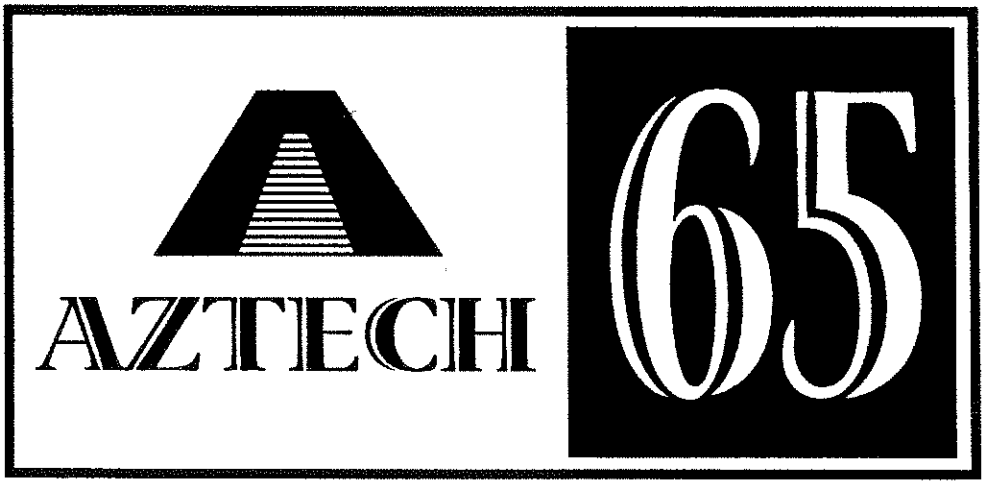
AZTECH 65
with CCD timer



Installation manual

Rev. 5 on 18.05.99

INDEX

1. WARNING

- **This equipment complies with DHHS performance standard 21 CFR Subchapter J.**
- **This X ray unit may be dangerous to the patient and operator unless safe exposure factors and operating instructions are observed.**
- **Electrical shock hazard. Do not remove panels.**
- **Risk of explosion. Do not use in presence of flammable anesthetics.**
- **For continued protection against risk of fire, replace only with same type and rating of fuse.**

On this manual and on the equipment, the following symbols are used to signal grounding terminals

Protective ground

Functional ground

X-Ray emission command

X-Ray emission signaling

Exposure time step decrement

Exposure time step increment

2. INTRODUCTION

The purpose of this manual is to provide the user with instructions for operating the X-Ray equipment described herein safely and efficiently.

The equipment must be utilized in full observance of the procedures described in this manual and never for purposes other than those for which it was designed.

The equipment is to be operated only by qualified personnel who are well-knowledge in X-Ray protection techniques.

The user is responsible for taking care of the legal aspects involved in the installation and operation of the equipment.

The manufacturer shall take no responsibility for any equipment breakage, malfunctions or injuries to persons caused by the incorrect operation or inadequate maintenance of the equipment.

3. SAFETY ASPECTS

1. Only qualified personnel of the Aztech Group and/or authorized Aztech dealers who have been expressly authorized by the same shall be allowed to perform technical intervention on the equipment.

2. The equipment has not been designed for use in the presence of flammable gases or fumes.

3. Always disconnect the equipment before proceeding to clean or sanitize it.

4. Do not allow water or other liquids to penetrate inside the equipment so as to avoid short circuits and corrosion.

5. Only qualified personnel shall be allowed to remove the tubehead from its support.

6. Personnel who are authorized to perform X-Ray examinations must observe all safety regulations for protection against radiation.

7. In order to protect patients against exposure to radiation, use such devices as lead-plated aprons.

8. During X-Ray examinations, no other persons must be allowed in the room except for the patient and the X-Ray machine operator.

9. The operator must not touch either the tubehead cover or the collimator cone during X-Ray emission.

10. The X-Ray film must be positioned inside the patient's mouth by hand or by using the special supports; it must never be held by the operator, but by the patient himself.

11. **For safety purposes, nobody should be allowed to hang down from the extension arm or scissors arm.**

4. DESCRIPTIONS

Aztech 65

The AZTECH 65 equipment makes it possible to obtain x-rays of the best quality thanks to the perfect repeatability of examinations combined with very short exposure times and a small focal spot.

The characteristics of this new X-Ray apparatus are:

- x-rays of the best quality;
- low exposure of patient to radiation;
- ease of use;
- ergonomic design.

The exposure times are microprocessor-controlled.

Ease of use and precise positioning

The dimensions of the AZTECH 65 tubehead are designed to be small; although, maintaining a focal distance of 20 cm according to regulation.

CCD Timer

Combined with the tubehead, the AZTECH 65 system is equipped with the innovative CCD microprocessor-based timer, that allows the compensation of the line voltage fluctuations with a sophisticated algorithm, thereby obtaining film with a constant density, therefore the name CCD, or Computer Controlled Density.

By simply pressing a push-button, the remote-control function makes it possible to manually increase or decrease exposure times to that required by the procedure.

4.1. Standard Configuration

The AZTECH 65 X-Ray apparatus has a standard configuration based with the following characteristics:

- AZTECH 65 tubehead assembly
- Wall mounted Control Box with CCD microprocessor-based timer
- Remote hand control system with external coiled cable
- Scissors arm assembly
- 90 cm extension arm

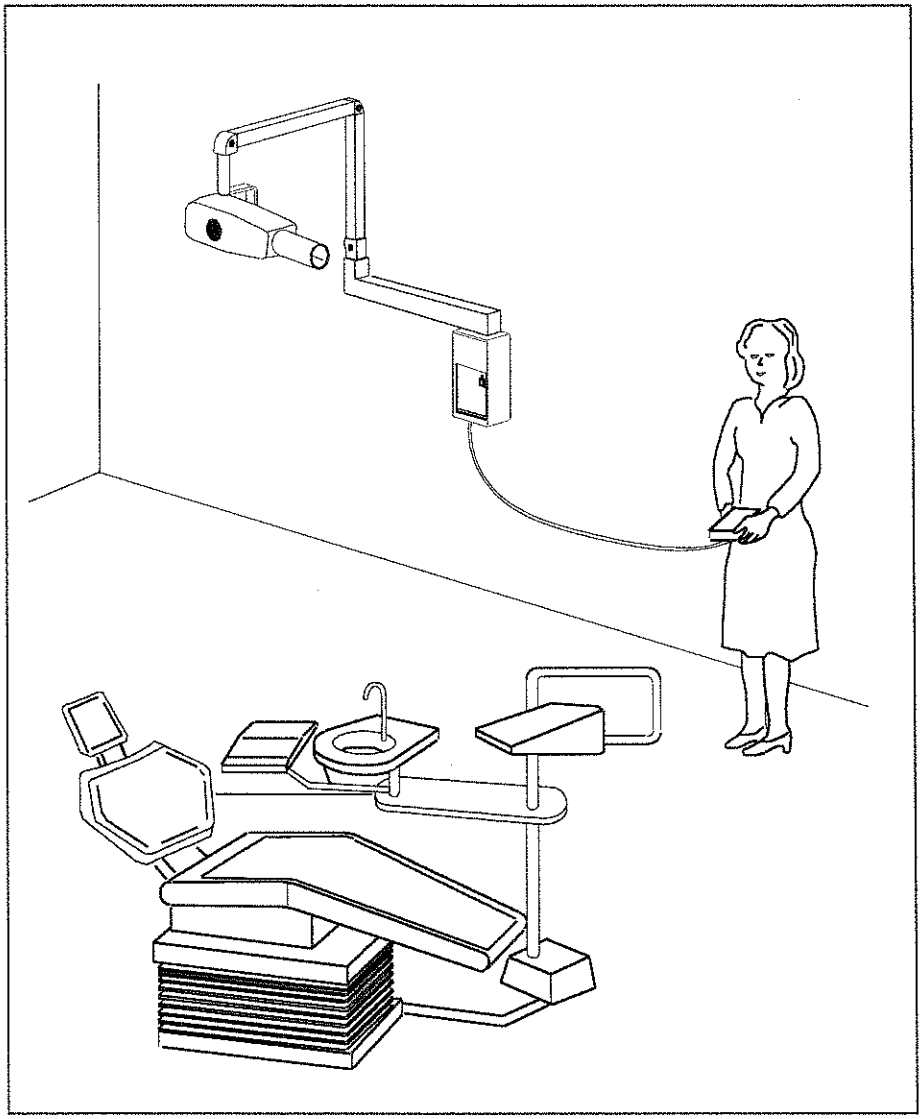


Figure 1 Standard Configuration

4.2. Optional Configuration

A remote-control configuration, with a structure similar to the standard one, but which offers the possibility of operating the remote hand control outside the work room, is also available (Figure 2 on page 8).

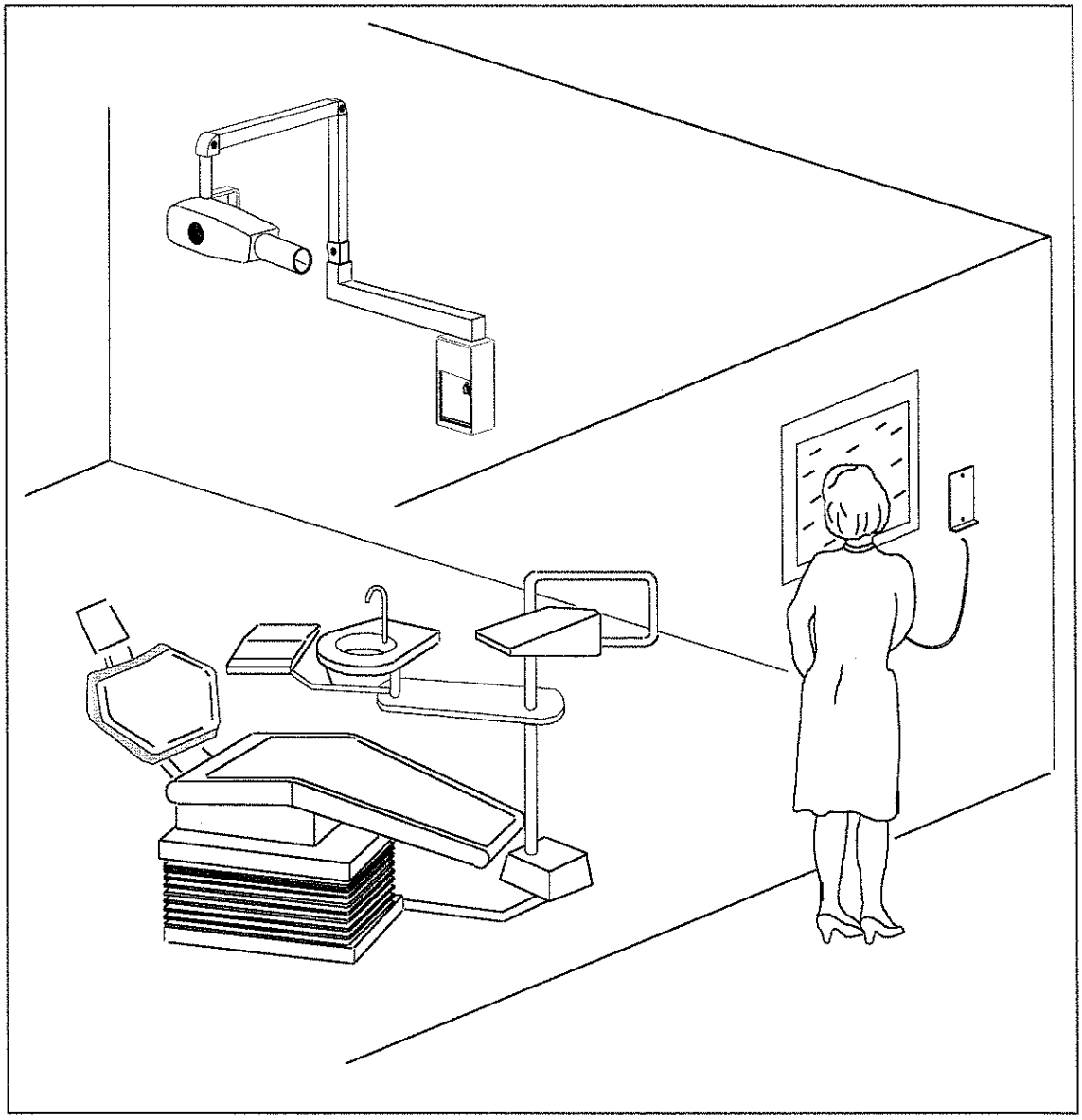


Figure 2 Remote hand control configuration

5. TECHNICAL DATA

APPARATUS	**AZTECH 65**
Manufacturer	VILLA SISTEMI MEDICALI Buccinasco (MILAN) ITALY
Class	I type B
Rated Line Voltage	120 V ± 10 %
Line Frequency	60 Hz
Line Current	6 A (120 V)
Power Consumption	0.8 kVA
Apparent Line Resistance	0.2 Ω max. 120 V
Line Voltage Regulation	≤ 3 %
Main fuse	10 A F (120 V)
Exposures Times	31 exposure times, with manual selection, from 0.03 s to 3 s
Control Exposures	Microprocessor controlled Timer, with automatic compensation of line voltage fluctuation
TIMER ACCURACY on the PRE-SELECTED EXPOSURE TIME (This is the value of the timer setting the operatorpre-selects which is displayed prior to exposure)	The absolute maximum deviations can be +180% -100% when line voltage changes within rated voltage range (see note below). Inaccuracy is +/- 5% or 30ms (whichever is greater) at 120V At different voltages within the rated voltage range this inaccuracy has to be added to the deviations due to line voltage changes. (see note below)
TIMER ACCURACY on the CORRECTED EXPOSURE TIME (This is the actual time of exposure, displayed on the CCD timer during emission, and indicated as long as the emission button is depressed)	+/- 5% or 30ms (whichever is greater) on the corrected actual exposure time as determined by the internal algorithm as a function of the line voltage (see note below)
Timer box dimensions	310 x 170 x 100 mm (12 x 14 x 4 inches)
Remote Hand Control Dimensions	175 x 60 x 25 mm (7 x 2.5 x 1 inches)
TUBEHEAD	
Manufacturer	VILLA SISTEMI MEDICALI Buccinasco (MILAN) Italy
Rated Output Voltage	65 kV_p ± 15%
High Voltage Circuit	Single-phase, self rectifying
Rated Output Current	8 mA
Rated Power	0.8 kW
Total Filtration	2 mm Al eq.
Transformer Insulation	Oil bath
Cooling	Environmental

Minimum focal spot to skin distance	20 cm (7 7/8")
X ray beam diameter	6 cm (2 3/8")
Radiation leakage at 1 m	< 50 mR/h
Technique factors for radiation leakage	65 kV, 8 mA, 1 s
Maximum deviation of output current	± 2 mA
Exposure interval	duty cycle 1/60
X-RAY TUBE	
Manufacturer	CEI - Bologna, Italy
Type	OCX 70 G
Focal spot	0.8 mm (IEC 336)
Inherent Filtration	0.5 mm Al eq.

WARNING

The duty cycle of 1/60 has to be intended as follows:

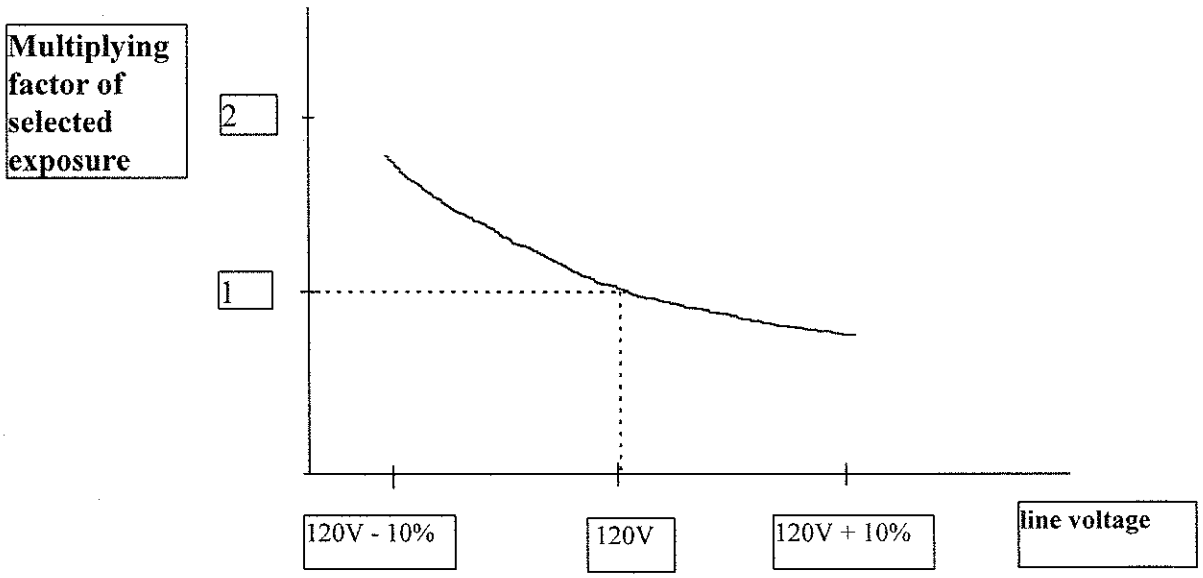
Exposure time	Interval Time between exposures
from 0.03 to 0.1 second	10 seconds
from 0.12 to 1.00 second	1 minute
from 1.30 to 3.00 second	3 minutes

The interval time between exposures has to be respected in order to assure the proper tubehead life.

NOTE: *Selected Exposure time and 'corrected actual exposure time'.The Aztech 65 CCD timer carries a special feature called Computer Controlled Density which allows to automatically correct the selected exposure time in case the line voltage has drifted from 120V. A change in the line voltage affects the peak voltage applied to the X-Ray tube and the value of high voltage affects significantly the spectrum of the radiation, which finally affects the optical density of the image on the film. Purpose of the Computer Controlled Density correction is to provide basically the same optical density on the film in front of any variation of the line voltage, within the standard accepted limits of rated voltage (120V +/- 10%). This feature allows the user to get basically the same quality of the image without caring about possible variations of the line voltage, which are quite common in many areas, and very difficult to monitor.*

The automatic correction of the exposure time works with the following sequence: the internal voltmeter of the CCD timer monitors continuously the line voltage while the user selects the desired exposure time. Once the user has selected the exposure time that is thought adequate to obtain the proper quality of the image for that specific test, the user presses the X-Ray button and the CCD timer displays the corrected actual exposure time that has been determined by the CCD timer itself, on the basis of the line voltage measured just prior to press the Xray button, and that shall be used for that specific test.

The corrected exposure time is the actual exposure time used by the device; it is calculated applying a correction factor to the selected exposure time, based on an empirical law that correlates the optical density of the film with the high voltage peak and consequently with the line voltage.
The qualitative relationship between the multiplying factor and the line voltage is shown in the following picture



The Following table allows to establish real exposure times as a function of preselected times and line voltage:

line voltage	108V		112V		116V		124V		128V		132V	
	corrected exposure time (on the basis of current line voltage) (1)	max/min exposure time due to electronic inaccuracy	corrected exposure time (on the basis of current line voltage) (1)	max/min exposure time due to electronic inaccuracy	corrected exposure time (on the basis of current line voltage) (1)	max/min exposure time due to electronic inaccuracy	corrected exposure time (on the basis of current line voltage) (1)	max/min exposure time due to electronic inaccuracy	corrected exposure time (on the basis of current line voltage) (1)	max/min exposure time due to electronic inaccuracy	corrected exposure time (on the basis of current line voltage) (1)	max/min exposure time due to electronic inaccuracy
line voltage correction factor:	1,75		1,45		1,24		0,89		0,79		0,7	
preselected time (ms)												
30	53	83	44	74	37	67	27	57	24	54	21	51
		23		0		0		0		0		0
60	105	135	87	117	74	104	53	83	47	77	42	72
		75		57		44		23		17		0
100	175	205	145	175	124	154	89	119	79	109	70	100
		145		115		94		59		49		40
200	350	380	290	320	248	278	178	208	158	188	140	170
		320		260		218		148		128		110
400	700	735	580	610	496	526	356	386	316	346	280	310
		665		550		466		326		286		250
800	1400	1470	1160	1218	992	1042	712	748	632	664	560	590
		1330		1102		942		676		600		530
1000	1750	1838	1450	1523	1240	1302	890	935	790	830	700	735
		1663		1378		1178		846		751		665
1200	2100	2205	1740	1827	1488	1562	1068	1121	948	995	840	882
		1995		1653		1414		1015		901		798
1500	2625	2756	2175	2284	1860	1953	1335	1402	1185	1244	1050	1103
		2494		2066		1767		1268		1126		998
2000	3500	3675	2900	3045	2480	2604	1780	1869	1580	1659	1400	1470
		3325		2755		2356		1691		1501		1330
2500	4375	no exposure	3625	3806	3100	3255	2225	2336	1975	2074	1750	1838
		no exposure		3444		2945		2114		1876		1663
3000	5250	no exposure	4350	no exposure	3720	3906	2670	2804	2370	2489	2100	2205
		no exposure		no exposure		3534		2537		2252		1995

(1) IT IS THE VALUE DISPLAYED BY THE TIMER SO LONG AS THE X-RAY BUTTON IS KEPT PRESSED

no exposure = the timer does not allow exposure times longer than 4 sec

HOW TO ASSESS TECHNICAL FACTORS

kVp The kVp is defined as the stationary high voltage value which settles under load after pre-heating time.
The kV_p are assessed with a non-invasive instrument having a ± 2% accuracy, at a nominal input line voltage.
A direct measurement of the high voltage can only be carried out by specialized technicians in a suitable testing laboratory wich would require disassembling of the tubehead.

mA The output current is defined as the average value of the stationary current which settles after pre-heating time.
The output current is measured with a digital voltmeter by assessing DC voltage drop on terminals of 1k Ohm resistance (measurement accuracy ± 2%) mounted on the tubehead. To access the resistance, remove the tubehead plastic covers looseling the four recessed screws. The voltmeter has to be connected in parallel to the resistance (DC, 10V).

t The exposure time is defined as the time measured with non invasive kV_p/t meter. Accuracy is granted by using an RTI PMX II instrument, set with the following parameters:

Parameter	:sec
LF.HF	:LF
SE/LO :	SE
Di	:2
CAl:	:1

To perform the measurement, the "RAD" probe of the instruments has to be placed at the end of the beam limiting device (Focus to Detector Distance = 20 cm) in a manner to cover completely the sensitive area.

5.1. Tube Characteristics

The following figures are the main characteristics of the X-Ray tube OCX 70 G used on the Aztech 65.

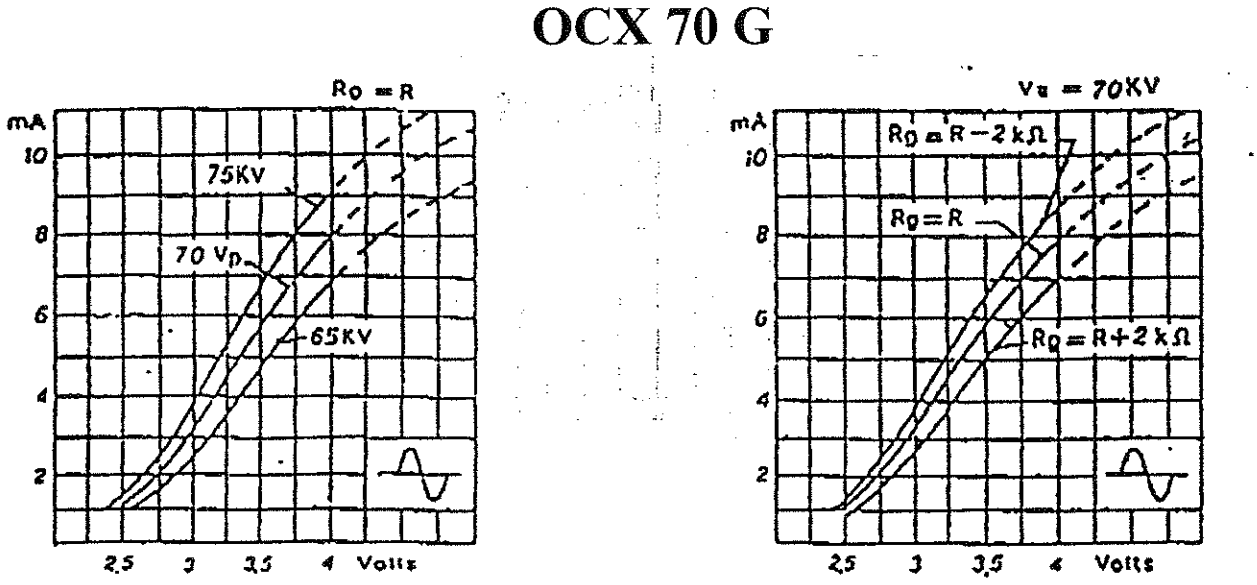


Figure 3 Emission Characteristics

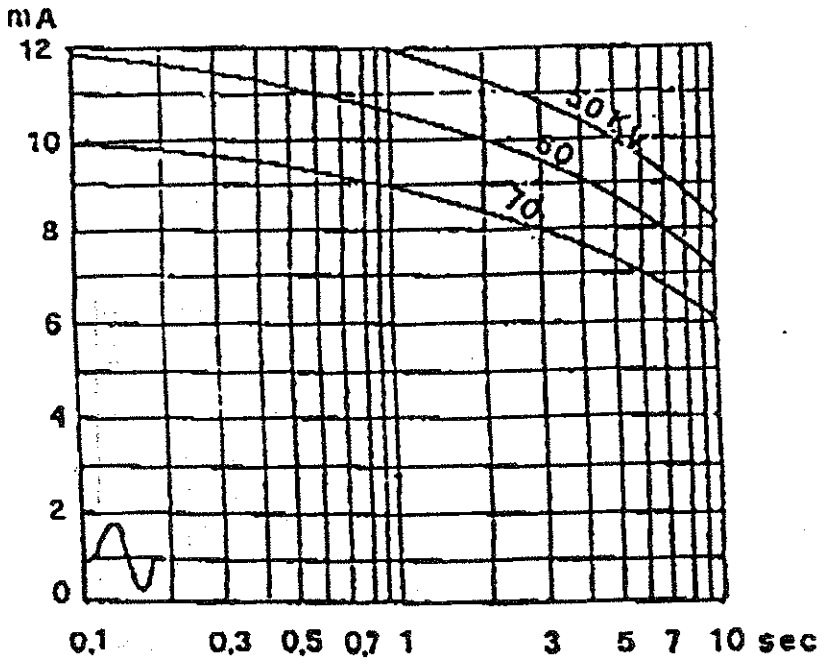


Figure 4 Ratings

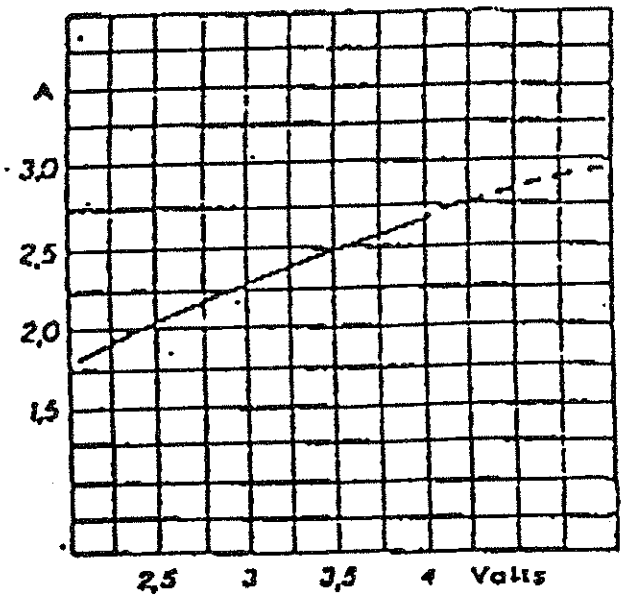


Figure 5 Filament characteristics

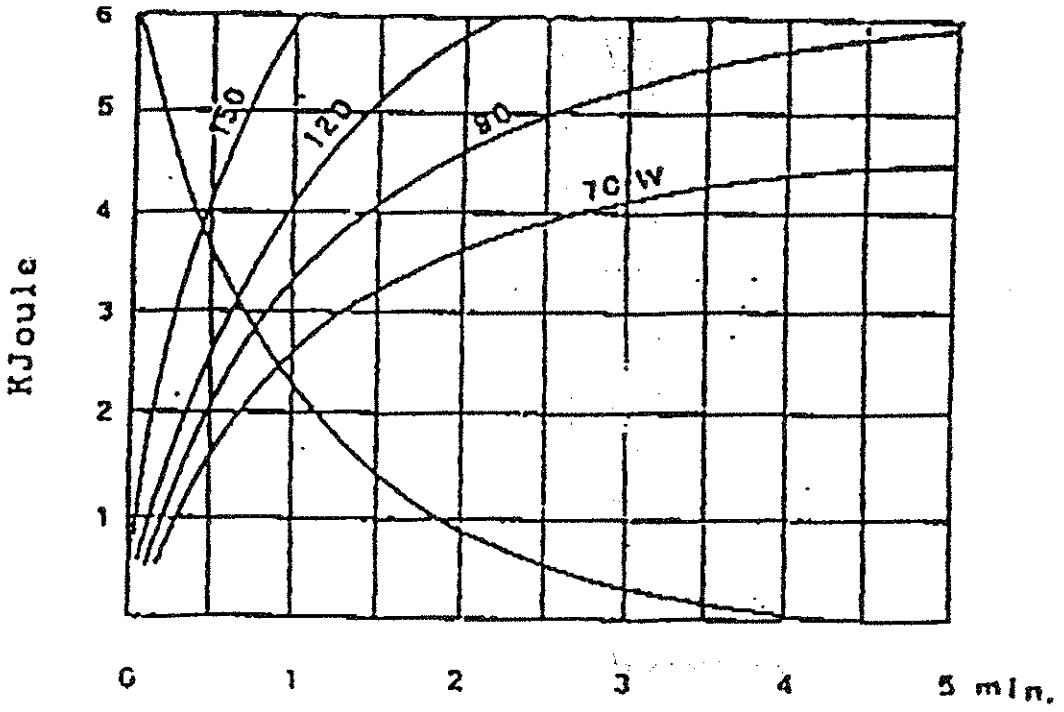


Figure 6.1 TUBE RATING CHARTS AND COOLING CURVES FOR ANODE

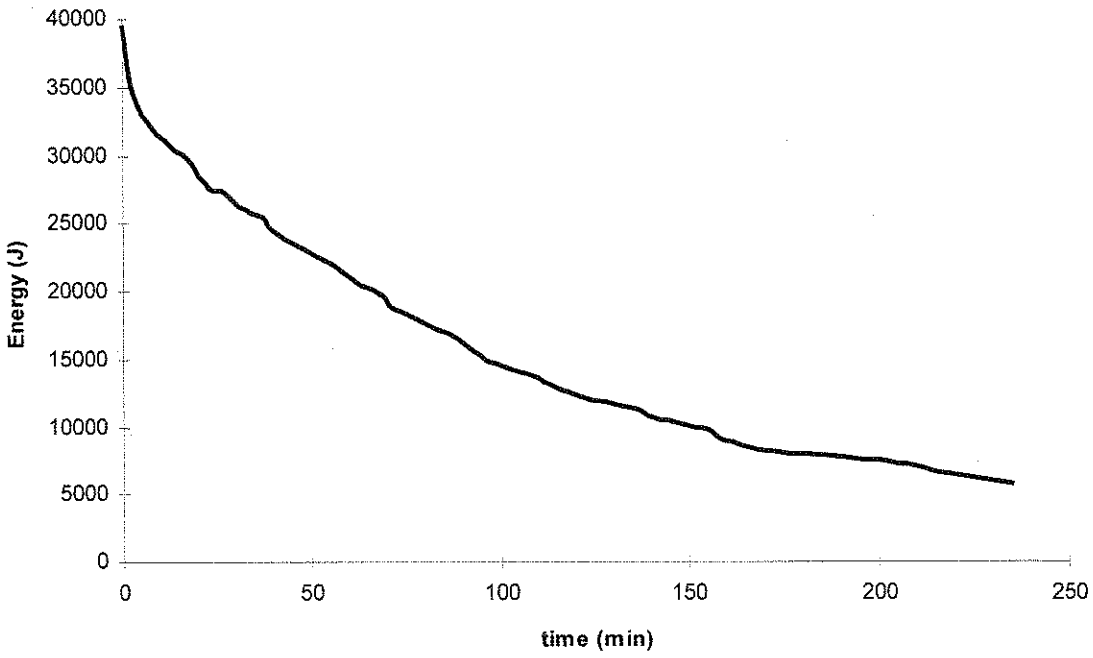


Figure 6.2 COOLING CURVE OF TUBEHEAD

6. PRE-INSTALLATION

Pre installation should consider the proper backing of the equipment as well as the correct wiring. It is important to order the correct parts for the installation such as wall plates and wiring kits.

Suitability of the installation is the full responsibility of the installer. Sufficient backing is absolutely necessary.

6.1. Electrical characteristics

Single phase + ground power supply	:	120 V
Line Frequency	:	60 Hz
Absorbed current	:	6 A momentary - 0.5A stand-by
Apparent line resistance	:	0.2Ω max. (120 V)

The installation must be done using a UL listed Junction Box; at least 16" wire length must be allowed to connect the equipment to the line supply.

The equipment must be wired to an electrical panel whose characteristics comply with the electrical norms in force in the country where it is installed. A dedicated line protected by a 15A circuit breaker is recommended.

Warning: The equipment is intended as a permanent installed equipment, so it never has to be connected though a plug.

Wire sizes in accordance with the following table are strongly recommended.

120 V 60 Hz				
MINIMUM REQUIRED WIRE SIZE	**WIRE RUN DISTANCE**			
	feet	**25**	**50**	**75**
	meters	**7.5**	**15**	**22.5**
12 AWG 4 mm²	■■■■■■■	■■■■■■■		
10 AWG 6.3 mm²	■■■■■■■	■■■■■■■	■■■■■■■	

In any case no wire sizes less than 10 AWG or greater than 14 AWG are allowed.

The general ground connection must be performed according to the norms in force. Unsatisfactory ground connection of the equipment may constitute a hazard for the operator and/or cause the electrical equipment to malfunction.

As stated in Chapter 4, it is also possible to install the hand held control at a remote position. A remote hand control kit which includes an extension cable is required.

6.2. Aztech 65 Installation backwired

Should the system require an electrical box, the installation must be done using a UL listed Junction Box.

Note:
The Junction box must always be placed behind the cutoff of the 16" on center wallplate (anchor plate) , as stated on the Figure 3 below.

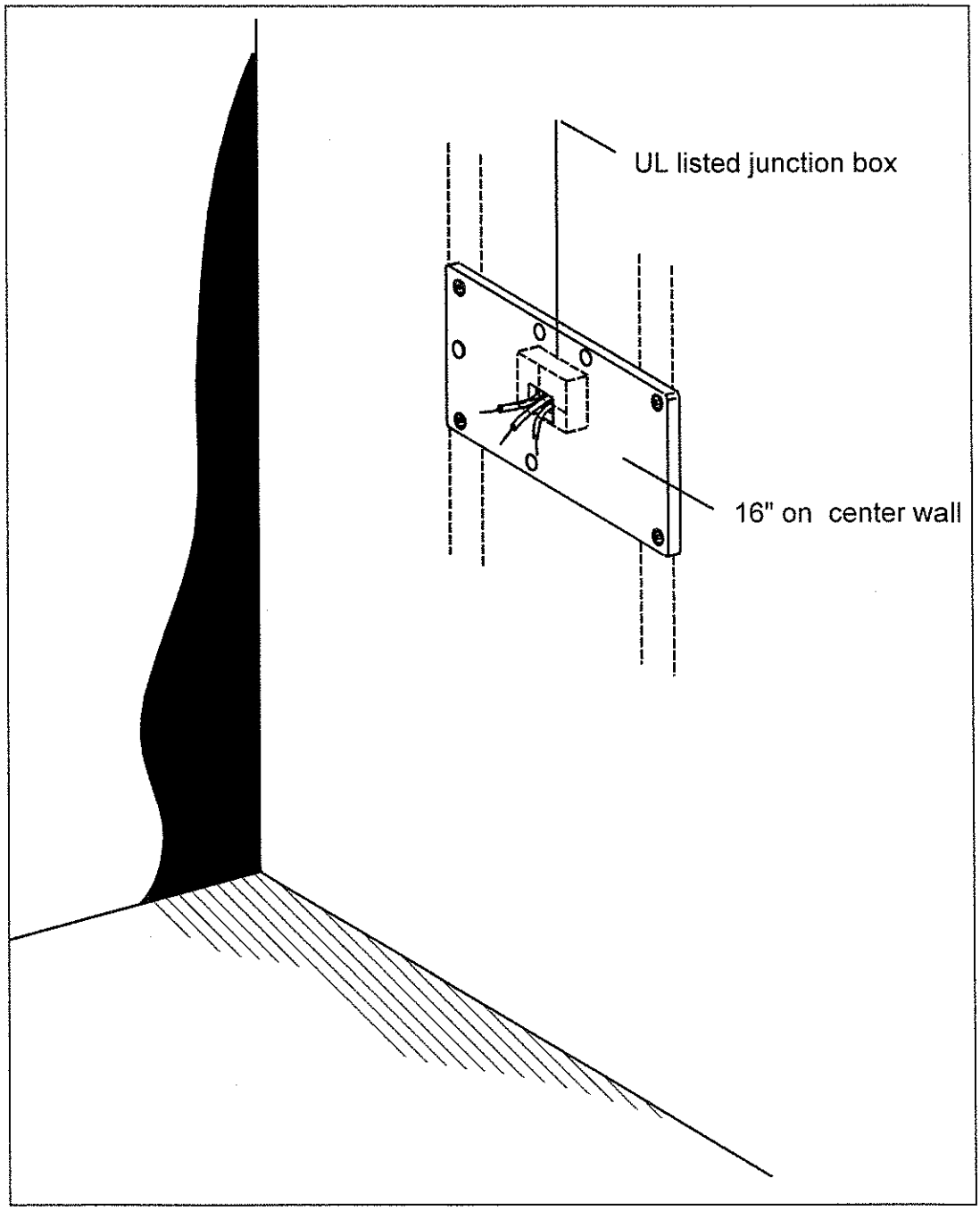


Figure 3 16" on center wall plate mounting

6.3. Aztech 65 installed on dry wall with wooden studs

Four lag bolts 5/16 x 2 - ½ inches are needed.

Note :

Make sure lag bolts penetrate center of the stud. See Figure 4.

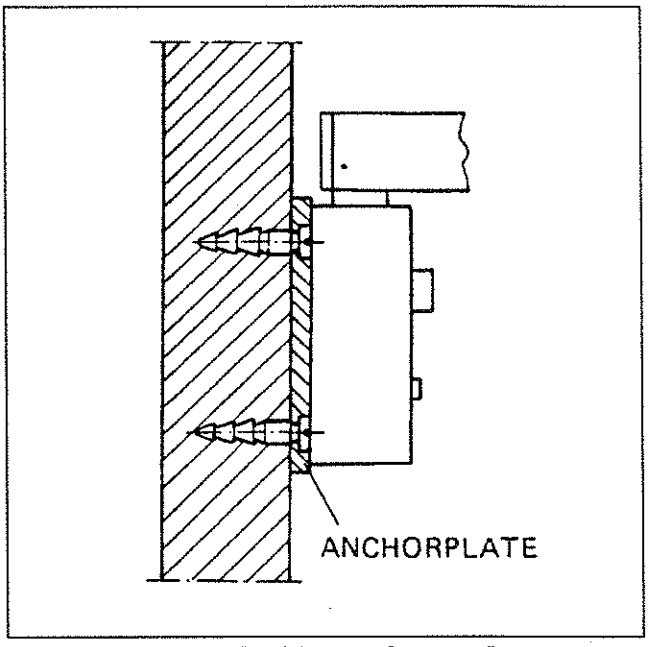


Figure 4 Dry wall with wooden stud mounting

6.4. Aztech 65 installed to a concrete wall

The Aztech 65 can be installed to a concrete wall. For this application, four 3/8" lead expansion shields are needed.

6.5. Ambient conditions

For best operating results, the air should be conditioned so as to assure a relative humidity of between 50% and 75% and a temperature ranging between 65° and 90° F (18° and 28°C).

7. INSTALLATION

The Wall Mounted AZTECH 65 comes in the following versions:

STANDARD made up of Tubehead assembly, scissors arm, extension arm, control box, back plate and remote hand control assembly with coiled cord, (see Figure 1 on page 7).

OPTION:

REMOTE HAND CONTROL SYSTEM WITH LONG CABLE (see Figure 2 on page 8) made up of Tubehead assembly, scissors arm, extension arm, control box, back plate an the remote wiring kit (30 feet cable + hand control plate), remote hand control assembly.

7.1. Installing the plate and CCD timer

NOTE: The CCD Timer must be installed with power card, remote control and cable as assembled and calibrated by manufacturer. Changing their configuration means new system calibration as per paragraph 11 on page 37.

This also applies to repairing or replacement of one of the three components after installation.

Before securing Plate and CCD Timer to the wall, see whether wiring between X-Ray Apparatus and mains must run externally or inside the wall. In the latter case, proper conduit should be used. To prevent voltage drops, the section of the cable (AWG) joining distribution panel to the Apparatus will depend on the distance as stated before (see paragraph 6.1 on page 16).

7.1.1. Standard configuration with 16" on center wall plate

With reference to Figure 5 on page 21, please follows the below steps:

a) Mark 4 holes "F" on the wall, 57" (1450 mm) from top of 16" on center wall plate to floor. Use template supplied.

b) Drill the holes as marked and insert the appropriate bolts or expansion plugs supplied with the apparatus depending on the backing available, as per instructions defined on paragraph 6.2 on page 17 or 6.3 on page 18.

c) With reference to Figure 6 on page 22, remove front casing from Plate/timer loosen the 2 screws on the bottom of the case.

d) Secure the wall plate to the wall by means of screws "4". Check with a spirit level that the 16" on center wall plate top border is leveled

WARNING:
Installer must check wall features. Load on top rawlplugs is 440 lbs. each. The installation is the full responsibility of the installer. The manufacturer does not and can not assume any liability in regards to improper or unsafe installation. Backing suitability to bear load is of outmost importance.

e) Fit plugs "8" (Figure 6, page 22) to screws "4" and secure the Plate with X-Ray Apparatus mounting to the 16" on center wall plate (holes "D" Figure 6). With a spirit level check that top of X-Ray apparatus mounting is perfectly leveled.

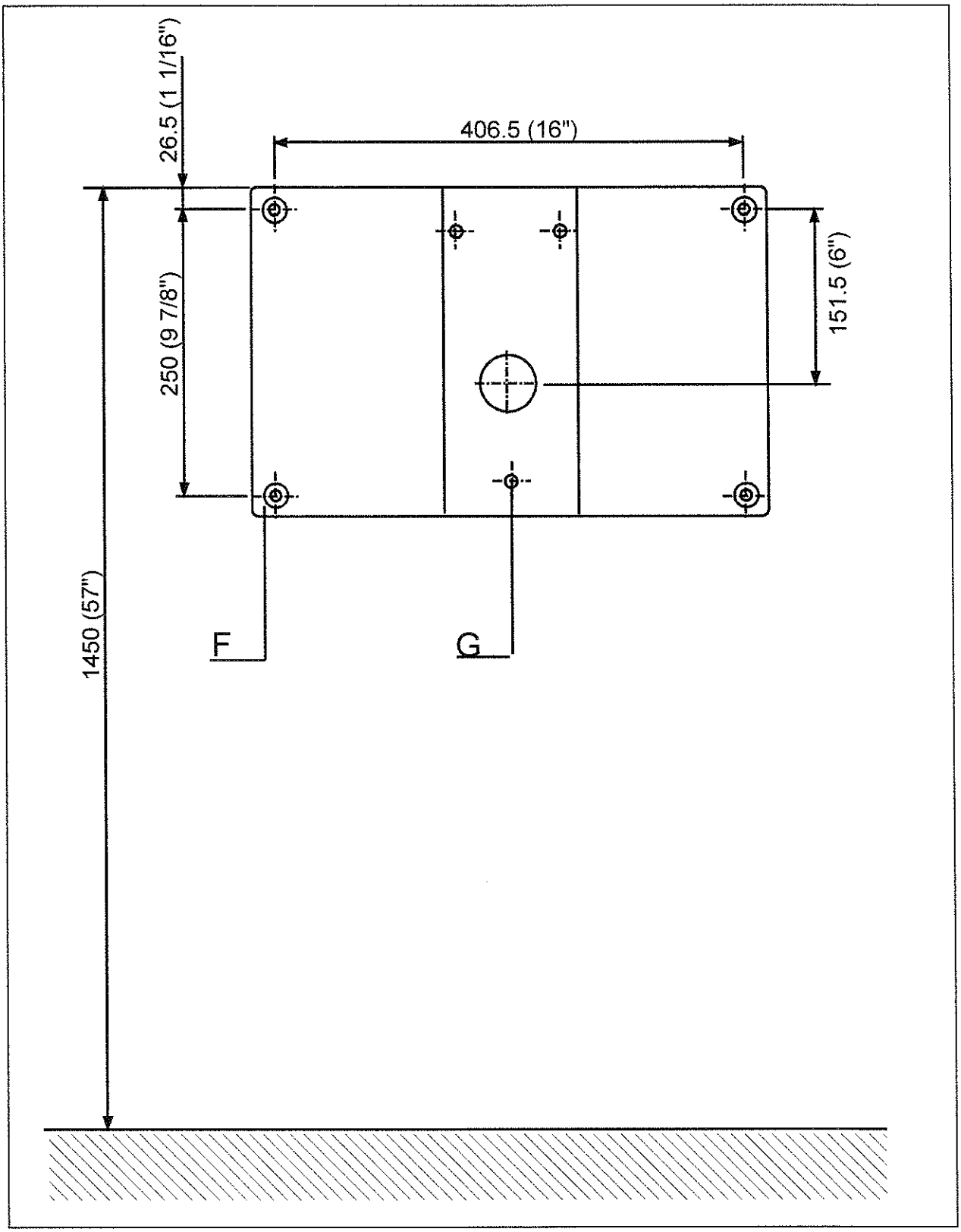


Figure 5 Standard wall mounting holes

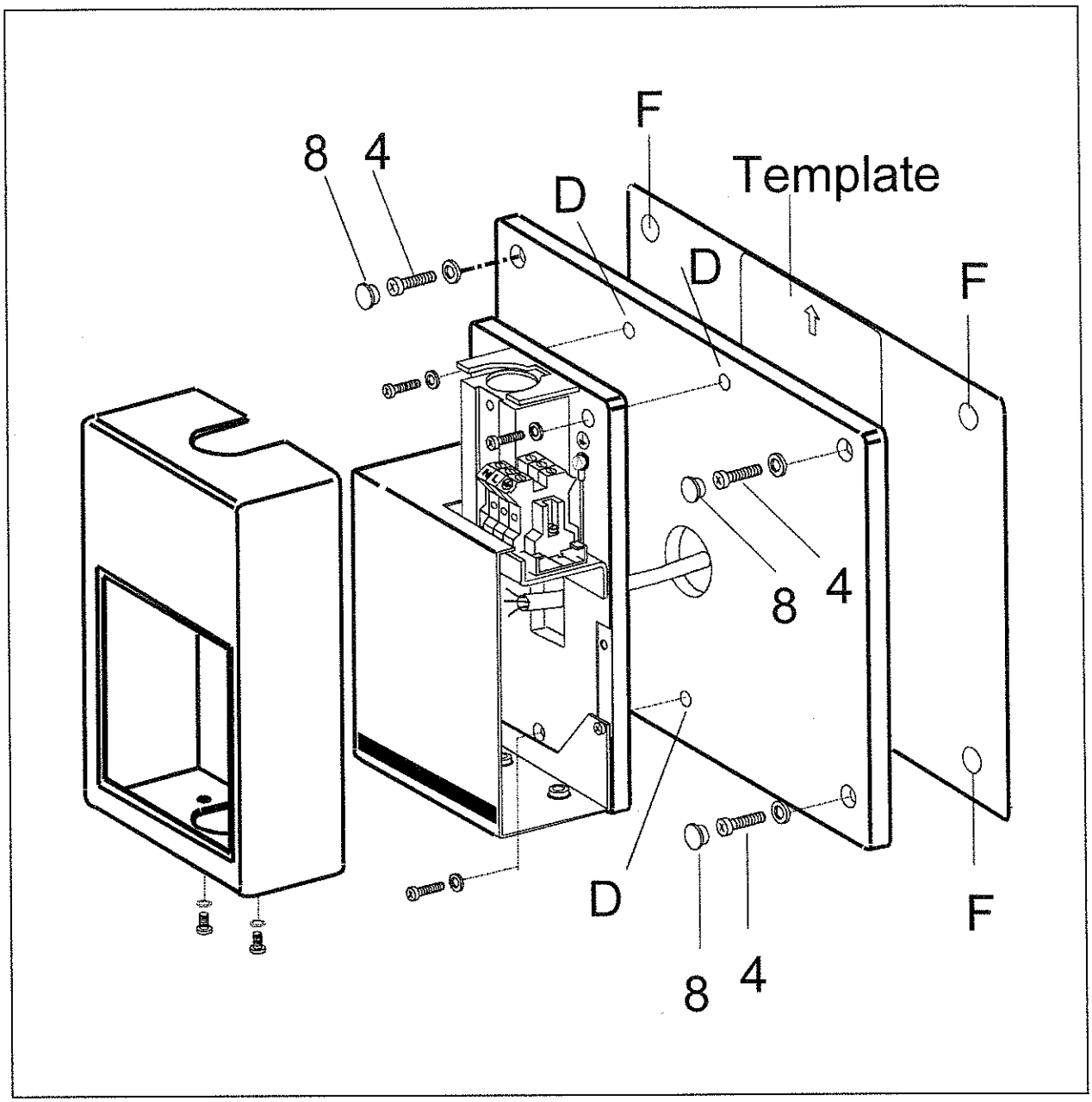


Figure 6 Securing the 16" on center wall plate

7.1.2. Remote hand control system with long cable

The exposed or chased cable connecting Timer to Remote Control must run in an iron raceway (conduit) to prevent disturbance signals. Maximum cable length may be 30 feet. Therefore, distance between Timer Box and Remote Control must be less than 30 feet. Excess cord connecting Remote Control to its support will allow easier handling.

a) Install the tubehead support on the 16" on center wall plate as described in point 7.1.1 a, b, c, d, e (see page 20).

b) Mark holes of Remote Control (Code 56603358) support plate (1) on the wall, 1450 mm (57") from Remote Control top to floor (See Figure 7 page 23.)

c) Introduce the 2 rawlplugs (2) and secure to wall with the two screws (3).

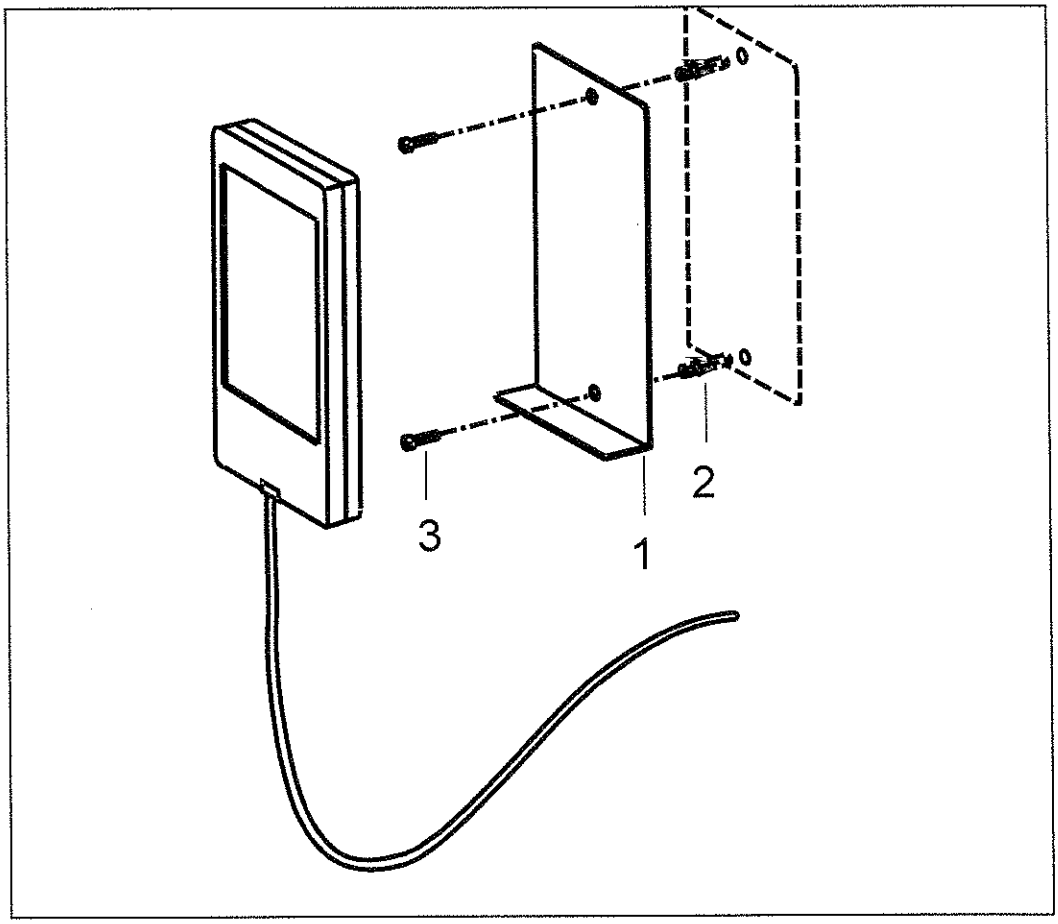


Figure 7 Remote hand control mounting

7.1.3. Remote single button activation

WARNING

The CCD timer as manufactured for The AZTECH Group, Inc. is in compliance with DHHS performance standards as set forth under 21 CFR.
The regulation requires that a visual indication of the technique factors be visible from the operator's position. The CCD timer, by itself, may easily be extended and used as a remote switch assembly to meet this criteria.
Occasionally, a need may arise to complement this switch with another single button or a combination thereof. Although a connection point is provided on the CCD timer, the manufacturer specially and expressly, by this warning, disclaims any responsibility, either expressed or implied as to the fitness and correctness of this remote installation in reference to the federal regulations as applicable. It is the installers responsibility to observe and abide by the rules.

Step 1

1. Run the two (2) 18 AWG wires from the Aztech 65 control box to the wall where the x-ray switch is to be mounted at a safe height.
2. Solder the end of the two wires to the connecting terminals of the x-ray switch.
3. Assemble the switch to the plate and mount to the wall.

Step 2

1. The CCD timer is to be attached to the gray metal portion of the control box using the magnet on the back of the CCD timer and removing the silver foil that covers the magnet
2. Remove coiled cord from the CCD timer and save for possible further use. This cord will be replaced with "flat cord" in kit.
3. Remove the back cover of the CCD timer by removing the four (4) screws. Remove the front plastic cover.
4. Route the two (2) 18 AWG wires from the push button switch through the small hole on the bottom of the CCD timer cover.
5. Attach the wires to the small terminal block at the bottom right side of the PC board
6. Reassemble the CCD Timer.
7. Plug one end of the 4 "flat cord" into the bottom of the CCD timer. Plug the other end into the bottom of the control box
8. Attach the CCD timer to the control box.
9. Perform calibration set for paragraph 11.1 (page 37)

7.2. Assembly of extension arm and scissors arm

CAUTION:
To facilitate assembly, do not unpack the Scissors Arm fully. Check that Extension Arm pivot is fitted with a spacer.

a) Tape cable without connector from Scissors Arm "24" (Figure 8) to wire "23" from Extension Arm. Pull wire through hole "26".

b) Turn out the safety screw "A" (Figure 15) and introduce Scissors Arm pivot into Extension Arm (Figure 13).

c) Loop cable back into rotation pivot (Figure 10).

d) Plug hole "26" (plastic plug) (Figure 11).

e) Block the screw "A" to avoid the scissors arm to exit.

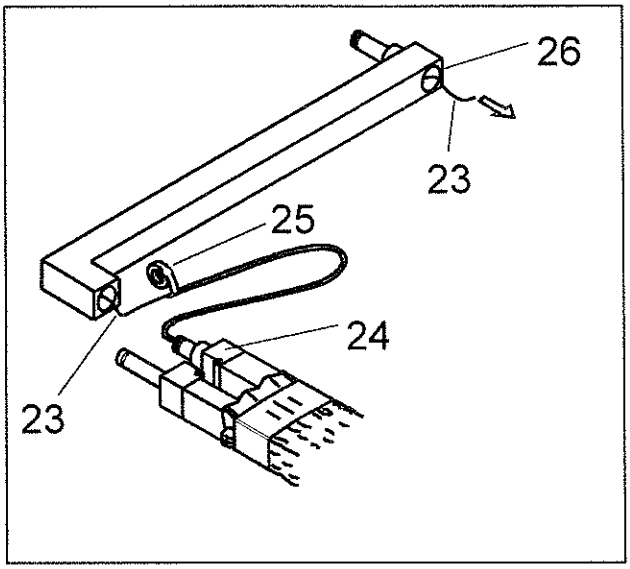


Figure 8 Arm assembly -1

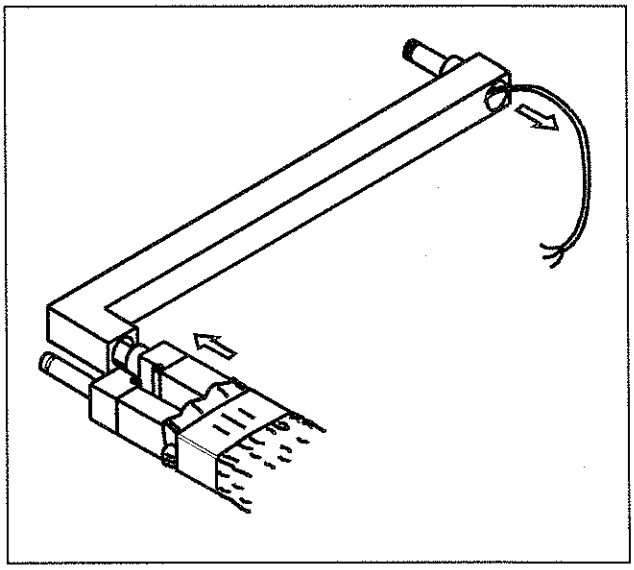


Figure 9 Arm assembly 2

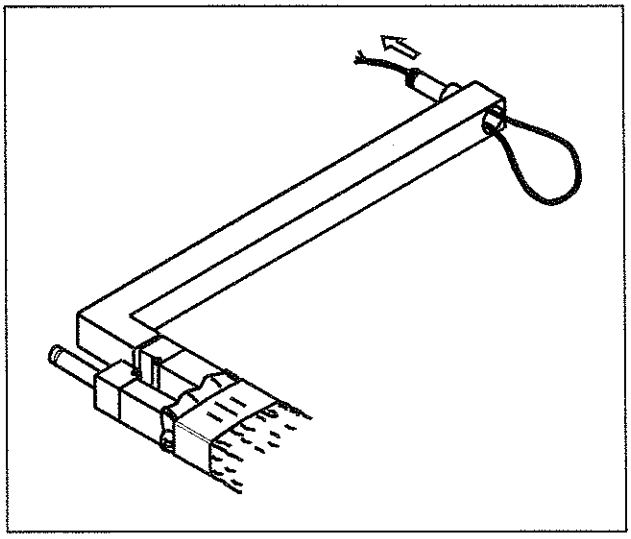


Figure 10 Arm assembly - 3

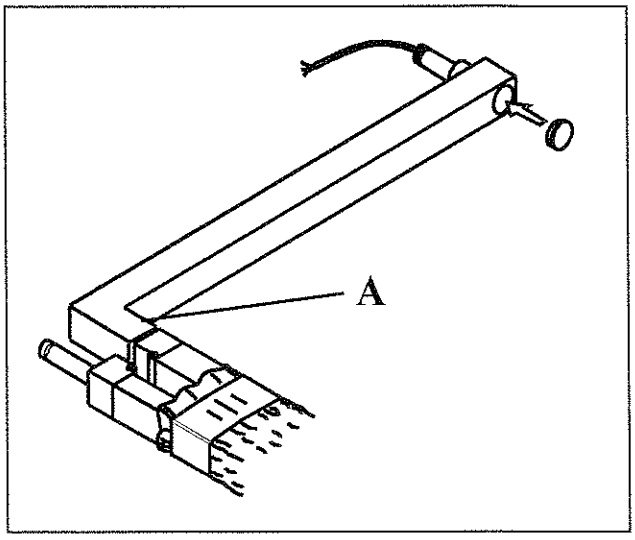


Figure 11 Arm assembly - 4

e) Fit Arm assembly with Extension to wall-plate by inserting pivot into housing "27" (Figure 12 on page 26).

NOTE: To fit pivot into its housing, the Arm must be held at a right angle with the Plate.

f) Check with a spirit level "28" that the arm is leveled.

NOTE:

If the extension arm is not properly leveled, refer to the arm mounting plate, where four screws are to be found, two on either side.
These screws are the levelling screws.
Adjust as follows (please refer to Figure 12 on page 26):

- **extension arm with $\alpha > 90°$**: loosen the two screws labeled "B".

- **extension arm with $\alpha < 90°$** (arm leaning towards the floor): insert the two screws labeled "A" further in.

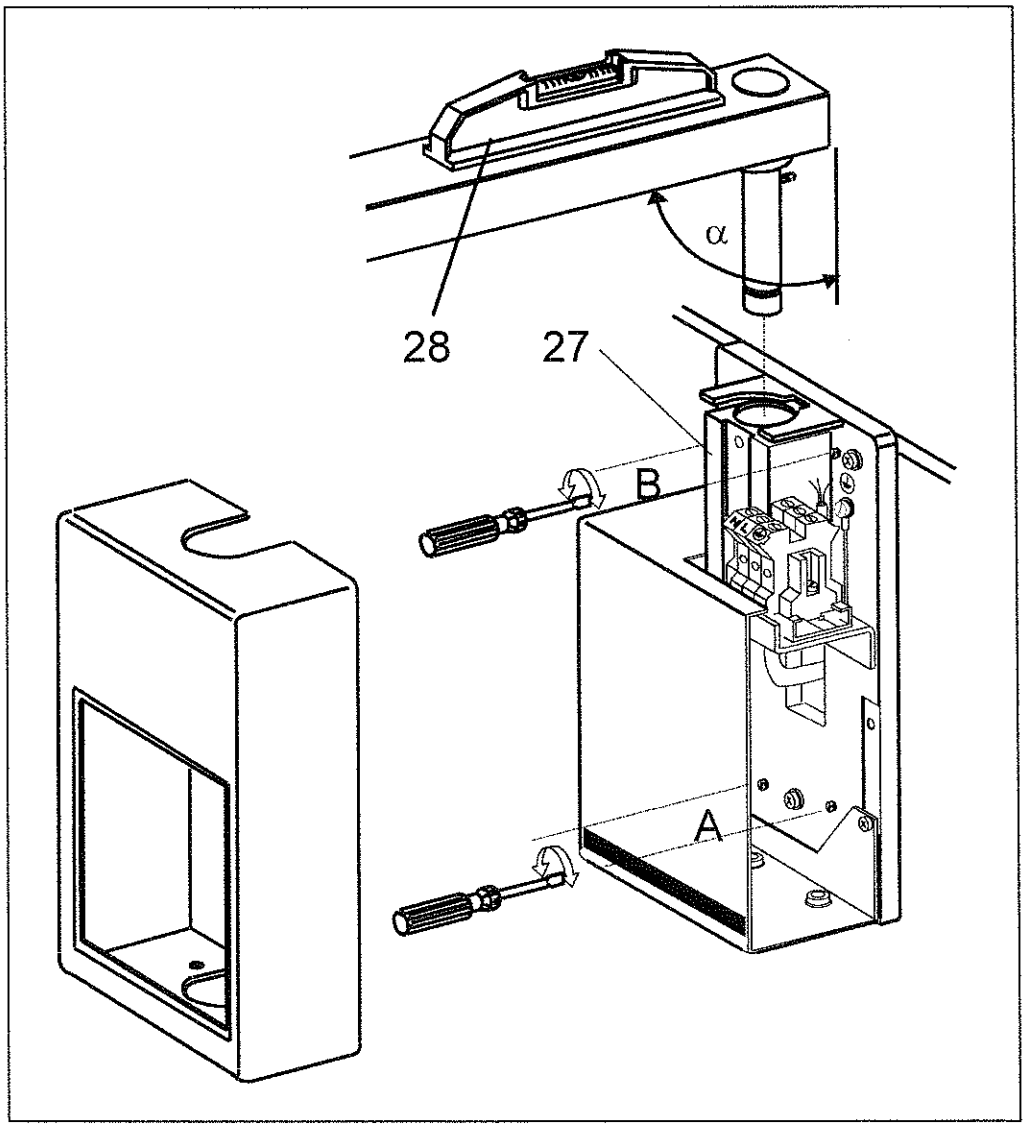


Figure 12 Arm levelling

7.3. Installing the tubehead

Reference to Figure 13, page 27

a) Remove screw "29" from joint.

b) Hold Arm at top height and fit sleeve "30" to joint. Fit Tubehead pivot into joint by half its length an fit safety ring "31" into the slots

NOTE: Insert safety "C" shaped clip from the same side as the screw so as to prevent sleeve from excessively moving

c) Push pivot in to have the safety "C" clip fitting into pivot slots. Now lower sleeve onto the "C" clip (Figure 14, page 27).

d) Tighten screw "29". This serves as a protection against easy removal of sleeve and safety "C" clip.

NOTE: When operations are completed recheck again that the extension arm is horizontal; if not please repeat the operations described at paragraph 7.2

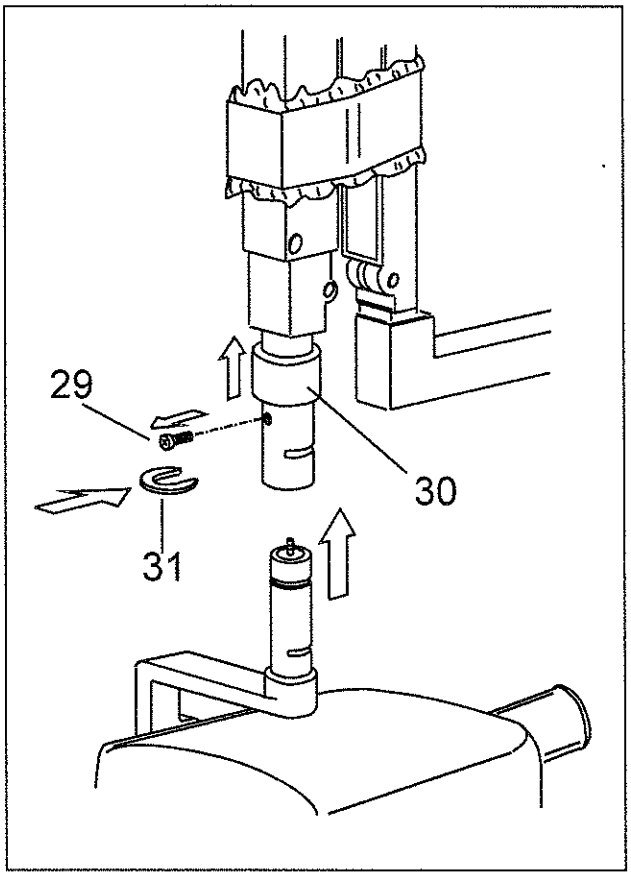


Figure 13 Tubehead mounting - 1

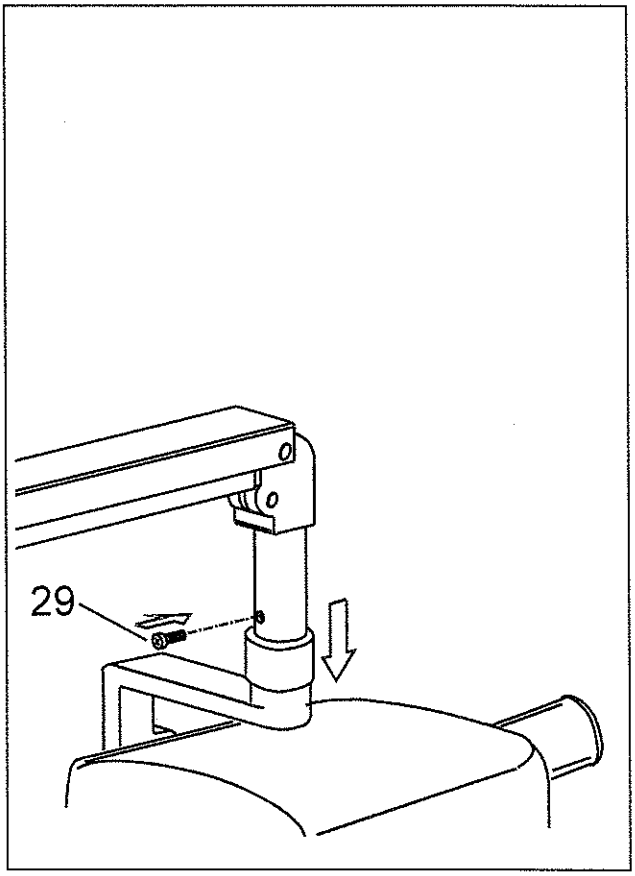


Figure 14 Tubehead mounting - 2

e) Adjust extension arm friction ("A" Figure 11, page 24) by means of a 4mm exagonal wrench and check arm rotation.

Note The purpose of friction adjustment is also to avoid rise up of scissors arm; hence it must not be loosen.

7.4. Electrical wiring

After mounting the CCD Timer, connect the electrical wires by referring to annexed Wiring Diagram. The CCD Timer must be connected to an electrical installation provided with adequate grounding according to UL and IEC Standards. Whenever possible, a dedicated line protected by a 15 A circuit breaker is recommended.

7.4.1. Symbols used

Protective ground

Functional ground

7.4.2. Electrical wiring for STANDARD version

a) **Make sure that the line input wire(s) cannot touch the power supply board. To do this, it is mandatory to follow the cable path depicted on the Figure 15 on page 29 and to fix in the appropriate path using the enclosed plastic strip.**

b) Open the power assembly part loosing the screws of Figure 15 on page 28.

c) Cut out all exceeding cable length taking into account the length needed to reach the terminal block.

d) Connect Line Voltage (Figure 16 on page 29) to Timer terminal block with a proper wire size. Insert wires into Timer's terminal block according to specific positions: L = Live "11", N = Neutral "12" and Ground "13" (see enlarged "A" on the above mentioned figure).

Warning: Connect the ground wire directly to the terminal block. This point is directly and permanently connected to the general protective grounding point on the aluminum plate.

Warning: the torque force of the input terminal block is 8.9 lb inch

e) Connect tubehead wires, routed through the arms assembly, to the Power Supply Printed Circuit Board using the following steps.
The cable from the arms contain three wires.
The two black wires, labeled as L2 (LIVE) and N2 (NEUTRAL), must be first fitted with the female spade connectors supplied and connected to the corresponding L2 and N2 spade terminals on the P.C.Board. Please refer to Figure 17 on Page 30, caption B.
The third wires is a yellow/green one and must be fitted with special round terminal and connected to GROUND point directly on the plate, as shown under caption C in the Figure 17 on Page 30.
Make sure connection is firm and not loose.

Warning:
Wiring of tubehead to power supply card must strictly comply with procedures, as the Printed Circuit Board houses circuit for high voltage overload at X-Ray tube.
Incorrect wiring causes abnormal current input; therefore decreased Tubehead efficiency and line fuse blow-out in some cases.
Before powering the Timer be sure that voltage selection jumper (on power Supply PCB) is set to correct value.

7.4.3. Check of line voltage regulation

Check of line regulation: a proper installation has to make sure that the line provided in the facility where the device is being installed, meets the requirement of line voltage regulation ≤3%. In order to carry out this test proceed as follows:
- using a true RMS Voltmeter asses the line voltage value under no load condition (Vn)
- select a timer setting of 2 seconds and make an exposure
- Using the same RMS Voltmeter, read the line voltage during exposure which is the under load condition (Vi)
- Calculate line voltage regulation as: ((Vn-Vi)/Vi)x100.
- In case line voltage regulation does not meet the spec (≤3%), refer to 6.1 of this manual and consult with a certified electrician or the local Power Company.

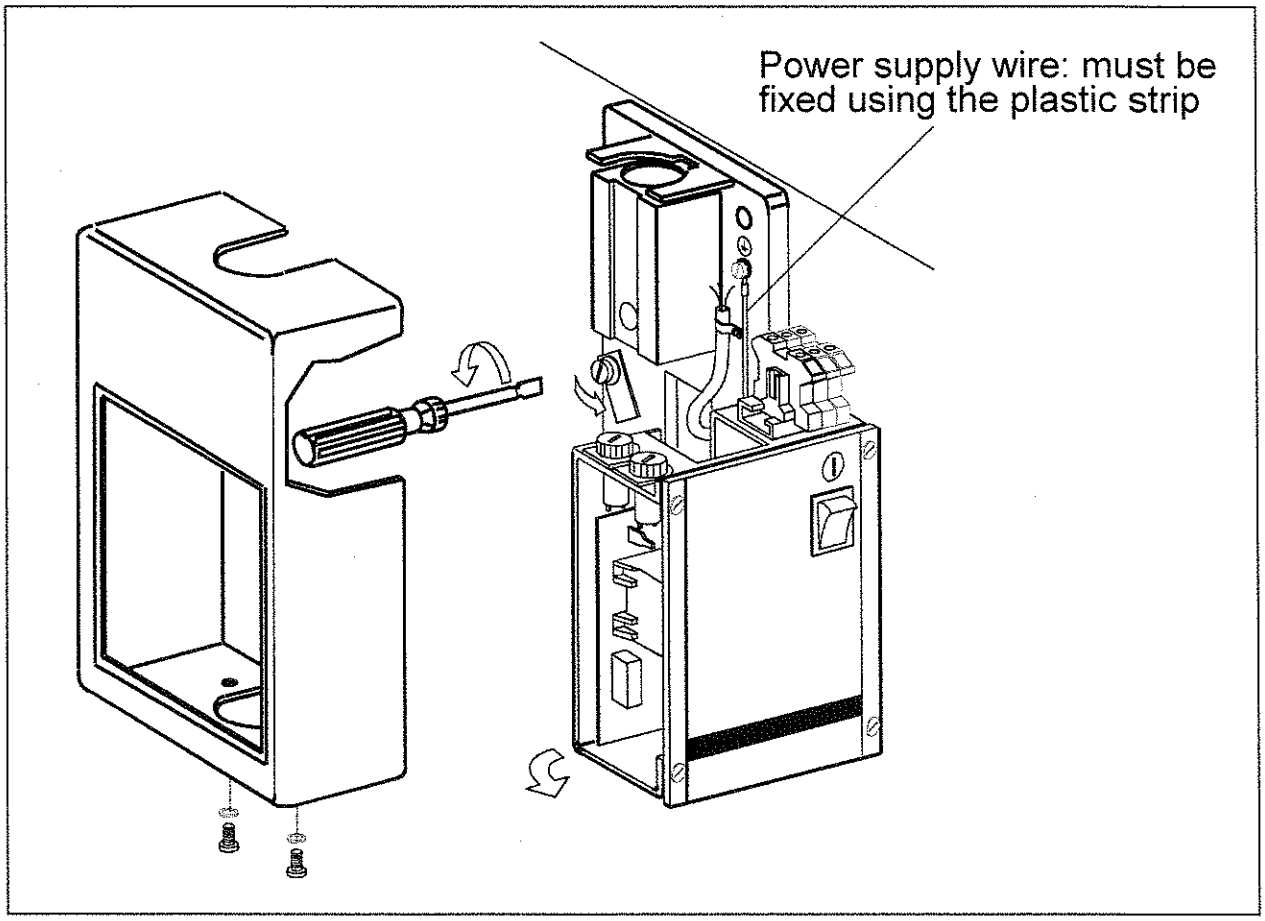


Figure 15 Electrical connection

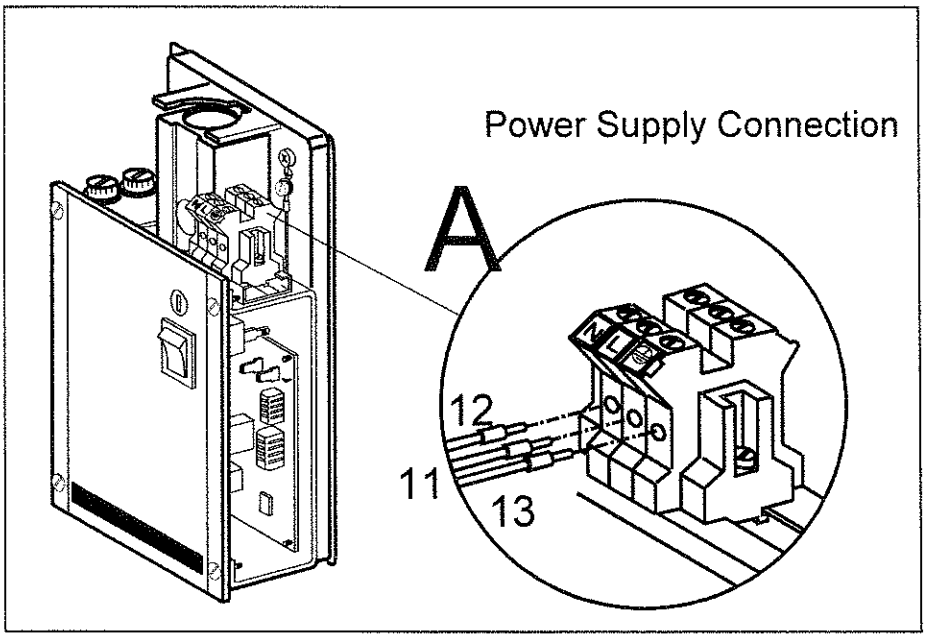


Figure 16 Power Supply connection

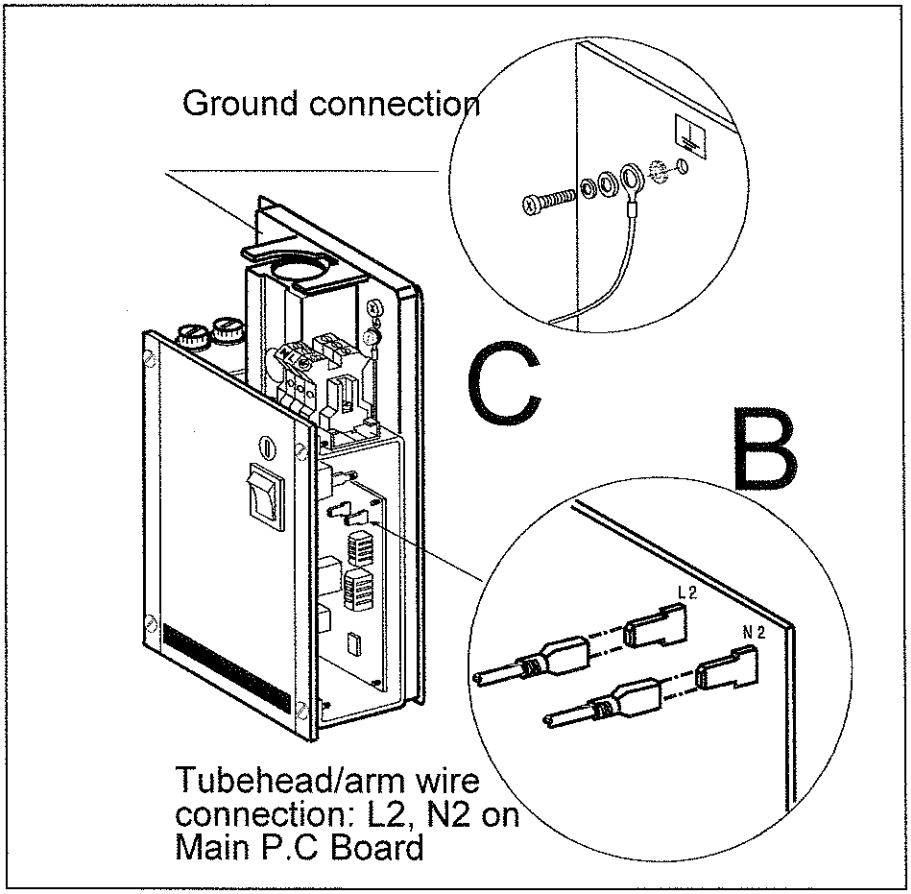


Figure 17 Tubehead/arm wire connection

8. CHECKS

All the equipment's functions are pre-calibrated and checked during final testing by the manufacturer. However, some functions can only be calibrated after the equipment has been installed.

8.1. Checking system's operation

After connecting the Apparatus to a suitable electrical line, check operation as follows:

a) Depress ON/OFF Switch "3" (Figure 21 on page 39) and check glowing of pilot lamp on Switch and simultaneous switching of Remote Hand Control

b) Pressing keys "5" and "6" and check that all such selected times are displayed as per Table 1 (page 31).

c) Position the fluorescent screen (to display radiation) on end of Collimator; depress key "3" to check simultaneous glowing of LED "8" and indication of a sound signal when X-rays are emitted. By keeping X-Ray key "7" depressed, the display will show actual exposure time which take into consideration line voltage changes during exposure. This is possible as the CCD timer is set for automatic time compensation.

WARNINGS: X-rays are being emitted. Follow all applicable safety standards as required by local laws.

Now the apparatus is ready for use

0.03 - 0.04 - 0.05 - 0.06 - 0.07 - 0.08 - 0.09 - 0.10 - 0.12 - 0.14 - 0.16 - 0.18 - 0.20 - 0.23 - 0.26 - 0.30 - 0.33 - 0.36 - 0.40 - 0.45 - 0.50 - 0.60 - 0.70 - 0.80 - 0.90 - 1.00 - 1.30 - 1.60 - 2.00 - 2.50 - 3.00

Table 1: Exposure Times allowed on the CCD Timer

NOTE: Exposure time selection is dependent on the setting performed during set-up phase. If local requirements on exposure time accuracy are more stringent than the declared ones, some short exposure times must be inhibited. For instance if local regulations require an accuracy within ± 20%, then the exposure times from 0.03 till 0.14 must be inhibited because for these times a maximum accuracy of ± 30 ms is stated which is more than ± 20%. Refer to paragraph 11.1 on page 37.

8.2. Error messages on the Remote-Control Display

As already illustrated in Chapter 3, the CCD timer is entirely managed by a microprocessor, which, besides controlling the programming of emission parameters, also indicates operational irregularities and errors by visualizing message codes on the display.

The error message "666" means that the input line voltage is too low, outside the allowed value of -10%.

The error message "999" means that the input line voltage is too high, outside the allowed value of +10%.

NOTE: if the above messages are displayed very frequently, perform the calibration procedure of the input line voltage as described on the paragraph 11.1, page 38.

9. MAINTENANCE

As for all electrical equipment, it is not only necessary to make proper use of this equipment, but also to perform regular maintenance and checking operations. Taking this precaution will assure the safe and efficient operation of the equipment and will be useful in preventing the possibility of risks for the patient and the operator.

Preventive maintenance of the equipment consists of checks performed directly by the operator, as specified in the table shown here below, and of periodic maintenance operations which can only be carried out by personnel assigned to servicing.

It is essential, when replacing components which have a direct or indirect effect on safety, to use only original components and to be sure that they are replaced only by personnel authorized by the manufacturer.

CAUTION:	Before using for the first time, the operator must make sure that the equipment shows no signs of malfunctions. In case of any operating irregularities or failures, the operator must notify your dental dealers or call The Aztech Technical Service.

Frequency	**Type of checks**
Once a year	• Check that labels on control Console and Tube-head are intact and properly secured. • Check that Tubehead is free from oil residues. • Check that X-Ray control box is not broken or scored • Check for external damage on the apparatus which may prejudice protection against radiation • Check balance of scissors arm • Check that mounting plates are intact and correctly attached • Make sure the remote-control cable shows no signs of breakage or abrasions • Check functionality of dead-man switch • Check integrity of LEDS and mains switch lamp • Check the efficiency of the screw frictioning the horizontal movement

10. WIRING DIAGRAMS

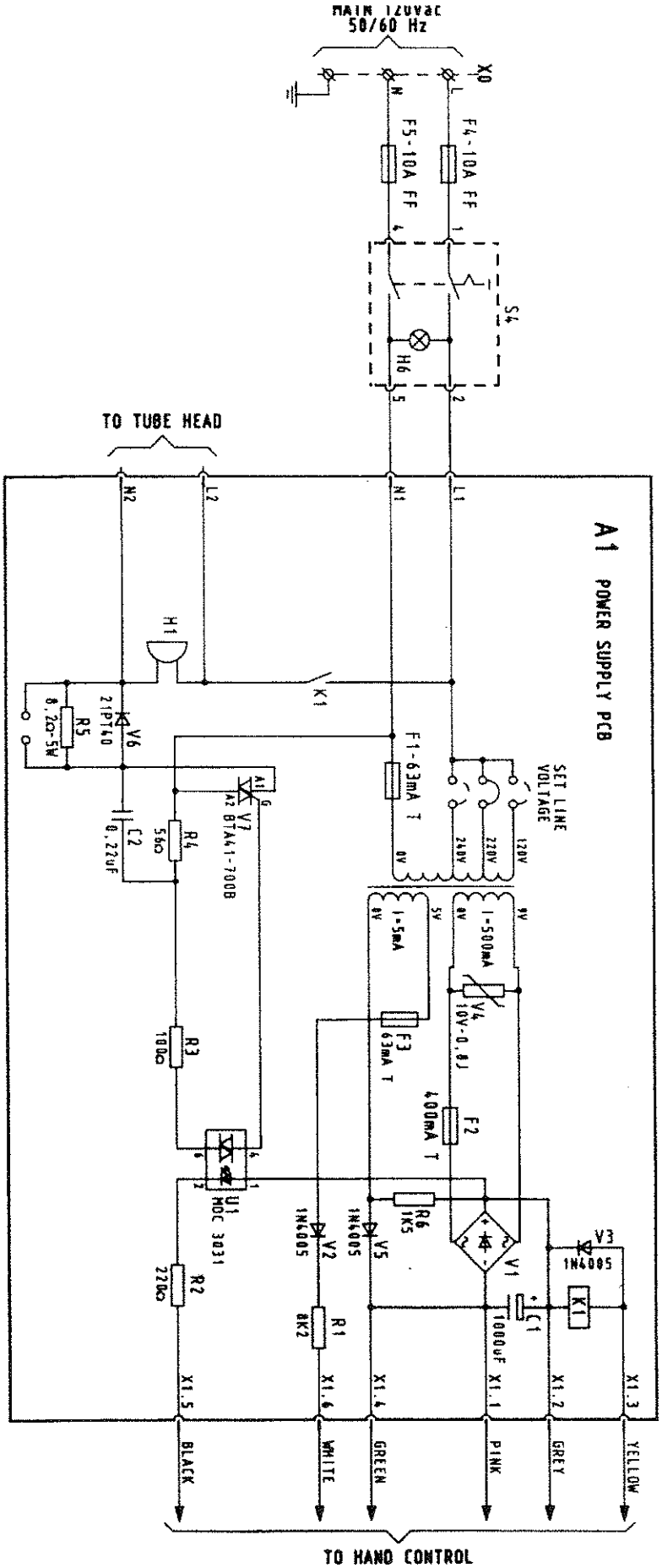


Figure 18 Overall wiring diagram

Key to CCD Timer schematic diagram

Reference to Figure 18 on previous page.

X0	Line Terminal Block
F4, F5	Main fuses 10 AF 120 V
S4	Line Switch
H6	Line Pilot Lamp
F1	Transformer fuse 63 mA T
F2	Power supply fuse 400 mA T or 1A T
F3	Hand held control fuse 63 mA T
U1	X-Ray control (optocoupler)
V7	X-Ray Triac
K1	Safety relay
H1	X-Ray emission acoustic signal
L1	Input line terminal (live)
N1	Input line terminal (neutral)
L2	Load line terminal (tubehead)
N2	Load line terminal (tubehead)
X1	Hand held control connector

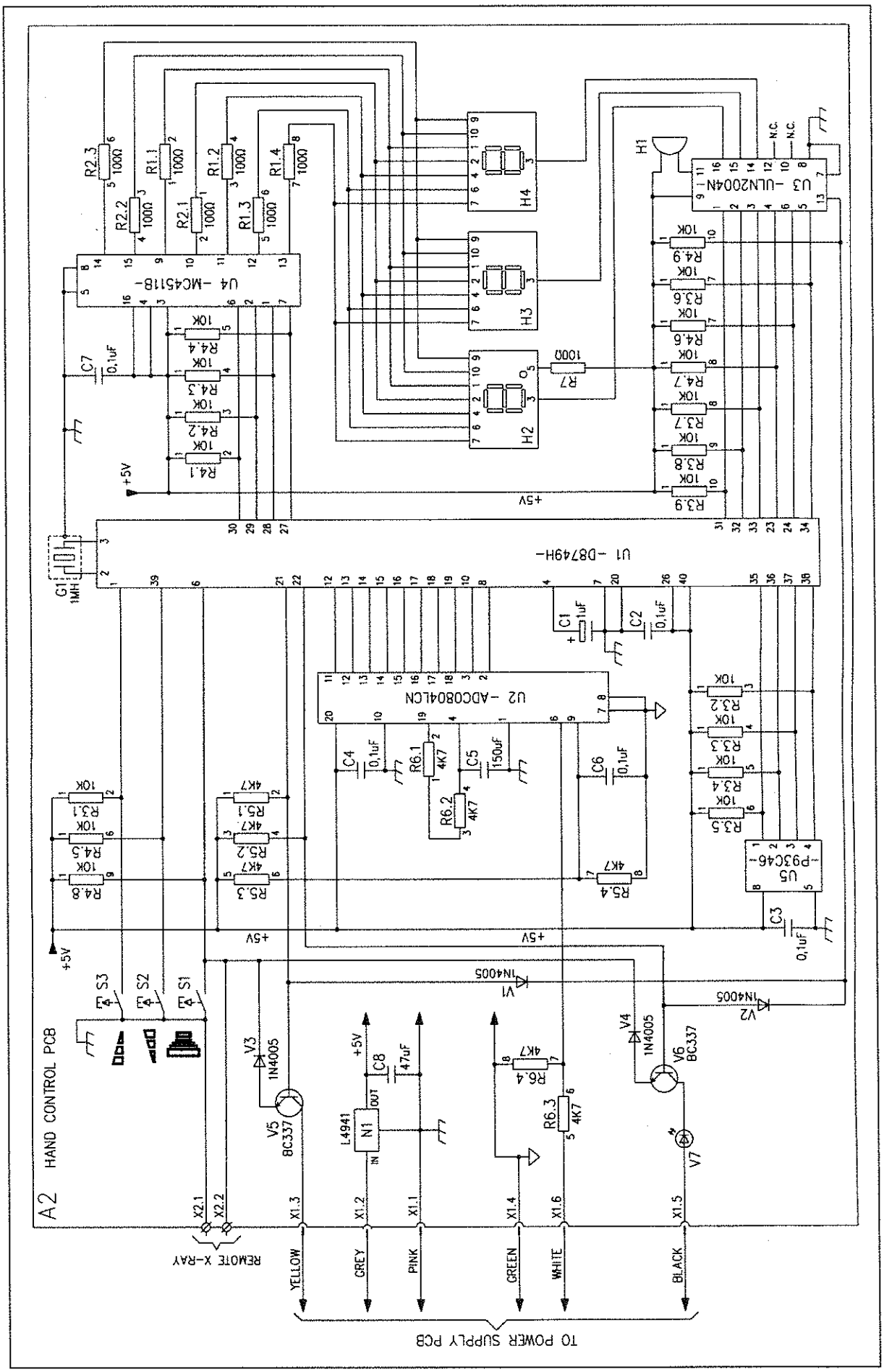


Figure 19 Hand held control schematic diagram

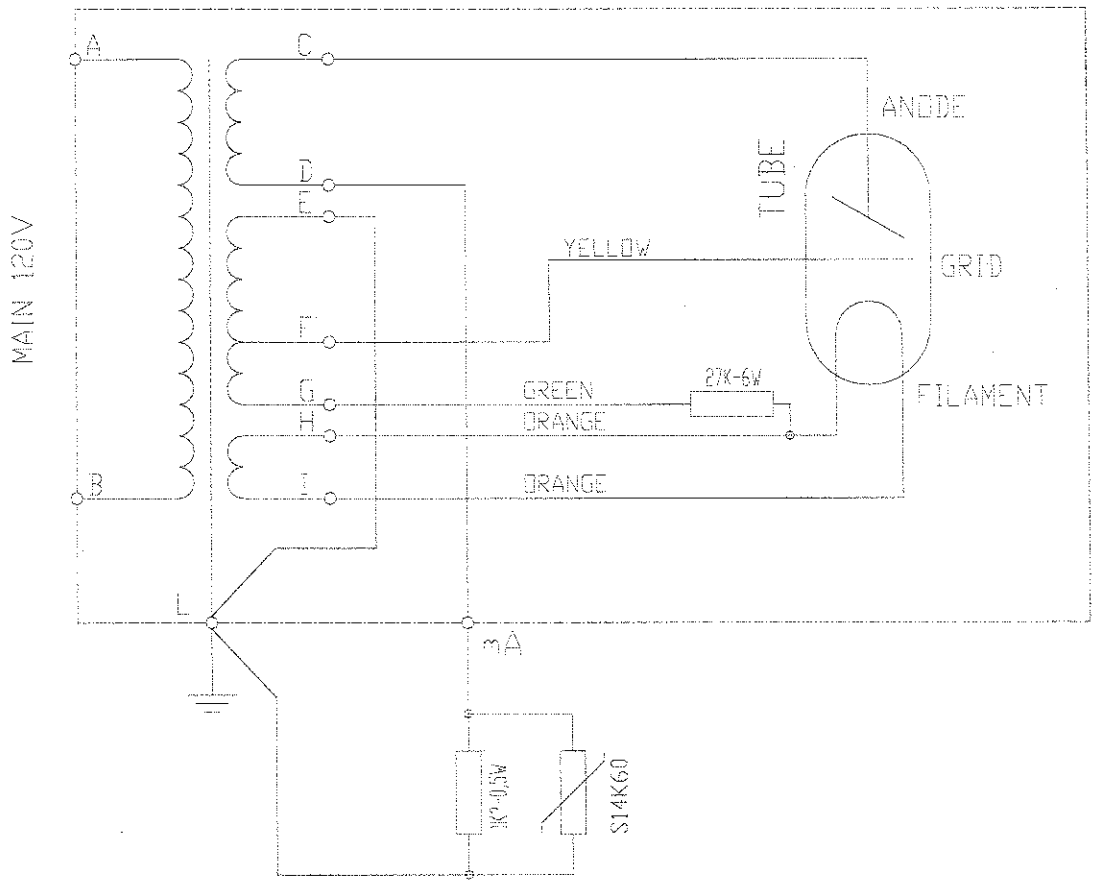


Figure 20 Tubehead connection diagram

11. Calibrating the system

11.1. Calibrating the power supply PC Board/Remote hand control

NOTE 1: During this calibration procedure no X-Ray will be emitted

a) Turn off the unit using lighted rocker switch (#3) on control box (#1) and follow instruction below.

1: With two fingers depress buttons (#5) and (#6) simultaneously

2: Turn the power on (using #3)

3: System will self test and a LED number will be shown in the window (#4)

b) Connect a digital voltmeter in parallel with the electrical power incoming to the unit. See Figure 20 enlargement "A" on page 29. Monitor the line voltage.

c) The first value shown on the display of the CCD Timer (hand control) is the preheat time. Verify that this value is set to "0.10". Otherwise, adjust this value to "0.10" by using buttons (#5) or (#6) up or down.

d) Confirm the selected value by pressing the X-Ray emission button (#7). At this point, the display will show a relative number such as 1.45. Refer to the line voltage being monitored and its corresponding relative value on the table below.

Voltmeter reading	CCD timer display
108	1.98
109	1.99
110	2.01
111	2.03
112	2.05
113	2.08
114	2.09
115	2.10
116	2.12
117	2.14
118	2.16
119	2.18
120	2.20

Voltmeter reading	CCD timer display
121	2.21
122	2.23
123	2.25
124	2.27
125	2.29
126	2.31
127	2.32
128	2.34
129	2.36
130	2.38
131	2.40
132	2.42

Using buttons (#5) or (#6) adjust the displayed value on the CCD timer according to the chart shown on the reverse side (i.e. voltmeter reading 119 = CCD timer 2.18).

e) Depress (#7) once to confirm the value.

f) Now the hand control is acting as a digital voltmeter; the display (#4) will show a numerical blinking value wich correponds to the actual voltage value. If the line voltage changes, also the displayed value will change.

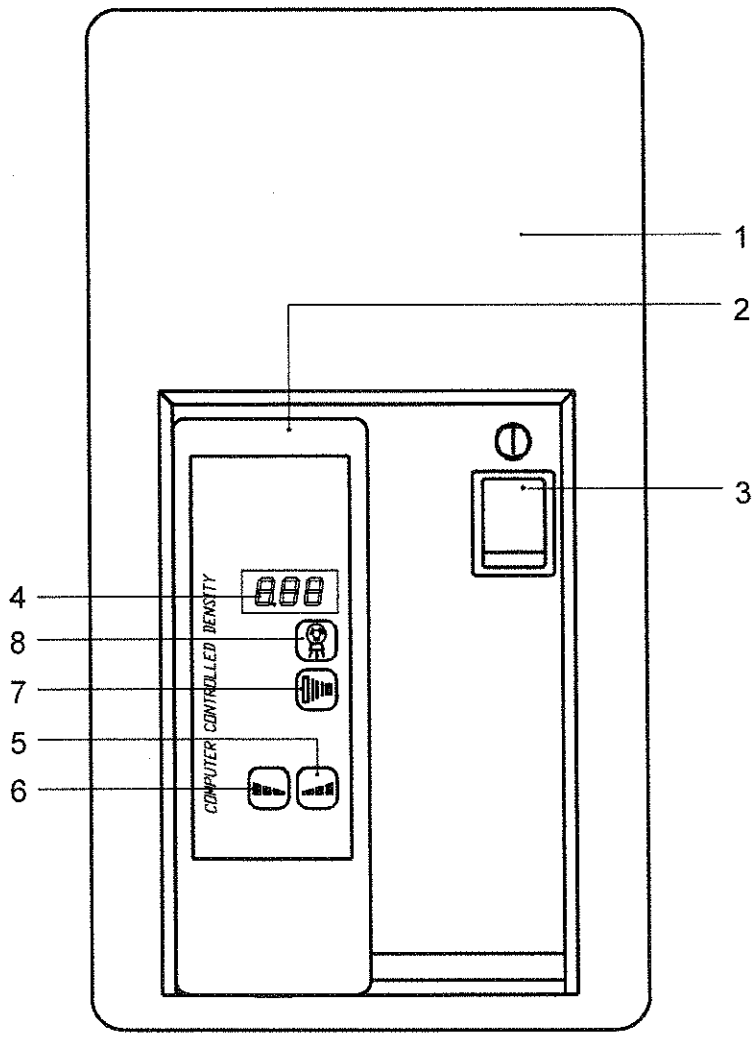
g) Press again the button (#7) to confirm the proper operation and pass to the last setup step.

h) This step is the minimum exposure time setting. Verify the display (#4) reads "0.03". Otherwise, adjust this value to read 0.03 using buttons (#5) or (#6) up or down.

i) Press button (#7) to confirm.

j) Switch off the power with switch (#3) to confirm all data.

NOTE : The calibration procedure is now completed. Any attempt to verify again the data stored will cause the unit to go back to default values and you will have to start calibration procedure again from the beginning.



LEGENDA

1 Timer
2 Hand control
3 Main line switch
4 Display
5 Exposure time step Increment
6 Exposure time step Decrement
7 X-Ray switch
8 X-Ray signalling

Figure 21 Aztech 65 Timer

11.2. Radiation Emission Test

This test must be conducted as described on paragraph 8.1.c. page 31.

WARNING: X-rays are being emitted. Follow all applicable safety standards as required by local laws.

11.3. Exposure time

The exposure time is defined as the time measured with non invasive kV_p/t meter.
Accuracy is granted using an RTI PMX II instrument, set with the following parameters:

Parameter	:sec
LF.HF	:LF
SE/LO	:SE
Di	:2
CAl:	:1

To perform the measurement, the "RAD" probe of the instruments has to be placed at the end of the beam limiting device (Focus to Detector Distance = 20 cm) in a manner to cover completely the sensitive area.

11.4. Adjusting tensioning of scissors arm

Warning: The scissors arm has been designed to work correctly with a minimum operating angle of 20 degree; therefore all adjustments has to be performed with the scissors arm opened more than 20 degree.

11.5. Balancing second arm

After some time, the balancing spring of the second arm may slacken. Therefore, the tubehead will not be balanced in all positions. Remedy as follows:

a) Position the scissors arm has to have the first arm vertical.

b) Position the second arm with an angle greater than 45 degree.

c) Remove screw and pin, then lift the cover in a convenient position for working, but let it maximum horizontal in order do not damage the paint (see Figure 22 on page 41.

d) Fit an hexagonal pin (Allen Wrench pin with a diameter not exceeding 4 mm) into the holes of spring adjusting rod. Rotate pin clockwise if tubehead tends to fall; counterclockwise if moving upwards (see Figure 23 on page 41).

e) Once correct balancing has been found, fit pin back and secure with its screw.

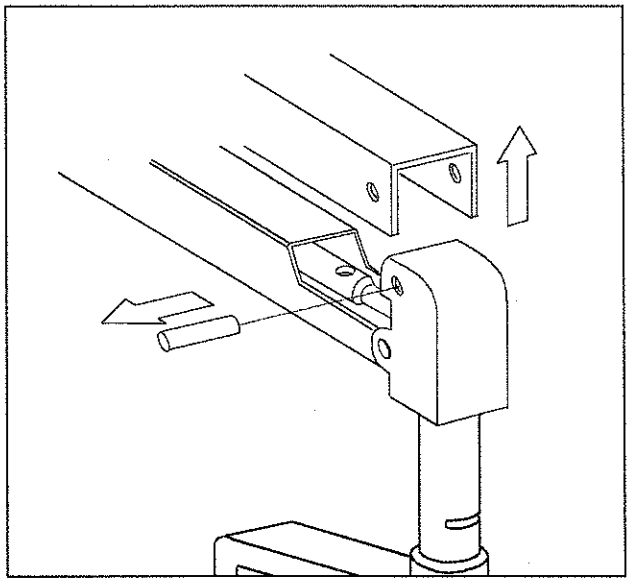


Figure 22 Second arm balancing - 1

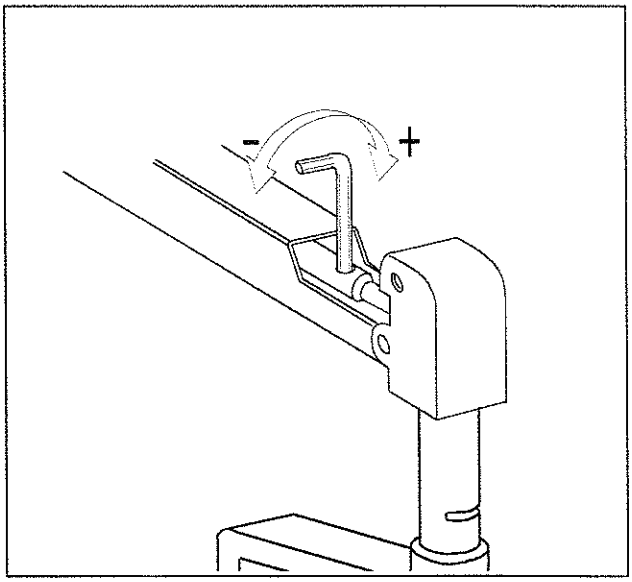


Figure 23 Second arm balancing - 2

11.6. Balancing first arm

If also the first arm needs to be balanced, proceed as follows:

a) Position the arm totally horizontal.

b) Lift the complete scissors arm in such a way to reduce the weight on the pin, remove screw and pin (see Figure 24 on page 41).

Warning : from this moment the arm is not balanced, so all following operations has to be carefully executed.

c) Holding the first arm, lower the second arm, among with the connecting part, up to a vertical position.

d) Lift the cover and acts on the spring adjusting rod as described on the point 11.5.c on page 40.

e) Once correct balancing has been found, fit pin back and secure with its screw.

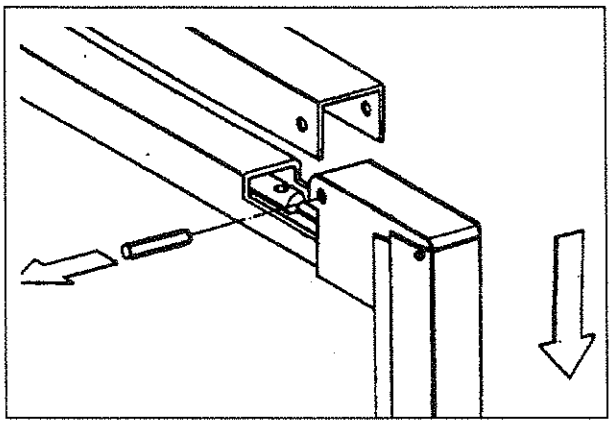


Figure 24 First arm balancing

11.7. Extension arm friction adjustment

1. Adjust friction by means of a 4 mm hexagonal wrench (Allen key) checking arm swivel rotation. This friction adjustment acts as brake adjustment for the arm.

Note The friction screw acts also as a lock to secure the scissors arm; and avoid disengagement.

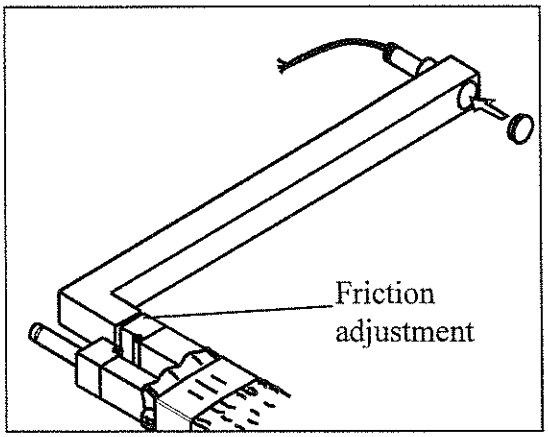


Figure 25 Friction adjustment

11.8. Tubehead replacement

CAUTION:
To avoid serious injury to personnel or assembler and to limit the potential arm breakage, the scissors arm must be held closed together using a heavy duty strip.

Refer to Figure 26 below.

a) Remove screw "29" from scissors tubehead arm holder.

b) Hold Arm at top height, hold the defective tubehead and slide sleeve "30" upwards and hold it with a piece of tape.

c) Remove the "C" shaped safety clip "31" securing the tubehead assembly and gently work the tubehead pivot post out. Care should be exercised not to damage the arm or the connection.
NOTE: Retain in a safe place the removed "C" clip for re use.

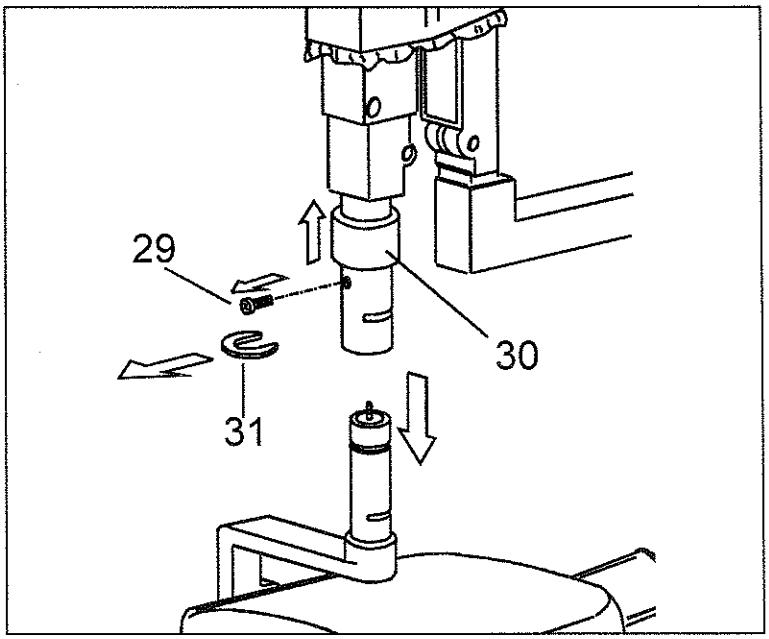


Figure 26 Tubehead replacing

d) Proceed to install the replacement tubehead as instructed under paragraph 7.3 Installing the tubehead, on page 27.

AZTECH 65

Code

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