SIE E S

6525 01 207 0824

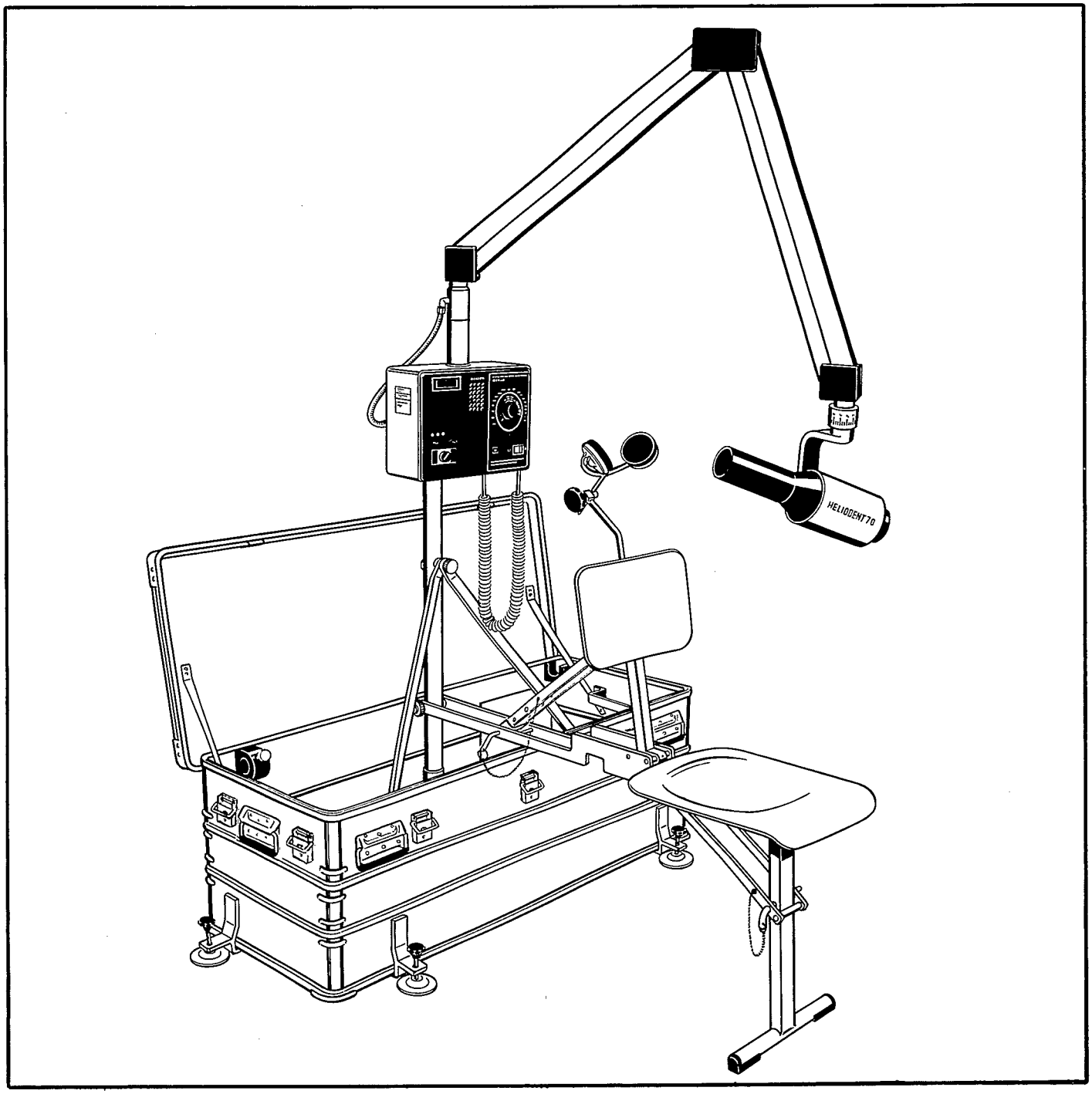
PORTARAY

HELIODENT® 70

with DENTOTIME

Model D3152 50/60 HZ Operation

Maintenance Instructions



Important Notice

This unit is not to be used in rooms where an explosion hazard exists.

This unit may only be repaired by us or a representative expressly authorized by us.

If work is performed by authorized persons, a certificate on the type and extent of repair must be requested. This must contain information of changes of nominal data or work range performed. The certificate must furthermore indicate the date of repair, the name of the company concerned and a valid signature.

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X-ray system and its major components

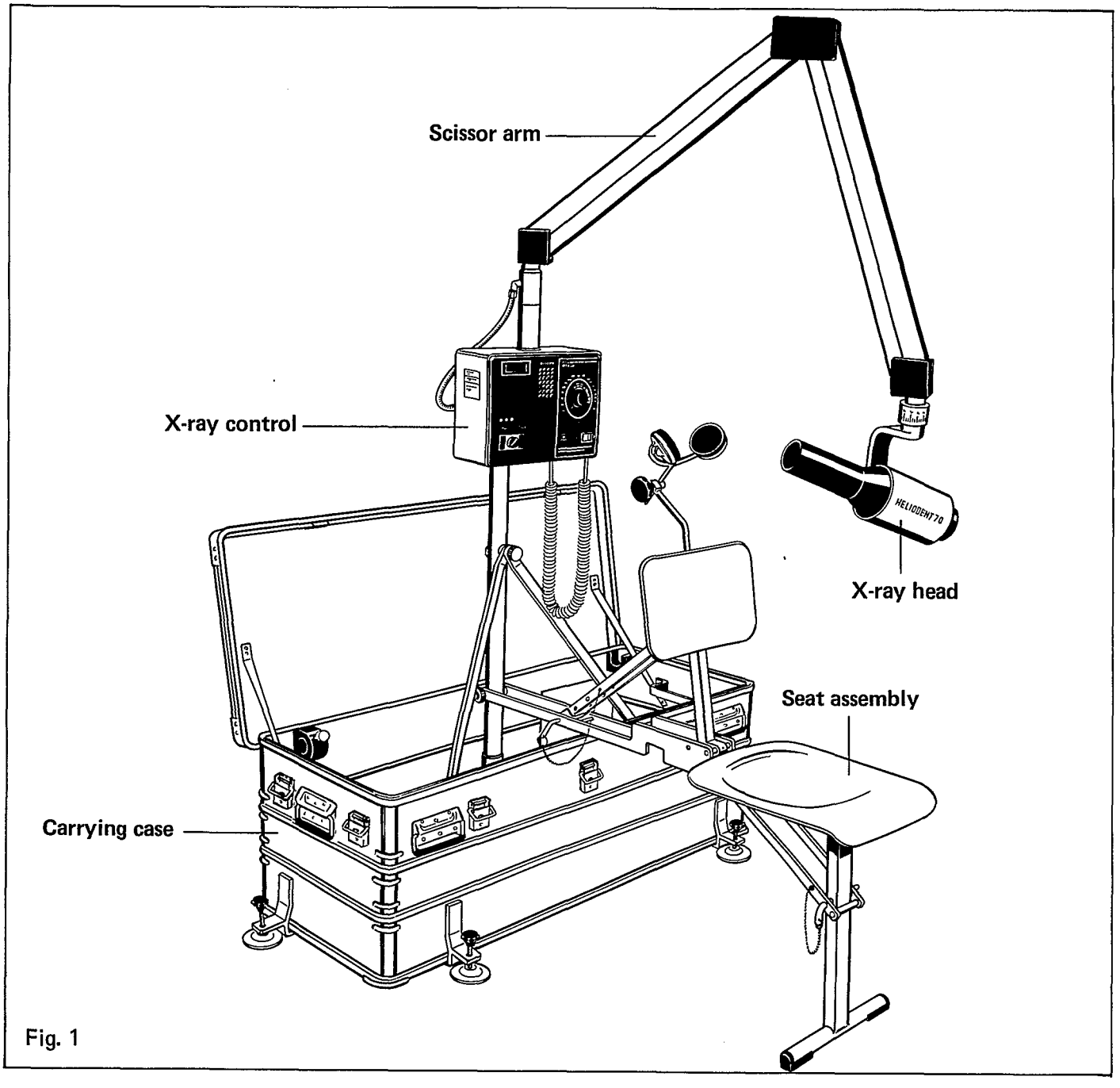


Fig. 1

GENERAL DESCRIPTION

The PORTARAY is a portable field dental X-ray apparatus suitable for use in intra-oral radiology.

The unit consists of a carrying case, support stand, scissor arm – tube head assembly, a control assembly and a patient chair with ajustable head rest.

The X-ray has a tube voltage of 70 kV and a tube current of 7 mA.

The filtration in the useful beam is at least 2,7 mm Al total.

The exposure technique setting is carried out by simply matching the patient to the object on the dial correspondending to the object being radiographed.

The PORTARAY can be operated on an adequate power supply of 109 VAC to 133 VAC at 60 Hz, 109 VAC to 132 VAC at 50 Hz, and at 207 VAC to 242 VAC at 60 Hz, 207 VAC to 240 VAC at 50 Hz when connected to the built-in transformer.

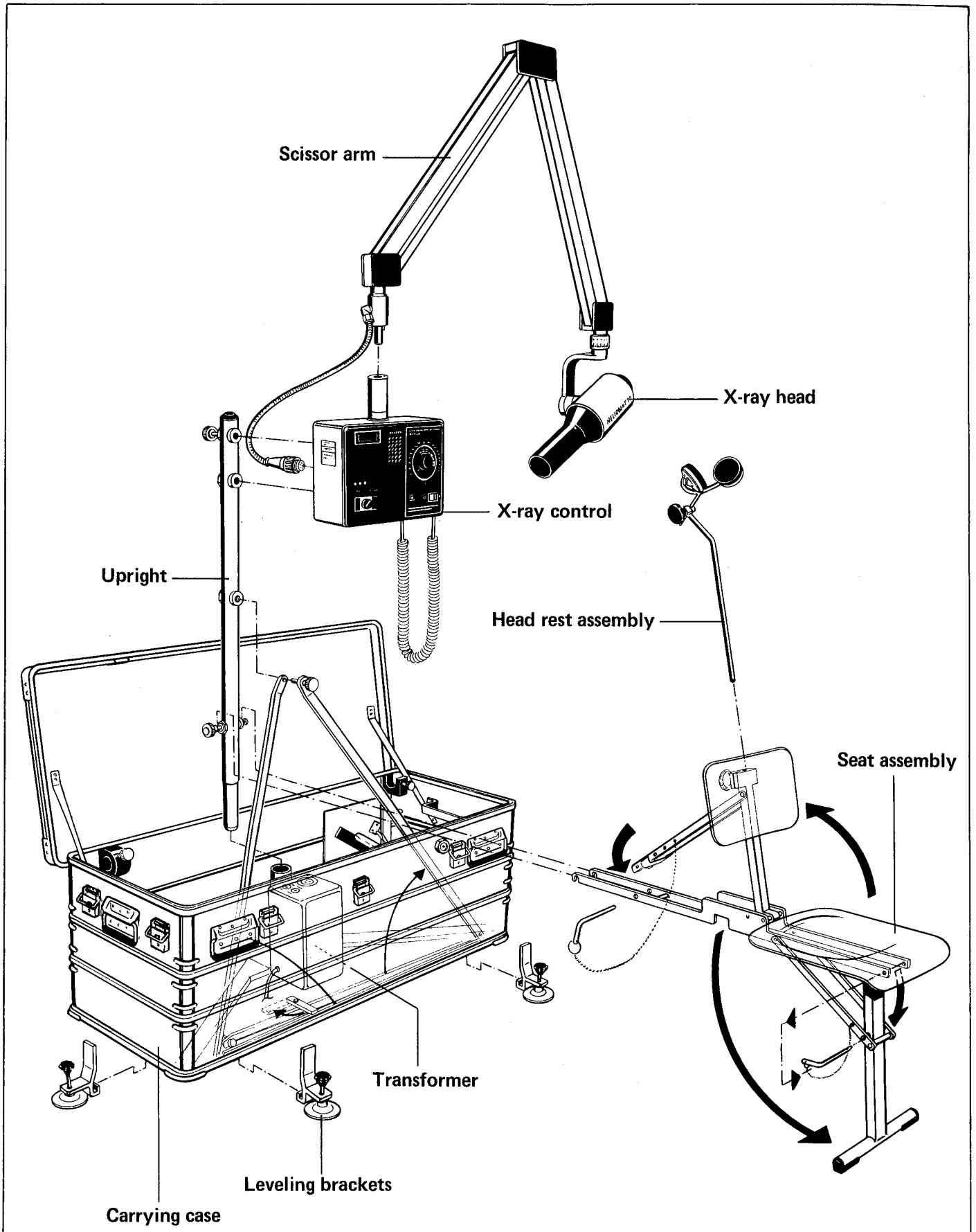

Scissor arm
X-ray head
X-ray control
Upright
Head rest assembly
Seat assembly
Transformer
Leveling brackets
Carrying case

Fig. 2

EQUIPMENT SPECIFICATIONS
Power requirement

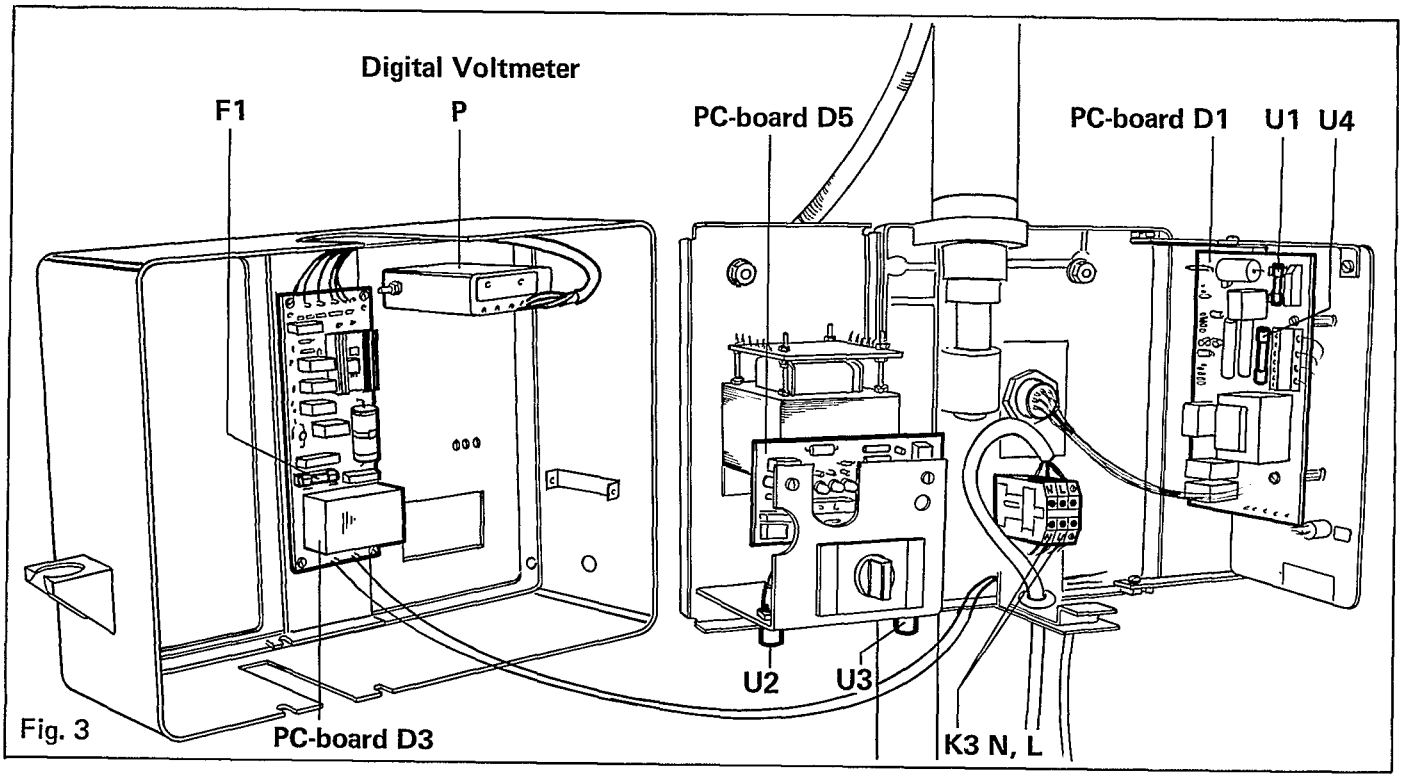


Fig. 3

Circuit PC boards:

PC-board D1 Order No. 83 53 245 X 1357
PC-board D3 Order No. 58 75 802 D 3152 with Digital-Voltmeter "P"
PC-board D5 Order No. 58 83 236 D 3152

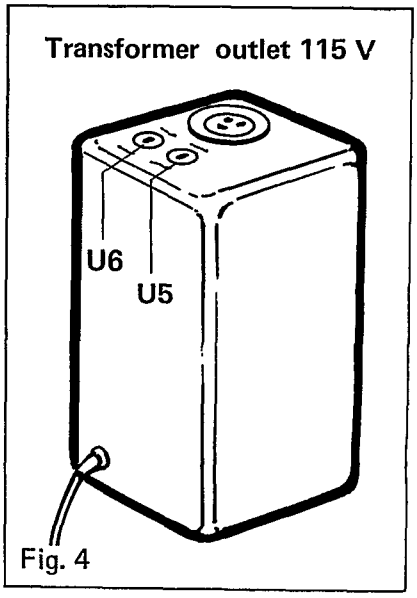


Fig. 4

Protective device:

Fuse	U1	0,16A, 250 V slow blow	Order No. 10 77 379 B 1302
Fuse	U2	10A, 250 V medium slow blow	Order No. 10 20 288 B 1302
Fuse	U3	10A, 250 V medium slow blow	Order No. 10 20 288 B 1302
Fuse	U4	1,5A, 250 V slow blow	Order No. 10 40 948 B 1302
Fuse	U5	10A, 250 V medium slow blow	Order No. 10 20 288 B 1302
Fuse	U6	10A, 250 V medium slow blow	Order No. 10 20 288 B 1302
Fuse	F1	0,063A, 250 V medium slow blow	Order No. 10 90 133 B 1302

Nom. line voltage 125 V 50/60 Hz
or 230 V 50/60 Hz

Line voltage range: From 109 to 133 VAC/60 Hz
From 109 to 132 VAC/50 Hz

Permissible maximum line voltage regulation 6 V
(measured at terminal strip K3 N, L.)

PHYSICAL DESCRIPTION

X-ray control:
Weight: 15,4 Lbs. (7 kg)

Consists of:
- Base plate,
- Line compensation transformer T3 with instrument circuit PC board D5.
- Power supply PC board D3 and digital instrument P.
- Object/exposure time assembly with PC board D1.

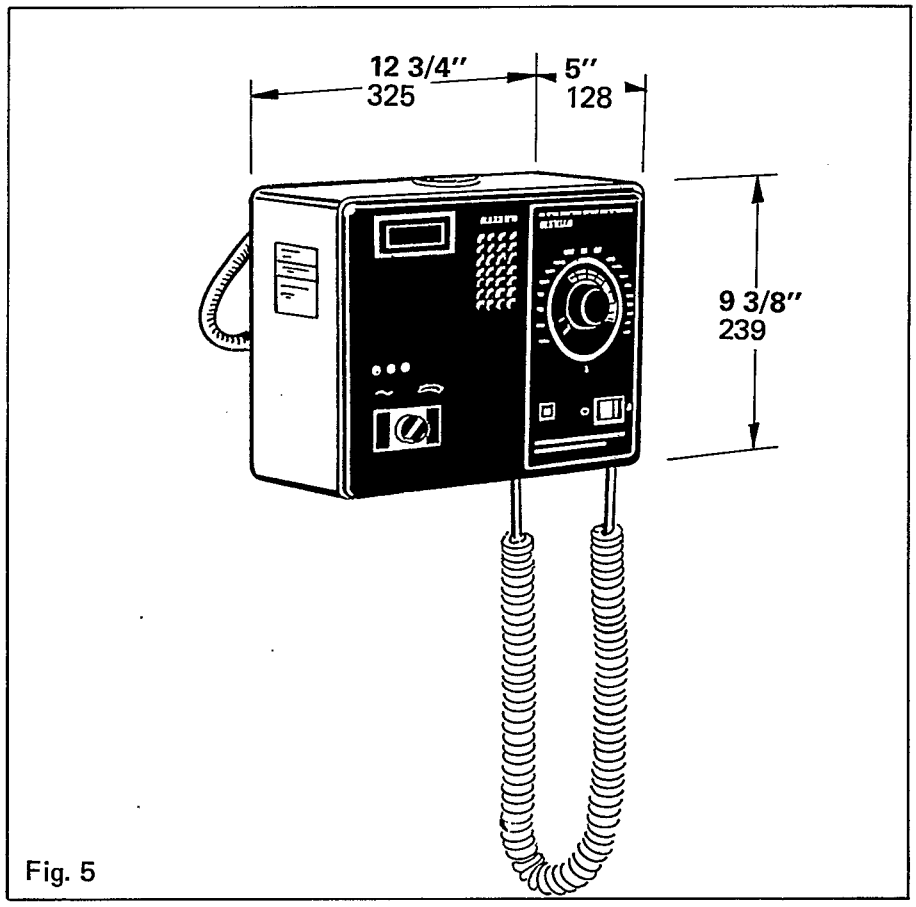


Fig. 5

X-ray head:
Weight: 11 Lbs. (5 kg)

Consists of:
- High tension transformer H1.
- Hight voltage capacitor C1.
- Voltage doubling circuit V10.
- X-ray tube.
- Oil filled aluminum housing for insulation and cooling of the above components.
- Lead shielded collimator.

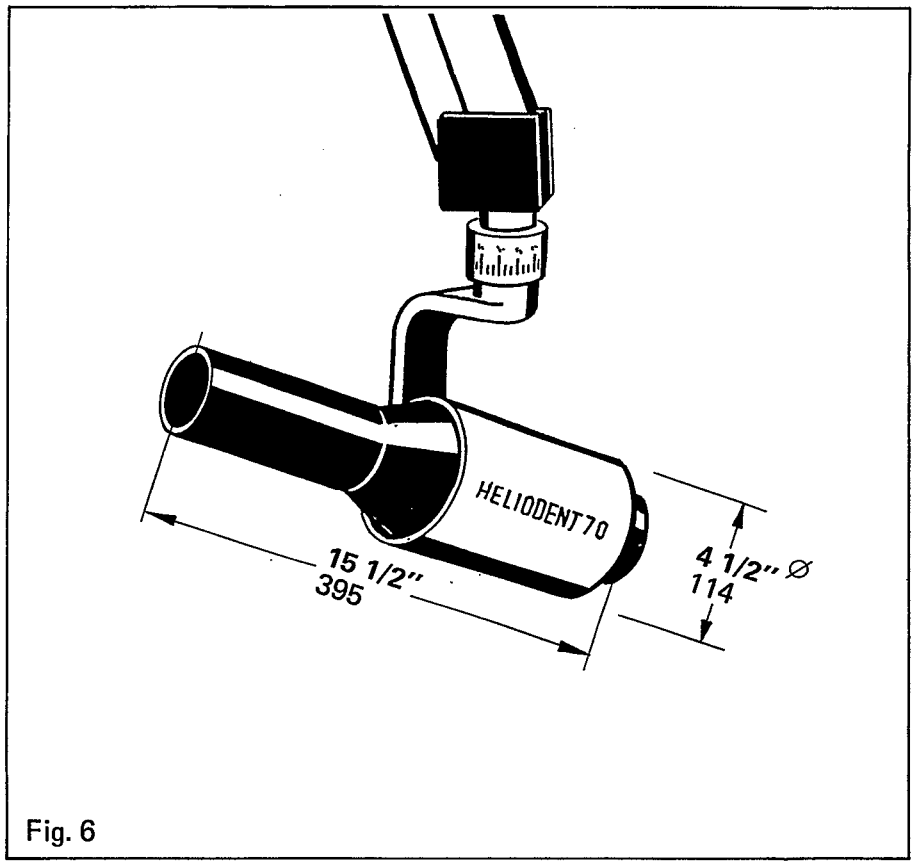


Fig. 6

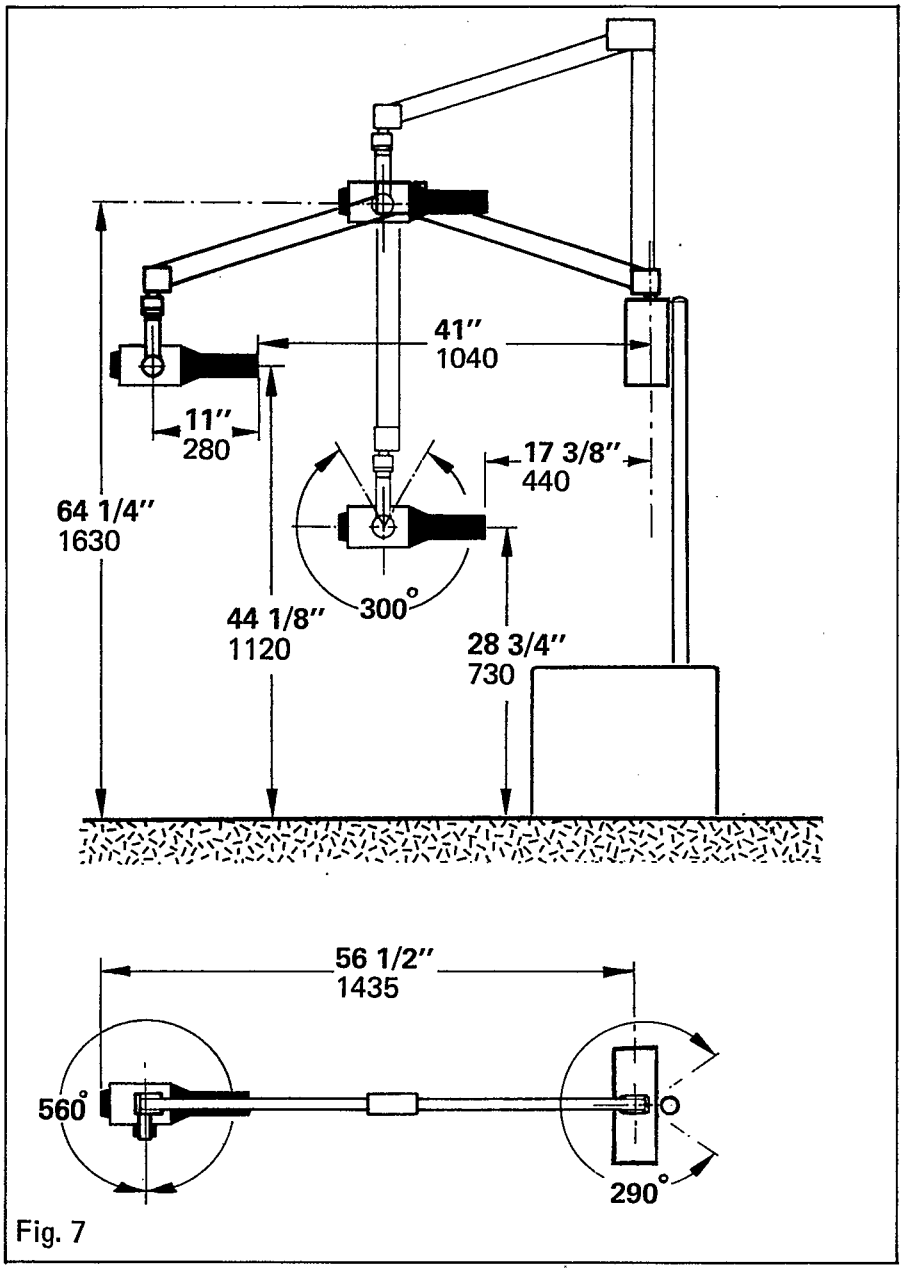


Fig. 7

Scissor arm:
Spring loaded scissor to support the X-ray head in a drift-free condition over an operating range as shown in the dimensional drawing.

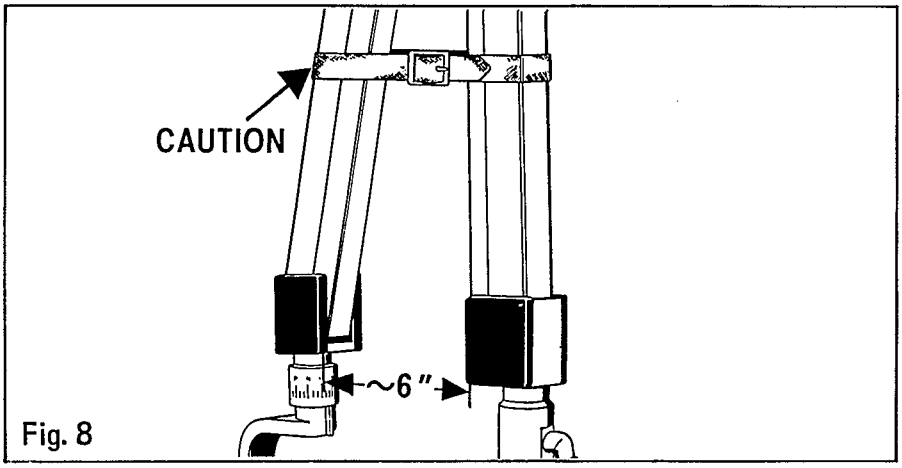


Fig. 8

Caution:
Removal of the X-ray head requires securing the scissor arm in a semi opened position to prevent accidental opening (spring loaded).

A five conductor wiring harness connects the X-ray head to the X-ray control.

Patient seat assembly:
Weight: 30,8 Lbs. (14 kg)

Metal constructions with pressure treated seat and backrest.

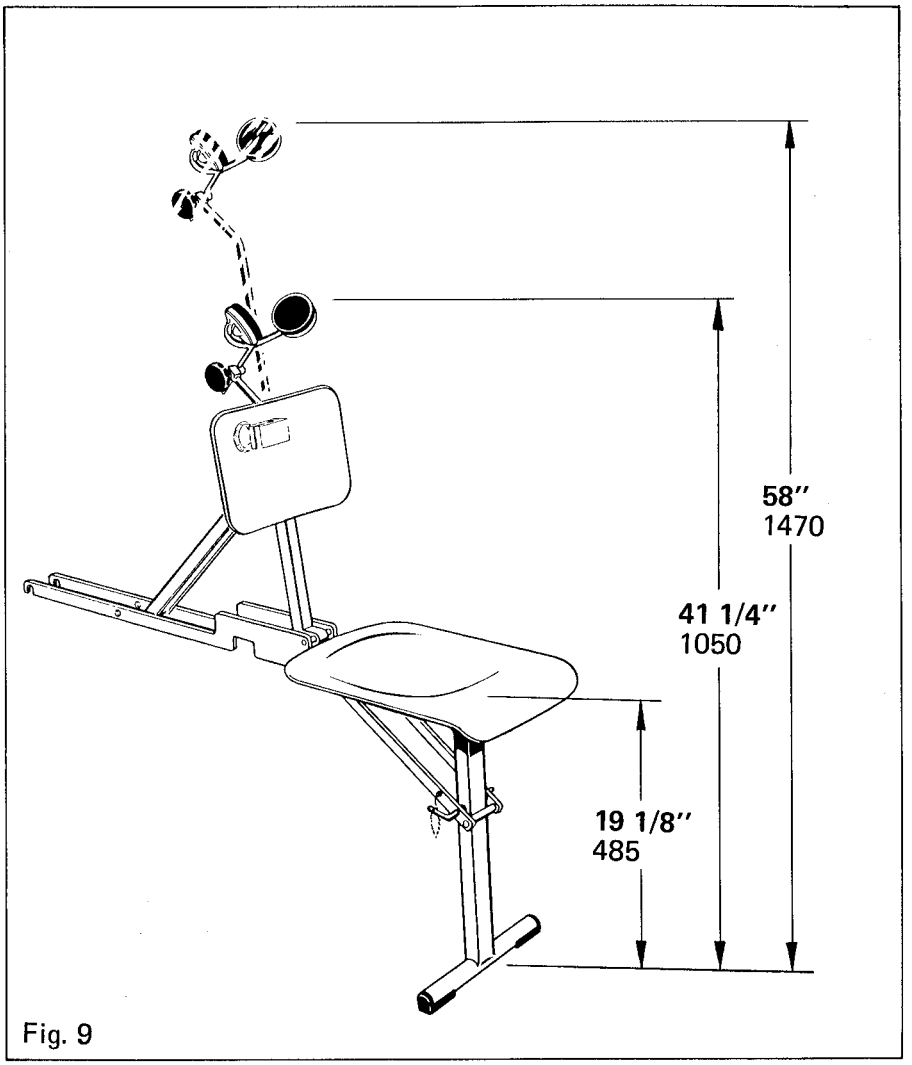


Fig. 9

Carrying case:

Weight with mounting devices and support structure: 92,5 Lbs. (42 kg)

Aluminum case finished with aliphatic polyurethane, chemical agent resistant paint, color forest green, with 6 carrying handles. The case lid is secured with 10 lockable latches.

The case is waterproof and fitted with an overpressure valve.

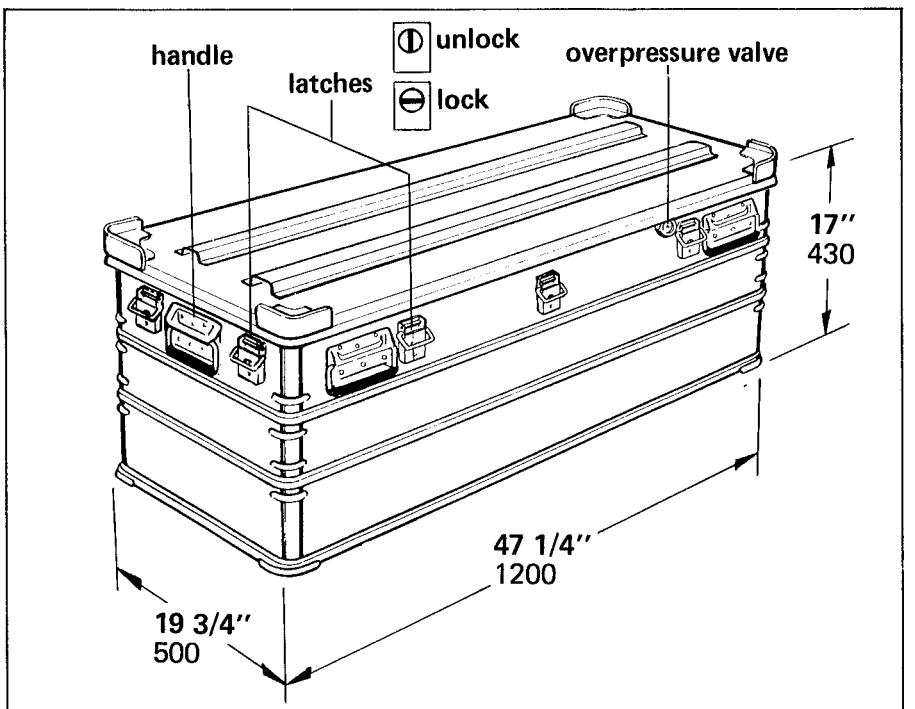


Fig. 10

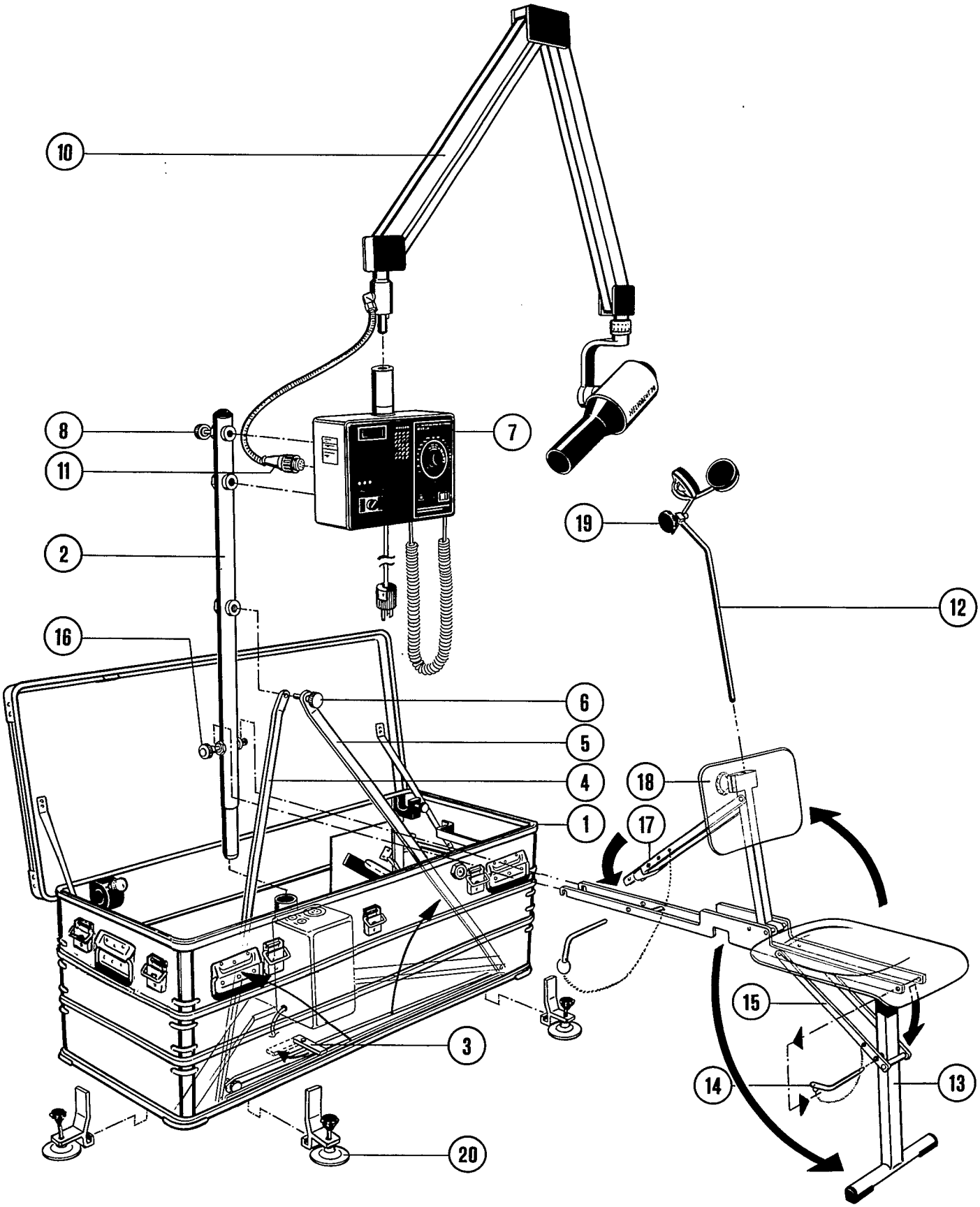


Fig. 11

Caution:

After the completed assembly the carrying case must be leveled.

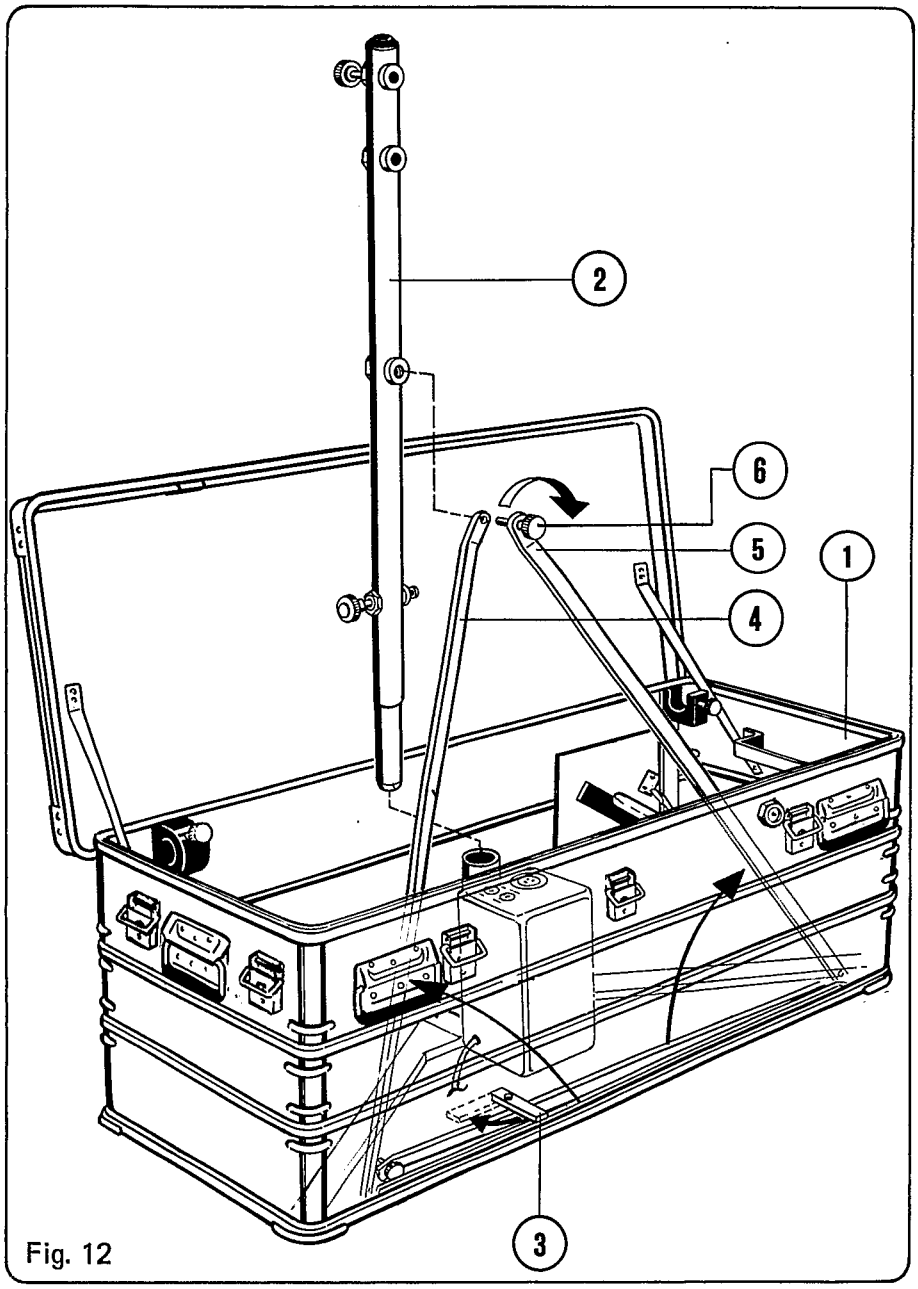


Fig. 12

Set-up

1

Remove all components from carrying case (1).
Lay out components keeping numbers in sequence.

Insert upright (2) into base, swing bracket (3) in the direction of the arrow.
Lift support bars (4) and (5), secure same in upright as shown with knob (6).

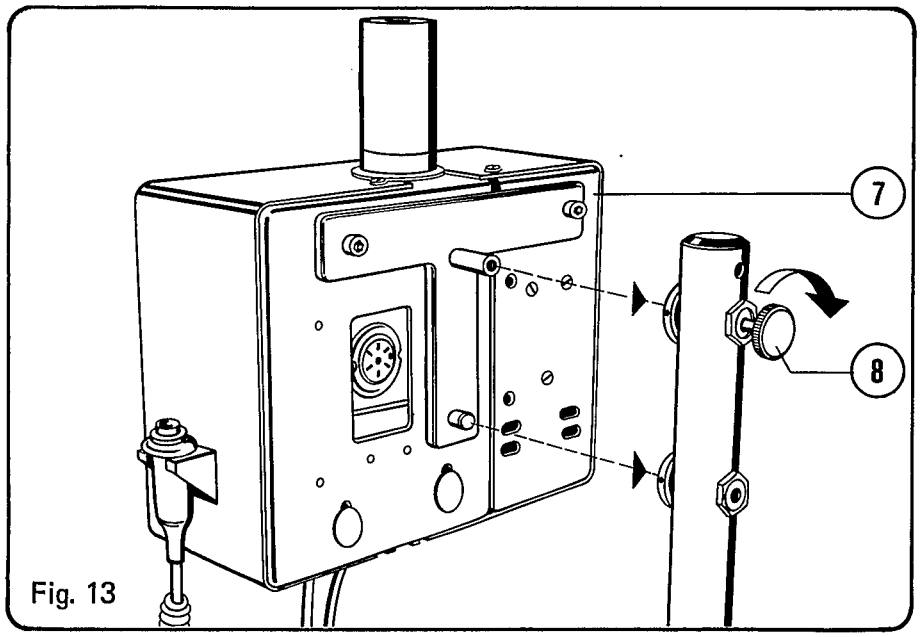


Fig. 13

2

Engage dowel pins of X-Ray control adapter (7) in upright, secure with knob (8).

3

Loosen safety strap (9) to permit a 6″ opening of the scissor arm (10) before engaging the arm in the coupling as shown.

CAUTION! To prevent accidental opening of the spring loaded scissor arm, causing injury and arm damage. DO NOT REMOVE safety strap completely, unless the arm is fully engaged in the coupling.

Connect multi pin plug (11) secure with lock ring in direction of arrow.

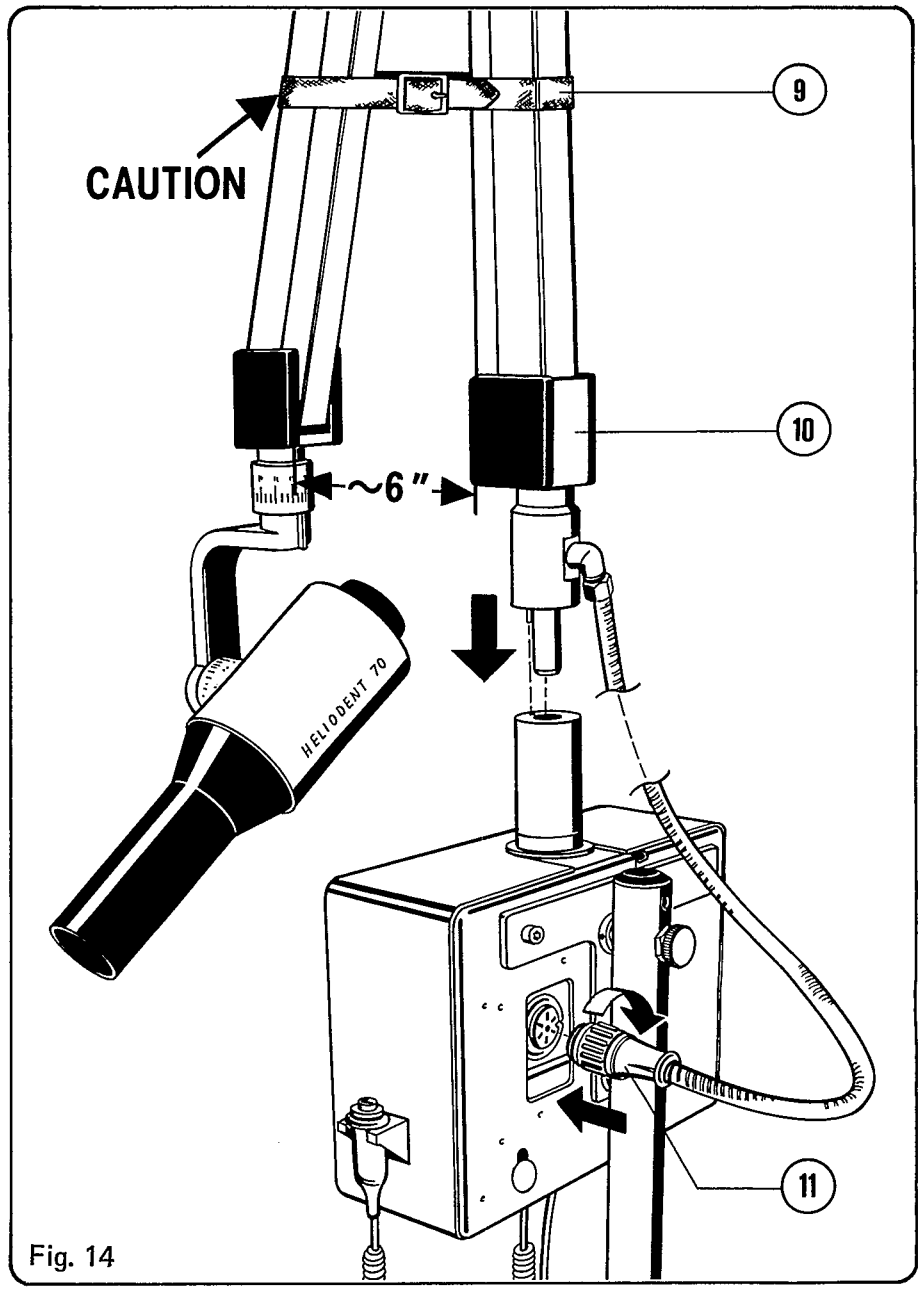
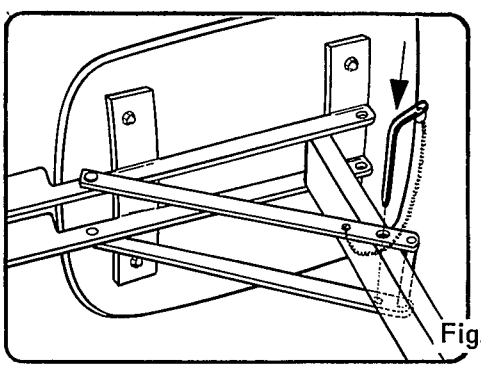


Fig. 14

4

Loosen knob (18), remove headrest assembly (12) from storage position. Remove safety pin (14). Unfold stool leg (13) and retainer bracket (15). With stool leg fully extended secure same with safety pin as shown see detail.



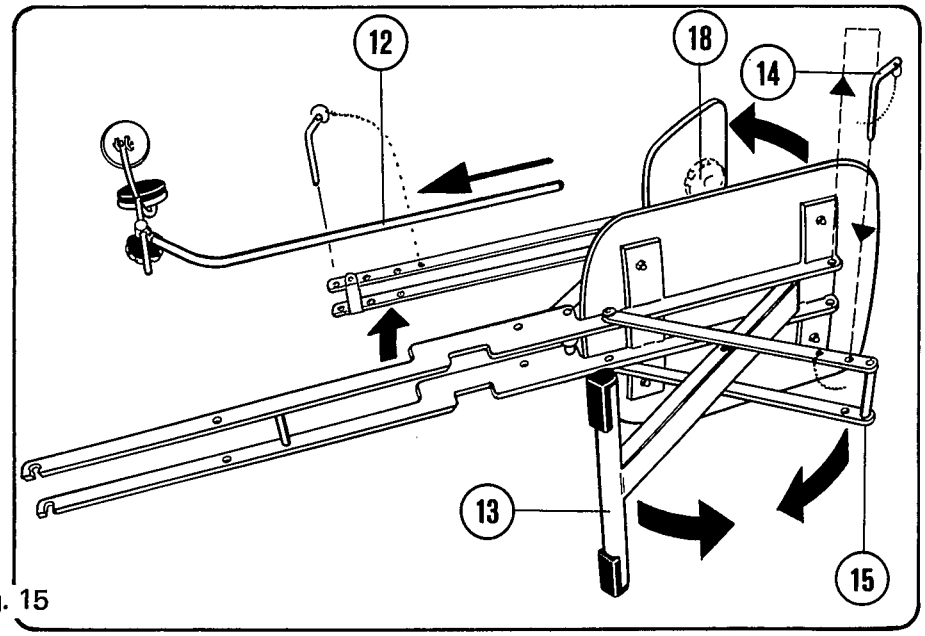


Fig. 15

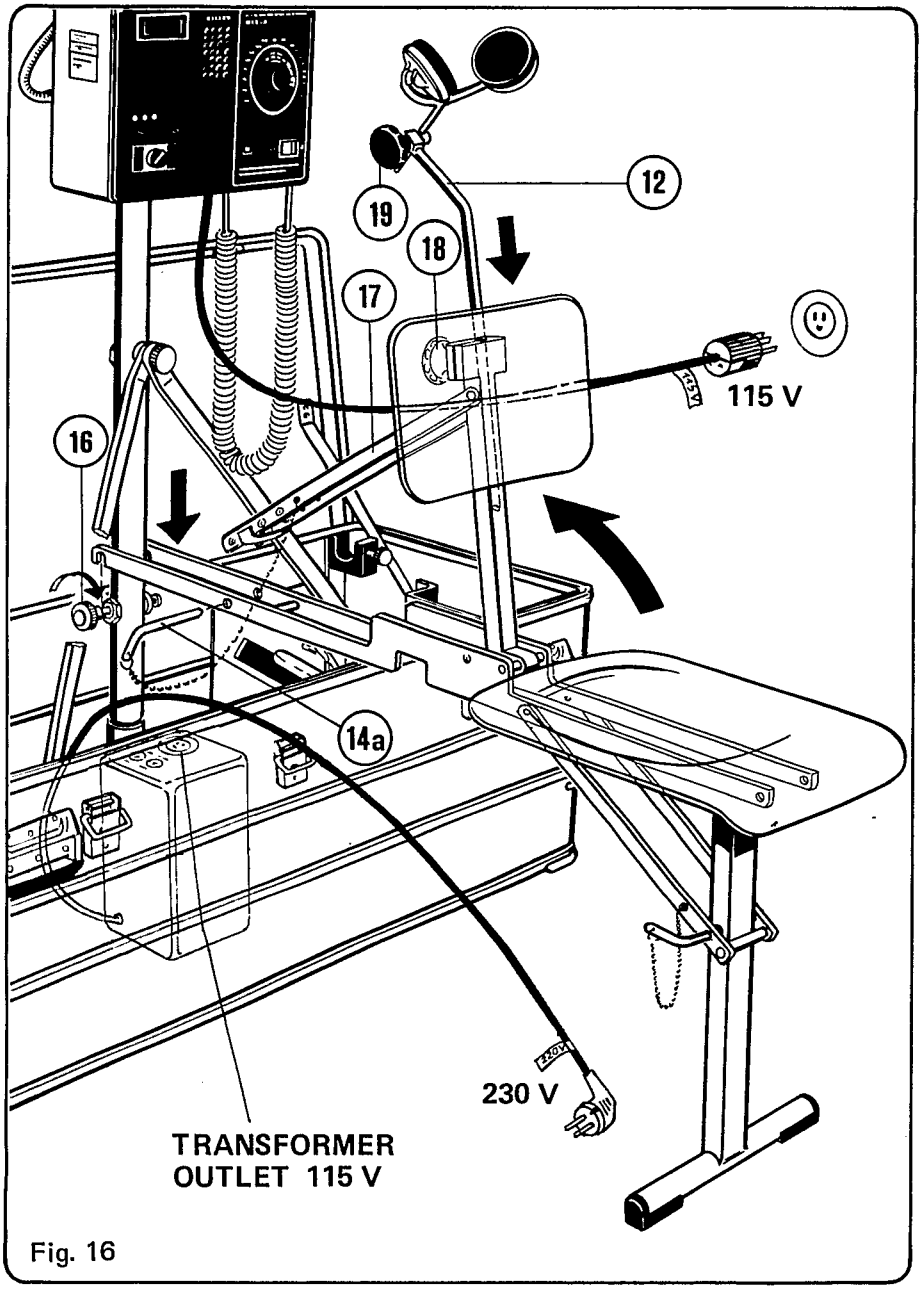


Fig. 16

5

Engage stool support in upright, secure with knob (16). Raise backrest in direction of arrow.
Position backrest with backrest brace (17) (3 positions) and secure with safety pin (14a).
Insert headrest assembly (12), secure with knob (18) (headrest height adjustment).

Adjust headrest cradle position with knob (19).

When the power supply is 115 V:
Connect the power cord directly into the 115 V wall outlet.

When the power supply is 230 V:
Connect the power cord at the transformer's 115 V outlet and connect the transformer's power cord into the 230 V wall outlet.

In case of a portable gasoline-diesel driven generator this generator must meet the following technical characteristics:
Power rating: 5 kVA,
Volts: 230 V nominal, single phase
Max.permissible deviation: 207 to 253 VAC
Max. permissible fluctuation of line voltage during standby:
1.5 % at 230 VAC.

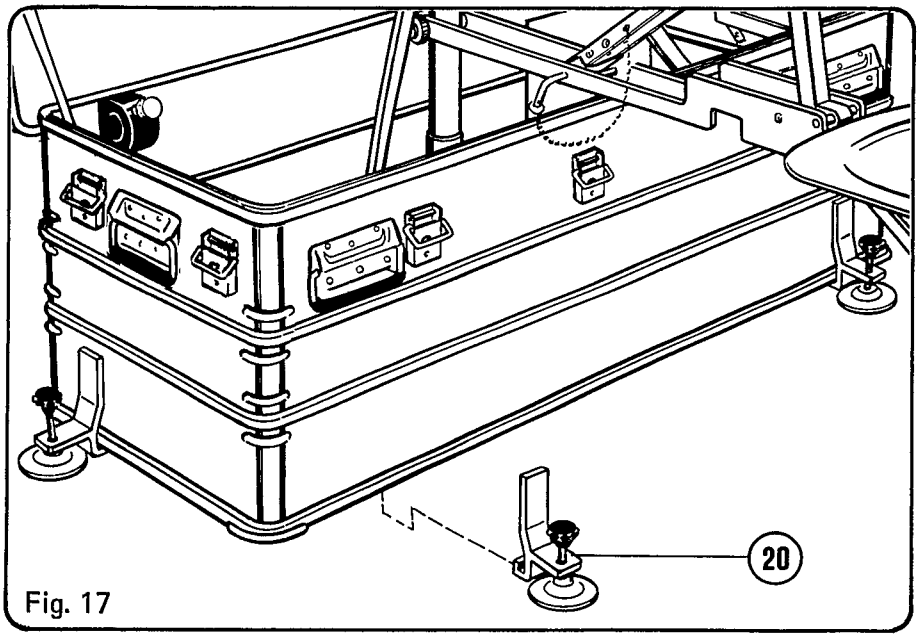


Fig. 17

6

Level carrying case and upright with the aid of 3-leveling brackets (20).

The leveling brackets hook to the lower carrying case frame.

PATIENT SAFETY AND OTHER PRECAUTIONS

Radiation protection for intraoral radiography

WARNING
During the exposure, nobody but the patient should be inside the useful X-ray beam. The operator must be at least 6 feet away from the X-ray head, and not in the direction of the radiation.

Full use of the length of the handswitch exposure cable should be made.

For dental radiography, the patient should hold the film himself with the hand or a film clip should be used. If this is not possible (with children or severely sick persons), the film should be held by a relative of the patient but not by the dentist or his assistent.

We recommend, the use of lead apron (0,25 mm lead), in order to obtain maximum protection of the patient's reproductive organs against scatter radiation.

WARNING
Since the Portable X-ray unit requires assembly-disassembly as same is transported from location to location, you the USER are required to perform a power supply line adequacy test as outlined in these instructions **every time** the unit is re-assembled for **use** and document same on the TEST RECORD as provided, last pages of the operating instructions.

WARNING
Visual checks must be performed **before** connecting the unit to an adequate power supply.

WARNING
When the unit is set-up in preparation for Radiography you as the installer/assembler **must** verify the following:

1. Verify that all labels are affixed and legible. Look for mechanical damage, possibly affecting radiation safety, (inspect collimator for possible cracks, test the tubehead in all working positions for possible drift).

2. Operating-ready light (green). Line compensation indicators (LED's). Digital line adequacy volt meter.

   The operating-ready light (green) **must** light up and the meter **must** be functional.

WARNING
Mechanical damage affecting radiation safety be evident, the user is **not** permitted to use the unit until repairs or replacements, correcting the defect(s), are made.

Defective bulbs for power "on" light, ready light, radiation light constitute a safety hazard to the patient as well as to the operator, therefore, repairs or replacements **must** be made promptly, same rule as above applies.

During line adequacy tests:

WARNING

Observe radiation protection as outlined above

1. Check radiation warning light and acoustic buzzer for proper functioning.

2. Make sure the X-ray exposure is interrupted after releasing the exposure switch (dead man feature).

EQUIPMENT CARE

All equipment surfaces shall be wiped with a damp lintfree cloth once a week.

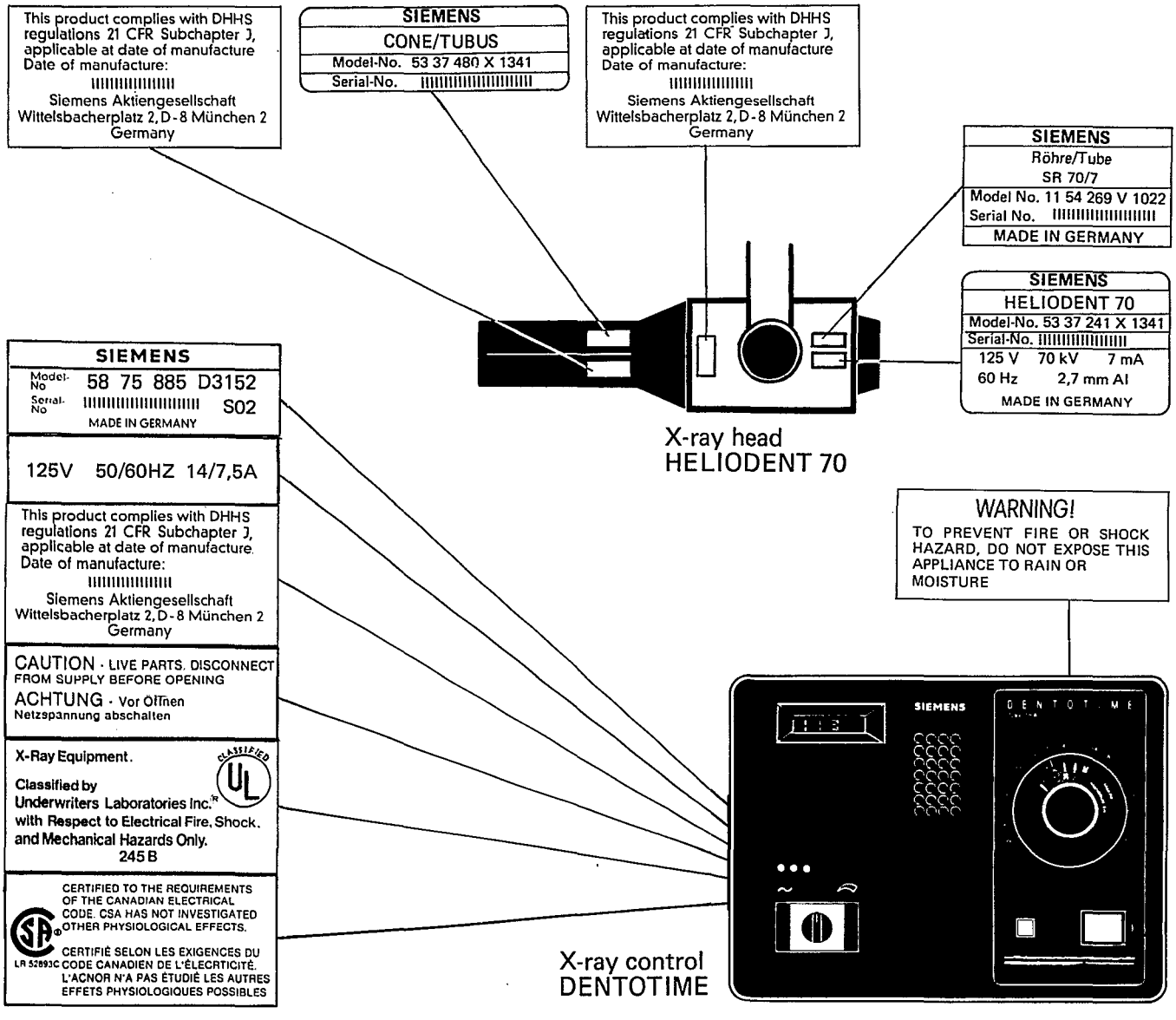
Visual checks and tests before the unit is operated:

1. Verify that all labels are affixed and legible. Look for mechanical damage, possibly affecting radiation safety.
2. Inspect components for tightness, rust, cracks, wear, fraying electrical cords, missing parts and operators publication.
3. Test tube head in all working positions for possible drift.
4. Operating-ready light (green). Line compensation indicators (LED's). Digital line adequacy volt meter.

   The operating-ready light (green) **must** light up and the meter **must** be functional.

   Should mechanical damage affecting radiation safety be evident, the user is not permitted to use the apparatus until repair or replacements, correcting the defects are made.

How to find product labels



ALERTS / TROUBLESHOOTING

The following operational tests are carried out with the PORTARAY in a ready to operate condition.

1. Testing of the deadman feature

The deadman feature permits the premature immediate termination of X-rays.

- Set the object/exposure time selector to 3.2 seconds.
- Cover the collimator with cover cap (leaded) No. 58 83 194 (Radiation protection).
- With the exposure button maintain a distance of at least 6FT from the X-ray head (Caution X-ray!) during exposure.
- Make an exposure. Count 5001 (fivethousandone) which equals approximately one second. Release the exposure button — the audible and visible radiation indicators must terminate immediately.
- In the event the radiation visible and audible indicators do not stop, disconnect the unit from the power supply immediately — call qualified service personnel familiar with the PORTARAY to repair this defect (exchange the DENTOTIME PC board D1 and adjust as indicated on page 47).

2. Operational conditions indicating improper timer function

Select the shortest exposure time 0.066.
Make an exposure. Caution radiation.
Observe the red radiation emission light (visual) and audible signal.

Both must come on and terminate simultaneously in very short order. In the event the audible signal is heard but no red light comes on at the same time, but approximately 1/2 second later the pre-heat fuse is blown, radiation is being emitted from the time the red light comes on — insufficient emission. The unit requires repair by a qualified technician.

Select the shortest exposure time 0.066.
Make an exposure. Caution radiation.

Observe the red radiation emission light(visual)and audible signal.

Both must come on and terminate simultaneously in very short order.
In the event both indicators come on together but the exposure time is noticeably longer (0.7 to 1.0 second), expose a periapical film. Develope same.

If the radiograph is blank (transparent) the X-ray head needs replacement.
If the radiograph is black the X-ray head is ok. The trouble is in the scissor arm wiring.
Call a qualified technician to repair or replace the X-ray head and/or the scissor arm.

If the conditions described under test 1 and 2 prevail, call qualified technical personnel familiar with the PORTARAY repair procedure.

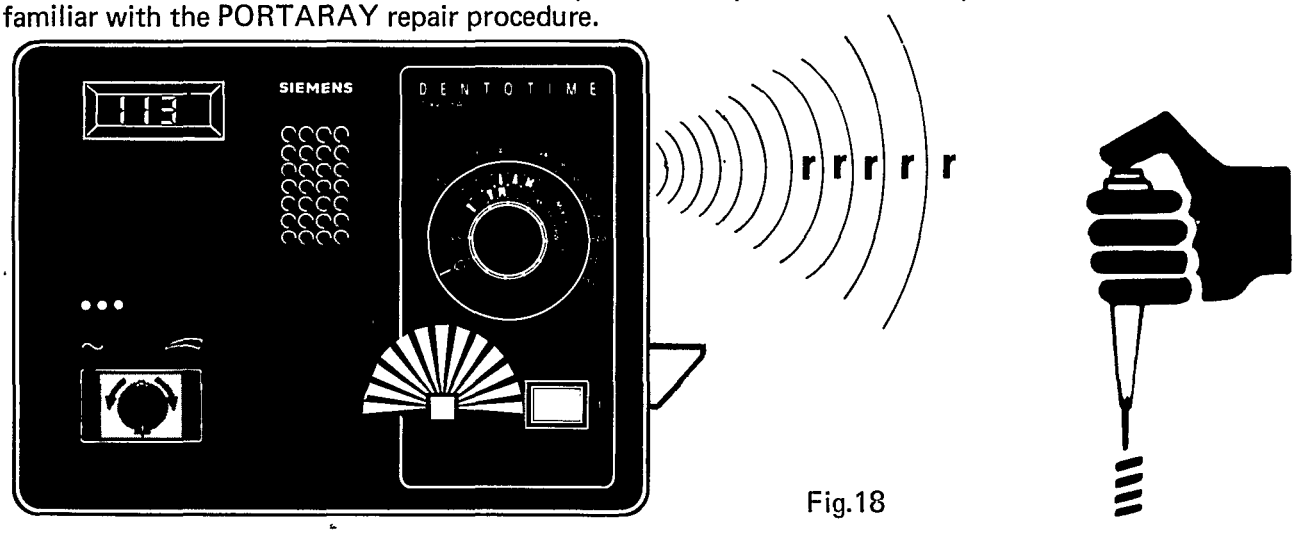


Fig.18

ACCESSORIES

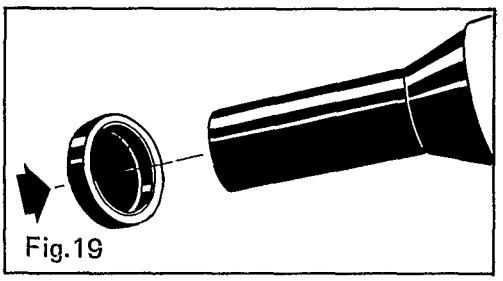


Fig.19

Lead cap provided for the line adequacy test.

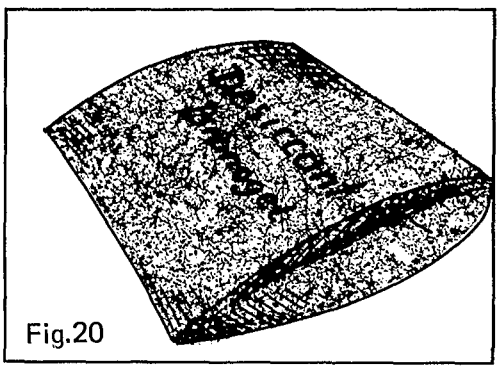


Fig.20

Desiccant bag to absorb moisture accumulated during storage.

EQUIPMENT WARRANTY

Siemens dental equipment is warranted against defects in material and workmanship for a period of one year from the date of installation, provided all installation and subsequent service is performed by an authorized Siemens dental dealer or technician. Siemens' warranty is subject to the following conditions: (1) Siemens must receive prompt notice of any defect within the warranty period; (2) if equipment must be returned to Siemens for repair, transportation charges to the location sesignated by Siemens must be prepaid; (3) Siemens' examination must show that the defect occurred in the course of normal use and was not the result of misuse, abuse, accident or neglect. Subject to these conditions, Siemens' will under its warranty repair or replace (at Siemens' option) any defective parts. Siemens' warranty extends only to the original purchase of the equipment and is not interrupted or prolonged by any repair or replacement provided pursuant to such warranty.

SIEMENS MAKES NO WARRANTY OTHER THAN THE ONE SET FORTH ABOVE, SUCH WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THOSE OF FITNESS AND MERCHANTABILITY.

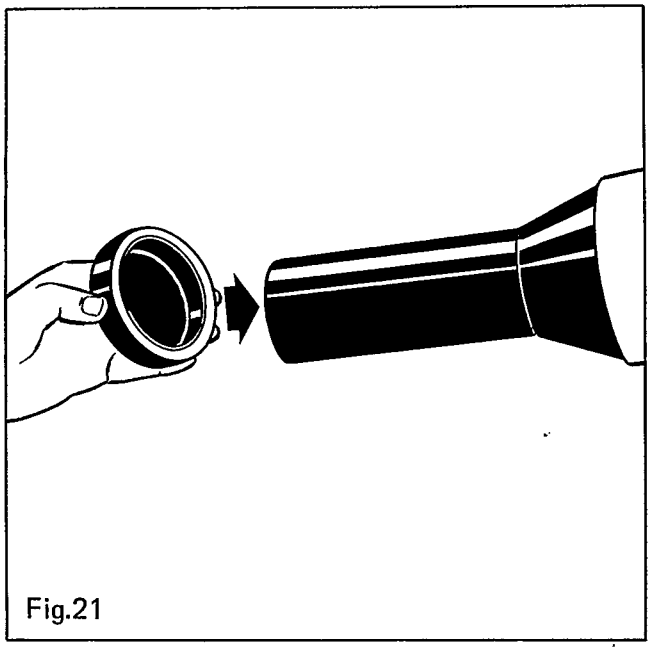


Fig.21

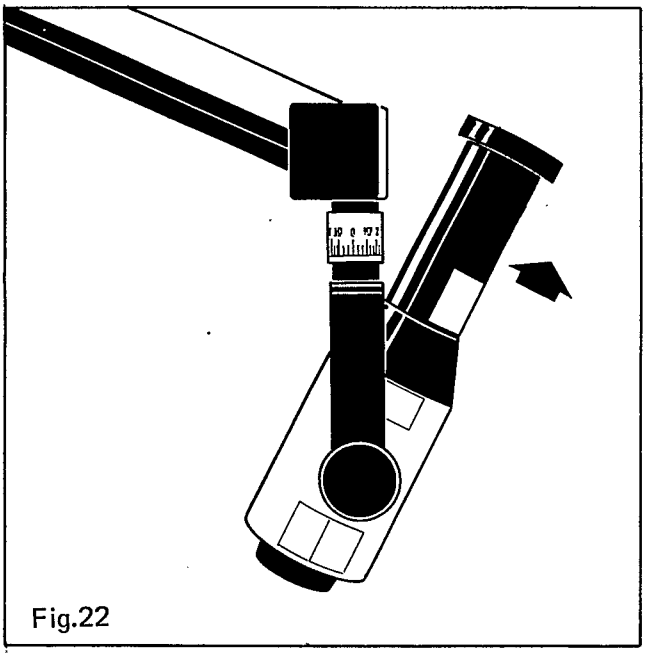


Fig.22

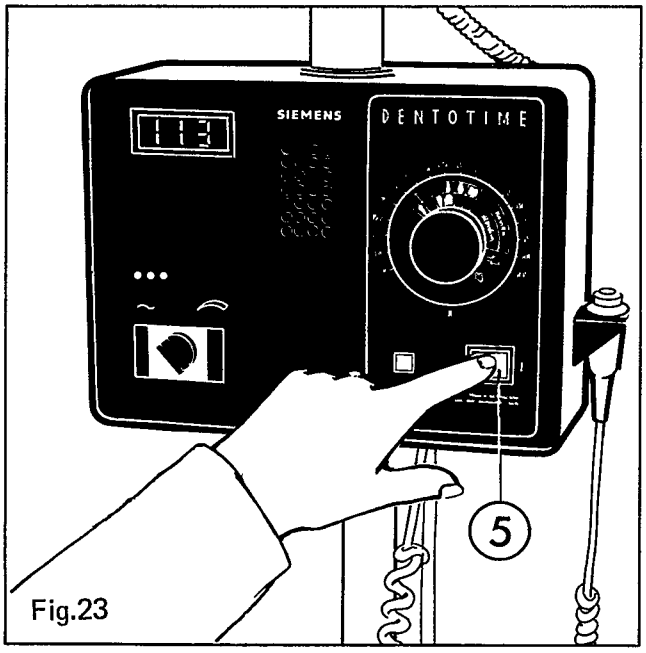


Fig.23

LINE ADEQUACY TEST

Attention operator

Before radiographing patients, you must perform a power supply adequacy test as outlined:

1. Cover collimator port with lead cap provided.
2. Place tubehead away from support stand (arm extended fully).
3. Plug in powercord (see set-up page 11).

   WARNING–power supply must be grounded.
4. Switch on X-ray control with switch (5) Power on — switch lights up (Green)

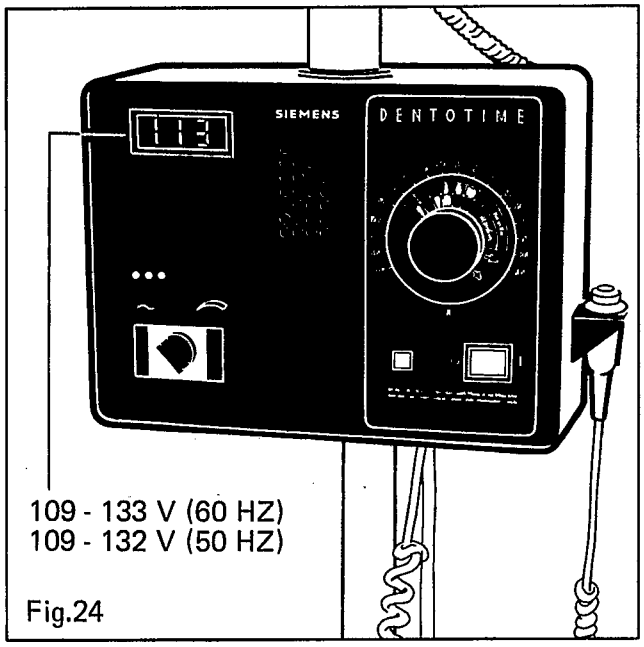


Fig.24

5. The digital power supply test instrument must read between:

min 109,0 V	133,0 V max. at 60 HZ
min 109,0 V	132,0 V max. at 50 HZ

After 5 minutes note value displayed on the test instrument, on test record (test records see Operating Instructions, appendix).

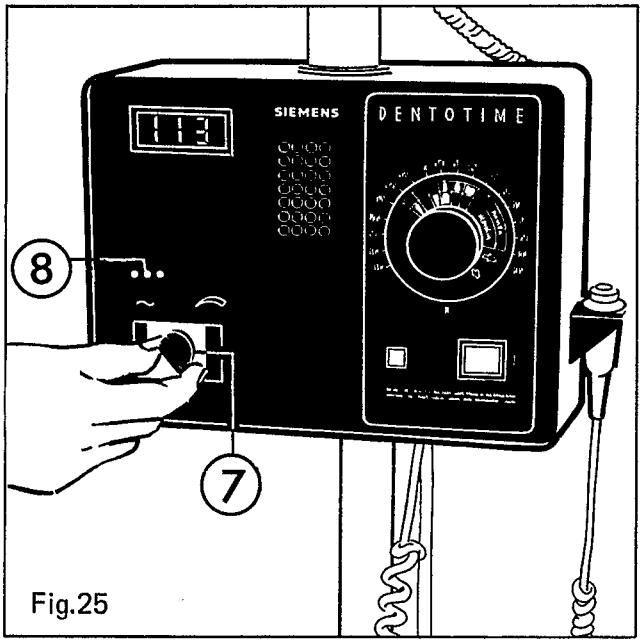


Fig.25

6. Verify that the green light diode (8) is lit:
Yellow (too low) Green (O.K) Red (too High)
Corrections are made with switch (7)

Yellow = Turn switch clockwise
Red = Turn switch counterclockwise

CAUTION – If green light will not come on, call medical maintenance personnel – DO NOT operate apparatus.
(See Maintenance page 45).

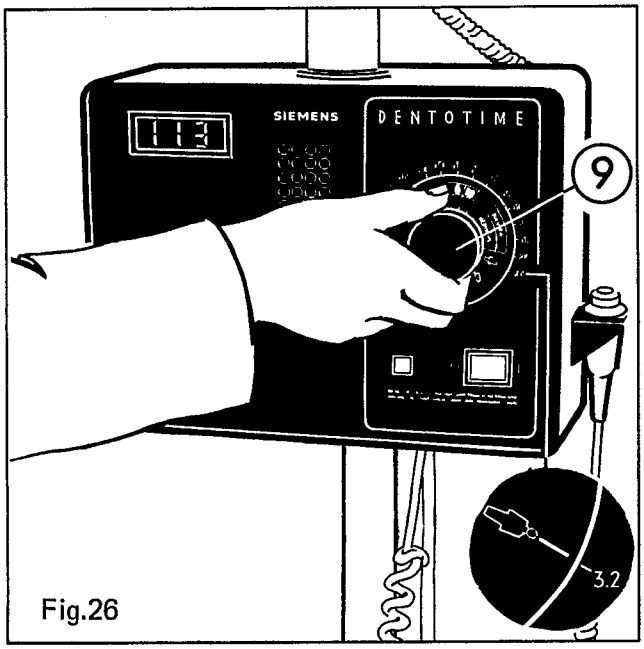


Fig.26

7. Select an exposure time of 3.2 seconds by turning knob (9) to align adult symbol (orange line) with 3.2 on scale.

Do not depress knob when aligning adult/child symbols.

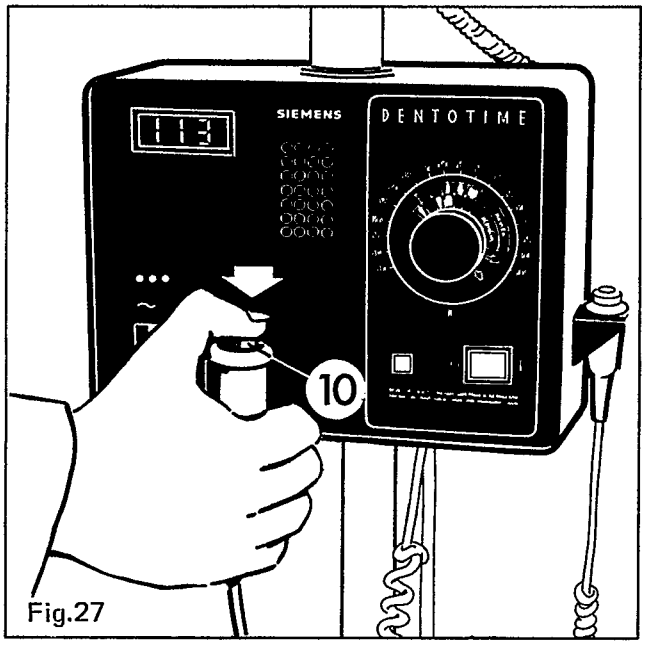


Fig.27

Caution radiation:

8. With the exposure button (10) take a position of at least 6 feet away from the X-ray head with the digital display of the power supply test instrument still ledgible.

Make an Exposure

Note value displayed on the instrument during exposure on test record.

Attention:
During exposure the yellow LED may come on. This is a normal condition if the line voltage regulation exceeds 3V.

9. To calculate the power supply adequacy enter the displayed values of the test instrument:

Value from step 5		Step 8		
_____	V minus	_____	V equals	_____ V
No load		Load		Voltage drop

The maximum permissable voltage drop must not exceed
6 V over the entire operating range.

In the event the calculated voltage drop is higher than stated above, another power supply must be located on the premises until the test results are met as specified.

Remove lead CAP from collimator cone and store in case.

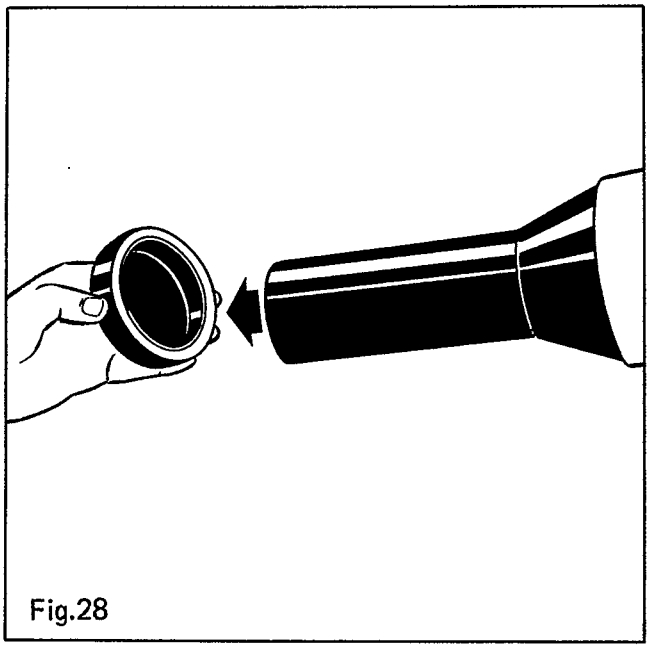


Fig.28

WARNING

Failure to comply with these requirements may result in a non-compliance of "the federal performance standard of diagnostic X-ray units" subsequently, punitive action (fines) may be levied against the operator by the Bureau of Radiological Health (BRH).

In the interest of the public health and safety and for the operators protection the power supply adequacy "Test record" (see attached sample) must be filled out and signed by the operator in charge, each and every time the portary is set-up in a new location.

The test record must remain with the equipment for possible inspection by radiation health officers.

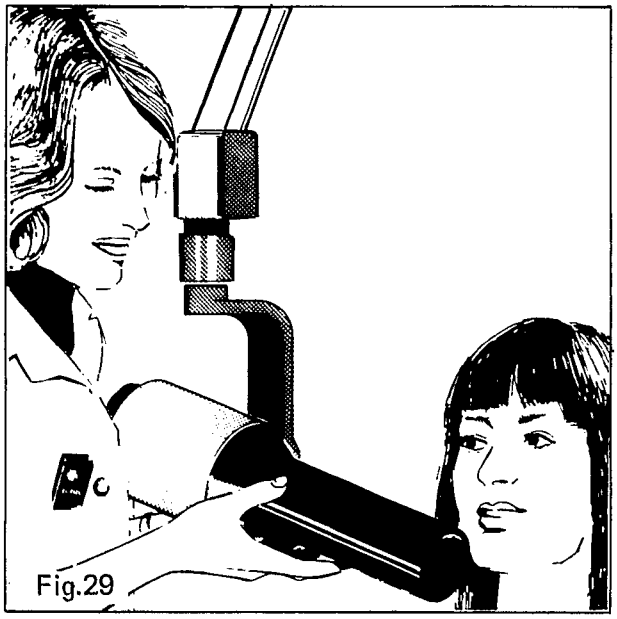


Fig.29

OPERATION

Preparation for exposure

Seat the patient, adjust the HELIODENT 70 to the patient.
(We recommend the use of a lead apron for the patient as added protection).

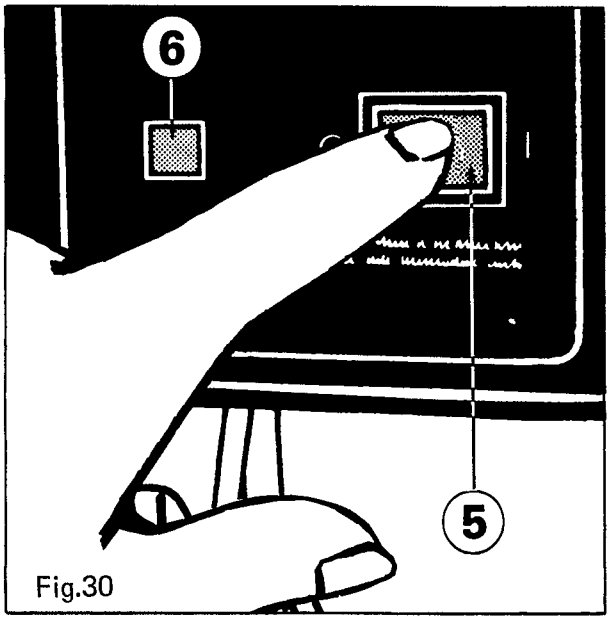


Fig.30

Switch on the unit

With switch (5) Power-on-switch lights up (Green)

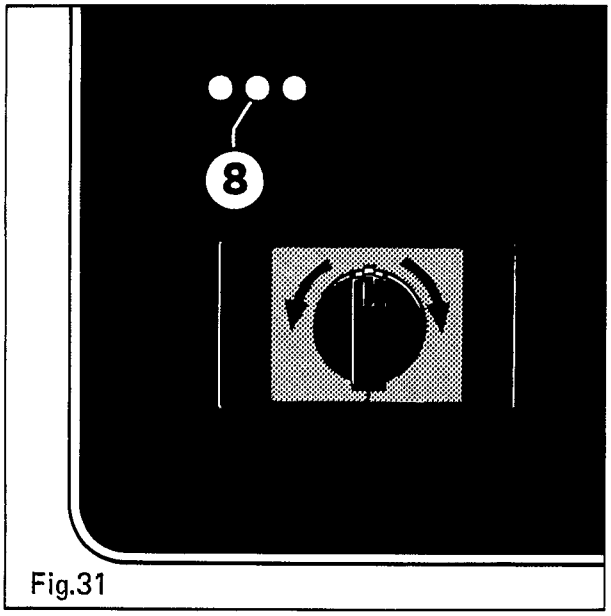


Fig.31

Check if the green lightdiode (8) is lit, proper line voltage exists.
Your HELIODENT 70 is ready for operation.

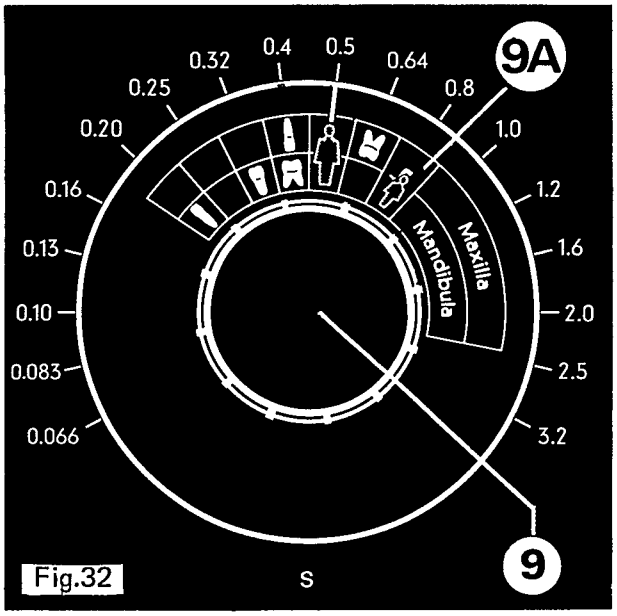


Fig.32

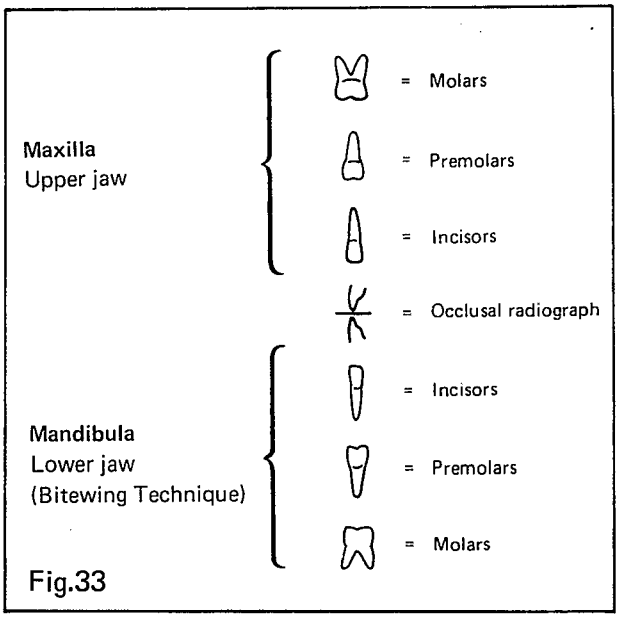


Fig.33

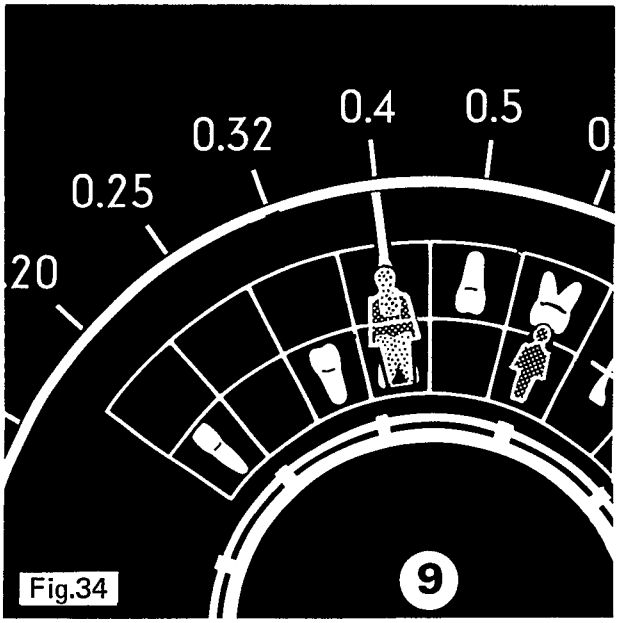


Fig.34

Setting the base value for intraoral filmspeed

The basic setting for ultra-highspeed film class "D" e.g. KODAK DF 58 is factory adjusted and verified during installation/calibration of the unit.

Nevertheless check that the object of the upper molar (maxilla) on the scale is exactly below the 0,64 sec. as shown.

If necessary corrections are made as follows:
- Gently press knob (9) against the front panel, to engage the object disc (9A).
- Slowly rotate the knob with object disc until upper molar is exactly opposite 0,64 sec.
- Release knob (9) to disengage object disc.

NOTE:
Now and only now is the base value correctly set for ultra-highspeed film "D". If upper molar is not exactly opposite 0.64 seconds, base value is INCORRECT.

NOTE:
The basic setting for ultra-highspeed film class "E", e.g. KODAK Ekta Speed, must be 0,32 sec.

Selection of the exposure

Adult patient

Turn knob 9 to align figure with tooth to be radiographed as shown
(Cuspid – Lower Molar)
Exposure time indicated by orange line is 0,4 sec.

Child patient

Turn knob 9 to align figure with tooth to be radiographed as shown
(Upper Molar)
Exposure time indicated by orange line is 0,4 sec.

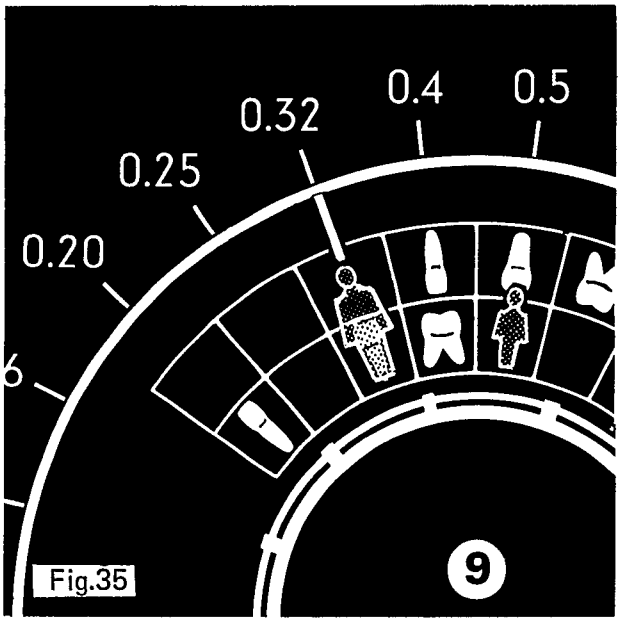


Fig.35

Bitewing Technique

For bitewing exposure use mandibula teeth only as shown.

Example:
Adult — Pre-Molar (Mandible)

Exposure time indicated by orange line is 0,32 sec.

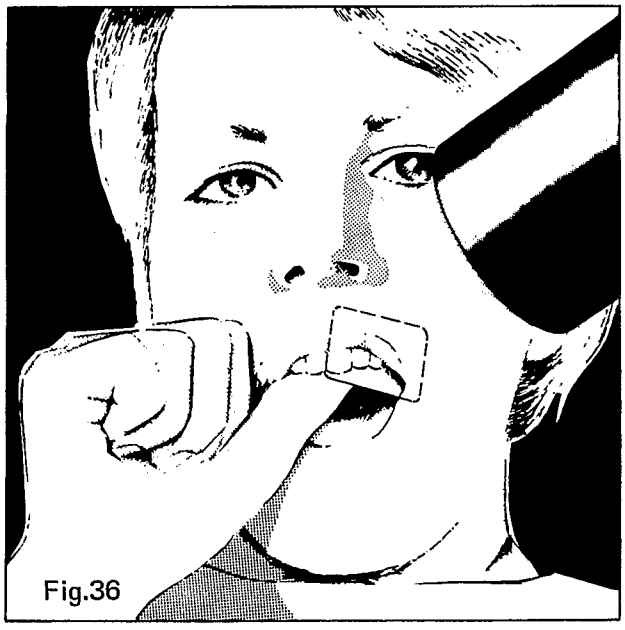


Fig.36

Insertion of the film

Insert the film in the patient's mouth. The film is held by the patient or a filmclip may be used.

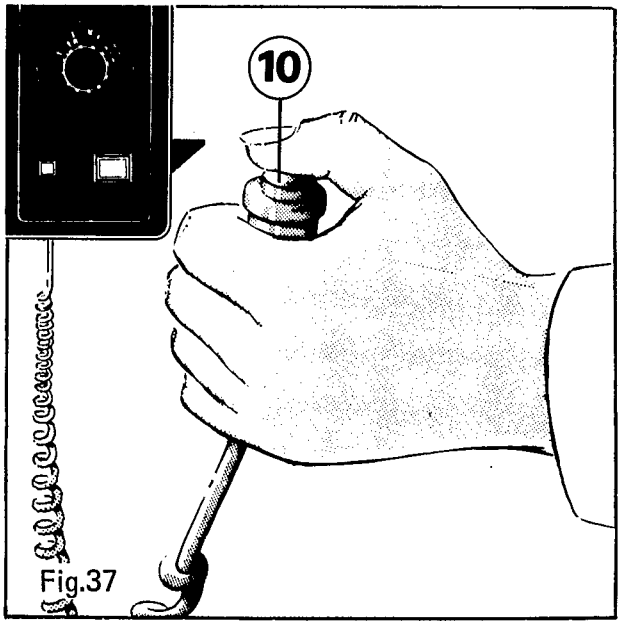


Fig.37

Releasing the exposure

Depress the button on the handswitch (10).
Fully depress the button and hold until the exposure terminates automatically.
The red pilot lights during the exposure period
Simultaneously audible sound is present.

IMPORTANT
If the button is released before the set exposure time is over, the exposure is terminated prematurely.

Repacking

Disconnect unit from power supply

1

Remove X-Ray Arm assembly (10) first!!

Place safety strap over scissor arm as shown.

CAUTION! Failure to follow this procedure may cause injury, and/or damage to the scissor arm (the arm is spring loaded).

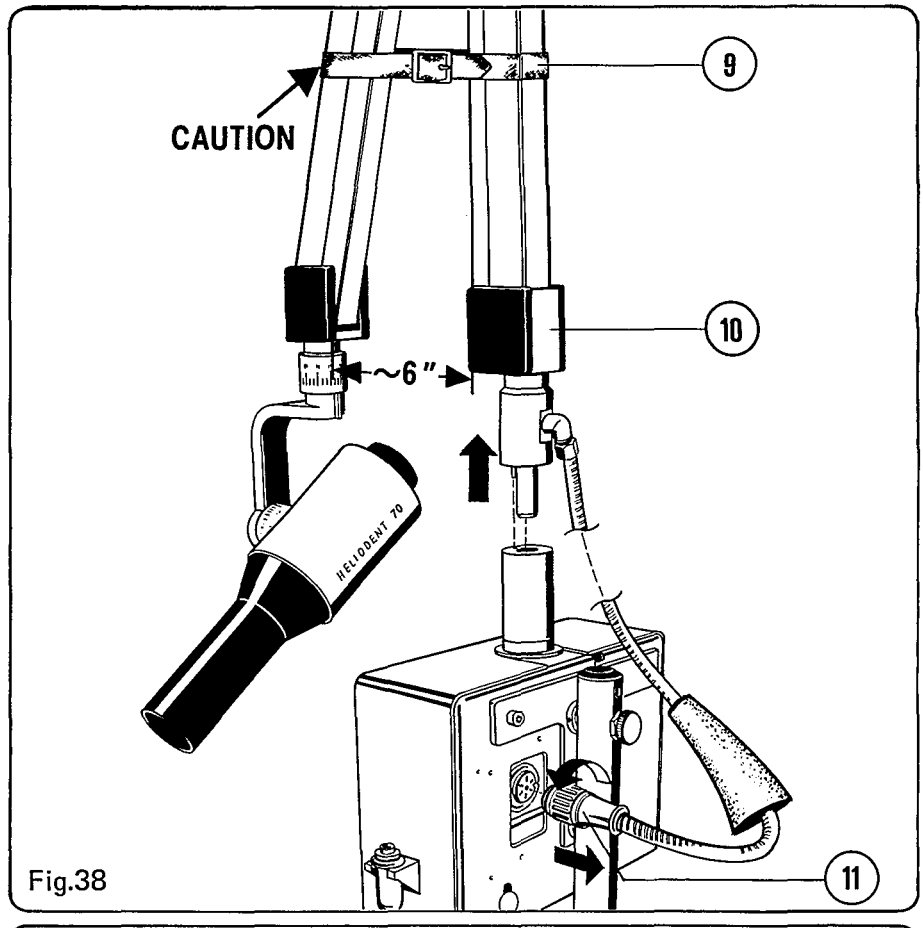


Fig.38

Loosen locking ring, disconnect multi pin connector, disengage scissor arm assembly from coupling as shown, place protective sleeve (23) over multi pin connector (11),route greenfield tubing tighten strap (9).

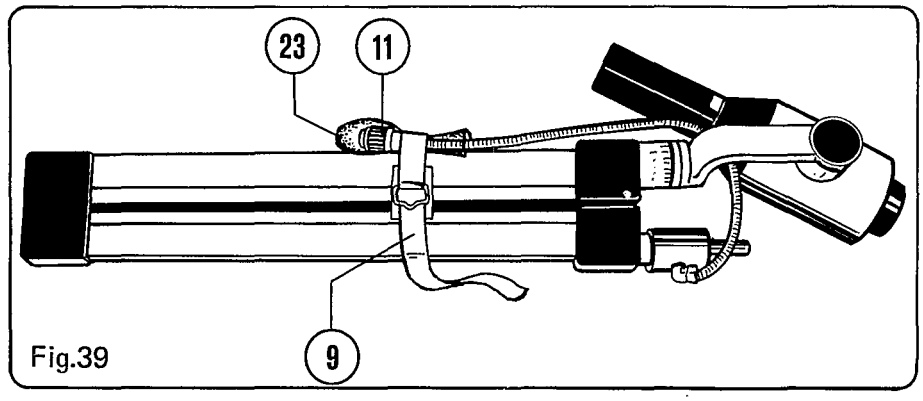


Fig.39

Remove all other components.

Fold support bars (4) and (5), secure with bracket (3) in the direction of arrow.

Store leveling brackets (20) as shown and secure.

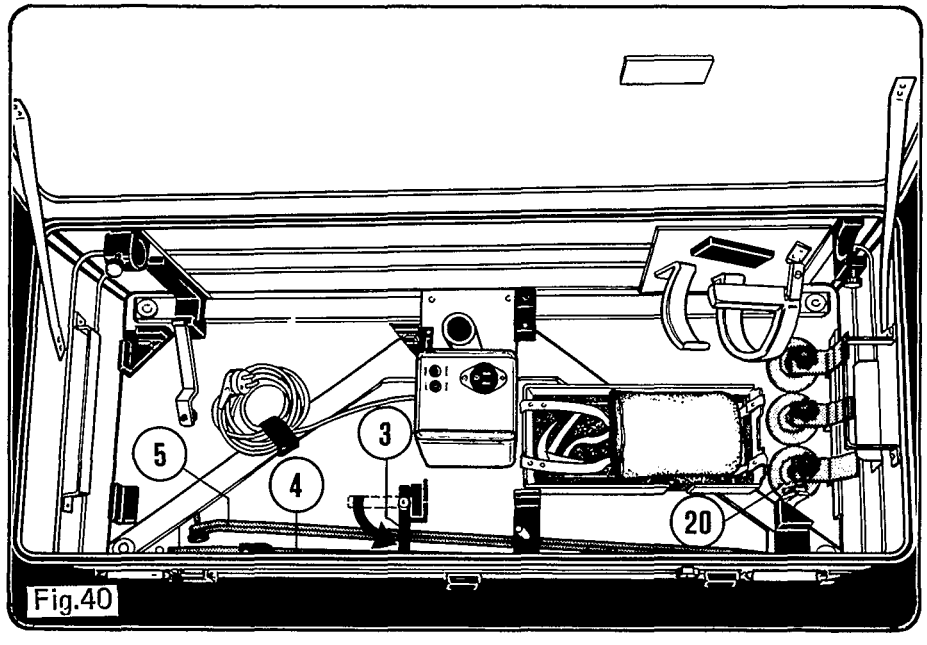


Fig.40

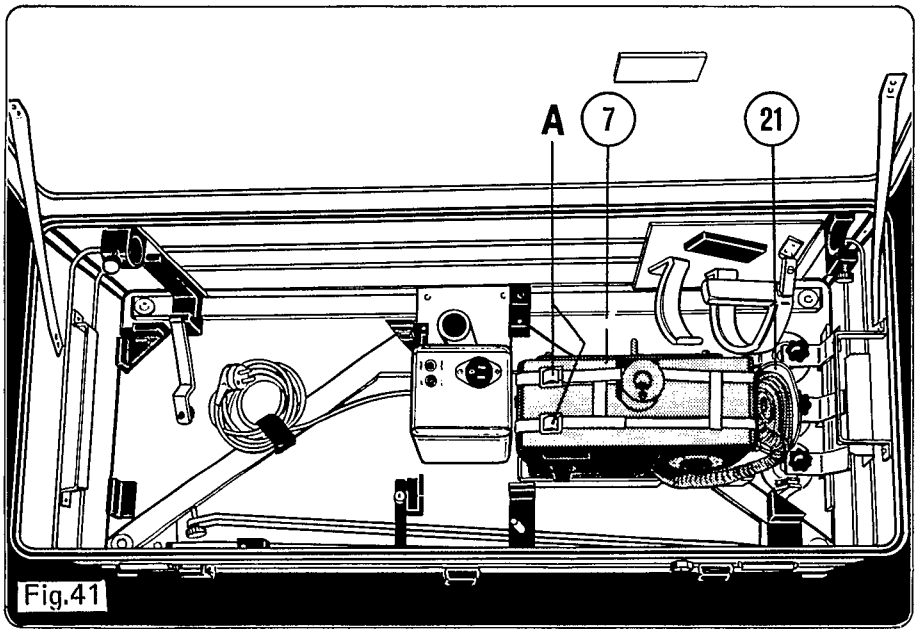


Fig.41

2

Place X-Ray control (7) into cradle, store power cord and exposure cord in pouch (21) . Secure control as shown (A).

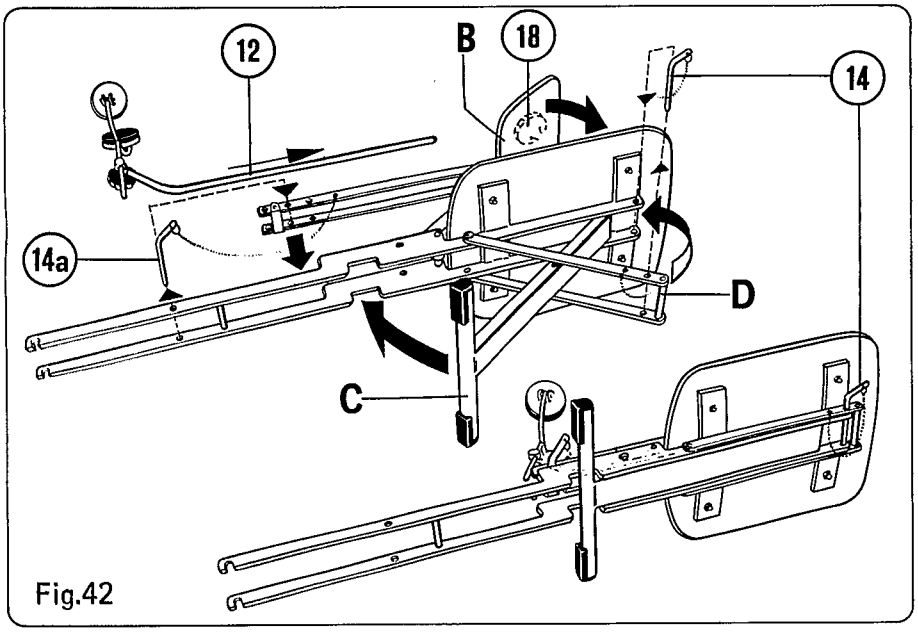


Fig.42

3

Remove headrest assembly (12). Remove pin (14a) and store in backrest brace.
Fold backrest (B). Insert headrest assembly (12) in the direction of arrow, secure with knob (18).

Remove safety pin (14) , fold stool leg (C) and retainer bracket (D), secure with safety pin as shown.

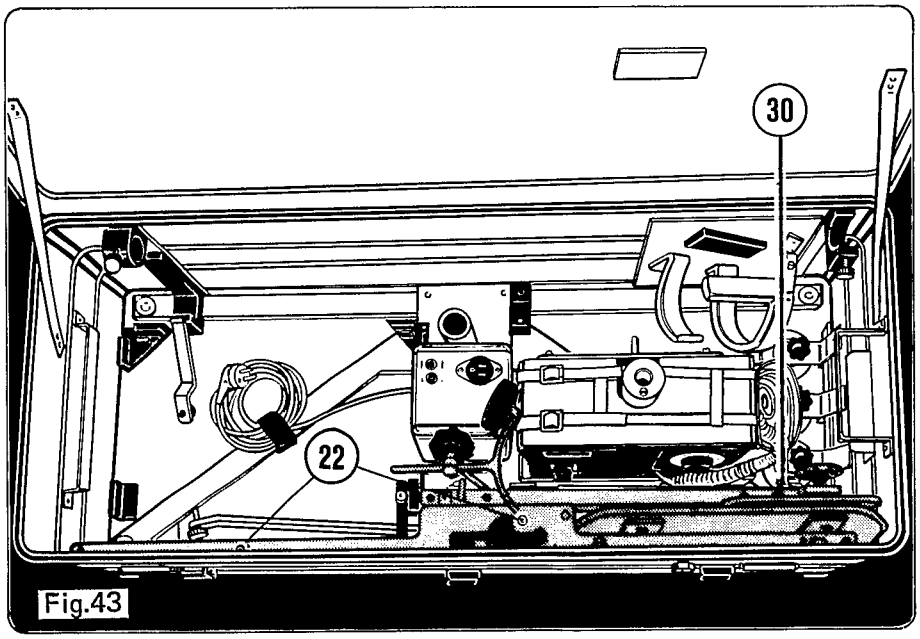


Fig.43

4

Place stool assembly into case, watch for dowel pins (22) to engage as shown. Secure (CLOSE) with fastener (30).

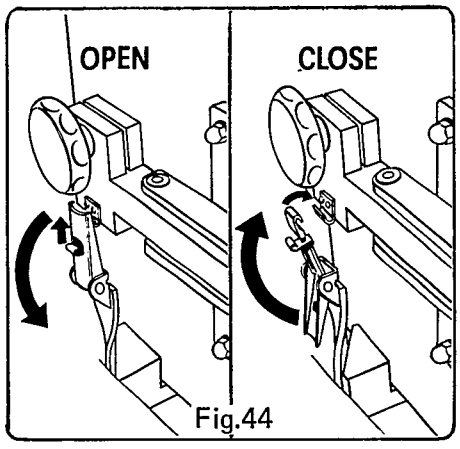


Fig.44

5

Raise brackets (24) and (26) OPEN, place scissor arm with X-Ray head into cradle. Secure brackets with fasteners (25) and (27) CLOSE.

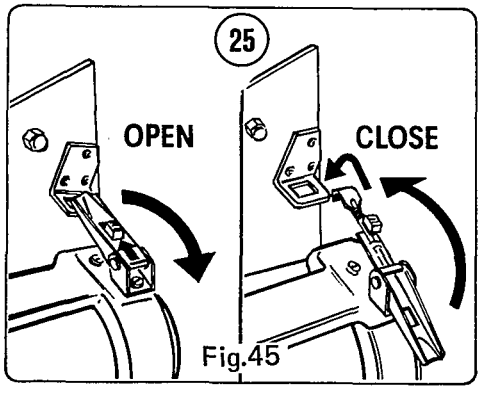


Fig.45

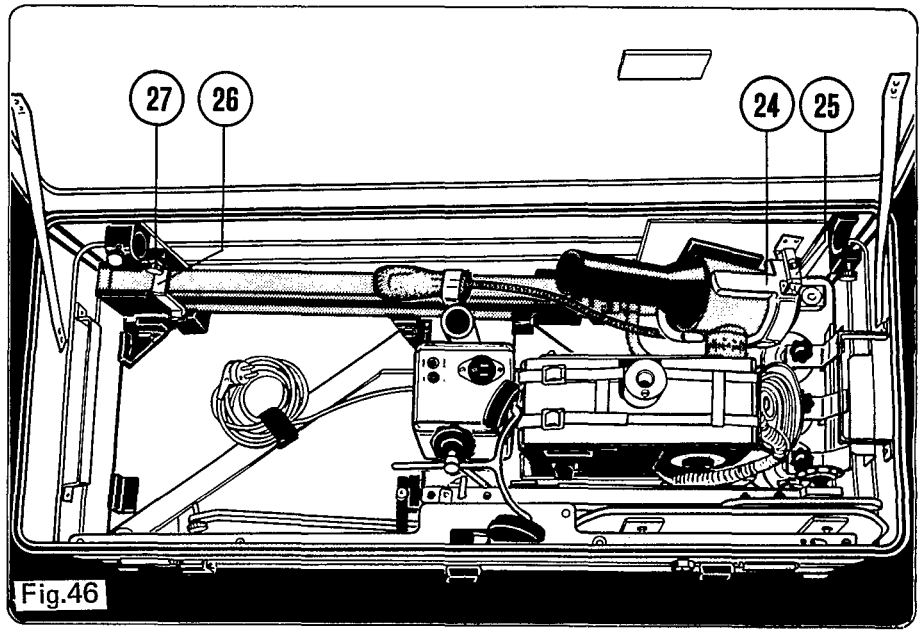


Fig.46

6

Guide upright through grommet (28) as shown, secure both ends to the case with two knurled knobs (29).

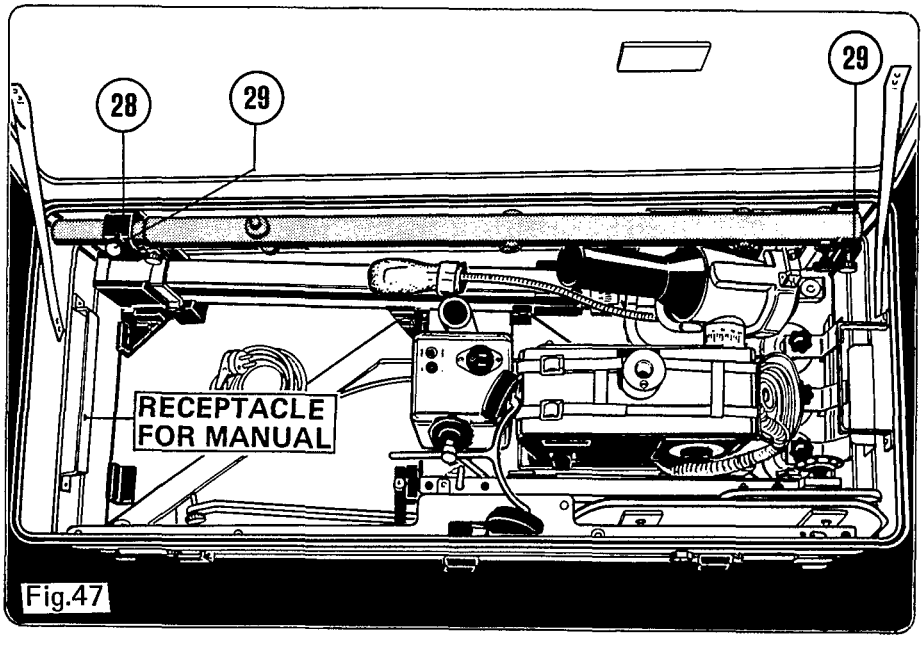
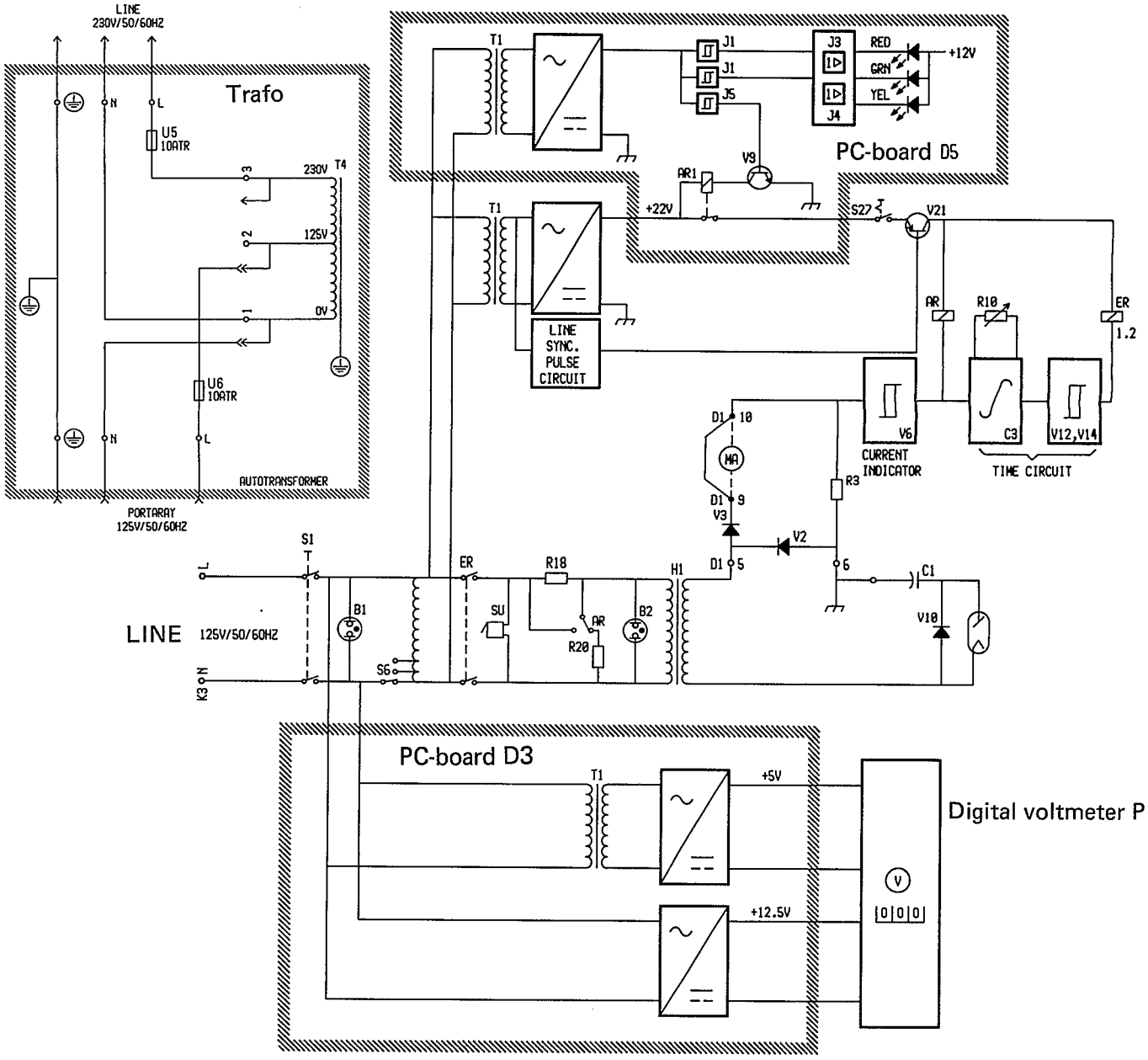
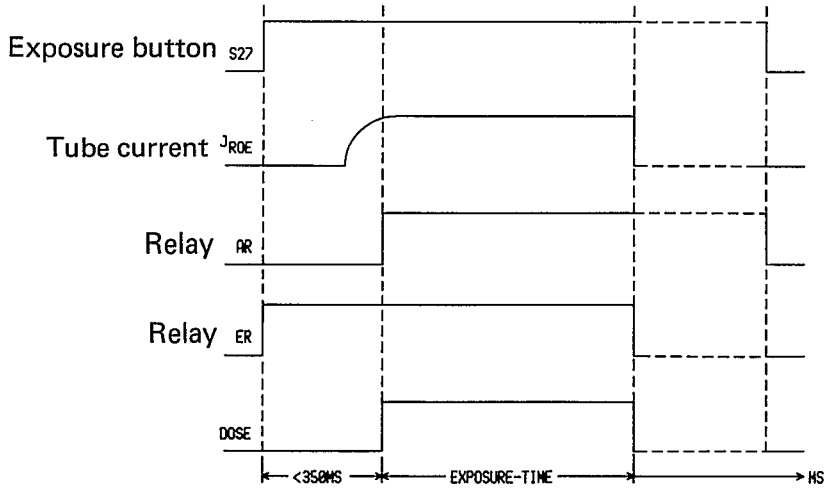


Fig.47

Logic block diagram



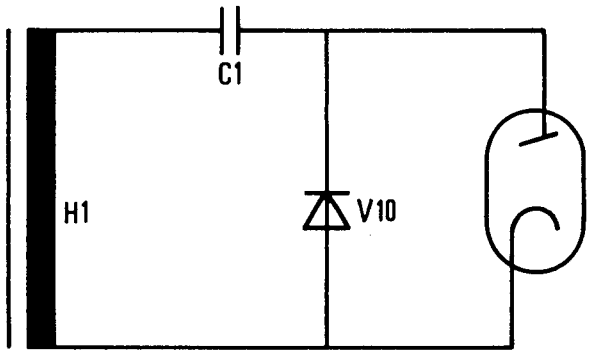


Description of function

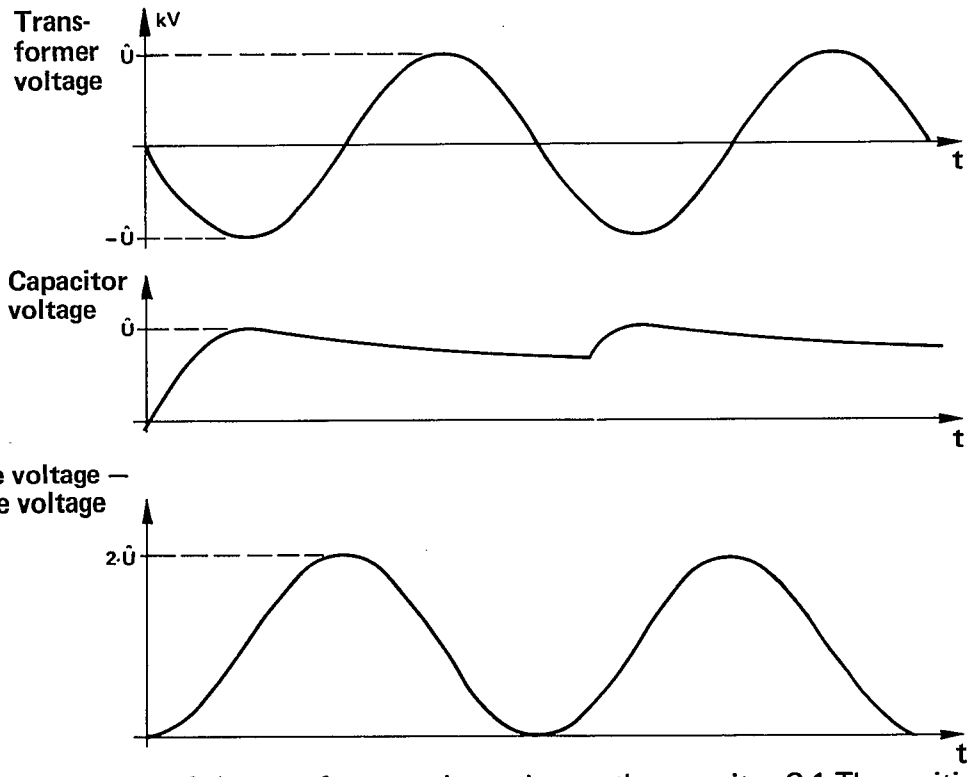
The X-ray tube of the Heliodent 70 is indirectly heated, i. e., the heater and the high voltage are switched on at the same time. Thus, tube current flows only once the emission temperature of the filament is reached (after 150 to 250 msec). As soon as the peak tube current exceeds a given value, the Schmitt trigger (V 6) switches over, the AR relay energizes, and the timer circuit, consisting of C 3/R 10, V 12, V 14 is triggered. The AR relay shorts the resistor R 18 and separates the resistor R 20 from the power source. Accordingly, the Heliodent is then operated from the line without damping.

As soon as the capacitor C 3 is charged to the threshold voltage set on the Schmitt trigger the timer circuit shuts the ER relays down, and the exposure is terminated. The AR relay drops only as the trigger switch is released.

The tube current cannot be measured directly between the points X and Y since an alternating current flows there (tube current plus capacitor-charging current). Thus, the capacitor charging current has been short circuited in the tube current measuring circuit with the diodes V 2 and V 3. The tube current may be measured between the points D 1.9/D 1.10.



Heliodent 70
The secondary circuit of the Heliodent 70 consists if a voltage-doubling circuit (C 1, V 10, H 1).



The negative half wave of the transformer voltage charges the capacitor C 1.The positive half wave of the transformer voltage is added to the capacitor voltage, so that twice the transformer peak voltage is measured on the tube.

DESCRIPTION OF FUNCTION HELIODENT 70 with DENTOTIME

Line input
The line input is protected with the fuses U 2 and U 3. The readiness indicating B 1 lamp lights if the switch S 1 is on.

Control transformer
The control transformer ensures that the Heliodent 70 is always operated with a primary voltage of 125 V in the line voltage range of 109 V to 133 V at 60 HZ, 109 V to 132 V at 50 HZ. The supply of the control transformer is changed to such an extent with the switch S 6 as a function of the input voltage that a voltage if 125 V is measured between the terminals T 3.1 - 7.

Start of Exposure
Depressing exposure button S 27 the relays ER 1 and ER 2 are controlled via V 21 syncronized to the power supply. The schmitt trigger (V 12, V 14) switches and the ER relay energizes.
The relay contacts place the primary winding of the high-voltage transformer H 1 under voltage through the voltage divider R 18/R 20. At the same time the buzzer SU and the radiation indicator B 2 are caused to operate and indicate the duration of the X-ray radiation acoustically and optically.

Exposure (Current path)
The base of transistor V 19 is supplied with power supply syncronized positive half waves and a square wave collector output. This output is differentiated by C 8 and R 30. The positive peak controls the transistor V 20, diode V 23. The inverted peaks are collected at base V 21, when exposure button S 27 is depressed V 21 turns the timer on. The voltage via dividers R 31, R 32 controls V 20 and V 21 as long as S 27 is depressed.
Since the capacitor C 3 is not yet charged, the transistor V 12 is blocked. V 14 obtains base current through the resistor R 12/R 14, and is then switched through. As a result, the relays ER 1 and ER 2 energize.
The emitter current of V 14 flows through the potentiometer R 13 and causes a voltage drop in it. It is thus possible to adjust the threshold voltage of the Schmitt trigger consisting of V 12/V 14, the transistor V 12 can be controlled through only once its base voltage exceeds the value of 0.7 V + on R 13.

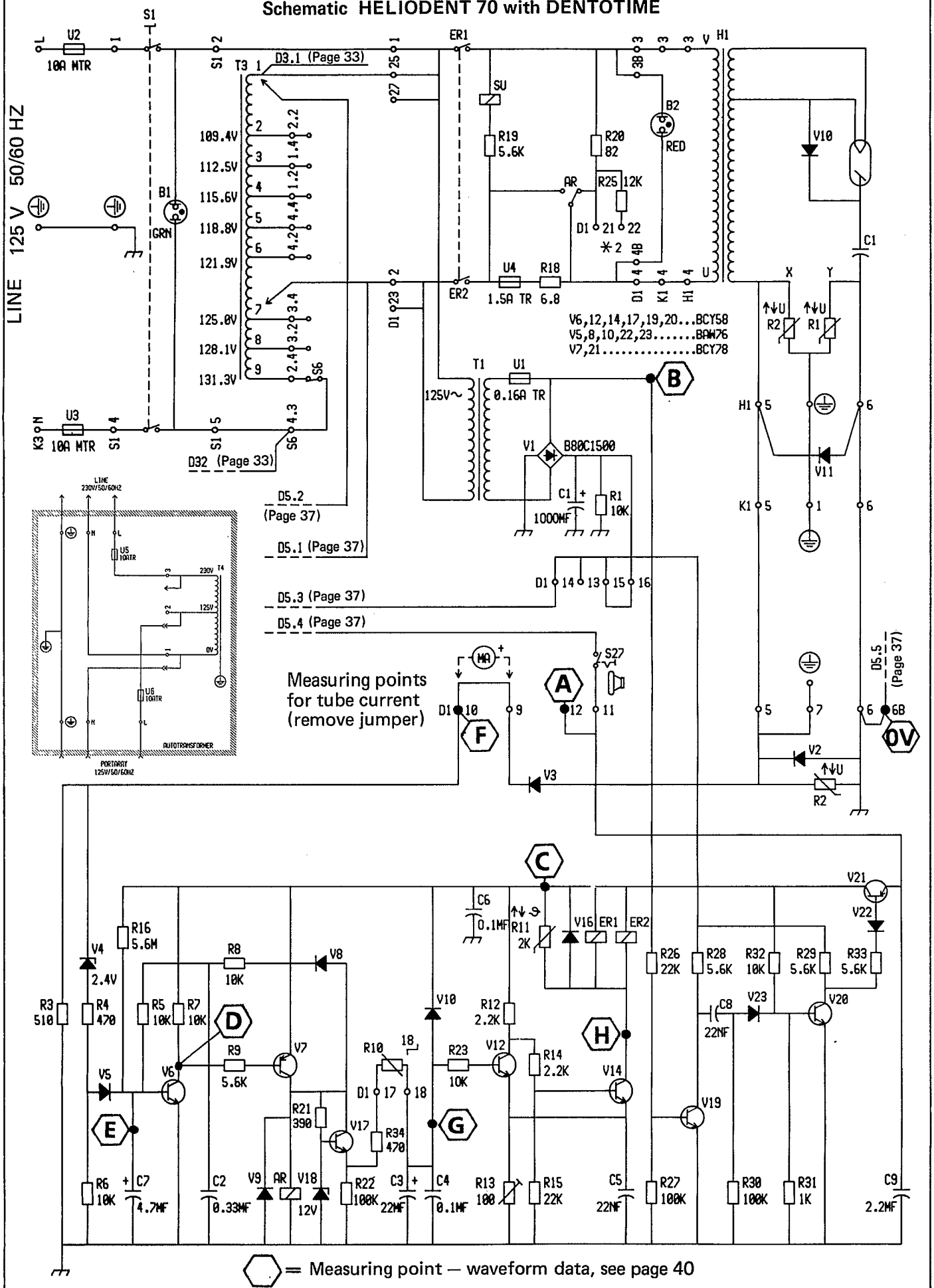
Switching relay AR
As soon as the tube current allows a voltage drop on the resistor R 3 which is greater than U (V 4) = 2,4 V + U (V 5) = 0.7 V + U (V 6) = 0.7 V, the transistor V 6 is controlled through. Then, the transistor V 7 is also controlled through R 9. The collector current of V 7 allows the AR relay to draw. This relay places the Heliodent 70 transformer under a voltage of 125 without damping.
The collector current of V 7 flows, at the same time through V 8, R 8, R 5 to the base of V 6, and keeps V 6 in the overmodulated state (flip-flop function). The capacitor C 7 and C 2 serve for interference suppression.
The transistor V 7 also controls the transistor V 17. This transistor serves as an impedance converter and provides a supply voltage stabilized by V 18 to the integrator, consisting of R 10 and C 3. The exposure times of 0.066 to 3.2 sec. are set in 18 steps with R 10.

End of exposure
As soon as C 3 is charged to the threshold voltage, which is adjusted with R 13, the transistor V 12 switches through. This initiates a flip-flop process. On the one hand, the transistor V 12 short circuits the base section of V 14, so that the current through ER is reduced; on the other hand, the voltage drop on R 13 decreases, so that the transistor V 12 is controlled through even faster. Thus, the ER relays drop.

Temperature compensation
The R 11 hot wire compensates the temperature response of the entire circuit in the 10° to 70° C range.

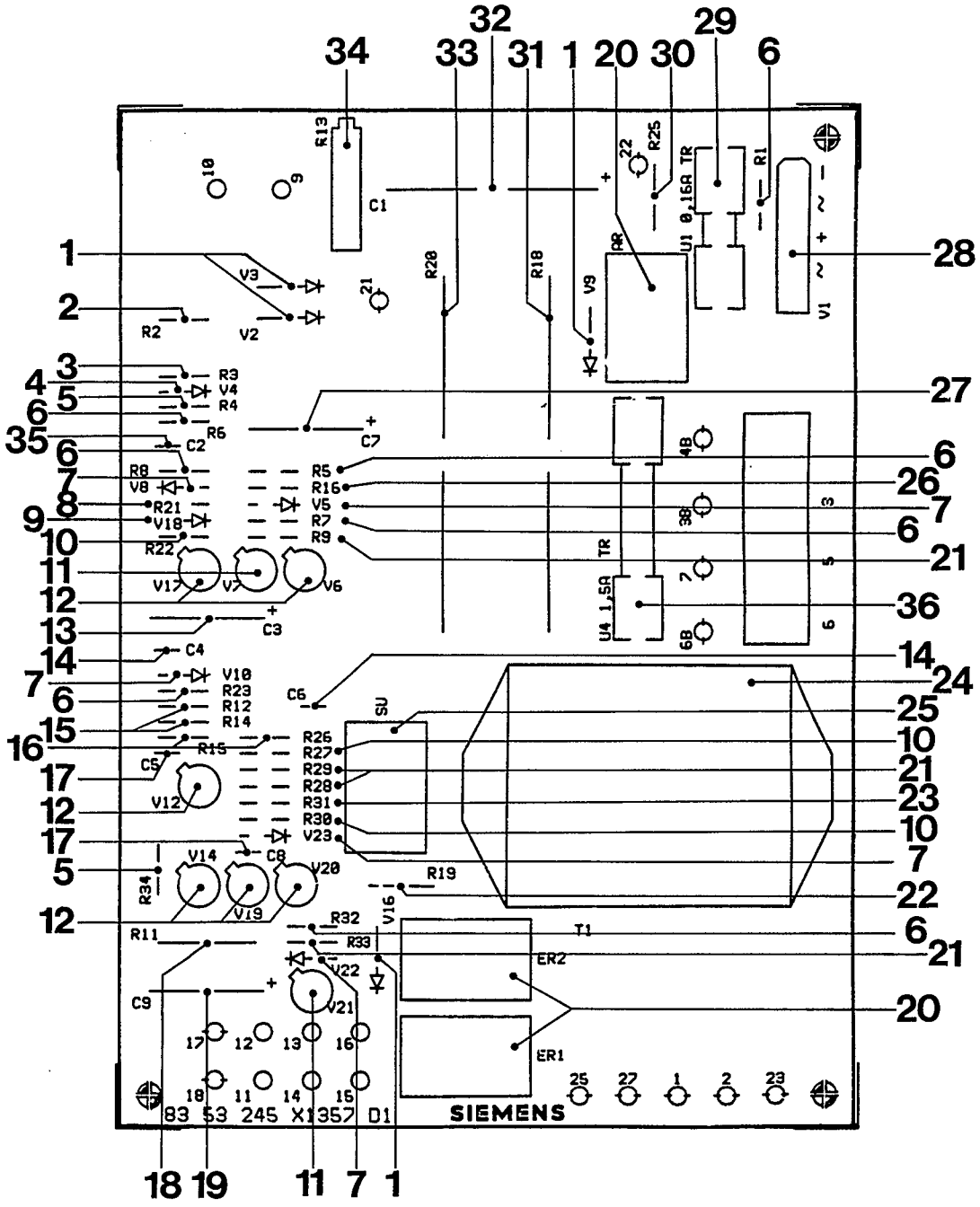
Forced exposure
In case of a defect where no tube current signal triggers the Dentotime there is a forced switching system. The capacitor C 7 is charged through the resistor R 16 after switching on.
If no tube current pulse triggers the Dentotime, the transistor V 6 is controlled through over R 16 after approximately 0,7 to 1 sec. and the timer circuit is actuated.

Schematic HELIODENT 70 with DENTOTIME



PC – board D1

1	SI-Diode EGB	V2, V3, V9, V16	1000 V 1A DO-41 1N 4007
2	Zinkoxid varistor EGB	R2	14 V 0,05W 069-X3011
3	Metal film resistor	R3	510 Ohm 0,25W 1 % Gr. 0207
4	SI-Z-Diode EGB	V4	BZX 97 C2V4 2,4 V 0,4W 5 % DO-35
5	Metal film resistor	R4, R34	470 Ohm 0,25W 1 % Gr. 0207
6	Carbon resistor	R1,R5,R6,R7,R8,R23,R32	10k 0,25W 5 % Gr. 0207
7	SI-Planar-Diode	V5, V8, V10, V22, V23	50 V 200 mA DO-35 BAW 76
8	Metal film resistor	R21	390 Ohm 0,25W 1 % Gr. 0207
9	SI-Z-Diode EGB	V18	ZPD12 12 V 0,4W 5 % DO-35
10	Metal film resistor	R22, R27, R30	100k 0,25W 1 % Gr. 0207
11	SI-PNP-Transistor EGB	V7, V21	BCY78 IX TO-18 32 V 200 mA
12	SI-NPN-Transistor EGB	V6,V12,V14,V17,V19,V20	BCY59 IX TO-18 45 V 200 mA
13	Capacitor	C3	22MF 16 V- 20 % 0513
14	Ceramic Capacitor	C4, C6	100NF 100 V 10 % W5R 8x8x4-2M
15	Metal film resistor	R12, R14	2,2k 0,25W 1 % Gr. 0207
16	Metal film resistor	R15, R26	22k 0,25W 1 % Gr. 0207
17	Ceramic Capacitor	C5, C8	22NF 100 V 10 % W5R 7x5x4-2M
18	Measuring resistor	R11	2k 5 % 0,1W K11
19	Capacitor	C9	2,2MF 35 V- 20 % 0408
20	Relay N	AR, ER1, ER2	12 V- 1U V23016
21	Metal film resistor	R9, R28, R29, R33	5,6k 0,25W 1 % Gr. 0207
22	Metal film resistor	R19	5,6k 0,5W 1 % Gr. 0309
23	Metal film resistor	R31	1k 0,25W 1 % Gr. 0207
24	Transformer	T1	125/17, 5 V 3VA Typ 42
25	Relay N	SU	60 V- 1U V23016 LO
26	Resistor	R16	5,6M 0,25W 1 % Gr. 0207
27	Capacitor	C7	4,7MF 35 V- 20 % 0513 Dry
28	SI-Rectifier set EGB	V1	B 80 V 1A
29	Fuse	U1	0,16A 250 V slow blow 5x20 mm
30	Metal film resistor	R25	12k 0,5W 1 % Gr. 0309
31	Wire wound resistor	R18	6,8 Ohm 10W 5 % Gr. 1045
32	Elko/Capacitor	C1	1MF 40 V- +50 -10 % Gr. 17x31
33	Wire wound resistor	R20	82 Ohm 10W 5 % Gr. 1045
34	Resistor spindel Adj.	R13	100 Ohm 0,75W 10 %
35	Ceramic Capacitor	C2	330NF 100 V 10 % W5R 8x8x4-2M
36	Fuse	U4	1,5A 250 V slow blow 1/4x1 1/4"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18
19
11
7
1
C1
C2
C3
C4
C5
C6
C7
C8
C9
R1
R2
R3
R4
R5
R6
R7
R8
R9
R11
R12
R13
R14
R15
R16
R18
R19
R20
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R30
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R33
R34
V1
V2
V3
V4
V5
V6
V7
V8
V9
V10
V12
V14
V16
V17
V18
V19
V20
V21
V22
V23
T1
ER1
ER2
SU
U1 0,16A TR
U4 1,5A TR
SIEMENS
83 53 245 X1357 D1

Digital Voltmeter "P" PC board D3

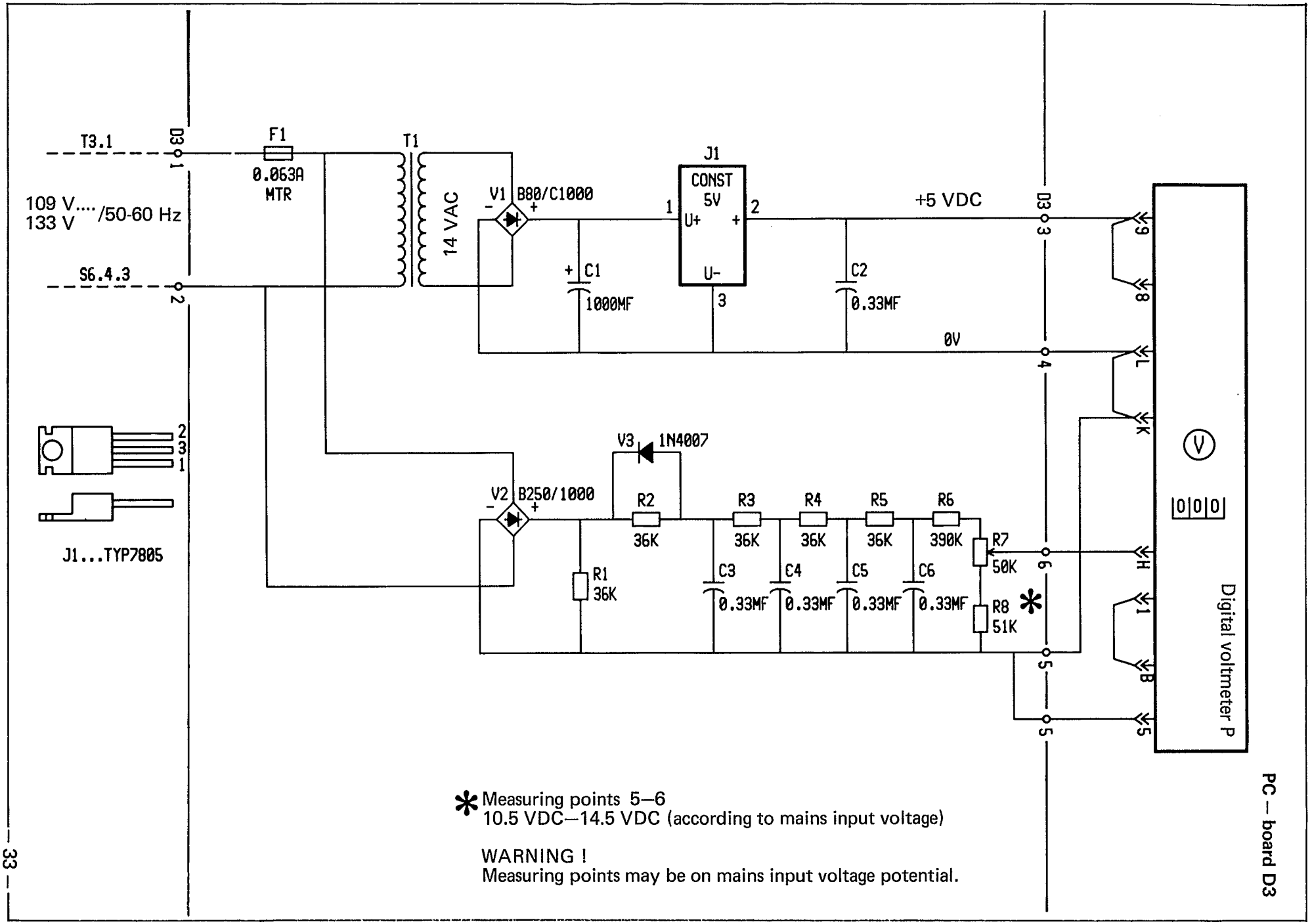
Principle

The digital instrument "P" receives a rectified filtered 12.5 V measuring voltage, proportional to a 125 V line voltage input. The power supply to the instrument consists of the transformer T 1 (D 3) and a 5 VDC circuit.

Line voltage compensation with over voltage exposure blocking

The transformer T 1 (D 5) supplies a line voltage proportional voltage. This stabilized voltage is supplied to the Schmitt trigger which in turn controls via gates J 3 and J 4 the respective LED'S Red (RT), Green (GN), Yellow (GE).

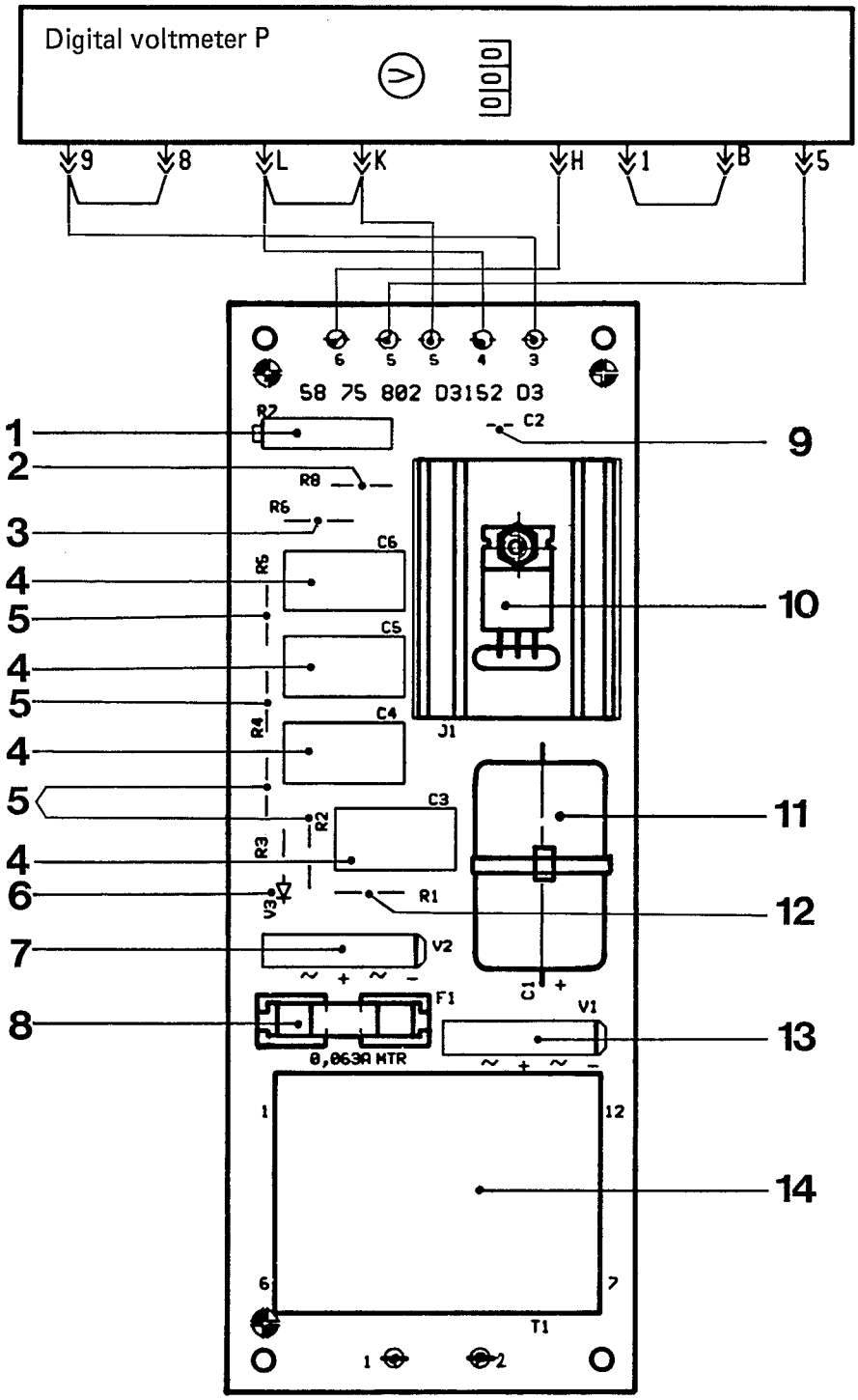
In case of an over voltage condition the Schmitt trigger J 5 output drives transistor V 9, relay AR 1 energizes interrupting the exposure circuit.


T3.1
D3
1
F1
0.063A
MTR
T1
109 V.... /50-60 Hz
133 V
S6.4.3
2
14 VAC
V1 B80/C1000
J1
CONST
5V
U+
U-
1
2
3
+5 VDC
C1
1000MF
C2
0.33MF
0V
D3
3
4
9
8
L
K
V3 1N4007
V2 B250/1000
R2
36K
R3
36K
R4
36K
R5
36K
R6
390K
R7
50K
R8
51K
R1
36K
C3
0.33MF
C4
0.33MF
C5
0.33MF
C6
0.33MF
6
5
H
1
B
5
Digital voltmeter P
J1...TYP7805
2
3
1
* Measuring points 5—6
10.5 VDC—14.5 VDC (according to mains input voltage)
WARNING !
Measuring points may be on mains input voltage potential.

PC — board D3

PC — board D3

1	Resistor spindel Adj.	R7	50k 0,75W 10 %
2	Metal film resistor	R8	51k 0,25W 1 % Gr. 0207
3	Metal film resistor	R6	390k 0,5W 1 % Gr. 0309
4	MKT-Capacitor	C3, C4, C5, C6	0,33 uF 250 V -20 % 18x15x9-6M
5	Metal film resistor	R2, R3, R4, R5	36k 0,25W 1 % Gr. 0207
6	SI-Diode EGB	V3	1000 V 1A DO-41 1N4007
7	SI-Full wave rectifier EGB	V2	B 250 V 0,7A
8	Fuse	f. F1	0,063A 250 V med. sl. bl. S10 5x10 mm
9	Ceramic Capacitor	C2	330NF 100 V 10 % W5R 8x8x4-2M
10	Volt. Regulator EGB	I1	Typ 7805 TO-220 5V/1A
11	Elko	C1	1000 uF 40 V +50 -10 % Gr. 17x31
12	Metal film resistor	R1	36k 0,5W 1 % Gr. 0309
13	SI-Full wave rectifier EGB	V1	B 80V 1A
14	Transformer	T1	2x 115 V/2x 6 V 4VA TFB 468


Digital voltmeter P
9
8
L
K
H
1
B
5
6
5
5
4
3
58 75 802 D3152 D3
R2
C2
R8
R6
C6
R5
C5
R4
C4
R3
R2
C3
R1
V3
V2
F1
0,063A MTR
J1
C1
V1
T1
1
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13
14

Linevoltage indication and over voltage exposure interruption PC board D5

The 15 V stabilizer J 2 receives its input voltage from the power supply of the timing switch board D 1. The transformer T 1 (D 5) supplies via rectifier V 1 the voltage for the Schmitt triggers J 1 and J 5.

The zener diodes V 3 and V 4 increase that value the R - C circuit R 8, C 3 and R 5, C 4 smoothen the signal input to Schmitt, trigger J 1.2, J 1.6 and J 5.2.

At a lower control voltage the Schmitt trigger output J 1.1 and J 1.7 (signals) are at H. Via the inverter J 3 and the AND gate J 4, inverter J 3.10 signals L, the light diode V 6 (yellow) lights up.

As the control voltage increases the output signal of Schmitt trigger J 1.7 changes to L, controlled by R 11. The output signal of the inverter J 3.10 changes from L to H.

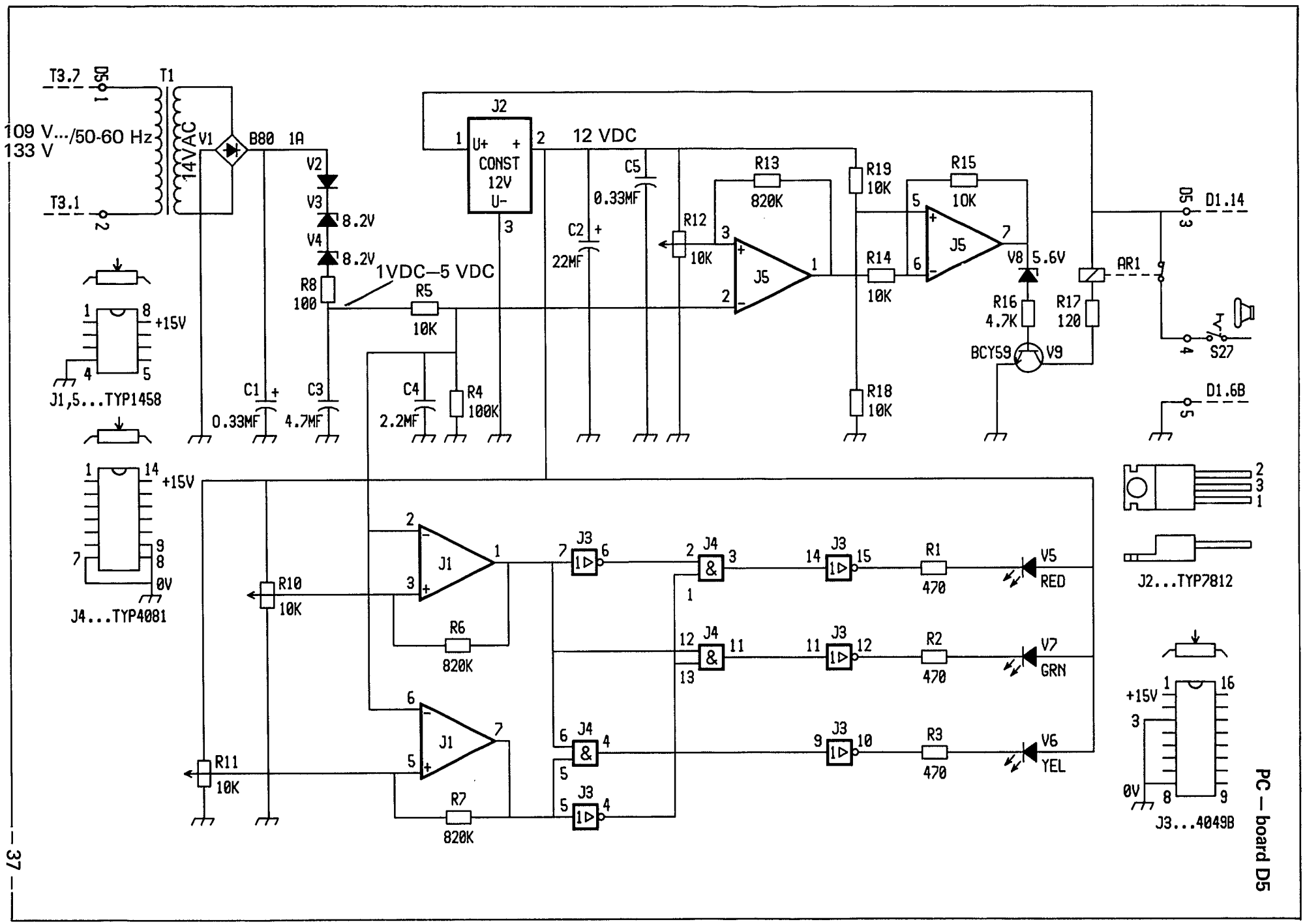
The light diode V 6 is deenergized J 3.12 in turn switches to output from H to L and the light diode V 7 (Green) lights up (Nominal unit operating condition).

As the control voltage increases further (over voltage condition) the output signal of J 1.1 controlled via R 10, switches from H to L.

The output of J 3.12 changes from L to H and J 3.15 changes from H to L. The light diode V 7 (Green) is deenergized and light diode V 5 (Red) lights up.

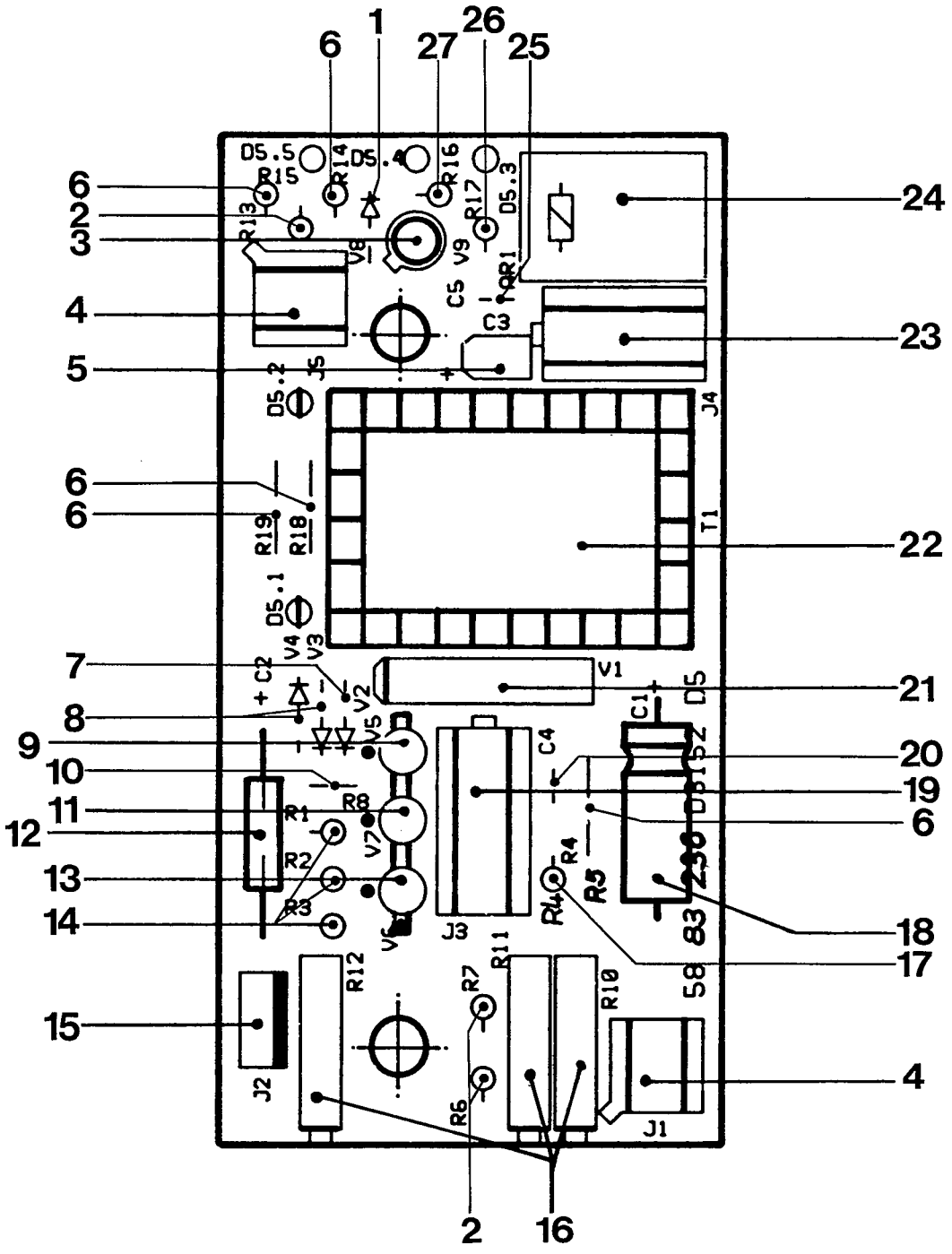
At a control voltage, corresponding to a line voltage of approx. 130 V, the output signal of J 5.1 controlled via R 12, switches from H to L, thus changing the output signal of J 5.7 from L to H.

Transistor V 9 conducts, AR 1 energizes thereby interrupts the exposure. No exposure can be made.


T3.7
D5
T1
109 V.../50-60 Hz
133 V
T3.1
14VAC
V1
B80 1A
V2
V3
8.2V
V4
8.2V
R8
100
1VDC—5 VDC
R5
10K
J2
U+
CONST
12V
U-
12 VDC
C5
0.33MF
C2
22MF
R12
10K
R13
820K
R19
10K
R15
10K
R14
10K
J5
V8 5.6V
R16
4.7K
R17
120
BCY59
V9
AR1
D5
D1.14
S27
D1.6B
J1,5...TYP1458
+15V
C1
0.33MF
C3
4.7MF
C4
2.2MF
R4
100K
R18
10K
J4...TYP4081
R10
10K
J1
R6
820K
R11
10K
R7
820K
J3
J4
&
R1
470
V5
RED
R2
470
V7
GRN
R3
470
V6
YEL
J2...TYP7812
J3...4049B
PC — board D5

PC — board D5

1	SI-Z-Diode EGB	V8	ZPD5,6 5,6 V 0,4W 5 % DO-35
2	Carbon resistor	R6, R7, R13	820k 0,4W 5 % Gr. 0309
3	SI-npn-transistor	V9	BCY 59 VIII TO-18 45 V 200 mA
4	Double-OP-Amplifier EGB	I1, I5	Typ 1458 DIP 8pol. (2x741c)
5	Capacitor	C3	4,7 uF 35 V 20 % 7x5x10
6	Metal film resistor	R5, R14, R15, R18, R19	10k 0,5W 1 % Gr. 0309
7	SI-Diode EGB	V2	50 V 200 mA DO-35 BAW 76
8	SI-Z-Diode	V3, V4	ZPD8,2 8,2 V 0,4W 5 % DO-35
9	Ga-As-P-Diode EGB	V5	5 mm RM 2,5 red HLMP 0240
10	Carbon resistor	R8	100 Ohm 0,2W 5 % Gr. 0204
11	Ga-P-Diode EGB	V7	5 mm RM 2,5 green Typ 3502
12	Capacitor	C2	22 uF 25 V -20 % 0614 NASS
13	Ga-As-P-Diode EGB	V6	5 mm yellow Typ 3400
14	Metal film resistor	R1, R2, R3	470 Ohm 0,5W 1 % Gr. 0309
15	Voltage regulator EGB	I2	7812 UC TO-220 12 V, 1A
16	Resistor spindel Adj.	R10, R11, R12	10k 0,75W 10 % Lin liegend S
17	Metal film resistor	R4	100k 0,5W 1 % Gr. 0309
18	Capacitor	C1	0,33 uF 63 V -20 % Gr. 06x19
19	Power inverter EGB	I3	CMOS 4049 B DIP 16
20	Capacitor	C4	2,2 uF 40 V- 7x5x10
21	SI-Rectifier set EGB	V1	B 80 V 1A
22	Flat transformer	T1	127 V/9,5 V 1,8VA BV34
23	AND-Gate 4x2 EGB	I4	C MOS 4081 B DIP 14
24	Relay	AR 1	12 V -2U AU LO Monost.
25	Ceramic-Capacitor	C5	0,33 uF 100 V 10 % W5R 8x8x4-2M
26	Metal film resistor	R17	120 Ohm 0,5W 1 % Gr. 0309
27	Metal film resistor	R16	4,7k 0,5W 1 % Gr. 0309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21
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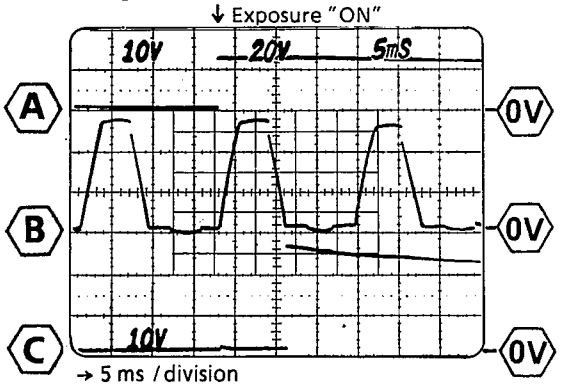
24
25
26
27
D5.1
D5.2
D5.3
D5.4
D5.5
J1
J2
J3
J4
J5
T1
V1
V2
V3
V4
V5
V6
V7
V8
V9
C1
C2
C3
C4
C5
R1
R2
R3
R4
R5
R6
R7
R8
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19

Waveform data

General notes on oscillographs

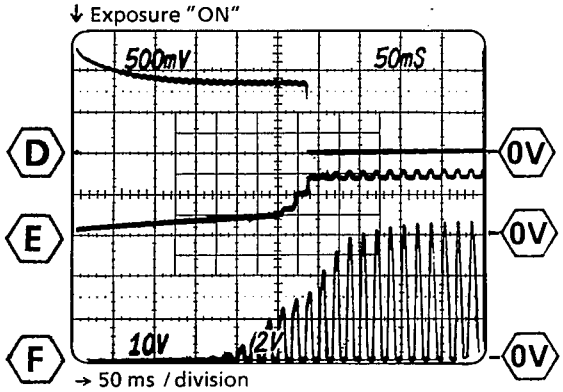
The illustrated oscillographs have been produced with the following instruments:
Oscilloscope Tektronik 7623 A
Dose pulse instrument MDH X-ray Monitor
The measuring points ⟨letters⟩ stated to the left of the oscillographs are identical with those in the circuit diagram.
All measuring points are measured against Pin D1.6B.

1. Voltage condition relating to the supply voltage for the time switch



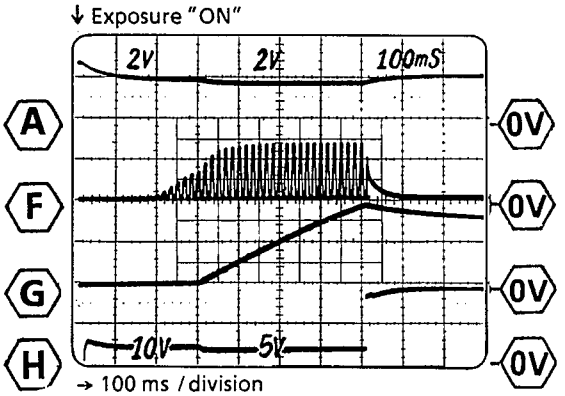
Amplification factor	Function
20 V / division	Exposure release switch S27 "ON"
10 V / division	Position of the voltage pulse for the mains-synchronons exposure release
10 V / division	Mains-synchronons time switch supply voltage

2. Start of exposure time counting depending on tube current



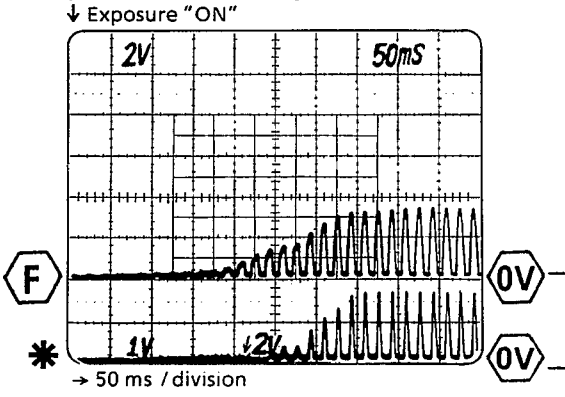
Amplification factor	Function
10 V / division	AR-relay "ON" signal (tube current triggered)
500 mV / division	Tube current integration signal
2 V / division	Tube peak current (corresponds to 6.6 mA r.m.s.)

3. Exposure time determination



Amplification factor	Function
20 V / division	Exposure release switch S27 "ON"
5 V / division	Tube peak current
2 V / division	Integration signal for exposure time determination (Exp. time = 0.4 sec set on the DENTOTIME)
20 V / division	ER-Relay "OFF" signal

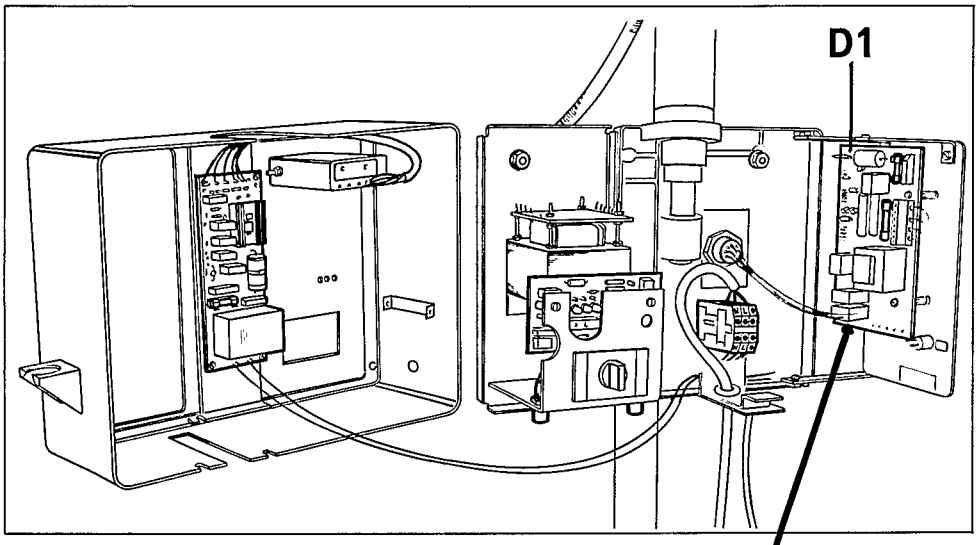
4. Signals at the single tank

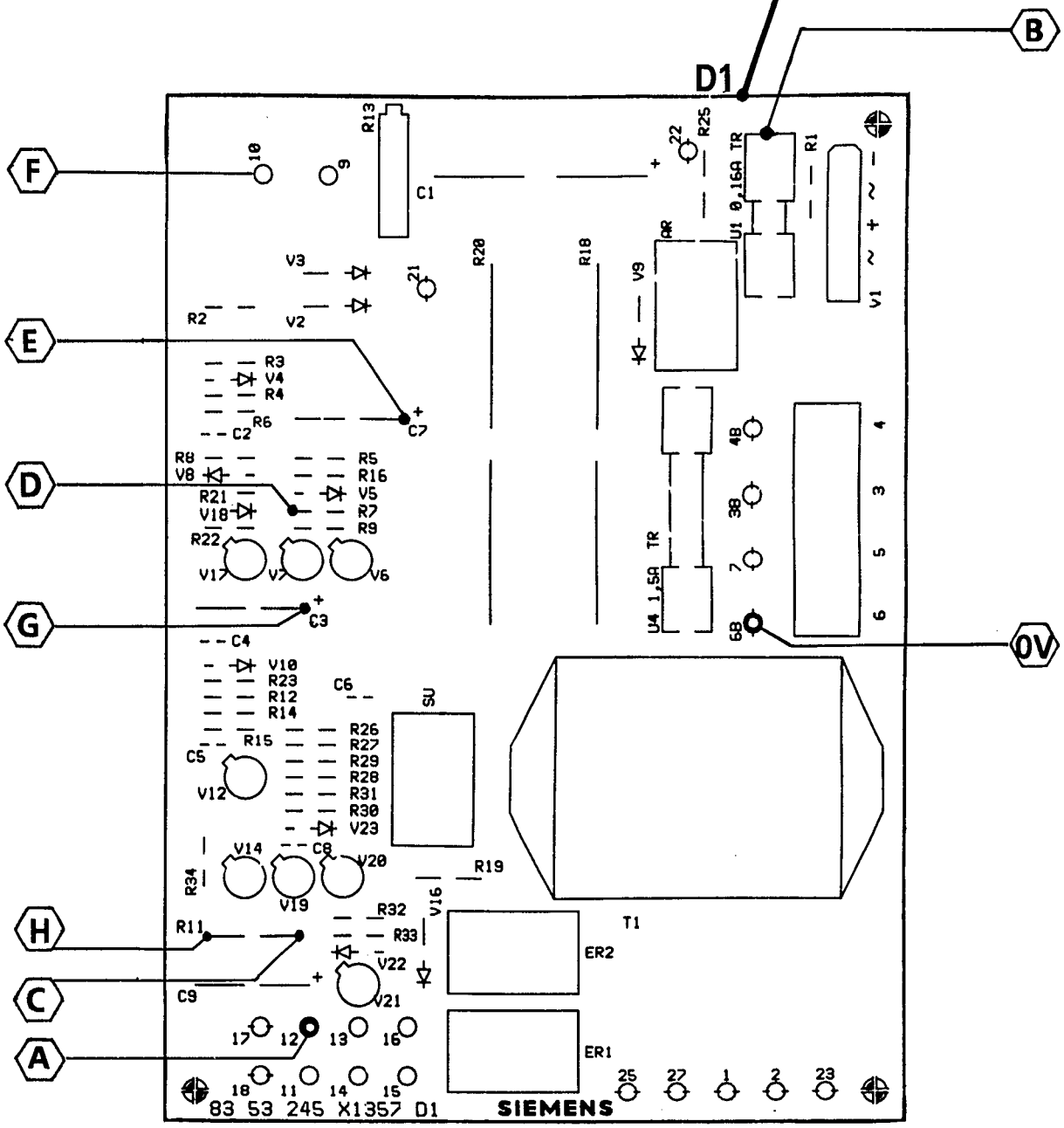


Amplification factor	Function
5 V / division	Tube peak current
5 V / division	Dose pulse (deflection dependent on instrument)

* The semiconductor radiation receptor or dose measuring chamber for measuring the dose pulse must be positioned as described in the section "Dose Measurement", page 68.

Measuring points for waveform data on PC board D1





MAINTENANCE

To stay in compliance with the DHHS requirements the PORTARAY must be maintained annually.

It is the responsibility of the user to insure that the equipment is maintained with the manufacturer's recommended maintenance schedule to insure compliance with the Federal Performance Standard. The manufacturer and the assembler/installed are relieved from responsibility in those cases where noncompliance with the standard results from the user's failure to have the manufacturer's recommended maintenance performed..

The actual maintenance inspection and consequent service must be accomplished by a trained serviceman. Neither the inspection nor service is part of the equipment warranty.

Instruments required:

Digital Multimeter MODEL – FLUKE 8000 A, or equivalent.
Accuracy:
AC voltage ± 0.5 % of reading plus 1 digit
DC voltage ± 0.1 % of reading plus 2 digits
DC current ± 0.3 % of reading plus 1 digit

Electromechanical pulse counter
MODEL- KESSLER ELLIS KT 203 ± 1 pulse, or equivalent.

Regulating transformer (stepless) 90 – 150 VAC, 50 VA

Check as follows:

1. Verify that all labels are affixed and legible (labels see page 13)
   Look for mechanical damage, possibly affecting radiation safety, (inspect collimator for possible cracks, test the tubehead in all working positions for possible drift).

2. Operating LED light (yellow, green, red) for line compensation must light up Digital line adequacy voltmeter must be operational.

Corrective Action:

Defaced labels must be replaced.

Order same from SIEMENS MEDICAL SYSTEMS, INC. Dental X-Ray Division (address see rear) in writing stating:

Customer Name
Customer Address
All Model Numbers with Serial Numbers still legible on the unit for identification purposes.

Should mechanical damage affecting radiation safety be evident, the user is not permitted to use the unit until repairs or replacements correcting the defect are made.

Defective bulbs for power "on" light, radiation indicating light, inoperative line compensation LED.s, Digital line adequacy voltmeter constitute a safety hazard to the patients well as to the operator, therefore, repairs or replacements must be made promtly, same rule as above applies.

WARNING! Radiation Safety

CAUTION: Radiation will be indicated by this symbol

To reduce personal exposure and not damage the X-ray tube head, the individual **exposure times shall be just long enough to permit meter readings.**

Observe radiation protection as outlined in on page 12.

3. Check radiation warning light and acoustic buzzer for proper functioning,

4. Make sure the X-ray exposure is interrupted after releasing the exposure switch (dead man feature).

Checking the line voltage
(Power supply)

Remove cover **.CAUTION WIRES!**

Set the multimeter to a.c. voltage (range: 150V, a.c). Connect the test leads to the terminals K3 N,L.
Turn on the power supply, note the measured value.
The measured line voltage must be at least 109V, A.C., and may not exceed 133 V, a.c.

*** Line voltage range at 50 HZ ONLY 132 V**

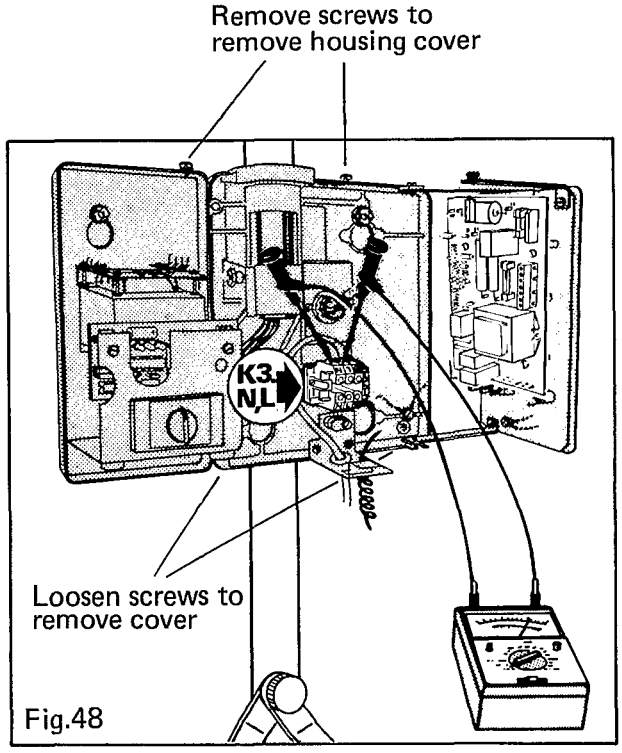


Fig.48

Digital line adequacy test instrument "P" (plus, minus 1 digit accuracy).
Plug in power supply.
Turn on the X-Ray control, wait 5 min (warm-up-time).
Compare the indicated value on the multimeter with the digital line adequacy test instrument. The values indicated must be within your multimeters stated accuracy tolerance.

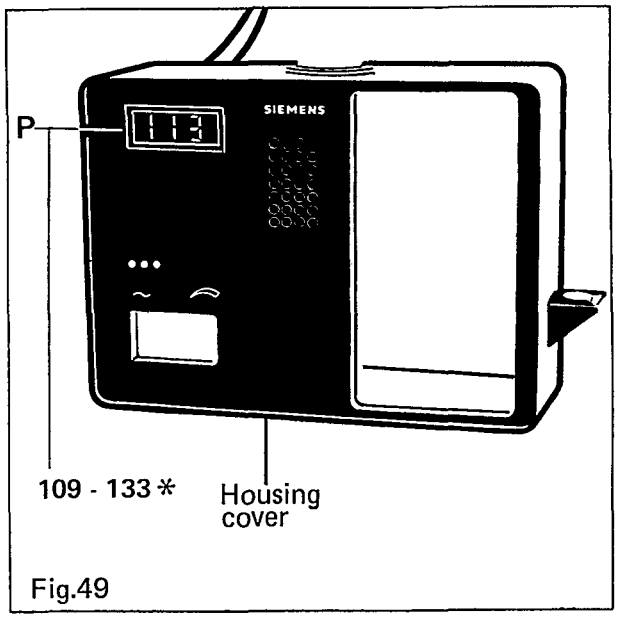


Fig.49

WARNING:
Electric shock hazard!
For reasons of safety, always disconnect the powercord while the measuring leads are connected to the various test points during the calibration.

Verification of the line voltage compensation light diodes (LED) function.

Determine that the power supply is within the specified range of 109 VAC to 133 VAC max. indicated on the digital panel voltmeter "P". **Line voltage range at 50 HZ ONLY 132 V**

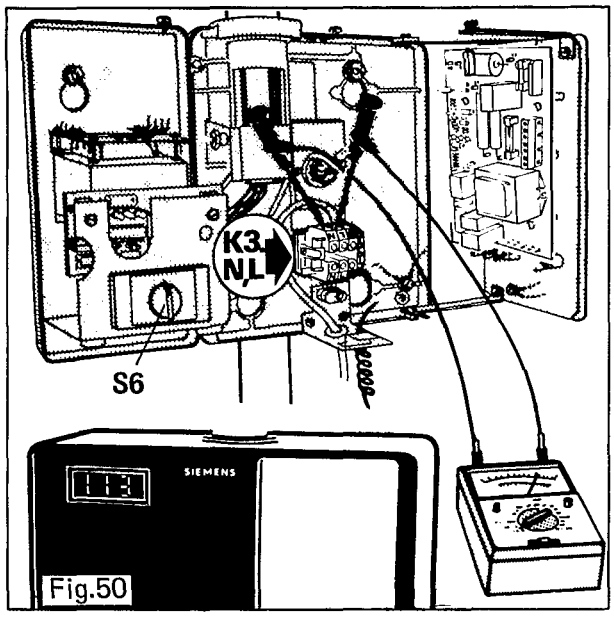
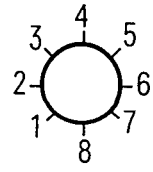


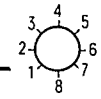
Fig.50

S6 Positions



Dependent on the line voltage indicated and position of line compensation switch S6, the corresponding LED's Yellow, Green or Red light up.

On hand of Chart A compare:



Digitalinstrument 'P'	Switch S6							
	1	2	3	4	5	6	7	8
109 V	GE	←	←	←	←	←	GE	GN
110 V	GE	←	←	←	←	←	GE	GN
111 V	GE	←	←	←	←	GE	GE/GN	GN/RT
112 V	GE	←	←	←	←	GE	GN	RT
113 V	GE	←	←	←	←	GE	GN	RT
114 V	GE	←	←	←	GE	GE/GN	GN/RT	RT
115 V	GE	←	←	←	GE	GN	RT	RT
116 V	GE	←	←	←	GE	GN	RT	RT
117 V	GE	←	←	GE	GE/GN	GN	RT	RT
118 V	GE	←	←	GE	GN	RT	↔	RT
119 V	GE	←	←	GE	GN	RT	↔	RT
120 V	GE	↔	GE	GE/GN	GN	RT	↔	RT
121 V	GE	↔	GE	GN	GN/RT	RT	↔	RT
122 V	GE	↔	GE	GN	RT	→	→	RT
123 V	GE	GE	GE/GN	GN	RT	→	→	RT
124 V	GE	GE	GN	GN/RT	RT	→	→	RT
125 V	GE	GE	GN	RT	→	→	→	RT
126 V	GE	GE/GN	GN	RT	→	→	→	RT
127 V	GE	GN	GN/RT	RT	→	→	→	RT
128 V	GE	GN	RT	→	→	→	→	RT
129 V	GE	GN	RT	→	→	→	→	RT
130 V	GN	GN/RT	RT	→	→	→	→	RT
131 V	GN	RT	→	→	→	→	→	RT
132 V	GN	RT	→	→	→	→	→	RT
133 V *	GN	RT	→	→	→	→	→	RT

Legend

GE = yellow
GN = green
RT = red

Chart A

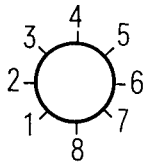
Note: A one position shift of the LED display in relation to the switch position S6 can occur if the actual line voltage lies in between the voltage values shown on the chart.

Example:

Indicated line voltage – position of S6 – LED lit

Instrument "P"

121



		Y	G	R
1 to 3	Yellow	O	O	O
4	Green			
5	Green or Red			
6 to 7	Red			

Verify power supply adequacy

With the multimeter connected to K3 N,L (see figure 48). AC input, unit turned on, linecompensation adjusted,green LED lit.

Verify that the voltage indicated on your measuring instrument coincides with instrument P (see figure 49). Note the value indicated (no load).

Set the exposure time by rotating the object button. To 3,2 s indicated by the orange line on the object/time selector.

Make an exposure 

Observe the voltage reading (under load)

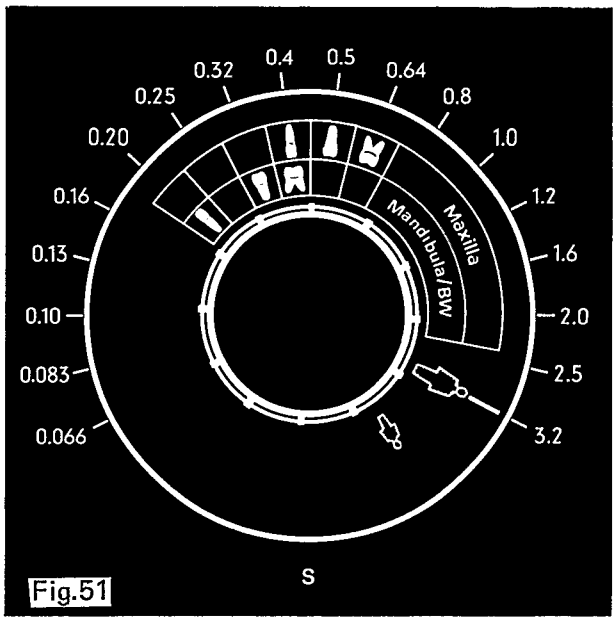


Fig.51

To calculate the power supply adequacy, enter below the measured values, starting with the no load voltage.

NO LOAD VOLTAGE	VOLTAGE UNDER LOAD	VOLTAGE DROP
..... V	 V	 V

The maximum permissible VOLTAGE DROP must not exceed 6,0 V in the exposure range given. In the event, that the power is insufficient an adequate power supply must be found.

Tube current

Remove the 9–10 jumper from Circuit Board D 1.

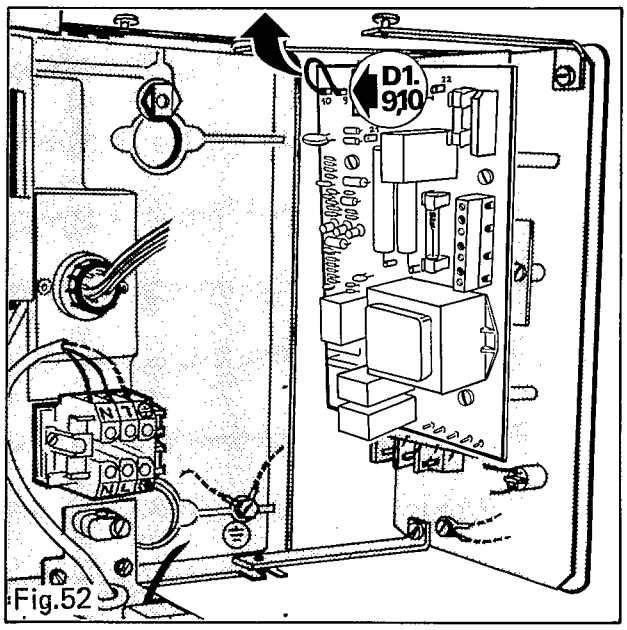


Fig.52

Connect the multimeter to D 1.9 - 10
Select DCmA range (10 DCmA).
Set 2,0 sec. on the time selector

Make an exposure.

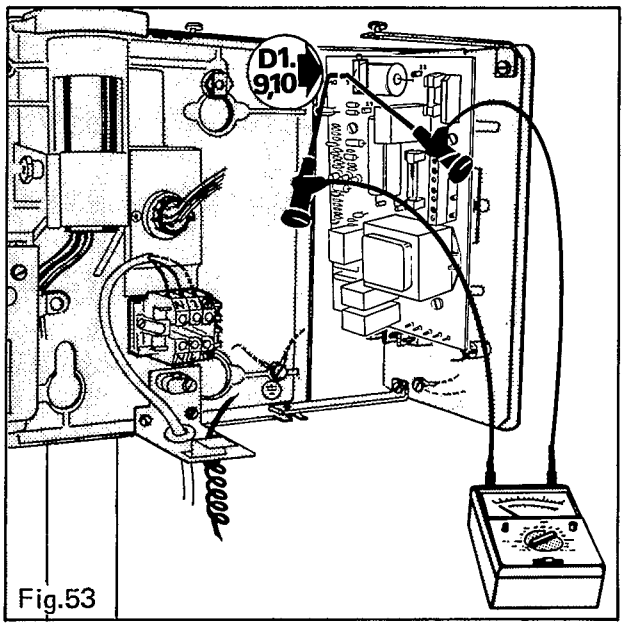


Fig.53

The buzzer must sound and the **red** radiation light on the front panel must light up.

Note the mA value on the instrument.
The reading should be 7 DCmA (tolerance + 1,2 DCmA – 2 DCmA 60 HZ / +1,0 DCmA –2,5 DCmA 50 HZ)
The exposure must be terminated at once if the exposure button is prematurely released (deadman feature).
Disconnect the instrument.
Reinstall the jumper 9 - 10 on circuit board D1.

Exposure time

The exposure time **must** be checked with a mechanical counter or equivalent.
The counter is connected as described below.

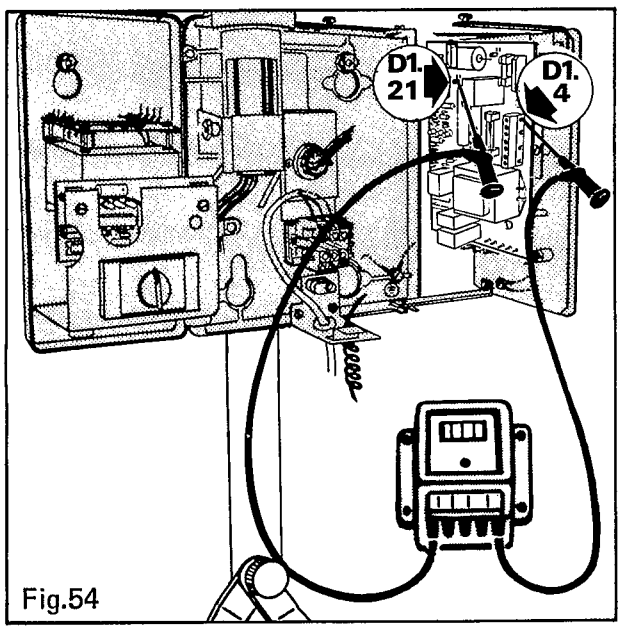
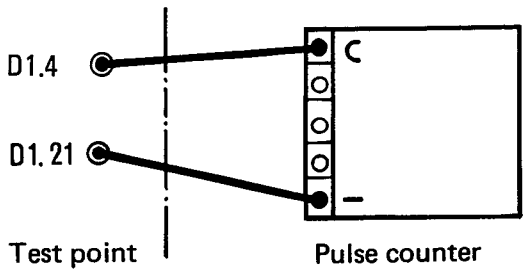


Fig.54



Set the exposure time as shown in the table below.

Exposure time	Pulses 50 HZ	60 HZ	Tolerance
0.066 sec.	3	4	+ 1 pulse - 2 pulses
3,2 sec.	160	192	+ 10 pulses - 20 pulses

Make an exposure 

Note the pulses on the pulse counter used.

Caution:
Observe the cooling time between exposures.
Relative power duration: 1 : 60 / min. cooling period 20 sec.
For example, 3,2 sec. exposure time – a pause of 3 1/2 min.

If the measured pulse count does not agree with the data as indicated, adjust as follows:

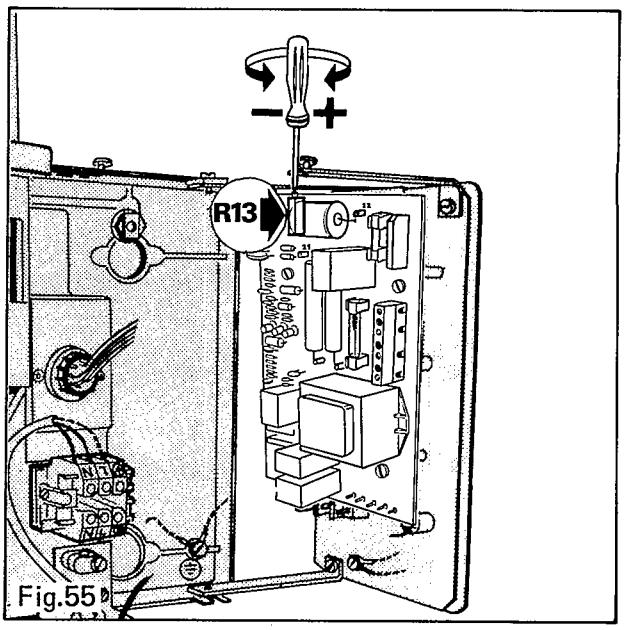


Fig.55

Make an exposure. 

With potentiometer R13 on the circuit board D1, adjust the value until the proper pulse count is obtained.

⊕ = Increase the exposure time
⊖ = Decrease the exposure time

Exchange cabling of scissor arm

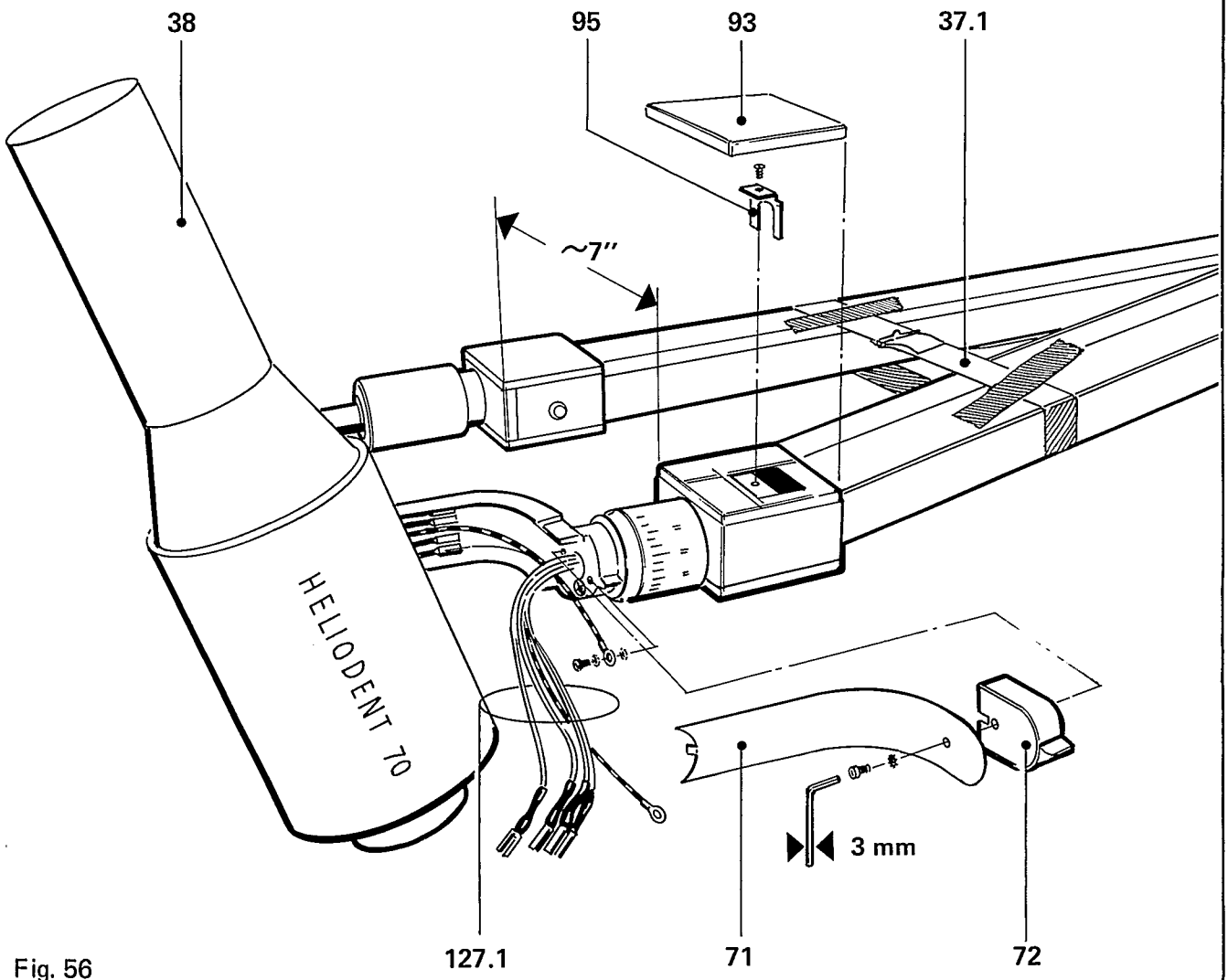


Fig. 56

For the fitting of a new cabling you will need:

1 cabling Art. No. 58 06 864 D 3019
2 profiles Art. No. 37 14 623 D 3019
1 Shrink tubing (set of 5), length 1/2" Art. No. 59 30 888 D 3152
1 Insulating tubing, length 2 1/2" Art. No. 59 30 896 D 3152
1 Insulating tubing, length 4 3/4" Art. No. 59 30 904 D 3152
1 adhesive Art. No. 29 78 195 D 3152

Loosen safety strap (37.1) until scissor arm (37) is open about 7".
Secure safety strap with adhesive tape.
Remove cover cap (93).
Unscrew cover (71) and cover cap (72).
Cabling (scissor arm) (127.1).
Remove plug connections 3, 4, 5, 6 and ground lead.
Unscrew and remove angle support (bracket) (95).
Pull out HELIODENT generator (38).

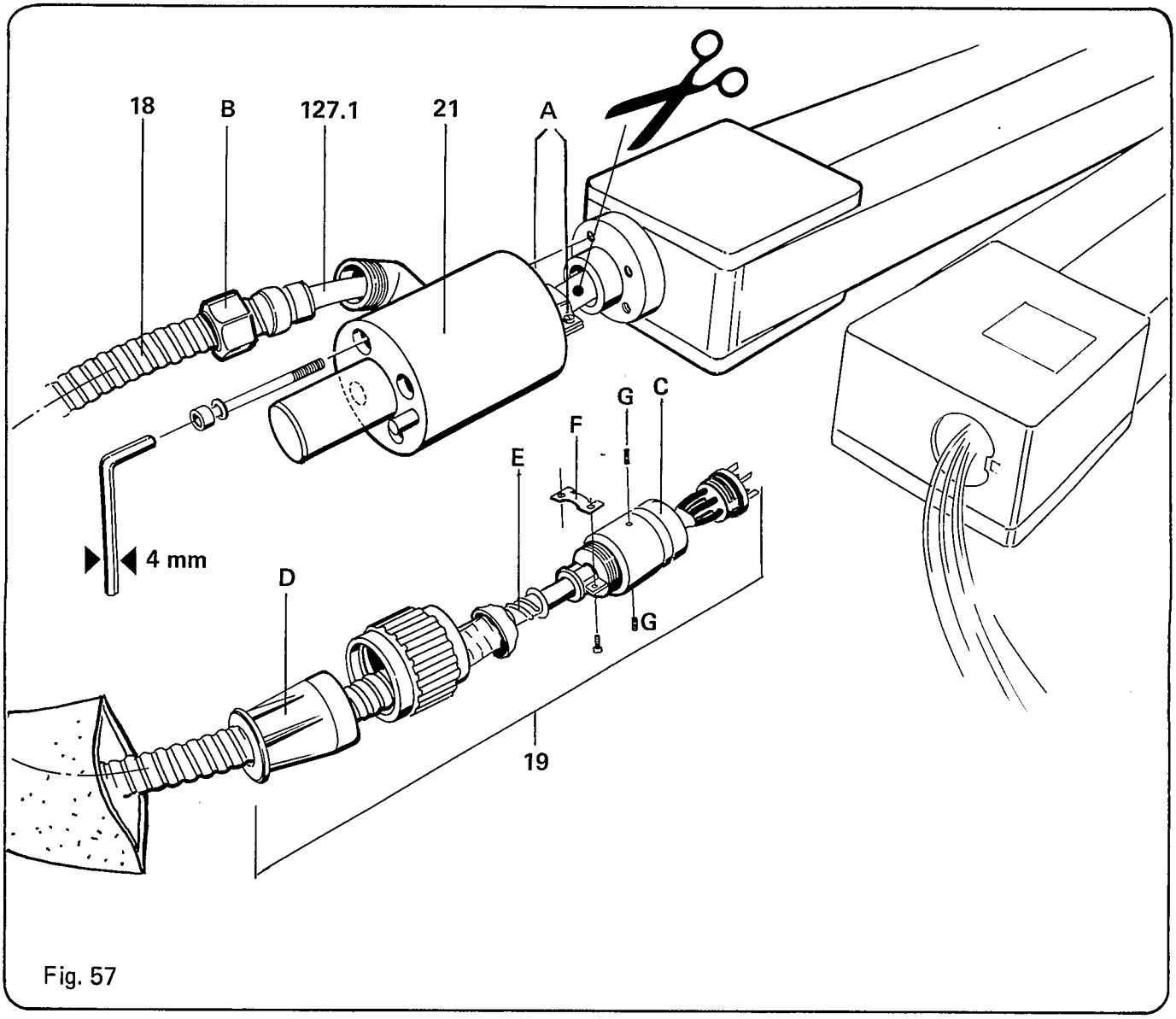


Fig. 57

Unscrew axle (21) (4 screws) and remove from scissor arm.
Remove cable clip (A).
Sever defective cabling (127.1) at place indicated.
Loosen bolt connection (B) and pull cabling out of axle.
Open multipin plug (19).
Hold onto part (C) and unscrew bolt connection (D).
Remove greenfield tubing (18).
Unscrew sleeve (E) backwards and remove strain relief (F).
Screw out locking screws (G), push back part (C) and unsolder cabling.

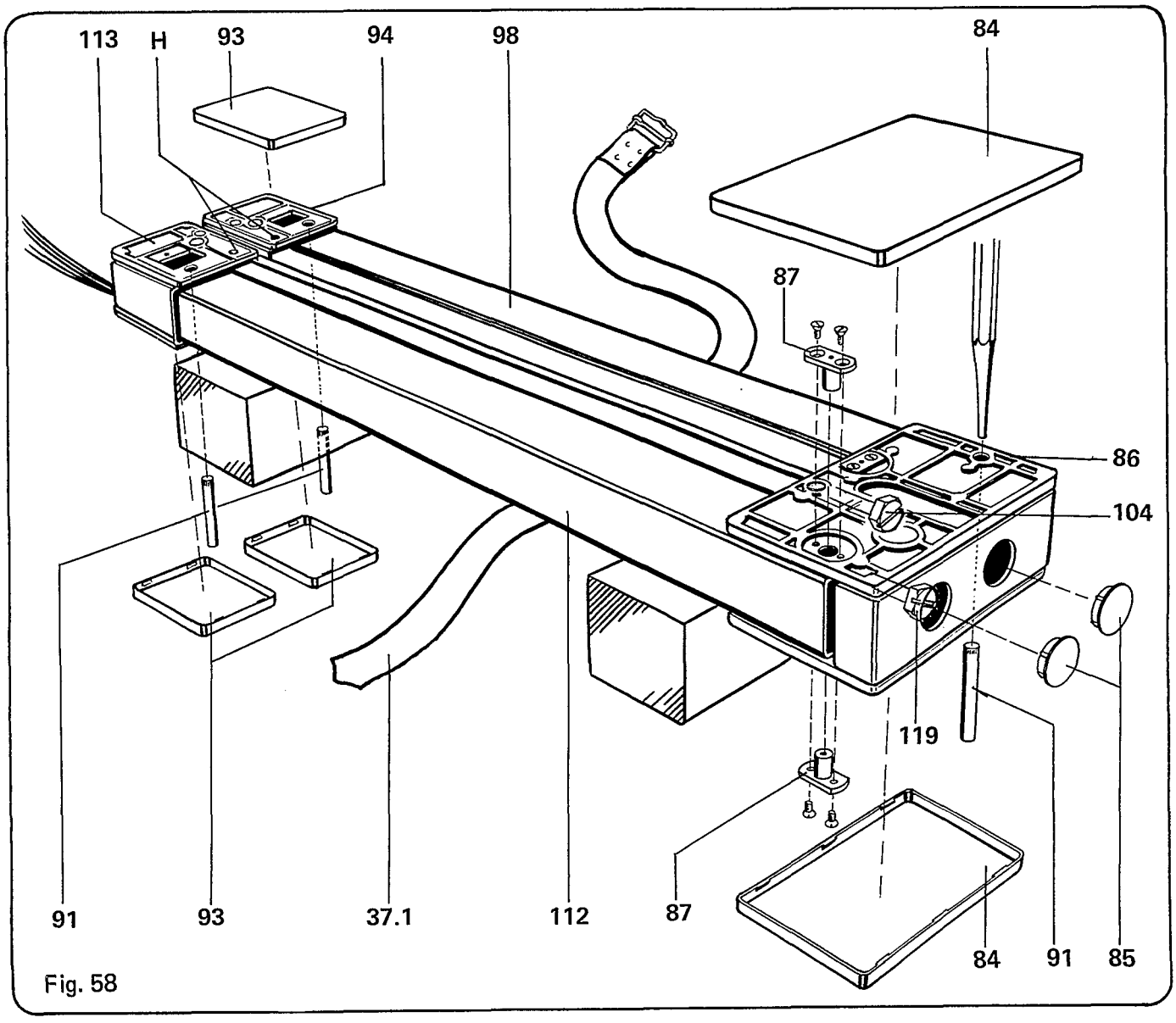


Fig. 58

Remove the two caps (85) and cover caps (84) on intermediate piece (86), as well as the cover caps (93) on the head pieces (94) and (113).
Relax the tension of the tension springs by means of the two hexagonal head screws (104) and (119) (about 200 rotations required to relax tension springs).
Attention!
It is imperative that you take care that the tension of the springs is completely relaxed.
Remove safety strap (37.1).
Place the scissor arm on its base in such a way that both marking drill-holes (H) are shown upwards on the head pieces (94) and (113).
Adjust head pieces by about 3".
Knock the cylindrical pins (91) which hold longeron (cover) (98) and cover (112) out downwards on both head pieces.
On each of the two bearings (87) unscrew the countersunk screws and remove bearings.

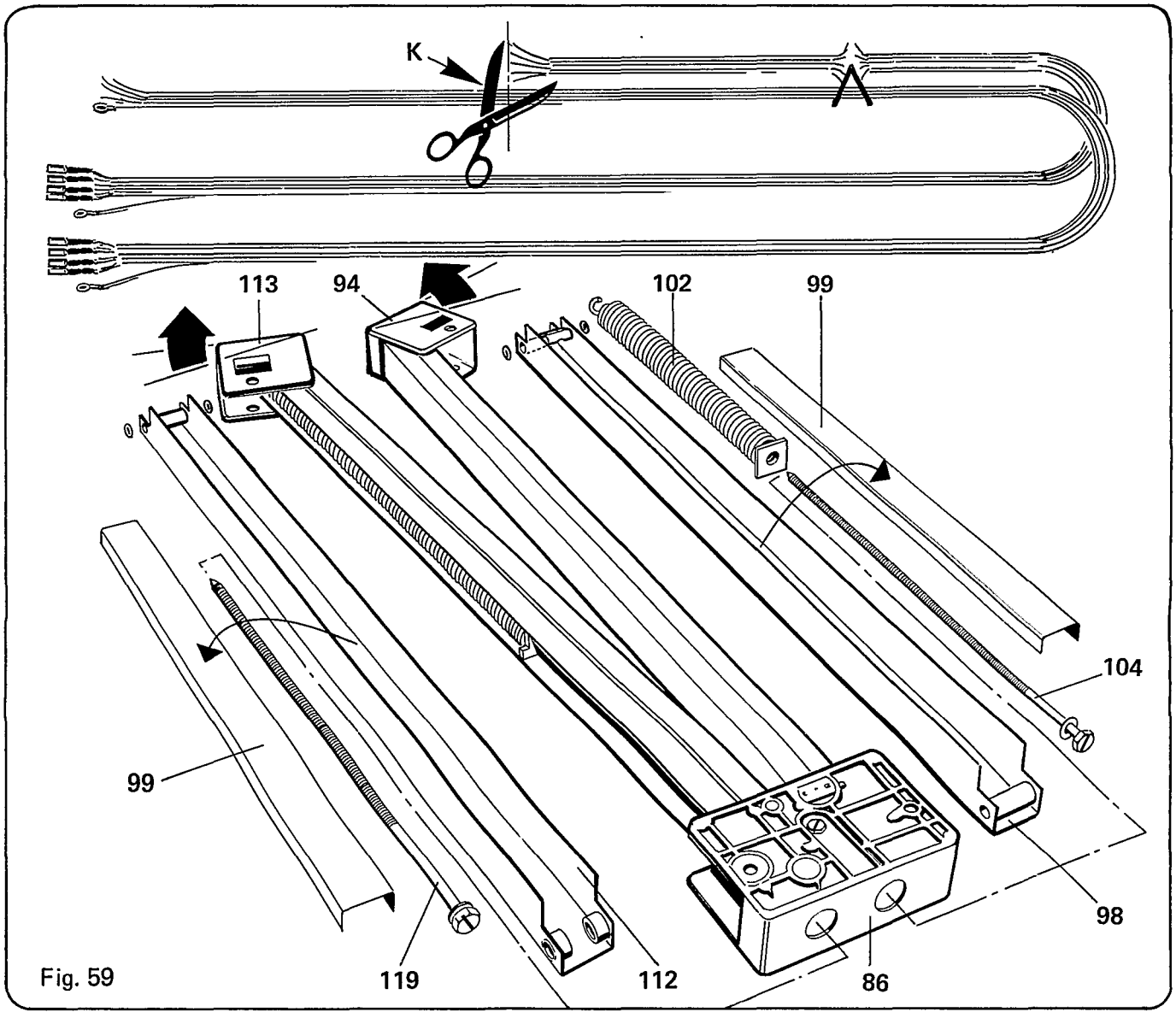


Fig. 59

Completely unscrew the two hexagonal head screws (104) and (119).
Turn away head piece (94) and remove longeron (cover) (98).
Take out tension rear (102).
Pull defective cabling out of longeron (98).
Turn away head piece (113) on second arm.
Remove cover (112).
Pull defective cabling completely out of the scissor arm through intermediate piece (86), cover (112) and head piece (113).
Remove the two profiles (99) and all remaining adhesive from longeron (cover) (98) and cover (112).
Beforehand, hold severed cabling segment from the multipin plug up against defective cabling and shorten new cabling to exactly the required length (K).

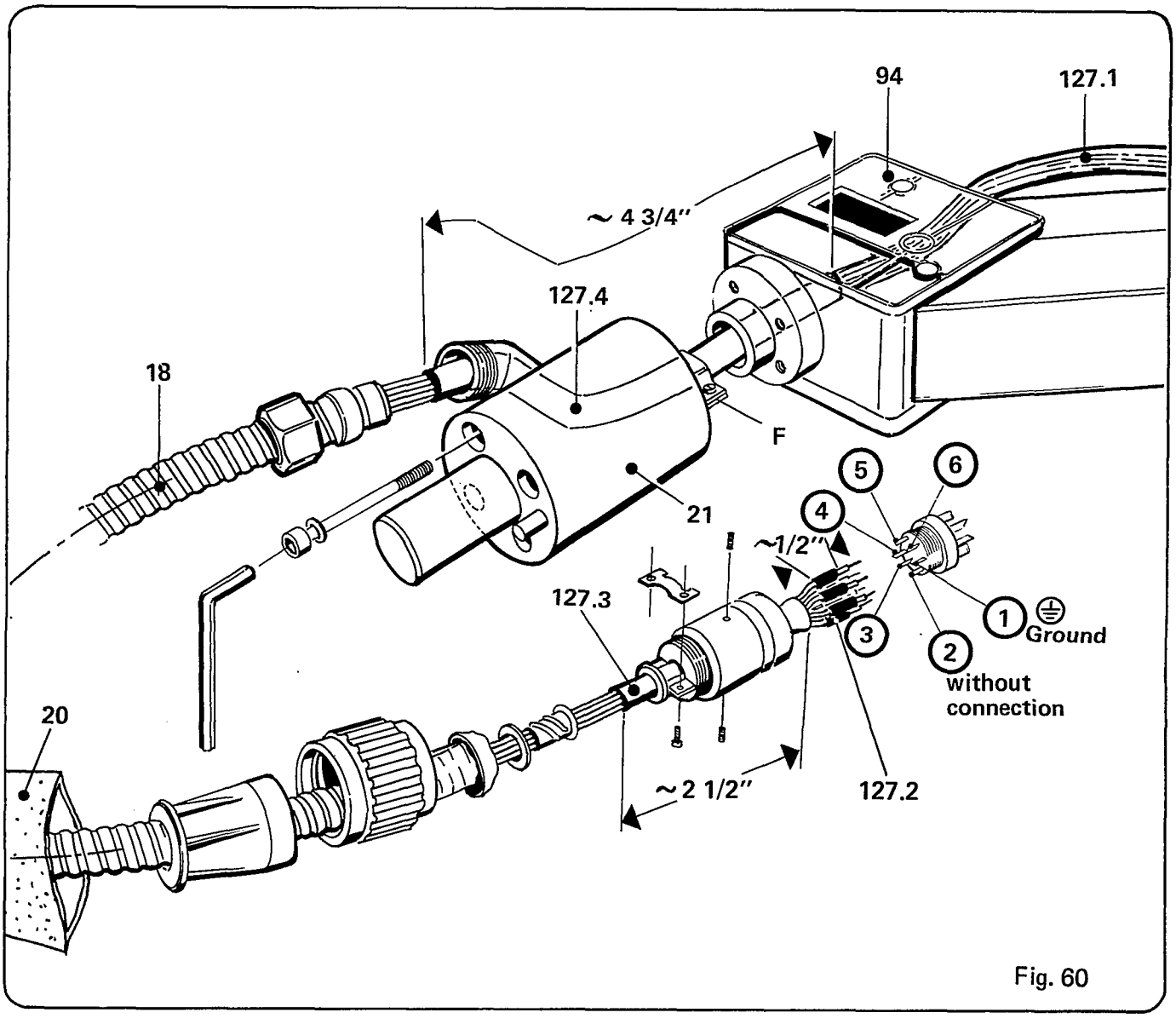


Fig. 60

Push new cabling (127.1) in direction of arrow through the head piece (94), and pull through the axle (21). Push back insulating hose (127.4) about 4 3/4" and push cabling through greenfield tubing (18).
Push multipin plug parts (19) and pouch (20) along as shown.
Push insulating hose,(127.3), about 2 1/2", over cabling; push shrink hose (set of 5)(127.2), about 1/2" over each single-line.
Check single-lines from the other end of the cabling and connect corresponding numbers 3,4,5,6.
Ground lead on No. 1, No. 2 remain free. Shrink on the shrink hoses (127.2) with hot air,push forward insulating hose (127.3), assemble multipin plug (19).
Fix on the insulating hose (127.4) at the other end near the axle.
Bolt greenfield tubing onto axle, attach strain relief (F) and pull cabling back through head piece (94).
Fasten axle (21) with screws.

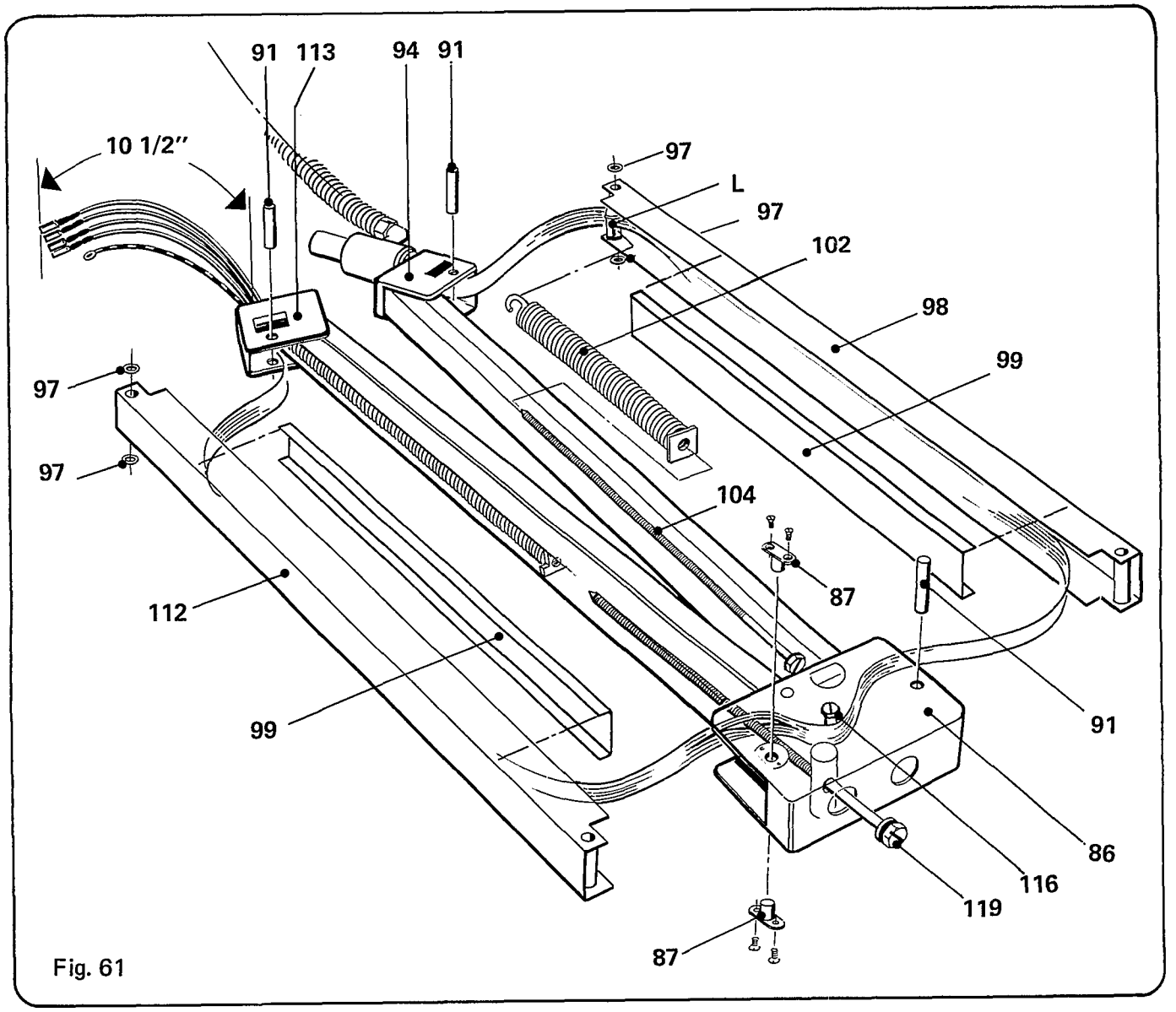


Fig. 61

Place longeron (cover) (98) close enough to the arm that the mobile spring holder (L) lies on the head piece (94).
Pull cabling through the spring holder.
Insert cabling flat in longeron (cover), put on profile (99) and stick together with adhesive (Cat. No. 29 78 195 D 3152). Make sure that the distances upwards and downwards are equal.
Wait at least one hour for the adhesive to dry.
Attach tension rear (102).
Pull cabling through the intermediate piece.
Check lead is in correct position. It must lie flat on the roller (116) in intermediate piece.
Faster longeron (cover) to the head piece (94) and the intermediate piece with cylindrical pins (91).
Place a washer between head piece and longeron (cover) on each side.
Insert hexagonal head screw (104) in such a way that it goes through the middle of the cabling. Screw into tension rear with about 10 rotations.
Fit other side of scissor arm with cover (112), profile (99), hexagonal head screw (119), washers (97) and bearings (87) to head piece (113) and intermediate piece (86) in the same way.
Secure scissor arm with safety strap.
Attach HELIODENT generator.
Tension the tension springs.
Carry out weight counterbalance as described on page 55 (mechanical adjustments).
Replace all cover caps.

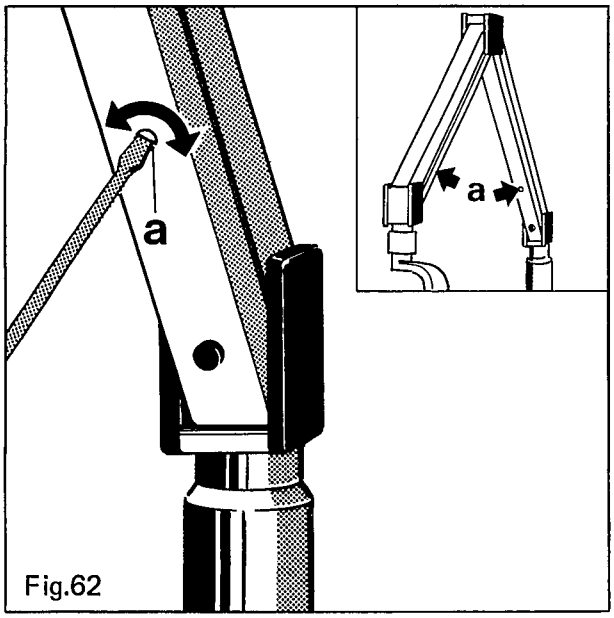


Fig.62

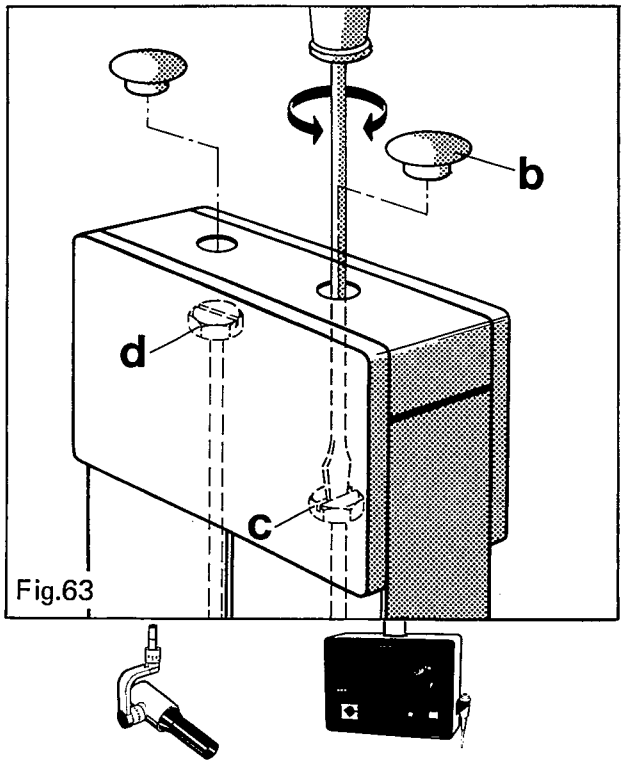


Fig.63

Mechanical adjustments (if required)

1. Spring adjustment

Adjustment Possibility of the spring counter poise.

The spring counter poise is set at the factory. However, it is possible to make readjustments after installation at the customer's facilities. Loosen screws (a) by turning **(1 1/2 turns max.)**. The two spring adjustment screws (c,d) are accessible at the double joint when the folded arm is in a vertical position and after removal of the caps (b). One of the screws heads is lower but is accessible with a medium size screwdriver held in vertical position. Clockwise movement increases the spring tension. Finally tighten screws (a) again.

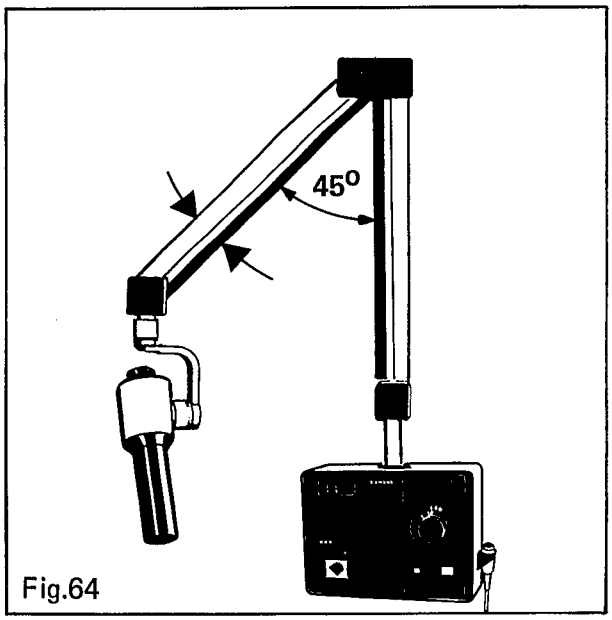


Fig.64

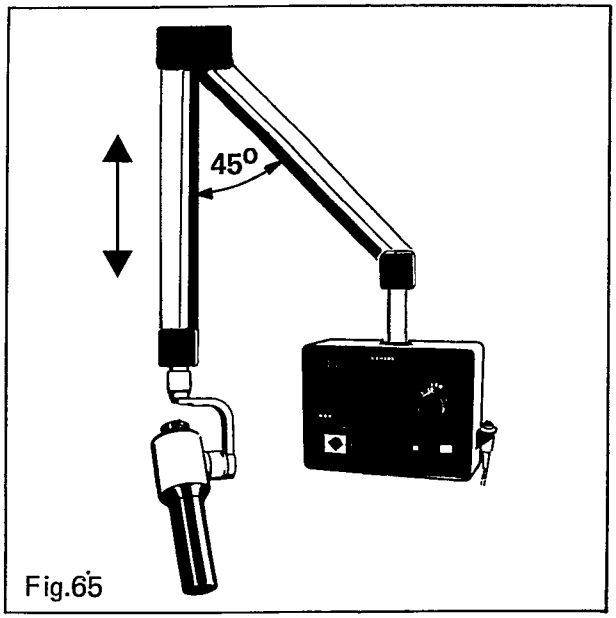


Fig.65

2. Friction pad

The adjustment sequence is: loosen screw (a) of arm to be adjusted **(1 1/2 turns)**. Position the X-ray head in a 45°angle to the vertical scissor arm. The arm with the X-ray head shall remain stationary at a 45° angle as shown. When lowering the X-ray head (to less than 45°) the X-ray head must return to 45° angle by itself when released. Spring adjustment is made with screw (d).

When raising the X-ray head (to more than 45°) the X-ray head must return again by itself when released. Spring adjustment is made with screw (c).

OPEN END WRENCH 13 mm 1/2"

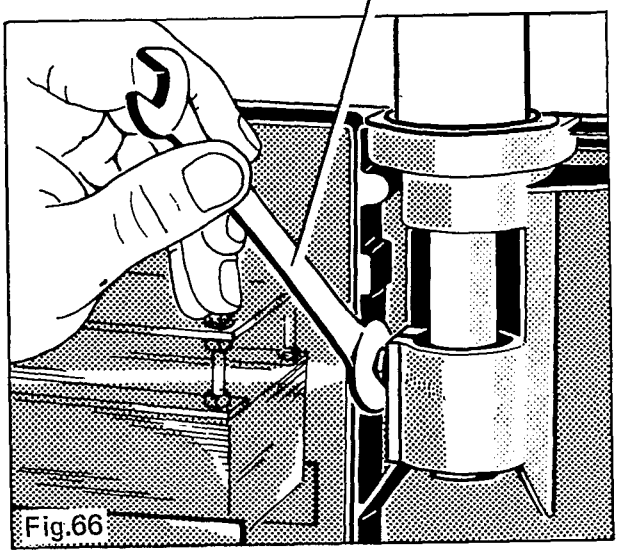


Fig.66

Brake adjustment

In the event the tube head drifts adjust the brake with an openend wrench.

Tighten the brake firmly but gently!
Check various arm positions for drifting.

Tube head rotational stop

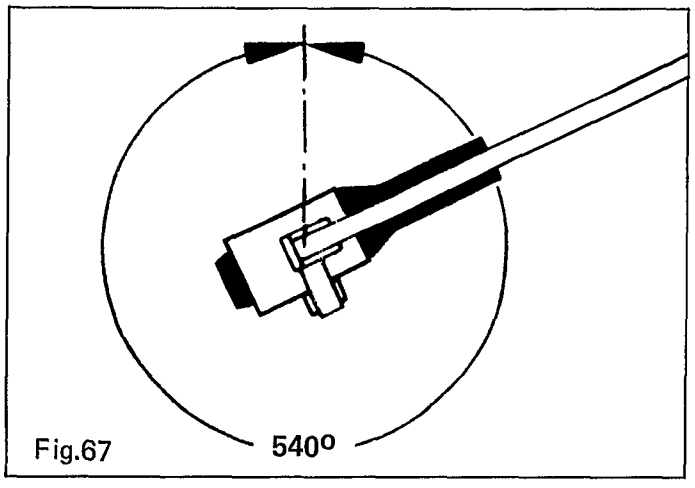


Fig.67

Test the tube head rotation from stop to stop for 540° (1 1/2 turns).

Rotational parts may require replacement.

To inspect, remove X-ray head from scissor arm as follows:

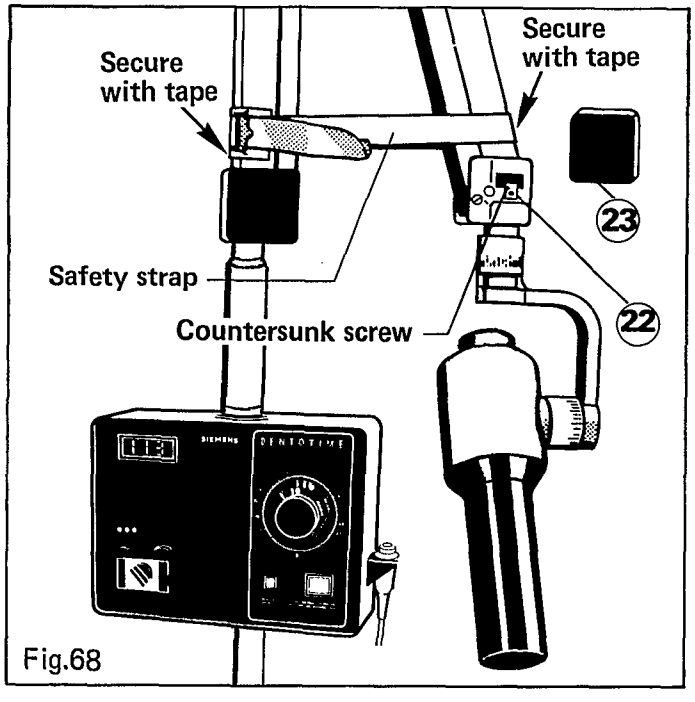


Fig.68

To facilitate the removal of the X-ray head, the scissor arm must be secured with the safety strap as shown.

Remove cap and cover.

Disconnect wires in the U-channel and ground wire ⏚.
CAUTION:
The wires must be marked as follows:

X-ray tube assembly wires	3	4	5	6
Scissor arm wires	3	4	5	6

Remove cover (23).
Remove countersunk screw from bracket (22). Hold X-ray head at the yoke and remove bracket (22). Remove X-ray head.

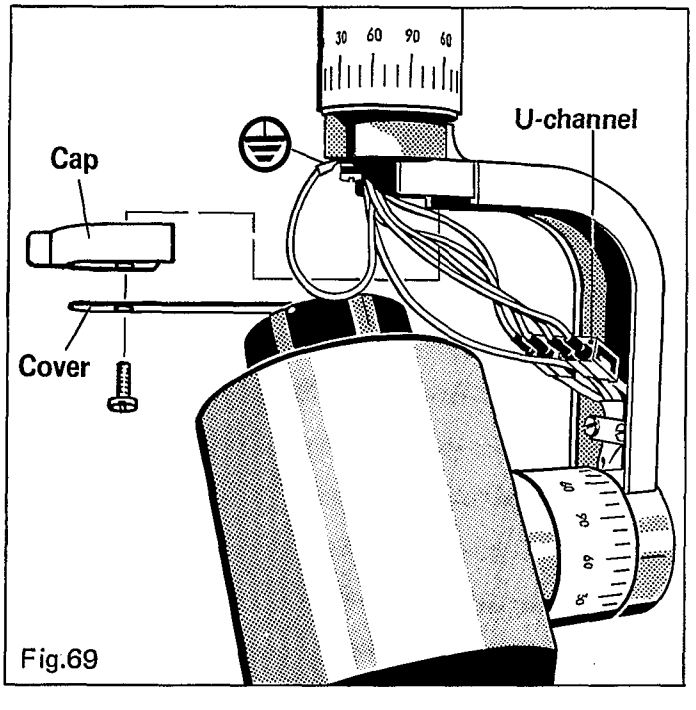


Fig.69

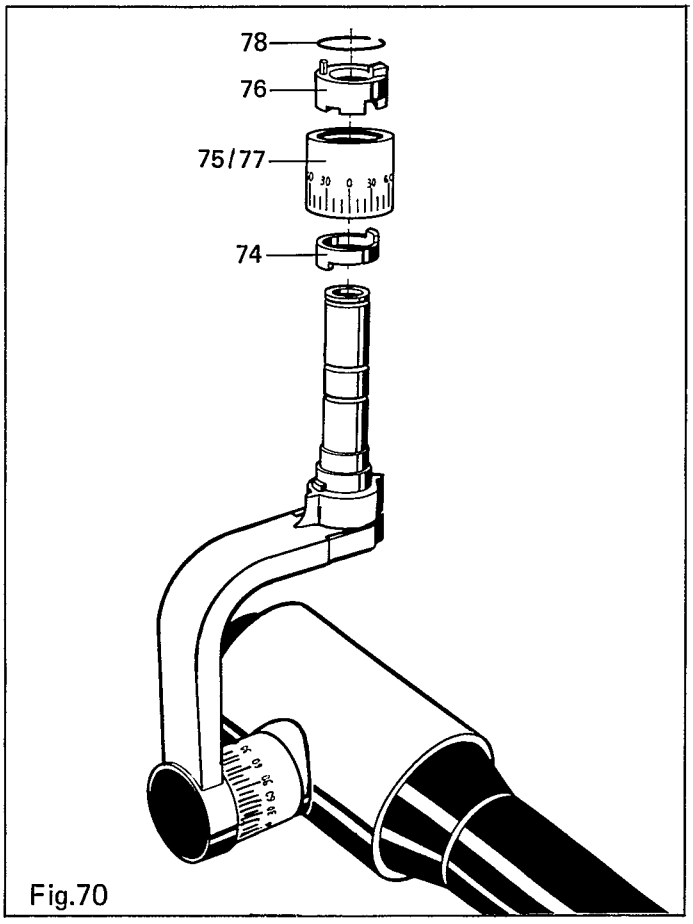


Fig.70

Remove clip ring (78).
Check rotational stop assembly (3 parts,74,75/77,76)
Replace parts as needed.

Reassemble in reverse sequence.

TAKE CARE NOT TO PINCH ELECTRICAL WIRES

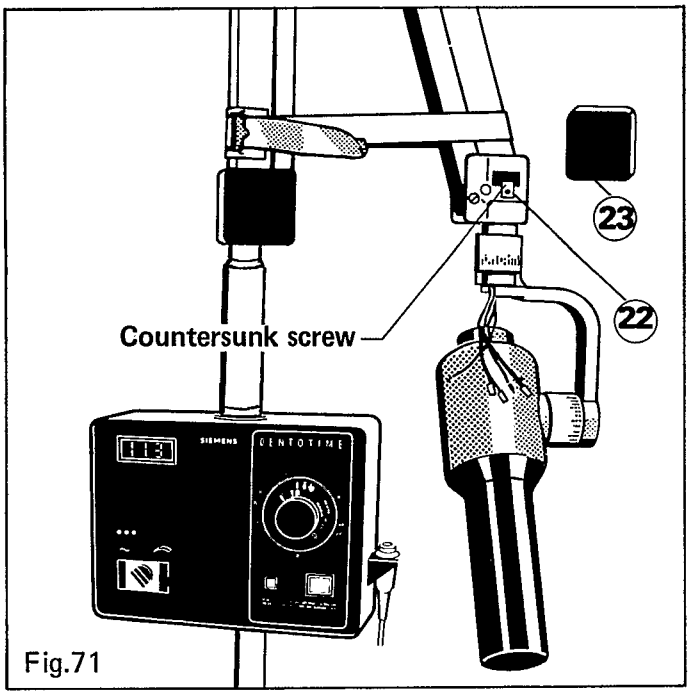
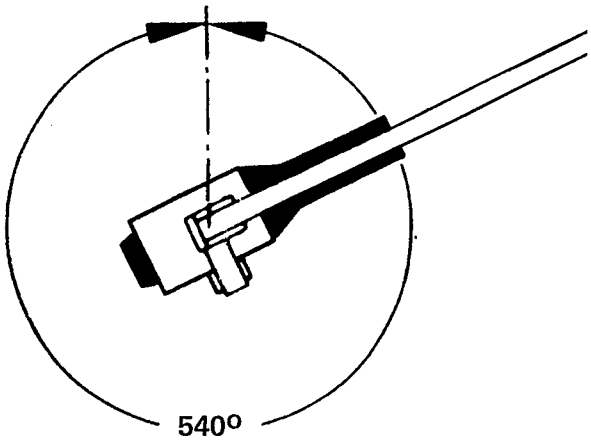


Fig.71



Grease the bracket (No. 22).
Secure the shaft with the bracket (No. 22) to the arm, using the countersunk screw.
Install the brown cover over the joint (No. 23); it snaps into place.
Test the tube head rotation from stop to stop for 540° (1 1/2 turns).
Note:
Rotation beyond 1 1/2 turns indicate improper assembly, wiring damage will occur if not corrected.

Remove strap.

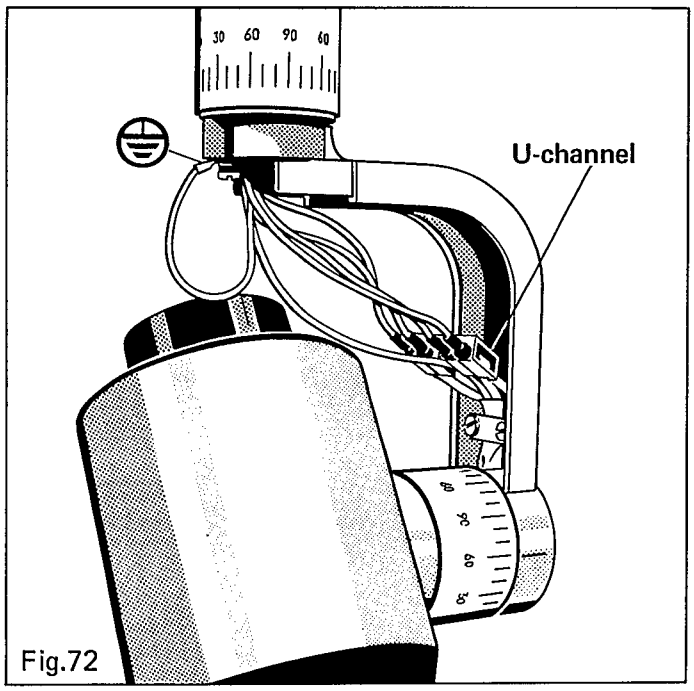


Fig.72

Connect the five wires of the X-ray tube assembly to the wires of the scissor arm according to the markings.

X-ray tube assembly wires	3	4	5	6
Scissor arm wires	3	4	5	6

Ground Connections

Connect the leads as shown and secure

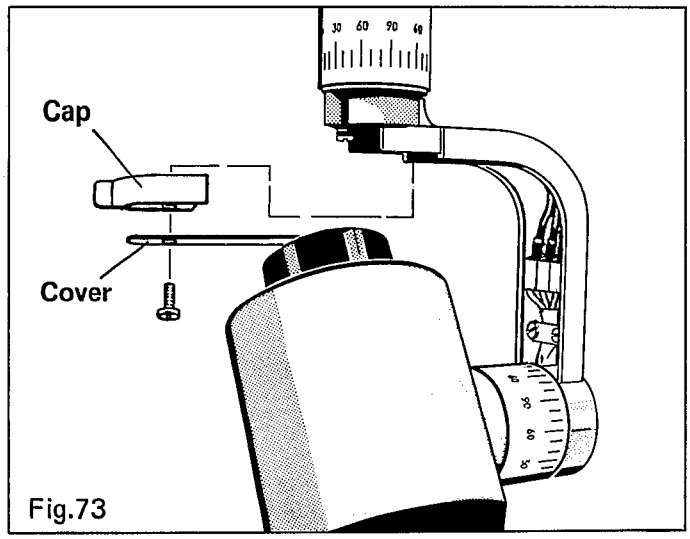


Fig.73

Press in U-channel

Place cap on yoke TAKE CARE NOT TO PINCH ELECTRICAL WIRES

Place cover over yoke and fasten with screw.

Wiring exchange in scissor arm: WE DO NOT RECOMMEND a field repair.
Defective scissor arms shall be returned to SIEMENS MEDICAL SYSTEMS, INC. Dental X-Ray Division (address see rear)

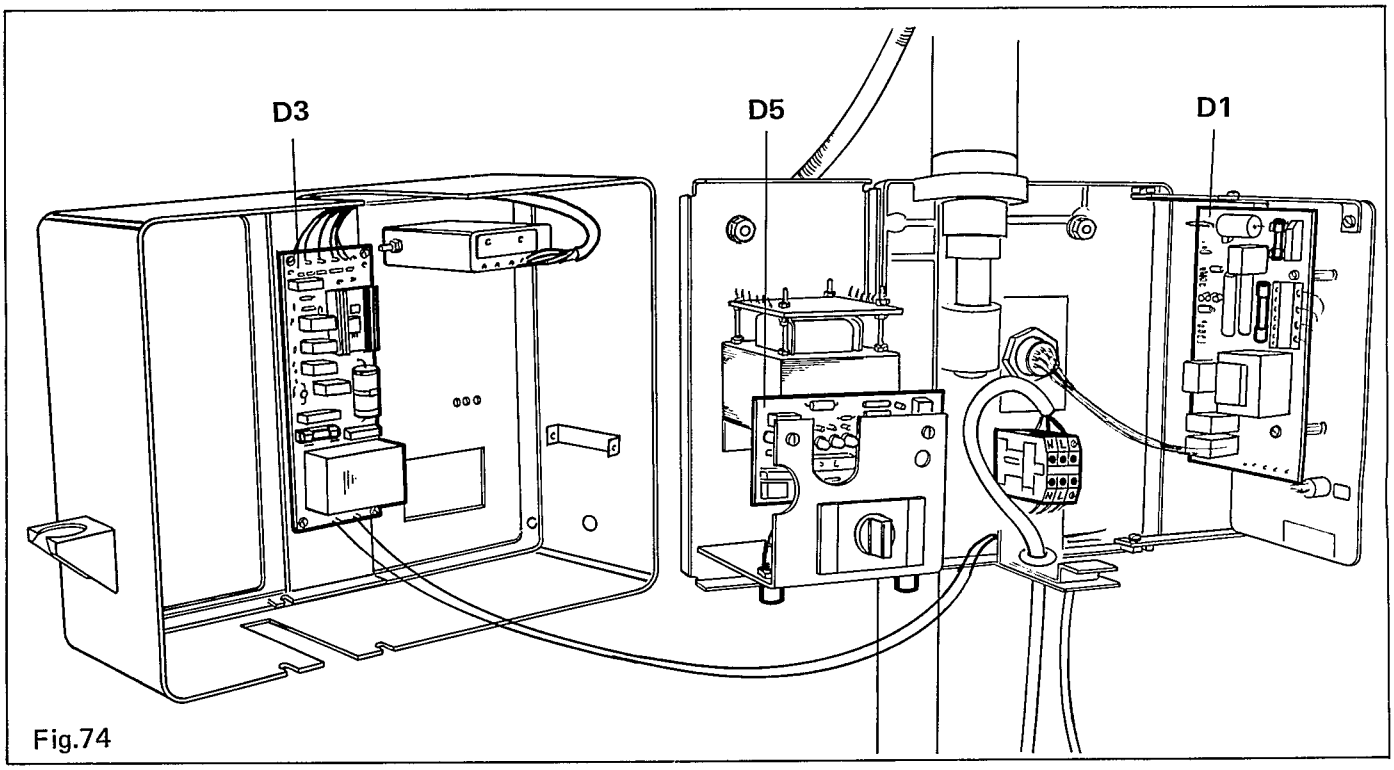


Fig.74

PC boards D1 and D3 may be exchanged with the aid of a screw driver.
PC board D5 requires a soldering tool.

All PC boards are factory calibrated. For adjustment of PC board D1 see chapter MAINTENANCE, page 48.

No X-rays emitted from tube head – blank radiographs

X-ray output can be checked with a fluorescent screen, if available.

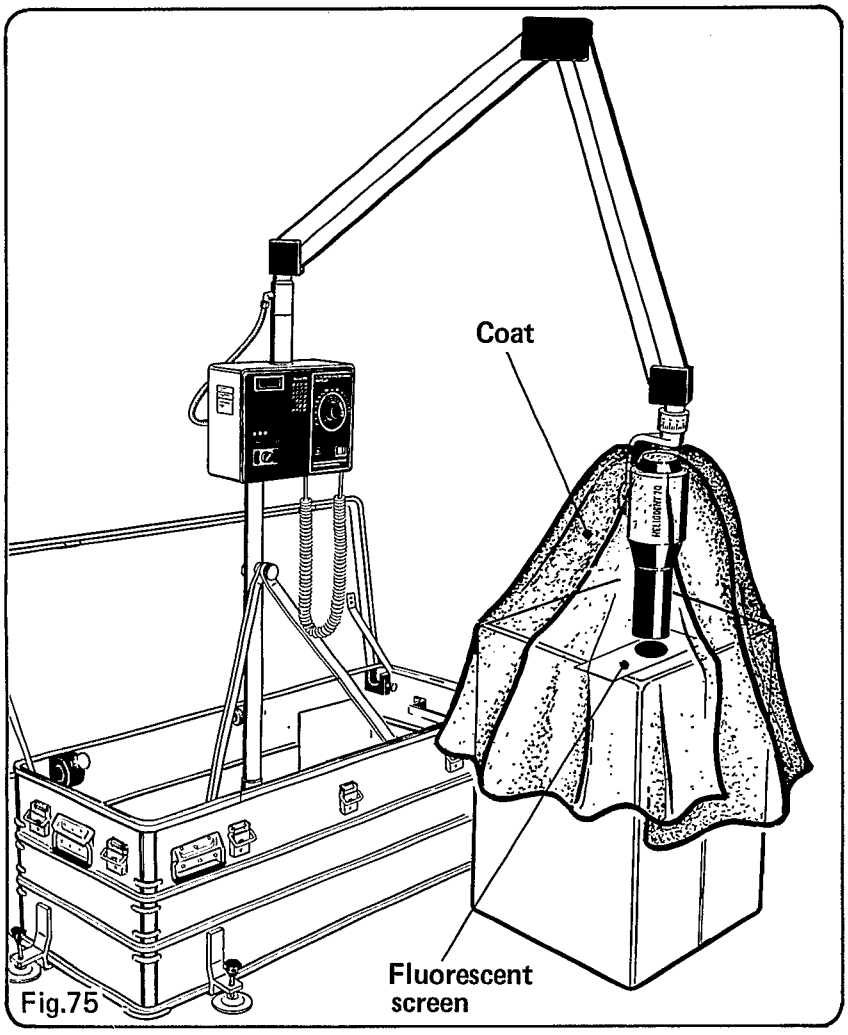
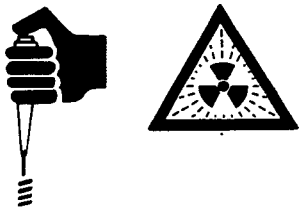


Fig.75

Place the fluorescent screen on a table or counter top as shown.
Place a coat over the X-ray head in order to dim the surrounding area.
Set exposure time 1,0 sec.

Make an exposure



During the exposure the radiation will be visible on the fluorescent screen.
At the same time, the red radiation indication lamp at the DENTOTIME must light up, simultaneously audible sound is present.

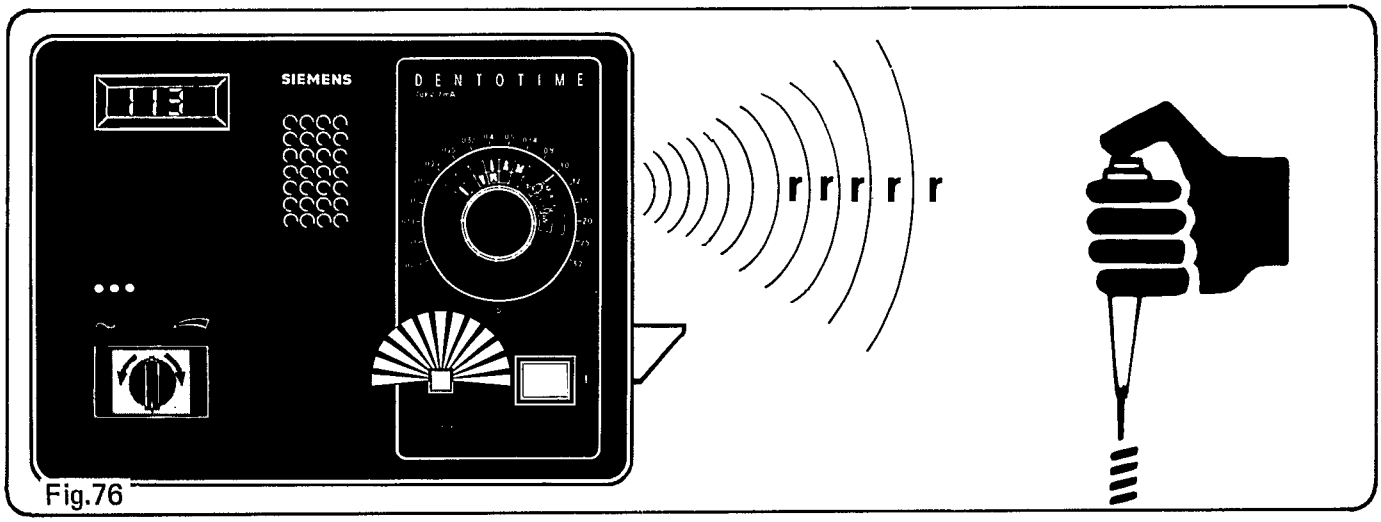


Fig.76

If no X-rays are present but all visual and audible indicators are functional, make electrical measurement as follows.

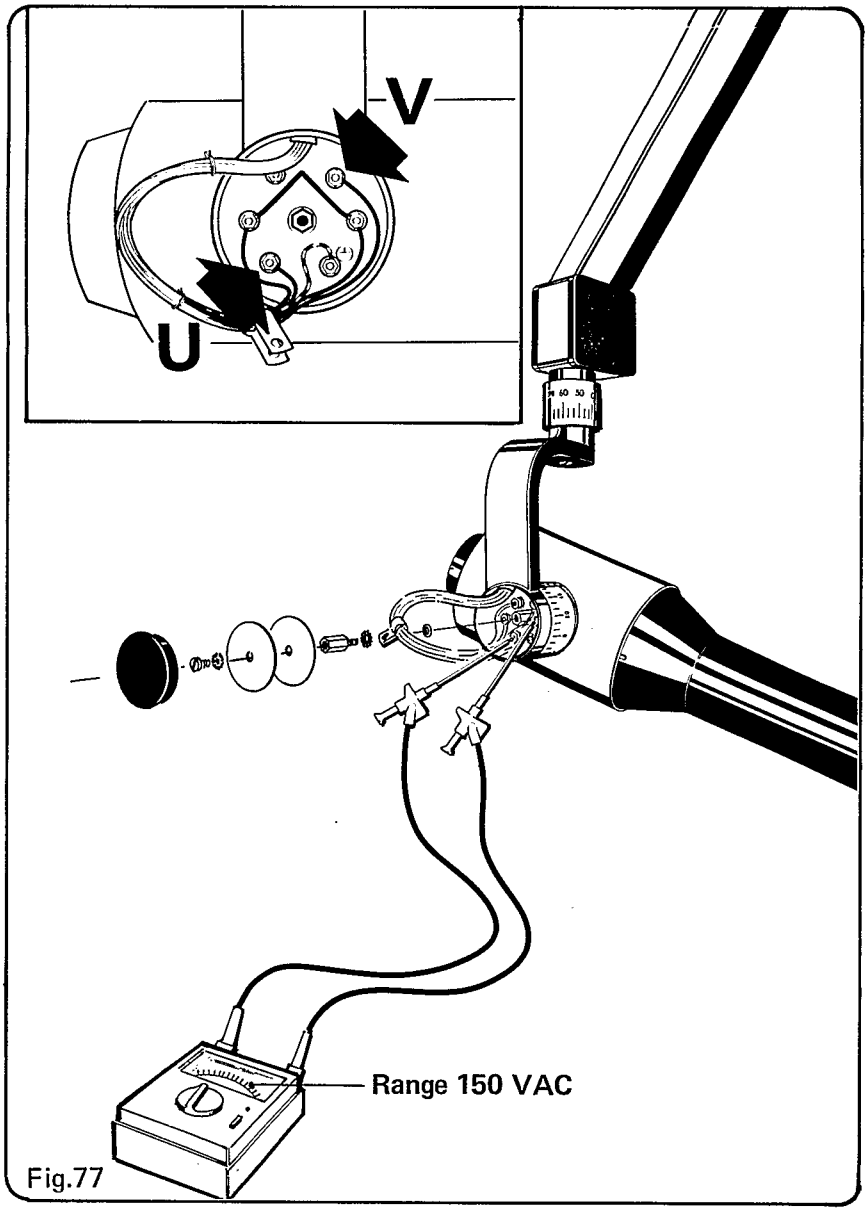


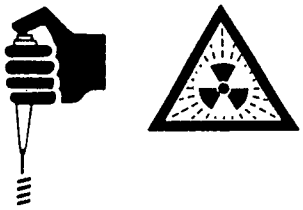
Fig.77

Electrical measurement

Remove cover and aluminum disc.

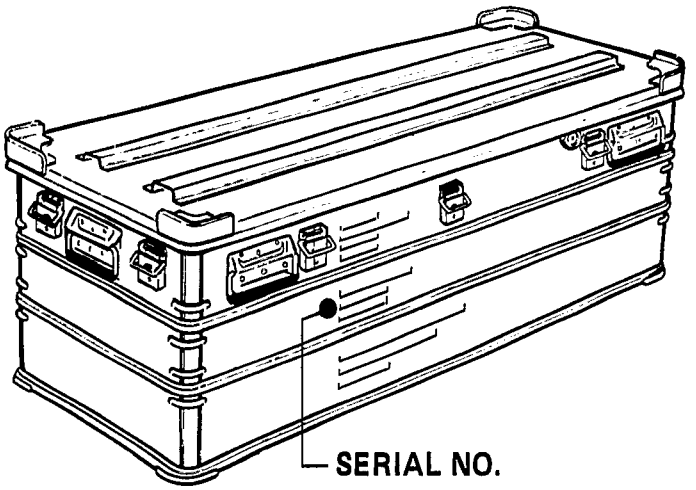
Connect multimeter at leads 3 and 4. (X-ray head terminals are marked U and V).
Select range 150 VAC.

Make an exposure



If a voltage of approx. 120 V is present, the X-ray head is defective and must be exchanged.

STORAGE INSPECTION PROCEDURE



First inspection: 18 months after date of manufacture

Further inspections: every 12 months thereafter

	UNIT's SERIAL NO.				
	Date of inspection Month	Day	Year	Inspectors name	Signature
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

ASSEMBLY INSTRUCTIONS FOR PORTARAY - MODEL D 3152

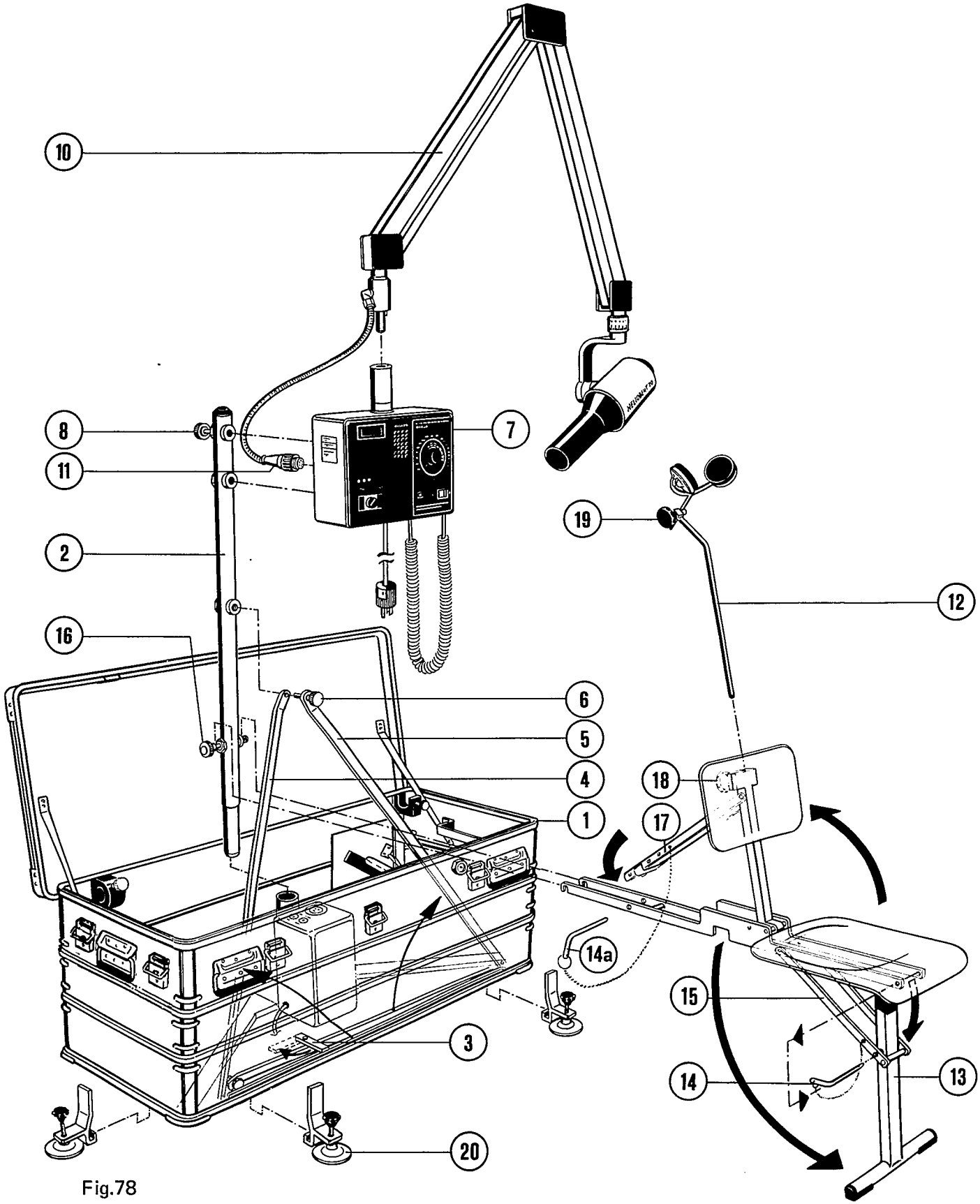


Fig.78

Caution:

After the completed assembly the carrying case must be leveled.

Set-up

1

Remove all components from carrying case (1).
Lay out components keeping numbers in sequence.

Insert upright (2) into base, swing bracket (3) in the direction of the arrow.
Lift support bars (4) and (5), secure same in upright as shown with knob (6).

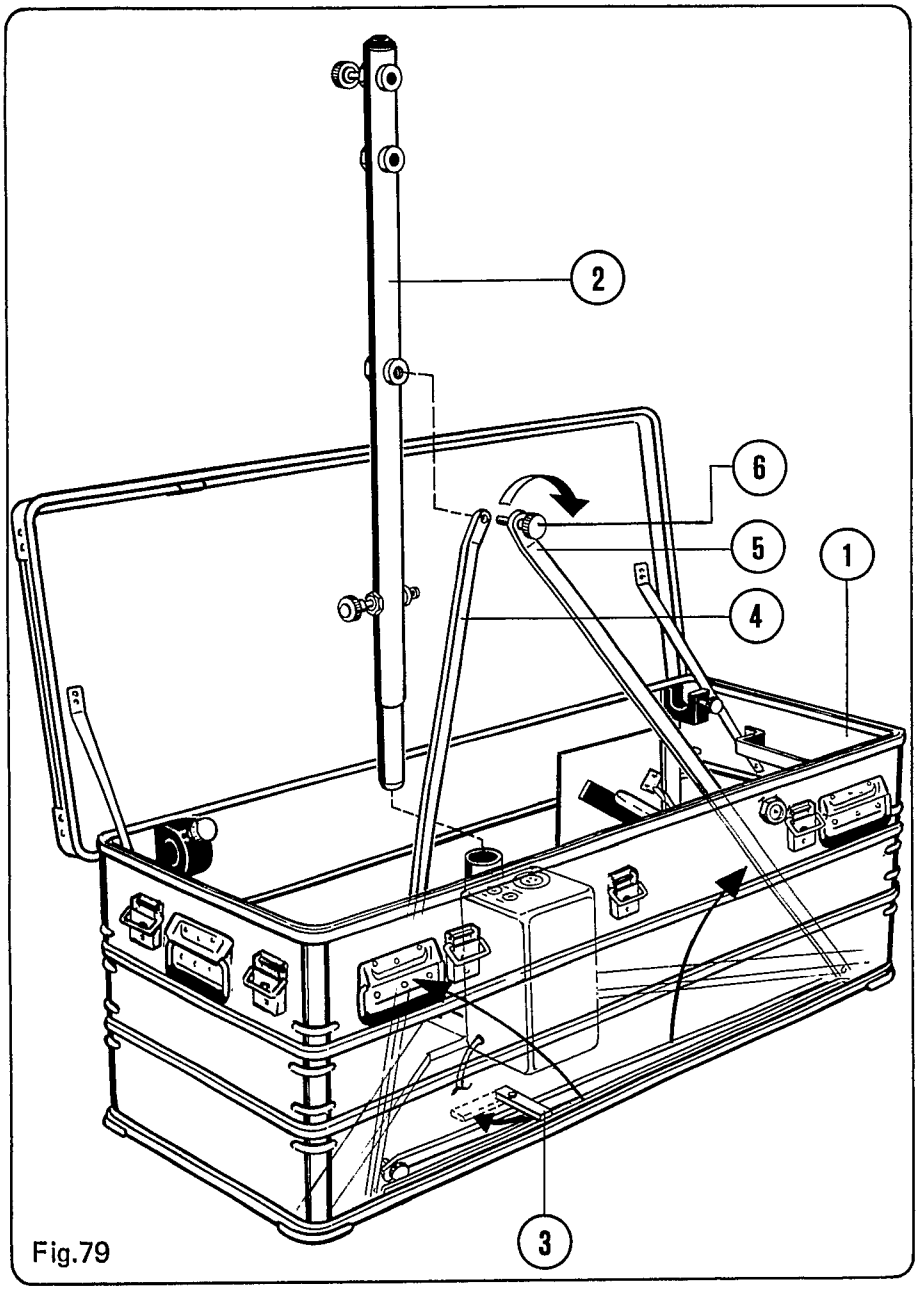


Fig.79

2

Engage dowel pins of X-Ray control adapter (7) in upright, secure with knob (8).

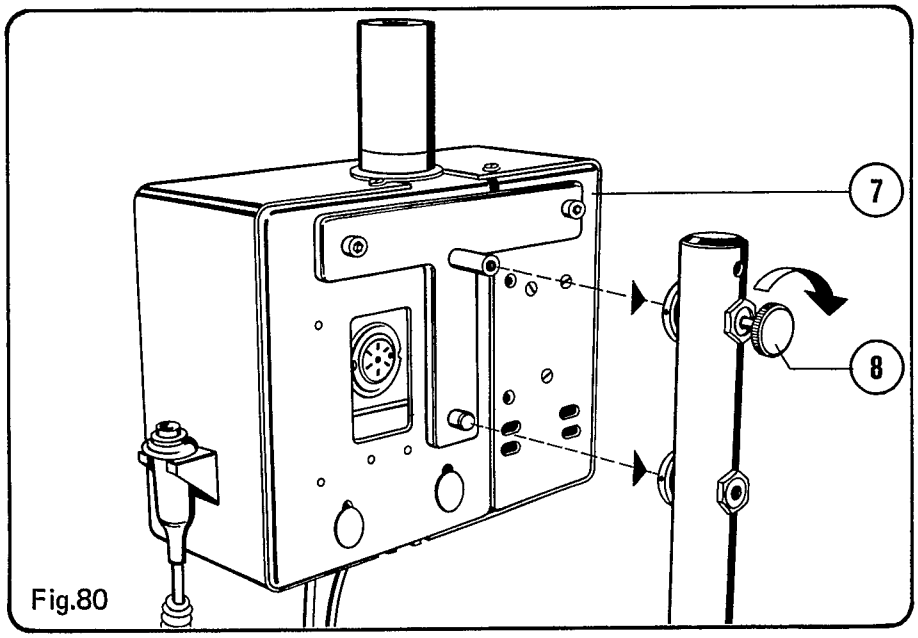


Fig.80

3

Loosen safety strap (9) to permit a 6" opening of the scissor arm (10) before engaging the arm in the coupling as shown.

CAUTION! To prevent accidental opening of the spring loaded scissor arm, causing injury and arm damage. DO NOT REMOVE safety strap completely, unless the arm is fully engaged in the coupling.

Connect multi pin plug (11) secure with lock ring in direction of arrow.

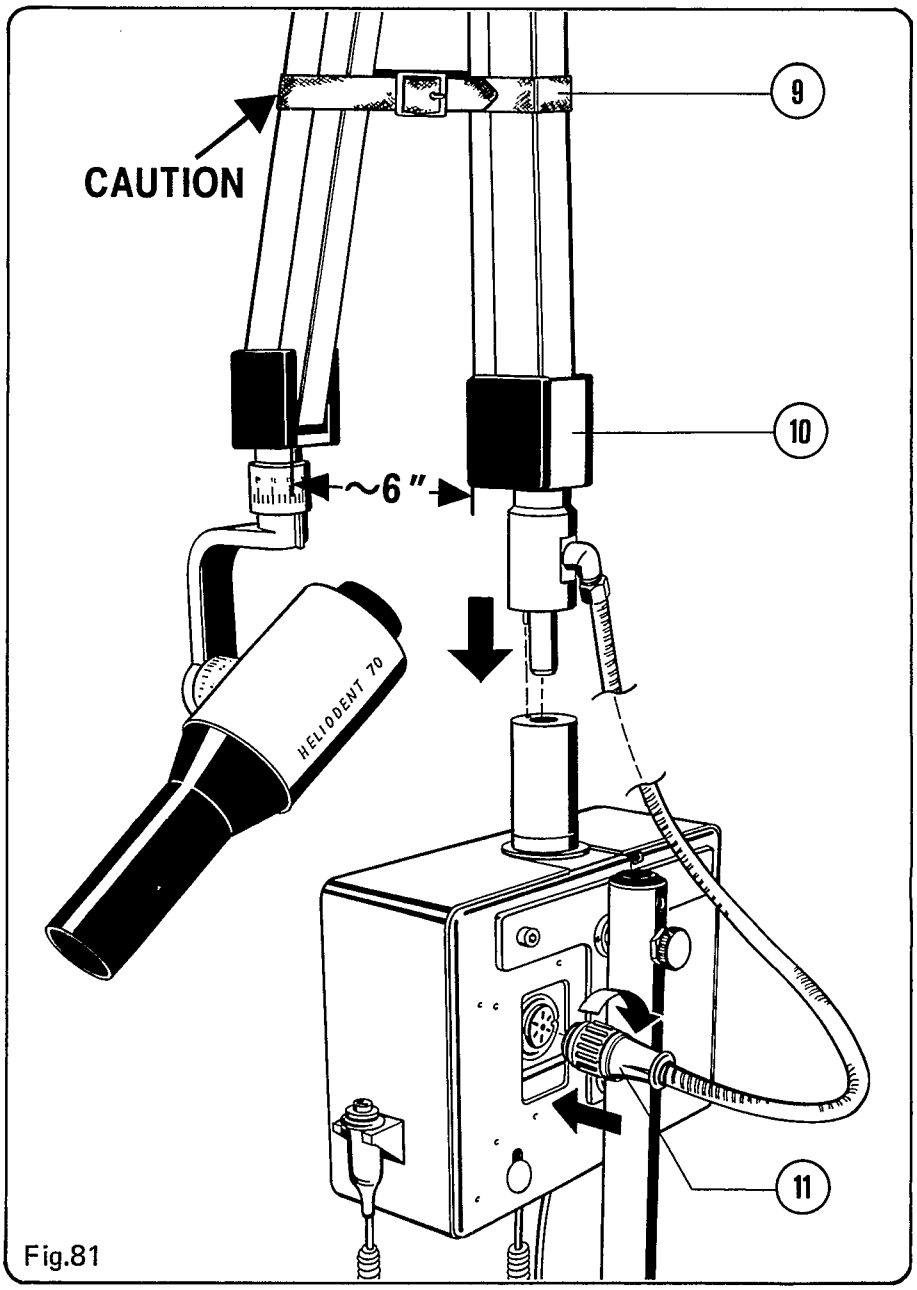
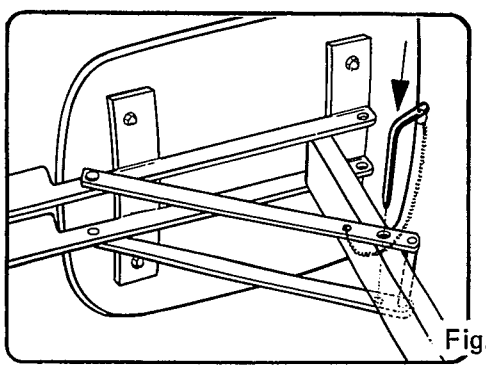


Fig.81

4

Loosen knob (18), remove headrest assembly (12) from storage position. Remove safety pin (14). Unfold stool leg (13) and retainer bracket (15). With stool leg fully extended secure same with safety pin as shown see detail.



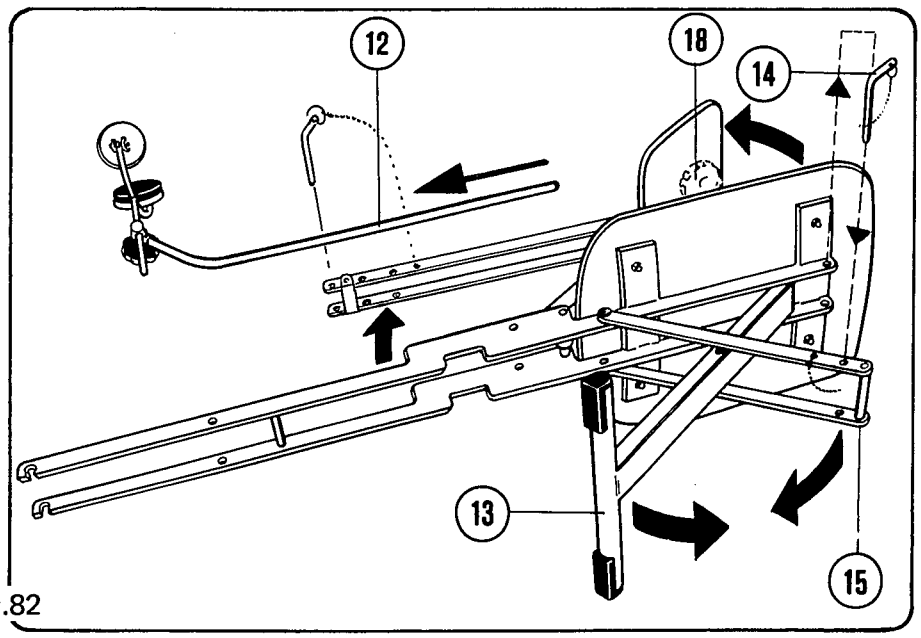


Fig.82

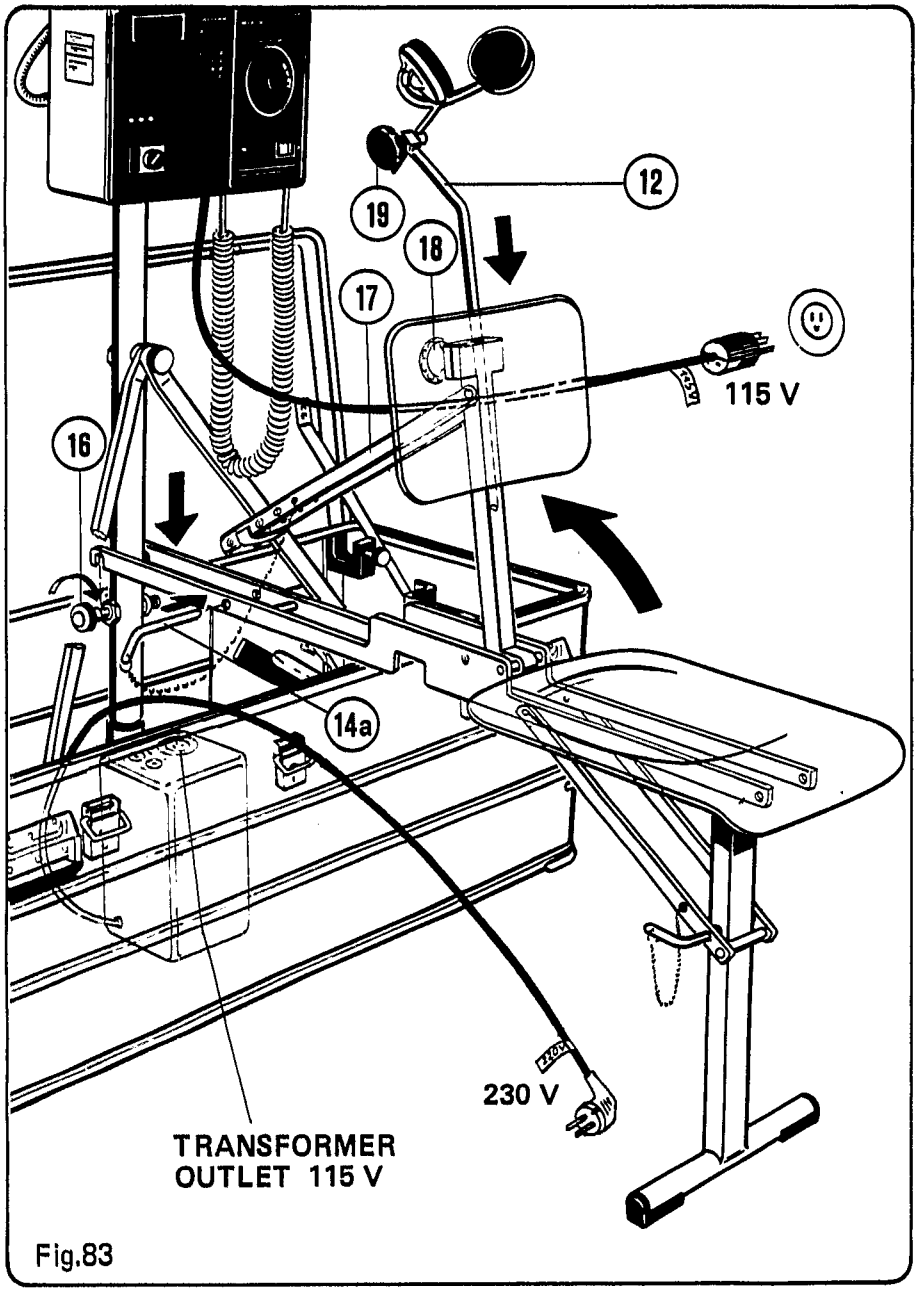


Fig.83

5

Engage stool support in upright, secure with knob (16). Raise backrest in direction of arrow.
Position backrest with backrest brace (17) (3 positions) and secure with safety pin (14a).
Insert headrest assembly (12), secure with knob (18) (headrest height adjustment).

Adjust headrest cradle position with knob (19).

When the power supply is 115 V:
Connect the power cord directly into the 115 V wall outlet.

When the power supply is 230 V:
Connect the power cord at the transformer's 115 V outlet and connect the transformer's power cord into the 230 V wall outlet.

In case of a portable gasoline-diesel driven generator this generator must meet the following technical characteristics:
Power rating: 5 kVA,
Volts: 230 V nominal, single phase
Max.permissible deviation: 207 to 253 VAC
Max. permissible fluctuation of line voltage during standby:
1.5 % at 230 VAC.

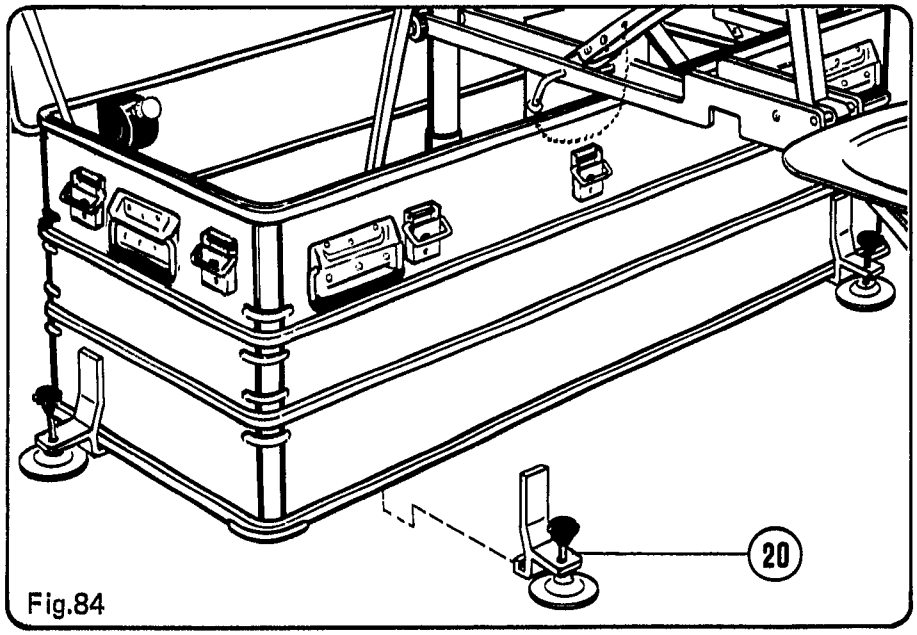


Fig.84

6

Level carrying case and upright with the aid of 3-leveling devices (20).

The leveling devices hook to the lower carrying case frame.

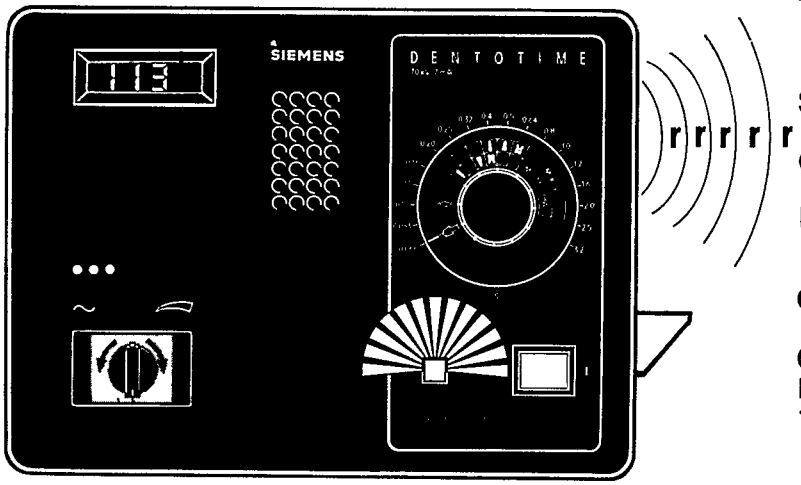


Fig.85

X-ray head performance test

Reseasoning of the built-in X-ray tube.

Set exposure time 0.066 sec.

Collimator is still covered with lead cap!

Make 5 exposures.

CAUTION:

Observe the cooling time between exposures.
Relative power duration:
1 : 60 / min. cooling period 20 sec.
For example,
0.066 sec. exposure time — pause of 5 sec.

The X-ray tube is now reseasoned.

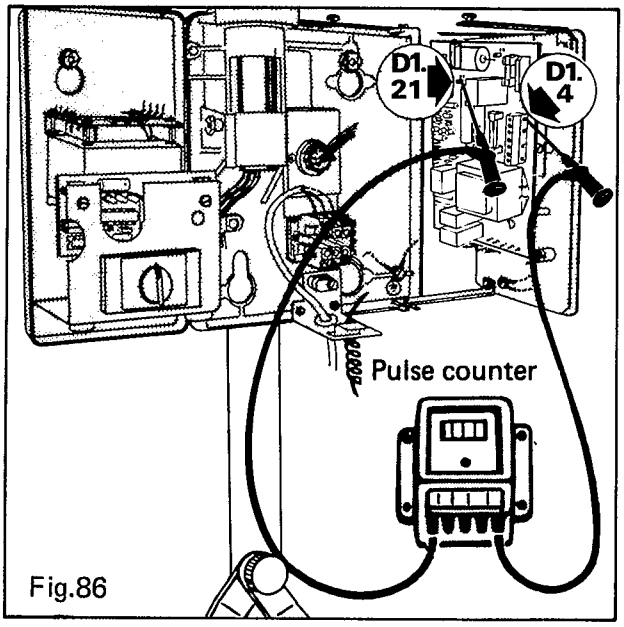


Fig.86

Checking the exposure time

Pulse counter Model - KESSLER ELLIS KT
203 ± 1 pulse.
Connect pulse counter as shown.
Set exposure time 0.066 sec.

Make four exposures

CAUTION: Observe the cooling time between exposures.
Relative power duration:
1 : 60 / min., cooling period 20 sec.
For example:
0.066 sec. exposure time — pause of 5 sec.
3.2 sec. exposure time — pause of 3 1/2 min.

Note the values:

1. _____ pulses
2. _____ pulses
3. _____ pulses
4. _____ pulses

Total_____ and divide by 4 = _____
average pulse count.

ATTENTION! Installer/Assembler
Measurements followed by this symbol **must** be **recorded** on the QA Installer Check-list!

If the average pulse count is not within: 1 to 4 pulses at 50 Hz
2 to 5 pulses at 60 Hz see MAINTENANCE, page 48.

Set exposure time 3.2 sec.

Make four exposures

Note the values:

1. _____ pulses
2. _____ pulses
3. _____ pulses
4. _____ pulses

Total_____ and divide by 4 = _____
average pulse count.

ATTENTION! Installer/Assembler
Measurements followed by this symbol must be recorded on the QA Installer Check-list!

If the average pulse count is not within: 140 to 170 pulses at 50 Hz
172 to 202 pulses at 60 Hz see MAINTENANCE, page 48.

Dose Measurement

Set exposure time 1.0 sec.
Remove lead cap from collimator of the X-ray head.

The measurement is carried out with the MDH X-ray Monitor, Model No. 1015 or equivalent.

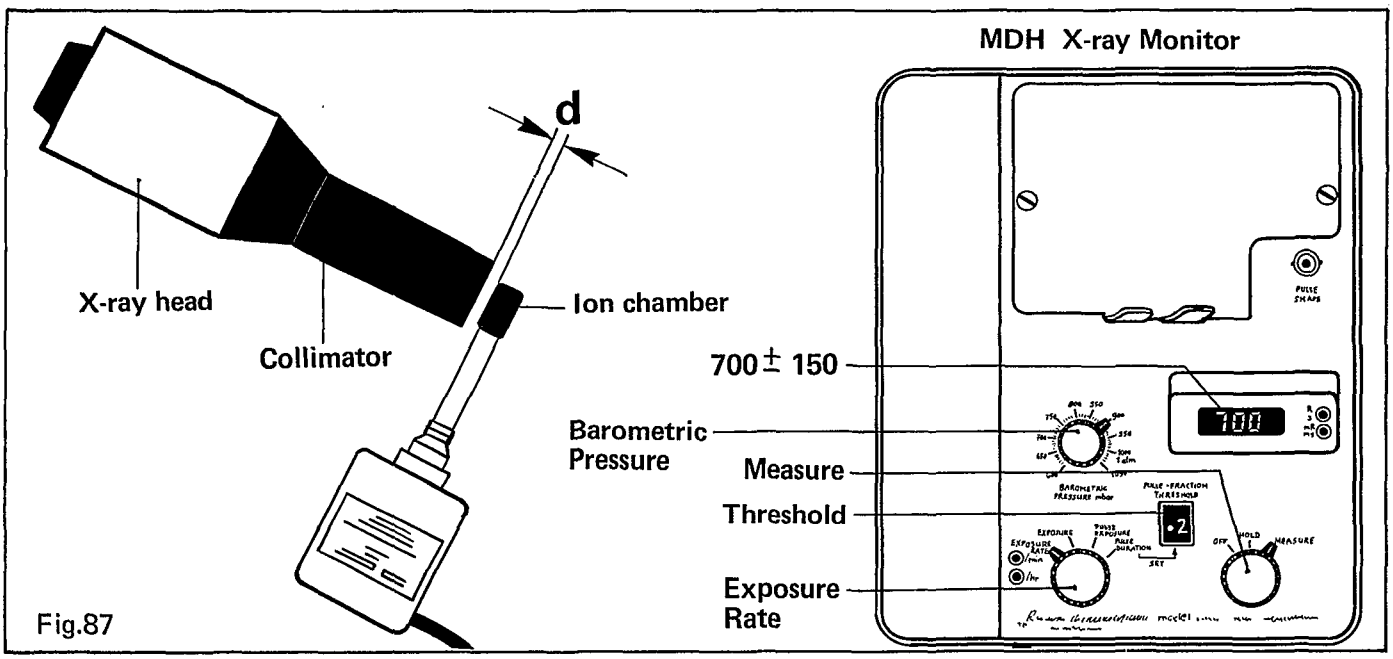


Fig.87

Position the X-ray head to the ion chamber as shown (90°, same central plane).
For reproduceability we recommend a special holding device with a radiation barrier.

Adjustments to the MDH X-ray Monitor:

- Set THRESHOLD to 0.2
- Set to proper BAROMETRIC PRESSURE
- Set to EXPOSURE RATE
- Set to MEASURE

Make an exposure **WARNING: RADIATION!**

The measured dose should be 700 mR plus minus 150 mR.

For reproduceability note the distance , where the measured dose value is obtained. Distance d: .....

In the event the dose levels are lower than specified above, the X-ray head needs to be replaced.

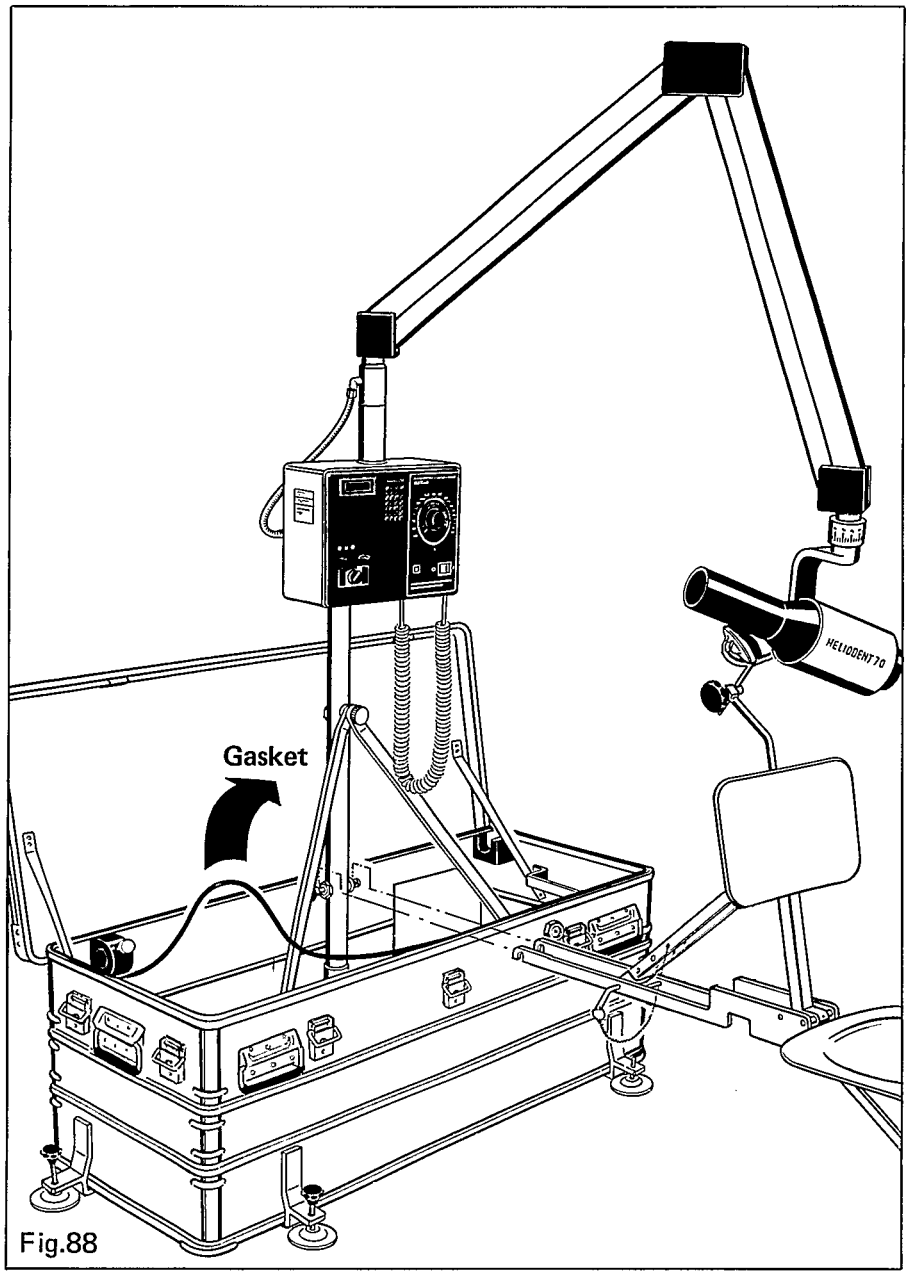


Fig.88

Inspection of the gasket

If a mechanical defect (cuts, frayed etc.) is visible, the gasket must be exchanged.
Remove old gasket and clean the gasket retainer groove with a scraper to remove old adhesive.
Apply new adhesive per manufacturers instruction.
(Adhesive part no.29 78 195 D 3152).
Install new gasket.

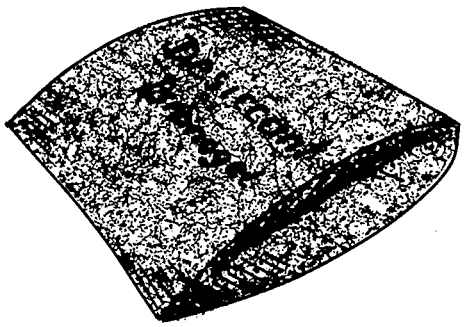


Fig.89

Desiccant bag
(Branogel).

The desiccant bag must be exchanged at 18 month after date of manufacturing, then every year.
The desiccant bag in the storage packaging has a color indicator:
color blue means "good",
color pink means "not good".

Repacking

Disconnect unit from power supply

1

Remove X-Ray Arm assembly (10) first!!

Place safety strap over scissor arm as shown.

CAUTION! Failure to follow this procedure may cause injury, and/or damage to the scissor arm (the arm is spring loaded).

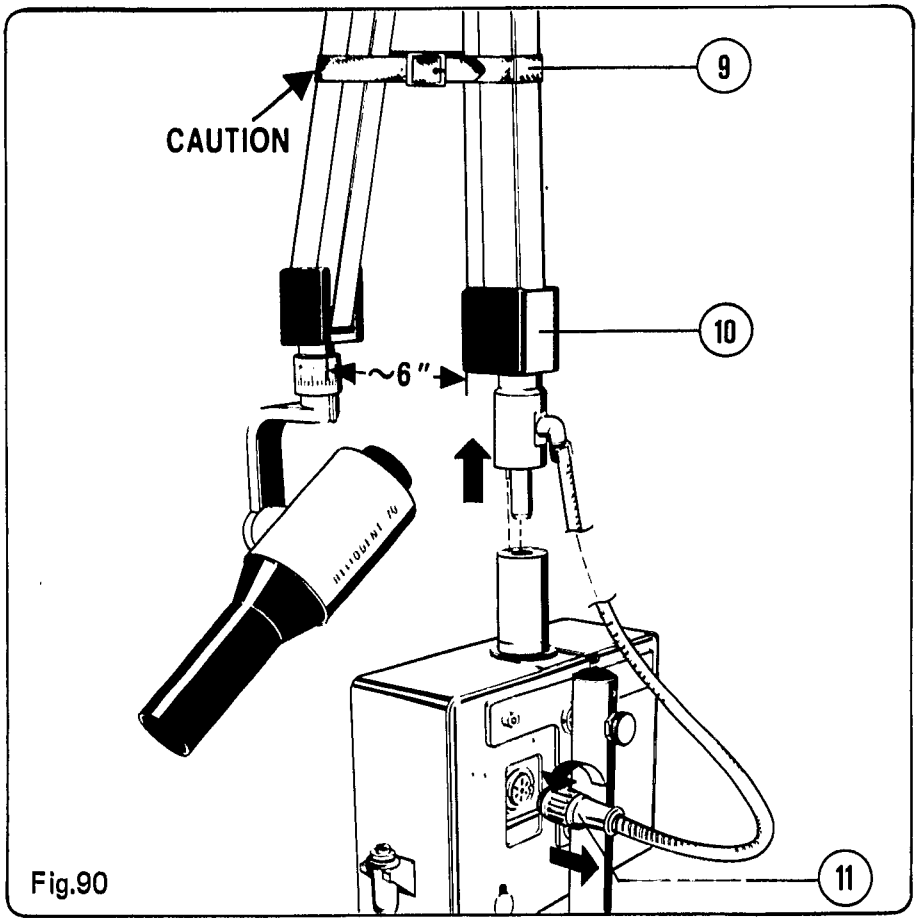


Fig.90

Loosen locking ring, disconnect multi pin connector, disengage scissor arm assembly from coupling as shown, place protective sleeve (23) over multi pin connector (11),route greenfield tubing tighten strap (9).

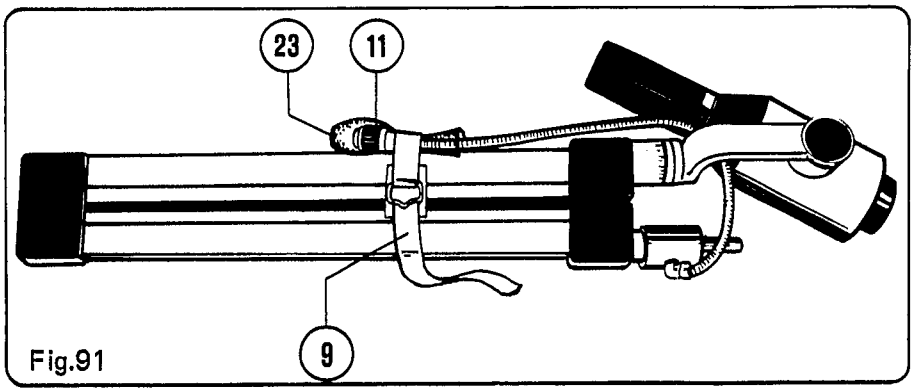


Fig.91

Remove all other components.

Fold support bars (4) and (5), secure with bracket (3) in the direction of arrow.

Store leveling brackets (20) as shown and secure.

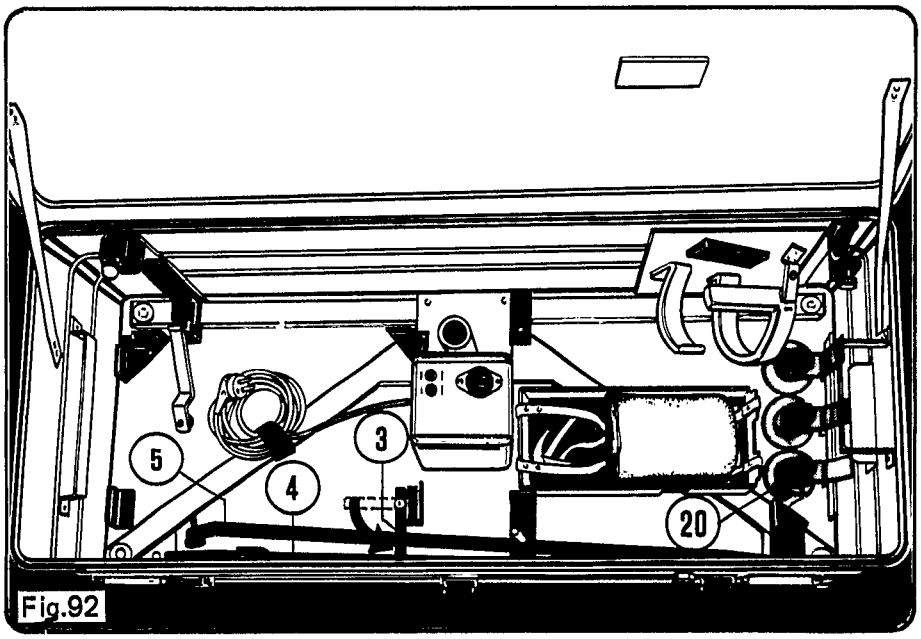


Fig.92

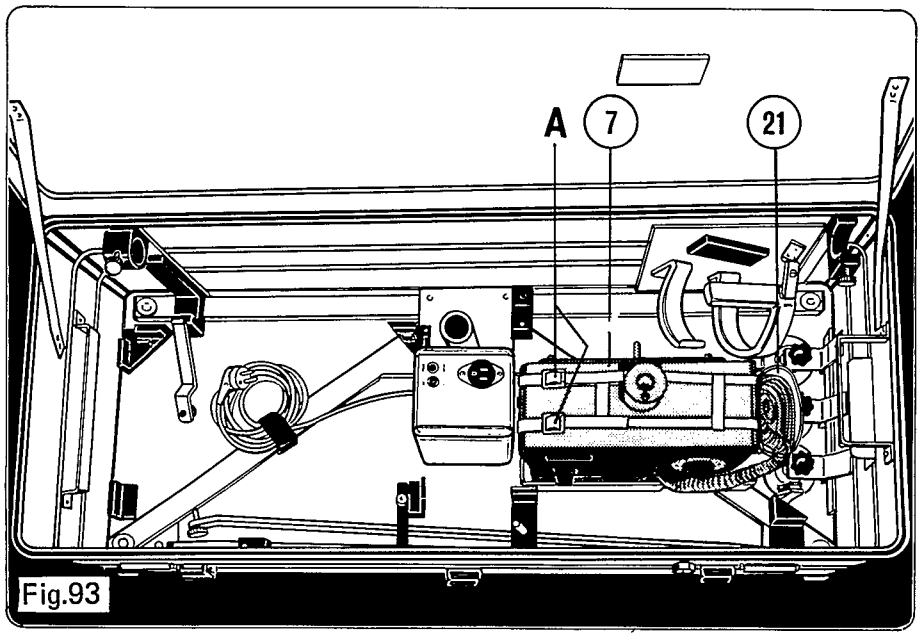


Fig.93

2

Place X-Ray control (7) into cradle, store power cord and exposure cord in pouch (21) . Secure control as shown (A).

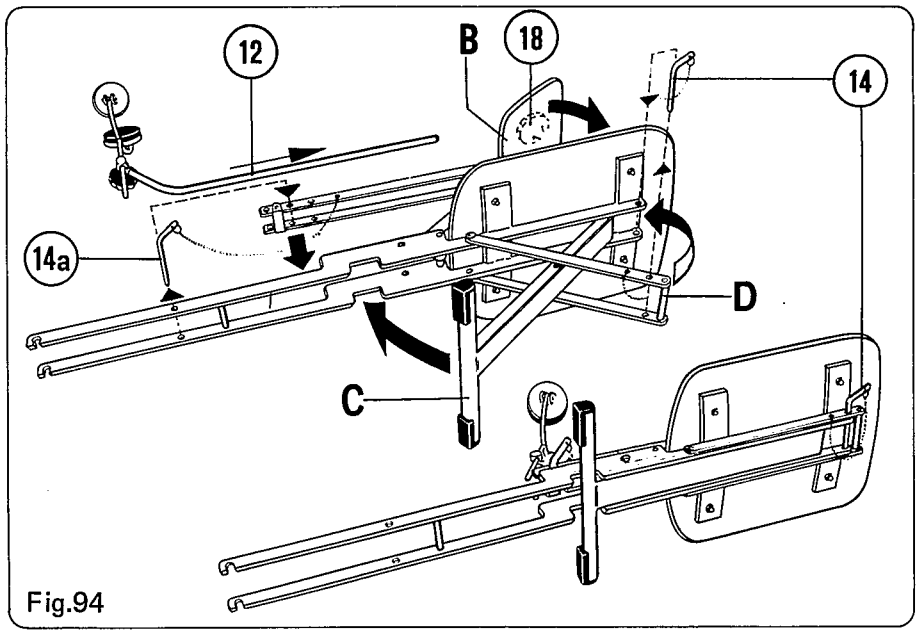


Fig.94

3

Remove headrest assembly (12). Remove pin (14a) and store in backrest brace.
Fold backrest (B). Insert headrest assembly (12) in the direction of arrow, secure with knob (18).

Remove safety pin (14) , fold stool leg (C) and retainer bracket (D), secure with safety pin as shown.

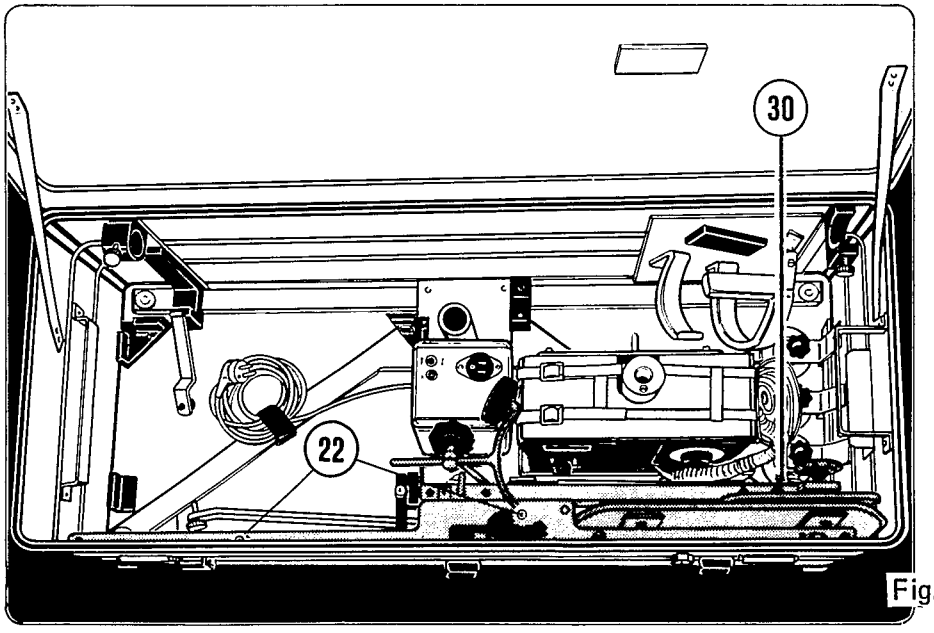
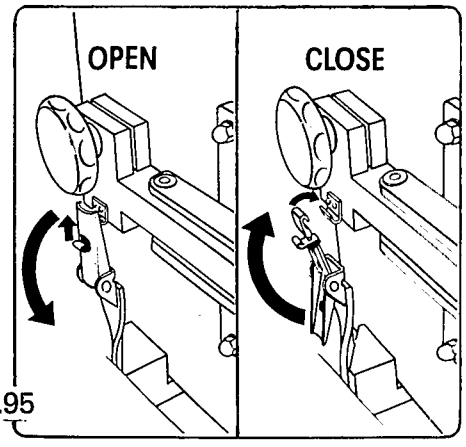


Fig.95

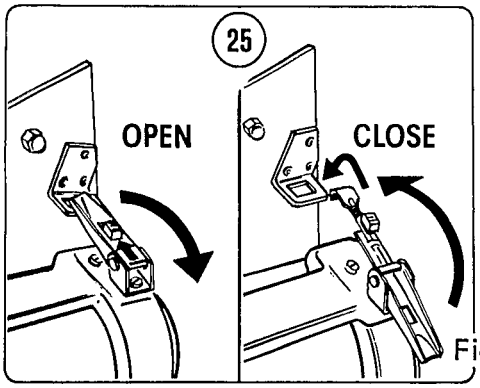
4

Place stool assembly into case, watch for dowel pins (22) to engage as shown. Secure (CLOSE) with fastener (30).



5

Raise brackets (24) and (26) OPEN, place scissor arm with X-Ray head into cradle. Secure brackets with fasteners (25) and (27) CLOSE.



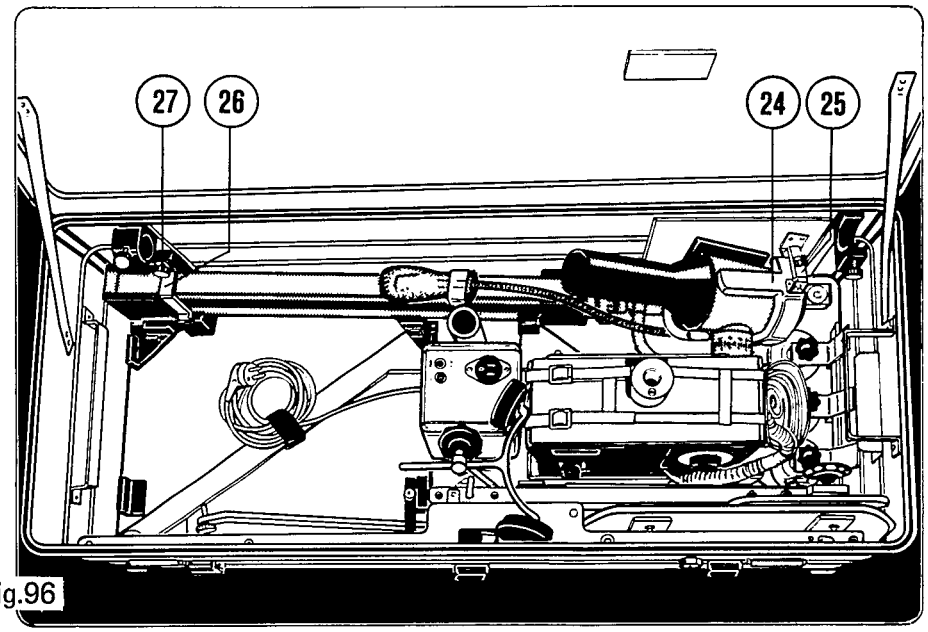


Fig.96

6

Guide upright through grommet (28) as shown, secure both ends to the case with two knurled knobs (29).

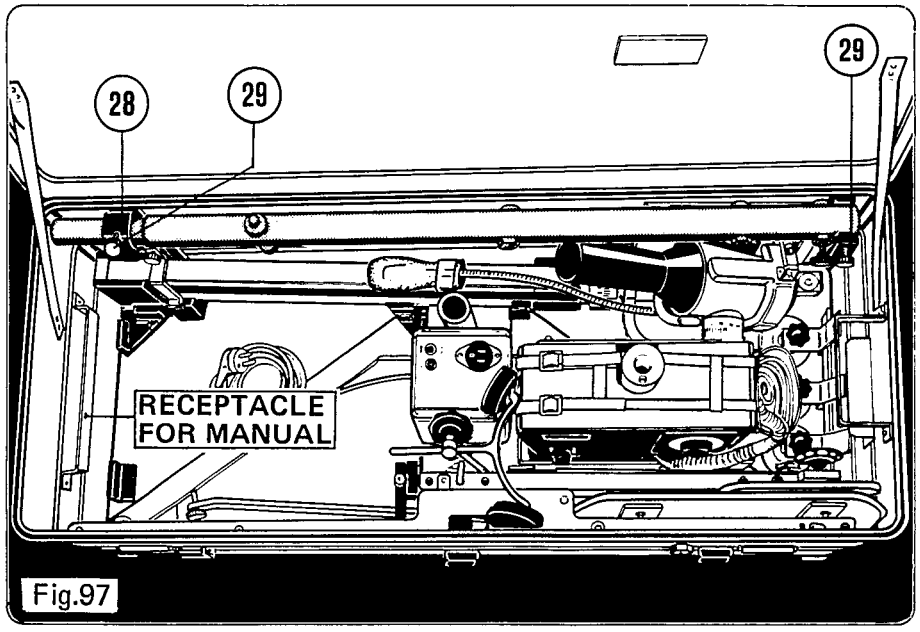
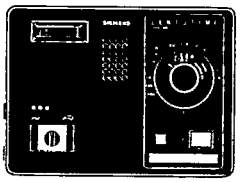
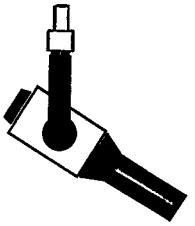
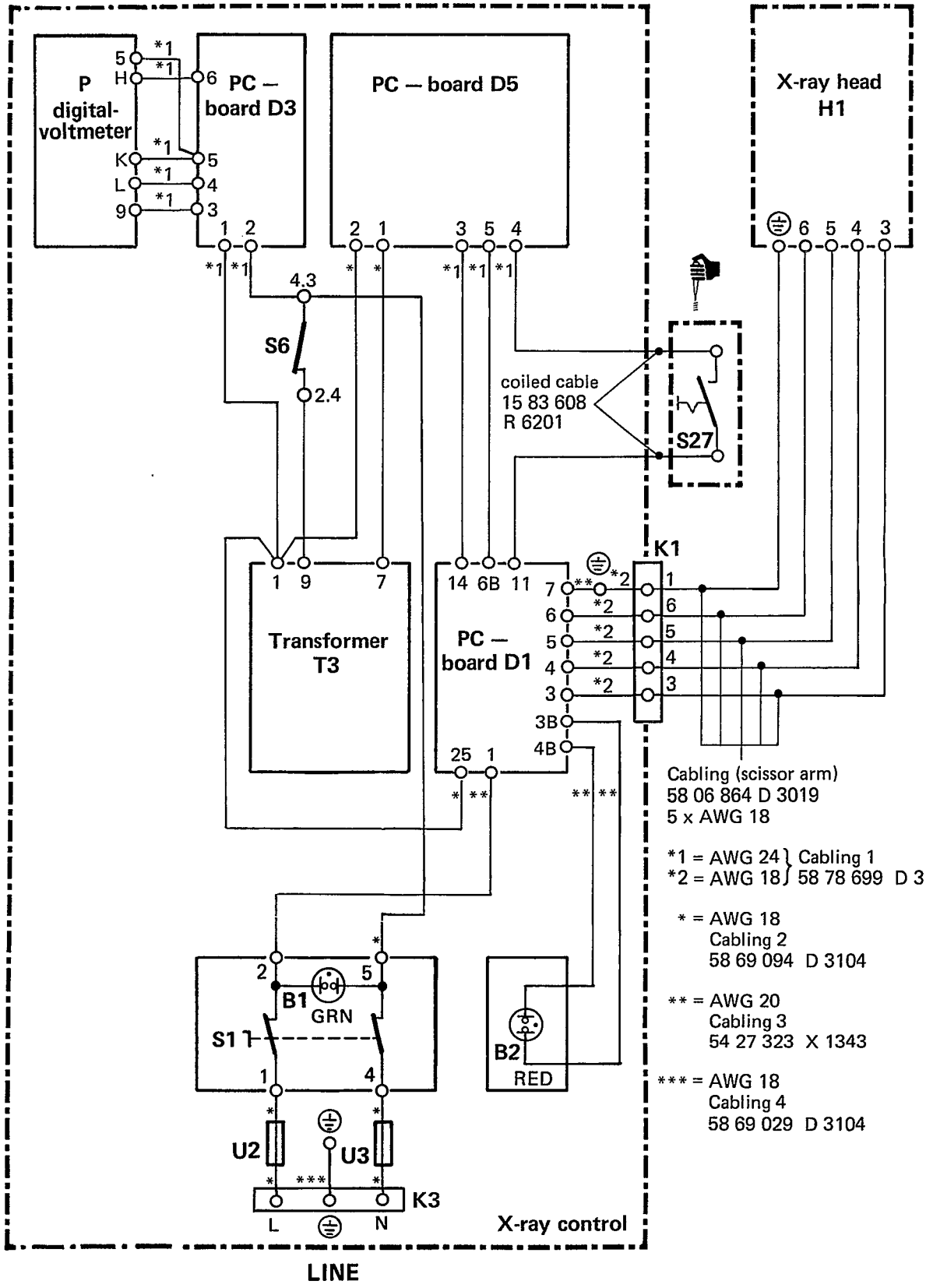


Fig.97

CABLING DIAGRAM







Cabling (scissor arm)
58 06 864 D 3019
5 x AWG 18

*1 = AWG 24 } Cabling 1
*2 = AWG 18 } 58 78 699 D 3152

* = AWG 18
Cabling 2
58 69 094 D 3104

** = AWG 20
Cabling 3
54 27 323 X 1343

*** = AWG 18
Cabling 4
58 69 029 D 3104

DHHS – STATEMENTS and INFORMATION according to 21 CFR Sub Chapter J

HELIODENT 70 single-tank dental x-ray generator

1020.30 (h) (1) (i)

Instructions for the use of the HELIODENT 70 and precautionary statements are part of the OPERATING INSTRUCTIONS:

1020.30 (h) (1) (ii)

After a period of 12 months the X-ray control must be serviced to keep it in compliance with the DHHS Performance Standard.

See: MAINTENANCE INSTRUCTIONS and/or STORAGE INSPECTION PROCEDURE

Note:

It is the responsibility of the user to insure that the equipment is maintained in compliance with the manufacturer's recommended Maintenance Schedule.

Failure of the user to do so relieves the manufacturer or his agents, from all responsibility in this matter.

1020.30 (h) (2) (i)

Rated maximum peak tube potential	70 kV
leakage technique factors (0,12 mA is the equivalent maximum rated continuous tube current for 7 mA with a duty cycle 1 : 60)	70 kV/0,12 DCmA
Minimum filtration in useful beam	2,7 mm Al at 70 kV

1020.30 (h) (2) (ii)

Cooling curve for the tube housing	page 27
Anode cooling characteristic	page 29

1020.30 (h) (2) (iii)

The tube is designed for self-rectifying mode of operation with the HELIODENT only.

Nominal tube current (fixed)	7 DCmA
Nominal peak tube potential (fixed)	70 kV
Duty cycle	1 : 60 in seconds

1020.30 (h) (3) (i)

	60 HZ	50 HZ
Rated nominal line voltage	125 V 230 V	125 V 230 V
Permissible maximum line-voltage regulation at terminal strip K3	6 V	6 V
Line voltage range	109-133 V 207-242 V	109-132 V 207-240 V
Maximum line current at the nominal values of 70 k V and 7 DCmA	125V: 9.5A 230V: 5.0A	17.0A 9.0A
1020.30 (h) (3) (v)		
Generator duty cycle at the nominal values of 70 kV/ 7 DCmA Rest minimum 20 sec. between two exposures	1 : 60 in sec.	1 : 60 in sec.
1020.30 (h) (3) (vi)		
Maximum deviation from indicated values		
a. peak tube potential nominal 70 kV	+ 10 kV − 9 kV	+10kV − 9kV
b. tube current nominal 7 DCmA	+ 1,2 DCmA − 2,0 DCmA	+ 1,0 DCmA − 2,5 DCmA
c. exposure time see table		

1020.30 (b) (vii)

Measurement base of technique factors:

a. kV measurements have been obtained employing the following methods:
Oscilloscope with frequency compensated bleeder resistors and a spectrum analyzer.

b. Tube current is measured by a DCmA-meter, accuracy 1,5 % at full scale.

c. The exposure time is measured with an oscilloscope, and is determined by the time of high - voltage without the pre - heat time.

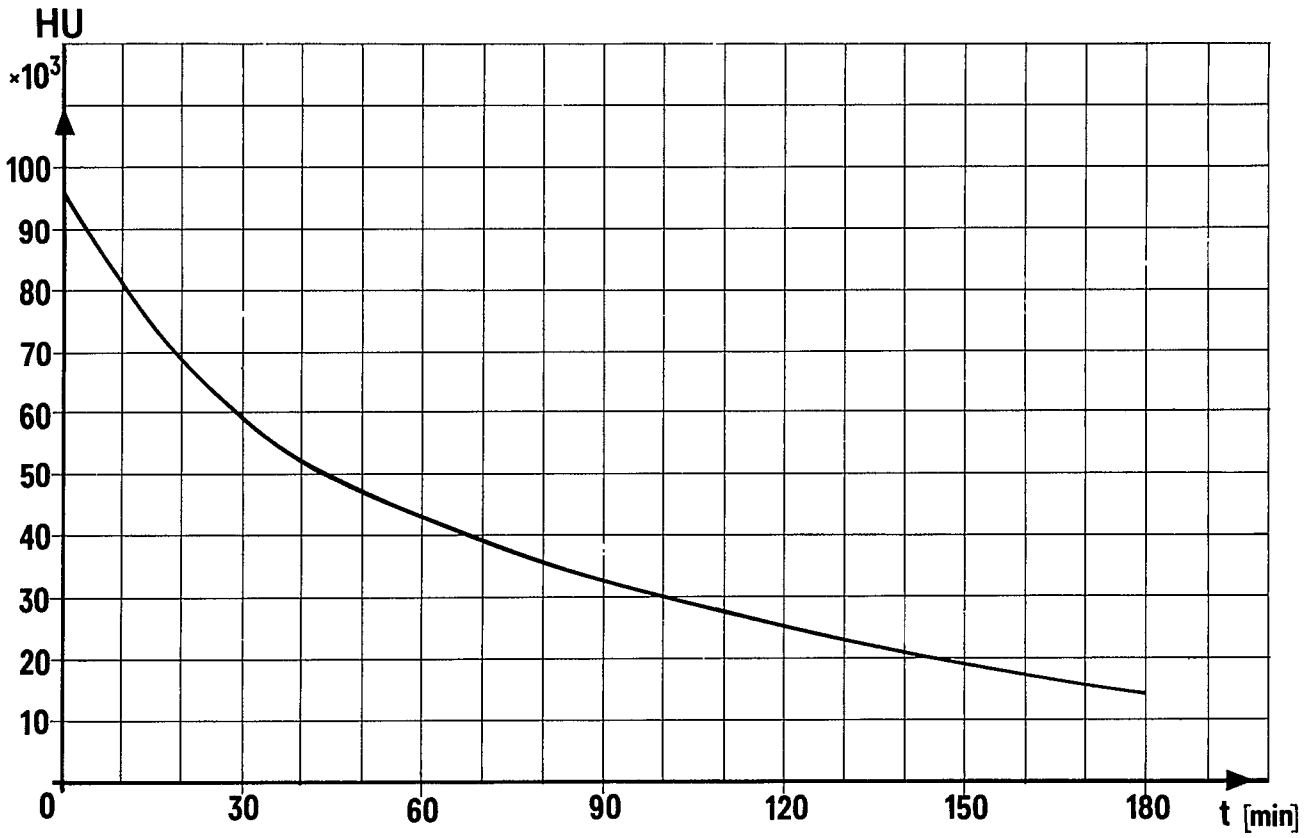
NOMINAL

MAXIMUM DEVIATION

Exposure time: (DENTOTIME)

Exposure time setting (in seconds)	Equivalent pulses 60 HZ	50 HZ	Accuracy of time setting (in pulses)
0,066	4	3	+1 −2
0,083	5	4	+1 −2
0,10	6	5	+1 −2
0,13	8	6	+1 −2
0,16	10	8	+1 −2
0,20	12	10	+1 −2
0,25	15	12	+1 −2
0,32	19	16	+1 −2
0,40	24	20	+1 −2
0,50	30	25	+1 −2
0,64	38	32	+2 −4
0,80	48	40	+2 −4
1,0	60	50	+3 −6
1,2	72	60	+3 −6
1,6	96	80	+5 −10
2,0	120	100	+6 −12
2,5	150	125	+7 −14
3,2	192	160	+10 −20

Cooling curve for the tube housing

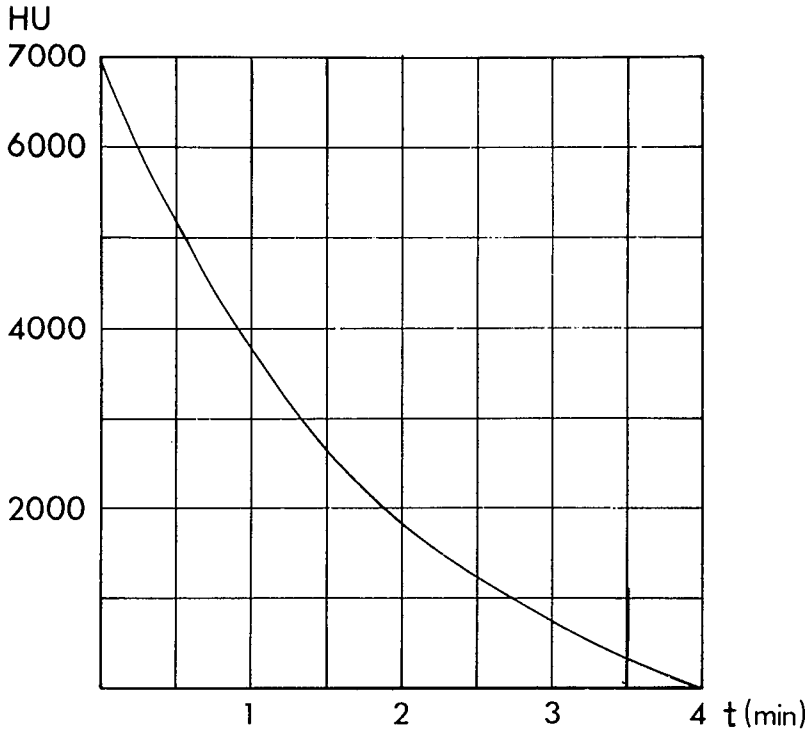


Fixed anode tube for single-tank generators

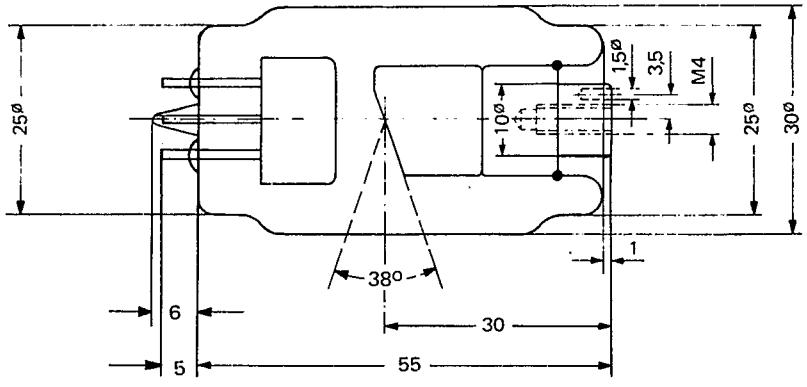
Technical data

Type	SR 70/7
List number	11 54 269 V 1022
Nominal voltage	70 kV
Optical focal spot	1,0 mm (IEC) 60HZ/ 1,3 mm (IEC) 50HZ
Nominal continuous rating	30W
Anode heat storage capacity	5200 Joule (7000 HU)
Maximum rating	7 DCmA
Filament heating	~1,5A 5,0V
Anode cooling	oil convection cooling
Minimum inherent filtration (Al equivalent)	0,4 mm Al
Type of operation	One peak high potential (without negativ half cycle)
Weight	approx. 2 ozs.
Application	dental radiographs

Anode cooling characteristic



Dimensions in mm



We reserve the right to make any alterations

SIE E S

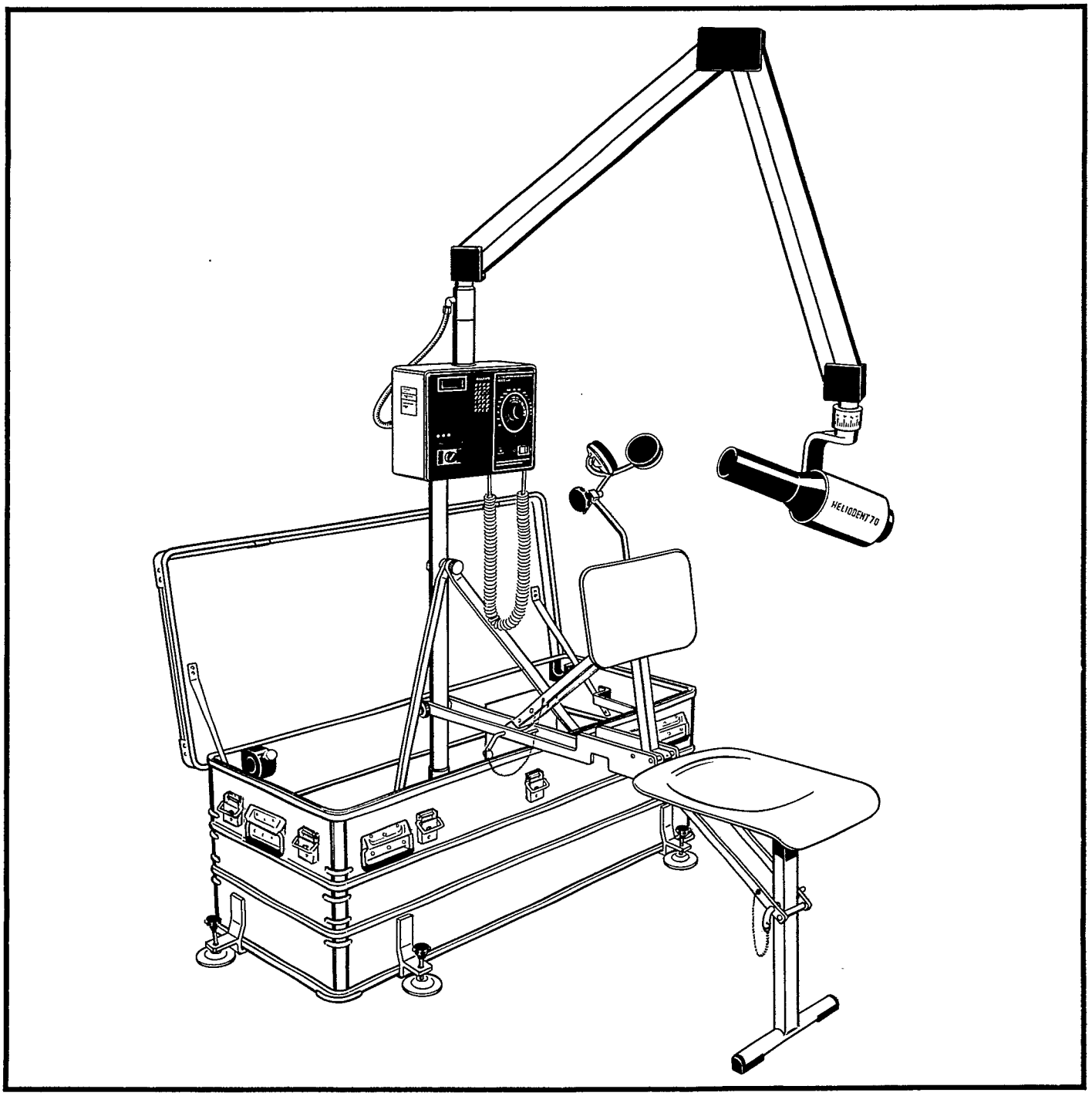
PORTARAY

HELIODENT® 70

with DENTOTIME

Model D3152 50/60 HZ Operation

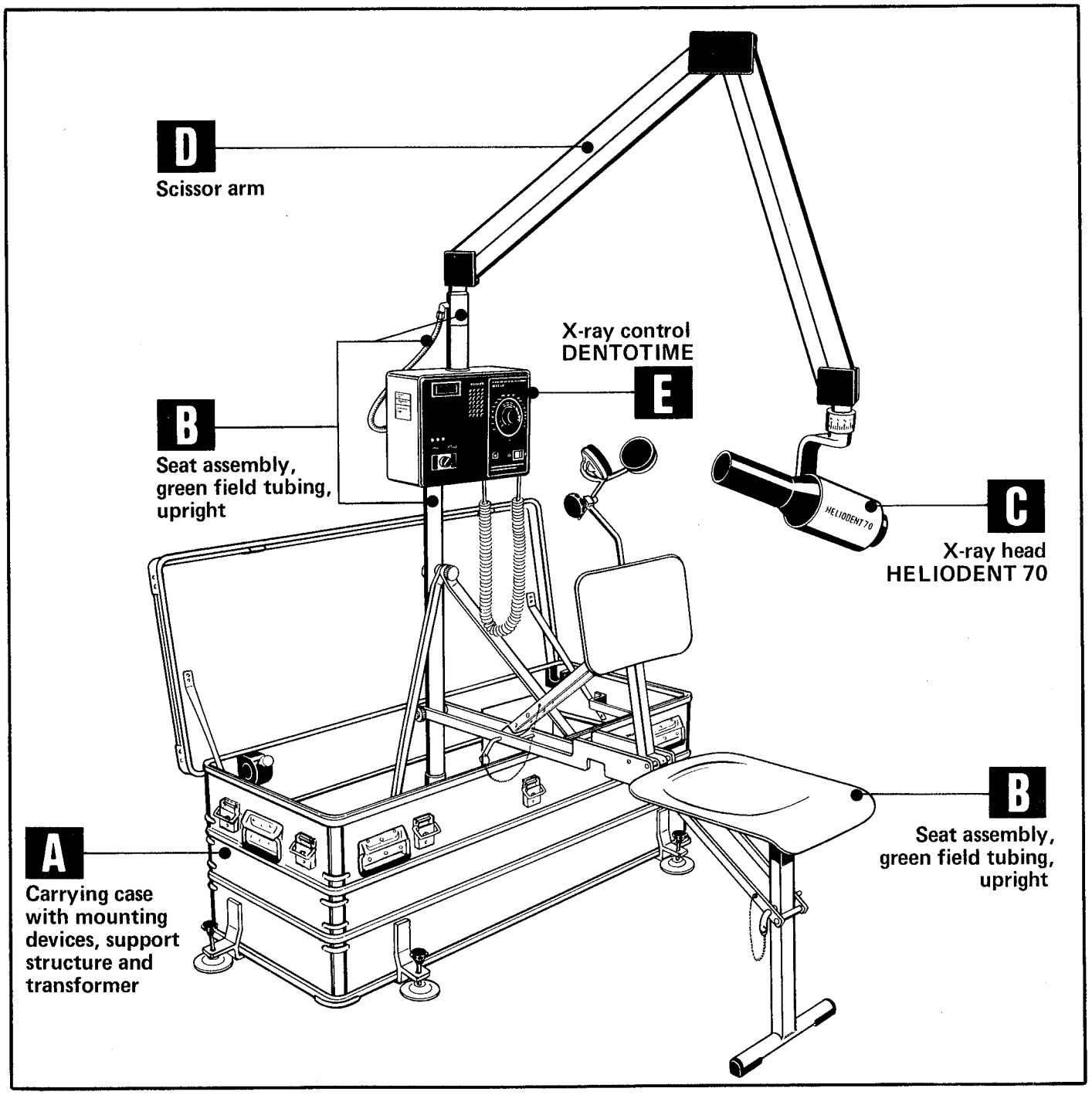
List of spare parts



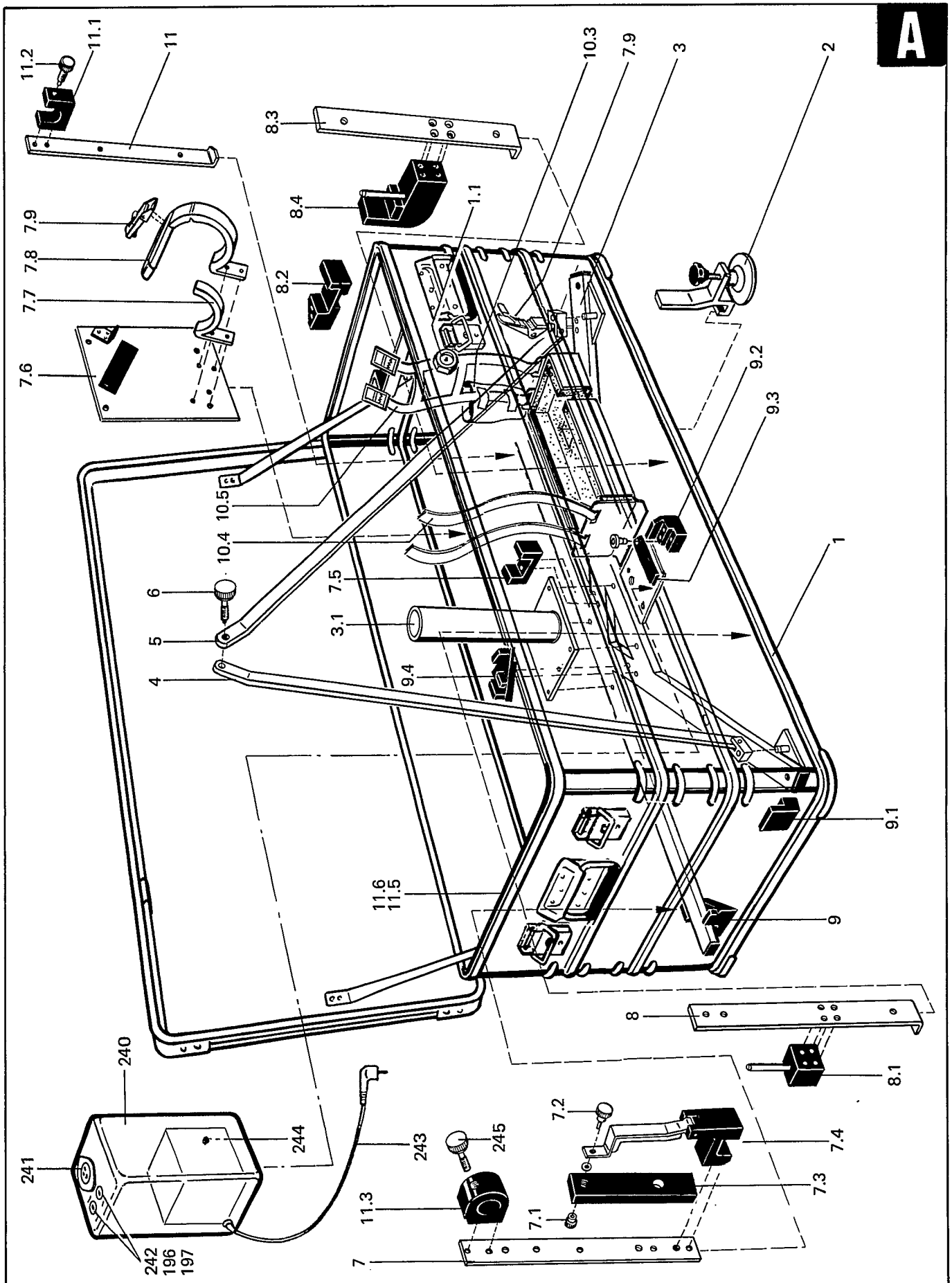
For information

All the components shown in an assembly drawing, which are available as spare parts, have an item number. Under this item number, you will find the article number (= order number) as well as the designation of the article in the opposite piece liste.

Unit parts shown, whose item numbers are indicated in a circle, are a combination of two or several single parts.



Pos.	Art.-Nr.	Designation	
1	58 89 431 D 3152	Case	4101-8-66-1
	58 89 613 D 3152	Case compl. without X-ray head, scissor arm and X-ray control	4101-0-00-S
1.1	29 64 559 D 3152	Pressure relief valve	TA294-10-10-R
2	29 64 567 D 3152	Leveling bracket compl.	4101-1-55
3	58 89 449 D 3152	Subframe compl.	4101-1-50-4
3.1	29 64 583 D 3152	Upright support bracket	4101-2-50
4	29 64 591 D 3152	Support left	4101-3-55
5	29 64 609 D 3152	Support right	4101-3-54
6	29 64 617 D 3152	Stud with knurled knop	4101-3-58
7	29 64 625 D 3152	Bracket left (X-Ray arm)	4101-8-71
7.1	29 64 633 D 3152	Threaded bushing	4101-8-78
7.2	29 64 641 D 3152	Screw	4101-8-76
7.3	29 64 658 D 3152	Rail	4101-8-73
7.4	29 64 666 D 3152	Bracket	4101-8-72
7.5	29 64 674 D 3152	Receptacle for scissor arm	4101-8-87
7.6	29 64 682 D 3152	Base plate compl.	4101-8-105
7.7	29 64 690 D 3152	Support bracket left for X-Ray head	4101-8-106
7.8	29 64 708 D 3152	Support bracket right for X-Ray head with locking device	4101-8-117
7.9	29 64 716 D 3152	Locking device	51L1-1X-5AA
8	29 64 724 D 3152	Bracket left (chairsupport)	4101-8-90
8.1	29 64 732 D 3152	Retainer for chairsupport, left	4101-8-94
8.2	29 64 740 D 3152	Retainer for chair	4101-8-113
8.3	29 64 757 D 3152	Bracket right (chairsupport)	4101-8-90
8.4	29 64 765 D 3152	Retainer for chairsupport, right	4101-8-91
9	29 64 773 D 3152	Receptacle for PROCOMAT	4101-8-99
9.1	29 64 781 D 3152	Receptacle for PROCOMAT	4101-8-96
9.2	29 64 799 D 3152	Receptacle for PROCOMAT	4101-8-97
9.3	29 64 807 D 3152	Retainer bracket	4101-8-95
9.4	29 64 815 D 3152	Receptacle for PROCOMAT	4101-8-114
10.3	29 64 856 D 3152	Pouch	4101-8-126
10.4	58 89 456 D 3152	Strap	4101-8-127-1
10.5	58 89 464 D 3152	Strap	4101-8-128-1
11	29 64 880 D 3152	Bracket	4101-8-81
11.1	29 64 898 D 3152	Receptacle	4101-8-83
11.2	29 64 906 D 3152	Screw	4101-8-82
11.3	58 89 472 D 3152	Receptacle	4101-8-74-3
11.4	29 78 211 D 3152	Desiccant bag Branogel (ten bags) 16 DIN 55473/B	
11.5	29 78 203 D 3152	Gasket	
11.6	29 78 195 D 3152	Adhesive (for gasket)	
196	31 28 154 B 1303	Fuse holder	
197	31 28 162 B 1303	Bayonet catch	
240	29 78 245 D 3152	Transformer 230/125V complete	4101-9-00
241	29 78 237 D 3152	Socket 125V	
242	10 20 288 B 1302	Fuse 10A 250V medium slow blow 1/4 x 1 1/4 "	
243	29 78 229 D 3152	Cable 230V	
244	86 12 426 X 1807	Transformer	
245	58 59 555 D 3152	Screw	4101-8-141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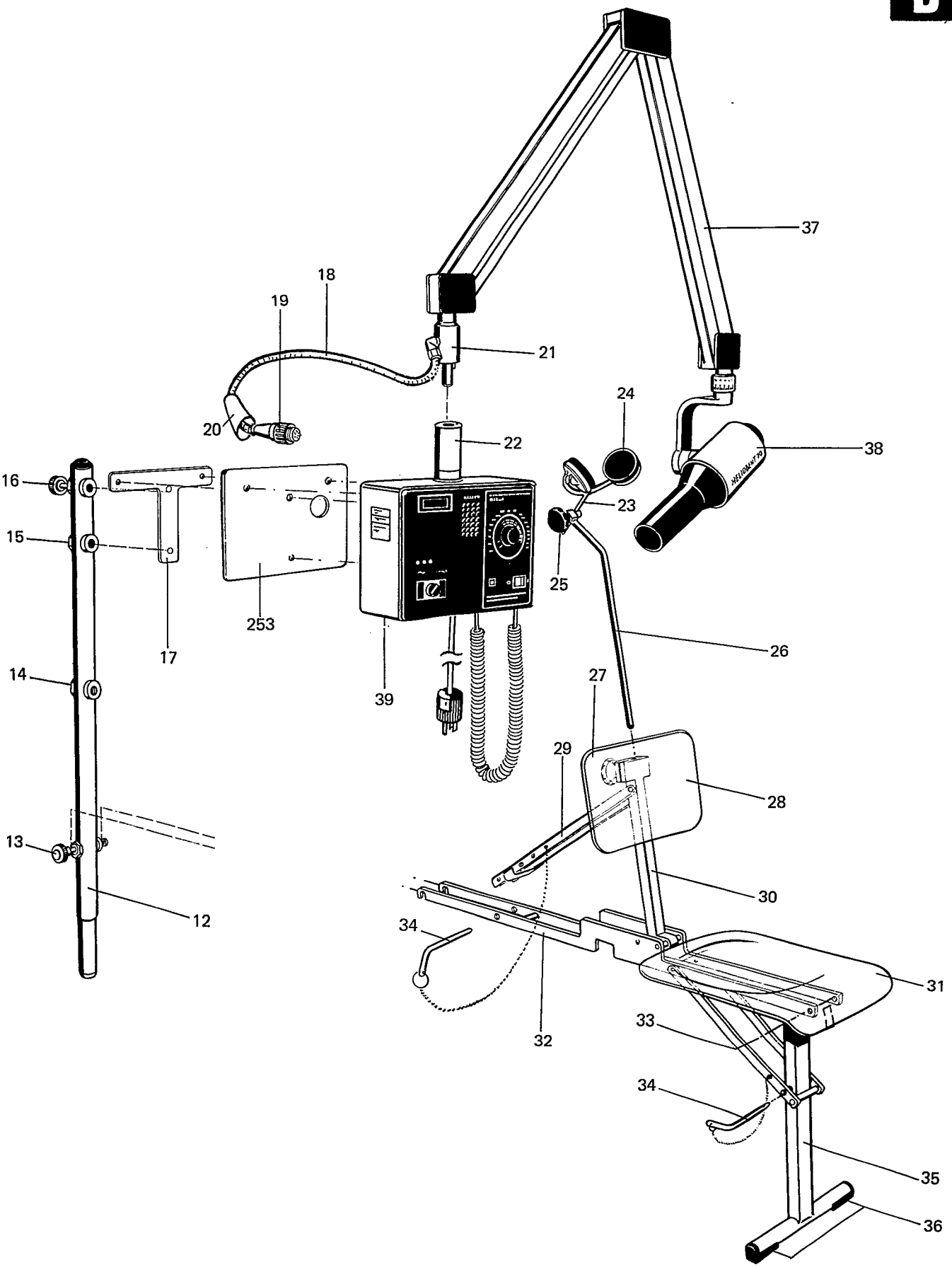
Pos.	Art.-Nr.	Designation	
12	29 64 922 D 3152	Upright	4101-3-51
13	29 64 930 D 3152	Assembly compl.	4101-3-53
14	29 64 948 D 3152	Threaded bushing	4101-3-52
15	29 64 955 D 3152	Bushing	4101-3-05
16	29 64 963 D 3152	Assembly compl.	4101-3-03
17	29 64 971 D 3152	X-Ray control adapter	4101-3-20
18	58 96 154 D 3152	Greenfield flexible tubing	4101-7-53
19	58 96 162 D 3152	Multipin plug	3037-10
20	29 64 989 D 3152	Pouch	4101-8-129
21	58 96 147 D 3152	Axle	4101-7-51
22	29 64 997 D 3152	Axle intermediate piece	4101-7-50
23	59 31 936 D 3152	Head holder	4101-6-17
24	59 31 944 D 3152	Pad	4101-6-11
25	59 31 951 D 3152	Knob	4101-6-55
26	59 31 969 D 3152	Head holder bar	4101-6-51
27	59 31 977 D 3152	Knob	4101-5-62
28	59 31 985 D 3152	Back rest	4101-5-51
29	58 89 480 D 3152	3 Position-back rest support assembly	4101-5-58-1
30	58 89 498 D 3152	Back rest support	4101-5-52-1
31	59 30 821 D 3152	Seat	4101-4-51
32	59 30 839 D 3152	Chair support bar	4101-4-52
33	59 30 847 D 3152	Retainer bracket	4101-4-59
34	59 30 854 D 3152	Safety pin	4101-4-62
35	59 30 862 D 3152	Stool leg	4101-4-63
36	59 30 870 D 3152	Inserts	4101-4-70
37	58 05 346 D 3019	Scissor arm compl.	
38	53 37 241 X 1341	HELIODENT 70, 125V, X-ray head	
39	58 75 885 D 3152	DENTOTIME 125V, 50/60 Hz, X-ray control compl.	
250	29 82 239 D 3152	Operating instructions	
251	58 92 617 D 3152	Maintenance instructions	
252	29 82 213 D 3152	Storage inspection procedure	
253	58 89 514 D 3152	Plate	4101-3-32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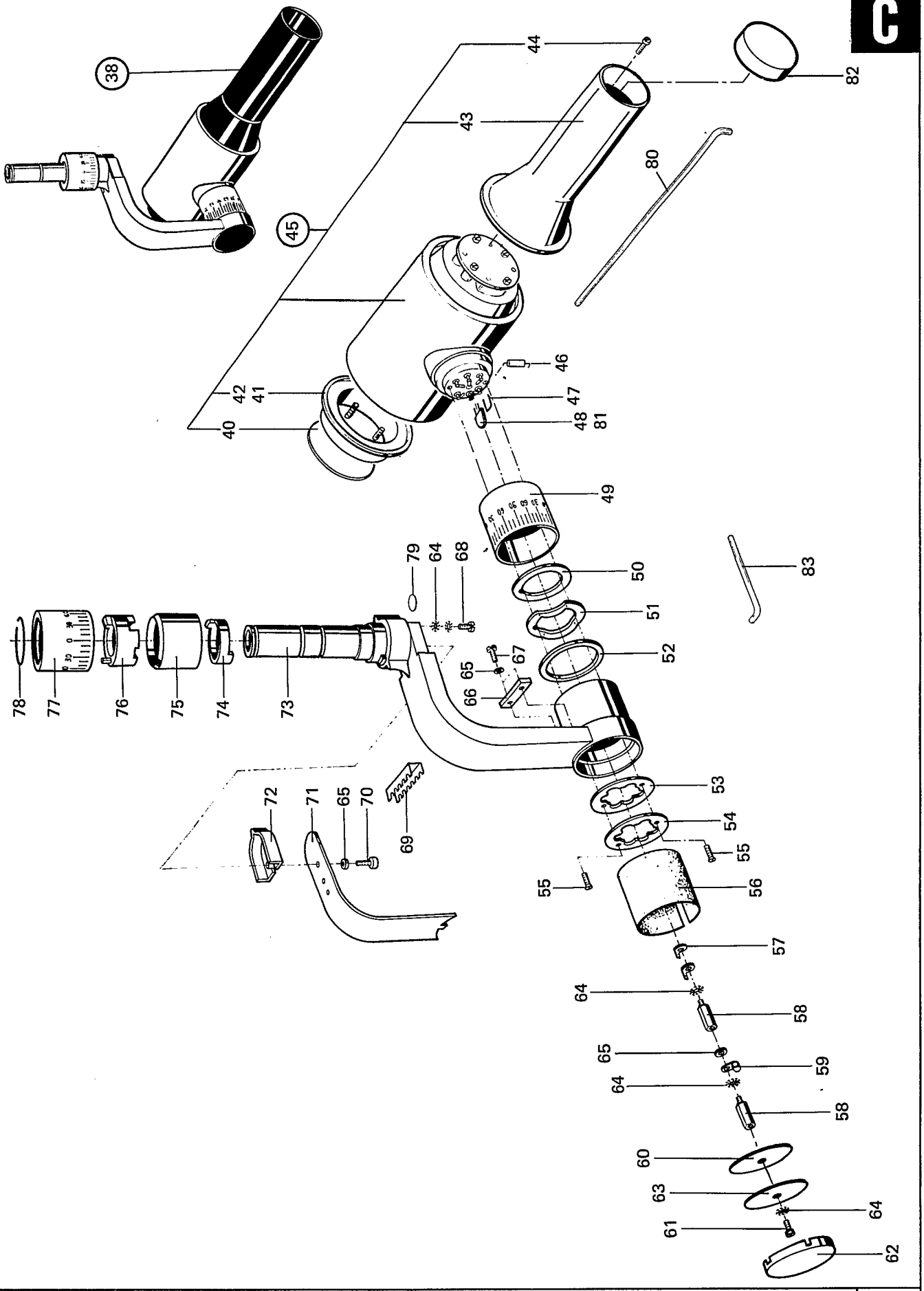
Pos.	Art.-Nr.		Designation
38	53 37 241 X 1341		HELIODENT 70 ,125V
40	53 37 332 X 1341		Cap
41	53 37 191 X 1341		Ring
42	33 32 798	M4x8 DIN 912-8.8 6980	Screw
43	53 37 480 X 1341		Cone, long, lead
44	33 35 569	M4x10 DIN 912-8.8 6980	Screw
45	53 37 209 X 1341		HELIODENT 125V
46	71 63 108 X 1341		Diode
47	20 32 274	0,25 DIN 46431	Wire
48	31 17 298 B 2221	14 0,05W	Varistor
49	24 83 303 D 3019		Graduated collar
50	23 16 412 D 3019		Washer
51	23 16 420 D 3019		Spring washer
52	23 16 438 D 3019		Teflon washer
53	53 37 456 X 1341		Teflon washer
54	53 37 464 X 1341		Washer
55	33 79 419	M4x8 DIN 963-5.8 6490	Countersunk screw
56	24 83 634 D 3019		Insulation
57	33 60 054	A4x1,4 DIN 46211 6490	Cable socket
58	71 63 124 X 1341		Bolt
59	70 05 853 F 0104		Cable clip
60	54 25 962 X 1341		Washer
61	35 19 782	M4x8 DIN 85-5.8 6490	Screw
62	24 83 345 D 3019		Cover
63	71 63 363 D 3019		Cover washer
64	33 43 514	A4,3 DIN 6798-St 6980	Fan washer
65	33 87 271	4,3 DIN 433-St 6490	Washer
66	24 83 352 D 3019		Clamping plate
67	35 23 685	M4x6 DIN 85-Ms 6490	Screw
68	35 23 693	M4x8 DIN 85-Ms 6490	Screw
69	24 83 857 D 3019		Strain relief
70	35 23 115	M4x16 DIN 6912 - 8.8 6980	Screw
71	71 63 355 D 3019		Cover
72	71 63 967 D 3019		Cover cap
73	71 63 959 D 3019		Suspension bracket
74	80 53 829 D 3019		Stop
75	24 83 758 D 3019		Intermediate piece
76	71 63 983 D 3019		Bushing, compl.
77	24 83 428 D 3019		Graduated collar
78	71 63 009 D 3019		Ring
79	33 66 978	220 SRN 825	Shield
80	54 97 417 X 1341		Wrench
81	20 30 591		Insulating hose
82	58 83 194 D 3152		Cover cap (lead)
83	35 35 531	3 DIN 912	Wrench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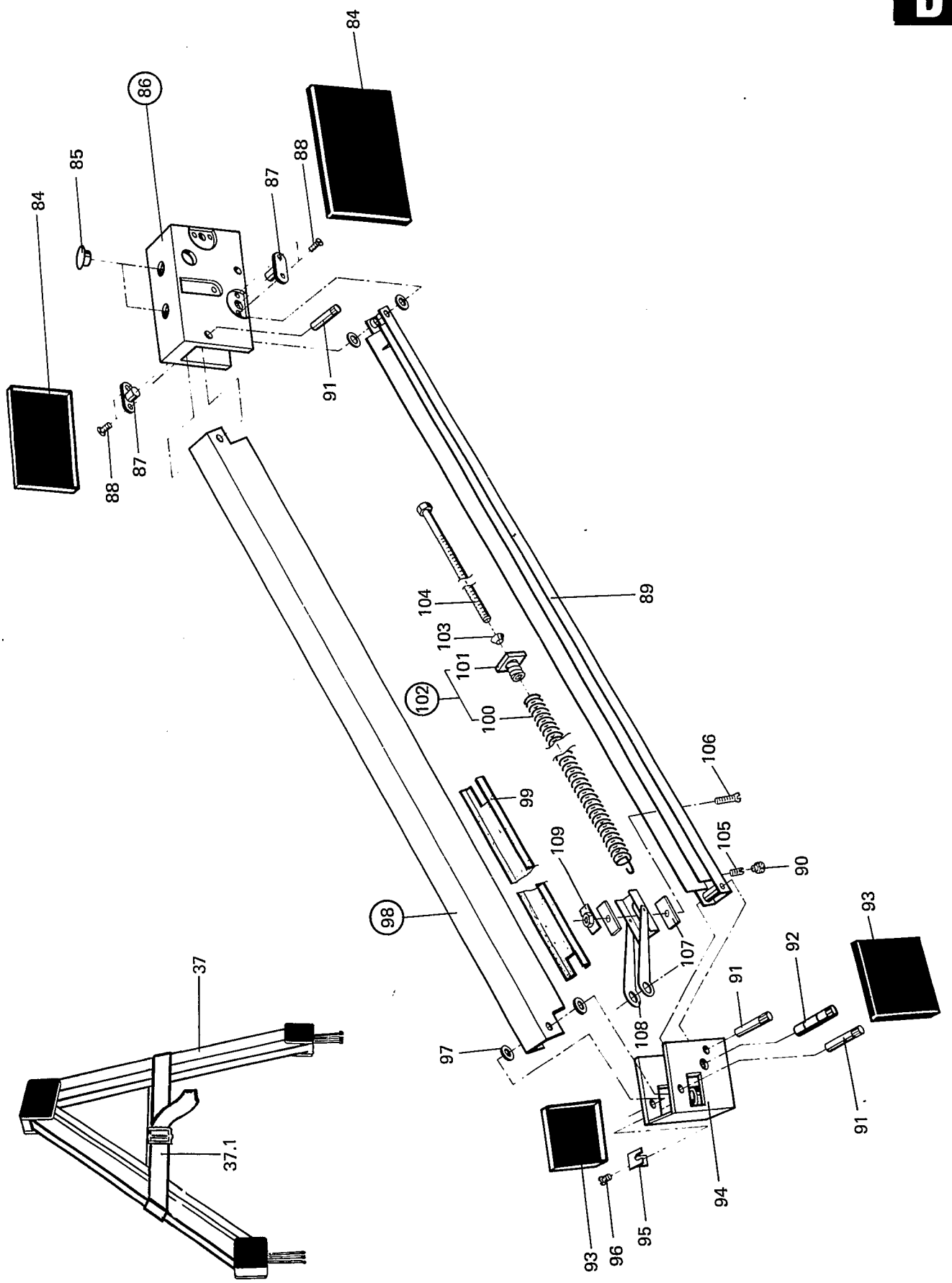
Pos.	Art.-Nr.	Designation
37	58 05 346 D 3019	Scissor arm compl.
37.1	26 56 783 D 3019	Safety strap
84	58 23 646 D 3019	Cover cap
85	13 01 530 G 0875	Cap
86	24 98 418 D 3019	Intermediate piece, compl.
87	24 98 202 D 3019	Bearing
88	33 79 385 M3x5 DIN 963-5.8 6490	Countersunk screw
89	58 23 620 D 3019	Support
90	24 98 608 D 3019	Cap
91	24 98 061 D 3019	Cylindrical pin
92	37 30 926 D 3019	Cylindrical pin
93	58 23 604 D 3019	Cover cap
94	24 99 655 D 3019	Head piece, rear
95	24 98 087 D 3019	Angle support
96	33 79 385 M3x5 DIN 963-5.8 6490	Screw
97	24 98 640 D 3019	Washer
98	24 98 103 D 3019	Longeron, compl.
99	37 14 623 D 3019	Profile
100	24 83 444 D 3019	Tension spring
101	24 98 319 D 3019	Stop for spring
102	24 98 574 D 3019	Tension rear, compl.
103	35 10 765 c 8,4 DIN 6319	Spherical washer
104	24 98 053 D 3019	Hexagonal-head screw
105	37 30 157 D 3019	Countersunk screw
106	33 79 930 M4x20 DIN 963-5.8 6490	Countersunk screw
107	58 83 178 D 3019	Braking block
108	37 29 563 D 3019	Articulation
109	59 10 377 D 3019	Brake plate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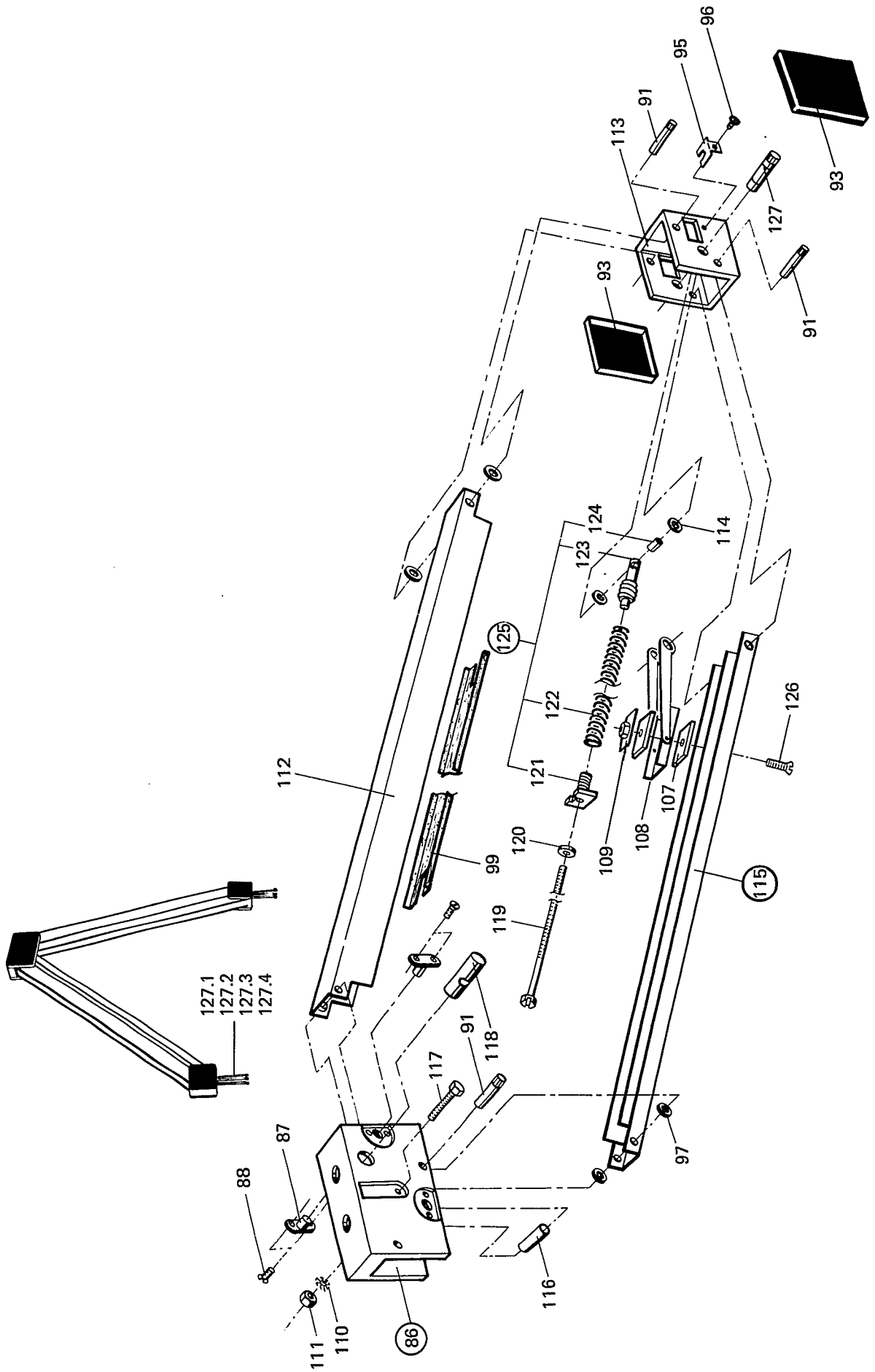
Pos.	Art.-Nr.	Designation
110	33 43 381 A6,4 DIN 6798-St 8650	Fan washer
111	33 58 579 B M6 DIN 439-04 6490	Nut
112	24 98 145 D 3019	Cover
113	58 05 338 D 3019	Head piece
114	35 11 482 8 DIN 6799 6303	Locking washer
115	58 23 638 D 3019	Support, compl.
116	33 73 529 6,4 x 30 SRN 6278	Spacing tube
117	33 44 827 M6 x 45 SZ DIN 933-5.6 6490	Screw
118	24 98 285 D 3019	Bolt
119	24 97 568 D 3019	Hexagonal-head screw
120	24 98 293 D 3019	Washer
121	24 98 327 D 3019	Spring suspension
122	24 83 436 D 3019	Tension spring
123	24 98 558 D 3019	Spring top
124	70 26 156 F 0515 MB 1020 DU	DU-Bushing
125	24 98 566 D 3019	Tension spring, front, compl.
126	33 79 443 M4 x 12 DIN 963-5.8 6490	Countersunk screw
127	24 98 541 D 3019	Cylindrical pin
127.1	58 06 864 D 3019	Cabling (scissor arm)
127.2	59 30 888 D 3152 Shrink tubing (set of 5), length 1/2"	4101-7-62
127.3	59 30 896 D 3152 Insulating tubing, length 2 1/2"	4101-7-58 R1
127.4	59 30 904 D 3152 Insulating tubing, length 4 3/4"	4101-7-58 R2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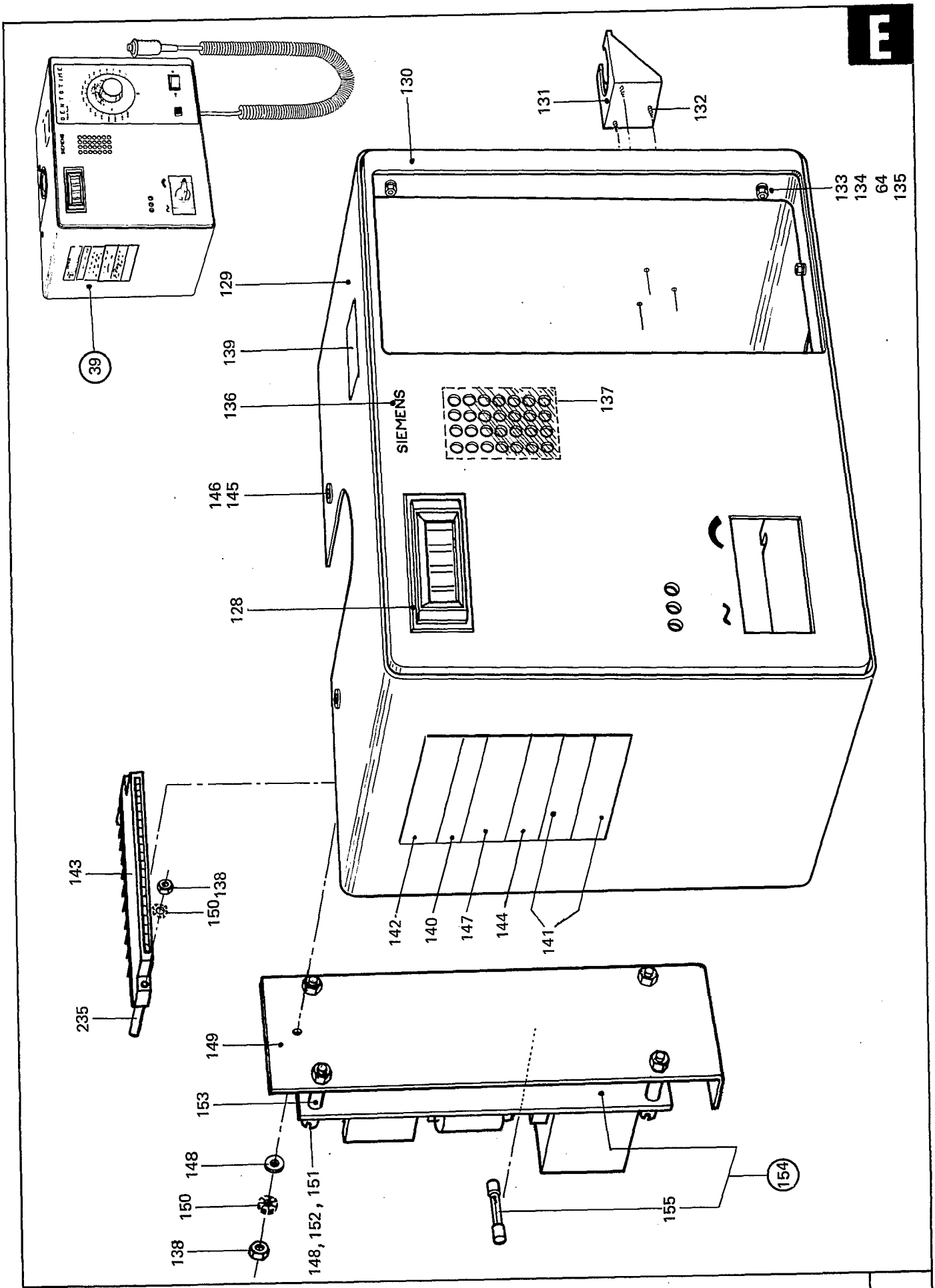
Pos.	Art.-Nr.	Designation
39	58 75 885 D 3152	Adapter, Dentotime 125V
128	31 47 402 B 2713	Digital voltmeter
129	37 23 731 D 3104	Housing , compl.
130	58 75 828 D 3152	Front panel
131	37 28 417 D 3104	Holder
132	33 36 898 BZ 2,9x6,5 DIN 7971 6490	Sheet-metal screw
133	37 21 115 D 3104	Washer
134	33 42 045 A4,3 DIN 125-St 6490	Washer
64	33 43 514 A4,3 DIN 6798-St 6980	Fan washer
135	33 59 528 M4 DIN 934-5 6490	Nut
136	34 10 024 A5 SN 66 322	Name
137	37 22 931 D 3104	Textile
138	33 59 403 M3 DIN 934-5 6490	Nut
139	59 14 478 D 3152	WARNING label
140	59 11 949 D 3152	Rating label
141	34 05 909 1051 SRN 825	UL label
	34 18 993 1091 SRN 825	CSA label
142	58 75 992 D 3152	Identification label
143	31 47 428 B 2713	Connecting block
144	33 46 020 1014 SRN 825	CAUTION label
145	33 79 450 M4x10 DIN 963-5.8 6490	Countersunk screw
146	33 81 233 AF 4 SRN 133	Bevelled washer
147	35 31 878 ~ 1043 SRN 825	DHHS label
148	33 41 807 A3,2 DIN 125-St 6490	Washer
149	58 75 844 D 3152	Angle
150	33 43 910 A3,2 DIN 6798-St 6980	Fan washer
151	35 19 691 M3x16 DIN 85-5.8 6490	Screw
152	33 83 189 3,2x8x1 SRN 3-HP	Insulating disk
153	35 13 702 4x8x10 SRN 7-HP	Insulating tube
154	58 75 802 D 3152	Power supply PC board D3
155	10 90 133 B 1302 0,063A 250V	Fuse
235	59 14 742 D 3152	Spacer
236	58 69 029 D 3104	Cabling 4 (see cabling diagram)
237	58 78 699 D 3152	Cabling 1 (see cabling diagram)
238	58 69 094 D 3104	Cabling 2 (see cabling diagram)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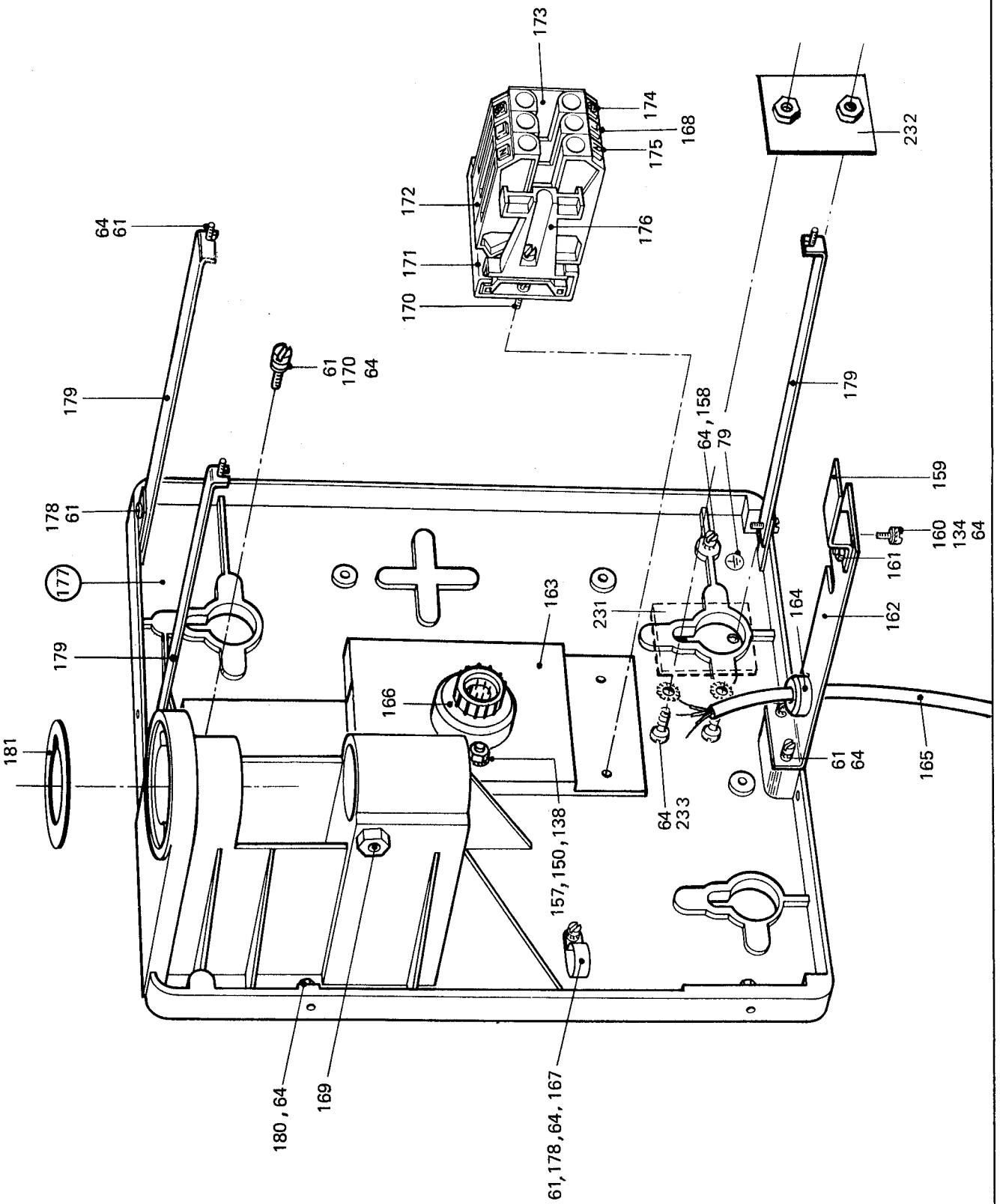
Pos.	Art.-Nr.		Designation
64	33 43 514	A4,3 DIN 6798-St 6980	Fan washer
157	35 25 714	M3x8 DIN 85-5.8 6490	Screw
150	33 43 910	A3,2 DIN 6798-St 6980	Fan washer
138	33 59 403	M3 DIN 934-5 6490	Nut
158	35 40 655	M4x8 SZ DIN 933-Ms 6490	Screw
79	33 66 978	220 SRN 825	Shield
159	58 05 064 D 3104		Angle, compl.
160	35 40 309	M4x10 DIN 85-5.8 6490	Screw
134	33 42 045	A4,3 DIN 125-St 6490	Washer
64	33 43 514	A4,3 DIN 6798-St 6980	Fan washer
161	33 44 850	M4x8 DIN 551 6490	Threaded pin
162	58 18 992 D 3104		Bracket
163	58 78 616 D 3152		Holding plate
164	70 17 650 F 0112		Grommet
165	58 75 935 D 3104		Cable 125V
166	21 68 243 Q 1212		Flange socket
167	70 05 887 F 0104		Cable clip
168	34 15 122	SRN 7175	L-Shield
169	58 18 950 D 3104		Brake
170	35 40 283	M4x6 DIN 85-5.8 6490	Screw
171	37 31 130 D 3104		Supporting rail
172	33 53 356	10 SRN 7174	Clamp
173	33 53 364	D10 SRN 7174	Cover plate
174	33 58 843	SRN 7175	Shield
175	33 58 926	SRN 7175	N-Shield
176	33 52 796	E1 SRN 7174	Terminal clamp
177	37 19 788 D 3104		Wall adapter
61	35 19 782	M4x8 DIN 85-5.8 6490	Screw
178	33 42 094	A4,3 DIN 125 Ms 6490	Washer
179	37 20 091 D 3104		Fixing angle
180	33 59 528	M4 DIN 934-5 6490	Nut
181	58 32 449 D 3104		Washer
231	59 14 718 D 3152		Plate
232	59 14 734 D 3152		Plate,compl.
233	35 19 840	M4x16 DIN 85-5.8 6490	Screw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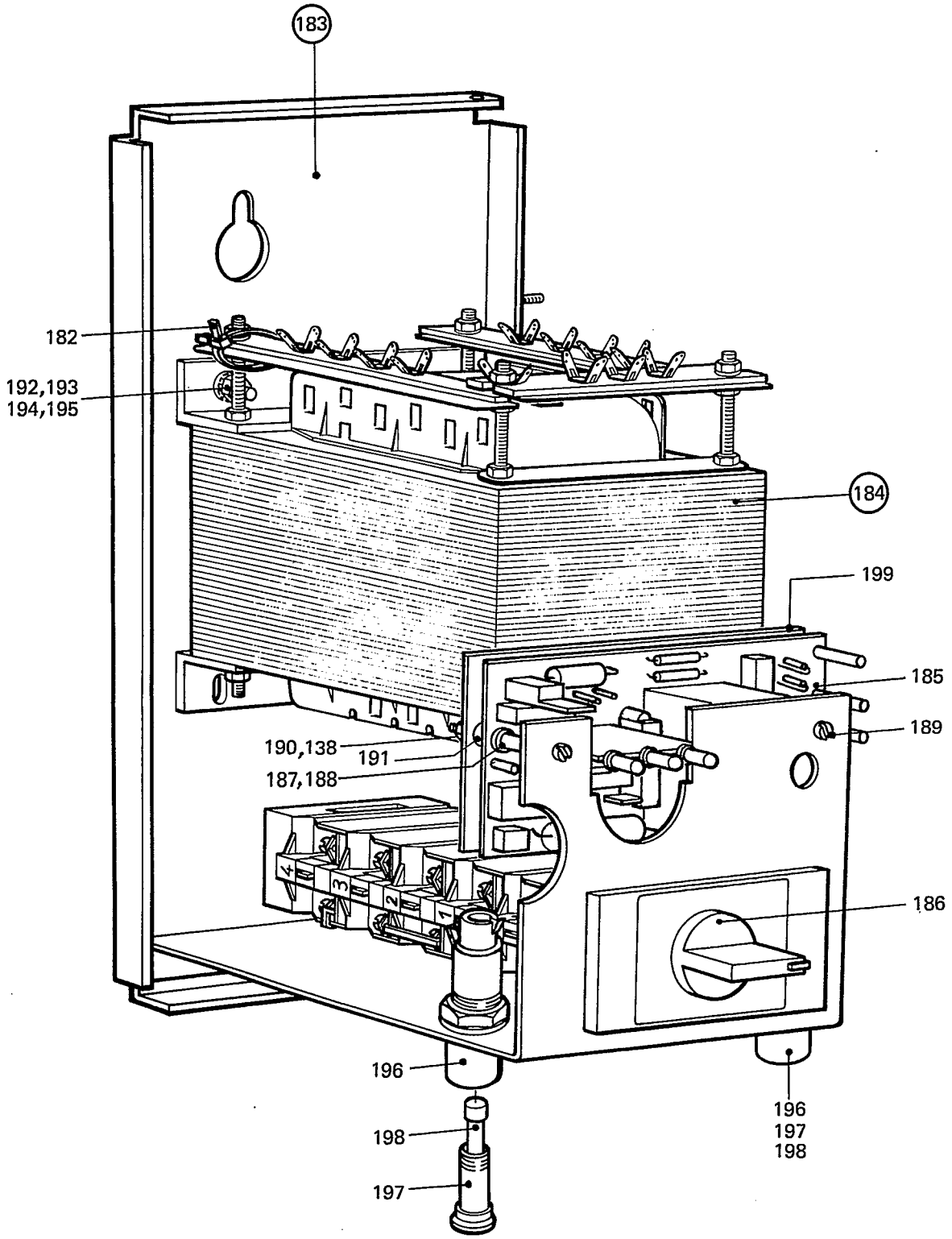
Pos.	Art.-Nr.	Designation
182	33 32 624 A1 SRN 7859	Cable binder
183	58 75 927 D 3152	Housing, compl.
184	15 16 095 R 8106	Transformer
185	58 83 236 D 3152	PC board D5
186	31 18 643 B 0105 1 pol.	Control switch
187	33 79 856 4,2x8x15 SRN 7-HP	Insulating tube
188	37 31 627 D 3104	Insulating bushing
189	35 21 903 AM 3x32 DIN 85-5.8 6490	Screw
138	33 59 403 M3 DIN 934-5. 6490	Nut
190	33 86 596 3,7x9x1,2 SRN 134-St 6490	Washer
191	37 31 635 D 3104	Insulating ring
192	33 43 530 A5,1 DIN 6798-St 6980	Fan washer
193	33 42 144 A5,3 DIN 125-St 6490	Washer
194	33 80 912 M5x12 DIN 963-4.8 6490	Countersunk screw
195	33 59 593 M5 DIN 934-5 6490	Nut
196	31 28 154 B 1303 5 x 20 u. 6 x 32 MM FEU 031.1653	Fuse holder
197	31 28 162 B 1303 6,3 x 32 MM FEK 031.1662	Bayonet catch
198	10 20 288 B 1302 10A 250V medium slow blow 1/4 x 1 1/4 "	Fuse
199	58 75 570 D 3152	Insulating plate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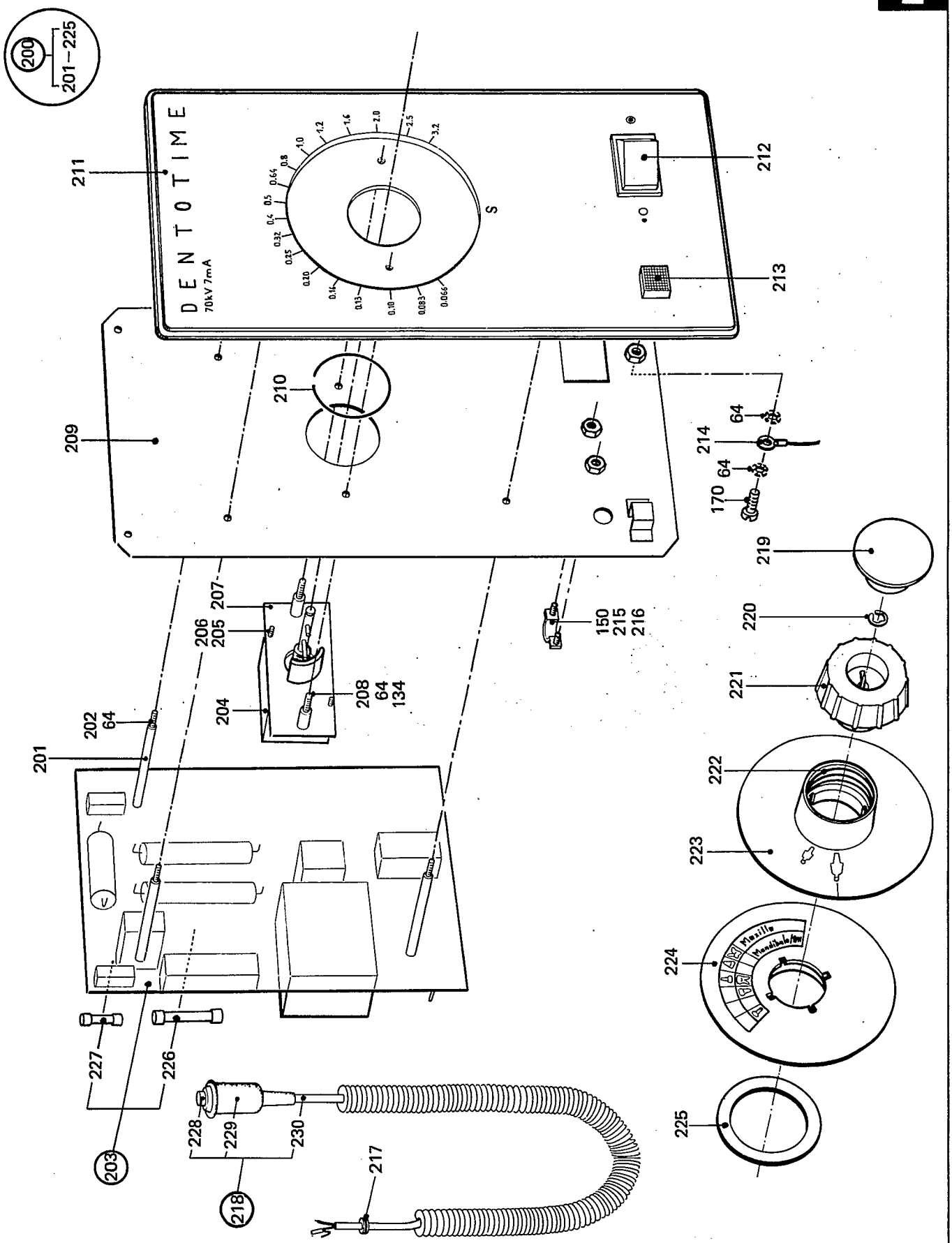
Pos.	Art.-Nr.		Designation
200	84 02 430 X 1357	50/60 Hz	Dentotime
201	33 80 557	4,5 x 35 SRN 6278 6490	Spacing tube
202	35 20 491	AM 4 x 40 DIN 85-5.8 6490	Screw
203	83 53 245 X 1357	50/60 HZ Operation	Board D1, time switch
204	81 38 265 X 1357		Switch
205	33 87 065	M2,5 x 20 DIN 84-5.8 6490	Screw
206	33 85 762	A2,7 DIN 6798-St 6980	Fan washer
207	74 04 510 X 1343		Plate
208	35 19 840	M 4 x 16 DIN 85-5.8 6490	Screw
64	33 43 514	A4,3 DIN 6798-St 6980	Fan washer
134	33 42 045	A4,3 DIN 125-St 6490	Washer
209	54 27 117 X 1343		Intermediate plate, compl.
210	43 67 397 X 1259		Ring
211	54 27 083 X 1357		Front panel
212	31 41 280 B 0103		Switch
213	10 12 160 B 1603	110V Tr red 12,5 x 12,5	Signal lamp
214	21 80 883 G 5074		Cable
170	35 40 283	M 4 x 6 DIN 85-5.8 6490	Screw
150	33 43 910	A3,2 DIN 6798-St 6980	Fan washer
215	33 60 799	B6 SRN 7855 6980	Clip
216	35 19 626	M3x6 DIN 85-5.8 6490	Screw
217	70 00 094 F 0307		Grommet
218	74 69 208 X 1260		Switch
219	43 66 357 X 1259		Cap
220	33 87 784	4 DIN 6799 6603	Ring clip
221	43 66 340 X 1259		Rotary knob
222	43 67 405 X 1259		Pressure spring
223	74 04 528 X 1357		Scale
224	53 48 552 X 1343		Disk, indicator
225	72 59 328 X 1343		Washer
226	10 40 948 B 1302	1,5A 250V Tr. 1/4x1 1/4"	Fuse
227	10 77 379 B 1302	0,16A 250V Traeg 5 x 20 mm	Fuse
228	12 38 294 R 6207	R Sch 207A	Button
229	49 45 275 X 1259		Sleeve
230	15 83 608 R 6201		Cable
246	54 27 323 X 1343		Cabling 3 (see cabling diagram)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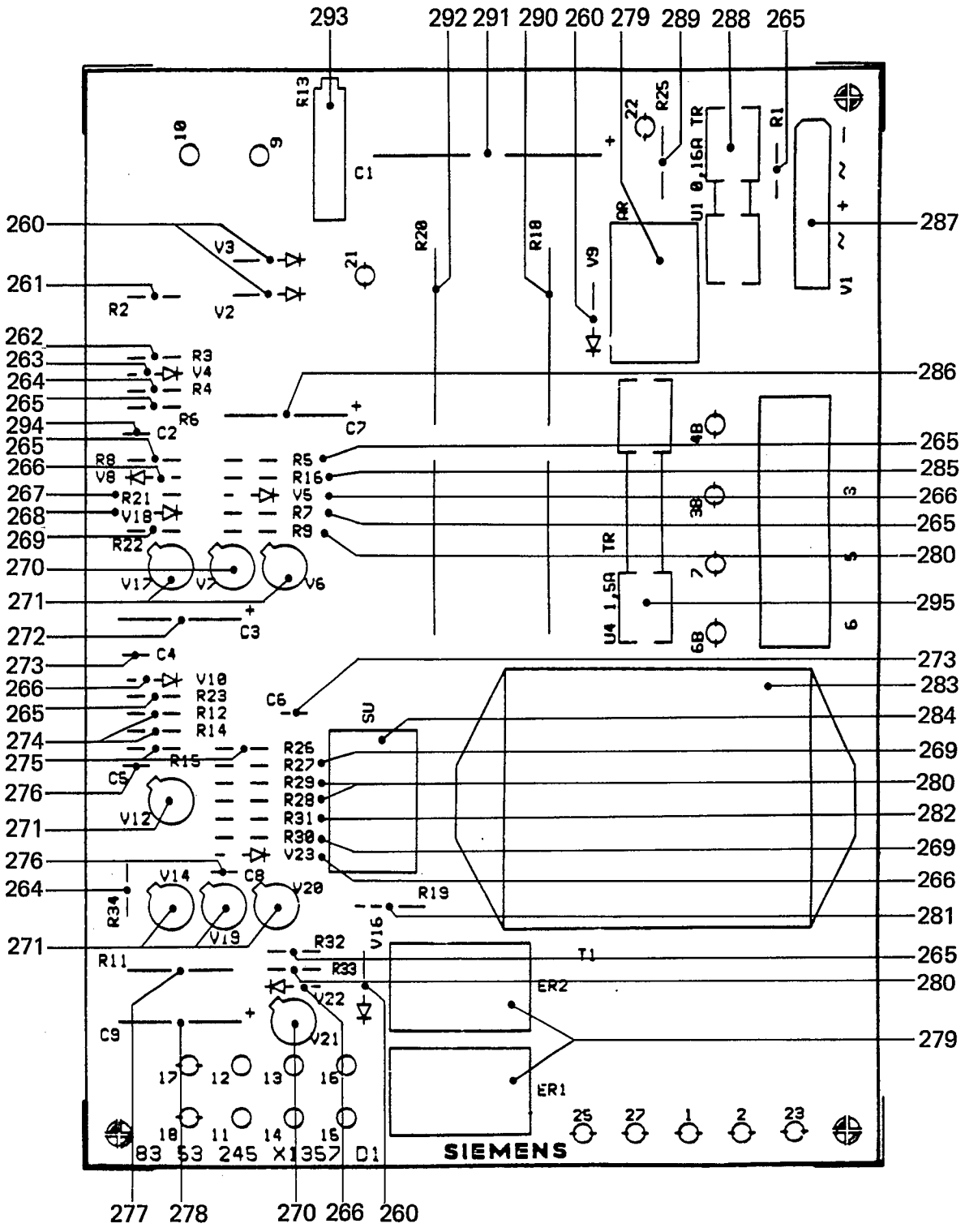
Pos.	Art.-Nr.	Designation		
203	83 53 245	PC Board D1		
260	10 99 258	Diode valve	1000V 1A DO-41 1N4007 B2	V2/3/9/16
261	31 17 298	Varistor	14 0,05W	R2
262	10 56 332	Resistance	510R 0,25W 1%	R3
263	10 99 001	Fleming valve	BZx97c2V4 2,4V 0,4W 5%	V4
264	10 52 760	Resistance	470R 0,25W 1%	R4/34
265	10 36 912	Resistance	10K 0,25W 1% G	R1/5/6/7/8/23/32
266	10 38 009	Fleming valve	BAW76 75V 300MA DO-35	V5/8/10/22/23
267	10 56 324	Resistance	390R 0,25W 1%	R21
268	10 71 117	Fleming valve	ZPD12 12V 0,4W 5% DO-3	V18
269	10 52 893	Resistance	100K 0,25W 1%	R22/27/30
270	10 74 178	Transfer resistor		V7/21
271	10 16 823	Transistor		V6/12/14/17/19/20
272	10 55 672	Condenser		C3
273	10 95 389	Condenser	VP41 BY104MB	C4/6
274	10 57 108	Resistance	2K2 0,25W 1% G	R12/14
275	10 52 869	Resistance	22K 0,25W 1% G	R15/26
276	10 81 140	Condenser	VP41 BY223KB 22NF 100V-10%	C5/8
277	10 90 430	Conducter		R11
278	10 55 698	Condenser		C9
279	10 98 789	Relay		AR, ER1/2
280	10 49 451	Resistance	5K6 0,25W 1% G	R9/28/29/33
281	10 30 345	Resistance		R19
282	10 52 810	Resistance	1K 0,25W 1% GR	R31
283	31 12 836	Transformer	N 750 Z. 3842	T1
284	31 34 442	Relay		SU
285	31 06 697	Resistance	SPR 5053YL 5M6 0,25W	R16
286	10 55 706	Condenser		C7
287	10 23 068	Current redresser		V1
288	10 77 379	Fuse cartridge	0,16A 250V	U1
289	10 30 287	Resistance		R25
290	31 26 224	Resistance	6R8 10W 5% GR1045	R18
291	10 11 642	Condenser		C1
292	31 26 398	Resistance	82R 10W 5% GR1045	R20
293	10 57 033	Trimmer	89P 100R 0,75W 10% LI	R13
294	10 95 397	Condenser	VP44 BY334MB	C2
295	10 40 948	Fuse cartridge	1,5A250V	U4

PC Board D1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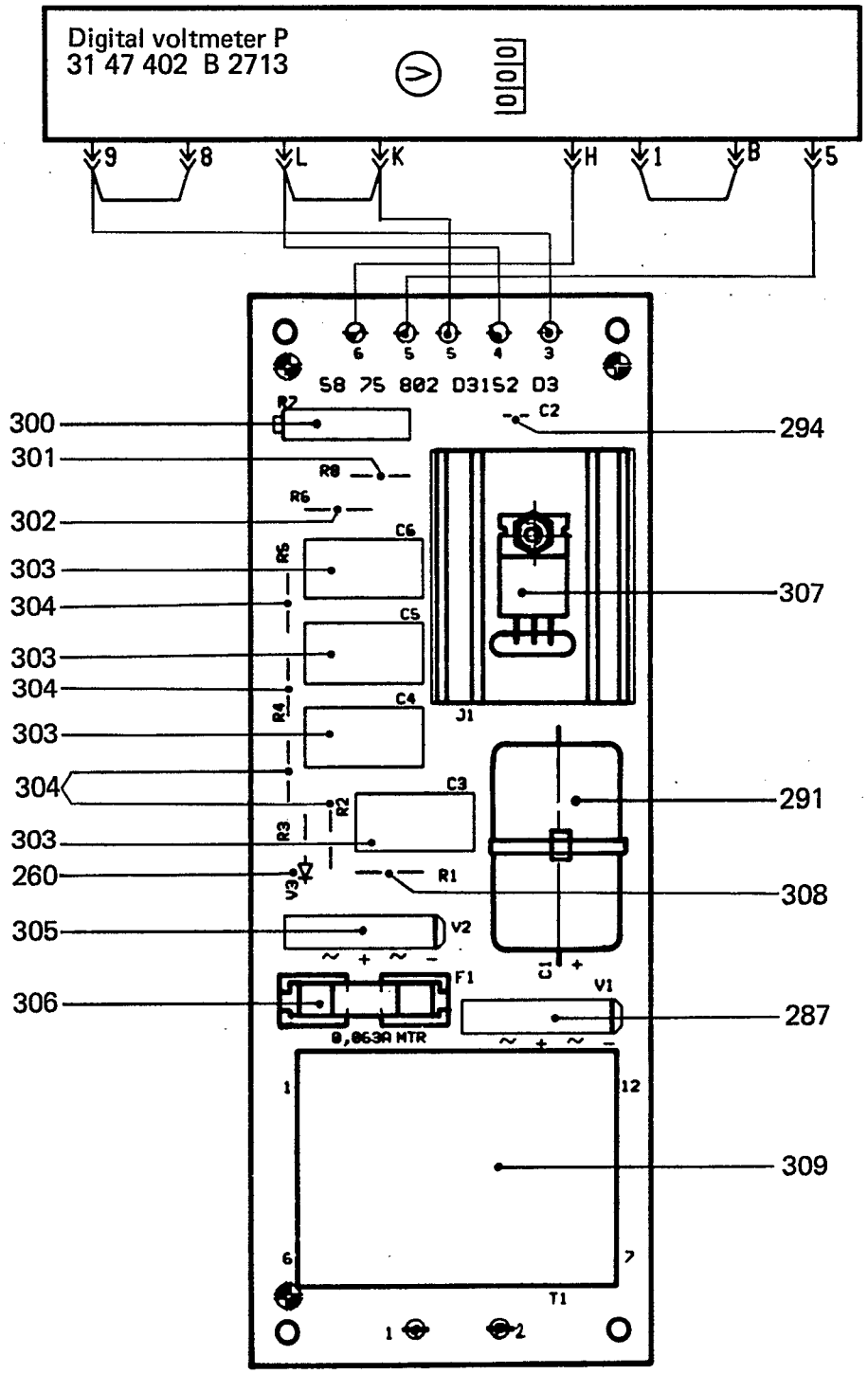
SIEMENS
277 278 270 266 260

Pos.	Art.-Nr.	Designation		
154	58 75 802	PC Board D3		
260	10 99 258	Diode valve	1000V 1A DO-41 1N4007 B2	V3
287	10 23 068	Current redresser		V1
291	10 11 642	Condenser		C1
294	10 95 397	Condenser	VP44 BY334MB	C2
300	10 40 252	Resistance	89p R50K CRV=1%	R7
301	10 56 498	Resistance	213 SMA 0	R8
302	10 30 725	Resistance		R6
303	10 54 444	Condenser		C3/4/5/6
304	10 56 472	Resistance		R2/3/4/5
305	10 17 110	Current redresser	B250 c1000/700 B1240	V2
306	10 90 133	Fuse	0,063A 250V	F1
307	30 23 652	Tension regulator	7805 CU	I1
308	10 30 196	Resistance		R1
309	31 26 422	Transformer	TFB 468/040-01-N2	T1

PC Board D3


Digital voltmeter P
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0,063A MTR
C1
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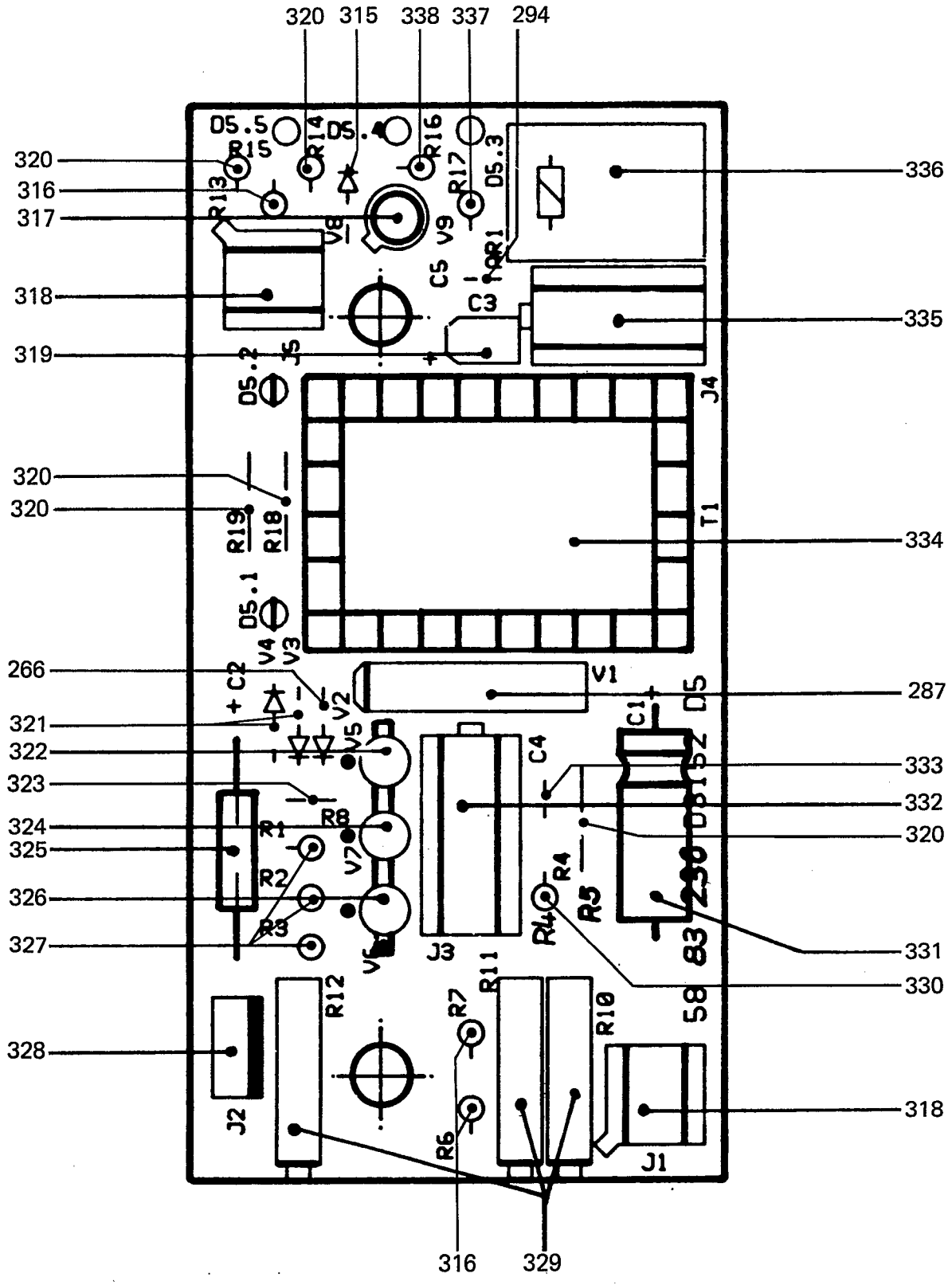
Pos.	Art.-Nr.	Designation		
185	58 83 236	PC Board D5		
266	10 38 009	Fleming valve	BAW76 75V 300MA DO-35	V2
287	10 23 068	Current redresser		V1
294	10 95 397	Condenser	VP44 BY334MB	C5
315	10 75 142	Fleming valve	ZPD 5,6	V8
316	10 37 530	Resistance	SBC 0309 820K 5%	R6/7/13
317	10 04 886	Transfer resistor		V9
318	10 91 164	Repeater	G CA 145BE	I1/5
319	10 99 464	Condenser		C3
320	10 30 303	Resistance		R5/14/15/18/19
321	10 66 646	Fleming valve		V3/4
322	10 86 149	Light emitting diode red		V5
323	10 60 136	Resistance	SMA 0204 TK100	R8
324	31 11 606	Light emitting diode green		V7
325	10 56 050	Condenser		C2
326	31 12 554	Light emitting diode yellow		V6
327	10 30 501	Resistance		R1/2/3
328	31 17 199	Tension regulator		I2
329	10 38 272	Resistance	89P R10K	R10/11/12
330	10 30 865	Resistance		R4
331	10 09 026	Condenser		C1
332	65 00 193	Inverter	HEF 4049BP	I3
333	10 99 449	Condenser		C4
334	31 47 329	Transformer	BV 34 127V 50	T1
335	31 21 241	Grating	HEF 4081BP	I4
336	31 70 131	Relay		AR1
337	10 30 584	Resistance		R17
338	10 30 352	Resistance		R16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R13
V8
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C5
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C3
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D5.2
J5
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R19
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C2
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287
D5
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C4
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324
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R1
R8
V7
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R2
R4
326
R3
R5
327
V6
J3
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R12
R11
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R10
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J2
R6
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J1
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We reserve the right to make any alterations which may be due to technical improvements.

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SIEMENS MEDICAL SYSTEMS, INC., Dental X-Ray Division
P.O. Box 24 11 47, Charlotte, NC 28224

Order No. 58 92 617 D 3152

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