The *LifeJacket*™ from ADAMS

Hydraulic Elevator Safety (Patented)

Installation Instructions

In addition to the *Job Survey Sheet*, included with the *LifeJacket* assembly, the following *Tools* and *Materials*, *not included*, are required for installation:

Tools:

2' Level	¼" Anchors	Packing Tools	Hand Truck
¼" Drill bits	¾" EMT Bender	Tape Measure	Tachometer
¼ - 20 tap	3/8" Drill	Diameter Tape	Pipe Stands or Timbers
¼" Tap Drill	Hammer Drill	Teflon Tape	
¼" Masonry Bit	Hand Tools	Hack Saw	Test Weights

Not Required, but useful: *LifeJacket* Access Device (LAD) (part number LJ550)

Materials:

3/4" EMT conduit, connectors and couplings - enough to run from the *LifeJacket* controller to the elevator controller and from the wireway to the cylinder head.
1 Normally Open Momentary Switch with approximately 25' of two-conductor wire (Not required when *LifeJacket* Access Device is available)
18 gauge wire (Enough to run from Machine Room to top of hatch or to pit.)
Set Valve wires, Refer to section 4.12 for required gage
Elevator packing
Clean wipe cloths or rags
1/2" or 3/4" flex and fittings

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General

The ***LifeJacket*** is intended for use as a Safety that nondestructively grips the plunger when a direct-acting hydraulic elevator has lost pressure and fluid causing an uncontrolled descent. This condition can be caused by any component of the pressure system failing, it is not limited to any particular component. This is the primary advantage of the Safety; all dangerous failures are detected and acted on.

Monitoring the elevator's actual movement is a pulse producing encoder whose sinusoidal pulses are converted to feet per minute. Monitoring the elevators intended direction is done by bringing the direction valve voltages in the elevator controller into the ***LifeJacket*** controller, where the microprocessor and FPLA compare them to determine if the elevator is descending under control or not. If the elevator is going down, over 30 fpm, without down direction valves energized or if the car exceeds 125% of Operating Speed in the Down Direction at any time, the ***LifeJacket*** Safety sets.

In the event of power outages, there is a backup battery in the controller. This battery is monitored as well, to assure that it is present and good. When the battery decays with age, there is an annunciator that alarms and a visual LED fault indication to alert the service person or owner of the need to order and change the battery. If the battery is not changed, it will continue to alarm the service person or owner until the battery is further decayed and the ***LifeJacket*** will set. This assures the battery will be replaced. The ***LifeJacket*** cannot operate without a reliable battery.

Mechanically holding open the ***LifeJacket*** is elevator pressure. A hydraulic circuit steers this fluid and pressure into two set valves that open a path for the fluid to flow into the pit can or scavenger pump. When either of these set valves is energized by the ***LifeJacket*** controller, the retractable spring inside the control cylinder cause the arms to fall and the Safety to set. Being directly fluid connected to the elevator cylinder, it is also possible to monitor the pressure of the elevator system and if that pressure falls to less than the control cylinder spring force, the ***LifeJacket*** will set, hydro-mechanically. There are two valves for redundancy. Each valve is separately wired and circuited, all the way back to the microprocessor. There is also circuitry that monitors the fuses to each valve solenoid as well as the set valve coils themselves. This is to assure that if the wiring is open between the ***LifeJacket*** controller and the ***LifeJacket*** in the pit, an alarm will sound.

When installed per these instructions, maintained and exercised annually, the ***LifeJacket*** will provide dependable operation for many years.

1.0 Preliminary Checks

It is important, before you start, to verify the ***Plunger Diameter, Runby, Between Buffer*** **and** ***Strike Distance*** against the data supplied in the ***Job Survey Sheet,*** included.

If any information differs, do not proceed until you contact *LifeJacket* Technical Support at Adams Elevator Equipment Company, 1-800-323-0796 or 1-847-581-2900.

1.1 Confirm *Plunger Diameter* with the *LifeJacket* inserts stamped markings (**Appendix A**). Compare the actual dimension of the plunger to the dimensions stamped on the inserts.

1.2 Confirm the dimension *between the buffers*. This is the side-to-side clearance needed to mount the *LifeJacket*. If there is not enough room to mount the assembly, the buffer stands must be relocated or replaced.

1.3 Confirm existing *Runby* in one of the two following ways:

1.3.1 a. Run the car below floor until it is resting on the uncompressed buffer springs.
b. Measure from bottom floor sill to car sill.

1.3.2 a. With the car above floor allowing access to pit, measure from hatch sill to car sill.
b. Without moving car, measure between the top of buffer to bottom of strike plate.
c. Subtract dimension in step 'a' from dimension in step 'b'. The remainder is *Runby.*

1.4 Confirm the existing *Strike Distance* by measuring in the following way:

1.4.1 a. With car above floor allowing access to pit, measure from hatch sill to car sill.
b. Without moving car, measure the exposed plunger.
c. Subtract dimension in step 'a' from dimension in step 'b'. The remainder is *Strike Distance.*

1.5 Confirm that the plunger is straight by looking up the hatch at the extended plunger. Note any bowing or bending, if any is observed, to Adams Technical Support.

Warning: ***Strike Distance must be greater than 6" minimum in order to proceed.***

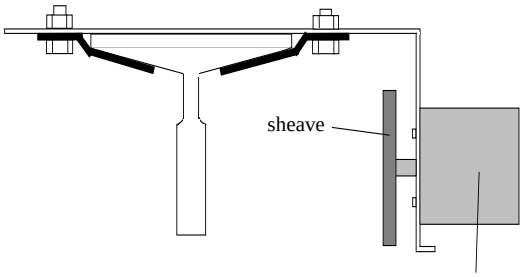
Note: Component list is in Appendix A, all terms used in this manual may be referenced there.

Note: Check plunger condition by looking up it's extended length for bends.

2.0 Encoder Installation

Note: Rail clips provided are designed for 12# rails. Using clips on smaller or larger size rails may require through bolting to the rail.

2.1 Locate the quadrant of hatch that has clearance for the encoder and kevlar cable. The *ideal choice* is the side of the hatch that the wireway is on. Before mounting, be careful to assure cable will clear the crosshead and bolster channels. The encoder brackets can be through-bolted to rails, mounted to the walls or turned around so that the encoder is behind the rail. *What is important is that the top and bottom sheaves end up in line.*



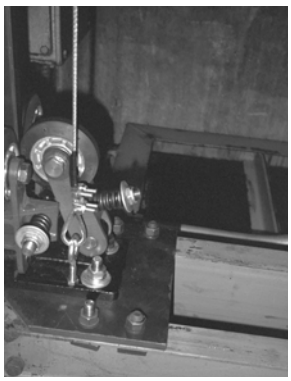
Use rail clips or through bolt bracket to rail. Mount with upper and lower sheaves in line.

FIG 1

2.2 Bring Kevlar cable, encoder, rail bracket, mounting hardware and tools to top floor. Prepare to layout upper bracket and encoder for mounting. It is recommended that the encoder be installed in the upper portion of the hatch.

CAUTION: Use Care when working on car top, slips and falls may cause serious injury.

2.3 Access car down, get on car top with tools and assembly components, run up on inspection and install encoder to rail at highest point of rail. Assure that the car cannot strike the encoder sheave assembly when car is up against the stop ring.



2.4 Install mounting eyelet to car top, usually to roller guide assembly. See photo at right. Be careful not to allow any side runout, this can shorten the life of the encoder cable.

Note: Leave as much of the eyelet thread out as possible to tension later, if necessary.

2.5 Using a crimping tool, crimp the niko press, attach the cable and eyelet to the hole and run cable over sheave, where the cable going to pit is on the back side of the idler sheave.

2.6 Thread the kevlar cable through the slots in the encoder cover and around drive sheave. Mount cover on bracket, as shown on left. Even though this picture has the encoder in the pit, we recommend the encoder at the top of the hatch. Also, this picture depicts a steel cable that is no longer in production. Kevlar cable will be orange, not silver.

2.7 Drop remaining cable into the pit. Alternately, leave the coil of cable on the cartop as you go down and carefully feed it as you move.

2.8 Assure cable isn't wrapped around rail brackets or brace rods, etc.

2.9 Run car down SLOWLY, monitoring that cable doesn't snag, as it will be going up as you are going down. Remember also that there is no tension on cable over the encoder sheave, so assure that the cable remains on the sheave.

2.10 Run down until you have a good pit working height meaning the roller guide is within reach of you standing in the pit and there being enough room to access the pit without moving the car. Bring tools and idler assembly into pit. You will need to mount the eyelet onto the bolster or roller guide assembly.

2.11 Mount the idler to the bracket provided, if not already done.

Note: The idler and encoder sheaves must be in alignment.

2.12 Mount the idler bracket on rail in line with upper encoder sheave. Assure strike clearance again with car platform.

2.13 Add eyelet to bolster channel or to the lower roller guide assembly as shown in the picture. In this picture the eyelet was mounted to an angle so that replacing this brand of roller guide is made easier. The angle is not necessary in most cases.

2.14 Attach spring to the eyelet hole, then run kevlar cable from the idler up to the spring. Using the niko press crimps provided, pull so that 1 (one) inch of spring extends and crimp.

Note: There should be one inch of spring extension, or about 10 (ten) pounds of spring force after cable is connected.

2.15 Do not wire the encoder yet; the wiring will be completed when the piping is run later.

Note: If you use the running car to lift the* LifeJacket *into the pit, do it at this time, prior to landing the car.

2.16 After the encoder is completely assembled, land the car on timbers or pipe stands being very careful to follow proper safety procedures.

CAUTION: Be sure to follow proper safety procedures. Failure to properly secure car on timbers or pipes could result in serious injury and may even be fatal.

2.17 Prior to dropping the plunger, mark the location of platen plate on the bolster to assure correct alignment when reattaching.

2.18 Lower the plunger until 6 (six) inches remains above top of cylinder. This will assist in aligning the *LifeJacket* assembly for mounting.

2.19 ***Open Mainline Disconnect***

CAUTION: Some of the circuits in the controller are not de-energized by the mainline disconnect.

***Warning:* The pit power is usually separately fused. Do not assume it is dead when you throw the mainline disconnect.**

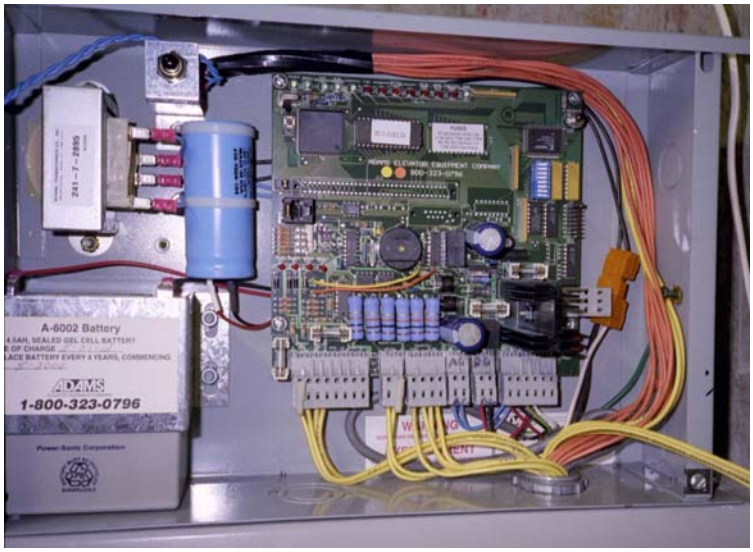
3.0 *LifeJacket* Controller Mounting

3.1 Mount the *LifeJacket* control box in the machine room, as close as possible to or on the elevator controller. There is a momentary safety circuit cutout switch in the *LifeJacket* controller that will allow the safety switch on the *LifeJacket* **ONLY** to be momentarily jumped out. For ease of testing, it should be within reach of the controls that operate the elevator.

***Warning:* Do not mount controller where battery is sideways or upside down.**

Note: Mount this controller in the Machine Room only.

3.2 Install conduit between the elevator controller and the *LifeJacket* controller. Run 13 (thirteen) wires from the elevator controller to the *LifeJacket* controller.



3.2.1 In the elevator controller connect the wires as follows:
Parallel 2 (two) wires to the down slow solenoid,
Parallel 2 (two) wires to the down fast solenoid,
Parallel 2 (two) wires to up fast solenoids in the existing elevator controller or to the up contactor coil. **This up signal must be energized for the ENTIRE up trip**. In some cases, you must use the up contactor coil voltage.
Connect 2 (two) wires in series with the safety circuit
Connect 1 (one) wire to the chassis ground.
Connect 2 (two) wires to an elevator controller 120 VAC source. This must be voltage that is off with the Mainline Disconnect.
See wiring diagram in **Appendix C** for more detail if required.

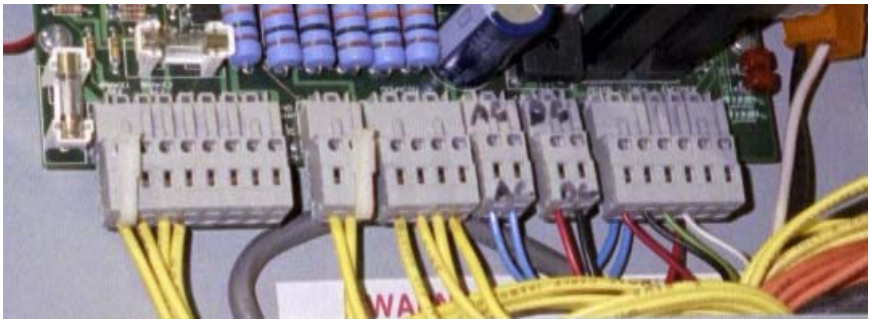
3.2.2 All LifeJacket installations include the LJ4010B Valve Driver Adapter to eliminate the effects of induced electrical noise. See Appendix L for installation details.

Note: Some Elevator controllers do not have 120 VAC available. If this was noted on the survey, a multi-tap transformer was sent.

3.2.1.1 If the multi-tap transformer is sent, it should be mounted in the elevator controller. It can step down 240 VAC to 120 VAC.

Note: The up signal must be energized throughout the entire up run. Some valve solenoids aren't designed to do this. You will get a "Direction Error" if this is not verified.

3.2.2 In the *LifeJacket* controller connect the wires as follows:
Connect 2 (two) wires to the down fast wago type connector,
Connect 2 (two) wires to the down slow,
Connect 2 (two) wires to the up fast soleniod,
Connect 2 (two) wires to the Safety cut-out switch wired in parallel with the Safety Switch on the *LifeJacket*,
Connect 2 (two) wires to the transformer connector provided
Connect 1 (one) to chassis ground. **DO NOT GROUND THE PC BOARD. USE ONLY THE CHASSIS GROUND located on the right side wall of the box.**
The last 2 (two) wires are for a remote annunciator if required.
See wiring diagram in **Appendix C** for more detail if required.



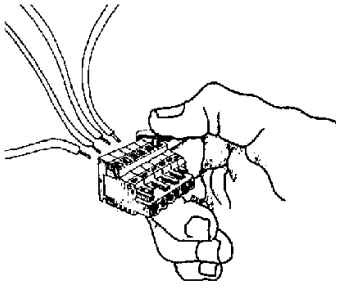
Warning: Connect 1 (one) wire to ground, but do not connect it to the PC board in* LifeJacket *controller, connect only to chassis ground provided.

Warning: If shielded cable is used, only ground one side of the shield and do this in the controller box. Grounding both sides of the shield could lead to ground loops and cause erratic operation and even damage components.

Note: Wago is the brand name of a wire connector.

Note: The elevator direction solenoid coils must be wired in parallel to the* LifeJacket *inputs on the* LifeJacket *controller board. The* LifeJacket *controller can receive any solenoid voltage between 90 and 240 VAC or VDC.

3.2.2 There is a plastic wago insertion tool included. Depressing this tool will open the connector for wire insertion. Make sure the insulation is stripped prior to insertion. See illustration at right.



3.3 Install 4 (four) #18 wires or a four conductor shielded wire from the encoder to the *LifeJacket* controller. Connect the wires to the wago type connectors supplied on the *LifeJacket* PC board per the wiring diagram in **Appendix C.**

Check with your local code to determine if these wires require conduit. If the wires can be run down a pipe without being physically damaged, use the tywraps or the 'P' clips supplied; or run conduit from the encoder cover box to the *LifeJacket* controller box.

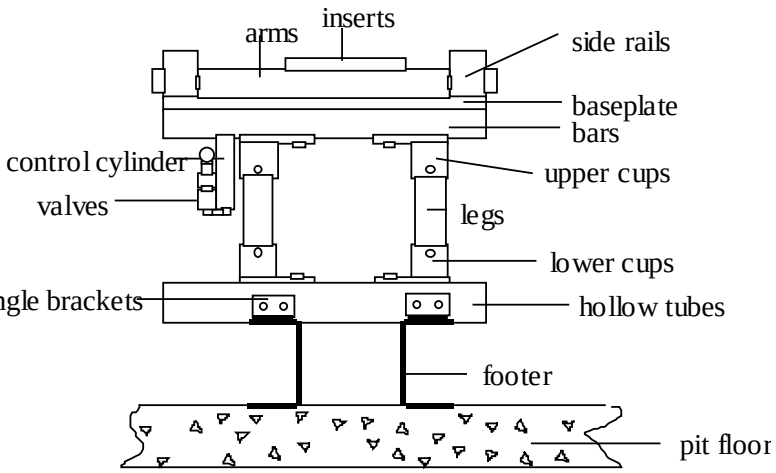
3.4 On relay controller jobs (e.g. Dover P&B or Otis H1BL), we require shielded cable for all wiring to the hatch. Transient voltages cause erratic operation.

Warning: ***Do not use independent power such as lighting or pit circuits for the 120 VAC. Use only fused elevator controller 120 VAC. Add circuitry to elevator if necessary.***

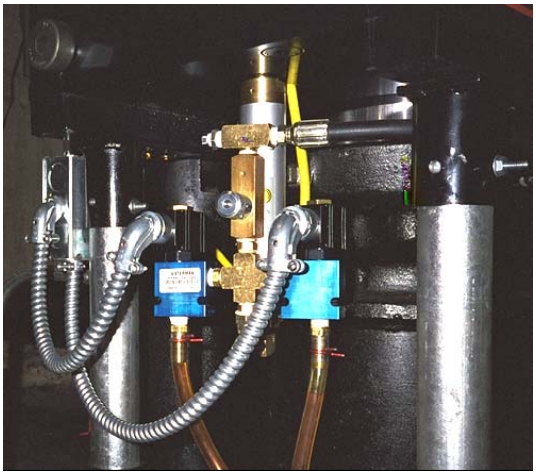
Note: The fuses on the* LifeJacket *controller board are 5 mm by 20 mm, F1 3 Amp 120 Volt and F2, F3, F4 1.25 Amp 120 Volt.

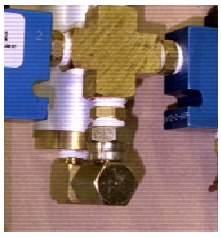
4.0 *LifeJacket* Support Stand Mounting (Appendix D)

4.1 Locate the live pressure port or bleeder in the elevator cylinder. Usually there is a tapped hole in the upper section of the cylinder. There are two common size holes, 1/8" NPT and 1/4" NPT. The *Job Survey Sheet* asked if this was present, and if not, the *LifeJacket* comes with a drill (7/16") and 1/4" NPT (National Pipe Thread) tap (Step 4.1.3). After locating the hole, you will choose the orientation of the *LifeJacket*, to prepare the hydraulic connection. The Flexible hose is 18" long and must be considered as you determine the orientation of the hydraulic assembly on the *LifeJacket*.



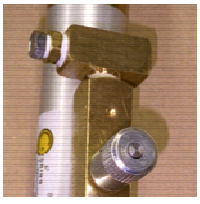
Warning: ***Use extra care to keep debris from getting into the set valves. All assemblies were tested, cleaned and drained at Adams to assure reliability.***





4.1.1 Disconnect the *LifeJacket* set valves from the control cylinder by loosening the 90° swivel fitting under the cross fitting.

4.1.2 Orient the upper "T" fitting in the direction that the flexible hose will be going to get to the live pressure hole in the elevator cylinder.



4.1.3 If there is not a tapped hole in the elevator cylinder, one will have to be added. When you determine the mounting location of the hydraulic assembly,

note the location for a new hole. This new hole will be 1/4" NPT. **Do not drill or tap hole yet.** This will be done in **Step 4.9.2.1**.

4.1.4 If the existing hole is 1/8" NPT, use the 1/8" to 1/4" adapter provided.

4.1.5 Do not remove the plug or bleeder yet, you still have pressure. This will be removed in **Step 4.9.3**.

4.1.6 There is a thumb turn adjuster on the flow control orifice which was set at the factory. If you turn it fully clockwise, you will close the pressure feed into the hydraulic assembly. **If it is necessary to change this setting, loosen the Allen lock screw** on the side of and turn the thumb turn counter-clockwise to open, clockwise to close. This restrictor controls the flow into the control cylinder and thus the speed at which the arms open. This adjuster can also be used to close the pressure feed while installing on an ESCO, as well as for repacking. When properly adjusted, the jaws open smoothly taking one to two seconds to reach full open..

Note: Verify that this adjustment is set to allow the arms to stay down after the set valve coils are energized. During a set, the arms should engage the plunger and not reopen.

4.2 ESCO heads (Victaulic type) have their bleeder ports on the top of the head. In these cases, you have to add the hose, prior to installing the *LifeJacket*, and terminate the hose temporarily into the hydraulic assembly by connecting to the fitting end of the hydraulic assembly and set to the side. Loosen the set screw and close the adjuster thumb turn to close the system until the control cylinder is mounted.

Note: Do not forget to check this flow control adjustment prior to operating. If it is closed, the arms will not re-open after a set. If this happens, simply opening the adjuster and running the car will get the arms open

Follow steps 4.2.1 - 4.2.2 when installing on ESCO heads only. Skip to 4.3 otherwise.

4.2.1 Allow the plunger to go all the way down so that there is no pressure and install the flexible hose into the bleeder hole. This may require removing the head to install the 90° fitting.

4.2.2 Stow out of the way until after the *LifeJacket* is installed. This is to retain pressure when you repressurize the system shortly.

4.2.3 It may be easier to simply tap a new hole on some ESCO jobs.

4.3 Assemble the *LifeJacket* support stand legs by bolting the lower cups onto the hollow tubes and set them onto the footer channel. Slide the legs into the lower cups and bolt. The two inch hollow tubes are pre-drilled and tapped and match the pre-tapped holes of the bars mounted directly under the *LifeJacket* baseplate, so whatever holes you use to bolt the lower cups on the tubes. *Ideally you want the legs and cups as close to the center of the elevator cylinder as possible, but the tubes are designed to put the cups anywhere.*

4.3.1 Place the hollow tubes across the footer channels. With the legs and cups in place,

assure that the legs have vertical clearance up to the baseplate. If the main feed pipe does not allow the footer mounting to be used, the feet are designed to be mounted directly onto the pit floor or under the baseplate as well. It is also possible to cut the hollow tubes, if necessary. Bolt the lower cups to the hollow tubes.

Note: Remember to use the boltholes inside the cups. Don't just use the slotted hole.

4.3.2 After the stand is assembled, measure to confirm that the stand is high enough that the *LifeJacket* is above the cylinder head. Bolt the upper cups to the underside of the bars, in the same location as you chose to mount the lower cups on the hollow tubes in **Step 4.3.1.**

4.3.3 Confirm that the baseplate or bars do not touch any part of the cylinder or head.

4.3.4 Use the Shim provided to level and clear the *LifeJacket* as required.

Note: A good time to replace packing would be right now. The* LifeJacket *was designed to allow repacks through the large hole in the baseplate, but not in all cases. Repacking now would give you the maximum time for packing life. If the packing is bad you must do the packing now. See Appendix G, for more details.

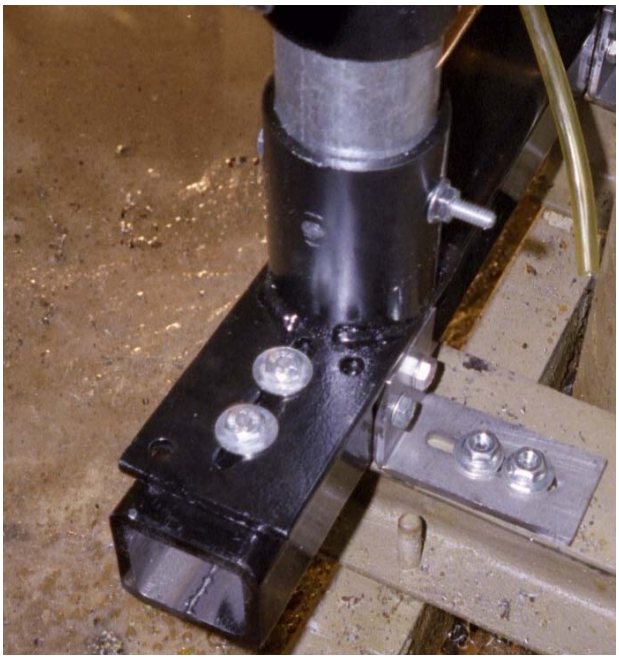
Warning: The* LifeJacket *baseplate must not touch the head anywhere.

4.3.5 If the assembly is not already in the pit from **Step 2.15,** bring the *LifeJacket* into the pit. Lift into position over the legs and into the upper cups.

CAUTION: The assembly exceeds 200 pounds. Use good body mechanics when lifting. Use the car or a come-along to hoist the *LifeJacket* as an alternate to manually lifting the Safety.

4.3.6 Bolt the stand legs to the upper cups of the *LifeJacket*.

4.3.7 Check for plumb across the top of the *LifeJacket* in all four directions. Use a 2' (two foot) level to check this. It is critical to be totally within the bubble to assure proper operation.



Warning: The* LifeJacket *must be level in both directions, side-to-side and front-to-back.

4.3.8 Shim under the cups with shim stock provided to get plumb and level as necessary.

4.3.9 Center the hole in the *LifeJacket* over the plunger.

4.3.10 Bolt the angle brackets supplied to the lower tubes in line with the top of the footer channel. If there is not a flat

surface to mount the angles to the footer, use the flat plates of the lower cups provided and anchor to the pit floor. Footer or floor mounting was determined in the *Job Survey*.

4.3.11 Drill and tap the hollow tubes for the 2 (two) hole, side angle mounting bracket as shown above. Do not drill the footer yet; the *LifeJacket* has yet to be centered. In some cases the unused tapped holes on the side of the tube can be used for this mounting

4.3.12 If the legs are too short, Schedule 40, 1-1/2" rigid conduit can be used. If the legs are too long, cut to suit.

4.4 Install the 4 square box to an upper stand leg bolt allowing the shortest route for the set valve flex conduits and the SO cord.

4.5 Remove the *LifeJacket* set valves from the control cylinder if not already done. This will make it easier to screw the control cylinder into the baseplate. Screw the control cylinder into the baseplate in the 1" tapped hole.

Warning: ***Use extra care to keep debris from getting into the hydraulic assembly. All assemblies were tested, cleaned and drained at Adams to assure reliability.***

4.5.1 Don't lose the jamb nut, cotter key and registration bit. They will be installed in **Step 4.9.4**.

4.5.2 After installing the control cylinder, reattach the *LifeJacket* set valves by reconnecting the 90° swivel connector. Use care to keep debris out of system.

4.6 With the *LifeJacket* mounted on the support stand, the hydraulic control cylinder, hydraulic valve assembly re-attached, and the leg hardware in but the hollow tubes still not bolted to the footer (or floor); it is necessary to get the truest center and to install the hydraulic hose. This will begin the Centering process, outlined in **Step 4.9**.

4.7 Install the hose with the fittings provided that will assure that the hose does not fall outside of the *LifeJacket* footprint. *It is ideal to mount the hose and fittings so that they can't be easily stepped on or hit by falling debris.* The *LifeJacket* would set if this hose were to break, but the risk should be reduced.

4.8 Install the strike extensions if sent with job per **Appendix A**.

4.9 Centering procedure

Note: Remember to install dust cover prior to reattaching plunger to platen plate.

4.9.1 Apply power to the elevator, slip the dust cover onto plunger and re-attach the plunger to the platen. Realign the platen to the marks made when the platen was disconnected. Support the cover by tying a rag around the plunger or tie it to the bolster. The tight fit of the cover is deliberate to prevent debris from getting into the *LifeJacket* insert and shoe assemblies.

Warning: ***Make VERY sure that there is no debris in the arms or on the copper shoes. Potential plunger damage can occur.***

4.9.2 Run up on inspection to re-pressurize the system, about 6" (six inches) above timbers or pipe stands, but do not remove timbers or pipe stands from the pit, then run the car down and close the arms of the Safety. In most cases the *LifeJacket* will not support the car at this point. Land the car to remove pressure. If the arms do not go fully down, DO NOT force them.

4.9.2.1 If there was not an existing bleeder hole, one will have to be added now. With the car supported, carefully drill and tap the cylinder for a 1/4"NPT fitting with the drill and tap provided. Use care to collect drill and tap shavings.

Warning: ***Make sure that no metal shavings enter the cylinder. This could cause problems later with normal operation.***

4.9.3 Have rags on hand and remove the bleeder plug in the elevator cylinder and attach the flexible hose from elevator cylinder to hydraulic assembly. Run the car up and correct any leaks if any. You should see the control cylinder rod extend when the elevator is lifted off the stands. If not, check the Flow control adjuster, loosen the Allen and turn counterclockwise until it moves up. It should move to the full open in about three seconds.

CAUTION: Extreme pinch point hazard. Never place fingers in position to be crushed. Use cable handles ONLY to access arms.

4.9.4 The registration bit can now be installed into the routed holes in the arms and onto the top of the rod, then the jamb nut tightened. Running clearance will be adjusted by the bottom jamb nut later, so do not install the cotter key yet.

4.9.5 The arms of the *LifeJacket* should close fully when the plunger is going down and when the *LifeJacket* set valves are energized. As the arms set, the plunger may not stop until the shimming procedure is complete.

Warning: ***If the arms do not go down, do not force down with a hammer or by standing on it. This procedure is for centering only, not for stopping.***

4.9.6 If the arms do not go flat it is OK, the intent is to center the *LifeJacket*. Adjust the legs to be vertically plumb and square to each other.

4.9.7 Bolt the angles to the footer, or anchor the feet to the floor.

4.9.8 With the *LifeJacket* mounted to the footer or floor, tighten every stand bolt.

4.10 Connect the flex conduit from the set valves to the 4 square box, as shown at above.

4.11 Run 3/4" conduit from *LifeJacket* controller, usually via the existing wireway gutter or duct, to the 4 square box mounted on the *LifeJacket* stand. Connect the flex or liquidtite conduit supplied from set valves to the 4 square box.

Note: See wiring diagram in Appendix F for a quick overview of pipe layout and number of conductors needed.

Warning: Using the required wire gage is critical to battery operation of the set valves. The chart in section 4.12 must be followed for set valve wiring.

4.12 Use the chart below to find the required wire gage for wiring from the 4 square box on the *LifeJacket* leg to the *LifeJacket* controller box. Connect the wires to their appropriate Wago type connector:

Connect 2 (two) wires to set valve 1 coil (use chart)
Connect 2 (two) wires to set valve 2 coil (use chart)
Connect 1 (one) for ground, 18 gage
Connect 2 (two) to the safety switch, 18 gage

MAX DISTANCE LifeJacket CONTROLLER TO PIT	SET VALVE WIRING USE THIS WIRE GAGE
70 ft	18
115 ft	16
180 ft	14
290 ft	12

Note: For distances greater than 290 feet, all Adams Technical Support at 800 323-0796.

4.12.1 The safety switch wiring must go to the *LifeJacket* controller box and paralleled to the normally open momentary safety cut-out switch. Do not parallel any other pit safety switches. Refer to wiring diagram in **Appendix C**. The cord going down through the baseplate is wired to the safety switch, a normally open momentary positively acting type switch. The switch is mounted on an arm. When the arms are open, it will engage the side of the dust cover to close the switch. For ease of installation, this switch will have to be jumped out until **Step 6.1.4**.

Warning: Make sure you do not forget to remove this jumper when you are finished

CAUTION: Make sure to remove power when wiring the *LifeJacket* Controller.

4.13 Obtain a 120 VAC and ground from the elevator controller. Run wires and connect to the wago type terminal connector provided in the *LifeJacket* controller.

4.13.1 If the controller does not have 120 VAC, the survey should have noted this and a multi-tap transformer (Part # LJ 4035) was sent. Mount it in the elevator controller. Wire it to a 240 VAC source to get the 120 VAC necessary.

Warning: ***Do not connect ground to the controller board; Use only the chassis grounding screw supplied.***

Warning: ***The 120 VAC connects ONLY to the transformer taps. There are NO board connections. Do not connect 120 VAC to any other terminal except the transformer.***

4.14 Verify all wiring by checking wire number to terminal marking. Turn on power.

4.15 When power is first supplied to the *LifeJacket* controller, a Power green LED in the upper left of the Board should be illuminated indicating 120 volt AC power is on and the Inservice Green LED on the top of the Board will be blinking showing that the CPU is operating. You will also hear one long (4 second) beep followed by several shorter (.5 second) beeps indicating things are normal.

4.16 Install all other wago type connectors if they are not already connected.

4.17 Press the system reset button on the controller. There are only 2 (two) switches on the controller PC board. SW 2 is for CPU reset on the upper left and RESTART on the upper right. To reset you push only the restart.

Note: The* LifeJacket *will not open until the pressure of the oil is increased to lift and move the car up. Pushing resets in the controller alone will not open the brake arms.

4.18 After running up and the arms open, adjust the *LifeJacket* registration bit until the plunger is running clear of the copper shoes. This may require adjusting the jamb nuts to raise and lower the registration bit on the cylinder rod threads.

4.19 With the centering complete, again verify that all mounting bolts are tightened, including the angle brackets and floor anchors if applicable.

4.20 Install the vinyl tubing as shown at right and lead into the pit can. Do not run back to the tank, the backpressure can prevent the *LifeJacket* from operating.

Warning: ***Use ONLY the length of vinyl tubing supplied. Longer lengths create too much backpressure to operate correctly. Do not place the end of the tubing in the bottom of the pit can. It must be secured near the top of the pit can to prevent the tubing becoming submerged in oil.***

4.21 In some cases it is necessary to reduce the Runby. This is done by the addition of Strike Extensions. If supplied, mount the buffer extensions to the buffer strike plates as shown below and in **Appendix B**. In some cases it may be possible to raise the buffers to reduce the Runby, Call Adams Technical Support for more information.

5.0 *LifeJacket* Setup and Adjustment

CAUTION: The rest of this procedure should be done while standing in the hallway, not in the pit. It is recommended that you use the LAD or a remote wired set/reset switch so that you are not under the car for these tests.

Note: Before beginning the next steps, set all the Dipswitches in the controller to ON. This will prevent the safety from setting unexpectedly while you are testing. See Step 5.8.1 for details on final adjustment settings.

5.1 Using an access switch or running from the machine room, run the car up in preparation to run down full speed. For testing, start the down run at the same spot, usually the third floor, running to the second floor. If the car is a two stop, then obviously start from the second. Try to set the safety at the same area of the plunger.

Note: After running for the first time, you may get a direction error fault. This is caused when the encoder output quadrature indicates a direction opposite from the valve coil direction indication. To correct this, look on the* LifeJacket *controller board for the direction reversal shunt and either remove the shunt or add the shunt per the instructions in Step 5.9. See diagram on controller cover or Appendix C.

Note: A* LifeJacket *Access Device (LAD) is available from Adams for diagnostic and set/reset functions. If one is unavailable on the job, a N/O momentary switch will work as a temporary actuation device, wired to "bat -" and "set 1 -" terminals on the controller board. Remove this switch for normal operation. See Appendix C.

All buttons on the LAD activate by pressing and holding the <enable> button while pressing the desired function button.

5.2 Manually set the *LifeJacket* with the empty car running down full speed. This is done by pressing the "<enable> Set Valve 1" to set valve 1 or "<enable> Set Valve 2" to set

valve 2 on the **LAD**; or by jumping the "**bat -"** (battery minus) terminal to the "**set 1 -"** (set one minus) terminal. If the brake arms fall flat and the car does not stop, reset the *LifeJacket* controller by pressing the "<enable> Restart from Set" button on the **LAD** or by pressing the RESTART button on the controller board and run car up until the *LifeJacket* opens. Again, resetting is done by pushing the RESTART switch on the *LifeJacket* controller AND by running the car in the up direction.

5.3 There are shims provided with the *LifeJacket* package. They are .005" ((5) five thousandths) thick. These shims are cut to proper length and punched to fit under the copper shoe mounting screws in the insert. If more shims are needed, there is another bag of shims supplied**, BUT do not use them until you have called Adams Technical Support at 1-800-323-0796.** This extra bag is for years later, if needed, and must be left on the job, ideally in the *LifeJacket* controller.

Note: ***Leave the spare shim package in the* LifeJacket *controller when complete. Do not open this bag unless instructed to by technical support.***

Warning: ***Use only the shims supplied. The shims are custom length to each diameter job.***

5.4 If the car did not stop, shims will have to be added. To add shims, fully open the arms and remove the 1/4-20" flat head brass screws to remove the copper shoes. Only shim in increments of .005" and in equal amounts on both shoes**.**

Warning: ***Use only the brass flathead screws supplied and make sure the heads are below the face of the copper shoes.***

Warning: ***Add shims only in increments of .005 (five thousandth) at a time and add equal amounts to both inserts. Failure to observe this could result in permanent damage to plunger.***

If the car does not stop after all the shim supplied in the first bag is installed, Do Not Continue; call Adams Technical Support at 1-800-323-0796.

5.5 Re-install copper shoes and re-test until car stops successfully. A successful stop is one that the car comes to a stop within 2 (two) inches of travel or less after the *LifeJacket* arms fall flat.

5.6 When the empty car is successfully stopped, it is time to increase the load until the *LifeJacket* can stop a full load.

5.6.1 Add 1000 pounds of test weights to the car. Repeat **Steps 5.1 - 5.5**. If the car stops, repeat this step until the car slides. When the *LifeJacket* stops the capacity load, the shimming procedure is complete.

Note: If there are any leftover shims, leave them on the job site to be used for future adjustment. The shims are custom made for each diameter so should not be used on any other job.

Note: Be advised that resetting the* LifeJacket *after a full load set may require increasing bypass relief pressure. Resetting requires additional pressure to the normal pressure required to run the full load car.

5.7 Re-adjust the *LifeJacket* rod bottom nut until minimum running clearance between the copper shoes and the plunger is obtained. Install cotter key after adjustment is complete.

5.8 With the mechanical adjustments made, the only electrical adjustments are to set the 125% of rated or operating down speed. This is the speed at which a car goes down with full load. If you don't have a tachometer, you can find the speed by adding the binary equivalents of the DIP switches on the controller board. Each switch has an equivalent binary value. The switches are labeled 1 - 8, and each binary equivalent is double the value of the former, meaning switch 1 is 1. Switch 2 is 2. Switch 3 is 4. Switch 4 is 8. Switch 5 is 16. Switch 6 is 32. etc... Running the car and toggling the switches, it is possible to determine the car speed, by when the *LifeJacket* sets; then add 25% of that speed, convert that number to a binary equivalent, then set the switches for high speed trip speed. Depressing the switch to the **"1"** position is **on**, depressing the **"0"** position is **off.** Shown at the right is an example of switch 5,6,7 and 8 **"on"** adding up to 16 + 32 + 64 + 128 = 240 fpm.

5.8.1 As another example, if the operating speed in the down direction is 100 fpm, then you will set the DIP switches for 125 fpm by flipping to the **"1" or** "**on**" position, the switches which add up to 125, you would be setting the switches 7, 6, 5, 4, 3 and 1 to the **on** position; the binary equivalent of 64, 32, 16, 8, 4 and 1 which added together equal 125.

5.9 There is an 8 (eight) pole header block on the controller board next to the remote annunciator wago type connector (**Appendix C**) labeled J9**.** If you see encoder directional faults, remove the shunt that jumps the top two pins on this header connector. This shunt must be set to the proper rotation to determine the correct direction. If it is set wrong, you will get encoder failure LED indication after every run. Also, do not leave the shunt across any other header terminals. They are for testing purposes only. See **Appendix E** for *LifeJacket* Board operational details.

Note: If the elevator rated or operating speed in the down direction is less than 30 fpm, another rotation procedure check must be made.

5.9.1 If the operating Speed is less then 30 fpm, run the car up in preparation for a down run. Using the **LAD** press the "<enable> High Speed" test at the same time. This tells the controller to trip at 50% of the overspeed DIP switch setting.

5.9.2 If the **LAD** is not available, place the direction reversal shunt on the terminals shown on the diagram in **Appendix C**, wait 2 seconds, and replace the shunt on the direction reversal terminals.

5.9.3 When the car runs down the *LifeJacket* will set as described above, if the direction shunt is correctly placed. If the *LifeJacket* did not set, reverse the Header jumper to the opposite rotation. See **Appendix C**.

5.9.4 Press "<enable> Restart from Set" if you have a **LAD** or "RESTART" on the PC board to resume normal operation.

5.10 Verify that if the car has a final limit switch, it operates prior to buffer engagement.

5.11 After complete wiring checkout, press SW2 on the PC Board to begin the program operation.

6.0 Testing

6.1 - Set the *LifeJacket* with battery power

6.1.1 Run the elevator down from the 2nd floor. LAD Press '<enable> Set Valve 1' to energize set valve. Without LAD Jump Bat- to Set 1- on PC Board.

6.1.2 *LifeJacket* will set with 2" or less of slide.

6.1.3 There will be no PC Board indication as it was not a computer-generated set. Reset by running elevator up to second floor. When jumping Bat- to Set 1- the PC Board may indicate fuse is blown or missing by lighting the fuse LED. This is not a problem. Just press '<enable> Restart' to clear.

6.1.4 Verify that the Safety Circuit was interrupted. To run the elevator up it will be necessary to press the Safety Switch cutout to reclose the Safety Circuit until the *LifeJacket* arms fully open. This must be done for every test.

***Warning:* Remember to remove Safety Switch jumper after testing is complete.**

6.2 - Set the *LifeJacket* with the High Speed Test

6.2.1 Run the elevator down from the second floor. LAD) Press '<enable> High Speed Test' to enable the test. Without LAD) Shunt, for at least 2 seconds, the #7 header jumper with the direction reversal shunt. It is the second header from the bottom, below the #1 header or direction reversal shunt. This also enables the High Speed Test. Replace the shunt as you found it. See inside cover of controller.

6.2.2 *LifeJacket* will set after attaining at least 50% of the Overspeed setting of the DIPswitch. The speed displayed may show the car traveled faster than the trip speed. This is normal.

6.2.3 The Overspeed LED will light and the board will beep. Press the Restart switch in the controller to reset. Run elevator up.

6.3 - Set the *LifeJacket* with a Direction Error

6.3.1 Remove the direction coil connectors from the PC Board. Run the elevator down from the top floor. Car speed must exceed 30 fpm for at least 4 seconds. Fast cars may take more than one down run before direction error is indicated.

6.3.2 *LifeJacket* will set after exceeding 4 seconds of encoder output without a direction indication.

6.3.3 The Direction Error LED will light and the board will beep. Press the Restart switch in the controller to reset. Run elevator up.

6.4 - Set the *LifeJacket* with an Encoder Error

6.4.1 Remove the encoder connector from the PC Board. Run the elevator down from the top floor. Car speed must exceed 30 fpm for at least 4 seconds. Fast cars may take more than one down run before encoder error is indicated.

6.4.2 *LifeJacket* will set after exceeding 4 seconds of down direction indication without an encoder output. (It will not set in the up direction but will give an error.)

6.4.3 The Encoder Error LED will light and the board will beep. Press the Restart switch in the controller to reset. Run elevator up.

6.5 - Battery Presence test

6.5.1 Remove the battery connector from the PC Board.

6.5.2 After about 15 seconds, the Battery LED will light and the board will beep.

6.5.3 Replace connector. Press the Restart switch in the controller to reset. Run elevator up.

6.6 - Fuse and Valve Presence test

6.6.1 Remove the set valve connector or the valve driver board from the PC Board.

6.6.2 After about 15 seconds, the Fuse LED will light and the board will beep.

6.6.3 Replace connector. Press the Restart switch in the controller to reset. Run elevator up.

6.7 After successful verification of these tests, the installation is complete. Press SW2 on controller PC Board to reset system and reinitiate Software.

6.8 Clear the Brake Sets by placing header jumper onto the bottom header pins and pressing SW2. Remember to return the jumper to its previous position on the direction pins. See **Appendix E** for details on how to reset Brake Sets.

7.0 Final Installation Checklist

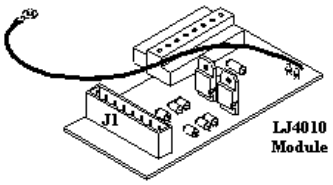
Please remember to check:

- ☐ **120 VAC connected and powered.**
- ☐ **Battery is connected.**
- ☐ **Any Safety circuit jumper is removed.**
- ☐ **The Flow Control Allen setscrew is tightened. (Step 4.1.6)**
- ☐ **The packing does not leak.**
- ☐ **All stand bolts are tight.**
- ☐ **The *LifeJacket* board has a green LED power light solid "ON" and a green LED blinking "ON". These indicate all is well with the system.**
- ☐ **Verify that the accumulated set count is reset to zero. (Appendix E).**
- ☐ **Assure that the spare shim pack is left in the *LifeJacket* controller.**
- ☐ **Verify that there are no leaks in the hydraulic assembly or tubing.**
- ☐ **Verify that the Final Limit switch (if present) operates prior to buffer engagement.**
- ☐ **If buffer extensions were installed, verify that they are centered over the buffers.**

8.0 Troubleshooting Index

8.1 Fuse LED lights continuously with no fuse problems. <u>This will not cause a set.</u>

There are two known conditions that will cause this. First is when a jumper is used to energize the set coils during testing (**Step 5.2**), a sneak circuit is created through the battery causing the discreet circuit to falsely indicate a blown fuse. Restarting the *LifeJacket* controller will clear this condition. The second is if there is a lot of electrical noise in the elevator itself into any wire going to the PC board. These spikes play havoc with the circuitry that measures the impedance of the wiring to the set coils; causing a fault that appears to be a blown or missing fuse. This circuitry is monitored by the software and if a high impedance occurs for a long time, the software then sets the annunciator to beep during a "Fuse Fault". Transients are inherently short in duration and the Fuse LED will light due to high impedance event, but the software rechecks prior to annunciating and if a transient had caused the Fuse Fault, the condition goes away and the annunciator never latches. The fix is to add a LJ4010B valve driver module, shown at right. Call Technical Support at Adams if this applies to your job. Please note that a true "Fuse Fault" situation causes the annunciator to beep in addition to the Fuse LED being on.



See Appendix L for Installation instructions for the LJ4010B Valve Driver Module

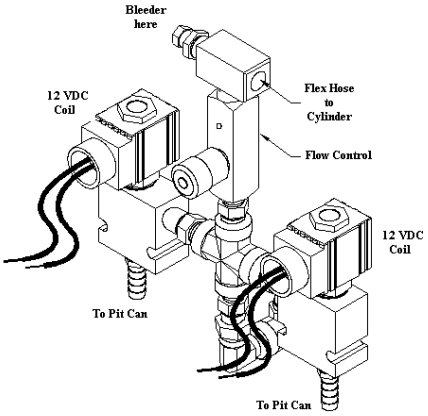
8.2 Encoder Error LED consistently reoccurs on a Miprom ™ type controller. <u>This will cause a set.</u>

This condition has occurred while the car is at the bottom floor and the down valve LED shows constant on, yet the valve is not energized and the car is not moving. The direction input circuitry on the *LifeJacket* controller is optically isolated and is typically insensitive to about 40 volts, but some of the components have been observed to turn on at 7 volts. Because of the Triac switching of the Miprom circuitry, there are occasions where there is a

standing voltage of 7 - 10 volts, which has, on one job, caused the *LifeJacket* controller to set due to an encoder failure. The fix is to either isolate this signal with a relay or call Technical Support at Adams for a new PC Board with higher threshold input circuitry.

8.3 The *LifeJacket* arms will not lower when the set valves are tripped.

There have been a few jobs where the flow control (adjustable orifice) has been mechanically installed upside down causing a check valve to be in the hydraulic circuit forward biased. (instead of reverse biased). The proper orientation of the Flow Control is pictured in **Step 4.1.6** of the installation manual and here. This check valve allows pressure in the control cylinder to flow at full capacity to the elevator cylinder if the pressure in the elevator cylinder goes to a lower pressure than what was in the control cylinder. By being in the wrong direction, it allows full flow INTO the control cylinder while the set valves are trying to allow full flow into the pit can. Therefore, the pressure doesn't drop in the control cylinder and the spring does not pull the arms down. It will be necessary to disassemble the hydraulics and reassemble them as shown to correct the problem.

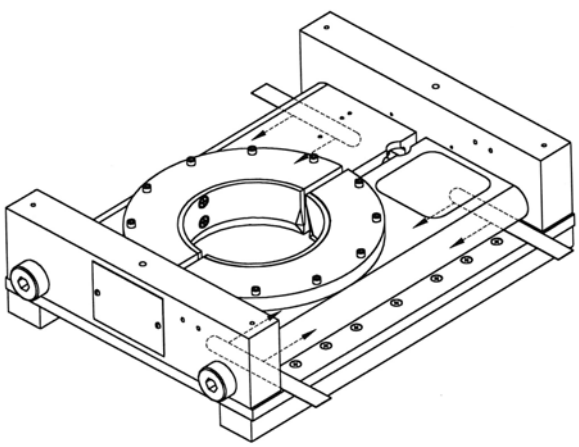


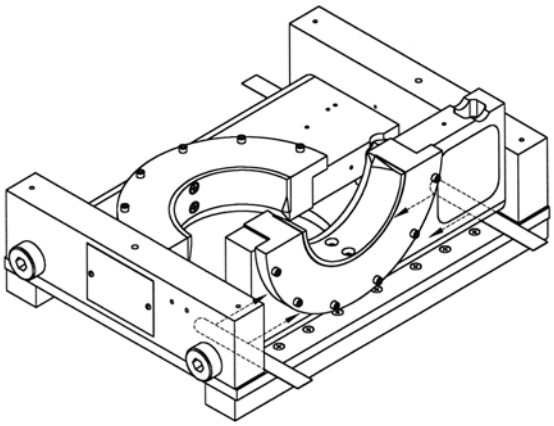
8.4 *LifeJacket* arms do not fall flat during a set; raise right back up even when the car is traveling down.

On one job, it was determined that the registration bit was the correct length; however the routed holes where the bit engages into the arms were too shallow. This caused the arms to not fall flat enough to be able to engage the copper shoes against the plunger correctly. Call Technical Support at Adams if you observe this condition. A common cause is also that the flow control is open too much to allow the pressure to fully drain from the control cylinder.

8.5 *LifeJacket* arms fall flat but the full or partial load is not stopped.

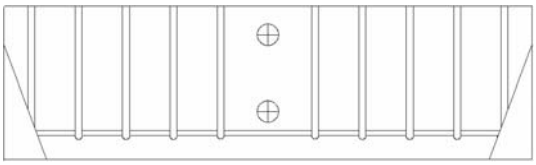
This condition has been observed in units where the shoulder boltholes are machined to minimum tolerance. First, determine if your unit has this condition by using a .015" feeler gauge in the positions shown below. There must be AT LEAST .015" of clearance under the arms in both the flat or closed position and the open position as shown below. Use three shims if you do not have a set of feeler gauges. **This would only be seen in units shipped before March 1998.**



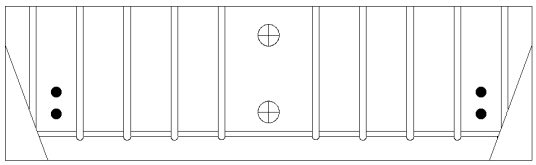


8.6 *LifeJacket* arms fall, but do not fall fully, reopen and appear to not even begin the stopping process.

This condition has been seen in a very few jobs and is indicative of the need to increase the co-efficient of friction necessary to pull the arms into the fully closed position. The corrective action is to change the copper shoes to the high friction type as shown on the below. This additional frictional component does not harm the plunger, it is designed to increase the friction needed to pull the arms all the way down in cases where the plunger wall has a reduced friction due to an early specification that plunger be ground to a finer finish. Call Adams Technical Support for specific instructions.



Normal



High Friction

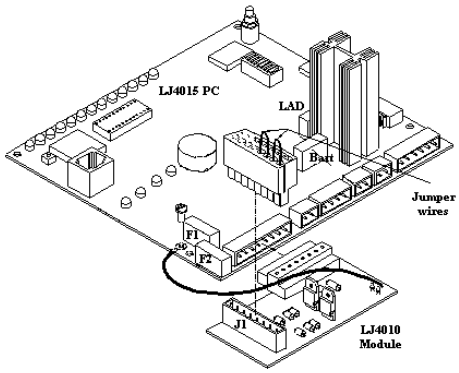
8.7 *LifeJacket* sets with an encoder fault. <u>This will cause a set</u>.

The encoder fault is simply that there is direction valve voltage from the elevator and the encoder is not producing pulses as expected. This can occur for several reasons;

1. If the hydraulic control cylinder spring is of too high a force, the *LifeJacket* arms could close due to high “stiction” in the packing. This is due to the system pressure dropping before the stiction releases the plunger and is usually associated with a "bump" in the start of a down run. When the system pressure drops to below the spring force, the arms will close. If the safety switch is not adjusted to open the safety circuit after approximately 1/2 inch of arm travel, then the direction coils stay energized, the arms do not go fully flat and the car does not move. The correction is to lower the force in the control spring. Call Adams Technical support for assistance.

2. If the controller has some leakage voltage in the direction coils as described in **Section 8.2**, the correction is to isolate the voltage inputs by adding pilot relays on the elevator controller and using a contact to feed the *LifeJacket* inputs or we can add specific opto-isolation chips. **This should only affect jobs prior to June 1999.**

3. If there is a tremendous amount of transient voltages, usually seen in older controllers. The correction is to run the *LifeJacket* set coils in shielded wires and isolate the controller voltage from the set coil wiring by piloting the safety switch on the arms with a relay mounted in the elevator controller. This affects all jobs.



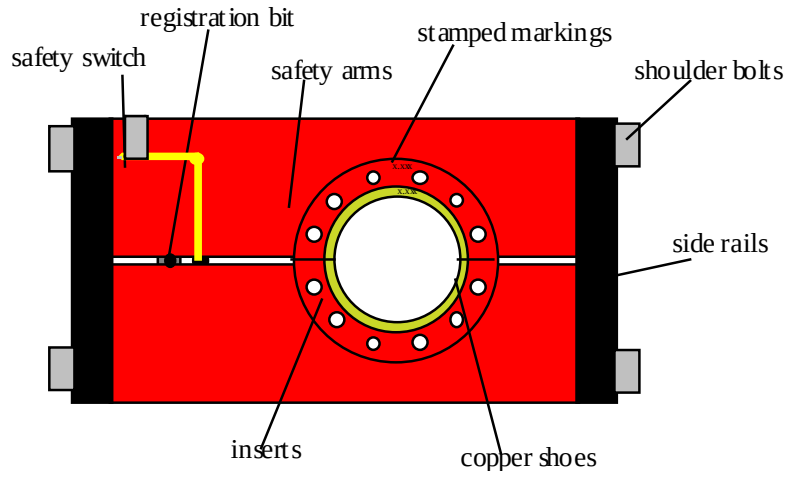
8.8 The *LifeJacket* controller has the Fuse light on without beeping. (**Section 8.1** and **Appendix L**)
Some elevator controllers have high transient voltages that have caused driver chips on the *LifeJacket* board to burn up and cause intermittent rapid impedance changes in the Fuse monitoring circuit. This is eliminated by the addition of the LJ 4010 Valve Driver Module, which until June 1999 we sent on a demand basis, but to eliminate the problem in the first place, we are sending to all jobs which answer 'relay controller' to a survey question relating to the elevator controller being a relay or solid state type. If you do not have this Module and experience transient voltage spikes, this will filter them out of the *LifeJacket* controller board. We also recommend the use of shielded cable to isolate these transient voltages.

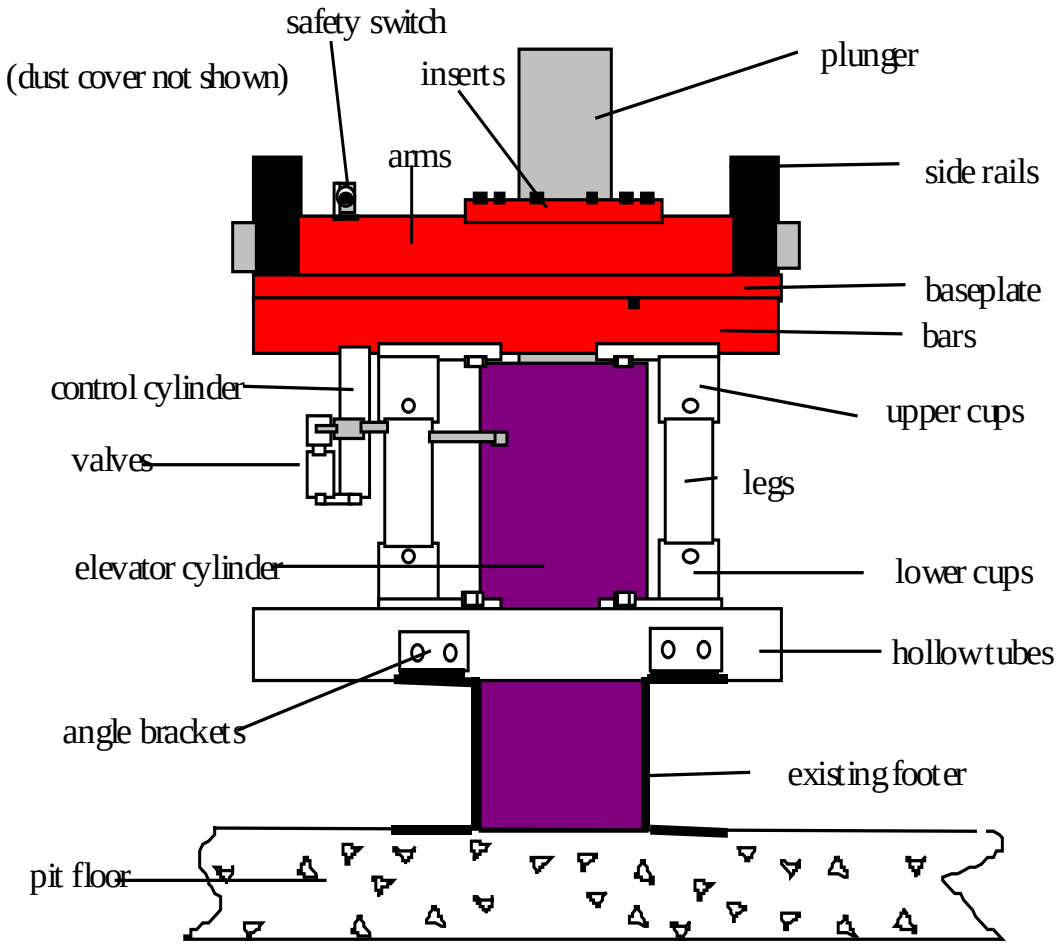
8.9 What are the other jumpers on the Controller Board for?

1. On the far left, above the LAD plug, is J3, with a jumper on it. It is for noise reduction in the serial communication to devices such as the LAD.
2. In the middle of the board may be a jumper J8 without a jumper on it. It is for testing the voltage output of the piezo driver and should NEVER be jumped out, that would be a direct short to the piezo driver circuit.
3. On the upper left is J2, without a jumper on it. It is not used at this time; do not jump it at all.
4. On the far right is an 8-pole header, J9. The first jumper is for reverse direction, either on or off is determined by the quadrature output of the encoder and is set only once during installation. The second jumper location on J9 is to select a non-standard encoder. The third jumper location on J9 select the LJ4050 Information Display option so information is not sent in LAD format. The fourth, fifth, and sixth locations are not used. The seventh location on J9 enables a high speed test set when a LAD is not available. The eigth and last jumper location on J9 clears accumulates sets.

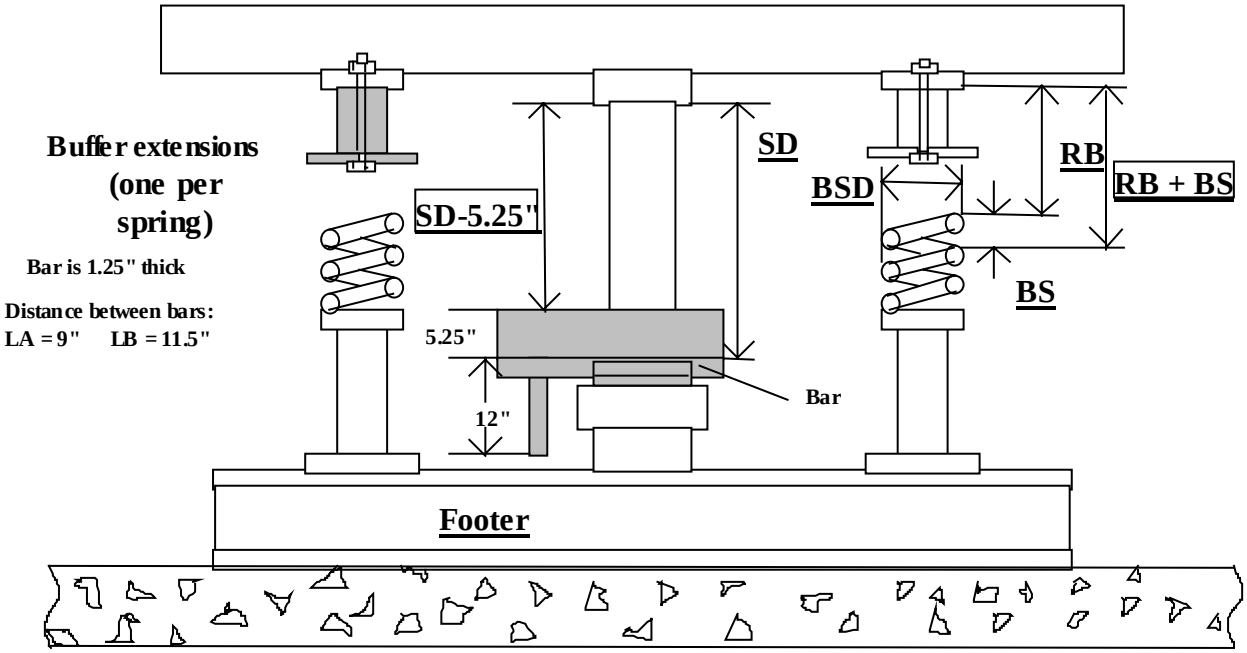
8.10 *LifeJacket* arms fall fully flat with higher loads on plungers over 6" in diameter and under 25' of travel but do not stop the car.
On some jobs it was noted that the normal amount of shimming did not stop the car. Further analysis of these jobs found that the steel was of a low ksi. Call if your *LifeJacket* behaves as described.

Appendix A: Component Locations





Appendix B: Buffer Extension Mounting



To mount the buffer extensions, first verify the dimensions given on the survey. Some simple calculations will determine the need to have them. Simply, if the car will strike the *LifeJacket* before it travels through the buffer stroke, then you need the buffer extensions. The height of the *LifeJacket* 5". So, for example*:*

If **SD** minus **5."** is greater than **RB** plus **BS** then you do not need extensions.
If **SD** minus **5."** is less than **RB** plus **BS** then you do need extensions. To put real numbers into the example, assume that:

SD = 16", **RB** = 6" and **BS** = 2"...
If (16" - 5") > (6" + 2") or Since (11" > 8") then there is enough room that the platen will never hit the LifeJacket, so extensions are not needed. But if:

SD = 8", **RB** = 5" and **BS** = 1"...
If (8" - 5") > (5" - 1") or Since (3"< 4") then there is not enough room and extensions are needed.

In some cases, the bars under the baseplate will not allow the head to fit up to the bottom of the baseplate. When the Upper Flange Diameter is greater than the space between the bars, another 1.25" will be needed to fit the *LifeJacket.* In these cases, the height of the *LifeJacket* is 6.25" instead of 5".

Drill the existing strike plates for two 3/8" bolts using the orange plates provided as a pattern. Bolt extensions as shown in diagram above. The **BSD** dimension is for the spring diameter to determine the extension plate size. It is critical that the extension be sized properly so that it can't go into the spring. Mount them directly above the Buffer Spring.

Appendix C: Board Wiring Diagram

Refer to next page for LED references and LAD conditions.

LAD DISPLAY: PC BOARD

No display: DOWN Direction LED
Indicates the direction of travel. Traveling DOWN when lit, UP when not lit.

DIRECT SERV SPD ERR: Direction Error LED
Indicated the direction of travel (as seen by the encoder) does not match intended direction as determined by elevator UP and DOWN valves.

NO DISPLAY: Brake set LED
Indicates that brake has set 50 times and the Life Jacket Requires maintenance.

RELEVELING WARNING: Valve DRVR LED (Version 3C4.1 only)
Indicates the car is releveling more than three (3) time per minute. Check for oil leaks and the level of oil remaining in the tank.

RELEVELING FAULT: Valve DRVR LED (Version 3C4.1 only)
Indicates the car is releveling more than six (6) time per minute. Check for oil leaks and the level of oil remaining in the tank.

ENCODER FAULT: Encoder LED
Indicates no encoder signal.

BATTERY FAULT: Battery Dischrg LED
A fault condition occure when battery is missing or discharged to the minimum level required to operate Life Jacket system. This fault is latched and you must press RESTART or RESTART FROM SET to clear the LED.

BATTERY LEVEL LOW: Battery Dischrg LED
This indicates that battery is low, but not discharged below the level for setting the Life Jacket control valves.

OVERSPEED TRIP: Overspeed LED
Indicates that the elevator has traveled faster than the TRIP SPEED setting on the dip switch.

OVERSPEED UP: Overspeed LED
indicates that while traveling UP, the elevator was moving faster than the TRIP SPEED setting on the dip switch.

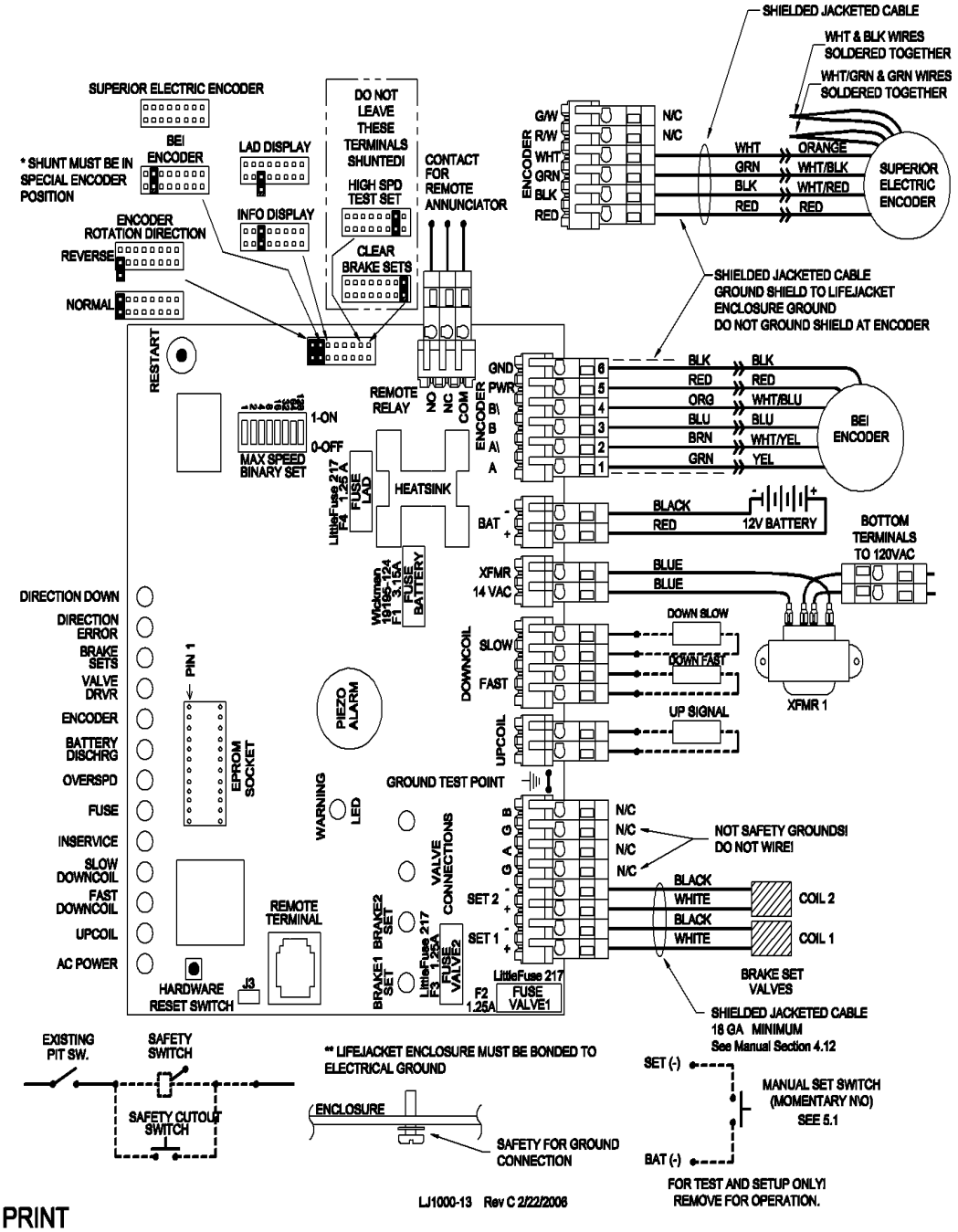
VALVE FUSE BLOWN: Fuse LED
Indicates that one or both Life Jacket SET VALVE fuses are blown or missing, or the SET VALVES are unplugged or missing.

OPERATING: Inservice LED
Flashes at 1 second intervals to indicate normal Life Jacket controller loop time.

UP SIGNAL ON, DOWN SLOW VALVE ON, DOWN FAST VALVE ON: Upcoil, Fast, Downcoil, Slow Downcoil LED illumination indicates coils energized.

POWER LOSS TRIP: AC Power
Illumination indicates AC power to PC board. Life Jacket will SET when battery is missing or at fault voltage level and AC power is lost.

NOTE: WIRE ACCORDING TO THIS PRINT



NOTE! Wire colors vary by brand of encoder.

LifeJacket Visual and LAD Operation and Fault indications

PC Board LED: LAD DISPLAY

Down Direction LED: no display, Indicates the present or last direction traveled determined by the encoder output. Lit indicates down, Unlit indicates up.

Direction Error LED: DIRECT SERV SPD ERR, Indicates that the encoders direction output does not match the demanded direction as determined by the direction valve inputs. This will cause an alarm. To correct, the Direction Jumper on J9 must be moved as shown on the Board drawing in **Appendix C**.

Brake Sets LED: BRAKE SETS FAULT, Indicates that the number of sets has exceeded 50 and requires a retest with Full Load to reset the counter to zero. This will cause the *LifeJacket* to set and alarm. To reset, the Clear Brake sets procedure must be performed as outlined in **Appendix E**. This procedure should be done before leaving the job after initial installation and full load testing.

Valve Drvr: RELEVELING WARNING or FAULT, Rev 3C4.1 only, Indicates the elevator is releveling too often causing a warning alarm. Excessive releveling causes and alarm and the *LifeJacket* will set.

Encoder LED: ENCODER FAULT, Indicates that the car has had a down fast valve on for an accumulated four seconds of running without an encoder output. This will cause the *LifeJacket* to set and alarm. Possible cable missing, loose connection, bad encoder or car not moving. Reset by pressing the Restart button on the PC Board and run the elevator up to release the *LifeJacket.*

Battery Dischrg LED: BATTERY LEVEL LOW, Indicates that the battery charge is lower than expected. This can occur when the battery is generally years old, or when brief power outages occur causing the battery to power the PC Board. This will cause an alarm that automatically stops when battery recharges when AC power returns.

Battery Dischrg LED: BATTERY FAULT, Indicates that the battery is dead or missing. This will cause an alarm and if AC power is removed, the capacitive battery may set the *LifeJacket.* Reset by pressing the Restart button on the PC Board and run the elevator up to release the *LifeJacket.*

Overspd LED: OVERSPEED TRIP, *Indicates* that the down speed has exceeded the overspeed Dipswitch setting. This will cause the *LifeJacket* to set and alarm. Reset by pressing the Restart button on the PC Board and run the elevator up to release the *LifeJacket.*

Overspd LED: OVERSPEED UP, Indicates that the up speed exceeded the overspeed Dipswitch setting. This fault will cause an alarm but will reset itself after approximately 15 seconds.

Fuse LED: VALVE FUSE BLOWN, Indicates that one or both of the set valves, fuses or wires are open. This will cause an alarm. Reset by pressing the Restart button on the PC Board.

Inservice LED: OPERATING, Indicates that the program is cycling correctly. The LED and LAD "OPERATING" should toggle on and off approximately once per second.

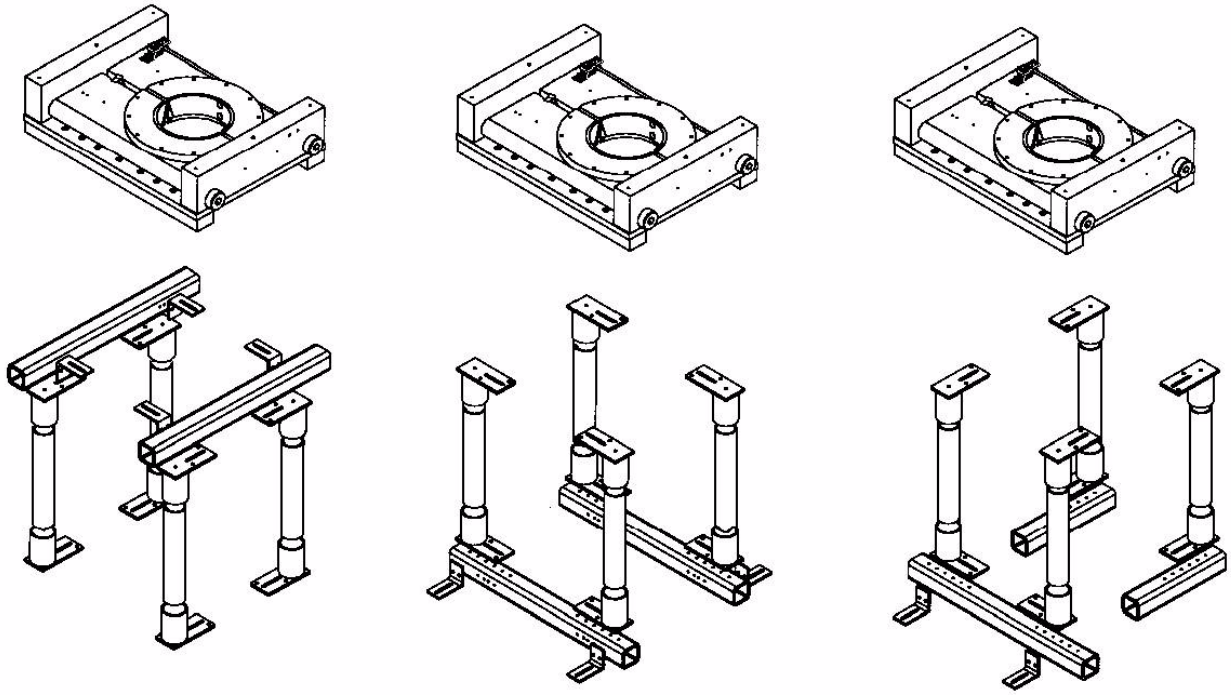
Slow Downcoil: DOWN SLOW VALVE ON, Indicates the elevator direction valve that is energized.

Fast Downcoil: DOWN FAST VALVE ON, Indicates the elevator direction valve that is energized.

Upcoil: UP VALVE ON, Indicates the elevator direction valve that is energized.

AC Power: no display, Indicates that AC Power is present and connected to the PC Board.

Appendix D: Stand Configurations



The stand assembly is designed to be as versatile as possible, to accommodate the several head and footer designs that are in the field. Above are some examples of how you might use the different stand components to assemble the *LifeJacket* mounting stand. The hollow tubes are engineered to support the legs as long as the pretapped holes are used with the preslotted cups.

The legs and cups have been predrilled so you shouldn't have to drill in the field, but it may sometimes be necessary. The 3.5", 1/4-20 leg bolts that connect the predrilled legs into the cups are not designed to sustain any shear forces, so be careful to have a fully clear hole when bolting together. Any shimming should be done under or over the cups. The Cups also have holes drilled in 90-degree directions, so turning the cup for any mounting can be done without redrilling.

If you find that the legs are too short, the legs are the same O.D. as 1-1/2" **rigid conduit**. (Not EMT or Thinwall). This will give you the flexibility to get more if needed locally.

The cups are designed to be mounted on the pit floor as well. Be aware that if you mount to the floor, applicable earthquake codes require 10 times the bolt diameter spacing on anchors, so the cups have the two diagonal holes. **Use only these holes when anchoring to the pit floor.**

"A" above is a typical requirement with Westinghouse type "E" and "F" jacks.
"B" is the typical mounting for most applications.
"C" is typical for ESCO jacks or jacks with the inlet pipe on the side of the jack just above the channels.

Appendix E: LAD (*LifeJacket* Access Device) and Controller Board Operating Instructions

Software REV 3C3.10 & 3C3.11RLD
3C4.1 Where Noted

Record All LED Faults or LAD Faults for future reference!!

Technical Support at Adams needs this data to be of help.

The *LifeJacket* control system continuously monitors its own condition and will respond with an audible alarm or failsafe *LifeJacket* operation. The following list summarizes some of the *LifeJacket* control system's safety and diagnostic features.

- Overspeed going down setting the *LifeJacket*
- Overspeed going up without setting the *LifeJacket*
- Over service speed (30 fpm without any elevator coil voltage)
- Encoder wiring errors or faults
- Encoder rotation direction error detection
- Low voltage or missing battery detection
- Blown fuse detection
- *LifeJacket* set valves not connected
- Over speed, DIP switch setting **(rev 3C4.1)**
- Re-leveling monitor **(rev 3C4.1)**

All fault conditions sound an audible alarm and flash the yellow LED on the control board. Fault conditions like low battery or blown fuse, do not set the *LifeJacket.* Emergency conditions like overspeed in the down direction or encoder faults do set the *LifeJacket* taking the elevator out of service. When there is insufficient power to set the *LifeJacket,* it will set upon that low power notification.

During power up, or a microprocessor reset, the **LAD** displays an introduction screen then cycles to operating mode. The introduction screen displays the hardware and software version number and the resettable and grand total of *LifeJacket* sets that have occurred since the *LifeJacket* was installed. This grand total cannot be reset. The software and hardware versions can be read directly from the EEPROM on the controller PC board. In addition, pressing **"<enable> Display ID"** on the LAD will display the version number of the controller and the grand total of sets.

Version 3C4.1, during power up, also displays the relevels per minute stored the last time the LifeJacket set.

After two seconds, the introduction screen switches to the operating screen. On the operating screen, the bottom line displays peak speed during the last trip. The peak reading is automatically cleared before every trip. The peak reading is valuable in setting the high-speed trip speed. Record peak speeds going UP and DOWN during full load testing. Refer to the *LifeJacket* Installation Instructions, **Step 5.8**, for proper setting of the trip speed. The top line displays

"ADAMS LIFEJACKET." Lines two and three display which elevator coils are energized, any fault conditions and the peak speed of the last run in line 4.

Version 3C4.1, the third line of the operating screen displays trip speed (**DIPSW**, the over speed set point programmed by the DIP switch) and the number of times the car releveled in the last minute, **RELVLS**.

The operating screen will display any fault conditions when they exist. When any fault condition is displayed, except low battery level and overspeed in the up direction, the controller MUST be restarted for the *LifeJacket* system to clear the fault indication. If the fault condition reoccurs, it will be re-displayed. Fault conditions are also indicated by LEDs on the controller PC board. Each LED is labeled. When the *LifeJacket* is set, the operating screen will display the reason for the set and the accumulated number of times the *LifeJacket* has been set since last *LifeJacket* system servicing.

***Note: All LAD functions require pressing the "<enable>" keys simultaneously with the Function key listed. This was designed to prevent unintentional setting of the* LifeJacket.**

Resetting the Brake sets to zero

To reset the accumulated total, press and release switch **"SW2"** on the *LifeJacket* controller board. It is on the upper left side of the controller board. You will hear a continuous tone then a pulsating tone. While the tone is pulsating, press **"2"** on the **LAD**. If the **LAD** is not available, move the direction reversal shunt (**Appendix C**) from the header and place it on both bottom header terminals. Press **"SW2"** to reset the controller and wait for the pulsating tone to stop. Place the shunt back on the direction reversal terminals of the header. Press **"SW2"** to reset the controller again.

Warning: Do not perform this procedure unless you verify a full load stopping ability. Resetting without verifying with full load is not recommended.

Note: Do not perform this test while the car is operating

Testing the *LifeJacket* Set Valves

Before operating the elevator, the *LifeJacket* system must be tested to ensure that all components are working. To assist with this testing the **LAD** can individually energize either *LifeJacket* set valves.

Press **"<enable> Set Valve 1"** to energize Set Valve 1.
Press **"<enable> Set Valve 2"** to energize Set Valve 2.

If the **LAD** is not available, jumping " **SET 1 -**" or " **SET 2 -**" on the *LifeJacket* controller board to "**BAT -**" will energize the respective valves. This method may cause the fuse LED to light; it is not a problem, disregard if you see it. It will go out when the system is reset.

After each valve test, the *LifeJacket* system must be restarted. Press the **"RESTART"** switch on the controller board located on the upper left side of the board, or **"<enable> Restart from Set"** on the **LAD**.

High Speed Test Set

Before the car starts to move down, press the **"<enable> High Speed Test Set"** button on the **LAD**. This button calculates a one-time use trip speed of 50% of the DIP switch setting.

When the car runs down it should exceed 50% of the trip speed and will set the *LifeJacket*. The display will show an Overspeed fault set and the peak speed reached by the car. Press **"<enable> Restart from Set"** on the **LAD** to bring the system back into operation.

If the **LAD** is not available, place the direction reversal shunt on the terminals shown on the diagram in **Appendix C**, wait 2 seconds, and replace the shunt on the direction reversal terminals. When the car runs down the *LifeJacket* will set as described above. Press **"<enable> RESTART"** on the *LifeJacket* controller board to resume normal operation.

Note: The trip speed will likely be lower than the displayed peak speed. This is due to the propagation delay between the demand to set and the mechanical components actually moving and causing a set. During this time, the car was still accelerating to full speed. It is not malfunctioning.

Servicing existing installations with a tripped *LifeJacket*

Note: BEFORE RESTARTING THE ELEVATOR, record any fault LED conditions that may be displayed on the LifeJacket controller board before shutting off power to the LifeJacket controller.

If the **LAD** is available, plug it in and press **"<enable> Display Refresh"** to display current conditions. After collecting all fault information, press "RESTART" on the *LifeJacket* controller board, **"<enable> Restart from Set"** on the **LAD**.

Attempt to operate the elevator. If there are still problems, the *LifeJacket* may set again and any fault conditions will be again be displayed on the **LAD** or by the LEDs on the PC board being lit.

Diagnostics and working with faults

This list describes what has happened when fault a message appears on the **LAD** or is indicated by LEDs on the PC board. Diagnostic functions are listed below by message displayed on **LAD** and **LED** indicator.

***LAD display: LifeJacket* PC Board LED indicators**

***OVERSPEED TRIP*: Overspeed LED**
This **LAD** display and LED indicate that the elevator has traveled faster than the trip speed setting on the Dipswitch. If the elevator was traveling down, the *LifeJacket* will set. During initial *LifeJacket* installation, check the trip speed setting of the Dipswitch on the *LifeJacket* controller PC board. It must set 125% of the peak speed with full load being displayed on the

LAD. Oil temperature and viscosity can affect the actual elevator speed. Expect the elevator to run faster with hot oil.

OVERSPEED UP: **Overspeed LED**
Indicates that the elevator while traveling up was faster than the trip speed setting on the DIP switch. The *LifeJacket* will not set in this case. This fault clears after 15 seconds.

ENCODER FAULT: **Encoder LED**
This **LAD** display and LED indicate that the encoder is not outputting, wired incorrectly or the direction of travel does not match the active elevator coil information. Press **"RESTART"** on the *LifeJacket* controller board, **"<enable> Restart from Set"** on the **LAD**. If the fault still exists, check the encoder wiring. It is doubtful the encoder is defective, more likely a wiring error. This fault indication works **only** occurs after the down fast solenoid is on for an accumulated 4 (four) seconds without a valid encoder output.

DIRECT SERV SPD ERR: **Direction Error LED**
This **LAD** display and LED indicate the direction of travel as output by the encoder does not match the intended direction determined by the active elevator up and down coils. First, check that the elevators up and down coils are connected to the *LifeJacket* controller PC board correctly. When the down coils are not energized, the *LifeJacket* controller will not allow the elevator to operate faster than 30 fpm (feet per minute). Next, change the position of the direction shunt on J9, press "RESTART" on the *LifeJacket* controller board, **"<enable> Restart from Set"** on the **LAD**, and run the elevator. This will clear a direction mismatch. This fault indication works only after the car speed exceeds 30 fpm.

BATTERY FAULT**: Battery LED**
First, check to see that the battery is connected to the *LifeJacket* controller PC board correctly and the battery fuse on the controller PC board is not blown or missing. A fault condition occurs when the battery is missing or discharged to a minimum level to operate the *LifeJacket* system. This fault is latched and you must press "RESTART" on the *LifeJacket* controller board, **"<enable> Restart from Set"** on the **LAD** to clear the LED and display. Because the *LifeJacket* controller measures battery capacity and not just voltage, do not rely on a voltmeter reading. Capacity changes with the age of the battery, degree of use and other factors. As a guideline though, if the battery measures more than 13 volts when it is disconnected from the PC board, it is fully charged.

BATTERY LEVEL LOW**: Battery LED**
This indicates the battery level is low but not discharged to where it cannot set the *LifeJacket* control valves. It usually means that the AC power has been off and the *LifeJacket* controller was operating on battery for an extended period of time. When AC power is restored, the battery will be recharged and the low level indications will go off automatically.

VALVE MISSING FUSE BLOWN**: Fuse LED**
Indicates one or both *LifeJacket* set valve fuses is blown or missing. Check and replace as required. It can also mean the *LifeJacket* valve coils are not connected to the *LifeJacket* controller, wiring error or are valve coils are open. It can also be lit if a jumper is used to set the *LifeJacket* by jumping **Bat -** to **Set 1-**. A sneak circuit causes this to occur.

***RELEVELING WARNING*: Valve DRVR LED (Version 3C4.1 only)**
Indicates the car is releveling more than three (3) time per minute. Check for oil leaks and the level of oil remaining in the tank.

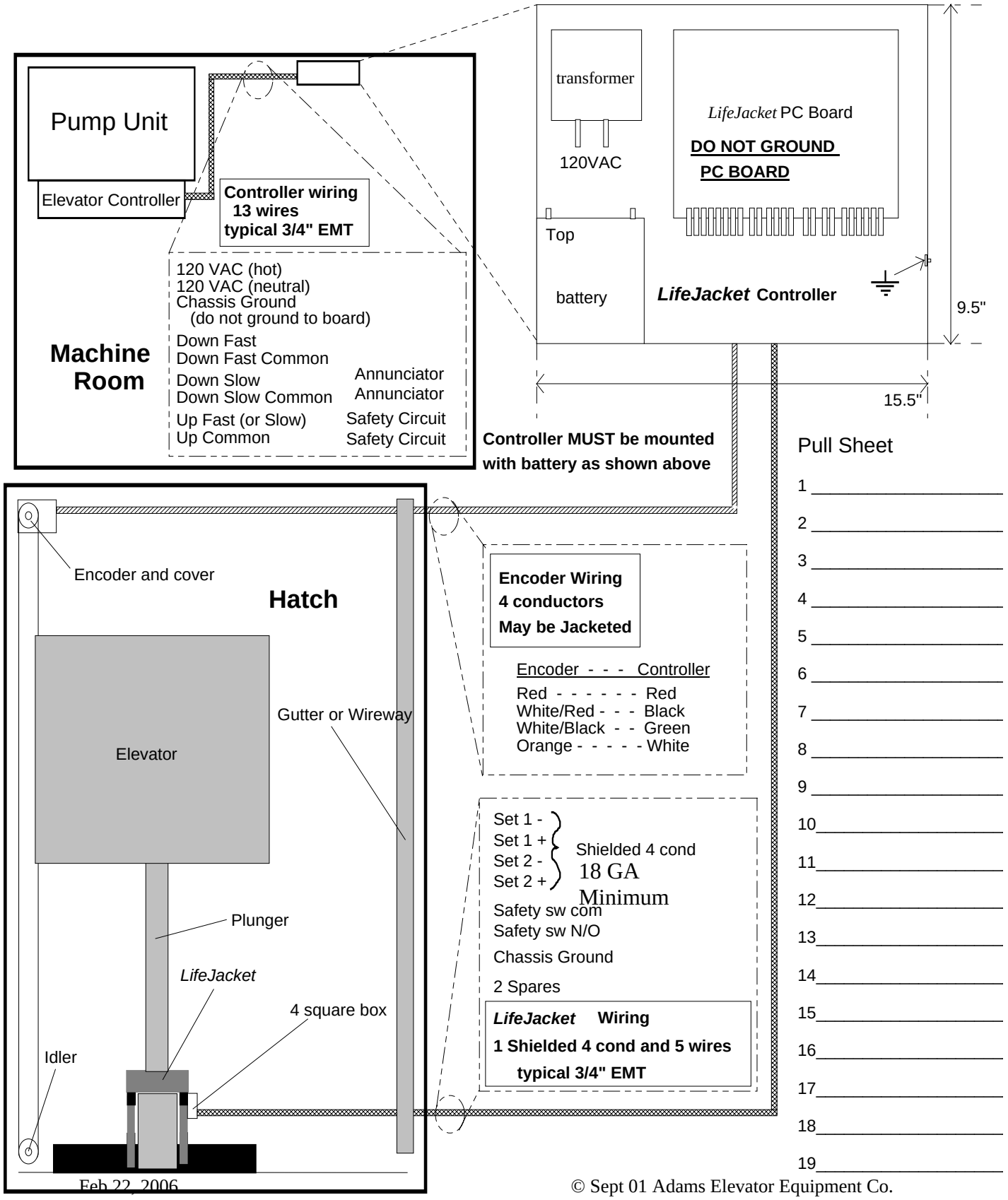
***RELEVELING FAULT*: Valve DRVR LED (Version 3C4.1 only)**
Indicates the car is releveling more than three (6) time per minute. Check for oil leaks and the level of oil remaining in the tank.

POWER LOSS TRIP
As part of the *LifeJacket* control system's design, the *LifeJacket* can set when the battery is at fault voltage level and AC power is lost. This is done to protect passengers when the *LifeJacket* controller has no AC power and the battery is close to a fault discharge level. With a power loss trip set, you can get a battery fault indication after AC power is restored. When only AC power is lost the *LifeJacket* controller will operate on battery power and protect the elevator. As the battery is slowly discharged, it will reach a low-level state. An audible alarm will sound and low battery level indicators, as described above, will come on. If AC remains off, the battery will further discharge. When a battery fault level is reached the *LifeJacket* controller will set the *LifeJacket*.

Notes:
LAD buttons called out in this document are based on generic keypads and custom keypads with improved, intuitive keypad labeling. The *LifeJacket* controller measures elevator speed many times a second and can give more accurate readings than hand held tachometers that average speed over a long period of time. This is most likely to occur when the elevator is making one run trip. For most accurate speed measurement, run the elevator several times from top landing to bottom and back again.

A final feature of the handheld terminal is a communication test. Press **"<enable> LAD Comcheck"** and the **LAD** sends a command to the *LifeJacket* controller. The controller sends back a command to sound a low volume alarm sound. It is a simple test of communications between controller and terminal.

Appendix F: Wiring and Pipe Plan



Appendix G: Maintenance and Testing Procedures

Maintenance consists of keeping the unit clean and exercising the *LifeJacket* at least once a year. The controller monitors all critical components for proper operation, such as the encoder, the set coil conditions, the battery condition and the condition of the microprocessors.

Repacking the elevator

On occasion, all elevators will require repacking. This necessity was planned for by the base plate having the largest clearance hole possible, while retaining the strength required to do its job. Although most packing can be changed through this clearance hole, there are occasions where the packing ring or gland is larger than this hole. In these cases, the *LifeJacket* will have to be temporarily removed from the cylinder. The first procedure, repacking through the clearance hole is described first.

Repacking the elevator through the clearance hole

1. Remove the plastic cover of the *LifeJacket.*
2. Remove the registration bit.
3. Open the arms of the *LifeJacket.*
4. Repack the head.
5. Reverse these steps to reassemble the *LifeJacket*.
6. After reassembly, test the *LifeJacket* by setting at full down speed.

The second procedure, repacking by temporarily removing the Safety is listed below. There have been two common methods of doing this, generally one could simply lift it off by hand and set it aside or one could use the car to lift it off by tying it to the bolster plank and when the car is landed so is the *LifeJacket.* In both procedures, the electrical and hydraulic connections must be disengaged for removal of the Safety. These steps are;

Repacking the elevator by removing the *LifeJacket*

1. Remove the plastic cover of the *LifeJacket.*
2. Remove the registration bit.
3. Open the arms of the *LifeJacket.*
4. Open the junction box and unwire the safety switch SO cord.
5. Disconnect the cord from the junction box.
6. Close the hydraulic circuit by loosening the allen set screw on the orifice adjuster flow control and turn the thumbturn in (clockwise) until fully closed.
7. Using the LAD or a jumper, energize either of the *LifeJacket* valves to discharge the pressure in the control cylinder. The rod should fall indicating that the pressure has fallen.
8. Disconnect the control cylinder from the hydraulic assembly by loosening the swivel fitting near the bottom of the control cylinder until full disengaged.

Warning: ***Use extra care to prevent debris from getting into the hydraulic assembly.***

9. Loosen and remove the upper leg bolts which connect the *LifeJacket* to the legs so that the device is free to be raised out of the way.
10. At this point the *LifeJacket* is now free from the mounting and can be lifted out of the way for any procedure.
11. Repack the head.
12. Reverse these steps to reassemble the *LifeJacket*.
13. After reassembly, test the *LifeJacket* by setting at full down speed.

Lifting off and setting to the side

CAUTION: The assembly exceeds 200 pounds. Use good body mechanics when lifting. Using the car to hoist and place the *LifeJacket* is an alternate to manually lifting.

1. Two people lifting the *LifeJacket* pick it off from its legs.
2. Carefully place on ground out of the way.
3. Upon completion of the work, return the *LifeJacket* to its legs.
4. Re-insert leg bolts and tighten nuts.
5. Reconnect the electrical and hydraulic connections disconnected during removal.
6. Run car up in preparation of running down and setting Safety.
7. Verify that the car is stopped after a full speed test.
8. This completes the procedure.

Lifting off by using the car to hoist

1. While in the pit, run the car down as low as possible and still be able to attach a rope or slings to the bolster.
2. With either a rope or slings, securely hitch the *LifeJacket* to the Bolster.
3. Run the car and *LifeJacket* up until clear of timbers or landing pipes.
4. Land the car on approved pipe stands or timbers.
5. Upon completion of the work, return the *LifeJacket* to its legs.
6. Re-insert leg bolts and tighten nuts.
7. Reconnect the electrical and hydraulic connections disconnected during removal.
8. Run car up in preparation of running down and setting Safety.
9. Verify that the car is stopped after a full speed test.
10. This completes the procedure.

Maintaining the mechanical components

The clear cover should be kept clean for visual inspection. There will always be a thin layer of oil on the entire device and being painted, it will not be subject to rust under most conditions. There are times when the some pits will be inundated with water or other liquids, after such events, it must be cleaned and tested.

In order to assure the bearing surfaces remain free, the fit of the bearings in addition to the bearing lubricant will not allow water into the surfaces, but, in cases where the pit is inundated

for long periods of time, the shoulder bolts should be removed and relubricated. The procedure is as follows:

Servicing after a pit has been flooded

1. Land the car on approved pipe stands or timbers.
2. Remove the clear cover.
3. With the arms in an open position, remove the shoulder bolts.
4. With shoulder bolts removed, the arms will be free to move away from the plunger. Pull them out enough to expose the threaded area within the arms.
5. Use a flashlight to closely examine the bearing surfaces for evidence of oxidation (rust) or other obstructions.
6. After cleaning any foreign matter if any, relubricate with "Never Seize", available from Adams. Do not use any other lubricant.
7. Return the arm on to the registration bit and reinstall the shoulder bolts and torque to 100 ft/lbs. Use a torque wrench for this procedure.

Warning: ***Make VERY sure that there is no debris in the arms or on the copper shoes. Potential plunger damage can occur.***

8. Repeat to remaining arm.
9. Remove the registration bit and rotate the arms through their full range. There should be freedom of rotation throughout this range. If this is not the case, re-examine the bearing surfaces and determine the problem. If the problem cannot be determined, call Adams Technical Support for further assistance.
10. Return the registration bit, install the clear cover and return the *LifeJacket* to operation.

Testing

Testing consists of setting the *LifeJacket* and observing the car stopping. This should be done with the car in visual contact, either through the crack in the doors, visual access to the hatch through a wall or with the doors open. However, if done alone in the machine room, it could be assumed that the test was successful when upon looking into the hatch; the car is stopped in a reasonable area of when the set was commanded. This assumption may be made because of the high number of sets required before re-shimming is necessary. Also, it is the nature of the operation of the *LifeJacket* that it will stop or will slow the car but continue all the way to the pit. A successful test is when the elevator is stopped with no visible slide. It will look as though there is no slide, but really, the slide is there, the falling arms begin to slow the car prior to the arms going to the full closed position. If the LAD is available, a confirmation of the number of sets is displayed on the LAD. If this number is under 50, the *LifeJacket* is very likely to have not exceeded the number of sets required to retest with full load.

Note: The LifeJacket will not open until the pressure of the oil is increased to lift and move the car up. Pushing restart in the controller alone will not open the brake arms.

CAUTION: These procedures should be done while standing in the hallway, not in the pit.

It is recommended that a no-load test be performed annually, with a Five (5) year full load test. This assures that the *LifeJacket* will perform dependably for the life of the elevator. The steps of this test are as follows:

If a LAD is available

1. Place the car on independent operation or prevent the public from entering the car.
2. Plug the LAD into the plug connector on the controller board.
3. Run the car to the second floor.
4. Press the **"<enable> High Speed Test"**. This will cause the *LifeJacket* to set after 50% of the overspeed setting is reached in the down direction. This is not a true overspeed, but a simple one-time operation that will verify the operation of the software.
5. Verify that the elevator has traveled from the second floor and is stopped. This will indicate that the trip speed was attained, that the car was stopped and did not slide.
6. Reset the *LifeJacket* by pressing **"RESTART"** on the *LifeJacket* controller board, **"<enable> Restart from Set"** on the **LAD**.
7. Run the car up to release the arms. This will also require pressing the *LifeJacket* safety switch cutout located in the controller box.
8. Return the car to the second floor.
9. This time, run the car to the first floor and press **"<enable> Set Valve 1"** after reaching full speed. This will confirm that the *LifeJacket* will stop a full speed car.
10. Verify that the safety switch drops the safety circuit relay in the elevator controller.
11. Reset the car and run car to top floor.
12. Remove the Wago type connector that connects the elevator valve coils to the *LifeJacket* controller. This will simulate a car running down with no demand.
13. Run the car down and confirm that the car is stopped after 4 seconds of 30 fpm or faster.
14. Reset the car and run to the second floor.
15. Toggle to the "off" position, the DIP switch of the highest value that is on. This will confirm that the software is monitoring the overspeed setting of the DIP switch.
16. Run the car down and confirm that the car is stopped after an overspeed is attained.
17. Return the DIP switch to the previous setting. DO NOT press the restart switch.
18. Run the car up and attempt to run the car down.
19. Confirm that the safety sets while the board is still tripped.
20. Reset the car. This concludes the testing.

If a LAD is not available

1. Prepare a switch, normally open single pole, with the two (2) wires going to the **bat -** [battery minus] and the **set 1 -** [set valve one (1) minus]. Bridging these points will energize the set valve on the *LifeJacket*. Make the wires long enough to be able to observe the car as you close the switch contact.

2. Place the car on independent operation or prevent the public from entering the car.
3. Run the car to the second floor.
4. Run the car down and press the microswitch after reaching full speed. This will confirm that the *LifeJacket* will stop a full speed car.
5. Verify that the elevator has traveled from the second floor and is stopped. This will indicate that the car was stopped and did not slide.
6. Reset the *LifeJacket* by pressing the restart switch on the controller board.
7. Run the car up to release the arms. This will also require pressing the *LifeJacket* safety switch cutout located in the controller box.
8. Verify that the safety switch drops the safety circuit relay.
9. Reset the car and run car to top floor.
10. Remove the Wago type connector that connects the elevator valve coils to the *LifeJacket controller*. This will simulate a car running down with no demand.
11. Run the car down and confirm that the car is stopped after 30 fpm is attained.
12. Reset the car and run to the second floor.
13. Toggle to the "off" position, the Dipswitch of the highest value that is "on". This will confirm that the software is monitoring the overspeed setting of the Dipswitch.
14. Run the car down and confirm that the car is stopped after an overspeed is attained.
15. Return the Dipswitch to the previous setting. DO NOT press the restart switch.
16. Run the car up and attempt to run the car down.
17. Confirm that the safety sets while the board is still tripped.
18. Reset the car. This concludes the testing.

Note: If any problems are encountered, refer to Section 5 of the installation manual or contact Adams Technical Support.

Note: The procedures are the same for the full load tests; however it may be necessary to turn in the relief to get the car to run up. This is because there is extra load to open the* LifeJacket*, which may require more pressure.

Adams *LifeJacket*™ Ordering Survey rev Nov 03

Required Tools & Equipment: Tape Measure, Diameter Tape, Tachometer, Pressure Gauge, Pencil

Please Print! Survey must be fully completed and dated for order processing. Ship to: Job ☐ or Shop ☐ (check one)

Job Name _____

Code in Force *(i.e. A17, Title 8, B44)*_____

Job Address _____

City _____ State _____ Zip/Postal Code_____ Country_____

Car #_____ Number of Landings _____ Travel _____ft Pit Depth _____ft Car Speed: _____fpm.

Jack Mfg._____ Plunger Wall Thickness _____ inches Capacity of Car _____ lbs.

Car Weight _____ lbs. OR Pressure of Empty Car: _____ psi OR Working Pressure _____ psi

Elevator Installing Company: _____ Date of installation_____ Mfg.'s Job Number_____

Include LifeJacket Information Display Option LJ4050 (additional charge applies): ☐ Yes ☐ No (*Required in Michigan)*

Packing, specify style and size_____ **Packing Must be Replaced** Is Controller Solid State ☐ or Relay ☐

Is Pit prone to flooding? Yes _____ No _____ - - - - - - - - - - - - - - (if yes, NEMA 3R conduit [liquitite flex] is supplied)

Does elevator have a bottom final limit switch? Yes _____ No _____ - - - - (if yes, it must open prior to buffer engagement)

Does Cylinder have a tapped bleeder hole in the head? Yes _____ No _____ - - - - (if no, optional drill and tap is supplied)

Is 120VAC available in controller? Yes _____ No _____ - - - - - - - - - - - - (if no, 480/240 to 120 transformer is supplied)

How many 'wiring' feet from controller to Cylinder head? ____Ft - - - (length of shielded cable sent for set coils and encoder)

Special delivery instructions (i.e. do you have a forklift to get it off the truck?) _____

Pit Information Record dimensions to 3 decimal places (i.e. 1.234). DO NOT USE FRACTIONS.
The plunger diameter (PD) must be *accurately* measured to thousandths of an inch. Using a diameter tape in decimal increments, measure the plunger in at least three (3) places (if a two stop) and with car level at every floor. Record these measurements in the blanks below. Measure a foot or so above the packing head while standing in the pit. Start with car at top landing.

(PD) top____._____ top - 1____._____ top - 2____._____ top - 3____._____

top - 4____._____ top - 5____._____ top - 6____._____ top - 7____._____

See diagrams on page 2 for graphic illustration of dimensions. These dimensions must be accurate for proper fit.
All dimensions below must be in inches unless otherwise marked.

(BSD)_____" (UFD)_____" (FD)_____" (CD)_____" (BN)_____"
Buffer spring diameter *Upper Flange Diameter* *Flange Diameter* *Cylinder Diameter* *Buffer springs Number*

(RB)_____" (BS)_____" (SD)_____" (BB)_____"
Runby *Buffer Stroke* *Strike Distance* *Between Buffers distance*

(CHF) _____" (CHC)_____" (*LifeJacket legs are made to CHF height unless checked here)*
Top of cylinder to top of footer *Top of cylinder to floor*

Company _____ **Address** _____

City _____ **State** _____ **Zip/Postal Code** _____

PO # _____ **Charge #** _____

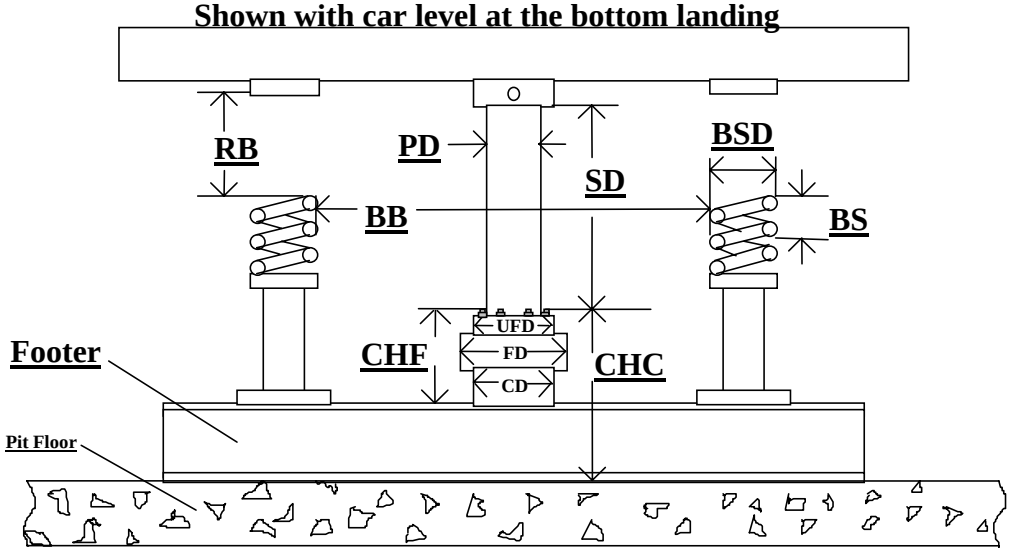
Ordered and Approved by _____ **Date** _____

Phone # _____-_____ **Fax #**_____-_____ **Adams Order #** _____

Serial # _____

Adams*LifeJacket*™ Ordering Survey rev Nov 03

Shown with car level at the bottom landing



PD is the plunger diameter.
For this survey it must be measured to the thousandths using a decimal diameter tape.
BSD is the buffer spring diameter.
UFD is the diameter of the upper flange section of the head, if it is a stepped flange style head.
FD is the diameter of the widest flange section of the head, if it is a flange style head.
CD is the diameter of the cylinder or stuffing box at the top of the head.
BN is the number of Buffer Springs. Please provide a sketch of unusual buffer assemblies and return with survey.
RB is runby, a measurement from the top of the uncompressed buffer springs to the strike plates when the car is floor level.
BS is the buffer stroke and should be stamped on the buffer stand data tag, if not, measure the spring gaps and add.
SD is the strike distance between, from lowest point on the platen to the highest projection on the top of the head, when the car is floor level at the bottom floor. Consider reversing Platen bolts if the heads of bolts are up, for more room.
BB is the distance between buffers.
CHF is the distance from the highest point of the cylinder head to the top of the footer channel.
CHC is the distance from the highest point of the cylinder head, to the (concrete) pit floor.

Please note items below that may have cost ramifications:

1: The distance from the pit to the machine room, the *LifeJacket* requires two 4 Conductor shielded wires and three 18G wires run to the pit from the *LifeJacket* Controller in the machine room, so allow wiring time.
2: If there is not a tapped hole in the cylinder you will have to add one. A drill and tap is provided. Takes about 1/2 hour.
3: The type of jack packing, you must replace it before installation. Extra time is saved later for repacks if it is done now.
4: If the buffers need rework, i.e. moving or shortening. The *LifeJacket's* dimensions are 13.25" x 21" (small) or 15.75" x 21" (large). If the **BB** dimension is less than 13.25" or 15.75", they will need to be moved.
5: If the pit floods; NEMA 3R conduit on the *LifeJacket* is provided, but not for the pit wiring, parts costs must be added.
6: There must be at least 6" of strike distance (**SD**) to install the *LifeJacket.* Simply put, **RB** + **BS** + 6" has to be less than **SD.** Note: **RB** and **BS** can very often be changed to Code minimums to accommodate the *LifeJacket.* We will tell you after the survey is processed.
7: If buffers are multi-springed, please provide a sketch of the buffers with dimensions and return with the survey. Additional strike extension kits may be required.
8: Local jurisdictional authorities may charge a fee for a permit, variance and/or inspection where required. Notification of Code concerns will be sent after survey is processed along with an elevation drawing of the pit dimensions after the *LifeJacket* is installed.

Adams *LifeJacket*™ Otis™ Cast Head Ordering Survey rev Nov 03

Required Tools & Equipment: Tape Measure, Diameter Tape, Tachometer, Pressure Gauge, Pencil

Please Print! Survey must be fully completed and dated for order processing. Ship to: Job ☐ or Shop ☐ (check one)

Job Name _____

Code in Force *(i.e. A17, Title 8, B44)*_____

Job Address _____

City _____ State _____ Zip/Postal Code_____ Country_____

Car #_____ Number of Landings _____ Travel _____ft Pit Depth _____ft Car Speed: _____fpm.

Jack Mfg._____ Plunger Wall Thickness _____ inches Capacity of Car _____ lbs.

Car Weight _____ lbs. OR Pressure of Empty Car: _____ psi OR Working Pressure _____ psi

Elevator Installing Company: _____ Date of installation_____ Mfg.'s Job Number_____

Include LifeJacket Information Display Option LJ4050 (additional charge applies): ☐ Yes ☐ No (*Required in Michigan)*

Packing, specify style and size_____ **Packing Must be Replaced** Is Controller Solid State ☐ or Relay ☐

Is Pit prone to flooding? Yes _____ No _____ - - - - - - - - - - - - - - - (if yes, NEMA 3R conduit [liquitite flex] is supplied)

Does elevator have a bottom final limit switch? Yes _____ No _____ - - - - (if yes, it must open prior to buffer engagement)

Does Cylinder have a tapped bleeder hole in the head? Yes _____ No _____ - - - - (if no, optional drill and tap is supplied)

Is 120VAC available in controller? Yes _____ No _____ - - - - - - - - - - - - (if no, 480/240 to 120 transformer is supplied)

How many 'wiring' feet from controller to Cylinder head? ____Ft - - - (length of shielded cable sent for set coils and encoder)

Special delivery instructions (i.e. do you have a forklift to get it off the truck?) _____

Pit Information Record dimensions to 3 decimal places (i.e. 1.234). DO NOT USE FRACTIONS

The plunger diameter (PD) must be *accurately* measured to thousandths of an inch. Using a diameter tape in decimal increments, measure the plunger in at least three (3) places (if a two stop) and with car level at every floor. Record these measurements in the blanks below. Measure a foot or so above the packing head while standing in the pit. Start with car at top landing.

(PD) top____._____ top - 1____._____ top - 2____._____ top - 3____._____

top - 4____._____ top - 5____._____ top - 6____._____ top - 7____._____

See diagrams on page 2 for graphic illustration of dimensions. These dimensions must be accurate for proper fit. All dimensions below must be in inches.

(BSD)_____" (CD)_____" (PH) _____" (PW) _____" (BN)_____"
Buffer spring diameter *Cylinder Diameter* *Pedestal Height* *Pedestal Width* *Buffer springs Number*

(RB)_____" (BS)_____" (SD)_____" (BB)_____" (CHP)_____"
Runby *Buffer Stroke* *Strike Distance* *Between Buffers distance* *Top of cylinder to Pedestal*

Company _____ Address _____

City _____ State _____Zip/Postal Code _____

PO # _____ Charge # _____

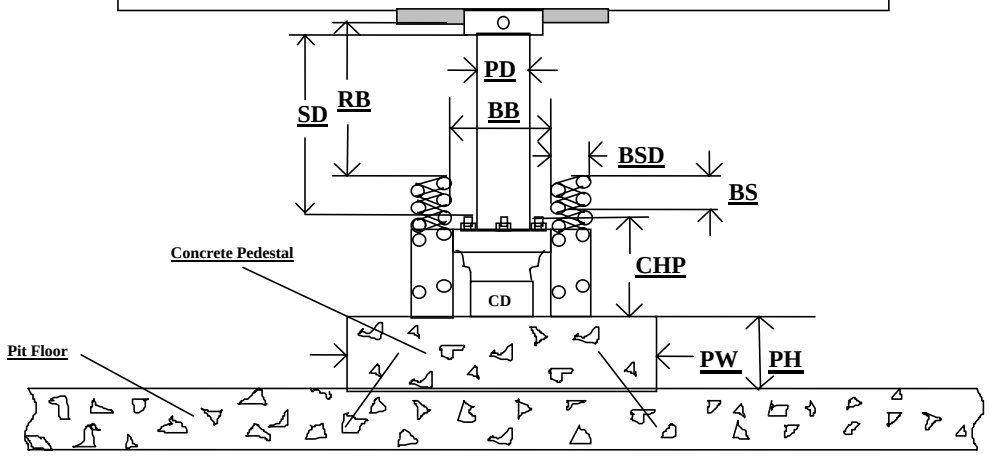
Ordered and Approved by _____ Date _____

Phone # _____-_____ Fax #_____-_____ Adams Order # _____

Serial # _____

Adams *LifeJacket*™ Otis™ Cast Head Ordering Survey

Shown with car level at the bottom landing **rev Nov 03**



PD is the plunger diameter.
For this survey it must be measured to the thousandths using a decimal diameter tape.

BSD is the buffer spring diameter.
FD is the diameter of the widest flange section of the head, if it is a flange style head.
PH is the height of the concrete pedestal.
PW is the width of the concrete pedestal. This dimension is necessary if the buffers need to be moved or replaced.
BN is the number of Buffer Springs. Please provide a sketch of unusual buffer assemblies and return with survey.
RB is runby, a measurement from the top of the uncompressed buffer springs to the strike plates when the car is floor level.
BS is the buffer stroke and should be stamped on the buffer stand data tag, if not, measure the spring gaps and add.
SD is the strike distance between, from lowest point on the platen to the highest projection on the top of the head, when the car is floor level at the bottom floor. Consider reversing Platen bolts if the heads of bolts are up, for more room.
BB is the distance between buffers.
CHP is the distance from the highest point of the cylinder head, to the (concrete) pedestal.

Please note items below that may have cost ramifications:

1: The distance from the pit to the machine room, the *LifeJacket* requires two 4 Conductor shielded wires and three 18G wires run to the pit from the *LifeJacket* Controller in the machine room, so allow wiring time.
2: If there is not a tapped hole in the cylinder you will have to add one. A drill and tap is provided. Takes about 1/2 hour.
3: The type of jack packing, you must replace it before installation. Extra time is saved later for repacks if it is done now.
4: If the buffers need rework, i.e. moving or shortening. The *LifeJacket's* dimensions are 13.25" x 21" (small) or 15.75" x 21" (large). If the **BB** dimension is less than 13.25" or 15.75", they will need to be moved.
5: If the pit floods; NEMA 3R conduit on the *LifeJacket* is provided, but not for the pit wiring, parts costs must be added.
6: There must be at least 6" of strike distance (**SD**) to install the *LifeJacket.* Simply put, **RB** + **BS** + 6" has to be less than **SD**. It can very often be changed to Code minimums to accommodate the *LifeJacket.* We will tell you after the survey is processed.
7: If buffers are multi-springed, please provide a sketch of the buffers with dimensions and return with the survey. Additional strike extension kits may be required.
8: Local jurisdictional authorities may charge a fee for a permit, variance and/or inspection where required. Notification of Code concerns will be sent after survey is processed along with an elevation drawing of the pit dimensions after the *LifeJacket* is installed.

Appendix H: Retesting Procedures

This is a quick reference to retesting for Inspectors and companies on installations with a *LifeJacket.* For further explanation of product operation, please refer to the Installation Instructions. This guide is meant to provide a simple testing procedure for Annual Inspection. If at any time the *LifeJacket* does not stop the elevator in less than 2" of slide, one shim per side must be added to bring the operation into specification. Refer to **Step 5.4** of the Installation Instructions for shimming instructions. Only Authorized Elevator personnel should perform these tests.

Test 1 - Set the *LifeJacket* with battery power (Tests with the LAD and Without the LAD)

- **a)** Run the elevator down from the 2nd floor. LAD**)** Press **'<shift> F3'** or **'<enable> Set Valve 1'** to energize set valve. Without LAD**)** Jump **Bat-** to **Set 1-** on PC Board.
- **b)** *LifeJacket* will set with 2" or less of slide.
- **c)** ***There will be no PC Board Fault indication*** as it was not a computer-generated set. Reset by running elevator up to an upper floor. To run the elevator up it will be necessary to press the Safety Switch cutout to reclose the Safety Circuit until the *LifeJacket* arms fully open. Verify that the Safety Circuit was interrupted.

Test 2 - Set the *LifeJacket* in the "High Speed Test" mode

- **a)** LAD**)** Press **'<enable> High Speed Test'** to enable the test. Without LAD**)** Shunt, for at least 2 seconds, the #7 header jumper on J9 with the rotation shunt. It is the second header from the bottom, below the #1 header or rotation shunt. This enables the High Speed Test. Replace the shunt as you found it. See inside cover of controller. Run the elevator down from the second floor.
- **b)** *LifeJacket* will set after attaining at least 50% of the Overspeed setting of the Dipswitch. The speed displayed may show the car's velocity was faster than the trip speed. This is normal.
- **c)** The **Overspeed LED** will light and the board will beep. Press the **Restart** switch on the controller to reset. Run elevator up to open arms.

Test 3 - Set the *LifeJacket* with a Direction Error

- **a)** With the car at the top floor, remove the direction coil connectors from the PC Board. Run the elevator down. Car speed must exceed 30 fpm for at least 4 seconds.
- **b)** *LifeJacket* will set after exceeding 4 seconds of encoder output without direction input.
- **c)** The **Direction Error LED** will light and the board will beep. Press the **Restart** switch in the controller to reset. Run elevator up to open arms.

Test 4 - Set the *LifeJacket* with an Encoder Error

- **a)** Remove the encoder connector from the PC Board. Run the elevator down from the top floor. Car down direction voltage must be present for at least 4 seconds.
- **b)** *LifeJacket* will set after exceeding 4 seconds of down direction input without an encoder output. (It will not set in the up direction but will give an error.)
- **c)** The **Encoder Error LED** will light and the board will beep. Press the **Restart** switch in the controller to reset. Run elevator up to open arms.

Test 5 - Battery Presence test

- **a)** Remove the battery connector from the PC Board.

b) After about 15 seconds, the **Battery LED** will light and the board will beep.
c) Replace connector. Press the **Restart** switch in the controller to reset.

Test 6 - Fuse and Valve Presence test

a) Remove the set valve connector from the PC Board.
b) After about 15 seconds, the **Fuse LED** will light and the board will beep.
c) Replace connector. Press the **Restart** switch in the controller to reset.

After all testing is complete, press SW2 on controller PC Board to reset system. ***Switch is located in upper left corner of Controller Board***

Appendix J: Replacement Parts List

Adams Part #	LifeJacket Part Descriptions
LJ 550	LifeJacket Access Device (LAD)
LJ560	Installation Manual
LJ1010	Safety Switch and Bracket Assembly
LJ2010	Encoder, Drive Sheave and Bracket Assembly
LJ2015	Idler Sheave and Bracket Assembly
LJ2020	Kevlar cable Hardware kit
LJ2040	
LJ2100	
LJ3010	Hydraulic Kit without Cylinder
LJ3012	15 LB. Hydraulic cylinder
LJ3015	30 LB. Hydraulic cylinder
LJ3020	60 LB. Hydraulic cylinder
LJ3025	90 LB. Hydraulic cylinder
LJ4010B	Valve Driver Adapter for PC Boards
LJ4015	Complete Controller PCB w/EEPROM
LJ4020	Programmed EEPROM Only
LJ4025	Replacement Battery for the Controller
LJ4030	120 volt Transformer
LJ4035	Multi-tap 240 volt Transformer
LJ4040	
LJ4050	Information Display Kit
LJ5010	Leg support assembly (required when legs are 60” tall or more)
LJAXXXXC	Dustcover for Small LJ's (need serial #)
LJBXXXXC	Dustcover for Large LJ's (need serial #)
503078-01	Kevlar cable ONLY (how many feet?)
774724-01	Shielded Cable for Encoders (how many feet?)
774416-01	Shielded Cable for Hydraulic Valves (how many feet?)
6850250-20	1/8 x 1/8 Swivel Flexible Hose
402204-01	1/4 NPT - 1/8 NPT Reducer
401204-04	1/8 NPT - 1/4 NPT Adapter

Appendix K: Local Display

As an option, the LifeJacket may have a display installed in the cover of the control enclosure. This special LCD display retains the image after power is removed. This single feature makes it the best choice for the LifeJacket and elevator safety. Version 3C4.1 uses this feature to show anyone inspecting the elevator the condition of the LifeJacket when it shut down due to power outage. The LifeJacket monitors and protects the elevator as long as battery power is available. When power becomes insufficient for the LifeJacket to provide safety, it will trip, stopping the car. The display image remains providing anyone inspecting the elevator (even months later) the conditions at time of shut down.

The following diagram explain the information presented by this optional display.

Power Up Display

Line Number	Adams LifeJacket ™
1	COPYRIGHT 1997 - 2001
2	VER 3C4.1 BATT XX.X V
3	TRIPS xxx G-TRIPS xxxx
4	DIPSW xxx RE-LVLS xx

Tripped Display

	Adams LifeJacket ™	
1	TRIPPED { fault cause }	Encoder, Over Speed, Pwr Fail, Batt Fail, Direction Err, etc.
2	SPEED XXX BATT XX.X V	
3	TRIPS xxx G-TRIPS xxxx	
4	DIPSW xxx RELVLS xx	

Operating Display

	Adams LifeJacket ™	
1	OPERATING	
2	SPEED xxx fpm DOWN	DOWN or UP is encoder direction
3	TRIPS xxx G-TRIPS xxxx	
4	DIPSW xxx RELVLS xx	

1	UP VALVE ON	As car runs, "OPERATING" changes to show appropriate elevator valve activity.
1	DOWN FAST VALVE ON	
1	DOWN SLOW VALVE ON	

Tripped Display After Power Failure — There will always be a trip when power fails.

	Adams LifeJacket ™	
1	TRIPPED { fault cause }	Encoder, Over Speed, Pwr Fail, Batt Fail, etc.
2	PWR FAIL SHUT DOWN OK	Regardless of cause, a successful power fail shut down will change line 2 as shown.
3	TRIPS xxx G-TRIPS xxxx	
4	DIPSW xxx RELVLS xx	

DIPSW	is the over speed set point in feet per minute set by the DIP switch on the controller PC board.
SPEED	is the peak speed in feet per minute achieved during the last run.
TRIPS	is the number time the LifeJacket has tripped since it was last tested for stopping the car.
G-TRIPS	is the total trips the LifeJacket has experienced. This value is not resetable.
BATT	is the battery voltage.
RELVLS	is the number of times a re-leveling is detected in a one minute period.

Installation:
The Local Display Kit comes with the following parts.
Enclosure Cover with Display
Version 3C4.1 Software EPROM
Display Cable
Shunt for PC Board
The display kit can be installed without taking the car out of service.

Step 1: Remove the cover.

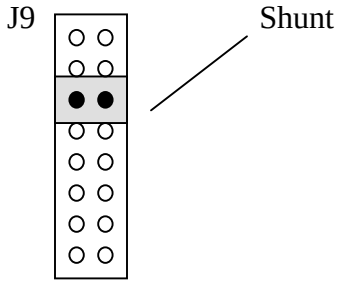
Step 2: **Most importantly**, unplug the set valves by removing the 8 circuit plug from the LifeJacket control board. If your LifeJacket has the LJ4010 adapter PC board, unplug the 8 circuit plug from the LJ4010 adapter.

Step 3: Unplug the battery and AC power plugs from the LifeJacket control board. Wait a few minutes from all the stored power to discharge. You will know all power discharged when the INSERVICE LED remains off.

Step 4: Remove the existing software and install version 3C4.1 by replacing the EPROM at location U12. It is the only socketed part.

Note: The notch or dimple on the EPROM must be on the right matching the notch in the U2 component location legend.

Step 5: Place the shunt supplied with the display kit across the third pair of terminals as shown. This shunt must be installed as shown below for the display to operate. It must be removed for the LAD to operate.



Step 6: Install the green ground cable from the cover to the #8 stud just above the battery. This wire also provides a safety strain relief that prevents damage to the LifeJacket control PC board.

Step 7: Connect the display to the LifeJacket control board with the RJ11 cable supplied. You must use the cable supplied or the display may be damaged or not function.

Step 8: Reconnect the battery and AC power plugs to the LifeJacket control PC board. After the normal power up cycle the display must indicate “VALVE OR FUSE

MISSING." Connect the 8 circuit set valve plug and press RESTART. The normal operating screens must be displayed.

Step 9: Install the cover. Your LifeJacket is back in service.

Car Releveling Monitor:

Version 3C4.1 includes a feature that monitors how many time the car relevels and sounds a warning if releveling is too often. If releveling occurs more than three (3) times a minute, an alarm will sound, Valve DRVR LED will light, and a warning is displayed. If releveling occurs more than six (6) times a minute, the LifeJacket will set stopping the car. Releveling is defined as running up (elevator up coil on) for four (4) seconds or less.

Appendix L: LJ4010 Installation

INSTALLATION INSTRUCTIONS

LJ 4010 VALVE DRIVER MODULE

Replace fuses at locations F2, F3 and F4 on the LJ 4000 PC board. The new fuse size for these locations is Little Fuse Series 217 rated at 1.25 amp fast acting. Fuse F1 is not changed.

Refer to the drawing.

1. Unplug the 8 circuit (Life Jacket set valve) connector at J11.
2. Plug the LJ 4010 module into J11 on the main PC board.
3. Add two wire jumpers (provided) to the 8 circuit set valve plug. One wire goes between circuits 5 and 6. The other wire goes between circuits 7 and 8.
4. Plug the set valve plug into J1 on the LJ 4010 module.
5. Remove the PC board mounting screw located next to fuse F2.
6. Use this screw to attach the green ground wire from the LJ 4010 module.

REMOVING THE MODULE

A. Place the index finger of your right hand on the LJ 4010 PC board next to J1. *You must hold the module firmly while removing the plug.*
B. With your left hand, gently pull up on the set valve plug attached to J1.
C. Remove the green ground wire next to fuse F2 on the main PC board. Replace the screw.
D. Gently pull the LJ 4010 PC board out of J11 on the main PC board.