SPARE PARTS AND INSTRUCTION MANUAL

DANDO 100 CABLE PERCUSSION DRILLING RIG

RIG SERIAL NUMBER: 100/0559
OUR REFERENCE: D10315
SOIL MECHANICS

(PLEASE QUOTE THIS NUMBER WHEN ORDERING SPARE PARTS)

DANDO DRILLING INTERNATIONAL LTD

OLD CUSTOMS HOUSE, WHARF ROAD,
LITTLEHAMPTON, WEST SUSSEX,
BN17 5DD, ENGLAND

E-MAIL: info@dando.co.uk
WEB SITE: http://www.dando.co.uk
TEL: +44(0)1903 731312 FAX: +44(0)1903 730305

INDEX - DANDO 100 INVESTIGATOR

SPARE PARTS & INSTRUCTION MANUAL

CONTENTS **PAGE**

INDEX - DANDO 100 INVESTIGATOR

SPARE PARTS & INSTRUCTION MANUAL

CONTENTS **PAGE**

SECTION 1

GENERAL

DANDO 100

SAFETY OF MACHINERY

As Designers, Manufacturers and Suppliers of Specialised Equipment, Dando Drilling International Ltd ensure so far as it is reasonable that our products are safe and without risk to health when properly used.

While every care has been taken to ensure that the information contained in this manual is clear and accurate, the information in it is supplied in performance of our duty under current E.C. Legislation with regard to C.E. Marking, and no legal liability, other than that imposed by the Act, is accepted.

You are requested to take the necessary steps to ensure that the appropriate information is made available to all those involved with the proper use of our products, or to anyone who may work on, purchase, or otherwise acquire such products for their own use.

EEC DIRECTIVE 89/392/EEC

The above Directive has been adopted by HM Government and became effective in the United Kingdom from 1.1.1993 with a transitional period upto 31.12.94.

Notwithstanding other and various legally binding requirements, the Directive specifically requires manufacturers of products to provide instructions for the safe use of such products.

Dando Drilling International Ltd and its Hydreq Division support all new products being supplied to their customers with a comprehensive Operator Manual which clearly defines mandatory instructions for the operation, safe use and maintenance of the products.

Further, where proprietary items are incorporated into products of Dando Drilling International Ltd or its Hydreq Division, comprehensive Operators Manuals on these items are also supplied, together with the Operating Manuals etc. on any vehicle or other carrier supplied as part of a contract.

It is the responsibility of the owners or hirers of such products to ensure that operators are provided with these Manuals and are suitably instructed regarding the purpose of these Manuals and safety instructions. In addition operators should be suitably and adequately trained in the use of the product.

RIG DATA

MANUFACTURER	:	DANDO DRILLING INTERNATIONAL LTD., OLD CUSTOMS HOUSE, WHARF ROAD, LITTLEHAMPTON, WEST SUSSEX, BN17 5DD, ENGLAND.	
RIG MODEL	:	DANDO 100 LOW HEADROOM RIG	
RIG TYPE	:	PERCUSSION DRILLING RIG	
SERIAL NUMBER	:	D100/0559	
HORSEPOWER	:	8 h.p. at 1,500 R.P.M.	
MAXIMUM DERRICK LOADING	:	3.0 TON	3,000 KG
WINCH - SINGLE LINE PULL	:	1.0 TON	1,000 KG
TOTAL MASS OF MACHINE : **(depending on configuration)**		3,033 LBS	1,550 KG

SPECIFICATION OF INTENDED USE OF THE MACHINE

DANDO 100 INVESTIGATOR DRILLING RIG

The Dando 100 Investigator Drilling Rig is intended for drilling of holes in the ground using the cable percussion method of drilling. The Dando 100 Investigator is also suitable for performing site investigation work including U100 (U4) and S.P.T. Sampling and Testing.

GENERAL SPECIFICATIONS FOR GUIDANCE ONLY

Engine Power at 1500 r.p.m.	8 h.p.	
Winch - single line pull	1 Ton	1000 Kgf
Drilling Depths and Diameters	4 inches (100mm) to 100 feet (30 metres) 8 inches (200mm) to 75 feet (20 metres)	

Note: The maximum drilling capacity is dependent on drilling conditions, type and size of tools. The figures given provide a general guide only.

Derrick Working Height under sheaves	9.5 Feet	3.0 Metres
Overall Height derrick erected	10.7 Feet	3.5 Metres
Derrick Loading	3.0 Ton	3000 Kg

Weights of components:

Telescopic Mast Unit: The estimated overall weight of the unit is 150Kg but it can be separated in to lighter sections by the withdrawal of the three telescopic leg sections

Hydraulic Winch Unit: The dimensions of the winch unit are:-
Width: 410mm, Height:450mm,
Length:850mm Weight : 85Kg

Power Pack: The Engine is approx 725mm wide by 1010mm long
Weight approximately 350Kg when full of oil including battery etc.
The oil tank and engine components can be mounted onto separate skid units and connected by hydraulic hoses if required. reducing the weight to about 175Kg per unit.

The machine consists of three main components:-

1) <u>TELESCOPIC MAST UNIT</u>

Constructed of steel box section giving a maximum working height under crown sheave 3m and a minimum working height 2.5m on standard unit. The unit has a single crown sheave and is a three leg design with the rear leg designed to attach to the hydraulic winch unit.. The overall height when set at maximum is 3.5m.

2) HYDRAULIC WINCH UNIT

The winch unit is mounted onto a skid base with a facility to pass stabilizing bars through the members of the base to react against the rotational force of the winch. A removable Sampson Post can be fitted to the back of the winch base to allow the rig to be set up in confined spaces

The winch is equipped with an expanding shoe clutch operated by direct mechanical linkage from the operators handle and a powerful band type foot brake.

The unit is driven hydraulically by a fixed flows hydraulic motor operating at maximum pressure of 2500 PSI and maximum flow of 16 GPM. The speed of which can be varied from the winch location by the use of a manually operated flow divider.

The winch can be started and stopped from the winch location and has a single line pull capacity on a bare drum of 1000Kg approximately.

3) THE POWER PACK

The Lister TS1 air cooled single cylinder engine has an electric start and low oil pressure safety override so the engine can be stopped in case of an emergency.

The speed of the winch unit can be controlled from the winch location with a hydraulic valve and flow divider system.

The engine will power a fixed displacement hydraulic pump producing a maximum flow of 16 GPM at maximum pressure of 2500 PSI.

The engine is equipped with an urban type silencer to make it as quiet as possible along side the engine and mounted onto the same skid base will be a hydraulic oil reservoir complete with pressure relief and filtration systems.

The power pack and winch unit is connected by two 3/4" and one 1/2" hydraulic hoses.

SERVICE AGENTS
UNITED KINGDOM

DANDO 100 DRILL RIG

Spare Parts and Servicing in the United Kingdom can be obtained from the manufacturer:

DANDO DRILLING INTERNATIONAL LTD
Old Customs House, Wharf Road, Littlehampton,
West Sussex, BN17 5DD
Tel: +44 (0)1903 - 731312 Fax: +44 (0)1903 - 730305

Please ask for the Spares Department.

LISTER TS1 ENGINE

Spare Parts and Servicing can be obtained from various Lister agents throughout the United Kingdom, . A list of agents can be found at the back of this Manual.

SERVICE AGENTS
OUTSIDE THE UNITED KINGDOM

DANDO 100 DRILL RIG

Spare Parts and Servicing can be obtained from the manufacturer:

DANDO DRILLING INTERNATIONAL LTD
Old Customs House, Wharf Road, Littlehampton,
West Sussex, BN17 5DD
Tel: +44 (0)1903 - 731312 Fax: +44 (0)1903 - 730305

Please ask for the Spares Department.

SECTION 2

ASSEMBLY INSTRUCTIONS & RIG CONTROLS

DANDO 100

OPERATING INSTRUCTIONS

GENERAL

It is the responsibility of the owners and hirers of this equipment to ensure that the operators of the equipment are aware that drilling sites can be potential hazardous environments and that safe drilling practice should be adhered to.

Dando Drilling International draw your attention to the Code of Safe Drilling Practice as published by the British Drilling Association, and would recommend that all operators are fully conversant with all aspects covered by this publication and take the necessary steps to become B.D.A. Accredited Drillers. For operators outside the United Kingdom, we would recommend that their national equivalent to the B.D.A. publication is adhered to.

The Guidance Notes on Safety Section of this Manual is extracted from the British Drilling Association's publication "Code of Safe Drilling Practice", and Dando Drilling International would like to acknowledge with thanks their permission to reproduce this section.

1. RIG ASSEMBLY

Place the hoisting reel base in the correct position relative to the centre of the required borehole.

Connect the Samson Post to the rear of the base, and the front base extensions ensuring that the pins are secure

Lift the mast assembly and position the Lower Single Pole into the bracket on the base unit.
Insert the Pivot Pin and secure with the 'R' Clips provided. Ensure that the all the pins are secured in the required holes of the telescopic mast **Because of the weight involved this operation should not be carried out by one man alone.** The crown assembly should be supported in this position by placing a suitable stable and safe support beneath the mast legs.
Check that the hoisting base is level. It maybe necessary to level the ground or pack up the base with timber.

Connect the short hyd hoses from the hyd pump to the tank, and then the long hyd hoses from the tank to the motor on the winch shaft. Ensuring that the snap couplings on the hoses are clean and seated properly.

2. ERECTING AND LOWERING THE MAST USING THE SAMSON POST

Run the winch line over the crown wheel, back through the A frame and attach to the samson post with a suitable shackle.

Ensure that the winch controls are in the off position and the footbrake is locked on.

Start the engine as described in the manufacturers handbook provided.

Ensure that all personnel other than the operator are clear of the rig.

Ensure that the wire rope is located on the working side of the drum.

Make sure that there are no no loose items on the mast or rig

Make a final check that there are no overhead obstructions etc.

Once checks are complete operate the winch gently, ensuring that the operators foot is over the brake pedal at all times and hoist the mast until the crown sheave is approximately one metre from the vertical. Apply the winch brake ensuring that the brake is locked on

The legs should now be walked round to the front by the assistant driller and the spreader bar and the side stays attached with the correct bolts. The front legs should be as close as possible to the ground during this part of the operation.

The driller MUST remain on the controls during this operation.

If the driller has to assist the second man then the footbrake must be in the locked position, and the hyd control lever for the motor must be in neutral before he leaves the controls.

On concrete or soft boggy ground, place timbers under the feet of the legs before lowering to the ground.

Remove the shackle from the samson post.

The rig is now ready to operate.

3. **LOWERING THE MAST**

Run the winch line over the crown wheel, back through the A frame and attach to the sampson post with a suitable shackle.

Ensure that the winch controls are in the off position and the footbrake is locked on.

Remove the stay bars and spreader bar.

Ensure that all personnel other than the operator are clear of the rig.

Ensure that the wire rope is located on the working side of the drum.

Make sure that there are no loose items on the mast or rig

Once checks are complete operate the winch gently, ensuring that the operators foot is over the brake pedal at all times and hoist the mast until the crown sheave is approximately one metre from the vertical. Apply the winch brake ensuring that the brake is locked on

The legs should now be walked round to the front by the assistant driller The front legs should be as close as possible to the ground during this part of the operation.

The mast can now be gently lowered to the ground.
Remove the shackle from the samson post.

Dismantle the Samson post and front base extensions from the rig base.

BLANK PAGE

4. RIG CONTROLS

4.1 HOISTING REEL CLUTCH

The clutch is controlled by the operation of the Clutch Lever. This is pulled towards the operator to engage the clutch, and pushed away from the operator to disengage.

4.2 HOISTING REEL BRAKE

The Hoisting Reel Brake has two controls: a hand lever and a foot pedal.

To engage the Hand lever is pulled towards the operator, or the foot pedal is depressed.

To disengage the Hand lever is pushed away from the operator, or the foot pedal allowed to rise.

There is a brake locking device which is situated above the foot pedal. This should be turned to lock the brake on.

It is important that the brake control be left in the locked position when the machine is not being used, or when tools are being handled in the working area.

The attention of the operator is drawn to the Guidance Notes on Safety Section 6 - Drilling Operations Cable Percussion, relating to general and specific areas to be noted with regard to the safe operation of the drilling rig.

4.3 ENGINE

Please refer to the instructions in the engine manufacturer's handbook provided.

4.4 HYDRAULIC POWER-TAKE-OFF - GENERAL

The hydraulic power take-off attachment comprises:-

1) A fixed displacement type hydraulic pump, coupled directly to the diesel engine.

2) Hydraulic oil reservoir complete with the suction strainer diffuser, relief valve and interconnecting pipework. Check that the hydraulic oil reservoir is full (this contains approximately ten gallon of hydraulic oil), a suitable standard being 'MOBILE DTE LIGHT'. A note must be kept of the make and type of hydraulic oil used in the systems as it is essential that oil of the same make should be used when topping up. Oils of different make do not mix

SECTION 3

GUIDANCE NOTES ON SAFETY

DANDO 100

GUIDANCE NOTES ON SAFETY

1. PERSONNEL

1.1. Drilling may entail the employment of men inexperienced in this class of work. Particular care should therefore be taken to explain and enforce safety precautions, and to teach good practice in the handling and use of equipment and plant.

1.2. No workman should be employed on any work unless he has been adequately instructed and trained in that work and is competent to do that work without supervision, or he is working under the instruction and supervision of some person competent to give instruction in and supervision in the doing of that work. This is especially important when employing young persons on drilling sites.

1.3. Alcohol should not be consumed on the site and persons who have been drinking should not be allowed on the site.

1.4 Pranks and horseplay are a common cause of accidents and should be forcefully discouraged. Safe successful work requires serious attention and good teamwork.

1.5. Operators should not lift, carry or move any load which is so heavy as to be likely to cause injury. When lifting it is recommended that the person should stand squarely with a solid footing and should lift the load slowly by straightening the legs rather than the back..

1.6 Care should be exercised when handling weights which must be moved with artificial means, such as pipe used for casing etc.

1.7. If pipe is to be moved by rolling by hand, this must be done from the ends and the person must ensure that the hands are kept out of the ends of the pipe. Whenever possible the pipe should be rolled away from the person rolling it.

1.8. In general, care should be exercised whenever lifting something, be it heavy or light. In the case of lifting and moving heavy weights, chains, ropes and pipe hooks should be checked to ensure that they are in good conditions and employees should never stand under a raised load.

1.9. Visitors to the drilling site are in more danger that the operator, and should be steered clear of operational areas unless the nature of their visit demands otherwise. If necessary, operations should be suspended until visitors have been moved to a safer part of the site.

2. TRAVELLING TO, ON AND FROM DRILLING SITES

2.1 Vehicles travelling on public highways must comply with the Highway Code, relevant Road Traffic Acts and with the appropriate Motor Vehicle Regulations currently in force in the United Kingdom or other E.C. country.

2.2. Before travelling, checks should be made to all vehicles for road worthiness, giving special attention to lights, indicators, screen wipers, registration plates, brakes, brake lights, steering, security of loads, particularly overhanging loads, tyre pressure and wear and lack of mud before proceeding onto a public highway.

2.3. **Important:** It is drawn to your attention that the Dando 2000/3000 models of drilling rigs are **NOT** trailers and should not be loaded with drilling equipment during travel from drilling site to drilling site.

2.4 It is important that checks are made of the coupling and/or hitching of the drilling rig to any towing vehicle.

2.5 Where required long vehicle signs, caution or towing boards should be securely attached.

2.6. When towing equipment, correct towing speeds, reversing and manoeuvring procedures should be observed and assistance obtained where necessary. Due regard should be paid to road conditions and visibility at all times. Care should be taken when towing in icy conditions as "jack-knifing" can occur. The safe towing speed should not be exceeded as there is a risk that "snaking" may suddenly develop, which may cause the trailer to lose a wheel.

2.7 Consideration should be given to other road users who may become impatient and take risks - it is advisable to pull into the side occasionally to let them pass.

2.8. Where wide, long or heavy loads are to be moved it is advisable to have all lights on for road travel, even in broad daylight.

2.9. On arrival at the site, ground conditions should be checked before driving in, and a watch kept for temporary overhead obstructions.

2.10. If necessary an assistant should be used to control traffic if safety dictates.

2.11 Passengers should not be carried on or around the machine.

2.12 The driver of the vehicle should check for all round visibility before commencing any manoeuvre, especially reversing. If necessary, an assistant should be used to signal. The presence of an assistant does not relieve the driver of his responsibility, so he should constantly check the rear view in his mirror, and by direct sight.

2.13. When manoeuvring vehicles, due regard should be paid to soft ground, potholes, gradients, slippery grass and mud, and overhead cables. Special care should be taken when crossing dykes with improvised bridges. At all times personnel should keep well clear of moving vehicles in case they overturn. Where winches have to be used, a watch should be kept for flying ground anchors and rope failures.

2.14. Loading and un-loading the plant should only be carried out on firm level ground.

2.15. The vehicle's driver should act as assistant during loading and un-loading operations. Signals should be agreed beforehand and standard procedures followed.

2.16. When loading or un-loading on a public highway, assistants should be used to hold back traffic. These men should be responsible to the vehicle driver only.

2.17. Where the access to and from the site does not have good visibility in all directions, traffic leaving the site should be controlled by a person nominated for that purpose.

2.18. Vehicles should not reverse out of the drilling site on to a public highway.

3. DRILLING SITE PREPARATORY AND RESTORATION WORKS.

3.1 It is of greatest importance that a proper site appraisal should be made before any work is commenced. The results, together with any records of any underground installations, services, workings, etc., should have been made available to the drilling contractor who in any event should take all reasonable steps to obtain them.

3.2 A plan of the site showing the location of hazards to site preparatory work and to drilling operations should be prepared before any equipment is taken on site.

3.3. The drilling contractor should always act with competent engineering advice and assess the general hazards which may arise during construction and drilling due to the nature of the ground, the existence of high water, gas or oil pressures in the strata, surface and underground installations and services.

3.4 The site should be inspected before rig entry to find a safe approach route to the proposed drilling position. Some guidance may be required for winching or lowering rigs on steep slopes and in setting up in marshy or other soft areas.

3.5 It should be ascertained that the load bearing quality of the proposed site is adequate for safe working conditions. Hazardous situations such as old rock fill, unstable material, surface soils on sloping rock surfaces, under dangerous banks or quarry sides and on quarry edges should be avoided.

3.6 A clear access to and from the site should be provided with good visibility in all directions. If this is not possible, traffic leaving the site should be controlled by a person nominated for that purpose.

3.7 The working area should be suitably prepared and where necessary levelled, surfaced and drained. Means should be provided to trap any escape of petrol, diesel fuel or oil which might leak into the water courses, fields or public drains, before it leaves the site.

3.8 The site should be adequately fenced and warning notices posted, with separate fencing and warning notices being provided for any mud or slurry pits.

3.9 Where working platforms are required to support men, equipment and/or materials, the platform should be properly constructed. It should be of adequate dimensions, and if over 2 metres above ground, should have guard rails and tow boards so placed as to prevent falls of persons or articles from the platform. Similar guard rails and two boards may be considered desirable on platforms constructed at lesser heights in some circumstances. The platform construction and stability should be checked weekly for defects.

4. SETTING UP

4.1 The site must be kept in a well organised tidy state and clear of all debris and extraneous material.

4.2. It is preferable for acoustic barriers to be constructed of non-flammable material.

4.3 It should be ensured that all relevant machine guards have been installed before starting up any machine.

4.4. Bulk stocks of fuel, oil and gas cylinders should be stored in a designated compound remote from the immediate working area.

4.5 Rods, Casings etc. should be neatly stacked, preferably on appropriate racks and maintained in a clean condition.

4.6 Threads and connectors should be regularly cleaned and greased, and preferable protected with thread protectors.

4.7 Tools and materials should be laid out according to requirements and in order of use.

5. DRILLING OPERATIONS - GENERAL

5.1 Drilling may entail the employment of some personnel inexperienced in this class of work. In such circumstances, particular care should be taken to explain and enforce safety precautions, and teach practice in the handling and use of equipment, It is important that safe working systems of work are adhered to by all personnel.

5.2. Inexperienced men should always remain under expert supervision.

5.3. At the commencement of each shift the incoming crew should make certain that the equipment is in a useable and safe condition. Unsafe conditions and any significant change in operating conditions. Unsafe conditions and any significant change in operating conditions should be reported in the driller's log book and any action taken thereon should also be logged.

5.4 Each operation must have its set routine, each team member knowing exactly what part he is to play.

5.5 Under no circumstances must a rig be operated by one man.

5.6. High noise level areas should be identified and hearing protection worn where necessary.

5.7. Where engine noise or other sounds prohibit verbal communication, a clear set of signals which are clearly understood and known by each team member should be used. This will also apply when ear defenders are worn.

5.8. It should be ensured that the winch operator has a clear view of men operating equipment at all times.

6. DRILLING OPERATIONS - CABLE PERCUSSION

6.1 A firm and level working surface should be established for the erection of the rig using timber baulks where necessary. Mast guys, if applicable, should be correctly positioned and securely anchored, properly tensioned and frequently checked.

6.2 The equipment should always be operated in a safe manner and in accordance with the manufacturer's instructions.

6.3. Cable tools which are not in use should be laid down horizontally on timber grillage and should not be left in an upright position resting against the derrick.

6.4. The correct tool should always be used for the operation being undertaken.

6.5. Personnel should keep clear of suspended equipment and use a rope, strap or bail hook to swing tools away from the borehole. They should never look down the borehole beneath a suspended tool.

6.6. When the drive clamps are suspended or in use the operator should not place his hand on the drive head. When casing is being driven the drive clamps should not be suspended above the operator's head. Short lengths of casing can be used for this operation.

6.7. Tools should not be held in suspension by means of only the hand or foot control when personnel are changing or working on them.

6.8. The winch operation should be in accordance with the manufacturer's instructions, and should not be overloaded when pulling casing. When additional force is required proper jacking equipment with positive connections between jack head and casing should be employed, or an appropriate casing jar.

6.9. Casing tubes and tool joints should always be screwed well home in order to avoid damage to the threads and to prevent parting.

6.10. When driving casing, personnel should not place their fingers in tommy bar holes or over the lip of the casing.

6.11. All worn or splintered drive heads, drilling tools, sinker bars etc. should be replaced. Crushed, bruised or damaged wirelines should be removed immediately.

6.12 Sheave Wheels, shafts and pins should be checked daily, kept well lubricated and replaced when worn.

6.13. Personnel should be alert for indications of broken strands of wire ropes and of shackles becoming undone.

6.14. Cuttings or spoil at the hole collar should not be cleared by hand or any tool unless the rig is in neutral and the clutch disengaged.

6.15 Slurry pits should be positioned so that they can be reached safely and easily by the bailer/shell without danger to the drill crew or undue stress on the bailing line. They should not be so close to the rig as to undermine the rig grillages.

7. PLANT MAINTENANCE

7.1. Plant, machinery and structures should be inspected at regular intervals in accordance with the manufacturer's recommendations. In the case of plant which is subject to corrosion, steps should be taken to effect repairs before corrosion reaches dangerous limits.

7.2. A planned preventative maintenance system covering shift, daily, weekly and periodic times should be established for the different types of machine used. This should include the inspection of all pulleys, drum surfaces and ropes, and should stipulate their regular cleaning and lubrication. The system should include a three part sequence of inspection, thorough examination and testing. Results of each stage to be recorded and signed.

7.3. Cleaning, repair, maintenance, oiling or greasing of machines or the topping up of fuel tanks should not be carried out whilst a machine is operating.

7.4. If inspection involves the running of a petrol or diesel engine in an enclosed space, all doors and windows to the workshop should be opened and even then the engine should only be run intermittently to avoid dangerous build-up of fumes.

7.5. All plant should be kept clean by the regular removal of mud and dirt and of snow and ice in the winter, if applicable.

7.6 When major dismantling of components is necessary, the correct lifting equipment should always be used and it should be ensured that struts and chocks are strategically placed as the process continues.

7.7. The ignition key should always be removed, and a notice placed in such a prominent position that it cannot be missed, if it is necessary to work underneath a machine, or to leave it in an incomplete unsafe state.

7.8. Moving parts of machinery are guarded where possible and such guards should be in position when machinery is in normal operation. Guards should not be removed except as required for maintenance purposes when the machine should be immobilised.

7.9. Lifting machines and tackle should be inspected and tested at set intervals and certified for the maximum permissible working loads, and these loads should not be exceeded. Following any major repair, they should be re-certified before being returned into service. The owner/operator should be aware of current legislation in force in their own country and comply with all regulations with regard to re-testing of equipment.

7.10. Electrical installations should be effectively earthed.

7.11 Electrically operated hand tools, together with leads and earth wires, should be inspected at regular intervals to ensure that they have been maintained in good order, and such inspections should be recorded.

7.12. Trailing cables, except for hand-lamps and small portable tools should be of a standard equal to BE 708. Pliable armoured cables are preferred.

7.13. When high pressure grease guns are used, protective gloves should always be worn and are taken to avoid injecting grease under the skin.

7.14. Hose used for steam cleaning should be of the type made for steam service. The metal nozzle should be securely clamped to the hose and maintained in serviceable condition at all times.

7.15. A flammable liquid within the classification of Class 'A' or Class 'B' petroleum should not be used for cleaning purposes, except in very special circumstances, and then by written permission only.

7.16 Loose board and materials not in use should be removed from the derrick floor.

7.17 Steps and guard rails, where applicable, should be maintained in good condition. If it is necessary to remove them temporarily during installation of the machinery, they should be replaced without delay when finished.

7.18 To eliminate slipping hazards, drilling rig floors, etc. should be kept as free of mud and oil as practicable. Better footing is provided if the floor is washed while the next stand of pipe is being picked up. Non-skid materials are useful in some areas to prevent slipping.

8. SITE ABANDONMENT

8.1. Every uncompleted borehole should be fenced or temporarily capped in a safe manner when the rig has moved off and until the hole is finally capped.

8.2 Unless a borehole is required to be kept open for some specific purpose, it should be infilled, consolidated and capped in such a manner that there will be no subsequent depression at ground surface due to settlement of the infill material.

8.3. Surface standpipe should be withdrawn or cut at least one metre below ground level prior to infilling the borehole.

8.4. Capping pads should be placed at least one metre below ground level.

8.5. Mud and slurry pits should remain adequately fenced and signposted until emptied, backfilled and consolidated. Any impervious membrane should be removed prior to restoration.

8.6. The site should be left in a safe, clean and tidy state, with all gates and fences left as found.

9. TRAINING

9.1 The most important factor of all on site safety is the full education and practical technical training of all drill crew members, in all aspects of drilling and associated operations.

9.2 Such training should include not only basic safety precautions but also a thorough understanding of the correct use of all plant, equipment and tools.

9.3. In addition, knowledge should be given of the forces of both energy and mass which the crew control through the medium of the drill rig.

9.4. The prime concept of this training is to teach each crew member to do his own job efficiently and safely and to so work with the other members of the crew that good and safe team work becomes instinctive.

9.5. This not only results in steady and safe progress, but secures higher production.

9.6. All training whatever the size of the organisation, should be formally programmed throughout the number of stages required by the personnel concerned. Each step in the training module or syllabus should be monitored by a fully trained instructor and duly recorded towards the eventual certification of the trained upon completion of the course concerned

9.7. Training should be so presented that the stimulation of personal interest and the known attainment of craft and skill achievement is a main aim and result. Such training therefore, should be initiated and encouraged by both management and supervisory staff.

9.8. One emphasis should be made on the value of efficient teamwork towards the goal of high and safe production.

9.9 It cannot be too strongly stressed that the operatives involvement and outlook is dependent upon the quality and support of the employer.

9.10 The responsibility for all aspects of site safety rest with all levels of management.

10 WELFARE AND PERSONAL PROTECTION

10.1 **The Health and Safety at Work Act 1974 (United Kingdom) requires every employee, while at work, to take reasonable care for the health and safety of himself and of other persons who may be affected by his acts or omissions at work. In this connection personal and site safety and hygiene are most important.**

10.2 Adequate and suitable protective clothing should be provided for any person employed who by reason of the nature of his work is required to continue working in the open air during rain, snow, sleet or hail.

10.3. Adequate accommodation for personnel to take shelter during bad weather, for the storage, drying and changing of clothing and for taking of meals should be available. Such accommodation should include the facility for boiling water, heating food, the provision of washing facilities to permit personal hygiene. Personnel should be encouraged to wash before partaking of food.

10.4. Washing and kitchen waste water should be discharged into a pit or sump dug into the ground remote from ditches and water courses.

10.5. Empty tin cans, bottles, plastic containers, drums and scrap metal, wire rope etc, should be placed in containers for transport to recognised waste disposal sites.

10.6. Suitably ventilated chemical toilets housed to provide privacy, should be available. Theses should be regularly serviced and contents disposed of in accordance with manufacturer's instructions. Personnel should be encouraged to wash after using these facilities.

10.7 Potable/drinking water should be available and containers clearly marked as such to distinguish from non-potable/non-drinkable water.

10.8. Oil saturated clothing is a fire risk and also a health risk in that it irritates the skin. They should be changed as soon as possible.

10.9 Advice should be sought from the local water authority and their medical officer of health prior to working in sewers or on waste disposal sites. When working in these situations rubbing of the nose or mouth with the hands should be avoided. On completion of the work, hands and forearms should be thoroughly washed with soap and clean water with an added disinfectant. Any clothing or boots which have become contaminated should be washed, cleaned or disinfected. Any cut, scratch or abrasion should be cleaned, treated with antiseptic and completely covered until quite healed.

10.10. The possibility of existing excavations transmitting bacteria carrying liquids into a working area should not be overlooked.

10.11 It is advisable that drilling crews should receive regular anti-tetanus injections, and always carry the anti-tetanus injection card with them.

10.12 Relatively harmless materials can cause irritation leading to more harmful effects by repeated or prolonged exposure so that every effort should be made to avoid inhaling dust, fumes or smoke. Should such conditions have to be endured as a temporary measure, suitable protective equipment should be used.

10.13 Similarly prolonged or repeated contact with the skin of certain substances, chemicals, oils or other fluids can be harmful. Under these circumstances protective gloves/clothing should be worn, and/or barrier creams used. Any such skin contacts should be washed before eating food, and this should not be consumed in the working or contaminated area.

10.14 Personnel should be fully protected against any hazard likely to be incurred in carrying out their work. Protective clothing and equipment should therefore be issued, maintained in good order and replaced when necessary.

10.15 Rig personnel should wear only close-fitting clothing, preferable distinctly coloured overalls. Clothing should be kept clean by frequent washing, and each crew member should have a clean change of work clothes on location at all times. Particular care should be taken to ensure that drawstrings to hoods or other items of clothing are not left dangling so as to become entangled in any moving parts.

10.16 If overalls are not worn, long-sleeved shirts with tails tucked in will provide protection against sunburn, insect bites, scratches, injurious chemicals and flash burns.

10.17 Safety helmets must be worn by members of the drilling crew and visitors to the site. Safety boots of safety wellingtons should also be worn.

10.18 When working on or adjacent to the public highway, a top coat, jerkin or waistcoat, with fluorescent markings should be worn at all times.

10.19 The use of gloves whenever practicable is recommended. Gloves prevent minor injuries when employees are handling rough materials or skin irritants. Only short, tightfitting gloves should be worn. Gauntlets may become caught in the machinery and workers may be pulled into moving machinery if they wear them.

10.20 Hairnets should be worn by persons with dangerously long hair. Loose clothing, i.e. trailing scarves, ties etc. should be avoided, especially when working near rotating machinery.

10.21 Rig personnel should never wear finger rings or bracelets while working.

10.22 Eye protection is of the utmost importance. An eye injury, no matter how slight, should receive prompt medical attention. Even a slight eye injury may lead to serious complications.

10.23 The correct eye protection should be provided and should be maintained in good condition on each drilling site. Employees should wear approved safety glasses or goggles when chipping, grinding, scraping, buffing, breaking or cutting any metal or material that involves a flying chip hazard.

10.24 Operators who wear contact lenses should wear eye protection and should always be aware of the problems posed by contact lenses when attempting prompt emergency treatment following the introduction of foreign material into the eye.

10.25 Splashproof chemical goggles or face-shields should be used when handling potentially hazardous or injurious chemical liquids, powders or vapours such as cement, chemicals, chemical cleaning solutions, creosoted material, molten metal, asphalt or bitumastic compounds. Goggles also should be worn by persons near operations which require the use of safety goggles by the operator.

11. WIRE ROPES - GENERAL SAFETY AND MAINTENANCE

11.1 Regular inspection of ropes in service is essential if high standards of safety are to be ensured, and the relevant test certificate obtained and available.

11.2 All running ropes in continuous service should be visually inspected once every working day by an authorised person.

11.3 A thorough inspection of all ropes in use should be made at least once a month and a full written, dated and signed report of rope condition kept on file and readily available.

11.4 Any deterioration resulting in appreciable loss of original strength, such as described below, should be carefully noted and the rope should not be used if any of the following situations are present:

a) Reduction of rope diameter below nominal diameter due to loss of core support, internal or external corrosion or wear of outside wires.

b) In any length of diameters the total number of visible broken wires exceeds five percent of the total number of wires in the rope.

c) Corroded or broken wires at end-connections.

d) Corroded, cracked, bent, worn or improperly applied end-connections.

e) Severe kinking, crushing, cutting or understranding.

f) Heavy wear and/or broken wires may occur in section in contact with equaliser sheaves, or other sheaves where rope travel is limited, or with saddles. Particular care should be taken to inspect ropes at these locations.

g) All rope which has been idle for a period of a month or more due to shutdown should be given a thorough inspection before it is placed in service. This inspection should be for all types of deterioration and should be performed by an authorised person whose approval should be required for further use of the rope.

h) Particular care should be taken in the inspection of non-rotation rope.

I) Wire rope removed from service due to defects should be plainly marked or identified as being unfit for further use on load carrying devices.

11.5 Upon receipt of wire ropes, whether they arrive in coil form or on reels, it is advisable to examine, and if necessary remove, the outer protective wrapping. This may have become wet during transit and, if left on the rope local corrosion will appear in course of time. Ropes should be stored in a dry atmosphere and preferably off the floor, on well seasoned timber.

11.6 Rope delivered in reel form should have the reel jacked up to turn freely, so that the rope can be carried straight away from the reel. Provision should be made to stop reel rotation be a braking device, however simple.

11.7 When rope is delivered in coil form, it should be rolled along a smooth surface, like a hoop, away from the end of the rope, and protected from unnecessary bending and abrasion.

11.8. When rope cannot be stretched out straight, it should be arranged in a long narrow "U" or series of "U's" with as wide a radius for the turn of the "U" as possible.

11.9 When handling wire rope it should be manipulated so that its natural twisting action will not cause it to kink.

11.10. A replacement rope must be of the same type and specification as the original fitted to the rig by the manufacturer and also of the correct safe working load.

11.11 Care should be taken when installing ropes on winding drums to ensure that there is even tension of the new rope being pulled round the system, that sharp bends are avoided and that the rope is kept clear of dirt and abrasive materials.

11.12. Rope should be kept tightly and evenly wound on the drums.

11.13. When the rope is feeding onto the drum it should not be touched by hand.

11.14. In order to prevent crushing the rope where a drum divider is used, there should not be more than four turns on the working section when the tools is at the deepest point.

11.15. Overruns should be avoided by correct winch operation.

11.16. The rope should be firmly fastened in the drum with set-screws, or a suitable clamp, and three full turns of the rope should be kept on the drum at all times.

11.17. Every rope should be thoroughly lubricated with the correct wire rope dressing as it is installed, and kept similarly coated throughout its life.

11.18 When equipment using wire rope is kept in dead storage for any length of time, the rope should not be left on the equipment.

11.19. Connections, fittings, fastenings, parts etc. used in connection with cables and ropes should be of good quality and of proper size and strength and should be installed in accordance with the recommendation of the manufacturer.

11.20. Socketing, splicing and sizing of wire rope should be performed by qualified persons.

11.21. All eye splices should contain the proper size of rope thimble.

11.22. When wire rope clips are used, the base of the clip must bear on the "live" end of the rope - the "live" end being the free-running portion of the rope. The "U" section of the clip bears on the dead end of termination fold of the rope. Failure to follow this procedure could cause the "U" bolt to kink or cut the live end of the anchor and cause failure.

11.23. Spacing of the clips, or "U" Bolts, is also important. They should be installed about six rope diameters apart, and tightened securely before the rope is placed in tension - and tightened again after the rope is put into use. The pulling on the rope can cause a slight reduction in its diameter with a resulting loosening of the clips.

11.24 When a wedge socket-type of fastening is used, the dead of shortened end of the rope should be clipped with U-bolt or otherwise made secure against loosening.

11.25. Winch ropes should not be lopped, knotted, or kinked around themselves or any other object except suitably designed "D" etc.

11.26 Lifting hooks or shackles should be attached to the winch rope via a swivel connection which can operate under maximum load.

11.27. Whenever possible, new wire rope should be run under light load for a short period after it has been installed in order to adjust the rope to working conditions.

MAINTENANCE AND ADJUSTMENTS

1. HOISTING REEL - DIVIDING PLATE

CAUTION:

When using hoisting reels fitted with a dividing plate to provide a storage and working section of the drum, it is important that the correct section of the drum is used for each function.

The working section is the part nearest the mast or derrick centre line, while the storage side is off centre and incorporates the rope anchor. Using the storage section on the working side will lead to premature failure of drilling sheaves and damage to the rope.

2. MAINTENANCE

2.1. **ENGINE** : Maintenance of the engine should be carried out in accordance with the engine manufacturers instructions.

2.2. **WINCH** : The winch shaft and drum are mounted on sealed roller bearing units which should require no maintenance. The clutch operating mechanism should be greased daily using a grease gun to the nipples provided. Occasionally oil the control lever and brake lever pivot points.

3. ADJUSTMENTS

3.1 BRAKE - HOISTING REEL

It is important to keep the brake correctly adjusted at all times. On the brake there are three points of adjustment which should be checked in the following order:

1. There is an adjuster screw connection between the brake band and the brake lever which must be clear of the base side member. It will be necessary from time to time to take up on this adjuster to compensate for wear and stretch on the brake band.

2. With the brake lever correctly adjusted, position the brake lever retaining catch to suit. To do this turn the bolt head in the centre of the oval handle clockwise to lower and anti-clockwise to raise the retaining catch.

3. On the far end of the brake lever on the counterweight, there is an adjustable lever positioning screw. This should be kept adjusted so that when the brake is off it still provides a slight drag on the drum. This is of great assistance in helping to prevent a quantity of loose line being unwound from the drum during drilling operations.

2.3 CLUTCH

For the satisfactory operation of the rig it is essential that the clutch unit should be maintained in correct adjustment. The clutch unit fitted on the DANDO 100 drilling hoist is capable of transmitting far more power than is available from the engine.

In consequence if the hoist drum is held stationary by the brake then providing the clutch is in good condition and correctly adjusted it should need only a small amount of pressure on the operating lever to stall the engine.

The power of the clutch cannot be increased, but adjustment can be made to take up wear on the clutch shoes if this is causing excessive movement on the operating lever.

The small expansion and contraction of the clutch shoes resulting from the available movement of the operating lever must be regulated to allow both full application of pressure from driving and complete release to give free drum rotation.

The clutch adjuster provided for this purpose has to be correctly set to allow the shoes to move within these required limited. To make the necessary adjustment see that there is no load on the winch then with the engine stopped and the brake off, slacken the shielded locknut (Hoisting Reel Assembly Item 26) and turn adjuster (Hoisting Reel Assembly Item 4) anti-clockwise to slacken operating pull rod.

Rotate clutch assembly 180° to bring clutch shoe adjusting nut (large nylon locking type) to the operational area, and turn adjusting nut clockwise until the shoes lock the winch drum. Turn adjusting nut back anti-clockwise until winch is just free to rotate.

Rotate clutch assembly through 180° to bring pull rod into the operational area. Tighten adjuster (item 4) to give operating handle travel required, locking the pull rod in the desired position using the shielded locknut (Item 26).

NOTE WELL: IN ORDER TO MINIMISE FRICTION IN THE PULL MECHANISM BEFORE PINCHING LOCKNUT TIGHT, ENSURE THAT THE INDICATOR SLOT ON THE END OF THE PULL ROD IS VERTICAL. ITS POSITION MAY BE ADJUSTED BY EITHER INSERTING A SCREWDRIVER IN THE INDICATOR SLOT AND TURNING, OR EASING BACK THE HEXAGON ADJUSTING NUT.

The clutch should now be set ready for operation, but extraneous causes can however result in the clutch failing to operate correctly, the most common being:-

a) Damage to the pull rod operating mechanism. This being most frequently caused by the drill line getting wrapped around it beyond the limits of the drum, but this can only occur if the guard is not fitted.

b) Damage to the surface of the shoes and to the internal face of the drum caused by small pieces of stone or grit getting into the clutch and being trapped between shoe and drum.

In addition to keeping the clutch itself correctly adjusted it is also essential to see the operating mechanism between the clutch lever and the pull rod attaching to the clutch expander is maintained in reasonable working order.

If this mechanism including the thrust ring is allowed to become slack and badly worn, then it will be impossible to transmit the necessary movement in order to expand and contract the shoe. The main points to be watched are:-

a) See that the shielded nut which locks the pull rod on the pull rod plate is kept tightened.

b) The main wearing component is the phosphor bronze thrust ring (Hoisting Reel Assembly - item 9). If this is allowed to become too slack then it will be impossible to transmit the necessary movement between the clutch lever and the clutch unit. The thrust ring is held in position by a screwed back ring which can be rotated to take up wear as it occurs.

To carry out this adjustment, remove the two locking screws which seat in keyways on the main body. Then rotate the ring a quarter turn or so in order to take up the wear that has occurred on the thrust ring. Position the ring so that the locking screw holes are opposite the keyways. Insert the locking screws and tighten.

<u>WARNING.</u> BREATHING ASBESTOS DUST IS DANGEROUS TO HEALTH

Certain brake and clutch components fitted to this equipment contain asbestos. Under EEC Regulation "The Asbestos Products (Safety) Regulations 1985" you are advised to follow the following safety instructions:-

1) When fitting such components, operate in a well ventilated place and use appropriate equipment or a damp cloth to remove dust.

2) Dampen all dust.

3) Dispose of asbestos waste in heavy gauge plastic sacks in accordance with legislature requirements.

2.4. RELIEF VALVE SETTING FOR HYDRAULIC CIRCUIT

To ensure protection for both pump and shaft motor, the relief valves in the circuit must be correctly maintained to allow the following maximum operating pressures:-

The main by-pass relief valve on top of the reservoir should be set at 2500 p.s.i.

2.5 PRESSURE FILTER

It is important that the pressure filter mounted under the hydraulic control console should receive regular attention. This filter has an easy to replace element and on the outside there is a dial indicator which is operated by the pressure drop occurring as the oil passes through the filtering element. As this element becomes clogged, so the pressure builds up and if this is allowed to continue, the element may eventually disintegrate or by-passed with the consequence of possible serious damage to the hydraulic equipment. The dial indicator is clearly marked and when the needle approaches the red section, it is important to fit a new element.

2.6 COUPLINGS

When dealing with a hydraulic attachment, there must obviously be flexible hoses with couplings which have to be connected and disconnected as and when the occasion arises. Hydraulic systems depend for there efficient operation, on very fine tolerances and it is essential that no dirt should get into the system. This is safe-guard, as far as possible, by the suction and pressure filters in the circuit, but great care must always be taken to check that the fittings on the hose ends, are as clean as possible before being coupled together, otherwise dirt from this source can get into the hydraulic component before oil reaches the filters provided.

2.7 C A U T I O N !

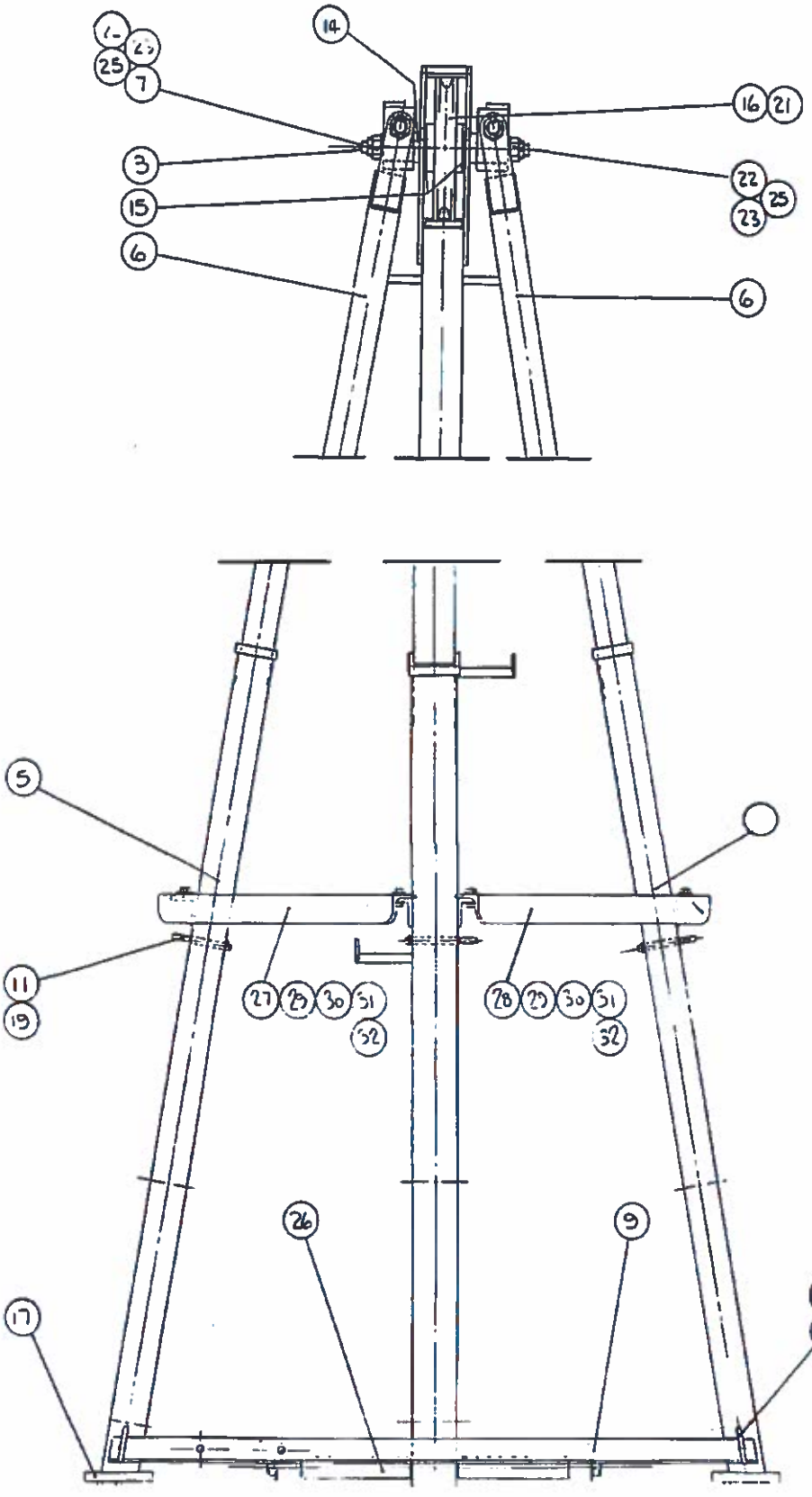
UNDER NO CIRCUMSTANCES SHOULD THE RIG ENGINE BE RUN WITHOUT THE HOSES IN PLACE OR SEVERE DAMAGE TO THE PUMP WILL OCCUR.

SECTION 5

SPARE PARTS ILLUSTRATIONS & LISTINGS.

DANDO 100

DANDO 100
SINGLE POLE MAST ASSEMBLY



SHEET 1 OF 2
AG00980L001

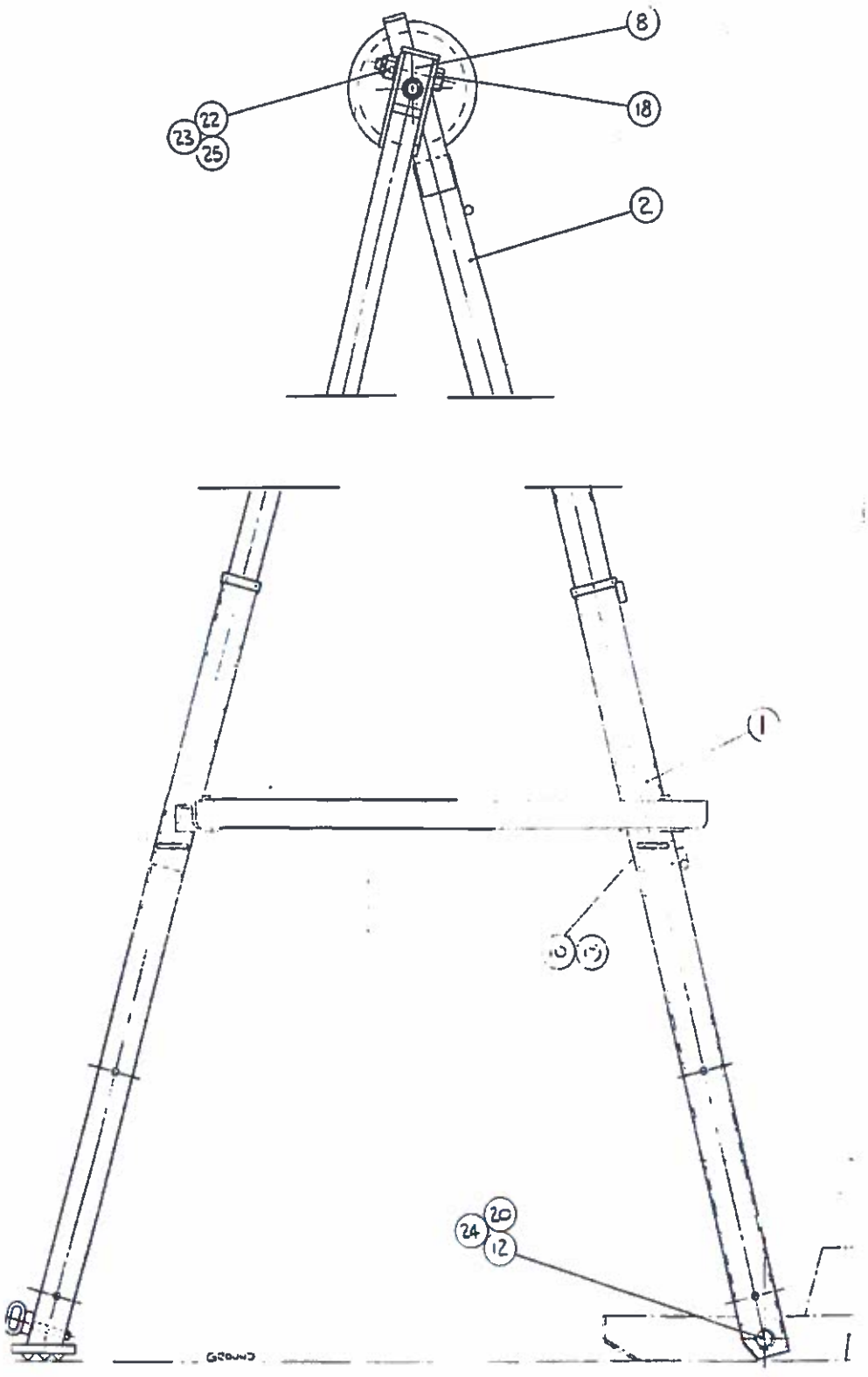
DANDO 100 - SINGLE POLE MAST ASSEMBLY

PART NUMBER: AG00980L001

ITEM NO	PART NUMBER	QTY	DESCRIPTION
1	AG00981H001	1	Lower Single Pole
2	AG00982F001	1	Upper Single Pole
3	AG00983H001	1	Sheave Shaft
4	AG00984F001	1	Lower Front Leg
5	AG00984F002	1	Lower Front Leg
6	AG00985F001	2	Upper Front Leg
7	AG00986H001	1	Pivot Block
8	AG00986H002	1	Pivot Block Anti-Rotation
9	AG00988H001	1	Spreader Bar
10	AG00989H001	3	Pin
11	AG00989H002	2	Pin
12	AG00996H001	1	Leg Pivot Pin
13	AG00148H003	2	Top Collar
14	AG00998H001	2	Spacer
15 *	AG00111H202	1	Crown Sheave and Bush
16	AG00987H001	2	Foot
17	ST05421X133	2	Bolt
18	ST01259X163	5	'R' Grip
19	ST02224X163	2	'R' Grip
20	ST00180X270	1	Greaser Straight
21	ST05422X509	4	Castle Nut
22	ST00714X750	4	Split Cotter Pin
23	ST00351X880	2	Washer
24	ST01059X881	4	Washer
25	13130140000	2	Tube - 254mm long
26	AG00995F001	1	Spreader Bar
27	AG00995F002	1	Spreader Bar
28	ST01329X133	4	Bolt - Hex Head
29	ST00579X511	4	Nut
30	ST00788X881	4	Washer
31	ST00648X885	4	Spring Washer
32			

*** - FOR BUSH SEE – AG00148H00 – ITEM NO. 13 ALSO.**

DANDO 100
SINGLE POLE MAST ASSEMBLY



SHEET 2 OF 2

AG00980L001

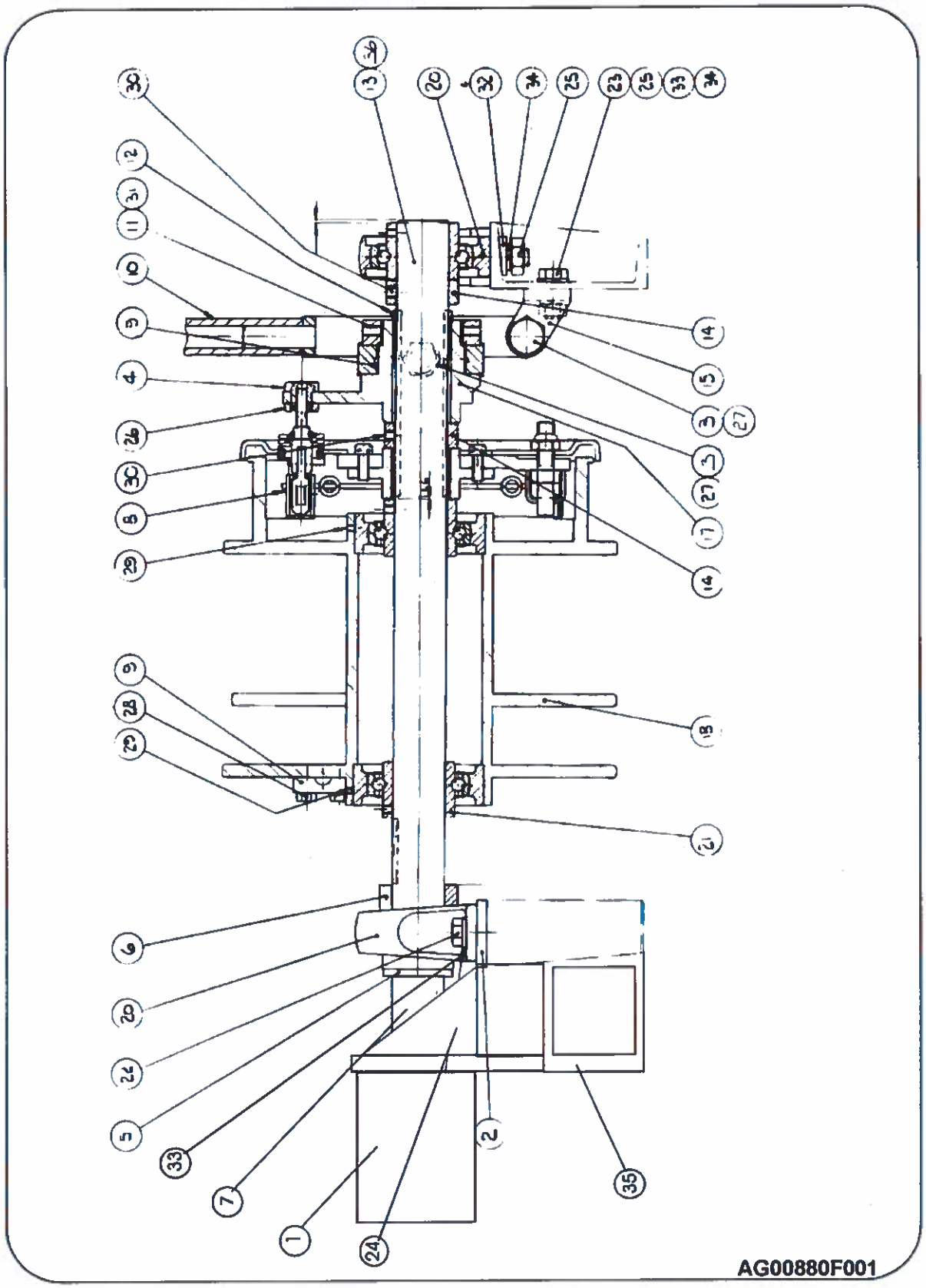
DANDO 100 - SINGLE POLE MAST ASSEMBLY

PART NUMBER: AG00980L001

ITEM NO	PART NUMBER	QTY	DESCRIPTION
1	AG00981H001	1	Lower Single Pole
2	AG00982F001	1	Upper Single Pole
3	AG00983H001	1	Sheave Shaft
4	AG00984F001	1	Lower Front Leg
5	AG00984F002	1	Lower Front Leg
6	AG00985F001	2	Upper Front Leg
7	AG00986H001	1	Pivot Block
8	AG00986H002	1	Pivot Block Anti-Rotation
9	AG00988H001	1	Spreader Bar
10	AG00989H001	3	Pin
11	AG00989H002	2	Pin
12	AG00996H001	1	Leg Pivot Pin
13	AG00148H003	2	Top Collar
14	AG00998H001	2	Spacer
15 *	AG00111H202	1	Crown Sheave and Bush
16	AG00987H001	2	Foot
17	ST05421X133	2	Bolt
18	ST01259X163	5	'R' Grip
19	ST02224X163	2	'R' Grip
20	ST00180X270	1	Greaser Straight
21	ST05422X509	4	Castle Nut
22	ST00714X750	4	Split Cotter Pin
23	ST00351X880	2	Washer
24	ST01059X881	4	Washer
25	13130140000	2	Tube - 254mm long
26	AG00995F001	1	Spreader Bar
27	AG00995F002	1	Spreader Bar
28	ST01329X133	4	Bolt - Hex Head
29	ST00579X511	4	Nut
30	ST00788X881	4	Washer
31	ST00648X885	4	Spring Washer
32			

*** - FOR BUSH SEE – AG00148H00 – ITEM NO. 13 ALSO.**

DANDO 100
HOISTING REEL ASSEMBLY

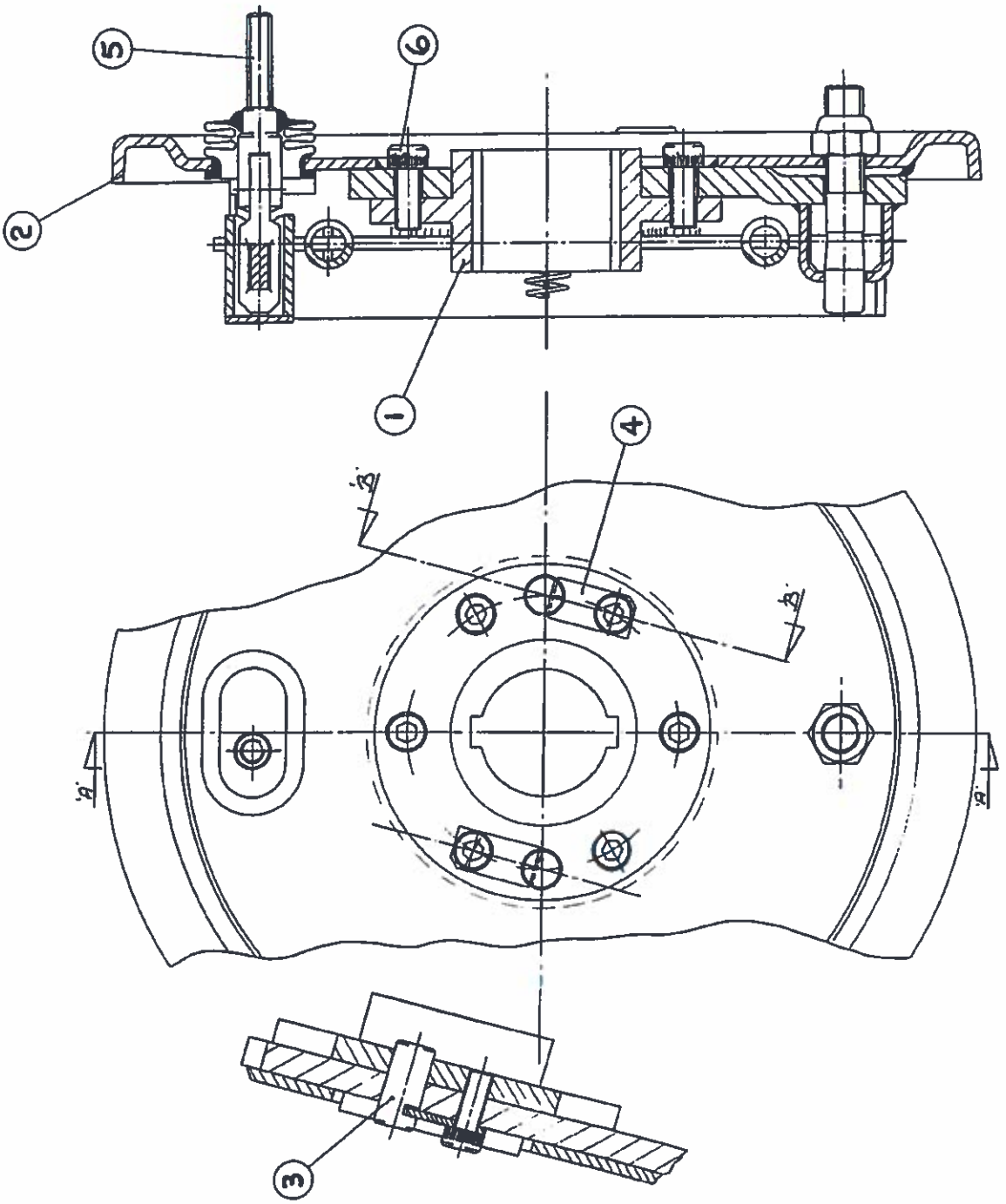


DANDO 100 - HOISTING REEL ASSEMBLY

PART NUMBER: AG00880F001

ITEM NO	PART NUMBER	QTY	DESCRIPTION
1	ST08651X475	1	Hydraulic Motor
2	AG00471M001	4	Bearing Stop
3	AG00741H002	4	Pivot Set Screw
4	AG00792H001	1	Adjuster
5	AG00881H001	1	Cover Plate
6	AG00882H001	1	Spacer
7	AG01605H001	1	Keyed Coupling
8	AG00920F001	1	Clutch Assembly
9	AG00885H001	1	Thrust Ring
10	AG00886F001	1	Operating Handle
11	AG00887H001	1	Locking Ring
12	AG00888H001	3	Key
13	AG00889H001	1	Hoisting Reel Shaft
14	AG00890H001	2	Set Collar
15	AG00891H001	1	Pivot Bracket
16			
17	AG00893H001	1	Sliding Member
18	AG00894L001	1	Hoisting Reel Drum
19	AG00895H001	1	Line Clamp
20	ST002736X127	2	Pillow Block
21	ST06492X127	2	Cartridge Unit
22	ST01118X133	4	Hex Head Bolt
23	AG	2	Bracket
24	ST06170X133	1	Hex Head Bolt
25	ST00650X511	6	Ordinary Nut
26	ST01043X511	1	Thin Nut
27	ST00912X270	4	Greaser 90°
28	ST05367X715	2	Hex head Set Screw
29	ST00778X747	2	Grub Screw
30	ST00781X747	2	Grub Screw
31	ST01190X747	2	Grub Screw
32	ST01081X878	4	Girder Washer
33	ST00656X881	6	Ordinary Washer
34	ST00651X885	6	Spring Washer
35		1	Box Section
36	ST00180X270	1	Greaser Straight

DANDO 100
CLUTCH ASSEMBLY

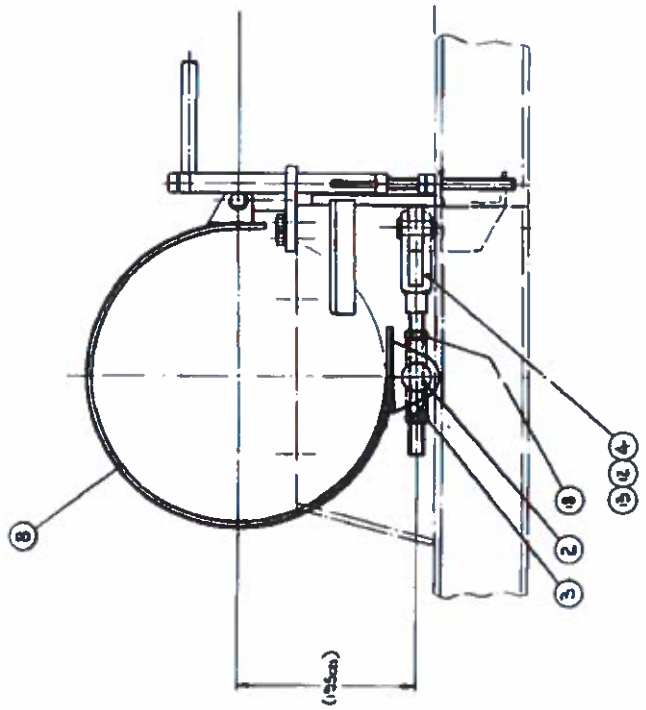


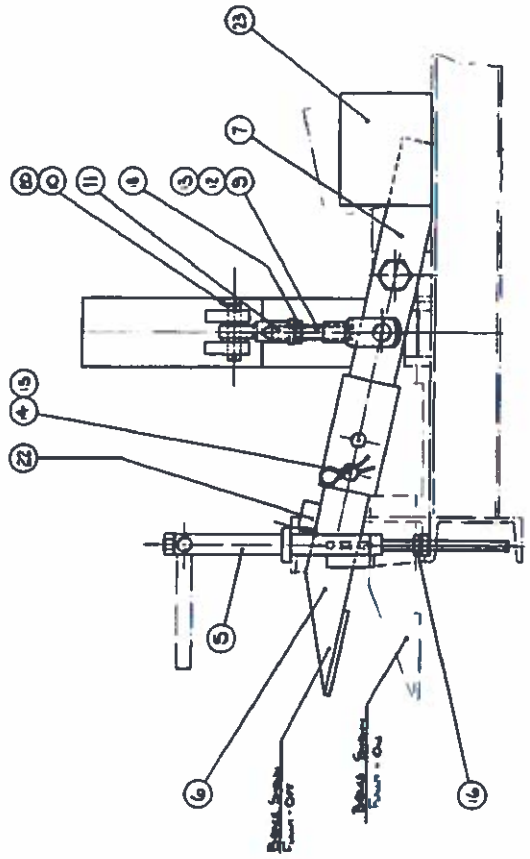
DANDO 100 - CLUTCH ASSEMBLY

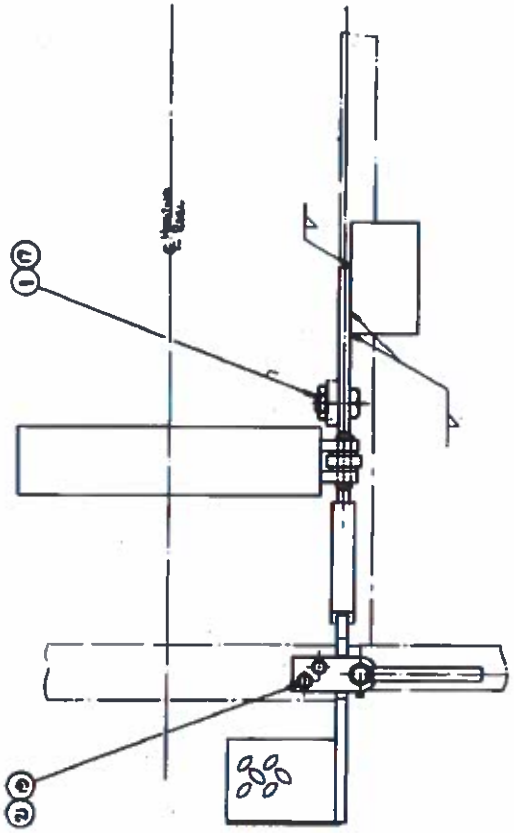
PART NUMBER: AG00920F001

ITEM NO	PART NUMBER	QTY	DESCRIPTION
1	AG00921H001	1	Boss - Clutch Mounting
2	AG00922F001	1	Modifications to Clutch
3	AG00923H001	2	Dowel
4	AG00924H001	2	Keep Plate
5	AG00925H001	1	Assy - Pull Rod
6	ST06770X784	6	Screw - Socket Head Cap
7	ST07449X165	1 Pair	Lined Shoes (Not Illustrated)

DANDO 100
FOOT BRAKE ASSEMBLY







AG00970L001

DANDO 100 - FOOT BRAKE ASSEMBLY

PART NUMBER: AG00970L001

ITEM NO	PART NUMBER	QTY	DESCRIPTION
1	AG00956H001	1	Pivot Pin
2	AG00957H001	1	Brake Band Pin
3	AG00960H001	2	Pull Rod Pin Saddle
4	AG00974H001	1	Adjusting Rod
5	AG00969F001	1	Brake Locking Rod
6	AG00971H001	1	Foot Brake Pad
7	AG00972H001	1	Foot Brake Pivot Section
8	AG00973F003	1	Brake Band(Complete)
9	AG00974H002	1	Adjusting Rod
10	AK00747H001	1	Pull Rod Pin
11	ST00795X170	1	Spherical Rod End
12	ST02011X170	2	Clevis Pin
13	ST02012X170	2	Safety Clip
14	AG00977H001	4	Link Pin
15	ST00383X163	4	Grip ('R') Clip
16	ST00579X511	1	Nut - Ordinary
17	ST01043X511	3	Thin Nut
18	ST00652X511	2	Thin Nut
19	ST01956X715	2	Hex head Set Screw
20	ST00195X749	2	Split Pin
21	ST01146X885	2	Spring Washer
22	10140730120	1	Flat Black
23	10141450750	1	Flat Black

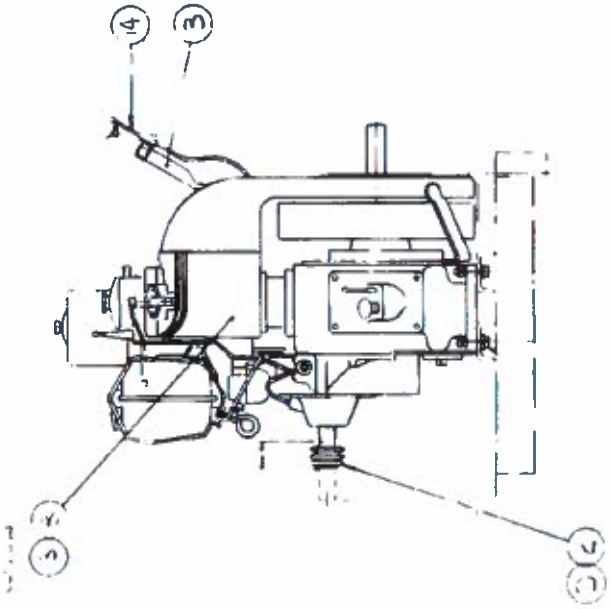
DANDO 100 - GUARDS ASSEMBLY

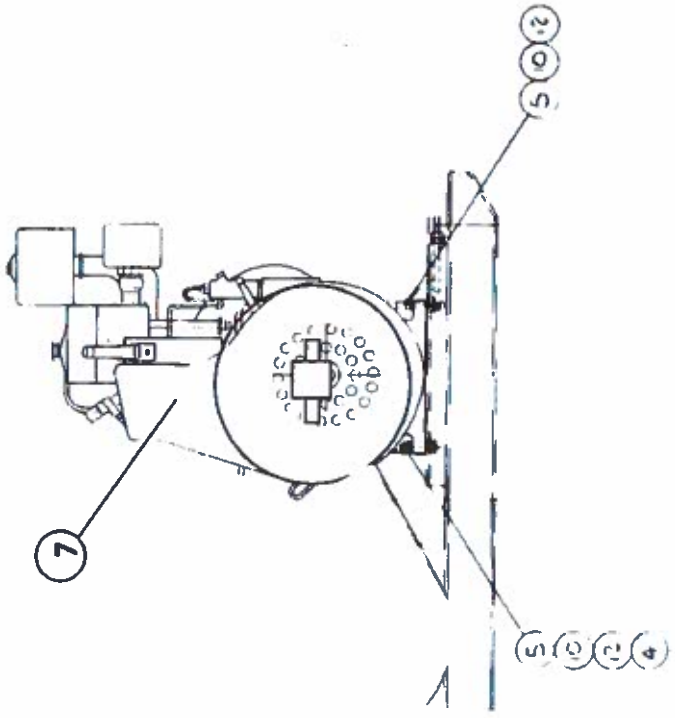
ITEM NO	PART NUMBER	QTY	DESCRIPTION
1		1	Drum Clutch Guard
2		1	Winch Guard
3		1	Chain Guard
4		1	Chain Back Guard
5			
6		1	Alternator Guard

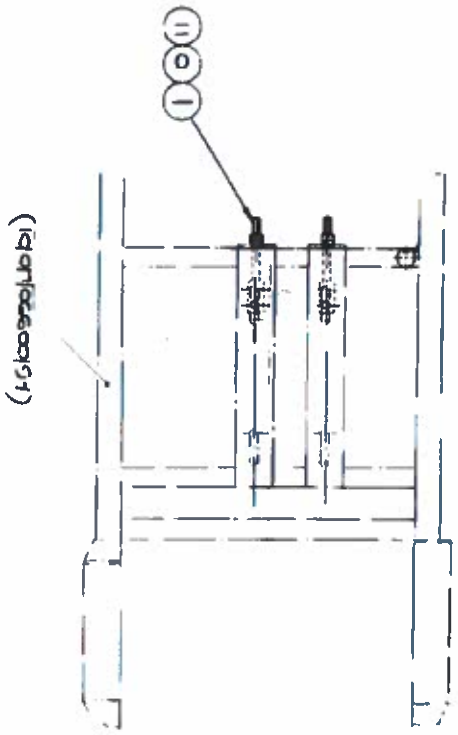
DANDO 100 - GUARDS ASSEMBLY

ITEM NO	PART NUMBER	QTY	DESCRIPTION
1		1	Drum Clutch Guard
2		1	Winch Guard
3		1	Chain Guard
4		1	Chain Back Guard
5			
6		1	Alternator Guard

DANDO 100
ENGINE AND DRIVE ASSEMBLY







AG01550L001

DANDO 100 - ENGINE AND DRIVE ASSEMBLY

MODIFICATION TO FRONT FIXINGS

PART NUMBER: AG01550F001

ITEM NO	PART NUMBER	QTY	DESCRIPTION
1	AG00747H101	2	Engine Adjuster
2			
3	AG00621M001	1	Throttle Handle Anchor
4	AJ00634H001	2	Washer - Special
5	ST04143X133	4	Bolt - Hexagon Head
6			
7		1	Engine complete with Starter Kit
8	ST03007X222	1	Throttle Control Lever
8A	ST03008X222	1	Operating Cable
9			
10	ST00579X511	6	Nut - Ordinary
11	ST01304X511	2	Lock Nut
12	ST00788X881	6	Washer - Ordinary
13	ST07522X221	1	Throttle Hand Lever and Cable
14	ST03763X222	1	Starting Handle