

USER MANUAL DUAL LANE TRAINING SLIDES

USER MANUAL
P/N 53038-001, REV B



TULMAR
ENGINEERED FOR PROTECTION

Tulmar Safety Systems
1123 Cameron Street Hawkesbury, ON, K6A 2B8
+1-613-632-1282

TABLE OF CONTENTS

1 TRAINING SLIDE OVERVIEW	4
2 TRAINING SLIDE FEATURES AND EQUIPMENT	6
2.1 STANDARD FEATURES	7
2.1.1 REPLACEABLE TUBE STRUCTURE	7
2.1.2 REPLACEABLE SLIDING SURFACE	7
2.1.3 REPLACEABLE GIRT	8
2.1.4 D-RING PATCHES	9
2.1.5 CARRYING HANDLES	9
2.1.6 PORTS	10
2.1.7 SOCKET TOOL	10
2.1.8 STENCILLING	11
2.1.9 TULMAR ID	11
2.2 OPTIONAL EQUIPMENT	11
2.2.1 SPARE REPLACEABLE SLIDING SURFACE	11
2.2.2 SPARE GIRT	11
2.2.3 GIRT ACCESSORIES	11
2.2.4 ADDITIONAL CARRYING HANDLES	12
2.2.5 LIFE LINES	12
2.2.6 RE-ENTRY LINE	13
2.2.7 ADDITIONAL PORTS	13
2.2.8 ASPIRATOR FLANGE	14
2.2.9 CANOPY STUBS	14
2.2.10 NET	14
3 GENERAL OPERATION	15
3.1 INFLATION	16
3.2 INSTALLATION GUIDE LINES	17
3.2.1 SITE PREPARATION	17
3.2.2 INSTALLATION	19
3.2.3 ADJUSTING THE DESCENT SPEED	20
3.3 DEFLATION	20
3.4 PACKING	21
4 CARE AND PERIODIC MAINTENANCE	22
5 SERVICE INSPECTION PROCEDURES	24
5.1 VISUAL INSPECTION	25
5.2 AIR RETENTION EVALUATION	27
5.3 PRESSURE RELIEF VALVE TEST	28
6 REPAIR PROCEDURES	29
6.1 GENERAL	31
6.2 REPAIR ASSESSMENT	31
6.3 REPAIR ENVIRONMENT & EQUIPMENT	31
6.4 MATERIALS	31
6.5 SURFACE PREPARATION	31
6.6 REPAIR PROCESS	32
6.7 ACCESSORY REPAIRS	33
6.7.1 VALVES AND PLUGS	33
6.7.2 SLIDING SURFACE REPLACEMENT	33
6.7.3 GIRT REPLACEMENT	33
6.7.4 TUBE STRUCTURE REPLACEMENT	35
APPENDIX A – SAFE SLIDE USE	38
REVISION HISTORY	39



1.0 TRAINING SLIDE OVERVIEW

1 TRAINING SLIDE OVERVIEW

Tulmar Safety Systems' dual lane training slides are designed to simulate an OEM evacuation slide by replicating the user experience essential for training and which meets the requirements of the various civil aviation regulatory authorities.

They are available in nominal lengths between 4.1m (13.4 ft) and 11.1m (36.4 ft) to enable proper installation on most heights of trainer platforms. They are made with two independent tube structures (lower and upper) that are separable for replacement if needed. The sides of the upper tube structure also provide increased safety during descents.

The slides are constructed from robust materials suitable to meet the demanding needs of a training environment. The sliding surface is made from the same low conductivity material used for OEM evacuation slides. The sliding surface is removable, designed for easy replacement as this is the component most subject to wear.

Tulmar's dual lane slides are fitted with a custom sized girt to accommodate each customer's trainer installation. The girt is also removable, designed for easy replacement if the need arises.

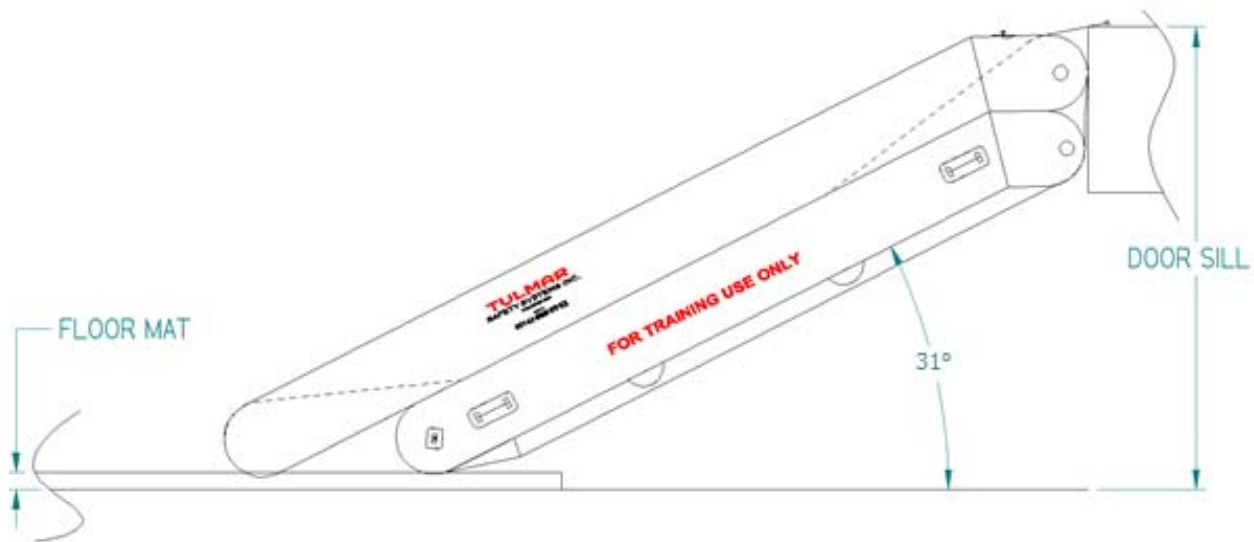
Several additional features are available to enhance the user's training experience or to accommodate installation. Some features are functional and can be used as part of the physical exercises while others are only meant to be for demonstrative purposes.



**2.0 TRAINING
SLIDE FEATURES
AND EQUIPMENT**

2.1 STANDARD FEATURES

All Tulmar dual lane training slides are derived from the same basic form, the only difference being variations in length in increments of 500mm (20 in). All slides have two independent tube structures, the lower tube structure with cross-tubes for structural stability and the upper tube structure with a permanently attached sub-floor (non-sliding) with a transition at the foot end to help rotate the evacuee out of the slide. The length of the slide is determined by considering the trainer floor height, the thickness of floor mats used at the facility and targets an optimum slide angle between 30° and 32°.



The standard features outlined below are included with the basic slide.

2.1.1 REPLACEABLE TUBE STRUCTURE

The dual lane slide tube structures can be individually replaced. They are independent of each other and are secured together with a hook & loop fastener sandwich along the full length of the tubes. The upper and lower chambers must always remain attached when training and must only be detached when a replacement tube structure is needed. Refer to section 6.7.4 for replacement procedure.

2.1.2 REPLACEABLE SLIDING SURFACE

All training slides come equipped with a replaceable sliding surface made of the same low conductivity material used on OEM slides. The sliding surface is in two sections identified as the left and right lanes. Left and right are defined as the sides when looking down the slide. The sliding surface is attached to the sub-floor by means of hook & loop fasteners. Flaps and shingles at the girt end overlap onto the top of the sliding surface to eliminate a potential tripping hazard.

2.1.3 REPLACEABLE GIRT

The slide's two point girt is used to attach the slide to the trainer platform. It is custom designed to fit to a slide angle of $31^{\circ}\pm 1$, which in turn is a function of the measurements taken of the facility. It is important that the initial set up parameters be maintained. For instance, while reducing the floor mat thickness will increase the angle of the slide, if this is desired; it may also add undue stress on the top panel of the girt. The owner should contact TULMAR SAFETY SYSTEMS if a major change in setup is required post installation. Most likely a new girt can be configured for the modified installation without having to modify the slide. The girt is designed for the slide chamber to sit approximately 25mm to 50mm (1"-2") below the trainer floor, therefore it should not interfere with opening simulator doors.

The standard width of the girt is 762mm (30") but a narrower girt can be provided if necessary. At the design stage, the girt bar sleeve is designed to accommodate the customer's specific girt bar size (diameter). Tulmar strongly recommends a round girt bar to maximize service life of the girt, but the girt bar can also be square or rectangular shaped, provided it has rounded edges.



2.1.4 D-RING PATCHES

D-rings are placed at the girt end of the upper tube structure and foot end of the lower tube structure. These are used to loosely tether the training slide and add stability during training if the customer so desires. It is recommended that bungee cords be used to allow full mobility of the slide during training sessions without placing undue stress on the d-ring patches.



2.1.5 CARRYING HANDLES

Carrying handles are installed at the foot and girt end of the lower tube structure for ease of manipulation and carriage.

When moving the slide, avoid dragging them. If it is necessary to move or handle a deflated slide, do so on a tarpaulin or mat to mitigate abrasion of the slide chambers.



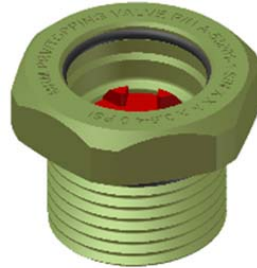
2.1.6 PORTS

The basic dual lane training slide comes with three ports per tube structure; one inflate/deflate valve (top-up valve), one pressure relief valve and one maintenance plug. The same base flange is used for all three ports, making them interchangeable.

Inflate/Deflate Valve (top-up valve):

Used for temporary connection to inflate, deflate or pressure monitoring.

An adapter is also provided to enable connection between shop air supply (1/4" NPT) and the valve.



Pressure Relief Valve:

Overpressure protection; opens automatically to prevent the slide from being inflated above 3.5 psig.



Maintenance port:

A removable plug allows connection of other devices such as a permanently attached air supply or a pressure gauge. The universal flange thread is 1-1/16-12UN.



2.1.7 SOCKET TOOL

The Socket tool is used to remove and install the valves and plug shown in 2.1.6.

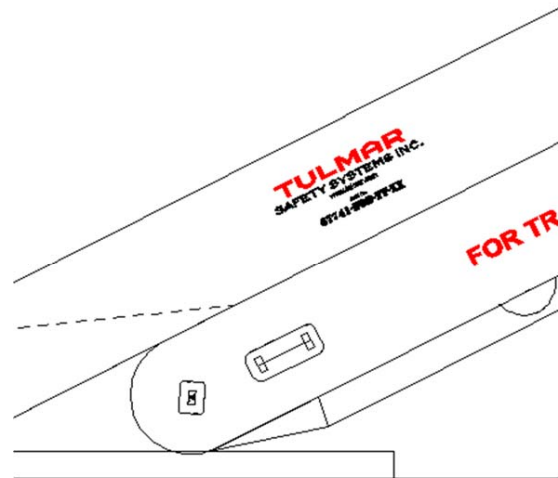


2.1.8 STENCILLING

The warning “FOR TRAINING USE ONLY” is stenciled on each side of the lower tube structure in 76mm (3”) high red text.

2.1.9 TULMAR ID

The serial number is stenciled on each side of the upper tube structure.



2.2 OPTIONAL EQUIPMENT

Tulmar dual lane slides can be configured with additional features and accessories. Optional features are outlined below.

2.2.1 SPARE REPLACEABLE SLIDING SURFACE

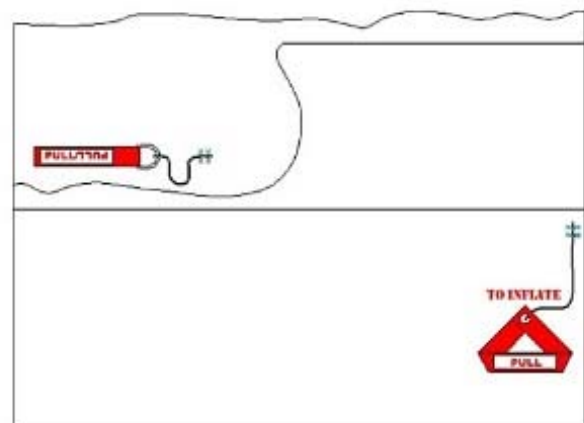
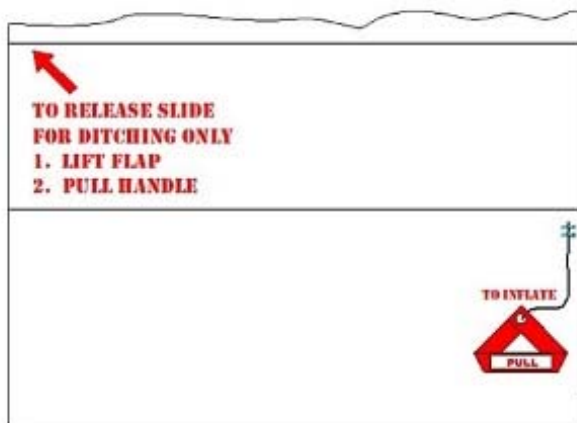
The p/n of the sliding surface can be found on the underside of the sliding surface near the girt end. Alternately, the p/n can be determined by Tulmar Safety Systems by tracing back the serial number in paragraph 2.1.9.

2.2.2 SPARE GIRT

The p/n of the girt can be found on the underside of the top lacing strip panel. Alternately, the p/n can be determined by Tulmar Safety Systems by tracing back the serial number in paragraph 2.1.9.

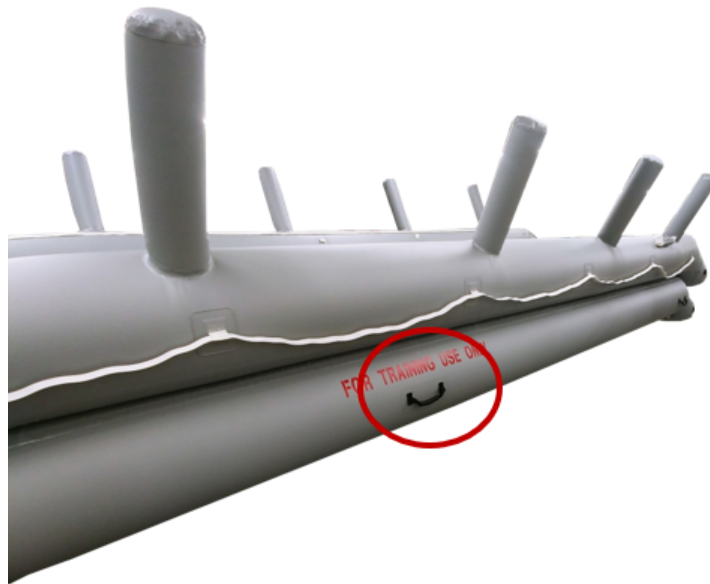
2.2.3 GIRT ACCESSORIES

Optionally, non-functional handles can be added to the girt to demonstrate the location of the inflation and ditching actuations.



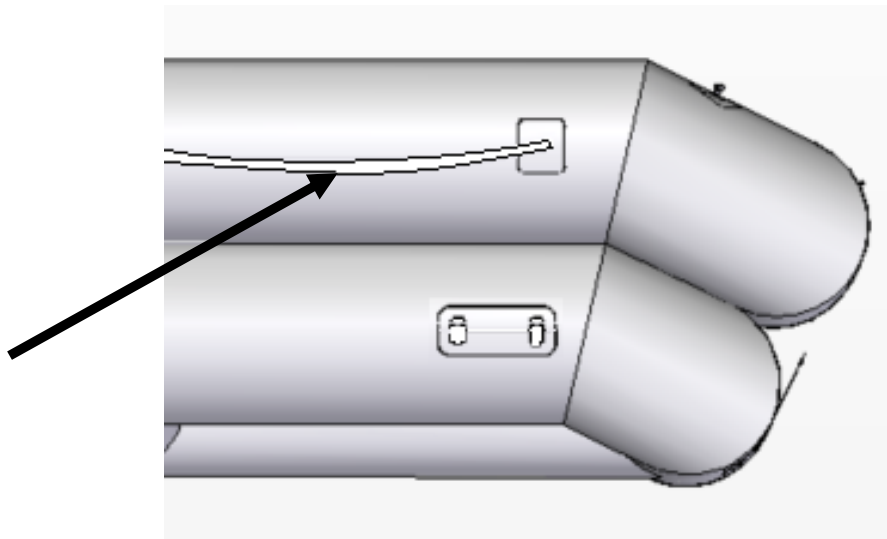
2.2.4 ADDITIONAL CARRYING HANDLES

The basic slide includes four carrying handles, two at the foot end and two at the girt end of the bottom tube structure. Optionally, two more carrying handles can be added in the middle of the bottom tube structure when ordering the slide. These additional handles may be desirable on a longer dual lane slide if it is displaced often.



2.2.5 LIFE LINES

Life lines can be installed on each side of the dual lane upper tube structure. While the life lines are demonstrative in the case of evacuation training, they are nonetheless designed and constructed to cover about 80% of the slide length and meet the strength requirements of TSO C-69c 4.30.



2.2.6 RE-ENTRY LINE

The re-entry line is a strap installed on the slide enabling crew members to climb back onboard the aircraft if necessary. Tulmar's re-entry line is a functional option that can be used as part of training exercises. It is attached to the girth end of the upper tube structure and is routed along the right side of the upper tube structure (looking down). When not in use, the re-entry line is secured to the top of the tube structure by means of hook & loop fasteners patches, away from the slide path



2.2.7 ADDITIONAL PORTS

Additional ports can be added at the foot end of both tube structures during construction. This allows access to chamber inflation pressure from ground level. Two ports are provided; one on each side. These two ports can be paired with a top-up valve, maintenance plug or pressure relief valve. Tulmar offers a pressure gauge option which includes a 0-5 psig gauge and an adapter plug with 1/4" NPT (monitor port).



The adapter plug can also be used for permanent and regulated air supply.

2.2.8 ASPIRATOR FLANGE

An aspirator adapter flange is another option offered. The standard flange is made to fit a 4.5" OD aspirator. The training facility may wish to install a plug or "dummy" aspirator for demonstrative rather than functional training. The flanges are mounted on the right side of both tube structures at the girt end.



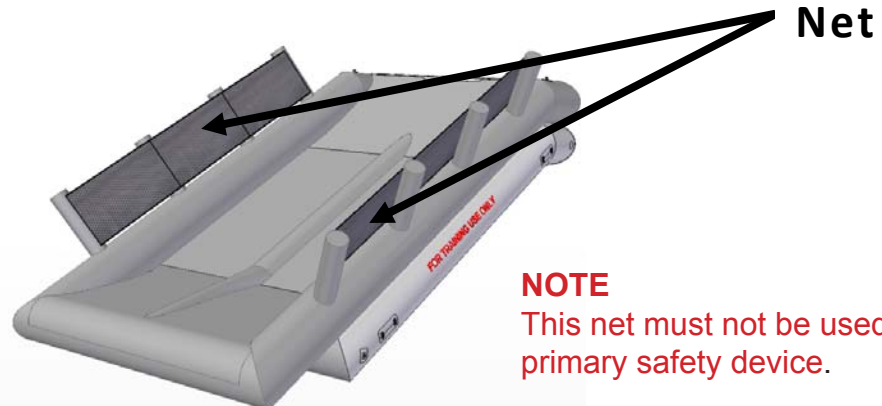
2.2.9 CANOPY STUBS

Canopy stubs are optional and offered for the dual lane slide. They are used to support a canopy during wet or dry deck training. They are also used to attach some accessories like the side net, sea-lights, etc.

2.2.10 NET

A side net kit option is offered for the dual lane slide. The net is attached to the canopy stub using hook & loop fasteners making it removable and replaceable. This net must not be used as a primary safety device.

The part number of the net is on a tag located at the top right end of the net. Use this number to order a replacement.



NOTE
This net must not be used as a primary safety device.



3.0 GENERAL OPERATION

3 GENERAL OPERATION

CAUTION: Always work in a clean area, smooth and free from sharp objects, splinters, abrasive and corrosive materials.

3.1 INFLATION

- Unpack the slide and roll it out to its full length. Ensure there are no sharp foreign objects underneath or near the slide.
- As mentioned in paragraph 2.1.6, the top-up and relief valves as well as the maintenance ports may be interchangeable by unscrewing and re-tightening them using the socket wrench. It is critical that a Pressure Relief Valve (PRV) be installed on each air chamber to protect them from overpressure.



- Inflate the slide through the top-up valve, flange with valve removed, flange with a monitor port (1/4" NPT) or an aspirator. Inflation must be achieved using clean, dry air from a compressor or industrial blower until the slide is fully extended. The air source must be free from moisture. The upper & lower tube structures must be at the same pressure during training operation.
- Inflate the slide to approximately the recommended pressure in table 1 below. If the slide is over pressurized, the pressure relief valve will open once the pressure has reached between 3.3 and 3.5 psig and will subsequently close at approximately 3.0 psig. The pressure relief valve is not to be used as a pressure regulator.
- For a permanent installation, it is preferable to attach compressed air regulated at the recommended pressure (Table 1) to the slide using a monitor port (1/4" NPT).
- Do not inflate the slide beyond 4.0 psig.

Table 1: Recommended inflation pressure		
Slide serial number	Slide length (m)	Recommended Pressure (psig)
67741-001-YY-XX	4.1	2.1
67741-002-YY-XX	4.6	2.1
67741-003-YY-XX	5.1	2.1
67741-004-YY-XX	5.6	2.1
67741-005-YY-XX	6.1	2.1
67741-006-YY-XX	6.6	2.6
67741-007-YY-XX	7.1	2.6
67741-008-YY-XX	7.6	2.6
67741-009-YY-XX	8.1	2.6
67741-010-YY-XX	8.6	2.6
67741-011-YY-XX	9.1	3.1
67741-012-YY-XX	9.6	3.1
67741-013-YY-XX	10.1	3.1
67741-014-YY-XX	10.6	3.1
67741-015-YY-XX	11.1	3.1

3.2 INSTALLATION GUIDELINES

Warning: It is safest to have several people assisting with the installation of the slide because the weight and size of the slide makes it awkward to manipulate. Appropriate safety measures need to be taken when working at heights over 2.4m (8 ft).

Tip: The installers may find it easier to lift a partially or fully inflated slide as there is less dead weight when the foot end of the slide is resting on the ground.

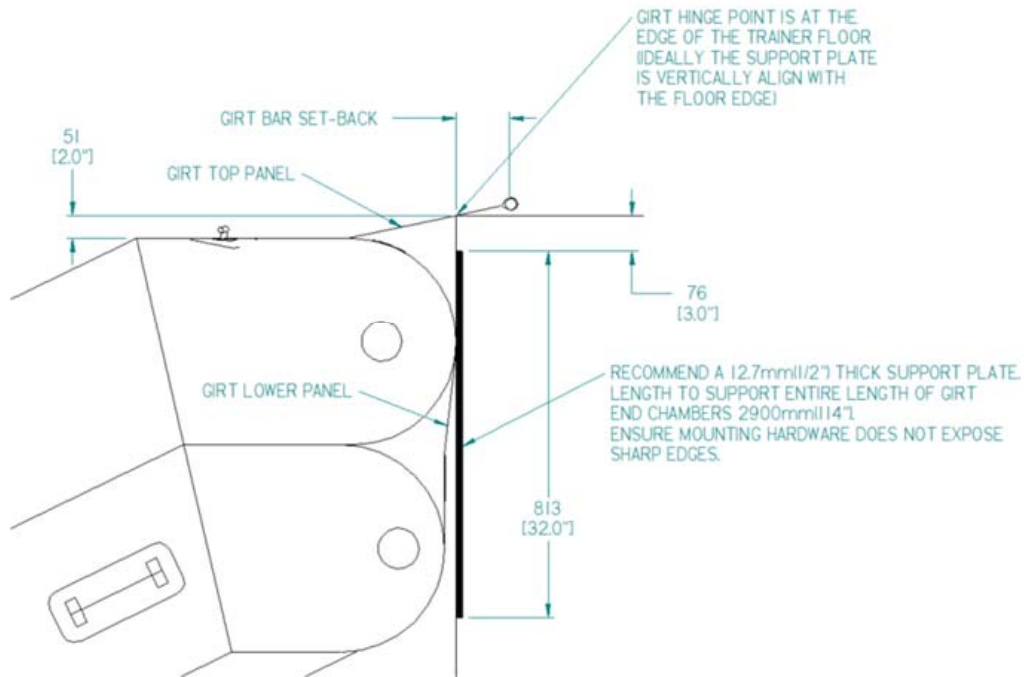
Tip: Lace a rope or strap in between the girt panels to help lift that end of the slide up to the platform.

Warning: Ensure there is enough clear area at the end of the slide for safe exit of the trainees.

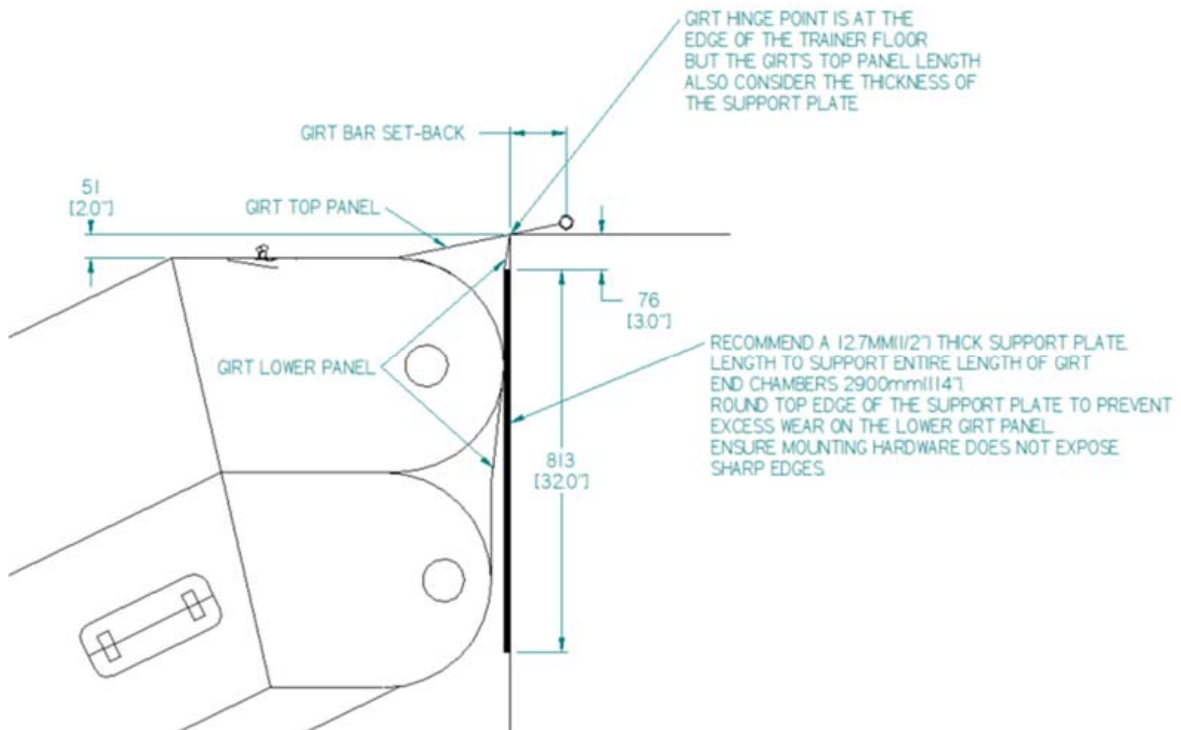
3.2.1 SITE PREPARATION

The slide will require a backboard or support plate upon which to rest against. Placement of the support plate is detailed below. Note the effect on the girt's top panel if the support plate is installed beyond the edge of the trainer floor. The thickness of the support plate needs to be accounted for when designing the girt.

Support plate vertically aligned with the edge of the trainer floor



OR



Support plate installed beyond the edge of the floor trainer

3.2.2 INSTALLATION

Lift the girt end of the slide up to the trainer platform. A rope or strap attached through the girt panels to hold the girt end will make this an easier task. While holding the girt close to the cabin crew trainer or trainer platform, attach to the trainer using a standard girt bar, or equivalent. Ensure the girt bar is safely secured. When attached to the simulator or training platform, examine the contact points of the slide and the structure to ensure there are no visible stress points, distortions or sharp objects that might abrade the slide during its normal movement or flexing.

Tulmar strongly recommends that floor mats or gym pads be placed on the floor from the edge of the trainer to underneath the bottom of the slide and beyond, where trainees will exit the slide. Floor mats are used for safety purposes as well as to prevent excessive wear on the bottom of the slide itself. As mentioned in paragraph 2.1.3, different thicknesses of floor mats can be used to fine tune the slide angle. The training facility should contact Tulmar if a major change in set-up is required, otherwise undesired stresses may be placed on the girt which is designed to be 31°, considering the trainer height and mat thickness.

NOTE: It is recommended that a safety net be installed beneath the slide even if a side net kit installed on the canopy stubs was purchased with the slide.

Loosely tether the slide to the trainer and the floor using the D-rings at each corner of the slide. This will add stability to the slide during training. Ensure the attachments to the D-rings allow for full mobility of the slide during all training scenarios, without placing undue stress on the D-ring patches. For this reason, bungee cords, or shock cords are recommended to tether the slide.



When a slide constructed of PVC cloth is installed on a motion training simulator and the simulator is put into motion with the slide fully inflated, there may be a bit of chatter noise caused by the PVC slide rubbing against the PVC floor mat. This can be remedied by applying some Armor All Original Protectant onto a cloth and rubbing it onto the contact area of the slide (upper and lower tube structure).

<http://www.armorall.com/products/protectants/original-protectant> .

NOTE: Be careful not to apply Armor All to the floor mat as this could create a hazardous exit for the evacuees.

3.2.3 ADJUSTING THE DESCENT SPEED

Despite the slide being installed at the proper design angle, if the trainees are coming off the slide too slow or are stopping before the end of the slide, it is possible to make the descent quicker by applying a bit of Armor All Original Protectant to the sliding surface.

It is recommended that the Armor All be applied onto a clean cloth and then conservatively wiped onto the sliding surface to avoid making the sliding surface too slippery. Armor All can make the slide very slippery and fast, so you will want to apply small amounts at a time. Test the sliding speed before applying more Armor All.

To slow down the sliding speed, first, wash any Armor All off the sliding surface with soap and clean fresh water. Rinse with clean water and let dry. Try the sliding speed.

Increasing the thickness of floor mats under the foot end of the slide will decrease the slide angle, also slightly reducing the speed.

Additionally, the air in the chamber can also impact the decent speed. Reducing the air pressure in the tube structures below the recommended pressure by 0.1-0.2 psig can help in decreasing the decent speed. Same goes for increasing the speed of decent, increasing the pressure by 0.1-0.2 psig can help with increasing the decent speed. This strategy should only be used if all other recommendations noted above have been tested.

3.3 DEFLATION

- For partial deflation, either insert an unattached adapter, as shown in paragraph 2.1.6 into the inflate/deflate valve or hold the valve open to let air out of the tube structures.
- To deflate the slide completely, use the socket tool (paragraph 2.1.7) to remove the top-up valve and/or the maintenance plug in both tube structures.
NOTE: Hold on firmly to the valve or the plug upon removal as the internal pressure in the chambers will expel it.
- Once the air has been almost completely removed, use a vacuum to remove the remaining air. Re-install all valves and plugs that have been removed

3.4 PACKING

Remove the girt bar from the slide prior to packing the slide to avoid risk of damaging the slide with sharp edges or corners.

Once the slide is fully deflated, lay it flat on a clean floor.

Ensure the slide is completely dry.



Fold in the two sides of the slide along its length



When folding in the sides of the slide, ensure the flanges and valves lie flat. This will help when folding the slide and avoid possible pinching later when the slide is folded in a more compact shape.



Fold the slide in half along its length



Starting from the foot end of the slide, make a 1st fold about 26" deep. Continue folding the slide upon itself, all the way to the girt end.



Flatten and square up the folded slide to fit into a container



4.0 CARE AND PERIODIC MAINTENANCE

4 CARE AND PERIODIC MAINTENANCE

NOTE: ALWAYS USE FRESH CLEAN WATER TO CLEAN AND RINSE THE TRAINING SLIDE

- Avoid performing evacuation training exercises with shoes, boots, clothes with sharp objects or snap buttons that could cause damage to the sliding surface. Clean cotton coveralls are recommended.
- Prior to each training session, verify the slide is inflated to the recommended air pressure as per section 3.1 Table 1 or to the air pressure adjusted as per section 3.2.3.
- In a dry training environment, the training area should be kept clean to optimize service life of the training slide. Dust, sand and debris found on the floor in the training area can stick to the slide and cause premature wear.
- Cleaning the slide;
 - When soiled, remove the sliding surface and clean the slide and sliding surface using a mild soap (non-detergent) mixed with clean fresh water. Thoroughly rinse the slide with clean fresh water after washing.
 - Leave the sliding surface off and allow the slide to dry completely. A circulating fan can be used to assist with air drying. NOTE: Do not use forced air or dry with heat.
 - Re-install the sliding surface once the slide and sliding surface have dried.
- In a wet training environment where the slide is exposed to salt water or chlorinated water, the slide must be thoroughly rinsed using clean fresh water after each day of training. Chlorine and salt water can have a detrimental effect on fabric, gaskets and components and consequently on the unit service life and performance.
- Lubricate the rubber O-ring on the top-up valve when it is difficult to insert the adapter. Dow Corning MolyKote 55 O-ring Grease is a suitable lubricant.





5.0 SERVICE INSPECTION PROCEDURES

5 SERVICE INSPECTION PROCEDURES

A service inspection should be performed at least once a year or when the slide loses too much air pressure during a training exercise. Service inspection includes a visual inspection, leakage test and a pressure relief valve (PRV) test. The leakage test will uncover any porosity in the cloth or loss of integrity in the inflation chamber seams. A pressure relief valve test and a leakage test may be performed at any time if the operation of the relief valve or the air retention of the slide is questionable.

CAUTION: Ensure the work area is clean, smooth and free from sharp objects, splinters, and abrasive or corrosive materials.

Equipment and materials required for testing:

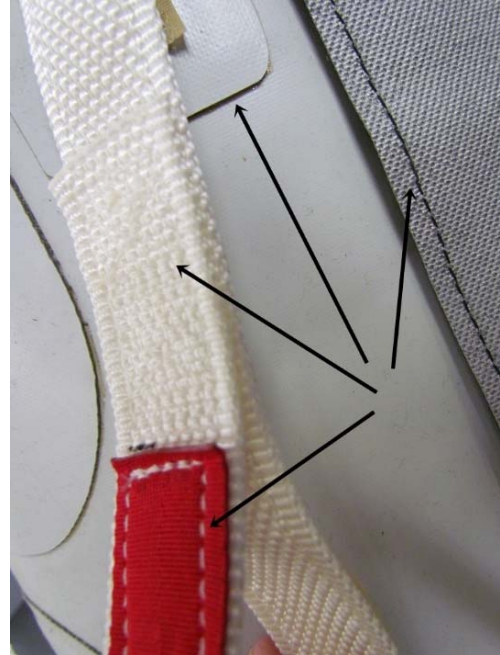
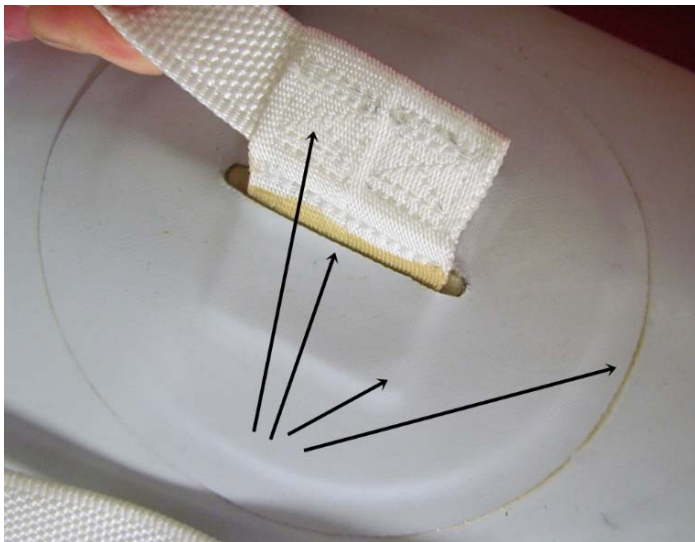
- Soapy water (using mild soap, non-detergent)
- Paint brush or spray bottle

5.1 VISUAL INSPECTION

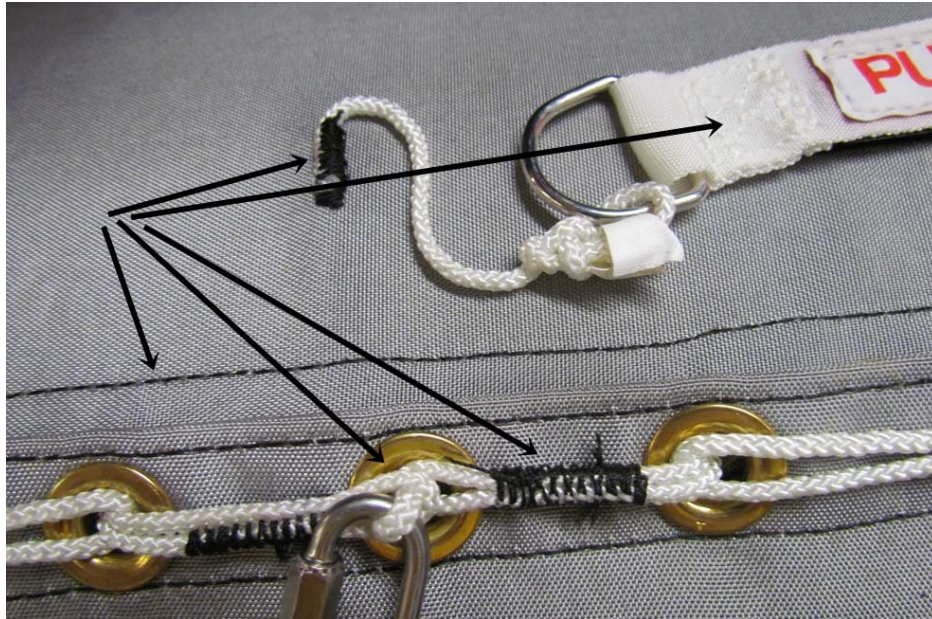
- Inspect the inflation chambers for tears, holes, abrasion, pigment-peeling.
- Inspect all seams for peeled edges or loose seam tape. Apply soapy water to determine if there is any air leakage where the seam tape has detached.



- Inspect the sliding surface and sub-floor for tears, holes, abrasion, loose stitching.
- Inspect all anchor patches (re-entry line, life line) and d-ring patches for peeling, inspect webbing for tears, loose stitching, etc.



- Inspect slide hardware, damage to the valves, O-rings, flanges, caps and fittings. Inspect girt components, lacing strip, hook & loop fasteners.



Any defect or damage found should be fixed in accordance with Section 6, *Repair Procedures*.

5.2 AIR RETENTION EVALUATION

If during a normal training period the slide loses air and becomes unusable, an air retention evaluation needs to be performed. This evaluation is used to locate sources of excessive air leakage from the inflatable chambers.

NOTE: The slide should be removed from the trainer and placed on a flat surface to facilitate access to all areas of the slide.

1. Inflate only one chamber to the pressure normally used during training sessions (i.e. the recommended pressure in table 1, section 3.1 or the adjusted pressure as per section 3.2.3).
2. Use a paint brush or a spray bottle and apply a soapy water solution to all chamber seams and areas that shows signs of abrasion or damage.
3. Below are examples of leaks and the risk level for them to be the cause of loss of pressure

Low Air Leakage

Small bubbles or soapy fuzz as seen in the image below are indicative of a minor air leak. These areas do not usually need repair unless the slide is required to maintain unadjusted air pressure for a period of more than 6 hours.



Medium Air Leakage

Leaks creating bubbles as seen in the image below are indicative of a medium air leak. This type of leak may or may not be enough to make the slide unusable during training sessions. The area should be marked as a leak to be repaired if no other larger leaks are found during inspection. Otherwise, if larger leaks are to be repaired elsewhere on the chamber, the operator may elect to monitor this medium leak over a longer term to ensure it does not become worse.



High Air Leakage

Leaks creating bubbles as seen in the image below must be repaired as per the guideline in section 6. These leaks are usually the cause of rapid loss of pressure.



4. Repeat step 1 to 3 for the other chamber
5. If the origin of the leak is a valve, replace the valve.

5.3 PRESSURE RELIEF VALVE TEST

Prior to testing the pressure relief valve, a mild non-detergent soap can be applied to the valve surface to aid in detecting the opening of the valve. Bubbles will appear on the valve surface indicating excess pressure is being vented.

Warning: Do not inflate the slide beyond 4.0 psig.

1. Inflate the slide and record the valve opening pressure. The relief valve should open at a pressure between 3.3 and 3.5 psig.
2. When the PRV opens, shut off the air supply and continue to observe the relief valve until air stops venting or bubbles cease to form indicating closure of the valve.
3. Record the pressure at the time of closure. The relief valve should close at or above 3.0 psig.

If a relief valve fails to open or close at the specified pressure or pressure interval, remove and replace the relief valve. A non-functioning relief valve could lead to slide damage or higher consumption of air supply.



6.0 REPAIR PROCEDURES

6 REPAIR PROCEDURES

6.1 GENERAL

Repairs to evacuation training slides normally consist of patching the damaged area with cloth patches.

When there is a lot of damage in a single location, then part panel replacement or total panel replacement is necessary. For part or whole panel replacement, the slide must be returned to TULMAR SAFETY SYSTEMS.

Alternatively, if the damaged is only on one tube structure, a replaceable lower or upper tube structure can be ordered and installed on site using section 6.7.4.

6.2 REPAIR ASSESSMENT

The area of damage is estimated by the size of the patch required to repair it.

Removal of coating that does not affect the base fabric is treated as an abrasion and can be adequately repaired with tape, or a small patch. If the base cloth is damaged it is treated as a hole.

Deteriorated and/or porous fabric is treated as a hole.

Coated fabric that has been contaminated with a substance which has deteriorated the coating and/or base fabric is treated as a hole. The affected area shall be cut out, cutting 25mm (1") larger than the damaged area. The cut must have rounded corners to avoid creating stress points that can tear further. If contamination exists, the remainder of the slide shall be checked for additional contamination.

Replacement of panels should not be attempted. For part or whole panel replacement, the slide must be returned to TULMAR SAFETY SYSTEMS.

6.3 REPAIR ENVIRONMENT & EQUIPMENT

Repairs are to be carried out in a room with the following characteristics:

- Temperature 20 °C +/-5 °C;
- Barometric pressure between 94.8 and 108.4 kPa (28 to 32 inches of mercury);
- Relative humidity less than 80 %;
- Free from direct sunlight;
- Free from drafts;
- An area with a clean smooth surface, such as a table with a melamine top;
- An area free from projections and having a clean, dry floor;
- Ventilation for eliminating Volatile Organic Compounds (VOC) fumes.

It is imperative that tools used for repairs are always clean and free from abrasives. Service personnel should wear rubber or felt-soled footwear to avoid creating static electrical shocks.

Equipment required to perform the repair

- TULMAR repair Kit 5513-1758-001 (patches only, kit included with slide)
- Self-curing Vinyl Adhesive/Cement HH-66 or equivalent
- Scissors
- MEK, Toluene or isopropyl alcohol as a degreasing solvent
- Paint Brush used for adhesive application, if not included with adhesive

6.4 MATERIALS

Repairs must be made with the same materials as the section being repaired. Use the material/patches provided in the repair kit listed in section 6.3.

Adhesive is not included in the repair kits. Follow the adhesive manufacturer recommendations for application of the adhesive. The pot life of mixed adhesives must be complied with.

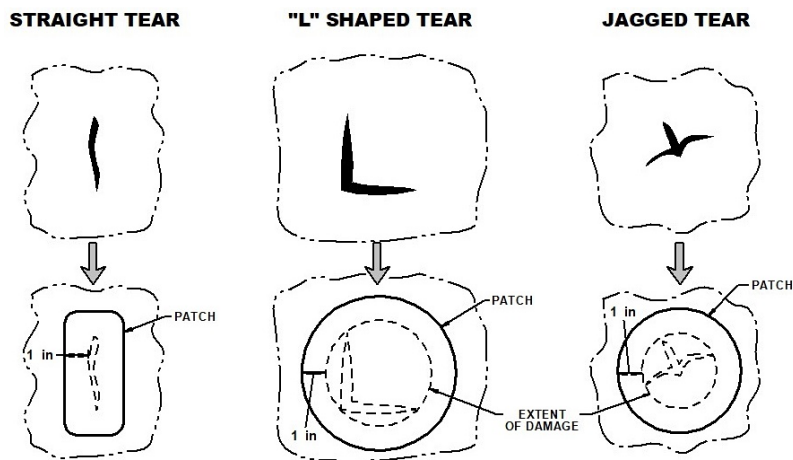
6.5 SURFACE PREPARATION

Refer to the instruction leaflet included in the appropriate Tulmar repair kit.

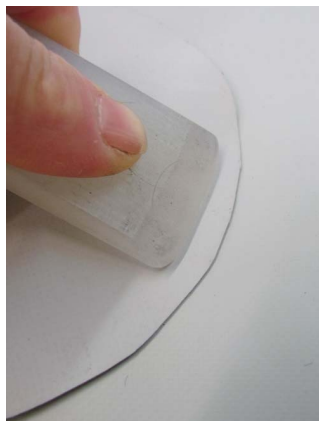
The repair patch and the chamber area to be repaired must be thoroughly cleaned using MEK, Toluene or isopropyl alcohol. Clean the surfaces to be joined with a pad wet (not dripping) with the solvent. A clean cloth indicates a properly cleaned surface. Let dry completely.

6.6 REPAIR PROCESS

1. Use the training slide repair kit pre-cut patches. The pre-cut patches can also be trimmed into a different shape or size.
2. The patch is to extend 25mm (1") beyond the damaged area on all sides. The corners of the patch are to be rounded and not square. For example, if there were a slit 6mm (1/4") long, the patch would be 57mm (2 1/4") long by 51mm (2") wide, with rounded corners.



3. Use the patch centered over the area to lightly mark the location of the patch.
4. Prepare both the patch and chamber surfaces per section 6.5 above.
5. Apply adhesive as per manufacturer instructions.
6. Apply the patch to the area; start by centering the patch over the area. Then apply pressure to the center of the patch using an object with a smooth flat surface and rounded edges, or a roller with a hard surface. Apply pressure working from the center to the outer edges, removing any bubbles between the two surfaces.



7. To maximize results, allow the adhesive to cure for the time recommended by the manufacturer. Do not use or train on the slide without allowing the adhesive to fully cure.

6.7 ACCESSORY REPAIRS

NO REPAIR SHOULD BE DONE ON ANY ACCESSORIES INSTALLED ON THE DUAL LANE TRAINING SLIDE. HOWEVER, REPLACEMENT OF SOME COMPONENTS OR PARTS ARE POSSIBLE AS FOLLOWS:

6.7.1 VALVES AND PLUGS

- Replace any hardware showing damage or rough edges.
- Replace valves showing damage, leakage issue or rough edges. Refer to the table at the end of the manual for the appropriate part number.
 1. To replace a valve, remove it using the socket tool provided by turning counter clockwise. It is recommended to vent out the slide chamber and let the pressure drop prior to completely removing the valve.
 2. Replace with a new valve, turning clockwise. Tighten with the socket tool, hand tight.
 3. Check the valve for leaks after installation. If there is leaking, re-tighten the valve.

6.7.2 SLIDING SURFACE REPLACEMENT

The sliding surface of the training slide has strips of hook fasteners installed underside, around the perimeter of the sliding panel.

When the sliding surface requires replacement due to wear or inadvertent damage, a replacement sliding surface should be ordered from TULMAR SAFETY SYSTEMS. The p/n of the sliding surface can be found on the underside of the sliding surface, near the girt end.

After removing the used or damaged sliding surface, install the replacement surface by laying it out over the sub-floor, aligning the hook & loop fasteners strips. Press firmly along the perimeter of the sliding surface to firmly secure it.

6.7.3 GIRT REPLACEMENT

The two-point girt is designed with two lacing strips, making the girt removable and replaceable.

When the slide girt requires replacement due to wear, a replacement girt should be ordered from TULMAR SAFETY SYSTEMS. The p/n of the girt can be found on the underside of the top lacing strip panel. To install a new girt, follow the below procedure;

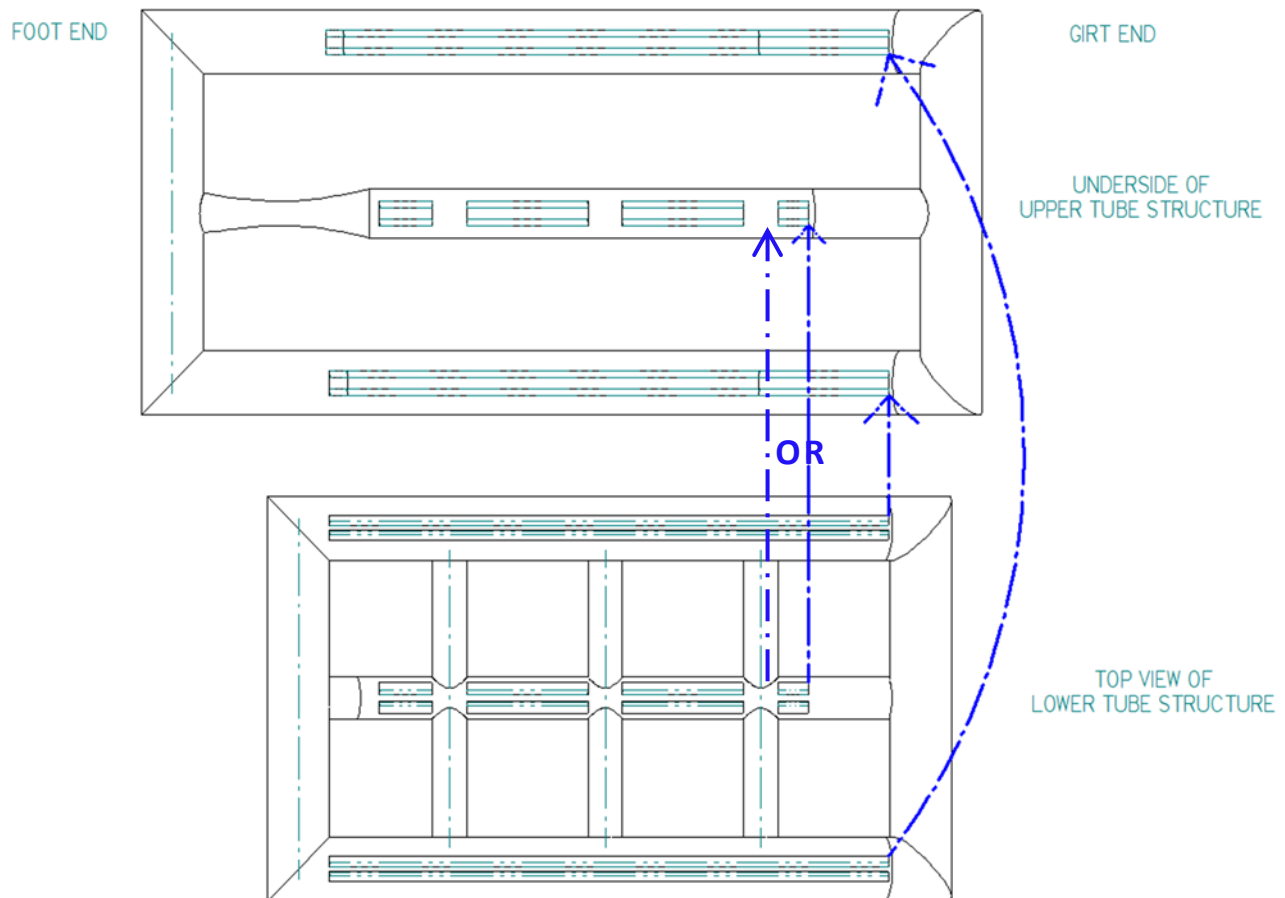
1. Remove the girt bar from the slide girt and lower the slide to the ground. A rope or strap attached through the girt panels to hold the girt end will make this an easier task.
2. Before undoing the lacing strip, observe how the cord loops are laced one into the next, towards the center loop.
3. Starting with the upper lacing strip, remove the quick link. The lacing strip will come apart easily.
4. Lace the new girt upper panel onto the lacing strip on the slide. Re-install the quick link. Compare the upper lacing strip attachment with the lower to ensure the cords are looped in the same fashion.
5. Repeat steps 3 and 4 to attach the bottom portion of the girt.
6. The slide is now ready to be re-installed on the trainer as per section 3.2.2

6.7.4 TUBE STRUCTURE REPLACEMENT

The upper and lower tube structures are attached together with a hook & loop fastening system. This feature allows the replacement of either tube structure, independently, as required.

A replacement tube structure can be ordered from TULMAR SAFETY SYSTEMS. The p/n can be determined by Tulmar Safety Systems by tracing back the serial number in paragraph 2.1.9. The serial number of the slide will be used to identify the p/n of the tube structure needed & the accessories that will need to be added to the tube structure. To install a new tube structure, follow the below procedure;

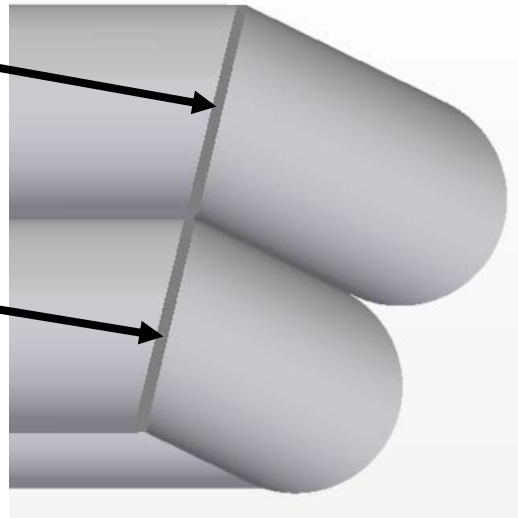
1. Place the upper tube structure upside down and completely deflated.
2. Deflate the lower tube structure and place upside down on top of upper tube structure.
3. Align the lower tube structure hook fasteners sandwiches to the upper chamber loop fasteners strip following the picture below.



4. The seam tape at the girt end should be closely aligned, as shown in the image below.

Upper chamber seam

Lower chamber seam



5. Mate the chambers together starting with the center tube, then the side tubes, always going from the girt end to the foot end of the slide.
6. To mate the Hook & loop fasteners together, open the hook sandwich, mate with the loop strip and close the sandwich. Ensure there is a full 51mm (2") contact between the hook and loop fasteners.
7. As much as possible, minimize the quantity of ripples when mating the hook & loop fasteners together.
8. The slide is now ready to be re-installed on the trainer as per section 3.2.2.

7 SERVICE PARTS LIST

The following table lists components available for standard dual lane training slides. If you are looking to replace a part that is not listed below, please contact TULMAR SAFETY SYSTEMS.

SERVICE PARTS

Description Tulmar	Part No.
Replaceable sliding surface	As marked on the existing sliding surface
Replaceable girt	As marked on the existing girt
Repair Kit, PVC, FOR WELDED SLIDE (No adhesive included)	5513-1758-001
Top-up valve	63408
Pressure relief valve (PRV)	6454
Maintenance plug	6339
Adapter, universal flange to ¼" NPT	6418
Pressure gauge 0-5psi	6463-001
Socket Tool	6366
Pump adapter top-up	6314
O-Ring, replacement, for top-up valve 63408	3514
Lower or Upper tube structure	Please contact Tulmar Safety Systems with your slide serial number.
Replaceable net	As marked on the existing net

Table provided for reference only, information may change without notice.

For pricing, please contact Tulmar Safety Systems Inc.

Tel: 1-613-632-1282

Fax: 1-613-632-2030

aviation@tulmar.com

APPENDIX A – SAFE SLIDE USE

- Before each, use the structure of the slide should be examined for damage and firmness. If in doubt, take a pressure reading of the chambers and top up the air pressures as required. Check the condition of the sliding surfaces.
- Ensure floor mat is present as per Tulmar's recommendations during purchasing process.
- When inflating the slide, do not use the pressure relief as a gauge for appropriate pressure. Refer to table on page 17.
- Inspect the girt for signs of stress or damage and verify that it is properly secured to the trainer platform or simulator.
- Ensure there is sufficient length of unobstructed runway area at the bottom of the slide to ensure safe dismount and run out. The runway should be at least 3 meters (recommend up to 4 meters for slides longer than 9m.) in length, including the floor mat.
- Descent down a fixed surface will generate heat and may cause friction burns to unprotected skin. Suitable clothing should be worn to protect both the user and the sliding surface.
- When using the slide for evacuation training, it is recommended that spotters or 'catchers' are present at the foot of the slide to assist the trainees.
- Outdoor shoes, trainers and rubber soled shoes should not be worn as these may contaminate and damage the sliding surface. They may also grab onto the surface, throwing the user out of control. If the wearing of shoes is chosen, reusable heavy duty cotton overshoes should be used for safety and to prolong the useful life of the sliding surface. The overshoes should be carried and put on only once at the top of the slide to avoid contamination, slipping and injury.
- In most cases, students will be moving from a classroom setting (sedentary) to the evacuation training segment. Slide descents can be fast, taking a person from an inactive situation to an active one in seconds. It is recommended that trainees have the opportunity to perform stretches and warm-up exercises before the training session to reduce the risk of injury.
- It is recommended the trainees be briefed thoroughly in the correct methods of descent before being allowed to use the slide.
- The training facility may consider recording the briefings and evacuation training sessions. This may reduce the risk of litigation arising from unexpected incidents.

REVISION HISTORY

This revision history is to serve as a record of the changes to this manual. The record includes the revision letter, the date of the revision, the page(s) affected, and a brief description of the change.

Rev	Date	Pages Affected	Brief Description
A	2019-04-04	All	Original release
B	2022-09-23	All	Changed Layout

TULMAR

ENGINEERED FOR PROTECTION

Tulmar Safety Systems

1123 rue Cameron, ON K6A 2B8

 +1-613-632-1282

www.tulmar.com