LEAVING CERTIFICATE EXAMINATION, 2000

TECHNICAL DRAWING - HIGHER LEVEL

PAPER II(A) - ENGINEERING APPLICATIONS

Friday, 16 June, Afternoon 2.00 - 5.00 pm

200 Marks

INSTRUCTIONS

(a) Answer four questions.
(b) All questions carry equal marks.
(c) Drawings and sketches should be in pencil unless otherwise stated.
(d) Where dimensions are omitted they may be estimated.
(e) Credit will be given for neat orderly presentation of work.
(f) Candidates should work on one side of the paper only.
(g) The Examination Number should be written on each drawing sheet used.
(h) All dimensions are in millimetres.

OVER →

1. Details of a Milling Machine Tailstock are given in Fig. 1 with the parts list tabulated below.

(a) Draw a full size sectional elevation A-A showing the parts fully assembled.

(b) Insert item reference numbers to identify the parts and add the title MILLING MACHINE TAILSTOCK.

(c) With the aid of a neat freehand sketch suggest a modification to the design which will ensure that the handwheel (Part 4) is secured to the adjusting screw (Part 3).

PART	NAME	REQUIRED
1	BODY	1
2	CENTRE	1
3	ADJUSTING SCREW	1
4	HANDWHEEL	1
5	QUILL	1

2. **(a)** Fig. 2 below shows details, in section, of a right-hand, single-start feed screw for an injection moulding machine.
Draw an elevation of this screw for a length of 120 mm, showing its helical form at both outside and root diameters. Hidden details/curves are not required.

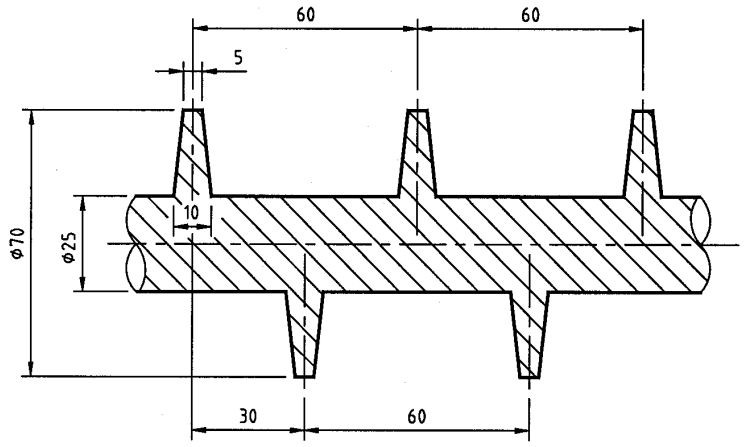

FIG. 2 FÍOR 2

(b) Draw, full size, **one** tooth of a spur gear with 24 teeth of involute form, module 10 and 20° pressure angle.

Tabulate on the sheet the following values for the gear:-

(i) Pitch circle diameter.
(ii) Addendum circle diameter.
(iii) Dedendum circle diameter.
(iv) Base circle diameter.
(v) Circular pitch.
(vi) Tooth thickness.

3. **(a)** Draw the profile and displacement diagram for a cam rotating in an anti-clockwise direction and imparting the following motion to an in-line knife edge follower:

0° to 90°	Rise 42 mm with Simple Harmonic Motion.
90° to 270°	Fall 42 mm with Uniform Acceleration and Retardation.
270° to 360°	Dwell.

The minimum distance between the central axis and the cam edge is 35mm.

(b) Fig. 3 shows three views, in first angle projection, of a pipework run. Using the dimensions given draw, to scale 1:10, **a single line isometric** drawing of the pipework which runs consecutively from point A, through all points and finishing at point G. Make A the lowest point in your drawing and ignore the radius of the pipework bends.

4. The elevation and plan of a thin sheetmetal transition piece, which is connected to a circular duct, is shown in Fig. 4.

(a) Draw the given views and produce a one piece surface development of the transition piece. The development should have the shortest seam possible.

(b) Sketch the following freehand:

(i) A sheetmetal joint suitable for the seam of the transition piece. Using a separate sketch show the seam allowance necessary to make this joint.

(ii) A sheetmetal joint suitable for connecting the transition piece to the circular duct.

Print the name of the sheetmetal joint below each sketch.

OVER →

5. A sectional elevation of a clutch release mechanism is shown in Fig. 5.

(a) Make the following drawings, scale 1:1, of the flanged housing, part 2.

(i) A sectional elevation corresponding to elevation given;
(ii) A side elevation viewed in the direction of arrow E.

The flange has four equi-spaced counterbored holes for parts 6 and three equi-spaced holes for parts 10.
Dimensions should be taken from the scale provided.

(b) Sketch freehand a pictorial view of a special spanner that would be suitable for removing and tightening the two-hole nut, part 9.

(c) Tabulate a parts list which shows the item number and the name of any **six** of the clutch parts.

6. **Answer SECTION A or SECTION B but not both**

SECTION A

(a) A sectional view of a horizontal plunger pump assembly, with the plunger completing the discharge stroke, is shown in Fig. 6(a).

(i) Make a large neat freehand sketch of the sectional view of the assembly showing the plunger on the suction stroke and with the valves in their correct working position.

(ii) Identify and neatly label on the sketch the following parts:
Plunger, Inlet port, Suction valve, Discharge valve, Discharge manifold, Valve cover, Gland and Seal ring.

(iii) With the aid of arrows, show the direction of fluid flow through the pump.

(b) Sketch freehand the following:

(i) Woodruff key;
(ii) Taper gib head key;
(iii) Round-ended parallel key.

OR

SECTION B

(a) **Briefly** answer the following questions. Sketches may be used where appropriate.

(i) In selecting a CAD system, which **one** of the following is the most important and state the reason for your choice:
• 4.2 Gb Hard disk • 64 Mb RAM • 500 MHz Processor • 17" Monitor.

(ii) Data on a floppy disk may be accidentally corrupted. State two situations which could cause this corruption.

(iii) Show how *'write-protection'* is accomplished with a floppy disk.

(iv) How do the PAN and ZOOM commands differ?

(v) Name **one** Text Font available with CAD and demonstrate the effect of increasing the text width factor.

(vi) What value would you enter to scale an object to one quarter of its original size?

(vii) Using circles sketch an example of an array using five columns and three rows.

(viii) Sketch an example of baseline dimensioning.

(ix) List **two** types of plotter suitable for producing plots of CAD drawings.

(x) What command normally restores objects just erased?

(b) Fig. 6(b) shows the main window of a CAD system, with 10 parts identified with item reference numbers 1 to 10. Match each of the numbered items with the correct term from the following selection:

- *Layer name,*
- *Dimension toolbar,*
- *Scroll box,*
- *Screen menu,*
- *Crosshair cursor,*
- *Close button,*
- *Drawing title,*
- *Co-ordinate display,*
- *Drawing area,*
- *Paper space icon.*

(c) Make pictorial sketches to show the results of the following solid modelling operations:

(i) The cylinder which is penetrating the cone in Fig. 6(b) 1 is subtracted from the cone.

(ii) The hexagon in Fig. 6(b) 2 is extruded a height of 80 mm with a taper angle of 5º .

(iii) The profile in Fig. 6(b) 3 is revolved clockwise through 180º about the axis Y-Y.

(d) List **ten** CAD commands you would use in producing the drawing of the guitar shown in Fig. 6(b) 4.

AN ROINN OIDEACHAIS AGUS EOLAÍOCHTA **M.84(L)**

SCRÚDÚ ARDTEISTIMÉIREACHTA

2000

LÍNÍOCHT THEICNIÚIL – ARDLEIBHÉAL

PÁIPÉAR II(A)

FEIDHMIÚCHÁIN INNEALTÓIREACHTA

AN ROINN OIDEACHAIS AGUS EOLAÍOCHTA

LEAVING CERTIFICATE EXAMINATION

2000

TECHNICAL DRAWING – HIGHER LEVEL

PAPER II(A)

ENGINEERING APPLICATIONS

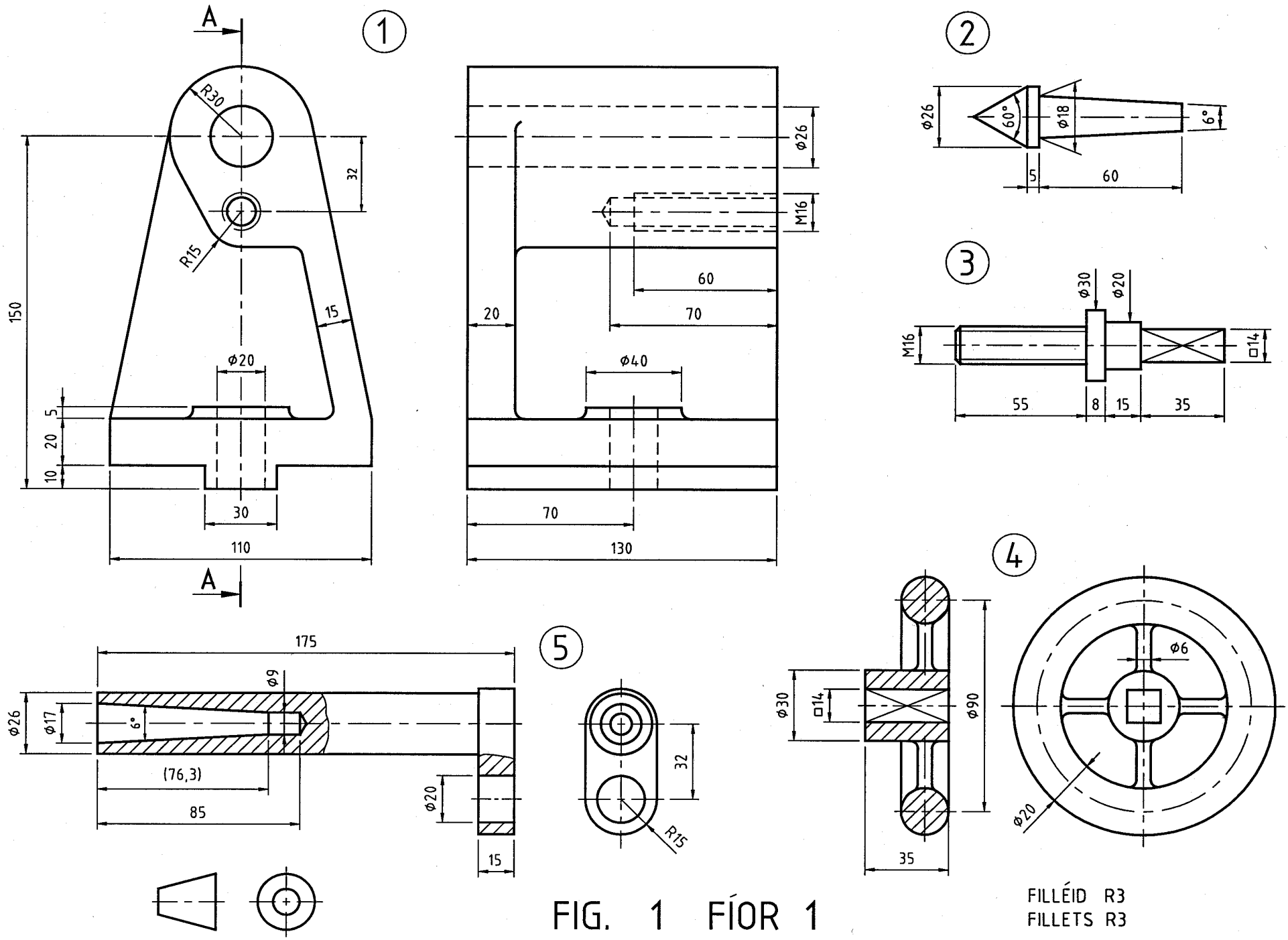

FIG. 1 FÍOR 1

FILLÉID R3
FILLETS R3

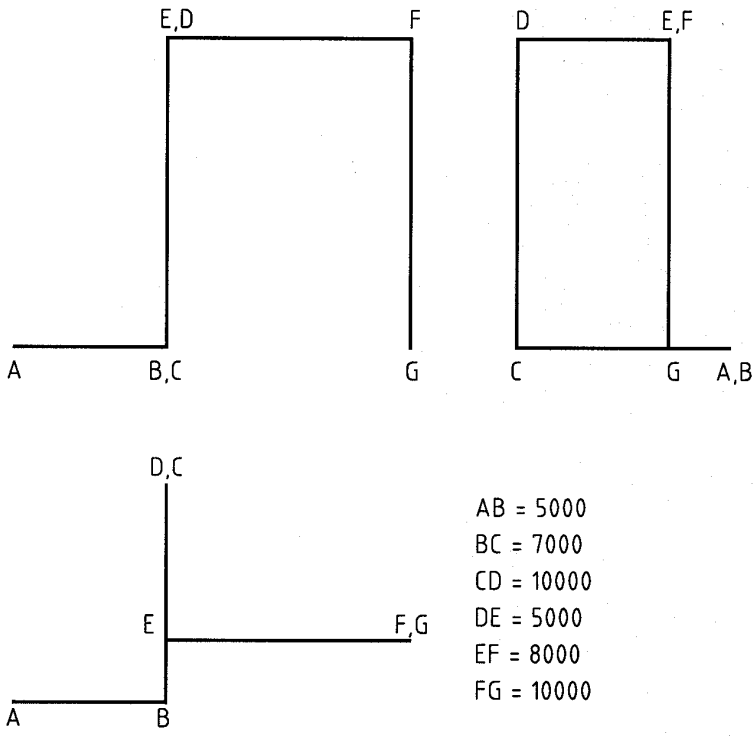

FIG. 3 FÍOR 3

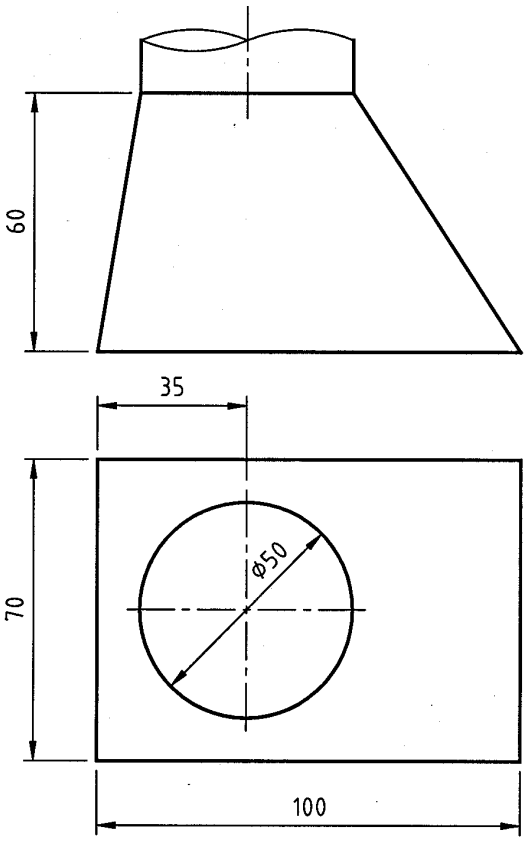

FIG. 4 FÍOR 4

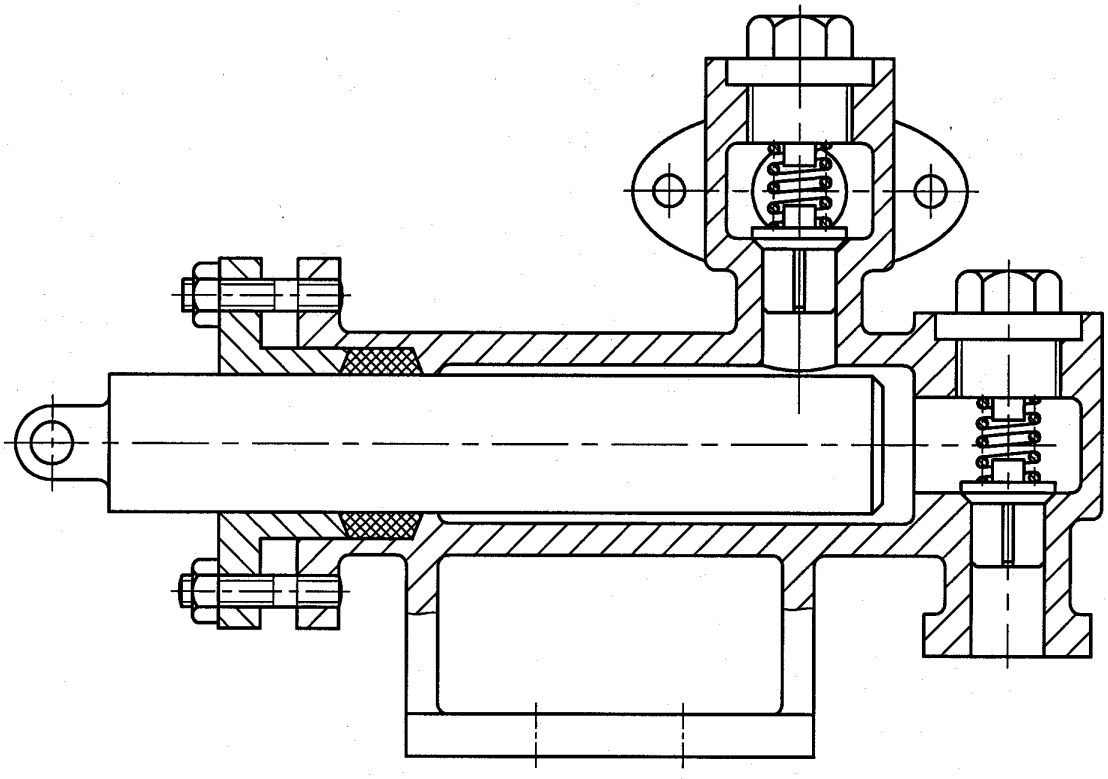

FIG. 6a FÍOR 6a

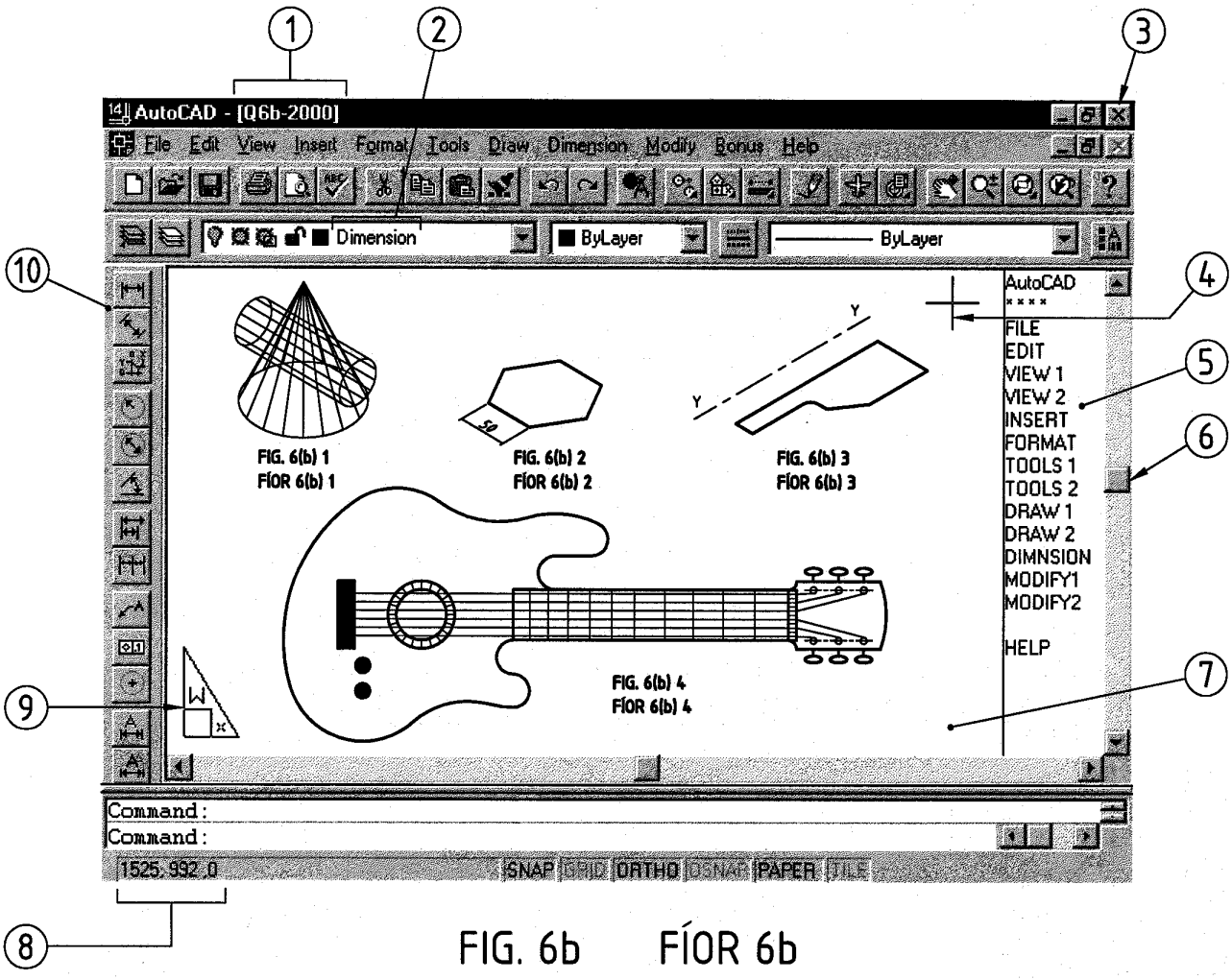

FIG. 6b FÍOR 6b