



SERVICE MANUAL

AIRWAVE MATTRESS SYSTEM

MODEL 7202

AMENDMENT RECORD

REVISION	CHANGE NOTE	TECH. NOTE	BRIEF DETAILS	SIGNATURE	DATE
1					
2					
3					
4	078/01	002/02	Change of Part Number for Resistor Block Assemblies. Logos updated	B. Pile	08-Jan 2002
	-	-	Re-numbered pictorial drawing on page 24 to reflect BOM.	K. Wilson	08-Oct 2002

Pegasus Limited. has a policy of continuous product improvement and reserves the right to change details presented in this Service Manual without notice.

Page issue states are shown in the List of Effective Pages (Pages i and ii). For current level of issue please contact the Customer Services Department:

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SECTION 1 - SAFETY STATEMENT

1. Pegasus Limited systems must be used in accordance with the manufacturer's instructions.
2. The mains electricity supply within the building where the system is to be used must comply with IEE Regulations.
3. Only qualified personnel, trained or formally approved by Pegasus Limited may perform maintenance, modification or repair work on Pegasus systems.
4. Unqualified personnel attempting to work on Pegasus Power systems risk serious injury to themselves and others, and possibly death by electrocution.

Do not work, nor attempt to work on Pegasus systems unless you are properly qualified to do so.

5. Pegasus systems are designed to comply with all relevant electrical safety, manufacturing and performance standards published by ISO, IEE & BSI.
6. Materials used for cleaning procedures may be subject to COSHH regulations - manufacturers Instructions For Use must be followed at all times.
7. Materials used for maintenance and repair may be subject to COSHH regulations - manufacturers Instructions For Use must be followed at all times.

SECTION 2 - INTRODUCTION

Product Name: Airwave

Model No 7202

Product Type: Mattress Replacement System

The product serial number is the key reference for all service matters relating to the Airwave System. The serial number is displayed on the rear face and on the right hand side of the Power Unit. It is essential to know this number to make proper use of this manual and to quote it in all communications.

The Airwave System is suitable for patients showing any of the following characteristics:

Assessed to be up to very high risk of developing pressure sores.

Require therapy to promote pressure sore healing

Have limited mobility, but can be repositioned if necessary

The system is suitable for use in hospitals, nursing homes and in the community.

Support while in bed is provided by a specially constructed mattress which comprises a series of transverse cells which are inflated and deflated in sequence creating a series of pressure waves which travel beneath the patient from foot to head.

Air to inflate the mattress is provided by a microprocessor controlled Power Unit through an airpipe that features a quick release connector at the Power Unit end. This connector features a non-return valve that allows the mattress to remain inflated when disconnected and a facility to enable rapid deflation for CPR procedures.

The air pressure in the mattress is continuously monitored, and the system is completely self-regulating.

The system mattress replaces the normal bed mattress and the Power Unit is suspended from the foot of the bed.

Audio and visual alarms activate if a fault condition arises and exists for more than ten minutes. An audio alarm sounds when the unit is switched off, or if the mains supply is interrupted.

SECTION 3 – SYSTEM OPERATION

3.1 INSTALLATION

Remove the bed mattress and place the Airwave Mattress onto the bed with the yellow shiny surface uppermost.

Ensure the airpipe connector is at the foot end of the bed. A cardio board is recommended if the Airwave Mattress would otherwise come into direct contact with bedsprings.

Place the Power Unit in a convenient position on the foot of the bed.

Connect the airpipe to the Unit, taking care not to kink the pipes. The blue self-seal connector must be fully home.

Plug the mains lead into a suitable electrical outlet, switch the Power Unit on and check:

- i The amber LED on the front panel illuminates to indicate electrical supply to the unit.
- ii Red Fault and Green Normal LEDs flash and Alarm sounds instantaneously to prove alarm and indicator functions.

A green Normal light will indicate when system is ready for use.

Note: The low-pressure alarm may sound after 30 minutes - cancel by switching off and back on again.

The mattress may be secured to the bed using the corner straps and snap buckles provided.

Do not fit straps to removable head or footboards.

Cover loosely with a cotton sheet.

Place patient on the Mattress, with the sacral area directly over a cell if possible.

3.2 PROFILING

To provide pressure relief to a patient in a semi-recumbent or recumbent position the Airwave Mattress can be fixed in the profile position using the adjustable profiling straps half way along the underside of the cover.

Loosen the corner straps from both ends of the mattress cover.

Adjust the bed back support to the desired angle, and then loosely fasten the profiling straps around the bottom rail of the bed head, or the bed frame if the bed head is removable - **Straps must not be fitted to removable head or footboards.**

Pull down on the profiling straps to adjust the mattress to the same angle as the back support. Do not tighten these straps any more than is necessary to achieve this position.

The foot end corner straps may now be refastened to the bed.

3.3 START UP

When the Power Unit is switched on, both Compressors run. When the average pressure fed from the Mattress via the restrictors to the low-pressure switch reaches 20mmHg, the switch closes (the pressure switch is set to 20mmHg falling pressure).

Providing the switch remains continuously closed for three minutes, the ECU then shuts down one compressor, leaving one running and simultaneously illuminates the green LED on the Control Panel to indicate normal running. Thereafter the two compressors are each automatically alternately cycled at 15-minute intervals.

3.4 NORMAL RUNNING MODE

The High Pressure Switch monitors the Mattress pressure in the 'B' cells - closing when this reaches 25mmHg (the pressure switch is set to 25mmHg falling pressure).

As the pressure cycles in the B cells, the ECU monitors the state of the High Pressure Switch and 'expects' to see two changes of state within ten minutes, i.e. the switch should open and close again, indicating correct cycling of mattress cell pressure.

If these changes of state of the High Pressure Switch do not occur, the ECU illuminates and flashes a red LED on the control panel and triggers an alarm buzzer.

The alarm may be cancelled by switching the unit off and then back on again (effectively re-entering the start-up phase), or switching the unit off and pressing the alarm reset to cancel the power down alarm.

3.5 ROTORVALVE OPERATION

An integral electric motor and gearbox drives the Rotorvalve. The Rotorvalve rotor turns at a rate of one revolution every 7.5 minutes. As the rotor turns, various slotted and circular paths align with holes in the interface plate allowing air to flow to and between the sets of Mattress cells in the required sequence.

The pattern of inflation is one fully inflated cell followed by one part inflated cell followed by one fully deflated cell - nominal pressures being 50, 40 and 0mmHg respectively.

This is accomplished by allowing the air in the deflating set to bleed into the zero pressure set, bringing all cell sets to the same pressure. One cell set then exhausts to zero pressure while the other two are inflated to around 40mmHg, followed by a final feed of air to the high pressure cell.

The three head cells of the upper deck of the mattress and the side formers are kept fully inflated at all times. This is accomplished by taking a direct feed from the Rotorvalve. This permanent inflation provides a pillow and lateral security for the patient and maintains the relative positions of the two decks of cells, one above the other.

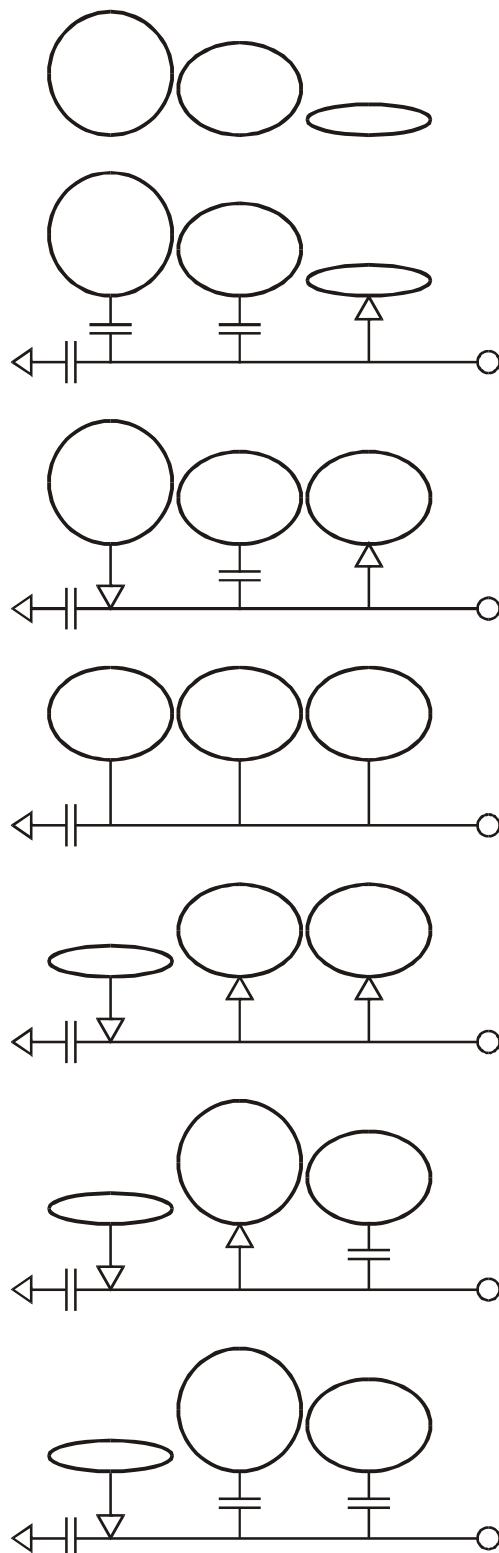
3.6 MATTRESS INFLATION PATTERN

Cell Set:

A

B

C



Step

- 1 Start of cycle
A cells fully inflated
B cells part inflated
C cells inflated from supply
- 2 C cells inflated from supply
- 3 A cells partially exhaust to equalise with c cells
- 4 A, B and C cells equalise
- 5 A, cells exhaust to atmosphere
- 6 A, cells continue exhausting to atmosphere
B cells continue to inflate
C cells closed off, partially inflated
- 7 A cells fully deflated.
B cells fully inflated
C cells part inflated

The above process repeats in sequence

SECTION 4 - CONSTRUCTION OF PRODUCT

4.1 MATTRESS

The Mattress is constructed from a tough flexible abrasion and puncture resistant polyurethane-coated, woven nylon sheet material, with all joints high frequency welded. The top surface of the Mattress is extended at the sides to provide a 'skirt' which protects the mattress from soiling by body fluids, and has a smooth surface finish to facilitate cleaning. The Mattress has two layers of 18 transverse cells, one above the other, separated by two inflatable longitudinal formers, one each side.

The formers each have 17 short loops and toggles at regular intervals along their length which thread through eyelets in the side flaps of the upper and lower decks such that the transverse cells in the upper layer are located vertically above their corresponding cells in the lower layer. The loops are slightly longer on one of the formers to accommodate the mattress harness.

The cells and formers have a valve that is connected to a harness terminated by a connector that plugs over the Rotorvalve spigot outlets from the Power Unit.

The mattress cells are interconnected such that the 3 head end upper deck cells and 2 side formers remain fully inflated at all times when the system is in use.

Every third pair of upper deck cells is interconnected, such that there are 3 sets of cells - each being sequentially fully inflated, part deflated and fully deflated, to create the Pegasus Airwave action.

4.2 POWER UNIT

Casing, Control Panel and Alarm Buzzer

The casing is in two halves, fixed together by socket headed screws.

The lid features a pair of moulded silicone rubber-edge buffers which are fixed by screws and silicone adhesive. The buffers serve to locate the lid to the base whilst the lid fixing screws are being inserted, and also protect the unit from impact damage. A carrying handle is moulded into the end of the lid.

Two cradle ratchets are mounted in moulded recesses in the lid and are each held in place by a socket head screw. Each ratchet carries a cradle arm so the whole unit can be 'hooked' over the footboard of a bed.

The sub-frames and the cradle arms are fitted with rubber buffer pads together with the edge buffers.

An integral plastic membrane control panel adhered to the recessed sloping front face of the lid incorporates an orange LED to indicate power supply 'on'. A red LED to indicate an operating fault, a green LED to indicate normal running mode and a power-down alarm reset button are also fitted.

A printed circuit board (PCB) mounted immediately behind the control panel provides mounting for the control panel LEDs and is connected to the panel mounted power-down-alarm reset switch by a ribbon connector.

A multi-pin connector on the PCB allows the lid to be electrically/mechanically disconnected from the base during service/maintenance procedures.

The base of the case has air intake slots moulded into the lower front face, behind which is a slot cavity within the casing wall. The slot cavity is filled by a small block of open cell polyether foam which serves as a primary air filter and protects the unit from ingress of dust.

A 2-amp double-pole circuit breaker, protected externally by a flexible, transparent silicone rubber boot, is mounted into a protective recess in the rear wall of the casing base. An adjacent recess accommodates the mains supply lead gland fitting. When closed, the casing is sealed to IP40. A 'Cautions' label is affixed to the rear of the base, alongside the manufacturer's label that bears electrical ratings information and the serial number of the unit.

A polyester-coated aluminium plate, fixed by 4 screws into a recess at the end of the base, holds the Rotorvalve unit. When the lid is in place, a further 2 screws fix this plate to the lid and provide a rigid assembly.

Note: The following description relates to all power units built prior to Serial Number 14655 only:

The interior of the base carries a rubber mounted aluminium sub-frame which carries: a pair of rubber mounted Air Compressors, the Silencer/Accumulator, the Electronic Control Unit (ECU) and a bulkhead to which 2 Pressure Switches and the Alarm Buzzer are fitted.

Note: The following description relates to all power units built from Serial Number 14655 only:

The interior of the base carries a free standing, cast aluminium chassis, secured in the unit by extension lugs covered in rubber feet that are the same dimensions as the power unit interior. The chassis carries a pair of rubber mounted Air Compressors, ECU, 2 Pressure Switches, Silencer/Accumulator, Restrictor Block, Alarm Buzzer and Mains Input Filter.

Air Compressor

Two Air Compressors are fitted. Each Air Compressor is essentially a small aluminium bodied, linear electric motor, the iron cored armature of which reciprocates in a cylinder under the action of induced magnetic force in one direction and a return spring in the other. The compressor is fitted with flap valves at inlet and outlet, automatically actuated by the air pressure in the compression chamber, such that the compressor takes in ambient air and delivers compressed air to the mattress, via the air distribution and control system.

In Power Units prior to Serial Number 14655 the Compressors each have rubber mounting feet attached by screws and nuts to an aluminium baseplate, which is itself supported on rubber blocks and fixed to the floor of the Power Unit by screw/nut fastenings. The Compressor has flying lead electrical connections, fitted with insulated push-lock spade connectors.

In Power Units from Serial Number 14655, the Compressors mounting feet have a plate attached to prevent excess sideways movement of each compressor. A screw through the centre of the feet is secured to the chassis by means of a restraining plate and nuts.

In Power Units from Serial Number 20125, the Compressors each have rubber-mounting feet attached by screws to the chassis. The screw and retaining plate used in Power Units from Serial Number 14655 are no longer used. The power leads of each Compressor terminate in a 4-way IDT connector to enable connection to the ECU. The Compressor has a spigot outlet over which 8mm-diameter silicone tubing is push fitted, and retained by a linear ratchet moulded plastic tie. This silicone tube is push-fitted over spigot inlets on the Silencer/ Accumulator to effect the pneumatic connections from the Compressors.

Silencer/Accumulator

The Silencer/Accumulator is an hermetically sealed enclosure moulded from high impact plastic material, packed with open cell foam.

In Power Units prior to Serial Number 14655, the Silencer/Accumulator is secured on a bracket by means of 2 cable ties, the bracket being fixed to the sub-frame in the base of the casing using 3 screws through the feet of the Compressors.

In Power Units from Serial Number 14655, the Silencer Assembly is secured horizontally to the underside of the chassis using a fixing kit which comprises of double-sided tape and a cable tie.

A horizontal spigot outlet from the Silencer/Accumulator is push-fitted with a length of 8mm silicone tubing retained by a plastic linear ratchet tie, which is in turn push-fitted over a spigot inlet to the Rotorvalve and secured by means of a plastic linear ratchet tie.

Rotorvalve

The Rotorvalve is a rotary pneumatic valve in which a moulded plastic rotor with integral drive spigot bears on an interface plate housed in an aluminium housing. The airways open and close as the rotor turns to facilitate air flow to and from the mattress.

The rotor is turned by a synchronous electric motor via a reduction gearbox, the output shaft of which is fitted with a drive dog which engages into a transverse slot in the end of the rotor. The drive dog is fixed to the gearbox output shaft by means of a radial socket grub screw, and provides a drive between the gearbox shaft and Rotorvalve rotor. The drive motor has flying leads fitted with push-lock spade terminal connectors.

The rotor face is held in contact with the interface plate by means of a large 'O' ring axially compressed between the valve housing and a radial needle thrust race. The air seal to the air inlet chamber where the drive spigot passes through the housing is provided by an 'O' ring.

The rotorvalve is mounted in the left-hand end of the Power Unit casing by means of 3 screws. The plate is in turn fixed to the casing by screws.

The air outlet spigots that are press fitted and glued into the rotorvalve body protrude through the clamping plate. The spigots each have 2 'O' rings to effect pneumatic seals with the mattress connector, which is a simple push fit over the spigots. The outer 'O' ring is black and of smaller cross-sectional area than the inner one which is white.

The Rotorvalve has pressure tappings in the valve housing, to which 5mm diameter silicone tubing is secured by means of cable ties, connected via the Restrictor Block to the Pressure Switches.

The Rotorvalve is fitted with an internal air actuated slide valve to prevent exhausting of the mattress in the event of air supply failure, for whatever reason.

A spring loaded pressure relief valve is integral with the Rotorvalve housing.

Pressure switches

A dual Pressure Switch is fitted. Each pressure switch has a single pole electrical switch that is actuated via a diaphragm which responds to the system air pressure.

In Power Units prior to Serial Number 14655 the pressure switches are mounted on the sub-frame bulkhead in the Power Unit casing and are pneumatically connected to the Rotorvalve via the Restrictor Block by means of 5mm silicone tubing. Electrical connections to the ECU are effected by sleeved push-lock spade terminals and PVC insulated electrical connection wires hard wired into the Electronic Control Unit.

In Power Units from Serial Number 14655 the two Pressure Switches are mounted on the front chassis cross member and secured using 2 screws. Electrical connections to the ECU are effected by a loom with spade terminals at the Pressure Switch end and an IDT connector at the ECU end

Electronic Control Unit (ECU)

In Power Units prior to Serial Number 14655 the ECU comprises a printed circuit board carrying electronic components and integrated circuits. The ECU also carries a lithium battery to provide power for the ECU and Alarm Buzzer in the event of power failure. It does not provide reserve power for the Compressor or Rotorvalve.

The Air Compressor, Rotorvalve, Control Panel, Circuit Breaker and Mains Input Filter each have push-lock spade terminal connections to suitably sized PVC insulated flexible copper cable, led back and hard wired to the ECU. The Alarm Reset Push is connected via a flexible circuit and Reliflex 4-way connector to the LED printed circuit board which has a 6-way push-fit output connector, the socket of which is led back and hard wired to the Electronic Control Unit.

In Power Units from Serial Number 14655 the ECU is mounted in grooves on the underside of the chassis and held in place using 2 screws. The ECU carries a rechargeable, 3.6V, Nickel Metal Hydride battery to provide power for the ECU and Alarm Buzzer in the event of power failure. It does not provide reserve power for the Compressor or Rotorvalve. The battery may only be recharged by the ECU.

The Mains Filter, Rotorvalve Motor, Pressure Switches, and Alarm Buzzer looms have push-lock spade terminal connections at the assembly end and a suitable IDT connector at the ECU end. The LED PCB has an IDT connector at each end.

Internal electrical connections are effected by means of suitably sized PVC insulated flexible copper cable, fitted with sleeved connectors which push-lock over spade terminals, hard wired via the Base Connector Block (for units up to Serial Number 14655), or suitable IDT connectors (for units from Serial Number 14655).

4.3 TECHNICAL DETAILS

General

Serial No.	Located right hand side and to the rear of the Power Unit.
Cycle Control	Purpose designed distributor valve supplying air to the mattress cells.
Cycle Time	7.5 minutes.
Compressor Rating	7 litres/minute at 0.18kg/cm ²
Noise Level	Better then NC30
Medical Classification	Class 1

Electrical

Supply Voltage	220/240V ac. 50Hz
Power Consumption	100Va (max)
Fuse rating	Mains Plug: 3A fuse The equipment is protected by a 2-amp double pole circuit breaker.
Standards	BSEN60601-1
Classification	Class 1, Type B

Symbols



Type B



Alternating Current

Environment (Usage & Storage)	Air Humidity: 30% to 75% Ambient Temperature: 0°C (32°F) to 40°C (104°F)
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EMC

This equipment complies with EMC requirements. If affects are noted, the affected equipment should be moved apart.



This product carries the CE mark in accordance with EC Directive on Medical Devices (93/42/EEC).

SECTION 5 –INFECTION CONTROL/CLEANING

Cleaning procedures should be carried out in accordance with your local Infection Control Policy.

Ensure that the Power Unit is disconnected from the mains electricity supply before cleaning.

Do not immerse the Power Unit in water

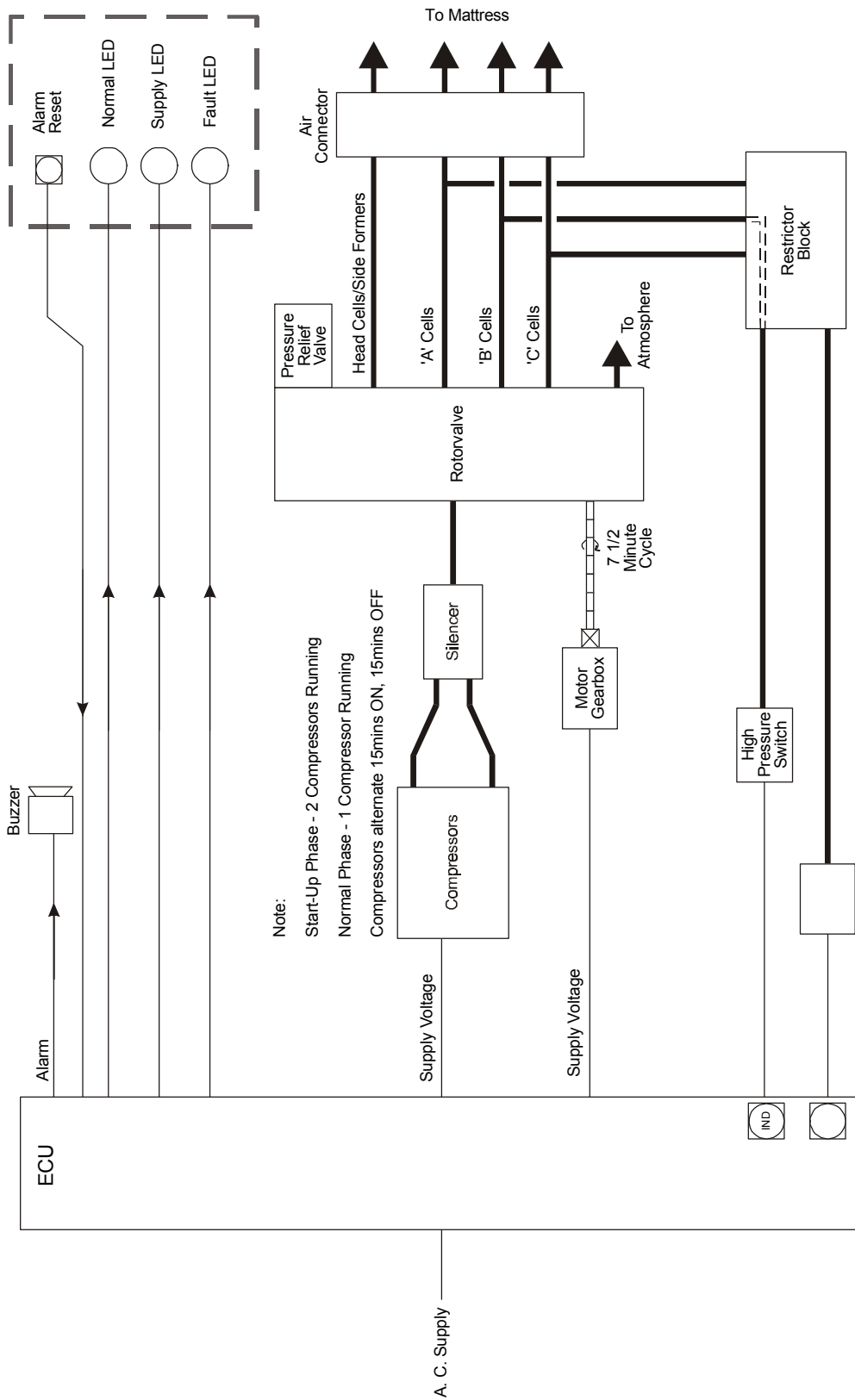
Do not autoclave, or use Phenol based products for cleaning

The mattress, power unit and umbilical cover can be cleaned using the following simple procedure:

1. Wash mattress top using hot water (60°C) containing detergent and dry.
2. Fold mattress in half from head to foot end, clean exposed bottom half of mattress and dry.
3. Invert the mattress, clean the exposed top half and dry.
4. Repeat 1 to 3 using a Hypochlorite solution containing 10,000 parts per million of available chlorine.
5. Clean the ribbon piping on the mattress connector with hot water, detergent, hypochlorite solution and dry.
6. Inflate the mattress and spray mattress underneath the skirt with an appropriate secondary disinfectant.
7. The mattress, power unit and umbilical cover may be sterilised using ETO or Draeger processes.

SECTION 6 - EQUIPMENT MAINTENANCE

SYSTEM FLOW DIAGRAM



General

It is recommended that the Airwave system be part of a planned preventative maintenance scheme.
To prevent damage, normal electrostatic control procedures must be observed when working on the Power Unit.
Electrical safety checks must be carried out on completion of any routine maintenance or workshop repairs

Power Unit - General

ECU	Connection N/A
Maint/Repair	Check the security of the wiring and tightness of screws and integrity of component mountings – rectify as necessary. Check pneumatic tubing for hardening or cracking and replace as necessary. Switch on the electrical power supply. Check LED's and audible alarms for function (see Fast Mode Check). Check that the Air Compressors and the Rotorvalve motor are running. Check all pneumatic connections for air leaks and rectify as necessary. Lubricate spigot outlets sparingly with appropriate grease.
Test/Set-Up	Carry out an overall operation test., the test is carried out in Service Mode.

Compressors

ECU	Connection
Maint/Repair	Maintenance of a compressor consists of replacing the filter plate filter and inlet spigot filter. 1. Remove the filter cover from the end of the compressor, remove the filter. 2. Clean the filter housing surfaces and the disk. 3. Fit a new filter and replace the cover. 4. Replace the inlet spigot filter.
Test/Set-up	Carry out compressor electrical tests: 1. Disconnect tubing from the compressor (if fitted). 2. Connect the compressor to the appropriate connector(s) on the test set (TE5315). 3. Connect the test set to mains and switch on. <u>No Load Test:</u> Check compressor runs with no excess vibration or noise, if there is a defect the 1.6a fuse may <u>On Load Test:</u> This test is carried out at the same time as the flow rate test. Carry out a compressor flow rate test with TE5315 connected as for the no-load test. If there is a defect the 1.6a fuse may blow. Carry out a flow rate test on the compressor: <u>Note:</u> Ensure the compressor is in its 'HOT' state prior to carrying out the test: Start Service Mode and press the Alarm Reset button once, this will start the compressor. Let the compressor run for about 30 minutes to get to the 'Hot' state. If the system has been running for at least 1 hour prior to starting Service Mode, the compressor is assumed to be in the 'Hot' state and does not need to be run for 30 minutes. 1. Remove the tubing from the compressor and connect the test equipment (TE4540) in its place. <u>Note:</u> Ensure Test Equipment is connected to the pressure outlet of the compressor, not the vacuum side. 2. Switch the power unit On. Adjust the aneroid sphyg to read 100mmhg. 3. Check the flow rate on the flow meter reads not less than 5.5 ltr/min. If using test equipment other than TE4540, the flow rate should read 7 ltr/min or greater. 4. Switch off, remove test equipment; reconnect the tubing to the compressor. <u>Notes:</u> If using a 1-12 ltr glass tubed flow meter, read the value from the top of the float. If using a plastic bodied flow meter, read the value from the centre of the float.
Test Eqpt.	TE4540, TE5315

Rotorvalve

Removal of this item from Power Units prior to Serial Number 14655 is effected by disconnection of pneumatic and electrical connections and undoing the 3 screws securing it to the cabinet.

Removal of this item from Power Units from Serial Number `14655 requires removal of the chassis assembly from the cabinet before undoing the securing screws.

ECU	Connection N/A
Maint/Repair	1 Undo 2 screws securing motor gearbox to rotorvalve and remove motor gearbox.
	2 Remove the 5 M4 set bolts, washers and nuts securing both halves of the rotorvalve housing.
	3 Split the housing, ensuring the 2 location dowels remain in place in the rotor housing.
	4 Withdraw the rotor complete with the thrust race bearing assembly and 'O' ring.
	5 Check the valve airways are clean and clear of obstruction - replace interface if necessary.
	6 Clean the thrust race bearing assembly, lubricate the needle roller bearing sparingly with white petroleum jelly - replace if necessary.
	7 Check the large 'O' ring - replace if necessary.
	8 Fit the thrust race bearing assembly and large 'O' ring, in that order, on the rotor spindle having lightly greased the 'O' rings.
	9 Press the rotor into the rotor housing so that it is pushed fully home.
	10 Replace the interface to the rotor housing, ensuring it fits onto the 2 locating spigots correctly.
	11 Fit the two parts of the housing together using the 5 M4 set bolts washers and nuts.
	12 Remove the PRV adjuster, check the spring, valve seat and ball bearing - replace if necessary. Refit on completion.
	13 Remove reducer, check thrust 'O' ring, spring, thrust washer, diaphragm and actuator - replace if necessary. Refit on completion.
	14 Remove dump valve retainer, check dump spring, valve seat and dump 'O' ring - replace if necessary. Refit on completion.
	15 Refit the motor gearbox using the screws removed at (i) ensuring the drive dog gap is set to 0.015" - 0.030".
	16 Check condition of the 'O' rings on the rotorvalve spigots - replace if necessary (Note: Two different sizes of 'O' rings are required).
	17 Lubricate Rotorvalve spigots sparingly using an appropriate grease.
	Replacement is the reverse of the relevant removal procedure.

Electronic Control Unit

Normal electrostatic control procedures must be observed when working on the Electronic Control Unit.

ECU	Connection N/A
Maint/Repair	With the exception of battery replacement, repair cannot be carried out on site. Any defective Electronic Control Unit should be removed and replaced with a new one. Battery connections must be soldered.

Pressure Switches

ECU	Connection
Maint/Repair	Other than the complete assembly, the only replaceable parts are the pressure switch microswitches.
Test/Set-Up	Check operation as follows: 1. Disconnect the tubing connecting the Pressure Switches to the Restrictor Block at the Restrictor Block end (care must be taken not to damage the Pressure Switches or pressure sacs). 2. Remove the wires from both switches. 5. Using a sphyg and continuity tester set the High Pressure switch to open at a <u>falling</u> pressure of 54 – 64 mmHg and the Low Pressure switch to close at 20mmHg <u>falling</u> pressure 4. Reconnect the tubing and wires.

Mattress

Mattresses may be repaired by patching in the event of small holes, or by cell replacement in the case of more serious leaks. Patches are only suitable for small holes away from welds

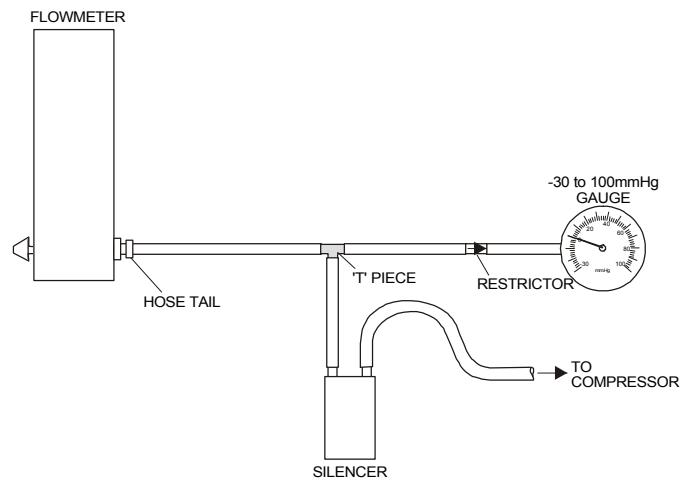
ECU	Connection N/A
Maint/Repair	1. Cut a small circular piece of material from the top or bottom edge of the mattress skirt. This not only provides patching material, but clearly identifies that a mattress has been repaired and can be a useful indicator when fault finding at a future date. 2. Clean the surfaces of the material to be joined. Abrade slightly and re-clean. Apply UPVC solvent cement to the mattress (cement for jointing UPVC plumbing is suitable) 3. Apply the circular patch, smooth out and weight down with a suitable heavy weight for 24 hours before mattress is reinflated. 4. Larger leaks normally occur between cells through ruptured seams, or to atmosphere through end seams. 5. In these cases cell inserts (part number MAT772) are used. 6. To implant a cell insert, first carefully remove the connector (Roberts valve) from the cell by cutting around the connector base, leaving a circular hole. Take care not to cut through into the bottom layer of the cell when removing the connector 7. Roll the insert into a long thin tube and pass through the hole into the defective cell, with its Roberts valve protruding through the hole 8. Gently inflate the insert and position it carefully within the cell. 9. Secure the Roberts valve of the cell insert to the cell wall using a washer of mattress material fitted over the valve and glued to the cell wall using UPVC solvent cement.
Test/Set-Up	1. Connect the Mattress to the Power Unit and run the system. 2. Check Mattress for any air leaks paying particular attention to any repaired cells

FAULT FINDING GUIDE

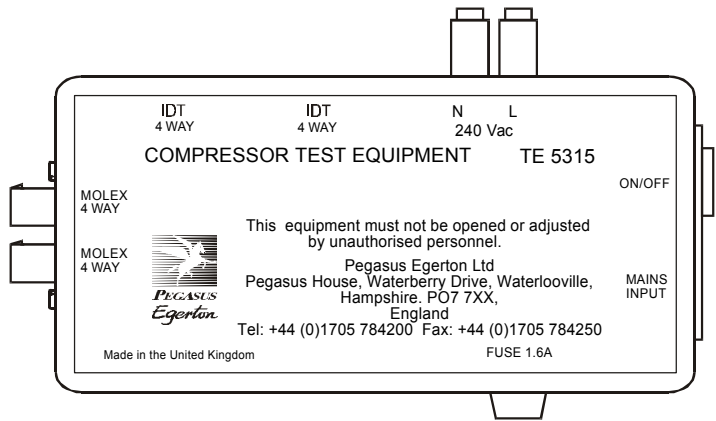
FAULT	ACTION
No lamps illuminated	Check power supply Check mains plug fuse (3amp)
Amber LED illuminated, system not functioning	Check ECU
Red Warning Lamp Flashing/Alarm Sound mattress alternating	Check for punctured mattress. Check supply pipes in mattress. Check Compressor air filter for blockage. Check Compressor performance – worn out. Check Rotor valve and other pneumatic components for leakage Check Pressure relief valve for maladjustment. Check restrictor tubing for slackness. Check settings of pressure switches.
Red Warning Lamp Flashing/Alarm Sound mattress not alternating	Check slide valve in Rotorvalve for defect. Check Rotorvalve for rotation Check rotorvalve diaphragm for holes and splits.

SECTION 7 – TEST EQUIPMENT

TE 4540



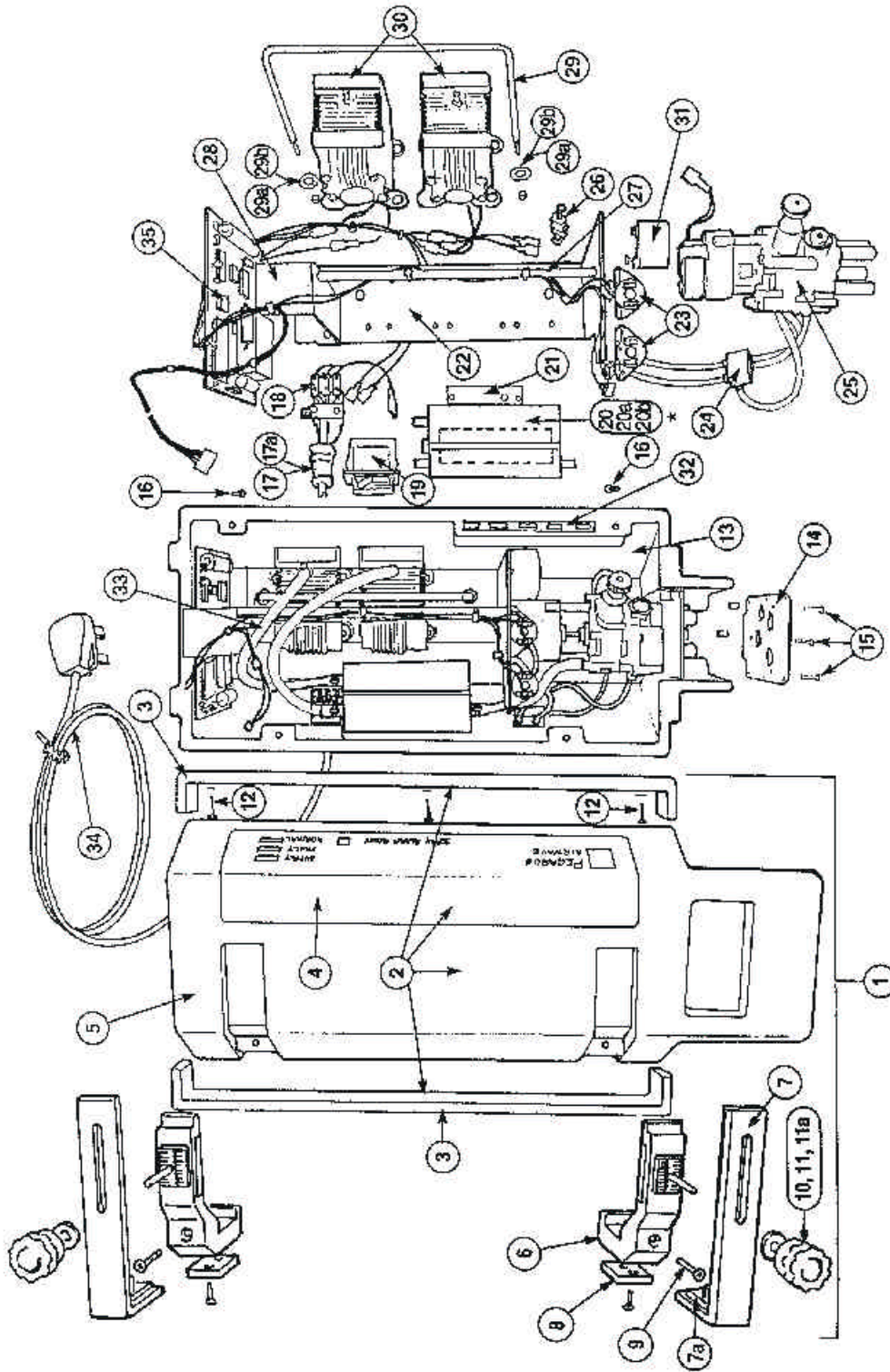
TE5315



SECTION 8 – PARTS LIST

8.1 POWER UNIT

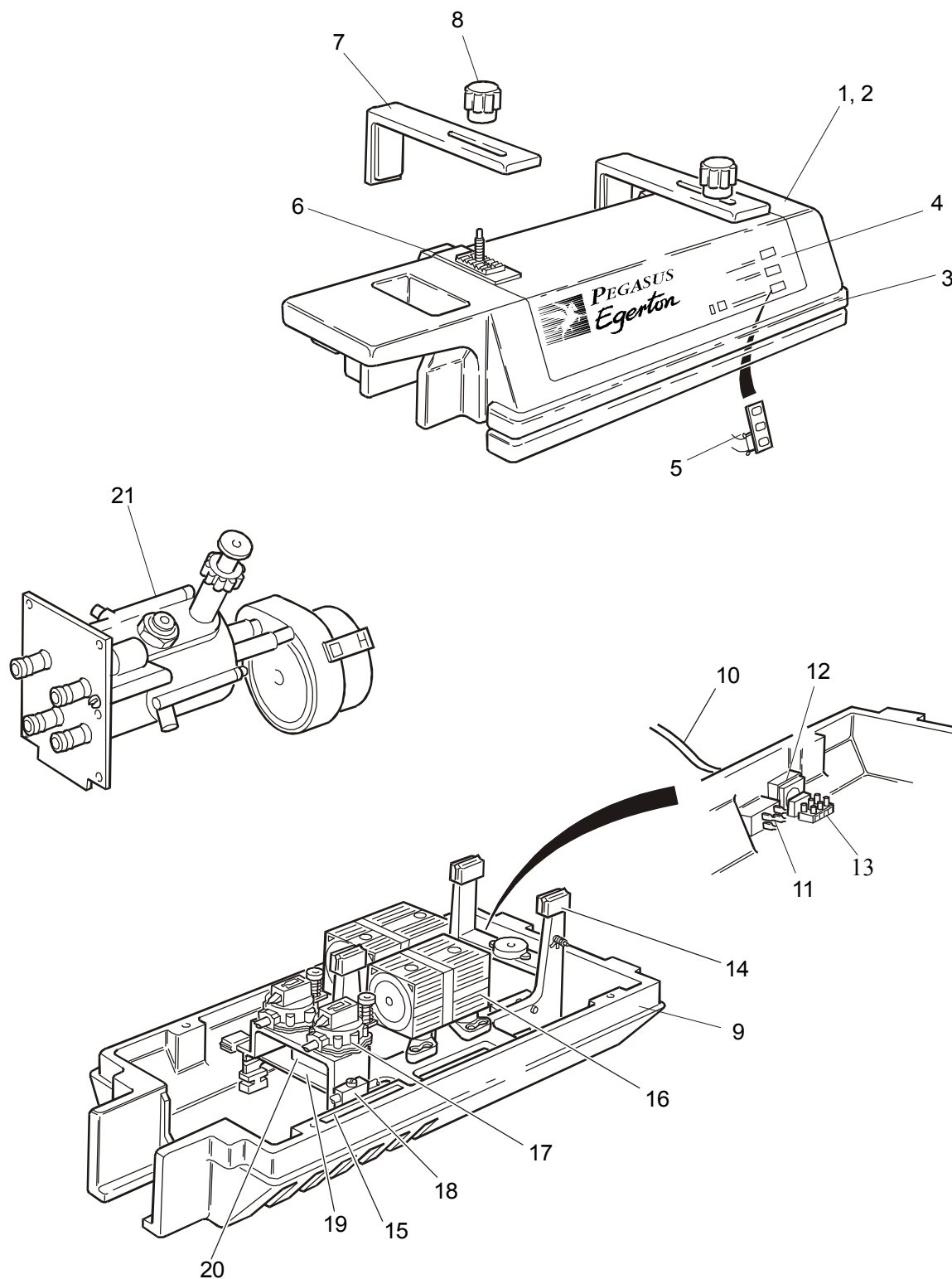
Prior to Ser No 14655



ITEM	DESCRIPTION	PART No.	QTY
1	Housing Top C/W Fittings	SA704	1
2	Housing Top F/P & Bumpers only		
3	Rubber bumper Front	MLD179	1
	Rubber Bumper Rear	MLD4330	1
4	Membrane Panel	LAB 206	1
5	Housing Top	MLD175	1
6	Cradle/Ratchet Single	CAS1351	2
7	Bumper, Cradle Arm	MLD4332	2
8	Bumper Pads	MLD4331	2
9	Screw Csk Skt M5x55	SCR2153	
10	Cradle Knob	MLD212	2
11	Screw for Knob	MEC359	2
	Washer	WAS352	
	PCB Front Panel Assy	SA714	
	PCB Front Panel	PCB1173	1
	LED Green	MSE1065	1
	LED Amber	MSE1178	1
	LED Red	MSE1174	1
	Pin Header	CON1180	1
	Connector Reliflex 4-way	CON1172	1
13	Housing Base	MLD176	1
14	Valve Securing Plate	MEC187	1
15	Screw C/H M4x20	SCR457	
16	Screw Csk Skt M5x40	SCR2152	
17	Cable Gland	MSM598	1
18	Conclamp	CON597	1
19	Circuit Breaker 2A	CON594	1
20	Silencer	SA707	1
21	Silencer Mounting Plate	MEC190	1
22	Compressor Mounting Plate	MEC188	1
23	Pressure Switch Assy	MOD1701	1
	Pressure Switch	MSM120	
24	Restrictor Block Assy	MEC14272	1
	Tubing Black 3/6mm	PIP762	
26	Mounting Rubber Chassis	MSM351	4
27	Securing Bar	MEC189	1
28	ECU Mounting Plate	MEC191	1
29	ECU Protection Bracket	MEC473	1
	Washer Captive M\$	WAS475	
	Washer P/St	WAS474	
30	Compressor (NOTE 1)	SA610	1
	Filter Compressor	MEC3024	1
31	Sounder Alarm	MSE1171	1
32	Inlet Filter Foam	MEC445	1
33	Tubing Silicone 5/8mm	PIP756	
34	Main Cable Assy	SA709	1
35	ECU Mk4 C/W Wiring	PEC5632	1
	Lithium Battery	MSE1142	1
	Connector IDT 6Way	CON1113	1
	Looms not shown.		
	Loom Earth (hinge to hinge)	MSM5564	
	Loom Main ECU	MSM5565	
	Loom Pressure Switch	MSM5567	
	Loom Front Panel	MSM5568	
	Loom Sounder	MSM5569	
	Earth Loom Rotorvalve	MSM5570	
	Earth Loom Input/Post	MSM5571	
	Earth Loom Post/Filter	MSM5572	
	Loom Set for Input/Filter	MSM5573	
	Loom Set for C/B to Inlet	MSM5374	

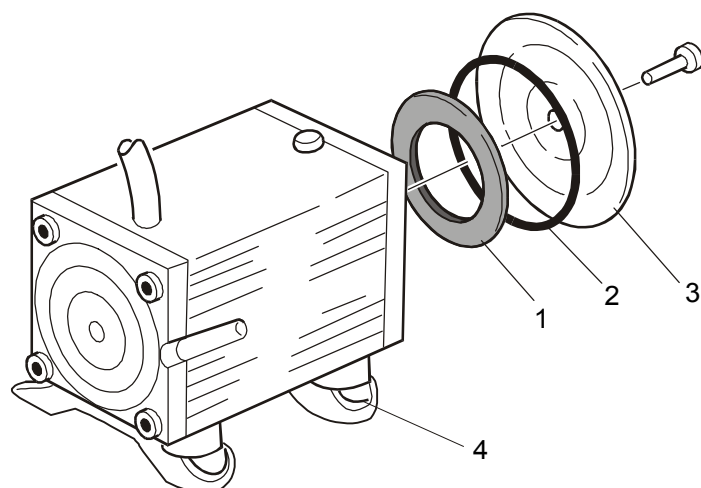
Note 1: If fitted with NITTO compressor (SA610), when replacement required replace with COMVAC compressor (MOD13484).

From Serial Number 14655



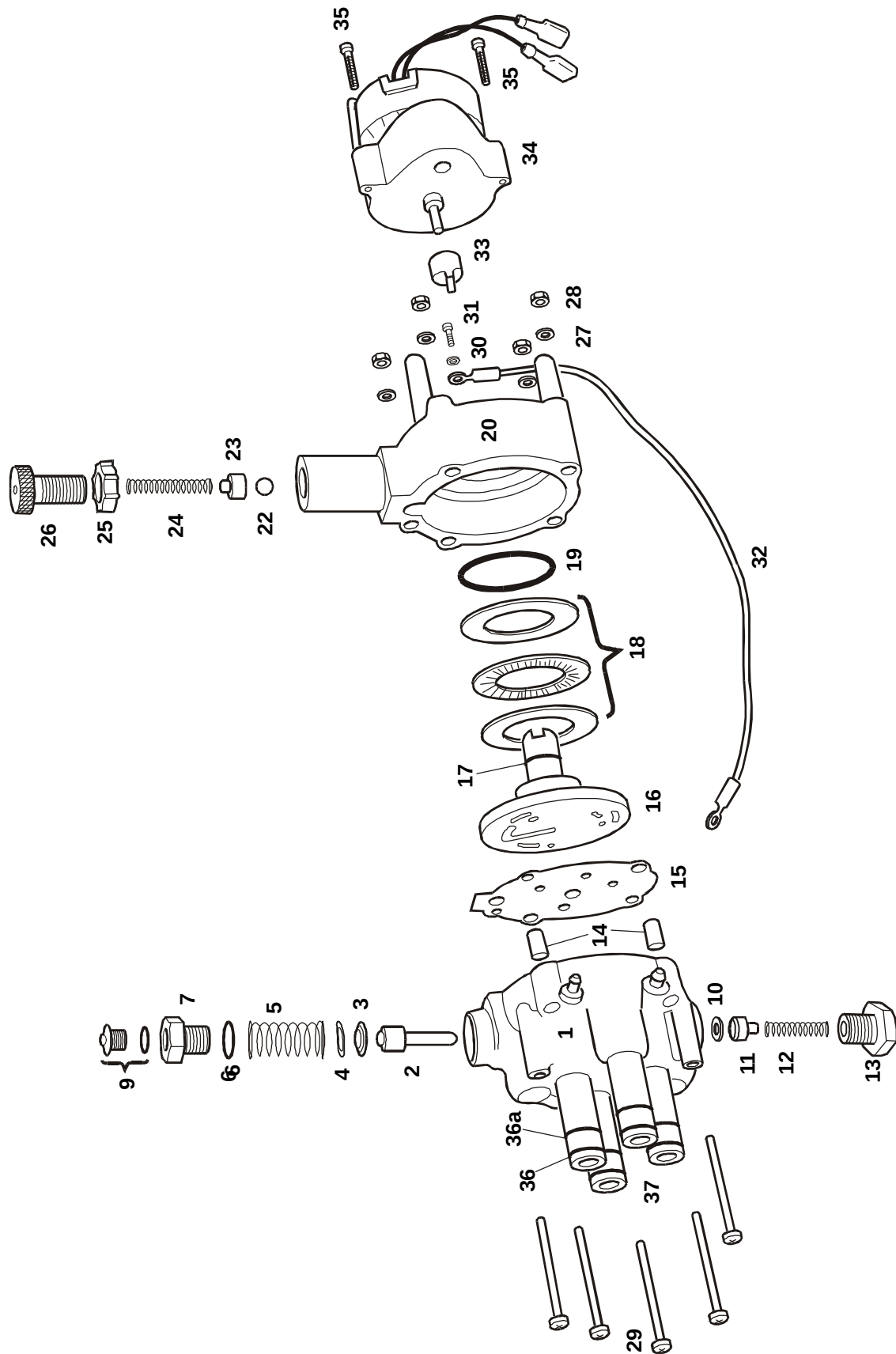
ITEM	DESCRIPTION	PART No.	QTY	PAGE REF
1	Housing Top c/w Membrane Panel and Bumpers	SA704/1	1	
2	Housing Top	MLD175	1	
3	Rubber Bumper Front	MLD179	1	
Not Shown	Rubber Bumper Rear	MLD4330	1	
4	Membrane Panel	LAB206	1	
5	ECU LED PCB Complete ECU Securing	PEC5634 Screw M3 x 10 SCR438	1 2	
6	Cradle Ratchet, Single	CAS1351	2	
	Bumper Pads	MLD4331	2	
	Screw Csk Skt M5 x 35	SCR2152		
	Screw Csk Pozi M3 x 16	SCR480		
	Foam Pad	MSM4015	2	
7	Cradle Arm	CAS210	2	
	Bumper Cradle Arm	MLD4332	2	
8	Cradle Knob	MLD212	1	
9	Housing Base (power units from Ser No 20125) (power units Ser No 14655 to 20125)	MLD4376 MLD176	1 1	
10	Mains Power Cable	CAB1251	1	
11	Switch Mains	CON594	1	
12	Cable Gland	MSM608	1	
13	Conclamp	CON597	1	
	Chassis (power units from Ser No 20125) (power units Ser No 14655 to 20125)	CAS4327 CAS1355		
14	Side Boot (power units from Ser No 20125) Mounting Foot (power units from Ser No 20125) Rubber Boot (power units Ser No 14655 to 20125)	MLD4329 MLD4328 MLD1665	7 4 11	
Not Shown	Filter Mains Filter securing	MSE596 Screw M3 x 16 Nut M3 Washer Shakeproof	1 2 2 2	
15	Filter Foam Air Inlet	MEC445	1	
16	Compressor Assembly	CMP1405	2	8.5
17	Pressure Switch Pressure Switch Microswitch Pressure Switch securing	MEC119 MSE4450 Screw KB30/12 SCR452	1 1	
18	Restrictor Block Assembly Restrictor securing	MEC14273 Screw M3 x 20 SCR2151	1	
19	ECU Mk5 240V Battery 3.6V Jumper Socket (for fast mode test) ECU securing	PEC5636 MSE1760 CON1468 Screw M4 x 20 SCR457	1 1 1 2	
20	Silencer	SA737	1	
21	Rotorvalve (4 spigot) Rotorvalve securing Rotorvalve Plate securing	SA736 Screw SCR457 Screw SCR444	1 3 6	8.6
Not Shown	Loom Buzzer Assembly	MSM5575		
Not Shown	Loom Earth Mains Input	MSM5576		
Not Shown	Loom Earth Mains Filter	MSM5577		
Not Shown	Loom Earth Rotorvalve	MSM5578		
Not Shown	Loom Front Panel and Buzzer	MSM5579		
Not Shown	Loom Pressure Switch	MSM5580		
Not Shown	Loom Filter/ECU/Rotorvalve(white)	MSM5581		
Not Shown	Loom Filter/ECU/Rotorvalve(black)	MSM5582		
Not Shown	Loom Earth Rotorvalve	MSM5583		
Not Shown	Loom Compressor/ECU (power units from Ser No 20125) (power units Ser No 14655 to 20125)	MSM5655 MSM5584		
Not Shown	Loom Rotorvalve/Earth (MOD1701)	MSM5585		

Compressor



ITEM	DESCRIPTION	PART No.	QTY
	Screw M4 x 12	SCR3085	
1	Filter	MEC3024	1
2	'O' Ring	MSM3073	1
3	Filter Cover c/w 'O' Ring	MLD3075	1
4	Foot Shock Absorbing (power units from Ser No 20125) (power units Ser No 14655 to 20125)	MLD4114 MLD3069	2

Rotorvalve



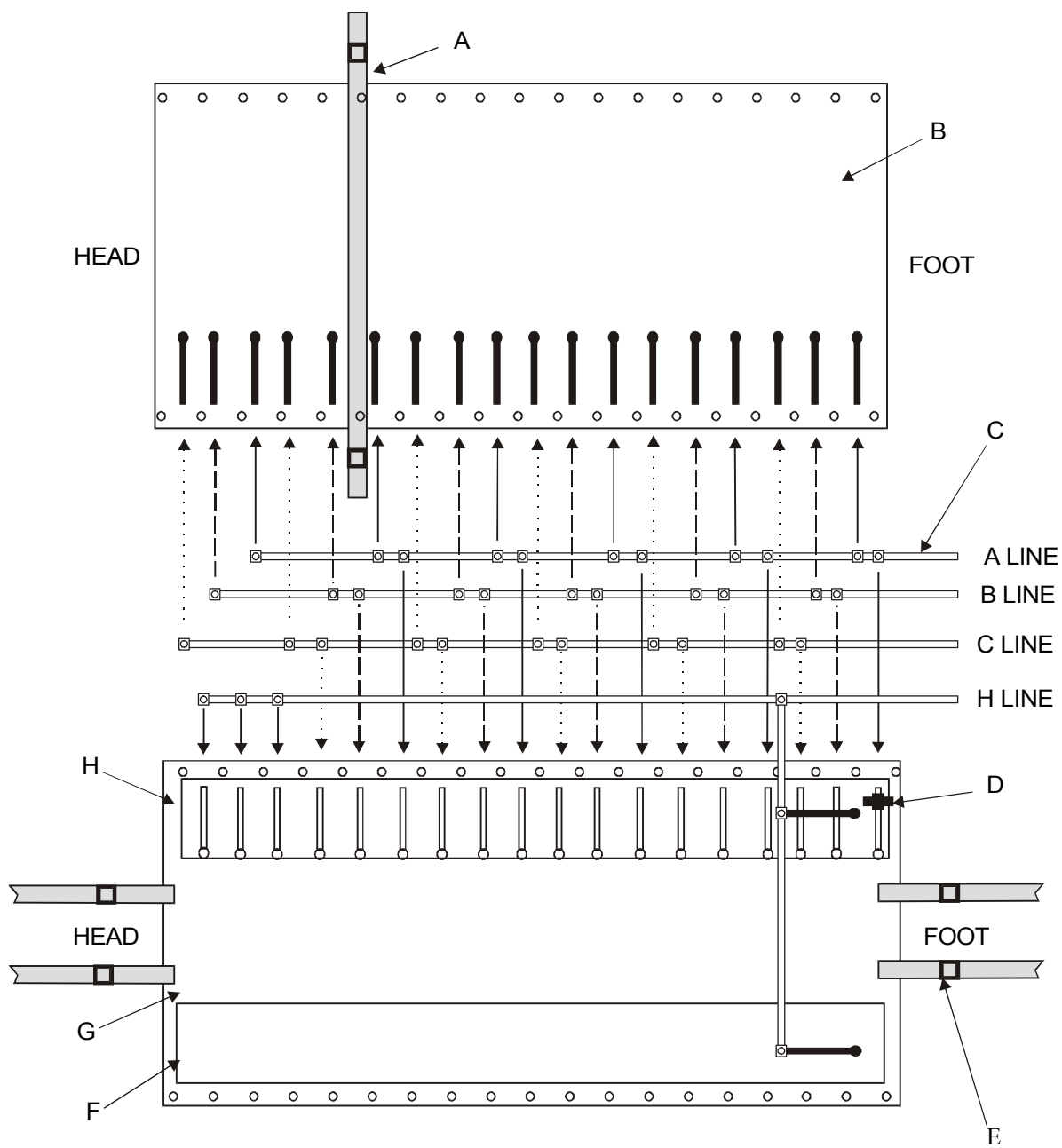
	ITEM	DESCRIPTION	PART No.	QTY
	1	Housing c/w/ Spigots	MEC274	1
	2	Actuator	MLD243	1
*	3	Diaphragm	MEC262	1
	4	Thrust Washer	MEC261	1
	5	Spring Slide Valve	MEC271	1
	6	'O' Ring – Thrust	MEC267	1
	7	Reducer	MEC265	1
	9	Blanking Plug c/w 'o' Ring	MEC264	1
	10	'O' Ring Dump	MSM241	1
	11	Valve Seat	MLD253	1
	12	Dump Spring	MEC270	1
	13	Dump Valve retainer	MEC244	1
	14	Location Dowel	MEC254	2
*	15	Interface	MEC255	1
	16	Rotor	MEC226	1
	17	'O' Ring Rotor	MSM231	1
	18	Thrust Race Bearing Assembly	MEC238	1
*	19	Large 'O' Ring	MSM237	1
	20	Housing Rotor	CAS227	1
	21	'O' Ring PRV (see Note 1)	MSM241	1
*	22	Ball Bearing	MSM269	1
	23	Valve Seat	MLD268	1
*	24	Spring PRV	MEC239	1
	25	Adjuster Locking Ring	MEC249	1
	26	PRV Adjuster	MSM240	1
	27	Plain washer M4	WAS363	5
	28	Nut M4	NUT335	5
	29	Screw M4 x 45	SCR232	5
	30	Washer M3 S/P	WAS362	1
	31	Screw M3 x 8 C/H Screw	SCR438	1
	32	Loom Earth Rotorvalve (prior to serial number 14655) (from serial number 14655)	MSM5570 MSM5583	1 1
	33	Drive Dog (see Note 2)	MEC235	1
*	34	Motor Gearbox	MOT5617	1
	35	Screw M3 x 10 – Rotalink or Crouzet Motor/Gearbox	SCR4178	2
		Screw M3 x 25 – Saia Motor/Gearbox	SCR428	2
*	36	'O' Ring Black(8.73 x 1.78)	MSM1812	4
*	36a	'O' Ring White(9.1 x 1.6)	MSM231	4
	37	Spigot	MLD230	4

NOTES:

- 1 Only fitted in rotorvalves pre serial number 4/5960
- 2 Gap between Drive Dog and rotor collar is set to between 0.015” and 0.030”.
- 3 Items shown thus * are recommended spares holding – available as Spares Kit SA753.

8.2 MATTRESS

Standard (880mm), Narrow (800mm) Width



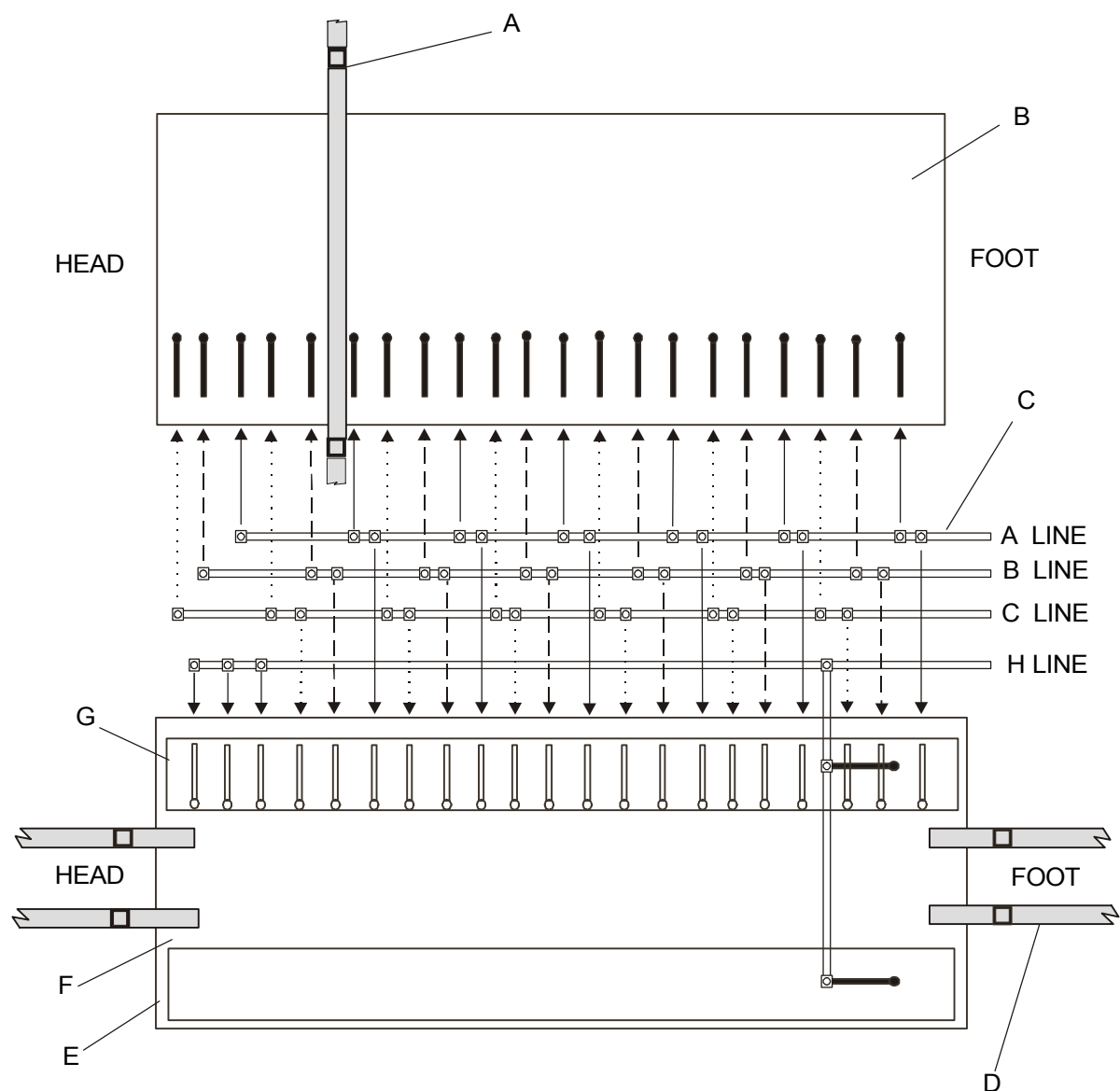
Standard (880mm) Mattress.

ITEM	DESCRIPTION	PART No.	QTY
	Mattress Assembly (complete)	SA703	
	Mattress Umbilical	SA702/1	
A	Profile Strap Set	MAT1565	1
B	Mattress Bottom	MAT769	1
C	Harness Assembly	SA702	1
D	Tie Wrap	MSM591	
E	Profile Strap Set	MAT1565	1
	Profiling Straps (for mattress with no profiling facilities)	MOD1704	
F	Former Short Loop	MAT743	1
G	Mattress Top	MAT768	1
H	Former Long Loop	MAT742	1

Narrow Width (800mm) Mattress.

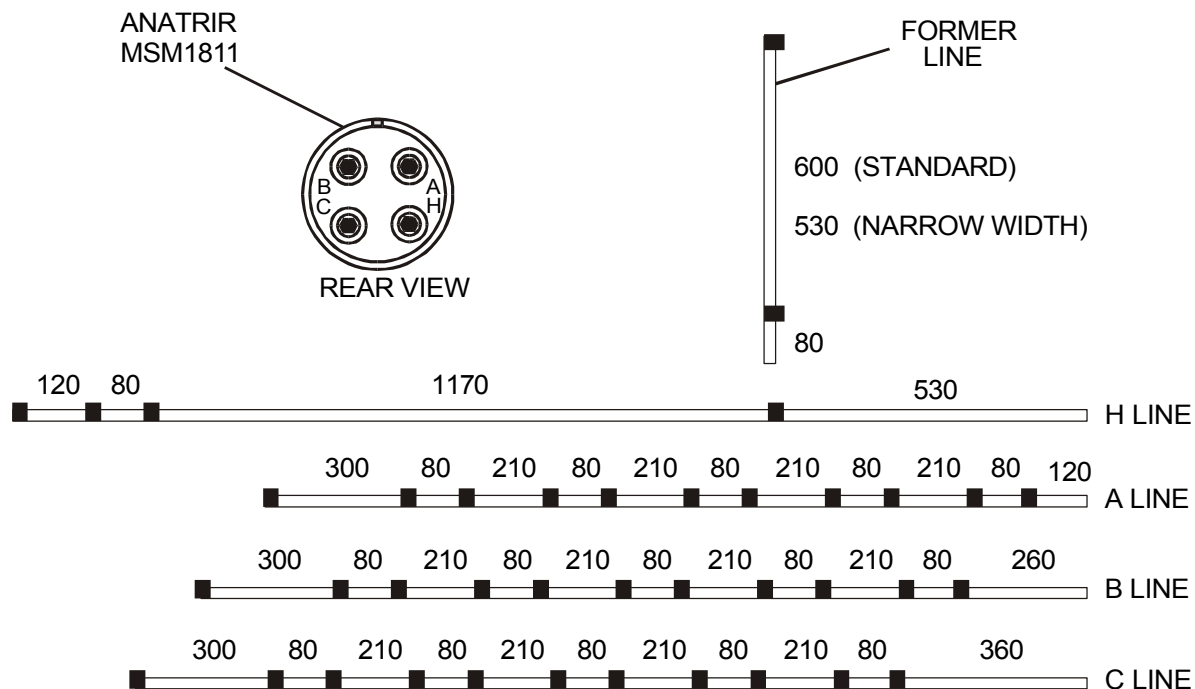
ITEM	DESCRIPTION	PART No.	QTY
	Mattress Assembly (complete)	SA703/12	
	Mattress umbilical	SA702/1	
A	Profile Strap Set	MAT1565	1
B	Mattress Bottom	MAT791	1
C	Harness Assembly	SA702/6	1
D	Tie Wrap	MSM591	
E	Profile Strap Set	MAT1565	1
	Profiling Straps (for mattress with no profiling facilities)	MOD1704	
F	Former Short Loop	MAT743	1
G	Mattress Top	MAT790	1
H	Former Long Loop	MAT742	1

Extra long



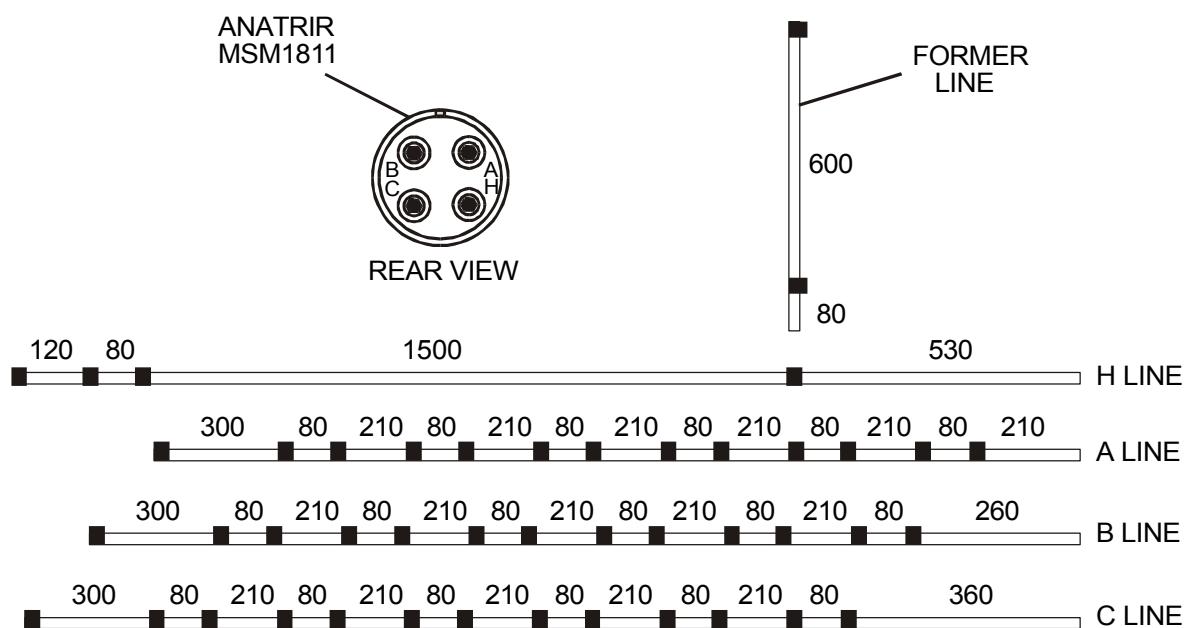
ITEM	DESCRIPTION	PART No.	QTY
	Mattress Assembly (complete)	SA703/6	
	Mattress Umbilical	SA702/1	
A	Profile Strap Set	MAT1565	1
B	Mattress Bottom	MAT1562	1
C	Harness Assembly	SA702/9	1
D	Profile Strap Set	MAT1565	1
	Profiling Straps (for mattress with no profiling facilities)	MOD1704	
E	Former Short Loop	MAT1563	1
F	Mattress Top	MAT1561	1
G	Former Long Loop	MAT1564	1

Harness Assembly Standard (880mm) and Narrow Width (800mm)



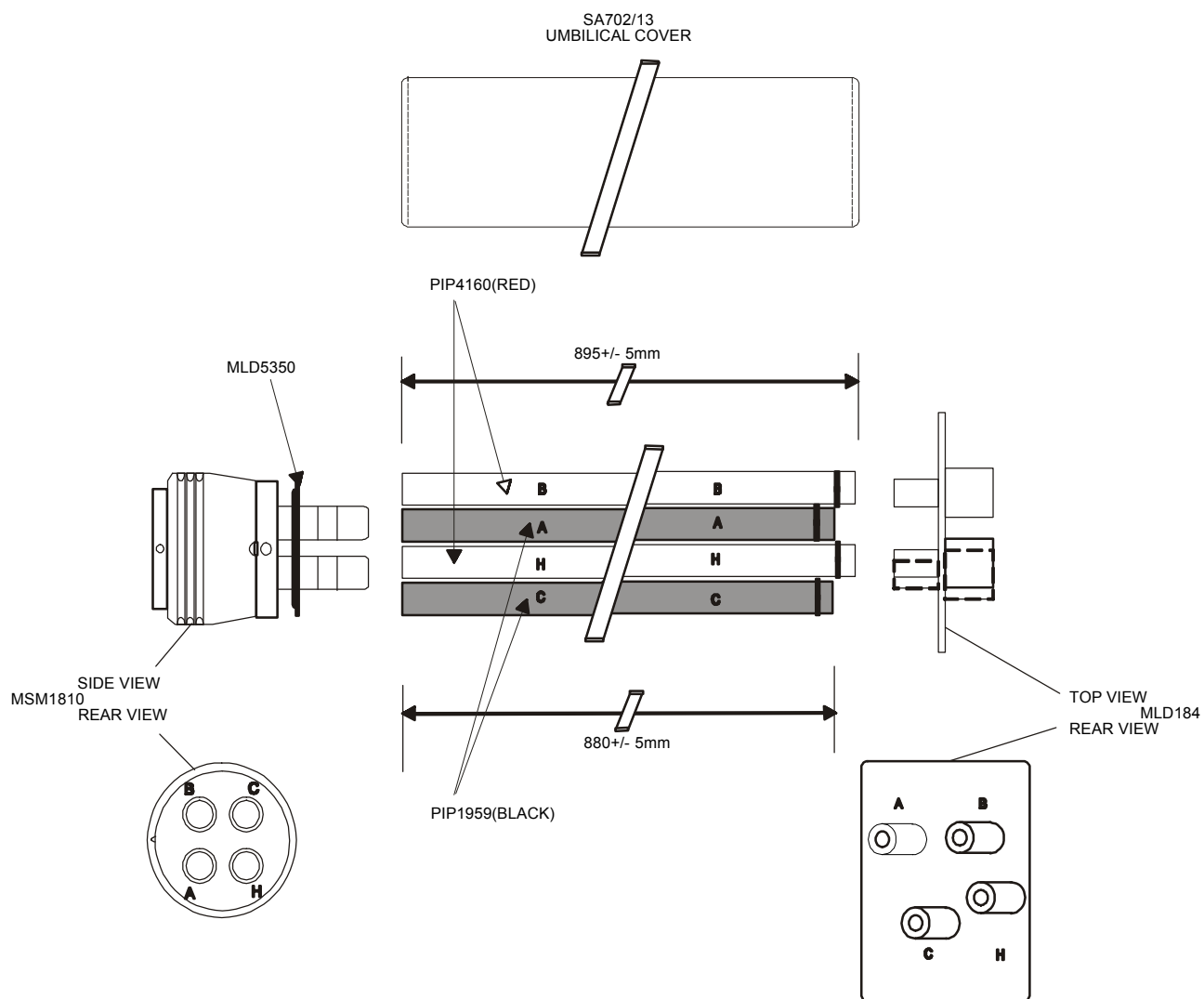
ITEM	DESCRIPTION	PART No.	QTY
	Tubing PVC Black 80mm	PIP1950	17
	Tubing PVC Black 120mm	PIP1951	2
	Tubing PVC Black 210mm	PIP1952	12
	Tubing PVC Black 260mm	PIP1959	1
	Tubing PVC Black 300mm	PIP1954	3
	Tubing PVC Black 360mm	PIP1959	1
	Tubing PVC Black 530mm (800mm uses 2 items)	PIP1959	1 or 2
	Tubing PVC Black 600mm (880mm only)	PIP1957	1
	Tubing PVC Black 1170mm	PIP1958	1
	Harness without Socket 4 Way Non Return	SA702/2	
	Socket 4 Way Non Return	MSM1811	1

Harness Assembly Extra Long



ITEM	DESCRIPTION	PART No.	QTY
	Tubing PVC Black 80mm	PIP1950	20
	Tubing PVC Black 120mm	PIP1951	2
	Tubing PVC Black 210mm	PIP1952	15
	Tubing PVC Black 260mm	PIP1959	1
	Tubing PVC Black 300mm	PIP1954	3
	Tubing PVC Black 360mm	PIP1959	1
	Tubing PVC Black 530mm	PIP1959	1
	Tubing PVC Black 600mm	PIP1957	1
	Tubing PVC Black 1500mm	PIP1959	1
	Socket 4 Way Non Return	MSM1811	1

Umbilical Assembly



ITEM	DESCRIPTION	PART No.	QTY
	Umbilical Cover	SA702/13	1
	Angle Connector	MLD184	1
	Socket 4 Way Non Return	MSM1811	1
	Umbilical Sleeve Plate	MLD5350	1
	Tubing PVC Black	PIP1959	
	Tubing PVC Red	PIP4160	
	Umbilical Assembly	SA702/1	
	Handle Left	MLD177	1
	Handle Right	MLD178	1
	Catch Release	MLD185	1
	Label Handle	LAB436	1
	Socket Cap Screw M3 x 16	SCR440	
	Socket Cap Screw M3 x 25	SCR443	
	Spring Compression	MEC446	1
	Locating Pin for MSM1811	MSM4482	

SECTION 9 - FITTING OF COMPRESSOR FEET

Fitting of compressor feet to 7202 units built from Serial no 14655 includes the addition of a strengthening plate as part of the compressor assembly, a restraining plate for securing the feet to the chassis and a pad for protection for the inside of the power unit lid.

PARTS LIST

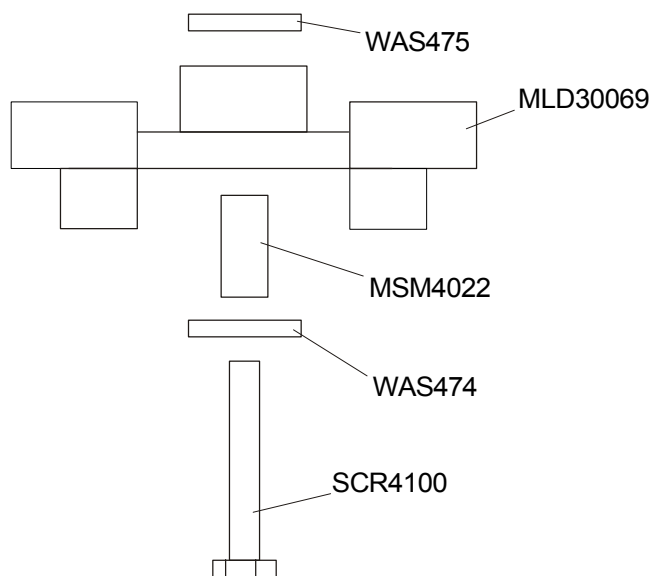
ITEM	DESCRIPTION	PART No.	QTY
	Label Warranty Invalidation	LAB398	1
	Buffer Pad 115 x 52 x 12mm	MEC4021	1
	Bush 15mm	MEC4023	8
	Compressor Plate	MEC4024	2
	Nylon Bush	MSM4022	2
	Nut M5 2	NUT335	
	Screw M4 x 30	SCR4100	2
	Screw M4 x 20 Csk	SCR4035	8
	Plastic Restraining Plate	MEC4063	1
	Washer Captive	WAS475	2
	Washer Plain	WAS474	2
	Tie Wrap	MSM550	5

If a compressor assembly (SA733) is replaced, all the parts listed will be supplied fitted to the compressor feet, with the exception of the restraining plate (MEC4063), nuts (NUT335), warranty invalidation label (LAB398) and buffer pad (MEC4021). The warranty invalidation label and buffer pad are required for fitting to the power unit lid, the restraining plate and nuts for securing to the chassis.

ASSEMBLY INSTRUCTIONS

If the compressor is not already fitted with the above but has feet attached, remove the feet from the compressor and discard the screws and foot bushes, ensuring those bushes discarded are from the holes used for securing the feet to the compressor.

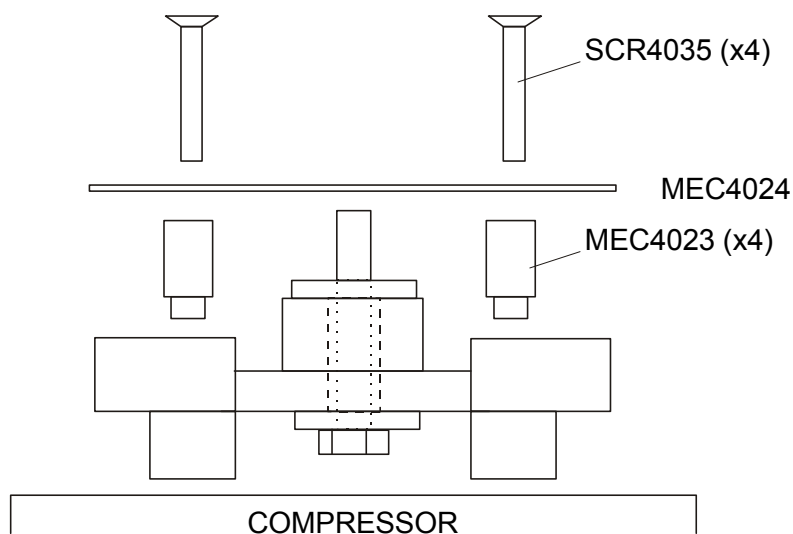
Figure 1



Insert nylon bush (MSM4022) through centre hole of feet.

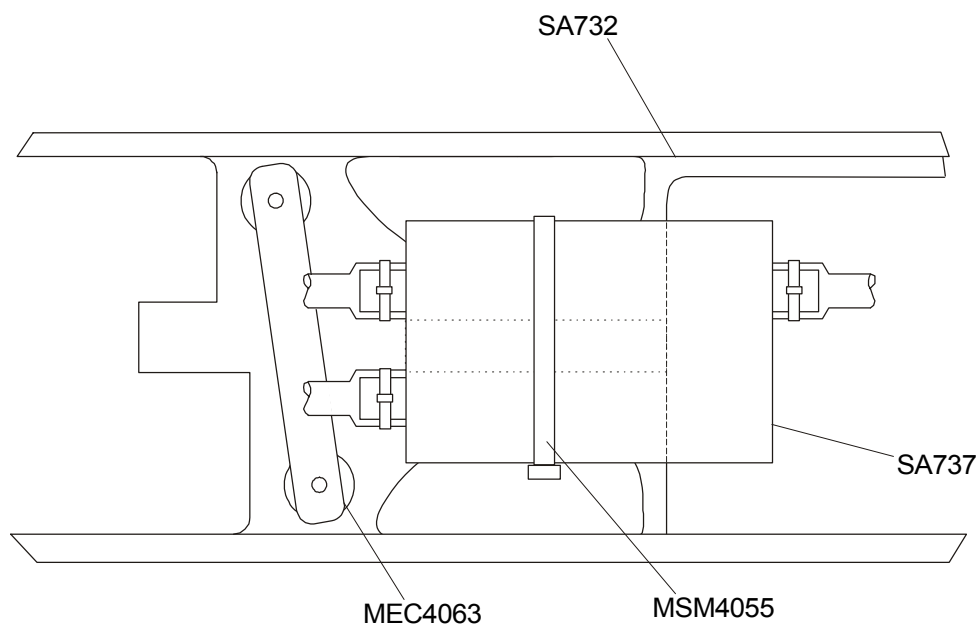
Fit washer (WAS474) onto screw (SCR4100), push screw through nylon bush and screw onto captive washer (WAS475).

FIGURE 2



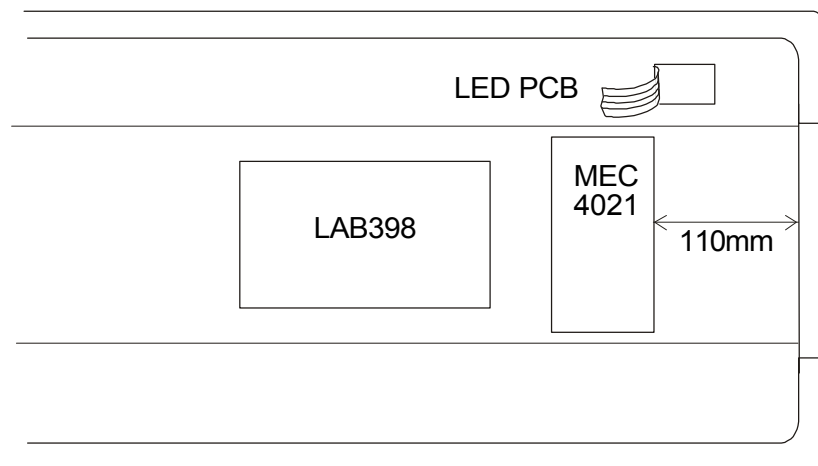
Insert 4 off bushes (MEC4023) into the feet holes where the foot bushes were removed from.
Lay the compressor plate (MEC4024) on the feet ensuring the holes are lined up.
Secure the feet and plate to the compressor using 4 screws (SCR4035).
Secure both compressor to chassis then turn chassis upside down.

Figure 3



Place plastic retaining plate (MEC4063) over screw through centre of compressor feet of each compressor and secure using 1 off shake-proof washer (WAS360) and M4 nut (NUT335) per compressor.
Replace ECU and secure.
Connect compressors to ECU - compressor 1 to Pl8, compressor 2 to Pl6.
Replace chassis assembly in power unit.
Reconnect silencer assembly to rotorvalve tubing and secure using a tie wrap (MSM550).
Reconnect tubing to silencer and secure using tie wraps.
Using tie wraps, secure compressor leads to chassis cross member.

Figure 4



In the power unit top, remove the existing warranty label noting pressure switch and PRV settings. Fix the buffer pad (MEC4021) to the inside of the lid above the compressor positions. Ensure the pad is positioned across the top with the leading edge 110mm from the LED PCB end. Annotate replacement warranty label (LAB398) with information noted on removal of old label and fix inside lid alongside buffer pad.



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