PORTABLE X-RAY EQUIPMENT
MINXRAY HF100H
INSTALLATION AND OPERATING INSTRUCTIONS

CAUTION ;

Federal law restricts this device
to sale by or on the order of a
licensed physician or dentist.

MINXRAY INC

3611 Commercial Avenue
Northbrook, Illinois 60062-1822
(847)564-0323

CONTENTS PAGE NO.

INTRODUCTION

This manual provides information relative to the MinXray Portable X-Ray Systems.

CARELESS OR IMPROPER USE OF EOUIPMENT CAN BE EXTREMELY HAZARDOUS.

It is imperative that this equipment be operated and serviced only by trained personnel familiar with the safety precautions required to prevent excessive exposure to primary and secondary radiation, the dangers of exposure to x-ray radiation, and the proper use of the equipment discussed in this manual.

All personnel authorized to operate or service equipment should be fully acquainted with the established maximum permissible dose, safety recommendations, and procedures derived from the following sources.

A. National Council on Radiation Protection Report, No.33 (Medical X-Ray and Gamma Ray Protection for Energies up to 10 MEV - Equipment and use); from NCRP Publications; P.O. Box 30175, Washington. D.C. 20014.

B. National Bureau of Standerd Hanbook No. 76 (Medical X-Ray Protection up to Three Million Volts); from the Superintendent of Documents, Government Printing Office, Washington. D.C. 20401.

C. All documents related to the Performance Standard for Diagnostic X-Ray Systems 21 CFR Subchapter J, Part 1020: obtainable from the Bureau of Radiological Health. Department of HHS, 5600 Fishers Lane, Rockville, Maryland 20852.

D. State and local regulations governing radiation protection and the use of diagnostic x-ray equipment.

E. Requirements of the user's in-house radiation protection program.

F. Instructions and precautionary notices of this manual.

Although this equipment incorporates protective design features for limiting both the direct (primary) x-ray beam and the secondary radiation produced by this beam, design factors alone cannot prevent human carelessness, negligence, or lack of knowledge. This apparatus is sold with the understanding that the user assume sole responsibility for radiation safety and that MinXray, Inc., agent and representatives, dose not accept any responsibility for:

A. Injury or danger to patient or other personnel from x ray exposure.

B. Over exposure due to poor operating techniques or procedures.

C. Equipment not properly serviced or maintained in accordance with this manual.

D. Equipment which has been modified or tampered with in any way.

RECORDKEEPING REQUIREMENTS

1. Dealer and Distributor Records.

a. Dealers and distributors of x-ray equipment shall obtain and preserve for a period of five years from the date of sale, award, or lease of each such product, such information as is necessary to permit tracing of specific products to specific purchasers.

b. Such information shall include:
1) The name and mailing address of distributor, dealer, or purchaser to whom the product was transferred.
2) Identification and brand name of the product.
3) Model number and serial or other identification number of the product.
4) Date of sale, award or lease.

2. Records to be Furnished to MinXray, Inc., by Dealers and Distributors.

The information required in "1" above shall immediately be forwarded to MinXray unless:

a. The dealer or distributor elects to hold and preserve such information, and to immediately furnish it to MinXray, Inc., when advised by MinXray or Director, Department of Health and Human Services, that such information is required for purposes of Section 359 of the Radiation Control for Health and Safety Act of 1968.

b. The dealer or distributor, upon making the election under "a" above of this section, promptly notifies MinXray and the Bureau of Radiological Health of such election. Such notification shall be in writing and
shall identify the dealer or distributor and the type of equipment for which the information is being accumulated.

3. Assembler's Report.

All assemblers who install certified components shall file a report of such assembly. All assemblers reports shall be on Form FD-2579, which is prescribed by and available from the Director. FDA/Department of Health and Human Services, Division of Compliance, 1390 Piccard Drive, Rockville, Maryland 20850. The original of Form FD-2579 sha11 be sent to the Director and copies to the purchaser, State Agency responsible for radiation protection, and one kept by the assembler for a period of least 5 years.

TO: ALL MANUFACTURERS AND ASSEMBLERS OF DIAGNOSTIC X-RAY EQUIPMENT

SUBJECT : Final Testing of Diagnostic X-ray Systems and Components Following Assembly.

This letter is intended to establish HHS policy relative to final testing of a newly-assembled x-ray system or component before release to the user.

Manufacturer Responsibility - The FDA believes that plant-based manufacturers must include in their assembly instructions a specific requirement that the assembler perform a test(s) for the applicable requirements of the FDA performance standard at the time of installation. A thorough explanation of the equipment required and step-by-step instructions must be provide by the component or system manufacturer. The instructions should include a requirement to record key data to demonstrate at a later data that all tests were performed and that the equipment was left in full compliance with the standard. The FDA's Department of Health and Human Services will insure that these assembler test instructions are provided through a close review of the information submitted by manufacturers in initial, model change and annual reports. Plant-based manufacturers who do not include a final compliance test in their assembler instructions could be subject to disapproval of their quality control and testing program.

Assembler Responsibility - Assemblers of diagnostic x-ray equipment must perform a test or tests for the applicable requirements of the FDA performance standard at the time of installation if specified in the assembly instructions provided by the component or system manufacturer. Assemblers who do not perform and document such final compliance tests will be considered by the FDA to have issued a false and misleading certification and will, therefore, be subject to regulatory action by the Agency.

Should they be any questions concerning this Bureau policy please call X-ray Products Branch at 301-427-1165.

INSTALLATION

UNPACKING

The HF100H consists of x-ray generator (Tubehead/control/collimator), exposure cord with two-stage exposure switch, and power cord.

When the equipment is received, the shipping container should be carefully examined for any evidence of mishandling during shipment. Note its condition. If any damage is noted, immediately report it to the carrier in the proper manner. Save all packing material for inspection by the carrier. This equipment was shipped in perfect condition. If it arrives with any damage, it is your responsibility to report to the carrier, and to file a claim.

All printed matter supplied with this unit should be saved for reference during installation and operation.

ASSEMBLY

Plug the power cord and exposure cord into their sockets on the back of the HF100H.

PRE-OPERATIONAL TESTING

The control of HF100H contains the main on/off power switch, the kV selector, and the exposure time selector. The collimator light "on" switch is located on the collimator. Line voltage compensation is automatic within the circuitry of the HF100H.

1. Make sure the power cord and exposure cord are securely connected to the HF100H. Connect the power cord to the correct AC power source for the rated line voltage of your HF100H.

2. Press the main power switch to turn on the HF100H. The "Warm-up" indicator will light for approximately 15 seconds. The kV and exposure time setting will be displayed.

3. Close the shutters on the collimator fully.

4. Select a kV and exposure time setting typical of the settings likely to be used routinely. Press and hold the first stage of the exposure switch. The "Stand-By" indicator will illuminate for approximately 1 second. When the "Stand-By" indicator has turned off, depress fully the second stage of the exposure switch, holding it down until the x-ray exposure has terminated. During the x-ray exposure, you will hear an audible signal and see the "X-ray" indicator illuminated.

5. Repeat step 4. for two additional kV and exposure time settings.

6. If all HF100H function are normal, proceed to the Collimator light field to x-ray field alignment test outline in the Collimax collimator instruction manual. If the HF100H does not function normally, call MinXray for technical assistance.

7. If the collimator light field is within normal parameters, testing is completed. If the collimator light field test shows that the light field and the x-ray field are not congruent, refer to the Collimax collimator instruction manual for alignment procedures. Make the necessary adjustments and test again.

OPERATING INSTRUCTIONS

IT IS ASSUMED BY THE DISTRIBUTORS AND MANUFACTURERS OF THE EQUIPMENT THAT THE PERSON RESPONSIBLE FOR ITS OPERATION HAS A GENERAL KNOWLEDGE OF THE USE OF X-RAYS, INCLUDING THE PRECAUTIONS WHICH MUST BE TAKEN.

OPERAT I NG

1. Turn the Power switch to OFF.

2. Plug the X-ray unit into a 110 - 130 V, 60 Hz grounded power source.

3. Turn the Power switch to ON. WARM UP light will be on.

4. Turn the Collimator ON by pushing the LIGHT switch. It will remain on for approximately 30 sec., then automatically turn off.
   The shutter of the Collimator can be adjusted at any time with the 2 knobs on the Collimator, but the size of the radiation field will be projected on the image receptor only when the light is on.

5. Adjust the collimator position so its center cross mark is aligned with the center of the image receptor.

6. Collimate the light field to the image receptor size by turning the knobs on the collimator.

7. Position the patient properly. Make sure the ERROR light and WARM UP light is not on.

   This unit has 2 kinds of WARNING light. If one of them is lit, X-ray can not be generated.

   a. WARM UP light : On the time of warming up internal circuit. "approximately 10 sec."

      WARM UP light will on power on and each exposure off.

   b. E.RROR light : Unit worked incorrectly.

      If ERROR light is lit even release EXPOSURE SWITCH BUTTON, it means unusual situation is occurred on inverter circuit. So, turn off the POWER SWITCH and start same procedure from the beginning after 3 minutes interval again.

8. Set the kV and time, and use the retractable scale on the collimator.

9. To make an exposure, stand as far as possible from the X-ray unit while holding the exposure switch and pressing the button.

   The exposure switch is two stage. When only the center button is pressed, the filament of the x-ray tube goes on. STAND BY light will remain on approximately 1.5 sec.
   When additional pressure is applied to include the outer button, the x-ray exposure is made. X-RAY light and Beep sounds will on during x-ray exposure.

   It is possible to press the two buttons simultaneously, and when this is done, there is a approximately 1.5 sec. delay before the X-ray is emitted.

10. When the procedure is finished, be sure to turn the Power switch to OFF.

SPECIFICATIONS

Maximum peak tube potential :	100kV ±15%
Leakage technique factors : 0.65mA is maximum rated continuous current for 20mA with duty cycle 1:30	100kV, 0.65mA
Total filtration :	2.2mm Al equivalent at 100kV
Range of line voltage regulation :	105 ～ 135VAC, 50/60hZ, or 200 ～ 260VAC, 50/60Hz, depending on model ordered
Line voltage regulation :	4.8%
Generating rating :	20mA at 100kV ±15% 20mA at 40kV ±15%
Duty cycle :	1 : 30 (1 sec. On, 30 sec. Off)
Maximum deviation from fixed factors :	Tube potential ±15% Tube current ±15%
X-ray tube :	Toshiba D-124S or equivalent
Focal spot size :	1.2×1.2mm
Exposure timer :	0.08 ～ 0.20 sec. ±20% 0.21 ～ 4.00 sec. ±10%
High voltage circuit output :	60 kHz high frequency inverter system with neutral ground circuit

MAINTENANCE

For proper maintenance, this schedule must be followed :

Every 6 months :

1. Check the alignment of the collimator light field with the x-ray beam, per the Collimax collimator instruction manual.

2. Check the audible and visible exposure functions.

3. Check to see that all screws and bolts are tight.

Every 2 years :

1. Replace the collimator bulb.

TO INSTALLERS, SERVICE PERSONNEL, AND USER OF X-RAY SYSTEMS EQUIPMENT MOUNTING SECURITY

When performing periodic maintenance, calibration, or changing of the components of an x-ray system, service personnel are advised to check the security of the collimator mounting screws. This can be accomplished easily by grasping the collimator and attempting to move it in relation to the x-ray unit. The system should also be inspected for loose joints, not only between the collimator and tubehead/control, but other mounting areas as well.

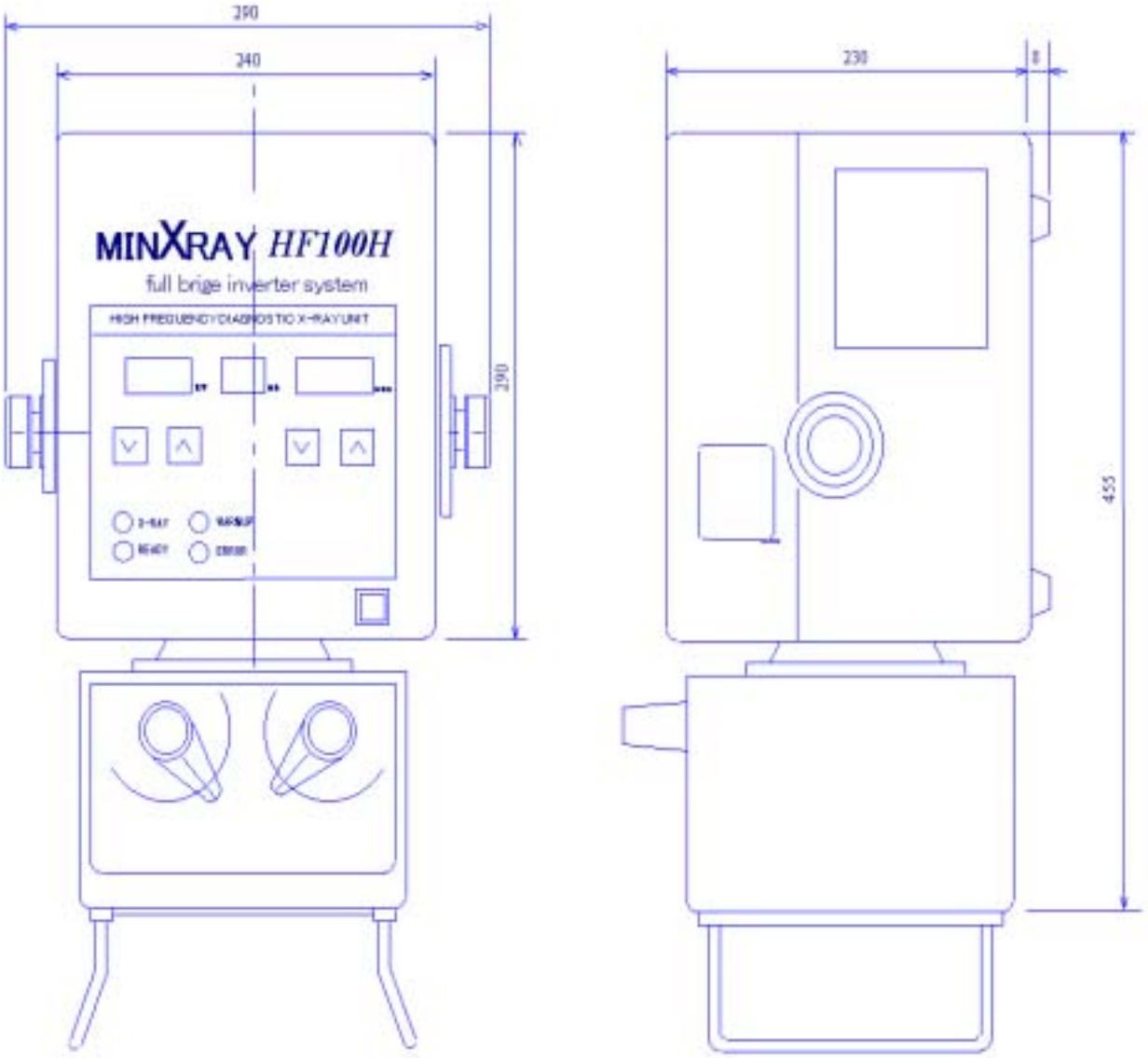
WARNING

Continued use of loose components is dangerous and could cause further loosening, damaged screws and bolts, or mount failure which could result in **HEAVY COMPONENTS FALLING DURING USE.** The operator should report all loose system components to x-ray service personnel for immediate repair.

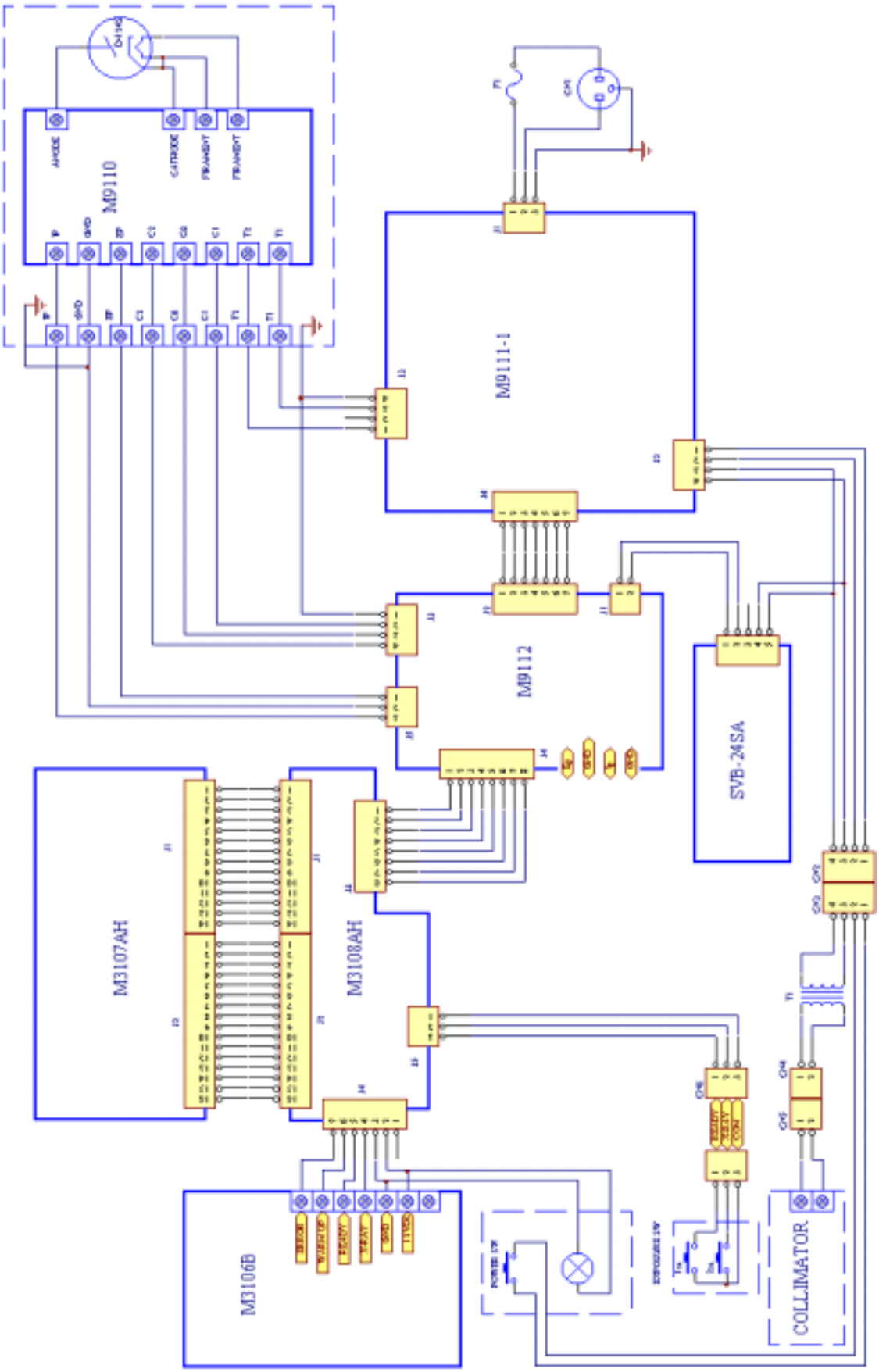
A REMINDER TO ASSEMBLERS AND SERVICE PERSONNEL

The 4 collimator mounting screws must engage the collimator mounting ring. If inspection reveals loose collimator mounting screws at an installation, or as a precautionary measure at any locking glue such as LOCTITE #242 or PERMA-LOK MM-115 be used after first cleaning the screw with alcohol.

DIAGRAM OF OURSIDE VIEW



SCHEMATIC DIAGRAM



OPERATOR'S AND INSTALLER'S MANUAL

FOR

"COLLIMAX" X-RAY COLLIMATOR

MODEL D-180HS-G

COLLIMAX CORPORATION

1-11. 2-Chome. Noge

Setagaya-ku. Tokyo. Japan

TABLE OF CONTENTS

---

* marked : Common to Operators and Installers.

** marked : For Operators Only.

*** marked : For Installers Only.

FOREWORD

This manual is prepared to guide the use of "Collimax" Model D-180HS-G X-Ray Collimator. This manual provides explanations of the function, operation and maintenance procedures etc.

One who installs and or uses this collimator must read this manual with care to understand this product prior to installation and operation.

WARNING

"Collimax" Model D-180HS-G X-Ray Collimator is designed and constructed within the specifications imposed by DHHW and within practical limitations to provide protectio against all unwanted x-radiation emissions. One who installs and or uses this collimator must be well acquainted with instructions in this manual pertaining to the proper use.

SECTION I. PRODUCT DESCRIPTIONS

General Description

This X-Ray Collimator is designed for such applications as shown in the " Specifi-cations" of this manual and must be used with the x-ray tube to restrict and define the area covered by the x-ray beam and also to reduce stray radiation. The beam that is collimated by the 2 control knobs should cover the smallest area of the patient neccessary to produce the required radiograph. The collimator that allows a stepless adjustment of a field size utilizes a light localizer to project a visibl beam with coverage equivalent to the coverage of the x-ray beam.

Features and Performances

1. Provided with a bush button timer to automaticallly switch off the lamp of light localizer in 30 seconds.

2. Equipped with special Ring Device by which the center of collimator is adjustable by ±2 mm to align the center of visible beam with the one of x-ray beam, and yet the collimator can be self rotated.

3. The lamp of light localizer is easily replaceable with minimized error of the same lamp position and the lamp filament position can be easily adjusted.

4. Maximum shutter opening of collimator is less than 35 cm x 35 cm at SID 65 cm.

5. Minimum x-ray field size at SID 100 cm is less than 5 cm x 5 cm.

6. The average illuminance of light field at SID 100 cm is 180 lux or more.

7. The contrast ratio on the light field edges is 3.5 : 1 or more, which allows an easy identification of light field and its size.

8. Provided with calibration scales indicating the light field sizes at each SID which accuracy variance is within 2 % of SID.

9. The leakage radiation at SID 100 cm is within 50 mR/h.

10. The insulation resistance between source circuit and a grounding metal is 2 M oh or more.

11. The electric resistance between a grounding terminal or a grounding metal and outer case is not more than 0.1 ohm.

12. The collimator can endure, for a minimum of one minute, AC 1500V between AC line terminal and a grounding metal.

Specifications

1. Applications:	For general purpose mobile x-ray units, and special purpose radiographic unit designed for use with a fixed image receptor size at a fixed SID.
2. Maximum KVP:	125kvp.
3. Outer Dimensions:	182mm × 197mm × 140mm.
4. Net Weight:	(approx.) 5.9kg.
5. Shutters Drive:	By 2 manual control knobs.
6. Projiction Lamp:	Philips Type 7158 Halogen Lampm, 24V/150W rated, or an equivalent Halogen lamp of the same rating.
7. Power Supply to Lamp:	AC 19V(under load), measured at lamp socket, or more.
8. Lamp Switch:	Push Button Type 30 seconds Electronic Timer.
9. Minimum Line Current:	5.8A at AC 19V under load, or more.
10. Maximum Field Size:	35cm × 35cm at SID 65cm.
11. Minimum Field Size:	Less than 5cm × 5cm at SID 100cm.
12. Min. Alminum Equivalence:	0.4mm Al at 100kvp.
13. Installation Method:	By installation of adaptor flange on tube housing with 4 bolts, and diagonal length of the 4 installation bolts is 92mm. Other installation methods are optionally available.
14. Tube Focal Distance:	60mm, as the standard tube focal distance, from tube focus to the bottom surface of adaptor flange, but adjustable between 60mm – 52mm by use of spacers that are supplied with each collimator.

Compatibility

This collimator is compatible and can be adopted for use with any x-ray tube (with tube housing) that meets all of the following factors.

1. Focal Distance of X-Ray Tube:
   Adjustable between 60mm (standard) – 52mm from tube focus to the bottom of adaptor flange of this collimator by use of the spacers. For 60mm tube facal distance, the spacers are not used. For tube focal ditance of less than 60mm, use the spacer(s) to obtain each correct tube focal distance in view of compliance with Performance Standard (e.g., 52mm: 2pcs. × 2mm thick spacers).

2. Installation Method:

   By installation of adaptor flange on tube housing with 4 bolts, and diagonal length of the 4 installation bolts is 92 mm.
   Other installation methods are optionally available but they must be consulted in advance with the manufacturer of this collimator.

3. Leakage Radiation:

   Maximum leakage radiation from tube housing assembly must be within 50 mR/h at SID 100 cm.

4. Inherent Filtration:

   Inherent Filtration of this collimator is 0.4 mm Al at 100 kVp.

5. Half-Value Layer:

   Half-value layer of useful beam at a x-ray tube voltage must not be less than the values shown in Table I of (m) Beam Quality of Section 1020.30 under Performance Standard.

6. Applications:

   For general purpose mobile x-ray systems, and special purpose radiographic systems designed for use with a fixed image receptor size at a fixed SID. Maximum tube voltage of those x-ray systems must be 125 kVp or less, in the output.

7. Power Supply to Collimator Lamp:

   Loading voltage and maximum line current to collimator lamp must be AC 19 V or more and 5.8 A or more respectively, being measured at the lamp socket under load.

   Note: Collimator lamp to be used must be Philips Type 7158 Halogen Lamp, rated 24 V/150 W or an equivalent Halogen Lamp of the same rating that meets the international standard (of same filament size and shape).

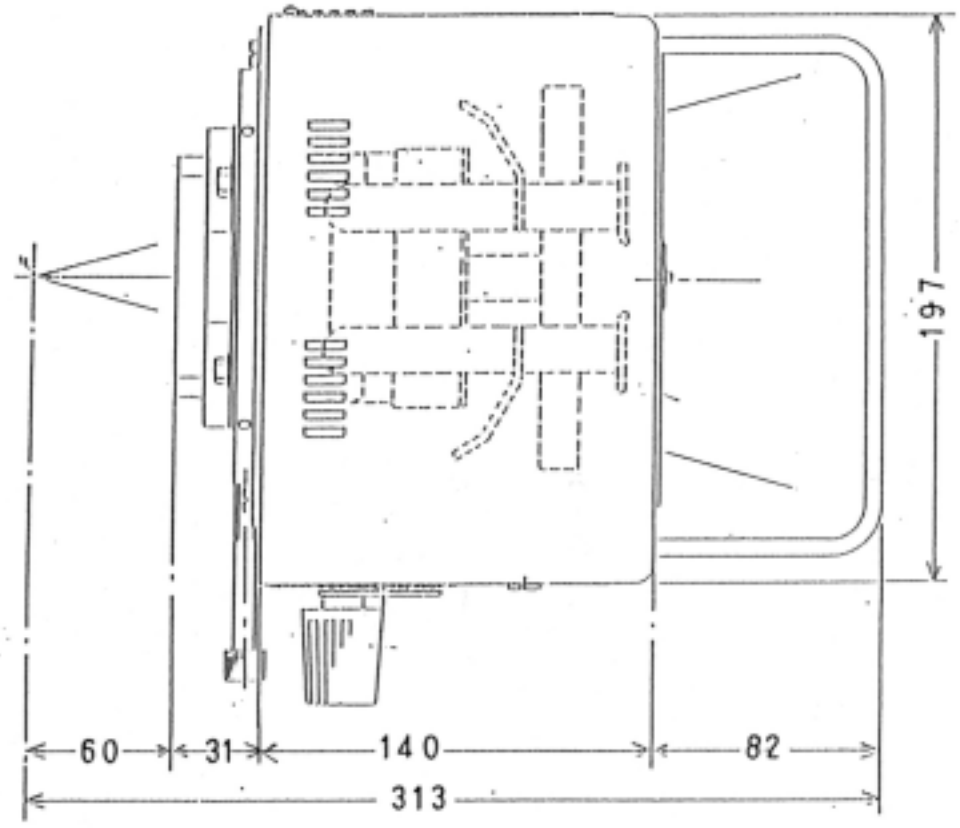
8. Others:

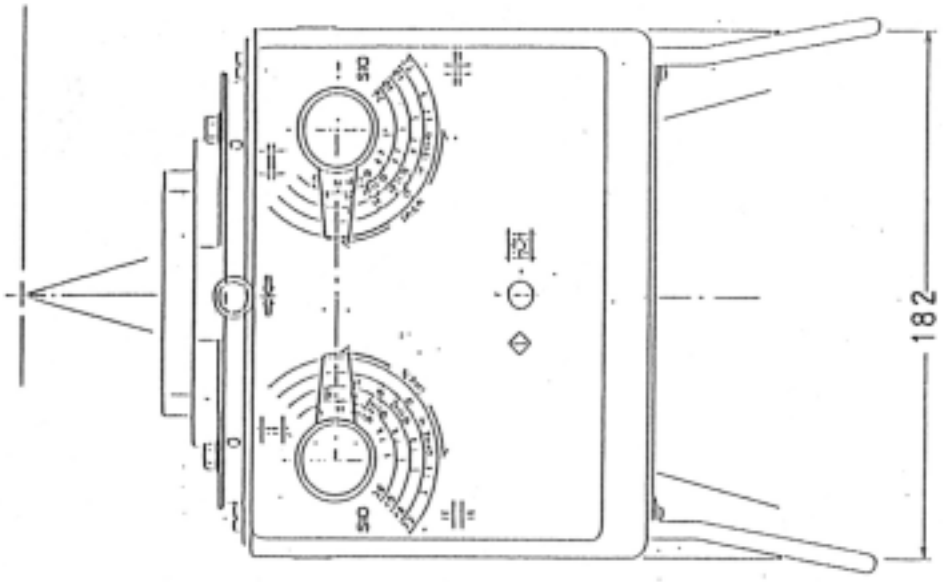
   When collimator was combined with x-ray tube, D.S.A.(Diagnostic Source Assebly) must have illuminance of 180 lux or more at SID 100 cm, Contrast Ratio of 3.5:1 or more at SID 100 cm, and Misalignment (of light field with x-ray field) of not more than 2 % of SID.

Name of Each Part

See the drawing of next page.

Outer Appearance and Dimensions and Name of Each Part





SECTION II. INSTALLATION AND OPERATION

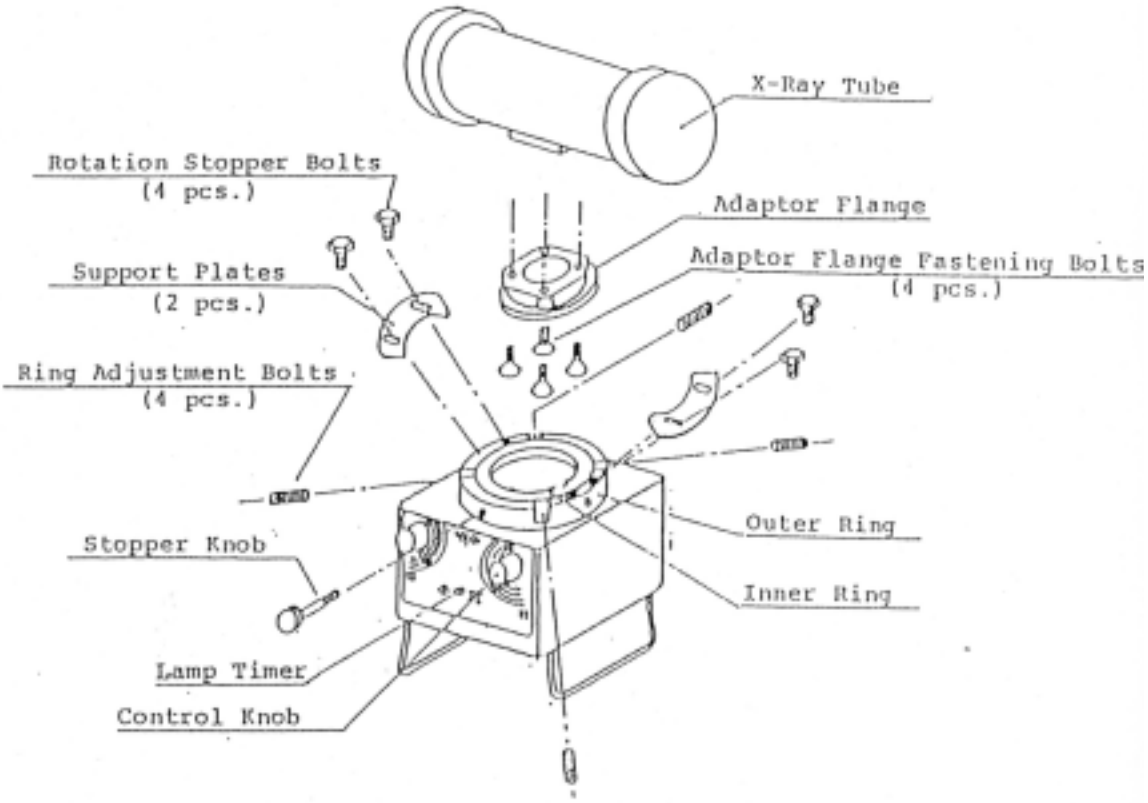
Responsibility of Installer

It is the responsibility of the installer to correctly install this collimator as instructed in this manual. The installer must certify that the x-ray equipment on which tube housing assembly the collimator was installed is in compliance with DHEW Regulations.

Electrical Supply Requirement

It is imperative that a sufficient power is supplied to the collimator lamp to obtain the specified voltage under on-load condition being measured at the lamp socket, to keep this collimator in compliance with DHEW Regulations.

Installation Method (see drawing as shown below)



1. Install the adaptor flange on tube housing assembly with 4 installation bolts.
2. Hold the collimator and place its Inner Ring over the adaptor flange, then fix the 2 Support Plates, temporarily, with the 4 Rotation Stopper Bolts.
3. Fasten Stopper Knob not to allow collimator to rotate.

4. Connect the power supply cord of lamp and push Lamp Timer to confirm that the lamp is illuminated.

5. Adjust collimator position with 4 Ring Adjustment Bolts so that the center of adaptor flange will be aligned with the center of the inner ring, then fasten firm the 4 Rotation Stopper Bolts.

6. Push Lamp Timer and make sure that light field can be collimated to a required size by operation of 2 manual control knobs.

Operation

1. Push Lamp Timer and confirm that light field is illuminated.

2. Adjust collimator position so that the centering cross mark of collimator is aligned with the center of an image receptor.

3. Collimate light field to the image receptor size operating the 2 manual control knobs.

Cares to be Taken on Operation

1. Do not fail to use within the specified maximum tube voltage.

2. Do not use installing on those x-ray tubes which focal distances are different from the ones specified.

3. If lamp replacement became neccessary, do after the inside temperature decreased sufficiently.

4. Never fail to use the same type of lamp as specified.

5. Do not touch on the projection lamp, plastic mirror and front acrylic plate except when it became neccessary to do so.

6. In case lamp was illuminated successively 5 times or so, keep it off for about 2 minutes till next operation for cooling purpose.

SECTION III. INSTRUCTIONS FOR MAIN ADJUSTMENT DEVICES

Lamp Replacement and Adjustment Method of Lamp Filament Position

1. For replacement of lamp, first remove the lamp cover, then remove the screen plate of lamp house, but never move the front acrylic plate.

2. Make sure first that the lamp surface temperature sufficiently decreased, and pull lamp out of the socket.

3. Wrap over the replacement lamp surface with a soft cloth or the like so as not to allow a finger to touch on the surface, and insert the lamp into the lamp socket so that the lamp pins will reach to the utmost depth of the lamp socket, then install the screen plate of lamp house.

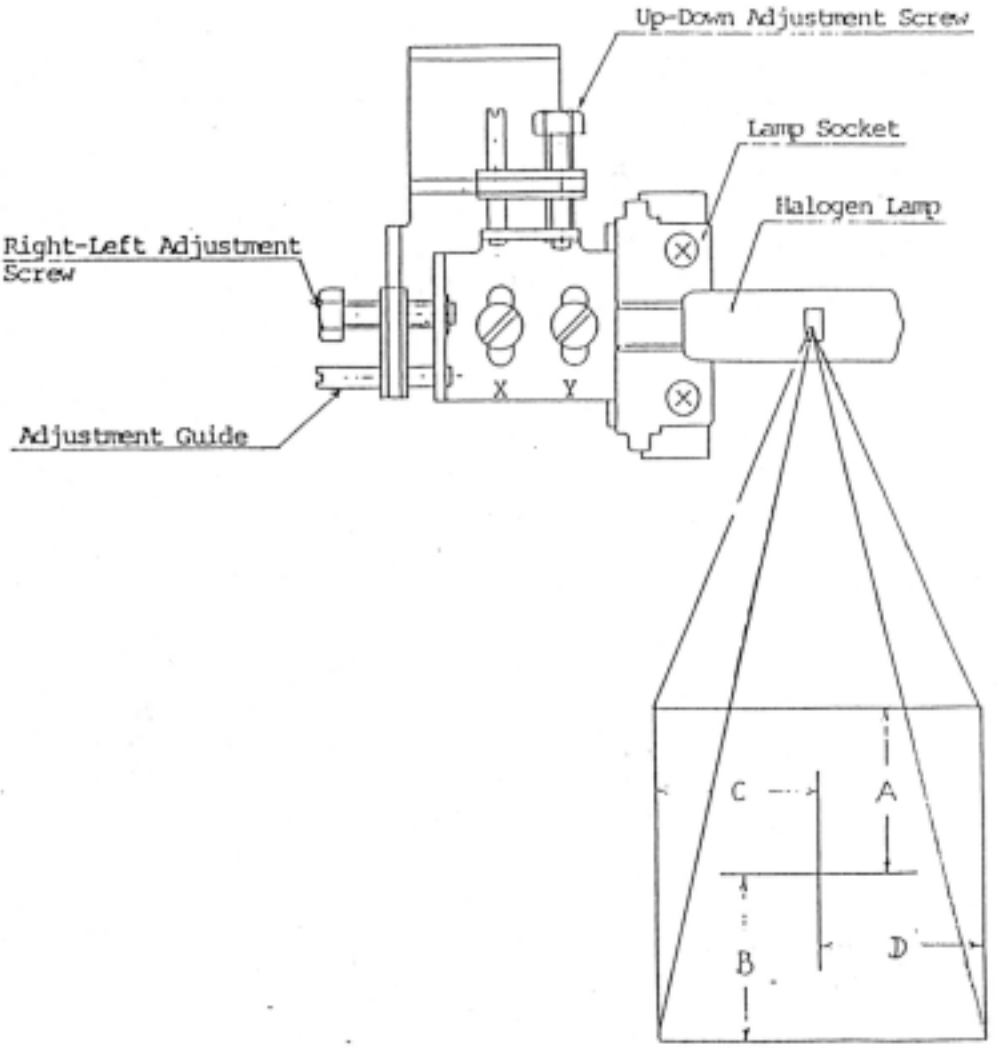
4. After the replacement work, illuminate the lamp by pushing lamp timer, and measure if the centering cross mark is in the center of light field.

5. If the centering cross mark should be drifted from the center, adjust the lamp filament position as follows (see the drawing of next page).

1) Measure A size and B size:
   In case A size was larger, loosen the Locking Screws(X & Y) and turn the Up-Down Adjustment Screw to left. In case B size was larger, turn the Adjustment Screw to right.

2) Measure C size and D size:
   In case C size was larger, turn Right-Left Adjustment Screw to left. In case D size was larger, turn this Adjustment Screw to right.

3) At the position where A & B and C & D of light field became equal to each other lock lamp position by fastening firm the Locking Screws (X & Y).



Alignment Check and Adjustment Method

1. This collimator is designed and factory adjusted to comply with Performance Requirement when it was correctly installed as specified in this manual, so far as the x-ray tube focus (target) position is correctly aligned with the center of the x-ray tube window.
   However, the misalignmennt of light field with x-ray field can be checked and adjusted, as follows, if there might be a possibility that the misalignment might exceed 2 % of SID due to the Off-Center of tube focus position and or if check of misalignment was required.

2. Prepare a fluorescent paper on which the center and a field size are marked (e.g., a center cross mark and 125 mm x 125 mm, or 250 mm x 250 mm, or 350 mm x 350 mm).

3. Place the fluorescent paper on a flat surface so that it becomes perpendicular to the center line of light beam. Illuminate collimator lamp and align the center of fluorescent paper with the center cross mark of light field, at SID 100 cm, then collimate to the size marked on the fluorescent paper.

4. Make a longest possible x-ray exposure (if fluoroscopic condition is not available) and observe if the x-ray field is aligned with light field. If there'd be a noticeable misalignment (entire field is usually drifted to one direction due to the off-center of tube focus position), adjust the entire collimator positionn as below.

   1) Keep collimator mounted on x-ray tube, and a little loosen 4 pcs. of Rotation Stopper Bolts (see drawing in "Installation Method"), then loosen 4 pcs. of Ring Adjustment Bolts.

   2) Make x-ray exposure aagain and confirm that x-ray field is aligned with the field size marked on the fluorescent paper (if neccessary, collimate x-ray field to the marked fielld size).
      Illuminate collimator lamp and align the light field size to the x-ray field size by adjusting the colllimator position.
      At the position where it was aligned, fasten the Ring Adjustment Bolts and also fix the Rotation Stopper Bolts.

   3) If there'd be still a noticeable misalignment after above work and if there'd be a need to further adjust, the alignment can be adjusted by moving the lamp position as described in "Lamp Replacement and Adjustment Method of Lamp Filament Position".

   4) In case of alignment check with a radiographed film, prepare a film cassette a little larger than the field size, illuminate lamp timer, measure the light field edges and mark them on the film cassette with a fuse wire or the like, then make a radiography and measure the misalignment on the developed film.
      The said mark with a fuse wire etc. will be placed so that it appears on the developed film even when x-ray field was smaller than light field.
      The radiography will be made under minimum required condition.
      If the misalignment measured on the radiographed film should exceed 2 % of SID as required by Performance Standard, further adjustment of alignment can be made in the same manner as above described.

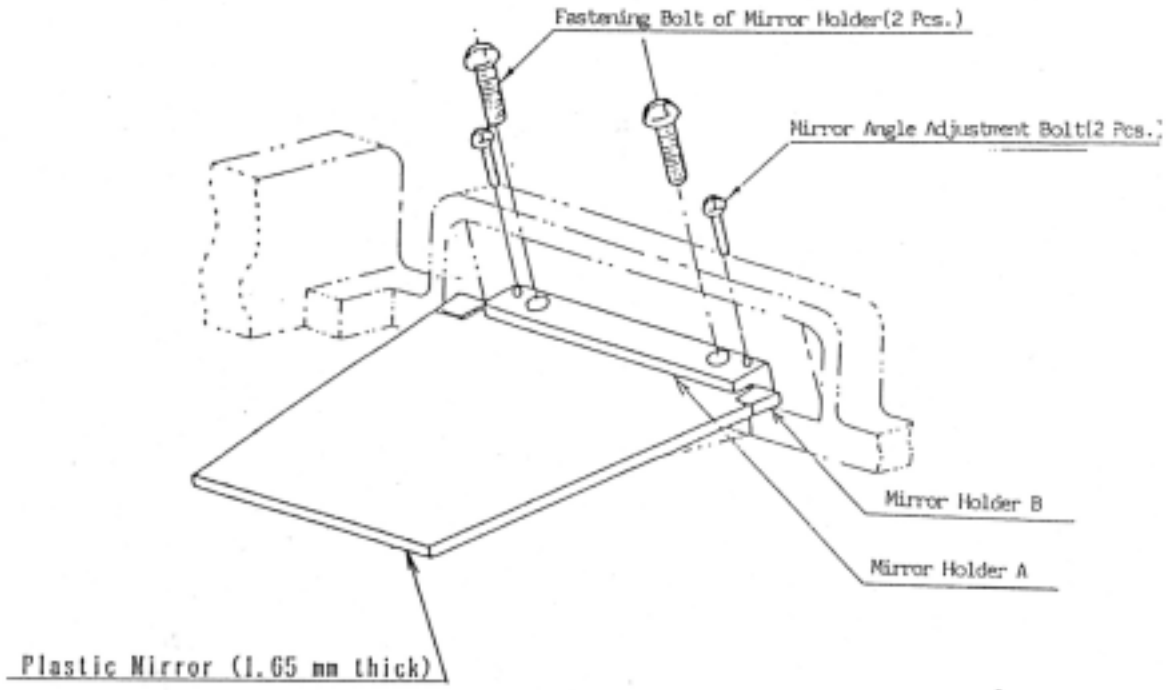
Plastic Mirror Replacement Method

1. For replacement of plastic mirror, first remove the front acrylic plate, and open collimator shutters to the maximumpositions in both of longitude and latitude.

2. Remove the installation screws of mirror holder (2 pcs.) and mirror holder A. Then, remove the plastic mirror with mirror holder B that is binded to the mirror.

3. Install the replacement plastic mirror fastened with mirror holder A, then temporarily fix the front acrylic plate.

4. Place a thin paper in front of the acrylic plate, then illuminate the lamp and gradually collimate the light field in both of longitude and latitude. At the position where the centering cross mark was aligned with the center of light field, lock the front acrylic plate with its 2 fastening screws.



SECTION IV. MAINTENANCE

1. Make a cleaning, every 3 months, of the front acrylic plate, collimator case and lamp surface. If a finger touched on the lamp surface, wipe out the finger print.

2. The plastic mirror will be replaced at any time if it was broken.

3. Make sure, before every use, that the lammp is illuminated when pushed the lamp timer.

4. Periodically check and make certain that warning label has not been defaced or worn so as to be illegible.

Compliance Maintenance Schedule

1. Conduct Illuminance Test, once a year and whenever lamp was replaced, to make certain that the average illuminance of light field at SID 100 cm is 180 lux or more.

   If the measured illuminance was less than 180 lux, check the loading voltage and line current to the lamp, and when necessary, replace the lamp to a new one, then again make sure that the illuminance is not less than 180 lux.

   Note: The replacement lamp must be Philips Type 7158 Halogen Lamp, rated 24 V/ 150 W or an equivalent Halogen Lamp of the same rating that meets the international standard (of same filament size and shape).

2. Make sure, whenever lamp was replaced, that the centering cross mark of collimeter complies with the center of light field. If it is drifted from the center of light field, adjust the lamp filament position till both the center comply with each other.
   For adjustmennt method, see "Lamp Replacement and Adjustment Method of Lamp Filament Position" in Section III of this manual.

3. Check once a year and whenever lamp was replaced, and make certain that the contrast ratio of light field is 3.5:1 or more at SID 100 cm.

4. Check once a year and whenever lamp was replaced, and make certain the misalignment of light field with x-ray field is within 2 % of SID.
   If the misalignment should be more than 2 % of SID, adjust it to within 2 % of SID. For the adjustment method, see "Alignment Check and Adjustment Method" in this manual.

CIRCUIT DIAGRAM