (SSR) and SIDESHIFT LEFT (SSL) ports.
- 3 Remove CL port special fitting with spool or orifice pipe plug.
- 4 Install kit pipe plug into CL port and reinstall fitting leaving spool out (as needed for G-Series valves).

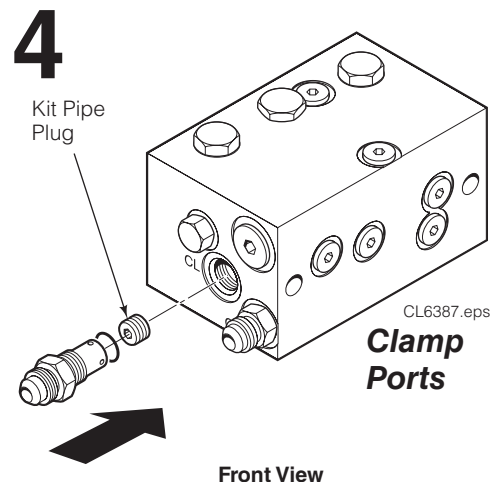
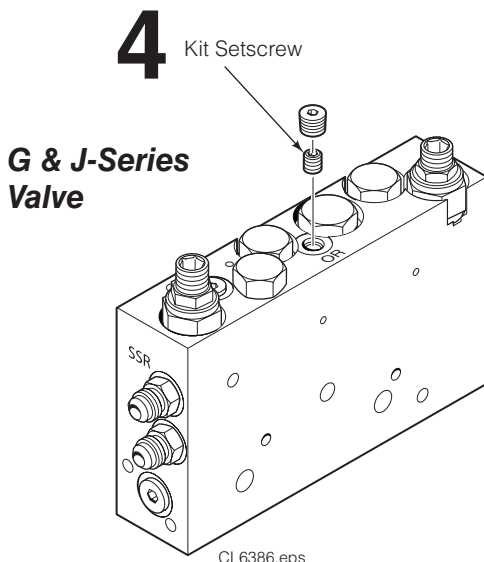
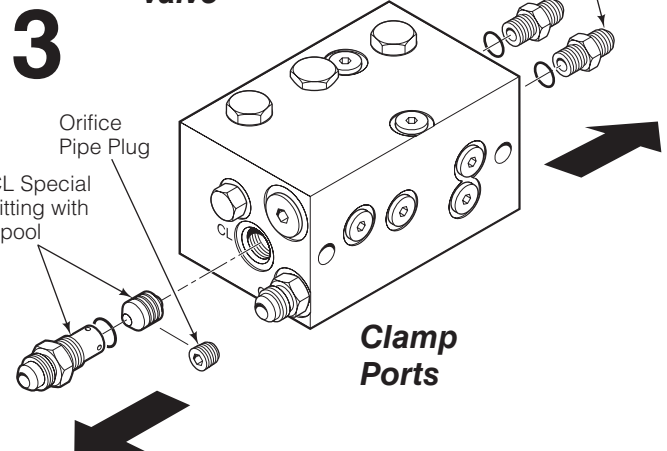
D-Series Valves – .25 in. dia. NPTF plug (Part No. 6603)

G & J-Series Valves – .3125 in. dia. setscrew (Part No. 5304)

**J-Series Valve
6915692**



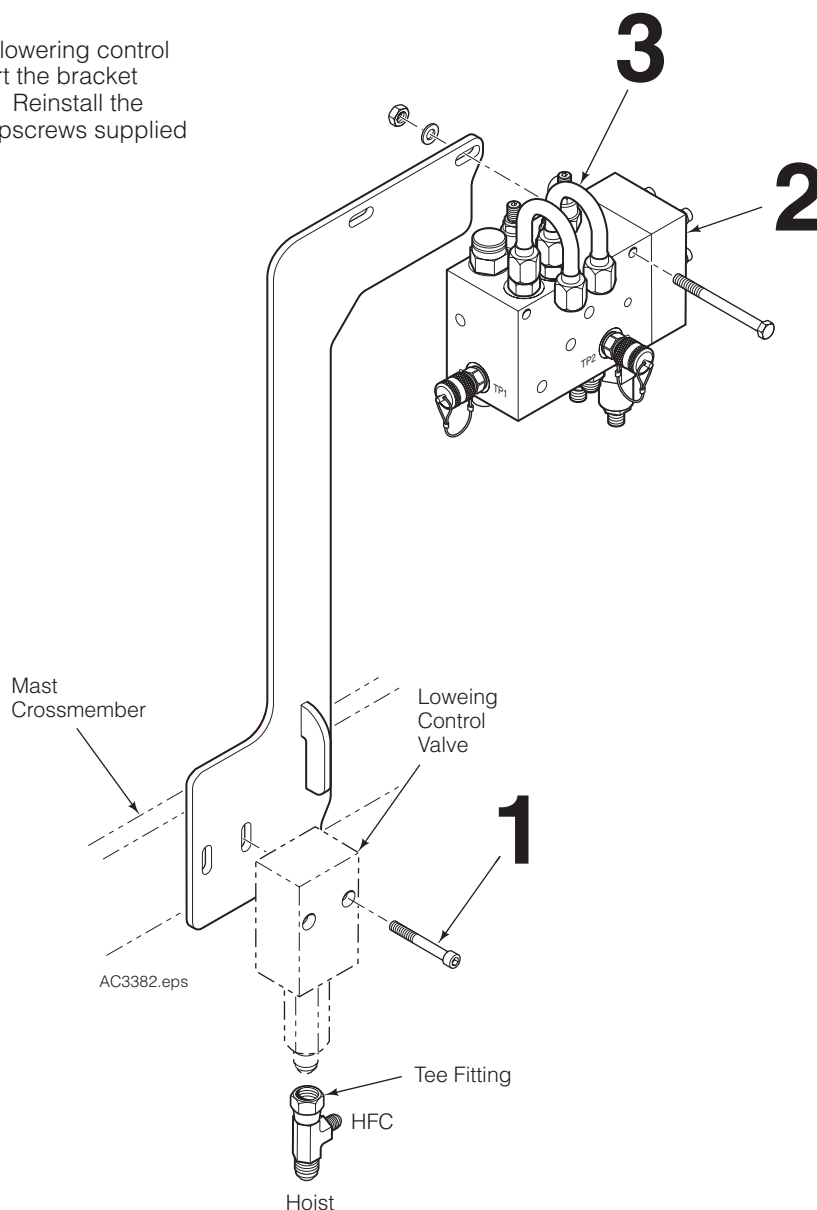
**D-Series
Valve**



INSTALLATION

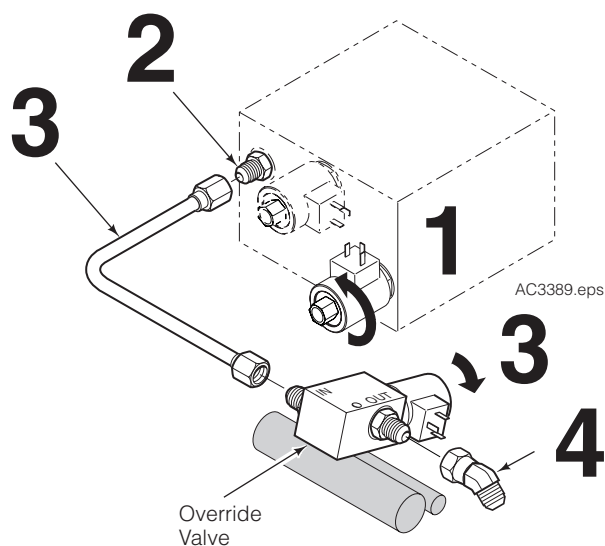
HFC VALVE

- 1 Remove the capscrews fastening the lowering control valve to the mast crossmember. Insert the bracket between the crossmember and valve. Reinstall the valve using the longer sockethead capscrews supplied in the kit.
- 2 Install the HFC valve to the bracket.
- 3 Install tubes to the valve top fittings.



HEAVY LOAD OVERRIDE VALVE

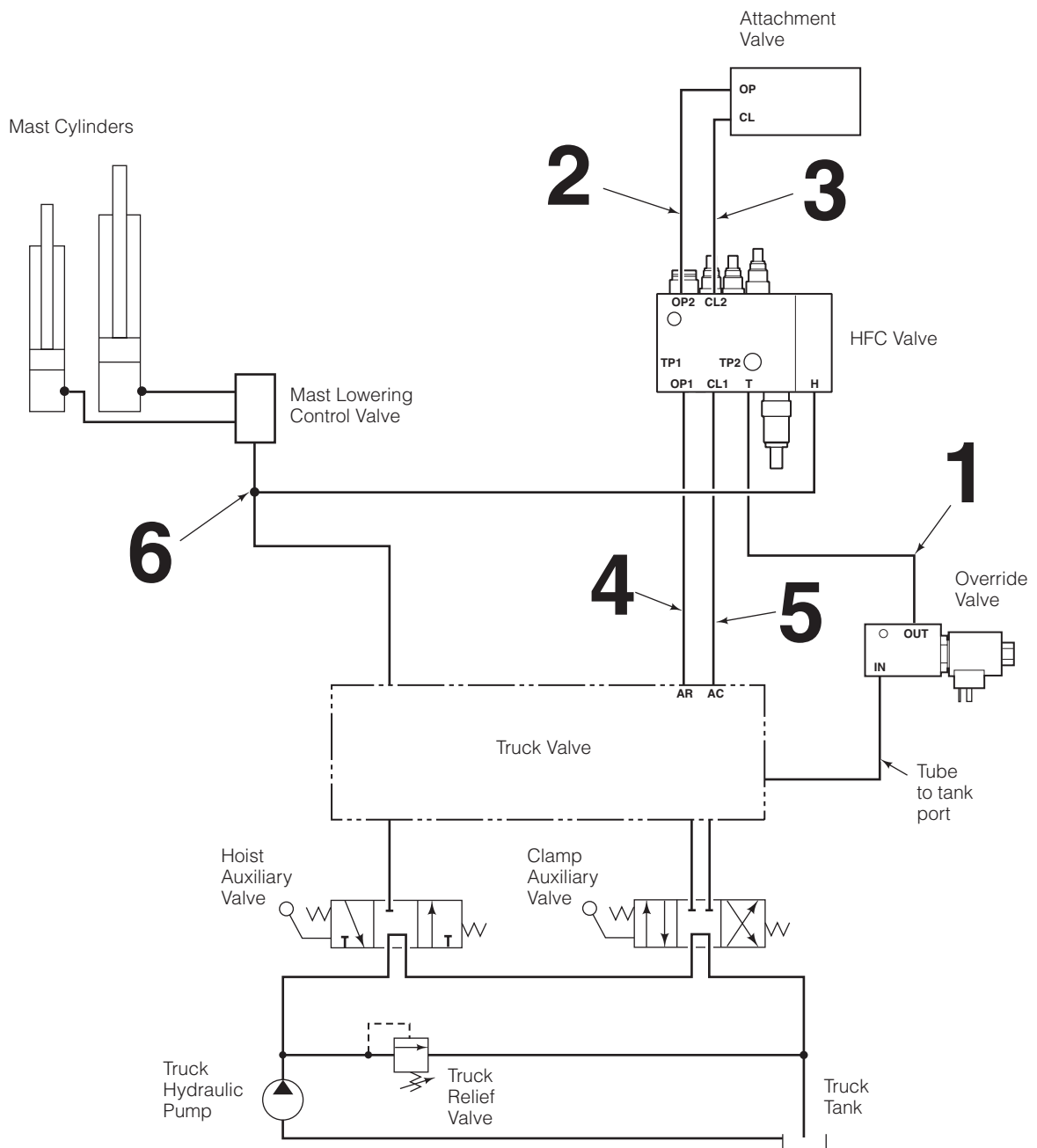
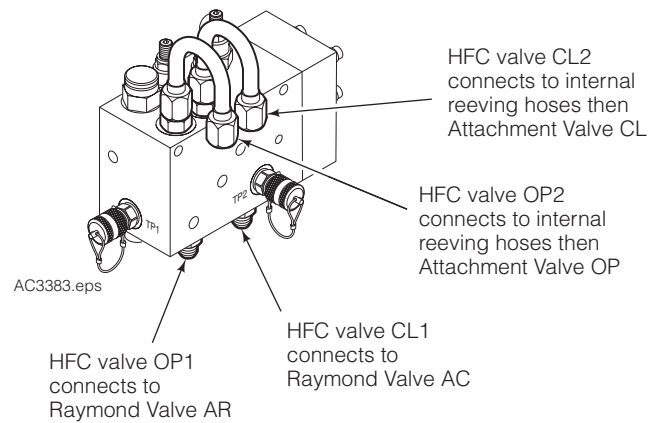
- 1 Turn the truck valve solenoid coil to position the connectors upward. This makes clearance for the override valve.
- 2 Remove the plug from the truck valve tank port. May require a 5/8 in. extractor to remove the plug. Install a No. 10-8 fitting in the port.
- 3 Install the tube to the override valve IN port and truck valve tank port. The valve will be laying on truck hoses, turn the valve downward for clearance.
- 4 Install a No. 8 45° fitting to the valve fitting.



INSTALLATION

HOSES

- 1** Connect a No. 8 hose (6898920) from the T port on the HFC valve to the OUT port on the Override Valve.
- 2** Disconnect the hose from the truck valve AR port. Connect the hose to the HFC valve OP2 port tube.
- 3** Disconnect the hose from the truck valve AC port. Connect the hose to the HFC valve CL2 port tube.
- 4** Connect No. 6 hose (6923278) from the truck valve AR port to the OP1 port of the HFC valve.
- 5** Connect No. 6 hose (6923155) from the truck valve AC port to the CL1 port of the HFC valve.
- 6** Install a No. 8-4-8 Tee fitting to the bottom of the lowering control valve. Connect No. 4 hose (6923279) from the H port on the HFC valve to the Tee fitting.



AC3383.eps

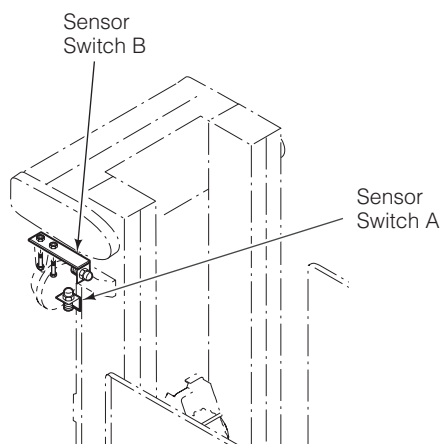
INSTALLATION

WIRING

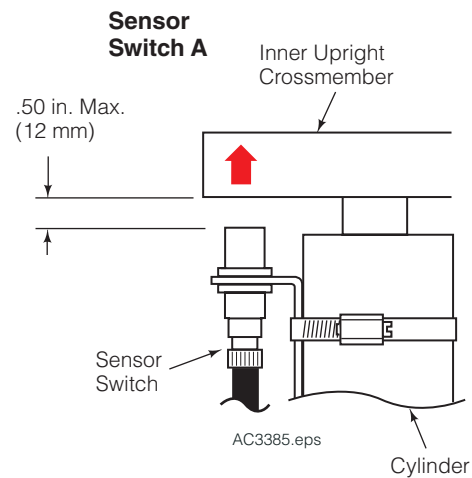
1 Mount sensor switches A and B on the mast.

Mount sensor switch A at the top of the mast cylinder shell with the hose clamp. Set the gap between the sensor and crossmember target at .50 in. (12 mm) maximum.

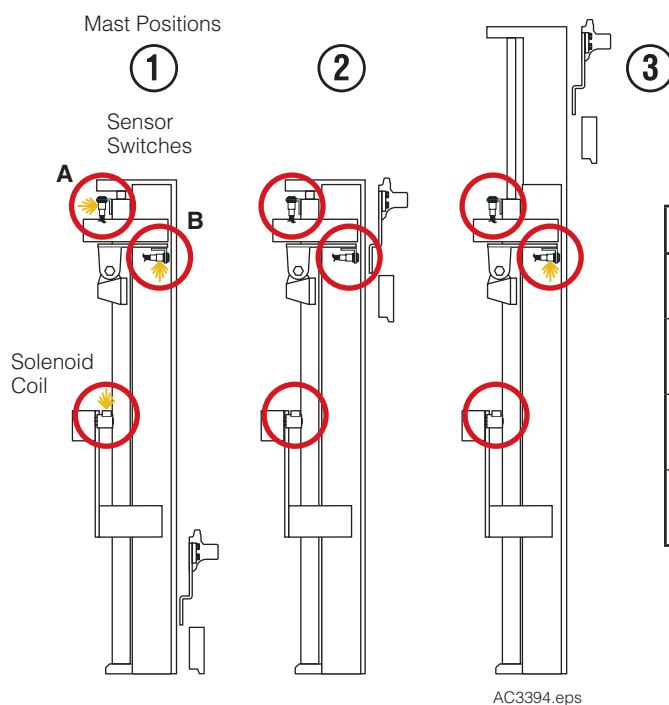
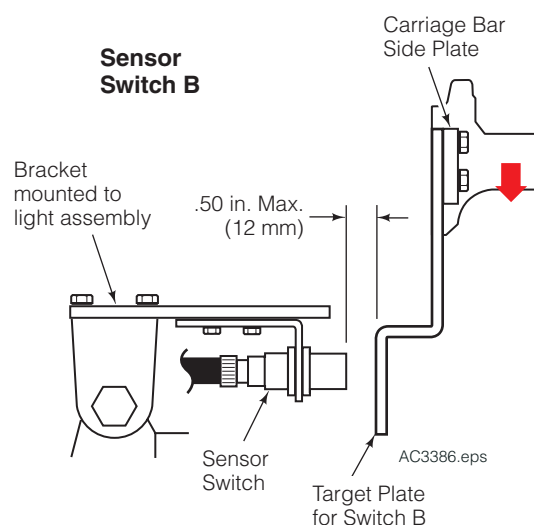
Mount sensor switch B and bracket to the light assembly on the right side of the mast. Mount the target plate for switch B to the upper carriage bar side plate. Set the gap between the sensor and target at .50 in. (12 mm) maximum.



Sensor switch **A** is used to detect inner upright extension. Sensor switch **B** is used to detect when the carriage is positioned near full freelif. The sensor switches signal the mast transition from freelif to mainlift.



1



Sensor Switch Operation

Mast Position	Description	Sensor Switch A	Sensor Switch B	Solenoid Coil
①	Carriage fully lowered or in freelif	Light ON	Light ON	Light ON
②	▲ Carriage in freelif prior to mainlift	OFF	OFF	OFF
③	Carriage and inner upright in mainlift	OFF	Light ON	OFF

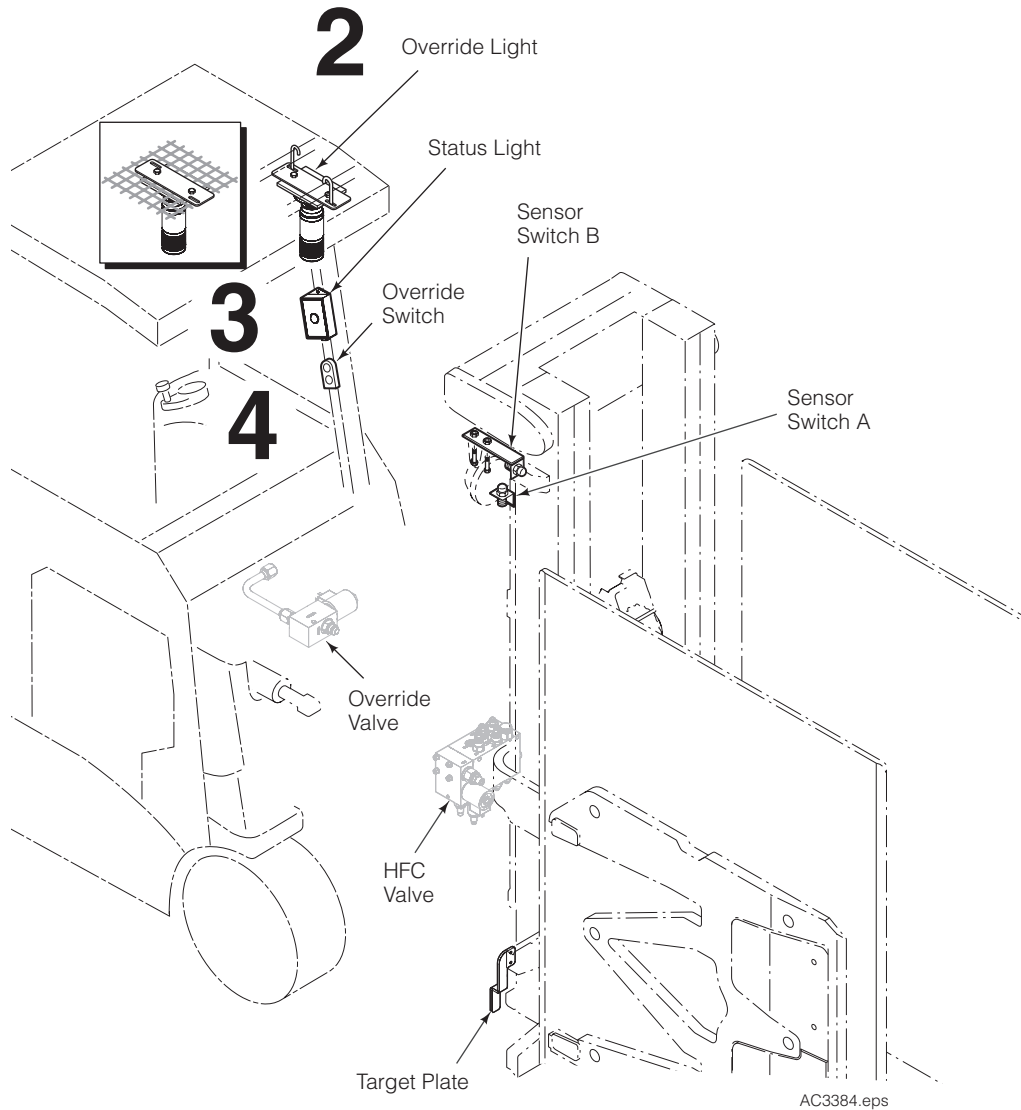
▲ Sensor switch B must see the target 2 in. (50 mm) before mainlift and through the beginning of mainlift.

INSTALLATION

WIRING

CAUTION: Consult the Lift Truck OEM for proper + power source connection.

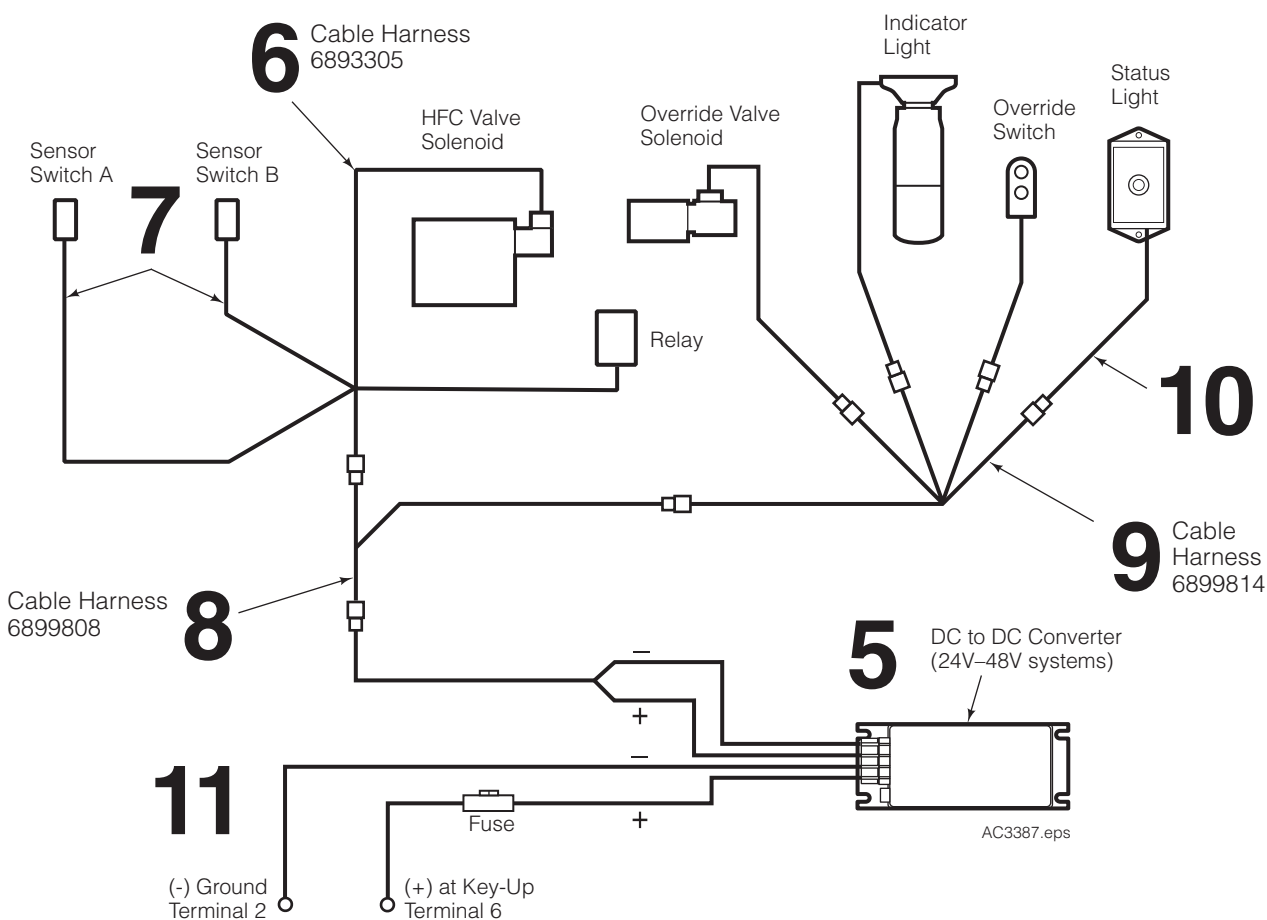
- 2** Install the Override Light and mounting plates to the overhead guard. If the guard has bars, use the J-bolts. If the guard has screen, clamp the screen between the plates.
- 3** Install the Status Light to the overhead guard upright using zip ties.
- 4** Install the Override Switch to the overhead guard upright using zip ties.



INSTALLATION

WIRING

- 5 Mount the Voltage Converter under the truck left side cowling.
- 6 Connect cable harness 6893305 solenoid connector to the HFC valve solenoid coil.
- 7 Connect cable harness 6893305 sensor switch connectors to the sensor switches.
- 8 Connect cable harness 6899808 to the DC-to-DC converter output connector and cable harness 6893305.
- 9 Connect cable harness 6899814 to cable harness 6899808.
- 10 Connect cable harness 6899814 to the Override Valve Solenoid connector, Indicator Light connector, Override Switch connector and Status Light connector.
- 11 Connect the negative wire from the voltage converter to (-) ground at terminal 2. Connect the positive fused wire from the voltage converter to (+) power (key-up) at terminal 6.



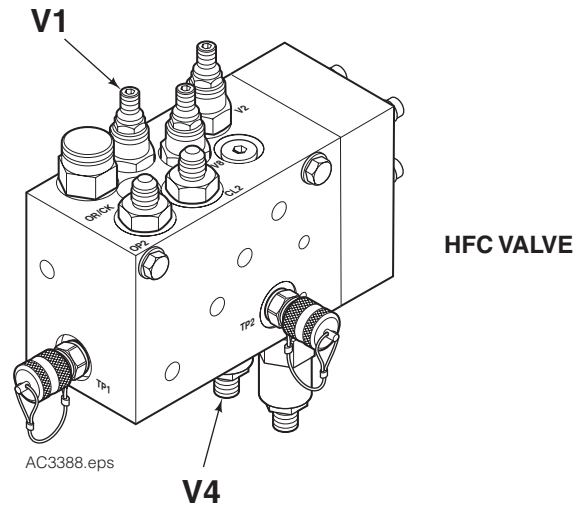
INSTALLATION

DISABLING HFC SYSTEM

To temporarily disable the HFC features, perform the following steps:

- 1** Turn V1 inward (CW) or until desired clamp pressure is reached. The maximum pressure that the cartridge is capable of handling is 3000 psi (207 bar).
- 2** Turn V4 all the way out (CCW).
- 3** The truck attachment will now operate in the standard mode.

NOTE: To enable HFC features refer to Prior To Operation Section.



SETUP

INITIAL SETUP WITHOUT PRODUCT

STEP 1: Check list prior to setup of V5A

- Install pressure gauge (Cascade pressure test kit 6034612) in HFC Valve port TP2 or HG.
- Completely turn out V2 (CCW).
- Fully clamp arms.
- Verify Sensor A and Sensor B are functioning properly. See sensor switch operation on page 5.

STEP 2: V5A Setup – Equalize pressure between Freelift and Mainlift cylinders of the truck.

- A** Choose a hoist speed either idle or full throttle, maintain this for rest of setup.
- B** Hoist mast to mainlift, hoist in mainlift, record steady state pressure below:
- C** Hoist in freelift, record steady state pressure below:

Freelift Pressure	
Mainlift pressure	

- D** If freelift pressure is lower than mainlift pressure turn in V5A (CW) to equalize pressure.
- E** If freelift pressure is higher than mainlift pressure, turn out V5A (CCW) to equalize pressure.
- If not equalizing, verify Sensor A and Sensor B are functioning properly. See sensor switch operation on page 5.

STEP 3: Check list prior to setup of V1, V2, V3, V4

- Install pressure gauge in attachment port G.
- On attachment valve completely turn in (CW) both clamp and sideshift relief valves if equipped.
- Verify that orifice was installed in attachment valve, if required.

STEP 4: V1 Setup - Starting Pressure

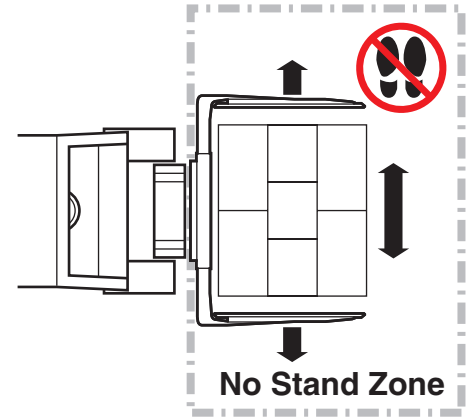
- A** Adjust V1 so that a light load is not damaged, if attachment is retrofitted from a three position relief valve, use the lowest setting.
- B** Further adjustment may be needed to handle heavy product, see V3 final setup.

STEP 5: V4 Setup – Maximum Clamping Pressure

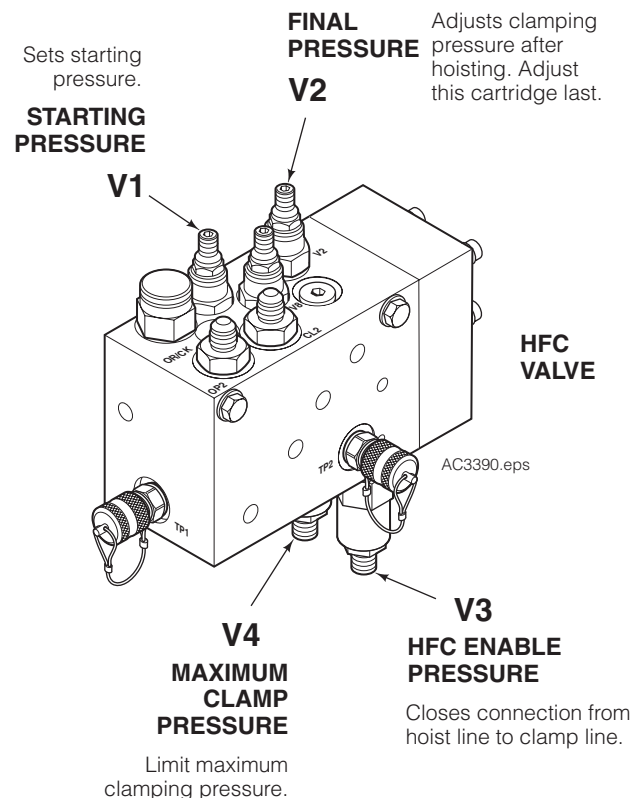
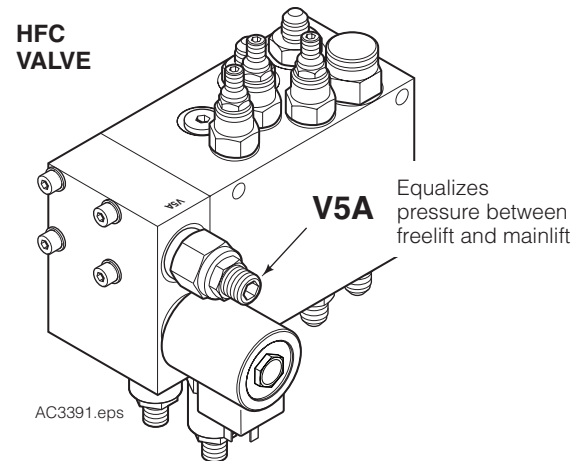
- A** Fully close arms without a load and hoist to maximum lift. Fully extend the mast and hold lever for 2 seconds. Lower the mast without unclamping and check the pressure.
- If the pressure exceeds the desired maximum clamp pressure of the heaviest load, turn out V4 (CCW) to decrease maximum pressure and repeat.
 - If the pressure is lower than desired to clamp heaviest load, turn in V4 (CW) to increase maximum pressure and repeat.

STEP 6: V3 Initial Setup – Zero out Attachment Weight

- A** Fully close the arms (clamp) and build starting pressure (V1) on gauge. Hoist attachment empty, lower and read gauge. If pressure remains unchanged, turn out V3 (CCW) a half turn. Open the arms and then re-clamp. Repeat until the pressure increases on gauge.
- B** If pressure does not increase when fully clamped and hoisting and V3 is turned out completely (CCW), make sure V2 is turned out completely (CCW).
- C** Turn in V3 (CW) a quarter turn so when hoisting, pressure remains unchanged. Pressure on gauge should read V1 pressure.



CL4644.eps



SETUP

FINAL SETUP WITH PRODUCT

STEP 7: V3 Final Setup – HFC Enable Pressure

Pressure gauge should be installed in attachment port 'G'.

- A** Clamp on lightest load and hoist. If clamp pressure increases above the starting pressure on the gauge port, turn in V3 (CW).
- B** Clamp heaviest **light** load (load that needs to be clamped a V1) and hoist. If clamp pressure increases above the starting pressure V1, turn in V3 (CW) a quarter turn at a time until pressure does not increase.
- C** Check V3 setting by clamping the heaviest load. If conditions of Steps A & B above are met but still unable to handle product:
 - If slippage occurs and product is not hoisted at all, turn in V1 (CW).

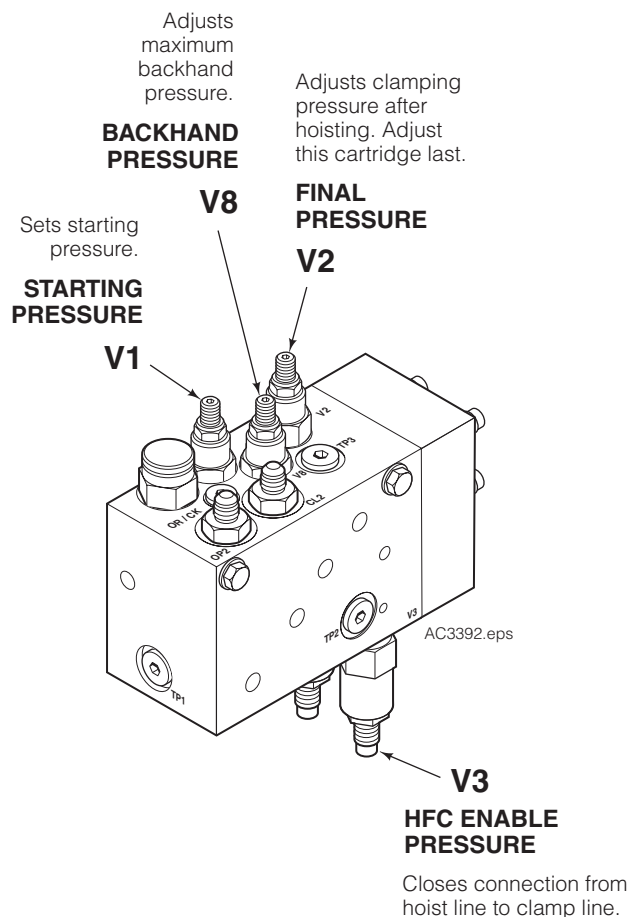
STEP 8: V2 Setup – Final Pressure (typically heavy attachment on small truck)

- A** To adjust V2, clamp a load. Hoist the load. Use the chart below to record the initial clamp pressure. If the pressure is too high for the heaviest load, turn in V2 (CW) to reduce the adjusted clamp pressure.

Load Weight	Initial Clamp Pressure	Adjust Clamp Pressure
No. 1		
No. 2		
No. 3		
No. 4		
No. 5		
No. 6		

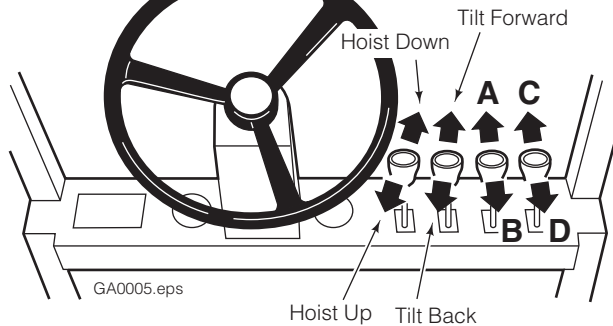
STEP 9: V8 Setup – Backhand Pressure

- A** Install pressure gauge in HFC Valve port TP1 or OPG. Open arms to maximum opening and record pressure. To decrease backhand pressure turn out V8 (CCW). Pressure must be a minimum of 1/3rd of maximum clamp pressure V4.



OPERATION

Auxiliary Valve Functions



WARNING: Truck control handle and attachment function activation shown here conforms to ASME/ANSI B56.1 recommended practices. Failure to follow these practices may lead to serious bodily injury or property damage. End user, dealer and OEMs should review any deviation from the practices for safe operation.

The HFC system works fundamentally the same as a normal lift truck system when used with a carton clamp. Use the following techniques when clamping loads:

To Lift a Unit Load

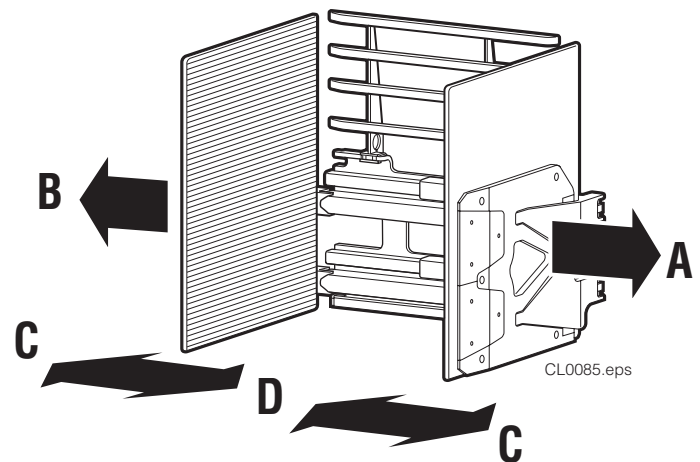
- 1** If equipped with Heavy Load Option, verify cab light is off.
 - For a light load, proceed to clamp.
 - For a heavy load, press the heavy load switch. The cab light will go on.
- 2** Clamp a unit load. Hold for 1-2 seconds to build starting clamp pressure.
- 3** Lift the load. Clamp pressure will automatically increase according to load weight.
 - If feathering is used to reduce clamp force on light loads, use the same process with HFC. However, it is recommended to use the techniques above for all loads unless absolutely necessary.

CAUTION: Develop adequate clamp force to hold the load when feathering

NOTE: HFC allows lower clamp starting pressures so that light loads can be handled without damage along with heavier loads. Slightly slower arm speed is normal. If product widths vary widely with very low starting pressures, the slower arm speed can be corrected with an optional arm overdrive system. Consult Cascade.

CLAMP/SIDESHIFT

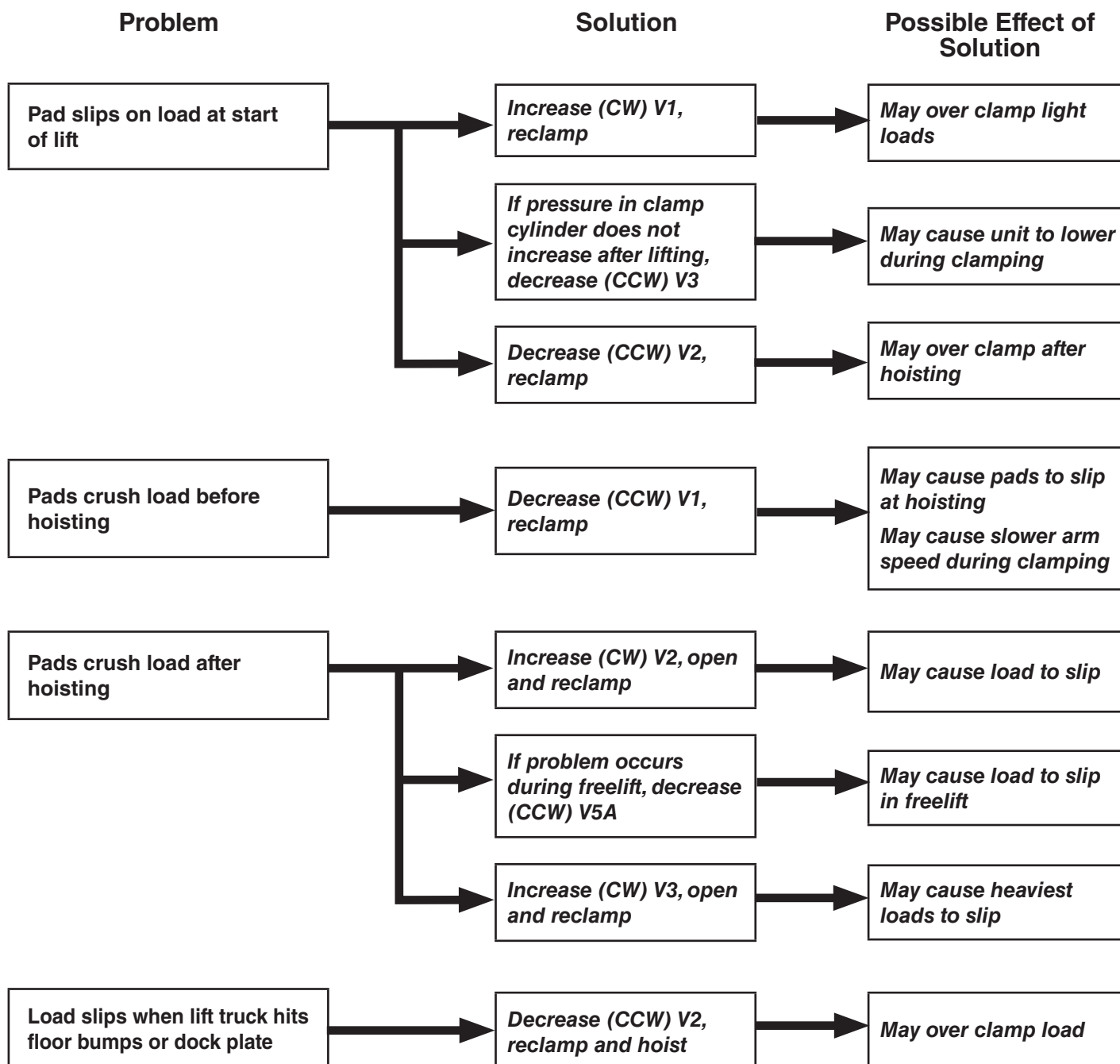
- A** Sideshift Left
- B** Sideshift Right
- C** Release Arms
- D** Clamp Arms



TROUBLESHOOTING

CAUTION: Prior to troubleshooting, verify that clamp is working properly and check for defective check valves and cylinder seals.

NOTE: When adjusting cartridges, turn in 1/2 turn increments.



TROUBLESHOOTING

Problem	Solution	Possible Effect of Solution
Hoist lowers while closing arms	Increase (CW) V3	May not add pressure during hoisting
Clamped pressure is substantially higher in freelif over mainlift	Install switch if not installed	Improved accuracy
	Decrease (CCW) V5A	Load may slip in freelif
Clamped pressure is substantially lower in freelif over mainlift	Increase (CW) V5A	May over clamp in freelif
Over clamps when mast runs out of travel	Decrease (CCW) V4	May cut off needed clamp pressure on heavy loads
Arm speed is too slow during clamping	Increase (CW) V1	May over clamp light loads
	Light loads that require low starting pressure, install optional arm overdrive system	Driver may overclamp load if button is not released in time or relief not properly set.

GLOSSARY

Clamp Pressure – Pressure set to clamp a load.

Starting Pressure (V1) – The minimum clamp pressure that will be applied, even on light loads.

Final Pressure (V2) – The final HFC adjusted clamp pressure applied when the load is hoisted.

HFC Enable Pressure (V3) – The hoist pressure to achieve prior to hoisting.

Maximum Clamp Pressure (V4) – The maximum pressure set to clamp a load.

Freelift Pressure (V5A) – Pressure in the hoist line when the mast is in freelift state.

Overdrive System – A system to aid with increasing arm speed and allows an attachment to have higher clamping pressure when breaking out rolls.

Total Load Weight – The sum of the load weight and clamp weight.

BLANK

Do you have questions you need answered right now?

Call your nearest Cascade Service Department.

Visit us online at www.cascorp.com

AMERICAS**Cascade Corporation****U.S. Headquarters**

2201 NE 201st
Fairview, OR 97024-9718
Tel: 800-CASCADE (227-2233)
Fax: 888-329-8207

Cascade Canada Inc.

5570 Timberlea Blvd.
Mississauga, Ontario
Canada L4W-4M6
Tel: 905-629-7777
Fax: 905-629-7785

Cascade do Brasil

Praça Salvador Rosa,
131/141-Jordanópolis,
São Bernardo do Campo - SP
CEP 09891-430
Tel: 55-13-2105-8800
Fax: 55-13-2105-8899

EUROPE-AFRICA**Cascade Italia S.R.L.****European Headquarters**

Via Dell'Artigianato 1
37030 Vago di Lavagno (VR)
Italy
Tel: 39-045-8989111
Fax: 39-045-8989160

Cascade (Africa) Pty. Ltd.

PO Box 625, Isando 1600
60A Steel Road
Sparton, Kempton Park
South Africa
Tel: 27-11-975-9240
Fax: 27-11-394-1147

ASIA-PACIFIC**Cascade Japan Ltd.**

2-23, 2-Chome,
Kukuchi Nishimachi
Amagasaki, Hyogo
Japan, 661-0978
Tel: 81-6-6420-9771
Fax: 81-6-6420-9777

Cascade Korea

121B 9L Namdong Ind.
Complex, 691-8 Gojan-Dong
Namdong-Ku
Inchon, Korea
Tel: +82-32-821-2051
Fax: +82-32-821-2055

Cascade-Xiamen

No. 668 Yangguang Rd.
Xinyang Industrial Zone
Haicang, Xiamen City
Fujian Province
P.R. China 361026
Tel: 86-592-651-2500
Fax: 86-592-651-2571

**Cascade India Material
Handling P Ltd**

Sy no 271/8, Ingawale Patil
Estate,
Godown No.9,10 & 11, Bhugaon,
Off Paud Road, Tal Mulshi, Dist
Pune 411 042

Cascade Australia Pty. Ltd.

1445 Ipswich Road
Rocklea, QLD 4107
Australia
Tel: 1-800-227-223
Fax: +61 7 3373-7333

Cascade New Zealand

15 Ra Ora Drive
East Tamaki, Auckland
New Zealand
Tel: +64-9-273-9136
Fax: +64-9-273-9137

**Sunstream Industries
Pte. Ltd.**

18 Tuas South Street 5
Singapore 637796
Tel: +65-6795-7555
Fax: +65-6863-1368

