

INTERSTATER MK 2 RECOVERY UNIT



USERS' HANDBOOK

BONIFACE

INTERSTATER Mk 2

RECOVERY UNIT

UNIT NUMBER			
DATE OF MANUFACTURE			
U.K./EURO/U.S.			
LEGS/NO LEGS			
LEG POSITION	STANDARD	2.5in LOWER	OTHER
VALVE SPEC.	4 SPOOL	6 SPOOL	7 SPOOL
DOWN BOOM	STANDARD	5in LONGER	OTHER
HYDRAULIC SYSTEM	IMPERIAL	METRIC	
WINCHES	ONE	TWO	

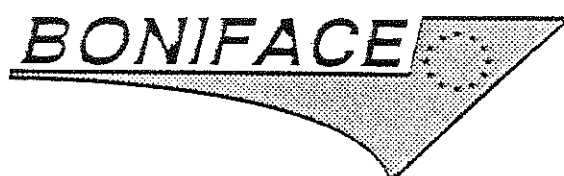
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PREFACE

1. This book is written to cover the technical details of the Interstater Mk 2 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. NOTE: This book does not apply to other Marks of Interstater Recovery Unit.

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, lifting, suspend towing and flat towing. The load limits on these aspects are given on Pages 9 and 10 (Figure 6, 7 & 8).

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) Single or double hydraulic winches.
 - b) Roller or sheave type fairleads.
 - c) One or two hydraulic pumps.
 - d) Inboard, outboard or no support legs.
 - e) Type C (Hydraulic/Mechanical) extending boom
or Type E (Fully Hydraulic) extending boom.
 - f) Adapted for metric hydraulic hoses
- NB. a), b) and c) are inter-dependent

The Interstater Mk 2 can be supplied with lifting forks, wheel frames or both. Both modes of operation are described in this book.

Other special customer requirements (e.g. special winches, 12volt vehicle supply etc.) may not be covered by this book.

5. This book is not intended to be a comprehensive guide to recovery operations, but certain procedures are outlined in Part 3 in order to describe how to use the unit safely. Each recovery operation is a separate problem, and should be treated accordingly.

6. The lifting capacity of the unit is given in Figures 7 & 8. However the chassis size, weight and boom rating 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. (See the test certificate for your vehicle.

PREFACE (Continued)

7. IMPORTANT NOTE: The newly published 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.
8. 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.
9. When using this equipment, due regard must be paid to published Codes of Practice, British Standards and legislation affecting recovery operations. Nothing contained in this book is intended to countermand any such regulations.
10. 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.**



SAFETY PRECAUTIONS

1. The control levers attached to the hydraulic valve block are to be regarded as a manual overrides, to be used if the electric controls fail, or during workshop tests and servicing. When engaged in recovery work always use the control panel and the remote control handset. That will avoid having people clambering on the recovery vehicle when lifting or winching is taking place. **THAT IS NOT A HEALTHY PLACE TO BE.**
2. When operating the Interstater controls, always make sure that it is safe to do so, and there is no one else in a vulnerable position when doing so. There may be unnoticed onlookers about when a recovery is taking place, but **NOT EVEN FOOLS DESERVE TO DIE.**
3. Never work under a vehicle which is not properly supported. There is a requirement to fit lashings and restraints to a casualty vehicle before towing away, and for that there is a need for someone to go underneath. In the case of a simple breakdown, the casualty vehicle is in no more danger of falling than any other, but if there is damage to the casualty, or it has been lifted, even slightly, by the recovery unit, then no one should get under it without properly rated jack stands to support it. **IT COULD FLATTEN SOMEBODY.**
4. 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, but **IT COULD ALSO DAMAGE A HYDRAULIC LINE, PNEUMATIC LINE OR THE HYDRAULIC FILTER.**
5. Take special care during winching operations. Choose a firm anchor point on the casualty to haul with, one that is not going to give way when load is applied. Make sure no one is standing in line with the winch cable when winching takes place. **IF A CABLE FAILS UNDER LOAD, SERIOUS DAMAGE CAN BE INFLICTED.**
6. Always wear a hard hat and a reflective jacket when working on a recovery. Those are basic safety requirements, and they may save your life. **SAFETY IS EVERYONE'S CONCERN.**
7. Do not overload your equipment. The professional not only knows what his rig can take, but he can also assess the loads offered by most recovery situations. **THE INTERSTATER 25 IS A GOOD PIECE OF KIT - DO NOT BREAK IT.**
8. Do not let your Interstater get neglected. Regular maintenance pays off. **AND KEEP IT CLEAN, IF IT IS KEPT NICE AND SHINY, YOU MIGHT BE ABLE TO CHARGE MORE!**

PART 1

GENERAL INFORMATION

INTERSTATER Mk 2

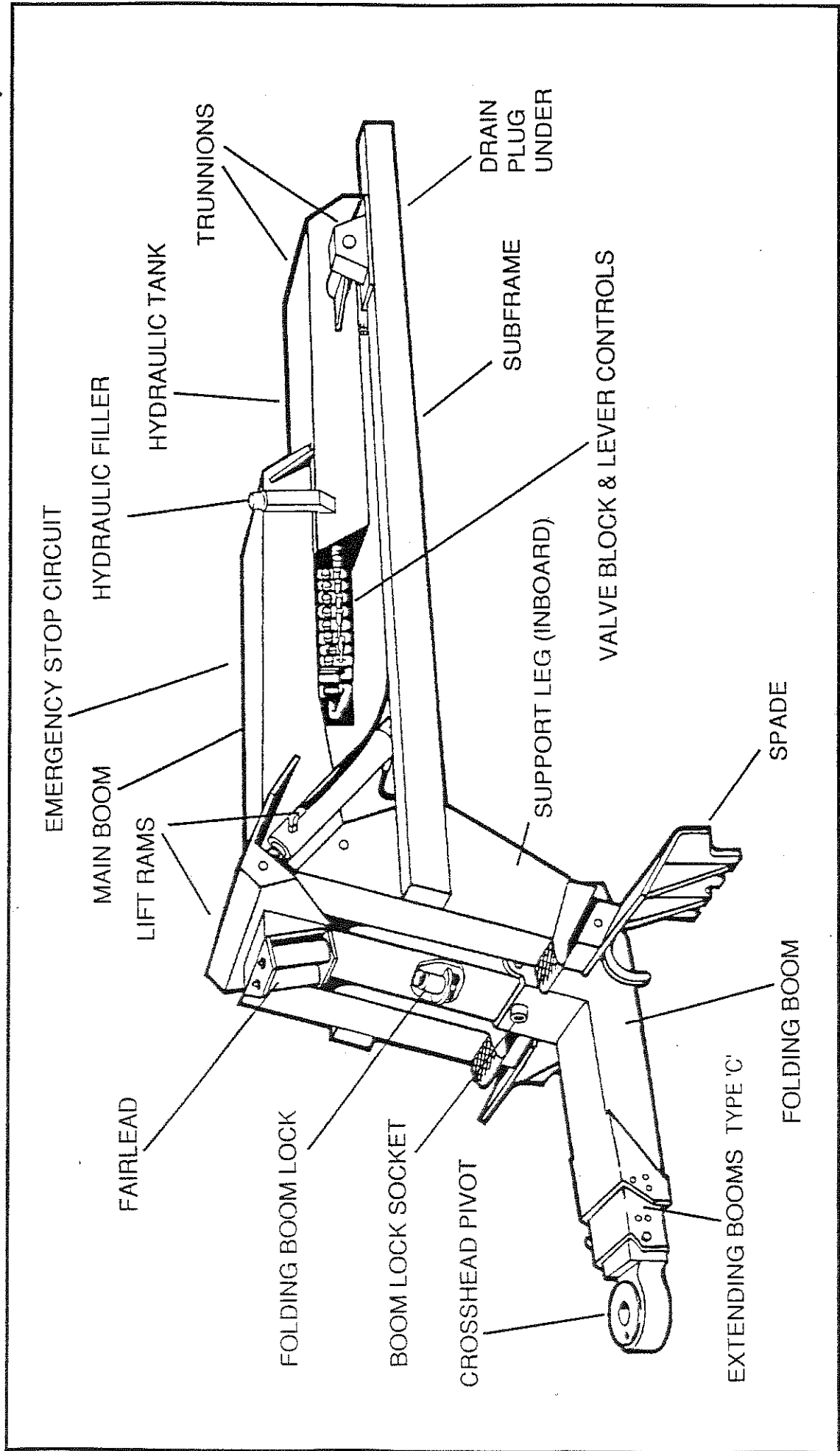


Figure 1 - General View, Interstater (Type C) Extending Boom, One Fairlead

GENERAL INFORMATION

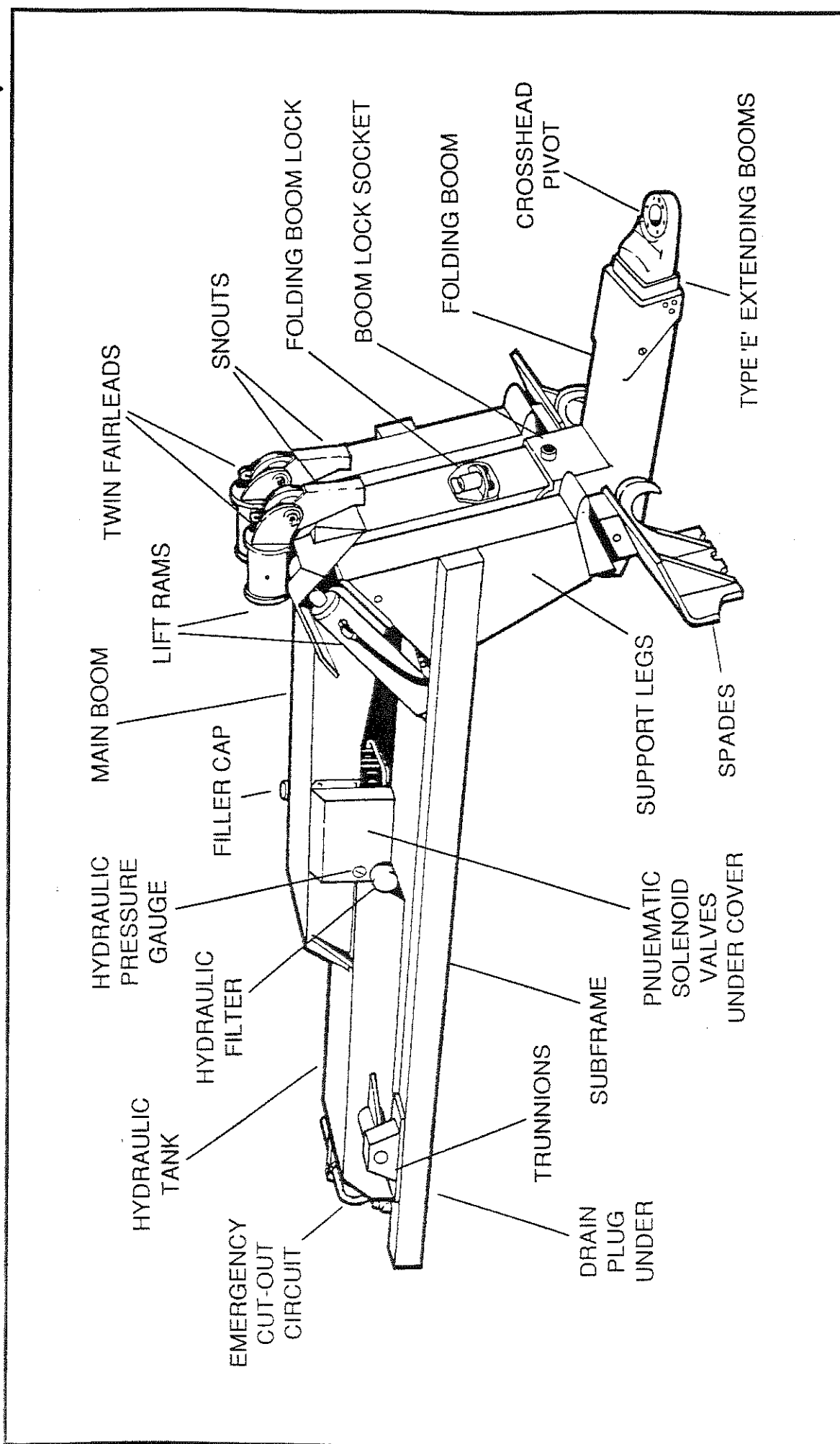
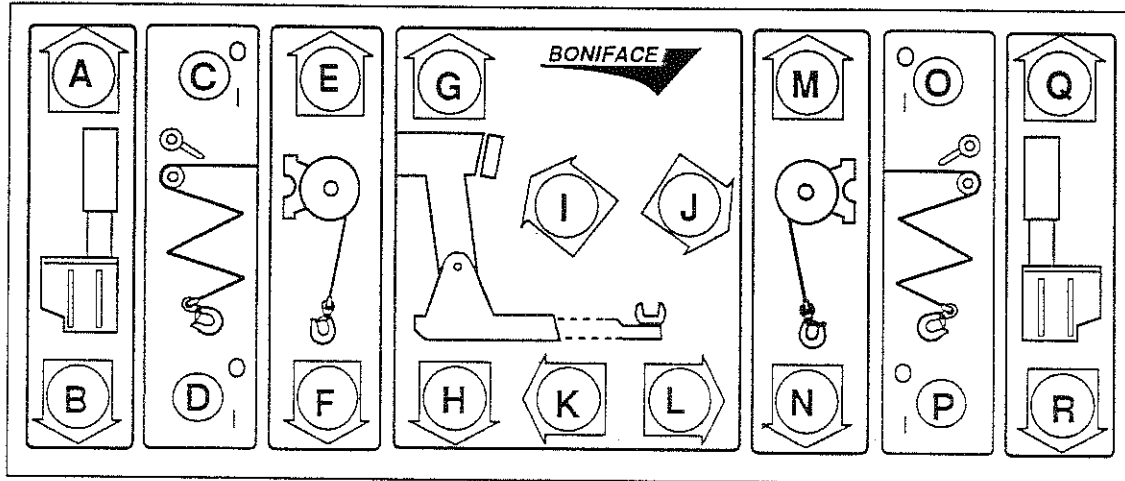


Figure 2 - General View, Interstater (Type E Extending Boom, Two Fairleads)

GENERAL INFORMATION



KEY	A - Left Leg - Up*	G - Main Boom - Raise	M - Winch 2 - In*
	B - Left Leg - Down*	H - Main Boom - Lower	N - Winch 2 - Out*
* = if fitted	C - Rope Tension - On/Off	I - Folding Boom - Up	O - Rope Tension - On/Off*
	D - Winch Freespool - On/Off	J - Folding Boom - Down	P - Winch Freespool - On/Off*
	E - Winch 1 - In	K - Extending Boom - In	Q - Right Leg - Up*
	F - Winch 1 - Out	L - Extending Boom - Out	R - Right Leg - Down*

Figure 3 - Control Panel

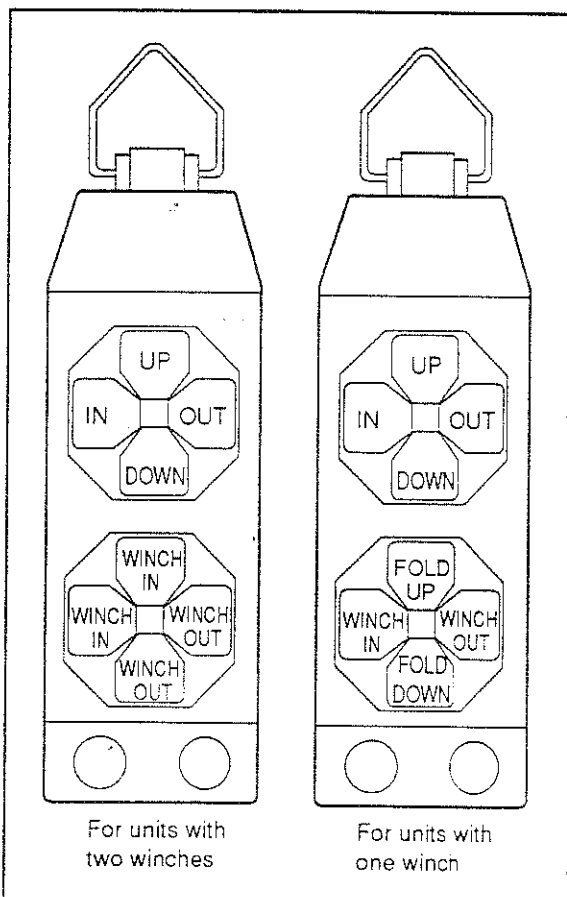


Figure 4 - Remote Control Handsets

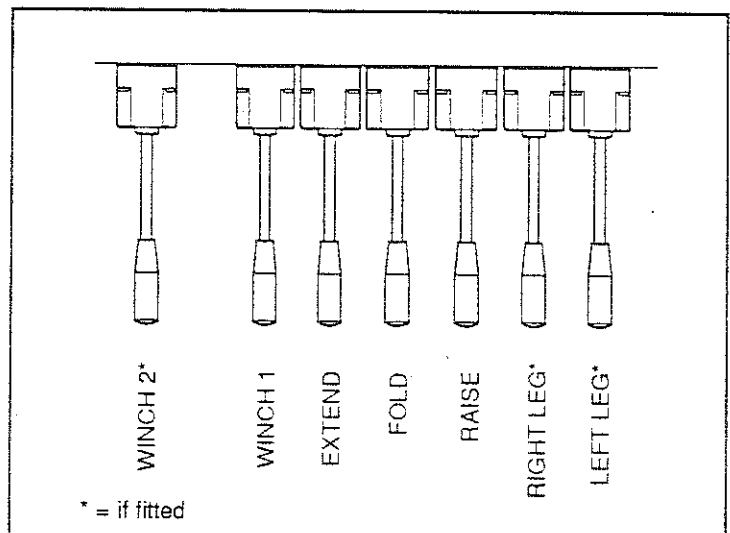
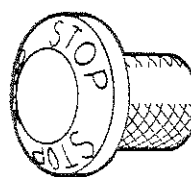


Figure 5 - Hydraulic Lever Controls



Two Emergency Stop Buttons are usually fitted to the vehicle body, one near the drivers seat in the cab, the other on the near-side rear, in a prominent place.

Figure 6 - Emergency Stop Buttons

GENERAL INFORMATION

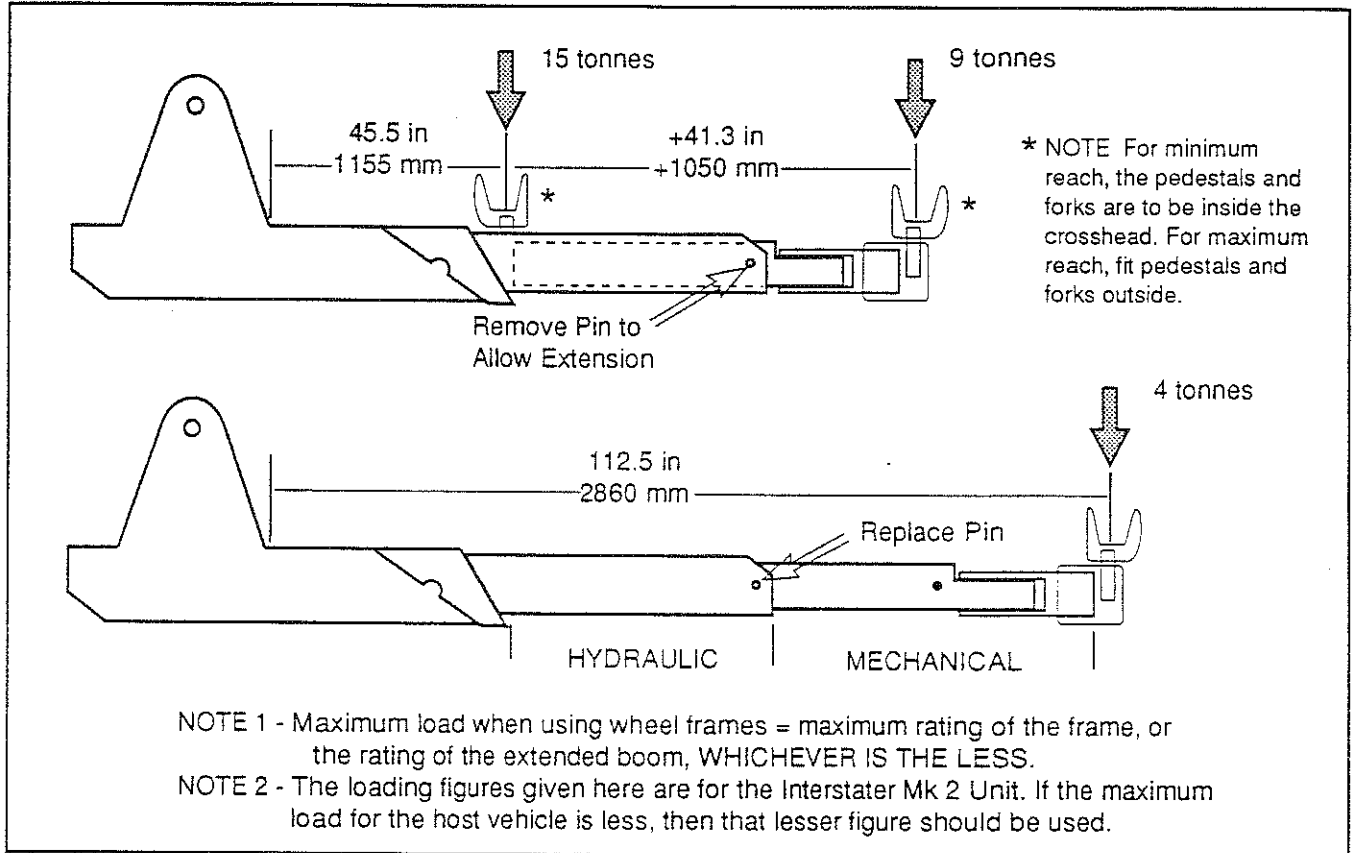


Figure 7- Performance Figures for the Type C Extending Boom

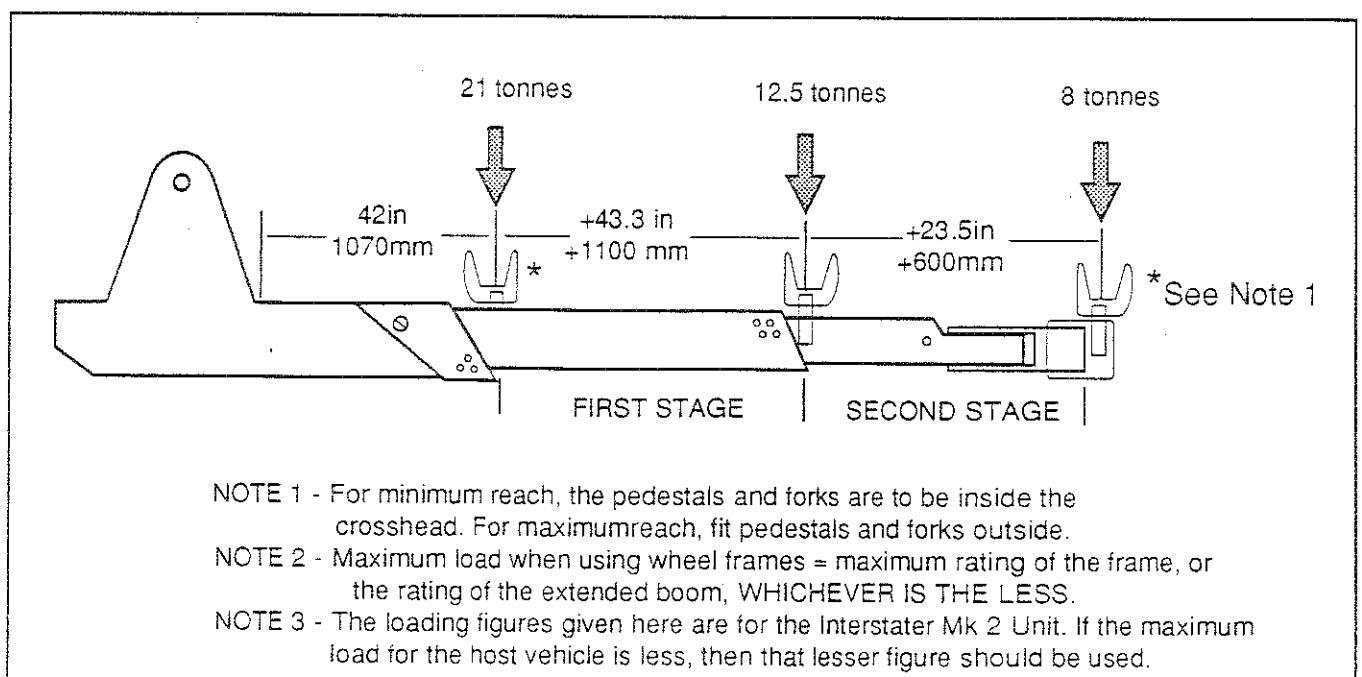


Figure 8- Performance Figures for the Type E Extending Boom

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) at the rear of the unit.
- 2.1.2 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 mark on the sight glass with the correct grade of hydraulic oil.
- 2.1.3 Start the recovery vehicle engine and engage the Power Take Off (P.T.O.)
- 2.1.4 Check for oil leaks between the pump(s) and the valve block.
- 2.1.5 Using the hydraulic control lever, 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.
- 2.1.6 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.
- 2.1.7 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.
- 2.1.8 Using the hydraulic control lever, 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.
- 2.1.9 Repeat operation 2.1.8, and part way through operate the Emergency Stop Button and check that all hydraulic functions are immobilised. To reset the Stop button turn it anticlockwise half a turn.
- 2.1.10 All Models. Using the hydraulic control lever, operate the extendible boom and check for leaks. Ensure that the extension is that specified in Figure 7 or 8 of this book.
- 2.1.11 Type C only. Operate the mechanical extension system and ensure there is no fouling.

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

- 2.1.12 Using the hydraulic control lever, 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 is advisable to put pads under the spades. 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.
- 2.1.13 Raise the legs completely.
- 2.1.14 Top up the hydraulic tank if necessary.
- 2.1.15 Using the control panel push buttons, operate the rope tensioners and check that the tensioning rollers function correctly.
- 2.1.16 Using the control panel push buttons, operate the winch releases and check that the winches release correctly.
- 2.1.17 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 7 or 8 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 Lower the loading vehicle as low as possible without the front wheels actually touching the ground.
- 2.2.5 Operate the extendible boom over its complete hydraulic range and ensure a smooth action and no leaks from the hydraulic system.
- 2.2.6 Release the loading vehicle.
- 2.2.7 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 CROSSHEADS

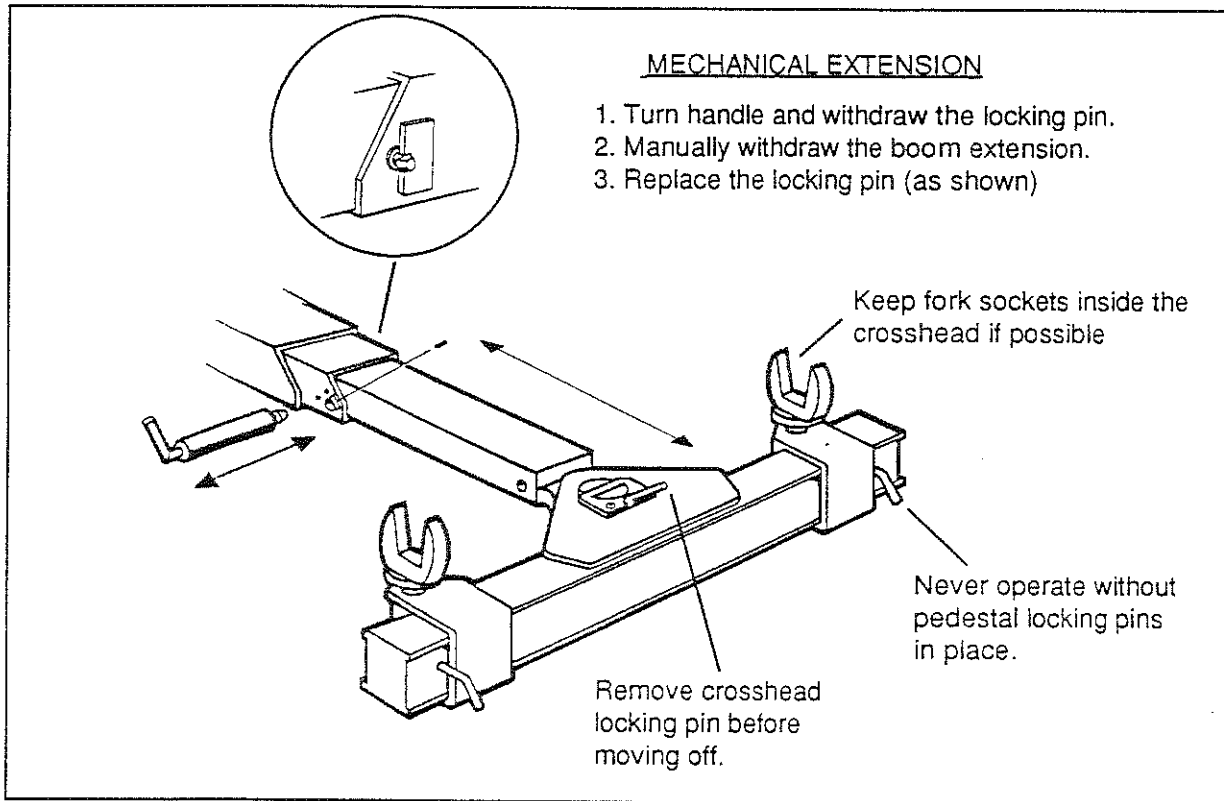


Figure 9 - The Type C Extensible Boom

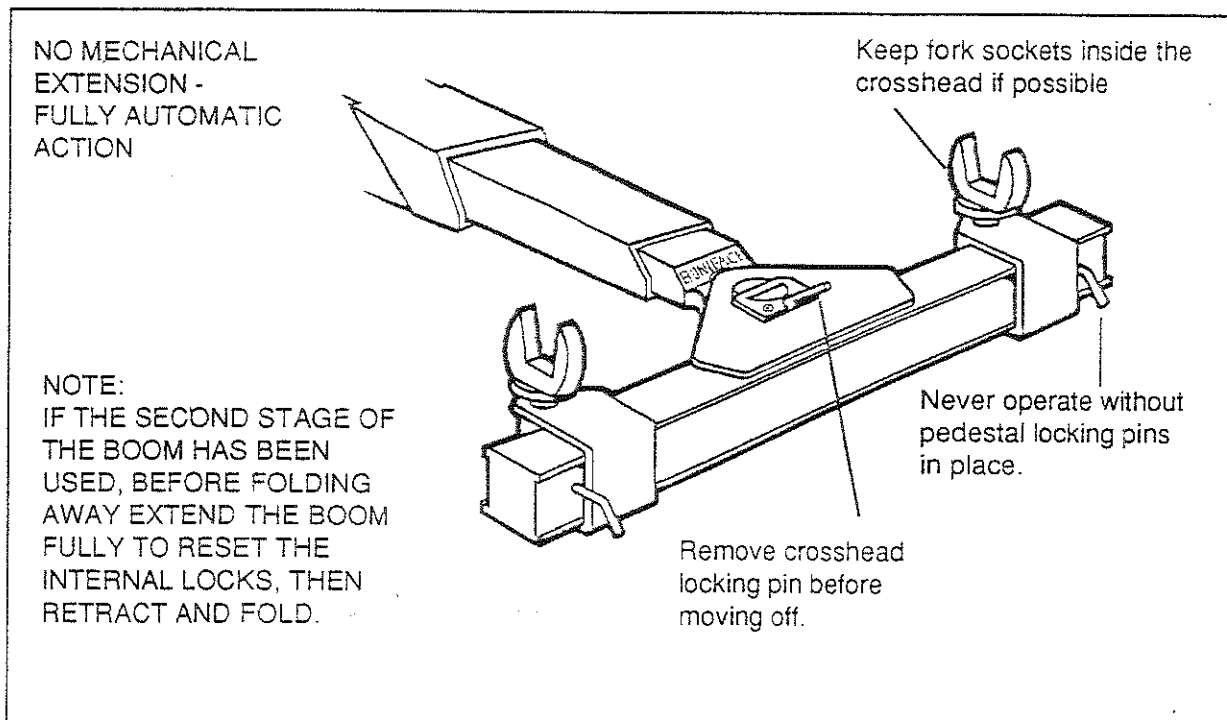


Figure 10 - The Type E Extensible Boom

3.0 OPERATION

NOTE: This part of the manual is written to describe how to operate the Interstater Mk 2 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 Assume 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 Assume the rear tag axle or mid tag axle (if fitted) is lowered.

3.1.3 Assume that the Interstater is in its normal travelling position, viz:

- a) Main boom in the down position with the lift cylinders fully closed.
- b) Folding boom locked in the vertical position.
- c) Extendible boom fully closed.
- d) Main crosshead pinned in the 'straight' position.
- e) Fork pedestals and forks stowed in their respective housings.

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.

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" from the ground.

3.2.8 The pedestals and forks can be fitted now, or later, according to the operation. In normal circumstances 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. (Continued)

- 3.2.9 The correct distance between the two vehicles must now be established, but this can only be learned by experience. In general, 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 Type C booms only. Where extra reach is required it may be necessary to use the integral mechanical extension. First remove the extension locking pin, pull the mechanical extension out to its full extent, and replace the locking pin. The hydraulic action can now be used to locate the lifting forks correctly. Again try not to have the hydraulic action at the end of its travel. When the forks are correctly located, take some weight on the main boom to verify the location of the forks.
- 3.2.11 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. 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 JACK STANDS. A SLIP WOULD PROBABLY BE FATAL.
- 3.2.12 For the main lift, it may be necessary to increase the engine revs to 800 - 1000 rpm. by means of the remote throttle control. NEVER TRY TO USE THE FOLDING FACILITY FOR LIFTING. IT WAS NOT DESIGNED FOR THAT.
- 3.2.13 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, to allow the distance between the two vehicles to be adjusted.
- 3.2.14 The best distance between the two vehicles is as short as possible, while still allowing enough clearance for cornering. Adjust this distance 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.
- 3.2.15 Lift to a suitable height for towing, and fit restraints and lashings.

3.3 SECURING THE CASUALTY ON FORKS

- 3.3.1 Before moving off the casualty should be secured 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.
- 3.3.2 If the vehicle is being lifted by another part of its structure, then 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 lashing the axle up to the chassis before the lift is implemented.

3.3 (Continued)

- 3.3.3 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 11). The tension in the chains should be firm, but not bar-tight. This can be achieved by slight adjustment of the boom extension facility. If the lashing chains are at too steep an angle, they would suffer periodic slackening and

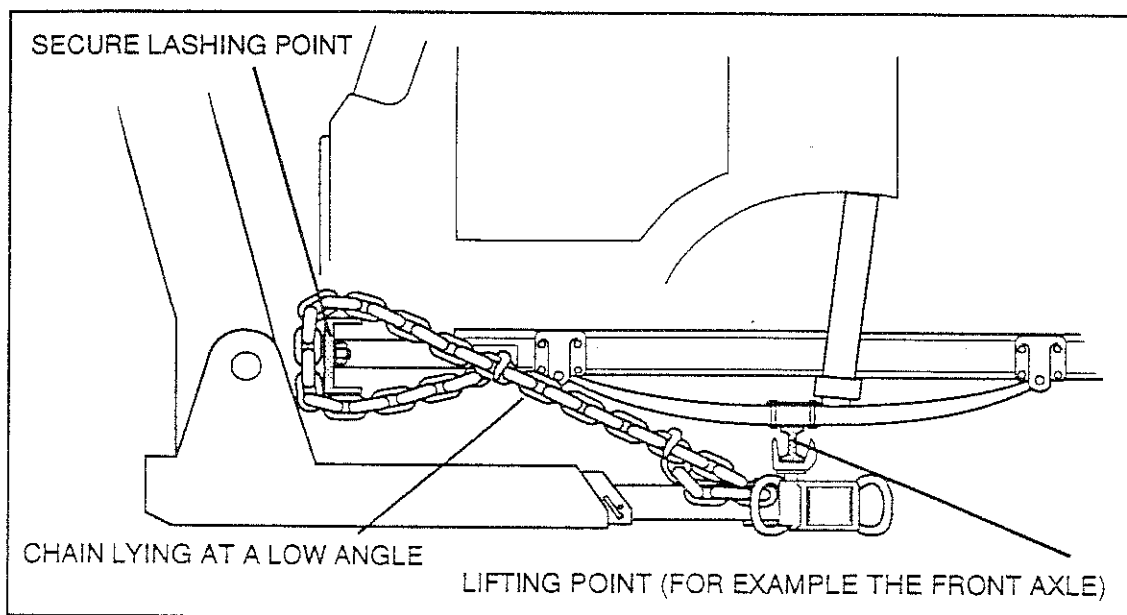


Figure 11 - Restraint against overrun

jarring as the springs of the casualty worked while travelling. To reduce this effect the lashing chains should be as near to the horizontal as possible.

- 3.3.4 When the recovery vehicle accelerates, the casualty will tend to get left behind. This is a similar effect to 3.3.3. 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 12. Again it is recommended that the path of the restraining strap should lie near to horizontal.

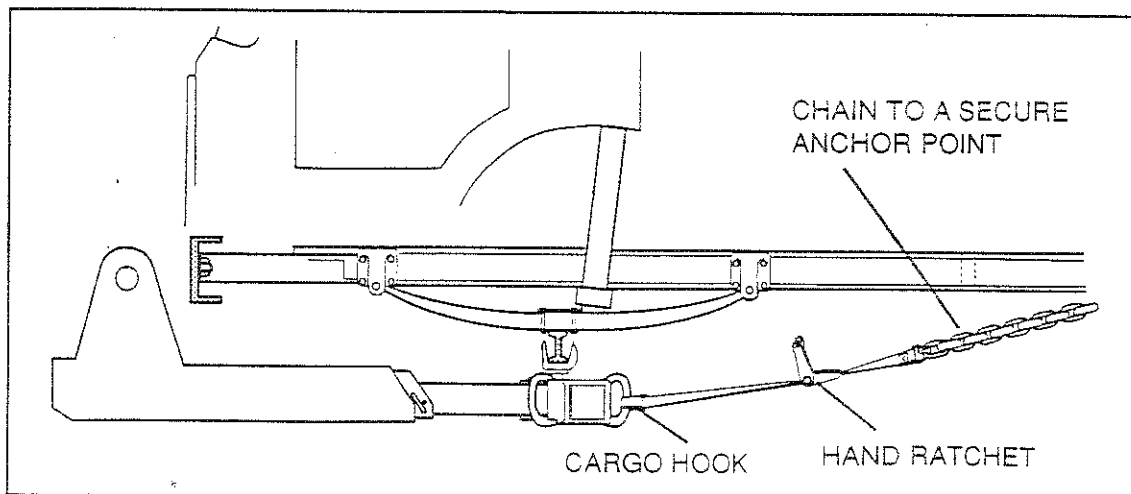


Figure 12 - Restraint against acceleration

- 3.3 (Continued)
- 3.3.5 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.
- 3.3.6 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.

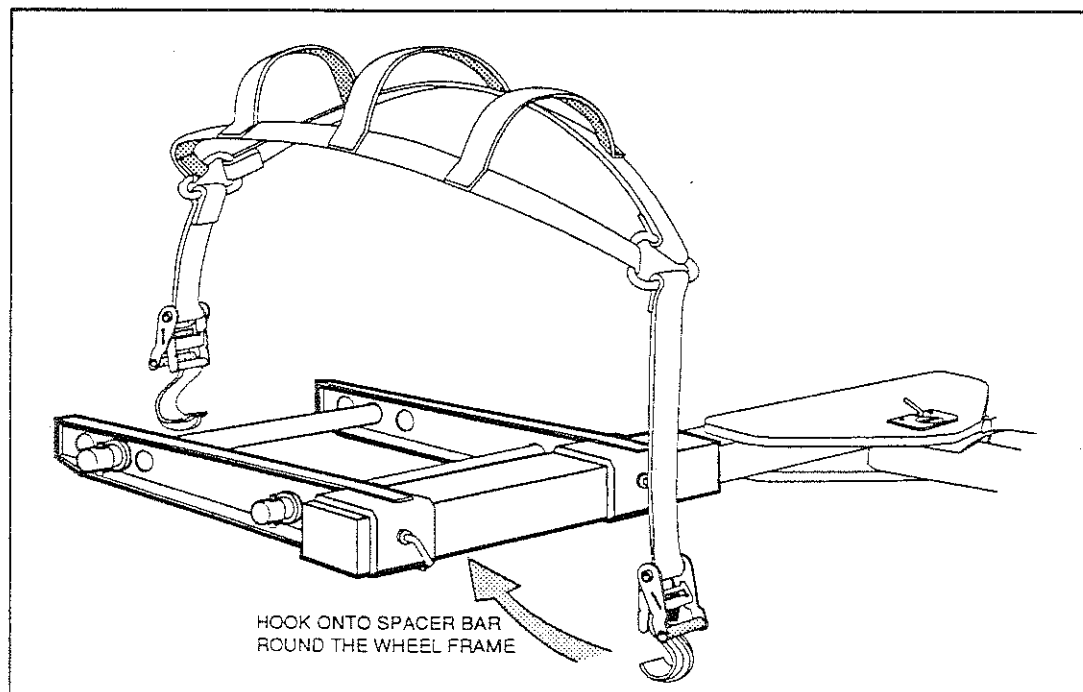


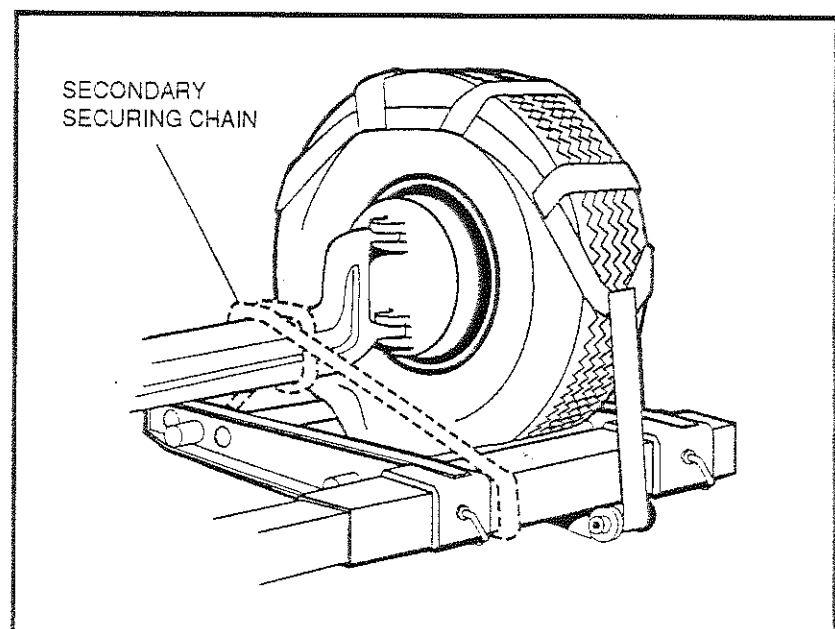
Figure 13 - Heavy Duty ('Euro') Wheel Frames

3.4 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.
- 3.4.1 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.
- 3.4.2 Check that the recovery vehicle parking brake is on.
- 3.4.3 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.
- 3.4.4 Move to the rear of the recovery vehicle and connect the remote control.
- 3.4.5 Release the boom latch and fold the boom fully down.
- 3.4.6 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.

- 3.4 (Continued)
- 3.4.7 Remove the crosshead locking pin, and ensure that the crosshead is free to pivot.
- 3.4.8 With the crosshead at a convenient height, fit the wheel frames at a width to suit the casualty. Keep the frames 'open'.
- 3.4.9 Adjust the height of the main boom so that the crosshead and wheel frames are within 1" from the ground and ensure it is parallel to the ground by use of the boom Swing control.
- 3.4.10 Extend the boom until the wheel frames span the casualty's wheels and firmly touch both tyres.
- 3.4.11 Close the wheel frames. The method varies with the type of wheel frame.
- 3.4.12 Raise the casualty a short way to confirm that the lift will be satisfactory.
- 3.4.13 Attach and tighten the wheel straps. The method will vary with the design.
- 3.4.14 Fit secondary lashing chains. It is not possible to specify exactly how to fit secondary chains for every type of casualty vehicle and for every situation. Their function is to take over the function of the wheel straps should they work loose or come adrift. The chains must prevent the casualty from rolling forwards, rolling backwards or from bouncing out of the wheel frames.
- 3.4.15 Raise the casualty to a suitable towing height, keeping the extending boom level by use of the Swing control.
- 3.4.16 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.
- 3.4.17 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 14 -
Secondary
Securing
Chains*



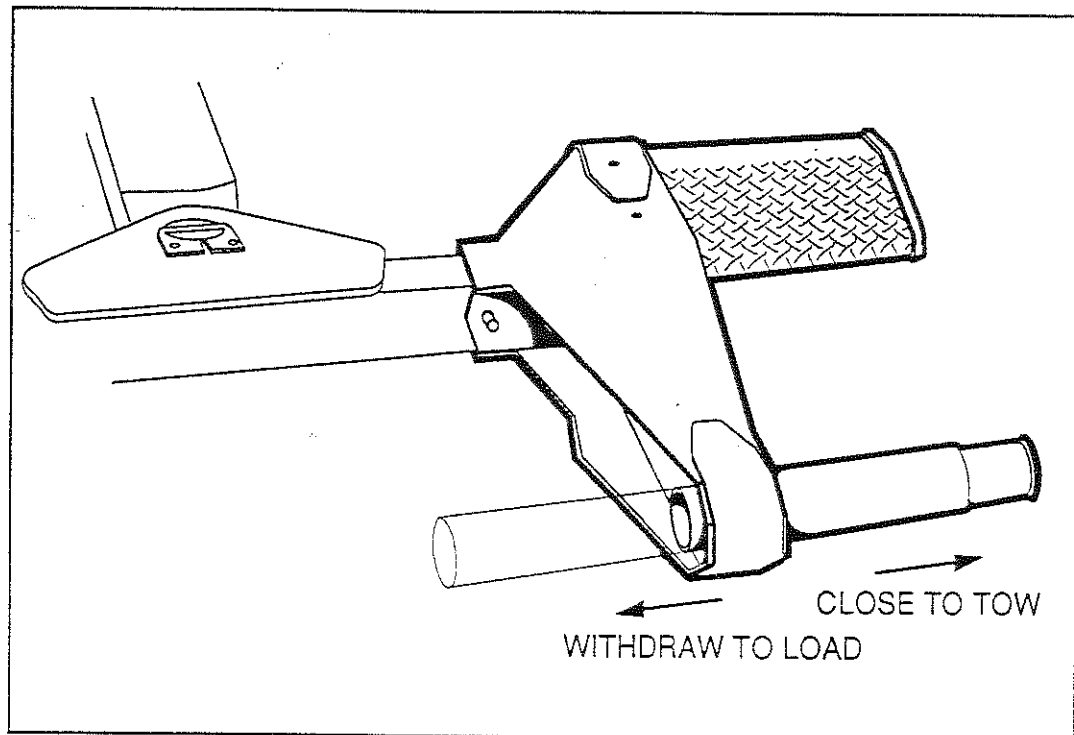


Figure 15 - Super Heavy Duty Wheel Frames

3.5 TOWING THE CASUALTY

- 3.5.1 Use the remote throttle to control the engine idling revolutions.
- 3.5.2 Ensure that the pedestal safety pins or wheel frame safety pins are in place, and that they too are secured with 'R' clips.
- 3.5.3 Unplug the remote control handset and stow away.
- 3.5.4 Apply the recovery vehicle handbrake and release the handbrake of the casualty.
- 3.5.5 Depress the recovery vehicle clutch and disengage the Power Take Off.
- 3.5.6 Ensure that all legal requirements regarding loading, braking and lighting are observed.
- 3.5.7 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.
- 3.5.8 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.
- 3.5.9 Ensure that the crosshead pivot pin remains well greased in use.

3.6 RELEASING A CASUALTY VEHICLE.

- 3.6.1 Engage the Power Take Off.
- 3.6.2 Engage the handbrake on the casualty.
- 3.6.3 Connect the remote control handset.
- 3.6.4 Set the throttle at 800 - 1000 rpm.
- 3.6.5 Lower the main boom and allow the casualty to settle on the ground.
- 3.6.6 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
- 3.6.7 Remove the forks and pedestals or open the wheel frames.
- 3.6.8 Retract the extendible boom. Note: If the second stage of a Type E extending boom has been used, extend the boom fully out before retracting. This will reset the internal interlocks.
- 3.6.9 Drive the recovery vehicle clear of the casualty to a position where the folding boom may be folded.
- 3.6.10 Type C boom only. Close the mechanical extension (if used).
- 3.6.11 Replace the crosshead locking pin.
- 3.6.12 Raise the folding boom.
- 3.6.13 Lower the main boom to the travelling position.
- 3.6.14. Stow all loose equipment including the remote control handset.

3.7 USE OF THE REAR SUPPORT LEGS

- 3.7.1 Each leg can be operated by means of the hydraulic control levers, or the electrical switches on the bodywork. During recovery operations, use of the switches should normally be preferred.
- 3.7.2 The legs have a dual purpose. 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. Please be aware of the very great pressure on the ground at the point of contact of the blades. The pressure is sufficient to break concrete and thus it may be necessary to spread the load by placing large timbers under the feet.
- 3.7.3 Secondly when used to provide resistance to winching forces, a greater resistance will be achieved the deeper the blades are driven into the ground. When they are fully down, the upper edge acts as a compactor to delay the ground breaking up.
- 3.7.4 When using the support legs 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 both. This will avoid undue racking of the chassis.

3.8 USING THE ROPE TENSIONER.

- 3.8.1 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 buttons on the control panel. To check that it is functioning, operate the controls and see that the tensioning roller has lowered.

3.9 USE OF THE WINCHES

- 3.9.1 A number of winch configurations may be encountered. For fuller technical details refer to the winch maker's published information. Always follow this sequence when operating winches in a recovery situation.
- 3.9.2 Release the rope tensioners.
- 3.9.3 Ensure that the winches are in neutral gear.
- 3.9.4 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 hard will normally be enough, but if the cable is left loose it can get into a monstrous tangle.
- 3.9.5 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.
- 3.9.6 Check that the recovery vehicle's brakes are firmly applied.
- 3.9.7 Lower the rear support legs and load them until, on unconsolidated ground, they will dig in no further. On hard roads, use road plates under the spades, but lowering the legs too far may be counter productive, as they will take the load off the braked wheels of the recovery truck.
- 3.9.8 Winch in.
- 3.9.9 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.

3.10 SIDE WINCHING

- 3.10.1 This can be achieved simply on a roller type fairlead by angling the rope in the required direction. With a sheave type fairlead, the whole assembly will swing to the horizontal position. In both cases the main boom should be fully down and in its lock position. NEVER WINCH SIDEWAYS WITH THE BOOM EVEN SLIGHTLY RAISED,
- 3.10.2 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.

3.11 AFTER WINCHING OPERATIONS

- 3.11.1 Apply the rope tensioners.
- 3.11.2 Rewind the cables, one at a time.
- 3.11.3 Hook cables into their stowing points, or a quick release 'bungee'.
- 3.11.4 Switch off the tensioners.

SAFETY NOTE

ON ALL INTERSTATER MK 2 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.

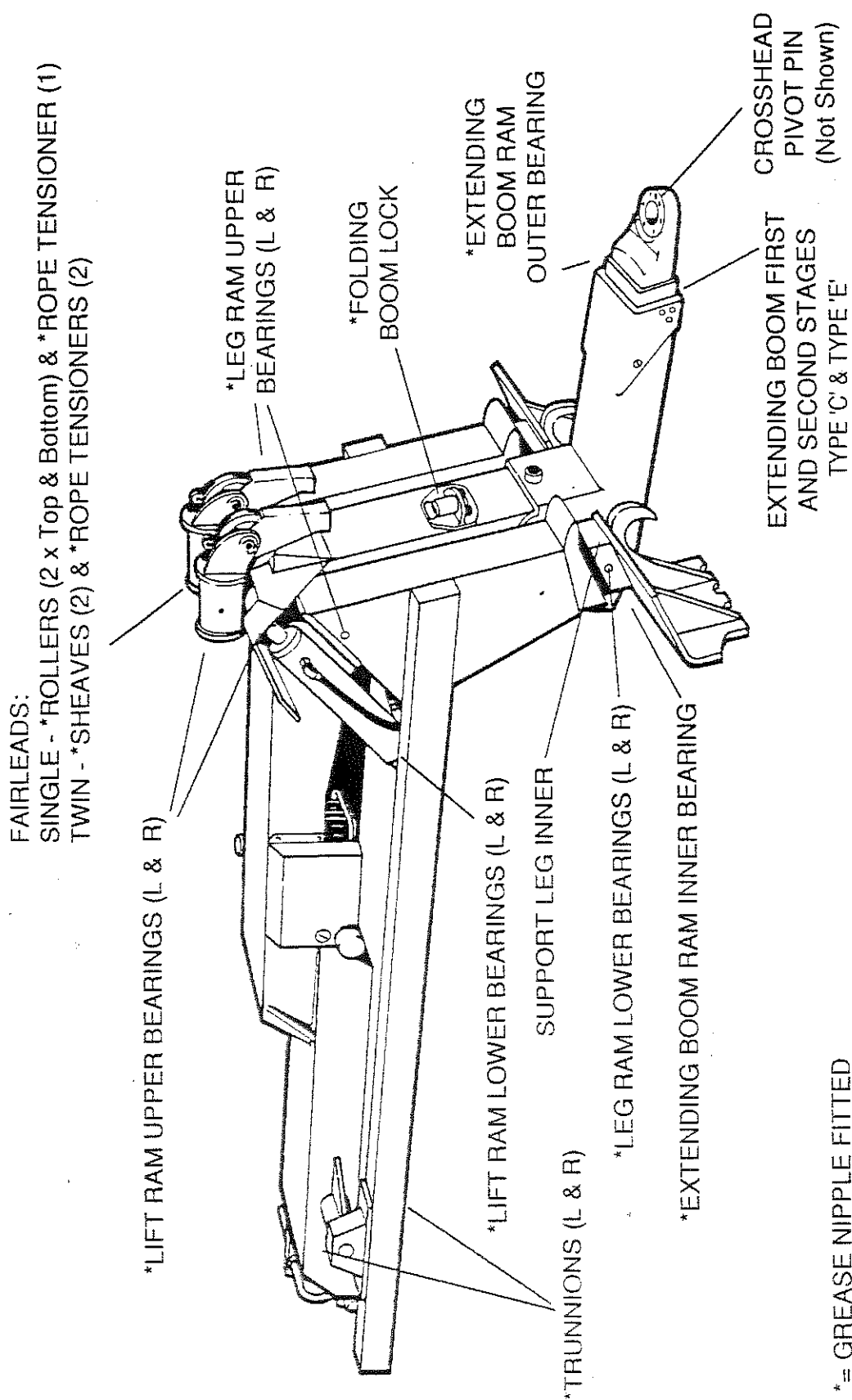


Figure 16 - Lubrication Diagram

MAINTENANCE**4.1 MAINTENANCE - GENERAL**

- 4.1.1 In order to ensure correct and efficient working, the Interstater Mk 2 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.

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 pin.
- 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 Diagram
- 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.

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.)

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 28) 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.

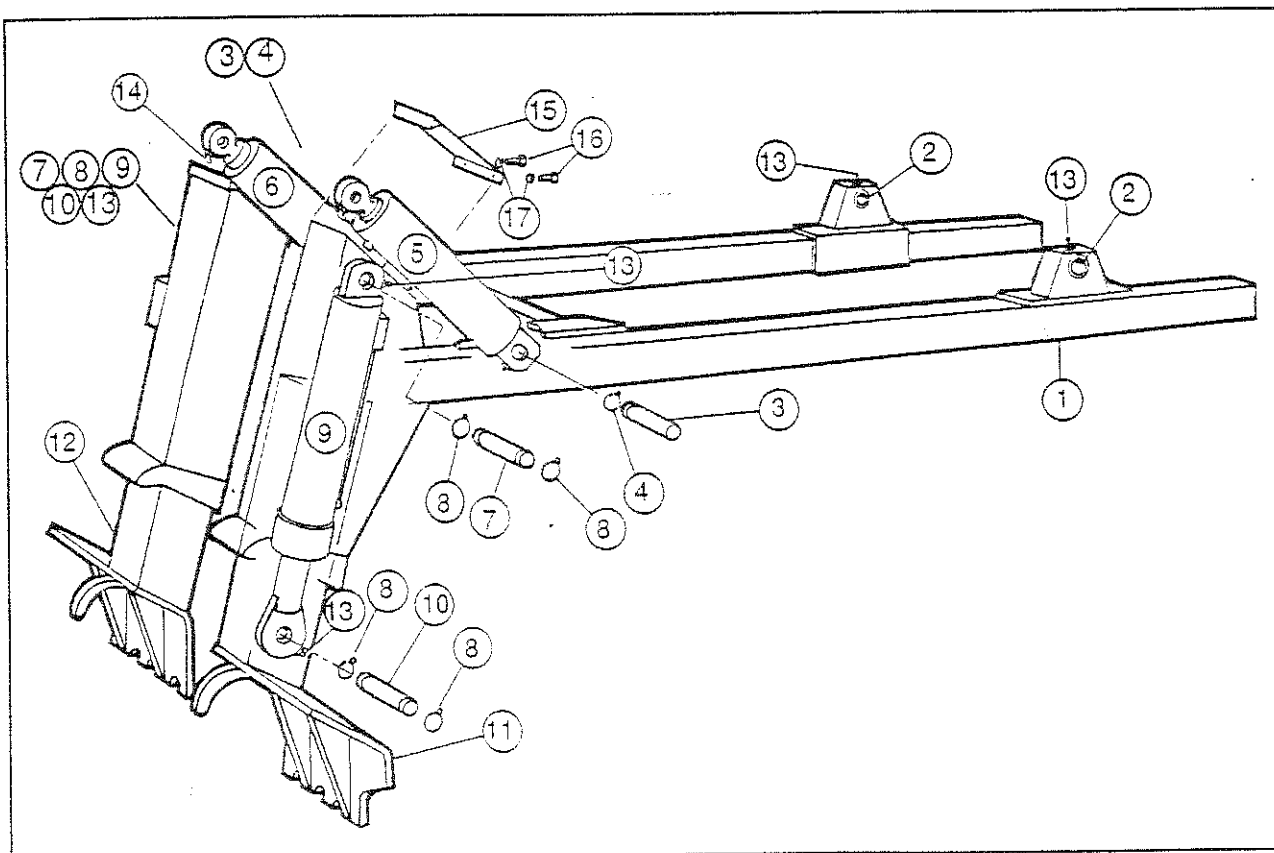
6.1 REPAIRS.

- 6.1.1 Many repairs can be effected by simple component replacement. Please use only approved re-placements, 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.

SPARES

1. SUBFRAME

ITEM No	DESCRIPTION	QTY
1	Subframe	1
2	Spherical Bearing	2
3	Lift Ram Locating Pin (Lower)	2
4	Circlips 1 1/2in i.d.	2
5	Lift Ram L.H.	1
6	Lift Ram R.H.	1
7	Leg Ram Locating Pin (Upper)	2
8	Circlips 1 1/4in i.d.	8
9	Leg Ram	2
10	Leg Ram Locating Pin (Lower)	2
11	Inner Leg (R.H.)	1
12	Inner Leg (L.H.)	1
13	Grease Nipples Straight	8
14	Grease Nipples 90deg.	2
15	Rear Leg Cover	2
16	Fixing Screws	4
17	Spring Washers	4



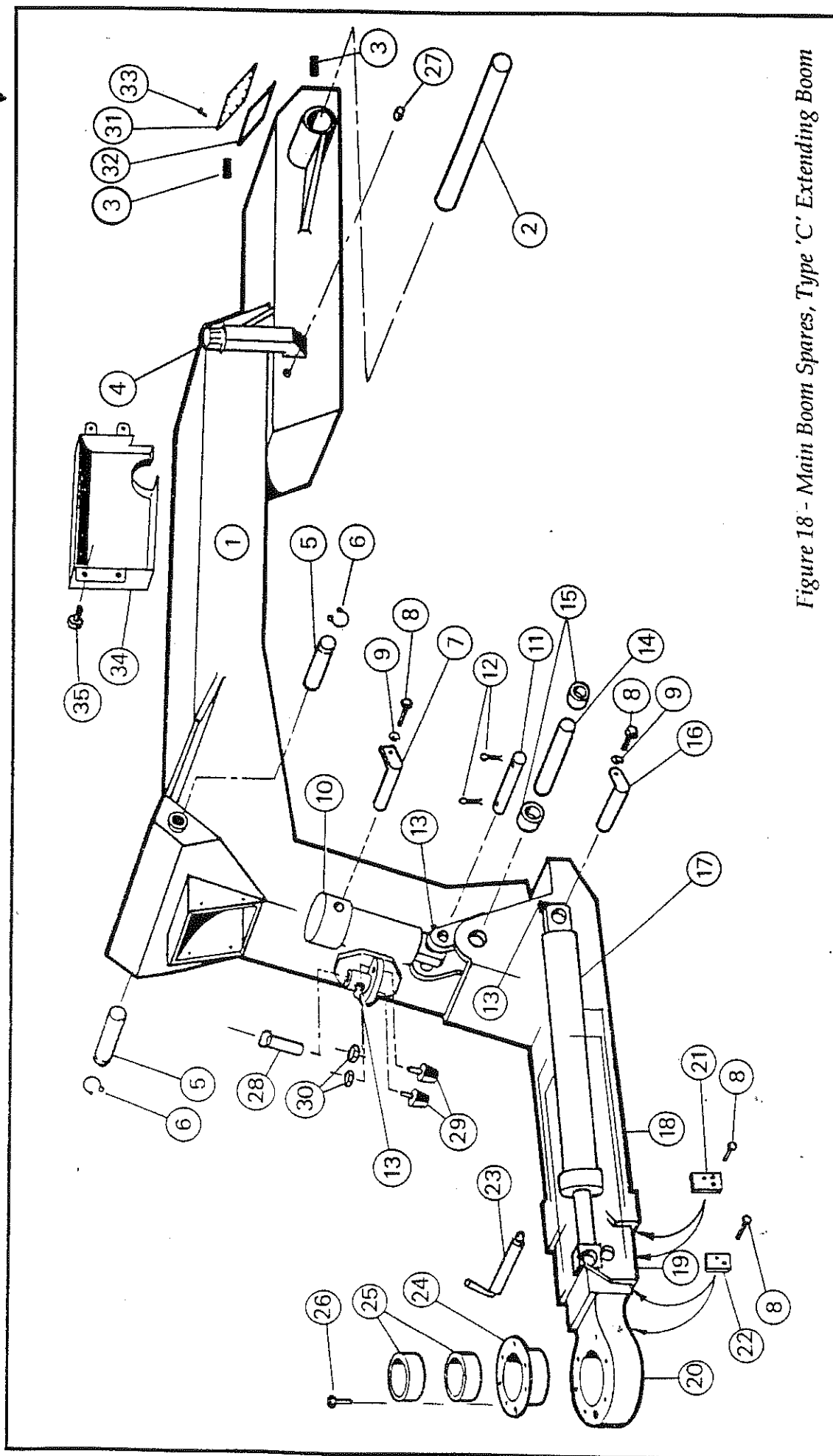


Figure 18 - Main Boom Spares, Type 'C' Extending Boom

SPARES

2. MAIN BOOM - Type 'C' Extending Boom

ITEM No	DESCRIPTION	QTY
1	Main Boom	1
2	Main Boom Pivot Pin	1
3	Grubscrew	2
4	Hydraulic Filler Cap	1
5	Lift Ram Locating Pin	2
6	Circlips 1 1/2in i.d.	2
7	Fold Ram Locating (Upper)	1
8	Fixing Screw M10	12
9	Spring Washer	2
10	Fold Ram	1
11	Fold Ram Locating Pin (Lower)	1
12	Split Pin	2
13	Grease Nipple Straight	3
14	Fold Boom Pivot Pin	1
15	Fold Boom Bearing	2
16	Extend Ram Locating Pin (Inner)	1
17	Extend Ram	1
18	Folding Boom	1
19	Extending Boom First Stage	1
20	Extending Boom Second Stage	1
21	Bearing Plate Inner	2
22	Bearing Plate Outer	2
23	Extending Boom Locking Pin	1
24	Crosshead Bearing Housing	1
25	Crosshead Bearing Bushes	2
26	Fixing Screws	6
27	Oil Level Plug	1
28	Boom Locking Pin	1
29	Rubber Stops	2
30	Nuts	2
31	Inspection Cover	1
32	Gasket	1
33	Fixing Screws	12
34	Cover	1
35	Fixing Screws	6

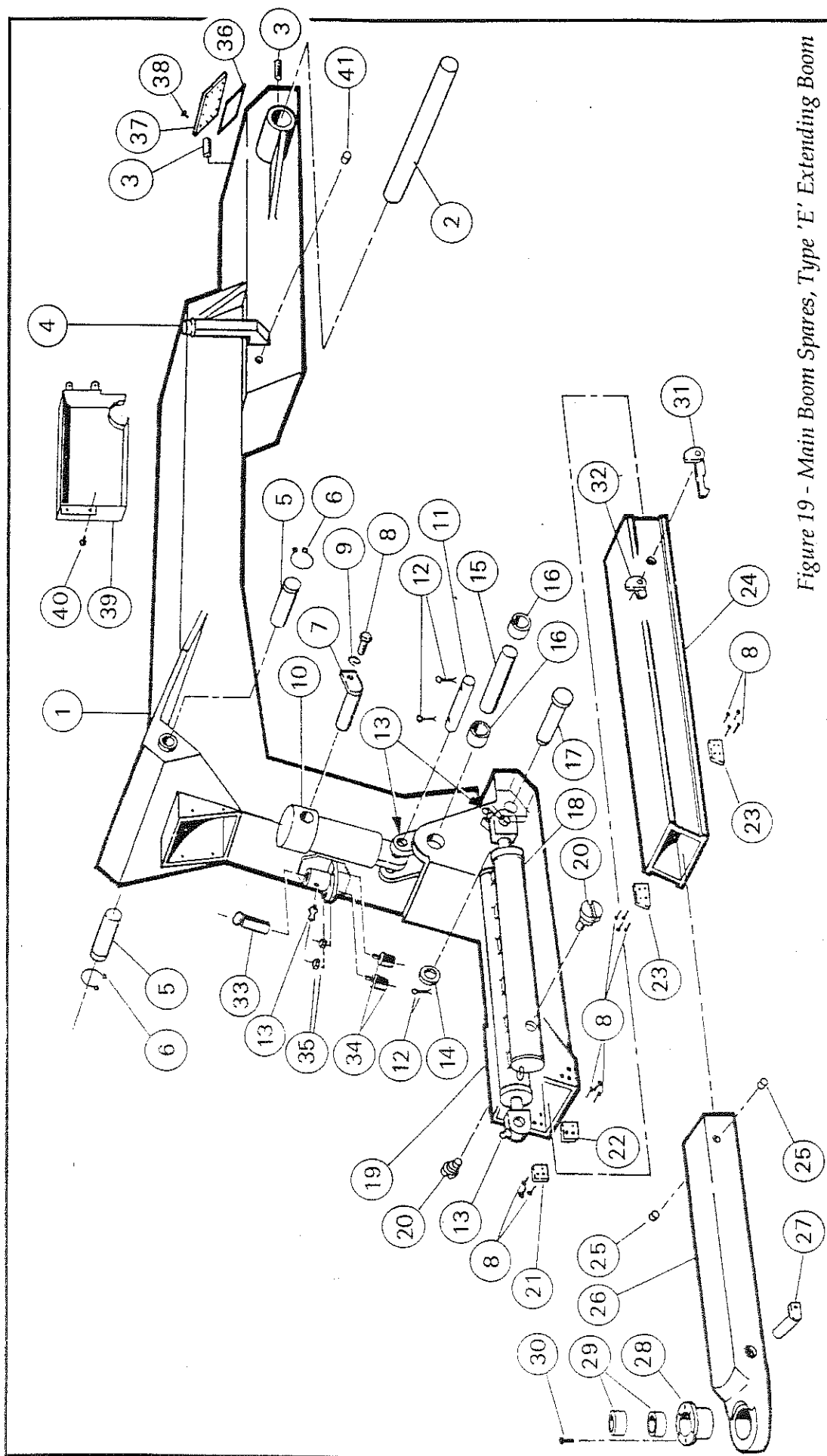


Figure 19 - Main Boom Spares, Type 'E' Extending Boom

SPARES

3. MAIN BOOM Type 'E' Extending Boom

ITEM No	DESCRIPTION	QTY
1	Main Boom	1
2	Main Boom Pivot Pin	1
3	Grubscrew	2
4	Hydraulic Filler Cap	1
5	Lift Ram Locating Pin	2
6	Circlips 11/2in i.d.	2
7	Fold Ram Locating Pin (Upper)	1
8	Fixing Screw M10	15
9	Spring Washer	1
10	Fold Ram	1
11	Fold Ram Locating Pin (Lower)	1
12	Split Pin	3
13	Grease Nipple Straight	4
14	Washer	1
15	Fold Boom Pivot Pin	1
16	Fold Boom Bearing	2
17	Extend Ram Locking Pin (Inner)	1
18	Extend Ram	1
19	Folding Boom	1
20	Cam Pin	2
21	Bearing Plate Outer L.H.	1
22	Bearing Plate Outer R.H.	1
23	Bearing Plate Inner	2
24	Extending Boom Intermediate	1
25	Actuating Pin	2
26	Extending Boom Inner	1
27	Extend Ram Locking Pin (Outer)	1
28	Crosshead Bearing Housing	1
29	Crosshead Bearing Bushes	2
30	Fixing Screws	6
31	Interlock Hook Assembly	1
32	Interlock Stop Assembly	1
33	Boom Lock Pin	1
34	Rubber Stops	2
35	Nuts	2
36	Gasket	1
37	Inspection Cover	1
38	Fixing Screws	12
39	Cover	1
40	Fixing Screws	6
41	Oil Level Plug	1

SPARES

4. ROLLER TYPE FAIRLEAD & ROPE TENSIONER

ITEM No	DESCRIPTION	QTY
1	Body	1
2	Outer Roller	2
3	Outer Roller Locating Pin	2
4	Bush	4
5	Set Screw	2
6	Spring Washer	2
7	Tensioning Arm	1
8	Tensioning Arm Pivot Pin	1
9	Grooved Roller	1
10	Grooved Roller Locating Pin	1
11	Circlip	4
12	Tensioning Roller	1
13	Tensioning Roller Locating Pin	1
14	Circlip	2
15	Grease Nipple 90 degs	3
16	Pneumatic Cylinder	1
17	Grease Nipple Straight	2
18	Spring Washers	4
19	Plain Washers	4
20	Fairlead Mounting Bolts (If fitted)	4

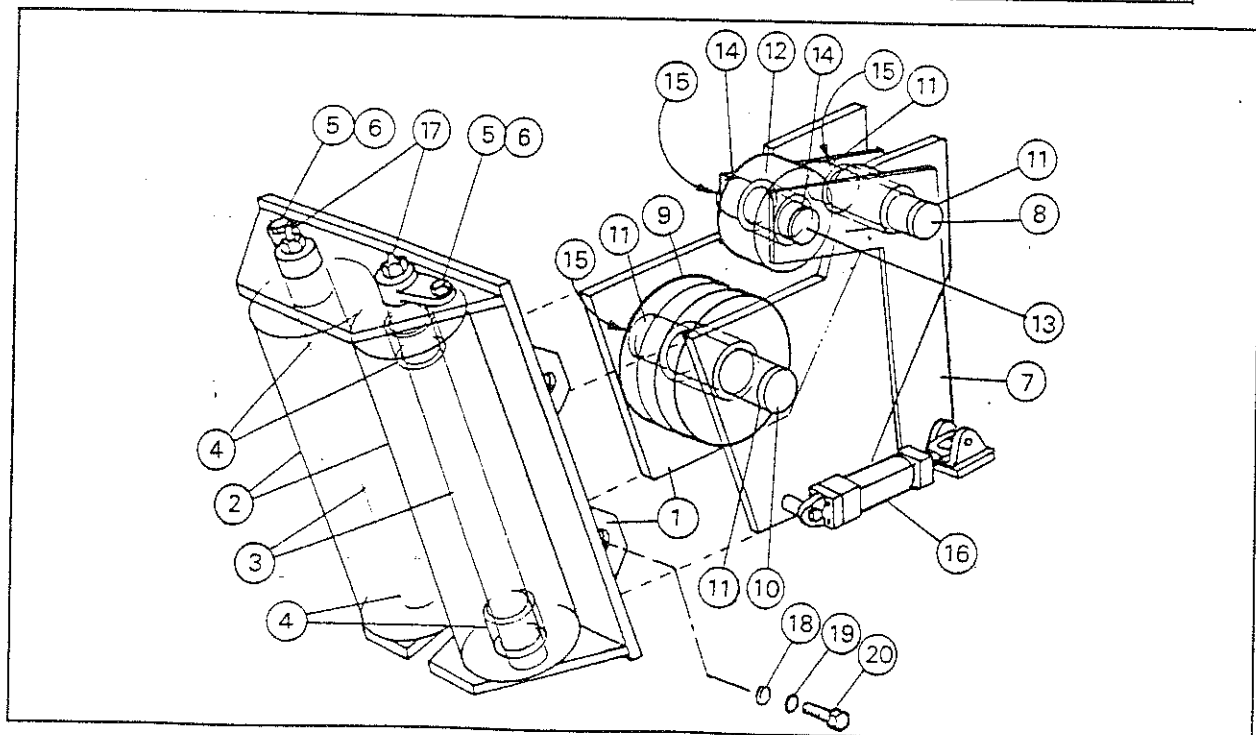


Figure 20 - Roller Type Fairlead

SPARES

5. SHEAVE TYPE FAIRLEAD & ROPE TENSIONER

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

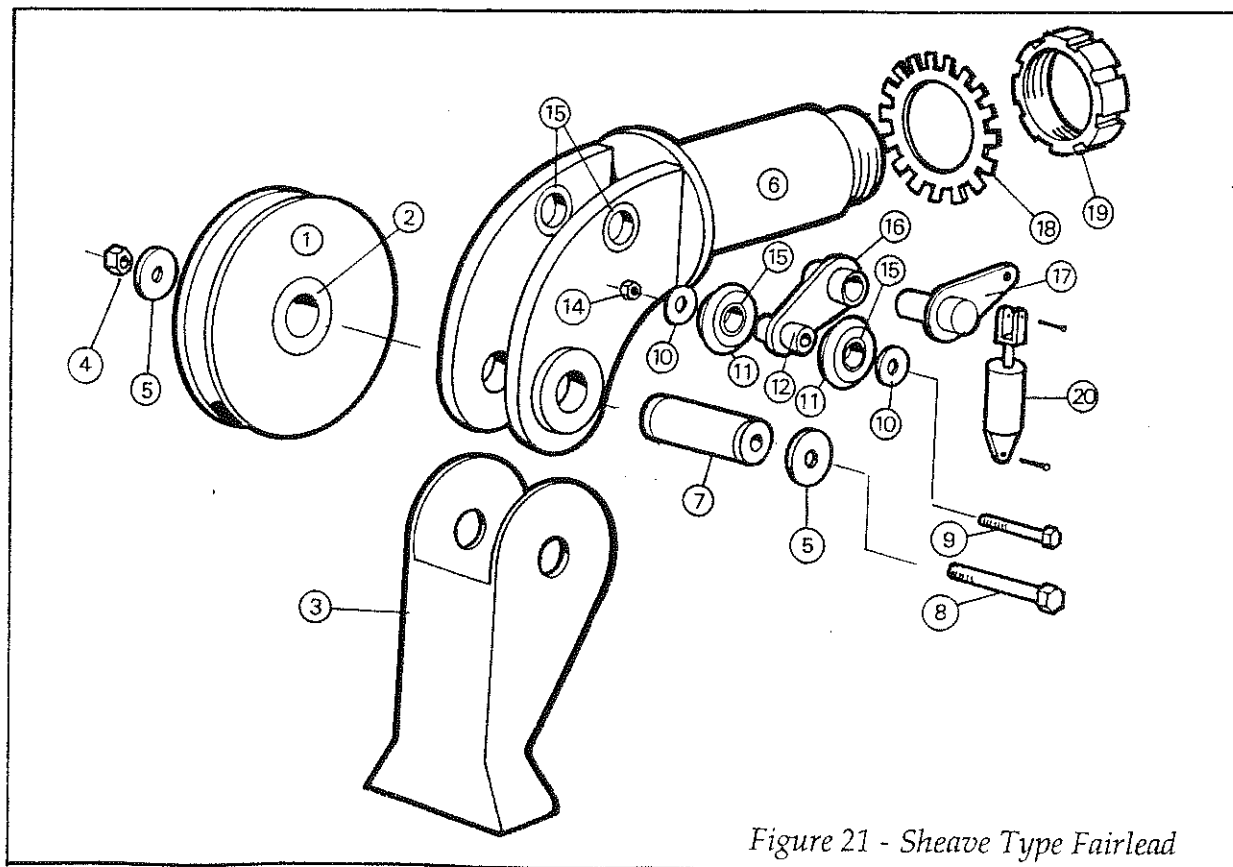


Figure 21 - Sheave Type Fairlead

SPARES

6. 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

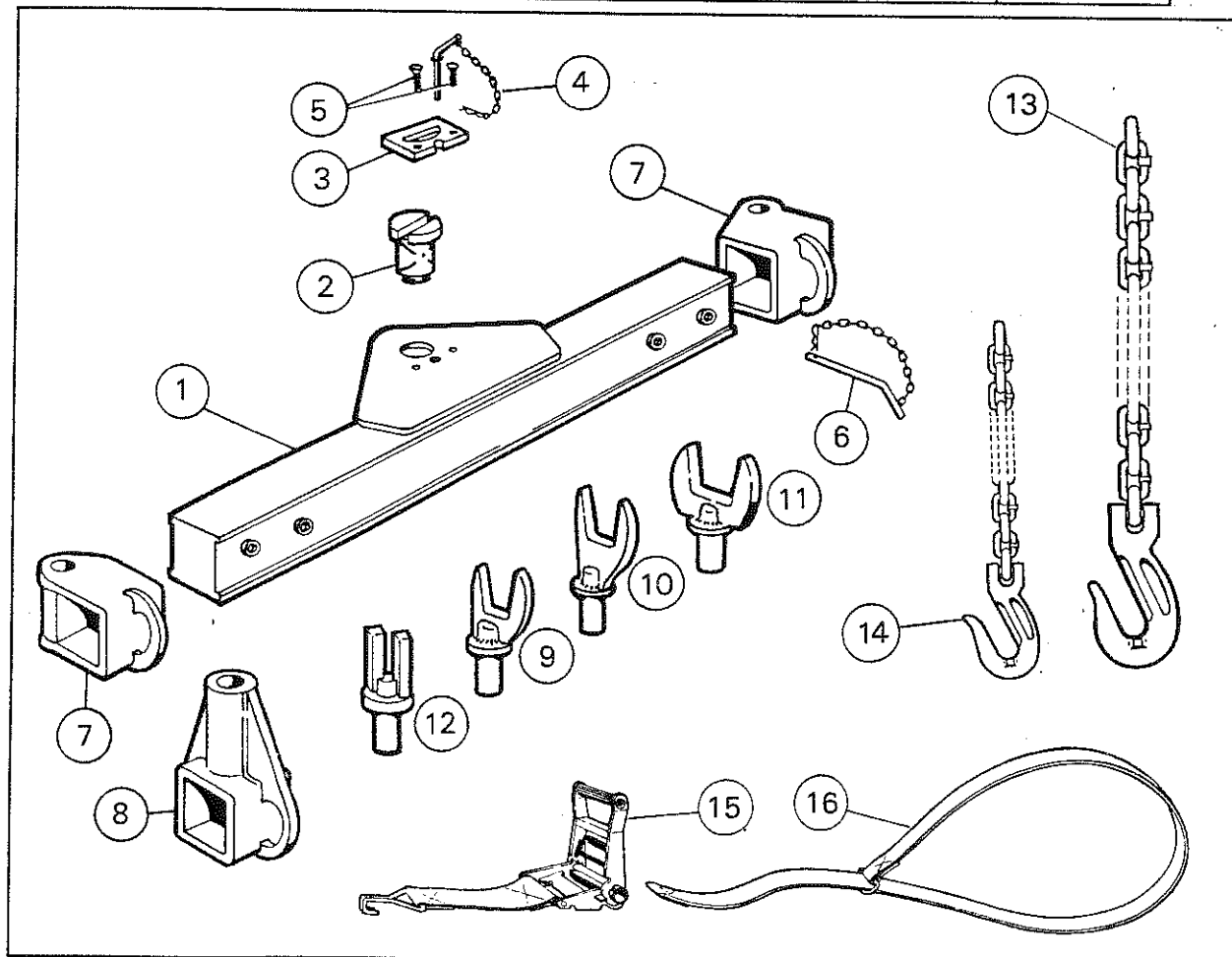


Figure 22 - Lifting Equipment

SPARES

7. WHEEL FRAMES

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

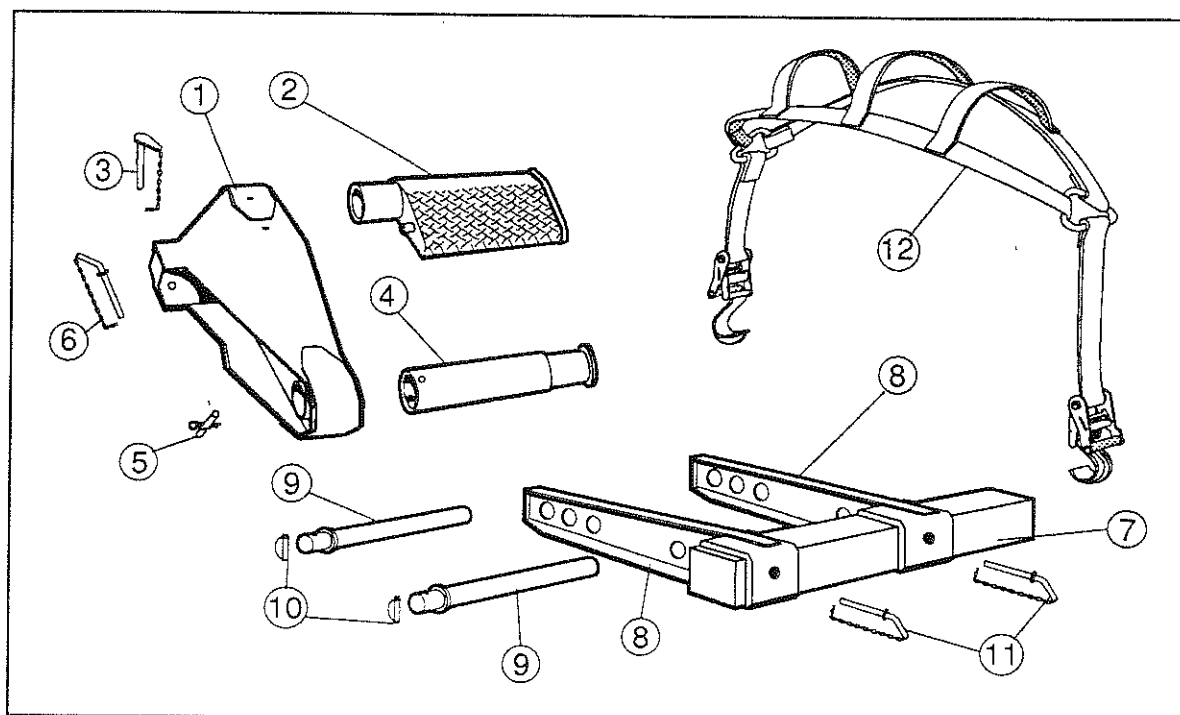


Figure 23 - Wheel Frames

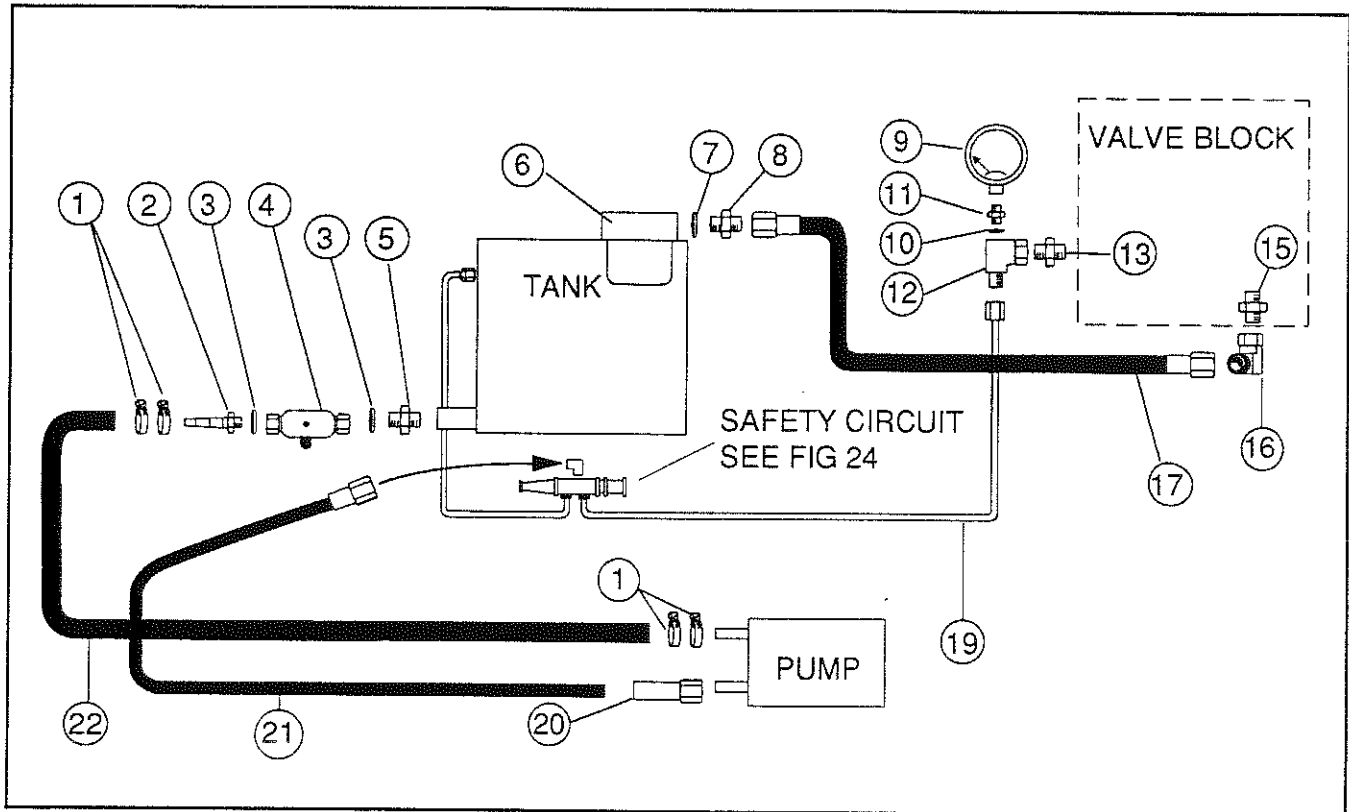


Figure 24 - Primary Hydraulics (One Pump)

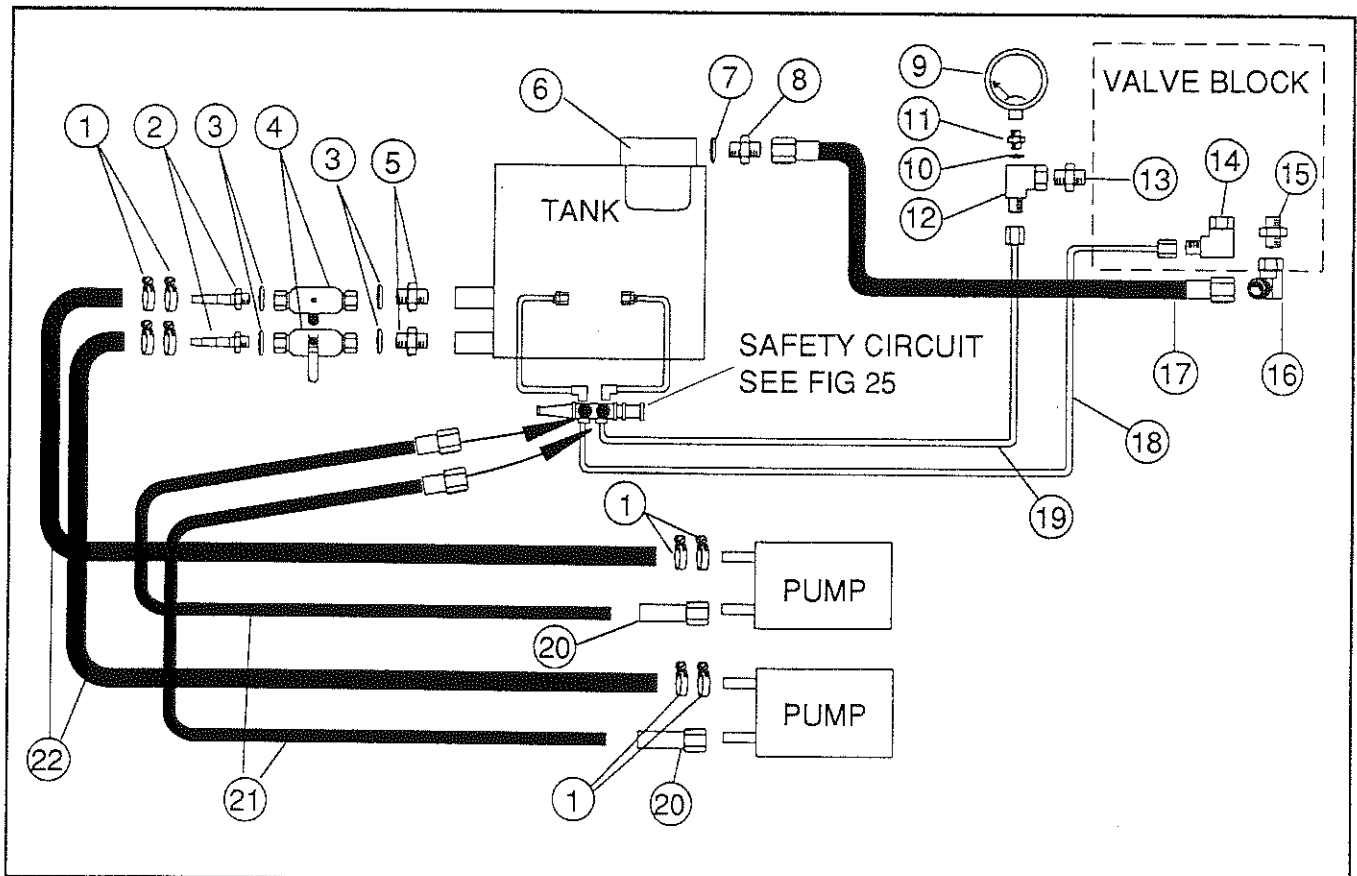


Figure 25 - Primary Hydraulics (Two Pumps)

PART 7
SPARES

INTERSTATER Mk 2

8. PRIMARY HYDRAULICS

		2 WINCH	1 WINCH	NO LEGS
ITEM No	DESCRIPTION	QTY	QTY	QTY
1	Hose clips	8	4	4
2	Hosetail 1 1/4in	2	1	1
3	Bonded Seal	4	2	2
4	Ball Valve	2	1	1
5	Adaptor	2	1	1
6	Adaptor	1	1	1
7	Bonded Seal	2	2	2
8	Filter Unit	1	1	1
8A	Filter Element	1	1	1
9	Adaptor	1	1	1
10	Elbow	1	1	1
11	Adaptor	1	1	1
12	Bonded Seal	1	1	1
13	Adaptor	1	1	1
14	Elbow	1	-	-
15	Adaptor	1	1	1
16	Elbow	1	1	1
17	Hose Assembly	1	1	1
18	Hose Assembly	1	1	1
19	Adaptor	1	1	1
20	Pressure Gauge	1	1	1
21	Feed Pipe Assembly	1	-	-
22	Feed Pipe Assembly	1	1	1
23	Re-usable Hose Coupling 3/4in BSP	2	1	1
24	Feed Hose Assembly	2	1	1
25	Suction Hose	6M	3M	3M

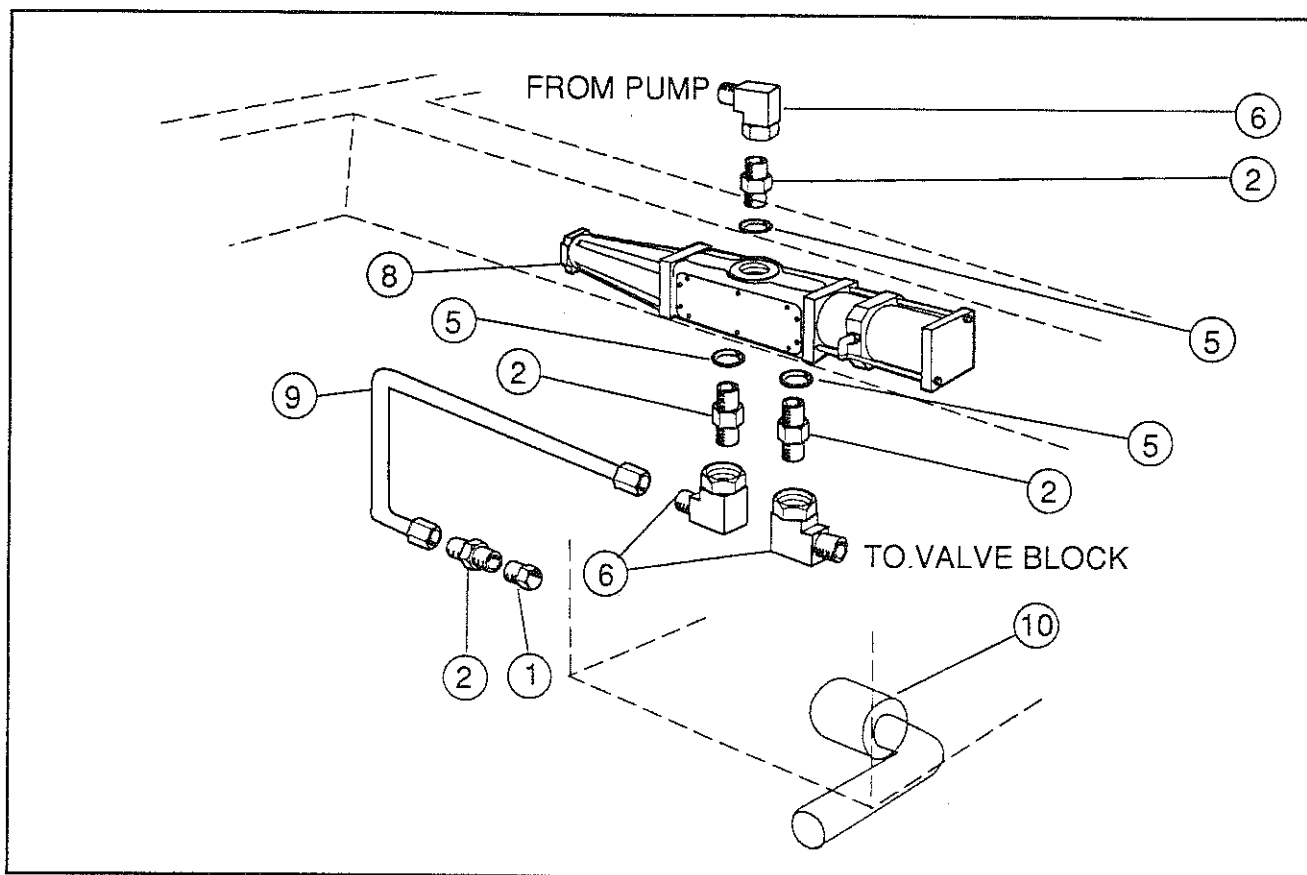


Figure 26 - Safety Cut-out Circuit (One Pump)

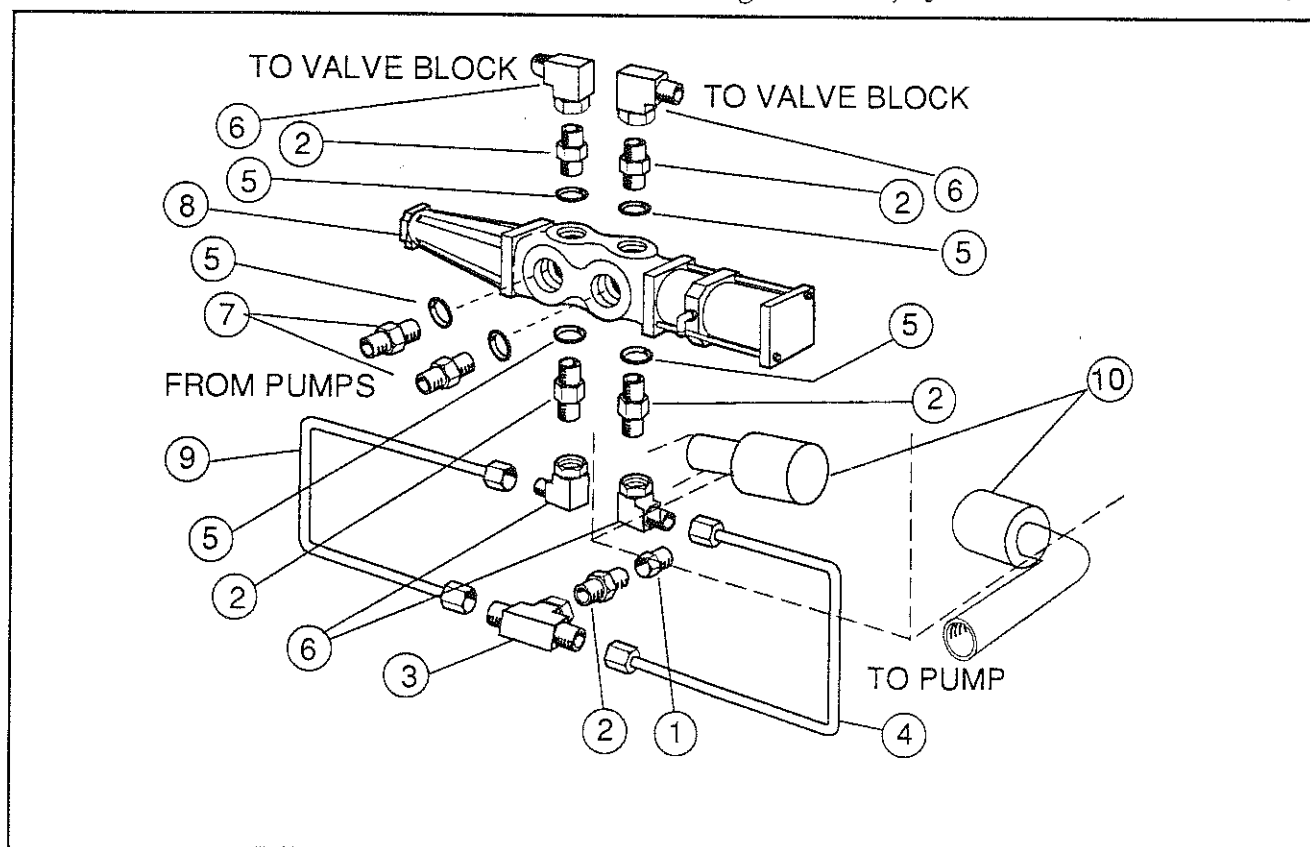


Figure 27 - Safety Cut-out Circuit (Two Pumps)

SPARES

9. HYDRAULIC SAFETY CUT-OUT CIRCUIT

ITEM No	DESCRIPTION	2 WINCH	1 WINCH	NO LEGS
		QTY	QTY	QTY
1	Reducing Bush	1	1	1
2	Adaptor	5	4	4
3	Tee	1	-	-
4	Pipe Assembly	1	-	-
5	Bonded Seal	6	3	3
6	Elbow	4	3	3
7	Adaptor	2	-	-
8	Diverter Valve Assembly	1	1	1
9	Pipe Assembly	1	1	1
10	Suction Element	2	1	1

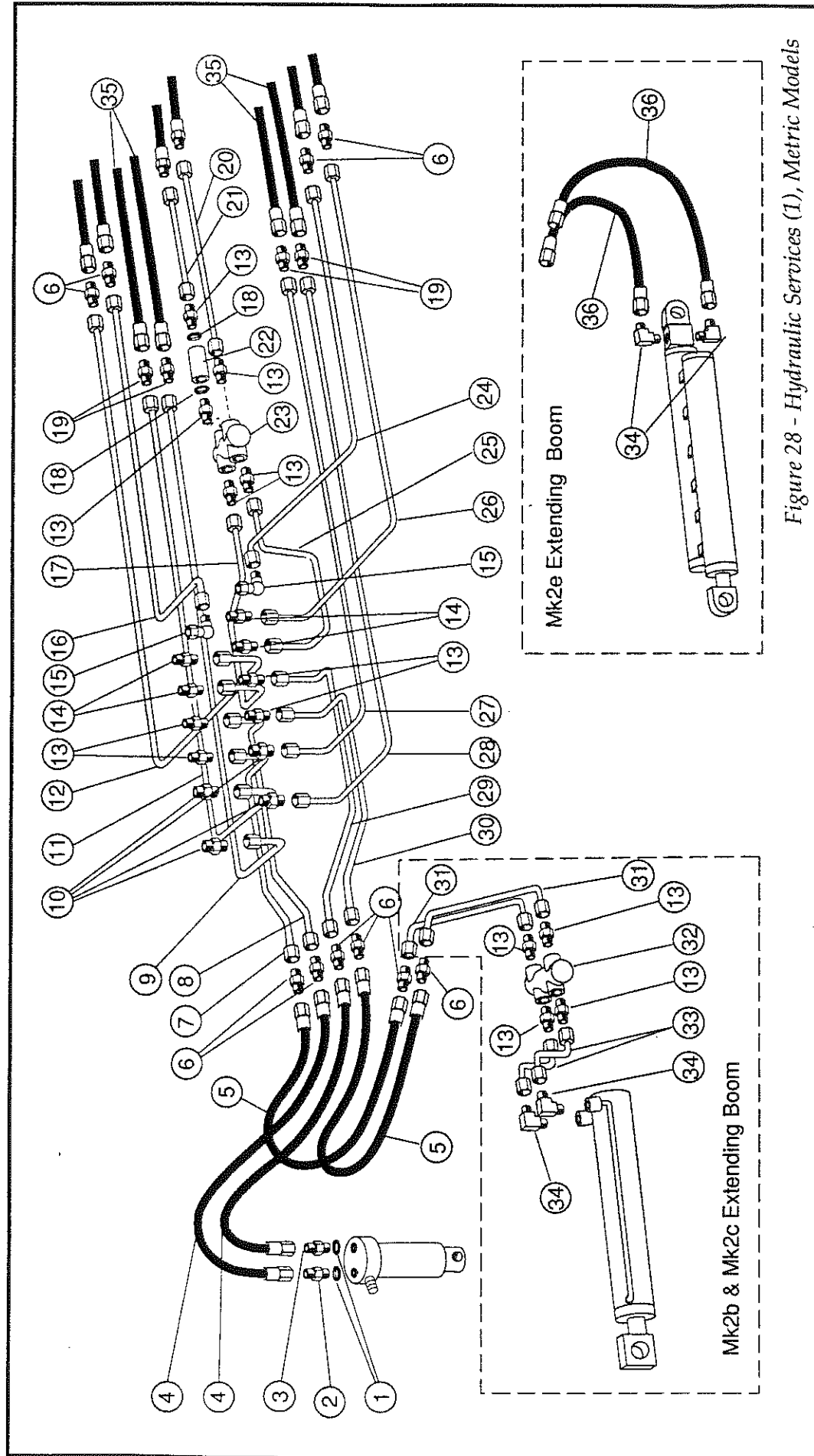


Figure 28 - Hydraulic Services (1), Metric Models

SPARES

10. HYDRAULIC SERVICES (1) - METRIC

ITEM No	DESCRIPTION	2 WINCH	1 WINCH	NO LEGS
		QTY	QTY	QTY
1	Bonded Seal	2	2	2
2	Adaptor	1	1	1
3	Adaptor Special	1	1	1
4	Hose Assembly	2	2	2
5	Hose Assembly	2	2	2
6	Adaptor	10	6	6
7	Pipe Assembly	1	1	1
8	Pipe Assembly	1	1	1
9	Pipe Assembly	1	-	-
10	Adaptor	4	2	2
11	Pipe Assembly	1	1	1
12	Pipe Assembly	1	1	-
13	Adaptor	13	13	13
14	Adaptor	4	4	-
15	Elbow	2	2	-
16	Pipe Assembly	1	1	1
17	Pipe Assembly	1	1	1
18	Bonded Seal	2	2	2
19	Adaptor	4	2	2
20	Pipe Assembly	1	1	1
21	Pipe Assembly	1	1	1
22	Throttle Valve	1	1	1
23	Pilot Operated Check Valve	1	1	1
24	Pipe Assembly	1	1	-
25	Pipe Assembly	1	1	1
26	Pipe Assembly	1	1	-
27	Pipe Assembly	1	1	1
28	Pipe Assembly	1	-	-
29	Pipe Assembly	1	1	1
30	Pipe Assembly	1	1	1
31	Pipe Assembly *	2	2	2
32	Pilot Operated Check Valve *	1	1	1
33	Pipe Assembly *	2	2	2
34	Elbow	2	2	2
35	Winch Hose Assembly	2	1	1
36	Hose Assembly †	2	2	2
*	Fitted only on Type C extending booms			
†	Fitted only on Type E extending booms			

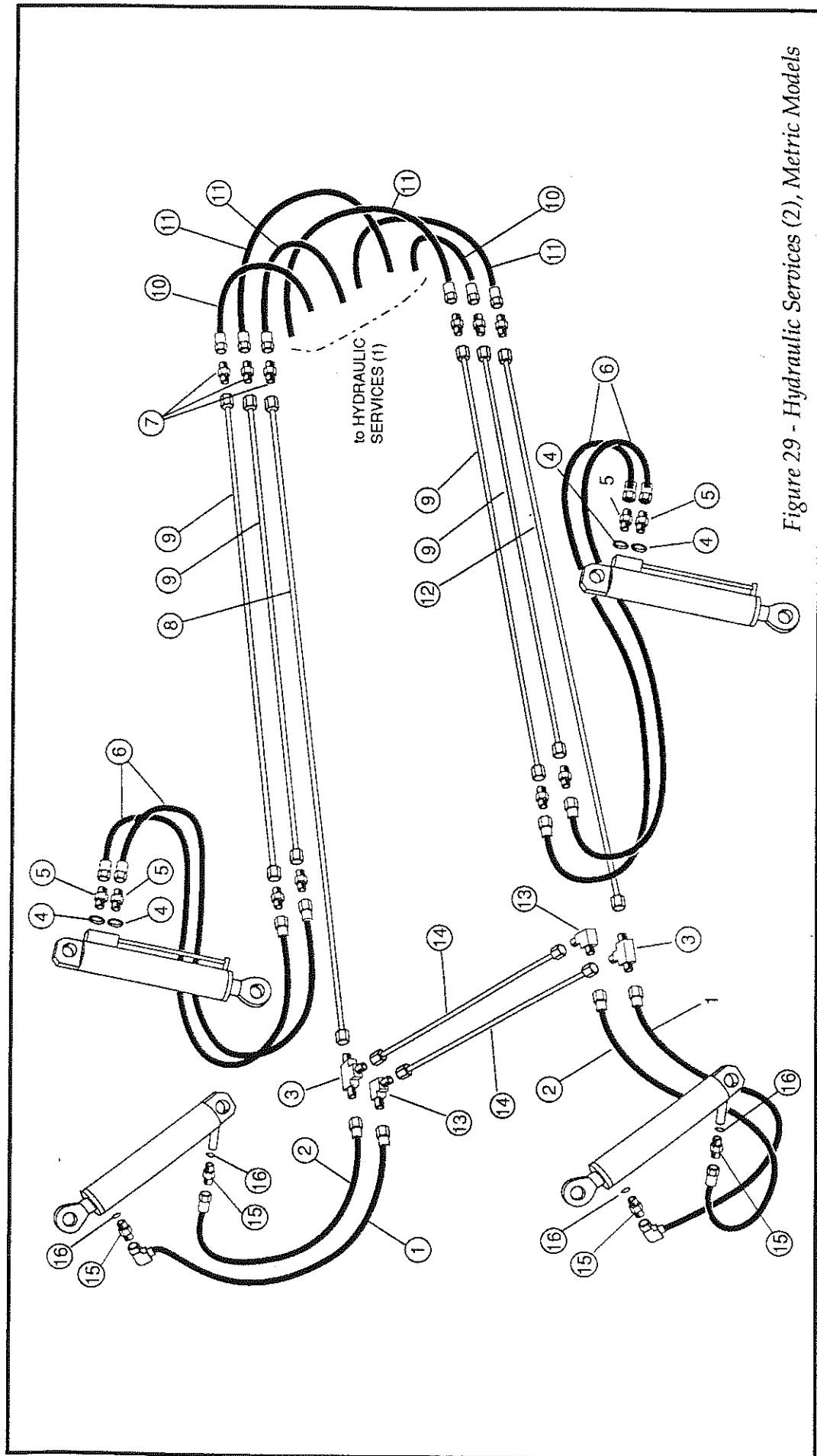


Figure 29 - Hydraulic Services (2), Metric Models

SPARES

11. HYDRAULIC SERVICES (2) - METRIC

ITEM No	DESCRIPTION	2 WINCH	1 WINCH	NO LEGS
		QTY	QTY	QTY
1	Hose Assembly	2	2	2
2	Hose Assembly	2	2	2
3	Tee	2	2	2
4	Bonded Seal	4	4	-
5	Adaptor	4	4	-
6	Hose Assembly	4	4	-
7	Adaptor	10	10	2
8	Pipe Assembly	1	1	1
9	Pipe Assembly	4	4	-
10	Hose Assembly	2	2	-
11	Hose Assembly	4	4	2
12	Pipe Assembly	1	1	1
13	Elbow	2	2	2
14	Pipe Assembly	2	2	2
15	Adaptor	4	4	4
16	Bonded Seal	4	4	4

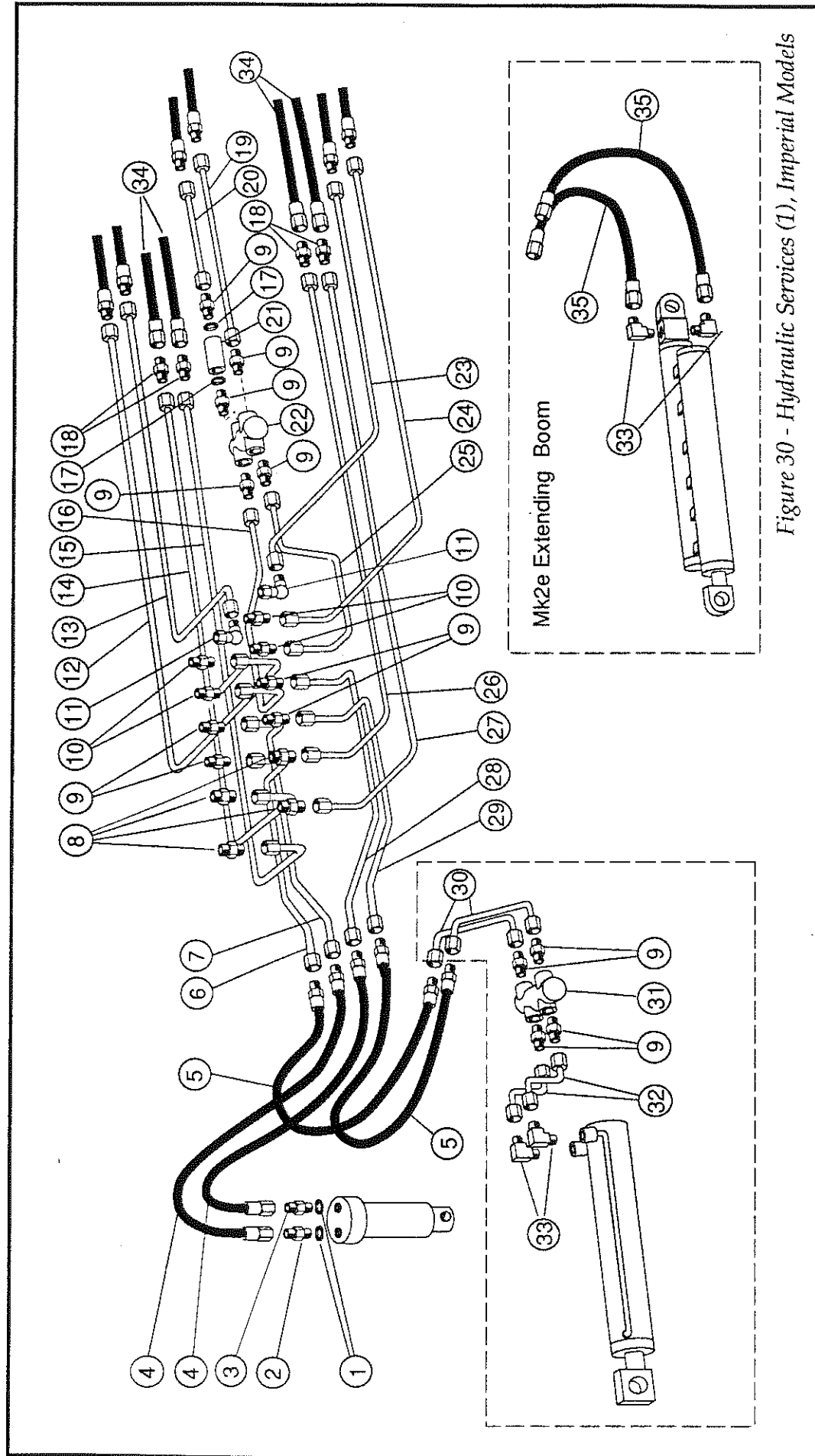


Figure 30 - Hydraulic Services (1), Imperial Models

SPARES

12. HYDRAULIC SERVICES (1) - IMPERIAL

ITEM No	DESCRIPTION	2 WINCH	1 WINCH	NO LEGS
		QTY	QTY	QTY
1	Bonded Seal	2	2	2
2	Adaptor	2	2	2
3	Adaptor Special	2	2	2
4	Hose Assembly	2	2	2
5	Hose Assembly	2	2	2
6	Pipe Assembly	1	1	1
7	Pipe Assembly	1	1	1
8	Adaptor	4	2	2
9	Adaptor	12	12	12
10	Adaptor	4	4	-
11	Elbow Compact	2	2	-
12	Pipe Assembly	1	1	-
13	Pipe Assembly	1	1	-
14	Pipe Assembly	1	1	1
15	Pipe Assembly	1	-	-
16	Pipe Assembly	1	1	1
17	Bonded Seal	2	2	2
18	Adaptor	4	2	2
19	Pipe Assembly	1	1	1
20	Pipe Assembly	1	1	1
21	Throttle Valve	1	1	1
22	Pilot Operated Check Valve	1	1	1
23	Pipe Assembly	1	1	-
24	Pipe Assembly	1	1	-
25	Pipe Assembly	1	1	1
26	Pipe Assembly	1	1	-
27	Pipe Assembly	1	-	-
28	Pipe Assembly	1	1	1
29	Pipe Assembly	1	1	1
30	Pipe Assembly *	2	2	2
31	Pilot Operated Check Valve*	1	1	1
31	Pipe Assembly*	2	2	2
33	Elbow	2	2	2
34	Winch Hose Assembly	4	2	2
35	Hose Assembly †	2	2	2
*	Fitted to Type C extending booms			
†	Fitted to Type E extending booms			

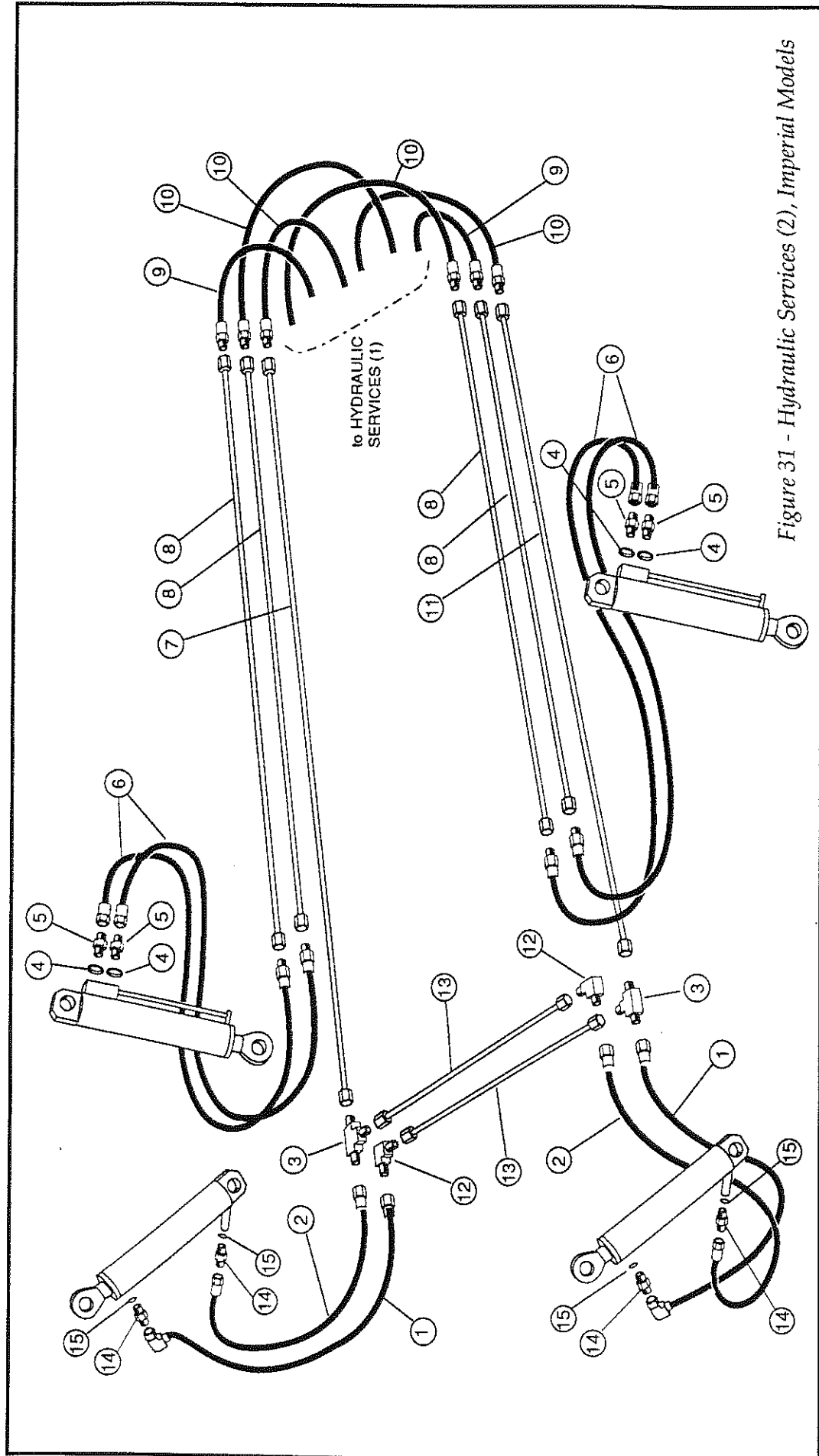


Figure 31 - Hydraulic Services (2), Imperial Models

SPARES

13. HYDRAULIC SERVICES (2) - IMPERIAL

ITEM No	DESCRIPTION	2 WINCH	1 WINCH	NO LEGS
		QTY	QTY	QTY
1	Hose Assembly	2	2	2
2	Hose Assembly	2	2	2
3	Tee	2	2	2
4	Bonded Seal	4	4	-
5	Adaptor	4	4	-
6	Hose Assembly	4	4	-
7	Pipe Assembly	1	1	1
8	Pipe Assembly	4	4	-
9	Hose Assembly	2	2	-
10	Hose Assembly	4	4	2
11	Pipe Assembly	1	1	1
12	Elbow	2	2	2
13	Pipe Assembly	2	2	2
14	Adaptor	2	2	2
15	Bonded Seal	2	2	2

SPARES

14. HYDRAULIC RAMS - LIFT

ITEM No	DESCRIPTION	QTY
1	Body L.H.	1
or	Body R.H.	1
2	Spherical Bearing	2
3	Grease Nipple Straight 1/8in BSP	1
4	Grease Nipple 90deg 1/8in BSP	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	1
15	Rod end	1
16	Lock Nut	1
17	Integral Velocity Fuse	1

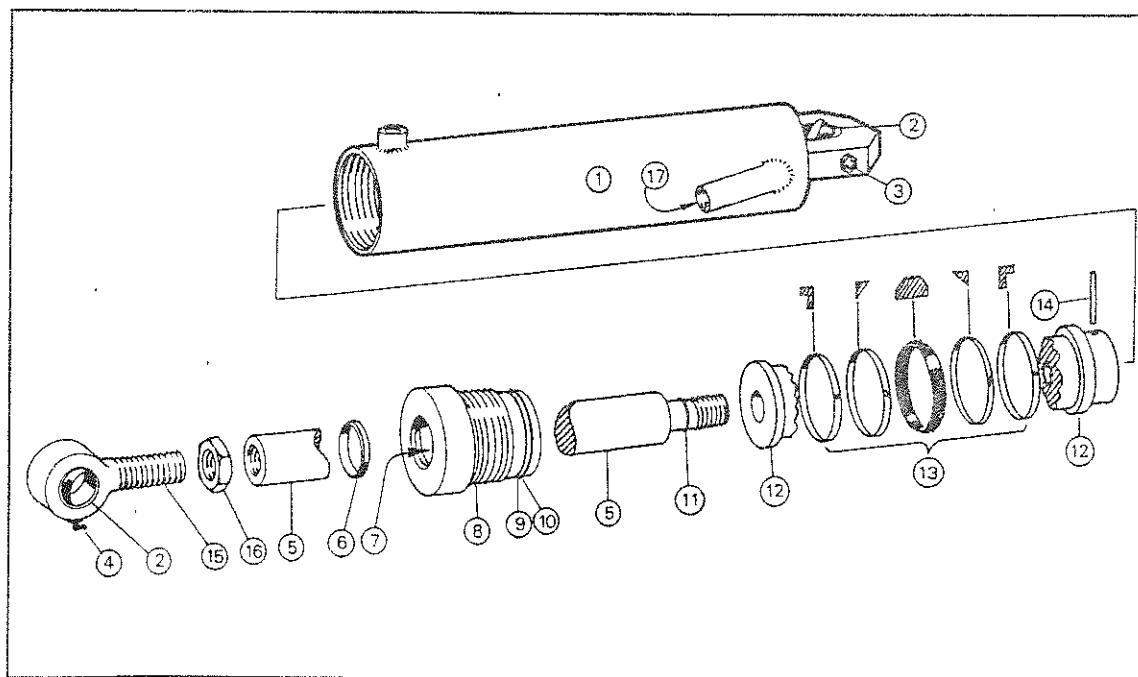


Figure 32 - Hydraulic Ram, Lift

SPARES

15. HYDRAULIC RAM - INBOARD REAR LEGS

ITEM No	DESCRIPTION	QTY
1	Body	1
2	Spherical Bearing	2
3	Grease Nipple Straight	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	1
12	Piston Seal Set - 5 items	1
13	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

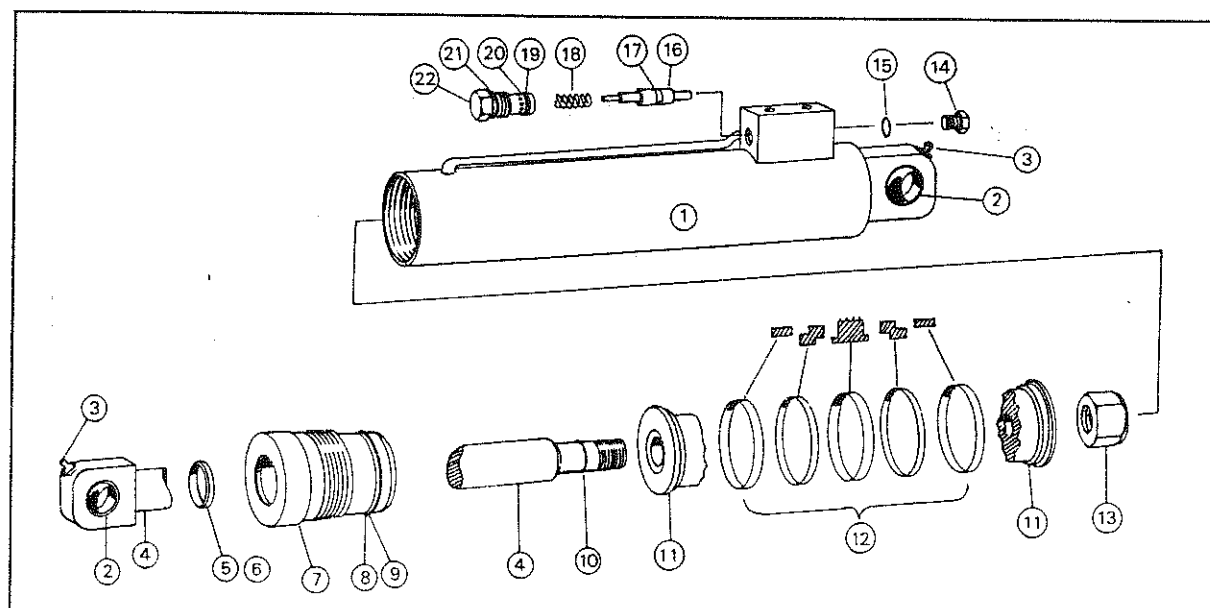


Figure 33 - Hydraulic Ram, Inboard Support Legs

SPARES

16. HYDRAULIC RAM - FOLD.

ITEM No	DESCRIPTION	QTY
1	Body	1
2	Plastic 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

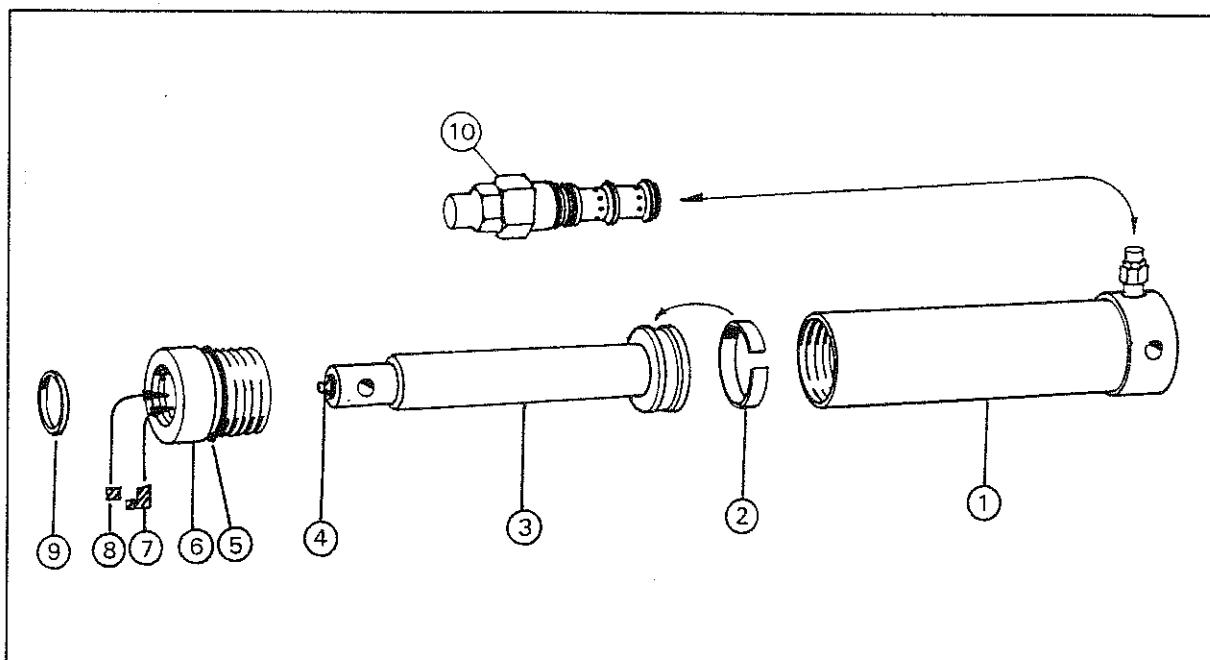


Figure 34 - Hydraulic Ram, Fold

SPARES

17. HYDRAULIC RAMS - EXTENDING Type C Boom

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

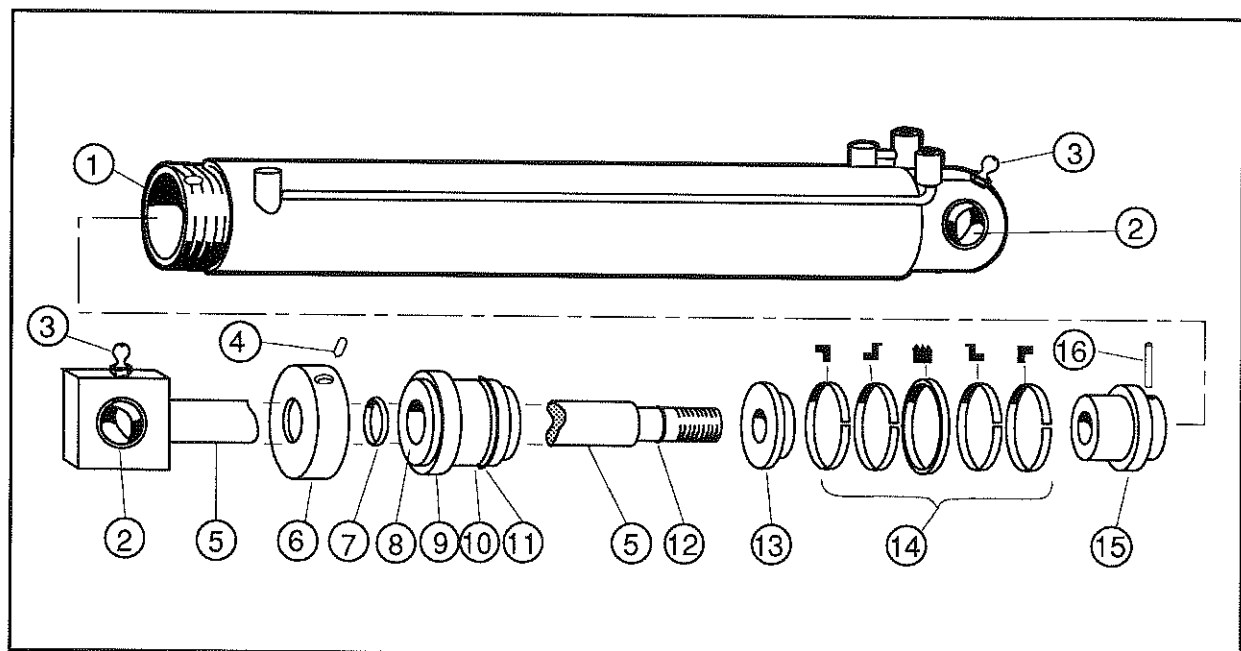


Figure 35 - Hydraulic Ram, Type C Extending Boom

SPARES

18. HYDRAULIC RAMS - EXTENDING, Type E Boom

ITEM No	DESCRIPTION	QTY
1	Body - Special	1
2	Spherical Bearing	4
3	Grease Nipple Straight 1/8in BSP	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

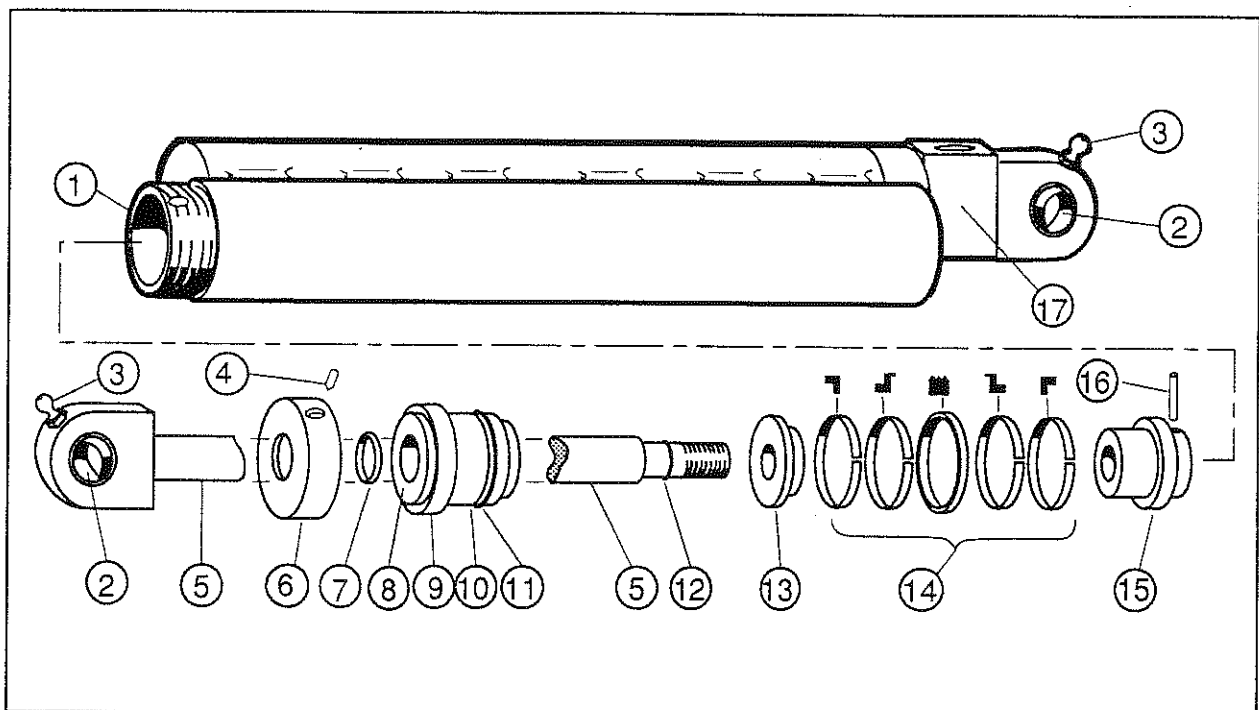


Figure 36 - Hydraulic Ram, Type E Extending Boom

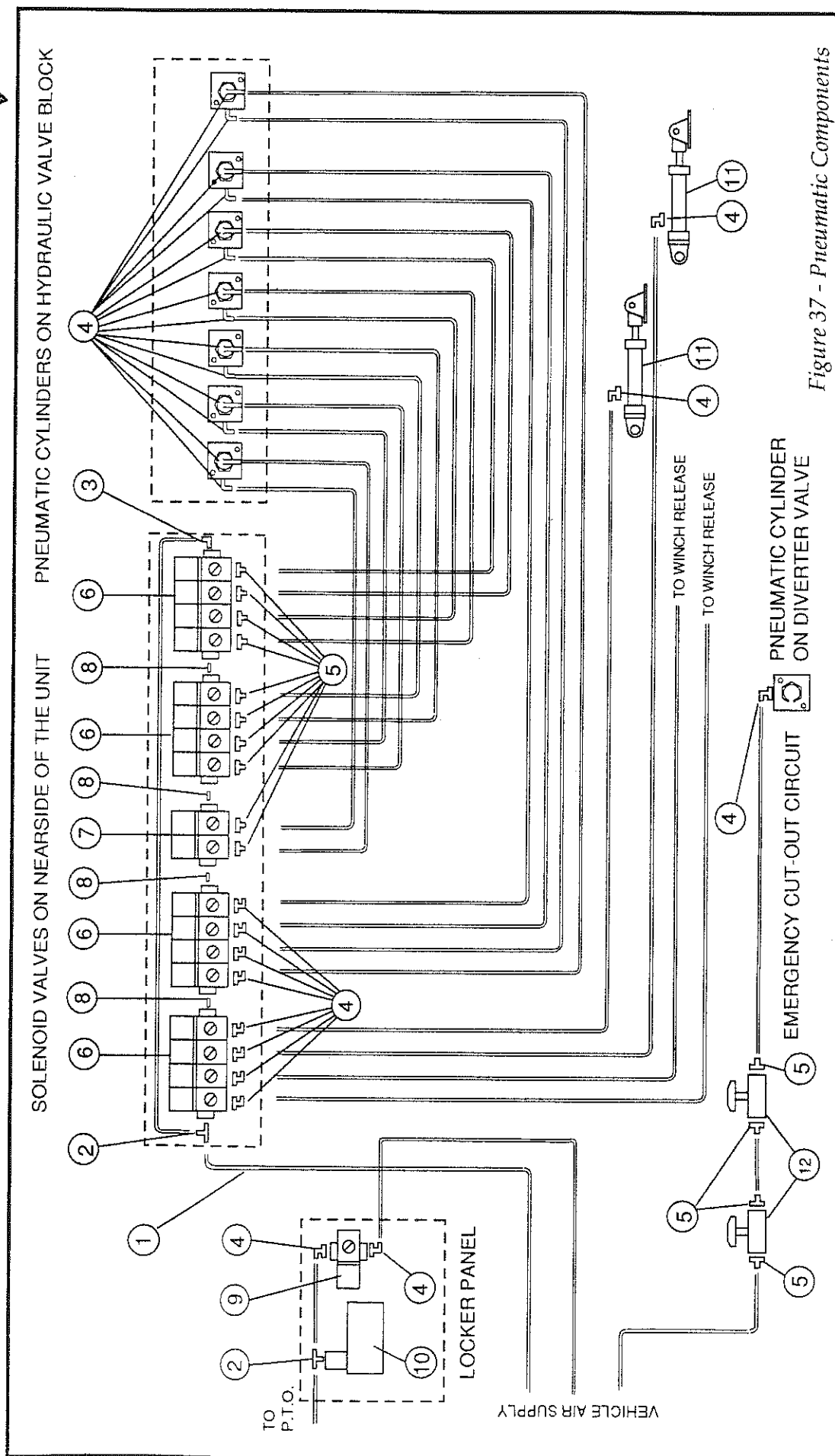


Figure 37 - Pneumatic Components

PART 7**INTERSTATER Mk 2****SPARES**

19 PNEUMATIC SPARES

ITEM No	DESCRIPTION	2 WINCH	1 WINCH	NO LEGS
		QTY	QTY	QTY
1	Nylon Pneumatic Pipe			
2	Tee	2	2	2
3	Elbow	1	1	1
4	Elbow	26	19	15
5	Connector, Straight	14	14	10
6	4 Bank Solenoid Valves	4	3	2
7	2 Bank Solenoid Valves	1	1	1
8	Adaptor	4	3	2
9	Single Solenoid Valve	1	1	1
10	Pneumatic Switch	1	1	1
11	Rope Tensioner Actuating Cylinder	2	1	1
12	Emergency Pneumatic Switch	2	2	2

SPARES

20 ELECTRICAL SPARES (CONTROL PANEL)

ITEM No	DESCRIPTION	2 WINCH	1 WINCH	NO LEGS
		QTY	QTY	QTY
1	10 Pin Socket	1	1	1
2	Toggle Switch	4	2	2
3	Push Switch	14	12	8
4	Front Panel	1	1	1
5	Steel Box	1	1	1

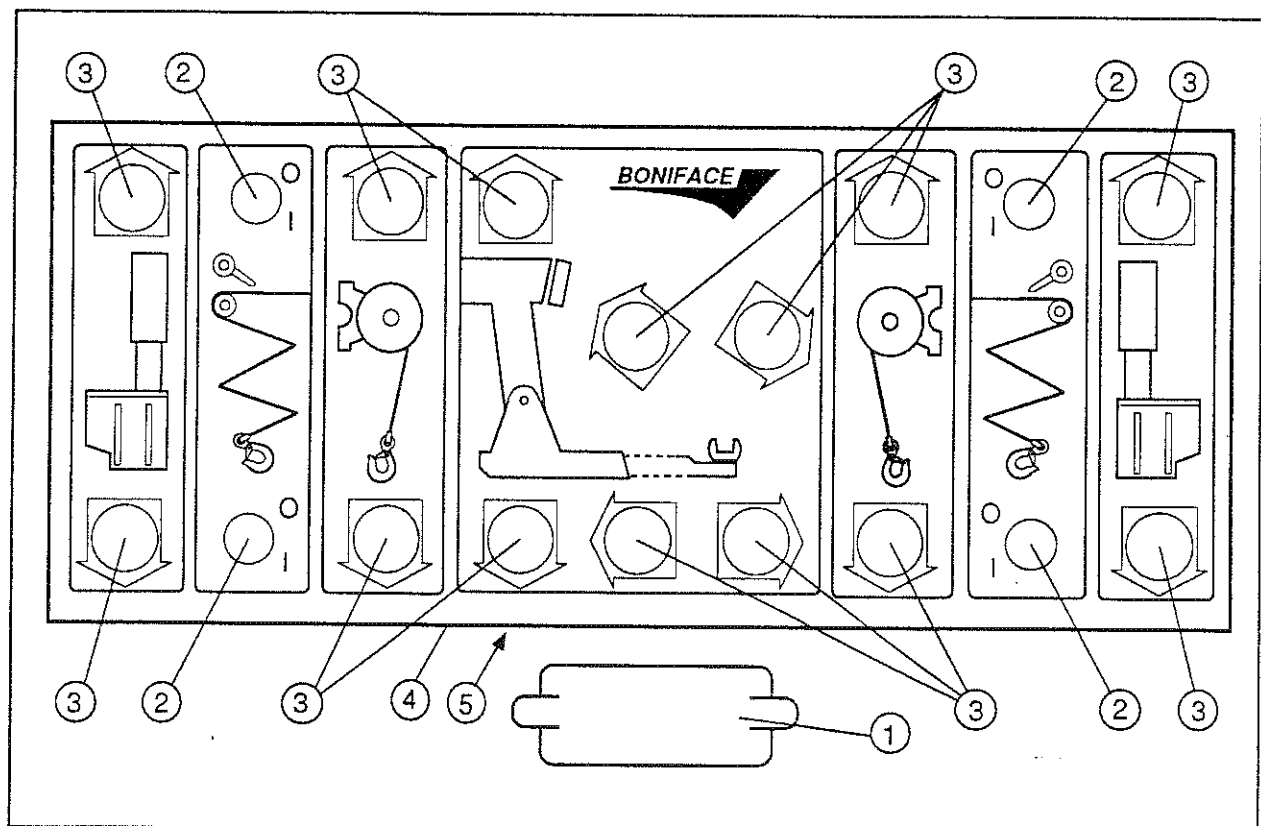


Figure 38 - Electrical Spares (Control Panel)

CIRCUIT DIAGRAMS

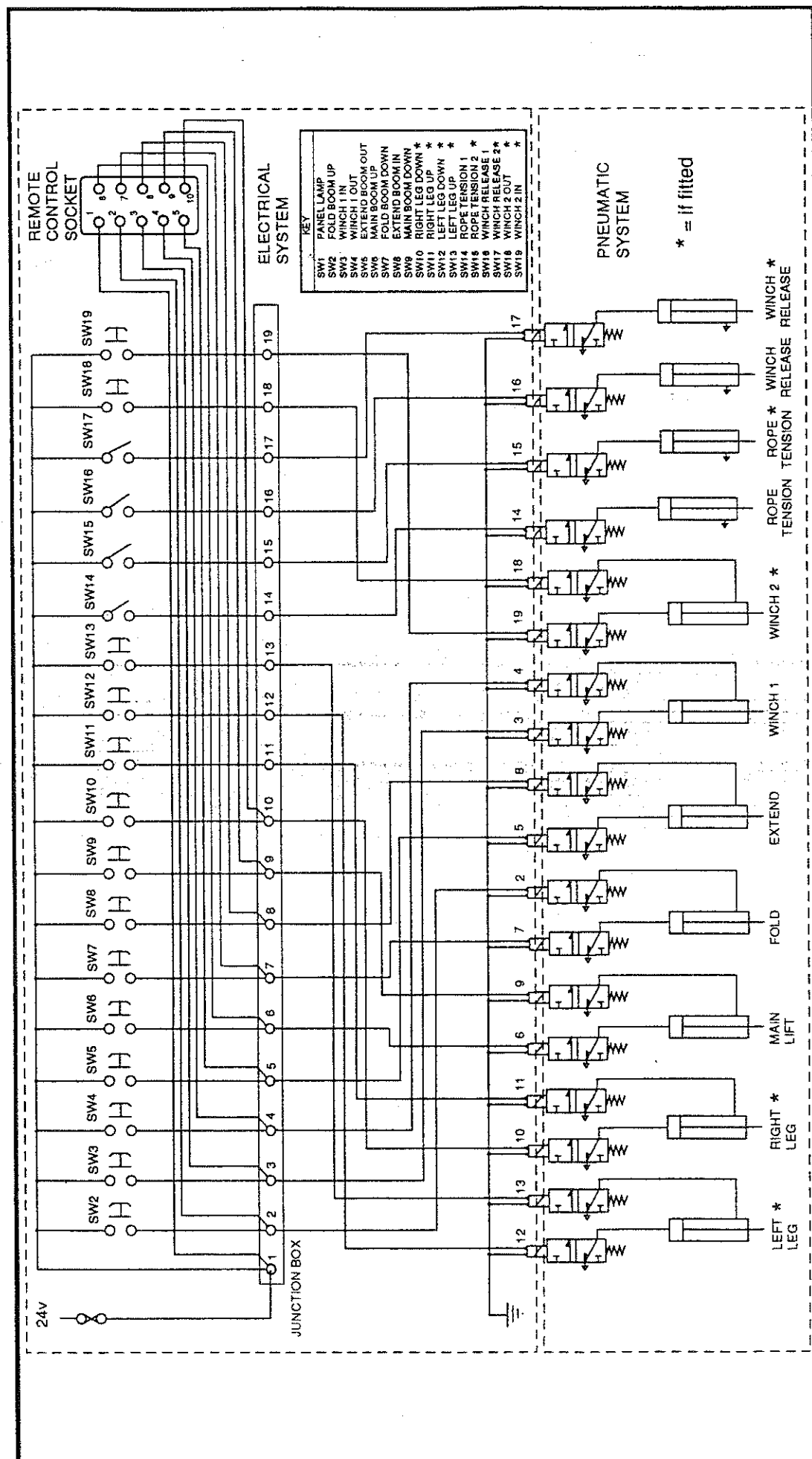


Figure 39 - Electro-Pneumatic Spares

CIRCUIT DIAGRAMS

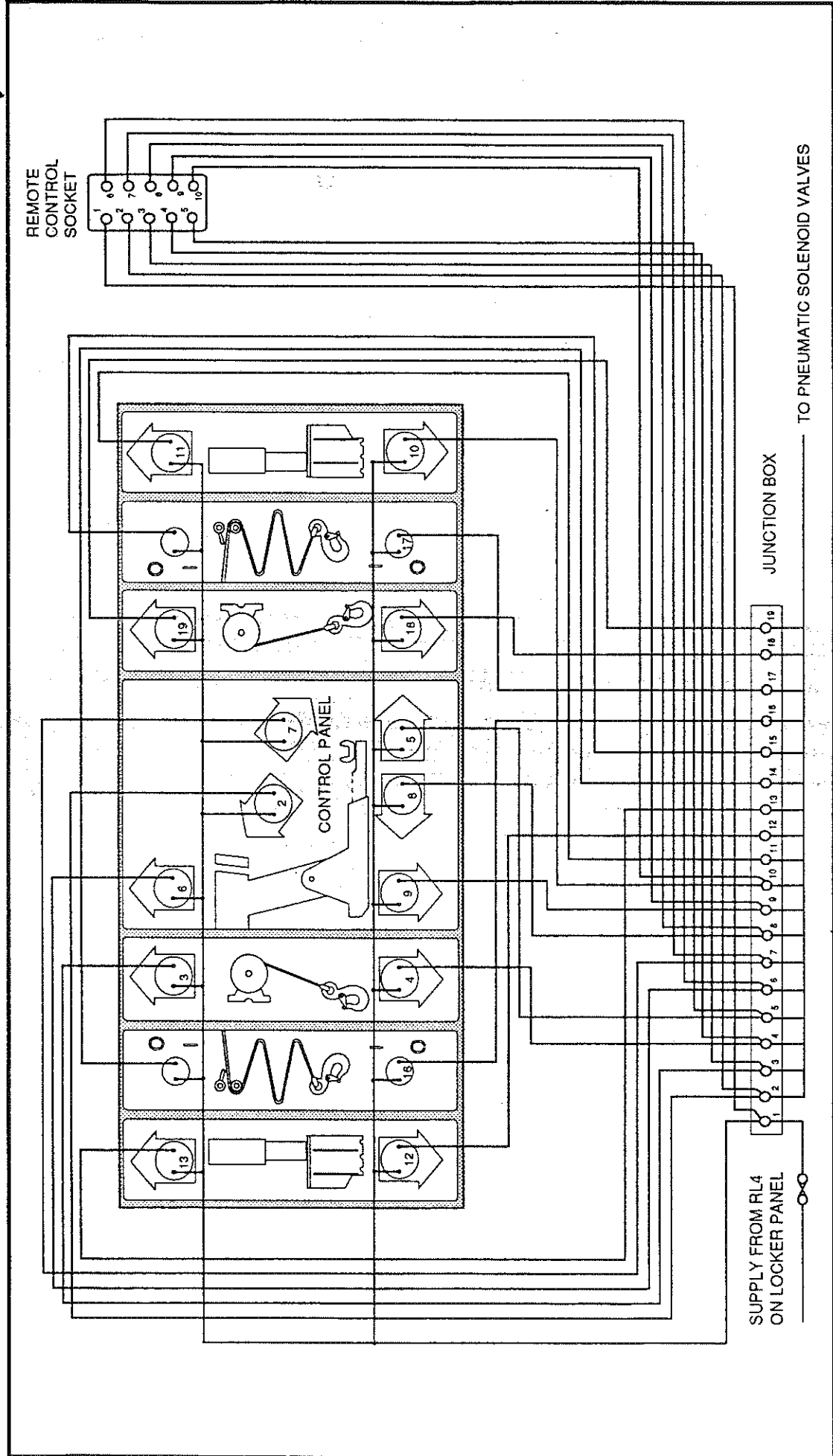


Figure 40 - Electrical Control Circuit

CIRCUIT DIAGRAMS

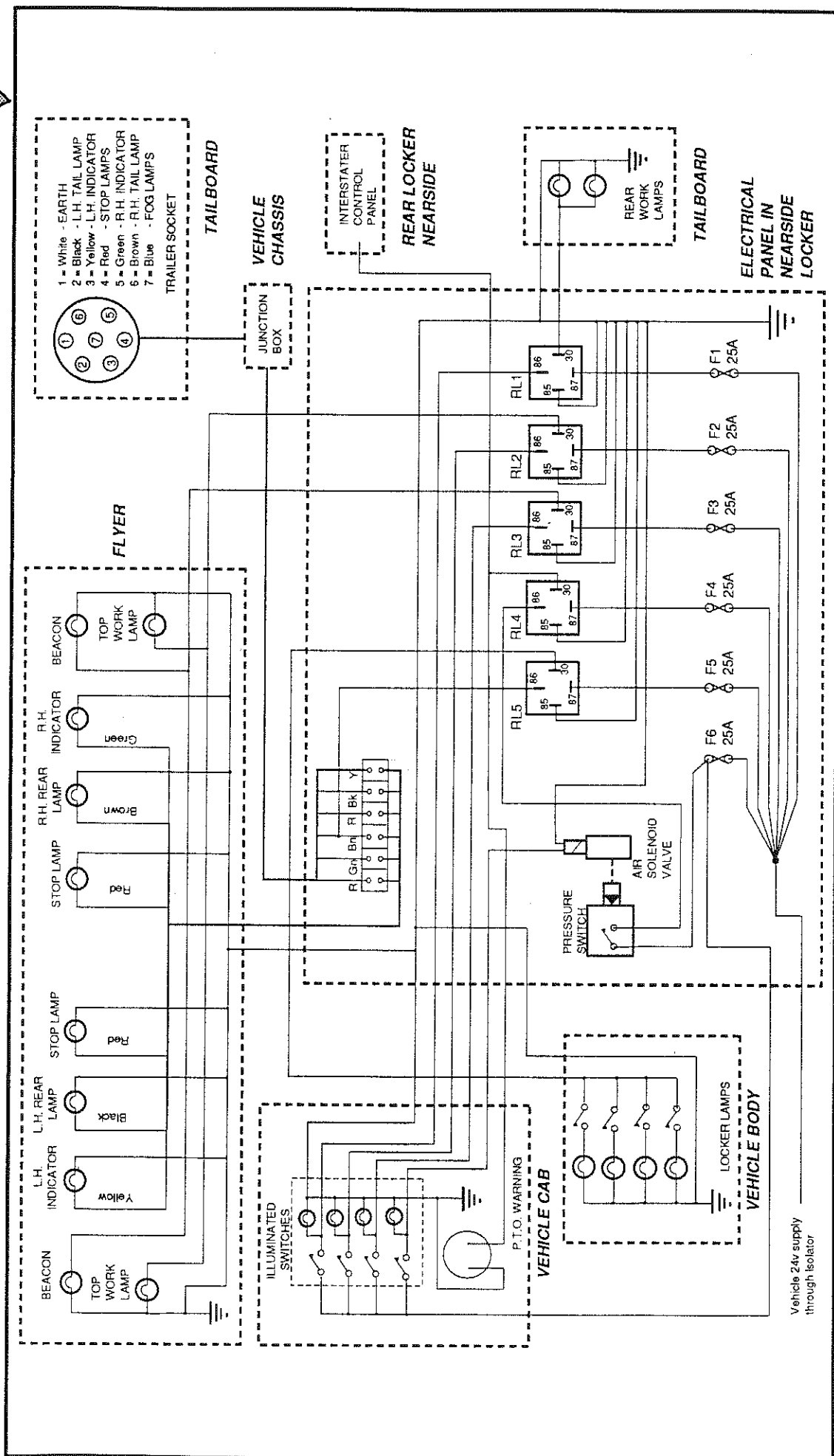


Figure 41 - Electrical Panel (Services)

CIRCUIT DIAGRAMS

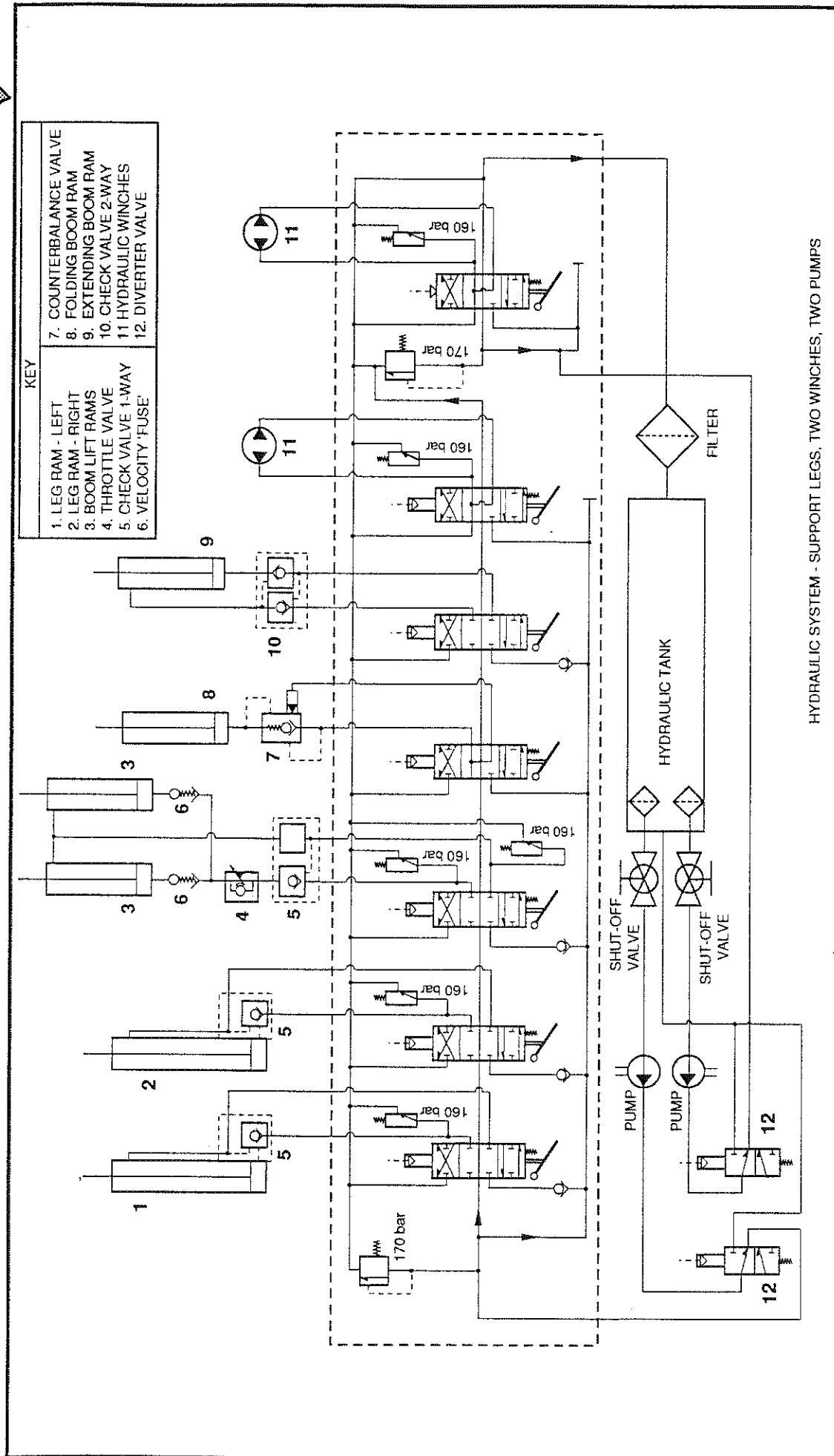


Figure 42 - Hydraulic Circuit (Two Winches)

CIRCUIT DIAGRAMS

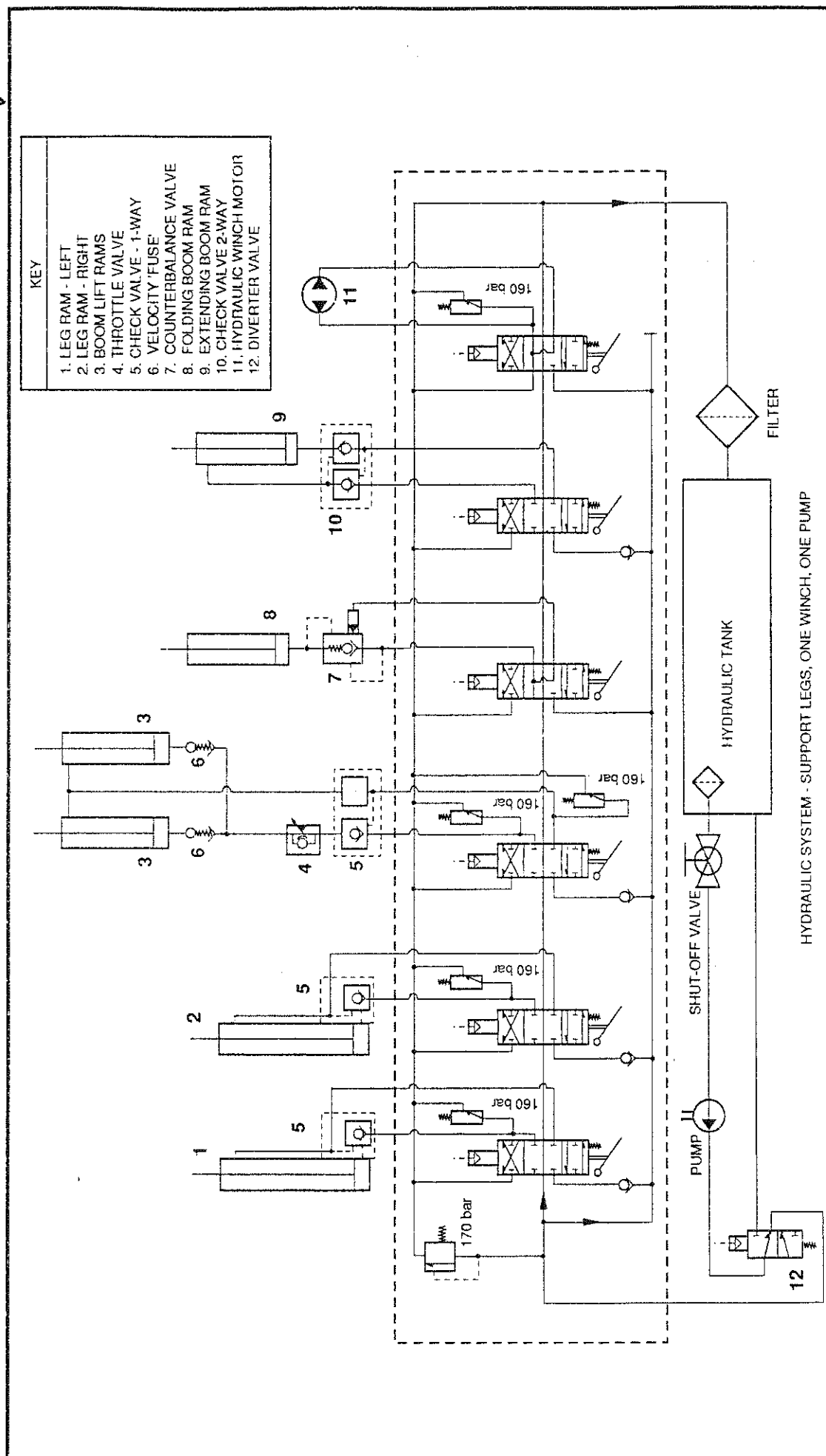


Figure 43 - Hydraulic Circuit (One Winch)

CIRCUIT DIAGRAMS

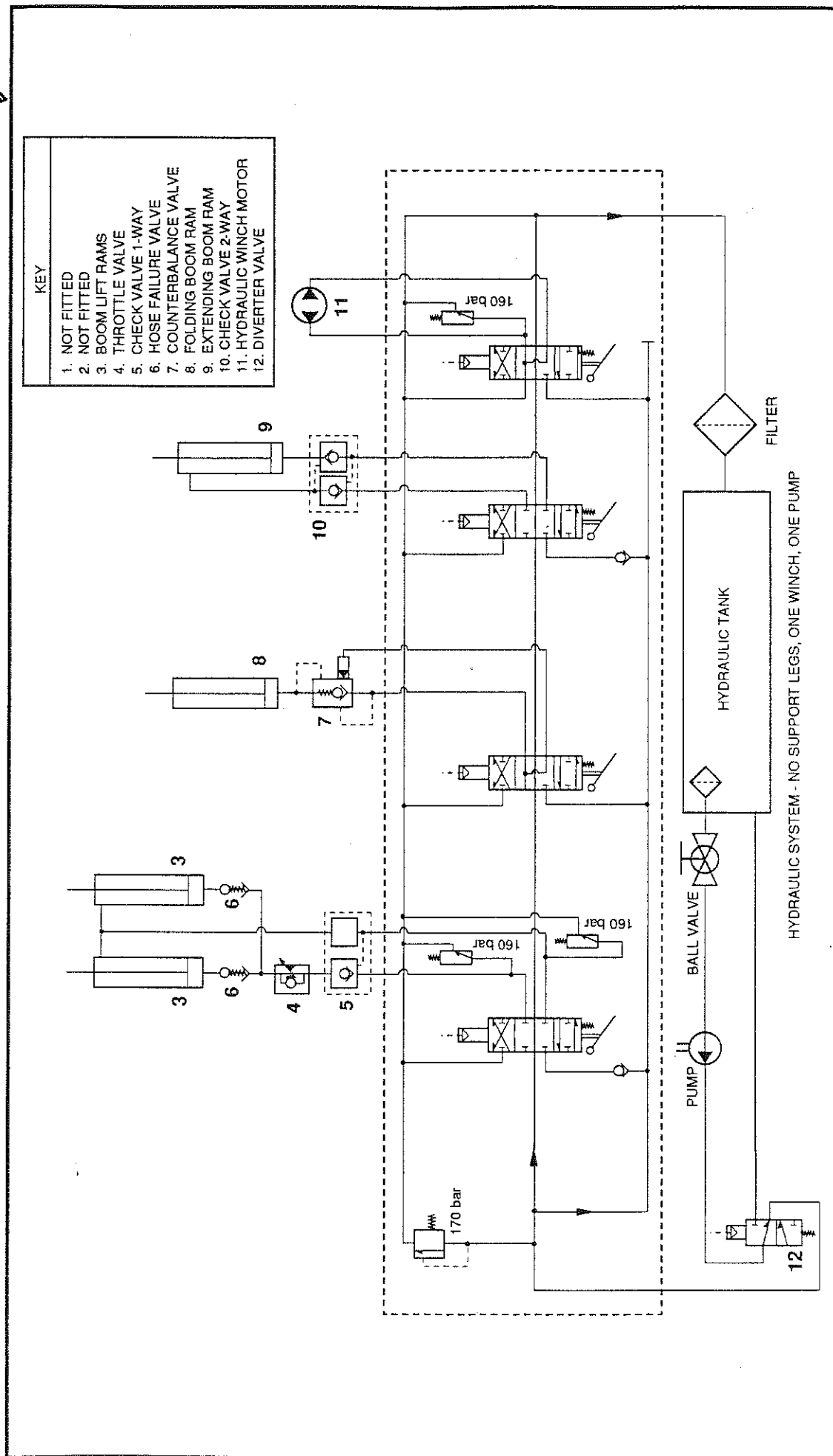


Figure 44 - Hydraulic Circuit - One Winch, No Legs

SAFETY PRECAUTIONS

THE UNDERLIFT UNIT

1. The safe working loads of the Interstater Mk 2 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)

14. 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.
15. 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

16. Never drive off with the PTO still engaged. It will be ruined.
17. 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.
18. When lifting on wheel frames do not exceed the load limits of the frames.
19. 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.
20. 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.
21. The load figures given in the User's Handbook are for the Interstater Mk.2 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 to Boniface Engineering Ltd.

APPENDIX 2

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 2

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.

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

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

WEIGHTS OF LOOSE EQUIPMENT

ITEM	FIGNo	ITEM	PARTNo	WEIGHT
STANDARD CROSSHEAD	22	1-5	06-035	73Kg.
LOW PEDESTAL	22	7	07-009	11Kg.
HIGH PEDESTAL	22	8	07-105	10kg.
6in FORK	22	9	07-001	9Kg.
4.5in FORK	22	10	07-002	7Kg.
7in LOW FORK	22	11	07-006	8Kg.
16mm CHAIN FORK	22	12	07-177	5Kg.
16mm LIFT CHAIN complete	22	13	21-SS-002	19Kg.
7mm SAFETY CHAIN complete	22	14	21-SS-001	2Kg.
EURO WHEELFRAME BODY	23	7	07-249	39Kg.
EURO WHEELFRAME ARM	23	8	07-249/250	24Kg.
EURO WHEELFRAME SPACERS	23	9	07-252	10Kg.
S.H.D. WHEELFRAME BODY	23	1	07-208	46Kg.
S.H.D. FRONT SUPPORT PLATE	23	2		15Kg.
S.H.D. REAR SUPPORT TUBE	23	4		11Kg.