Rev.2

INSTALLATION AND SERVICE MANUAL

"triton"

FLOOR MOUNT TUBE SUPPORT (FMTS)

MODEL NO: 09-000

Manual Number: 02-FMTS Revision: 2 Date: Sept., 2010

DURABLERELIABLEPRECISIONCRAFTED

Please have available the following information when requesting technical assistance:
Model name and number Serial number Date and place of purchase

The original draft of this document is written in English.

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1. GENERAL INFORMATION

1.1 INTRODUCTION

This manual provides information necessary for operation, installation and adjustment/ calibration of the Floor Mount Tube Support, product number 09-000. Throughout this manual, the Floor Mount Tube Support will be referred to as the "FMTS".

1.2 DESCRIPTION

The Floor Mount Tube Support is of the heavy duty manually operated, fully counterbalanced, floor mounted type, designed to accommodate the compatible components listed in this section.
The vertical column consists of a freestanding column, enclosing a counterweight designed to balance the associated weight of the supported X-ray tube and collimator.
The X-ray tube is easily positioned at any selected point within its total travel range. The column provides vertical movement of approximately 64 inches.
The X-ray tube rotates a full 360-degree (+/-180 degree) about the vertical tube axis with manual detent/stops at each 90-degree position. Tube rotation about its horizontal axis is also 360 degree (+/- 180 degree) with mechanical indexing at each 90-degree position. This movement is possible only with using Tube Rotate Lock Release; see Figure 2.1.

1.3 PRODUCT REGISTRATIONS

IEC 60601-2-32 (1994),
EN 60601-1, EN 60601-1-2, EN 60601-2-32,
IEC 601-2-32:1994,
CSA C22.2 No. 601.1M90.
This is Class 1 Equipment – Grounded Equipment.
This equipment is classified as a Ordinary EQUIPMENT with respect to ingress of liquids.
This equipment is not suitable for use in the presence of a FLAMMABLE ANESTHETIC MIXTURE WITH AIR or WITH OXYGEN OR NITROUS OXIDE.

1.4 COMPATIBLE COMPONENTS

The following equipment is compatible with the FMTS:

1.4.1 X-RAY TUBES

All X-ray tubes in the following series, which have a 180-degree cable termination to the output port, are considered compatible to the tube mounting platform or mounting rings.

VARIAN DIAMOND / SAPPHIRE SERIES
DUNLEE PX 1300 / PX 1400 SERIES

1.4.2 COLLIMATORS

Machlett Collimator "C" 150 kVp Automatic Collimating System.
Eureka Linear or MC Series
Collimare CM Series

Other Vendor's tubes and collimators may be compatible as listed in their respective documentation.

In case of using other (bigger) X-ray tubes or collimators with the triton FMTS, we recommend to consider some restrictions in movement and/or some necessary adjustment.

1.5 OPTIONS

- Extended Floor Tracks
- X-ray tube mounting ring arrangement. (trunnion)

1.6 POTENTIAL ELECTROMAGNETIC OR OTHER INTERFERENCE

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, it may cause harmful interference with radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the unit off and on, the user is encouraged to try to correct the interference by one or more
of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experience radio/TV technician for help.

2. OPERATION

2.1 SAFE OPERATION

Careless or improper use of X-ray equipment can be extremely dangerous. It is imperative that this equipment be operated and serviced only by trained personnel familiar with the proper use of OTS and the safety precautions required to prevent excessive exposure to primary and secondary radiation.

Although the FMTS includes protective design features for limitation both the direct (primary) X-ray beam and the secondary radiation produced by this beam, design factors alone cannot prevent human carelessness, negligence or lack of knowledge. This machine is sold with the understanding that the user assumes sole responsibility for radiation safety. The manufacturer or its agents and representative do not accept any responsibility for:

a) Injury or danger to any person from X-ray exposure.
b) Overexposure due to poor operating techniques or procedures.
c) Any problem or hazard resulting from improper servicing or failure to maintain equipment as specified in this manual.
d) Equipment, which has been modified or tampered with in any way.

WARNING!

When power is disconnected from the unit the transverse & longitudinal locks are released allowing free rolling motion of the tube assembly. The unit must be level to ameliorate free motion at this time.

2.2 OVERVIEW

The operator control panel for "triton" FMTS provides handles to allow the tube support to be moved, momentary push buttons to release the electric locks and a LCD display showing SID and tube longitudinal, transverse and angular positioning status.

2.3 CONTROLS

These operator controls are provided:

Center horizontal "Squeeze" handle with 1-momentary trigger switch,
3-momentary pushbuttons near left handle,
3-momentary pushbuttons near right handle,

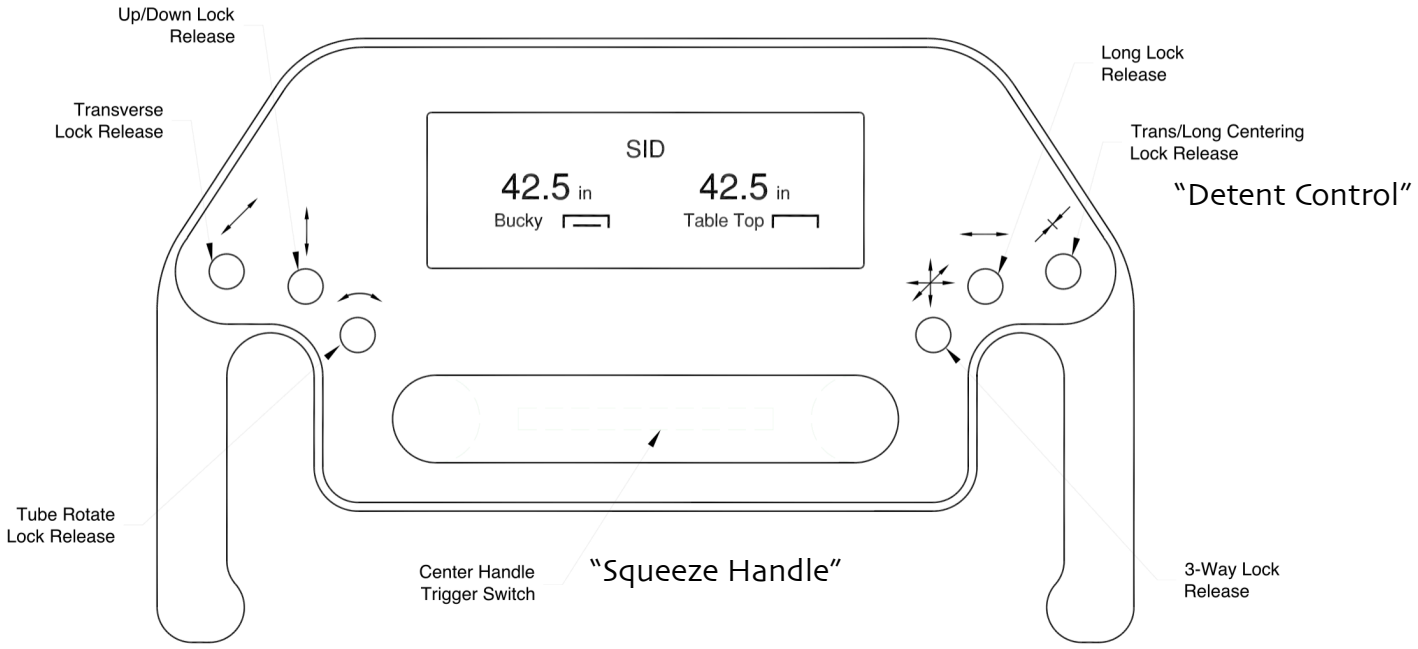


Figure: 2.1 Control Handle with operation switches

2.3.1 PUSHBUTTONS

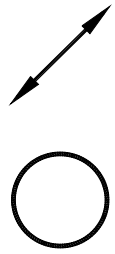
There are 6 momentary pushbuttons, 3 on each side, comfortably reachable with the thumb while holding either the left or right handle.

The left side pushbutton functions are:

Top: Transverse Lock Release
Middle: Up/Down (SID) Lock Release
Lower: Tube Rotate lock Release

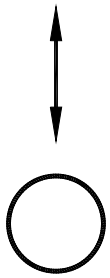
The right side pushbutton functions are:

Top: Transverse/Long Centering Lock Release (Detent Control)
Middle: Long Lock Release
Lower: 3-way Lock Release



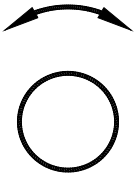
2.3.1.1 Transverse Lock Release

While this button is pressed, the transverse locks are released. This allows the OTS to be manually moved only in the lateral (transverse direction).



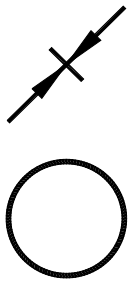
2.3.1.2 Up/Down (SID) Lock Release

While this button is pressed, the up and down counterweighted motion lock is released, allowing the tube to be manually moved up and down to adjust the SID (Source to Image Distance).



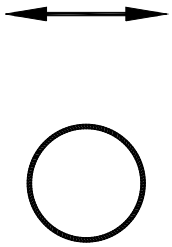
2.3.1.3 Tube Rotate Lock Release

While this button is pressed, the tube rotation lock is released, allowing the tube to be manually rotated, +/- 180-degree. There are mechanical detents every 90-degrees.



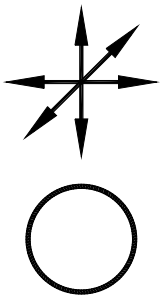
2.3.1.4 Transverse/Long Centering Locks Release **(Detents)**

While this button is pressed, the transverse, vertical and longitudinal locks are released, (unless the unit is positioned at each respective detent position). When the unit is panned through a detent position, the locks will automatically come on, holding that axis at the calibrated detent position.



2.3.1.5 Long Lock Release

While this button is pressed, the longitudinal locks are released. This allows the tube support to be manually moved only in the long direction.



2.3.1.6 3-Way Lock Release - **"ALL LOCKS" (EXCEPT TUBE ROTATION)**

While this button is pressed, all three Longitudinal, Transverse and Vertical locks are released, allowing the tube to be manually moved in all three directions.

When each axis is at its detent position, no motion in that axis is allowed. To release either axes from this centered position, one of the other lock release buttons can be used. For example the 3-way float switch overrides these center detents. Likewise the transverse and long lock release buttons will release respective axis from the center detent.

The centering lock release logic depends somewhat on the current SID mode: Vertical SID mode or Horizontal SID mode, as follows:

In the vertical SID mode, the X-ray tube is rotated to the 0-degree detent (collimator down). In this mode, a transverse center position is normally defined to be at the center of the table. There is no longitudinal lock position in this mode, since the film cassette is not fixed (this transverse center position is defined during system calibration. It corresponds to the position where the X-ray tube is exactly centered over the tabletop).

In the horizontal SID mode, the tube is rotated to the 90-degree position and an alternate set of centering positions are defined for operation with the wall Bucky. These locations are calibrated to properly align the tube for these horizontal operations. There are four horizontal SID lock positions, which are typically calibrated to represent the standard SID positions of 36", 40", 44" and 72", although they can be calibrated for any position. TYPICAL INSTALLATIONS WILL ONLY HAVE 40" & 72" Detents Calibrated (and the others will be calibrated outside the normal travel range so as to not interfere with the commonly used 40 & 72). The locks will be engaged when any of these positions are found. With the tube rotated to this position, the normal over tabletop center position is ignored. If the tube is rotated to any other position other than the 0-degree or 90-degree detents, then the centering locks are not used.

2.4 CENTER HANDLE - "SQUEEZE HANDLE"

The center handle trigger switch is momentary and when engaged it will release all locks except the tube rotate lock. This allows the entire tube support to be easily panned around and up/down movement made by one hand. This has the exact effect as the 3-way button described above.

2.5 DISPLAY

Mounted on control handle is a LCD Display, which is used to show the current X-ray tube positions. In normal operation, there is several display modes depend on the orientation of the tube rotation:

a) Tube is at 0-degrees (not rotated) and table height is known,– Shows SID values to table, (distance from focal spot to table Bucky and to tabletop). This is the standard configuration.
b) Tube is at 0-degrees, but table height is not known - Shows tube rotation angle (0). This is a non-standard configuration.
c) Tube is at +/- 90-degree detent – Shows SID to wall Bucky, (distance to wall Bucky) In this mode the display graphics are rotated to keep text horizontal.
d) Tube is at any other angle – Shows tube rotation angle, in 1-degree increments. In this mode the only angle of tube is displayed.

For the installation professional, the display is also used in the service modes to display various menus and prompts for calibrations.

2.5.1 SID to TABLE DISPLAY

When the X-ray tube is not rotated (<3 degrees), and the table height is known, then two values are simultaneously displayed:

a) Distance from focal spot to table Bucky (Cassette Face -- FFD)
b) Distance from focal spot to table top

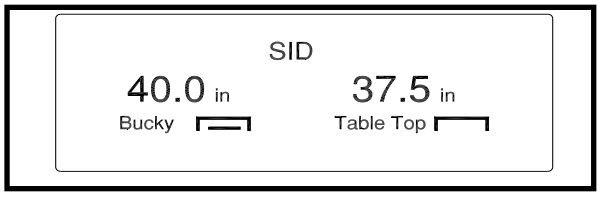


Figure 2.5.1 Vertical SID Mode Display

A service selectable option allows these two values to be displayed in inches or centimeters. In the inch mode, values are displayed to nearest 1/10 of inch. In centimeter mode, values are displayed to the nearest centimeter. Hysteresis is added to ensure that the display values do not "flicker".

The display is organized into three text "lines":

a) The display shows the letters "SID" with fairly large text, centered on the top line of the display.
b) Below that on the second (middle) line, the two numeric values are shown, again with large text. The left side shows the distance to the Bucky and the right side shows the distance to the tabletop. Immediately to the right of each numeric value the units will be shown in smaller size "in" or "cm".
c) The tabletop. Immediately to the right of each numeric value the units are shown in smaller text size "in" or "cm".
d) The bottom line shows the words "Bucky" and "Table Top" directly under the numeric readouts. These indicate the film orientation.

Graphic "pictorial" symbols are shown immediately to the right of the "Bucky" and "TableTop" words to represent the SID mode as shown on Figure 2.5.1.

2.5.2 SID to WALL BUCKY DISPLAY

The display will also show the SID distance to a wall Bucky. In this mode, the tube is rotated to the 90-deg detent and the unit displays the distance from the focal spot to the Bucky or image plane. The Bucky can be on the right side or left side, as setup in the service mode. In this mode the display is "rotated" to read right side up and will show only the SID to Bucky value.

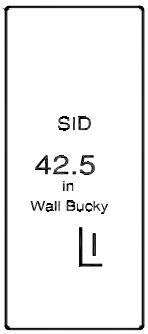


Figure 2.5.2 Wall Bucky SID Mode Display

This symbolizes film or image plane distance to the Cassette inside the Bucky or imager.

2.5.3 TUBE ROTATION ANGLE DISPLAY

When the tube is rotated more than 3 degrees away from the 0-degree or 90-degree detents or when the rotation lock release button is pressed, then the rotation angle is shown in place of the SID values. In this mode the SID value are not valid, so they are not needed.

The current rotation angle is displayed to the nearest whole degree value, with hysteresis added to ensure that the display does not "flicker".

The tube can be rotated from -180 degrees to +180 degrees. As the tube is rotated, the display rotates with it, therefore it is desirable to have the display text be automatically adjusted to read "right side up". There are two display orientations for the angle display mode:

a) Normal: -90 deg. to +90 deg.
b) Inverted: -180 deg. to –91 deg. and +91 deg. to +180 deg.

Hysteresis is used to avoid the display flickering back and forth between these modes.

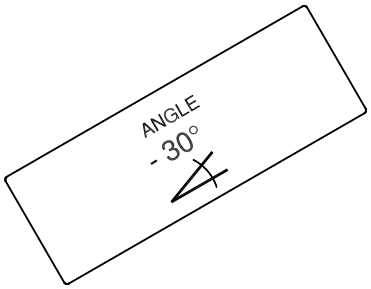


Figure: 2.5.3 Tube Angle Mode Display

2.5.4 DISPLAY BACKLIGHT CONTROL

The LCD uses a CCFL (Cold Cathode Fluorescent*) tube for backlighting to achieve the brightest display. To ensure maximum life of the backlight bulb, the software will automatically turn off the backlight when the system bas been idling for an extended period. The backlight can be re-enabled with any operator activity including pressing any button.

2.6 SERVICE MODE

The system can be placed into the service mode either by pressing the service pushbutton switch, which is located inside the covers or by pressing an exact sequence of normal user pushbuttons.

*Some units use a modern LCD alternative

To active the service mode with the normal user controls, an exact "magic" sequence must be followed. This sequence is such that it is highly unlikely that a normal user would activate the sequence. See Section 5.1.3.

Once in the Service menu, the display will prompt for all necessary services and calibration menu functions including, but not limited to:

a) Roll /Vert. /Long. /Trans. /Table Pot calibration
b) Long. /Trans. /Vert. 40" SID position over table calibration
c) Long/Trans. position calibration for wall Bucky
d) Horizontal SID calibration (36", 40", 48" and 72")
e) Table top to film plane offset

Service Menu and Calibration Procedure are explained in later chapters.

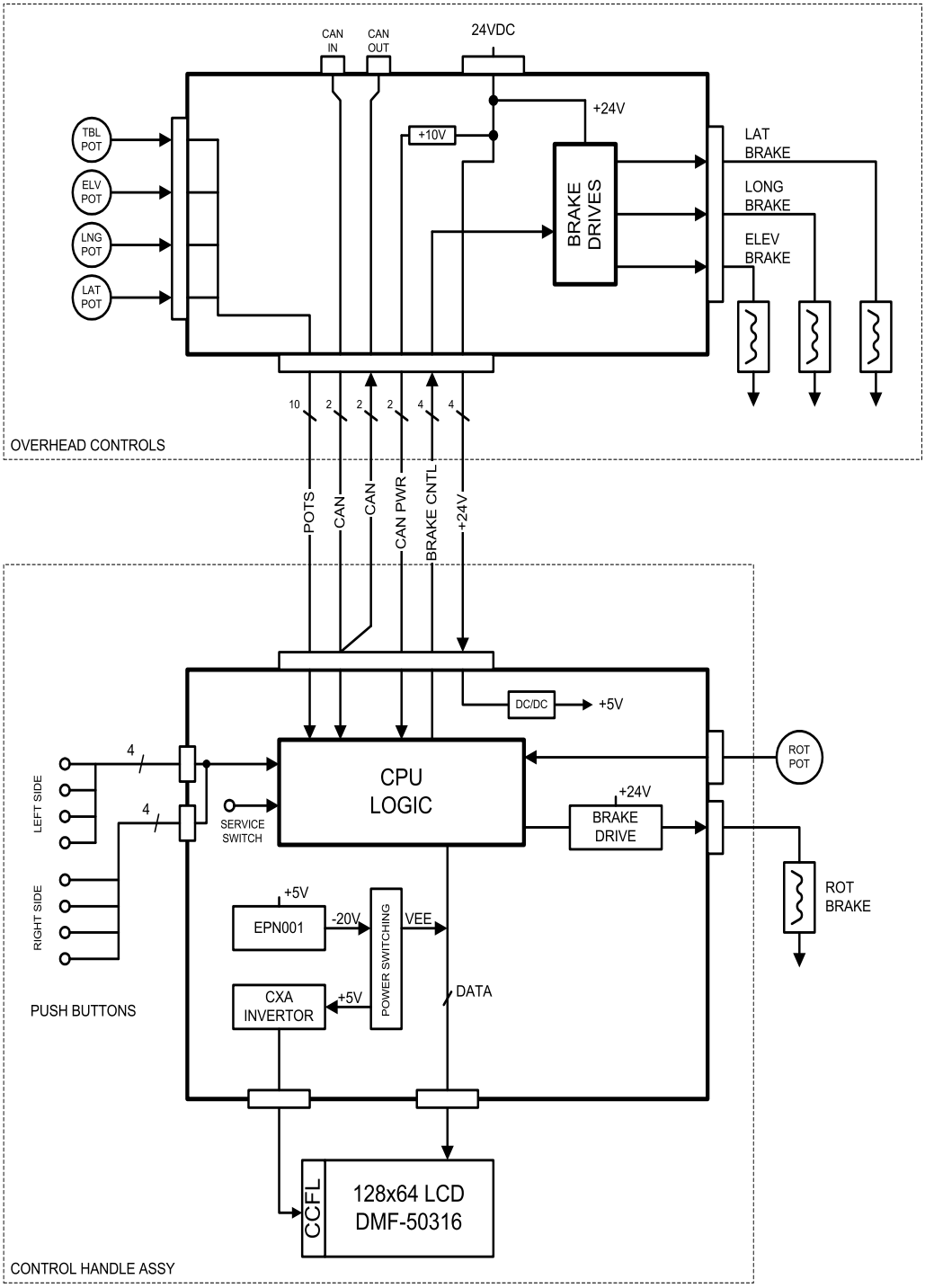
2.7 ELECTRONIC CONTROL ASSEMBLIES

The OTS electronics are comprised of two separate control assemblies:

a) Display Board Assembly **(Handle Board)**
b) Interconnect Board Assembly **(Top Board or Communications Board)**

The following is a block diagram of the OTS electronics assemblies:

Figure: 2.7 Block Diagram - OTS Control Assemblies



*Some Units drive brakes not from the interconnect board but rather the brakes are driven from the power supply board. Schematics of both are contained herein.

2.7.1 DISPLAY BOARD ASSEMBLY

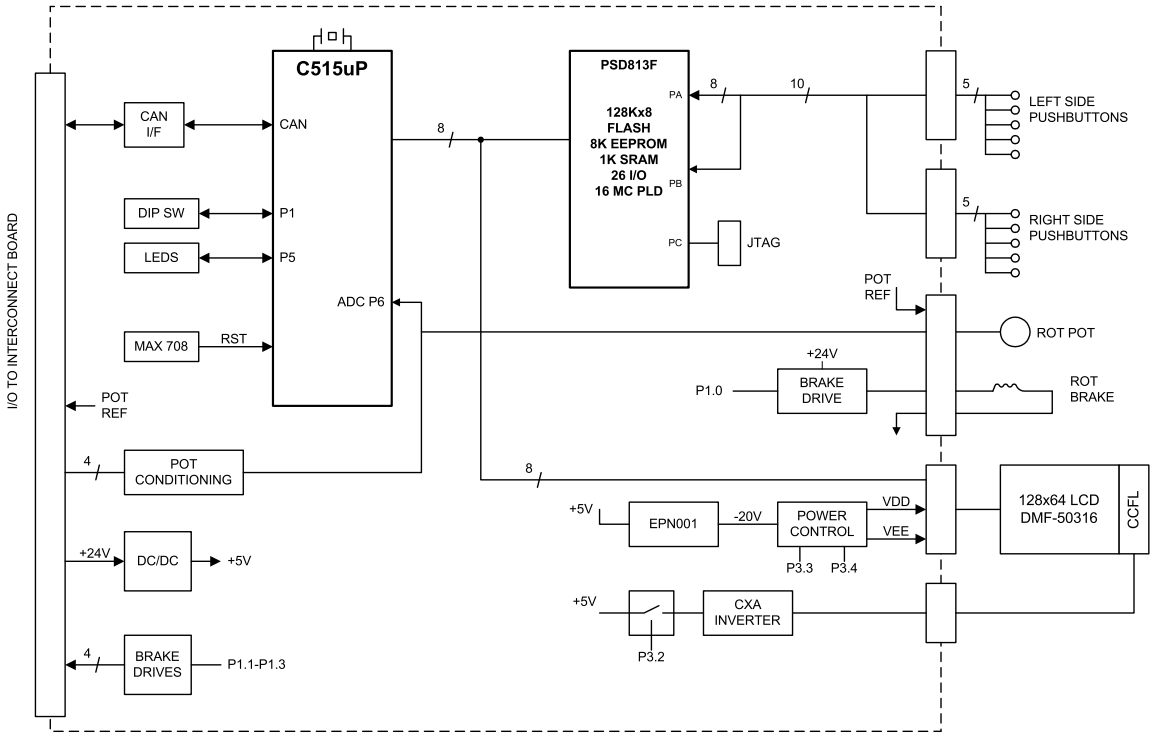


Figure: 2.7.1 Block Diagram-Display Board

The Display Board Assembly is located inside the control handle, immediately behind the LCD display. It contains the main CPU and electronics for the OTS control.

2.7.1.1 BASIC DISPLAY BOARD FEATURES

+ Main Control Electronics for FMTS
+ Siemens C515 microprocessor (8051 family)
+ Flash EPROM memory, field upgradeable
+ LCD display power and interface logic
+ 10 pushbutton switch inputs
+ 1 service switch (on board)
+ 5 pot inputs (10-bit ADC)
+ CAN bus communications with system
+ Brake control signals (software controlled)
    1 on board power supplied brake drive (tube rotation brake)
    3 off board brake control circuits (Vert, Long, Trans - power from Top board)
+ DC/DC converter for +24V to +5V logic
+ TDK CXA series backlight inverter module
+ Zentek EPN001 5V to –24V converter module for LCD bias supply
+ Optrex DMF-50316 240x64 dot LCD module with CCFL backlight*
+ AD202 "SmartLevel" tilt sensor (not shown)

*Some units use a modern LCD alternative

2.7.1.2 CONNECTORS

Eight (8) connectors are located on the Display Board Assembly:

a) I/O to overhead interconnect board, 26-pin 2x13 header
b) Left side pushbuttons, 6-pin header
c) Right side pushbuttons, 6-pin header
d) Rotation Pot/Brake, 5-pin header
e) LCD data I/F, 20-pin 2x10 header socket
f) LCD CCFL backlight, 4-pin JST
g) Front panel "flex switch" 5-pin header **(AUTO -- present only for OTS motorized versions)**

2.8 INTERCONNECT BOARD ASSEMBLY

The Interconnect Board Assembly is located overhead in the FMTS system. It contains the power supplies, the external interconnections and the transverse, longitudinal and vertical brake drivers (power for the tube rotation lock is supplied by the display board).

Since the space inside the handle control is very limited, all system interconnections are handled on this board located overhead where space is ample. In general this board provides mostly I/O connectors, brake drive circuits and power supplies. No logic functions are handled by this board.

The functions provided by the interconnect board are:

a) 24VDC power supply, powered from externally supplied 90-264VAC.
b) Three main brake drive circuits (Vertical, Longitudinal and Transverse). A 4th Spare is also provide for. Controlled by signals from the CPU module, these circuits are really just simple power switches.
c) Terminal strip connector for brake connections.
d) Terminal strip for 5 pots, signals are routed to CPU module below.
e) CAN Input/Output connectors (each 15-pin D).
f) +10V isolated CAN supply.
g) Uses 3.81mm pitch EURO style screw style terminal strip connectors:
   Phoenix style MC, MCVW and MCVR family (or similar).
h) 26-pin header I/O connects to display board via 12-1/2 pair cable.
i) SID status relay outputs.

*Later Units drive brakes not from the interconnect board but rather the brakes are driven from the power supply board. Schematics of both are contained herein.

3. INSTALLATION INSTRUCTIONS

3.1 INTRODUCTION

Thoroughly review this section before unpacking, handling or moving the FMTS.

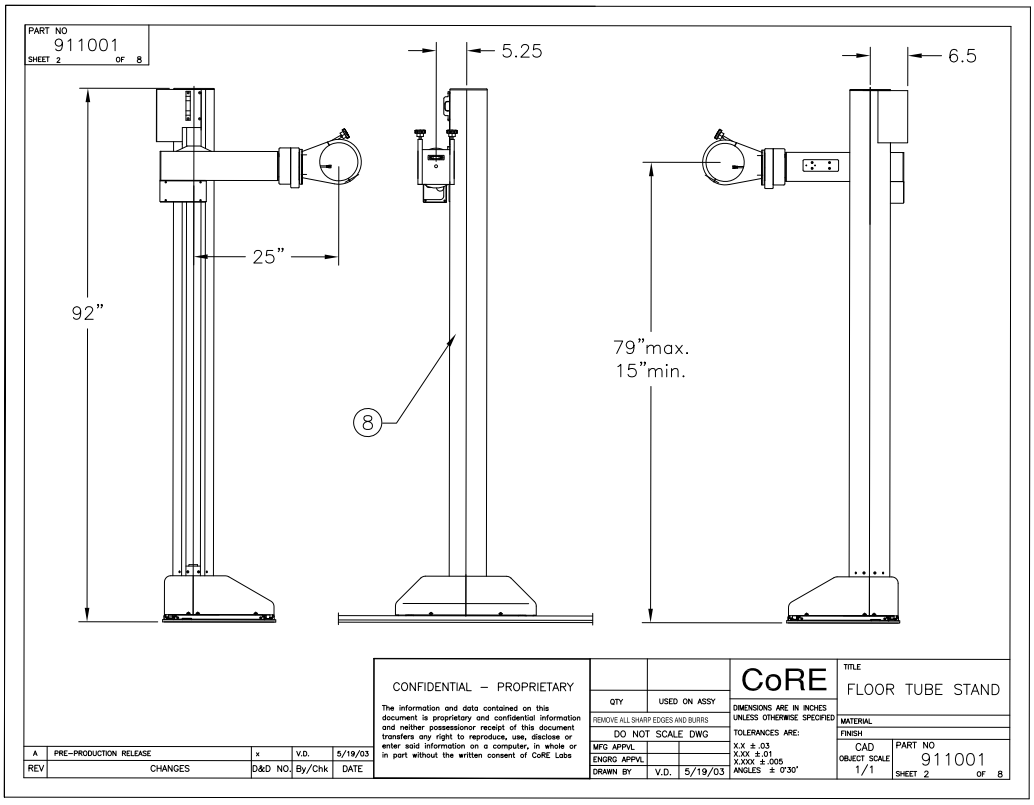
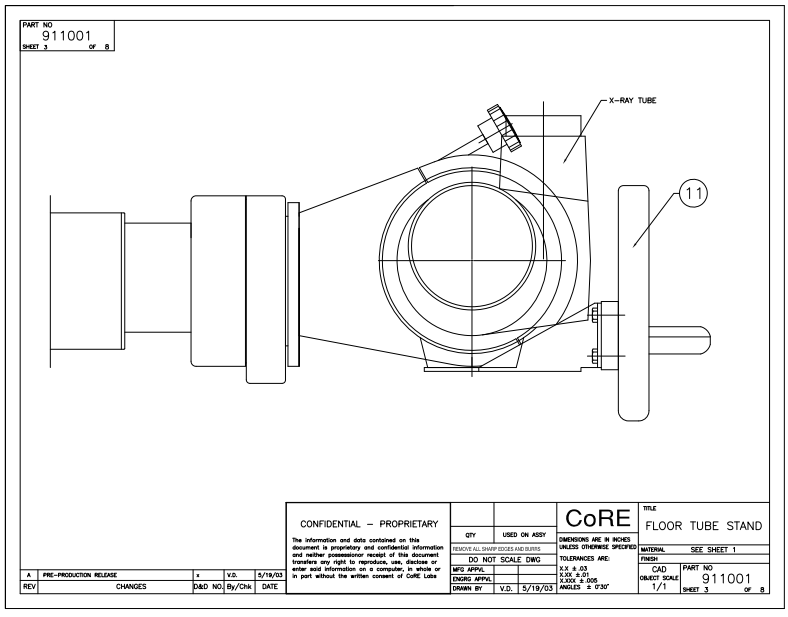


Figure 3.1. Standard Column Configuration With Optional Trunnion



Please Note:
Optional trunnion mounts will move the tube further away from the floor track.

The following drawing are provided to familiarize yourself with the construction and makeup of the triton FMTS. Familiarization of the components will greatly speed your installation time. Installation of this FMTS requires a skilled x-ray installation professional familiar with Floor Mount Tube Stands similar to this model from CoRE labs.

Proper room layout is required. Such room layout is typically provided by an X-Ray Architect. If you don't have architect plans for your installation location, please call CoRE labs for instructions on how to begin and complete your installation -- 303-761-0131.

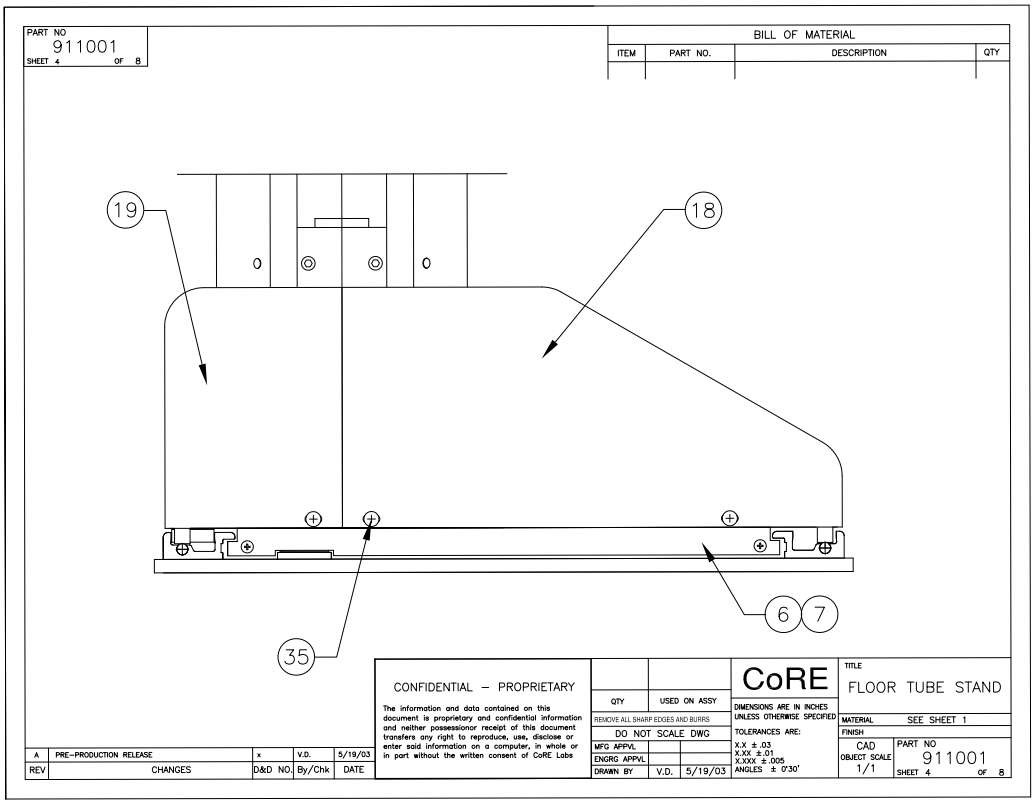


Fig.3.3-1 Side View of Column Base with Covers attached.

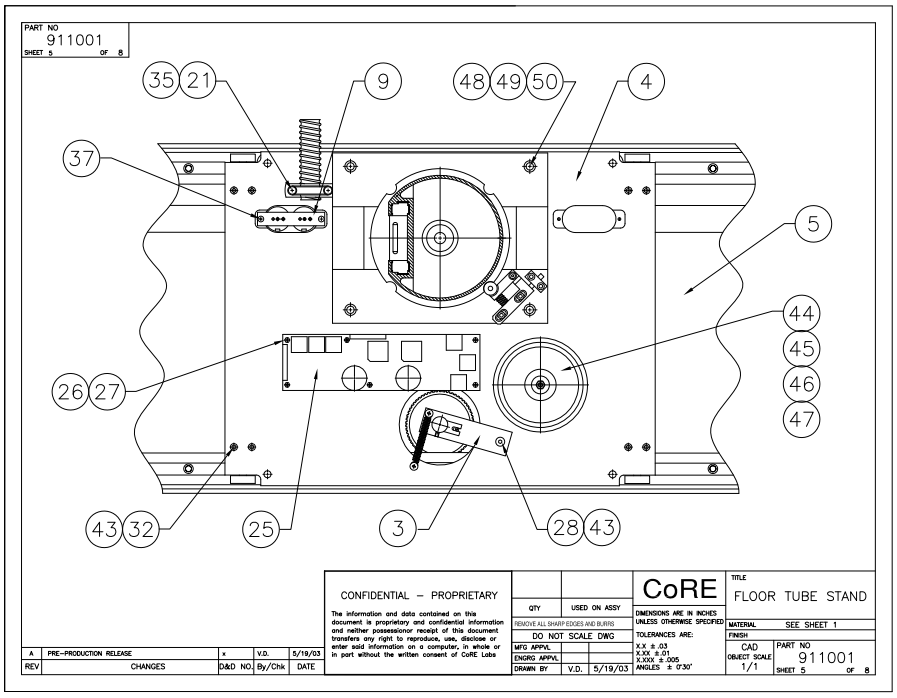


Fig.3.3-1 Top View of Column and Column Base, with covers removed, showing mechanical components and electrical components.

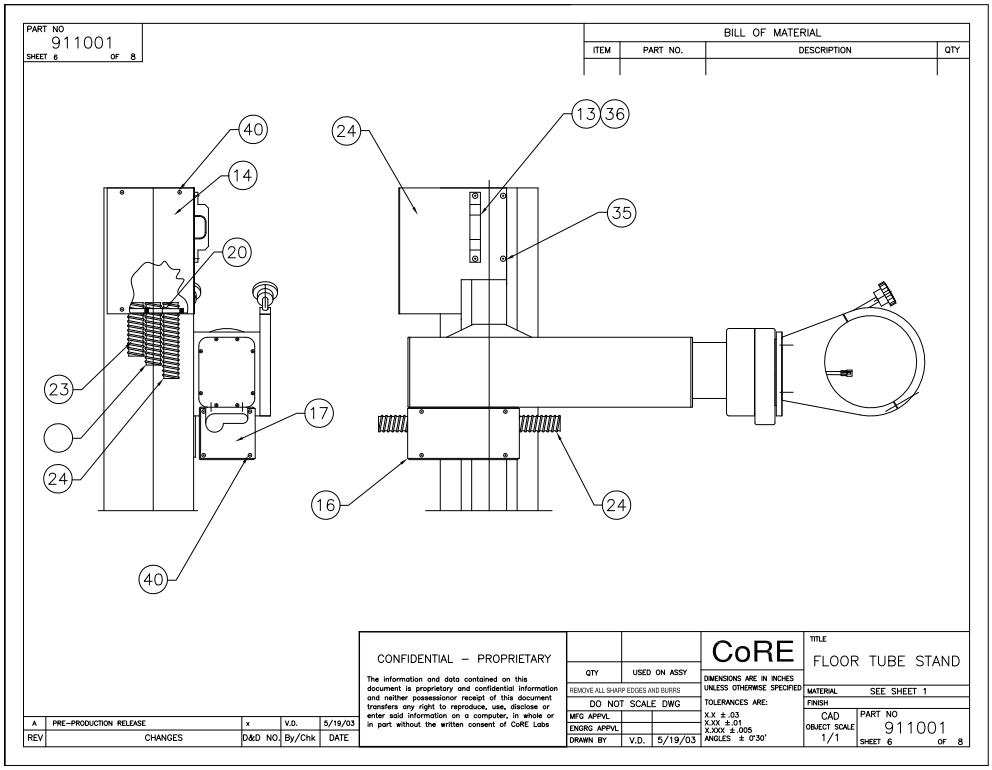


Fig.3.3-2 Side view of Transverse arm showing routing of cable conduit. Additional space is provided within #16 for routing of HV Cables. Top left view shows large eyelet (used for HV Cable Management).

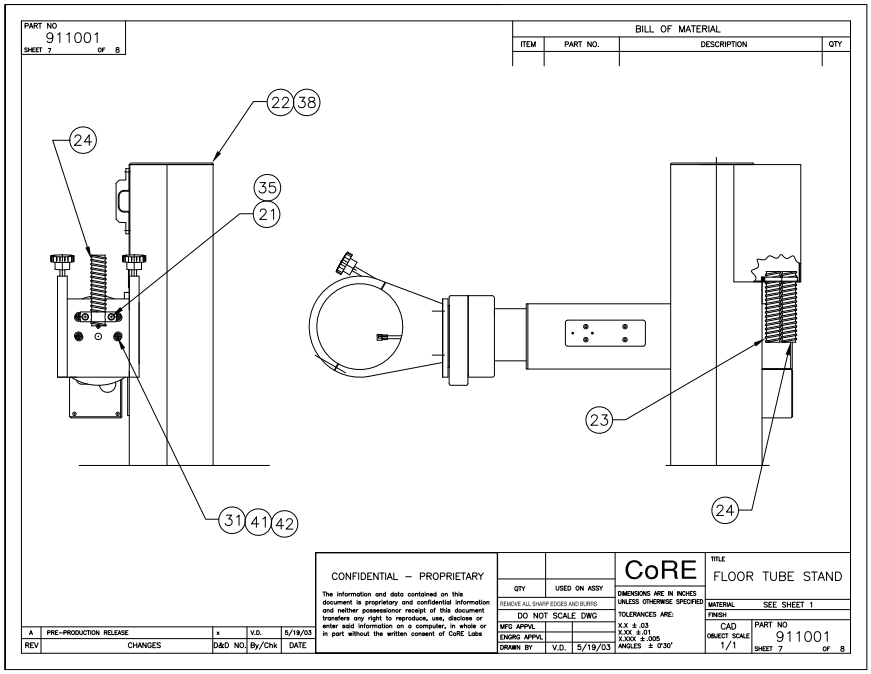


Fig.3.3-3 More views of transverse arm showing cable management as well as platform leveling screws (kidneys behind tube).

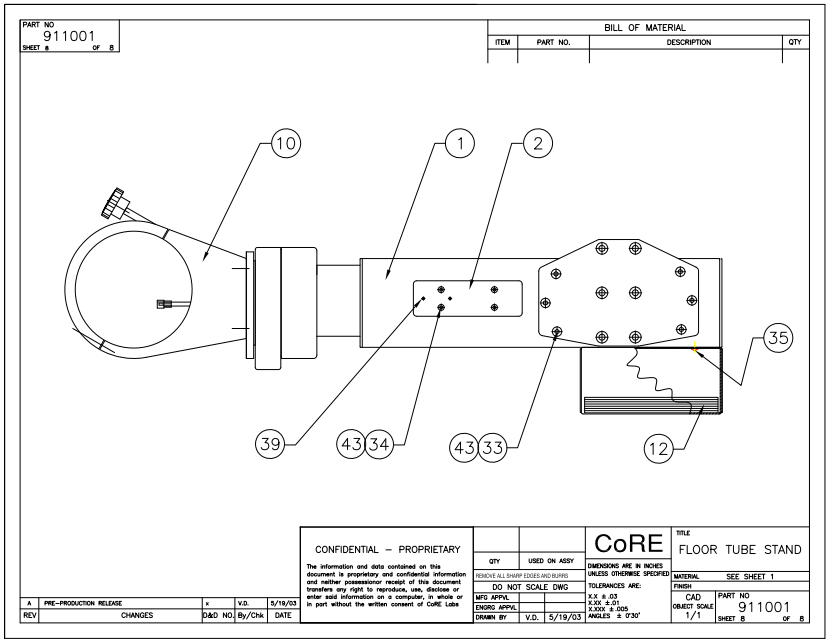


Fig.3.3-4 Transverse arm with Transverse Lock Assy (adjustment screws).

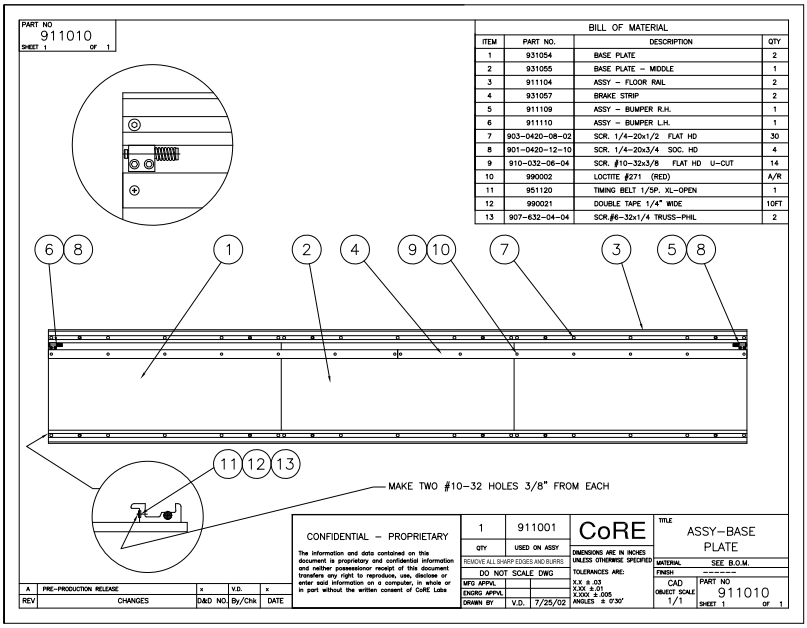
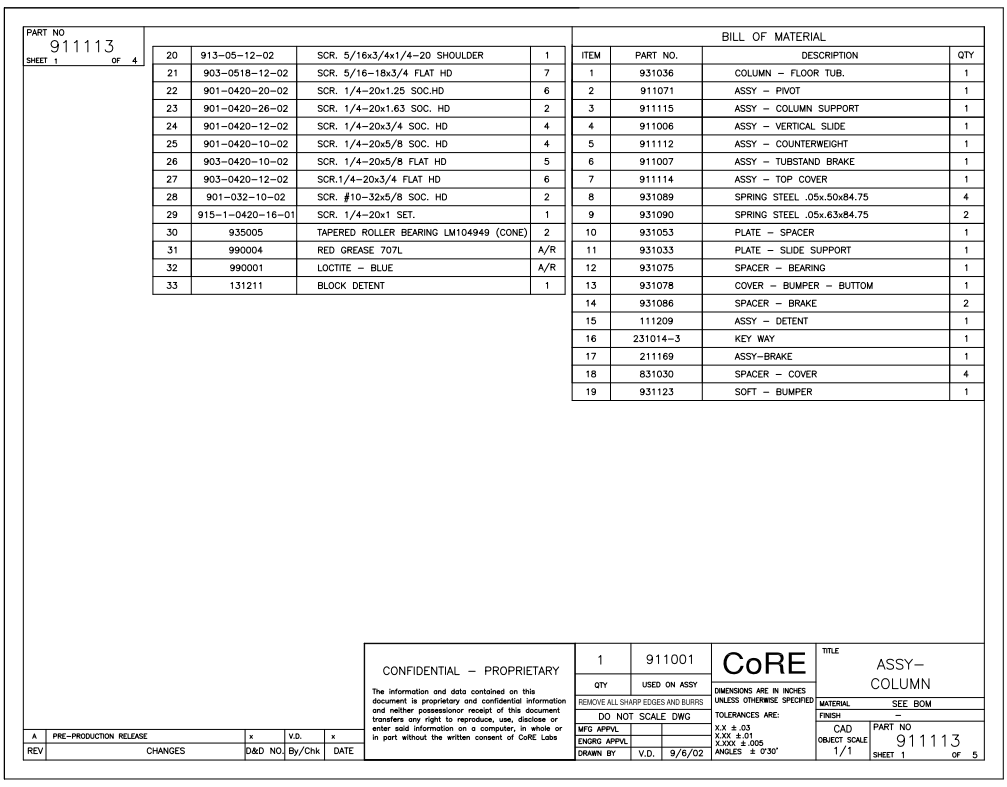


Fig.3.3-5 Main Floor Base Platform Showing Location of Longitudinal Brake Strip (which is to be located at the back of the room). This assembly has twin aluminum extrusions which are the assembling structure of the platform. The front extrusion, contains a geared rubber timing belt (used for longitudinal SID tracking). This platform must be secured to the floor with Tapcon or similar concrete anchors of at least 1/4-20 in size. A level floor is a must so that this platform is also level (a level foundation upon which to build a level traveling FMTS...



PART NO 911001
SHEET 1 OF 8

35	907-032-06-10	SCR. #10-32x3/8 TRUSS HD	20
36	907-032-08-04	SCR. #10-32x1/2 TRUSS HD	2
37	905-832-08-04	SCR. #8-32x1/2 FLAT HD	2
38	904-032-06-04	SCR. #8-32x3/8 PAN HD	2
39	915-1-0832-06-02	SCR. #8-32x3/8 SET	2
40	904-632-06-02	SCR. #6-32x3/8 PAN HD	18
41	930013	WASHER #1/4 FLAT	4
42	931008	WASHER #1/4 LOCK	4
43	990002	LOCTITE - RED	A/R
44	212232	ASSY-TRANSFORMER	1
45	912-0420-56-04	SCR. 1/4-20x3.5" HEX HD	1
46	930012	WASHER 1/4-20 FLAT	1
47	931008	WASHER 1/4 LOCK	1
48	901-0616-16-02	SCR..3/8-16X1" SHMS	4
49	930018	WASHER 3/8 FLAT	4
50	931012	WASHER 3/8 LOCK	4
51			
52			

BILL OF MATERIAL

ITEM	PART NO.	DESCRIPTION	QTY
1	911004	ASSY-SLIDE-HORIZONTAL	1
2	911005	ASSY-SLIDE BRAKE	1
3	911008	ASSY-LONGITUDINAL POT.	1
4	911009	ASSY-COLUMN PLATE	1
5	911010	ASSY-BASE PLATE	1
6	911100	ASSY-SWEEPER R.H.	1
7	911101	ASSY-SWEEPER L.H.	1
8	911113	ASSY-COLUMN	1
9	911116	ASSY-FLOOR BRAKE	1
10	911118 or 911119	ASSY-TRUNNION DUNLEE 1400 or 1500	1
11	911124	ASSY-HANDLE	1
12	931050	PLATE-LEAD 1.4LBS	4
13	931102	CABLE HOLDER	1
14	941043	COVER CONNECTOR BOX	1
15	941044	CONNECTOR BOX	1
16	941046	COUNTERWEIGHT BOX	1
17	941047	COVER COUNTERWEIGHT	1
18	941080	COVER FRONT	1
19	941081	COVER REAR	1
20	951098	HOSE CLAMP	3
21	951099	TWO HOLE STRAP	3
22	111198	ASSY-COVER TOP	1
23	912125	BASE CABLE-FLOOR TUBE STAND	1
24	912126	HANDLE CABLE-FLOOR TUBE STAND	1
25	212102	OTS POWER SUPPLY	1
26	931122-1	STANDOFF	6
27	904-632-04-02	SCR.#6-32x1/4 PAN HD	6
28	913-05-06-02	SHOULDER 5/16-3/8x1/4-20	1
29			
30			
31	901-0420-10-04	SCR. 1/4-20x5/8 SOC. HD	4
32	901-0420-12-02	SCR. 1/4-20x3/4 SOC. HD	8
33	903-0420-08-02	SCR. 1/4-20x1/2 FLAT HD	6
34	901-032-16-02	SCR. #10-32x1" SOC. HD	4

REV	CHANGES	D&D NO.	By/Chk	DATE
A	PRE-PRODUCTION RELEASE	x	V.D.	5/19/03

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QTY	USED ON ASSY
REMOVE ALL SHARP EDGES AND BURRS	
DO NOT SCALE DWG	
MFG APPVL	
ENGRG APPVL	
DRAWN BY	V.D. 5/19/03

CoRE

DIMENSIONS ARE IN INCHES
UNLESS OTHERWISE SPECIFIED
TOLERANCES ARE:
X.X ±.03
X.XX ±.01
X.XXX ±.005
ANGLES ± 0°30'

TITLE: FLOOR TUBE STAND
MATERIAL
FINISH
CAD
OBJECT SCALE 1/1
PART NO 911001
SHEET 1 OF 8

3.2 EQUIPMENT SIZE AND WEIGHT

Product literature "flyers" show the physical dimensions of the FMTS. (Weights shown do not include the X-ray tube, collimator, high-tension cables. All dimensions and weights are approximate and subject to change without notice.

3.3.1 INPUT POWER SOURCE REQUIREMENTS

The FMTS requires a nominal line voltage of 115/220 VAC, single phase, at 50/60 Hz. Power should be connected to the FMTS by three No. 18 gauge (minimum) common wires, and controlled by a front operated, 15 ampere main switch with an enclosed circuit breaker.

The FMTS should be connected to an auxiliary power source in the room, separate from the X-ray generator power.

3.3.2 EQUIPMENT GROUNDING

Proper equipment grounding minimizes the possibility of electrical shock hazard to personnel located in the room by establishing the same ground potential condition between equipment in the room. To maintain all equipment within the same room at an equal potential, all exit ground terminals should be connected to a single ground point.

Measurement of electrical leakage should be referenced to the physical location of the point.

The main grounding point is provided on a Euro Strip inside the Communication Board Enclosure).

The following recommendations concerning grounding of the apparatus should be observed:

a) One ground conductor should be run from each piece of equipment or group of equipment to the single reference ground point to avoid electrical ground loops.

b) Where applicable, the size of the ground wire must adhere to the requirement of the National Electrical Code.

c) Use of a fully insulated ground conductor must be standard.

d) Size of the ground conductor should be increased according to the length of the conductor run.

e) Terminating connections of ground conductors must be sufficiently low impedance so the ground conductor is not affected.

The following National Fire Protection Association documents of current issue should be reviewed.

a) NFPA Document No. 56A-Standard for Use Inhalation Anesthetics

b) NFPA Document No. 70-National Electric Code

c) NFPA Document No.- 76A - Essential Electrical Systems for Hospitals

d) NFPA Document No. 76B - Safe Use of Electricity in Hospitals

3.3.3 ELECTRICAL LEAKAGE

Electrical leakage measurements should be made between the installed equipment and the reference ground point, between equipment in the group, and between the equipment ground and any other equipment in the same room. Only responsible for the electrical leakage equipment between installed equipment and between these equipment and the reference point. During electrical leakage measurements make certain that electrical interference originating from the power line or other outside sources does not produce erroneous result. An oscilloscope survey of the electrical leakage is suggested to assure correct leakage measurements.

3.3.4 REQUIRED MAINTENANCE

After the X-ray is free from hazardous leakage potentials, the using facility is responsible for maintaining a safe environment. This maintenance includes the following:

a) Keep ground conductors free of damage and assure that ground conductors are not removed.
b) Maintain low impedance terminations on ground conductors.
c) Maintain equipment so that any internal faults that may occur are immediately corrected.
d) Notify the local factory representative whenever changes are made to the electrical distribution circuits for installed equipment.
e) Periodically inspect all ground conductors to insure that they are still properly connected and free from damage, dirt or corrosion, and notify the local representative if problems exist.
f) Review any technical documentation on the equipment and the specific grounding requirements of each device.

3.3.5 ELECTRICAL WIRING AND TROUGHING

Certain electrical wiring and troughing requirements must be met before equipment installation. The electrical contractor will supply and install all junction boxes and main switches, conduits, wire, troughing, etc., and the installation must conform to all applicable local codes. Standard type wire must be used throughout the installation and all wiring must be tagged at both ends. Six-foot wire tails are the minimum required. Ceiling fixtures in the X-ray room must be flush-mounted so as to interface with the OTS.

Conduits of approximate size should be installed to route wiring from the junction box to associated equipment in the room. Conduit runs are required between the junction box and X-ray control, the X-ray table, and the wall Bucky or wall mounted cassette holder.

The high tension cable trough and the electrical junction box should be installed adjacent to one other. If possible, installation of the high-tension cable trough should be inside the wall. This will help to prevent damage to high-tension cables, which may result from heat, cold, condensation or seepage from the outside.

3.4 TOOLS, EQUIPMENT AND MATERIALS

The following are recommended for proper execution of FMTS and X-ray room equipment:

a) Lifting device such as a appliance dolley and pallet jack, suitable to facilitate transportation of your FMTS components from the "dock" to your instal room.
b) Level, minimum length of 5 feet
c) Normal complete of hand tools
d) Shims, if necessary to level the main floor platform to ensure a level track.
e) Alcohol to clean the high-tension cable ends and tube-head and high-tension transformer sockets.
f) Dow Corning, DC4 Vapor Proofing Compound, silicon insulating grease or equivalent for packing X-ray tube head high-tension cable terminals (typically supplied with new x-ray tubes).
g) Syringe-minimum capacity 25cc (for above).
h) Plum bob
i) "C" Clamp
j) Loctite -- Blue and Red
k) Square
l) Special film cassette (11x14 cassette with scribed centerlines).

3.5 UNPACKING AND HANDLING

When the unit is received, carefully inspect the shipping container for damage, which have occurred during shipment. If there is any evidence of damage, call the carrier's representative immediately so that the equipment is unpacked under the supervision of the representative.

NOTE
X-ray tubes should always be inspected immediately upon receipt from the carrier.
DO NOT warehouse X-ray tubes without immediate inspection and, if possible, thorough testing. Extreme care must be used whenever X-ray tubes or high-tension cables and handled. They are extremely delicate.

A lifting device suitable for supporting the FMTS components should be available for transporting to installation site. Move all components as close as possible to the work site to avoid excessive movement after unpacking.
Be very careful to handle all of the material furnished to avoid unnecessary damage.

Hint! Your units are carefully packed and double-inventoried to be sure you receive all components. Be sure to not accidentally discard components during unpacking.

3.6 SELECTING EQUIPMENT LOCATION

The relationship between X-ray table and the FMTS should allow complete longitudinal and transverse coverage of the X-ray table. Additionally, this relationship should allow the FMTS to be parked and not interfere with the X-ray table in vertical position or with X-ray tube normal to the tabletop. A minimum source-image receptor distance (SID) of 36 inches must be obtained between the FMTS X-ray tube and the upright table Bucky.

The high-tension transformer (generator) should be positioned in an out-of-the-way location. In general, the high-tension transformer should be located so that the cable lengths from the transformer to the X-ray tube are as short as possible.

A wall-mounted cassette holder mounted to the wall in a common position, with the centerline of the cassette holder being on the same centerline as the X-ray table. Such a placement of a wall stand would require a large enough room to allow for "in-line" placement (and still have enough room for longer SID wall stand shots). All information provided is for reference only and room layout questions should be directed to your room layout planner (architect) prior to mounting / installing equipment.

3.8 UNIT INSTALLATION

3.8.1 Floor Track Installation

Proper placement in the room and parallelism of the floor track is <u>essential</u> for smooth operation of the FMTS. A level floor is also essential for smooth motion.

INSTALLATION HARDWARE

Each install location requires varying types of hardware to secure the floor track securely to the floor. This is a freestanding design and it must be secured to the floor in a robust fashion to prevent tipping. Failure to properly secure this track could lead to product tippage and cause injury or death. Mechanical engineers must be consulted to select the proper hardware to secure this track to your existing instal location floor. The floor track has multiple holes from which to secure it to the floor by the aforementioned hardware. All hole locations should be anchored (don't skip any holes).

After securing the floor track to your floor, install the main upright column onto the floor track. This can be "tipped" in from the front or rolled onto the tracks from the side, in the event you have room to perform the latter. <u>Immediately secure the main column to the floor track by installing both sweeper/keeper assemblies (which lock the column under the floor track extrusions.</u>

You will need to source:

Floor Anchoring Hardware per above description
Possible Unistrut hangar for Cable Drapes (Optional)

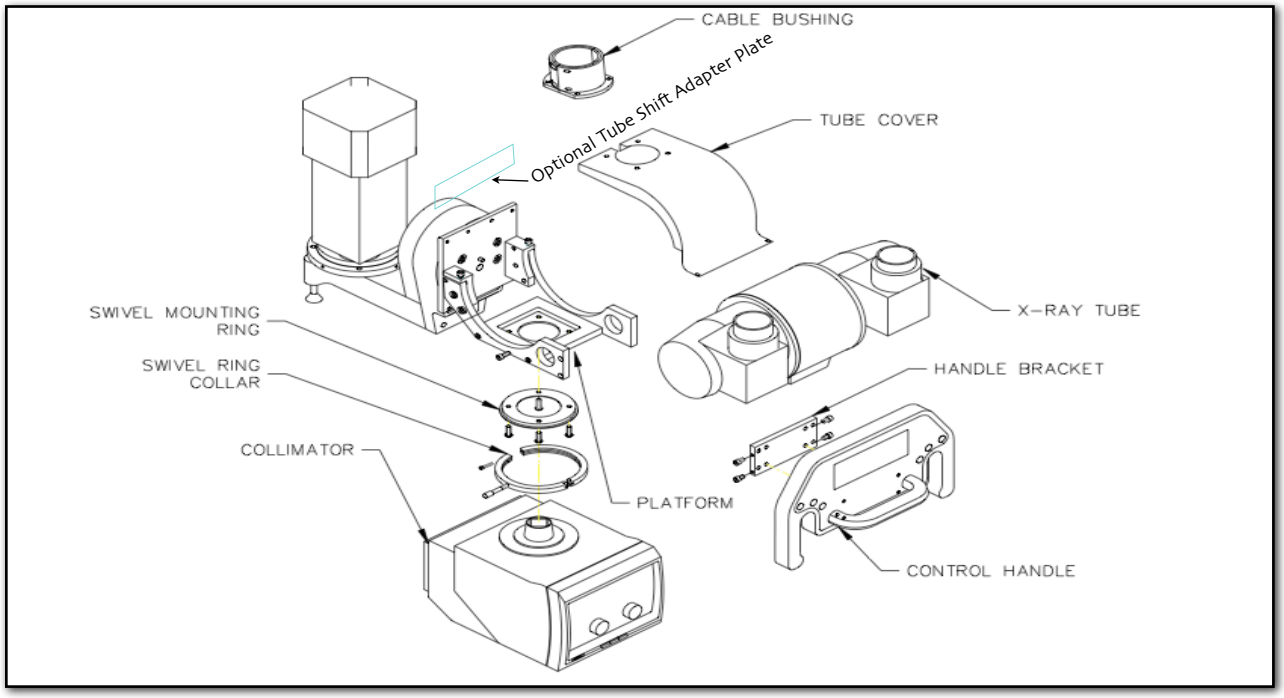
3.8.4 X-RAY TUBE AND COLLIMATOR INSTALLATION

CAUTION: INSTALLATION OF X-RAY TUBE REQUIRES TWO PERSONS

1. Pull the X-ray tube head down to comfortable working height and secure height by installing a piece of scrap wood into the recess on the column above the transverse arm. Tape around the column so that this scrap wood will not fall out. If this scrap wood falls out, the transverse arm may rapidly fly up and cause severe injury or death.
2. Place the X-ray tube on the platform (or trunnion).
3. Place the Swivel Mounting Ring and any spacers required beneath the platform, and install the four screw provided with collimator through the ring and into the tube (this procedure will vary if you have trunnions as the handle bracket and collimator are assembled in a different fashion). Tighten securely. Use of Loctite ™ #242 is recommended. Spacer quantity/ count/thickness varies on tube/collimator pair selection. See documentation of your purchased tube/collimator for this "F-FS" distance (Flange to Focal Spot).
4. Turn the platform with X-ray tube upside down so that the Swivel Mounting Ring will faces up. (you have to overcome the force of the Fail-Safe Tube Rotation Lock by turning hard on the control handle if your unit is not under power. You may also provide a 24VDC external power source to release this the lock to ease in "pre-power" rotation. As little as 12VDC will release this lock.
5. Carefully place the collimator upside down on the mounting ring.
6. Secure the screw in the Swivel Ring Collar (or 4 tab floating head type). Check if collimator is turning freely.
7. Turn the assembly back so that the collimator is facing down.

3.8.5 CONTROL HANDLE INSTALLATION

1. Install the Control Handle/Handle Bracket in to the platform. It is extremely helpful to attach the three system cables (ground, communication{ribbon} & tube rotation lock) prior to mounting the control handle as they can be difficult to attach otherwise. Be sure to actuate the slide locks on the communication and tube rotation cables after seating them onto their respective connections on the back of the control handle. Failure to engage these slide locks will lead to an intermittent system error after some usage by your customer).
2. Install Tube Cover on platform with HV cables and other cables within the cable bushing.



3.8.6 X-RAY TUBE AND COLUMN ADJUSTMENT

After installing X-ray tube and collimator, check the verticality of column and adjust accordingly.

1 If your column is not level. You may install shims between the steel base plate and the steel weldment structure. Be sure to retighten the four 3/8-16 bolts securely. Never remove these bolts completely as the unit could fall over and cause severe injury or death.

2 Check level of bottom face of collimator and adjust accordingly with four bolts behind tube (kidneys). Never remove these bolts completely as the tube head could fall off and cause severe injury or death.

3 For leveling in transverse plane, loose four screws on both sides of platform (parallel arms) and adjust collimator level by turning two vertical bolts on platform.

4 Reinstall Cover-Platform side (obsolete on later models).

3.8.7 CABLE INSTALLATION

The following cabling needs to be attached...

1. Connect the Rotational Brake Cable to socket on backside of Control Handle (see Figure: 3.7) -- engage slide lock.
2. Connect HV cables and stator cord to the X-ray tube according to X-ray tube manual.
3. Connect control cable to the collimator.
4. Connect 25 position communications (ribbon) control cable to Control Handle (socket is on backside of control handle) -- engage slide lock.

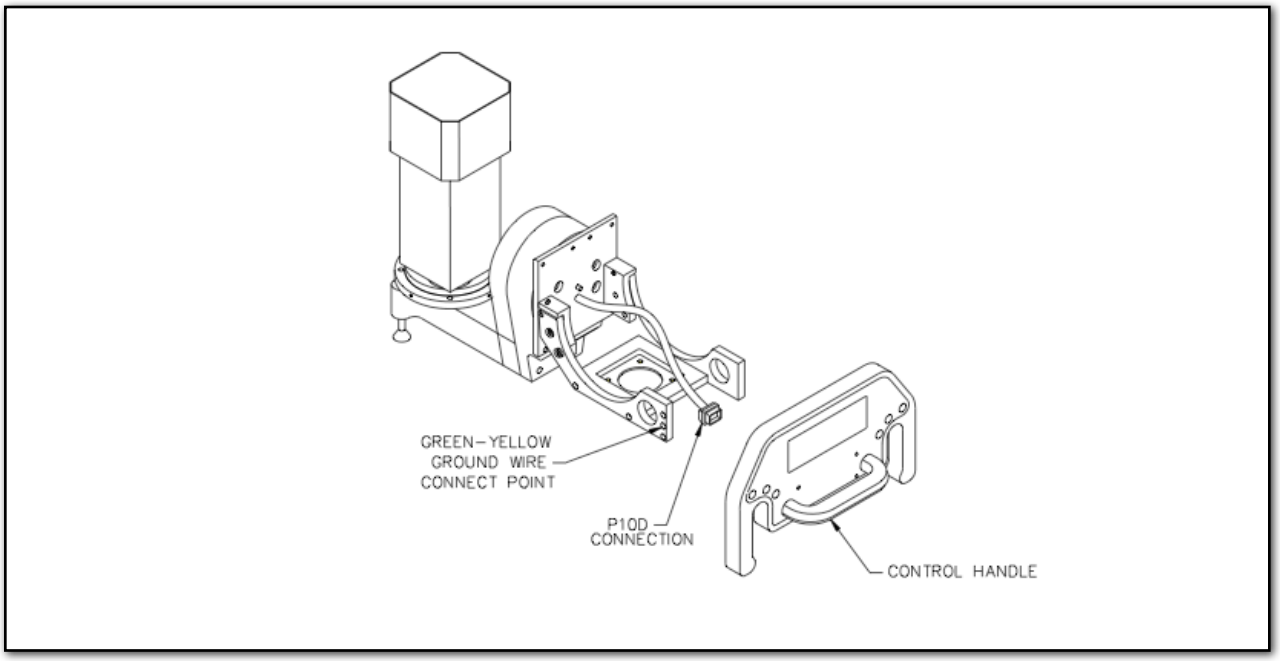
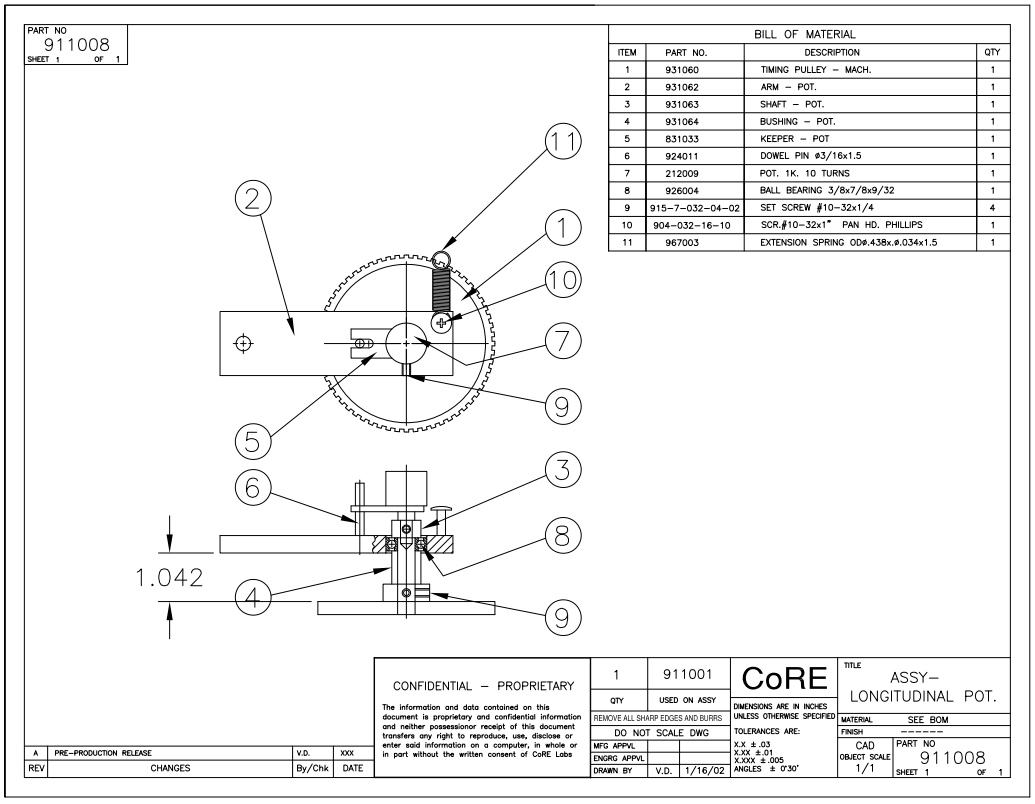


Figure: 3.7 ROTATIONAL BRAKE CABLE (FMTS & OTS)

3.8.8 INSTALLATION OF LONGITUDINAL POTENTIOMETER PULLEY

The longitudinal tracking system uses a pulley (geared) which rides on the under side of the front base track extrusion. On this base track extrusion, you will notice a rubber geared belt. Mechanically install the pulley so that it rides on this belt. Install tension spring to keep the pulley in place.

Later, during calibration, it will be necessary to install the potentiometer for this longitudinal assembly. When installing, set the FMTS at it's mid longitudinal travel and install the pot which you should preset at 5 turns (this is a 10 turn pot and it's mid position is 5 turns).



3.8.9 INSTALLATION OF LONGITUDINAL BUMPERS.

Most systems have these bumpers pre-installed for you onto the ends of the main base track. If you have removed these bumpers during installation

4. GENERAL MAINTENANCE

Maintenance should be performed on the FMTS to avoid any operational problem and assure long-lasting and safe use.
Close cooperation of operator and maintenance technician is essential to discover of any degraded performance during use and periodic inspection.
The operator and maintenance technician must be aware of and identify correctly any problems before catastrophic failure occurs.

The operator should carefully observe the normal operation of the unit. If there is any abnormal operation such as noise, stiffness, grinding etc., the maintenance technician must be notified immediately.

FMTS should be cleaned frequently. Use cloth slightly moistened in warm, soapy water to clean all surfaces. Wipe with a cloth slightly moistened in clean water. Do not use cleaners or solvent of any kind as they may remove markings and could damage the finish and plastic covers.
When cleaning the collimator and x-ray tube follow the manufacturers instruction and manuals.

The periodic inspection should cover the following:
- **inspect the counterweight support cables every 6 months.*****
- **inspect the mounting clips (ferrules) of cables every 6 months*****
- clean surface of wear-strip (blue temper) and bearings if necessary
- inspect magnetic holding pucks and brake strip
- **Inspect and verify operation of both Fail-Safe Brakes (vertical and tube rotation)*****

4.1 OPERATIONAL CHECK-UP

The operational check-up is recommended to keep a record of the operational performance and to early discover any future problems or failure.
Make a copy of this procedure, record the results of check-up and store copy with FMTS documentation.

***Critical**

4.2	OPERATIONAL "CHECK-UP" LIST	Pass/Fail	
1.	Ensure that system power is OFF	☐	☐
2.	Verify that FMTS unit moves freely in transversal and longitudinal directions and axial rotation (detents).	☐	☐
3.	Verify that FMTS unit is vertically balanced properly (not drifting).	☐	☐
4.	Turn the system ON.		
5.	Press the tube rotation lock release button and verify that the tube rotates freely in full range ± 180-degree.	☐	☐
6.	Verify that the rotation mechanically detents at 0, +90, -90 and 180-degree positions.	☐	☐
7.	Verify that the transverse lock release works properly.	☐	☐
8.	Verify that the longitudinal lock release works properly.	☐	☐
9.	Verify that the up/down lock release works properly and tube is not drifting up or down.	☐	☐
10.	Verify that the central handle lock release switch works properly.	☐	☐
11.	Verify that the 3-way lock release works properly.	☐	☐
12.	Verify that the transverse/long centering lock release works properly.	☐	☐

CALIBRATION PROCEDURE

5.1 Overview

5.1.1 General

This document outlines the Service and Calibration Mode of "halo" Overhead Tube Support or "triton" floor mount tube stands.

5.1.2 Scope

This procedure applies to the firmware, which is resident on the OTS/FMTS display control board.

Assy: 151-91-030-2 OTS/FMS Display CPU

This covers access to Service Menu and Calibration Procedure both from OTS/FMTS Control Handle and laptop computer.

5.1.3 Accessing Service Mode.

The Service Menu and Calibration Procedure is accessible from OTS Control Handle using "magic" sequence of pressing operation switches.

The "magic" sequence is shown on the Figure 5.1.

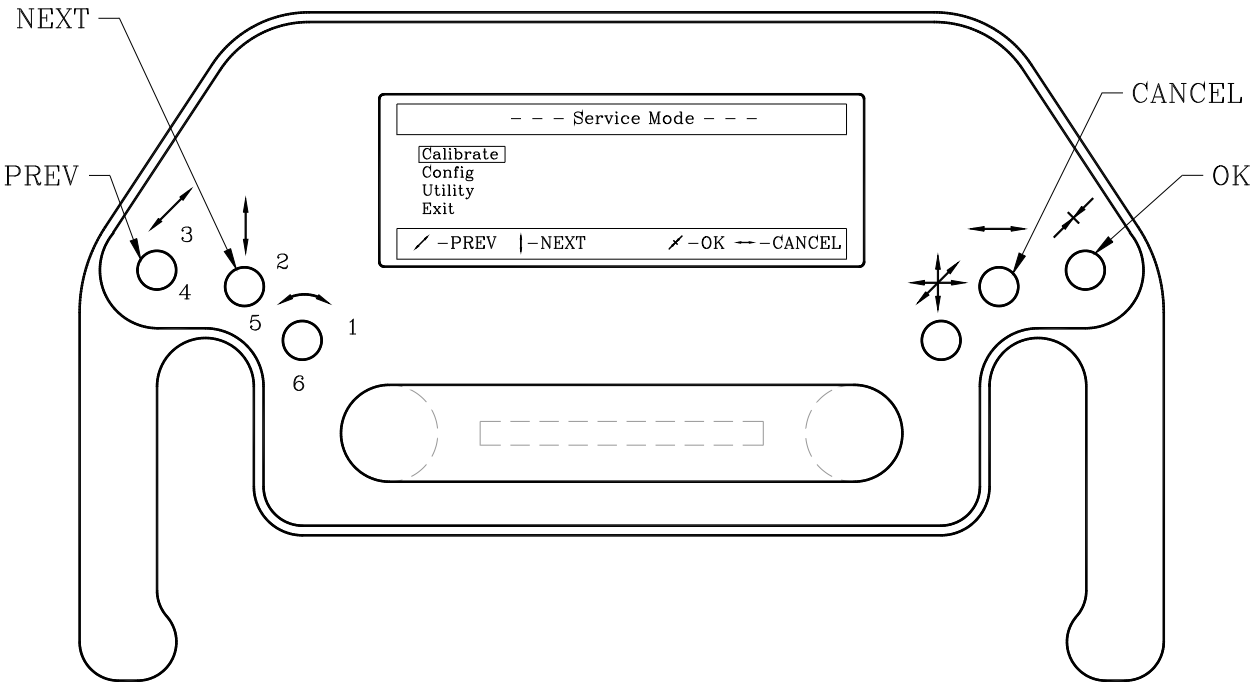


Figure: 5.1

Intentionally Blank

5.3 Calibration Menu

In this Menu the following parameters can be calibrated for further display in Operation Mode: To access to the Service Menu press the operation switches in "magic" sequence 1, 2, 3, 4 (this same again), 5, and 6. (Proceed slowly and precisely)

5.2 Service Menu Function

From Service Mode we have access to following operations:

Calibration
Configuration
Utility
Exit

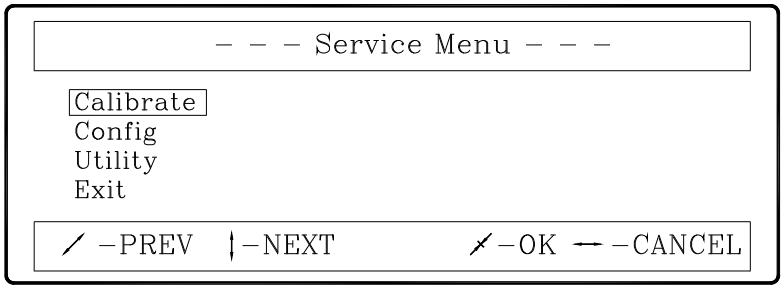


Figure 5.2 Service Menu Display

- Wall Bucky Pot - calibrates optional wall Bucky height
- Vertical Pot - calibrates tube vertical position to the floor,
- Long Pot - calibrates longitudinal position of tube,
- Transverse Pot - calibrates lateral position of tube,
- Table Pot - calibrates height of tabletop to the floor,
- Tilt Roll Sensor - calibrates smart-level tilt angle sensor
- Vert 40" SID Center [Table] - calibrates vertical 40" SID to the Table, and table centering (transverse) at the same time.
- Horz 36", 40", 48" or 72" SID Center - calibrates longitudinal SID (36", 40", 48" or 72") to the Wall Bucky (as well as transverse detent position). CoRE labs wall stands provide a third, vertical calibration as well.

5.3.1 Bucky Pot Calibration ***

At the bottom of display there are displayed functions related to the operation switches shown on Figure 5.1.

The "PREV" – operating switch moves highlight cursor to previous position or decreases the numbers in digital data.
The "NEXT" – operating switch moves highlight cursor to next position or increases the numbers in digital data.
The "OK" – operating switch accepts the entered data.
The "CANCEL" – operating switch cancels present operation and returns to previous menu.

*****IT IS RECOMMENDED TO MAKE SOME PRACTICE WITH COORDINATION OF OPERATION SWITCHES FUNCTIONS TO ACHIEVE EXPECTED RESPONSE ON DISPLAY PANEL. FAILURE TO PRACTICE WILL RESULT IN LONGER TIME BEING SPENT DURING FINAL CALIBRATION.**

With display as in Figure 5.2 press OK and display will look as follows:

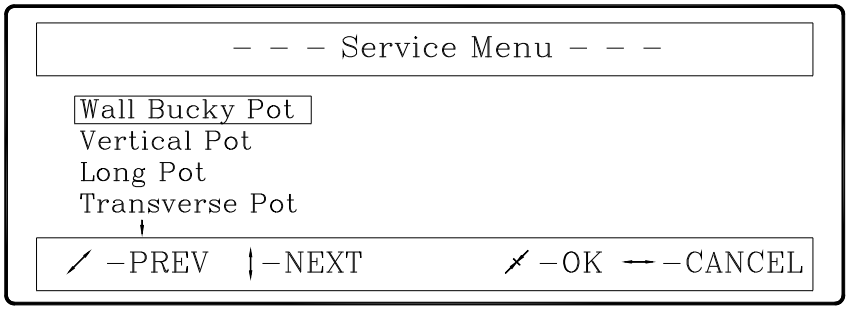


Figure 5.3.1.1

Press OK to go to Pot Calibration Mode – Wall Bucky Pot.
Press PREV or NEXT to go "High Cal Pos.

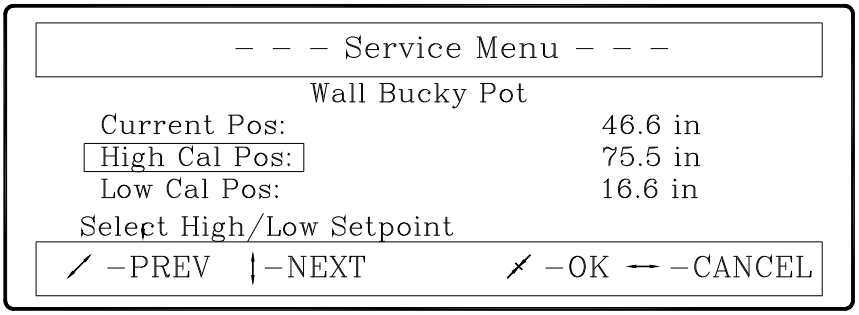


Figure 5.3.1.2

(The digits with adc on display are for software programming only and will be neglected in following descriptions)

Press OK to highlight value of High Cal Pos.
Move Wall Bucky to its highest position from the floor.
Measure the distance from the center crosshairs of the Bucky to the floor.
Set the measured value by pressing PREV or NEXT.
Press OK for confirmation.

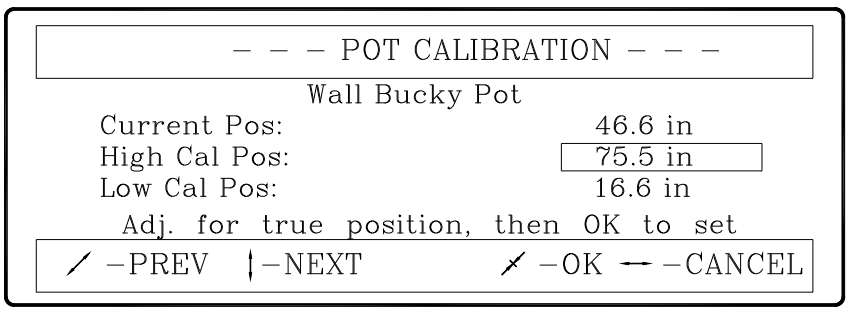


Figure 5.3.1.3

The display will prompt you if you are sure to execute calibration in this position.

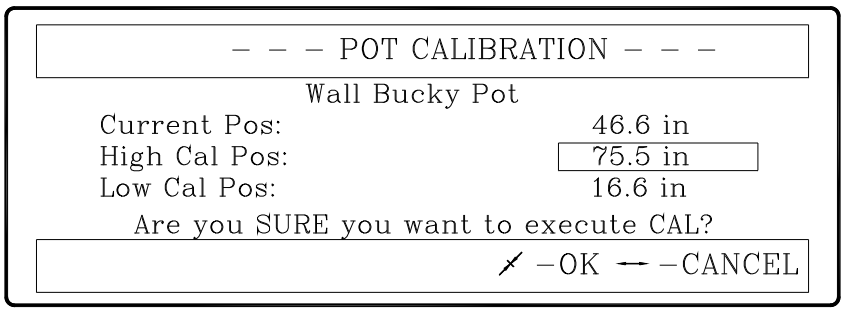


Figure 5.3.1.4

Press OK for confirmation.

Move Wall Bucky to lowest position from the floor.
Measure the distance from the floor to the center crosshairs of the Bucky.
PREV or NEXT to move cursor to Low Cal Pos.

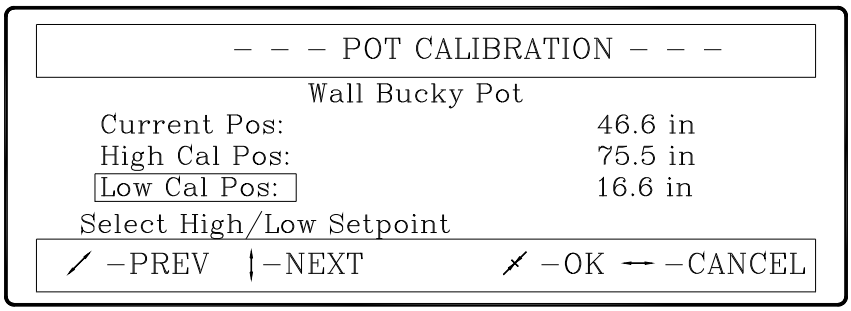


Figure 5.3.1.5

Press OK to highlight value of Low Cal Pos. as on Figure 5.3.1.6

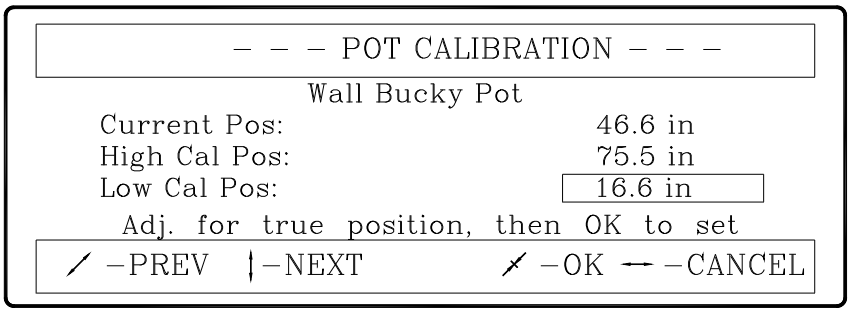


Figure 5.3.1.6

Set the measured value by pressing PREV or NEXT.
Press OK for confirmation.

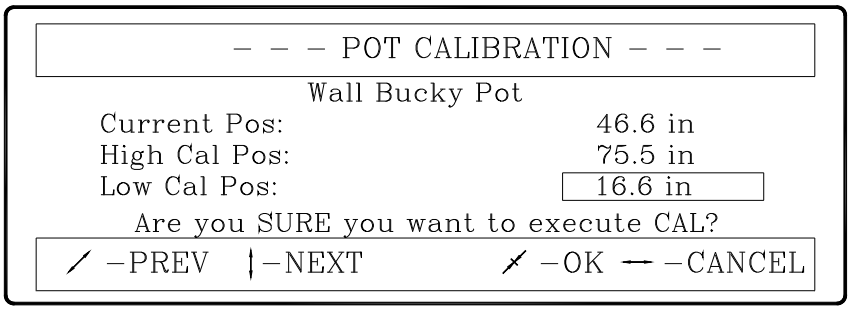


Figure 5.3.1.7

Press OK to execute.
Press CANCEL to return to the calibrate selection menu.

5.3.2 Vertical Pot Calibration **-- Tip! Place the tube crane/stand just off of a corner of the table below so that vertical calibration of the vertical pot is performed to the floor near a corner of the table. This same floor spot near the corner of the table frame should be used to measuring/calibrating the table height/table pot calibration (this will contain floor unlevelness variable during calibration). Making a mark "X" on this spot on the floor is advisable.**

Press NEXT to highlight Vertical Pot,

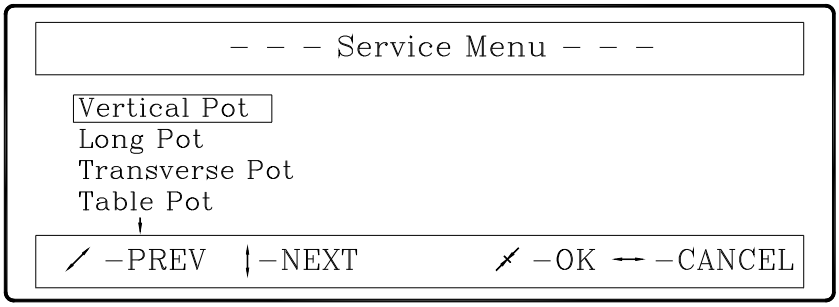


Figure 5.3.2.1

Press OK for Pot Calibration Mode-Vertical Pot.
By pressing 3-Way Lock Release, Figure 2.1, lift the Tube Head to the highest position. Measure the distance to the floor from the focal spot (marked on the ends of the tube) to the floor. **Hint! Do not use the collimator tape. Use a good rigid tape measure which is at least 16' long -- a Stanley FatMax works best. Use the same tape measure throughout all axes calibration for consistency.**

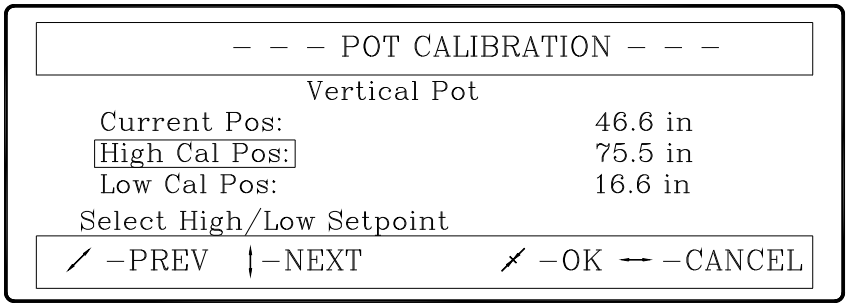


Figure 5.3.2.2

Press PREV or NEXT to highlight High Cal Position
Press OK to highlight "High Cal Pos:" value.

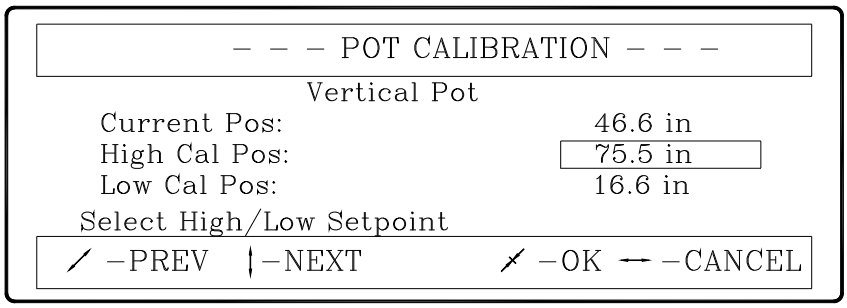


Figure 5.3.2.3

Enter the distance from the Focal Spot to the floor "X" by pressing PREV or NEXT.

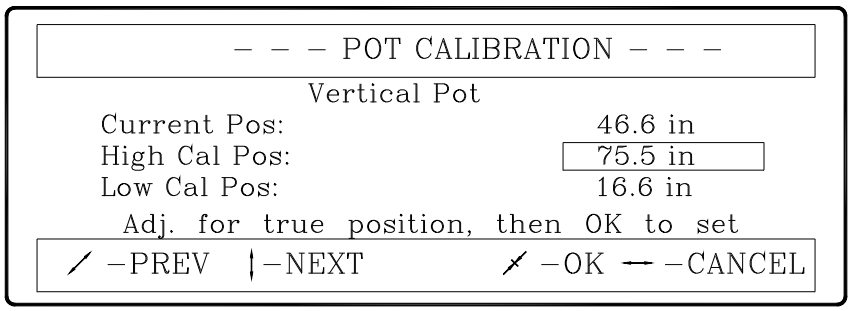


Figure 5.3.2.4

Press OK to confirm. You will be prompted whether you are sure to proceed with calibration.

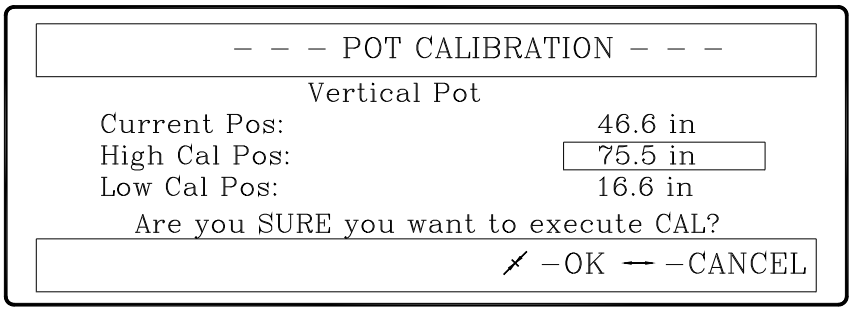


Figure 5.3.2.5

Press OK for confirmation.
Press PREV or NEXT to proceed with calibration of Low Tube Position.

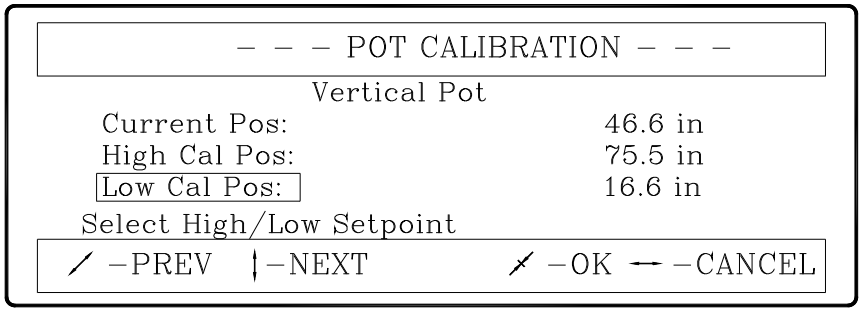


Figure 5.3.2.6

Move the tube to its lowest position and measure distance to the floor with the same tape measure. **Hint! Be sure the tube crane/stand has not moved transversely or longitudinally during this vertical move to low cal position. For example, if the tube moves somewhere else in the room, floor un-levelness can introduce a variable which will affect calibration accuracy.**

Press OK to highlight the value of Low Cal Pos.

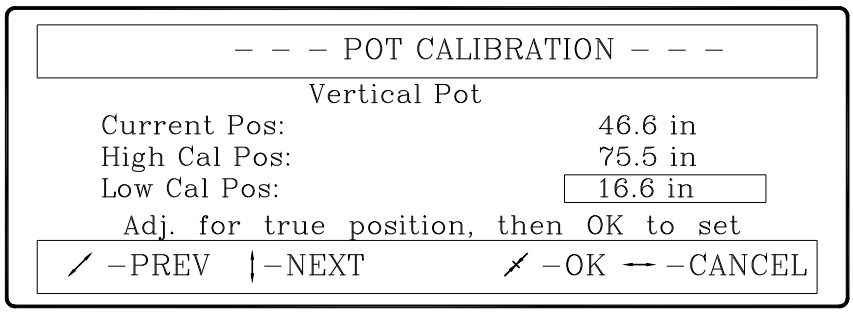


Figure 5.3.2.7

By pressing PREV or NEXT set the measured value.
Press OK for confirmation.

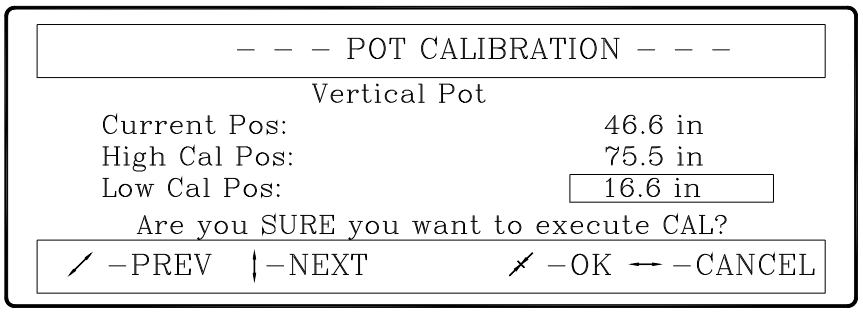


Figure 5.3.2.8

Press OK for confirmation.

Press CANCEL then NEXT to display as on Figure 5.3.3.1

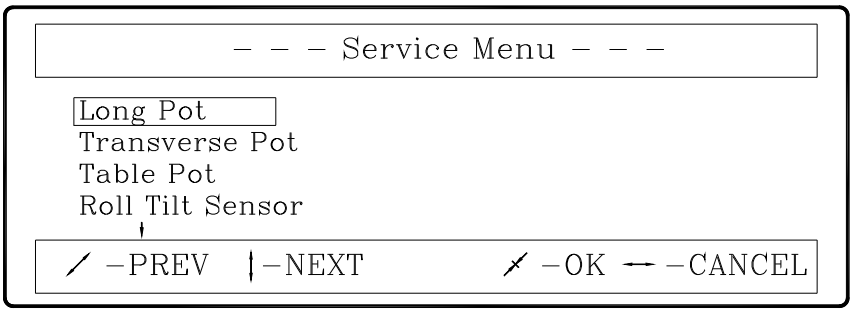


Figure 5.3.3.1

Press OK to enter Long Pot Calibration.

5.3.3 Longitudinal Pot Calibration **-- Hint! Use the same tape measure as before.**

Rotate the tube head so that it points to your wall Bucky (+90 or -90 Degrees).

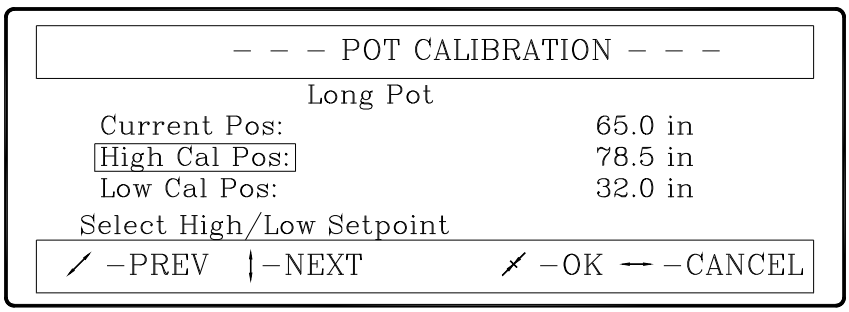


Figure 5.3.3.2

Press PREV or NEXT to go to High Cal Pos. digit value.

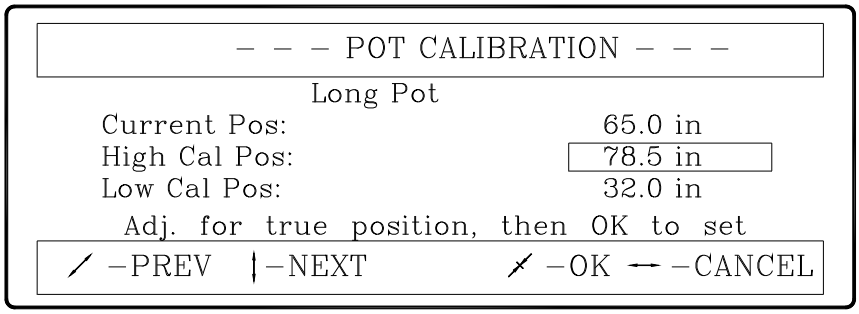


Figure 5.3.3.3

By pressing "3-Way Lock Release" or "Center Handle Squeeze Switch" move the unit to most distant position from Wall Bucky,
Measure distance from the focus spot on the cap of the tube (scribed line or dimple) to the Wall Bucky (face of a cassette or detector within the wall Bucky stand "FFD").
Press OK to Highlight High Cal figure in the display.
By pressing NEXT/PREV enter the measured value and press OK.

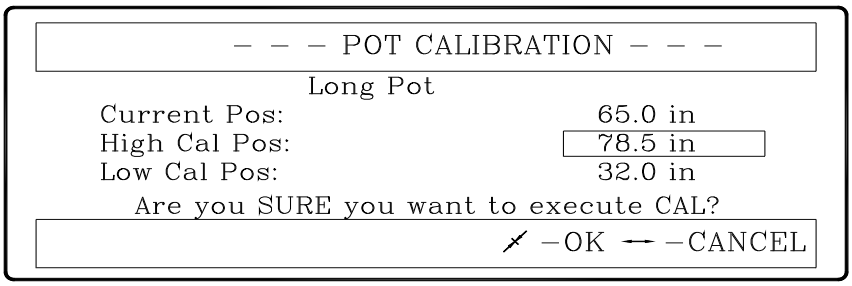


Figure 5.3.3.3

Press OK for confirmation and then press NEXT to go to Low Cal Pos. **Hint! This same OK-NEXT confirmation sequence (execute cal flashing) is used throughout calibration steps for all axes.**
Proceed as above in closest to the Wall Bucky pos.. After entering low cal "closest" figure, press OK twice to confirm, and CANCEL to return to the calibrate selection menu.

5.3.4 Transverse Pot Calibration -- OTS only.

Press NEXT to go to Service Menu-Transverse Pot.

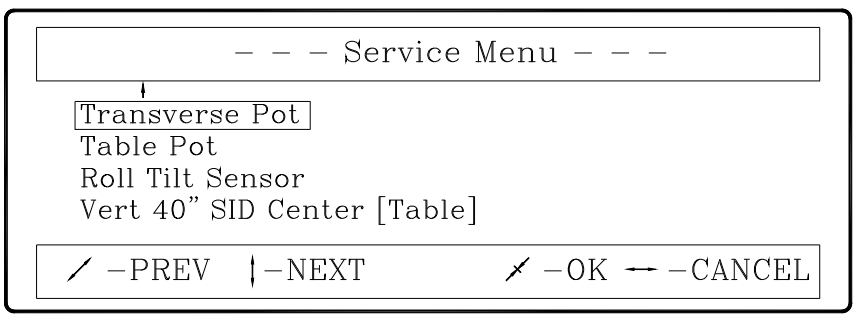


Figure 5.3.4.1

Proceed the same way as you just performed in longitudinal, but in transverse direction and calibrate high and low positions. **Hint! When measuring for transverse calibration, make a pencil mark on the back wall and originate your measurements (high & low) from this same origin point marked on the wall. The destination measurement point is anywhere on back of the tube crane (we suggest you use the lowermost point of the telescope (on the vacuum hose bracket where it bolts to the main pivot arm). When doing this transverse pot calibration, be sure not to move the unit vertically or longitudinally during the move from the low cal (back of the room) to the high cal position (front of the room). Low cal position should be tube crane as far back of the room as possible (to bridge bumper stops) and high cal position should be all the way to the front of the room (to the other bridge bumper stops -- or as far as your cable drapes will allow).**

After calibrating the transverse pot, press cancel to access the table pot calibration.

5.3.5 Table Pot Calibration

With display as in Figure 5.3.1.1 press NEXT to go to Service Menu-Table Pot,
This procedure apply only to the elevating table equipped with table elevation sensor potentiometer,
("ATLAS" Elevating Table).

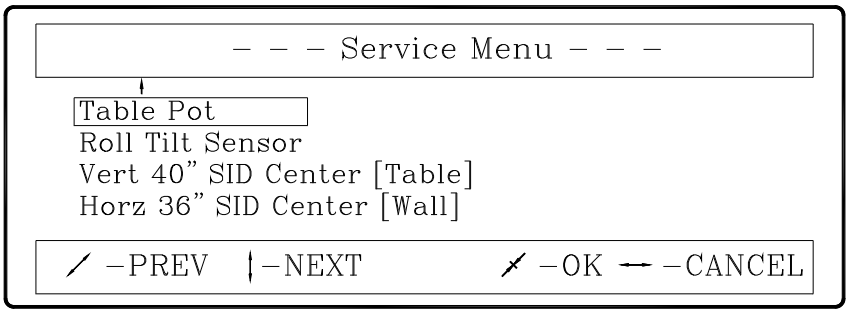


Figure 5.3.5.1

Hint! When installing the table pot into the spring tension assembly, we suggest the following method for ease/speed/correct installation. This pot is a 10 turn pot. Set this pot at 5 turns (mid position). Drive the table all the way down. Take a measurement from the table upper shroud (skirt) to the floor. Drive the table all the way up, take a measurement to the floor. Find the difference between these numbers, to calculate the mid-height-position of the table. Drive the table to its mid-height -position, SWITCH THE TABLE POWER OFF, then install the Pot. After installing the Pot into its position, and tighten the set screw. Be sure to remove your allen wrench after tightening the set screw for if you drive the table with the wrench installed, your pot assembly will be damaged. If you set screw is not visible/accessible at mid position, install the pot, hold sideways flexion on the pot, switch the table on, being very mindful of the dangers of a moving scissor, gently bump the table pedal to drive the table UP, while holding the flexion action on the pot, until the set screw is visible. Turn the table back off, fully tighten the now accessible set screw.

Sample 35" skirt height, less 24" skirt height (at low position) is 11" different. Eleven inches, divided by 2, is 5.5 inches. 35" minus 5.5" is 29.5" Mid-Height-Table Position for installation of table pot preset at 5 turns.

Press OK to go to POT CALIBRATION-Table Pot.

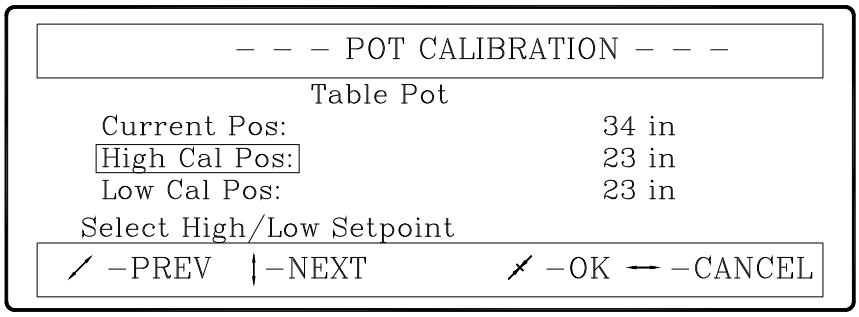


Figure 5.3.5.2

Move tabletop all the way up.
Measure the distance from the tabletop to the floor. **Hint! This is the exact same spot on the floor where the vertical calibration (high & low) measurements were taken from.**
Press OK to highlight digit value of high cal position.
By pressing PREV or NEXT set the measured value in this field.

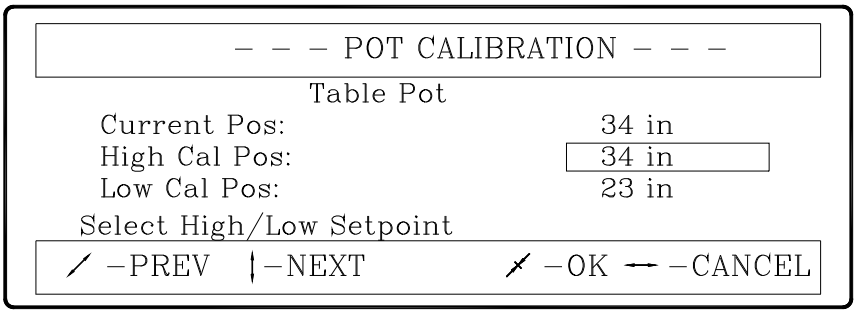


Figure 5.3.5.3

Press OK for confirmation.

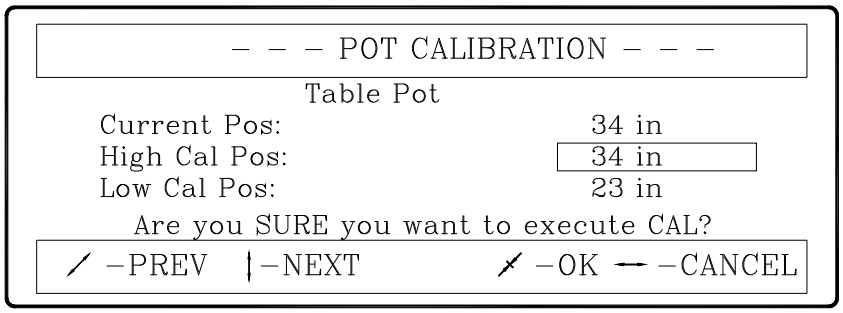


Figure 5.3.5.4

Press OK to execute.
Press CANCEL to go to low cal table position and OK to highlight Low Cal Pos value.

Move tabletop all the way down.
Measure the distance from tabletop to the floor (same exact spot again).
By pressing PREV or NEXT set value of Low Cal Pos.

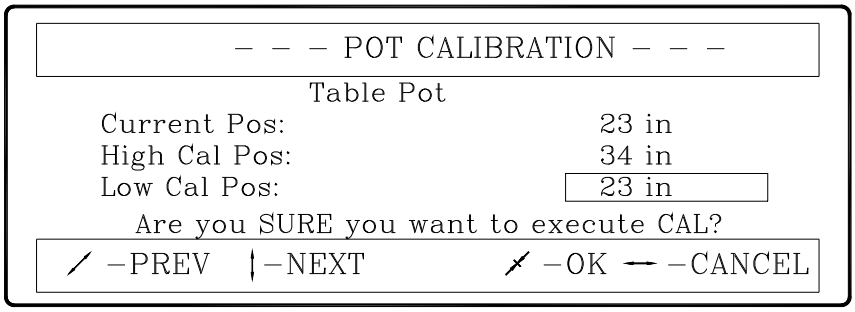


Figure 5.3.5.5

Press OK, twice for confirmation/execute and CANCEL to return to the calibrate selection menu.

5.3.6 Tilt Sensor Calibration - SKIP if your sensor is behaving properly upon receipt.

Press NEXT to go to Service Menu-Roll Tilt Sensor as on Figure 5.3.6.1.

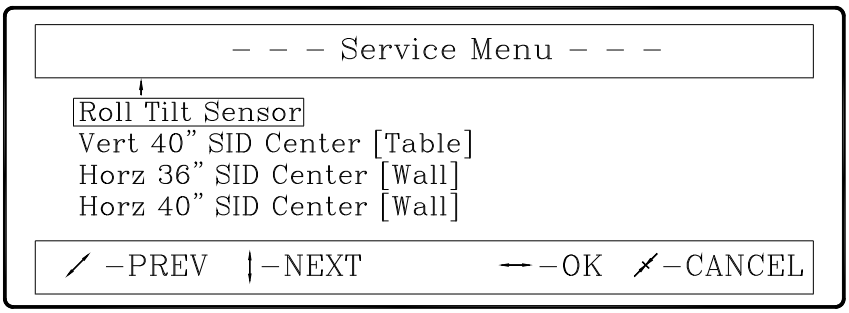


Figure 5.3.6.1

Press OK to go to Roll Tilt Sensor Calibration.

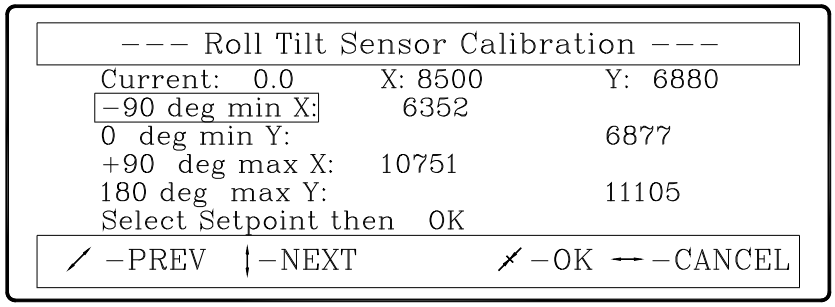


Figure 5.3.6.2

The displayed value of X and Y are for software programming only and are not matter of our consideration at this point. These are the feedback figures from the electronics on the PCB.

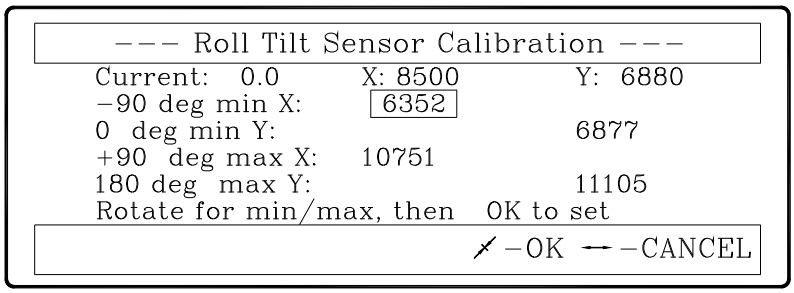


Figure 5.3.6.3

With this display turn the tube right 90 deg so the collimator will be facing to wall Bucky located on right side (counterclockwise). **Hint! during this roll tilt sensor calibration, be sure the tube is exactly in its detent position and also is exactly level (EYEBALL IS BEST -- BACK AWAY AND LOOK BEFORE EXECUTING EACH VALUE). See section 3.8.6 and drawing # 02-005.**

Press OK to confirm this position as "-90 deg"

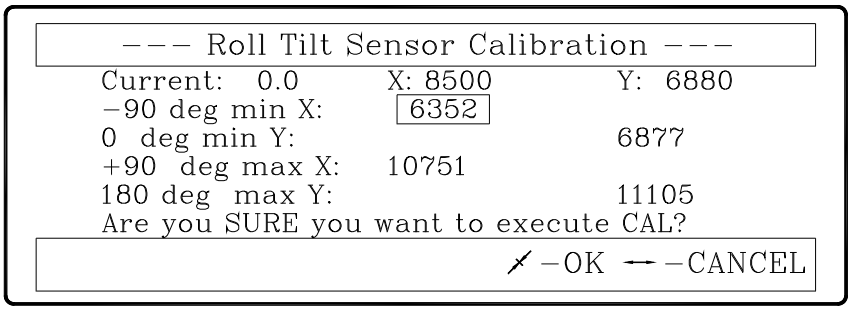


Figure 5.3.6.4

Press OK for execution.

Press NEXT to go to calibration in position "0 deg".

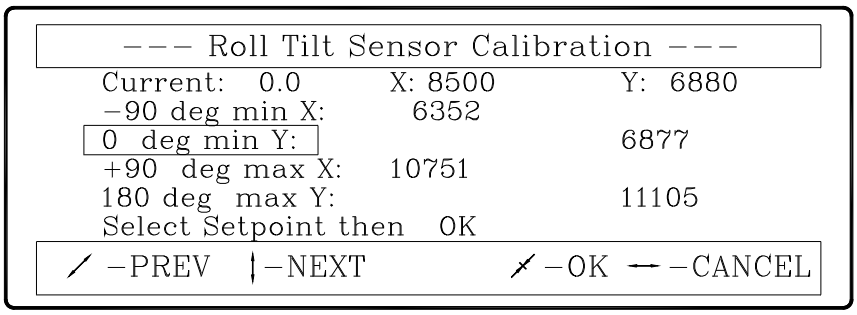


Figure 5.3.6.5

Press OK to highlight digit value.

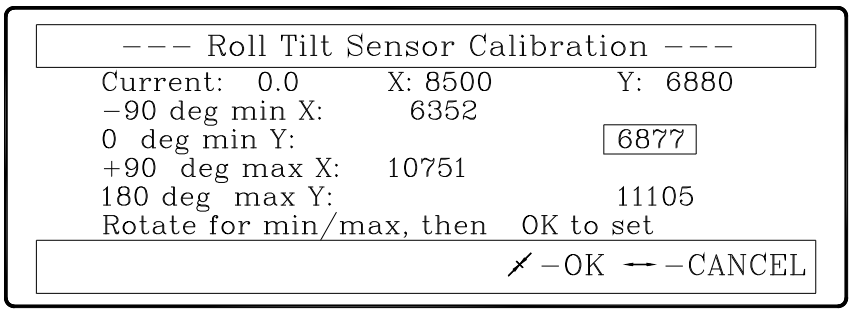


Figure 5.3.6.6

Turn tube back clockwise so that the collimator is facing down for "0 deg".
Press OK for confirmation.

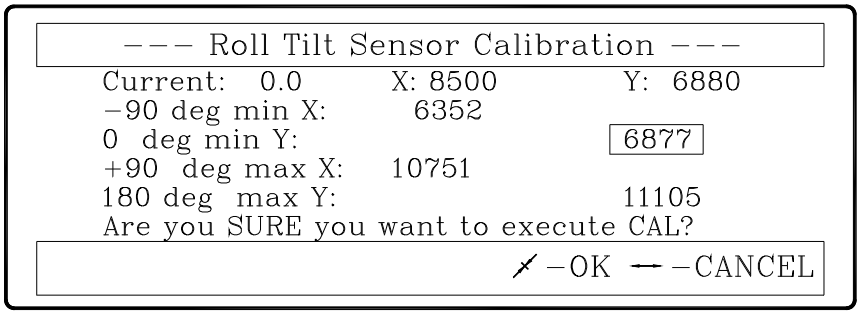


Figure 5.3.6.7

Press OK twice to execute this zero degree setting.

Press NEXT to go to "+90 deg " position (clockwise to +90 degrees as if the collimator would face a wall stand on the left side of the room). Once in this +90 degree position, proceed as above to execute calibration.

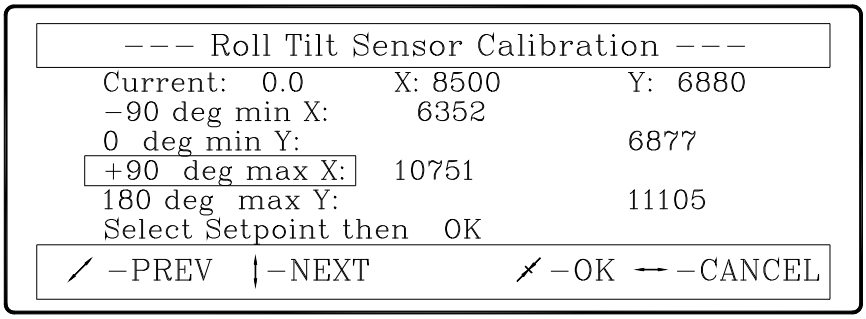


Figure 5.3.6.8

Press NEXT so that the display is as on Figure 5.3.6.9 and press OK to highlight the 180 degree digit value.

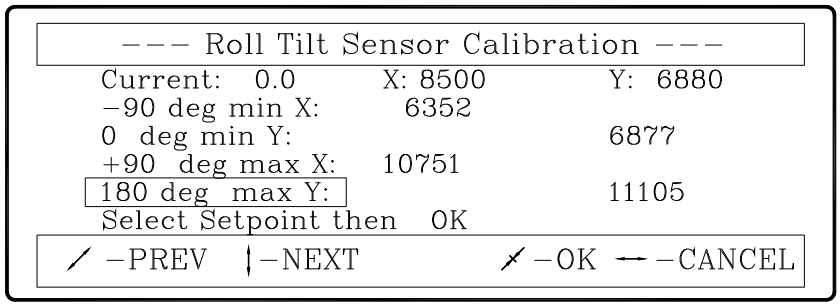


Figure 5.3.6.9

Turn the tube further clockwise, 180 deg so the collimator will face towards the ceiling and proceed as above. **Hint! After executing this fourth roll tilt sensor calibration, return the collimator to the zero position (straight down). Eyeball levelness, and note figure at the top of the display "current:". If this figure is not zero (or very close to zero), it may be necessary to toggle the cursor up to the top of this display screen to the current position. Executing a calibration on this current position value will zero it out and further perfect your roll-tilt sensor calibration.**

Press cancel to return to the service menu.....

5.3.7 Vertical 40 in SID and Center of the Table Calibration.

With display as in Figure 5.3.1.1 press NEXT to go to Service Menu-Vert 40" SID Center [Table].

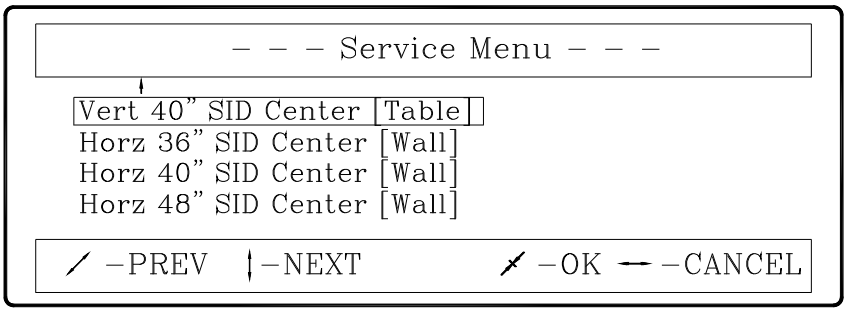


Figure 5.3.7.1

Press OK to go to Center Position Cal.

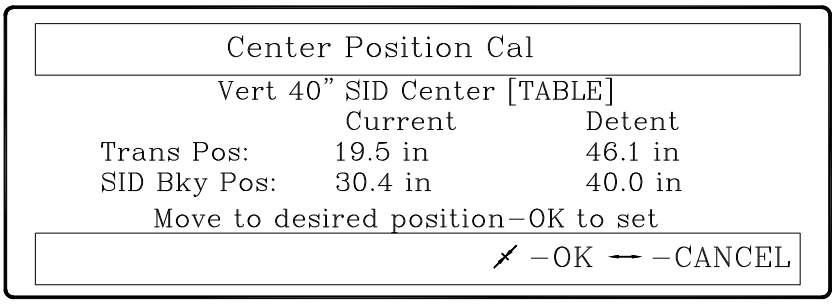


Figure 5.3.7.2

Move the tube up to the 40" distance from the table **(Depending on local regulations, this may be 40" from the tabletop or 40" from the cassette face (FFD).**

Switch the collimators light on and move the center of the light cross to desired position on the table (usually TRANSVERSE center -- center of actual cassette as seen with tabletop, Ion chamber and grid removed).

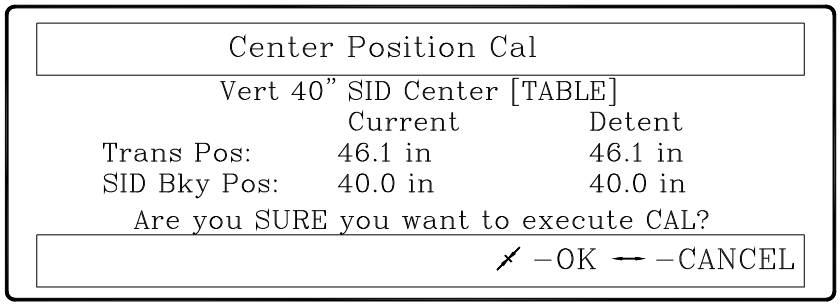


Figure 5.3.7.3

Be sure you are now 40" vertically for your SID and also centered transversely on the cassette).....
Press OK to execute calibration for this position.
Press Cancel to return to the service menu.

After this operation, the unit will stop on preset position when moving transverse and vertically.
There will be two signs of vertical and transverse set points on display when the SID will be in calibrated position. These signs (symbols) are shown in the figure 5.3.7.4 below.

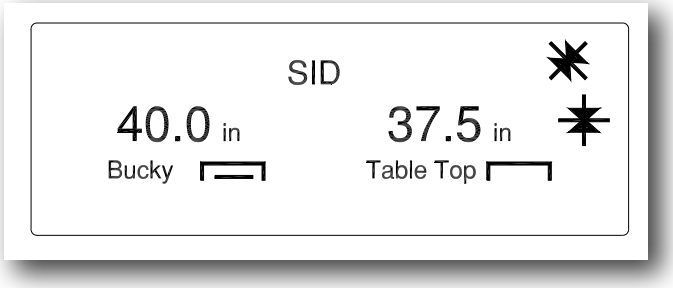


Figure 5.3.7.4

5.3.8 Horizontal 36" SID Center to the Wall Bucky Calibration

If the Bucky pot tracking has been enabled in the configuration menu, then all four of following screens will show an additional value "Vertical Offset". When calibrating the center positions, the collimator light field should be used to align the tube with the Bucky film center. When the calibration is done the difference between the Bucky height and the tube height will be recorded and displayed in this field.

Press NEXT to go to Service Menu-36" SID Center [Wall]
Press OK to enter the 36" Horiz SID section.

Turn the Tube (clockwise or counterclockwise) so that it points to your Wall Bucky direction.

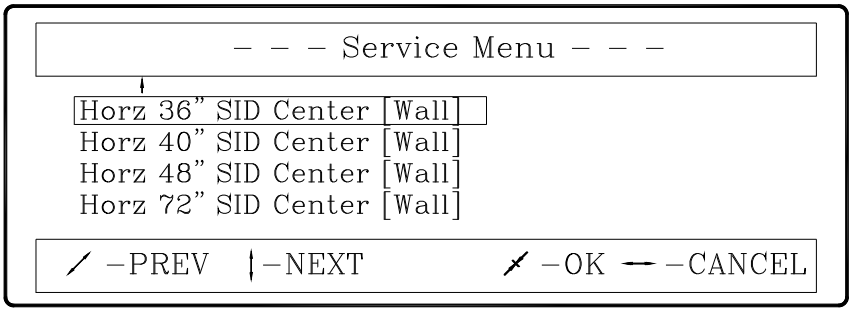


Figure 5.3.8.1

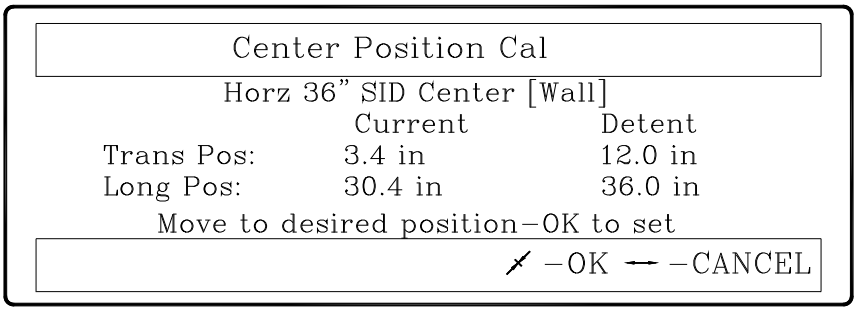


Figure 5.3.8.2

Switch the collimators light on and move the Tube, so the center of the light cross will mach with the center (transverse) of the Wall Bucky and an SID of 36 inches from the cassette face (FFD). CoRE labs Wall Stands also require that the collimators light field is at the same height as the wall stand (be sure to have the tube at exactly 90 degrees when executing). Press OK twice to execute Calibration for this position.

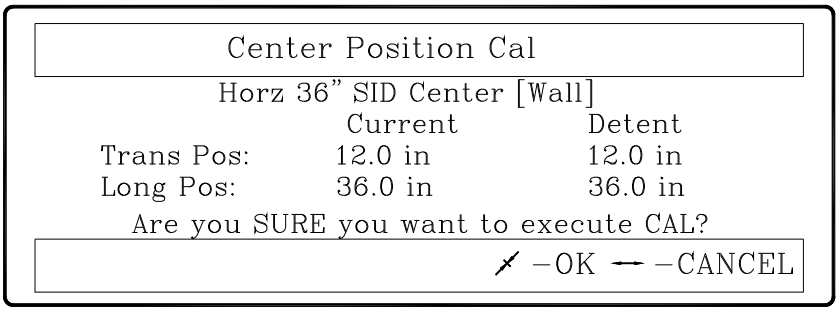


Figure 5.3.8.3

Press Cancel to return to the service menu.

After this operation, the unit will stop on preset position when moving transverse and longitudinal with the center of collimator cross light in center of wall Bucky and with SID of 36 in (plus vertically with CoRE labs Wall Stands).

There will be two signs of longitudinal and transverse set points on display when the SID will be in calibrated position.

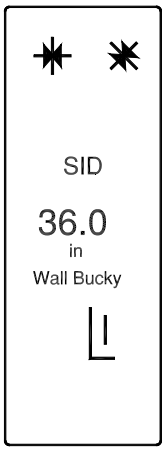


Figure 5.3.8.4

Proceed with calibration of next 40, 48 and 72 inches position the same way as just performed with the 36" calibration.

Hint! For 48", most users will want to calibrate this at actual 100" SID/FFD (out of range) so that it doesn't fall between the commonly used detents at 40" & 72". You may also want to do the same for 36".

Press CANCEL to return to the service menu...

5.4 Configuration Mode

In this Mode the following parameters can be configured and set for future operation:

Display Units **(in or cm)**
Display Blank Timeout **(minutes)**
Table Bucky Offset **-- fixed variable that user must enter value**
Table Pot Enable **-- enabled for CoRE labs ET configs (atlas)**
Fixed Table Height **-- enabled for non-ET configs**
Wall Bucky Type **-- most users will need to select at least one (left or right)**
Wall Bucky Pot Tracking **-- enabled with CoRE labs vertical Pot Wall Bucky Stand**
Aux State Relay Mode [VSID 40] **-- advanced users**
Roll Detent **-- advanced users**
Trans Centering Tolerance **-- advanced users**
Longitudinal Centering Tolerance **-- advanced users**
Vertical SID Centering Tolerance **-- advanced users**
Display Reverse Video -- advanced users **-- obsolete on later models**

In Service Menu Display, Figure 2.0 press NEXT to go to Config Mode,

5.4.1 Display Units Configuration
Press OK to go to Configuration Parameters Mode,

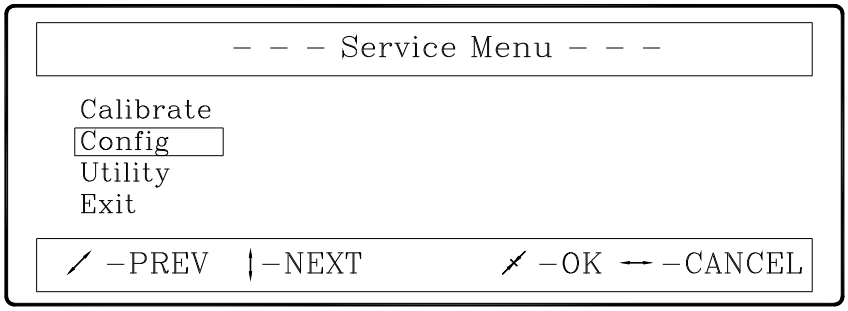


Figure 5.4.1.1

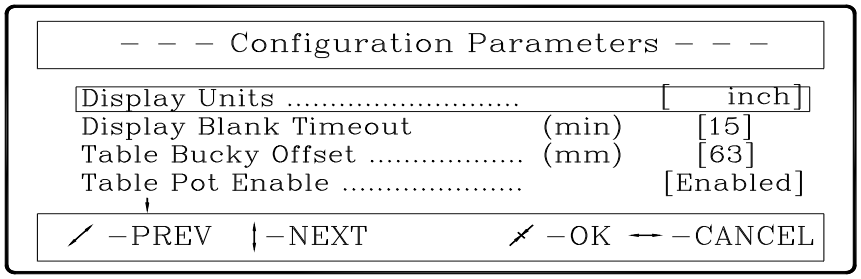


Figure 5.4.1.2

Press OK to highlight Units box,

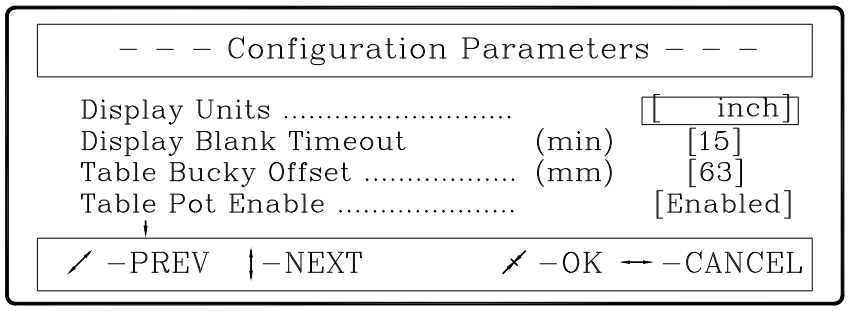


Figure 5.4.1.3

Press NEXT or PREV to move to another Units (inch or cm),

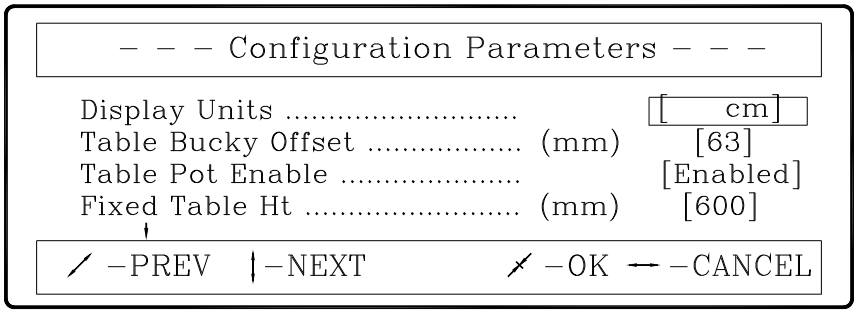


Figure 5.4.1.4

Press OK to confirm and CANCEL to return to Figure 5.4.1.2,

5.4.2 Display Blank Timeout

Press NEXT to move to Display Blank Timeout

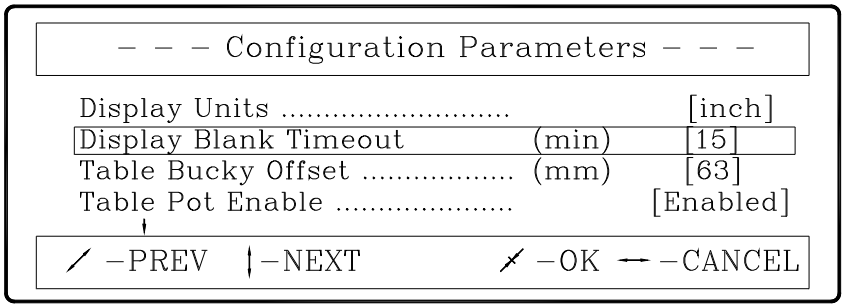


Figure 5.4.2.1

Press OK to highlight value.
Press NEXT or PREV to change value.

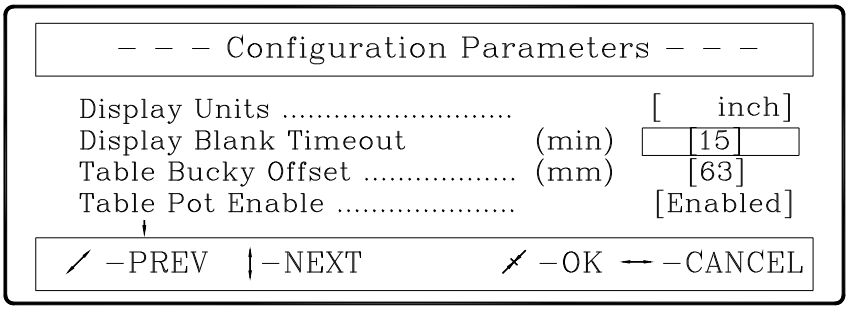


Figure 5.4.2.2

5.4.3 Table Bucky Offset Configuration -- Take a physical measurement from the top surface of the tabletop to the top surface of the cassette within the table (use a straight edge) and enter this value here in millimeters. This is the figure that the user display will show a different value on the display for SID distance to table top and table Bucky (while in vertical mode).

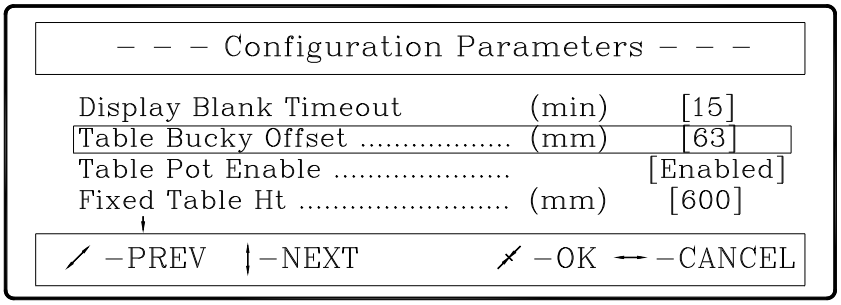


Figure 5.4.3.1

Press NEXT to highlight Table Bucky Offset,
By pressing NEXT/PREV set the proper for your Bucky offset,

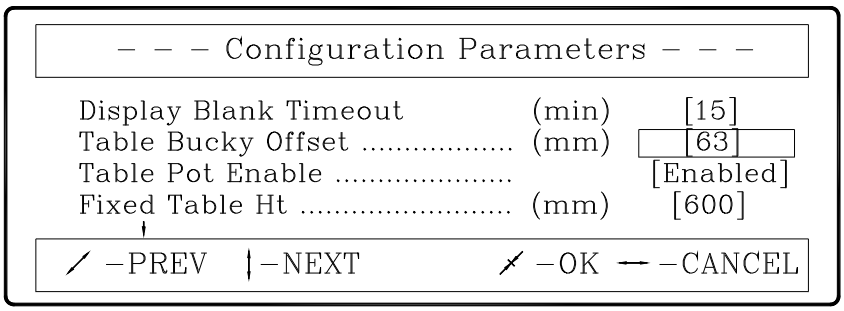


Figure 5.4.3.1

Press OK for confirmation,
Press CANCEL to return to configuration selection menu.
*** Some config parameters may be present in your tube crane display but are not discussed herein...

5.4.4 Table Pot Enable Configuration **-- enabled for CoRE labs ET configs (atlas)**

Press NEXT to go to Table Pot Enable

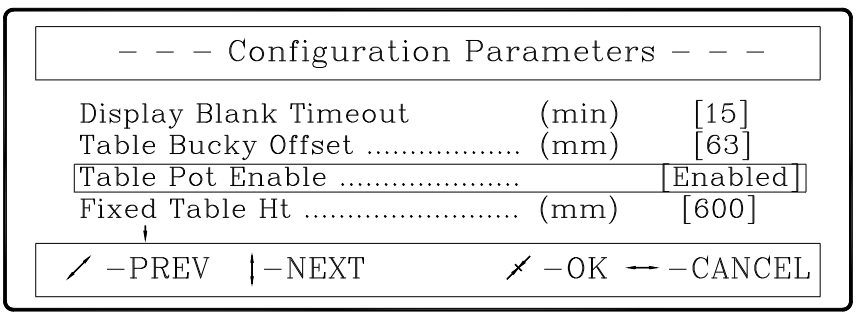


Figure 5.4.4.1

Press OK to highlight the field,

Press NEXT to Enable/Disable Table Pot according to used table (atlas users will want this enabled.

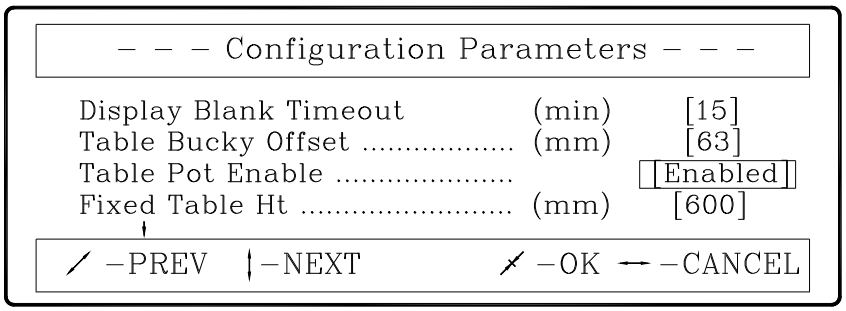


Figure 5.4.4.2

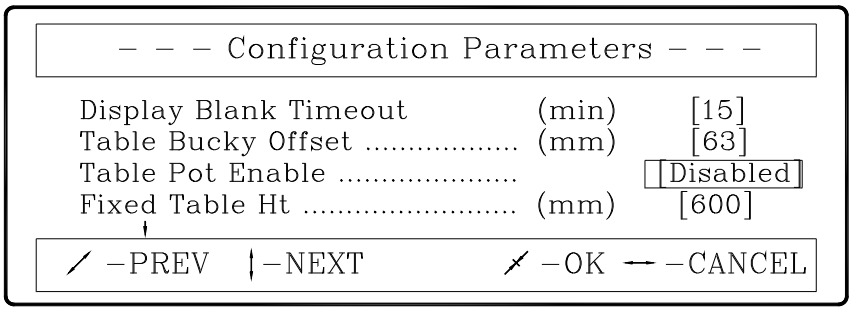


Figure 5.4.4.3

Press OK to confirm and CANCEL to return to Figure 5.4.1.2

5.4.5 Fixed Table Height Configuration (non-ET configs) Enter height here in millimeters the actual measured, installed height of a non-elevating-table. **It may be necessary to install a pair of 1K ohm resistors in the communications board (TB2) to simulate a feedback for the SID to display properly with these non-ET configs. A 1K ohm resistor should be installed in TB2, between position 1&2 and also between position 2&3.**

Press NEXT to go to Fixed Table Ht,

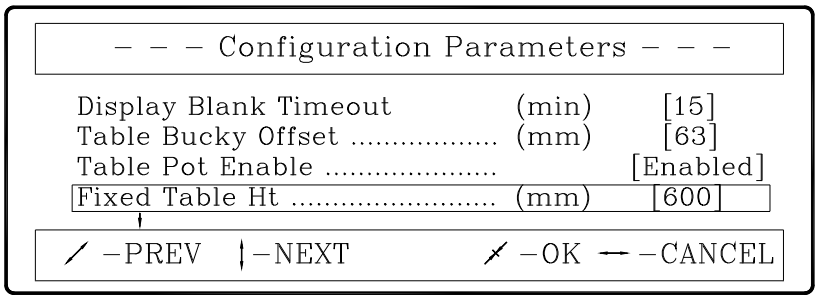


Figure 5.4.5.1

Measure your tabletop height from the floor,
Press OK to highlight digital value,

Press NEXT/PREV to set measured height.

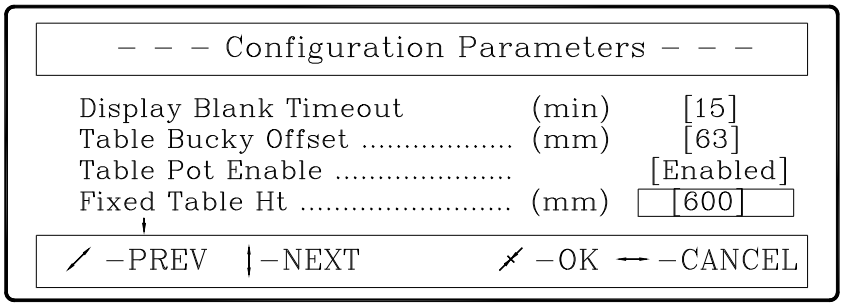


Figure 5.4.5.2

Press OK to confirm and CANCEL to return to Figure 5.4.1.2

5.4.6 Wall Bucky Type Configuration **-- (left or right) -- usually one or the other must be selected in rooms with a wall stand.**

Press NEXT to go to Wall Bucky Type,

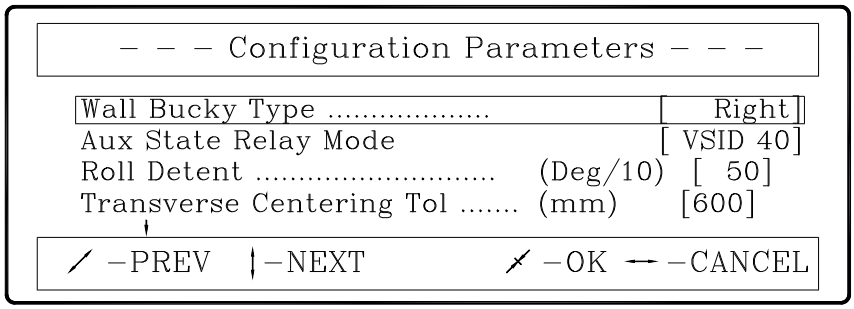


Figure 5.4.6.1

Press OK to highlight wall Bucky type,

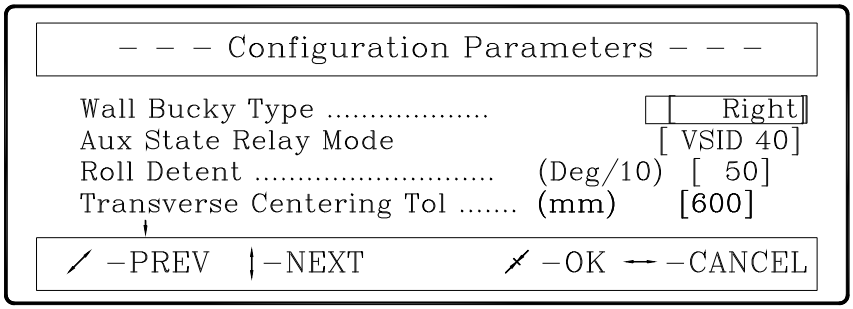


Figure 5.4.6.2

Press NEXT to select Bucky type: on the Right or Left side of the room,

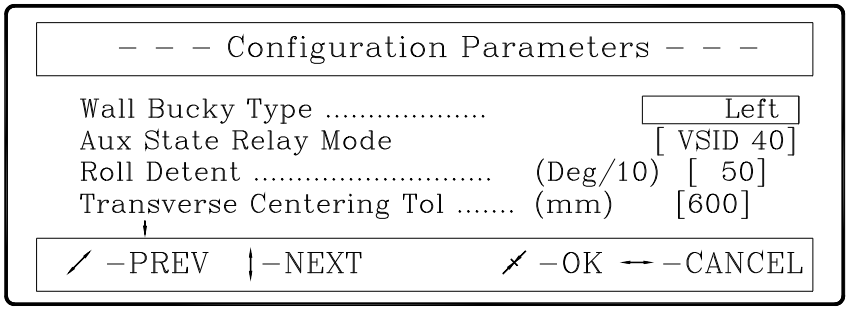


Figure 5.4.6.3

Press OK to confirm,

5.4.7 Wall Bucky Pot Tracking.

This configuration is used with Wall Bucky equipped with potentiometer for vertical movement tracing.

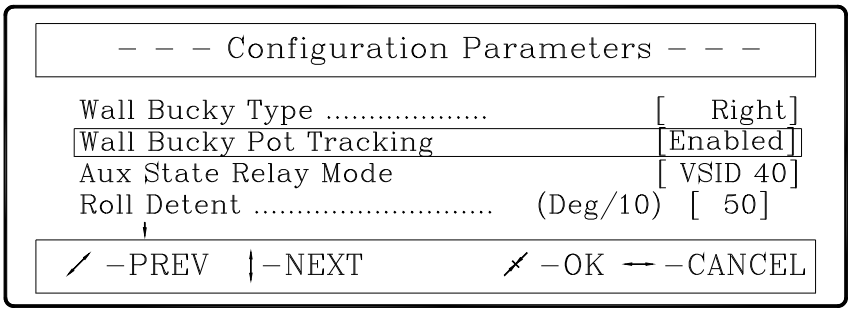


Figure 5.4.7.1

In this display the Wall Bucky Pot Tracking can be configures by choosing Enabled or Disabled position.

5.4.8 Auxiliary State Relay Mode of 40 in Vertical SID for the Table **- ADVANCED USERS**

Press NEXT to go to Aux State Relay Mode Configuration

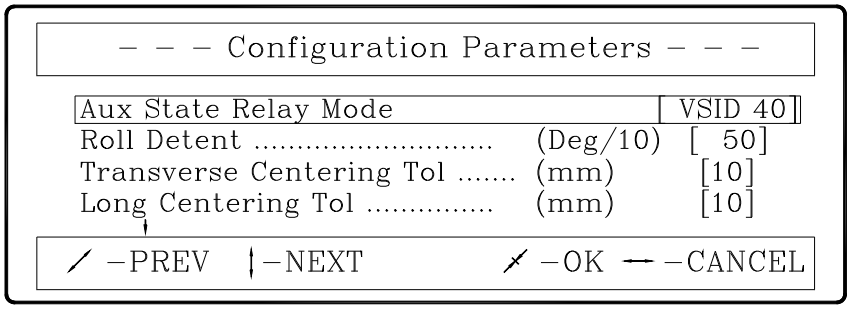


Figure 5.4.8.1

Press OK to highlight selection window.

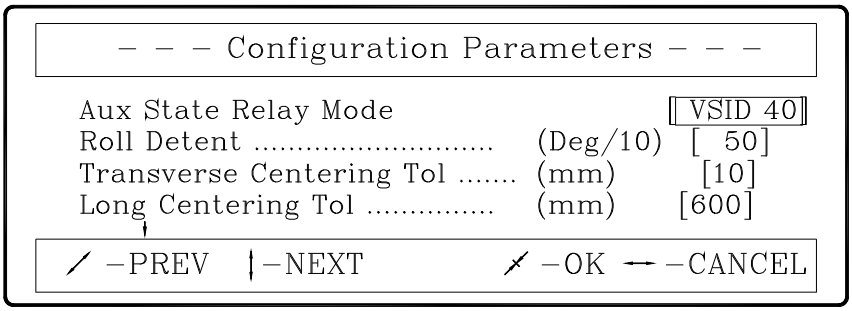


Figure 5.4.8.2

Press NEXT to select VSID 40 ON or OFF.

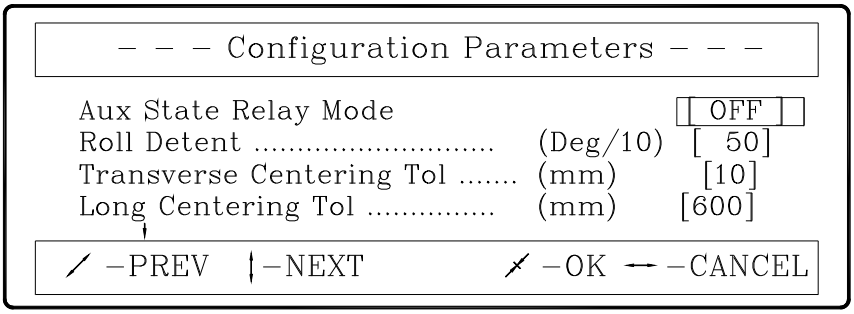


Figure 5.4.8.3

5.4.9 Roll Detent Configuration **- ADVANCED USERS**

Press NEXT to go to Roll Detent Configuration
This configures the angle of tube head above that the display will flip to Angle display.

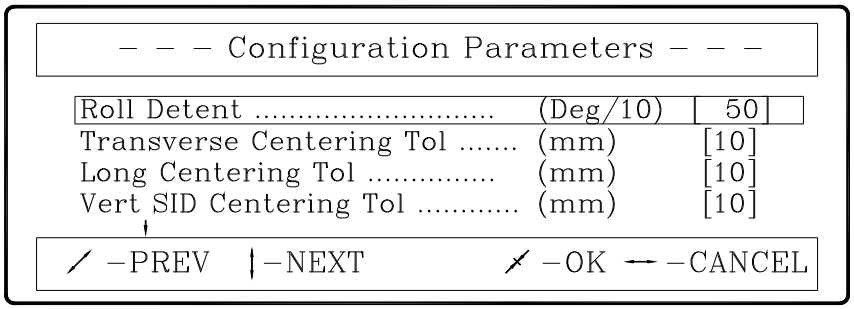


Figure 5.4.9.1

Press OK to highlight digital value,

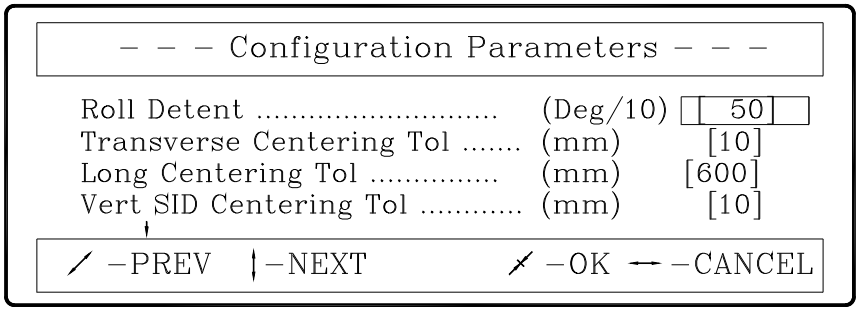


Figure 5.4.9.2

Press NEXT/PREV to set Roll Detent Configuration value (Deg/10),
Press OK for confirmation.

5.4.10 Transverse Centering Tolerance Configuration **- ADVANCED USERS**
This is the detent "window" width.

Press NEXT to go to Trans. Centering Tol. Configuration,

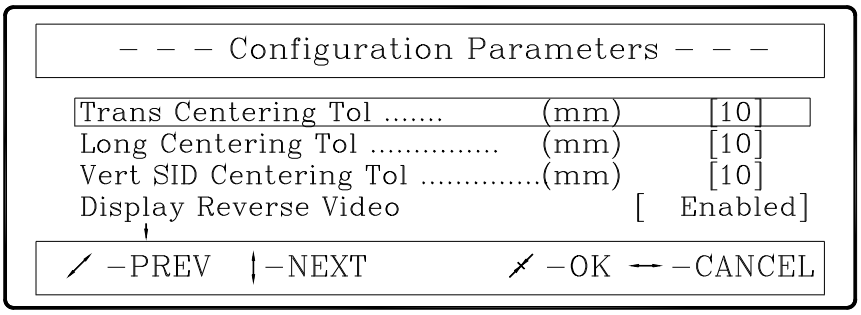


Figure 5.4.10.1

Press OK to move cursor to digits,

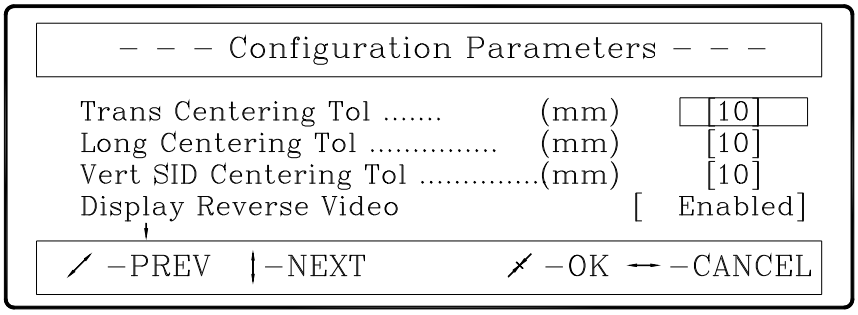


Figure 5.4.10.2

Press NEXT to set Transverse Centering Tolerance value,
Press OK to confirm.

5.4.11 Longitudinal Centering Tolerance Configuration **- ADVANCED USERS**
This is the detent "window" width.

Press NEXT to highlight Long Centering Tol,

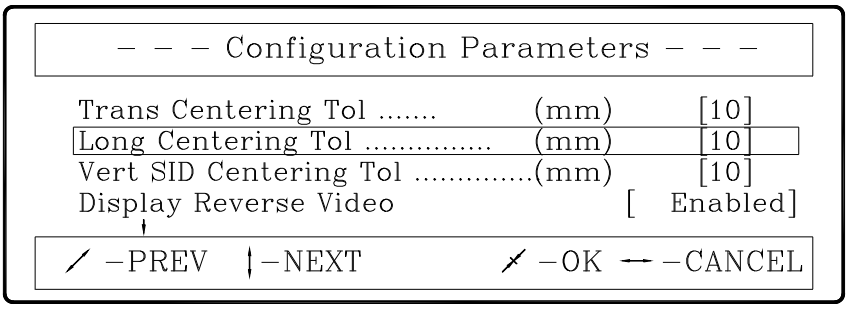


Figure 5.4.11.1

Press OK to move cursor to digital value,

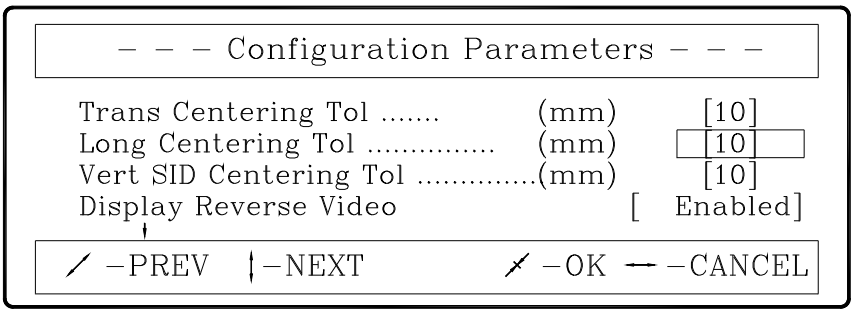


Figure 5.4.11.2

By pressing NEXT/PREV set the Longitudinal Centering Tolerance value,
Press OK to confirm.

5.4.12 Vertical SID Centering Tolerance Calibration **- ADVANCED USERS**
This is the detent "window" width.

Press to go to Vert SID Centering Tol.

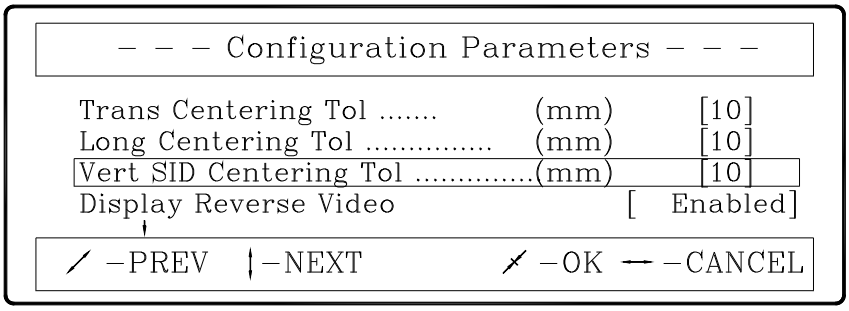


Figure 5.4.12.1

Press OK to highlight digit value.
By pressing NEXT or PREV set the tolerance value.

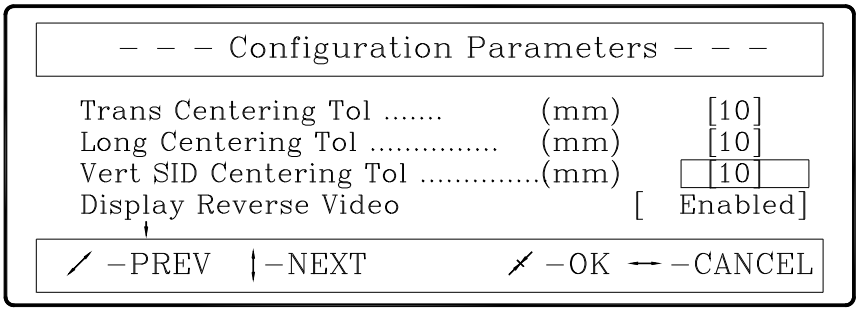


Figure 5.4.12.2

Press OK for confirmation.

5.4.13 Display Reverse Video Configuration -- Obsolete on late models.

Press NEXT to highlight Display Reverse Video,

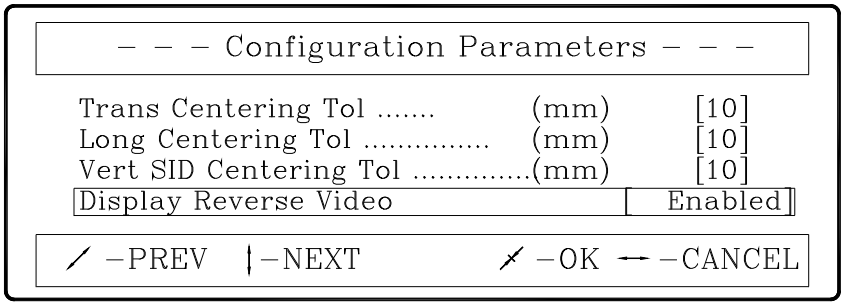


Figure 5.4.13.1

Press OK to move cursor right,

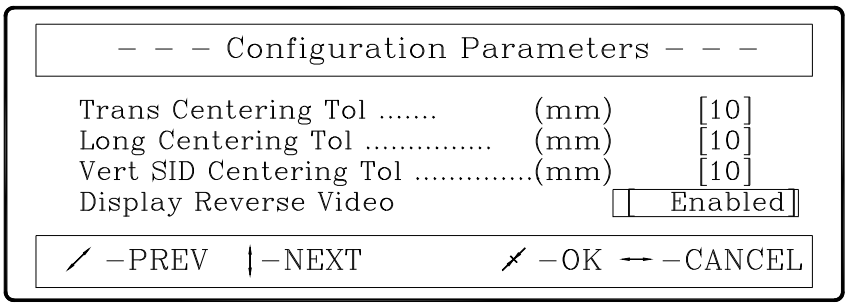


Figure 5.4.13.2

By pressing NEXT/PREV select preferable background of display,

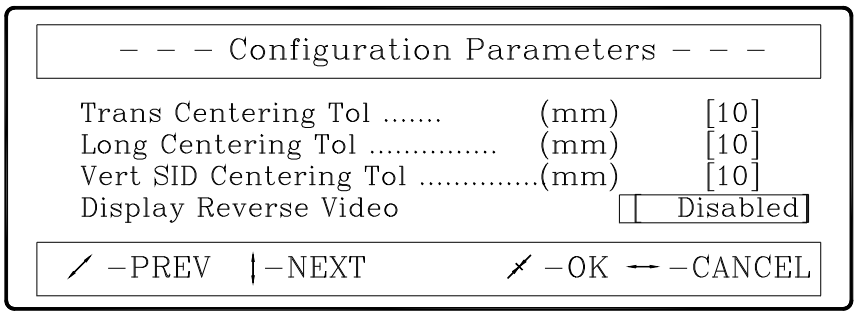


Figure 5.4.13.3

Press OK to confirm.

5.5 Utility Mode **- ADVANCED USERS**

In this Mode the Software Version and EEPROM can be verified.
Press NEXT to open Utility-Service Mode display,

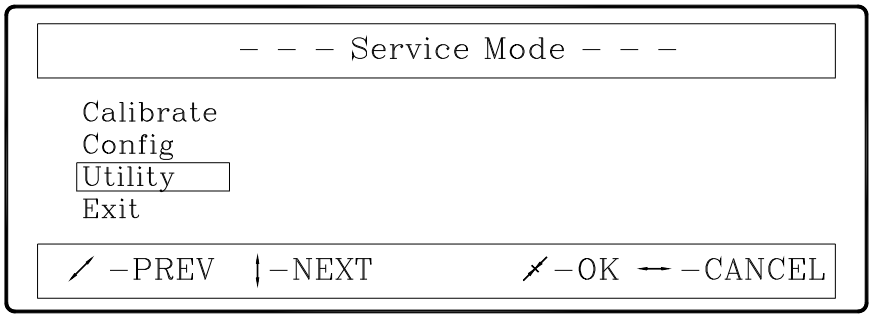


Figure 5.5.1.1

Press OK to highlight Software Version,

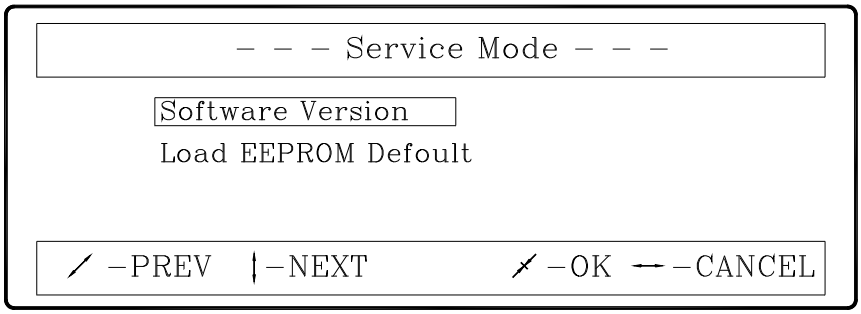


Figure 5.5.1.2

Press NEXT to highlight Load EEPROM Default. **CAUTION -- THIS IS TOTAL RESET**

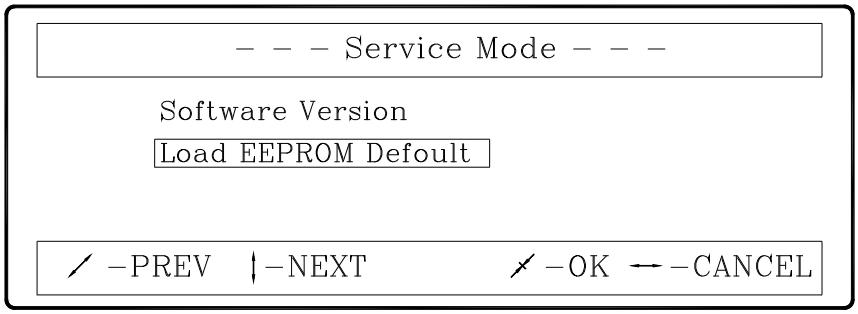


Figure 5.5.1.3

Press Cancel (3X) to return to Operation Mode Display.

5.6 Warranty

CoRE labs warrants that all products to be provided hereunder shall comply with SELLER's specification and shall be free from defects in material and workmanship under normal use and service for a period of 1 year from shipment to BUYER. If any products supplied by CoRE labs fail to conform to SELLER's specification, CoRE labs shall, as its sole and exclusive liability hereunder, repair or replace such products and /or its components if they are returned to CoRE labs facility, Englewood, Colorado, within the warranty period as expressed above and how it relates to the particular product involved. CoRE labs shall not be liable for any incident or consequential damages. These warranties are made upon the express condition that:

1. CoRE labs is given prompt written notice upon discovery by BUYER of such non-conformity, with a detailed explanation of the alleged deficiencies;
2. Such products and/or components are returned to CoRE labs at the expense of BUYER;
3. The product and/or components have not been altered, modified or changed in any manner by anyone other than CoRE labs or BUYER's qualified factory or service personnel as authorized by CoRE labs.
4. Repairs to the products and/or components have not been made by anyone other than CoRE labs or at CoRE labs' authorized service facility or BUYER's qualified service personnel as authorized by CoRE labs.
5. CoRE labs agrees to repair or replace such products within a reasonable time and will return the repaired or replaced product at CoRE labs expense.

THIS WARRANTY EXCLUDES ALL OTHER WARRANTIES, WHETHER EXPRESSED OR IMPLIED, ORAL OR WRITTEN, INCLUDING WITHOUT LIMITATION ANY WARRANTY FOR MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR PURPOSE. NO TERM, CONDITION, UNDERSTANDING OR AGREEMENT PURPORTING TO MODIFY THE TERMS OF THIS WARRANTY SHALL HAVE ANY LEGAL EFFECT UNLESS MADE IN WRITING AND SIGNED BY AN AUTHORIZED OFFICER OF CORE LABS AND THE BUYER. IF BUYER HAS MADE DIFFERENT WARRANTY TERMS THAN SHOWN ABOVE, BE SURE TO HAVE A CORE LABS REPRESENTATIVE OFFER SUCH WARRANTY IN WRITING, SIGNED BY AN OFFICER OF CORE LABS. FAILURE TO MAKE PAYMENT BY END USER AND OR INSTALLING DEALER, VOIDS ANY AND ALL WARRANTY.

5.7 Safety Overview

The CoRE labs triton is an Floor Mount Tube Support (FMTS). Personnel operating and maintaining the FMTS should receive training and be familiar with all aspects of operation and maintenance. To ensure safety, read the Safety Information section carefully before installing the system and observe all Warnings, Cautions, Importants', and Notes located throughout the manual.

General

The following are general safety precautions:

• Do not attempt any repairs if the equipment fails to operate correctly. Immediately call a person qualified and authorized to repair the equipment.

• Observe all warnings and cautions, stated or implied, in the procedures. • Follow all safety labels on the equipment.

Electrical/Mechanical

Only a qualified CoRE labs authorized Service Provider should replace electrical and mechanical components.

Mechanical

The following are mechanical safety precautions:

- Keep fingers, hands, and tools clear of moving parts.
- Unless specifically instructed, do not operate the equipment with covers or access panels removed.
- Route cables properly to eliminate hazards from tripping.

Safety Warnings and Cautions

This manual uses many types of messages to emphasize information or potential risks to personnel or equipment.

NOTE: Notes provide additional information, such as expanded explanations, hints, or reminders.

IMPORTANTS: Importants highlights critical policy information that affects how you use this manual and this product.

Cautions point out procedures that you must follow precisely to avoid damage to the system or any of its components, loss of data, or corruption of files in software applications.

Warnings identify procedures that you must follow precisely to avoid injury to your- self or others.

!

Only qualified personnel may operate the FMTS System. Operation of the equipment by persons who have not been trained or who are unfamiliar with the functions and controls of the FMTS System may cause serious injury to the patient, serious injury to the operator, or equipment damage.

The FMTS System includes no user serviceable parts. For service assistance, contact CoRE labs.

This device must be maintained according to the directions in the Operator's Manual. Failure to maintain this equipment as directed may result in injury, equipment malfunction, or unacceptable images.

Some of the ceiling components weigh up to 1000 lbs (454 kg). Use more than one installer and a suitable lifting device for these components.

The FMTS and associated cables must not be operated in the presence of condensation.

The FMTS System is not suitable for operation in the presence of a flammable anesthetic mixture with air, oxygen, or nitrous oxide.

Safety Information

Using the Equipment CAUTION

!

The equipment is fragile and must be handled with care.

Cleaning Cautions WARNING

Do not operate the equipment when cleaning the equipment.

Do not spray cleaning solution directly onto the equipment. Moisten a cloth with warm water/mild soapl solution for use on plastics and enameled metal. Apply to patient contact areas after each contact, or follow your hospital's approved disinfecting procedure.

Read and follow instructions in the Material Safety Data (MSDS).

Do not immerse the equipment in liquid. Do not autoclave the equipment.

Applicable IEC Symbols

Protective earth (ground). Identifies any terminal, which is intended for connection of an external protective conductor to protect against electrical shock in case of a fault.

This symbol on the equipment means that the accompanying operating instructions should be consulted to assure safe operation.

Dangerous voltage. Indicates an avoidable dangerous high voltage hazard.

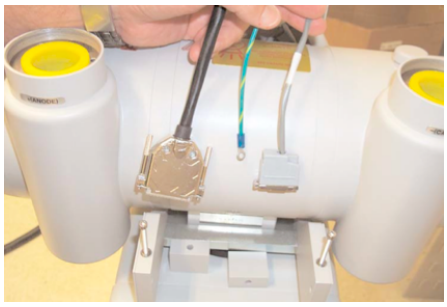
Function Earth (ground) Terminal. Terminal directly connected to a point of a UL measuring supply or control circuit or to a screening part that is intended to be earthen for functional purposes.

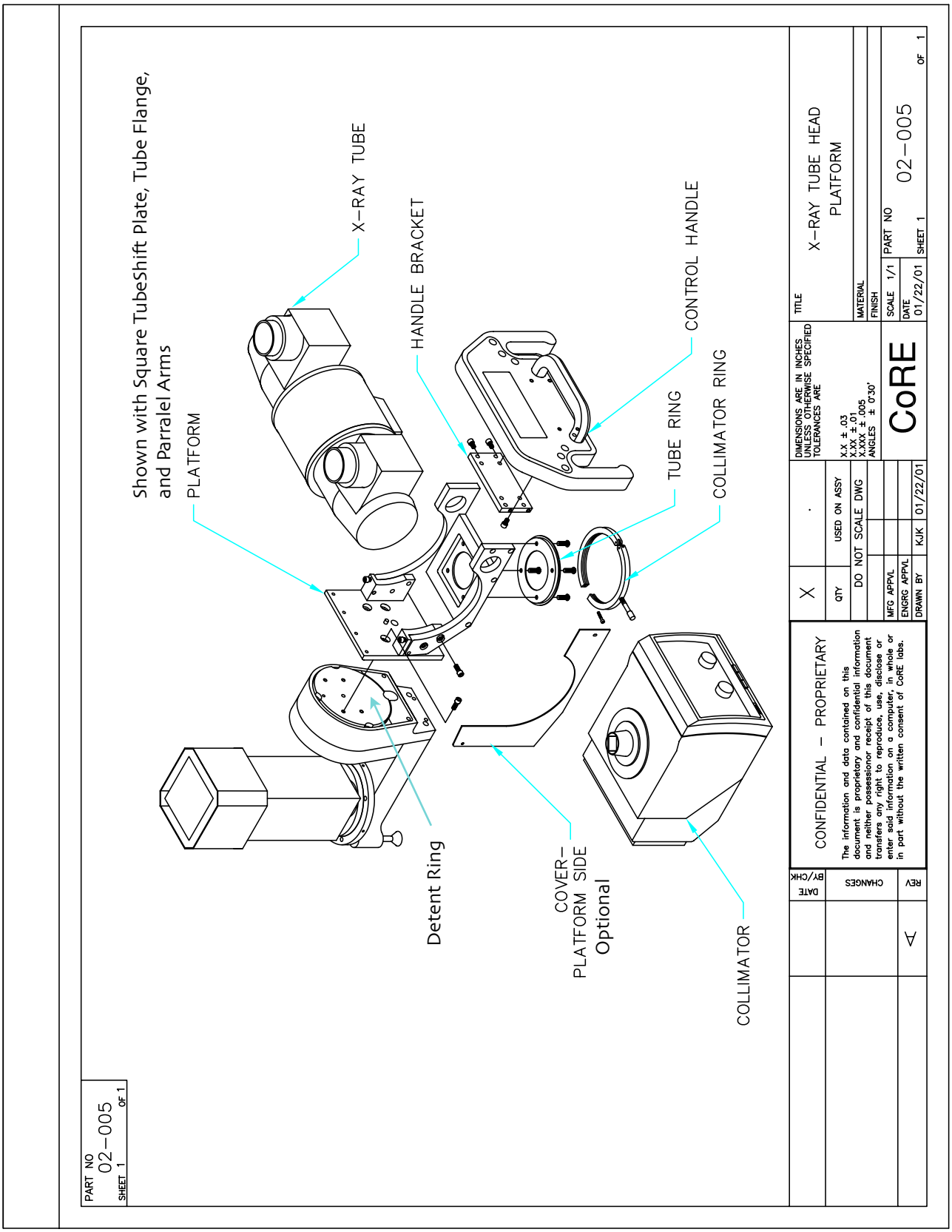
Alternating Current. Indicates equipment that is suitable for alternating current only.

N Connection point for the neutral conductor on PERMANENTLY INSTALLED EQUIPMENT

SUPPLEMENT SECTION.....

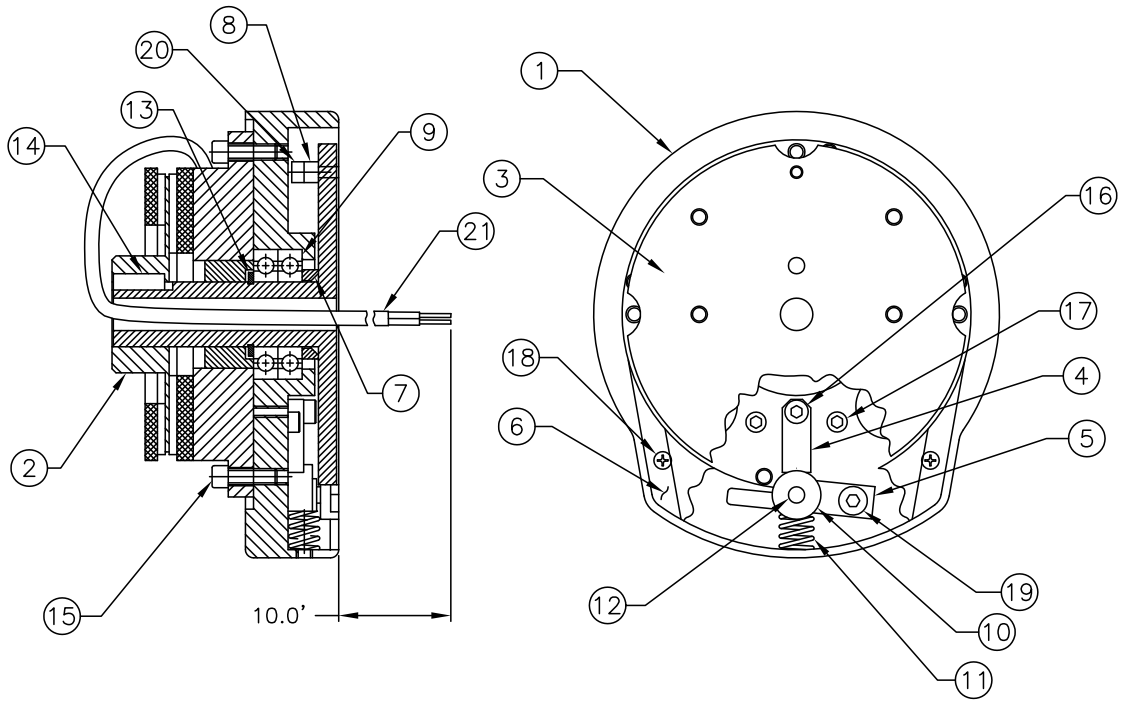
Photos of control handle cables and installation points.





OTS AND FMTS Platform

PART NO
911003
SHEET 1 OF 1



BILL OF MATERIAL

ITEM	PART NO.	DESCRIPTION	QTY
1	931011	BRAKE-DETENT SUPPORT	1
2	931035	BRAKE-VERTICAL -MACH.	1
3	231264	DETENT DISC - MACH.	1
4	231223	BUMPER-TUBE SUPPORT	1
5	231121	BLOCK-DETENT (TUBE SUPPORT)	1
6	231136	COVER-SIDE SUPPORT	1
7	231122	BUSHING	1
8	231224	RING-BUMPER	1
9	926010	BALL BEARING 1x2x3/8	2
10	926003	BALL BEARING 1/4x3/4x9/32	1
11	966010	SPRING COMP. LC-055G-3	1
12	924014	PIN ø1x1/4x3/4 DOWEL	1
13	940010	RETAINING RING SFR-98 EXTR.	1
14	231014-3	KEY WAY 1/4x1/4x7/8	1
15	901-0420-12-20	1/4-20-3/4 SHMS	4
16	231146	SHOULDER-MACH.	1
17	901-032-06-10	#10-32-3/8 SHMS	2
18	905-632-05-04	#6-32-5/16 FHMS	2
19	913-04-06-02	SHOULDER 1/4-3/8-10x24	1
20	901-032-08-10	#10-32-1/2 SHMS	1
21	E18-001-003	HEAT SHRINK	18'

REV	CHANGES	D&D NO.	By/Chk	DATE
A	PRE-PRODUCTION RELEASE	x	E.G.	07.22.02

QTY	USED ON ASSY
1	911004

REMOVE ALL SHARP EDGES AND BURRS
DO NOT SCALE DWG

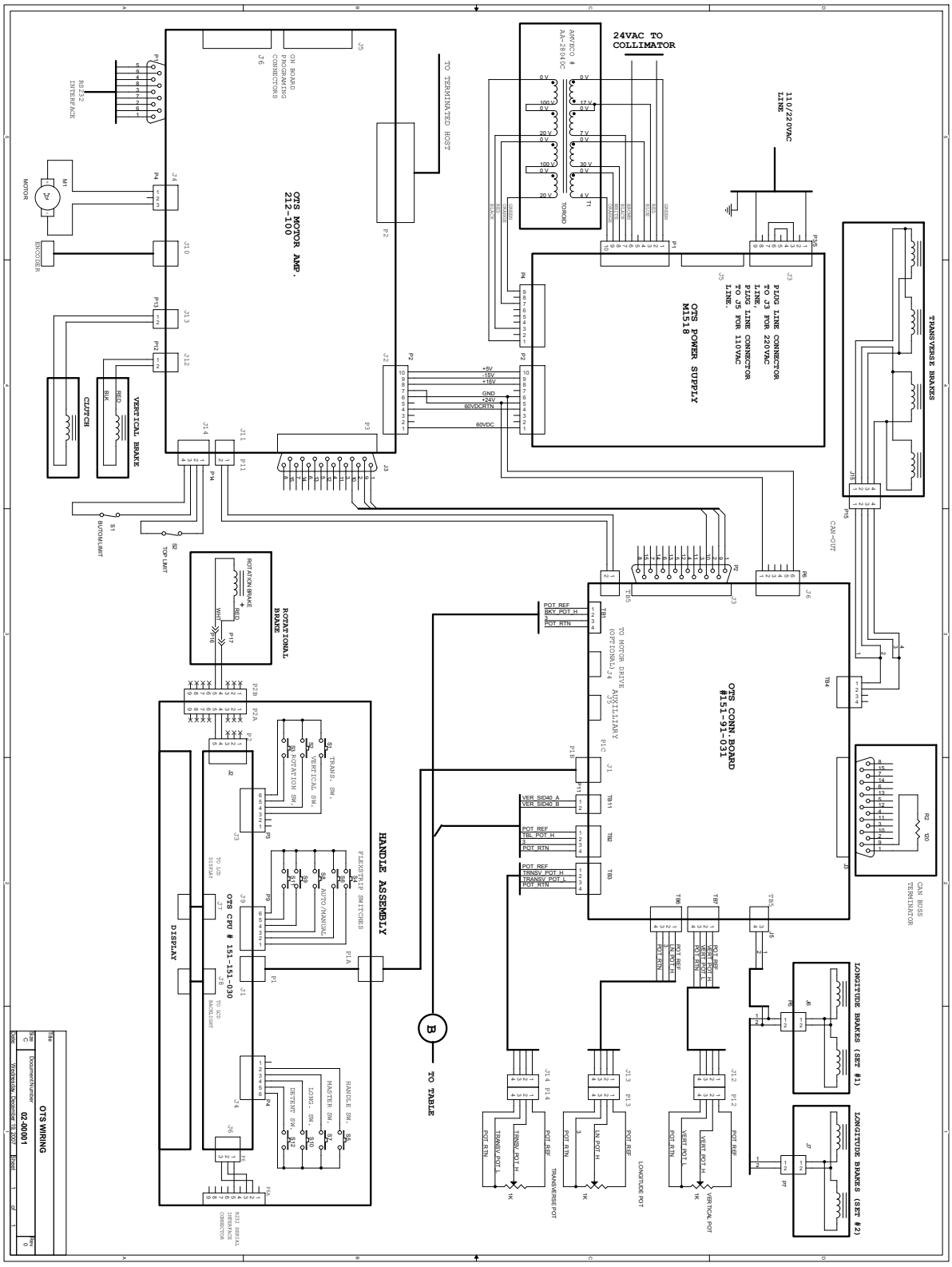
MFG APPVL		
ENGRG APPVL		
DRAWN BY	E.G.	06.12.02

CoRE

DIMENSIONS ARE IN INCHES
UNLESS OTHERWISE SPECIFIED
TOLERANCES ARE:
X.X ±.03
X.XX ±.01
X.XXX ±.005
ANGLES ± 0°30'

TITLE
BRAKE ASSY
X-RAY TUBE ROTATION

MATERIAL SEE B/M
FINISH -------
CAD
OBJECT SCALE 1/1
PART NO 911003
SHEET 1 OF 1


OTS MOTOR AMP.
212-100
OTS POWER SUPPLY
M1518
OTS CONN.BOARD
#151-91-031
OTS CPU # 151-151-030
HANDLE ASSEMBLY
DISPLAY
24VAC TO
COLLIMATOR
110/220VAC
LINE
TO TERMINATED HOST
PLUG LINE CONNECTOR
TO J3 FOR 220VAC
LINE,
PLUG LINE CONNECTOR
TO J5 FOR 110VAC
LINE.
TRANSVERSE BRAKES
LONGITUDE BRAKES (SET #1)
LONGITUDE BRAKES (SET #2)
ROTATIONAL
BRAKE
VERTICAL BRAKE
CLUTCH
MOTOR
TO TABLE
OTS WIRING
02-00001

OTS AND FMTS

E	D	C	B	A

REVISIONS

Rev	Description	Date	Appr.
A	INITIAL RELEASE	01/26/2000	SWT
B	SEE NOTE 6	12/12/2000	SWT
B1	SHEET 3 ADD R92, L1, C41. CHANGE C39, C40 FROM 100nF AND R67 FROM 1.0M.	02/06/2001	SWT
C	SEE NOTE 7.	03/27/02	WDS
C1	Change C35 (6D3) from 47uF, 16V to 10uF, 35V.	08/01/02	SWT
C2	Change D1 from 24V, SMBJ24A to 30V, SMBJ30A	01/30/03	SWT

Table 1. Reference Designators

LAST USED	UNUSED	NOT FITTED
C41 D39 E1 F2 J9 L1 MT11 Q5 R92 RP3 SW3 TP39 U19 Y1	D12, D16, D20 TP23 - TP27	R78 R91 U18

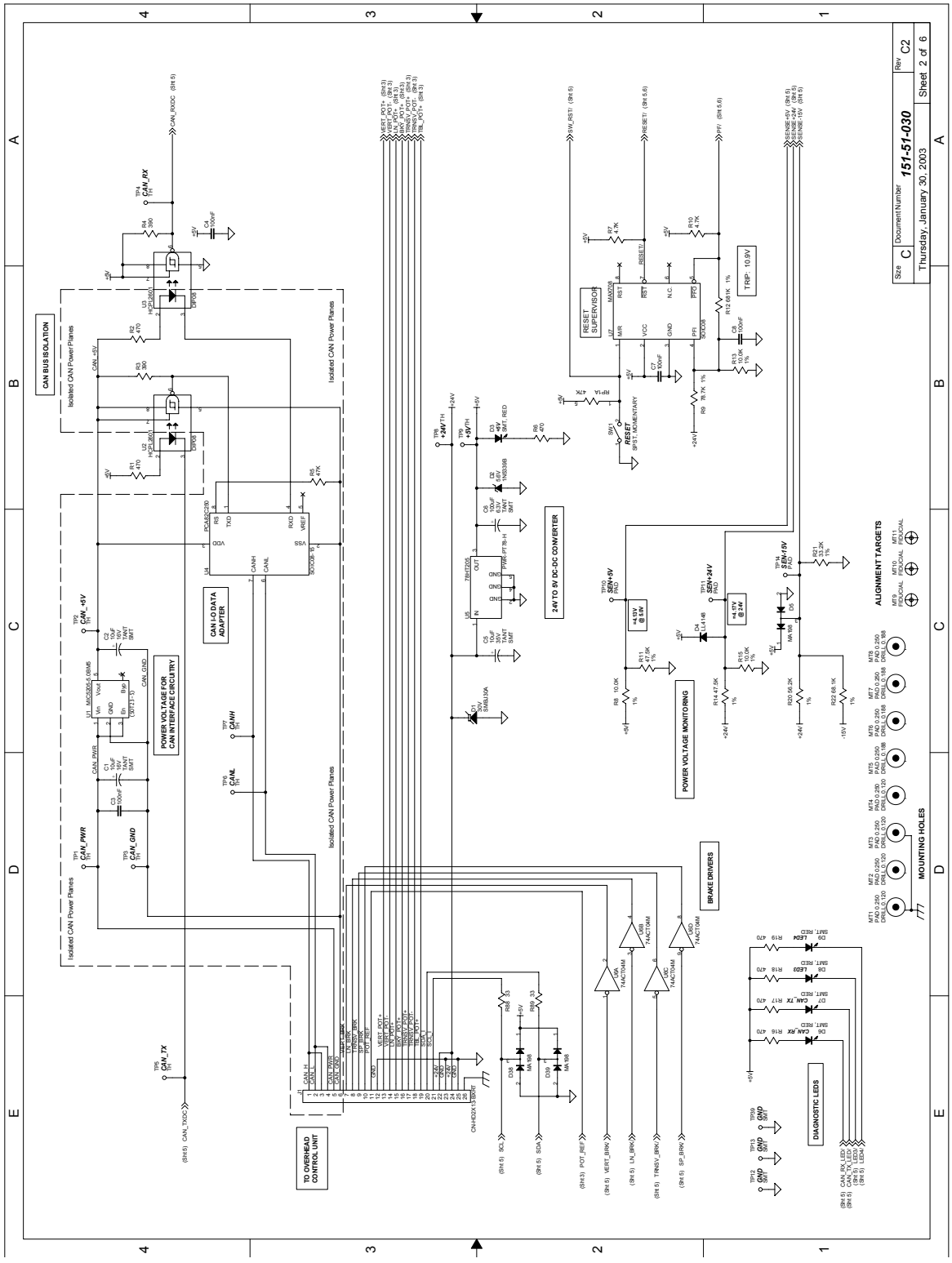
Table 2, IC Power & Ground Connections
(Implicit connections only)

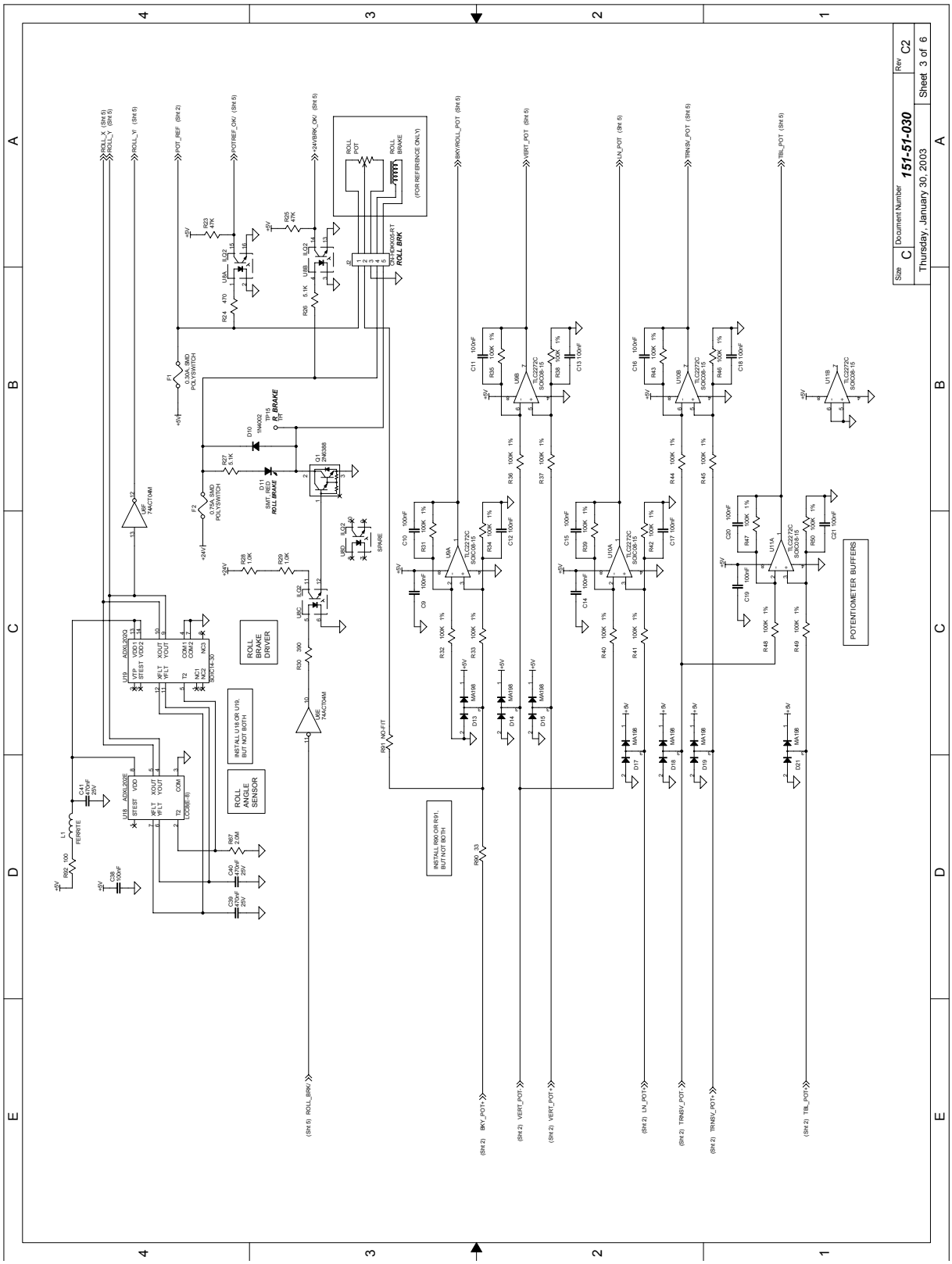
REF	TYPE	GND PIN	+5V PIN	PIN
U6	74ACT04	7	14	
U15	74HC00	7	14	

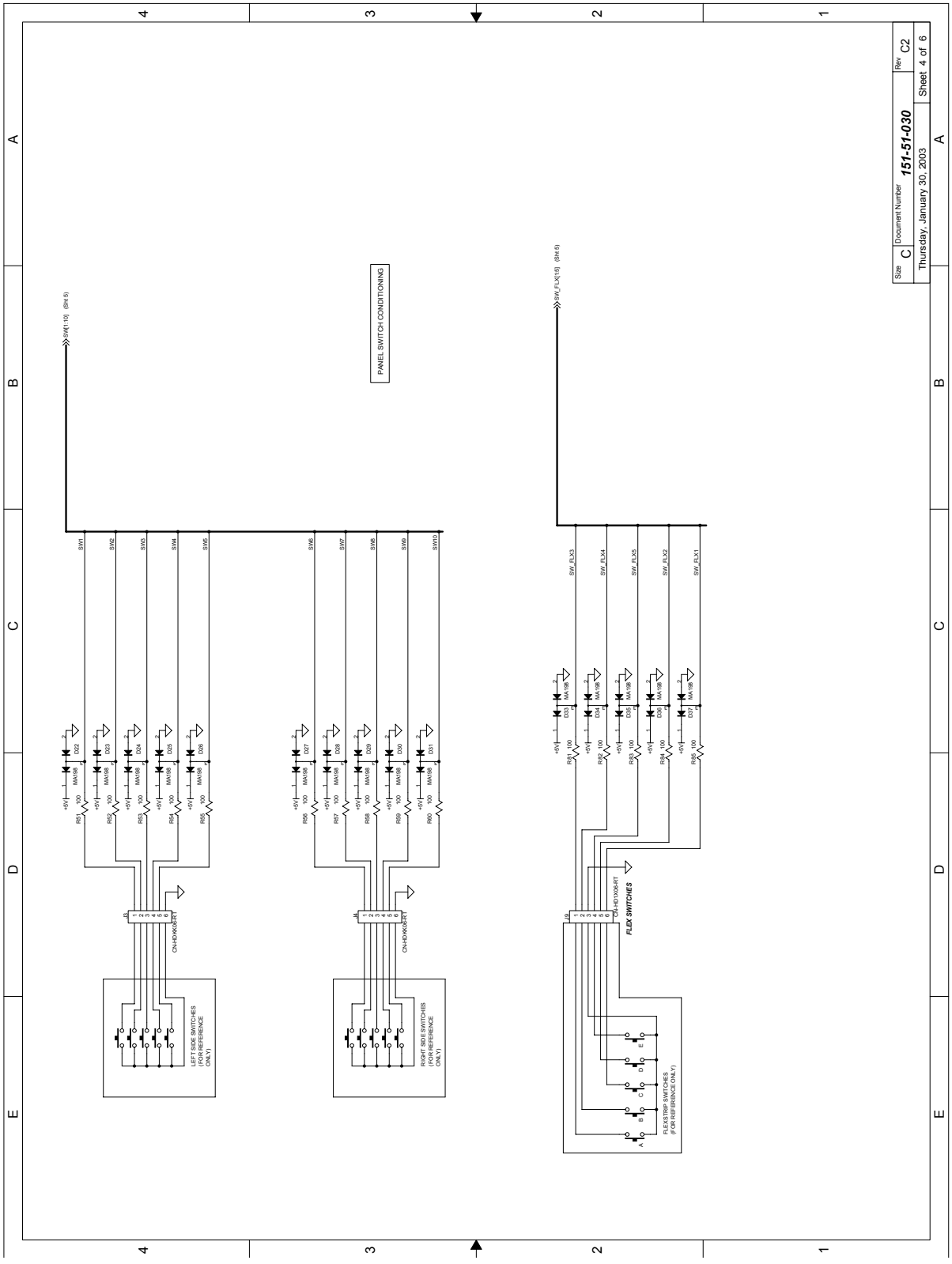
NOTES: (UNLESS OTHERWISE SPECIFIED)

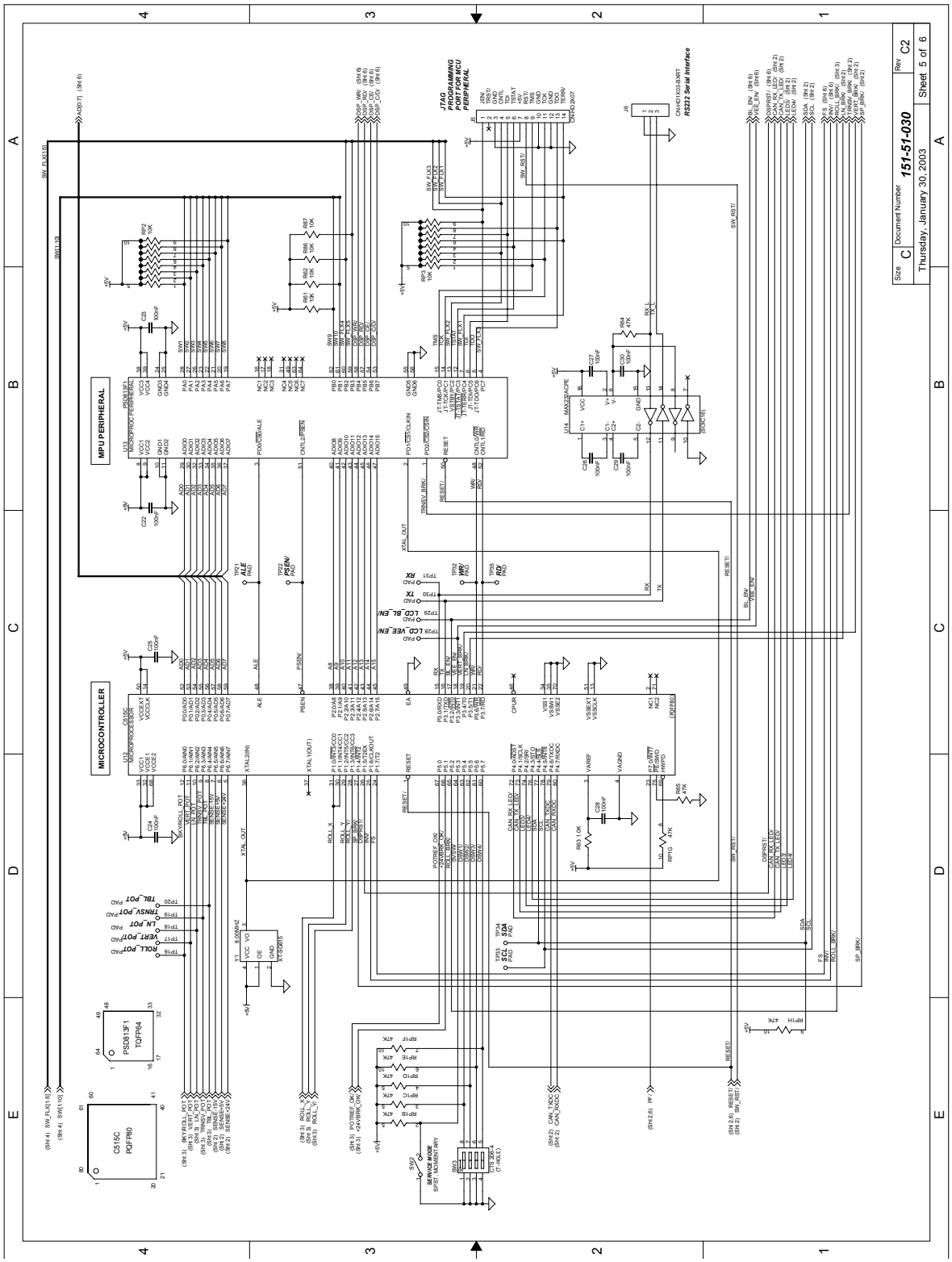
1. ALL RESISTORS ARE SURFACE-MOUNT CHIP TYPES, STYLE 1206, TOLERANCE 5%, RATED 1/8 WATT. VALUES ARE IN OHMS, KILOHMS (K) OR MEGOHMS (M).
2. ALL CAPACITORS ARE SURFACE-MOUNT CERAMIC CHIP TYPES, STYLE 1206, TOLERANCE 10%, RATED 50V. VALUES ARE IN MICROFARADS (uF), NANOFARADS (nF) OR PICOFARADS (pF).
3. RELATED DRAWINGS:
   ASSEMBLY: 151-91-030 (with CAN) 151-91-033 (No CAN)
   PCB: 151-93-030
4. USED ON PROJECT: IROM
5. NA
6. B REVISION CHANGES:
   Correct reversed inputs to U9A, U10A, U11A (Sh 3). Change U9, U10, U11 from TLC272. Pin Y1-1 was connected to GND (Sh 5). Delete U14-1 connection to +5V (Sh 5). Disconnect Q2A from J7-3, connect J7-3 to +5V, delete R67 (Sh 6). At J1-20,21 substitute signals SCL, SDA; add interface networks R88, D38, R89, D39 (Sh 3). Connect SCL, SDA at U12-77,78 (Sh 5). Change all references "Latitude" to "Transverse", "Elevation" to "Vertical", "Rotation" to "Roll". Change all signals LAT_POT to TRNSV_POT, EL_POT to VERT_POT, ROT_POT to ROLL_POT. Negative input to TBL_POT channel was independent and connected to J1-20; now shared with TRNSV_POT channel. Was: R69 47K, R71 2.7K, R73 10K (Sh 6). Add J9 and interface networks for signals SW_FLXx (SH 4) and route them into U13 (Sh 5). Add U18, U19, C38-C40, R67 (Sh 3). U6F was spare. Wire ROLL_X, ROLL_Y, ROLL_Y into U12, and rewire affected signals (Sh 5). Change PadsID of Y1 from SMT-04 to SMT-SG615. Change signal from LN_POT- to BKY_POT+. Add R90, R91. Change signal ROLL_POT to BKY/ROLL_POT. Delete D16 and R36 to R40.
7. Changes for revision C:
   Incorporate B1 changes as follows: Add C41, L1, R92 (3D4). Change C39, C40 from 100nF to 470nF and change R67 from 1.0M to 2.0M (3D4). Also add MT9, MT10, MT11 and E1 (2C1). Change R36 from 1.0uF to 0.47uF. Make note 5 not applicable - was an obsolete reference to connection of analog and digital ground at sheet 5, zone D2.

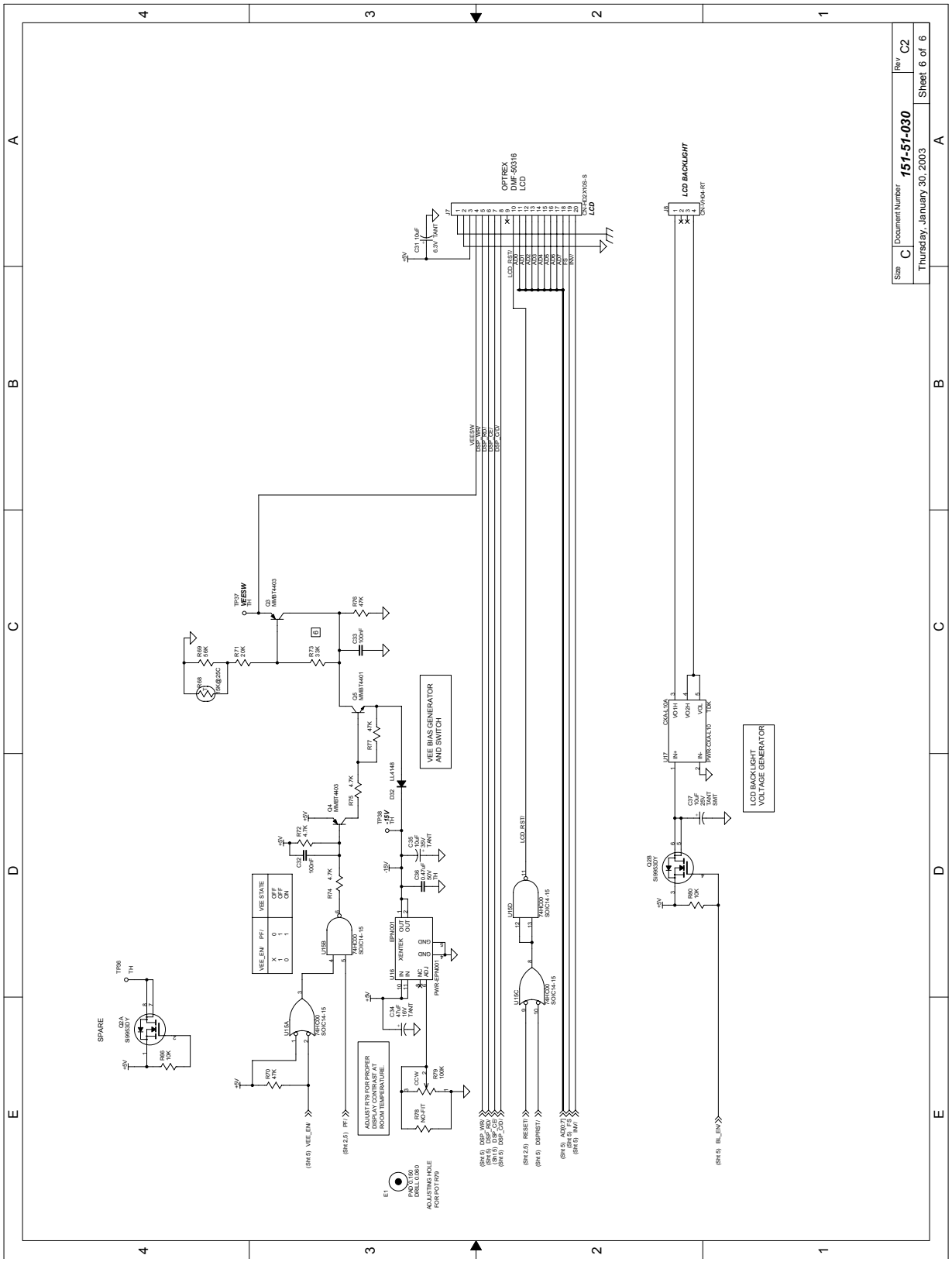
Title	Schematic, OTS Display CPU	
Size C	Document Number **151-51-030**	Rev C2
Thursday, January 30, 2003 18:15:36		Sheet 1 of 6


CAN BUS ISOLATION
Isolated CAN Power Planes
CAN I-O DATA ADAPTER
POWER VOLTAGE FOR CAN INTERFACE CIRCUITRY
24V TO 5V DC-DC CONVERTER
RESET SUPERVISOR
POWER VOLTAGE MONITORING
BRAKE DRIVERS
ALIGNMENT TARGETS
MOUNTING HOLES
DIAGNOSTIC LEDS
TO OVERHEAD CONTROL UNIT
Size C
DocumentNumber 151-51-030
Rev C2
Thursday, January 30, 2003
Sheet 2 of 6


Size C
Document Number 151-51-030
Rev C2
Thursday, January 30, 2003
Sheet 3 of 6
ROLL BRAKE DRIVER
ROLL ANGLE SENSOR
POTENTIOMETER BUFFERS
INSTALL U18 OR U19, BUT NOT BOTH
INSTALL R90 OR R91, BUT NOT BOTH
ROLL BRAKE
R_BRAKE
ROLL_BRK
ROLL POT
ROLL BRAKE
(FOR REFERENCE ONLY)
SPARE
BKY_POT+
VERT_POT+
LN_POT+
TRNSV_POT+
TRNSV_POT+
TBL_POT+


PANEL SWITCH CONDITIONING
SW[1:10] (Sht 6)
SW_FLX[1:5] (Sht 6)
LEFT SIDE SWITCHES (FOR REFERENCE ONLY)
RIGHT SIDE SWITCHES (FOR REFERENCE ONLY)
FLEX SWITCHES
FLEX STRIP SWITCHES (FOR REFERENCE ONLY)
CONHDWKSORT
Size C
Document Number 151-51-030
Rev C2
Thursday, January 30, 2003
Sheet 4 of 6


MICROCONTROLLER
MPU PERIPHERAL
JTAG PROGRAMMING PORT FOR MCU PERIPHERAL
RS232 Serial Interface
Size C
Document Number 151-51-030
Rev C2
Thursday, January 30, 2003
Sheet 5 of 6


Size C
Document Number 151-51-030
Rev C2
Thursday, January 30, 2003
Sheet 6 of 6
OPTREX DMF-50316 LCD
LCD BACKLIGHT
VEE BIAS GENERATOR AND SWITCH
LCD BACKLIGHT VOLTAGE GENERATOR
ADJUST R79 FOR PROPER DISPLAY CONTRAST AT ROOM TEMPERATURE
ADJUSTING HOLE FOR POT R79
SPARE
VEE_EN PF/ VEE STATE
X 0 OFF
0 1 OFF
1 0 ON
(SH 5) VEE_EN
(SH 2.5) PF
(SH 5) DSP_WR
(SH 5) DSP_RS
(SH 5) DSP_CS
(SH 5) DSP_C/D
(SH 2.5) RESET
(SH 5) DSPRST
(SH 5) A[0:7]
(SH 5) F/
(SH 5) R/W
(SH 6) BL_EN

REVISIONS			
Rev	Description	Date	Appr.
A	INITIAL RELEASE	03/29/2000	SWT
B	SEE NOTE 5.	12/12/2000	nnn

REFERENCE DESIGNATORS		
LAST USED	UNUSED	NOT FITTED
C6 D30 F3 J6 JB2 MT4 Q4 R35 TB11 TP14 U11		JB1, JB2

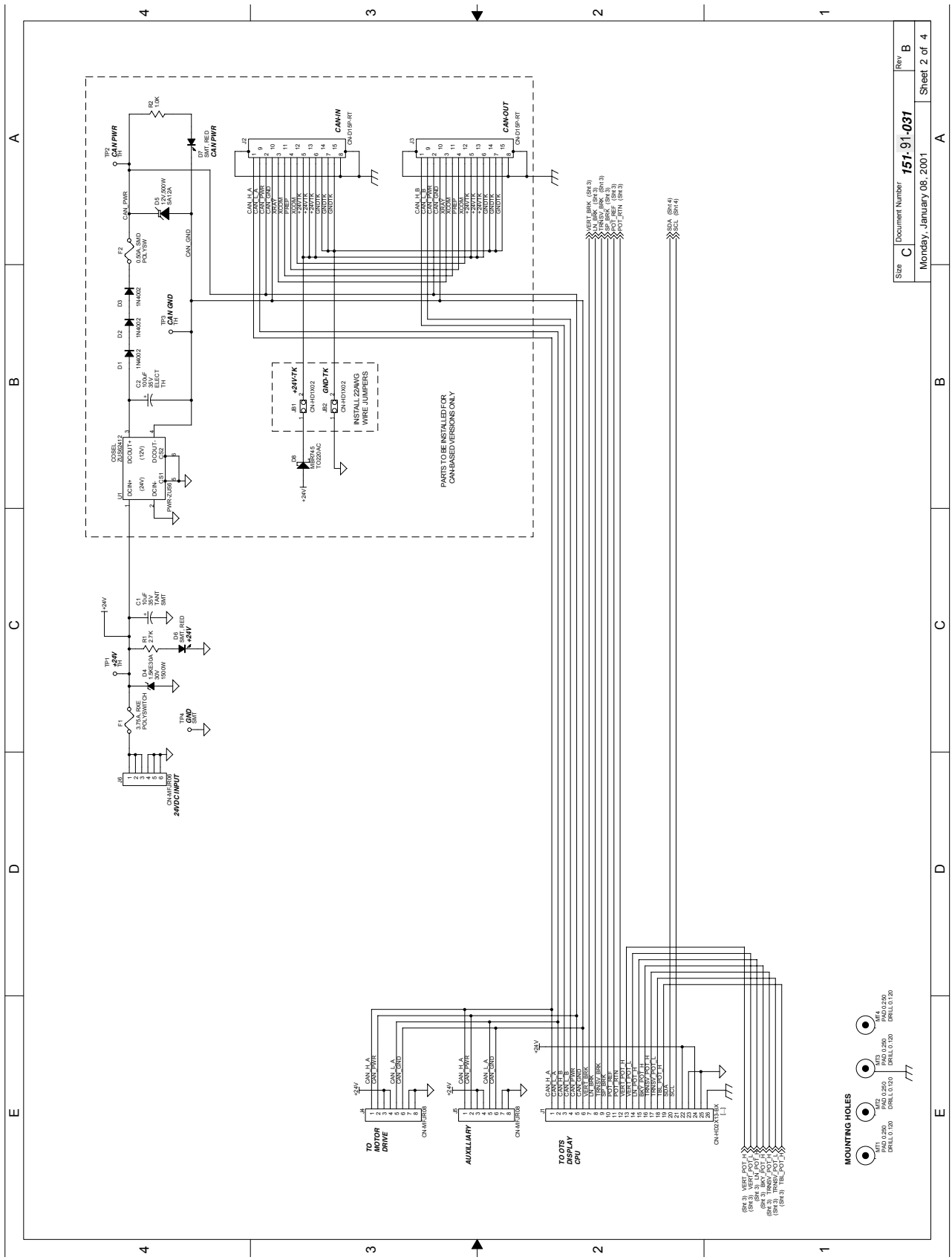
POWER, GROUND CONNECTIONS (EXPLICIT CONNECTIONS NOT LISTED)				
REF	TYPE	GND PIN	+5V PIN	PIN
U10	PCF8574	8	16	

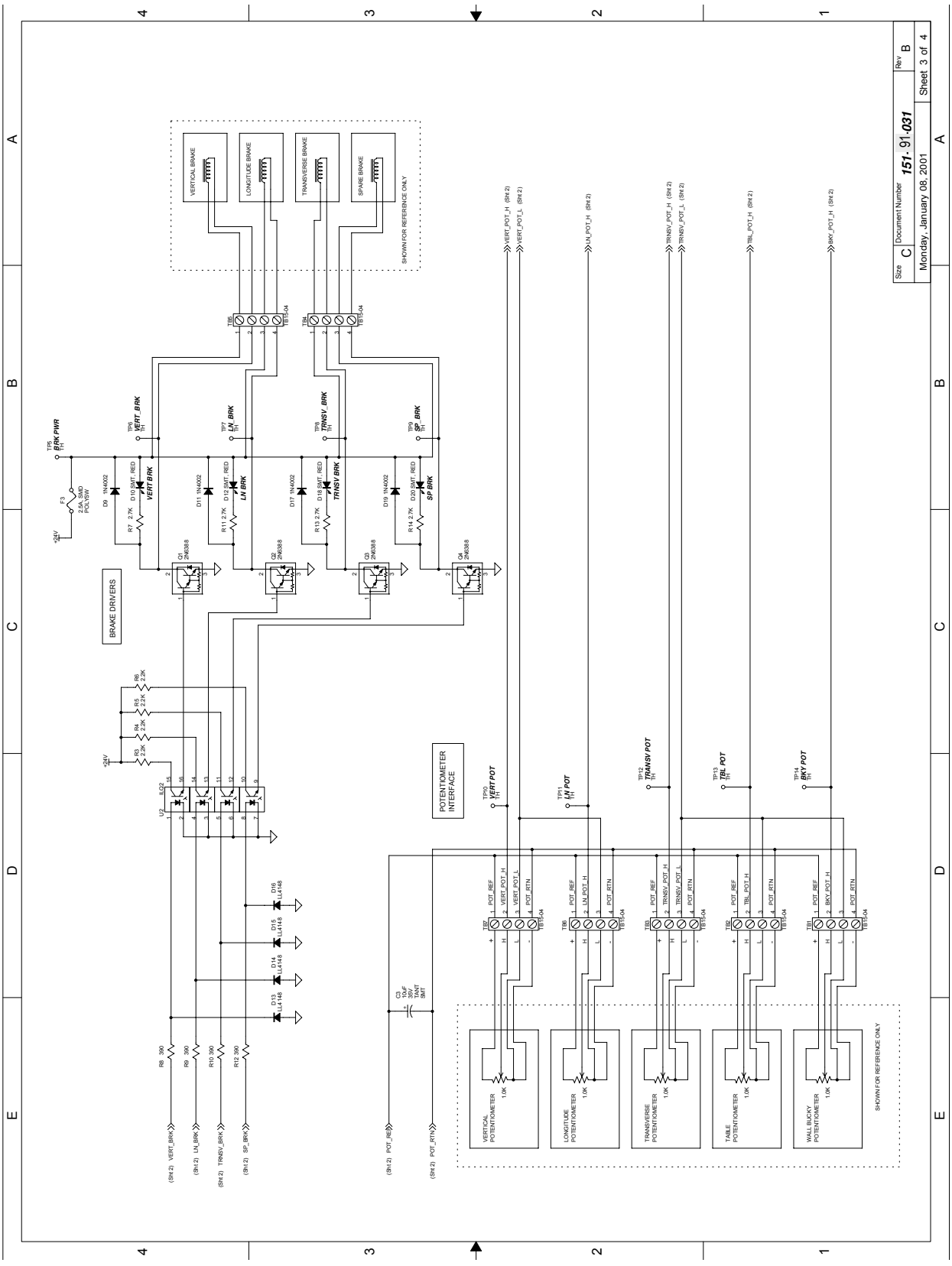
NOTES: (UNLESS OTHERWISE SPECIFIED)

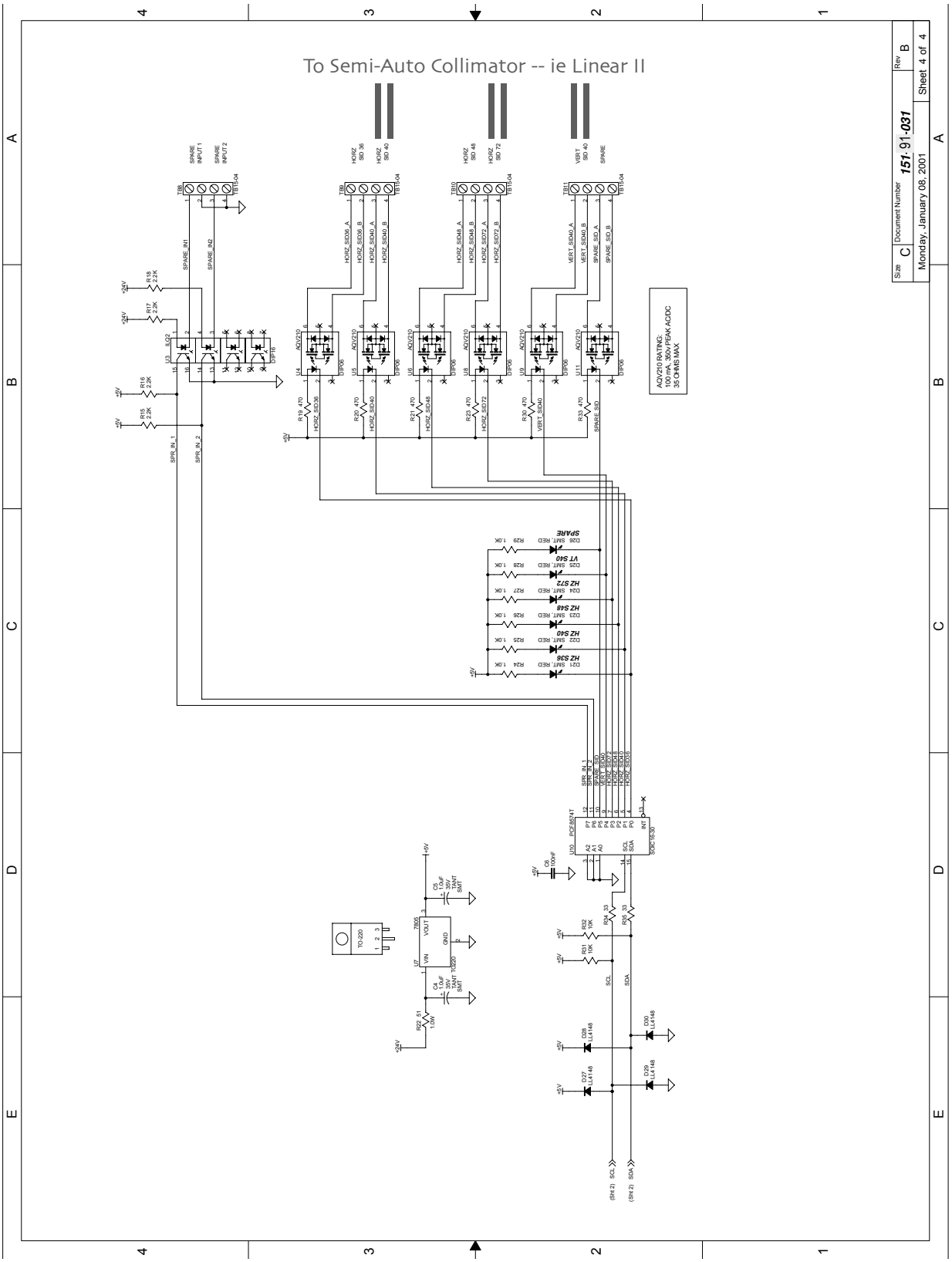
1. ALL RESISTORS ARE SURFACE-MOUNT CHIP TYPES, STYLE 1206, RATED 1/8 WATT. VALUES ARE IN OHMS, KILOHMS (K) OR MEGOHMS (M).
2. ALL CAPACITORS ARE SURFACE-MOUNT CERAMIC CHIP TYPES, STYLE 1206, RATED 50V. VALUES ARE IN MICROFARADS (uF). NANOFARADS (nF) OR PICOFARADS (pF).
3. RELATED DRAWINGS:
   ASSEMBLY: 151-91-031
   PCB: 151-93-031
4. USED ON PROJECT:
5. Changes for Revision B: Add Sh 4 containing SID Status circuitry. Axes renamed, LAT to TRSVS, EL to VERT. Fuse F3 was 1.1A. Sh2 add note and box regarding CAN-based components. Delete Cosel Power Supply, J2, etc. U9 was DIP16. Reorder "P" connections to U9. Add rating note for AQV210s. Signal names at TB4,5,6 were "HORZ_SID36_HI", etc.

Title	Schematic, OTS Overhead Controls	
Size C	Document Number 151-91-031	Rev B
Monday, January 08, 2001 18:20:13		Sheet 1 of 4

Rev.2


Size C
Document Number 151-91-031
Rev B
Monday, January 08, 2001
Sheet 2 of 4
PARTS TO BE INSTALLED FOR CAN-BASED VERSIONS ONLY
INSTALL 22AWG WIRE JUMPERS
CAN-IN
CAN-OUT
24VDC INPUT
TO MOTOR DRIVE
AUXILLIARY
TO OTS DISPLAY CPU
MOUNTING HOLES


VERTICAL BRAKE
LONGITUDE BRAKE
TRANSVERSE BRAKE
SPARE BRAKE
SHOWN FOR REFERENCE ONLY
BRAKE DRIVERS
POTENTIOMETER INTERFACE
VERTICAL POTENTIOMETER
LONGITUDE POTENTIOMETER
TRANSVERSE POTENTIOMETER
TABLE POTENTIOMETER
WALL BUCKY POTENTIOMETER
SHOWN FOR REFERENCE ONLY
Size C
Document Number 151-91-031
Rev B
Monday, January 08, 2001
Sheet 3 of 4


To Semi-Auto Collimator -- ie Linear II
Size C
Document Number 151-91-031
Rev B
Sheet 4 of 4
Monday, January 08, 2001
AQV210 RATING:
1500VA, 500V PEAK AC/DC
3A CARRY MAX
SPARE INPUT 1
SPARE INPUT 2
HORZ SID 36
HORZ SID 40
HORZ SID 48
HORZ SID 72
VERT SID 40
SPARE
SPARE_IN1
SPARE_IN2
SPR_IN_1
SPR_IN_2
+24V
+5V
+12V
R18 2.2K
R17 2.2K
R16 2.2K
R15 2.2K
U3 IL-Q2
DIP16
AQV210
DIP06
R19 470
R20 470
R21 470
R23 470
R30 470
R33 470
HORZ_SID36
HORZ_SID40
HORZ_SID48
HORZ_SID72
VERT_SID40
SPARE_SID
SPARE
VT 540
HZ 572
HZ 548
HZ 540
HZ 536
R29 1.0K
R28 1.0K
R27 1.0K
R26 1.0K
R25 1.0K
R24 1.0K
SMT, RED
U10 PCF8574T
SOIC16-30
SCL
SDA
INT
U7 7805
TO-220
VIN
VOUT
GND
C4 0.1uF 35V TANT TO220
C5 0.1uF 35V TANT SMT
C6 100nF
R52 10K
R51 10K
R54 3
R53 3
D29 LL4148
D30 LL4148
D27 LL4148
D28 LL4148
R62 51 1.0W
(SH 2) SCL
(SH 2) SDA

PART NO
212002s
SHEET 1 OF 1

BILL OF MATERIAL

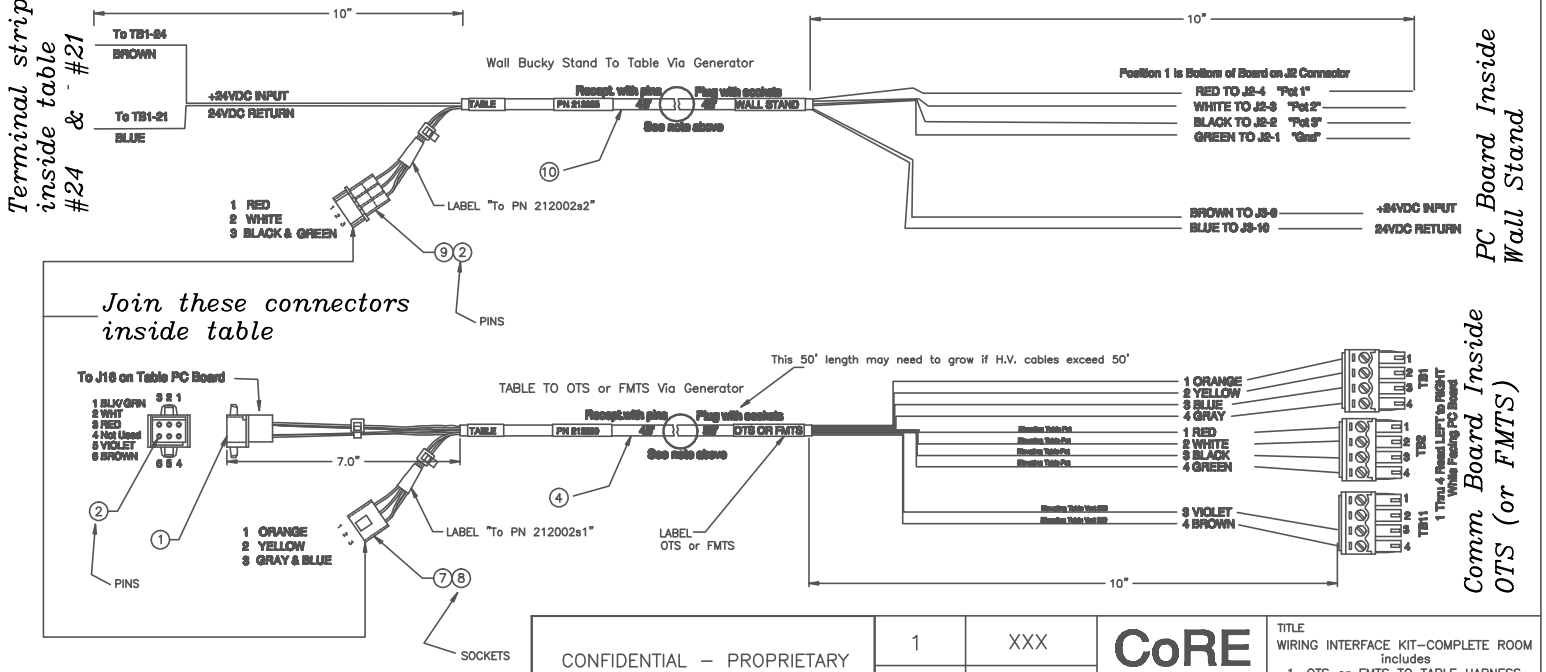
ITEM	PART NO.	DESCRIPTION	MFG	MFG #	UL #	QTY
0	E03-006-012	10 Pos Minifit Plug .165	Molex	39-01-2100		1
1	E03-021-106-1	PLUG, MALE 2x3 AMP Uses 0.084"	AMP	1-480276-0		1
2	E03-131-004-2	PIN CRIMP 14-20 AWG 0.084" Pins	AMP	60618-1		8
3	E03-006-013	10 Pos Minifit Recept. .165	Molex	39-01-3103		1
4		10 CON WIRE 22 AWG PVC spliced @ 45' (50' Remains on Generator to OTS side)				95'
5	E03-006-011	6 Pos Minifit Recept .165	Molex	39-01-3063		1
6	E03-003-017	18-24AWG Male Minifit Crimp Pin	Molex	39-00-0041		16
7	E03-022-103-2	MALE PIN HOUSING 3 pos vert .084"	AMP	1-480721-0		1
8	E03-132-004-2	.084" Socket 18-24 AWG		60617-1		3
9	E03-031-003-2	3 Position Female Connector uses .084" pins				1
10		6 Conductor 18 Ga. PVC Wire Spliced in middle at 45' (If H.V. Cables are longer than 50', this 90' cable must grow)				90'
11	E03-006-010	6 Pos Minifit Plug .165	Molex	39-01-2060		1
12	E03-003-016	18-24AWG Female Minifit Crimp Socket	Molex	39-00-0039		16

Make splice at 45' with item #5, 6, 11, 12 - SIX position Molex Minifit Connectors.

Pin #1	Red
Pin #2	White
Pin #3	Black
Pin #4	Green
Pin #5	Brown
Pin #6	Blue

Make splice at 45' with item #5, 6, 9, 12 - TEN position Molex Minifit Connectors.

Pin #1	Red	Pin #6	Blue
Pin #2	White	Pin #7	Orange
Pin #3	Black	Pin #8	Yellow
Pin #4	Green	Pin #9	Gray
Pin #5	Brown	Pin #10	Violet



REV	CHANGES	D&D NO.	By/Chk	DATE
B	Added Wire length and splices		B.Q	2.24.10
A	PRE-PRODUCTION RELEASE		B.Q	01.15.02

1	XXX	
QTY	USED ON ASSY	
REMOVE ALL SHARP EDGES AND BURRS		
DO NOT SCALE DWG		
MFG APPVL		
ENGRG APPVL		
DRAWN BY	B.Q	Aug 09

CoRE

DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED

TOLERANCES ARE:

X.X ±.03
X.XX ±.01
X.XXX ±.005
ANGLES ± 0°30'

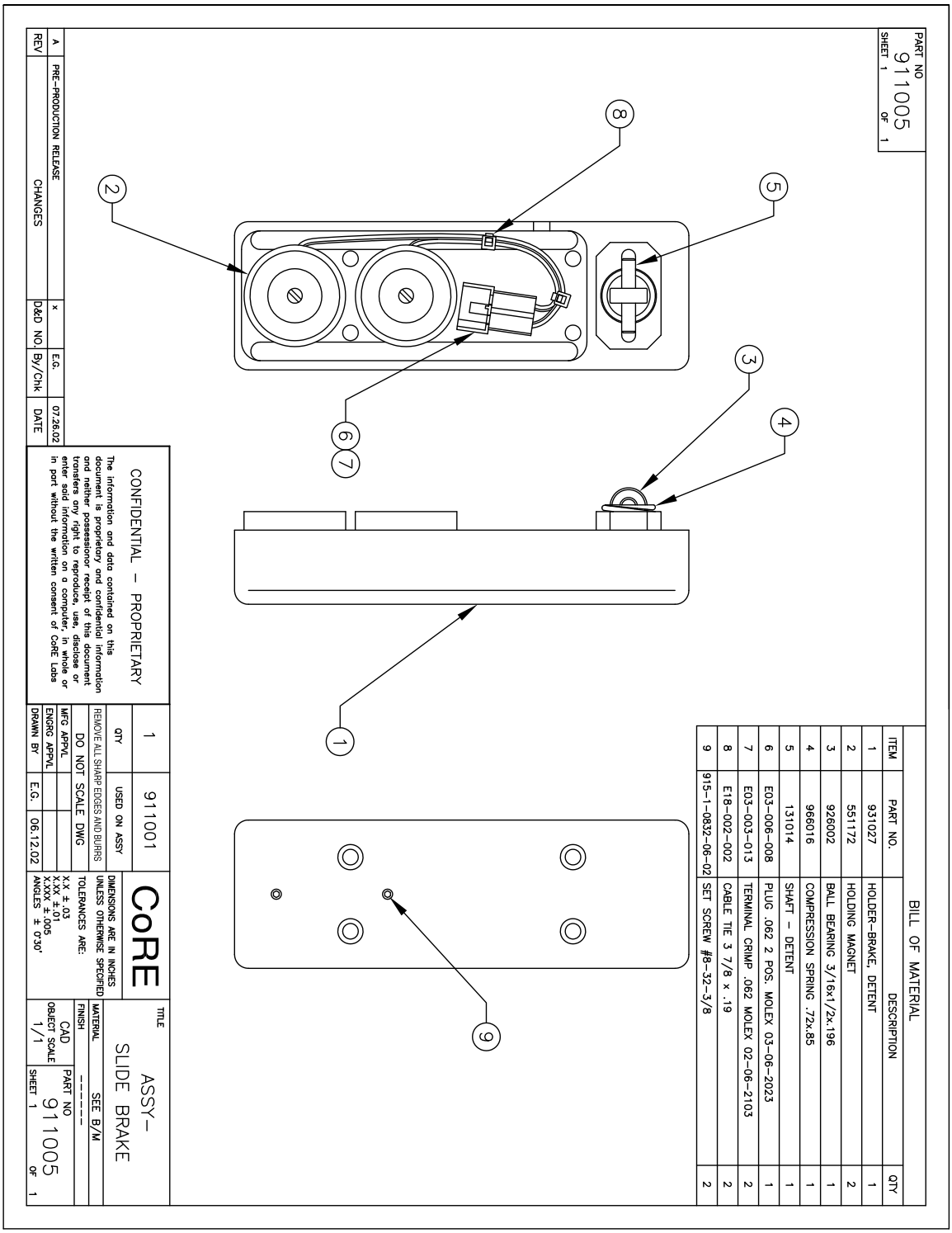
TITLE
WIRING INTERFACE KIT–COMPLETE ROOM includes
1. OTS or FMTS TO TABLE HARNESS
2. WALL STAND TO TABLE HARNESS

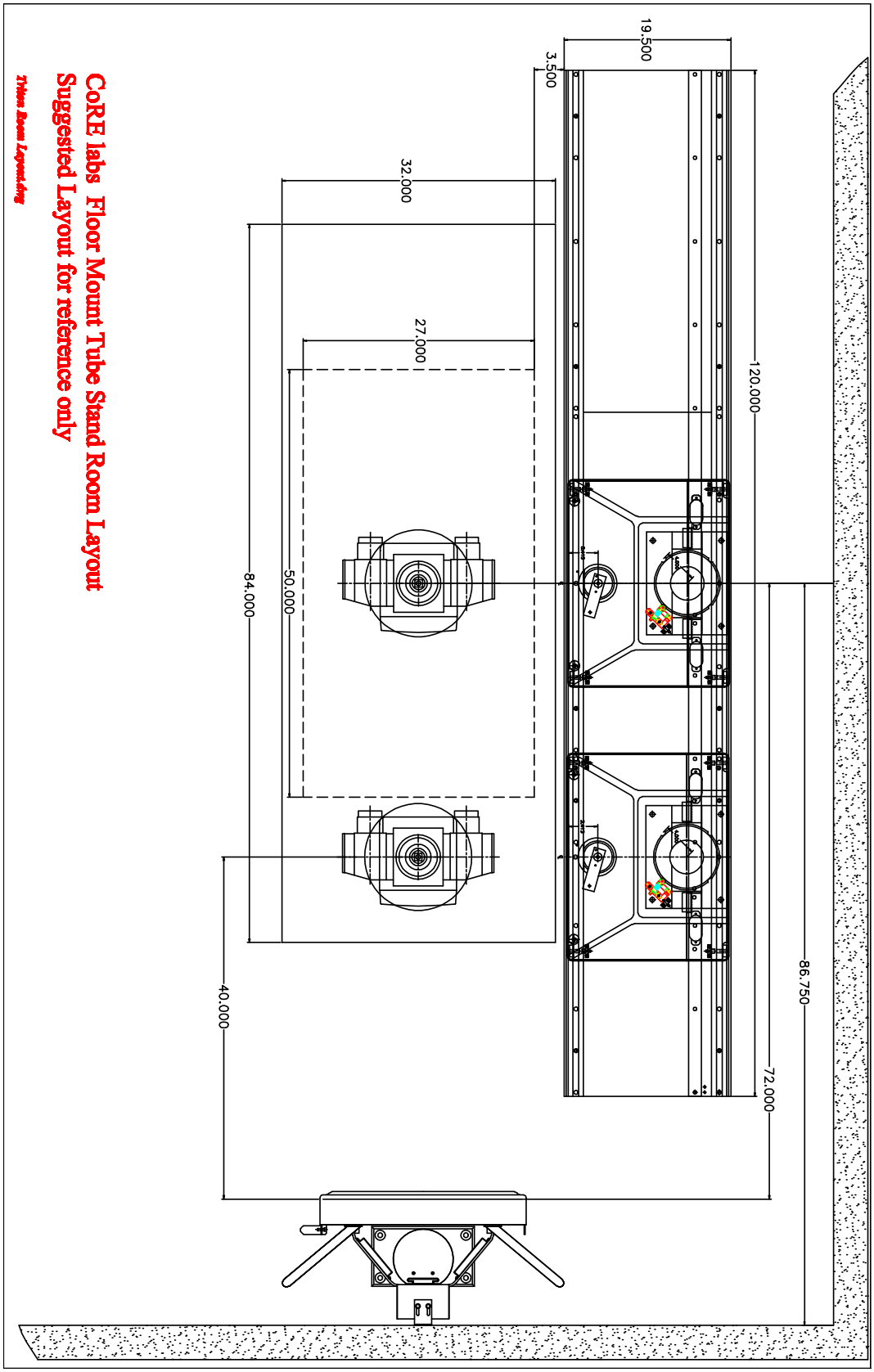
MATERIAL SEE B/M
FINISH -------

CAD OBJECT SCALE 1/1

PART NO 212002s
SHEET 1 OF 1

Supplimental:




CoRE labs Floor Mount Tube Stand Room Layout
Suggested Layout for reference only
Tritton Rooms Layout.dwg
19.500
3.500
32.000
27.000
120.000
84.000
50.000
86.750
40.000
72.000