# T400E
# ELEVATOR/FOUR WAY
# RADIOGRAPHIC TABLE

## USER AND ASSEMBLER INSTRUCTIONS
## MODEL S211

## D200-01 REV. X


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## INSTALLATION AND SERVICE MANUAL REVISIONS HISTORY

| Revision | Pages Affected/Revision Description | Release Date | ECR # |
|---|---|---|---|
| H | INITIAL RELEASE | | |
| J | Update part numbers and maximum power consumption | JULY, 2000 | 1992 |
| K | CREATE MANUAL TEXT | DEC., 2000 | 2064 |
| L | D230 thru D234 were replaced by K733 thru K737 respectively. | JULY, 2002 | 2662 |
| M | ADDED COVER SHEET, K733 LEGEND, K734 DIAGRAM, K735 COMPONENT, K736 DIAGRAM, K737 SCHEMATIC INTO ONE ELECTRONIC FILE | SEPT., 2003 | 3319 |
| N | REVISED TO INCORPORATE NEW ACTUATOR ASSEMBLY, INCLUDING REPLACEMENT PARTS, ELECTRICAL DESIGNATORS, AND RELATED DRAWINGS. ADDED THEORY OF OPERATION WITH DIAGRAMS. | JULY, 2004 | 4138 |
| P | Revised Figures 1 through 8. Updated 3.4.5 photo. P9: added QC code. In 2.3 Spare Parts List: 05976 was 01430, 04266 was A318, 01539 was D139, 01473 was D990, J436 was HB03, HAC19 updated to 1% from 5%, HAC20 updated to 5% from 1%. In 3.4.4: SW5 was SPDT microswitch. Removed references to tabletop switch handle. Added grid installation instructions. | JULY, 2014 | 8203 |
| Q | Added Note to Sheet 7, under Note 7 | Aug, 2014 | 8453 |
| R | Added Section 3.3.6 for bracket installation | July, 2015 | 8659 |
| T | UL certification; Added section 2.2, Added ⚠ symbols, linked TOC | Sep, 2015 | 8818 |
| U | Revised floor mounting installation instructions | Nov, 2015 | 8780 |
| V | Added Grounding Note in section 3.4.1 | Aug, 2016 | 9196 |
| W | Updated UL Label graphic; Added Symbol Legends table | Oct, 2016 | 9266 |
| X | Update address to Niles, IL; Added Intended Use, Attenuation, & Cleaning to sheet 1. | June, 2017 | 9584 |

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# 1. INTRODUCTION

## WARNING

**X-RAY EQUIPMENT MAYBE DANGEROUS TO BOTH PATIENT AND OPERATOR UNLESS PROPER SAFETY MEASURES ARE OBSERVED**

Though this equipment is built to the highest standards of electrical and mechanical safety, the useful X-ray beam becomes a source of danger in the hands of the unauthorized or unqualified operator. Excessive exposure to x-radiation causes damage to human tissue.

Adequate precautions must be taken to prevent unauthorized or unqualified persons from operating this equipment or exposing themselves or others to its radiation. Only qualified personnel should install, set up, maintain, and operate this equipment. Only qualified service personnel should remove electrical covers.

Before operation, persons qualified and authorized to operate this equipment should be familiar with the Recommendations of the International Commission on Radiological Protection, contained in Annals Number 26 of the ICRP, and with the applicable national and local standards.

The equipment described in this manual will perform reliably when installed, maintained and operated, in accordance with the instructions of this manual by qualified personnel. This equipment is sold with the understanding that the user assumes sole responsibility for radiation safety and that the manufacturer does not accept any responsibility for the following:

- Equipment improperly installed.
- Equipment improperly operated.
- Equipment improperly maintained or repaired.
- Equipment, which has been modified or altered in any way.
- Injury or damage to patient or other personnel for any of the above causes.

### Intended Use

This is an x-ray table, a mechanical device intended to support a patient during a radiographic procedure.

### Attenuation

All included components between the patient and image receptor have been certified to comply with 21 CFR Chapter 1 Subchapter J (§1020.30).

## Cleaning

The manufacturer recommends disinfection of the equipment between uses for any surfaces that may come in contact with the patient during a radiographic procedure.

| Symbol Legends | |
|---|---|
| **Symbol** | **Definition** |
|  | Date of manufacture |
|  | Manufacturer |
|  | Serial Number |
|  | Reference Number (Model/Part Number) |
|  | Keep Dry |
|  | NOTE<br>This symbol represents Information that assists the user of the manual in the performance of a task. It may provide the user with better methods of conducting the task, or it may point out conditions that could cause the system to fail to operate properly. |
|  CAUTION | Points out special procedures, or precautions, that personnel must follow to avoid equipment damage. |
|  WARNING | Identifies situations or actions that may affect patient or user safety. Disregarding a warning could result in patient or user injury. |
|  | TYPE B APPLIED PART<br>This symbol indicates equipment providing a particular degree of protection against electric shock, particularly regarding allowable leakage currents and reliability of the protective earth connection (if present). |
|  | This symbol indicates an Electro Sensitive Device is present which must be carefully handled to prevent damage to the device. |
|  | ELECTRIC SHOCK HAZARD WARNING<br>This symbol indicates an electric shock hazard. |
|  | DANGER VOLTAGE<br>This symbol indicates hazards arising from dangerous voltages. |
|  | DIRECT CURRENT<br>This symbol indicates a direct current source. |
|  | PROTECTIVE EARTH TERMINATIONS<br>This symbol indicates protective earth terminations in device. |

# 2. USER INFORMATION

## 2.1 GENERAL DESCRIPTION

The elevator table is a radiographic table that features a telescopic base and drive motor. These features allow the tabletop to be either raised or lowered. The elevator table is supplied with a lockable floating tabletop and a movable film cabinet. The film cabinet can be supplied in any one of the four models listed below. (All with optional PBL)

1. Bucky Cabinet with AEC
2. Bucky Cabinet
3. Grid Cabinet with AEC
4. Grid Cabinet

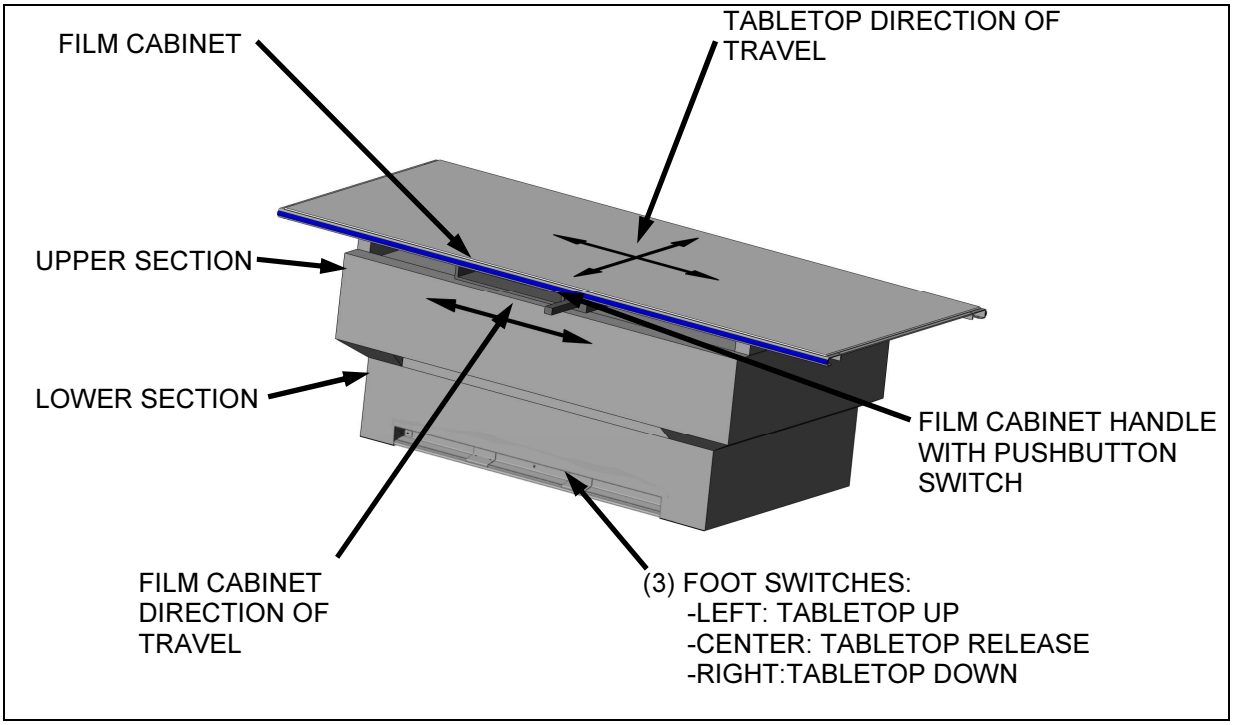



**Figure 1: Elevator Table**

**WARNING**

Care must be taken when operating, lowering, or raising the tabletop with a patient on the table.

1) Avoid all sudden movements.
2) Keep patient and operator hands and fingers clear of mechanical pinch points when table is in motion.
3) Never raise or lower the tabletop when patient is getting on or off the table.
4) Never release the tabletop locks when the patient is getting on or off the table.

**TABLETOP OPERATION (FOOTSWITCH; SEE FIGURE 1)**

1. To raise the tabletop, depress the left footswitch.
2. To lower the tabletop, depress the right footswitch.
3. To release the tabletop locks, depress the center footswitch. The electromagnetic locks holding the tabletop de-energize and free the tabletop to move in the lateral and transverse directions.
4. To re-activate the tabletop locks, release the center footswitch.

**FILM CABINET OPERATION**

1. To release the electric brake securing the film cabinet in position, depress the pushbutton switch on the film cabinet handle (See Figure 1). The film cabinet will be free to move laterally.
2. To re-activate the film cabinet brake, release the pushbutton switch on the handle. The electric brake will re-energize and the film cabinet will lock in position.

**NOTE:**

1) When the elevator table is in the elevating mode, the tabletop locks cannot be released and therefore the floating top mode of the table is not functional.
2) The elevator table has a built-in circuit that causes the raise/lower mode of the table to be momentarily interrupted when the tabletop reaches a pre-set X-ray height.

## 2.2 CLASSIFICATION DATA

This equipment is not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.

Type of protection against electric shock is Class 1.

Degree of protection against electric shock is Type B. 

Degree of protection against the ingress of water is IPXO / ordinary.

The function and intended application of this equipment is general radiography for human use.

Environmental conditions for transport, storage and operation:

Temperature: 40° F to 100° F (10° C to 40° C)
Relative humidity: 5% to 95%, non-condensing
Atmospheric pressure: sea level to 8000 feet (700 – 1100 hPa)

The symbol  is used to alert the installer and/or operator of conditions where personal safety or possible equipment damage is a consideration.

The elevator table model S211 is intended for intermittent use, with a 10% duty cycle for raising and lowering the table. Two minutes of raise/lower time is the maximum allowed within a 20 minute period.

The elevator table model S211 draws 2 Amps continuously, with a maximum 6 Amps during the raise/lower cycle.


## 2.3 EQUIPMENT SPECIFICATIONS

| | | |
|---|---|---|
| Height x Width x Length (Inches) | | |
| Crated: | | |
| | Tabletop | 2.75” x 31” x 90” |
| | Base | 30” x 30.5” x 54” |
| Uncrated: | | |
| | Top & Base Assembled | 31.5” x 30.5” x 84” |
| Weight (Lbs) | | |
| Crated: | | |
| | Tabletop | 100 |
| | Base | 550 |
| Uncrated: | | |
| | Top & Base Assembled | 580 |
| Power Consumption Max. (Watts) 120V/60 HZ | | 700 |
| Max. Patient Weight (Lbs) | | 400 |
| Tabletop Travel (Inches) | | |
| Elevation (Max. Height) | | 34 |
| Elevation (Min. Height) | | 22 |
| Transverse (From Centered Position) | | ±5 |
| Longitudinal (From Centered Position) | | ±16 |
| Film Plane to Tabletop Distance (Inches) | | (AEC) – 3.25 |
| | | (Non-AEC) – 2.75 |

## 2.4 SPARE PARTS LIST

Below is a list of parts whose life is finite or parts that may need replacement if the table is relocated. Spare parts other than those listed below are available. Please contact the factory for details.

| DESCRIPTION | QTY per TABLE | PART # |
|---|---|---|
| Logic control PCBA | 1 | 05976 |
| Transformer, T1, 120/30 VAC | 1 | HAC21 |
| Transformer, T2, 120/24 VAC | 1 | HX19 |
| Fuse F1 and F2, 1.25 A, SLO-BLO, 3 AG | 2 | HX29 |
| Fuse F3 and F4, 2.50 A, SLO-BLO, 3 AG | 2 | HAC22 |
| Capacitor, C1, 12000uF, 63V | 1 | HAC18 |
| Capacitor, C2, 5800uF, 40V | 1 | HU43 |
| Resistor, R1, 0.3 Ohms, 5%, 50W | 1 | HAC20 |
| Resistor, R2, 7.5 Ohms, 1%, 25W | 1 | HAC19 |
| Switch, Limit DPDT 10A (Table up/down travel unit) | 2 | HK07 |
| Switch, Roller Type 5A (Table Operating Height) | 1 | HA50 |
| Switch, N.C. - Film Cabinet | 1 | HB91 |
| Switch, Off/Twist On DPST (Electrical Service) | 1 | HK34 |
| Light, Red Pilot (Power on indicator) | 1 | 04266 |
| Actuator Assembly | 1 | 01539 |
| Open Type Linear Ball Bearing (.750 Nominal I.D.) | 4 | HF67 |
| Magnetic Brake Assembly (Tabletop) | 1 | 01473 |
| Tabletop Bearings (3/8" ID x 7/8" x .28" Thick.) | 20 | HF81 |
| Front Bearings, Film Cabinet (Large)<br>(3/8" ID x 7/8" OD x .22" Thick.) | 4 | HF81 |
| Front Bearings. Film Cabinet (Small)<br>(3/16" I.D. x 11/16" O.D. x .20" Thick) | 2 | HG07 |
| Rear Bearings, Film Cabinet (11/16" OD x 3/16" ID) | 2 | HF81 |
| Bridge Rectifier, BR2, 600V, 25A | 2 | J436 |
| Transverse Lock Right | 1 | L401-01 |
| Transverse Lock Left | 1 | L401-02 |

## 2.5 MAINTENANCE SCHEDULE AND INSPECTION

Safe performance of the elevating table requires daily inspection by the user and scheduled service by specifically trained X-ray apparatus service personnel. It is the user's responsibility to select qualified service personnel, or to consult with the factory in the event recommendations are required.

DAILY INSPECTION (USER)

1) Check to see that the electric locks for the tabletop and film cabinet operate properly.
2) Check to see that the tabletop moves freely and does not bind.
3) Inspect the table anchoring to ensure that the table is properly secured to the floor.

In the event service is required, contact a qualified service person.

SCHEDULED MAINTENANCE (SERVICE PERSONNEL)

In order to comply with applicable federal and state regulations the following maintenance schedule must be adhered to:

1) First servicing – 30 days after equipment installation.
2) Subsequent servicing – every 6 months.

*Scheduled maintenance should include but not be limited to the following checks:*

1) Proper equipment grounding.
2) Proper tightness of all mechanical fasteners.
3) Inspection of all electrical connections for proper connection and absence of corrosion.
4) Proper anchoring of table to floor.
5) Proper operation of tabletop and grid cabinet.
6) Inspection of all electric locks for proper operation.
7) Inspection of the foot switch for proper operation.
8) Checking the raising and lowering function of the table to insure that the table stops at the high and low positions as well as pauses at the working height.

# 3. ASSEMBLER INFORMATION

## 3.1 GENERAL INSTALLATION

To facilitate shipment of the elevating table it is necessary to partially disassemble the table prior to shipment. The tabletop and base are shipped in separate cartons that the installer must inspect before beginning the installation.

If the elevating table was purchased on an “FOB Shipping Point” or “Freight Collect” basis, it is the dealer’s responsibility to check the shipment for completeness against the Bill of Lading. In the event of shortage or damage, immediately file a claim with the carrier.

If the elevator table was purchased on an “FOB Destination” or “Freight Prepaid” basis, and shortage or damage is found, notify the factory immediately.

Leave the equipment on its timber skid until it has been moved to its installation site.

**WARNING**

Always wear protective glasses when servicing the table.

Do not service the table with the power on.

Always disconnect the power by depressing the electrical service switch inside the table base.

## 3.2 EQUIPMENT COMPATIBILITY

The radiographic table is certified to be compatible with all certified tube housing assemblies, X-ray controls, X-ray high voltage generators, cassette holders, and beam limiting devices, and will not affect the compliance of these components when these components are installed, connected, and adjusted in accordance with the applicable manufacturer’s instructions and specifications.

**NOTE:** It is the assembler’s responsibility to:

1) Verify that there is an angulation indicator means provided to ensure perpendicularity between the table and the collimator.
2) Verify that there is an angulation indicator for vertical SID provided on the tubestand.
3) Verify that all components assembled as parts of the X-ray system are compatible. Refer to the compatibility statement published by the component manufacturer for specific information.

## 3.3 MECHANICAL INSTALLATION AND ADJUSTMENTS

### 3.3.1 SITE SELECTION

The table location is dictated by office workflow and available space. When deciding on the table location, consideration should also be given to accessibility of the table and related components for servicing. Refer to Figure 2 below for minimum suggested clearances for proper table operation.

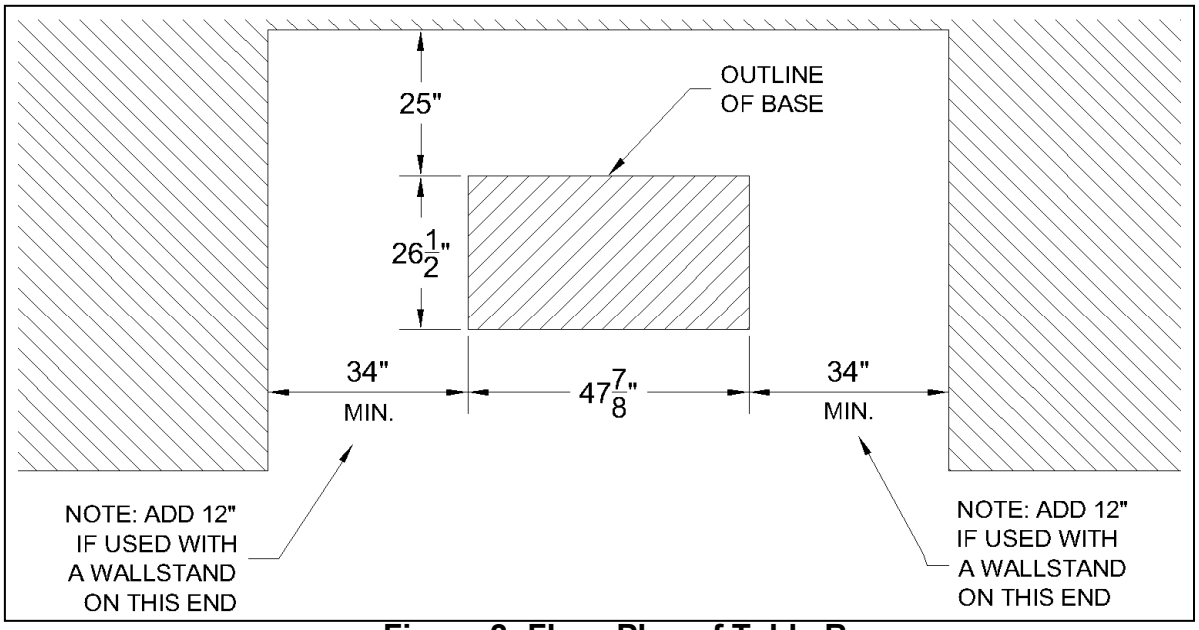



**Figure 2: Floor Plan of Table Base**

### 3.3.2 TABLETOP INSTALLATION

The tabletop and base have been disassembled at the factory prior to shipping. To reassemble the tabletop and base follow the procedure below:

1) Measure the room and determine where there is enough space to slide the top back onto the base.

2) Refer to Figure 3 and remove the retaining angles at each end of the table.

3) Disconnect the longitudinal lock assembly from the base by removing the appropriate screws.

4) Slide the tabletop over the base's bearing assembly. Position the tabletop so that the retaining angles will be towards the front of the table.

5) Slide the tabletop back and forth to ensure the top moves freely with a minimum of transverse and vertical movement.

6) If an excess of vertical or transverse motion occurs adjust the appropriate bearings.

   A) Transverse Bearing Adj. (Figure 3 View A-A)
   B) Vertical Bearing Adj. (Figure 3 View B-B)

7) Reinstall the retaining angles and longitudinal lock assembly.

*Note: It is recommended to apply some form of non-permanent thread locking compound onto the threads of the flat head mounting Screws that attach the Table Top's Longitudinal Locks to the Bearing Module.*

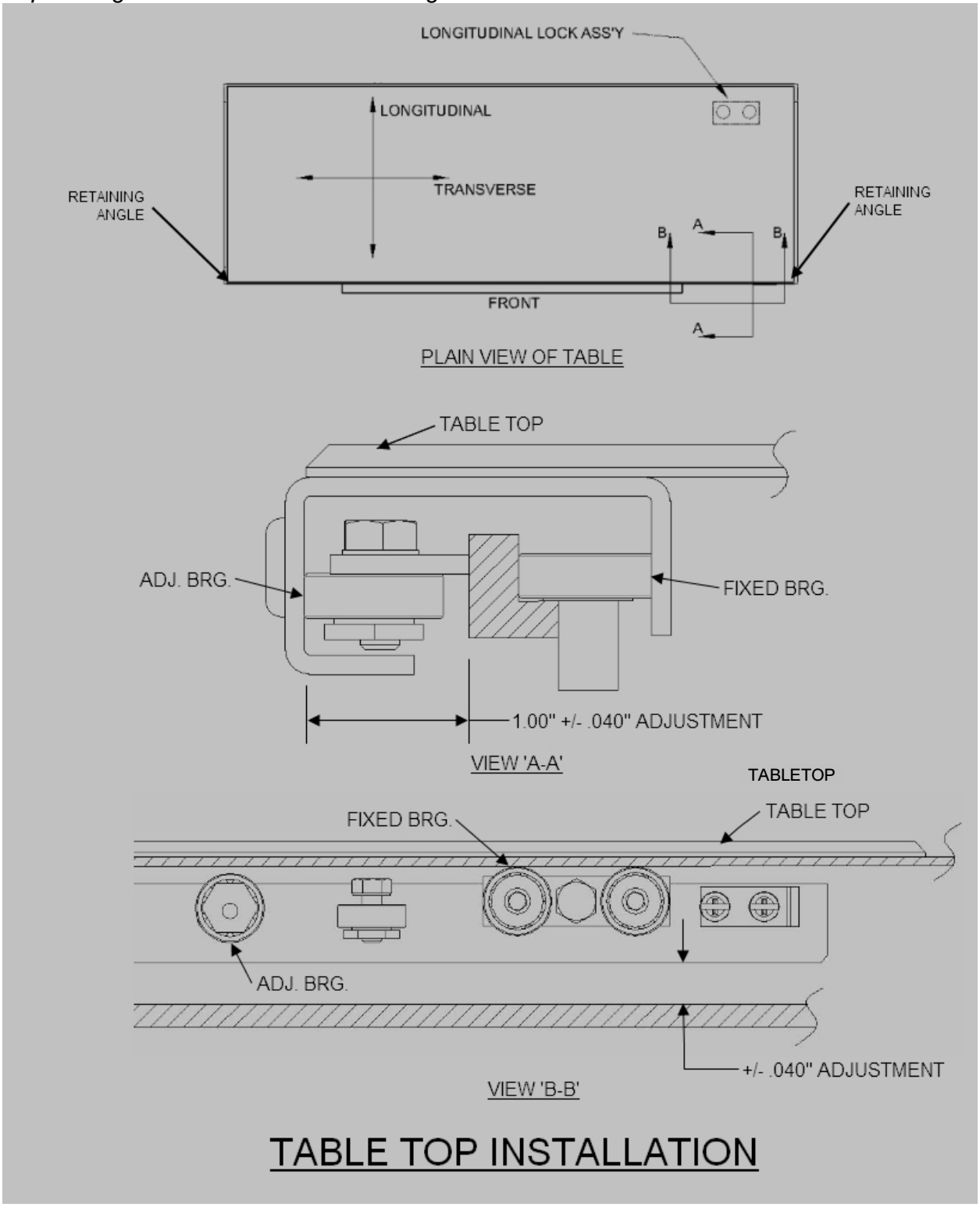



**Figure 3**

### 3.3.3 UPPER AND LOWER FRONT PANEL REMOVAL

Prior to operating the table, the red shipping bracket must be removed. To remove the upper and lower front panels and remove the shipping bracket, follow the procedure outlined on the following page.

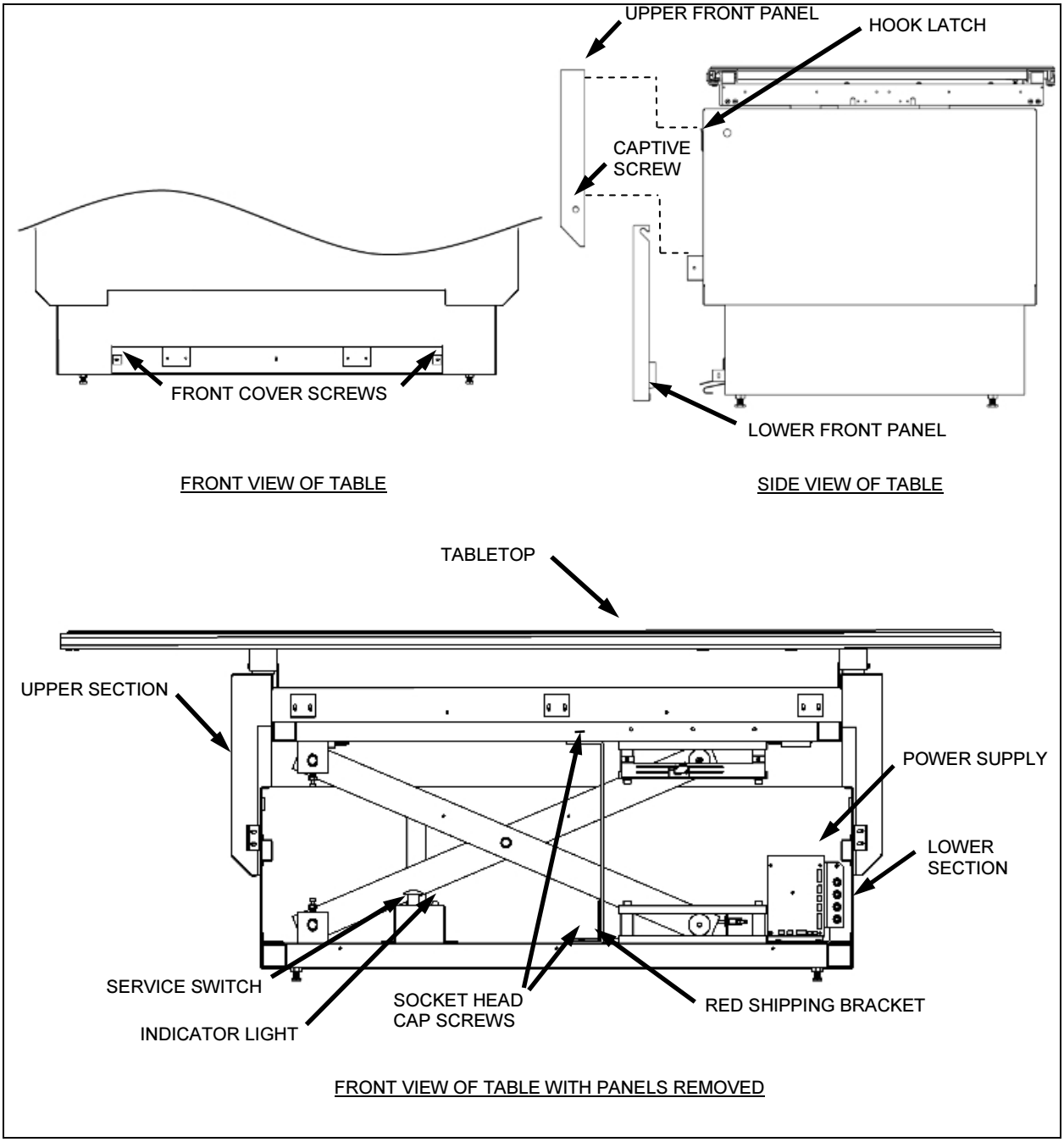



**Figure 4: Panel Removal**

## UPPER AND LOWER FRONT PANEL REMOVAL PROCEDURE

1. Refer to Figure 4 and remove the decorative caps on the upper front panel and loosen the captive screws.
2. Grasp the upper panel at the bottom and lift upwards until the panel passes the hook latch and then pull the panel away from the table.
3. The lower panel is held in place by the front cover screws indicated in Figure 4. To remove the panel, remove the screws and pull the panel outwards away from the base of the table, lifting up and out to disengage the upper end of the panel.
4. Loosen the socket head cap screws and remove the red shipping bracket. Replace the cap screws and store the shipping bracket for possible future use.
5. Replace the lower and then upper panels.

**WARNING**

Always wear protective glasses when servicing the table.

Do not service the table with the power on.

Always disconnect the power by depressing the electrical service switch inside the table base.

Scan the QR code below using a smartphone and QR code reader app for detailed unpacking video of the HI-LO TABLE.

### 3.3.4 ANCHORING AND LEVELING

**Install and Adjust the Leveller Pads**

To ensure patient safety it is imperative that the elevator table is anchored to the floor. Prior to anchoring, check to make sure that the table base is parallel to and the proper distance from the tubestand floor rail. If the floor is concrete, secure the table to the floor with 5/16" lead anchors. If the floor is a material other than concrete, drill holes through the floor and secure with suitable anchors.

**Floor Mounting Bracket Installation**

1. Locate and unpack the bag containing the three floor mounting brackets, hardware and bracket covers. Note that floor anchors are not included.

2. Position the table and level it in both longitudinal and transverse directions, then remove the upper and lower front panels. (Refer to Figure 4, section 3.3.3)

3. Attach Floor Anchor Brackets to the two rear corners of the lower skirt and the inner side of the front frame rail with the included ¼"-20 bolts, lock washers and flat washers as shown in Figures 5 and 6.

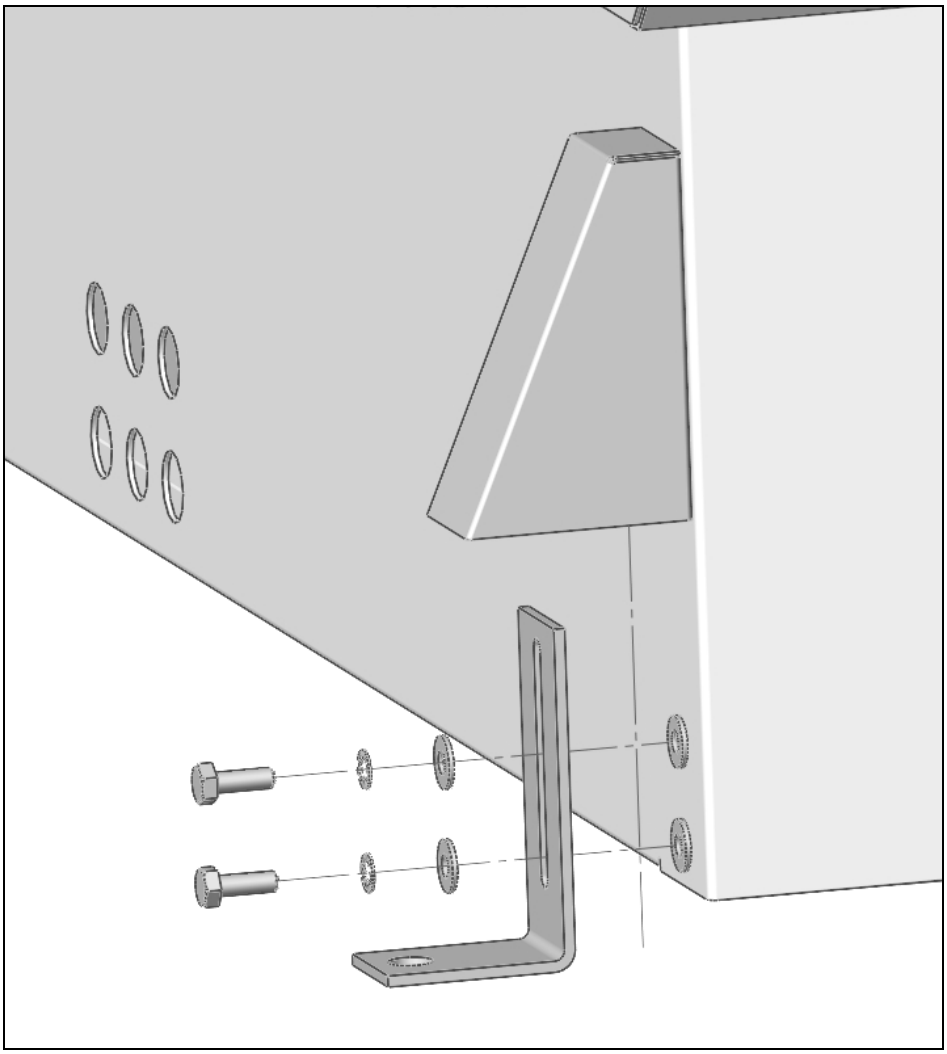


**Figure 5: Rear Brackets**

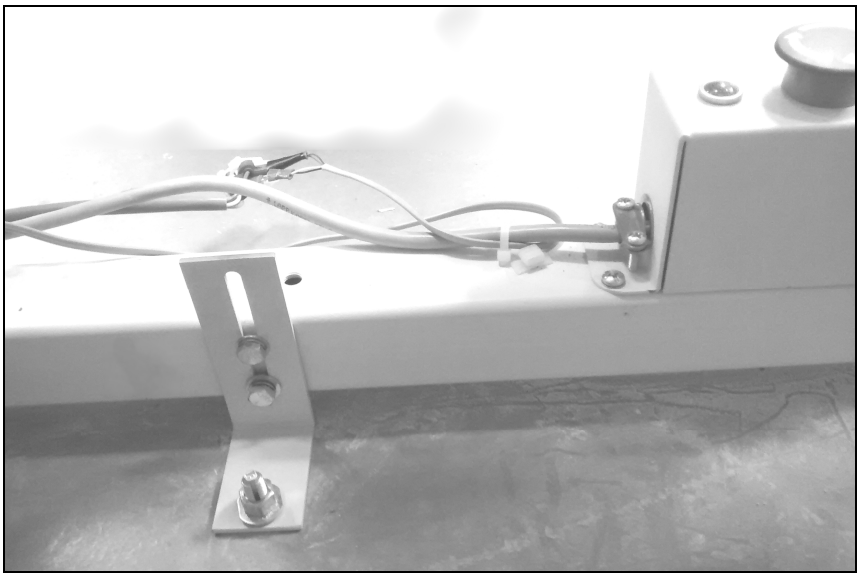


**Figure 6 – Front bracket (inside of front frame)**

4. Position the brackets so they contact the floor and tighten the ¼”-20 mounting bolts.

5. Drill holes for the anchors through the floor mounting holes in the bracket to the depth recommended by the anchor bolt manufacturer.

6. Insert anchor bolts through the bracket and into the floor and tighten according to the anchor bolt manufacturer instructions.

7. Slide the rear bracket covers over the brackets as shown in Figure 5.

### 3.3.5. SID SWITCH ADJUSTMENT

The elevator table has a built-in circuit that momentarily interrupts the raising or lowering of the tabletop when the tabletop reaches a preset height. X-ray exposures are allowed at this height only. The SID switch is preset at the factory for a tabletop to floor height of 30 ½”. To change the height at which the tabletop motion pauses, use the following procedure:

1. Move the tabletop to the desired working height.
   **NOTE**: The tabletop to film plane distance is given in the specification section.
2. Remove the upper and lower front panels. (Refer to Figure 4, section 3.3.3)
3. Turn the power off by pressing down on the service switch. The red indicator light near the switch should turn off.

**WARNING**

Failure to turn off the power can result in serious injury. High voltages and moving parts are exposed when the front panels are removed.

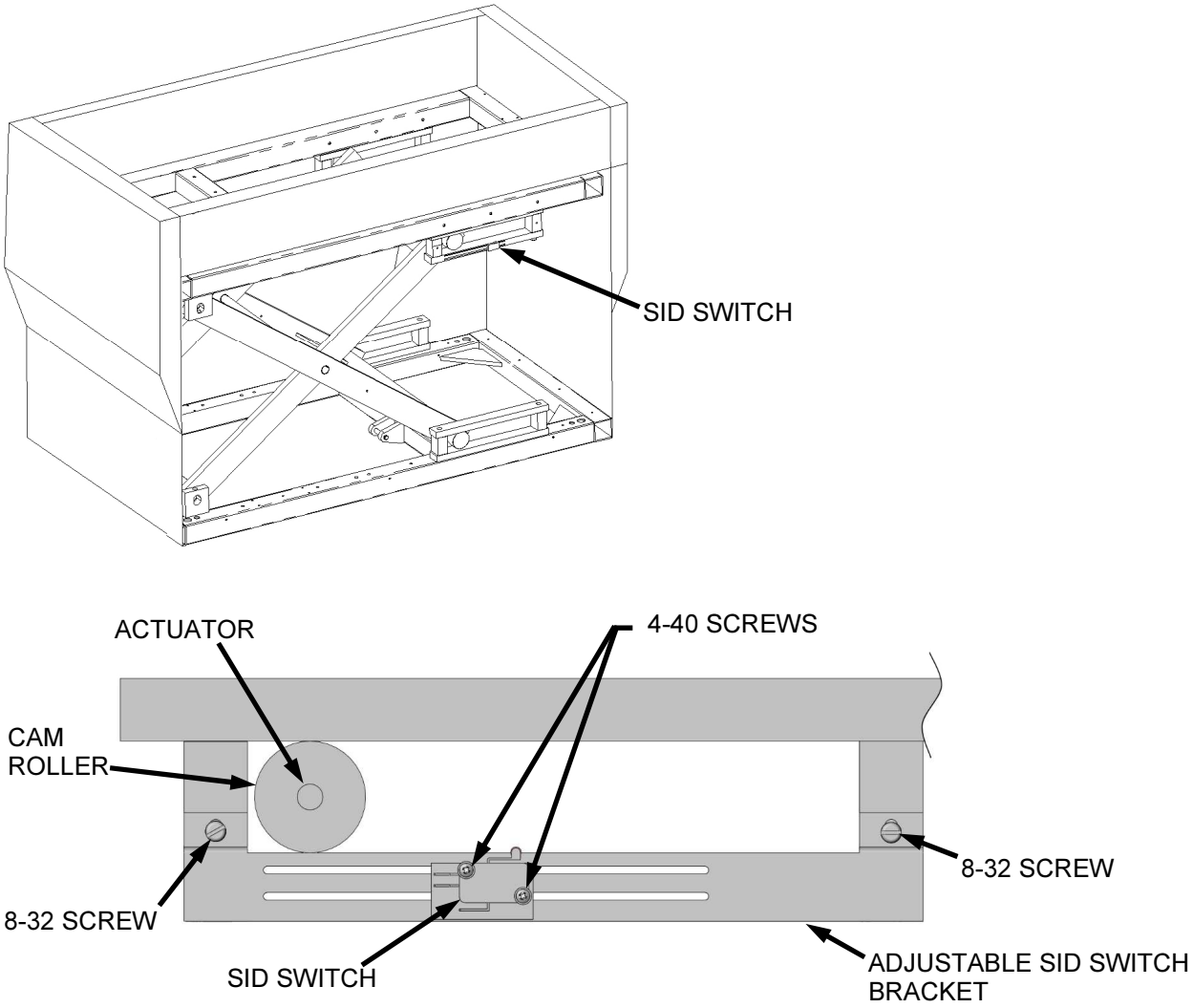



**Figure 7: SID Switch Adjustment**

4. Referring to Figure 7, loosen the #8-32 screws and move the adjustable bracket down away from the tabletop.
5. Loosen the #4-40 screws and slide the roller switch so that the SID switch roller is centered under the actuator.
6. Tighten #4-40 screws.
7. With no load on the tabletop, insert a business card or 0.012" feeler gauge between the base of the switch and the SID Switch Roller Arm. Move the adjustable bracket up towards the tabletop until the roller switch bottoms out against the business card or gauge. When correctly positioned, the SID switch and actuator will appear as in Figure 7.
8. Hold the bracket in position and tighten the #8-32 screws.
9. Remove the business card or gauge.
10. Turn the power back on by twisting the service switch in the direction shown on the switch. The red indicator power light should be lit.

11. Replace the upper and lower front panels.
12. Test the switch for proper operation.

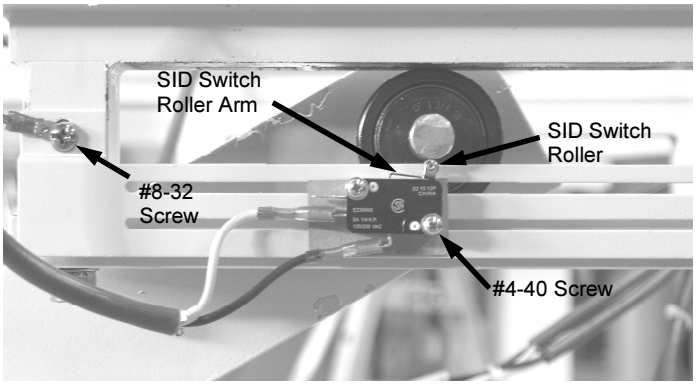



**Figure 8**

### 3.3.6 WORKING HEIGHT BRACKET ATTACHMENT

1. Once the table's correct working height is established, fully raise the table.
2. Turn off power to the table and remove the upper front panel.
3. Remove the backing from the arrow label and, ensuring that the arrowhead will point towards the center of the table once the bracket is installed, place arrow label on bracket as shown in Figure 9.

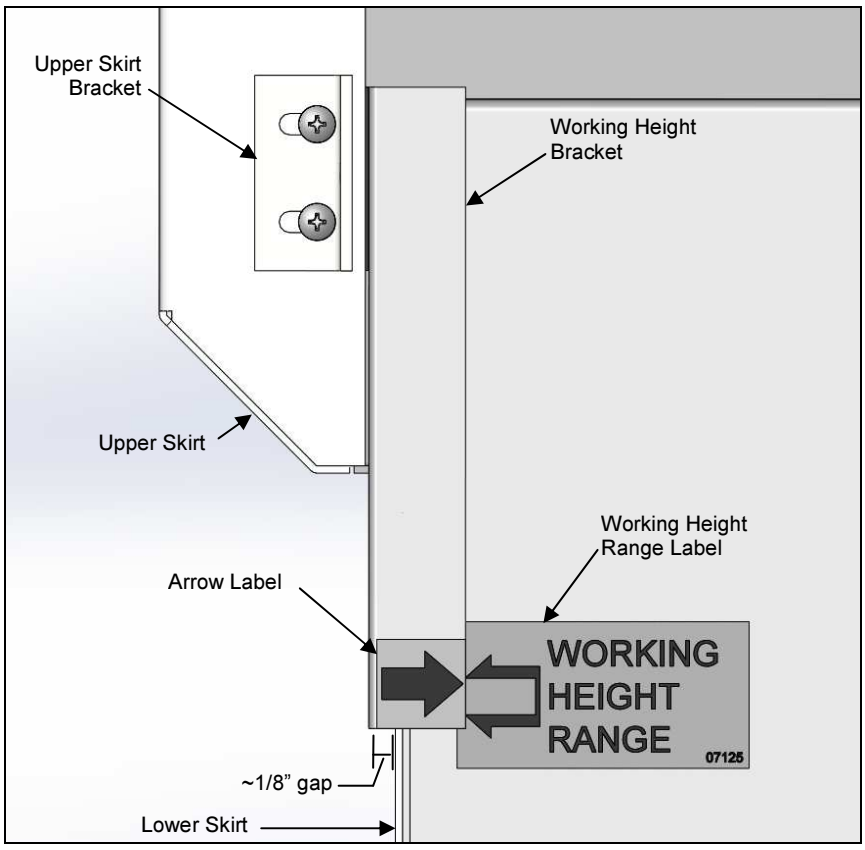



**Figure 9**

4. Install the working height bracket on the left side of the upper skirt using the existing screws for the upper skirt bracket and the included keps nuts. The working height bracket will sit flush with the inside surface of the upper skirt as shown in Figure 10.
5. Adjust the working height bracket to ensure that it does not scrape anywhere along the lower skirt panel and then tighten nuts. When correctly adjusted, there should be approximately 1/8” of clearance between the left side of the lower skirt panel and the flange of the Working Height Bracket.

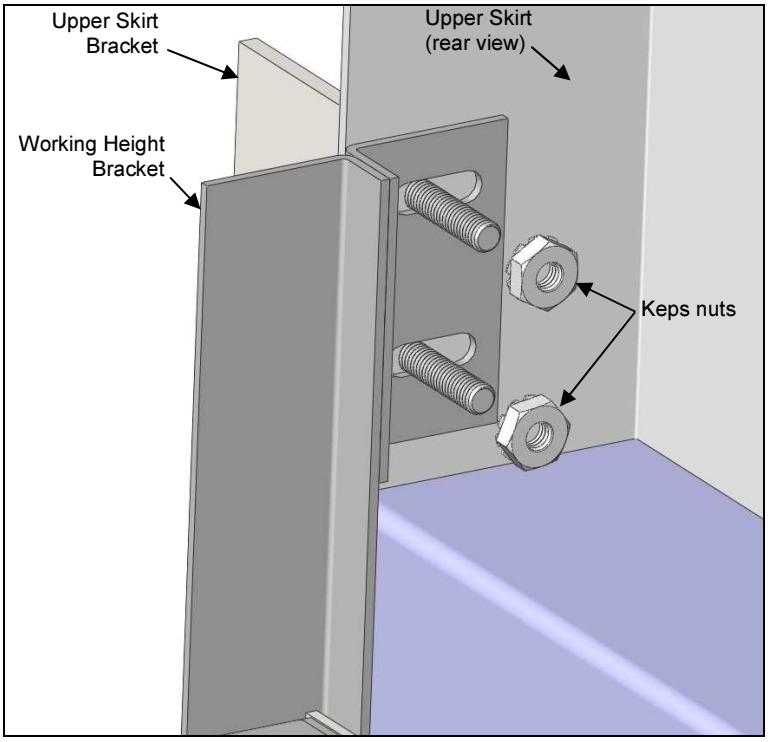



**Figure 10: Rear view of mounting procedure**

6. Turn on power to the table, then lower table until the SID switch activates and stops the table at the correct working height.
7. Turn off power to table.
8. Place the working height range label on the lower front panel. The tip of the upper arrowhead of the working height label should be approximately 1/16” above the arrow tip of the arrow label on the bracket as shown in Figure 9.
9. Reinstall the upper front panel and reconnect power to the table.
10. Operate the table to its extreme upper and lower limits to ensure proper functioning of the table height mechanism and that the bracket does not scrape against any part of the lower panels.
11. Test the electric vertical SID detents in both the up and down directions and verify that the table stops vertically with the arrow label within the indicated range of the working height label.

### 3.3.7. GRID CABINET ELECTRIC LOCK ADJUSTMENT

The grid cabinet electric lock is preset at the factory during assembly. If required during installation the locks can be adjusted using the following procedure:

1. Remove the cover.
2. Loosen the stop nuts.
3. Turn the screws to raise or lower the magnet.
4. The magnet should be placed as close as possible to the braking surface without touching (allow approximately 1/64" gap).
5. Retighten the stop nuts.
6. Move the brake back and forth to ensure the magnet does not scrape against the brake strip.
7. Repeat steps 2 through 6 if required.
8. Replace the cover.

**Transverse Lock Assembly Note:**

Each transverse lock assembly is designed for 50 lbs of holding force. Due to the design of the lock assembly, there is no adjustment for these locks. Holding force will increase through time as the locking pads start to wear, which increases lock pad surface area.

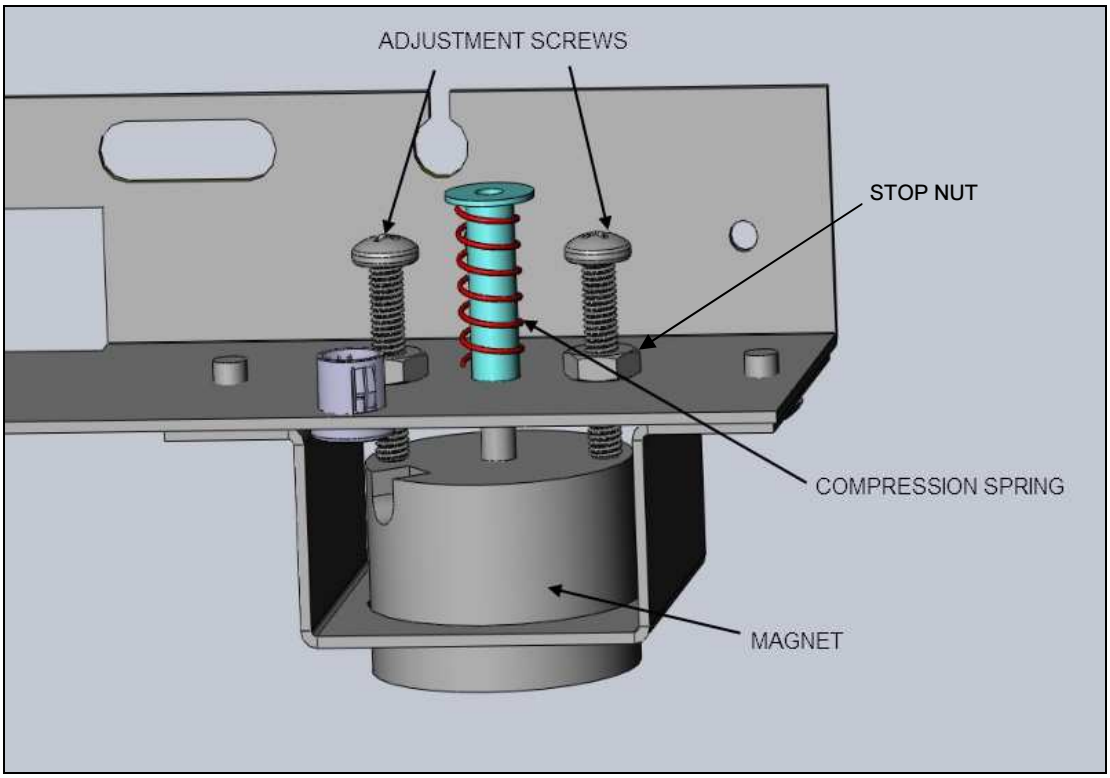



**Figure 11: Grid Cabinet Electric Lock**

### 3.3.8 GRID INSTALLATION

Some table configurations come with the grid and cassette tray packed in a separate box. If this is the case, perform the following:

Locate the box labeled "*Attention Installation Personnel Grid and Tray for Table Are Packed Inside."* To install the grid use the following procedure:

If the table has a grid cabinet (no bucky) without AEC:

1. Remove grid from grid packaging and place on a flat surface, tube side down and the center line running from right to left.
2. Remove the top cover from the grid cabinet, mounted in the table. Detach the mating portions of the Velcro strips (the strips with the release paper still attached) from the Velcro strips already on the grid cabinet.
3. Install on the grid the Velcro strips removed in step 2. Place one strip on the bottom edge and one on the top edge of the grid. Both should be approximately 1/16" from the edge and should run the full length of the grid
4. Position the grid so that the Velcro strips on the grid match with the mating velcro strips already installed in the grid cabinet.
5. Important Step: Ensure that the center line of the grid is in line with the center line of the image receptor and press down slightly on the two edges of the grid to insure proper engagement of the Velcro strips.
6. Reinstall the grid cabinet cover.

If the table has a grid cabinet with AEC, or a bucky (with or without AEC):

1. Remove the top cover from the grid cabinet, mounted in the table.
2. Remove the four L-shaped grid retaining clips at the corners of the grid frame of the cabinet.
3. Remove grid from grid packaging.
4. Position the grid so that it is approximately centered within the grid frame of the cabinet.
5. Important Step: Ensure that the center line of the grid is in line with the center line of the grid frame.
6. Reinstall the grid retaining clips. The interior 'L" of the clips should frame the outer corners of the grid, with only the small tabs on the legs of the clips contacting the grid to hold it in place.
7. Reinstall the grid cabinet cover.

## 3.4 ELECTRICAL INSTALLATION AND ADJUSTMENTS

### 3.4.1 WIRING AND ELECTRICAL CONNECTIONS

The elevator table is furnished with a power supply and control circuit board, mounted in the front right corner of the table base. A mains supply cable with an integral three-prong plug is pre-connected to the table power supply. Connect the supply cable to an appropriate power supply, either a wall outlet or fused disconnect.

The required input for the S211 table is 115 VAC (nominal), 6 Amp (minimum), either 50 or 60 Hz. Cable strain relief brackets and access holes are located at the rear of the table base.

**ATTENTION**

**TO ENSURE PROPER GROUNDING AND REGULATORY COMPLIANCE THE SUPPLIED INCOMING GREEN/YELLOW WIRE MUST BE CONNECTED TO EARTH GROUND.**

- Optional PBL will wire directly to the collimator logic circuitry per the manual.
- Optional Bucky cabling will wire directly to the X-ray generator per the manual.
- Optional AEC connections will plug directly into the generator per the manual.

The J8 connector on the table power supply board is an isolated contact closure that occurs when the table is at the field-selected working height. This contact closure can be wired to the generator as an interlock to prevent exposure when the table is not at the working height, or can be wired in series with tubestand vertical SID switches on PBL systems as verification of a 40-inch source-to-image distance.
All cabling will enter or exit the table at the rear of the base or through a floor access area (a 17" x 17" opening centered front to back at the left side of the table).

### 3.4.2 POWER SUPPLY SERVICING

**WARNING**
Disconnect power prior to servicing. High voltages and moving parts are exposed that can cause serious injury when the front panels are removed.

To service the power supply inside the base of the elevator table:

1. Remove the upper and lower front panels.
2. Press down on the red service switch. The red indicator light near the switch should turn off.
3. Remove (1) #10-32 screw and spacer from the base of the power supply. (Refer to Figure 12).
4. Grasp the power supply base firmly and slide the entire unit forward to clear the rear screw engagement, and then up from the table base.
5. When servicing is complete, repeat steps 1 through 4 in reverse order.

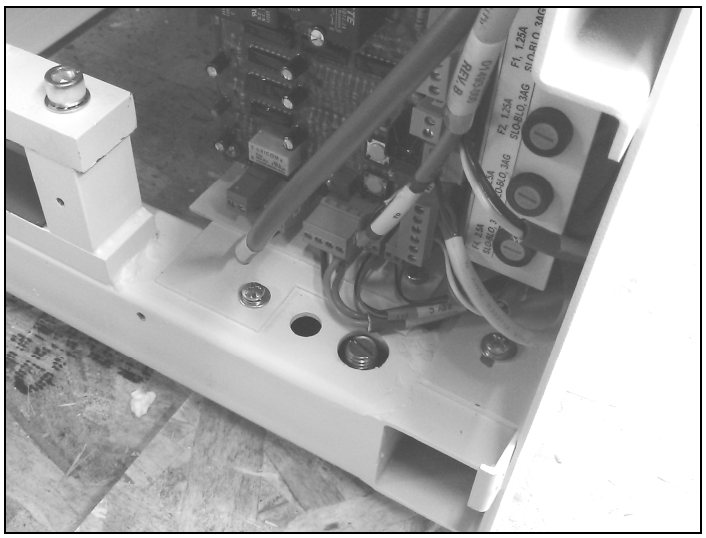


**Figure 12: Power Supply Servicing**

### 3.4.3 THEORY OF OPERATION

An enclosed screw drive actuator, driven by a DC motor in the table base, controls the elevating function of the table. The motor is powered by an unregulated 30 VDC power supply and relay driven directional logic, which provides a soft-start and soft-stop function to ensure smooth operation in both directions.

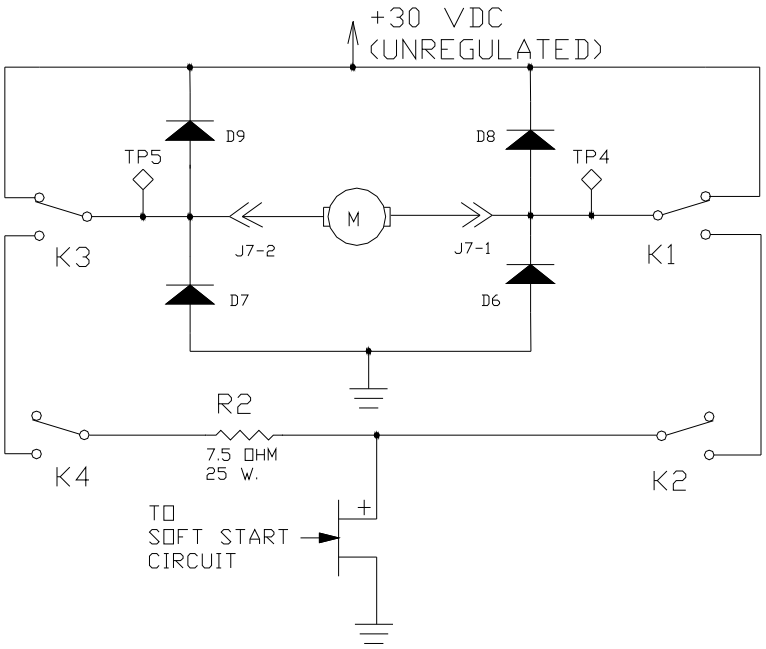



**Figure 13: Equivalent Drive Circuit**

**Sequence of Operation**

**Idle Mode:** All four relays are OFF and the Normally Closed contacts of K1 and K3 short the motor leads together, acting as a motor brake.

**Upward Motion:** Relays K1 and K2 are energized in order to drive the motor in the upward direction. Upon activation, relay K2 closes slightly before K1 closes. When the drive is deactivated, relay K2 also opens slightly before relay K1. The difference in activation and release times of these relays is approximately 150 milliseconds.

**Downward Motion:** Relays K3 and K4 are energized in order to drive the motor in the downward direction. Upon activation, relay K4 closes slightly before K3 closes. When the drive is deactivated, relay K4 also opens slightly before relay K3. The difference in activation and release times of these relays is approximately 400 milliseconds. Resistor R2 functions as a current limiting resistor, limiting motor currents in the DOWN direction only.

| Relay | Relay conditions during operational modes | | |
|---|---|---|---|
| | Idle | Up | Down |
| K1 | OFF | ON | OFF |
| K2 | OFF | ON | OFF |
| K3 | OFF | OFF | ON |
| K4 | OFF | OFF | ON |

*Relay Truth Table*

**Notes:**

- Transistor Q2 is driven by circuitry that provides the soft-start function for the motor drive. It operates at a high frequency (17 kHz) with a variable duty cycle, which ramps up from 0% to 100% within 500 milliseconds at the beginning of activation, and down from 100% to 0% within 150 milliseconds at the end of the driving event. Test points TP4 and TP5 provide connections to observe motor voltage (See Figure 14).

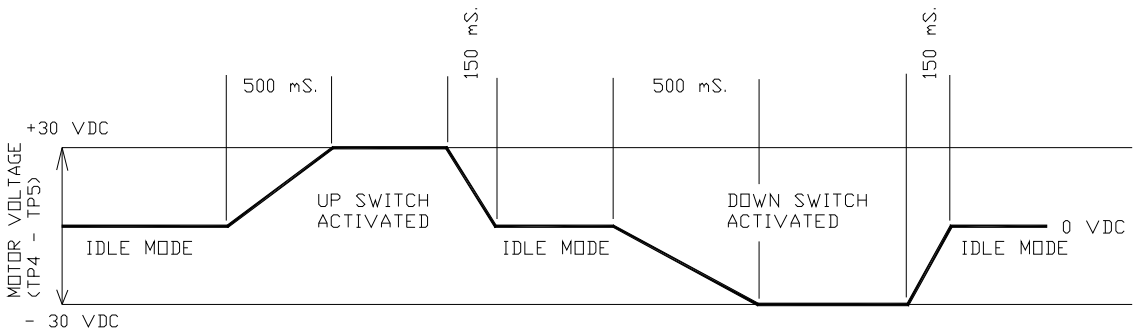



**Figure 14: Timing Diagram**

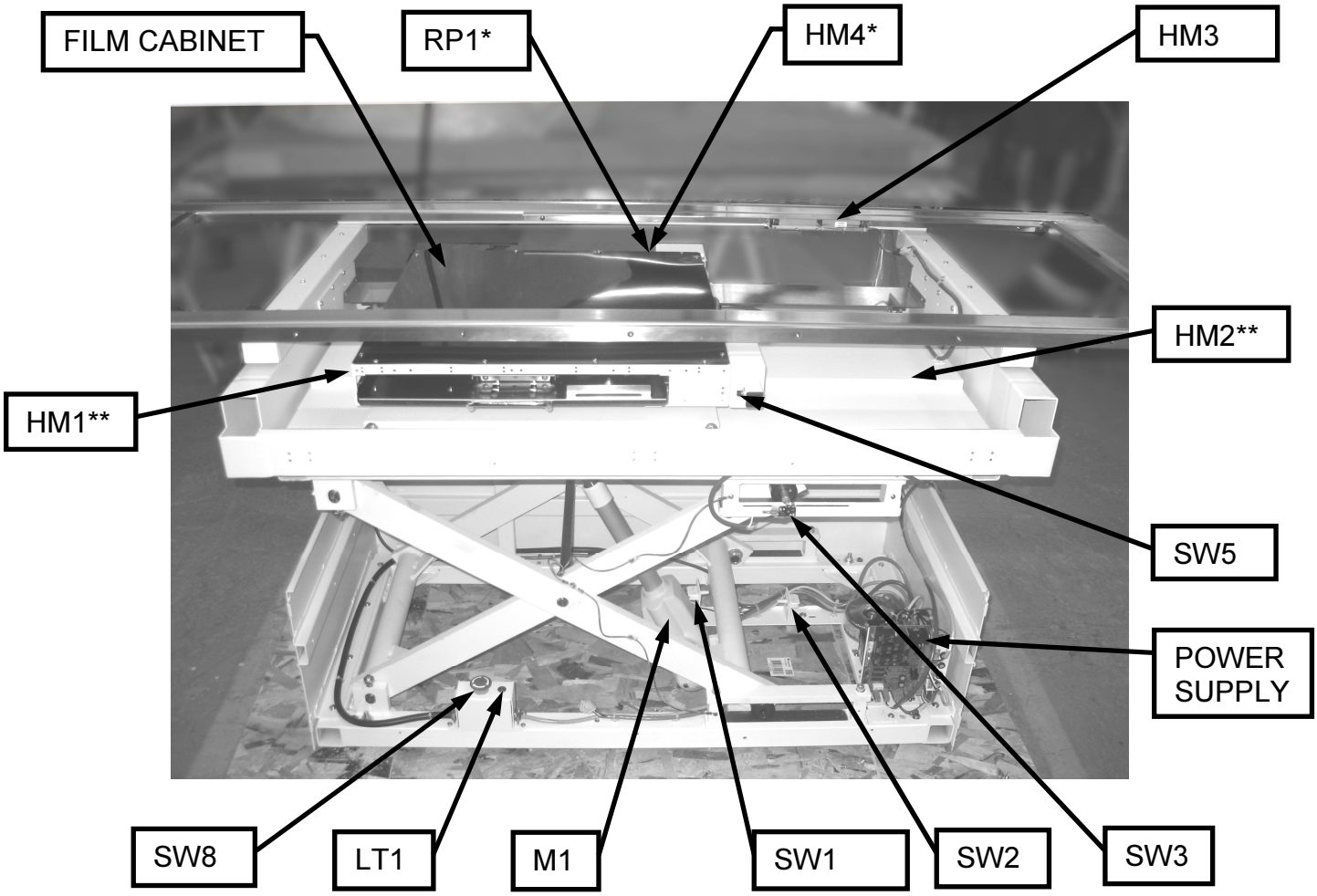
- Diodes D6, D7, D8 and D9 are used as flyback diodes, conducting transient voltages away from the relay contacts during switching operations. They do not provide any logic functions within the circuit.
- If the operator activates the “UP “ and “DOWN” switches simultaneously, the relay logic will prevent motion in either direction.
- The Logic Control Board provides interlock logic that prevents the release of the tabletop locks whenever the “UP” or “DOWN” switches are activated.

An electric detent function is provided that momentarily pauses the upward or downward motion of the table at an adjustable height (between 23” and 34” from floor to tabletop), which is determined at the time of installation. The duration of this pause is adjustable between 0.5 to 1.0 second.

### 3.4.4 ELECTRICAL COMPONENT LEGEND

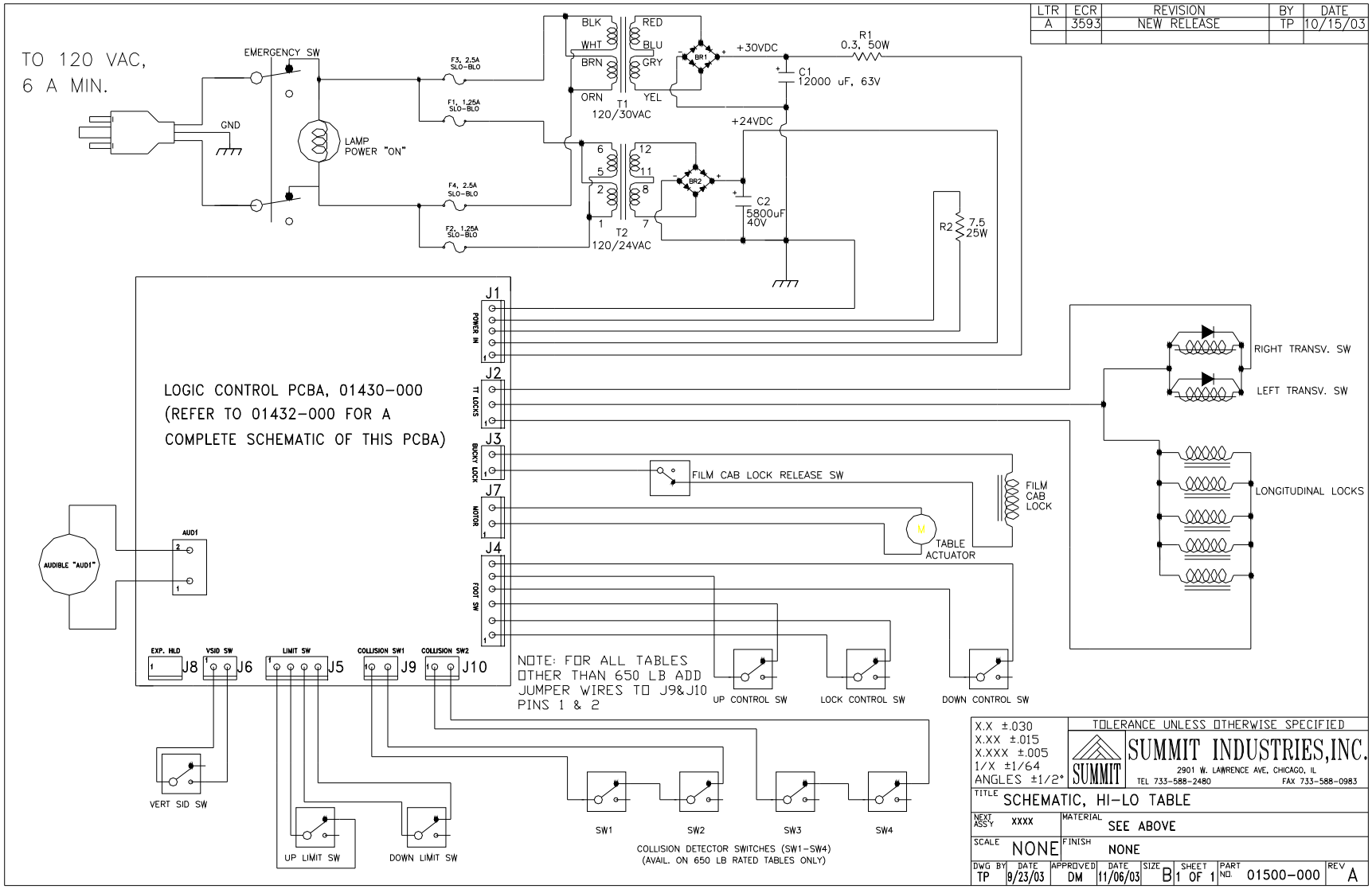
| I.D. | DESCRIPTION | FUNCTION | LOCATION |
|---|---|---|---|
| C1 | Cap, 12000 uF, 63V | Filter Cap | On power supply |
| C2 | Cap, 5800 uF, 40V | Power for locks | On power supply |
| F1 | Fuse, 1.25A, Slo-Blo | Line current limit | On power supply |
| F2 | Fuse, 1.25A, Slo-Blo | Line current limit | On power supply |
| F3 | Fuse, 2.5A, Slo-Blo | Line current limit | On power supply |
| F4 | Fuse, 2.5A, Slo-Blo | Line current limit | On power supply |
| T1 | Transformer, 120/30VAC | Step down 120V input | On power supply |
| T2 | Transformer, 120/24VAC | Step down 120V input | On power supply |
| BR1 | Bridge rectifier | Convert ac to dc | On power supply |
| BR2 | Bridge rectifier | Convert ac to dc | On power supply |
| R1 | Resistor, 0.3 ohm, 50W | Current limiting | On power supply |
| R2 | Resistor, 7.5 ohm, 25W | Current limiting | On power supply |
| PCB | Logic control board | Control all motion of table and looks | On power supply |
| HM1 | Solenoid, 24Vdc | Tabletop lock (left transverse) | Table base, top left |
| HM2 | Solenoid, 24Vdc | Tabletop lock (right transverse) | Table base, top right |
| HM3 | Electro-magnets, 24Vdc | Tabletop lock (longitudinal) | Under tabletop, upper right rear |
| HM4 | Electro-magnet, 24Vdc | Image receptor carriage magnet | Right rear of bucky-grid cabinet |
| LT1 | Pilot light, red, 120Vac | Indicates “power ON” | Table base, bottom front center |
| M1 | Motor, 120Vac | Raise & lower tabletop | Table base, bottom center |
| RP1 (opt.) | Receptacle | Connects to size sensing tray | Rear of film cabinet |
| SW1 | Switch, DPDT, white push button | “UP” travel limit | Table base, bottom center |
| SW2 | Switch, DPDT, white push button | “DOWN” travel limit | Table base, bottom right |
| SW3 | Switch, SPDT, micro sw | Vertical Detent | Table base, upper front right |
| SW4 | Switch, SPDT, micro sw | Operator’s foot switch, “UP” | Table base, bottom front right |
| SW5 | Switch, SPDT, black push-button | Image receptor carriage lock | Bucky-grid cabinet, front right |
| SW6 | Switch, SPDT, micro sw | Operator’s foot switch, (tabletop locks) | Table base, bottom front center |
| SW8 | Switch, power interrupt | Interrupts power to table | Table base, bottom front center |
| SW9 | Switch, SPDT, micro sw | Operator’s foot switch, “DOWN” | Table base, bottom front left |

### 3.4.5 COMPONENT LOCATION IN TABLE (K734)




* HM4 AND RP1 ARE LOCATED BEHIND THE FILM CABINET
** HM1 AND HM2 ARE LOCATED UNDERNEATH TABLE BASE COVERS

## 3.4.6 SCHEMATIC, HI-LO TABLE (01500)



## 3.4.7 SCHEMATIC, LOGIC CONTROL, HI-LO TABLE (01432)