NON-PBL MANUAL COLLIMATOR

USER AND ASSEMBLER INFORMATION

MODEL NUMBER D800

D771

REV R

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Installation and Service Manual Revisions History

Revision	Pages Affected/Revision Description	Release Date	ECR #
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L	REMOVED PG. 12, REVISED PG. 2	JUNE 2000	1952
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R	MANUAL CONVERTED TO SERVICE PART	SEPT. 2018	10037

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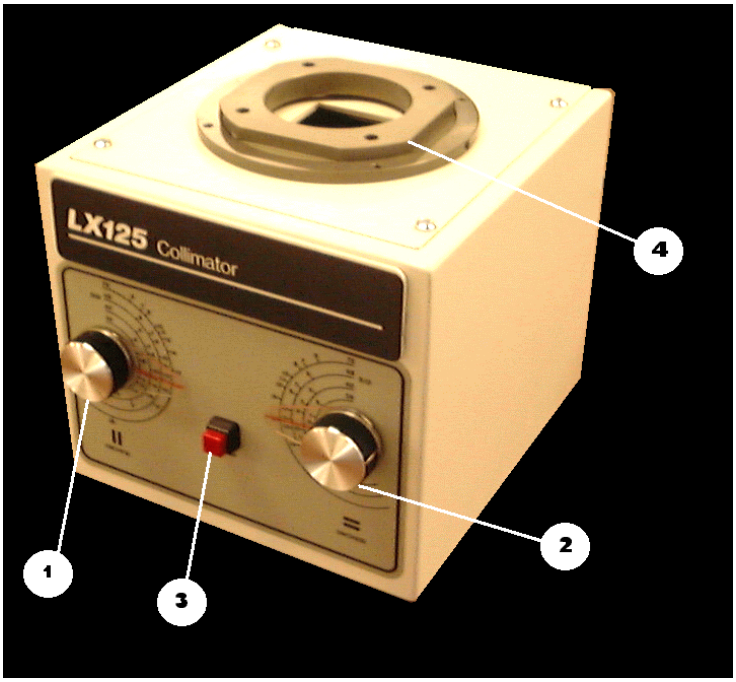

INTRODUCTION

1.0 USER INFORMATION

1.1 COLLIMATOR FEATURES

1. Collimator Dial – Controls the longitudinal shutters. Calibrated scales provided which correspond to 4 different sources to image distances (S.I.D.s).

2. Collimator Dial – Controls the cross shutters. Calibrated scales provided which correspond to 4 different sources to image distances.

3. Lamp Switch – Controls the light field. Depressing and releasing the light switch while the light field is “off”, causes the light field to turn “on” for the set lamp duration (see section II – H, for configuring the lamp time duration). At the end of this “on” period, the light field will automatically switch off.

   If the gradual turn-off selection is enabled (see section II- H, for selecting gradual turn-off), at the end of this “on” period, the light will dim gradually. Depressing the switch during gradual turn-off will restart the lamp and timer for another “on" period. Selection of this feature, however, disables the manual termination feature described below.

   Depressing and releasing the switch while the light field is “on” interrupts the “on” period and instantly turns the light field “off”. This feature allows the operator to manually terminate the light field, thus extending lamp life.

   Additional terminals are provided on the lamp timer PCB to allow for a secondary lamp switch to be used in conjunction with the primary lamp switch. This switch has the same functions as the primary collimator lamp switch.

4. For versatility, the collimator can be supplied with a swivel mount.

1.2 COLLIMATOR OPERATION

1. Position the collimator dials to correspond to the film size and S.I.D. being used.

2. Turn the light field “on” and center the light field to the film

3. The light field can be terminated if the operator desires.

NOTE: Radiographic quality is not affected by the light field being “on” or “off” during exposure.

1.3 GENERAL SPECIFICATIONS

Applications – Special purpose stationary radiographic systems.

Maximum rated KVp – 125 KVp

Outer dimensions (L, W, H,) – 10.31” x 7.75” x 7.34”

Net weight – 20 lbs. (approx.)

Lamp – type FCS, 150W @ 24V – (pin base)

Lamp timer – solid state, adjustable time: 30, 60, 90, or 120 seconds.

Input power – 150W, 24Vac (nominal)

Projected field size – square or rectangular, continuously variable, (See Chart below.)

SID	Max. Length	Max. Width
36”	18”	17”
40”	20”	19”
72”	36”	34”

Minimum Inherent Filtration – 1.0mm aluminum equivalence at 100 KVp.

1.4 MAINTENANCE

Periodic inspection and preventative maintenance of this equipment is necessary to assure continued safe performance and compliance with applicable state and federal regulations. The following maintenance program must be closely followed.

Q: Who should perform the service?
A: Service personnel specifically trained, experienced, and familiar with this type of medical x-ray equipment.

Q: When and how often?
A: Appropriate inspection and service should be performed 30 days after installation and every 12 months thereafter.

Q: Specifically, what must be inspected, tested, and/or serviced?
A: Several things:

1. Verify that knobs are tightly mounted and properly positioned.
2. Shutter assemblies operate smoothly with minimal backlash and no binding.
3. Lamp timer works properly.
4. Electrical connections are clean and tight.
5. Verify collimator is tightly mounted to tube.
6. Verify “load-on” voltage is within specified range.
7. Verify sizes and alignment of x-ray field, light field, and dial indication.
8. All external covers are properly and securely mounted.

NOTE: This product should not be altered or modified in any way as such action may invalidate its regulatory compliance and void the factory warranty.

2.0 INSTALLATION INFORMATION

2.1 ASSEMBLER INFORMATION (FOR CERTIFIED COLLIMATORS ONLY)

A. COMPATIBILITY – The LX125 collimator is compatible with x-ray tube housing assemblies that meet all of the following specifications:

1. Focal distance – The distance from the tube's focal spot to the collimator mounting surface must be 2.50" ± .03". A selection of spacers are provided to make-up this distance if the combined dimension of the tube housing assembly and tubemount are less than this value.

2. Leakage Radiation – Maximum leakage radiation from the tube housing assembly must not exceed 50 mR/hr at 100cm when operated at 4mA, 125 KVp.

3. Half-Value Layer – This collimator has a minimum inherent filtration of 1 mm alum. equivalence. This value plus the inherent filtration of the tube housing assembly and any added filters must meet the minimum requirements of 21 CFR Sub-chapter J, part 1020.30 (m) (1) table 1 on beam quality (e.g., minimum HVL at 100 KVp must be 2.7 mm al.).

   Note: Typically HVL of 2.7 mm al. is achieved if 2.5 mm alum. equivalent total filtration is in the beam.

4. Application – Special purpose stationary radiographic systems for use up to 125 KVp.

5. Beam Angle – To avoid x-ray field cutoff at large shutter openings, the total included angle of the x-ray beam emerging from the tube housing must be 28° (minimum) in each direction (length and width).

6. Mounting – This collimator is intended for use on x-ray tube housings and tubemounts provided with a 4 hole mounting pattern equally spaced on 3.62 dia. bolt circle.

2.2 INSTALLATION

1. SPACER SELECTION – This collimator will perform properly only when the distance between the focal spot of the x-ray tube and the mounting surface of the collimator port is 2.50" ± .03" (SEE FIGURE 2).

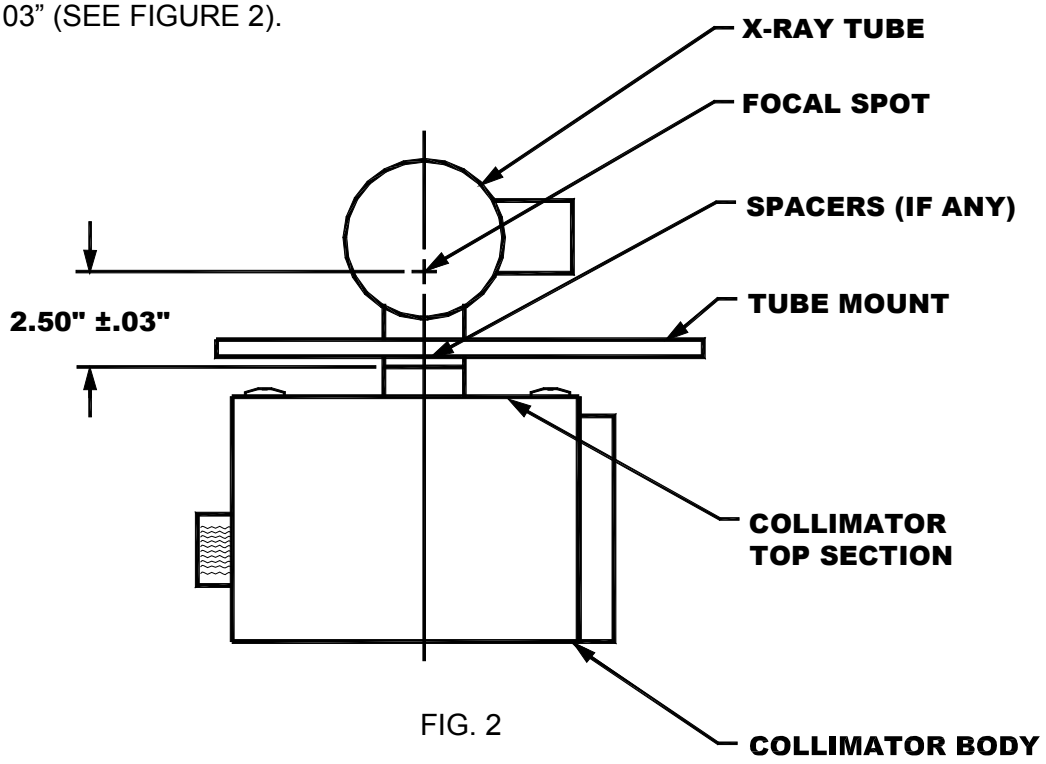

FIG. 2

A selection of spacers is provided which should accommodate all tubes and tubemounts currently available. To select the proper spacers for the particular components being installed, follow steps A thru E below.

A. Determine the distance from the focal spot to the port mounting surface of the x-ray tube (typically 1.88" to 2.25").

B. Determine the thickness of the tubemount (if any) between the tube and collimator (typically .09" to .187").

C. Add the distance of "A" to the thickness of "B".

D. The calculated spacer thickness is determined by subtracting the sub-total of "c" from the specified distance of 2.50".

E. Now considering the spacers provided (one .06" thick and several .12" thick) select the combination of spacers that most closely matches the calculated spacer thickness.

NOTE: Adding more spacers causes reduction of x-ray field size.

2. SELECTION OF COLLIMATOR MOUNTING SCREWS – WARNING – Mounting flanges of typical x-ray tubes are threaded either ¼ - 20 or M6 (metric). It is critical that screws of the correct thread size be used which match the threads of the x-ray tube.

For proper safe mounting of collimator to tube, screws must be selected which provide at least 5 full threads of engagement with the tube's mounting flange, but not so long as to bottom-out into the holes. To calculate the minimum screw length, total-up the thickness of tubemount (from 1B, above), the thickness of spacers selected (from 1E, above), and .68". This total is the minimum screw length.

3. MOUNTING THE COLLIMATOR –

A. Remove the (4) #10-32 x ½" slotted hex head screw and lock washer from the top section of the collimator and remove the top section (SEE FIG. 3)

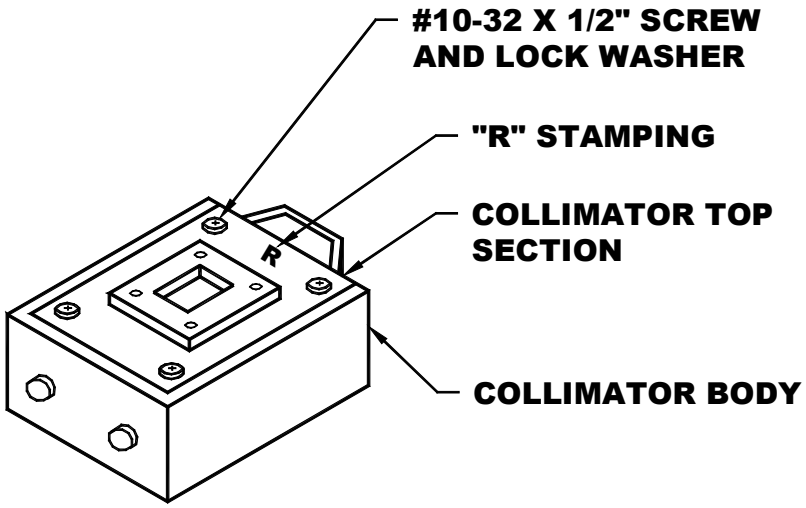

FIG. 3

B. Mount the top section of collimator and appropriate spacers to tubemount and tube using (4) screws of proper length and thread size and (4) lock washers. (SEE FIG.4).

NOTE: Letter "R" stamped into top section to be towards rear.

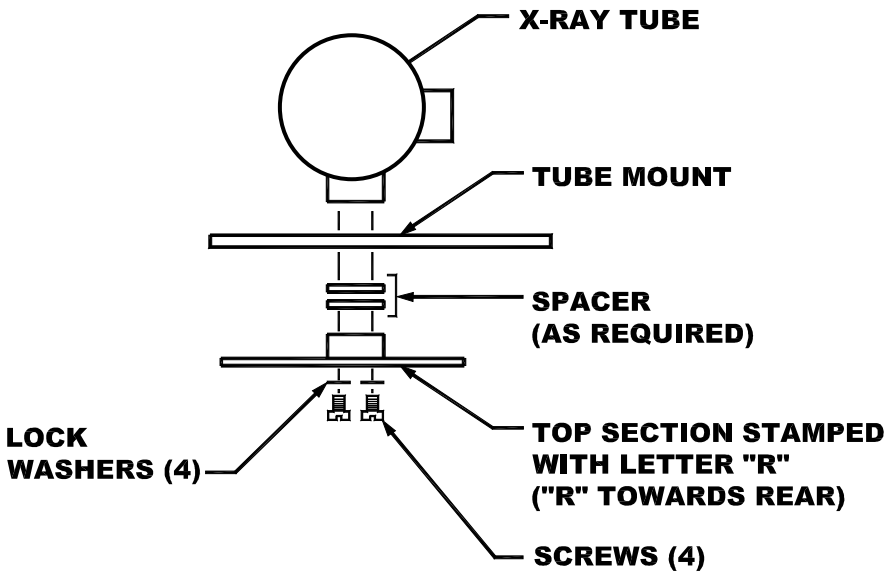

FIG. 4

C. Verify top section of the collimator is square to tubemount and tighten the (4) mounting screws firmly.

D. Reassemble collimator body to the top section using the (4) #10-32 x ½" phillips head screws and lock washers previously removed. Tighten these screws.

E. Thoroughly inspect port mounting area for gaps, loose joints, or loose components.

ELECTRICAL SPECIFICATIONS

30 VAC maximum no-load

21.0 to 23.0 VAC load-on voltage

Fused 8 to 10 Amps at source

NOTE: The load-on voltage is to be measured at the external collimator plug at the back of the collimator.

ELECTRICAL WARNING

For safety, the power source must either be ground referenced or isolated from the power line.

CABLE CONNECTIONS:

Black & White – 24 VAC, 150 VA, fused 8 to 10 Amps
(Polarity not important)

Green – Ground screw or bolt

2.3 COMPLIANCE TESTS (FOR CERTIFIED COLLIMATORS ONLY)

The compliance tests described in this section must be performed and documented in order to demonstrate at a later date that all tests were performed and that the unit was compliant with federal standards at the time of installation.

TEST PROCEDURES:

1. Field size and Alignment

   A. Place a loaded x-ray film cassette perpendicular to and centered with collimator light field, at a distance of 40" from focal spot of x-ray tube.

   B. Set collimator's indicated field size to a standards size somewhat smaller than the film being used.

   C. Place (4) radiographically opaque markers (coins work well) within the light field near the center of each edge so that the outer edges of the markers align with the visible edges of the light field. These markers will leave images on the processed radiograph which represents the light field. Place a fifth marker in the lower left quadrant so that the processed radiograph can be properly oriented.

   D. Expose the film with enough radiation to produce an optical density of approximately 1.0.

   E. Develop the film and examine the resultant image:
      1. The length and width of x-ray field (dark image area) should be equal to the length and width of the selected field size within ± .3" (at 40" SID) in each direction. If not, it will be necessary to change the spacing between the collimator and tubemount (increasing the spacer thickness reduces the x-ray field size and vice-versa). See "Installation" on page 7 if necessary.
      2. The distance between each edge of the x-ray field and the corresponding edge of the light field (as indicated by the outer edge of marker image) must not exceed ± .3". If it does exceed this distance, refer to "Adjustments" on page 11.

   F. Repeat this test at (3) field size settings (minimum); small, medium, and large.

2. Light Field Illuminance and Edge Contrast

   A. Using an A.C. Voltmeter capable of measuring up to 30V RMS (with accuracy of ± .2V) verify that voltage at plug of collimator is 21.0 to 23.0 V when the collimator's light field is "on".

2.4 LIGHT FIELD ADJUSTMENT

1. This step is only required if the installation does not meet the light field/x-ray congruency test of section C.

2. Remove Lamp Cover at rear of collimator to gain access to the Lamp adjusting screws. Adjust screws as required to bring the light field into acceptable congruence with the x-ray field.