

JAMES H. HEAL 
& CO. LTD. HALIFAX ENGLAND

**MARTINDALE WEAR & ABRASION TESTER
MODEL 103**

OPERATOR'S GUIDE

**Please note this is a legacy document for a refurbished/obsolete instrument.
Some references within this document may be out of date.**

**Covering Serial Numbers:
103/93/2365 and upwards**

**James H. Heal & Co. Ltd.
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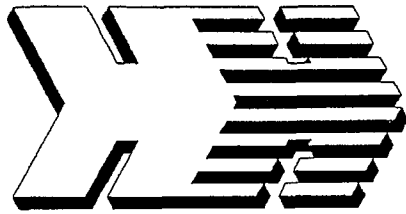
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1. INSTALLATION

REFER ALSO TO BRITISH STANDARD NO. 5690 : 1991 FOR FURTHER INFORMATION

UNPACKING

- If the machine is delivered in a pack, remove the tape and staples which secure the upper flaps.
- The pack contains the machine, components for the machine (in a separate internal pack), hand-operated lever press (if ordered), consumables : abrasive cloth, felt pads, felt, polyetherurethane foam (if ordered), and spare parts (if ordered).
- The contents of the pack are separated by polystyrene pieces. Do not throw the pack nor any of the packing pieces away, until such time as the machine is installed and is operating satisfactorily. Ensure all consumables and spare parts ordered with the machine are present.

CLEANING

- Remove any debris from the machine. Any traces of grease can be removed with Genklene or good quality white spirit.

IDENTIFICATION OF CONSTITUENT PARTS

FIG 1. - EXPLODED AND PLAN VIEWS

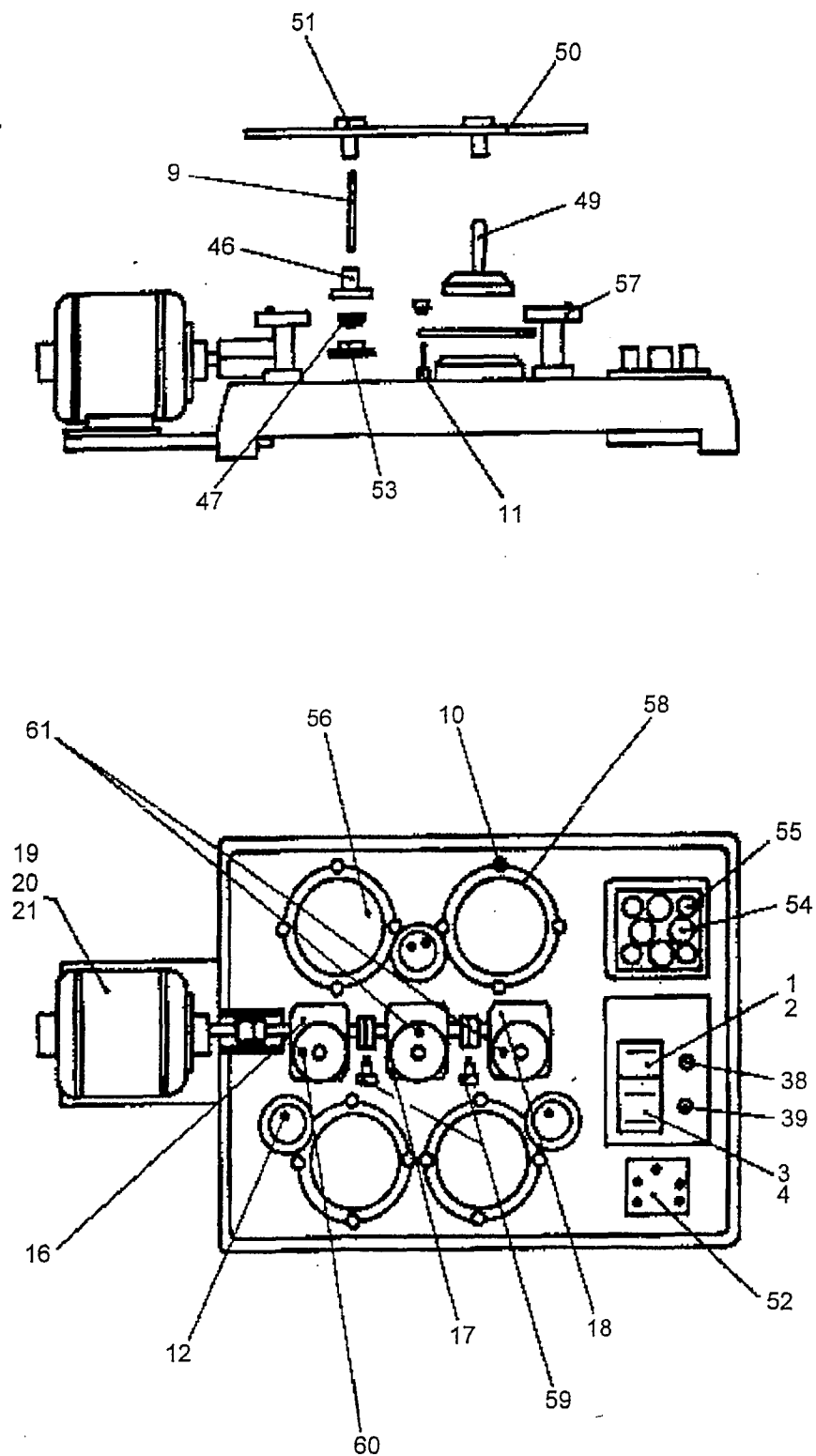


FIG 2. - ADDITIONAL DRIVE COMPONENTS (60HZ MACHINES ONLY)

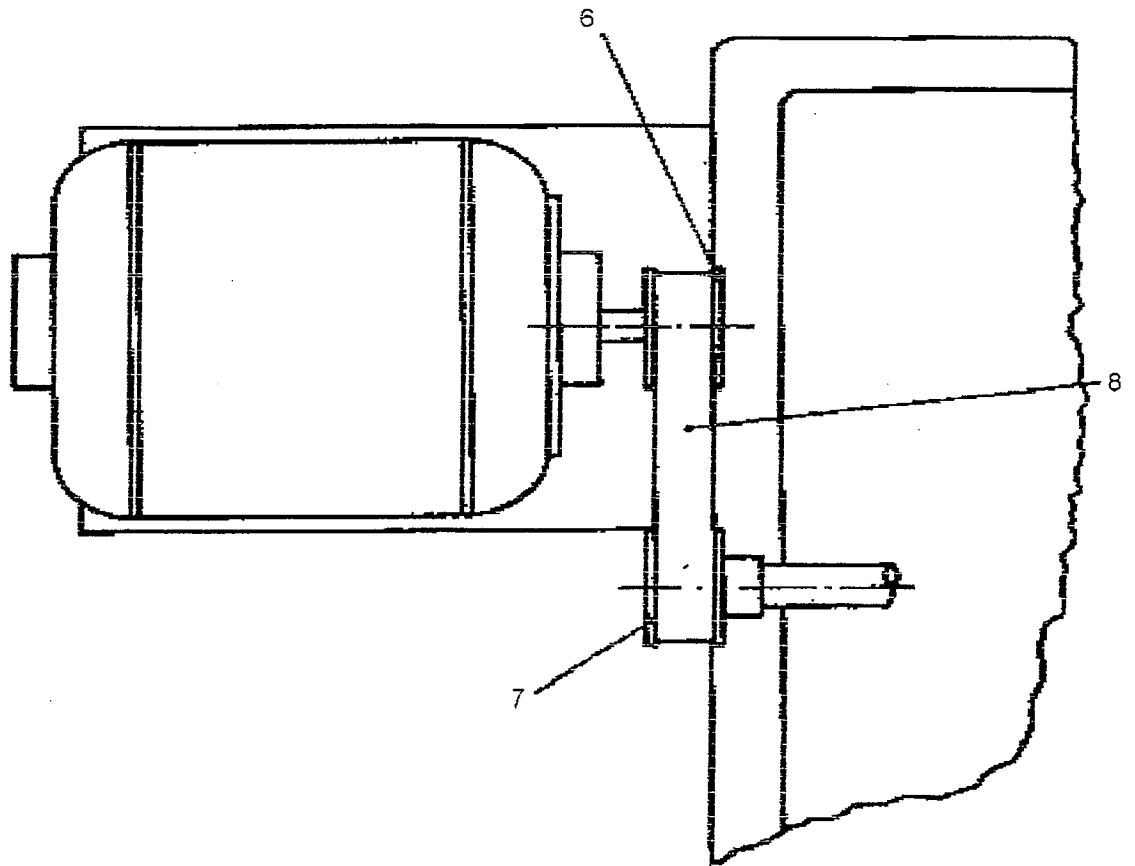
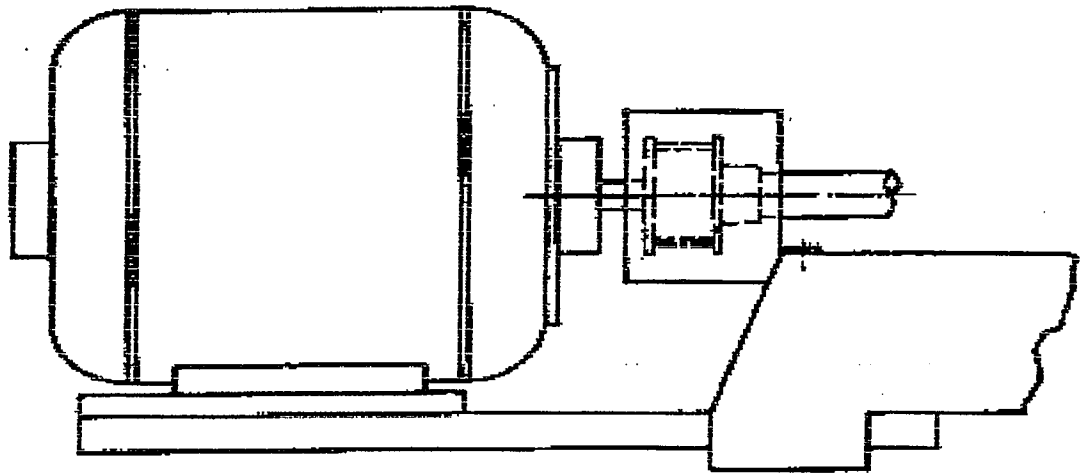
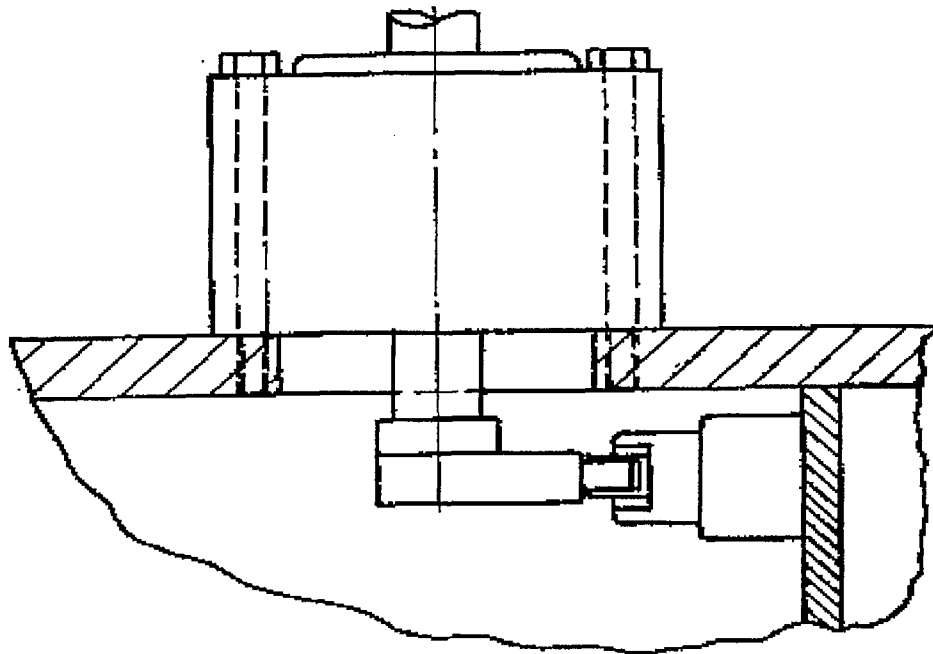
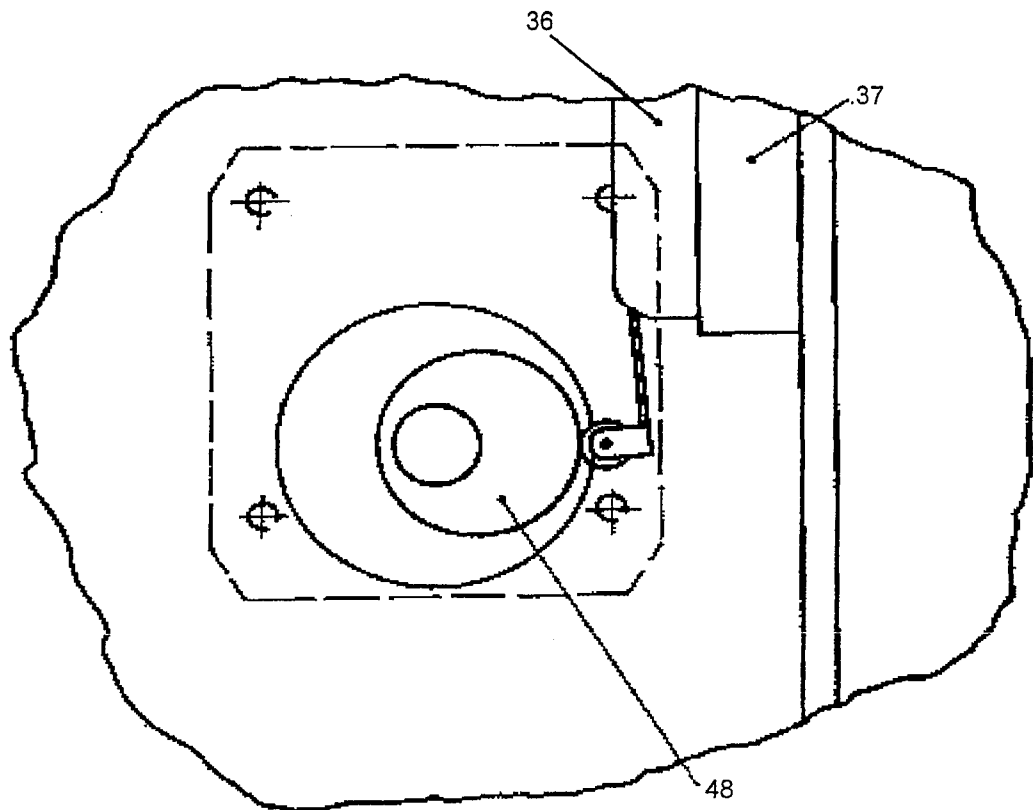


FIG. 3 - UNDER-BASE MICROSWITCH DRIVE TO COUNTERS

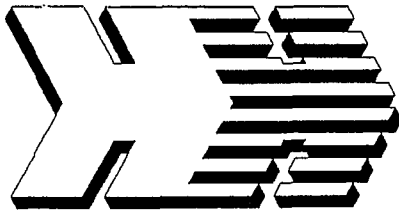


KEY TO COMPONENTS

Ref. No.	Stock Code No.	Description
1	309-101	Total Counter 110V 60Hz
2	309-102	Total Counter 220/240V 50Hz
3	309-103	Pre-set Counter 110V 60Hz
4	309-104	Pre-set Counter 220/240V 50Hz
5	356-303	'O' Ring
6	387-751	Timing Pulley (motor)
7	387-753	Timing Pulley (gearbox)
8	383-352	Timing Belt
9	525-258	Sample Holder Spindle
10	508-272	Quick-Release Nut
11	508-273	Clamping Ring Stud
12	393-252	Ball Bearing
16	350-507	Gearbox (left - nearest motor)
17	350-508	Gearbox (centre)
18	350-509	Gearbox (right - nearest control panel)
19	350-529	Motor 220/240V 50Hz
20	350-530	Motor 110V 60Hz
21	350-531	Motor 100V 60Hz
26	754-103	Cutter
27	754-104	Cutting Board
28	701-202	Pack (5 m) Abrasive Cloth SM25
29	714-602	Pack (5 sets) Felt Pads
30	786-251	Pack (50 sheets) Polyetherurethane Foam
36	160-277	Micro switch
37	101-105	Micro switch Base
38	160-284	Green START Button
39	160-285	Red STOP Button
46	508-257	Sample Holder Body
47	508-258	Sample Holder Insert
48	508-259	Cam
49	508-261	Top Plate
51	508-262	Block Spanner
53	508-263	Abrading Table
57	508-265	Bearing Cúp
58	508-266	Retaining Ring
59	508-268	Driving Pin for straight-line Motion

ASSEMBLY

- Stand the machine on a firm, level table or surface. Place a layer of thick rubber or felt between the machine and the table, so as to eliminate any vibration or noise.
- Put a small quantity of thin grease into each of the three bearing cups. Oil should not be used.
- Put ONE 14 mm diameter ball bearing in each of the front two cups. Put TWO 14 mm diameter ball bearings in the rear cup. These bearings support the top plate.
- Place the plate in position, having ensured that:-
 - It is the correct way up. The upper side is engraved with our numbers 1 - 2 - 3 - 4.
 - It is the correct way round. One of the three rectangular slots is wider than the other two. The correct position for this wider slot is adjacent to the motor. If the plate is the correct way up and the correct way round, the three driving pins can be located in the respective slots without difficulty.
- The four sample holders supplied with the machine are numbered 1 - 4, corresponding to the four marked positions on the upper side of the top plate. Withdraw each sample holder spindle from its head and push its 'O' ring end through the appropriate bearing housing in the top plate. Re-locate the same end of each spindle in the corresponding sample holder head. In this way place all four sample holders into their working positions.



2. DETAILED OPERATION

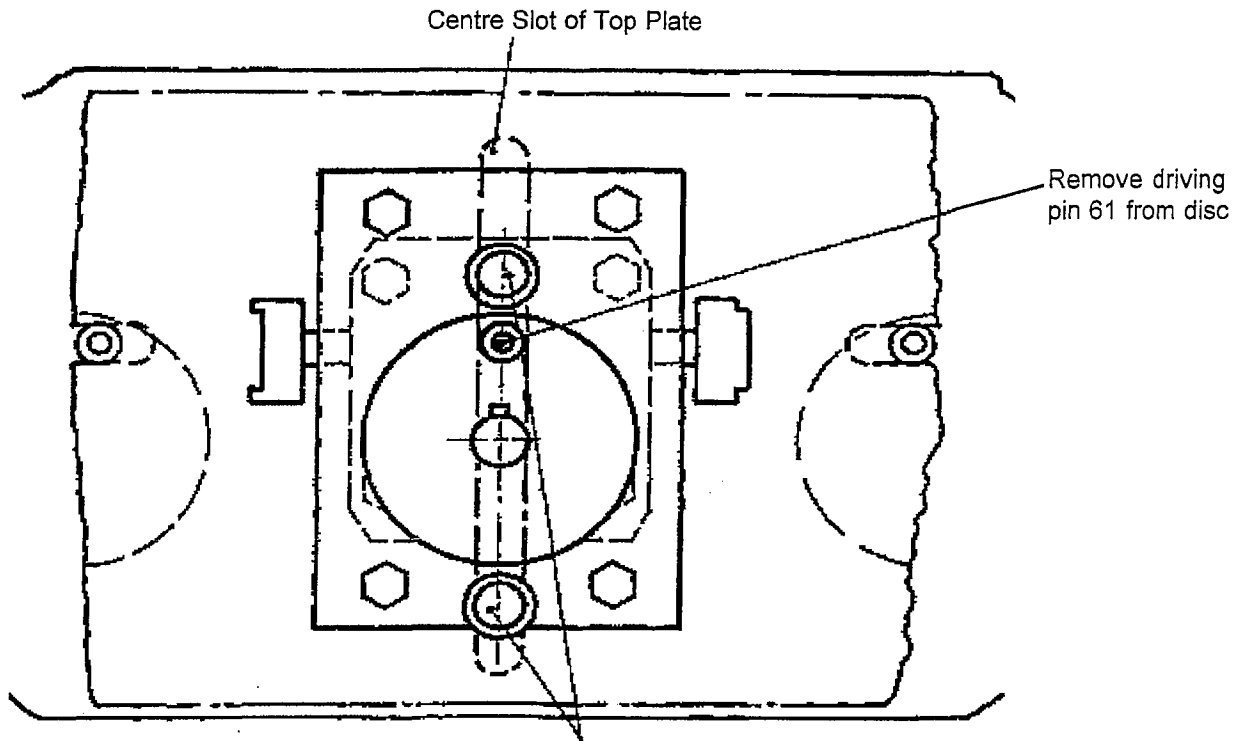
SELECTION OF TYPE OF MOTION

- There are two possibilities:-
 - Lissajous Figure (standard)
 - Straight Line (optional) - See Figure 4

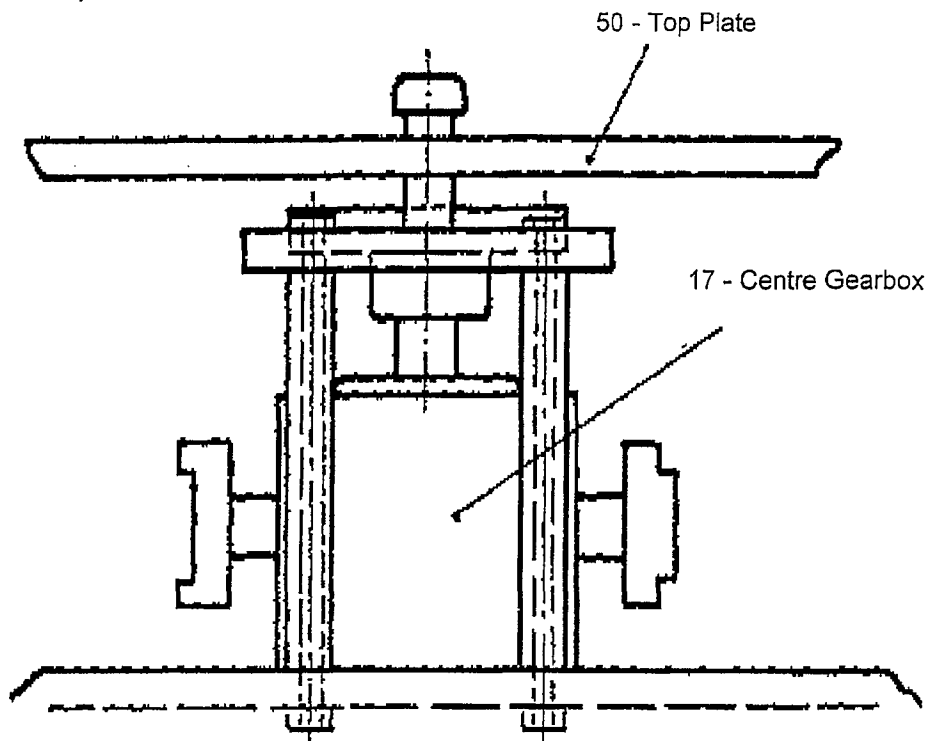
- Parts for the straight line motion are only fitted if ordered. Otherwise, they can be ordered and self-fitted later.

- When delivered, the machine is set up for the Lissajous Figure, i.e. a straight line, which becomes a gradually widening ellipse, until it forms another straight line in the opposite direction. The Lissajous is converted into the straight line as follows:-
 - Remove the sample holders and the top plate from the machine.
 - Remove the driving pin from the disc on the centre gear box by slackening and screwing off the securing nut underneath.
 - Replace the top plate.
 - Screw the two additional driving pins, which are located in terry clips on the machine base, through the centre slot of the top plate and into the two tapped holes in the plate surrounding the driving disc on the centre gear box.
 - Reconvert by reversing this procedure.

FIG 4. - CONVERSION TO STRAIGHT LINE MOTION



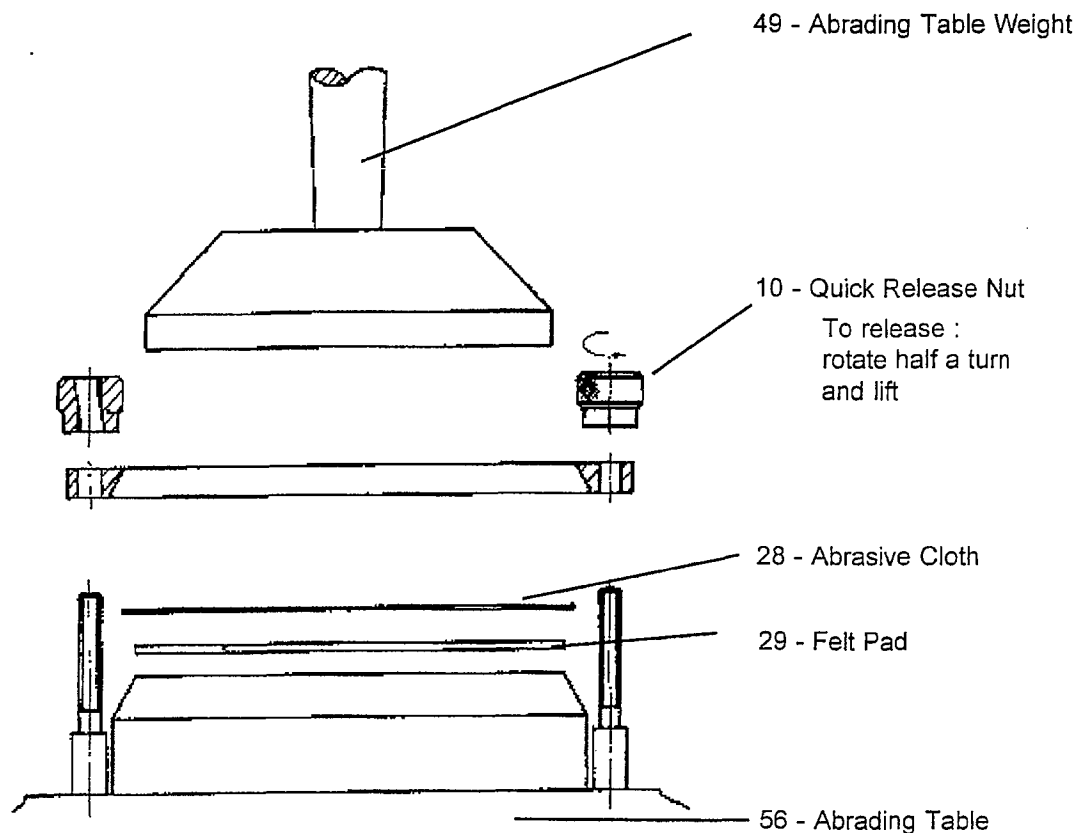
The two straight-line motion driving pins are inserted through the centre slot of the top plate, when it is in position on the machine.



PREPARATION OF MACHINE FOR TESTING

Abrading Tables

- Remove the top plate and sample holders.
- Undo the quick release nuts by rotating them approximately 180° in an anti-clockwise direction and lifting them vertically (reverse procedure to secure them). Remove the retaining rings.
- Place a piece of felt, 750 + 50 g/m², approx 2.5 mm thick, and approximately 140 mm diameter on top of each abrading table. This felt need not be renewed until soiled or damaged. Prepared felt pads are available from Heals.
- Cut out pieces of abrasive cloth, approximately Ø140 mm, and place one over each piece of felt. Put the abrading table weight on top of the abrasive cloth, taking care to smooth out any wrinkles. Drop the retaining ring over the weight and secure it in position with four nuts. Throughout this entire operation, make sure that the felt and abrasive material are free of creases and folds, and that they are held tightly in position over the top of the tables. The standard abrasive cloth should be replaced at the start of each test and after 50,000 rubs if a test is continued beyond this point. Packs of abrasive cloth are available from Heals.
- Replace the top plate.



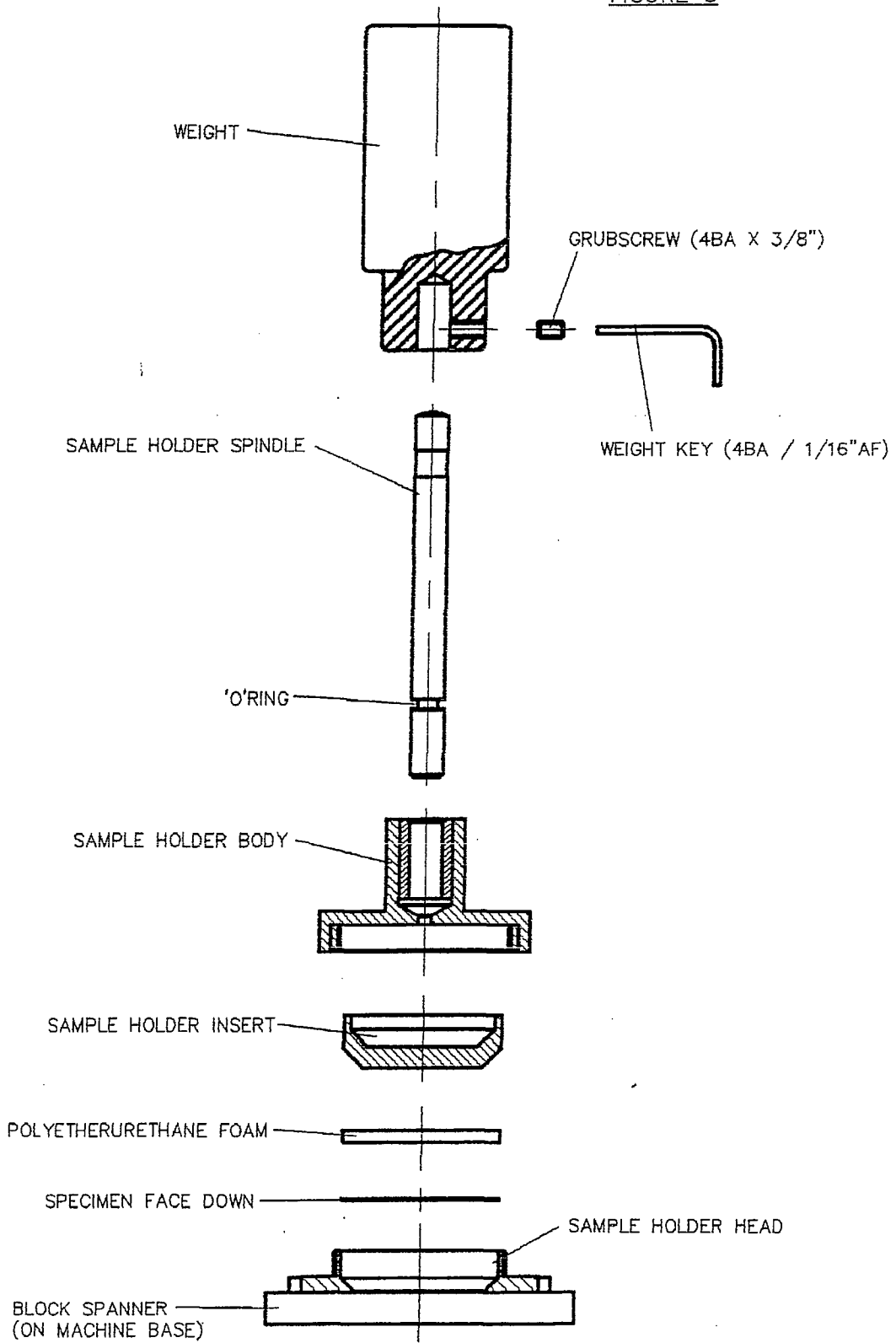
Sample Holders

- Use the hand-operated lever press to produce 38 mm diameter specimens of the cloth to be tested and 38 mm diameter pieces of polyetherurethane foam where applicable.
- See Figure 7. This Figure illustrates and describes the correct use and adjustment of the press.
- Unscrew the sample holder. Remove the insert. Place the head in the block spanner. Lay the specimen (face down), polyetherurethane foam and insert in the head. Replace the body and tighten firmly. Polyetherurethane foam must be used to back specimens below 500 g/m².
- The foam must be approximately 3 mm thick and have a density of 30 + 1 kg/m and a hardness of 190 + 20N. The foam must be changed after every test. Packs of polyetherurethane foam of the correct specification are available from Heals.
- Repeat the procedure for the remaining three sample holders.

Weights

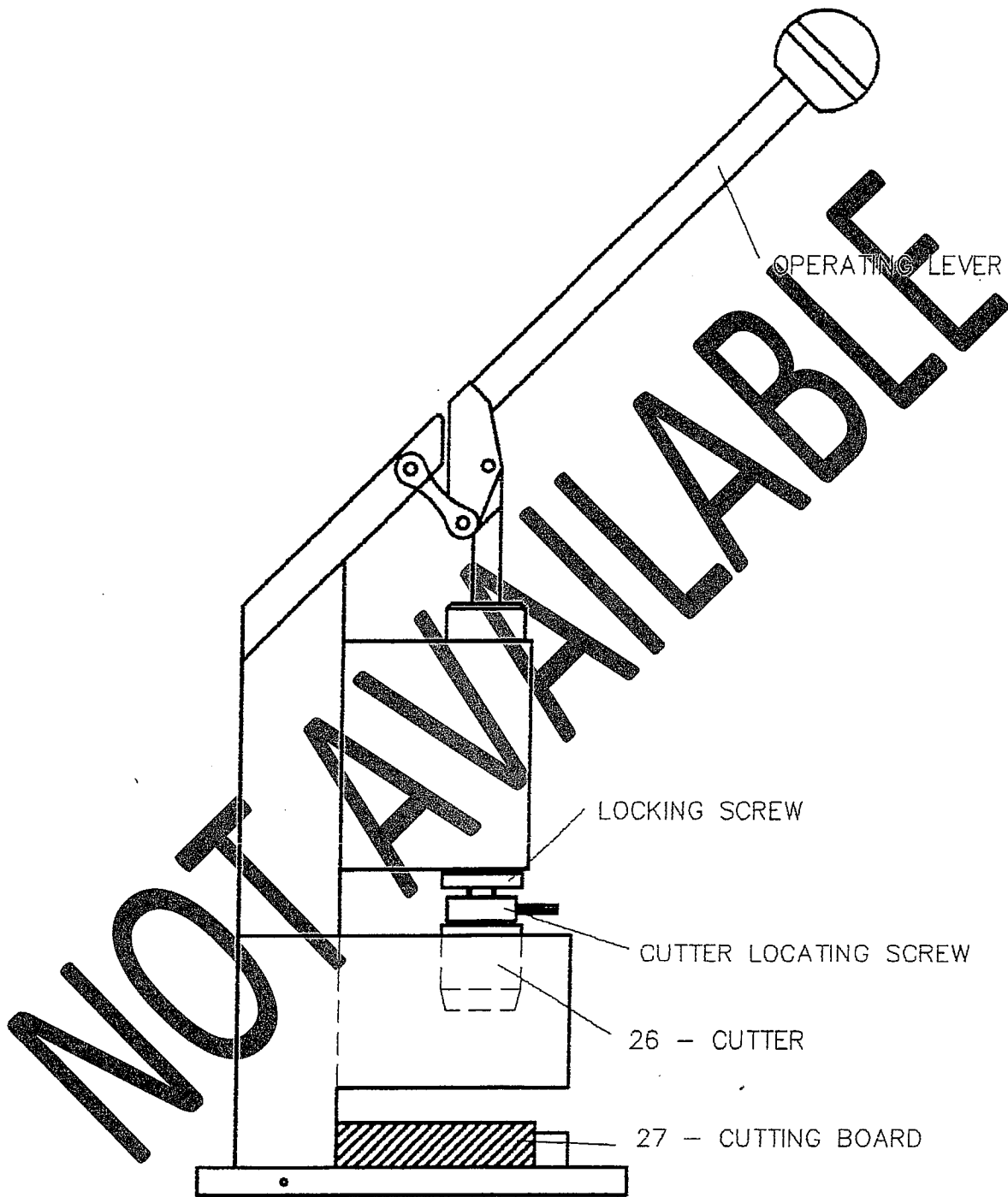
- Two sets of weights are supplied, which give total loadings of 9 and 12 kPa respectively. The weights have masses of 397 g and 597 g, which, when combined with the mass of the sample holder (198 g), give the loadings referred to above. 9 and 12 kPa correspond to imperial values of 21 and 28 oz/in².
- The weights are located on that portion of the sample holder spindle which protrudes vertically through the top plate. They are locked in position on the spindles by tightening the internal grub screw with the weight key provided.

FIGURE 6



LOADING A SAMPLE HOLDER

FIGURE 7



USE OF HAND OPERATED LEVER PRESS

METHODS OF ASSESSMENT OF RESULTS

Number of rubs to a defined end point

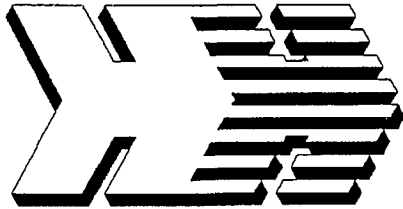
Commonly when two threads are broken. Continue abrading until two threads are broken and record the number of rubs achieved by each specimen.

Average rate of weight loss

Find the approximate end point using Method A. Choose three intermediate stages, representing approximately 25%, 50% and 75% of the total number of rubs to the end point. Abrade specimens to all four stages, condition and weigh them. Plot a graph of weight loss against number of rubs. Determine the average rate of weight loss in milligrams/1000 rubs.

Other

In some cases, other assessment criteria may be more appropriate, e.g. complete removal of surface pile or visual assessment against agreed photographic standards of surface deterioration after a specified number of rubs.



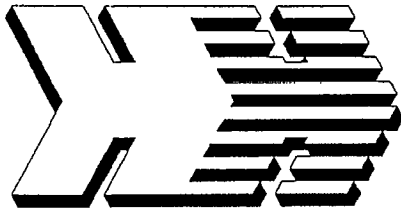
3. CONTROLS

Counter (5 figures)

- This counter, labelled PRE-SET, registers the number of machine revolutions, i.e. number of rubs.
- The desired number of rubs may be pre-set and the machine will stop automatically at that point.
- Pre-setting is carried out as follows:-
- Depress the black button.
- Push the white button downwards in the direction of the arrow.
- Holding the white button in the 'down' position, depress the individual black buttons located beneath the lower window, to register and pre-set the desired number of rubs.
- Note that the pre-set figure remains static for ready reference in the lower window.

Counter (6 figures)

- This counter, labelled TOTAL, totalises the number of rubs from successive tests until reset by depressing the red button on its upper face.
- Green START Button
Depress to commence a test.
- Red STOP Button
Depress to stop the machine in an emergency or if it is desired to arrest the machine in advance of the pre-set number of revolutions.



4. MAINTENANCE

ROUTINE CARE OF MACHINE

- Keep the machine scrupulously clean. Remove accumulated debris from all parts. Clean up oil or grease stains immediately.
- Clean the three bearing cups and the ball bearings and replenish the grease at regular intervals.
- Periodically, apply a drop of thin oil to the three driving pins.
- Keep the sample holder spindles clean. Do not lubricate them.
- The three gear boxes are sealed and lubricated for life. They do not require any maintenance.

MACHINE ALIGNMENT

- It is of the greatest importance that the four sample holder heads are perfectly parallel to the respective abrading tables. If they are not, uniform wear is not possible.
- This point may be checked by trying to insert at any point a 0.05 mm feeler gauge between the sample holder heads and the abrading tables.
This test should be carried out in several positions of the top plate for each sample holder head.
- If the gauge will slide under a head at any point, check:-
 - That the sample holder spindle is completely true.
 - That the sample holder is firmly seated on the abrading table and that the problem is not being caused by the presence of dirt or other foreign matter on either surface.
 - That the two needle bearings in the bearing housing are in good condition, i.e. no needles damaged or missing, and that the spindle rotates freely.

SPARE PARTS AND CONSUMABLES

- Spare parts are available at short notice. To facilitate identification of parts, please quote the serial number of the machine, and the reference number(s) of the part(s).
- It is of the utmost importance to use the correct consumable materials. Incorrect materials may falsify results. Heals supply consumables in standard packs:
 - Abrasive cloth SM 25 - pack (5 m) 701-202
 - Felt pads - pack (5 sets) 714-602
 - Polyetherurethane foam - pack (50 sheets) 786-251

Large stocks of these materials are carried, so requirements are fulfilled without delay.

SERVICING

- Servicing and calibration are available in the U.K. and some European countries. Calibration certificates can be issued upon request. Please ask for further details.

HEALINK

The Martindale Wear & Abrasion Tester model 103 can be supported by HEALINK - our world-leading Maintenance and Calibration Service - covering installation, operator training, regular maintenance, UKAS Calibration and on-line technical and applications support.

Servicing and calibration are available Worldwide – Contact our HEALINK department for further details.

Healink email : support@james-heal.co.uk

