

# **BASIC TRAINING**

**A T C PROGRAMME**

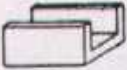



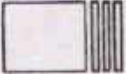
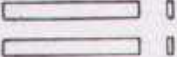

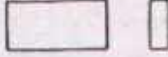
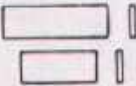












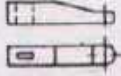
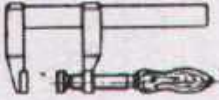

## **TURNER and MACHINIST**

**DEVELOPMENT CELL  
FOR SKILLED LABOUR TRAINING  
DIRECTORATE OF MANPOWER & TRAINING  
GOVERNMENT OF PUNJAB  
LAHORE**



**PRICE Rs. 15/-**

**T.T.P. SERIES No.15**

<p>FILING EXERCISE I</p>  <p>Flat filing</p> <p>1 → 4</p>	<p>MARKING EXERCISE</p>  <p>Flat filing, marking &amp; centre punching.</p> <p>2 → 5</p>	<p>STRETCHING EXERCISE</p>  <p>Filing, marking &amp; hammering.</p> <p>3</p>	<p>FILING EXERCISE II</p>  <p>Flat &amp; square filing</p> <p>1 → 4 → 26</p>
<p>SAWING EXERCISE</p>  <p>Sawing, square filing.</p> <p>2 → 5 → 10</p>	<p>FOR INSIDE CALIPER</p>  <p>Special filing operations.</p> <p>6 → 15</p>	<p>FOR SHEET-METAL BOX</p>  <p>Marking, shearing, filing</p> <p>7 → 16</p>	<p>FOR DRILLING EXERCISE</p>  <p>Smooth-filing acc. to given dimensions</p> <p>8 → 13</p>
<p>RIVETING EXERCISE</p>  <p>Filing.</p> <p>9 → 14</p>	<p>CHIPPING EXERCISE</p>  <p>Cross &amp; flat chiselling</p> <p>5 → 10 → 12</p>	<p>FIXED JAW</p>  <p>Marking, chiselling, radius filing.</p> <p>11 → 21</p>	<p>CHIPPING EXERCISE</p>  <p>Groove chiselling, chisel regrinding.</p> <p>10 → 12</p>
<p>DRILLING EXERCISE</p>  <p>Marking, drilling, drill regrinding.</p> <p>6 → 13 → 18</p>	<p>RIVETING EXERCISE</p>  <p>Marking, drilling, riveting.</p> <p>9 → 14</p>	<p>INSIDE CALIPER</p>  <p>Filing acc. to marking lines, assembling.</p> <p>6 → 15</p>	<p>SHEET-METAL BOX</p>  <p>Sheet-metal bending &amp; folding.</p> <p>7 → 16</p>
<p>MOVEABLE JAW</p>  <p>Filing.</p> <p>17 → 22</p>	<p>DRILLING EXERCISE</p>  <p>Counter-boring reaming, internal thread cutting.</p> <p>13 → 18</p>	<p>SPINDLE</p>  <p>External thread cutting, form filing.</p> <p>19 → 23</p>	<p>SLIDING BAR</p>  <p>Radius, filing, stamping, notch filing.</p> <p>20 → 23</p>
<p>FIXED JAW</p>  <p>Slot filing.</p> <p>11 → 21 → 23</p>	<p>MOVEABLE JAW</p>  <p>Assembling.</p> <p>17 → 22 → 23</p>	<p>SCREW CLAMP</p>  <p>Assembling.</p> <p>19 20 → 23 → 22 21</p>	
BASIC TRAINING	LAYOUT		No 1 0 1
			BASIC FITTING
 <p>DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING</p> <p>PAK-GERMAN TECHNICAL TRAINING PROGRAMME</p>			



## MATERIAL REQUIRED

Basic training for Turner / Machinist

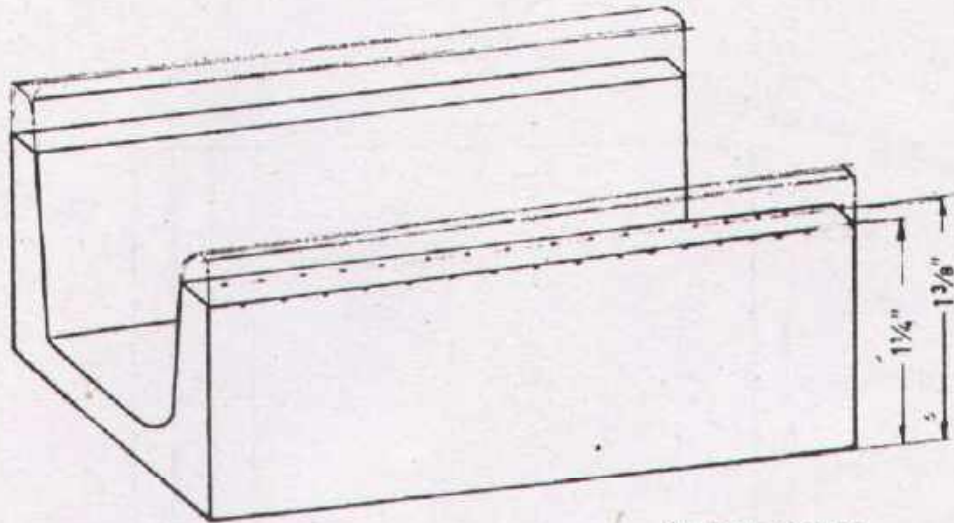
Fitting No. 1.0.1	Exercise No. (Length given in millimeter)										Test	Length per trainee	Total length for a batch of 16 trainee
	1	2	3	6	7	8	9	11	17	20			
M/S Channel 75 x 38 mm (3" x 1 1/2")	100											100 mm	1,7 meter
M/S Flat 60 x 15 mm (2 1/2" x 5/8")	95					82						160 mm	3,0 meter
M/S Flat 50 x 5 mm (2" x 3/16")							410					410 mm	6,5 meter
M/S Flat 25 x 6 mm (1" x 1/4")									250			250 mm	4,1 meter
M/S Square 20 mm (3/4")								103		103		210 mm	3,4 meter
M/S Sheet 2,5 mm (S.W.G. 12)			25 x 173	25 x 316								25 x 510 mm	1/4 meter <sup>2</sup>
M/S Sheet 1,0 mm (S.W.G. 19)					132 x 162							132 x 162 mm	1/2 meter <sup>2</sup>
M/S Round 12 mm (1/2")									190			190 mm	3,1 meter
Shaping No. 1.0.3	1	2	3										
M/S Square 20 mm (3/4")	182											182 mm	3,0 meter
M/S Square 30 mm (1 1/4")		115	205									320 mm	5,2 meter
Turning No. 1.0.4	1	2											
M/S Round 25 mm (1")											135	135 mm	2,3 meter
M/S Round 60 mm (2 1/2")	85	90										175 mm	3,0 meter

All other materials, as screws, rivets and pins, parts No. 3 & 4 of exercise No. 15 parts No. 6 & 7 of exercise No. 23 for fitting course should be supplied according to drawing.

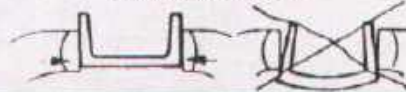


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



CLAMPING SCHEME



SEQUENCE OF OPERATIONS

NO.	Symbol	Tools	Descriptions
1		FLAT FILE 300 x 1 STRAIGHT BAR	FLAT FILING UPTO 1st MARKING LINE
2		FLAT FILE 300 x 1 STRAIGHT BAR	FLAT FILING UPTO 2nd MARKING LINE
3		FLAT FILE 300 x 1 STRAIGHT BAR	FLAT FILING OF BASE SURFACE

SCALE 1:1

M.T.: ST. 37-1

FILING EXERCISE

NO:- 1.01/01

BASIC / FITTING



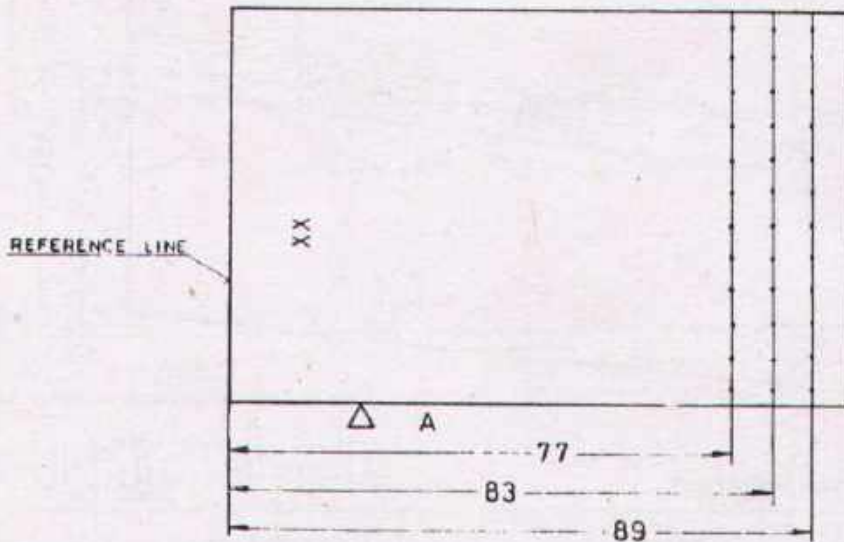
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME


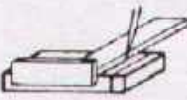
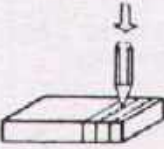


TOLERANCE +1

~ (▽)



SEQUENCE OF OPERATIONS

NO	Symbol	Tools	Descriptions
1		FLAT FILE 250 x 1 STRAIGHT BAR	FLAT FILING OF SURFACE 'A'
2		BACK SQUARE SCRIBER STEEL RULE	MARKING OF 'REFERENCE LINE' MARKING OF 'DISTANCE LINES'
3		CENTRE PUNCH HAND HAMMER 250 g	CENTRE PUNCHING OF DISTANCE LINES

SCALE 1 : 1

MAT : ST. 37-1

MARKING EXERCISE

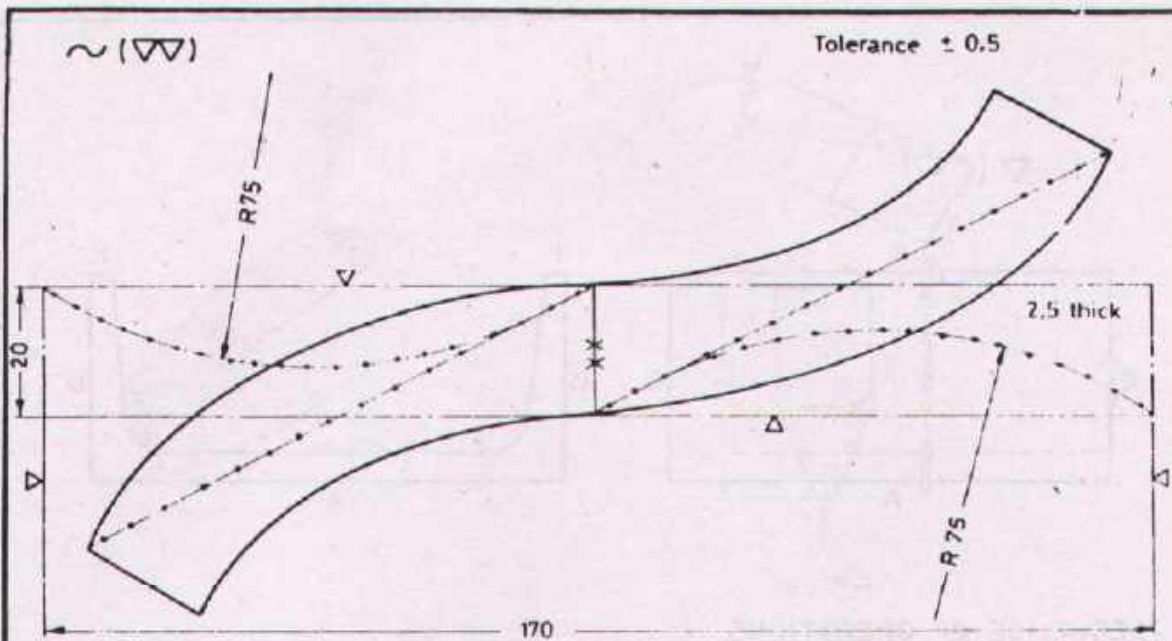
NO :- 1.0.1/02

BASIC/FITTING


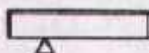






DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



### SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		FLAT FILE 300 x 1 STRAIGHT BAR	FLAT FILING OF 1st LONGITUDINAL SIDE
2		BACK SQUARE STRAIGHT BAR SCRIBER STEEL RULE	MARKING OF OUTER DIMENSIONS
3		FLAT FILE 300 x 1; 150 x 1	FILING OF OUTER SURFACES ACC. TO MARKING LINES
4		SCRIBER BACK SQUARE DIVIDER WOODEN BOARD	MARKING OF MIDDLE LINE AND RADII
5		CENTRE PUNCH HAND HAMMER 250 g	CENTRE PUNCHING OF RADII
6		HAND HAMMER STRAIGHTENING PLATE STRAIGHT BAR	CURVING OF THE MATERIAL
7		REPEAT OPERATION 6 ON THE 2nd HALF OF THE WORKPIECE. DON'T USE FILES FOR CORRECTION AFTER HAMMERING!	

SCALE 1:1

MAT. MILD STEEL

## STRETCHING EXERCISE

No. 1.0.1/03

BASIC FITTING

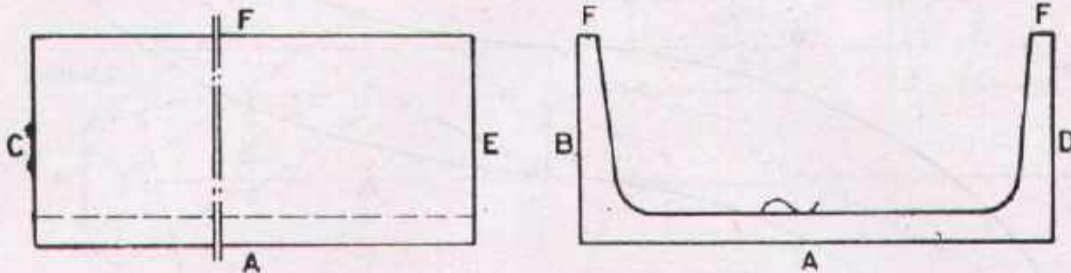


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



▽(≈)



### SEQUENCE OF OPERATIONS

NO.	Symbol	Tools	Descriptions
1		FLAT FILE 300x1; 250x1 TRY SQUARE	FLAT- AND SQUARE FILING OF 1st FLANGE 'B'. BASE SURFACE 'A' = REFERENCE SURFACE.
2		FLAT FILE 250x1; 200x1 TRY SQUARE WOODEN BLOCK VICE CLAMPS	FLAT- AND SQUARE FILING OF 1st FACE 'C' REFERENCE SURFACE = A & B.
3		FLAT FILE 300x1; 250x1 TRY SQUARE VICE CLAMPS	FLAT- AND SQUARE FILING OF 2nd FLANGE 'D'.
4		FLAT FILE 250x1; 200x1 TRY SQUARE WOODEN BLOCK VICE CLAMPS	FLAT- AND SQUARE FILING OF 2nd FACE 'E'
5		FLAT FILE 300x1; 250x1 TRY SQUARE VICE CLAMPS	FLAT- AND SQUARE FILING OF FLANGES 'F'

SCALE 1 : 1

MAT. of Ex. 01

## FILING EXERCISE II

NO :- 1.0.1/04

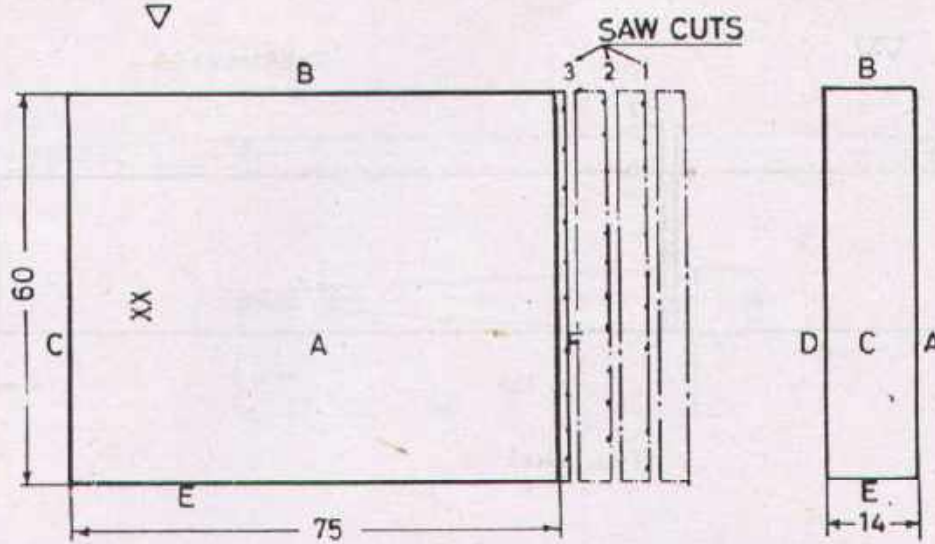
BASIC / FITTING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TOLERANCE +1



SEQUENCE OF OPERATIONS

NO	Symbol	Tools	Descriptions
1		THREE SQUARE FILE 150 x 1 HAND HACK SAW	NOTCH ENDS OF MARKING LINES WITH THREE SQUARE FILE. SAWING OF 1st AND 2nd CUT AS SHOWN.
2		THREE SQUARE FILE 150 x 1 HAND HACKSAW	SAWING OF 3rd CUT BY CLAMPING THE WORKPIECE IN HORIZONTAL POSITION
3		FLAT FILES 300x1 ; 200x1 TRY SQUARE	FLAT FILING OF SURFACE 'A'
4		FLAT FILES 300x1 ; 200x1 TRY SQUARE	FLAT AND SQUARE FILING OF SURFACE 'B'
5		FLAT FILES 300x1 ; 200x1 TRY SQUARE VICE CLAMPS	FLAT AND SQUARE FILING OF SURFACE 'C'
6	REPEAT OPERATION 3,4 & 5 FOR SURFACE D,E & F. DON'T CHECK WITH TRY SQUARE AND STEEL RULE, WHEN MATERIAL IS CLAMPED IN THE VICE! CHECK DIMENSION WITH OUTSIDE CALIPER AND STEEL RULE.		

SCALE 1:1

MAT. of Ex. 02

SAWING EXERCISE

NO: - 1.0.1/05

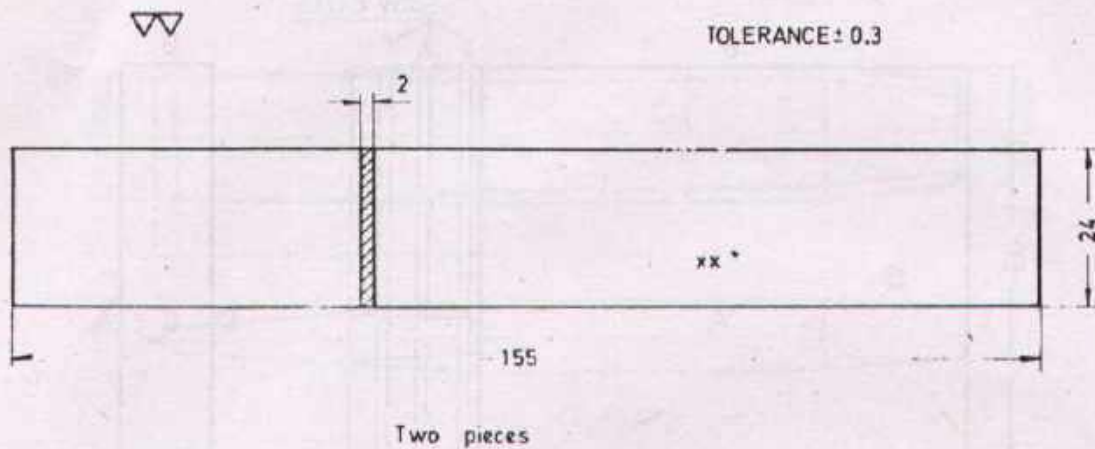
BASIC / FITTING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME





#### SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		SMOOTH-CUT FILE	SMOOTHING OPERATIONS. MATERIAL ALLOWANCE FOR SMOOTH FILING 0.1 TO 0.2 MM.
2		FLAT FILES 300x1; 250x3 TRY SQUARE VERNIER CALIPER WOODEN PIECE, NAILS	FLAT FILING OF 1st BROAD SURFACE. HOLD THE WORK ON A WOODEN PIECE.
3		FLAT FILES 300x1; 200x1; 250x3 TRY SQUARE VERNIER CALIPER	FLAT AND SQUARE FILING OF 1st LONGITUDINAL SIDE.
4	COMPLETE THE WORK IN A SEQUENCE OF OPERATIONS AS DONE IN PREVIOUS EXERCISES. MIND SMOOTHING ALLOWANCE. USE VICE CLAMPS.		

SCALE 1:1

MAT. ST. 37-1

INSIDE CALIPER 1

NO.-101/06

BASIC/FITTING

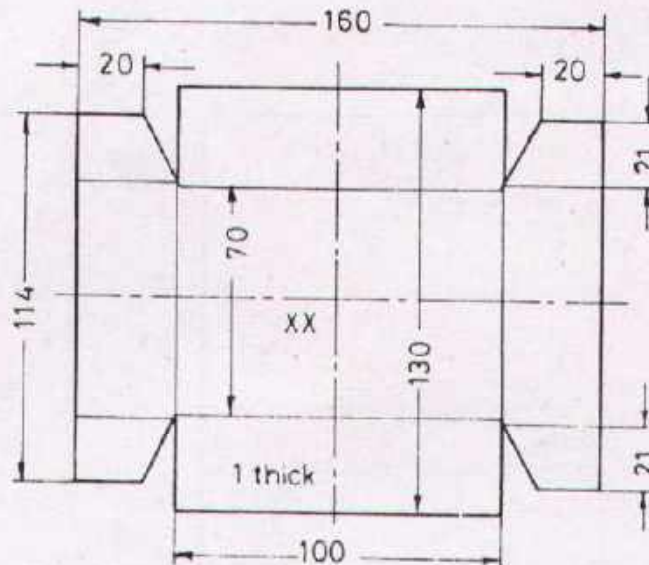


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



TOLERANCE  $\pm 0.3$



### SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		FILE FLAT 200x3 TRY SQ. STEEL RULE HANDVICE	FILING OF SIDES 'A' & 'B' IN RIGHT ANGLE.
2		MARKING TOOLS	LENGTH & WIDTH MARKING MARKING OF THE SHAPE OF THE WORK.
3		LEVER SHARING	SHEARING OF LENGTH AND WIDTH. SHEARING OF SHAP OF THE WORK ACCO- DING TO MARKING LINES.
4		TRY SQ., STEEL RULE, HAND VICE FILE 200x3 KEY FILE SET.	COMPLETING THE WORK ACCORDING TO GIVEN DIMENSIONS.
5			WHEN NUMBER PUNCHING USE LIGHT BLOWS. DEBURR THE WORK PROPERLY.

SCALE 1:25

MAT: ST 10

## SHEET METAL BOX 1

NO. 1.01/07

BASIC/FITTING



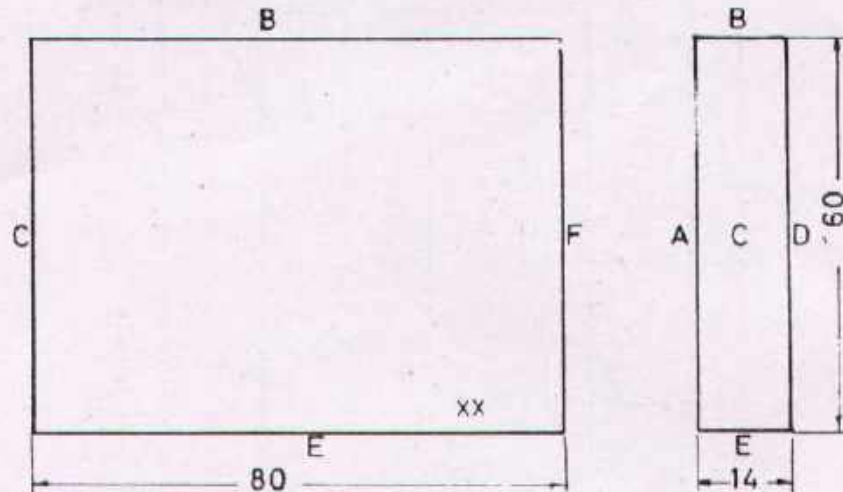
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

FAK-GERMAN TECHNICAL TRAINING PROGRAMME





TOLERANCE  $\pm 0.2$



### SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1	 	FLAT FILES 300x1 200x1 TRY SQ. V. CALIPER VICE CLAMPS.	FILING OF THE WORK ALL AROUND IN RIGHT ANGLES. MIND SMOOTHING ALLOWANCE.
2	 	FLAT FILES 250x3; 150x3 TRY SQ. V. CALIPER VICE CLAMPS	FINISHING OF SURFACE 'A' WITH SMOOTH FILES, USE CHALK FOR FINISHING.
3	 	FLAT FILES 250x3 150x3 TRY SQ. V. CALI V. CLM.	FINISHING OF SURFACE 'B' IN RIGHT ANGLE TO SURFACE 'A'
4	 	F. FILES 250x3 150x3 TRY SQ. V. CALI V. CLM.	FINISHING OF SURFACE 'C' IN RIGHT ANGLE TO SURFACE 'A' & 'B'
5			COMPLETE ALL OTHER SURF CHECK THE DIMENSIONS WITH THE VERNIER CALIPER. DEBURR THE WORK PROPERLY.

SCALE 1:1

## DRILLING EXERCISE 1

NO:- 1.01/08

MAT : ST 37\_1

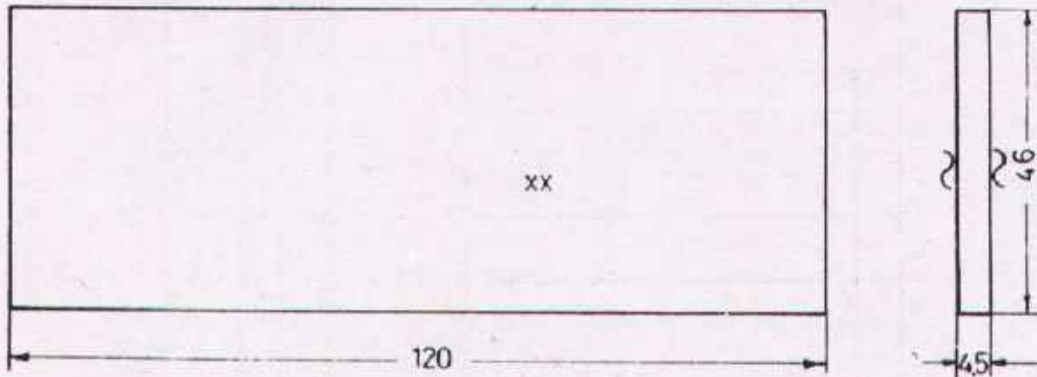
BASIC / FITTING



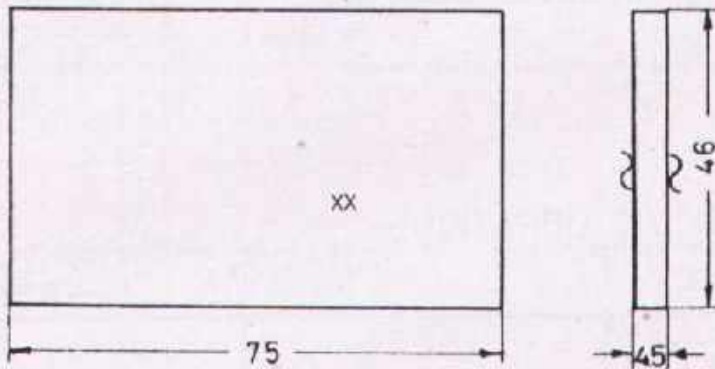
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK GERMAN TECHNICAL TRAINING PROGRAMME

TOLERANCE  $\pm 0.2$

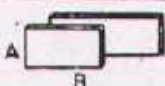




1,2  $\nabla(\sim)$



Two pieces each

### SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		FLAT FILES 300x1 200x1, 250x3, 150x3 TRY SQ., V. CALIPER.	FILING OF SURFACES A & B IN RIGHT ANGLE.
2		MARKING TOOLS	LENGTH & WIDTH MARKING. USE SURFACES A & B AS REFERENCE SURFACE.
3		FLAT FILES, TRY SQUARE, VERNIER CALIPER	FILING OF ALL PIECES ACCORDING TO MARKING LINES.
4		PENCH BENCH NUMBERS.	

SCALE 1:1

MAT: ST 37.1

## RIVETING EXERCISE 1

NO- 1.0.1/09

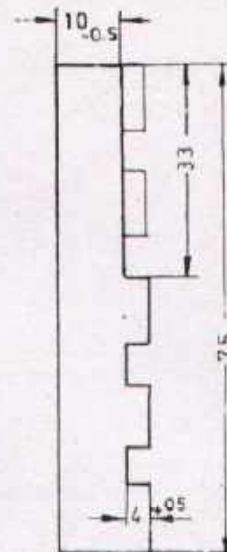
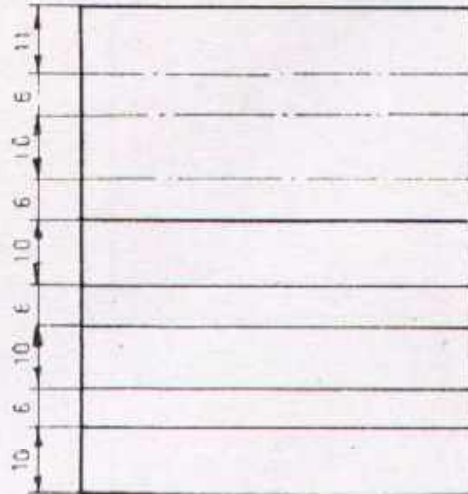
BASIC/FITTING




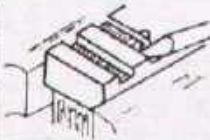

DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK GERMAN TECHNICAL TRAINING PROGRAMME





### SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		MARKING TOOLS	MARKING OF NOTCHES
2		CROSS CUT CHISEL HAND HAMMER 600g. STEEL RULE WOODEN BLOCK	CHIPPING OF NOTCHES
3		FLAT CHISEL HAND HAMMER 600g. STEEL RULE WOODEN BLOCK	CHIPPING OF TWO RIBS
4		LOOK AT THE CUTTING POINT WHILE CHISELLING. USE SAFETY SHIELD. USE PAKING BLOCK OF WOOD.	

SCALE 1:1  
MAT of Ex. 05

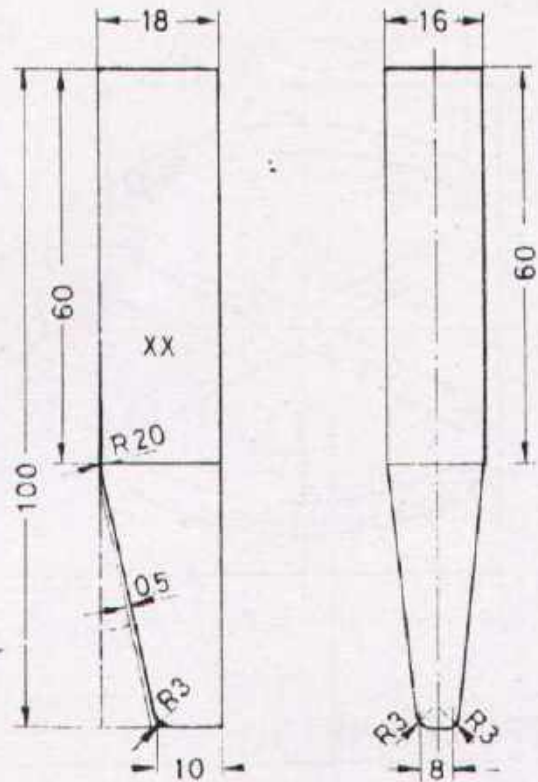
## CHIPPING EXERCISE

NO. - 10.1/10  
BASIC / FITTING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



TOLERANCE  $\pm 0.2$

FILING ALLOWANCE

No.	Symbol	Tool	Descriptions
1		ROUGH FILES, TRY SQUARE, VERNIER CALIPER	SQUARE FILING. MIND FINISHING ALLOWANCE.
2		MARKING TOOLS	MARKING WORK
3		FLAT CHISEL HAND HAMMER	CHIPPING OF INCLINA- TION UP TO MARKING LINE
4		SMOOTH FILES, VICE CLAMPS, TRY SQUARE, VERNIER CALIPER	SMOOTH AND SQUARE FILING
5		SMOOTH FILES VICE CLAMPS RADIUS GAUGE	RADII FILING
6	NUMBER PUNCHING, DEBURRING ETC. FINAL WORK.		

SCALE 1:1

MAT ST 37-1

**FIXED JAW**  
for SCREW CLAMP

NO - 1.01 / 11

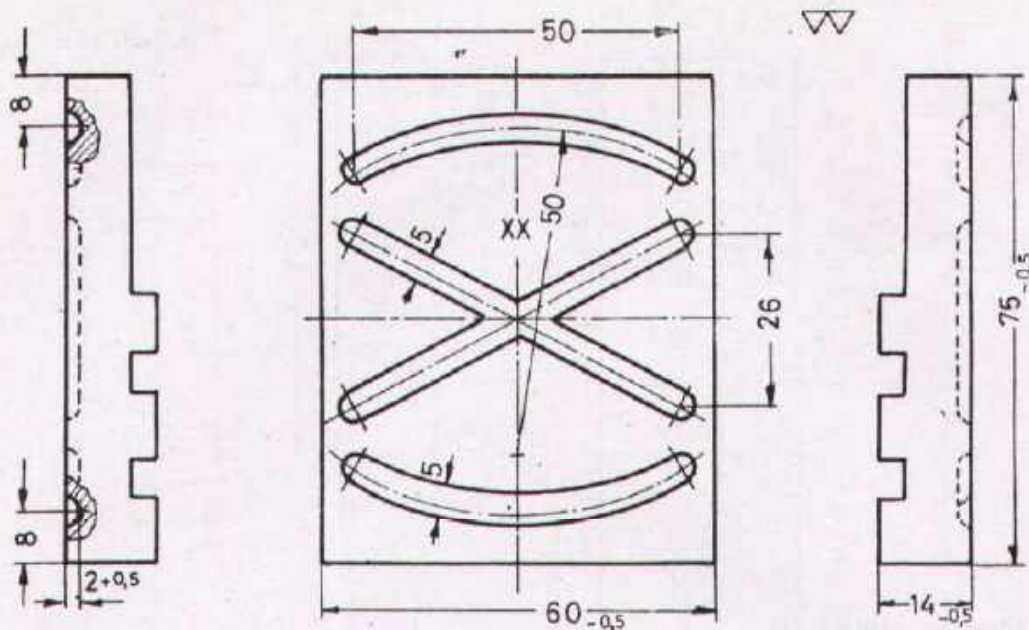
BASIC / FITTING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAR-GERMAN TECHNICAL TRAINING PROGRAMME





### SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		MARKING TOOLS	MARKING OF GROOVES.
2		GROOVE CUT CHISEL HAND HAMMER 600g. STEEL RULE WOODEN BLOCK	CHIPPING OF CROSSED GROOVES.
3		GROOVE CUT CHISEL HAND HAMMER 600g. STEEL RULE WOODEN BLOCK	CHIPPING OF CURVED GROOVES.
4		SMOOTH FILES VERNIER CALIPER TRY SQUARE VICE CLAMPS	SMOOTH AND SQUARE FILING AND AROUND FINAL WORK.

SCALE 1:1

MAT. of Ex. 10

## CHIPPING EXERCISE

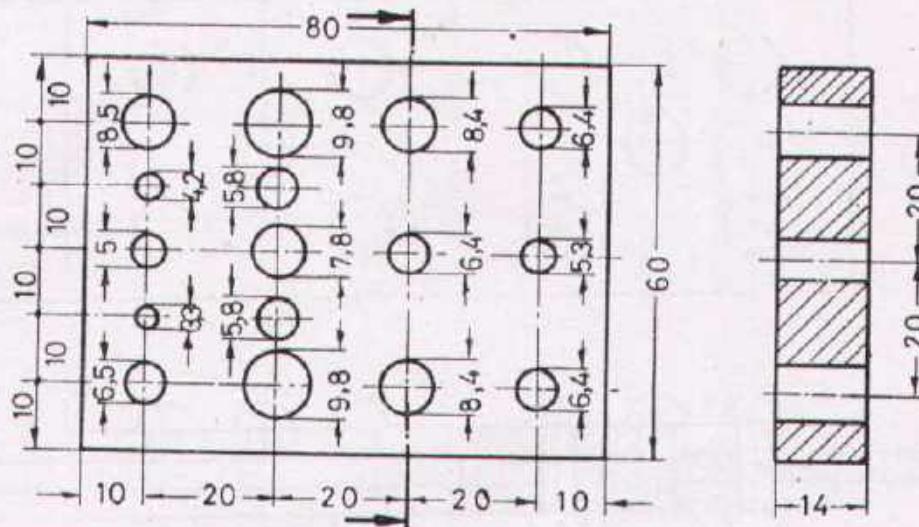
NO.— 101/12

BASIC / FITTING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL PROGRAMME



### SEQUENCE OF OPERATIONS

NO.	Symbol	Tools	Descriptions
1		MRKING TOOLS	MARKING OF ALL CENTRE POINTS AND CONTROL CIRCLES
2		MACHINE VICE PARALLEL PIECES	PROPER CLAMPING INTO THE MACHINE VICE
3		TWIST DRILLING ACCORDING TO GIVEN DIMENSION	DRILLIN OF HOLES. MIND THE R.P.M. AND FEED $R. P. M. = \frac{V \times 1000}{D \times \pi}$
4		COUNTE - SINK DRILL 90°	DEBURRING OF ALL HOLES FROM BOTH SIDES.

SCALE 1:1

MAT. of Ex. 08

## DRILLING EXERCISE 2

NO:- 101/13

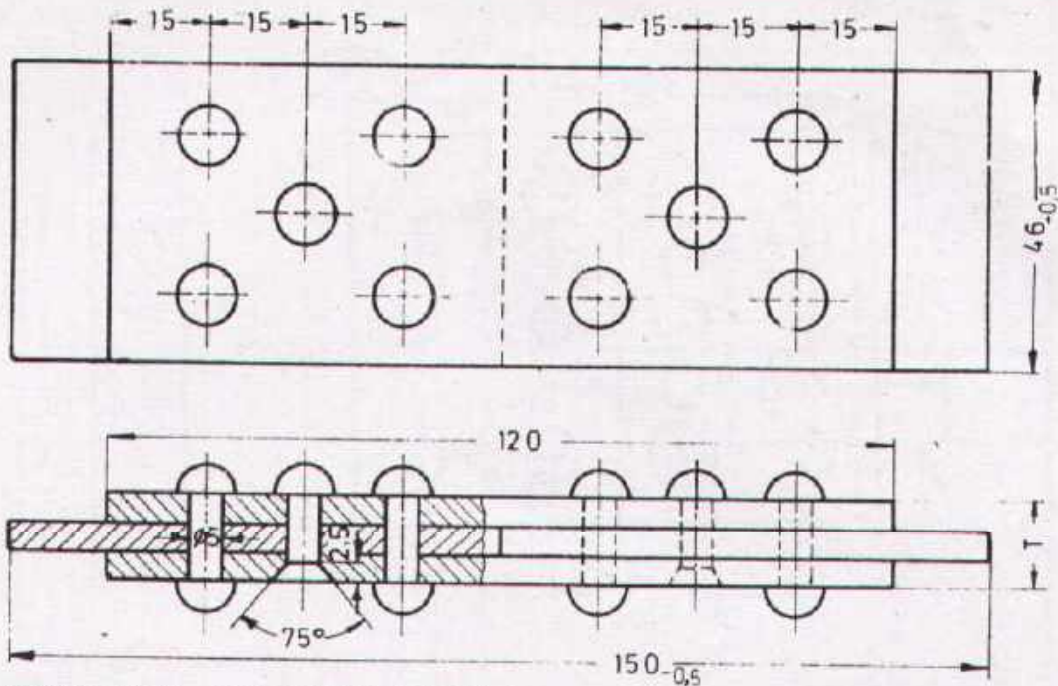
BASIC / FITTING




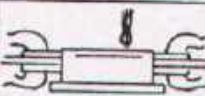




DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME





### SEQUENCE OF OPERATIONS

NO.	Symbol	Tools	Descriptions
1		MARKING TOOLS 2 HAND VICES	MARKIN OF CENTRE POINTS CLAMPING TOGETHER OF ALL PARTS
2		TWIST DRILL 5.2 MM. C/SINK DRILL 90° C/SINK DRILL 75°	DRILLING COUNTER-SINKING AND DEBURING OF THE HOLES
3		RIVET SETTING TOOLS 5 HAND HAMMER 600g M.M.	SETTING OF RIVETS
4		HAND HAMMER 250g. RIVET TOOL	PREFORMING OF RIVET HEAD
5		RIVET FORMING TOOL HAND HAMMER 600g.	FORMING OF RIVET HEAD
6		HAND HAMMER 600g. RIVET TOOL	SETTING OF COUNTERSINK RIVET
7			REPEAT RIVETING OPERATIONS FOR ALL RIVET JOINTS SHOWN IN THE DRAWING. RIVET LENGTH FOR ROUND HEAD 'L' = T + 1.5d. RIVET LENGTH FOR COUNTER SINK 'L' = T + 1d

SCALE 1:1

MAT. of Ex.09

## RIVETING EXERCISE

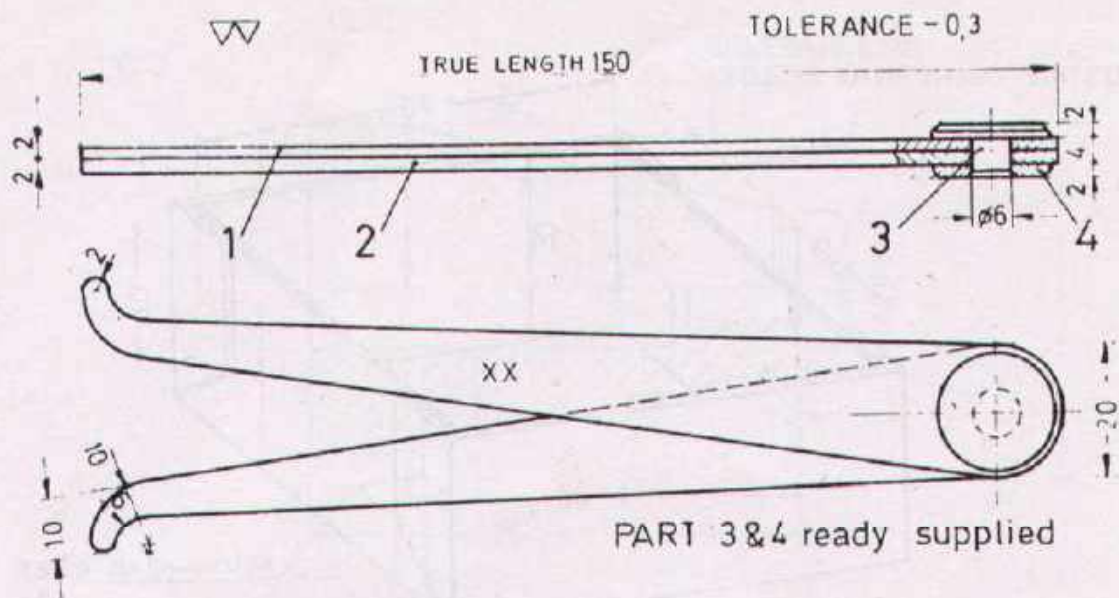
NO.— 10.1 / 14

BASIC / FITTING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



### SEQUENCE OF OPERATIONS

NO.	Symbol	Tools	Descriptions
1			MARKING OF PART 1 & 2 ACCORDING TO GIVEN DIMENSIONS.
2		FILES, VICE CLAMPS	FILING OF PART 1 & 2 ACCORDING TO MARKING LINES.
3		TWIST DRILL 6M.M. HAND VICE	DRILLING WITH PART 1 & 2 CLAMPED TOGETHER.
4		HAND HAMMER 250g.	RIVETING TOGETHER OF PART 1 & 2
5			FINAL WORK, DEBURRING, NUMBER PUNCHING.

SCALE 1:1

MAT. of Ex. 06

**INSIDE CALIPER**

NO:— 10.1 / 15

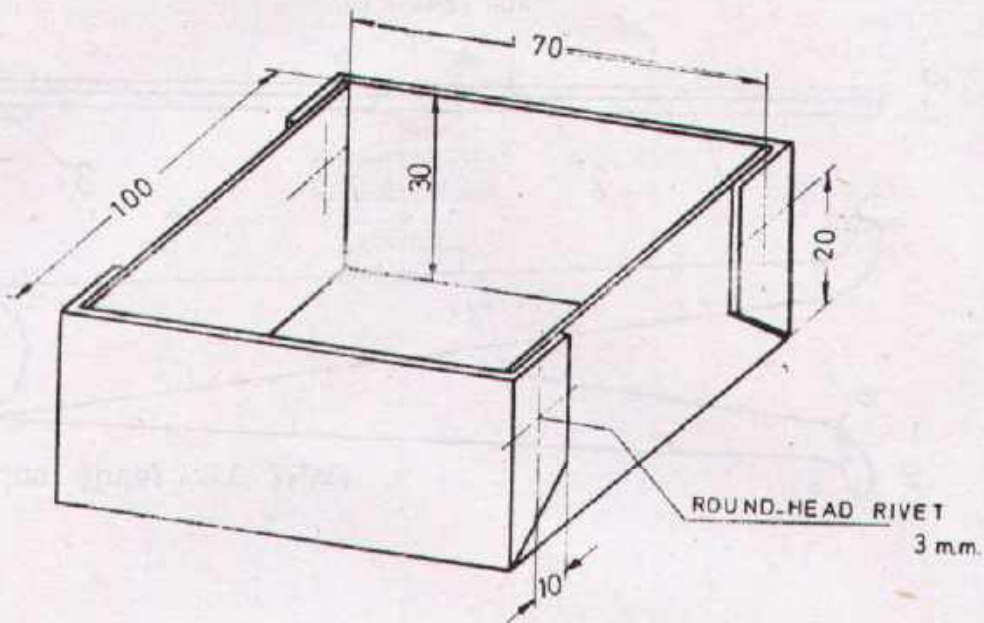
BASIC / FITTING







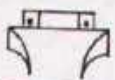
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

FOR GERMAN TECHNICAL TRAINING PROGRAMME





### SEQUENCE OF OPERATIONS

NO.	Symbol	Tools	Descriptions
1		HAND HAMMER 250g TWO ANGLE IRON	BENDING OF THE 4 FLANGES
2		HAND HAMER 250g TOW ANGLE IRON	BENDING OF THE SIDES 100MM LENGTH (WITHOUT FLANGES)
3		HAND HAMMER 250g SHIM	COMPLETION OF BEANDING WORK
4		MARKING TOOLS TWIST DRILL 32 MM HAND VICE	DRILLING, DEBURRING, RIVETING
5		FILES MEASURING AND CHECKING TOOL	FILING, DEBURING, FINAL CHECKING

SCALE 1:1

MAT. of Ex. 07

## SHEET METAL BOX

NO:- 101 / 16

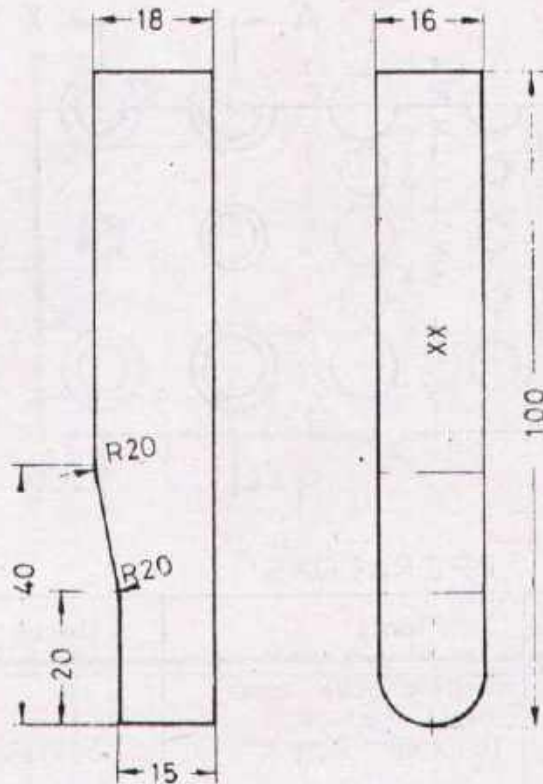
BASIC FITTING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK GERMAN TECHNICAL TRAINING PROGRAMME

2 ∇



TOLERANCE  $\pm 0.1$


FOR THE COMPLETION OF THIS EXERCISE, A LIMIT OF TIME IS GIVEN.

ALL SKILLS AND OPERATIONS NEEDED FOR THIS EXERCISE HAVE BEEN DONE PREVIOUSLY.

THEREFORE, NO ASSISTANCE OR SUPERVISION IS NECESSARY BY THE INSTRUCTOR.

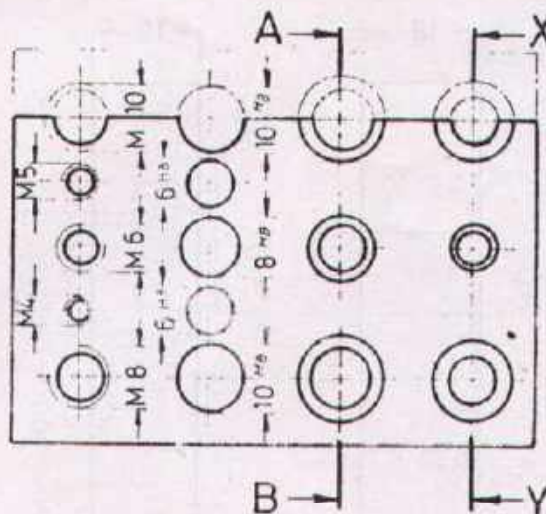
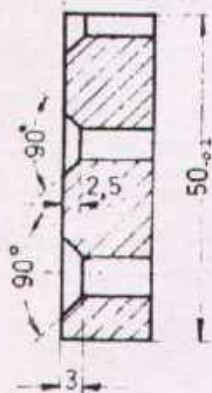
PRORATED TIME	STARTED		COMPLETED		TIME USED
	DATE	TIME	DATE	TIME	
10 HRS.					

TIME MARKS + -

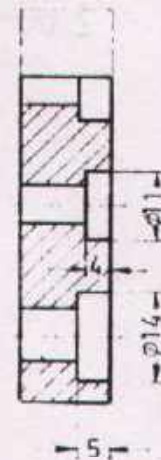
SCALE 1 : 1	<b>MOVABLE JAW</b> for SCREW CLAMP	NO :- 1.0.1/17
MAT. ST 37-1		BASIC / FITTING
 DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING		
PAK-GERMAN TECHNICAL TRAINING PROGRAMME		



SECTION X-Y



SECTION A-B



## SEQUENCE OF OPERATIONS

NO.	Symbols	Tools	Descriptions
1		CENTER BORE DRILL 6,4x11 8,4x14 MACHINE VICE	COUNTER-BORING
2		CONTER SINK DRILL 90° MACHINE VICE	COUNTER-SINKING
3		THREAD TAPS M4, M5, M6, M8, M10 TAP HANDLE	INSIDE-THREAD CUTTING
4		HAND REAMER 6 <sup>H8</sup> 8 <sup>H8</sup> 10 <sup>H8</sup> HANDLE	REAMING
5		CONTER SINK DRILL MACHINE VICE	DEBURRING & RETAPPRING IF NECESSARY
6		MARKING TOOL HAND HACSAW FILES MEARING TOOLS	MARKING, FILING, FINAL WORK

SCALE 1:1

MAT. of Ex.13

## DRILLIG EXERCISE

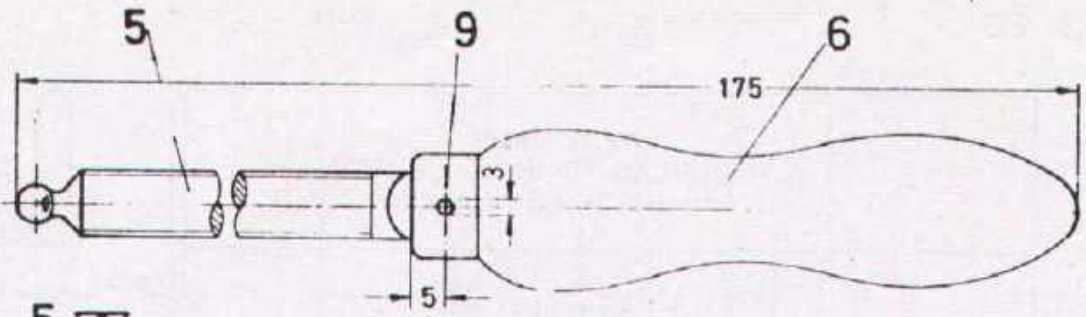
NO:— 10.1 / 18

BASIC / FITTING

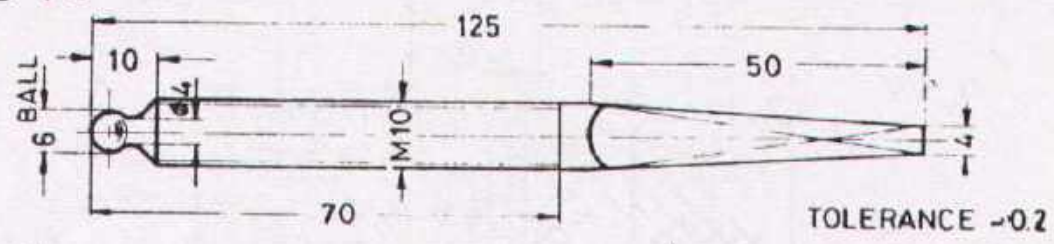


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

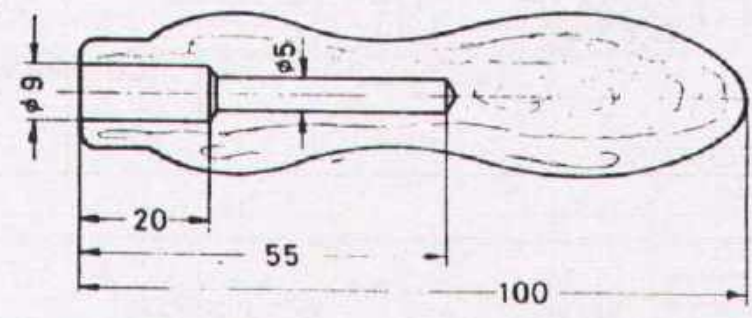
YAK - HERMAN TECHNICAL TRAINING PROGRAMME



5 ▽



6 ▽



SEQUENCE OF OPERATIONS

NO	Symbol	Tools	Descriptions
1		FILES MEASURING AND CHECKING TOOLS	COMPLETE FILING WORK
2		DIE 'M 10'	CUTTING OUTSIDE THREAD
3		TWIST DRILLS	DRILLING OF PART 6 JOINING PART 5 AND 6 SETTING OF PIN 3 MM

SCALE 1 : 1

MAT. ST. 37-1  
HARD WOOD

**THREAD BOLT**  
for SCREW CLAMP

NO:- 1.01/19

BASIC / FITTING

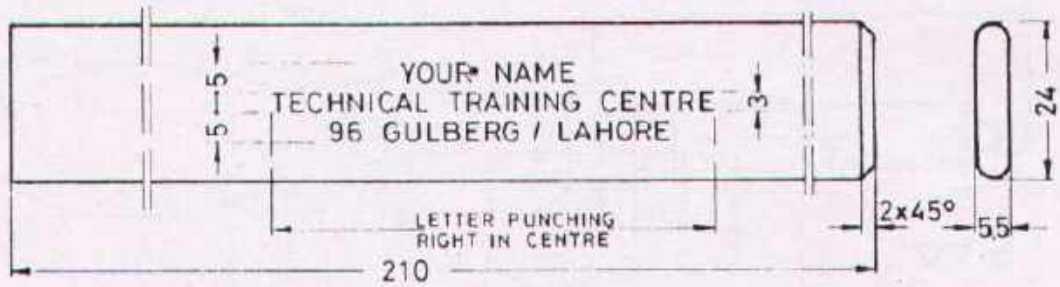


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

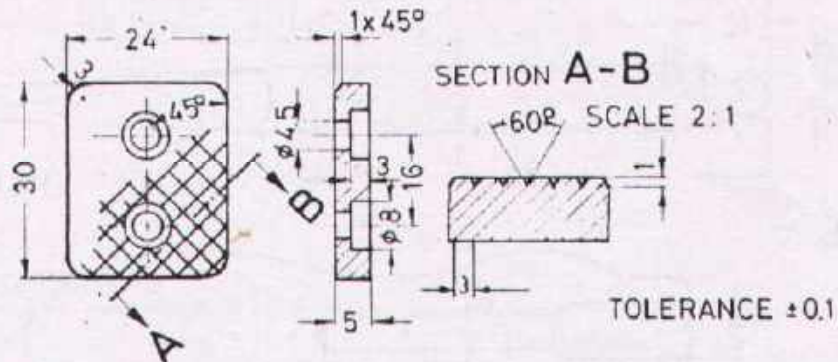
PAK-GERMAN TECHNICAL TRAINING PROGRAMME



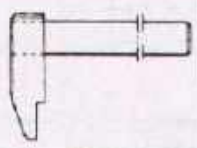
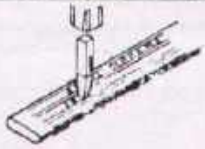

3 



4 



SEQUENCE OF OPERATIONS

NO.	Symbol	Tools	Descriptions
1		FILES MEASURING AND CHECKING TOOLS RADIUS GAUGE	FLAT AND RADIUS FILING
2		MARKING TOOLS LETTER PUNCHES 3 MM HAND HAMMER 250 g	STAMPING
3		FILES MEASURING AND MARKING TOOLS RADIUS GAUGE	DRILL THE HOLES FLAT AND RADIUS FILING NOTCH FILING
4	REMOVE ALWAYS THE BURRS FROM STAMPING WORK. MIND THE SURFACE QUALITY.		

SCALE: 2:1

MAT. ST. 37-1

GUIDE BAR  
for SCREW CLAMP

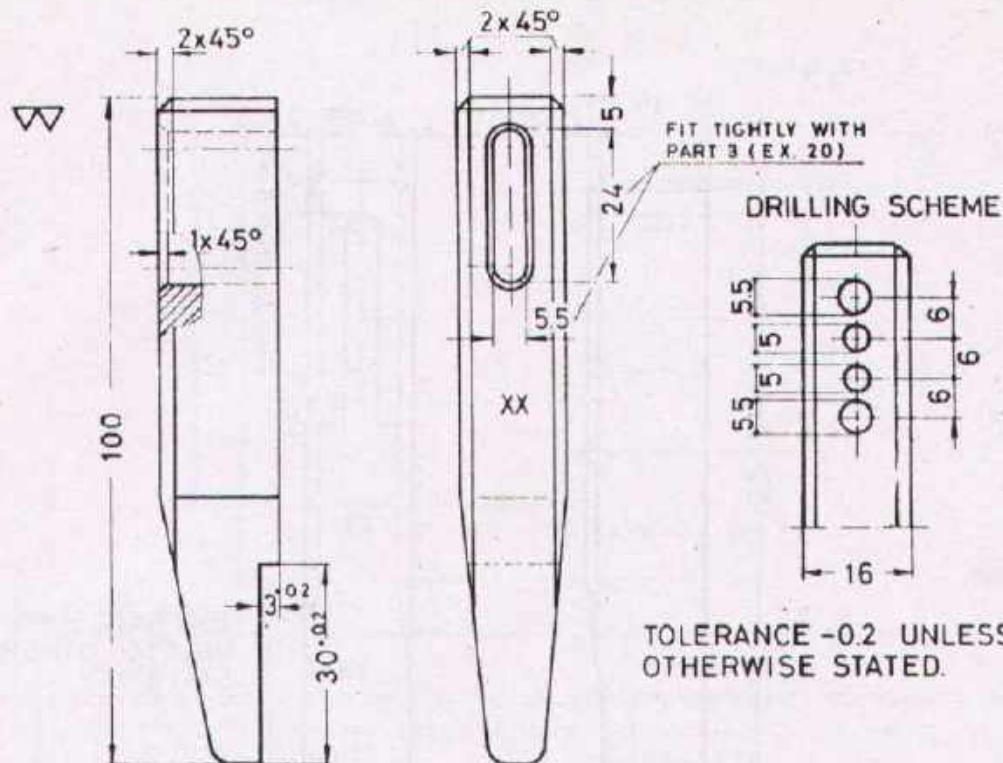
NO :- 1.0.1/20

BASIC / FITTING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



### SEQUENCE OF OPERATIONS

NO.	Symbol	Tools	Descriptions
1		MARKING TOOLS FILES MEASURING AND CHECKING TOOLS	MARKING OF THE WORK-PIECE COMPLETION OF RECESS
2		DRILLS HEWING CHISEL FILES CHECKING AND MEASURING TOOLS	DRILLING CHIPPING OF THE SLOT FILING OF THE SLOT
3		MARKING TOOLS FILES SQUARE 135° OBLIQUE CLAMP	CHAMFER FILING FINAL WORK

SCALE 1 1

MAT. of Ex. 11

**FIXED JAW**  
for SCREW CLAMP

NO :- 10.1/21

BASIC / FIFTER

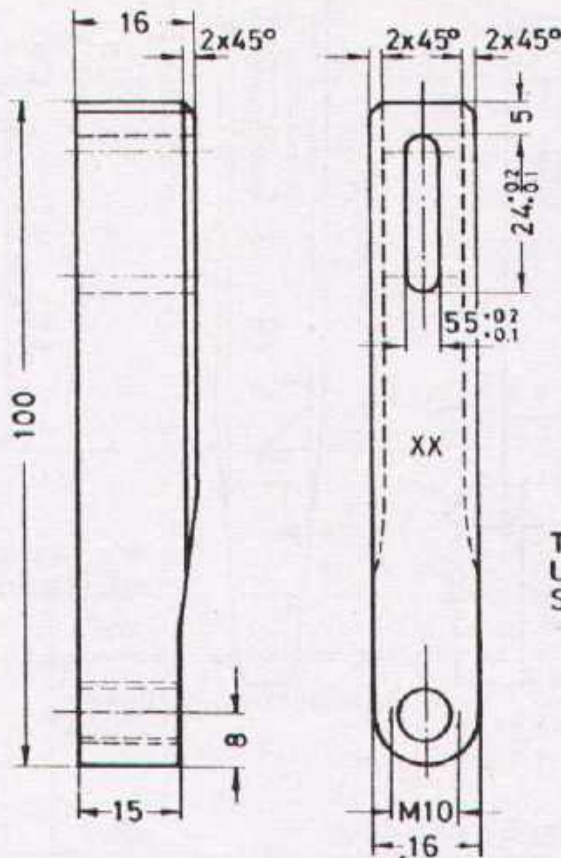


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



2  $\nabla$



TOLERANCE -02  
UNLESS OTHERWISE  
STATED

SEQUENCE OF OPERATIONS

NO.	Descriptions
1	COMPLETE THE SLOT AS DONE IN EXERCISE 21. CLEARANCE FIT WITH PART 3 (GUIDE BAR).
2	FILE CHAMFERS AS DONE IN EXERCISE 21.
3	DRILL THE HOLE FOR M 10 THREAD. CUT THE INSIDE THREAD. CHECK WITH PART NO. 5, EXERCISE 19. DO THE FINAL WORK.

SCALE 1:1

MAT. of Ex.17

**MOVABLE JAW**  
for SCREW CLAMP

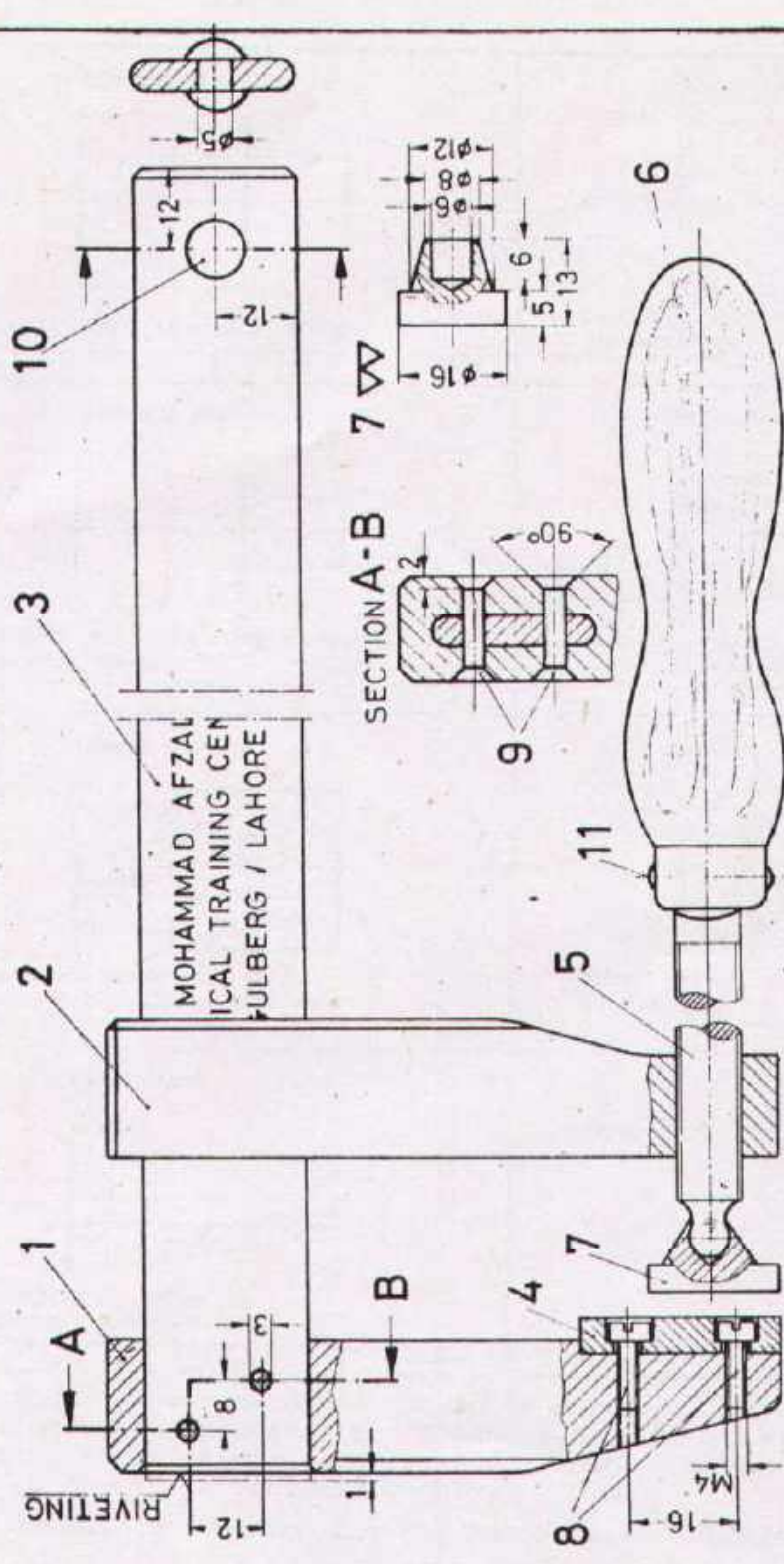
NO:- 101/22

BASIC/FITTING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK GERMAN TECHNICAL TRAINING PROGRAMME



SEQUENCE OF OPERATIONS

NO	Symbol	Discriptions
1		DRILL HOLES 3.3 MM. CUT INSIDE THREAD M4, JOIN PART 1 & 4 WITH PART 8.
2		JOIN PART 1 & 3 AS SHOWN IN THE DRAWING.

3		SCREW PART 5 INTO PART 2. JOIN PART 7 WITH PART 5.
4		PUT FOUND HEAD RIVET IN PART 3 WHEN PART 2 IS MOVED ONTO PART 3.

SCALE 1 : 1  
 MAT. of Ex. 19, 20  
 21, 22

SCREW CLAMP


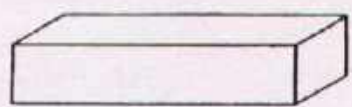
NO :- 1.0.1/23  
 BASIC / FITTING


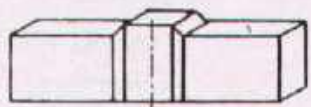


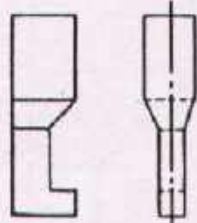
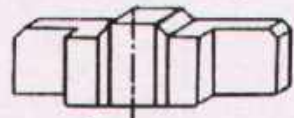
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

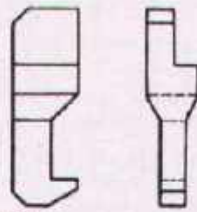
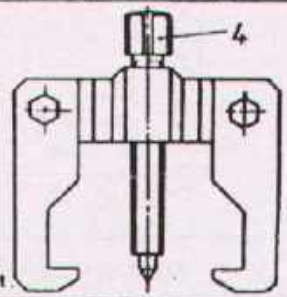
PAK GERMAN TECHNICAL TRAINING PROGRAMME



<p><b>SQUARE BAR</b></p>  <p>Clamping, Longitudinal (horizontal) Shaping</p> <p style="text-align: center;">1 → 10.4/</p>	<p><b>PULLER BRIDGE</b></p>  <p>Clamping, Toolhead setting Horizontal- and Vertical Shaping</p> <p style="text-align: center;">2 → 4</p>
--	--

<p><b>PULLER ARMS</b></p>  <p>Clamping, Longitudinal- and vertical Shaping, Hacksaw - cutting.</p> <p style="text-align: center;">3 → 5</p>	<p><b>PULLER BRIDGE</b></p>  <p>Marking, Clamping, Tool - setting Horizontal Shaping</p> <p style="text-align: center;">2 ← 4 → 6</p>
--	---

<p><b>PULLER ARMS</b></p>  <p>Marking, Clamping, Tool - setting.</p> <p style="text-align: center;">3 → 5 → 7</p>	<p><b>PULLER BRIDGE</b></p>  <p>Marking, Clamping, Toolhead - setting, Horizontal- and Vertical Shaping.</p> <p style="text-align: center;">4 → 6 → 8</p>
---	--

<p><b>PULLER ARMS</b></p>  <p>Marking, Clamping, Toolhead - setting.</p> <p style="text-align: center;">5 → 7 → 8</p>	<p><b>PULLER</b></p>  <p>Marking, Thread cut.</p> <p style="text-align: center;">4</p> <p style="text-align: center;">6, 7 → 8 → TEST</p>
--	---

THE ABOVE SHOWN EXERCISES SHOULD BE COMPLETED WITHIN 2 WEEKS. FOR PART NO. 4 OF THE PULLER, THE TEST PIECE, ADDITIONAL TIME WOULD BE GIVEN.

BESIDES THESE EXERCISES THE TRAINEES HAVE TO REGRIND THEIR REQUIRED CUTTING TOOLS. AFTER EACH REGRINDING, THE INSTRUCTOR CONCERNED, HAS TO CHECK THE TOOL THOROUGHLY.

THE MATERIAL OF EXERCISE NO. 1 WILL BE USED AS GRINDING EXERCISE IN THE TOOL GRINDING COURSE.

RAW MATERIAL REQUIRED FOR THE ABOVE SHOWN EXERCISES:  
1 PIECE EACH OF  $\frac{3}{4}$ " x  $\frac{3}{4}$ " x 182 mm,  $1\frac{1}{4}$ " x  $1\frac{1}{4}$ " x 115 mm,  $1\frac{1}{4}$ " x  $1\frac{1}{4}$ " x 205 mm.

SCALE —

MAT.: —

## LAYOUT

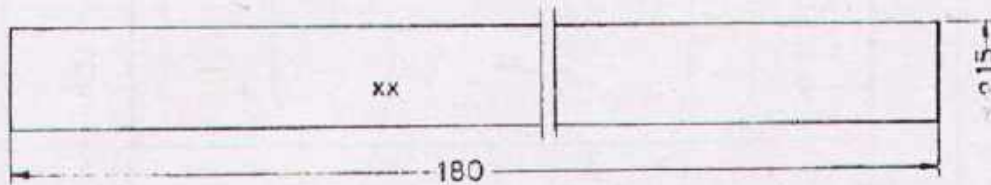
NO : - 1.0.3/1-8

BASIC / SHAPING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TOLERANCE  $\pm 0.3$ 

## SEQUENCE OF OPERATIONS

NO	Symbol	Tools	Descriptions
1		LEFT HAND ROUGHING TOOL, RUBBER HAMMER, PARALLELS, MEASURING TOOLS	CLAMPING OF TOOL AND WORKPIECE. SHAPING OF 1st SURFACE.
2		LEFT HAND ROUGHING TOOL, RUBBER HAMMER, PARALLELS, MEASURING TOOLS	RECLAMPING OF WORKPIECE. SHAPING OF 2nd SURFACE IN RIGHT ANGLE TO 1st SURFACE.
3		LEFT HAND ROUGHING TOOL, RUBBER HAMMER, PARALLELS, MEASURING TOOLS	RECLAMPING. SHAPING TO GIVEN DIMENSION AND IN RIGHT ANGLE.
4		LEFT HAND ROUGHING TOOL, RUBBER HAMMER, PARALLELS, MEASURING TOOLS	RECLAMPING. SHAPING.
5	AFTER EACH SHAPING OPERATION DEBURR THE WORKPIECE PROPERLY. NUMBER PUNCHING.		

**Remarks:** THIS WORKPIECE WILL BE USED FOR TOOL GRINDING  
EXERCISES. THEREFORE, SHAPING ACCORDING TO GIVEN  
LENGTH IS NOT NECESSARY.

SCALE 1:1

ST. 37 - 1

SQUARE BAR

NO: - 1.0.3/01

BASIC/SHAPING



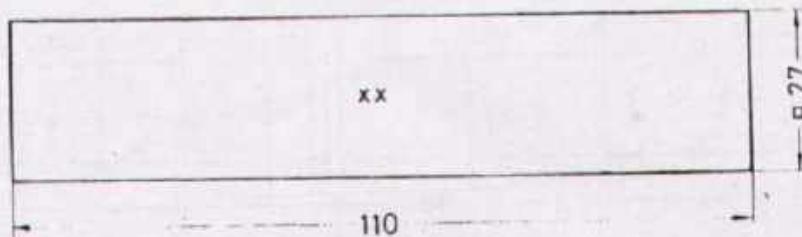
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME





TOLERANCE  $\pm 0.2$



### SEQUENCE OF OPERATIONS

NO	Symbol	Tools	Descriptions
1		LEFT HAND ROUGHING TOOL, RUBBER HAMMER, PARALLELS, MEASURING TOOLS	CLAMPING OF TOOL AND WORKPIECE SHAPING OF 1st SURFACE
2		LEFT HAND ROUGHING TOOL, RUBBER HAMMER, PARALLELS, MEASURING TOOLS	RECLAMPING OF WORKPIECE. SHAPING OF 2nd SURFACE.
3	SHAPING OF THE TWO REMAINING LENGTH SURFACES (as shown in exercise 1.0.3/01)		
4		BACK SQUARE DIAL INDICATOR	SETTING OF TOOLHEAD IN VERTICAL POSITION
5		DIAL INDICATOR	SETTING OF WORKPIECE OR MACHINE VICE IN TRANSVERSE DIRECTION
6		LEFT AND RIGHT HAND SIDE TOOLS MEASURING TOOLS	SHAPING OF FRONT SURFACES IN VERTICAL DIRECTIONS

SCALE 1:1

MAT: ST. 37-1

**PULLER BRIGDE**  
for PULLER

NO :- 1.0.3/02

BASIC / SHAPING

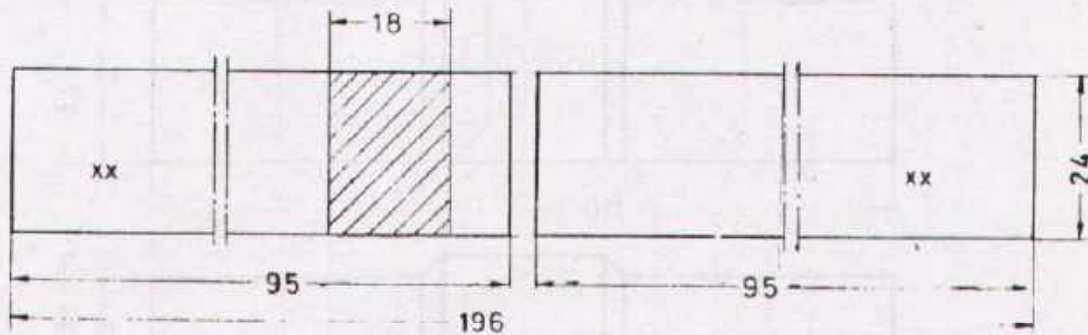


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



TOLERANCE  $\pm 0.1$



SEQUENCE OF OPERATIONS

NO	Symbol	Tools	Descriptions
1		LEFT HAND ROUGHING TOOL PARALLELS MEASURING TOOLS	ROUGH SHAPING OF 1st LONGITUDINAL SURFACE
2		SMOOTHING TOOL PARALLELS MEASURING TOOLS	SMOOTH SHAPING
3	REPEAT ROUGH AND SMOOTH SHAPING ON REMAINING LONGITUDINAL SURFACES		
4		SIDE CUTTING TOOL MEASURING TOOLS PARALLELS	SMOOTH SHAPING OF BOTH SIDES
5		MARKING TOOLS HAND HACKSAW	MARKING HANDSAW CUTTING DEBURRING
6	AFTER HACKSAW CUTTING, SHAPING OF SIDE SURFACES IS NOT REQUIRED. WHEN ROUGH SHAPING, MIND SMOOTHING ALLOWANCE.		

SCALE 1:1

MAT. ST. 37-1

**2 PULLER ARMS**  
for PULLER

NO:- 1.0.3/03

BASIC / SHAPING



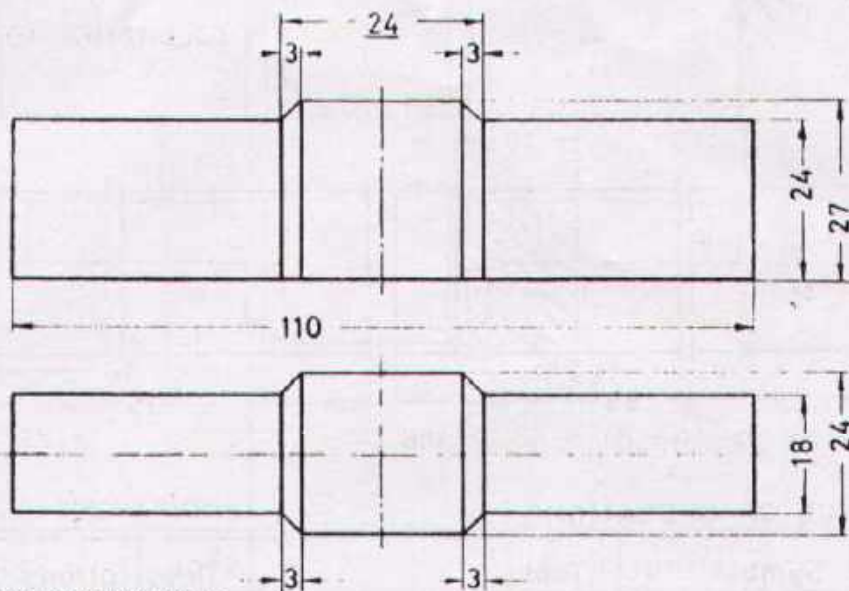
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME





TOLERANCE  $\pm 0,1$



SEQUENCE OF OPERATIONS

NO.	Symbol	Tools	Descriptions
1			SHAPING OF OUTER SURFACES UP TO DIMENSIONS 27 x 24 MM
2		MARKING TOOLS	MARKING
3		BEVEL LEFT HAND CUTTING TOOL	ADJUSTING OF CUTTING TOOL
4		LEFT HAND CUTTING TOOL MEASURING TOOLS PARALLELS	SHAPING UP TO MARKING LINES OF BOTH SIDES
5		MARKING TOOLS	MARKING
6		LEFT HAND CUTTING TOOL MEASURING TOOLS PARALLELS	SHAPING UP TO MARKING LINES OF ALL FOUR SIDES
7			WORKPIECE AND TOOL MUST BE CLAMPED IN POSITIONS, THAT NO VIBRATIONS CAN ARISE.

SCALE 1:1

MAT. of Ex.02

PULLER BRIGDE

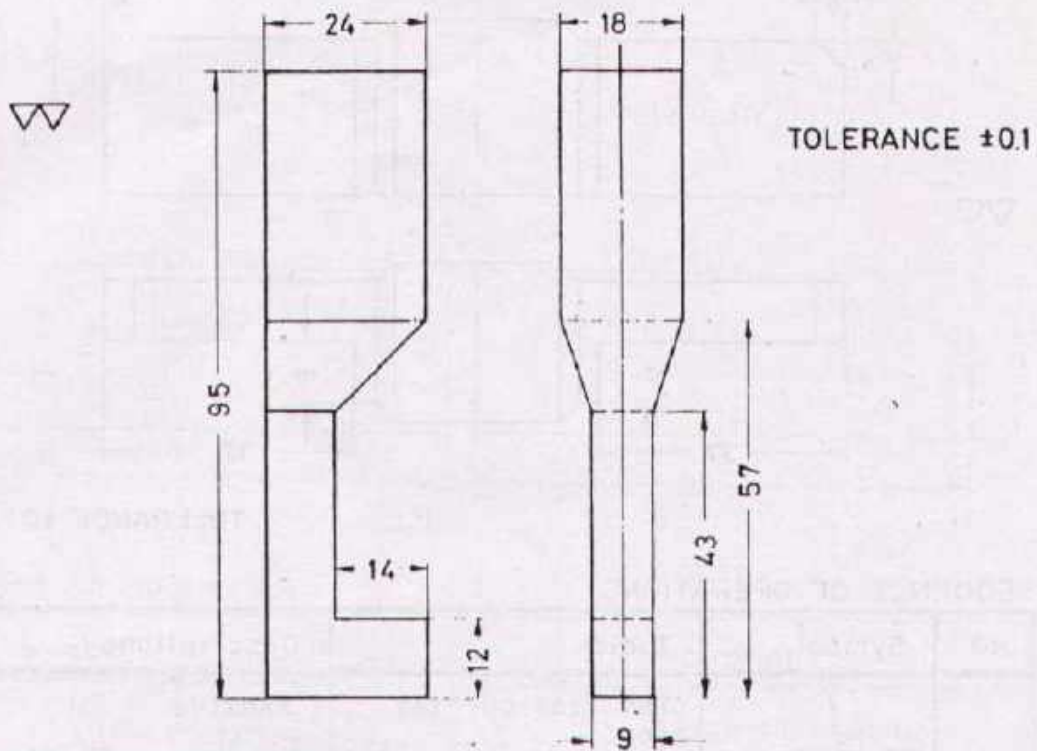
NO:- 1.03/04

BASIC / SHAPING



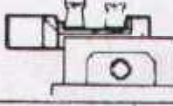




DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



### SEQUENCE OF OPERATIONS

NO.	Symbol	Tools	Descriptions
1		MARKING TOOL SIDE CUTTING TOOL MEASURING TOOL PARALLELS	SHAPING TO LENGTH, MARKING, SHAPING RECESS ACCORDING TO MARKING LINES
2		SIDE CUTTING TOOL	SHAPING OF INCLINATION ACCORDING TO MARKING LINE. REPEAT OPERATION 1 & 2 ON OPPOSITE SIDE.
3		MARKING TOOL GROOVING TOOL MEASURING TOOL PARALLELS	MARKING. GROOVE SHAPING UP TO 1 MM FROM THE MARKING LINE
4		SIDE CUTTING TOOL MEASURING TOOL PARALLELS	SHAPING OF VERTICAL AND HORIZONTAL SURFACE ACC. TO MARKING LINES
5		SIDE CUTTING TOOL	SHAPING OF INCLINATION ACC. TO MARKING LINE
6	REPEAT OPERATIONS 1 TO 5 ON THE 2nd PIECE.		

SCALE 1:1

MAT. of Ex. 03

**PULLER ARM**  
2 PIECES

NO:- 1.0.3/05

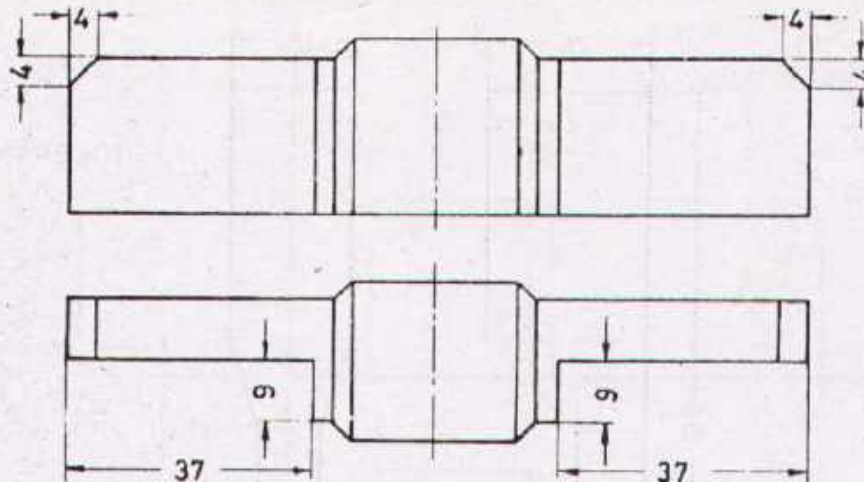
BASIC / SHAPING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME





TOLERANCE  $\pm 0.1$

### SEQUENCE OF OPERATIONS

NO	Symbol	Tools	Descriptions
1		LEFT SIDE CUTTING TOOL PARALLELS MEASURING AND MARKING TOOL	MARKING HORIZONTAL SHAPING OF RECESS
2		LEFT SIDE CUTTING TOOL PARALLELS MEASURING TOOL	VERTICAL SHAPING
3	REPEAT OPERATIONS 1 AND 2 ON 2nd SIDE.		
4		LEFT SIDE CUTTING TOOL	SETTING OF TOOL HEAD TO $45^\circ$ ANGLE
5		LEFT SIDE CUTTING TOOL PARALLELS MEASURING TOOL	SHAPING OF CHAMFERS

SCALE 1:1

MAT. of Ex. 04

PULLER BRIGDE

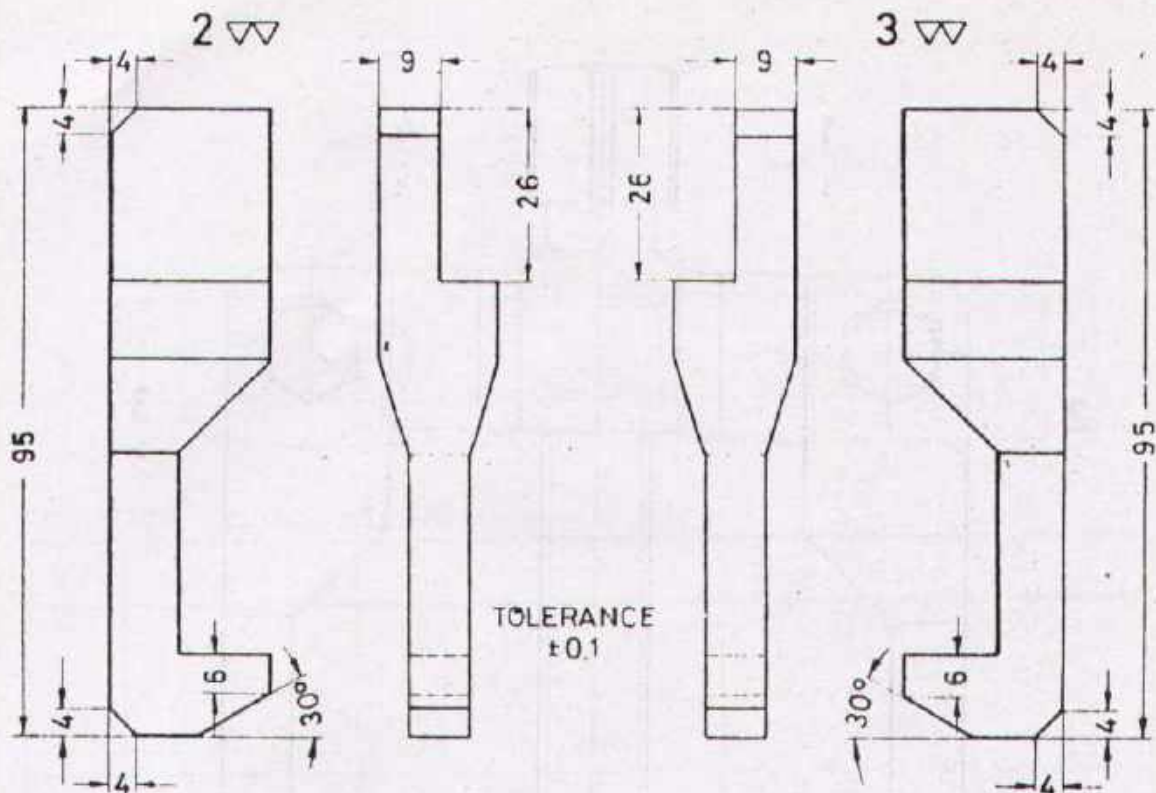
NO:-1.03/06

BASIC / SHAPING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



### SEQUENCE OF OPERATIONS

NO.	Symbol	Tools	Descriptions
1		MARKING TOOLS LEFT SIDE CUTTING TOOL, MEASURING TOOL, PARALLELS	MARKING. RECESS SHAPING. HORIZONTAL - VERTICAL SHAPING
2		LEFT SIDE CUTTING TOOL, PARALLELS	SETTING OF TOOLHEAD TO 45° CHAMFER SHAPING
3		LEFT SIDE CUTTING TOOL	SETTING OF TOOLHEAD TO 30°
4		LEFT SIDE CUTTING TOOL, MEASURING TOOL, PARALLELS	SHAPING OF INCLINATION
5	REPEAT OPERATIONS 1 TO 4 ON 2nd PART.		

SCALE 1 : 1

MAT. of Ex. 05

**PULLER ARMS**  
PART 2&3 for PULLER

NO:- 1.03 / 07

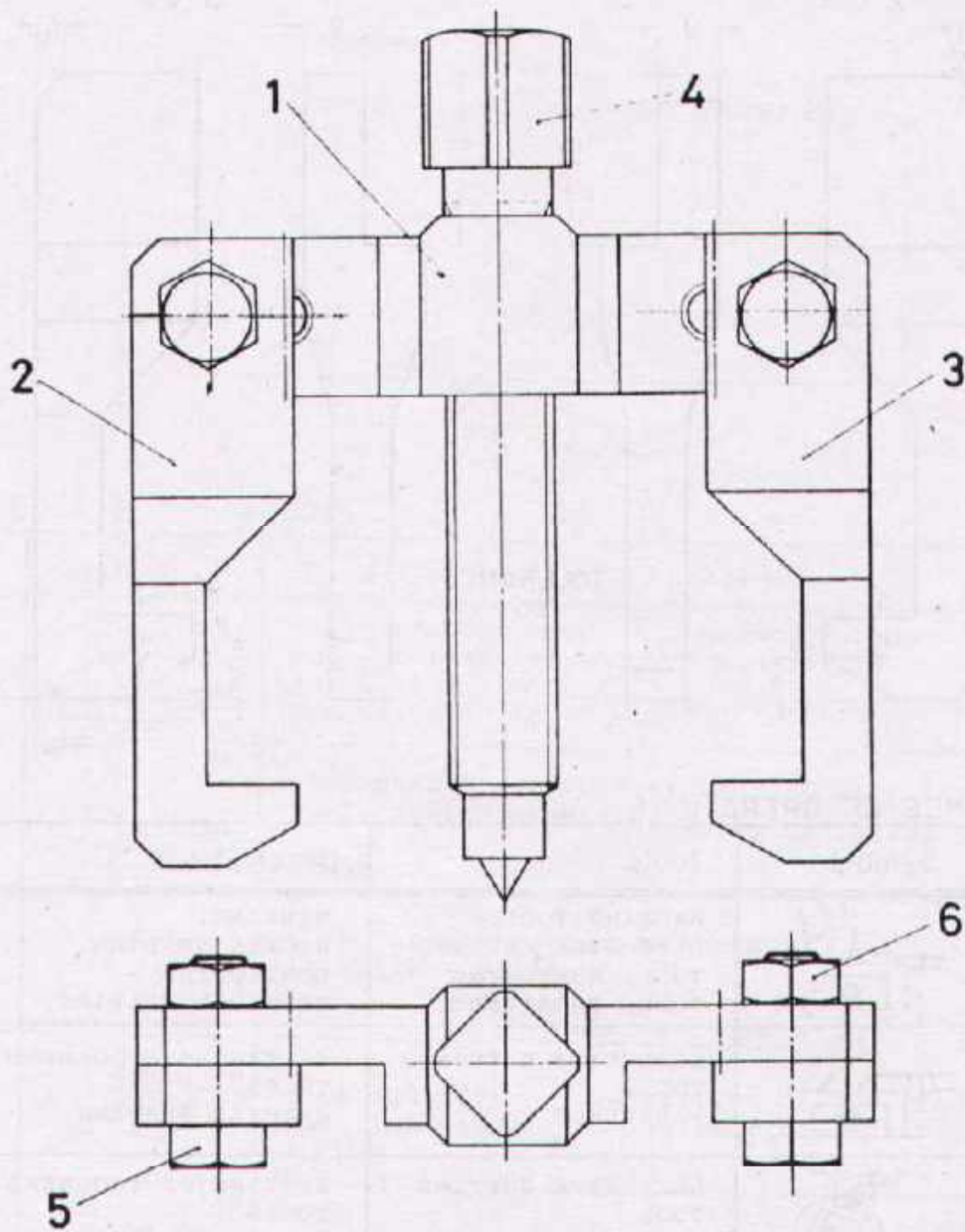
BASIC / SHAPING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME





2	6	Hexagon Nut M8	
2	5	Hexagon Screw M8x 25 mm	
1	4	Spindle	coming from Test T/M 1.0.
1	3	Puller Arm	" " Ex. 1.0.3/07
1	2	Puller Arm	" " Ex. 1.0.3/07
1	1		
Qty.	S-No.	Denomination	Remarks

SCALE 1 : 1

MAT. —

## PULLER

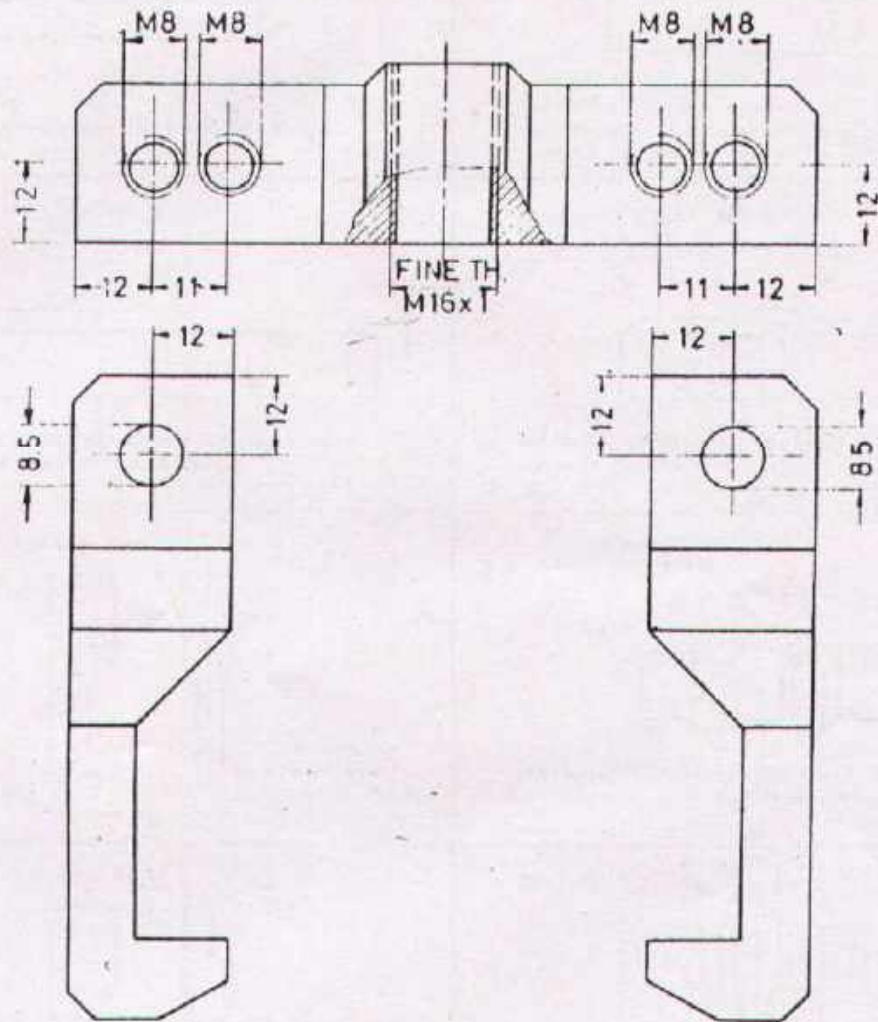
NO :- 1.0.3/08

BASIC / SHAPING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



**SEQUENCE OF OPERATIONS**

NO.	Symbol	Tools	Descriptions
1		MARKING TOOLS, DRILLS 6 & 15 MM, THREAD TAPS M16x1, HANDLE	MARKING, DRILLING, THREAD CUTTING, DEBURRING
2		MARKING TOOLS, DRILL 6,5 MM, THREAD TAPS M8, HANDLE	MARKING, DRILLING, THREAD CUTTING, DEBURRING
3		MARKING TOOLS DRILL 8,5 MM	MARKING, DRILLING, DEBURRING

SCALE 1 : 1

MAT. —

**PULLER**

NO :- 1.03/081

BASIC / SHAPING


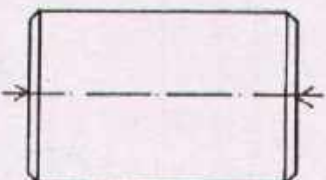
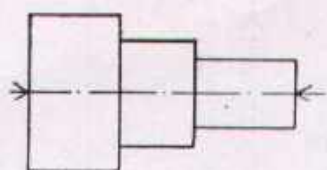
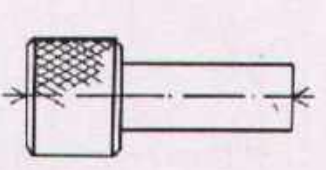
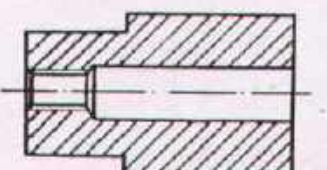
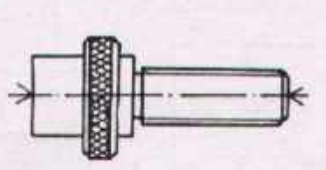
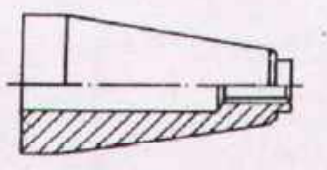



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME


TURNER/  
MACHINIST



<p style="text-align: center;"><b>STEPPED BAR</b></p>  <p style="text-align: center;">Chuckling . Facing . Longitudinal . Turning</p> <p style="text-align: center;">1 → 5</p>	<p style="text-align: center;"><b>ROUND BAR</b></p>  <p style="text-align: center;">Chuckling . Facing . Centering . Longitudinal . Turning Chamfer Turning</p> <p style="text-align: center;">2 → 3</p>
<p style="text-align: center;"><b>CENTERED BOLT</b></p>  <p style="text-align: center;">Exercising of Chuckling . Centering . Facing Longitudinal Turning</p> <p style="text-align: center;">2 → 3 → 4</p>	<p style="text-align: center;"><b>KNURLED BOLT</b></p>  <p style="text-align: center;">Knurling Exercing of known operations</p> <p style="text-align: center;">3 → 4 → 6</p>
<p style="text-align: center;"><b>THREAD BUSH</b></p>  <p style="text-align: center;">Chuckling . Facing . Centering . Drilling Thread Cutting . Longitudinal Turning</p> <p style="text-align: center;">1 → 5 → 7</p>	<p style="text-align: center;"><b>SPINDLE</b></p>  <p style="text-align: center;">Thread Cutting Exercising of known operations</p> <p style="text-align: center;">4 → 6 → 8</p>
<p style="text-align: center;"><b>BASE STAND</b></p>  <p style="text-align: center;">Chuckling . Taper Turning . Exercising of known operations</p> <p style="text-align: center;">5 → 7 → 8</p>	<p style="text-align: center;"><b>SCREW JACK</b></p>  <p style="text-align: right;">Marking . Filing . Assembling</p> <p style="text-align: center;">8 → 7</p>

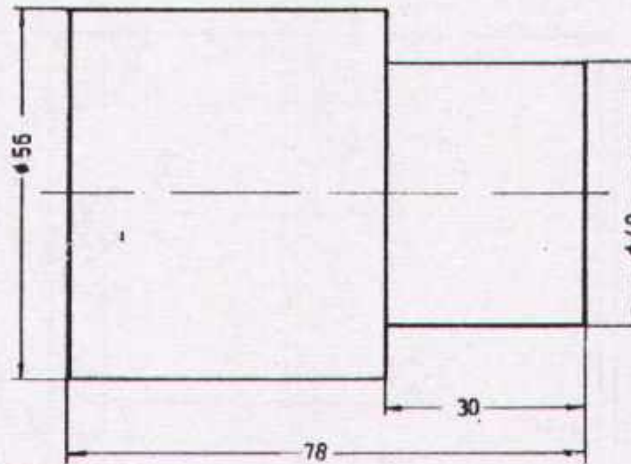
The above shown exercises should be completed within 2 weeks. Besides these exercises the trainees have to regrind their required cutting tools. After each regrinding, the instructor concerned, has to check the tool thoroughly.

Raw materials required for the above shown exercises:  
1 piece  $\phi$  2 1/2" x 85 mm length, 1 piece  $\phi$  2 1/2" x 90 mm length

<b>SCALE</b>	<b>LAYOUT</b>	NO:- 1,0,4/1-8
MAT. ST 37-1		BASIC / TURNING
 <b>DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING</b>		
PAK-GERMAN TECHNICAL TRAINING PROGRAMME		31



TOLERANCE  $\pm 0.2$



SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		4-JAW INDEPENDENT CHUCK RIGHT-HAND FACING TOOL	CLAMPING FACING
2		RIGHT-HAND ROUGHING TOOL	LONGITUDINAL TURNING
3		RIGHT-HAND SIDE TOOL	SHOULDER FACING
4		RIGHT-HAND SIDE TOOL	STEP TURNING TO DEPTH 30 MM AND DIA 40 MM
5		3-JAW CHUCK RIGHT-HAND SIDE TOOL	FACING TO LENGTH 78 MM
6.	LONGITUDINAL TURNING TO DIA 56 MM. NUMBER PUNCHING.		

SCALE 1:1

MAT. ST.37-1

STEPPED BAR

NO:- 1.0.4/01

BASIC/TURNING



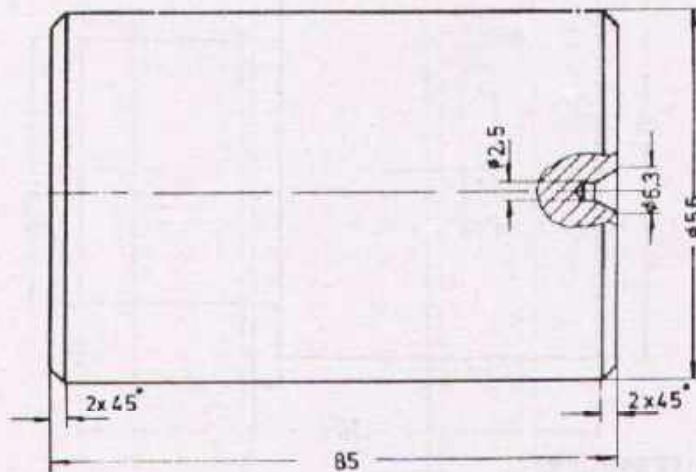
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME





TOLERANCE ±0.2



### SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		4-JAW INDEPENDENT CHUCK RIGHT-HAND FACING TOOL	CLAMPING FACING
2		DRILL CHUCK CENTRE DRILL 2.5 MM	CENTERING
3	RECLAMPING, FACING TO LENGTH 85 MM. CENTERING.		
4		DRIVING PLATE DOG CARRIER RIGHT-HAND ROUGHING TOOL	HOLDING BETWEEN CENTRES ROUGH TURNING TO DIA 56 MM
5		RIGHT-HAND SIDE TOOL	RESETTING, ROUGH TURNING TO DIA 56 MM
6		RIGHT-HAND SIDE TOOL	CHAMFERING

SCALE 1:1

MAT. ST. 37-1

## ROUND BAR

NO. 1.04 / 02

BASIC / TURNING

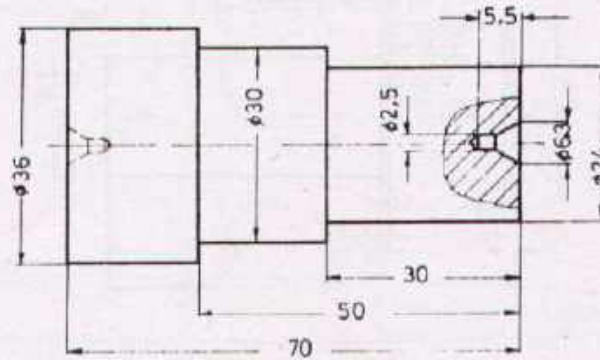


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



Tolerance  $\pm 0.1$



### SEQUENCE OF OPERATIONS

No.	Symbol	Tools	Descriptions
1		3-JAW CHUCK FACING TOOL	TRUE SETTING WITH DEAD CENTRE FACING TO LENGTH 70 MM
2		DRILL CHUCK CENTRE DRILL 2.5 MM	RECENTERING
3		DRIVING PLATE DOG CARRIER RIGHT-HAND SIDE TOOL	STEP TURNING TO DEPTH 50 MM AND DIA 30 MM
4		RIGHT-HAND SIDE TOOL	STEP TURNING TO DEPTH 30 MM AND DIA 24 MM
5		RIGHT-HAND SIDE TOOL CLAMPING BUSH	RESETTING, TURNING TO OUTSIDE DIA 36 MM

SCALE 1:1

MAT. from Ex. 02

## CENTERED BOLT

No. 1.0.4/03

BASIC / TURNING



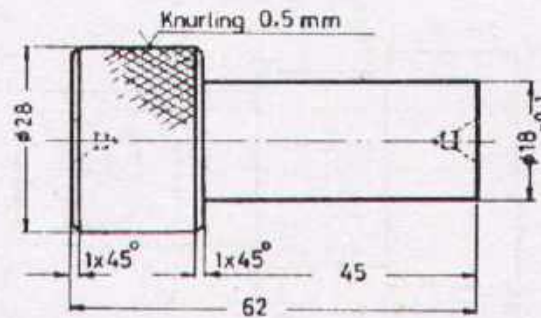
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK GERMAN TECHNICAL TRAINING PROGRAMME





Tolerance  $\pm 0.1$   
unless otherwise stated



### SEQUENCE OF OPERATIONS

No	Symbol	Tools	Descriptions
1		3-JAW CHUCK FACING TOOL RIGHT-HAND SIDE TOOL	TRUE SETTING WITH DEAD CENTRE, FACING TO LENGTH 62 MM, TURNING TO OUT- SIDE DIA 28 MM CHAMFERING
2		DRILL CHUCK CENTRE DRILL 2.5 MM	RECENTERING
3		DRIVING PLATE DOG CARRIER RIGHT-HAND SIDE TOOL	STEP TURNING TO DEPTH 45 MM AND DIA 18 MM CHAMFERING
4		3-JAW CHUCK KNURLING TOOL 0.5 MM, RIGHT-HAND SIDE TOOL, CLAMPING BUSH, OIL CAN	TRUE SETTING WITH DEAD CENTRE KNURLING CHAMFERING

SCALE 1:1

MAT. of Ex 03

**KNURLED BOLT**

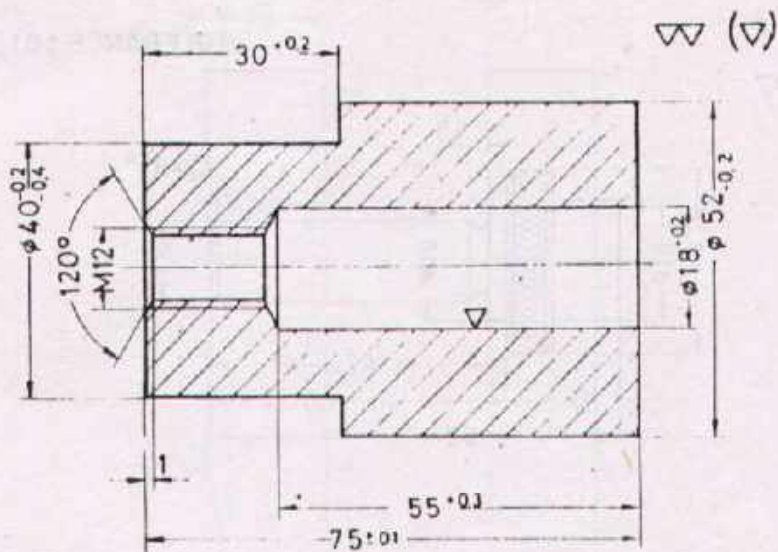
NO. 10.4/04

BASIC / TURNING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



#### SEQUENCE OF OPERATIONS

NO.	Symbol	Tools	Descriptions
1		3-JAW CHUCK FACING TOOL RIGHT-HAND SIDE TOOL	FACING UP TO LENGTH 75 MM. RECESS TURNING UP TO DEPTH 30 MM AND DIA 40 MM
2		CENTRE DRILL 2.5 MM TWIST DRILL 10.2 MM TWIST DRILL 18 MM CLAMPING BUSH	CENTERING, SETTING DRILLING 10.2 MM DRILLING 18.0 MM
3		TAPS M 10 HANDLE	INSIDE THREAD CUTTING RESETTING, TRUE SETTING WITH DEAD CENTRE CHAMFERING
4		MANDREL RIGHT-HAND SIDE TOOL	TURNING OUTSIDE DIA 52 MM

SCALE 1:1

MAT. of Ex 01

### THREAD BUSH

ND:-10.4/05

BASIC / TURNING

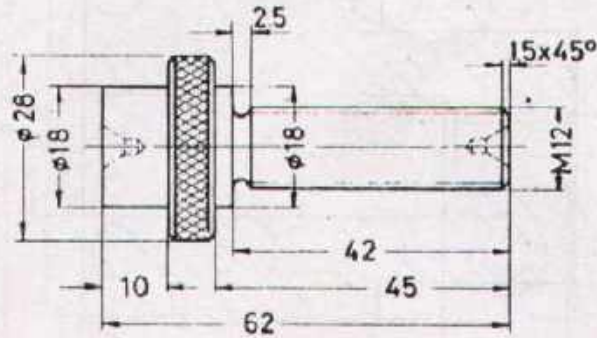


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



TOLERANCE  $\pm 0.1$



SEQUENCE OF OPERATIONS

NO.	Symbol	Tools	Descriptions
1		DRIVING PLATE DOG CARRIER RIGHT-HAND SIDE TOOLS	RECESS TURNING UP TO DEPTH 10 MM AND DIA 18 MM CHAMFERING
2		RIGHT-HAND SIDE TOOLS CLAMPING BUSH	RESETTING RECESS TURNING UP TO DEPTH 42 MM AND DIA 12 - 1.5 MM CHAMFERING
3		FORMING TOOL R 2.5 MM	RELIEF TURNING UP TO DIA 9.5 MM
4		3-JAW CHUCK THREAD DIE M 12 CLAMPING BUSH	TRUE SETTING WITH DEAD CENTRE OUTSIDE THREAD CUTTING

SCALE 1:1

MAT. of Ex.04

SPINDLE

NO:-1.0.4/06

BASIC / TURNING

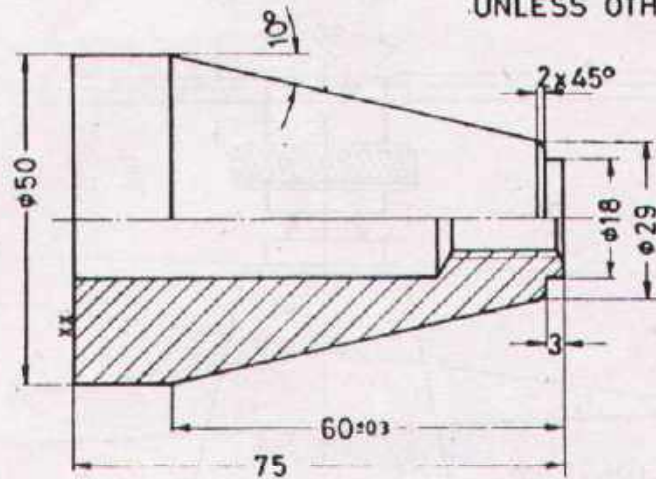


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



TOLERANCE  $\pm 0.1$   
UNLESS OTHERWISE STATED



SEQUENCE OF OPERATIONS

NO.	Symbol	Tools	Descriptions
1		DRIVING PLATE DOG CARRIER FINISHING TOOL	FINISHING DIA 50 MM
2		RIGHT-HAND ROUGHING TOOL MANDREL	SETTING OF COMPOUND REST TO $10^\circ$ ROUGHING MIND FINISHING ALLOWANCE
3		FINISHING TOOL MANDREL	FINISHING OF TAPER
4		RIGHT-HAND SIDE TOOL MANDREL	RECESS TURNING UP TO DEPTH 3 MM AND DIA 18 MM CHAMFERING

SCALE 1:1

MAT. of Ex. 05

BASE STAND

NO :- 104/07

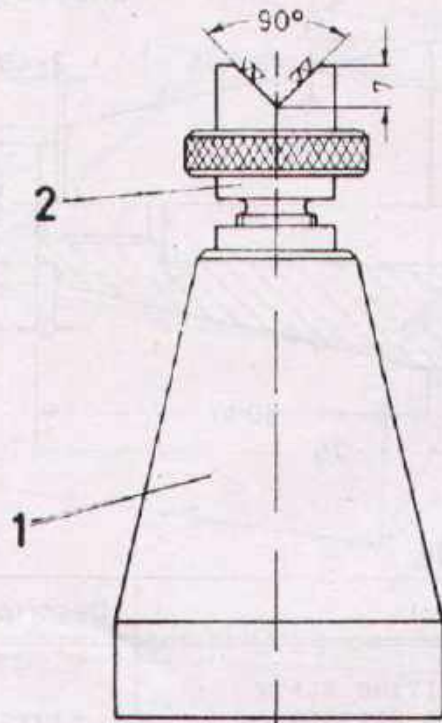
BASIC / TURNING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME





**SEQUENCE OF OPERATIONS**

NO.	Symbol	Tools	Descriptions
1		MARKING TOOLS	MARKING
2		FILES SLOTTED NUT	FILING OF NOTCH
3			ASSEMBLING

2	1	SPINDLE	COMING FROM EX. 1.02/06
1	1	BASE STAND	" " EX 1.02/07
P.No	Qty	Denomination	Remarks

SCALE 1 : 1

**SCREW JACK**

NO :- 1.0.4/08

MAT.

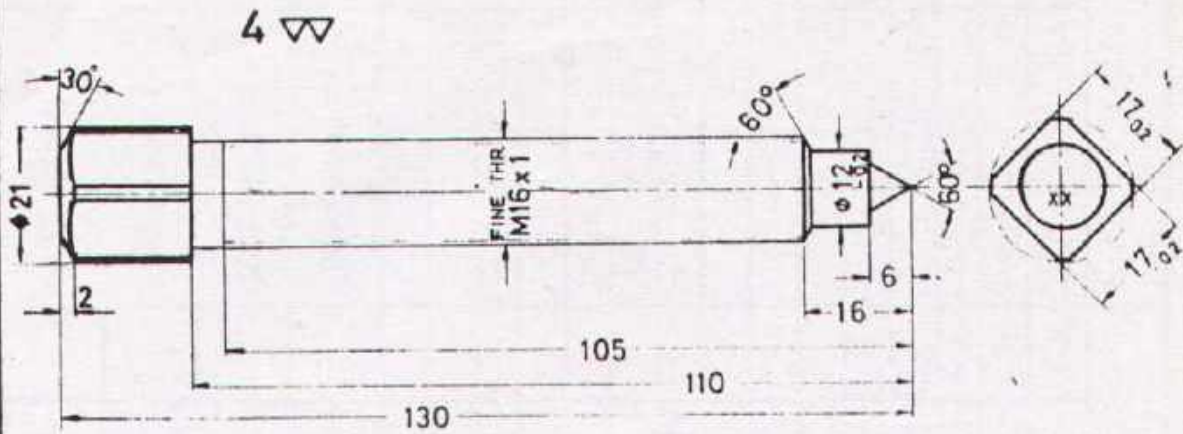
BASIC / TURNING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

PRORATED TIME \_\_\_\_\_ HRS



TOLERANCE  $\pm 0.2$  UNLESS OTHERWISE STATED.

SEQUENCE OF OPERATIONS

NO.	Symbol	Tools	Descriptions
1-2		CENTRE DRILL TURNING TOOLS	COMPLETE THE JOB UP TO THE SHOWN STAGE
3		CLAMPING BUSH DIE M 16 x 1 DIE STOCK	CENTERING - THREAD CUTTING
4		THREAD CLAMPING BUSH SIDE CUTTING TOOL	TURNING
5		SHAPING TOOL	SHAPING DEBURRING

SCALE 1 : 1

MAT. ST. 37-1

SPINDLE

NO :- 103-4/TEST

SHAPING/TURNING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



# MARKING SHEET

S. No./P. No.	Points to be checked	CONTROLLER I		CONTROLLER II		CONTROLLER III		CONTROLLER IV	
		actual size	controller average marks	actual size	controller average marks	actual size	controller average marks	actual size	controller average marks
1	4 SMOOTHNESS ALL-AROUND	X		X		X		X	
2	4 TOTAL LENGTH 1 ± 0.2								
3	4 RECESS LENGTH 110 ± 0.2								
4	4 RECESS LENGTH 16 ± 0.2								
5	4 DIAMETER 12 - 0.2								
6	4 SQUARE 17 - 0.2								
7	4 SQUARE 17 - 0.2								
8	4 SMOOTHNESS OF THREAD	X		X		X		X	
9	4 SMOOTHNESS OF SQUARE	X		X		X		X	
10	4 PROPER ANGLES OF SQUARE	X		X		X		X	
11	4 POINT 60°	X		X		X		X	
12	HANDLING OF TOOLS	X		X		X		X	
13	WORKING ON THE MACHINES	X		X		X		X	
		TOTAL MARKS =		TOTAL MARKS =		TOTAL MARKS =		TOTAL MARKS =	
		$\frac{\text{TOTAL MARKS}}{2.6} \times 0.9 =$		$\frac{\text{TOTAL MARKS}}{2.6} \times 0.9 =$		$\frac{\text{TOTAL MARKS}}{2.6} \times 0.9 =$		$\frac{\text{TOTAL MARKS}}{2.6} \times 0.9 =$	
		TIME MARKS ± =		TIME MARKS ± =		TIME MARKS ± =		TIME MARKS ± =	
		FINAL MARKS =		FINAL MARKS =		FINAL MARKS =		FINAL MARKS =	

CONTROLLER I \_\_\_\_\_

CONTROLLER II \_\_\_\_\_

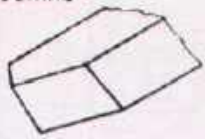
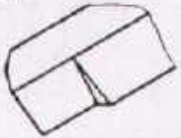


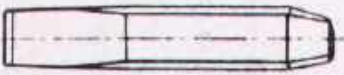
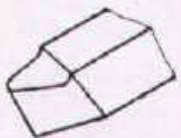
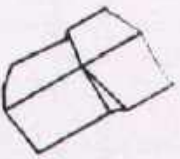


DATE \_\_\_\_\_



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

TURNER MACHINIST

<p style="text-align: center;">HINTS FOR OFFHAND GRINDING</p>	<p>RIGHT HAND ROUGHING TOOL</p> 
<p style="text-align: center;">1</p> <p>RIGHT HAND SIDE TOOL</p> 	<p style="text-align: center;">1.03/01 → 2</p> <p>CENTRE PUNCH</p> 
<p style="text-align: center;">1.03/01 → 3</p> <p>SCRIBER</p> 	<p style="text-align: center;">4</p> <p>FLAT CHISEL</p> 
<p style="text-align: center;">5</p> <p>ROUND NOSE SMOOTHING TOOL</p> 	<p style="text-align: center;">6</p> <p>RIGHT HAND SIDE TOOL</p> 
<p style="text-align: center;">1.03/01 → 7</p> <p>RIGHT HAND ROUGHING TOOL</p> 	<p style="text-align: center;">1.03/01 → 8</p> <p>TWIST DRILL</p> 
<p style="text-align: center;">1.03/01 → 9</p>	<p style="text-align: center;">10</p>

THE ABOVE SHOWN EXERCISES SHOULD BE COMPLETED WITHIN 2 WEEKS.  
AFTER COMPLETION OF THIS OFFHAND GRINDING COURSE, THE TRAINEES  
SHOULD BE ABLE TO SHARPEN THE EXERCISED TOOLS IN CORRECT MANNER  
AND WITHOUT ANY ASSISTANCE.  
THE REQUIRED MATERIALS FOR THE TOOL BITS ARE TO BE TAKEN FROM SHAPING  
EX.1.03/01. FOR THE OTHER EXERCISES WORN-OUT OR BLUNT TOOLS CAN BE USED.

SCALE	<b>LAYOUT</b>	No 1.05/1.0
MATERIAL		OFFHAND GRINDING



MATERIAL REQUIRED



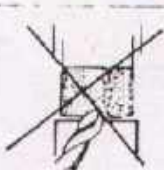

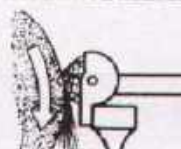
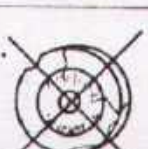
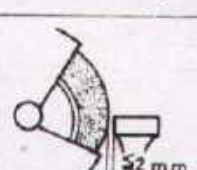
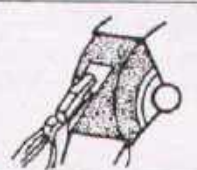

TRADE TRAINING I

OFF HAND GRINDING No. 1.O.5/1 to 10	Exercise No.										Length per Trainee	Total length for 16 Trainees	Total weight for 16 Trainees
	2	3	5	6	7	8	9	10	(Length given in Millimeter)				
M.S.Squ. 16x16 mm R.H. Roughing Tool	150										150 mm	2.4 meter	4.9 kg
M.S.Squ. 16x16 mm R.H. Side Tool	150										150 mm	2.4 meter	4.9 kg
Tool Steel Ø 5 mm or Spring Steel			175								175 mm	2.8 meter	0.5 kg
Tool Steel 22x11mm preforged				150							150 mm	2.4 meter	4.6 kg
M.S.Squ. 16x16 mm Round Nose Smoothing Tool					150						150 mm	2.4 meter	4.9 kg
M.S.Squ. 16x16 mm R.H. Side Tool							150				150 mm	2.4 meter	4.9 kg
M.S.Squ. 16x16 mm R.H. Roughing Tool								150			150 mm	2.4 meter	4.9 kg
worn out or condensed drills various sizes										1	1 Nos.	16 Nos.	16 nos.



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME

1		WHEN WORKING ON A GRINDING MACHINE, MAKE SURE THAT GUARDS AND HOODS ARE SECURELY PLACED. ALWAYS USE SOME SORT OF EYE PROTECTION, LIKE GOGGLES!
2		HAVE A CONTAINER OF COOL CLEAN WATER AVAILABLE TO COOL THE WORK AS IT BECOMES HEATED.
3		DON'T PRESS THE TOOL OR WORKPIECE CONSTANTLY AGAINST ONE PORTION OF THE GRINDING WHEEL ONLY. MOVE THE WORK ACROSS THE FULL FACE OF THE WHEEL TO PREVENT IT FROM BECOMING GROOVED.
4		DON'T GRIND ON THE SIDE OF A GRINDING WHEEL EXCEPT WHEN ABSOLUTELY NECESSARY! FOR ROUGH GRINDING ALWAYS WORK ON THE FACE OF A STRAIGHT GRINDING WHEEL!
5		BLUNT, GLAZED, GROOVED OR WOBBLING WHEELS MUST BE DRESSED OR TRUED.
6		DON'T WORK ON A GRINDING MACHINE WHICH HAS AN ABNORMAL 'SOUND'. MAYBE THE WHEEL HAS FRACTURES OR CRACKS OR IS NOT PROPERLY BALANCED.
7		WHEN GRINDING, KEEP THE TOOL REST ADJUSTED CLOSE TO THE WHEEL. A MAXIMUM DISTANCE OF 2 MM (1/16 IN.) IS RECOMMENDED TO PREVENT THE WORK FROM BEING CAUGHT BETWEEN THE REST AND THE WHEEL.
8		SMALLER TOOLS DON'T HOLD ON THE TOOL REST; SUPPORT THEM IN THE LEFT HAND AND SUPPORT THIS HAND WITH THE TOOL REST. VERY SMALL PARTS HOLD IN SUITABLE FIXTURES OR WITH PLIERS.
9		FOR HEAVY WORK, BIG GRINDING MACHINES AND COARSE GRIT WHEELS ARE REQUIRED. FOR FINE WORK, FINE GRIT WHEELS ARE REQUIRED. IF SPECIAL WORK OR MATERIALS OTHER THAN STEEL HAVE TO BE GROUND, ASK YOUR INSTRUCTOR!

SCALE

MATERIAL

## HINTS FOR OFFHAND GRINDING

NO 1.0 5/01

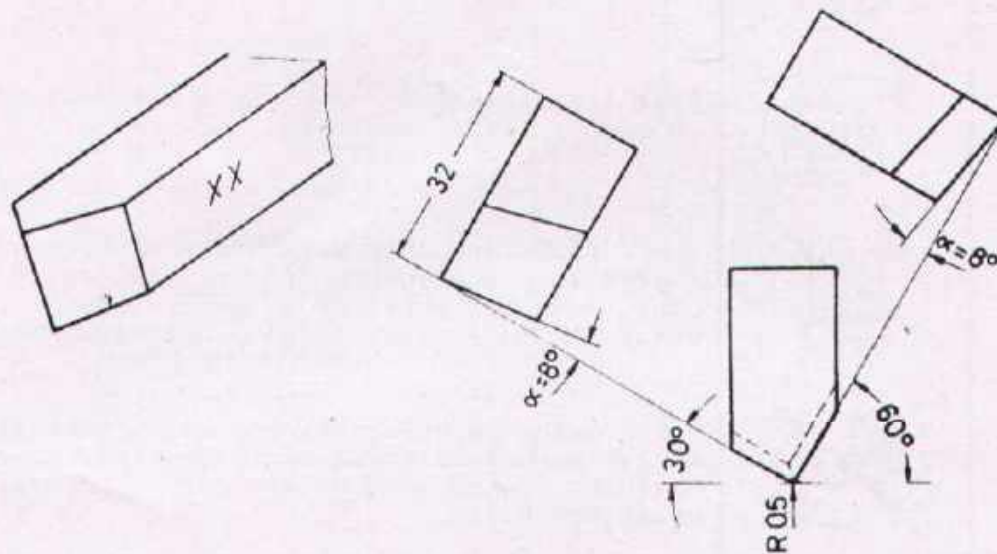
OFFHAND GRINDING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

FAK GERMAN TECHNICAL TRAINING PROGRAMME





### SEQUENCE OF OPERATIONS

NO.	Symbol	Tools	Descriptions
1		PEDESTAL WHEEL GRINDING MACHINE SAFETY GOGGLES LEVEL PROTRACTOR	GRINDING OF $60^\circ$ ANGLE
2		AS UNDER NO. 1	GRINDING OF $30^\circ$ ANGLE
3		CUP WHEEL GRINDING MACHINE SAFETY GOGGLES GRINDING GAUGE	GRINDING OF $60^\circ$ , $30^\circ$ ANGLES & RADIUS
4		TO AVOID HOLLOW GRINDING, THE CUP WHEEL GRINDER SHOULD BE USED FOR FINAL GRINDING.	
5		GRINDING GAUGE	CHECKING OF CLEARANCE ANGLES. HOLD THE GRIND- ING GAUGE IN RIGHT ANGLE.

SCALE 1 : 1

MAT. From Ex.1.0 3/1

## RIGHT HAND ROUGHING TOOL (WITHOUT TOP RAKE ANGLE)

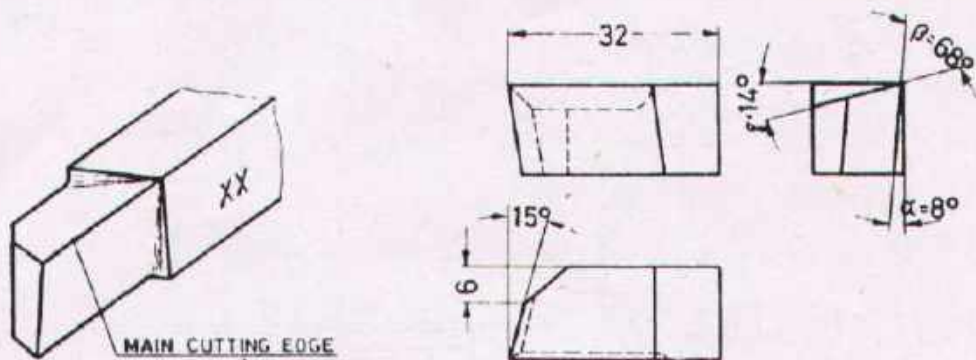
No 1.0.5/02

OFFHAND GRINDING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



### SEQUENCE OF OPERATIONS

NO.	Symbol	Tools	Descriptions
1			COMPLETE THE TOOL UP TO THE STAGE AS DONE IN EXERCISE 1.0.4/02.
2		CUP WHEEL GRINDING MACHINE SAFETY GOGGLES	ADJUSTING OF GRINDING TABLE TO $14^\circ$ . GRINDING OF TOP RAKE ANGLE $\gamma = 14^\circ$ .
3		OILSTONE	OILSTONING OF THE CUTTING EDGE
4		GRINDING GAUGE	CHECKING OF CLEARANCE ANGLE $\alpha = 8^\circ$ CHECKING OF CUTTING ANGLE $\beta = 68^\circ$ .

SCALE 1:1

MAT. From Ex.1:0 2/1

## RIGHT HAND SIDE TOOL

No. 1.0.5/08

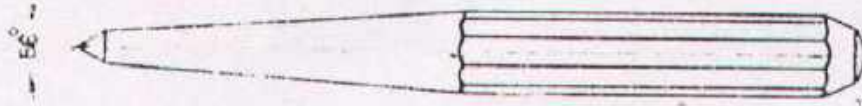
OFFHAND GRINDING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME





Nos.	Symbol	Tools	Descriptions
1		PEDESTAL WHEEL GRINDING MACHINE  SAFETY GOGGLES  BEVEL PROTRACTOR	ROTATE THE CENTRE PUNCH TO PRODUCE CONICAL POINT  COOL THE CENTRE POINT AS SOON AS IT BECOMES HEATED

SCALE 1 : 1

**CENTRE PUNCH**

NO. 1.05/04

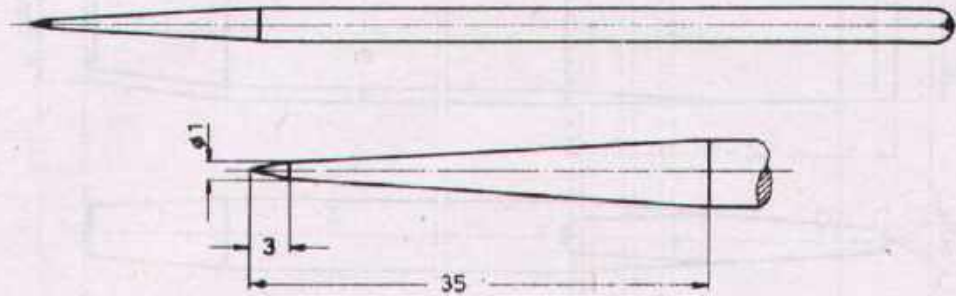
MAT. CARBON STEEL from Ex. 2.13.2/18

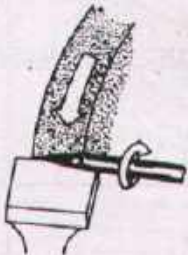

OFFHAND GRINDING




DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

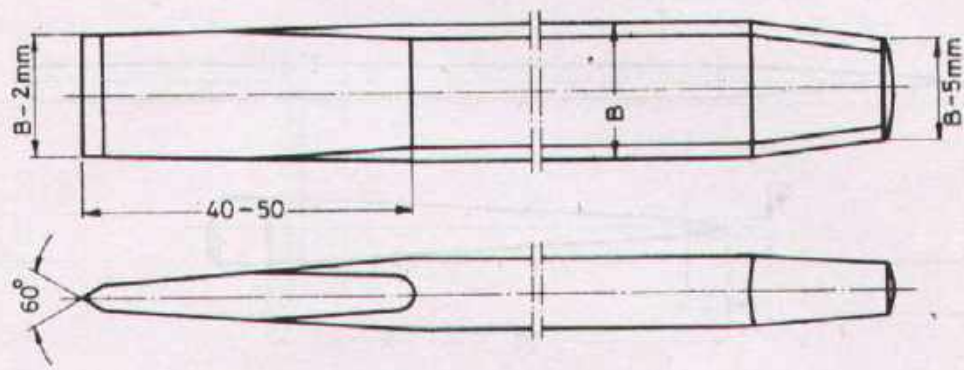
PAK GERMAN TECHNICAL TRAINING PROGRAMME



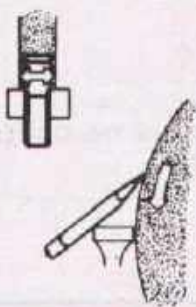


Nos.	Symbol	Tools	Descriptions
1		PEDESTAL WHEEL GRINDING MACHINE  SAFETY GOGGLES  CHECKING TOOLS	GRINDING OF LONG CONE
2		PEDESTAL WHEEL GRINDING MACHINE  SAFETY GOGGLES	GRINDING OF CONICAL POINT

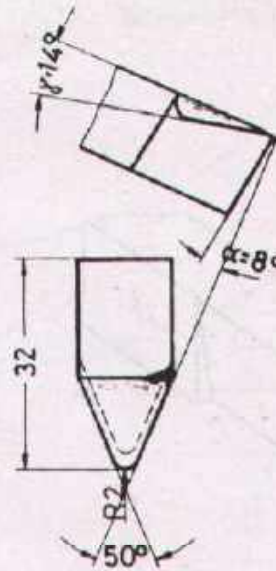
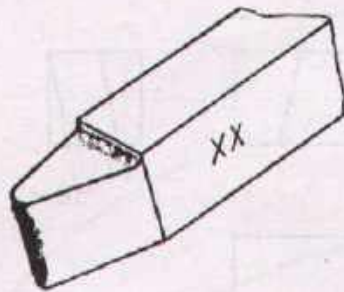
SCALE 1:1, 2:1	<b>SCRIBER</b>	NO. 1.0.5/05
MAT. CARBON STEEL		OFFHAND GRINDING
 <b>DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING</b> PAK-GERMAN TECHNICAL TRAINING PROGRAMME		57



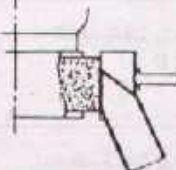
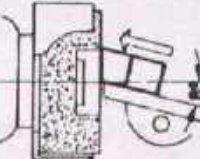
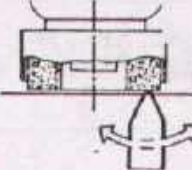



Nos.	Symbol	Tools	Descriptions
1		PEDESTAL WHEEL GRINDING MACHINE SAFETY GOGGLES	GRINDING OF CHISEL HEAD
2		PEDESTAL WHEEL GRINDING MACHINE SAFETY GOGGLES	GRINDING OF THE LONG CONICAL PORTION
3		PEDESTAL WHEEL GRINDING MACHINE SAFETY GOGGLES	SHARPENING OF CUTTING EDGE

SCALE 1 : 1	<b>FLAT CHISEL</b>	NO. 1.0.5 / 06
MAT. CARBON STEEL		OFFHAND GRINDING



### SEQUENCE OF OPERATIONS

NO	Symbol	Tools	Descriptions
1		PEDESTAL WHEEL GRINDING MACHINE SAFETY GOGGLES GRINDING GAUGE	PREGRINDING OF $50^\circ$
2		CUP WHEEL GRINDING MACHINE SAFETY GOGGLES GRINDING GAUGE	GRINDING OF CLEARANCE ANGLE $8^\circ$
3		CUP WHEEL GRINDING MACHINE SAFETY GOGGLES RADIUS GAUGE	GRINDING OF RADIUS 2 MM
4		GRINDING MACHINE SAFETY GOGGLES GRINDING GAUGE	GRINDING OF TOP RAKE ANGLE $14^\circ$ , AS SHOWN ON STRAIGHT GRINDING WHEEL

SCALE 1:1

MAT. From Ex.10.3/1

## ROUND NOSE SMOOTHING TOOL

No 10.5/07

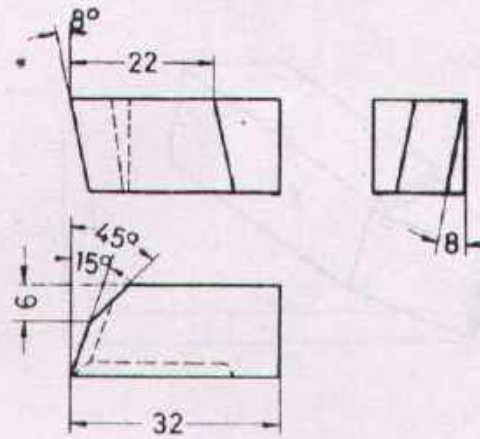
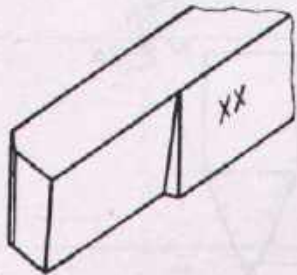
OFFHAND GRINDING



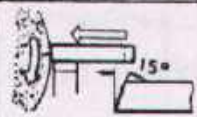
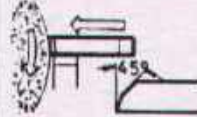



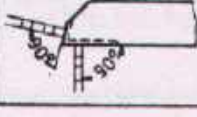
DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME





### SEQUENCE OF OPERATIONS

NO.	Symbol	Tools	Descriptions
1		PEDESTAL WHEEL GRINDING MACHINE SAFETY GOGGLES BEVEL PROTRACTOR	PREGRINDING OF 15° ANGLE
2		AS UNDER NO. 1	PREGRINDING OF 45° ANGLE
3		CUP WHEEL GRINDING MACHINE SAFETY GOGGLES GRINDING GAUGE	GRINDING OF SECONDARY CLEARANCE ANGLE 8°
4		AS UNDER NO. 3	GRINDING OF SIDE CLEARANCE ANGLE 8°
5		GRINDING GAUGE	CHECKING
6		GRINDING GAUGE	CHECKING

SCALE 1:1

MAT. From Ex.1 0.3/1

## RIGHT HAND SIDE TOOL (WITHOUT TOP RAKE ANGLE)

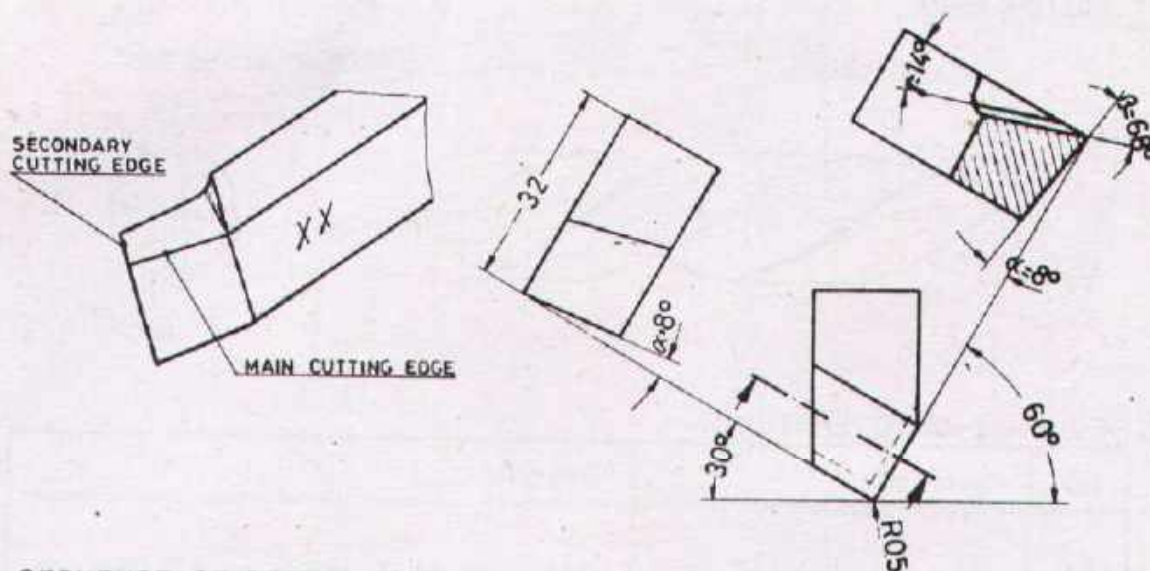
No 1-0 5/03

OFFHAND GRINDING

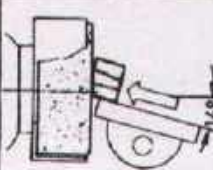
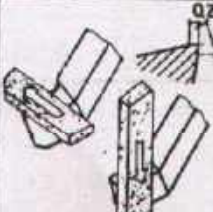
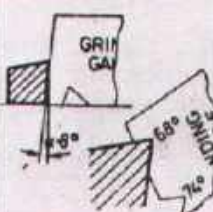


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



### SEQUENCE OF OPERATIONS

NO.	Symbol	Tools	Descriptions
1			COMPLETE THE TOOL UP TO THE STAGE AS DONE IN EXERCISE 1.O.4/O1.
2		CUP WHEEL GRINDING MACHINE SAFETY GOGGLES	ADJUSTING OF GRINDING TABLE TO $14^\circ$ . GRINDING OF TOP RAKE ANGLE $\gamma = 14^\circ$ .
3		OILSTONE	OILSTONING THE CUTTING EDGE, TO PRODUCE BETTER FINISH ON WORK AND TO PROLONG THE LIFE OF THE TOOL.
4		GRINDING GAUGE	CHECKING OF CLEARANCE ANGLE $\alpha = 8^\circ$ . CHECKING OF CUTTING ANGLE $\beta = 68^\circ$

SCALE 1:1

MAT. From Ex.1.0.2/1

## RIGHT HAND ROUGHING TOOL

No. 1.0.5/09

OFFHAND GRINDING

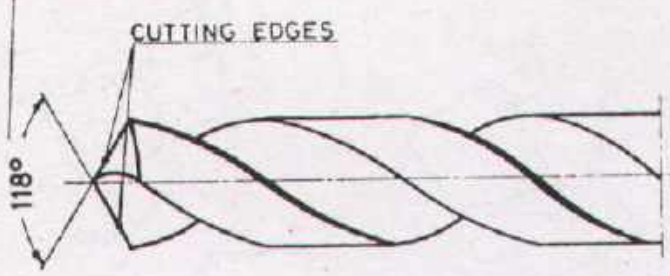


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

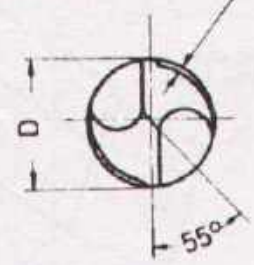
PAK-GERMAN TECHNICAL TRAINING PROGRAMME



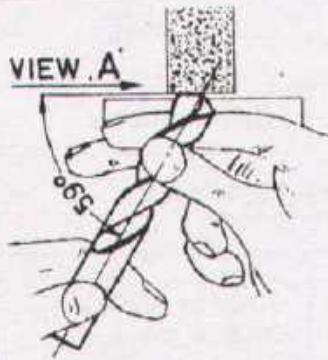
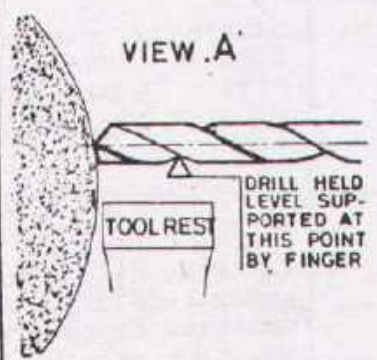
CUTTING ANGLE



BODY CLEARANCE



SEQUENCE OF OPERATIONS

NO.	Symbol	Descriptions
1	 	<p>FOR THIS EXERCISE A 10 TO 15 MM Ø TWIST DRILL WOULD BE SUITABLE.</p> <p>EITHER THE TWIST DRILL CAN BE HELD AS SHOWN, OR THE HANDS CAN BE PLACED IN OPPOSITE POSITION.</p> <ol style="list-style-type: none"> <li>1.1 STAND IN FRONT OF THE WHEEL AND SLIGHTLY TO THE LEFT OF THE MACHINE.</li> <li>1.2 HOLD THE DRILL BETWEEN THE THUMB AND FIRST FINGER OF THE RIGHT (OR LEFT) HAND.</li> <li>1.3 SUPPORT THE HAND ON THE TOOL REST WITH OTHER FINGERS.</li> <li>1.4 HOLD THE SHANK OF THE DRILL BETWEEN THE THUMB AND FINGER OF THE LEFT (OR, RIGHT) HAND.</li> <li>1.5 POSITION YOURSELF BY MOVING THE FEET SO THAT THE DRILL MAKES AN ANGLE OF 59° TO THE WHEEL FACE.</li> <li>1.6 HOLD THE DRILL LEVEL AND TWIST IT UNTIL ONE CUTTING EDGE IS HORIZONTAL AND PARALLEL TO THE WHEEL FACE.</li> </ol>

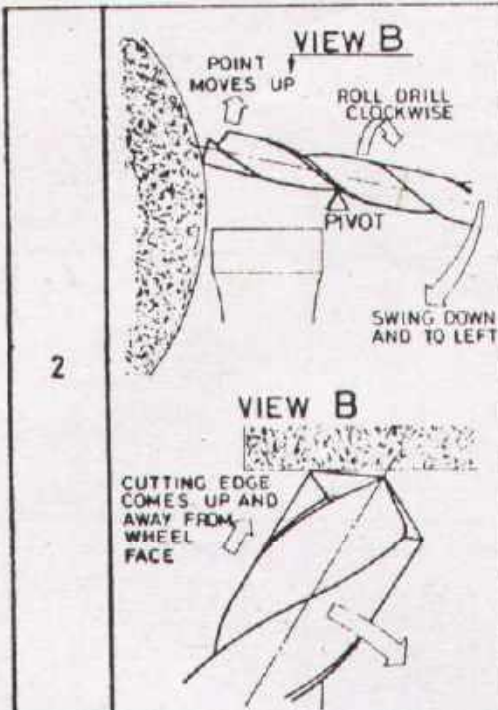
cont. 101

SCALE 1:1	<b>TWIST DRILL SHARPENG.</b>	No. 1-0.5/10
MAT. HIGH SPEED ST.		OFFHAND GRINDING

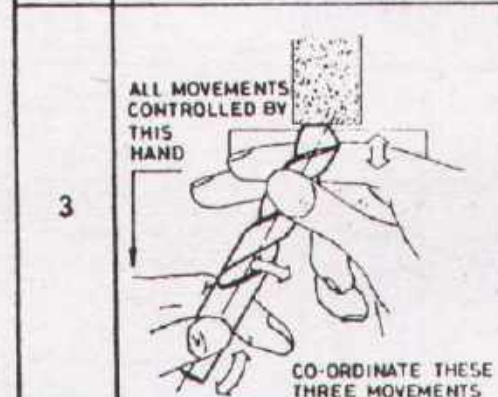


DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

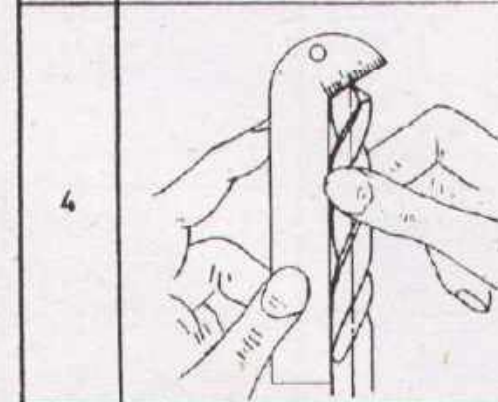
PAK-GERMAN TECHNICAL TRAINING PROGRAMME



- 2.1 SWING THE SHANK OF THE DRILL SLIGHTLY DOWNWARDS AND TO THE LEFT (OR RIGHT) HAND. THE OTHER HAND IS SUPPORTED BY THE TOOL REST.
- 2.2 ROLL THE DRILL TO THE RIGHT BY TURNING IT BETWEEN THE THUMB AND FINGER, AS YOU SWING THE HAND DOWN.
- 2.3 APPLY A SLIGHT FORWARD MOTION TO YOUR HAND. THIS PRODUCES THE LIP CLEARANCE.



- 3.1 MOVE THE DRILL BACK CLEAR OF THE WHEEL FACE.
- 3.2 TURN THE DRILL OVER WITHOUT MOVING THE POSITION. THIS PRESENTS THE SECOND EDGE TO THE WHEEL FACE AT THE SAME ANGLE AS THE FIRST CUTTING EDGE.  
PROCEED TO SHARPEN THE SECOND CUTTING EDGE USING THE SAME DRILL MOVEMENT AS BEFORE.



- 4.1 USE A DRILL GAUGE TO CHECK THAT THE CUTTING ANGLE IS CORRECT  $118^\circ$  FOR MILD STEEL, THE CUTTING EDGES ARE OF EQUAL LENGTH, THE LIP CLEARANCES ARE EQUAL AND CORRECT, ABOUT 10 TO 12 DEGREES.

SCALE 1:1

MAT. HIGH SPEED ST

## TWIST DRILL SHARPENING

No. 1-0.5/10-1

OFFHAND GRINDING



DEVELOPMENT CELL FOR SKILLED LABOUR TRAINING

PAK-GERMAN TECHNICAL TRAINING PROGRAMME



