
SUMMIT INDUSTRIES LLC

Quick Installation Guide for SHFR Generators

07732, Revision: F



THIS DOCUMENT IS INTENDED AS A GUIDE AND IS NOT A
SUBSTITUTE FOR THE SERVICE MANUAL.

READ THIS DOCUMENT FIRST!

This QUICK START Installation Guide has been compiled to help those experienced installers who have familiarity with the SHFR generator to have a quick and simple reminder guide as to the setup of this generator.

DO NOT risk a MISTAKE that is time consuming, costly, and will void your Parts Warranty for this product.

REVISION HISTORY

Revision	Pages Affected/Revision Description	Release Date	ECR #
A	Initial draft	12/20/2016	---
B	Added more details for “workstation” configuration and details.	12/27/2016	9375
C	Replaced second paragraph in Section 1.1	June, 2016	9571
D	Added the following: Instructions for Com Port Config Pages 11,12,13; Work Station configuration Page 18; AEC set up and calibration Pages 20 to 29	May, 2018	9911
E	Renamed 3.2, Added 3.3, & corr. Wrkst, Added the statement on Page 10 to check or install the jumper on TS1	July, 2020	10497
F	Updated page 2, cable connections section Updated page 3, room light connections	October, 2022	11089

This document is an English original version, edited and supplied by Summit Industries, LLC. This document is meant to be a quick guide to install a SHFR generator and is not intended to take the place of its formal Service Manual or other documentation supplied with the system.

ADVISORY SYMBOLS

The following advisory symbols will be used throughout this manual. Their application and meaning are described below.




DANGERS ADVISE OF CONDITIONS OR SITUATIONS THAT IF NOT HEHEDED OR AVOIDED WILL CAUSE SERIOUS PERSONAL INJURY OR DEATH.



ADVISE OF CONDITIONS OR SITUATIONS THAT IF NOT HEHEDED OR AVOIDED COULD CAUSE SERIOUS PERSONAL INJURY, OR CATASTROPHIC DAMAGE OF EQUIPMENT OR DATA.



Advise of conditions or situations that if not heeded or avoided could cause personal injury or damage to equipment or data.

Note 

Alert readers on pertinent facts and conditions. Notes represent information that is important to know but which do not necessarily relate to possible injury or damage to equipment.

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1 INSTALLATION



WARNING

THIS DOCUMENT PROVIDED AS A STEP BY STEP GUIDE AND IS NOT INTENDED TO TAKE THE PLACE OF THE SERVICE MANUAL.

Place the Operator Console close to its permanent position. For easy interconnection and calibration place the Generator Cabinet on a table or pedestal; or mount it to the wall using the wall Support bracket provided.

1.1 SINGLE PHASE

For Single Phase Generators, connect the Power wires L1 and N (L2) to the Fuse Holders of F1 and F2 (right side of the Cabinet), and the Ground wire to the Ground stud in the Cabinet Frame.

SINGLE PHASE GENERATORS MUST HAVE TWO MAIN LINE FUSES. IF A CARTRIDGE OR SLUG IS IN THE F2 LOCATION, REPLACE IT WITH THE PROVIDED F2 MAIN LINE FUSE.

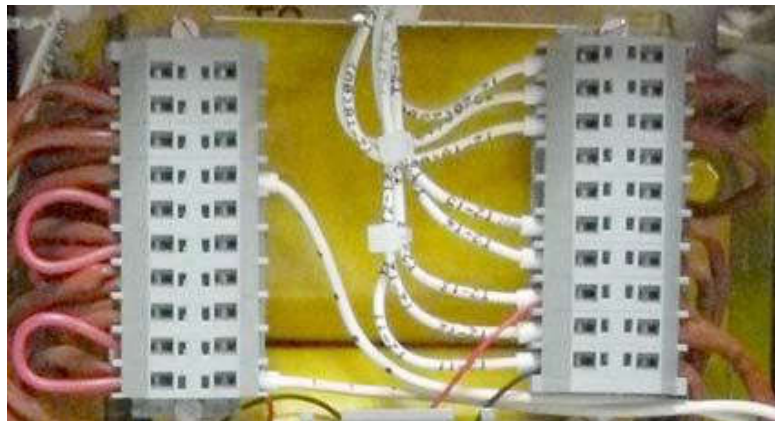
1.2 THREE PHASE

For Three Phase Generators, connect the Power wires L1, L2 and L3 to the Fuse Holders of F1, F2 and F3 (right side of the Cabinet), and the Ground wire to the Ground Stud in the Cabinet Frame. Three Phase do not need Neutral (N) wire connection from the Line.

According to the nominal voltage of the line, verify or connect the wire “**” to the indicated terminal (TB) of Transformer T2. This wire is factory connected to 230 VAC (for 1-Phase) or to 230 VAC, 400 VAC or 480 VAC (for 3-Phase Generators in accordance with the Generator configuration). (Refer to Schematic 54302260).

T2 Terminal Strip

- 10 = 480V
- 9 = 440V
- 8 = 415V
- 7 = 400V
- 6 = 230V
- 5 = 230V
- 4 = 208V
- 3 = 120V



Prepare and install the high voltage cables in the generator and the tube.

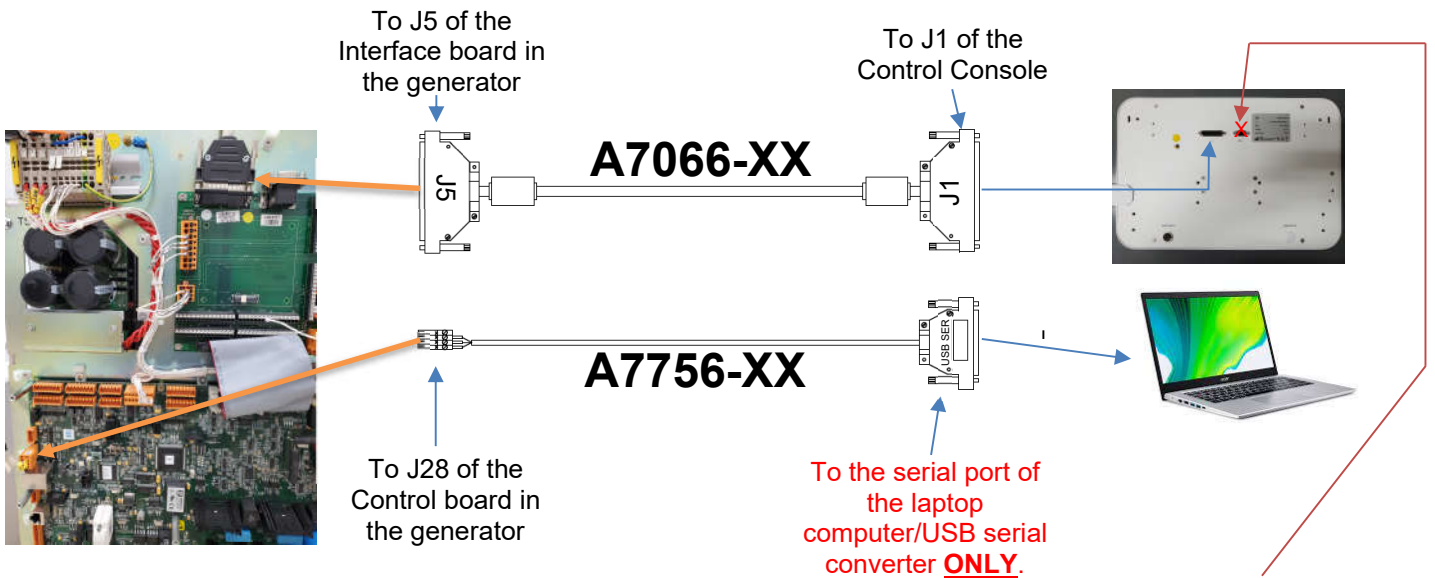
1.3 STATOR CABLE

Connect the Stator Cable to Terminal Block TS1 located in the top left hand corner of the swing out door. This cable must be shielded with the shield connected to the ground in the generator and on the tube.

Note  **This is not TS1 on the Interface Board!**

<u>Stator wires</u>	<u>TS1 Terminals</u>
Main	TS1-1
AUX (Shift)	TS1-2
Common	TS1-3
<u>Thermostat Wires</u>	<u>TS1 Terminals</u>
GND	TS1-4
Thermostat T1	TS1-5

Connect the Serial Cable A7066-XX and the Configuration cable A7756-XX as shown below.



CRITICAL NOTE: There is a DB9 serial port on the back of the Control Console, this port **SHOULD NOT** be used.

Ignoring This Warning Will VOID Your Parts Warranty

1.4 DOOR OPEN INTERLOCK SIGNAL

Connect two wires from the Room Door Interlock Switch(es) to Terminal Strip TS1-35 (/Door open) and TS1-14 (GND).

(Refer to the Configuration document for Door Open Switch Interlock configuration.)

1.5 WARNING LIGHT SIGNAL

Room Warning Lamp(s) are lighted when the Handswitch is pressed halfway (prep. position), during X-ray and during fluoro operation.

Room Warning Lamp(s) can be externally powered or internally by the Terminal Strip TS2. Room Lamp(s) must be connected through the Terminal Strip TS2 to enable the Generator switches to power on/off the Room Warning Lamps.

Connect the cables as indicated in the table below, according to the needed voltage:

1.5.1 Room Warning Lamps cables connections

Voltage	WIRE 1	WIRE 2	JUMPER
230 AC	TS2-7	TS2-20	TS2-8 - TS2-12
110 AC	TS2-7	TS2-20	TS2-8 - TS2-16
24 VDC	TS2-7	TS1-13	TS2-8 - TS2-21
Dry Contact	TS2-7	TS2-8	No Jumpers

1.6 COLLIMATOR LAMP

The generator can supply power to the Manual Collimator Lamp.

Connect wires from the Collimator Lamp to Terminal Strip TS2-23 (24 VAC) and TS2-24 (0 VAC) of the Interface board.

1.7 SYSTEM LOCKS

To supply power from the Generator to the System Locks (Table, Vertical Bucky, etc.) connect the wires from the Locks to Terminal Strip TS3-1 (+24 VDC) and TS3-7 (0 VDC) or to TS3-2 (+24 VDC) and TS3-8 (0 VDC) of the Interface board.

System Locks connections

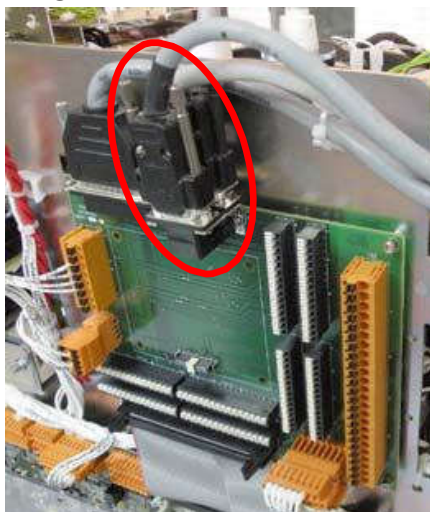


1.8 ION CHAMBERS FOR AEC (OPTIONAL)

For one Ion Chamber connection, connect the cable to J6 (AEC 1) on the Interface board. Connect the second Ion Chamber cable to J7 (AEC 2) when using two Ion Chambers.

Claymont, Vacutec and AID Ion Chambers are compatible with the Generator (refer to schematic 6011002 in the Schematics document).

AEC connections



1.9 BUCKY CONNECTIONS

For Table Bucky, 120VAC

Summit Cable wire leads	Connect to Sedecal Generator
B1	TS1-47
B2	TS1-52
B3	TS2-1
B4	TS2-14
B6	TS1-14
B8	TS2-18

Additional Jumper wires also needed from TS2-18 to TS2-2 and TS1-53 to TS1-59

For Table Bucky, 230/240VAC

Summit Cable wire leads	Connect to Sedecal Generator
B1	TS1-47
B2	TS1-52
B3	TS2-1
B4	TS2-10
B6	TS1-14
B8	TS2-18

Additional Jumper wires also needed from TS2-18 to TS2-2 and TS1-53 to TS1-59

For Wall Bucky, 120VAC:

Summit Cable wire leads	Connect to Sedecal Generator
B1	TS1-60
B2	TS1-58
B3	TS2-4
B4	TS2-15
B6	TS1-15
B8	TS2-19

Additional Jumper wires also needed from TS2-19 to TS2-5 and TS1-53 to TS1-59.

For Wall Bucky, 230/240VAC:

Summit Cable wire leads	Connect to Sedecal Generator
B1	TS1-60
B2	TS1-58
B3	TS2-4
B4	TS2-11
B6	TS1-15
B8	TS2-19

Additional Jumper wires also needed from TS2-19 to TS2-5 and TS1-53 to TS1-59.

2 INITIAL CONFIGURATION PROCEDURE

Configuration provides the initial settings and checkout procedures that must be carried out before making X-ray exposures. Functional characteristics of this Generator are defined at the time of installation.

All the Calibration and Configuration data are stored in a non-volatile memory chip (U66-EEPROM) located on the A3640-XX Control board. Other information, such as serial number, version and revision; is also stored in the EEPROM.

When the initial setup and checkout has been completed the Generator will be ready for Calibration.

2.1 GENERATOR SWITCHES

The system configuration and test switches are:

[Contact Support Before Changing Dip Switches](#)

DIP SWITCH LOCATION	FUNCTION
3640SW2 - Control board	Not used for Configuration
3640SW6 - Control board	Test
3640SW7 - Control board	Not used for Configuration
S0008009S1 - Dual Speed Starter board	Not used for Configuration

3640SW2 - CONTROL BOARD

Dip switch 3640SW2 is not used for configuration but all its switches must be set to **On**.

3640SW6 - CONTROL BOARD

Dip Switches 3640SW6-2 and 3640SW6-4 can be configured with the Generator ON, there is no need to turn it OFF to modify their position. Other switches modification require to reboot the Generator to apply the changes.

Set dip switch 3640SW6 to OFF

3640SW7 - CONTROL BOARD

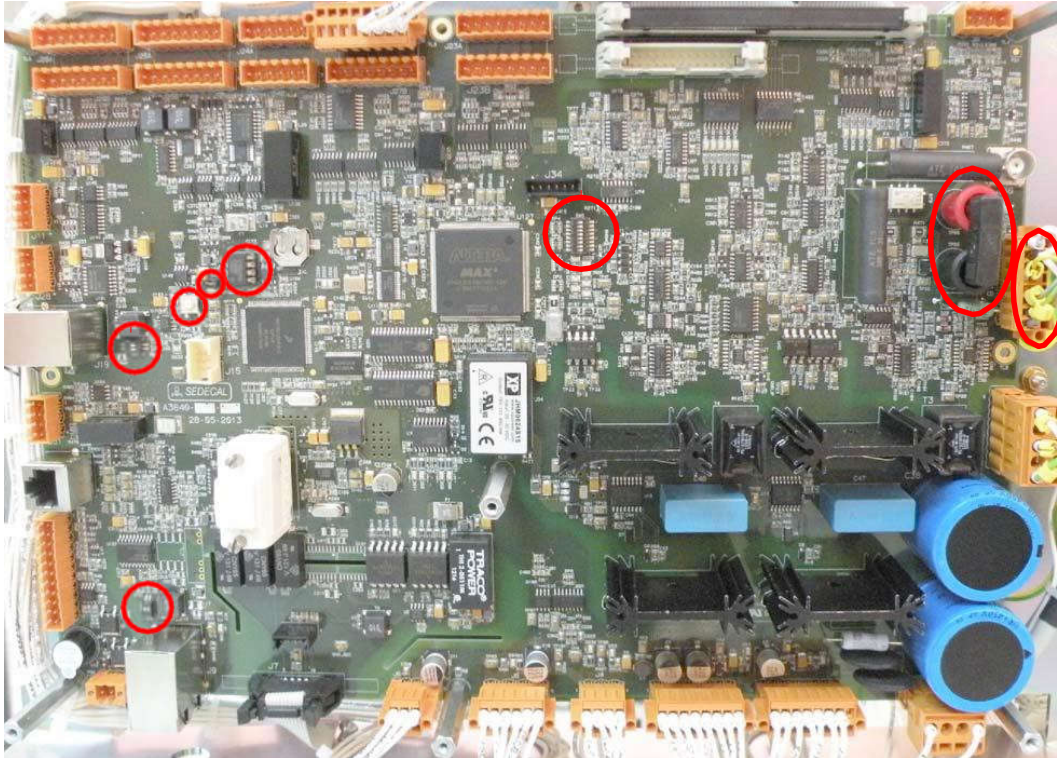
Dip switch 3640SW7 is not used for configuration but all its switches must be set to **On**.

Control board A3640-XX EEPROM, switches and jumpers

SW7 W1

SW6

J18



SW2 SW3

U66

TP85 & TP86

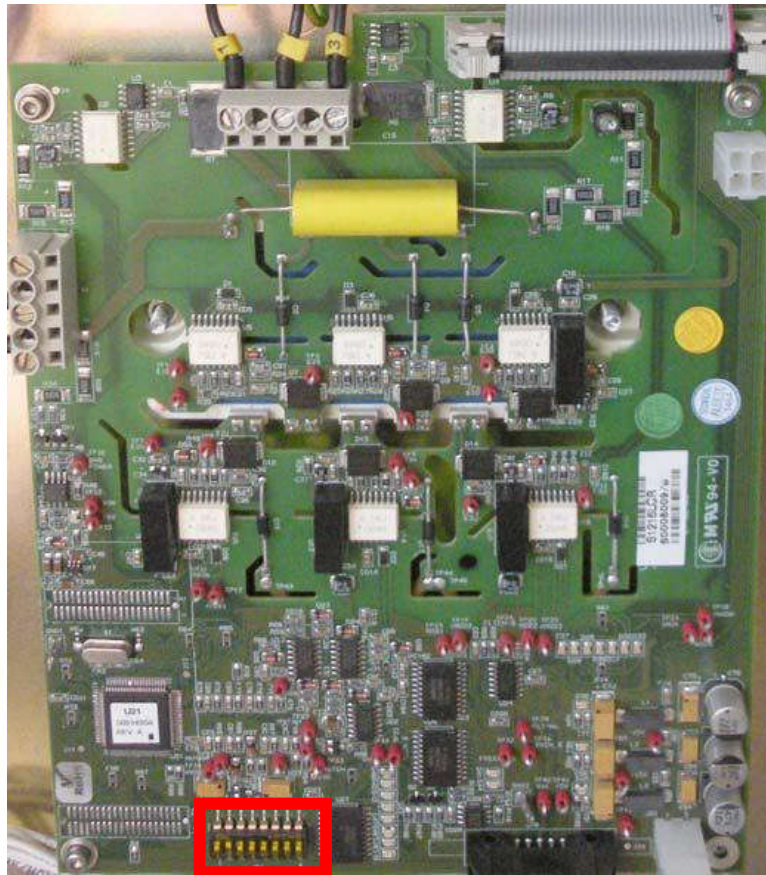
S0008009S1 - DUAL SPEED STARTER

Set dip switch S0008009S1 as indicated below.

Test Dip Switch S0008009S1 on the Dual Speed Starter

S0008009S1 POSITION	OPEN (OFF)	CLOSED (ON)
1	Not used. <i>Set to OFF.</i>	Not used.
2	Not used.	Not used. <i>Set to ON.</i>
3	Not used. <i>Set to OFF.</i>	Not used.
4	Not used. <i>Set to OFF.</i>	Not used.
5	Not used. <i>Set to OFF.</i>	Not used.
6	Not used. <i>Set to OFF.</i>	Not used.
7	Not used. <i>Set to OFF.</i>	Not used.
8	Not used. <i>Set to OFF.</i>	Not used.

Dual Speed Starter S0008009 switches location



S1

2.2 BASIC CONFIGURATION OF GENERATOR BOARDS

The following Jumpers are factory set or removed to configure the Generator boards according to the customer order. Check the jumpers position in the Generator boards.

GENERATOR BOARDS	JUMPERS POSITION
CONTROL BOARD	W1 installed. Remove to update the software if software download has been interrupted and software cannot be updated using the Downloader <i>(refer to the Troubleshooting document)</i> .
	TP85 and TP86 installed. Remove for mAs measurement.
	J18 in "7-8" to allow the kV oscillator operation.

Insure a jumper exists between TS1-6 and TS1-37 or add the jumper. This insures the OFF button on the console will work.

Power on the Generator and observe the green lamp next to T1. Wait for the generator to boot up completely. Approximately 15 seconds.


3 GENERATOR SERVICE MODE

In order to calibrate and configure the generator you must use the software service tools provided on the USB drive that shipped with the generator. If you are unable to locate the USB drive a copy of the software's installation files can be downloaded from Summit University.

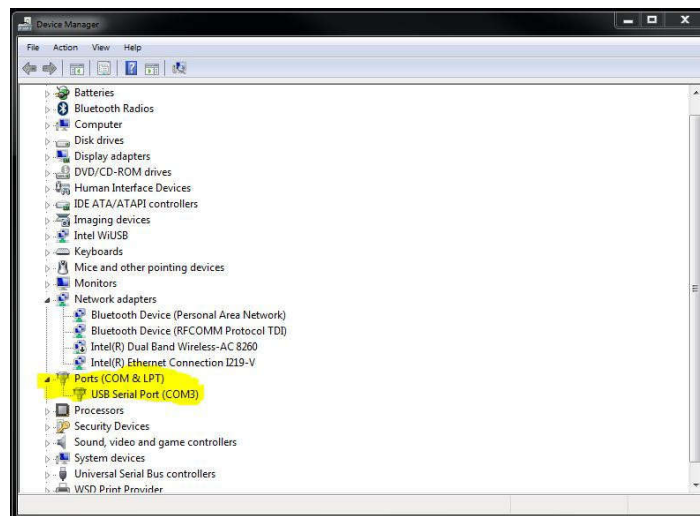
3.1 INSTALLING THE SOFTWARE SERVICE TOOL

To install the Service Console, plug the USB with the Software Service Tools of the Generator in the PC and click on the .exe file, Tech Service Console Setup. When installing the Service Console program in the computer, if the installer starts downloading .NET Framework from Internet, cancel the download and install version 4.0 (dotNetFx40_Full_x86_x64.exe) from the folder where the main application installer is. Then, install the Service Console program.

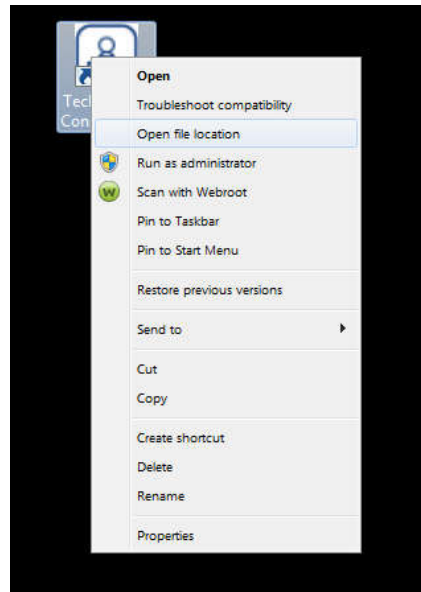
The Service Console (SC) program allows the access to the service screens for Configuration and Calibration procedures, reading the Error Log and Exposure Counters, downloading the Tube parameters and updating the software. It also allows the access to the User Console.

Note  It might be necessary to change the com port selection in the .ini file (located in the Tech Service Console folder) in case the cable is not connected to COM1 on the PC. In this case, open the ServiceConsole.ini file in Notepad and modify the serial port selection according to the one in use, e.g. SERIAL_PORT=COM3 .

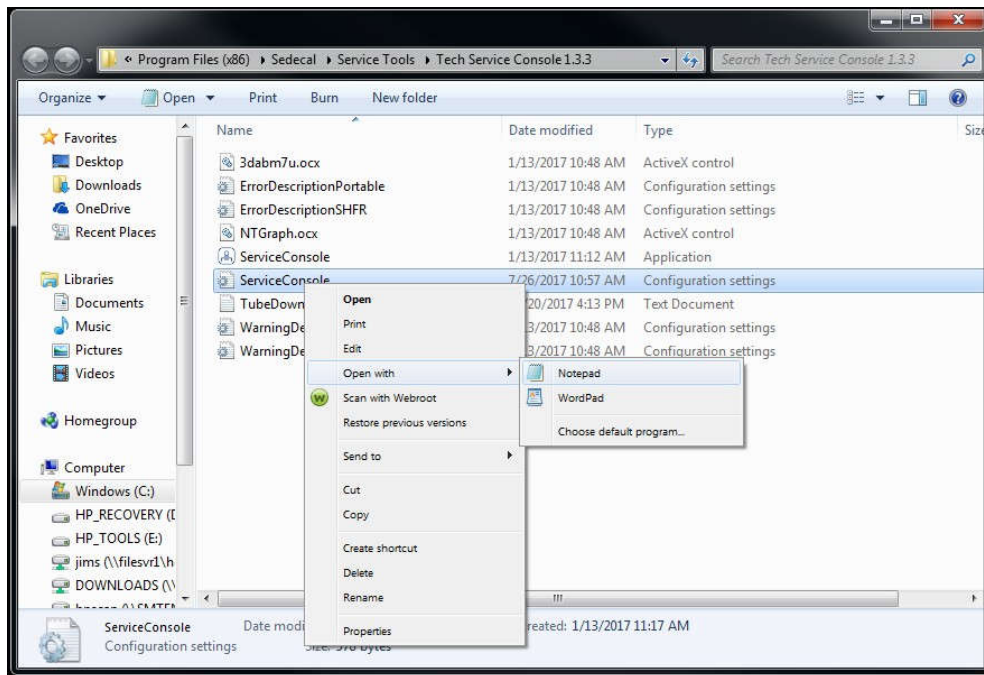
You will need to configure a COM port to communicate with the generator. If your computer has a DB9 serial port you will be able to plug it in directly. If you do not have a serial port available, you will need to purchase and install a USB to SERIAL adapter and install it on your computer. Open the computers device manager and click on "Ports (COM & LPT)". If you have a USB to serial adapter installed it should look similar to the picture below.



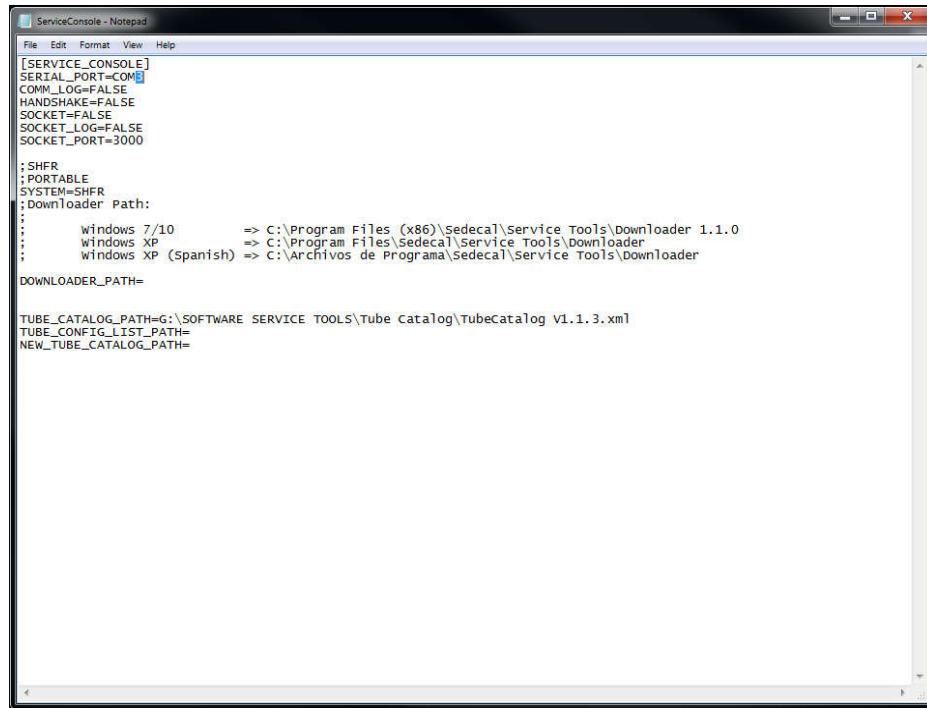
Quick Installation Guide for SHFR Generators



Right mouse click on service console configuration settings folder and choose open with and notepad.



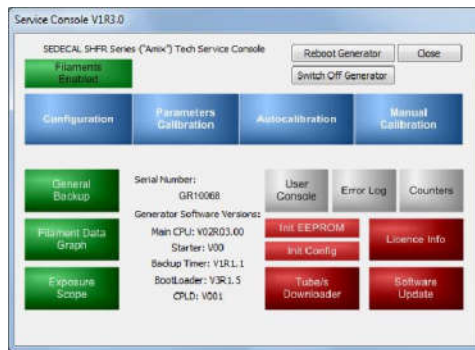
Once the file is open in notepad you will see the COM port the tech service console is set to use, change the com number to match the COM port that was noted earlier in the device manager of your computer. and choose file and save.



Choose file and save.

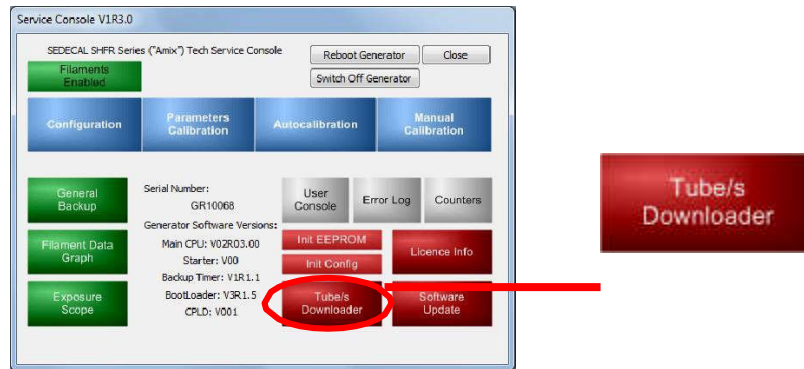
Start the SC program by clicking on the “Tech Service Console” desktop icon created during installation or in the path: C:\Program Files\Sedecal\Service Tools\Tech Service Console X.X.X (this is the path by default after installing the program). A password is required, enter the following password in the popup window: 2434.

The Service Console menu shows additional information such as the Generator Serial Number and the Software versions.



3.2 TUBE/S DOWNLOADER

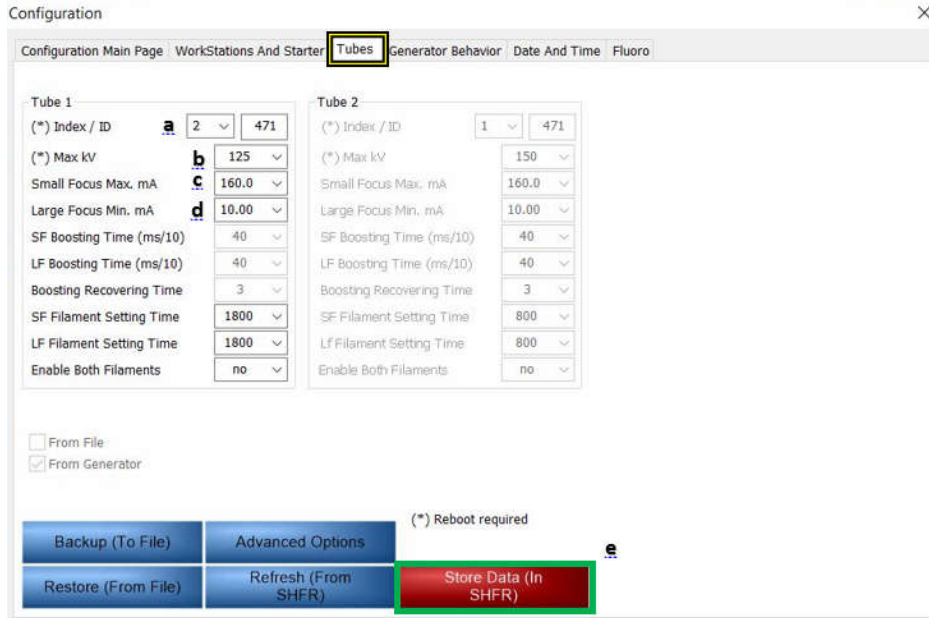
1. Launch the Tubes Downloader from the Service Console by pressing the “Tube/s Downloader” button. A list of the tubes loaded in the Generator is displayed, showing only their IDs.



2. To download the Tubes one by one, follow the procedure explained below:
 - a. Press “browse” to select the folder of the USB with the Software Service Tools that contains the .xml Tube catalog and open the file (select the file and press “Open” or double click on it). Once the Tube catalog has been opened and the “Refresh” button is pressed, some other information is shown in the “Tube list at the generator” column along with the IDs of the downloaded tubes:
 - Nominal focal spot value.
 - Brand and model of the tube.
 - Starter name or type.
 - Date or revision of the tube catalog: some of the tube specifications may change from one revision to another. Make sure that the revision of the selected tube matches the installed one.
 - b. Select the Tube Brand and Model to be downloaded and assign an Index position to it. Up to eight Tubes can be downloaded from the Tubes Catalog (the selected tubes are stored in the non-volatile RAM).
 - c. Start the transfer by clicking on the “Download” button and wait until the process ends and the Tube ID and model is displayed in the Status screen.
 - d. Repeat the process for all the Tubes to be downloaded.
 - e. Finally, press the “Close” button and reboot the Generator.

3.3 TUBE SELECTION

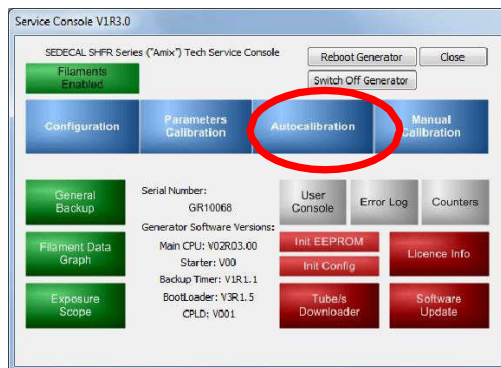
From the Service Console select Configuration followed by Tubes



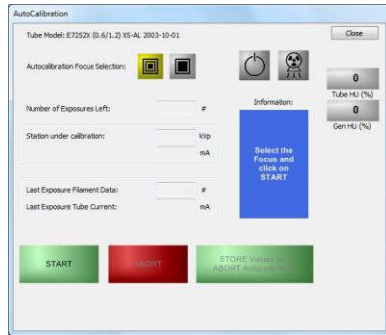
- a. Select the corresponding Index position of the Tube to be used and confirm that its ID matches.
- b. Maximum kV of the equipment can be limited from the maximum down to 80.
- c. This configuration determines the highest mA station for Small Focal Spot.
- d. This configuration determines the minimum mA station for Large Focal Spot. (typically set for 200)
- e. Be sure to save any changes by selecting Store Data (in SHFR) button.
NOTE: (*) Reboot required

3.4 AUTO CALIBRATION

With the service console open click on the Autocalibration button

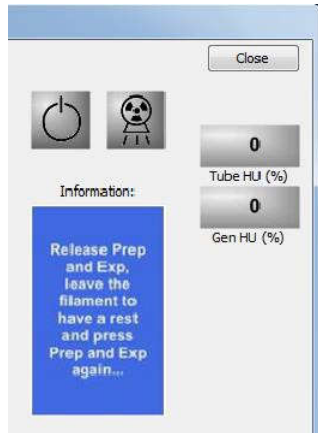


1. Enter in Autocalibration mode by pressing the “Autocalibration” button on the SC menu.



2. Check that the Heat Units used by the X-ray Tube are 0% or nearly.
3. Select the **Small Focal Spot** and press the “Start” button.
4. Keep the Handswitch button fully pressed to perform continuous exposures. The “Ready” icon is lighted in green and the “Exposure” icon is lighted in yellow every time a exposure is made.

Release the Handswitch when instructed to do so



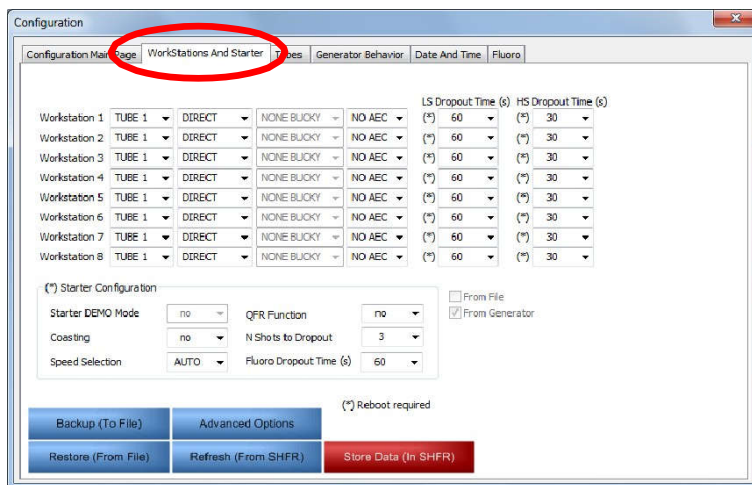
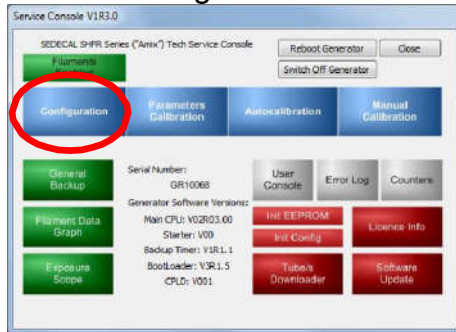
5. Autocalibration process is paused after every kVp station calibration, then it is mandatory to release the Handswitch, a message is shown in the screen asking to do so. Wait a few seconds and then press and hold the Handswitch again in order to continue with the calibration process.
6. When Autocalibration ends, the message “Autocalibration Finished” is shown in the Information screen. Press the “Exit” button, all calibrated parameters will be automatically saved.

Small spot calibration is complete.

7. Repeat the same procedure for the **Large Focal Spot**.

3.5 WORK STATION CONFIGURATION.

Click on Configuration button and complete workstation Setup



The workstations can be configured according to the customer preferences. If a workstation is configured with the value “No Tube”, it cannot be selected during operation.

Set the respective values of each Workstation to be configured (select the new value by clicking on the corresponding option). Up to 8 Workstations can be configured. If not using Tomo only the first three workstations are available for tube one.















Default setting – do NOT change:

- WORKSTATION 1 = **Table Top**
- WORSKTATION 2 = **Table**
- WORSKTATION 3 = **Wall Stand**
- WORSKTATION 4 =
- WORSKTATION 5 =
- WORSKTATION 6 =
- WORSKTATION 7 =
- WORSKTATION 8 =

Each workstation is assigned to a concrete push-button combination on the Console, regardless of its configuration. The workstations are configured according to the customer preferences during the installation procedure. The following push-buttons select their respective workstation (illuminated push-buttons).

If a push-button is not configured during the installation, the respective push-button(s) cannot be selected during operation.

Note in the following table the configuration of the Workstation assigned for each push-button.

PUSH-BUTTONS	WORKSTATION	WORKSTATION CONFIGURATION (Tube, Receptor, etc.)
	WS1	
 + 	WS2	
 + 	WS3	
 + 	WS4	
	WS5	
 + 	WS6	
 + 	WS7	
 + 	WS8	

Note. - Workstation data such as X-ray Tube, Receptor (Bucky, CR, Detector), Tomo, Ion Chambers, etc. must be registered.

3.6 BACKUP CALIBRATION DATA

Once the Calibration process has finished, it is recommended to make a backup copy of the Generators Calibration data. It is possible to save a backup of all the Calibration data or just a part of it.

COMPLETE CALIBRATION BACKUP AND RESTORATION



To save all the calibration data in the computer, go to the Parameters Calibration Main Page and press the “Complete Parameters Calibration Backup (To File)” button. A file containing the calibration data will be created in the designated directory of the computer.

3.7 FINAL CHECKS

1. Verify that all configuration and calibration data have been properly stored:
2. Turn off the Generator and check that Dip switches are set as indicated in Section 1.1 of the Configuration document:
 - A3640-XX Control board:
 - 3640SW2: All its switches in On position.
 - 3640SW6: All its switches in Off position once the calibration and configuration procedures are finished.
 - 3640SW7: All its switches in On position.
 - S0008009 Dual Speed Starter:
 - S0008009S1: All its switches but S0008009S1-2 in Off position. Dip switch S0008009S1-2 in On position.
3. Once the calibration and configuration procedures are completed, it is strongly recommended to save a general backup in the computer in case it is needed to be restored in the future (refer to Section 2.2 on the Configuration document). Write down in the Data Book the name and location of the folder containing the backup files.



3.8 AEC

If using the Bucky as a Flat Panel Detector connection follow the procedures below.

BUCKY AS FPD

Select “Yes” for Bucky 1 and/or Bucky 2, if any of them is configured as Flat Panel, when using a Flat Panel Detector. In this case, the Generator limits the maximum exposure time to 2.5 seconds.

The maximum exposure time set by default can be modified using the customer’s application. It can be increased up to the maximum allowed for each detector model.

Bucky 1 as FPD	no
Bucky 2 as FPD	no
Bucky / FPD 1 can abort EXP	yES
Bucky / FPD 2 can abort EXP	no
Bucky / FPD 1 timeout	10
Bucky / FPD 2 timeout	10
Bucky COM / HW Bus timeout	10

BUCKY OR FPD CAN ABORT EXP

Bucky/Detector RX_ORDER (Acknowledge) signal could be continuous or one pulse only.

- For continuous signal Buckys/Detectors:
 - When “Yes” is selected, if the RX_ORDER (Acknowledge) signal is stopped before the exposure is completed, it will be immediately aborted.
 - Select “No” to finish the exposure even if the Acknowledge signal is stopped before the exposure is completed.
- For one pulse signal Buckys/Detectors always select “No”. Otherwise, exposure will always be aborted from the very first moment as soon as the Acknowledge signal turns off.

Bucky or FPD can abort EXP Configuration

Bucky 1 as FPD	no
Bucky 2 as FPD	no
Bucky / FPD 1 can abort EXP	no
Bucky / FPD 2 can abort EXP	no
Bucky / FPD 1 timeout	10
Bucky / FPD 2 timeout	10
Bucky COM / HW Bus timeout	10

BUCKY/FPD TIMEOUT

“Bucky/FPD Timeout” sets the elapsed time since the RX_RQ (Request) signal is sent from the Generator until the RX_ORDER (Acknowledge) signal is sent back from the Bucky/Detector. If no answer is received from the Bucky/Detector within the designated time, exposure will not be initiated and error 24 will be displayed.

Time is set in seconds and “0” means no waiting, so the Acknowledge signal from the Bucky/Detector must be received immediately.

Bucky Timeout Configuration

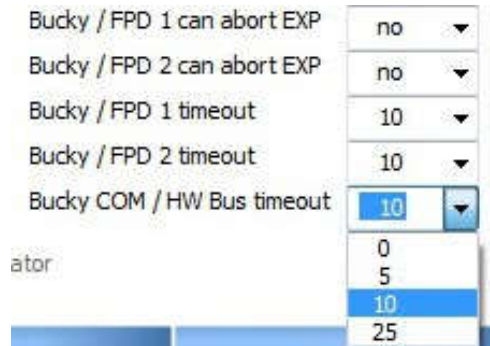
Bucky / FPD 1 can abort EXP	no
Bucky / FPD 2 can abort EXP	no
Bucky / FPD 1 timeout	10
Bucky / FPD 2 timeout	0
Bucky COM / HW Bus timeout	10

BUCKY COM / HW BUS TIMEOUT

“Bucky COM / HW Bus timeout” sets the time for the Bucky COM selection or Hardware Bus connected devices to be ready for the exposure.

Time is set in seconds and “0” means no waiting.

Bucky COM Timeout Configuration



AEC RAPID TERMINATION

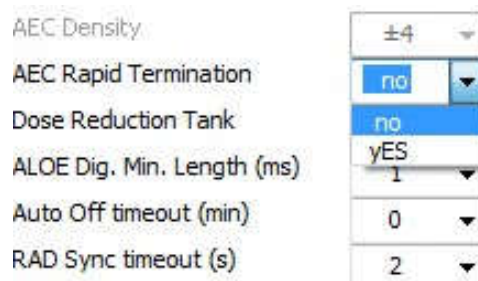
Rapid Termination is a Safety device that cuts the X-ray exposure in case of an error with the selected Ion Chamber or if the selected parameters (short backup time) are not appropriate for an exposure with AEC.

When selected, AEC Rapid Termination compares the AEC ramp with 30% of the final value at 30% of the Backup Time. It is activated after 30% of the exposure back-up time and after 10 ms of exposure, both conditions have to be fulfilled.

For a proper operation of the Rapid Termination feature, the operator must select an exposure back-up time higher or equal to 40 ms whenever the AEC is ON. Anyway, the back-up time must be selected according to the examination and patient, this exposure time is slightly higher than the worse case expected.

When AEC Rapid Termination is activated, Error Code “E070” is shown on the Service Console.

AEC Rapid Termination configuration



This section describes the adjustments needed to calibrate the AEC according to the customer input. Therefore, AEC exposures will be made during the calibration process in order to insure AEC functionality.

The Optical Density/Dose Level is controlled by the values stored in the generator memory. These values are influenced by film speed, screen speed, dark room procedures and customer requirements.

Use a homogeneous Phantom with enough density to produce an exposure of 100 ms. The AEC will be calibrated to produce a density of 1.0 (or the customer preference Optical Density/Dose Level):

- Filtration based on the RQA5 standard (21 mm Al) for the Collimator Filter Holder (recommended for AEC/ABC calibration).
- Copper Plates can be used Instead of Aluminum:
 - 2 units of 1 mm thickness, 1
 - unit of 0.5 mm thickness, 2
 - units of 0.2 mm thickness, 1
 - unit of 0.1 mm thickness.
- Acrylic Plastic Plates can be used Instead of Copper Plates:
 - 6 units of 5 cm. thickness,
 - 5 units of 1cm. thickness.

Note – *When using CR (Computed Radiography) or DR (Digital Radiography) calibrate the sensitivities used by the customer and instead of measuring Optical Density:*

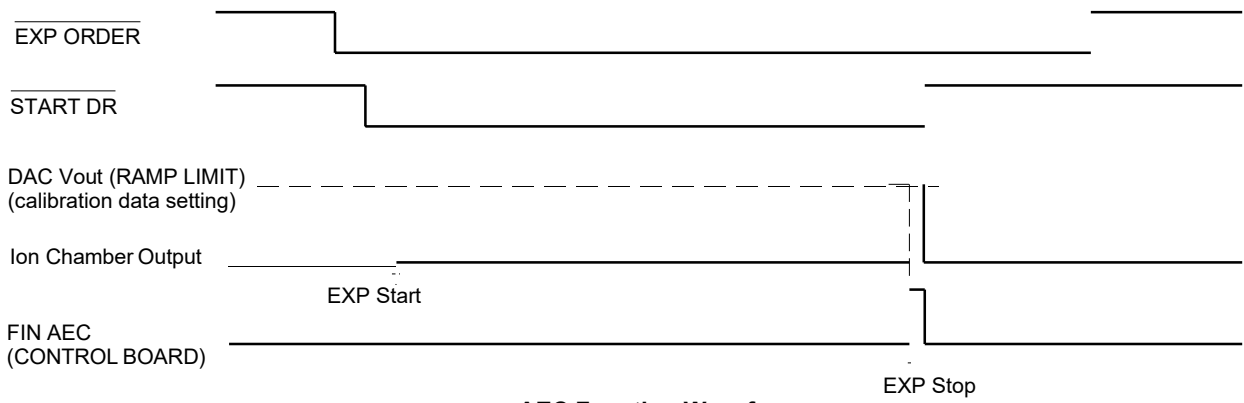
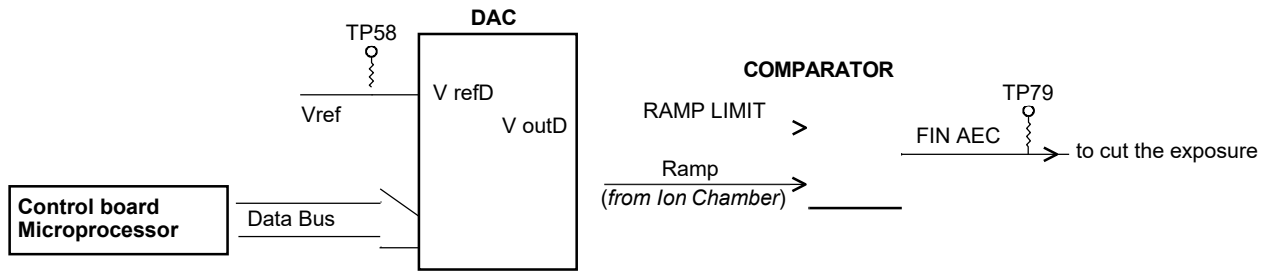
- measure the Image Gray level by using the needed software tools inside each application (refer to CR or DR documentation).

- or measure the Dose level:

- For CR, placing the Dosimeter as close as possible to the Cassette and centered with the Central Area of the Ion Chamber.

- For DR, placing the Dosimeter as close as possible to the Panel, centered with the Central Area of the Ion Chamber and with the Grid removed.

Automatic Exposure Control





1. Press the “Parameters Calibration” button on the SC menu and go to the AEC Calibration screen

AEC calibration screen

AEC (Ion Chamber 1)

Optical Density (OD * 100) AEC 1 Calibration Console

	SLOW	MEDIUM	FAST
DAC Value at 50 kVp	1,033	947	861
DAC Value at 60 kVp	916	850	784
DAC Value at 80 kVp	813	760	707
DAC Value at 100 kVp	725	680	635
DAC Value at 120 kVp	670	630	590
DAC Value at 130 kVp	617	580	543
	LEFT	CENTER	RIGHT
Equalization Value (mAs * 100)	250	250	250
Equalization Factor	1.00	1.00	1.00

2. Set the Master Gain potentiometer of the Ion Chamber or the Solid State Detector to mid range

Note – *This section describes the AEC calibration using the Service Console. AEC can be calibrated using the Ion Chamber potentiometers as well (refer to the Ion Chamber documentation).*

3. Set the SID at any Focal Distance from 1 to 2 meters (39 to 78 inches).
4. Collimate the X-ray beam so that it completely covers all three fields.
5. Add a filtration based on the RQA5 standard (21 mm Al) in the Collimator Filter Holder.

Note – *Make sure that the X-ray beam does not extend beyond the limits of the phantom if it is placed on the tabletop of the Table or on the Wall Stand front panel instead of being placed in the Collimator Filter Holder.*

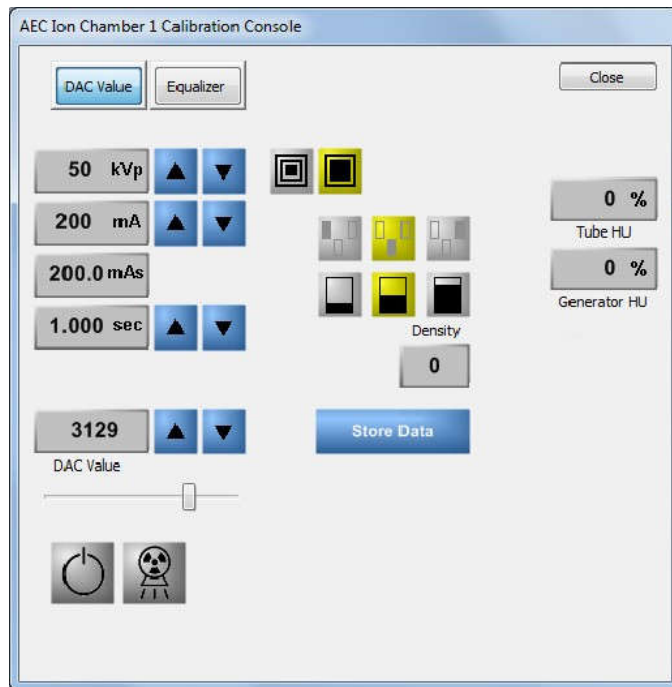
6. Set the Optical Density/Dose Level to the desired value in the "Optical Density (OD * 100)" field. A value of 100 is equal to an Optical Density/Dose Level of 1. Value can be set from 100 to 500.



7. Click on the "AEC 1 Calibration Console" button and select:

- RAD: 50 kV, 200 mA, Large Focal spot and 1 second back-up time.
- AEC: Select the Film/Screen combination to be calibrated. "Central Area" and "Density 0" are selected by default.

AEC calibration menu



8. For analog buckys:

- a. Make an exposure with film in the cassette (exposure time varies if film is removed) and make sure the exposure time is within 40 and 100 ms. Modify the mA selection as needed in case the time is out of this boundaries. Time will be increased when decreasing the mA selection and vice versa. Make as many exposures as needed using the same film to get the desired exposure time.
- b. Insert into the Bucky tray a cassette with the Film-Screen combination used by the customer. Make an exposure, develop the film and check the density, it should be approximately 0.8 to 1.2 (or the customer's density preference).

9. For Digital Detectors:

- a. Make an exposure with the previously selected values, as explained in step 7., and measure the Dose level.
- b. Increase the value in the "DAC Value" field in case it is needed to increase the density or decrease the value if the measured density is too high. Time must be always within 40 and 100 ms, modify the mA selection as needed in case the time is out of this boundaries. Time will be increased when decreasing the mA selection and vice versa.
- c. Repeat steps a. and b. as many times as needed to accurately calibrate the "DAC value" and click on the "Store data" button.
- d. Go to step 10.

10. Repeat the previous procedure for 60, 80, 100, 120 and 130 kVp.

Note – *Adjust the potentiometers of the Ion Chamber if unable to get an exposure time within 40 and 100 ms for every kVp station.*

11. Repeat the whole procedure for the remaining film/screen speed combinations.

EQUALIZATION

Note – Make sure to keep the same SID during the whole process and that the Exposure field covered by the X-ray beam remains constant.

Once the Central Area is calibrated, it is needed to calibrate the Left and Right Ion Chamber fields by adjusting the Equalization value. The equalization Factor remains constant for the Central Area and is automatically adjusted for the Left and Right Areas when modifying their respective Equalization value.



The equalization Factor for the Left, Center and Right areas must be set to 1.00 before starting this process.

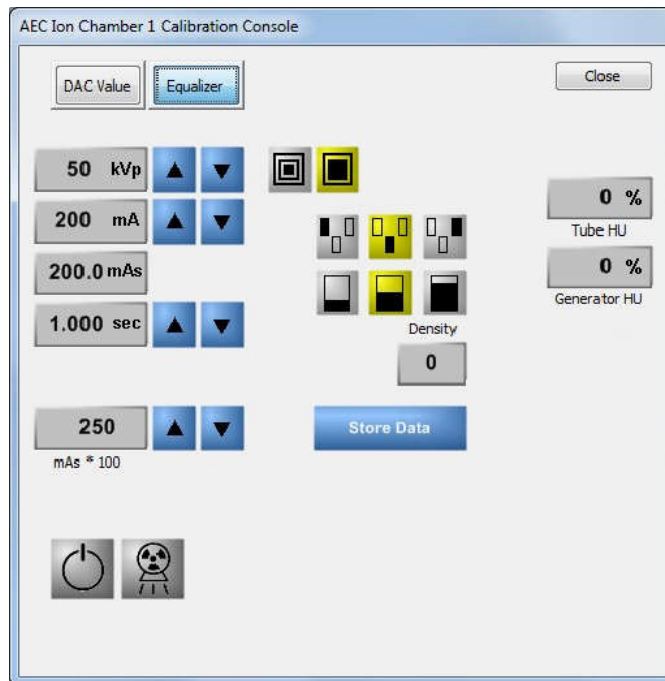
Equalization Factor before starting the Equalization procedure

	LEFT	CENTER	RIGHT
Equalization Value (mAs * 100)	250	250	250
Equalization Factor	1.00	1.00	1.00

Make sure this is set to 1.00 before starting the procedure

For the Left and Right Ion Chamber fields calibration, perform the following procedure:

1. Click on the “Equalizer” button in the “AEC 1 Calibration Console” screen.



2. Select 80 kVp and Central Area and make an exposure to get a mAs value close to 2.5.

Note – *It is recommended to make three exposures with the same parameters and calculate the average mAs value for a more accurate calibration.*

3. Enter the obtained mAs multiplied by 100 in the “mAs * 100” field (must be close to 2.5) and click on the “Store data” button.
4. Make the same exposure/s with the Left Area and, finally, with the Right Area selected, storing their respective mAs values after the exposures. The equalization factor is then automatically adjusted so the same mAs is obtained with every exposure, no matter which field or combination of fields is selected.
5. Click “Close” to exit the “AEC 1 Calibration Console”.

Equalization Value

	LEFT	CENTER	RIGHT
Equalization Value (mAs * 100)	210	230	220
Equalization Factor	0.91	1.00	0.96

The value is automatically adjusted after clicking “Store data”

6. Repeat the whole calibration and equalization procedures for AEC 2 if a second Ion Chamber is to be used, clicking on "AEC 2 Calibration Console".

4 REPLACE THE CONSOLES DEFAULT APR

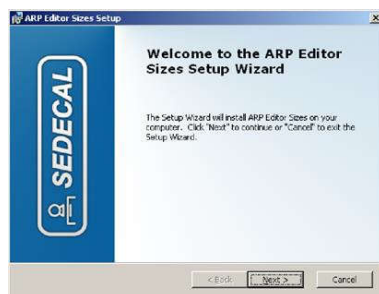
The default APR file should be replaced with the APR file provided by Summit.

Keep in mind additional modifications to the systems APR may be necessary dependent upon your installs configuration and equipment (AEC, buckys, available ma stations)

The Control Console is equipped with a communication port (serial) to allow the connection of an external PC with a female-female D-sub (9 pin) null modem cable.

4.1 INSTALLATION OF THE “APR EDITOR SIZES” PROGRAM

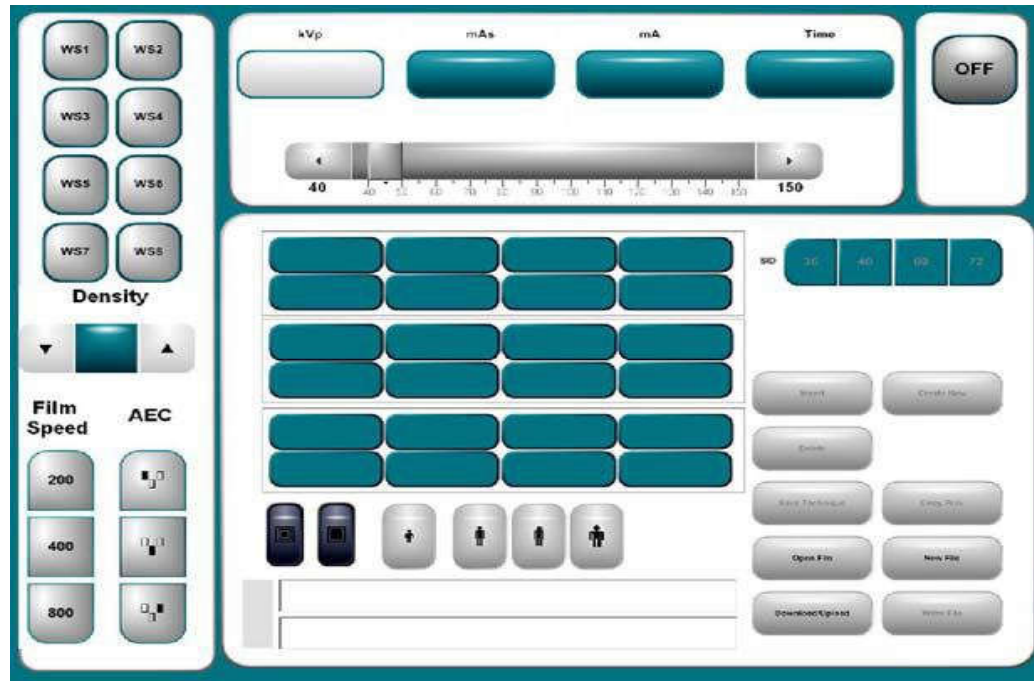
1. Plug the USB with the Software Service Tools of the Generator in the PC."
2. Click on the .exe file, APR Editor Sizes Setup, to run the installation program, select the installation language and click on “Accept”. Then, click on “Next”."
3. Install the program in the selected folder by default or click on “browse” to select a different folder and click on “Next”."



Click on Next



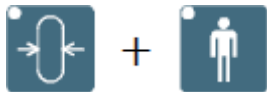
4. Click on “Install” to start the installation process."
5. Once the installation process has finished, click on “Finish”.
6. To run the program, click on “Start Menu\Programs\Sedecal\Service Tools\APR Editor Sizes” or on the desktop shortcut created during installation.



4.2 RECEIVING AN APR FILE FROM THE “CONTROL CONSOLE”

We recommend you create a backup copy of your systems default APR file before replacing it.

1. Interconnect PC and the Control Console with the female-female D-sub (9 pin) null modem cable (D-sub connector is located at the back of the Console)."
2. Run the program “APR Editor Sizes” in the PC, click on “Start Menu\ Programs\Sedecal\Service Tools\APR Editor Sizes” or on the desktop shortcut."
3. With the APR inactive, press “AEC Reset” + “Medium patient size” in the Control Console (APR Display shows the message “APR EDITION MODE”)."



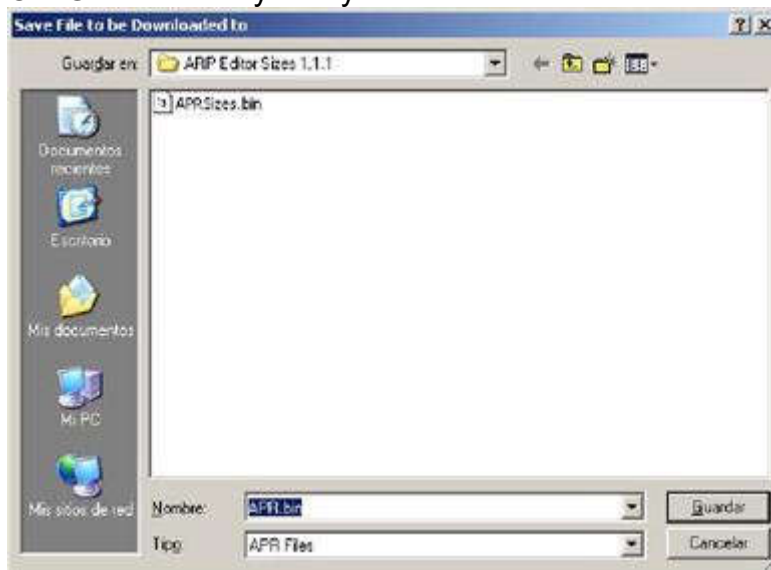
4. Open the APR editor and click on “Download/Upload” button on the APR PC Screen."



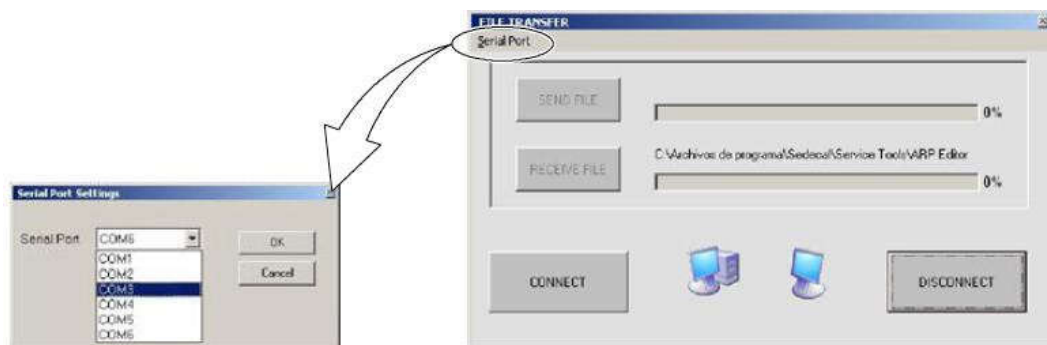
5. Click on "Download File".



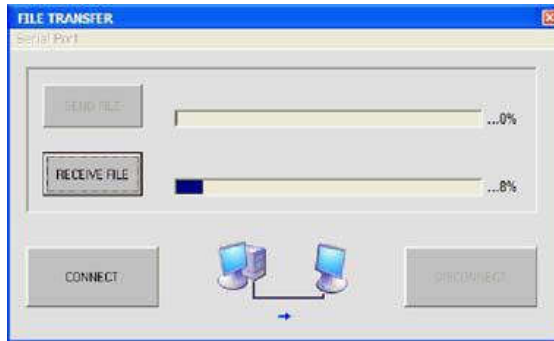
6. Select a folder and a new name (or existing name to be overwritten) for the APR file to be received in the PC and save it. We recommend "SHFR-ORIG" followed by today's date.



7. Check the communication serial port, by default "COM1". For that purpose, click on "Serial Port". If the Control Console is not connected to COM1 in the computer, select the corresponding serial port and press "OK".



- Click on “CONNECT” and then click on “RECEIVE FILE” button, now enabled.



The Control Console shows the message “PC CONNECTED” on the APR Display.

- Once the file transfer has finished, the PC screen requests an “OK” confirmation for “APR Received”.

4.3 SENDING AN APR FILE FROM THE “CONTROL CONSOLE”

- Interconnect PC and the Control Console with the female-female D-sub (9 pin) cable (D-sub connector is located at the back of the Console).
- Run the program “APR Editor Sizes” in the PC, click on “Start Menu\Programs\Sedecal\Service Tools\APR Editor Sizes” or on the desktop shortcut.
- With the APR inactive, press “AECReset” + “Medium patient size” in the Control Console (APR Display shows the message “APR EDITION MODE”).



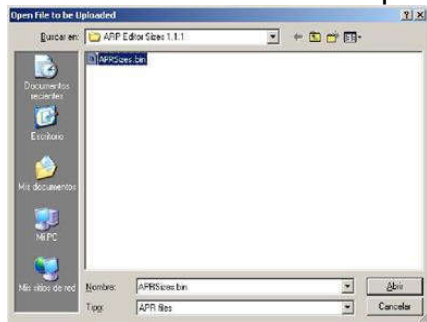
- Click on “Download/Upload” button on the APR PC Screen.



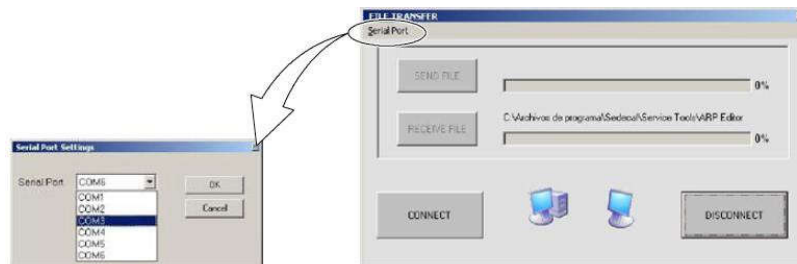
- Click on “Upload file”.



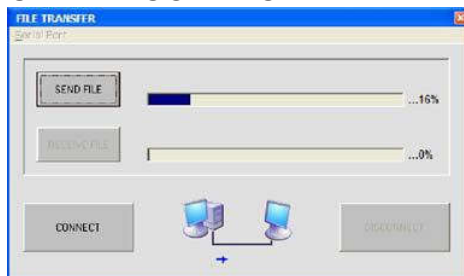
- Select the APR file to be uploaded in the Control Console.




- Check the communication serial port, by defect “COM1”. For that purpose, click on “Serial Port”. If the Control Console is not connected to COM1 in the computer, select the corresponding serial port and press “OK”.



- Click on “CONNECT” and then click on “SEND FILE” button, now enabled.



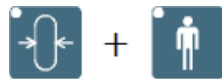
The Control Console shows the message “PC CONNECTED” on the APR Display.

Note  If the APR upload is canceled by closing the window, the Control Console is locked and shows the message “COMMUNICATION LOST”. It is needed to turn it off and on again.

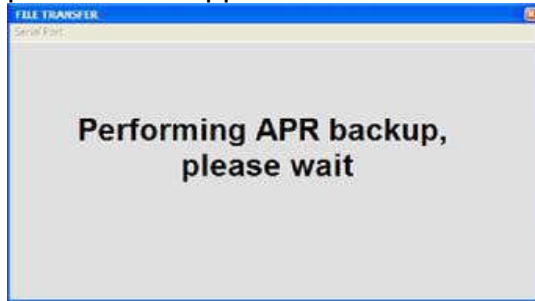
If the Generator is not ON or the Console is not on APR edit mode, the following message appears on the PC Screen.



Turn ON the Generator and/or press simultaneously “AEC Reset” + “Medium patient size” in the Control Console (the message “APR EDITION MODE” will be shown in the APR Display).

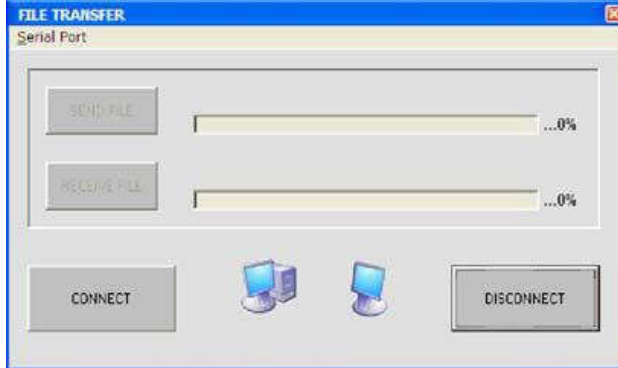


9. Once the file transfer has finished, the message “Performing APR backup, please wait” appears on the PC Screen.

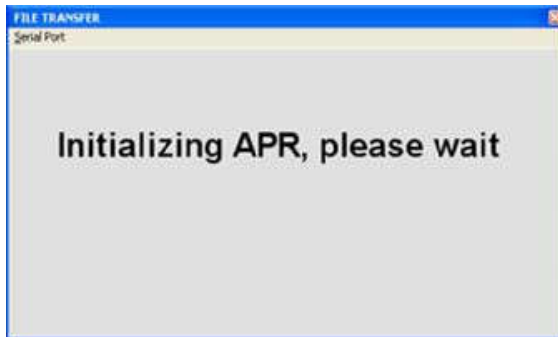


This is a safety feature that performs a Backup copy of the existing APR file in case the communication between the PC and the Console is interrupted during the Upload process.

10. Click on “DISCONNECT”.



11. Once the process is finished, the APR is automatically initialized on the Control Console while the PC shows the message “Initializing APR, please wait”.



12. Once the initializing process has finished, click on the top right window cross button. The Display on the Control Console shows the name of the uploaded APR.
13. Click on “OFF” button to exit the application.

