

Fitter 1st Year – Transparencies

Table of Contents

Fitter 1st Year – Transparencies	1
1. TR 01 01 01 01 93 – HAND HAMMERS – APPLICATIONS.....	1
2. TR 01 01 01 02 93 – HACKSAW BLADE – SELECTION.....	2
3. TR 01 01 01 03 93 – CUT OF FILES.....	3
4. TR 01 01 01 04 93 – TYPES OF CHISELS AND APPLICATION.....	5
5. TR 01 01 01 05 93 – FIXING FILE HANDLES.....	7
6. TR 01 02 01 01 93 – VERNIER CALIPER PARTS AND PRINCIPLE.....	9
7. TR 01 02 01 02 93 – READING OF VERNIER CALIPER.....	9
8. TR 01 02 02 01 93 – MICROMETER PARTS AND GRADUATIONS.....	11
9. TR 01 02 02 02 93 – MICROMETER READING.....	12
10. TR 01 02 03 01 93 – VERNIER BEVEL PROTRACTOR PARTS & APPLICATION.....	13
11. TR 01 02 03 02 93 – BEVEL PROTRACTOR READING.....	14
12. TR 01 02 04 01 93 – VERNIER HEIGHT GAUGE.....	15
13. TR 01 02 05 01 93 – INSIDE MICROMETER.....	16
14. TR 01 02 06 01 93 – DEPTH MICROMETER.....	17
15. TR 01 02 09 01 93 – DATUM – CUMULATIVE ERROR IN MARKING.....	18
16. TR 01 04 01 01 93 – GRINDING WHEEL MARKING.....	20
17. TR 01 05 01 01 93 – CUTTING SPEED, FEED AND R.P.M. OF DRILLS.....	20
18. TR 01 05 02 01 93 – DRILL PARTS AND ANGLES.....	21
19. TR 01 05 02 02 93 – DRILL SHARPENING – DEFECTS THINNING OF WEB.....	23
20. TR 01 06 01 01 93 – FUNDAMENTALS OF LIMITS AND FITS.....	24
21. TR 01 06 01 02 93 – CLASSES OF FIT.....	25
22. TR 01 06 01 03 93 – SHAFT BASIS AND HOLE BASIS SYSTEM OF LIMITS AND FITS.....	26
23. TR 01 11 03 01 93 – BLIND RIVETING WITH POP RIVETS.....	27
24. TR 01 15 03 01 93 – DIFFERENT METHODS OF TAPER TURNING (FORM TOOL AND COMPOUND REST).....	28
25. TR 01 15 03 02 93 – DIFFERENT METHODS OF TAPER TURNING (TAIL STOCK SET OVER AND TAPER TURNING ATTACHMENT).....	30
Back Cover.....	31

Fitter 1st Year – Transparencies



Directorate General of Employment & Training, Ministry of Labour, Govt. of India.

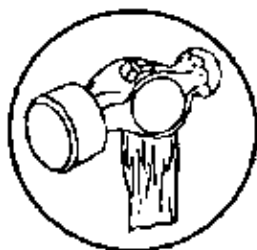
CIMI CENTRAL INSTRUCTIONAL
MEDIA INSTITUTE, MADRAS
AN INDO-GERMAN PROJECT

NOTE:

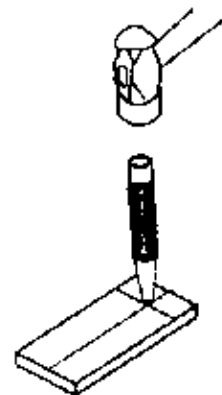
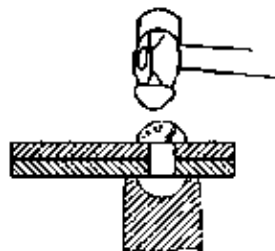
CIMI has developed a set of twenty five transparencies in order to assist the instructors in presenting their lessons. These transparencies cover only a part of the syllabus content but CIMI is working towards producing transparencies to cover all the major portion of the trade syllabus progressively.

In order to reduce the number of transparencies, these transparencies are slightly over loaded with informations. To overcome the adverse effects of such overloaded OHP transparencies, it is suggested that the instructors may use a thin board or paper and reveal part by part of the transparency that is required for explanation. You may find that in most transparencies, informations are incomplete. This is intentionally designed with a view to enhancing classroom interaction. For the assistance of the instructor a key is provided along with each transparency.

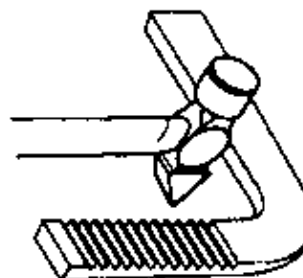
1. TR 01 01 01 01 93 – HAND HAMMERS – APPLICATIONS

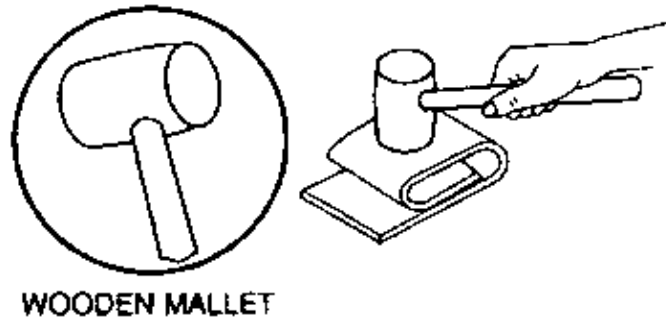
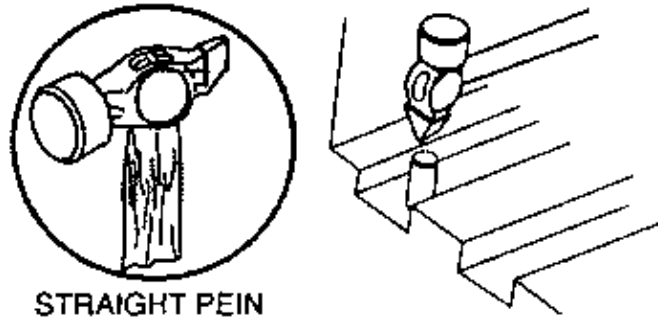
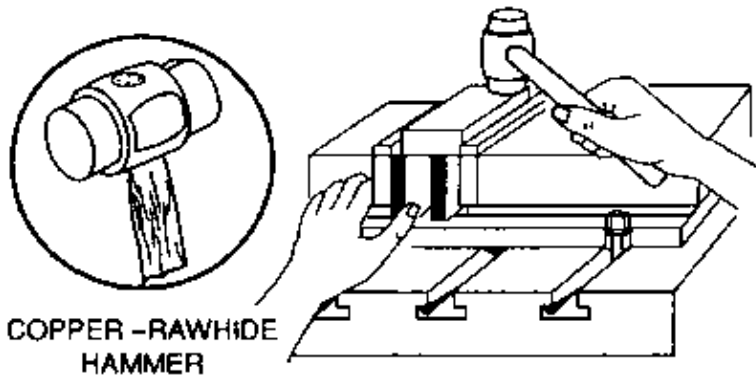


BALL PEIN

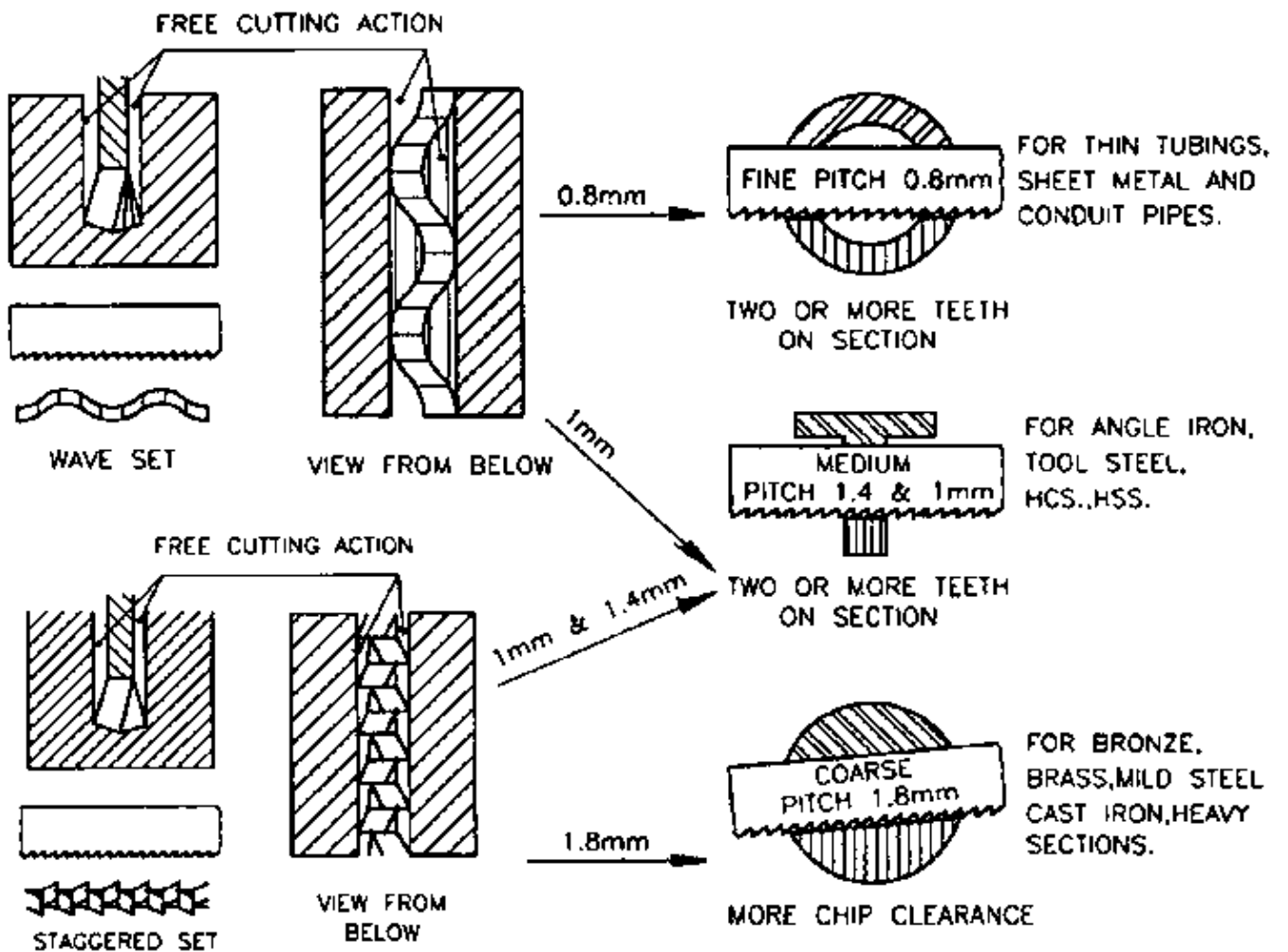
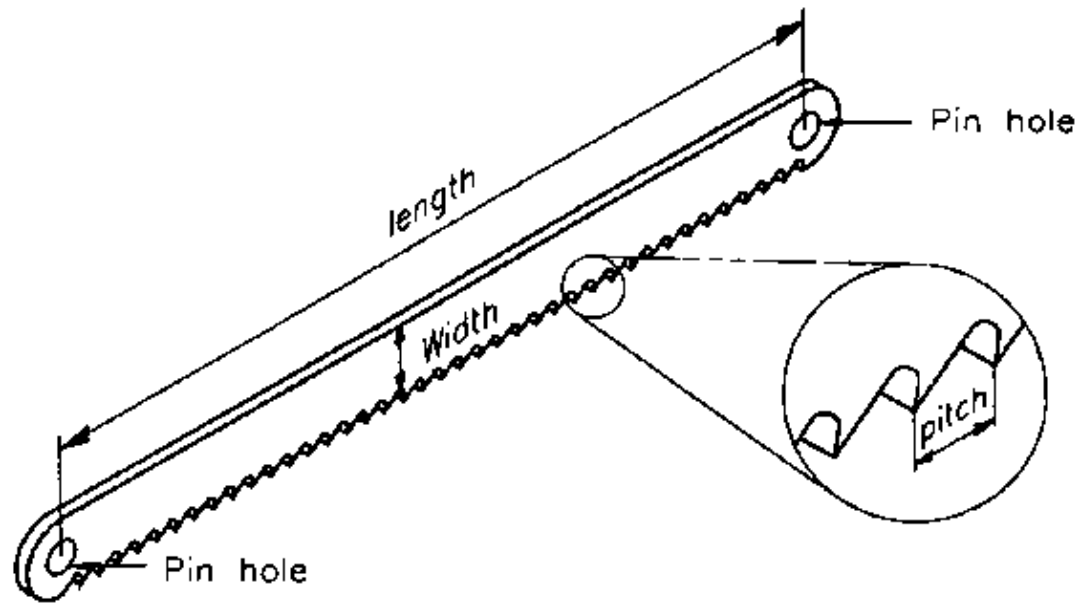


CROSS PEIN





2. TR 01 01 01 02 93 – HACKSAW BLADE – SELECTION



3. TR 01 01 01 03 93 – CUT OF FILES

- SINGLE CUT FILES USED FOR FILING SOFT METALS

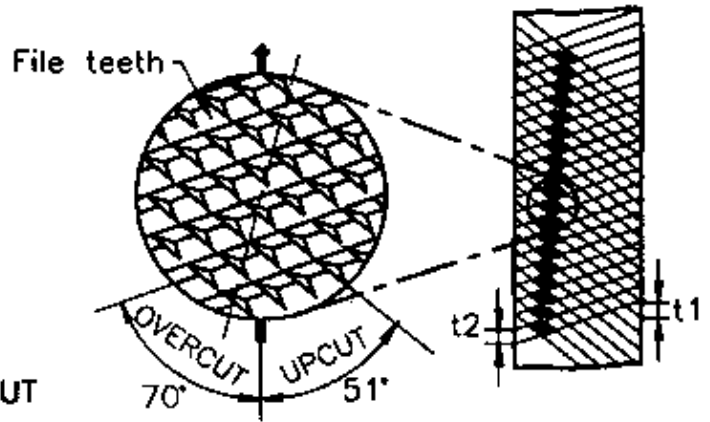
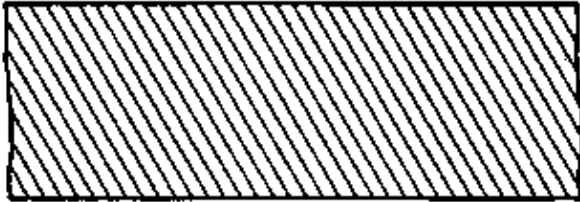
Eg. ALUMINIUM, BRASS, BRONZE ETC

• DOUBLE CUT FILES USED FOR FILING HARD METALS

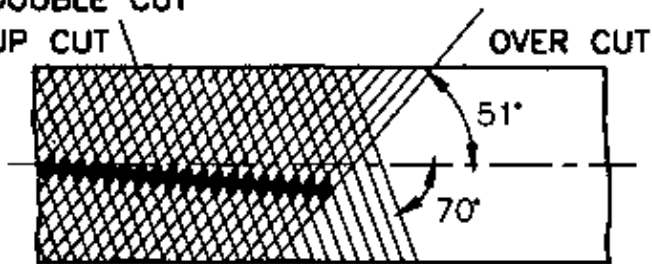
Eg. STEEL, CAST IRON ETC.

THESE FILES HAVE OVERCUT & UPCUT AT DIFFERENT ANGLES AND DIFFERENT SPACING OF TEETH. DUE TO THIS TEETH DO NOT FALL BEHIND ONE AFTER THE OTHER

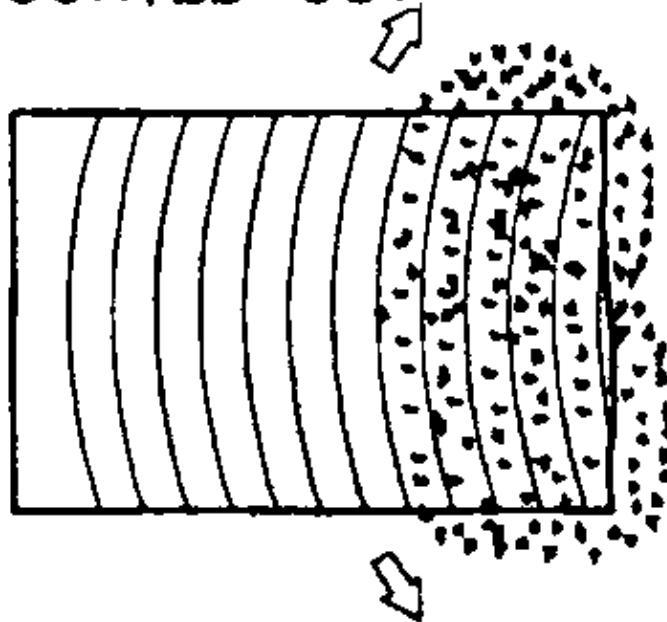
SINGLE CUT



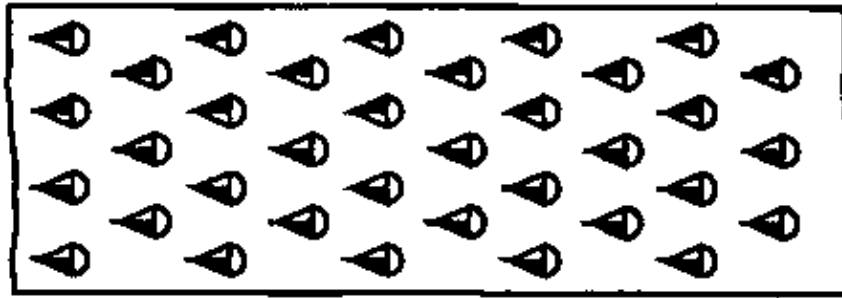
DOUBLE CUT UP CUT



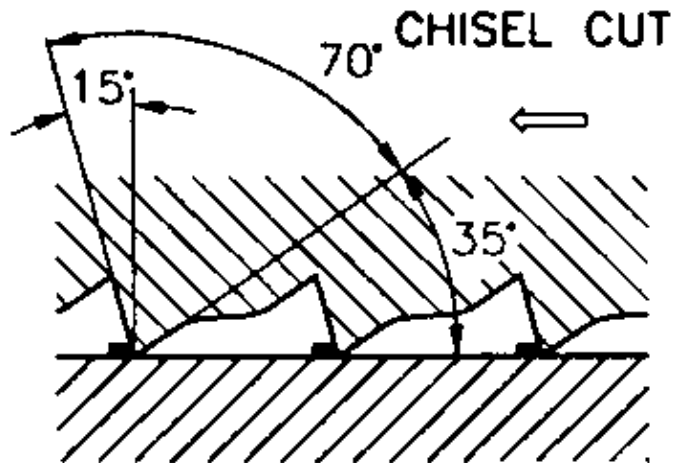
CURVED CUT



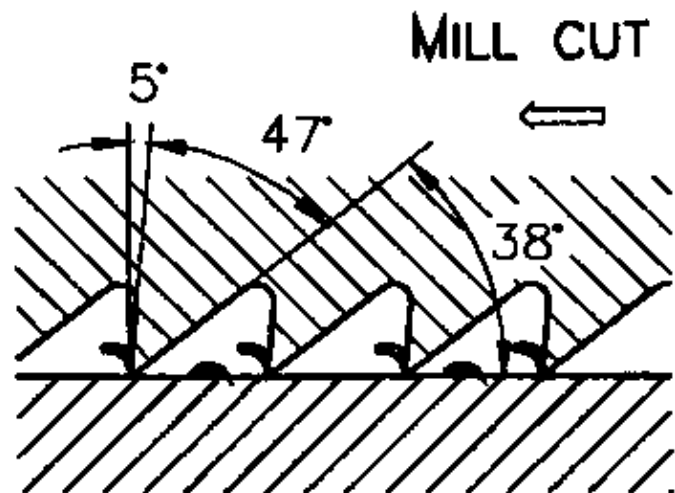
RASP CUT



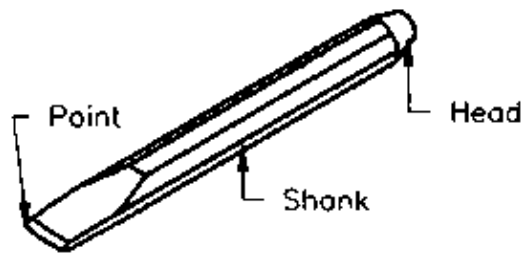
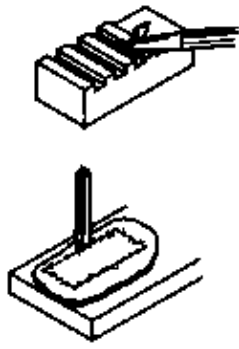
FOR HARD METALS NEGATIVE RAKE SCRAPING ACTION



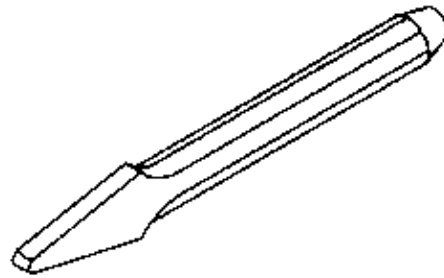
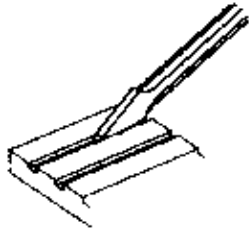
FOR SOFT METALS CUTTING ACTION



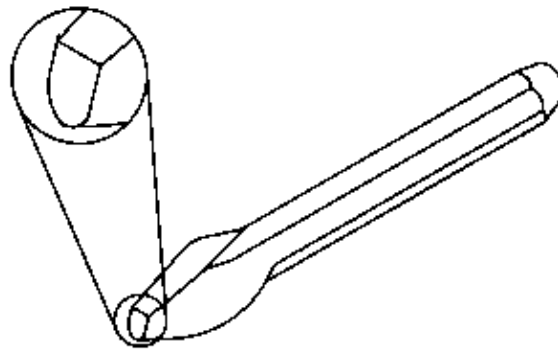
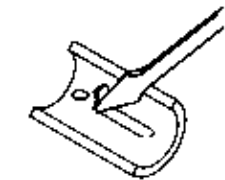
4. TR 01 01 01 04 93 – TYPES OF CHISELS AND APPLICATION



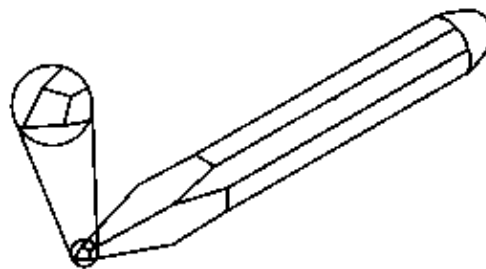
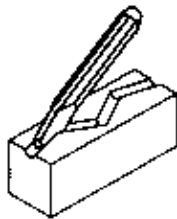
(a) Flat chisel



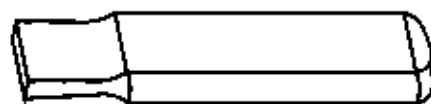
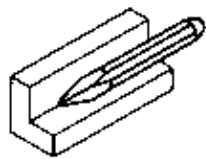
(b) Cross-Cut Chisel



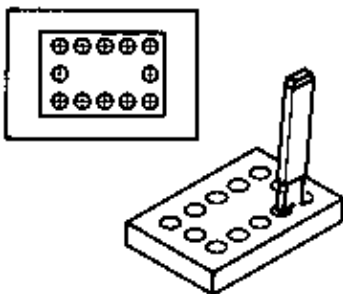
(c) Round-nose chisel



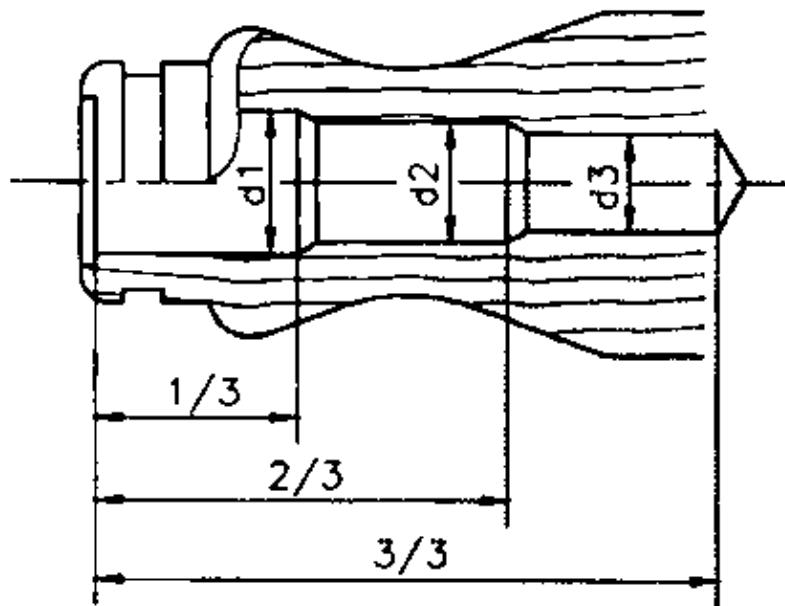
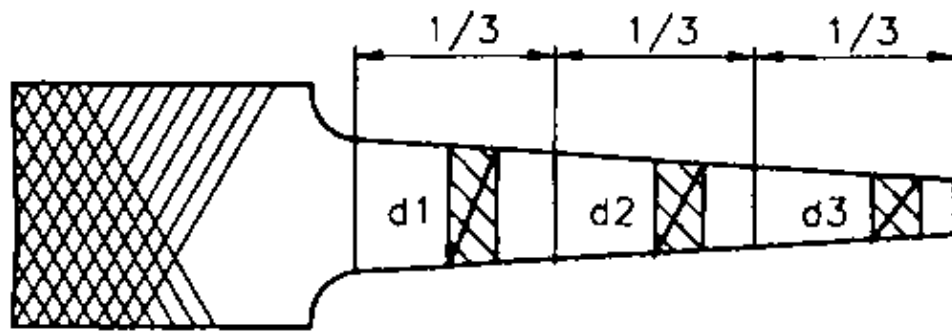
(D) Diamond-point chisel

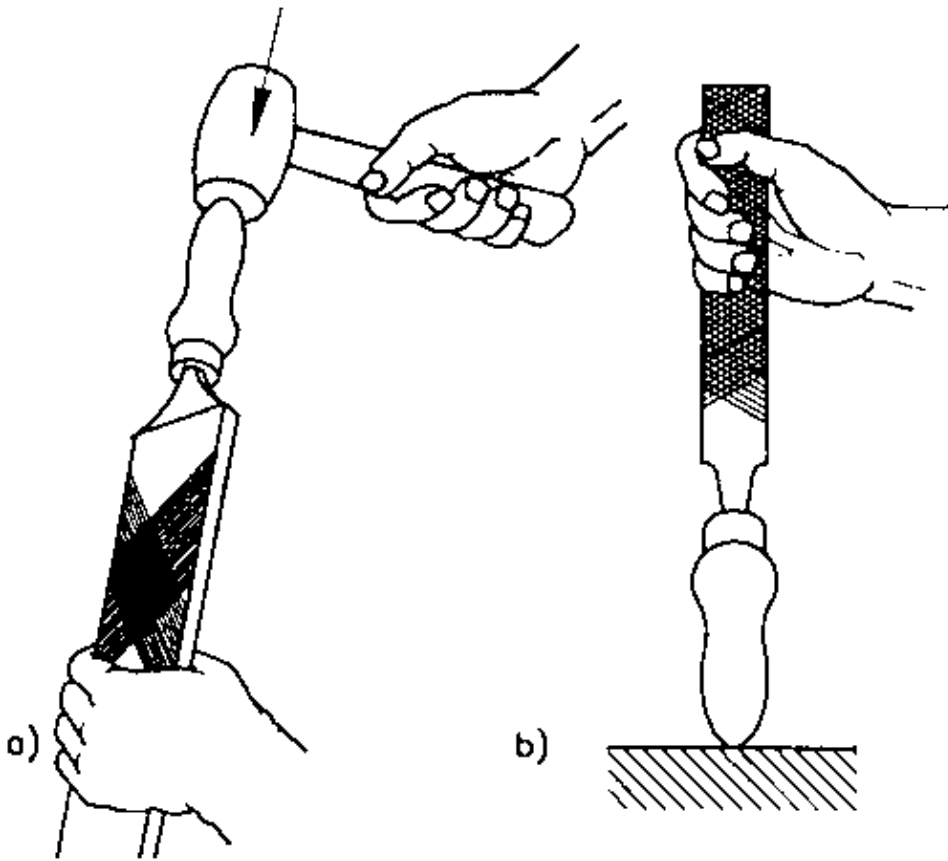


(e) Web chisel

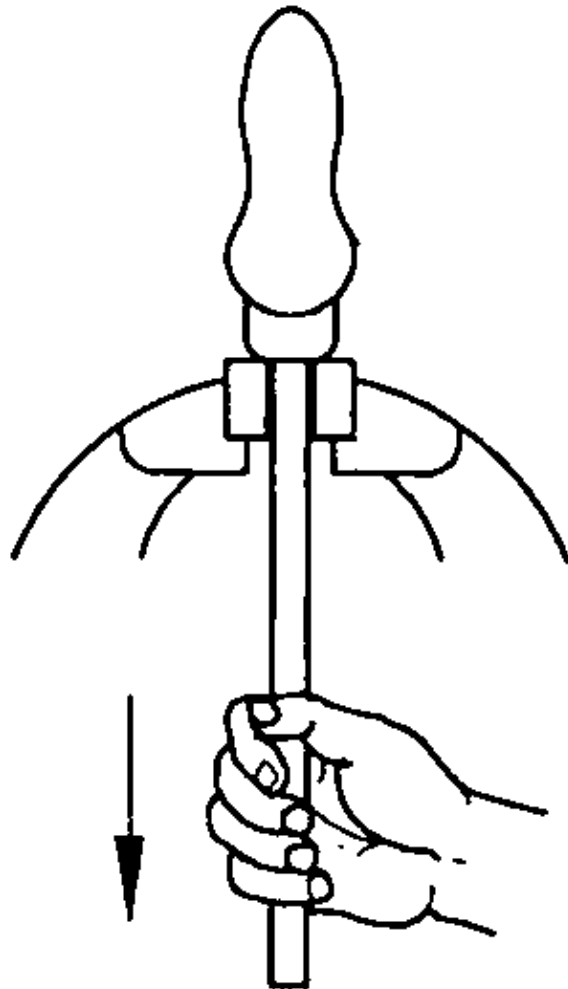


5. TR 01 01 01 05 93 – FIXING FILE HANDLES

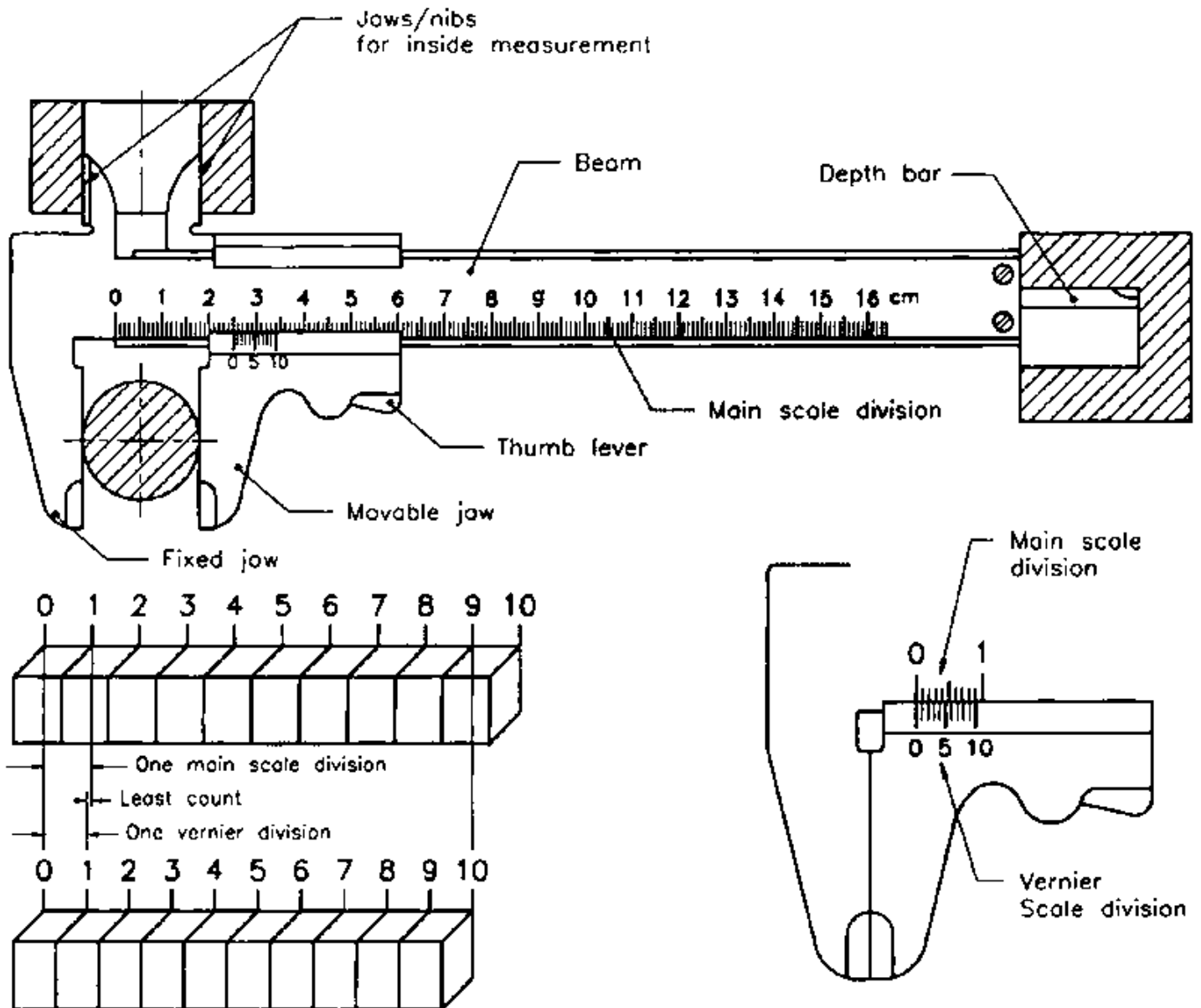




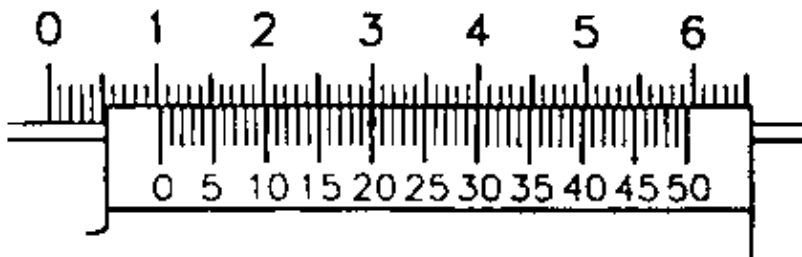
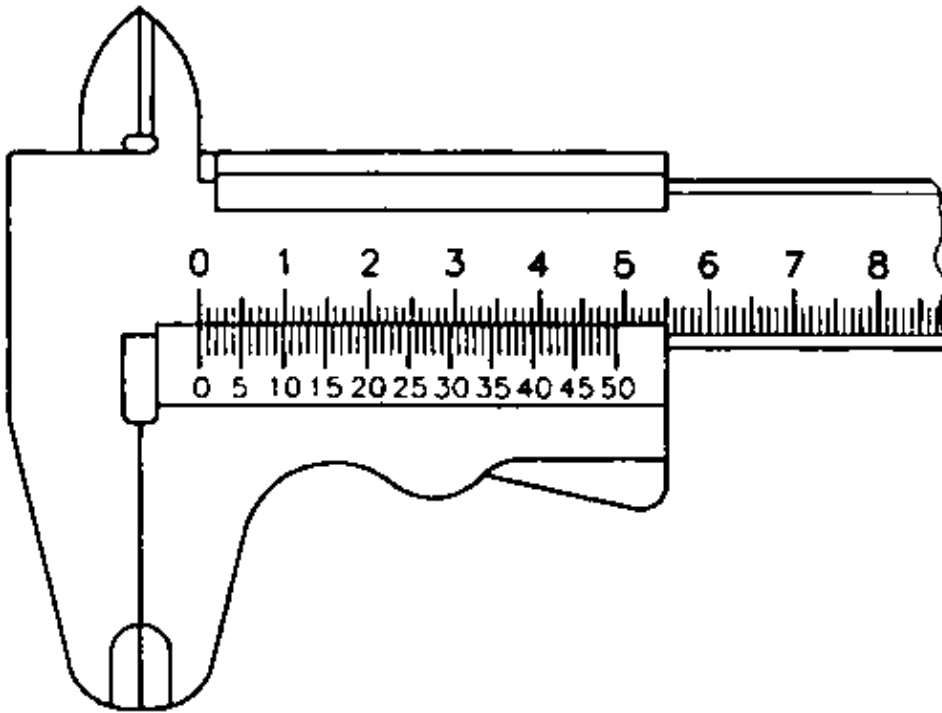
FIXING HANDLE



6. TR 01 02 01 01 93 – VERNIER CALIPER PARTS AND PRINCIPLE



7. TR 01 02 01 02 93 – READING OF VERNIER CALIPER



49 Main scale divisions are divided into 50 vernier scale divisions

$$\text{Value of 1VSD} = \frac{49}{50} \text{ mm}$$

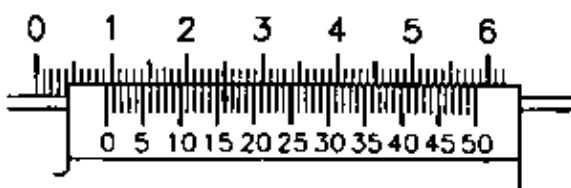
$$\begin{aligned} \text{Least count} &= 1\text{MD} - 1\text{VSD} \\ &= 1 - \frac{49}{50} \\ &= \frac{1}{50} = 0.02 \text{ mm} \end{aligned}$$

Main scale reading = 10.00 mm

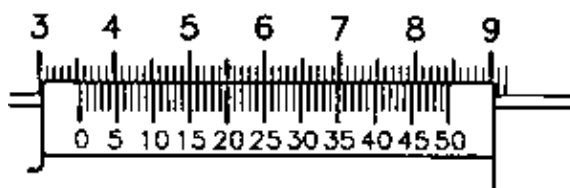
Value of coinciding vernier division = 00.40 mm

Reading = 10.40 mm

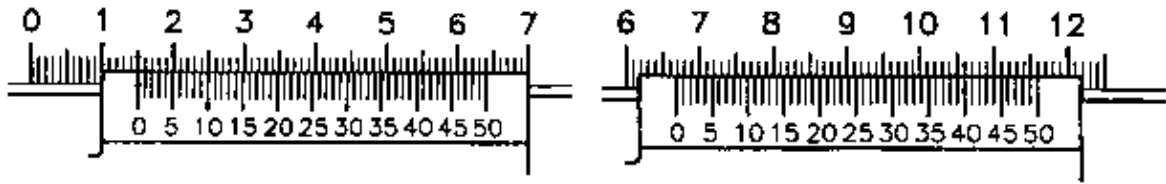
Assignments:-



A Reading 9.32 mm



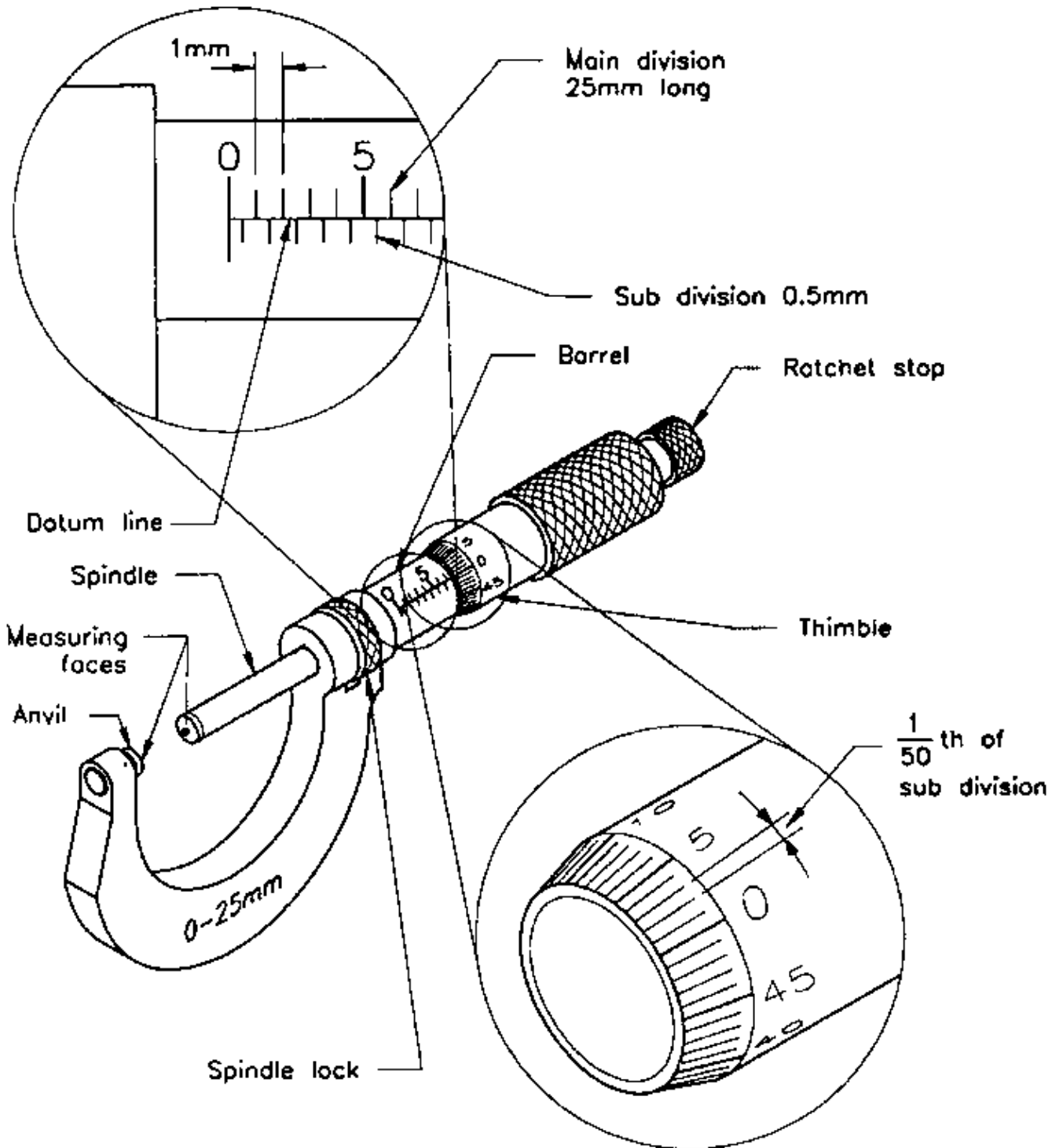
B Reading 35.80 mm



C Reading 15.00 mm

D Reading 66.80 mm

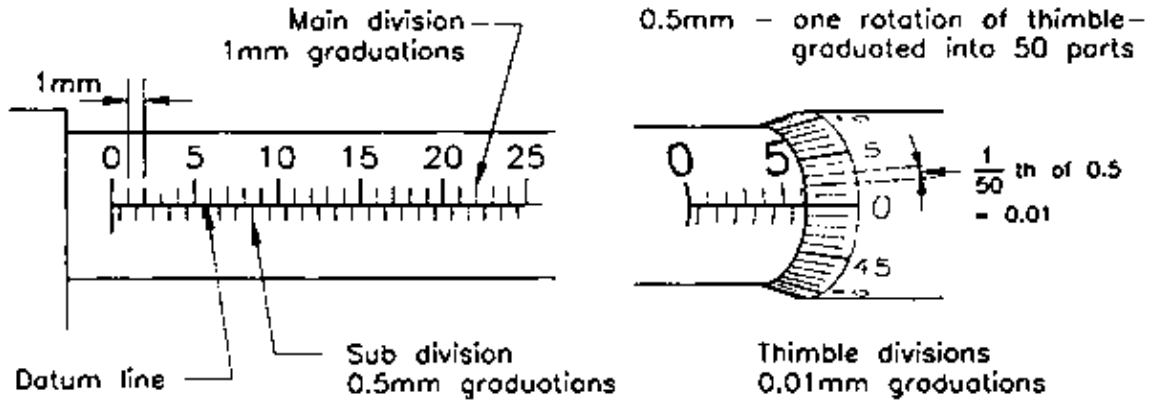
8. TR 01 02 02 01 93 – MICROMETER PARTS AND GRADUATIONS



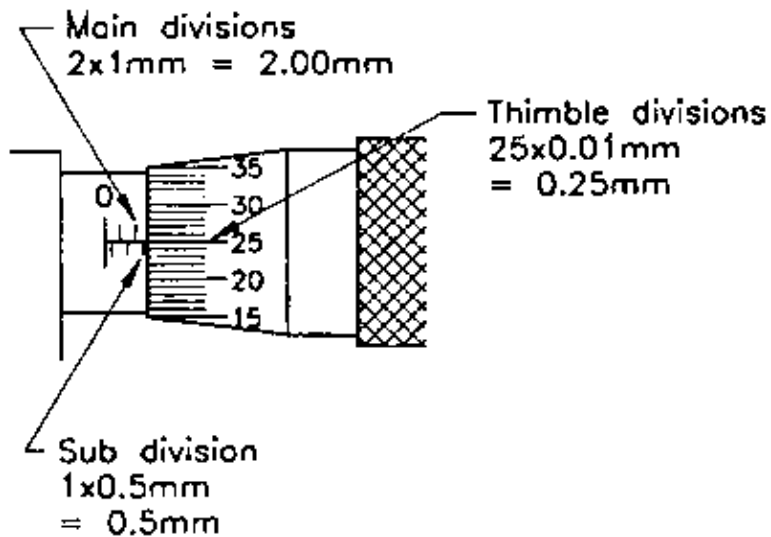
$$\text{Leastcount} = \frac{1}{50} \text{th of } 0.5 = 0.01\text{mm}$$

9. TR 01 02 02 02 93 – MICROMETER READING

Micrometer graduations

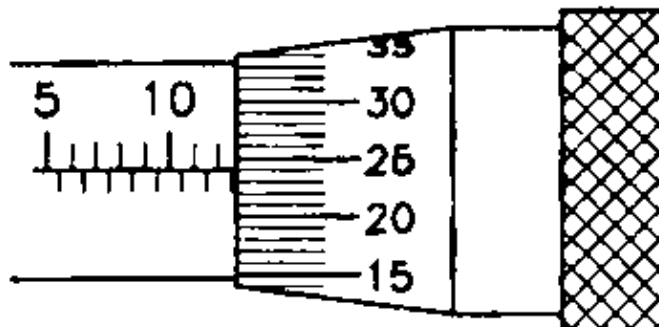


Micrometer reading



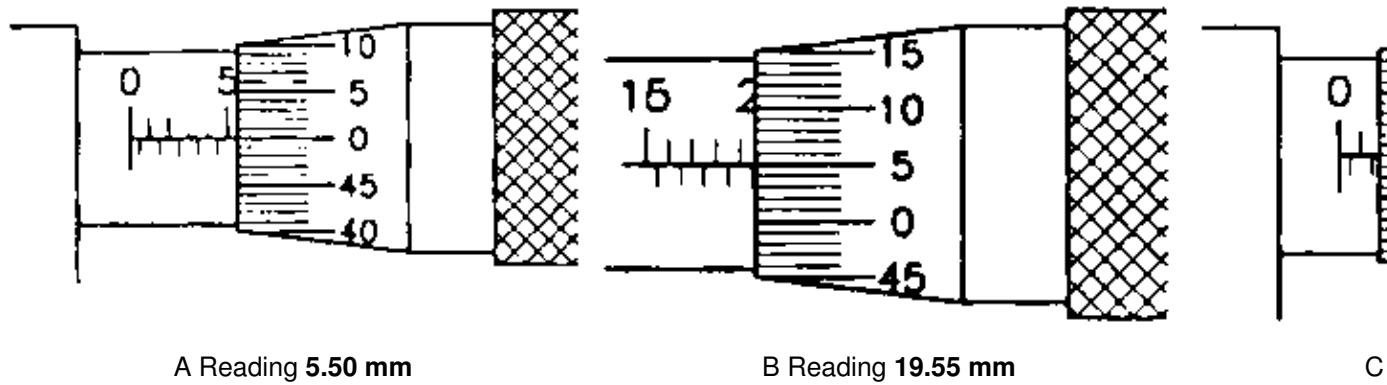
Main divisions = 2.00 mm
 Sub division = 0.50 mm
 Thimble divisions = 0.25 mm
 Reading = 2.75 mm

Exomple

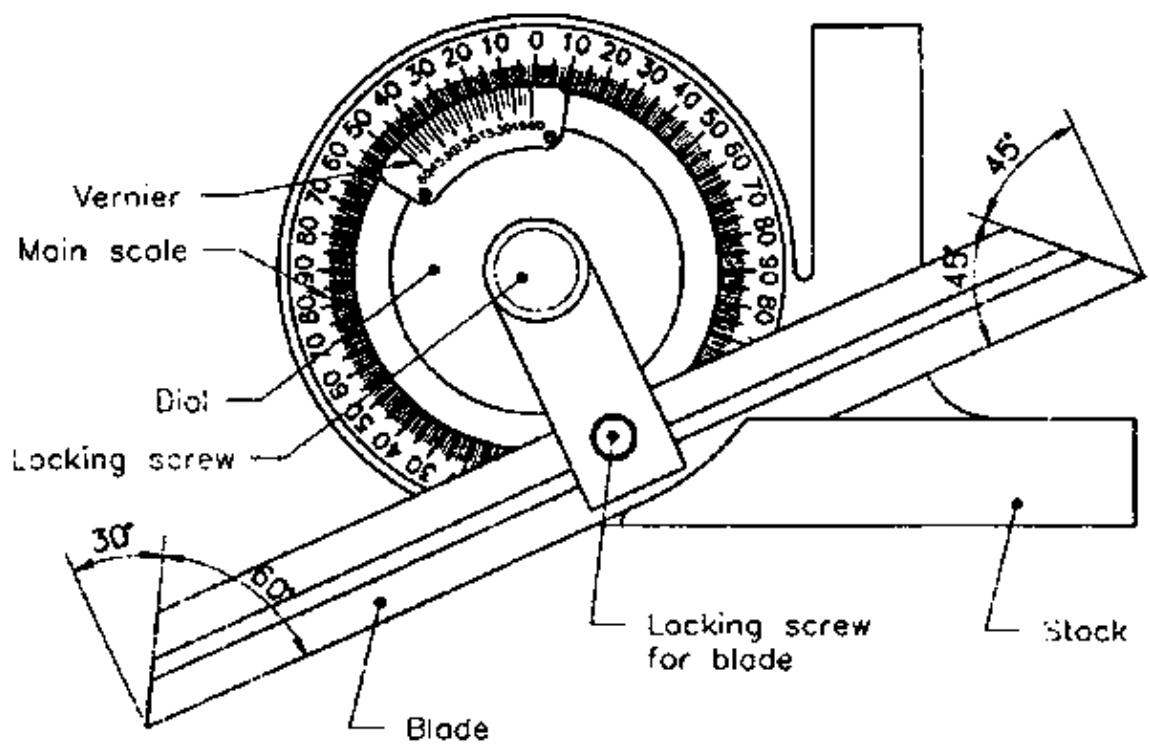


Main divisions = 12.00 mm
 Sub division = 0.50 mm
 Thimble divisions = 0.24 mm
 Reading = 12.74 mm

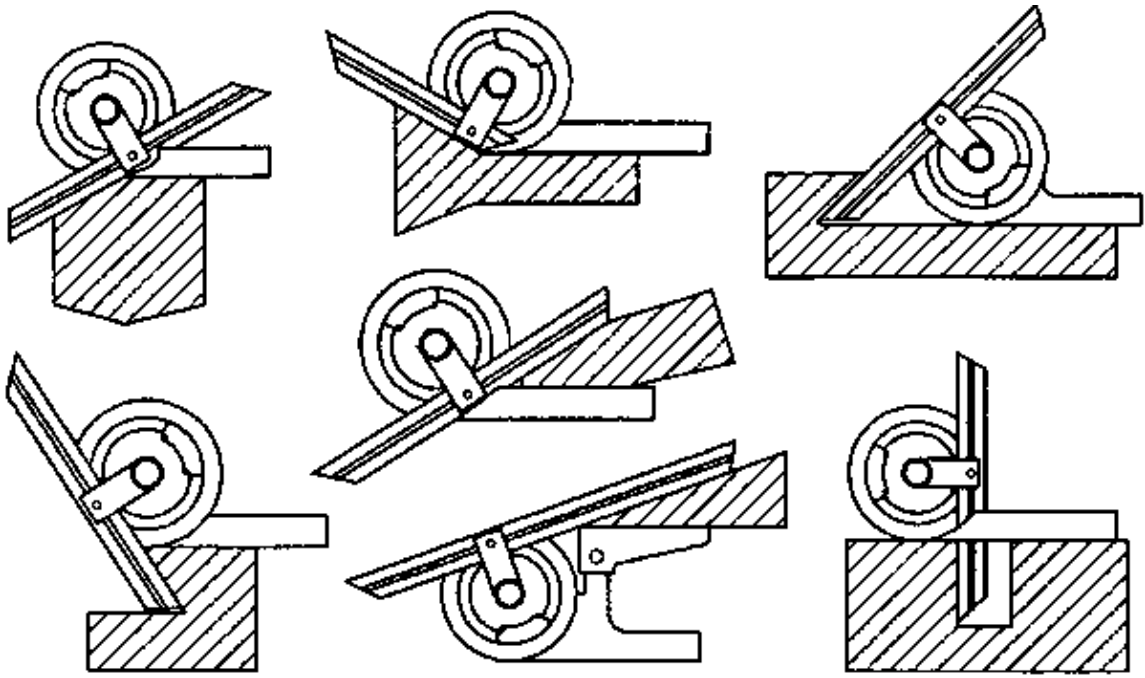
Assignments:-



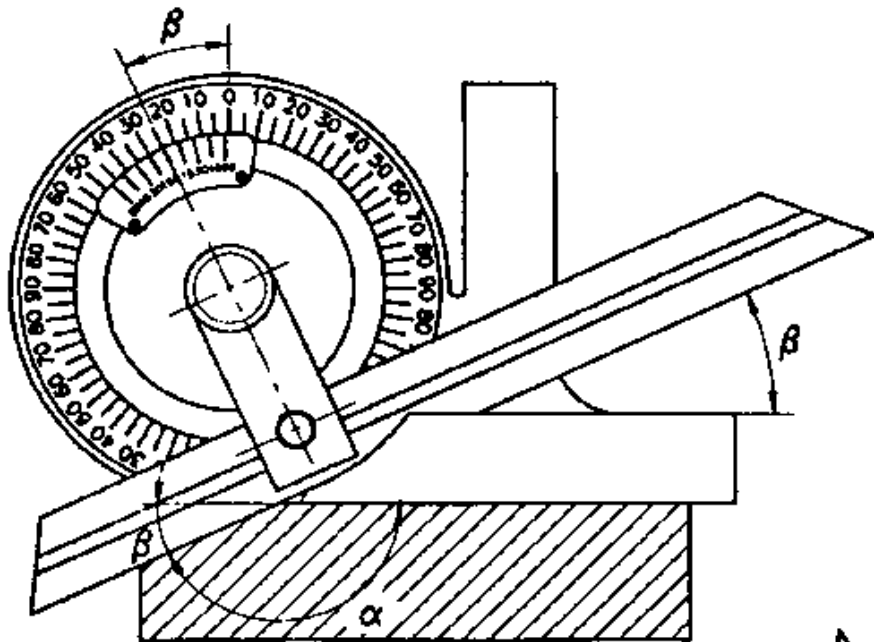
10. TR 01 02 03 01 93 – VERNIER BEVEL PROTRACTOR PARTS & APPLICATION



Applications:-



11. TR 01 02 03 02 93 – BEVEL PROTRACTOR READING

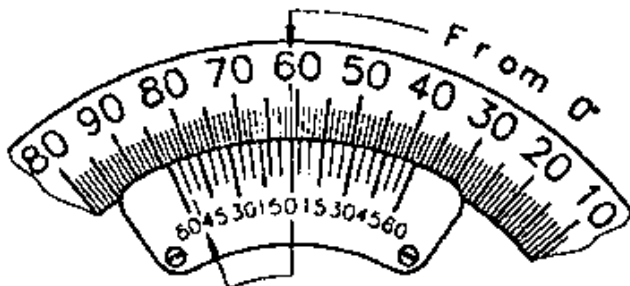
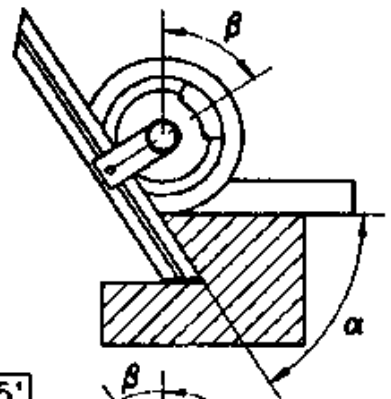


Obtuse angle
 $\alpha = 180^\circ - \beta$

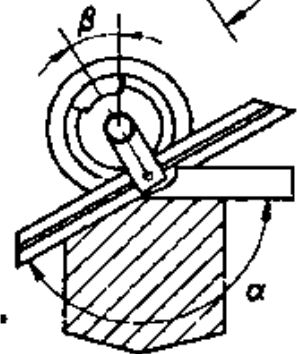
Assignments:-



A Reading $\alpha = \beta = 54^\circ 25'$



B Reading $\alpha = 180^\circ - \beta$
 $= 180^\circ - 60^\circ 55'$
 $119^\circ 5'$

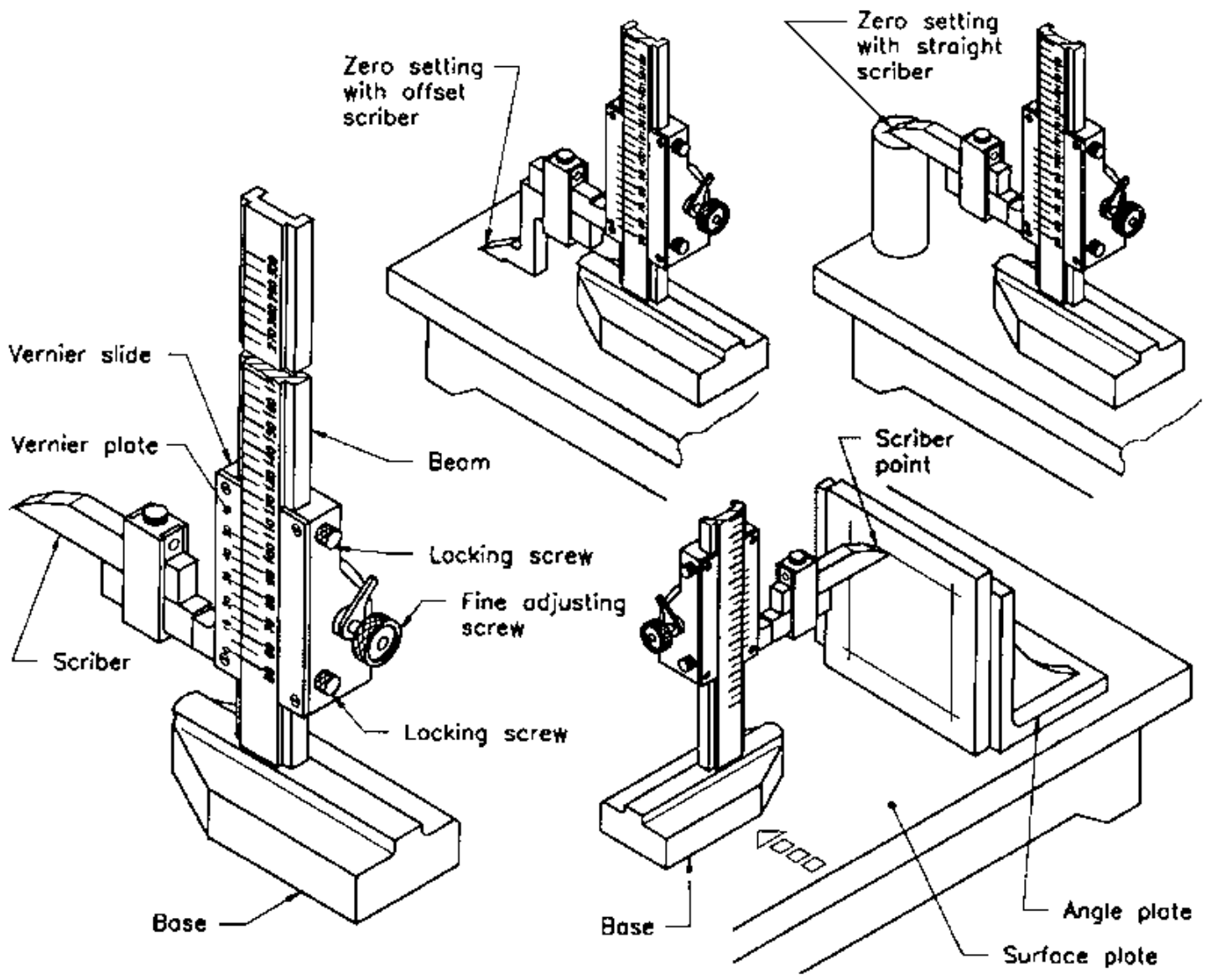


C Reading $29^\circ 10'$

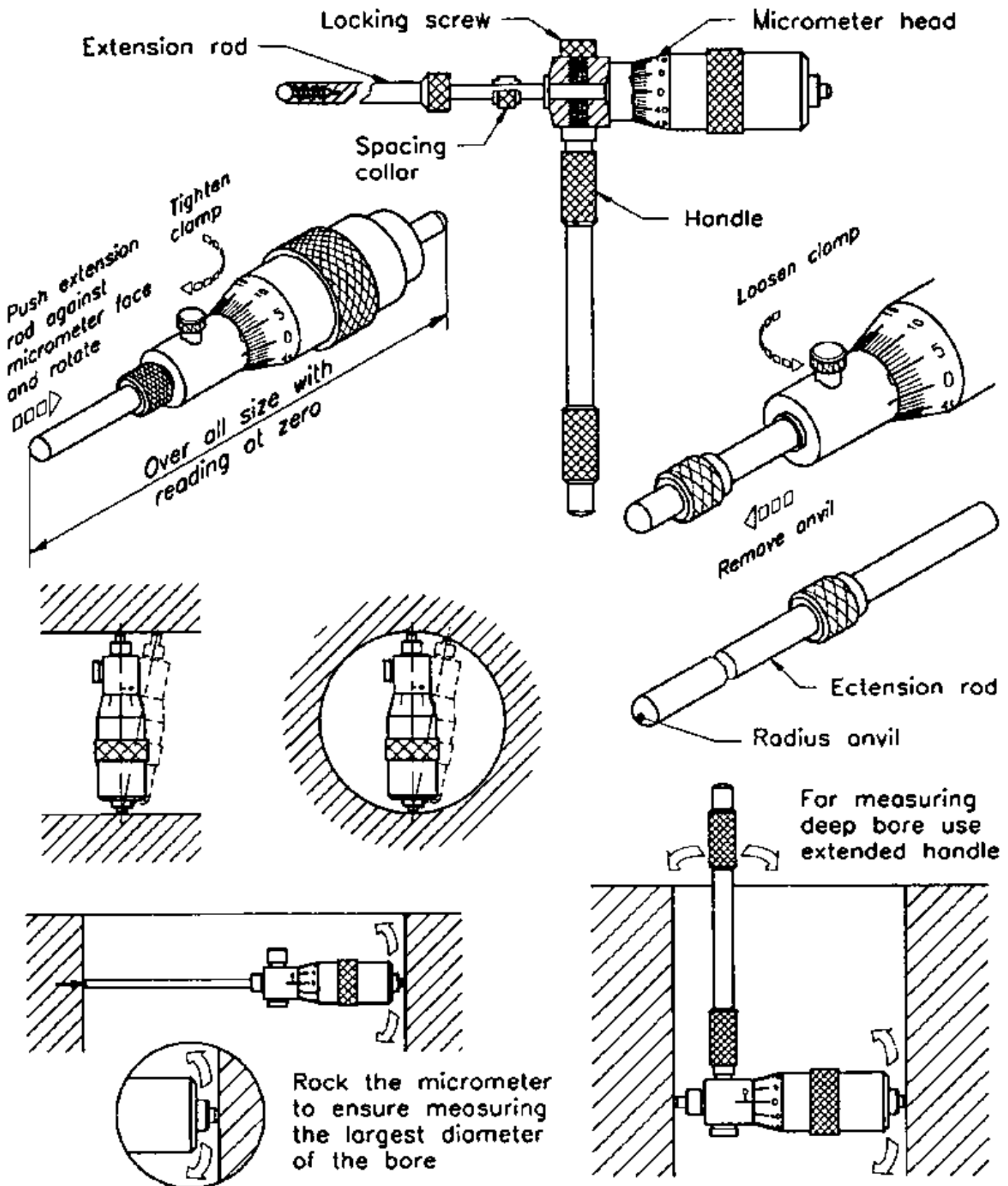


D Reading $30^\circ 35'$

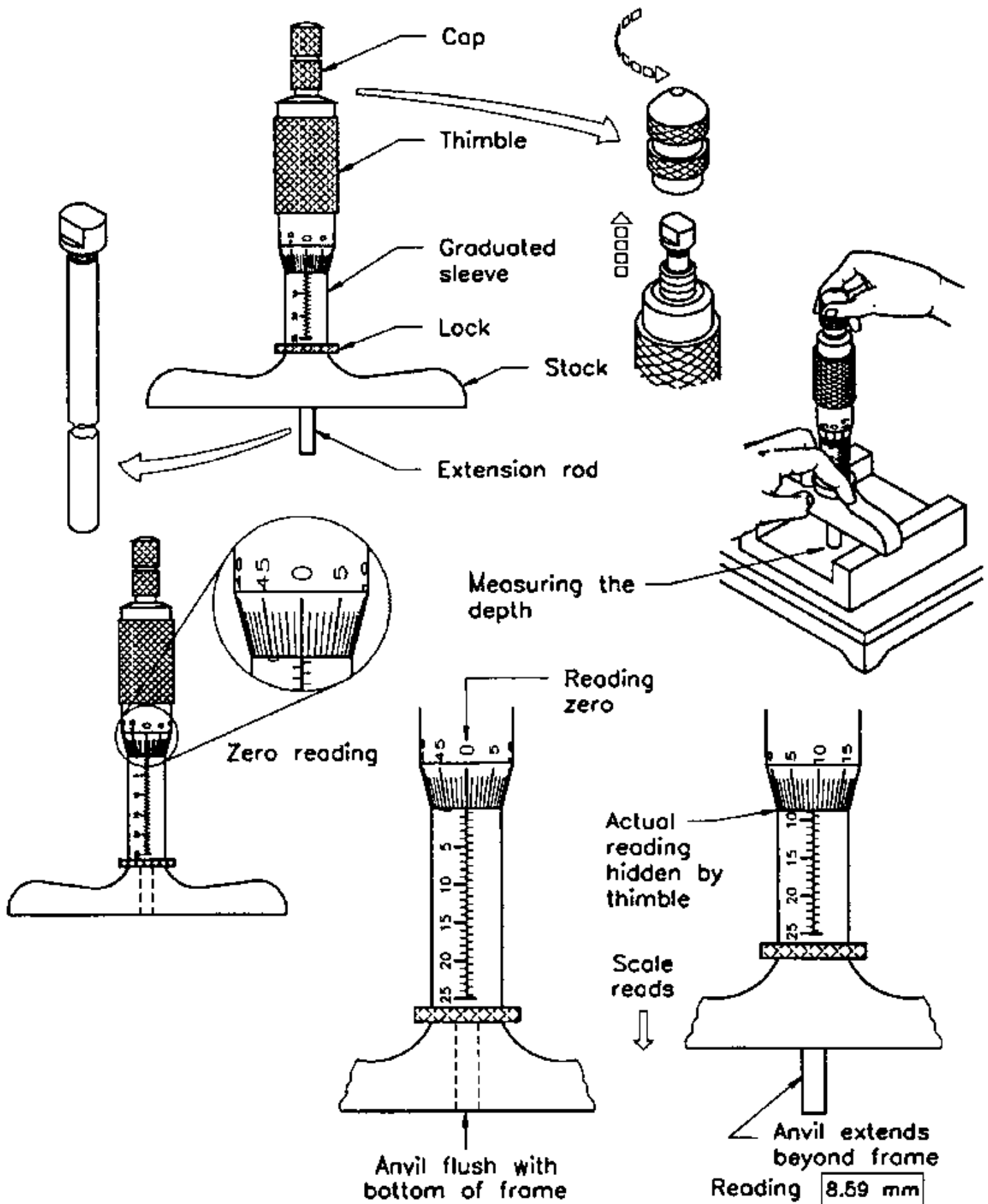
12. TR 01 02 04 01 93 – VERNIER HEIGHT GAUGE



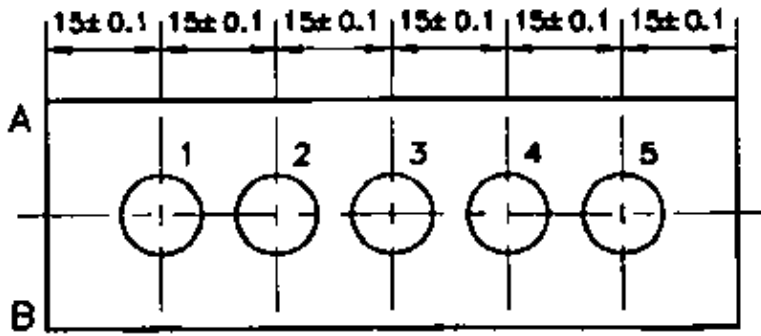
13. TR 01 02 05 01 93 – INSIDE MICROMETER



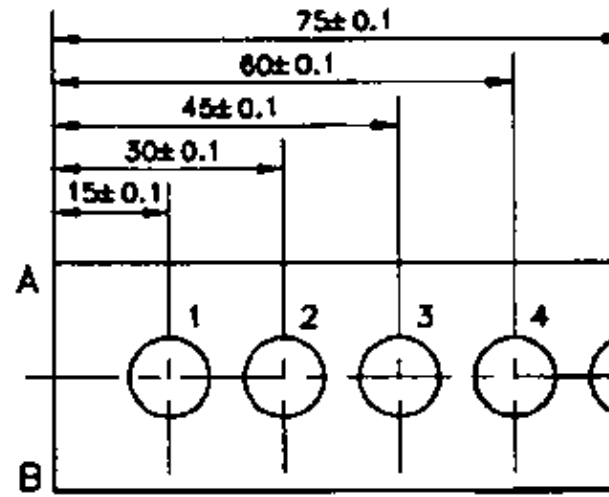
14. TR 01 02 06 01 93 – DEPTH MICROMETER



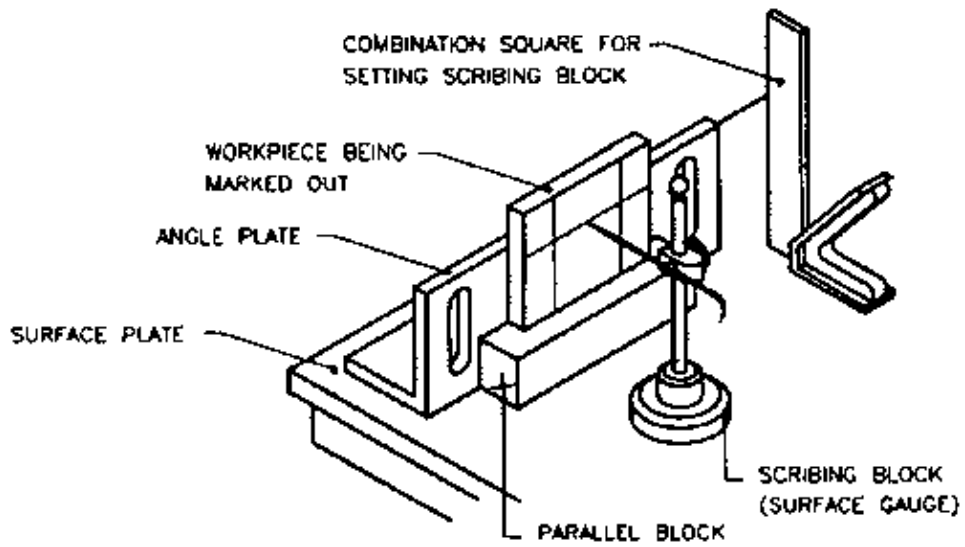
15. TR 01 02 09 01 93 – DATUM – CUMULATIVE ERROR IN MARKING



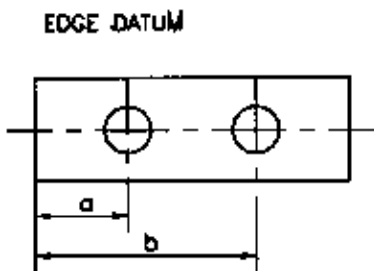
Dimensions marked progressively.
Cumulative error may built up



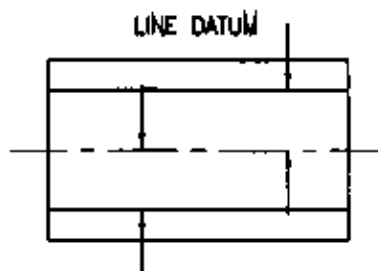
Each dimension is individually marked from one end.
possibility for cumulative error.



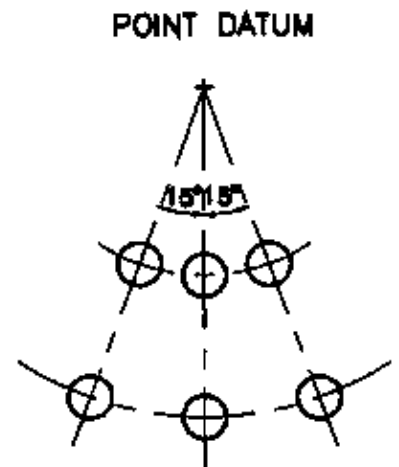
While marking datum is required
It can be a line or a reference surface



Reference for marking are the edges of the component.

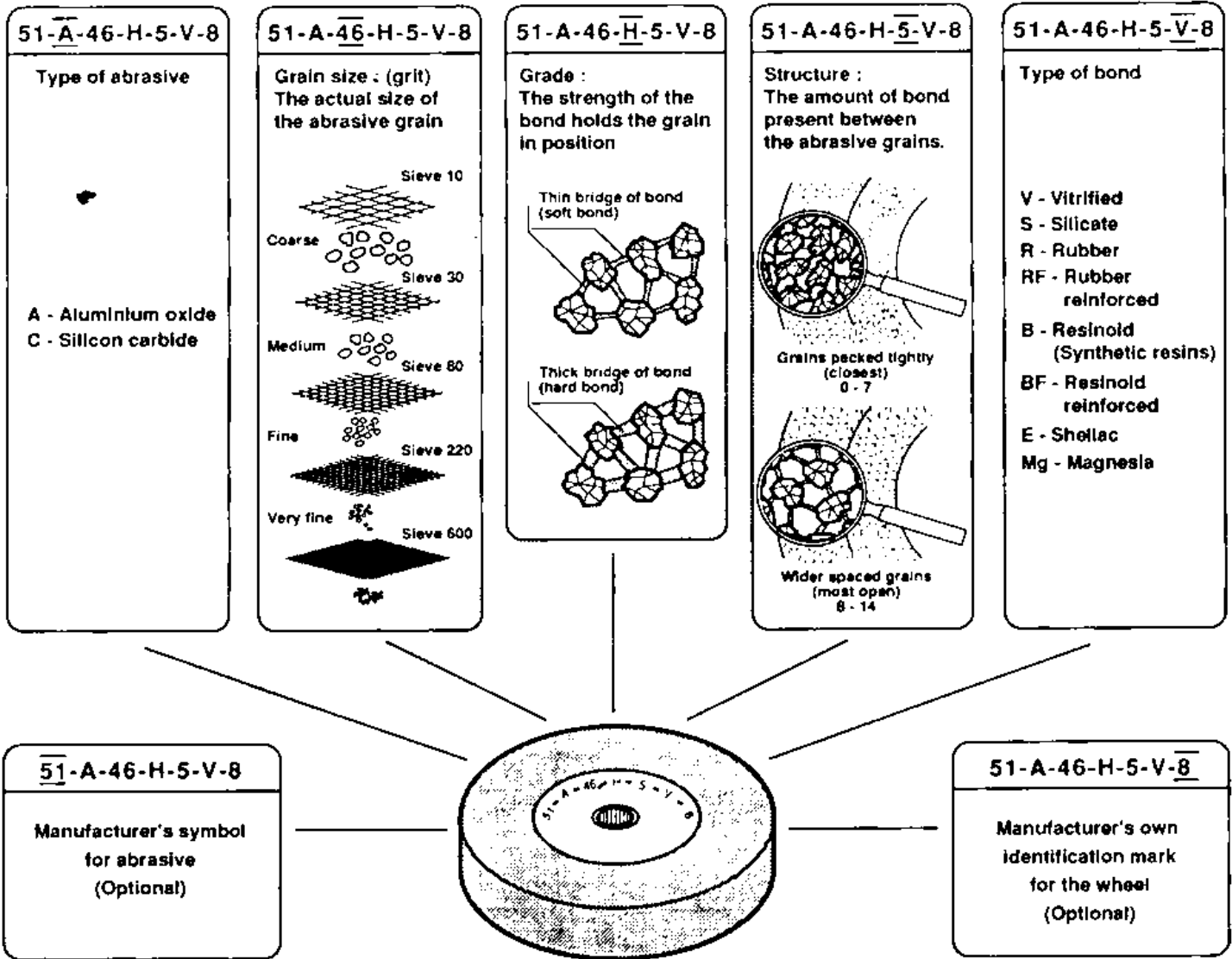


Dimensions are marked with centre line as reference.

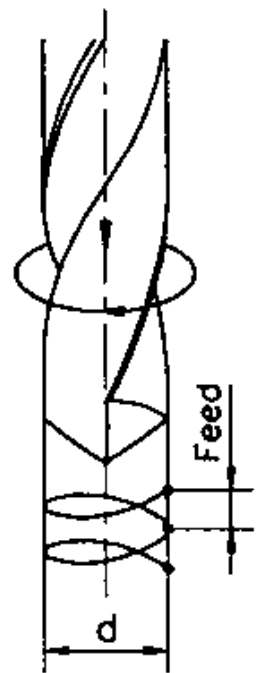
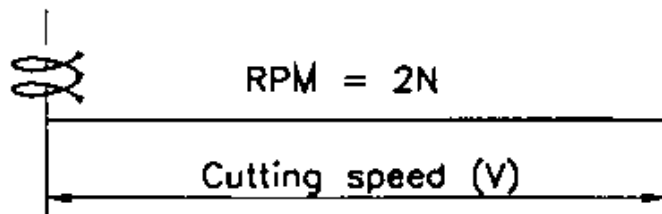
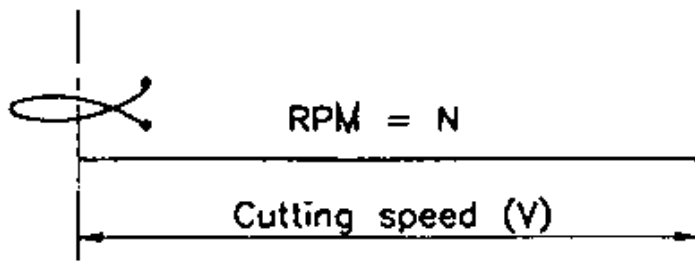
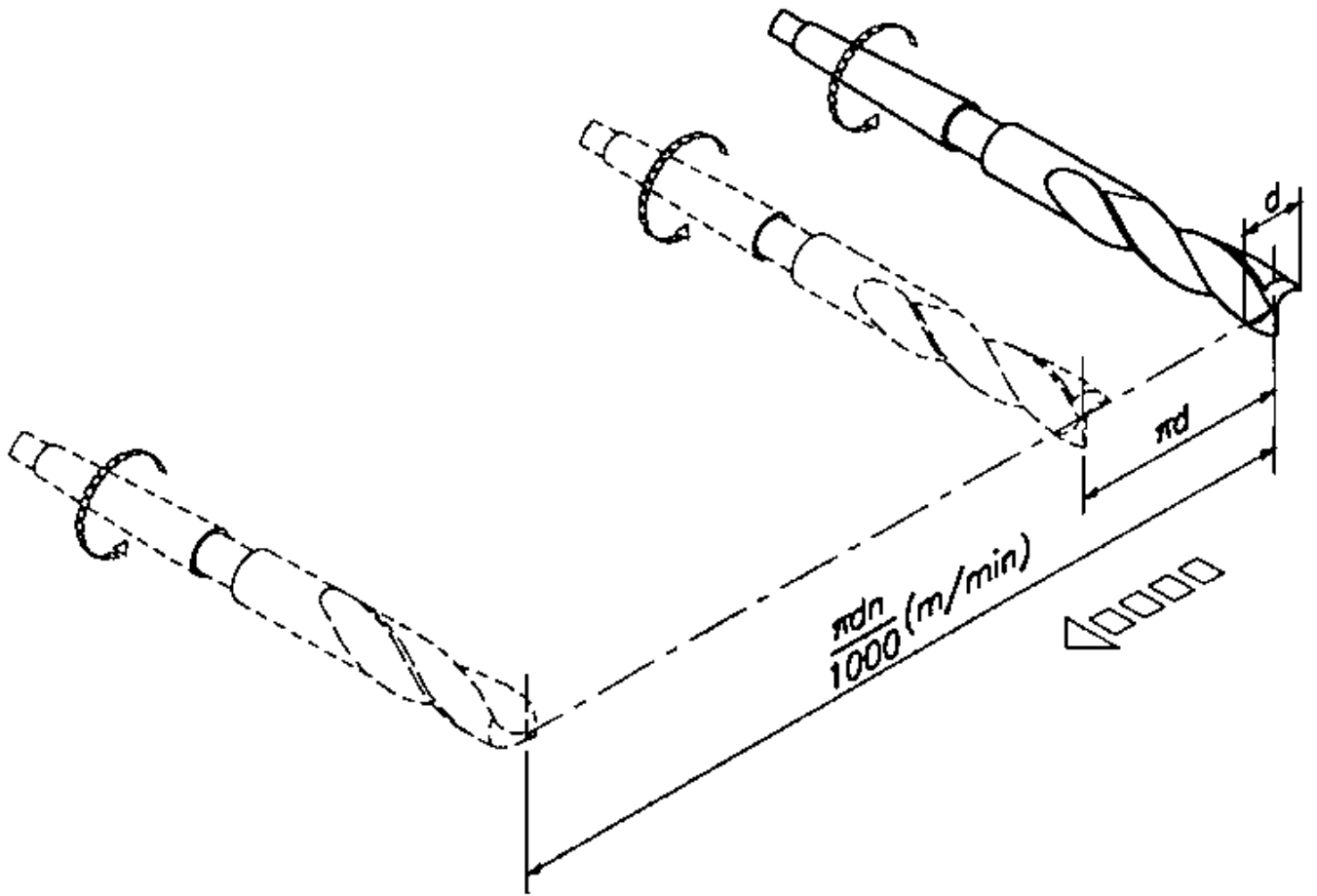


The reference for marking is a point

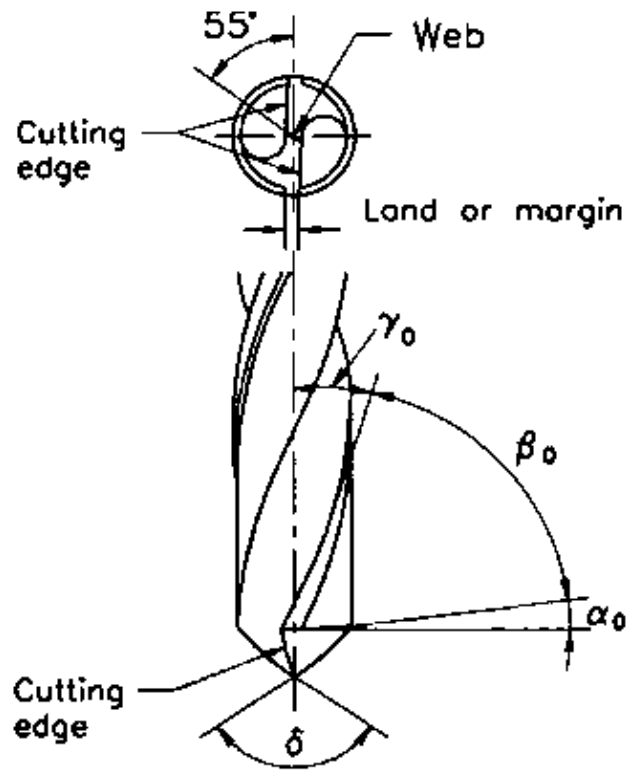
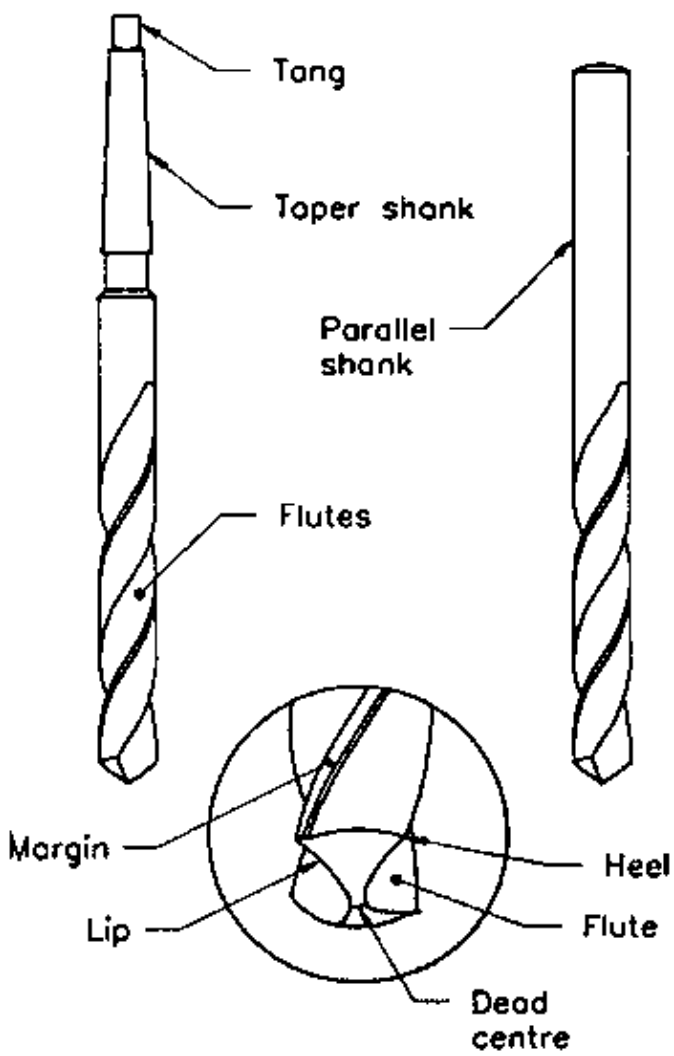
16. TR 01 04 01 01 93 – GRINDING WHEEL MARKING



17. TR 01 05 01 01 93 – CUTTING SPEED, FEED AND R.P.M. OF DRILLS



18. TR 01 05 02 01 93 – DRILL PARTS AND ANGLES

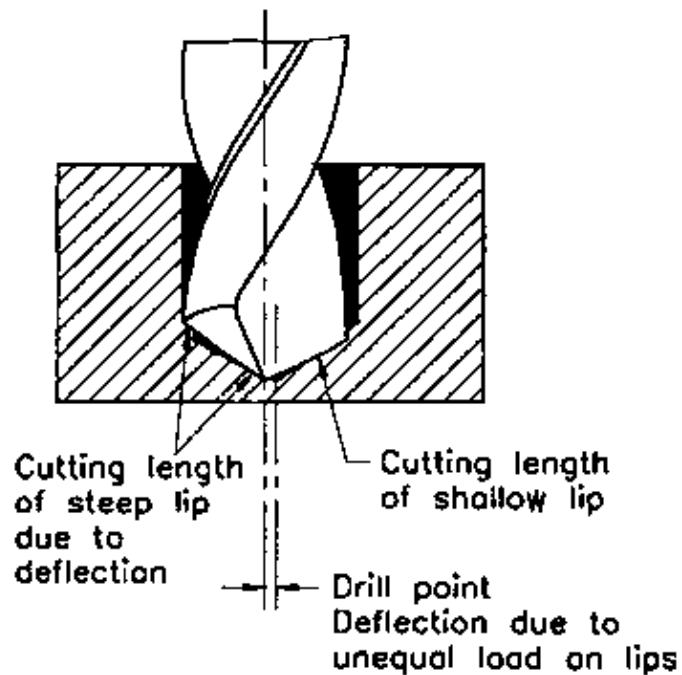


- α_0 – Lip clearance angle
- β_0 = Wedge angle
- γ_0 = Rake or helix angle
- δ = Point angle



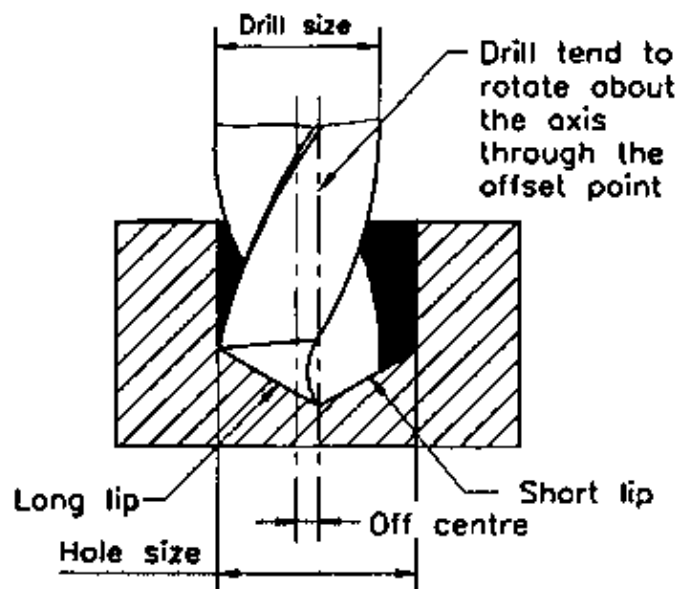
- Type H – For hard and tenacious materials.
- Type N – For normal low carbon steels.
- Type S – For soft and tough materials.

19. TR 01 05 02 02 93 – DRILL SHARPENING – DEFECTS THINNING OF WEB



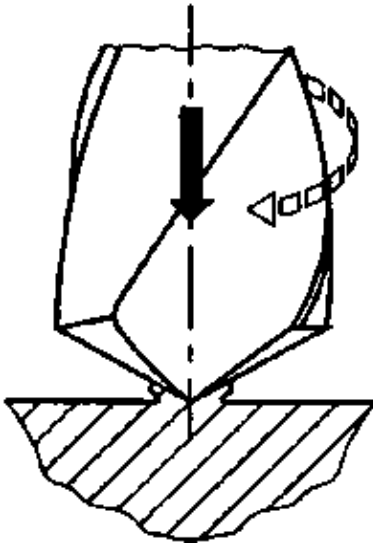
Cutting edges of unequal angles

- Only one lip does most cutting.
- Unequal load on tip.
- Drill point deflection
- Rapid wear on one cutting edge.
- Hole size larger.



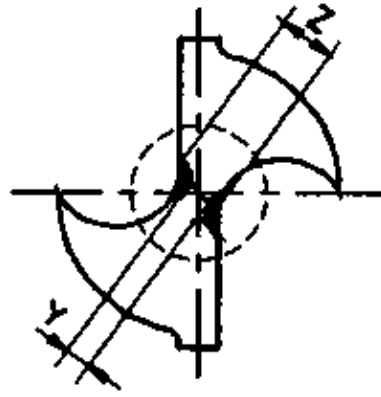
Cutting edges of unequal length but angles equal

- Eccentric running of drill point
- Hole size larger.
- Drill may break due to unequal load on lips.
- Drill life reduced.



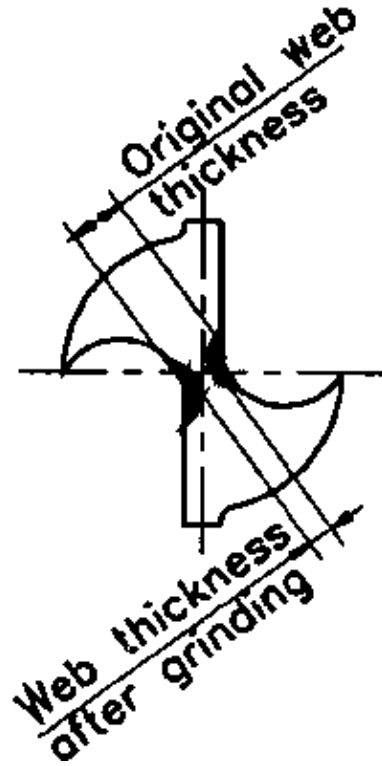
Thick web due to frequent grinding

- Drill cannot penetrate.
- Excessive pressure required for feeding.



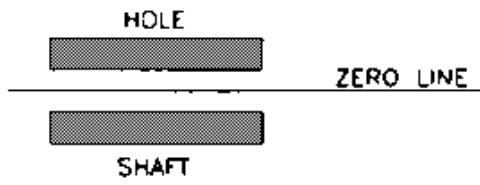
Web thinned by grinding

- Provides shorter chisel edge.

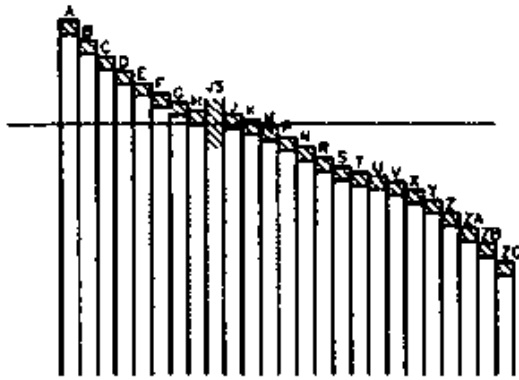
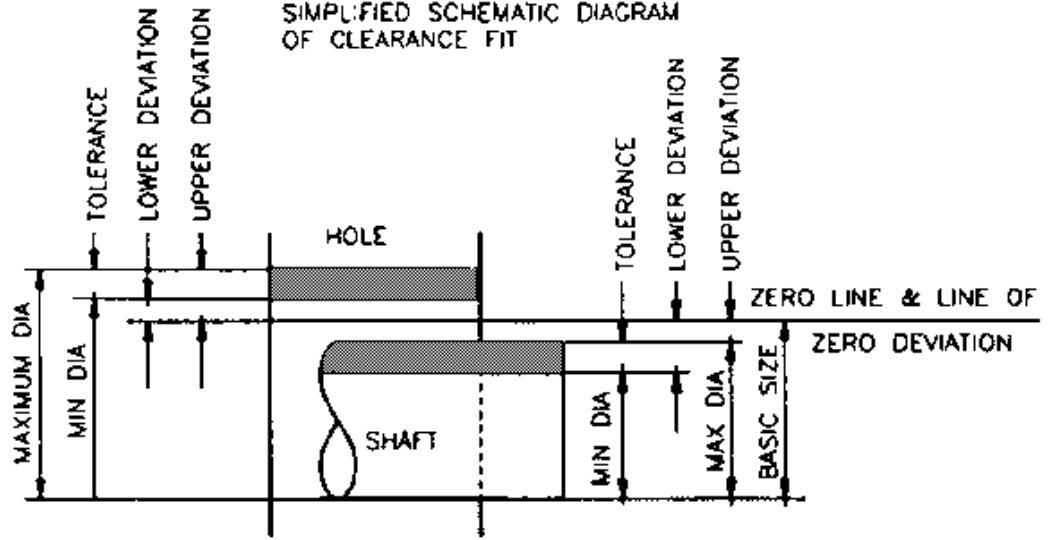
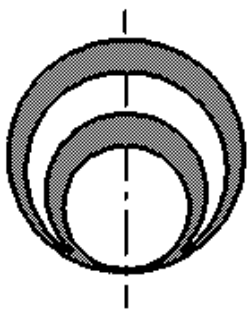


- How will this grinding affect the size of the hole drilled?

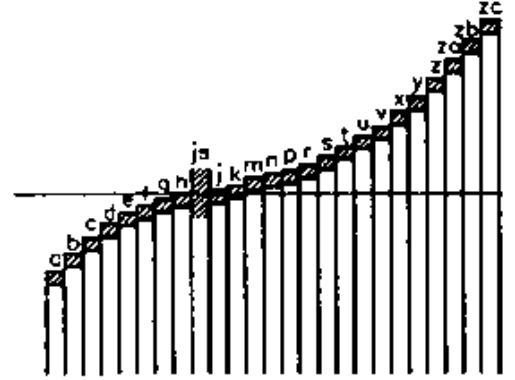
20. TR 01 06 01 01 93 – FUNDAMENTALS OF LIMITS AND FITS



SIMPLIFIED SCHEMATIC DIAGRAM OF CLEARANCE FIT

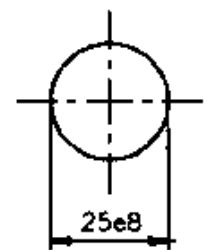
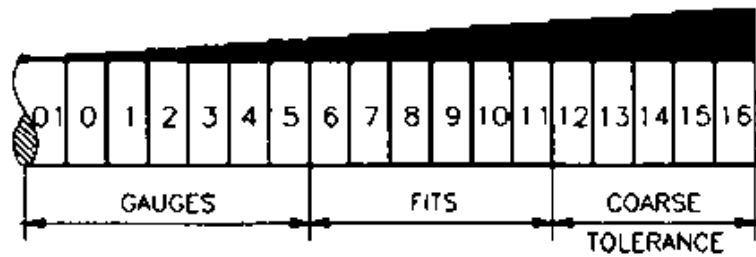
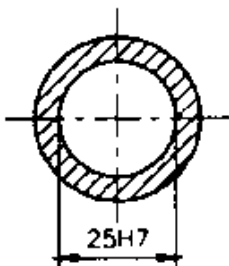


CAPITAL LETTERS INDICATE 25 FUNDAMENTAL DEVIATION FOR HOLES



SMALL LETTER INDICATE 25 FUNDAMENTAL DEVIATION FOR SHAFTS

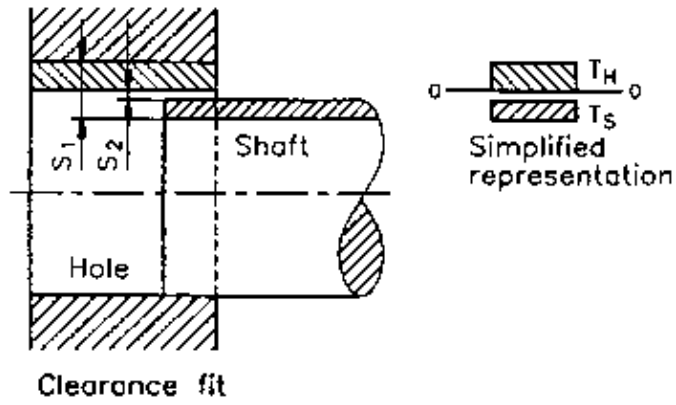
18 GRADES OF TOLERANCES



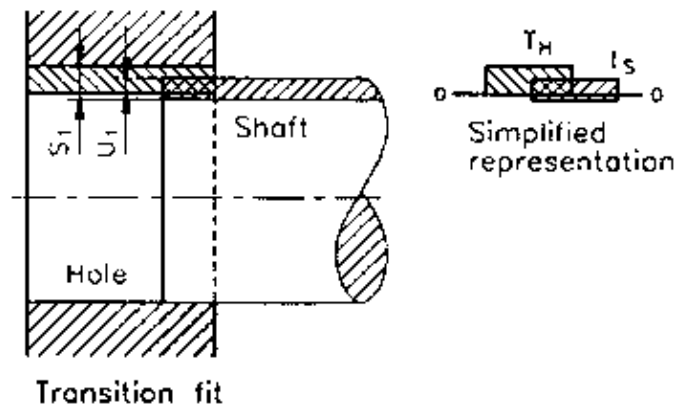
• WHAT DOES 25H7 INDICATE?

• WHAT DOES 25e8 INDICATE?

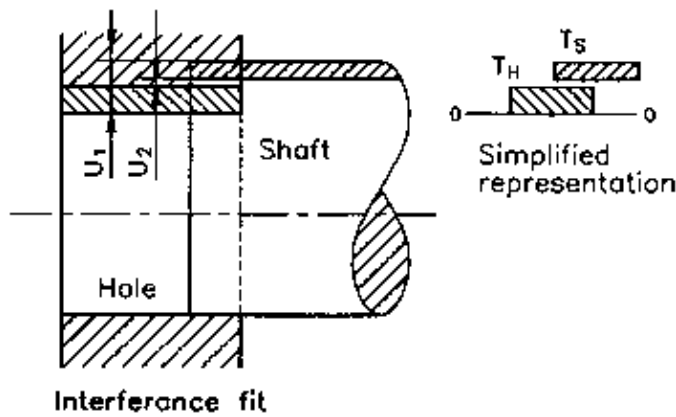
21. TR 01 06 01 02 93 – CLASSES OF FIT



S1 = Maximum clearance
 S2 = Minimum clearance

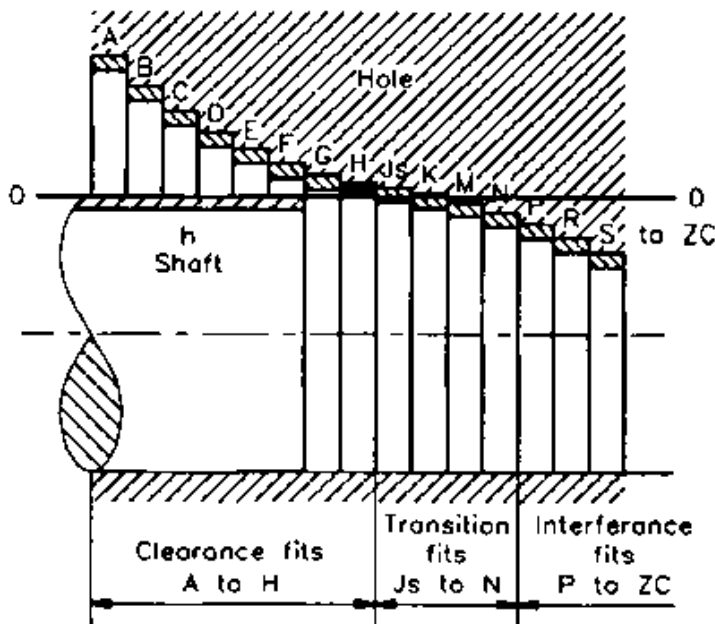


S1 = Maximum clearance
 U1 = Maximum interference

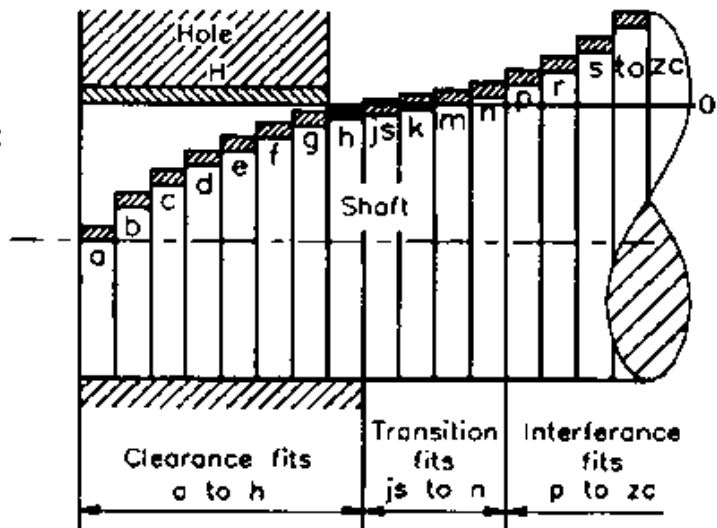


U1 = Maximum interference
 U2 = Minimum interference

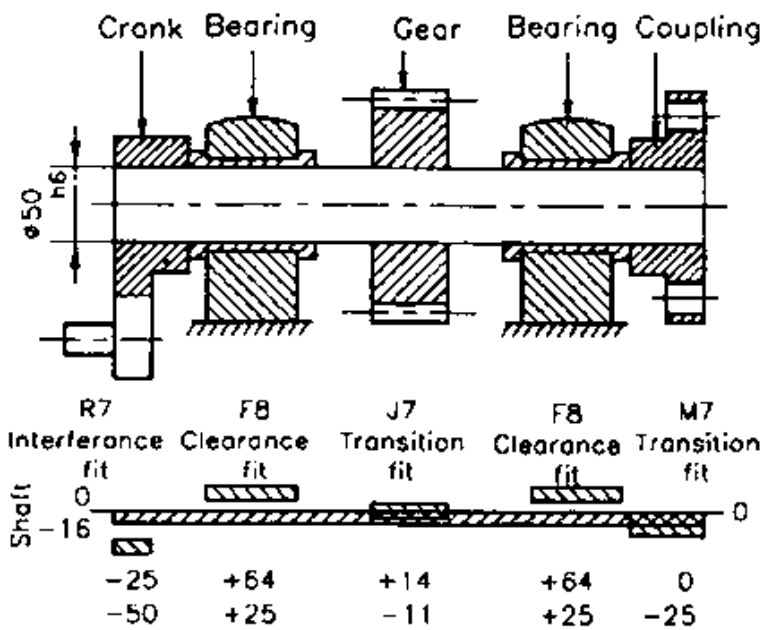
22. TR 01 06 01 03 93 – SHAFT BASIS AND HOLE BASIS SYSTEM OF LIMITS AND FITS



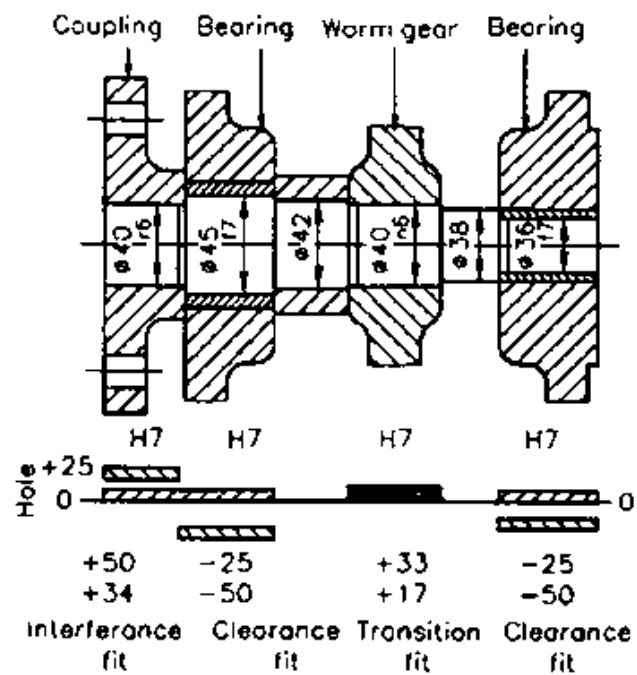
**BASIC SHAFT SYSTEM
(SHAFT BASIS)**



**BASIC HOLE SYSTEM
(HOLE BASIS)**

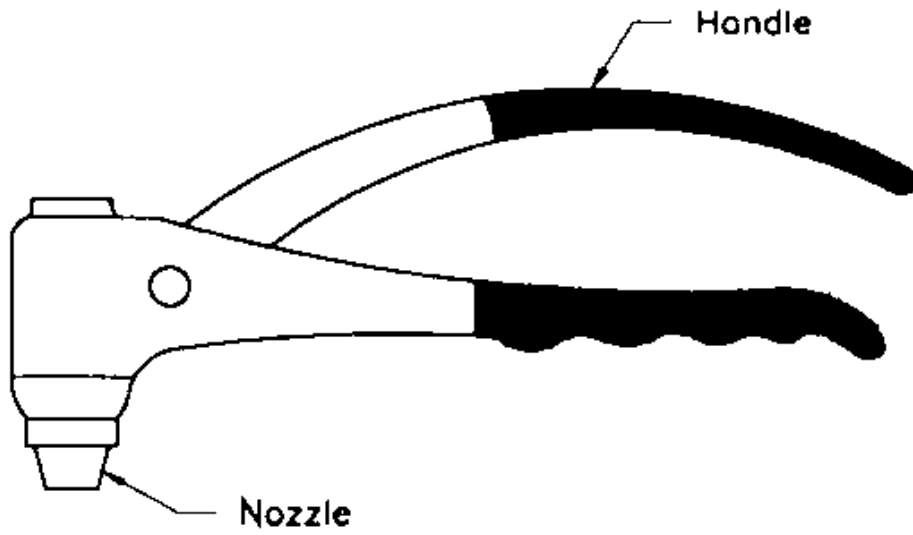


APPLICATION OF THE BASIC SHAFT SYSTEM

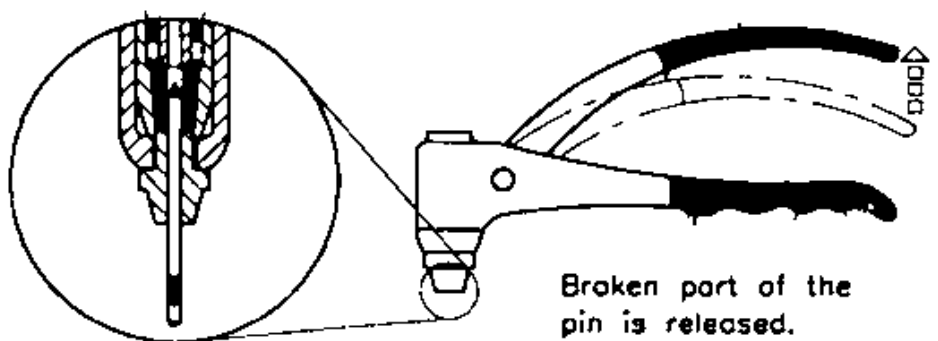
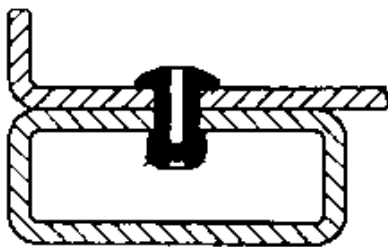
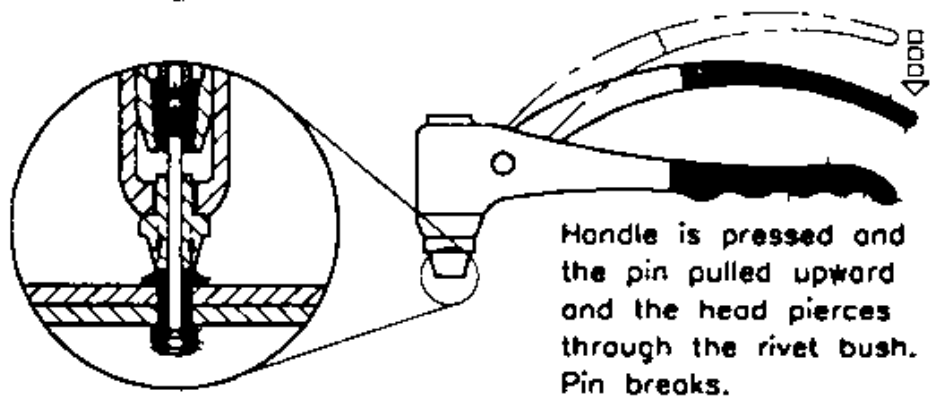
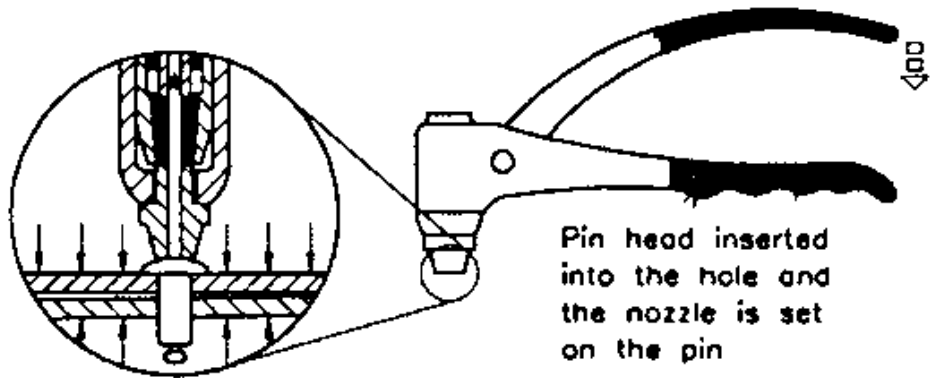
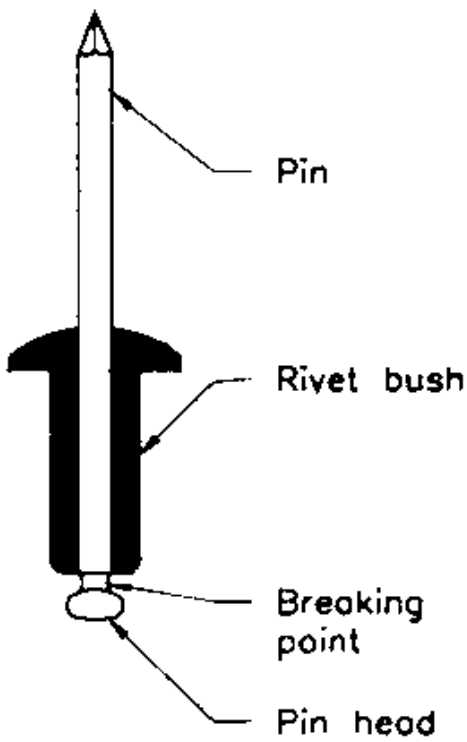


APPLICATION OF THE BASIC HOLE SYSTEM

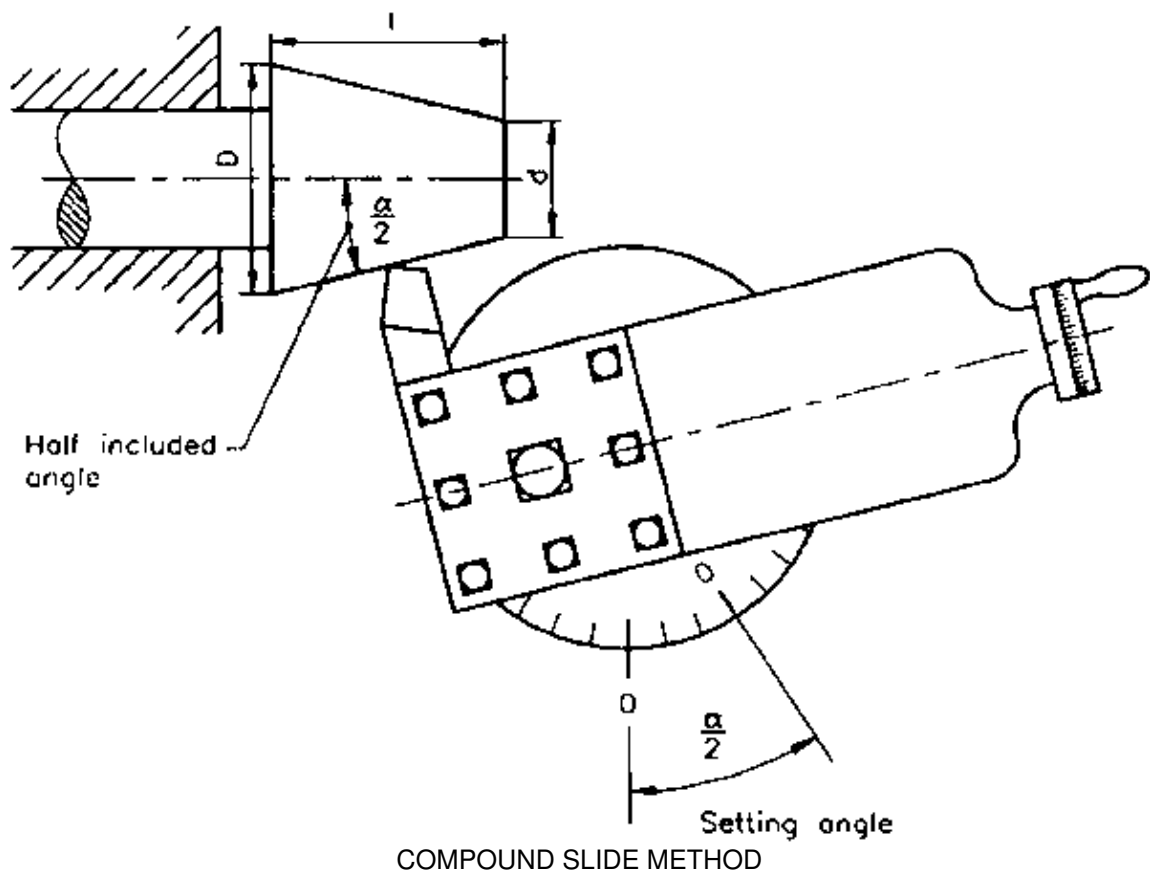
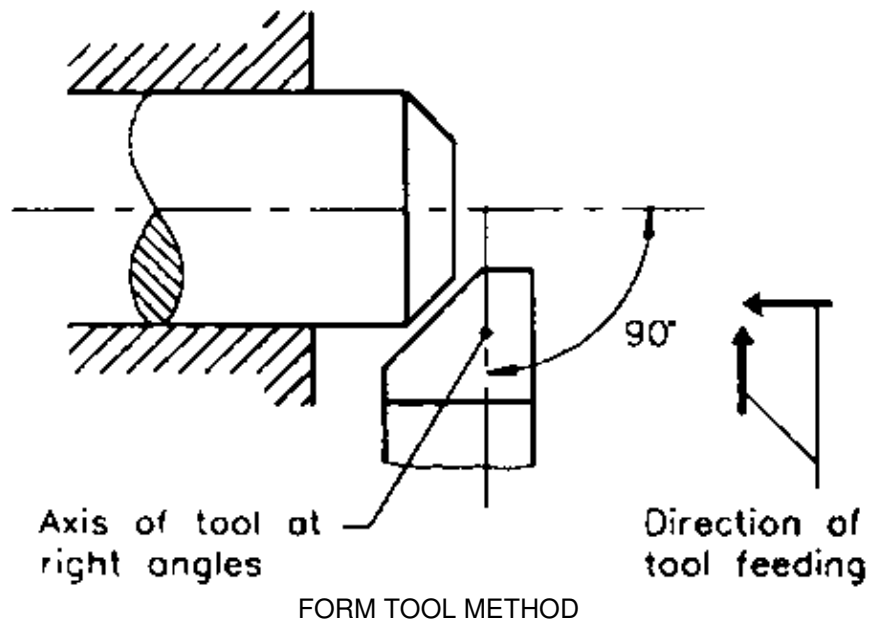
23. TR 01 11 03 01 93 – BLIND RIVETING WITH POP RIVETS



Pop riveting plier



24. TR 01 15 03 01 93 – DIFFERENT METHODS OF TAPER TURNING (FORM TOOL AND COMPOUND REST)



$$\tan \frac{\alpha}{2} = \frac{D-d}{2 \times l}$$

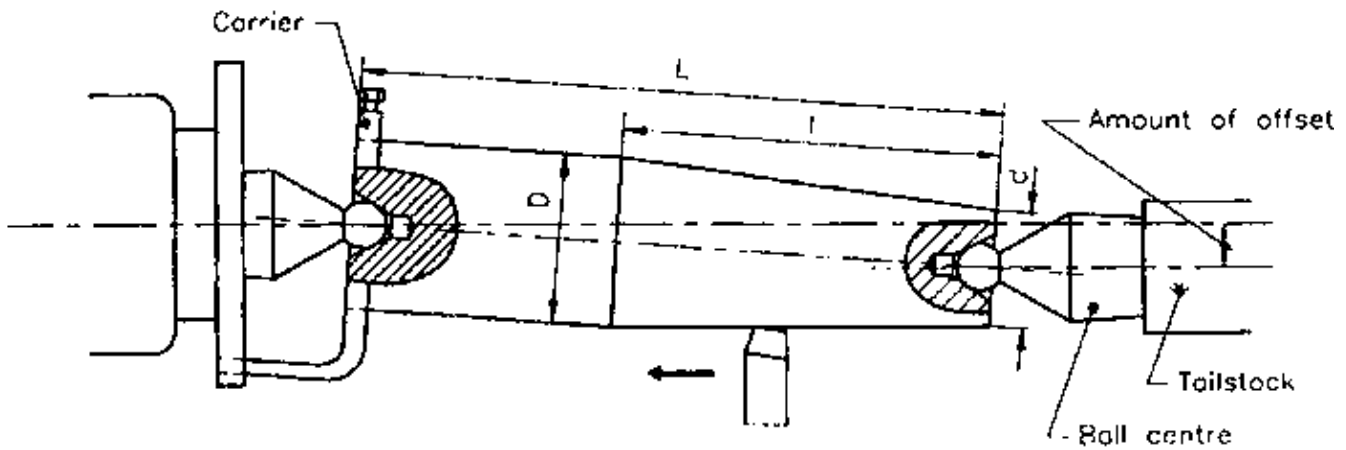
Where D = Big dia.

d = Small dia.

l = Length of taper

$\frac{\alpha}{2}$ = 1/2 included angle in degrees.

25. TR 01 15 03 02 93 – DIFFERENT METHODS OF TAPER TURNING (TAIL STOCK SET OVER AND TAPER TURNING ATTACHMENT)



TAIL STOCK OFFSET METHOD

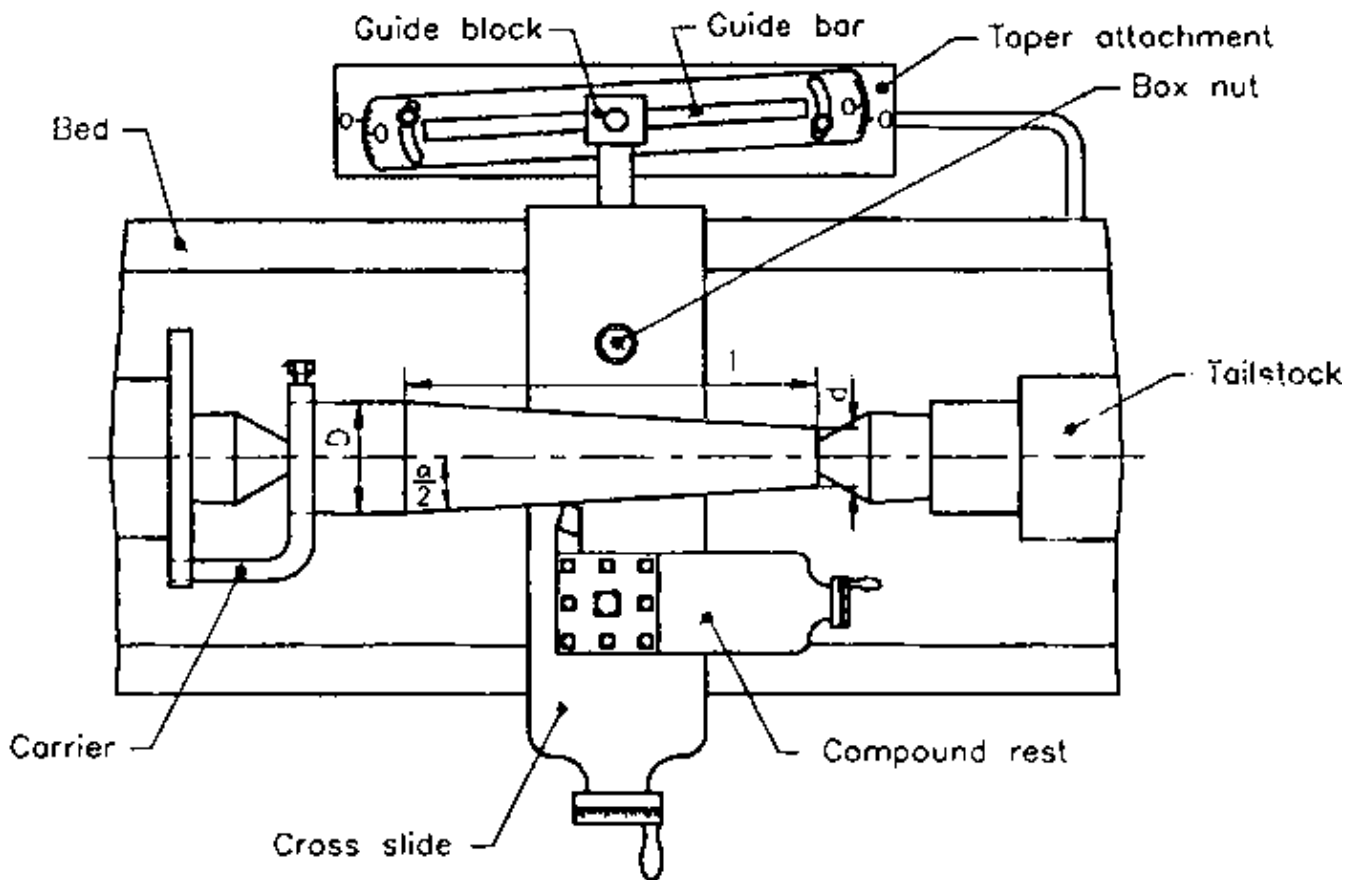
$$\text{Offset} = \frac{(D-d) \times L}{2 \times l}$$

Where D = Big dia. of taper

d = Small dia. of taper

l = Length of taper

L = Total length of job



TAPER TURNING ATTACHMENT METHOD

$$\tan \frac{\alpha}{2} = \frac{D-d}{2 \times l}$$

Where D = Big dia.

d = Small dia.

l = Length of taper

$\frac{\alpha}{2}$ = 1/2 included angle in degrees.

Back Cover

Developed by

CENTRAL INSTRUCTIONAL MEDIA INSTITUTE
in collaboration with DEUTSCHE GESELLSCHAFT FUER TECHNISCHE ZUSAMMENARBEIT (GTZ)
Germany.

P.O. Box 3142, 76, GST Road, Guindy, Madras – 600 032. Phone: 2345256, 2345257. Fax: 91-44-86627,
Telex: 041 7978 CIMI IN.

