

WILD AVIOTAB TA 2

OPERATING MANUAL

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WILD
HEERBRUGG

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Modifications resulting from technical developments may be made in the interest of our customers. Thus, illustrations, specifications and extent of delivery are not binding and are subject to change without notice.

Warning!

The Aviotab TA 2 has powerful, rapid-acceleration drive motors. Although the design includes safety measures for the operating personnel, e.g. the integration of a light barrier, carelessness may result in injury.

When the table is switched on, avoid placing the hands on the coloured cover strips. When changing the height or angle of the tabletop, ensure that no objects are placed between tabletop and plinth. Pull out mains plug before opening covers to the electronics unit (in plinth of TA 2).

1. Introduction

The Aviotab TA 2 digital plotting table is designed for a wide range of applications. It is particularly suitable for the requirements of computer control.

Its rapid acceleration and high speed with excellent plotting quality enable it to be used to produce fair drawings in a minimum of time. It therefore provides high cost-effectiveness.

Used together with photogrammetric plotting instruments, e.g. the Wild Aviolyt AC 1 analytical plotter, a high level of operating comfort and convenience is provided. With additional software in the control computer, a drawing can be produced whose quality is practically equivalent to the end product. Subsequent cartographic enhancement is correspondingly minor. The drawing can be scribed, with a tangentially controlled scribing cutter which also permits thick lines to be produced.

This manual describes the operation of the basic instrument and its accessories. For using the table with the Aviolyt AC 1, see the AC 1 operating manual. In addition, see the manual for connecting to a computer for a detailed description of the set of commands for the table's internal control computer.

2. Technical description

2.1 Generally

The Aviotab TA 2 is a flat-bed type plotting table. It provides a large-format plotting surface and is adjustable for tilt and height. The TA 2 is digitally controlled and possesses servo motors with positional and speed controls. It can be connected directly to a computer via a serial interface.

2.2 Mechanical components

The main mechanical components of the TA 2 are:

- a solid base (plinth)
- a tabletop adjustable for height and tilt
- a horizontal beam with the plotting-head carriage
- a dual plotting head for various plotting tools

Figure 1 is a diagrammatic drawing showing the above components.

2.2.1 Beam

The extremely rigid beam is driven by the motor (1/6) via a rack and pinion (1/7). A rigid connecting shaft (1/5) and a further rack on the left side of the table, together with interlocked gearwheels (on both sides) guarantee accurate tracking of the beam. When the tabletop is tilted, the effective mass of the beam is reduced by a mechanical counterweight. The light-weight plotting-head carriage runs on this beam; it is also driven via rack and pinion. The accurately machined racks and rotary encoders placed directly on the motor axis (resolution 10 μm) ensure high positional accuracy and excellent line quality of the table.

2.2.2 Tabletop

The tabletop measures 1.20 m x 1.20 m. It can be raised and tilted by means of two motors. It is controlled by means of a manual control box (5). The translucent acrylic panel can be illuminated from below (optional extra). This illumination is continually adjustable by means of a rotary control knob (7/1). The fluorescent tubes are accessible by opening the slide (7/3) and removing the cladding to the tabletop. A channel is formed along both sides to hold rolls of paper, and the holders (6/1) for the plotting tool and drawing utensils can also be placed in these.

2.2.3 Plotting head

The plotting head (3) holds two plotting tools 53 mm apart. A change-over from one tool to the other can be effective in less than 0.4 s by push-button control or program. The plotting head makes it possible to raise or lower the plotting tool very quickly, the lowering movement being braked considerably. Contact pressure can be separately adjusted for each plotting tool, thus maintaining line quality even when the plotting surface is tilted.

A number of elements of importance for the operation of the table are attached to the plotting head. The clamping screws (3/1) hold the plotting tool. The correct distance from the plotting surface is adjusted by pressing the push-knob (3/3). A red light diode (3/2) indicates which plotting tool is lowered.

The plotting-head carriage also has further switches and sockets. These are provided for the power supply and the transmission of signals from the television camera (socket 3/4), for changing the acceleration to obtain a better plotting quality (toggle switch 3/5), for the illumination of the plotting surface (toggle switch 3/6) and for the connection of the tangentially controlled plotting tool (socket 3/7). In addition, a mount may be fitted to the plotting-head carriage, for a television camera. A projector for the luminous measuring mark may be used together with the camera, and the power-supply cable for this is plugged into the socket (3/8) on the plotting head (see section 3.2).

2.2.4 Plinth

The base of the TA 2 consists of a plinth and the mechanism for raising and lowering the tabletop.

The plinth itself rests on two rollers in front and a foot at the rear. The entire table can thus be easily moved. The electronic components are accommodated within the plinth. The two racks are accessible by removing the two plastic covers held in position by magnets. The serial number (7/6) is marked on the plinth of the TA 2.

The mechanism for raising and lowering the TA 2 is shown in (1). Changes in position are effected by means of motors and spindles. The vertical movement is assisted by two hydraulic springs (7/7).

2.2.5 Plotting tools

The plotting tools in the standard delivery (8) always consist of a sleeve and an insert. Different tools are identified by different colours. The inserts are supported in the sleeve by springs. The force of the springs is adjusted by turning the milled screw on the insert. This means enables the best possible line quality to be obtained for each insert and drawing material.

The following inserts are available:

	Colour of insert sleeve
Standard pencil leads	black
Ball-point cartridges	blue
Ink pen (Staedtler Mars Plot)	red
Scribers with hard metal point	green
Thin pencil leads 0.2 mm (micro-leads)	yellow
Pricking needle	grey

2.2.6 Measuring microscope

For the accurate orientation of points on the plotting table and for measuring small offsets, a measuring microscope (8/1) is used. The measuring microscope has a central cross-hair, a circle with a diameter of 0.6 mm and a linear scale divided at 0.2 mm intervals. The measuring microscope can be rotated. For focusing, it is adjustable in height.

2.2.7 Holder for plotting tools and accessories

A number of plotting tools, the measuring microscope, the paper-weights and several other drawing utensils can be accommodated in two plastic holders. These can be placed in the channels (6/1) along the sides.

2.3 Electronics of the Aviotab TA 2

2.3.1 Generally

The electronics of the TA 2 consist of the following components:

- servo system for the drive system in X and Y and for the rotation of the plotting tool
- control computer with interface to the main computer
- functional component with safety provisions
- operating keys on the table

The electronics of the TA 2 are mainly accommodated in the plinth of the table. The electronics cabinet (9) with nine printed-circuit boards is located on the left side of the plinth, the functional components are located on the right side of the plinth. The block diagram in figure 2 shows the electronic components of the TA 2. Table 2 and (9) gives the description and position of the various printed-circuit boards.

2.3.2 Servo systems

The servo systems for X and Y movements have a positional and a speed adjustment. The positional adjustment is digital. Encoder disks are placed on the motor axes which measure the position of the plotting point. For each axis, the speed is also measured and fed back as analog signal to a regulating system placed below it. For this purpose, tacho-generators are placed on the motor axes. The setting values for the servo motors are computed in a microcomputer (INTEL 8741). Setting values are proportional to the mean value obtained between specified and effective values (P regulators).

The servo system for rotating the plotting tools also operates by means of feed-back of the rotation measured.

2.3.3 Control computer and interface

The control computer is accommodated on the so-called processor board (10). The control computer carries out a variety of functions, including straight-line interpolation, the generation of characters and figures, and it also controls the travelling speed when starting and stopping. In the subsequent vectors with only minor directional changes, the existing velocity is either not throttled at all or only to a negligible extent. In addition, the control computer also controls the waiting periods for raising and lowering the plotting tool.

Commands transmitted by the main computer are stored in the control computer and are then subjected to a syntax analysis. The input/output board I/O2 (9/6) also has a socket for the connection of an external computer. This is an RS 232C serial interface. The switch (9/4) fitted to the I/O2 board must always be set to PC (PLOTTER CONTROLLER) when the table is controlled from an external computer.

The baud rate is set on the switch (10/1) on the processor board. The following baud rates can be selected: 110, 150, 300, 600, 1200, 2400, 4800, 9600. The TEST (10/2) and RESET (10/3) switches are also fitted to this board. The TEST switch may be used to produce a number of test plots. The RESET switch is used to reset the microcomputer to its original position.

The I/O1 board contains the switches (11/1) for setting the interface parameters (DATA bit, STOP bit, PARITY, SYNC). In addition, the synchronization of RTS required for Data General computers can also be set. Table 2 shows the switch positions for the parameters given above. These parameters are adopted only when the table is switched on.

2.3.4 Functional components

The functional components of the TA 2 are accommodated in the right-hand portion of the plinth (9/5). This contains the power supply for the motors of the XY drive, for the plotting head and for the table adjustment, together with the control unit for adjusting height and table tilt. In addition, space is available in this section for installing a matching transformer. This part of the plinth is not accessible to the user. When the plastic cover is removed, only the four fuses are accessible (20 A for motors, 8 A for mains, 0.16 A for control circuit). Next to the fuses, there is an operating-hours counter (7/4).

The control unit for the transmitted lighting is placed in the tabletop. The brightness is adjusted with the rotary knob (7/1). Next to the brightness control is the fuse for transmitted lighting (4 A inert fuse for 100 V to 125 V, 2 A inert fuse for 200 V to 250 V).

2.3.5 Operating keys

Operating keys are located at left and right of the cladding to the lower edge of the tabletop (6). These keys control the following functions:

TABLE	for switching the table on and off
LIGHT	for switching the transmitted light on and off
CAMERA	for switching the television camera on and off
PEN1, PEN2	to select the plotting point in the manual mode
WINDOW	to set or cancel the boundaries of a plotting window, i.e. of the limits of a predetermined plotting area
SET REF	for setting and retrieving a reference point
MANUAL / STOP	for setting the operating mode, MANUAL or COMPUTER
SPEED (1-8)	for selecting the maximum travelling speed

The keys on the left-hand side are mains keys which are lit when switched on. The five operating keys on the right of the table have small light diodes which provide a certain amount of information to the user. Details of the key functions are given in section 5.

2.4 Manual control boxes

The TA 2 has two manual control boxes. One of these is for the manual control of the plotting point, the other for the manual control of the position of the plotting surface. Both can be used in any position as required and can afterwards be attached magnetically to the frame of the table.

2.4.1 Manual control of plotting point

The following functions can be controlled from the manual control box (4):

- movement of the plotting-head carriage in X and Y
- raising and lowering of the plotting point (PEN)
- recording of the table coordinates (REC)

It is possible to execute these functions in the MANUAL mode only.

Four keys (4/3) are used to control the movements of the plotting point. If the key in the centre is pressed at the same time, the plotting point will be offset with the fast drive in operation. If one of the directional keys is touched very briefly, the plotting point can be moved in incremental steps of 0.02 mm.

2.4.2 Manual control of plotting surface

Height and tilt angle of the tabletop are adjustable by pneumatic control via the manual control box (5). The symbol marked underneath each key indicates its function.

3. Technical description of accessory equipment

3.1 Tangentially controlled plotting tool

The tangentially controlled plotting tool is used for scribing, for cutting multi-layer sheets and for plotting with a rotating ball-point cartridge. For scribing and cutting, the cutter is controlled in such a way that its cutting edges are always vertical and parallel to the direction in which the plotting head is moving. As a result, the best possible cutting conditions are provided. When plotting with a rotating ball-point cartridge, the rotary movement executed is relative to the distance travelled. This prevents the formation of blobs.

The tangentially controlled plotting tool consists of the following parts:

- a. tool with relieving ring
- b. additional p-c board for tangential control
- c. scribing cutter with thicknesses from 0.18 mm to 1.0 mm
- d. cutter
- e. rotating ball-point cartridges, centred, in the following colours:
black, blue, red
- f. case for scribing tool and set of cutters

The main operating elements of the plotting tool are:

- setting ring for contact pressure of the cutter from 1.0 N to 5.0 N, with a resolution of 0.5 N
- button for blocking spindle when changing cutters (15/5)
- nut on chuck for securing cutter (15/1)
- set-screw for table tilt from 0° (table horizontal) to 75° (maximum table tilt) (15/2)
- setting ring for working distance (15/4)

To change a tool insert, the spindle is blocked by means of the key (15/5) and slackening the chuck by turning the nut (15/1) clockwise.

3.2 Television system

A camera and a measuring-mark projector can be fitted to the TA 2. The portion of the map on which work is being done can be seen on a monitor screen. This television system is particularly designed for the analytical plotter system AC 1/TA 2. It enables the operator to set the plotting table accurately to any point or line required.

The camera with a screw-on supplementary front lens is attached to the plotting-head carriage by means of a special mount (12/4). The electrical connection is effected by means of a cable plugged into the socket (12/2). The measuring-mark projector is fitted as if it were a plotting tool; its power supply is provided from the socket (12/1). The brightness of the luminous measuring mark is adjustable by means of the rotary knob (12/5).

Contrast (CONTR) and brightness (BRT) are adjustable on the monitor by means of setting knobs, and the image can be displaced vertically (VER) and horizontally (HOR), also by means of setting knobs.

3.3 Functions keyboard for computer-assisted plotting

For the 'computer-assisted direct mapping' program in conjunction with the Aviolyt AC 1 analytical plotter, a special functions keyboard (13) is required. This is placed on a special angle bracket on the lower section of the AC 1 (13/6). It has a number of clearly laid-out keys for the functions most frequently required in plotting (13/5) and a numerical keyboard for parameter input (13/4). The keyboard is connected to the computer of the AC 1 via an RS 232C serial interface.

Data are transmitted in both directions. The keyboard contains the microprocessor (INTEL 8748), a buzzer, keys, light diodes and a four-figure alphanumeric display (13/3). Used in conjunction with the computer, it produces acoustic signals to draw attention to operating errors, and any key that has been pressed lights up. The parameters selected for type of symbol and line, speed and plotting point are shown as figures in the display (13/3). The white fields (13/7) below the numerical keys are used for marking the symbols and line types assigned to each of the keys.

The various plotting functions are described in detail in the description of the programs given in the Aviolyt AC 1 instruction manual.

4. Setting up the table

It is easiest to position the plotting table with the plotting surface horizontal. Stand behind the table and grip the corners with both hands, then execute short movements in alternating directions and push the table at the same time into the required position. It may be found easier to do this by raising the tabletop slightly, in order to redistribute the weight more onto the rollers in the front of the plinth.

In positioning the table in its definitive location, the following rules must be observed:

1. The vibrations caused by the movements of the beam must not be transmitted to photogrammetric measuring instruments. In such cases, insulation by means of an anti-vibration mat is recommended.
2. The mains cable should not be tied together with the data cable, as this may cause interference.
3. Take care not to touch walls, other equipment or objects when changing the height or angle of the tabletop.

5. Operating the table

The operation of the table comprises a number of steps:

- switching-on the table
- attaching the plotting sheet
- inserting and adjusting the plotting tool
- setting the reference and the plotting limits (WINDOW)
- starting up the plotting process
- switching-off the plotting table

These steps are described in detail below.

5.1 Switching-on the table

Switch on the table by means of the green TABLE key (6/2). The plotting-head carriage will move to the top right corner and will automatically find a reference mark, with an accuracy of ± 0.05 mm. The plotting surface is now clear for placing the plotting sheet on it. The table is in the MANUAL mode, and this is shown by the light diode on the MANUAL/STOP key (6/9).

5.2 Attaching the plotting sheet

Depending on the plotting tool employed, a number of different materials may be used as plotting sheets, such as drawing paper, transparent drawing film or coated scribing film. In placing the plotting sheet on the table, proceed as follows:

1. place the tabletop horizontal and clean the plotting surface
2. smoothe the plotting sheet and hold down by placing the weights on the edges near the corners
3. secure the plotting sheet with adhesive tape; if transparent adhesive tape (e.g. Scotch Magic) is used, it is advisable to fold over the end of the adhesive strip to facilitate its later removal
if the plotting sheet curls too much, particularly along the edges, this will be noticed by the light barrier and signalled automatically
4. do not forget to remove the paper-weights before tilting the table

If instead of cut sheets rolls are used, these may be placed in the channels along the sides and held in position by means of the clamps supplied, particularly when the table is tilted. If coated material is used for scribing, switch on the transmitted illumination by means of the key (6/3). The intensity of the transmitted lighting is adjusted by means of the rotary knob (7/1).

Note:

The acrylic panel and the plotting sheet tend to become charged with static electricity. To eliminate this, use the antistatic cloth supplied to wipe over the plotting sheet and the acrylic panel.

5.3 Inserting and adjusting the plotting tool

To insert the plotting tool and adjust the correct distance between plotting sheet and plotting point:

1. raise the plotting head (if in lowered position) with the PEN key (4/2) of the manual control box
2. slacken the milled clamping screw (3/1) and insert the plotting tool in the opening of the plotting head; the plotting tool will touch the surface of the plotting sheet
3. press the light-coloured push-knob on the plotting head (3/3) and clamp tight with milled clamping screw (3/1)

The contact pressure must be set separately for each plotting tool by turning the milled knob on the insert. Two reference points enable the number of turns to be counted. The zero position is found by turning the milled screw anticlockwise until a resistance can be felt.

Table 3 in the annex lists the various settings for different plotting tools and plotting sheets. These are empirical values and should be used as a guide only. Generally, the operator will make his own tests and find his own ideal contact-pressure settings.

Further special measures are required to ensure that the various plotting tools are used correctly. These are described in section 6.

5.4 Setting the reference (SET REF)

The zero coordinate point is used as reference for the plotting table in the computer mode. For setting a reference, the reference key has to be pressed twice. The light diode on the SET REF key will begin to blink after the key has been pressed for the first time, after the second time it will remain lit continuously. This shows that the reference has been set.

The data buffer of the TA 2 is cleared as soon as the reference is set.

If the key is not pressed the second time within 1.5s, the plotting head will travel automatically to the previous reference point, with the plotting tool raised. This function may be described SEEK REFERENCE. When the reference has been reached, the light diode on the SET REF key will remain lit. When the TA 2 is first switched on, the left lower corner is used automatically as the reference point.

5.5 Setting the plotting limits (WINDOW)

The WINDOW key is used to define the usable plotting area. This is done by registering the bottom left and top right corner of the window by pressing the WINDOW key. The key lights up after being pressed for the first time. The manual control box is used for travelling to the second corner of the window. When this has been registered by pressing the WINDOW key a second time, the light diode is extinguished. Should it continue to blink, then the second corner is out of bounds. In that event, a different second corner has to be registered. Note that the

plotting surface may also be reduced by the reference point set, if this has been positioned within the window (14).

The window set can be cleared by pressing the WINDOW key twice.

5.6 Limiting the maximum speed (SPEED)

Certain plotting tools and materials used as plotting sheets make it necessary to limit the travelling speed in order to obtain the best possible plotting quality. The maximum plotting speed with plotting point lowered can be set on the SPEED switch (6/10). The following table gives the maximum speed possible in each of the eight positions available:

1	8 mm/s	315 mm/s
2	16 mm/s	63
3	32 mm/s	126
4	64 mm/s	252
5	128 mm/s	504
6	200 mm/s	787
7	256 mm/s	1008
8	296 mm/s	1165

This setting can be carried out only in the manual mode. The speed may also be limited via a software command. In this event, the speed set on the multiswitch is disregarded. Note that the maximum speed with the plotting tool raised is always the same at 296 mm/s. It is also possible to limit this by software command.

5.7 Setting the QUALITY switch

The QUALITY switch can be used for reducing the acceleration of the plotting-head carriage by half, i.e. 2.5 metres per second per second (2.5 m/s^2). The position of the switch is requested when switching from MANUAL to COMPUTER mode. If the tangential control is used, the acceleration is always reduced to 2.5 m/s^2 irrespective of the position of the QUALITY switch. It is also possible to select the acceleration by software command (5 m/s^2 or 2.5 m/s^2).

5.8 Further preparatory work

1. The plotting surface can also be illuminated from the plotting head. This is particularly useful for observation under the microscope. This incident light is switched on and off by means of the LIGHT switch (3/6) on the plotting-head carriage
2. For testing a plotting tool (e.g. ink pen), the plotting point may be lowered with the PEN key (28) under manual control on the edge (but within the window) or on a separate piece of plotting-sheet material. The point may then be moved at high speed (256 mm/s) or reduced speed (2.4.1).

3. Always thoroughly clean the plotting surface before starting to plot, in order to obtain a good plotting quality. For this purpose a wiper is provided in the standard accessories. Remove grease stains and fingerprints with petrol or special cleaning fluid.

5.9 Starting-up the plotting process

Press the MANUAL/STOP key (6/9) to begin plotting. The plotting table will now carry out the commands received via the RS 232C interface. If the end points of vectors come to lie outside the window, the whole of the vector is ignored. The same also applies to vectors lying entirely outside the window.

5.10 Interruption of plotting process

The plotting process may be stopped by pressing the MANUAL/STOP key (6/9). The 'present' plotting point position is then stored.

The plotting point is now in the MANUAL mode, and its position may be changed by means of the manual control box (e.g. for trying out a plotting tool near the edge of the table). The switches for speed and acceleration (QUALITY) may also be reset. On return to the COMPUTER mode, the same plotting point will continue the drawing at the same point where it was previously interrupted. The newly set parameters for speed and acceleration will now become effective.

If the instrument reaches the light barrier, the plotting process is automatically interrupted.

5.11 Switching-off the plotting table

The TA 2 is switched off at the main switch (6/2). If the TA 2 is linked to the Aviolyt AC 1 analytical plotter, the main switch on the computer cabinet may also be used to switch off the table.

6. Recommendations for using standard plotting tools

The quality of the drawing depends particularly on the plotting tool. Its condition, the contact pressure set, and other table parameters such as lowering time, travelling speed and lifting height are all of importance. Further, these parameters depend on the characteristics of the plotting sheet, climatic conditions and numerous other factors. Frequently, the operator will need to make his own tests in order to obtain the best possible results. Recommendations given here should therefore be used only as a guide or as initial values.

6.1 Ball-point cartridge

The ball-point cartridges supplied are of the gas-pressure type (Staedtler Mars Plot) black, blue, red and green. The cartridge is inserted into the top of the sleeve. Before doing so, the milled screw must be unscrewed completely, and the contact-pressure spring and threaded ring removed. Depending on the type of material being used as plotting sheet, the milled screw will need to be screwed in from about five turns (e.g. for drawing paper) up to ten turns (e.g. for film), in order to obtain the required contact pressure. For greater contrast, the pressure may be increased further.

The cartridge must always be free of dust and ink residue. Test the line quality near the edge or on a separate overlay sheet.

The tool is inserted as described in section 5.3. The ball-point cartridge should be cleaned from time to time during plotting, in order to prevent clogging and the formation of blobs. The line quality is further improved by using a rotating ball-point cartridge inserted in the tangentially controlled tool.

Sudden changes of direction, such as may occur in shading, must be avoided by suitable programming, since in such cases there is no ink flow at the start of a line.

For erasing, a special Staedtler Techniplot eraser must be used. With the ball-point cartridge, the instrument can be used at maximum speed and acceleration.

6.2 Standard pencil leads

The standard delivery includes pencil leads of grades 2H, 4H and 6H. These leads are inserted into the lead holders from below. To insert a lead, open the chuck by pressing the button at the top of the sleeve.

To sharpen a pencil lead, pull the lead approximately 10 mm out of the holder and insert the complete unit into the sharpener supplied. The coloured plastic insert provided for lead holders of older types of plotting table must be removed for the lead holder of the TA 2. The lead is sharpened by a rotary movement. The required pressure setting on the plotting-point insert is obtained by about ten turns (for drawing paper) and about fifteen turns (for film).

The period after which a lead needs to be resharpened may be increased by using harder leads or a lower contact pressure. To avoid the need for tiresome re-sharpening, extra-thin leads (micro-leads) may be used (see 6.3).

6.3 Micro-leads

The standard delivery includes two insert sleeves for micro-leads of 0.2 mm diameter and two sets of these micro-leads in the grades H and HB. The recommended contact pressure is obtained by about ten turns of the insert sleeve. Insert sleeves for micro-leads of 0.3 mm and 0.5 mm diameter are available as optional extras. Micro-lead refills are inserted from above. The guide sleeve for micro-leads is sensitive and should be handled with care.

The general indications given with regard to standard pencil leads also apply to micro-leads.

6.4 Scribing cutters

Scribing in coated film can be carried out to a maximum line thickness of only about 0.15 mm without tangential control of the scribing cutter. The standard delivery includes the supply of scribing points for a line thickness of 0.08 mm and 0.12 mm. These hard-metal points wear out after a time and should be replaced by new points.

The pressure set on the insert will depend on the width of the scriber and the hardness of the coated film used (see table 3). Quality is improved by reducing the acceleration by half (position switch 3/5 to QUALITY). For line thicknesses exceeding 0.15 mm, the tangentially controlled tool is necessary (see section 7.1).

6.5 Ink pens

Drawings made with ink pens require special preparation and a certain amount of experience. 0.2 mm and 0.3 mm tips are supplied as standard, together with a holder, ink and cleaner, all made by Staedtler. Additional tips, holders etc are available directly from Staedtler or from drawing-office suppliers.

The ink pen is put into service in accordance with the enclosed manufacturer's instructions (Annex 1). The contact pressure is set by about three to six turns on the plotting insert. Since the contact pressure is less than the weight of the tool, the plotting point will tend to come to rest by a number of springy motions on being lowered. In order to obtain a correct distance setting, the cartridge holder must be raised slightly after the usual setting of the distance (see 5.3). The lowering time for the point should be increased by an appropriate software command to about 100 ms. This will ensure a clean start of the line. The appropriate software command is described in a separate 'Control commands for the TA 2' manual.

6.6 Pricking point

The pricking point is used for pricking single points on the plotting sheets, e.g. for boundary beacons. To enable these pricked marks to be found again easily, it is recommended to plot a symbol, e.g. a circle with the other tool. Before beginning the work of marking, check the point. The depth of penetration of the point can be adjusted. For this adjustment, the adjusting screw is first set flush with the point. Use a pencil to mark the adjusting screw and the holder. The adjusting screw is then turned back, with one turn corresponding to approximately 0.7 mm depth of penetration.

7. Using accessory equipment

7.1 Tangentially controlled scribing cutter

7.1.1 Inserting the supporting sleeve

On first using the tangentially controlled tool, the supporting sleeve (16/1) must be fitted to the double plotting head. Slacken the fixing screws (16/6) of the double plotting head, by means of the Allen key. Remove the plotting head and by slight pressure from behind push out the left fixing screw. Reinsert the fixing screw together with the supporting sleeve and refix the plotting head.

7.1.2 Preparatory work on plotting table and engraving film

The preparatory work to be done on the plotting table and the engraving film is as given in section 4. Take particular care to set the window for the dimensions of the coated film being used to avoid damaging the tabletop. Carefully clean the coated film and eliminate any static electricity. For setting the scribing tool, position the plotting head under manual control near the edge of the table (within the window) above a strip of adhesive tape and lower the plotting point 1 by means of the PEN key on the manual control box.

7.1.3 Preparatory work to scribing tool

After checking that the cutting edge is undamaged, insert the required scribing point in the tool. The tool is clamped into position as follows:

1. press 'block spindle' key (17/3) and slacken chuck by turning clamping nut clockwise
2. insert the cutter (17/1), observing position of cam
3. the cutter is clamped in position by turning clamping nut anticlockwise
4. set cutting pressure by means of setting ring (17/4); the cutting pressure varies for different types of film material and will also depend on the cutting speed, the cutting width and the table angle

Figure 21 shows a diagram of approximate values for the contact pressure to be set for different types of material and various cutting speeds. The correction to be applied for table tilt is shown in the diagram (18). The point of intersection of the vertical a) with the slope b) gives the cutting pressure to be set.

7.1.4 Fitting and adjusting the plotting tool

7.1.4.1 Basic setting of relieving ring

The relieving ring (19/3) needs to be set only once. When the plotting point is raised, the supporting sleeve (16/1) on the plotting-head carriage must touch the spring pin (19/1). If this is not the case, the setting sleeve (19/4) must be adjusted accordingly and locked into position with the nut (19/2).

7.1.4.2 Fitting the tool

Fitting of the tool is carried out by the following steps:

1. insert scribing tool into the lowered left plotting head, with the relieving ring loose; ensure correct positioning of cam

2. raise or press down scribing tool by hand, by means of setting ring (17/4) for the contact pressure, until the setting ring corresponds with the upper index mark; fix the tool in this position by means of the clamping screw (16/7)
3. press down relieving ring upon the plotting head and clamp with the screw (16/5); if the relieving ring is left in this position when the scribing tool is removed, the simplified fitting method (7.1.5) can be used when the tool is inserted again
4. insert connecting cable in the socket (16/4) on the plotting-head carriage and press MANUAL/STOP key (6/9); turn clamping nut (15/1) by hand to check whether any torque is present
5. press PEN key (4/2) on the manual control box to raise the plotting head; place the table at the required tilt angle
6. relieve the tangential tool in accordance with the tilt angle set, by approximately setting the relevant tilt angle by means of the setting screw (19/5); 0° equals horizontal position, 75° equals maximum tilt
7. with the plotting head raised, check the working distance between scribing point and film. This distance should ideally be 0.8 mm to 1.0 mm but must never be less than 0.6 mm or exceed 1.3 mm; if these limits are exceeded, repeat steps 2 and 3. Always check the working distance whenever the scribing cutter is replaced.

7.1.5 Simplified method of fitting the tangential tool

Provided that the relieving ring has previously been correctly secured and has not been slackened since, the tangentially controlled tool can be fitted by a simpler method. In this event, disregard the procedure described in section 7.1.4.

The simplified method of fitting is as follows:

1. raise plotting head 1 with PEN key
2. insert tangentially controlled tool and clamp fast with screw (16/7)
3. relieve the tool according to the table tilt, setting the tilt angle with the setting screw (19/5)
4. check working distance from scriber point to the film; if the limiting values (1.3 mm and/or 0.6 mm) are exceeded, reset the tool in accordance with 7.1.4

7.1.6 Notes for the use of the tangentially controlled scribing tool

For obtaining a high quality of work with the scribing tool, the settings for the contact pressure of the cutter and the cutting speed are of great importance. Approximate values are shown on the diagram (21) for various types of film, taking both these factors into account. Too great a contact pressure will damage the support material, whilst the coating will not be cleanly removed if the contact pressure is set too low. If the cutting speed is too great, with the contact pressure too low, the lines will tend to be irregular. If the cutting speed and the contact pressure are set too high, material from the support will tend to accumulate at the end of a line.

In general, work should be done at greatly reduced speed, with the required contact pressure obtained by trial and error.

If the working distance set is too great, cutting will not begin immediately at the beginning of a line. Badly worn (rounded) cutters produce fuzzy edges.

See section 8.1 for information on removing scribing-point debris.

7.2 Tangentially controlled ball-point cartridge

For fitting and adjusting the tangentially controlled tool with a centred ball-point cartridge, see the instructions for the scribing tool. The contact pressure for ball-point cartridges is the same as for normal ball-point pens (see table 3).

Rotation of the point is started and stopped by software command.

7.3 Tangentially controlled cutting knife

The preparatory work is identical with that for the scribing cutter and the centred ball-point cartridge (7.1, 7.2). The correct pressure setting must be obtained by trial and error. For a normal coating of 'cut and peel' films, the tangentially controlled tool should be set for a contact pressure of approximately 2.0 N.

The cutting knife can be switched on and off by software commands (cf separate instruction manual on the 'Control commands for the TA 2').

7.4 Television system

7.4.1 Camera installation and starting-up procedure

Remove the protective lens cap and secure the television camera to the plotting-head carriage with the Allen key (247 852) supplied. Insert connecting cable in socket (3/4). Switch on camera with CAMERA key on the TA 2. A control lamp on the camera will now light up.

7.4.2 Inserting the measuring-mark projector

The measuring-mark projector is inserted like any other plotting tool.

- secure clamping ring with the screw (12/6) at the very top of the measuring-mark projector
- plug connecting cable into socket (12/1)
- set toggle switch on plotting-head carriage to LIGHT
- displace the projector vertically until the measuring mark is in sharp focus, clamp in position with clamping screw (3/1)
- press clamping ring on plotting head and secure with the clamping screw (12/6)
- adjust light intensity of the measuring mark with the rotary knob (12/5)

7.4.3 Switching-on the monitor

The monitor on the AC 1 is switched on by means of the POWER press switch. Adjust contrast and brightness with the CONTR and BRT knobs.

7.4.4 Operation of the television system

When the camera is used together with the plotting function, the acceleration and speed of the plotting-head carriage must be reduced in order to obtain an acceptable line quality. Set the switch (13/3) to QUALITY and set a reduced speed (SPEED) on the switch (6/10) or the functions keyboard (13) for computer-assisted plotting.

8. Care and maintenance

For the trouble-free operation of the equipment and the maintenance of a high plotting quality, a number of special measures are recommended.

8.1 Tabletop

The state of the tabletop, particularly its flatness, is of special importance in maintaining plotting quality. Residues of adhesive strips, eraser, scribing debris and scratches affect the flatness and can cause the plotting tool to move up and down, thus producing irregularities in the lines formed.

The tabletop is made of acrylic glass and should always be carefully cleaned and treated with care. It is an important part of a precision instrument and must not be used for depositing drinks, rough-surfaced objects etc. A window should always be set for the area covered by the manuscript sheet, to ensure that the lowered plotting tool will not damage the acrylic panel. To clean the acrylic panel, use the multi-purpose cloth supplied. This should be dampened with water containing a cleaning compound. Obstinate residues of adhesive on the acrylic panel can be readily removed with methylated spirits, petrol or a window-cleaning compound. Do not on any account use abrasives, acetone or ether.

Remove eraser debris with the wiper supplied. To remove scriber debris, use the multi-purpose cloth supplied, but in the dry state. Where scribing work is frequent, the use of a small vacuum cleaner with a soft brush (e.g. as made for motor cars) is recommended.

8.2 Other plastic parts

Cleaning of the other plastic parts may be limited to occasional dusting. Clean badly soiled parts with petrol, methylated spirits or window-cleaning materials. Never scour or rub vigorously when cleaning plastic or lettering (e.g. on control panels etc).

8.3 Drive system of beam

The drive system of the beam (racks, pinions, gears) is subjected to considerable stress. Lightly lubricate once monthly with the lubricant supplied (Molykote G Rapid paste).

Proceed as follows:

1. squeeze a small quantity of Molykote paste from the tube into the recess in the brush box
2. with the brush, dab the lubricant onto the gearwheels (22/1) and about every 0.10 m onto the racks (22/2)

Wipe dirty running surfaces (22/3) with a clean cloth.

8.4 Service and maintenance contracts

Service and maintenance contracts are available with Wild Heerbrugg Ltd and Wild agencies, to provide for regular and competent servicing and maintenance of the TA 2.

9. Diagnosis and elimination of faults

The user should not attempt to deal with defects other than lamp replacements. Should any other defect occur, he should only attempt to diagnose these in order to provide as much information as possible on likely causes to the Wild service agency, before a service engineer is sent to deal with the problem.

9.1 Replacing the plotting-head bulbs

The two soffit bulbs are wired in series. Thus, the illumination becomes inoperative if one of the bulbs is defective. To replace, proceed as follows:

- using the 3 mm Allen key, slacken the three fixing screws (3/9) of the plotting head
- remove the plotting head
- remove the defective bulb by lateral pressure on the outer retaining spring
- press new soffit bulb into mount and screw on plotting head

9.2 Replacing a fluorescent tube of the table illumination

Note: Do not replace fluorescent tubes unless the table illumination has first been switched off (LIGHT switch 3/6 in OFF position).

Proceed as follows:

1. place table horizontal and move to highest position
2. using screw drivers 202 994 and 378 036 supplied, remove front cover plate of table frame
3. open slide (7/3)
4. remove defective fluorescent tube
5. fit new fluorescent tube:
 - insert tube
 - insert right hand in slide opening and hold tube
 - with left hand, hold tube to enable pins to be inserted sideways in rear mount

Note: To avoid risk of damage to pins, do not insert tube.

 - with right hand, press back front mount and insert pins
 - rotate tube by quarter turn
6. replace front cover plate

Note:

The fluorescent tubes do not form part of the standard delivery. They are discharge lamps 38 mm in diameter and 1200 mm long, with a power consumption of 40 W, white. They can be obtained from any good electrical supplier or as stock number 379 638 from Wild Heerbrugg or any Wild agency. Once the fluorescent tubes are burned in (after about 100 hours), flickering will practically disappear.

9.3 Defective height adjustment

If the height adjustment becomes very slow or is no longer possible, it is probable that the gas has escaped from one or both the hydraulic springs. In this event, the defective hydraulic spring has to be replaced.

New hydraulic springs can be ordered from any Wild workshop and replaced by the user in accordance with a special conversion specification and the standard tools supplied.

9.4 Test functions

Tests carried out by the user have the purpose of locating the cause of defects in a complete system (e.g. the AC 1/TA 2 instrument system).

Any errors caused by the table can generally be clearly determined by test programs in the table itself. In the TA 2, there are two such programs, RUN TESTS and TEST PLOT.

9.4.1 RUN TESTS

These tests can be carried out automatically as soon as the table has been switched on and during operation. The type of fault found is displayed in binary code on the functions keyboard. It is signalled by rapid blinking of the MAN/STOP diode and an intermittent buzzing. Table 4 shows the codes for all faults. For their elimination, first check the table to ascertain whether it is a simple or a serious fault. In the case of simple faults (e.g. when the light barrier is interrupted by curled-up plotting sheet), press the MAN/STOP key once to switch to the MANUAL mode. For serious faults, the table has to be switched off and switched on again. Serious faults are generally due to hardware defects.

The light diodes of the table keyboard localize these faults. This information is important for the Wild service workshop. Note, however, that not every fault is shown on the display.

9.4.2 TEST PLOT

The user can generate a test plot to provide him with visual evidence of the functional efficiency of the TA 2 (see annex 2). Proceed as follows:

1. set reference and window (if applicable)
2. press TEST switch (9/2) on processor board once
3. switch table to COMPUTER mode; table now executes the test plot

The information provided by the test plot includes:

- the adjustment of the two plotting points (from the doubly plotted squares)
- the balancing quality of the X and Y servos (from pairs of straight lines plotted in different directions and with different changes of direction)
- to what extent the information stored by the microprocessor is still applicable (from the set of alphanumeric signs and symbols drawn)
- whether the various microprocessor commands are being correctly interpreted and executed

In the bottom right-hand corner of the test plot, the date of the last revision of the microprocessor software is indicated. In the event of faults, errors, irregularities etc, send the test plot to the Wild workshop.

When the tangentially controlled scribing tool is connected, an abridged test plot can be generated by pressing the TEST key twice. For this test plot, the speed can be reduced with the SPEED switch.

10. Technical data

Usable plotting surface	1.20 m x 1.20 m
Tilting range of table	0° to 75°
Height adjustment of table (from floor)	0.80 m to 1.05 m

Maximum speed (in axial direction)	296 mm/s
Maximum acceleration (in axial direction)	5.0 m/s ²

Resolution of measuring system	10 µm
Resolution of positioning system	20 µm

Mains connection

Supply voltage	220 V AC ±10%, or 100/115/125/200/235/250 V ±10% (optional)
Frequency	50 Hz or 60 Hz ±1 Hz
Current consumption	approximately 1.1 kVA

Dimensions

Width	1.73 m
Depth	1.10 m to 1.69 m (depending on table tilt)
Height	0.82 m to 2.08 m (depending on table tilt and height adjustment)

<u>Weight</u>	420 kg
---------------	--------

11. Extent of delivery

Basic equipment

403 422 for Aviolyt AC 1, 220 V

391 333	1	Aviotab TA 2
392 847	1	Standard accessories
403 409	1	PFKB 2 functions keyboard
391 637	1	Angle bracket
400 016	1	Cable from AC 1 computer to TA 2, 8 m
390 811	1	Cable from AC 1 computer to PFKB 2 functions keyboard
403 407	1	Plotting software

403 423 for computers generally, 220 V

391 333	1	Aviotab TA 2
392 847	1	Standard accessories
400 016	1	Cable from computer to TA 2, 8 m

404 225 for GEOMAP on-line, 220 V

391 333	1	Aviotab TA 2
392 847	1	Standard accessories
405 696	1	Special cable, RS 232

409 660 for GEOMAP off-line

391 333	1	Aviotab TA 2
392 847	1	Standard accessories
409 662	1	Cable
409 661	1	Tektronix 4923 cassette reader

Standard accessories

392 847 1 Standard accessories comprising:

384 489	1	plotting-point microscope
339 638	2	insert sleeves for ball-point cartridges
384 482	2	insert sleeves for standard pencil leads
390 206	2	insert sleeves for 0.2 mm micro-leads
384 485	2	insert sleeves for ink cartridge
339 624	2	insert sleeves for scribing points
384 483	1	insert sleeve for pricking point
307 250	1	pencil-lead sharpener
308 027	4	paper-weights
403 535	1	holder for drawing utensils
403 536	1	holder for plotting tools
401 969	5	ball-point cartridges, black
401 980	5	ball-point cartridges, blue
401 081	5	ball-point cartridges, red
401 982	5	ball-point cartridges, green
166 853	12	pencil leads 2H
166 855	12	pencil leads 4H
390 216	12	pencil leads 6H
166 857	12	coloured leads red
166 859	12	coloured leads blue

391 846	4 sets micro-leads 0.02 mm, HB
391 845	4 sets micro-leads 0.02 mm, H
401 997	1 ink pen 0.2 mm
401 998	1 ink pen 0.3 mm
407 402	2 holders for ink pen
402 000	1 ink, black
407 403	1 pen cleaner
117 192	2 scribing points 0.08 mm
117 193	2 scribing points 0.12 mm
407 406	1 eraser for paper and film
407 407	1 eraser for ink
401 995	1 antistatic cloth
401 994	1 set of 12 multi-purpose cloths
407 404	1 table brush
128 391	1 tube lubricant for racks, pinions and gears
191 552	4 soffit bulbs for plotting head
167 675	4 fuses 20 A for power supply
800 293	3 fuses 8 A for power supply
167 819	3 fuses 0.16 A for power supply
407 409	1 Scotch Magic adhesive tape
407 408	1 dispenser for 407 409
247 852	1 Allen key 3 mm
202 994	1 screwdriver 6.5 mm for flat-head screws
378 036	1 screwdriver n° 1 for countersunk Philips screws
229 403	1 double-ended open-end spanner SW16/17
410 137	1 test plug
	1 case
	1 instruction manual

Additional equipment

For all applications:

391 336	1 Transmitted-light unit, adjustable, for new instruments
394 751	1 Transmitted-light unit, adjustable, for customers' instruments
403 447	1 Transformer unit for voltages other than 220 V

Plotting tools

180 424	1 Insert sleeve for pencil leads
394 758	1 Insert sleeve for 0.2 mm micro-leads
339 685	1 Insert sleeve for 0.3 mm micro-leads
339 686	1 Insert sleeve for 0.5 mm micro-leads
384 484	1 Insert sleeve for ball-point cartridge
404 013	1 Ink pen 0.2 mm including holder (Staedtler Mars Plot)
404 014	1 Ink pen 0.3 mm including holder (Staedtler Mars Plot)
339 624	1 Insert sleeve for scribing point
117 192	1 Scribing point 0.08 mm
193 497	1 Scribing point 0.12 mm
117 193	1 Scribing point 0.15 mm

403 404	1	Tangentially controlled scribing tool
403 403	1	Additional printed-circuit board for tangential control of scribing cutter and for rotating ball-point pens
406 896	1	Set of scribing cutters, metric, 0.2 mm/0.3 mm/0.4 mm/0.5 mm/0.6 mm/0.7 mm/0.8 mm/0.9 mm/1.0 mm, including case for set of cutters and scribing tool
408 495	1	Set of scribing cutters, ISO standard, 0.18 mm/0.25 mm/0.35 mm/0.50 mm/0.70 mm/1.00 mm, including case for set of cutters and for scribing tool
403 431	1	Ball-point cartridge, centred, black
403 432	1	Ball-point cartridge, centred, blue
403 433	1	Ball-point cartridge, centred, red
409 774	1	Cutting point

For AC 1:

404 890	1	Television system comprising:
375 590	1	TV camera head with mains unit
391 338	1	camera support
391 320	1	PKR objective
385 858	1	measuring-mark projector
402 199	1	TV monitor with adapter for AC 1

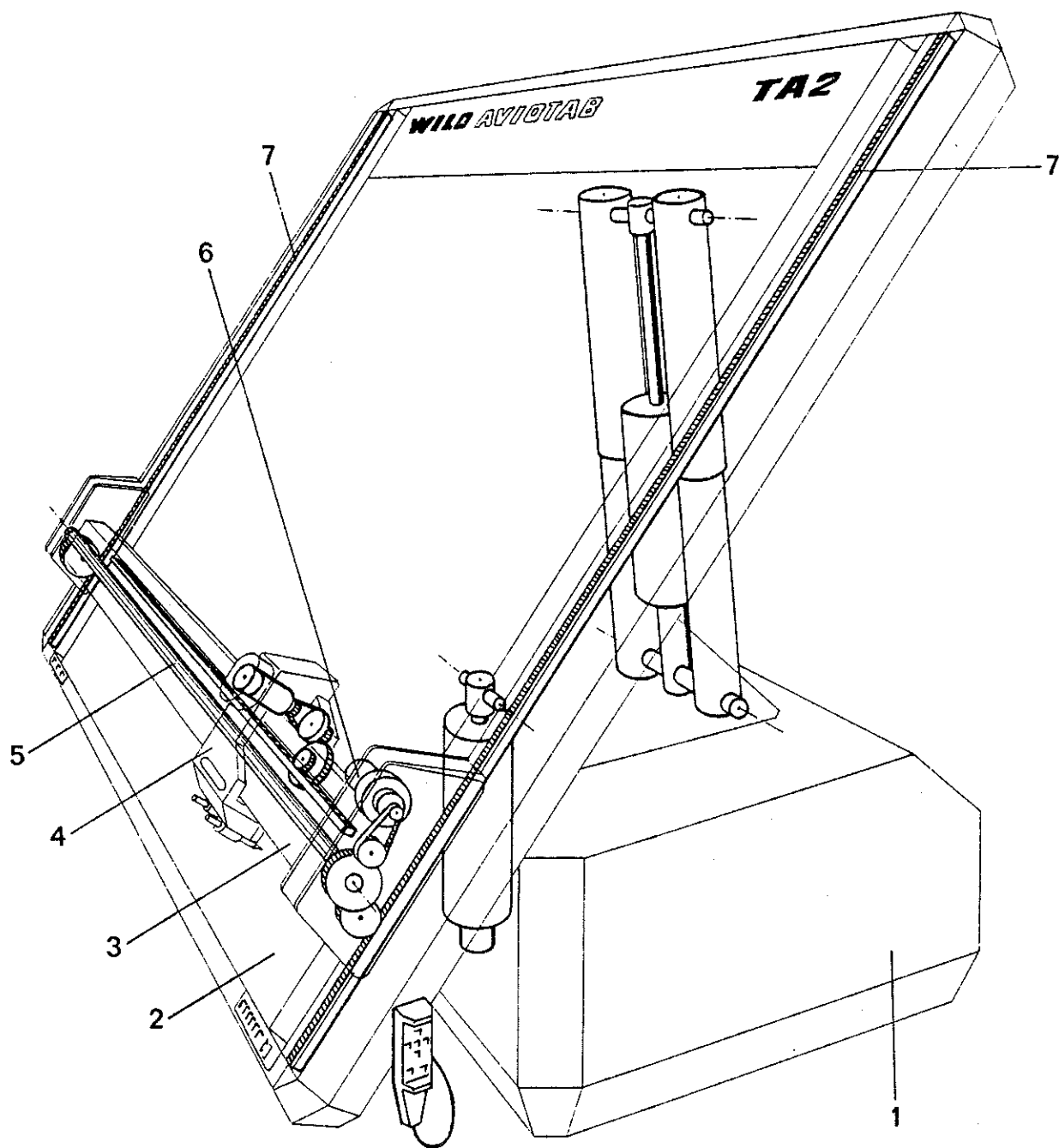


Fig. 1

Diagrammatic sketch of mechanical system of TA 2

- 1 Plinth
- 2 Tabletop
- 3 Horizontal beam with plotting-head carriage
- 4 Dual plotting head
- 5 Connecting shaft
- 6 Drive motor for beam
- 7 Rack

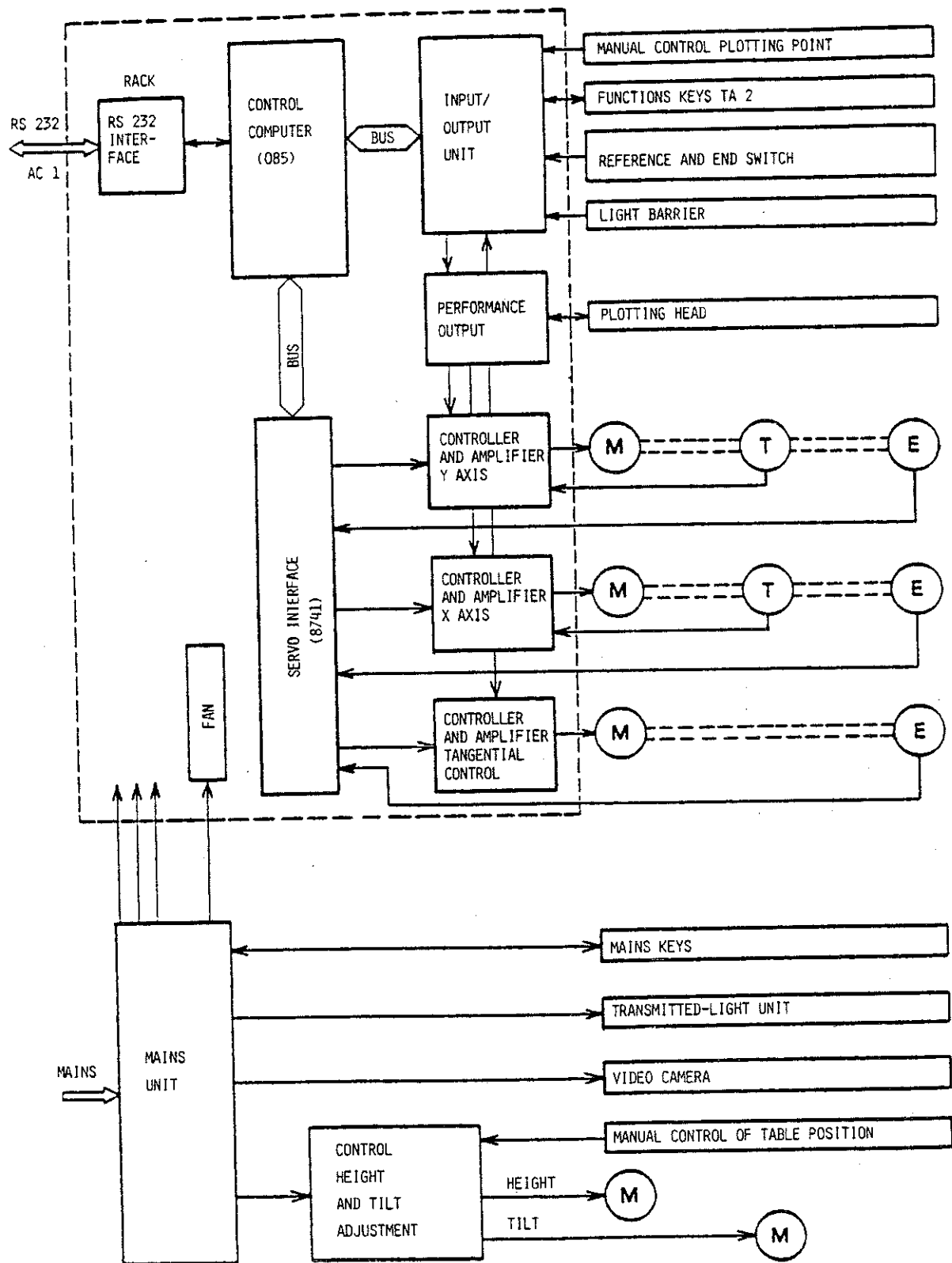


Fig. 2

Block diagram of electronics

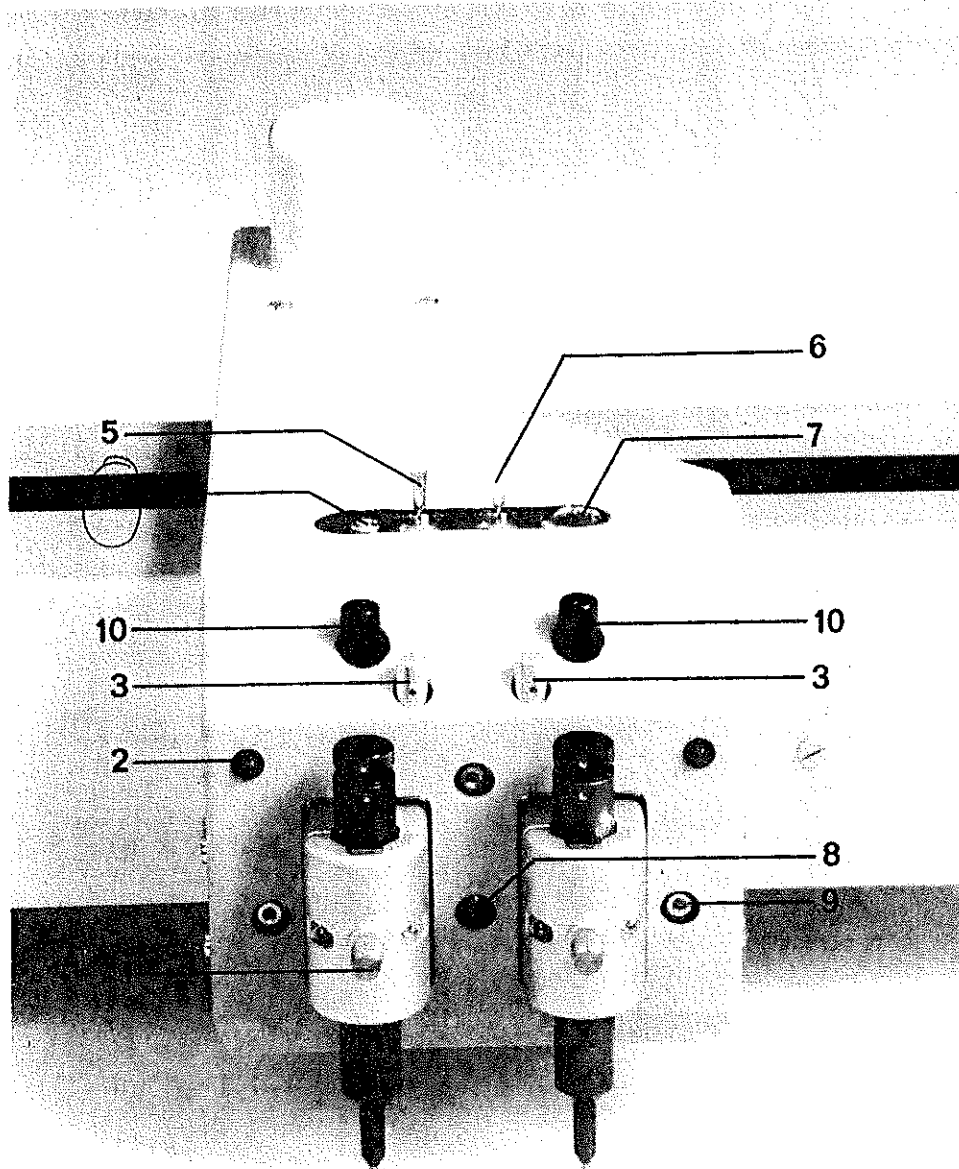


Fig. 3

Plotting-head carriage

- 1 Clamping screw for plotting tool
- 2 Light diode to indicate when plotting head is lowered
- 3 Knob for setting working distance
- 4 Socket for TV camera
- 5 Toggle switch to reduce acceleration (QUALITY)
- 6 Toggle switch for illumination of plotting surface (LIGHT)
- 7 Socket for tangentially controlled plotting tool
- 8 Socket for measuring-mark projector
- 9 Fixing screws
- 10 Push-knob for manual lowering of plotting tool

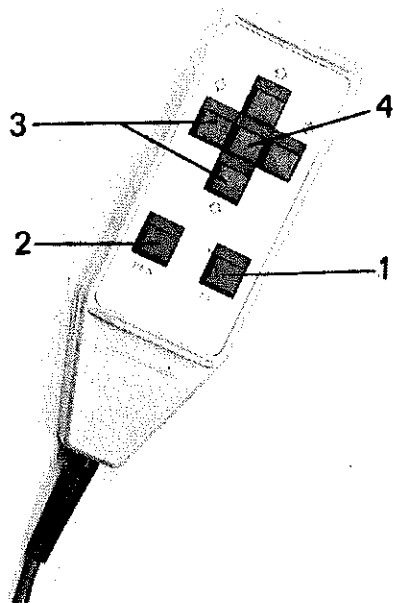


Fig. 4

Manual control box

- 1 Key for registration of table coordinates (REC)
- 2 Key for raising and lowering plotting point (PEN)
- 3 Keys for moving plotting head in directions marked
- 4 Fast drive

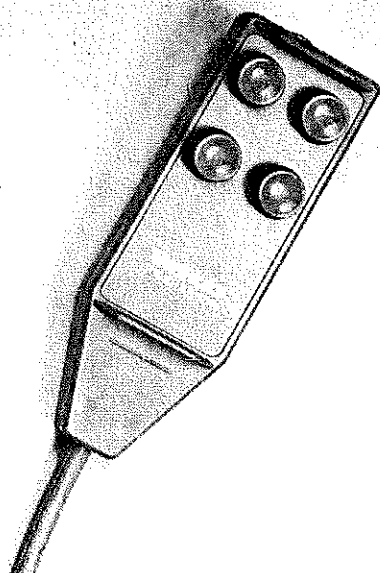


Fig. 5

Manual control box for table height and tilt

Fig. 6

- 1 Holders for drawing utensils and plotting tools
- 2 Key to switch table on/off (TABLE)
- 3 Key to switch transmitted-light unit on/off (LIGHT)
- 4 Key to switch TV camera on/off (CAMERA)
- 5 Key to select left-hand plotting head (PEN1)
- 6 Key to select right-hand plotting head (PEN2)
- 7 Key to set and delete plotting-area limits (WINDOW)
- 8 Key to set and retrieve a reference point (REF)
- 9 Key to select operating mode, MANUAL or COMPUTER (MANUAL/STOP)
- 10 Key to set maximum speed

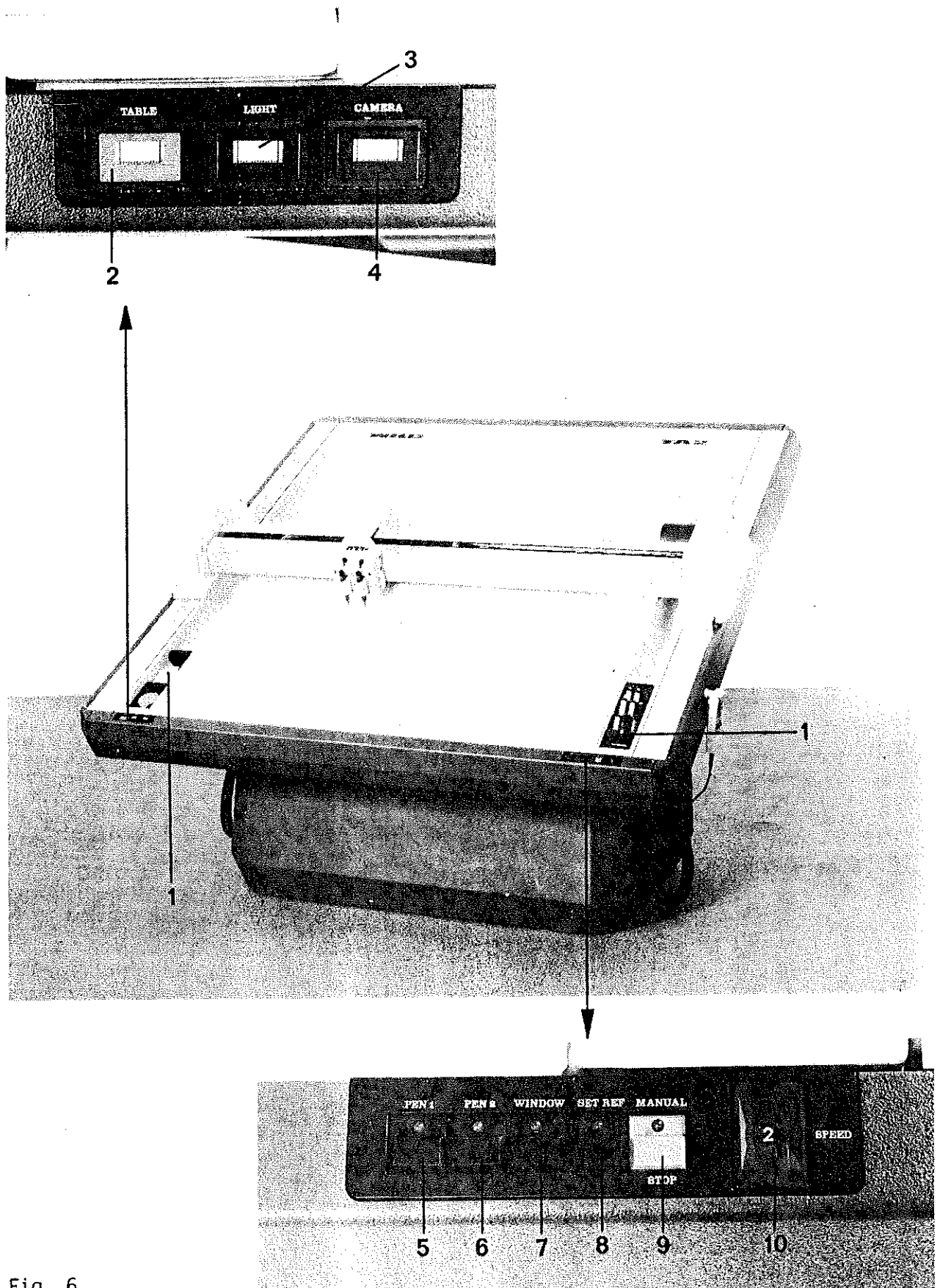


Fig. 6

Fig. 7

Brightness control, fuses and time counter

- 1 Rotary control knob for light intensity
- 2 Fuse for transmitted lighting
- 3 Slide for access to fluorescent tubes
- 4 Operating-hours counter
- 5 Fuses for motors, mains and control loop
- 6 Serial number
- 7 Hydraulic springs

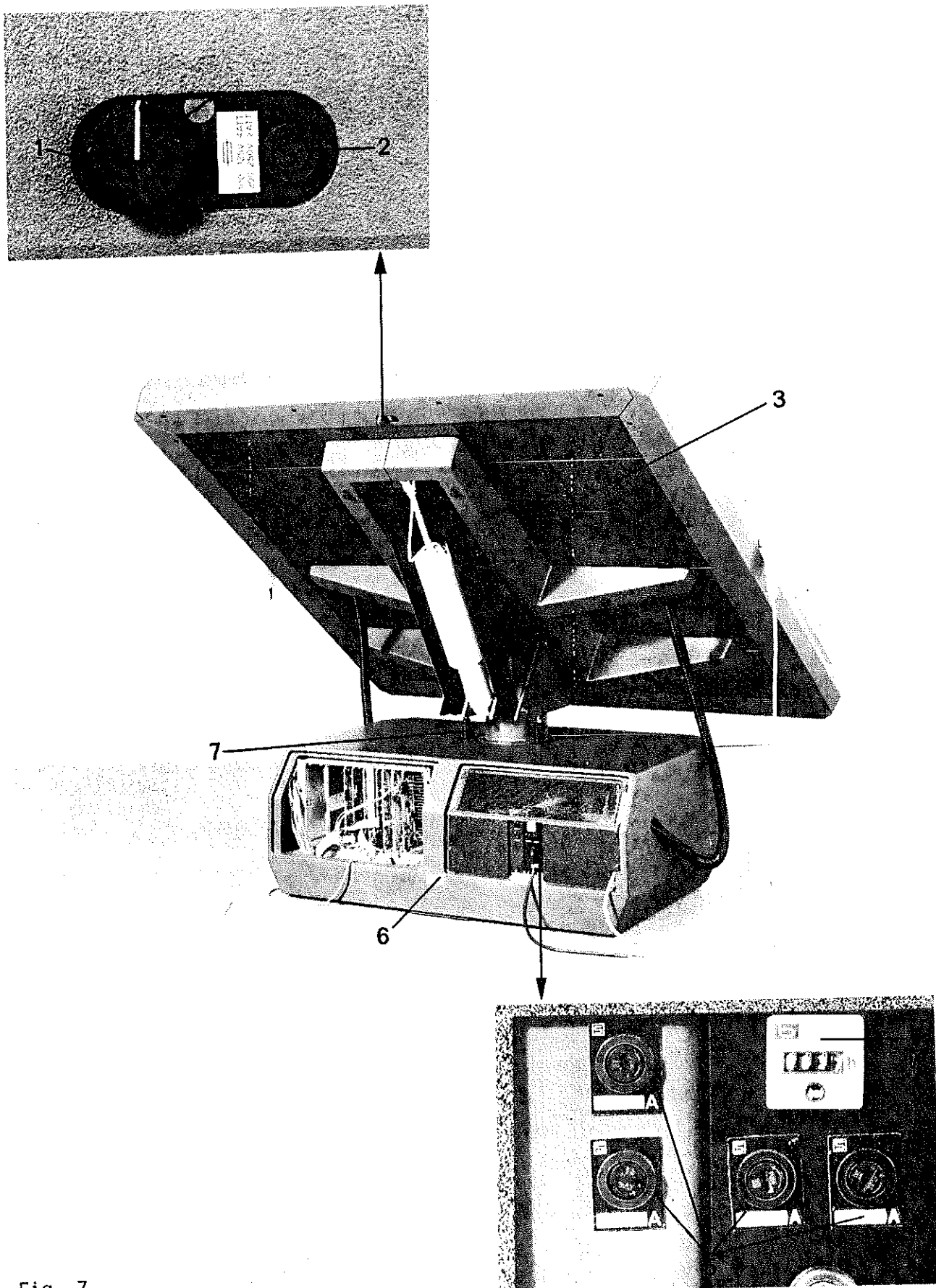


Fig. 7

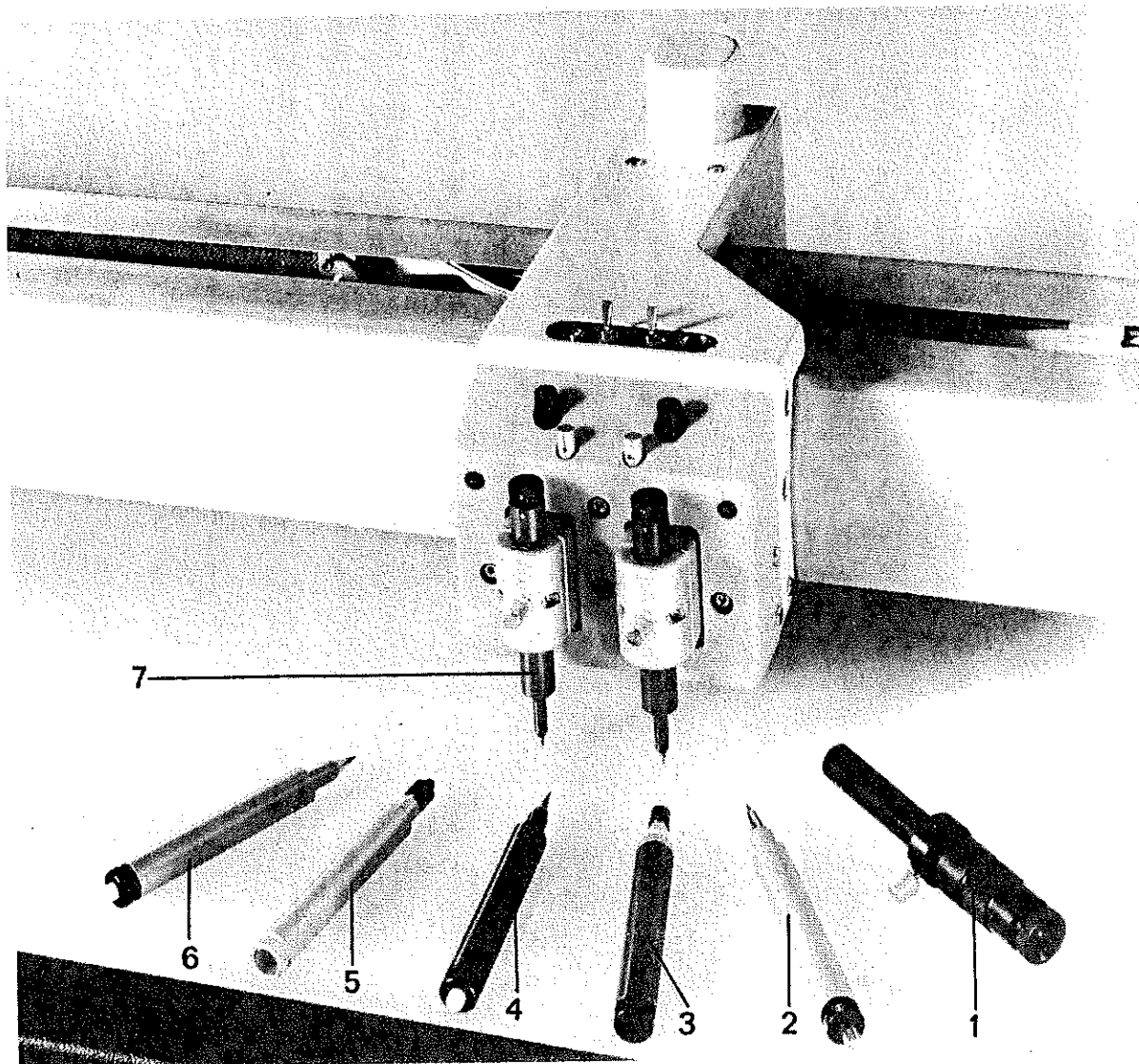


Fig. 8

Standard plotting tools

- 1 Measuring microscope
- 2 Micro-lead
- 3 Ink pen
- 4 Pencil lead
- 5 Pricking point
- 6 Scribing point
- 7 Ball-point cartridge

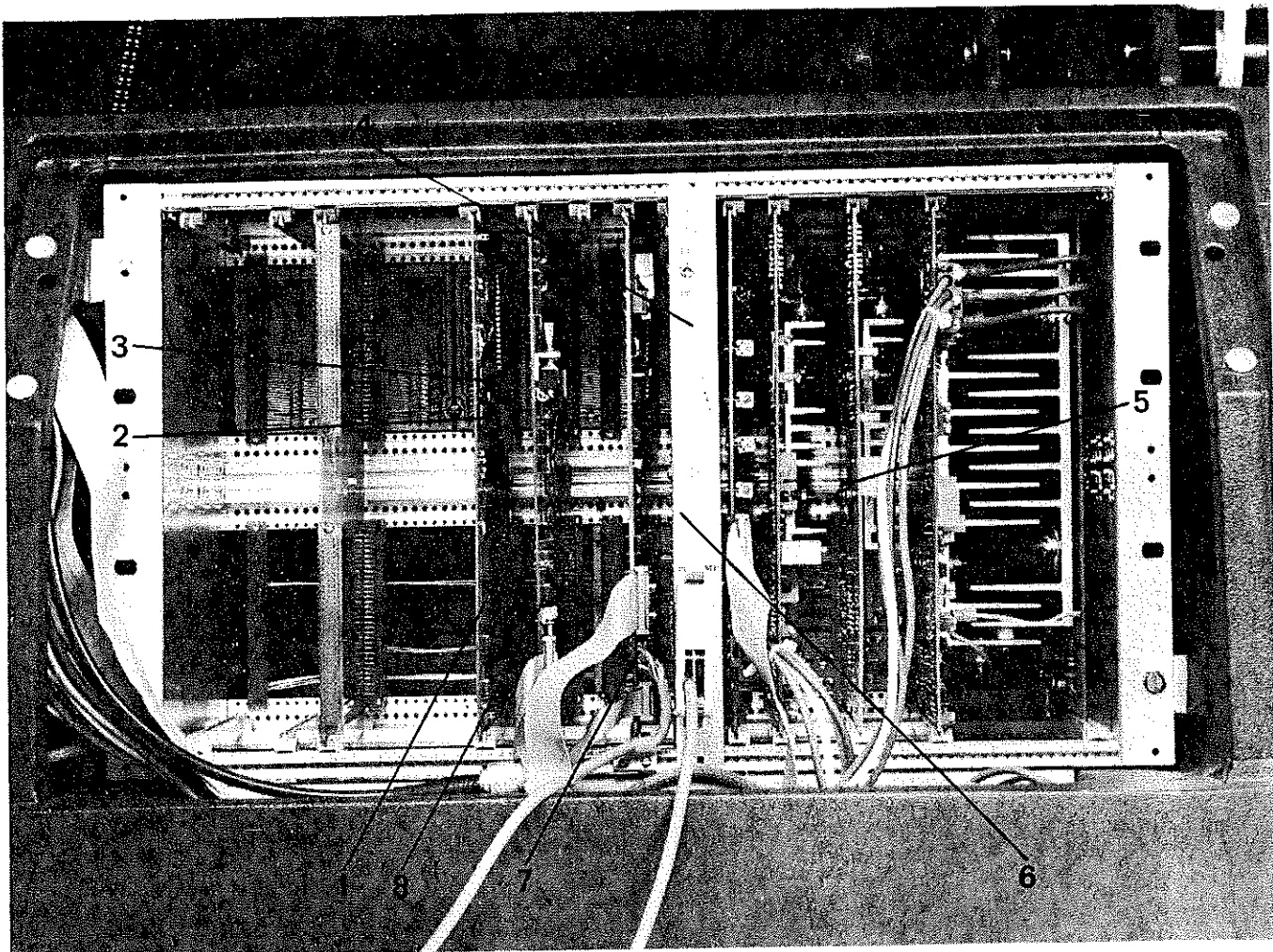


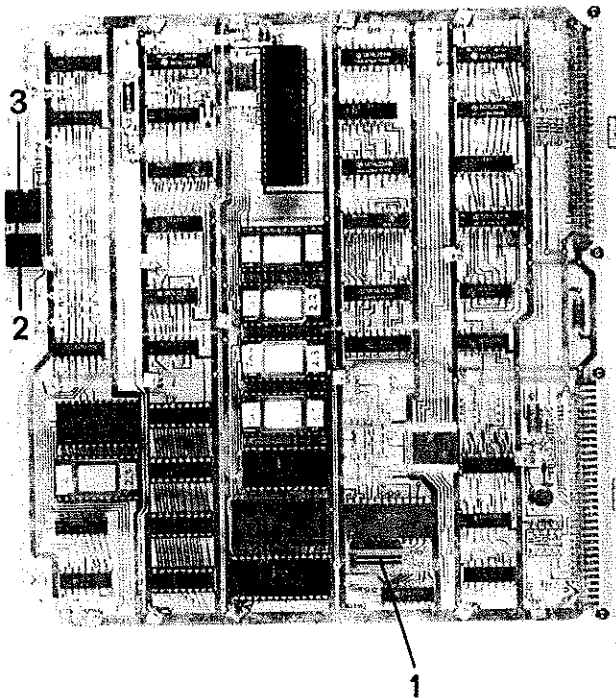
Fig. 9

Electronics cabinet

- 1 Processor printed-circuit board
- 2 TEST switch
- 3 RESET switch
- 4 Switch to select input from external computer (PC)
or from TA 2 internal processor (PP)
- 5 Functional components
- 6 Input/output p-c board 2 (I/02)
- 7 Input/output p-c board 1 (I/01)
- 8 Servo-interface p-c board

Fig. 10

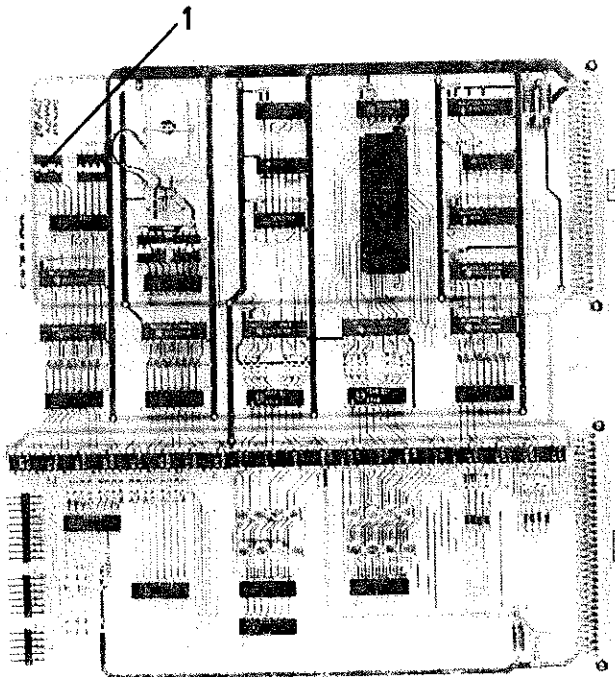
Processor p-c board



- 1 Baud-rate switch
- 2 TEST switch
- 3 RESET switch

Fig. 11

Input/output p-c board 1 (I/O1)



- 1 Switches for setting interface parameters: DATA bit, STOP bit, PARITY

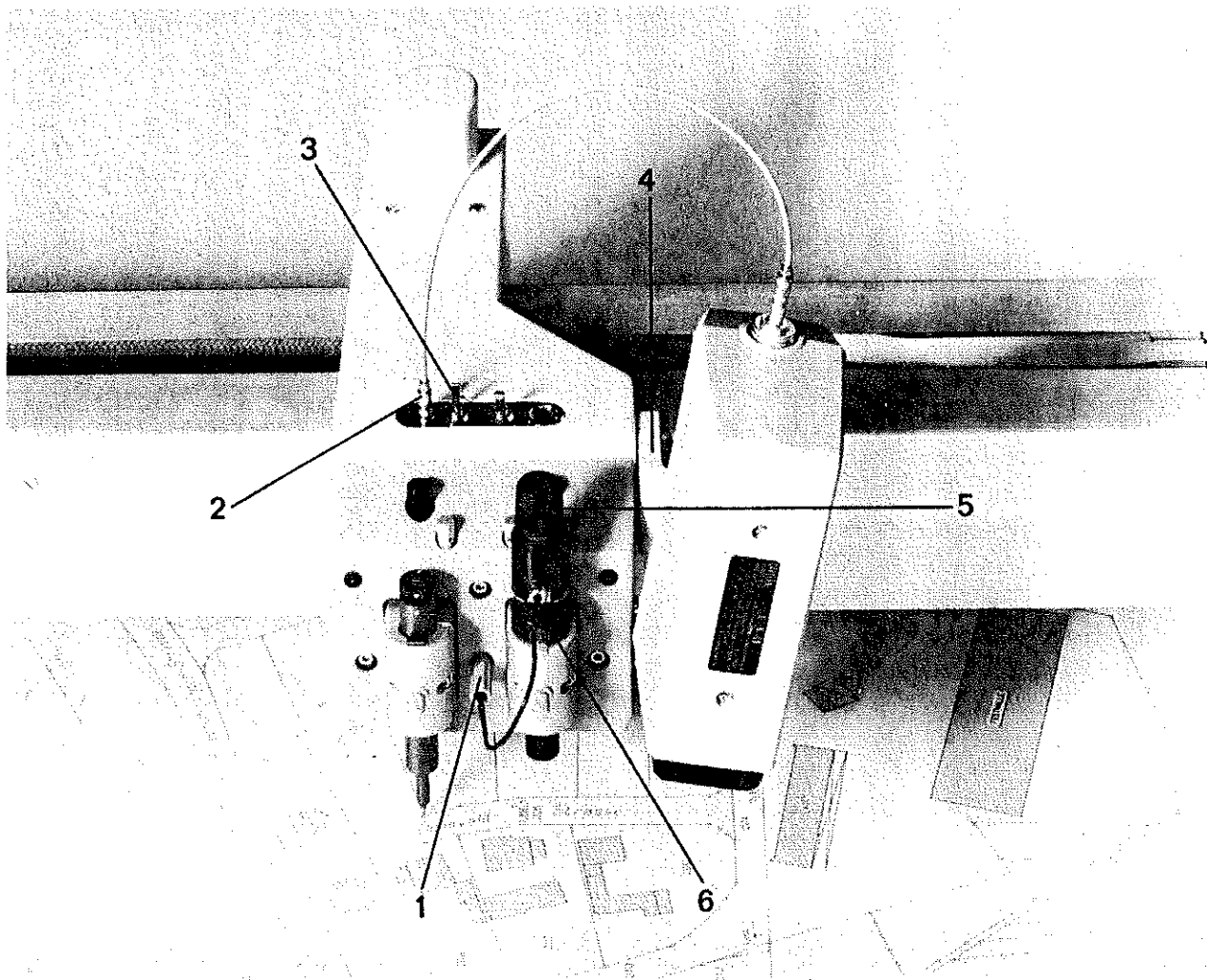


Fig. 12

Plotting-head carriage with TV camera and measuring-mark projector fitted

- 1 Socket for measuring-mark projector
- 2 Socket for TV camera
- 3 Toggle switch for reducing acceleration
- 4 Holder for TV camera
- 5 Rotary control knob to adjust intensity of projected measuring mark
- 6 Clamping screw for measuring-mark projector

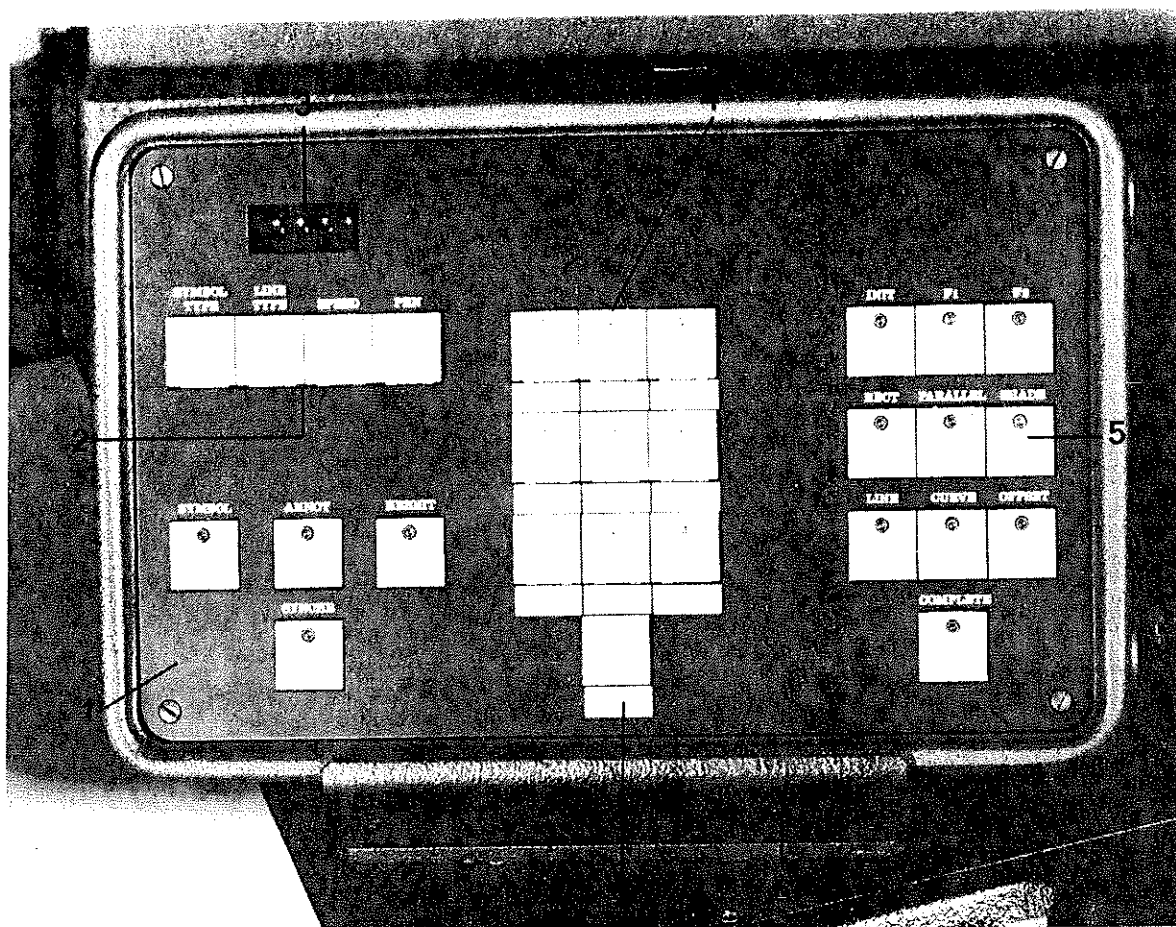


Fig. 13

Functions keyboard for computer-assisted plotting

- 1 Keys for plotting functions
- 2 Preselection keys for symbol type, line type, speed and pen
- 3 Four-figure display to indicate the activated symbol type, line type, plotting speed, plotting point
- 4 Numerical keys
- 5 Keys for plotting functions
- 6 Angle bracket
- 7 Fields for marking with symbols and lines

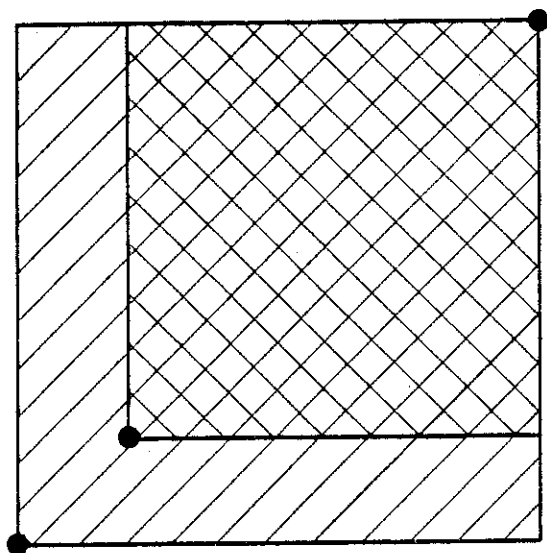


Fig. 14

Restriction of effective plotting area due to SET REF

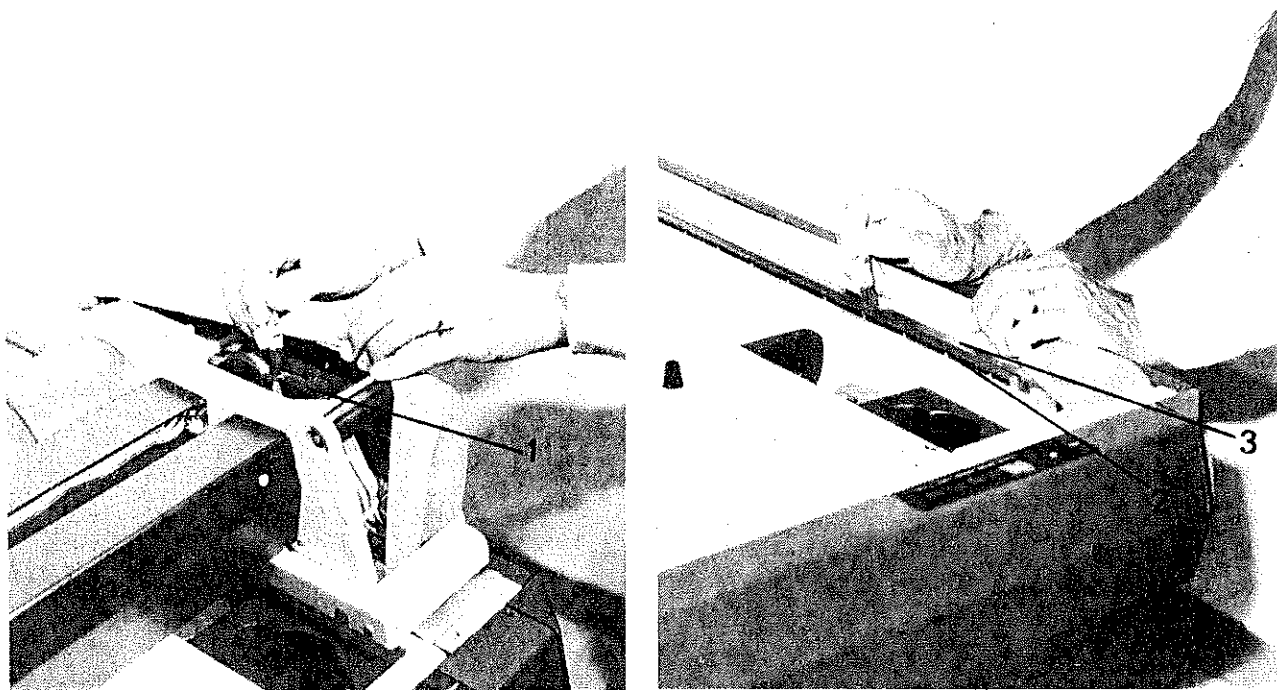


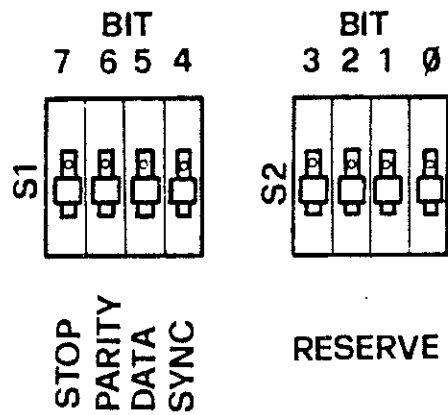
Fig. 22

Maintenance of drive system

- 1 Gearwheel of drive
- 2 Rack
- 3 Running surface

		02	
		10	
		14	
PLOTTER CONTROLLER	398770	28	
SERVO INTERFACE	398640	34	
INPUT/OUTPUT 1	398620	42	
INPUT/OUTPUT 2	398630	46	
INPUT/OUTPUT POWER	398650	51	
SERVO AMPLIFIER 50W	397080	55	
SERVO AMPLIFIER 50W-T (OPTION)	403210	62	
SERVO AMPLIFIER 150W-1	397090	69	
SERVO AMPLIFIER 150W-2	398610	83	
Printed Circuit Board	Art.Nr.	Pos. Nr.	

Table 1: Layout of printed-circuit boards in electronics cabinet



S1 (BITn)	Parameter	Switch position	
		white Ø	1 red
7	STOP bits	1	2
6	PARITY	ODD	EVEN
5	DATA bit	ASYNCH	8
4	SYNC		SYNC

Table 2: RS 232 interface parameters and corresponding switch positions

INSERT	PRESSURE SET ON PLOTTER TOOL INSERT		REMARKS
1. <u>PENCIL-LEAD HOLDER (180 424)</u>	<u>Tracing paper</u>	<u>Tracing film</u>	Tracing films: see under 2
	10 turns (0.50N)	15 turns (0.65N)	
	<u>Tracing paper</u>	<u>Tracing film</u>	
2. <u>MICRO-LEAD HOLDER</u> • 0.2mm (394 758) • 0.3mm (339 685) • 0.5mm (339 686)	10 turns (0.50N) 10 turns (0.75N) 15 turns (1.00N)	10 turns (0.50N) 10 turns (0.75N) 15 turns (1.00N)	Typical tracing films: K+E : Herculene (USA) : Stabilene Folex : Folarex H (CH) Renker: PL (West Germany)
3. <u>BALL-POINT PEN (384 484)</u> • Ball-point cartridge Staedtler Mars Plot	<u>Tracing paper</u>	<u>Tracing film</u>	Tracing films: see under 2
	5 turns (1.80N)	10 turns (2.50N)	
4. <u>SCRIBER (339 624)</u> • 0.08mm (117 192) • 0.12mm (193 497) • 0.15mm (117 193)	<u>Renker Engraving film</u>	<u>K+E and Folex Engraving film</u>	Typical engraving films: Renker: Polyscal (West Germany) K+E : Stabilene (*) (USA) Folex : Folascribe FSC-N (*) (CH)
	5 turns (1.50N) 10 turns (2.30N) 15 turns (3.00N)	10 turns (2.30N) 10 turns (3.00N) 25 turns (5.00N)	
5. <u>INK CARTRIDGE (384 485)</u> • Plotting point and holder for Staedtler Mars Plot ink cartridge • 0.1/0.2/0.3/0.4/0.5/ 0.6/0.8/1.0mm	<u>Tracing film</u>		Tracing films: see under 2
	3 turns (0.35N) up to 6 turns (0.50N)		

Table 3: Table of standard contact-pressure settings

	FAULT	LED FUNCTIONS KEYBOARD					BLEEP	FAULT
		PEN1	PEN2	WINDOW	SET REF	MAN/STOP		
0	LIGHT-BARRIER STOP *)	○	○	○	○	●	INTERMITTENT	MINOR
1	TANGENTIAL CONTROL	○	○	○	●	●		
2		○	○	●	○	●		
3		○	○	●	●	●		
4		○	●	○	○	●		
5		○	●	○	●	●		
6		○	●	●	○	●		
7		○	●	●	●	●		
8	RAM	●	○	○	○	●	INTERMITTENT	SERIOUS
9	EPROM	●	○	○	●	●		
10	SERVO INTERFACE INITIALIZE	●	○	●	○	●		
11	SERVO INTERFACE RUN	●	○	●	●	●		
12	X AXIS OVERRIDE	●	●	○	○	●		
13	Y AXIS OVERRIDE	●	●	○	●	●		
14	TANGENTIAL CONTROL OVERRIDE	●	●	●	○	●		
15	UNSPECIFIED	●	●	●	●	●		

● LED lights

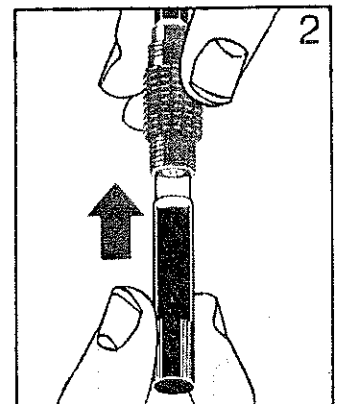
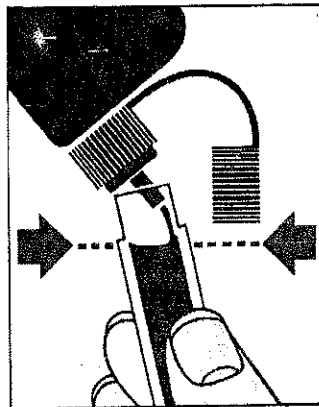
◐ LED blinks

○ LED out

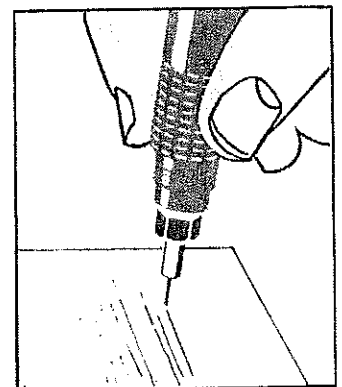
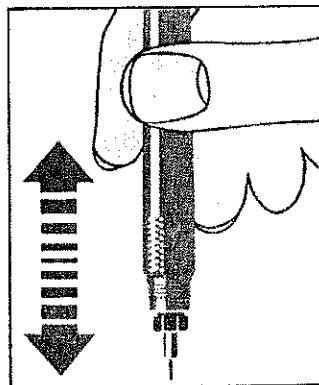
*) or interruption in travelling to table reference after switching on

Table 4: TA 2 fault code

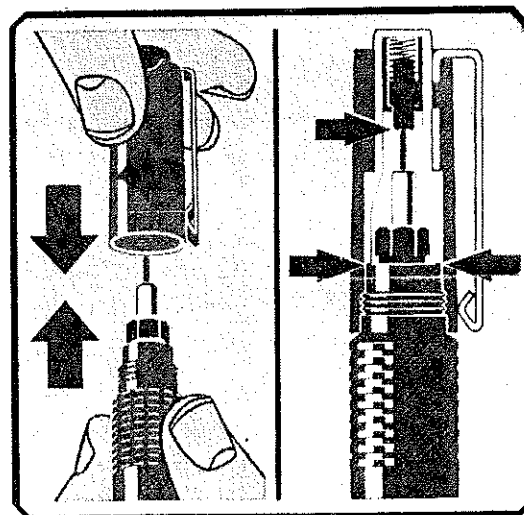
- 1
 Füllen
 Filling
 Remplissage
 Llenar



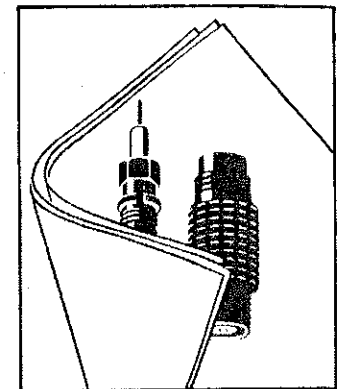
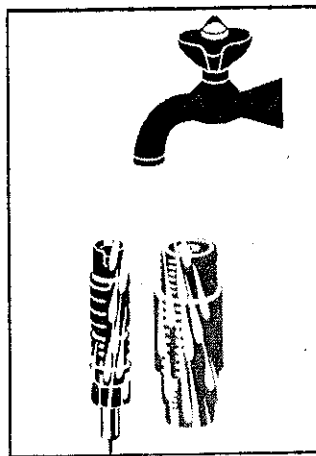
- 2
 Starten
 Starting
 Amorcage
 Arrancar



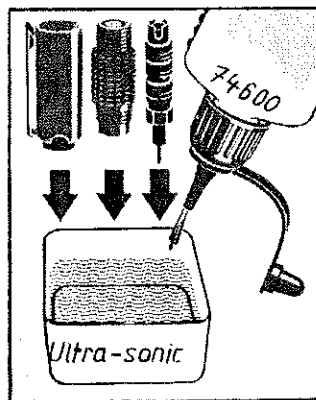
- 3
 Aufbewahren
 Storage
 Soins particuliers
 Guardar



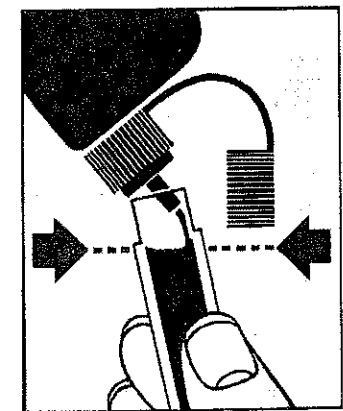
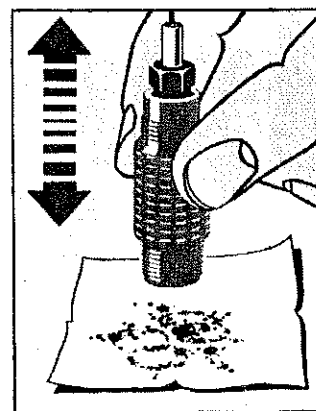
- 4
Reinigen
Cleaning
Nettoyage
Limpiar



- 5
Reinigen im Ultraschallgerät
Cleaning with ultra-sonic
Nettoyage dans appareil ultra-son
Limpieza en aparato ultrasonico



- 6
Nachfüllen
Refilling
Remplissage
Rellenar



Mars Plot Zeichenspitze Nr. 750PL., C3
Mars Plot Pen Point No. 750PL., C3
Pointe Tubulaire Mars Plot No. 750PL., C3
Puntera Mars Plot No. 750PL., C3

———— Tusche Nr. 748PL für Transparent- und Normalpapier
———— Ink No. 748PL for tracing paper and normal paper
———— Encre No. 748PL pour calque et papier normal
———— Tinta China No. 748PL para papel vegetal y papel normal

Mars Plot Zeichenspitze Nr. 757PL., C3 (CS)
Mars Plot Pen point No. 757PL., C3 (CS)
Pointe Tubulaire Mars Plot No. 757PL., C3 (CS)
Puntera Mars Plot No. 757PL., C3 (CS)

———— Tusche Nr. 748PLF für mattierte Zeichenfolie
———— Ink No. 748PLF for drafting film with matt surface
———— Encre No. 748PLF pour film matté
———— Tinta China No. 748PLF para de superficie mate

TAA2

TESTPLOT

WILD HEERBRUGG AG

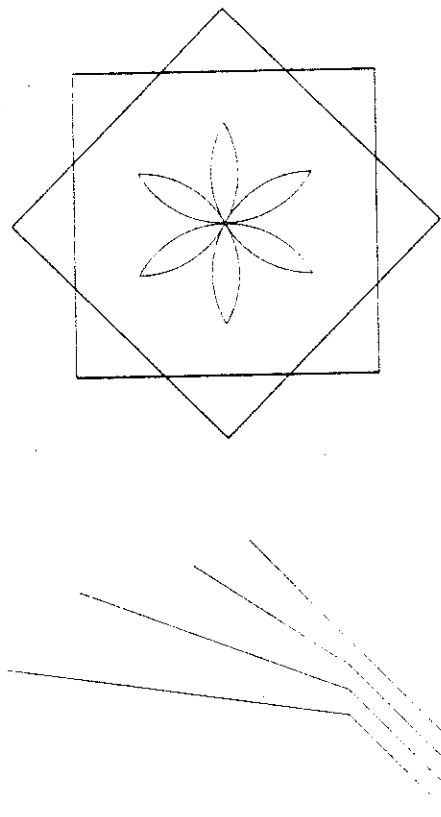
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abcdefghijklmnopqrstuvwxyz

abcdefghijklmnopqrstuvwxyz
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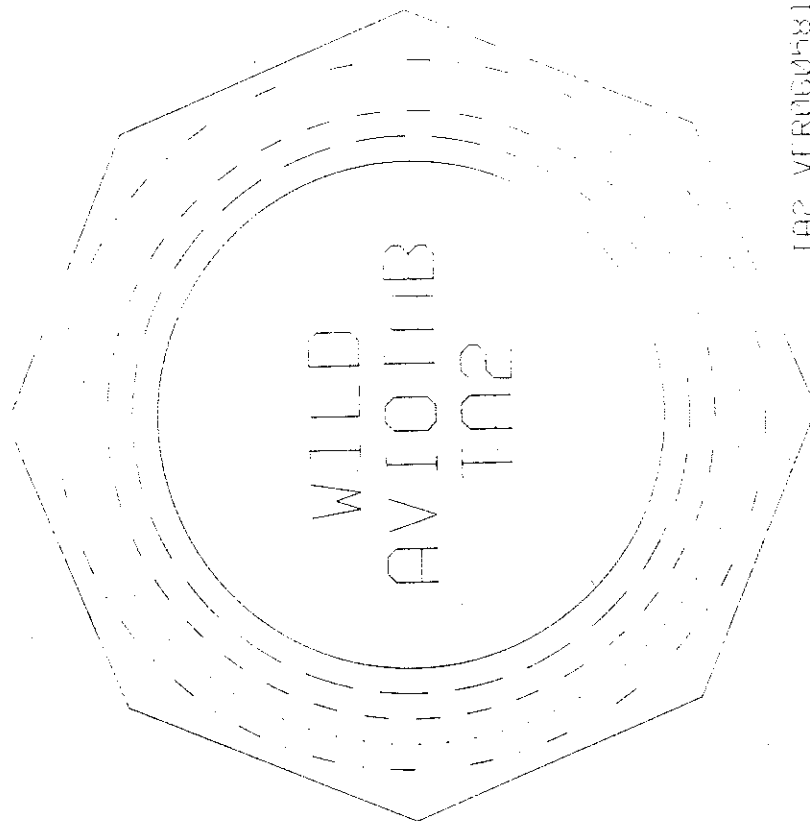
0123456789

abcdefghijklmnopqrstuvwxyz

abcdefghijklmnopqrstuvwxyz



Anhang 2
Annex 2
Annexe 2
Anexo 2



1A2 VER060581