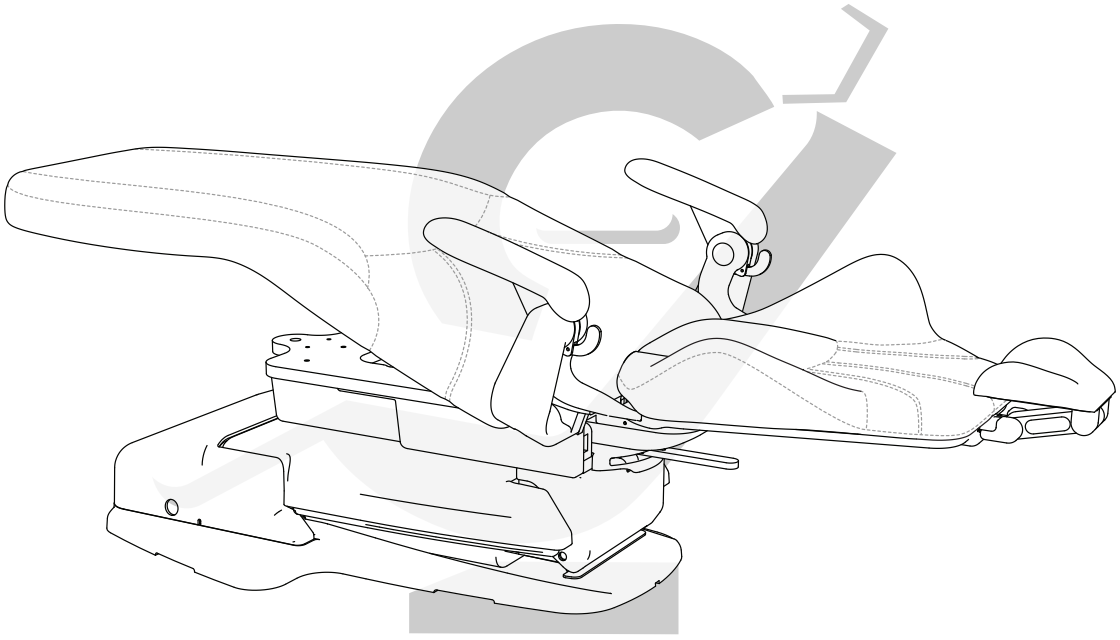
engle dental systems

INSTALLATION, OPERATION, & SERVICE MANUAL

ENGLE 300 DENTAL CHAIR

Model: P096540

Traverse Option: P096540T



MANUFACTURED & ASSEMBLED IN THE U.S.A

⚠ IMPORTANT

The instructions contained in this manual should be thoroughly read and understood before installing or operating the equipment. Keep this manual with the equipment, so it can be referred to for future use.

⚠ IMPORTANT

When installation is complete. Make sure to check all bolts, screws, and fasteners. Confirm that they are properly fastened.

P2291007 R16 8/5/2021

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Corporate/Factory: 7205 NE EVERGREEN PKWY, BLDG E #100 HILLSBORO, OR 97124
www.engledental.com

INSTALLATION, OPERATION, & SERVICE MANUAL

Client Services:
7:00 A.M. To 3:30 P.M. (PST)
Phone: 800.547.1906
Fax: 503.357.7286
E-mail: info@engledental.com

Technical Support:
6:00 A.M. To 3:30 P.M. (PST)
Phone: 800.547.1906
Fax: 503.357.7286
E-mail: support@engledental.com

Warranty

All products except stools sold to and installed by authorized Engle Dental Systems, LLC dealers are guaranteed against defects in materials and workmanship for a period of 5 years after date of purchase. Stools are guaranteed against defects in materials and workmanship for a period of 2 years after date of purchase. Upholstery is guaranteed for 1 year after date of purchase. All handpiece illumination systems are guaranteed for 6 months after date of purchase. This warranty does not cover light bulbs of any kind. Faulty parts as determined by a dealer service representative will be repaired or replaced; no claim for labor or consequential damages will be allowed. Invoices for replacement parts may be subject to adjustment after the manufacturer has inspected the alleged defective parts.

- This warranty does not cover normal wear, stains, cuts, or scratches of upholstery surface finishes, or parts sold to O.E.M. customers.
- This warranty does not cover damages resulting from the use of cleaning, disinfecting, or sterilization chemicals and processes.
- This warranty does not cover damages resulting from improper installation or maintenance, accident, misuse, or damages incurred in shipping and handling.

In the event of damages incurred during shipping, the purchaser must initiate all claims against the freight carrier in writing within 24 hours from receiving the damaged item(s). The claim is the responsibility of the customer.

PRODUCT MODIFICATIONS

At Engle Dental Systems, LLC, we continually work to better our products.
We reserve the right to make modifications without notice or obligation to modify previously manufactured products.

DOCUMENT INFORMATION

Engle Dental Systems, LLC does not guarantee that this document is completely error free. Engle Dental Systems, LLC shall not be held liable for errors contained in this manual, for any consequential or other damages concerning the furnishings, performance or use of this material. Engle Dental Systems, LLC does not guarantee the content of any kind in this document, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. The information in this document is subject to change without notice. If you fine any problems with this document, please report them to us in writing.

OTHER PRODUCTS & TRADEMARKS

All products or services mentioned in this document that are not manufactured by Engle Dental Systems, LLC are covered by the trademarks, service marks, or product names designated by the companies manufacturing those products. Refer to their respective manuals and instructions for all information regarding their product.

Intended Use of the Product:

This product is used solely for diagnoses, treatment, and relative procedures in dentistry. This equipment must be handled and/or operated by qualified dentists or by dental staff directly under the supervision of the dentist.
Patients are not allowed to handle and/or operate this equipment unless they are instructed to do so directly under the supervision of the dentist. The dentist and staff who operate this equipment should instruct and assist each patient in entering and exiting this equipment.

Operating Environmental Requirements:

Ambient Temperature: 50°F ~ 104°F (10°C ~ 40°C)

Humidity: 30% ~ 75%

Atmospheric Pressure: 10.2psi ~ 15.4psi (700hpa ~ 1060hpa)

NOTE: The emissions characteristics of this equipment make it suitable for use in industrial areas and hospitals (CISPR 11 class A). If it is used in a residential environment (for which CISPR 11 class B is normally required) this equipment might not offer adequate protection to radio-frequency communication services. The user might need to take mitigation measures, such as relocating or reorienting the equipment.

WARNING: Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the chair. Otherwise, degradation of the performance of this equipment could result.

WARNING: Use of this equipment adjacent to or stacked with other equipment should be avoided because it could result in improper operation. If such use is necessary, this equipment and the other equipment should be observed to verify that they are operating normally.

WARNING: Use of accessories, transducers and cables other than those provided by the manufacturer of this equipment could result in increased electromagnetic emissions or decreased electromagnetic immunity of this equipment and result in improper operation.

Maximum Weight Capacity:

Standard Chair (P096540): 525 lbs.

Traverse Option (P096540T): 325 lbs.

Classification:

- ▷ Classification of Equipment: Conforms to U.L. Std. 60601-1, Ed. 1
- ▷ Protection against electric shock: Class 1 Equipment, Type B Applied Parts
- ▷ Protection against water ingress: Ordinaty Equipment (IPX0)
- ▷ Built for continuous use with intermittent loading.
- ▷ Equipment not suitable for use in the presence of a flammable anesthetic mixture with air, oxygen, or nitous oxide.

Flammable Gasses:

- ▷ Equipment not suitable for use in the presence of a flammable anesthetic mixture with air, oxygen, or nitrous oxide, where such gases may accumulate in concentration in a closed space.

TERMS AND CONDITIONS OF SALE

TERMS
Net 30 days on approved accounts; other accounts C.O.D. until credit is approved.

PRICES
Minimum order $50 USD retail. All prices subject to change without notice.

FREIGHT
Products are shipped F.O.B. Hillsboro, Oregon, U.S.A.

RETURNED GOODS
No goods may be returned without prior factory **Returned Merchandise Authorization** number.

The **Returned Merchandise Authorization** number must be visible on the outside of returned merchandise shipping boxes.

Shipping boxes received without a **Returned Merchandise Authorization** will be refused.

Returned merchandise must be received within 60 days after issuance of **Returned Merchandise Authorization** number.

Copy of original invoice must be sent along with returned merchandise.

All returned merchandise are subject to a 20% restocking fee.

DAMAGED MERCHANDISE
Engle Dental Systems, LLC responsibility for safe delivery ends upon the delivery of the shipment in good condition to the carrier. At the point of pickup by the carrier, the merchandise becomes the property of the consignee, and the carrier becomes the agent of the consignee. Shipments that arrive with external damage or obvious rough handling should be noted on the delivery receipt as “Received in Damaged Condition”. If damage is revealed when merchandise are unpacked, inspection by the carrier should be demanded immediately.

ALL CLAIMS FOR DAMAGE CAUSED DURING SHIPMENT MUST BE MADE TO THE CARRIER.

CLEANING INFORMATION

BARRIER TECHNIQUE
The best way to preserve the finish of your Engle Dental Systems Equipment is to use the barrier technique whenever possible. The barrier technique will ensure maximum long term durability on the surfaces and finishes of the equipment.

CHEMICAL DISINFECTION
It is imperative that the equipment be thoroughly washed with a mild soap and warm water solution at least once a day, regardless of the chemical disinfectant used. This will minimize the harmful effects of chemical disinfectant residue building up on the equipment. Always follow the disinfectant manufacturer’s directions for use. Disinfectant solutions that are relatively harmless to surfaces at their recommended strengths can be corrosive at higher than recommended dilution ratios. Consult your dental dealer regarding specific chemical disinfecting and cleaning products.

UNACCEPTABLE DISINFECTANTS
The following disinfectants will harm the surface finish of Engle Dental Systems equipment and are **NOT RECOMMENDED**. Use of these products will void your warranty.

Chemical Composition: Household bleach at 5.25%, Ethyl Alcohol, Alcohol-based Phenols/PH3NOL, Strong Phenols, Phenol-Alcohol Combinations, and Household cleaners.

Iodine-based products have been known to stain upholstered and painted surfaces.

CONDITIONALLY ACCEPTABLE DISINFECTANTS
These disinfectants have been found to be LEAST HARMFUL to the equipment surfaces. None of these products are recommended for chair upholstery. Use the barrier Technique.

Chemical composition: Enhanced Quaternary Ammonia, Mild Phenols, Glutaraldehyde/Phenol Sprays, Synergized Super Quat, Phenol/Water Sprays.

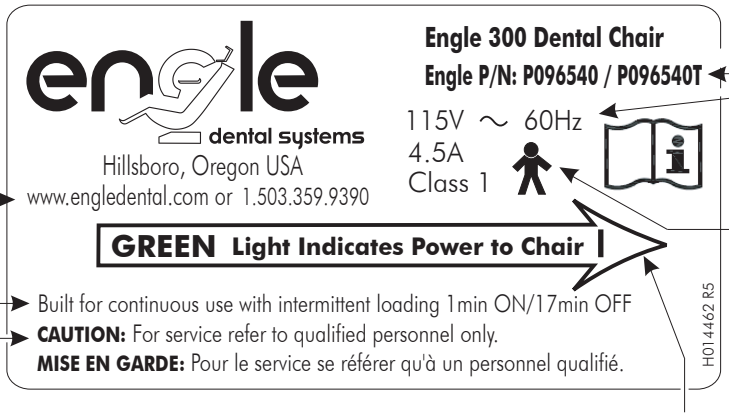
HP CONTROL WATER LINES AND BOTTLED WATER SYSTEM FLUSH
Use care when flushing HP Control water lines and bottled water systems. If using a powdered flushing product with water, be sure the powder is thoroughly dissolved. Improper mixing will cause residual debris in the HP Control water lines and may cause damage and/or malfunction.

Engle 300 Series Dental Chair Labels - Explanation of Labels and Symbols

Contact Information.
See Technical Support section at the beginning of this manual for addictional contact info.

Model Number

This Indicates the **POWER SOURCE** for this chair.



This Indicates the chair is a **TYPE B** device.

This indicates the duty cycle of the chair

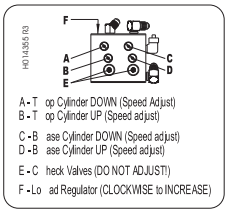
This chair contains dangerous electrical and mechanical elements. It should be serviced by

If the Dental Chair's Green Power Switch is illuminated, there is **ELECTRICAL POWER** To the chair. (115V chair only)
NOTE: If the switch does not illuminate, but there is power to the Dental Chair, call your authorized dealer immediately for service.

This sticker idicates that this equipment should only be used on **HOSPITAL GRADE** electrical circuits. Circuits of lesser Grade may nor be able to handle the electrical load of this equipment and may cause **PROPERTY DAMAGE, INJURY, OR DEATH.**

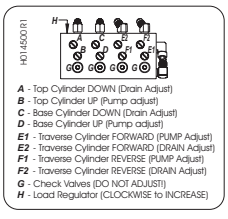
This sticker indicates that this is a protective **GROUND** location.

This sticker idicates that **HIGH VOLTAGE** electrical current is present in this area. **DANGER: EXTREME CAUTION** should be taken when this area is exposed. It also indicated the ratings of fuses to be used.



This sticker indicates **Adjustments** for **Chair Speed** and **Load Capacity** for the Standard Chair.

This sticker idicates equipment **IDENTIFICATION: DESCRIPTION, MODEL#, SERIAL#, AND ORDER#.** *NOTE: This sticker is located below the seat at your left side when seated in the chair.*



This sticker indicates **Adjustments** for **Chair Speed** and **Load Capacity** for the Traverse Chair.

This sticker indicates that this equipment has been **Certified** by a **Third Party** Organization.

1 **A.** Remove the Shrink Wrap and individual boxes from the top of the large Dental Chair Box.

B. Open the Dental Chair Box from the top.

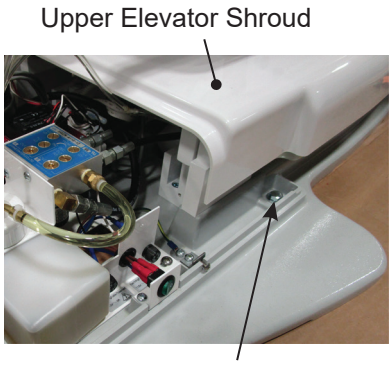
C. Remove the Dental Chair Box only from the Shipping Pallet.

2 Remove the Hydraulic Power Shroud. To do this, loosen the two Power Shroud Screws (one at each side of the shroud) and slowly pull the Power Shroud away from the chair.

3 **A.** Detach the Dental Chair from the Shipping Pallet by removing the two Pallet Shipping Bolts at each side of the Dental Chair Baseplate.
Note: These are the same holes you will use to secure the Dental Chair to the floor.

B. With help, carefully remove the Dental Chair from the Shipping Pallet and move it to it's service location.

C. ***Important: Use two hardened bolts (not included) to properly secure the chair to the floor.***



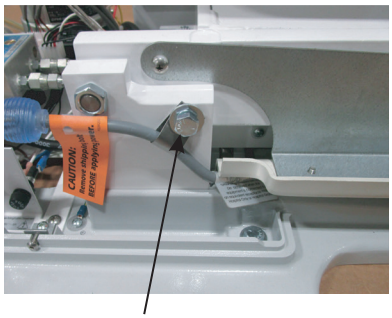
4 **A.** Release the Chair Brake located behind the Seat, and rotate the toe/seat to the right.

B. Lift up the front left side corner ofg the Upper Elevator Shroud to access the Dental Chair Shipping Bolt.

C. Remove and Discard/Recycle Dental Chair Shipping Bolt.
Caution: Do not operate the chair before removing this Dental Chair Shipping Bolt. Doing so can damage the Dental Chair.

D. Use the provided screw taped to the Upper Elevator Shroud to secure the Upper Elevator Shroud.

E. Re-install the Hydraulic Power Shroud.

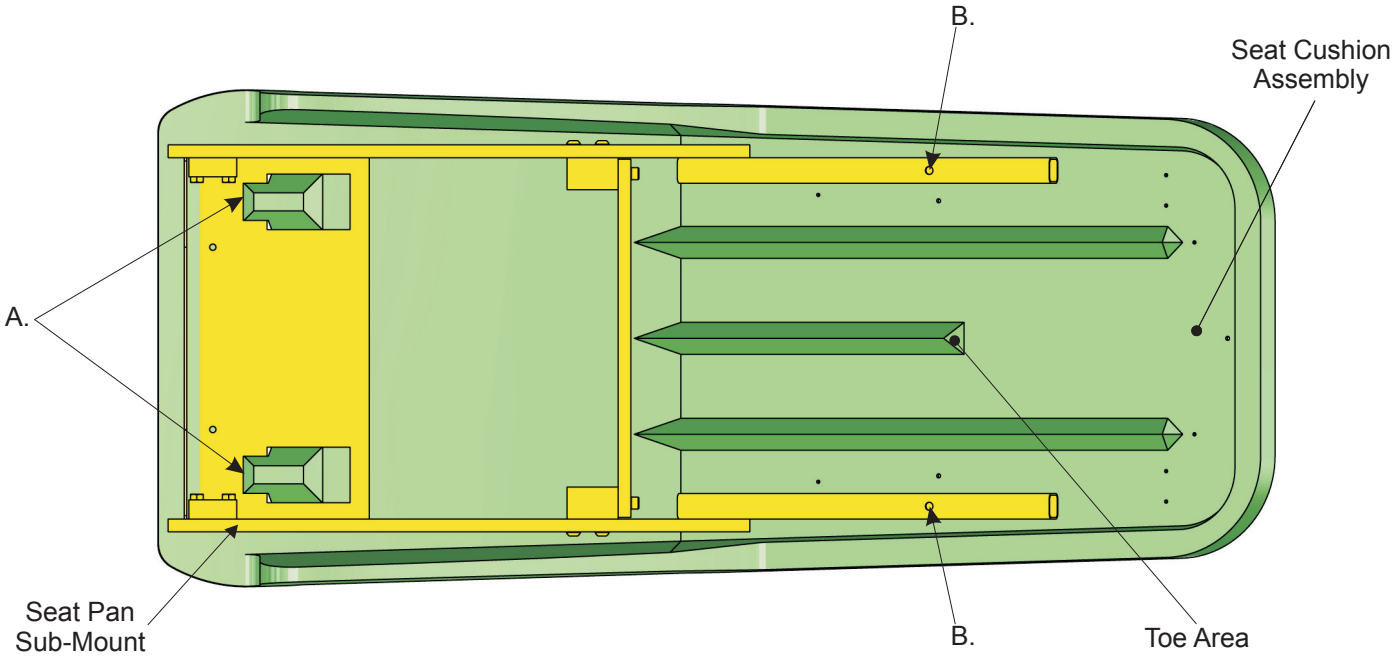


5 **A.** Connect any touch-pad controls at this time.
NOTE: *For touch-pad operation refer to page 9 of this manual.*

B. You may now connect the Dental Chair's Power Cord to a "HOSPITAL GRADE" power source.
CAUTION: *Reliable grounding of this equipment can only be achieved when it is connected to an equivalent receptacle marked* ***HOSPITAL ONLY*** *or* ***HOSPITAL GRADE.***
WARNING: To avoid risk of electric shock, this equipment must only be connected to a supply mains with protective earth ground.

6 ***NOTE:*** *If your Engle 300 Series Chair will be equipped with a Delivery System, stop at this step and proceed with the* ***"Installation and Operations Manual"*** *of the respective delivery system before proceeding with this step.*

Remove the Seat Cushion Assembly from the upholstery shipping box and install using the instructions below.



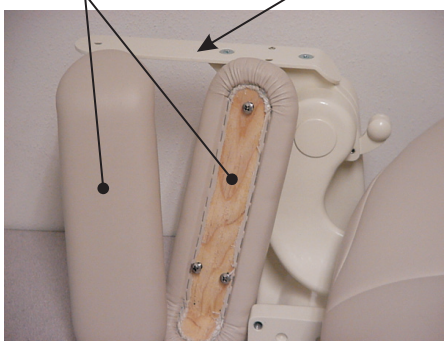
PARTIAL BOTTOM VIEW

A. Insert two Seat Cushion Tabs into the notched section of chair's Seat Pan.

B. Secure the Seat Cushion Assembly by using the two Pan Head Phillips Screws that are attached to the seat cushion assembly.

CAUTION: Do not lean or sit on the Toe Area. It can damage the Seat Cushion Assembly and/or cause injury.

7 Remove the two Arm Rest Pads from the upholstery shipping box. Use the screws already attached to the Arm Rest Pads to install them onto the Arm Rest Supports. If Arm Rest Pads are equipped with Arm Sleeves, keep the Sleeves in place when attaching the Arm Rest Pads to the Arm Rest Support.

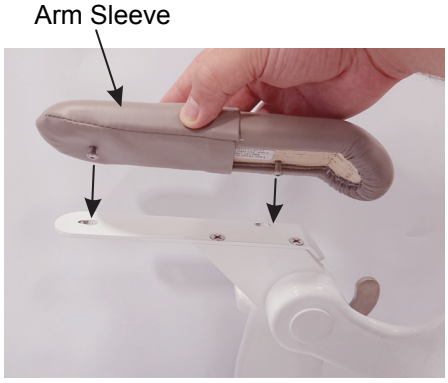


8 While supporting the Back Shroud, remove the two back shroud screws and carefully slide the shroud down and away from the chair.

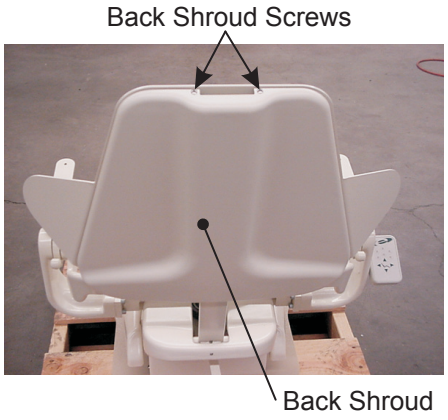
9 **A.** Remove the Back Cushion for the upholstery shipping box and place the Back Cushion onto the Back Plate Assembly.

B. From top to bottom, attach the eight Snaps on the two Rear Side Flaps to the Back Plate Assembly. Attach the two Bottom Straps on the Back Cushion to the Back Plate Assembly.

TIP: *To easilty attach the two Bottom Strap's Snaps, use one hand to compress the cushion at the base of the strap and with the other hand, align and secure the snap.*

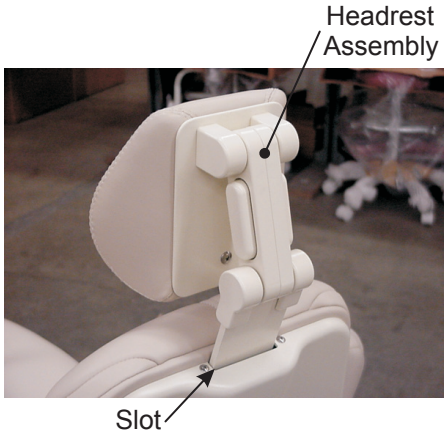


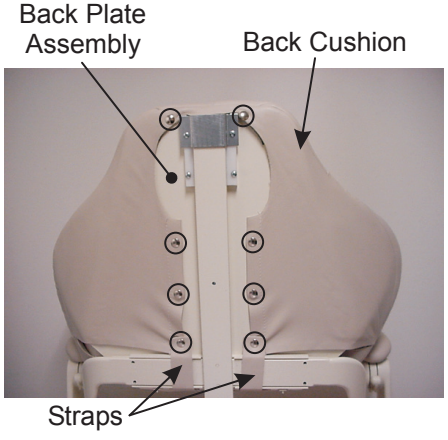
10 Reinstall the Back Shroud by guiding the two Mounting Pins on the bottom of the Back Plate thru the respective holes at the bottom of the Back Shroud. Reinstall the two Mounting Screws that were removed in **step 8**.



11 Remove the Headrest Assembly from it's shipping box and insert it into the top slot of the chair back assembly as shown.

NOTE: *The Engle Dental Chair is now ready to use. For touch-pad operation, refer to page 9 of this manual.*

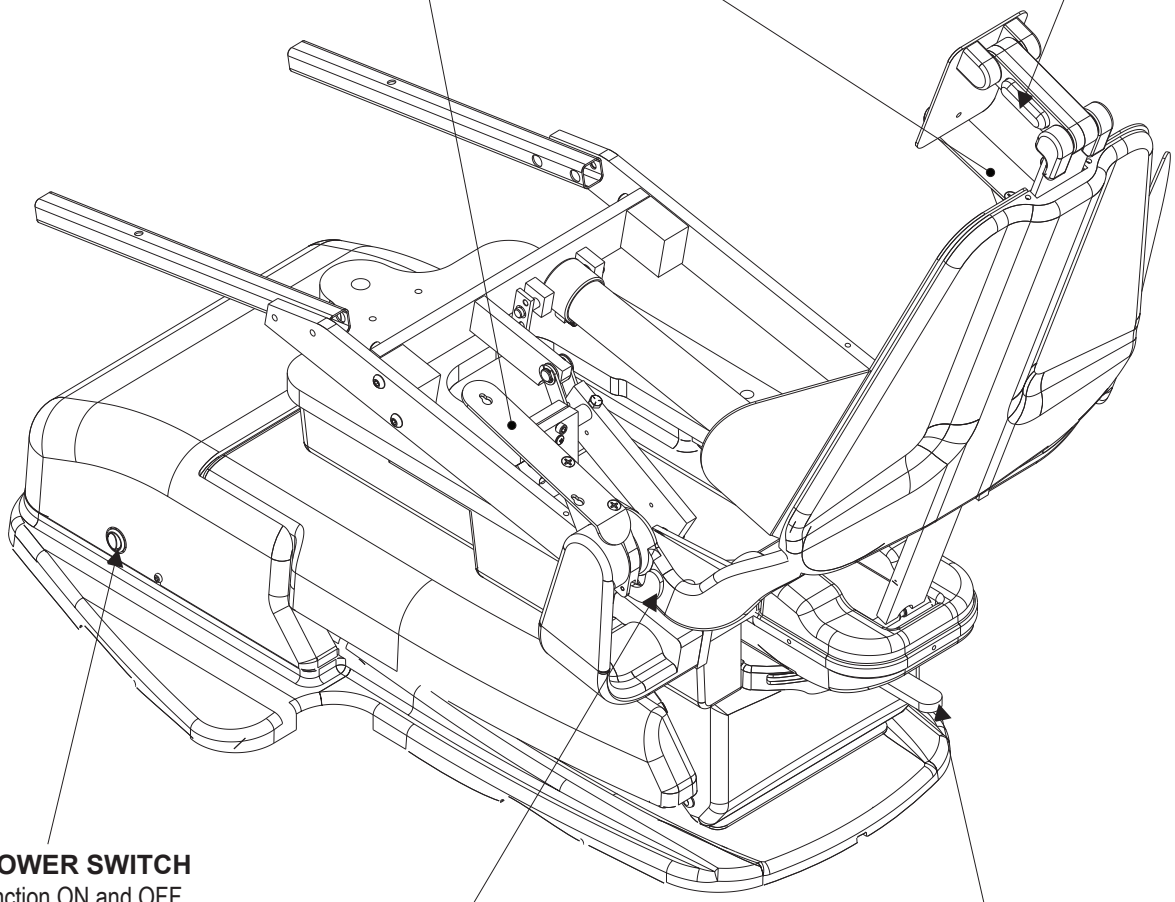




Engle 300 Series Dental Chair - Description of Functions

CAUTION: With or without upholstery, do not lean or sit on Armrests. It can damage the arm rest or cause injury.

PUSH BUTTON
Allows the Headrest to articulate at two pivot points for patient comfort.



MAIN POWER SWITCH
Chair Function ON and OFF.
IMPORTANT: Operate this Main Power Switch by hand only. Place into OFF position after daily operations.

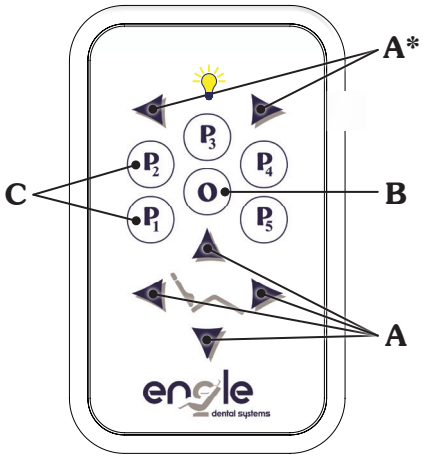
ARM PAD LATCH
Press Latch forward and pivot the arm pad down for easy patient Entry/Exit. Lift the arm pad up to lock in place.

SEAT ROTATION BRAKE LEVER
Pivot Left to Engage Brake and Right to Release. Allows the seat of the chair to be rotated from center.

Engle 300 Touch Pad - Description of Functions

Emergency Stop

At any time during an automatic chair movement, any button on the Touch Pad can be pressed to immediately cancel the automatic movement.



BLUE ARROW Buttons
(Manual Positioning Buttons)

These arrow buttons manually operate the chair in the direction indicated. *The Traverse Chair Option includes two additional buttons that control movement forward and aft.

A

"O" Button
(Programmable EXIT Position)

This button is generally used to automatically and consistently return the chair to a desired preset **"Patient Exit"** position.

Programming the Exit Position:
Manually position the chair using the blue arrows. Once you have finished positioning the chair, press and hold the **"O"** button. Once the chair beeps, release the button. The chair will now return the that position any time the **"O"** Button is pressed.

NOTE: *The chair will remember your programmed positions even after loss of power and/or unplugging the chair from it's electrical source.*

B

"P1" thru "P5" Buttons
(Programmable Position buttons)

These buttons are used to automatically and consistently position the chair to a pre-programmed position. One pre-programmed position is allowed per button.

Programming a Position:
Manually position the chair using the blue arrows. Once you have finished positioning the chair, press and hold the one of the **"P"** buttons. Once the chair beeps, release the button. The chair will now return the that position any time that **"P"** Button is pressed.

NOTE: *The chair will remember your programmed positions even after loss of power and/or unplugging the chair from it's electrical source.*

C

Clearing All Pre-Programmed Positions

Step 1 - Turn off the power to the Chair.
Step 2 - Press and hold down the S3 button on the P.C.B.
Step 3 - Turn on the power to the chair while continuing to hold down the S3 button.
Step 4 - The letter "L" will appear on the P.C.B. calibration screen to confirm deletion, you can now release the S3 button.

Engle 300 Dental Chair - Swivel Brake Adjustment

1. Raise the chair base and backrest all the way up for easy access to the Swivel Brake. Then, for safety, toggle the dental chair Power Switch to the OFF position.

2. Remove the two Phillips Head Mounting Screws from the underside of the Seat Upholstery, located towards the toe of the seat, then remove the Seat Upholstery Assembly.

3. Remove the four Button Head Screws holding the Seat Pan Support Plate using a 5/32" Allen Wrench. Then remove the two Phillips Head Mounting Screws with Nylon Washers from the Top Mount Shroud Assembly and slowly slide the Shroud Assembly away from the chair.
See Figure 1 & 2.

4. Loosen the Brake Lever Bolt with a 3/16" Allen Wrench until the Brake Lever releases it's grip on the large Brake Bolt.
See figure 3.

5. Use a 3/8" Allen Wrench to tighten the Brake Bolt until the desired amount of braking resistance is achieved.
See Figure 4.

6. With the braking resistance achieved, position the Brake Lever so that it is in line with the front and back of the chair Base Plate, and has full gripping contact with the Brake Bolt Head.
Now firmly tighten the smaller Brake Lever Bolt with the 3/16" Allen Wrench. Be sure that the Brake Lever has a full surface grip on the head of the Brake Bolt, and does not slip when the Brake is re-applied to the chair, *see Figures 2 & 3.*

7. Reinstall the Top Mount Shroud Assembly & Seat Upholstery.

Seat Pan Support Plate

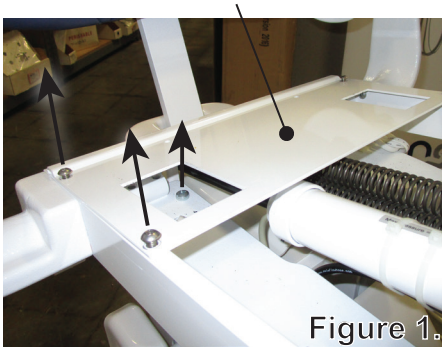


Figure 1.

Top Mount Shroud Assembly

Figure 2.

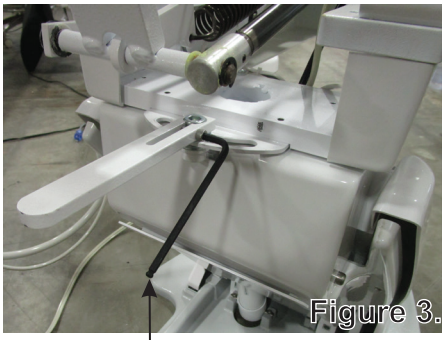
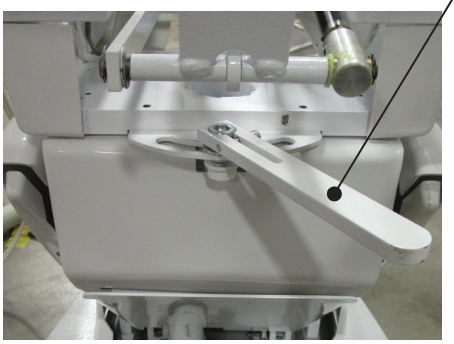


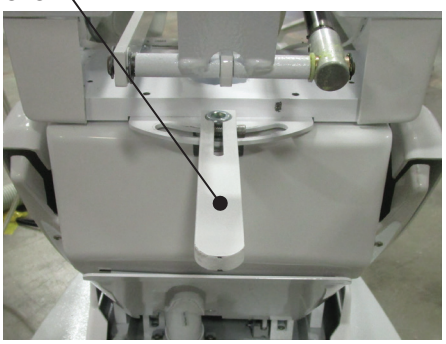
Figure 3.

3/16" Allen Wrench

Brake Lever



The Chair Top Brake is disengaged when the Brake Lever handle is shifted to the right as shown.



The Chair Top Brake is engaged when the Brake Lever handle is shifted to the left as shown.

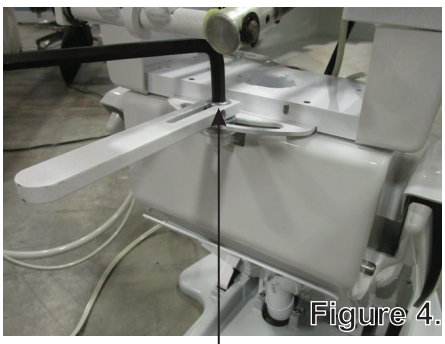


Figure 4.

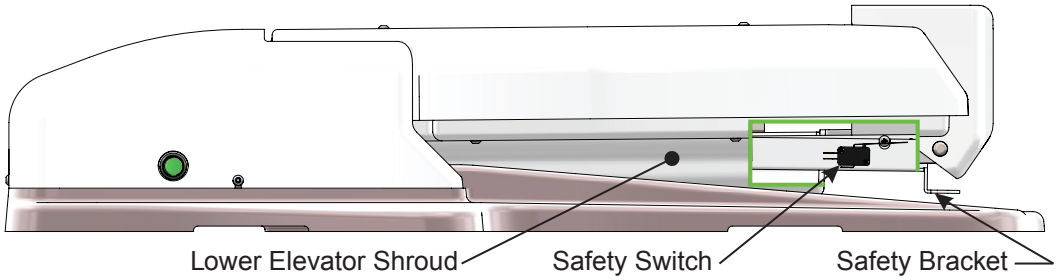
3/8" Allen Wrench

Engle 300 Series Dental Chair - Safety Protection System

This page explains the many safety devices used to protect the patient, doctor, and chair from injury or damage. Do not tamper with any safety devices unless specified for the installation of an optional accessory. Engle Dental Systems will not be held responsible for any damage or injury resulting from the adjustment of a safety device. All chairs are tested for correct safety device settings prior to shipment.

LOWER ELEVATOR SHROUD & BRACKET ASSEMBLY

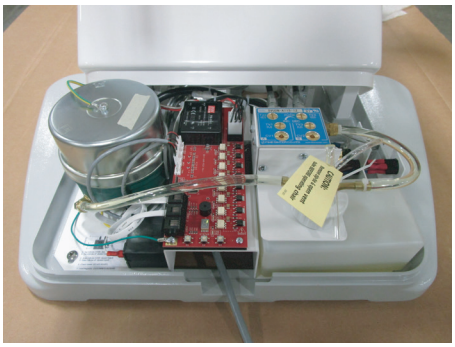
When triggered, the Safety Switches automatically stop downward movement of the chair base and initiate a slight upward movement. If continuously triggered, the chair base can only be moved upward. These switches are meant to prevent the chair from crushing anything beneath it, such as a foot.
The Safety Switches are used in Normally Closed operation. If the switches are disconnected or there is an open in the wire, the chair will behave as though the Safety Switches are triggered.
***DANGER:* DO NOT BYPASS THIS SAFETY ASSEMBLY! PERIODICALLY CHECK FOR IT'S COMPLETE FUNCTION. IF FAULTY, REPLACE WITH ORIGINAL PARTS IMMEDIATELY!**

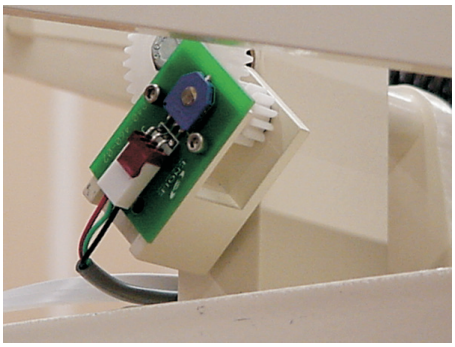


Partial Side View

HYDRAULIC SYSTEM MAIN P.C.B.

This advanced Printed Circuit Board continuously monitors and processes all incoming and outgoing signals from the Safety Switch, Touch Pad, and Sensor Positioning Systems. Then controls the chair movements accordingly. If the PCB senses a problem with the chair positioning or safety systems, it has the ability to communicate by showing a code on it's PCB Status Component screen that corresponds to circuit at fault. The PCB will then stop full or partial chair functions until the problem is resolved.
***NOTE:* In the exception of a Safety Switch malfunction which will not allow the chair base to go down, the manual positioning arrow buttons will still work for emergency patient care.**

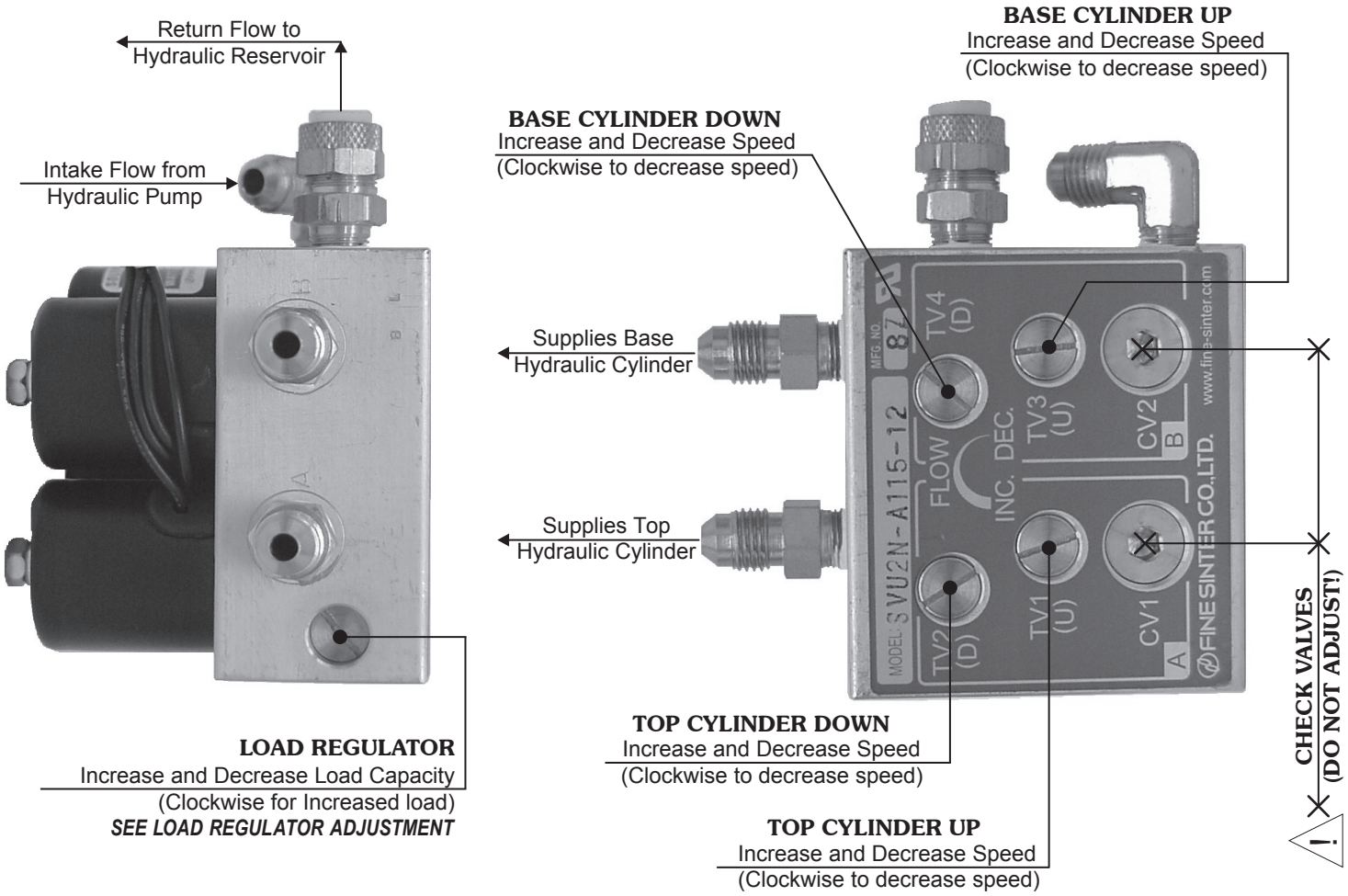




BACK & BASE SENSOR POSITIONING SYSTEM

These assembies constantly monitor the chair's position and allows the Hydraulic System Main PCB to precisely and repeatedly return the chair to any pre-progranned position. Also, the Sensor Positioning Systems allow the Hydraulic System Main PCB to accurately know the end limits of the chair's movement.

E300 Standard Solenoid Valve - Speed & Load Adjustment



CYLINDER SPEED ADJUSTMENT

To **INCREASE SPEED,** turn **COUNTER-CLOCKWISE.**
To **DECREASE SPEED,** turn **CLOCKWISE.**

NOTE: Top and Base Hydraulic Cylinder Maximum speed is reached when it's adjustable Slotted Valve Head is located at "4-1/4" revolutions conter-clockwise from it'sfull clockwise seated position ***(Do not over tighten)*** or when the top surface of the Slotted Valve Head is flush with the outside surface of the valve body.

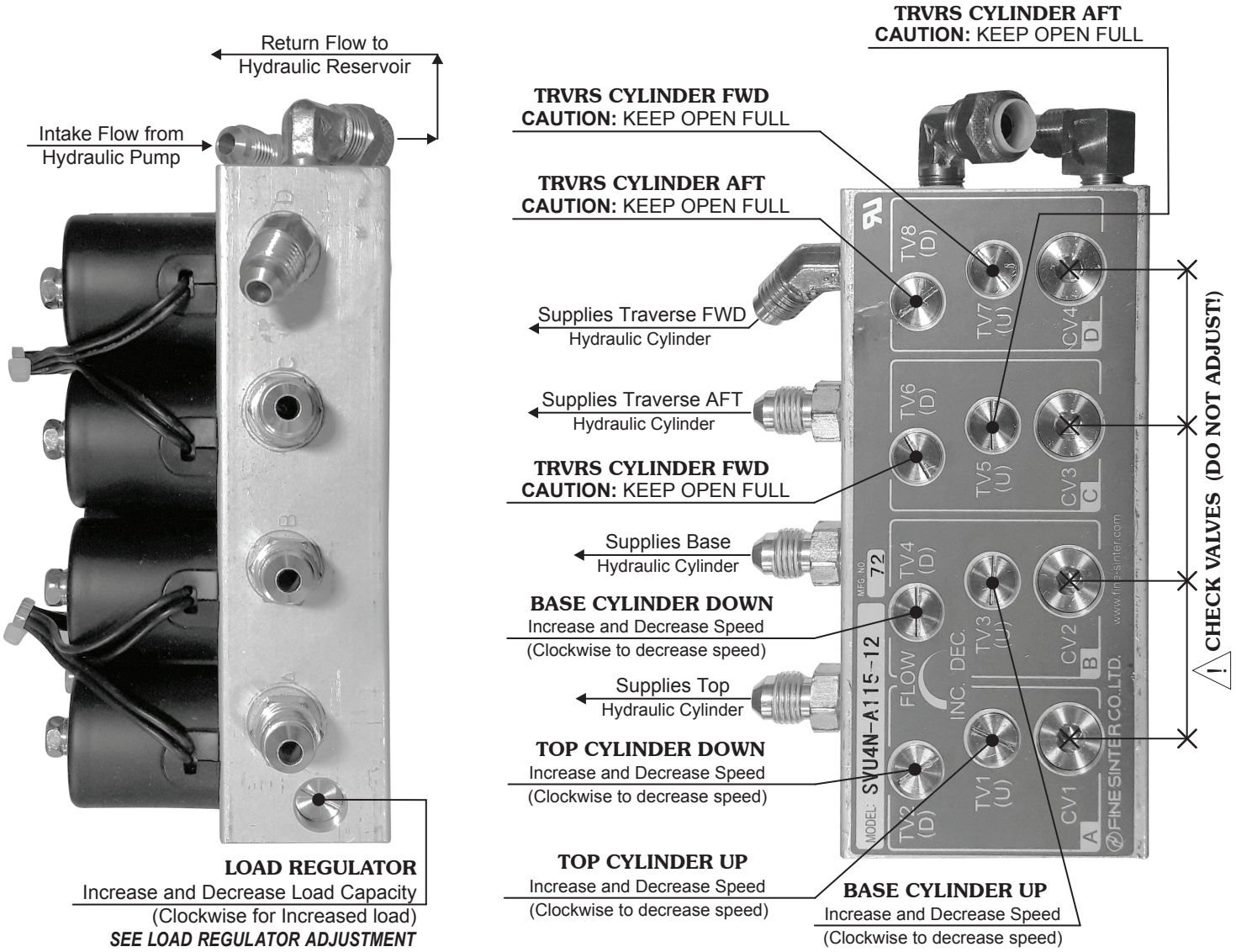
LOAD REGULATOR ADJUSTMENT

To **INCREASE LOAD CAPACITY,** turn **CLOCKWISE.**
To **DECREASE LOAD CAPACITY,** turn **COUNTER-CLOCKWISE.**

*At factory pre-set (recommended), an Engle 300 Dental Chair will accommodate patients weighing up to **525 lbs.**
*1 full revolution = **135 lbs.**

NOTE: To return the regulated setting back it it's Factory Pre-set, do so by turning the Slotted Valve clockwise **(IN)** until it stops. ***(Do not over tighten)***. Then turn the Slotted Valve counter-clockwise **(OUT)** one full revolution.

E300 Traverse Option Solenoid Valve - Speed & Load Adj.



CYLINDER SPEED ADJUSTMENT

To **INCREASE SPEED**, turn **COUNTER-CLOCKWISE.**

To **DECREASE SPEED**, turn **CLOCKWISE.**

NOTE: Top and Base Hydraulic Cylinder Maximum speed is reached when it's adjustable Slotted Valve Head is located at "4-1/4" revolutions conter-clockwise from it'sfull clockwise seated position ***(Do not over tighten)*** or when the top surface of the Slotted Valve Head is flush with the outside surface of the valve body.

LOAD REGULATOR ADJUSTMENT

To **INCREASE LOAD CAPACITY**, turn **CLOCKWISE.**

To **DECREASE LOAD CAPACITY**, turn **COUNTER-CLOCKWISE.**

*At factory pre-set (recommended), an Engle 300 Traverse Dental Chair will accommodate patients weighing up to **325 lbs.**
*Engle ***does not*** recommend using the Traverse function with patients above **325 lbs.**

Engle 300 Series Dental Chairs require very little regular maintenance. The following sections outline which functions should be performed and how often.

Regular Maintenance

Check cleanliness of Hydraulic Oil - ***once per year***
Check for Hydraulic Oil leaks from all fittings - ***once per year***

Visually Checking Hydraulic Fluid Cleanliness

Remove the Hydraulic Power Shroud by loosening the two attachment screws on either side of the shroud. (See ***step 2*** of "Engle 300 Series Dental Chair - Installation Instructions" on ***page 5*** of this manual for a more detailed guide to removing the Hydraulic Power Shroud.)

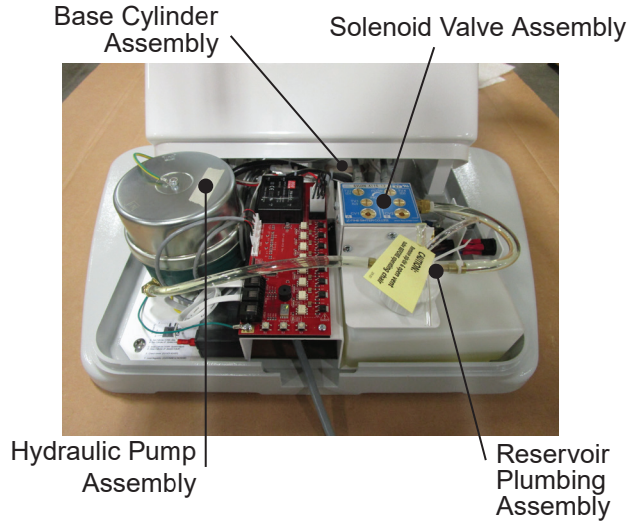
Visibly inspect the clear low-pressure Hydraulic Return Fluid Line between the Hydraulic Pump & the Hydraulic Reservoir. Looking through the clear tube, you should be able to see and object, such as your finger, on the other side. If you can not see your finger through the oil in the tube, have a service technician replace the Hydraulic Fluid using **Mobil DTE Light (Engle P/N: H015109-QT).**

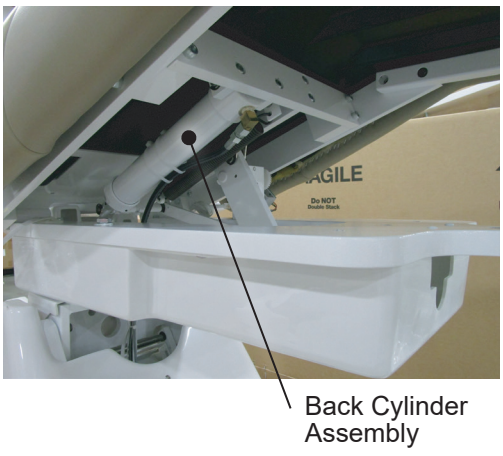
Inspecting Hydraulic Fittings for Oil Leaks

Remove the Hydraulic Power Shroud by loosening the two attachment screws on either side of the shroud. (See ***step 2*** of "Engle 300 Series Dental Chair - Installation Instructions" on ***page 5*** of this manual for a more detailed guide to removing the Hydraulic Power Shroud.)

Visibly inspect all Fittings (A Fitting is a device that connects a hose to a component) attached to the Top Cylinder Assembly, Base Cylinder Assembly, Traverse Cylinder Assembly (if equipped), Hydraulic Pump Assembly, Solenoid Valve Assembly, and the Reservoir Plumbing Assembly. If a Hydraulic Fluid leak is found at any fitting, contact your local service technician immediately.
DANGER: The Hydraulic Fluid can be under pressure. Thus, any leak can potentially cause injury, damage, and a significant mess.

Note: A small amount of hydraulic fluid leaking from the end of the traverse cylinder may indicate the felt washer (H004114) needs to be replaced. A replacement can be obtained by contacting technical support.



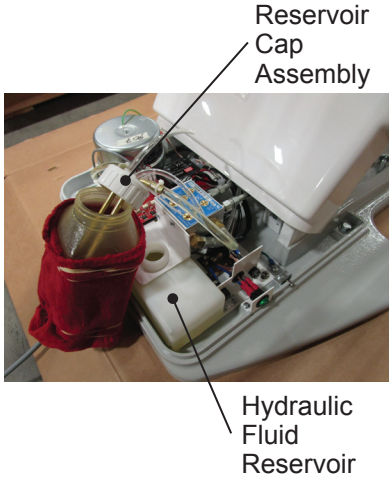


CAUTION: Follow safety precautiongs from the Hydraulic Fluid Manufacturer when handling used and unused hydraulic fluid.

Hydraulic Fluid Replacement

1 **A.** Raise the **CHAIR BASE** to the **FULLY UP** position.

B. Raise the **CHAIR BACK** to the **FULLY UP** position.
(This will evacuate most of the Hydraulic Fluid from the Reservoir)



2 ***CAUTION:*** This step may cause fluid to spill. You will need a drip rag, and a deep pan or bucket that will accommodate at least ***32 ounces*** of Hydraulic Fluid.

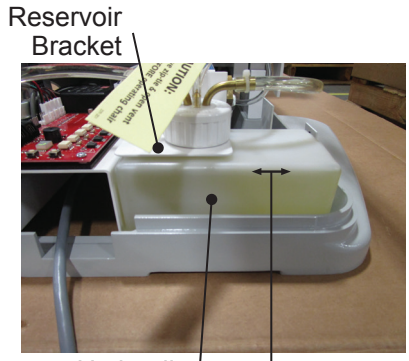
A. Remove the Hydraulid Power Shroud (See ***step 2*** of "Engle 300 Series Dental Chair - Installation Instructions" on ***page 5*** of this manual for a more detailed guide to removing the Hydraulic Power Shroud).

B. With the drip rag and pan/bucket ready, unscrew the Reservoir Cap from the Hydraulic Fluid Reservoir. Slowly remove the Reservoir Cap Assembly and attached tubes from the Hydraulic Fluid Reservoir. Carefully position the Reservoir Cap Assembly into the pan or bucket without dripping fluid onto the chair's components.

3 ***CAUTION:*** Parts A and B of this step will discharge the Hydraulic Fluid, make sure the two large open tube ends of the Reservoir Cap Assembly are aimed inside the pan or bucket.

A. Lower the **CHAIR BASE** to the **FULLY DOWN** position.

B. Lower the **CHAIR BACK** to the **FULLY DOWN** position.



NOTE:
Chair Base DOWN FULL,
Chair Back DOWN FULL,
Fluid level 1/8" below
Reservoir ceiling.

4 Now uninstall the Reservoir Bracket by removing the two screws that secure it. Carefully remove the Hydraulic Fluid Reservoir and pour the remaining Hydraulic Fluid from the reservoir into your pan or bucket.

5 Reinstall the Hydraulic Fluid Reservoir and Reservoir Bracket using the same two screws that were removed in step 4. With the base and back still in the fully down position, fill the Hydraulic Fluid Reservoir until the fluid level is approximately 1/8" below the reservoir ceiling.

IMPORTANT: DO NOT OVER FILL. USE ONLY Mobil DTE Light.
(Engle P/N: H015109-QT for 1 Quart)

6 Carefully return the Reservoir Cap Assembly to the secured Hydraulic Fluid Reservoir, then install and hand tighten the Reservoir Cap. Using the drip rag, wipe off any Hydraulic Fluid that may have dripped on and around the Chair (Hydraulic Fluid will stain). Reinstall the Hydraulic Power Shroud.

7 Finally, you must cycle the chair base to it's max UP and DOWN positions for a minimum of three cycles, and the chair back to it's max UP and DOWN positions for a minimum of three cycles. This will purge the air bubbles that may have gotten into the hydraulic system and will help to retain smooth and quiet function. Once cycled, the Hydraulic Fluid will not be clear due to the fluid that remained in the system. If unsatisfied, cycle all Hydraulic Cylinders & repeat steps 1 thru 7.

Hydraulic Motor Pump

115V ~ 60Hz

3.9A

45µF

Maximum Cycle Time - **1 minute**

Thermally Protected

Hydraulic Solenoid Valve

115V ~ 50/60Hz

19/13W

Maximum Cycle Time - **10 minutes**

Maximum Operating Pressure - **853psi (5880kPa)**

Relief Valve Setting - **853psi**

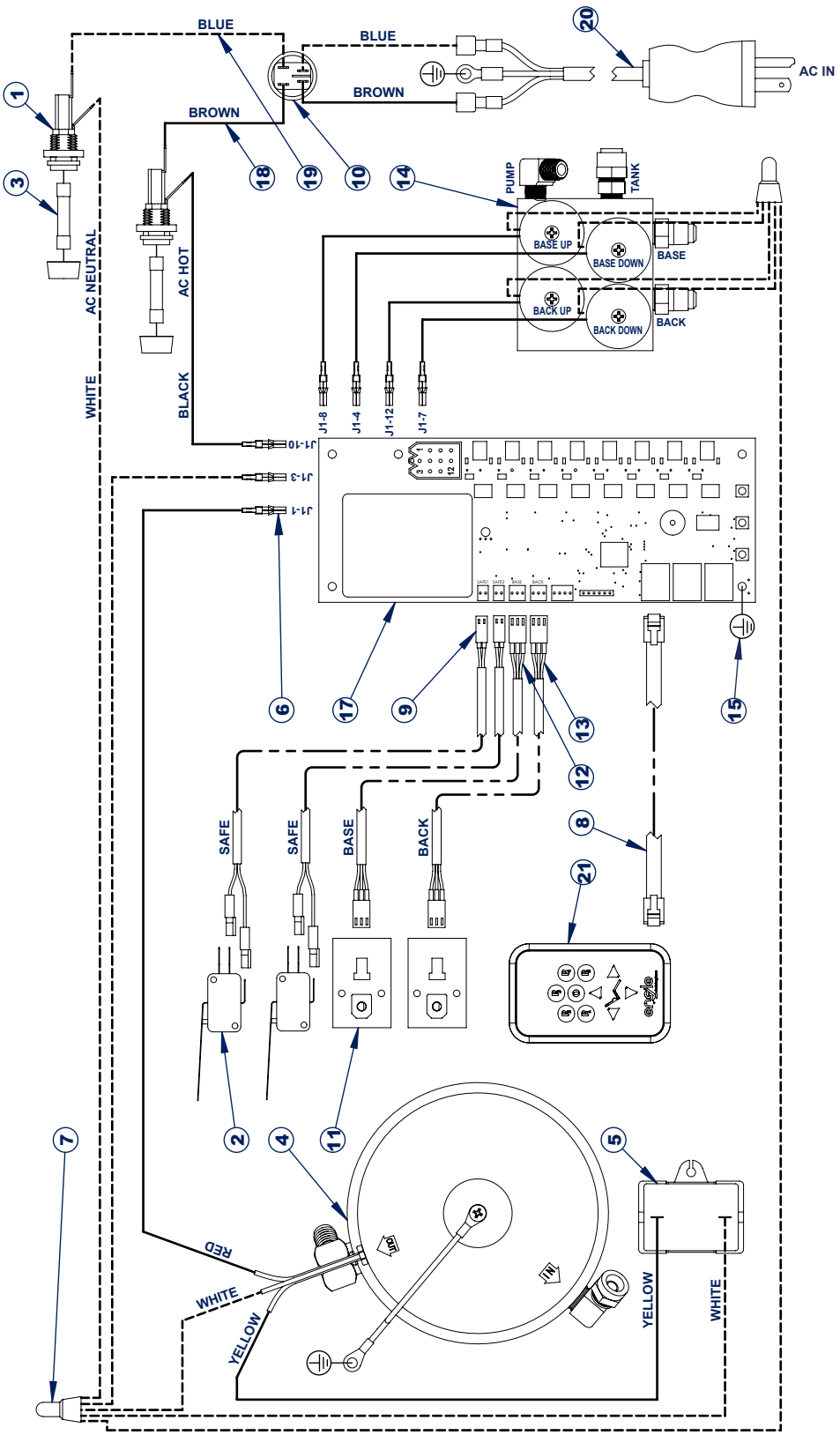
Hydraulic Cylinders

Maximum Operating Pressure - **800psi (5515kPa)**
(All Cylinders)

Fuses

Mains Fuses - **6A 250V**

Engle 300 Series Standard Dental Chair Electrical & Hydraulic Systems



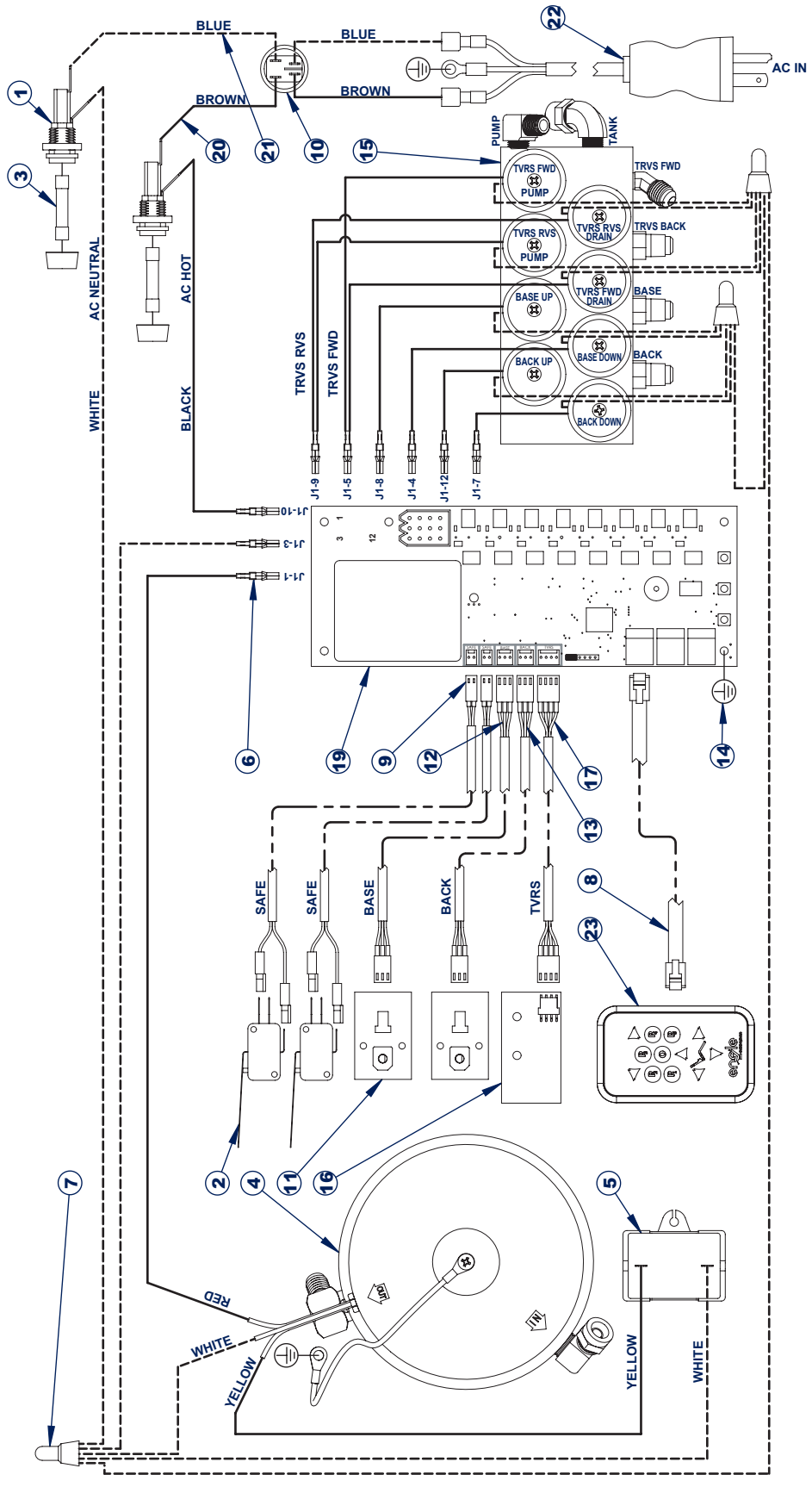
NO.	PART NO.	DESCRIPTION	QTY.
1	H014101	FUSE HOLDER	2
2	H014155	LIMIT SWITCH	2
3	H014250	FUSE - 6 AMP	2
4	H014280	PUMP MOTOR ASSY - 115V	1
5	H014284	PUMP CAPACITOR, 220V	1
6	H014311	FEMALE PIN CONNECTOR	7
7	H014328	CONNECTOR - CLOSED END	2
8	014-390-01	CHAIR TP CABLE - 73"	2
9	H014396	SAFETY SWITCH HARNESS	2
10	H014397	ROCKER SWITCH (125V) - GREEN	1

NO.	PART NO.	DESCRIPTION	QTY.
11	H014460	POT P.C.B.	2
12	H014464	BASE ENCODER HARNESS	1
13	H014465	BACK ENCODER HARNESS	1
14	H014466	SOLENOID VALVE ASSEMBLY (115V)	1
15	H014473	GROUND WIRE ASSEMBLY	1
16	H014572	* 12 CONTACT MALE PLUG	1
17	H014668	P.C.B.	1
18	P096648	BROWN POWER LEAD	1
19	P096649	BLUE POWER LEAD	1
20	P096650	POWER CORD ASSEMBLY (115V)	1

NOTE 1: P096660R - REPLACEMENT T.P. ASSY, LEFT HAND
P096662R - REPLACEMENT T.P. ASSY, RIGHT HAND
*INDICATES PARTS NOT SHOWN.

NO.	PART NO.	DESCRIPTION	QTY.
21	SEE NOTE 1	LEFT OR RIGHT TOUCH PAD	1

Engle 300 Series Dental Chair w/ Traverse Option Electrical & Hydraulic Systems



NO.	PART NO.	DESCRIPTION	QTY.
1	H014101	FUSE HOLDER	2
2	H014155	LIMIT SWITCH	2
3	H014250	6A F.A. FUSE (AGC-6)	2
4	H014280	PUMP MOTOR ASSY - 120V	1
5	H014284	PUMP CAPACITOR, 120V	1
6	H014311	FEMALE PIN CONNECTOR	10
7	H014328	CONNECTOR - CLOSED END	3
8	014-390-03	CHAIR TP CABLE - 102"	2
9	H014396	SAFETY SWITCH HARNESS	2
10	H014397	ROCKER SWITCH (120V) - GREEN	1

NO.	PART NO.	DESCRIPTION	QTY.
11	H014460	BACK/BASE POTENTIOMETER	2
12	H014464	BASE ENCODER HARNESS	1
13	H014465	BACK ENCODER HARNESS	1
14	H014473	* GROUND WIRE ASSEMBLY	1
15	H014494	SOLENOID ASSY (120V) - TRAVERSE	1
16	H014497	TRAVERSE ENCODER BOARD	1
17	H014505	TRAVERSE ENCODER HARNESS	1
18	H014572	* 12 CONTACT MOLEX PLUG	1
19	014-668-02	TRAVERSE OPTION P.C.B.	1
20	P096648	BROWN POWER LEAD	1

NOTE 1: P096730R - REPLACEMENT TRAVERSE T.P. ASSY, R.H.
P096731R - REPLACEMENT TRAVERSE T.P. ASSY, L.H.
*** INDICATES PARTS NOT SHOWN.**

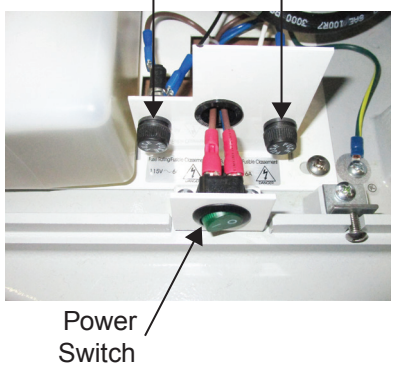
NO.	PART NO.	DESCRIPTION	QTY.
21	P096649	BLUE POWER LEAD	1
22	P096650	POWER CORD ASSEMBLY (120V)	1
23	SEE NOTE 1	LEFT OR RIGHT TRAVERSE TOUCH PAD	1

DANGER: Engle Dental Systems recommends all services & repairs be performed by a qualified technician. Make sure to **UNPLUG** the Dental Chair's **POWER CORD** from it's **POWER SOURCE** any time the Hydraulic Power Shroud will be removed unless specified otherwise.

Dental Chair Does Not Function:
(Power Switch at "**ON**" Position, but GREEN Power Light is "**OFF**")

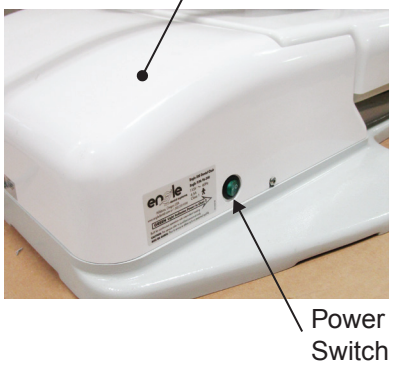
- Is the chair plugged into a working outlet? Make sure to check the circuit breaker.

  (***DANGER:*** Make sure chair **POWER CORD** is **UNPLUGGED**)
- Check all Fuses and replace using the specified fuses (Page 15) if necessary.
  Main Fuses are located inside the Hydraulic Power Shroud, near the Power Switch.
  P.C.B. Fuse is located on the board, next to the transformer.
- Has the Power Cord been damaged? Visibly inspect the cord and it's connections to the chair base.



Dental Chair Does Not Function:
(Power Switch at "**ON**" Position and GREEN Power Light is "**ON**")

- Was there a momentary power source failure in the office? If so, perform the steps for "**BACK & BASE CALIBRATION**" on ***page 18*** of this manual.
- Verify all Touch Pad Cable connections are continuous a
- Check Main P.C.B. Calibration Status Screen for error codes, and troubleshoot using "**BACK & BASE ENCODER CALIBRATION**" section on ***page 18*** of this manual.



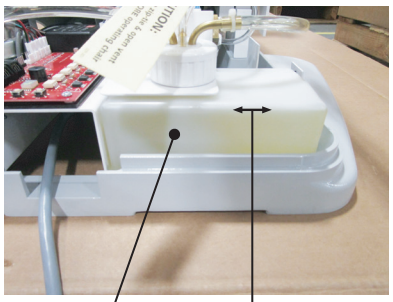
Dental Chair Makes a Squealing Noise When Moving:
(Power Switch at "**ON**" Position and GREEN Power Light is "**ON**")

- There is air in your hydraulic system. Cycle the chair base all the way up and down 3 times and cycle the chair back all the way up and down 3 times. If this does not correct the problem, check your Hydraulic Fluid level.
  (The Hydraulic Fluid Reservoir is located inside the Hydraulic Power Shroud)

Checking and retaining correct fluid level:

- **Step 1** - ***IMPORTANT:*** Lower the Chair Base **DOWN** completely
- **Step 2** - ***IMPORTANT:*** Lower the Chair Back **DOWN** completely
- **Step 3** - Inspect the Hydraulic Fluid Reservoir. The oil needs to be 1/8" below the reservoir ceiling, about where the Reservoir's edge radius begins.
- **Step 4** - If fluid level is low, add **MOBIL DTE OIL LIGHT Hydraulic Fluid (Engle P/N: H015109-QT)** to the Hydraulic Fluid Reservoir until the fluid level is full as described in Step 3.

CAUTION: **DO NOT OVER FILL!**



NOTE:
Chair Base DOWN FULL,
Chair Back DOWN FULL,
Fluid level 1/8" below
Reservoir ceiling.

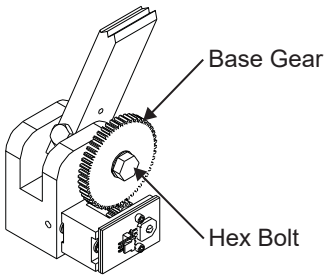
If problem persists, please contact the Engle Technical Support Team for help in diagnosing the issue.
(See page 1 of this manual for contact information)

Engle 300 Series Dental Chair - Troubleshooting & Calibration

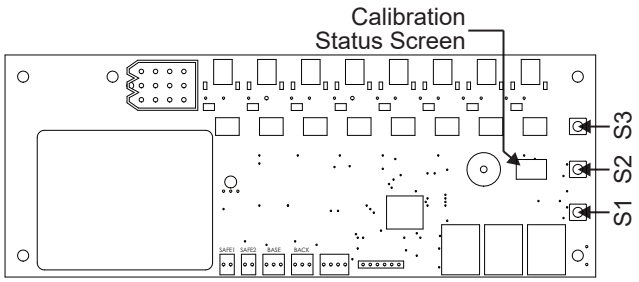
DANGER: Engle Dental Systems recommends all services & repairs be performed by a qualified technician. Make sure to **UNPLUG** the Dental Chair's **POWER CORD** from it's **POWER SOURCE** any time the Hydraulic Power Shroud will be removed unless specified otherwise.

Engle 300 Series Power Pack P.C.B. Troubleshooting Guide

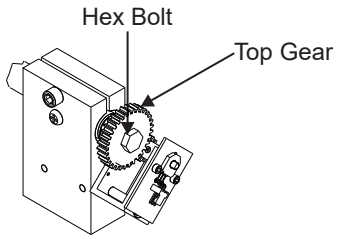
CODE	DESCRIPTION	ACTION	LOCATION
_I	Operating Mode (Circular Running Dash)	NOTE: If the chair is malfunctioning, refer to Base and Back Calibration.	N/A
C	In Status and Calibration Mode	Press S1, then S2, then S3 & cycle the chair's Power Switch OFF/ON to exit and return to operating mode. Also refer to Base & Back Encoder Calibration sticker.	Above Base Plate at Power Pack
F	Safety Switch Engaged	Make sure the Safety Switch assembly is functioning properly.	Under Lower Elevator Shroud. (See page 11)
7	Base Sensor Connection Fault	Make sure the Base Sensor wiring harness is installed properly in it's designated ports. Check for broken connections in harness assembly.	On Chair Base, Under Upper Elevator Shroud
8	Back Sensor Connection Fault	Make sure the Back Sensor wiring harness is installed properly in it's designated ports. Check for broken connections in harness assembly.	Under Seat Upholstery Assembly
9	Back & Base Sensor Connection Fault	Make sure the Back & Base Sensor wiring harness is installed properly in it's designated ports. Check for broken connections in harness assembly.	See Code 7 & 8 Assembly Locations



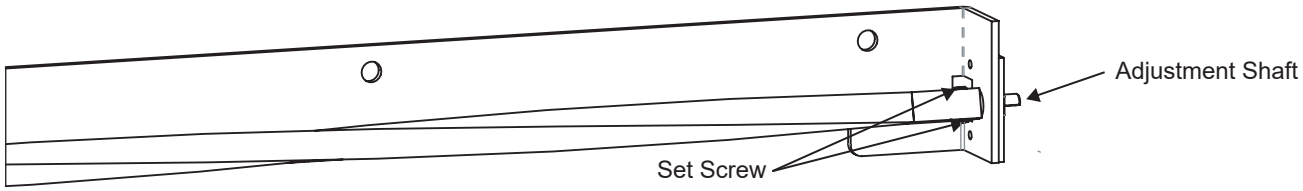
Sensor Assembly - Base



Engle 300 Series Main P.C.B. - 115V
H014668(Standard) & 014-668-02(Traverse)



Sensor Assembly - Back



Sensor Assembly - Traverse

CALIBRATION FOR ENGLE 300 SERIES DENTAL CHAIR POTENTIOMETERS (P.C.B. H014668 & 014-668-02)

Step 1 - Locate the Engle 300 Series P.C.B. under the Power Shroud on the Base Plate. (If the chair is equipped with the Traverse Option, manually position the seat completely **AFT** - towards the headrest.)

Step 2 - Important - Press buttons S3 & S1 on the P.C.B. simultaneously and manually position the chair until it's **BASE** is **FULLY DOWN**, then press button S2 on the P.C.B. until the chair **BACK** is **FULLY UP.**

Step 3 - Enter calibration mode by simultaneously pressing S1, S2, & S3 until an audible beep is heard, then release. The status component will indicate the letter "C".

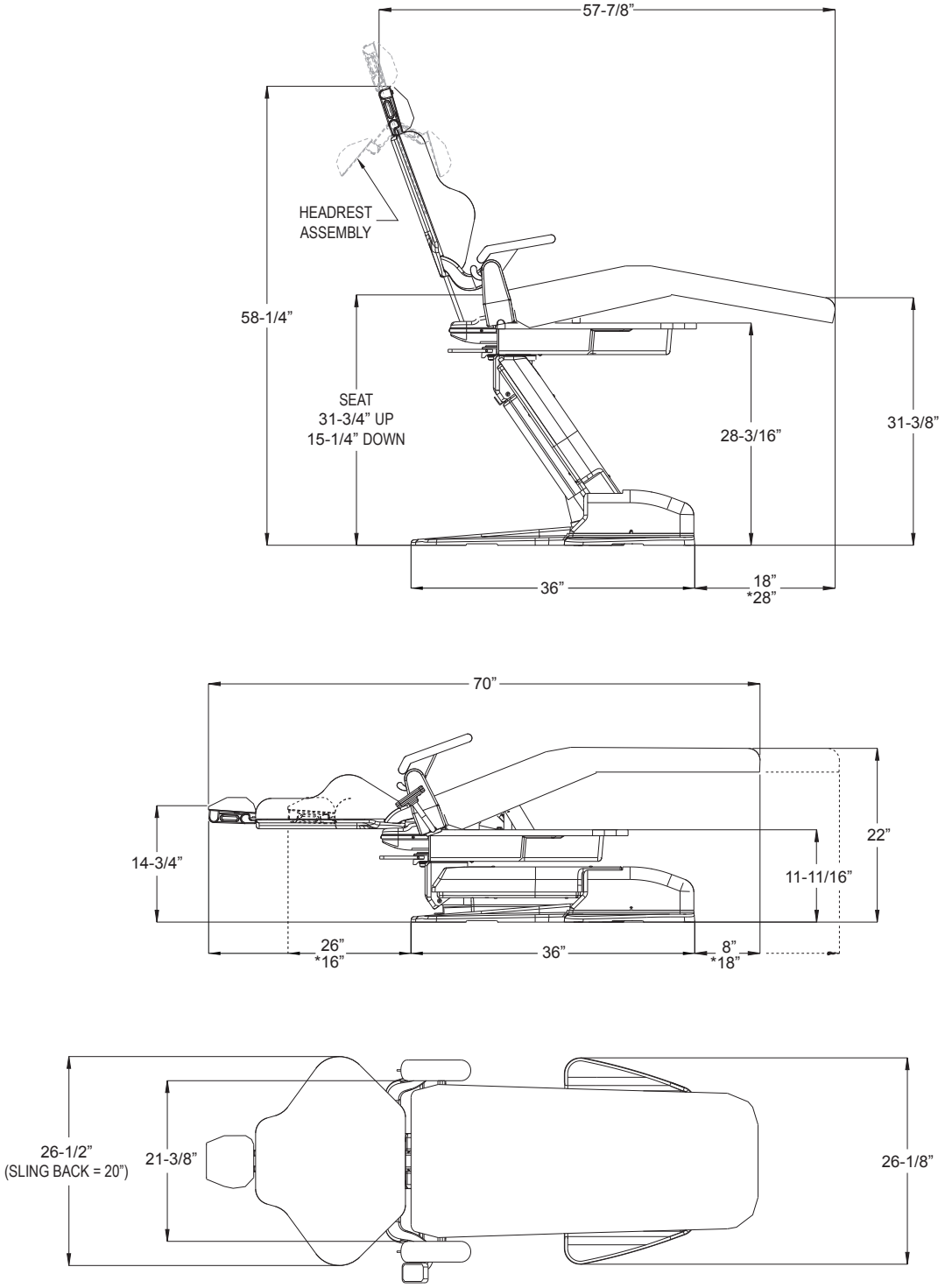
Step 4 - Press and release S1 on the P.C.B. to check the calibration of the Base Sensor assembly located on the Base Plate and S2 to check the calibration of the Back Sensor assembly located under the seat.
NOTE: **IF THE DASH APPEARS AT THE CENTER LOCATION OF THE P.C.B. STATUS COMPONENT FOR S1 AND S2, SKIP STEP 5 AND PROCEED TO STEP 7. CHAIR DOESN'T REQUIRE CALIBRATION.**

Step 5 - Remove the Seat Pan assembly and/or the Upper Elevator Shroud, depending on which Sensor assembly needs calibration. After choosing a Sensor assembly as noted in Step 5, loosen the Hex Bolt for the Large Gear of the Sensor assembly to be calibrated. Rotate the large gear until the dash symbol appears in it's center location on the P.C.B. Status component. Adjust it such that it is located in the middle of that center dash segment. Precisely maintain that calibrated Large Gear position and tighten the Hex Bolt. That Sensor is now calibrated, repeat for the other Sensor assembly.
IMPORTANT: **DO NOT RE-POSITION THE CHAIR FROM IT'S FULL BASE DOWN & FULL BACK UP CALIBRATION BEFORE PROCEEDING WITH STEP 7.**

Step 6 - If the chair is equipped with the traverse option and it has the sensor shown above, it will need to be calibrated. Press and release S3 to check the calibration. If the dash appears at the center location of the P.C.B. status screen, calibration is not needed and you can skip to step 7. If calibration is needed, remove the Top Plate Shroud to gain access to the traverse position sensor assembly. Loosen the two set screws shown above and rotate the adjustment shaft until the dash is located in the center of the P.C.B. status screen. Tighten the set screws while maintaining the shaft position.
IMPORTANT: **RETURN THE CHAIR TO IT'S FULL BASE DOWN, FULL BACK UP & TRAVERSE FULL AFT POSITION BEFORE PROCEEDING WITH STEP 7.**

Step 7 - Cycle the chair Power Switch OFF/ON to exit and return to Operating Mode. The Status component will show a P series number, then a circular running dash (Operating Mode). Reinstall the Seat Pan and /or the Upper Elevator Shroud, Top Plate Shroud, and the Power Shroud.

Engle 300 Series Dental Chair - General Dimensions



* Indicates dimension when Chair is traversed to its maximum forward position. Available only on Chairs purchased with the Traverse option.

Guidance and manufacturer's declaration – electromagnetic emissions		
The Engle 300 is intended for use in the electromagnetic environment specified below. The customer or the user of the Engle 300 should assure that it is used in such an environment.		
Emissions Test	Compliance	
RF emissions CISPR 11	Group 1	The Engle 300 uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class A	The Engle 300 is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage Fluctuations/ Flicker emissions IEC 61000-3-3	Not Applicable	The Engle 300 can only be powered to 115V 60Hz.

Guidance and manufacturer's declaration – electromagnetic immunity			
The Engle 300 is intended for use in the electromagnetic environment specified below. The customer or the user of the Engle 300 should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment – guidance**
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz (6 Vrms in ISM radio Bands within 150kHz – 80MHz)	3 Vrms	Portable and mobile RF communications equipment should be used no closer to any part of the Engle 300, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance** $d = 1.2\sqrt{P}$ $d = 1.2\sqrt{P}$ 80 MHz to 800 MHz $d = 2.3\sqrt{P}$ 800 MHz to 2.7 GHz where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and *d* is the recommended separation distance in metres (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey[a], should be less than the compliance level in each frequency range.[b]
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.7 GHz	3 V/m	
NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies. NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			
[a] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the Engle 300 is used exceeds the applicable RF compliance level above, the Engle 300 should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the Engle 300. [b] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.			

Guidance and manufacturer's declaration – electromagnetic immunity			
The Engle 300 is intended for use in the electromagnetic environment specified below. The customer or the user of the Engle 300 should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment – guidance**
Electrostatic discharge (ESD) IEC 61000-4-2	±8 kV contact ±15 kV air	±8 kV contact ±15 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±2 kV for power supply lines ±1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	±1 kV differential mode ±2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	Voltage Dips 30% reduction, 25/30 periods At 0°	Voltage Dips 30% reduction, 25/30 periods At 0°	Mains power quality should be that of a typical commercial or hospital environment. If the user of the Engle 300 requires continued operation during power mains interruptions, it is recommended that the Engle 300 be powered from an uninterruptible power supply or a battery.
	Voltage Dips > 95% reduction, 0.5 period At 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315°	Voltage Dips > 95% reduction, 0.5 period At 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315°	
	Voltage Dips > 95% reduction, 1 period At 0°	Voltage Dips > 95% reduction, 1 period At 0°	
	Voltage Interruptions > 95% reduction, 250/300 periods	Voltage Interruptions > 95% reduction, 250/300 periods	
Power frequency magnetic field IEC 61000-4-8 (50/60 Hz)	30 A/m	30 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

Recommended separation distances between portable and mobile RF communications equipment and the Engle 300			
The Engle 300 is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the Engle 300 can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the Engle 300 as recommended below, according to the maximum output power of the communications equipment.			
Rated maximum output power of transmitter W	**Separation distance according to frequency of transmitter** m		
	150 kHz to 80 MHz $d = 1.2\sqrt{P}$	80 MHz to 800 MHz $d = 1.2\sqrt{P}$	800 MHz to 2.7 GHz $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23
For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer. NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies. NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			

Immunity to RF Wireless Communications Equipment						
Test Frequency (MHz)	**Band [a] (MHz)**	**Service [a]**	**Modulation [b]**	**Maximum Power (W)**	**Distance (m)**	**IMMUNITY TEST LEVEL (V/m)**
385	380 –390	TETRA 400	Pulse modulation [b] 18 Hz	1.8	0.3	27
450	430 – 470	GMRS 460, FRS 460	FM [c] ± 5 kHz deviation 1 kHz sine	2	0.3	28
710	704 – 787	LTE Band 13, 17	Pulse modulation [b] 217 Hz	0.2	0.3	9
745						
780						
810	800 – 960	GSM 800/900, TETRA 800, iDEN 820, CDMA 850, LTE Band 5	Pulse modulation [b] 18 Hz	2	0.3	28
870						
930						
1720	1 700 – 1 990	GSM 1800; CDMA 1900; GSM 1900; DECT; LTE Band 1, 3, 4, 25; UMTS	Pulse modulation [b] 217 Hz	2	0.3	28
1845						
1970						
2450	2 400 – 2 570	Bluetooth, WLAN, 802.11 b/g/n, RFID 2450, LTE Band 7	Pulse modulation [b] 217 Hz	2	0.3	28
5240	5 100 – 5 800	WLAN 802.11 a/n	Pulse modulation [b] 217 Hz	0.2	0.3	9
5500						
5785						

a) For some services, only the uplink frequencies are included.
b) The carrier shall be modulated using a 50 % duty cycle square wave signal.
c) As an alternative to FM modulation, 50 % pulse modulation at 18 Hz may be used because while it does not represent actual modulation, it would be worst case.

Maintenance & Service Notes:

Company, Technician, & Description of Service | Date