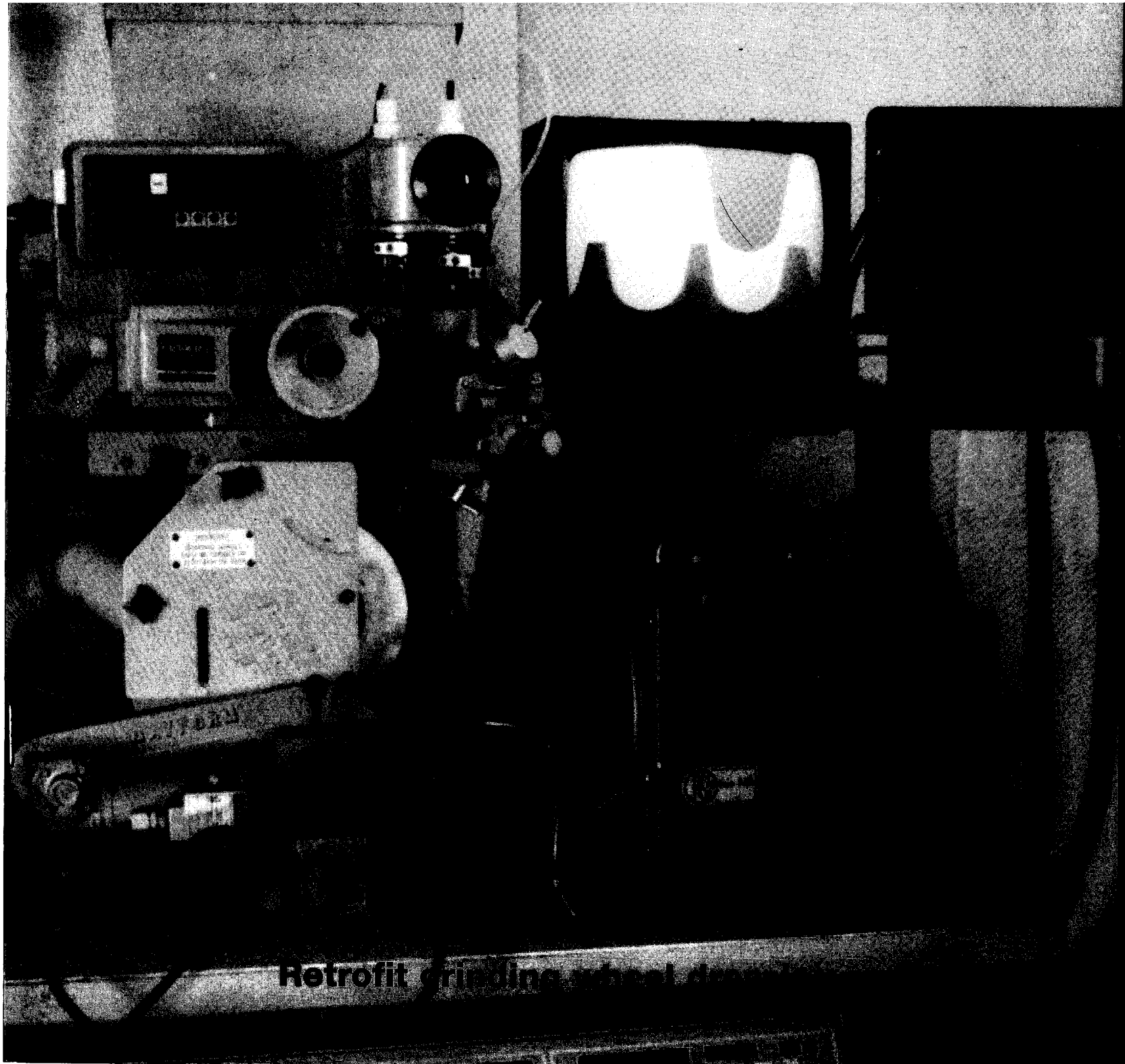
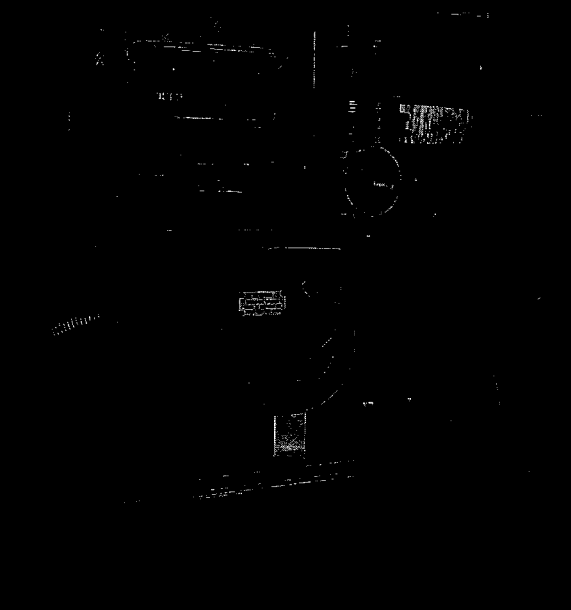


PG Technology Limited

Operator's Manual



Retrofit grinding

PG Technology Limited

Important

When using PG equipment in conjunction with grinding or other metalworking machines, care should be taken to observe the machine manufacturer's safety recommendations.

The wearing of safety glasses is essential.

Use of coolant warning

Optidress E is dust proof, which under normal working conditions safeguards all essential parts against wear from abrasives.

Optidress E is not waterproof

If coolant is used the instrument must have adequate shielding.

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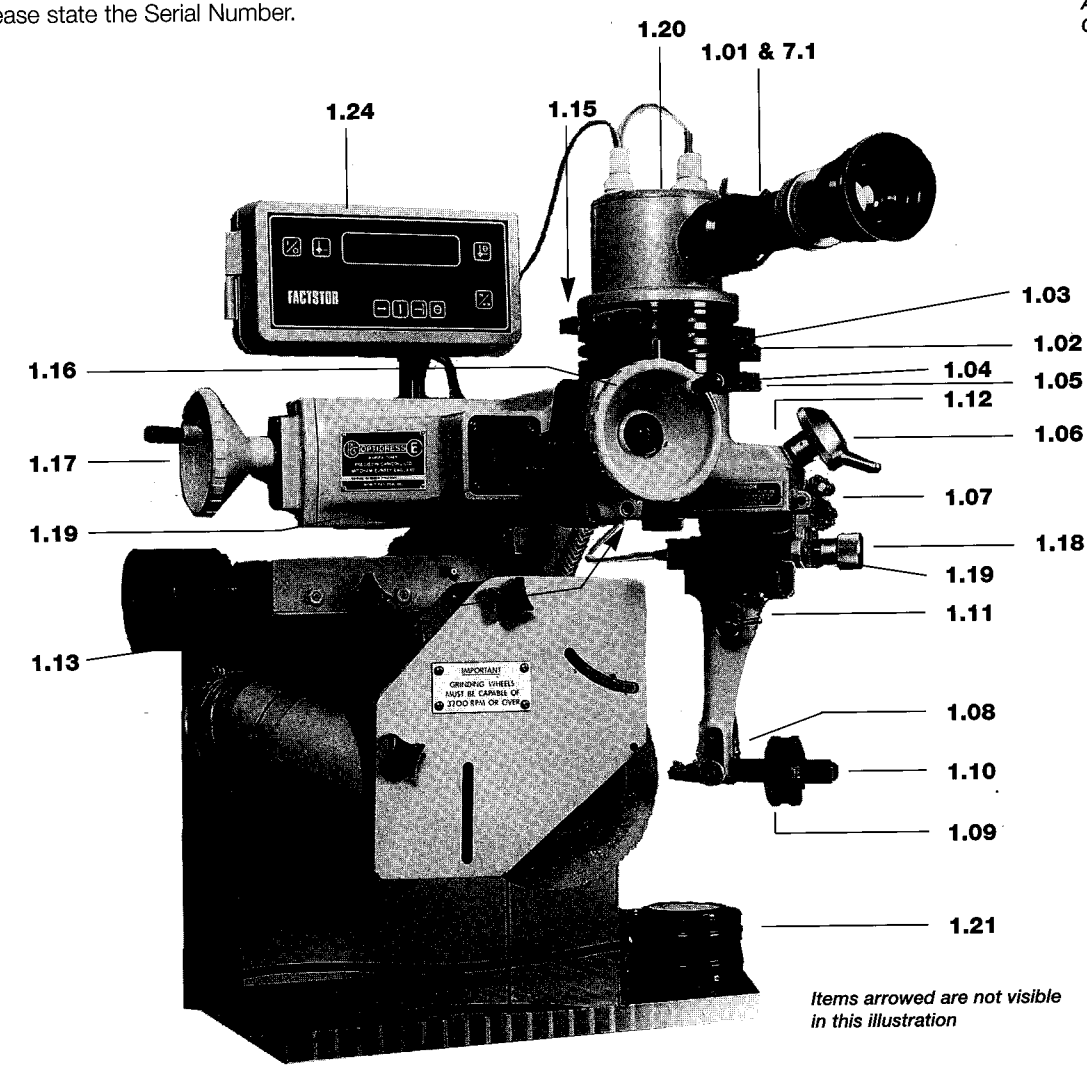
Optidress E Operator's Manual

Introduction

The Optidress E is a quality optical and electronic instrument. Its assembly and maintenance require care. Read the instructions in this manual carefully before making any attempt to mount the unit on to the machine. The information given will help to ensure that your Optidress E is assembled and used correctly and gives good service in providing the accurate wheel forms you require.

Please get the advice of your supplier or PG Technology Limited Service Department before attempting any maintenance other than that given in this manual.

When communicating with us or our Distributors concerning any queries relating to your Optidress E, please state the Serial Number.



Items arrowed are not visible in this illustration

Contents

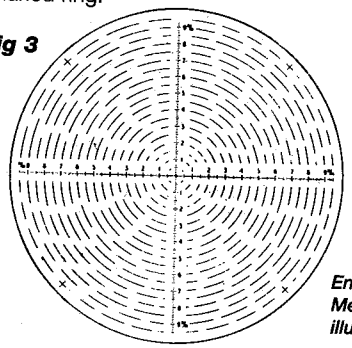
1 Main Features

1.01 Microscope: This has a x 10 magnification and is fitted with a reticle marked with concentric rings (Fig 3).These rings are spaced 0.5mm or 0.025in apart out to a radius of 9.5mm or 0.375in. The vertical and horizontal co-ordinates are marked every 0.1 mm or 0.005 in and figured every 1.0mm or 0.05in. The down tube of the microscope forms the pivot for radius arm.

Alternative oculars are available to facilitate the use of English or Metric graduations.

The oculars are interchanged by unscrewing the knurled ring behind the rubber eye cup and withdrawing the unit from the microscope tube. When replacing, ensure that the location pin fits into the slot provided before tightening the knurled ring.

Fig 3



English or Metric (Metric illustrated)

1.02 Angle Setting Stops are used to limit the rotary movement of the radius arm either side of zero θ° and provide the angle settings for dressing tangents. The lower pair of stops operate against the fixed post whilst the middle and upper pair of stops operate against a retractable post. This allowing 3 pairs of angles to be set. Each stop is provided with a fine setting screw.

1.03 Stop Post. This is raised or lowered by a lever.

1.04 95° Fixed Stop. Angle datum.

1.05 The Angle Locking Knob is used for clamping the radius arm in position while angles are being dressed.

1.06 Tangent Slide Operating Handle. This handle operates the dovetail tangent slide that carries the radius arm and dresser in a straight line movement for tangential dressing. The operating handle is inclined to the slide and movement is transmitted through a rack and pinion.

1.07 The Centralising Stops hold the tangent slide firmly in the central position to prevent movement of the slide while dressing a radius. When tangents are dressed the stops must be lifted to free the slide.

1.08 Slip Pad. The maximum convex or concave radii that can be set optically with Optidress is 9.5mm or 3/8in, but this dimension can be increased to 28.6mm or 1⅛in convex and 25.4mm or 1in concave, by inserting slip gauges of the required dimensions between the slip pad and the Dresser Setting Ring (1.09). It should be noted that this restricts the angular movement of the dressing arm on some makes of grinding machines. By reversing the dressing arm a convex radius of 38mm or 1½in can be formed.

1.09 The Dresser Setting Ring is used as described in 1.08 above. It can also be used to compensate for dresser wear.

1.10 Dressing Tools see section 14, for styles available.

1.11 Slide Lock. This is used to prevent the radius setting slide moving while the wheel is being dressed.

1.12 Radius Arm. This pivots about the hardened and ground microscope tube and carries the tangent slide and dressing arm complete with dresser. To allow for the provision of a complete wheel guard cover, the dressing arm is designed for easy detachment.

1.13 Lens Cover. This protects the cover glass and objective lens against dust and damage.

1.14 Spacing Collars are fitted individually to each Optidress to eliminate vertical play in the radius arm.

1.15 Pinch Screw. This holds the microscope in position and should only be loosened when aligning the reticle with the dresser or when dismantling.

1.16 Co-ordinate Slides. The co-ordinate cross slide (1.16) and co-ordinate depth control **1.17 slide** (1.17) are used for the initial positioning of the dressing tool relative to the grinding wheel and the subsequent positioning of the geometric co-ordinates of the wheel form to be dressed. Both slides are adjusted by feed screws and the positioning is controlled by transducers which eliminates errors due to back-lash. The slides can be set to zero at any point in their working range and read direct to 0.002 mm (0.0001 in).

1.18 Radius Setting Slide. This is used with the radius setting reticle in the microscope eyepiece to position the dresser at the required male or female radius to be dressed.This slide is controlled by a transducer which eliminates errors due to back-lash, can be set to zero at any point within its movement and reads direct to 0.002 mm (0.0001in).

1.19 Transducers. Measure each of the three linear motions and the angular rotation.

1.20 Angle Setting. This device has a mechanical pickup and a total measuring range of 190° of arc with a smallest reading of 1 min of arc and can be set to zero at any angle within its measuring range.

1.21 Illuminator (See Section 20). The illuminator for the Optidress is designed to stand on the work table of the machine and consists of a low power light source with diffusing screen.

1.22 Transformer (not illustrated). The transformer powered by mains supply has a dual output of 6V.6VA and 9V.12VA, for the illuminator and DRO respectively.

1.23 Spacer Plate (not illustrated). This locates between the mounting surfaces of the Optidress and grinding machine and is machinable for accurate positioning of the Optidress relative to the grinding wheel centre line. (Only supplied with an adaptor for the Optidress.)

Fig 4

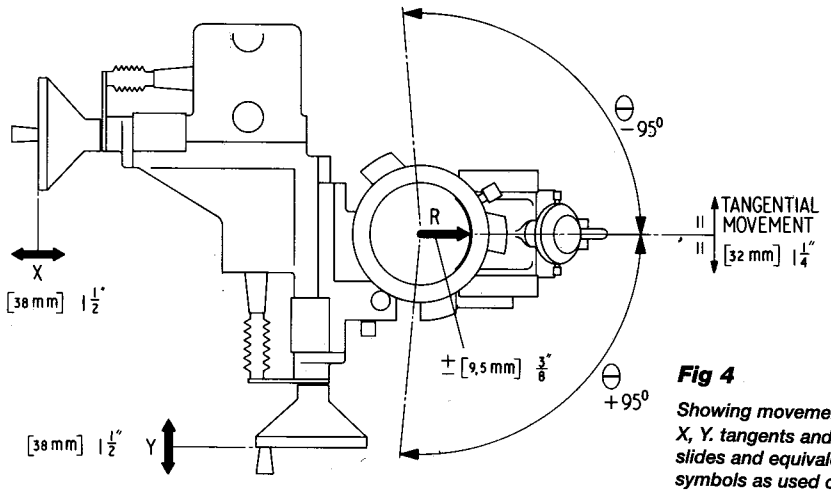


Fig 4

Showing movement of θ, X, Y. tangents and radius R slides and equivalent symbols as used on the Digital Read Out (DRO) touch control panel.

1.24 Factstor 2 is unique in its conception, employing a microprocessor to continuously monitor the 4 moire fringe measuring transducer elements built into Optidress E. This enables the 3 linear movements together with the rotary movement to be displayed on a common display.

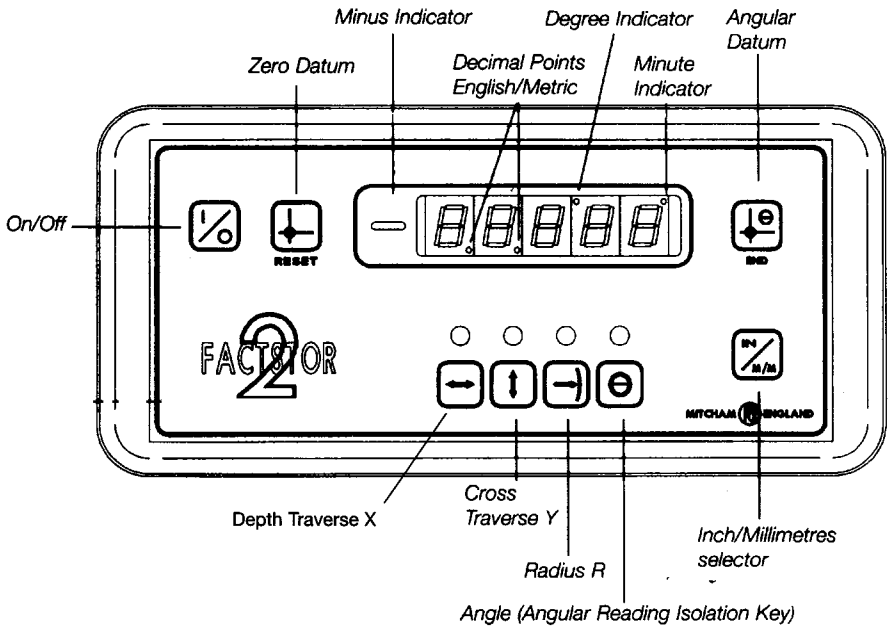
After switching on, the dressing arm is actuated to initiate the DRO and then rotated to bring the 95° fixed stop in contact with the stop post. The pre-set key is operated to locate the 95° position.

As each of the 3 traverse screws is operated the readout is automatically switched to that motion giving its position, the indicator light above the recall keys indicating the axis being moved. It is possible to check the position of all motions on the readout without movement taking place by depressing each of the 4 keys as required.

To facilitate setting, zero datum can be established at any position in the motion by depressing the Datum key. Negative movements from the datum setting are indicated when the negative sign to the left of the LED display is illuminated. When the motion is positive (+) the light is off. The microprocessor circuit is constantly monitoring all linear and angular movements so that the distances from datum can be viewed on the readout by depressing the appropriate key.

All information from the transducers is monitored for errors, should an error situation arise the display will flash, and it will be necessary to re-establish the datum setting and operate the zero key to restore the signal.

Fig 5



Optidress E, Factstor 2 general operating instructions (also see Fig 5)

To switch on, press and release ½

After switching on Factstor will not display the rotary axis movement until an initial setting of 95°00 or 00°00 is made, and the following must be completed as the first operation.

Slowly rotate the knuckle assembly to the 95°00 or 00° stop

Press and release ⊕ or ⊖ the display will now show 95° or 00°, If set correctly and the rotary axis will remain set until switched off. If SLo is displayed the rotary movement was too fast, and it will be necessary to Re-set.

Linear axis movements are displayed if moved or selected by key, no setting is required.

To select an axis – Press and release any of the four axis selection keys. All axes are also displayed when moved.

To set an axis to zero – Press and release ⊖

Rotary axis disable – To avoid the rotary movement interfering with linear axis movements, press and hold ⊖ until the LED above the key flashes and the LED above ⊟ is displayed.

To release – press and release ⊖ If SET is displayed, reset to 95° or 00°.

To change from imperial to metric or from metric to imperial – Press and release IN/M/M

To switch off – Press and hold the ON/OFF ½ key for two seconds.

If the DRO does not function, go through the following check procedure:

a Check power supply
b Check transformer connection
c Check that all plugs and sockets are fully engaged

If the DRO does not function correctly after carrying out these checks, contact your supplier for advice. On no account should repair work be attempted on the internal circuitry of the Factstor 2 box.

The Optidress E is broken down into sub-assemblies for packaging and consists of:

- A co-ordinate assembly complete with transducers.
- A radius and tangent slide assembly complete with transducer.
- A dressing arm.
- A microscope complete with rotary transducer.
- A digital readout unit.
- A mounting bracket when supplied.
- Transformer.
- Illuminator
- Tools.

Fitting Instructions – These instructions are of a general nature because the machines to which the OPTIDRESS E is adapted vary in their construction.

Assembling the Optidress E

With the Optidress mounting bracket attached to the machine proceed as follows:

3.1 Place the fixing studs complete with spacer loosely in position.

3.2 Fit the co-ordinate slide assembly over the studs and hold in position with the nuts and washers.

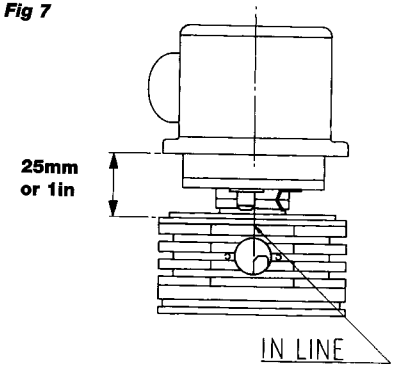
3.3 Lightly smear both the co-ordinate slide housing, the radius slide bores and the bearing faces with light machine oil.

3.4 Place the hardened spacing collar on the top bearing face of the co-ordinate slide microscope housing. (Fig 6).

3.5 Fit the radius slide assembly over the housing and carefully bring the bores of all 3 items into approximate alignment.

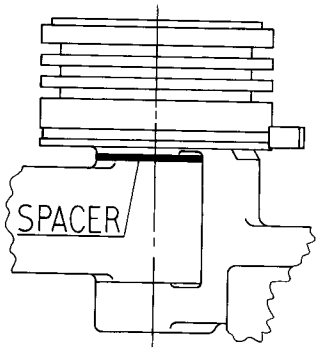
3.6 Carefully clean microscope tube and fit into the matched bores to form a pivot.

Fig 7



Important ***Do not push the microscope fully home at this point, but leave a gap of approximately 25mm or 1in (Fig 7) between the base of the microscope and the upper face of the stop mounting ring (angle setting stop cylinder).***

Fig 6



3.7 Lightly tighten the pinch screw (Fig 8) at the rear of the microscope housing.

3.8 Rotate the radius slide assembly clockwise until the fixed stop rests against the stop post.

3.9 Carefully remove the screws retaining the plastic cover on the side face of the stop mounting ring (angle setting stop cylinder).

3.10 Remove cover, complete with the flexible transducer conduit, to expose sighting aperture.

3.11 Rotate the rotary transducer mount at the base of the microscope to bring the driving dog into vertical alignment with the sighting hole.

3.12 Release the microscope pinch screw and gently lower the microscope to bring the dog into engagement with a similar dog situated on the internal flange of the stop ring as seen through sighting hole (Fig 9).

3.13 Tighten microscope pinch screw. ***Note: To avoid heavy pivotal movements the thrust ring fitted at the top of the microscope tube should only be in light contact with the top bearing face of the radius slide – check before the pinch screw is tightened. This note applies for all subsequent operations in aligning the microscope.***

3.14 Refit plastic cover complete with conduit to the side face angle setting stop cylinder.

Fig 8

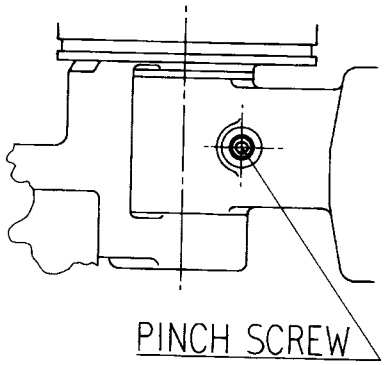
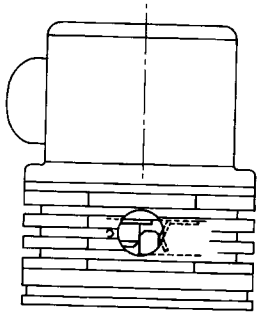


Fig 9

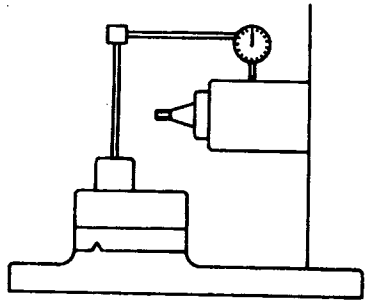


Checking the mounting pad

4.1 For most adaptations, the Optidress with its spacer plate fits on the flat pad which forms the top of the wheel head. This pad must be checked to ensure that it is parallel with the machine work table. This can be checked using a dial indicator mounted on the work table as shown in Fig 10. When the table is traversed in both directions the pad should be parallel to the table with 0.05mm (.002in) over its area.

Note ***The spacer or adaptor, if supplied, has a fitting allowance included to bring the dressing tool on centre line with the grinding wheel spindle. Dependent upon the type of machine to which the Optidress is fitted, the spacer plate supplied is designed to focus on the dressing tool location in either, but not both, top or bottom bore of the dressing arm. The position should be checked on assembly. (If in doubt, consult the manufacturer or your dealer.)***

Fig 10



Aligning for Height

5.1 Next check that the centre line of the diamond is within 0.125mm (.005in) of the centre line of the wheel spindle. To do this, mount the Optidress temporarily but firmly in position, with the spacer plate placed between the mounting pad and the Optidress.

5.2 Fit dressing arm and dressing tool. Lock in position.

5.3 With a dial indicator mounted on the work table (Fig 11) clock a convenient diameter of the wheel spindle. Set the dial indicator to zero in this position.

5.4 Assemble gauge blocks to the same height to give a zero reading.

5.5 Measure the diameter of the wheel spindle and divide it by two. From this figure subtract 6mm for metric shank diamonds (12mm) and 0.2188in for English shank (.4375in) (half the diameter of the diamond shank). This dimension (x in figure 11) should now be subtracted from the gauge blocks and the dial indicator lowered and zero'd on the gauge blocks.

5.6 Now measure the dressing tool shank with the indicator. If the tool is on the same centre line as the spindle it will read zero. Because the spacer plate has been made oversize to allow for adjustment to be made, the reading will be high. Note this reading.

Fig 11

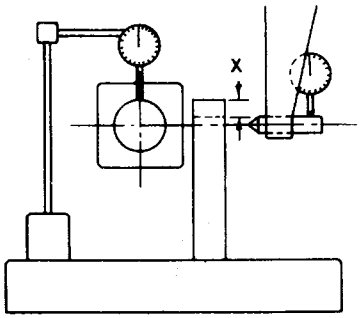
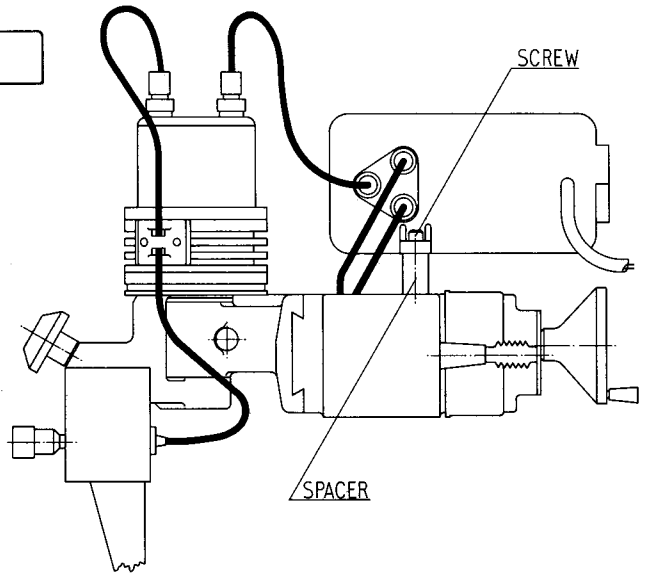


Fig 12



5.8 Dismantle the Optidress and remove the spacer plate.

5.9 Reduce the thickness of the spacer plate by the amount noted.

5.10 Re-mount the Optidress complete with spacer plate onto the pad and fasten down securely. Check to ensure that the dial indicator reads zero over the tool shank.

5.11 Place the DRO box in position with the screw and spacer to face towards the front of machine.

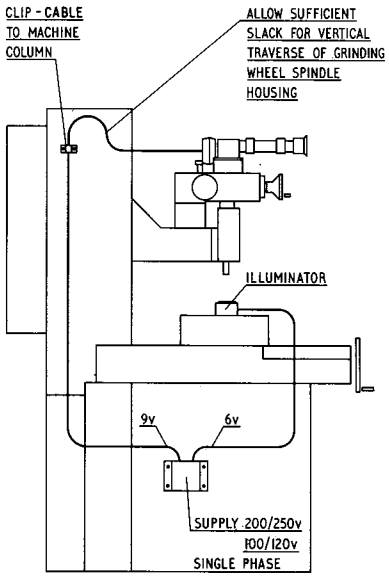
5.12 Connect plugs and sockets – see Fig 12.

5.13 At this point the transformer must be fixed at an appropriate position on the column (see Fig 13) and wired to the mains supply, single phase.

5.14 Connect power supply lead to 9V outlet on transformer. (3 pin socket).

5.15 Switch on.

Fig 13



Aligning for Parallelism

6.1 To initiate the measuring system, slowly actuate the radius slide assembly about its pivot until angular readings appear on the DRO.

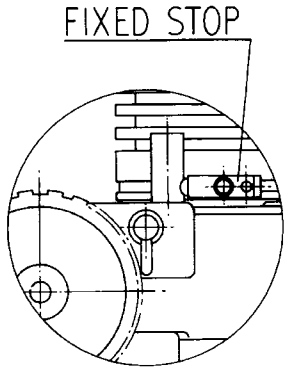
6.2 Carefully rotate the radius slide assembly to bring the fixed stop into contact with the stop post (Fig 14).

6.3 Press the Preset θ button. A reading 95° will appear on the DRO.

6.4 Rotate the radius slide until reading on the DRO is zero degrees. Set the radius slide in this position by moving the bottom pair of stops against the fixed post using the fine adjustment screws in the stops for final setting (Fig 15).

6.5 Mount a dial indicator in the dressing arm (Fig 15).

Fig 14



6.6 Mount a suitable angle plate on the work table so that it is parallel to the cross traverse of the machine using the dial indicator.

6.7 With the indicator still in contact with the angle plate traverse the Optidress tangent slide to check that it is parallel with the angle plate. (A zero reading must be maintained throughout the 32mm (11/4in) traverse).

6.8 To correct errors, slacken the 2 retaining nuts and move the Optidress to bring into true alignment.

6.9 Tighten down securely and re-check. Align the dressing tool with the reticle (Fig 16).

6.10 Refer to paragraph 3.13. Remove dial indicator and place a dressing tool in the hole aligned to the centre line of the grinding wheel spindle.

6.11 Place illuminator on the work table or chuck directly under the microscope and connect to transformer 6V outlet (Fig 13).

6.12 View the dressing tool through the microscope and adjust radius and tangent slides to bring the point of the tool co-incident with the edge of the vertical graduations in the reticle.

6.13 Still viewing the dressing tool through the microscope, move the tool along the reticle by actuating the tangent slide.

6.14 If the tool does not maintain coincidence with the line along its length, loosen the microscope pinch screw (Fig 8) and rotate microscope until alignment is obtained.

6.15 Tighten pinch screw (Fig 8) (refer to paragraph 3.13). Re-set to 95°.

Fig 15

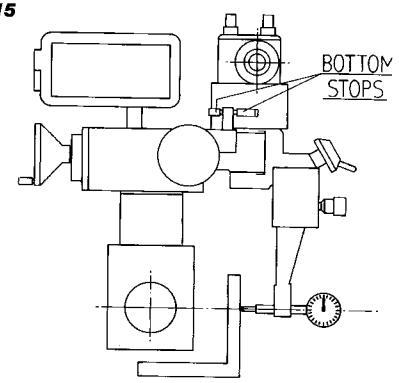
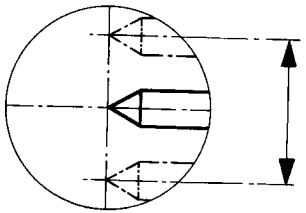


Fig 16



7 Centralising Dressing Tool Image to Reticle

7.1 Using the side of the dressing tool shank for reference bring the image of the shank coincident with the vertical axis of the reticle by rotating the radius slide and adjusting the tangent slide. (Fig 17a).

7.2 Rotate the radius slide through 180° and check the amount of offset the image is displaced on the reticle (Fig 17b).

7.3 Release the image adjusting screw on the top of the microscope extension tube (Fig 17d) and move to the left to halve the offset (Fig 17c).

7.4 Re-adjust tangent slide to bring the side of tool shank co-incident with the reticles vertical axis (Fig 17e).

7.5 Rotate the radius slide through 180° to check. If the adjustment has been made correctly the image of the side of the tool shank should be co-incident with the reticle axis (Fig 17f).

7.6 Rotate the radius slide through 90° and correct any offset in the image by moving image adjustment screw mounted on the side of the microscope extension tube to bring the image co-incident with the horizontal axis of the reticle (Fig 17g).

7.7 Lightly tighten the image adjusting screws and re-check centring.

Fig 17a

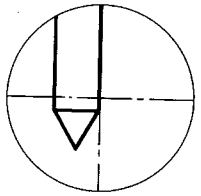


Fig 17b

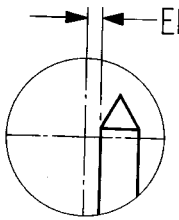


Fig 17c

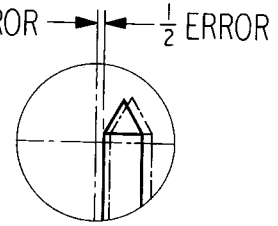


Fig 17d

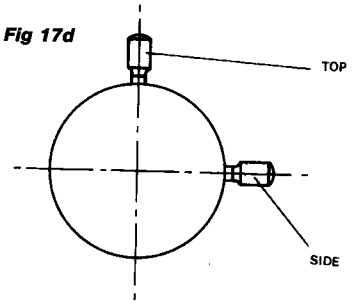


Fig 17e

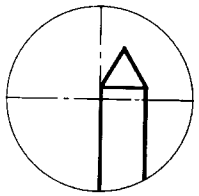


Fig 17f

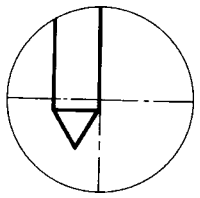
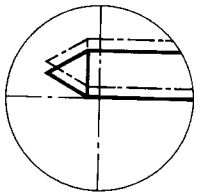


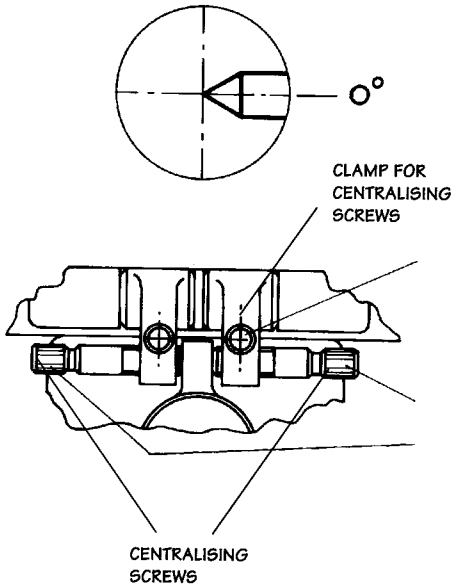
Fig 17g



8 Dressing Tool Centralising Stop

8.1 The Optidress is adjusted at the factory to ensure that the dressing tool bores are located centrally about the axis of the microscope. Should any re-setting be found necessary, the centralising screws must be released before any correction is made. The stops must be set to give the minimum of movement on the tangent slide consistent with the ease of operating the stops. Always lock the centralising screws in position when adjustments have been made. (Fig 18a)

Fig 18a



9 Wheel Forming information

9.1 ***Note*** – It may be necessary to rough-out the form using a worn dresser if the initial stock removal is large. The Polytip should then be rotated to present a new point for finish dressing and subsequent re-dressing (See Section 14).

9.2 Abbreviations used in diagrams.

Stop Pin Position		*Stop Ring Position*		*Lift Tangent Stops*	
Top	*T*	*Top Right*	*T.R.*	*Left Stop*	*L.S.*
Mid	*M*	*Top Left*	*T.L.*	*Right Stop*	*R.S.*
Bottom	*B*	*Mid Right*	*M.R.*		
		Mid Left	*M.L.*		
		Bottom Right	*B.R.*		
		Bottom Left	*B.L.*		
		Angle Lock	*A.L.*		

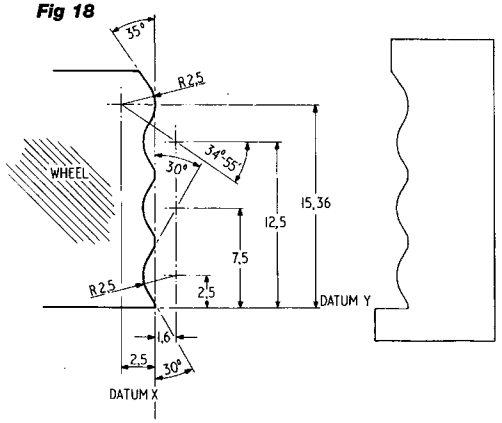
10 Example One

10.1 With dresser centralising stops engaged, set dresser point to the centre line of the reticle. Clamp. Zero R (See Fig 18).

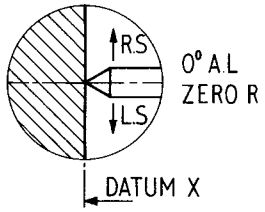
10.2 Rotate radius slide to 0°. Lock in position with angle lock.

10.3 Move slide Y so that the dresser is central to wheel width.

Fig 18



10.1
10.4



10.4 Release centralising stops. Use X slide to contact dresser with wheel. Dress periphery using tangent slide. Zero X. Move dresser away from wheel. Re engage centralising stops.

10.5 Move slide Y so that the dresser is just clear of front face of wheel.

10.6 Release angle lock. Rotate radius slide clockwise to +90°. Lock angle Lock. Release centralising stops. Lightly dress front face of wheel with tangent slide using slide Y to feed into wheel. Zero Y. Engage centralising stops. Datum is now established for X, Y and R.

10.7 Move slide X +3.0 to clear dresser of wheel. Release angle lock. Rotate to 0°. Move slide R to R -2.5 clamp. Check with microscope. Move slide Y to -2.5.

10.8 Using top pair of stops. Adjustable stop post in top position. Rotate radius slide to + 30° clockwise. set RH stop. Rotate radius slide to -30° anti-clockwise, set LH stop.

10.9 Gradually feed dresser into wheel using slide X rotating radius slide through 60° arc. At each end of arc movement disengage appropriate centralising stop to dress tangents using the tangent slide. Disengage only one stop at a time and lower the stop before the radius is dressed again. Continue this operation until dimension +1.6 is reached.

10.10 Retract dresser with slide X. Move slide Y to -7.5 and repeat operation 10.9.

10.11 Retract dresser from wheel. Move slide Y to -12.5. Using middle pair of angle stops and the stop post in its mid position, rotate radius slide clockwise to +34° 55' set RH stop. Rotate radius slide anti-clockwise to -30°. Set LH stop. Gradually feed dresser into wheel using slide X. Rotating radius slide through 64° 55' arc and dress tangents as described in 10.9 until +1.6 is reached.

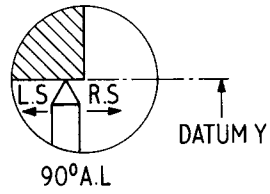
10.12 Retract dresser with slide X. Move slide Y to -15.36. Reset dresser to radius R +2.5 Clamp. Check with microscope.

10.13 Using bottom pair of angle stops and the stop post in its bottom position, rotate radius slide clockwise to +34° 55' set RH stop. Rotate radius slide anti clockwise to -35°. Set LH stop. Gradually feed dresser into wheel using slide X rotating radius slide through 69° 55' arc and dress tangent retracting only the RH centralising stop. Continue this operation until dimension -2.5 is reached. The profile is now complete and ready to grind form. The dressing arm complete with dresser can now be removed, if necessary, to allow wheel guard to be closed. When the dressing arm is replaced for re-dressing, be sure that the mating surfaces are thoroughly cleaned to ensure accurate re-location. In order to identify which axis is being used the measuring system requires an initial movement before displaying the reading on the Digital Read Out. Although no measurement is lost, the first increment of 0.002in or 0.0001in will not be displayed. If it is essential to display this initial measurement on the DRO it will be necessary to operate the appropriate axis select key before adjusting the axis.

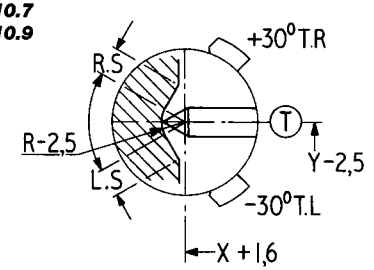
Re-setting after switching off at end of working period. As the unit has no memory, before switching off to avoid unnecessary re setting of the established zero datums, all axes should be brought back to these datum settings. Depending on the form being dressed, it may be necessary to set an angular stop to zero° in order that the angular datum can be re established.

When re-commencing work, the unit is switched on in the prescribed manner (1.24) and radius slide rotated to the set zero stop. The select axis key must be pressed in sequence with the datum zero key to re-establish datums.

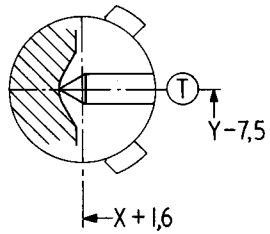
10.5
10.6



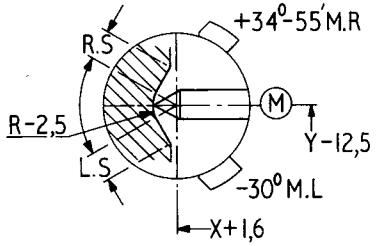
10.7
10.9



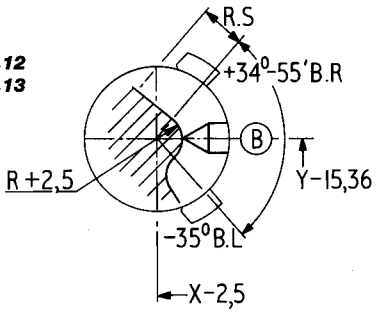
10.10



10.11



10.12
10.13



Example Two

Fig 19

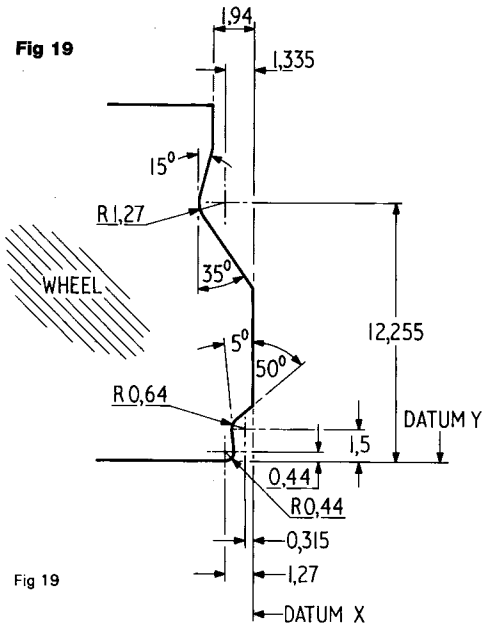
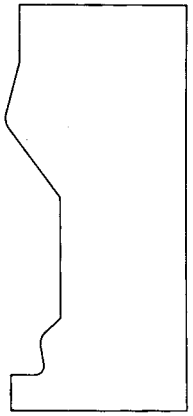


Fig 19



11.1 With dresser centralising stops engaged, set dresser point to the centre line of the reticle. Clamp. Zero R. (See Fig 19).

11.2 Rotate radius slide to 0°. Lock in position with angle lock.

11.3 Move slide Y so that the dresser is central to wheel width.

11.4 Release centralising stops. Use X slide to contact dresser with wheel. Dress periphery using tangent slide. Zero X. Move dresser away from wheel. Re engage centralising stops.

11.5 Move slide Y so that the dresser is just clear of front face of wheel

11.6 Release angle lock. Rotate radius slide clockwise to + 90° set RH bottom stop. Lock angle lock. Release centralising stops. Lightly dress front face of wheel with tangent slide using slide Y to feed into wheel. Zero Y. Engage centralising stops. Datum is now established for X, Y and R.

11.7 Move slide X to + 3.0 to clear dresser of wheel. Rotate to 0° Move slide R to -1.27 and clamp. Check with microscope. Move slide Y to -12.255.

11.8 Using top pair of stops. Adjustable stop post in top position. Rotate radius slide to +15° set RH stop. Rotate radius slide to -35° set LH stop.

11.9 Gradually feed dresser into wheel using slide X rotating radius slide through 50° arc At each end of arc movement disengage appropriate centralising stop to dress tangents using the tangent slide. Disengage only one stop at a time and lower the stop before the radius is dressed again Continue this operation until -1.335 is reached

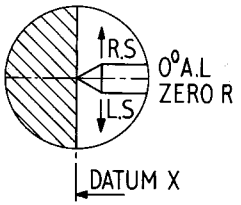
11.10 Retract dresser with slide X. Move slide Y to -1.5. Set slide R to -0.64 Clamp. Use middle RH stop and bottom LH stop with stop post at mid position. Rotate radius slide to +50° set RH middle stop. Rotate radius slide to -5°. Set LH bottom stop. Gradually feed dresser into wheel using slide X. Rotating radius slide through 55° arc and dressing tangents as described in 11.9 until -0.315 is reached .

11.11 Retract dresser with slide X. Move slide Y to -0.44. Set slide R to 0.44 Clamp. Using bottom row of stops set RH stop to +90°. LH stop is already in position -5

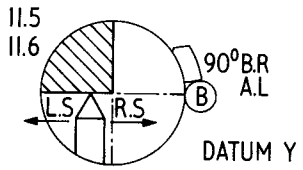
11.12 Gradually feed dresser into wheel using slide X rotating the radius slide through 95° arc. Releasing RH centralising stop only to dress 5° tangent to blend. Continue this operation until -1.27 is reached. Move slide X to clear dresser from wheel.

11.13 Set slide R to zero Rotate radius slide to 0° . Lock with angle lock. Move slide Y to -12.255. Raise RH centralising stop. Actuate the tangent slide, gradually feeding the dresser into the wheel with slide X until -1.94 is reached. The profile is now complete and ready to grind form. The dresser arm complete with dresser can now be removed, if necessary, to allow wheel guard to be closed. When the dressing arm replaced for re-dressing, be sure that the mating surfaces are thoroughly cleaned to ensure accurate re-location. With the exception of the bottom LH stop all angular settings can be used for re-dressing. (It will be necessary to release the 5° bottom LH stop to dress the 35° angle).

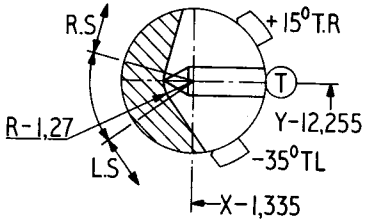
11.1
11.4



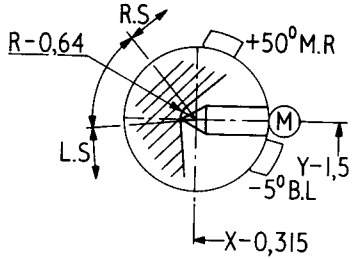
11.5
11.6



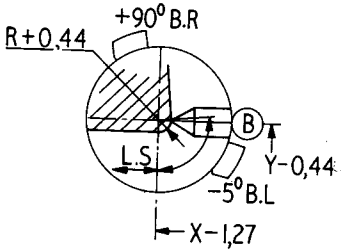
11.7
11.9



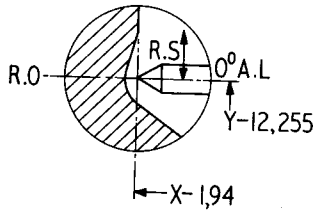
11.10



11.11
11.12

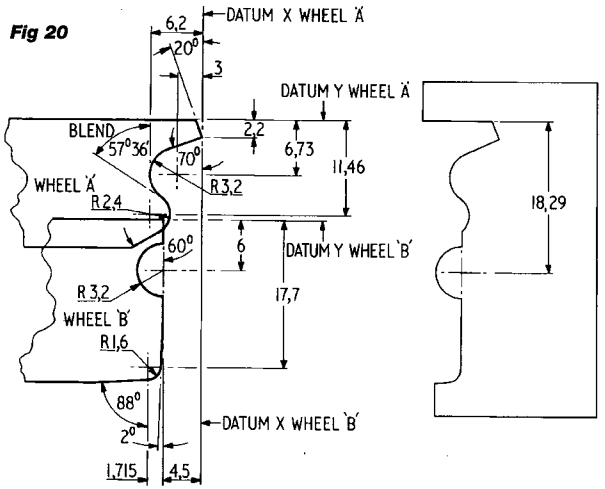


11.13



Example Three

Fig 20



WHEEL A. 1 6mm wide (Fig 20)

12.1 Engage centralising stops. Set standard dresser point to centre line of reticle with slide R. Clamp.

12.2 Rotate radius slide to 0°. Lock in position with angle lock.

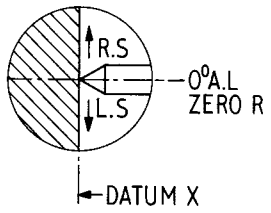
12.3 Move slide Y so that the dresser is central to wheel width. Release centralising stops. Use slide X to contact dresser with wheel. Dress periphery using tangent slide. Zero X. Move dresser away from wheel. Re-engage centralising stops.

12.4 Move slide Y so that the dresser is just clear of back face of wheel.

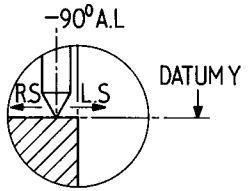
12.5 Release angle lock. Rotate dresser to -90°. Lock with angle lock. Release centralising stops. Lightly dress back face of wheel with tangent slide, using slide Y to feed into wheel. Zero Y. Engage centralising stops. Datum is now established for X and Y.

12.6 Move the dresser clear of wheel with slide X to +10. Rotate radius slide +90°. Release dressing arm clamp. Withdraw dressing arm complete with dresser.

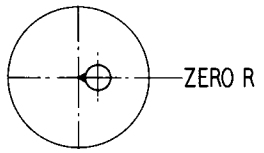
12.1
12.3



12.4
12.5



12.7
12.8



12.7 Unclamp the dressing tool and remove from arm. Replace with 180° radius attachment fitted with dresser 663 256D. Re-fit dressing arm with attachment and clamp Set dresser as described in section 14 10.

12.8 Set dresser point on centre line of reticle Zero R. Move R to -3.2 clamp. Check with microscope Using middle ring of stops and stop pin the mid position set RH stop to +70° and LH stop to the tangent angle of -57° 36'

12.9 Move slide Y to +6.73 Gradually advance dresser with slide X into wheel rotating through 127° 36' arc and dressing tangents until X = -3.

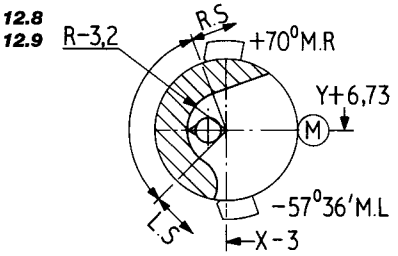
12.10 Lower stop pin to bottom position. Move dresser clear of wheel using slide X. Set R = 0. Rotate radius slide to -20°. Lock with angle lock. Move slide Y to +2.2. Set dresser to reticle centre line R = 0. Release centralising stops. Gradually feed dresser into wheel, operating the tangent slide, until X = 0. Move dresser away from wheel.

12.11 Re-engage centralising stops. Unlock angle clamp. Using top RH stop only set to +60°. The stop pin in the upper position will operate between the top RH stop and the middle LH stop at -57° 36'. Set dresser with the R slide to +2.4. Move slide Y to +11.46.

12.12 Gradually feed dresser into wheel using X slide rotating the dresser through 117° 36' arc dressing the 60° tangent by raising only the LH centralising stop. The RH centralising stop remains in the engaged position. This operation is continued until X = -6.2. The wheel A is now completely formed.

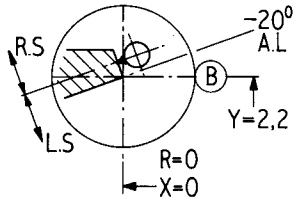
N.B. ***When re-dressing becomes necessary, operations 12.1 -12.7 inclusive are omitted. The dresser should be checked for wear with the microscope and re-centred with slide R and zeroed by pressing datum zero key. Set slide X to 0 move it to, say, -0.25 or whichever re-dressing increment is necessary. Press the datum zero key to reset slide X to zero. The wheel can then be redressed. Note that the angular stops are already in their set positions***

12.8
12.9

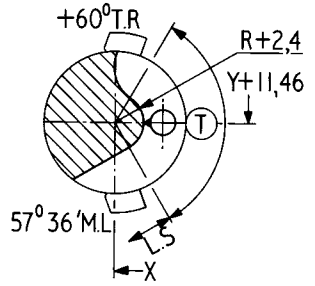


12.13
12.15

12.10



12.11
12.12



WHEEL B. 20mm wide

12 13 Engage centralising stops. Set standard dresser point to centre line of reticle with slide R. Clamp.

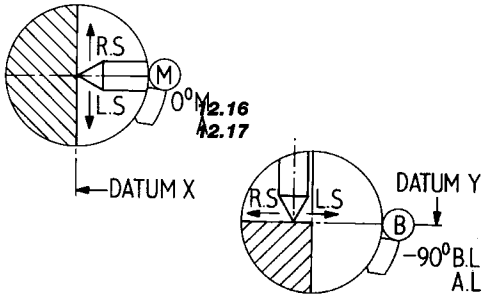
12.14 Rotate radius slide to 0°. Set LH stop of the middle ring. Stop pin in upper position. Lock angle lock.

12.15 Move slide Y so that the dresser is central to wheel width. Release centralising stops Use slide X to contact dresser with wheel. Dress periphery using tangent slide. Zero X. Move the dresser away from wheel. Re-engage centralising stops.

12.16 Move slide Y so that the dresser is just clear of back face of wheel.

12.17 Release angle lock. With stop pin in bottom position, rotate the radius slide to -90° set bottom LH stop, lock angle lock. Release centralising stops. Lightly dress back face of wheel with tangent slide. Using slide Y to feed into wheel. Zero Y. Engage centralising stops. Datum is now established for X and Y. Release angle lock.

12.16
12.17



12.18 Move the dresser clear of wheel with slide X to +10. Rotate the radius slide to +90°. Release dressing arm clamp. Withdraw arm complete with dresser.

12.19 Unclamp dresser and remove from arm, replace with 180° radius attachment fitted with dresser 663 256D. Re-fit dressing arm with attachment and clamp. Set dresser as described in section 14.11.

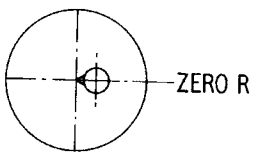
12.20 Set dresser point on centre line of reticle. Zero R. Move R to -3.2. Check with microscope. Use bottom ring of stops. Stop pin in bottom position. Rotate radius slide to +90° set RH stop. Rotate radius slide to -90°. LH stop is already set as in 12.17. Move slide Y to +6. Gradually feed dresser into wheel using slide X, rotating dresser through 180° until X = 0.

12.21 Move dresser away from wheel with slide X to +4. Set slide R to +1.6.Use top ring of stops and stop pin in top position. Rotate radius slide to +2° set LH stop. Rotate radius slide to +88° set RH stop.

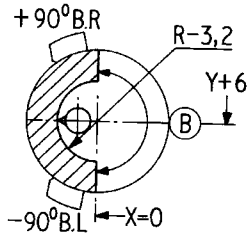
12.22 Move slide Y to +17.7. Gradually feed dresser into wheel using slide X, rotating through 86° arc operating the tangent slide by alternately raising and lowering centralising stops until -1.715 is reached. Wheel B is now completely formed.

N.B. ***When re-dressing becomes necessary, operations 12.1 -12.7 inclusive are omitted. The dresser should be checked for wear with the microscope and re-centred with slide R and zeroed by pressing datum zero key. Set slide X to 0 move it say to - 0.25 or whichever re-dressing increment is necessary. Press the datum zero key to reset slide X to zero. The wheel can then be redressed. Note that the angular stops are already in their set positions.***

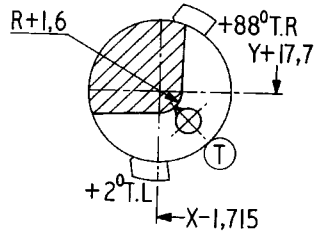
12.18
12.18



12.20

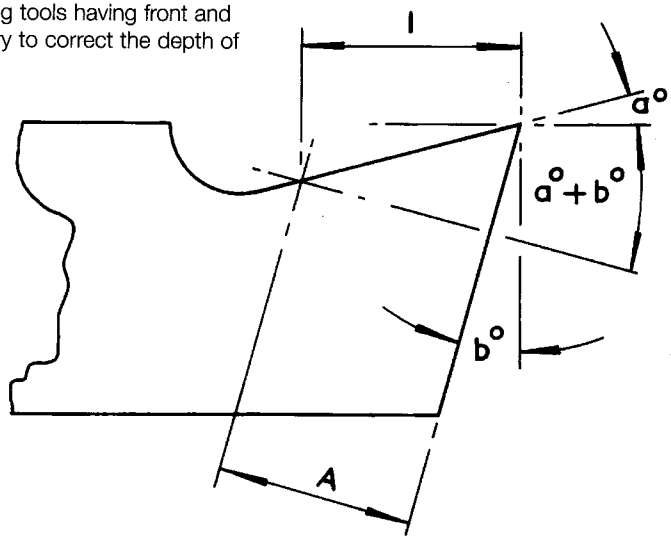


12.21
12.22



13 Form Correction of Forming Tools

13.1 When dressing wheels which are to be used for forming cutting tools having front and top rake, it is necessary to correct the depth of the wheel form.



CONSTANT (A)

a°	b=6°	b=8°	b=10°
2°	9909	9854	9787
3°	9890	9830	9757
4°	9872	9805	9727
5°	9854	9781	9696
6°	9835	9756	9666
8°	9798	9707	9604
10°	9761	9657	9542
12°	9723	9607	9479
15°	9665	9530	9383

By using the following formulae the amount of correction can be determined.

$$A = \frac{1}{\cos a} \times \cos(a+b) = \frac{\cos(a+b)}{\cos a}$$

where A = the depth of the form required on the grinding wheel

1 = the depth of the form required to be turned

for example: A tool having a 5° top rake and an 8° front rake alters a depth of 0.25in by

$$\frac{\cos(5° + 8°)}{\cos 5°} = 0.9781$$

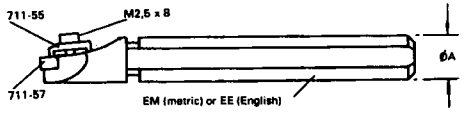
0.250in x 0.9781 in = 0.2445in, the true depth of form on the grinding wheel.

Dressing Tools

14.1 Poly-Tip tools are the low cost alternative to expensive lapped diamonds. Our factory tests prove that POLY-TIP cuts, rather than crushes the wheel grit. This action reduces dressing temperature and results in a freer cutting wheel that imparts a superior finish with less frequent dressing.

As each point becomes worn, Poly-Tip is rotated to a new position and, finally, turned over and the procedure repeated. By this means, six separate dressing points can be utilised.

14.2 Poly-Tip and Holder



	ØA	Stock No.
Holder complete (less tip)	12mm or .4375in	EM or EE
Poly-Tip (Blister Pack of 3)		711-57
Clamp		711-55
Socket Screw		M2,5 x 8
Hex Wrench		711.58

14.3 Poly-Tip setting instructions

14.4 Switch off grinding machine before setting or re-locating dressing tips.

14.5 Poly-Tip is supplied in a blister pack for convenience of storage and as a safeguard against loss. To free tips, cut bubbles with a sharp knife.

14.6 Mount Poly-Tip polished face downward on toolholder seating and locate firmly against toolholder shoulder so that both sides protrude more or less equidistantly, Fig 22(a). Clamp tip in position, Fig 22(b).

14.7 Insert toolholder in dressing arm and set tip profile to reticle cross-line by adjusting centralising stops and viewing through microscope in the usual manner, Fig 22(c).

14.8 After the point has worn to a maximum 1,2mm (0.05in.) radius, the tip should be rotated through 120° to bring a new point to the dressing position, Fig 22(d). After the three tips on one face of the POLY-TIP are used, it should be turned over and the procedure repeated, Fig 22(e)

Fig 22(a)

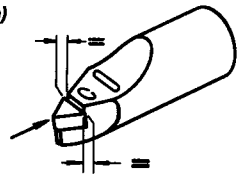


Fig 22(b)

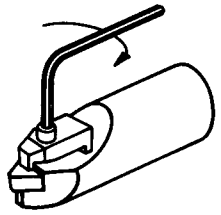


Fig 22(c)

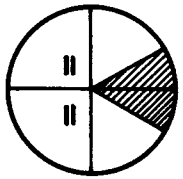


Fig 22(d)

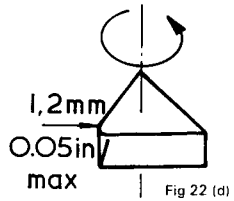


Fig 22 (d)

Fig 22(e)

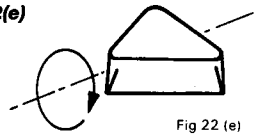
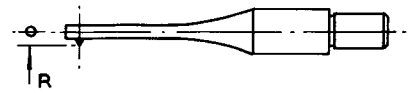
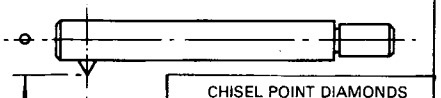


Fig 22 (e)

14.9 180° Radius Dressing Attachment

This attachment is used in place of the POLY-TIP DRESSING TOOL when forming full 180° concave radii. The attachment locates on the dressing arm in one of two positions dependent upon the correct distances required for focusing as shown in Figs 23 and 24 the diamond holder is located on ground pins and is locked in position with the dressing tool clamping screw.

14.10

180° CONCAVE RADIUS DRESSING ATTACHMENT OF DIAMONDS		Stock No.
180° ATTACHMENT LESS DIAMONDS		711.A39
RAT TAIL DIAMONDS	R	
	0,87mm 0.034in	663.256B
	1.98mm 0.078in	663.256C
	2.95mm 0.117in	663.256D
 CHISEL POINT DIAMONDS Shown mounted in diamond post	6,35mm 0.25in	663.271

14.11 Fitting and setting the diamond

The diamond 663-256 rat-tail (Fig 23) and 663-271 chisel point (Fig 24) locate in a bore in the diamond holder(a) and are automatically aligned with the centre line of the reticle. The diamond point will require positioning about its axis to ensure that the 180° of rotation corresponds to the 180° ordinate on the reticle, as seen through the microscope. Set the two bottom stops to read +90° -90° on the DRO and then rotate the diamond so that when the dressing arm is against the stops the diamond point is on the vertical ordinate in each position. When the diamond is set correctly, lock it in position with screw (c).

14.12 Use of diamond steady

The smaller diamonds, particularly 663-256B, may vibrate under dressing load. To overcome this possibility, a steady is provided (b Fig 23). The steady is brought into contact with the diamond by rotating it in a clockwise direction. This causes a deflection which is sufficient to dampen any vibration present. It is important that the diamond is deflected by the correct amount. Too much deflection will cause vibration in the same way as an unsupported diamond. Experiment will determine the correct amount of deflection, but as a guide a deflection of 0.05mm (0.002in) should produce a smooth cutting action. This measurement is obtained by setting the dressing arm at 0° and the diamond coincident with the reticle cross line. Zero R. Move slide R to 0.05mm (0.002in) then rotate the steady to bring the diamond again in coincidence with the reticle cross line. Reset R to zero.

14.13 Rate of feed

When forming concave radii the best feed for each pass will vary according to size of tool used. As a guide the maximum feed for a 1.25mm (0.05in) radius using tool 663-256B is 0.025mm (0.001in) per pass.

Fig 23

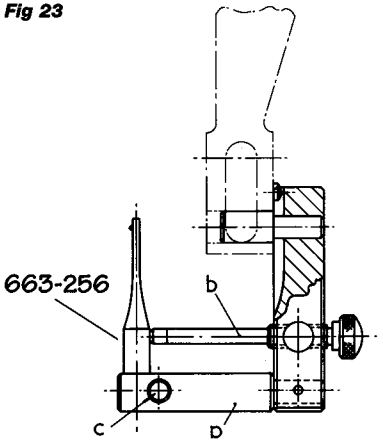
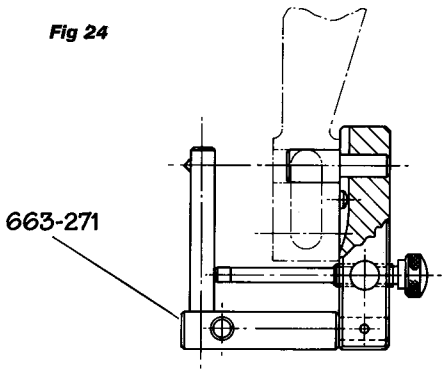


Fig 24



15 Types of Grinding Wheel

15.1 When dressing forms which include concave radii, do not use wheels with grit coarser that 100 or harder than grade H or G. Coarse grit wheels are not suitable for forming small radii They may also tear the diamond from its seating.

15.2 Grinding Wheel Recommendations In general, we recommend that the dressing tools listed for use with the OPTIDRESS E are not used with wheels outside the following categories, which also include aluminium and silicon carbide.

Grit Size	60	80	100	120
Grade	G H I			

The 46J grinding wheel, commonly supplied by some grinding machine manufacturers, is not suitable for form grinding or form generation with the dressing tools listed. Should the use of wheel grits and grades other than those mentioned above be required, we suggest that you consult your local diamond supplier.

16 Radius Arm Bearing

The Optidress, in common with all items of precision equipment, required regular maintenance of parts subject to friction and wear.

The most frequently used and extensive movement is centred around the microscope tube which acts as the pivot of the radius arm casting carrying the radius slide, the tangent slide and the dressing arm. The cleaning and lubrication of this bearing assembly on a regular basis (say every 200 working hours) is particularly important and is effected by the following procedure:

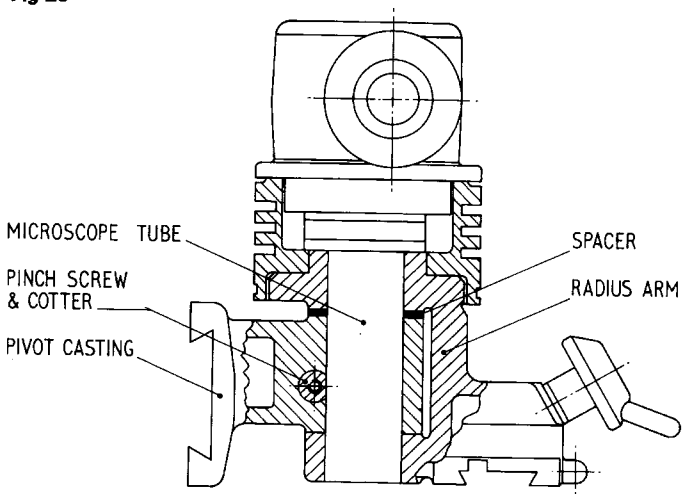
16.1 Release the microscope by undoing the pinch screw, located at the rear of the pivot casting Fig 25, **six turns to free the cotter**. Then dismantle in the reverse order as described in section 3 – 3.14.

16.2 Using a clean dry cloth, thoroughly wipe the bore of the pivot casting, the radius arm and spacer, the end bearing surfaces and the microscope tube.

16.3 Re-assemble as in 3 – 3.14 and re-align the microscope as in 6.11 onwards to 8.1.

Maintenance

Fig 25



17 The Slides

To get the best results from the Optidress, check all slides regularly and adjust for wear if necessary.

17.1 Co-ordinate slides (the adjusting of) Fig 26 and 26A.

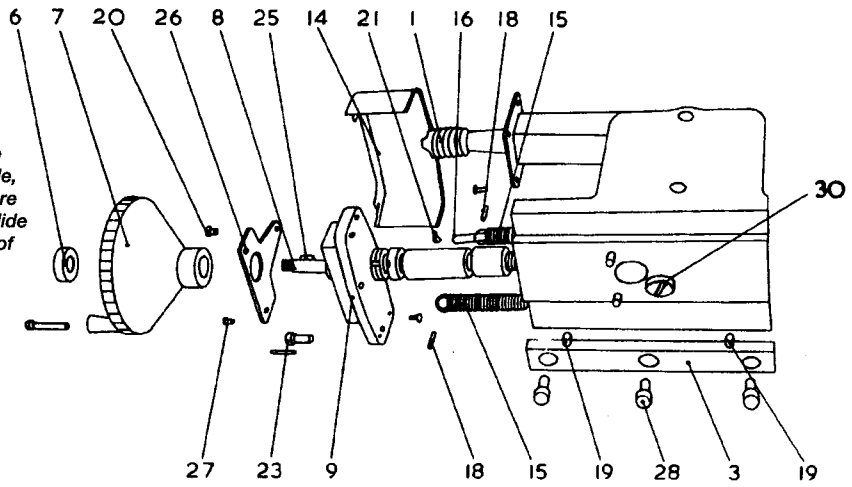
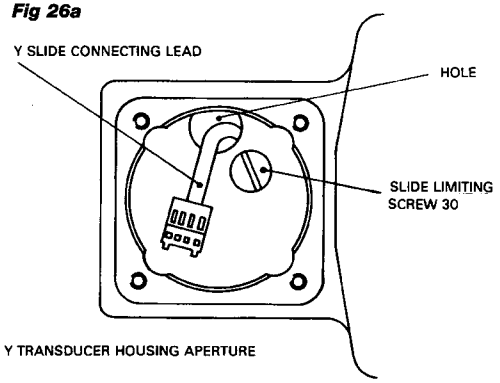


Fig 26 . Although this figure illustrates the X slide, the details shown are common to the Y slide with the exception of Detail 30.

Fig 26a



17.2 Before attempting adjustment of the X slide, wind the Y slide out to its fullest extent.

17.3 Remove the screw (20) from the Y slide transducer.

17.4 Remove the 4 screws holding the transducer in position.

17.5 With the transducer connecting rod 1 free of the drive arm (26), withdraw the transducer from its housing and disconnect the wafer connector.

17.6 Carefully put the transducer to one side.

17.7 Wind the X slide out to its fullest extent and repeat operation 17.3 to 17.6.

17.8 Set the X slide so that hole and slide limiting screw (30) in the face of the main back casting are clearly visible through the Y transducer housing aperture.

17.9 Carefully feed the Y slide connecting lead back through the hole in the main back casting taking care not to sever or strain the small wires going to the connector body. See Fig.26a.

17.10 Remove the slide limiting screw (30).

Radius Setting Slide Adjustment

17.11 Remove the slotted retaining nut (6) with service tool supplied and release handwheel (7) ensuring that the Woodruff key (25) is not lost.

17.12 Remove the three countersunk socket screws (27) retaining the outrigger (26) and take away to reveal the two retainer pins (18) holding the back lash eliminating springs (15) together with the integral slide restricting device (16) (upper hole only).

17.13 Carefully remove pins (18).

17.14 Remove the 2 screws (21) retaining the plastic slide cover (14) and gently pull to one side away from the slide assembly to disconnect from the thrust plate (9). Do not attempt to take away completely.

17.15 Remove the 3 cap screws (23) retaining the thrust plate (9) and take away complete with the feed screw (8).It will be necessary to turn the feed screw until it is free of the machine nut.

17.16 Remove the plastic slide cover (14).

17.17 Take the slides apart and carefully clean with paraffin (kerosene). (Avoid contact of the cleaning fluid with the transducer).

17.18 If play is found in the slides slacken the 3 cap screws (28) retaining the adjustable dovetail section (3).

17.19 Carefully adjust the 2 socket grub screws (19) in the side of the dovetail section to take up the wear.

17.20 Tighten the 3 cap screws and re-check the fit of the dovetail. It is possible that the tightening of the screws will slightly alter the fit. If this happens lightly tap the section with a soft mallet until the adjusting screws are in contact with the register.

17.21 Lightly smear with oil and re-assemble In reverse order.

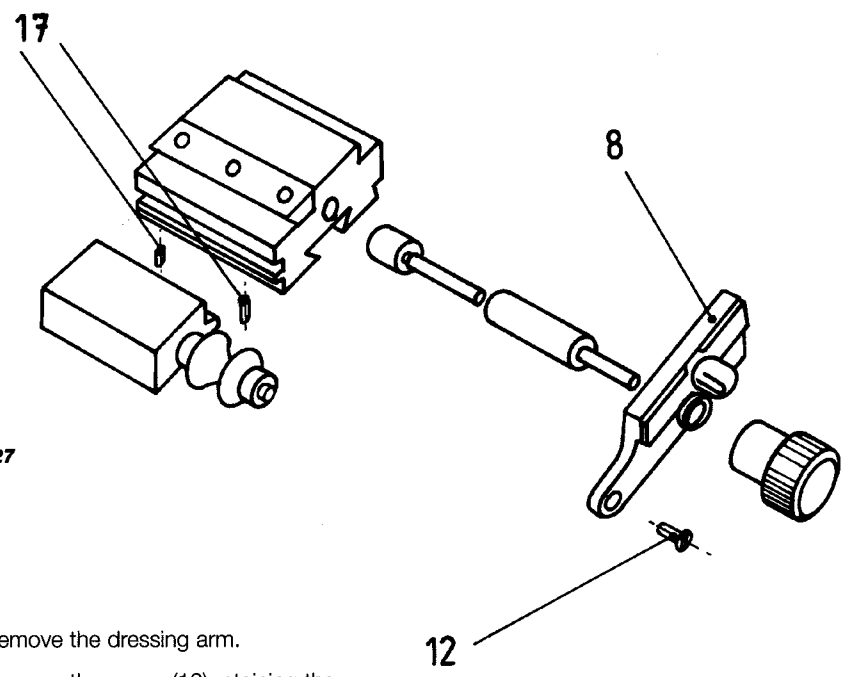


Fig 27

18.1 Remove the dressing arm.

18.2 Remove the screw (12) retaining the transducer connecting rod.Carefully grip the end of the connecting rod cover adjacent to the support plate (8) when removing this screw to avoid damaging the transducer.

18.3 Slacken the 2 socket grub screws (17) on the lower edge of the radius setting slide.

18.4 Remove the radius transducer socket from the top of the microscope.

18.5 Remove the 2 countersunk screws retaining the flexible conduit to the angle stop cylinder and take away transducer.

18.6 Lift the two centralising stops.

18.7 Remove the two screws retaining the thrust plate.

18.8 Proceed as for the cross slides from instruction 17.10 onwards.

NOTE ***When refitting the transducer, set the radius slide in the fully closed position. Slide the tenon on the side of the transducer body into the slot provided and guide the connecting rod into the hole in the support plate. Fit the connecting rod retaining screw(12). Do not tighten. Carefully push the transducer body towards the thrust plate outrigger until pressure is felt. Carefully pull backwards 1.5mm (1/16th inch) and lock in position with the 2 socket grub screws (17). Carefully tighten the connecting rod retaining screw (12) whilst holding the bellows adjacent to the outrigger.***

Tangent Slide Adjustment

This slide is operated by a rack and pinion and the following repetitions procedure should be used for adjustment.

Follow the instructions for the Radius Setting Slide up to instruction 18.5 and proceed as follows.

19.1 Remove screw (1 Fig 28) to release transducer cover.

19.2 Remove the six screws (2 Fig 28) three on each side of the slide, and allow the transparent cover to slide into the housing.

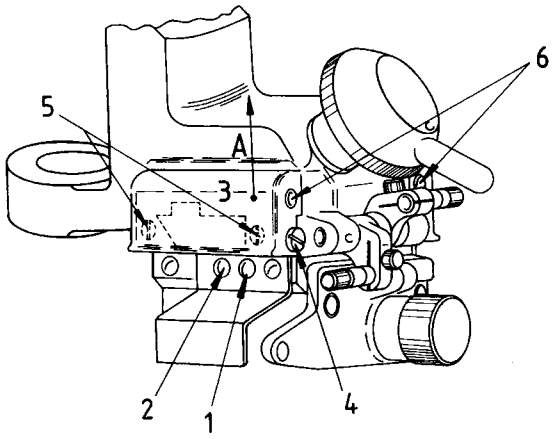
19.3 Remove the four screws (4) holding the two covers (3) and lift the covers in the direction of the arrow (A) clear of its retaining pegs. Remove the cover.

19.4 Remove the two screws (5) from each of the two end stops and remove the stops.

19.5 Take the slides apart and thoroughly clean with paraffin (kerosene).

19.6 Adjust the dovetail keys as described from 17.17 onwards. When re-assembling the slide be sure that the transparent cover is tight over the slide. The left hand cover is tensioned by loosening the 8BA screw in the end of the spindle (6) and turning the spindle (6) in a clockwise direction a maximum of nine turns. The right hand spindle turned in an anti-clockwise direction. Then re-tighten the 8BA screw.

Fig 28

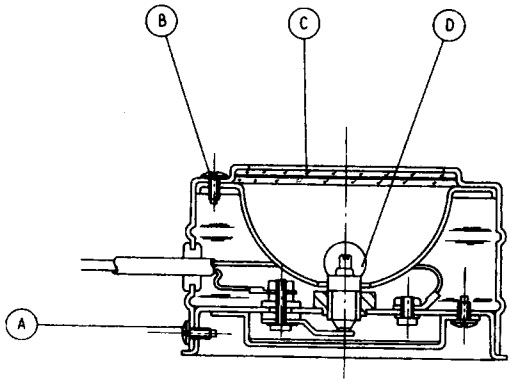


20 Illuminator

To renew the bulb (D) remove the three screws (A). To renew the diffusion screen (C) remove the three screws (B) also. Do not overtighten these screws when re-assembling.(Fig 29)

Replacement bulbs are 6V 3W M.E.S. 11 mm.

Fig 29



20.1 Transformer To ensure against damage or interference to the DIGITAL READOUT, the low voltage transformer has a built in mains filter and is supplied with secondary outputs. 6V-6VA for the ILLUMINATOR and 9V. 12VA for the DIGITAL READOUT.

21 Setting Objectives for Optidress E

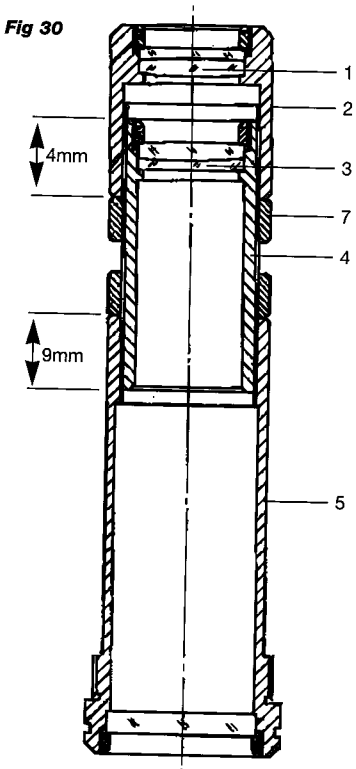
If it should be necessary to dismantle the objective lens cell for cleaning or adjustment, use the following instructions for assembly and adjustment. (Fig 30)

21.1 Assembly When re-fitting lenses or cover glasses it is important that the locking rings that retain them in their cells are not over-tightened. Over tightening will cause strain in the glasses and impair optical quality. All glasses must be assembled before setting the objective, including the cover glass.

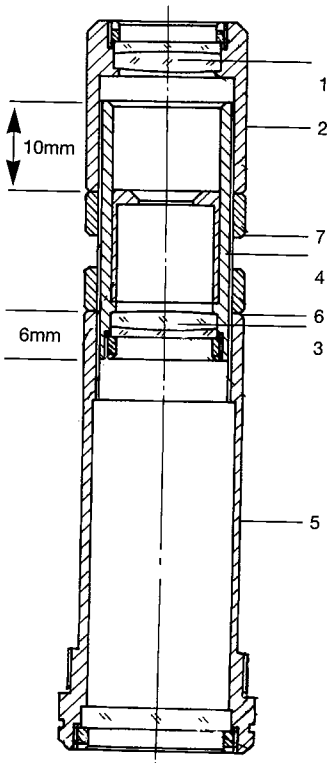
21.2 The achromatic lens (1) is fitted in its cell (2) with the curved surface facing downwards.

21.3 The achromatic lens (3) is fitted in its cell (4) with the curved surface facing upwards.

Fig 30



146mm 5.75in STD Focus
711-SA123 STD



171.4mm 6.7in EXT Focus
711-SA123 EXT

21.4 Assemble cells to the dimensions on Fig 30. This will give a good initial setting.

Adjustment

To obtain correct magnification.

21.5 Adjust the eyepiece to bring reticle sharply into focus.

21.6 With a test piece (see Fig 31)

21.7 Screw or slide the objective into the microscope tube until the image of the test piece appears sharp in the eyepiece.

21.8 Check size of the image against the reticle scale. (10mm for Metric and 0.4in for English).

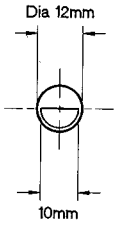
21.9 If the image is too small when compared against the reticle, it will be necessary to screw the lens cell (2) into the cell (4) and so bring the lenses closer together. This will make the image bigger. Moving lenses apart makes image smaller.

21.10 Repeat steps 21.7 to 21.9 until focus and size are correct

21.11 When focus and size are correct, (***taking note of the number of turns or parts of a turn***) screw the complete objective into the microscope tube, until the objective seats onto the bottom of the microscope tube.

21.12 Remove the objective from the microscope and screw lens cell (2) and (4) into (5) by the identical amount of turns noted in 21.11. Lock the cells locking rings (6) and (7)

21.13 Refit the objective assembly into the microscope tube and check focus and size, it may be necessary to adjust the size, lock objective onto microscope tube.



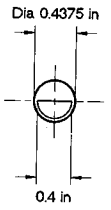
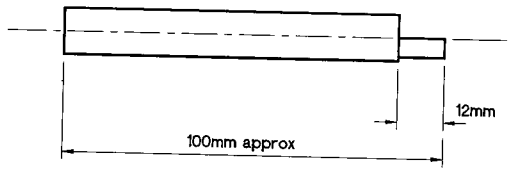
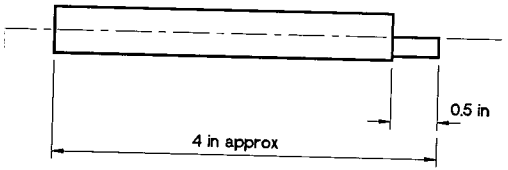


Fig 31



Metric test piece



English test piece

PG Technology Limited

PG Technology Limited
Mill Green Road
Mitcham Junction
Surrey, England CR4 4TX

Telephone 0181 648 9461
Fax 0181 685 9638

A part of
COMSAT

options, attachments and accessories

Fig. 1

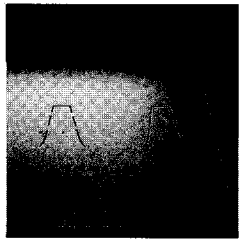


Fig. 2

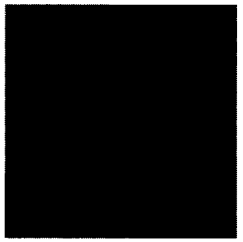


Fig. 3

In accordance with our policy of continued improvement, details and specifications are liable to change without notice.

Options

System 620 *Fig. 1*
Eliminates 'down time' and off machine inspection. A versatile closed circuit camera/monitor system, with precision slides and digital read-out. Designed to complement Optidress E to give 'on machine' high precision non-contact measuring and checking, of wheel and workpiece, through to completion of the grinding operation.

System 620 Image Overlay Unit *Fig. 2*
Developed to increase performance and flexibility. Via an Opto-electronic interface, enlarged 'in-house' produced drawings of workpiece profiles, can be shown on the System 620 monitor. The drawings are enlarged to suit the magnification, and displayed superimposed over the magnified workpiece profile, for direct measurement. This is a highly flexible inspection facility, and modifications are simple to implement.

Projectdress E. *Fig. 3*
Grinding Wheel Dresser for high precision wheel profiling on cylindrical grinding machines.

Attachments and accessories

Roughing and Finishing Dressing Tool Attachment *Fig. 4*
A major time saver, tool change over is achieved by rotating the tools through 180 degrees.

180 Concave Radius Dressing Attachment *Fig. 5*
Dresses concave radii down to 0,86mm (0.034 in).

Microdress Wheel Thinning Attachment *Fig. 6*
For fine limit precision ground slots, typically in electronic component tooling.

Diamond Wheel Dressing Attachment *Fig. 7*
Form profiles resin bonded diamond wheels 'fast'.

Rotary attachment *Fig. 8*
Enables cylindrical grinding operations to be performed on surface grinders.

Poly-Tip
Six grinding wheel dressing points, for long life and maximum economy. Significantly cheaper than natural diamonds.

Fig. 4

Fig. 5

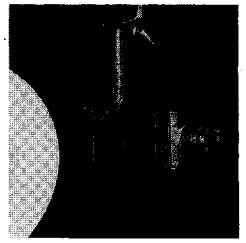


Fig. 6

Fig. 7

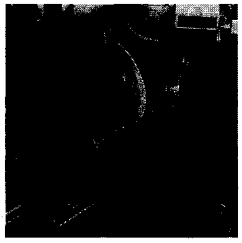


Fig. 8