



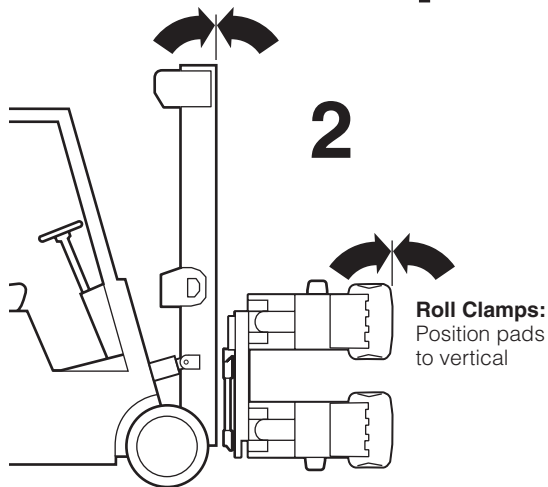
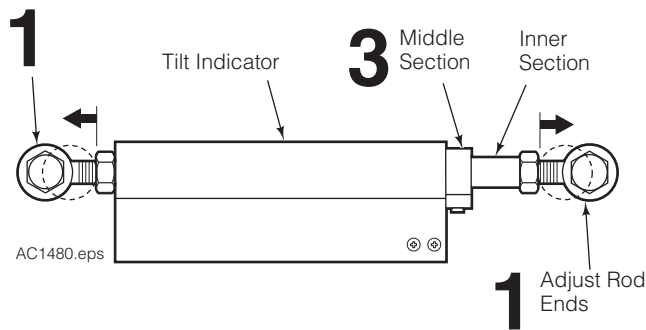
Installation Instructions

Dual Direction Tilt Control Kits

This sheet provides installation instructions for Cascade Dual Direction Tilt Control. The tilt control positions the mast at true vertical from forward or back tilt for precision handling of paper rolls and other applications such as rack storage.

Consult Cascade about the availability of custom installation kits for the truck being fitted.

- 1** Loosen jam nuts and adjust rod ends of the tilt indicator to midpoint. Tighten jam nuts.
- 2** Position the mast at vertical using a level. **For Roll Clamps, position the pads at vertical.**
- 3** Position the middle section to place the button under the switch roller.



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Tilt Control Kit	Truck Voltage	Application
6013612	12V	HYSTER S120XL – Switched
6014899	12V	HYSTER S70XL – Unswitched
		HYSTER S120 XL – Unswitched
6018422	12V	UNIVERSAL – Switched
		HOIST F180 – Switched
6018486	12V	HYSTER S-135XL – Switched
		HYSTER S-158XL – Switched
6025062	48V	KOMATSU FD100-T6 – Switched
6028702	12V	HYSTER H-360XL2 – Switched
6059873	12V	TAYLOR T-360L – Switched
6063218	24V	NISSAN JPD 80 Y – Switched
6076901	48V	HYSTER S120XL – Switched
6080527	12V	HYSTER H-5.00 DX TALL BRACKET – Switched
6092295	12V	UNIVERSAL – Switched
6092297	24V	UNIVERSAL – Switched
6092300	48V	UNIVERSAL – Switched
6092302	36V	UNIVERSAL – Switched
6092303	48V	HYSTER E70 – Unswitched
		HYSTER 120 XL3 – Unswitched
		HYSTER E45 – Unswitched
		HYSTER 65XM – Unswitched
6092304	36V	HYSTER E70 – Unswitched
		HYSTER 120XL3 – Unswitched
6092306	48-80V	UNIVERSAL – Switched
6092308	48V	CAT EC25K – Switched
6092310	12V	NACCO – Unswitched
6092312	48V	UL CABLES – Switched

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Call: 1-800-227-2233 Fax: 1-888-329-8207

Internet: www.cascorp.com

Write: Cascade Corporation, PO Box 20187, Portland, OR 97294

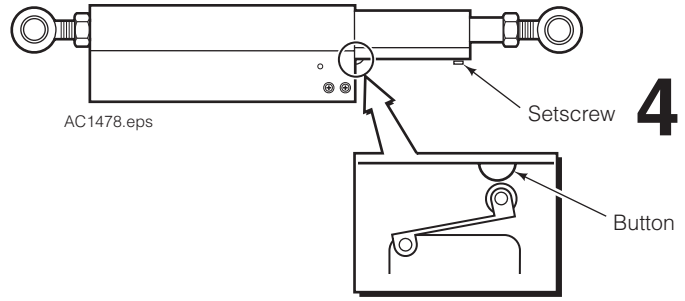
To Order Parts . . .

Call: 1-888-227-2233 Fax: 1-888-329-0234

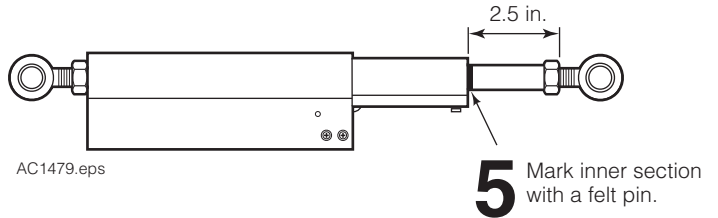
Internet: www.cascorp.com

Write: Cascade Corporation, 2501 Sheridan Ave., Springfield, OH 45505

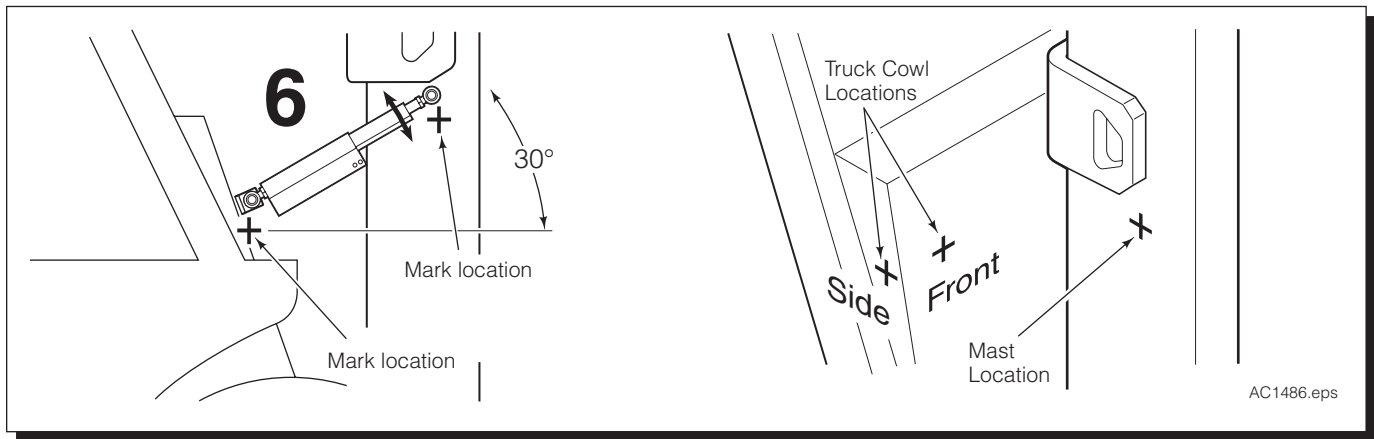
4 Loosen the setscrew on the tilt indicator middle section. Adjust the inner section to show 2.5 in. of rod. For large truck tilt indicators, adjust the inner section to show 11.5 in. of rod. **Tighten the setscrew just enough so the arm will not easily move.**



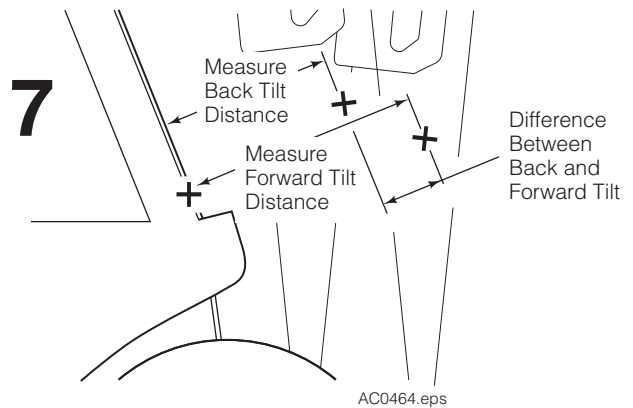
5 With a felt pen, mark the inner section at the middle section, as shown.



6 Using the tilt indicator and brackets, find a location on the truck cowl (side or face) and the side of the mast. Angle the tilt indicator at approximately 30 degrees from the horizontal of the base end of the bracket. Mark the locations of each end.



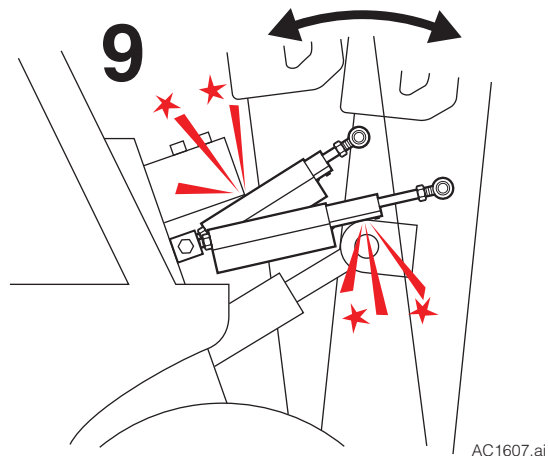
7 Tilt fully back and measure the distance between the marks. Tilt fully forward and measure the distance between the marks. If the difference between the two measurements is greater than 5 in., then relocate the tilt indicator with a steeper angle until the difference between the two measurements is less than 5 in.



8 Temporarily secure the tilt indicator ends/brackets to the marked locations.

9 Tilt the mast fully backward and forward to verify that the tilt indicator will not bind and has no interference with truck and attachment components.

CAUTION: Failure to allow for full extension and retraction will damage the tilt indicator.



10 Secure the brackets to the marked locations on the truck cowl and mast. If using an adhesive, mix and apply adhesive (user supplied) to attach the brackets to the truck cowl and mast. Adhesives approved for this installation:

- Loctite 332 with Activator 7380
- Devcon S-220 two part epoxy
- Devcon Plastic Welder 14320
- JB Weld 8265-S

Apply per manufacturer's instructions.

IMPORTANT: Remove adhesive residue from hands immediately. Once dry it is permanent to your skin.

CAUTION: Weld only with permission of the mast OEM and only in a location authorized by the mast OEM.

11 Attach the tilt arm assembly to the cowl and mast mounts using the hardware supplied.

12 Slowly tilt the mast completely forward and backward. Check the felt pen mark on the inner section to verify it has not moved. If the mark has moved significantly, verify that the setscrew is snug and completely tilt forward and backward to check felt pen mark location.

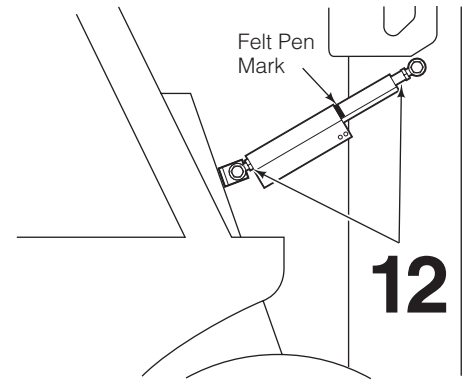
13 For the felt pen mark that moved slightly, loosen the jam nut on a rod end.

- If the mark is inside the middle tilt indicator section, turn the rod end clockwise.
- If the mark has moved outward from the middle section, turn the rod end counterclockwise.

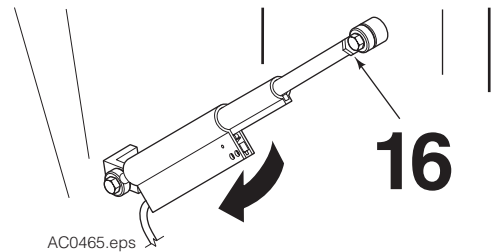
The adjustment should bring the felt pen mark next to the middle section. Tighten the jam nut. Repeat Step 13

14 It may be necessary to relocate the button. Position the mast (or roll clamp) to vertical with a level. Mark the middle channel next to the switch roller. Drill a .125 in. (3 mm) hole and relocate the button. Recheck the tilt indicator position. Adjust the rod end as described in Step 13 and 14.

15 Verify that the indicator is clear from mast. To adjust, loosen the rod end jam nut of the tilt indicator and rotate the tilt arm away from the mast.




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Tilt Control Valve Installation

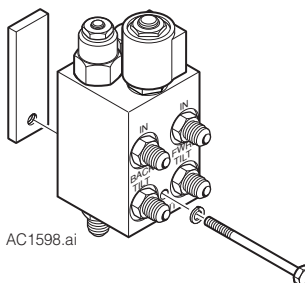
1 Determine a location to install the tilt control valve on the cowl or under the floor board. The valve must be plumbed in between the truck TILT auxiliary valve and the tilt cylinders. See the hydraulic schematic.



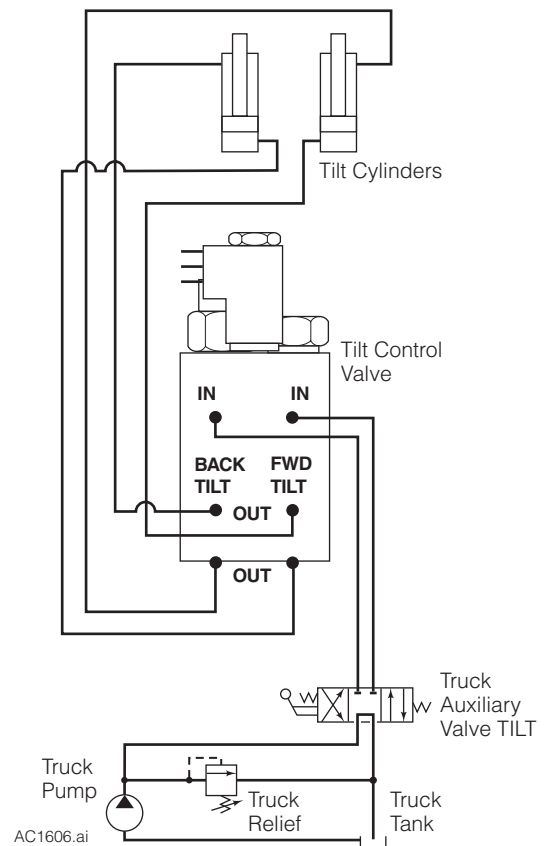
WARNING: Tilt the mast completely forward before disconnecting hoses to install the tilt control valve. This will minimize oil loss.

2 Mount the valve and install the hoses. The valve ports must be connected to the tilt cylinder ports with a hose for each function. Do not use tee fittings. See hydraulic schematic.

IMPORTANT: The hoses must be installed consistent with the operation of the tilt cylinders. To reduce restriction, minimize the use of additional fittings.



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Wiring Installation

- 1 Install the tilt override switch to the tilt control knob using one of the following methods:

Switch Mounted on Knob Face – Position the tilt override switch on the front of the tilt control knob in a location that is easy to press the button and move the handle. File or carve a flat surface on the front of the knob if needed to keep the switch from rocking. Over the knob and switch place the smallest heat shrink tubing that will fit. Using a heat gun, heat the tubing to secure the switch to the knob.

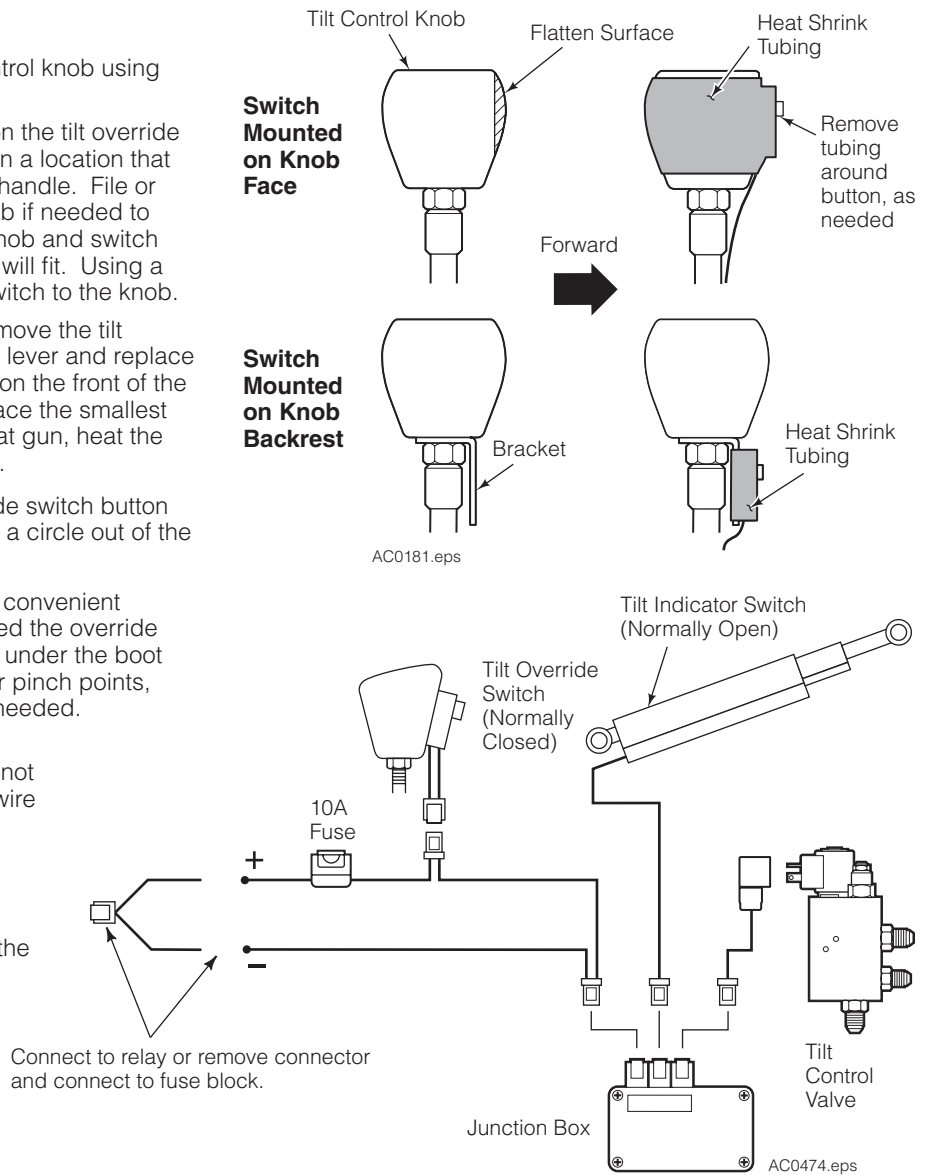
Switch Mounted on Knob Bracket – Remove the tilt control knob. Place the bracket on the tilt lever and replace the knob. Position the tilt override switch on the front of the bracket. Over the bracket and switch, place the smallest heat shrink tubing that will fit. Using a heat gun, heat the tubing to secure the switch to the bracket.

- 2 If it is difficult to feel or operate the override switch button through the heat shrink tube, carefully cut a circle out of the tubing around the button.

- 3 Mount the junction box under the dash or convenient location. Connect cables as marked. Feed the override switch wires down the control handle and under the boot (if equipped). Check the cable routing for pinch points, chafing and clearance. Use wire ties as needed.

NOTE: The connector for power is plug compatible with a Cascade Relay. When not using a relay, remove the connector and wire directly to a fuse bank.

- 4 Check the wiring with the key or power on. Depress the switch roller with a small screwdriver - the light in the solenoid cap should turn on. Simultaneously pressing the tilt override switch will turn the light off.



Tilt Control Operation

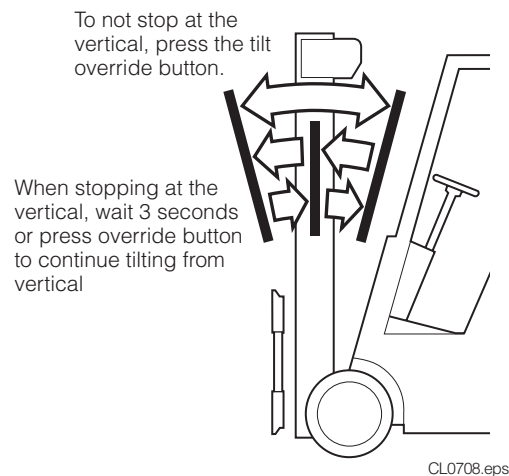
- 1 Test the installation before putting truck in service. When tilting forward and backward, mast travel should stop at vertical. Wait 3 seconds to tilt from vertical after stopping **OR** press the tilt override button to continue tilting.

Tilt the mast fully backward then tilt forward to vertical. Mast travel should stop at vertical.

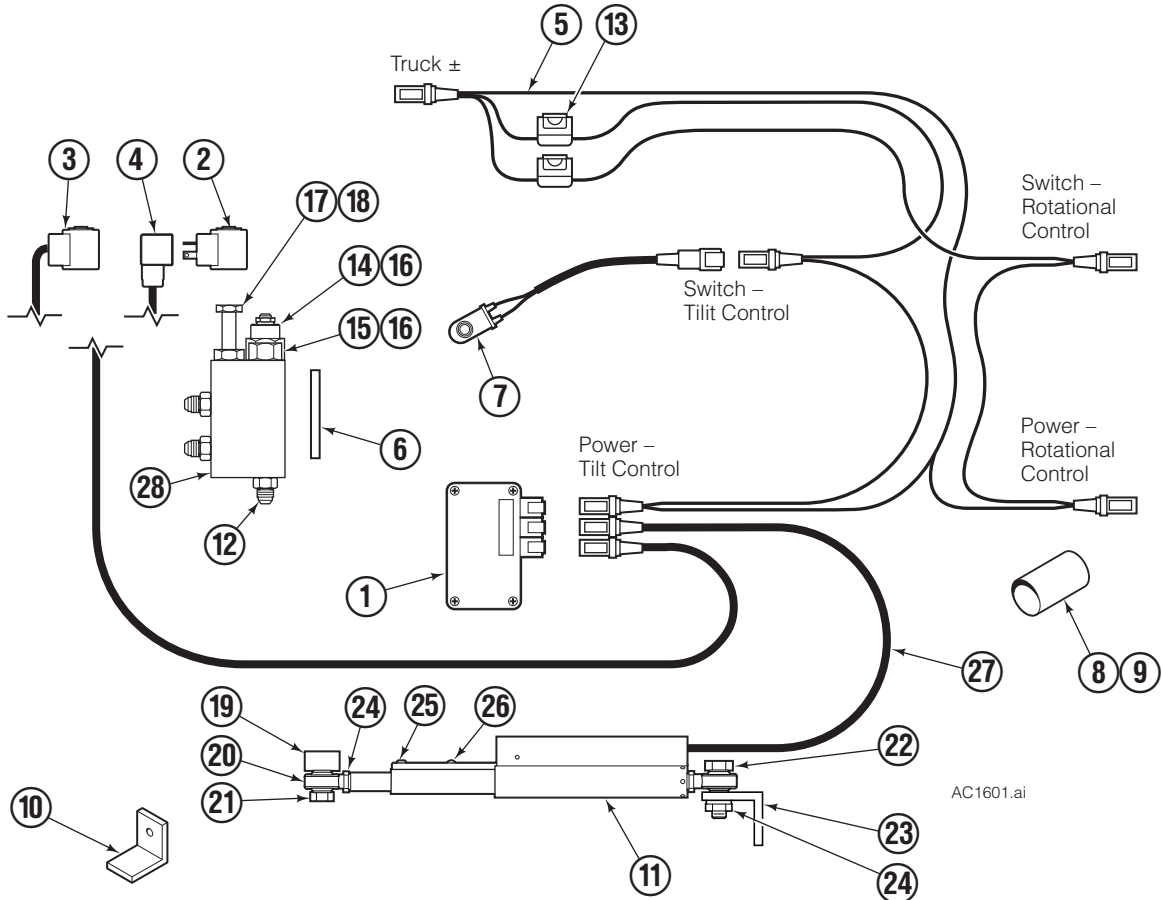
- If mast travel **does not stop** at vertical:
 - A The switch roller should be on the actuator when the mast is at vertical.
 - B Inspect the hose and wiring installation. The light in the solenoid cap should turn on when the mast is at vertical.
 - C If truck relief pressure is higher than 2800 psi and the mast slows down but does not stop at vertical when tilting, it may be necessary to adjust the counterbalance cartridge. Turn the cartridge adjustment screw CCW until the mast stops at vertical.

- 2 To tilt from vertical, wait 3 seconds after stopping or the tilt override button must be pressed before the mast can move.

To tilt forward or backward through vertical without stopping, press the override button.



Dual Direction Tilt Control Kit with Mounting Kits



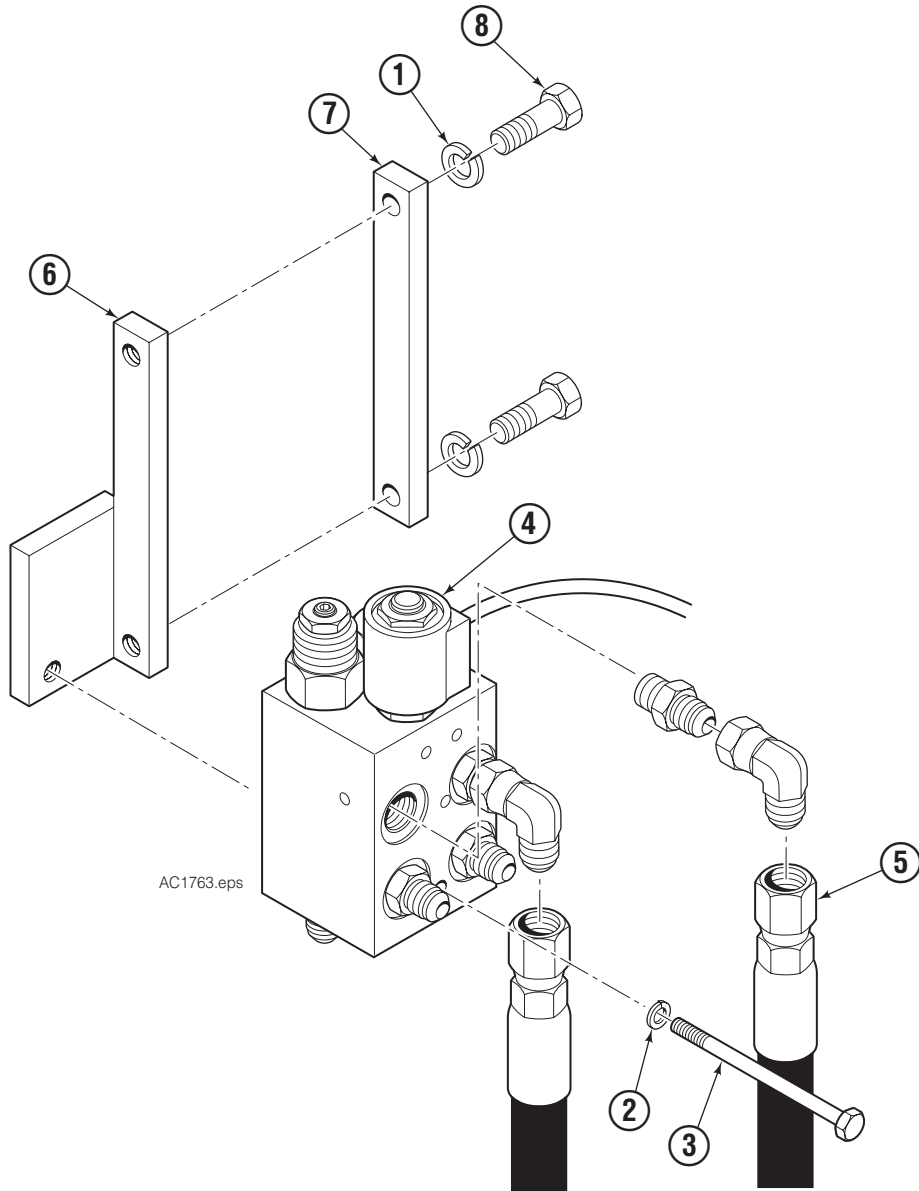
REF	QTY	HYSTER S120XL	HYSTER S120XL	DESCRIPTION
		12 V PART NO.	48 V PART NO.	
		6013612	6076901	Dual Direction Tilt Control Kit
		6016269	6093492	Tilt Control Mounting Kit ■
1	1	220890	223629	Relay Enclosure
2	1	–	223637	Solenoid Coil
3	1	220632 ▲	–	Solenoid Coil with Cable
4	1	–	6017665	Wire Harness - Solenoid
5	1	6015623	219398	Wire Harness - Power
6	1	–	6018319	Spacer

REF	QTY	PART NO.	DESCRIPTION	REF	QTY	PART NO.	DESCRIPTION
7	1	6001663	Switch Assembly (NC)	18	1	6026713	Seal Service Kit
8	1	6026934	Shrink Tube – 2.0 in. dia.	19	1	220330	Anchor
9	1	6001641	Shrink Tube – 1.0 in. dia.	20	2	221054	Rod End
10	1	222009	Knob Bracket	21	1	684649	Capscrew, M10 x 25
11	1	220013	Tilt Control Arm Assembly	22	1	768538	Capscrew, M10 x 30
12	6	604511	Fitting 6–6	23	1	220525	Bracket
13	2	219414	Fuse, ATC-10	24	3	209152	Jam Nut, M10
14	1	6026591	Counterbalance Valve Cartridge	25	1	768734	Setscrew, M6 x 12
15	1	6026592	Check Valve Cartridge	26	1	220328	Button ◆
16	2	6024964	Seal Service Kit	27	1	220313	Wire Harness – Tilt Switch
17	1	6026589	Solenoid Valve Cartridge	28	1	6010663	Valve Assembly without Coil

■ See Tilt Control Mounting Kit page for parts breakdown.
▲ Included in Tilt Control Mounting Kit 6016269.

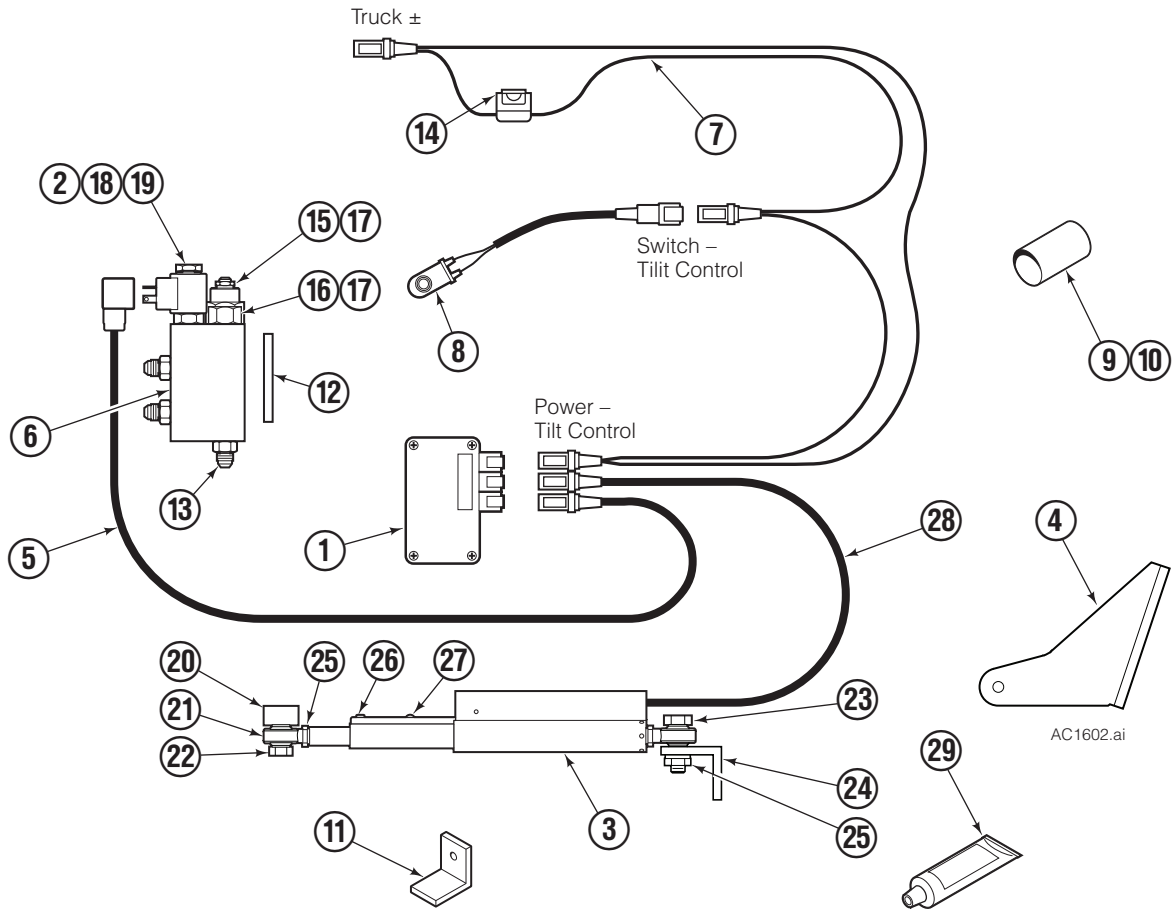
◆ For replacement, refer to kit 6801758.

Tilt Control Valve Mounting Kit



REF	QTY	PART NO.	PART NO.	DESCRIPTION
		6016269	6093492	Mounting Kit
1	2	681238	681238	Lockwasher, M10
2	1	206323	206323	Lockwasher, M6
3	1	768520	768520	Capscrew, M6 x 75
4	1	6003169	-	Solenoid Coil/ Cable Assembly
5	2	211989	211989	Hose
6	1	6016292	6016292	Bracket
7	1	6016295	6016295	Bar
8	2	768538	768538	Capscrew, M10 x 30

Dual Direction Tilt Control Kit with Tilt Brackets



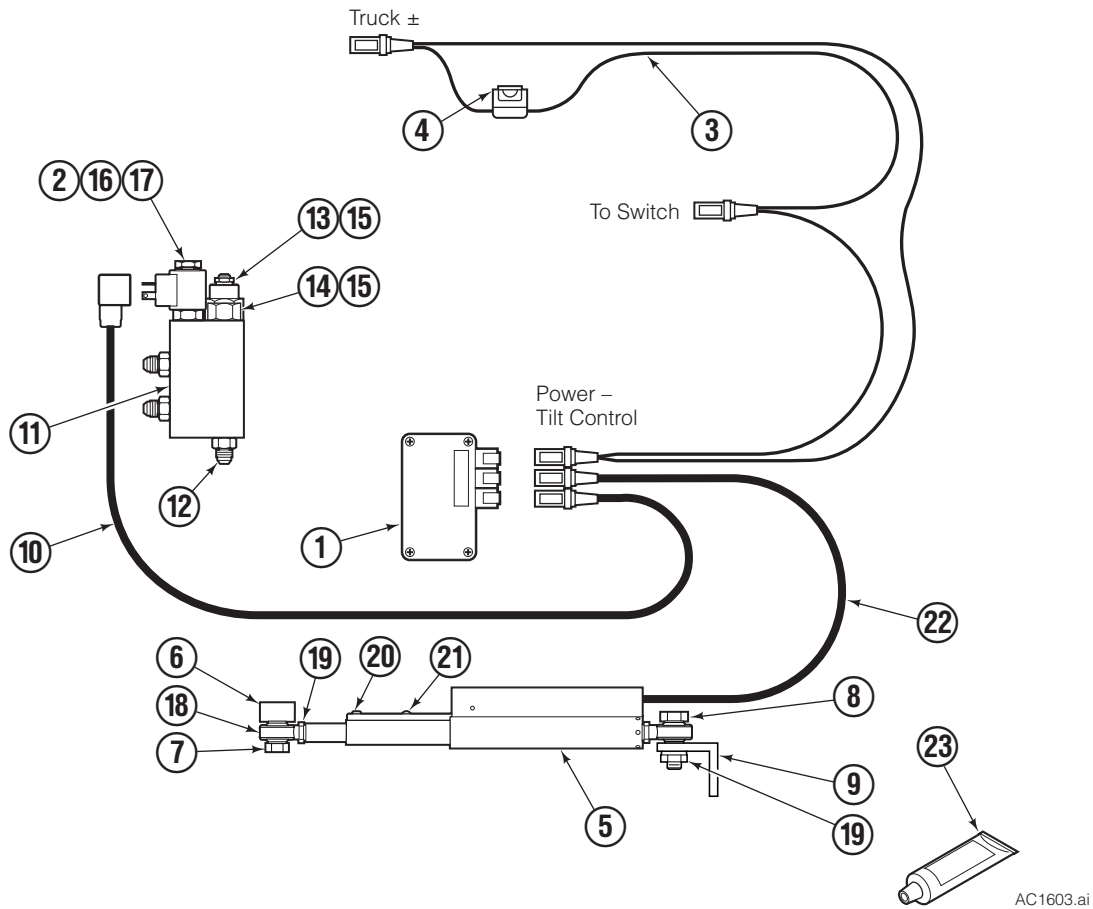
REF	QTY	HYSTER H-360XL2	TAYLOR T-360L	KOMATSU FD100-T6	DESCRIPTION
		12 V PART NO.	12 V PART NO.	48 V PART NO.	
		6028702	6059873	6025062	Dual Direction Tilt Control Kit
1	1	220890	220890	221718	Relay Enclosure
2	1	220632	220632	220633	Solenoid Coil
3	1	6018483	6059872	6018483	Tilt Control Arm Assembly
4	1	6028640	6059869	6025063	Bracket

REF	QTY	PART NO.	DESCRIPTION	REF	QTY	PART NO.	DESCRIPTION
5	1	6017665	Wire Harness – Solenoid	18	1	6026592	Solenoid Valve Cartridge
6	1	6010663	Valve Assembly	19	1	6026713	Seal Service Kit
7	1	219398	Wire Harness – Power	20	1	220330	Anchor
8	1	6001663	Switch Assembly	21	2	221054	Rod End
9	1	6026934	Shrink Tube, 2.0	22	1	684649	Capscrews, M10 x 25
10	1	6001641	Shrink Tube, 1.0	23	1	768538	Capscrews, M10 x 30
11	1	222009	Knob Bracket	24	1	220525	Bracket
12	1	6018319	Spacer	25	3	209152	Jam Nut, M10
13	6	604511	Fitting, 6-6	26	1	768734	Setscrew, M6 x 12
14	1	6008233	Fuse, 10 Amp	27	1	220328	Button ◆
15	1	6026591	Counterbalance Valve Cartridge	28	1	220313	Wire Harness – Tilt ●
16	1	6026589	Check Valve Cartridge	29	1	6017272	Silicon, RTV ●
17	2	6024964	Seal Service Kit				

● Included in Limit Switch Service Kit 6017267.

◆ For replacement, refer to kit 6801758.

Dual Direction Tilt Control Kit without Switch Assembly



REF	QTY	HYSTER S70XL, S120XL	NACCO	HYSTER E70, 120XL3	HYSTER E70, 120XL3 E45, 65XM	DESCRIPTION
		12 V PART NO.	12 V PART NO.	36 V PART NO.	48 V PART NO.	
		6014899	6092310	6092304	6092303	Dual Direction Tilt Control Kit
1	1	220890	220890	223628	223629	Relay Enclosure
2	1	220632	220632	223636	223637	Solenoid Coil
3	1	-	-	219398	219398	Wire Harness - Power
4	1	-	-	6008233	6008233	Fuse
5	1	220013	6042603	220013	220013	Tilt Control Arm Assembly
6	1	220330	-	220330	220330	Anchor
7	1	684649	-	684649	684649	Capscrews, M10 x 25
8	1	768538	-	768538	768538	Capscrews, M10 x 30
9	1	220525	-	220525	220525	Bracket

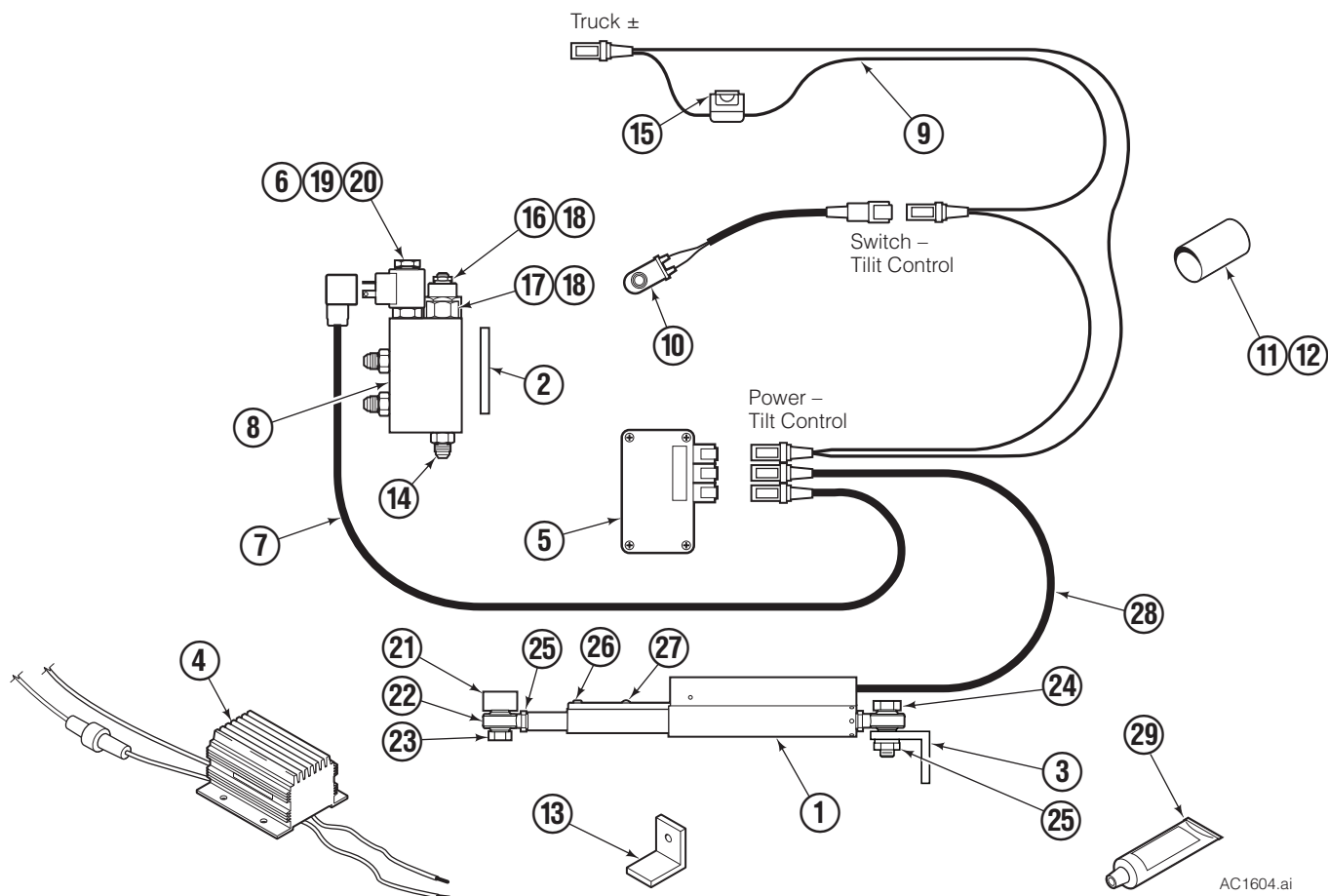
REF	QTY	PART NO.	DESCRIPTION	REF	QTY	PART NO.	DESCRIPTION
10	1	6017665	Wire Harness - Solenoid	17	1	6026713	Seal Service Kit
11	1	6010663	Valve Assembly	18	2	221054	Rod End
12	6	604511	Fitting, 6-6	19	■	209152	Jam Nut, M10
13	1	6026591	Counterbalance Valve Cartridge	20	1	768734	Setscrew, M6 x 12
14	1	6026589	Check Valve Cartridge	21	1	220328	Button ◆
15	2	6024964	Seal Service Kit	22	1	220313	Wire Harness - Tilt ●
16	1	6026592	Solenoid Valve Cartridge	23	1	6017272	Silicon, RTV ●

● Included in Limit Switch Service Kit 6017267.

◆ For replacement, refer to kit 6801758.

■ Quantities varies per kit.

Dual Direction Tilt Control Kit (12V) with Switch



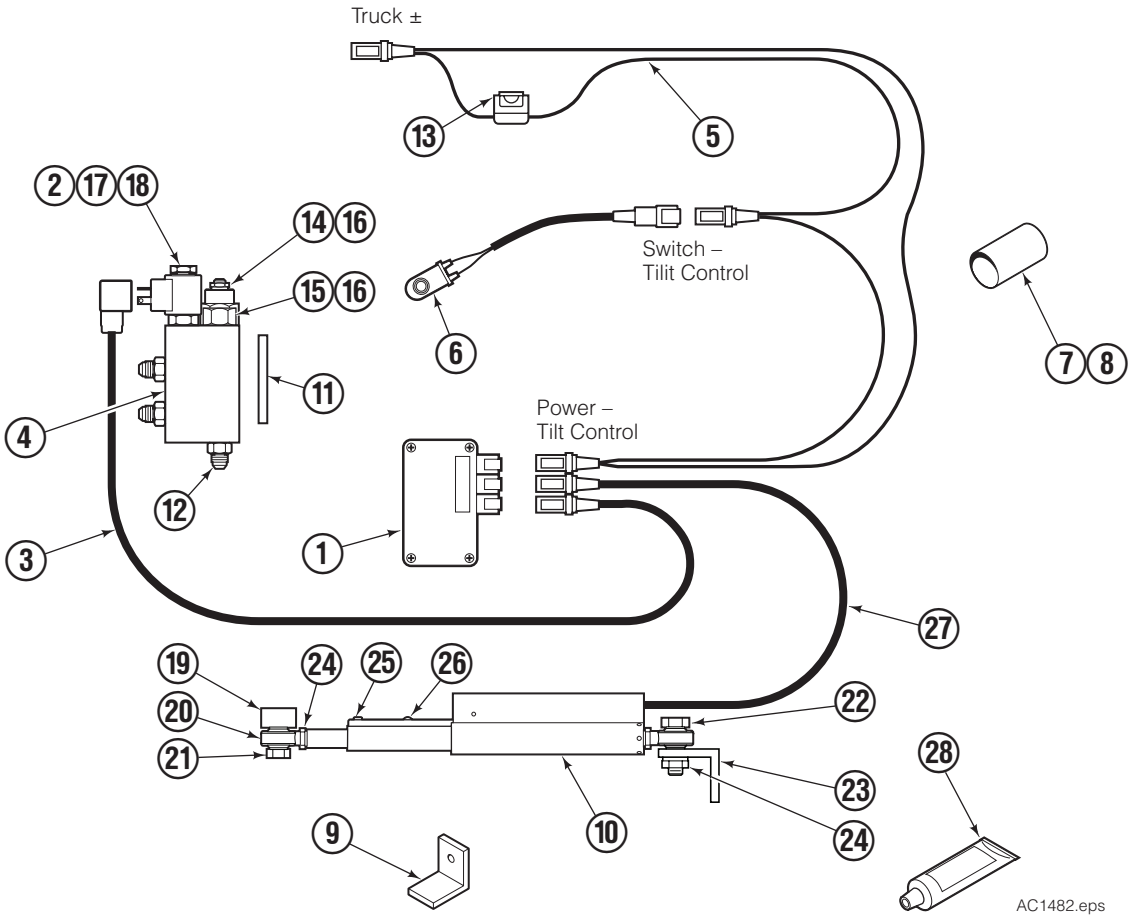
REF	QTY	UNIVERSAL, HOIST F180	HYSTER S-135XL S-158XL	HYSTER H-5.00 DX TALL BRACKET	PART NO.	PART NO.	DESCRIPTION
		PART NO.	PART NO.	PART NO.			
		6018422	6018486	6080527	6092295	6092306 ■	Dual Direction Tilt Control Kit
1	1	220013	6018483	6080528	220013	220013	Tilt Control Arm Assembly
2	1	-	6018319	6018319	6018319	6018319	Spacer
3	1	220525	220525	6059869	220525	22052	Bracket
4	1	-	-	-	-	6009166	DC/DC Converter (48V-80V → 12V)

REF	QTY	PART NO.	DESCRIPTION	REF	QTY	PART NO.	DESCRIPTION
5	1	220890	Relay Enclosure	18	2	6024964	Seal Service Kit
6	1	220632	Solenoid Coil-12V	19	1	6026592	Solenoid Valve Cartridge
7	1	6017665	Wire Harness – Solenoid	20	1	6026713	Seal Service Kit
8	1	6010663	Valve Assembly	21	1	220330	Anchor
9	1	219398	Wire Harness – Power	22	2	221054	Rod End
10	1	6001663	Switch Assembly	23	1	684649	Capscrews, M10 x 25
11	1	6026934	Shrink Tube, 2.0	24	1	768538	Capscrews, M10 x 30
12	1	6001641	Shrink Tube, 1.0	25	3	209152	Jam Nut, M10
13	1	222009	Knob Bracket	26	1	768734	Setscrew, M6 x 12
14	6	604511	Fitting, 6-6	27	1	220328	Button ◆
15	1	6008233	Fuse, 10 Amp	28	1	220313	Wire Harness – Tilt ●
16	1	6026591	Counterbalance Valve Cartridge	29	1	6017272	Silicon, RTV ●
17	1	6026589	Check Valve Cartridge				

■ Includes DC/DC Converter to drop truck voltage to 12V.
● Included in Limit Switch Service Kit 6017267.

◆ For replacement, refer to kit 6801758.

Dual Direction Tilt Control Kit (24V, 36V) with Switch



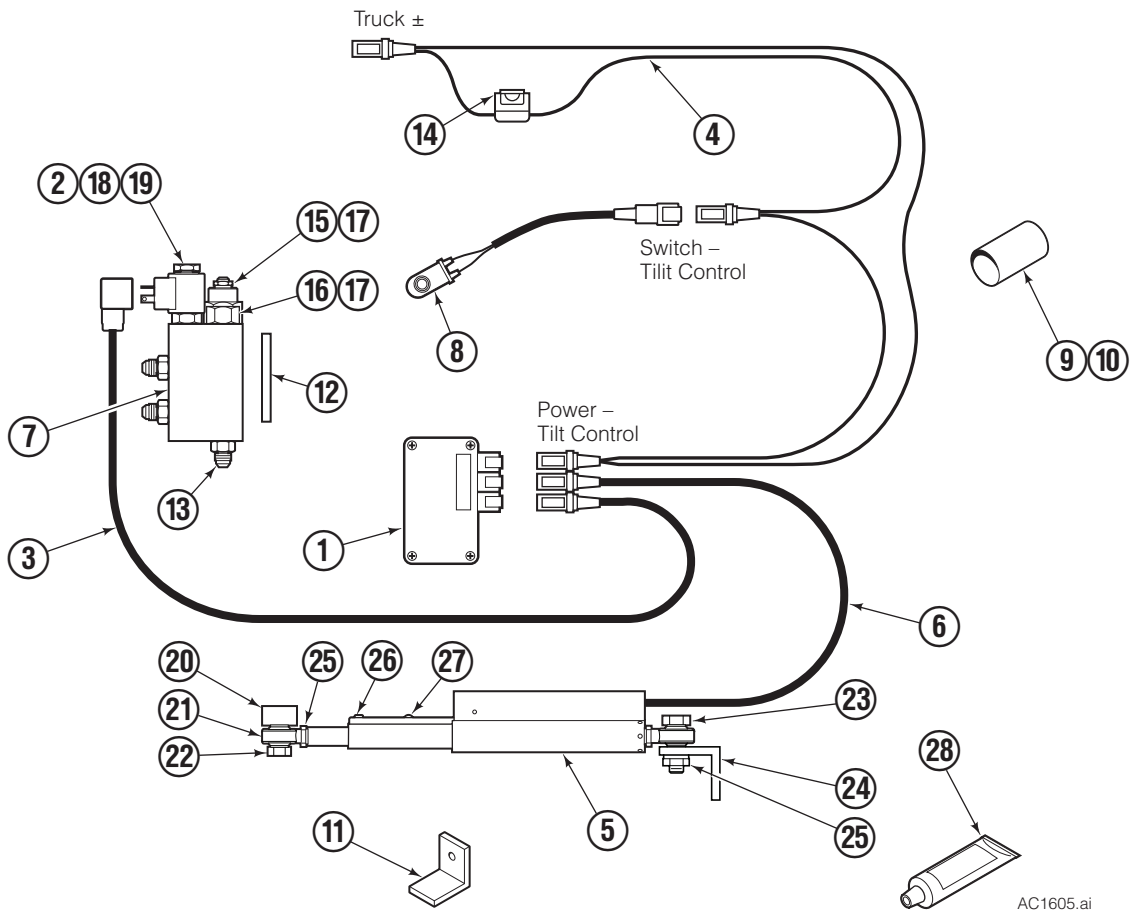
REF	QTY	NISSAN JPD 80 Y		36 V PART NO.	DESCRIPTION
		24 V PART NO.	24 V PART NO.		
		6063218	6092297	6092302	Dual Direction Tilt Control Kit
1	1	221718	221718	223628	Relay Enclosure
2	1	220633	220633	223636	Solenoid Coil

REF	QTY	PART NO.	DESCRIPTION	REF	QTY	PART NO.	DESCRIPTION
3	1	6017665	Wire Harness - Solenoid	16	2	6024964	Seal Service Kit
4	1	6010663	Valve Assembly without Coil	17	1	6026589	Solenoid Valve Cartridge
5	1	219398	Wire Harness - Power	18	1	6026713	Seal Service Kit
6	1	6001663	Switch Assembly (NC)	19	1	220330	Anchor
7	1	6026934	Shrink Tube - 2.0 in. dia.	20	2	221054	Rod End
8	1	6001641	Shrink Tube - 1.0 in. dia.	21	1	684649	Capscrew, M10 x 25
9	1	222009	Knob Bracket	22	1	768538	Capscrew, M10 x 30
10	1	220013	Tilt Control Arm Assembly	23	1	220525	Bracket
11	1	6018319	Spacer	24	3	209152	Jam Nut, M10
12	6	604511	Fitting, 6-6	25	1	768734	Setscrew, M6 x 12
13	1	6008233	Fuse, 10 Amp	26	1	220328	Button ◆
14	1	6026591	Counterbalance Valve Cartridge	27	1	220313	Wire Harness - Tilt Switch ●
15	1	6026592	Check Valve Cartridge	28	1	6017272	Silicon, RTV ●

● Included in Limit Switch Service Kit 6017267.

◆ For replacement, refer to kit 6801758.

Dual Direction Tilt Control Kit (48V) with Switch Assembly



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REF	QTY	48 V PART NO.	CAT EC25K	UL CABLES	DESCRIPTION
			48 V PART NO.	48 V PART NO.	
		6092300	6092308	6092312	Dual Direction Tilt Control Kit
1	1	223629	223629	6077054	Relay Enclosure
2	1	223637	223637	223637	Solenoid Coil-48V
3	1	6017665	6017665	6077358	Wire Harness - Solenoid
4	1	219398	219398	6077236	Wire Harness - Power
5	1	220013	220013	6077084	Tilt Control Arm Assembly
6	1	220313	220313	6077068	Wire Harness - Tilt Switch ●

REF	QTY	PART NO.	DESCRIPTION	REF	QTY	PART NO.	DESCRIPTION
7	1	6010663	Valve Assembly without Coil	18	1	6026589	Solenoid Valve Cartridge
8	1	6001663	Switch Assembly (NC)	19	1	6026713	Seal Service Kit
9	1	6026934	Shrink Tube - 2.0 in. dia.	20	1	220330	Anchor
10	1	6001641	Shrink Tube - 1.0 in. dia.	21	2	221054	Rod End
11	1	222009	Knob Bracket	22	1	684649	Capscrew, M10 x 25
12	1	6018319	Spacer	23	1	768538	Capscrew, M10 x 30
13	6	604511	Fitting, 6-6	24	1	220525	Bracket
14	1	6008233	Fuse, 10 Amp	25	3	209152	Jam Nut, M10
15	1	6026591	Counterbalance Valve Cartridge	26	1	768734	Setscrew, M6 x 12
16	1	6026592	Check Valve Cartridge	27	1	220328	Button ◆
17	2	6024964	Seal Service Kit	28	1	6017272	Silicon, RTV ●

● Included in Limit Switch Service Kit 6017267.

◆ For replacement, refer to kit 6801758.

Do you have questions you need answered right now? Call your nearest Cascade Service Department. Visit us online at www.cascorp.com

AMERICAS

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