JENA TEC

Duplex
PRECISION GRINDING
CATALOGUE

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DUPLEX INDEX

DUPLEX TOOL-POST GRINDERS INSTRUCTIONS FOR OPERATION

DUPLEX - PRECISION GRINDING OVERVIEW

The Jena-Tec Duplex range of Tool-Post Grinding Units incorporating precision spindles offer reliability and durability. The units incorporate enclosed fan cooled motors and special attention is given to ensure accurate balance of all rotating parts.

Wheel flanges, manufactured in mild steel, are to BS 4581 Pt2 and ISO R6666 Standards. A wide range of flanges are interchangeable on the various models.

Special Duplex Tool-Post Grinding Units are available to suit specific application requirements. Please discuss with a Jena-Tec rotary products technician.

General Specification

SPINDLES Precision Ball or Roller Bearings are used throughout the range.

MOTORS All types have totally enclosed motors with external fan cooling. Particular care is taken to ensure accurate balance of rotating parts.

SWITCHES A Switch Box with start & stop buttons is mounted on a plate adjacent to the motor, for quick control.

WHEEL FLANGES Mild Steel to BSI 4581 Pt2/ISO R6666 for Grinding Wheels. An interchange system is standard on Types D.31, D.30A, D.31A, D.31B, D.32, D.33, D70, D71 and D72. Flange and wheels can be removed as one unit and replaced by others without the necessity of re-trueing.

DRAWINGS Full dimensioned drawings are available, the numbers of which will be found in the Unit Specification.

TROPICAL INSULATION Motors for use in hot and humid tropical climates can be tropically insulated.

WHEELGUARDS Type D.26 and D.27 have high strength cast aluminium guards. All others are of malleable iron with steel side plates.

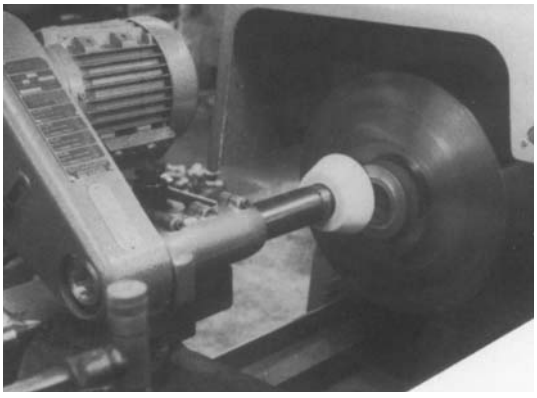
BELT ADJUSTMENT Motors swing on a pivot, for belt adjustment.

SMALL AND DEEP BORE GRINDING A range of High Speed 4-Bearing Spindles and Long Reach Spindles will be found on Pages 6 and 7.

BELT GUARDS Aluminium castings or fabricated steel, completely enclosing belts.

BELTS Either Vee or endless Flat Belts are used depending on the duty.

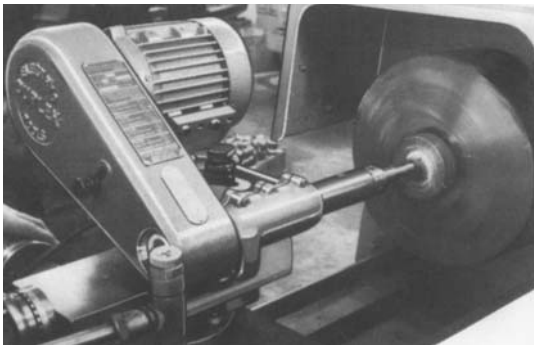
SAFETY User safety is an important factor in the design and manufacture of our units, however the user must ensure adequate safety standards are employed appropriate to the application in which the units are being used. This is particularly important in the use of left hand units. The manufacturer can not be responsible for the users failure to ensure adequate safety standards.



FACE GRINDING

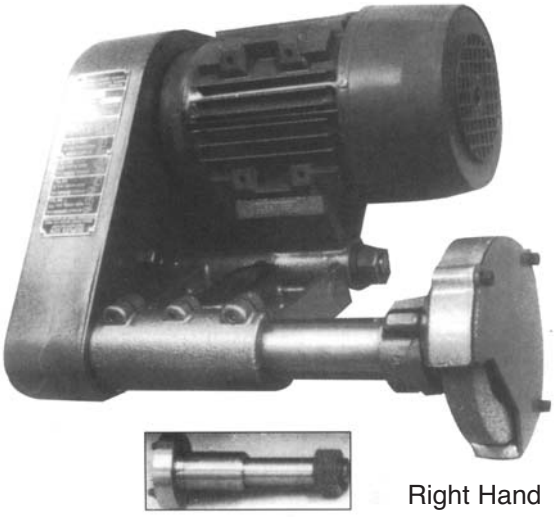
Although not supplied as standard, wheel flanges with balance weights and a suitable mandrel can be supplied to special order. This applies to units with integral wheel/flange assemblies such as D30.A, D.31, D.31A, D.31B, D.32, D.33, D.70, D.71 and D.72.

This arrangement is to accommodate the small minority of applications where very fine work is involved. They are not normally fitted due to the time involved in special balancing.

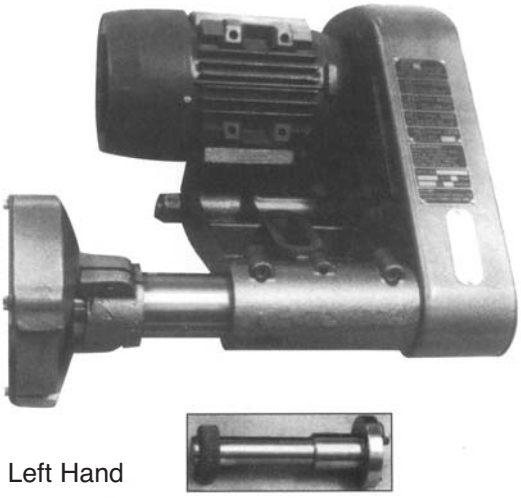


INTERNAL WORKING

LEFT AND RIGHT HAND UNITS



Right Hand



Left Hand

98% of all units supplied are right hand and fit onto the normal front tool-post. Left hand units can be supplied for use on the rear Tool-Post or a copy attachment. Such units will have spindles with left hand threads.

SPECIAL UNITS

Units designed and manufactured to customers requirements are available. Contact our Sales Office with your specifications.

REPAIR, SERVICE AND RECONDITIONING

When your spindle requires attention we recommend that it should be returned to us, where it will receive the same care as when it was originally built.
The precision bearings used are particularly sensitive to correct fitting and absolute cleanliness is essential to obtain satisfactory results.
Spindles received for servicing have the same attention as new ones and are subjected to the same tests after assembly. This service can be provided for all types and makes of precision spindles.

INTERNAL AND EXTERNAL TOOL-POST GRINDERS

*SPECIAL FLANGES REQUIRED FOR CUP WHEELS

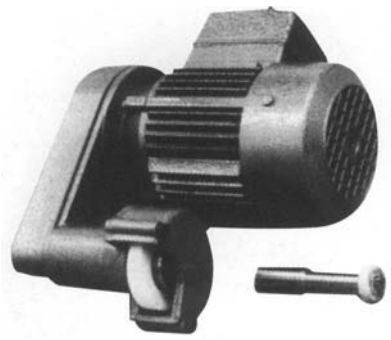
Type		D.26	D.27	D.28	D.29
Dimension Sheet		101	102	103	103
Plain Wheels – Inches mm	Ext	3" x 1/2" x 1/2" 60 x 10 x 10	5" x 3/4" x 1/2" 80 x 13 x 12.7 1 recess	5" x 3/4" x 1/2" 129 x 19 x 12.7 1 recess 2 3/4" x 1/4" 70 x 6	6" x 1" x 2 1/8" 125 x 19 x 12.7 1 recess 2 3/4" x 1/4" 70 x 6
Inches mm	Int	20 x 6 x 6	1" x 1/2" x 5/16" 25 x 13 x 8	None	1" x 1/2" x 5/16" 25 x 13 x 8
Cup Wheels (Flared) Inches mm			3/2 – 1/4" rim 1/4" back 80/50-6 rim 13 back *	4/3 – 3/8" rim 1/2" back 100/80-10 rim 13 back *	4/3 – 3/8" rim 1/2" back 100/80-10 rim 13 back *
Grinding Depth With Ext. inches Wheel mm With Int inches Extension mm		 3" 75	 2" 50 3" 80	 3" 76 Not supplied	 3" 76 3" 75
Smallest bore with Standard extension		1/2" 13	3/4" 19		3/4" 19
Speeds		8000 18000	6000 16000	4500	4500 7000 8000 12000
Motor Power	1 Phase	1/4hp .17kw	1/3hp .25 kw	3/4hp .55kw	3/4hp .55kw
	3 Phase		1/2hp .37 kw	1hp .75kw	1hp .75kw
Quill Dia			1 3/4" 44.45mm	1 3/4" 44.45mm	1 3/4" 44.45mm
Belts		Flat	Flat	2 Vee	Flat
For Lathes of Centre Height		3 1/2" & over 87mm & over	5" & over 125mm & over	7" & over 175mm & over	7" & over 175mm & over
(Approx) kgs Weight Lbs Can Built-in Diamond Dresser be fitted		7kg 15 1/2 lb No	13kg 29lb No	24kg 53lb Yes	25kg 55lb Yes

INTERNAL AND EXTERNAL TOOL-POST GRINDERS

*SPECIAL FLANGES REQUIRED FOR CUP WHEELS

Type		D.30A	D.31	D.31A	D.31B
Dimension Sheet		104	104	105	105
Plain Wheels – Inches mm	Ext	6" x 1" x 2 1/8" 150 x 25 x 54 1 recess 3 1/4" x 1/4" 86 x 6	6" x 1" x 2 1/8" 150 x 25 x 54 1 recess 3 1/4" x 1/4" 86 x 6	8" x 1" x 2 3/8" 200 x 25 x 60.3 1 recess 4 1/4" x 1/4" 108 x 6	8" x 1" x 2 3/8" 200 x 25 x 60.3 1 recess 4 1/4" x 1/4" 108 x 6
Inches mm	Int	None	1 1/2" x 1/2" x 3/8" 40 x 13 x 9.5	None	1 1/2" x 1/2" x 3/8" 40 x 13 x 9.5
Cup Wheels (Flared) Inches mm		5/4 – 1/2" rim 1/2" back 125/100-13 rim 13 back *	5/4 – 1/2" rim 1/2" back 125/100-13 rim 13 back *	7/5 – 1/2" rim 1/2" back 180/125-13 rim 13 back *	7/5 – 1/2" rim 1/2" back 180/125-13 rim 13 back *
Grinding Depth With Ext. inches Wheel mm Extension mm		6 1/4" 156 Not supplied	6 1/4" 156 4" 100	6" 150 Not supplied	6" 150 4" 100
Smallest bore with Standard extension			1" 25		1" 25
Speeds		3000	2850 4400 6500 10000	2850	2850 4400 6500 10000
Motor Power	1 Phase	3/4hp .55kw	3/4hp. .55kw	1.5 hp 1.1kw	1.5 hp 1.1kw
	3 Phase	1hp .75kw	1hp .75kw		
Quill Dia		2 3/4" 57.15mm	2 1/4" 57.15mm	2 1/4" 57.15mm	2 1/4" 57.15mm
Belts	Flat	3 Vee	Flat	3 Vee	Flat
For Lathes of Centre Height		8 1/2" & over 215mm & over	8 1/2" & over 215mm & over	10" & over 250mm & over	10" & over 250mm & over
(Approx) kgs Weight Lbs Can Built-in Diamond Dresser be fitted		34kg 75lb Yes	34kg 75lb Yes	55kg 121lb Yes	54kg Yes

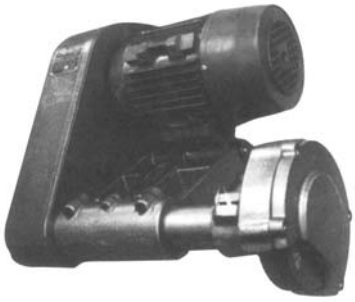
INTERNAL AND EXTERNAL TOOL-POST GRINDERS



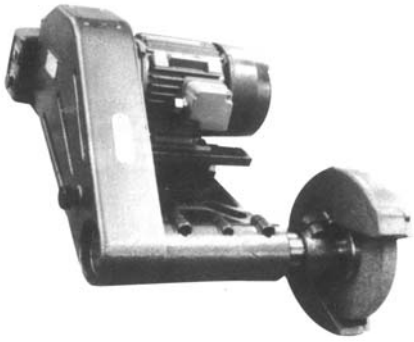
D.26 for 3½" (87mm)
Centre height lathes.
Internal and External.

D.27 for 5" (127mm)
Centre height and larger lathes.
Internal and External.

D.28, D.29 for 7" (175mm)
Centre height and larger lathes.
D.28 External.
D.29 Internal and External



D.30A, D.31 for 7" (215mm)
Centre height and larger lathes.
D.30A External.
D.31 Internal and External

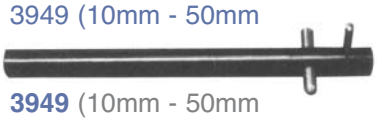


D.31A, D.31B for 7" (175mm)
Centre height and larger lathes.
D.31A External.
D.31B Internal and External

DIAMOND DRESSERS

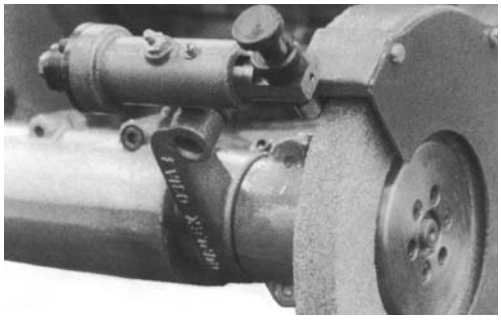
3949 (10mm - 50mm

3949 (10mm - 50mm



3949 (10mm - 50mm

For mounting on the work or tailstock barrel 3949 and 3950 will dress the side and periphery of a wheel.
Type 3951 can be chucked or mounted between centres.



The BUILT -IN DIAMOND DRESSER IN POSITION

'Built-in' type for mounting on the grinder quill between base and wheel guards, allows wheel dressing by means of its own slideway and feedscrew without removing or disturbing the workpiece.

Type	4954 Suits	D.28/D.29
	4955 Suits	D.30/D.30A/D.31
	4956 Suits	D.31A/D.31B

All types are complete with .3 carat diamond nib. As an extra a 1.0 carat nib can be fitted.

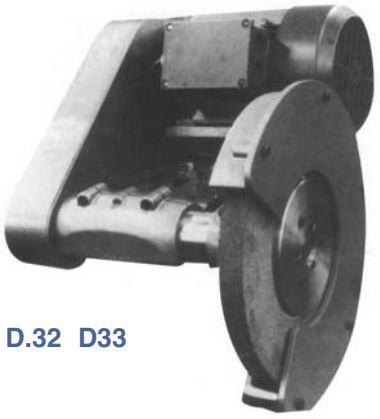
EXTERNAL HEAVY DUTY TOOL-POST GRINDERS

These Heavy Duty units can be used with plain, form or cup wheels in any position from the horizontal to the vertical.

MOTORS are totally enclosed and surface cooled. Particular care is taken to secure accurate balancing.

SPINDLES run in taper roller bearings, protected by seals.

FLANGES are made from sawn Mild Steel blanks, and are to BS 4581 Pt2 and ISO R6666 Standards. An interchangeable system is standard on D.32 and D.33, i.e., flange and wheels can be removed as one unit and replaced by others without the necessity or re-trueing.

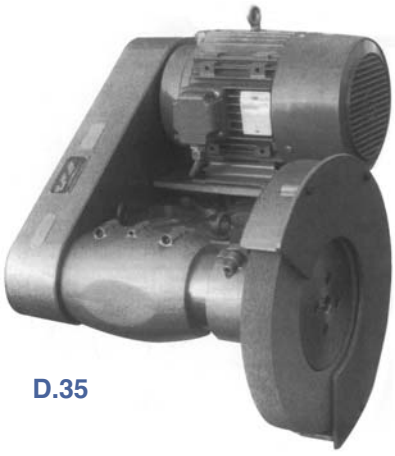


D.32 D33

SWITCHGEAR
D.32, D.33 direct on.
D.35 direct on or star/delta automatic.

INTERNAL SPINDLES – D.32, D.33 & D.35

	Speeds	Max Wheel	Type	Details on page	Drive Equipment
High Speed	20000	1" (25)	32334		
	15000	1¼" (32)	32335		
Long Reach	6000	3" (75)	11" (275) reach	10	D.32 3758
		3" (75)	17" (432) reach	10	D.33 3759
		(75)	24" (610) reach	10	D.35 3760



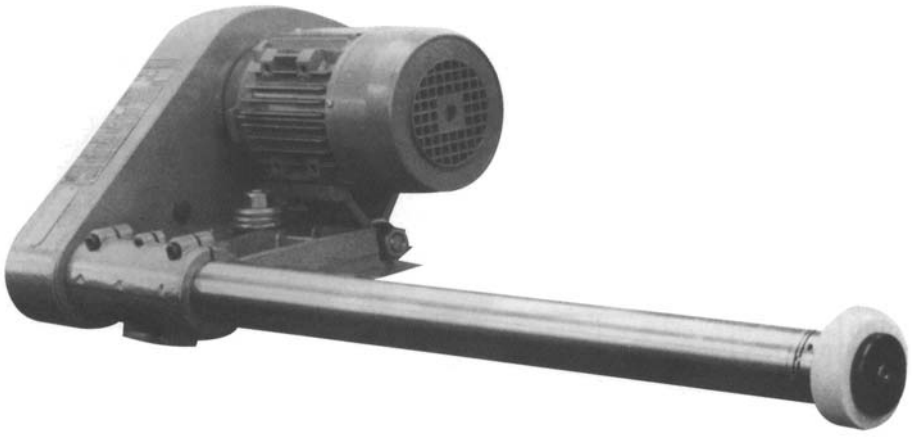
D.35

SPECIFICATION (3-phase only)

Type	Wheels				Diam of Flanges	Motor		Spindle		No. of Vee Belts	slots clear bolts	Base (Approx) Nett weights	Dim'n Sheet No.
	Diam	Width	Bore	Recesses (one side)		Power	Speed	Speed	Diam				
D.32	12" 300	1¼" 32	4" 102	6¼" x ¼" 159 x 6	6" 150	2hp 1.5kw	14.50	1800	3" 76.2	2	1 25	172lb 78 kg	106
D.33	14" 350	1¼" 32	4" 102	7¼" x ¼" 184 x 6	7" 175	3hp 2.2kw	14.50	1500	3" 76.2	3	1 25	209lb 95kg	106
D.35	16" 400	2" 50	4" 102	8¼" x ¾" 210 x 19	8" 200	5.5hp 4kw	14.50	1320	5" 127	4	1 25	466lb 212kg	107
D.35A	16" 400	2" 50	4" 102	8¼" x ¾" 210 x 19	8" 200	10hp 7.5kw	14.50	1320	5" 127	5 5	1 25	490lb 223kg	107
D.35B	20" 500	1½" 38	4" 102	10¼" x ¼" 260 x 6	10" 250	5.5hp 4kw	14.50	1020 1	5" 127	4	1 25	457lb 208kg	107
D.35C	20" 500	1½" 38	4" 102	10¼" x ¼" 260 x 6	10" 250	7.5hp 5.5kw	14.50	1020	5" 127	5	1 25	480lb 218kg	107
D.35D	20" 500	1½" 38	4" 102	10¼" x ¼" 260 x 6	10" 250	10hp 7.5kw	14.50	1020	5" 127	5	1 25	530lb 241kg	107

ALL INDIRECT DRIVE UNITS HAVE CONTINUOUSLY RATED MOTORS AND ARE AVAILABLE FOR SINGLE OR THREE PHASE SUPPLY

LONG REACH QUILLS FOR DEEP HOLE GRINDING



These quills have solved many awkward production problems, and are an invaluable accessory. They provide a means of machining a workpiece without the deflection that might be caused by a cutting tool. The massive bases of the larger Duplex grinders provide adequate anchorage. They are readily interchangeable with the standard quills. High precision bearings are used throughout, the longer sizes having supporting bearing or bearings in the centre.

STANDARD LENGTHS

Effective Grinding Depth	Cat No	For Grinders	Quill Diameter
8" 200	2949	D.27 D.28 D.29	1 3/4" (44.45mm)
11" 275	2950	D.27 D.28 D.29	1 3/4" (44.45mm)
11" 275	2953	D.30 D.30A D.31 D.31A D.31B	2 1/4" (57.15mm)
17" 432	2954	D.30 D.30A D.31 D.31A D.31B D.32 D.33 D.35	2 1/4" (57.15mm)
24" 610	2955	D.31A D.31B D.32 D.33 D.35	2 1/4" (57.15mm)

Drive Equipment includes Spindle Sleeve for D.32, D.33 and D.35

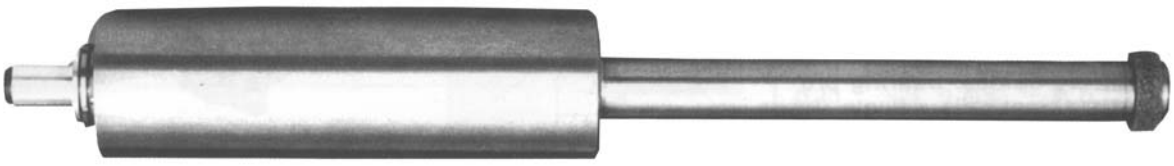
Drive Equipment required for types below

D.28	3761
D.30	3762
D.30A	3763
D.31A	3764
D.32	3758
D.33	3759
D.35	3760

WHEEL SIZES	
2949, 2950	3" x 1/2 x 1/2 80 x 13 x 12.7mm
2953, 2954 2955	3" x 1" x 5/8" 80 x 25 x 15.9mm

Speed 6000 rpm

STEP TYPE LONG REACH SPINDLES

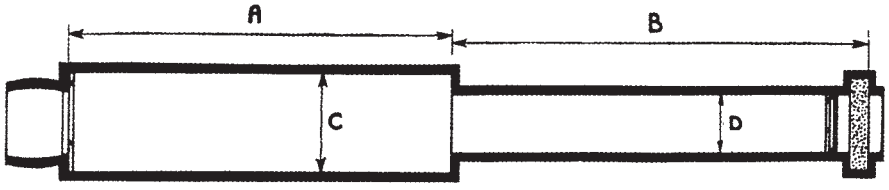


Production Engineers are sometimes faced with the problem of accurately grinding smaller diameter bores of considerable depth. The spindles listed below are interchangeable with the standard of the 'Duplex' Grinders listed. Other sizes can be made subject to design limitations and the necessity of having bearing directly behind the grinding wheels.

SPECIFICATION

Spindle	For Grinder	A	B	C	D	Wheel	Speed	*Driving Equipment
3601A	D.27 D.28 D.29	8" 200	6" 150	1 3/4" 44.45	1 1/8" 28.6		3752	
3602A	D.27 D.28 D.29	8" 200	9" 225	1 3/4" 44.45	1 1/8" 28.6		3753	
3603A	D.30 D.30A D.31 D.31A D.31B	10" 254	7" 175	2 1/4"" 57.15	1 1/8" 28.6	40x13X9.5	3754 12,000	
3604A	D.30 D.30A D.31 D31.A D.31B	10" 254	11" 275	2 1/4" 57.15	1 1/4" 32.0	1 1/2"x 1/2"x 3/8"		3755
3605A	D.32 D.33	10" 254	7" 175	3" 76.2	1 1/4" 32.0			3756
3606A	D.32 D.33	10" 254	11" 275	3" 76.2	1 1/4" 32.0			3757

*DRIVE EQUIPMENT NEEDED FOR VEE BELT MODELS ONLY D.28, D.30A, D.31A, D.32 & D.33



3-Phase only

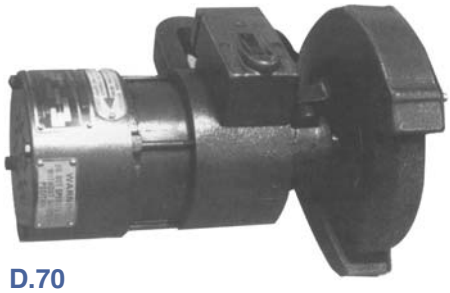
These compact and substantially built units comprise, basically, a precision grinding spindle with a 3-phase rotor/starter unit mounted thereon. Bearings are grease packed and sealed for life. They can be used in lubricated.

All sizes lend themselves very readily for building into special purpose machines either singly or in banks for progressive grinding operations. They are also suitable for use on vertical boring machines where compactness is desirable.

Units can be built left hand if required.

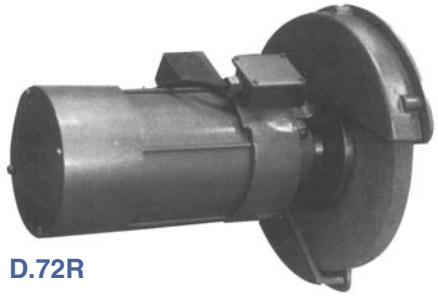
Type D.70 had an on/off switch built in, the D.71 and D.72 are suitable with contractors with no-volt release and overload protection.

As with all Duplex grinders the hardened shaft runs in precision bearings. Flanges are of mild steel to BS 4581 Pt2 and ISO R6666 Standards. Wheelguards are of malleable iron with steel cover plates



D.70

VOLTAGES
110, 220, 346, 380, 400, 415, 440, 500, 550, (50 or 60Hz)



D.72R

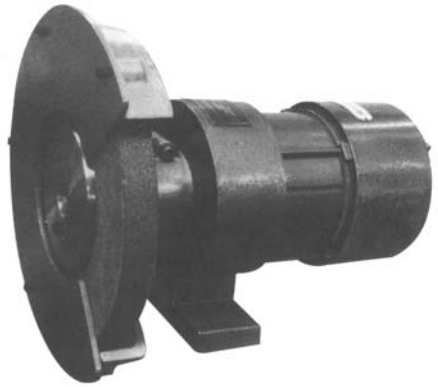


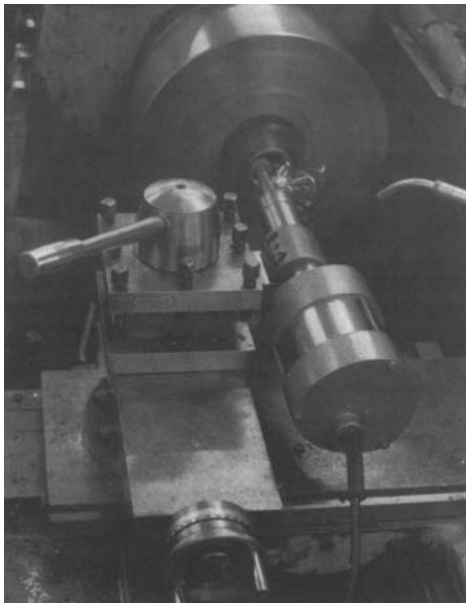
FIG 92. Foot Mounting D.71R and D.72R

SPECIFICATION

Type	D.70	D.71R	D.72R
Power	.75hp .55kw	2.0hp 1.5kw	4.0hp 3.0kw
Switch	Mounted on Machine	Separate Contractor	Separate Contractor
Speed, rpm	50 Hz 2850 60 Hz 3400	50Hz 1450 60 Hz 1720	50Hz 1450 60 Hz 1720
Bearings	Ball	Ball and Taper Roller	Ball and Taper Roller
Plain Wheel Dia and Width	8" x 1" 200 x 25mm	12" x 1 1/4" 300 x 32mm	14" x 1 1/4" 350 x 32mm
Bore	2 3/8" 60.3mm	4" 100mm	4" 100mm
Recesses 1 – side	4 1/4" x 1/4" 106 x 6mm	6 1/4" x 1/4" 159 x 6mm	7 1/4" x 1/4" 184 x 6mm
Cup Wheel Dia and Width	7" x 2" Taper Cup	12" x 2" 300 x 50mm	12" x 2" 300 x 50mm
Bore	180 x 50mm 31.75*	4" 102mm	4" 102mm
Rim Thickness	1/2" x 13mm	1" .25mm	1" .25mm
Thickness of Back	1/2" x 13mm	1" .25mm	1" .25mm
Weight of Wheel (Approx)	46-lbs 21-kgs	108-lbs 49 1/2-kgs	150-lbs 68 1/2-kgs
Dimension Sheet	110	111	111

*SPECIAL FLANGE REQUIRED FOR CUP WHEEL
60Hz MACHINES, D70 WHEEL IS 6" (150mm), D72 12" (300mm)

DIRECT DRIVE, HIGH FREQUENCY TOOL-POST GRINDERS



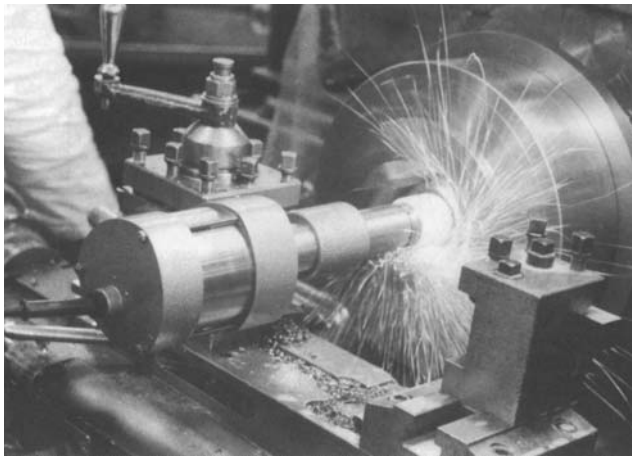
The Duplex D68 and D69 units are both direct driven internal Tool-Post Grinders for mounting directly into the tool-post. They are intended primarily for quick trueing chuck jaws.

D68 is a 12000 rpm unit using a 1" (25mm) wheel for smaller work and hard jaws and D69 runs at 9000 rpm using a 2" (50mm) wheel for retrueing purpose machined soft jaws and grinding larger bores. Both units are continuously rated and utilise a rotor stator unit which is driven from a solid state frequency converter preset for speed before delivery. The convertor is housed in a separate steel case together with its contractor and overload protection. Primary supply is normal single phase. The unit to be used with the solid state frequency convertor.

Because the convertor provides a constant frequency on any load, the grinder runs at constant speed, thus giving the safety expected from a synchronous drive at speeds normally associated with series wound motors which can over speed on release from the loaded condition.

The mounting arm comprises a clamp round the nose of the unit which can be moved axially to give varying amounts of overhang or inverted for mounting at a different height in relation to the lathe centre line.
This arrangement means that the grinder can be mounted directly into the tool-post and thus ensures that whatever grinding is required can be achieved quickly with the minimum disturbance to an existing set up.

Because this unit is intended for grinding jaws where the cut is intermittent, left hand threads are used throughout to ensure that sparks and dust are directed down and away from the operator. The motor unit is wired for correct rotation to its individual convertor, hence it can be used straight away. Should the connecting plug be accidentally removed while the unit is running an electrical interlock will prevent damage to the convertor. The bearing arrangement used is similar to the D29 unit and is suitable for continuous running at the preset speed. As with all precision grinding arrangements the wheel needs dressing before work commences.



SPECIFICATION 3 Phase 50/60Hertz

	D68	D69
Standard	25 x 13 x 8mm (1 x 1/2" x 5/16")	50 x 40 x 12.7 rec 2 x 1 1/2" x 1/2" rec
Speed	12,000 rpm	9,000 rpm
Power	0.8kw	1.1kw
Weight		
Grinder	11kg	11kg
Weight		
Converter	6kg	6kg
Size Converter	25 x 15 x 36cms (11 x 6 x 14")	25 x 15 x 36cms (11 x 6 x 14")
Dimensions Grinder	DWG 115	DWG 114

Both units can be built for 200 – 250 volt single phase 50 or 60Hz supply only

ABRASIVE BAND TOOL POST GRINDERS

Description

Duplex Abrasive Band Finishing Grinders are complementary to the range of Duplex Tool-Post Grinders and are built to make effective use of the modern abrasive bands which are now available in a wide variety of grits and grades.

The heart of each unit is a very rigid cartridge type spindle, incorporating taper roller and ball bearings enclosed by lip seals. Mounted at the working end of the spindle is a removable contact wheel, comprising in aluminium hub with a moulded on rubber tyre. Drive from the motor is by multiple vee belts and the power of the motor is approximately double that associated with the equivalent size of orthodox grinding wheel because material removal rates can be that much greater. Switchgear is built into the machine and is readily accessible to the operator.

The abrasive band is tensioned and aligned by a crowned idle pulley at the top of the run. Both actions are controllable to allow for an infinite range of adjustment.

The machine is mounted on the lathe in the same way as Duplex Tool-Post Grinders, that is by clamping in place of the normal tool-post after height adjustment by packing.

On this range of units the whole band support assembly can be rotated so that the job can be worked on either with the band in the "slack" or unsupported area or on the contact wheel.

In the case of the former, that is working on the slack, a light context can be achieved allowing for a very fine finishing cut and also accommodating some work run out. Full advantage can be taken of abrasive bands with grits as fine as 1000.

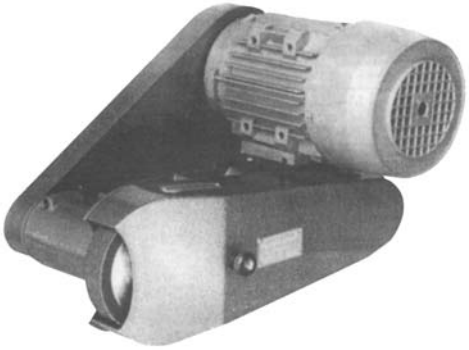
Grinding on the contact wheel achieves greater material removal and more accurate geometry.

The combination of a slightly flexible contact area and the fact that the band is bent and straightened during its passage over the idle and contact wheels means that many materials, traditionally difficult to grind effectively, can be coped with very well. Successful applications have included polyurethane, copper, monel metal, fibreglass and electrical stampings.

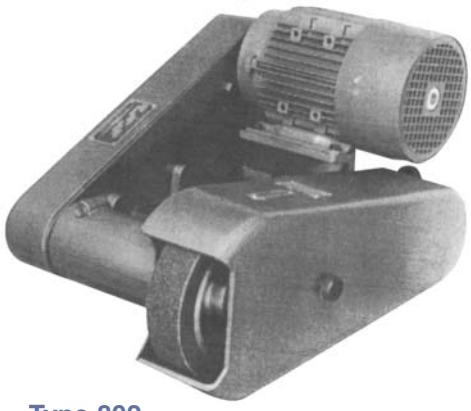
Belt selection is very similar to that used for grinding wheels, aluminium oxide abrasive being used for steel and steel alloys, silicon carbide for nonferrous and non metallic materials. Many applications are also covered by Zirconium abrasives.

Course grit sizes will, as in grinding wheels, mean high material removal rates and a coarse finish, while fine grit sizes will give a good finish with a lower removal rate. Bands are available, in various types with grit sizes from 36-1000.

Machines are supplied with 36, 60 and 100 grit bands and these are polyester backed and suitable for wet or dry working.



Type 501
For lathes 7" (180mm) centre height and above

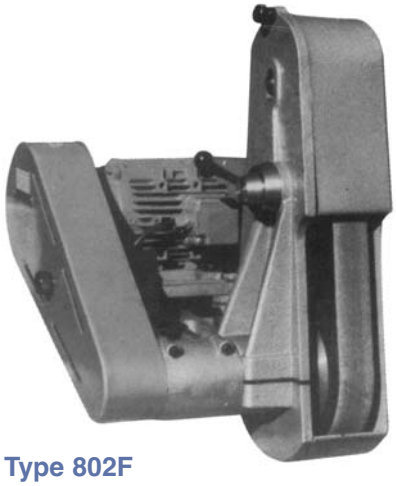


Type 802
For lathes 9" (225mm) centre height and above

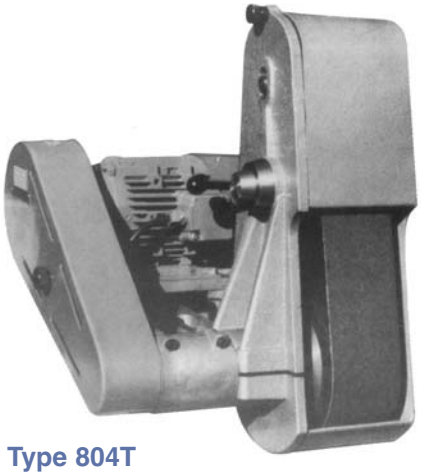
Type 804
For lathes 11" (280mm) centre height and above

ABRASIVE BAND TOOL POST GRINDERS

Type 502F
For lathes 200mm centre height and above



Type 802F
For lathes 220mm centre height and above



Type 804T
For lathes 250mm centre height and above

SPECIFICATION

TYPE	501	802	804
Contact Wheel Size	125 x 25	200 x 50	200 x 100
Band Size	860 x 25	1220 x 50	1220 x 100
Band Speed	30m/sec	30m/sec	30m/sec
Motor Power	1.1kw	2.2kw	4kw
Drive	2 x vee Z section	5 x vee Z section	5 x vee SPZ section
Dimension Sheet No	116	113	117
Weight, nett	35kg	60kg	84kg
Type 501 1 Phase or 3 phase Type 802 & 804 3 phase ONLY 50 or 60Hertz available on all.			

TYPE	502F	802F	804F
Motor Power	1.1kw	2.2kw	4kw
Drive Belts	3 x Z section	5 x Z section	5 x SPZ section
Band Speed	30m/sec	30m/sec	30m/sec
Contact Wheel	125 x 50mm	200 x 50mm	200 x 100mm
Weight	40kg	40kg	40kg
Dimension DRWG	118	119	120

DUPLEX

GRADE OF WHEEL		MA46L or BA46L	MA60L or BA60L	WA60JV or PA60JV	C46JV or GC46JV	12A120H or 35VMROM
USE		Steel Medium General Purpose	Steel Fine General Purpose	Tool and High Speed Steel Stellite	Cast Iron Sprayed Metal Non-Ferrous	Rubber Plastics only
APPEARANCE		Grey	Grey	White or Pink	Green	Blue Porous
20 x 6 x 6mm	D.26 Int.					
25 x 13 x 8mm	D.27/D.29/D.68 Int					
40 x 13 x 9.5mm	D.31/D.31B Int Step Quills					
50 x 40 x 12.7 recess	D.69 Int					
60 x 10 x 10mm	D.26 Ext.					
80 x 13 x 12.7mm	D.27 Ext., LR Quills					
80 x 25 x 15.9mm	LR Quills					
125 x 19 x 12.7 recess	D.28/D.29 Ext					
150 x 25 x 54 recess	D.30A/D.31 Ext.					
200 x 25 x 60.3 recess	D.31A/D.31B/D.70 Ext					
300 x 32 x 102 recess	D.32/D.71 Ext.					
350 x 32 x 102 recess	D.33/D.72 Ext					
400 x 50 x 102 recess	D.35/D.35A Ext					
500 x 38 x 102 recess	D.35B/C/D Ext					
80/50mm taper cup	D.27					
100/80mm taper cup	D.28/D.29					
125/100mm taper cup	D.30A/D.31					
180/125mm taper cup	D.31A/D.31B/D.70					
300 x 50 straight cup	D.32/D.33/D.71/D.72					

SECTIONS SHADED BLUE ARE NORMAL STOCK, SHADED LIGHT GREY SUBJECT TO DELAY & MINIMUM QUANTITY

REPLACEMENT ABRASIVE BANDS

DUPLEX

Sizes	501	25mm x 860mm
	802 / 802F	50mm x 1220mm
	804 / 804F	100mm x 1220mm
	502F	50mm x 1220mm

Abrasive Types (Based on Carborundum System, all waterproof thus suitable for wet and dry work)

CODE	Available Grit Size	Suggested Primary Use	Acceptable Use
Aluminium Oxide ALX 681 ALX 682	100 – 220 Steel 40- 80	Rubber and Plastic	
Silicone Carbide CLK 931	40 – 320, 400, 500	Cast Iron and Non Ferrous Metals	Rubber and Plastic
Zirconium ZLY 681 ZLY 728	24,36,60,80 Hard Materials 24,36,60,80,100,120	Steel, Stainless Steel etc	Rubber and Plastic
Silicone Carbide Cork Mixture CLX 808	150,220,400,600 800,1000	Finishing and polishing work on metals only	
Cork KLX 890	36 only	Polishing work on soft metals such as copper, no material removal	

Duplex Tool-Post Grinders Instructions for Operation Types D26, D27, D28, D29, D30A, D31, D31A, D31B, D32, D33, D35A, D35B, D35C & D35D, D68, D69, D70, D71R, D72R

Section 1 - CONSTRUCTION

The range of Duplex Tool-Post Grinders can be divided into two categories, as follows: -

1. Direct Drive

Available for 3 phase supply only, these are powered by rotor/stator units mounted on a precision spindle. The windings are totally enclosed. This makes for a very compact unit but the speeds are confined to that provided by a synchronous motor, either 2 or 4 pole, 1450 and 2900 rpm on 50 Hz and 1720 and 3400 rpm on 60 Hz. Hence external or large bore internal work is possible and the compact nature of the unit makes them desirable for mounting on planers and boring mills.
The exceptions are machines, which utilise a rotor and stator unit powered at high frequency by an inverter. Higher speeds are thus available for smaller wheels to run at correct speeds for internal work (D68 and D69). Inverters are factory set, sealed and matched to a particular machine.

2. Indirect Drive

The belt driven types allow more flexibility and the most popular versions are those which combine both external and internal capabilities. All machines in the range use totally enclosed, fan cooled, continuously rated synchronous motors. All machines up to and including type D31 can be supplied for a single or three phases supply. From D31A and D31B upward three phases is normal although single phase can be supplied to special order. Spindles run in high precision bearings protected by labyrinth seals. Multi speed machines use flat nylon reinforced neoprene belts, single speed machines use multiple matched vee belts.

MOTORS

The motors used on Duplex Tool-Post Grinders are all synchronous types and continually rated. This means that they are constant speed under all load conditions. They should need no attention over long periods.

Earthing

All motors have earth lead, which is I.S.O standard green/yellow. This must be used as such and connected to a properly bonded earth in the same way that a lathe is.

Rotation

Single phase machines will run with correct rotation when power is connected, three phase machines can run either way, so the rotation must be checked and altered by changing over any two of the line conductors.
If the machine is to be used in one place frequently a metal clad plug and socket arrangement should be set up.
Always check rotation with either the wheel or belt removed.

Repeat, always check rotation.

Switchgear

Smaller single phase machines have a two pole vault release stop/start switch built into the motor itself.
Large types, have separate start/stop contactors, which are mounted on the rear of the unit so they are easily available in an emergency. Types D70R to D72R have the contactor separate. This also applies to left hand machines where the contactor must be mounted near to the operator for safety.

Section 2 - INSTALLATION & MOUNTING

For mounting on the lathes the tool-post should be removed. This will normally expose a stud or tapped hole on the top slide.

The machine should be mounted on the top slide and packed up to height. It is important that the centre line of the grinder and the lathe axis are at the same height in the same way that a turning tool would be. Duplex does not normally supply a packer as the number of makes of lathes now available world wide make this all but impossible. A suitable packer is in the form of a ring, mounted between the grinder and the top face of the slide.

The unit can be clamped in the position, checking that the grinding spindle axis is parallel to the lathe centre line.

Finally the wheel should be dressed before grinding commences. For very small jobs, ground between centres, it may be necessary to skew the machine so that the tailstock is not interfered with by the beltguard, obviously this means redressing the wheel so that its periphery is parallel to the machine centre line.

Fitting Wheels

Always inspect the wheel carefully to see that it is not cracked or chipped. Always fit with paper blotters on each side of the wheel and check a new wheel with the 'Ring Test'. You are reminded that, in the UK at least, a person who mounts grinding wheels shall be trained and competent appointed by the factory occupier and their name shall be registered in the appropriate register. (*See Section 7 - page 26*)

Belts

These should be tensioned only enough to provide drive without slip. Belts that are too tight wear quickly and impose an undue strain on the bearings. Belts that are too loose will slip and wear the pulleys. Belt tensioning is simple. The motors are pivoted and swing away from the spindle, and are locked in position with one nut.
Belts should be slackened or removed altogether during storage. (See separate notes on D26)

Speed Selection

On single speed machines this presents no problem, provided the wheel is covered by the guard and no attempt is made to fit a larger one, but types D26, D27, D29, D31 and D31B (which incidentally are the types in the most common demand) have pulleys which can give either two or four speeds for both internal and external work.
The greatest care must be taken to see that the external wheel is not used at one of the higher internal speeds since mistakes can be dangerous. The procedure to avoid errors is simple. The beltguard has to be removed to fit the belts. On the belt guard there is a plate indicating the speeds obtained with various belt positions against the maximum diameter wheels that can be used. BEFORE switching on, CHECK and CHECK AGAIN, to see that the belt is in the correct position. If the machine is being put into service after storage, go through exactly the same procedure.

One final warning. NEVER under any circumstances, run the grinder even at the correct speed, without the wheelguard securely in place. The wheel could have been damaged in transit or in storage.

Wheelguards are adequate to contain the wheel in the unlikely event of a burst wheel. NEVER TAKE A CHANCE.

Section 3 - WHEEL SELECTION

This depends on many factors, some of which are outlined below. The material to be ground is obviously the over-riding factor. Generally speaking, abrasive materials fall into two types for ordinary usage. Aluminium Oxide and Silicone Carbide. Aluminium Oxide, usually blue or brown in colour is for grinding steels and similar materials of High Tensile strength. A variation white or pink is used for hardened tool and high speed steels, as it has a cool, free-cutting action. Silicon Carbide Wheels, greenish in colour, are for cast iron, brass and other non-ductile materials.

The finish depends mainly on the grit size used; a coarse grit will give a coarse finish, and a fine grit a good finish, other things being equal. The finer the grit the lower will be the stock removal in a given time, and it follows that a wheel of as coarse a grit as possible should be used that will give an acceptable finish.

Another factor enters the choice of wheel and that is the contact area between the wheel and the workpiece. A small area of contact with the cylindrical work allows a harder wheel to be used than say with surface grinding where contact is large and it is necessary to use a softer wheel so that the blunted abrasive fragments break away easily, revealing new sharp abrasive to carry on the work.

With internal grinding a wheel, which nearly fills the bore to be ground, has a disproportionately large area of contact as compared with a smaller wheel in the same bore. The effect is such as to make a hard wheel appear softer particularly if the speed is low. Against this, if a small wheel is used the highest speed available may not be fast enough for good working. In practice, as with so many problems in grinding a little trial and error generally produces a satisfactory solution, or at any rate, a reasonable compromise. The generally accepted ideal wheel is 75% the bore size.

The various grinding wheel makers have no complete standardisation of wheel notation, but the table below will explain the basis of the system.

Abrasive Type	Grit Size	Grade	Bond	Suffix
Numbers or letters depending on the maker.	Numbers 9-900, but for most purposes 36-100	Letters from 'E' Soft to 'Z' very hard normally between 'J' & 'P'	Usually 'V' for vitrified for normal work cut off wheels may be 'R' for resinoid bond	This varies from maker to maker but indicates more exactly the structure of the wheel

For example: Ma46LV, mixed aluminium oxide abrasive, 46 grit L grade vitrified or C46JV, silicon carbide abrasive, 46 grit, J grade, vitrified.

Wheel selection continued

Wheel speeds are most important and normal vitrified wheels should run at such a speed as to give a periphery speed of 5,000-ft per minute (27m/sec) minimum and 6,500-ft per minute (35m/sec) absolute maximum. Every wheel has a maximum operating speed marked on it. This must never be exceeded.

Diameter Inches	Speed rpm for 5,000 fpm (27m/sec)	Speed rpm for 6,000 fpm (32m/sec)	Speed rpm for 6,500 fpm (35m/sec)	Diameter mm
1	19,100	22,900	24,800	25
2	9,500	11,500	12,400	50
3	6,400	7,600	8,300	75
4	4,800	5,700	6,200	100
5	3,800	4,600	5,000	125
6	3,200	3,800	4,100	150
8	2,400	2,900	3,100	200
12	1,600	1,900	2,100	305
14	1,400	1,600	1,800	355
16	1,200	1,450	1,550	405
20	950	1,150	1,250	505

Duplex stock wheels will cover most eventualities and these are listed in the leaflet. Sizes and grades are marked, when kept in stock. Suggested uses for the various wheels are also indicated with types to cover hard and soft steels, cast iron, brass, tool steel, high-speed steel, fibreglass and rubber compounds.

All wheels stocked by Duplex are manufactured to high standards of balance and are, suitable for precision work. Wheels outside the stocked range are obtainable by special order.

Section 4 - USE

WHEELS FOR EXTERNAL WORK

It is always necessary to dress the wheel before use. Truing the periphery will remove radial run out, but truing the sides is just as important for a good finish. It is not necessary to dress the whole side of the wheel, but just enough to remove the axial wobble which may be present with a new wheel. When grinding a shoulder, if the wheel is dressed to a very shallow cup, leaving a small section to do the grinding, it will avoid a smearing effect. The active portion of the wheel need only be 1/16" or 3/32" (1-2mm) wide, but used with care, it will be found capable of producing a large number of similar pieces. It may also be found that if half the width of the wheel is dressed away, say to a few thou deep, better results will occur. Therefore, that it might be thought that a narrower wheel would do equally well, but this is not usually the case as the thinner wheel will "ring" to the detriment of the finish.

The actual grinding can proceed with the lathe running comparatively slowly. A fast sliding feed should be used, removing a few thou at a time. Since all the lathes have some play on the saddle (otherwise it could not be moved at all), it is best to retract the grinder at the end of the cut, rather in the manner of screw cutting. If working to a shoulder the leading edge of the wheel should be preserved by feeding the grinder away from the shoulder.
On work pieces that are narrower than the wheel, plunge cutting is possible, i.e. feeding the unit straight in with a final facing cut to remove the last thou or two to size.

WHEELS FOR INTERNAL WORK

This is always a compromise between bore size and wheel diameter. Use the largest wheel that will not give too great an area of contact and again, if working to a shouldered bore, feed outwards from the shoulder to preserve the leading edge of the wheel. Dressing the leading edge to a very narrow band of abrasive material will result in a clean and non-smeary finish at the bottom.

COOLANT

Coolant is desirable because considerable heat can be generated during heavy stock removal, also coolant will remove the dust and allow the wheel to work properly. It is also very necessary on internal work or accurate gauging may be impossible. A cold plug gauge may become stuck in a hot work piece and become difficult to remove. Ordinary soluble oil, as used in turning work is suitable.

GRINDING DUST

There are popular misconceptions about this. In actual fact, under a microscope, the grinding dust takes the form of minute lathe turnings, it is of course a nuisance and if it can be settled by applying a coolant, so much the better. The dust produced when truing the wheel is a different matter and during this operation the ways should be covered with 'a piece of paper' and carefully removed with the abrasive from the wheel.

During the grinding of rubber, fibreglass or similar unusual compounds it is desirable to extract the dust into a dust-exhausting unit. Duplex do not make these but can suggest suitable suppliers.

DIAMOND DRESSERS

Diamonds are expensive and it should be borne in mind that it is usually only necessary to remove a few thou at each dressing. There is no object in removing large amounts of the wheel. Again, if too small a diamond is used it wilt not last long. On the other hand, a large and expensive one is liable to be broken away from its setting and lost. A compromise is indicated. A stone of 0.3 to a 0.5 carat should be large enough for wheels up to 8" in diameter, if carefully used, and a 1 carat stone for larger wheels. The diamonds in the built in diamond dressing attachment, which can be supplied as an optional extra with D28, D29, D31 and D31B grinders will be found adequate. Other types of dresser are available as listed in the leaflet.

Section 5 - GRINDING SPINDLES

The bearings behind the wheels are precision units with phenolic cages, of angular contact type, with a thin shim in between them to afford a small measure of adjustment with a slotted screwed collar and lock rings. The pulley end bearing is a precision deep groove journal with spring preloading. These spindles are carefully adjusted and tested at the Duplex Works and should be left alone. If after much work, slight play develops, it can be taken up by a screwed ring, but any adjustment must be very carefully made, not more than 1/16 of a turn at a time. If overdone the spindle will run hot and the balls may indent their tracks and be ruined.

The bearings for the High Speed Four Bearing Spindles that can be used with most Duplex Grinders for dealing with small bores are very special selected matching pairs and such spindles should be returned to the Jena Works for overhaul.

LUBRICATION OF SPINDLES

All units have sealed for life lubrication.

After prolonged storage, the spindles may feel stiff. The remedy to bring them in to service is to give them a few turns by hand, and then a short run at the lowest possible speed. The spindles may run warm at first but eventually the temperature will remain constant.

SPARES AND SERVICE

Each machine carries a serial and type number. It is necessary to quote the number and type when ordering spares. Some of the models have a further letter suffix, which indicates more completely the type, and this should also be quoted.

All spindles should be returned to Jena Rotary Technology Ltd. for service or repair.

Section 6 - CAPACITIES AND CAPABILITIES (Standard Machines)

Type	External wheel diameter	Internal wheel diameter	Drive	Usage
D26	2 3/8" (60mm)	3/4" (20mm)	Flat belts	External and Internal
D27	3" (80mm)	1" (25mm)	Flat belts	External and Internal
D28	5" (125mm)		2 vee belts	External only
D29	5" (125mm)	1" (25mm)	Flat belts	External and Internal
D30A	6" (150mm)		2 vee belts	External only
D31	6" (150mm)	1 1/2" (40mm)	Flat belts	External and Internal
D31A	8" (200mm)		2 vee belts	External only
D31B	8" (200mm)	1 1/2" (40mm)	Flat belts	External and Internal
D32	12" (300mm)		2 vee belts	External only
D33	14" (350mm)		3 vee belts	External only
D35	16" (400mm)		4 vee belts	External only
D35A	16" (400mm)		5 vee belts	External only
D35B	20" (500mm)		4 vee belts	External only
D35C	20" (500mm)		5 vee belts	External only
D35D	20" (500mm)		5 vee belts	External only
D68		1" (25mm)	High Frequency	Internal only
D69		2" (50mm)	High Frequency	Internal only
D70	8" (200mm)		Direct	External only
D71R	12" (300mm)		Direct	External only
D72R	14" (350mm)		Direct	External only

Section 7 - NOTES ON FITTING WHEELS (These notes apply in the UK but are equally important anywhere)

Grinding wheels, whether as spares or original equipment if used improperly can cause a serious accident.

ALWAYS

1. Use correct mounting procedures.
2. Use the wheel guard.
3. Check that the speed is correct for the size of the wheel.
4. Use Mounting blotters.
5. Store wheels in a clean dry place away from extremes of temperature.

NEVER

1. Use a wheel that has been dropped or damaged.
2. Start the machine without the guard in place.
3. Stand in line with the wheel when first started.
4. Use a wheel at above the maximum operating speed marked on it.

This warning is issued in line with the "Consumer Protection Act" 1987 passed as a result of an EEC directive effective from 1st March 1988.

You are also reminded that no person shall mount any grinding wheel unless they have been trained and appointed in accordance with the Abrasive Wheels Regulations 1970, No 535 (Regulation 9).

This Duplex Tool-Post Grinder uses vitrified bond grinding wheels. These are of a ceramic nature and can be easily damaged if mishandled. The speeds at which they can be clearly defined at between 5,000 ft per minute (25 metre/sec) and 6,500 ft per minute (35 metre/sec) on the rim. The larger the wheel, the lower the speed, i.e. a 5" (125mm) wheel can run at 4,500 rpm, a 12" (300mm) wheel at 1,800 rpm and so on.

Some Duplex Tools Post Grinders have two or more speeds, (Types D26, D27, D29, D31 and D31B) for both internal and external grinding. The large external wheel must always be used on the lowest speed and the correct belt position, which is indicated on a plate fixed to the beltguard. The greatest care must be taken to ensure that large wheels are not run at the higher speeds used for internal work with small wheels.

Check and double check that the belt is on the correct pulley steps before switching on.

Never run an external wheel without the wheelguard in position and never stand in line with any wheel being run for the first time. It is possible that it may have been damaged in transit or storage and no chances should be taken in this respect.

Never use a wheel that is larger than the rated machine capacity as it cannot be guarded and will also run too fast. An accident, under those circumstances, is inevitable.

Before commencing work the wheel must be dressed using a fixed diamond mounted on the machine and by traversing the grinder. This will ensure that the face of the wheel is parallel to the machine slide ways.

Grinding work may now commence. The wheel supplied as standard equipment will be found suitable for the majority of materials to be ground but it may be necessary to experiment with feed and traverse rates in co-ordination with work spindle rotation speeds to obtain the best results.

MAINTENANCE

The motor is of such a design that there are no wearing parts. Motor bearings are sealed for life and require no attention. The spindle bearings are grease packed on initial assembly and similarly require no further attention.

BELT ADJUSTMENT

The drive belt tension is adjusted by inserting a screwdriver through the drilled holes in the motor pulley and slackening the motor retaining screws. The top screw can be moved in its curved slot to tighten or loosen the belt.

All fixings on this machine are metric.

Section 8 - NOTES ON HIGH FREQUENCY MACHINES

On direct drive internal grinders, types D68 and D69 the primary power supply is 220/240V single phase to a dedicated inverter unit and thence to the grinder via a 6 pin plug and 4 core cable.

The power supply unit comprises a steel enclosure containing start and stop buttons, no volt release contactor and phase inverter. Both speed and rotation are set before leaving the works

The unit is "soft start" and spindle rotation begins 2-3 seconds after power on and operating speed is reached in 5-10 seconds. An interlock is fitted in the secondary socket which prevents damage to the inverter should the plug be removed by accident. The inverter is set, sealed and dedicated to a particular machine no adjustments should be attempted in the field.

The power supply box should be mounted vertically to give a degree of cooling inside. However, the inverter parts are very small and delicate and great care should be taken over this as the assembly is not repairable by replacement of individual parts, which become damaged in some way.

The grinder itself must be run with an inverter of this type it will not function powered by rotary high frequency supplies.