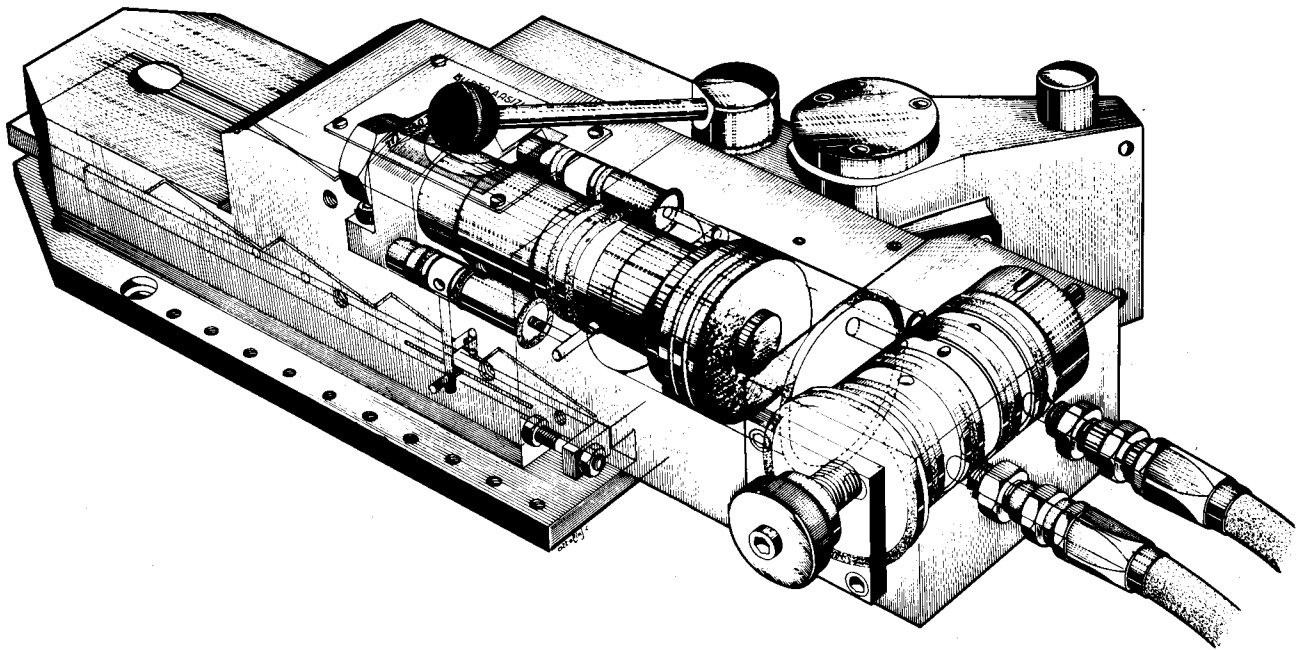




DIPLOMATIC

MAINTENANCE HANDBOOK FOR «TA/20» TRACER



index

specifications and introduction	pag. 2
standard components	» 3
uncrating the equipment	» 4

INSTALLATION

general view of the assembled unit	» 5
determination of the height of the tracer base plate	» 6
mounting base plate	» 7
levelling pads for master-holder beam	» 8
mounting of the master-holder beam	» 8
rear master rail	» 8
setting up for face tracing	» 9
hydraulic diagram	» 11
hose connections	» 12
hydraulic power unit	» 13

SET-UP (OF EQUIPMENT)

mounting of stylus-holder rod	» 14
stylus and tool profile	» 15
operating test of the equipment	» 16
copying stroke limitation	» 17
master and flat template	» 18
angle setting	» 20
angle adjustment	» 21
alignment of master-holder beam	» 24-27
placing and adjustment of the master	» 24-27
working with a counter-template	» 28
turret adjustment	» 29
turret rotation	» 30
tool-holders	» 32
work cycle - chip section	» 33
machining of shoulders	» 36
accessories and their use	» 37
finishing pass	» 39
automatic stops	» 40
special instructions for ARL	» 43
adjustments	» 45

MAINTENANCE

checking the lubrication - oil change	» 46
gib adjustment	» 47
spare parts	» 48-58
service manual	» 59
trouble shooting	» 60-64

specifications

Copier model or size	Hydraulic stroke (mms)	Useful stroke at 60° (mms)	Force at 20 Kgs/cm ²		Maximum tool section	Chip section (mm ²) (1)	For lathes with power of (HP)	Weight Kgs (2)
			working-in	working-out				
TA 55	64	55	250	320	16 x 16	1,5	6	23
TA 80	92	80	350	450	20 x 20	2,4	10	34
TA 120	139	120	560	660	25 x 25	4,2	16	62
TA 175	202	175	740	880	32 x 32	5,5	25	93

- (1) Values recorded during operation with copier working-out on steel with $R = 70 \text{ Kgs/mm}^2$.
 (2) Copier only, without turret and accessories.

introduction

This instruction manual is intended to familiarize the use with the «TA» Copying Attachments in such a way to get the best possible use from this equipment for a long period of time.

The back of this book has a listing of possible problems and their suggested corrections. However, if a problem persists, call your dealer who, in turn, will get in touch with the DUPLOMATIC Service.



DIPLOMATIC

DIPLOMATIC S.p.A. MECCANICA APPLICAZIONI OLEODINAMICHE

S.p.A. - Capitale Sociale L. 2.000.000.000
 Reg. Soc. N. 4690 Trib. di Busto Arsizio
 C.C.I.A.A. Varese N. 56224
 Codice Fiscale - Partita IVA 00181720129

SEDE E AMMINISTRAZIONE: 21052 BUSTO ARSIZIO
 VIA ALBA, 18 - TELEF. 0331/627.551 (5 linee) 638.591 (3 linee)
 TELEF. 332262 DPLDIR-I

DIREZIONE COMMERCIALE: 20025 LEGNANO
 P.LE BOZZI, 1 - TELEF. 0331/596.006 (8 linee)
 TELEF. 330604 DPLCOM-I
 TELEF. 330582 DPLSIS-I

DIPLOMATIC SUBSIDIARIES

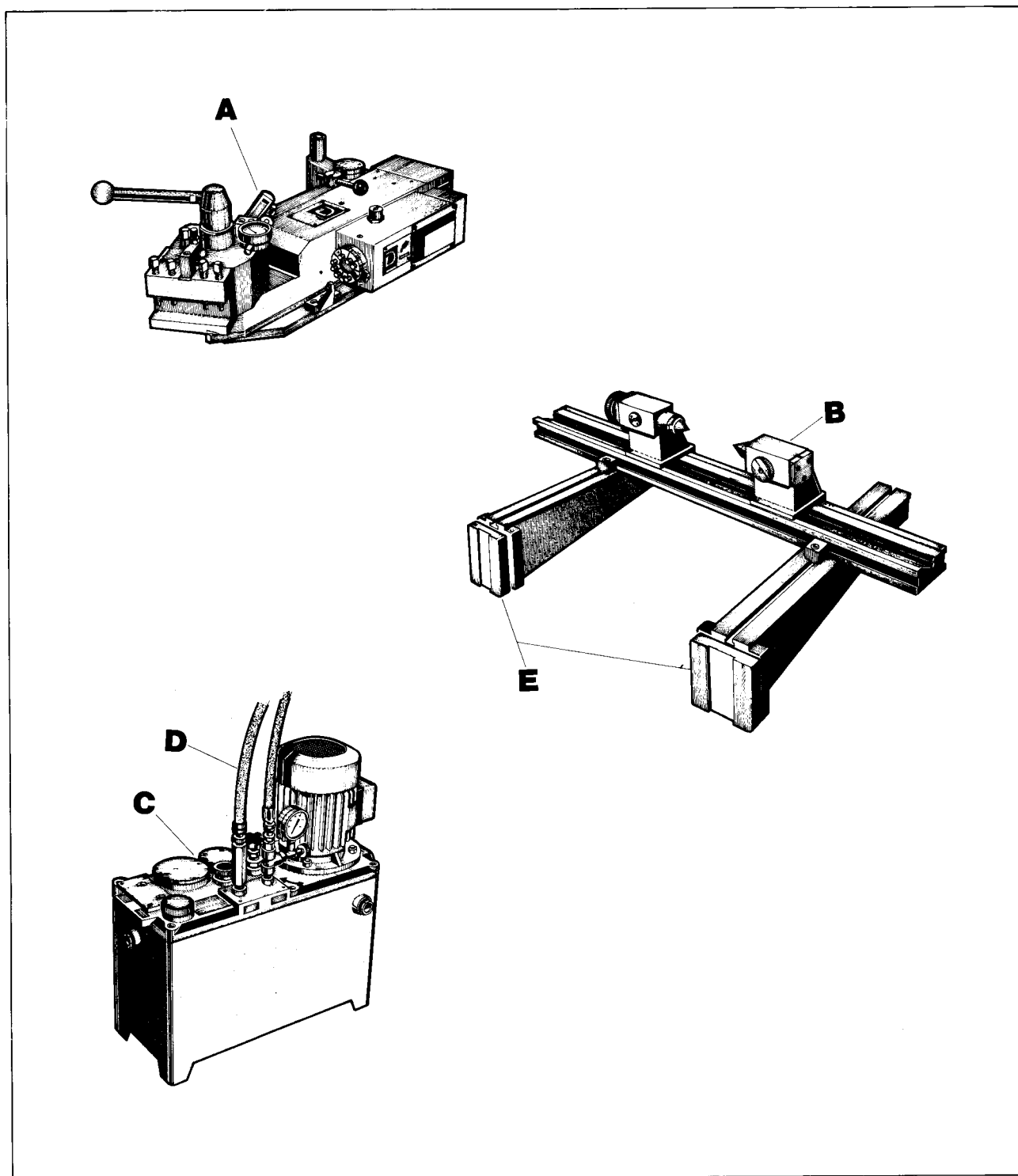
In Italy:

20149 MILANO - VIA G. DA PROCIADA, 6 - Tel. 02/312756 - 3492485
 10141 TORINO - C.SO PESCHIERA, 325 - Tel. 011/793318 - 798054
 25100 BRESCIA - VIA MARCONI, 29 - Tel. 030/390811
 35100 PADOVA - VIA A. DA BASSANO, 45 - Tel. 049/606699
 40133 BOLOGNA - VIA PASUBIO, 63 - Tel. 051/387840 - 310988 - Tlx 52243 Duplœbo

Abroad:

DIPLOMATIC SYSTEMS INC. (USA) - NEW HYDE PARK, N. Y. 11040 - 505 Jackson Ave. - P.O. Box 149 - Tel. 516/741.6933
 Tlx 14-4532 Duplœmat NhpK - GLENDALE, Cal. 91201 - 624/A Irving Ave. - P.O. Box 3811 - Tel. 213/245.5563 - Tlx 674580 Schaefer Gind
 DIPLOMATIC ESPANOLA (E) - USURBIL (Guipuzcoa) - Poligono 24 - Tel. 362646/7 - Tlx 38277 Dumac - Apartado 1336 - San Sebastian
 DIPLOMATIC HYDRAULIK GmbH (D) - 6050 OFFENBACH MAIN - Mühlheimerstrasse 107 - Tel. (0611) 864081 - Tlx 04 185 490 duhy
 DIPLOMATIC (U.K.) Ltd. (GB) - 11 Consul Road - Tribune Industrial Estate - RUGBY CV21-1PB, Warks
 Tel. Rugby 0788/2088-2089 - Tlx 311236 Duplœmatic Rgby
 DIPLOMATIC FRANCE (F) - 94250 GENTILLY (Val de Marne) - 43, Ave. Pasteur - Tel. 5810140 - Tlx 204968 Duplœma

standard supply components



- A** Hydraulic copying device complete with turret and two tool-holders
- B** Master-holder unit
- C** Power unit
- D** Pair of hoses
- E** Pair of pads (when necessary)
- F** Instruction handbook
- G** Set of service wrenches

at receipt of the equipment

The device is supplied entirely assembled, ready to be mounted on the lathe. Please remember that the power unit is shipped without oil.

The right oil should have a viscosity of 2.8 to 3.3° E at 50° C, with additives for way lubrication (f.i. vacuoline oil 1405). Please check the oil chart of page 13.

When uncrating, be sure to check and account for all contents. Then remove the protective coating from all unpainted surfaces. This coating is either vaseline or cosmoline, remove with kerosene.

The components are arranged into the crate as shown on figs. 1 and 2.

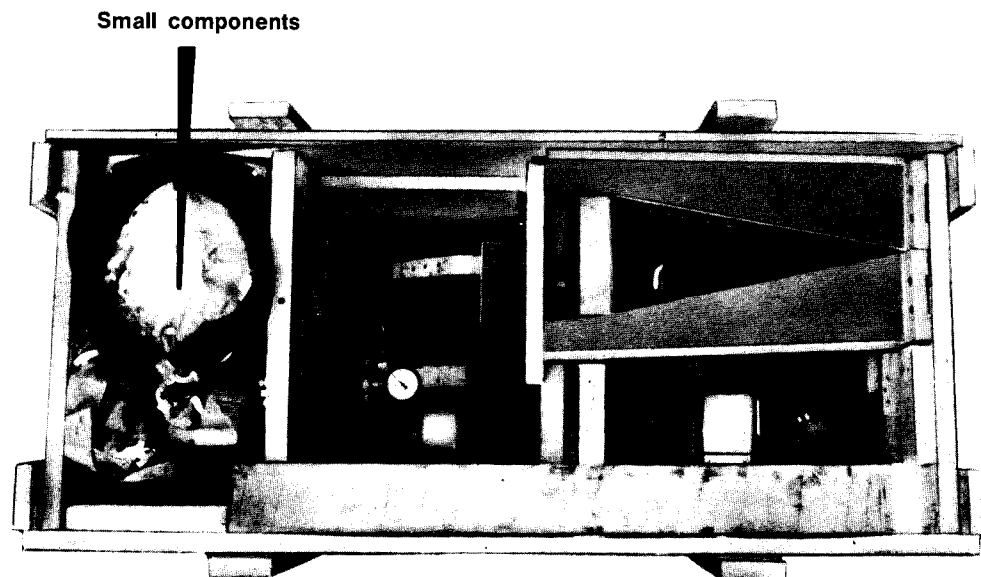


Fig. 1 - The crate opened

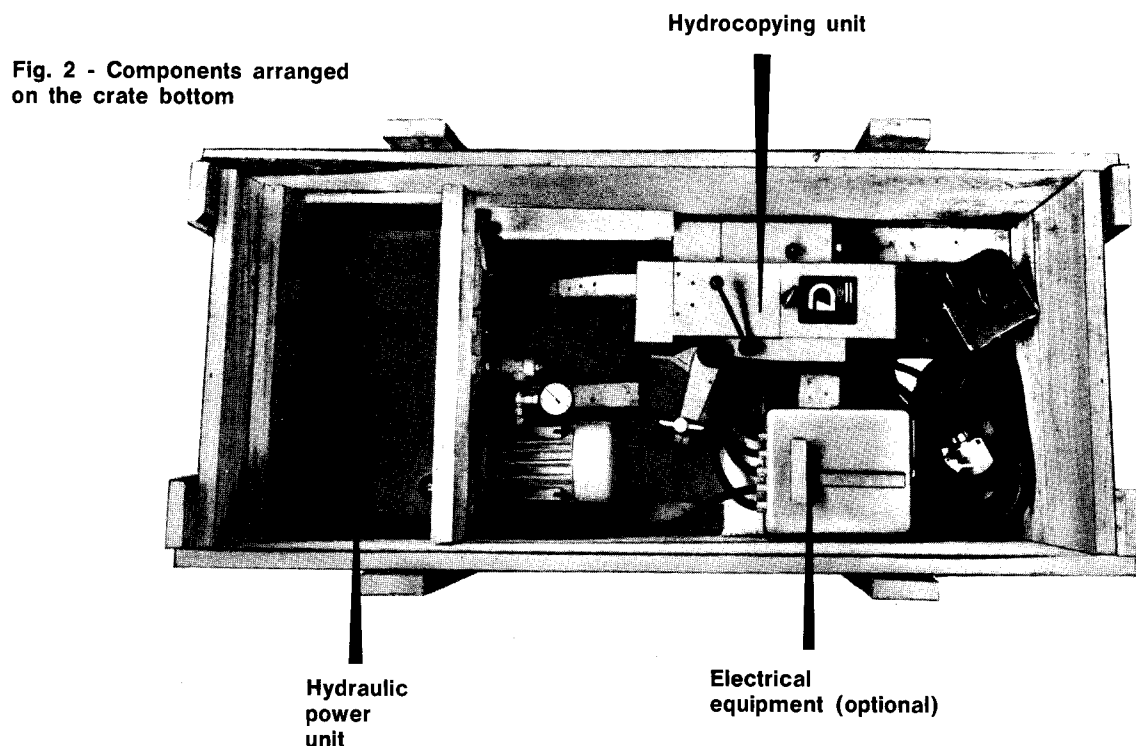


Fig. 2 - Components arranged on the crate bottom

set up of the equipment

The fig. 3 shows the standard assembly of a copying device.

The device is mounted on the rear side of the lathe transverse slide.

As a rule, a plate with a circular slot is used for adapting the copying device to the lathe (fig. 4 and fig. 5).

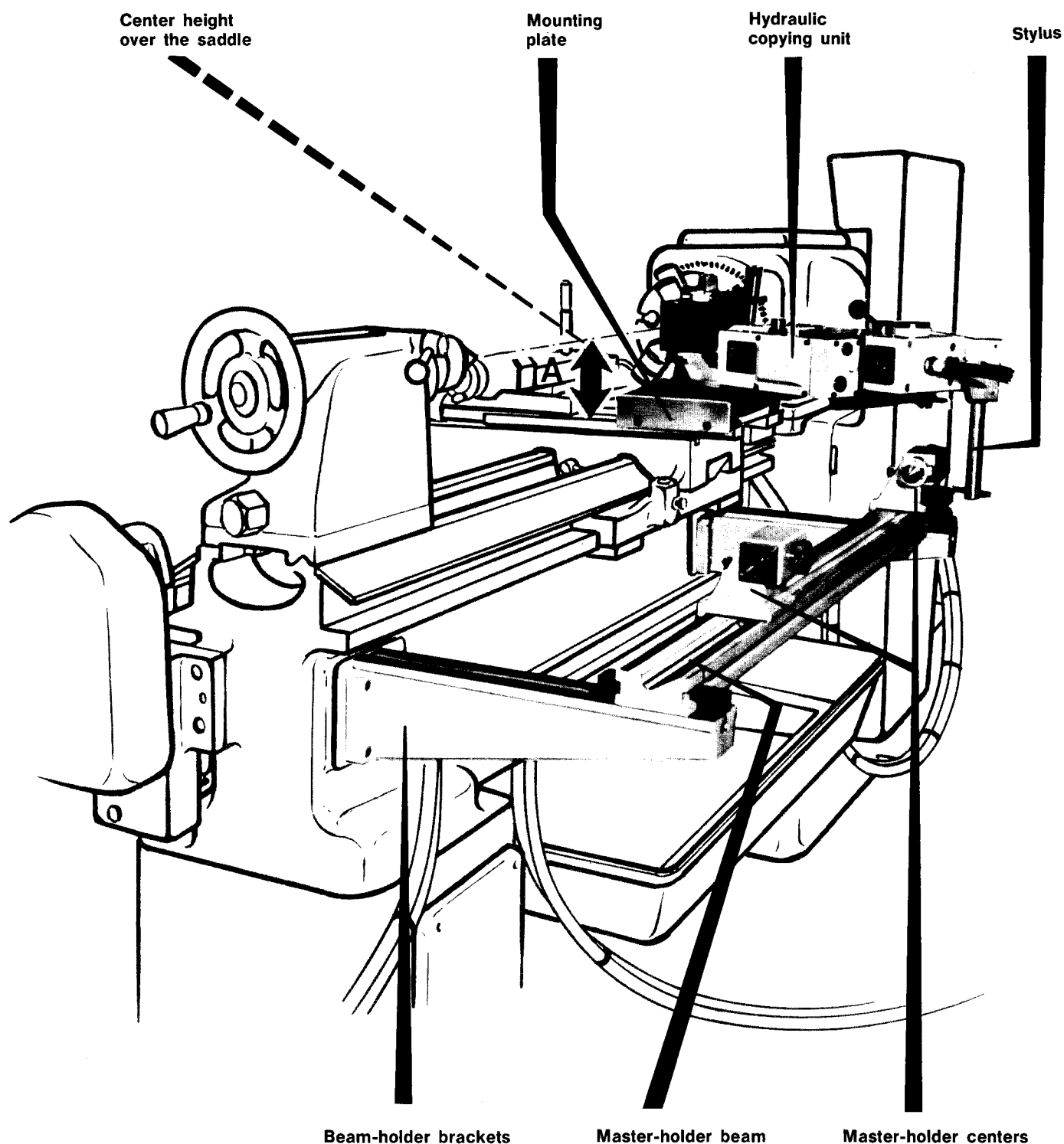
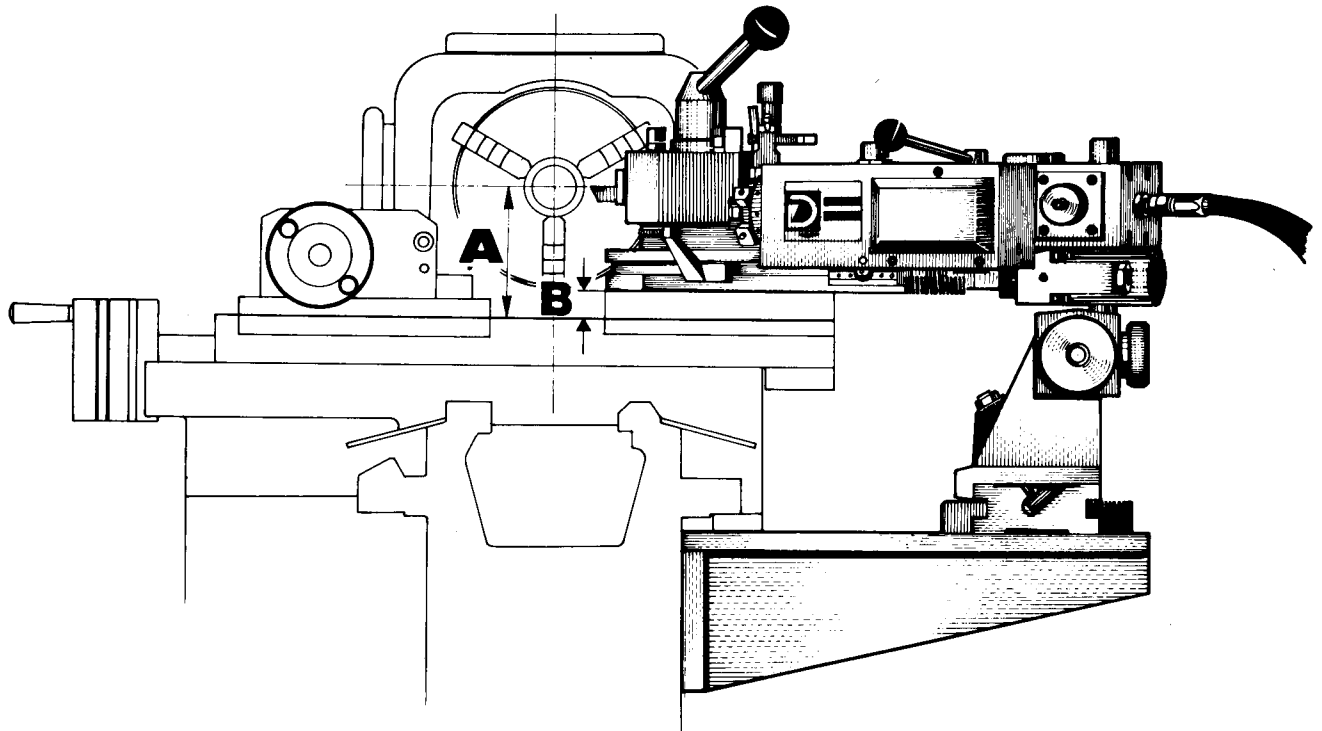


Fig. 3 - Standard assembly of a rear mounted tracer

height determination of the copier mounting plate



Copier	Tool	Tool-holder	A		B suggested
			Tool with cutting edge up	Tool with cutting edge down	
TA. 55	16 x 16	normal	116 ÷ 131	100 ÷ 115	20
		intermediate	101 ÷ 116	85 ÷ 100	20
		extended	86 ÷ 101	70 ÷ 85	20
TA. 80	20 x 20	normal	138 ÷ 153	118 ÷ 133	22
		intermediate	123 ÷ 138	103 ÷ 118	22
		extended	108 ÷ 123	88 ÷ 103	22
TA. 80	20 x 20	normal	151 ÷ 166	131 ÷ 146	35
TA. 120	25 x 25	normal	166 ÷ 186	141 ÷ 161	25
		intermediate	146 ÷ 166	121 ÷ 141	25
		extended	126 ÷ 146	101 ÷ 121	25
TA. 120	25 x 25	normal	186 ÷ 206	166 ÷ 186	45
TA. 175	32 x 32	normal	194 ÷ 214	162 ÷ 182	25
		intermediate	169 ÷ 194	137 ÷ 162	25
		extended	149 ÷ 169	117 ÷ 137	25
TA. 175	32 x 32	normal	214 ÷ 234	182 ÷ 202	45

mounting plate (swivel baseplate)

The copying attachment is mounted to the rear of the cross-slide, and for the purpose of flexibility (rotation), a swivel plate is furnished. To establish the correlation concerning thickness of swivel plate, center height and tool holders, see chart on page 6.

If the cross-slide has T-slots, these can be used to fasten the swivel plate. In this case, drill and counterbore matching holes for socket head screws. Make sure screws are of proper length and do not touch bottom of T-slot (Fig. 4).

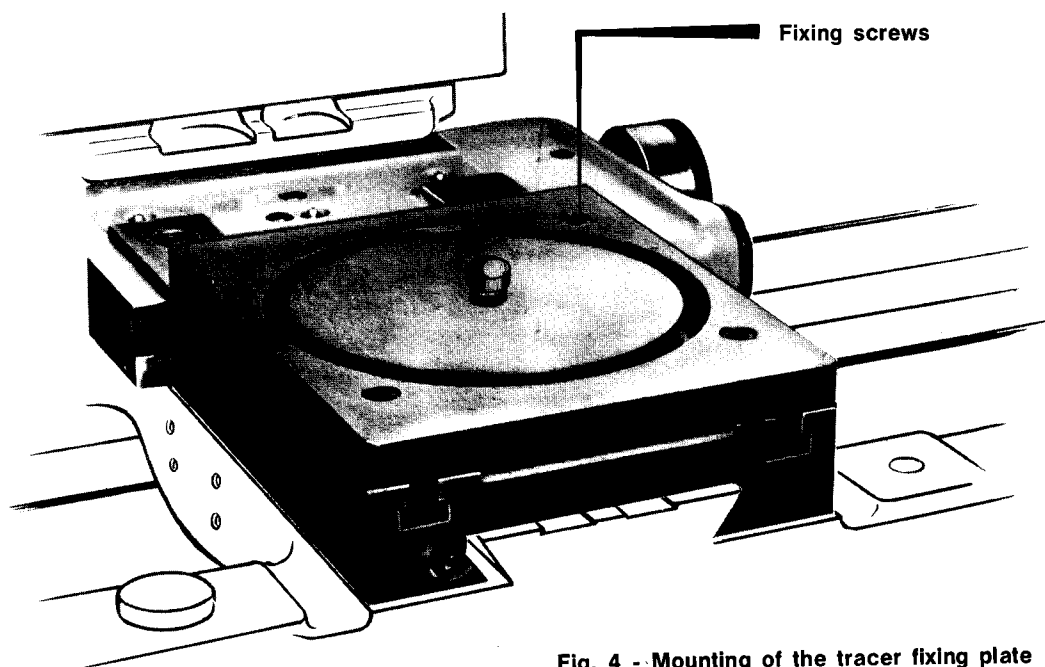


Fig. 4 - Mounting of the tracer fixing plate

Some lathes have a dovetail arrangement on the extended cross slide. In this case a clamping arrangement will serve to accurately hold the swivel plate to the carriage (Fig. 5).

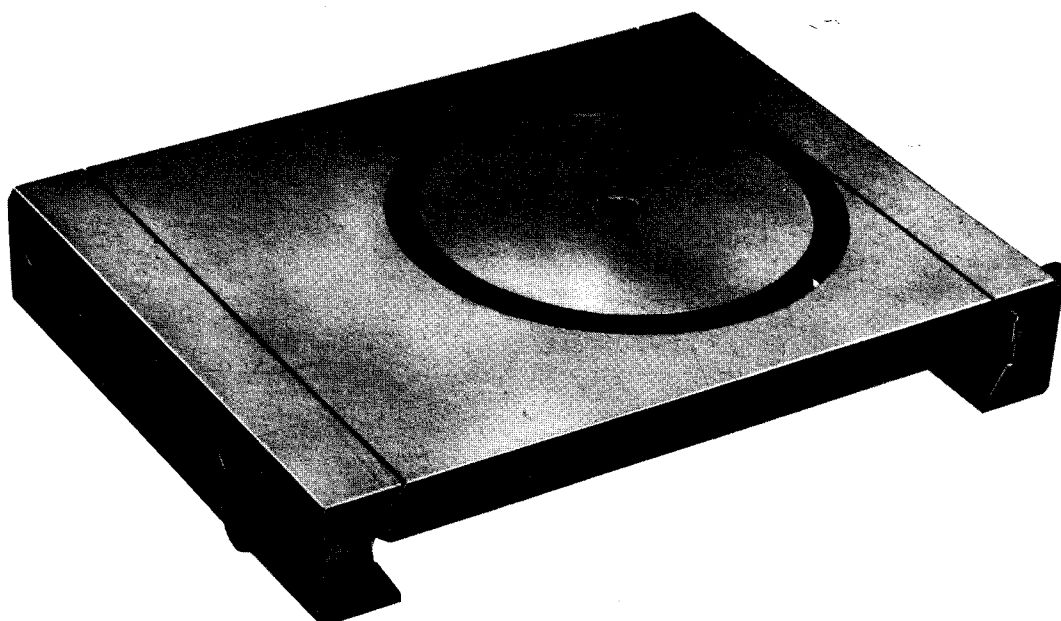


Fig. 5 - Fixing plate for lathes without T-slots

leveling pads for master beam supports

These should be used when rear of lathe bed does not have true machined surface to attach supporting arms. DUPLOMATIC supplies these pads undrilled permitting the customer to drill mounting holes and holes for leveling screws as needed.

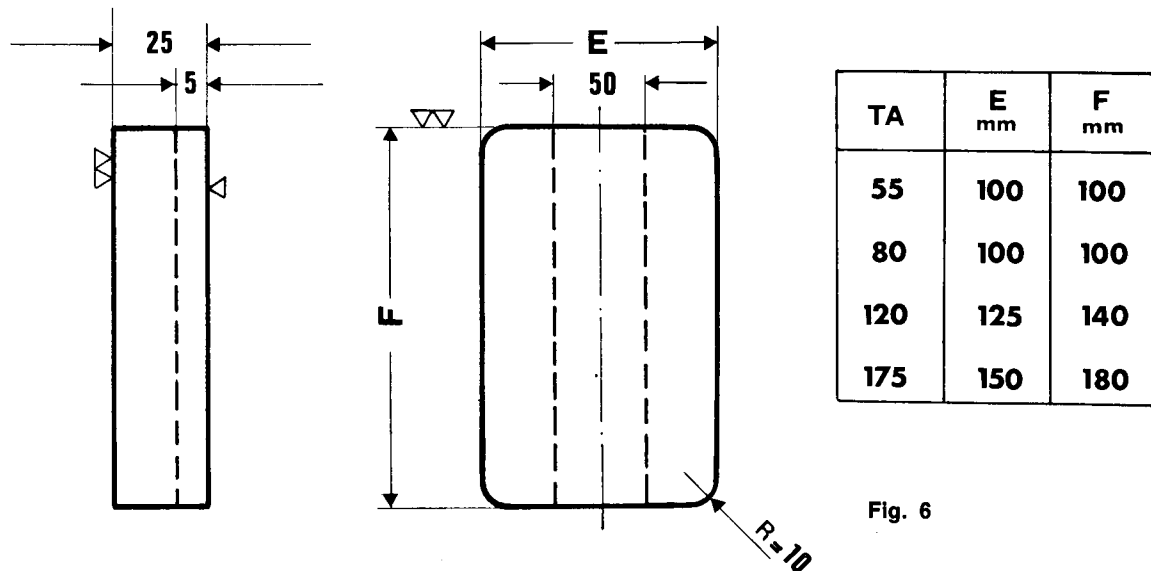


Fig. 6

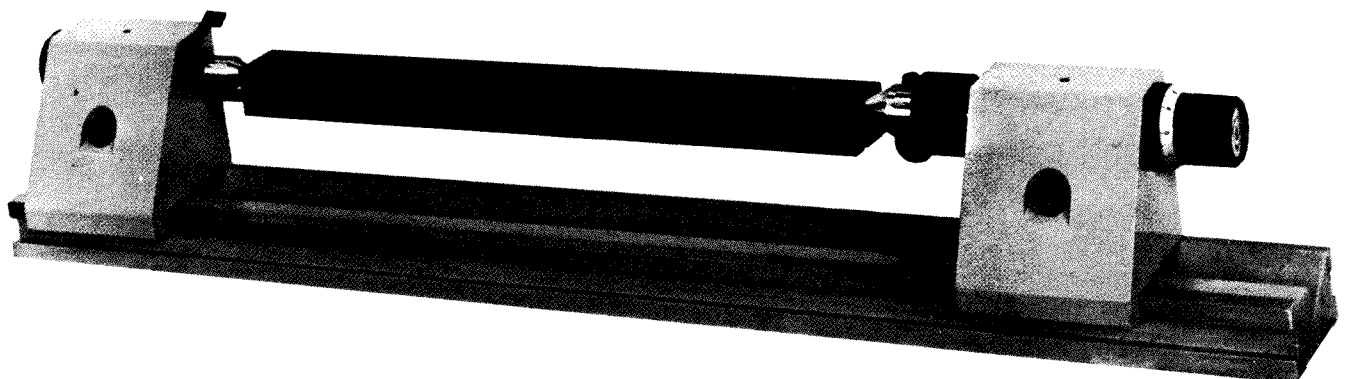
mounting the master holder assembly

Before proceeding, check the bed configuration for the best possible positioning of this assembly. For most work, the headstock end of the beam should be in line with the chuck face. The position of the template should be as high as possible, but not to interfere with the cross slide. Lay out the most convenient center height to determine the position of the supports. It is important that the arms and rail are parallel to the lathe center line and careful mounting to achieve this is suggested.

rear template-holder rule

This accessory can be furnished when flat templates are used. It is inserted between the centers and locked against rotation.

Fig. 7 - Rear template holder assembly



See page 25 for description of adjustments of centers.

face tracing

With copying attachment turned to either 30° or 0° , longitudinal movement locked and cross-feed engaged, it is now possible to do face tracing operations. For this purpose, a facing template holder has to be mounted to the right hand side of the carriage as shown in fig. 8.

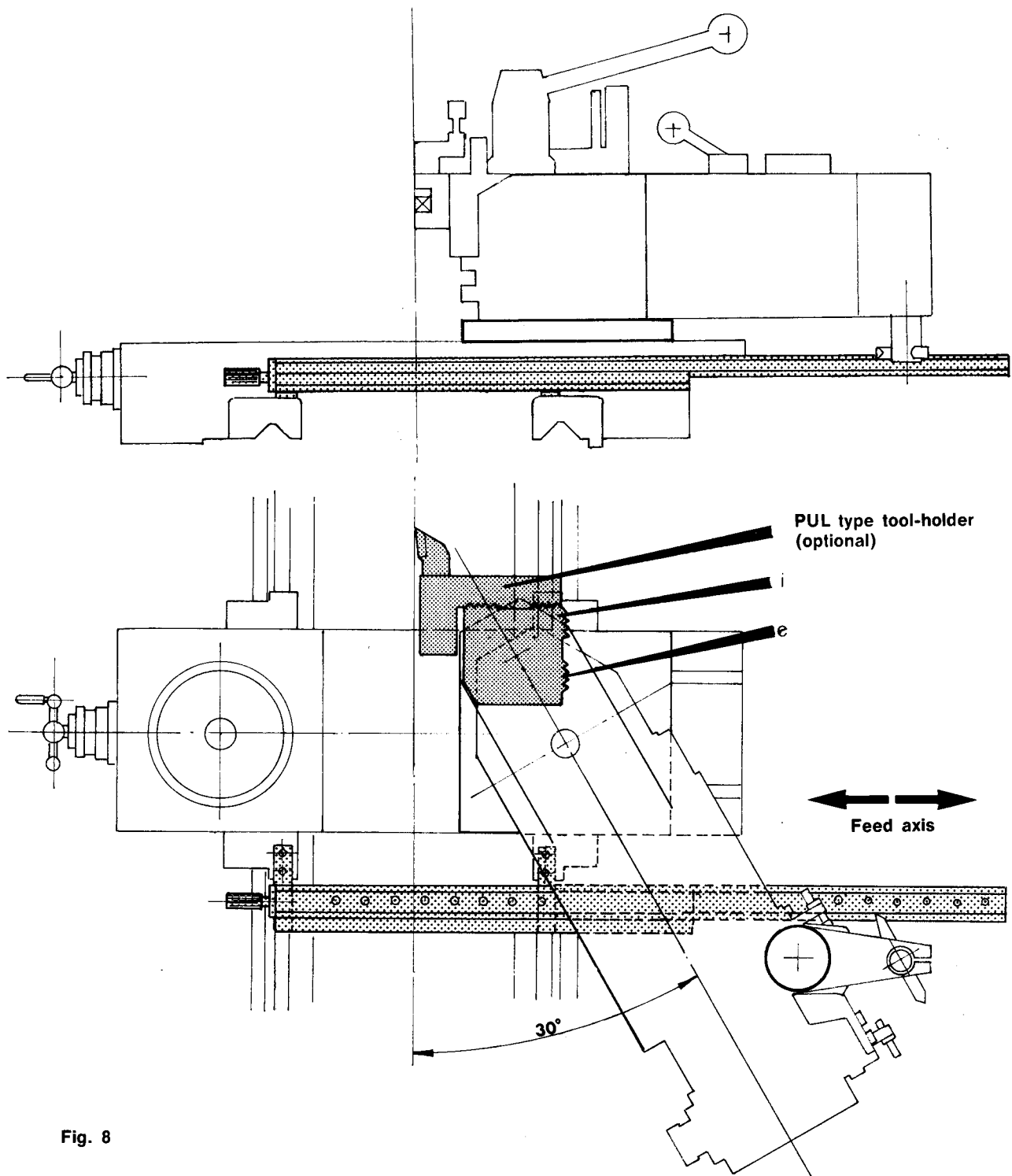


Fig. 8

When orientating the copier at 30° or 0° , with reference to the center axis (facing work), the side «e» will be the farthest one from the center axis.

A special optional tool-holder PUL can be supplied which-when fitted on the side «i» - puts the tool over the center axis, for internal facing work or any work where the tool protrudes over the tool-holder axis.

Here too, the mounting has to be done with care; the facing template holder has to be set perfectly parallel to the cross slide ways. Many lathes have machined pads and even drilled and tapped holes on the right hand side of the carriage to accomodate a follow rest. These can be utilized. In other cases, it might be necessary first to create level surfaces with the aid of pads fastened to the carriage attaching the template holder to these pads.

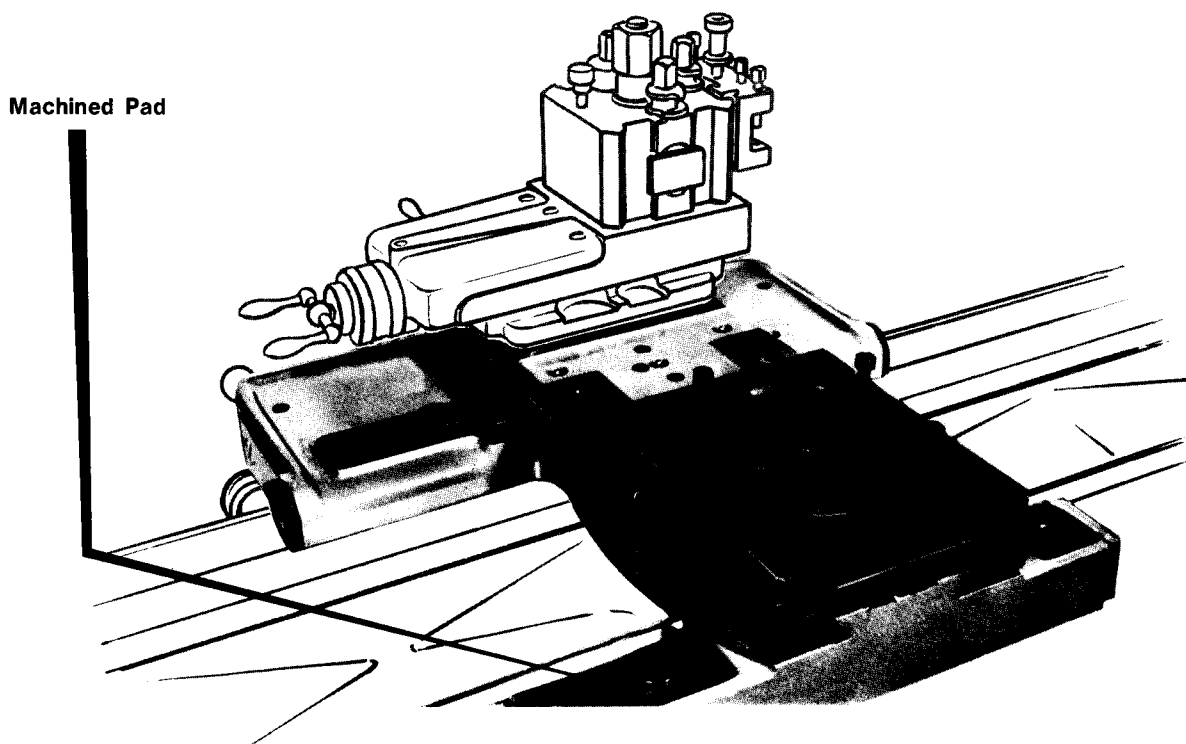


Fig. 9 - Machined pads for facing template

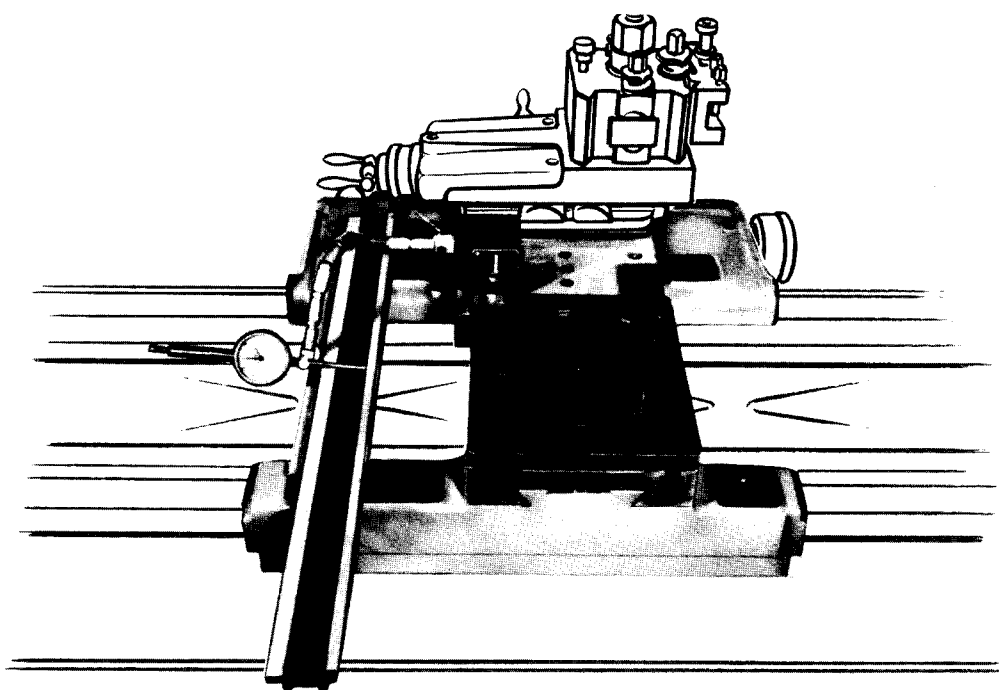


Fig. 10 - Set-up of facing template

Check parallelism with dial indicator on cross slide, point against edge of template holder and scan by moving cross slide.

hydraulic diagram

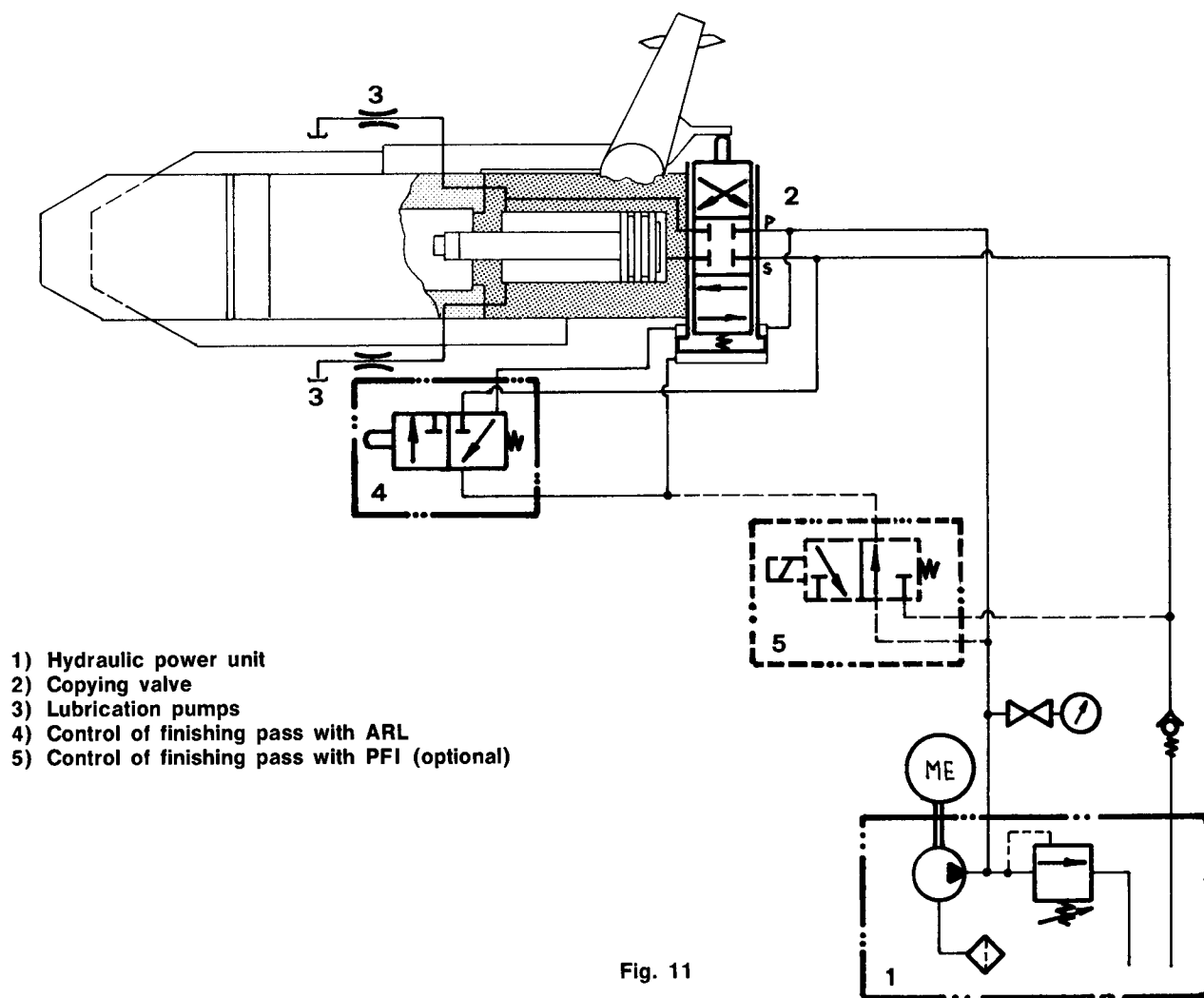


Fig. 11

The power unit supplies the copying device and can also be used for feeding the following units:

- UCP type hydraulic tailstock
- MAC hydraulic clamping device
- UT cut-off unit
- Filematic «RCF» re-indexing

Of course, all these must be actuated successively and never two or more at the same time.

Equipment type	Power unit type	Pump delivery Q-ls/min.	Motor power HP
TA. 55	CTR 22/7	7	0,75
TA. 80	CTR 22/7	7	0,75
TA. 120	CTR 22/13	13	1
TA. 175	CTR 22/13	13	1

hose connections

Connect the hoses from both power unit outlets (P and S) (see fig. 12) to the two connectors on the copier.

The chart shows the proper set of hoses for each type of copier.

Copier	Port «P»	Port «S»	Hole for «PF»
TA. 55	1/4" gas	3/8" gas	1/8" gas
TA. 80	1/4" gas	3/8" gas	1/8" gas
TA. 120	3/8" gas	1/2" gas	1/8" gas
TA. 175	3/8" gas	1/2" gas	1/8" gas

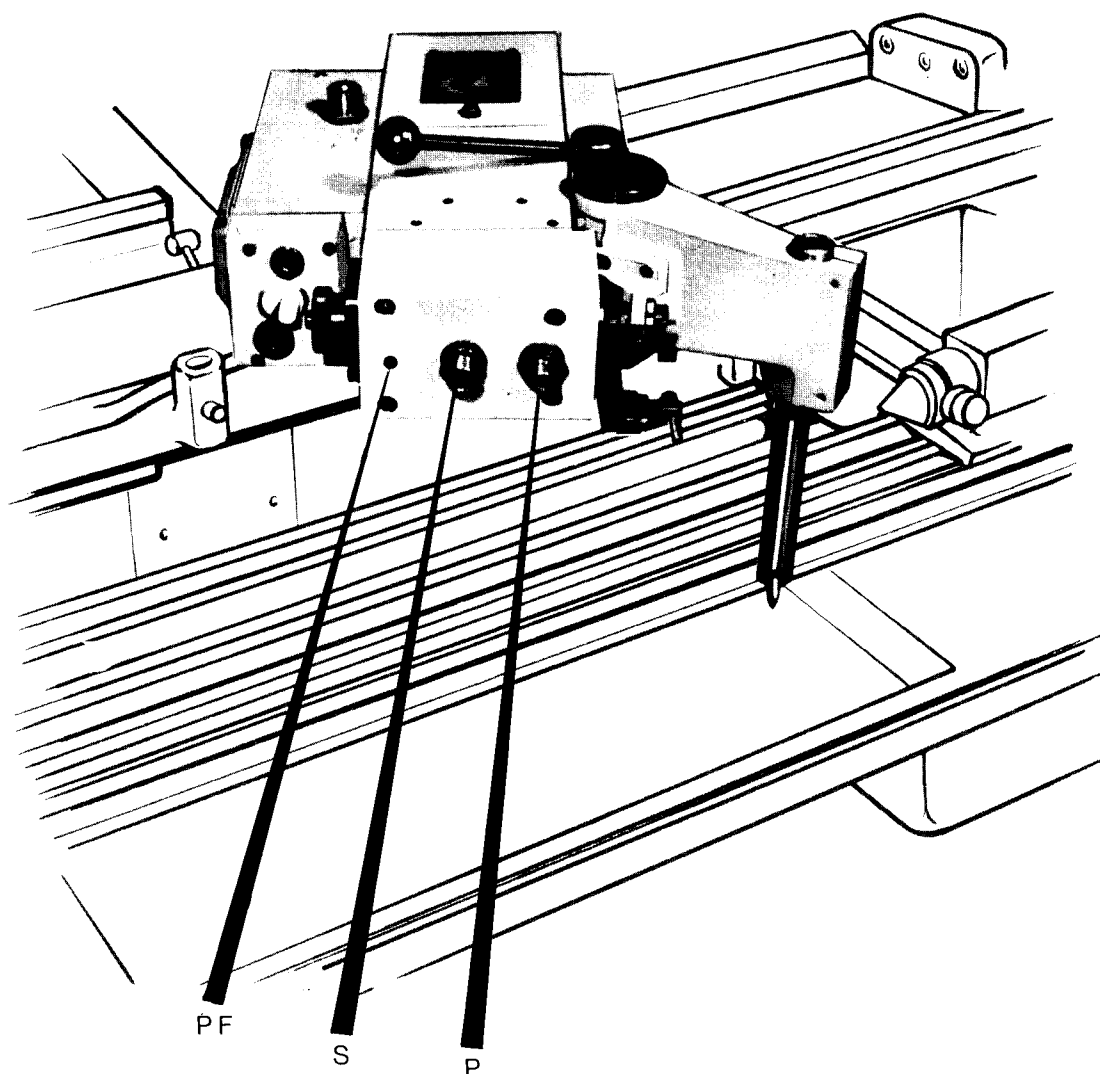


Fig. 12 - Connection of hoses to the copier

As a rule, the PF hole is plugged.
It is used only when provided with remote control for finishing pass.

hydraulic power unit

Fill the tank with proper hydraulic oil to the correct level. An oil sight glass on the side of the tank should be checked periodically. Then, proceed with electrical connections. Most units have motors for dual voltage 220/440/60 cycles and are factory connected for 220 volts. The inside of the cover on the terminal box shows the schematic for changing the terminals for operation at 440 v. We recommend a separate line from the electric power supply with a 3 phase cut off switch and proper fuses.

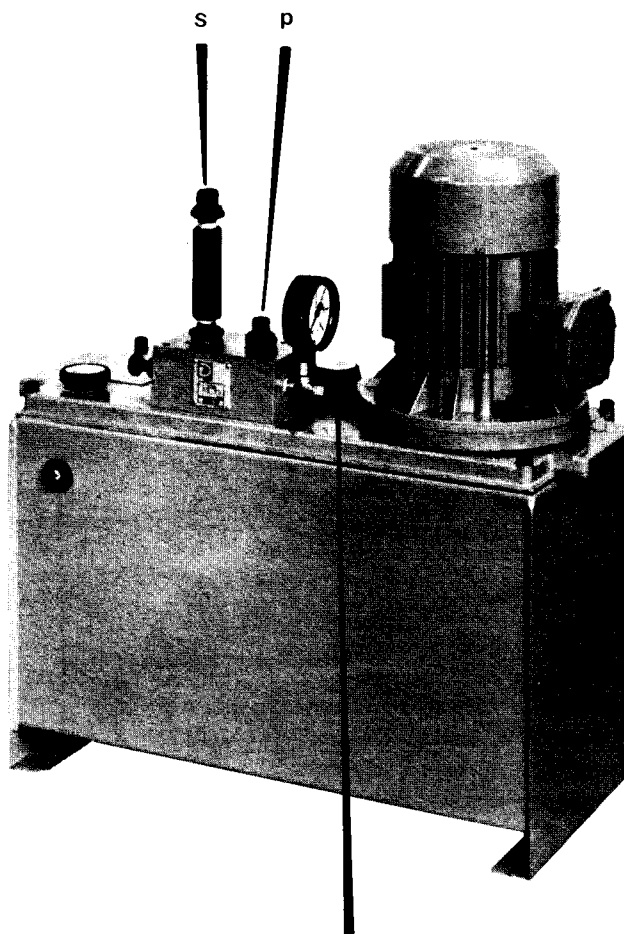
Start motor briefly to verify proper direction of rotation indicated by arrow. If not correct, change connection of 2 supply cables.

NOTE: Duplomatic does not supply the starter switch for the motor.

Oil with a viscosity of 3° E at 50° C, with additive for guide lubrication, is suggested.

Next, some brands of oil, proper for the purpose, are listed:

MOBIL	—	Vacuoline Oil 1405
ESSO	—	Febis K.32
(SHELL) IP	—	Tavia Oil 32
AGIP	—	Exidia 3
TOTAL	—	Drosera MF 20
HOUGHTON	—	Hydro-Drive MIH. 150
FINA	—	Hydran CIN 32
GULF	—	Gulfway 44
CASTROL	—	Magna GC
VEEDOL	—	Amarex 43 E.P.
AMOCO	—	Waytac Oil 15
COFRAN	—	Coffralin Equitex 103
FUCHS	—	Renolin MR.10



Adjusting knob of pressure adjusting valve

The normal operating pressure recommended is 280 p.s.i. or the equivalent 20 kg/cm². Insert pressure gauge and adjust pressure by turning regulating knob - clockwise rotation increases pressure. When correct reading is reached, tighten counter nut on knob. We also recommend removal or deactivation of pressure gauge, except when reading pressure. This will add to the longevity of this instrument.

setting the equipment

mounting of the stylus bar

During the shipment, the stylus bar is not mounted on the equipment. This rod should be mounted in such a way that the stylus axis is parallel to the copier axis. Tolerance of $\pm 1^\circ$. The tracer point should protrude 15-17 mm. from the rod (see fig. 14).

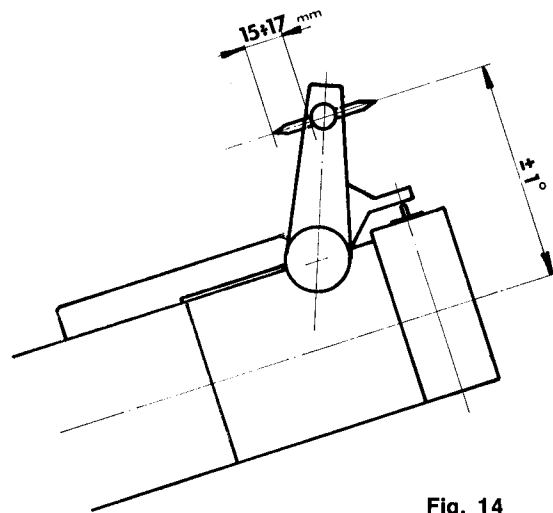
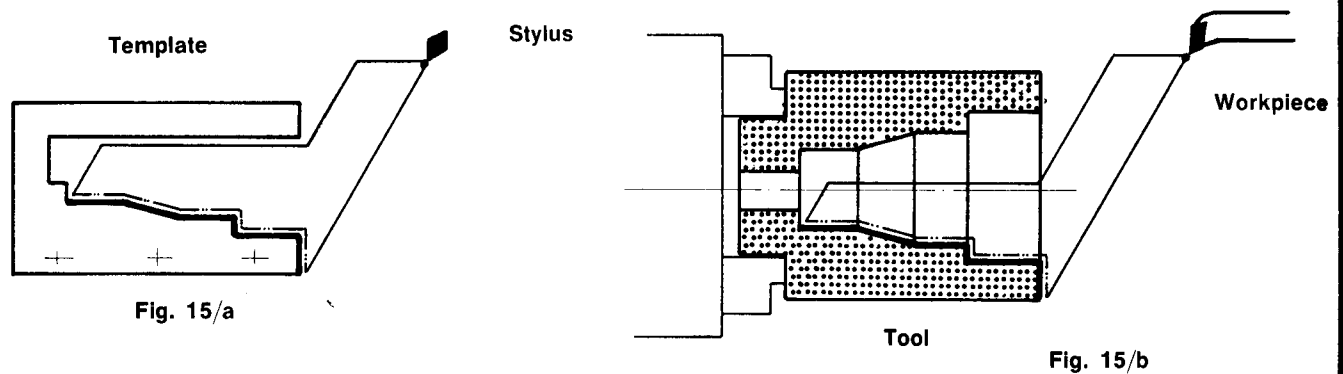


Fig. 14

An auxiliary stylus is supplied (as standard), to be used when machining internal profiles, when it is necessary to limit the out stroke with a counter-template (see fig. 15).



For mounting this auxiliary stylus, the stylus bar will be reversed and the stylus fitted as shown on fig. 16.

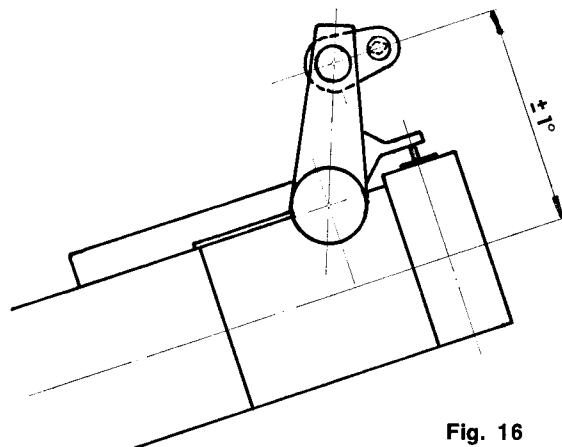


Fig. 16

stylus and tool profile

The exact reproduction on the workpiece of the details of profile, can only occur when tracer and tool have the right rake and that their points have the same radius; this radius must be smaller than the radius to be reproduced.

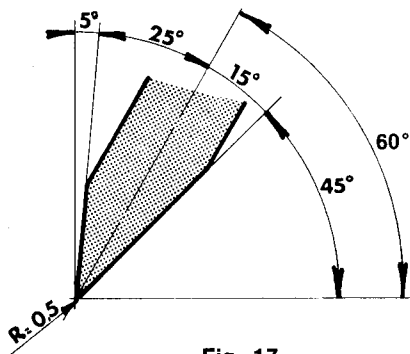


Fig. 17

Example: when turning with the copier at 60° with reference to the center line, the stylus profile should meet the template as shown in fig. 17 to be able to scan templates with maximum slope as indicated on fig. 18.

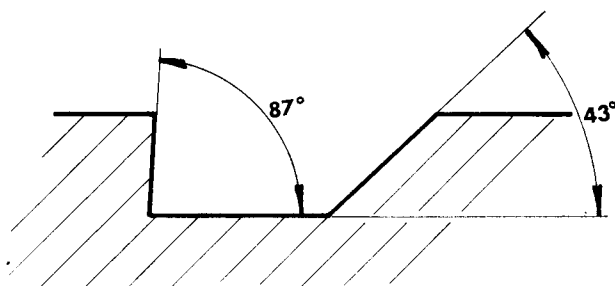


Fig. 18

Most standard marketed copying tools have a rake as shown in fig. 19; it is then obvious that the maximum reproducible slope will be as indicated in fig. 20.

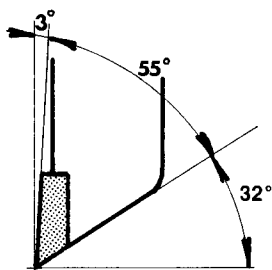


Fig. 19

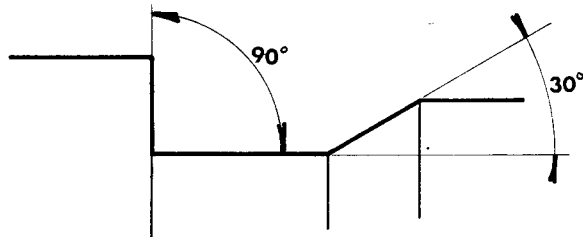


Fig. 20

Note: Each stylus is equipped with two points with radius of 0,5 mm. When tools with a greater radius are used, it will be necessary that the stylus point, be accordingly-modified.

test of copying device operation

When all components of the equipment are assembled, the copier operation should be tested. Before testing, both the center and the tool-holder - if mounted - must be demounted.

The testing procedure is as follows:

- 1) - Push the transverse slide to the end of the backward stroke
- 2) - Start the power unit motor and adjust the pressure at 20 Kgs/cm².
- 3) - Operate the lever and actuate the copier working-in.

After the step N. 3 the equipment will move toward the center axis until reaching the end of the forward stroke.

- 4) - Manually check the tracer sensitivity. Displacing the stylus point with a force of about 1 kg, the copier should move backward and releasing the stylus the copier must return to the end of the forward stroke.

Repeat this manoeuvre several times producing several forward and backward strokes of the copier, to bleed all the air from both cylinder chambers. Should the unit be equipped with stops, these should be removed for allowing the copier to travel the whole range.

When the unit is equipped with the electro-magnetic remote control this manoeuvre should be carried out with the solenoid energized.

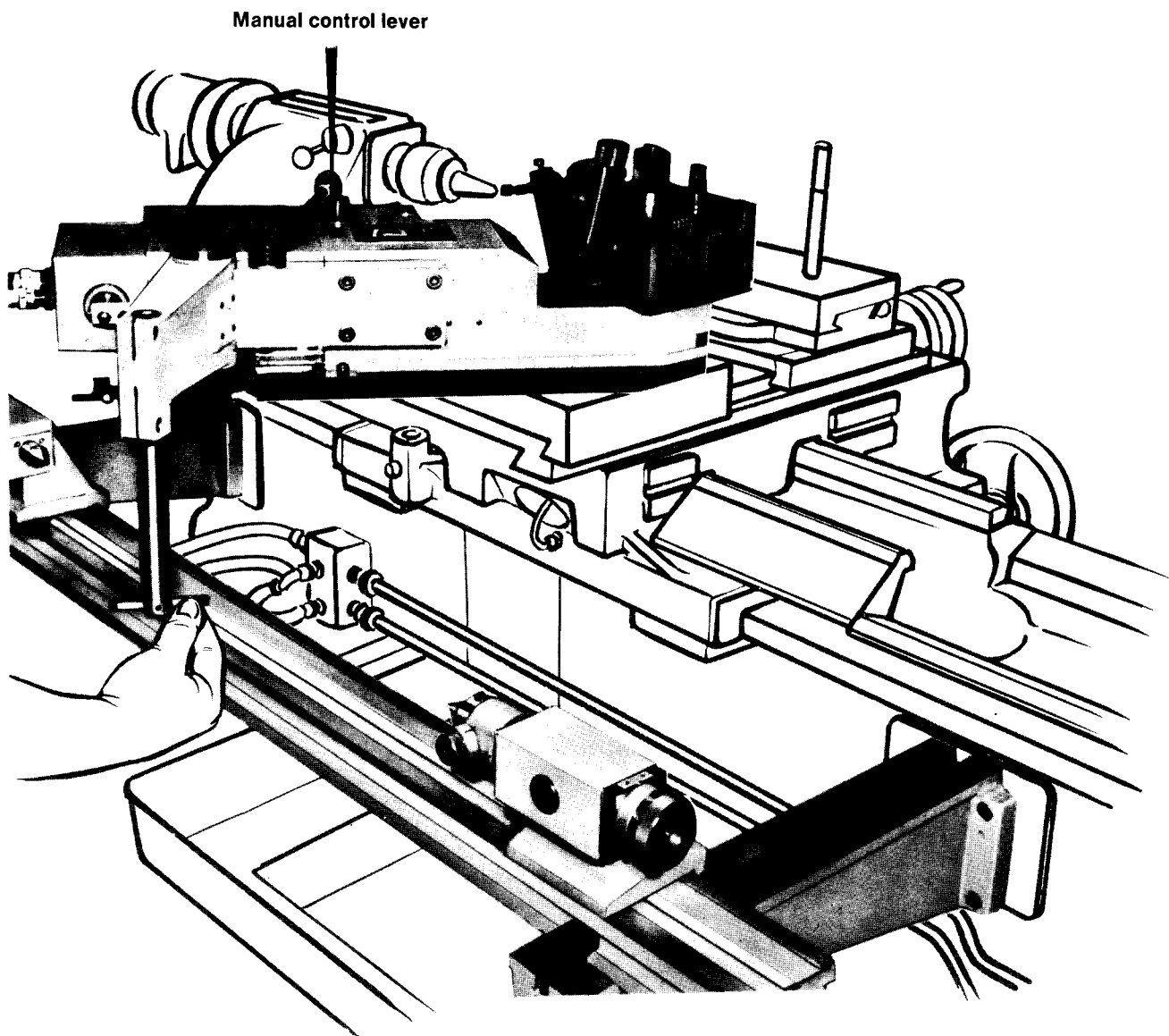


Fig. 21 - Moving the unit by operating the tracer by hand

to limit stroke

On the base of the tracing slide near the stylus arm, you will find a rail with angle piece and adjustable stop screw. This may be used to limit the stroke of the slide if the required stroke is much shorter than the maximum stroke of the unit. In this case, the shorter stroke can save operating time.

Keep in mind that this shortened stroke will then be permanent until the stop is re-adjusted or removed.

For partially reduced stroke, see pag. 28.

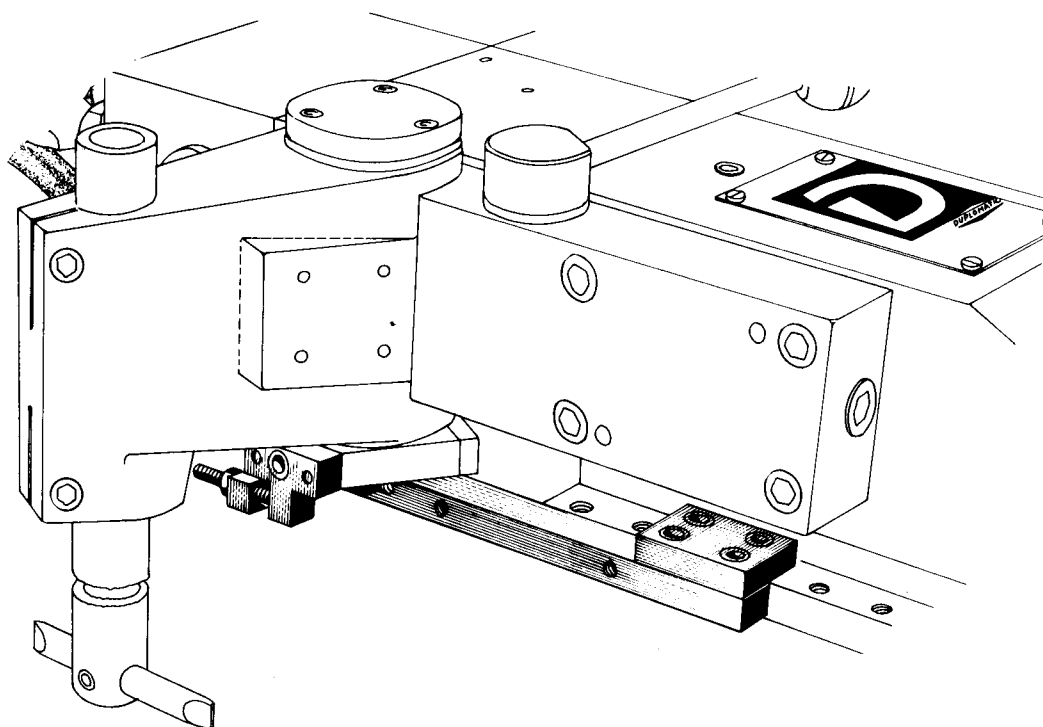


Fig. 22

round master and flat template

In order to be able to copy a distinct shape, it is necessary to have a correct master piece made to reproduce a quantity of work pieces.

For small cylindrical parts, the round master is more practical. Larger work, and internal and face tracing operations depend more on the use of flat templates. Preference often depends on the skills and equipment available. A holder for flat templates can be inserted between tracer centers, locked against rotation and adjusted just like round masters. In either case, here are some basic rules. Master or template should have at least as good a finish as expected on the workpiece. The stylus will pickup and transfer every rough spot found on the master. On long production runs, a hardened and ground master is recommended.

Extensions beyond the required tracing area (lead surfaces) have to be provided. This is especially important to avoid collision when tracing between centers.

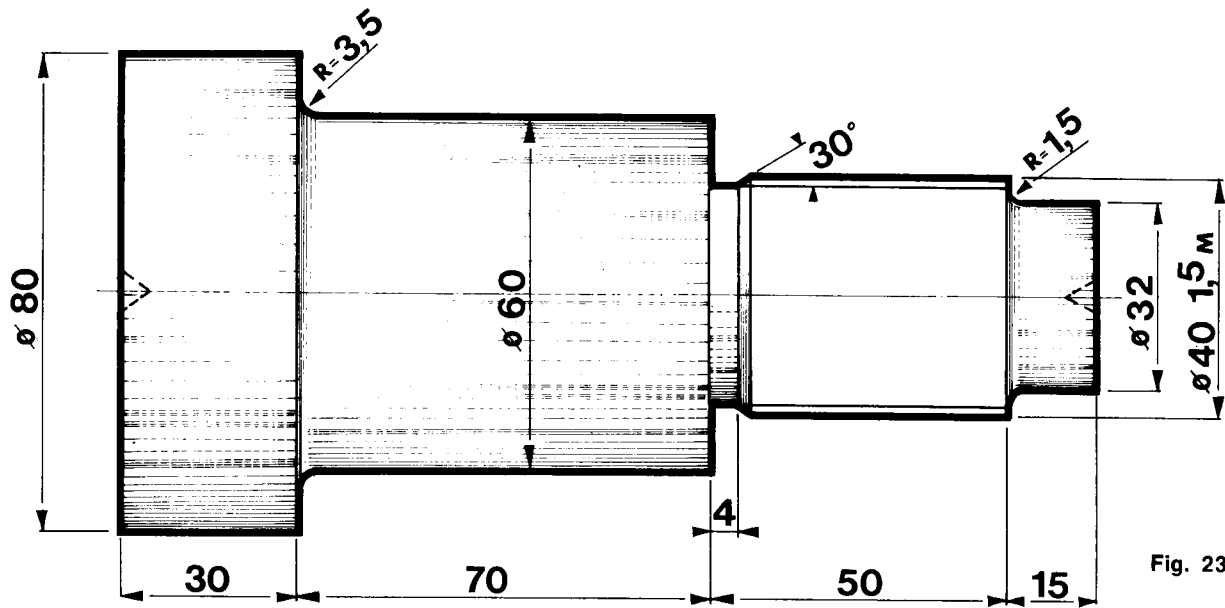


Fig. 23

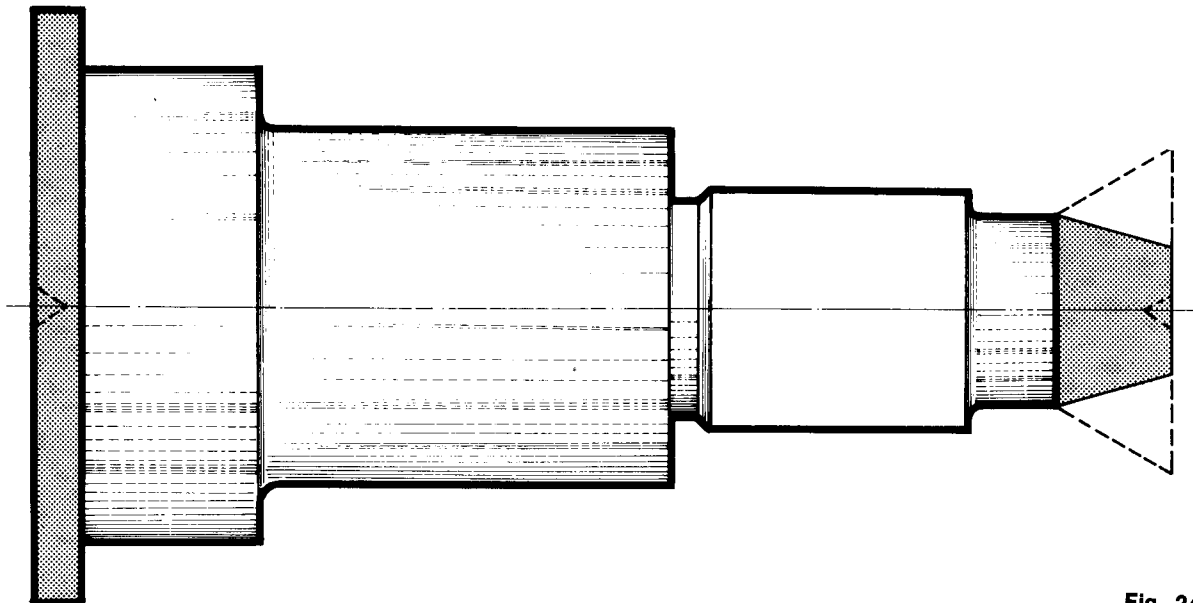


Fig. 24

On short runs, it is often possible to make the first piece in the conventional way using this piece as a master for the production run.

Dimensional accuracy of the master is, of course, important. When turning a shaft, every dimension in the longitudinal axis has to be exact on the master. Dimensions in the transverse axis must represent the net size and shape, but the actual diameter of the master can be smaller or larger, as long as the net dimensions are maintained.

The execution of both centers must be very careful for reaching a perfect concentricity of revolution of the piece between the centers. After this the piece will be brought to the exact dimensions by grinding, always grinding the centers first.

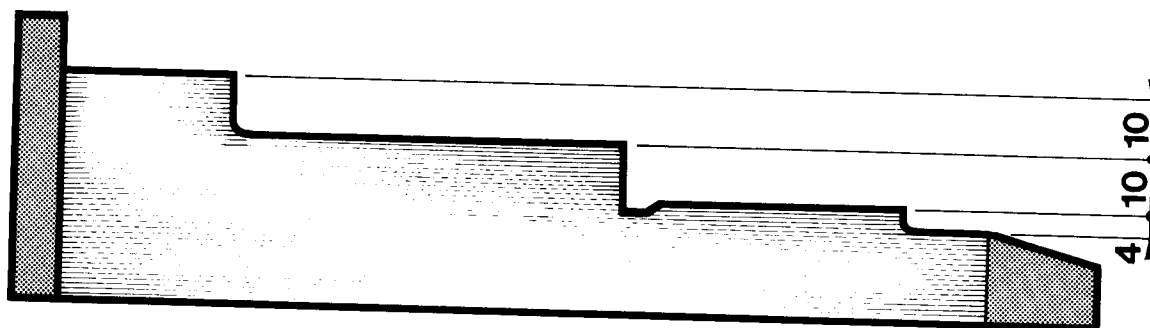


Fig. 25

It is also good rule to rotate, the master from time to time, to prevent wear produced by the stylus point.

A template is preferable for large workpieces and for internal work and for small pieces.

positioning of tracer for several purposes

The tracer, depending on need, may be set in 4 positions (fig. 26). The most commonly used is the 60° position. In this position, and using the longitudinal feed of the lathe, the tracer can handle all ascending shapes, including 90° shoulders and even recessed shoulders.

A limitation exists on descending shapes, limited by the fact that the lathe feed is constant and that, if the form approaches the angle of the tracing slide, the infeed would be too sudden and result in digging in and tool breakage.

With the tracer set at 90° and longitudinal feed, the angular limitation is shifted. Now a larger segment of the descending shape can be handled, but 90° shoulders are no longer possible.

The same applies to face tracing. For this, the tracing slide is set either at 30° or 0° and the cross-feed is now actuated.

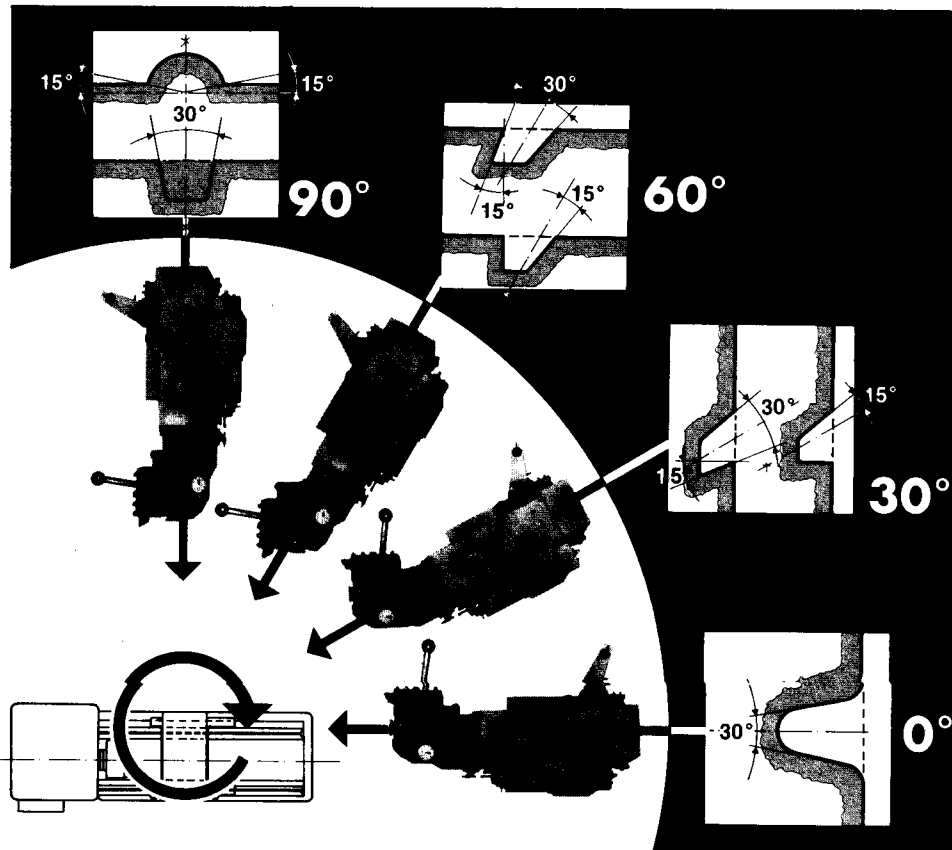
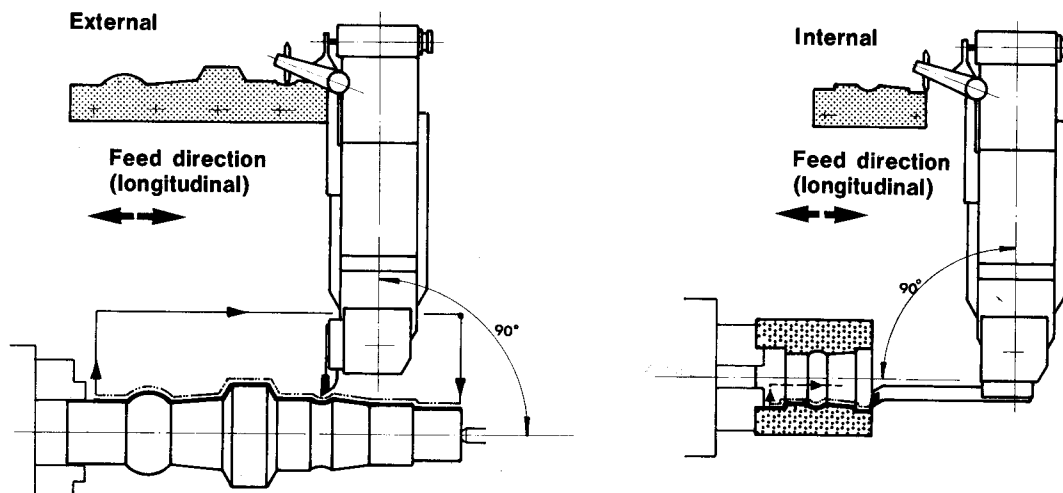


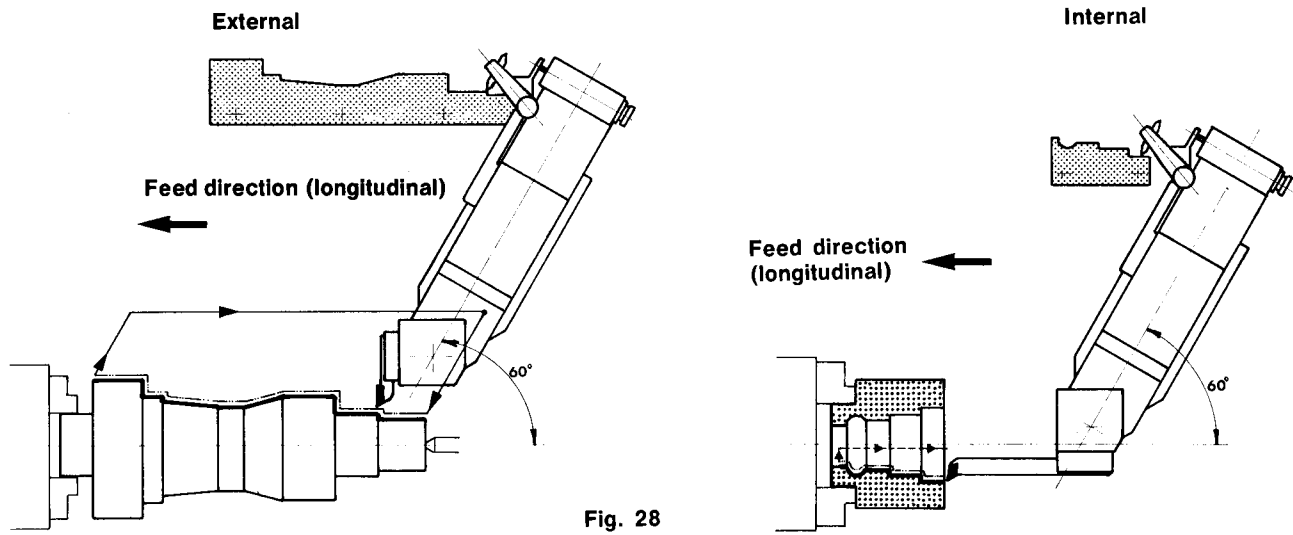
Fig. 26

orientation examples

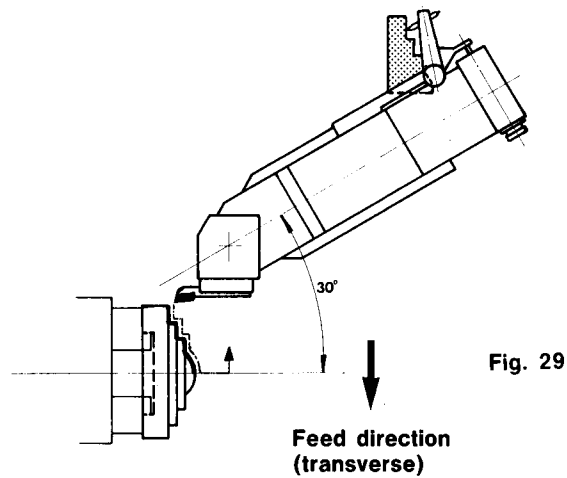
a) Cylindrical part without 90° shoulders



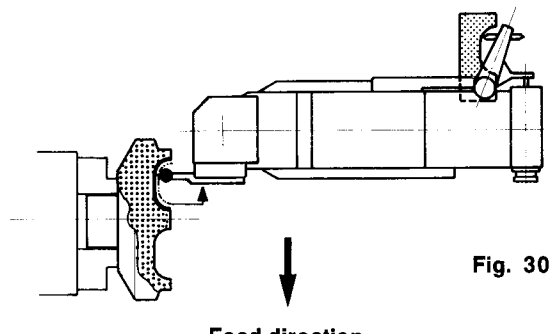
b) Cylindrical part with shoulders



c) Facing work with shoulders



d) Facing work without shoulders.



correct setting of tool block angle

For warranting a tool feed strictly at 90° with reference to the centers axis, during the assembly of the unit this condition should be carefully secured. This condition is checked by fitting the base of a dial gauge on the turret. Then the dial gauge stylus is put against the chuck face and the turret is moved along the whole range.

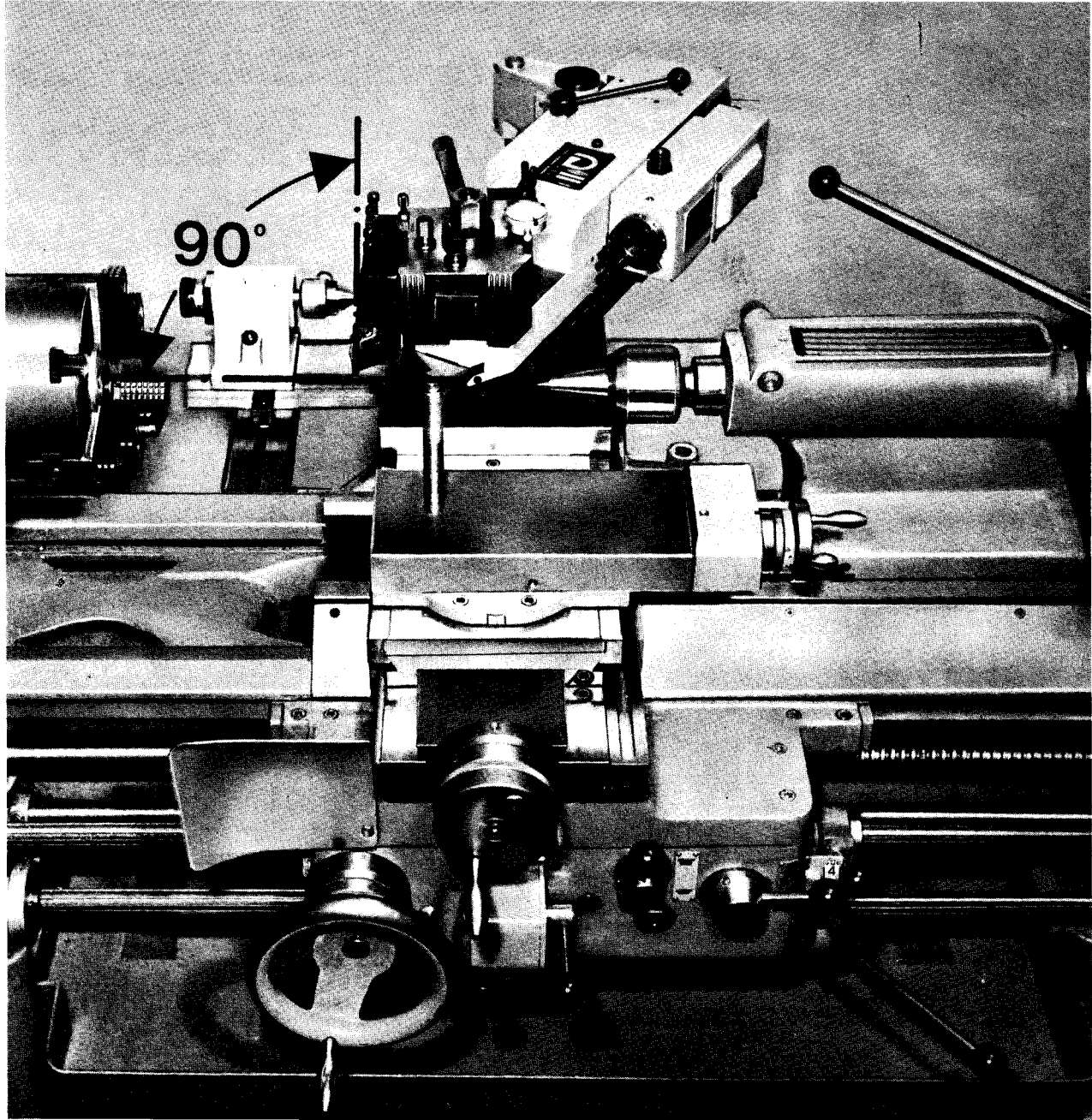


Fig. 31

Any correction will be obviously made by changing the copier tilt. Then the securing screws of the unit should be tightened (fig. 33) and a last check is made.

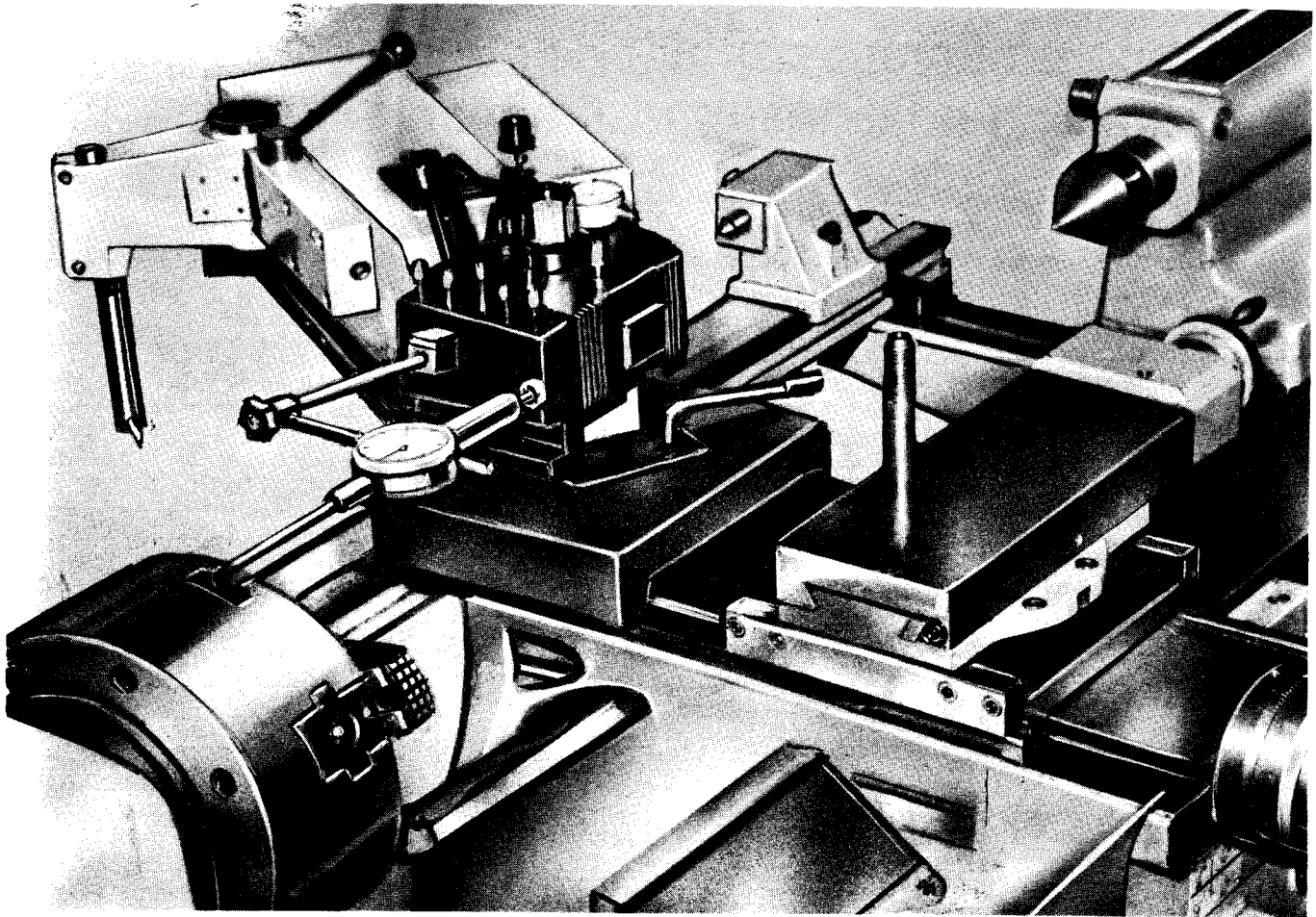


Fig. 32

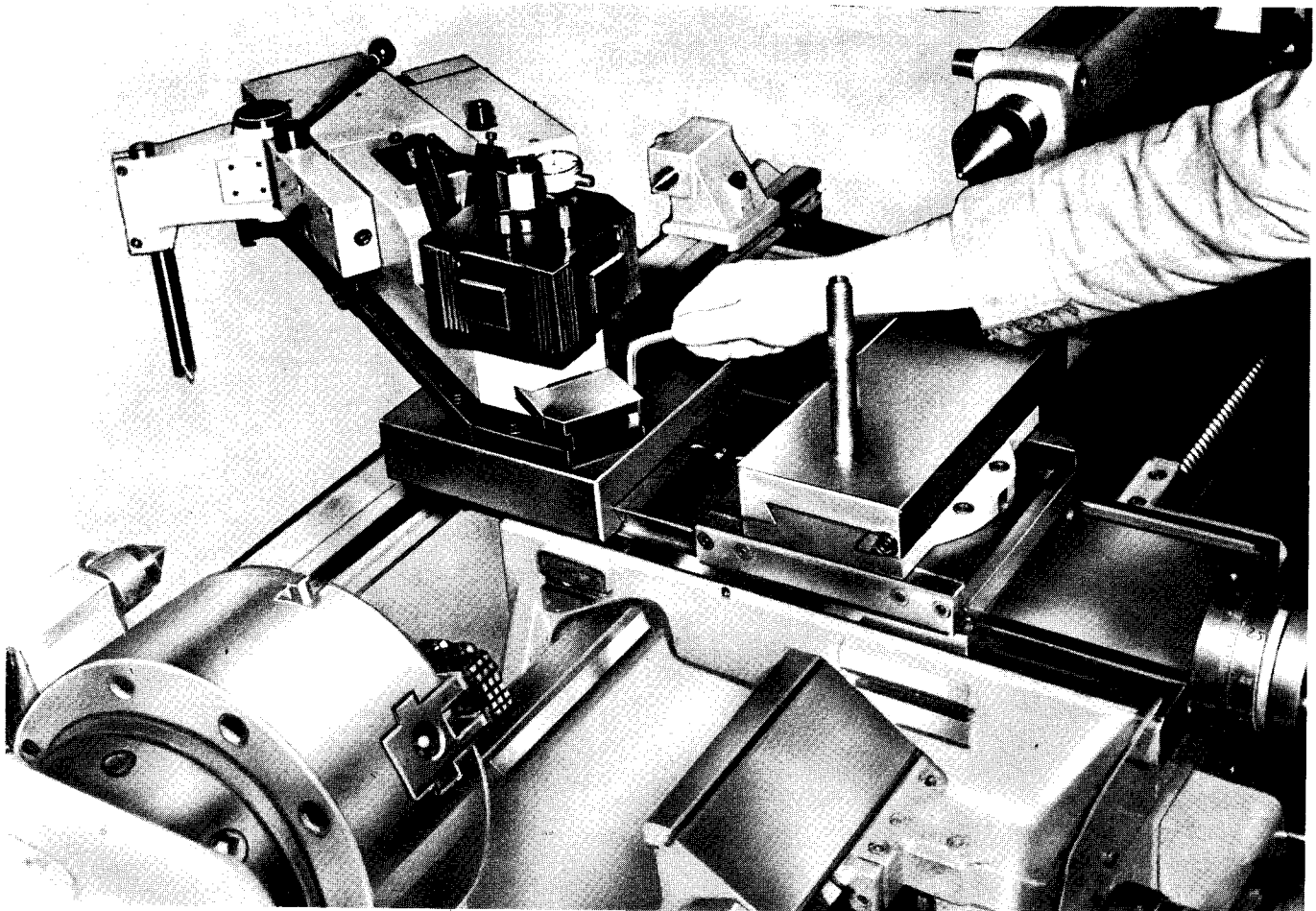


Fig. 33

alignment of master beam placing and adjustment of the master

The master rail is furnished with two center blocks, one fixed (f) and the other with 2-way adjustment (r).

Both center blocks are made to slide on the rail and can be locked in position by means of locking bolt and nut (d).

The fixed block has one knob (m) for longitudinal positioning and knob (t) for correcting parallelism. These adjustments are to be locked with screws (s).

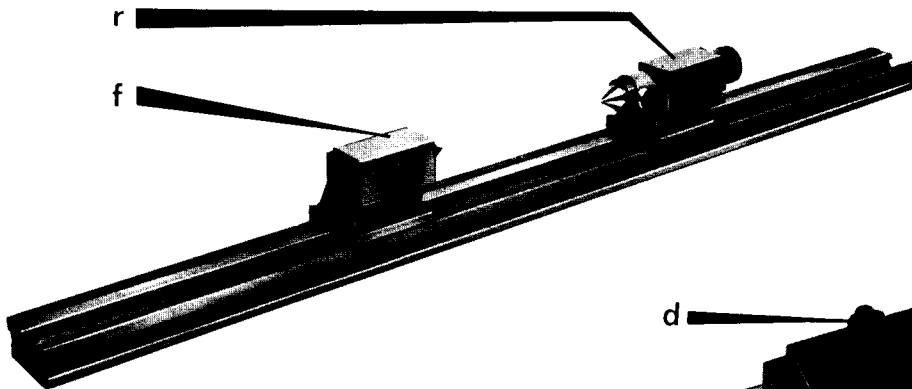


Fig. 34 Template holder beam

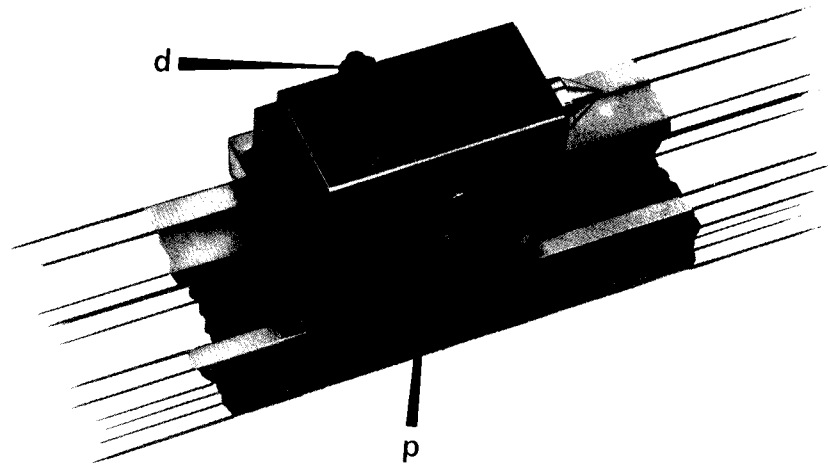


Fig. 35 Fixed center block

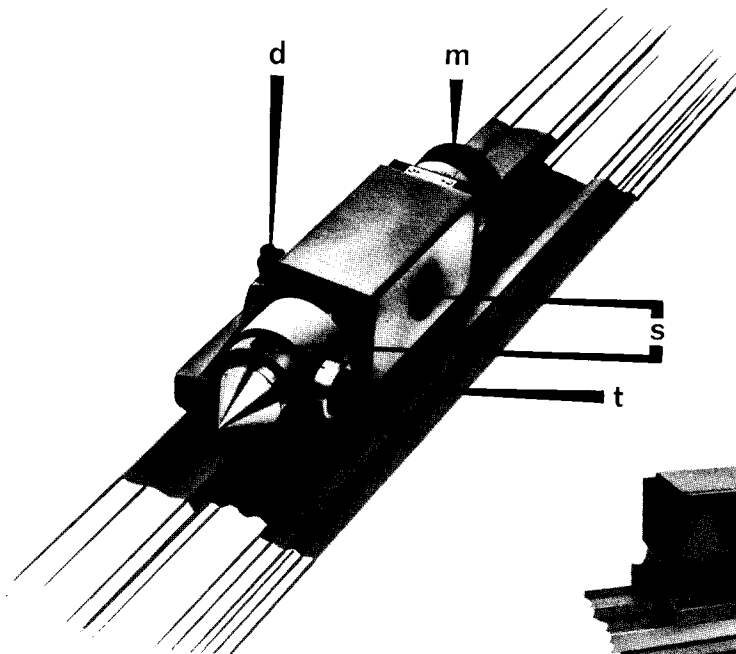


Fig. 36 - Two-way adjustment center block

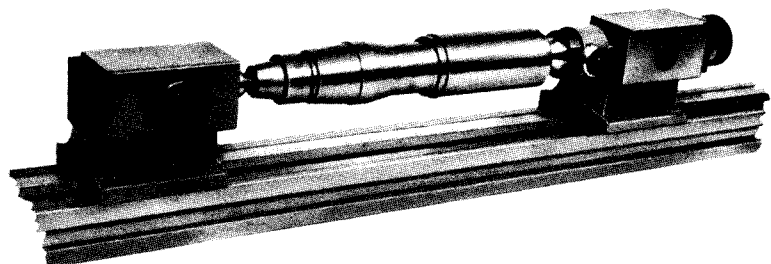


Fig. 37 Master piece between centers

After the process of setting the tracer (page 22) is completed, proceed with the setting of the master rail. For this purpose, insert a work piece in the chuck, keeping in mind to put an identical piece between the centers on back rail.

Put a tool holder into the turret and insert a tool. Move the carriage and the cross slide until the tool point touches extreme edge of the work piece, as shown in fig. 38.

See to it that the turret is approximately in the middle of the slide; this will allow margin for adjustment in either direction.

Now go to the rear of the lathe to set up the master assembly. Align the rail in the longitudinal position as shown in fig. 39 for chuck work; this still permits shifting of abt. 4 in for collet work. Set the rail roughly parallel to the bed with scale measurement.

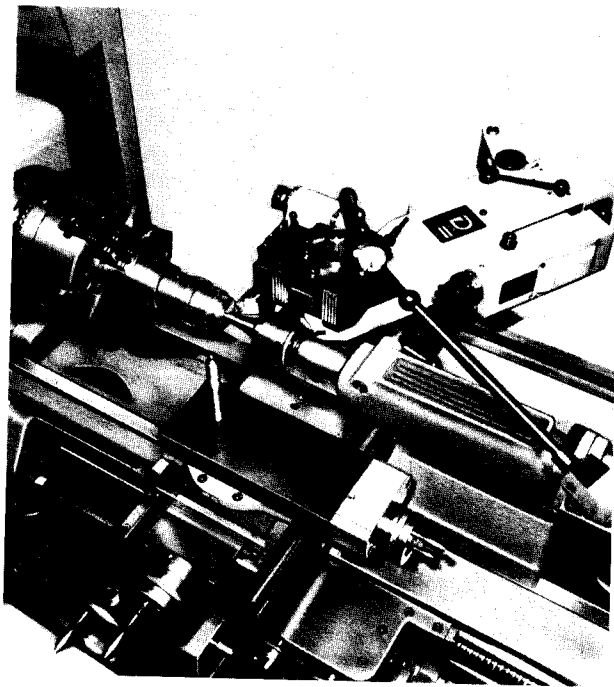


Fig. 38

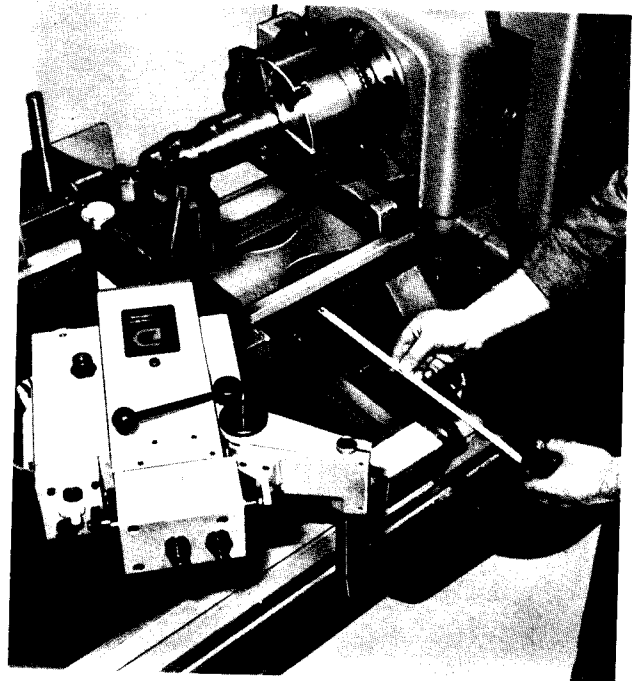


Fig. 40

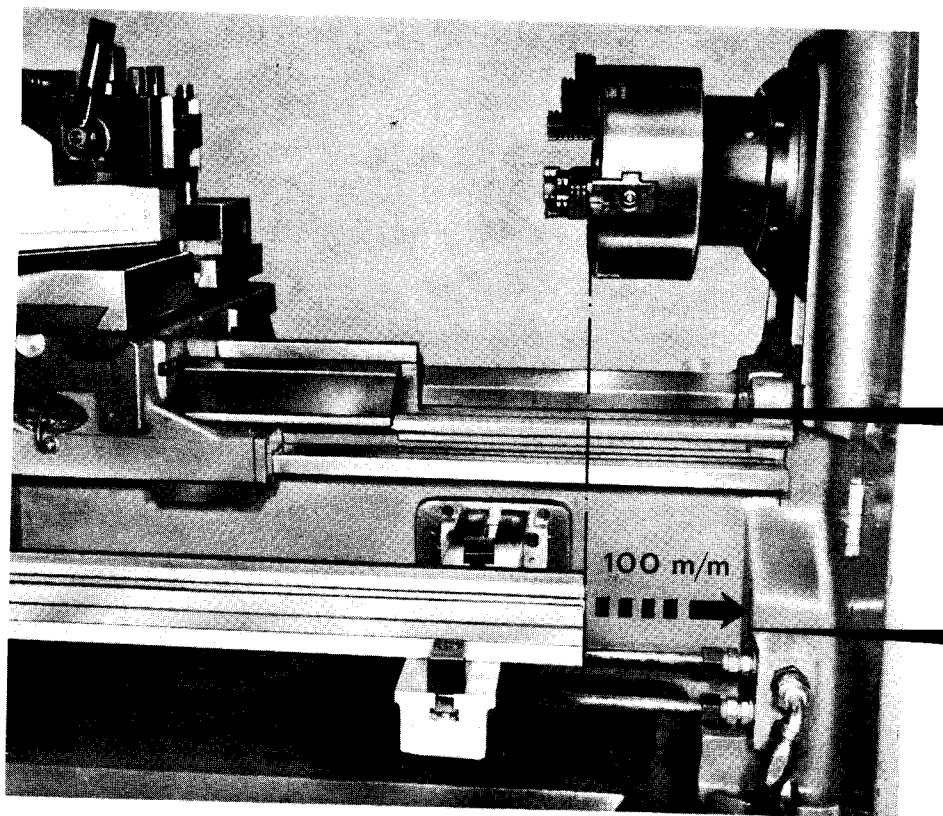


Fig. 39

Hold the master between the centers and slide master and, if necessary, the rail until the same edge to which the tool is set touches the stylus point, then tighten rail and centers (fig. 41).

Next, check if the master is parallel to the lathe center line. Use an indicator as shown in Fig. 42. Scan a parallel section of the master with the longitudinal movement of the carriage. Adjust for 0 reading and lock.

Utilizing the adjustments on the center block, bring the stylus point exactly to the corresponding position as the tool on the work piece. Check once more for parallelism and then tighten all screws. It is advisable to run one piece, staying oversize, to see if all conditions are okay.

It is advisable to scribe some positioning marks on the rail supports. This will make it easier to reset the rail in case it has to be moved for internal work or very large pieces.



Fig. 41

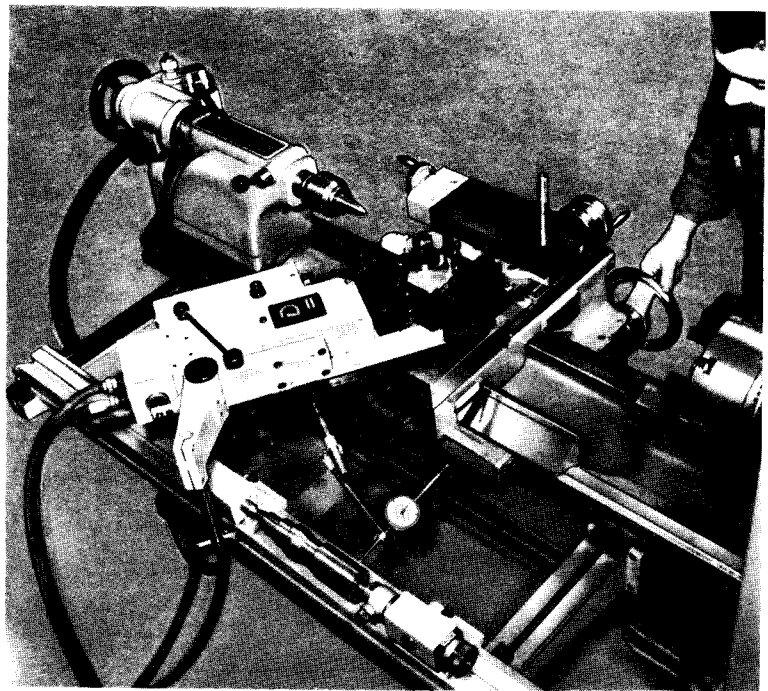


Fig. 42

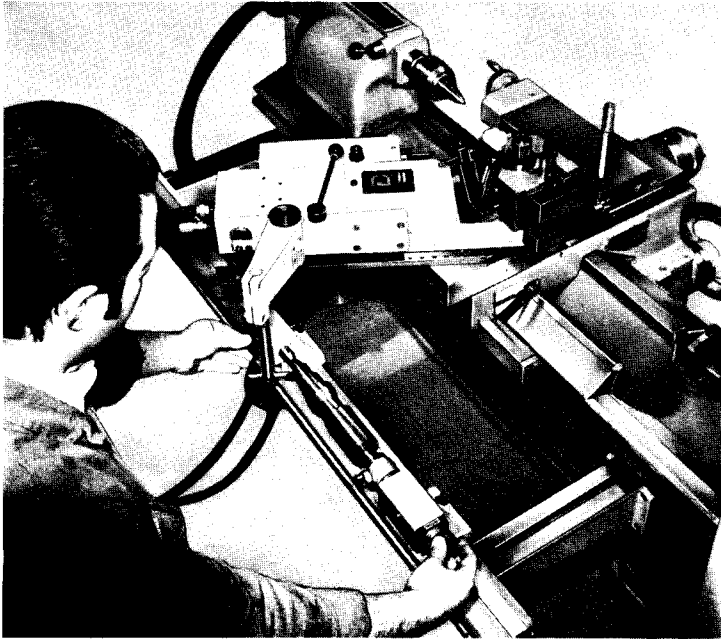


Fig. 43

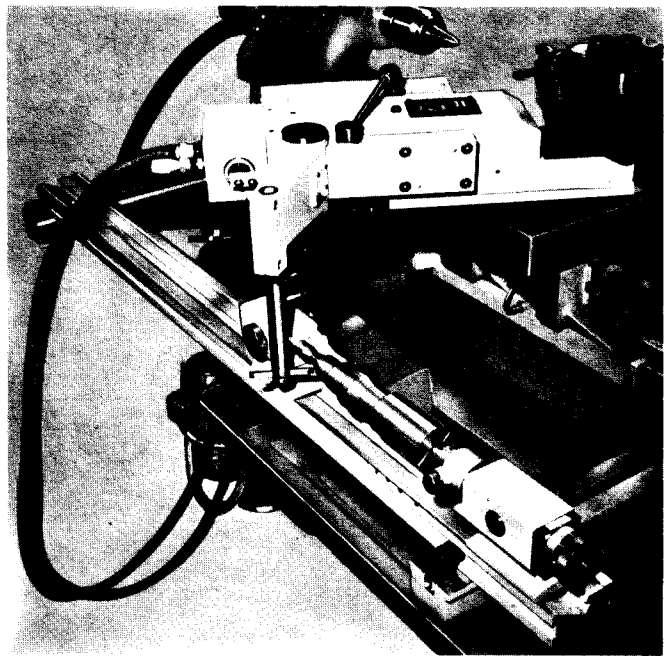


Fig. 44

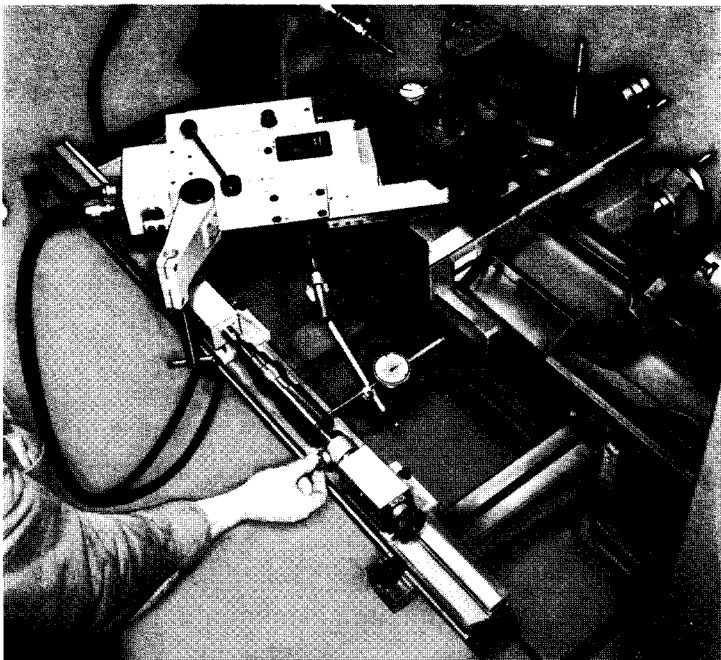


Fig. 45

work with a counter template

For internal work it is often necessary to limit the return stroke of the tracing slide so that the tool will not run into the apposing wall when retracting. Here, one can utilize the two-directional feature of the DUPLOMATIC tracing valve.

Fig. 46 shows a typical application, template and counter template.

It is important that the internal stylus arrangement is used for this work. (See also Fig. 16).

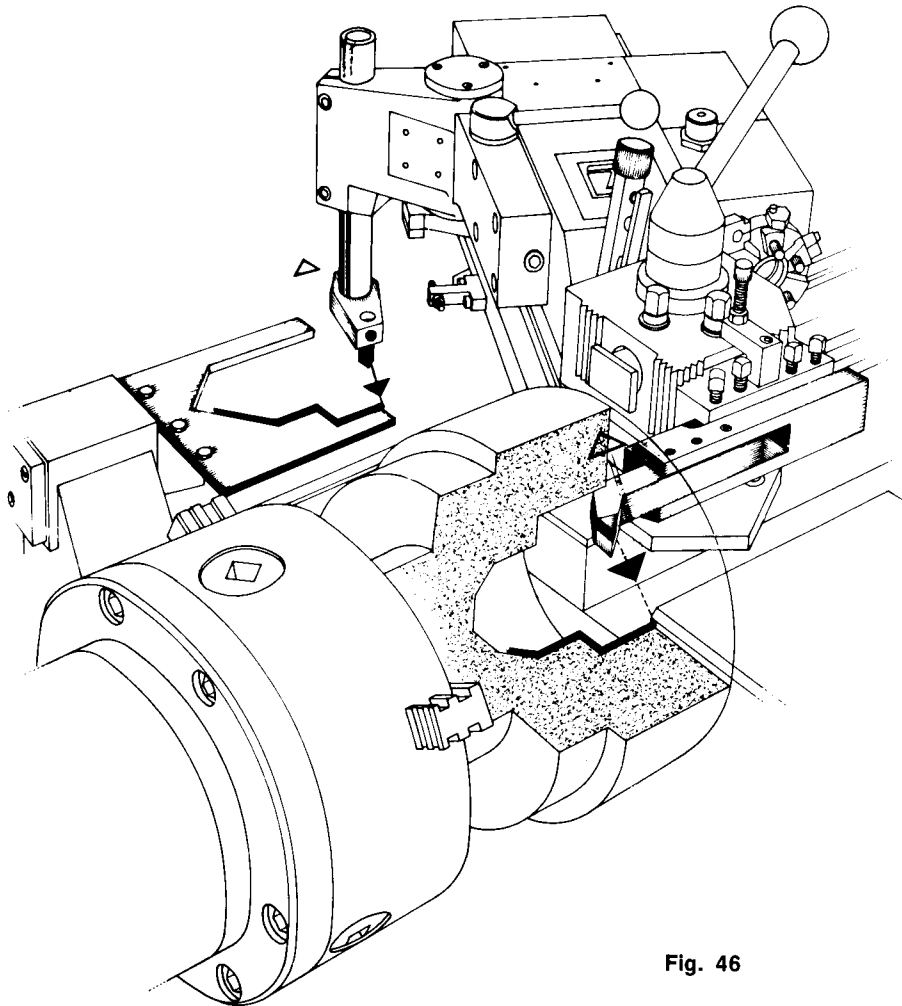


Fig. 46

tool-holder turret

The tool-holder turret is provided with a built-in adjustment to set radially the tool position in respect to the workpiece. The adjustment travel is of 10 mm.

To carry-out the adjustment proceed as follows:

- Loosen the lock nut 2 by means of the lever wrench 1
- To adjust the radial position of the tool rotate the knob 3.

The amount of the movement is indicated by the dial gauge 4. The turret has two machined surfaces on which the quick-change tool-holders can be clamped.

The lateral surface is suitable for clamping tool-holders for external working, while the front surface is suitable for clamping tool-holders for internal working.

The height adjustment of the tool-holder is accomplished by turning the screw 5.

The locking of the tool-holder is accomplished by rotating the bolt 6 by means of the provided wrench.

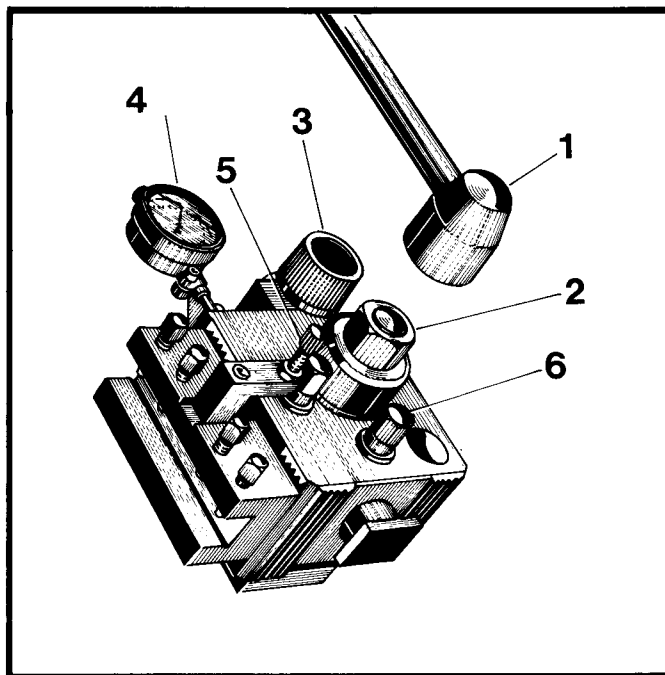


Fig. 47

tool-holders turret orientation

Depending on the copier position it is necessary to rotate the tool-holder turret in such a way that the tool movement, operated by the knob (3), should always be perpendicular to the feed axis (see fig. 48a – b).

Rear mounting of the copier

Longitudinal feed axis

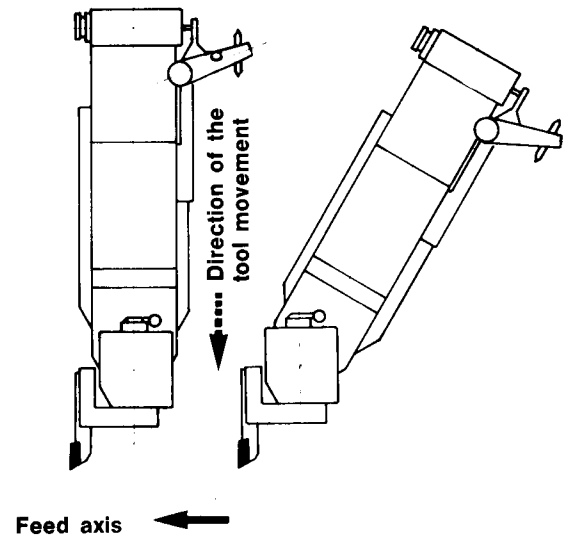


Fig. 48a

Tracer positioned for facing transverse feed axis

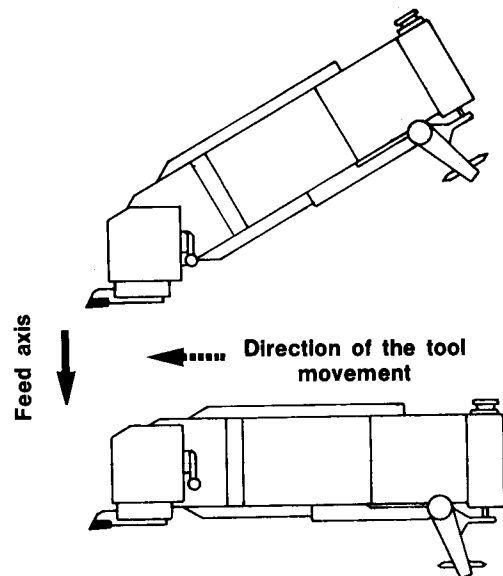


Fig. 48b

There are three sets of holes on the toolpost base for correct turret orientation (see fig. 49). These holes are used for securing the guide key of the turret body.

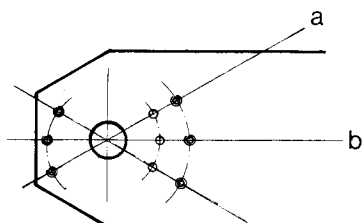


Fig. 49

Holes on axis «a» $\alpha = 60^\circ$
 Holes on axis «b» $\alpha = 0^\circ$ and 90°
 Holes on axis «c» $\alpha = 30^\circ$

The procedure for changing the turret AS-M/ * * * /30 orientation, is the following:

- Loosen and take off the nut 1
- Take off the ring 2
- Loosen the set-screw 3
- Take off the ring nut 4
- Take off the ring and the washer 5
- Loosen and take off the screws 6
- Raise and take off the turret body 8
- Loosen and take off both the screws 9 which fasten the key 10 to the base
- Locate the key 9 on its new position, also taking care of changing the reference pin position
- Remount the turret body, make sure that it seated properly (on its own surface).
- (Before mounting the turret body, the surface must be cleaned carefully).
- Re-insert the washer and the spring
- Tighten the ring nut to pre-load the spring without jeopardizing the movement of the lever
- Tighten the set-screw
- Lock the turret by means of the nut 1.

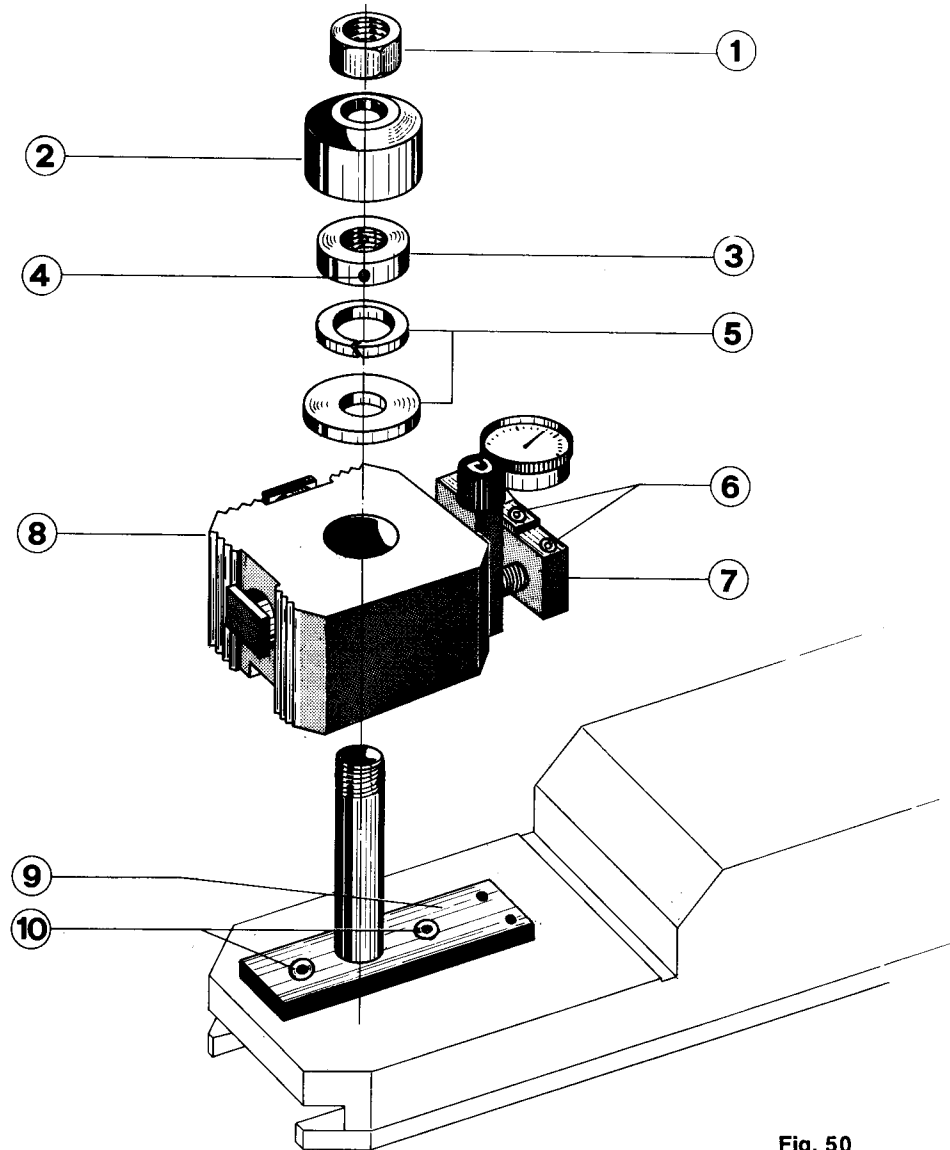


Fig. 50

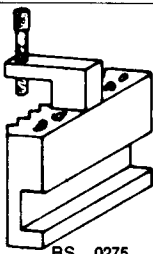
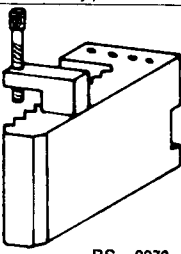
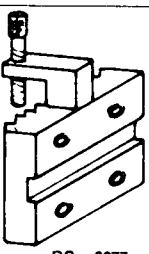
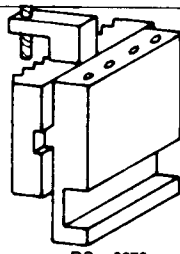
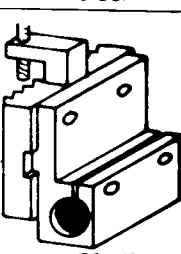
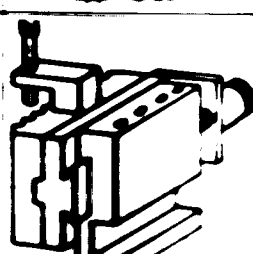
















tool-holder

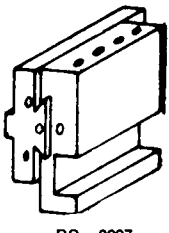
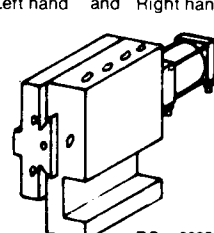
All available tool-holders for the series 20 TA copiers are listed on the following chart





Standard tool-holders are listed in «basic» column.

For more details about types of tool-holders check the special table.

F.i. for information about boring-bar-holders look on chart under BS 0279.

		Tool-holder standard	"L" Tool-holder right-handed type	Plate for tool-holder	Extended tool-holder	Extended boring-bar holder	Adaptative right and left-hand tool-holder	
SIZE								
O	Normal	43.0095	43.0141	43.0068	43.0610	43.0618		
	Intermed.	43.0096	43.0142					
	Long	43.0097	43.0143		43.0611	43.0619		
	Extralong	43.0098						
A	Normal	43.0099	43.0144	43.0069	43.0612	43.0620		
	Intermed.	43.0100	43.0145					
	Long	43.0101	43.0146		43.0613	43.0621		
	Extralong	43.0102						
B	Normal	43.0103	43.0147	43.0070	43.0614	43.0622		
	Intermed.	43.0104	43.0148					
	Long	43.0105	43.0149		43.0615	43.0623		
	Extralong	43.0106						
C	Normal	43.0107	43.0150	43.0071	43.0616	43.0624		
	Intermed.	43.0108	43.0151					
	Long	43.0109	43.0152		43.0617	43.0625		
	Extralong	43.0110						

		Tool-holder slides	Retractable tool-holder for fixed mounting		Compound retractable left-hand and right-hand tool-holder		
SIZE			Left hand and Right hand				
A	Normal	43.0074	Left hand	Normal	43.0647	Left hand	Normal Long 43.0667 43.0668
				Long	43.0648	Left long	Normal Long 43.0669 43.0670
	Long	43.0075	Right hand	Normal	43.0649	Right hand	Normal Long 43.0671 43.0672
				Long	43.0650	Right long	Normal Long 43.0673 43.0674
B	Normal	43.0076	Left hand	Normal	43.0651	Left hand	Normal Long 43.0675 43.0676
				Long	43.0652	Left long	Normal Long 43.0677 43.0678
	Long	43.0077	Right hand	Normal	43.0653	Right hand	Normal Long 43.0679 43.0680
				Long	43.0654	Right long	Normal Long 43.0681 43.0682

Copier type	
TA. 55	
TA. 80	
TA. 120	
TA. 175	

work cycle

On copying attachments without optional accessories the following cycling is possible:

Single cut:

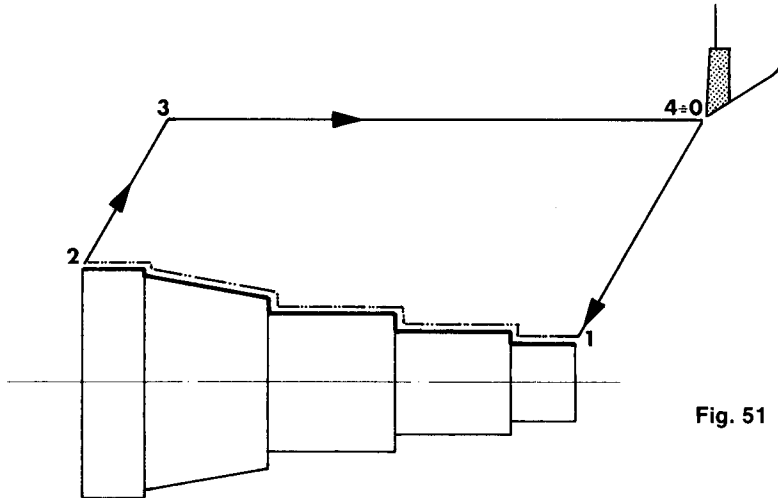


Fig. 51

- 0-1 Tracer forward - manual operation with lever.
- 1-2 Longitudinal carriage feed - engage feed lever.
- 2-3 Retract tracer - manual operation of lever. Stop carriage feed.
- 3-4 Manual return of carriage to starting position.

For multiple cuts:

This procedure is useful for preliminary roughing cuts. Two methods are available:

- Method a) With the stylus always in contact with the profile to be copied (during feed). This method uses the adjustment of the tool turret which can be loosened, advanced and locked again.
- Method b) Use the cross-slide for several cuts approaching the master in successive steps. The stylus scans the entire profile only during the last cut.

chip section

To determine the actual chip section removed by the tool, one has to consider the tracer angle and the slope of the profile in addition to the penetration depth and the feed rate. Diagrams shown on figs 52 and 53 give the actual chip section values.

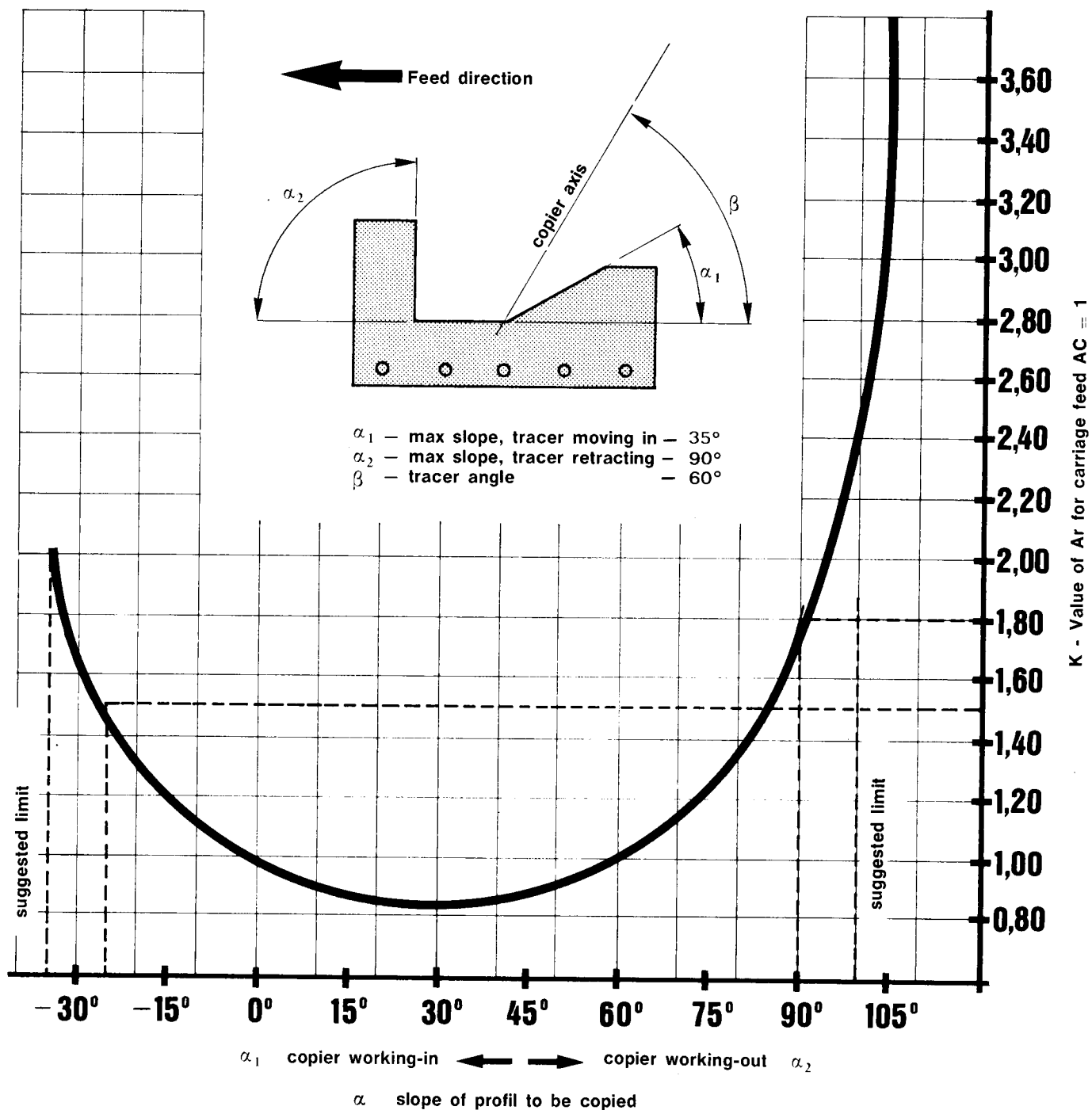


Fig. 52

Example:

Working-in slope $\alpha_1 = 25^\circ$ $K = 1,52$

Working-out slope $\alpha_2 = 90^\circ$ $K = 1,78$

With a carriage feed rate of $A_c = 0,8$ mms, the actual value A_r results in: $A_r = A_c \cdot K$

Working-in: $A_r = 0,8 \cdot 1,52 = 1,22$ mms

Working-out: $A_r = 0,8 \cdot 1,78 = 1,42$ mms

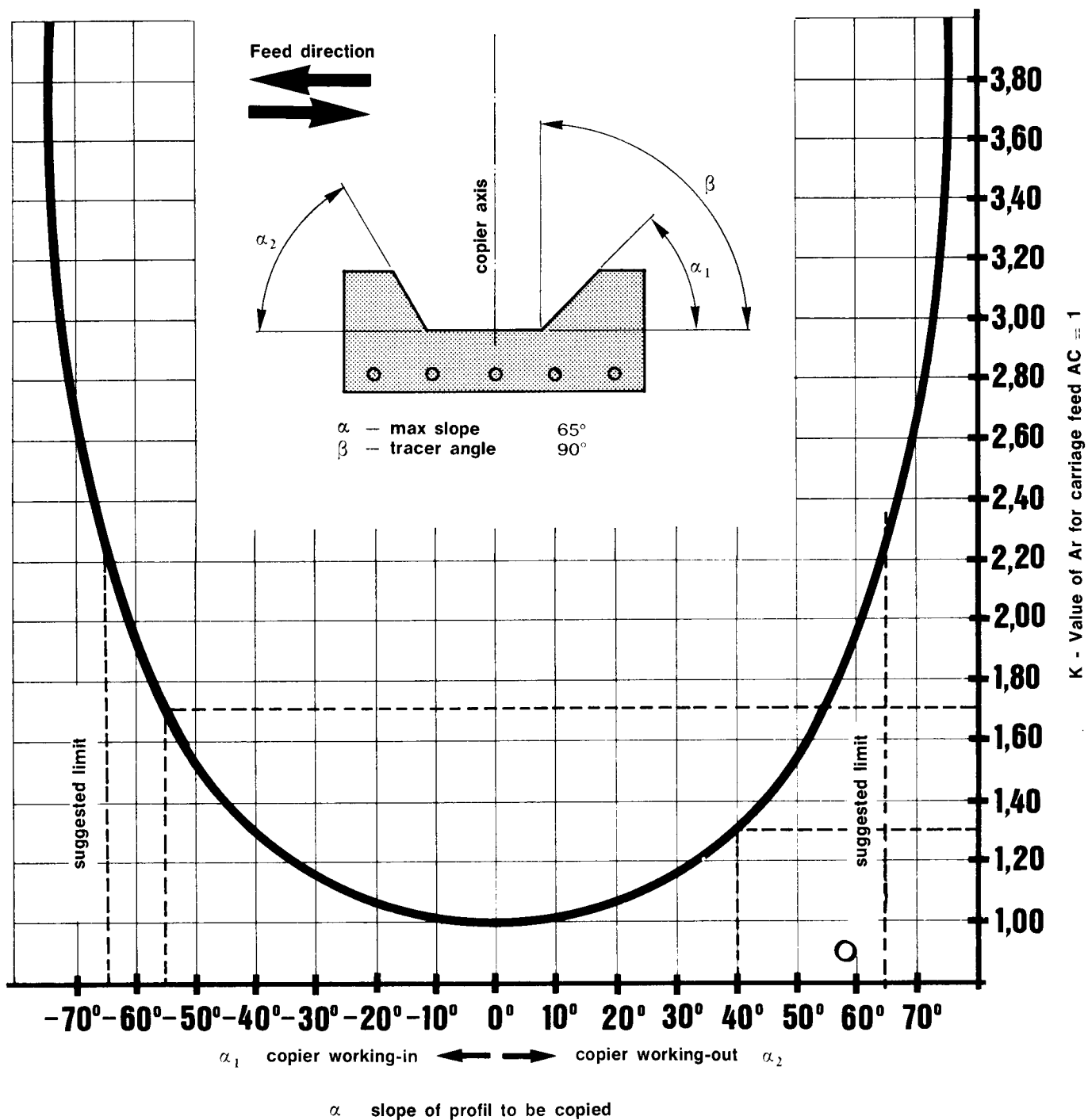


Fig. 53

Example:

Working-in slope $\alpha_1 = 40^\circ$ $K = 1,28$

Working-out slope $\alpha_2 = 55^\circ$ $K = 1,72$

With a carriage feed rate of $Ac=0,8$ mms, the actual value Ar results in: $Ar = Ac \cdot K$

Working-in: $Ar = 0.8 \cdot 1.28 = 1.03$ mms

Working-out: $Ar = 0.8 \cdot 1.72 = 1.38$ mms

machining of shoulders

Frequently parts with big shoulders have to be machined. (See fig. 54).

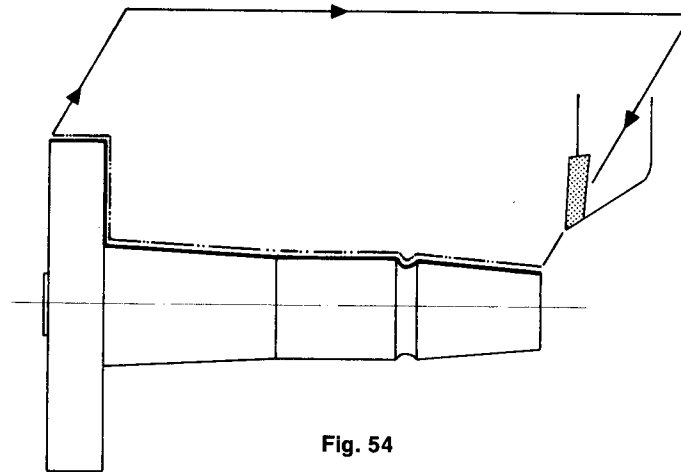


Fig. 54

Since the side clearance rake of profiling tools is usually only 3° , this results in a very large chip section and consequently the copier will be under stress. When the stock is excessive (greater than 0.6 mms) the tool could also be deflected. Also consider that the unit is set at 60° and therefore the retract speed of the tool point is 1.78 times greater than the longitudinal feed rate.

For these reasons the stresses during facing operations are usually severe and can produce an unacceptable finishing.

A simple and effective solution is to increase the side clearance, grinding it to a value of 8° . This can be obtained by milling 5° of the opposing side of the tool-holder, and using this side as a reference for clamping. (See Fig. 55).

With equal stock the chip section with $\alpha = 8^\circ$ is 2.4 times smaller.

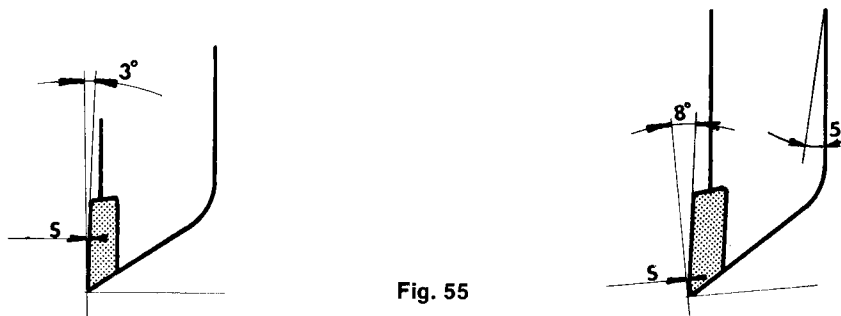


Fig. 55

Another method which can be tried is to reverse the feed direction.

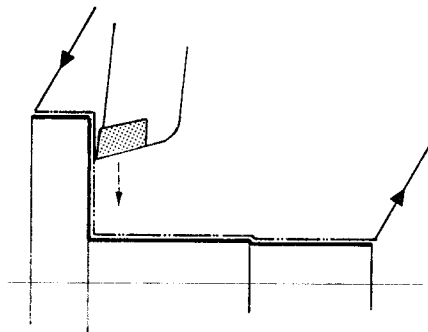


Fig. 56

accessories-description and their use

1) Remote control BIP

This accessory uses electric signals to control the in and out movements of the copier. A special solenoid, fitted on the copier, operates the copying valve by means of a lever linkage.

- When the solenoid is energized the copier is active and will move forward.
- When the solenoid is de-energized, the copier will retract to the end of the stroke or to the rear stop.

When working with the BIP, the manual control lever of the copier has to be in the forward position.

The application of this device is useful and even necessary with the larger attachments, where the unit may be far from the operator and where manual operation might be difficult.

The pushbutton panel should be located in a convenient position for the operator.

A cable with quick-disconnect plug connects the solenoid to the control panel.

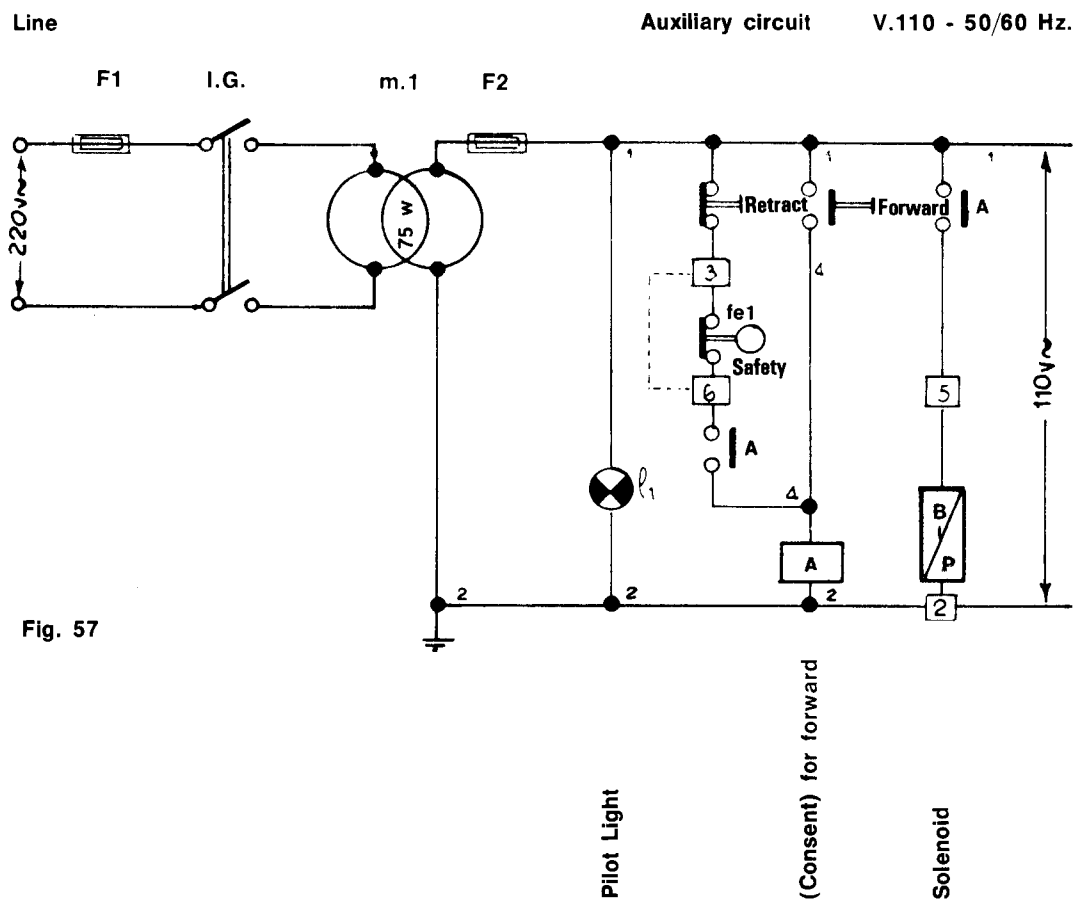
The solenoid is a D.C. type and has a built-in rectifier.

The panel output voltage is 110 V.A.C., but the solenoid is rated at 98 V.D.C.

The electrical diagram is shown on fig. 57.

An additional microswitch can be furnished with the BIP.

This microswitch can be attached to the carriage or ways; when depressed it initiates the retract movement of the copier.



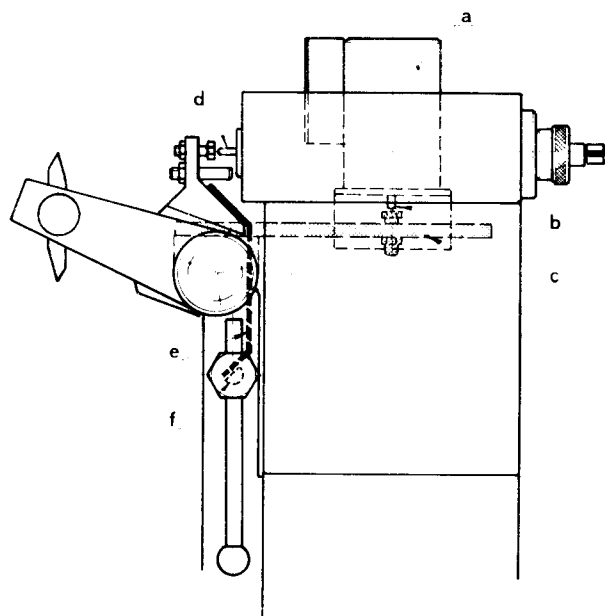


Fig. 58

See Fig. 58

With Solenoid (a) de-energized

The rod (b) stays out, holds the linkage (c) which in turn presses against the pin (d) of the copying valve and makes the copier retract.

With solenoid (a) energized

The rod (b) retracts and releases the linkage (c). The pin (d) is free and can move out. Now the copier is operative. To obtain correct operation of the BIP, the plate (f) has to be free.

The plate (f) operated by the cam (e) is part of the manual control.

In some special cases, f.i. when the copier is assembled by the lathe manufacturer, the solenoid is furnished with 24 V.D.C.

In that case the electrical diagram is shown in fig. 59.

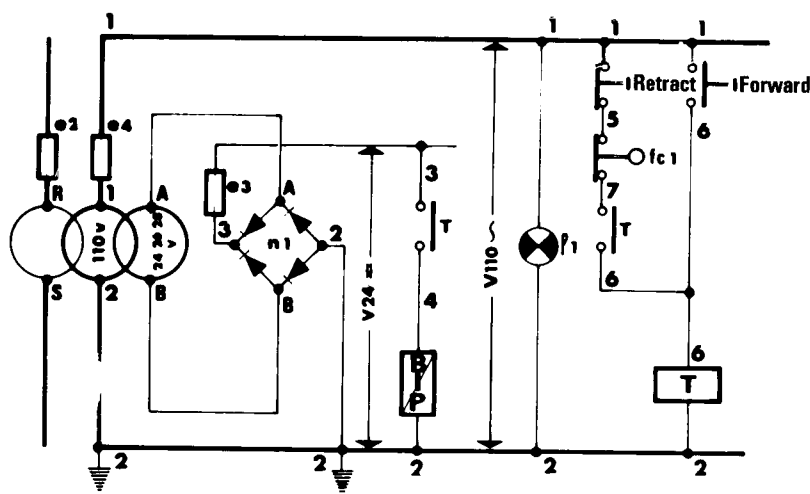


Fig. 59

Remote controlled
solenoid

Pilot Light

Copier remote
control

finishing cut

To obtain the best results as to accuracy and finish, the last cut should be machined with a small constant thickness along the entire length of the workpiece.

The PF device permits a pre-set finishing cut depth from 0 up to 1.5 mms.

The PF finish cut has two control possibilities:

- 1) By auxiliary solenoid, which is called PFI
- 2) From the ARL unit (described later)

Both systems are represented on the hydraulic diagram.

The procedure for setting the finishing cut is as follows:

The finishing cut depth is regulated by the screw (a)

First loosen the knurled knob (c)

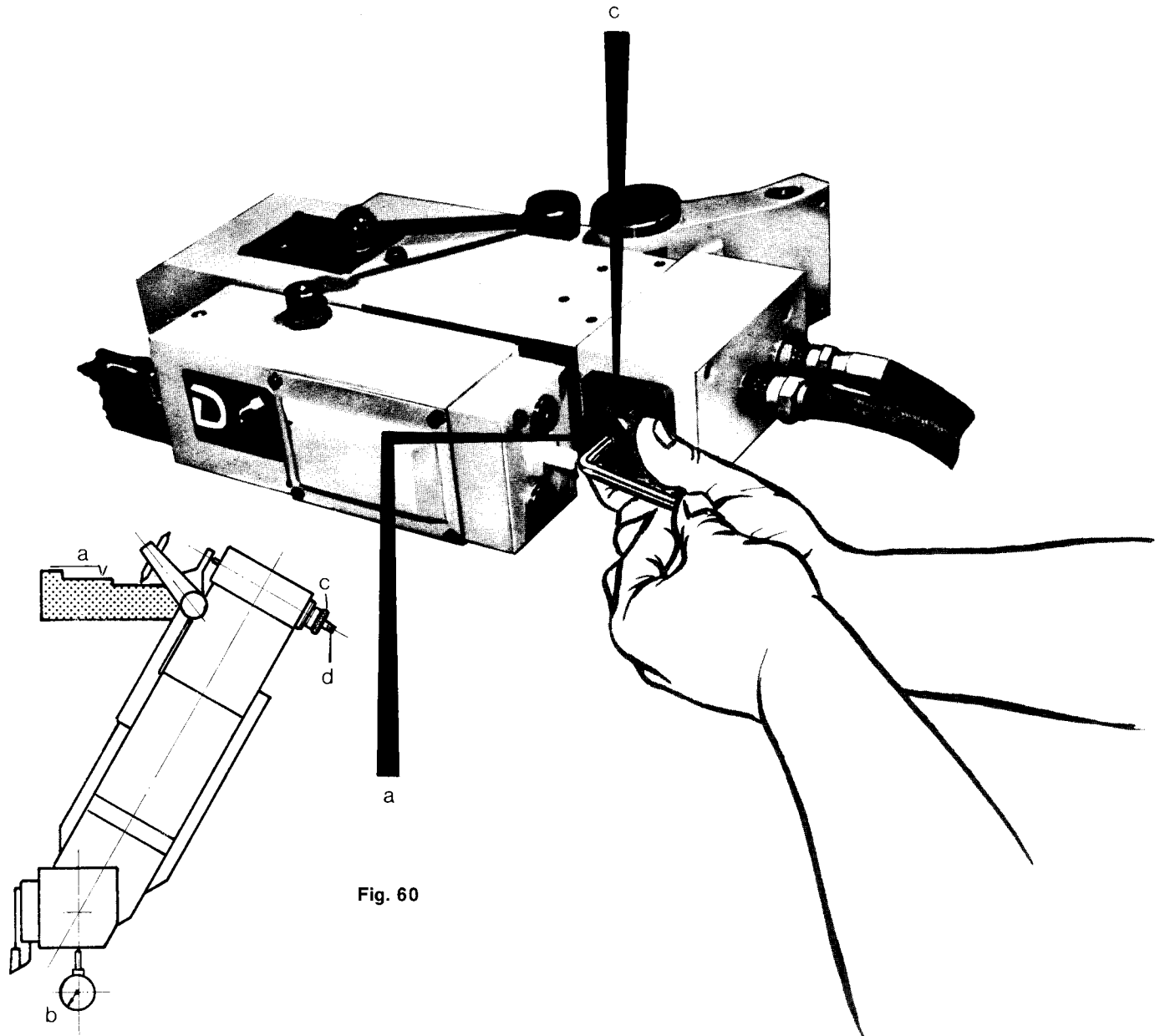


Fig. 60

Then use wrench on crew (a) and rotate. (Clockwise rotation diminishes the depth, counter-clockwise rotation increase the depth).

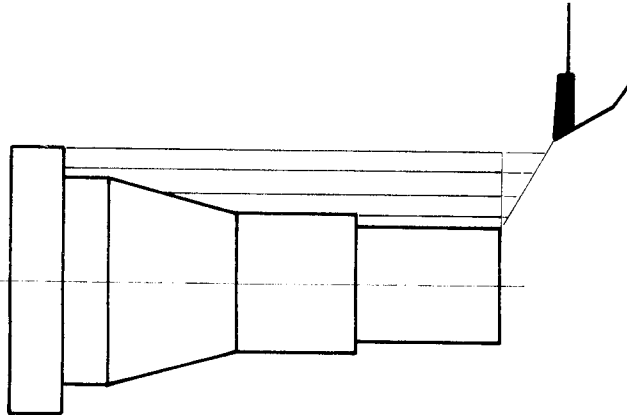
After the desired setting is reached, tighten knob (c) again.

For accurate setting, we recommend that the tracing slide is brought against the master. Then place an indicator against the front of the tool-holder and observe adjustment.

automatic stops

The use of a stop device which limits the forward stroke of the copier is very effective when several cuts have to be taken. An example of workpiece machined with these stops is shown on Fig. 61.

Fig. 61



The TA series copiers can be equipped with two types of stops, as follows:

AL-with 6 positions with automatic indexing, but without:

- automatic resetting
- finishing cut control

ARL-with 10 positions, equipped with:

- automatic resetting
- finishing cut control

The following description is valid for both types and their differences will be illustrated separately. The limitation of the forward stroke is programmed for various roughing cuts with adjustable pins, which are inserted into the drum. See fig. 62.

On each return stroke the drum is automatically indexed for the next cut.

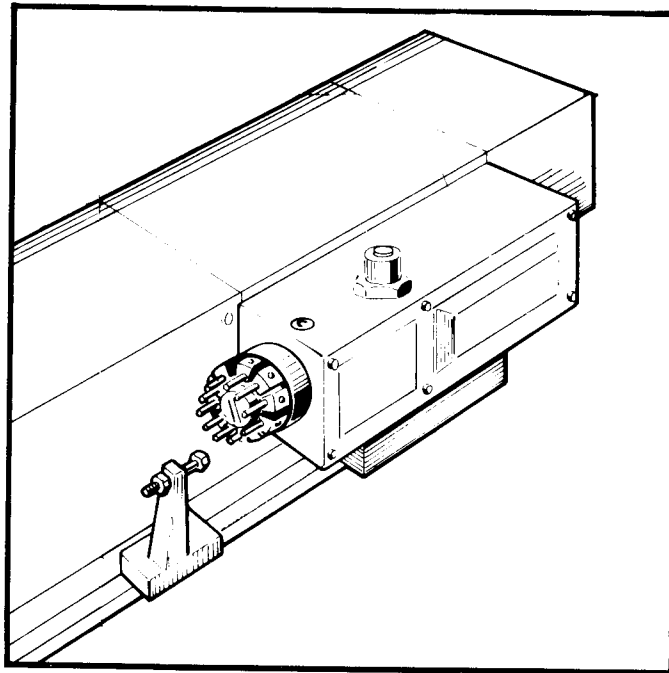


Fig. 62

The forward motion is arrested when one of the drum stop pins makes contact with the front stop. Only a light contact is needed to balance the tracer due to fact that a linkage actuated by the axial movement of the stop drum acts directly on the tracing valve.

The repetition accuracy of the drum stop is not as good as the accuracy of the tracing valve; errors of .002" to .003" are common. For this reason we recommend that the drum stop pins are to be used for roughing work only.

The stops (a) are mounted on the copier as shown on fig. 63 from which one could see that the front stop is adjustable.

The rotation of the drum is actuated by a cam (c) whose position can be also adjusted.

This cam should be adjusted in such a way that during the retract stroke of the copier the drum rotates by one step.

Should this rotation fail, the cam can be advanced or the rear stop can be adjusted. (See fig. 22 page 17).

The drumstop and linkage are adjusted at the factory, but an occasional adjustment might be needed in the field. (See fig. 58 e fig. 67).

Proper function depends on the unrestricted axial movement of the drum within the drum body. Fig. 63 shows that the dimension S is normally 3 mm or about 1/8". When the pins make contact with the front stop, the drum should retract about 1.5 mm (1/16"), at which time the tracer should also stop its forward movement. This is accomplished by the linkage acting on the lever (e) which is also controlled from the BIP solenoid. In case the drum retracts further, approaching the drum body, an adjustment will have to be made with set-screw (d) until the right distance is maintained.

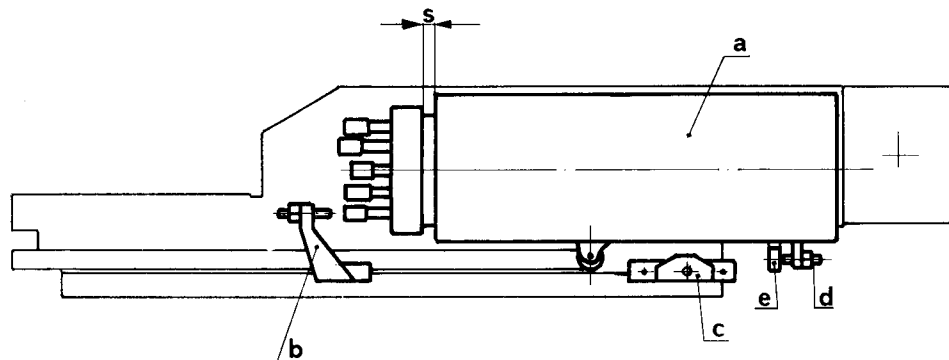
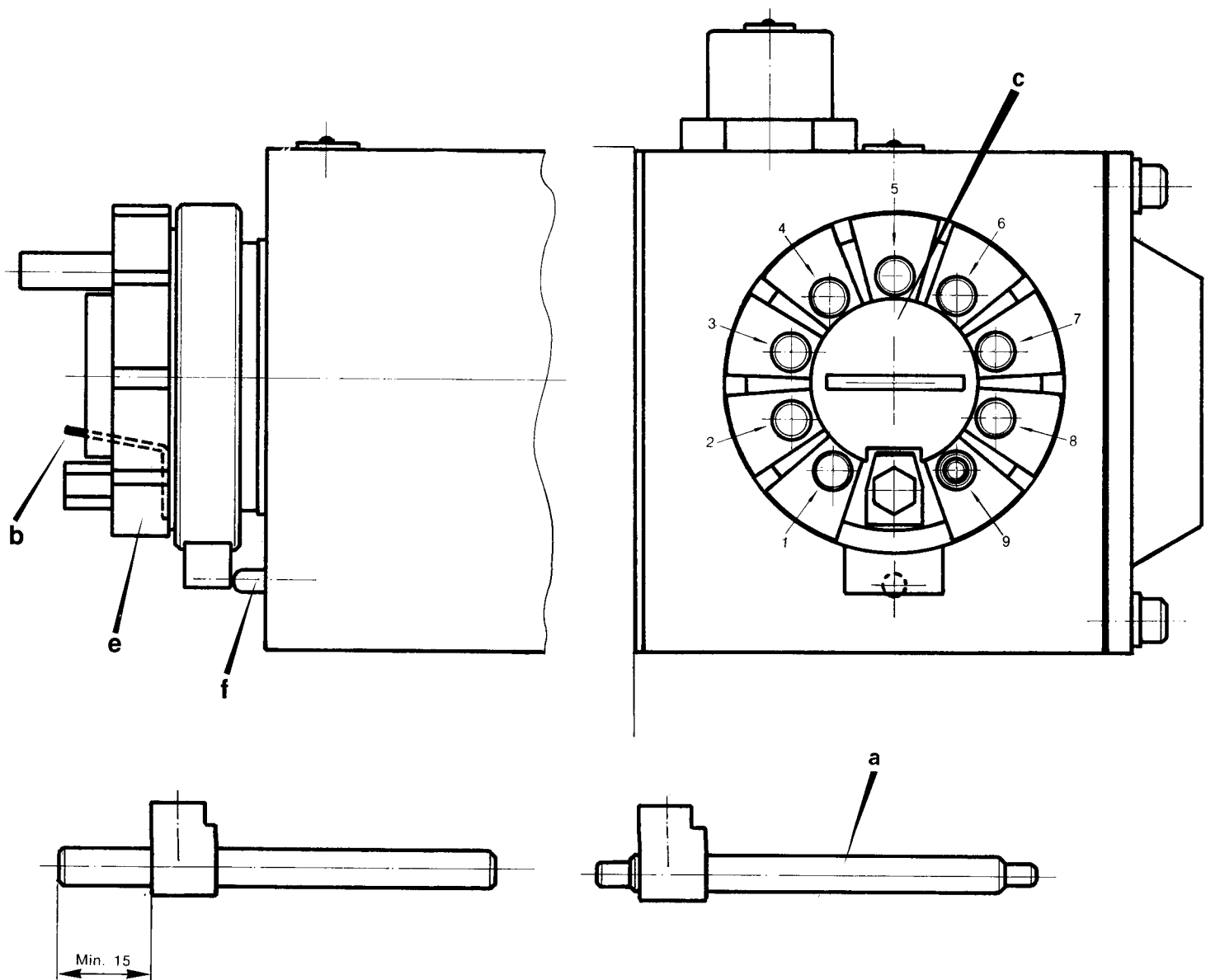


Fig. 63

S = when stops are disengaged = 3 mms
S = when stops are engaged = 1.5 mms

The procedure for inserting and locking the pins is as follows. See fig. 64.



PLS NOTE: The not- used pins have to be positioned with the free-end 15 mm. out of the drum.

Fig. 64

- Raise the flat spring (b) from its seat on the retainer (c)
- Rotate the retainer with a screwdriver until the seat of the spring will coincide with the pin to be inserted or removed.

After the pins are positioned, the retainer should be put again on such a position that the flat spring prevents any movement.

Before insertion into the drum the pins should be properly adjusted (see fig. 64) and inserted in the proper sequence.

special instructions for ARL

As stated above, the ARL resets at the end of the cycle and can effect 10 cuts.

The procedure to restrict the number of cuts as required for each job is as follows (see fig. 64):

- Set the drum on the last cut position, cam (e) in correspondance with the pin (f).
- To limit the number of cuts use the pin (a) with short step; this pin must be inserted on a position corresponding to the required number of cuts. In order to choice the number of cuts you have to count the pins (clock-wise, from pin n° 1).

Some examples:

N° 2 cuts: insert the pin (a) on position 2

N° 8 cuts: insert the pin (a) on position 8

N° 10 cuts: pin (a) not inserted

As an optional the stops unit can be supplied with 3 internal microswitches which operate as follows (see fig. 66).

Microswitch 1 (fc 11) - to be used when the tracer is balanced on the template.

Microswitch 2 (fc 18) - to be used on the last two cuts.

Microswitch 3 (fc 0) - to be used only on the last cut.

These microswitches are used with the copier for complete automatic cycle, that is when the longitudinal carriage feed can be controlled, as f.i. on devices TFB, TCA type or automatic cycle lathes.

The three microswitches are assembled on a module card which also holds the termical board.

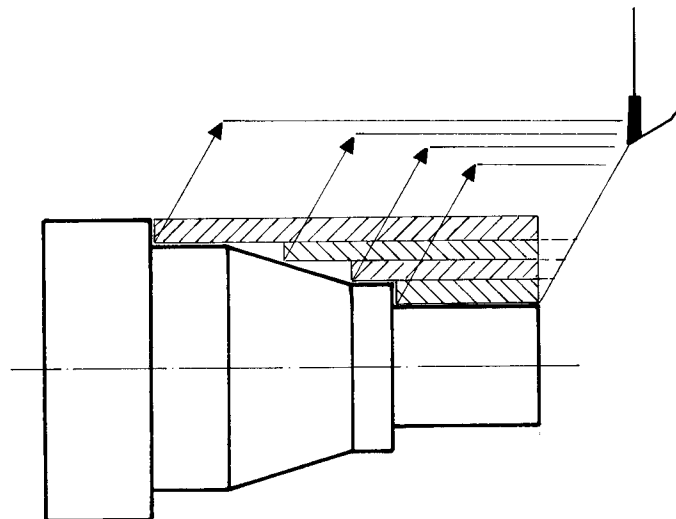


Fig. 65

The operation of the CICLEL system is obtained through a combination of these microswitches: it is thus possible to control the copier and carriage retract, when the tracer meets the template during roughing work stage (see fig. 65).

Obviously when the entire profile is to be traced, this system has to be cancelled. The machining of the entire profile can only take place on the two last cuts (pre-finishing and finishing) or on the last cut only (finishing).

The method by which the microswitches are used with the CICLEL device is shown on fig. 66.

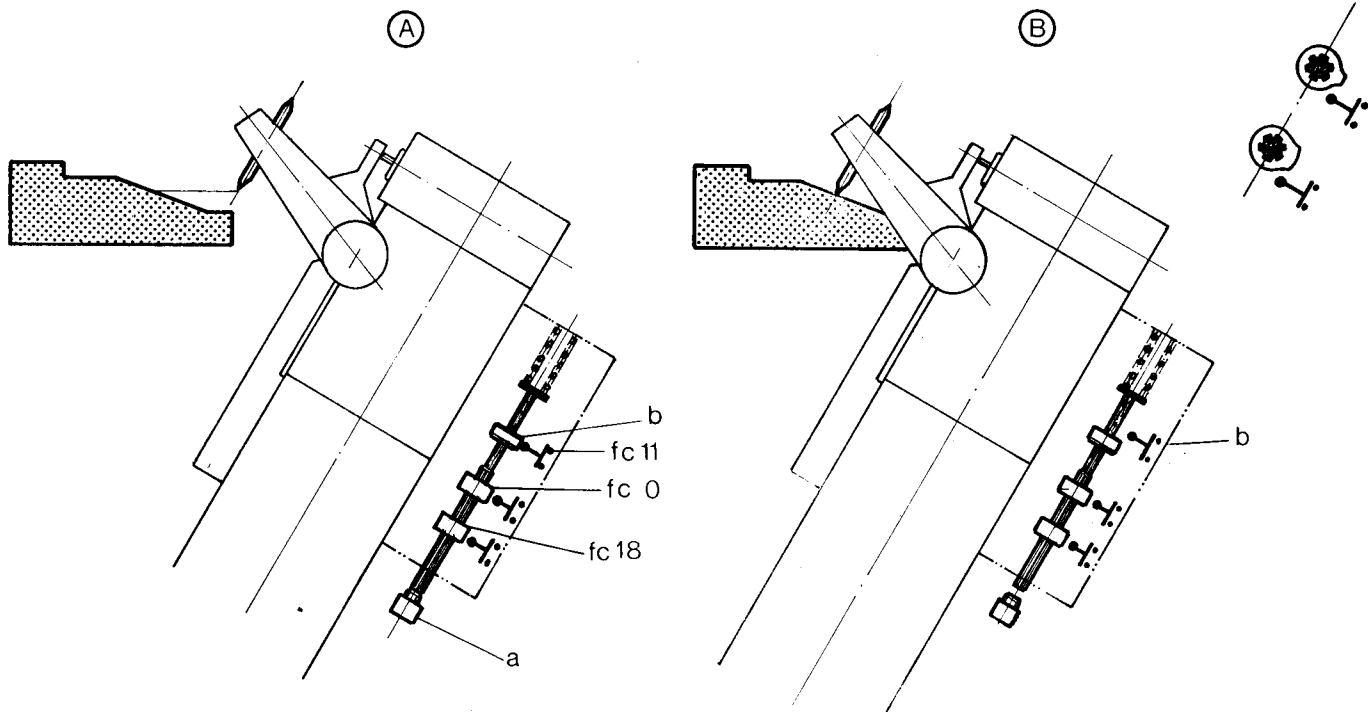


Fig. 66

- A == Tracer in contact with the fixed front stop (a):
the fc 11 microswitch is depressed by the cam (b); the tracer does not touch the template.
- B == During the feed the stylus makes contact with the template, the cam (b) is disengaged from the micro fc 11 which gives the retract signal.

During the last two cuts or the last cut, the microswitches fc 0 and fc 18 are depressed by their respective cams, to prevent the operation of the microswitch fc. 11

Note: Should the drum not return on starting point after the last cut:

- Blow compressed air into the lubrication hole
- Lubricate with very light oil
- Blow again with compressed air.

adjustments on valve and linkage

Fig. 67 shows all points of adjustment possibilities in case these might be required.

- **Screw (a)** - Transmits the stylus deflections to the valve and should be regulated so that the forward and retract motions of the tracer are balanced and at equal speed, even with a finish cut setting (PF) of 1.8 mm.
- **Setscrew (b)** Is a damper to prevent sudden shock to the valve plunger. Make adjustment to obtain retract speed without PF equivalent to retract speed with PF set at 1.8 mm.
- **Screw (c)** Provides adjusted contact between the solenoid and the linkage. Set as follows:
With solenoid energized, the rod (d) should not make contact with screw (c) in order not to impede the movement of the tracer.
With solenoid de-energized, the rod (d) has to make contact with the screw (c) in order to hold the tracer in the retract position, even with PF engaged. Adjust, if necessary and tighten nut on screw (c).
- **Set-screw (e)** It should be adjusted in such a way that the collar of the drum is $s = 1.5$ mms from the surface of the body, when AL or ARL stops make contact with the fixed front stop (see fig. 63).
- **Cam (f)** It should be adjusted in such a way that the AL or ARL drum can rotate one step only during the last part of the copier backward stroke.
- **Rear stop (g)** Should be set to limit the copier backward stroke as required.

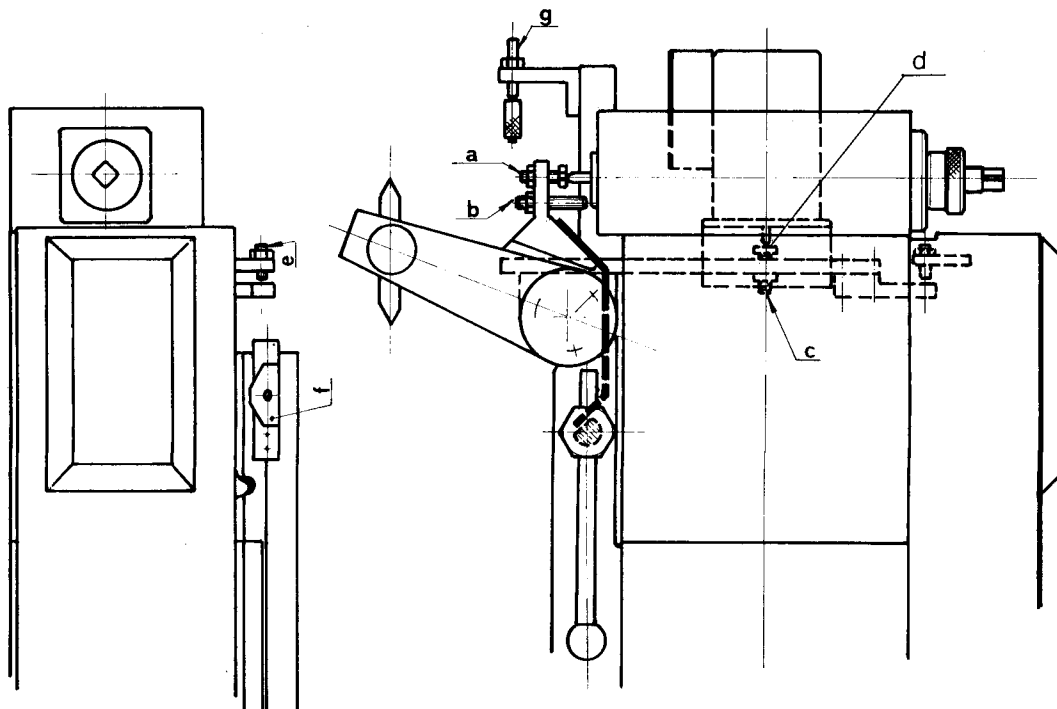


Fig. 67

maintenance

checking of lubrication

The copier guide ways are automatically lubricated by two pumps which are connected to the hydraulic power circuitry.

The perfect effectiveness of the lubricating system should be checked frequently by seeing that the guide ways are always coated with oil.

Keep in mind that the oil is pumped whenever a rapid forward movement occurs.

During repeated very short cycles, the oil could drip slightly but this is not a problem. Consult Duplo-matic Service in case of lubrication failure.

Other lubrication points are:

ARL - AL fig. 68

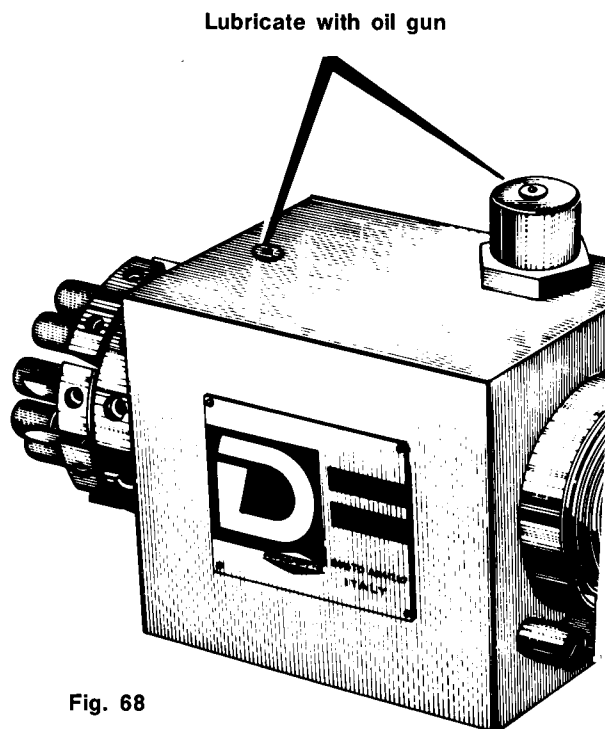


Fig. 68

oil change

c) The oil in the power unit should be changed every 800/1000 working hours.

The procedure is: take off the power unit cover (c), empty the tank, empty the control cylinder, the piping, the pump, the exhaust valve and the pilot valve, rinse everything carefully with gasoline and refill with fresh oil (fig. 69).

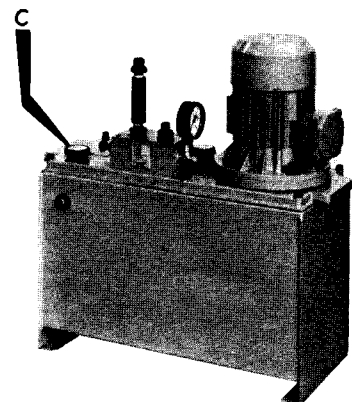


Fig. 69

gib adjustment

The single existing adjustment on the copier guides ways is that on the gib of the tracing slide is properly adjusted during testing at the factory.

If for any reason an adjustment is needed, proceed as follows:

Reduce the pressure to 25-30 psi. This is done by turning the pressure relief valve on the tank until a «O» reading shows.

Tighten gib and then slowly increase pressure by turning valve clockwise. Slide should start moving at approx. 30 psi. If it moves sooner - tighten gib; if more pressure is required - loosen gib.

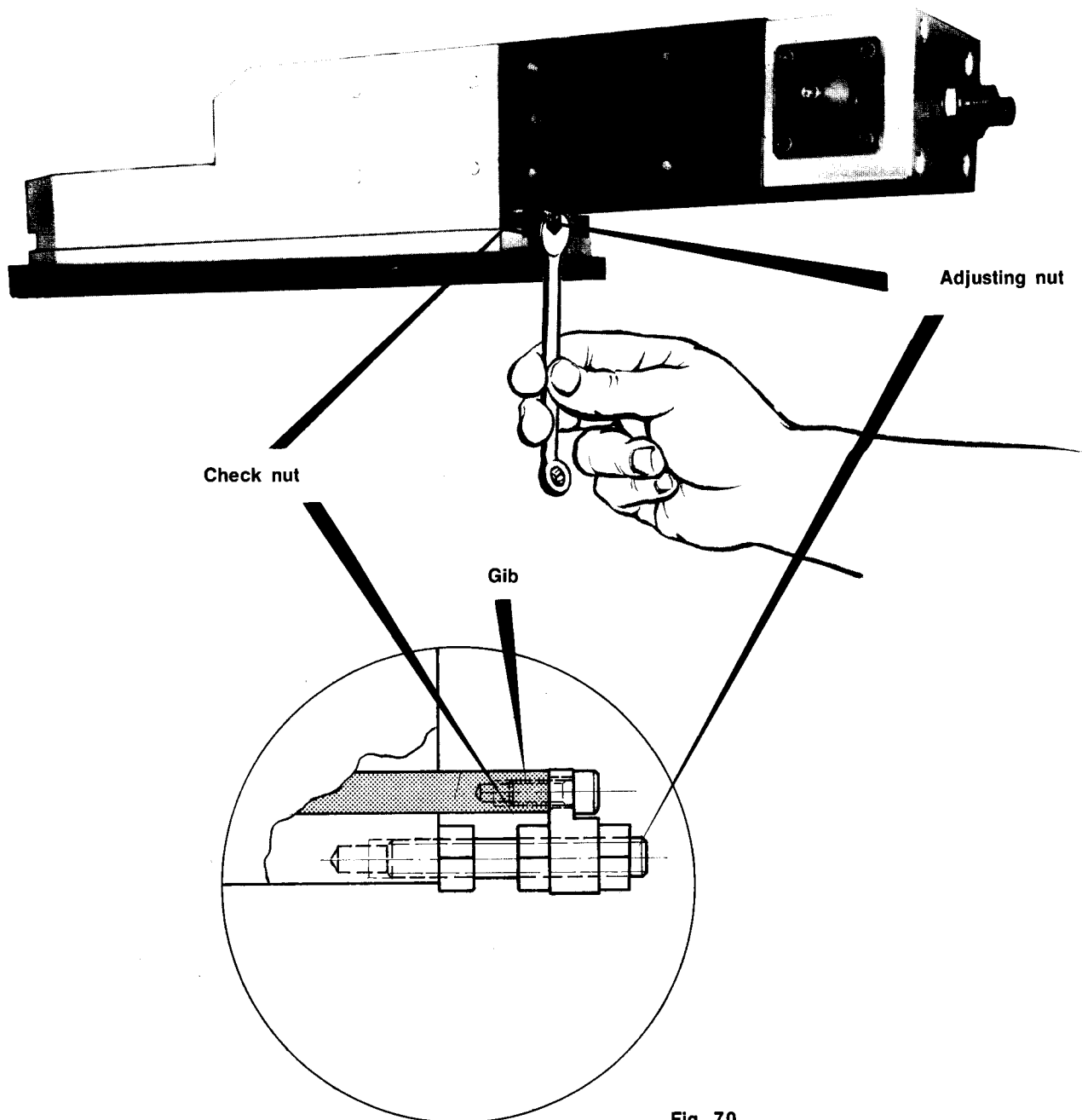
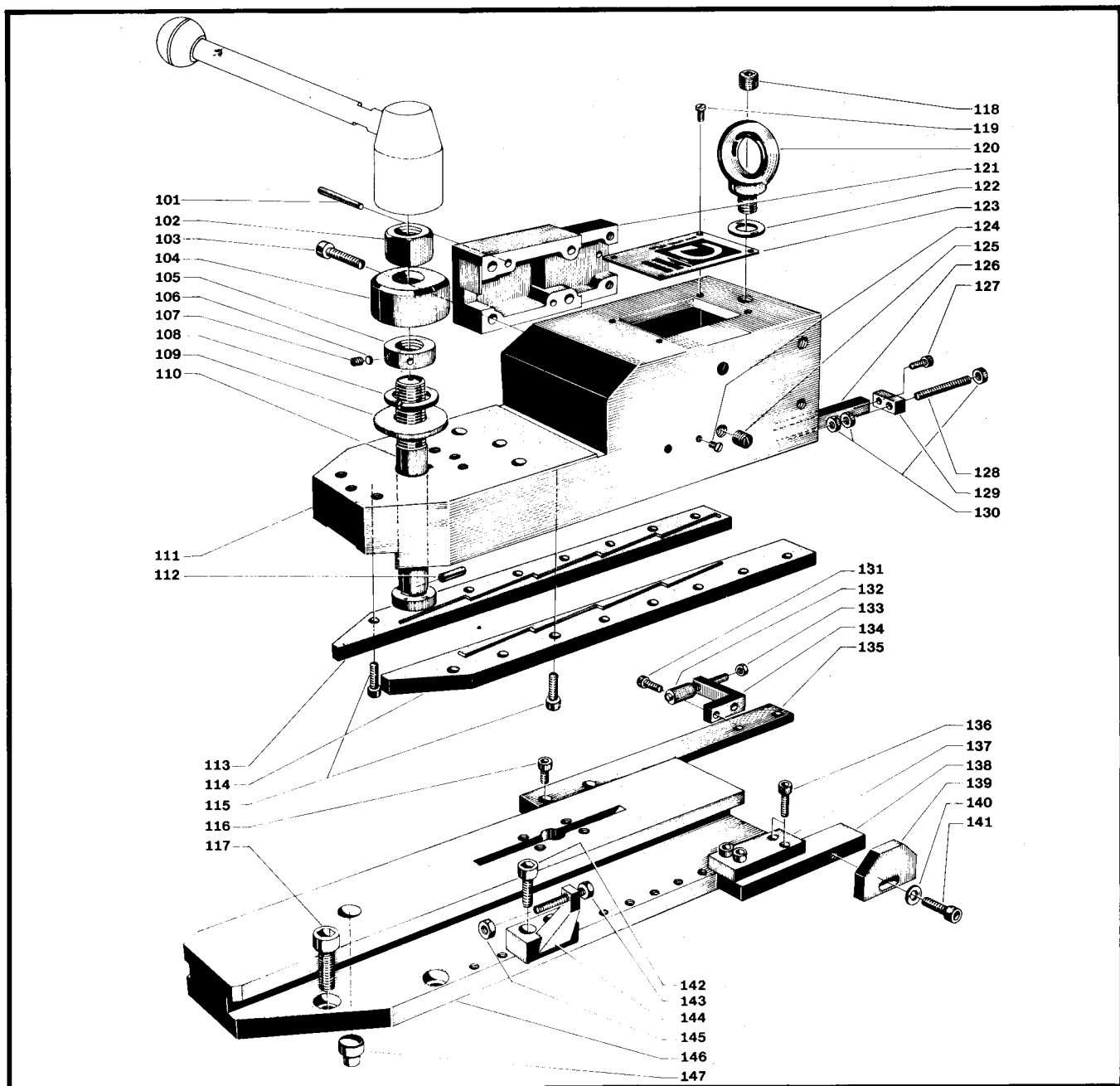


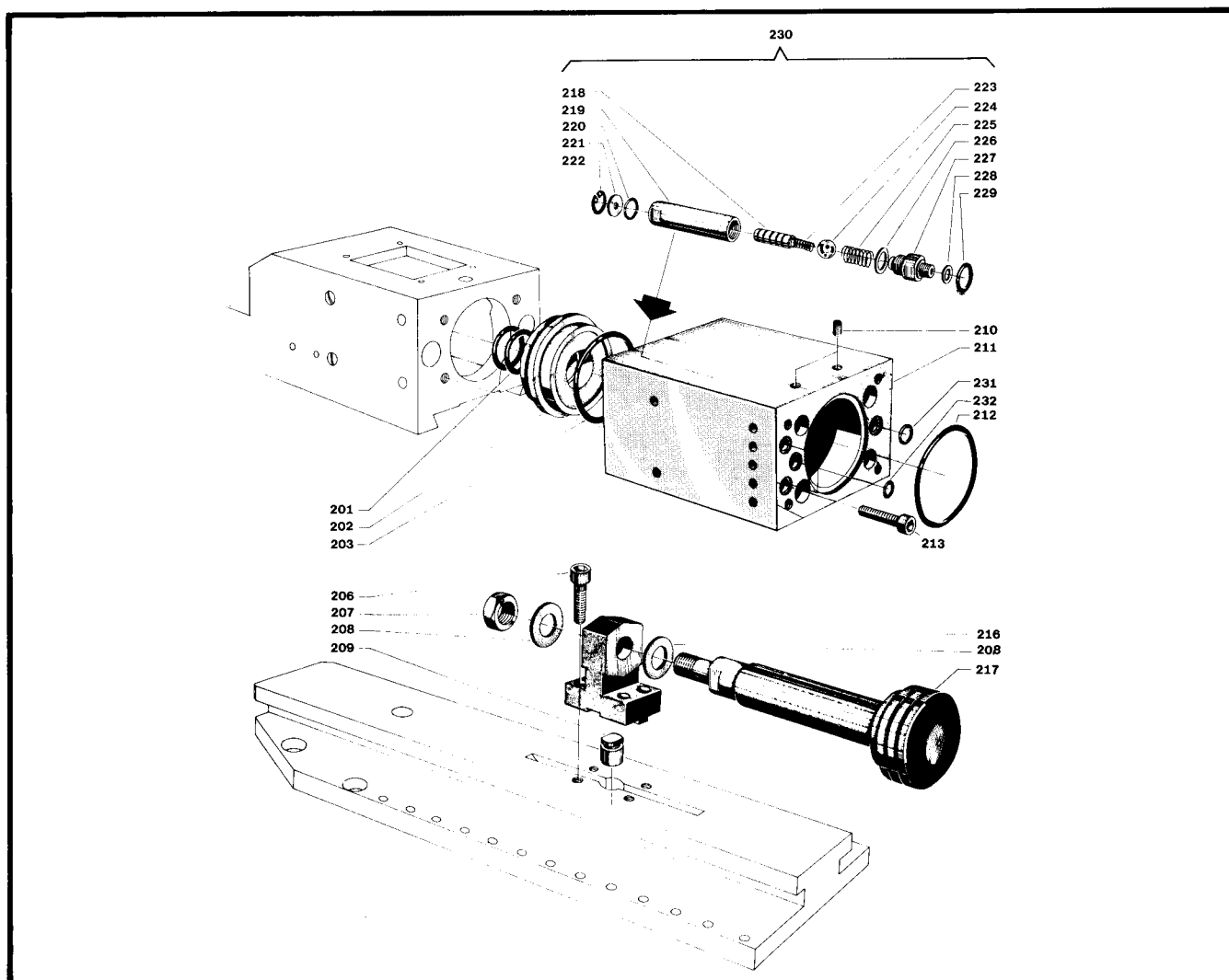
Fig. 70

slide standard



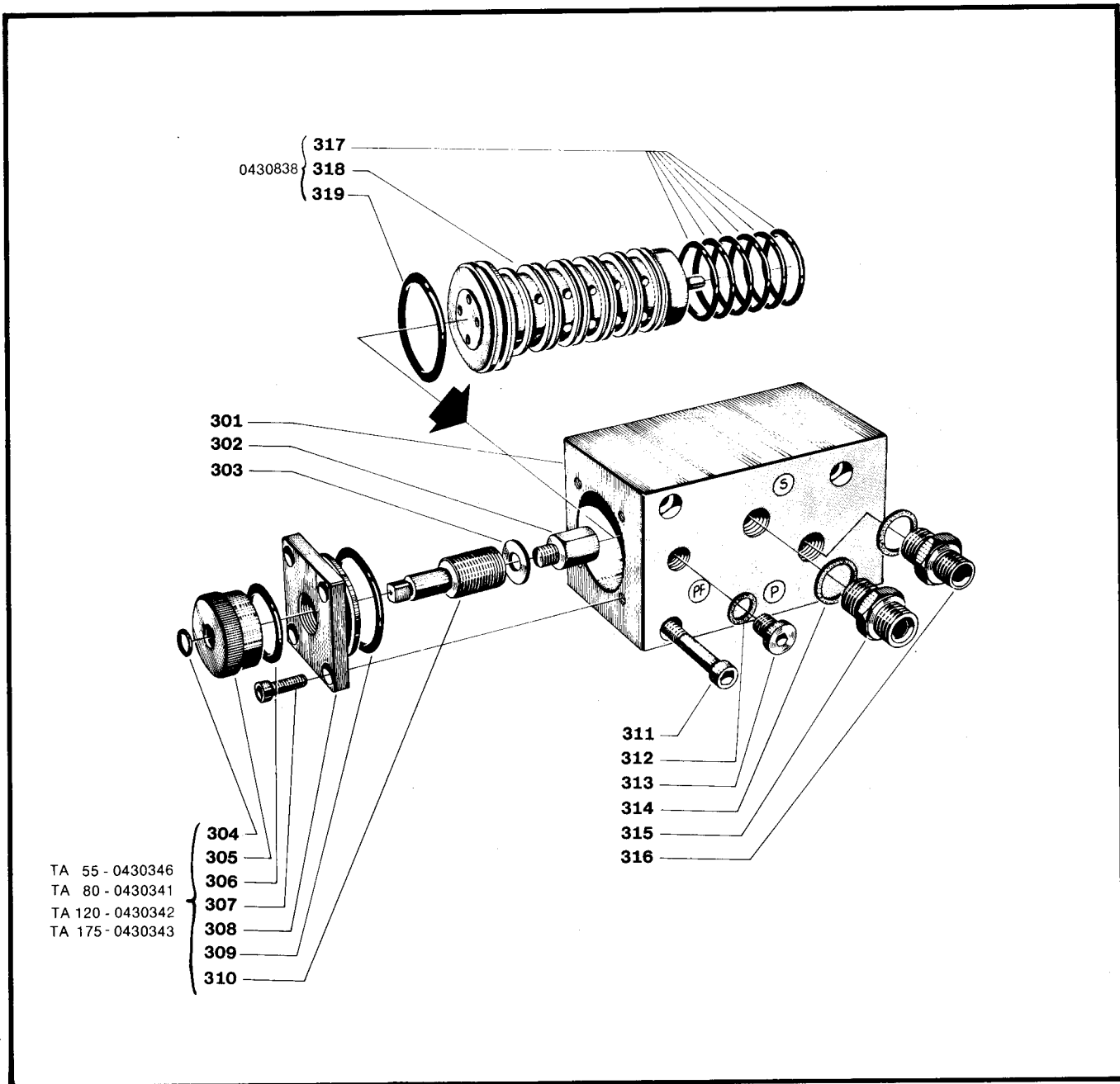
PART No.	CODE				117	0530195	0530196	0530198	0530199	134	0315829	0315829	0315829	0315829
	TA 55	TA 80	TA 120	TA 175										
101	0530610	0530610	0530611	0530611	118	0530422	0530422	0530422		135	0310505	0310499	0310498	0310500
102	0550153	0550156	0550153	0550153	119	0530210	0530210	0530210	0530210	136	0530044	0530047	0530047	0530047
103	0530063	0530063	0530063	0530063	120				0550043	137		0312435	0312430	0312430
104	0312516	0312516	0312514	0312514	121	0314638	0310492	0310493	0310494	138	0312395	0312442	0312432	0312439
105	0312515	0312515	0312513	0312513	122				0570205	139	0312398	0312442	0312431	0312439
106	0550118	0550118	0550119	0550119	123	0312877	0312877	0312878	0312878	139	0312398	0312437	0312432	0312440
107	0530383	0530383	0530391	0530391	124	0590139	0590139	0590139	0590139	140	0550020	0550020	0550020	0550020
108	0550027	0550027	0550028	0550028	125	0590142	0590142	0590142	0590142	141	0530045	0530045	0530045	0530045
109	0312508	0312508	0312509	0312509	•126	0310251	0310284	0310296	0310318	142	0530044	0530045	0530045	0530045
110	0312494	0312495	0312496	0312497	•127	0530021	0530021	0530031	0530031	143	0530315	0530315	0530315	0530315
111	0310250	0310283	0310295	0310317	•128	0530441	0530441	0530441	0530441	144	0314464	0312403	0312409	0312417
112	0550340	0550340	0550334	0550334	•129	0310252	0310252	0310297	0310297	145	0530526	0530526	0530526	0530526
113	0310254	0310286	0310299	0310320	•130	0530527	0530527	0530527	0530527	146	0310247	0310281	0310293	0310315
114	0310253	0310285	0310298	0310319	131	0530032	0530032	0530032	0530032	147	0314079	0314079	0314079	0314079
115	0530031	0530045	0530045	0530059	132	0430016	0430016	0430016	0430016					
116	0530044	0530047	0530047	0530049	133	0530526	0530526	0530526	0530526					

cylinder



PART No.	CODE				PART. NO.	CODE			
	TA 55	TA 80	TA 120	TA 175		TA 55	TA 80	TA 120	TA 175
• 201	OR 4081 0590184	OR 4100 0590191	OR 4100 0590191	OR 4118 0590195	219	0315834			
202		OR 152 0314902	OR 162 0314903	OR 171 0314904	220	0590168			
• 203		0590210	0590220	0590229	221	0315833			
206	0530049	0530062	0530081	0530098	222	0550377			
207	0310260		0310314		223	0315830			
208	0310259		0310313		224	0630239			
209	0310248				225	0315831			
210	0590141				226	0315836			
211	0314732	0315009	03105010	0315011	227	0315835			
• 212	OR 3193 0590326	OR 3218 0590329	OR 171 0590229	OR 4312 0590335	228	0570190			
213	OR 2021 0530050	OR 2021 0530063	OR 2021 0530070	OR 2021 0530085	• 229	OR 3062 0590178			
216	0310249	0310282	0310294	0310316	• 230	0430363			
217	0314733	0310504	0310502	0314735	• 231	OR 2031 0590165		OR 2043 0590297	OR 2050 0590298
218	0315832		0315832		• 232	OR 2021 0590162		OR 2031 0590165	

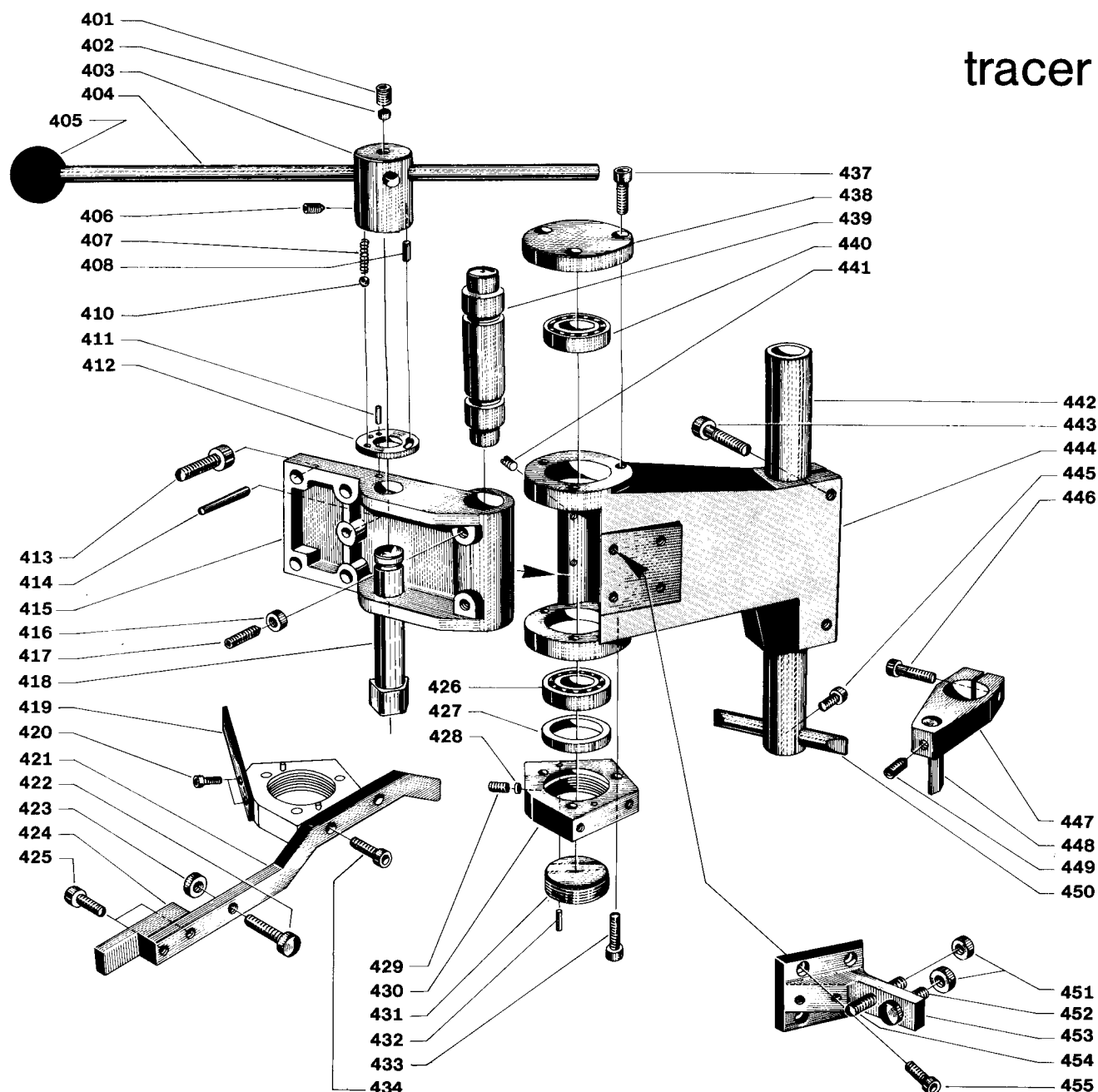
head



PART No.	CODE				310	0315839	0315839	0315839	0315839
	TA 55	TA 80	TA 120	TA 175					
301	0314731	0314736	0314737	0314738	311	0530179	0530179	0530065	0530070
302		0314755	0314756	0314739	312	0570191	0570191	0570191	0570191
303		0550012	0550012	0550012	313	0570181	0570181	0570181	0570181
• 304	OR 112 05590170	OR 112 0590170	OR 112 0590170	OR 112 0590170	314	0570193	0570195	0570195	0570195
• 304	0590170	0590170	0590170	0590170	315	0570279	0570279	0570280	0570280
305	0315838	0315838	0315838	0315838	316	0570272	0570272	0570273	0570273
• 306	OR 4093 0590189	OR 4093 0590189	OR 4093 0590189	OR 4093 0590189	• 317	OR 2125 0590314	OR 2125 0590314	OR 2125 0590314	OR 2125 0590314
307	0530031	0530031	0530031	0530031	• 318	0430546	0430546	0430546	0430546
308	0315837	0315837	0315837	0315837					
• 309	OR 144 0590202	OR 144 0590202	OR 144 0590202	OR 144 0590202	• 319	0590202	0590202	0590202	0590202

• We suggest a spare part stock of these components

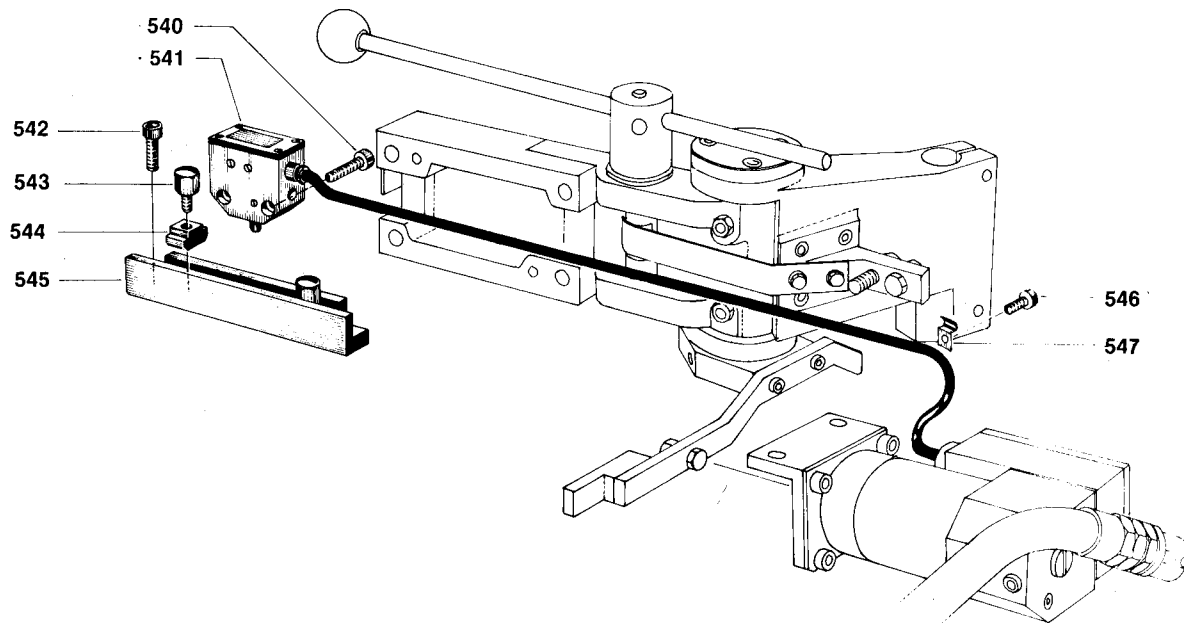
tracer



PART No.	CODE							
	TA 55	TA 80	TA 120	TA 175				
401		0530408			419	0315522	438	0310268
402		0550121			420	0530304	439	0310267
403		0315520			421	0312443	440	0630148
404		0420303			422	0530319	441	0590139
405		0630112			423	0530527	442	0310415 0315840 0315841 0315842
406		0530493			424	0312434	443	0530047
407		0312804			425	0530030	444	0310271
408		0550209			426	0630418	445	0530400
					427	0310269	447	0315843
					428	0550119	447	0315843
410		0630227			429	0530391	• 448	0310278
411		0550297			430	0310497	449	0530408
412		0310265			431	0310270	• 450	0310277
413		0530063			432	0550341	451	0530527
414		0550151			433	0530022	452	0310276
415		0310495			• 434	0530031	453	0310273
416		0530527					454	0530407
417		0530495					455	0530020
418		0315519			437	0530020		

• We suggest a spare part stock of these components

control of movement

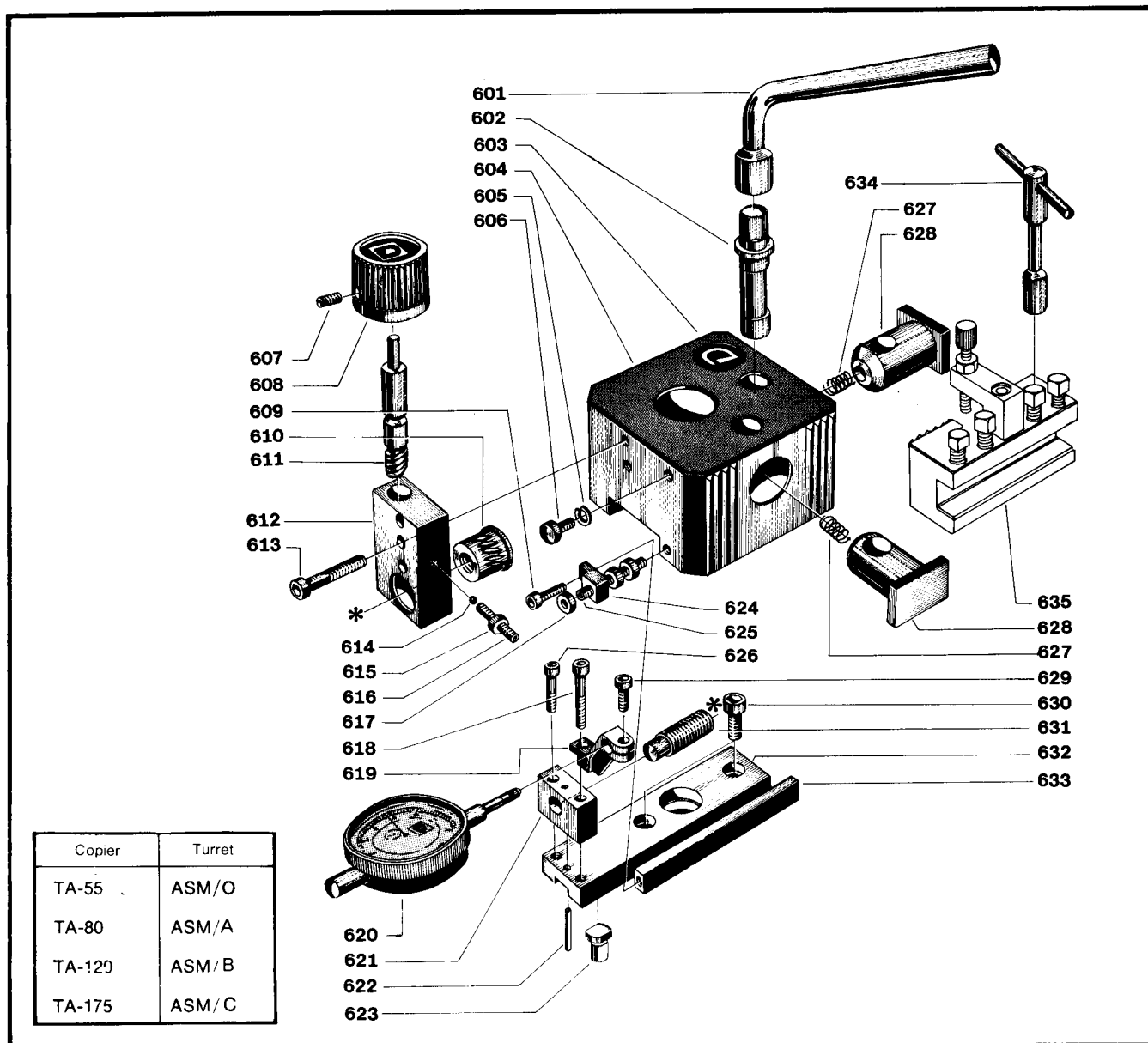


PART No.	TA 55 CODE	TA 80 CODE	TA 120 CODE	TA 175 CODE
540	0530024			
• 541	0660262			
542	0530044	0530045	0530047	0530050
543	0310194			
544	0530562			
545	0312423	0312424	0312425	0312426

- We suggest a spare part stock of these components

WHEN ORDERING SPARE PARTS, PLEASE REFER ALWAYS TO THE SERIAL NUMBER OF THE DEVICE.

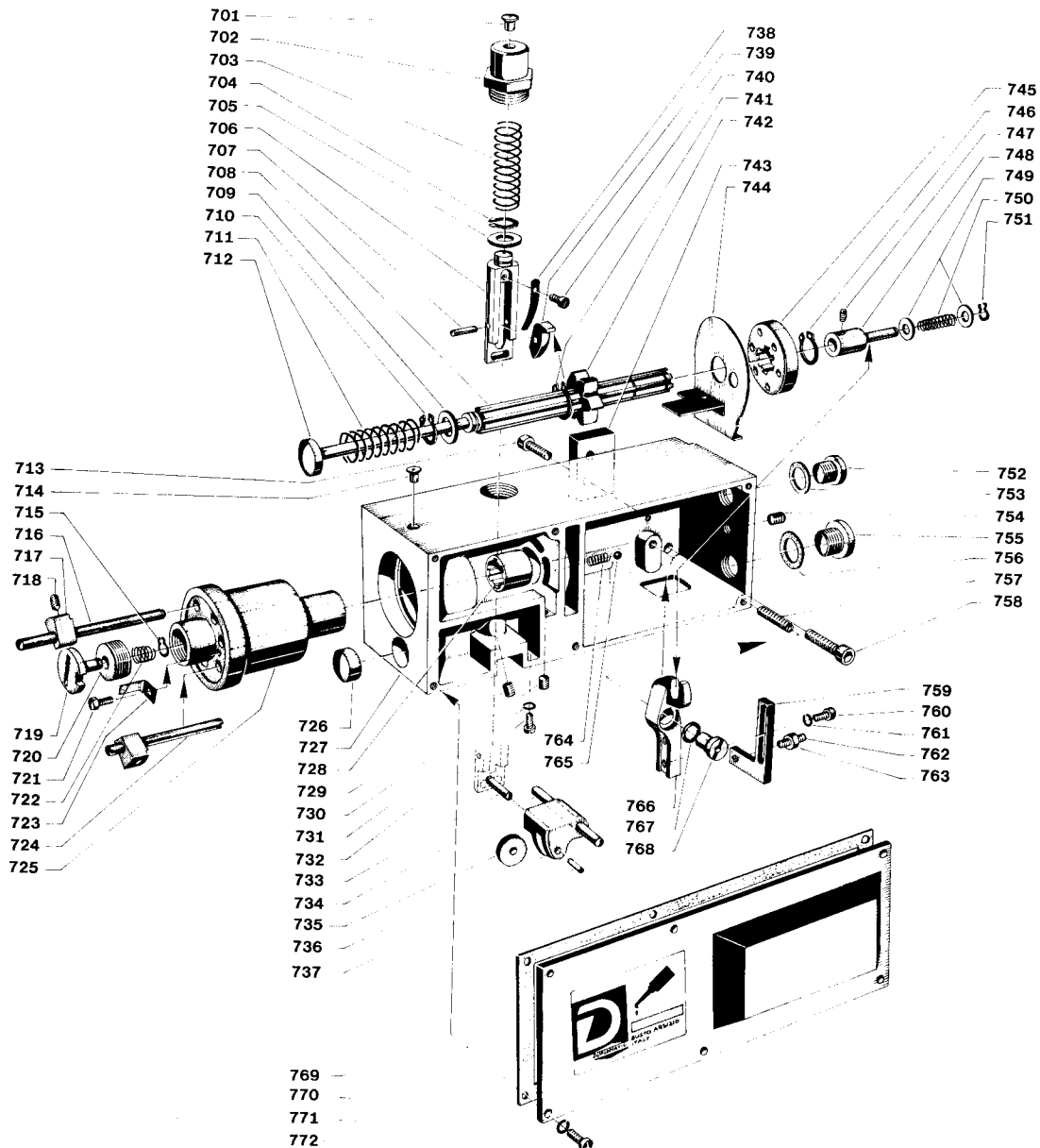
AS-M/ *** 30 turret



PART No.		ASM/O	CODE			618	0530036		0530039		
			ASM/A	ASM/B	ASM/C						
601		0630062	0630063	0630064	0630065	619	0315799				
602		0314758	0314759	0314760	0314761	620	DM 0630472 - DP 0630473				
603	{ right left	0315776	0315777	0314778	0314779	621	0315795		0315796		
		0315780	0315781	0315782	0315783						
604	{ right left	0315768	0315769	0315770	0315771	622	0550301				
		0315893	0315894	0315895	0315896						
605	0550010					623	0312511				
606	0530316					624	0310252				
607	0530383					625	0530441				
608	0630463					626	0530036		0530039		
609	0530021					• 627	0314855		0314856		
• 610	0315798					628	0314620	0314621	0314622	0314623	
• 611	0315793		0315794			629	0530030				
612	0315791		0315792			630	0530045	0530057		0530075	
613	0530050					• 631	0315797				
614	0630227					632	0315785	0315786	0315787	0315788	
615	0630527					633	0315789		0315790		
616	0315580					634	0630066	0630068	0630432		
617	0530527										

• We suggest a spare part stock of these components

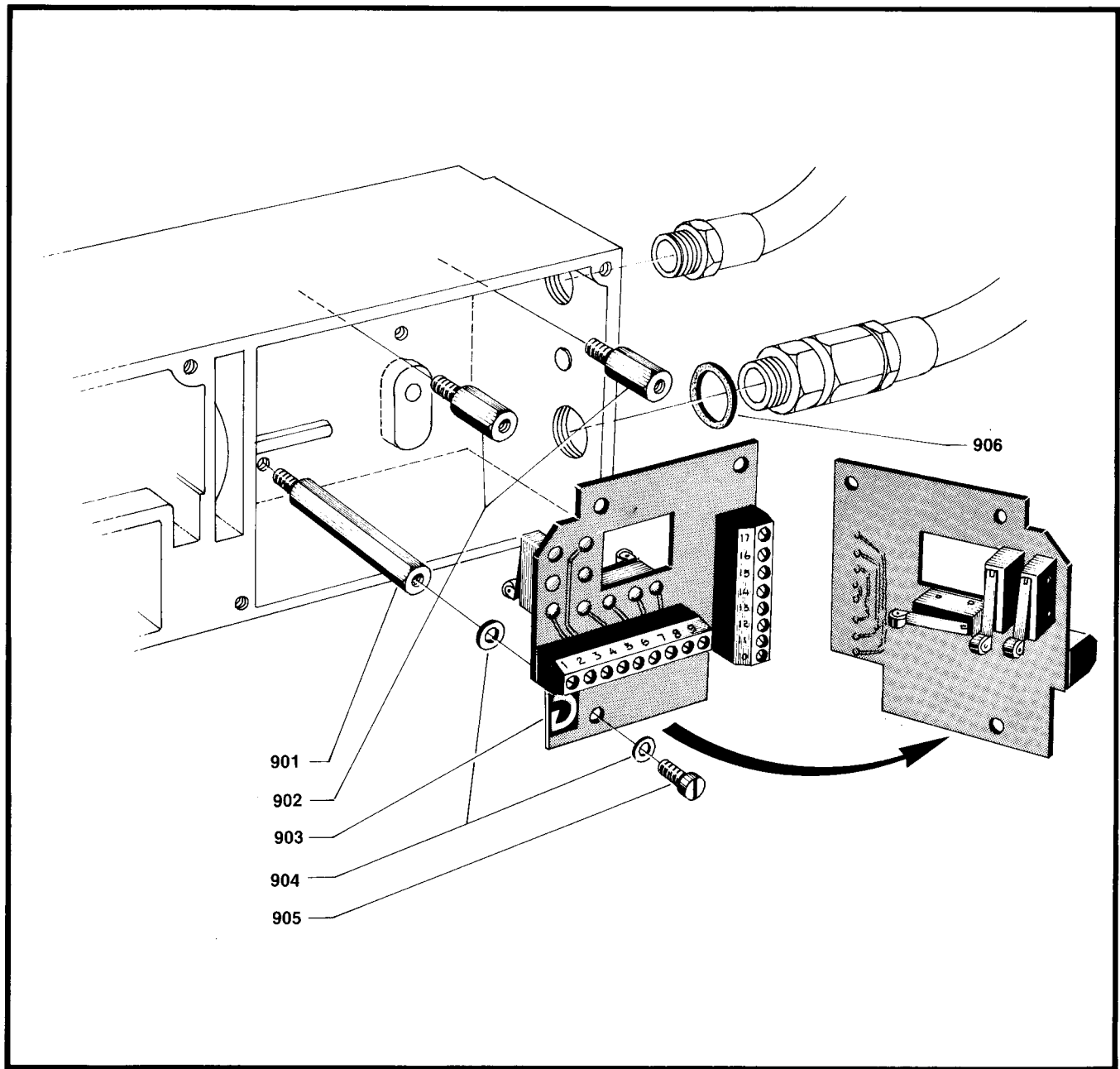
AL



PART No.	AL-20 right	AL-20 left	725	0314573	750	0312794
701	0610087		726	0314560	751	0550356
702	0312301		727	0312393	752	0670837
703	0312810		728	0314564	753	0570197
704	0550359		729	0530408	754	0570167
705	0312298		730	0530430	755	0670838
• 706	0312297		731	0550018	756	0570198
707	0550224		732	0530212	757	0530397
708	0314565		733	0550227	758	0530044
709	0314561		734	0550198	759	0312350
710	0550360		735	0312302	760	0530020
711	0312809		736	0312320	761	0550018
712	0314563		737	0550202	762	0312313
713	0530020		• 738	0312300	763	0530526
714	0610087		• 739	0312299	764	0312822
715	0550356		740	0530202	765	0630229
• 716	0314579		741	0550362	766	0312348
717	0312288		742	0314564	767	0590165
718	0530485		743	0312390	768	0312314
719	0314639		744	0312334	769	0312392
720	0314640		745	0314569	770	0312391
721	0315051		746	0550362	771	0550018
722	0314641		747	0530384	772	0530212
723	0314754		748	0314562		
• 724	0314579		749	0550010		

This diagram is an exploded view of a mechanical assembly, likely a pump or motor component. It shows the main housing (846) and various internal and external parts. The assembly includes a central shaft (847) with a fan (848) and a pump head (849). The pump head is connected to a pump body (850) which has a pump head (851) and a pump body (852). The pump body is connected to a pump head (853) and a pump body (854). The pump body is connected to a pump head (855) and a pump body (856). The pump body is connected to a pump head (857) and a pump body (858). The pump body is connected to a pump head (859) and a pump body (860). The pump body is connected to a pump head (861) and a pump body (862). The pump body is connected to a pump head (863) and a pump body (864). The pump body is connected to a pump head (865) and a pump body (866). The pump body is connected to a pump head (867) and a pump body (868). The pump body is connected to a pump head (869) and a pump body (870). The pump body is connected to a pump head (871) and a pump body (872). The pump body is connected to a pump head (873) and a pump body (874). The pump body is connected to a pump head (875) and a pump body (876). The pump body is connected to a pump head (877) and a pump body (878). The pump body is connected to a pump head (879) and a pump body (880). The pump body is connected to a pump head (881) and a pump body (882). The pump body is connected to a pump head (883) and a pump body (884). The pump body is connected to a pump head (885) and a pump body (886). The pump body is connected to a pump head (887) and a pump body (888). The pump body is connected to a pump head (889) and a pump body (890).

PART No.	CODE		828	0550356	856	0550362
	AL-20 right	AL-20 left				
801	0610087		• 829	0314580	857	0314568
802	0312301		830	0312290	858	0550356
803	0312810		831	0530013	859	0312794
804	0550359		832	0314574	860	0550010
805	0312298		833	0312393	861	0530384
806	0312297		834	0314564	862	0530224
• 807	0312300		835	0550227	• 863	0312309
• 808	0550224		836	0312320	864	0312334
• 809	0314565		837	0312302	865	0550018
810	0314561		838	0550202	866	0530212
811	0550360		839	0550198	867	0570167
812	0550368		840	0630229	868	0530044
813	0312294		841	0312807	869	0312305
814	0314570		842	0530408	870	0550225
815	0312809		843	0550225	871	0312348
816	0314563		844	0312808	872	0550018
817	0610087		845	0530430	873	0530020
818	0550238	0550236	846	0312323	874	0312313
819	0530384		847	0590162	875	0530526
820	0530485		848	0530202	876	0312350
821	0312288		• 849	0312384	877	0530397
• 822	0314579		• 850	0314566	878	0590165
823	0314639		851	0314662	879	0312314
824	0530211		852	0530391	880	0312392
825	0314754		853	0314964	881	0312391
826	0314640		854	0314571	882	0550018
827	0314641		855	0314572	883	0530212

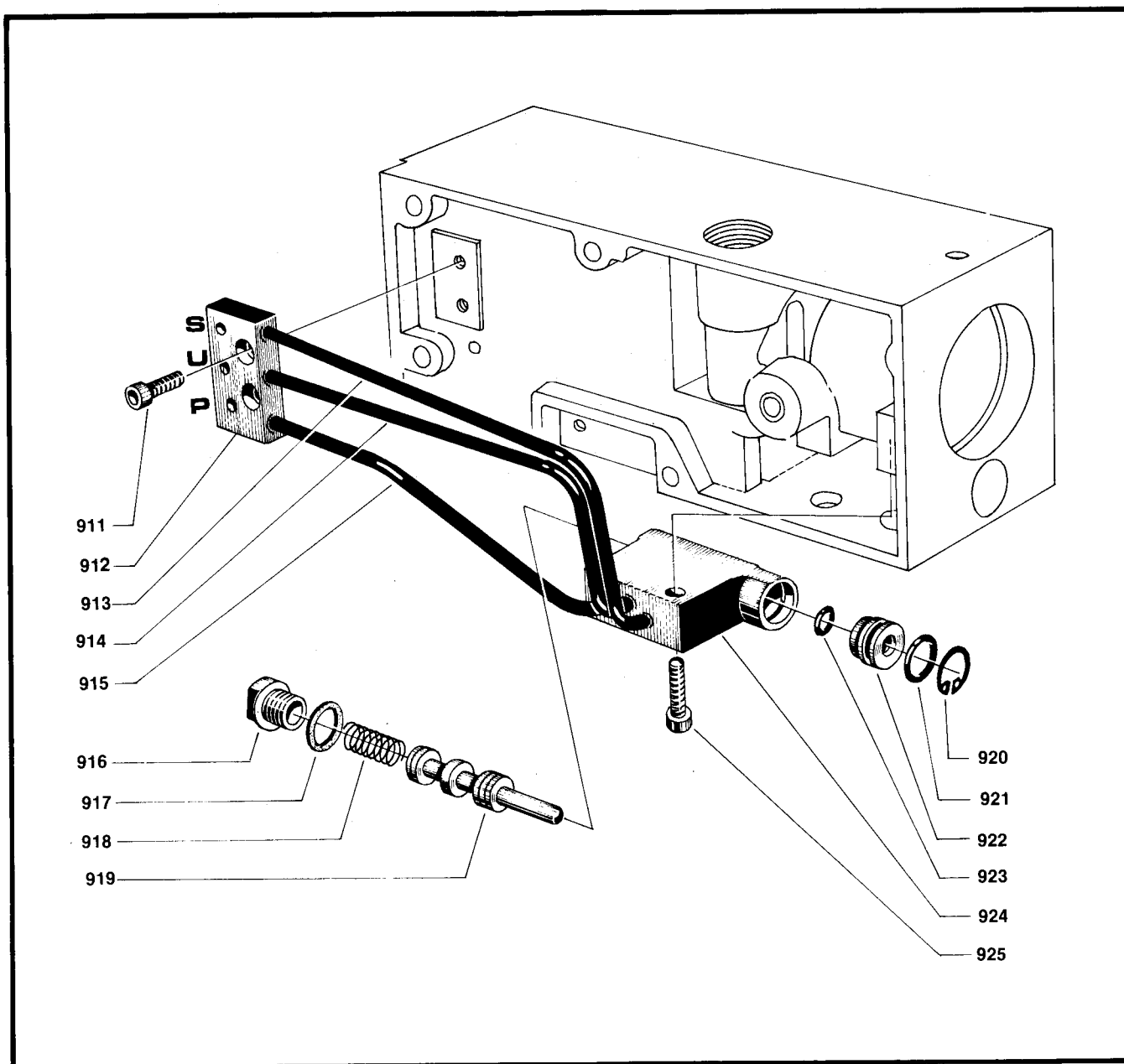


PART No.	CODE	
	CICLEL on right-hand ARL	CICLEL on left-hand ARL
901	0314963	
902	0314962	
• 903	0314961	0314773
904	0550362	
905	0530211	
906	0570198	

• We suggest a spare part stock of these components

WHEN ORDERING SPARE PARTS, PLEASE REFER ALWAYS TO THE SERIAL NUMBER OF THE DEVICE.

PF

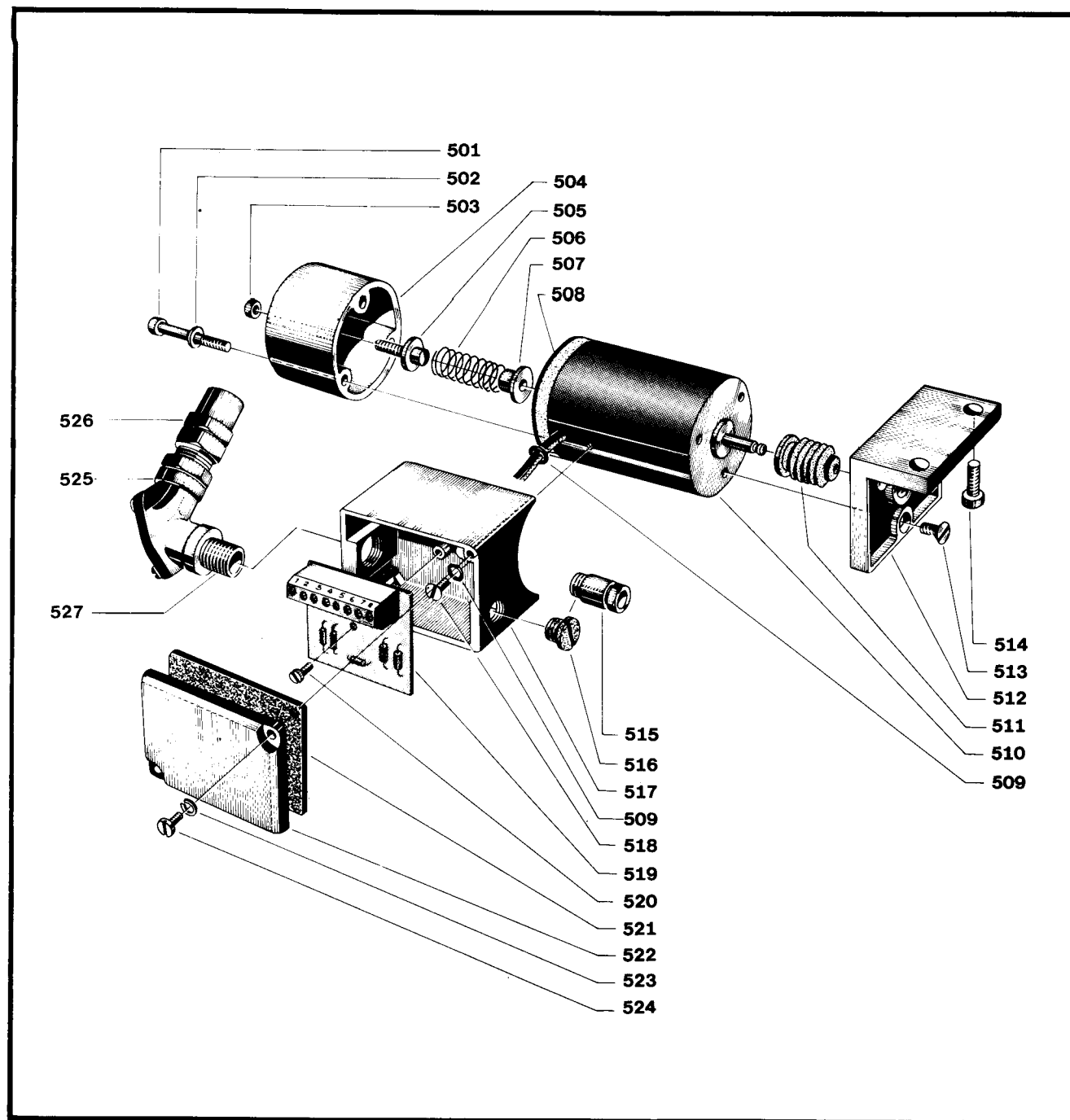


PART No.	CODE PF	918	0312777
• 911	0530020	919	0312291
912	0314582	920	0550377
913		921	0590166
914	0510902	922	0312292
915		923	0590162
916	0314583	924	0314581
917	0570192	925	0530024

• We suggest a spare part stock of these components. Entire group assembled

WHEN ORDERING SPARE PARTS, PLEASE REFER ALWAYS TO THE SERIAL NUMBER OF THE DEVICE.

BIS servocontrol



Piece N.	CODE N.			
501	0530026		514	0530044
502	0530008		515	0670851
503	0530545		516	0670117
504	0316379		517	0316389
505	0316380		518	0530242
506	0315276		• 519	0480066 110 V. 50/60 Hz 0480154 24 V. C.C.
507	0316382		520	0530202
• 508	0316383		521	0316391
509	0590160		522	0316392
• 510	0316384	110 V. 50/60 Hz. 0316386 24 V. C.C.	523	0550018
511	0316387		524	0530203
512	0316388		525	0670889
513	0530243		526	0670918
			527	0670894

• We suggest a spare part stock of these components

WHEN ORDERING SPARE PARTS PLEASE REFER ALWAYS TO THE SERIAL NUMBER OF THE DEVICE

service manual

DUPLOMATIC Tracers are reliable and will perform trouble-free for many years. It is advisable to follow the instructions contained in the manual carefully, and to provide periodic maintenance.

Should problems arise, the cause very often may be unrelated to the tracer. We will list several reasons for malfunction which should be checked out first, and will then list specific problems and the recommended remedies.

First, here is the list of basic checks to be made:

- A. The condition of the lathe itself should be checked. Spindle, ways, carriage and cross-slide have to be in perfect condition to get good tracing results.
- B. Also check the chuck and centers (if used) to ascertain that the work-piece is held firmly.
- C. The cutting tool can be the cause of poor results. Select the right grade and shape, and examine the tool for wear and correct clearance.
- D. Make sure that the tracer is properly mounted. The swivel base and the tracing slide bolts should be tightened securely. Also, check tool turret and tool holder.
- E. Check hydraulic power unit; make sure that oil level is not too low, and that pressure is set correctly. Use only recommended oils.
- F. The master or template has to be held firmly between the centers or in the template holder.
- G. Check stylus for correct setting and good response.
- H. Check gib on tracing slide for proper fit. See page 18 for adjustment procedure.
- I. Should it become evident that there is a defect on the tracing-valve, we recommend that you contact your dealer or the Duplomatic service at once.

In the following listed cases, the need for checking for the previously mentioned problems is indicated by the respective letter in each category:

trouble shooting

GROUP I		Problems with work-piece	
Probable Cause		Remedy	
FACING CUT NOT CORRECT Feed rate too high Shoulder too long Too much material per cut Also see: A, B, C, D		Reduce feed rate Check if tracing stroke is not restricted Reduce cut	
CHATTER ON SHOULDERS Cut too heavy Wrong speed and tool combination Also see: A, B, E, F, G		Reduce cut Change tool shape and type Check cutting speed Check tool relief and wear	
CHATTER ON CYLINDRICAL SURFACE Wrong speed and tool combination Also see: A, B, E, F		Check cutting speed Change tool shape and type Check tool relief and wear	
TRACER RETRACTS UNEVENLY Stylus arm has play Defective lubrication Also see: B, D, E, H		Regulate Examine	
WORK IS TAPERED Master not aligned Headstock of lathe Tailstock		Check for parallelism Check headstock for proper alignment Check tailstock for proper alignment	
CUT DETERIORATES Feed rate too fast Stylus and tool not compatible Also see: E, G, H		Reduce feed rate Examine and correct	

<div>GROUP I</div> <div>Problems with work-piece</div>	
Probable Cause	Remedy
POOR REPRODUCTION Stylus and tool not compatible Also see: A, B, D, E, F, H	Examine and correct
SLIGHT TAPER WHEN TRACER RETRACTS Feed too fast, or not even Also see: A, E, G, H	Reduce
CHATTER, VIBRATION Master too thin Vibration in pressure regulating valve Air in circuit Also see: D, E, F, G, H	Support master with rests Check and correct Bleed
GROUP II	Problem with tracer
Probable Cause	Remedy
SLIDE DOES NOT MOVE ALL THE WAY Stops out of position Front and rear stop too close Protruding screw on swivel base plate Also see: E and H	Check and adjust Check and adjust Correct condition
SLIDE DOES NOT MOVE FORWARD Position of lever incorrect Obstacle or interference Lubrication defect Also see: E and I	Adjust See that there are no chips between base and slide Repair
STYLUS TOO STIFF See E, G and I	

GROUP II	Problem with tracer
Probable Cause	Remedy
IRREGULAR IN & OUT FEED RATE Lubrication not working Also see: E, G, H, I	Correct
DIFFERENT RAPID APPROACH IN & OUT Obstruction on stylus rotation Finish cut adjustment too open Also see: I	Correct Reduce
TAPER AT BEGINNING OF CUT Feed too fast Slope not right Cut too heavy	Reduce See positioning of tracer Reduce
LOSS OF OIL Connections not tight Lubrication defect	Correct Correct
LACK OF POWER Wrong speed and tool combination Also see: E and H	Check cutting speed and tool condition
TRACER DOES NOT PICK UP SMALL DIAMETER VARIATIONS Wrong speed and tool combination Also see: E, G, H	Check cutting speed and tool condition

<div> GROUP III <div>Hydraulic power unit</div> </div>	
Probable Cause	Remedy
OIL TOO HOT See: E	
MOTOR OVERHEATING Incorrect voltage Lack of ventilation Also see: E	Check voltage and connections Make sure that motor is not too close to lathe and has ample room for air circulation
EXCESSIVE PUMP NOISE Pressure regulating valve vibrates Pump does not work properly Motor not working right Also see: E	Correct and adjust Check to eliminate cause of noise Correct
<div> GROUP IV <div>Problems with accessories</div> </div>	
Probable Cause	Remedy
STOPS DO NOT ROTATE Mechanical obstruction Stop not lubricated Rear stop out of place Also see: E	Make sure that there are no screws or collar segments laying loosely on stop Stop has to be lubricated with light oil Adjust and correct
PRE-SET CYCLE DOES NOT REPEAT Wrong cycling of stop	See as indicated on pag. 40-41
CHATTER AGAINST STOP Damaged mechanical linkage	Check that there is no deformation caused by impact of stop linkage on stylus

GROUP IV		Problems with accessories	
Probable Cause		Remedy	
CHATTER AGAINST BACK LIMIT STOP Spring pin bent or sticking; spring weakened		Adjust or replace	
TRACER DOES NOT WORK WITH ELECTRIC CONTROLS Manual lever in wrong position Mechanical linkage defect Electrical problem		Correct Check entire linkage Check all electrical components	
SOLENOID CHATTERS Wrong voltage Wrong position Screws holding solenoid are not tightened		Correct Make sure that solenoid shaft makes good contact with linkage Check and correct	



**DIPLOMATIC S.p.A.
MECCANICA APPLICAZIONI
OLEODINAMICHE**

S.p.A. - Capitale Sociale L. 2.000.000.000
Reg. Soc. N. 4690 Trib. di Busto Arsizio
C.C.I.A.A. Varese N. 56224
Codice Fiscale - Partita IVA 00181720129

SEDE E AMMINISTRAZIONE: 21052 BUSTO ARSIZIO
VIA ALBA, 18 - TELEF. 0331/627.551 (5 linee) 638.591 (3 linee)
TELEX 332262 DPLDIR-I

DIPLOMATIC SUBSIDIARIES

In Italy:

20149 MILANO - VIA G. DA PROCIÒ, 6 - Tel. 02/312756 - 3492485
10141 TORINO - C.SO PESCHIERA, 325 - Tel. 011/7933318 - 798054
25100 BRESCIA - VIA MARCONI, 29 - Tel. 030/390811
35100 PADOVA - VIA A. DA BASSANO, 45 - Tel. 049/606699
40133 BOLOGNA - VIA PASUBIO, 63 - Tel. 051/387840 - 310988 - Tlx 52243 Dupluebo

Abroad:

DIPLOMATIC SYSTEMS INC. (USA) - NEW HYDE PARK, N. Y. 11040 - 505 Jackson Ave. - P.O. Box 149 - Tel. 516/741.6933
Tlx 14-4532 Diplomatic Nhpk - GLENDALE, Cal. 91201 - 5247A Irving Ave. - P.O. Box 241 - Tel. 213/245.5563 - Tlx 674580 Schaefer Gind