HOIST DESIGN & USE

The Front End Ram is a multi stage telescopic displacement type hydraulic cylinder designed for use on tipper trucks. In operation it functions as a slender column rounded (pinned) at both ends. Basically this means that if it is badly overloaded it will bend or buckle under the overload. At the design stage a factor of safety is incorporated so that when the hoist is used in the recommended manner there is no likelihood of buckling occurring.

Basic conditions of use:

- **That there are absolutely no limits to the freedom of movement of the mounting pins at each end of the hoist. The hoist must be free to align itself between the two mounting points.**
- That the maximum recommended working pressure should not be exceeded because this accurately limits the maximum load applied directly to the hoist.
- That tipping takes place on a reasonably level site.

Note:

- Tipping across a slope puts a bending side load on the hoist.
- Tipping up a slope tends to reduce tipping capacity.
- Tipping down a slope tends to increase load on rear axle.
- Shaking the load (backing and braking) puts a whipping/bending side load on the hoist.

THE TIPPING PROCESS

Tipping a truck body is like tipping a wheelbarrow. Take the wheelbarrow, there is a pivot point (the wheel axle), a lifting point (the handles) and a load concentrated somewhere between these two points. The load consists of the weight of the wheelbarrow tray and frame and the payload. The point where the load is concentrated is the centre of the gravity of the load. Positioning the payload nearer to the wheel makes it easier to tip. If you have used a wheelbarrow you have experienced this.

	Wheelbarrow	**Tip Truck**
Pivot Point	wheel axle	rear body hinge
Lifting point	handles	telescopic truck hoist
Load	tray & frame + payload	body + payload

To tip the truck body the tipping moment of the extending truck hoist must exceed the resisting moment of the load, i.e. the thrust of the hoist x its moment arm must exceed the load x its moment arm. This condition must exist through the full stroke of the hoist taking into consideration that as each stage reaches the end of its stroke the potential thrust reduces to that of the next smaller stage.
The tipping capacity of a hoist can be calculated as long as certain parameters are set and accepted, this in effect sets a standard condition of application permitting comparison of hoist performances.

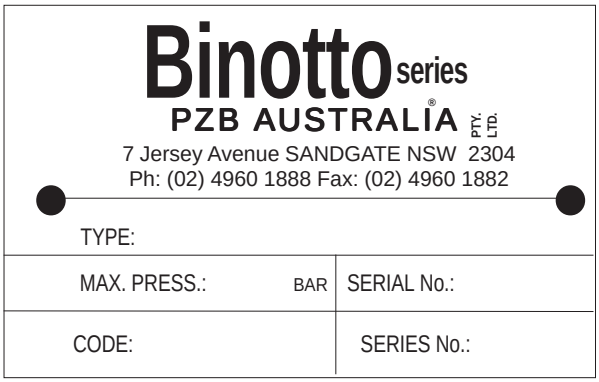
THE TIPPING PROCESS (CONT.)

To set comparable conditions we make the following assumptions:

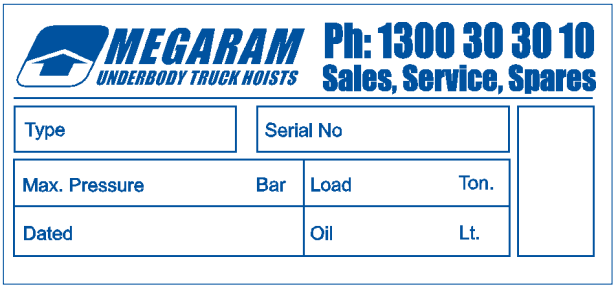
- Hoist and body pivots are in the same horizontal plane
- Hoist is mounted perpendicular to this plane
- Pivot centres give 48° tip angle
- Centre of gravity of body + payload is mid-pivots
- Centre of gravity of body + payload is 610mm above pivot plane.

HOIST IDENTIFICATION

A tag (shown below) is attatched to each Cylinder to aid with identification. The tag is located near the bottom trunnion.



Binotto Front of Body Hoists



Megaram Underbody Hoists

When making an enquiry regarding your cylinder, quoting the Type and Code will assist us with your queries.

TIPPING SAFETY

Before tipping:

- Check that rear of vehicle is clear of personnel
- Check that wheels are on a firm level site
- Check for overhead power lines
- Check that tailgate locking mechanism is released

During tipping:

- Don't shake the load

Lowering:

- Check that area below body is clear of personnel
- Body should be fully lowered before vehicle is driven away:
- Check that tailgate mechanism is secured.

Before making any inspection or adjustment under body in raised position, ensure that:

- Vehicle is on firm site
- Body is securely propped
- Hand/parking brake is on
- Wheels are chocked

GENERAL MAINTENANCE

- During normal service raise hoist, clean away dirt, dust and excessive oil.
- Check oil level in tank.
- Check oil for contamination.
- Check oil tank breather/filler for dust build up.
- Check all hoses and oil line connections for kinks or leaks.
- Grease all hoist pivots.
- Check mounting bolts, tighten where necessary. Replace if stripped, fatigued or damaged.

INSTALLATION OF UNDERBODY MEGARAMS

To achieve all the advantages listed, it is essential to correctly mount the rams and fabricate the body to suit the underbody concept.

1 Chassis sub-frame
2 Rear pivot
3 Ram Mounting
4 Body sub-frame

BODY DESIGN PRINCIPALS

1 **Chassis Subframe -** The sub frame is the most important part of the fabricated body. It is the point that all the load and body movement is directed towards. It has to be made with rigid crossmemebers to evenly distribute weight and body flex over the chassis rails. To achieve good rigidity it must have crossmembers at regular intervals throughout the sub-frame and should be reinforced in these main areas:
- the ram pivot
- the rear pivot

2 **Rear Pivots** - The rear pivots must be made an integral part of the chassis sub-frame. To lessen body flex the rear pivot should be kept as close as possible to the last axle (although the body can 'overhang' past this point). After chassis rails have been cut back closer to the last axle it is important to close or reinforce the open chassis rails to help control chassis rail flex in this area.

3 **Ram Mounting** - Twin underbody rams are generally mounted inside the chassis rails but can be mounted externally or outrigger style.

Internal Mounting - Rams should be mounted in a steel plate fabrication that includes rigid cross members to connect it to the sub-frame. It is essential to have this one piece mounting so that all the load is transferred to the sub-frame and chassis rails. Rams have to be mounted exactly in line with each other and parallel on full extension, The same mounting techniques are to be used for single underbodies.

External Mounting - Rams fitted outside the chassis rails should be mounted in sturdy fabricated cradles that are fixed rigidly to the chassis rails and the chassis sub frame. One piece crossmembers should run accross the chassis rails to tie the two cradles together to prevent the rams from pushing out and to also distribute the load accross the chassis rails. Again rams have to be in line and parallel.

4 **Body Design**
- Must have substantial bracing between the body runners to reduce body flex.
- The use of strong reinforced corner posts and some bracing outside the body rails to help reduce the amount of body flex particularly with uneven loads.
- The ram ball heads should be mounted on thick plate or channel runners to distribute load onto the body runners and braces.
- External mounted ram heads have to be braced and plated to the main runners to evenly distribute ram thrust and to transfer load to the body runners.

INSTALLATION OF THE IN WELL AND FRONT OF BODY CYLINDERS

MF Series (In well type)

Allow 25mm over ‘A’ dimension for fitment to the body, i.e. pull out cylinder 25mm before mounting top brackets,

MFC Series (Front of body type)

Allow 25mm over ‘A’ dimension for fitment to the body, i.e. pull out cylinder 25mm before mounting top brackets.

The dimensions ‘B’ and ‘C’ must be equal for proper cylinder operation. This will require the hoist to be tilting towards the body in applications where the body pivot is low. This can be acheived by moving the bottom cylinder brackets forward.