

# INTERSTATER MK 4 RECOVERY UNIT

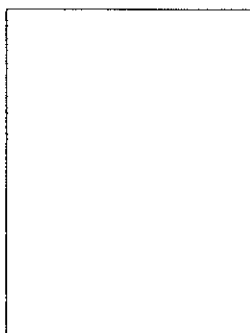


USER'S HANDBOOK

***BONIFACE***

# INTERSTATER Mk4 RECOVERY UNIT

*This Interstater Mk4 was built by the team led by:*



*Assisted by:*

*Electrical Installing* \_\_\_\_\_

*Chassis Engineering* \_\_\_\_\_

*Tested by* \_\_\_\_\_

UNIT NUMBER				
DATE OF MANUFACTURE				
REAR SUPPORT LEGS	INBOARD	OUTBOARD	NONE	
UNDERREACH BOOM	TYPE C	TYPE E	TYPE F	TYPE G
WHEEL FRAMES	HEAVY DUTY	SUPER HEAVY	NONE	
WINCHES				



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## RECOVERY UNIT

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DATE OF MANUFACTURE			
REAR SUPPORT LEGS	OUTBOARD	INBOARD	NONE
UNDERREACH BOOM	TYPE E	TYPE F	
WHEEL FRAMES	HEAVY DUTY	SUPER HEAVY	NONE
HYDRAULIC HOSES	IMPERIAL	METRIC	
WINCHES			

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PREFACE

1. This book is written to cover the technical details of the Interstater Mk 4 Recovery Unit, and failure to pay regard to the instructions, suggestions and warnings in it may invalidate the maker's warranty. The book cannot, however be authoritative about the vehicles upon which the unit may be fitted, and so it is essential also to refer to the vehicle manufacturer's handbook.
  2. The unit complies with all the requirements of the European Machinery Directive. Appendix 1 of this book quotes the weights and dimensions and other relevant details of the unmounted unit.
  3. This recovery unit has been designed for use in all normal vehicle recovery situations, i.e. winch hauling, suspend towing and flat towing. The load limits on these aspects are given on Pages 8 (Figures 6 & 7). However the size and weight of the chassis upon which it is mounted may limit the actual loads which can be lifted or towed. The installation of extra leaf springs is recommended, and if a choice is available, a higher rated chassis should be used in order to allow an increased payload.
  4. This book covers the variations of build which may be encountered. In some cases the book covers items which may not be fitted to your particular unit. Please ignore such information. The variations which normally occur are:
    - a) One or two hydraulic winches
    - b) Position and mounting of winches
    - c) One or two hydraulic pumps
    - d) Inboard, outboard or no support legs
    - e) Type 'E' or Type 'F' extendible boom
    - f) Adapted for metric hydraulic hoses
- Other customer requirements (e.g. 12volt vehicle supply etc.) might not be covered by this book.
5. This book applies to a recovery unit which has been properly mounted on a chassis by Boniface Engineering Ltd. When the unit is supplied for self mounting a separate set of instructions for mounting and testing are available.
  6. The Interstater Mk 4 can be combined with a 'Pioneer' Axle System; that is dealt with in a separate book.
  7. The unit could be combined with 'Sidewinder' winching system and support legs. They are dealt with in another publication, and so they are not covered in this book. Note: When the unit is used in conjunction with the Sidewinder, open cable guides are fitted to the fairleads to enable the winch ropes to be reeved through the fairleads for rearward winching, or freed for direct winching sideways .

PREFACE (Continued)

8. This book is not intended to be a comprehensive guide to recovery operations, but certain procedures are outlined in Chapter 3 in order to describe how to use the unit. Each recovery operation is a separate problem, and should be treated accordingly.
9. IMPORTANT NOTE: The European Machinery Directive covers the design and use of all forms of machinery, and requires all machinery to be safe to use in all normal circumstances. There is also an obligation on the user of the machinery to keep it in good working order. It is therefore a legal requirement for users to maintain their equipment, to use only approved spare parts when effecting a repair, and not to modify the equipment in any way without first checking with the manufacturer.
10. Very often the supply of this recovery equipment includes full bodywork, beacons, tailgate fittings etc., and this will vary depending upon the customer's requirements. This equipment is not covered in this book, except for circuit and wiring diagrams for beacons, lockers etc. ('services') which are standard and are given in Section 8.
11. When using this equipment, due regard must be paid to published Codes of Practise, British Standards and legislation affecting recovery operations. Nothing contained in this book is intended to countermand any such regulations.
12. When taking the delivery of a new Interstater unit, Boniface Engineering will undertake a comprehensive hand-over which includes a short course of instructions on how to use the unit. However that is not intended to cover all aspects of recovery, and if the intended operator of the unit has not been adequately trained, it is essential that the operator should enrol on a properly approved training course for heavy vehicle recovery.

**SAFETY PRECAUTIONS.**

THE PROCEDURES DESCRIBED IN THIS BOOK HAVE BEEN WRITTEN WITH SAFETY IN MIND. ASPECTS OF PERSONAL SAFETY AND USE OF THE MACHINE SO AS NOT TO CAUSE DAMAGE ARE DEALT WITH AT THE RELEVANT PLACE IN THE TEXT.

GENERAL SAFETY PRECAUTIONS ARE INCLUDED AS APPENDIX 2 OF THIS BOOK, AND A COPY OF THE RECOVERY INDUSTRY'S CODE OF PRACTISE FOR WORKING AT THE ROADSIDE IS GIVEN IN APPENDIX 3. **IT IS IMPERATIVE THAT ALL RECOVERY PERSONNEL SHOULD PAY DUE REGARD FOR THAT INFORMATION.**



#### NOTE:

The version shown here has outboard support legs. Other versions are with inboard legs or no legs at all. This illustration shows the bare construction of the legs, although when built into body work the outer structure of the legs will get absorbed into the body styling.

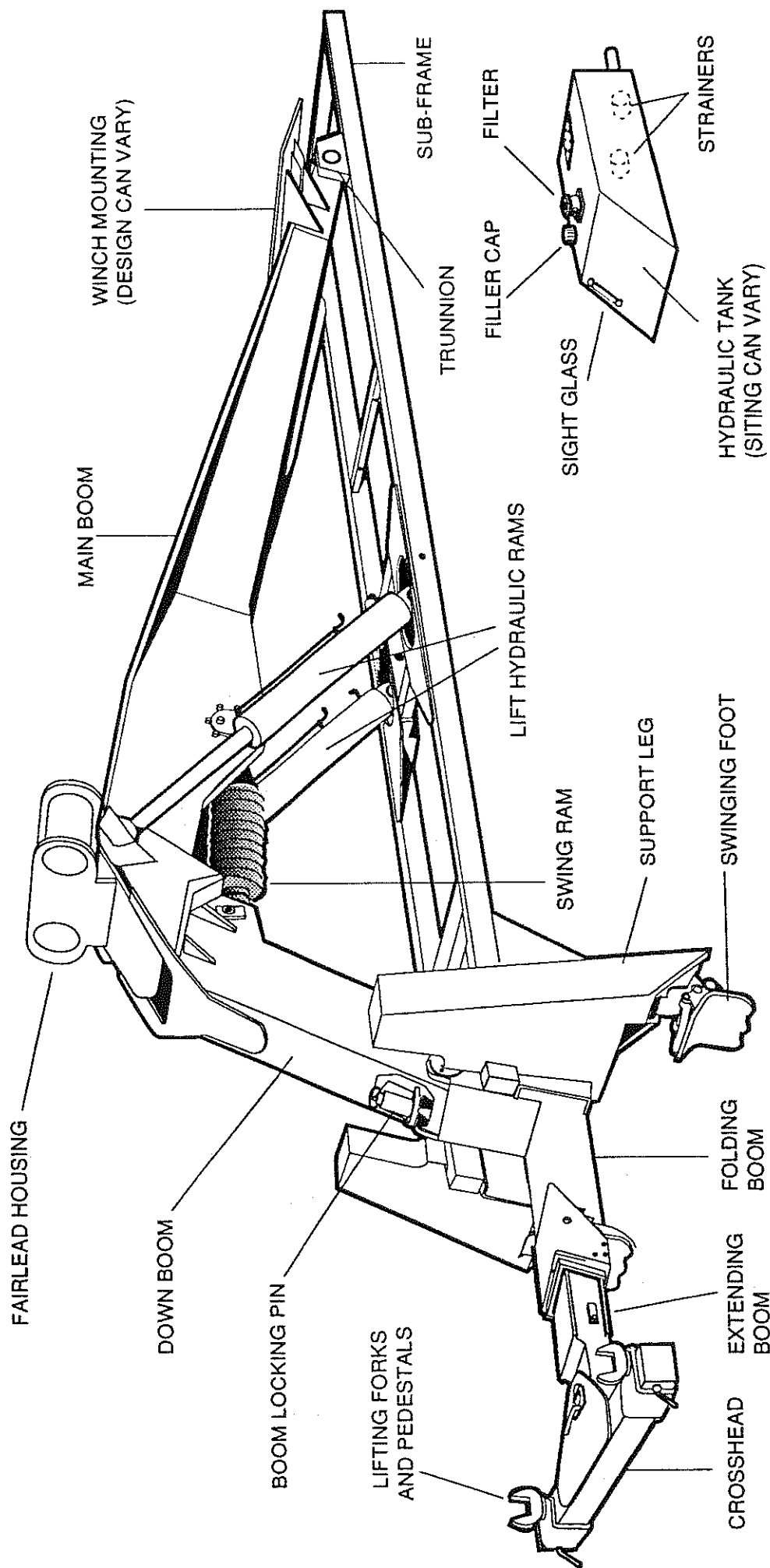


Figure 1 - Interstater Mk4 - General View

# GENERAL INFORMATION

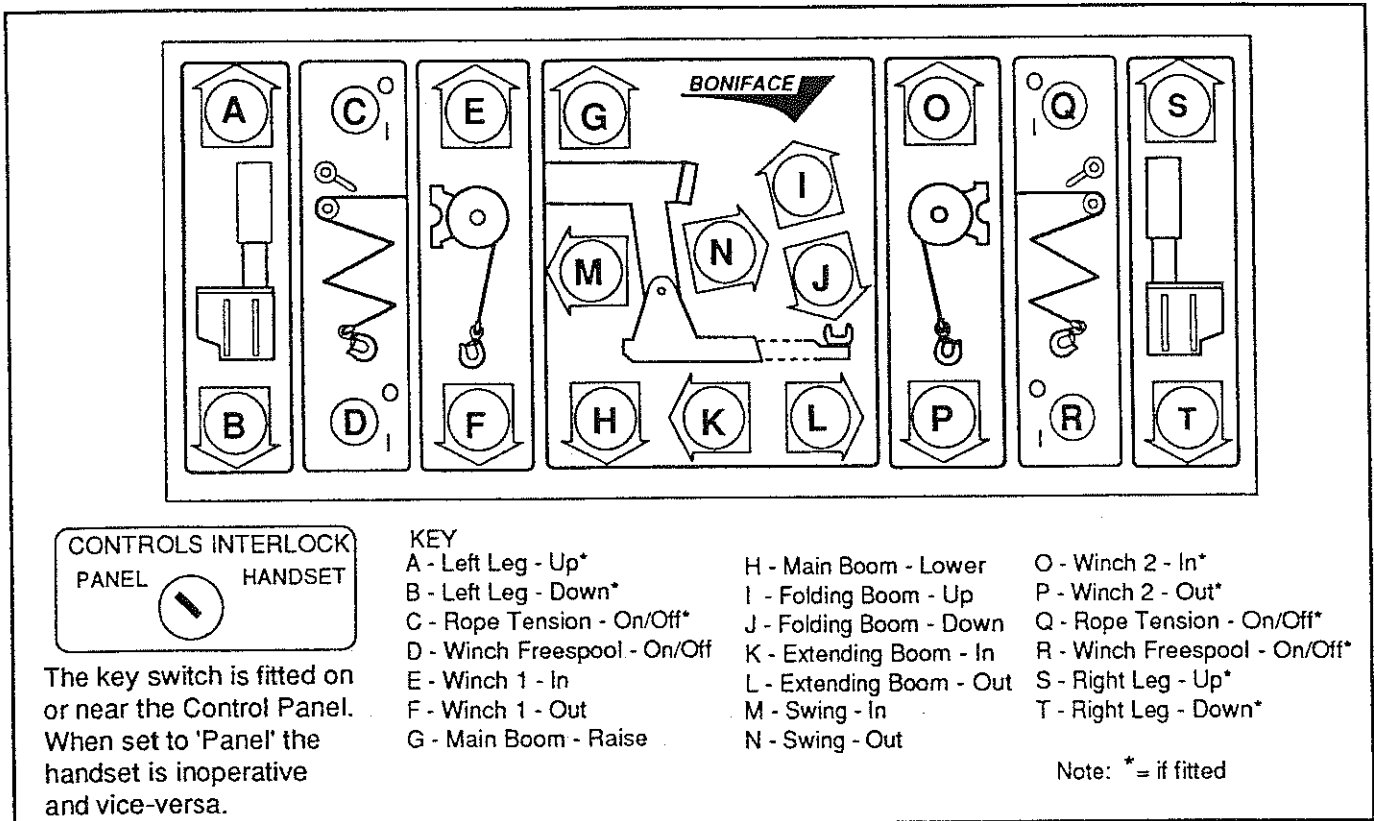


Figure 2- Control Panel

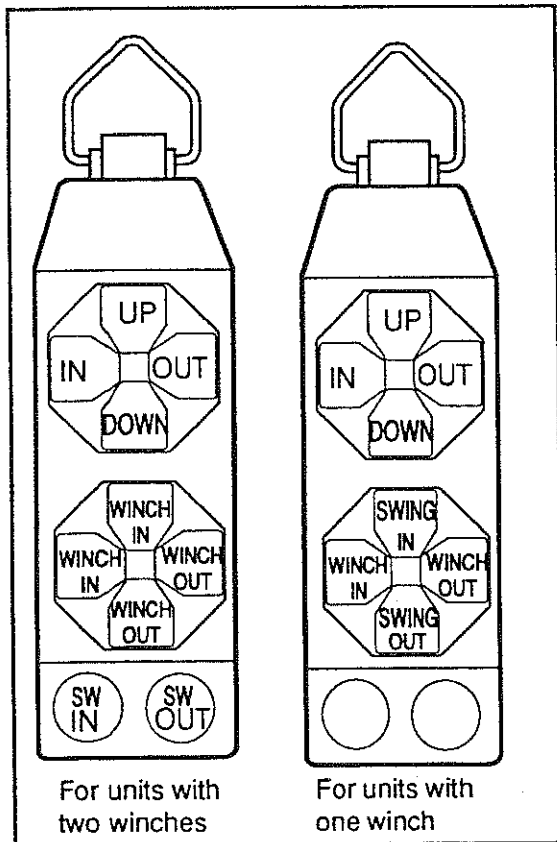


Figure 3 - Remote Control Handsets

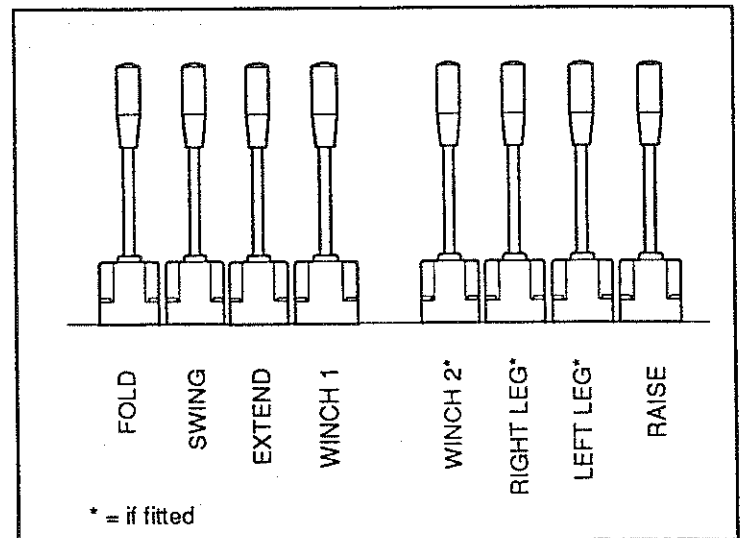


Figure 4- Hydraulic Lever Controls

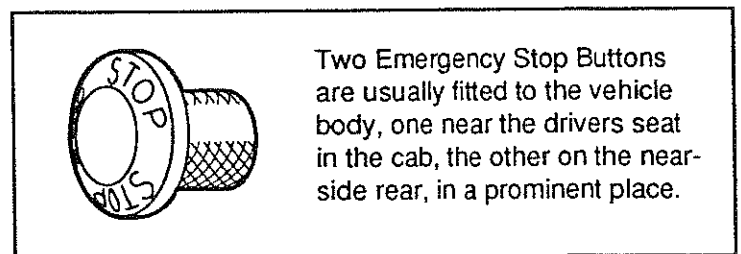


Figure 5 - Emergency Stop Buttons

## GENERAL INFORMATION

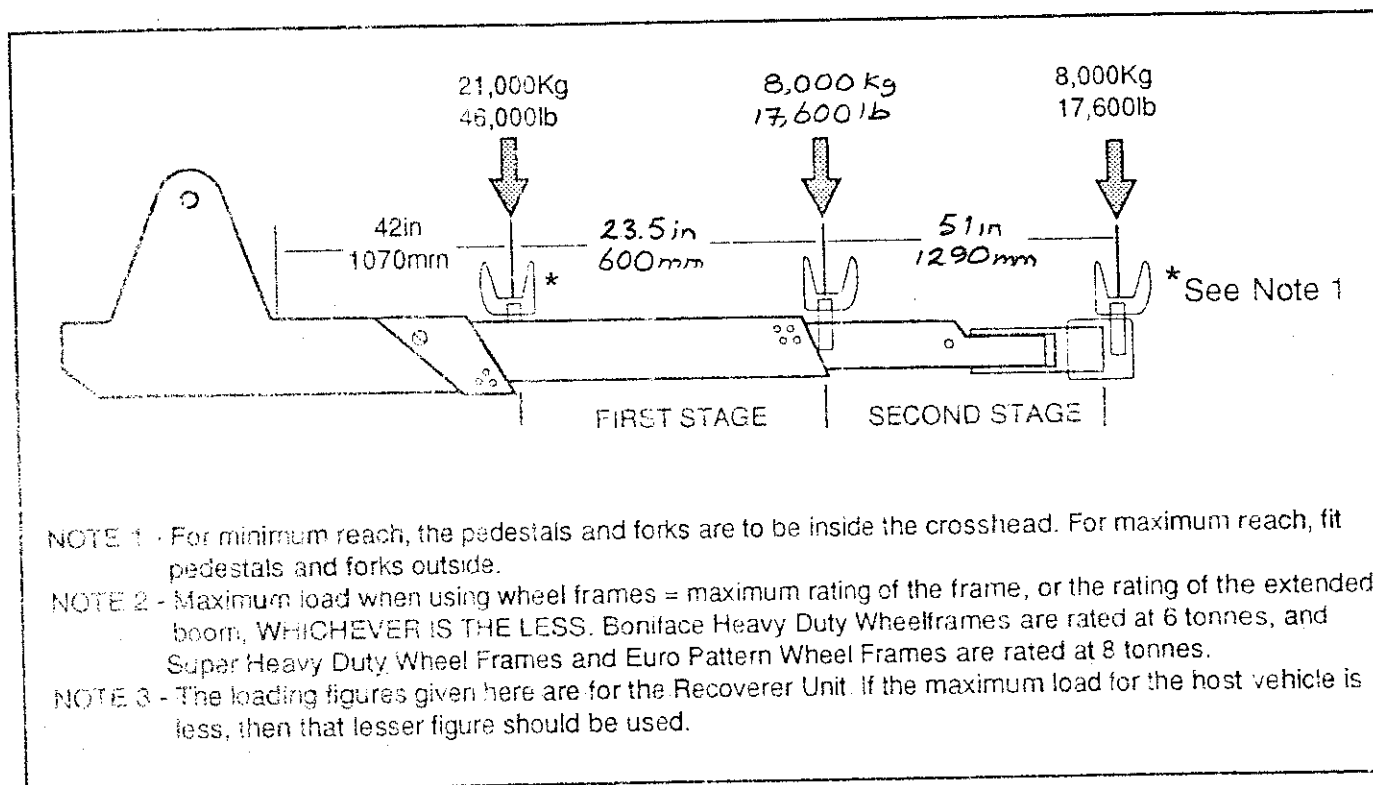


Figure 6 - Performance Figures for the Type E Extending Boom

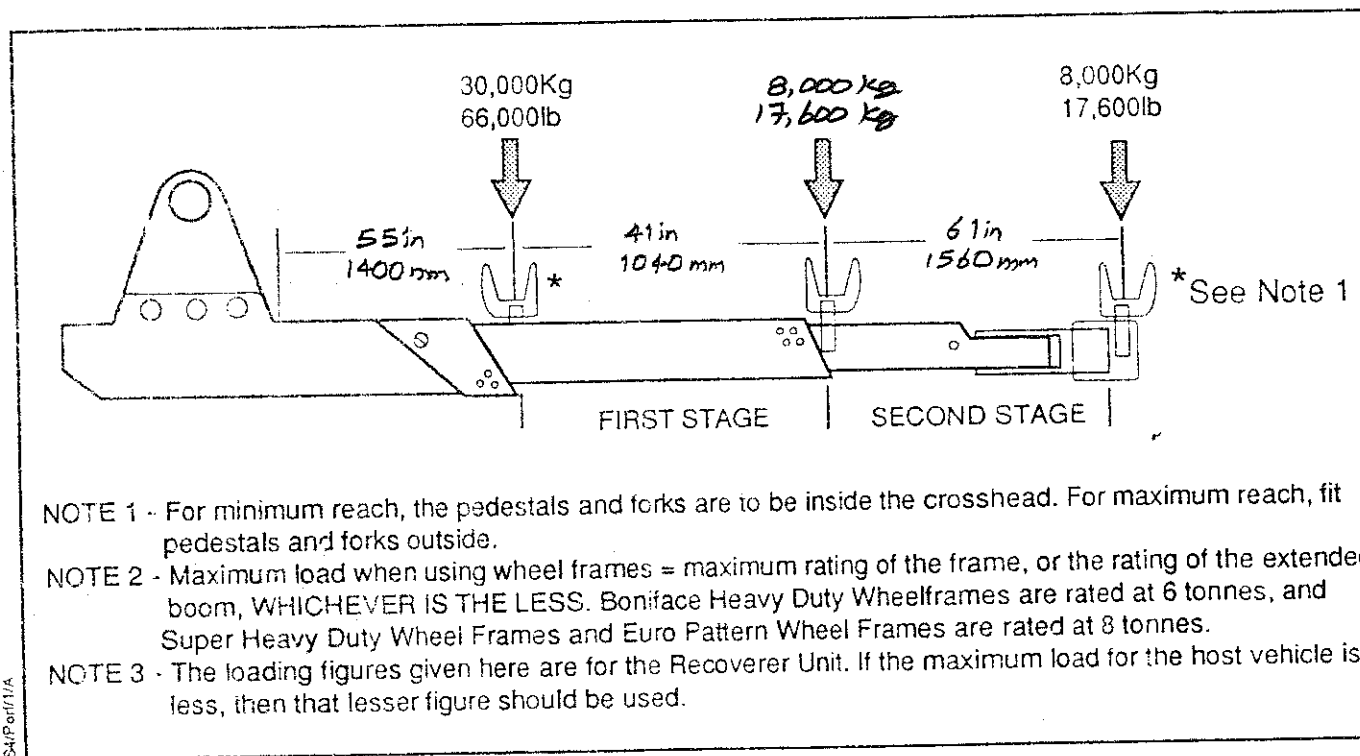


Figure 7- Performance Figures for the Type F Extending Boom

**2.1      ACCEPTANCE CHECK - STATIC**

**NOTE 1**      This check should be carried out any time when the serviceability has to be verified, i.e. Upon delivery from the supplier, after repairs or if a fault is suspected. It will confirm that all functions operate under no-load conditions.

**NOTE 2**      This check should be carried out with the recovery vehicle on a level, even surface.

**NOTE 3**      If the unit should fail any part of this test, it should not be used until the fault is rectified. If it cannot be rectified by the Operator, then a service engineer should be called out.

**2.1.1**      Open the hydraulic shut-off valve(s) on the hydraulic reservoir.

**2.1.2**      Start the recovery vehicle engine and engage the Power Take Off (P.T.O.)

**2.1.3**      Check for oil leaks between the pump(s) and the valve block.

**2.1.4**      Ensure that the Key Switch on or by the control panel is set to 'Panel'. **NOTE:** The function of the key switch is for safety. If it is set to 'Panel' the remote control handset will be inoperative, and vice-versa.

**2.1.5**      Release the folding boom lock. This is done by operating the folding boom control to slightly raise it, and to relieve the load on the lock pin. Lift the lock pin and lower the folding boom.

**2.1.6**      With the folding boom down, the main boom at its lowest and the extending boom fully in, ensure that the hydraulic tank is full to the level plug with the correct grade of hydraulic oil.

**2.1.7**      Using the winch control push-switches on the control panel, operate the winch(es) in both directions and ensure that they operate in the correct sense. If not reverse the winch hose connections. Check for oil leaks in the winch supply pipes and hoses.

**2.1.8**      Raise and lower the folding boom once or twice and check for oil leaks in the pipe run between the valve block and the folding boom hydraulic ram.

**2.1.9**      Using the lift control push-switches, operate the main boom fully up and down and check the pipe and hose runs for leaks. Ensure that the main boom moves parallel and equidistant from the support legs, or if legs are not fitted, between the down boom guides, without fouling the sides.

**2.1.10**      With the main boom raised a small amount, operate the boom swing control once or twice and check for leaks in the supply and return pipes and hoses.

**2.1.11**      Repeat operation 2.1.8, and part way through operate one of the Emergency Stop Buttons and check that all hydraulic functions are immobilised. To reset the Stop button turn it anticlockwise half a turn.

**2.1.12**      Repeat Operation 2.1.11 using the other Emergency Stop Button.

**2.1.13**      Using the extend control, operate the extendible boom and check for leaks. Ensure that the extension is that specified in Figure 6 or 7 of this book.

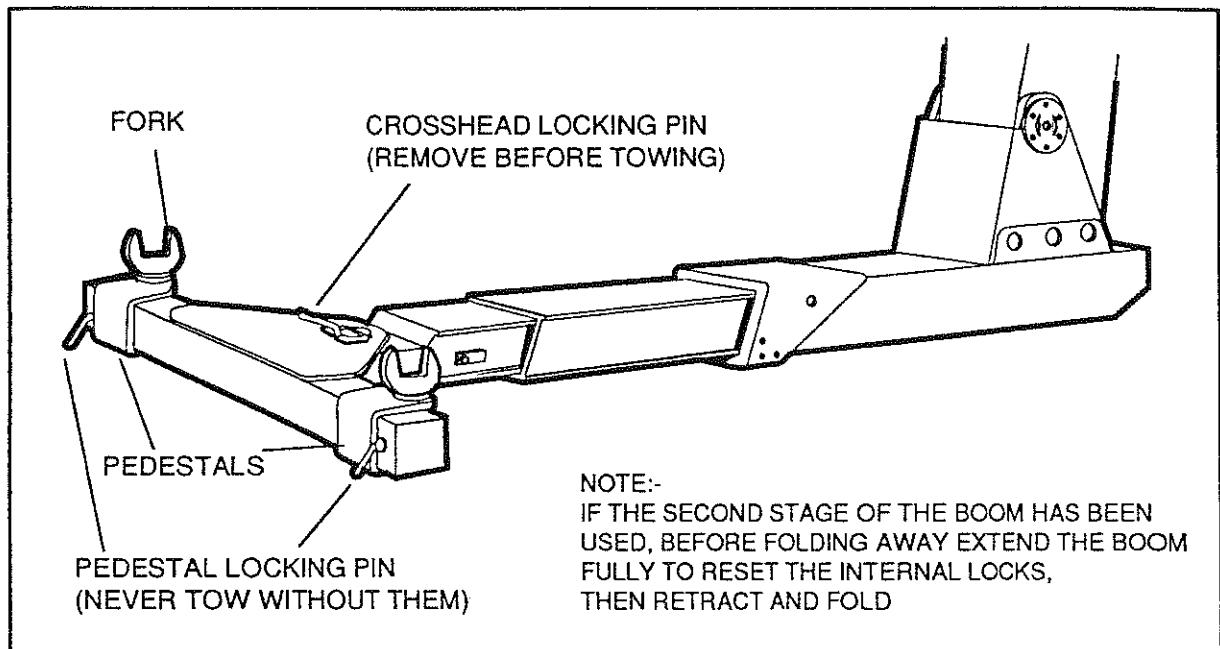
**ACCEPTANCE CHECKS****2.1      ACCEPTANCE CHECK - STATIC (Continued)**

- 2.1.14      Using the support leg controls, operate the rear support legs simultaneously and check for leaks between the valve block and the support leg hydraulic rams.  
NOTE: This operation will raise the vehicle, and to prevent damage to a made floor or hard standing, it might be advisable to put pads under the feet. With much of the weight of the recovery vehicle supported on the legs, wait at least five minutes and check that there is no tendency for the vehicle to sink down.
- 2.1.15      Raise the legs completely.
- 2.1.16      Check the contents of the hydraulic tank and top up if necessary.
- 2.1.17      Using the control panel push buttons, operate the rope tensioners and check that the tensioning rollers function correctly.
- 2.1.18      Using the control panel push buttons, operate the winch releases and check that the winches release correctly.
- 2.1.19      Connect the remote control handset and ensure that all the controls function as expected.

**2.2      CHECKING THE UNIT UNDER LOAD**

- 2.2.1      The method used to load the unit for testing will vary from situation to situation. The methods suggested here would seem to be practical for most operators.
- 2.2.2      Without aiming to overload the Interstater or the vehicle it is fitted to, (See Figure 6 or 7 for loadings at full hydraulic extension), chose another vehicle which can be lifted by the unit, and prepare to lift as described in Part 3 of this book.
- 2.2.3      With the recovery vehicle's handbrake applied, and the loading vehicle's hand brake released, raise the lift rams as high as possible without damaging the loading vehicle. Ensure a smooth action and no leaks from the hydraulic system. Hold the load high for at least five minutes and check that there is no tendency for the main rams to sink under load.
- 2.2.4      With the main boom about half way up, operate the swing boom to and fro and ensure a smooth action throughout.
- 2.2.5      Lower the loading vehicle as low as possible without the front wheels actually touching the ground, ensuring that the extending boom is parallel to the ground by use of the boom swing control.
- 2.2.6      Operate the extendible boom over its complete hydraulic range and ensure a smooth action and no leaks from the hydraulic system. NOTE: Beware of over-loading the boom at full extension.
- 2.2.7      Release the loading vehicle.
- 2.2.8      The action of the winch(es) under load can be checked by arranging a heavy load on sliders, or perhaps another vehicle on sloping ground. Ensure that the winch(es) perform smoothly and efficiently.

3.0 THE CROSSHEAD



*Figure 8 - The Extensible Boom*

OPERATION

**NOTE:** This part of the manual is written to describe how to operate the Interstater Mk 4 Recovery Unit and its associated equipment, and refers to procedures in a typical breakdown situation. IT IS NOT INTENDED TO BE A COMPREHENSIVE GUIDE TO RECOVERY OPERATIONS. As all recovery operations are unique, to give instruction on every situation is impractical. Therefore, no liability can be accepted for the procedure described.

**3.1 PREPARATION**

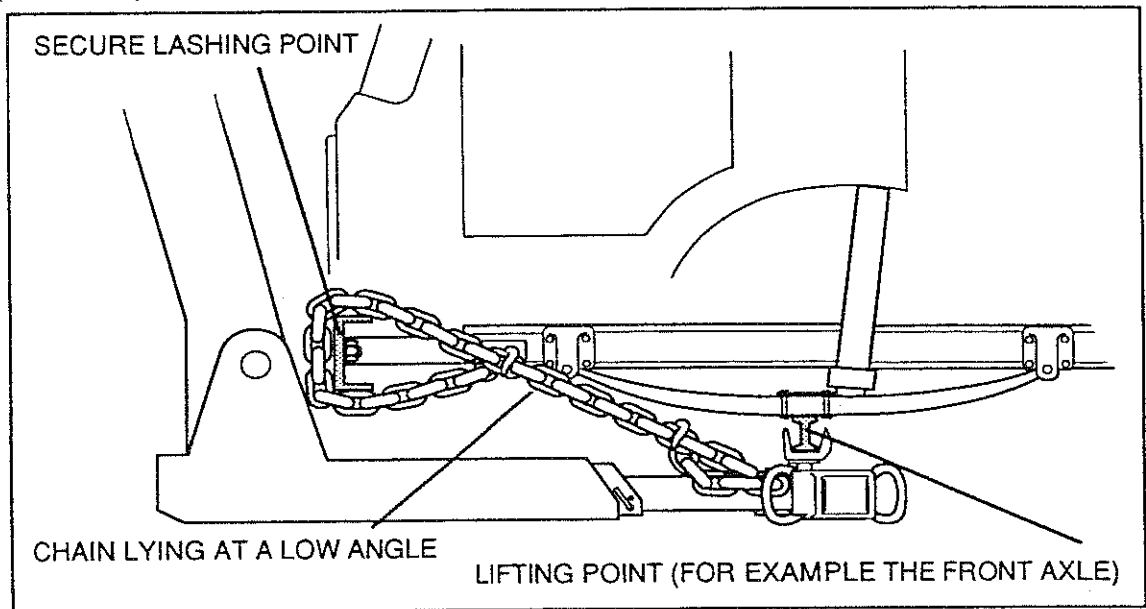
- 3.1.1 Ensure the unit is in full working order. This can be verified by carrying out the procedure detailed in Part 2 of this book.
- 3.1.2. Ensure the rear tag axle or mid tag axle (if fitted) is lowered.
- 3.1.3 Ensure that the key switch is set to the correct mode. If set to 'Remote' the control panel will be inoperative and vice versa.
- 3.1.4 The following text assumes that the Interstater is in its normal travelling position, viz:
  - a) Main boom lowered.
  - b) Folding boom locked in the vertical position.
  - c) Extensible boom fully closed.
  - d) Main crosshead pinned in the 'straight' position.
  - e) Fork pedestals and forks stowed away.

**NOTE:** If the user prefers to operate with wheel frames they are usually left fitted to the crosshead and are only removed if a lift on forks is the only option.

**3.2 LIFTING WITH CROSSHEAD AND FORKS**

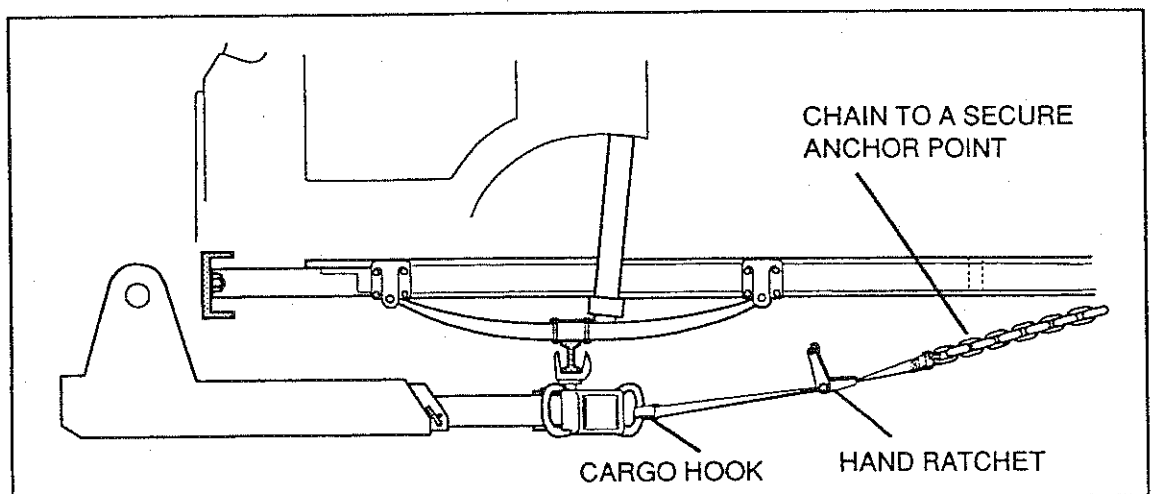
- 3.2.1 Park the recovery vehicle directly in front of (or on occasions, behind) the casualty, close to, but not so close that there is no room for the boom to fold down.
- 3.2.2 Check that the recovery vehicle parking brake is on.
- 3.2.3 Depress the clutch, engage Power Take Off and release the clutch. NOTE: The engine revs. should be at idle, between about 700 and 800 rpm.
- 3.2.4 Move to the rear of the recovery vehicle and connect the remote control.
- 3.2.5 Release the boom latch and fold the boom fully down.  
NOTE: ALWAYS KEEP WELL CLEAR OF AN UNSUPPORTED FOLDING BOOM, A HYDRAULIC FAILURE CAN CAUSE IT TO FALL WITHOUT RESTRAINT, AND DEATH OR SERIOUS INJURY COULD RESULT.
- 3.2.6 Remove the crosshead locking pin, and ensure that the crosshead is free to pivot.
- 3.2.7 Adjust the height of the main boom so that the crosshead is within 1" (25mm) from the ground and ensure it is parallel to the ground by use of the boom swing control.
- 3.2.8 The pedestals and forks can be fitted now, or later, according to the operation. Normally it is probably better to fit the pedestals at this stage, and fit the forks later. Whenever possible fit the low pedestals with the fork socket in front of the cross-head (toward the recovery vehicle). This will maximise the lifting capacity of the unit.
- 3.2.9 The best distance between the two vehicles must now be established, but this can only be learned by experience. If the boom is extended under the casualty, the position required for the forks to locate on the chosen lifting point (e.g. front axle) can be determined. If the extending boom is not fully extended, or not fully retracted, then the forks can be moved both forwards and back to find the correct position. Raise the main boom slightly to verify that the forks (fit them now if not fitted before!) locate correctly
- 3.2.10 When the forks are correctly located, the main boom can now be raised to a point where the operator can assure himself of a good, safe lift. He should now keep clear of the casualty vehicle.
- 3.2.11 If it is going to be necessary to crawl under the casualty to fix securing chains, place wheel stands and lower the casualty onto them.
- 3.2.12 The casualty must be secured into the forks with chains or lashings to prevent dangerous movement between the casualty and recovery vehicles. We cannot anticipate all the problems which might be encountered, but the following are the more usual precautions which need to be considered.
- 3.2.13 If the vehicle is being lifted by different part of its structure, the axle will hang down, and the casualty would need to be towed at an excessive height to prevent the wheels or axle from dragging on the ground. This can be prevented by chaining the axle up to the chassis before the lift is implemented.

3.2 (Continued)



*Figure 9 - Restraint against overrun*

- 3.2.14 When braking occurs, there is a tendency for the casualty to ride forward. Chains to restrain this potential movement should be laid between the crosshead and some strong point on the vehicle - see Figure 9. The tension in the chains should be firm, but not bar-tight. This can be achieved by slight movement of the extending boom. If the lashing chains are at too steep an angle, they would suffer periodic slackening and jarring as the springs of the casualty worked while travelling. To reduce this effect the chains should be as near to the horizontal as possible.
- 3.2.15 When the recovery vehicle accelerates, the casualty will tend to get left behind. This is a similar effect to 3.2.14. above, but lesser in extent. This can be countered by using a nylon strap and hand ratchet. Ideally the ratchet should have a short 'tail' fitted with a means of attaching to a chain from an anchor point. The nylon strap should have a cargo hook to connect to the fork pedestal. Tension with the hand ratchet - see Figure 10. Again it is recommended that the path of the restraining strap should lie near to horizontal.



*Figure 10 - Restraint against acceleration*



**OPERATION****3.3 (Continued)**

3.2.16 **SAFETY NOTE: NEVER WORK UNDER A VEHICLE WHICH IS SUPPORTED ONLY BY THE RECOVERY UNIT. IF IT IS NECESSARY TO GET UNDER THE CASUALTY AGAIN, USE CORRECTLY RATED WHEEL STANDS. A SLIP WOULD PROBABLY BE FATAL.**

3.2.17 The main lift can now be implemented. Before the full weight of the casualty is taken up, release the parking brake of either the casualty vehicle, or the recovery vehicle, **BUT FOR SAFETY'S SAKE, NOT BOTH.** This allows the distance between the two vehicles to be adjusted. The distance between the two vehicles should be as short as possible, while still allowing enough clearance for cornering. Adjust using the extendible boom control. **NEVER STAND, OR ALLOW ANYONE ELSE TO STAND BETWEEN THE CASUALTY AND THE RECOVERY VEHICLES WHEN RECOVERY IS IN PROGRESS.**

**NOTE:** It may be necessary to increase the engine revs to 800 - 1000 rpm. by means of the remote throttle control.

3.2.18 Lift to a suitable height for towing, use the boom swing control to ensure that the extending boom remains parallel to the ground.  
**NEVER TRY TO USE THE FOLDING FACILITY FOR LIFTING. IT WAS NOT DESIGNED FOR THAT.**

3.2.19 Before driving off, fit a safety chain between the casualty and a strong point on the recovery vehicle. This will prevent a disaster should the casualty break free.

3.2.20 Boniface Engineering can supply all the necessary items if required. Please remember that safety is of paramount importance in any lifting or towing operation, and if there is any doubt about what is the correct procedure, seek advice before proceeding. At Boniface Engineering we are always pleased to hear from operators, and if you require help please do not hesitate to contact us.

**3.3 LOADING A CASUALTY ON WHEEL FRAMES**

**Note:** Wheel frames are perhaps easier to use as long as the wheels are not badly damaged. Various designs are available. Before use, ensure that they are of the correct rating for the job. The following text assumes they are already fitted.

3.3.1 Park the recovery vehicle directly in front of (or on occasions, behind) the casualty, close to, but not so close that there is no room for the boom to fold down.

3.3.2 Check that the recovery vehicle and casualty vehicle parking brakes are on.

3.3.3 Depress the clutch, engage Power Take Off and release the clutch. **NOTE:** The engine revs. should be at idle, between about 700 and 800 rpm.

3.3.4 Move to the rear of the recovery vehicle and connect the remote control.

3.3.5 Release the boom latch and fold the boom fully down.

**NOTE: ALWAYS KEEP WELL CLEAR OF AN UNSUPPORTED FOLDING BOOM, A HYDRAULIC FAILURE CAN CAUSE IT TO FALL WITHOUT RESTRAINT, AND DEATH OR SERIOUS INJURY COULD RESULT.**

## OPERATION

## 3.3 (Cont'd)

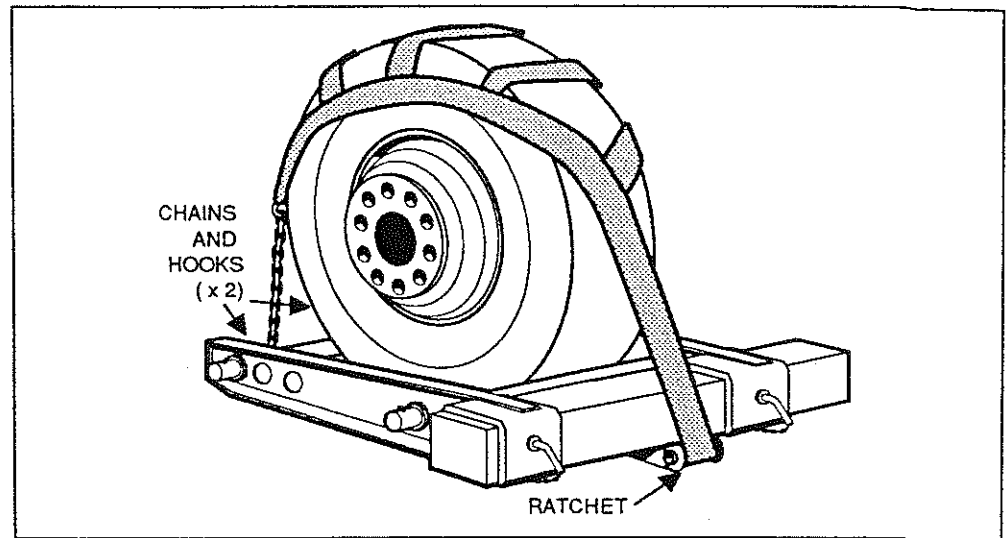
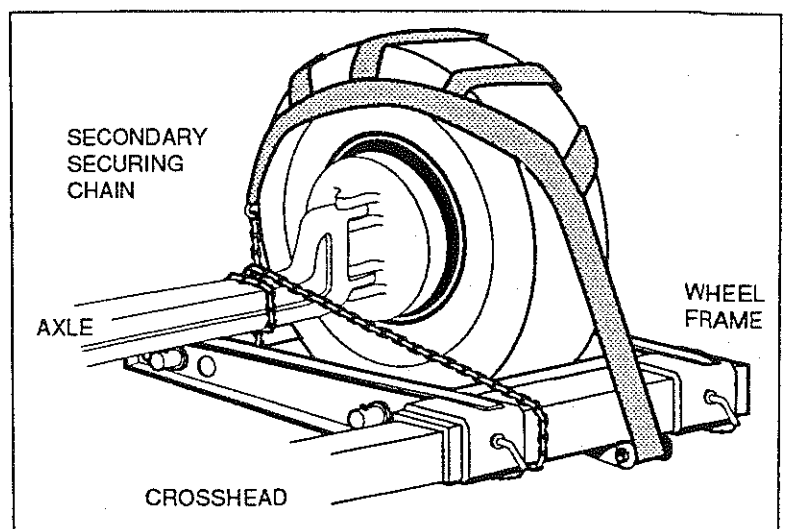


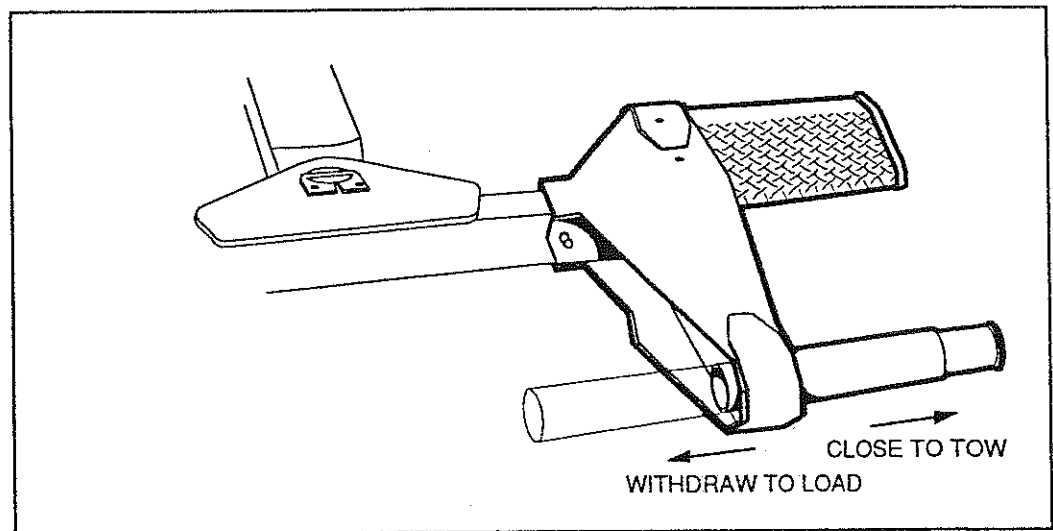
Figure 11 - Heavy Duty ('Euro') Wheel-Frames

- 3.3.6 Remove the crosshead locking pin, and ensure that the crosshead is free to pivot.
- 3.3.7 With the crosshead at a convenient height, adjust the wheel frames to a width to suit the casualty. Keep the frames 'open'.
- 3.3.8 Adjust the height of the main boom so that the crosshead and wheel frames are as close to the ground as possible without touching, and parallel to it.
- 3.3.9 Extend the boom until the wheel frames span the casualty's wheels and firmly touch both tyres.
- 3.3.10 Close the wheel frames. The method varies with the type of wheel frame.
- 3.3.11 Raise the casualty a short way to confirm that the lift will be satisfactory.
- 3.3.12 Attach and tighten the wheel straps. The method will vary with the design.
- 3.3.13 Fit secondary lashing chains. It is not possible to specify exactly how to fit secondary chains for every situation. Their function is as a back-up for the wheel straps should they work loose or come adrift. The chains must stop the casualty from rolling forwards, rolling backwards or from bouncing out of the wheel frames.

Figure 12 -  
Secondary  
Securing  
Chains

3.3 (Continued)

- 3.3.14 Raise the casualty to a suitable towing height, keeping the extending boom level by use of the Swing control.
- 3.3.15 Fit a safety chain between the casualty and the recovery vehicle. This is to prevent the casualty from breaking free should there be a disastrous failure of the equipment.
- 3.3.16 Release the casualty's brakes and with the extend control adjust the distance between casualty and recovery vehicle to the shortest suitable distance. Allow enough room for cornering.



*Figure 13 - Super Heavy Duty Wheel Frames*

3.4 **TOWING THE CASUALTY**

- 3.4.1 Use the remote throttle to control the engine idling revolutions.
- 3.4.2 Ensure that the pedestal safety pins or wheel frame safety pins are in place, and that they too are secured with 'R' clips.
- 3.4.3 Unplug the remote control handset and stow away (If used).
- 3.4.4 Apply the recovery vehicle handbrake and release the handbrake of the casualty.
- 3.4.5 Depress the recovery vehicle clutch and disengage the Power Take Off.
- 3.4.6 For vehicles with raising axles, ensure all rear axles are lowered and any such front axles are raised
- 3.4.7 Ensure that all legal requirements regarding loading, braking and lighting are observed.
- 3.4.8 When moving off, do so very slowly so that there is sufficient weight remaining on the steering axle. If the steering is unacceptably light then either the boom must be further retracted, or a new lifting position for the forks must be found.
- 3.4.9 It is advisable to stop the vehicle after about half a mile and make a further check of the locking pins and the tension in the lashing chains or wheel straps.
- 3.4.10 Ensure that the crosshead pivot pin remains well greased in use.

**3.5**     RELEASING A CASUALTY VEHICLE.

- 3.5.1     Engage the Power Take Off.
- 3.5.2     Engage the handbrake on the casualty.
- 3.5.3     Connect the remote control handset if required and check the key switch is set appropriately .
- 3.5.4     Set the throttle at 800 - 1000 rpm.
- 3.5.5     Lower the main boom and allow the casualty to settle on the ground.
- 3.5.6     Extend or retract the extendible boom to relieve any tension in the chains and lashings. Disconnect all restraints including safety chain between casualty and recovery vehicle
- 3.5.7     Remove the forks and pedestals or open the wheel frames.
- 3.5.8     Retract the extendible boom. Note: If the second stage the extending boom has been used, extend the boom fully out before retracting. This will reset the internal inter-locks.
- 3.5.9     Drive the recovery vehicle clear of the casualty to a position where the folding boom may be folded.
- 3.5.10    Replace the crosshead locking pin.
- 3.5.11    Raise the folding boom.
- 3.5.12    Lower the main boom to the travelling position.
- 3.5.13    Stow all loose equipment including the remote control handset.

**3.6.**     USE OF THE REAR SUPPORT LEGS

NOTE: Leg controls are not normally featured on the remote control handset. Ensure the key switch is set to 'Panel' before attempting to lower the legs.

- 3.6.1     Each leg can be operated by means of the hydraulic control levers, or the electrical push-switches on the control panel. During recovery operations, use of the hydraulic levers is not recommended for reasons of safety..
- 3.6.2     The legs have two purposes. They may be used as a support for the chassis when lifting heavy loads which would otherwise cause the front axle of the vehicle to leave the ground. In that mode the swinging feet should be deployed and please note that the pressure on the ground can be much greater than the load being lifted. It can be enough to break concrete so it is advisable to place timbers under the feet when being used on a made surface.

NOTE:

When using the legs in this mode lower them firmly onto the ground, but do not raise the recovery vehicle significantly on its suspension. That will reduce the effectiveness of the brakes, and there is much less friction between the ground and the support feet. Let the suspension hold the vehicle and let the legs support the *extra load* imposed by the lift.

## OPERATION

3.6 (Continued)

- 3.6.3 Secondly when used to provide resistance to winching forces. On soft ground a great deal of resistance can be achieved by using the feet in 'spade' mode, and driving them well into the ground. Use the full weight of the recovery vehicle to drive them in, but do not operate with the vehicle up in the air. Let the braked wheels add to the resistance of the whole.
- 3.6.4. On hard ground the spades cannot be used as such. They can be used as support feet, but for a heavy haul scotch blocks used correctly will provide better resistance.
- 3.6.5. When using the support legs on soft ground it is better to lower one leg at a time to a point where the blade is just touching the ground, and then lowering the other to a similar position before applying power to both. This will avoid undue racking of the chassis. Put plenty of weight on the spades to drive them in, but do not leave the vehicle chassis high in the air when winching. More resistance can be gained by having the vehicle wheels on the ground also. When winching with the recovery vehicle on hard ground, scotch blocks are more effective than the support legs.

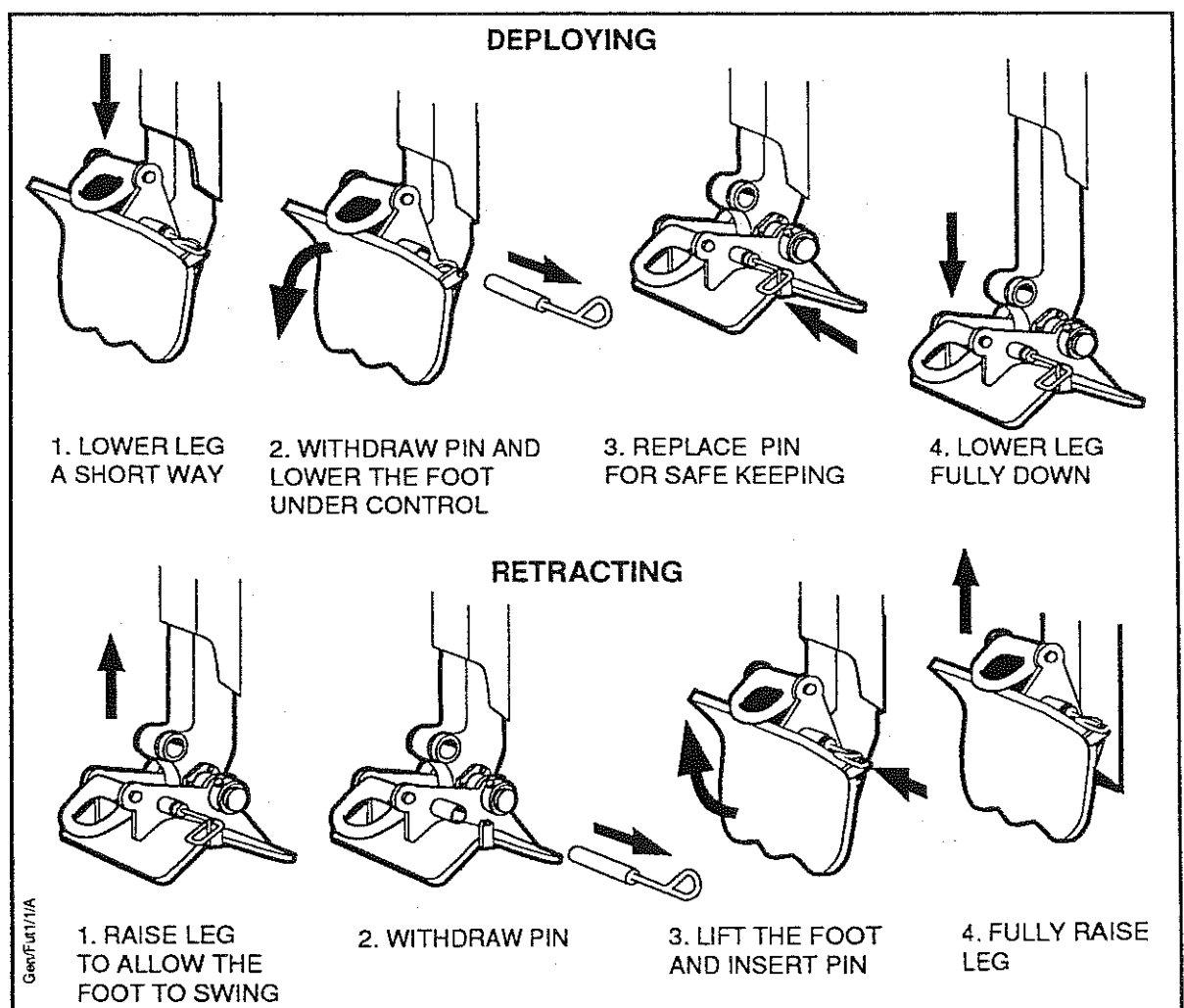


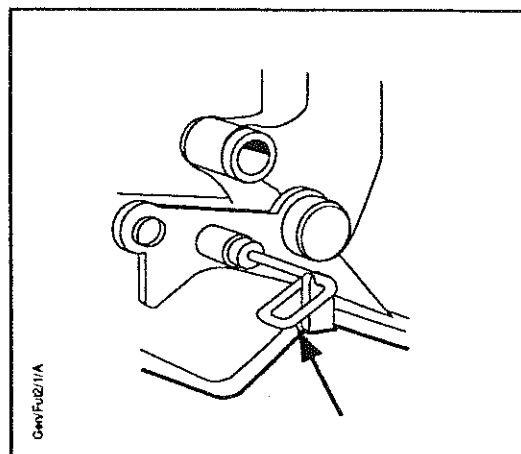
Figure 14 - Using the Swinging Feet

**OPERATION**

## 3.6 (Continued)

- 3.6.6 **SAFETY NOTE:** The avoid losing the foot locking pin while travelling, ensure that it is hooked on as shown here.

*Figure 15 - Retaining the Locking Pin.*

3.7 USING THE ROPE TENSIONER.

- 3.7.1 This is fitted to apply tension to the otherwise slack rope when rewinding the winch rope. It helps to achieve a good lay of the rope on the drum. It is operated by a button on the control panel. To check that it is functioning, operate the controls and see that the tensioning roller has lowered.

3.8 USE OF THE WINCHES FOR HAULING

- 3.8.1 When haul winching, the main boom must be fully down, so that the boom trunnions do not get strained by any sideways force which may occur. Always follow this sequence when operating winches in a recovery situation. **NOTE:** For fuller technical details of the winch and its capabilities refer to the winch maker's handbook.
- 3.8.2 Release the rope tensioners.
- 3.8.3 Ensure that the winches are in neutral gear.
- 3.8.4 Release the hooks from their stowage and pull out the cables. **NOTE:** A cable can also be paid out under power, but never without a load applied to it. A man pulling should be enough, but if the cable is left loose it can get into a monstrous tangle.
- 3.8.5 Attach the winch cables to a strong point on the casualty. In all circumstances, especially if the pull is likely to be a strong one, it is vital that the point of attachment should not fail when power is applied. Axles and chassis members are good points to use, bumpers (fenders) and bodywork are usually not good. **IF A WINCH CABLE FAILS UNDER POWER, SERIOUS HARM CAN OCCUR.**
- 3.8.6 Check that the recovery vehicle's brakes are firmly applied.
- 3.8.7 Lower the rear support legs and load them until, on unconsolidated ground, they will dig in no further. On hard roads, use the swinging feet as road plates, but lowering the legs too far may be counter productive, as they will take the load off the braked wheels of the recovery truck. Units which do not have rear support legs fitted should use scotch blocks on both driving wheels. (See Operation 3.6 for a fuller description)
- 3.8.8 Winch in.
- 3.8.9 **SAFETY NOTE:** Avoid handling the winch cable, but if that is imperative, use heavy duty gloves, for a loose cable strand can cause a nasty injury.

3.9 SIDE WINCHING

- 3.9.1 This can be achieved simply with one winch by swinging the fairlead assembly to the horizontal. If two winches are fitted, then use the winch and fairlead on the appropriate side. In an extreme case the other winch rope can be paid out in the opposite direction to a 'deadman' or ground anchor to stabilise the recovery vehicle. In all cases the main boom should be fully down and in its locked position. NEVER WINCH SIDEWAYS WITH THE BOOM EVEN SLIGHTLY RAISED,
- 3.9.2 Always use a snatch block at the load end, and return the cable back to hook onto the side anchor point of the recovery vehicle.

3.10 AFTER WINCHING OPERATIONS

- 3.10.1 Apply the rope tensioners.
- 3.10.2 Rewind the cables, one at a time.
- 3.10.3 Hook cables into their stowing points, or a quick release 'bungee'.
- 3.10.4 Switch off the tensioners.

SAFETY NOTE

ON ALL INTERSTATER MK 4 UNITS THE LEVER CONTROLS ARE INTENDED FOR USE AS A MANUAL OVERRIDE WHEN THE ELECTRO-PNEUMATIC CONTROLS ARE INOPERATIVE. RECOVERY WORKERS SHOULD AVOID BEING ON THE BACK OF THE RECOVERY VEHICLE WHEN WINCHING AND LIFTING OPERATIONS ARE TAKING PLACE. THAT IS A VERY DANGEROUS PLACE TO BE.

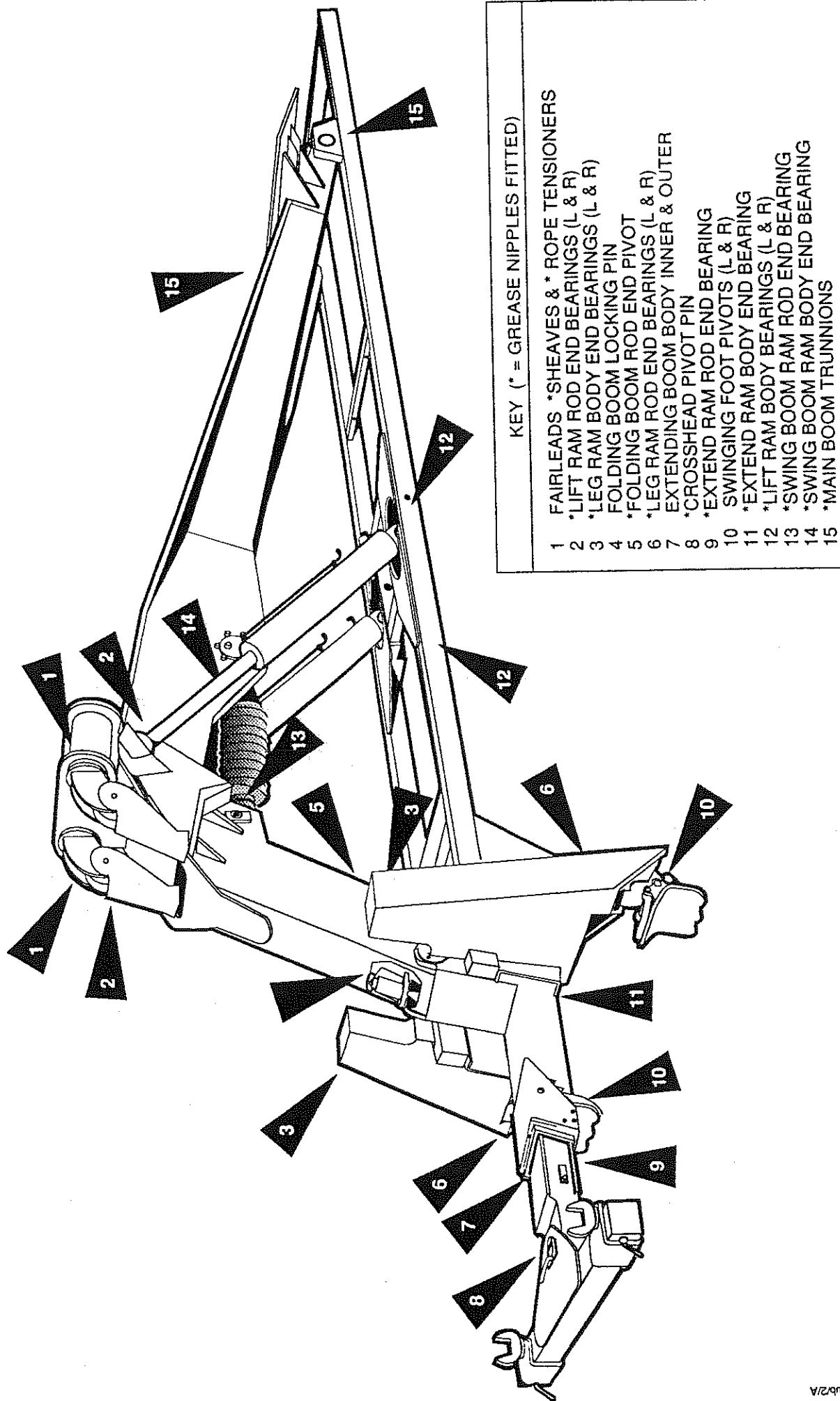


Figure 16 - Lubrication Diagram



**4.1     MAINTENANCE - GENERAL**

- 4.1.1 In order to ensure correct and efficient working, the Interstater Mk 4 should be properly lubricated and serviced. The working conditions under which the recovery unit operates will determine the frequency of servicing and maintenance required, and it is for the owner of the recovery vehicle to determine what that period should be. If the unit is being used every day, then the servicing detailed below is recommended.
- 4.1.2 In all hydraulic systems, strict cleanliness is essential for continued efficiency. Before dismantling any part of the hydraulic system, ensure that the surrounding area is completely clean. This also includes the hydraulic oil filler cap. Care should be taken not to introduce muck into the system from the outside, including the container from which the oil is dispensed.
- 4.1.3 The unit can be spray painted, if required, but hydraulic hoses, pressure gauges, the chrome plated filler cap etc. should be masked off before spraying. The use of paint strippers in the vicinity of hydraulic hoses, pneumatic and electrical gear is not advised. **DO NOT PAINT OVER WARNING SIGNS, S.W.L. PLATES etc.**

**4.2     DAILY AFTER USE**

- 4.2.1 Check through all ancillary equipment to ensure that it is properly stowed, and can all be accounted for.
- 4.2.2 Lubricate the crosshead pivot pins.
- 4.2.3 Inspect the unit for obvious signs of wear, distortions, chafing hoses, loose fasteners, loss of hydraulic oil etc. The driver of the unit should confer with the service engineer, (if he is not the same person) to pass on faults or observations he may have.

**4.3     WEEKLY**

- 4.3.1 Lubricate all round. See Figure 16 - Lubrication Chart.
- 4.3.2 Check the level of oil in the hydraulic tank. It should be observable through the level plug hole. Top up if required. NOTE: This check can only be carried out with the vehicle standing level, the main boom fully down, folding boom down and the extending boom fully retracted.
- 4.3.3 Carry out a more detailed inspection for damage. All pipes should be examined for leaks, chafing, kinks etc. Ensure all hydraulic rams are not leaking, and ensure that all electrical and pneumatic components are free from dirt or contamination from hydraulic oil.
- 4.3.4 Start the vehicle engine, engage the Power Take Off, and check that all controls - lever, remote control handset and switch panel - function correctly. Whilst raising the main boom operate the Emergency Stop Button and ensure that all hydraulic functions are rendered inoperative. Reset the Emergency Stop.

**MAINTENANCE****4.4.     ANNUALLY**

- 4.4.1     Thoroughly inspect the unit for signs of wear and damage. Rectify as required.
- 4.4.2     Remove the covers and check that all electrical connections and components, all pneumatic connectors and components are secure and clean. Replace covers.
- 4.4.3     Drain the hydraulic tank using the drain plug at the front of the unit.
- 4.4.4     Remove the inspection plate at the rear of the hydraulic tank and remove the oil strainer(s) for cleaning. Refit when clean.
- 4.4.5     Change the filter element. If the strainers or filter element are excessively dirty, then the hydraulic system should be flushed out by filling with a proprietary flushing oil, and running the pumps to circulate the oil. Discard the dirty flushing oil.
- 4.4.6     Refill with clean hydraulic oil. (H32)
- 4.4.7     Thoroughly clean down the unit, with steam if available. Care should be taken not to force steam or cleaning fluid behind the covers and into the electrical and pneumatic components.
- 4.4.8     After cleaning, (and painting if applicable) lubricate all round.
- 4.4.9     Run out both winch cables and inspect them for signs of corroding, fraying, stretching or undue kinking. Renew if necessary. Lubricate the cable if required.
- 4.4.10    Inspect all ancillary equipment for damage, cleanliness and lubricate any moving parts (e.g. sheaves in snatch blocks etc.)

**ADJUSTMENTS****5.0 ADJUSTMENTS****5.1 MAIN LIFT HYDRAULIC RAMS**

NOTE: The rams were correctly adjusted when the unit left the factory. Only in exceptional circumstances (e.g. if a ram has been replaced) will this procedure be necessary.

- 5.1.1 If the down boom is observed to kick sideways at the top of its travel (See Part 2.1.7) that shows that the strokes of the two lift rams are not exactly equal. The rams are adjustable. Proceed as follows.
- 5.1.2 With the main boom raised about half way, support the boom securely and relieve completely the pressure in the hydraulic system.
- 5.1.3 Remove the locating pin from the top of the selected ram. A 5/8in UNC extraction hole is provided to allow the use of a puller or slide hammer.
- 5.1.4 Slacken one of the hydraulic hose connections to relieve any residual pressure, allowing the ram to be manually closed enough to give room to work.
- 5.1.5 Slacken the lock nut at the top of the ram (see Figure 33) and adjust the stroke by screwing the rod end in or out as required.
- 5.1.6 Tighten the lock nut, and refit the ram locating pin.
- 5.1.7 Test to verify the adjustment has been effective.

**5.2 FOLDING BOOM COUNTER-BALANCE VALVE ADJUSTMENT**

The folding ram is not intended to lift a load other than its own weight. To protect it against damage should a load be inadvertently be applied, a counterbalance valve is fitted to it. This item is adjustable, and if the folding boom has a tendency to creep down from a raised position, its setting can be increased as follows:

- 5.2.1 Lower the folding boom against its stops.
- 5.2.2 Remove the left hand fairlead roller if fitted, or the boom end cover plate if fitted.
- 5.2.3 Reach down to locate the valve mounted at the top of the folding ram.
- 5.2.4 Remove the cap nut using a 22mm wrench.
- 5.2.5 Adjust the valve using a 8mm allen key. Screwing down will increase the setting.
- 5.2.6 If the folding boom still will not remain upright when not in use, and there is no more adjustment on the counterbalance valve, then the hydraulic system probably needs overhaul.

**REPAIRS****6.1     REPAIRS.**

- 6.1.1     Many repairs can be effected by simple component replacement. Please use only approved replacements, from the spares list published in this book. The use of non-approved spare parts may render the maker's warranty invalid.
- 6.1.2     When replacing a component in the hydraulic system, strict care must be taken not to introduce dirt into the system. The area surrounding the part being replaced should be cleaned meticulously before breaking the system open.
- 6.1.3     It is recommended that structural repairs involving welding should be carried out only by the manufacturer. The work will be carried out by certified welders, and the unit must be proof tested before being returned to use.
- 6.1.4     As soon as seepage from a hydraulic ram is noticed, the seals should be replaced. If the ram has been in use for a great length of time, it would probably benefit from a complete overhaul. Boniface Engineering can arrange for that.
- 6.1.5     Modifications should only be carried out in agreement with the designers at Boniface Engineering Ltd.

NOTE:

The version shown here has outboard support legs. Other versions are with inboard legs or no legs at all. This illustration shows the bare construction of the legs, although when built into body work the outer structure of the legs will get absorbed into the body styling.

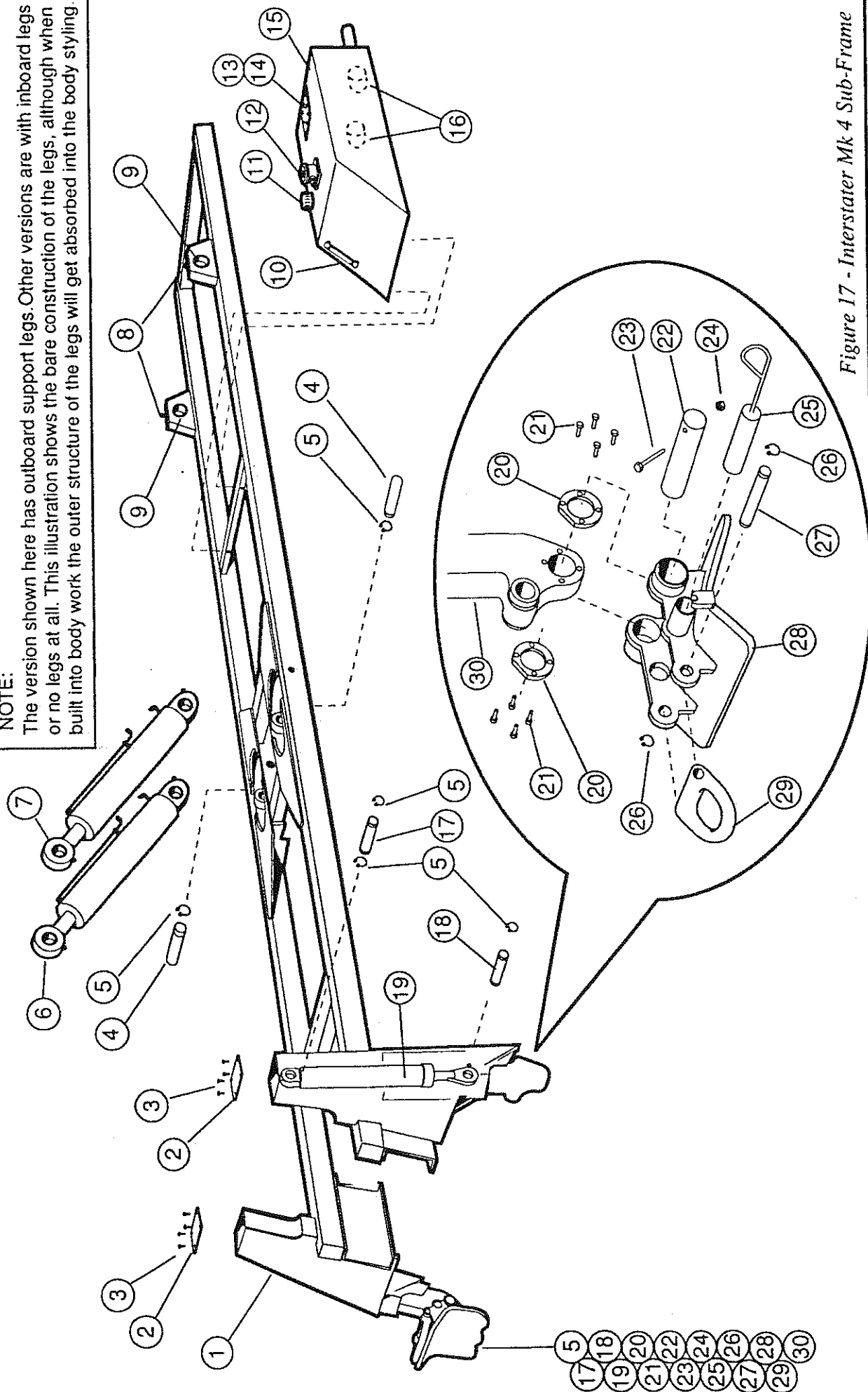


Figure 17 - Interstater Mk 4 Sub-Frame

## SPARES

## 1. SUBFRAME

ITEM No	DESCRIPTION	QTY
1	Subframe	1
2	Leg Housing Cover Plate	2
3	Fixing Screws	8
4	Lift Ram Locating Pin (Lower)	2
5	Circlips 1 1/2in i.d.	8
6	Lift Ram R.H.	1
7	Lift Ram L.H.	1
8	Grease Nipples Straight	2
9	Spherical Bearing	2
10	Sight Glass	1
11	Hydraulic Filler Cap	1
12	Hydraulic Filter Unit	1
12A	Filter Element (Not Illustrated)	1
13	Inspection Cover	1
14	Fixing Screws	8
15	Hydraulic Tank	1
16	Strainers (Inside Tank)	2
17	Leg Ram Locating Pin Upper	2
18	Leg Ram Locating Pin (Lower)	2
19	Leg Hydraulic Ram	2
20	Retaining Ring	2
21	Fixing Screws	8
22	Foot Pivot Pin	2
23	Retaining Bolt	2
24	Nut	2
25	Foot Locking Pin	2
26	Circlip	4
27	Anchor Retaining Pin	2
28	Swivelling Foot	2
29	Anchor Point Eye	2
30	Support Leg (Inner)	



Figure 18 - Interstate M4 Main Boom

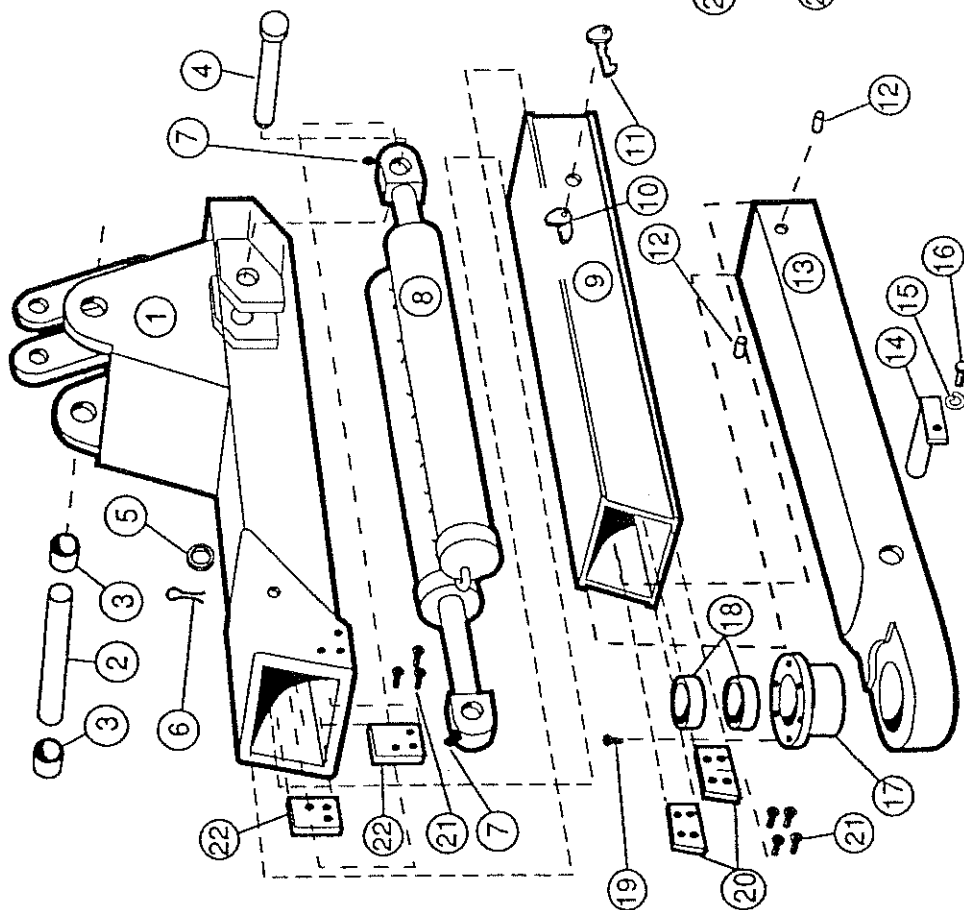
## SPARES

## 2. MAIN BOOM

ITEM No	DESCRIPTION	QTY
1	Main Boom	1
2	Down Boom Pivot Pin	1
3	Lift Ram Retaining Plate	2
4	C/S Socket Screw	2
5	Key Plate	1
6	Retaining Bolts	2
7	Main Boom Pivot Bushes	2
8	Main Boom Pivot Pin	1
9	Locating Bolt	4
10	Swing Ram Locating Pin - Body End	1
11	Fixing Screws	12
12	Ram End Adjusters	2
13	Swing Ram	1
14	Hose Clip, Large	1
15	Gaiter	1
16	Hose Clip, Small	1
17	Retaining Plate	1
18	Swing Ram Pivot Pin - Rod End	1
19	Spring Washer	1
20	Fold Ram Locating Pin - Body End	1
21	Split Pins	2
22	Fold Ram Pivot Pin - Rod End	1
23	Fold Ram	1
24	Rubber Stops	2
25	Nuts	2
26	Folding Boom Locking Pin	1
27	Down Boom	1
28	Down Boom Pivot Bushes	2
29	Pin Retaining Plate	1



TYPE 'E' UNDERREACH BOOM



TYPE 'F' UNDERREACH BOOM

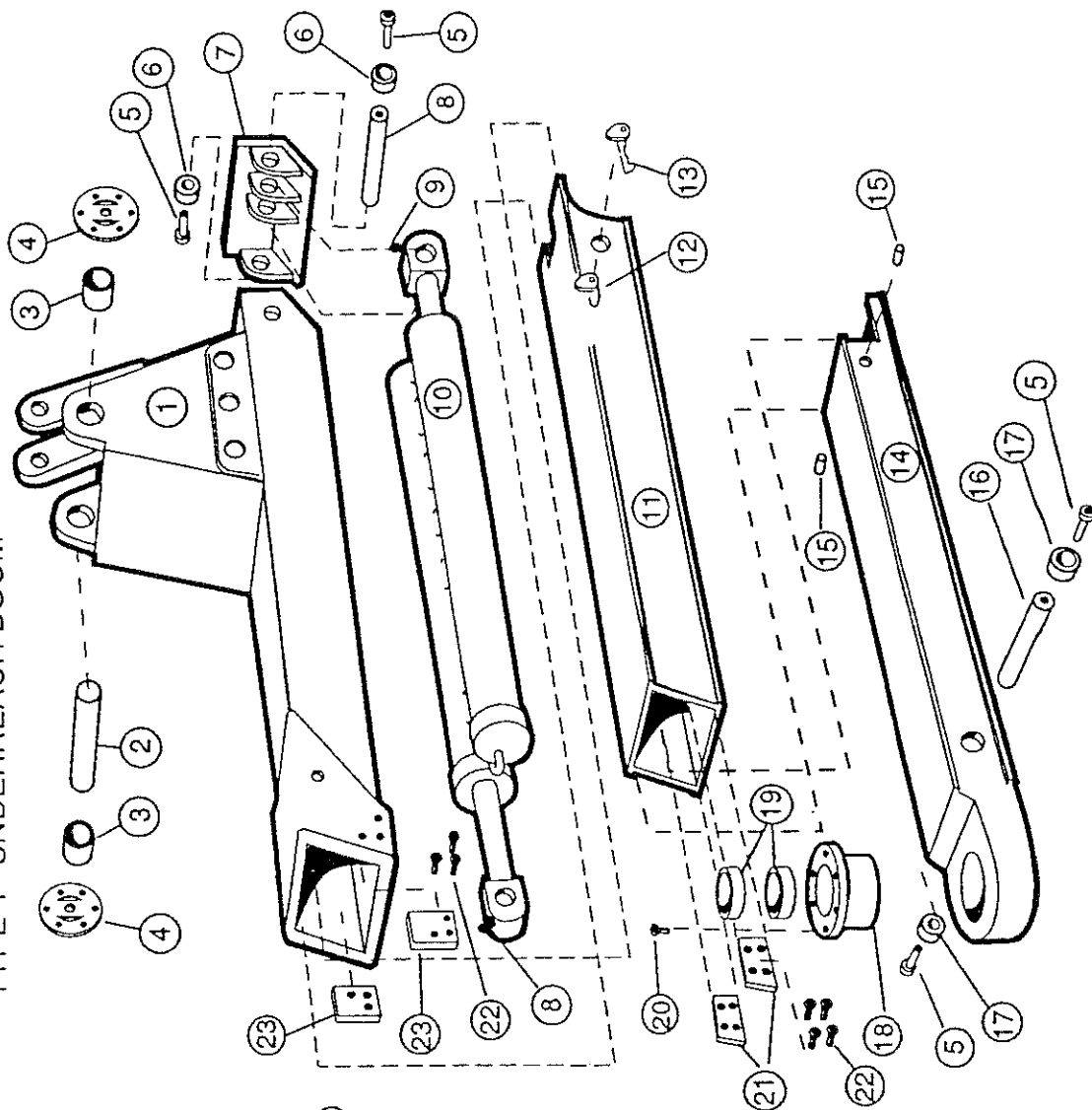


Figure 19 - Underreach Booms

## SPARES

## 3. UNDERREACH BOOMS

ITEM No	DESCRIPTION	QTY
	Type 'E' UNDERREACH BOOM	
1	Folding Boom	1
2	Folding Boom Pivot Pin	1
3	Folding Boom Bearing	2
4	Extend Ram Pivot Pin - Body End	1
5	Washer	1
6	Split Pin	1
7	Grease Nipple	2
8	Extend Ram	1
9	Extending Boom First Stage	1
10	Interlock Stop Assembly	1
11	Interlock Hook Assembly	1
12	Actuating Pin	2
13	Extending Boom Second Stage	1
14	Extend Ram Pivot Pin (Outer)	1
15	Spring Washer	1
16	Fixing Screw	2
17	Crosshead Bearing Housing	1
18	Crosshead Bearing Bushes	2
19	Fixing Screws	6
20	Bearing Plates (Inner)	2
21	Fixing Screws	14
22	Bearing Plates (Outer)	2
	Type 'F' UNDERREACH BOOM	
1	Folding Boom	1
2	Folding Boom Pivot Pin	1
3	Folding Boom Bearing	2
4	Retaining Plate	2
5	Fixing Screw	4
6	Cup Washer	2
7	Boom End Plate	1
8	Extend Ram Pivot Pin - Body End	1
9	Grease Nipple	2
10	Extend Ram	1
11	Extending Boom First Stage	1
12	Interlock Stop Assembly	1
13	Interlock Hook Assembly	1
14	Extending Boom Second Stage	1
15	Actuating Pin	2
16	Extend Ram Pivot Pin - Rod End	1
17	Cup Washer	1
18	Crosshead Bearing Housing	1
19	Crosshead Bearing Bushes	2
20	Fixing Screws	6
21	Bearing Plates (Inner)	2
22	Fixing Screws	14
23	Bearing Plates (Outer)	2

**4. FAIRLEAD & ROPE TENSIONER**

ITEM No	DESCRIPTION	QTY
1	Body	1
2	Tab Washer	1
3	Nut	1
4	Tension Arm - Outer	1
5	Tension Arm - Inner	1
6	Rope Tension Cylinder	1
7	Tension Roller Pivot Bolt	1
8	Washer	2
9	Tension Roller	2
10	Sheave Pivot Pin	1
11	Tension Roller Bearing	2
12	Nut	1
13	Washer	1
14	Retaining Bolt	1
15	Snout	1
16	Sheave	1
17	Sheave Bearing	1
18	Tension Arm Bearing	1

NOTE: Quantities are given for one Fairlead

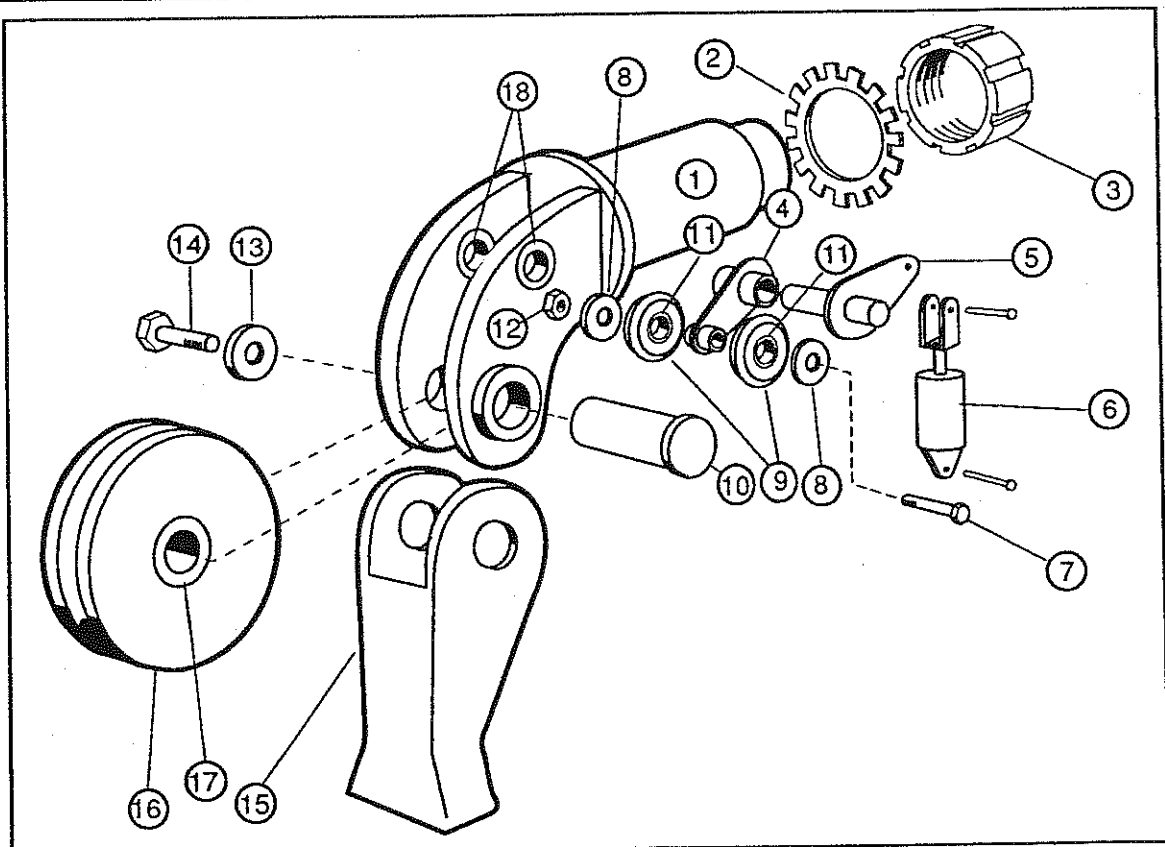


Figure 20 - Fairlead

**PART 7**  
**SPARES**

**INTERSTATER Mk 4**

**5. LIFTING EQUIPMENT**

ITEM No	DESCRIPTION	QTY
1	Crosshead	1
2	Crosshead Pivot Pin	1
3	Crosshead Pin Retaining Plate	1
4	Crosshead Locking Pin	1
5	Securing Bolts	1
6	Pedestal Safety Pin c/w 'R' clips	2
7	Low Pedestal	2
8	High Pedestal	2
9	6" Forks (07-01)	2
10	4.5" Forks (07-02)	2
11	7" Forks (07-06)	2
12	Chain Forks	2
13	Chains c/w Grab Hooks 16mm	2
14	Chains c/w Grab Hooks 7mm	4
15	Hand Ratchets	2
16	Straps	2

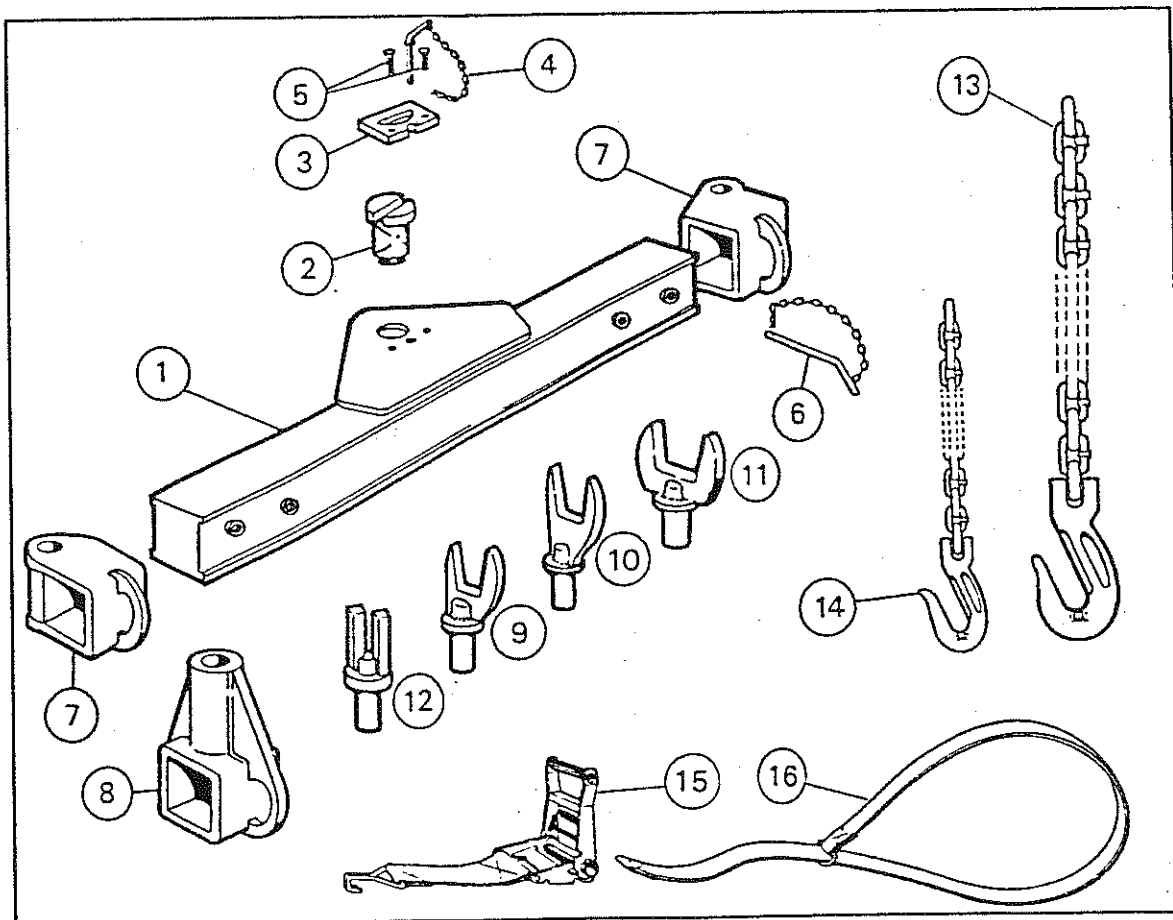


Figure 21- Lifting Equipment

## SPARES

## 6. WHEEL FRAMES

ITEM No	DESCRIPTION	QTY
	<b>SUPER HEAVY DUTY WHEEL FRAMES (ONE PAIR)</b>	
1	Frame Body L.H.	1
	Frame Body R.H.	1
2	Rear Support Plate L.H.	1
	Rear Support Plate R.H.	1
3	Rear Support Locking Pin	2
4	Front Support Tube	2
5	Support Tube Locking Pin	2
6	Frame-Crosshead Locking Pin	2
	<b>HEAVY DUTY ('EURO') WHEEL FRAMES (ONE PAIR)</b>	
7	Frame Body	2
8	Frame Arms	4
9	Spacer Bars	4
10	Spring Clips	4
11	Arm-Body-Crosshead Locking Pins	4
	<b>RESTRAINING STRAPS c/w RATCHETS AND HOOKS</b>	
12	For Super Heavy Wheel Frames	2
	For Heavy ('Euro') Wheel Frames	2

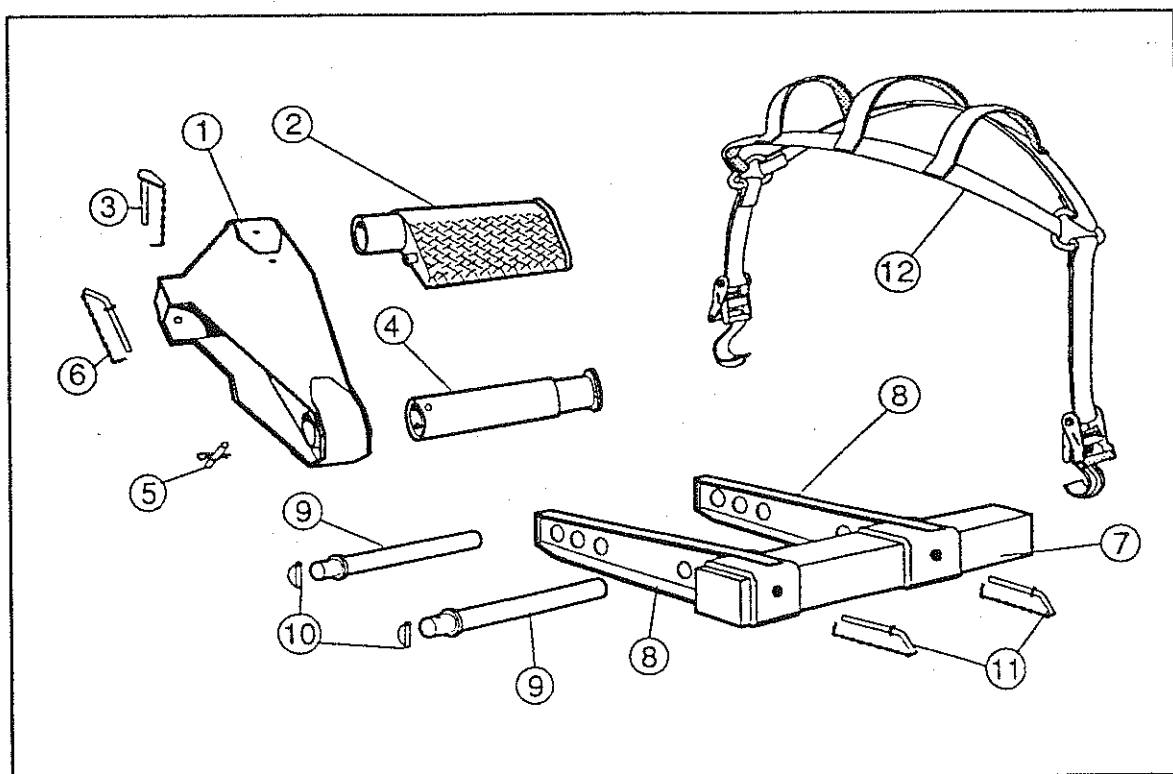
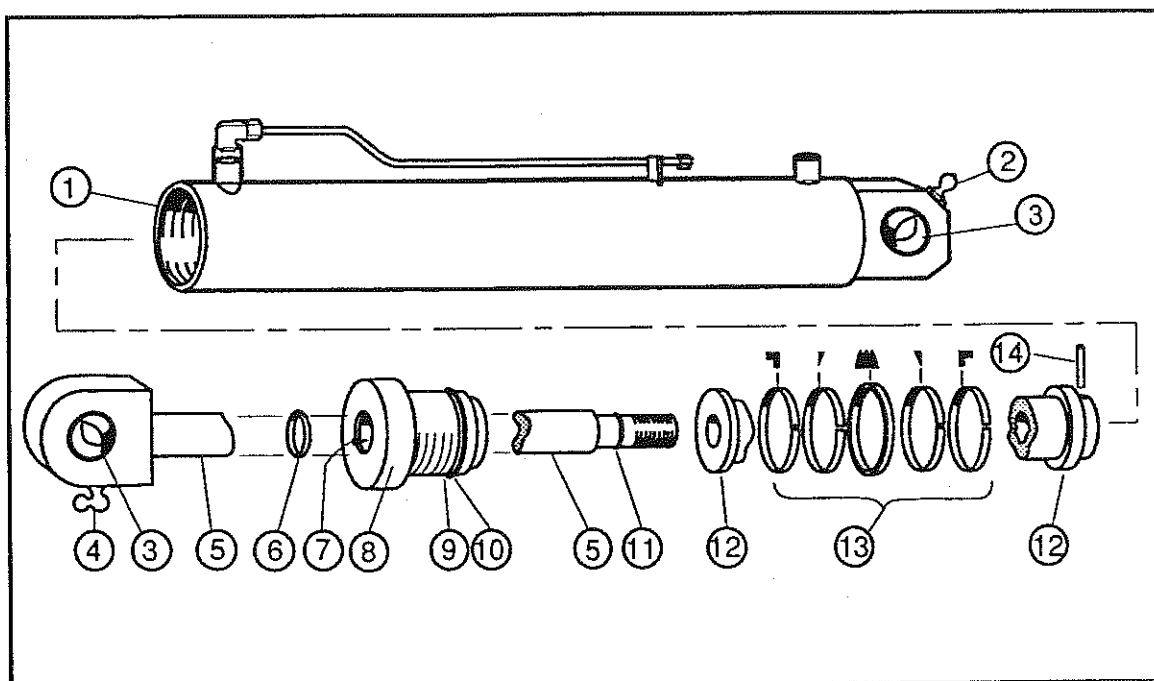


Figure 22 - Wheel Frames

**7. HYDRAULIC RAM - LIFT, NON-ADJUSTABLE**

ITEM No	DESCRIPTION	QTY
1.	Body	1
2.	Grease Nipple Straight	1
3.	Spherical Bearing	2
4.	Grease Nipple 90°	1
5.	Piston Rod	1
6.	Wiper Seal	1
7.	Gland Seal	1
8.	Gland	1
9.	Back-up Ring	1
10.	Gland 'O' Ring	1
11.	Piston 'O' Ring	1
12.	Piston Head	1
13.	Piston Seal Set - 5 Items	1
14.	Roll Pin 6mm	



*Figure 23 - Lift Ram (Non-adjustable)*

## SPARES

## 8. HYDRAULIC RAM - LIFT, ADJUSTABLE

ITEM No	DESCRIPTION	QTY
1.	Body	1
2.	Grease Nipple Straight	1
3.	Spherical Bearing	2
4.	Grease Nipple 90°	1
5.	Piston Rod End	1
6.	Lock Nut	1
7.	Wiper Seal	1
8.	Piston Rod	1
9.	Gland Seal	1
10.	Gland	1
11.	Back-up Ring	1
12.	Gland 'O' Ring	1
13.	Piston 'O' Ring	1
14.	Piston Head	1
15.	Piston Seal Set - 5 Items	1
16.	Roll Pin 6mm	

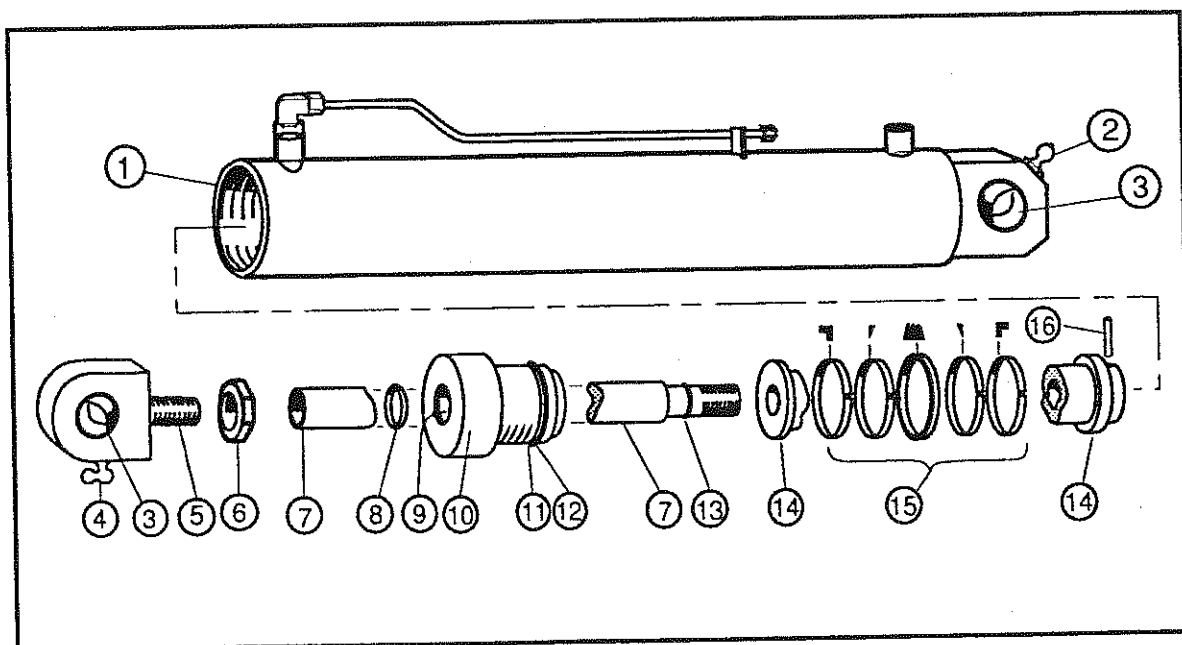


Figure 24 - Lift Ram (Adjustable)

## SPARES

## 9. HYDRAULIC RAM - SUPPORT LEGS

ITEM No	DESCRIPTION	QTY
1.	Body	1
2.	Grease Nipple Straight	2
3.	Spherical Bearing	2
4.	Piston Rod	1
5.	Wiper Seal	1
6.	Gland Seal	1
7.	Gland	1
8.	Back-up Ring	1
9.	Gland 'O' Ring	1
10.	Piston 'O' Ring	1
11.	Piston Head	1
12.	Piston Seal Set - 5 Items	1
13.	Piston Retaining Nut	1
14.	Blanking Screw	1
15.	Washer	1
16.	Check Valve Piston	1
17.	Sealing Ring	1
18.	Spring	1
19.	Back-Up Ring	1
20.	'O' Ring	1
21.	'O' Ring	1
22.	Check Valve	1

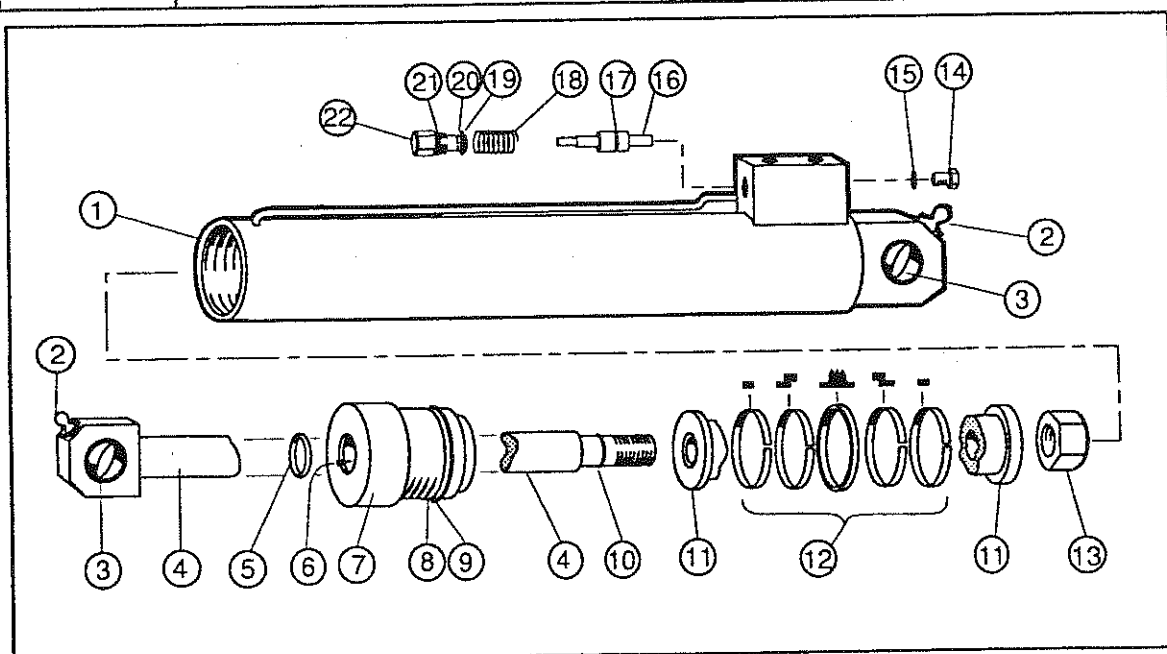


Figure 25 - Leg Ram



## SPARES

## 10. HYDRAULIC RAM - FOLD, TYPE 'E' BOOM

ITEM No	DESCRIPTION	QTY
1.	Body	1
2.	Sealing Ring	1
3.	Piston Rod	1
4.	Grease Nipple Straight	1
5.	'O' Ring	1
6.	Gland	1
7.	Gland Seal	1
8.	Back-Up Ring	1
9.	Wiper Seal	1
10	Counterbalance Valve.	1

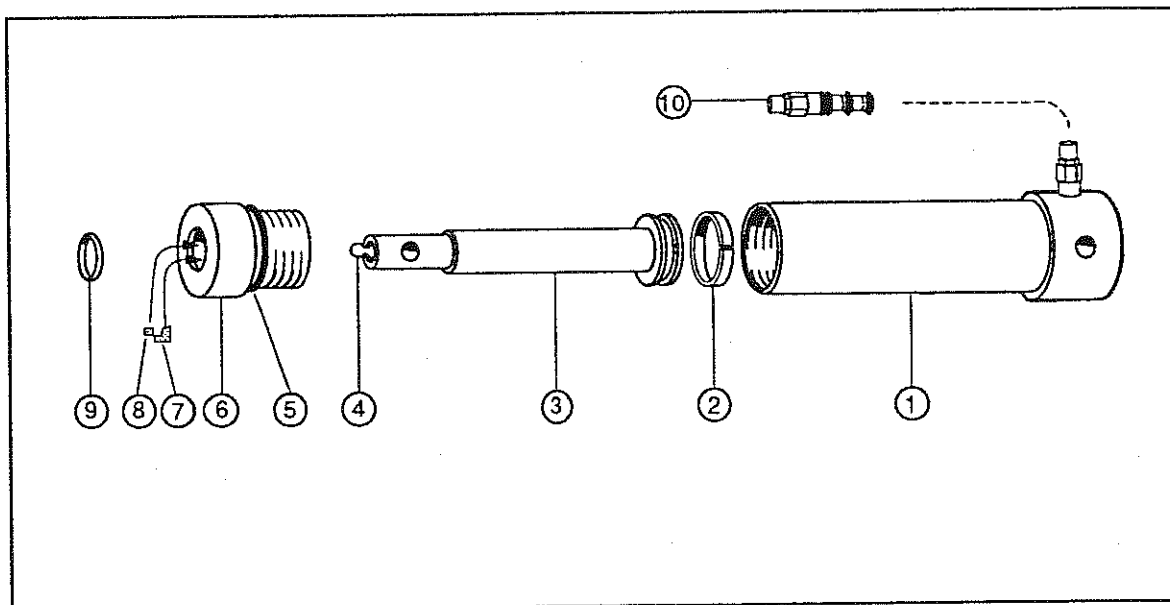


Figure 26 - Fold Ram

**IMPORTANT NOTE:** Although the Spare Parts List and the Illustration of this hydraulic ram appears to be the same as that for the Type 'F' extending boom, they are of different sizes. When ordering spares be sure to quote which extending boom you have.

## SPARES

## 11. HYDRAULIC RAM - FOLD, TYPE 'F' BOOM

ITEM No	DESCRIPTION	QTY
1.	Body	1
2.	Sealing Ring	1
3.	Piston Rod	1
4.	Grease Nipple Straight	1
5.	'O' Ring	1
6.	Gland	1
7.	Gland Seal	1
8.	Back-Up Ring	1
9.	Wiper Seal	1
10	Counterbalance Valve.	1

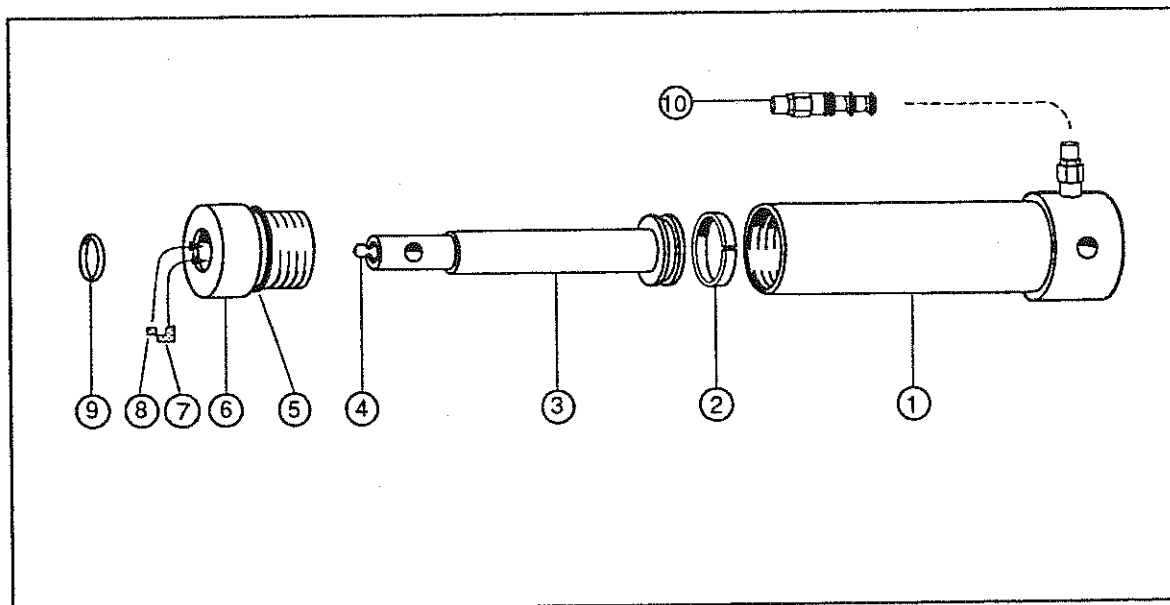


Figure 27- Fold Ram

**IMPORTANT NOTE:** Although the Spare Parts List and the Illustration of this hydraulic ram appears to be the same as that for the Type 'E' extending boom, they are of different sizes. When ordering spares be sure to quote which extending boom you have.

## SPARES

## 12. HYDRAULIC RAM - EXTEND TYPE 'E' BOOM

ITEM No	DESCRIPTION	QTY
1.	Body - Special	1
2.	Spherical Bearing	4
3.	Grease Nipple Straight	4
4.	Grub Screw	2
5.	Piston Rod	2
6.	Gland Cap	2
7.	Wiper Seal	2
8.	Gland	2
9.	Gland Seal	2
10.	Back-up Ring	2
11.	Gland 'O' Ring	2
12.	Piston 'O' Ring	2
13.	Piston Head Top	2
14.	Piston Seal Set - 5 Items	2
15.	Piston Head Threaded	2
16.	Roll Pin 3mm	2
17.	Integral Pilot Operated Check Valve	1

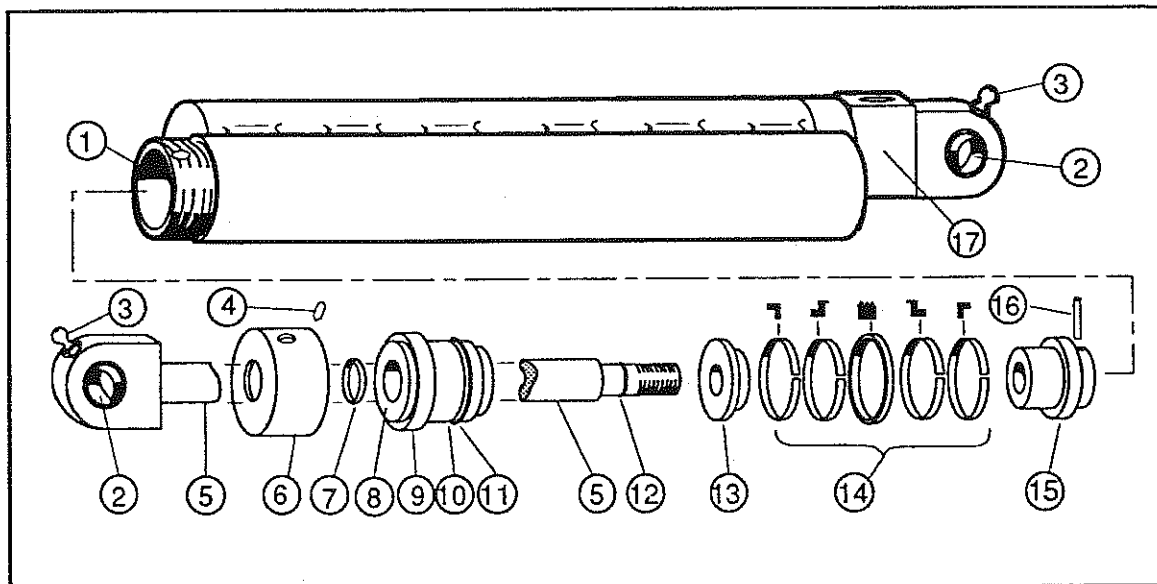
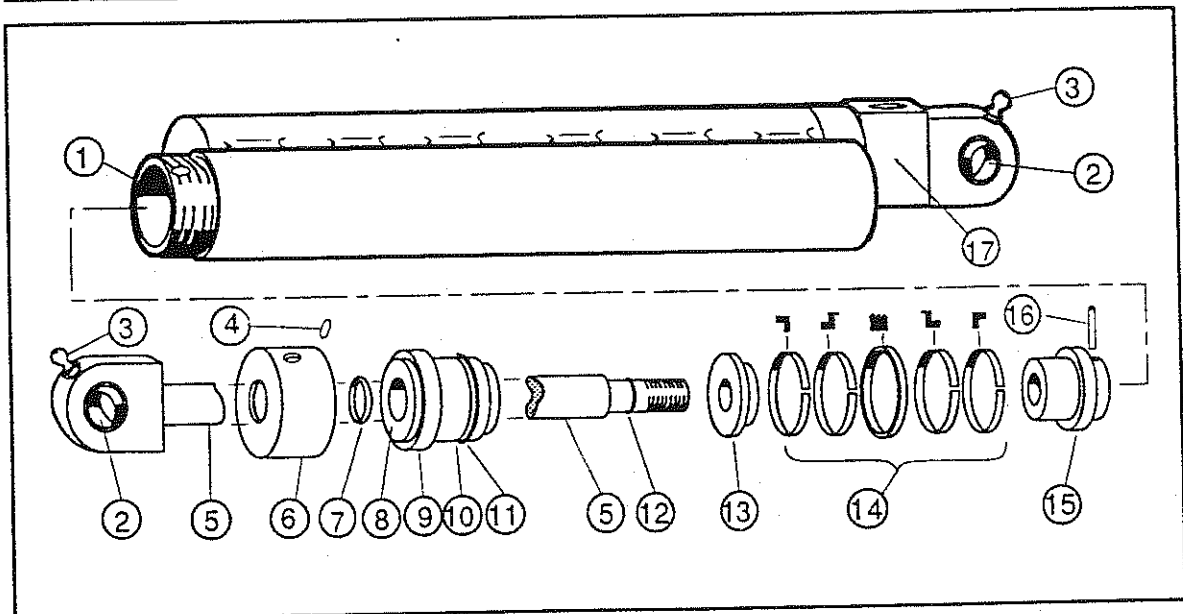


Figure 28 - Extend Ram, Type E Boom

**IMPORTANT NOTE:** Although the Spare Parts List and the Illustration of this hydraulic ram appears to be the same as that for the Type 'F' extending boom, they are of different sizes. When ordering spares be sure to quote which extending boom you have.

**13. HYDRAULIC RAMS SPECIAL - EXTENDING TYPE 'F' Boom**

ITEM No	DESCRIPTION	QTY
1	Body - Special	1
2	Spherical Bearing	4
3	Grease Nipple Straight	4
4	Grub Screw 6mm	2
5	Piston Rod	2
6	Gland Cap	2
7	Wiper Seal	2
8	Gland	2
9	Gland Seal	2
10	Back Up Ring	2
11	Gland 'O' Ring	2
12	Piston 'O' Ring	2
13	Piston Head Top	2
14	Piston Seal Set - 5 items	2
15	Piston Head Threaded	2
16	Roll Pin 3mm	2
17	Integral Pilot Operated Check Valve	1



**Figure 29 - Hydraulic Ram, Type 'F' Extending Boom**

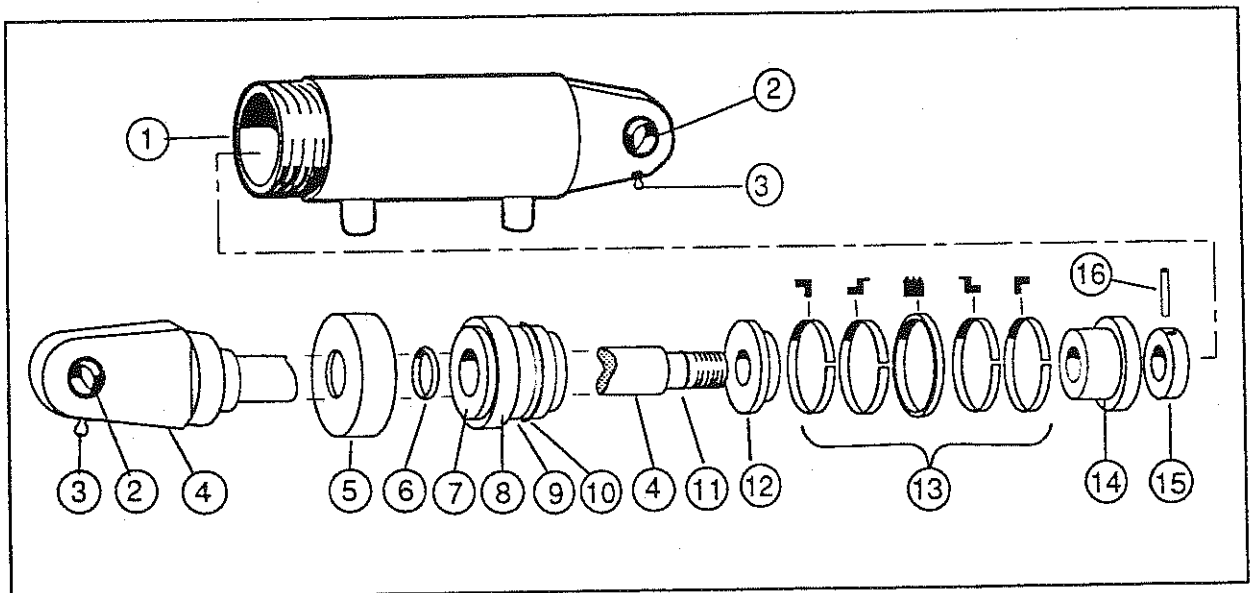
**IMPORTANT NOTE:** Although the Spare Parts List and the Illustration of this hydraulic ram appears to be the same as that for the Type 'F' extending boom, they are of different sizes. When ordering spares be sure to quote which extending boom you have.

**PART 7**  
**SPARES**

**INTERSTATER Mk 4**

**14 HYDRAULIC RAM - SWING**

ITEM No	DESCRIPTION	QTY
1	Body	1
2	Spherical Bearing	1
3	Grease Nipple Straight 1/8in BSP	1
4	Piston Rod	1
5	Gland Cap	1
6	Wiper Seal	1
7	Gland	1
8	Gland Seal	1
9	Back-Up Ring	1
10	Gland 'O' Ring	1
11	Piston 'O' Ring	1
12	Piston (Top)	1
13	Piston Seal Set - 5 items	1
14	Piston Body	1
15	Threaded Retainer	1
16	Roll Pin	1



*Figure 30 - Hydraulic Ram, Swing Boom*

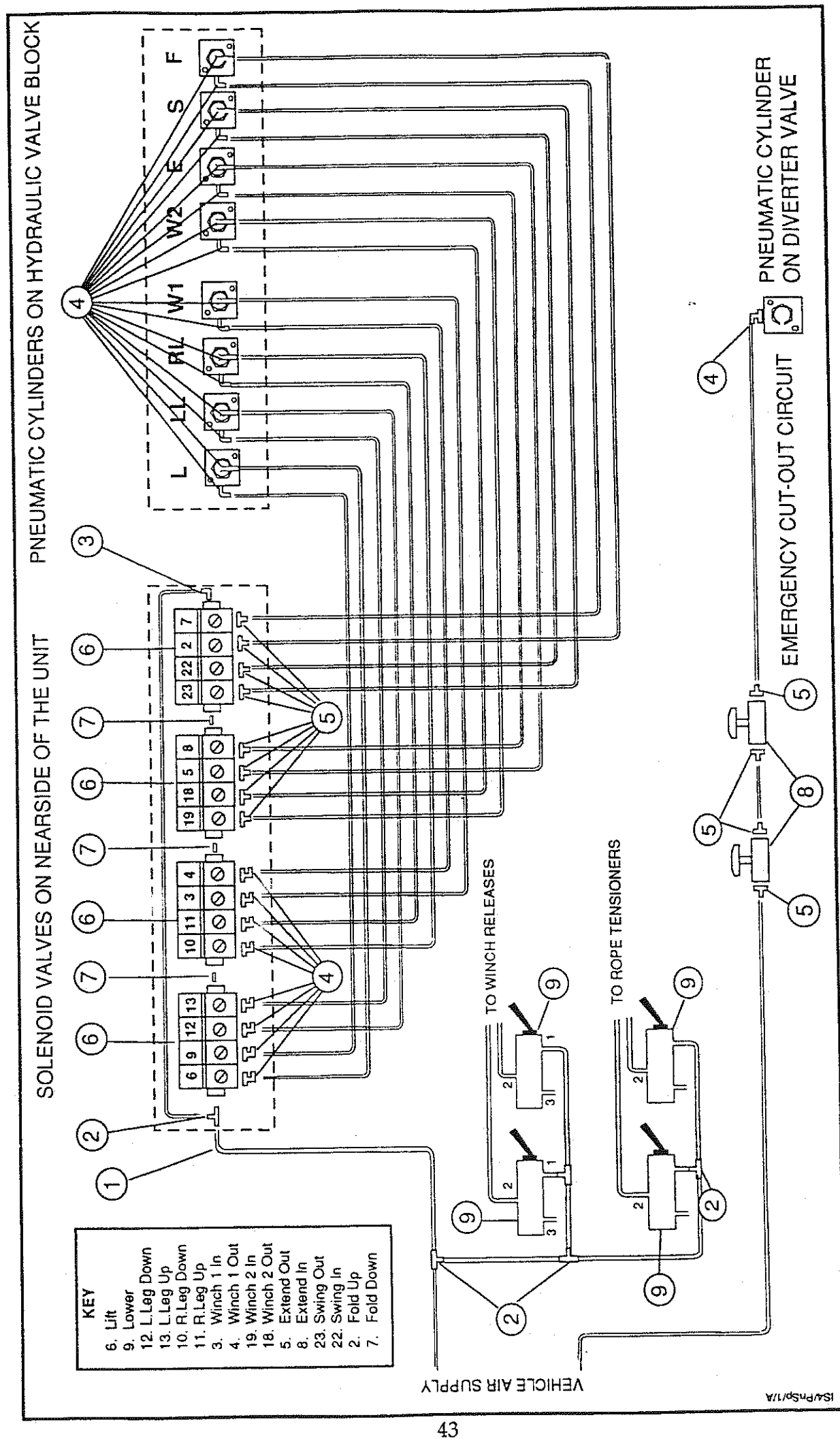


Figure 31 - Pneumatic Components

**PART 7**  
**SPARES**

**INTERSTATER Mk 4**

**15. PNEUMATIC COMPONENTS**

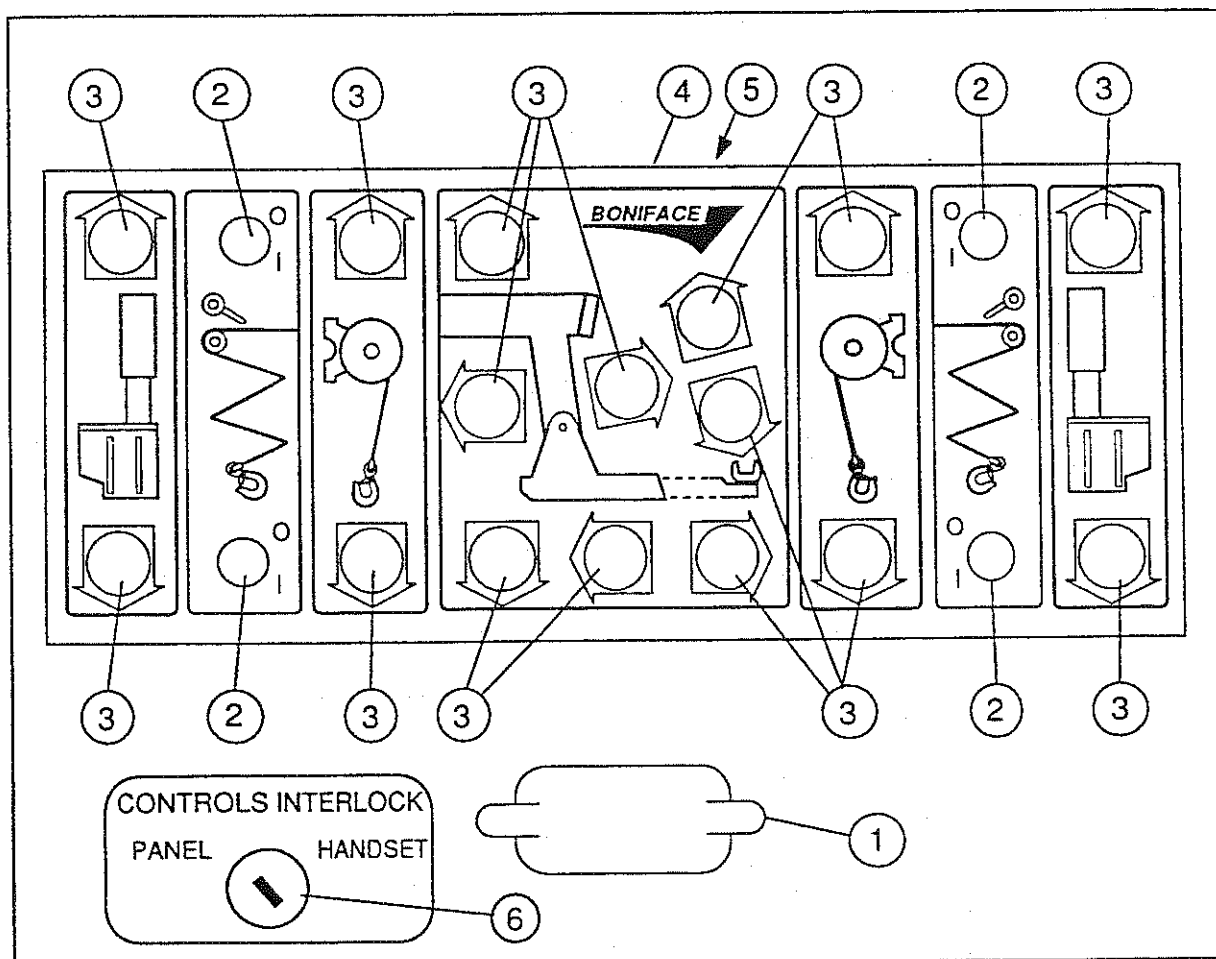
ITEM No	DESCRIPTION	QTY
1	Nylon Pneumatic Tubing	5
2	Tee	1
3	Elbow	25
4	Elbow	12
5	Connector, Straight	4
6	4 Bank Solenoids	3
7	Adapter	2
8	Pneumatic Emergency Switch	4
9	Pneumatic Toggle Switch	2
10	Rope Tension Cylinder (See Figure 20)	

**PART 7**  
**SPARES**

**INTERSTATER Mk 4**

**16. ELECTRICAL COMPONENTS (CONTROL PANEL)**

ITEM No	DESCRIPTION	QTY
1	16 Pin Socket	1
2	Toggle Switch	4
3	Push Switch	16
4	Front Panel	1
5	Steel Box	1
6	Key Switch (c/w 2 keys)	1



*Figure 32 - Control Panel Spares*



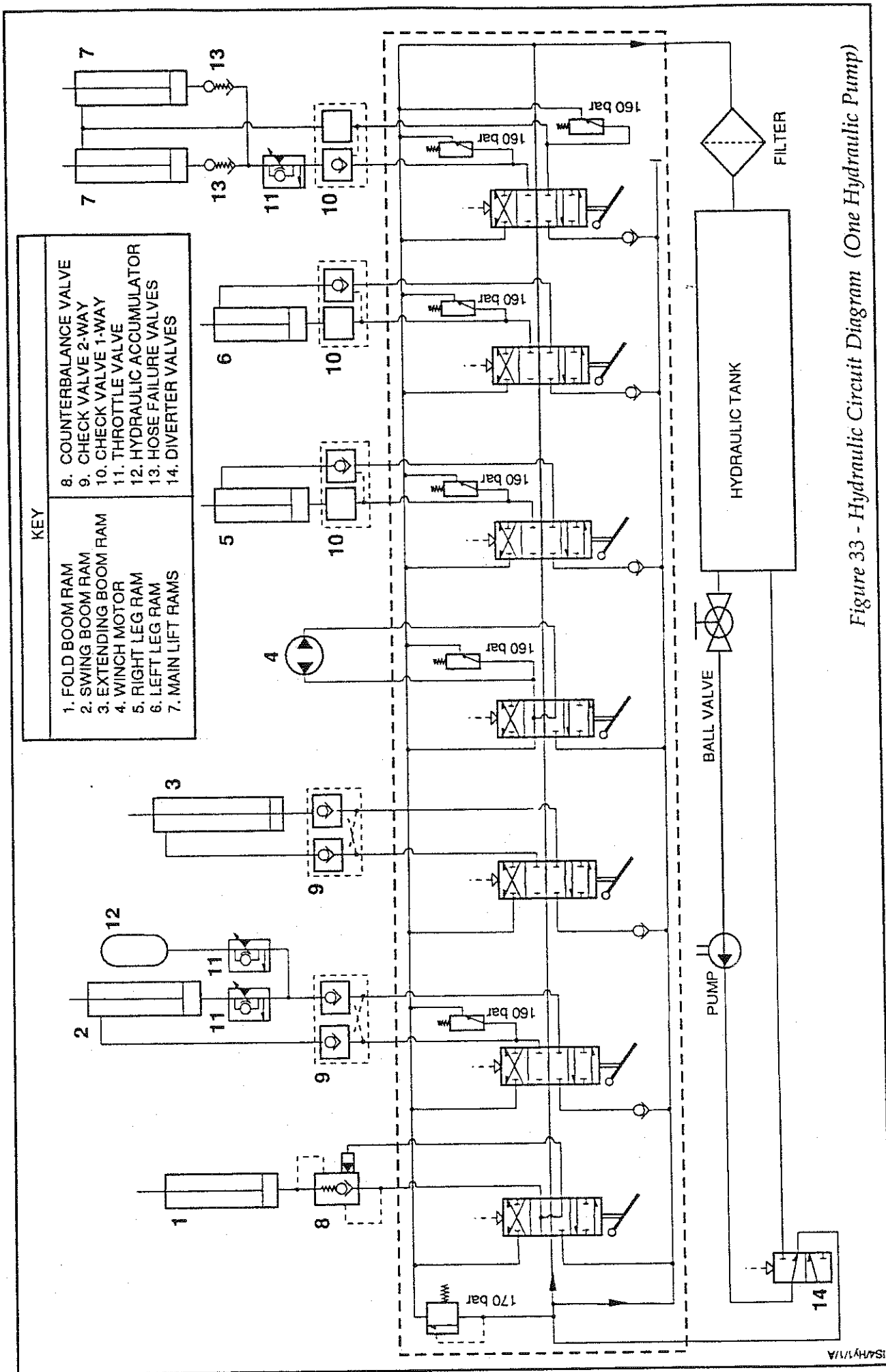


Figure 33 - Hydraulic Circuit Diagram (One Hydraulic Pump)

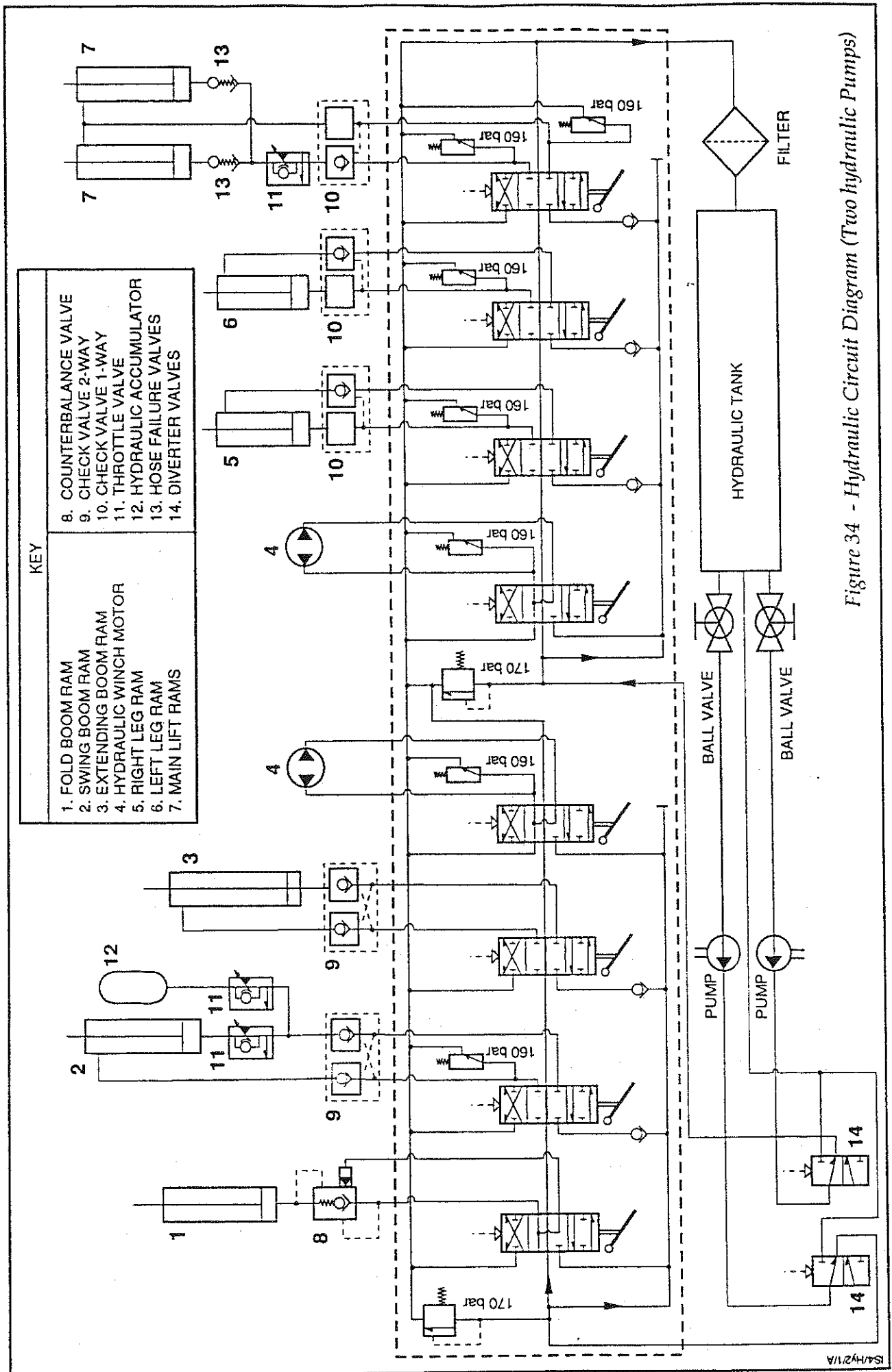


Figure 34 - Hydraulic Circuit Diagram (Two hydraulic Pumps)

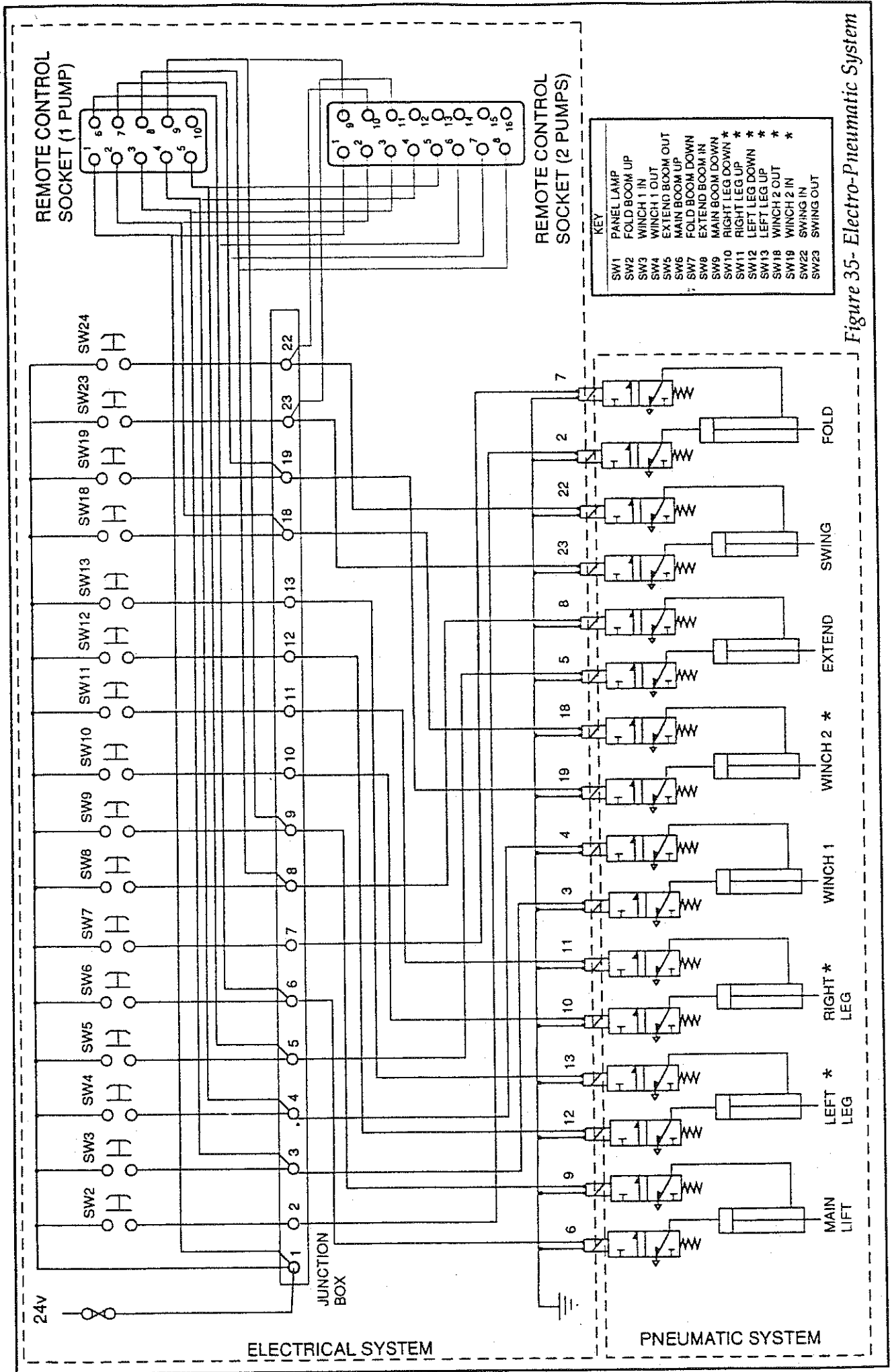


Figure 35- Electro-Pneumatic System

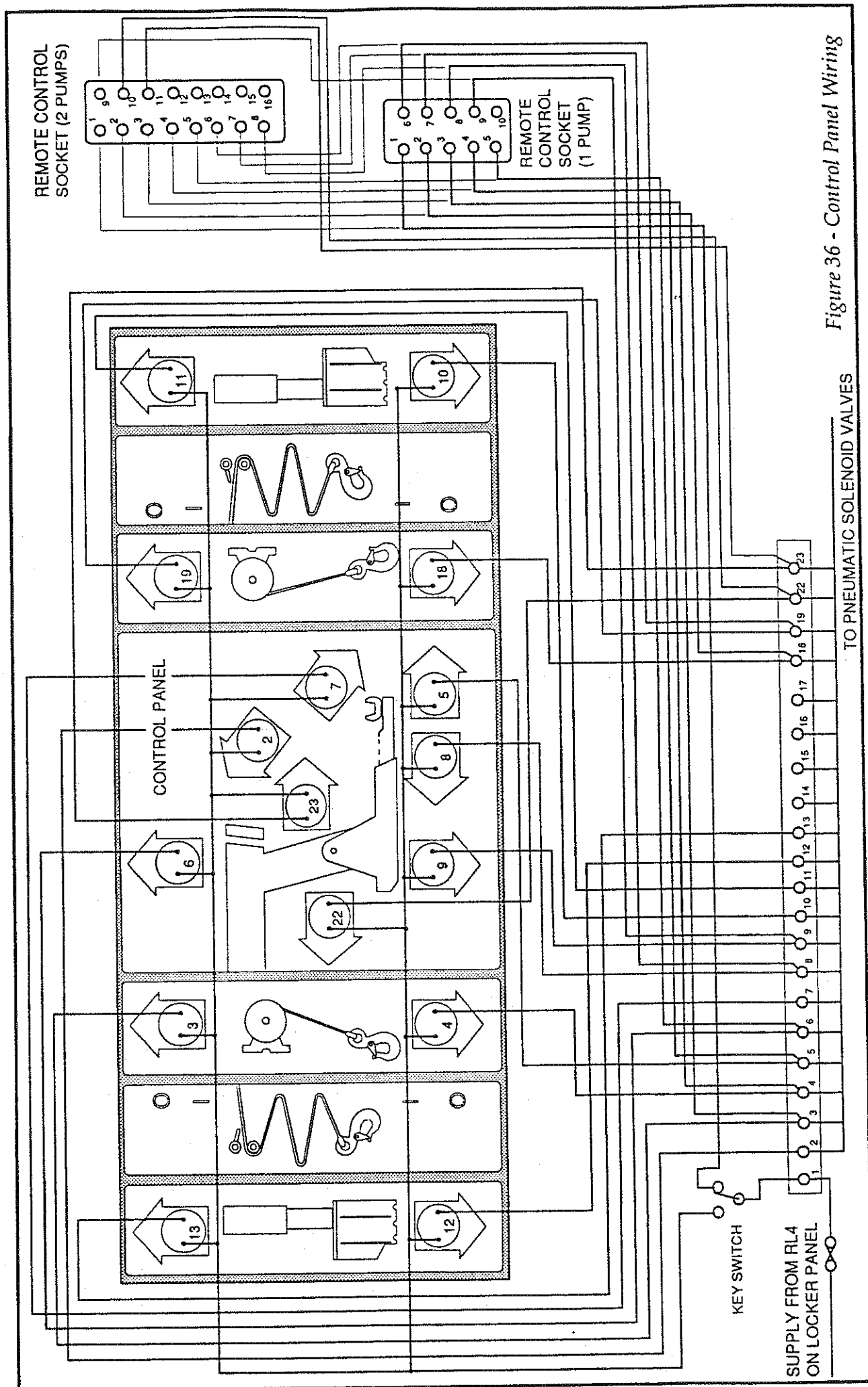


Figure 36 - Control Panel Wiring

### CIRCUIT DIAGRAMS

#### NOTES:

1. The Extra Beacon is optional (incl. Cab-Switch, RL6 etc)
2. The PTO circuit is for when the PTO is fitted by Boniface Engineering

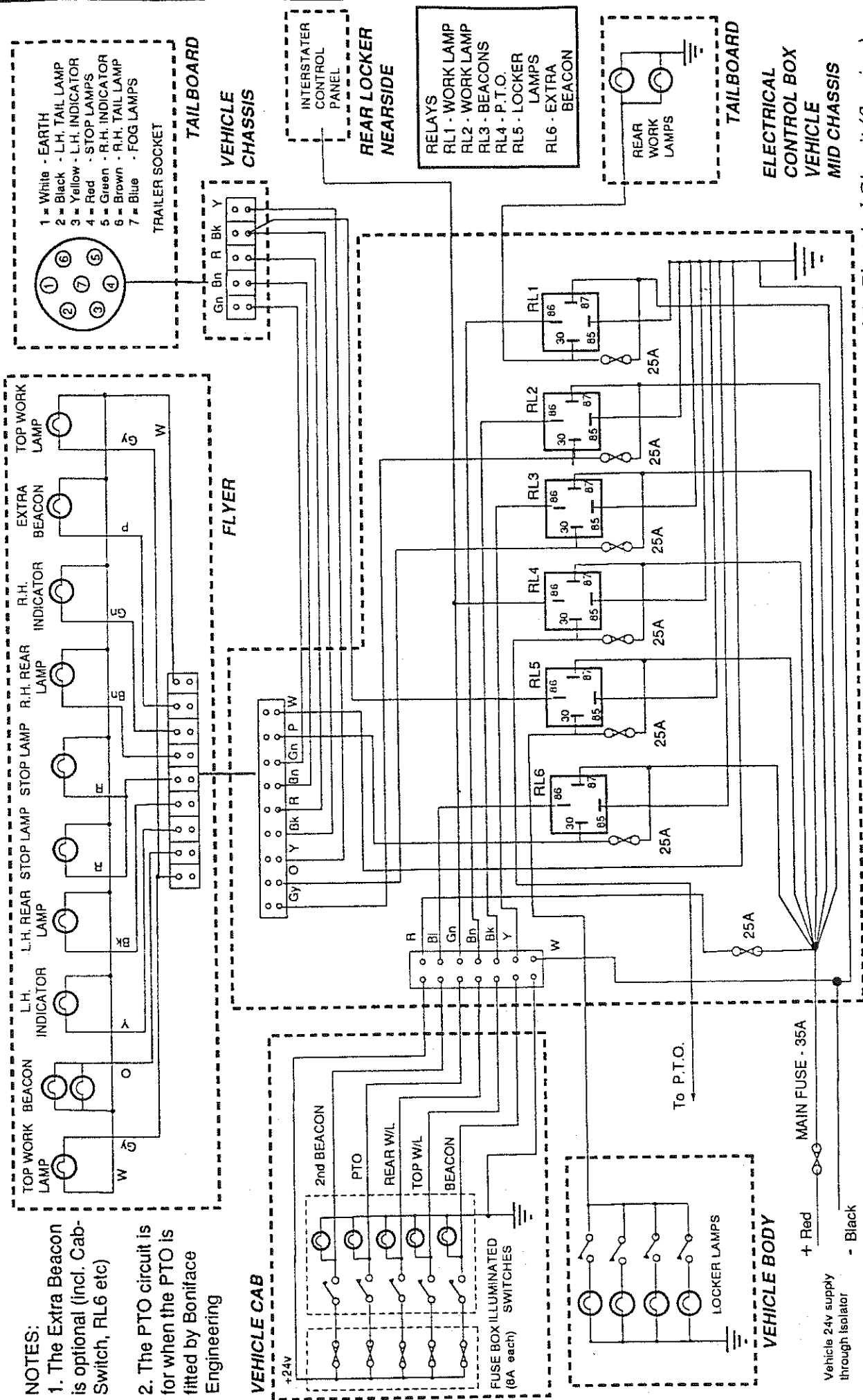


Figure 37 - Electrical Circuit (Services)

## CIRCUIT DIAGRAMS

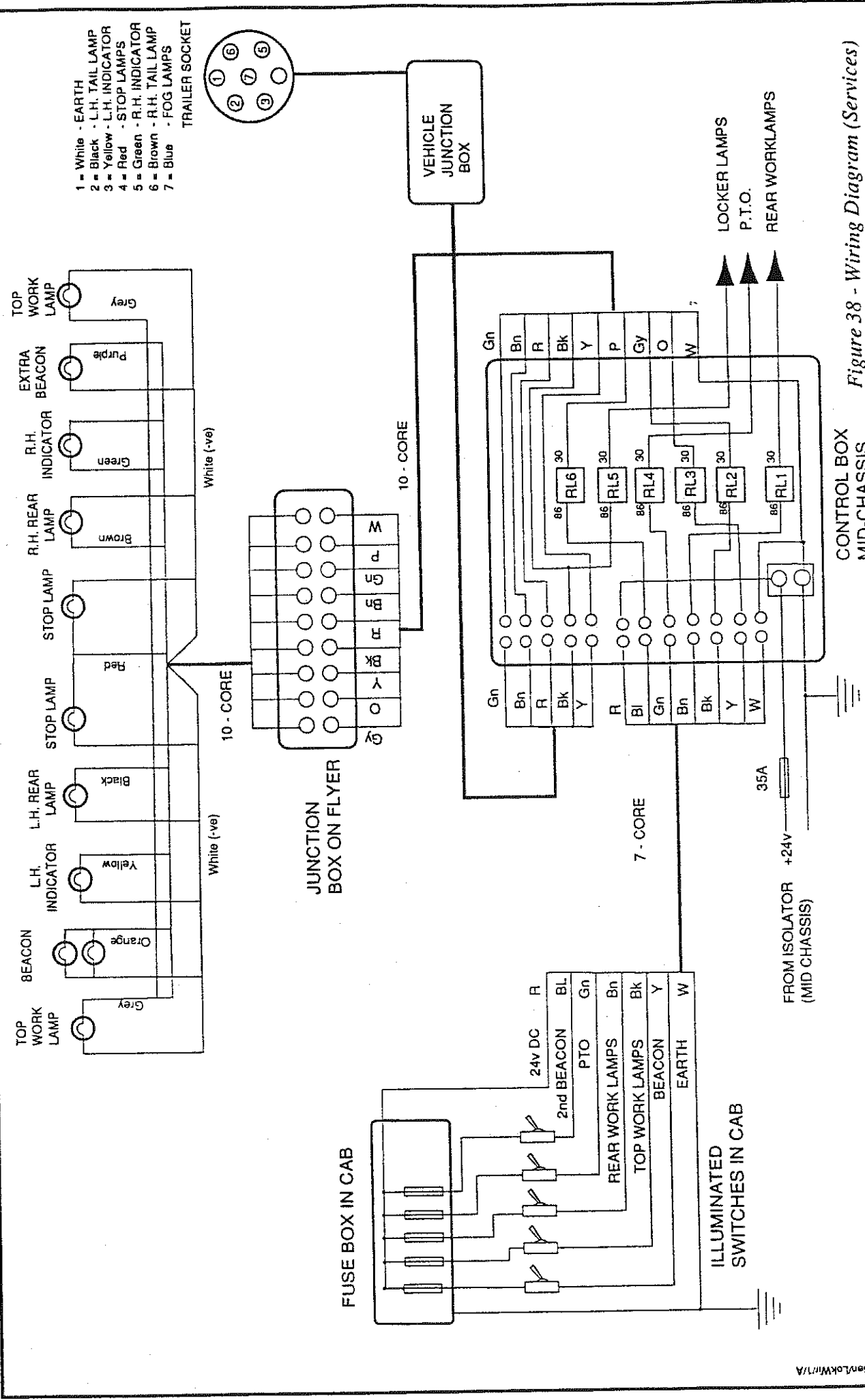


Figure 38 - Wiring Diagram (Services)

# WEIGHTS OF LOOSE EQUIPMENT

ITEM	FIGNo	ITEM	PARTNo	WEIGHT
STANDARD CROSSHEAD	23	1-5	06-035	73Kg.
LOW PEDESTAL	23	7	07-009	11Kg.
HIGH PEDESTAL	23	8	07-105	10kg.
6in FORK	23	9	07-001	9Kg.
4.5in FORK	23	10	07-002	7Kg.
7in LOW FORK	23	11	07-006	8Kg.
16mm CHAIN FORK	23	12	07-177	5Kg.
16mm LIFT CHAIN complete	23	13	21-SS-002	19Kg.
7mm SAFETY CHAIN complete	23	14	21-SS-001	2Kg.
EURO WHEEL FRAME BODY	24	7	07-249	39Kg.
EURO WHEEL FRAME ARM	24	8	07-249/250	24Kg.
EURO WHEEL FRAME SPACERS	24	9	07-252	10Kg.
S.H.D. WHEEL FRAME BODY	24	1	07-208	46Kg.
S.H.D. FRONT SUPPORT PLATE	24	2		15Kg.
S.H.D. REAR SUPPORT TUBE	24	3		11Kg.

### SAFETY PRECAUTIONS

#### THE UNDERLIFT UNIT

1. The safe working loads of the Interstater unit are displayed in a prominent place. Be sure not to exceed those ratings.
2. When operating the unit controls, always make sure that it is safe to do so, and there is no one else in a vulnerable position when doing so.
3. The control levers must not be used during recovery operations, they are used during workshop tests and servicing. When engaged in recovery work always use the control panel and the remote control handset.
4. Never work under a vehicle which is not properly supported. If the casualty has been lifted, even slightly, by the recovery unit, no one should get under it without properly rated jack stands to support it.
5. Beware of leaving equipment, blocks of wood etc. on top of the body work when operating the main boom. If the boom sits down onto a piece of kit, it can damage it, and the hydraulic pipes or the controls of the unit as well.
6. Do not use the 'Fold' control when lifting a load.
7. Be aware when removing the folding boom lock that if there is a fault in that part of the hydraulic system, the folding boom could fall unexpectedly. Mind your feet.
8. Do not let your Interstater get neglected. Regular maintenance pays off.
9. Use the Emergency Cut-outs when a dangerous situation occurs. The best way to ensure that they will work when needed is to test them regularly, say once per week.

#### THE WINCHES

10. Do not overload the winch or winch ropes. If the calculations indicate too great a load for the winches, rig tackle to reduce the loading.
11. Make sure that winch ropes wind onto the drums tidily. Overlaps can cause the winches to lock up, and could also damage the ropes beyond repair.
12. Never operate the clutch or freespool controls when there is a load on the winch.



SAFETY PRECAUTIONS (Continued)

13. Take special care during winching operations. Choose a firm anchor point on the casualty to haul with. Make sure no one is standing in line with the winch cable when heavy winching is taking place.
14. Watch out for signs that a winch rope is about to fail. The warning signs are:
  - a) The winch rope getting very hot - look for steam coming off.
  - b) In the dark sometimes sparks can be seen.
  - c) The rope 'sings' as strands part in succession.

**LIFTING AND TOWING**

15. Never drive off with the PTO still engaged. It will be ruined.
16. When lifting on forks rig securing chains to prevent the casualty from jumping out of the forks. Also rig a safety chain between the casualty and the recovery vehicle in case equipment failure allows the casualty to break free whilst towing.
17. When lifting on wheel frames do not exceed the load limits of the frames.
18. When using wheel frames, lash the wheels with wheel straps, and fit secondary chains as a back-up. Also fit a safety chain between the casualty and the recovery vehicle.
19. Both lifting fork pedestals and wheel frames rely on locking pins to hold them in place. Never drive off without ensuring that all locking pins are in place.
20. The load figures given in the User's Handbook are for the Recoverer/Concept underreach boom. With some recovery vehicles it is possible to put too great a load on the crosshead so as to take most of the weight off the steering axle, even though the boom is not itself overloaded. If that happens the load will have to be re-rigged.

NOTE: These safety notes are given in good faith and without prejudice.

## **APPENDIX 3**

### **SAFE ROADSIDE WORKING - CODE OF PRACTICE**

---

#### **ALL RECOVERY/BREAKDOWN VEHICLES**

1. All vehicles must be maintained in a clean condition and comply with current legislation
  2. All vehicles should be marked with reflective tape on the sides and rear
  3. All vehicles to be fitted with four-way flashing hazard warning lights.
  4. All vehicles to be fitted with a minimum of two roof beacons or a full width lighting bar.
  5. Any additional working lamps must comply with Construction & Use Regulations.
- 

#### **VEHICLE EQUIPMENT**

All vehicles must carry the following items:

- Fire Extinguisher
  - First Aid Kit
  - Six Identical Traffic Cones
- 

#### **SERVICE/BREAKDOWN/RECOVERY PERSONNEL**

1. All personnel attending a breakdown/recovery scene must be in possession of a reflective safety garment, BS6629 Class A (appendix G)
2. Garment must be stored and maintained in good, clean condition.
3. Reflective garment must be worn at all times when working outside on a vehicle.
4. At no time will wet weather clothing or any other item be worn over a reflective safety garment.
5. It is strongly recommended that the following items be used:

- Safety Footwear - BS 1870
  - Safety Gloves
  - Safety Glasses - BS 2092
- 

#### **WORKING PRACTICE AND PROCEDURES (GENERAL RULES)**

Initial attendance at the scene:

1. All approaches to be made from the rear.
2. Park the recovery vehicle parallel with the offside running lane, as close to the nearside as possible, with front wheels turned full lock to the nearside.
3. Park the recovery vehicle 2 - 3 car lengths to the rear of the disabled vehicle.
4. Illuminate roof beacons and hazard flashers
5. Exit the vehicle from the nearside.
6. Place the traffic cones 3 - 4 car lengths to the rear of the recovery vehicle.

Disabled Vehicles - Occupants

It is the responsibility of recovery/breakdown personnel to ensure the safety of immobilised vehicle occupants.

All movements between vehicles must be confined to the nearside of the vehicle.

---

#### **MOTORWAY PROCEDURES (Additional to General Rules)**

1. Park on hard shoulder as far away from the nearside running lane as possible.
2. Where immobilised vehicles are found to have come to rest in an unsafe position - in all cases inform the Police.
3. Under no circumstances will recovery/breakdown personnel attempt to cross a motorway running lanes or central reservation on foot or in their vehicles.
4. At no time will recovery/breakdown personnel reverse on a motorway slip road or hard shoulders to gain access to immobilised vehicles - in all cases of difficulty, inform the Police.
5. Never work on the offside of your vehicle or of the immobilised vehicle.

## **APPENDIX 3**

### **CODE OF PRACTICE (continued)**

#### **MANOEUVRING OF BREAKDOWN VEHICLES**

The longer you are at a breakdown scene, the greater the danger.

1. Only where absolutely necessary will recovery /breakdown vehicles be manoeuvred or parked to the front of a disabled vehicle, i.e. to connect up for a recovery.
2. If recovery is to be undertaken, recovery equipment must be connected, whenever possible, prior to moving recovery vehicle to the front of immobilised vehicle. All such manoeuvres must be completed with extreme care.
3. If breakdown faults cannot be rectified quickly and safely, immediately recover the vehicle to a place of safety.

---

#### **REMOVAL OF IMMOBILISED VEHICLES (GENERAL RULES)**

1. In all cases - inform the driver of the immobilised vehicle of the recovery procedures to be undertaken.
2. Before moving off from the breakdown scene, be mindful of the other road users and their safety.
3. Where a recovery manoeuvre is likely to obstruct the flow of traffic - contact the Police.
4. Before moving off, remove debris, tools, equipment and cones.

---

#### **REMOVAL FROM MOTORWAY HARD SHOULDER.**

Use the hard shoulder to build up speed and, having identified a suitable space in the nearside lane, signal and move off the hard shoulder. Extreme care should be taken during this manoeuvre, being mindful of other vehicles that may be stationary on the hard shoulder.

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#### **REMOVAL OF ACCIDENT DAMAGED VEHICLES.**

Action in all cases of removal of accident damaged vehicles:

- a) If Police present - under their direction. b) If no Police - comply with all safety guidelines.

---

#### **GENERAL ADVICE TO MOTORIST**

Following a repair, the driver of a previously immobilised vehicle should be given advice regarding the safe procedures for re-joining the traffic flow.

---

#### **GENERAL ADVICE TO BREAK/RECOVERY PERSONNEL**

##### **Hazardous Chemicals**

All recovery/breakdown personnel should be aware of the legal requirements in respect of vehicles carrying hazardous loads. If in doubt - contact the Police.

**ALL PERSONNEL SHOULD BE AWARE OF THE EVER-PRESENT DANGERS TO THEMSELVES AND OTHER ROAD USERS WHEN ATTENDING THE SCENE OF A BREAKDOWN/RECOVERY INCIDENT**

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#### **FAILURE TO COMPLY WITH THE CODE OF PRACTICE COULD SERIOUSLY DAMAGE YOUR HEALTH**

This Code of Practice has been formulated and sponsored by the following organisations:

THE AUTOMOBILE ASSOCIATION  
THE ROYAL AUTOMOBILE CLUB  
NATIONAL BREAKDOWN RECOVERY CLUB  
THE INSTITUTE OF VEHICLE RECOVERY