COROB™
SIMPLEshake 90

Vibrational Shaker

Technical Manual

CE

V2.0 – R0 (03/2014)

Technical manual
Vibrational shaker
COROB™ SIMPLEshake 90

Version 2.0 - R0 (03/2014)
© COPYRIGHT 2014, COROB S.p.A.
All rights reserved in all countries
If you require additional copies of this manual or further technical information about it, please write to:

COROB S.p.A.
Via Agricoltura 103 • 41038 San Felice s/P • Modena • Italy
Phone: +39-0535-663111 • Fax: +39-0535-663285
Web site: www.corob.com
Email: info.it@corob.com

INTELLECTUAL PROPERTY RIGHTS AND DISCLAIMER

No part of this manual may be translated into any other languages and/or adapted and/or reproduced in any form, or by any means, electronic or mechanical, including but not limited to photocopying and recording, without prior written permission of COROB S.p.A..
COROB™ is a registered trademark and/or commercial trademark used on an exclusive basis by COROB S.p.A. and its affiliated companies (hereinafter “COROB”).
A failure of a trademark to appear hereunder does not mean that COROB does not use the trademark in question nor does it constitute a waiver by COROB of any related intellectual property rights.
Valuable proprietary technical information contained in the present manual are referring to proprietary know-how, designs, drawings and/or applications used on an exclusive basis by COROB frequently covered by Patents and/or Patent Applications and thus protected by International and National Intellectual Property Laws.
Unless otherwise indicated, all references to other companies other than COROB and its affiliated companies, their names, data and addresses used in the screens and/or examples are purely coincidental and serve as a reference only to clarify the use of the COROB™ products.
COROB has carefully reviewed the wording and imagines contained in the present manual, nevertheless COROB reserves the right to modify and/or update the information herein to correct editorial errors and/or inaccuracy of the information herein without notice or commitment on its part.
The manual contains guidelines and/or information for product repair. For safety reasons, only trained and authorized technical personnel should perform such interventions.
Authorized technical personnel shall mean technicians who have attended a technical training course held by COROB and/or its affiliated companies.
Unauthorized interventions could void the warranty coverage of your COROB™ product pursuant to the sales contract or to the General Sales Conditions of COROB. COROB can be held responsible only within the limits of the warranty coverage provided by the General Sales Conditions.
COROB does not intend to limit or exclude its liability against any statutory provisions under any applicable law. Therefore the reference to above warranty limitations or exclusions may not apply.

Table of Contents

1 MACHINE RULES AND OVERVIEW 5
2 MACHINE OPERATION 5
3 SHAKER FRAME ASSEMBLY 6
3.1 Shaker frame 6
3.2 Clamp motor 6
3.3 Side channel assembly 7
3.4 Bronze nut 8
3.5 Platform assembly 8
3.6 Flange bearings 9
3.7 Top section assembly 10
3.8 Timing belt 10
3.9 Clamp plate assembly 11
4 OUTER FRAME ASSEMBLY 12
4.1 Outer base 12
4.2 Clamp transformer 12
4.3 Feet and wheels 13
4.4 Suspension assembly 14
5 MOTOR FRAME ASSEMBLY 15
5.1 Motor frame 15
5.2 Drive shaft assembly 15
5.3 Shake motor frame 16
5.4 Shake motor pulley 16
5.5 Shake motor 17
5.6 Crankshaft 18
6 ELECTRICAL ASSEMBLY 19
6.1 Control panel 19
6.2 Main control PCB 20
6.3 Clamp drive PCB 22
6.4 Relay PCB 22
6.5 Interface board 23
6.6 MCB switch 23
6.7 Mains input filter 24
6.8 Logic transformer 24
6.9 Contactor 25
6.10 Inverter 25
6.11 Clamp motor assembly 26
6.12 Door lock assembly and latch (type A) 26
6.13 Door Lock Assembly and latch (type B) 27
7 SERVICE PROCEDURES 28
7.1 Service 1: Replacing worn or damaged drive shaft belt 28

7.2 Service 2: Replacing the lead screw drive belt 32
7.3 Service 3: Removal and Replacement of shock absorber assembly 36
7.4 Service 4: Replacing the door lock type A 40
7.5 Service 4: Replacing the door lock type B 41
7.6 Service 5: Changing side channel assembly 42
8 TROUBLESHOOTING GUIDE 53
8.1 Machine is unstable and noisy 53
8.2 Can comes loose during shake cycle 53
8.3 Crushing cans 53
8.4 Machine will not clamp 53
8.5 Machine will not unclamp 53
8.6 Machine has clamped but will not shake 53
8.7 Poor mixing action 54
8.8 Machine shaking but not clamping 54
8.9 Main fuse breaker shuts down during shake mode 54
8.10 Door won't open (door lock type A) 54
9 ERROR CODES 55
10 PARAMETER MODE 58
10.1 Opening the control panel 58
10.2 Accessing parameter mode 59
10.3 Parameter mode 60
10.4 General Settings 61
10.5 Case Example - change language 62
10.6 Inverter Parameters 63
10.7 Default settings and units 64
10.8 Case Example – change the acceleration/ de acceleration settings 65
10.9 Clamp parameters 66
10.10 Default settings and units 67
10.11 Case example – changing the large can clamping pressure 68
10.12 Force clamp feature 69
11 PARAMETER SETTINGS 70
11.1 Shake speed- ref table 70
11.2 Recommended maximum Speed Setting 70
11.3 Determining Height of Cans 71
11.4 Clamping Pressure 71
11.5 Shake Motor Times 72
12 APPENDIX 1: Electrical schematic R0 74
13 APPENDIX 2: Electrical schematic R0.5 (June 2013 – October 2013) 75
14 APPENDIX 3: Electrical schematic R1 (October 2013) 76

1 MACHINE RULES AND OVERVIEW

- The machine must be unpacked in accordance with the instructions on the user manual.
- Please do not ship or move the machine without replacing the fastening systems in the shaker frame.
- This machine should be powered from a dedicated power supply of at least 13 amperes output and fuse protected. **This circuit must also be grounded**. Power extension cords are not advised, however, if they are to be used, they must be fully unwound. Failure to do so will result in premature failure of components and this will affect the warranty.
- Periodic lubrication of the lead screws to ensure smooth operation of the clamp system.
- All other bearings must be lubricated once a year.
- Under no circumstance the machine should be operated with the covers removed.
- No safety devices should be short circuited or by passed under any circumstances.
- Non trained personnel should not carry out and repairs on these machines.
- The machine should be installed in a dry, clean environment with a good airflow around the machine.
- It is most important that the end user understands all the functions of the machine and its limitations.
- If there is material spillage inside the machine, it is imperative that the paint is removed from the lead screws.

2 MACHINE OPERATION

The machine is operated via the front control panel. The front control panel consists of an LCD screen and 5 buttons in total.

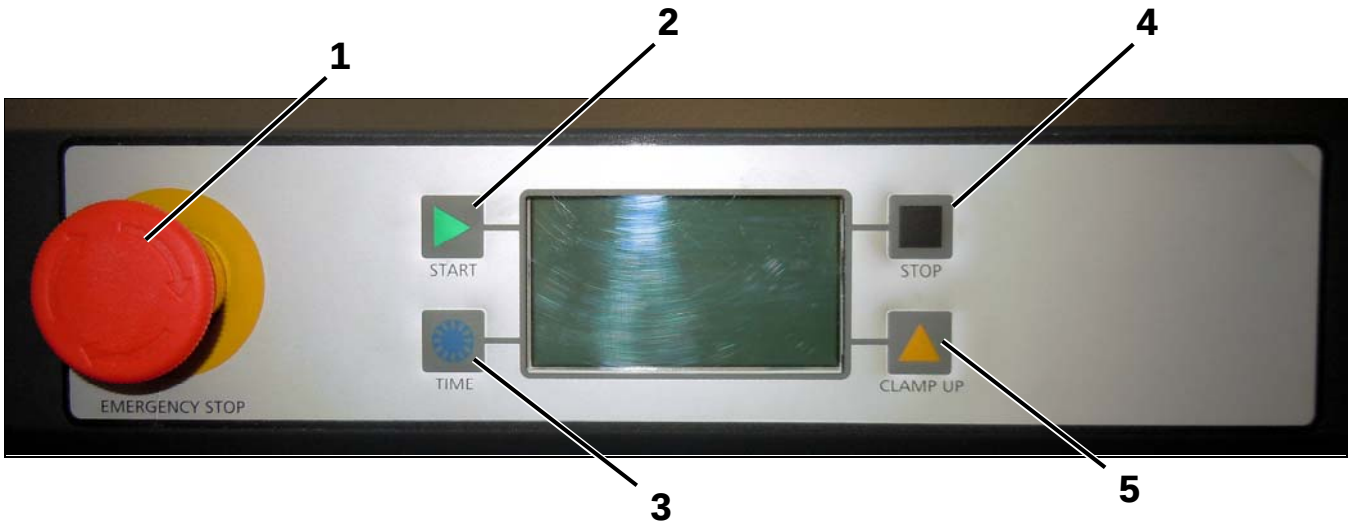
1. Emergency stop button – this button is used to stop the machine in the event of an emergency – immediate stop.

2. Start button – this button is used to start a shake cycle and will only work once the door is closed

3. Time button – this button allows the end user to select between default mode and 9 other shaking times (default is recommended for normal use)

4. Stop button – this button is used to stop the machine during shake cycle. If the button is pressed while the machine is in standby mode, the information screen will appear with information such as cycle count, run time and recent errors etc. Press the stop button once to exit the information screen.

5. Clamp up button – this button is used to lift the clamp plate when placing a large paint container into the machine. Press once and the clamp plate will continue to rise until it has fully opened. Press the stop button at any time if you want the stop the machine unclamping.



3 SHAKER FRAME ASSEMBLY

3.1 Shaker frame

The inner frame of the SIMPLEshake 90 machine is referred to as the shaker frame. The shaker frame mainly consists of two side channels assemblies, platform assembly, top section assembly, timing belt and clamping plate assembly (Figure 1 - Figure 2).

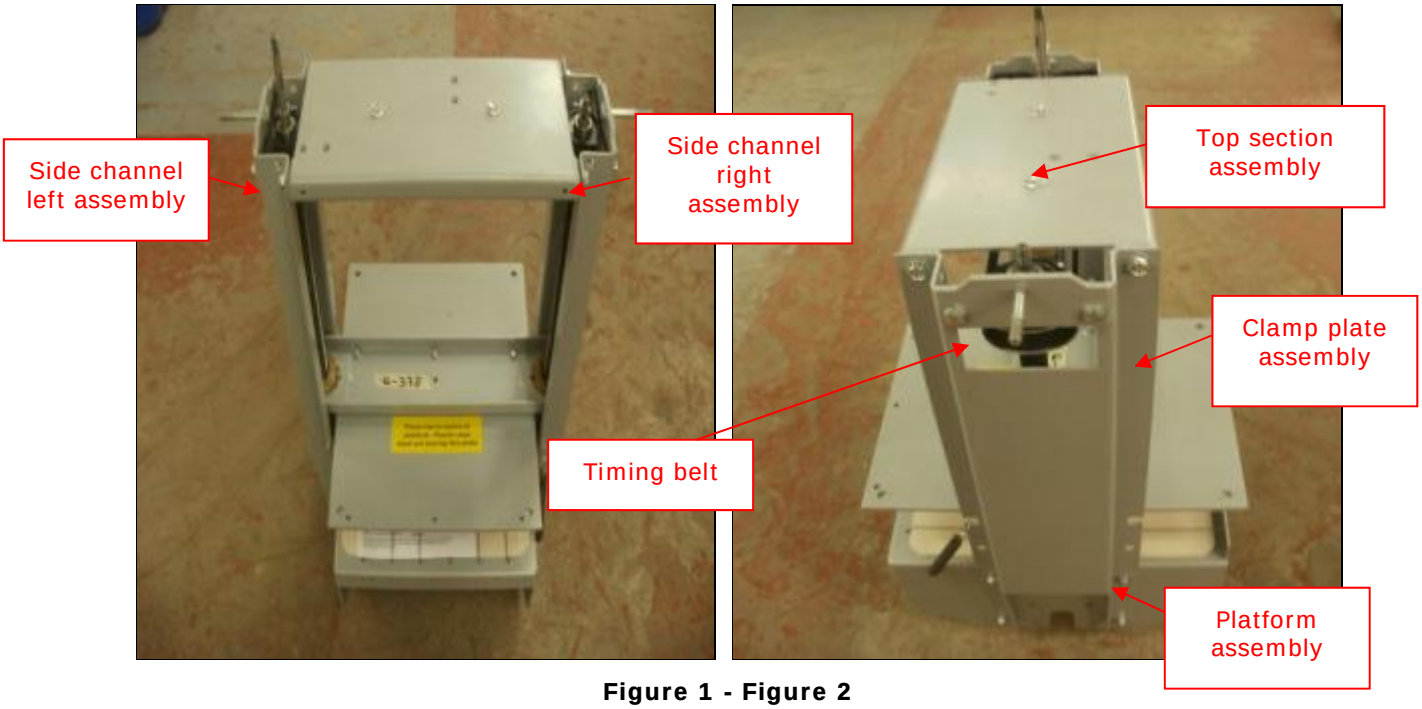


Figure 1 - Figure 2

3.2 Clamp motor

The shake frame also has a clamp motor mounted on top of the top section. The clamp motor is always located on the top left hand side of the shaker frame. The motor consists of four parts: gearbox, main motor, brake and encoder (Figure 3).

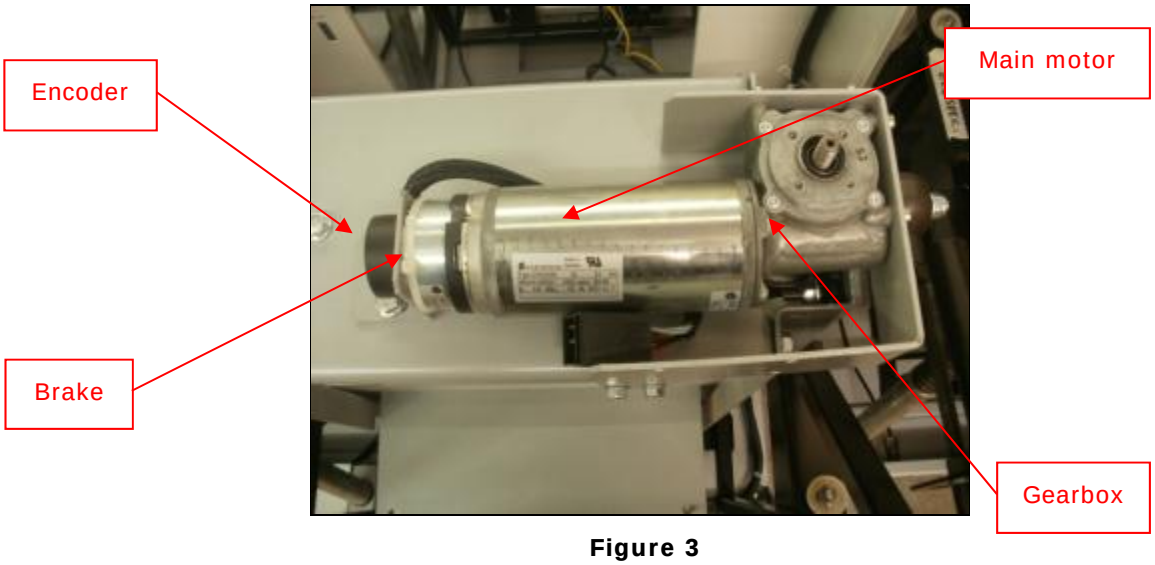


Figure 3

The clamp motor is supplied with 8 cables and plug in connector. Red and black wires (heavy) supply the main motor with 24 volts DC. The two grey wires supply the motor brake with 24 volts DC. The red, green, yellow and black wires supply 24 volts DC to the encoder. The complete unit is maintenance free.

The brake which is near the end of the motor prevents the clamp from opening when in shake mode. This brake is released only when the motor is powered up.

The Clamp motor comes with nine pin clip in connector with the following wire positions (Figure 4).

Connection housing ports:
Female connections

1. Grey
2. Grey
3. Red (light gauge)
4. Black (heavy gauge)
5. Green
6. Yellow
7. Red (heavy gauge)
8. Black (light gauge)

Figure 4

It is very important that this clamp motor is never allowed to come free on its mountings - check when carrying out a service on the machine. It is not possible to turn the clamp system by hand. The unit must be removed in order to adjust or open the clamp system manually!

3.3 Side channel assembly

The shaker frame has two lead screws which are part of the left and right hand side channel assemblies. The left hand lead screw is connected to the clamp motor via a 3mm keyway while the right hand lead screw is independent. If ever removing the clamp motor from the left hand lead screw, please ensure you do not lose the 3mm keyway. The left lead screw is different from the right lead screw (Figure 5 - Figure 6).

Figure 5 - Figure 6

On either lead screw, no springs are used. However, thrust bearings are placed on either side of the side channel plate for rotation purposes (Figure 7 - Figure 8).

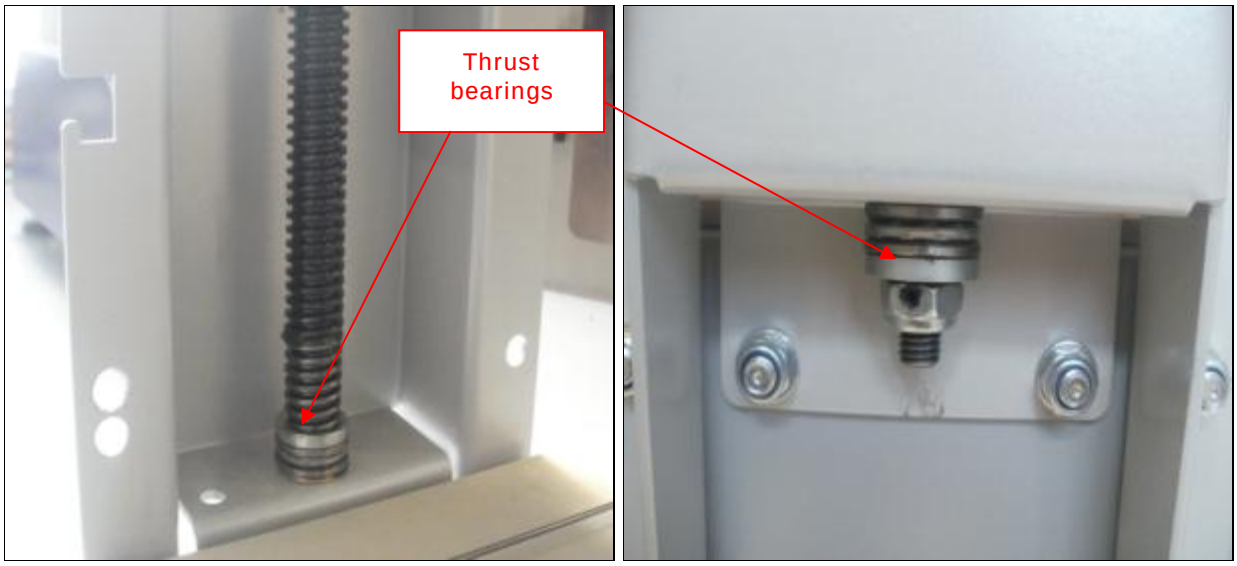


Figure 7 - Figure 8

3.4 Bronze nut

The picture below shows the Bronze nut - the same type is used on both lead screws. **Note:** the grub screws in the bronze nut - these grub screws are factory set and are used to achieve the correct noise level when the clamp system is operating. Lead screws should be greased on a regularly bases. Failure to do so will result is shorter life span (Figure 9).

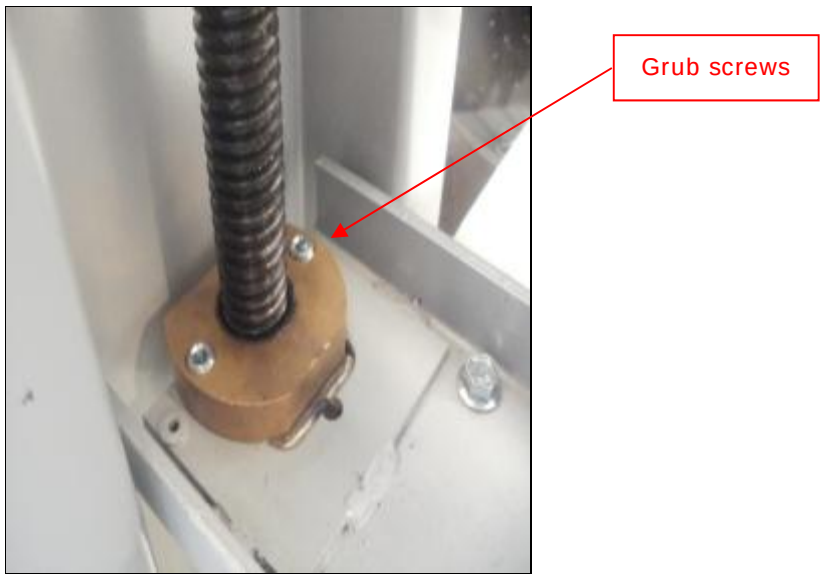


Figure 9

3.5 Platform assembly

There are six wire ribs on the base of the Shaker frame. These wire ribs are used to ease the movement of heavy cans in and out of the shaker frame. No special tools are required for fitting these as they are simply pressed into place. These wire ribs are a consumable item and will need replacing from time to time.

Note: Rubber Pads - these will require replacing depending on the amount of use, the old pads are removed by cutting them off and new pads are glued using high strength adhesive glue. Also, note the position of the can handle holder spring. This device will prevent the can handle from moving while the machine is in shake mode. The can handle holder must be put into its holding position after use (Figure 10 - Figure 11).

Figure 10 - Figure 11

3.6 Flange bearings

- The picture below shows the flange bearings used on the shaker frame. Both right and left flange bearings are the same. Whenever replacing these bearings, always replace both bearings. Always remove and replace one bearing at a time (Figure 12).

Figure 12

- The picture below shows the flange bearing assembled to the Shaker frame.

Note: the position of the bearing regarding the grease nipple – the grease nipple is always pointing upwards when assembled for ease of service (Figure 13).

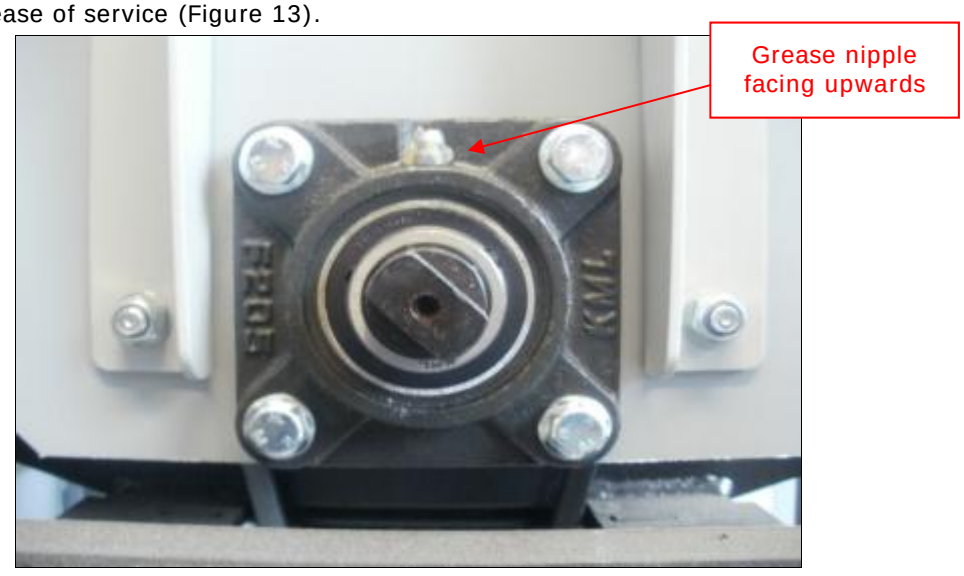


Figure 13

- The picture below shows the grub screws in the flange bearing - these grub screws must always be tightened using “Nut lock” if replacing or opening (Figure 14).

Figure 14

3.7 Top section assembly

The picture below shows the conical stops - these stops are used when the upper clamp plate is moved to the maximum opening position. Once the clamp plate hits these stops, the machine reaches a pre-determined clamp up pressure and stops unclamping automatically (Figure 15).

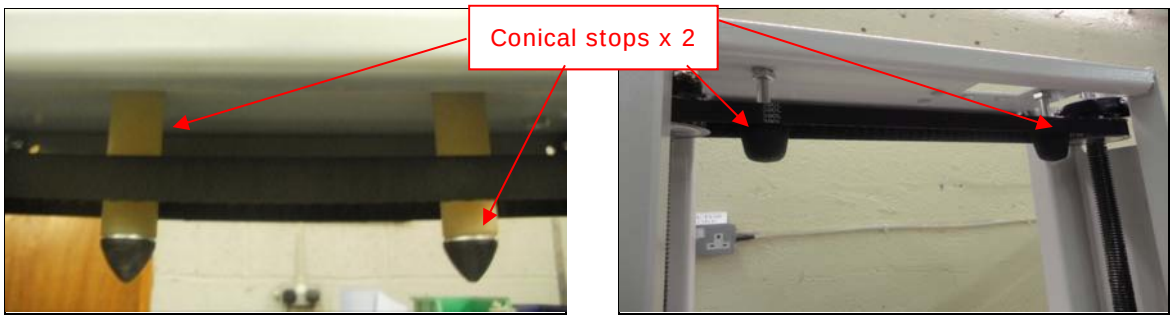


Figure 15

3.8 Timing belt

The timing belt is connected to two timing pulley located on either lead screw. The belt is used to connect one lead screw to another (Figure 16).

Figure 16

3.9 Clamp plate assembly

The clamp plate is standard on all machines. The plate is fitted with a rubber pad. In the event of wear or damage to the rubber pad, it is recommended to remove the entire clamp plate and replace with a new unit (Figure 17).

Figure 17

4 OUTER FRAME ASSEMBLY

4.1 Outer base

The picture below shows the outer base assembly. The base is complete with four shock absorber assemblies, three wheels and four feet. On certain models of SIMPLEshake 90, the clamp transformer is located at the rear of the base assembly (Figure 18).

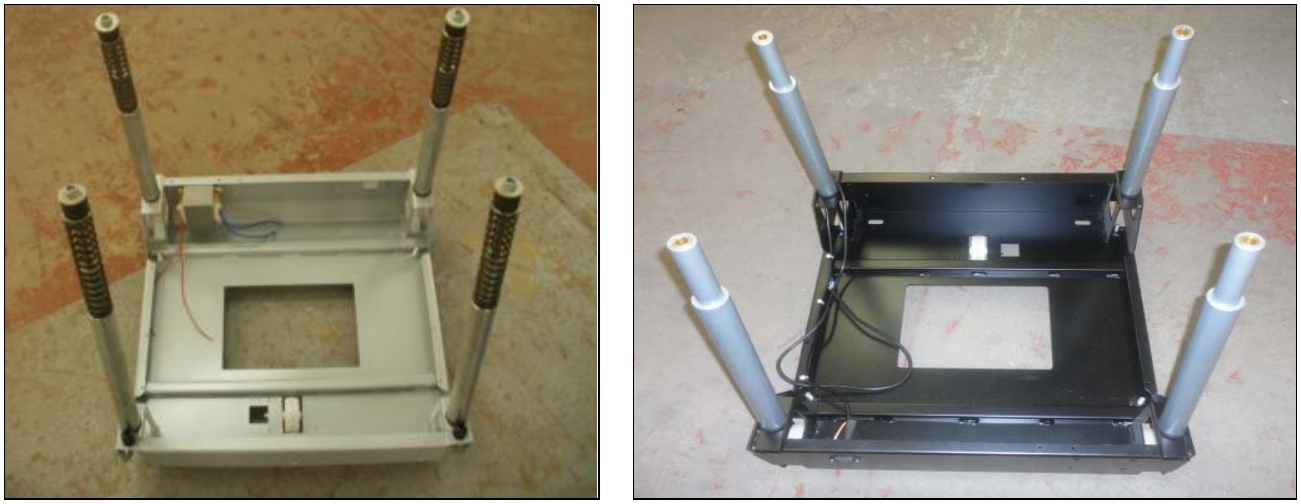


Figure 18

4.2 Clamp transformer

The clamp transformer is located at the rear of the machine or on the underside of the front control panel depending on which model SIMPLEshake 90 you have. The transformer converts 220V AC to 24V AC and sends this power directly back into the clamp driver board via a three pin connection. This device is maintenance free and is protected by a metal casing (Figure 19).

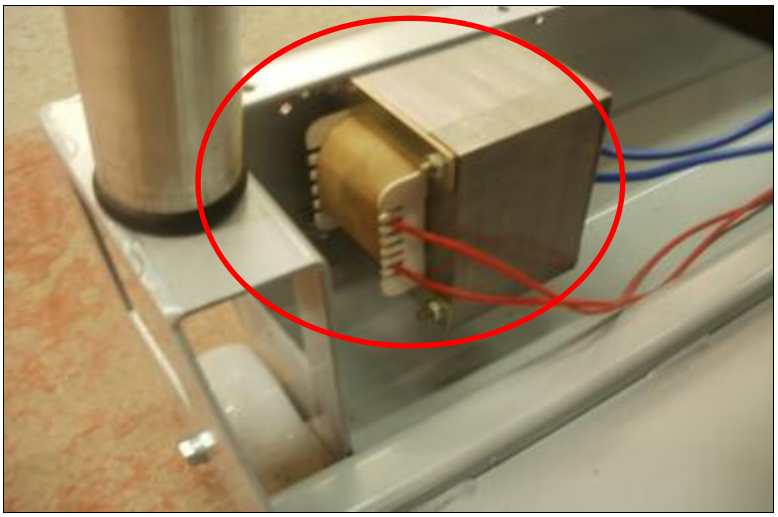


Figure 19

4.3 Feet and wheels

The base is assembled with three wheels and four feet. A single wheel is located at the front with two wheels at the back of the base. There are two feet front and back on the base assembly (Figure 20 - Figure 21).

Figure 20

Figure 21

The picture below shows the adjustable foot pad. To adjust, use a 12mm open spanner to level the machine. Lock the foot pad by screwing the M10 nut up-wards towards the underside of the chassis by using a 17mm open spanner. To achieve the maximum stability, finely adjust the foot pads when the machine is running (Figure 22).

Figure 22

4.4 Suspension assembly

The picture shows a fully assembled suspension unit of which there are four pieces used in each machine. The suspension units should be lubricated on each service visit or twice per year – this will of course depend on the amount of use (Figure 23).

Figure 23

In the picture below, the components that make up the suspension can be seen.

This suspension system can be damaged by failing to fit the packing bolts which prevent the shaker and motor frame from moving during transport. All parts for the suspension base are readily available from the manufacturer (Figure 24).

Figure 24

5 MOTOR FRAME ASSEMBLY

5.1 Motor frame

The picture shows the complete motor frame assembly (Figure 25).

Figure 25

5.2 Drive shaft assembly

The picture shows the drive shaft assembly in position with the main drive motor and the drive belt (Figure 26 - Figure 27).

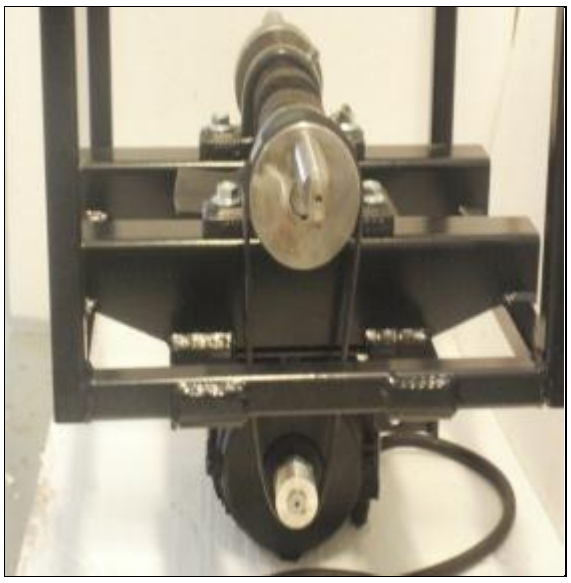


Figure 26

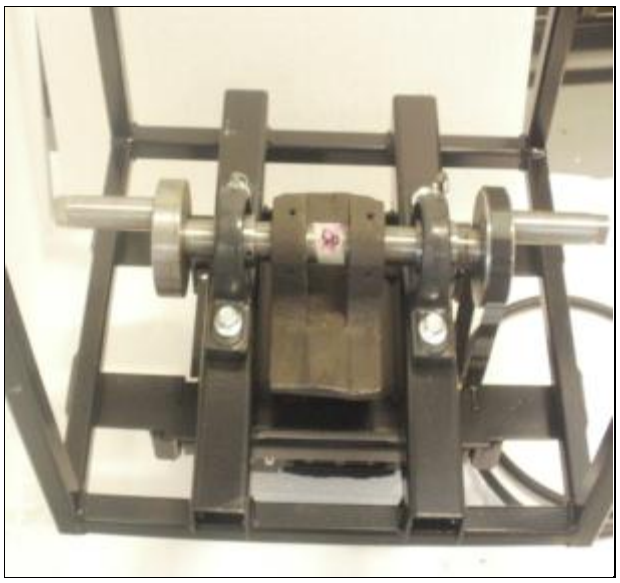


Figure 27

5.3 Shake motor frame

The picture below shows the shake motor mounting plate. Motor mounting plates are available with or without the motor unit. This plate is also part of the drive belt adjustment system (Figure 28).

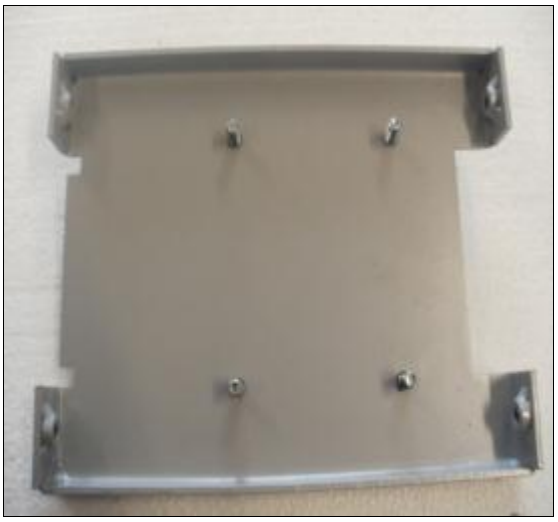


Figure 28

5.4 Shake motor pulley

The picture below shows the pulley type used on the shake motor. The standard pulley used is 40 mm in diameter, however different sizes are available (Figure 29). Technical advice is recommended if increasing or decreasing the pulley size.

Figure 29

5.5 Shake motor

The picture below shows the 1HP 3 phase SIMPLEshake 90 motor. There are different versions available depending on the Power supply and Power frequency required (Figure 30).

Specifications: European:

- 220/240 V A/C 50Hz
- KW 0.75
- Amps 3.31
- RPM 1390
- 10kg

Figure 30

Replacement motors are not supplied with Pulleys unless requested.

When ordering motors, please ensure you identify the correct type of motor. The motor is connected to the motor frame via the motor plate. The motor belt can be tensioned using the slot adjustment (Figure 31).

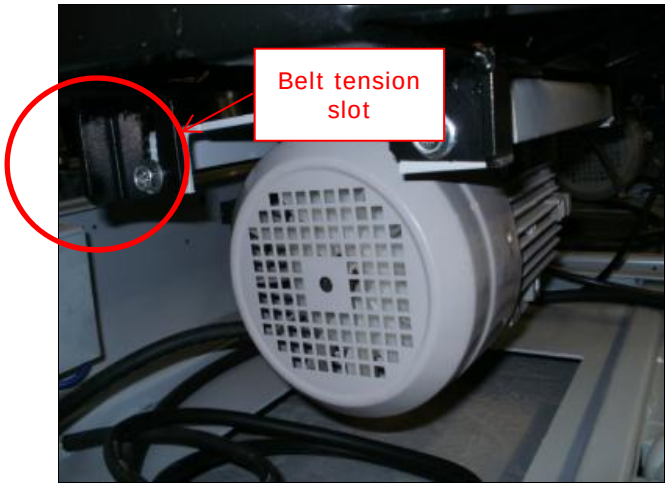


Figure 31

5.6 Crankshaft

This crank shaft is an integral part of the machine. The crank-shaft is mounted by two pillar bearings. These bearings should be greased annually, using standard bearing grease. When carrying out any maintenance or replacing any parts of the crank-shaft , always make sure all grub screws are locked in placed using nut lock (Figure 32).

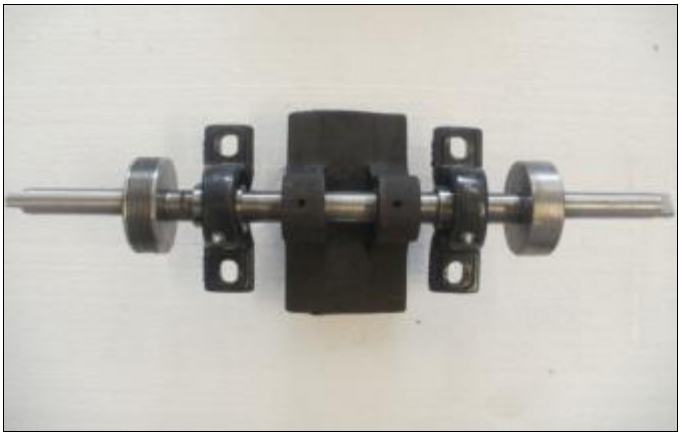


Figure 32

6 ELECTRICAL ASSEMBLY

6.1 Control panel

The front control panel of the machine contains the majority of the electrical components required to operate the machine with the exception of the clamp transformer and clamp motor. The components inside the control panel are as follows (different machine versions are represented in Figure 33 and Figure 34).

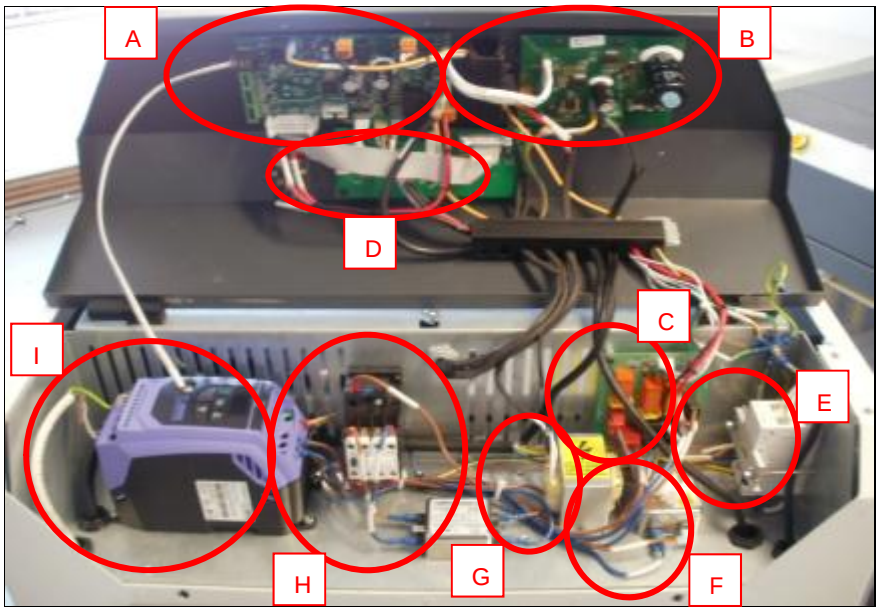


Figure 33

A	Main controller board
B	Clamp driver board
C	Relay board
D	Interface board
E	MCB switch

F	Mains input filter
G	Logic transformer
H	Contactor
I	Inverter

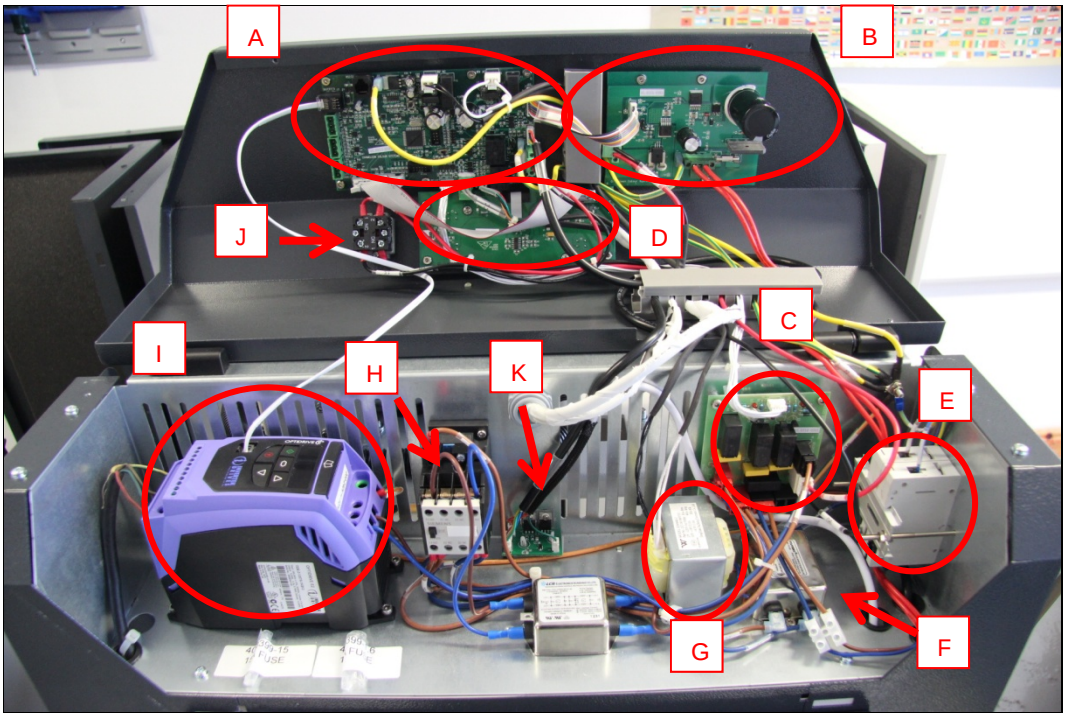


Figure 34

A	Main controller board
B	Clamp driver board
C	Relay board
D	Interface board
E	ON/OFF switch
F	Mains input filter

G	Logic transformer
H	Contactor
I	Inverter
J	Emergency Stop Button
K	Door Lock type B PCB board

All PCB's are static sensitive so it is highly recommended an earth strap is worn at all times when working with any PCB within the control panel

6.2 Main control PCB

This board controls all the other electrical components on the machine and is where all parameter settings are saved. The board is programmable via JTAG device and software upgrades are available.

The board is fitted with two fuses: 1.6 A quick blow fuse at the 8V and 18V connection (ref. area 3 and 4).

All power to this board is low voltage and ranges from 8V up to 18V.

The cables connected to this board are as follows (Figure 35):

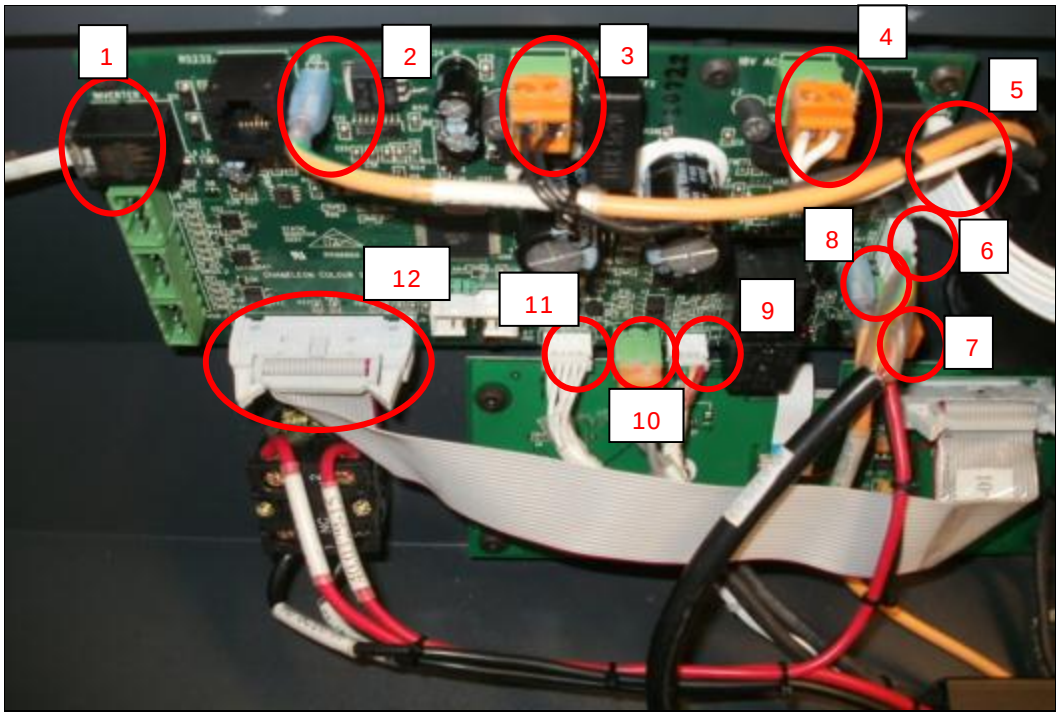


Figure 35

1. Communication cable between controller board and Inverter
2. Earth cable 1
3. 8V AC cable connection from logic transformer
4. 18V AC cable connection from logic transformer
5. Communication cable between controller board and clamp driver board
6. 24V DC cable from Door lock
7. Emergency stop cable
8. Earth cable 2
9. Clamp motor encoder cable
10. Clamp motor brake cable
11. Communication cable between controller board and relay board
12. Communication cable between controller board and interface board

6.3 Clamp drive PCB

This board's sole purpose is to power the clamp motor. The board is powered by 24V AC and there is a 15amp fuse located on this board. The cables connected to this board are as follows (Figure 36):

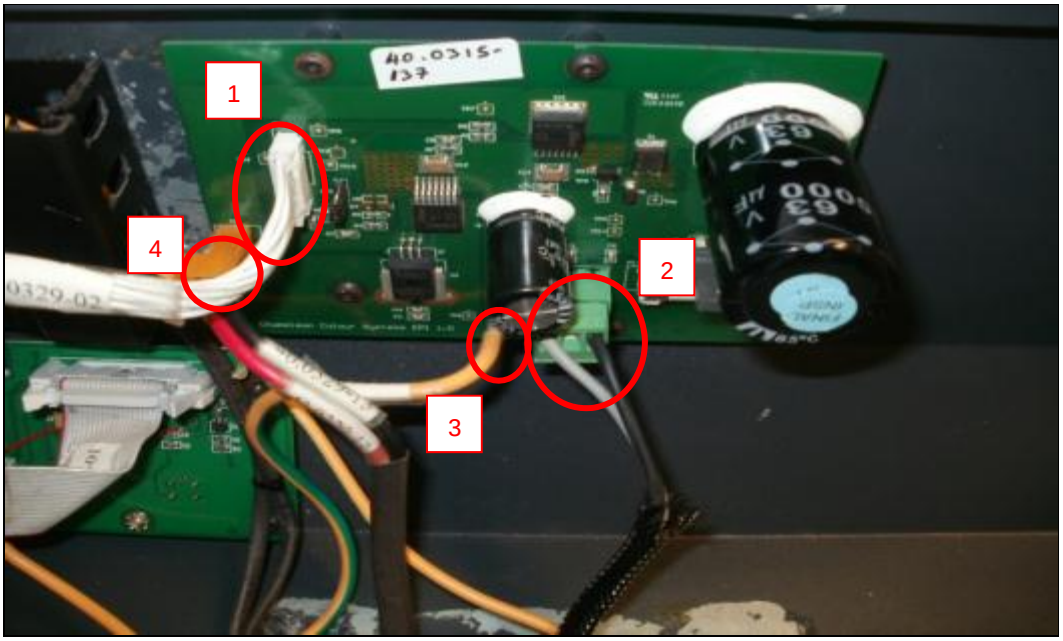


Figure 36

1. Communication cable between controller board and clamp driver board
2. 24V AC power supply cable from Clamp transformer
3. Earth cable 3
4. 24V DC power supply cable to clamp motor

6.4 Relay PCB

This board supplies 220v to all the 220v components in the control panel i.e contactor and emergency stop. The fuse located on this board is rated for 10 amps. The cables connected to this board are as follows (Figure 37):

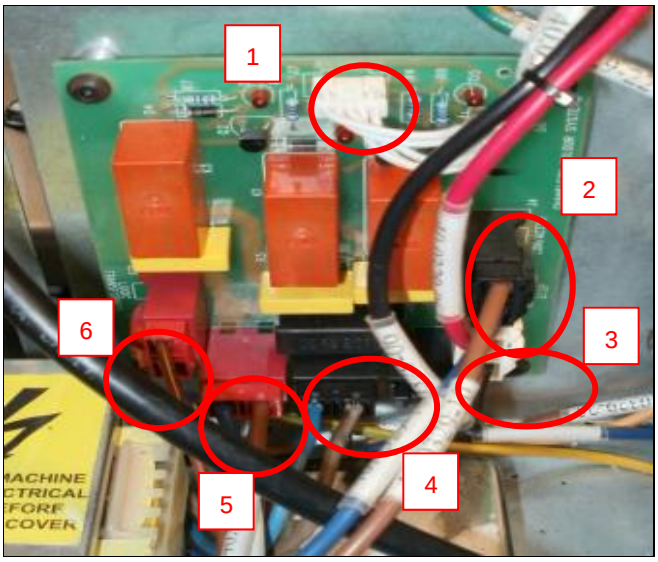


Figure 37

1. Communication cable between controller board and relay board
2. Contractor power supply cable 1
3. Emergency stop power supply cable
4. Clamp transformer power supply cable

5. Contractor power supply cable 2
6. 220v power supply for logic transformer

6.5 Interface board

This board powers the front LCD of the machine and contains the four push buttons on the front of the control panel. The board is connected to the controller board via ribbon cable. There is no fuse on this board (Figure 38).

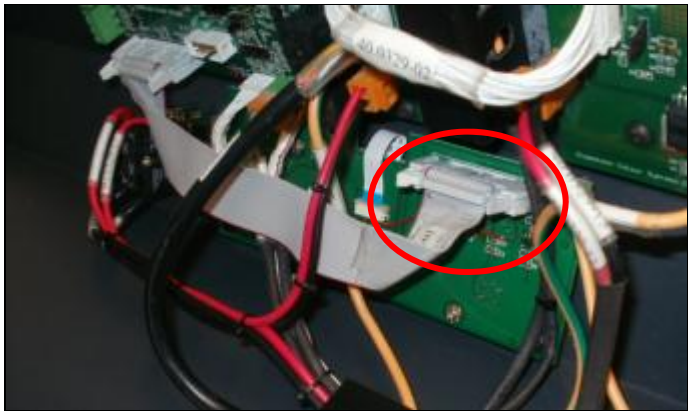


Figure 38

6.6 MCB switch

The switch is located on the right hand side of the machine. The mains power input goes through the switch and then into the mains input filter before supplying 220V AC power to the contactor. The MCB is rated for 16 amps and prevents damage to any electrical component in the event of a power surge. The switch can be used to turn the machine on or off by flicking the switch on the outside (Figure 39).

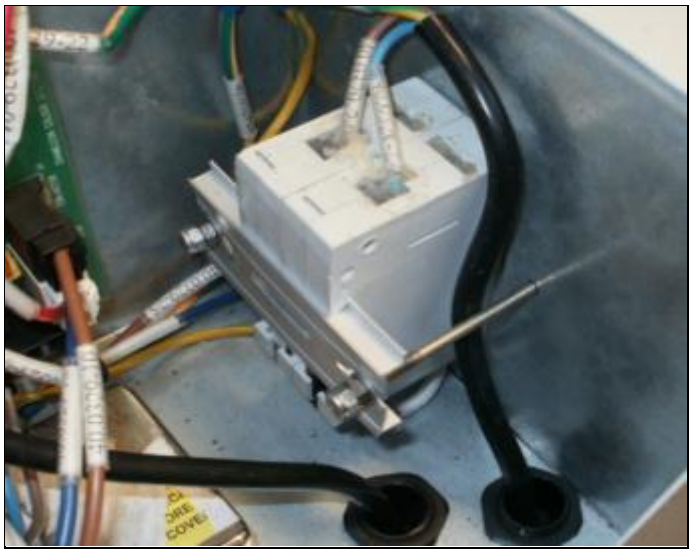


Figure 39

6.7 Mains input filter

The mains input filter ensures the power supply going to all electrical components in the control panel is at a consistent level and also ensures there is a clean supply of power (Figure 40).

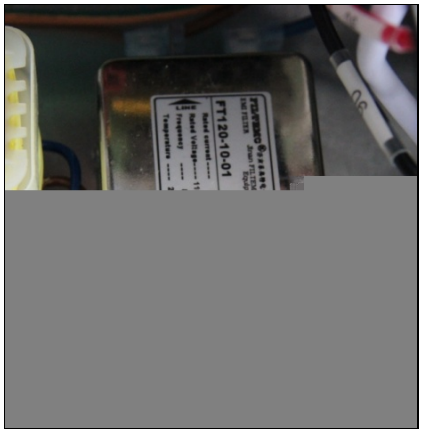


Figure 40

6.8 Logic transformer

The logic transformer powers the controller board. The transformer sends 8v and 18v current to the controller board via two black cables and two white cables. The logic transformer is powered by the relay board (Figure 41).

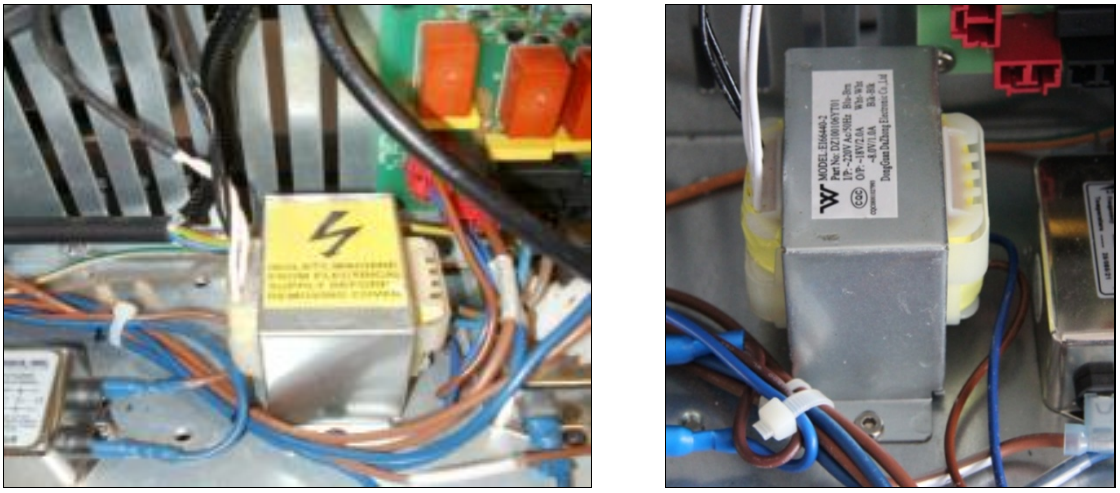


Figure 41

6.9 Contactor

The contactor is used to power the inverter. The power is sent from the relay board to the contactor which in turns powers the inverter. When the contactor is off, the inverter is off (Figure 42).

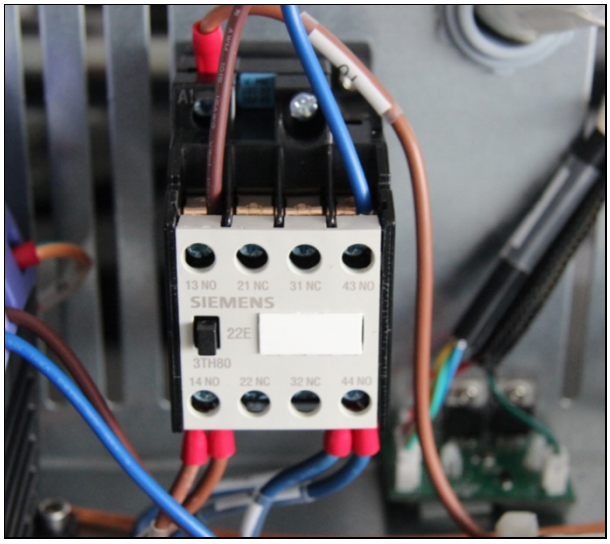


Figure 42

6.10 Inverter

The inverter is controlled by the controller board. The inverter's sole purpose is to control the shaking speed and direction of the shake motor. The inverter is pre-programmed and in the event where an inverter is replaced, a pre-programmed inverter will be sent to the customer for installation (Figure 43).

Figure 43

6.11 Clamp motor assembly

The clamp motor is connected to the control panel via the eight cables from the control panel. The eight cables are routed through the long section of black conduit which in turn is connected to the clamp motor via a nine pin male plug in connector (Figure 44).

Figure 44

6.12 Door lock assembly and latch (type A)

(Figure 45 - Figure 46)

The door lock assembly is mounted to the front of the machine via 4 x M4 countersink screws. This unit is powered by 24V DC. The door latch must be inserted into the door lock before the machine will operate. In the event the door latch being damaged or distorted in any way, repair or place as required.

Figure 45

Figure 46

The door locks consists of two internal sensors. The top sensor is for the door latch while the bottom sensor is for the internal solenoid engagement. Both sensors must be activated before the machine will shake or clamp. If the sensors are damaged in any way, solenoid is unable to engage or the door is not properly closed, an error E8 or E5 may occur (Figure 47).

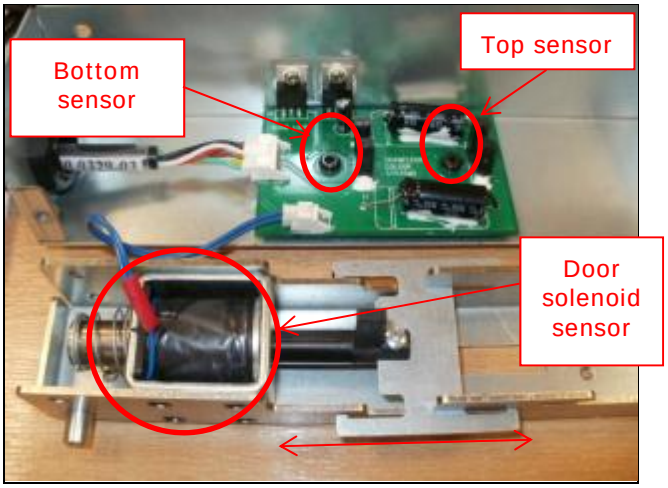


Figure 47

6.13 Door Lock Assembly and latch (type B)

(Figure 48 - Figure 49)

The door lock assembly is mounted to the front of the machine via 4 x M4 countersink screws. This unit is powered by 24VDC. The two door latches must be inserted into the door lock before the machine will operate. In the event the door latch being damaged or distorted in any way, repair or place as required.

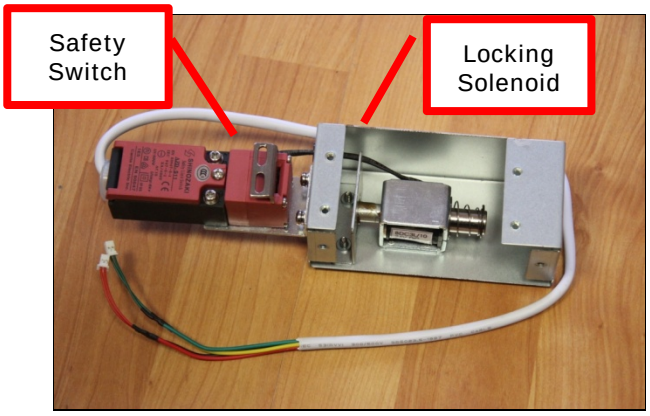


Figure 48

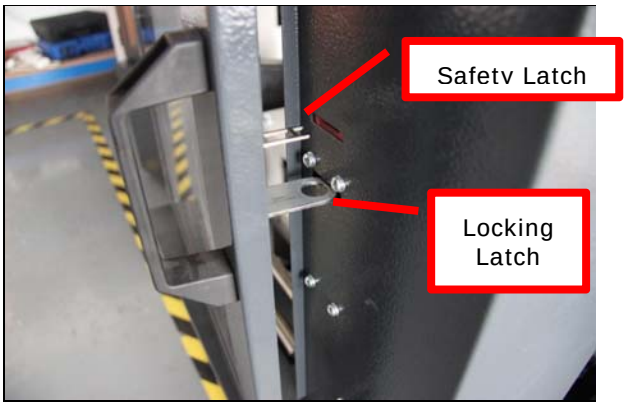


Figure 49

The main door lock PCB board is located inside the main control panel. There are three wire connection on this board (Figure 50):

- J1 is for the main controller board communication
- J2 is for the safety switch. If this is connected “DOOR OPEN” will appear on display.
- J3 for the activation of the locking solenoid. If this is disconnected, door lock solenoid is disabled.

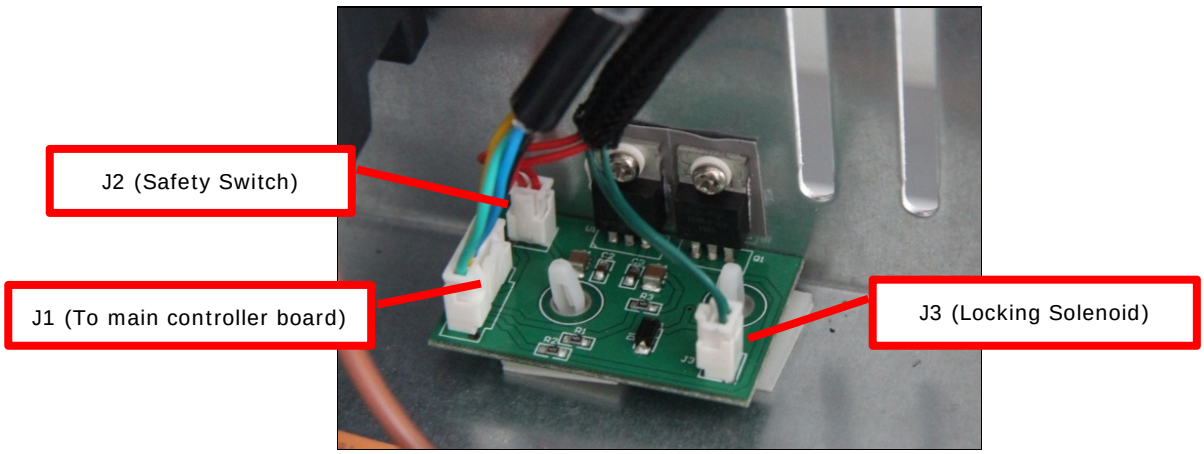


Figure 50

7 SERVICE PROCEDURES

7.1 Service 1: Replacing worn or damaged drive shaft belt

1. With all access panels removed, as can been seen in the picture, loosen (only) all four retain bolts on the main drive mounting plate. This is located directly under the crank shaft. This procedure will allow the motor mounting plate to move upwards and downwards to accommodate the belt replacement and tensioning of the belt (Figure 51).

Figure 51

2. Using a 3mm allen key, loosen the 2 grub screws on the flange bearing only on the right side of the machine where the belt is fitted (Figure 52).

Figure 52

3. As in the picture below, use a power bar or a similar device, place into the crankshaft as seen in the picture, to prevent it from moving (Figure 53).

Figure 53

4. Now with the crank shaft prevented from turning, using the crank pin removing tool and a power bar as seen in the picture. Turn the crank pin anti-clockwise until it comes loose. Do not remove at this stage (Figure 54).

Figure 54

5. Remove all four retain bolts and 2 spacers from the flange bearing as seen in the picture below (Figure 55).

Figure 55

6. Using the crank pin tool, remove the crank pin complete with the flange bearing from the crank shaft (Figure 56).

Figure 56

7. Separate both components using a mallet (Figure 57).

Figure 57

8. The belt can now be removed by sliding the belt between the crankshaft pulley and the shaker frame as seen in the picture below. Reverse this procedure when refitting the belt (Figure 58).

Figure 58

9. Fit the new belt onto the crankshaft pulley and then to the drive shaft pulley on the motor (Figure 59).

Figure 59

10. The next procedure is to place some nut lock onto the crank shaft. This is a vital procedure to prevent the crank shaft coming loose (Figure 60).

Figure 60

11. Screw the crank shaft pin into the crank shaft by hand until it is fully locked up (Figure 61).

Figure 61

12. Ensuring the crank shaft is still locked, use the crank shaft pin tool to full tighten the crank pin (Figure 62).

Figure 62

13. Replace the flange bearing ensuring the grease nipple is in the upward position, spacer in place and tighten all four retain bolts. Finally tighten the two grub screws using nut lock and a 3mm allen key (Figure 63).

Figure 63

14. Tension the drive belt by pushing down on the motor mounting plate and secure all four retaining bolts using a 13mm drive socket (Figure 64).

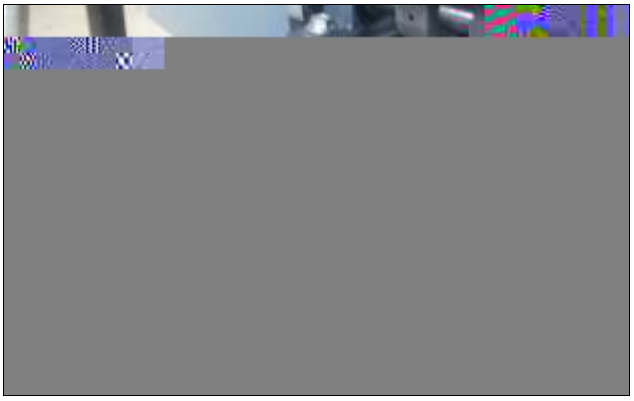


Figure 64

7.2 Service 2: Replacing the lead screw drive belt

1. It is best practice to ensure the clamp plate is in a low position in the shaker frame to allow movement of the lead screws for the removal and placement (Figure 65).

Figure 65

2. With the clamp plate in the low position the clamp drive gear is removed as in the picture. A 13mm and a 10mm spanner together with a 13 socket are the tools required to remove the drive unit (Figure 66).

Figure 66

3. With the fixing bolts removed simply slide the motor gear up wards and place it in the position as seen in the picture below, do not disconnect the electrical connection (Figure 67 - Figure 68).

Figure 67

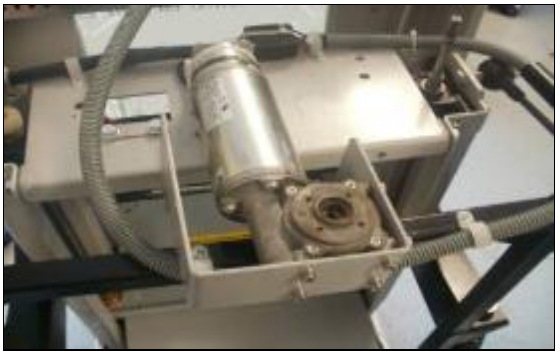


Figure 68

4. When the motor is removed ensure the 3mm key on the lead screw is not misplaced. To ensure the key is not misplaced, wrap it in tape or use a cable tie to temporarily secure (Figure 69).

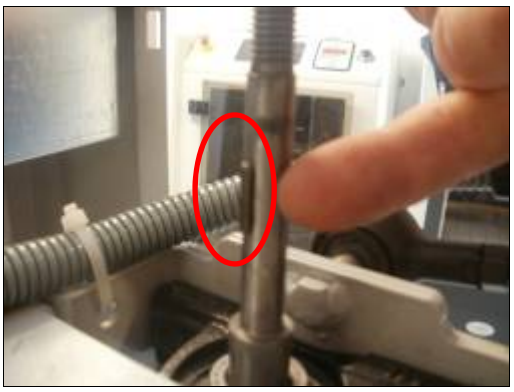


Figure 69

5. The next step, remove the M8 bolts retaining the pillar bearing on each lead screw (Figure 70).

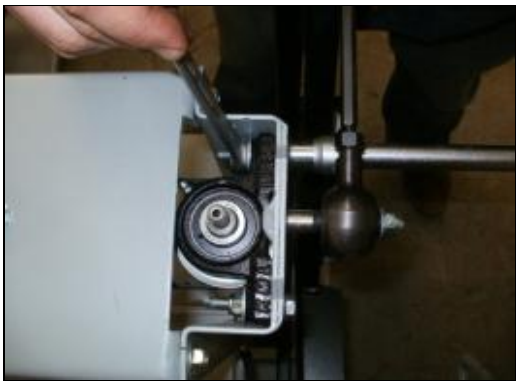


Figure 70

6. As is the picture below, the left and right lead screw are now loose and can be moved inwards to allow the belt removal (Figure 71).

Figure 71

7. As per picture, it is best to remove the belt first from the drive lead screw (Figure 72).

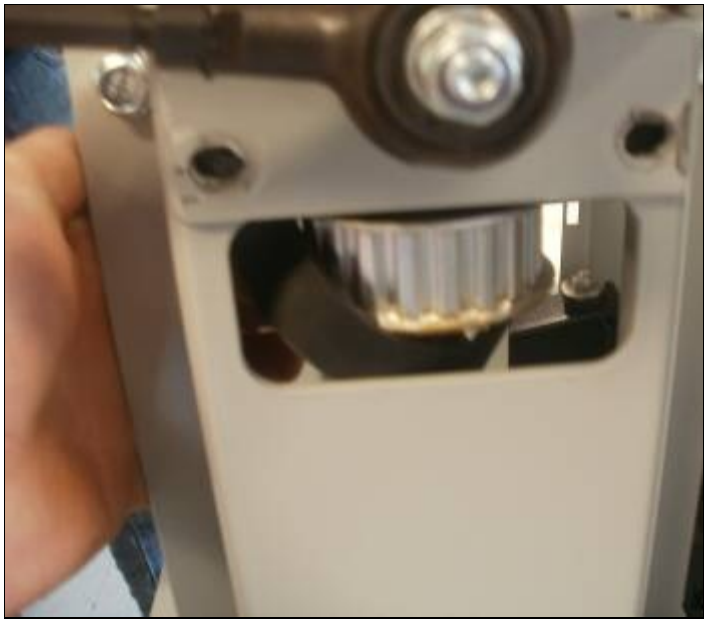


Figure 72

8. With the drive belt is loose on the drive side, it can then be maneuvered around the right lead-screw bearing and which now makes the belt free of the right lead-screw. The belt is now removed around the left lead-screw bearing and away from the machine (Figure 73).

Figure 73

9. Fitting a replacement belt simply requires a reversal of the previous procedure (Figure 74).

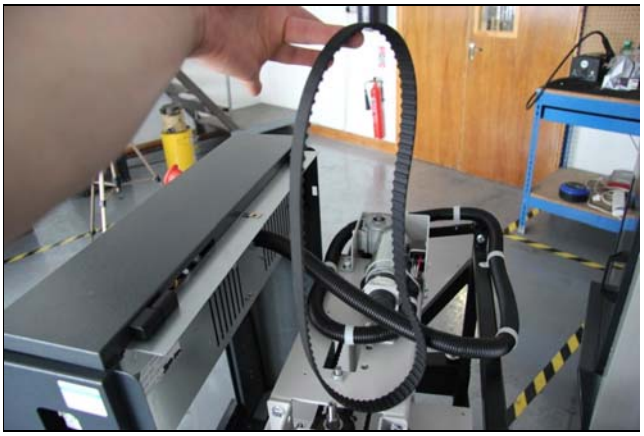


Figure 74

10. Once the belt is the position as in the picture below the clamp plate must even on both sides (Figure 75).

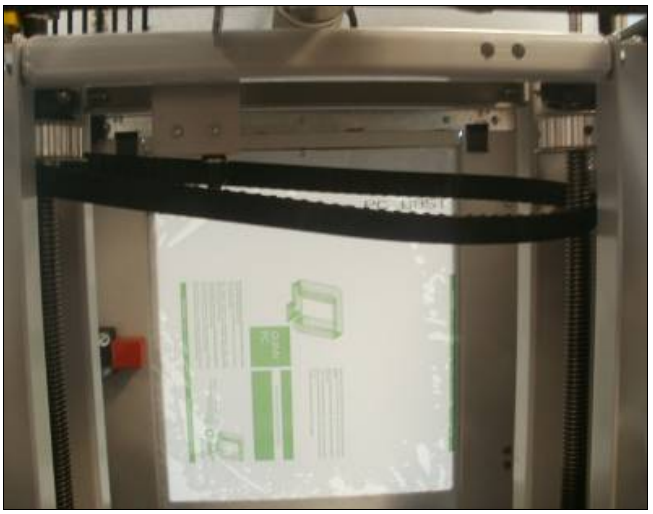


Figure 75

11. This procedure simply requires the use of a steel ruler as in Figure 76. Measuring at the front of the machine, measure the height of the top clamp plate from the base plate on the left side at 150mm before simply turning the right lead-screw until you can measure the distance between the top clamp and the base plate at 150mm also. When the clamp plate is set correctly, replace the lead-screw belt ensuring you do not change the settings.

    With the belt in place replace all bolts in the bearings and then refit the clamp motor - be sure the key is in place in the lead-screw. Retro fit of belt now complete.

Figure 76

7.3 Service 3: Removal and Replacement of shock absorber assembly

1. After the removal of the access panels, insert timber supports between the motor frame and the base as seen in Figure 77.

Figure 77

2. Hold the suspension rod with a pliers and using a 17mm spanner, remove the M10 nut on top of the suspension. (Figure 78).

Figure 78

3. With a 17mm spanner, remove the bottom bolt of the suspension (Figure 79).

Figure 79

4. Remove the old suspension unit by sliding out the lower end of the suspension (Figure 80).

Figure 80

5. Assembly the components of the new shaft assembly (Figure 81).

Figure 81

6. When installing the new suspension, ensure the male rubber buffer is installed on top of the flange on the base (Figure 82).

Figure 82

7. When placing the new suspension unit in, ensure that the male buffer is underneath the flange of the motor frame (Figure 83).

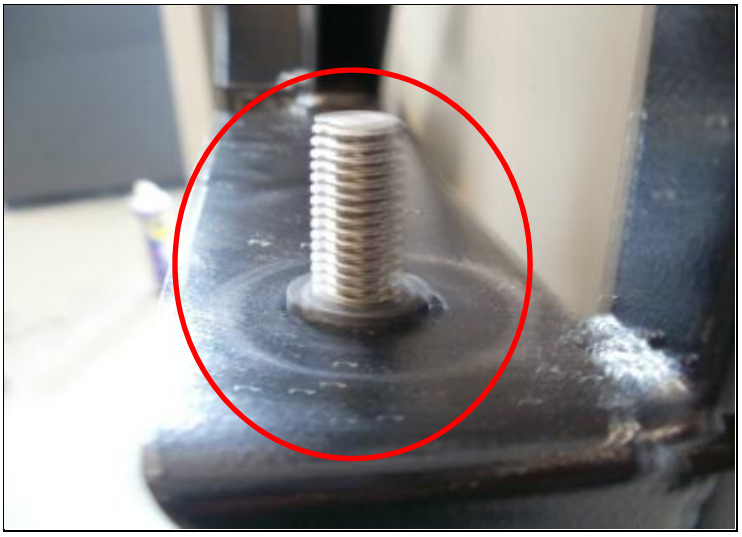


Figure 83

8. Assemble the lower suspension with a M10 bolt, spring washer, suspension washer and female rubber buffer (Figure 84).

Figure 84

9. When tightening the M10 nut on the upper suspension part, with the use of a verniercallipers, tighten the nut till you get a reading of **30mm** between the outside of the suspension washers (Figure 85).

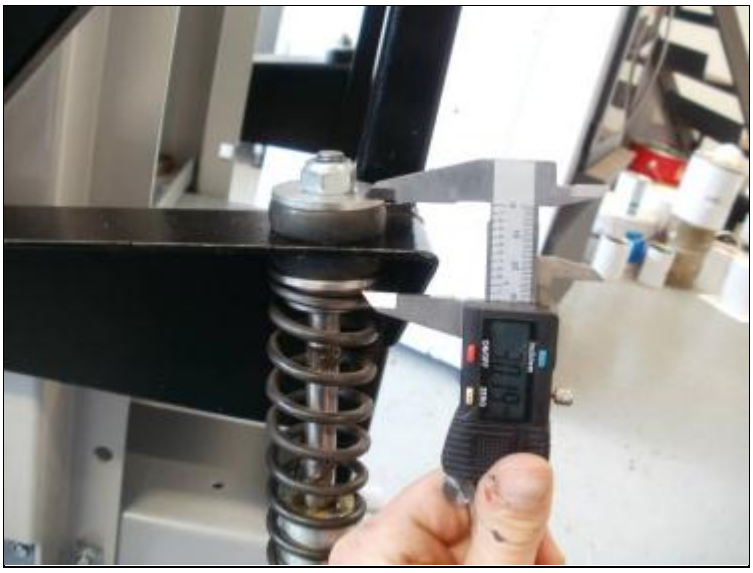


Figure 85

10. When tightening the M10 bolt at the lower suspension, tighten till you get a measurement of **20mm** between the top of the base flange and outside of the suspension washer as shown in the picture below (Figure 86).

Figure 86

11. Assembly is now complete. Remove the timber supports from underneath the motor frame (Figure 87).

Figure 87

7.4 Service 4: Replacing the door lock type A

1. Remove the power from the machine
2. Open the front control panel and remove the door lock connection from the controller board (Figure 88).

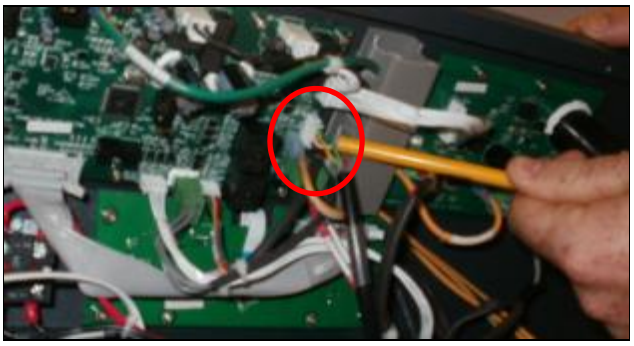


Figure 88

3. Pull the door lock cable through the gland opening in order to release the cable (Figure 89).

Figure 89

4. The door lock can now be removed by using a pozi head screwdriver to open the four M4 counter sink screws holding the door lock in place (Figure 90).

Figure 90

5. Once the screws have been removed, replace the old door lock with the new door lock unit and connect to machine by using the previous steps in reverse.

7.5 Service 4: Replacing the door lock type B

(Figure 91 - Figure 92)

1. Remove the power from the machine
2. Remove the transformer and door lock cover by two M4 screws and two M4 Nyloc nuts.

Figure 91

Figure 92

3. Disconnect the wires going into the door lock PCB board at J2 and J3 (Figure 93).

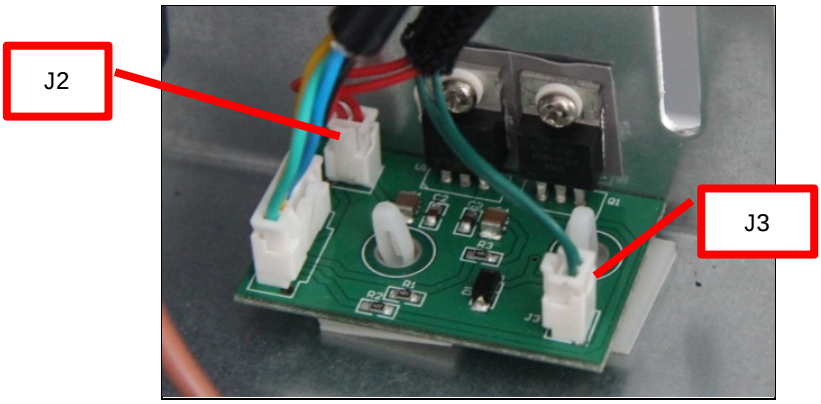


Figure 93

4. Cut any cable ties that are holding the loom to the panel.
5. Remove the four retain screws at the front of the panel (Figure 94 - Figure 95)

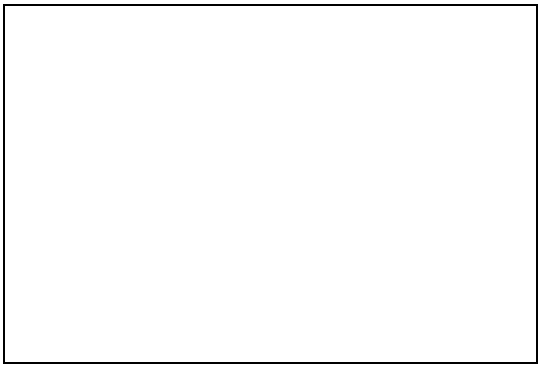


Figure 94

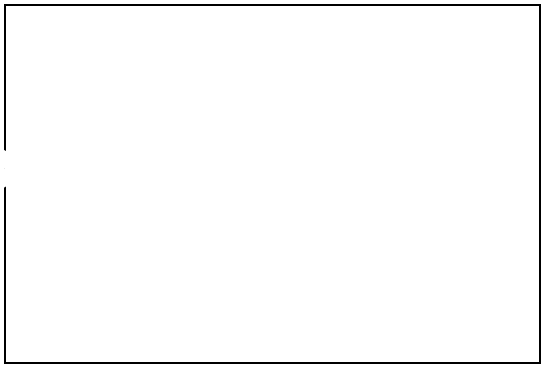


Figure 95

6. Once the screws have been removed, replace the old door lock with the new door lock unit and connect to machine by using the previous steps in reverse.

7.6 Service 5: Changing side channel assembly

1. Turn of power and remove plug from mains before carrying out any work on shaker.
2. Remove the top, side and back panels of shaker (Figure 96).

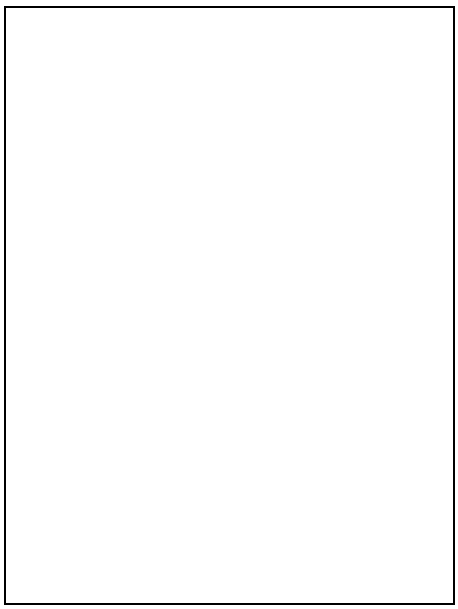


Figure 96

3. Remove the four P-clips and cut the cable ties that are holding the wire loom from the control panel to the clamp motor (Figure 97).

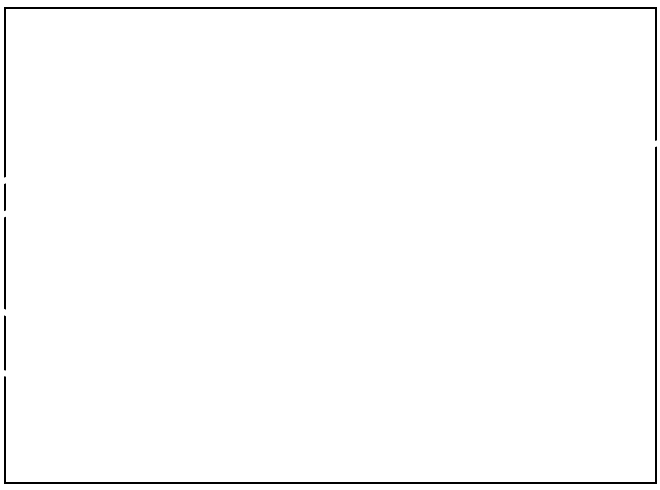


Figure 97

4. Disconnect the 9-pin connector from the wire loom to the clamp motor (Figure 98).

Figure 114

22. Put the pulley belt onto the pulley. Be careful not to rotate the pulley when getting the belt back on (Figure 115).

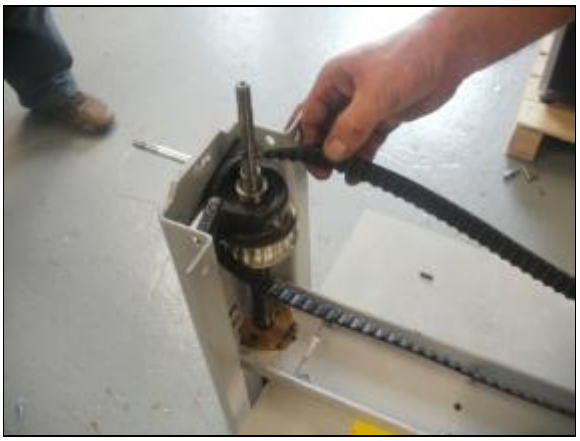


Figure 115

Recheck the clamp plate is still parallel with the platform.

23. Get the 2 M8 x 40mm bolts, 2 M8 Nyloc nuts and 4 M8 washers and bolt the bearing to the side channel. Before fully tighten the bolts, check the bearing is parallel with the top to the side channel. Torque bolts to 25kNm (Figure 116 - Figure 117).

Figure 116

Figure 117

24. Tighten the 2 M6 x 8mm grub screws in the bronze nut. **Only tighten lightly.** Do a quick check of the rotation of the lead screws by pulling on the pulley belt. If it rotates with little effort, then its ok to proceed (Figure 118).

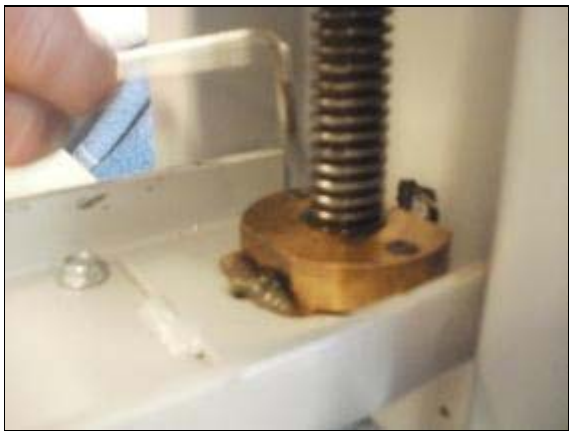


Figure 118

25. Place the shake frame back onto the crank shaft in the motor frame. When placing the frame on, check that flange bearings grease nipples are facing towards the roof (Figure 119 - Figure 120).

Figure 119

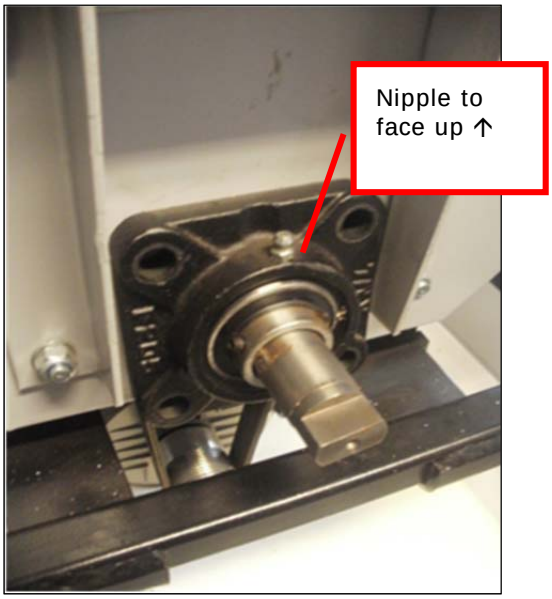


Figure 120

26. Put on the stabilizer arms between the motor frame and the shake frame. Place the bolts, washers, stabilizer bush and nuts on, but do not tighten the bolts yet (Figure 121).

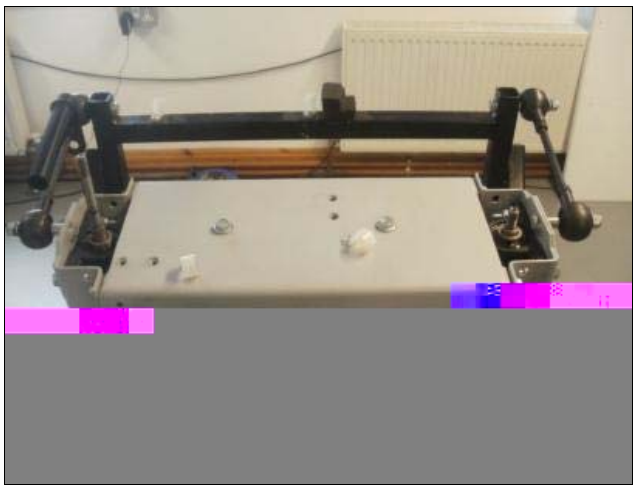


Figure 121

27. Bolt the flange bearings onto the shake frame with 4 M8 x 25 bolts. Make sure there are two bushing per bearing placed onto the bolts before assembly. Torque setting 25kNm (Figure 122).

Figure 122

28. With a ruler and rubber mallet, position the frame so that in is at the very center of the motor frame (Figure 123).

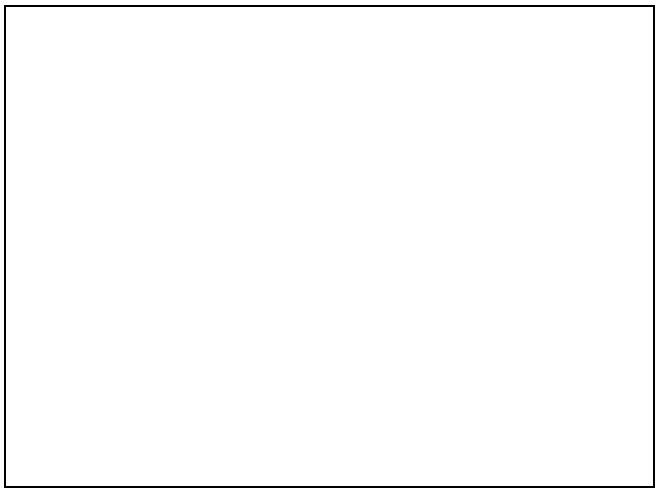


Figure 123

29. Place thread locker onto the four grub screws on the flange bearing and tighten the grub screws (Figure 124).

Figure 124

30. Place some thread locker onto the threads on the bolts for the stabilizer arms and tighten the nuts. Torque setting 12kNm (Figure 125 - Figure 126).

Figure 125

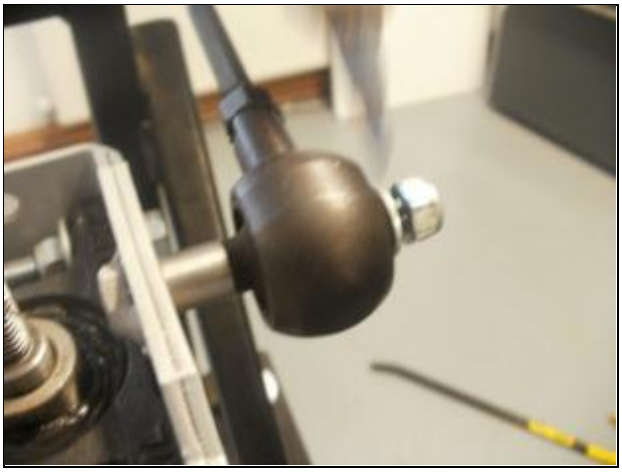


Figure 126

31. Before assembly of clamp motor, place a 5mm x 5mm x 15mm key way onto the lead screw (Figure 127).

Figure 127

32. Rotate the pulley belt till the key way on the lead screw is aligned with the keyway on the clamp motor (Figure 128 - Figure 129).

Figure 128

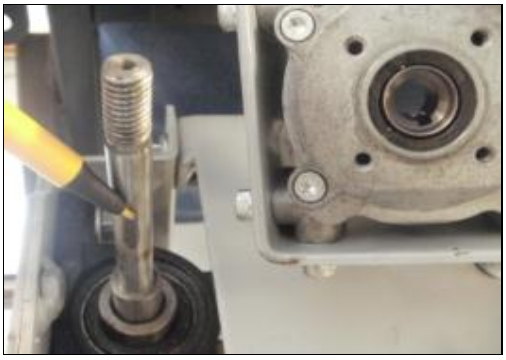


Figure 129

33. Place the clamp motor onto the lead screw and shaker frame.
34. Bolt on 2 M6 bolts and 4 M8 bolts onto the clamp motor and tighten (Figure 130).

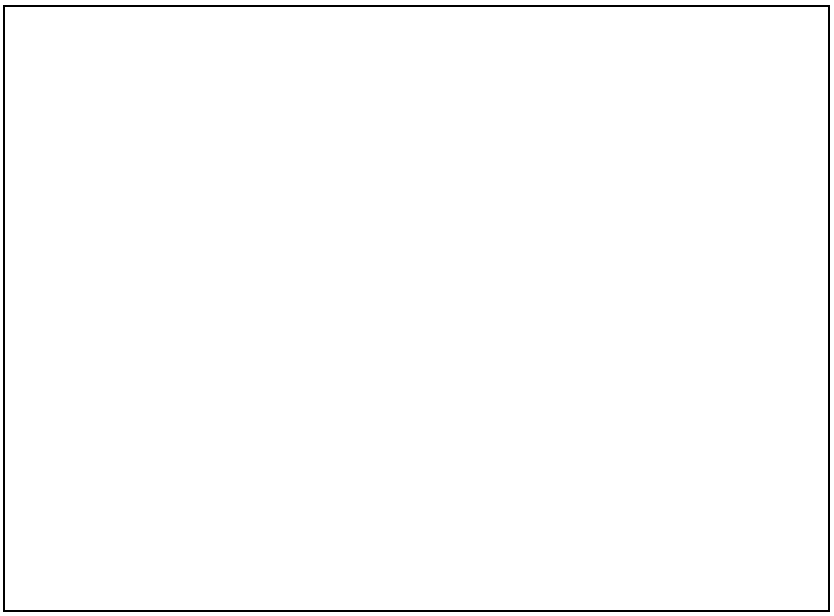


Figure 130

35. Join together the 9 way connector on the clamp motor to the 9 way connector on the wire loom (Figure 131).

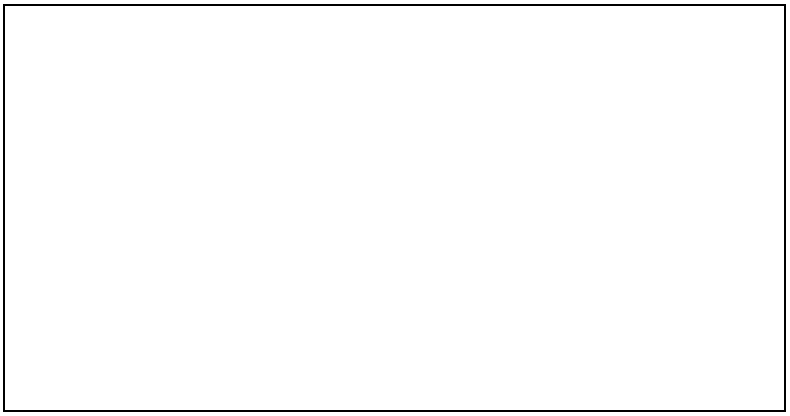


Figure 131

36. With cable ties, wrap one cable tie around the 9 pin connector and one to hold the connector block to the clamp motor frame (Figure 132 - Figure 133).

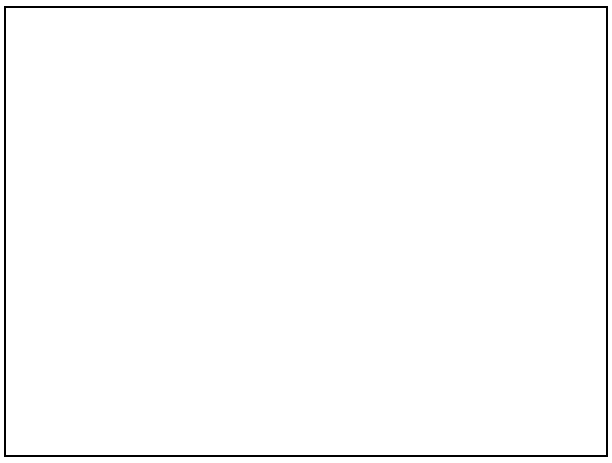


Figure 132

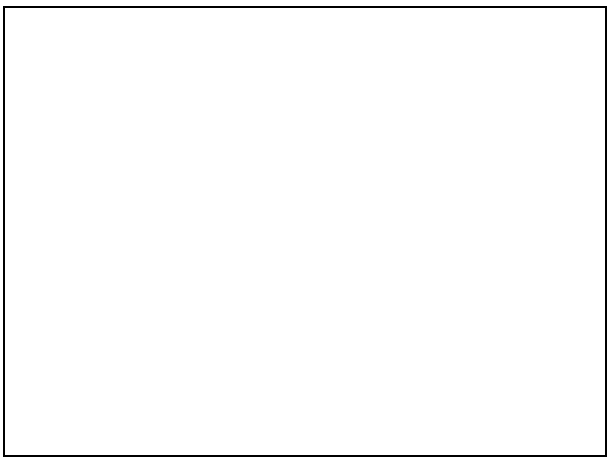


Figure 133

37. Secure the wire loom with the 4 M16 P-clips and 4 self-tapers (Figure 134).

8 TROUBLESHOOTING GUIDE

8.1 Machine is unstable and noisy

- Ensure the machine is correctly unpacked and make sure all packing devices are removed.
- Ensure all feet are level on the ground and screw down properly.
- Ensure there is no foreign objects under the shaker frame.
- Check the condition of the four shock absorbers.
- Check that there are no loose bolts, fixings in the machine.
- Check motor is secure and belt is tensioned.
- Check that the flange bearings are in good condition.
- Check the condition of the can handle holder.
- Check the wire ribs and rubber pad are loose (if applicable).
- Check the condition crank shaft bearings.
- Ensure that all panels are tight and secure.

8.2 Can comes loose during shake cycle

- Check the clamping pressure.
- Worn or damaged lead screw drive belt.
- Ensure the keyway in the left hand lead screw is not worn or damaged as this connects the lead screw to clamp drive motor gear.
- Clamp pressure set too low.
- Clamp pressure set too high. – Plastic cans when clamped under high pressure can collapse and come loose during shake cycle.
- Worn rubber pads on clamp top or bottom clamp plates (if applicable).
- Wire ribs missing or damaged on clamp base plate (if applicable).
- Machine not positioned on level shop floor surface.

8.3 Crushing cans

- Clamp pressure set too high.

8.4 Machine will not clamp

- Clamp motor drive gear failure. May be disconnected from the power supply. Check all power supply cables to the motor. Check the fuse on the clamp driver board.
- PCB connections.
- Check the door locking device. Check for power supply to the door locking device.

8.5 Machine will not unclamp

- Clamp motor power supply failure. Check wire connections.
- Failure of components on the PCB board.
- Check the lead screw drive belt and the lead screw pulleys.

8.6 Machine has clamped but will not shake

- Shake motor power supply failure. Check connections.
- Shake motor key missing from the pulley. Motor may turn but not drive crank shaft.
- Crank shaft drive belt broken.

- Failure of components on the PCB board or bad connections.
- Inverter failure.

8.7 Poor mixing action

- Shake speeds incorrectly set on machine.
- Drive belt on crank shaft loose.
- Shake motor key missing from the pulley. Motor may turn but not drive crankshaft. Check belt tension.
- Incorrect pulley size on the motor resulting in slower shake speed.
- Poor power supply in relation to can weight.

8.8 Machine shaking but not clamping

- Clamp motor power supply failure. Check wire connections.
- Clamp driver board failure.

8.9 Main fuse breaker shuts down during shake mode

- Surging. Insufficient mains power supply. For example, if the voltage drops below 180V on a 220/240V machine.
- Faulty inverter.
- Faulty shake motor.

8.10 Door won't open (door lock type A)

- Check to see if the solenoid in the door lock has been damaged.
- Grounding issue on doorlock PCB board, loosen the screw on the rectifier (Q1).

9 ERROR CODES

LCD ERROR DISPLAY	CAUSE	SOLUTION
E00	No error.	No error. No action required.
E02	Shake system fail.	1. Normally associated with the communication cable between the inverter and controller board being faulty or not connected. Check cable and replace if required. 2. If there is no fault found on the inverter cable, check contactor to see if operating when door is open or closed. 3. If contactor is operating, check inverter to see if receiving power. If contactor is not operating, check relay board or replace contactor unit.
E03	Clamp System fail.	1. Normally associated with 15 amp fuse failure on the clamp driver board. If fuse is found faulty, replace with spare fuse supplied with machine. 2. Check all cable connections on clamp driver board, particularly the 24 DC connection (red and black cable) supplying the clamp motor. Secure cable if found to be loose or disconnected. 3. If fuse on clamp board is deemed ok, check cable between controller and clamp driver board. If found faulty, replace cable. 4. If all of the above are ok, clamp driver board is faulty and must be replaced. 5. If all of the above are ok, relay board is faulty and must be replaced.
E05	Door Solenoid Fail.	1. Normally associated if the bottom sensor of the door lock PCB is not activated or broken. 2. Remove door lock from machine, open lock assembly and check for movement of solenoid when start button is pressed. 3. If solenoid does not activate or if the sensor on the doorlock pcb is broken, replace doorlock assembly.
E08	Door Lock fail.	1. Normally associated with the top sensor of the door lock PCB. 2. Open door lock assembly and check top (door latch) sensor on door lock PCB. 3. If sensor is broken, replace door lock assembly. If sensor is ok, check function of door solenoid. If solenoid is not operating when start button is pressed, replace door lock assembly.
E14	Clamp motor not operating	1. Check position of clamp plate – if in the top (zero) position, use force clamp feature to move clamp plate downwards. 2. If clamp late is already free, check power voltage going to machine. If voltage is above 250 volts, clamping system will not operate and a voltage regulator is required to operate the machine. 3. If power supply is deemed satisfactory, check all cabling supplying the clamp motor. Use a multi meter to check continuity of these cables. 4. Check earth supply to machine – machine must have dedicated power supply with a good earth connection. Use of extension cables to power the machine is strictly prohibited. 5. If all of the above is ok, controller board is faulty and must be replaced. 6. If all of the above is ok ,clamp driver board faulty and must be replaced.

E22	Shake Motor / Inverter Fail	1. This error is normally associated with failure on the shake motor or inverter. 2. To confirm which component is faulty, disconnect the four shake motor cable from the left hand side of the inverter. 3. Operate the machine as normal. 4. If the machine clamps, counts the time and unclamps afterwards without fault, then the shake motor is faulty. If the error appears during operating with the shake motor disconnected from the inverter, then the inverter is faulty. 5. Repair/replace faulty component as required.

FOR ALL OTHER ERRORS, PLEASE CONTACT COROB S.P.A. ITALY, SERVICE DEPARTMENT

Other faults / Description	Possible Cause
Emergency switch activated on display screen	1. Faulty estop switch 2. Cable disconnected / faulty to estop switch
No action from any control buttons	1. User interface board faulty 2. Ribbon cable faulty
During start up, clamp motor operates in opposite direction as normal	Controller board faulty
Door open	1. Door lock cable disconnected or faulty to controller board 2. Fuse at 18V connection on controller board is missing or blown 3. 18V cable on controller board disconnected or faulty
No display - no action	1. 8V cable on controller board disconnected or faulty 2. Mains cable disconnected/faulty 3. Cable on relay board disconnected/faulty (ref J2)
Clamp opening - Wait (no action)	Clamp motor cable disconnected from clamp driver board
No display - machine operates as normal	Ribbon cable between controller board and LCD board disconnected or faulty
Emergency (E-stop not pressed)	E-stop cable disconnected or faulty to controller board
Machine does not work (includes no display) after powered up	1. J1 cable disconnected from Logic board 2. J2 cable disconnected from Logic board 3. Cable disconnected from filter 4. Fuse missing or blown on controller board at 8v connection
Machine operates as normal except shaking	Motor cable disconnected from the inverter
Relay board flashing on and off	J22 connection on controller board faulty
Machine clamping, not shaking and unclamping after 3-5 seconds - no shake action	1. Inverter faulty 2. Missing link cable on inverter between 1 & 2
Machine goes into shake mode without clamping	1. Clamp pressure setting is set too low 2. Brake cable faulty/disconnected 3. Faulty communication cable between controller and clamp driver board 4. Jumper connector on clamp driver board is in wrong location

10 PARAMETER MODE

10.1 Opening the control panel

In order to access the parameter adjustment mode you must gain access to the control panel.

- Using a Philips head screwdriver loosen the six self-tappers located on the top panel (Figure 135 - Figure 136).

Figure 135

Figure 136

- Slide back the panel 20mm approximately.

ATTENTION:

Before carrying out any maintenance, make sure that the machine has been disconnected from the mains power supply.

- Remove the two M4 Cap screws located inside the panel above the door on the left and the right using a 3mm Allen key (Figure 137).

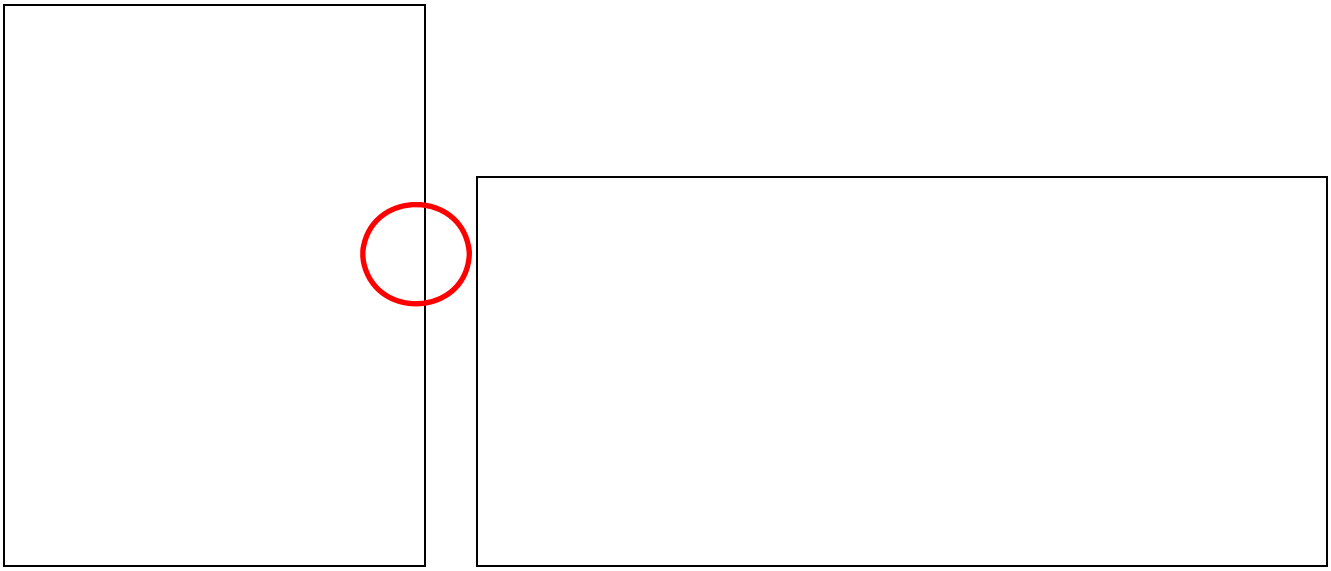


Figure 137

10.2 Accessing parameter mode

x Open control panel (Figure 138). ENSURE POWER IS DISCONNECTED AND THAT AN ESD STRAP IS FITTED.

Figure 138

x Change the position of the toggle switch located on the motherboard (Figure 139) .

Switch positions:
- x Standard mode: right
- x Parameter mode: left

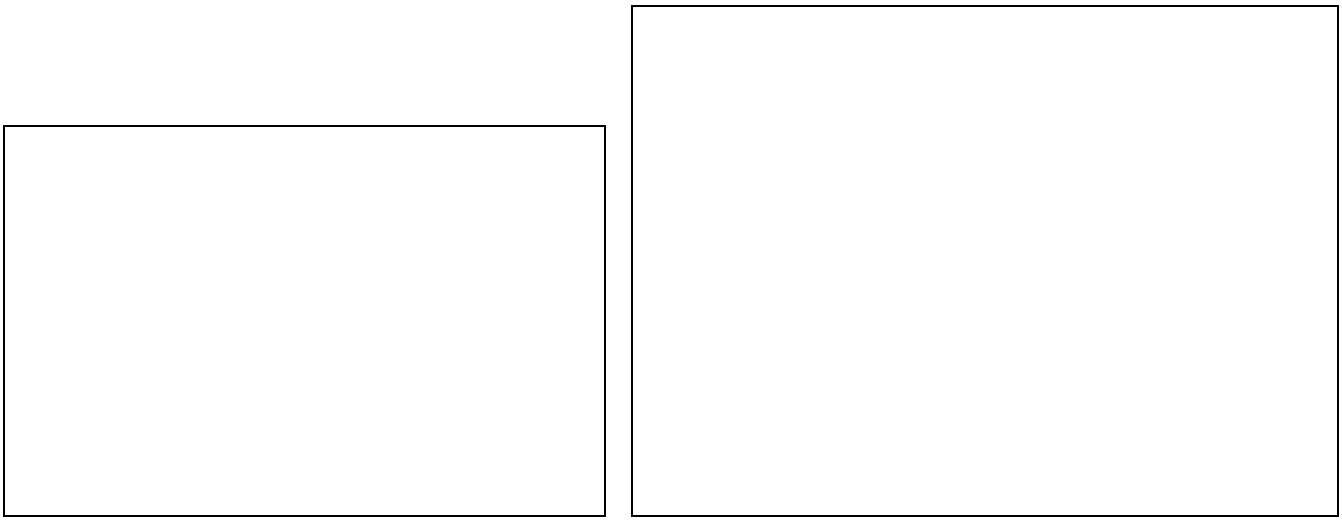


Figure 139

10.6 Inverter Parameters

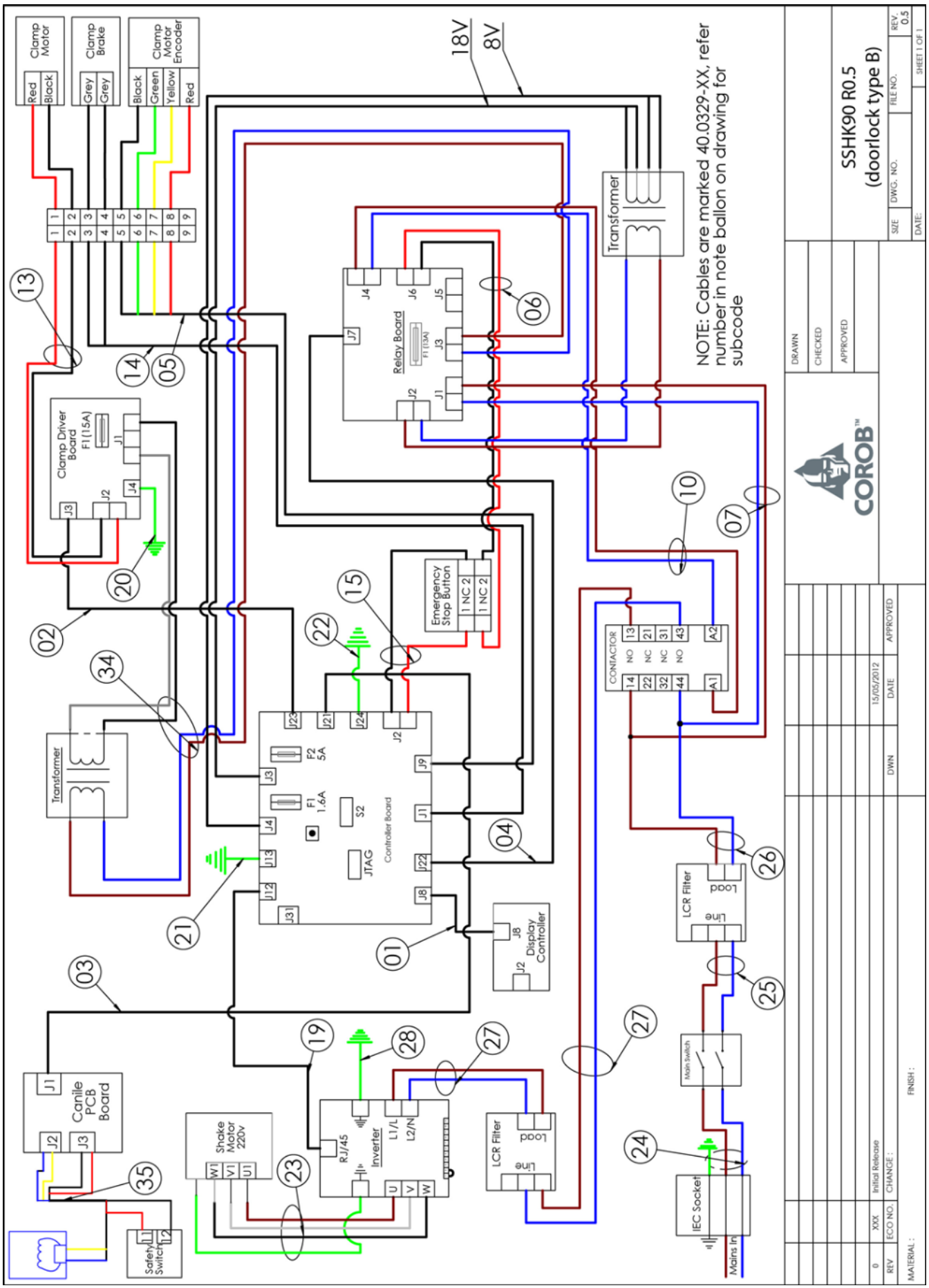
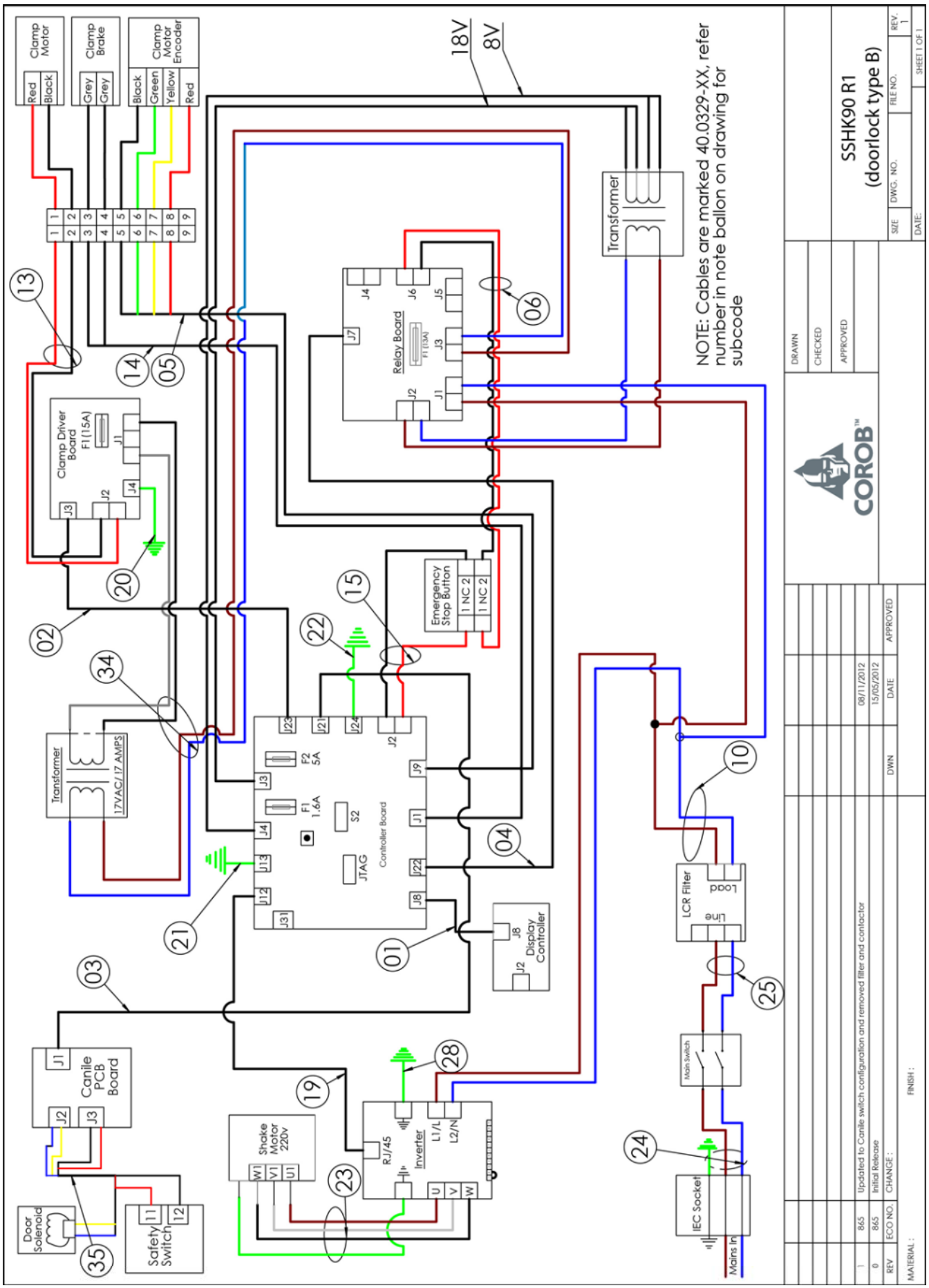
Inverter parameters has the following adjustable features.

- Acceleration/deceleration ramp time – measured in seconds. This is the time taken for the shake cycle to reach its required speed from a standstill to the end cycle speed.
- Delay before shake – measured in seconds. This is an adjustable time between the container being clamped and the shake cycle commencing.
- Delay after shake – measured in seconds. This is an adjustable time between the shake finishing and the container being released.
- Program 1 Default – measured in seconds. Cycle time for program 1.
- Program 2 time – measured in seconds. Cycle time for program 2.
- Program 3 time – measured in seconds. Cycle time for program 3.
- Program 4 time – measured in seconds. Cycle time for program 4.
- Program 5 time – measured in seconds. Cycle time for program 5.
- Program 6 time – measured in seconds. Cycle time for program 6.
- Program 7 time – measured in seconds. Cycle time for program 7.
- Small can time – measured in seconds. Particular time for a small can under default program.
- Medium can time – measured in seconds. Particular time for a small can under default program.
- Large can time – measured in seconds. Particular time for a small can under default program.
- Bidirectional time – measured as a percentage. This parameter is used to shake the container in the opposite direction at a percentage chosen of the overall time.
- Bidirectional – Yes/No. This parameter turns on the bidirectional option.
- Small can first stage speed – measured in hertz. This is the first speed setting for a small can.
- Small can final speed – measured in hertz. This is the final speed setting for a small can.
- Small can first stage time – measured as a percentage. This is the point where the SIMPLEshake 90 goes from first stage speed to final speed during the cycle.
- Medium can first stage speed – measured in hertz. This is the first speed setting for a medium can.
- Medium can final speed – measured in hertz. This is the final speed setting for a medium can.
- Large can first stage speed – measured in hertz. This is the first speed setting for a large can.
- Large can final speed – measured in hertz. This is the final speed setting for a large can.

10.7 Default settings and units

Parameter listing	Description	Default setting	Max	Min	Increment	Remarks
Acc/dec	Time taken to start/stop to end speed	2 secs	10 secs	1 sec	1 sec	N/A
Delay before shake	Time between the container being clamped and the shake cycle commencing	3 secs	10 secs	2 secs	1 sec	N/A
Delay after shake	Time between the shake finishing and the container being released	3 secs	10 secs	2 secs	1 sec	N/A
Program 2 time	Standard cycle time	30 secs	10 hours	20 secs	10 secs	N/A
Program 3 time	Standard cycle time	40 secs	10 hours	20 secs	10 secs	N/A
Program 4 time	Standard cycle time	50 secs	10 hours	20 secs	10 secs	N/A
Program 5 time	Standard cycle time	80 secs	10 hours	20 secs	10 secs	N/A
Program 6 time	Standard cycle time	120 secs	10 hours	20 secs	10 secs	N/A
Program 7 time	Standard cycle time	180 secs	10 hours	20 secs	10 secs	N/A
Small can time	Particular time for a small can cycle under default program	60 secs	10 hours	20 secs	10 secs	N/A
Medium can time	Particular time for a medium can cycle under default program	90 secs	10 hours	20 secs	10 secs	N/A
Large can time	See above	150 secs	10 hours	20 secs	10 secs	N/A
Bidirectional time	The time at which the shaking action will move in the opposite direction	50%	70%	30%	5%	Measured as a percentage of the overall time
Bidirectional	Used turn on/off bidirectional function	No	Yes	No	N/A	N/A
Small can first stage speed	This is the first speed for a small can	45 Hz	65 Hz	0 Hz	1 Hz	N/A
Small can final speed	This is the final speed for a small can	45 Hz	65 Hz	0 Hz	1 Hz	N/A
Small can first stage time	Amount of time the shaking cycle is at the first stage speed	30%	95%	5%	5%	Measured as a percentage of the overall time
Medium can first stage speed	This is the first speed for a medium can	43 Hz	65 Hz	0 Hz	1 Hz	N/A
Medium can final speed	This is the final speed for a medium can	43 Hz	65 Hz	0 Hz	1 Hz	N/A
Medium can first stage time	Amount of time the shaking cycle is at the first stage speed	30%	95%	5%	5%	Measured as a percentage of the overall time
Large can first stage speed	This is the first speed for a large can	40 Hz	65 Hz	0 Hz	1 Hz	N/A

13 APPENDIX 2: Electrical schematic R0.5 (June 2013 – October 2013)



14 APPENDIX 3: Electrical schematic R1 (October 2013)