Recognition of drawing types

Purpose of drawing in industry

There are three main reasons for drawing in industry. They are:

Communication

Engineering drawing is the main method of communication between the people concerned with the design and manufacture of components.

Discussion

Developing ideas and theories and discussing them with colleagues. For instance a manufacturer might discuss the problems of a manufacturing process with an engineer.

Records

Drawings are kept for :

- extra orders of components
- recording previous specifications
- records of current job specifications in case of faulty manufacture or design.

Types and functions of engineering drawings

This part will allow you to differentiate between the different types of drawings produced by draftspersons. The basic types are:

- Assembly
- Sub-assembly
- Detail assembly
- Detail
- Pictorial
- Tabulated

Assembly drawings

These are drawings that show a general overview of the completed work, with arrangements of parts and a list of parts. They show overall dimensions or none at all.

Sub-assembly drawings

These show the arrangements of a few parts of the general assembly. A gear box is a sub-assembly of a motor vehicle. Sub-assembly drawings show how a section of the total work is assembled.

Detail assembly drawings

These drawings show how the work is assembled, together with the details you need to manufacture it. It satisfies both the function of an assembly drawing, sub-assembly drawing and a detailed drawing.

Detail drawing

This is a drawing which contains all the information that is required to manufacture the item drawn. A detailed drawing may consist of one component, or a number of components on the same sheet.

Pictorial drawings

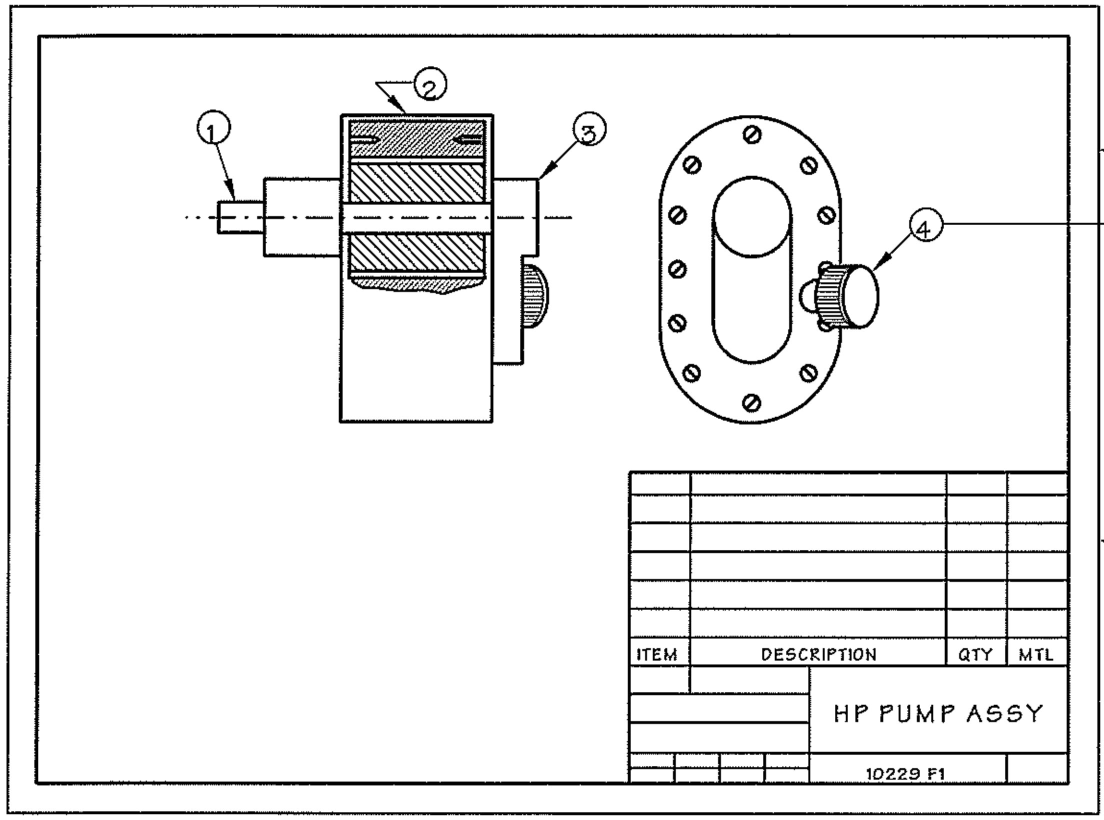
These can take the form of either isometric, oblique, perspective or exploded and can be assembly, sub-assembly or detail. They are not recommended for manufacturing purposes, but provide a picture.

Tabulated drawings

These are used when one component may be made with some size variations. Often used in catalogues but may also be seen on production drawings.

On the next few pages are some examples.

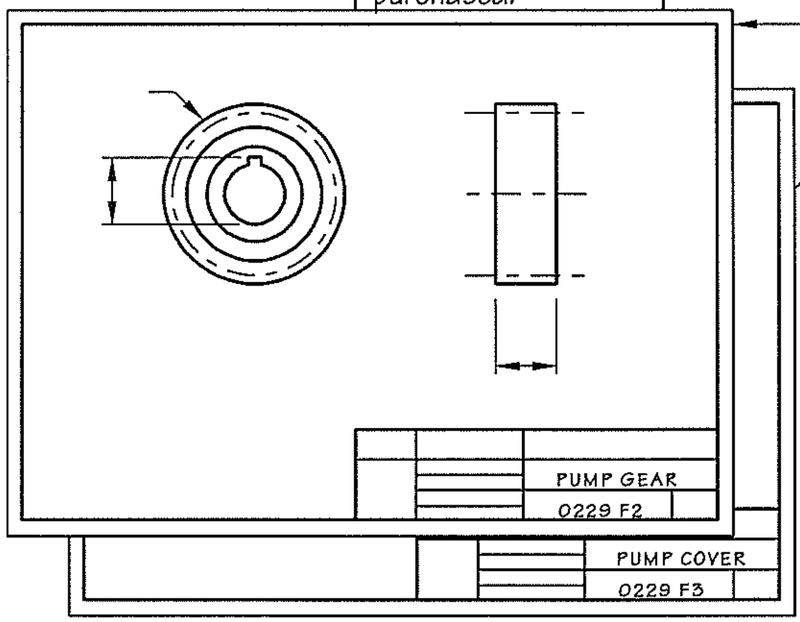
Example of a drawing system



An assembly drawing.

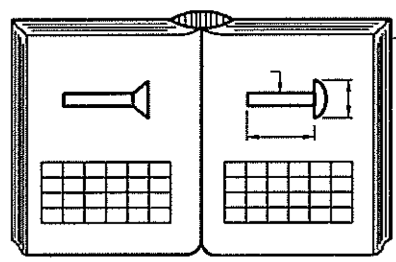
Item number called up in

material list or parts list, listing material, quantities and drawing Nos corresponding to item Nos. Also parts to be purchased.



Detail drawings completely describe each manufactured part.

A number of parts may be detailed on one drawing sheet.



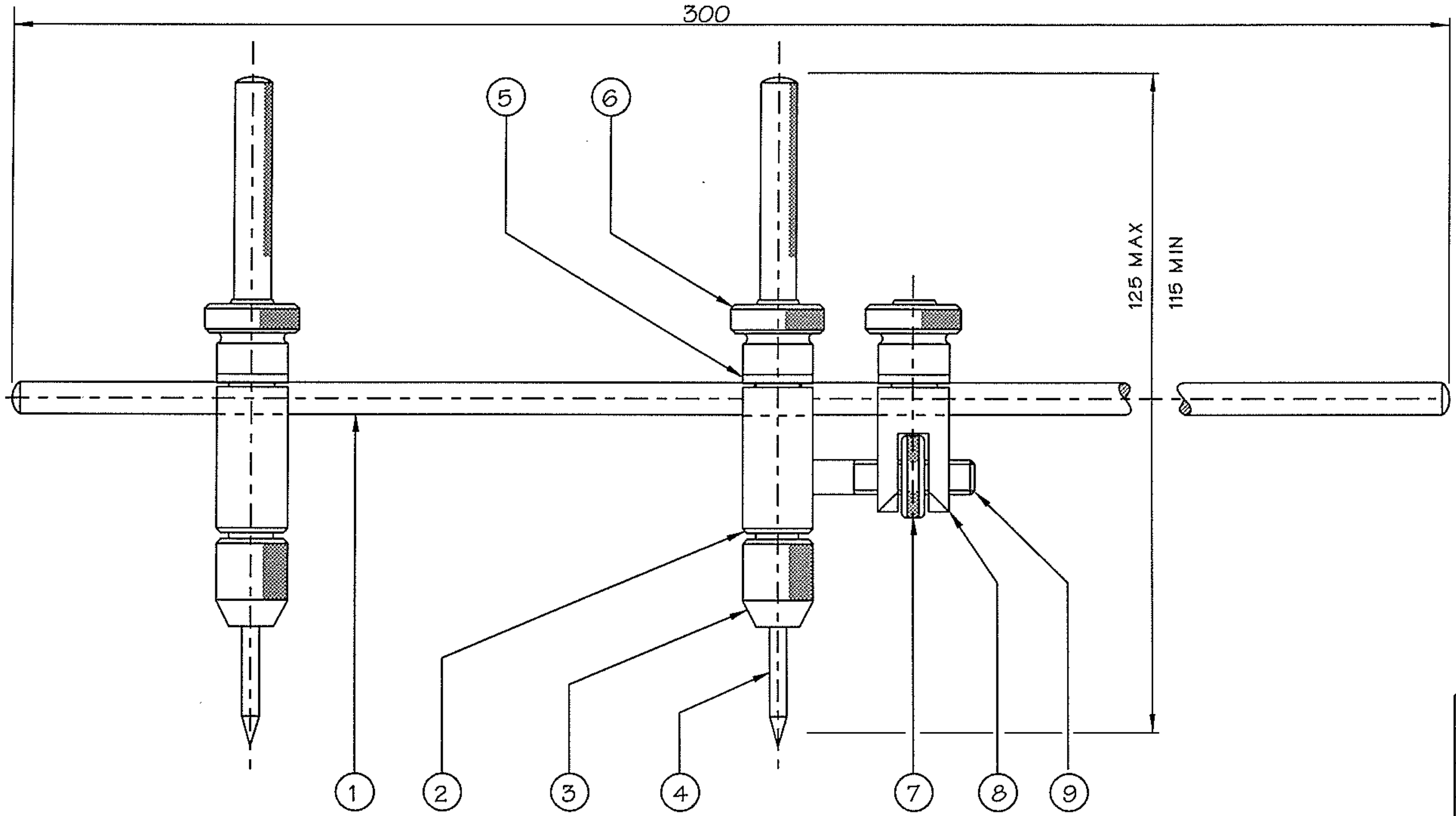
Purchased parts may be described in a tabulated drawing in a catalogue or data sheet.

ALL DIMENSIONS ARE IN MILLIMETRES
DO NOT SCALE

AN ASSEMBLY DRAWING

IT SHOWS THE TRAMMEL ASSEMBLED. THERE ARE NO DIMENSIONS OR DETAILS THAT ALLOW EACH COMPONENT TO BE MADE. OVERALL SIZES HAVE BEEN SHOWN.

THE SHEET CONTAINS A PARTS/MATERIAL LIST. IT IS SHEET 1 OF 2, INDICATING THAT THERE IS A SECOND SHEET THAT CONTAINS THE DETAIL DRAWINGS.



ASSEMBLY

ITEM	DESCRIPTION	No OFF	REF DRWG No	MATERIAL
9	ADJUSTING SCREW	1	124 SHT 2 ITEM 9	
8	" BLOCK	1	124 SHT 2 ITEM 8	
7	" NUT	1	124 SHT 2 ITEM 7	
6	NUT - TRAVERSE LOCKING	3	124 SHT 2 ITEM 6	
5	WASHER	3	124 SHT 2 ITEM 5	
4	SCRIBER	2	124 SHT 2 ITEM 4	
3	NUT	2	124 SHT 2 ITEM 3	
2	LEG	2	124 SHT 2 ITEM 2	
1	BEAM	1	124 SHT 2 ITEM 1	

ISSUE	DATE	ZONE	CHANGE	ECN	BY	CKD
A	22/12/97	ZONE	ORIGINAL ISSUE		JR	WC

AMENDMENTS

UNLESS NOTED OTHERWISE TOLERANCES ARE:
LINEAR N/A
ANGULAR N/A

DRAWING PRACTICE AS 1100

MATERIAL N/A

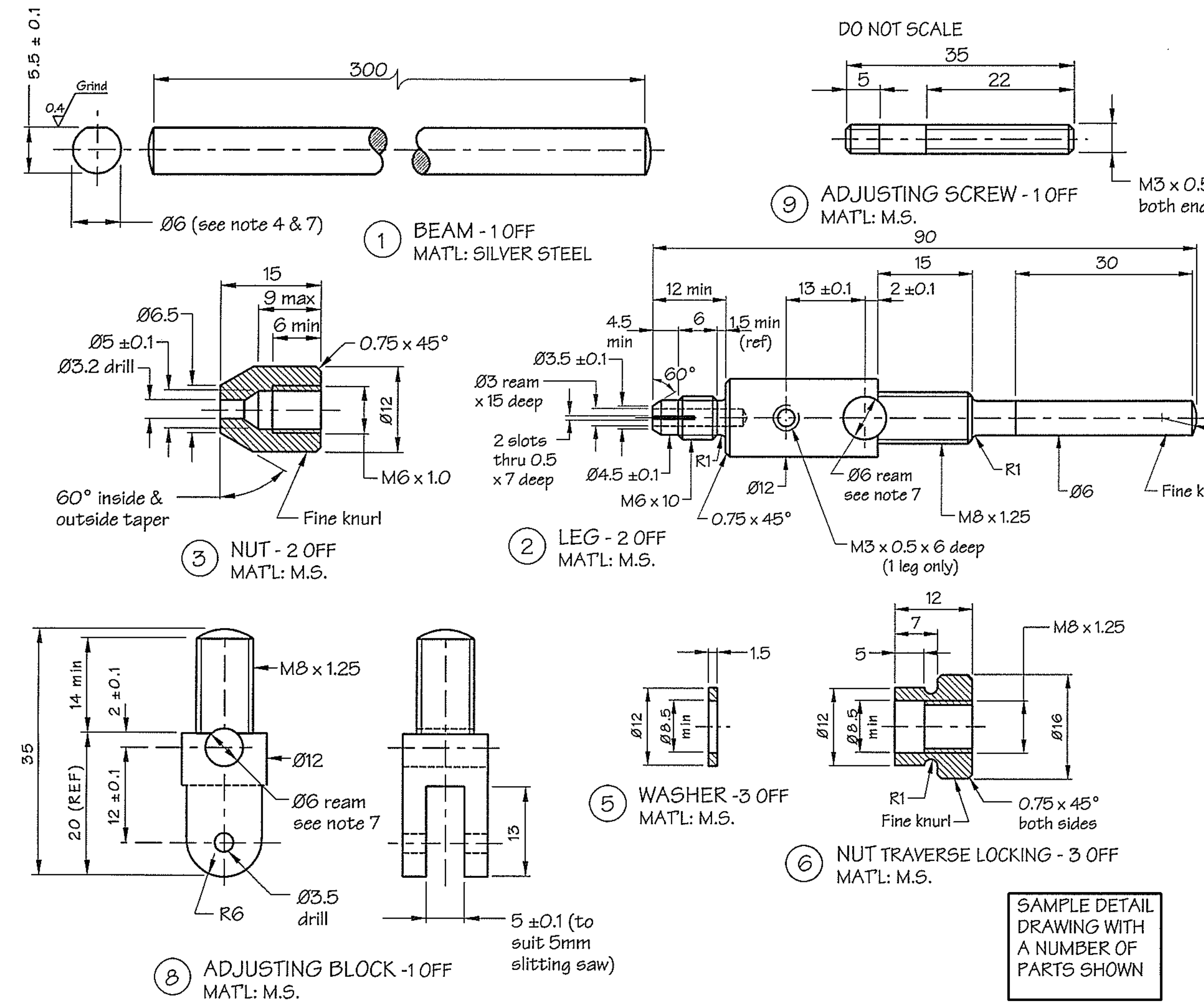
FINISH N/A

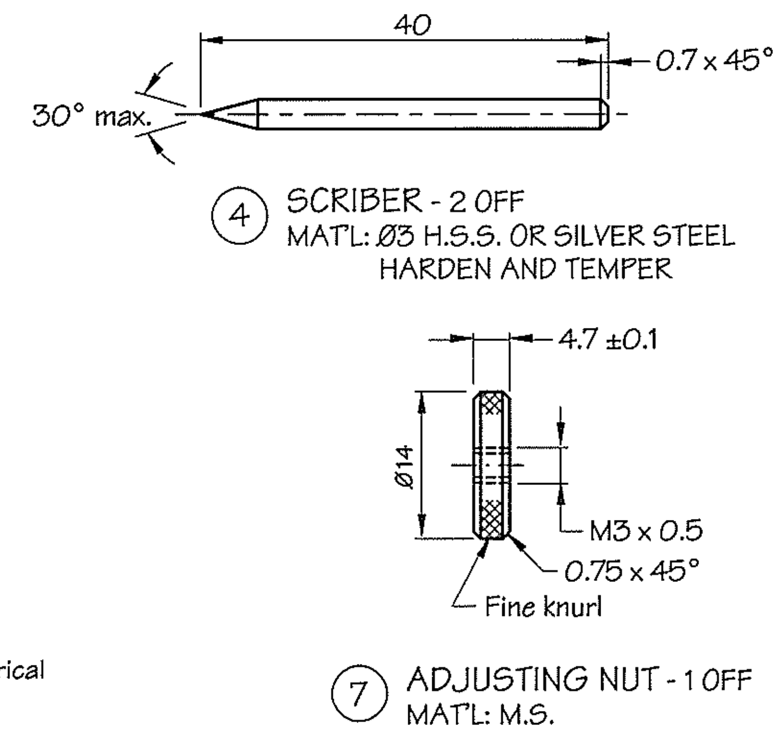
DRAWN JR
TRACED ———
CHECKED WC
APPROVED TC
ISSUED 20 - 12 - 97
RECORD OF ISSUE
A

TAFE NSW
MANUFACTURING AND ENGINEERING EDUCATIONAL SERVICES DIVISION

TITLE
TRAMMEL

SCALE	SIZE	DRG Nº	SHT
NTS	A3	124	1 OF 2





NOTES

1. UNLESS SHOWN OTHERWISE DIMENSIONS IN MILLIMETRES.
2. ALL M.S. TO BE PER A.S. 1442-1973/S1020.
3. TOLERANCES TO BE WITHIN ±0.5 UNLESS SHOWN OTHERWISE.
4. SURFACE FINISH GENERAL TO BE 1.6
   BEARING SURFACES (ITEM 1) TO BE 0.4
5. REMOVE ALL SHARP CORNERS WITH A SMOOTH FILE.
6. DO NOT SCALE OFF DRAWING - WORK TO DIMENSIONS.
7. ITEM 1 TO BE A "SLIDE FIT" IN ITEMS 5 & 8. THIS CAN BE PRODUCED BY REAMING TO SUIT THE Ø6 BEAM, OR BY BUFFING THE BEAM WITH FINE EMERY TO SUIT A Ø6 REAMED HOLE.

ITEM	DESCRIPTION	QTY	MATERIAL
9	ADJUSTING SCREW	1	35 x Ø3.5 M.S. BAR
8	" BLOCK	1	35 x Ø12 M.S. BAR
7	" NUT	1	4 x Ø14 M.S.
6	NUT - TRAVERSE LOCKING	3	12 x Ø16 M.S.
5	WASHER	3	12 O.D. x 8.5 I.D. x 1.5 M.S.
4	SCRIBER	2	Ø3 H.S.S. OR SILVER STEEL
3	NUT	2	15 x Ø12 M.S.
2	LEG	2	90 x Ø12 M.S.
1	BEAM	1	300 x Ø6 SILVER STEEL BAR

ISSUE	DATE	ZONE	CHANGE	ECN	BY	CKD
A	15 - 5 - 97		ISSUED FOR PRODUCTION		J D	W L

AMENDMENTS

UNLESS NOTED OTHERWISE TOLERANCES ARE:
LINEAR ± 0.5 UNO
ANGULAR ± 0° 15'

DRAWING PRACTICE AS 1100

MATERIAL: AS LISTED

FINISH: SEE NOTES

DRAWN	J D
TRACED	W P
CHECKED	W L
APPROVED	J R P
ISSUED	15 - 5 - 97

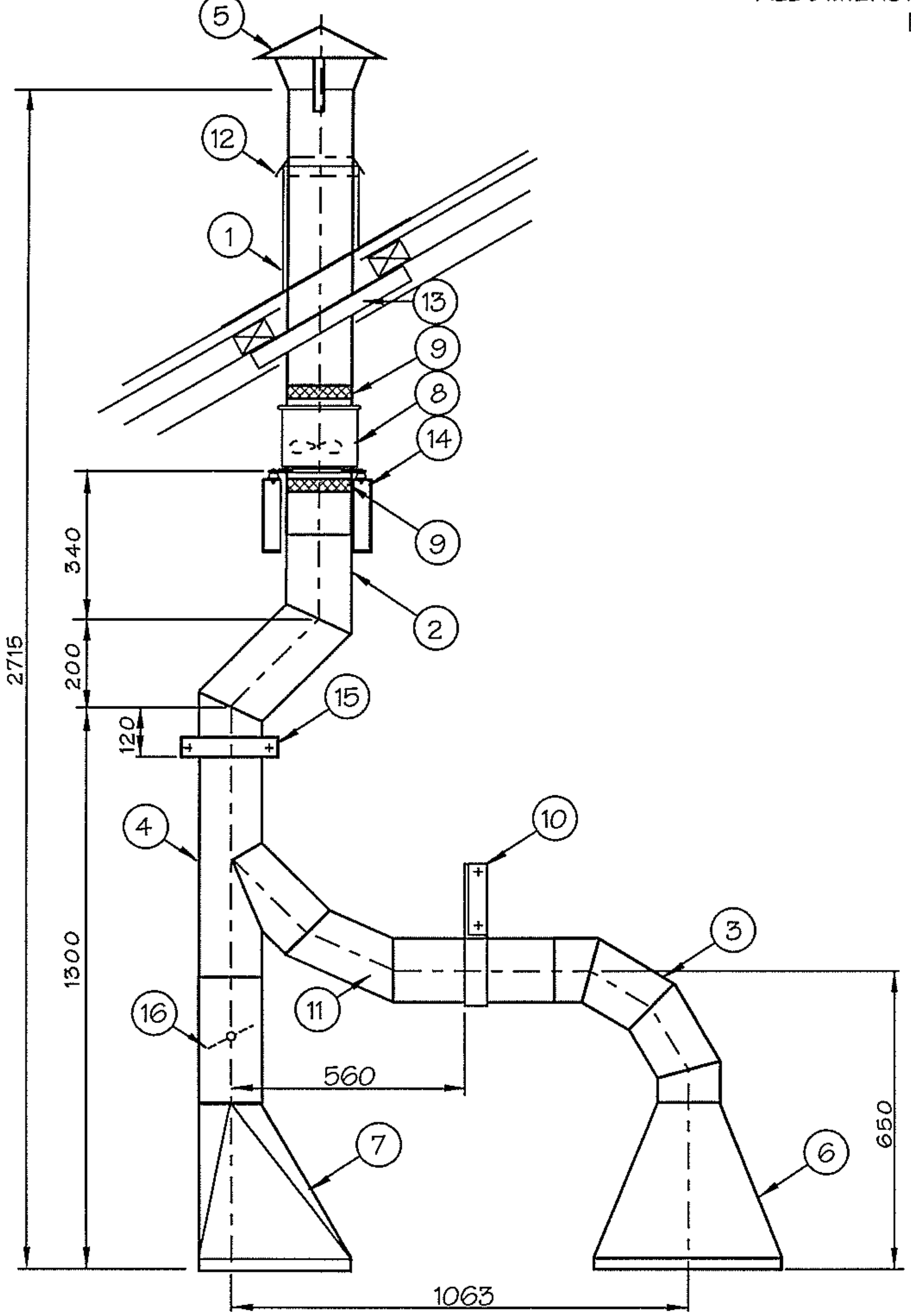
RECORD OF ISSUE: A

TAFE NSW — MANUFACTURING AND ENGINEERING EDUCATIONAL SERVICES DIVISION

TITLE: TRAMMEL DETAILS

SCALE	SIZE	DRG Nº	SHT
1:2	A3	124	2 OF 2

ALL DIMENSIONS ARE IN MILLLIMETRES
DO NOT SCALE



THIS IS AN EXAMPLE OF A GENERAL ASSEMBLY DRAWING SHOWING A DUCT SYSTEM.

IT GIVES A LIST OF THE PARTS AND THE OVERALL DIMENSIONS NECESSARY TO INSTALL THE DUCT FULLY.

NOTE: DIMENSIONS GIVEN DO NOT ENABLE YOU TO MANUFACTURE THE PARTS.

NOTE: AXIAL FAN WESTINGHOUSE 9497-1 AVAILABLE FROM CREST ENGINEERING, STANDARD HOT DIP GAL FINISH

PART No	DESCRIPTION	QTY	REMARKS	PART No	DESCRIPTION	QTY	REMARKS
9	FLEXIBLE JOINT	1	DRG 382 ITEM 1				
8	AXIAL FAN	1	PURCHASE SEE NOTE				
7	RECTANGULAR ROUND HOOD	1	DRG 380 ITEM 1	16	DAMPER	1	DRG 330 ITEM 2
6	CONICAL HOOD	1	DRG 330 ITEM 3	15	DUCT SUPPORT	1	DRG 332 ITEM 3
5	COWL	1	DRG 381 ITEM 1	14	FAN SUPPORT SUB-ASSY	1	DRG 325
4	ANGULAR BRANCH	1	DRG 329 ITEM 1	13	DUCT SUPPORT	1	DRG 333
3	4-PIECE, 90° ROUND ELBOW	1	DRG 326 ITEM 3	12	APRON	1	DRG 332 ITEM 4
2	ROUND OFFSET	1	DRG 326 ITEM 2	11	DUCT	1	DRG 329 ITEM 2
1	CYLINDRICAL FLASHING	1	DRG 326 ITEM 1	10	DUCT SUPPORT	1	DRG 332 ITEM 2

PARTS LIST

ISSUE	DATE	ZONE	CHANGE	ECN	BY	CKD
1	5/1/97		FIRST ISSUE		BS	WW

AMENDMENTS

UNLESS NOTED OTHERWISE TOLERANCES ARE:
LINEAR N/A
ANGULAR N/A

DRAWING PRACTICE AS 1100

MATERIAL N/A

FINISH N/A

DRAWN BS
TRACED
CHECKED WW
APPROVED IB
ISSUED
RECORD OF ISSUE
A

TAFE NSW

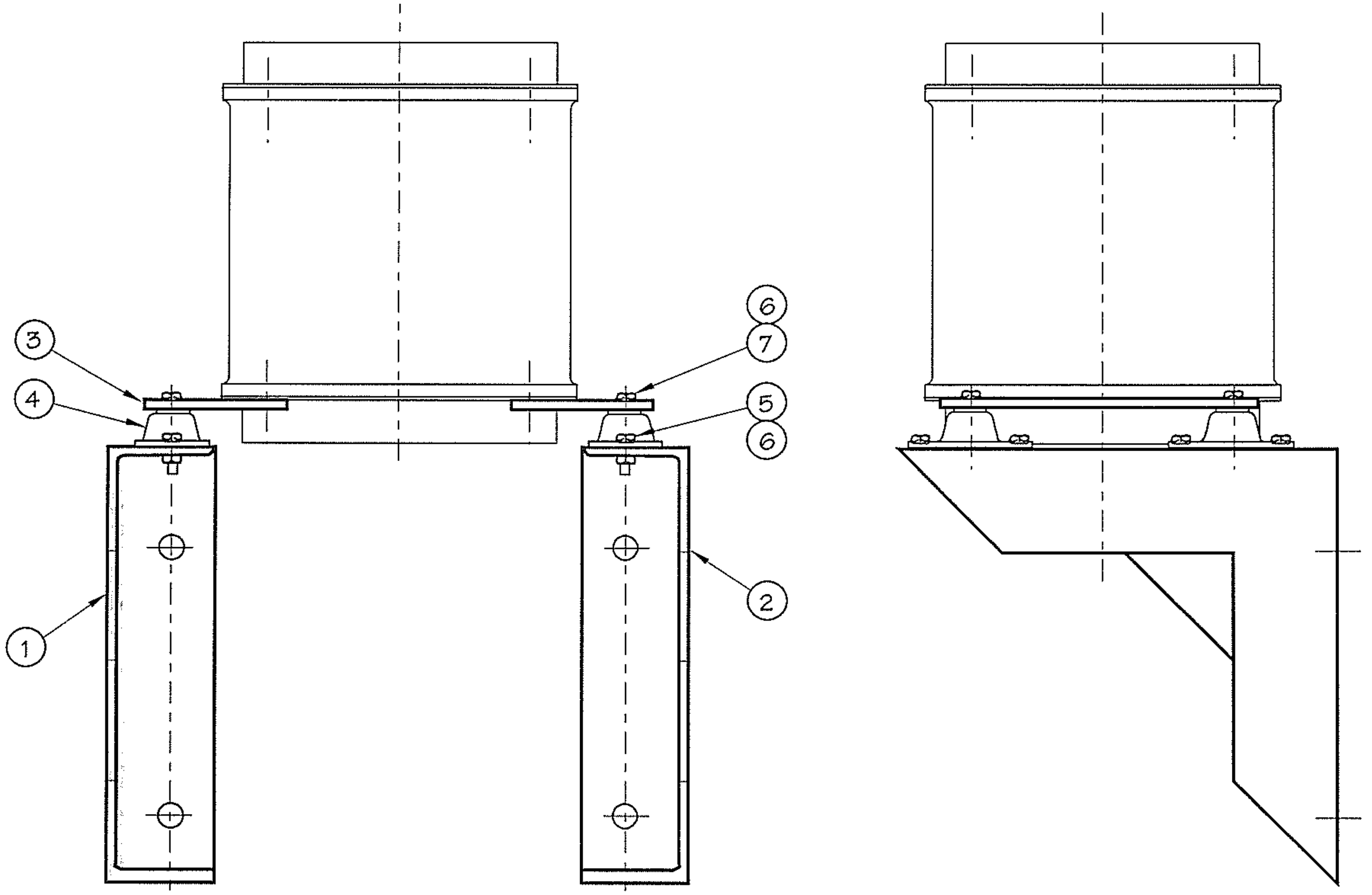
MANUFACTURING AND ENGINEERING EDUCATIONAL SERVICES DIVISION

TITLE EXHAUST DUCTING ASSEMBLY

SCALE NTS | SIZE A3 | DRG N° 324 | SHT 1

DO NOT SCALE

ALL DIMENSIONS ARE IN MILLIMETRES



THIS IS AN EXAMPLE OF A

SUB ASSEMBLY DRAWING

IT GIVES SUB ASSEMBLY INFORMATION FOR THE FAN SUPPORT, ITEM NUMBER 14 SHOWN ON DRAWING NUMBER 324. IT LISTS THE PARTS NEEDED AND ILLUSTRATES THE METHOD FOR CONNECTING THE FAN TO ITS SUPPORT BRACKETS.

NOTE: NO DIMENSIONS ARE NECESSARY

ITEM No	DESCRIPTION	QTY	MATL	SIZE
7	BOLT	4	MS	MS. HEX HD x 20 LG
6	NUT	12	MS	MS. HEX
5	SCREW	8	MS	MS. HEX HD x 15 LG
4	ANTI-VIBRATION MOUNTING	4	—	TYPE 6/47 SCRUTTONS
3	MOUNTING PLATE	2	MS	SEE DRAWING 328
2	BRACKET R.H.	1	MS	SEE DRAWING 327/2
1	BRACKET L.H.	1	MS	SEE DRAWING 327/1

MATERIAL LIST

ISSUE	DATE	ZONE	CHANGE	ECN	BY	CKD
1	25/10/97		ORIGINAL ISSUE		JB	WW

AMENDMENTS

UNLESS NOTED OTHERWISE TOLERANCES ARE:

LINEAR N/A

ANGULAR N/A

DRAWING PRACTICE AS 1100

MATERIAL N/A

FINISH N/A

DRAWN JB

TRACED

CHECKED WW

APPROVED IB

ISSUED 25/10/97

RECORD OF ISSUE

A

TAFE NSW

MANUFACTURING AND ENGINEERING EDUCATIONAL SERVICES DIVISION

TITLE EXHAUST DUCT FAN SUPPORT ASSEMBLY

SCALE NTS

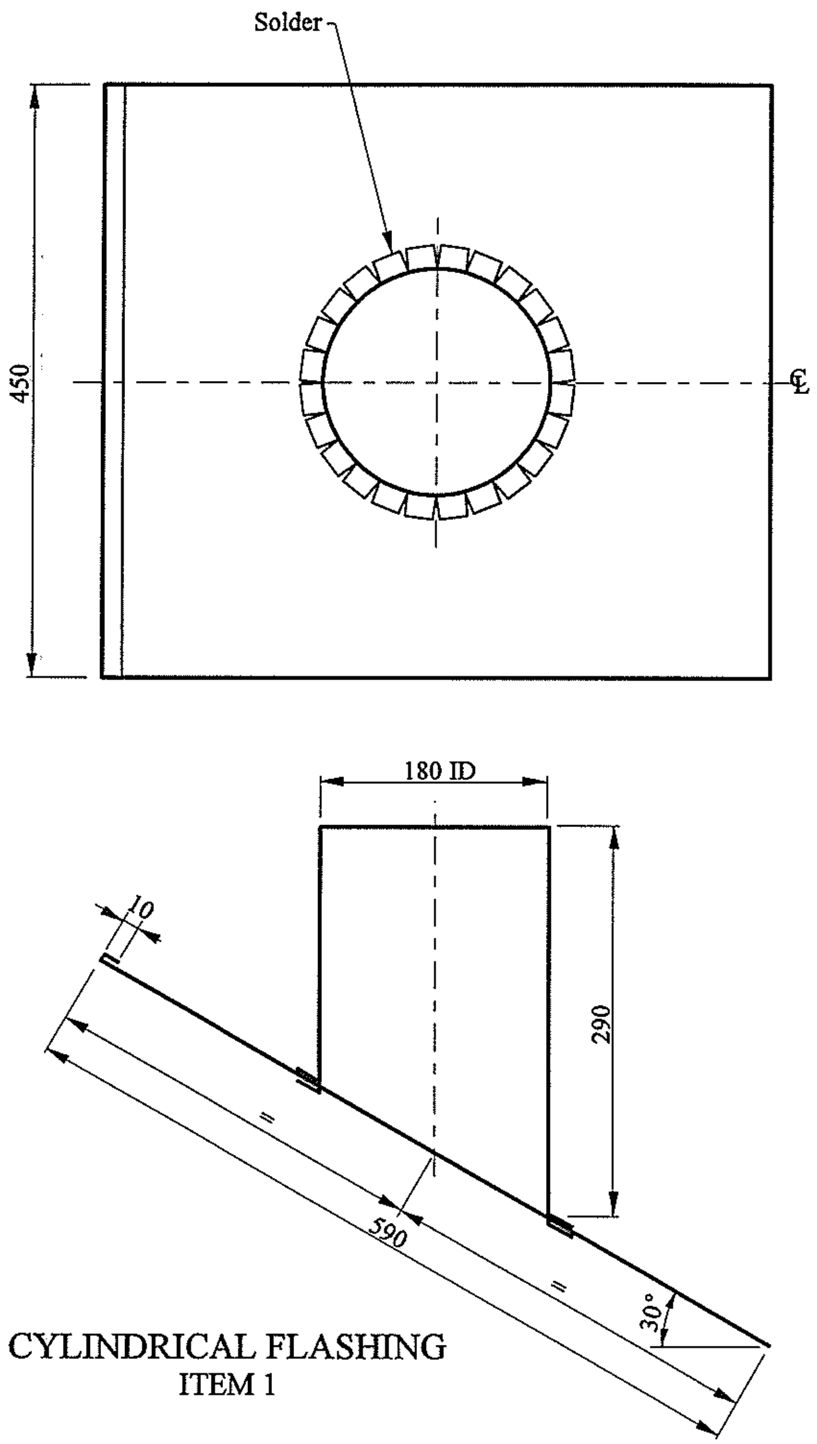
SIZE A3

DRG Nº 325

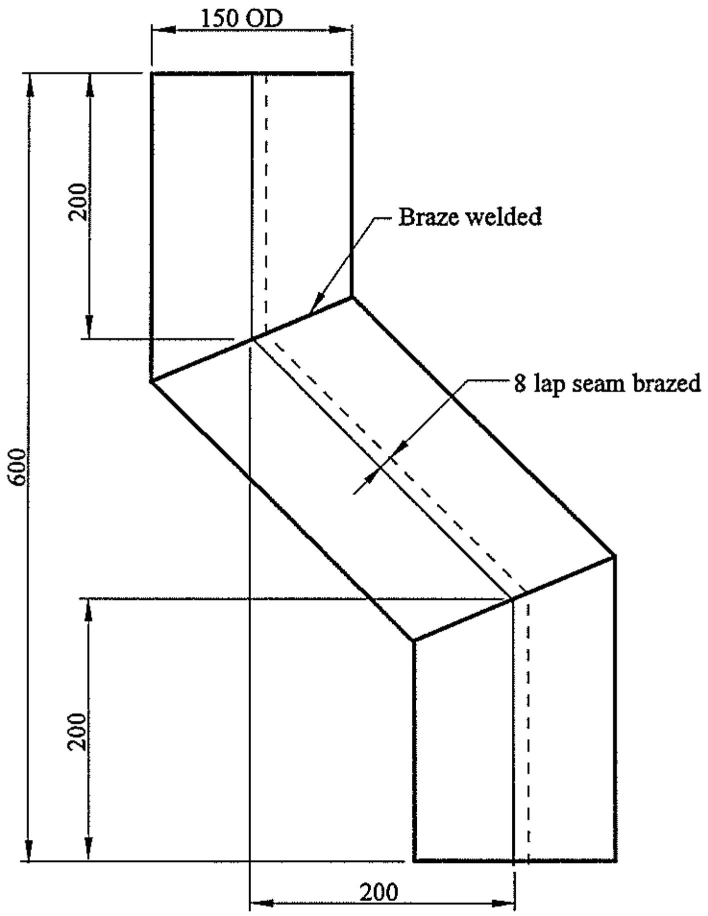
SHT 1 of 1

MEC076 - 2 - 8

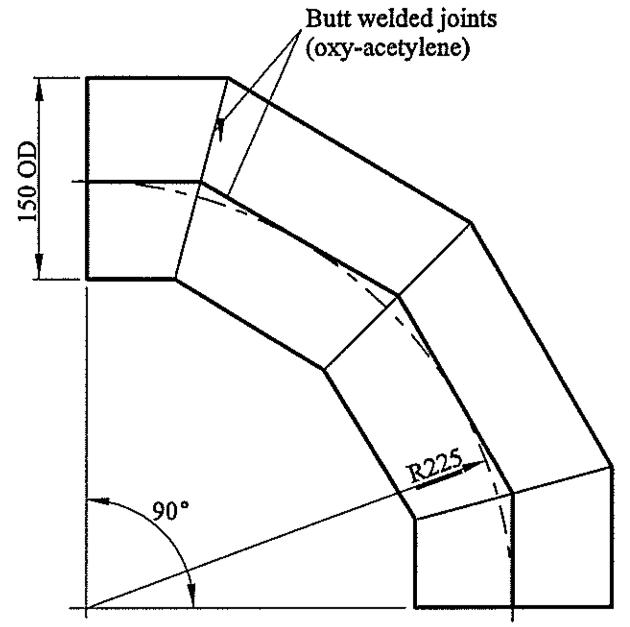
ALL DIMENSIONS IN MILLIMETRES
DO NOT SCALE



CYLINDRICAL FLASHING
ITEM 1



ROUND OFFSET
ITEM 2



FOUR PIECE 90° ROUND ELBOW
ITEM 3

This is an example of a detailed drawing with three parts shown.

It gives details of items 1, 2 and 3 shown on drawing number 324.

Note: All dimensions, fabrication methods and materials have been given for manufacturing the parts.

ISSUE	DATE	ZONE	CHANGE	ECN	BY	CKD
A	1 - 4 - 97		ISSUED FOR PRODUCTION		J S	BW

AMENDMENTS

UNLESS NOTED OTHERWISE TOLERANCES ARE:
LINEAR ± 0.5
ANGULAR ± 0°-30'

DRAWING PRACTICE AS 1100

MATERIAL AS LISTED

FINISH UNO 12.5

DRAWN	J S
TRACED	
CHECKED	B.W.
APPROVED	W.Y.
ISSUED	1 - 4 - 96

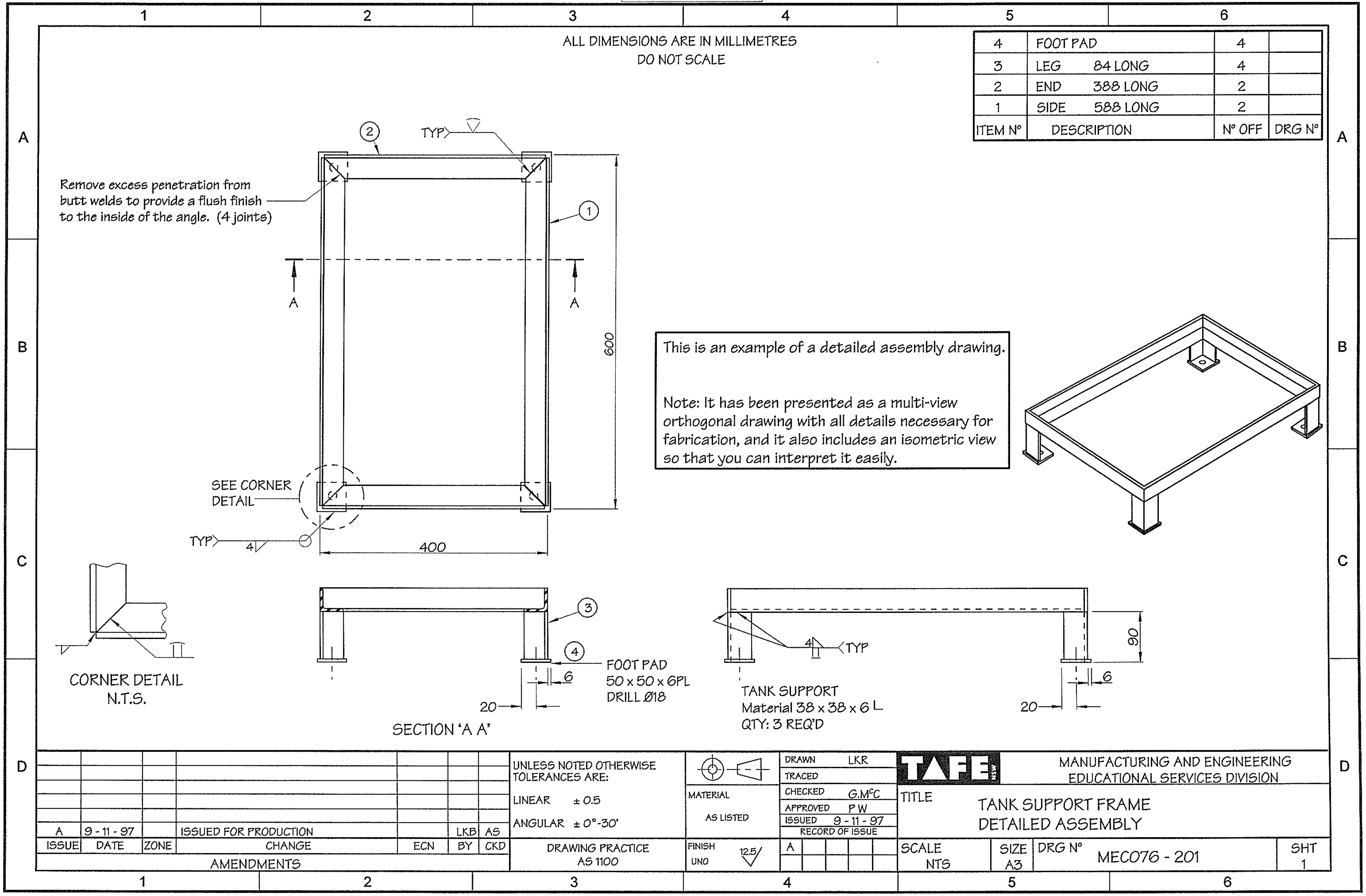
RECORD OF ISSUE: A

TAFE NSW

MANUFACTURING AND ENGINEERING EDUCATIONAL SERVICES DIVISION

TITLE EXHAUST DUCT
DUCTING DETAILS

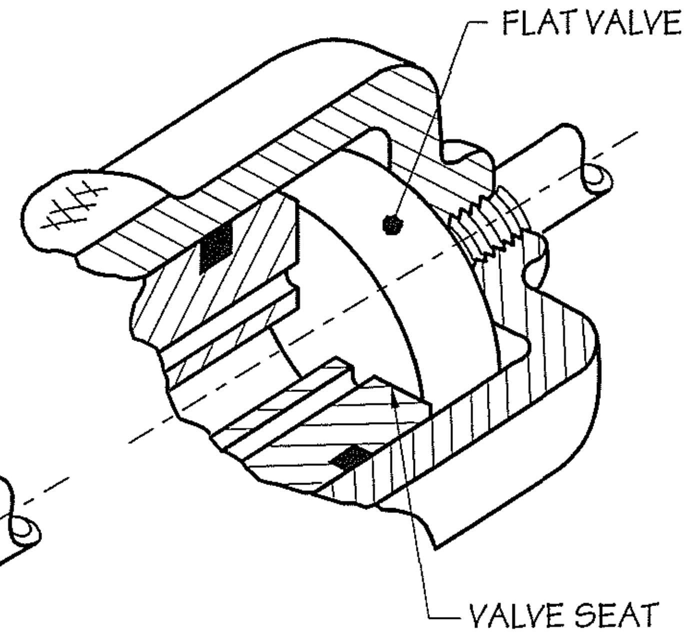
SCALE	SIZE	DRG Nº	SHT
NTS	A3	326	1 OF 1



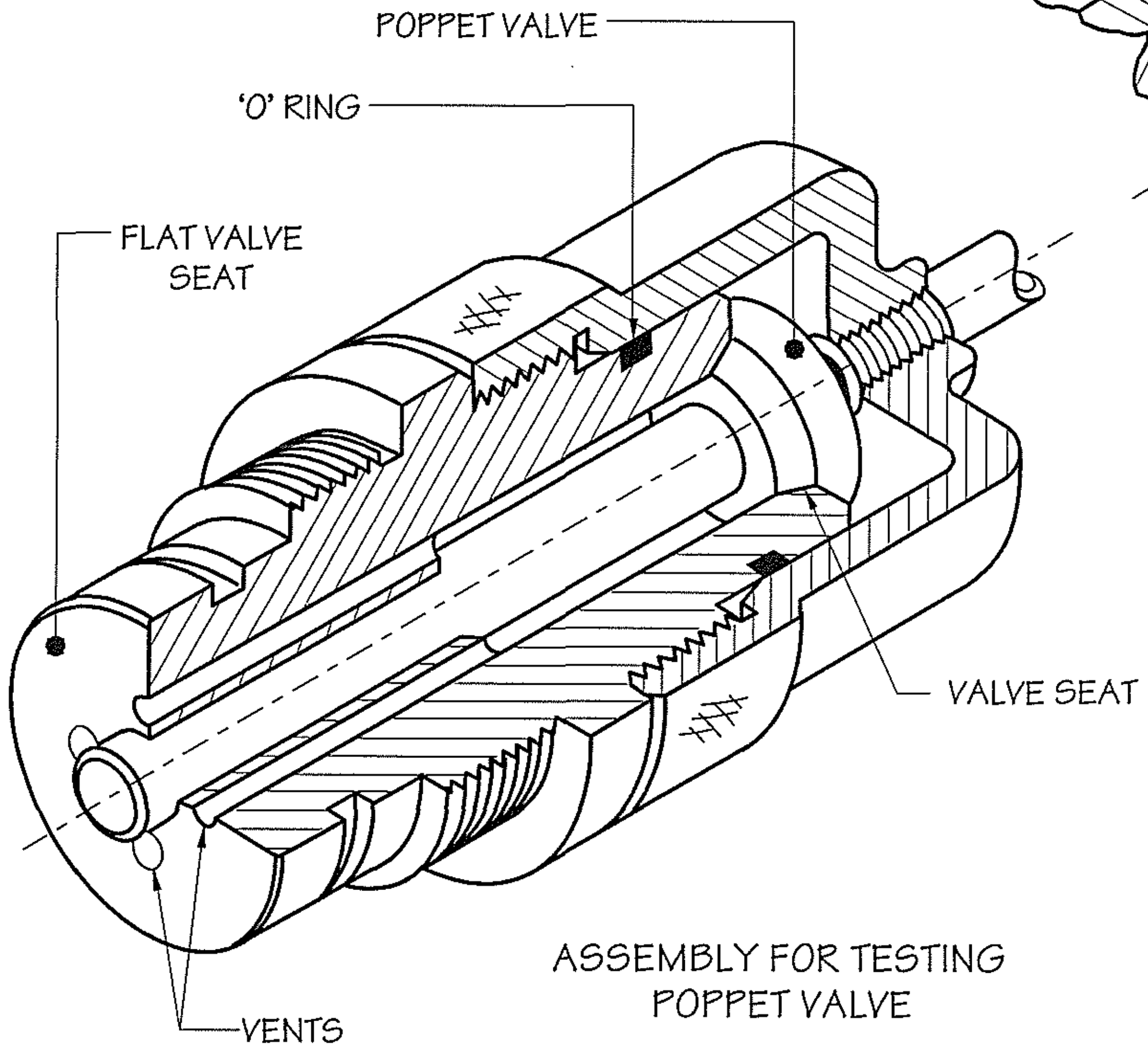
ITEM N°	DESCRIPTION	N° OFF	DRG N°
4	FOOT PAD	4	
3	LEG 84 LONG	4	
2	END 388 LONG	2	
1	SIDE 588 LONG	2	

1 2 3 4 5 6

DO NOT SCALE
ALL DIMENSIONS ARE IN MILLIMETRES



DETAIL OF FLAT VALVE TEST



ASSEMBLY FOR TESTING POPPET VALVE

This is an example of a pictorial drawing.

Note: Some parts are shown 'cut away' or 'in section'. Ask your teacher to identify the cross hatching and its purpose.

ISSUE	DATE	ZONE	CHANGE	ECN	BY	CKD
A	12 - 01 - 98		FIRST ISSUE		J B	L R

AMENDMENTS

UNLESS NOTED OTHERWISE TOLERANCES ARE:
LINEAR N/A
ANGULAR N/A

DRAWING PRACTICE AS 1100

MATERIAL N/A

FINISH N/A

DRAWN	J B
TRACED	
CHECKED	L R
APPROVED	P W
ISSUED	12 - 01 - 98

RECORD OF ISSUE: A

TAFE NSW

MANUFACTURING AND ENGINEERING EDUCATIONAL SERVICES DIVISION

TITLE POPPET VALVE

SCALE	SIZE	DRG N°	SHT
NTS	A3	MEC076 - 202	1 of 1

1 2 3 4 5 6

Understanding and recognition of amendments (changes to a drawing)

Understanding amendments

Changes are often required to a drawing due to such things as: errors on the original drawing, design alterations, production requirements, client requirements or some other valid reason.

Recognition of amendments

Changes are usually shown in a list in or next to the main title block. Letters are often used to identify the latest issue - example A, B, C, etc. Over time millions of dollars have been wasted due to problems created by amendments. Some reasons for this are:

- changes have not been recorded in the amendments section.
- someone has worked from a drawing that was not the latest issue containing any changes.
- the person working from a drawing has not checked that the drawing is the latest issue.
- the company does not have a system whereby all drawings issued are recorded and recalled when a change has been made.
- photocopiers can account for a lot more copies being in circulation than was originally issued.
- computer aided drafting (CAD), where changes can be made quickly and easily, and often by a number of people, and where recording of changes can easily be overlooked, have cost enormous amounts of money.
- the person who gave you the drawing to work from has not verified with the drawing office that the copy they have is the latest issue containing the latest changes.
- drawings that have been in the workshop for a length of time are used without checking with the drawing office to see if there are update issues on file.
- trades-person has not checked to see if the equipment they are about to work on complies perfectly with the drawing.
- trades-person has not checked to see if the drawing or drawings are for the particular model they are working on. There are plenty of things that are manufactured that retain the same name (cars are a good example) but vary from model to model or year to year. Make sure that the correct version is with the trades-person.

The potential for costly errors by working from the wrong drawing can not be stressed too strongly. It is imperative that every time you work from a drawing that you confirm with your superior or directly with the drawing office that the drawing is the latest issue.

Original drawings are filed in the drawing office. These are often referred to as 'hard copies'. These never leave the drawing office, only copies of them, hence this master copy will contain a record of all changes that have been made since it was originally issued.

The sheet size listed on the drawing is the size of the sheet it was originally drawn on. This is the size that is on file in the drawing office. The drawing you have may not be this size due to the ability of photocopiers to vary the size of the copy.

Remember, a drawing may change. It contains all the modifications to overcome operational malfunctions, wear problems and working life problems.

The problem that every change creates is that there are possibly out-of-date drawings in existence, just waiting for someone to be careless enough not to check that the drawing they have is the latest issue.

Be careful. Something made to a superseded drawing could cost a massive amount of money, time, and lead to litigation and a claim for damages or compensation.

Students should undertake questions as guided by the teacher.

Exercise 2-1 on sheet MEC076 - 2 - 12 (page 28)
Exercise 2-2 on sheet MEC076 - 2 - 14 (page 30)
Exercise 2-3 on sheet MEC076 - 2 - 14 (page 30)

Discussion time should be allowed during and after the completion of the required work.

Student Exercise 2-1

Referring to drawing 6547-1-1/B on sheet MEC076 - 2 - 13 , answer the following questions.
Tick the correct response where boxes are provided.

1. What type of drawing is it?

____

2. What is the part called?

____

3. The scale is NTS, what does that mean?

____

4. What does 'AS' in the material specification AS CS1040 stand for?

____

5. What dimension sizes are located in zone A3? (list three)

1. ________ 2. ________ 3. ________

6. What dimension sizes are located in zone C4? (list three)

1. ________ 2. ________ 3. ________

7. How can you be sure Issue B is the latest issue?

____

8. If you had a copy of the drawing 6547-1-1 (issue A) in the workshop would it be up to date and correct? ☐ Yes ☐ No

9. What part of the Title Block indicates the latest drawing?

☐ Finish ☐ Amendments ☐ Approved

10. What size drawing sheet was used to produce the original drawing?

☐ A2 ☐ A3 ☐ A4

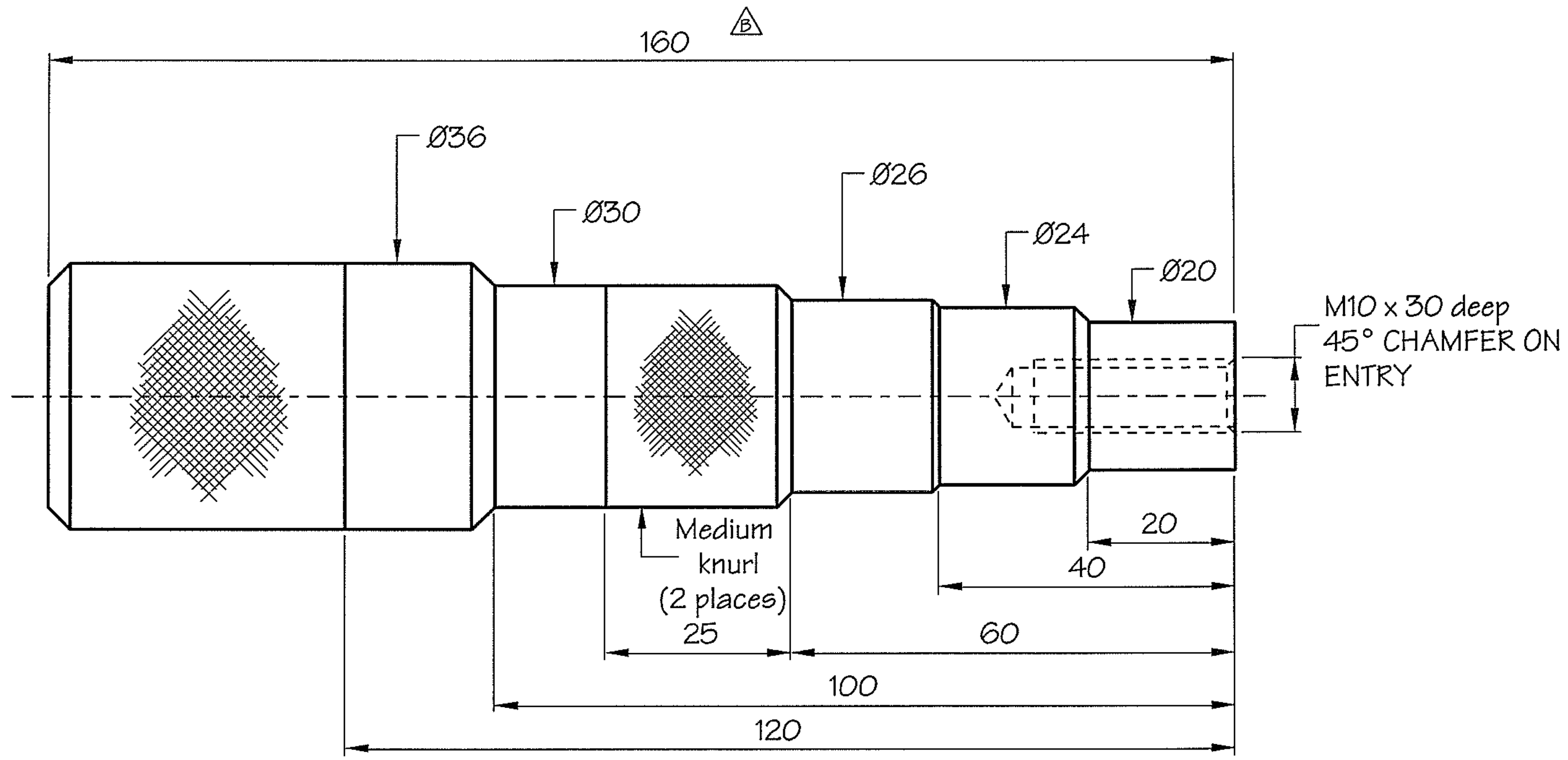
11. What are the initials of the drafter?

____

12. How many months between the original issue for production and the first amendment (change)?

____

DO NOT SCALE
ALL DIMENSIONS ARE IN MILLIMETRES



External chamfers 45°

Materials to comply with: AS CS 1040

ISSUE	DATE	ZONE	CHANGE	ECN	BY	CKD
B	10 - 7 - 97	A3	160 was 155	36975	J D	W L
A	15 - 5 - 97		ISSUED FOR PRODUCTION		J D	W L

AMENDMENTS

UNLESS NOTED OTHERWISE TOLERANCES ARE:
LINEAR ± 0.1
ANGULAR 0.5°

DRAWING PRACTICE
AS 1100

MATERIAL
AS LISTED

FINISH 3.2 UNO

DRAWN	J D
TRACED	W P
CHECKED	W L
APPROVED	K A
ISSUED	5 - 5 - 96

RECORD OF ISSUE: A B

TAFE NSW — MANUFACTURING AND ENGINEERING EDUCATIONAL SERVICES DIVISION

TITLE
ADJUSTING PIN

SCALE	SIZE	DRG N°	SHT
NTS	A3	6547-1-1/B	1 OF 1

Exercise 2-2

Referring to Drwg 97-416 on sheet MEC076-2-15 answer the following questions.

1. What type of drawing is it?

2. What is the device called?

3. How many items are listed?

4. How many parts are required for one complete assembly?

5. What angle is the drawing produced in?

   ☐ First angle ☐ Third angle

6. How did you decide?

7. What detail drawing number needs to be found to produce Item 2, the side plate?

8. When was this drawing first issued?

Exercise 2-3

Referring to Drwg 50882 on sheet MEC076-2-16 answer the following questions.

1. What type of drawing is it?

2. How many parts are detailed on this drawing?

3. What are the initials of the person who produced the drawing?

4. What units are the dimension?

   ☐ Centimetres ☐ Metres ☐ Millimetres

5. How did you decide on your answer in (4)?

6. What is the drawing standard practice that has been used?

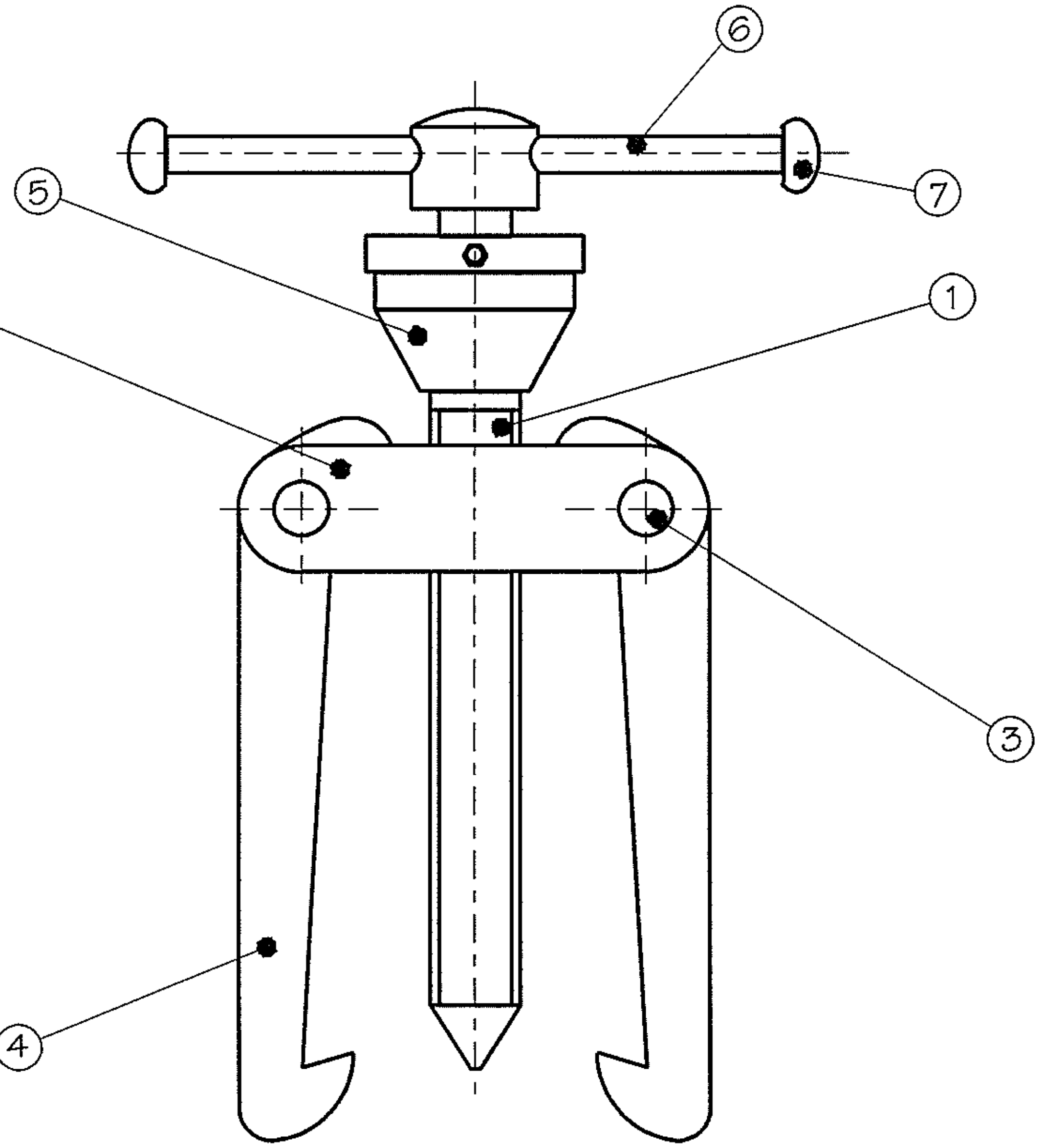
7. Is the latest issue A, B, or C?

   ☐ A ☐ B ☐ C

8. How many dimensions were changed on the drawing for issue C?

MEC076 - 2 - 15

ALL DIMENSIONS ARE IN MILLIMETRES
DO NOT SCALE



WHEEL PULLER
ASSEMBLY

ITEM	QTY	DESCRIPTION	DRG No
7	2	CAP	97-508
6	1	HANDLE	97-507
5	1	BODY	97-506
4	2	LEG	97-505
3	2	PIN	97-504
2	2	SIDE PLATE	97-503
1	1	STEM	97-502

AMENDMENTS

ISSUE	DATE	ZONE	CHANGE	ECN	BY	CKD
A	15 - 10 - 97		FIRST ISSUE		J D	W L

UNLESS NOTED OTHERWISE TOLERANCES ARE:
LINEAR N/A
ANGULAR N/A

DRAWING PRACTICE AS 1100

MATERIAL N/A

FINISH N/A

DRAWN	J D
TRACED	W P
CHECKED	W L
APPROVED	L R
ISSUED	10 - 10 - 97

RECORD OF ISSUE: A B

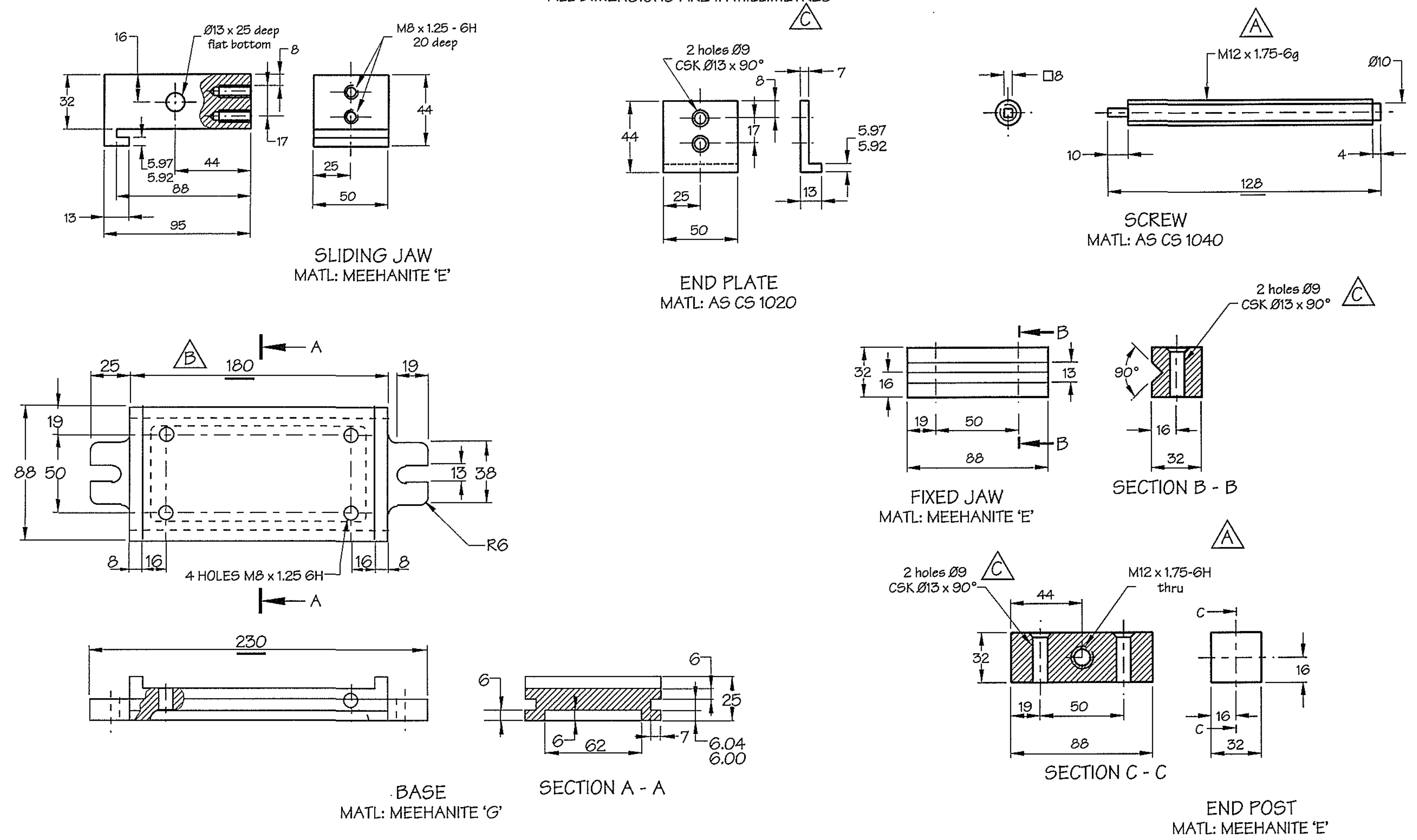
TAFE NSW

MANUFACTURING AND ENGINEERING EDUCATIONAL SERVICES DIVISION

TITLE WHEEL PULLER

SCALE	SIZE	DRG Nº	SHT
NTS	A3	97 -416	1 OF 1

DO NOT SCALE
ALL DIMENSIONS ARE IN MILLIMETRES



C	04 - 8 - 95	A4/B6/C5	DIAMETER 9 WAS DIAMETER 8	L R	N C
B	26 - 7 - 95	B2/A6/C6	180 WAS 170	F B	N C
A	7 - 7 - 95	6A/6C	WAS SQUARE THREAD	N M	L A
ISSUE	DATE	ZONE	CHANGE	BY	CKD

AMENDMENTS

UNLESS NOTED OTHERWISE TOLERANCES ARE:
LINEAR ± 0.1
ANGULAR 0.5°
DRAWING PRACTICE AS 1100

MATERIAL AS SHOWN
FINISH - UNO ALL OVER 3.2

DRAWN	F B
TRACED	W P
CHECKED	J B
APPROVED	K A
ISSUED	13 - 6 - 95

RECORD OF ISSUE: A B C

TAFE NSW — MANUFACTURING AND ENGINEERING EDUCATIONAL SERVICES DIVISION

TITLE: MACHINE VICE DETAILS

SCALE	SIZE	DRG N°	SHT
1 : 2	A3	50882	1 OF 1

Instructions/Notes - identification and explanation

Drawings are not just shapes with dimensions, symbols and abbreviations around them. Often there are separate instructions printed somewhere on the drawing sheet.

These may explain why a change has been made, how the component has to be aligned with a mating part prior to drilling holes through them, the fact that the component must be made oversize to allow for heat treatment and final grinding to size. Failure to read these notes and comply with them may be costly and/or dangerous in manufacture or in operation.

Note that all firms are not large enough to have their own printed sheets. Where there is no title block or a very small and simple one, the information you would expect to see in a title block may appear in note form.
For example:

Notes
1. UNLESS SHOWN OTHERWISE DIMENSIONS ARE IN MILLIMETRES
2. ALL MS TO BE PER AS 1442 - 1992/S1020
3. TOLERANCES TO BE WITHIN ± 0.5 UNLESS SHOWN OTHERWISE
4. SURFACE FINISH GENERAL TO BE 1.6
   BEARING SURFACES (ITEM 1) TO BE 0.4
5. REMOVE ALL SHARP CORNERS WITH A SMOOTH FILE
6. DO NOT SCALE THE DRAWING - WORK TO THE DIMENSIONS
7. ITEM 1 TO BE "SLIDE FIT" IN ITEMS 5 & 8. THIS CAN BE PRODUCED BY REAMING TO SUIT THE Ø 6 BEAM, OR BY BUFFING THE BEAM WITH FINE EMERY TO SUIT A Ø 6 REAMED HOLE.

ITEM	DESCRIPTION	QTY	MATERIAL
9	ADJUSTING SCREW	1	35 x Ø3.5 MS BAR
8	" BLOCK	1	35 x Ø12 MS BAR
7	" NUT	1	4 x Ø14 MS
6	NUT - TRAVERSE LOCKING	3	12 x Ø16 MS
5	WASHER	2	12 OD x 8.5 ID x 1.5 MS
4	SCRIBER	2	3ØHSS OR SILVER STEEL
3	NUT	2	15 x Ø12 MS
2	LEG	2	90 x Ø12 MS
1	BEAM	1	300 x Ø6 SILVER STEEL BAR

J & N INDUSTRIES PTY LTD

COURSE - PRE-EMPLOYMENT SUBJECT PRACTICAL	DRAWN BY JOHN	SHEET No. 1 of 1	ISSUE 1
TITLE TRAMMEL ASSEMBLY & DETAIL	APPROVED BY NICK DATE 5/1/97	DRAWING No. PERM 04	

Information on dimensions or tolerances can be given by way of a note on the drawing. Notes can be classified as general, that is, applying to the whole drawing, or local, where they apply to a particular feature.

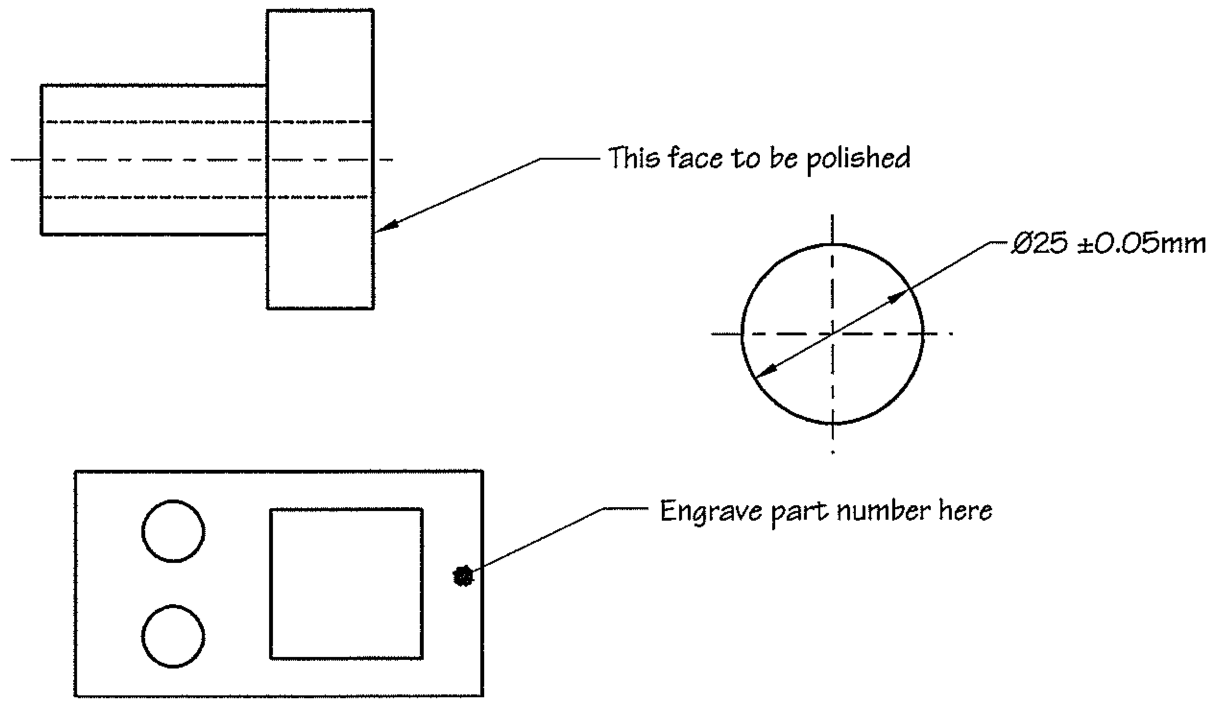
General notes

These are used to specify information which would otherwise have to be repeated many times on the drawing, that is fillet radii are all 6mm UNO (unless noted otherwise).

Where more than one such note is used on a drawing, they should be grouped together, preferably near the title block as shown on the illustration. This does not always happen, methods of explanation may be added later, and for this reason the whole drawing should be studied carefully before commencing work.

Local notes

These should be placed near the feature to which reference has been made, connect to the point of reference by a leader line ending in either an arrow or dot, whichever is appropriate for the situation. Below are some examples of these methods.



Students should attempt Exercise 2-4 on sheet MEC076 - 2 - 18 page 34

Student exercise 2-4

Referring to the drawing on sheet MEC076 - 2 - 19, involve yourselves in group discussions/individual research on the answers for the questions below.

1. What drawing methods have been used on this drawing sheet? (Detail, assembly etc)

   ____

2. What is the drawing number?

   ____

3. What is the latest issue? (Is it clearly shown or not?)

   ____

4. Was this drawing produced by a large business or a small business?

   ☐ Small ☐ Large

5. What are the reasons for showing the exploded view.

   ____

6. Are any zones indicated on this drawing?

   ☐ Yes ☐ No

7. This drawing has no provision for change registration to indicate that this is the latest drawing for production, could this lead to errors in production, and if so list at least two possible problems that could occur.

   1. ____________________

   2. ____________________

8. The drawings has circles with B, C, D, E shown. What do these circles with letters refer to, and why are they used?

   ____

9. Did you find it a bit confusing to answer question 8?

   ☐ Yes ☐ No

   Comment: ____________________

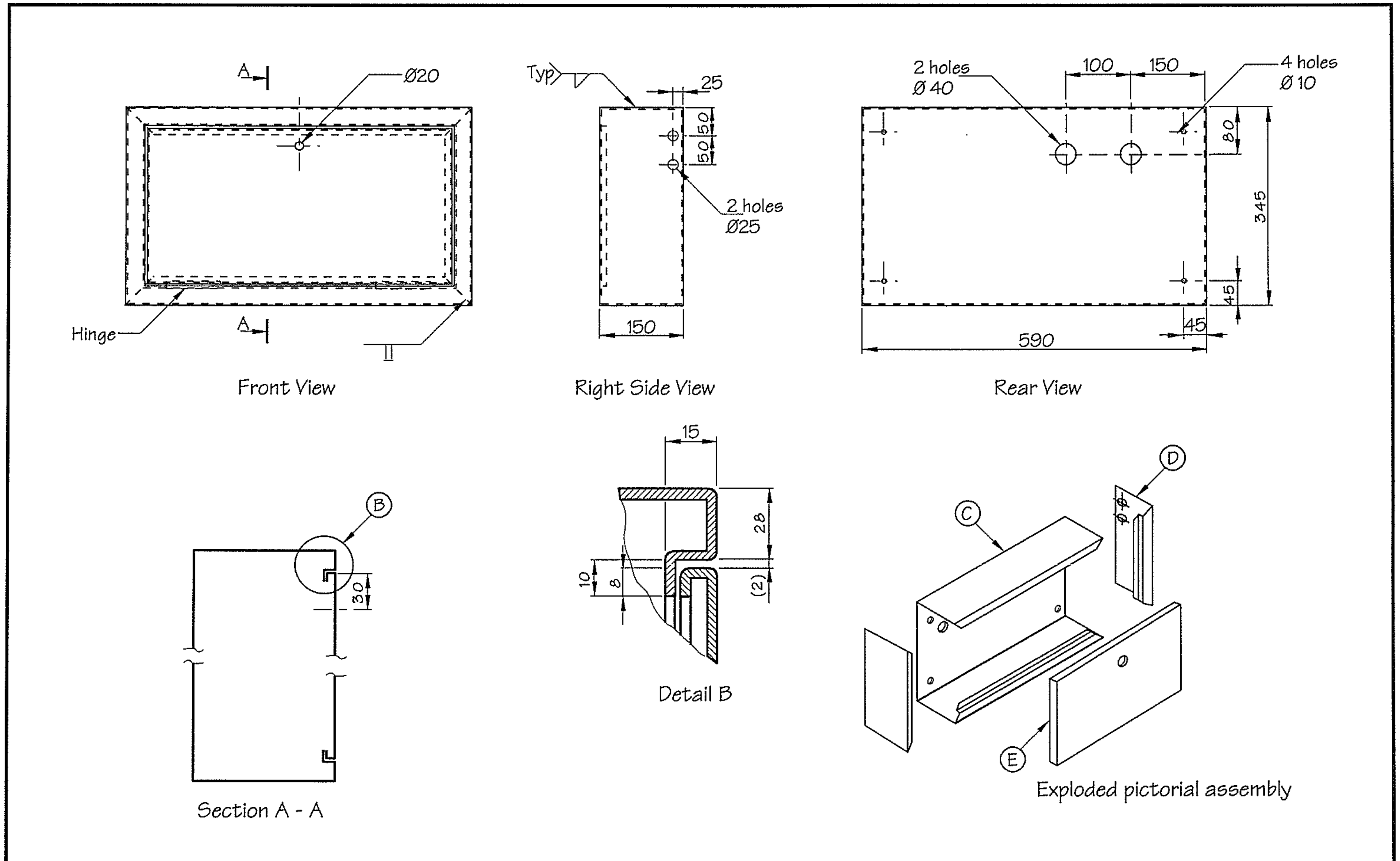
   ____

10. Could you purchase the correct hinge from the information provided on the front view? Supply a reason with your response.

    ☐ Yes ☐ No

    Reason ____________________

Note: Drawings vary a lot in their presentation, not every drawing in industry is clear and concise. "If in doubt, ask!"



TITLE	SWITCH BOX DETAIL ASSEMBLY			
DRAWN BY ASC	ORDERED BY WB	SCALE NTS	DATE 27.2.98	DRG N° 46217

Methods of pictorial presentation

Orthogonal

There are a number of ways an object may be drawn. If the object is something large, such as a building, it could be photographed from directly in front, from both sides and an aerial shot from above. These photos could then be arranged side by side with the aerial photo above the front.

Looking at these photos you could then picture in your mind what the building looked like. This is the principle used with orthogonal drawings and is what was looked at in section 1 when introducing first and third angle projection.

Perspective

Another way to photograph the building would be to stand off one corner and photograph the front, one side, and if you could get high enough, the roof from a corner as well all on one photo. This would give an appreciation of what the building looked like in one direction. The problem is that the front, side and top would be distorted because they are being looked at from an angle. A photograph from a corner is basically what your eye would see, especially in the case of very long buildings that seem to taper away from you. (Like looking down a straight road or railway line.) This is easy to photograph but time consuming to recreate when drawing. This is called Perspective Drawing.

Isometric

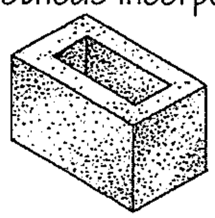
This is similar to the above, which once again looks at an object from a corner, but this time all lines are drawn parallel to each other saving time and simplifying the drawing.

Oblique Drawing

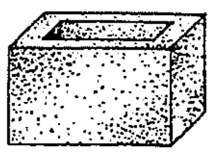
This pictorial method shows one face as a true shape, while the other faces/surfaces are drawn at an angle from that face, usually at 45°. Because the front is of a true shape, the object is not representative of what it should look like, as in perspective.

Exploded

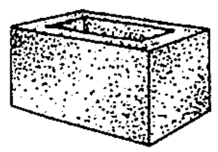
This method of pictorial representation is purely used to show someone how a multiple part object is assembled, and this is commonly used to assemble self-assemble furniture or the bearing assembly of an engine shaft. These exploded views could have any of the other pictorial view methods incorporated.



Isometric



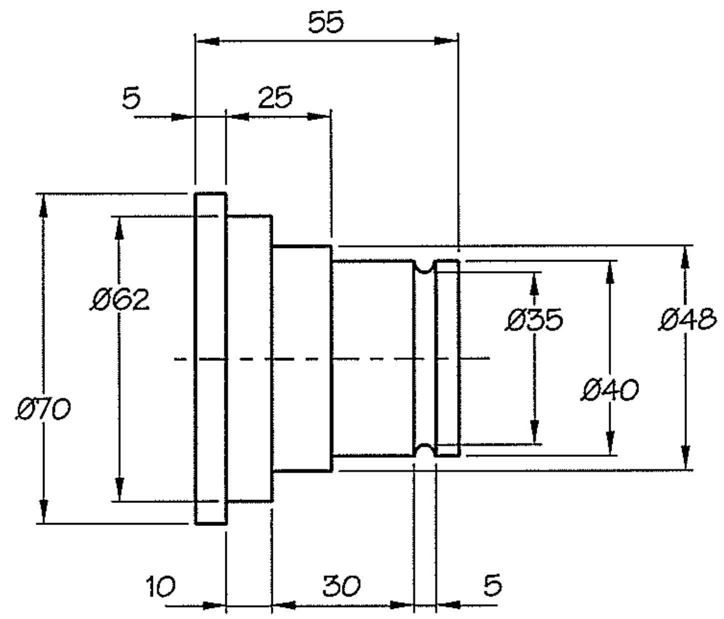
Oblique



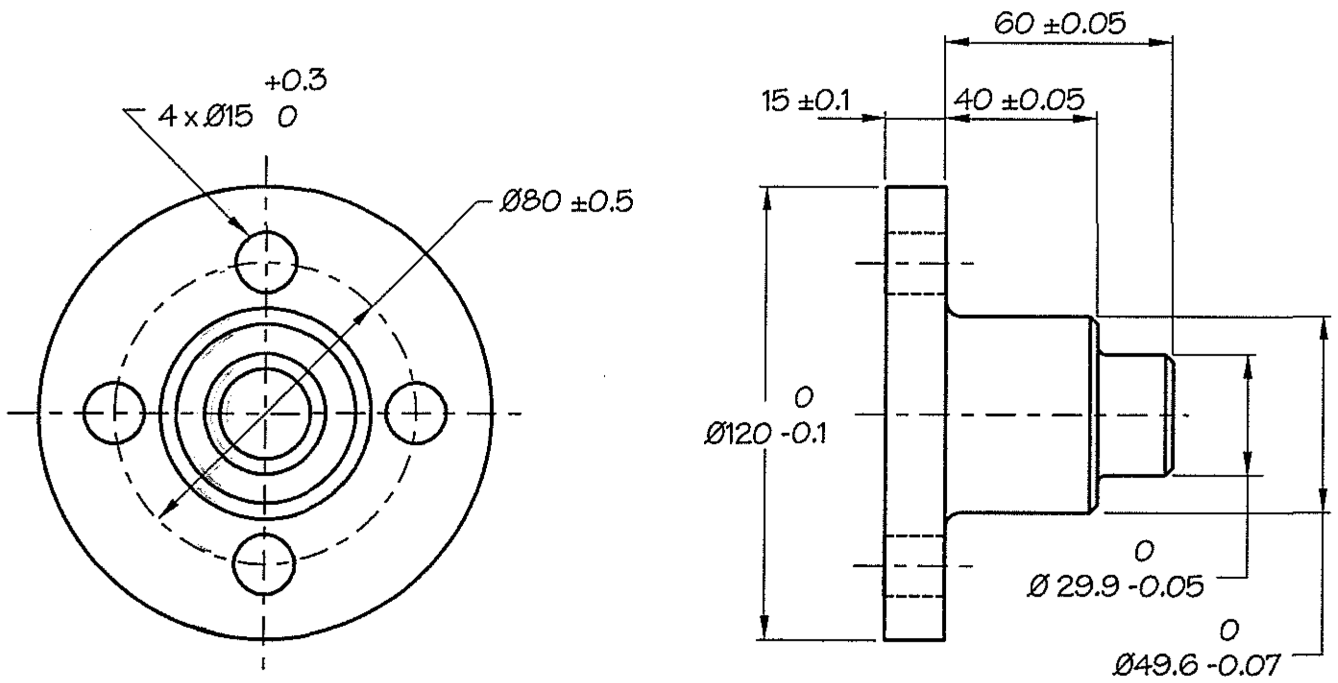
Perspective

Orthogonal Drawings

This type of drawing forms the basis of working drawings for industry in general. Because drawing is a time consuming job, time is not spent in preparing unnecessary views. Usually we think in terms of two or more drawings or views as they are called, however, a single view is sufficient with some objects. See the example below where the use of the diameter symbol indicates that the object is round. Hence, the drawing of concentric circles at the end of the view would be a waste of time and money.



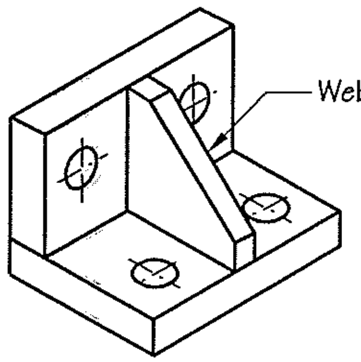
An end view here is unnecessary



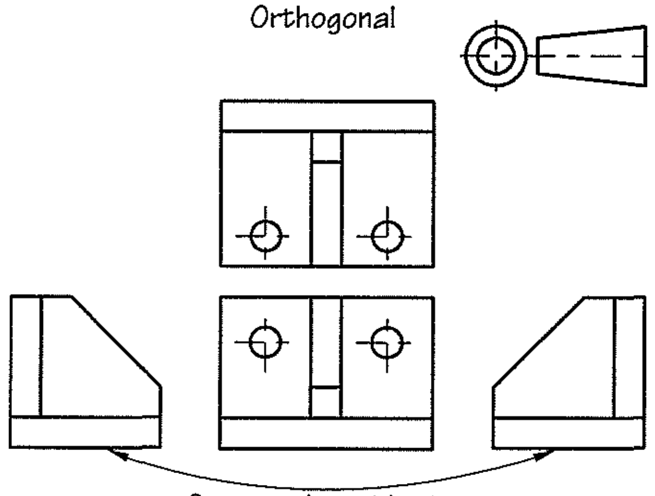
All chamfers 1.5 x 45°

An end view is necessary here to show the position of the four holes

Pictorial
(Isometric)



Orthogonal



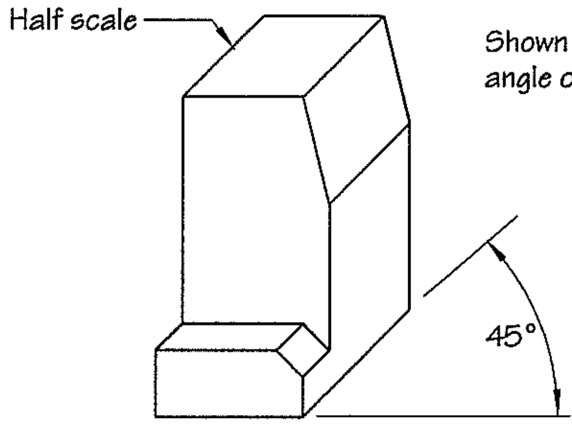
One or other side view

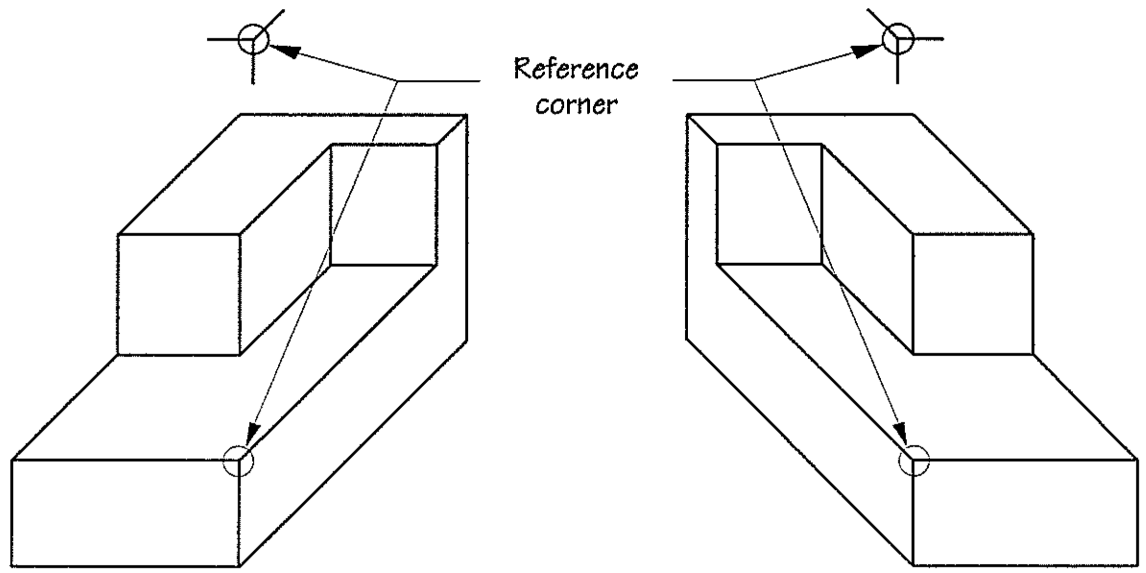
In general, the most common number of views is 3

Oblique drawings

This method of drawing objects is not very common and is not often used in technical publications.

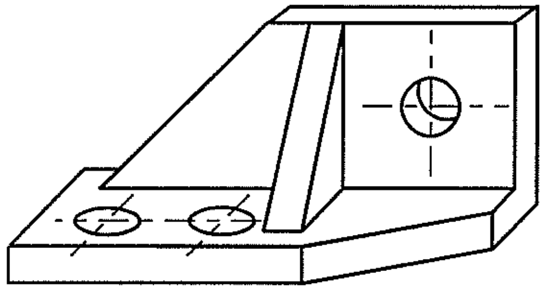
To make these drawings look somewhere in proportion, the receding 45° lines are drawn half size. Note that there is no set rule about 45° and half size lengths, however, the feature that identifies oblique is the fact that one front edge is horizontal. See below.

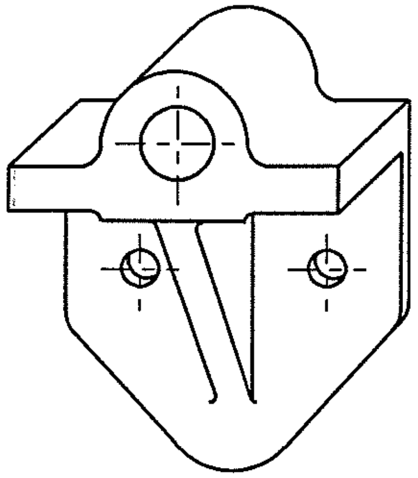


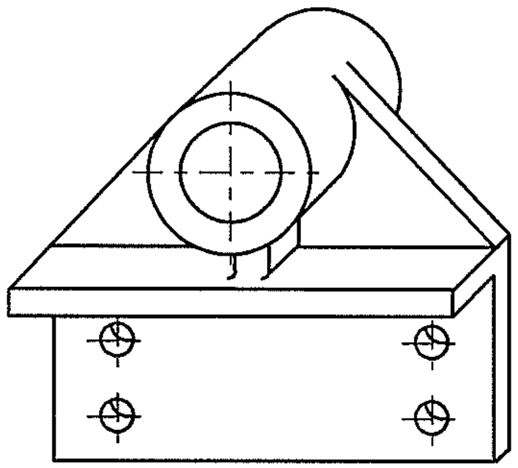


All pictorial drawings should be drawn looking on the corner that shows the maximum amount of detail. They should not be drawn from a viewing point that hides one or more features. In order to do this the receding lines can be drawn either to the left or right, as shown above, in order to reveal maximum information.

Three examples of oblique drawings. Note that the one advantage oblique drawing has over the other pictorial drawings is the fact that circles and arcs on the front surfaces are true circles, or parts of circles. On the other hand receding faces show them distorted.

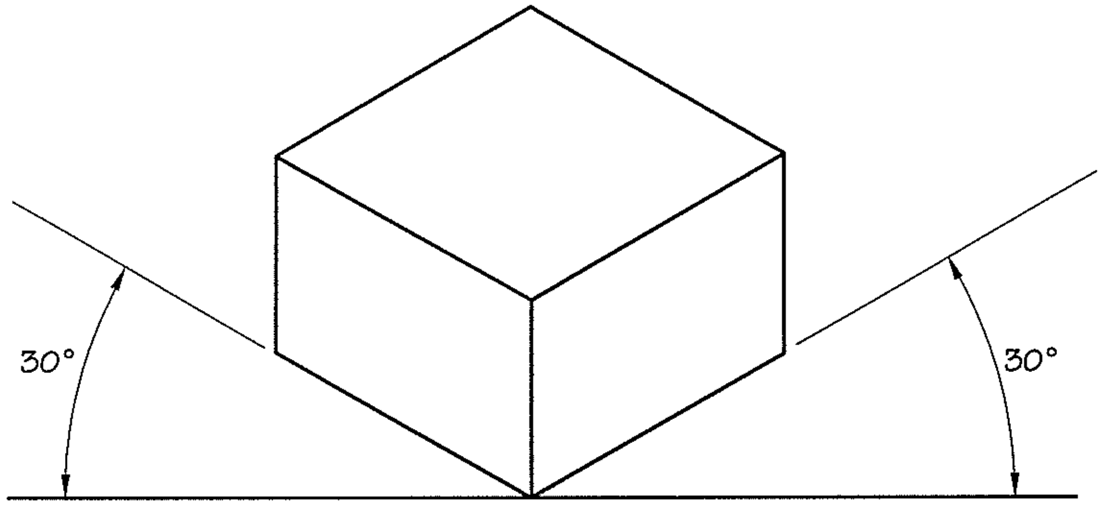


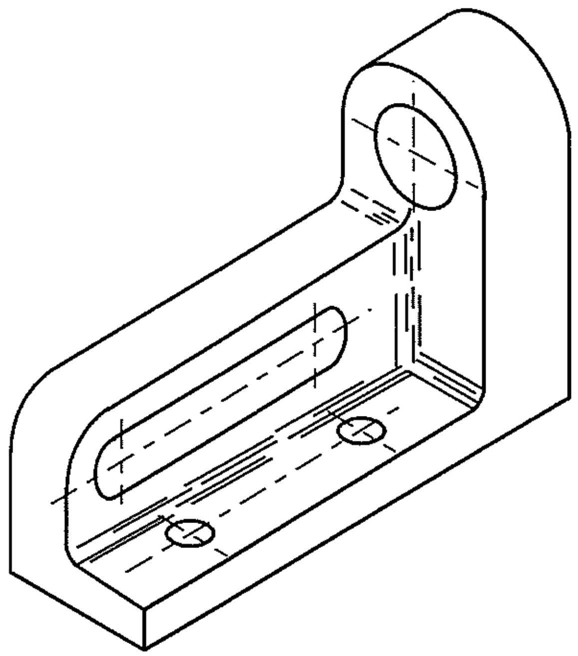




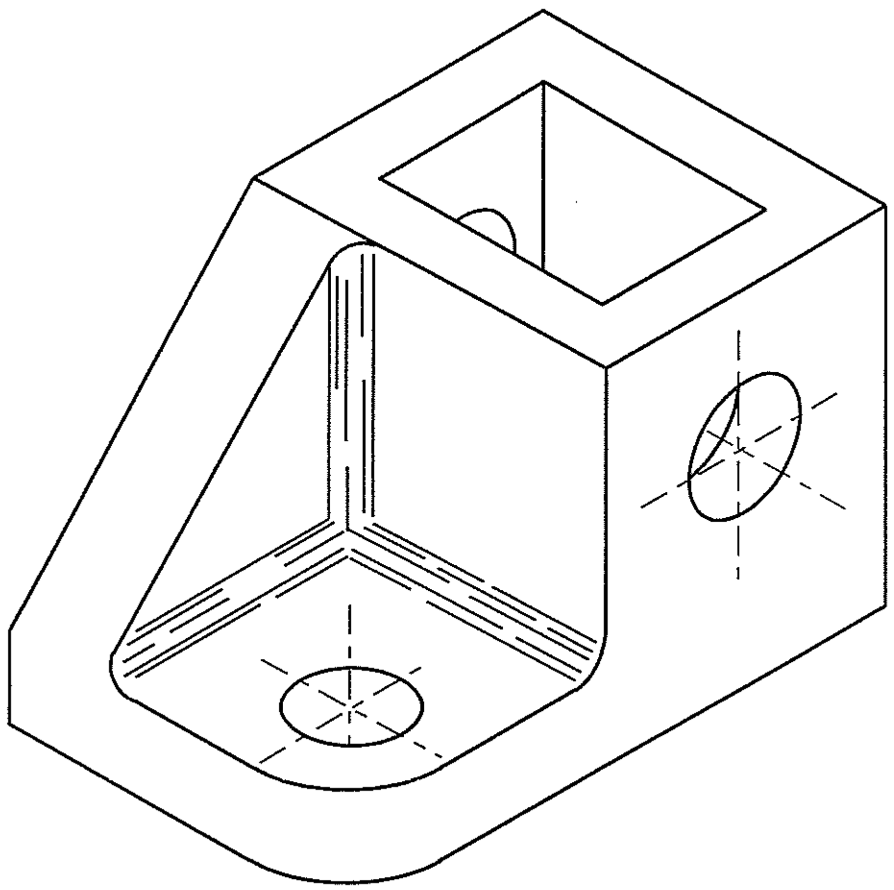
Isometric drawings

These are by far the most common pictorial drawings that are to be found in most technical publications. All lengths are drawn full size and all edges recede at 30° from the vertical as shown below.



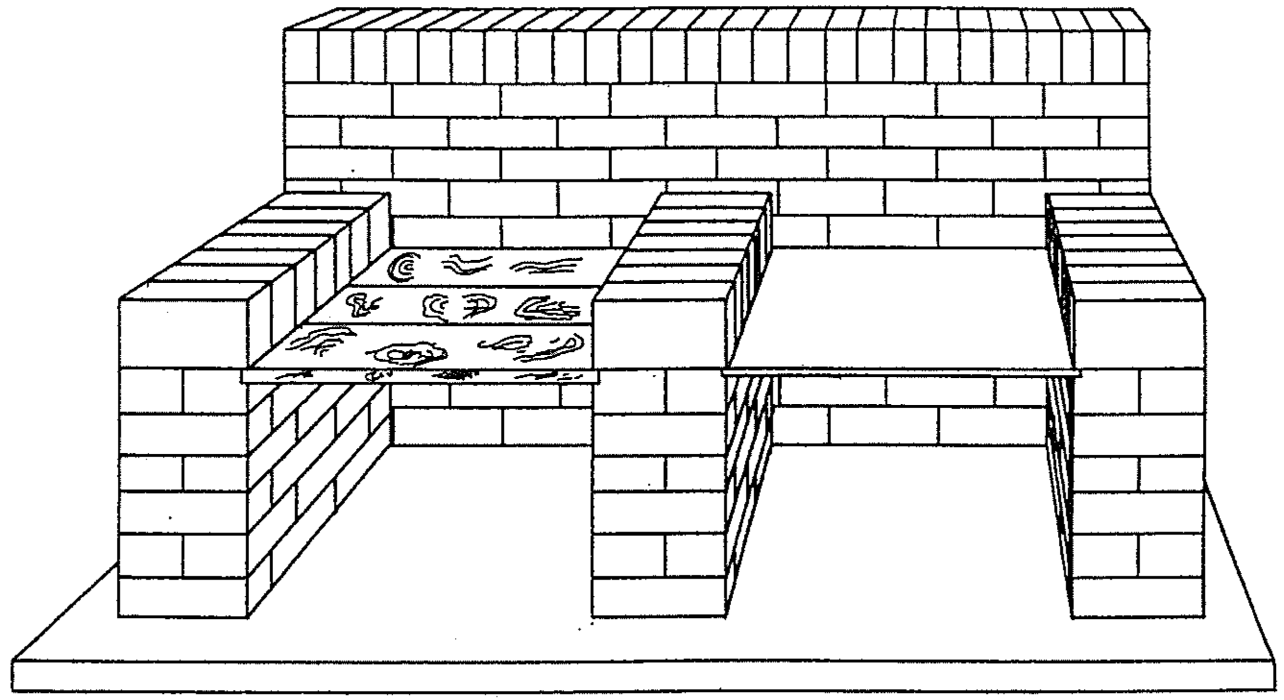


Another example of an isometric drawing. Note how the circles and arcs on all faces are elliptical and no faces are a true shape.



Perspective

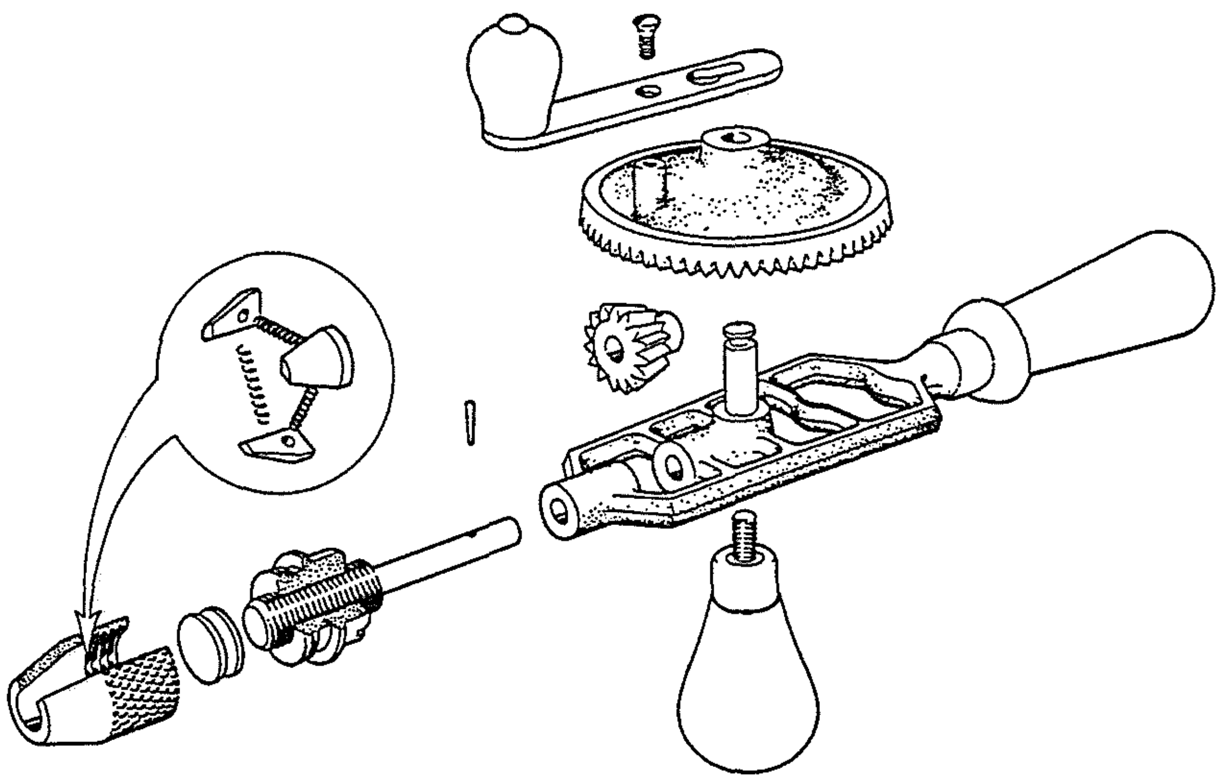
A method widely used by architects to show construction and buildings as they would appear to the eye on completion.



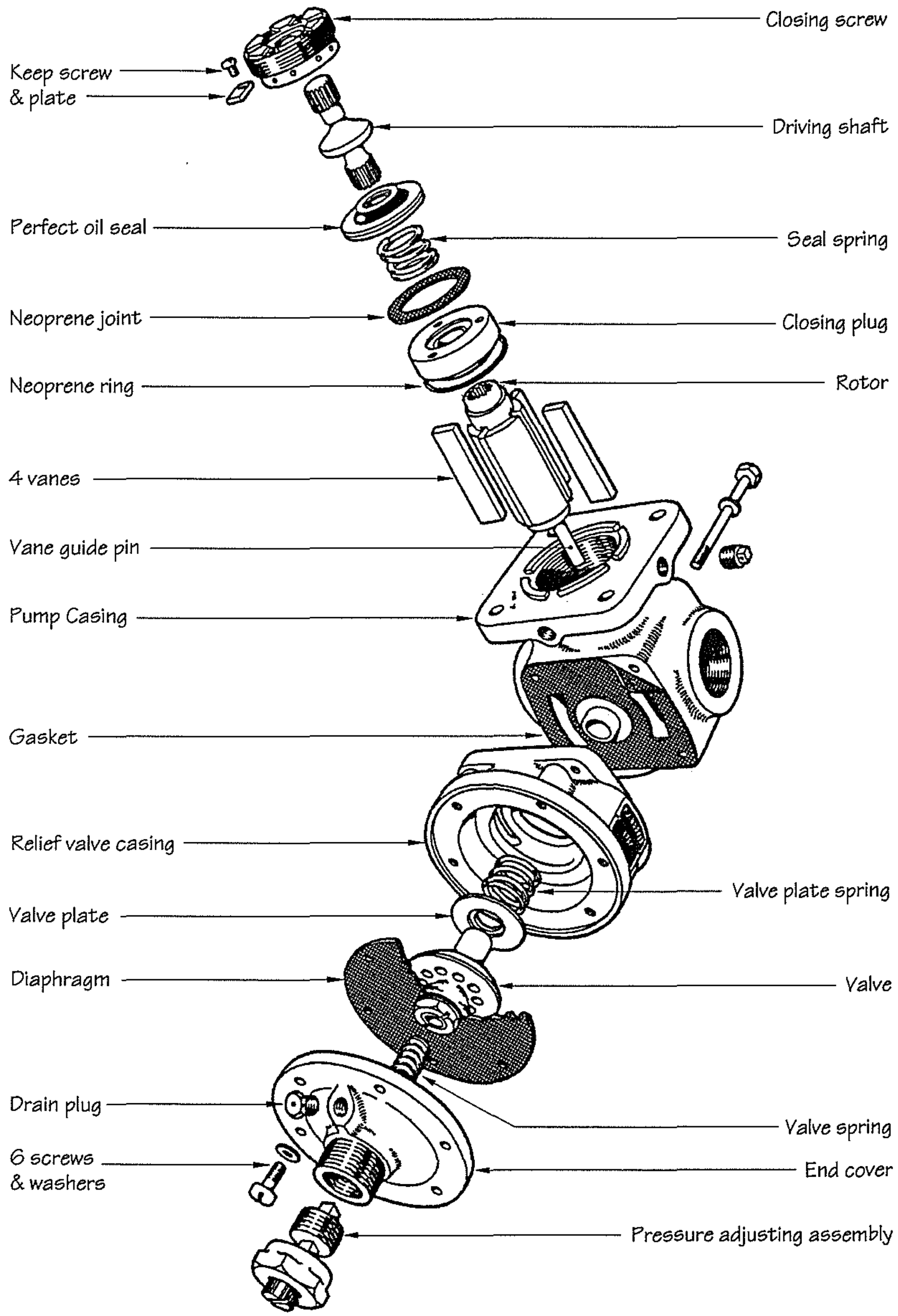
This example is a single point perspective. The lines of projection from the front eventually meet at one point.

Exploded views

This method is particularly good for showing those, who have little or no experience with reading drawings, and with the ability to comprehend the assembly or dis-assembly of a mechanical component.

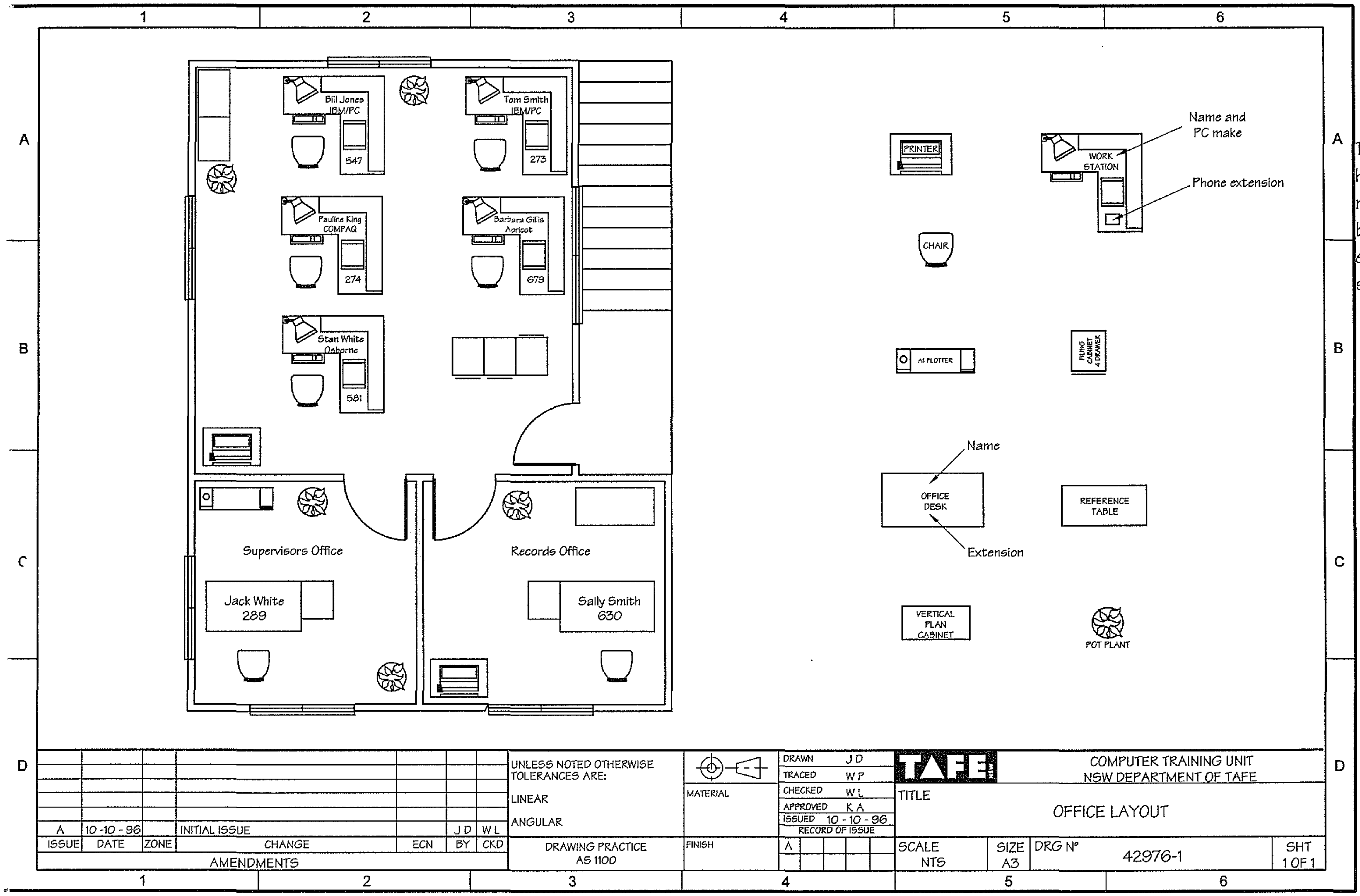


Exploded view of a hand drill



Exploded view of a pump

Plan/layout drawings



These are used to plan the position of a house on land, furniture, equipment, machinery or other items within a building or factory. Such a layout is essential for occupational health and safety aspects

Exercise 4-1

Name the pictorial methods used to produce the drawings shown. Place your answer on the line provided.