



TRAM™ SAFETY SYSTEM TECHNICAL MANUAL

TR-6-ST Series – Standard TRAM
TR-6-RAT Series – Rotating Arm TRAM



GET HOME
SAFELY

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1 READING THE DOCUMENTATION

1.1 LITERATURE INFORMATION

This manual contains safety information and instructions for operation and maintenance of the Standfast TRAM System. This Manual should be stored in an area where it is accessible to those responsible for maintenance of the equipment.

The information, specifications, and illustrations in this publication are provided on the basis of information available at the time of writing. Continued improvement and advancement of product design may have caused changes to your TRAM System, which are not included in this Manual.

Some photographs or illustrations in this Manual show details or attachments that may be different from your TRAM system:


- Subassemblies, guards or covers may have been removed for illustrative purposes.
- The specifications, torques, pressures, measurements, adjustments, illustrations, and other items can change at any time.

Important! These changes can affect the service given to the product.

Whenever a question arises regarding your TRAM System or this Manual, and before starting any job, please consult your Standfast TRAM dealer to obtain the complete and most current information available.

1.2 ALERTS USED IN THIS MANUAL

Please read the list below of alerts used in this manual. These alerts are used to indicate important instructions. Be sure to obey these instructions.

ALERT	MEANING
	Indicates a warning concerning an operation or hazard that may lead to death or injury to persons if not performed correctly or with due care. Always pay attention to these warnings.
Important!	Indicates a restriction or important information. Be certain to read these items to avoid improper use or damage to the equipment.
Note!	Indicates additional information or explanation. Be certain to read these items.

2 IMPORTANT SAFETY INFORMATION

2.1 GENERAL



The purpose of the TRAM Safety System is to protect the user from a fall from height. If the system is not properly used, maintained or repaired, it may no longer protect against a fall from height.



Failure to follow the instructions or heed the warnings contained in this manual could result in injury or death. Improper operation, maintenance or repair of this product can be dangerous and could result in injury or death.

*All inspection, maintenance, servicing and repair work on the TRAM System shall be carried out by a **Competent Person**.*

*A **Competent Person** is defined as a person:*

- who is knowledgeable of recommendations and instructions on the TRAM System issued by Standfast (including information contained in this manual)*
- who is authorised* by Standfast to carry out inspection, maintenance, servicing and repair work,*
- who has the necessary training, skills and tools to perform the work properly,*
- who is capable of identifying existing and predictable defects and hazards in any component of the TRAM safety system and related equipment used in the work environment,*
- who is authorised to take prompt corrective action to eliminate or control hazards, and has the skills and resources to do so,*
- who is familiar with relevant guidelines and national and international safety regulations.*

**Your Standfast TRAM Dealer is authorised to carry out all inspection, maintenance, servicing and repair work on the TRAM System. Your Standfast TRAM Dealer may also be contacted to authorise a Competent Person.*

All work must comply with the safety regulations of the jurisdiction in which the TRAM System is installed and operated, including industry Codes of Practice and Standards.



No one should make any alterations or additions to the equipment. Any repair shall only be carried out in accordance with authorized procedures.

The TRAM shall not be used outside its limitations as described in this Manual, or for any purpose other than that for which it is intended.

Most accidents involving product operation, maintenance and repair are caused by failure to observe basic safety rules or precautions. An accident can often be avoided by recognizing potentially hazardous situations before an accident occurs.

Standfast Corporation cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this publication and on the product are therefore not all inclusive. If a tool, procedure, work method or operating technique not specifically recommended by Standfast Corporation is used, you must satisfy yourself that it is safe for you and others. You should also ensure that the product will not be damaged or made unsafe by the operation, lubrication, maintenance or repair procedures you choose.



2.2 SAFETY SIGNS AND LABELS

Safety precautions and warnings are provided in this manual and on the product. If these hazard warnings are not heeded the product may not protect you or others from bodily injury or death.

The TRAM system is permanently marked or labelled to indicate its purpose, correct use, limitations and other relevant information aimed at reducing the incidence or misuse or misfitting of the equipment.

Make sure that all safety signs can be read. Clean or replace these if illegible. When cleaning the labels use a cloth, water and soap. Do not use solvents, gasoline, etc to clean safety signs.

Contact your Standfast TRAM Dealer to organise replacement signs and labels.



2.3 SAFE WORKING AT HEIGHTS

The operation and maintenance of the TRAM must comply with the safety Legislation and Regulations of the jurisdiction in which it is used.

Users of the TRAM System must be properly trained and competent. Further enquiries regarding training materials and courses should be directed to your Standfast TRAM Dealer or by email to: hq@standfastcorp.com

The TRAM restraint belt must only be used when the TRAM system is used as a total restraint system. The TRAM restraint belt must not be used if there is a risk of free fall.

Total restraint means that there is no risk of fall as the user is prevented from reaching a fall edge. This is achieved through combination of anchor point and lanyard length.



2.4 FALL ARREST

It is essential for safety that if the TRAM System is used as a fall-arrest system a full body harness and energy absorber should be used.

The TRAM Belt described in this Manual is for use in total restraint and must NOT be used in fall arrest.

In fall arrest applications, the TRAM System should always be positioned, and the work carried out in such a way, as to minimise both the potential for falls and potential fall distance.

When the TRAM system is used as a fall-arrest system consideration should be given as to how any necessary rescue could be safely achieved.

The operator should ensure that when the TRAM is used as a fall-arrest system that the distance required or necessary to arrest the fall of a falling worker does not exceed the distance available on site.

If the TRAM has been used to arrest a fall it should be not used again until confirmed in writing by a competent person that it is acceptable to do so.



2.5 PRE-USE CHECK

Users must carry out a Pre-Use Check of the equipment, as per the instructions in this Manual, to ensure that it is in a serviceable condition and operates correctly before use.

It is essential for safety that equipment is withdrawn from use immediately should any doubt arise about its condition for safe use.



2.6 SERVICING

Servicing should be carried out at regular intervals as described in this Manual.

Services should only be conducted by a Competent Person and strictly in accordance with servicing procedures.

Equipment Records of Periodic and Overhaul Services must be maintained and be available to the user.



2.7 INSTALLATION

Anyone installing the TRAM system must read, understand and strictly adhere to the instructions and safety information in this manual and any Installation Instructions for the TRAM Safety system.

The installer must verify the adequacy of anchor point(s) either by calculation or by carrying out a test in a sample of the material in compliance with the specifications of the appropriate Standards.



2.8 MAINTENANCE & REPAIR

Attach a DO NOT OPERATE or similar warning tag to start switch or controls before performing maintenance or repairing the TRAM, if it is a vehicular installation. When appropriate, attach tags at the engine and at each user's position and disconnect starting controls. Ensure any protective locks, controls or inhibitors are in the applied position before commencing work.

Some installations will require the use of fall protection equipment during removal and installation of the TRAM system. A service platform or walkway is recommended.

It is the responsibility of the owner to ensure that access is achieved in accordance with local regulations and standards.

Wear a hard hat, protective glasses, hearing protection, gloves and other protective equipment as required by job conditions.

Do not wear loose clothing or jewellery that can catch on controls or other parts of the TRAM.

Use caution when removing springs. Gradually loosen (do not remove) the last bolts or nuts located at opposite ends of any spring energy device, until all elastic energy is dissipated, before completely removing the fasteners.

Do not carry out hot work on the TRAM device without first consulting your Standfast TRAM Dealer. Your TRAM contains plastic components that may not function correctly in the event that hot work is carried out on the TRAM.

Compressed air can cause personal injury. When using compressed air for cleaning, wear a protective face shield, protective clothing and protective shoes. The maximum air pressure must be below 200 kPa (30 psi) for cleaning purposes.

Wear eye protection at all times when cleaning the TRAM system with hot and/or pressurised water. Pressurised water could cause debris and/or hot water to be blown at the worker and result in personal injury.

Escaping fluid under pressure, even a pin-hole size leak, can penetrate body tissue, causing serious injury or possible death. If fluid is injected into your skin, it must be treated by a doctor familiar with this type of injury immediately.

The TRAM System and replacement parts (brake pads) shipped from the factory are asbestos free.

Support equipment and attachments correctly when working beneath them.

Do not allow unauthorized personnel on or around the TRAM when it is being serviced.

Do not attempt repairs you do not understand.

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4 INTRODUCTION

4.1 TRAM SYSTEM DESCRIPTION

The TRAM Safety System described in this publication is a total restraint height safety system. It is designed for various industrial, mining, defence, transport and domestic height safety applications to provide the user with an ideal system of mobility, stability and restraint.

The TRAM (Safety) System consists of three components; the **TRAM**, the **TRAM Belt** and the **TRAM Installation**.

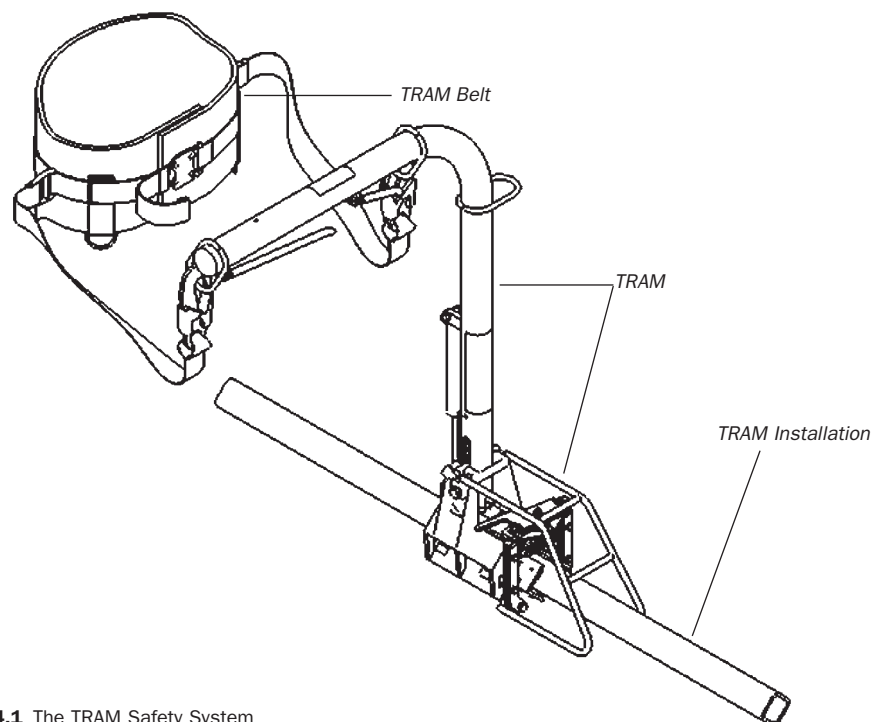


Figure 4.1 The TRAM Safety System

The **TRAM** (or **TRAM device**) is a mobile anchor point that moves along the fixed rail. For inspection, maintenance and repair purposes, the TRAM is classified into three subassemblies – the TRAM Arm, the TRAM Trolley and the TRAM Brake System.

The **TRAM Belt** is a restraint belt that is worn by the user and attached to the TRAM by two lanyards.

The **TRAM Installation** consists of the fixed rail and the mounting hardware which attaches the fixed rail to the structure or vehicle to which the TRAM System is fitted.

4.2 SAFETY

The “Important Safety Information” section lists basic safety precautions. In addition, this section identifies hazardous situations, which are identified within the text by the highlighted warning symbol. Read and understand the basic precautions listed in the “Important Safety Information” section before using or performing maintenance or repair of this product.

4.3 COMPLIANCE TO WORKPLACE SAFETY LAWS

The use and maintenance of the TRAM Safety System must comply with the Workplace Safety Legislation and Regulations of the jurisdiction in which the TRAM System is used.

The TRAM and the TRAM Rail have been tested to the specifications of, and are compliant with:

EN 795:1997 Protection against falls from a height – Anchor devices – Requirements and testing (Class D anchor device employing a horizontal rigid anchor rail)

The TRAM Belt has been tested to and is compliant with:

EN 358:2000 Personal protective equipment for work positioning and prevention of falls from a height – Belts for work positioning and restraint and work positioning lanyards (Waist belt intended for restraint)

4.4 CUSTOMER SERVICE

Your satisfaction is a primary concern to Standfast Corporation and its dealers. When a problem arises concerning the sale, operation or service of your TRAM System, please contact the Standfast TRAM Dealer in your area.

The Standfast TRAM Dealer nearest to you can be located by consulting the website: www.standfastcorp.com.

Standfast Corporation may be contacted directly by email or phone by consulting the website: www.standfastcorp.com, or in writing to:

The Customer Service Manager
Standfast Corporation
PO Box 1224,
Milton BC, Queensland
Australia, 4064

5 DESCRIPTION OF EQUIPMENT

This chapter provides the names and location of major components of the TRAM Safety System, and also describes their functions.

5.1 FEATURES & CONTROLS

Refer to Figures 5.1 and 5.2 to identify the features and control components of the TRAM System. Figure 5.1 illustrates a TRAM in the TR-6-ST Series of products and is also termed the “Standard TRAM”. Figure 5.2 illustrates the TR-6-RAT Series of products and consists of a Standard TRAM with a rotary joint incorporated into the TRAM Arm. This type of TRAM is termed the Rotating Arm TRAM.

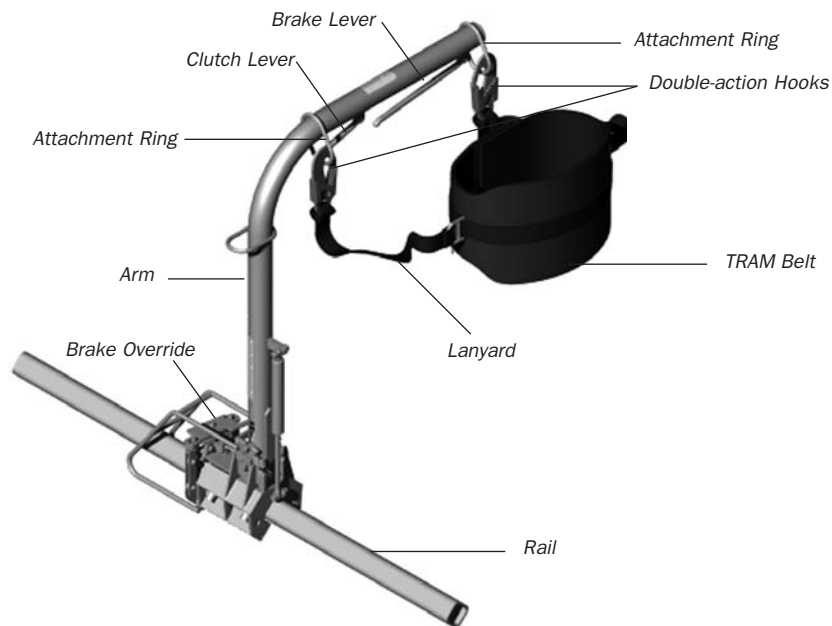


Figure 5.1 Features and Controls of the TRAM System – TR-6-ST Series

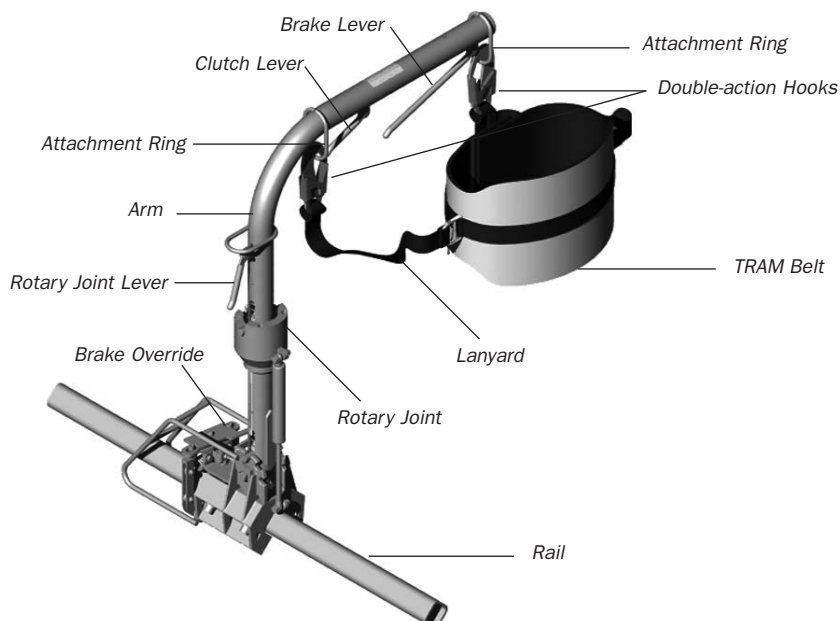


Figure 5.2 Features and Controls of the TRAM System (with Rotary Joint fitted) – TR-6-RAT Series

Arm

The TRAM Arm provides a handhold that moves with the user and also supports the Attachment Rings which are anchor points for the restraint belt. A Rotary Joint is fitted to the TRAM Arm as part of the TR-6-RAT Series.

Rotary Joint (TR-6-RAT Series ONLY)

The Rotary Joint allows the horizontal segment of the Arm to rotate relative to the TRAM Device. By activating the Rotary Joint Lever, the Arm can be rotated through 180 degrees, in 90 degree increments. This is illustrated in Figure 5.3.

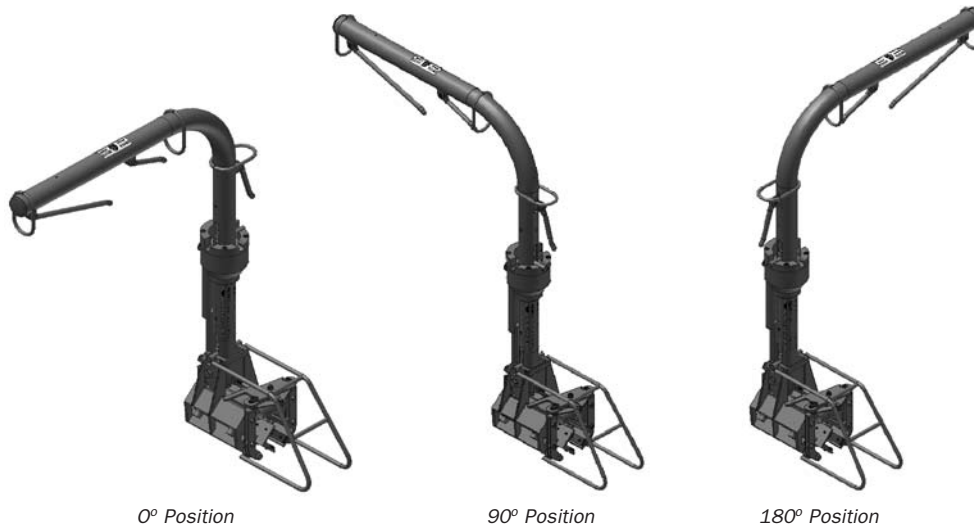


Figure 5.3 TRAM Arm Positions with Rotary Joint fitted (TR-6-RAT Series ONLY)

Clutch Lever

The pivoting movement of the TRAM Arm is controlled by the Clutch lever. Activating the lever allows the user to pivot the TRAM Arm between vertical and horizontal positions. The arm position can be locked into either the horizontal, 45 degree or the vertical position and will lock in place in position when the pivot clutch lever is released. See Figure 5.4.



Figure 5.4 TRAM Arm positions

Brake Lever

In its normal position, the Brake system is locked and the TRAM Device is locked in its location on the TRAM rail. Activating the Brake lever by hand releases the TRAM Device from its locked position and allows it to move along the rail with the user. Releasing the Brake lever allows it to return to the normal position and again lock the brake system and TRAM onto the rail.

Attachment Rings

Attachment Rings are anchor points provided on the TRAM Arm for attachment of the Lanyards via the Double-action Hooks.

Double-action Hooks

The Double-action Hooks are attached to the end of the lanyards and are used to attach the user to the TRAM Arm via the Attachment rings.

TRAM Belt

The TRAM Belt is a purpose designed restraint belt with two lanyards that attach to the TRAM with double action hooks. The Belt is fixed around the user's waist using a quick lock and release buckle mechanism and must be fastened when the Belt is in use

The TRAM Belt is available in the following sizes:

TRAM Belt Sizes

WAIST SIZE	TRAM BELT SIZE	TRAM BELT COLOUR
Up to 70cm [27.5"]	Small	Purple
70-100cm [27.5-39.4"]	Medium	Red
100-125cm [39.4-49.2"]	Large	Blue
125-150cm [49.2-59.1"]	Extra-Large	Black

Lanyards

The lanyards are of fixed length and allow the user to move and work while attached to the TRAM Arm.

Brake Override Foot Lever

In its normal position, the Brake system is locked and the TRAM Device is fixed in its location on the TRAM rail. In the event that the Brake lever fails to function, the Brake override foot-lever may be used to unlock the TRAM Device from its fixed location, allowing it to move along the rail with the user.

Rail & Fixtures

The Rail provides a path for the TRAM Device to move along. Rail fixtures hold the rail in position and are designed to comply with Design Strength requirements of legislation. Rail fixtures provide the interface between the Rail and the structure to which the TRAM is to be fixed.

5.2 TRAM DEVICE IDENTIFICATION PLATE

The TRAM (Device) is supplied with an identification plate as illustrated in Figure 5.2.1 below. The plate is usually affixed to the lower section of the TRAM Arm. The plate contains important information about the TRAM system including the type of TRAM Product, a unique serial number, a date of manufacture and a statement of compliance to legislation.

Important! The TRAM Identification plate is permanently attached to your TRAM system and should not be removed or modified in any way.

Important! The Installation Plate may vary in design and content subject to Workplace Safety Legislation and Regulations of the jurisdiction in which the TRAM System is used



The image shows a rectangular identification plate with rounded corners. At the top left is the TRAM logo, which consists of a stylized truck icon above the word 'TRAM' in a bold, italicized font, with 'TOTAL RESTRAINT ACCESS MODULE' written in smaller text below it. To the right of the logo is the 'STANFAST CORPORATION' logo, featuring a stylized helmet icon to the right of the company name. Below the company name is the website 'www.standfastcorp.com'. Below these logos are three input fields for 'Product:', 'Serial No.:', and 'Date of Manufacture:'. Below the input fields is a bulleted list of four safety instructions. At the bottom left, it says 'EN795:1997 Class D' and 'Notified Body: 0320'. At the bottom right is the CE mark.

TRAM
TOTAL RESTRAINT
ACCESS MODULE

STANFAST
CORPORATION

www.standfastcorp.com

Product:

Serial No.:

Date of Manufacture:

- This device is suitable for use by one person.
- Operators of the TRAM system must be properly trained and competent.
- Operator's Manual and Equipment Records should be freely available to operators and users of the TRAM.
- Periodic Examination must be carried out by a Competent Person at regular intervals of every six months or less.

EN795:1997 Class D
Notified Body: 0320

CE

Figure 5.2.1 TRAM Identification Plate

5.3 TRAM BELT LABEL

The TRAM Belt is supplied with an information label sewn into the belt material and illustrated in Figure 5.3.1 below. The label contains important information about the TRAM Belt including a description of the product, product identification, serial number, date of manufacture and date to be taken out of service, a statement of compliance to legislation and a pictogram.

Important! The TRAM Belt label is permanently attached to your TRAM Belt and should not be removed or modified in any way.

Important! The Installation Plate may vary in design and content subject to Workplace Safety Legislation and Regulations of the jurisdiction in which the TRAM System is used.







TRAM RESTRAINT BELT – USE ONLY FOR RESTRAINT – DO NOT USE FOR FALL ARREST				
Product No:		Tested to: EN358:2000 Notified Body: 0320	 www.standfastcorp.com	
Serial No:		Operators of the TRAM system must be properly trained and competent		
Date of Manufacture:	Month Year	Operator's Manual and Equipment Records should be freely available to operators and users of the TRAM Periodic Examination must be carried out by a Competent Person at intervals of every six months or less		
				
1 Clip into TRAM safety harness		2 Proceed up ladder and clip onto TRAM	3 Step onto tanker	
		4 Move along and conduct work		

Figure 5.3.1 TRAM Belt Label

5.4 TRAM INSTALLATION PLATE

The TRAM Installation Plate is an information plate affixed in a visible location at the TRAM Installation (the anchorage point). This plate should be clearly visible to the user before the user is in a position to operate the TRAM System. The plate contains important information about the TRAM Installation including the installer's identification, the installation serial number, the date of installation, a statement of compliance to legislation and a pictogram.

Important! The TRAM Installation Plate is permanently attached to your TRAM Installation and should not be removed or modified in any way.

Important! The Installation Plate may vary in design and content subject to Workplace Safety Legislation and Regulations of the jurisdiction in which the TRAM System is used.

	Installed by: <input type="text"/>
	Serial No.: <input type="text"/>
	Date of Installation: <input type="text"/>
EN795:1997 Class D Notified Body: 0320	
	
<ul style="list-style-type: none">• Operators of the TRAM system must be properly trained and competent.• Operator's Manual and Equipment Records should be freely available to operators of the TRAM.• Periodic Examination must be carried out by a Competent Person at intervals of every six months or less.• The system is suitable for use by one person only.	
	www.standfastcorp.com

Figure 5.4.1 TRAM Installation Plate

6 OPERATION

The instructions provided in section 6.1 should be used to operate the TR-6-ST Series and the TR-6-RAT Series TRAM Systems. Section 6.2 applies to operation of the Rotary Joint supplied with the TR-6-RAT Series TRAM System. Section 6.3 describes operation of the Brake Override.

6.1 GENERAL OPERATION

STEP 1

Perform a pre-use check in accordance with the TRAM Pre-Use Check Procedure. (A copy of the Pre-use check procedure is contained in Appendix A.)

APPENDIX A - TRAM PRE-USE CHECK PROCEDURE	
THE PRE-USE CHECK SHOULD BE CARRIED OUT BY THE USER EACH TIME, BEFORE THE TRAM SYSTEM IS USED.	
Important! The Pre-Use Check consists of a basic inspection of the TRAM System and should be tactile, visual and undertaken in good light.	
PROCEDURE	FALLS IF
Check Equipment Record	1. The TRAM System Periodic Service or Overhaul Service is overdue.
Check TRAM Device Identification Plate, TRAM Belt Label and TRAM Installation Plate	2. The TRAM Device Identification Plate, TRAM Belt Label and/or TRAM Installation Plate are not present or are illegible.
Inspect TRAM belt and lanyards while passing slowly through the hands.	3. The Belt Buckle does not function properly. 4. There is evidence of damage or deformation to the Double-action Hooks or Duffing Joiners. 5. The abradement mechanism does not function properly. 6. There are cuts or abrasions of 3 mm or more at the edges of the Strapped or belt.

STEP 2

Put on the TRAM restraint belt.



STEP 3

Fasten the belt buckle.

Pull belt strap tight.

Note: The lanyards are kept in a 'carry position' hooked back to the belt.

Note: When worn correctly, the restraint belt should look like the restraint belt in the illustration.



Note: Double action hooks are operated by first depressing the latch on the back spine of the hook and then opening the hook gate.



STEP 4

Move to the work area into a position where the TRAM Arm can first be reached and held.

Important! When climbing a ladder, three points of contact should be maintained on the ladder at all times.



STEP 5

One-at-a-time, unclip the double-action hooks and take the hooks from their 'carry position' on the belt and attach them to the attachment rings on the TRAM arm.

Important! Do this one-at-a-time and maintain three points of contact throughout.



Note: Once the double-action hooks are attached to the attachment rings on the TRAM Arm, the user is in a position of total restraint and can work safely.

STEP 6

Activate the clutch lever. The TRAM Arm will pivot from the horizontal "lay down" position to its vertical position. Whilst this takes place move from the ladder onto the walkway.

Important! Grip the Arm with both hands when activating the clutch lever to maintain three points of contact throughout the transition.



STEP 7

Once on top of the walkway, move the TRAM arm along the rail by activating the brake lever. You are in total restraint and can move safely along the walkway.

Note: Whilst standing and walking the anchor points are at waist level.

Note: Horizontal travel along the walkway is controlled by the brake lever.



STEP 8

Once at the required work position, release the brake lever to apply the brake and lock the TRAM in position.



STEP 9

If the user needs to kneel, squat or sit, the TRAM Arm and attachment points can be lowered by pivoting the TRAM Arm. Pivot the TRAM Arm by operating the clutch lever.



STEP 10

Once the required task is complete, activate the brake lever and move back along the walkway.



Important! The lanyards are of suitable length to allow the user to turn around and walk back along the walkway head first.

STEP 11

At the end of the walkway, turn and face inwards. Activate the clutch lever and while pivoting the TRAM Arm back into the 'laydown' position, move back onto the ladder.



Important! Grasp the TRAM Arm with both hands throughout the transition to ensure three points of contact are maintained.



STEP 12

One at a time, unclip the double-action hooks from the attachment rings and attach them to the 'carry position' on the restraint belt.

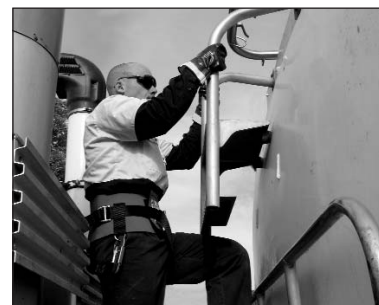
Important! Do this one-at-a-time and maintain three points of contact throughout.



STEP 13

Proceed back down the ladder.

Important! When descending the ladder, three points of contact should be maintained on the ladder at all times.



STEP 14

When not in use the TRAM belt should be stored in a safe place in the bag provided.

Do not store wet or damp belt.

Keep out of direct sunlight.

Keep away from corrosive agents, excessive heat or moisture.



6.2 OPERATING THE ROTARY JOINT (TR-6-RAT SERIES ONLY)

Activating the rotary joint lever allows the TRAM Arm to rotate from its initial position through 180°. The TRAM Arm can be locked at the 90° and 180° position by releasing the rotary joint lever. The rotary joint affords access to both sides of the TRAM Rail.



6.3 OPERATING THE BRAKE OVERRIDE

In the event that the brake lever fails, the brake override foot lever may be used to release the brake and allow the TRAM system to move freely along the rail.

Note: The brake is normally engaged, meaning that brake failure will result in the TRAM being safely locked on to the rail rather than 'free wheeling' along the rail



7 INSPECTION & MAINTENANCE

Inspection and maintenance of the TRAM System consists of a number of activities that are to be performed on a regular basis. The activities are categorised as: Pre-Use Check, Cleaning, Periodic Service, Overhaul Service and Repair.

This section describes the different maintenance activities to be performed, who is able to perform the activity, when each activity should be performed and whether or not completion of the activity requires documentation.

7.1 INSPECTION & MAINTENANCE ACTIVITIES & SCHEDULE

The inspection and maintenance activities defined in this Manual for the TRAM System are:

Pre-Use Check

The Pre-Use Check is a checklist that is to be completed before the TRAM System is used each time. This will ensure the TRAM operates correctly and safely at all times. It should be performed by the user of the TRAM. The Pre-Use Check Procedure is contained in the Operator's Manual and is transposed in Appendix A.

Cleaning

To maintain continued performance, appearance and durability of your TRAM System, it should be cleaned regularly using the Cleaning procedure. Cleaning should be performed at intervals depending on the severity of the working environment and may be carried out by the user or at a maintenance workshop. The Cleaning Procedure is contained in Chapter 8.

Periodic Service

The Periodic Service is an in-depth inspection and maintenance procedure and should be carried out on all elements of the TRAM system at periodic intervals depending on the working environment. Periodic Servicing should be carried out by a Competent Person as defined in Chapter 2 of this Manual. The Periodic Service is contained in Chapter 9.

Note! The Periodic Services contained in this Manual comply with the requirements of the “periodic examination” contained in the Standard EN 365:2004.

Overhaul Service

The Overhaul Service is a preventative service where the major wear items of the TRAM System are replaced before failure. An Overhaul Service is always carried out in conjunction with a Periodic Service. Overhaul Servicing should be carried out by a Competent Person as defined in this Manual. The Overhaul Service is contained in Chapter 9.

Repair

Repair work is to be done on an as needed basis. The requirement for repair work and associated downtime will be minimised when other maintenance activities described in this Manual are completed properly and at recommended intervals. Any repair work should be carried out by a Competent Person as defined in this Manual.

The following Table provides the maintenance interval schedule for the TRAM System:

Maintenance Interval Schedule

ACTIVITY	NORMAL OPERATING CONDITIONS – FREQUENCY	EXTREME OPERATING CONDITIONS – FREQUENCY
Pre-Use Check	Before each use	Before each use
Cleaning	At least every six (6) weeks	At least every three (3) weeks
Periodic Service	Every six (6) months	Every four (4) months
Overhaul Service	Every three (3) years	Every two (2) years
Repair	At any time as required	At any time as required

Important! The TRAM System should be maintained under the Normal Operating Conditions Schedule unless the TRAM System is exposed to or operates in **one or more** of the following conditions:

- Temperature extremes – above 60°C or below -10°C
- Abrasive dust, bull dust, cement powder
- Corrosive liquids
- High salt concentrations or a marine environment
- For vehicular applications, “Off Road” conditions

Important! For special cases, the frequency of services carried out may be increased for individual items depending upon your specific maintenance practices, operation and application.

Important! For vehicle mounted TRAMs the TRAM Maintenance Interval Schedule should be included into the vehicle’s preventative maintenance program/schedule.

Important! Although most users will obtain more life for the parts to be replaced during overhaul servicing than the overhaul schedule recommends, Standfast has determined that these limits are the best (least cost) for the vast majority of our TRAM users.

Your Standfast TRAM dealer can assist you in tailoring your Maintenance Interval Schedule to meet the needs of your operating environment.

The following Table provides a summary of Maintenance Activities showing who is able to carry out which activity and the documentation records of maintenance required:

Maintenance Activity Summary

ACTIVITY	MAY BE CARRIED OUT BY:		MAINTENANCE RECORD
	USER	COMPETENT PERSON	
Pre-Use Check	Yes	Yes	-
Cleaning	Yes	Yes	-
Periodic Service	No	Yes	Record on Equipment Record
Overhaul Service	No	Yes	Record on Equipment Record
Repair	No	Yes	Record on Equipment Record

7.2 MAINTENANCE RECORDS

Documentation of maintenance activities is a key element of a well managed personal protective equipment programme. Standfast recommends that accurate maintenance records be maintained for all Periodic Services, Overhaul Services and any Repairs to the TRAM System. Records should be kept on an Equipment Record or similar document that includes all fields contained in the Equipment Record contained in Appendix C.

Accurate maintenance records can be used for determining operating costs, establishing maintenance schedules for other TRAM Systems being operated in the same environment and for a variety of other related business decisions. Accurate maintenance records can also be used to show compliance with the required maintenance practices and intervals required for product warranty.

In addition to the Equipment Record, the following types of documents should be kept as proof of maintenance or repair for warranty:

1. Standfast Dealer work orders and itemized bills.
2. Owner's repair orders.
3. Owner's receipts.

Important! It is the responsibility of the TRAM System owner organisation to document and maintain records of maintenance and repair using the Equipment Record in Appendix C.

Important! Failure to record maintenance activities in accordance with the Maintenance Activity Summary may void your Standfast TRAM System warranty.

Note! If the TRAM is sold, transfer the records with the TRAM to the new owner.

8 TRAM CLEANING PROCEDURES

8.1 TRAM BELT CLEANING PROCEDURE

1. Wipe off surface dirt with a damp cloth
2. Clean webbing and hardware with warm water and mild detergent
3. Rinse in warm water
4. Drip dry in shade

Important! Do not place Belt near direct heat or in direct sun to dry

Important! Do not store a wet or damp belt

8.2 TRAM DEVICE CLEANING PROCEDURE

Important! The TRAM is constructed predominately of **Stainless Steel** components and is very durable in normal operating conditions.

Care should be taken not to contaminate parts of the TRAM device by allowing it to come into contact with **Mild or Carbon Steel** cleaning implements.

NEVER use steel wool (wire wool) or steel wire brushes to clean stainless steel. They are usually made of carbon steel and any fragments left behind will rust onto the stainless steel surface. Using any kind of scourer which has previously been used on mild or carbon steel should also be avoided for the same reason.

1. Remove TRAM dust cover (if fitted) and visually inspect the TRAM unit for evidence of contaminants eg dust, stones, mud, cement, grain dust etc that will foul the working parts of the TRAM.
2. Hose down the TRAM Device, Rail & Fixtures to remove any excess contaminants.
3. Visually inspect unit again and remove any further contaminates with the aid of brushes and cleaning tools. For best results, wash with mild detergent and warm water followed by rinsing with clean cold water
4. If any stains or surface rust remains after the cleaning steps above scrubbing may be required. Use a clean nylon scourer or a cloth with chalk-based cream cleaner. Alternatively it may be necessary to use a proprietary stainless steel cleaner. These are usually based on dangerous chemicals (such as phosphoric, oxalic or sulphamic acids) and must be handled with care according to the manufacturer's directions. After cleaning it is important to neutralise any acids with a 1% ammonia or baking powder solution followed by rinsing with clean water.

Important! Cement and mortar splashes should be washed off before they set. Mild acids such as vinegar may be used, however avoid those using chloride rich chemicals. Do not use brick cleaning liquids which contain hydrochloric acid.

8.3 TRAM INSTALLATION CLEANING PROCEDURE

Important! The TRAM Rail must be kept free of deposits of foreign material. Deposits may interfere with the TRAM Device Wheels affecting smooth operation of the TRAM or causing damage to the Wheel System.

1. Visually inspect the TRAM Installation, including the rail and all individual fixtures for evidence of contaminants eg dust, stones, mud, cement etc.
2. Hose down the TRAM Installation to remove any excess contaminants using clean water. Alternatively use a nylon scrubbing brush and bucket of water.
3. Visually inspect the Installation again and remove any further contaminants with the aid of brushes and cleaning tools. For best results, wash with mild detergent and warm water followed by rinsing with clean cold water.
4. If, after cleaning the Rail using the above procedure, foreign deposits remain, it is important that they are removed completely. Successful removal may require the use of an abrasive cleaning method. If an abrasive cleaning method is to be used, first ensure that the abrasive cleaning method selected is compatible with the Galvanised Carbon Steel Rail OR the Stainless Steel Rail (depending on your installation).

Important! Never use steel wool (wire wool) or steel wire brushes to clean stainless steel. They are usually made of carbon steel and any fragments left behind will rust onto the stainless steel surface. Using any kind of scourer which has previously been used on mild or carbon steel should also be avoided for the same reason.

9 SERVICING INSTRUCTIONS

The continued efficiency and durability of the TRAM system and the safety of the user depends on regular servicing in accordance with the Maintenance Interval Schedule.

The servicing instructions are divided into sections that correspond to the major components or assemblies of the TRAM System. These are:

- TRAM Belt
- TRAM Arm
- TRAM Trolley
- TRAM Brake System
- TRAM Installation

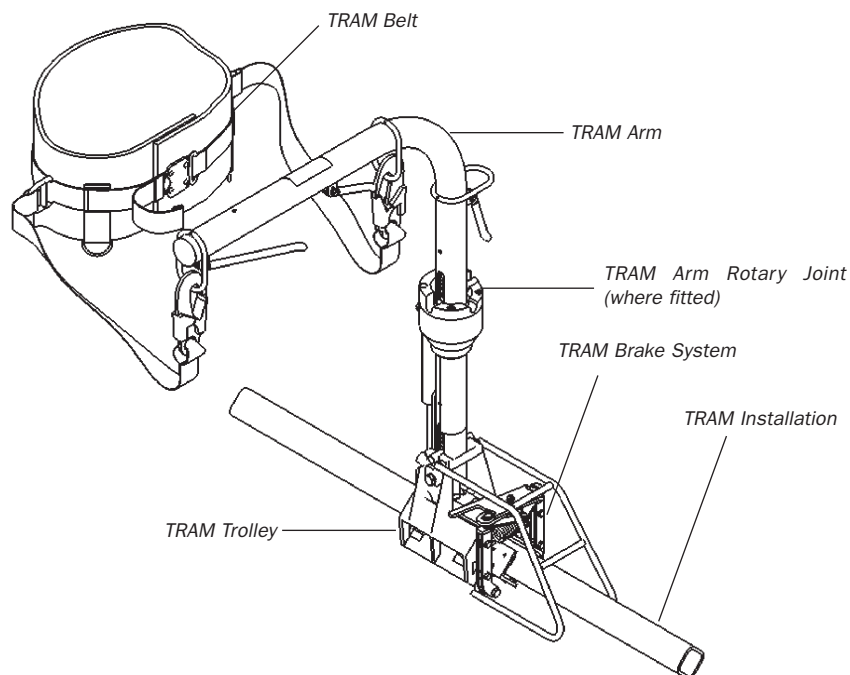


Figure 9.1 Major Components of the TRAM System

Servicing of these components falls into two categories:

- The **Periodic Service** is an in-depth inspection and adjustment procedure that is carried out on all elements of the TRAM system at periodic intervals.
- The **Overhaul Service** is when the major wear items of the Product are replaced before failure. The overhaul service should always be carried out in conjunction with a periodic service. Note that there is no Overhaul Service for the TRAM Belt.

Important! Before servicing the TRAM, carry out the TRAM Cleaning Procedure in Chapter 8 of this manual.

Important! TRAM Systems may be supplied and fitted in various configurations. The service instructions contained in this Manual may recommend maintenance for items not installed on your particular TRAM System. If this is the case, simply disregard reference to any extraneous items. If unsure of any item, consult your Standfast TRAM Dealer.

9.1 FASTENER TORQUE SETTINGS

The following Table specifies torque values for tightening Stainless Steel Bolts and Nuts with Metric Threads. These settings are to be used for all relevant maintenance and repair work of the TRAM System.

Metric ISO² Thread

THREAD SIZE (METRIC)	STANDARD TORQUE	
	N•m ¹	lb•ft
M6	12±3	9±2
M8	28±7	20±5
M10	55±10	40±7
M12	100±20	75±15
M14	160±30	120±20
M16	240±40	175±30
M20	460±60	340±40

1 Newton meter (N.m) is approximately the same as 0.1 mkg.

2 ISO – International Standard Organization.

9.2 THREADLOCKING ADHESIVE

Threadlocking adhesive has been used in assembly of your TRAM to prevent loosening of threaded fasteners. Where this Manual specifies the use of threadlocking adhesive, the following products or their equivalent should be used:

- Loctite Brand 262 Threadlocker threadlocking adhesive.
- Cyberbond Brand Titan 7262 threadlocking adhesive.

9.3 SERVICING THE TRAM BELT

The TRAM Belt is a restraint belt and a critical element of the TRAM System. Due to the nature of its construction and wear and tear from general use, periodic servicing should be carried out to ensure that the TRAM Belt is fit for use as part of the TRAM Safety System. There is no Overhaul Service available for the TRAM Belt.



Destruction The TRAM Belt must be destroyed on or before its “destroy before date”. The method of destruction must ensure that the belt is rendered unusable in a fall restraint application. It is recommended that, as a minimum, the following actions for destruction are taken:

1. Cut both Lanyards from the D-Ring Joiner.
2. Cut the Belt and the Belt Backing completely through.
3. Remove the Hook Stow Rings completely from the Belt.
4. Remove and shred the Information Label, or render the Information Label illegible.

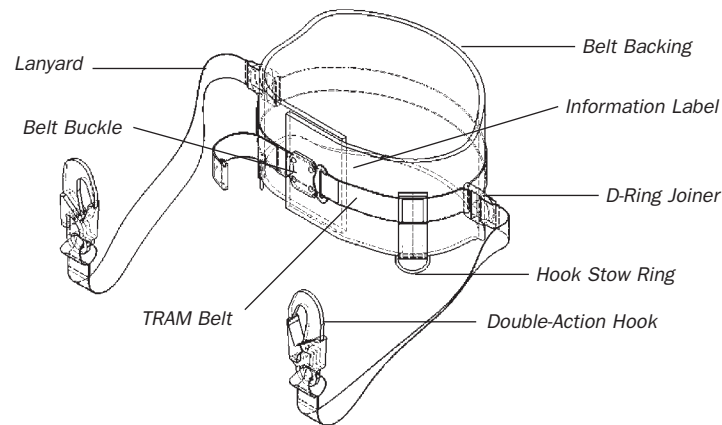


Figure 9.3 The TRAM Belt

9.3.1 PERIODIC SERVICE – TRAM BELT

1. Clean the TRAM Belt in accordance with the TRAM Cleaning Procedure in the Appendix.
2. Check the TRAM Belt information label is legible and undamaged. Check the “Remove from Service” date. If the “Remove from Service” date has passed or is illegible, remove the TRAM Belt from service and destroy.
3. Remove any knots in the lanyards.
4. Check the belt buckle and double-action hooks for proper and smooth function. If either does not function, destroy the TRAM Belt as described in section 9.3.
5. Check the D-Ring Joiner for damage. If it has been deformed or cut, destroy the TRAM Belt as described in section 9.3.
6. Inspect the TRAM Belt and lanyards while passing slowly through the hands one lanyard at a time, followed by the belt. Destroy the TRAM Belt if one or more of the following is found:
 - a) Cuts of 1mm (0.04”) or more at the edges of the lanyards or the belt.
 - b) Localised surface abrasion across the face of the lanyard or belt.
 - c) Localised abrasion at the edges of the lanyard.
 - d) Damage to stitching on lanyards or belt (eg cuts or abrasion).
 - e) Chemical attack to lanyards or belt which can result in local weakening and softening – often indicated by flaking of the surface. There may also be a change to the colour of the fibres.
 - f) Heat or friction damage indicated by fibres with a glazed appearance which may feel harder than surrounding fibres
 - g) UV-degradation which is difficult to identify, particularly visually, but there may be some loss of colour (if dyed) and a powdery surface
 - h) Contamination of the lanyards or belt (eg with dirt, grit, sand etc) which may result in internal or external abrasion
7. Inspect the Belt Backing for gross damage. The function of the Belt Backing is to provide comfort to the user only – it is not part of the restrain function of the belt. While the TRAM Belt can function properly with some damage to the belt backing, care must be taken as damage to the belt backing may be indicative of damage to other components of the belt.
8. Record the service activity on the Equipment Record.

9.3.2 OVERHAUL SERVICE – TRAM BELT

There is no Overhaul Service available for the TRAM Belt. The TRAM Belt must be destroyed on or before its destroy before date. This date is printed on the TRAM Belt Label and on its Equipment Record. Refer to 9.3 for instructions on destroying the TRAM Belt.

9.4 SERVICING THE TRAM ARM

The TRAM Arm provides a handhold that moves with the user and also provides a moveable anchor point for the restraint belt. Refer to Figure 9.4.1 for illustrations of major components in this chapter.

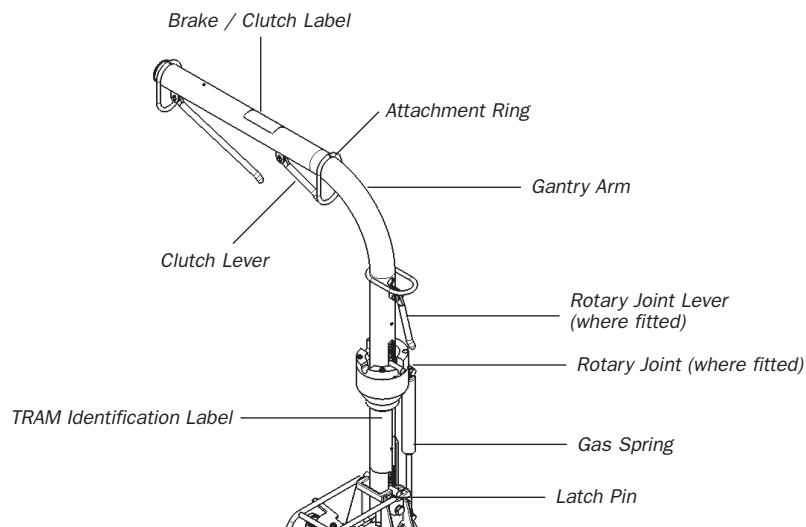


Figure 9.4.1 The TRAM Arm

9.4.1 PERIODIC SERVICE – TRAM ARM

1. Inspect the following parts for any evidence of permanent deformation in shape or orientation:
 - Gantry Arm
 - Attachment Rings
 - Gas Spring
 - Clutch Lever
 - Latch Pin
 - Rotary Joint (where fitted)
 - Rotary Joint Lever (where fitted)
 - Rotary Joint Pin (where fitted)

Important! If any permanent deformation is detected, remove the TRAM from service immediately and consult your TRAM Dealer for instructions.

2. Inspect the labels on the Arm. The Brake/Clutch Label and the TRAM Identification Label are permanently fixed and should be firmly in place and legible. If either is missing or illegible then contact your TRAM Dealer to organise a replacement.

3. Inspect the Gantry Arm, including all welds, for evidence of corrosion.

Important! If any corrosion is detected, remove the TRAM from service immediately and consult your TRAM Dealer for instructions.

4. Activate the Clutch Lever by hand and ensure that it operates smoothly and freely. Check the split pin is securely in place and there are no signs of damage. When activating the Clutch Lever, check the Latch Pin retracts freely and completely from its location slot and allows the Arm to pivot. Pivot the Arm and lock it in all positions, checking the Latch Pin locks and retracts freely in each position.

If the Latch Pin is difficult to retract from its location slot, apply silicon based lubricant/release agent spray to free the Latch Pin in the location slot. Then apply a thin layer of silicon based lubricant/release agent spray to all of the location slots and to the corresponding contact areas on the Latch Pin ends.

If the Clutch Lever fails to operate or fails to operate properly, the Latch Pin position may be adjusted by following the procedure 9.4.3 Latch Pin Adjustment Procedure.

5. If fitted, activate the Rotary Joint Lever by hand and ensure that it operates smoothly and freely. Check the split pin is securely in place and there are no signs of damage. When activating the Rotary Joint Lever, check the Rotary Joint Pin retracts freely and completely from its location slot and allows the Arm to rotate. Rotate the Arm and lock it in all positions, checking the Rotary Joint Pin locks and retracts freely in each position.

If the Rotary Joint Pin is difficult to retract from its location slot, apply silicon based lubricant/release agent spray to free the Rotary Joint Pin in the location slot. Then apply a thin layer of silicon based lubricant/release agent spray to all of the location slots and to the corresponding contact areas on the Rotary Joint Pin ends.

If the Rotary Joint Lever fails to operate or fails to operate properly remove the TRAM from service and contact your TRAM Dealer for instructions.

6. If, after adjustment, the Clutch Lever fails to operate or fails to operate properly Contact you Standfast TRAM Dealer for instructions.
7. To inspect the Gas Spring, move the Arm to the vertical position to ensure that the Gas Spring is at full extension. The Gas Spring should be clean and free from dirt. To remove dirt, use a damp, soft, clean cloth. Do not scrub or apply heavy pressure to the polished rod. Ensure the Gas Spring Ends are captive by the M8 Screw and Nyloc Nut, and that there is 'play' or clearance of 0.5mm – 1mm at both ends as illustrated. This clearance allows for any misalignment of the device and ensures maximum life of the Gas Spring.

Note! The Gas Spring is maintenance-free and does not require greasing or lubrication.

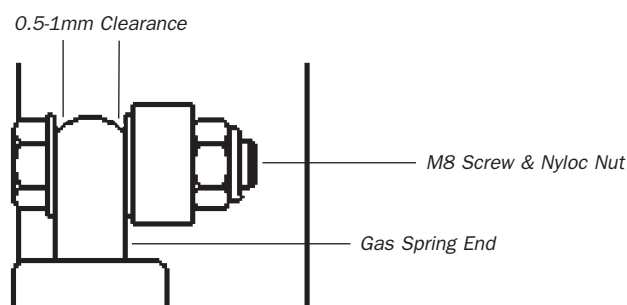


Figure 9.4.2 Gas Spring alignment clearance

8. Check the function of the Gas Spring by operating the Clutch Lever and pivoting the Arm through all positions. The Gas Spring should always create a lifting force when the Arm is pivoted, with the force acting to move the Gas Spring from the retracted to the extended position. If no lifting force is felt while pivoting the Arm, the Gas Spring should be replaced. The procedure for replacing the Gas Spring is included in procedure 9.4.2 Overhaul Service – TRAM Arm.
9. Check the two M10x20 Hexagonal Head Set Screws which locate the Pivot Pin are tightened to the required torque. Tighten if necessary.
10. Record the service activity on the Equipment Record.

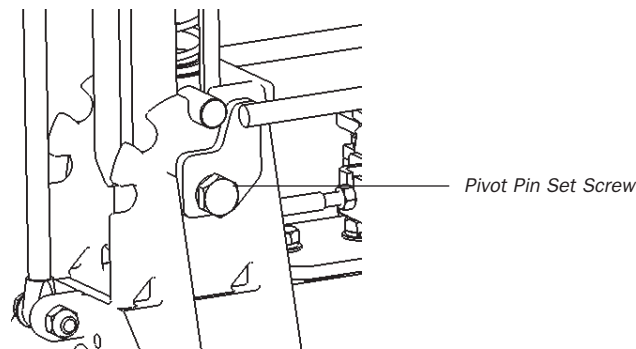


Figure 9.4.3 Pivot Pin Set Screw

9.4.2 OVERHAUL SERVICE – TRAM ARM

PARTS REQUIRED:	PART/KIT NAME	PART/KIT NO.	QUANTITY
	Gas Spring Replacement Kit	TR-06-3-007	1-off

The overhaul service of the TRAM Arm involves Periodic Servicing activities and replacement of the Gas Spring. The Rotary Joint, where fitted, is adjusted during manufacture. There is no overhaul service for the Rotary Joint.

1. Complete Periodic Service Steps 1 to 4.
2. Replace Gas Spring using the following procedure:
 - a. Position Arm in the upright position as shown, to ensure that the Gas Spring is in the extended position.
 - b. Remove M8 Nuts, Washers and Screws from both ends of Gas Spring. Install the new Gas Spring and new fasteners from Kit TR-06-3-007. Ensure the orientation of the Gas Spring is correct with the ram extending downwards. See Figure 9.4.4.
 - c. Verify correct function of Gas Spring by pivoting the Arm between horizontal and vertical positions several times.

Important!

Do not tighten Nyloc Nuts against Gas Spring ends – allow 0.5mm – 1.0mm of play to facilitate self alignment of Gas Spring during operation. See Figure 9.4.2.

Disposal of Gas Spring

The replaced gas spring should be disposed of in an environmentally correct manner. To accomplish this, the compressed nitrogen gas should be released (vented) and the oil drained according to the following procedure:

- Clamp the gas spring in place, ensuring the gas spring is in its extended position.
- To vent, slowly drill or saw the gas cylinder using a drill bit (size 3mm) or a handsaw respectively.

The unpressurised gas spring must now be disposed of in accordance with waste disposal legislation.

Note! The gas spring is filled with oil.



Warning! Metal chips and oil can be ejected at high pressure from the rupture point due to high internal pressure. Ensure suitable personal protection is worn such as goggles and a face visor.

3. Record the service activity on the Equipment Record.

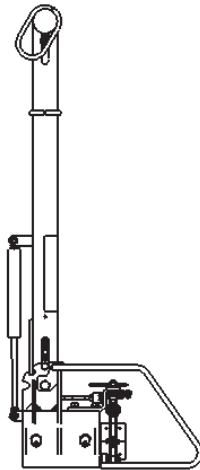


Figure 9.4.4 The TRAM Upright position

9.4.3 LATCH PIN ADJUSTMENT PROCEDURE

PARTS REQUIRED:	PART/KIT NAME	PART/KIT NO.	QUANTITY
	Latch Pin Adjustment Kit	TR-06-3-008	1-off

1. The Latch Pin position is adjusted by turning the M6 Nyloc Nut under the Pivot Pin Spacer. To access the M6 Nyloc Nut, the TRAM Arm must first be removed from the TRAM Trolley.
1. Place TRAM Device on working surface, with the TRAM Arm in the upright position. This ensures the Gas Spring is in its extended position.
2. Remove the M8 Set Screw, M8 Nyloc Nut and M8 Washers from the upper end of the Gas Spring. See Figure 9.4.3.1.

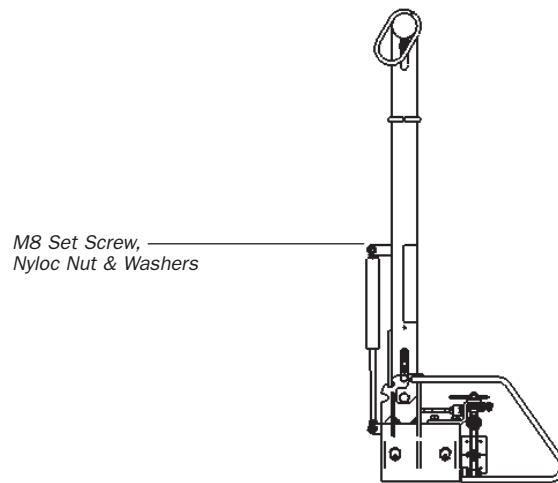


Figure 9.4.3.1 TRAM in the upright or vertical position

3. Pivot the TRAM Arm into the horizontal position
4. Remove the M4 Nyloc Nut from the M4 Inner Cable End. See Figure 9.4.3.2
5. Loosen both the M6 Brake Cable Adjuster Nuts and lever the M6 Outer Cable End out from the Tensioning Bracket. See Figure 9.6.5.2.

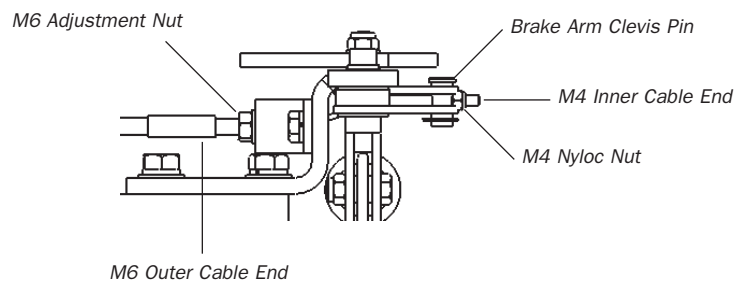


Figure 9.4.3.2 Removal of Brake Cable Ends

6. Remove the TRAM Arm from the TRAM Trolley by the following procedure:
 - a. Remove both M10 Pivot Pin Set Screws. Note! The Pivot Pin Set Screws are locked in place with threadlocking adhesive. For easier removal, loosen both set screws a $\frac{1}{4}$ turn to break the adhesive then remove both set screws entirely. See Figure 9.4.3.3.
 - b. If not already done so, Pivot the TRAM Arm to the horizontal position. Lever the Crash Guard Mounting Plates up and out to rest on the Trolley Casting.
 - c. Hammer out the Pivot Pin with a pin punch to remove entirely. The TRAM Arm may now be lifted out the Trolley.

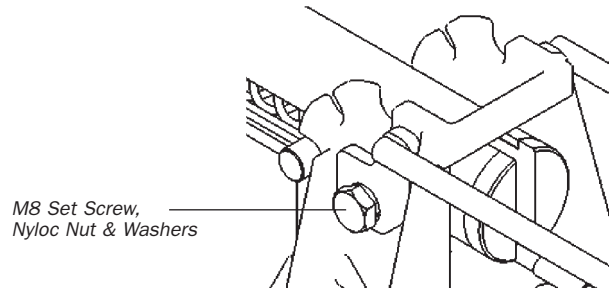


Figure 9.4.3.3 The Pivot Pin Set Screw

7. Clamp the TRAM Arm in upright position and remove the Lower Brake Spacer while leaving the Brake Cable assembly in the TRAM Arm.
8. Using pliers, grip Latch Cable End and begin to tighten M6 Nyloc Nut using a long socket to access the Nut inside the end of the TRAM Arm. See Figure 9.4.3.4.

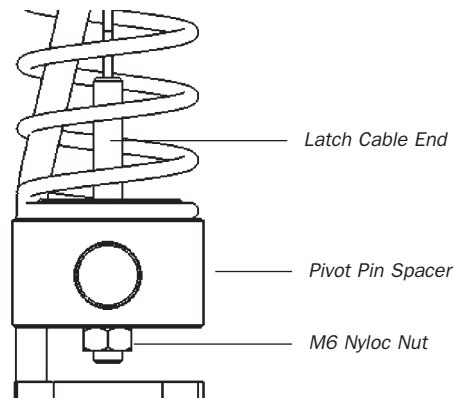


Figure 9.4.3.4 Pivot Pin Adjustment arrangement (Note: TRAM Arm omitted for clarity)

9. Adjust the M6 Nyloc Nut until there is 1mm (0.04") clearance between the Latch Pin and the bottom of the slot in the TRAM Arm. See Figure 9.4.3.5

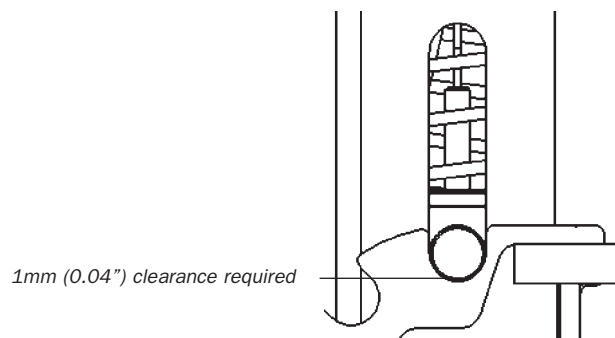


Figure 9.4.3.5 Latch Pin and TRAM Arm Slot clearance

10. Refit the Lower Brake Spacer to the TRAM Arm. See Figure 9.6.2.
11. Refit the TRAM Arm into the TRAM Trolley, and insert the Brake M4 Inner Cable End through the Brake Support Bracket.
12. Assemble one M10 Set Screw into one end of the Pivot Pin. Insert Pivot Pin through Trolley and TRAM Arm. Tap Pivot Pin into place by tapping M10 Set Screw head. Remove M10 Set Screw from end of Pivot Pin. Refit Crash Guard in place ensuring Crash Guard Mounting Plate holes line up with Pivot Pin ends and assemble M10 Split Washers and M10 Set Screws into both ends of the Pivot Pin and tighten. Apply a small amount of threadlocking adhesive to the ends of the M10 Set Screws before assembly. See Figure 9.6.2.
13. Insert the Brake M4 Inner Cable End through the hole in the Brake Arm Clevis Pin. Assemble the new M4 Nyloc Nut from Kit onto the Cable End such that the M4 Nyloc Thread is fully engaged onto the M4 Inner Cable End. See Figure 9.4.3.6.
14. Install the M6 Adjustment Nuts and M6 Washers onto the M6 Outer Cable End. See Figure 9.4.3.6.

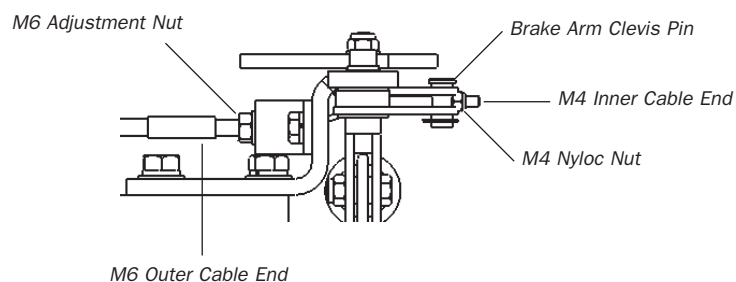


Figure 9.4.3.6 Cable End Fitment

15. Activate the Clutch Lever and pivot the TRAM Arm into the vertical or upright position.
16. Refit the Gas Spring using the M8 Set Screw, M8 Washers and M8 Nyloc Nut from the Kit. Do not tighten.

Important!

Do not tighten the Nyloc Nut against the Gas Spring end – allow 0.5mm – 1.0mm (0.02” - 0.04”) of play to facilitate self alignment of the Gas Spring during operation. See Figure 9.4.3.7.

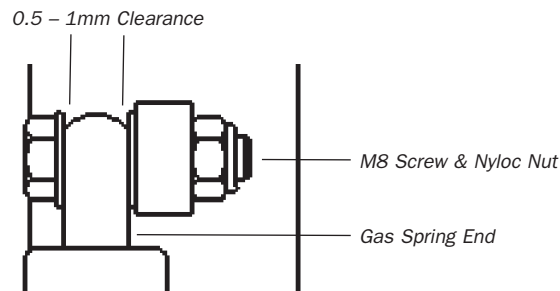


Figure 9.4.3.7 Gas Spring Alignment Clearance

17. Verify correct function of the Gas Spring by pivoting the TRAM Arm between the horizontal and vertical positions several times.
18. Grip the Brake Cable Cable End with pliers and tighten the M4 Nyloc Nut until it contacts the edges of the Brake Arms. If required, prise the Brake Arms apart and activate Brake Lever until the M4 Nyloc Nut “jumps” between the Brake Arms and locates against the Brake Arm Clevis Pin. See Figure 9.4.3.6.
19. Adjust the M6 nuts on the Brake Cable Outer Cable End to remove excess slack in brake lever operation. Tighten the M6 Nuts in position against the Tensioning Bracket. Check Operation of the Brake System.

Note!

The Brake System may now be adjusted by two methods:

1. By adjusting the position of the M4 Nyloc Nut on the Brake Cable Inner Cable End, or
2. By adjusting the position of the Brake Cable Outer Cable End on the Tensioning Bracket by adjusting the M6 Nuts.

Follow the procedure 9.6.3 Brake Adjustment Procedure to adjust the Brake System.

20. Discard used parts. All parts should be disposed of in accordance with waste disposal legislation.

9.5 SERVICING THE TRAM TROLLEY

The TRAM Trolley assembly consists of the Trolley Casting, eight Wheels and the Crash Guard. These components are illustrated in Figure 9.5.1.

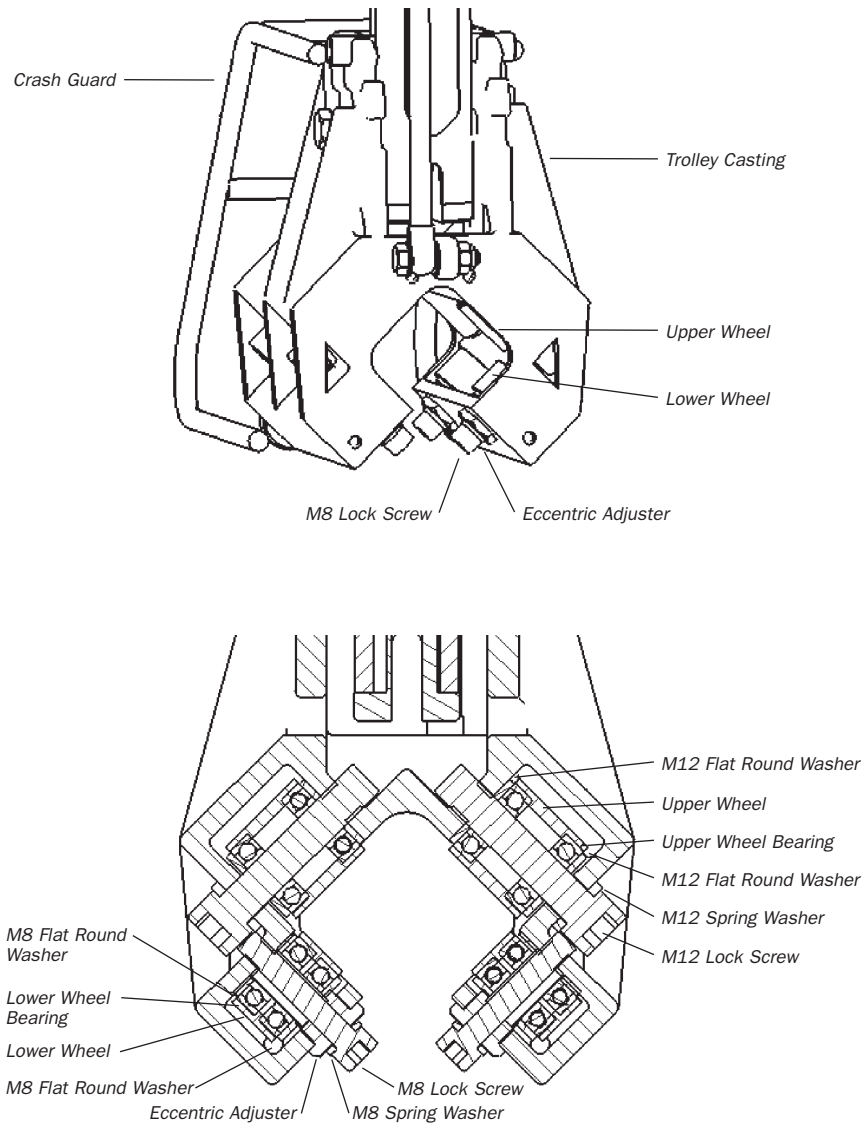


Figure 9.5.1 The TRAM Trolley Assembly

9.5.1 PERIODIC SERVICE – TRAM TROLLEY

1. Inspect the Following parts for any evidence of permanent deformation in shape or orientation:
 - Trolley Casting
 - Crash Guard

Important!

If any permanent deformation is detected, remove the TRAM from service immediately and consult your Standfast TRAM dealer for instructions.

2. Inspect the Trolley Casting and Crash Guard including all welds for evidence of corrosion.

Important!

If any corrosion is detected, remove the TRAM from service immediately and consult your Standfast TRAM dealer for instructions.

3. Check wheel adjustment and function by rolling TRAM along the Rail with the Brake released. The TRAM should roll smoothly and freely along the entire length of the Rail.

If the TRAM does not roll smoothly and freely along the Rail, it may be because:

- a. The Brake System is not releasing properly
- b. The Rail & Fixtures are damaged or in poor condition
- c. The Trolley wheels are not functioning properly

The following 3-Step procedure should be followed to discover the cause of the problem and to remedy the problem:

Step 1: Check the Brake System for correct function. If activating the Brake Lever does not completely disengage the Brake Shoes from the Rail, then the Brake Pads may interfere with the Rail while the TRAM is moving and prevent the TRAM moving smoothly and freely. To remedy the Brake system function, carry out the Periodic Service of the Brake System. If this solves the problem, then follow the next step in the TRAM Trolley Service, otherwise continue with Step 2 of this procedure.

Step 2: Check and service the Rail and Fixtures by carrying out a Periodic Service of the Rail and Fixtures. If this solves the problem, then follow the next step in the TRAM Trolley Service, otherwise continue with Step 3 of this procedure.

Step 3: Complete the procedure 9.5.4 Adjustment of the TRAM Wheel Set.

If after the 3-Step procedure the problem persists, contact your Standfast TRAM Dealer for instructions.

4. While travelling along the Rail, it is normal for the TRAM Arm to have a small amount of 'play' relative to the Rail. Refer to 9.5.3. The amount of 'play' at the end of the TRAM Arm should be less than 15mm. If the end of the TRAM Arm has more than 15mm of play, then there is excessive play in the Arm and the Wheels should be adjusted or replaced. To adjust the Wheels, follow the procedure 9.5.4 Adjustment of the TRAM Wheel Set. If Adjustment of the wheels fails to solve the symptoms, then replace the TRAM Wheel set by following the procedure 9.5.5 Replacement of the TRAM Wheel Set.
5. Check all Wheel Lock Screws (Socket Head Cap type). Tighten if necessary.

Important!

When tightening the four Lower Wheel Socket Head Cap Screws, use a second spanner to ensure the Eccentric Wheel Adjuster is prevented from rotating.

6. Record the service activity on the Equipment Record.

9.5.2 OVERHAUL SERVICE – TRAM TROLLEY

PARTS REQUIRED:	PART/KIT NAME	PART/KIT NO.	QUANTITY
	Lower Wheel Assembly Kit	TR-06-4-001	4-off
	Upper Wheel Assembly Kit	TR-06-4-002	4-off

The overhaul service of the TRAM Trolley involves replacement of the complete TRAM Wheel Set.

1. Remove TRAM Device from Rail and clamp at workbench height in position to expose the Wheel Set.
2. Complete Periodic Service 9.5.1 Steps 1 & 2 above.
3. Replace the complete TRAM Wheel Set using the procedure 9.5.5 Replacement of the TRAM Wheel Set.
4. Adjust the TRAM Wheels using the procedure 9.5.4 Adjustment of the TRAM Wheel Set.
5. Record the service activity on the Equipment Record.

9.5.3 ‘PLAY’ IN THE TRAM ARM

While travelling along the Rail, it is normal for the TRAM Arm to have a small amount of ‘play’ at any one point relative to the Rail. This ‘play’ is illustrated in Figure 9.5.2. The amount of ‘play’ at the end of the TRAM Arm should be less than 15mm. If the end of the TRAM Arm has more than 15mm of play, then there is excessive play in the TRAM Arm and the TRAM Wheel Set should be adjusted or replaced.

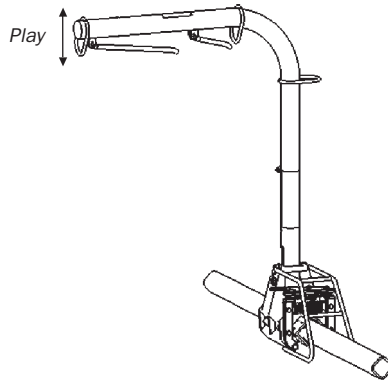


Figure 9.5.2 ‘Play’ in the TRAM Arm

9.5.4 PROCEDURE: ADJUSTMENT OF THE TRAM WHEEL SET

The purpose of this procedure is to adjust the TRAM Wheel Set such that, with the Brake released, the TRAM rolls smoothly and freely along the entire length of the Rail without excessive ‘play’ in the TRAM Arm. For an explanation of ‘play’ in the TRAM Arm, refer to 9.5.3.

The Wheel Set consists of eight wheels – two on each face of the square section TRAM Rail. Four of the eight wheels can be adjusted by varying their position relative to the rail. The adjustable wheels are the four lower wheels (where “lower” refers to the wheels at the bottom of the TRAM Device).

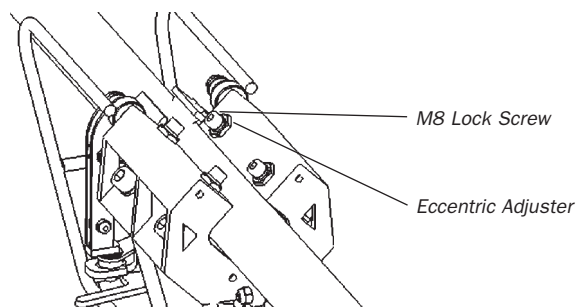


Figure 9.5.3 The Eccentric Adjuster

Adjustment of the four lower wheels is made by rotating the Eccentric Adjuster using a spanner. Rotating this adjuster moves the position of the wheel axle closer or further from the Rail. The Eccentric Adjuster is locked in position by a M8 Lock Screw. The M8 Lock screw must be loosened before the Eccentric Adjuster can be rotated, and subsequently retightened to lock the Eccentric Adjuster in its adjusted position. See Figure 9.5.3.

Correct wheel adjustment is achieved when the following two conditions are met:

- a) The TRAM rolls smoothly and freely along the entire length of the Rail
 - b) While travelling along the Rail, the 'play' at the end of the TRAM Arm is less than 15mm.
1. With the TRAM Device mounted on the Rail (or any section of Rail of the correct size), adjust the position of the four wheels to the maximum open position using the procedure 9.5.4.1 Adjustment of Wheel Position. The TRAM Device will now be loose on the rail, with excessive play in the TRAM Arm.
 2. Adjustment of the Wheel Set is a process of tightening the wheels onto the Rail to reduce the play in the TRAM Arm, whilst not tightening the wheels excessively which will inhibit smooth and free rolling of the TRAM Device along the entire length of the Rail. Adjustment should be made by slowly tightening each wheel onto the rail in sequence using the procedure 9.5.4.1 Adjustment of Wheel Position.
 3. Each time the four adjustable wheels are adjusted closer to the rail, check wheel adjustment and function by rolling the TRAM along the Rail (with the Brake released) and check for smooth and free rolling operation and a normal (not excessive) amount of 'play' in the TRAM Arm. Normally, several adjustment iterations will be made to achieve correct adjustment of the Wheel Set. Continue repeating steps 2 and 3 until correct adjustment is made.

Important!

Once the Wheel Set is adjusted correctly, be sure to check for smooth and free operation and for normal 'play' in the TRAM Arm along the entire length of the Rail as small changes in Rail geometry for especially long Rails may require further adjustment of the wheel set.

4. Once the TRAM Wheel Set is adjusted correctly, check all Lock Screws and tighten if necessary.

Important!

When tightening the four Lower Wheel Socket Head Cap Screws, use a second spanner to ensure the Eccentric Wheel Adjuster remains in position.

9.5.4.1 Adjustment of Wheel position

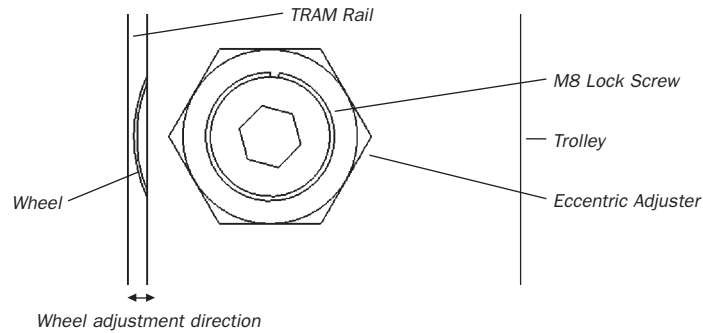


Figure 9.5.4 Wheel Adjustment

Refer to Figure 9.5.4. To adjust the position of a Wheel using the Eccentric Adjuster:

1. Undo the M8 Lock Screw.
2. Using a spanner, rotate the Eccentric Adjuster. Rotating the Eccentric Adjuster (either clockwise or anti-clockwise) will move the Wheel relative to the rail and loosen and tighten the wheel against the Rail in an ongoing cycle.
3. While holding the Eccentric Adjuster in place with the spanner, make up the M8 Lock Screw to lock the position of the Eccentric Adjuster.

Important! When making an iterative adjustment, be sure to adjust the wheel position only a fraction within the full adjustable range of the wheel.

9.5.5 PROCEDURE: REPLACEMENT OF THE TRAM WHEEL SET

PARTS REQUIRED:	PART/KIT NAME	PART/KIT NO.	QUANTITY
	Lower Wheel Assembly Kit	TR-06-4-001	4-off
	Upper Wheel Assembly Kit	TR-06-4-002	4-off

1. Remove all Upper and Lower Wheels by removing the Lock Screws (Socket Head Cap Screws – 4-off M8 Screws and 4-off M12 Screws). Remove all Spring Washers, Flat Washers, Eccentric Adjusters and Wheels from the Trolley.

Note! Be aware threadlocking adhesive has been used to assemble the Lock Screws in place during manufacture.

2. Install Upper and Lower Wheel Assembly Kits including Wheels, flat washers, spring washers and lock screws. The four (4) Lower Wheels are to be installed with Eccentric Adjusters. Before fastening, coat end of socket head cap screw threads with threadlocking adhesive.
3. Check Upper Wheel lock screws (M12 Socket Head Cap Screws). Tighten if necessary.
4. Adjust Lower Wheels using the procedure 9.5.4 Adjustment of the TRAM Wheel Set.
5. Check Lower Wheel lock screws (M8 Socket Head Cap Screws). Tighten if necessary.

Important! When tightening the four Lower Wheel lock screws, use a second spanner to ensure the Eccentric Wheel Adjuster remains in its adjusted position.

9.6 SERVICING THE TRAM BRAKE SYSTEM

The TRAM Brake System functions in one of two positions – locked or released. The locked position is the default position of the brake system and locks the TRAM Device in its position on the TRAM Rail. The lock mechanism consists of four brake pads mounted on two horizontally opposing brake shoes. The brake shoes are normally closed against the TRAM Rail, with the closing force provided by a mechanical coil spring.

The Brake System is moved into its released position by activating the Brake Lever. The Brake Lever is mounted at a convenient position on the TRAM Arm and is activated by clapping the lever and pulling it up against the TRAM Arm. The lever action pulls a mechanical cable which runs from the Brake Lever down through the TRAM Arm to the Brake Mechanism. The end of the mechanical brake cable is attached to two pivoting arms and as the brake cable retracts the arms pivot to extend the mechanical coil spring and open the brake shoes, thus releasing the closing force of the brake pads against the TRAM Rail. Figure 9.6.2 shows an exploded assembly view of components referenced in the procedures in this Chapter.

Your TRAM is fitted with either a Type I or a Type II Brake System. To determine which Brake System your TRAM is fitted with refer to the illustrations and explanations below.

Important! A TRAM fitted with the Type I Brake System may be retrofitted with the Type II Brake System using the procedure 9.6.4 To Replace the TYPE I Brake Cable with the TYPE II Brake Cable.

TYPE I Brake System

The Type I Brake System has a single mechanism for adjusting the position of the brake shoes relative to the TRAM Rail which is a M6 Cable End. The ends of the Brake Arms are connected by a Clevis/Clevis Pin arrangement as shown in Figure 9.6.1.

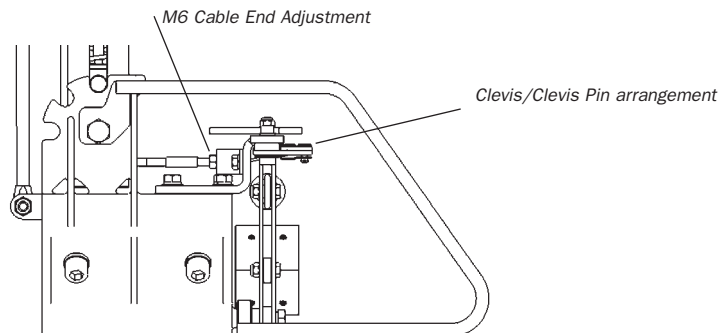


Figure 9.6.1 Type I Brake System

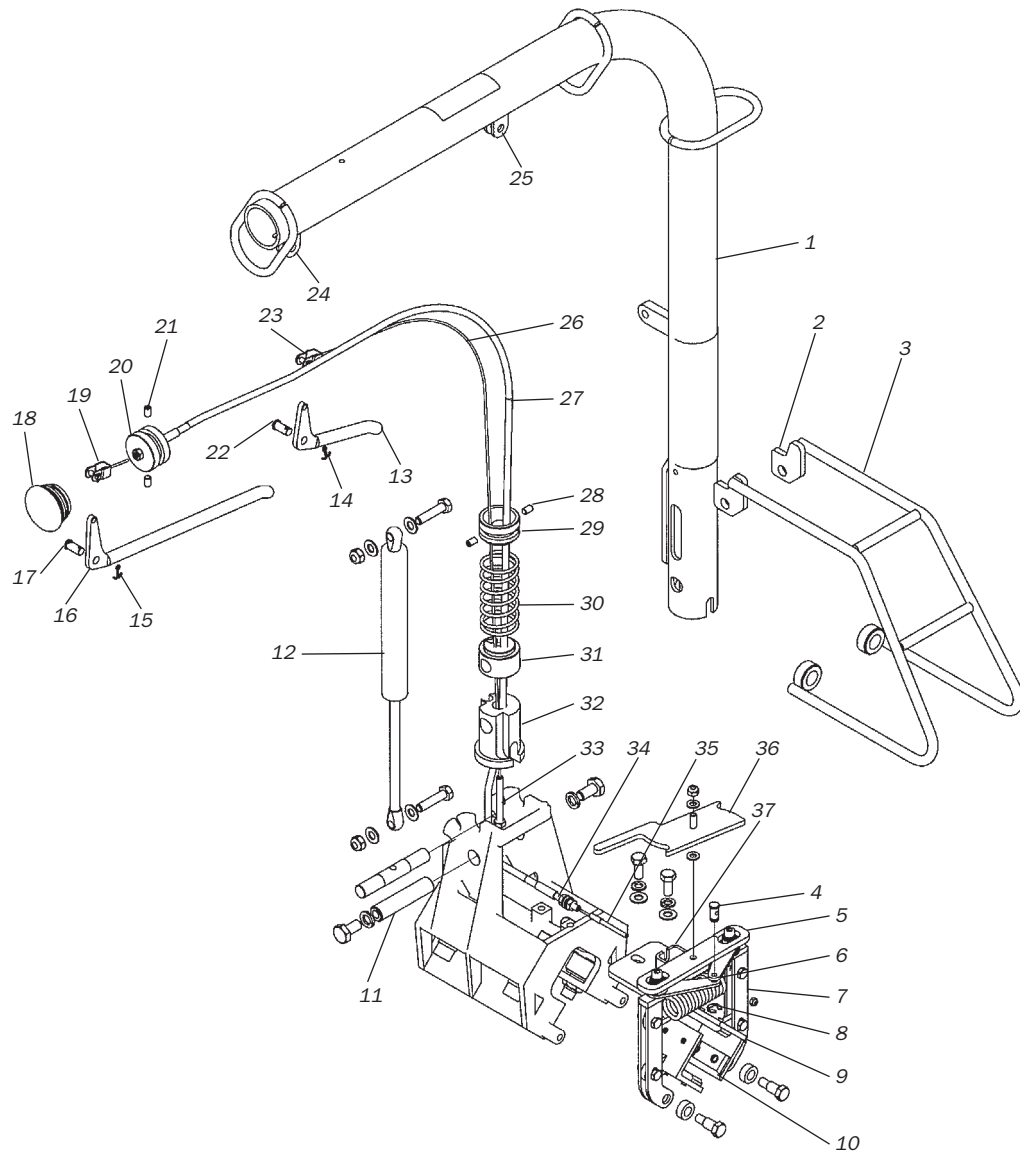


Figure 9.6.2 Exploded Assembly (with Type II Brake System)

Item	Description	Item	Description
1	TRAM Arm	20	Upper Brake Spacer
2	Crash Guard Mounting Plate	21	Grub Screw
3	Crash Guard	22	Clutch Lever Clevis Pin
4	Brake Arm Clevis Pin	23	Latch Clevis Assembly
5	Brake Support Bracket	24	Brake Lever Mounting Lug
6	Brake Arm	25	Clutch Lever Mounting Lug
7	Brake Support Arm	26	Latch Cable
8	E-Type Circlip	27	Brake Cable
9	Brake Shoe	28	Grub Screw
10	Brake Pad	29	Latch Spacer
11	Pivot Pin	30	Latch Spring
12	Gas Spring	31	Pivot Pin Spacer
13	Clutch Lever	32	Lower Brake Spacer
14	Clutch Lever Split Pin	33	Latch Cable End
15	Brake Lever Split Pin	34	M6 (Outer) Cable End
16	Brake Lever	35	M4 (Inner) Cable End
17	Brake Lever Clevis Pin	36	Brake Override Foot Lever
18	TRAM Arm End Cap	37	Tensioning Bracket
19	Inside Brake Clevis Assembly		

TYPE II Brake System

The Type II Brake System has two mechanisms for adjusting the positions of the brake shoes relative to the TRAM Rail: an M6 Cable End (similar to Type I) and an M4 Cable End which is located at the end of the Brake Arms. This is illustrated in Figure 9.6.3.

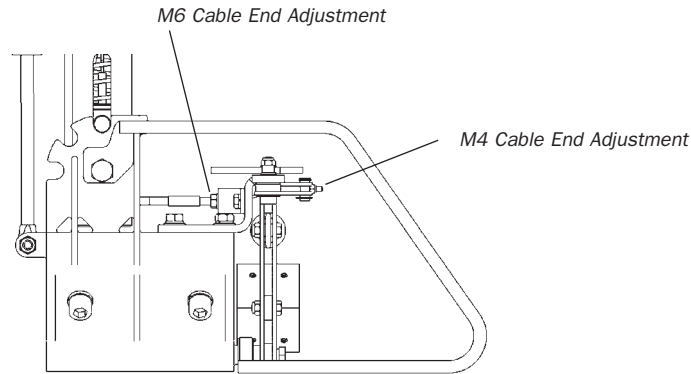


Figure 9.6.3 Type II Brake System

9.6.1 PERIODIC SERVICE – TRAM BRAKE SYSTEM

1. Remove the TRAM Device from the TRAM Rail and clamp in the upright position.
2. Inspect all parts of the Brake System for any obvious evidence of permanent deformation in shape or orientation:

Important! If any permanent deformation is detected, remove the TRAM from service immediately and consult your TRAM distributor for instructions.

3. Inspect all parts of the Brake System including all welds for evidence of corrosion.

Important! If any corrosion is detected, remove the TRAM from service immediately and consult your TRAM distributor for instructions.

4. Inspect the Brake Pads for evidence of damage, excessive wear or contamination.

Important! If damage, excessive wear or permanent contamination is detected, replace the Brake Shoes. Refer to the 9.6.2 Overhaul Service – TRAM Brake System for the replacement procedure.

5. Check the Brake Shoes can pivot freely in the Brake Support Arms. If required, apply silicon based lubricant spray to free the Brake Shoe.



Warning! Do not allow lubricant to contaminate the Brake Pad surface as this will affect brake performance.

6. Activate the Brake Lever by hand and ensure that it operates smoothly and freely. Check the split pin is securely in place and there are no signs of damage. If the Brake Lever fails to operate or fails to operate properly, the Brake System must be adjusted or parts replaced. For adjustment, follow the procedure 9.6.3 Brake Adjustment Procedure.

7. Check for excessive play in the Brake Lever. If more than 5mm of play exists, carry out the procedure 9.6.3 Brake Adjustment Procedure.
8. Check all exposed fasteners. Tighten if necessary.

Important!

The M6 Nyloc Nut locking the Brake Override Foot Lever in place should not be tightened. A clearance of up to 0.5mm should be left to allow for the pivoting action of the Foot Lever.

9. Reinstall the TRAM onto the TRAM Rail. Check for proper brake function by releasing the brake and checking that the TRAM stops with the brakes locked onto the TRAM Rail. With the brakes locked onto the rail, apply a pushing force of 300 to 400 N (30 to 40 kg, 65 to 90 lbs) to the TRAM Arm in a direction of TRAM Trolley travel. Verify that the Brake System remains locked. Repeat test in opposite direction.
10. Check that activation of the Brake Override Foot Lever releases the brake and allows TRAM movement along the TRAM Rail.
11. Record the service activity on the Equipment Record.

9.6.2 OVERHAUL SERVICE – TRAM BRAKE SYSTEM

PARTS REQUIRED:	PART/KIT NAME	PART/KIT NO.	QUANTITY
	Brake Shoe Kit	TR-06-5-009	1
	Brake Cable Kit	TR-06-5-010	1

The overhaul service of the TRAM Brake System involves replacement of the two Brake Shoes and the Brake Cable.

1. Remove TRAM Device from Rail and clamp at workbench height in upright position.
2. To first replace the two Brake Shoes, remove M6 x 20 Hex Head Screw, M6 Nyloc Nut, Brake Spacer and Brake Shoe.
3. Clean the two Brake Support Arms with a clean damp cloth.
4. Using parts in the Brake Shoe Kit, insert Brake Spacer into Brake Shoe, position in Brake Support Arm. Insert M6x20 Hexagonal Head Set Screw and secure in place with M6 Nyloc Nut. Tighten the M6 Nyloc Nut. Repeat for the other Brake Shoe.
5. The Brake Shoes are now replaced.
6. To replace the Brake Cable of a TRAM with a Type I Brake System, follow the procedure 9.6.4 To Replace the TYPE I Brake Cable with the TYPE II Brake Cable.

To replace the Brake Cable of a TRAM with a Type II Brake System, follow the procedure 9.6.5 To replace the TYPE II Brake Cable.

7. Carry out the procedure 9.6.3 Brake Adjustment Procedure.
8. Check all Fasteners. Tighten if necessary.
9. Discard used parts. All parts should be disposed of in accordance with waste disposal legislation.
10. Record the service activity on the Equipment Record.

9.6.3 BRAKE ADJUSTMENT PROCEDURE

The Brake Adjustment Procedure is used to ensure that the TRAM Brake System locks the TRAM Device onto the Rail properly and releases the brake when the Brake Lever is activated by the user.

Important! This procedure must be carried out with the TRAM installed on the rail.

Important! This procedure should be carried out after the TRAM Wheels have been adjusted for the rail. If this is not possible (because the brakes require adjustment before the TRAM Device will fit onto the Rail), then this procedure should be repeated after the TRAM Wheels have been adjusted.

1. Install the TRAM Device onto its Rail by pressing the Brake Lever while pushing the Tram Device onto the end of the Rail. If the Brake Pads foul with the rail and do not allow the TRAM to be installed, adjust the Brake Shoes by following the procedure 9.6.3.1 for a Type I Brake System or 9.6.3.2 for a Type II Brake System to open the brake shoes.
2. With the Brake Lever activated (pressed), check the TRAM Device runs freely along the Rail. If this is not the case, carry out the procedure 9.5.1 Periodic Service - TRAM Trolley.
3. With the Brake Lever released, the brakes are in the locked position and the TRAM Device should be locked in position on the TRAM Rail. To check that the brake system locks the TRAM Device correctly, lock the Brake System and apply a force of 35kg to the handhold of the TRAM Arm in a direction along the TRAM Rail. The TRAM Device should remain locked on the rail. If it does not remain locked, adjust the Brake Shoes by following the procedure 9.6.3.1 for a Type I Brake System or 9.6.3.2 for a Type II Brake System to close the brake shoes. Repeat until the TRAM Device remains locked under the applied force.
4. Activate the Brake Lever and check that the lever action releases the Brake System and allows the TRAM Device to roll along the entire length of the Rail without the Brake Pads contacting with or fouling on to the Rail. Check this, and the locking function in several positions along the entire length of the TRAM Rail. If the brake system does not release sufficiently to free the TRAM Device on the rail, then adjust the Brake Shoes by following the procedure 9.6.3.1 for a Type I Brake System or 9.6.3.2 for a Type II Brake System to open the brake shoes. Repeat this step until the TRAM Device is released when the Brake Lever is activated.
5. Several iterations of steps 3 and 4 may be required until the Brake System functions correctly.
6. Check the operation of the Brake Override Foot Lever by operating the Foot Lever and checking that the lever action releases the Brake System and allows the TRAM Device to move along the TRAM Rail. In the event that the Foot Lever does not function correctly, contact your Standfast TRAM dealer for instructions.

9.6.3.1 TYPE I BRAKE SYSTEM ADJUSTMENT

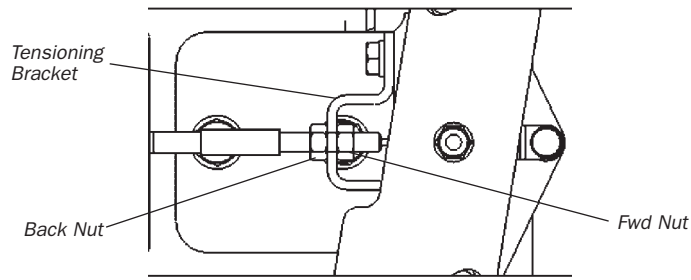


Figure 9.6.4 Type I Brake System

1. **To open the brake shoes (to reduce brake shoe pressure on the Rail)**, turn the Fwd Nut anti-clockwise, then turn the Back Nut anti-clockwise to tighten the Back nut and Fwd Nut against the Tensioning Bracket. This action pushes the Brake Shoes apart in the locked position. Repeat as required.
2. **To close the brake shoes (to increase brake shoe pressure on the Rail)**, turn the Back Nut clockwise, then turn the Fwd Nut clockwise to tighten the Back nut and Fwd Nut against the Tensioning Bracket. This action pushes the Brake Shoes together in the locked position. Repeat as required.

9.6.3.2 TYPE II BRAKE SYSTEM ADJUSTMENT

The Type II Brake System may be adjusted by either of two methods. If one method reaches the end of its adjustable range, then the other method may be used.

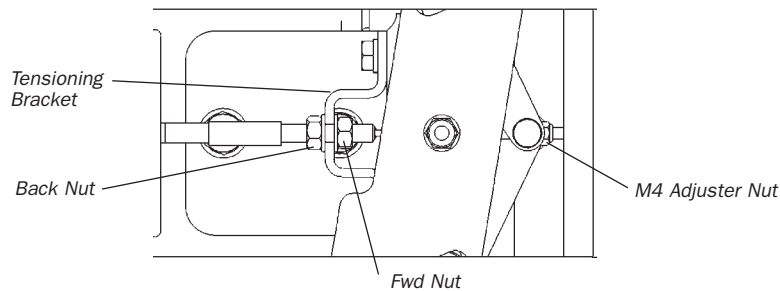


Figure 9.6.5 Type II Brake System

1. **To open the brake shoes (to reduce brake shoe pressure on the Rail).**

Method 1: Pull the M4 Adjuster Nut out from the locked position between the Brake Arms and turn the M4 Adjuster Nut clockwise. Push the M4 Adjuster Nut back to its captive position between the Brake Arms. This action pushes the Brake Shoes apart in the locked position. Repeat as required.

Method 2: Turn the Fwd Nut anti-clockwise, then turn the Back Nut anti-clockwise to tighten the Back nut and Fwd Nut against the Tensioning Bracket. This action pushes the Brake Shoes apart in the locked position. Repeat as required.

2. **To close the brake shoes (to increase brake shoe pressure on the Rail)**

Method 1: Turn the Back Nut clockwise, then turn the Fwd Nut clockwise to tighten the Back nut and Fwd Nut against the Tensioning Bracket. This action pushes the Brake Shoes together in the locked position. Repeat as required.

Method 2: Pull the M4 Adjuster Nut out from the locked position between the Brake Arms and turn the M4 Adjuster Nut anti-clockwise. Push the M4 Adjuster Nut back to its captive position between the Brake Arms. This action pushes the Brake Shoes together in the locked position. Repeat as required.

**9.6.4 PROCEDURE: REPLACEMENT OF THE TYPE I BRAKE CABLE
WITH THE TYPE II BRAKE CABLE**

PARTS REQUIRED:	PART/KIT NAME	PART/KIT NO.	QUANTITY
	Type II Brake Cable Conversion Kit (includes Latch Cable)	TR-06-0-004	1

Important! This procedure includes replacement the Latch Cable. It is important that both cables are replaced at the same time using this procedure.

Note! Refer to Figure 9.6.2 throughout this procedure for identification of components.

21. Place TRAM Device on working surface, with the TRAM Arm in the upright position. This ensures the Gas Spring is in its extended position.
22. Remove the M8 Set Screw, M8 Nyloc Nut and M8 Washers from the upper end of the Gas Spring.

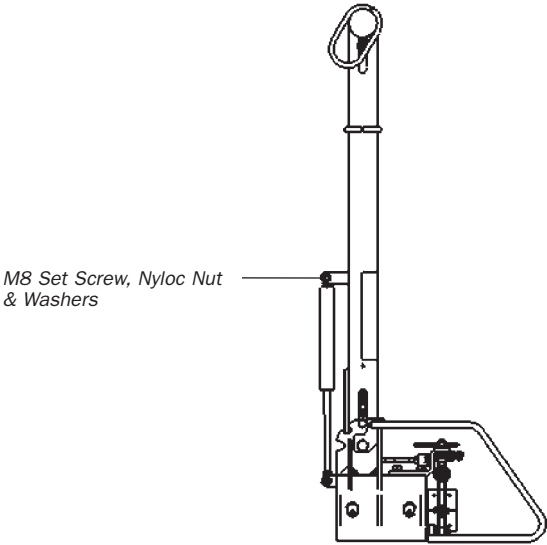


Figure 9.6.4.1 TRAM in the upright or vertical position

23. Pivot the TRAM Arm into the horizontal position
24. Remove the Brake Override foot lever by removing the M6 nyloc nut and M6 washer from the threaded stud. See Figure 9.6.4.2.

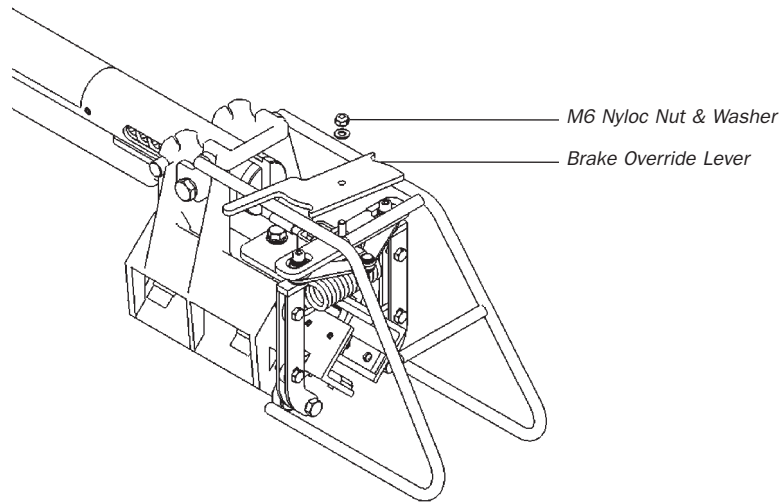


Figure 9.6.4.2 The Brake Override Lever

25. Remove the Split Pin and Clevis Pin from the end of the Brake Arms and discard. See Figure 9.6.2.
26. Loosen both the M6 Brake Cable Adjuster Nuts and lever the cable end out from the Tensioning Bracket. See Figure 9.6.4.3.
27. Remove the M6 Set Screw from one side of Tensioning Bracket, loosen the other M6 Set Screw and swivel the Tensioning Bracket 180 degrees. See Figure 9.6.4.3.
28. Remove the Brake Support Bracket by removing the 2-off M8 Set Screws and M8 Split Washers. See Figure 9.6.4.3.

Note! Screws are locked with threadlocking adhesive.

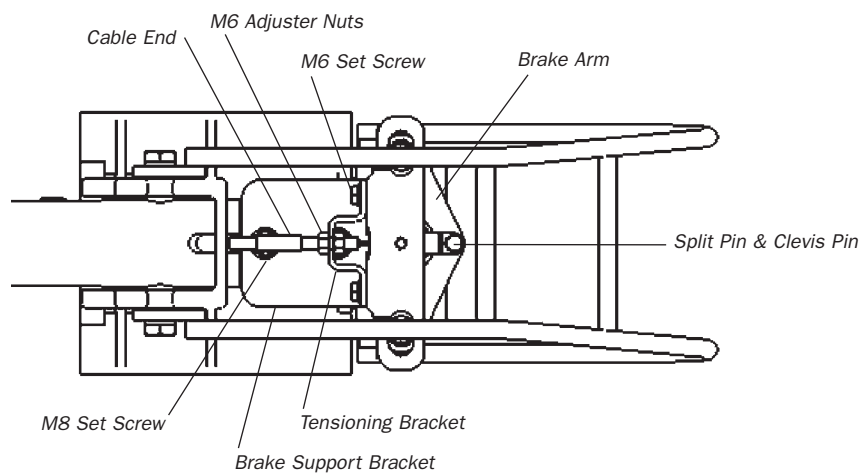


Figure 9.6.4.3 Brake System top view

29. Remove the TRAM Arm from the TRAM Trolley by the following procedure:

- a. Remove both M10 Pivot Pin Set Screws. Note! The Pivot Pin Set Screws are locked in place with threadlocking adhesive. For easier removal, loosen both set screws a $\frac{1}{4}$ turn to break the adhesive, then remove both set screws entirely. See Figure 9.6.4.4.
- b. If not already done so, Pivot the TRAM Arm to the horizontal position. Lever the Crash Guard Mounting Plates up and out to rest on the Trolley Casting.
- c. Whilst taking care to avoid damage to the Pivot Pin, hammer out the Pivot Pin with a pin punch and remove it entirely. The TRAM Arm may now be lifted out the Trolley and put aside.

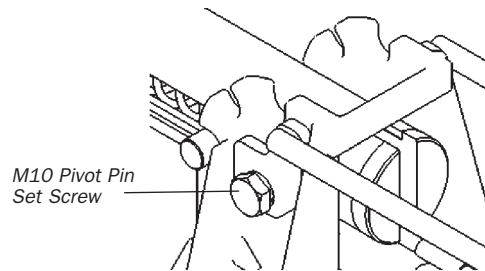


Figure 9.6.4.4 The Pivot Pin Set Screw

30. Remove both Brake Arm assemblies. Keep M6 Flat Washers aside for reuse and discard other parts of Brake Assembly. See Figure 9.6.4.5.

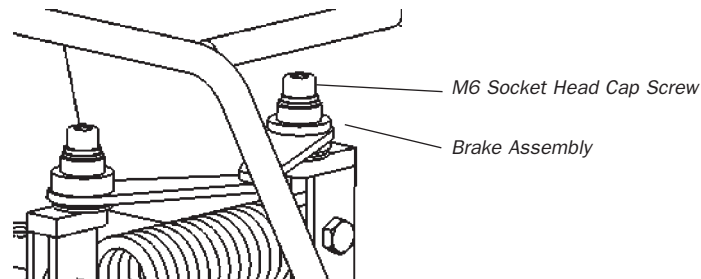


Figure 9.6.4.5 The Brake Assembly

31. Install new Brake Arm assemblies (orientate bronze bushing facing up) using all new fasteners supplied in Kit. Apply threadlocking adhesive to fastener ends and tighten. See Figure 9.6.4.5.
32. Fit new Brake Arm Clevis Pin from the Kit through the Brake Arm ends and retain in place with the E-type Circlip from the Kit. See Figure 9.6.2.
33. Reinstall Brake Support Bracket using two M8 Set Screws, Flat Washers and Split Washers from the Kit. Apply threadlocking adhesive to ends of M8 Set Screws. Ensure slots in Brake Support Bracket are centralized relative to Brake Arm Assembly Top Socket Head Cap Screws. See Figure 9.6.4.6.

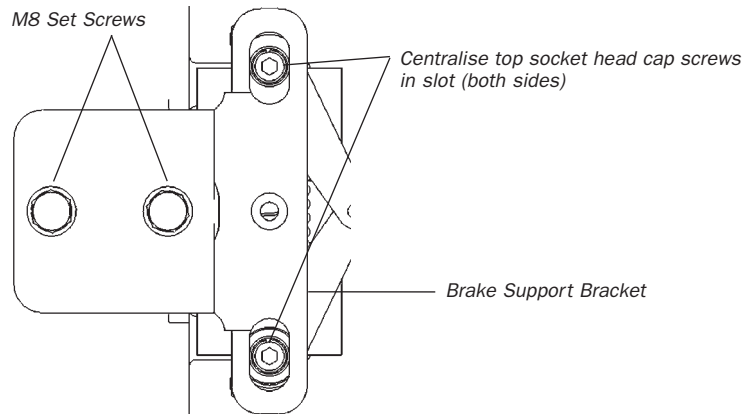


Figure 9.6.4.6 M8 Set Screws centralised in slots

34. Reinstall the Tensioning Bracket with M6 Set Screws and M6 Spring Washers. Apply threadlocking adhesive to ends of M6 Set Screws.

35. Refit Brake Override Lever using M6 Washer and M6 Nyloc Nut from Kit.

Important! Do not tighten Nyloc Nut against Brake Override Lever. Allow brake override lever to rotate smoothly.

Important! Ensure Brake Override Lever contacts Brake Arm Assembly Top Socket Head Cap Screw Heads evenly. Tap side of Brake Support Bracket to adjust if required.

36. Clamp the TRAM Arm in upright position and remove the Lower Brake Spacer and keep aside. See Figure 9.6.2.

37. Remove TRAM Arm End Cap and keep aside. See Figure 9.6.2.

38. Remove and discard the Brake Lever Split Pin and Clutch Lever Split pin and remove both Clevis Pins. Keep Clevis Pins aside. See Figure 9.6.2.

39. Remove Split Pin and Clevis Pin on end of Brake Lever (inside TRAM Arm). Side cutters may be used to cut Split Pin. Discard Split Pin after removal. See Figure 9.6.2.

40. Cut Brake Cable next to Tensioning Bracket and remove Adjusting Nuts from M6 Cable End.

41. Remove two Grub Screws from TRAM Arm next to Brake Lever. Remove Upper Brake Spacer and entire Brake Cable from TRAM Arm. See Figure 9.6.2.

42. Use pliers to hold the Latch Cable End (inside the TRAM Arm) and remove the M6 Nyloc Nut from the end of the Cable End. Then remove the Clutch Lever and entire Latch Cable assembly. Keep Clutch Lever aside and Discard rest of Latch Cable assembly.

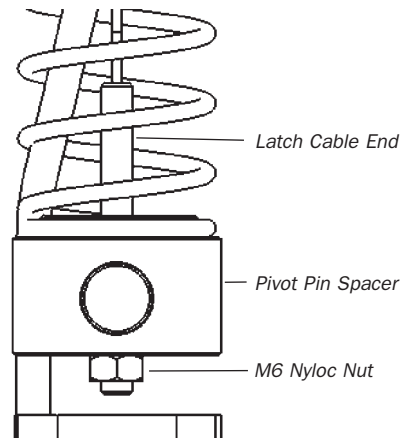


Figure 9.6.4.7 Pivot Pin Spacer captive on Latch Cable End (Note: TRAM Arm omitted for clarity)

43. Assemble Clutch Lever onto new Latch Cable from Kit securing it with new Clevis Pin and Split Pin from Kit. See Figure 9.6.2.
44. Insert Latch Cable assembly, Cable End first, into TRAM Arm through opening at Clutch Lever Mounting Lugs. Allow Latch Cable End to fall through centre hole in Latch Spacer and line up with Latch Spring (visible from Slot in TRAM Arm). Using long nose pliers, feed the Latch Cable End through the Pivot Pin Spacer. Fit new M6 Nyloc Nut from kit to Latch Cable End until Nyloc Nut is fully engaged on Cable End thread. See Figures 9.6.4.7 and 9.6.2.
45. At Clutch Lever end, install new Clutch Lever Clevis Pin and Split Pin from Kit to install Clutch Lever into TRAM Arm Clutch Lever Mounting Lugs. See Figure 9.6.2.
46. Flick Clutch Lever five or six times to “settle” the cable. Using pliers, grip Latch Cable End and begin to tighten M6 Nyloc Nut. Tighten M6 Nyloc Nut until there is 1mm (0.04”) clearance between the Latch Pin and the bottom of the slot in the TRAM Arm.

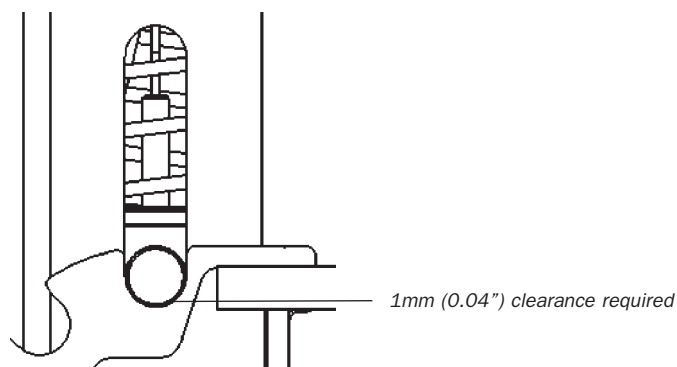


Figure 9.6.4.8 Latch Pin and TRAM Arm Slot clearance

47. Fit new (slotted) Upper Brake Spacer from Kit to the Brake Cable End (on the Inside Brake Clevis Assembly end of the Brake Cable) and tighten locknuts on both sides of Spacer. See Figure 9.6.2 for correct orientation of the Brake Cable.
48. Remove Nuts and Washers from M6 Outer Cable End if fitted and keep aside. Whilst removing all slack from M4 Inner Cable End and M6 Outer Cable End, insert Brake Cable into TRAM Arm from the TRAM Arm End Cap end with the M4 Inner Cable End of the cable assembly first. Push the assembly down inside the TRAM Arm until the end of the M4 Inner Brake Cable End contacts the Pivot Pin Spacer. Using pliers, feed both the Brake Cable Ends through the hole in the Pivot Pin Spacer. (The hole is on the TRAM Arm weldment side of the Pivot Pin Spacer). See Figure 9.6.2.
49. Align the slot around circumference of Upper Brake Spacer with the Grub Screw tapped holes in the TRAM Arm and install two Grub Screws from the Kit. (Ensure the longitudinal slot in the Upper Brake Spacer at approximately 90° to the Grub Screw tapped holes). See Figure 9.6.4.9.

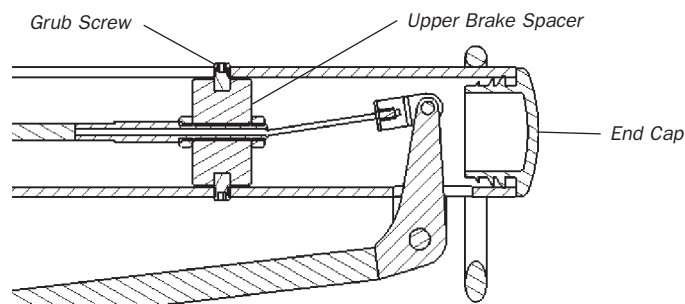


Figure 9.6.4.9 Upper Brake Spacer fitment

50. Refit the Brake Lever with the Brake Cable Clevis using the new Clevis Pin and Split Pin from Kit. (Note! This operation takes place inside the TRAM Arm.)
51. Install the TRAM Arm End Cap. See Figure 9.6.4.9.
52. Install the Brake Lever between the Brake Lever Mounting Lugs using the Clevis Pin and Split Pin from the Kit. See Figure 9.6.2.
53. Refit the Lower Brake Spacer to the TRAM Arm. See Figure 9.6.2.
54. Refit the TRAM Arm into the TRAM Trolley, and insert the Brake M4 Inner Cable End through the Brake Support Bracket.
55. Assemble one M10 Set Screw into one end of the Pivot Pin. Insert Pivot Pin through Trolley and TRAM Arm. Tap Pivot Pin into place by tapping M10 Set Screw head. Remove M10 Set Screw from end of Pivot Pin. Refit Crash Guard in place ensuring Crash Guard Mounting Plate holes line up with Pivot Pin ends and assemble M10 Split Washers and M10 Set Screws into both ends of the Pivot Pin and tighten. Apply a small amount of threadlocking adhesive to the ends of the M10 Set Screws before assembly. See Figure 9.6.2.

56. Insert the Brake M4 Inner Cable End through the hole in the Brake Arm Clevis Pin. Assemble the new M4 Nyloc Nut from Kit onto the Cable End such that the M4 Nyloc Thread is fully engaged onto the M4 Inner Cable End. See Figure 9.6.4.10.
57. Install the M6 Adjustment Nuts and M6 Washers onto the M6 Outer Cable End. See Figure 9.6.4.10.

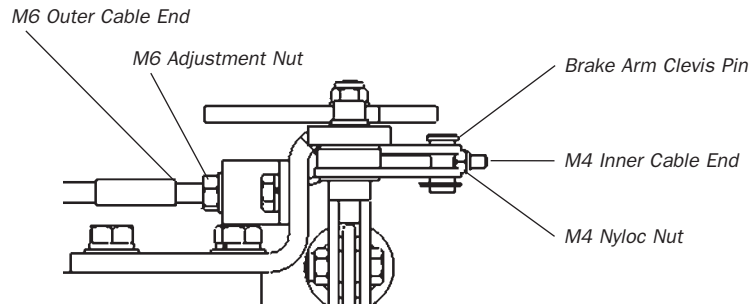


Figure 9.6.4.10 Brake Cable End Fitment

58. Activate the Clutch Lever and pivot the TRAM Arm into the vertical or upright position.
59. Refit the Gas Spring using the M8 Set Screw, M8 Washers and M8 Nyloc Nut from the Kit. Do not tighten.

Important!

Do not tighten the Nyloc Nut against the Gas Spring end – allow 0.5mm – 1.0mm (0.02” – 0.04”) of play to facilitate self alignment of the Gas Spring during operation. See Figure 9.6.4.11.

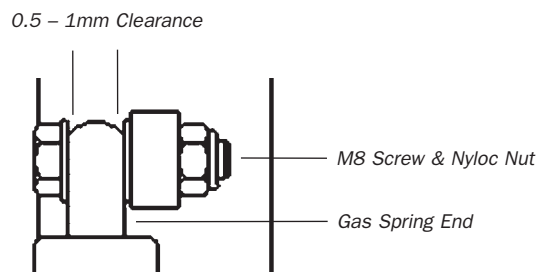


Figure 9.6.4.11 Gas Spring Alignment Clearance

60. Verify correct function of the Gas Spring by pivoting the TRAM Arm between the horizontal and vertical positions several times.
61. Grip the Brake Cable Cable End with pliers and tighten the M4 Nyloc Nut until it contacts the edges of the Brake Arms. If required, prise the Brake Arms apart and activate Brake Lever until the M4 Nyloc Nut “jumps” in between the Brake Arms and locates against the Brake Arm Clevis Pin. See Figure 9.6.4.10.

62. Adjust the M6 nuts on the Brake Cable Outer Cable End to remove excess slack in brake lever operation. Tighten the M6 Nuts in position against the Tensioning Bracket. Check Operation of the Brake System.

Note! The Brake System may now be adjusted by two methods:

1. By adjusting the position of the M4 Nyloc Nut on the Brake Cable Inner Cable End, or
2. By adjusting the position of the Brake Cable Outer Cable End on the Tensioning Bracket by adjusting the M6 Nuts.

Follow the procedure 9.6.3 Brake Adjustment Procedure to adjust the Brake System.

63. Discard used parts. All parts should be disposed of in accordance with waste disposal legislation.

64. Record the service activity on the Equipment Record.

9.6.5 PROCEDURE: TO REPLACE THE TYPE II BRAKE CABLE

PARTS REQUIRED:	PART/KIT NAME	PART/KIT NO.	QUANTITY
	Brake Cable Kit	TR-06-5-010	1

Note! Refer to Figure 9.6.2 throughout this procedure for identification of components.

65. Place TRAM Device on working surface, with the TRAM Arm in the upright position. This ensures the Gas Spring is in its extended position.

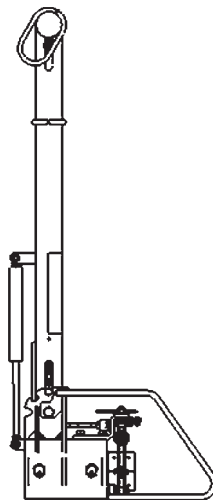


Figure 9.6.5.1 TRAM in the upright or vertical position

66. Remove the M4 Nyloc Nut from the M4 Inner Cable End and discard. See Figure 9.6.5.2.

67. Loosen both the M6 Brake Cable Adjuster Nuts and lever the M6 Outer Cable End out from the Tensioning Bracket. See Figure 9.6.5.2.

68. Remove both the M6 Brake Cable Adjuster Nuts and Washers from the M6 Outer Cable End.

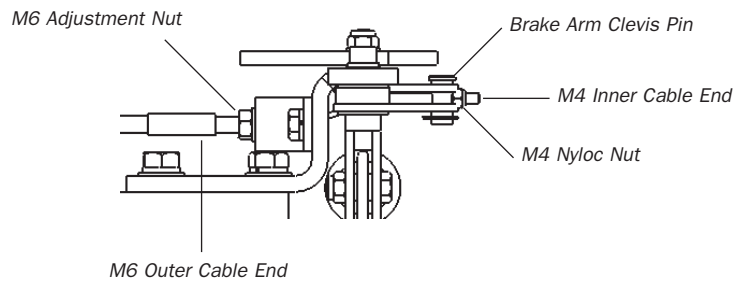


Figure 9.6.5.2 Removal of Brake Cable Ends

69. Remove the TRAM Arm End Cap and keep aside. See Figure 9.6.2.
70. Remove and discard the Brake Lever Split Pin and remove the Brake Lever Clevis Pin. Keep Clevis Pins aside. See Figure 9.6.2.
71. Remove Split Pin and Clevis Pin on the end of the Brake Lever (inside TRAM Arm). Side cutters may be used to cut Split Pin. Discard Split Pin after removal. See Figure 9.6.2.
72. To facilitate easier removal, cut the M6 Outer and M4 Inner Cable ends off the Brake Cable by cutting the Brake Cable between the Tensioning Bracket and the bottom of the TRAM Arm.
73. Remove the two Grub Screws from TRAM Arm and Upper Brake Spacer next to the Brake Lever. Remove the Upper Brake Spacer and entire Brake Cable from the TRAM Arm and discard. See Figure 9.6.2.
74. Fit the new (slotted) Upper Brake Spacer from Kit to the new Brake Cable End (on the Inside Brake Clevis Assembly end of the Brake Cable) and tighten locknuts on both sides of the Spacer. See Figure 9.6.5.3 and Figure 9.6.2 for correct orientation of the Brake Cable.
75. Remove Nuts and Washers from M6 Outer Cable End if fitted and keep aside. Whilst removing all slack from M4 Inner Cable End and M6 Outer Cable End, insert Brake Cable into TRAM Arm from the TRAM Arm End Cap end with the M4 Inner Cable End of the cable assembly first. Push the assembly down inside the TRAM Arm until the end of the M4 Inner Brake Cable End contacts the Pivot Pin Spacer. Using pliers, feed both the Brake Cable Ends through the hole in the Pivot Pin Spacer. (The hole is on the TRAM Arm weldment side of the Pivot Pin Spacer). Continue to feed both the Brake Cable Ends down through the hole in the Lower Brake Spacer. See Figure 9.6.2.
76. Align the slot around circumference of Upper Brake Spacer with the Grub Screw tapped holes in the TRAM Arm and install two Grub Screws from the Kit. (Ensure the longitudinal slot in the Upper Brake Spacer at approximately 90° to the Grub Screw tapped holes). See Figure 9.6.5.3.

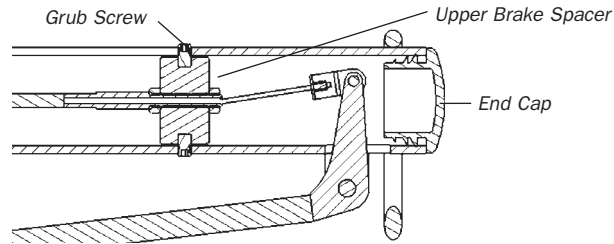


Figure 9.6.5.3 Upper Brake Spacer fitment

77. Refit the Brake Lever with the Brake Cable Clevis using the new Clevis Pin and Split Pin from Kit. (Note! This operation takes place inside the TRAM Arm.)
78. Install the TRAM Arm End Cap. See Figure 9.6.5.3.
79. Install the Brake Lever between the Brake Lever Mounting Lugs using the Clevis Pin and Split Pin from the Kit. See Figure 9.6.2.
80. Insert the Brake M4 Inner Cable End through the hole in the Brake Arm Clevis Pin. Assemble the new M4 Nyloc Nut from Kit onto the Cable End such that the M4 Nyloc Thread is fully engaged onto the M4 Inner Cable End. See Figure 9.6.5.4.
81. Install the M6 Adjustment Nuts and M6 Washers onto the M6 Outer Cable End. See Figure 9.6.5.4.

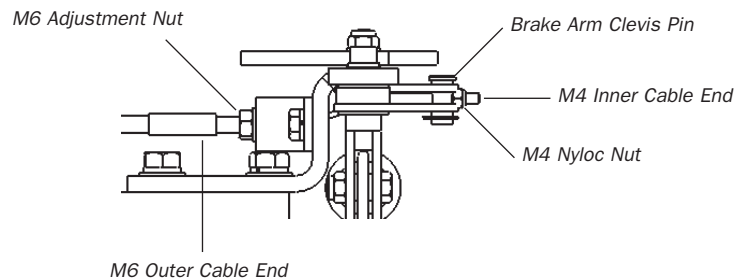


Figure 9.6.5.4 Brake Cable End Fitment

82. Grip the Brake Cable Cable End with pliers and tighten the M4 Nyloc Nut until it contacts the edges of the Brake Arms. If required, prise the Brake Arms apart and activate Brake Lever until the M4 Nyloc Nut “jumps” in between the Brake Arms and locates against the Brake Arm Clevis Pin. See Figure 9.6.5.4.
83. Adjust the M6 nuts on the Brake Cable Outer Cable End to remove excess slack in brake lever operation. Tighten the M6 Nuts in position against the Tensioning Bracket. Check Operation of the Brake System.

Note!

The Brake System may now be adjusted by two methods:

1. By adjusting the position of the M4 Nyloc Nut on the Brake Cable Inner Cable End, or
2. By adjusting the position of the Brake Cable Outer Cable End on the Tensioning Bracket by adjusting the M6 Nuts.

Follow the procedure 9.6.3 Brake Adjustment Procedure to adjust the Brake System.

84. Discard used parts. All parts should be disposed of in accordance with waste disposal legislation.

9.7 SERVICING THE TRAM INSTALLATION

The TRAM Installation consists of the TRAM Rail (a horizontal rigid anchor rail) and the fixtures or mounting brackets required to fix the TRAM Rail in place on the vehicle or structure to which it is fitted. The TRAM is prevented from travelling past the ends of the TRAM Rail by use of an End Stop at both ends of the TRAM Rail. See Figure 10.1.

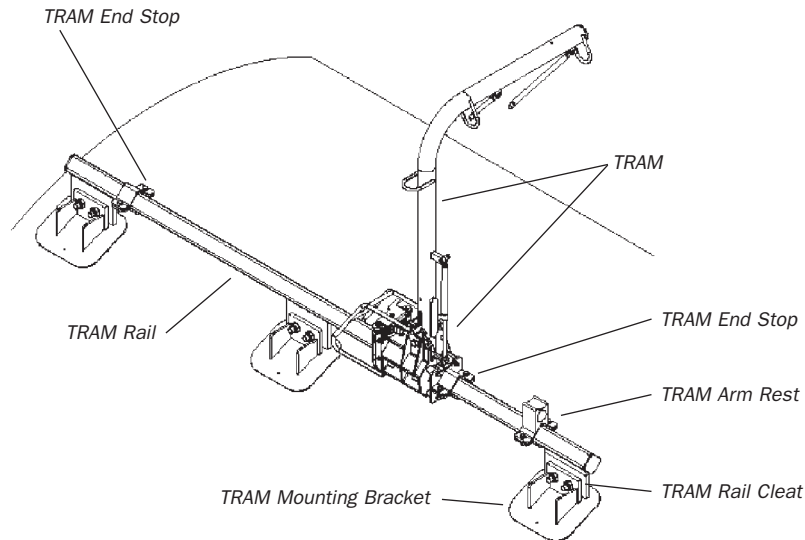


Figure 10.1 The TRAM Installation

The TRAM rail consists of the rail and Rail Cleats which provide the mounting interface to the rail support structure. The Rail Cleats are attached to their corresponding Mounting Brackets by use of fasteners. TRAM Rail and Mounting Bracket material may be different. Dissimilar materials are insulated from direct contact using insulating bushes and insulating gaskets.

9.7.1 PERIODIC SERVICE – TRAM INSTALLATION

1. Inspect the TRAM Installation Plate. The Installation Plate is permanently fixed and should be firmly in place and legible. If missing or illegible then contact your TRAM distributor to organise a replacement.



2. Check the TRAM Rail for End Stops at both ends of the TRAM Rail

Loose or missing End Stops must be replaced or refitted securely to the TRAM Rail. Failure to do so may result in the TRAM separating from the TRAM Rail and consequent loss of the fall restraint function.

Important!

An Endstop Kit, Part Number TR-06-1-117, is available to replace missing or damaged Endstop parts and fasteners.

3. Inspect the Following parts for any evidence of permanent deformation in shape or orientation:

- TRAM Rail (including Rail Cleats)
- Mounting Brackets
- Fasteners

Important! If any permanent deformation is detected, remove the TRAM from service immediately and consult your TRAM distributor for instructions.

4. Inspect the Following parts for any evidence corrosion:

- TRAM Rail (including Rail Cleats)
- Mounting Brackets
- Fasteners

Important! If any corrosion is detected, remove the TRAM from service immediately and consult your TRAM distributor for instructions.

5. Where fitted, check the equipotential strap for correct and secure attachment and for excessive build up of deposits around the equipotential strap ends. Check for continuity between the TRAM Rail and the vessel, vehicle or structure to which the TRAM Rail is mounted. Resistance should not exceed 10 ohms.

6. Record the service activity on the Equipment Record.

Note! An Endstop Kit, Part Number TR-06-1-117, is available to replace missing or damaged Endstop parts and fasteners.

9.7.2 OVERHAUL SERVICE – TRAM INSTALLATION

There is no overhaul service for the TRAM Installation.

Note! An Endstop Kit, Part Number TR-06-1-117, is available to replace missing or damaged Endstop parts and fasteners.

10 REPAIRS TO THE TRAM SYSTEM



10.1 DAMAGE TO THE TRAM SYSTEM

If you experience a structural failure which necessitates a repair, or consider that your TRAM System may have been overloaded either in service or otherwise, tag out the TRAM System immediately to prevent use and contact your Standfast TRAM Dealer for information regarding Repair.

10.2 THE REPAIR PROCESS

Major repair work is best left to your Standfast TRAM Dealer. Repair work carried out by the Dealer Workshop will ensure work is carried out using genuine spare parts, correct procedures and that the repair work is verified and documented correctly in accordance with 10.3.

In some cases, Standfast may authorize repairs to be conducted by a Competent Person as defined in this manual. The repair procedure shall be strictly in accordance with the instructions provided by Standfast. Spare parts are available, generally in kit form, from your Standfast TRAM Dealer. See Chapter 11 for information on obtaining spare parts. Repair work shall be verified in accordance with 10.3.

10.3 VERIFICATION OF REPAIRS

Immediately following any repair, and before the TRAM System is returned to service, your TRAM System must be examined by a Competent Person for verification of the repair work.

The examination shall consist of:

1. Checking the repaired components are fully operational and fit for use.
2. A Periodic Service on all affected components in accordance with the instructions for Periodic Service contained in this Manual.

If the examiner is satisfied that the TRAM Safety System has been repaired successfully and is fit for use, the examiner shall record, date and sign the repair activity on the Equipment Record(s) of the affected component(s). The TRAM System may now be returned to service.

11 REPLACEMENT & SPARE PARTS

11.1 ORDERING PARTS

Quality Standfast replacement parts are available from Standfast TRAM Dealers worldwide. Their parts stocks are up-to-date and include all parts normally required to protect your investment in your Standfast TRAM Safety System.

When ordering parts, your order should specify the part number, part name and quantity required. In addition, please quote the serial number and application (vehicular, marine or fixed) of the TRAM for which the parts are needed. If in doubt about the part number, please provide your dealer with a complete description of the required item

Important! Many parts are not available separately and are supplied as part of a kit. This ensures that when replacing certain parts, critical related parts such as fasteners are also replaced.

Important! When maintenance or repair is needed for your Standfast TRAM, be prepared to give the dealer all the information that is provided on the Information Plate located on the TRAM Arm, described earlier in this Manual.

11.2 SPARE PARTS LIST

Below is a list of Parts (and Kits) offered by Standfast.

DESCRIPTION	PART NUMBER
Gas Spring Replacement Kit	TR-06-3-007
Wheel Replacement Kit – Lower (adjustable)	TR-06-4-001
Wheel Replacement Kit – Upper (adjustable)	TR-06-4-002
Brake Shoe Kit	TR-06-5-009
Brake Cable Kit	TR-06-5-010
TRAM Belt – Small	TR-00-7-001
TRAM Belt – Medium	TR-00-7-002
TRAM Belt – Large	TR-00-7-003
TRAM Belt – Extra Large	TR-00-7-004
TRAM Endstop Kit	TR-06-1-117

Important! While the list above is accurate at the time of printing, please contact your Standfast TRAM Dealer for an up-to-date list of available parts and kits.

Note! If the component you require is not listed here, contact your Standfast TRAM Dealer for advice.

12 RECERTIFICATION OF THE TRAM SYSTEM

The TRAM and the TRAM Installation may be recertified 10 years after the date of manufacture of the TRAM. The Date of manufacture of the TRAM is located on the Identification Plate described earlier in this manual.

Important! The TRAM Belt cannot be recertified and must be destroyed before its destroy by date. Refer to section 9.3 for instructions.

A TRAM and TRAM Installation may only be recertified when, for the life of the TRAM System, periodic and overhaul servicing has been carried out in accordance with the Maintenance Schedule and maintenance procedures in this manual AND records have been kept to document the servicing required.

To recertify the TRAM Device:

1. Check all documentation for Periodic and Overhaul Services since the date the TRAM System was first put into use is in order.
2. Contact your Standfast TRAM Dealer and advise that you wish to recertify your TRAM and/or TRAM Installation. You may be asked to supply documentation regarding the TRAM and the TRAM Installation that is contained in Equipment Records for these components.
3. If successful, you will be sent a Recertification Plate and a new Equipment Record for each component. Affix the Recertification Plate to the equipment as instructed and reissue the new Equipment Record within your organisation.

13 GUIDELINES FOR INSTALLATION OF THE TRAM SYSTEM

The TRAM Installation is an integral part of the TRAM Safety System. The TRAM is an anchor device able to travel along a fixed rail, called the TRAM Rail. This rail and the fixtures used to mount this rail to the vehicle or structure to which the TRAM Safety System is fitted are together termed the “TRAM Installation”. See Figure 13.1.



Due to the variation in design of vehicles and structures to which the TRAM Safety System is fitted, the TRAM Installation may be designed on a custom or project basis. In such cases, the installer must verify the adequacy of anchor points either by calculation or by carrying out a test in a sample of the material in compliance with the specifications of the appropriate Standard(s).

TRAM Installation may be carried out by your local Standfast TRAM Dealer or representative, a licensed TRAM Installer or by the owner of the TRAM System.



End Stops must be fitted securely to both ends of the TRAM Rail to prevent the TRAM from travelling past the ends of the TRAM Rail.

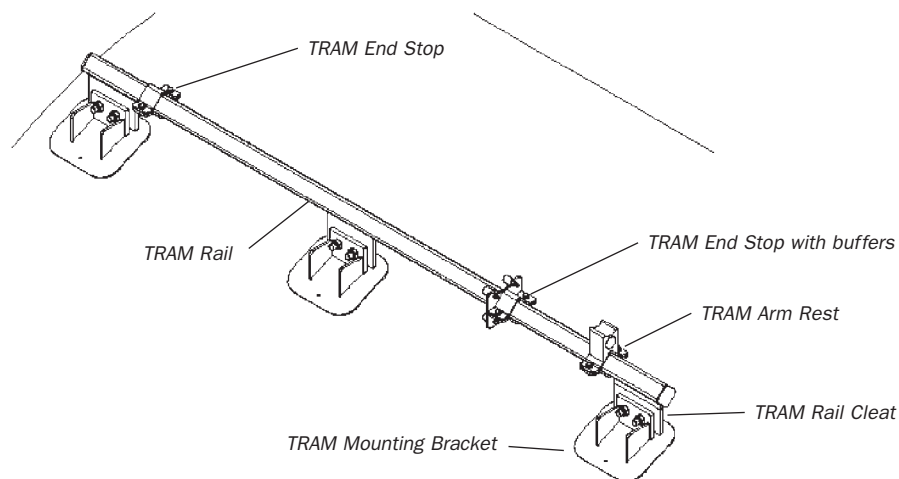


Figure 13.1 Typical TRAM Installation

For further information regarding the installation of your TRAM Safety System, please contact your Standfast TRAM Dealer.

14 SPECIFICATIONS

OVERALL DIMENSIONS

MAJOR COMPONENT	SIZE
TRAM Device (TR-6-ST-Series) "Standard TRAM"	900mm height x 674mm width x 380 mm length [35.4" height x 26.5" width x 15.0" length]
TRAM Device (TR-6-RAT-Series) "Rotating Arm TRAM"	As Above
TRAM Rail	50mm [2.0"] x 50mm [2.0"] Square
TRAM Belt	Available in sizes: Small, Medium, Large and Extra Large
TRAM Belt Lanyard Length	750mm [29.5"]

WEIGHT

MAJOR COMPONENT	WEIGHT
TRAM Device (TR-6-ST Series)	18 kg [40 lbs]
TRAM Device (TR-6-RAT Series)	21 kg [47 lbs]
TRAM Rail	6.5 kg/m [4.4 lbs/ft]
TRAM Belt	1.5 kg [0.7 lbs]

OTHER

COMPONENT	SPECIFICATION
Brake Pads	4 x Moulded Composite Material Pads
Brake Test Force	35 kg [16 lbs] applied to TRAM Arm in direction a long TRAM Rail
Brake System	Mechanical Cable (adjustable)
Latch Pin Mechanism	Mechanical Cable (adjustable)
Rotary Joint Mechanism*	Mechanical Cable (adjustable)
Trolley Wheel Bearings	Type: 6001 2RS, Material: Stainless Steel
TRAM Arm End Play	15mm [0.6"] Maximum

*Where fitted

APPENDIX A – TRAM PRE-USE CHECK PROCEDURE

THE PRE-USE CHECK SHOULD BE CARRIED OUT BY THE USER EACH TIME, BEFORE THE TRAM SYSTEM IS USED.

Important! The Pre-Use Check consists of a basic inspection of the TRAM System and should be tactile, visual and undertaken in good light.

PROCEDURE	FAILS IF
Check Equipment Record	1. The TRAM System Periodic Service or Overhaul Service is overdue.
Check TRAM Device Identification Plate, TRAM Belt Label and TRAM Installation Plate	2. The TRAM Device Identification Plate, TRAM Belt Label and/or TRAM Installation Plate are not present or are illegible.
Inspect TRAM Belt and lanyards while passing slowly through the hands	3. The Belt Buckle does not function properly. 4. There is evidence of damage or deformation to the Double-action Hooks or D-Ring Joiners. 5. The double-action mechanism does not function properly. 6. There are cuts or abrasions of 1 mm or more at the edges of the lanyard or belt. 7. There is damage to stitching or stitching is unravelled on the lanyard or belt. 8. Either lanyard is knotted. 9. There is evidence of chemical attack which can result in local weakening and softening - often indicated by flaking of the surface or discolouring of the fibres. 10. There is evidence of heat or friction damage indicated by fibres having a glazed appearance and which may feel harder than surrounding fibres. 11. The Belt or lanyards are contaminated (eg with dirt, grit, sand etc).
Inspect the TRAM Device	12. There is evidence of damage or corrosion. 13. There is evidence of missing or loose fasteners. 14. The brake and clutch cables are loose, broken, worn or corroded. 15. The Attachment Rings are damaged or deformed. 16. The Brake System does not function (activating the Brake Lever does not release the Brake). 17. The Pivot Clutch does not function (activating the Clutch Lever does not allow the Arm to pivot and lock into all positions). 18. The Rotary Joint does not function (where fitted). 19. TRAM does not move freely along the rail.
Inspect the TRAM Rail & Fixtures (if practicable)	20. There is evidence of damage, including foreign material deposits that may affect the smooth operation of the TRAM, cracks or corrosion. 21. There is evidence of missing or loose fasteners.

IF THE TRAM SYSTEM FAILS ONE OR MORE OF THE CHECKS:

The TRAM System should be withdrawn from use and the failing components/reasons should be passed to a Competent Person. The Competent Person shall decide whether it should be:

- used as is
- destroyed
- repaired/serviced (including Periodic Service/Overhaul Service), or
- returned to your Standfast TRAM Dealer.

APPENDIX B – TRAM SERVICE TOOLBOX LIST

The tools and consumables listed below are required to carry out all periodic and overhaul servicing activities contained in this manual.

QUANTITY	DESCRIPTION
1-off	Allen Key – 10mm
1-off	Allen Key – 6mm
1-off	Allen Key – 5mm
1-off	Allen Key – 3mm
1-off	Ring/Open End Spanner – 19mm
1-off	Ring/Open End Spanner – 17mm
1-off	Ring/Open End Spanner – 14mm
1-off	Ring/Open End Spanner – 13mm
2-off	Ring/Open End Spanner – 10mm
1-off	Long Socket with $\frac{1}{4}$ " drive size – 10mm
1-off	Long Socket with $\frac{1}{4}$ " drive size – 7mm
1-off	$\frac{1}{4}$ " Socket Driver
1-off	200mm Long Nose Pliers
1-off	Side Cutters
1-off	8mm Pin Punch
1-off	Hammer (12 oz – 24 oz)
1-off	TubeThread Locking Adhesive Loctite Brand 262
1-off	Spray Can Silicon Release Agent and Lubricant
1-off	300mm TRAM Rail Mounting Jig (optional)

APPENDIX C – EQUIPMENT RECORD

[illegible]

Important! Failure to maintain equipment records may void product warranty.



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