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TM 8-633

WAR DEPARTMENT TECHNICAL MANUAL

U.S. Dept. of Army

X-RAY FIELD UNIT, FLUOROSCOPIC, FOREIGN BODY LOCALIZATION, COMPLETE Item 9621500

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X-RAY FIELD UNIT, FLUOROSCOPIC, FOREIGN BODY LOCALIZATION, COMPLETE Item 9621500



WAR DEPARTMENT • APRIL 1945

United States Government Printing Office
Washington: 1945

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WAR DEPARTMENT
Washington 25, D. C., 17 April 1945

TM 8-633, X-ray Field Unit, Fluoroscopic, Foreign Body Localization, Complete, Item 9621500, is published for the information and guidance of all concerned.

[AG 300.7 (8 Mar 45)]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL
Chief of Staff

OFFICIAL:
J. A. ULIO
Major General
The Adjutant General

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PART ONE

INTRODUCTION

Section I. GENERAL

1. Scope

a. This manual is published for the information and guidance of the personnel to whom this equipment is assigned. It contains information on the operation and first and second echelon maintenance of the equipment, as well as descriptions of the major units and their function in relation to

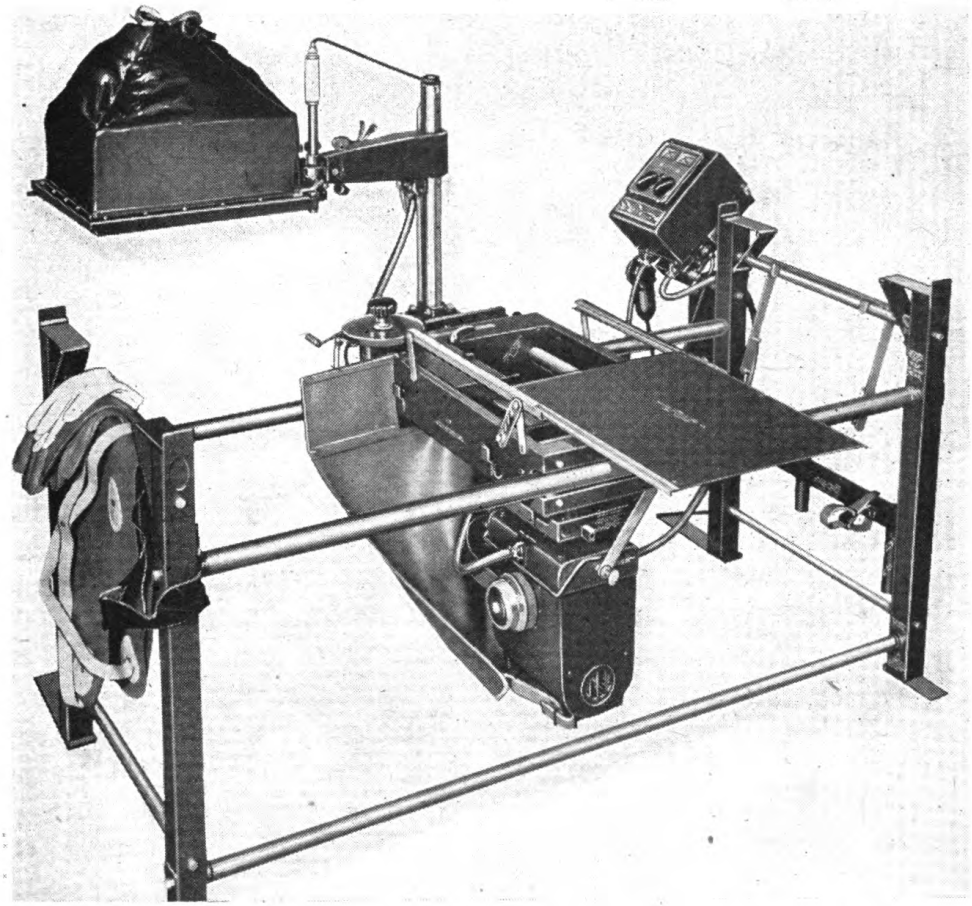


Figure 1. Medical Department item No. 9621500 X-ray field unit, fluoroscopic, foreign body localization, complete.

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the other components of the equipment. It applies to the following Medical Department item, No. 9621500 X-ray field unit, fluoroscopic, foreign body localization, complete. (See fig. 1.) These instructions are arranged in four parts: Part One—Introduction; Part Two—Operating Instructions; Part Three—Maintenance Instructions; Part Four—Auxiliary Equipment.

b. For further information refer to the following publications:

TM 8-240, Roentgenographic Technicians.
TM 8-280, Military Roentgenology.
TM 8-630, X-Ray Field Unit Generator, Item 9606000.
TM 8-632, X-Ray Field Unit, Machine, Chassis and Table, Items 9608508, 9608510, 9609005, 9609010, 9614500.
TB MED 117, Electrical Requirements for X-Ray Apparatus in the Field or in Temporary Installations.

c. Those parts keyed on the illustrations with Medical Department numbers and formal nomenclature are regularly supplied as spare parts. All requisitions for spare parts should be submitted in accordance with latest ASF Supply Catalog MED 7 on this equipment.

2. Records

No special maintenance forms or records are required to be kept by the using personnel except as may be prescribed by the Medical Officer in charge.

Section II. DESCRIPTION AND DATA

3. Description

a. GENERAL. The X-ray field unit, fluoroscopic, foreign body localization, which will be referred to in this manual as the Airflow Unit, is designed to do horizontal fluoroscopy, horizontal and vertical radiography, and foreign body localization with a patient on a litter. Because of the probability of transportation by air and its use in advance medical installations, some flexibility of use has been sacrificed to make the unit compact and portable. Three chests make up the unit and when used in conjunction with the X-ray field unit generator, a completely independent installation is established. The table assembly can be used with the control, transformer and tube assembly of item No. 9608500. (See figs. 2 and 3.)

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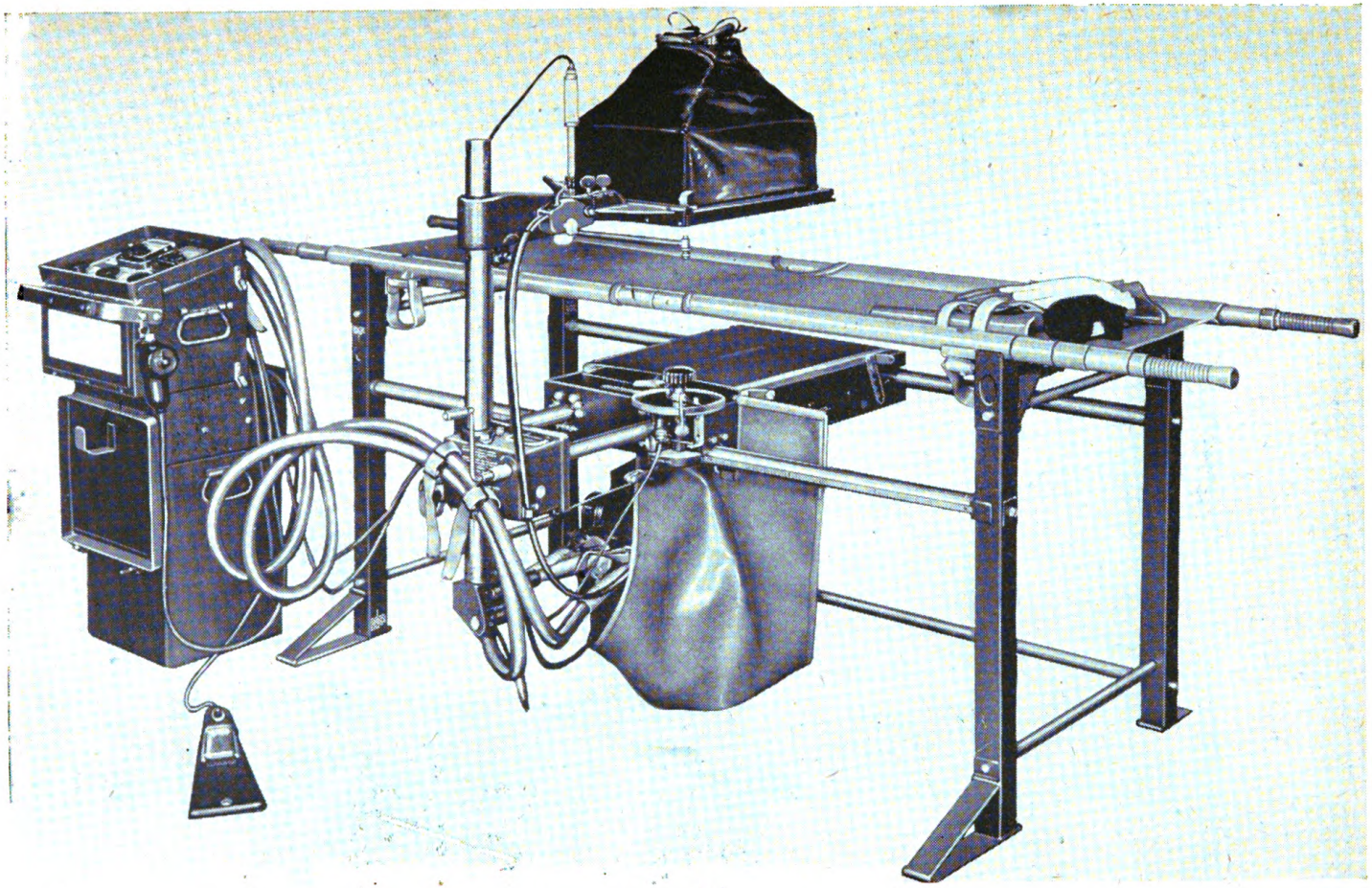


Figure 2. Airflow table in use with control, transformer, tube and cables of item No. 9608500. (Assembled for fluoroscopy and localization.)

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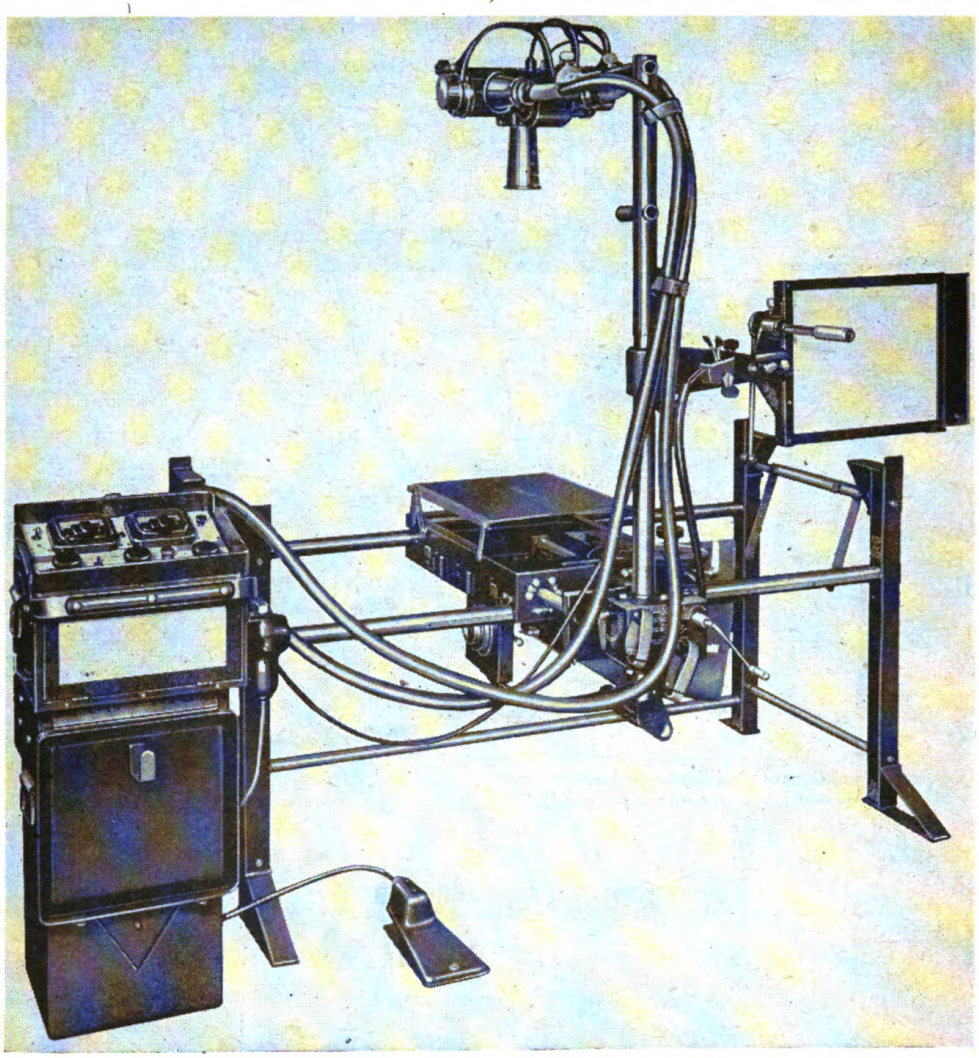


Figure 3. Airflow table in use with control, transformer, tube and cables of item No. 9608500. (Assembled for radiography.)

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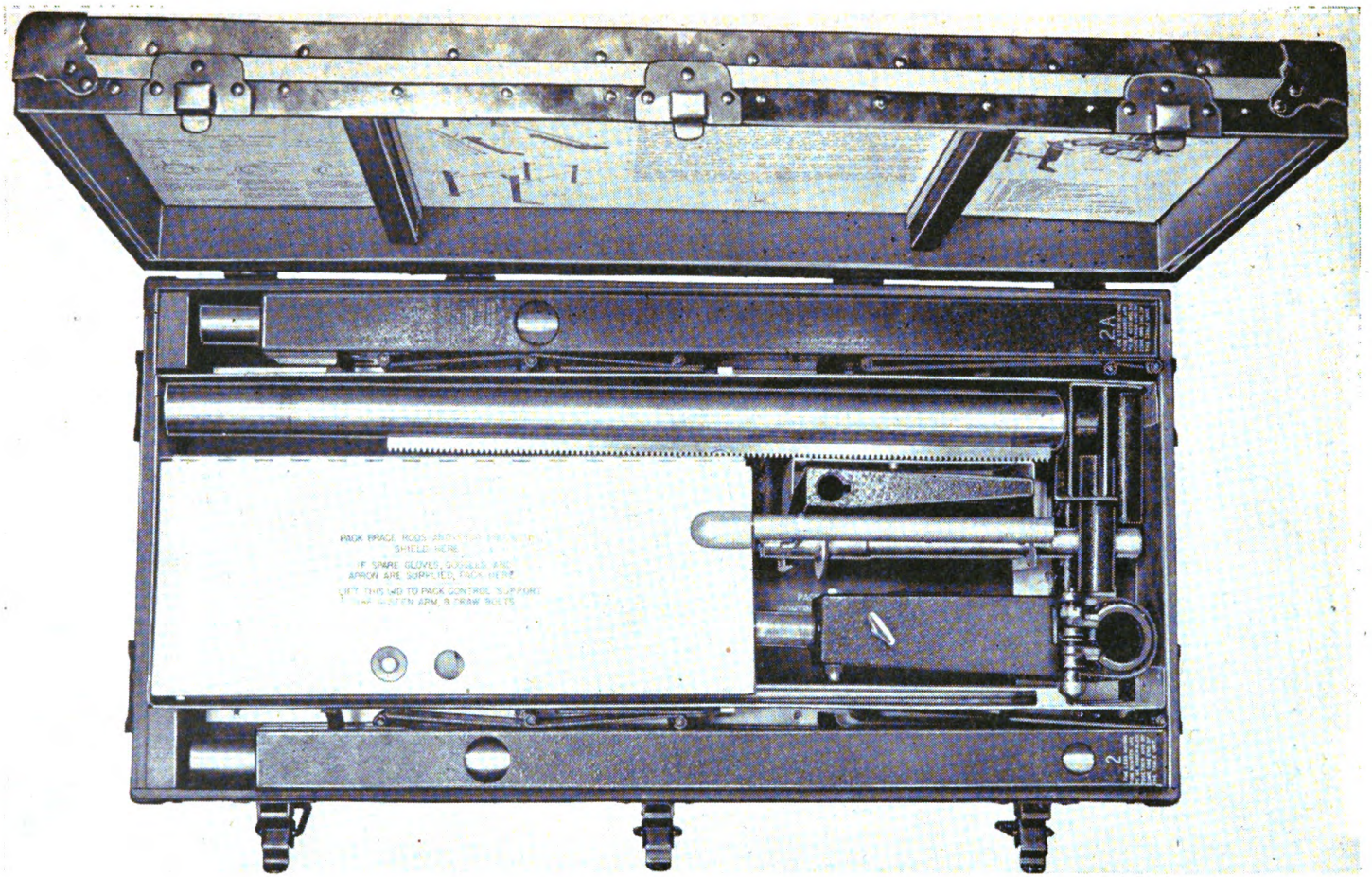


Figure 4. Table Chest No. 1, Airflow unit.

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(1) Table Chest No. 1 (fig. 4) contains the following items:

(*a*) Four table legs.
(*b*) Four table leg cross rails.
(*c*) Two sectional separable tie rail.
(*d*) One sectional separable tie rail.
(*e*) Six rail draw bolts.
(*f*) One vertical column assembly.
(*g*) One radiographic tubestand.
(*h*) One control shelf.
(*i*) One control shelf support tube.
(*j*) One 30-inch focal distance scale.
(*k*) One fluoroscopic screen arm.
(*l*) One X-ray tube arm.
(*m*) One X-ray protective shield.
(*n*) Two brace rods.
(*o*) One manufacturer's instruction manual.

The last three items are packed in the compartment provided. Space has also been provided within the compartment for a protective apron, gloves and fluoroscopic goggles, if an extra set of these items is furnished.

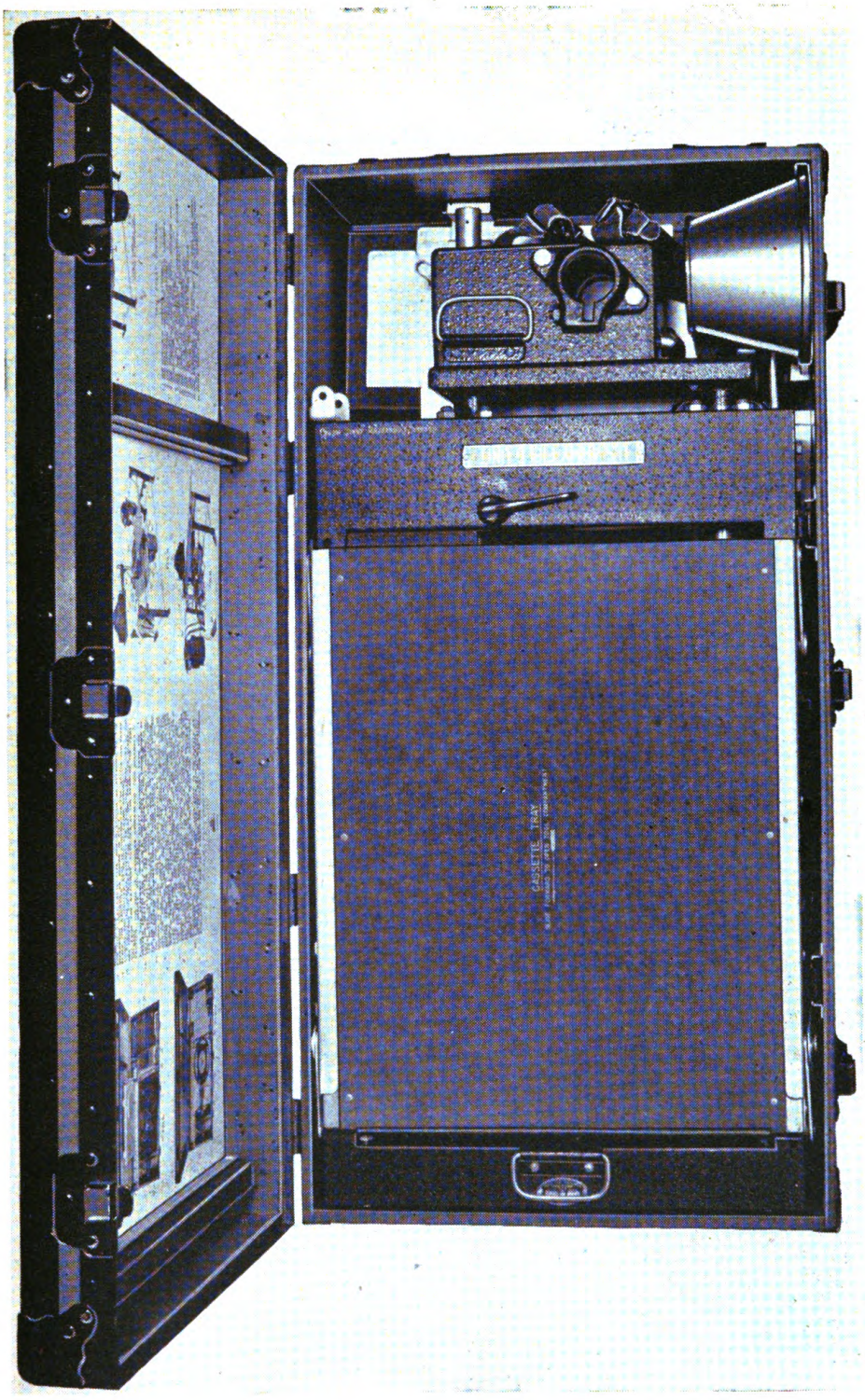
(2) Table Chest No. 2 (fig. 5 ①, ②, and ③) contains the following items:

(*a*) One horizontal carriage assembly.
(*b*) One mounted fluoroscopic screen assembly.
(*c*) One diaphragm control assembly.
(*d*) One daylight fluoroscopic hood.
(*e*) One calibration gauge.
(*f*) One X-ray protective apron.
(*g*) One pair X-ray protective fluoroscopic gloves.
(*h*) One pair of fluoroscopic goggles.
(*i*) One localizer dial assembly.
(*j*) One 12 x 16-inch fluoroscopic grid.
(*k*) One fluoroscopic radiation cone.
(*l*) One depth indicator and skin marker.
(*m*) One lifting crank.
(*n*) One extension cord for use with item No. 9608500.
(*o*) One localizer lamp cord.
(*p*) Spare parts and tools.

The last four items are packed in the tool and spare parts compartment on the carriage. To reach this compartment it is necessary to slide the cassette tray to the left as you face the open chest.

Caution: Care must be exercised in handling the fluoroscopic grid as it is easily warped or broken.

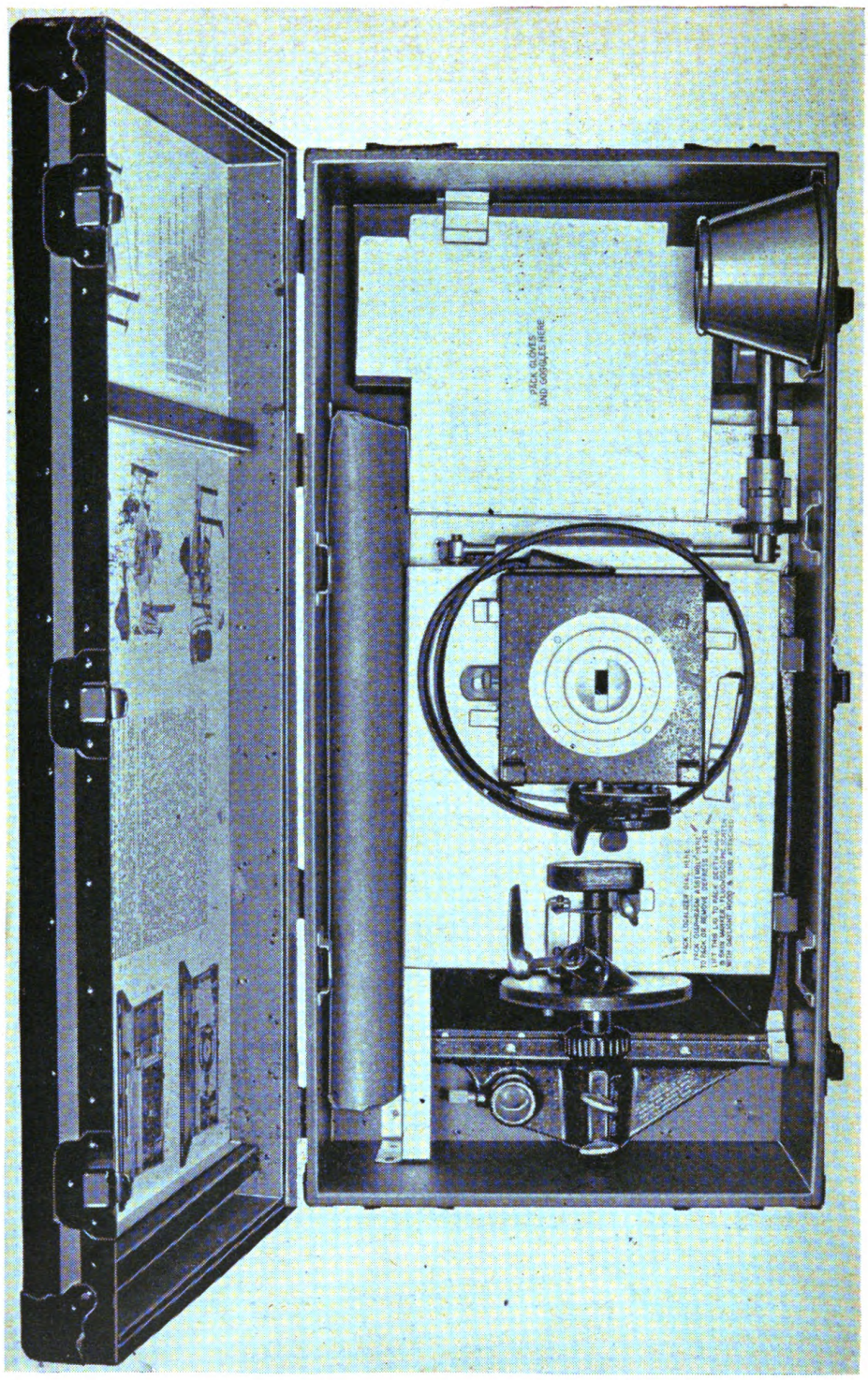
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① *Complete.*

Figure 5. Table Chest No. 2, Airflow unit.

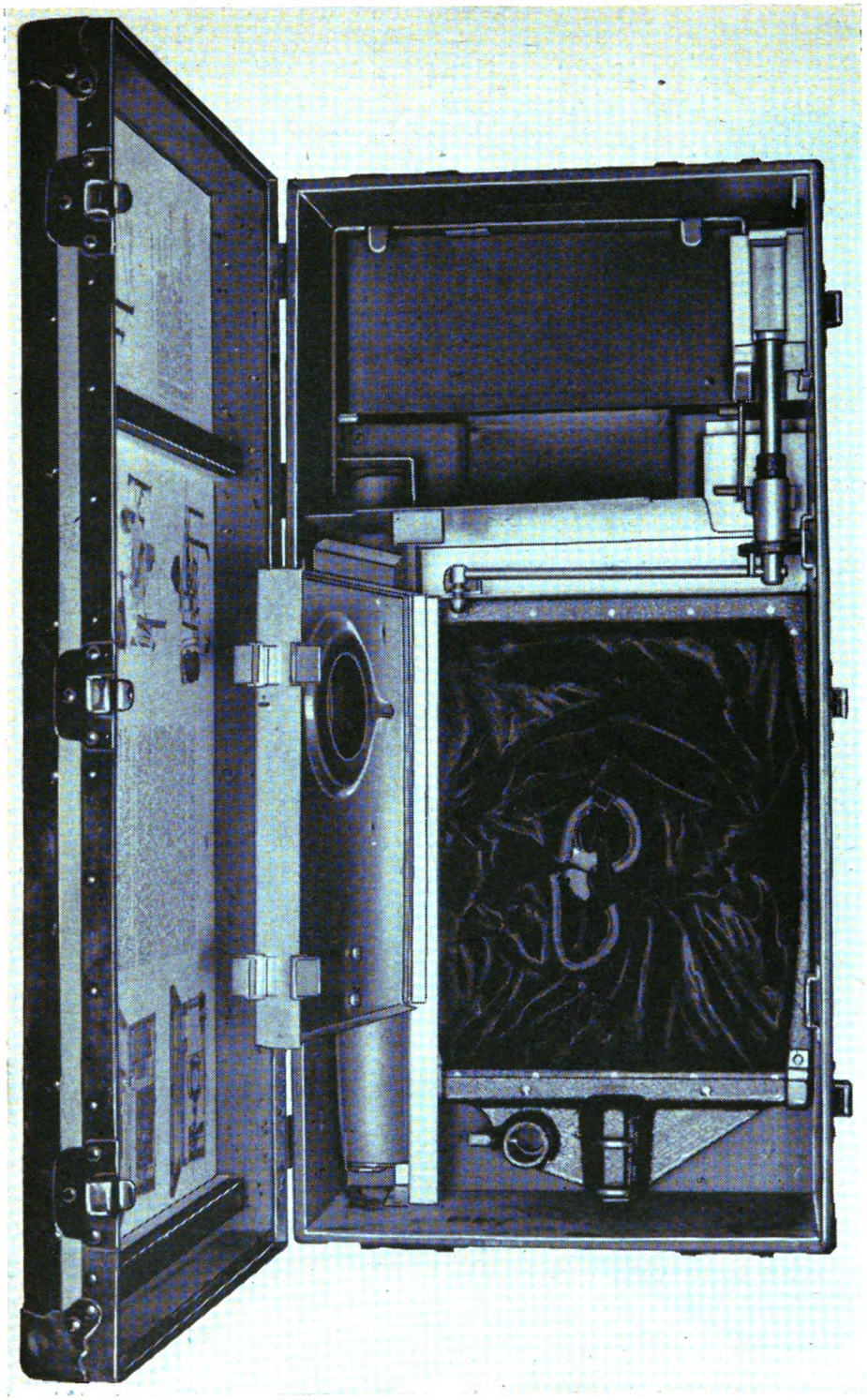
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② *Carriage removed.*

Figure 5. Table Chest No. 2, Airflow unit.

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③ *Showing screen.*

Figure 5. Table Chest No. 2, Airflow unit.

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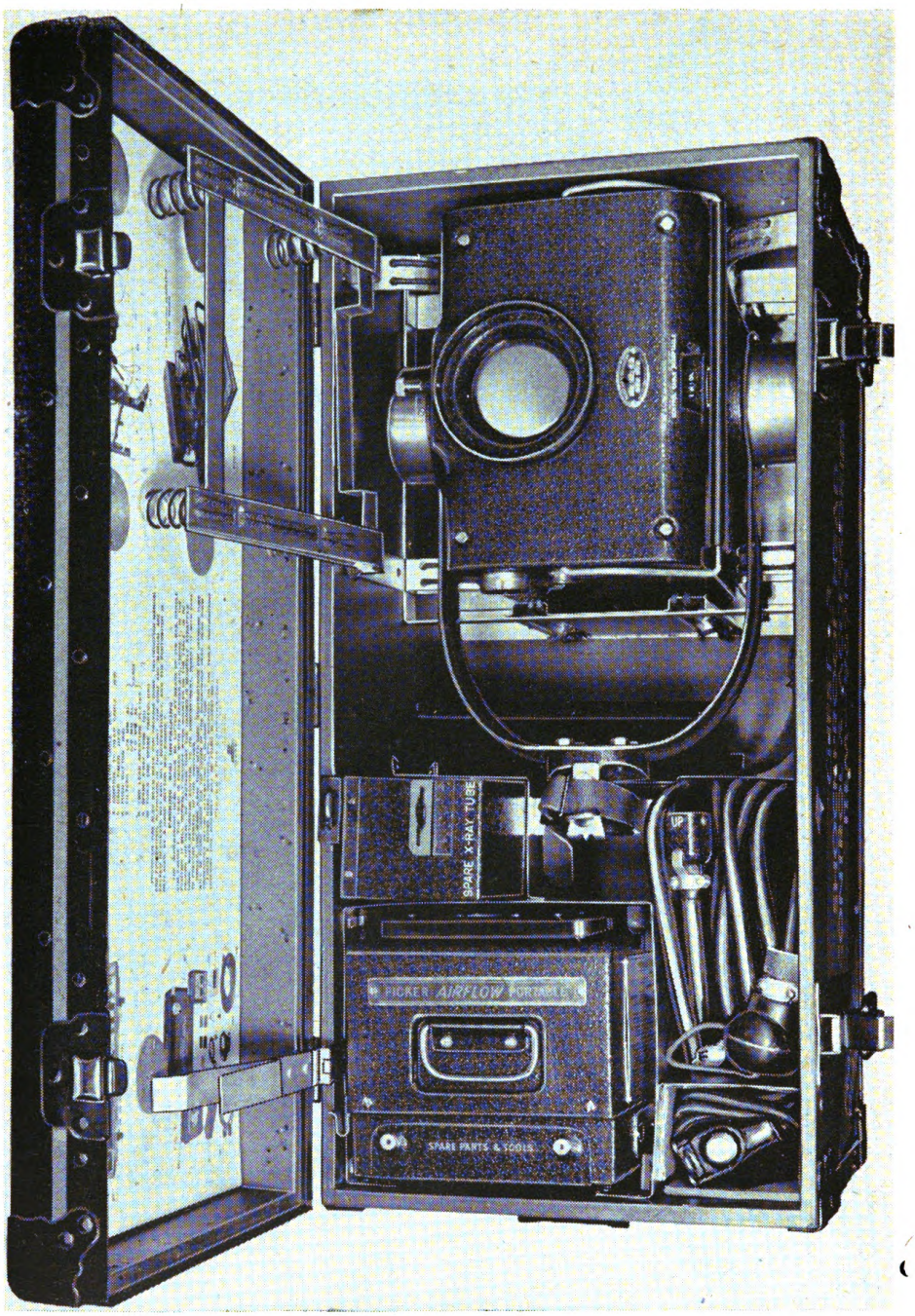


Figure 6. Generator chest No. 3, Airflow unit.

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(3) Generator Chest No. 3 (fig. 6) contains the following items:
(*a*) One shockproof head assembly.
(*b*) One control assembly.
(*c*) One main line cable.
(*d*) One control to head cable.
(*e*) One hand timer and cord.
(*f*) One push button and cord.
(*g*) Three aluminum filters.
(*h*) Two lead aperture plates.
(*i*) One spare X-ray tube and container.
(*j*) Tools and spare parts.

Caution: The shockproof head and spare tube must be handled with extreme care because of its comparatively fragile nature.

b. DIFFERENCE IN MODELS. There are no differences in the models of the Airflow unit as a whole, but substitution of a footswitch for the fluoroscopic push button and use of item No. 9608500 can be made to establish a more permanent installation. (See sec. XVII.)

4. Data

a. CAPACITIES. This equipment is designed to operate on 50 to 60 cycle, 115 or 230 volt current, automatically selecting the proper incoming line tap for the line voltage present. The maximum ratings are:

Fluoroscopy: 5 M.A. @ 80 PKV, 10 seconds exposure, 2 seconds rest, for an indefinite period.

Radiography: 15 M.A. @ 80 PKV, 10 seconds exposure, 40 seconds rest, for an indefinite period.

Note. For 50-cycle operation, reduce the maximum KV by 10 KV or double the rest period between exposures.

b. MANUFACTURER. This equipment is manufactured by the Picker X-ray Corporation, Waite Manufacturing Division, Inc., Cleveland, Ohio.

Section III. TOOLS AND ACCESSORIES

5. Tools

No special tools are required for the assembly or maintenance of this unit. However, to facilitate organizational maintenance certain common tools have been included with the unit.

6. Accessories

The accessories supplied with this unit consist of a pair of fluoroscopic goggles, a pair of lead rubber gloves and a protective lead rubber apron. (See fig. 1.) Use of these items should follow best medical practices and be established by the medical officer in charge.

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PART TWO

OPERATING INSTRUCTIONS

Section IV. GENERAL

7. Scope

Part Two contains information for the guidance of the personnel responsible for the operation of this equipment. It contains information on assembly and operation of the equipment with a description and location of the controls and instruments.

Note. Failure or unsatisfactory performance of equipment will be reported on WD AGO Form 468 (Unsatisfactory Equipment Report). If this form is not available see TM 38–250. This form will be made out in duplicate by using or service organization and forwarded in duplicate through command channels to The Surgeon General.

Section V. ASSEMBLY

8. Unpacking and Assembly

a. Unpacking and assembly for fluoroscopy and localization is shown in the following photographs. As an additional aid to assembly, printed instructions and color codes on the various members will be found helpful. The changes necessary to do radiography are covered in paragraph 14.

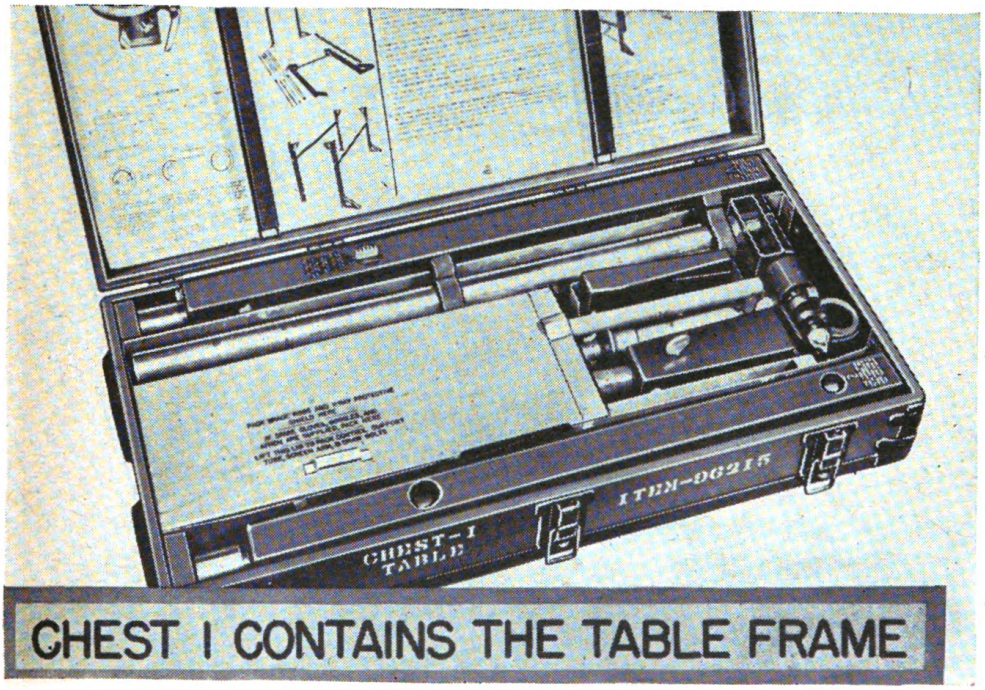
b. Adjustment should not be necessary as all clearances and settings are established by the manufacturer. Should adjustment be necessary after considerable use, the necessary information will be found under section XIV.

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ASSEMBLY PHOTOGRAPHS



ITEM 96215 IS PACKED IN THREE CHESTS

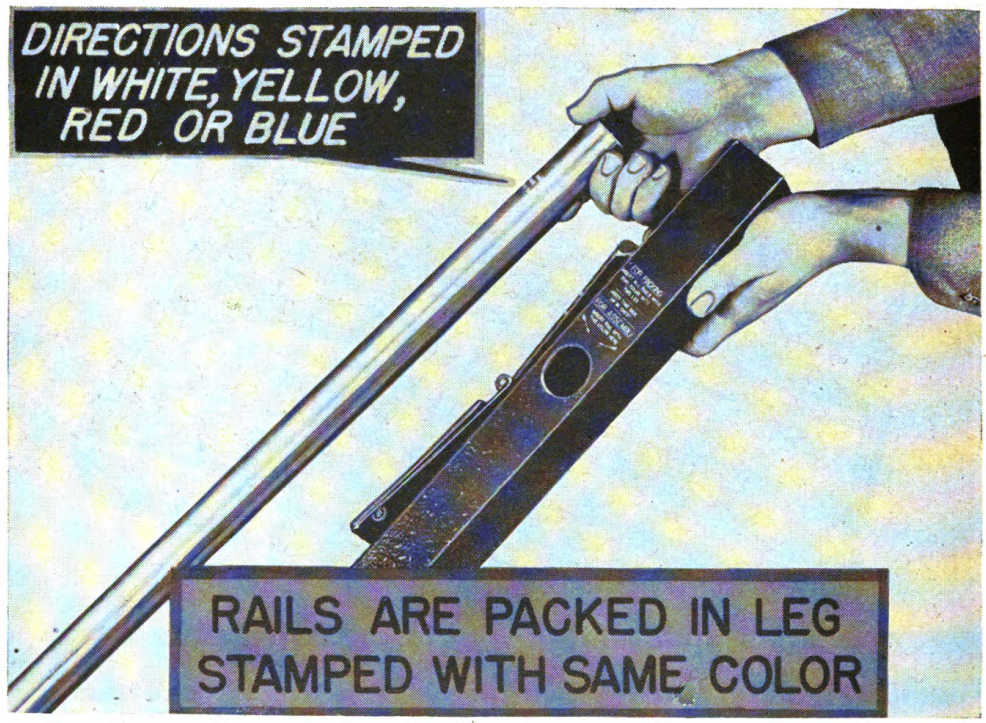


CHEST 1 CONTAINS THE TABLE FRAME

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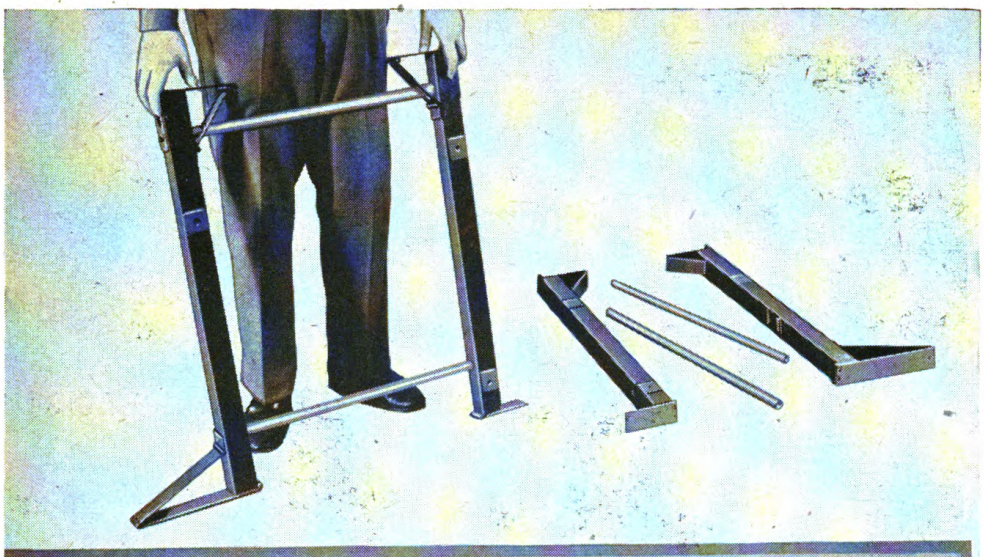
FOR ASSEMBLY REMOVE THE FOUR LEGS FROM CHEST AND TUBULAR RAILS FROM EACH LEG



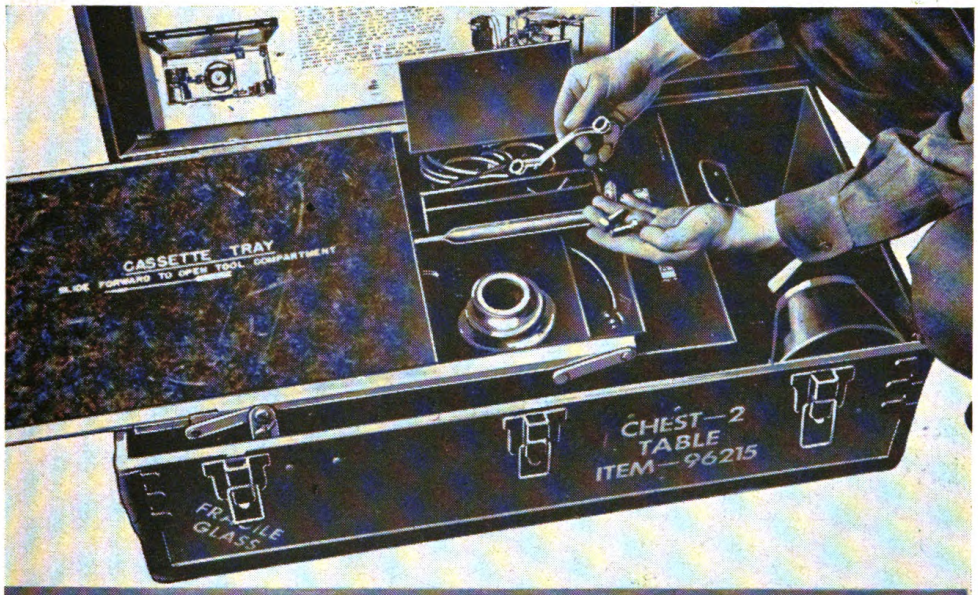
RAILS ARE PACKED IN LEG STAMPED WITH SAME COLOR

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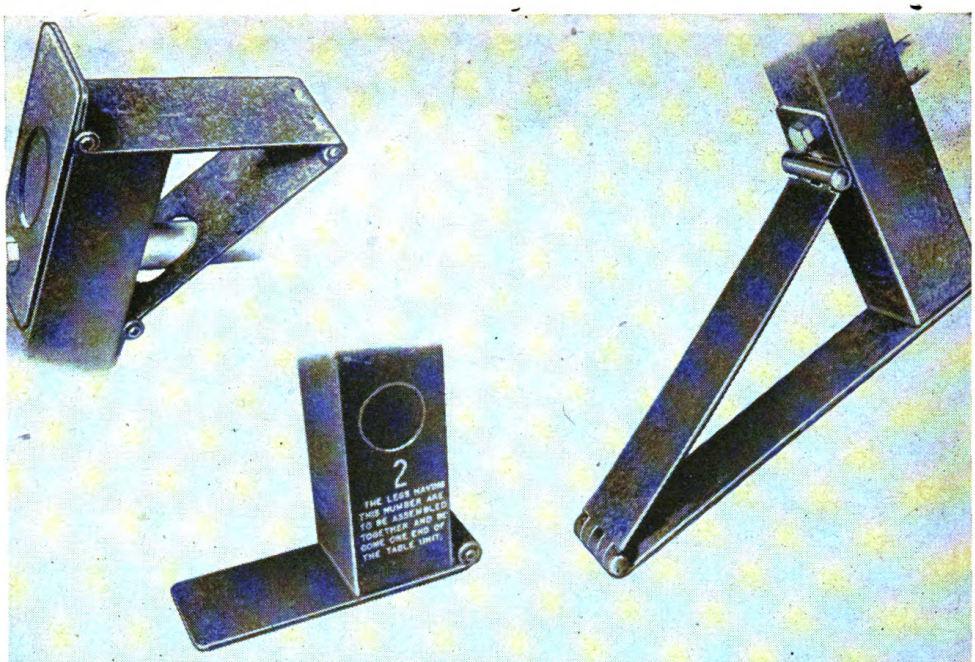


LEGS MARKED 1 AND 1A, 2 AND 2A ARE JOINED TOGETHER WITH THE SMALLEST DIAMETER TUBULAR MEMBERS

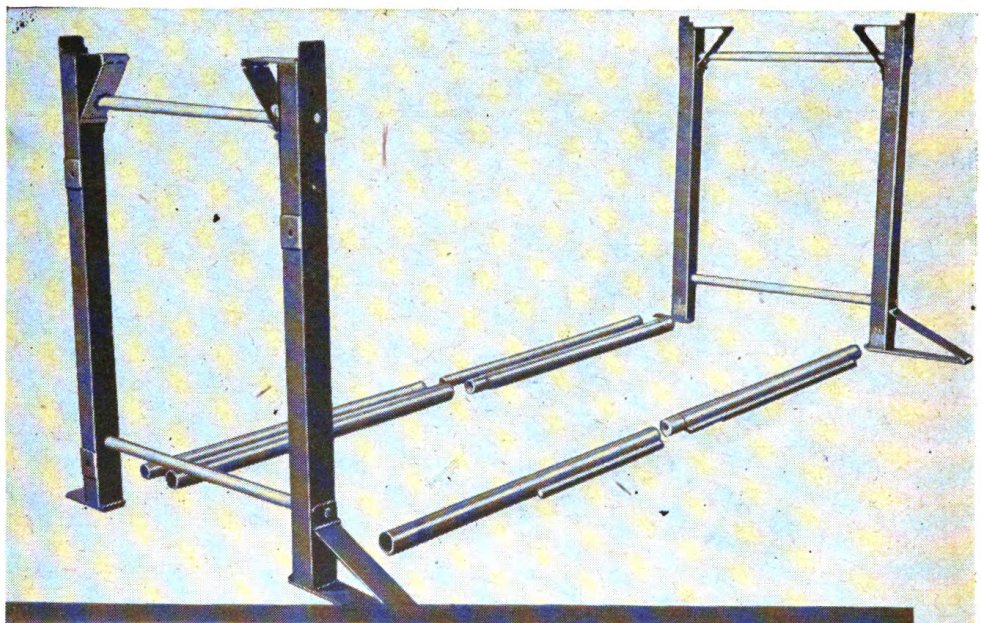


USE HEX HEAD SCREWS FROM TOOL-BOX OF CHEST 2 TO FASTEN RAILS

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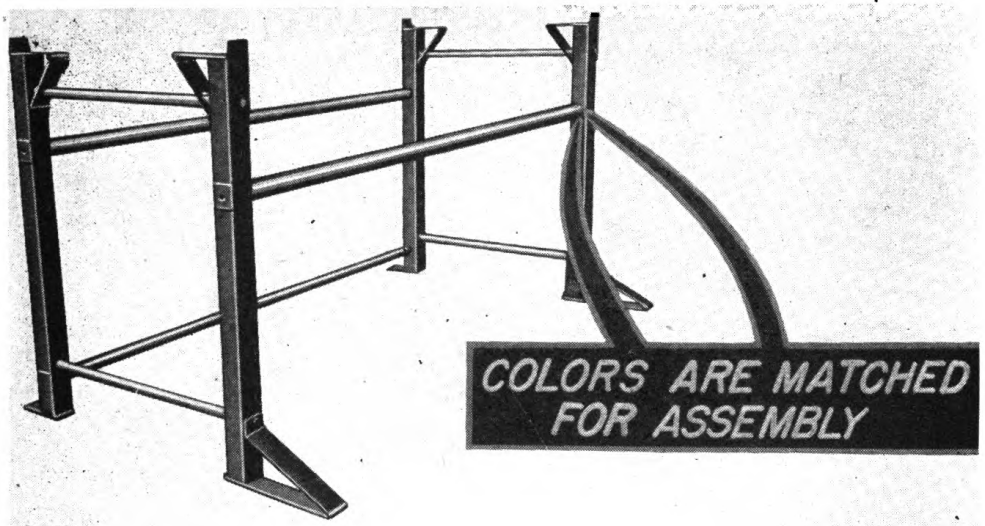
NOTICE THE FOLDING ARRANGEMENT OF HINGED PLATES



THE TWO END LEGS ARE NOW JOINED BY ASSEMBLY OF THE SIX TUBULAR SECTIONS

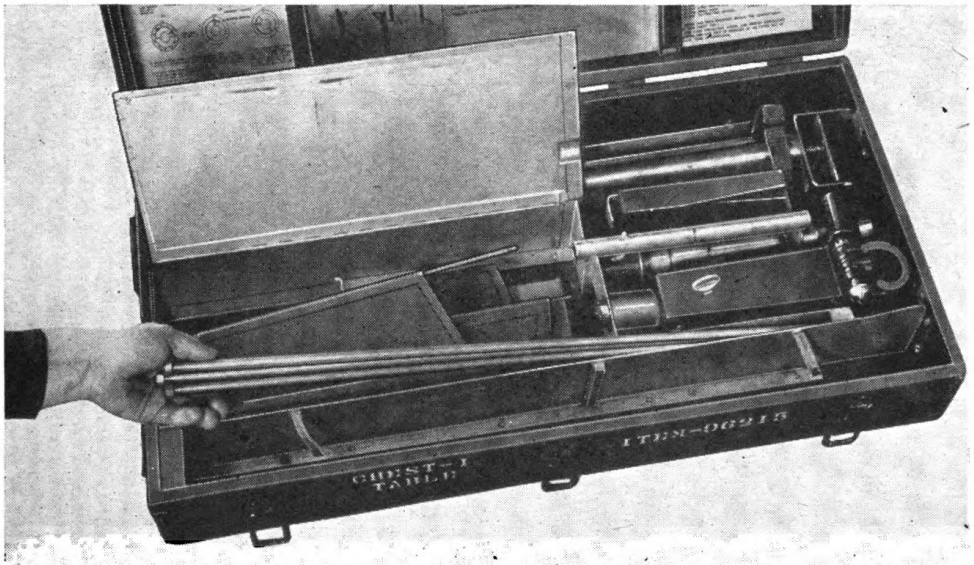
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COLORS ARE MATCHED FOR ASSEMBLY

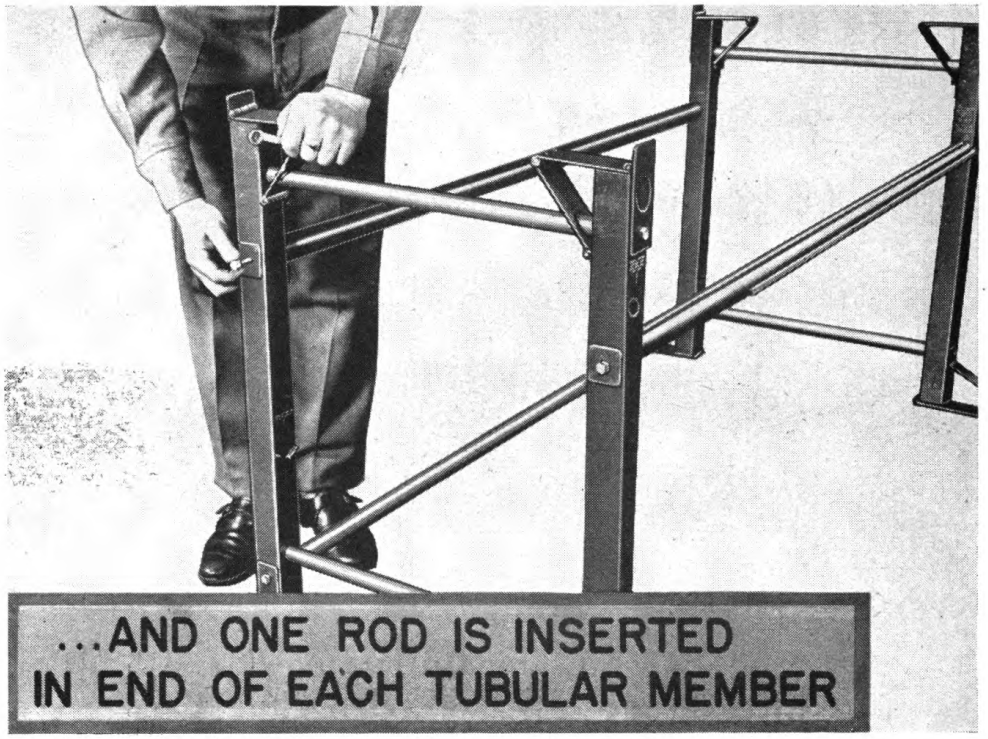
TUBULAR SECTIONS AND TABLE ENDS ASSEMBLED



TIE RODS ARE OBTAINED FROM CHEST I...

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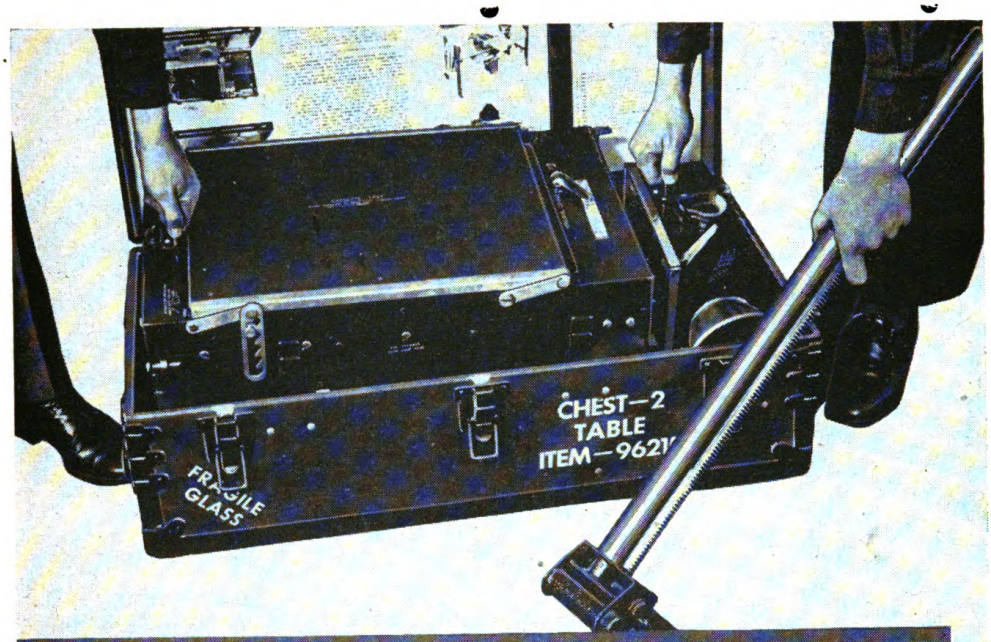


...AND ONE ROD IS INSERTED
IN END OF EACH TUBULAR MEMBER

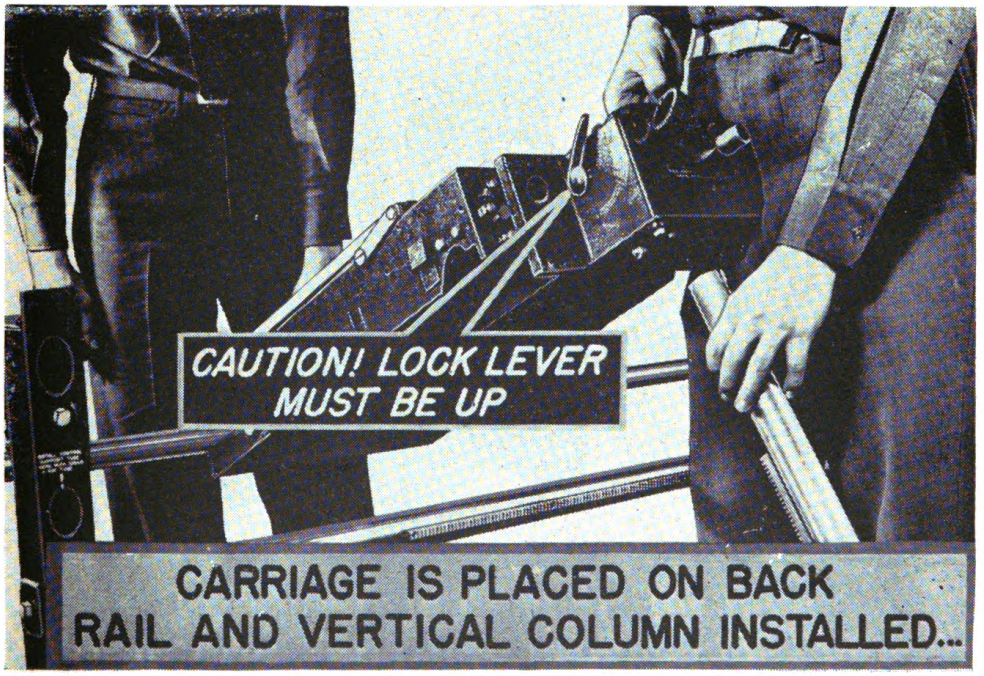


VERTICAL COLUMN IS NEXT
REMOVED FROM CHEST I...

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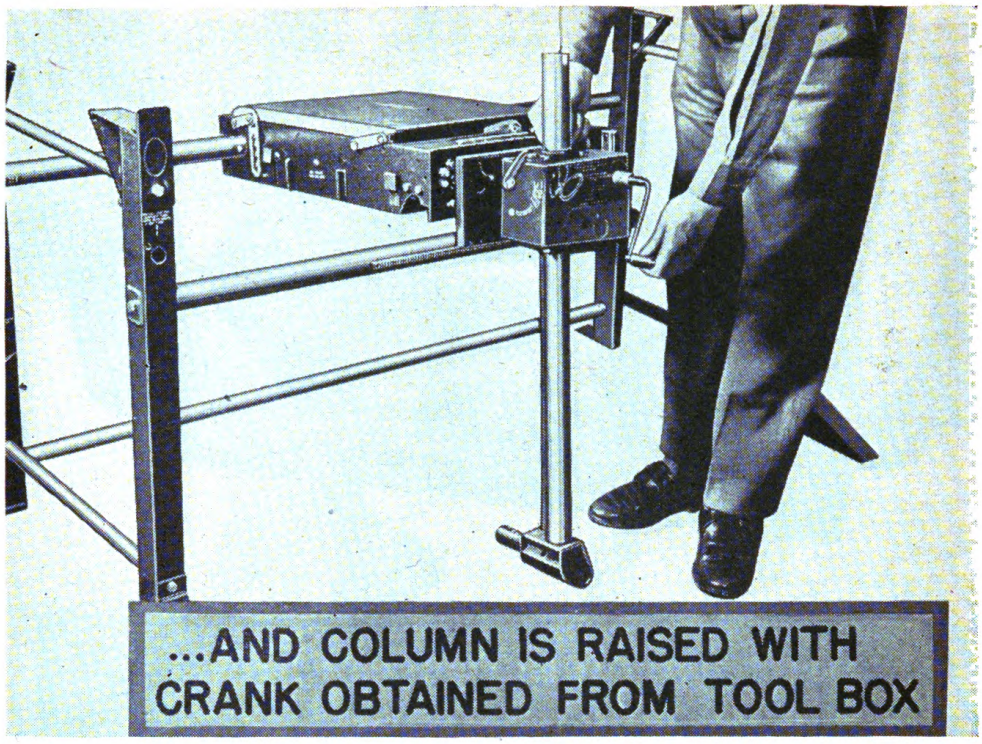


...AND HORIZONTAL CARRIAGE FROM CHEST 2

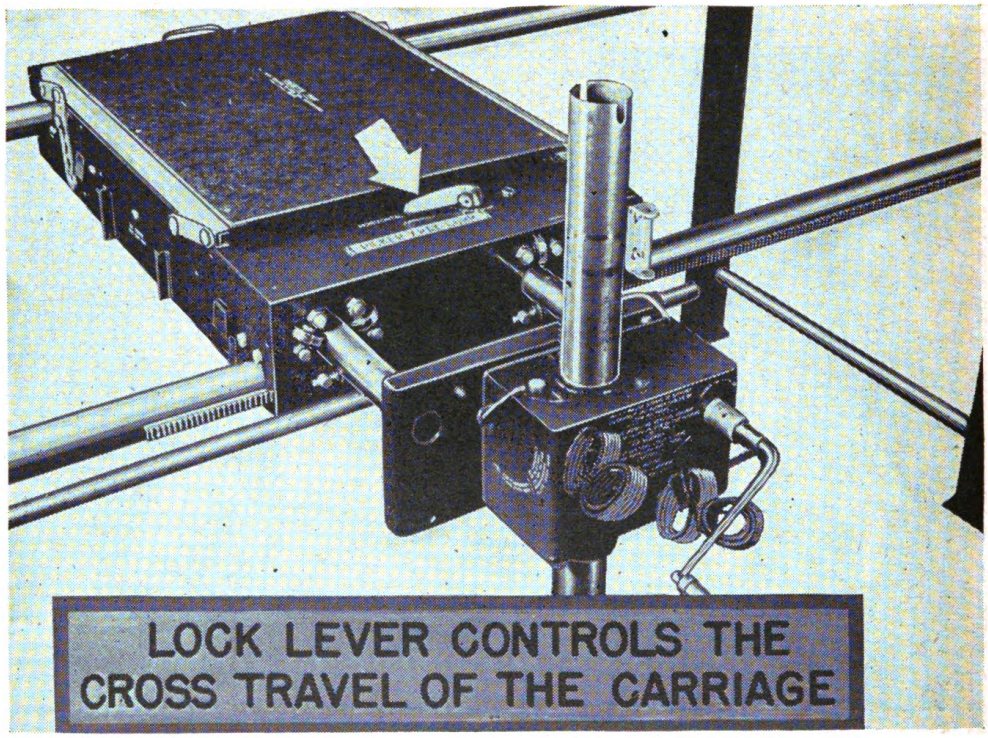


CARRIAGE IS PLACED ON BACK RAIL AND VERTICAL COLUMN INSTALLED...

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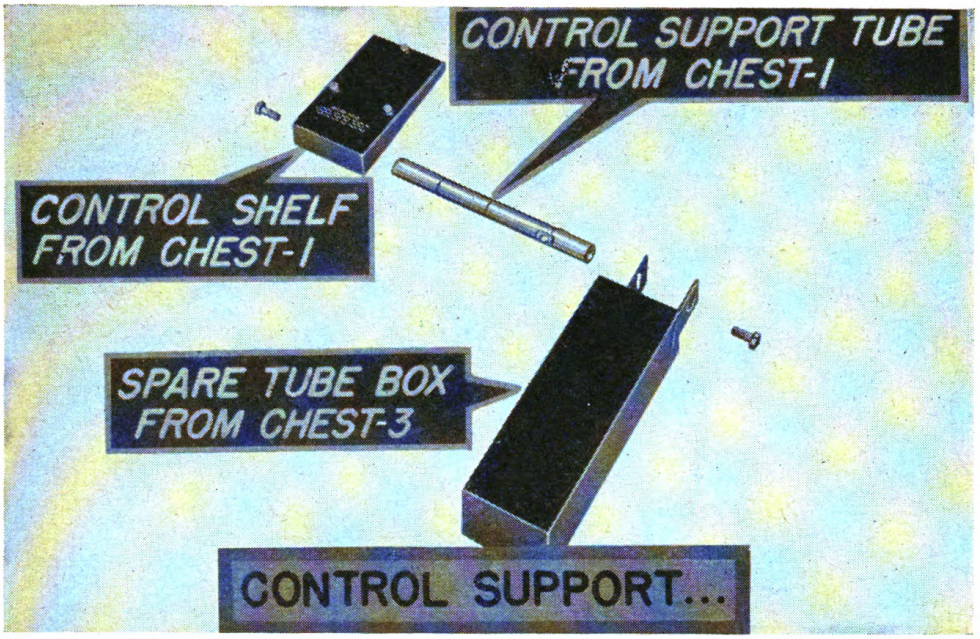
...AND COLUMN IS RAISED WITH CRANK OBTAINED FROM TOOL BOX

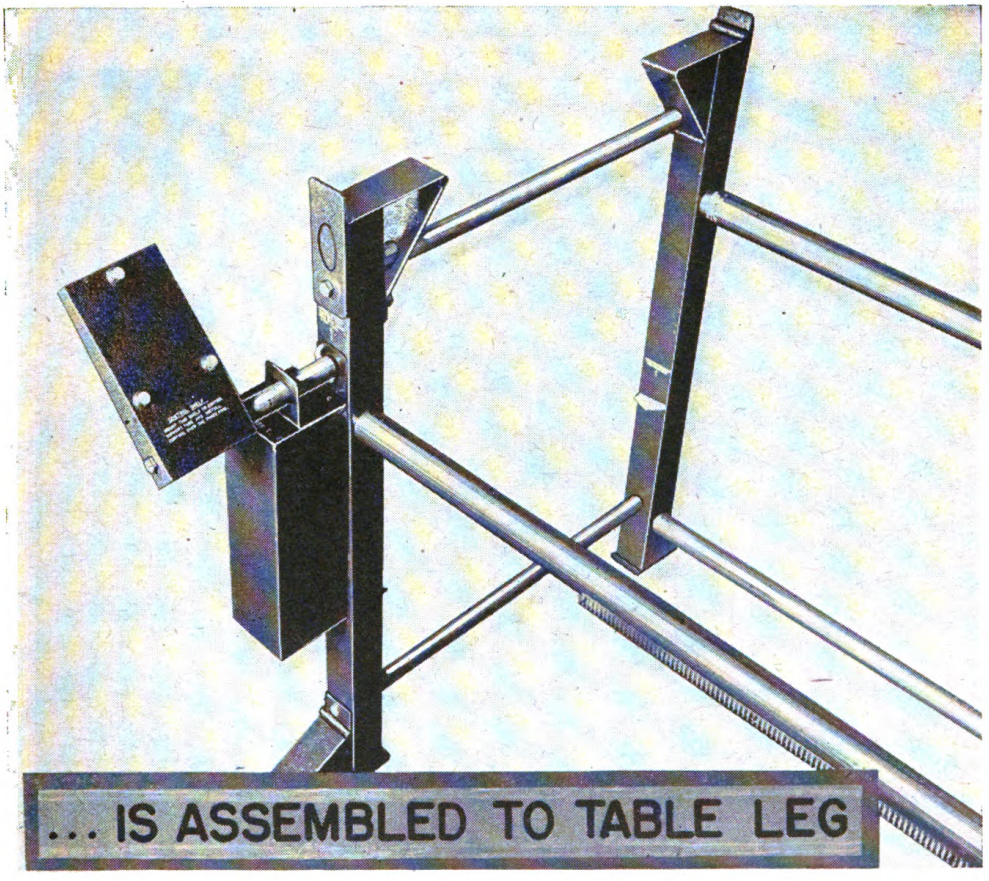


LOCK LEVER CONTROLS THE CROSS TRAVEL OF THE CARRIAGE

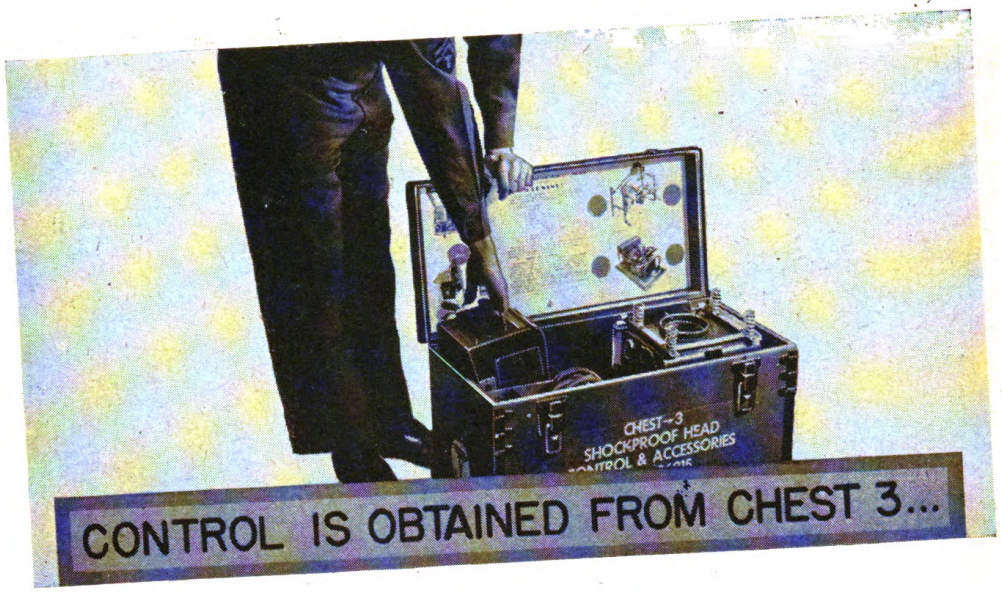
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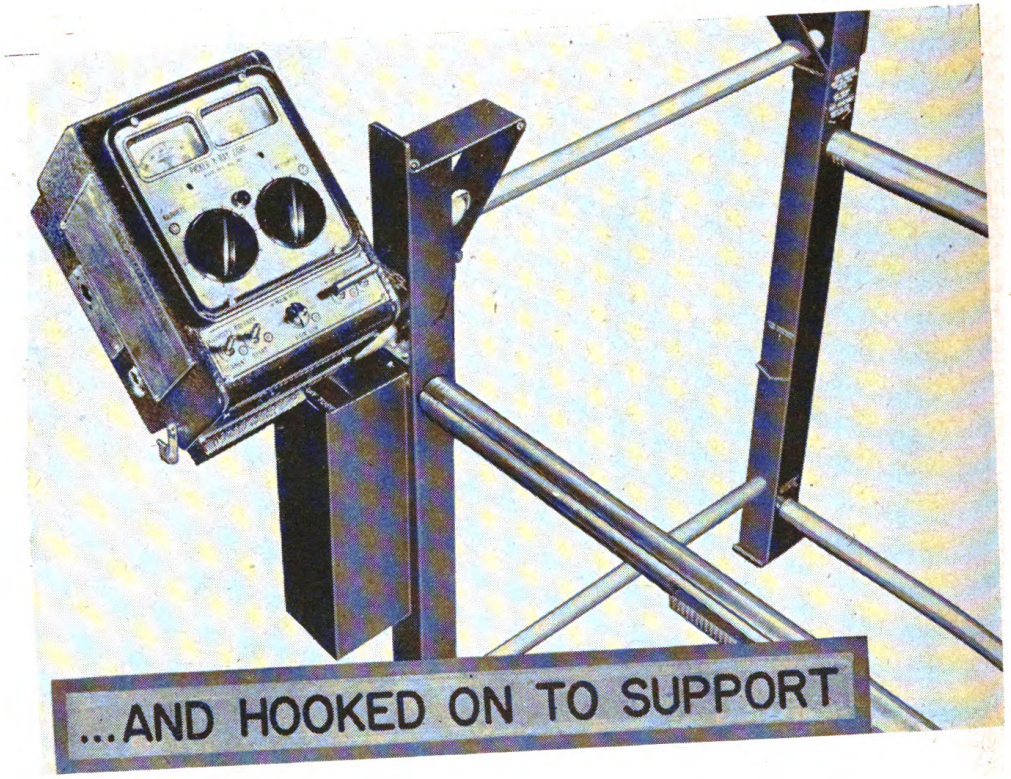
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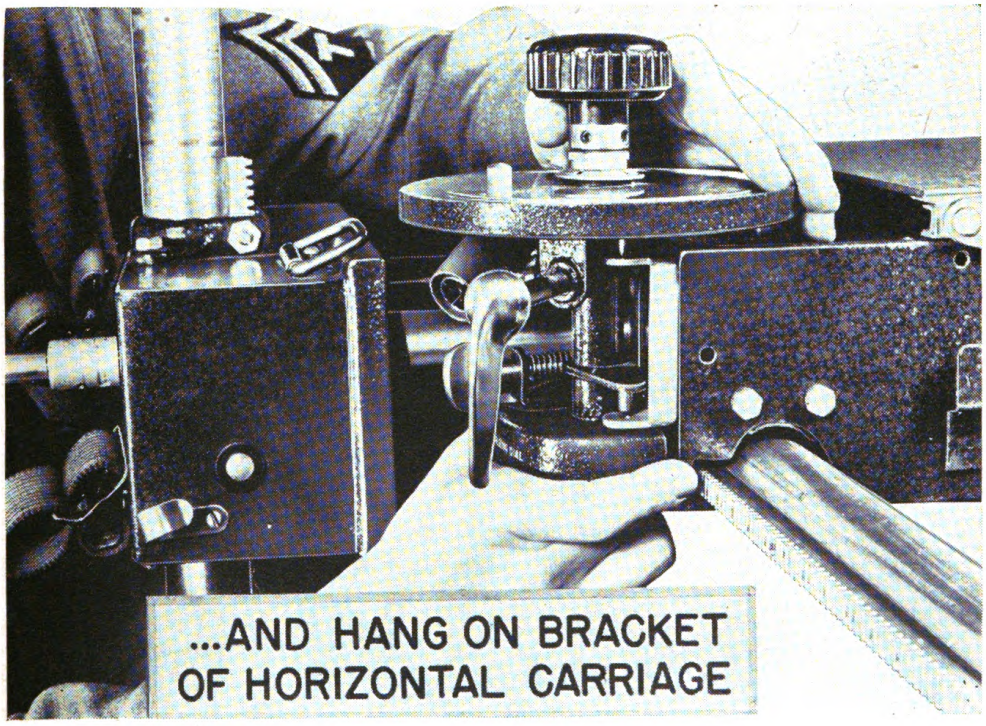




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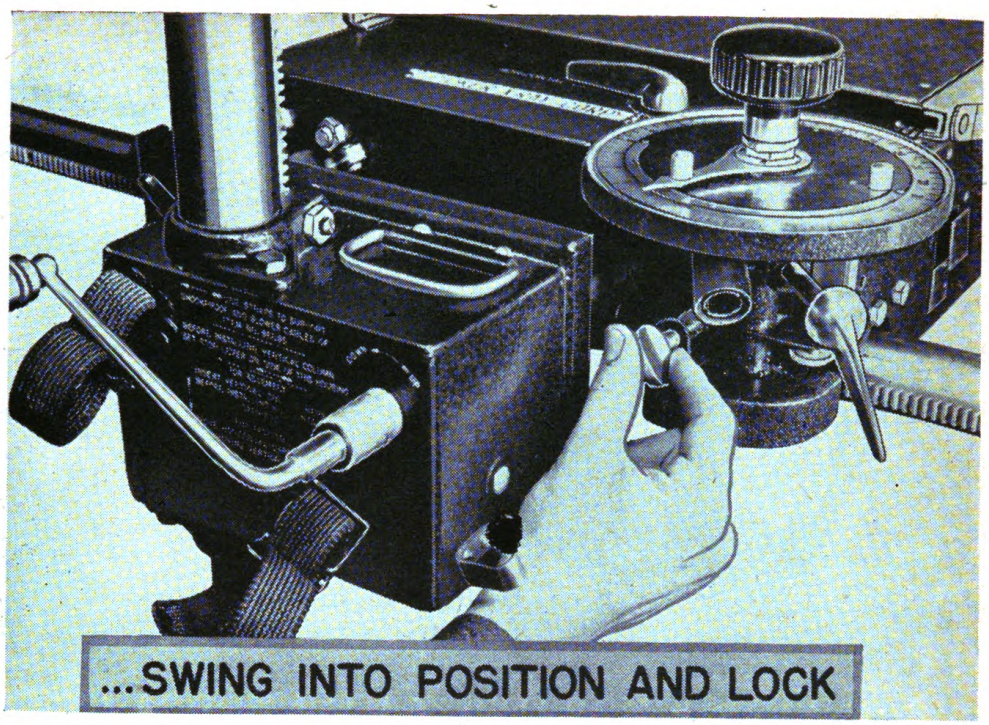


BY LOOSENING THUMB SCREW REMOVE LOCALIZER DIAL FROM CHEST 2...

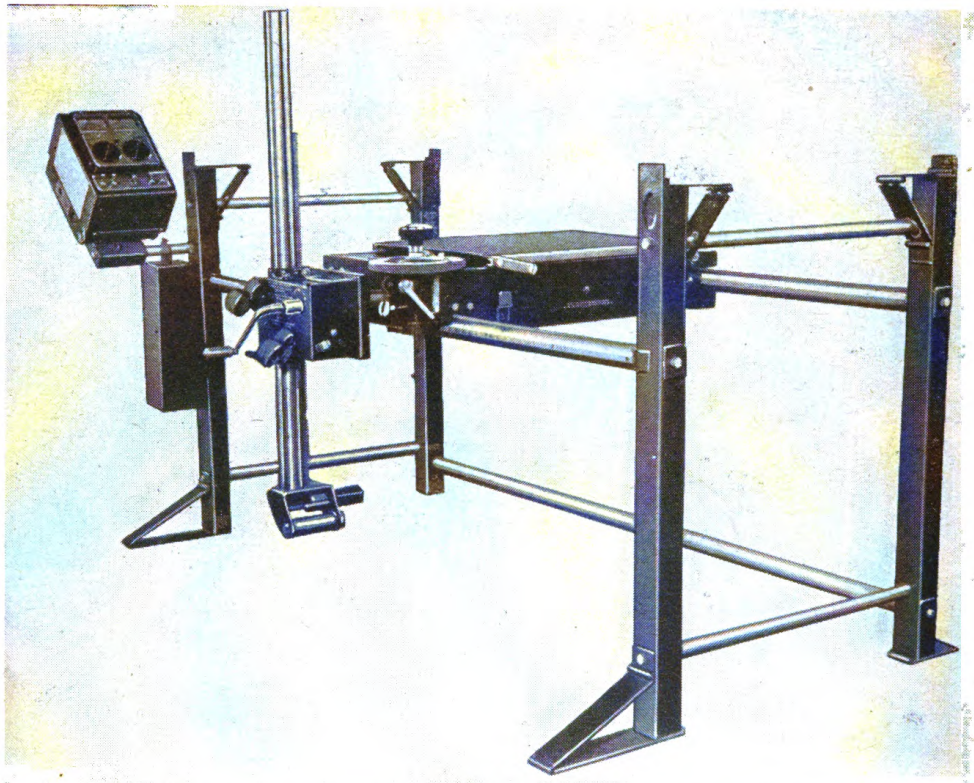


...AND HANG ON BRACKET OF HORIZONTAL CARRIAGE

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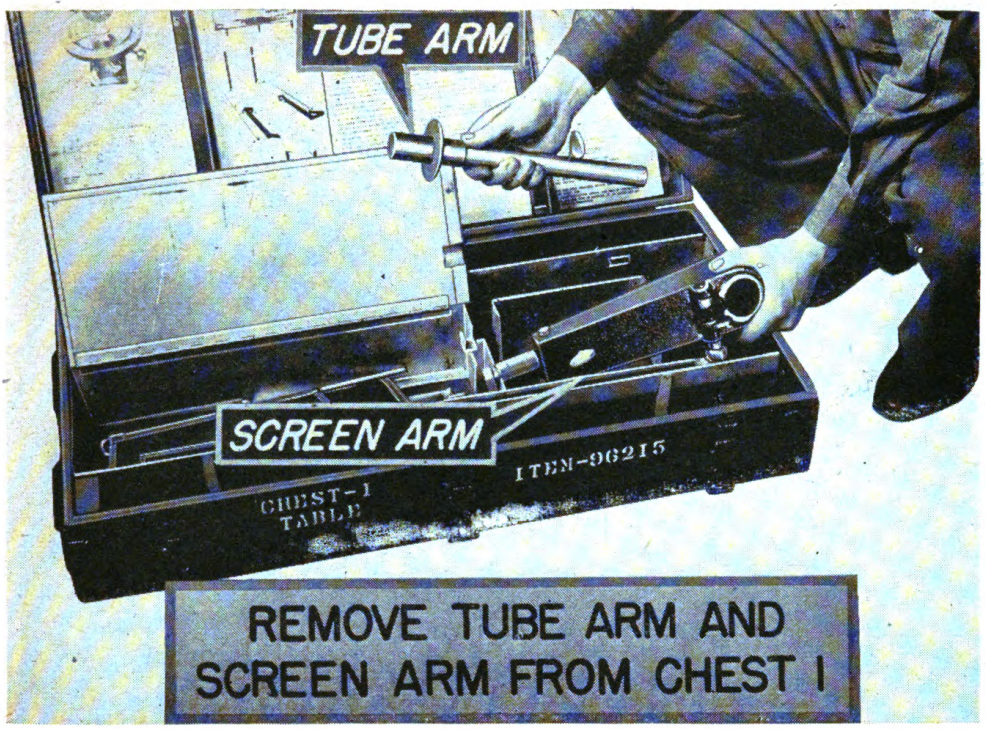
...SWING INTO POSITION AND LOCK



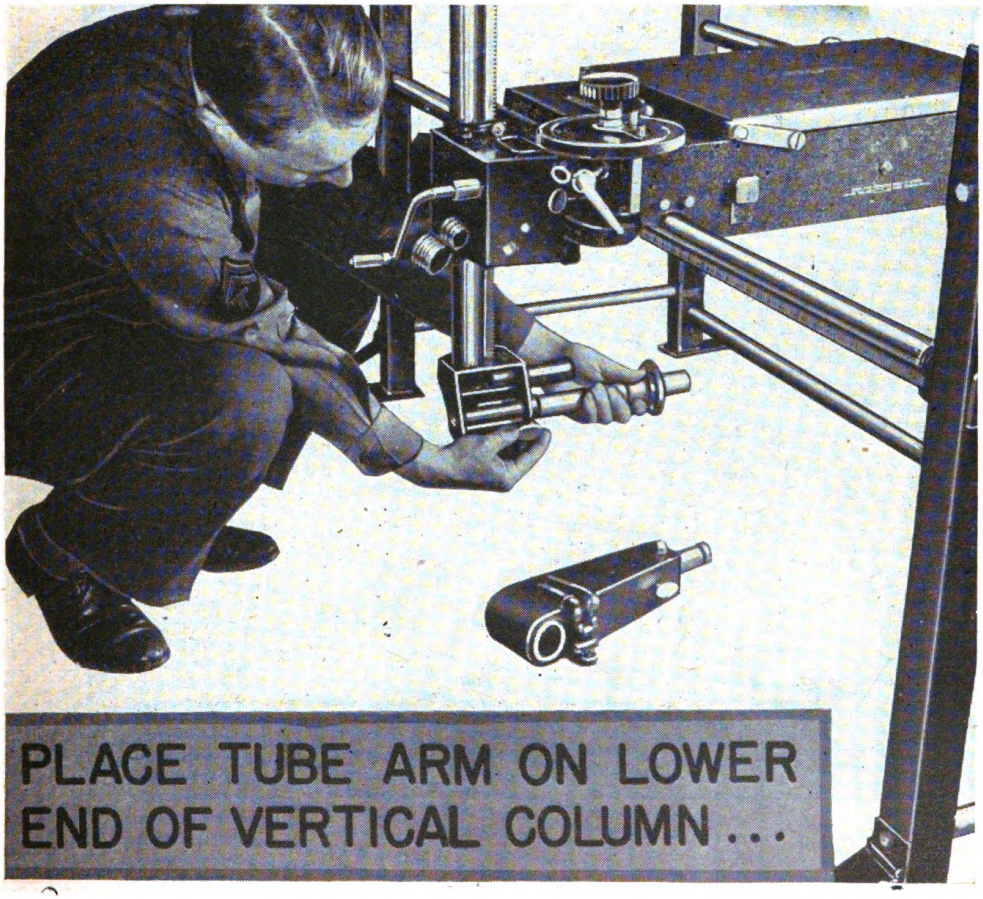
BASIC TABLE IS NOW ASSEMBLED

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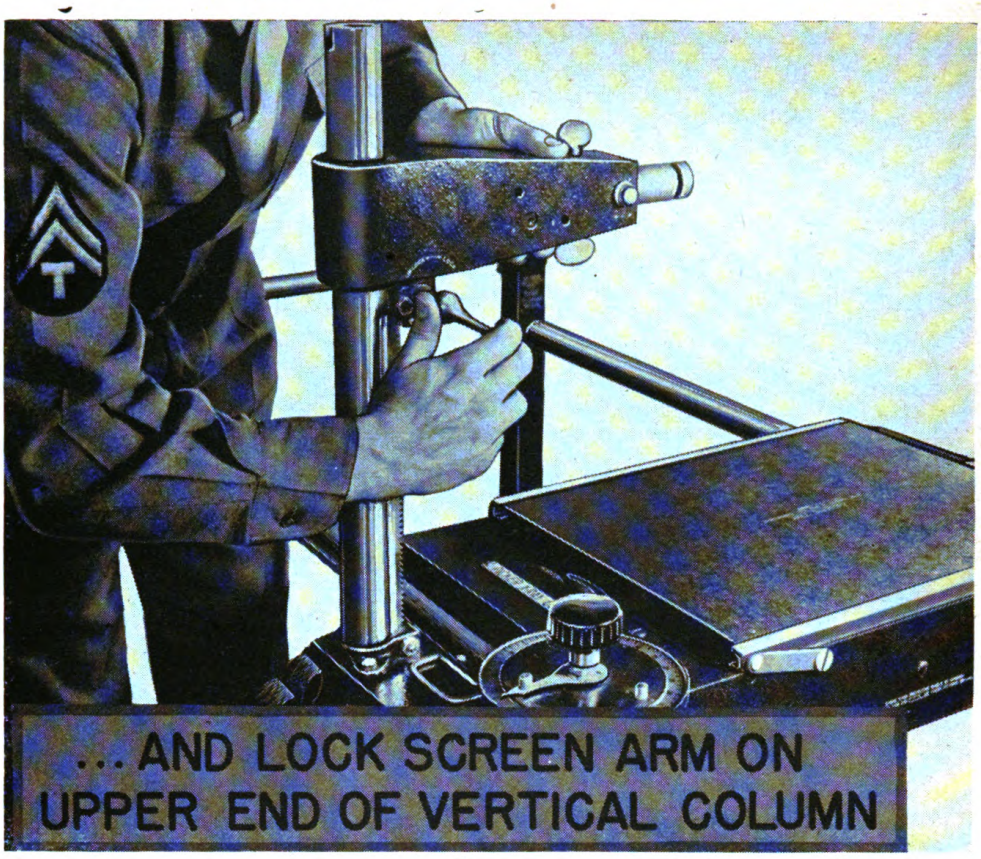


REMOVE TUBE ARM AND SCREEN ARM FROM CHEST I

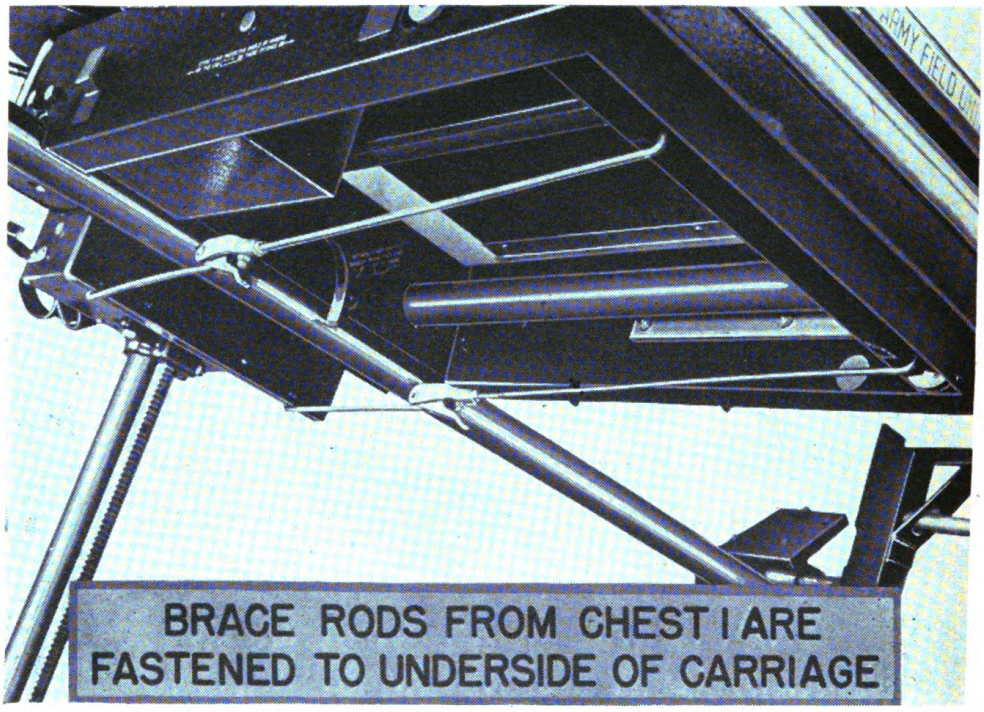


PLACE TUBE ARM ON LOWER END OF VERTICAL COLUMN ...

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... AND LOCK SCREEN ARM ON UPPER END OF VERTICAL COLUMN

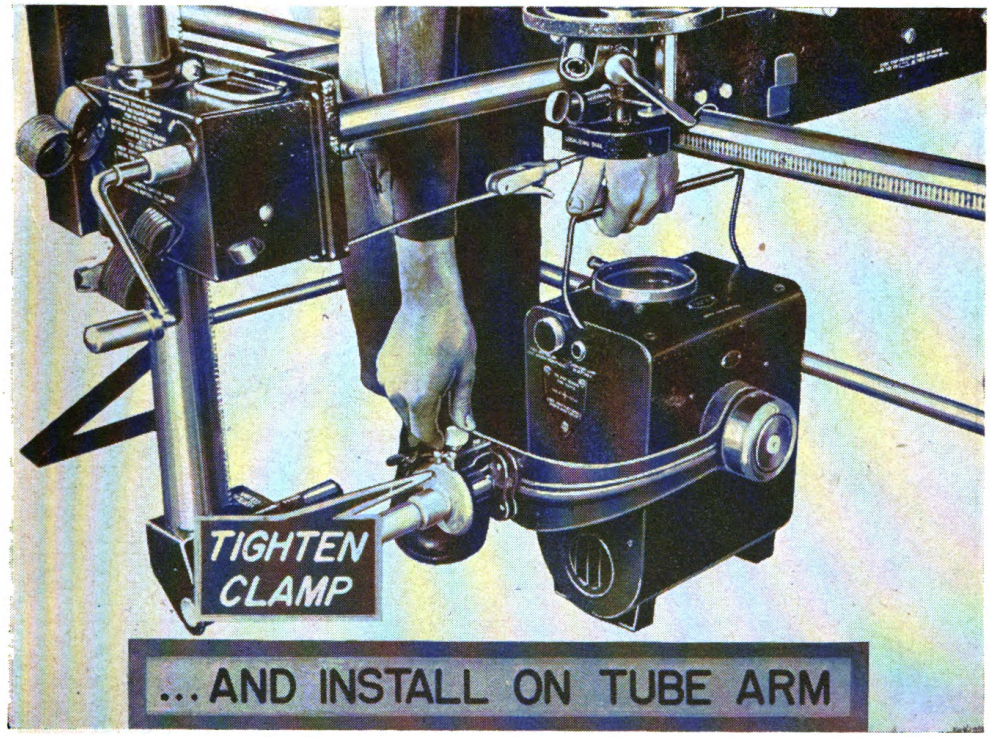


BRACE RODS FROM CHEST I ARE FASTENED TO UNDERSIDE OF CARRIAGE

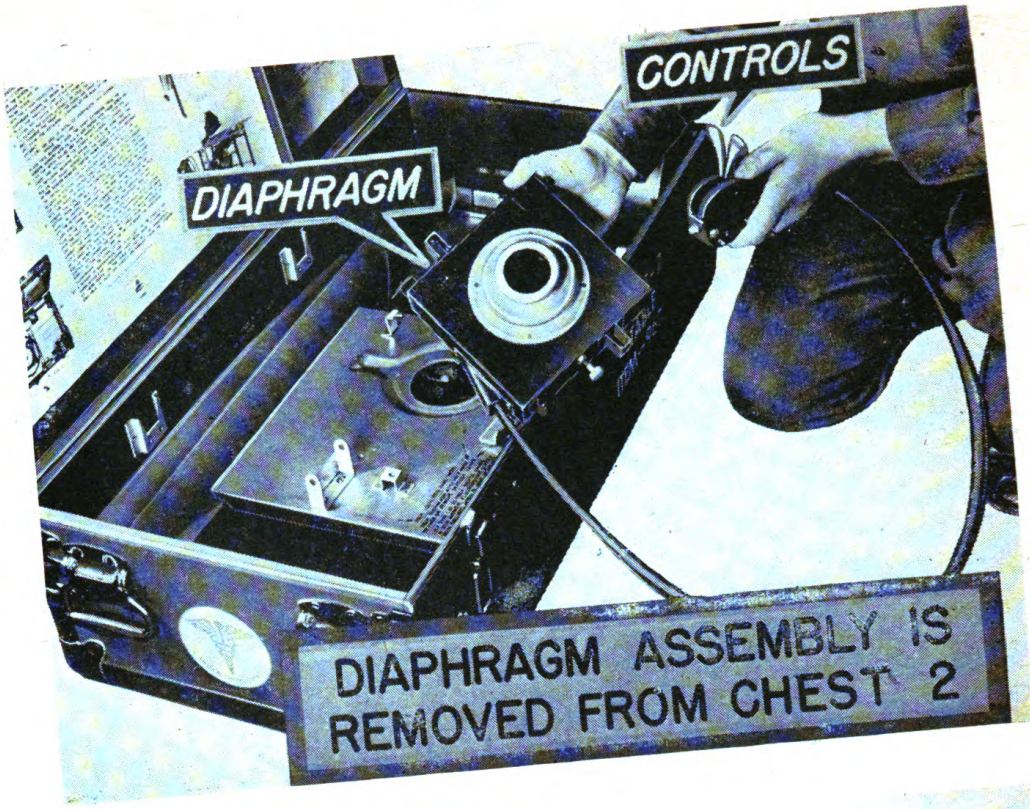
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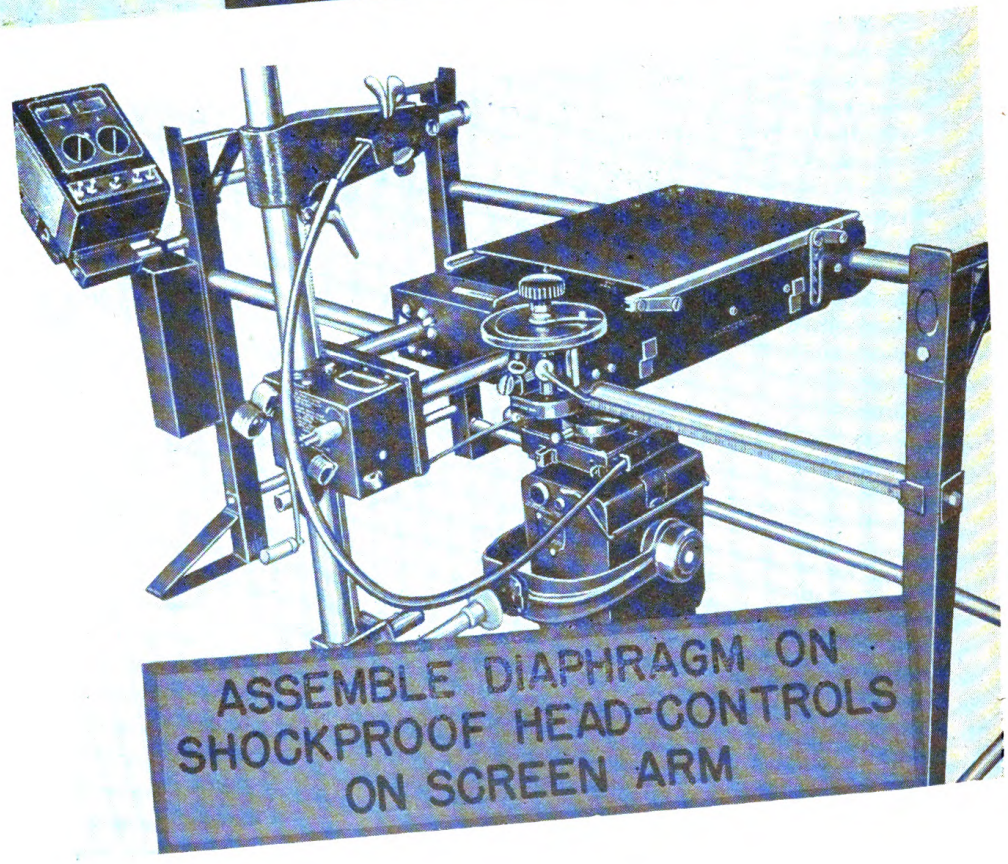
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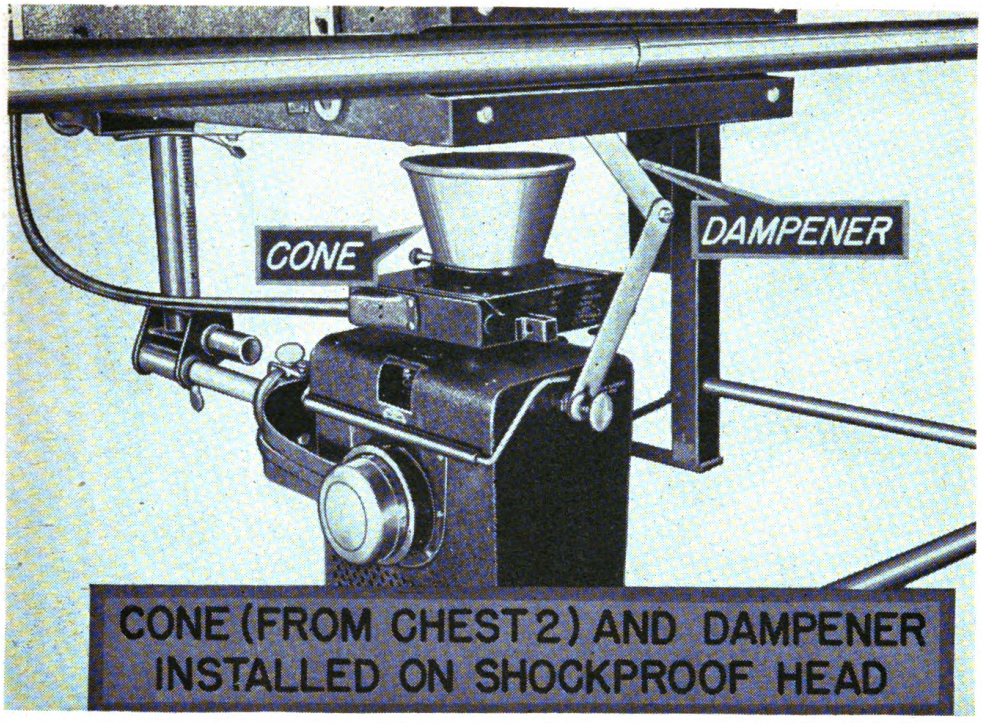


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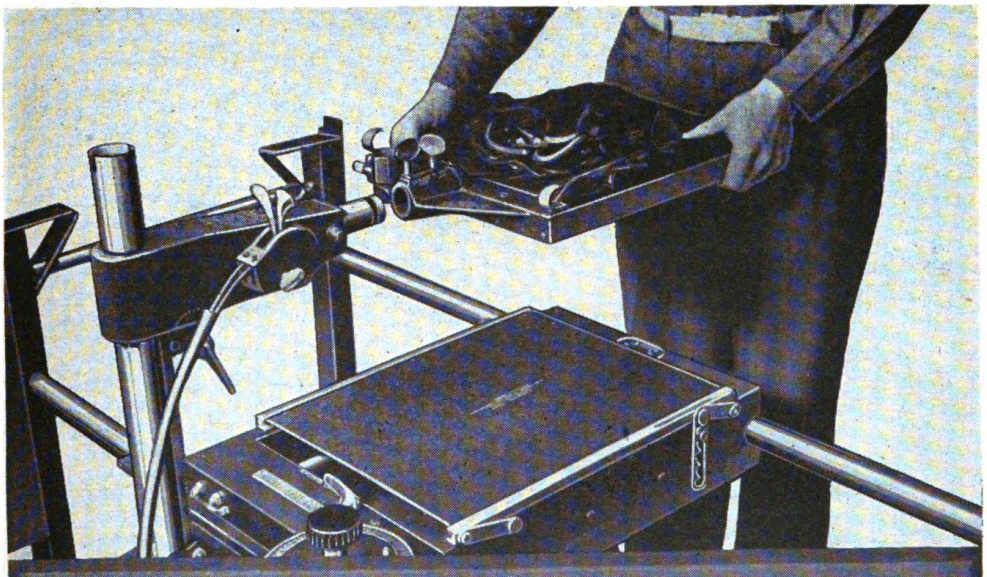




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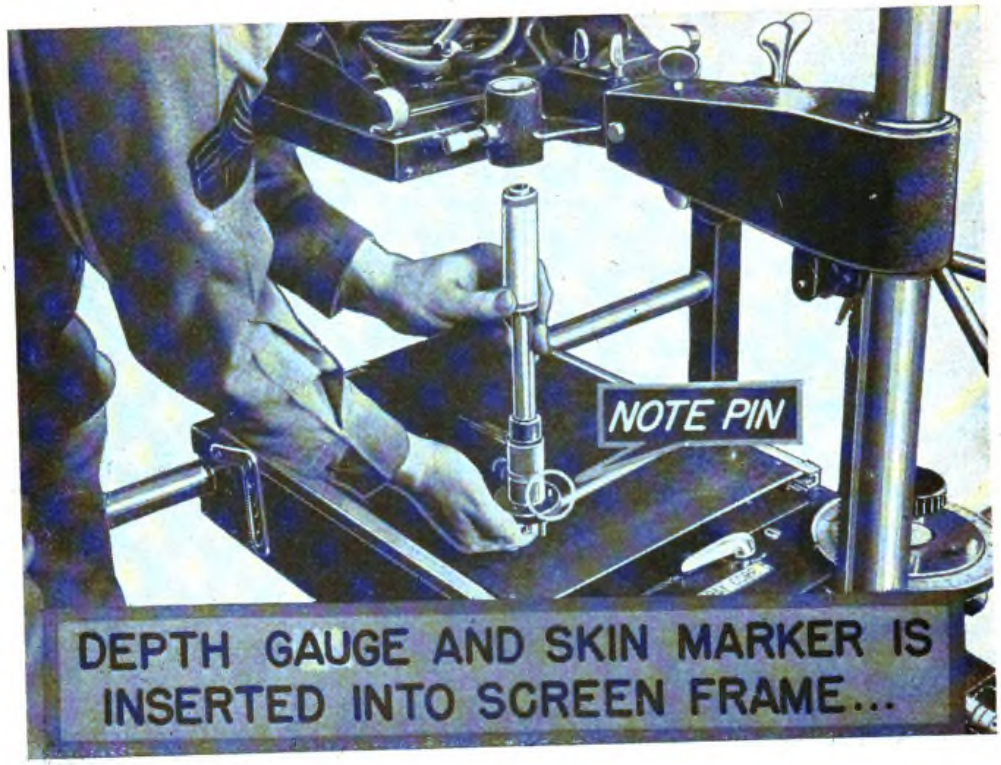


CONE (FROM CHEST 2) AND DAMPENER INSTALLED ON SHOCKPROOF HEAD

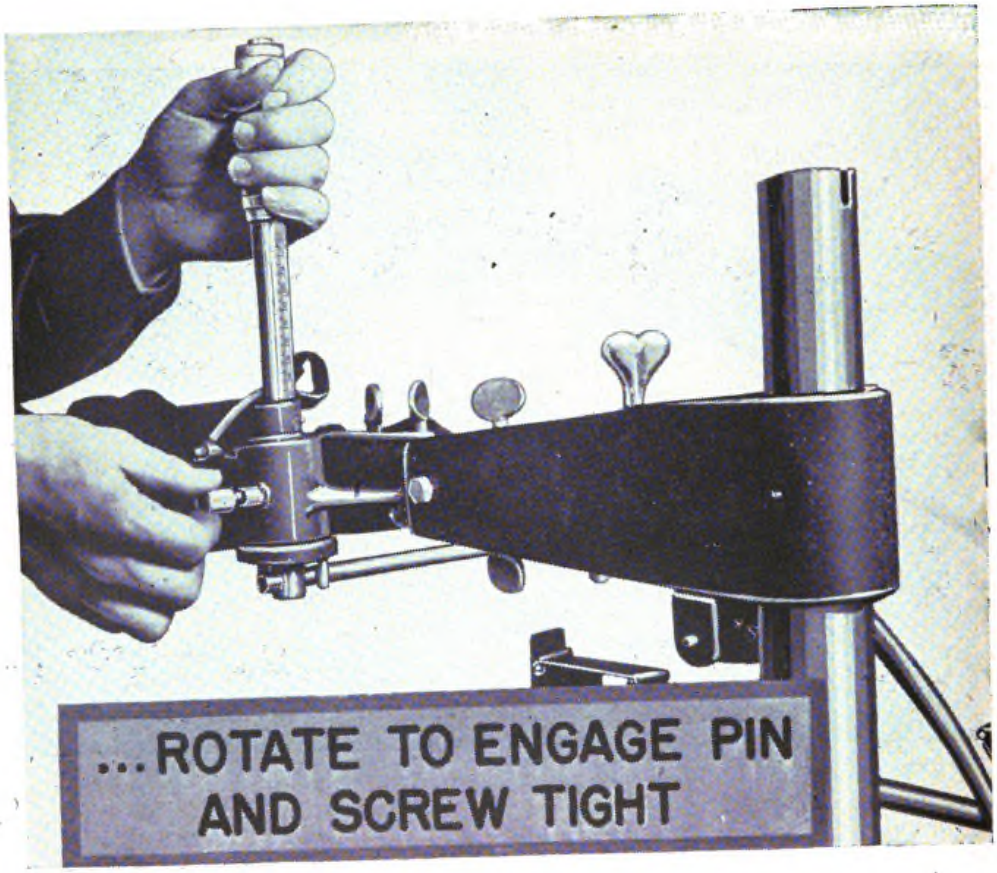


FLUOROSCOPIC SCREEN FROM CHEST 2 IS ASSEMBLED TO SCREEN ARM

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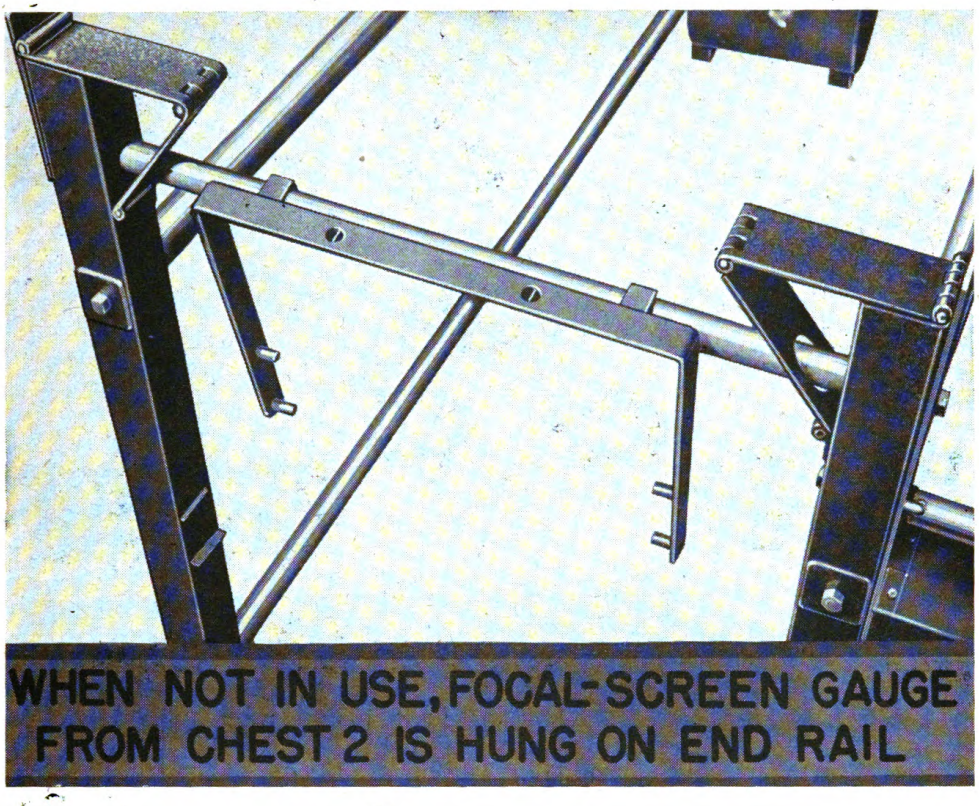
DEPTH GAUGE AND SKIN MARKER IS INSERTED INTO SCREEN FRAME...



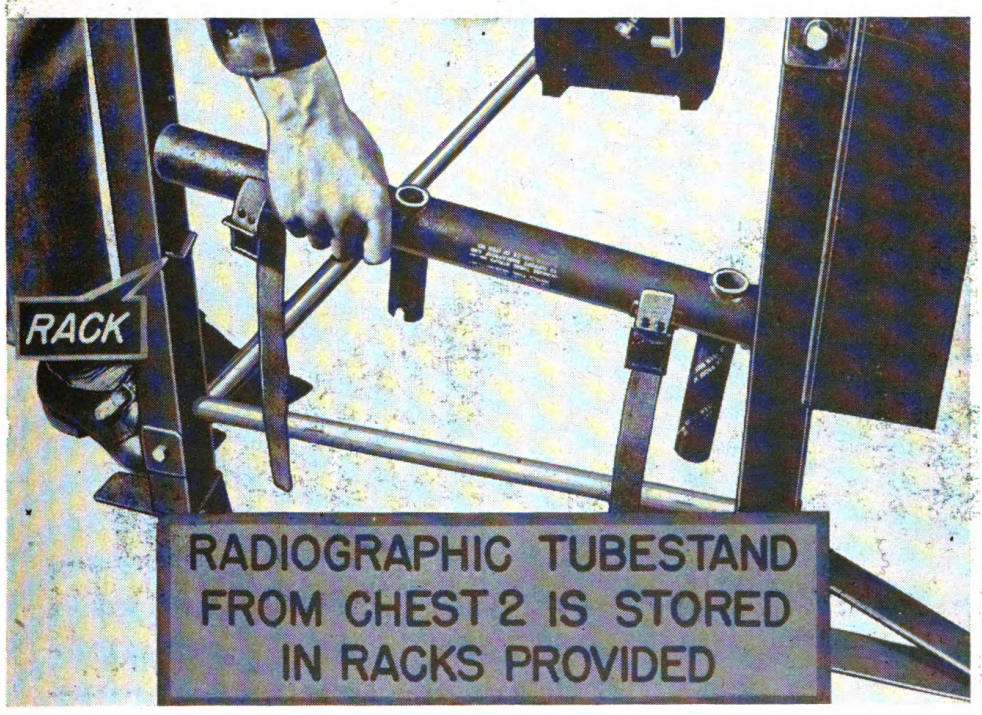
...ROTATE TO ENGAGE PIN AND SCREW TIGHT

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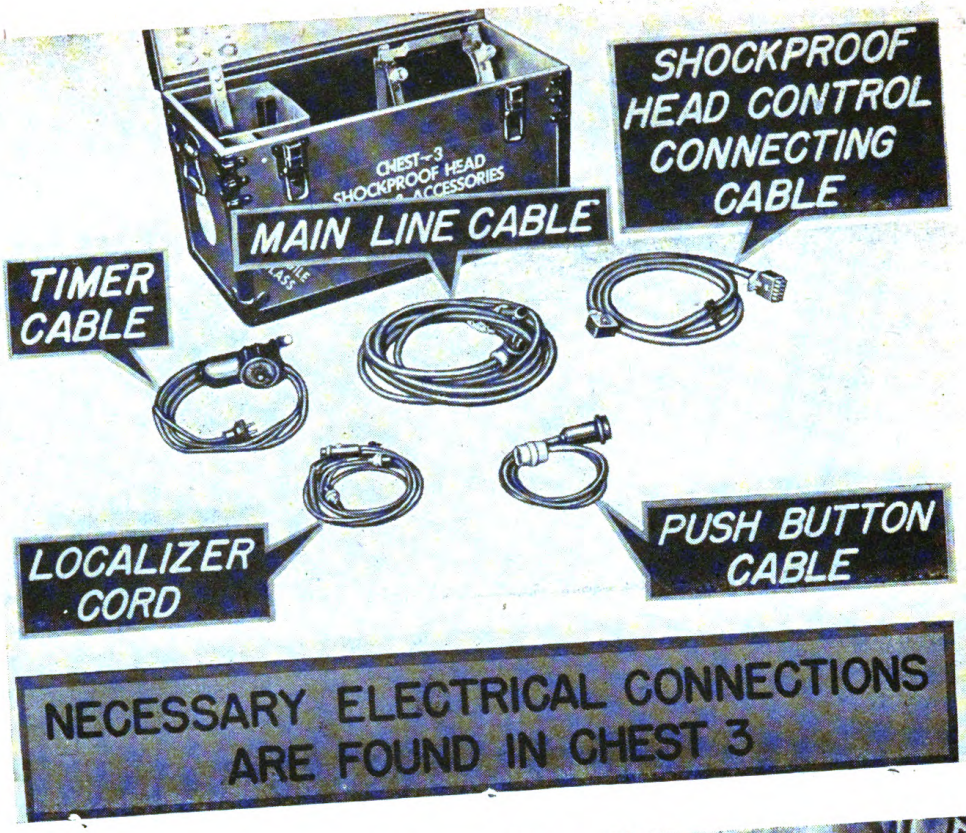
WHEN NOT IN USE, FOCAL-SCREEN GAUGE FROM CHEST 2 IS HUNG ON END RAIL



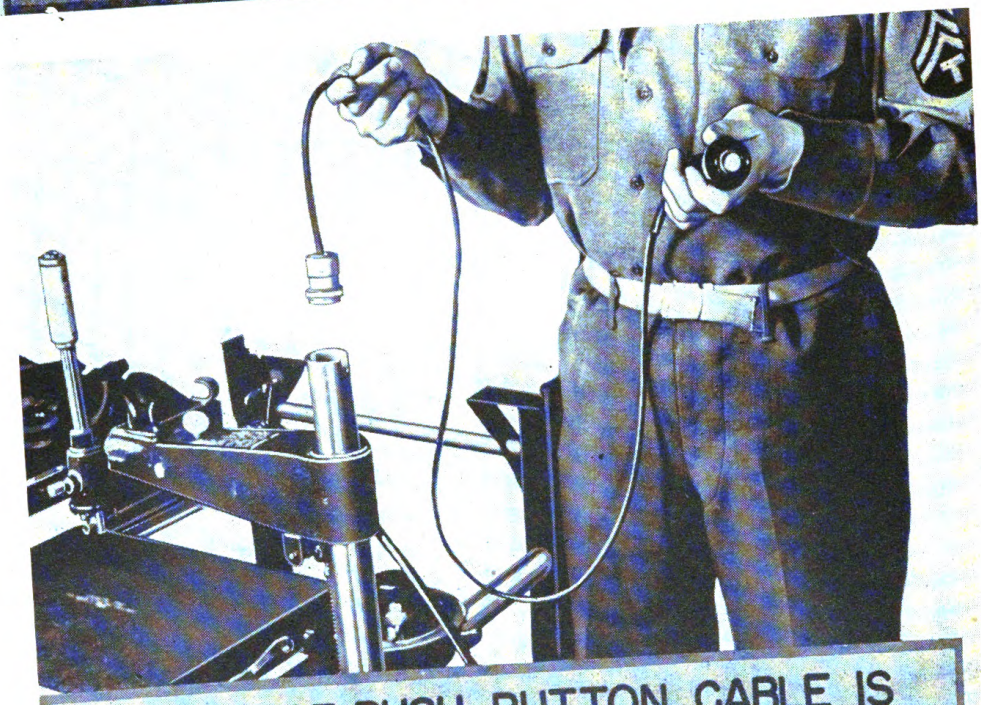
RADIOGRAPHIC TUBESTAND FROM CHEST 2 IS STORED IN RACKS PROVIDED

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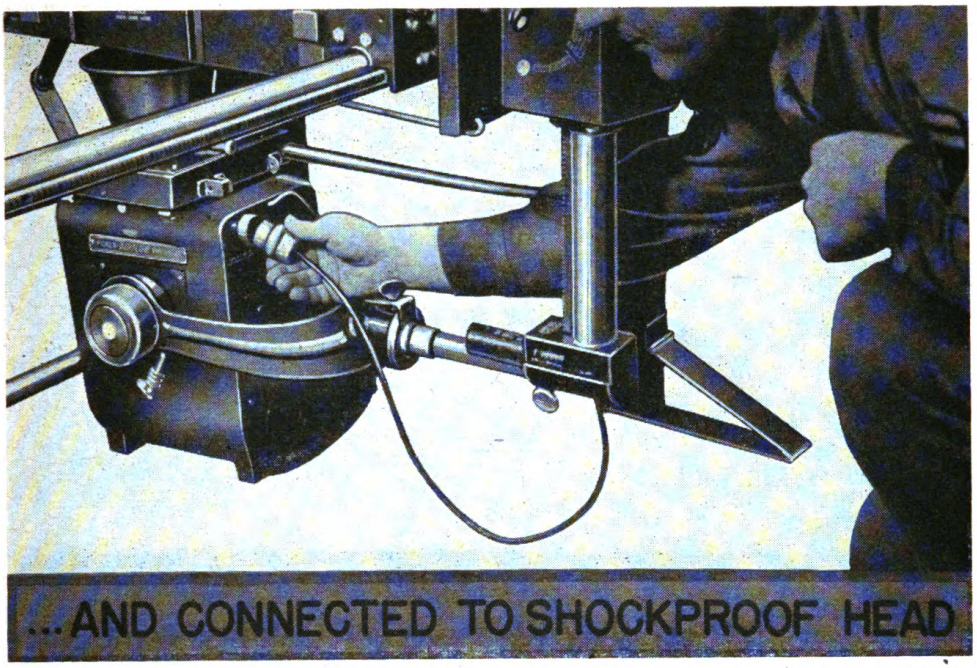


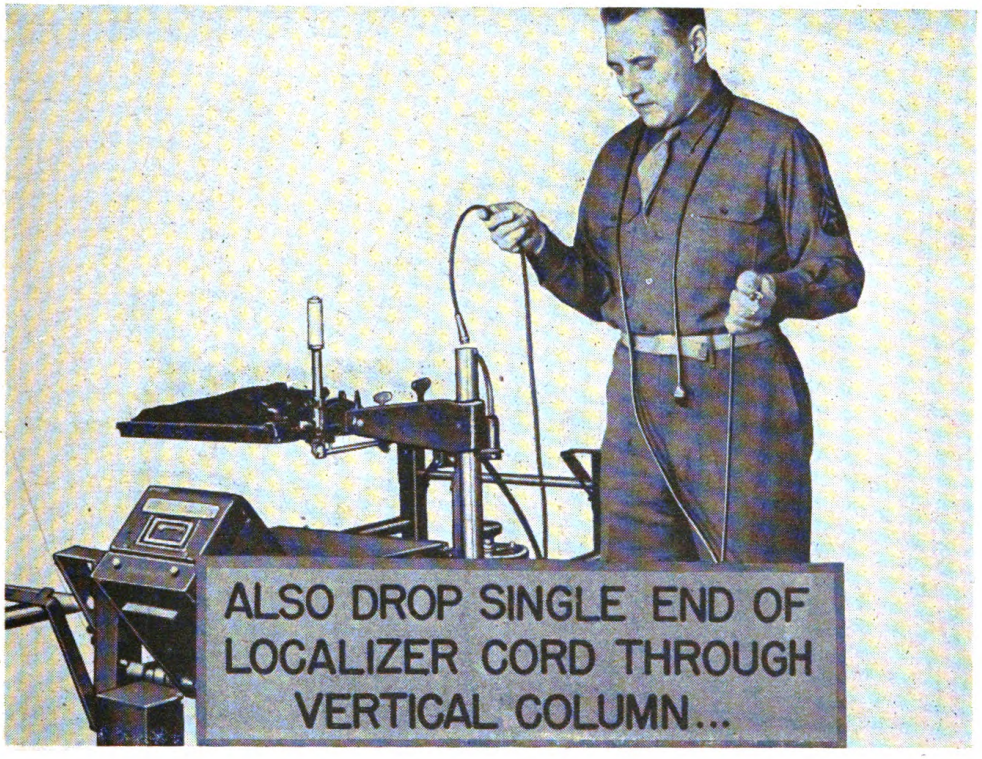
NECESSARY ELECTRICAL CONNECTIONS ARE FOUND IN CHEST 3



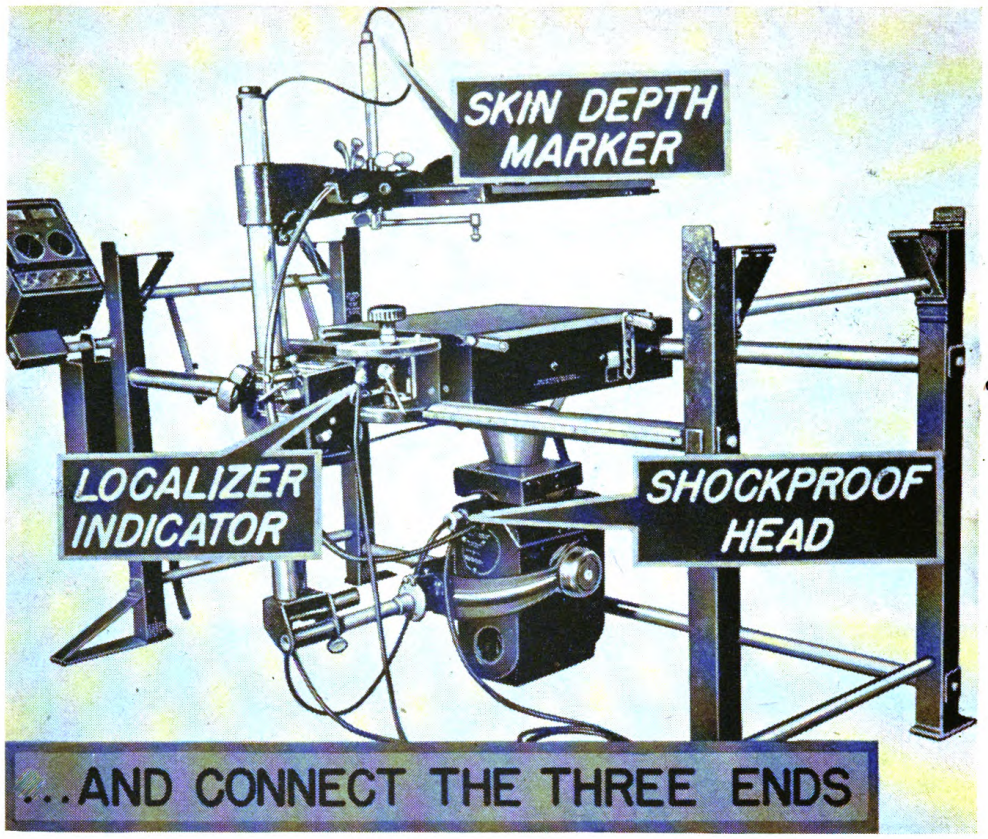
SOCKET OF PUSH BUTTON CABLE IS DROPPED THROUGH VERTICAL COLUMN...

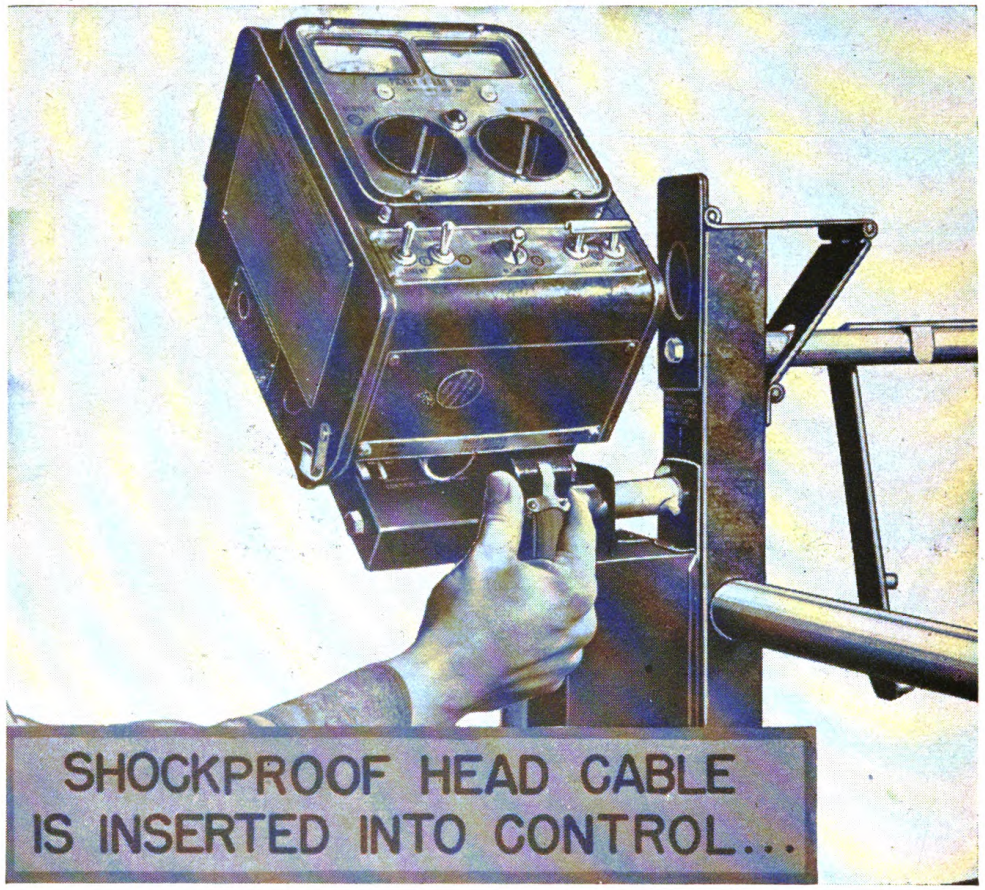
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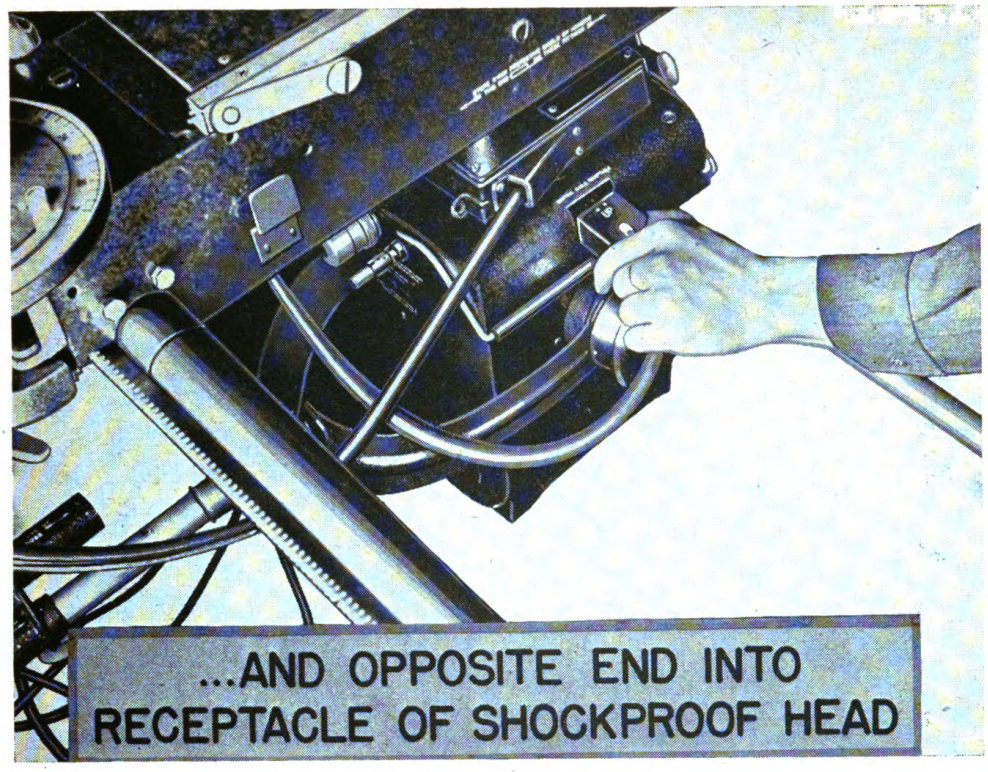


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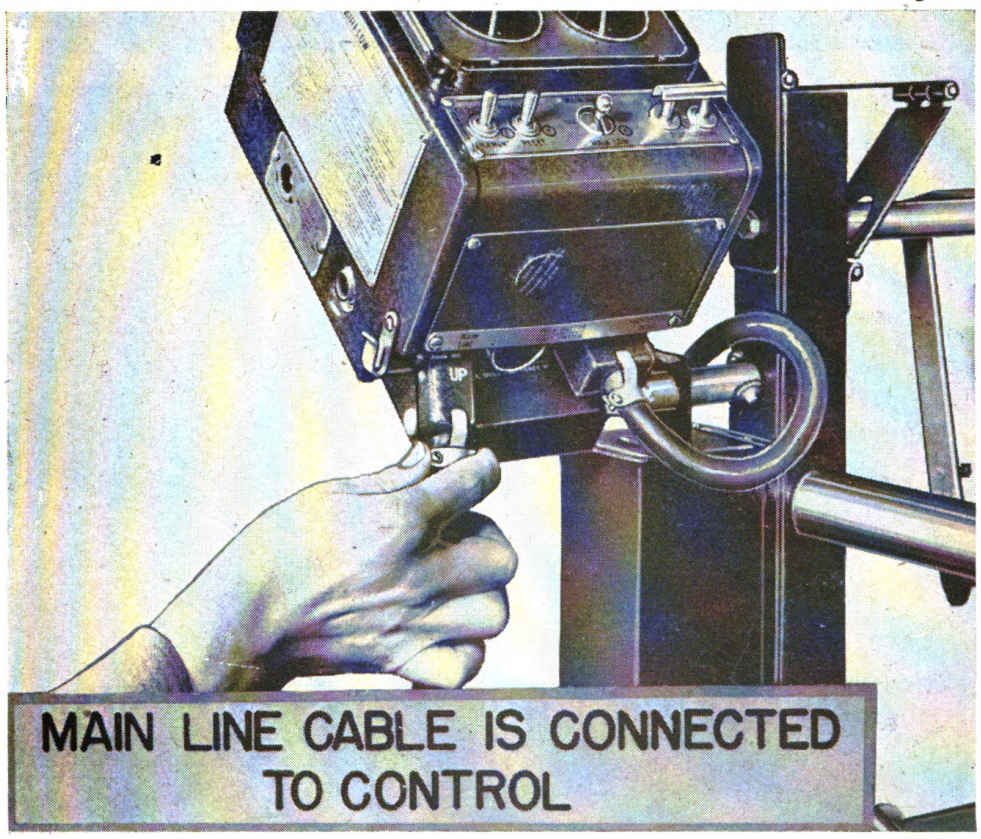




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...AND OPPOSITE END INTO RECEPTACLE OF SHOCKPROOF HEAD



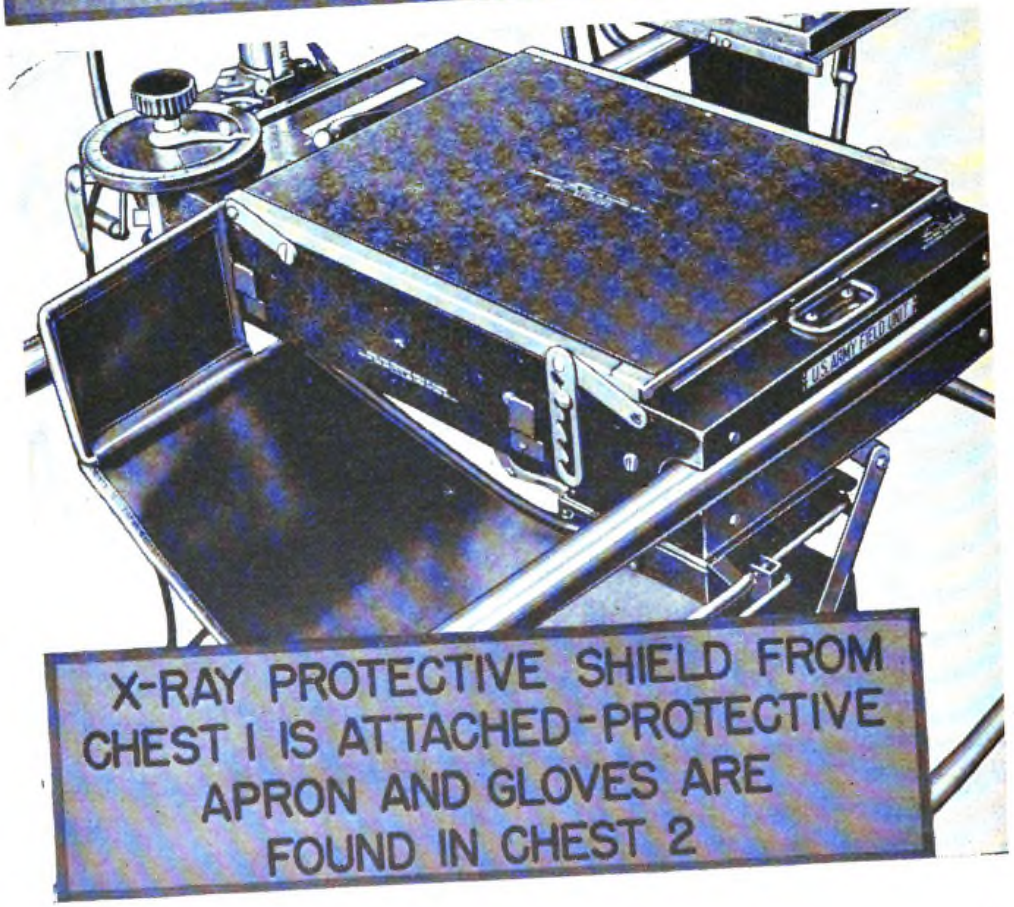
MAIN LINE CABLE IS CONNECTED TO CONTROL

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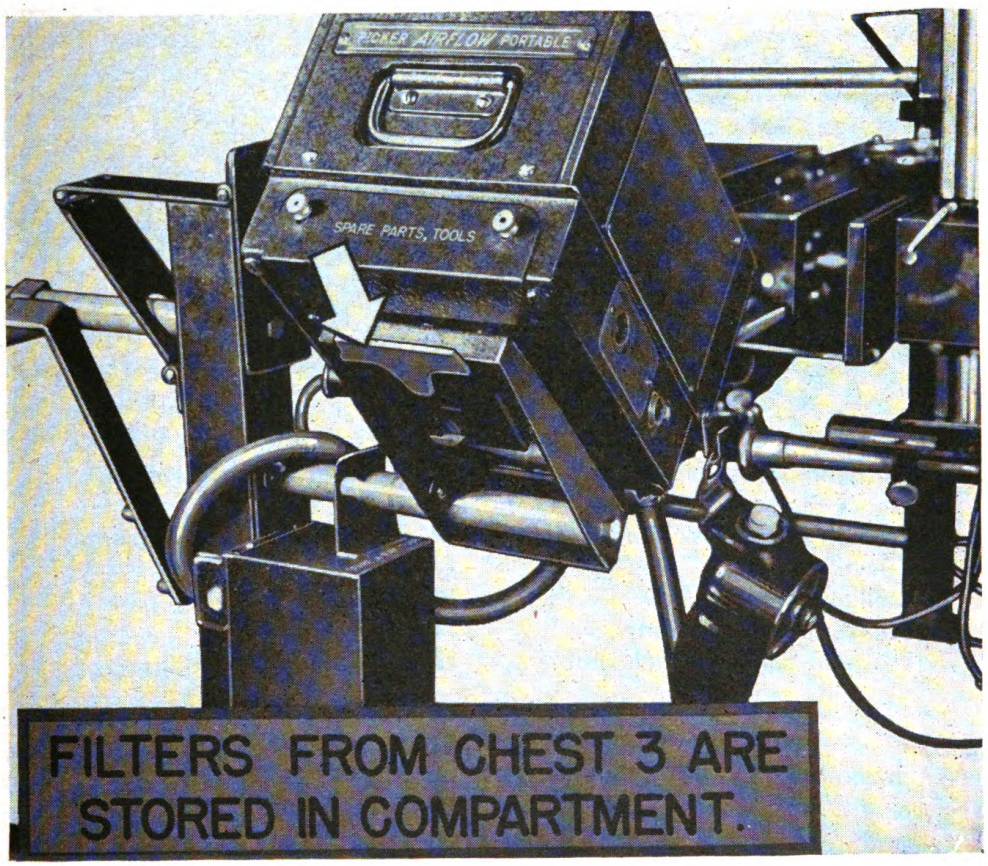


TIMER PLUG IS CONNECTED TO RIGHT SIDE OF CONTROL.



X-RAY PROTECTIVE SHIELD FROM CHEST I IS ATTACHED - PROTECTIVE APRON AND GLOVES ARE FOUND IN CHEST 2

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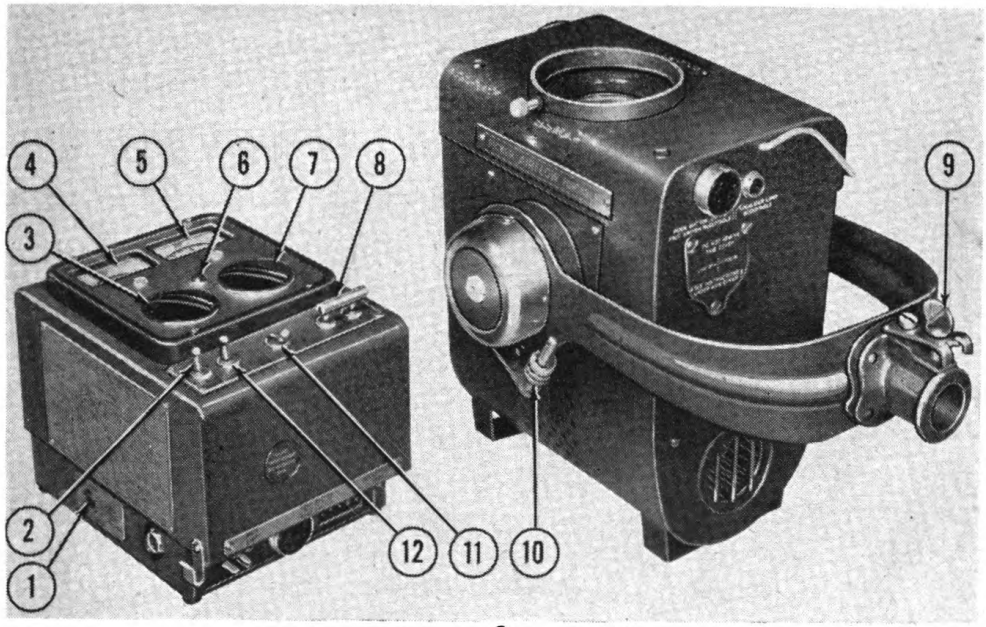


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Section VI. CONTROLS AND INSTRUMENTS

9. Controls

a. MAIN SWITCH "A" (fig. 7 (11)). Located in the center of the



1. Line compensator switch.
2. Check filament switch.
3. Kilovolt selector switch knob.
4. Kilovolt meter.
5. Milliammeter.
6. Breaker indicator lamp.
7. Filament control switch knob.
8. Radiographic-fluoroscopic safety switch.
9. Thumbscrew for retaining tubehead.
10. Lock handle.
11. Main switch.
12. Breaker reset switch.

Figure 7. Control and head assemblies, Airflow unit.

switch panel, the main switch serves the purpose of energizing the unit, selecting a high or low kilovolt range and when moved to the OFF position and returned to its previous position, will cause the circuit breaker to reset. Although the main switch is not normally used to reset the circuit breaker, it is well to note this possibility in case of damage to reset switch, or when attempting to locate trouble.

(1) Both sides of the power supply are broken by the main switch and upon closing it the voltmeter should indicate, and all pilot lights light.

(2) In the HIGH position, the maximum kilovoltage is slightly above 80 kilovolts and in the LOW position, the lowest kilovoltage is approximately 40 kilovolts. Thus, in combination with kilovolt selector switch (fig. 7 (3)), a range of from 40 to 80 kilovolts in approximately 2 kilovolt steps is available.

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b. Radiographic-Fluoroscopic Safety Switch "B" (fig. 7 (8)). This double switch is located in the switch panel on the right-hand side and serves the following functions:

(1) It changes the control of the main contactor from the push button to the timer when the switch is changed from fluoroscopy to radiography. (A footswitch may be substitued for the push button since an identical plug is used on both accessories.)

(2) It changes the calibration of the circuit breaker to fluoroscopic or radiographic limits.

(3) It controls the illumination of the meters from dim on fluoroscopy to bright on radiography.

c. Kilovolt Selector Knob "C" (fig. 7 (3)). Location of this knob is in the lower left-hand corner, and provides for 11 steps of kilovoltage adjustment of about 2 kilovolts each. This selector in combination with the main switch provides a range of from 40 to 80 kilovolts in approximately 2 kilovolt steps.

d. Check Filament Switch "E" (fig. 7 (2)). This switch is the left hand one of the pair of switches located in the lower left-hand corner of the switch panel. With this switch in its normal position, the kilovoltmeter scale is read. When it is depressed and held to the preset filament position, the upper scale "F" of the kilovoltmeter is read.

e. Filament Control Knob "G" (fig. 7 (7)). In the lower right-hand corner of the name plate is the filament control knob which permits adjustment of the milliamperage to any value up to 15 MA. It will be found that the adjustment is spread over approximately 250° of rotation of the control knob, thus providing a fine degree of regulation of milliamperage.

f. Breaker Reset Switch "H" (fig. 7 (12)). This switch is the right hand one of the pair of switches located in the lower left-hand corner of the switch panel. When the circuit breaker is opened by an overload, this switch is used to reset it, and permits resumption of operation after the cause of the overload has been eliminated. Also, see *a* above.

g. Push Button (sec. V). The push button is located in the top of the vertical tubular member and is packed in Chest No. 3 for shipment. It is used during fluoroscopy and localization instead of a footswitch, facilitating operation because of its location, and eliminating the necessity of a footswitch which may be objectionable on soft or bumpy ground.

h. Hand Timer (sec. V). The hand timer is suspended from the control and is packed in Chest No. 3 during shipment. It is used for radiography and has a time range of 1/10 second to 12 seconds. Exposure is made by depressing the button after selecting the desired time period.

i. Line Compensator Switch (fig. 7 (1)). The compensator is located in the lower left-hand side of the control. This switch permits the

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adjustment of the control to various line voltages, in order to maintain the accuracy of the filament control. (See par. 26.)

10. Instruments

a. KILOVOLT METER "D" (fig. 7 (4)). This meter located in the upper left-hand corner of the control serves a dual purpose, lower scale "D" indicating the kilovoltage applied to the X-ray tube and upper scale "F" indicating, when the check filament switch is depressed, the filament setting.

(1) Under operating conditions, that is, with filament check switch not depressed and an exposure being made, this meter shows the kilovoltage which is being applied across the tube during exposure.

Note. If a presetting of this meter is desired, it will be necessary to determine what drop in meter reading is developed for each setting of milliamperage used. Each different service outlet or source of power will require individual calibration.

(2) Upper scale "F" of this meter is read when the check filament switch is depressed. The use of this position is given in paragraph 9*d*.

b. MILLIAMMETER "J" (fig. 7 (5)). This meter is located in the upper right-hand corner of the control and indicates the current passing through the X-ray tube during exposure. It should be noted that part of the scale is printed in red, indicating the operation is in the danger zone and the milliamperage should be lowered by adjusting the filament control counterclockwise.

c. CIRCUIT BREAKER AND BREAKER INDICATOR. If the safe limits of either radiographic or fluoroscopic operations are exceeded, the circuit breaker opens, the breaker indicator lamp (fig. 7 (6)) goes out, and further operation is suspended until the source of trouble is corrected. To reset the circuit breaker, the breaker reset switch is depressed as explained in paragraph 9*f*.

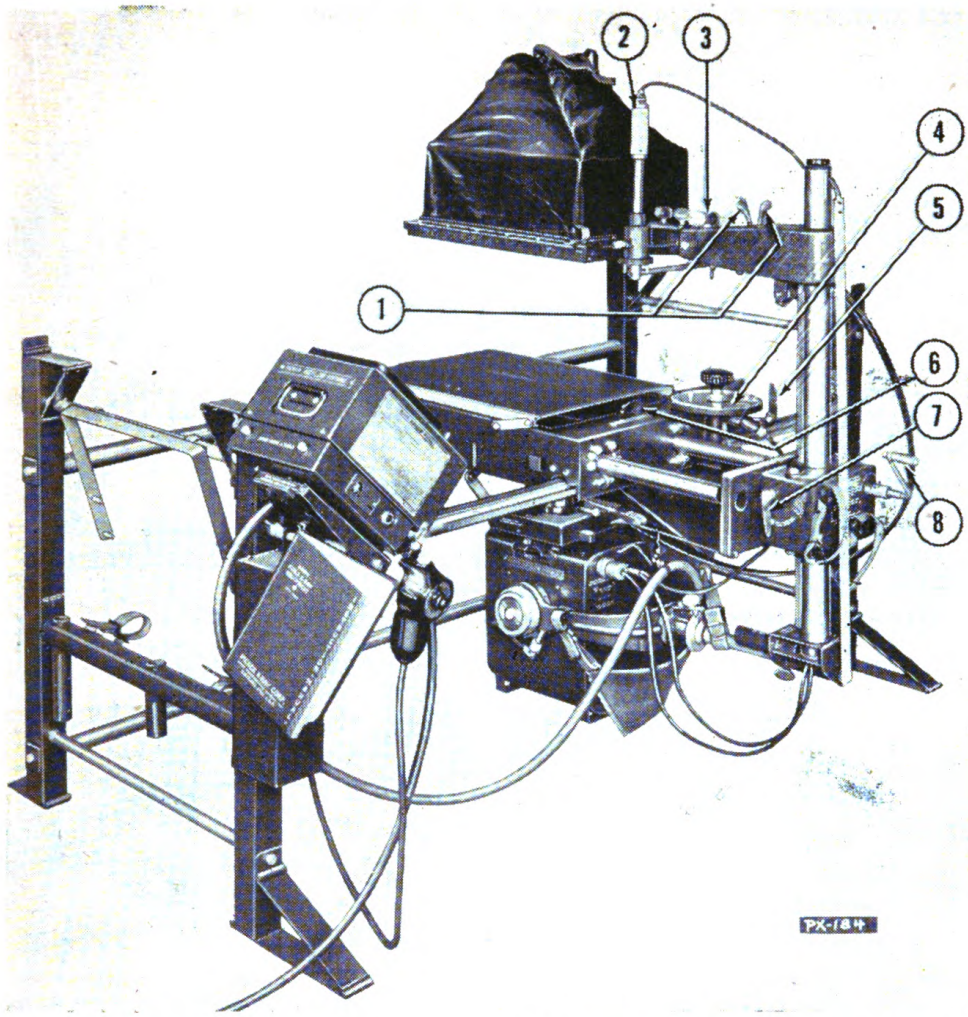
11. Table Controls

a. SHUTTER CONTROL (fig. 8 (1)). Remote control of the shutters is accomplished by means of two levers mounted on the horizontal screen arm. These levers by means of a flexible cable operate the shutter assembly, which in turn governs the size of the fluoroscopic field on the screen.

b. DEPTH INDICATOR AND SKIN MARKER (fig. 8 (2)). By means of this assembly, located on the screen frame, the distance of the screen from the patient's skin is measured. A pad is included which, when saturated with a colored fluid, marks the point on the patient's skin at which the measurement was taken.

c. VERTICAL COLUMN CRANK (fig. 8 (8)). Located on the operator's

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1. Shutter control levers.
2. Depth indicator and skin marker.
3. Thumbscrew for adjusting screen to tube distance.
4. Localizer dial.
5. Longitudinal travel lock lever.
6. Cross travel lock lever.
7. Vertical travel limiting lever.
8. Vertical column crank.

Figure 8. Table controls, Airflow unit.

side of the table on the carriage assembly, this crank is used to raise and lower the screen and tube head simultaneously.

d. Localizer Dial (fig. 8 (4)). The dial assembly is located on the operator's side of the carriage and is used in the process of calculating the depth of a foreign body.

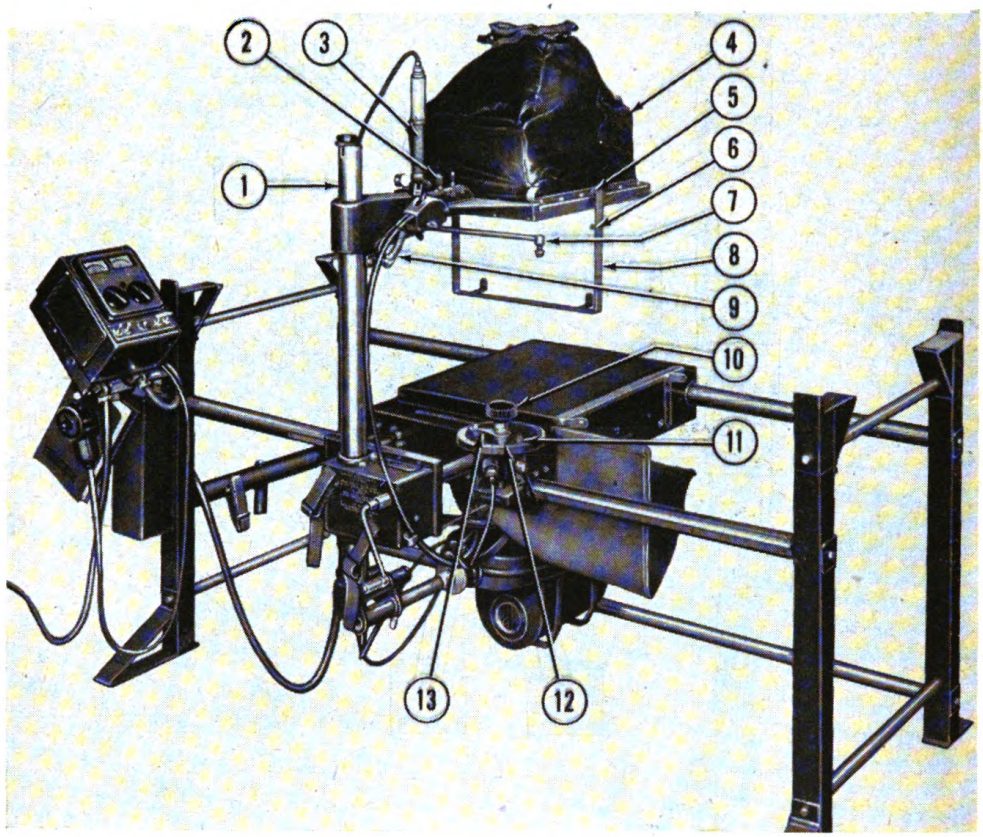
e. Locking Levers. There are three main locking levers used during operation.

(1) Lever (fig. 8 (5)), used to lock the carriage against longitudinal travel.

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(2) Lever (fig. 8 (6)), used to lock the carriage against cross travel.

(3) Lever (fig. 9 (9)), used to lock the fluoroscopic screen against horizontal rotation about the vertical column.



1. Vertical column.
2. Localizer lock.
3. Vertical scale of skin marker.
4. Daylight hood.
5. Support pins for use in checking screen to tube distance.
6. Support pins for use in checking skin to screen distance.
7. Depth gauge and adjusting nut.
8. Calibration gauge.
9. Horizontal rotation lock lever.
10. Drive knob.
11. Dial knob.
12. Localizer dial.
13. Movable pointer.

Figure 9. Airflow unit, assembled for localization and fluoroscopy.

Section VII. OPERATION

12. Fluoroscopy

Upon completing the assembly and before operating the equipment, read section VI. For localization and fluoroscopy see figure 9. For fluoroscopy proceed as follows: Alphabetical sequence is followed as shown by the letters on the controls and instruments.

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a. Set main switch "A" on MAIN HIGH.

b. Set radiographic-fluoroscopic safety switch "B" on FLUOROSCOPY.

c. Adjust kilovolt selector knob "C" to desired kilovoltage which will be indicated on kilovolt meter scale "D."

d. Depress check filament switch "E" and hold while filament control knob "G" is adjusted to approximate reading as indicated on filament scale "F."

e. Depress push button and read milliamperage on milliampere scale "J," readjusting knob "G" if correction is necessary.

f. While push button is still depressed read kilovoltage on scale "D." If desired kilovoltage is not registering, release push button and adjust by knob "C." Again depress push button and recheck kilovoltage.

g. If 7 milliamperes on fluoroscopy is exceeded, the circuit breaker will open the circuit, and breaker indicator lamp will go out. If this occurs, reduce milliamperage by turning knob "G" to the left and depress breaker reset switch "H" to reset breaker.

13. Foreign Body Localization

a. GENERAL. To prevent errors in calculation and reduce the tendency of developing play, looseness, or wear of the parts, observe the following precautions and methods of handling.

(1) It is highly important that the depth gauge (fig. 9 (7)) is treated in a careful manner to prevent bending and errors in calculation.

(2) It is recommended that when moving the screen, pressure be applied to the vertical column (fig. 9 (1)) rather than to the screen itself. This will reduce the tendency of developing looseness or play in the screen mechanism.

(3) Proper positioning of levers and controls will assure accuracy and prevent damage to the equipment. For example, during fluoroscopy, in order to prevent the shockproof head from being cranked down until it strikes the ground, the vertical travel limiting lever (fig. 8 (7)) must be in the position marked FLUOROSCOPY.

(4) The cranking mechanism and carriage travel should operate smoothly and should not be forced. Check position of locks and lifting mechanism if undue force is needed to raise or lower the assembly.

(5) Proper adjustment of all locking mechanisms to hold the assembly against accidental movement will prevent errors in calculation.

b. ALIGNMENT OF TUBE. Before calibrating the localization device, the screen and tube must be centered with respect to each other.

(1) Close the shutter aperture down to about a ½-inch square.

(2) Adjust the screen so that it is parallel to the table top.

(3) Operate the unit fluoroscopically and observe the illumination on

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the screen. If the tube and screen are centered with respect to each other, the center intersecting lines will be in the illuminated portion of the screen, and the point of the intersection of the lines an equal distance from all sides of the square.

(4) If the alignment is not correct, the head must be rotated slightly on its mounting hanger by releasing the lock handle (fig. 7 (10)), or about the tube arm by releasing thumbscrew (fig. 7 (9)), until the screen and tube are properly centered. Securely lock both the lever and thumbscrew. (See par. 33.)

c. CALIBRATION. Calibration of the localizing device when setting up the equipment, and from time to time during use, is necessary in order to insure accurate results. To accomplish this, the calibration gauge (fig. 9 (8)) is supplied with the unit, and the checking is done with the daylight hood (fig. 9 (4)) installed. If the calibration is done in a darkroom with the daylight hood removed, allowance for the thickness of the hood frame must be made by inserting a coin, or equal thickness of paper, under each of the pins of the calibration gauge.

(1) Suspend the gauge from the fluoroscopic screen frame, as shown, by the two pins (fig. 9 (5)), nearest the open end. Note that the closed end of the gauge has two holes in it, each carrying a cross hair, and that the fluoroscopic screen has three cross lines affixed to the glass. These lines on the screen can be seen when the hood is removed, or during operation when fluoroscopy is being done.

(2) Operate the unit fluoroscopically with the diaphragm closed down slightly, in order to be certain not to ray over the edge of the screen, yet have the field sufficiently large to permit visualization of the two outside lines on the screen.

(3) Move the gauge one way or the other until the shadow from one of the cross hairs casts its image directly on one of the lines on the screen. Note whether the image of the second cross hair is directly on the other extreme line of the screen. If it is not in direct register, it indicates that the screen is either too close or too far from the focal point of the tube.

(4) To adjust for proper screen to tube distance the thumbscrews (fig. 8 (3)) and the one directly below it on the underside of the arm, are turned at the same time in opposing directions, until both cross hair shadows are in direct register with the two outside lines on the screen. After this has been accomplished, tighten the thumbscrews in order to prevent losing the adjustment. The proper tube to screen distance, 66 cm. exactly, has been established. After tightening recheck alignment.

(5) Remove the calibration gauge and suspend it this time from the two pins (fig. 9 (6)), farthest from the open end. This is done to check the skin to screen distance.

(6) Swing the depth gauge and skin marker under the screen so that it is positioned in the approximate center of the screen. Now lower it

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until its rests on the calibration gauge, allowing the full weight to rest on the cross member.

(7) If properly adjusted, the vertical scale of the skin marker (fig. 9 (3)), as read against the cross wire in the center of the window, should read 14.7 cm. If it does not read 14.7 cm. adjustment to the proper distance is made by loosening the lock nut (fig. 9 (7)), and raising or lowering the marker until the reading is exactly 14.7 cm. Tighten the lock nut and recheck.

d. LOCALIZATION PROCEDURE. In order to localize a foreign body, operate as for fluoroscopy and proceed as follows (fig. 9):

(1) Lock the fluoroscopic screen against horizontal rotation about the vertical column by means of the locking lever and against rotation about its own axis by localizer lock. (See fig. 9 (2).)

(2) With the patient on the stretcher, adjust the vertical column by moving the crank up or down until there is approximately 3 inches between the underside of the screen and the patient. With this clearance sufficient room will be had for the free use of the skin marker.

(3) Align the foreign body, when viewed on the fluoroscopic screen, to the center intersecting lines on the screen by moving the carriage cross the lengthwise to the table. Lock the movement of the carriage.

(4) Rotate the skin marker so that it too lies directly under the center intersecting lines on the screen, then lower it gently until it just touches the patient's skin. This will mark the skin directly above the object in the patient's body.

(5) Read the skin screen distance from the scale of the skin marker. Raise marker and rotate out of field. Adjust the movable pointer (fig. 9 (13)) to this corresponding depth on the red side of the dial (fig. 9 (12).)

(6) Unlock the lengthwise motion of the screen keeping the crosswise motion locked, and by means of the knob (fig. 9 (10)) drive the carriage until the image of the foreign body coincides with the line at the red side of the screen. Care must be exercised not to shift the pointer once the depth is recorded as in (5) above.

(7) Relock against lengthwise motion and by means of knob (fig. 9 (11)) rotate the dial until the pointer, which will move at the same time, coincides with the stationary pointer on the housing. By this operation the skin-screen distance is automatically subtracted from the screen foreign body distance.

(8) Release the longitudinal travel lock and drive the carriage in the opposite direction until the image of the foreign body coincides with the line on the opposite side of the screen.

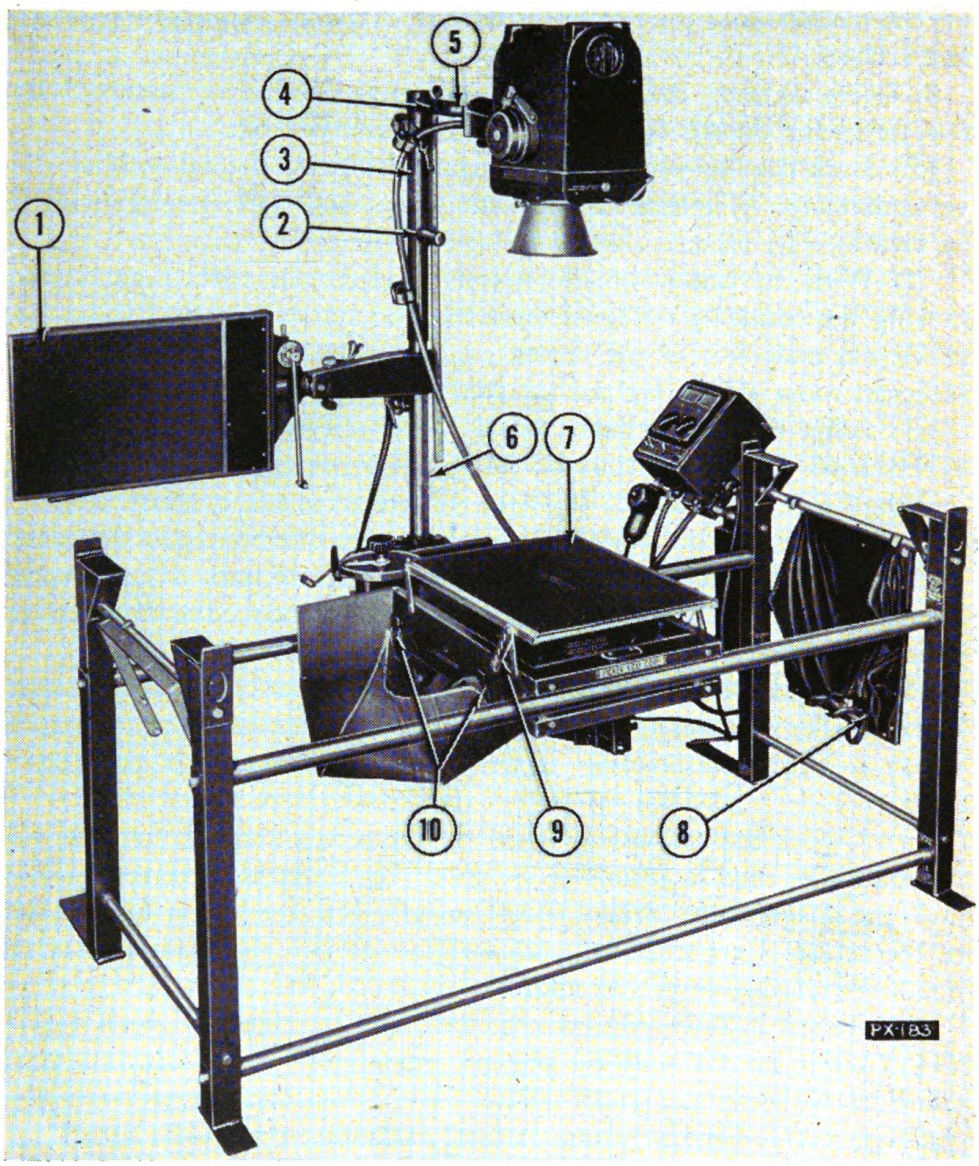
(9) Relock the carriage and the depth of the foreign body below the mark on the patient's skin can be read directly on the black side of the dial as indicated by the stationary pointer.

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14. Radiography

a. If it is desired to do radiographic work, the following changes must be made:

(1) Remove the daylight fluoroscopic hood and store by hooks on rail at end of table as shown in (fig. 10 (8)).



1. Grid.
2. Position of head for vertical radiography.
3. Radiographic tubestand.
4. Extended tube arm.
5. Position of head for horizontal radiography.
6. Vertical column.
7. Cassette tray.
8. Hood in storage position.
9. Ratchet levers.
10. Hangers for protective shield.

Figure 10. Airflow unit—assembled for radiography.

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(2) Swing fluoroscopic screen to side as shown in figure 10.

(3) Remove the cord used for the illumination of the screen-skin depth gauge and the push button from the top of the vertical column. Store them in a place where they will not be lost or damaged.

(4) Take the radiographic tube stand (fig. 10 (3)) from its hanger and attach to the upper part of the vertical column (fig. 10 (6)). When so doing, it should be turned so that it indexes with the slots in the vertical column in such a way that the extended tube arm (fig. 10 (4)) points to the center of the table.

(5) When removing the shockproof head, the diaphragm and X-ray protective shield must also be removed. In order to make it unnecessary to remove the shield completely, two fittings (fig. 10 (10)) are provided on the horizontal carriage frame, and it can be hung there as shown. The diaphragm shutter housing can be hung on the brace rods that stiffen the carriage.

(6) By reversing the procedure followed during assembly, the shockproof head can be removed from the undertable position.

Note. The vertical travel stop must be turned to the radiographic position to permit lowering the assembly for removal.

(7) Install the shockproof head on its arm at the top of tubestand. It will be noted that there are two positions (fig. 10 (2) and (5)) on the radiographic tubestand into which the head can be mounted, as indicated in the instruction label, one for horizontal radiography and one for vertical radiography. If the arm (fig. 10 (5)) is placed in the correct position, it will permit crosswise travel and equidistance from the center of the table.

(8) By means of the crank the head can be raised or lowered for all normal radiographic distances. By turning the head and tubestand 180°, a distance of approximately 6 feet from a litter placed on the ground is obtained. When this is done, care must be exercised that the overhanging weight of the head does not accidently tip the table.

(9) For horizontal radiography the cassette should be placed upon the tray (fig. 10 (7)) and centered with the target of the tube.

Note. The target in the shockproof head is approximately 1¼ inches off center of the arm. (See fig. 10(5).) By grasping the side of the frame and raising or lowering it, the cassette can be brought as close to the patient as desired, and will be held there by the ratchet levers. (See fig. 10(9).) To lower the tray both ratchet levers must be released.

(10) In order to bring the tube into position for vertical chest radiography, it must be installed on arm (fig. 10 (2)) and rotated 90° to the right or left about its axis. Therefore, by having the patient stand at either end of the table, the focal distance can be altered by shifting the carriage mechanism lengthwise on the table.

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(11) When it is desired to use the grid (fig. 10 (1)) it is removed from the screen holder and placed upon the cassette. Always store the grid, when not in use, with the screen.

(12) When the head is used over the table, the radiation cone can be installed if desired. When not in use, the cone is stored on the carriage.

b. Presetting for any desired exposure factors are made as follows: Alphabetical sequence is followed as shown by the letters on the controls and instruments. (See sec. VI.)

(1) Set main switch "A" on either HIGH or LOW, depending upon kilovoltage range desired.

(2) Set radiographic-fluoroscopic safety switch "B" on RADIOGRAPHY.

(3) Adjust kilovolt selector knob "C" to approximate kilovoltage as indicated on kilovolt meter "D."

(4) Depress check filament switch "E" and hold while filament control knob "G" is adjusted to give approximate readings on filament scale "F." Release switch.

(5) Depress timer button and read millamperage on milliampere scale "J," readjusting knob "G" if correction is necessary.

(6) With the timer button depressed read kilovoltage on scale "D." If desired kilovoltage is not obtained, release timer button and adjust by knob "C." Depress timer button and recheck kilovoltage.

(7) If 15 milliamperes on radiography is exceeded, the circuit breaker will open circuit and breaker indicator lamp will go out. If this occurs, reduce milliamperage by turning knob "G" to the left and depress breaker reset switch "H" to reset.

(8) In order to prolong tube life and to speed up operation, the settings obtained can be tabulated and kept for future reference. It should be noted, however, that these readings will hold true only for each service outlet or source of power.

Section VIII. OPERATION OF AUXILIARY EQUIPMENT

15. X-Ray Field Unit Generator

For operation of the X-ray field unit generator see TM 8–630.

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PART THREE

MAINTENANCE INSTRUCTIONS

Section IX. GENERAL

16. Scope

Part Three contains information for the guidance of the personnel of the using organizations responsible for the maintenance (first and second echelon) of this equipment. It contains maintenance information as well as a tabulation of possible service problems and their correction. It is well to note that no two service problems are identical and individual resourcefulness and thinking will simplify many problems.

Section X. SPECIAL ORGANIZATIONAL TOOLS AND EQUIPMENT

17. Tools and Equipment

There are no special tools or equipment required for the maintenance of this equipment.

Section XI. LUBRICATION

18. Lubrication

Lubrication of this equipment is not required. Care should be exercised to prevent oil from getting on any rubber parts or the rubber covered cables.

Section XII. PREVENTIVE MAINTENANCE SERVICES

19. Operator Maintenance (First Echelon)

a. Before Operation. (1) Clean and dust off all parts being particularly careful to remove particles from bearing surfaces and gear rack.

(2) Check to see that all accessories are available for immediate use and that protective screen is properly affixed.

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(3) Operate the unit fluoroscopically to determine if it is functioning properly and that all cable connections are secure.

b. DURING OPERATION. (1) Occasionally during fluoroscopy observe the visual signal button on the tube head to determine whether the safe heat limits of the tube are being exceeded. When the red band on the button becomes visible it indicates that the total heat capacity of the tube is being approached, and operation should be discontinued until the head has cooled down.

(2) From time to time observe the meter settings to permit compensation for minor fluctuations and to determine that maximum ratings are not exceeded.

c. AFTER OPERATION. (1) Remove any foreign matter which may have fallen on the equipment during use.

(2) Return all accessories to their proper places so that the unit will be ready for immediate use.

(3) Be sure main switch is returned to the OFF position.

20. Organizational Maintenance (Second Echelon)

a. GENERAL. From time to time operational difficulties may be encountered and can as a general rule be corrected by the using organization. By proper handling and occasional checking much trouble can be avoided.

b. MONTHLY. The maintenance schedule depends primarily upon the location and frequency of use and should be determined by the officer in charge. The following services are set up on a monthly basis assuming that the equipment has been in daily use.

(1) Thorough cleaning to remove accumulated dust and dirt from the less accessible parts.

(2) Wipe off all unpainted parts with oil, lubricating, to prevent rust formation.

(3) Check the action of all locks for proper operation.

(4) Calibrate the depth indicator and associated parts of the localizer mechanism.

(5) Examine the protective devices and daylight hood for holes, cracking or damage.

(6) Check all moving parts and adjustments for proper freedom of motion and clearance.

(7) Tighten all accessible parts to lessen the possibility of developing play.

Section XIII. TROUBLE SHOOTING

21. General

The following listed possible troubles and remedies will assist in deter-

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mining the cause of unsatisfactory operation. If the remedy is not given, reference is made to a paragraph where complete information will be found. Only those causes which can be detected during operation or during first and second echelon maintenance service are listed. Therefore, if the trouble still exists after performing the listed remedies, the unit requires higher echelon service.

22. Electrical

A gross examination of the more obvious places where trouble may occur will in many instances rapidly locate the cause and eliminate further checking. For example, if the unit fails to produce X-rays, both the milliammeter and voltmeter indicate the passage of current, it is possible that the lead diaphragm is in the closed position.

a. FUSES IN SUPPLY LINE BLOW OUT.

Possible cause	*Possible remedy*
(1) Improper fuse capacity.	(1) Replace fuse with one of correct capacity. (See par. 25.)
(2) Improper supply line values.	(2) Use power line of correct voltage and frequency. (See par. 26.)
(3) Line compensator switch not set correctly.	(3) Reset compensator switch. (See par. 27.)

b. VOLTMETER DOES NOT INDICATE.

Possible cause	*Possible remedy*
(1) Line cable not plugged in.	(1) Plug in line cable.
(2) Line cable plug not making contact in receptacle.	(2) Test contact. (See par. 28.)
(3) No voltage at source.	(3) Report to proper authority.
(4) Blown fuse.	(4) Replace fuse. (See par. 25.)
(5) Break in continuity of line cable conductors.	(5) Repair or replace cable. (See par. 29.)
(6) Voltage selector switch on a dead button.	(6) Turn selector knob to right or left.
(7) Main switch not in ON position.	(7) Set switch in ON position.
(8) Voltmeter circuit open.	(8) Refer to higher echelon.

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c. MILLIAMMETER DOES NOT INDICATE.

Possible cause	*Possible remedy*
(1) X-ray filament not energized.	(1) Refer to higher echelon.
(2) Insufficient filament heat.	(2) Increase filament current.
(3) Break in continuity of head cable.	(3) Repair or replace cable. (See par. 29.)
(4) Timer or push button not connected.	(4) Connect timer or push button.
(5) Control to head cable loosely inserted.	(5) Check cable insertion.
(6) Radiographic - fluoroscopic safety switch set on RADIOGRAPHY and push button being depressed.	(6) Set radiographic - fluoroscopic switch on FLUOROSCOPY.
(7) Radiographic - fluoroscopic safety switch set on FLUOROSCOPY and timer button being depressed.	(7) Set radiographic - fluoroscopic safety switch on RADIOGRAPHY.
(8) Tube head overheated.	(8) Cease operation until tube head cools off.
(9) Circuit breaker open.	(9) Reset circuit breaker.
(10) Meter damaged.	(10) Refer to higher echelon.

d. MILLIAMMETER INDICATES BUT X-RAYS ARE NOT PRODUCED.

Possible cause	*Possible remedy*
(1) Tube head off center.	(1) Center tube head. (See par. 13*b*.)
(2) Diaphragm shutters in closed position.	(2) Open diaphragm.
(3) Full scale deflection and no filament control.	(3) Refer to higher echelon.

e. MILLIAMMETER INDICATES BUT FLUCTUATES.

Possible cause	*Possible remedy*
(1) Defective X-ray tube.	(1) Refer to higher echelon.
(2) Loose connection in tube head.	(2) Refer to higher echelon.
(3) Line voltage fluctuates.	(3) Report to proper authority.

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f. CIRCUIT BREAKER TRIPS CONSTANTLY.

Possible cause	*Possible remedy*
(1) Defective X-ray tube.	(1) Refer to higher echelon.
(2) Defective transformer.	(2) Refer to higher echelon.
(3) Safe limits of tube being exceeded.	(3) Decrease exposure factors.
(4) Circuit breaker incorrectly set.	(4) Refer to higher echelon.

g. HAND TIMER NOT OPERATING.

Possible cause	*Possible remedy*
(1) Not plugged in.	(1) Plug in.
(2) Time mechanism damaged.	(2) Refer to higher echelon.
(3) Corroded contacts.	(3) Clean contacts. (See par. 30.)
(4) Break in continuity of cord.	(4) Repair or replace cord.

h. PUSH BUTTON NOT OPERATING.

Possible cause	*Possible remedy*
(1) Not plugged in.	(1) Plug in.
(2) Corroded contacts.	(2) Clean contacts. (See par. 30.)
(3) Break in continuity of cord.	(3) Repair or replace cord.

23. Mechanical

Mechanical troubles are generally caused by improper care in handling and can be lessened by strict adherence to all instructions.

a. INACCURACY IN LOCALIZATION OF A FOREIGN BODY.

Possible cause	*Possible remedy*
(1) Skin to screen distance inaccurate.	(1) Recalibrate localizer. (See par. 13*d*.)
(2) Focal spot to screen distance inaccurate.	(2) Recalibrate localizer. (See par. 13*d*.
(3) Skin marker off center.	(3) Recenter skin marker. (See par. 31.)
(4) Lock not holding.	(4) Adjust lock pressure. (See par. 32.)
(5) Skin marker arm bent.	(5) Straighten or replace and then recalibrate localizer. (See par. 13*d*.)
(6) Screen out of longitudinal alignment.	(6) Realign screen. (See par. 33.)
(7) Screen to tube distance inaccurate.	(7) Recalibrate localizer. (See par. 13*d*.)

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b. EXCESSIVE VIBRATION, LOOSENESS, OR BINDING.

Possible cause	*Possible remedy*
(1) Table assembly loose.	(1) Tighten all screws.
(2) Play in vertical column.	(2) Adjust tension on friction screws. (See par. 34.)
(3) Carriage assembly loose on rails.	(3) Adjust eccentric bearings. (See par. 35.)
(4) Carriage assembly binds.	(4) Adjust brace rods. (See par. 36.)
(5) Excessive vibration in head.	(5) Check vibration dampener.
(6) Faulty operation of screen arm lock mechanism.	(6) Adjust lock mechanism. (See par. 37.)

Section XIV. MAINTENANCE OPERATIONS

24. General

Maintenance operations as outlined in this section are a basis for correcting operational difficulties and include the procedures for making adjustments. Unusual conditions under which the unit may be operated will create new problems calling for individual resourcefulness.

25. To Replace Fuses

The proper fuse is approximately determined by the capacity of the unit on a basis of 1-ampere capacity of the fuse for each milliampere output of the machine. On this basis the fuses should be at least 15-ampere capacity for 15-milliampere work. It should be remembered however, that some lines will not carry that much of a load and to continue operation it may be necessary to reduce the exposure factors to conform with the existing line conditions. Reduce the milliamperage, if necessary, to conform to the existing line condition using the basis as mentioned above.

26. Source of Current

Check source of current to be sure that the supply in 50–60 cycles, and 100–130 or 200–400 volts; be certain that supply is not D-C. Check with proper authority.

27. To Set Line Compensator Switch

If the line is not exactly 115 or exactly 230 volts, the range of the filament control will be affected and the calibration of the device will not be accurate. To permit compensation for various line conditions the line

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compensator switch is provided. To operate this switch proceed as follows:

a. Red dots are provided on the control and in compensating it is necessary to position the knobs or switches in respect to them.

b. Turn the minor kilovoltage selector to the red dot to button No. 3.

c. Set the radiographic-fluoroscopic safety switch to the red dot or RADIOGRAPHY position.

d. Set the main switch to the red dot or HIGH side.

e. Adjust the line compensator switch clockwise or counterclockwise, so that the pointer on the kilovoltmeter is made to coincide with the red line on the scale. The unit is then ready for operation.

28. To Test Contact in Receptacles

Receptacles that have become worn will not make proper contact with plugs and are frequently the cause of intermittent or complete cessation of operation. By twisting the plug in the receptacle and observing the action of the voltmeter, with the main switch on, such a condition is readily determined. Replacing the receptacle will eliminate the trouble.

29. To Repair a Cable

Damage is most likely to occur at or near the point of connection of the cable to the plug and necessitates cutting off the damaged portion and replacing the plug. Care must be exercised to follow coding on the wires and to connect them properly on polarized plugs and to replace insulating barriers. Damage along the length of a cable can be determined by flexing the cable along its length and noting whether or not contact of the broken ends momentarily energizes the equipment. A temporary repair can be made by splicing, but the cable should be replaced.

30. To Clean Contacts

Contacts can be reconditioned by cleaning with a piece of fine sandpaper.

Note. Do not use emery cloth.

31. To Recenter Skin Marker

Operate the unit fluoroscopically and proceed as follows:

a. If the pad rotates too far or not far enough before striking the stop, loosen the setscrew located near the lower end of the scale and slide rod, and adjust the marking arm either clockwise or counterclockwise until the pad lies beneath the center intersecting lines on the screen. Tighten the setscrew and recheck.

b. If the length of the arm seems too little or too great, adjust by loosening the setscrew at the bottom of the marking arm support and sliding the arm in the direction necessary to correct the error. Before tightening the setscrew make sure the well and cup are at right angles to the axis of the marking arm. Tighten the setscrew and recheck.

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32. To Adjust Lock Pressure

Wherever necessary, nuts or setscrews are provided whereby the holding action of a lock can be adjusted. To adjust, loosen or remove any retaining screw, nut or pin and adjust until sufficient holding action is obtained without putting too much strain on any member. Care must be exercised so as to permit free action when the lock is released and to prevent binding. If this condition cannot be obtained, replace the worn lock parts. Tighten retaining screw, nut or pin and recheck action. (See par. 37.)

33. To Center Screen Longitudinally

On the shaft of the lock (fig. 9 (9)) is a cam having an adjustable screw bearing against the side of the rack on the vertical column. The bracket through which this lock shaft passes has a similar adjusting screw. Adjust these screws alternately until the screen locks parallel to the side of the horizontal carriage. Check the action of the lock to be sure that it operates properly. (See par. 37.)

34. To Remove Play in Vertical Column

In the two vertical column bearings mounted on the gear housing are adjusting screws locked with nuts. These screws are intended to bear against the side of the gear rack on the vertical column to reduce any play of the assembly. If necessary, adjust these screws until they just bear against the rack without binding. Tighten lock nuts and recheck.

35. To Adjust Eccentric Bearings

Wherever necessary, eccentric bearings are provided to permit taking up excessive play in the carriage. These consist of regular bearings mounted on either an eccentric shaft or bushing. To adjust, loosen the retaining nut or mounting screw and rotate the shaft or bushing so that there is .012 inch clearance between the opposing bearing and the rail. Approximately four thickness of newspaper are equivalent to .012 inch. Tighten retaining nut or mounting screw and recheck.

36. To Adjust Brace Rods

Shorten or lengthen the brace rods as necessary by first loosening the lock nut and then rotating the rod in the eccentric. Adjust to a good snap action and retighten lock nuts to maintain adjustment.

37. To Adjust Screen Arm Lock Mechanism

The operation of this lock should be such so that the cam will always free itself. Adjust by removing the cotter pin which holds the slotted head friction nut and turn the nut until there is definite friction of the cam. Replace the cotter pin and check action.

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PART FOUR

AUXILIARY EQUIPMENT

Section XV. X-RAY FIELD UNIT GENERATOR 9606000

38. General

a. This item is designed for use as an auxiliary source of current for the unit. No generator having a different item number should be used. Two receptables are provided, either of which may be used to connect line cable plug of the Airflow unit to the generator.

b. Detailed instructions pertaining to this auxiliary equipment are contained in TM 8–630.

39. Installation

The location of this plant is important as this model is a portable type, and will frequently be operated on the ground. A place should be selected where it will be as free as possible from sand, mud, and dust. Although the unit is protected against normal exposure, it is desirable to provide as much shelter as possible.

40. Exhaust

When operated in a closed or even well ventilated room or tent, the exhaust pipe must be connected by a flexible metal hose, or some other means, to the outside. The exhaust fumes are poisonous and can cause illness and death.

41. Connecting X-Ray Unit

Before applying the X-ray load the power unit should be run for a slight warm-up period, long enough so its operation is stable and no further chocking is necessary. Never permit starting of the generator without having the main switch of the X-ray control in the OFF position.

Section XVI. USE OF TABLE WITH CONTROL AND TUBE OF FIELD UNIT 9608500

42. Installation

If it is desired to operate this table with the tube, transformer, control and shockproof cables, of the Army Field Unit 9608500, it will be found

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to be extremely simple to handle. The tube is installed either above or below the table as in figures 2 or 3. The transformer and control should be placed at the end of the table that would be at your left if you stood at the side of the table facing the localizer dial and it should be placed about 1 foot beyond and 6 inches away from the leg of the table. The control should be mounted on the top of the transformer and the two should be so turned that the back of the control and back of the transformer are facing the space at the left of the table. If the unit is placed in this manner, it will provide the best position for the cables, and will be convenient for the operator to adjust the controls. If it is in this position, the shockproof cables and the smaller gauge or motor cables to the tube should be supported by the canvas straps on the back of the control. This will remove the strain from the cables and support them in a graceful rather than in a sharp bend. It will be noticed that canvas straps are provided on the elevating mechanism housing adjacent to the vertical cranking mechanism on the table. When using the table fluoroscopically the shockproof cables and the motor cables should be supported at this point, and if properly done the cables will assume large radius curves which will protect them from undue strain which would break down the insulation. In the event that the table is used in this manner, there will be available with the transformer and control a footswitch instead of the push button which is supplied with the Airflow shockproof head.

43. Accessories

Packed in the tool compartment of the horizontal carriage is an extension cord for the localizer circuit. This cord can only be used with item No. 9608500 as it will be found that the regular cord is too short to reach to the control if the transformer is placed in the proper relationship to the table.

44. Capacities

The instructions covering the operation of the tube, transformer, and control of item No. 9608500 should be followed so far as they apply, but these instructions will still cover the use of the tube with this table.

45. Precautions

Canvas straps are also provided for mounting the cables of the shockproof tube of item No. 9608500 to the radiographic tubestand for horizontal or vertical radiography. These canvas straps will properly support the cables at the upper extremity of the radiographic tubestand, and will prevent the cables from sagging or interfering with the operation of the unit.

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APPENDIX

STORAGE AND SHIPMENT; SPARE PARTS

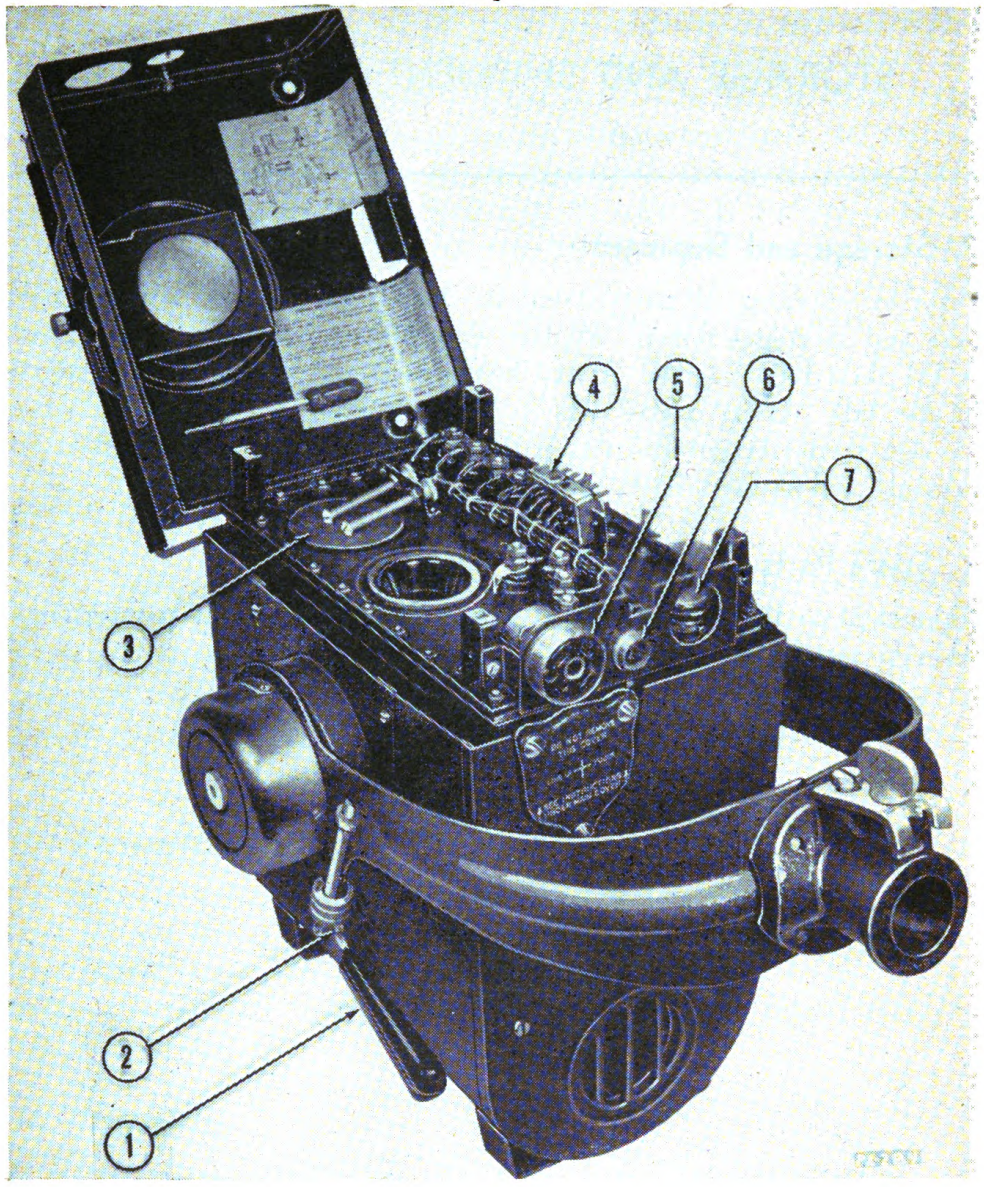
1. Storage and Shipment

Prior to repacking, all parts should be cleaned and checked for completeness and shortages noted. Replace all members into their proper place in the chest following the printed instructions and photographs mounted in the lids. Other places where undue friction or strain will cause damage should be checked and if the unit has been properly packed no pressure will be required to close the chests.

2. Spare Parts

Figures 11 to 16, inclusive, show spare parts which can be requisitioned through regular channels.

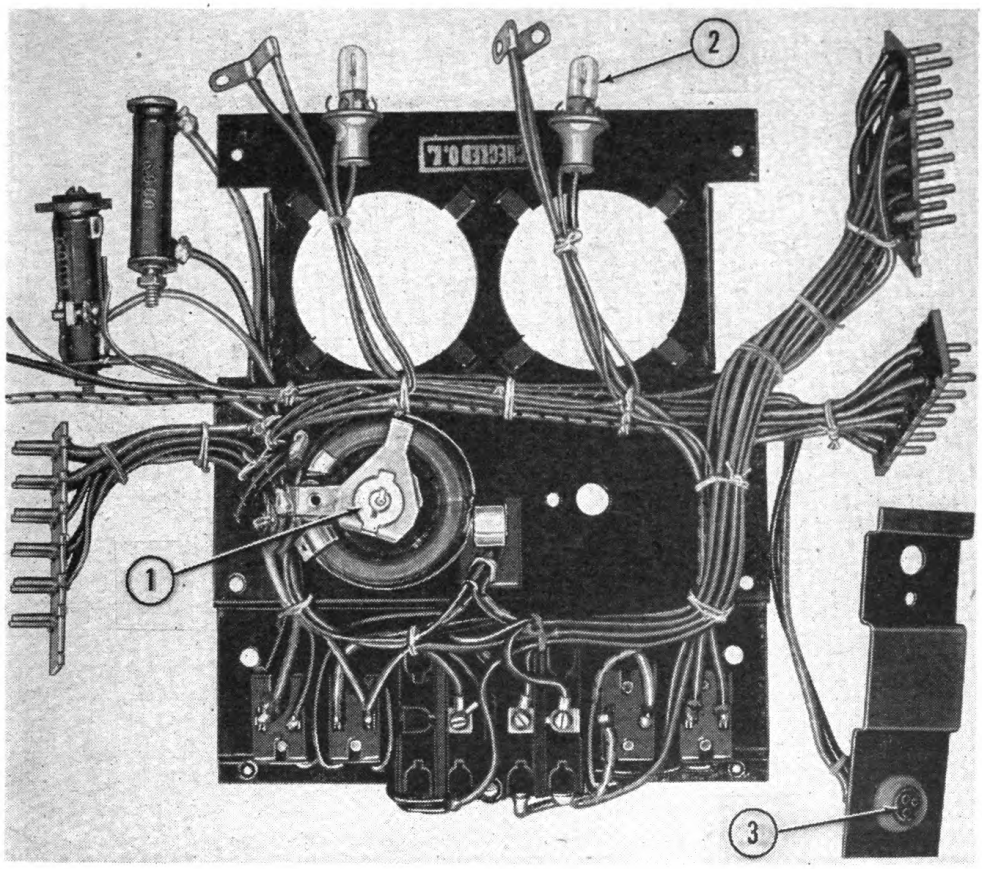
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	Med. Dept. No.	Nomenclature
1.	9R03654	HANDLE, LOCK, TUBE HEAD:
2.	9R03658	CLEVIS PIN, TUBE HEAD LOCK HANDLE:
3.	9R03888	GASKET, TUBE PORT:
4.	9R04138	RECEPTACLE, MALE, FIFTEEN POLE:
5.	9R04132	RECEPTACLE, FEMALE, FOUR POLE, COMPLETE:
6.	9R04130	RECEPTACLE, FEMALE, TWO POLE, COMPLETE:
7.	9R04084	PLUG, FILLER, TUBE HEAD:

Figure 11. Spare parts for tube head, Airflow unit.

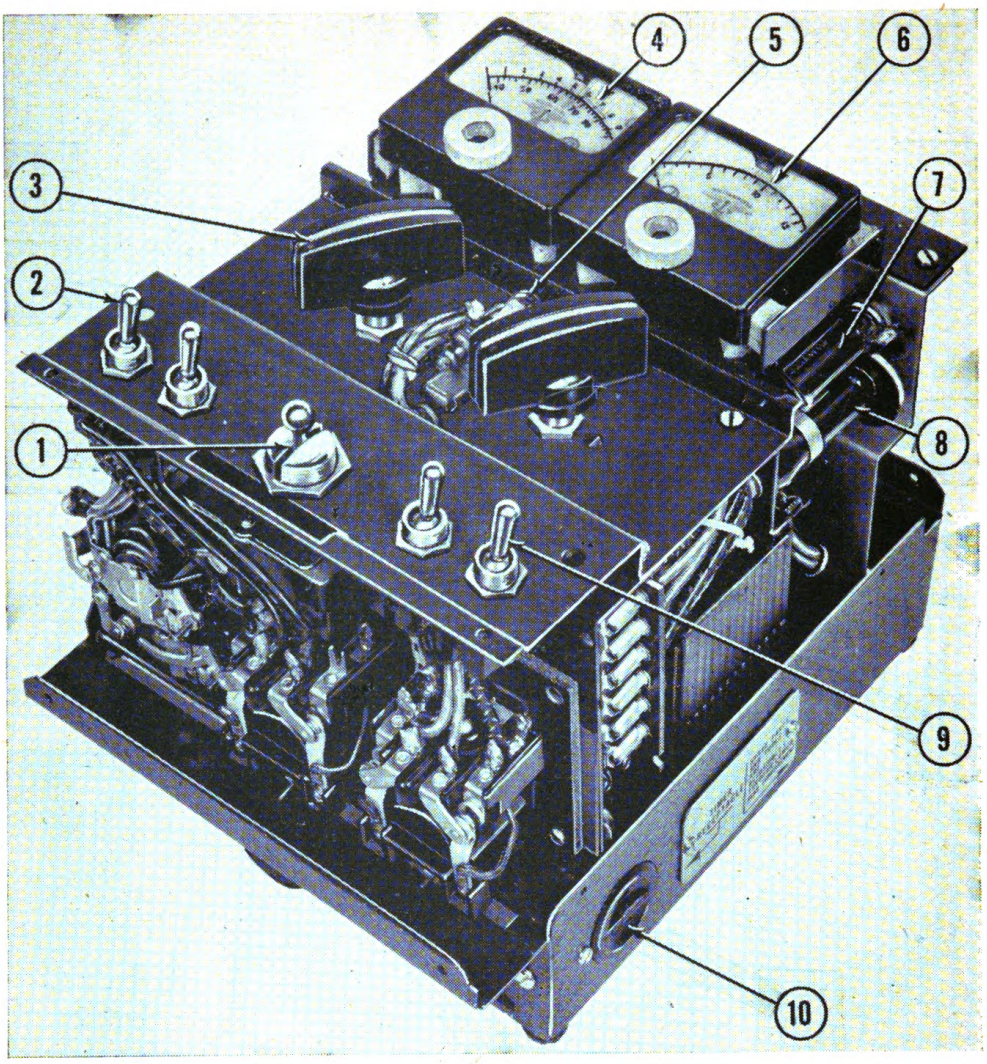
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	Med. Dept. No.	*Nomenclature*
1.	9R04148	RHEOSTAT, VARIABLE, 50 WATT, 250 OHMS, WIRE WOUND, VITREOUS ENAMELED:
2.	SR01113	BULB, 6-8 V., 1 C.P., T 3¼, SINGLE CONTACT BAYONET, FROSTED:
3.	9R04130	RECEPTACLE, FEMALE, TWO POLE, COMPLETE:

Figure 12. Spare parts for control subpanel, Airflow unit.

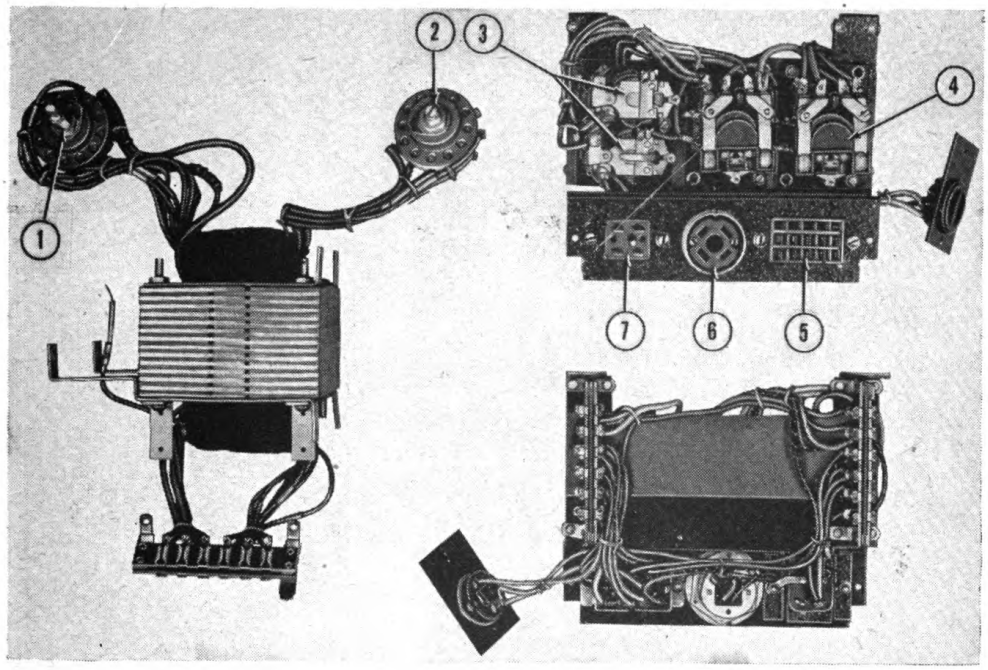
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	Med. Dept. No.	*Nomenclature*
1.	9R03610	SWITCH, TOGGLE, 3 P.D.T., CENTER STOP:
2.	9R03614	SWITCH, TOGGLE, D.P.D.T., SPRING RETURN:
3.	9R03956	KNOB, SWITCH CONTROL, BAKELITE: (For retaining spring order 9R04256).
4.	9R03618	VOLTMETER:
5.	SR00365	BULB, 6-8 V., 1 C.P., SINGLE CONTACT BAYONET:
6.	9R03620	MILLIAMMETER:
7.	SR01115	RESISTOR, FIXED, 25 WATT, 6000 OHMS, WIRE WOUND, VITREOUS ENAMELED:
8.	SR01116	RESISTOR, VARIABLE, 25 WATT, 6000 OHMS, WIRE WOUND, VITREOUS ENAMELED:
9.	9R03616	SWITCH, TOGGLE, D.P.D.T.:
10.	9R04128	RECEPTACLE, FEMALE, TWO POLE:

Figure 13. Spare parts for control, Airflow unit.

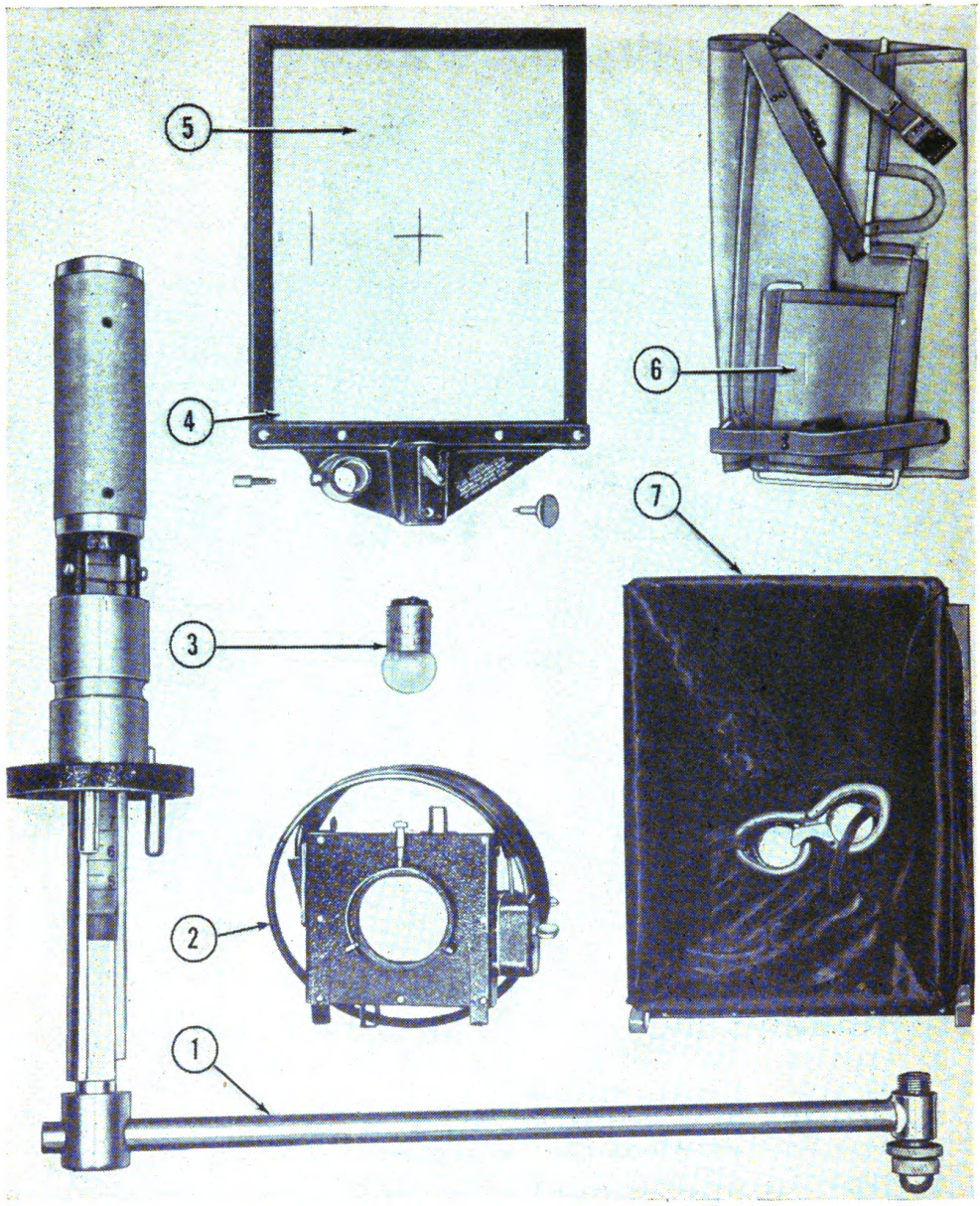
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	Med. Dept. No.	*Nomenclature*
1.	9R04292	SWITCH, MULTIPLE TAP, ELEVEN POLE:
2.	9R04294	SWITCH, MULTIPLE TAP, SIX POLE:
3.	9R04144	RELAY, ASSEMBLY:
4.	9R04142	RELAY, CONTACTOR:
5.	9R04134	RECEPTACLE, FEMALE, FIFTEEN POLE:
6.	9R04132	RECEPTACLE, FEMALE, FOUR POLE, COMPLETE:
7.	9R04136	RECEPTACLE, MALE, FOUR POLE:

Figure 14. Spare parts for relay panel and autotransformer, Airflow unit.

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	Med. Dept. No.	*Nomenclature*
1.	9R03694	ARM, MARKING, DEPTH INDICATOR:
2.	9R03780	CABLE, CONTROL, DIAPHRAGM, COMPLETE:
3.	SR01114	BULB, 12-16 V., 3 C.P., G 6, DOUBLE CONTACT BAYONET:
4.	9R04158	SCREEN, FLUOROSCOPIC:
5.	9R03910	GLASS, LEAD, PROTECTIVE, FLUOROSCOPIC:
6.	9R05238	SHIELD, PROTECTIVE, AUXILIARY, LEADED RUBBER:
7.	9R03804	CLOTH, DAYLIGHT FLUOROSCOPIC HOOD:

Figure 15. Spare parts for screen, hood and depth indicator, Airflow unit.

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	Med. Dept. No.	*Nomenclature*
1.	9R03818	CONE, RADIATION:
2.	9R03746	CABLE, THIRTEEN CONDUCTOR:
3.	9R04082	PLUG, FEMALE, FIFTEEN POLE:
4.	9R04096	PLUG, MALE, FIFTEEN POLE:
5.	9R04090	PLUG AND SLEEVE, MALE, LOCALIZER CORD:
6.	9R03660	TUBE AND CRADLE, X-RAY:
7.	9R04076	PLUG, FEMALE, LOCALIZER CORD:
8.	SR00072	CORD, NEOPRENE, NO. 18, TWO CONDUCTOR:
9.	SR00073	CORD, NEOPRENE, NO. 16, TWO CONDUCTOR:
10.	9R04094	PLUG, MALE, FOUR POLE:
11.	9R04088	PLUG, MALE, TWO POLE:
12.	9R03622	CABLE, LINE, COMPLETE:
13.	9R04080	PLUG, FEMALE, FOUR POLE, COMPLETE
14.	9R03626	PLUG, MALE, TWO POLE, COMPLETE: (For insert only order 9R15016).
15.	6R50408	NUT, RETAINING, DIAL KNOB, HAND TIMER:
16.	6R50398	PUSH BUTTON, HAND TIMER:
17.	6R50404	DIAL, HAND TIMER:
18.	6R50406	KNOB, DIAL, HAND TIMER:
19.	6R50388	CASE, HAND TIMER:

Figure 16. Spare parts for timer and cables, Airflow unit.

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Breaker indicator light	10*c*	40
Breaker reset switch	9*f*	39
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Blow out constantly	22*a*	51
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Kilovolt selector knob	9*c*	39
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Switch, D. P. D. T. toggle. (*See* Radiographic-fluoroscopic safety switch.)		

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