Installation

HF Series Generators
REVISION HISTORY

<table>
<thead>
<tr>
<th>REVISION</th>
<th>DATE</th>
<th>REASON FOR CHANGE</th>
</tr>
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<tr>
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<td>6</td>
<td>NOV 30, 2006</td>
<td>General improvements</td>
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This Document is the english original version, edited and supplied by the manufacturer.

The Revision state of this Document is indicated in the code number shown at the bottom of this page.

ADVISORY SYMBOLS

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

![DANGER!]

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

![WARNING]

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

![CAUTION]

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

*Note*  
*Alert readers to 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.*
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong> INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>1.1 Tools and Test Equipment</td>
<td>1</td>
</tr>
<tr>
<td>1.2 Pre-installation Check</td>
<td>2</td>
</tr>
<tr>
<td>1.3 General Cautions</td>
<td>3</td>
</tr>
<tr>
<td><strong>2</strong> UNPACKING, CABINET INSTALLATION AND POWER LINE CONNECTION</td>
<td>5</td>
</tr>
<tr>
<td>2.1 Compact Generators - Line Powered</td>
<td>5</td>
</tr>
<tr>
<td>2.2 Compact-ESM Generators - Battery Powered</td>
<td>18</td>
</tr>
<tr>
<td>2.3 Control Console Installation</td>
<td>25</td>
</tr>
<tr>
<td><strong>3</strong> CABLE CONNECTIONS</td>
<td>27</td>
</tr>
<tr>
<td>3.1 Cable Routing inside Generator Cabinet</td>
<td>27</td>
</tr>
<tr>
<td>3.1.1 General Cable Routing</td>
<td>27</td>
</tr>
<tr>
<td>3.1.2 Line Powered Generator with Optional Supports</td>
<td>30</td>
</tr>
<tr>
<td>3.2 High Voltage Cables Connection</td>
<td>32</td>
</tr>
<tr>
<td>3.2.1 High Voltage Cables</td>
<td>33</td>
</tr>
<tr>
<td>3.2.2 X-ray Tubes with Metallic Insert Envelope</td>
<td>33</td>
</tr>
<tr>
<td>3.3 X-ray Tube Connection</td>
<td>34</td>
</tr>
<tr>
<td>3.3.1 Stator Cable</td>
<td>34</td>
</tr>
<tr>
<td>3.3.2 Tube Selection Signals</td>
<td>37</td>
</tr>
<tr>
<td>3.4 Interconnection Cables</td>
<td>37</td>
</tr>
<tr>
<td>3.4.1 Serial Interconnection RS232 / RS422</td>
<td>38</td>
</tr>
<tr>
<td>3.4.2 Collimator Error Signal (Optional)</td>
<td>40</td>
</tr>
<tr>
<td>3.4.3 Door Interlock Signal</td>
<td>41</td>
</tr>
<tr>
<td>3.4.4 Warning Light Signal</td>
<td>41</td>
</tr>
<tr>
<td>3.4.5 Collimator Lamp and System Locks</td>
<td>41</td>
</tr>
<tr>
<td>3.4.6 Buckys</td>
<td>42</td>
</tr>
<tr>
<td>3.4.7 Tomo Device</td>
<td>43</td>
</tr>
<tr>
<td>3.4.8 Ion Chambers (Optional)</td>
<td>43</td>
</tr>
<tr>
<td>Section</td>
<td>Page</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>3.4.9 Photomultiplier (Optional)</td>
<td>47</td>
</tr>
<tr>
<td>3.4.10 RAD &amp; Fluoro Table (Spot Film Device)</td>
<td>48</td>
</tr>
<tr>
<td>3.4.11 Image System</td>
<td>50</td>
</tr>
<tr>
<td>3.4.12 Spare Signals on RF Adaptation Board</td>
<td>54</td>
</tr>
<tr>
<td>4 FINAL INSTALLATION AND CHECKS</td>
<td>55</td>
</tr>
<tr>
<td>4.1 HV Transformer</td>
<td>55</td>
</tr>
<tr>
<td>4.2 Cable Fastening and Covers</td>
<td>55</td>
</tr>
<tr>
<td>5 SYSTEM INTERCONNECTIONS</td>
<td>57</td>
</tr>
<tr>
<td>5.1 System Interconnection Signals</td>
<td>57</td>
</tr>
<tr>
<td>5.2 System Interconnection Maps</td>
<td>60</td>
</tr>
</tbody>
</table>
SECTION 1  INTRODUCTION

The Installation process depends on the Generator and System configuration. Installation must be performed in the order indicated along this document. Perform only the sections required to install this Generator.

1.1  TOOLS AND TEST EQUIPMENT

The following hand tools and products are required for the Installation:

- Standard service engineers tool kit.
- Electric drill motor and assorted bits.
- Silicone Insulating Grease (proofing compound).
- Alcohol cleaning agent.

The following test equipment is required for Configuration and Calibration:

- Digital Multimeter.
- Non-invasive kVp Meter.
- Digital mAs Meter.
- Calculator.

- Only for AEC purposes:
  - Sensitometer.
  - Densitometer.
  - Copper Plates for the Collimator Filter Holder (recommended for AEC / ABC calibration):
    - 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 1 cm. thickness.
1. Only for Tomo purposes:
   - Tomophantom tool.

2. Only for Fluoro purposes:
   - Dosimeter, with R/min and mR/min meters and/or mGy/min and μGy/min meters.
   - Imaging Test Phantom tool.
   - Copper Plates: 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.

1.2 PRE-INSTALLATION CHECK

Prior to beginning installation, it is recommended to inspect the site and verify that the X-ray room complies with Pre-installation requirements, such as:

- Incoming Line.
- Main Switch and Safety Devices.
- Conduits.
- Space Requirements.

(Refer to the “Pre-Installation” document.)
1.3 GENERAL CAUTIONS

**DANGER!**

MAKE SURE THAT THE MAIN STORAGE CAPACITORS OF THE HIGH VOLTAGE INVERTER DO NOT CONTAIN ANY RESIDUAL CHARGE. WAIT UNTIL THE LIGHT EMITTING DIODES ON THE CHARGE-DISCHARGE MONITOR BOARDS ARE OFF, APPROXIMATELY 3 MINUTES AFTER THE UNIT IS TURNED OFF.

**WARNING**

ALWAYS HAVE THE “IPM DRIVER BOARD” CONNECTED IN THE GENERATOR PREVIOUS TO MAINS POWER IS ACTIVATED IN IT. IF THE “IPM DRIVER BOARD” IS NOT CONNECTED, PERMANENT DAMAGE WILL OCCUR TO IGBTS.

**DANGER!**

TO AVOID ELECTRIC SHOCK, DO NOT TOUCH ANY HEATSINK OF THE CIRCUIT BOARDS EVEN THE GENERATOR IS TURNED OFF. PREVIOUS TO DISASSEMBLE ANY BOARD, REMOVE ALL CONNECTORS PLUGGED TO IT.

**DANGER!**

LINE POWERED GENERATOR:

THIS GENERATOR IS PERMANENTLY CONNECTED TO THE POWER LINE, AND POWERED ON UNLESS THE SAFETY SWITCH INSTALLED IN THE ROOM ELECTRICAL CABINET IS OFF. WHEN THE GENERATOR IS POWERED, THE NEON LAMP (GREEN) LOCATED ON THE TRANSFORMER 6T2 (GENERATOR CABINET) IS ON.

INTERNAL PARTS OF THE GENERATOR (ALL FUSES, LINE CONTACTOR (6K5), INPUT TRANSFORMER (6T2), ON/OFF RELAY (3K3) AND LF-RAC MODULE) ARE PERMANENTLY POWERED ON THROUGH POWER LINE ALTHOUGH THE CONTROL CONSOLE IS OFF. BE SURE THAT THE SAFETY SWITCH IS OFF BEFORE HANDLING ANY INTERNAL PART OF THE EQUIPMENT.
BATTERY POWERED GENERATOR: THIS GENERATOR IS PERMANENTLY CONNECTED TO THE POWER LINE THROUGH A LINE PLUG.

WHEN IT DOES NOT WORK WITH STAND-ALONE, IT IS POWERED ON UNLESS THE SAFETY SWITCH INSTALLED IN THE ROOM ELECTRICAL CABINET IS OFF. WHEN THE UNIT IS POWERED, THE NEON LAMP (GREEN) LOCATED ON THE TRANSFORMER 6T2 IS ON.

WHEN IT WORKS WITH OPTIONAL STAND-ALONE IT IS POWERED ON IN ALL SITUATIONS. WHEN THE UNIT IS TURNED ON, THE NEON LAMP (GREEN) LOCATED ON THE TRANSFORMER 6T2 IS ON.

KEEP THE PROTECTION COVERS IN PLACE ALL THE TIME, ONLY REMOVE THE COVERS TO PERFORM SERVICE OPERATIONS. INTERNAL PARTS (CONTACTOR 6K5, LINE FUSES, BATTERY CHARGER BOARD, LINE MONITOR BOARD, BATTERY MONITOR BOARD, ENERGY GUARD BOARD AND STAND-ALONE BOARD) ARE PERMANENTLY POWERED ON AND HAVE THE FULL VOLTAGE POTENTIAL OF THE BATTERIES (APPROX. 400 VDC) ALTHOUGH THE UNIT IS DISCONNECTED FROM THE LINE OR THE CONTROL CONSOLE IS OFF. USE CAUTION WHEN WORKING IN THIS AREA.
SECTION 2 UNPACKING, CABINET INSTALLATION AND POWER LINE CONNECTION

The Generator is shipped in one box to facilitate transport and installation.

Upon receipt of the X-ray unit and associated equipment, inspect all shipping containers for signs of damage. If damage is found, immediately notify the carrier or their respective agent.

2.1 COMPACT GENERATORS - LINE POWERED

1. Open the shipping box. Take out the Control Console, Interconnection Cables, Cabinet Cover and other furnished parts. Do not discard any packing material such as envelopes, boxes or bags until all parts are accounted for as listed on the packing list.

2. Remove the packing material from the pallet.

3. Remove the Generator Cabinet from the shipping pallet, placing it near its chosen room position. This operation requires at least two people.

4. When the equipment is unpacked, verify that all items on the customer order are present, and the hardware and internal wiring is secure.

5. Check the part numbers / serial numbers of each component with its identification labels, and inspect all pieces for visible damage. If any damaged parts are found, repair or order replacements to prevent unnecessary delay in installation.

Illustration 2-1
Compact Generators (two versions)
6. In some cases, due to transport safety requirements, the HV Transformer is shipped out of the Generator Cabinet. Install the HV Transformer inside the Cabinet (upper area) and secure it with the respective anchors or plates, then connect the following cables from the Power Module to the corresponding terminals on the HV Transformer:

- P2-Shield (2 thin wires), P1 and P3. Connect these cables to the stud-brass terminals using two wrenches to tighten the nuts (one to hold the base nut in place and the other to tighten the nut over the cable) and avoiding twisting the studs. Ensure that the connection is secure and properly tightened.
- Ground wire to Ground stud.
- Connector J1.

**WARNING**

THE HV TRANSFORMER HAS TO BE SECURED WITH ITS ANCHORS OR PLATES INSIDE THE CABINET. OTHERWISE P1, P2 AND P3 STUDS MAY BE IN CONTACT WITH THE CABINET FRAME AND PRODUCE A SHORT-CIRCUIT.

**Illustration 2-2**

Cable Connections to the HV Transformer

7. The Line Powered Generator Cabinet can be installed in one of the following ways:

- **Using the optional Wall Support only** *(for installation refer to step-8.)*
- **Using the optional Wall Support and Base Support** *(for installation refer to steps-9.)*
- Freestanding without supports *(for installation refer to steps-12.)*

**Note**

Optional Supports must be requested in the customer order.
8. **Installation of the Generator Cabinet using a Wall Support Only.**

An optional Wall Support can be provided to hang the Cabinet. The Wall Support must be securely installed on a resistant wall that can hold both the Generator and Cables (keep in mind their weights). *(Refer to the “Pre-Installation” document for more information.)*

a. Place the Wall Support against the wall and level it.

b. Mark the anchoring holes on the wall. Make sure that there is a sufficient number of anchoring points in order to firmly secure the Generator Cabinet to the wall (minimum 4 / 6 anchoring points).

**Illustration 2-3**
Installation of the Wall Support (optional)

![Wall Mounting Holes](image1)

![Wall Support](image2)

c. Secure the Support firmly to the wall.

d. Hang the Generator, at least two people are required.

e. Fix the two screws that join the rear side of the Cabinet to the Wall Support. Go to step-13.

**Illustration 2-4**
Installation of the Generator in the Wall Support (optional)

![Cable Entrance](image3)

![Hooks and Slots](image4)

![Joint points for Cabinet - Wall Support](image5)

![Wall Support](image6)

![Wall Mounting Holes](image7)
9. **Installation of the Generator Cabinet using a Wall Support and a Base Support.**

The Generator Cabinet can be assembled over a metallic Base Support (Cable Box) and a Wall Support at the rear side. The final assembly (Generator + Supports) can be hung on the wall *(refer to step 10.)* or left freestanding *(refer to step 11.)*.

*(Refer to the “Pre-Installation” document for more information.)*

**Illustration 2-5**
Compact Generator with optional Supports
10. **When hanging the Generator on the wall**, the Wall Support must be securely installed on a resistant wall that can hold the Generator with the Supports and Cables (keep in mind their weights). *(Refer to the “Pre-Installation” document for more information.)*
   
   a. Place the Wall Support against the wall and level it.
   
   b. Mark the anchoring holes on the wall. Make sure that there is a sufficient number of anchoring points in order to firmly secure the Generator Cabinet to the wall (minimum 4 / 6 anchoring points).

Illustration 2-6
Installation of the Wall Support (optional)

![Wall Mounting Holes](image1)

Wall Mounting Holes

Wall Support

c. Secure firmly the Support to the wall.

d. Hang the Generator, at least two people are required.

e. Fix the two screws that join the rear side of the Cabinet to the Wall Support.

Illustration 2-7
Installation of the Generator in the Wall Support (optional)

![Cable Entrance](image2)

Cable Entrance

Hooks and Slots

Joint points for Cabinet - Wall Support

Wall Support

Wall Mounting Holes
f. Remove the four Adjustable Leveling Legs from the base of the Generator Cabinet and re-install them in the Base Support.

g. Assemble the Base Support under the Generator Cabinet and secure it using four M6x20 screws (supplied). At least two people are required for this operation.

h. Go to step-13.

Illustration 2-8
Installation of the Base Support (optional)

11. When the Generator is freestanding, perform the following steps:

a. Remove the four Adjustable Leveling Legs from the Base of the Generator Cabinet and re-install them in the Base Support.

b. Place the Base Support near its chosen place in the room. Level the Base using the Adjustable Leveling Legs. Keep the Base at the maximum distance from the floor.

   Seismic areas and other conditions require the Generator to be secured to the floor. There are mounting holes on the bottom of the Base Support. Place the four spacers (provided) under the Base and secure them to the floor. Keep the four Leveling Legs at the same height as the spacers (refer to Illustration 2-9).

c. Assemble the Wall Support to the Base Support using two M6x20 screws (supplied). Place the Generator Cabinet over the Base Support and secure it using four M6x20 screws (supplied). At least two people are required for this operation. (refer to Illustration 2-9).

Illustration 2-9
Installation of the Generator over the Base Support (optional)
12. **Installation of the Generator Cabinet Freestanding.**

Usually, the Generator Cabinet is freestanding. Place the Cabinet near its chosen place in the room. Level it using the Adjustable Leveling Legs at the bottom of the Cabinet. Keep the Base at the maximum distance from the floor.

Seismic areas and other conditions require the Generator to be secured to the floor. There are mounting holes on the bottom of the Cabinet. Keep the four Leveling Legs at the same height (refer to Illustration 2-10).

**Illustration 2-10**
Adjustable Leveling Legs

13. Leave a sufficient working area around the equipment that will permit unhindered movements until its final assembly.

**POWER LINE CONNECTION**

*KEEP IN MIND THE GENERAL CAUTIONS FOR LINE POWERED GENERATORS INDICATED IN SECTION 1.3.*

*DO NOT POWER ON THE GENERATOR UNTIL SPECIFICALLY INSTRUCTED IN THIS SERVICE MANUAL.*

14. Verify that the power supply line is "OFF" in the Room Electrical Cabinet. Verify that the power line to the Generator is cut when the Emergency Switch(es) is(are) activated.

15. The power supply line should conform with the Generator model defined in the “Pre-Installation” document. Wire sizes indicated in this document are relative to the power supply line and wire length. Verify that the power line voltage and phase of the Generator coincides with the one for Room Electrical Cabinet.

**Note**

As indicated in the Pre-Installation document, 16 mm² (AWG 6) may be used from the Room Electrical Cabinet to the Generator Cabinet provided that the length does not exceed 6 m (20 ft).
16. Cut the cables to the appropriate length and remove insulation from both ends of the power and ground wires. Connect them to the respective terminals in the Room Electrical Cabinet.

17. Route the Power Line Cables to the Ground Terminal and Input Line Fuses. These cables can be secured to the Fastening Bar of the Cabinet and routed internally along the rear side of the Cabinet; or they can be routed through the Round Cable Outlet on the Rear Cover of the Cabinet (always apply Local Codes for cable routing). *(Refer to Illustration 2-11.)*

**Illustration 2-11**

*Cable Routing in the Line Powered Generator*
18. For Single Phase Generators, connect the Power wires L1 and N (L2) to the Fuse Holders of F3 and F4 (right side of the Cabinet), and the Ground wire to the Ground stud in the Cabinet Frame (above these fuses or close to the right side of the HV Transformer).

**WARNING**
SINGLE PHASE GENERATORS ARE FACTORY DELIVERED TO OPERATE ON PHASE AND NEUTRAL. IN CASE OF CONNECTING THE EQUIPMENT TO A TWO-PHASE LINE, REPLACE THE NEUTRAL CARTRIDGE WITH THE FUSE SUPPLIED WITH THE GENERATOR.

19. For Three Phase Generators, connect the Power wires L1, L2 and L3 to the Fuse Holders of F3, F4 and F5 (right side of the Cabinet), and the Ground wire to the Ground Studs in the Cabinet Frame (located above these fuses or close to the right side of the HV Transformer).

Three Phase Generators do not need Neutral (N) wire connection from the Line. If the unit is provided with the optional Fuse Module, connect the Neutral (N) wire from the Line to the Neutral Stud below F3 Fuse Holder.

**Illustration 2-12**
Power Line connections
For 80 kW Generators, the power supply line must be 480 VAC (or 530 VAC). If the Generator is supplied with an external step-up autotransformer, it will include the cables to connect the autotransformer to the Generator Cabinet. Power line should be connected to the autotransformer terminals according to the line.

**SEP-UP TRANSFORMER**

Input: 380 VAC / 400 VAC / 415 VAC, Three-Phase.

Output: 480 VAC / 530 VAC, Three-Phase.

Max Power Output: 80 kW, 10% duty cycle (approx. 5 seconds / minute)

Rising Temperature: 40°C

20. The whole System (Tables, Spot Film Devices, etc.) can be switched ON/OFF when the Generator is switched ON/OFF. For this, power the System through the output terminals of the Line Contactor 6K5 (upper contactor close to the Input Transformer). These terminals are located underneath the Line Contactor 6K5.

**Illustration 2-13**

Line Contactor 6K5  (two versions)
21. Three-Phase Generators can be provided with an optional Fuse Module mounted on Module-12, for switching ON/OFF the whole system when the Generator is turned ON/OFF.

For this, connect the Neutral (N) wire from the Line to the Neutral Stud below F3 Fuse Holder. Power the System through the Output Terminals 12TS4 (U, V, W, N, GND) close to Fuses F14, F15, F16.

**Illustration 2-14**

Power Line connections in the optional Fuse Module
22. According to the **nominal voltage** of the line, verify or connect the wire "\(\star\)" to the indicated terminal (TB) of Transformer 6T2. This wire is factory connected to 230 VAC (for 1-Phase), 400 VAC (for 3-Phase) or 480 VAC / 530 VAC (for 80 kW 3-Phase Generators). *(Refer to Schematic 543020XX).*

**Note**
For 220 VAC power line, connect the wire "\(\star\)" to the 230 VAC terminals. For 380 VAC power line, connect the wire "\(\star\)" to the 400 VAC terminals.

Illustration 2-15
Connections on Transformer 6T2

23. After connecting the Power Line Cables, secure them to the Fastening Bar using cable ties if they are routed over the Fastening Bar, or using a suitable clamp if they are routed through the Round Cable Outlet on the Rear Cover of the Cabinet (always apply Local Codes).

24. Install the Control Console as indicated in Section 2.3.
2.2 COMPACT-ESM GENERATORS - BATTERY POWERED

1. Open the shipping box, unpack the Control Console, Interconnection Cables, Cabinet Cover and other furnished parts. Do not discard any packing material such as envelopes, boxes, bags until all parts are accounted for as listed on the packing list.

2. Remove the packing material from the pallet. One of the laterals is adapted to be used as a ramp for unpacking the Generator.

Illustration 2-16
Compact-ESM Generator (unit with batteries)
3. Remove both lateral anchoring plates of the Generator Cabinet. Assemble the ramp to the pallet base. Move the Generator from the shipping pallet and place it near its site in the room. At least two people are required for this operation.

**WARNING**

THIS GENERATOR IS VERY HEAVY BECAUSE IT IS SHIPPED WITH THE BATTERIES INSTALLED. AT LEAST TWO PEOPLE ARE REQUIRED TO REMOVE THE UNIT FROM THE PALLET. THE EQUIPMENT IS SHIPPED WITH THE BATTERIES CHARGED (APPROX. 400 VDC). CAREFULLY HANDLE THE UNIT DURING ITS UNPACKING AND INSTALLATION.

SOME CONNECTORS ARE UNPLUGGED FOR TRANSPORT, DO NOT PLUG IN THEM UNTIL SPECIFICALLY INSTRUCTED TO DO SO IN THIS DOCUMENT.

4. When the equipment is unpacked, verify that all items in the customer order are present, and the hardware and internal wiring is secure.

5. Check the part numbers / serial numbers of each component with its identification labels and inspect all pieces for visible damage. If any damaged parts are found, repair or order replacements to prevent unnecessary delay in installation.

6. The Generator Cabinet usually is freestanding. Seismic areas and other conditions require the Generator to be secured to the floor by anchoring plates fixed to both lateral sides of the Cabinet.

7. Leave a sufficient working area around the equipment that will permit unhindered movements until its final assembly.

**Illustration 2-17**

Anchoring Plates for the Battery Powered Generator
POWER LINE CONNECTION

**KEEP IN MIND THE GENERAL CAUTIONS FOR BATTERY POWERED GENERATORS INDICATED IN SECTION 1.3.**

**DO NOT PLUG THE UNIT INTO THE MAINS SOCKET OR POWER ON THE GENERATOR UNTIL SPECIFICALLY INSTRUCTED TO DO SO IN THIS SERVICE MANUAL.**

8. Before connecting the cables, ensure that the power line to the Generator is cut when the Emergency Switch(es) is(are) activated.

9. Measure the line voltage at the wall socket. The power supply line should be according to the “Pre-Installation” document.

10. Obtain a suitable line cord with line plug to conform to local codes and requirements.

11. Cut the line cord to the appropriate length. Fasten and route the cable over the top bar of the frame as shown in the Illustration 2-18, using cable ties (tie-wraps) in the holes provided. The cables should be routed through the cable entrance of the Front Panel of Module-1 before connecting the cable to the Terminals in 1TB-1 at the Front Panel. (Refer to Illustration 2-18.)

12. The Terminal Block 1TB1 is also provided with connections:
   - to supply power to a Table or another device (1TB1-Table), so the whole system (Tables, etc.) can be switched ON/OFF when the Generator is switched ON/OFF. (Refer to Schematics 543020XX).
   - to install an optional Emergency Stop Button for isolating the Batteries and Power Line of the Generator. In this case, remove the jumpers installed in the Terminals of 1TB1 (8–9, 7–10, 11–12) and connect the Emergency Stop Button as indicated in Schematics 543020XX.

   The minimum specification for this installation should be:
   - Cable: 2.5 mm² (AWG 14), 600 V.

13. Connections of power supply must be made as indicated below:

<table>
<thead>
<tr>
<th>LINE VOLTAGE</th>
<th>TABLE SUPPLY (WHOLE SYSTEM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1TB1-1</td>
<td>1TB1-2</td>
</tr>
<tr>
<td>Phase</td>
<td>Neutral</td>
</tr>
<tr>
<td>1TB1-3</td>
<td>1TB1-4</td>
</tr>
<tr>
<td>GND</td>
<td>Phase</td>
</tr>
<tr>
<td>1TB1-5</td>
<td>1TB1-6</td>
</tr>
<tr>
<td>Neutral</td>
<td>GND</td>
</tr>
</tbody>
</table>

14. Install the line plug to the other end of the cord.
Illustration 2-18
Cable Routing in the Battery Powered Generator
15. The equipment is factory set for a 230 VAC input line. Connect cable “×” to Transformer 2T1 (close to Battery Charger Board) according to the nominal voltage of the Line.

Set Jumper in SW1 of Line Monitor Board and connect cable “×” in Transformer 6T2 (right side of Cabinet), as indicated below.

<table>
<thead>
<tr>
<th>Power Supply Line (Nominal Voltage)</th>
<th>Stand-Alone Option</th>
<th>110 VAC</th>
<th>208 VAC</th>
<th>230 VAC (or 220 VAC)</th>
<th>240 VAC</th>
</tr>
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<tbody>
<tr>
<td>Cable-× in Transformer 6T2</td>
<td>TB-3 or TB-8</td>
<td>TB-3 or TB-8</td>
<td>TB-21</td>
<td>TB-4 or TB-5</td>
<td>TB-6 or TB-7</td>
</tr>
<tr>
<td>Jumper in SW1 Line Monitor</td>
<td>Set according to Power Supply Line</td>
<td>SW1-5 with SW1-4</td>
<td>SW1-5 with SW1-3</td>
<td>SW1-5 with SW1-2</td>
<td>SW1-5 with SW1-1</td>
</tr>
</tbody>
</table>

Illustration 2-19
Connections according to Nominal Voltage
16. **For safety purpose,** the following connectors are unplugged during shipping:

- Remove the Protective Cover of the Battery Charger Board and carefully plug Connector J1 into the Battery Charger Board. Re-install the Protective Cover.
- Carefully plug the Anderson Connector 6J10 at the right side of the Cabinet.

**WARNING**

WHEN THESE CONNECTORS ARE PLUGGED, FULL BATTERY VOLTAGE IS PRESENT ON THE TERMINALS OF CONTACTOR 6K5 AND ON THE BATTERY CHARGER BOARD, REGARDLESS OF WHETHER THE LINE PLUG IS CONNECTED OR NOT. WHEN THE LINE PLUG IS CONNECTED, THE BATTERIES ARE SUBJECT TO VOLTAGES PRODUCED BY THE CHARGER BOARD.

Illustration 2-20
Connections of J1 on Battery Charger and Anderson 6J10
17. With Cabinet Cover close to the Cabinet, connect the “Line” and “Battery” lamp wires from the Cabinet cover to the respective Molex connectors on the top of the Cabinet (remove the wire tie-wrap).

18. Plug the Generator to the line socket and turn ON the Circuit Breaker. Visually check that:

- “Line” and “Batteries” Lamps (on the Cabinet cover) are lit.
- LED “CHECK” (yellow) is flashing on the Line Monitor Board (2A3). The MAX and MIN LEDs (red) on the Line Monitor Board should be off.

Perform the **Line Monitor Board Adjustment**:
- Note the Nominal Line Voltage configured with SW1 at the Line Monitor Board.
- Measure and note the Power Line Voltage with a Digitalmeter in the mains socket.
- Adjust VDC on TP2 (positive) and TP1 (negative) with POT1 at the Line Monitor Board as per the following formula:

\[
\frac{V_{\text{mains}}}{V_{\text{nominal}}} \times 2.5 = V_{\text{TP2}}
\]

**Example:**
\[
\frac{V_{\text{mains}}}{V_{\text{nominal}}} = \frac{220\text{V}}{230\text{V}} \times 2.5 = V_{\text{TP2}}(2.4\text{VDC})
\]

- All of the green LEDs and LED DS1 are lit on the Battery Charger Board.
19. Turn Off the Circuit Breaker and unplug the Generator from the mains socket. Observe the “Line” Lamp is switch off.

20. Install the Control Console as indicated in Section 2.3.

2.3 CONTROL CONSOLE INSTALLATION

1. Control Console can be freestanding, wall supported or mounted on an optional Pedestal. Console is provided with several mounting holes on the bottom for anchoring to the Pedestal or another support.

   Console CPU Boards and AEC Control Board can be located inside the Console (standard) or inside the Generator Cabinet (for Serial communication).

2. When a Pedestal is used, secure the Pedestal to the floor through the anchoring holes on its base and place the base cover. Attach the Console to the Pedestal using the mounting holes on the bottom of the Console.

3. When the Console is wall supported, secure the support to the wall and attach the Console to the support using the mounting holes on the bottom of the Console.

4. Leave a sufficient working area around the equipment until its final assembly.
SECTION 3  CABLE CONNECTIONS

This section provides the information necessary to connect the Generator Cables with the system and options.

Note  For more information about electrical requirements and cable connections, refer to the “Pre-Installation” document and Section 5 “System Interconnections” at the end of this document.

Note  Identification of some terminal connections (TB, TS), boards, etc... along with this document (text and schematics) may have a prefix number which indicates the module number in the equipment. (a.e. TS2 as 4TS2, 10TS2 or 11TS2).

Some safety devices such as the Safety Switch / Emergency Switch, Warning Light, and Door Interlock Switch are supplied and installed by the customer. Verify that safety devices have been properly installed and routed during the Pre-Installation procedure.

3.1  CABLE ROUTING INSIDE GENERATOR CABINET

3.1.1  GENERAL CABLE ROUTING

1. Before connecting the Interconnection cables within the Generator Cabinet, cables must be first connected to each Device (Tables, Buckys, etc.) and routed through the raceways. Remove the ferrite blocks of the cables (factory clamped) when it is required to carry out a correct routing, then re-install the ferrite blocks where they originally were around cables.

2. Inside the Generator Cabinet, all Interconnection cables must be routed over the Fastening Bar (upper rear bar) of the Cabinet Frame minding the upper Cable Outlet at the rear side of the Cabinet Cover.  (Refer to Illustration 3-1).
Illustration 3-1
Cable Routing in Compact Generator

- Fastening Bar
- Stator & Interconnections Cables Outlet (rear side)
- Power Line Cables
- HV Cables
- Stator & Interconnections Cables
- Input Transformer
- Ground Terminals
- Input Line Fuses
- Power Line Cable Entrance
- Stator & Interconnections Cable Entrance
3. For Generators with a Low Speed Starter located behind the Front Panel (Module 4), Stator and Interconnections Cables have to be routed internally through the Cabinet close to the Input Transformer.

4. For Generators with the Low or High Speed Starter located on a shelf (Module 10 or 11), Stator and Interconnections Cables have to be routed internally through the Cabinet close to the HV Transformer.

In order to avoid signal interferences, it is strongly recommended to fold and fasten close to the Generator Cabinet the portion of cables not routed (see picture below). Never wrap in circles.

5. Connect all cables as indicated in Section 3 “Cable Connections”.

6. Secure all cables to the Fastening Bar using cable ties after all cable / wire connections are complete.
3.1.2 LINE POWERED GENERATOR WITH OPTIONAL SUPPORTS

1. Before connecting the Interconnection cables within the Generator Cabinet, cables must be first connected to each Device (Tables, Buckys, etc.) and routed through the raceways. Remove the ferrite blocks of the cables (factory clamped) when it is required to carry out a correct routing, then re-install the ferrite blocks where they originally were around cables.

2. Cables can enter into the Generator through the Cable Outlet on the upper side of the Wall Support or through the Cable Outlet at the rear side of the Base Support (according to the raceway position in the room and Local Codes). The non used Cable Outlet has to be closed with the cover supplied. (Refer to Illustration 3-2).

3. Route each cable through the Base Support and take out each one to fold and fasten individually the remaining portion of cable that is not used for Generator connections. Then, route the other end of the cable through both Supports. (Refer to Illustration 3-2).

4. Inside the Generator Cabinet, all Interconnection cables must be routed over the Fastening Bar (upper rear bar) of the Cabinet Frame minding the upper Cable Outlet at the rear side of the Cabinet Cover. (Refer to Illustration 3-1).

5. For Generators with a Low Speed Starter located behind the Front Panel (Module 4), Stator and Interconnections Cables have to be routed internally through the Cabinet close to the Input Transformer.

6. For Generators with the Low or High Speed Starter located on a shelf (Module 10 or 11), Stator and Interconnections Cables have to be routed internally through the Cabinet close to the HV Transformer.

7. All the folded cables should be put into the Base Support. Install the Front Cover of the Base Support.

**CAUTION**

In order to avoid signal interferences, it is strongly recommended to fold and fasten the remaining portion of cables as indicated in Illustration 3-2, before putting them inside the Base Support. Never wrap them in circles.

8. Connect all cables as indicated in Section 3 “Cable Connections”.

9. Secure all cables to the Fastening Bar using cable ties after all cable / wire connections are complete.
Illustration 3-2
Cable Routing and Outlets

- Fastening Bar
- Upper Cables Outlet
- Wall Support
- Cabinet Frame
- Generator Cover

INTERNAL CABLE ROUTING
FROM UPPER CABLES OUTLET

Tie-wraps
Base Support

INTERNAL CABLE ROUTING
FROM LOWER CABLES OUTLET

Cables Outlet (rear side of Cabinet Cover)

Cables Routing from Cabinet to Base Support (rear view)

Cables Entrance (upper side of Wall Support)
3.2 HIGH VOLTAGE CABLES CONNECTION

FOR GENERATORS WITH A HV TRANSFORMER WITH X-RAY TUBE RECEPTACLES (ANODE / CATHODE) FOR ONLY ONE X-RAY TUBE CONNECTION AND WHEN THIS TUBE IS BEING USED FOR "FLUOROSCOPY / SPOT FILM": CONNECTIONS OF THE FILAMENT LEADS “FIL-1 RTN” (J4-15) AND “FIL-2 RTN” (J4-16) ON THE INTERFACE CONTROL BOARD HAVE BEEN INVERTED, AND THE “HT INL” (J3-13) IS DISCONNECTED AND INSULATED IN THE CABINET. THESE CONNECTIONS ARE FACTORY SET. (REFER TO SCHEMATIC 543020XX).

FOR GENERATORS WITH A HV TRANSFORMER WITH DOUBLE X-RAY TUBE RECEPTACLES (ANODE / CATHODE TO CONNECT TWO TUBES) AND WHEN ONE OF THE X-RAY TUBES IS BEING USED FOR “FLUOROSCOPY / SPOT FILM”, THIS TUBE MUST ALWAYS BE CONNECTED TO THE TUBE-2 RECEPTACLES.

FOR GENERATORS WITH A HV TRANSFORMER WITH DOUBLE X-RAY TUBE RECEPTACLES (ANODE / CATHODE TO CONNECT TWO TUBES): CONNECTIONS OF THE FILAMENT LEADS “FIL-1 RTN” (J4-15) AND “FIL-2 RTN” (J4-16) ON THE INTERFACE CONTROL BOARD HAVE BEEN INVERTED. THESE CONNECTIONS ARE FACTORY SET. (REFER TO SCHEMATIC 543020XX).
3.2.1 HIGH VOLTAGE CABLES

*CAUTION*  
The Terminal Pins of the High Voltage cables are extremely delicate and easily damaged. They therefore must be handled carefully. Make sure that they are straight and that the splits in the pins are open (parallel to sides).

Anode and Cathode cables are furnished according to the room layout (length of the cables).

1. Assemble the mounting accessories of each Termination Plug following the Cable manufacturer’s instructions.

*CAUTION*  
Do not install the Silicone washer supplied with the HV Cables.

2. Prepare the High Voltage terminals that will be installed in the X-ray Tube(s) receptacles. Apply Silicone Paste over the entire surface of the Plug including the Pins.

3. Carefully connect the Anode and Cathode cables from the HV Transformer to the respective X-ray Tube(s) receptacles. Ensure that all connections are made correctly, maintaining correct Anode and Cathode orientation. Tighten the cable nuts securely.

4. Put approximately 1 cm (0.5") of HV Oil in the HV Transformer receptacles.

5. Carefully connect the Anode and Cathode cables from the X-ray Tube(s) to the respective HV Transformer receptacles. Ensure that all connections are made correctly, maintaining correct Anode and Cathode orientation. Tighten the cable nuts securely.

3.2.2 X-RAY TUBES WITH METALLIC INSERT ENVELOPE

In case of X-ray Tubes with a Metallic Insert Envelope, it is required to connect the wire from the Metallic Insert Envelope to the Black Banana Plug connection on the HV Transformer to obtain a correct mA measures. For these X-ray Tubes the part number of the HV Transformer has to be coded in revision A or higher (a.e. A6094-16A). *(Refer to Section 5.2 - Map 54302035).*
3.3 X-RAY TUBE CONNECTION

3.3.1 STATOR CABLE

X-ray Tubes are equipped with the Stator cable installed.

Note For Generators with a “Single X-ray Tube for Fluoroscopy / Spot Film”, connect the Stator wires as indicated for Tube-2, except for Generators with the Low Speed Starter LF-RAC located behind the Front Panel (module-4), in this case connect wires as Tube-1.

A LV-DRAC (Low Voltage - Digital Rotatory Anode Controller) is required for High Speed X-ray Tubes. Connections between LV-DRAC and Power Module are factory made.

Route the Stator cable together with the HV cables to the Generator Cabinet. Connect the Stator cable terminals to the indicated Terminal Block TS2:

<table>
<thead>
<tr>
<th>STATOR WIRES</th>
<th>TERMINAL TS2</th>
</tr>
</thead>
<tbody>
<tr>
<td>TUBE-1</td>
<td>TUBE-2</td>
</tr>
<tr>
<td>MAIN</td>
<td>TS2-1</td>
</tr>
<tr>
<td>AUX (Shift)</td>
<td>TS2-2</td>
</tr>
<tr>
<td>COMMON</td>
<td>TS2-3</td>
</tr>
</tbody>
</table>

Note Terminal Block TS2 may be marked as 4TS2, 10TS2 or 11TS2 depending on the Generator model.

Note For Philips or Siemens X-ray Tubes refer to Interconnection Maps I/F-021 or I/F-024.

MAKE SURE THAT STATOR WIRES ARE PROPERLY CONNECTED. BEFORE MAKING ANY EXPOSURE, CHECK THAT THE ANODE ROTATES CORRECTLY.

IN GENERATORS EQUIPPED WITH LV-DRAC: THE LV-DRAC OUTPUT CAN BE AS HIGH AS 1000 Vrms. FOR SAFETY REASONS (TO AVOID ELECTRIC SHOCKS), THE STATOR CABLE MUST BE SHIELDED AND BOTH ENDS OF THE SHIELD MUST BE CONNECTED TO GROUND.

DUE TO ELECTROMAGNETIC INTERFERENCE (EMC) PROBLEMS, THE IGBT’s HEATSINK IS NOT GROUNDED. IT IS CONNECTED TO THE NEGATIVE TERMINAL OF THE INPUT RECTIFIER. TO AVOID ELECTRIC SHOCK, BE SURE THAT THE INPUT LINE IS DISCONNECTED AND THE CAPACITOR BANK IS PROPERLY DISCHARGED BEFORE MANIPULATING THE LV-DRAC.
FANS

Wires from fans should be routed with the Stator Cables, and connected to the indicated terminal of the Generator Cabinet. Depending on the model of X-ray Tube, the fans are powered at 115 VAC or 220 VAC. Make the following connections to select the fan voltage.

For Compact Generators (for only one LS Tube) with the Low Speed Starter LF-RAC located behind the Front Panel (module-4), connect wires from fans to:

<table>
<thead>
<tr>
<th>0 VAC</th>
<th>115 VAC</th>
<th>220 VAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>3TS1-3 or 3TS1-10</td>
<td>3TS1-27</td>
<td>3TS1-26</td>
</tr>
</tbody>
</table>

For Compact Generators (for one or two LS Tubes) with the Low Speed Starter LF-RAC located on a shelf at the bottom of the Generator (module-10), connect wires from fans to:

<table>
<thead>
<tr>
<th>TUBE CONNECTION</th>
<th>GENERATOR WITH LOW SPEED STARTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS TUBE-1</td>
<td>WIRES FROM FANS</td>
</tr>
<tr>
<td>10TS2-6 and 10TS2-7 on the Generator Cabinet</td>
<td>TB4-T1 with TB1-22 or TB1-23 on the LF-RAC Board</td>
</tr>
<tr>
<td>AS TUBE-2</td>
<td>10TS2-14 and 10TS2-15 on the Generator Cabinet</td>
</tr>
</tbody>
</table>

Note: For Generators with a “Single X-ray Tube for Fluoroscopy / Spot Film” connect the Fan wires as indicated for Tube-2.

For Generators with a “Single X-ray Tube for Fluoroscopy / Spot Film” connect the Fan wires as indicated for Tube-2.

For Compact Generators (for one or two HS Tubes) with the High Speed Starter LV-DRAC located on a shelf at the bottom of the Generator (module-11), connect wires from fans to:

<table>
<thead>
<tr>
<th>TUBE CONNECTION</th>
<th>GENERATOR WITH HV TRANSFORMER AND HIGH SPEED STARTER FOR ONLY ONE X-RAY TUBE</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS TUBE-1</td>
<td>WIRES TO FANS</td>
</tr>
<tr>
<td>11TS2-6 and 11TS2-7 on the LV-DRAC Module</td>
<td>Jump 11TS2-6 with 11TS2-17 on the LV-DRAC Module</td>
</tr>
<tr>
<td>AS TUBE-2</td>
<td>11TS2-14 and 11TS2-15 on the LV-DRAC Module</td>
</tr>
</tbody>
</table>

Note: For Generators with a “Single X-ray Tube for Fluoroscopy / Spot Film” connect the Fan wires as indicated for Tube-2.

<table>
<thead>
<tr>
<th>TUBE CONNECTION</th>
<th>GENERATOR WITH HV TRANSFORMER AND HIGH SPEED STARTER FOR TWO X-RAY TUBES</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS TUBE-1</td>
<td>WIRES TO FANS</td>
</tr>
<tr>
<td>11TS2-6 and 11TS2-7 on the LV-DRAC Module</td>
<td>wire marked “T1” with 11TS2-17 on the LV-DRAC Module</td>
</tr>
<tr>
<td>AS TUBE-2</td>
<td>11TS2-14 and 11TS2-15 on the LV-DRAC Module</td>
</tr>
</tbody>
</table>

Note: For Generators with a “Single X-ray Tube for Fluoroscopy / Spot Film” connect the Fan wires as indicated for Tube-2.
THERMOSTAT OR PRESSURE SWITCH SIGNAL

If the X-ray Tube is provided with a Safety Thermostat (approx. 65°C) or Pressure Switch (must be NC Contact), the two wires should be routed to the Terminal Block TS2 in the Generator Cabinet and connected to the following Terminals.

In case that the X-ray Tube is provided with a Safety Thermostat (approx. 65°C) and a Pressure Switch (both must be NC Contacts), connect them in series before routing, connecting both wire-ends to their respective Terminals in TS2.

<table>
<thead>
<tr>
<th>THERMOSTAT WIRES</th>
<th>TUBE-1</th>
<th>TUBE-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>THERMOSTAT SIGNAL</td>
<td>TS2-4</td>
<td>TS2-12</td>
</tr>
<tr>
<td>THERMOSTAT COMMON</td>
<td>TS2-5</td>
<td>TS2-13</td>
</tr>
</tbody>
</table>

Note: Terminal Block TS2 may be marked as 4TS2, 10TS2 or 11TS2 depending on the Generator model.

Note: For Generators with a “Single X-ray Tube for Fluoroscopy / Spot Film”, connect the Stator wires as indicated for Tube-2, except for Generators with the Low Speed Starter LF-RAC located behind the Front Panel (module-4), in this case connect wires as Tube-1.

If an X-ray Tube is not provided with Thermostat signal, jump both connections in the Terminal Block TS2 (refer to above table).

GND AND/OR SHIELD

The connection of the GND and/or Shield wire of the Stator cables depend on the Generator model.

<table>
<thead>
<tr>
<th>GENERATOR MODEL</th>
<th>CONNECTION OF GND and/or SHIELD WIRE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of X-ray Tubes</td>
<td>Starter type and Location</td>
</tr>
<tr>
<td>ONLY 1 Tube</td>
<td>LF-RAC (Low Speed) behind the Front Panel (Module 4)</td>
</tr>
<tr>
<td>1 or 2 Tubes</td>
<td>LF-RAC (Low Speed) Lower Cabinet Shelf (Module 10)</td>
</tr>
<tr>
<td>1 or 2 Tubes</td>
<td>LV-DRAC (High Speed) Lower Cabinet Shelf (Module 11)</td>
</tr>
</tbody>
</table>
3.3.2 TUBE SELECTION SIGNALS

Note  
This section only applies to Generators with two X-ray Tubes.

The Tube Selection signals are available through two contacts free of voltage located on the starter.

<table>
<thead>
<tr>
<th></th>
<th>TUBE-1 SELECTION</th>
<th>TUBE-2 SELECTION</th>
<th>SELECTION COMMON</th>
</tr>
</thead>
<tbody>
<tr>
<td>on the LF-RAC Board</td>
<td>J1-10</td>
<td>J1-11</td>
<td>J1-12</td>
</tr>
<tr>
<td>on the LV-DRAC Module</td>
<td>11KT1-84</td>
<td>11KT1-72</td>
<td>11KT1-83 and 11KT1-71</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(connect both)</td>
</tr>
</tbody>
</table>

3.4 INTERCONNECTION CABLES

This section identifies the cables and runs needed for Generator and System Interconnection. Route and connect the interconnection cables from each component installed in the system to the Generator Cabinet as indicated in Illustration 3-3 and Section 5.2 - Interconnection Maps "543010XX".

Interconnection cables should not be routed into the same conduit or cable raceway as the Power or High Voltage cables.

Note  
For Serial Generators (RS232 / RS422): Console CPUs are located inside the Generator Cabinet and Interconnections are factory made. Only one cable (serial communication) from J5 of the Generator Cabinet should be connected to the Serial Console or PC Interface Box.
3.4.1 SERIAL INTERCONNECTION RS232 / RS422

SERIAL CONSOLE

For systems using a Serial Console, only a Serial Interconnection Cable (A7066-xx) from J5 of the Generator Cabinet must be connected to the J1 of the Serial Console. (Refer to Section 5.2 - Maps 54301052, A6188-03).
TOUCH SCREEN PC (TPC)

For systems using a TPC, perform the following connections:

(Refer to Section 5.2 - Maps 54301052, A6188-03).

1. Connect the AC Supply Cable (A7059-xx) from “AC Supply” connector of the TPC to the respective terminals in TS1 of the Generator Cabinet.

2. Connect the Serial Interconnection Cable (A7067-xx) from “COM 1 (Generator)” of the TPC to J5 of the Generator Cabinet.

3. Connect the Handswitch Cable to the Handswitch connector of the TPC.

4. The TPC includes extra connectors for optional connections of a Printer, Dosimeter, Laptop, Mouse or/and Keyboard. Connect them as indicated in the illustration below. In some cases, these communication ports are used to interface the TPC with an Imaging System (refer also to “Configuration” document in the Service Manual).
VIRTUAL CONSOLE (PC)

Systems using a Virtual Console running on a PC usually must have a PC Interface Box installed between the PC and Generator. (Refer to Section 5.2 - Maps 54301052, A6188-03 and I/F-036).

Perform the following connections:

1. Remove the Back Cover of the PC Interface Box.
2. Connect the Serial Interconnection Cable (A3352-01) from J5 of the Generator Cabinet to J1 of the PC Interface Box.
3. Connect the Handswitch Cable to J2 of the PC Interface Box.
4. Connect the Interface Box-Computer Cable (A3363-01) to J3 of the PC Interface Box and the other end (2 connectors) to COM1 (Communication) and J1 (Auto ON/OFF) of the Computer connectors.

**Note**

*J1 connector is only available in Computers provided with Auto ON/OFF Board inside (factory installed).*

5. Re-install the Back Cover of the PC Interface Box.
6. Check to set proper Line Voltage on PC. Plug the Power Line cable for the Computer to a 110 VAC or 230 VAC socket.

3.4.2 COLLIMATOR ERROR SIGNAL (OPTIONAL)

This option must be requested on the customer order. For systems using an Automatic Collimator, the X-ray exposure can be inhibited due to a Collimator Error. This signal can be used only for one Automatic Collimator in the system, special interconnection should be required when two Collimators are present.

Connect two wires from the Collimator to Terminal Block 4TS3-20 (Collimator Error signal) and 3TS1-18 (or another GND in this Terminal Block). Collimator Error signal goes (through the Interface Cable) from 4TS3-20 in the Generator Cabinet to terminal J2-6 in Connector J2 of the ATP Console CPU Board. If the system is not provided with Automatic Collimator connect 4TS3-20 to GND (3TS1-18).
3.4.3 DOOR INTERLOCK SIGNAL

Connect two wires from the Room Door Interlock Switch(es) to Terminal Block 3TS1-22 (Door signal) and 3TS1-23 (Door Rtn - gnd). If the X-ray Room is not provided with a Door signal, place a jumper between both connections in Terminal Block 3TS1.

At this point, proceed to perform the complete Configuration and the Calibration procedures except for AEC, Fluoro and ABC procedures. Once Configuration and Calibration tasks have been performed, proceed with the rest of the Installation and Calibration tasks.

3.4.4 WARNING LIGHT SIGNAL

Room Warning Lamp(s) can be externally powered, or internally by the Terminal Block 3TS1. Room Lamp(s) must be connected through the Terminal Block 3TS1-47 and 3TS1-48 (internal relay on Interface Control Board) to enable the Generator switches On/Off the Room Warning Lamps. (Refer to Section 5.2 - I/F-008).

3.4.5 COLLIMATOR LAMP AND SYSTEM LOCKS

The Generator can supply power to the Manual Collimator Lamp and System Locks (Table, Vertical Bucky, etc.)

Connect wires from the Collimator Lamp to Terminal Block TB7-3 (24 VAC) and TB7-4 (0 VAC) of the Lock Board.

Connect wires from the Locks to Terminal Block TB7-5 (+24 VDC) and TB7-6 (0 VDC) of the Lock Board.

Note: When required, voltages (VAC and VDC) on TB7 can be changed by connecting their respective wires to the other available terminals on the Input Transformer 6T2. (Refer to Schematics 543020XX).
3.4.6 BUCKYS

Connect the Bucky as indicated in the Section 5.2 (Interconnections Maps for Buckys), and test them before connecting the Ion Chambers.

The following table represents the standard Bucky cable connections:

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>CABLE FROM BUCKY IS CONNECTED TO</th>
</tr>
</thead>
</table>
| Systems with 1 or 2 Bucky                  | Terminal Block 3TS1 of the Generator Cabinet  
(Refer to Section 5.2 - Bucky)                                                              |
| Systems with 3 or 4 Bucky                  | Terminal Block TB2 of the optional “Tomo / Bucky Adaptation Board”, located in the Generator Cabinet  
(Refer to “Tomo / Bucky Adaptation Board” and Section 5.2 - Buckys). |
| The Bucky of a RAD only Table with Tomo Device | Terminal Block TB1 of the optional “Tomo / Bucky Adaptation Board”, located in the Generator Cabinet  
(Refer to “Tomo / Bucky Adaptation Board” and Section 5.2 - Buckys). |

**Note** Optional “Tomo / Bucky Adaptation Board” is required to install more than two Buckys in the System. (Refer to the “Tomo / Bucky Adaptation Board” and the Manual for the Bucky).

If the “Bucky Start” signal enters the Bucky through a relay or another inductive device (a.e. a motor), it is mandatory to add the supplied R2-C2 close to each Bucky, so they have to be connected on the terminal output of the Bucky assembly. The R-Cs are attached to the Generator harness in a bag.

If “Bucky Start” signal enters the Bucky through an optocoupler, do not add the supplied R2-C2 for the Bucky.

**Note** The operations described above will prevent noises and uncontrolled Bucky movements that can cause exposure cutting or console blocking.
3.4.7 TOMO DEVICE

RAD Only Table

The Tomo cable (A3083-01) from connector J13 of the “ATP Console CPU Board” has to be connected to the Terminal Blocks TB1 and TB2 of the optional “Tomo / Bucky Adaptation Board”, located in the Generator Cabinet.

The cables from the Tomo Device are also connected to the Terminal Blocks TB1 and TB2 of the optional “Tomo / Bucky Adaptation Board”. Refer to the “Tomo / Bucky Adaptation Board” for more detailed information and interface. (Refer also to the Manuals of the Tomo Device).

Note

RAD only Table requires the optional “Tomo / Bucky Adaptation Board”.

RF Table

The Tomo cable (A6742-01) from connector J13 of the “ATP Console CPU Board” has to be connected to the “RF Adaptation Board”.

Some RF Tables with Tomo send Tomo Time information (binary code) to the Generator. Each Table has a specific codification of this binary code. In order to ensure proper functioning, the Table type has to be specified for interfacing it with the Generator.

3.4.8 ION CHAMBERS (OPTIONAL)

The “AEC Control Board” (A3012-XX) must be installed on the ATP Console CPU Board before installing the Ion Chamber(s). The optional “AEC Adaptation Board” (A3263-03) is also required except for Systems with only one AID or Vacutec Ion Chamber type. (Refer to the “Ion Chamber” Service Manuals).

Systems with only one AID or Vacutec Ion Chamber type:

Connect the Ion Chamber cable to the Terminal Block 3TS1 of the Generator Cabinet and Connector J5 of the ATP Console CPU Board, as indicated in Section 5.2 – AEC / Ion Chambers.

Systems that require the optional “AEC Adaptation Board”:

For Systems with more than one Vacutec, AID or similar (Comet) Ion Chamber type, or with another type of Ion Chamber (even if it is only one), perform the following tasks in the order described:

Note

The Generator is only compatible with Ion Chambers that output a positive ramp.
1. If an Ion Chamber requires High Voltage (200 to 500 VDC), the Generator must include an Interface Control Board (version A3009-09/12) that supplies this voltage.

The Interface Control Board must have Jumpers from W3 to W8 in “A” position. This High Voltage is supplied through Terminal Block 3TS1-39 “PT SPLY” of the Generator Cabinet and sent with a wire to TB1-9 of the “AEC Adaptation Board”.

<table>
<thead>
<tr>
<th>ON CHAMBERS WITH HIGH VOLTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>GE</td>
</tr>
<tr>
<td>----</td>
</tr>
<tr>
<td>300 VDC</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

*Notes:*
- If the System included both GE and BVM-CGR Ion Chambers, Terminal TB1-9 must supply 270 VDC.
- Philips Amplimat Ion Chambers can not be installed with GE or BVM-CGR Ion Chambers.

**WARNING**

DO NOT CONNECT ANY ION CHAMBER TO THE GENERATOR CABINET UNTIL HIGH VOLTAGE IS EITHER VERIFIED OR ADJUSTED TO THE VALUES REQUIRED. OTHER VOLTAGE COULD DAMAGE THE ION CHAMBERS.

Turn the Generator ON and verify voltage in TB1-9 according to the Ion Chambers to be installed. If necessary, adjust the High Voltage at Potentiometer R20 of the Interface Control Board. Turn the Generator OFF after adjustment.

2. Connect each Ion Chamber cable to J1 (IC1), J2 (IC2), J3 (IC3) or J5 (IC4) of the “AEC Adaptation Board”. The code for the Ion Chamber cable supplied by the Generator manufacturer is A3253-01.

*Note*  
Same Ion Chamber types have to be installed in consecutive order starting at J1 (IC1). In the case of using four Ion Chambers, IC3 and IC4 must have the same film/cassette combination.

*Note*  
The Vacutec, AID or similar Ion Chamber type is directly connected to the “AEC Adaptation Board”. For Comet Ion Chambers, cable connection has to be made previously through the Comet Preamplifier PA-021 and then directly to the “AEC Adaptation Board”.

For other cases, a cable adapter is required. The Generator manufacturer has the following cable adapters available: GE (A3082-01), CGR-BVM (A3081-01), Philips Amplimat (A3080-01/02 with DB-15 or A6727-01/02 with Phenolic connector) and MEDYS (A6715-01).
**Illustration 3-4**

Four Ion Chamber Connection

### GENERATOR

- **TS1** - POWER INTERFACE Cable
- **ATP CONSOLE BOARD** - J5
- **AEC INTERFACE Cable**

### AEC ADAPTATION BOARD (A3263-03)

- **TB1**
- **J1**
- **J2**
- **J3**
- **J4**
- **J5**

### AEC ADAPTATION PCB

- **TB1-9**
- **ADAPTATION CABLE***
  - J1
  - J2
  - J3
  - J5

### ATP CONSOLE CPU BOARD

- **POWER INTERFACE CABLE**
- **J5**

---

3. Configure Jumpers from JP1 to JP8 and from JP13 to JP16 according to the group of Ion Chamber type:

<table>
<thead>
<tr>
<th>ION CHAMBER TYPE</th>
<th>JUMPERS POSITION</th>
</tr>
</thead>
</table>
4. Each type of Ion Chamber requires a specified reference voltage for "Area Selections" and "AEC Reset" signals:

- Vacutec, AID and Comet Ion Chambers require GND (TB1-10).
- MEDYS, CGR-BVM, GE and Philips Amplimat Ion Chambers require +24 VDC (TB1-4).

The reference voltage is provided from: TB1-7 "Relay 1" for IC1; TB1-6 "Relay 2" for IC2; TB1-5 "Relay 3" for IC3; and TB1-8 "Relay 4" for IC4.

For each group of Ion Chambers of the same type, connect a wire between each of the above mentioned terminals to TB1-10 (GND), TB1-4 (+24 VDC) or TB1-3 (+12 VDC) depending on the voltage required (examples: for four MEDYS Ion Chambers add only a wire-jumper between TB1-7 and TB1-4; or for one MEDYS Ion Chamber as IC-1 and one COMET Ion Chamber as IC-2 add a wire-jumper between TB1-7 and TB1-4, and another wire between TB1-6 and TB1-10).

**WARNING**

DO NOT TURN ON THE GENERATOR UNTIL THE INPUT SIGNALS OF ALL THE ION CHAMBERS ARE CONNECTED TO THE REQUIRED VOLTAGE. OTHER VOLTAGE MIGHT DAMAGE THE ION CHAMBERS.

5. Ion Chambers output must be 0 VDC when there is no-radiation (No-Offset adjustment). If an Ion Chamber output has an offset, it must be adjusted to 0 VDC with the respective Potentiometer.

Configure Jumpers from JP9 to JP12 and turn ON the Generator only to adjust the following Potentiometers (if needed) according to the Ion Chamber output:

<table>
<thead>
<tr>
<th>ION CHAMBER OUTPUT</th>
<th>JUMPERS POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO-OFFSET ADJUSTMENT</td>
<td>JP9 (IC1)</td>
</tr>
<tr>
<td>OFFSET ADJUSTMENT</td>
<td>B</td>
</tr>
<tr>
<td>TEST POINT AND POTENTIOMETER</td>
<td>TP1 – R11</td>
</tr>
</tbody>
</table>

6. Turn OFF the Generator and connect the AEC Interface cable (A3251-01) between Connector J5 of the ATP Console CPU Board and Connector J4 of the "AEC Adaptation Board".
3.4.9 PHOTOMULTIPLIER (OPTIONAL)

Connect the optional Photomultiplier as indicated in the schematic “Section 5.2 - Photomultiplier (IF-011) and RF System (IM-300)”.

**Note**

“AEC Control Board” version A3012-06/07/09 is factory installed when the Photomultiplier option is ordered. It can be used for AEC with up to four Ion Chambers, AEC controlled by the Photomultiplier, and ABC performed with the Photomultiplier or the TV Camera.

The Photomultiplier requires negative High Voltage controlled by the Generator. The “Interface Control Board” (version A3009-09 or A3009-12) in the Generator Cabinet supplies this type of voltage. Check on this board that Jumpers from W3 to W8 are in “B” position. High Voltage is supplied through Terminal Block 3TS1-39 “PT SPLY” and 3TS1-42 “IC GND” of the Generator Cabinet.

**CAUTION**

*The High Voltage Power Supply of the Generator can be used to provide either Positive High Voltage to the Ion Chambers or Negative High Voltage to the Photomultiplier, not both. Never connect the Photomultiplier if the Jumpers W3 to W8 in the “Interface Control Board” are in “A” position (positive voltage).*

In order to have the Photomultiplier working with AEC, it has to be externally selected by using the “-PT SEL (-SFC)” signal in terminal 4TS3-7 of the Generator Cabinet.

If the System always uses the Photomultiplier for AEC, connect a wire between 4TS3-7 and GND (from 3TS1) in the Generator Cabinet.

If the System is provided with a Photomultiplier Selection signal, use one of the Spare signals in the “RF Adaptation Board” (refer to Section 3.4.12).
3.4.10 **RAD & FLUORO TABLE (SPOT FILM DEVICE)**

The “RF Adaptation Board” is installed in all Conventional RF Generators. It provides circuitry to induce compatibility between numerous Rad and Fluoro Tables with the Generator. Connections between the “RF Adaptation Board” and the Generator are factory performed.

The Fluoro cable (A3267-01) from connector J1 of the “Fluoro CPU Board” must be connected to J1 of the “RF Adaptation Board”.

**INTERFACE OF RF SYSTEMS**

The Generator can be interfaced with the main RF Systems. Additional Interface Schematics can be provided with this Service Manual whenever the RF System is indicated in the Generator order. Perform all the connections and set all the jumpers according to the respective interface as detailed in each Schematic.

If Interface Schematics are not available, refer to the Manuals of the Table and/or Spot Film Device for the interface signals required as well as the schematics in **Section 5.2 - RF System**. Perform connections as described in the points below:

- The “PREP”, “FLUORO” and “RAD EXPOSURE” orders from the Table to the “RF Adaptation Board” are adapted to give the “-SF PREP”, “-FT SW CMD” and “-FL EXP (RAD EXPOSURE)” signals of the Generator. Each one has three jumpers for its configuration according to the type of voltage given by the Table. They share the same Return to the Table.

Insert or remove the following Jumpers on the “RF Adaptation Board” according to the type of signals given from the Table for PREP, RAD EXPOSURE and FLUORO.

<table>
<thead>
<tr>
<th>TABLE SIGNAL TYPE</th>
<th>CONNECTION ON RF ADAPTATION BOARD</th>
</tr>
</thead>
</table>
• The “READY” output of the Generator is sent through a N.O. ( Normally Open) contact as “GEN READY” to the Table to inform that the Generator is ready for a RAD Exposure.

• The “ALOE” output of the Generator is sent through a N.O. contact to the Table as “EXPOSURE ON” to acknowledge the RAD exposure, or as “EXPOSURE END” to advance the film to the next position. Set Jumper JP17 in position A for “EXPOSURE ON” or in position B for “EXPOSURE END” (50 ms pulse at the end of the RAD exposure). Any of these signals can also be configured for “NO FLUORO ACKNOWLEDGE” by setting Jumper JP16 in position A or for “FLUORO ACKNOWLEDGE” by setting Jumper JP16 in position B.

• “GEN READY” and “EXPOSURE ON / EXPOSURE END” share the same return to the Table which is common for both N.O. contacts.

<table>
<thead>
<tr>
<th>TABLE SIGNALS</th>
<th>CONNECTION ON RF ADAPTATION BOARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>PREP order</td>
<td>TB4-2</td>
</tr>
<tr>
<td>RAD EXPOSURE order</td>
<td>TB4-3</td>
</tr>
<tr>
<td>FLUORO order</td>
<td>TB4-4</td>
</tr>
<tr>
<td>RETURN of PREP, RAD EXPOSURE and FLUORO</td>
<td>TB4-20 GND (Jumper JP2 is inserted - free of voltage) or TB4-1 (Jumper JP2 is removed)</td>
</tr>
<tr>
<td>GENERATOR READY</td>
<td>TB4-9</td>
</tr>
<tr>
<td>EXPOSURE ON / EXPOSURE END</td>
<td></td>
</tr>
<tr>
<td>NO FLUORO ACKNOWLEDGE / FLUORO ACKNOWLEDGE</td>
<td>TB4-7</td>
</tr>
<tr>
<td>COMMON of GENERATOR READY and EXPOSURE ON / END</td>
<td>TB4-8</td>
</tr>
</tbody>
</table>

• An independent “FLUORO FOOT SWITCH” can be connected directly to TB1-1 and TB1-2 of the “RF Adaptation Board”.

**SELECTION OF TABLE OPERATION MODE FROM THE GENERATOR (OPTIONAL)**

Some RF Tables (Prestige, Prestilix, Televix, Telegem, etc) need a selection of Table Operation Mode from the Generator.

A binary code from the Generator (WS1 and WS2) is sent to the “RF Adaptation Board”. It is decoded and sent to the Table through N.O. contacts as “SFD SELECT”, “DIRECT SELECT”, “DIGITAL SELECT (DSI)” and “SPECIAL SELECT” to select the operating mode. These signals share the same return to the Table which is common for all the N.O. contacts.
Connect the wire marked “Tomo” (WS2) of the “Tomo Cable” (A6742-xx) to TB3-5 of the “RF Adaptation Board”.

Connect the wires from the Table as indicated below:

<table>
<thead>
<tr>
<th>WIRE FROM TABLE SIGNAL</th>
<th>CONNECTION ON RF ADAPTATION BOARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFD SELECT</td>
<td>TB4-5</td>
</tr>
<tr>
<td>DIRECT SELECT</td>
<td>TB1-7</td>
</tr>
<tr>
<td>DIGITAL SELECT (DSI)</td>
<td>TB1-6</td>
</tr>
<tr>
<td>SPECIAL SELECT</td>
<td>TB1-8</td>
</tr>
<tr>
<td>SEL RETURN (common)</td>
<td>TB4-6</td>
</tr>
</tbody>
</table>

### 3.4.11 IMAGE SYSTEM

The “RF Adaptation Board” is the interface of the Generator with an Image System and, if needed, with the Image Intensifier. *(Refer to schematics in Section 5.2 - RF System).*

### FLUORO PULSES SYNCHRONISM

Fluoro pulses must be synchronized with the Vertical Synchronism of the TV Camera. Connect the signals according to the following situations:

- If the Imaging System provides a Digital output signal for Vertical Synchronism, connect it as “EXP SYNC+” to J2-4, its return as “EXP SYNC-” to J2-9, and set Jumper JP19 in C position, on the “RF Adaptation Board”.

- If the Imaging System does not provide the Vertical Synchronism signal, connect the Video Cables as indicated below:

<table>
<thead>
<tr>
<th>VIDEO CABLES OF IMAGING SYSTEM</th>
<th>CONNECTION ON RF ADAPTATION BOARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM IMAGING SYSTEM CONTROL</td>
<td>VID IN (BNC)</td>
</tr>
<tr>
<td>TO TV MONITOR</td>
<td>VID OUT (BNC)</td>
</tr>
<tr>
<td>-</td>
<td>Jumper JP19 in B position</td>
</tr>
<tr>
<td>-</td>
<td>Jumper JP23 to connect or to isolate the shield of the Video Cable (BNC) to Generator GND</td>
</tr>
</tbody>
</table>

**Note**

Some TV Monitors provide a Video output connector (BNC). In this case, to avoid noises on the Image, connect directly:
- The Video signal from the Imaging System to the Monitor
- The Video output of the TV Monitor to the VID IN of the “RF Adaptation Board”.
- Set Jumper JP19 in B position.
ABC INTERFACE

Connect the signals according to the following situations:

- If the Imaging System provides an ABC output signal proportional to the brightness, connect the "ABC SIGNAL" to TB2-12, its return as "GND" to TB2-14, set Jumper JP21 in B position and remove Jumper JP22, on the "RF Adaptation Board".

- If the Imaging System does not provide an ABC output signal proportional to the brightness, connect Video Cables as indicated below:

<table>
<thead>
<tr>
<th>VIDEO CABLES OF TV SYSTEM</th>
<th>CONNECTION ON RF ADAPTATION BOARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>FROM IMAGING SYSTEM CONTROL</td>
<td>VID IN (BNC)</td>
</tr>
<tr>
<td>TO TV MONITOR</td>
<td>VID OUT (BNC)</td>
</tr>
<tr>
<td></td>
<td>Jumers JP20 and JP21 in A position</td>
</tr>
<tr>
<td></td>
<td>Insert Jumper JP22</td>
</tr>
<tr>
<td></td>
<td>Jumper JP23 to connect or to isolate the shield of the Video Cable (BNC) to Generator GND</td>
</tr>
<tr>
<td></td>
<td>Inserted = Connected</td>
</tr>
<tr>
<td></td>
<td>Removed = Isolated</td>
</tr>
</tbody>
</table>

According to the type of “AEC Control Board” (A3012-xx) installed, check that the ABC output signal is correctly routed between J3-9 on the "RF Adaptation Board" and the terminal in the Generator Cabinet indicated in the table below (for more details, refer to Section 5.2 - RF System (IM-300))

<table>
<thead>
<tr>
<th>RF ADAPTATION BOARD</th>
<th>with AEC Control Board A3012-02</th>
<th>with AEC Control Board A3012-06/07</th>
</tr>
</thead>
<tbody>
<tr>
<td>J3-9 (ABC OUT)</td>
<td>3TS1-51 (PT INPUT)</td>
<td>4TS3-18 (ABC OUT)</td>
</tr>
</tbody>
</table>

INTERFACE OF RF SYSTEMS

Additional Interface Schematics can be provided with this Service Manual whenever the RF System is indicated in the Generator order. Perform all the connections and set all the jumpers according to the respective interface as detailed in each Schematic.

If Interface Schematics are not available, refer to the Manuals of the Image System and Image Intensifier for the interface signals required as well as to schematics in Section 5.2 - RF System. Perform the connections as indicated in the following points.
Imaging System Interface

The “VIDEO UNBLANK” output is activated with RAD preparation (PREP ACTIVE), the full Image Blanking on the TV Monitor is obtained. This prevents a flash on the TV Monitor during radiographic exposures. The following connection is provided through a “dry contact” (free of voltage):

<table>
<thead>
<tr>
<th>SIGNALS TO IMAGING SYSTEM</th>
<th>CONNECTION ON RF ADAPTATION BOARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>VIDEO UNBLANK</td>
<td>TB2-10</td>
</tr>
<tr>
<td>VIDEO UNBLANK RETURN</td>
<td>TB2-11</td>
</tr>
</tbody>
</table>

The “LAST IMAGE HOLD (LIH)” output is activated at the same time that the X-rays are switched-off (Fluoro not active). The last full image is maintained on the TV Monitor until the X-rays are switched-on again. Set Jumpers JP11 and JP15 in B position for “LIH” function. The following connection is provided through a “dry contact” (free of voltage):

<table>
<thead>
<tr>
<th>SIGNALS TO IMAGING SYSTEM</th>
<th>CONNECTION ON RF ADAPTATION BOARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAST IMAGE HOLD (LIH)</td>
<td>TB2-8</td>
</tr>
<tr>
<td>LAST IMAGE HOLD RETURN (LIH RTN)</td>
<td>TB2-9</td>
</tr>
</tbody>
</table>

It is recommended to connect the 24 VDC from the Imaging System to TB2-13 “LIH ENABLE” on the “RF Adaptation Board”.

Pulsed Fluoro at variable rate (a.e. from 30 PPS to 1 PPS) needs an interface from the Generator to the Imaging System in order to freeze or capture a new image. This interface is achieved with the connections indicated in the table below, with each signal passing through the Open Collectors and Emitters to Ground of the corresponding transistor.

<table>
<thead>
<tr>
<th>SIGNALS FROM GENERATOR</th>
<th>CONNECTION ON RF ADAPTATION BOARD</th>
<th>IMAGING SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEMORY ENABLE</td>
<td>INPUT J1-13</td>
<td>OUTPUT J2-8</td>
</tr>
<tr>
<td></td>
<td>24 VDC J2-3</td>
<td></td>
</tr>
<tr>
<td>MEMORY GATE</td>
<td>INPUT J1-14</td>
<td>OUTPUT J2-7</td>
</tr>
<tr>
<td></td>
<td>24 VDC J2-2</td>
<td></td>
</tr>
</tbody>
</table>
Image Intensifier Field Selection (Zoom)

Normally, the Image Intensifier Field Selections are connected directly from the Table to the Image Intensifier. If the outputs from the Table are not compatible with the inputs on the Image Intensifier, adapt these selections on the "RF Adaptation Board" as indicated below:

<table>
<thead>
<tr>
<th>SELECTIONS FROM TABLE</th>
<th>CONNECTION ON RF ADAPTATION BOARD</th>
<th>IMAGE INTENSIFIER</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.I. MINIMUM</td>
<td>TB4-11</td>
<td>TB2-1</td>
</tr>
<tr>
<td>I.I. MEDIUM</td>
<td>TB4-12</td>
<td>TB2-2</td>
</tr>
<tr>
<td>I.I. MAXIMUM</td>
<td>TB4-13</td>
<td>TB2-3</td>
</tr>
<tr>
<td>-</td>
<td>TB4-20 (Generator GND)</td>
<td>TB2-4</td>
</tr>
</tbody>
</table>

Set Jumpers JP5, JP6 and JP7 in B position

The Selections from the Table have to send Ground (from the Generator) when they are activated. The outputs to the Image Intensifier (ZOOM 1, 2, 3) are sent as “dry contacts” (free of voltage). The Common is sent as “ZOOM COMMON”.

TV MONITOR IMAGE REVERSE SELECTION

Image Reversal Selections are normally connected directly from the Table to the Imaging System. If the outputs from the Table are not compatible with the inputs on the Imaging System, adapt these selections on the "RF Adaptation Board" as indicated below:

<table>
<thead>
<tr>
<th>SELECTIONS FROM TABLE</th>
<th>CONNECTION ON RF ADAPTATION BOARD</th>
<th>IMAGING SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>HORZ REVERSE</td>
<td>TB4-14</td>
<td>TB2-6</td>
</tr>
<tr>
<td>VERT REVERSE</td>
<td>TB4-15</td>
<td>TB2-7</td>
</tr>
<tr>
<td>-</td>
<td>TB4-20 (Generator GND)</td>
<td>TB2-5</td>
</tr>
</tbody>
</table>

The Selections from the Table have to send Ground (from the Generator) when they are activated. The outputs to the Image Intensifier (H REV and V REV) are sent as “dry contacts” (free of voltage). The Common is sent as “REV COMMON”.

IN-1005R6 53
3.4.12 SPARE SIGNALS ON RF ADAPTATION BOARD

*Note* If the RF System has been interfaced using Additional Interface Schematics, some Spare signals may have already been used.

Spare Signals for direct connections:

<table>
<thead>
<tr>
<th>SIGNAL NAME</th>
<th>CONNECTIONS ON RF ADAPTATION BOARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPARE 1</td>
<td>J3-12</td>
</tr>
<tr>
<td></td>
<td>TB3-1</td>
</tr>
<tr>
<td>SPARE 2</td>
<td>J3-13</td>
</tr>
<tr>
<td></td>
<td>TB3-2</td>
</tr>
<tr>
<td>SPARE 3</td>
<td>J3-14</td>
</tr>
<tr>
<td></td>
<td>TB3-3</td>
</tr>
<tr>
<td>SPARE 4</td>
<td>J3-15</td>
</tr>
<tr>
<td></td>
<td>TB3-4</td>
</tr>
<tr>
<td>SPARE 5</td>
<td>J3-10</td>
</tr>
<tr>
<td></td>
<td>TB2-16</td>
</tr>
</tbody>
</table>

Spare Signals through Optocouplers, all inputs have to be 24 VDC:

<table>
<thead>
<tr>
<th>CONNECTIONS ON RF ADAPTATION BOARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>INPUT</td>
</tr>
<tr>
<td>OUT</td>
</tr>
<tr>
<td>IN 1</td>
</tr>
<tr>
<td>IN 2</td>
</tr>
<tr>
<td>IN 3</td>
</tr>
<tr>
<td>IN 4</td>
</tr>
<tr>
<td>IN COMMON</td>
</tr>
</tbody>
</table>
SECTION 4  FINAL INSTALLATION AND CHECKS

4.1 HV TRANSFORMER

This point does not apply to the hermetic HV Transformers (black aluminium HV Transformers).

The HV Transformer contains “Shell Diala AX” oil. Check that there is no oil leakage. If leakage is found, remove the oil fill plug from the top of the HV Transformer and verify that the oil level is within 20 mm (3/4”) from the top of the HV Transformer. Add “Shell Diala AX” oil if necessary.

Unscrew the Ventilation Screw from the top of the HV Transformer.

4.2 CABLE FASTENING AND COVERS

Note: Before re-installing cabinet covers, perform the rest of the required Calibration procedures (i.e. AEC, Fluoro, ABC).

Check that all electrical connections are firm and secure. Cables should be correctly routed. (Refer to Section 3.1)

In order to avoid signal interferences, it is strongly recommended to fold and fasten close to the Generator Cabinet the portion of cables not routed (see picture below). Never wrap in circles.

Re-install the Cabinet covers and connect its internal ground wires. Power line, High Voltage and Interconnections cables must go through the cover cable outlet.
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SECTION 5 SYSTEM INTERCONNECTIONS

5.1 SYSTEM INTERCONNECTION SIGNALS

All input signals are active low. This means the inputs must be pulled to ground (chassis ground of the Generator) thru relay contacts, by a transistor or other switching device. The current requirement of the switch is less than 10 mA.

**CAUTION**

*Do not apply 115 / 220 VAC logic signals to any of the logic inputs. If 115 / 220 VAC logic signals are used in the X-ray table (i.e. fluoro command), these signals must be converted to a contact closure by a relay.*

The outputs signals from the Generator to the subsystem devices are usually active low (switched to chassis ground of the Generator). The outputs are open collector transistor drivers with a maximum current of 0.5 Amperes.

**Table 5-1**

System Interconnection Signals

<table>
<thead>
<tr>
<th>SIGNAL NAME</th>
<th>SIGNAL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC OUT</td>
<td>This analog input is the output from the RF Adaptation Board or from Imaging System. A DC level signal is used for systems that uses a Imaging Systems for the Brightness level. When a DC level is used, an input range of 0 to 10 volts is required. The stabilized value of the input will be between 5 and 7 volts.</td>
</tr>
<tr>
<td>-ABC</td>
<td>This signal selects the Fluoro operation mode: a low signal selects Automatic Brightness Control, a high signal selects Manual Mode.</td>
</tr>
<tr>
<td>ALOE</td>
<td>This high going signal indicates the Actual Length Of Exposure. This signal is used to interface to some Spot Film system and is used to advance the Spot Film device to the next position when multi-exposures are made on the same film.</td>
</tr>
<tr>
<td>-ALOE</td>
<td>This low going signal indicates the Actual Length Of Exposure. This signal is used to interface to some Spot Film system and is used to advance the Spot Film device to the next position when multi-exposures are made on the same film.</td>
</tr>
<tr>
<td>-AUTO OFF</td>
<td>This signal only applies to Generator systems with the Stand-alone option.</td>
</tr>
<tr>
<td>AUX BUCKY SPLY</td>
<td>External voltage supply required for the Bucky motion, when this voltage is not +24 VDC.</td>
</tr>
<tr>
<td>-BEEP</td>
<td>A low signal energizes the Fluoro buzzer.</td>
</tr>
<tr>
<td>-BUCKY 1 DR CMD</td>
<td>A low signal to the Interface Control Board as a command to output a Bucky-1 (normally the Table Bucky) drive signal.</td>
</tr>
<tr>
<td>-BUCKY 1 MOTION</td>
<td>This low going signal from Bucky-1 indicates Bucky-1 motion, and therefore the exposure is enabled.</td>
</tr>
<tr>
<td>BUCKY 1 DR</td>
<td>This signal is originated from the Bucky supply of the Power Module when an exposure order. It starts the Bucky.</td>
</tr>
<tr>
<td>-BUCKY 2 DR CMD</td>
<td>A low signal to the Interface Control Board as a command to output a Bucky-2 (normally the Vertical Bucky Stand) drive signal.</td>
</tr>
<tr>
<td>-BUCKY 2 MOTION</td>
<td>This low going signal from Bucky-2 indicates Bucky-2 in motion, and therefore the exposure is enabled.</td>
</tr>
</tbody>
</table>
### Table 5-1 (cont.)
**System Interconnection Signals**

<table>
<thead>
<tr>
<th>SIGNAL NAME</th>
<th>SIGNAL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUCKY 2 DR</td>
<td>This signal is originated from the Bucky supply of the Power Module when an exposure order. It starts the Bucky.</td>
</tr>
<tr>
<td>-BUCKY EXP</td>
<td>This low going (0 volts) signal starts the Bucky exposure. The signal originates on the Interface Board.</td>
</tr>
<tr>
<td>BUCKY SPLY</td>
<td>Voltage supply required for the Bucky drive command.</td>
</tr>
<tr>
<td>CAM SYNC</td>
<td>Sync. signal from Imaging System. This signal is used for timing in the Generator.</td>
</tr>
<tr>
<td>-CAM FL EXP</td>
<td>This signal interfaces to any Video Camera. A low signal tells the camera that the Generator is making a Fluoro exposure and the Camera should unblank.</td>
</tr>
<tr>
<td>C-HT CLK</td>
<td>Serial data clock to the HT Control Board. This clock synchronizes the C-HT DATA signal.</td>
</tr>
<tr>
<td>C-HT DATA</td>
<td>Serial data to the HT Control Board. This data is synchronous with the C-HT CLK signal.</td>
</tr>
<tr>
<td>-COLLIMATOR</td>
<td>This active low signal indicates that NO EXPOSURE HOLD condition exists at the Collimator. This input is read only when the Radiographic Tube is selected.</td>
</tr>
<tr>
<td>-COMP</td>
<td>This low signal indicates that a Compression Device has been selected. This input changes the original density to the appropriate density for Compression selection.</td>
</tr>
<tr>
<td>-DOOR</td>
<td>This low signal is the interlock for the Door of the X-ray room.</td>
</tr>
<tr>
<td>-DSI SEL</td>
<td>This low going signal from a DSI device indicates that the DSI has been selected and will be used for the next exposure.</td>
</tr>
<tr>
<td>-EXP</td>
<td>Low going Expose signal to the HT Control Board. If -PREP is low then a Spot Film or RAD exposure is made, else a Fluoro exposure is made.</td>
</tr>
<tr>
<td>FL DSI</td>
<td>Sync. signal from the DSI device. This signal is used for timing in the Generator.</td>
</tr>
<tr>
<td>-FL EXP</td>
<td>This is the EXPOSURE COMMAND input when the Tube-2 (Fluoro / Spot Film) is selected. If the -SF PREP input is open then a Fluoro exposure is started, and if the -SF PREP input is low then a Spot Film exposure is made.</td>
</tr>
<tr>
<td>-FLD1 DR</td>
<td>A low signal to select the right field in the Ion Chamber.</td>
</tr>
<tr>
<td>-FLD2 DR</td>
<td>A low signal to select the left field in the Ion Chamber.</td>
</tr>
<tr>
<td>-FLD3 DR</td>
<td>A low signal to select the center field in the Ion Chamber.</td>
</tr>
<tr>
<td>-FT SW CMD</td>
<td>This low going signal indicates the Fluoro exposure command. It is needed for Pulsed Fluoro at variable rate.</td>
</tr>
<tr>
<td>HT-C CLK</td>
<td>Serial data clock from the HT Control Board. This clock synchronizes the HT-C DATA signal.</td>
</tr>
<tr>
<td>HT-C DAT</td>
<td>Serial data from the HT Control Board. This data is synchronous with the HT-C CLK signal.</td>
</tr>
<tr>
<td>-HT INL</td>
<td>This signal is low when the switch in the high voltage transformer is in the RAD position. This is a safety interlock which prevents an exposure if the high voltage switch (in the HV Transformer) is in the wrong position.</td>
</tr>
<tr>
<td>HV PT CRL</td>
<td>This analogic signal (originates in the optional AEC Control Board) controls the output of the HV Power Supply on the Interface Control Board. +5 volts programs the output to be 0 volts, and 0 volts programs the output to approximately ~1200 volts.</td>
</tr>
<tr>
<td>IC GND</td>
<td>GND for the IC SPLY.</td>
</tr>
<tr>
<td>IC1 INPUT</td>
<td>This input is the output of the Bucky 1 Ion Chamber (normally the Table Ion Chamber).</td>
</tr>
<tr>
<td>IC2 INPUT</td>
<td>This input is the output of the Bucky 2 Ion Chamber (normally the Vertical Bucky Stand Ion Chamber).</td>
</tr>
<tr>
<td>IC3 INPUT</td>
<td>This input is the output of the Spot Film Ion Chamber.</td>
</tr>
<tr>
<td>IC SPLY</td>
<td>Power supply for the Ion Chamber. This output should be within the range of 500 to 800 volts.</td>
</tr>
<tr>
<td>-kV DWN</td>
<td>A low signal is a command for the HT Control Board to drive the Fluoro kVp DOWN during a Fluoro exposure in ABC mode.</td>
</tr>
<tr>
<td>-kV UP</td>
<td>A low signal is a command for the HT Control Board to drive the Fluoro kVp UP during a Fluoro exposure in ABC mode.</td>
</tr>
</tbody>
</table>
### Table 5-1 (cont.)

**System Interconnection Signals**

<table>
<thead>
<tr>
<th>SIGNAL NAME</th>
<th>SIGNAL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>-LINE CONT</td>
<td>A low signal energizes the main line contactor K5 in the Power Module.</td>
</tr>
<tr>
<td>LINE SYNC</td>
<td>Signal synchronous with the AC line. This signal originates in the Interface Board and is used to synchronize Fluoro exposures with the AC line.</td>
</tr>
<tr>
<td>-MAG 1</td>
<td>A low signal selects Magnification-1 mode on the Image Tube.</td>
</tr>
<tr>
<td>-MEM EN</td>
<td>A low signal enables a frame grabber function in some Video Camera.</td>
</tr>
<tr>
<td>-MEM GATE</td>
<td>A low signal enables a record function in some Video Camera. Sometime it can be used to start a VCR or other recording device not integrated into the Video Camera.</td>
</tr>
<tr>
<td>-PREP</td>
<td>Commands to the HT Control Board to boost X-ray Tube Filament to the value of mA selected and to start the X-ray Tube Rotor is RAD Tube is selected.</td>
</tr>
<tr>
<td>PT INPUT</td>
<td>This analog input is normally the output of the Photo Multiplier Tube in the Image System and is used for Automatic Brightness Control. A DC level signal can be used for systems with solid state pick-up device or the TV Camera for the Brightness level. When a DC level is used, an input range of 0 to 10 volts is required. The stabilized value of the input will be between 5 and 7 volts.</td>
</tr>
<tr>
<td>PT SPLY</td>
<td>Power supply output for the Photomultiplier. The level of this signal is controlled by the HV PT CRL.</td>
</tr>
<tr>
<td>-READY</td>
<td>This low going signal indicates the system is ready to make an exposure (Prep cycle complete). This signal is used to interface to certain peripheral devices such as Film Changers, etc.</td>
</tr>
<tr>
<td>-ROOM LIGHT</td>
<td>This low going signal indicates the X-ray preparation or exposure. This signal is used to interface to the Room X-ray warning light.</td>
</tr>
<tr>
<td>-SFC</td>
<td>This low going signal from a Spot Film camera indicates that the Spot Film camera has been selected and will be used for the next exposure.</td>
</tr>
<tr>
<td>-SF PREP</td>
<td>This low going signal indicates the system to boost the filament to the level required for the mA selected on the Control Console and prepares the system for a Spot Film. This input is read only when the Tube-2 (Fluoro / Spot Film) is selected.</td>
</tr>
<tr>
<td>-STRT DR</td>
<td>A low signal to indicate the start of an exposure to the Ion Chamber.</td>
</tr>
<tr>
<td>-THERMOSTAT-1</td>
<td>This signal from X-ray Tube indicates the overheat of the Tube-1.</td>
</tr>
<tr>
<td>-THERMOSTAT-2</td>
<td>This signal from X-ray Tube indicates the overheat of the Tube-2.</td>
</tr>
<tr>
<td>V SYNC</td>
<td>Vertical Sync pulses from the TV Camera. In Fixed Rate Pulsed Fluoro the X-ray tube is pulsed at line rate. However, with the Variable Rate Pulsed Fluoroscopy option the X-ray tube is pulsed at rate selected by the operator, the rate is driven from the V Sync signal (it is obtained by dividing the timing frequency of the V sync).</td>
</tr>
</tbody>
</table>
5.2 SYSTEM INTERCONNECTION MAPS

Refer to the following maps for details of the wire connections.

SYSTEM INTERCONNECTION

- Compact / Compact-ESM Generators.  
  System Interconnection .......................... 54301045
- Serial Communication to Generator.  
  System Interconnection .......................... 54301052
- RS-232/422/485 Serial Communication .......... A6188-03
- PC / Serial Interface Box ......................... I/F-036
- Metallic Case X-ray Tube Connection .......... 54302035
- Earthing Diagram .................................. I/F-103

STATOR INTERFACE

- Philips Tubes - Stator Interface ............... I/F-021
- Siemens Tubes - Stator Interface ............... I/F-024

ROOM LAMPS

- Room Warning Light Interface ................. I/F-008
BUCKYS

- Table Bucky Interface
  (Liebel / Midwest / Ultravit / Dong-A) ...................... I/F-001

- Vertical Bucky Interface
  (Liebel / Midwest / Ultravit / Dong-A) ...................... I/F-002

- Table Bucky Interface (Philips) .......................... I/F-005

- Vertical Bucky Interface (Philips) ......................... I/F-006

- Bucky TS Table Interface ................................. I/F-041

- Bucky VE/VT (Philips) Interface ......................... I/F-042

- US X-ray Bucky Interface ............................... I/F-045

AEC - ION CHAMBERS

- AEC Compatibility for only one Ion Chamber .............. I/F-003

- AEC - VACUTEC / AID / COMET Compatibility
  for more than one Ion Chamber .......................... I/M-015

- AEC - Philips Compatibility .............................. I/M-014

- AEC - GE Compatibility ................................. I/M-018

- AEC - BVM Compatibility ................................. I/M-019

- AEC - MEDYS Compatibility .............................. I/M-081

- AEC Adaptation ........................................... A3263-03
RF SYSTEMS (RF TABLE / IMAGE SYSTEM)

- RF Adaptation Interface ......................... A3514-04S
- RF Adaptation Board .............................. A3514-04
- ABC Interface (jumper setting) ..................... IM-300
- Standard System with CC TV Interface .......... IM-302
- Evolution Table with Standard System .......... IM-312

PHOTOMULTIPLIER

- Photomultiplier Interface ....................... I/F-011
- Photomultiplier Amplifier ...................... A3168-02
NOTE.- The Adaptation Boards are optional

Interconnection of Adaptation Boards for a Generator without RF Adaptation Board

Interconnection of Adaptation Boards for a Generator with RF Adaptation Board
SERIAL OPERATOR CONSOLE

<table>
<thead>
<tr>
<th>Board</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tbody>
<tr>
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<td>+24 VDC UNR</td>
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<td>CHASSIS GND</td>
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<td>DOOR</td>
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<tr>
<td></td>
<td>PREP/EXP COMM</td>
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<td>POWER ON</td>
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<td></td>
</tr>
</tbody>
</table>

TPC or PC INTERFACE BOX

| Connector J1 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
|               |  +24 VDC UNR |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|               |  DOOR        |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|               |  PREP/EXP COMM |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|               |  POWER ON    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

SERIAL INTERCONNECTION CABLE FOR SERIAL CONSOLE (A7066-xx or A3149-01)

NOTES:
- RXD and TXD are internally reversed in TPC or PC INTERFACE BOX.
- Refer to schematics I/F-036 for other PC INTERFACE BOX connections.

SERIAL INTERCONNECTION CABLE FOR INTERFACE BOX (A3352-01)

NOTES:
- RXD and TXD are internally reversed in TPC or PC INTERFACE BOX.
- Refer to schematics I/F-036 for other PC INTERFACE BOX connections.

GENERATOR CABINET

NOTE: FOR GENERAL INTERCONNECTIONS REFER TO SCHEMATIC 54301045 (COMPACT / COMPACT-ESM GENERATORS)

NOTES:
- RXD ON GENERATOR IS CONNECTED TO TXD ON SERIAL OPERATOR CONSOLE
- TXD ON GENERATOR IS CONNECTED TO RXD ON SERIAL OPERATOR CONSOLE

SERIAL INTERCONNECTION CABLE FOR TPC (A7067-xx or A3352-01)

SERIAL INTERCONNECTION CABLE FOR INTERFACE BOX (A3352-01)

NOTE: REFER TO SCHEMATIC A6188-02 FOR RS-232/422/485 SERIAL COMMUNICATION

NOTES:
- RXD AND TXD ARE INTERNALLY REVERSED IN TPC OR PC INTERFACE BOX.
- REFER TO SCHEMATICS I/F-036 FOR OTHER PC INTERFACE BOX CONNECTIONS

SERIAL COMMUNICATION TO GENERATOR SYSTEM INTERCONNECTION
ATP CONSOLE BD. (Multilayer)

GND  +12V UNR  +12V  OFF  ON  GND  +12V UNR  -12V

POWER CABLE

COMMUNICATION CABLE

J2  J1  J3  J4  J5

See Note

Note: - Signals between () when RS-232 Serial Communication

RS-232/422/485 SERIAL COMMUNICATION
PC INTERFACE BOX (A6509-01)

HANDSWITCH CABLE (A3223-05)

COMPUTER

AUTO ON/OFF (A3179-01/02)

INTERFACE BOX-COMPUTER CABLE (A3363-01)

J1
14
16
15
25
13
19
18
17
5
6
2
3
7
9
21
10
11
22
23
25
24

+24V UNR
PWR GND
LAMP
POWER ON
POWER OFF
POWER COMM
N.U.
TxD
RxD
GND
PT INPUT
+12 VDC
-ALOE
DOOR
DOOR RTN

COM 1
RS232

GND
STUD

for external connection

PREP/EXP COMM
PREP ORDER
EXP ORDER

HAND-SWITCH

INTERFACE BOX CABLE (A3352-01)

HANDSWITCH CABLE

COM 1
INTERFACEx-COMPUTER CABLE

COMPUTER CABLE (A3352-01)

HANDSWITCH CABLE (A3352-01)

HAND-SWITCH

COMPUTER

AUTO ON/OFF

INTERFACE BOX-COMPUTER CABLE

COM 1
RS232

GND
STUD

for external connection

PREP/EXP COMM
PREP ORDER
EXP ORDER

HAND-SWITCH

COMPUTER

AUTO ON/OFF

INTERFACE BOX-COMPUTER CABLE

COM 1
RS232

GND
STUD

for external connection

PREP/EXP COMM
PREP ORDER
EXP ORDER

HAND-SWITCH

COMPUTER

AUTO ON/OFF

INTERFACE BOX-COMPUTER CABLE

COM 1
RS232

GND
STUD

for external connection

PREP/EXP COMM
PREP ORDER
EXP ORDER

HAND-SWITCH

COMPUTER

AUTO ON/OFF

INTERFACE BOX-COMPUTER CABLE

COM 1
RS232

GND
STUD

for external connection

PREP/EXP COMM
PREP ORDER
EXP ORDER

HAND-SWITCH

COMPUTER

AUTO ON/OFF

INTERFACE BOX-COMPUTER CABLE

COM 1
RS232

GND
STUD

for external connection

PREP/EXP COMM
PREP ORDER
EXP ORDER

HAND-SWITCH

COMPUTER

AUTO ON/OFF

INTERFACE BOX-COMPUTER CABLE

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GND
STUD

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PREP ORDER
EXP ORDER

HAND-SWITCH

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INTERFACE BOX-COMPUTER CABLE

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GND
STUD

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PREP ORDER
EXP ORDER

HAND-SWITCH

COMPUTER

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RS232

GND
STUD

for external connection

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PREP ORDER
EXP ORDER

HAND-SWITCH

COMPUTER

AUTO ON/OFF

INTERFACE BOX-COMPUTER CABLE

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RS232

GND
STUD

for external connection

PREP/EXP COMM
PREP ORDER
EXP ORDER

HAND-SWITCH

COMPUTER

AUTO ON/OFF

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GND
STUD

for external connection

PREP/EXP COMM
PREP ORDER
EXP ORDER

HAND-SWITCH

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AUTO ON/OFF

INTERFACE BOX-COMPUTER CABLE

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GND
STUD

for external connection

PREP/EXP COMM
PREP ORDER
EXP ORDER

HAND-SWITCH

COMPUTER

AUTO ON/OFF

INTERFACE BOX-COMPUTER CABLE

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RS232

GND
STUD

for external connection

PREP/EXP COMM
PREP ORDER
EXP ORDER

HAND-SWITCH

COMPUTER

AUTO ON/OFF

INTERFACE BOX-COMPUTER CABLE

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RS232

GND
STUD

for external connection

PREP/EXP COMM
PREP ORDER
EXP ORDER

HAND-SWITCH

COMPUTER

AUTO ON/OFF

INTERFACE BOX-COMPUTER CABLE

COM 1
RS232

GND
STUD

for external connection

PREP/EXP COMM
PREP ORDER
EXP ORDER

HAND-SWITCH

COMPUTER

AUTO ON/OFF

INTERFACE BOX-COMPUTER CABLE

COM 1
RS232

GND
STUD

for external connection

PREP/EXP COMM
PREP ORDER
EXP ORDER

HAND-SWITCH

COMPUTER

AUTO ON/OFF

INTERFACE BOX-COMPUTER CABLE

COM 1
RS232

GND
STUD

for external connection

PREP/EXP COMM
PREP ORDER
EXP ORDER

HAND-SWITCH
EARTHING DIAGRAM

I/F-103

NAME

DATE

SEDECAL

EARTHING DIAGRAM

DRAWING

REVISION

REV.

DESCRIPTION

ISSUED BY

DATE

SEDECAL

1/1

NAME

DATE

SEDECAL

EARTHING DIAGRAM

DRAWING

REVISION

REV.

DESCRIPTION

ISSUED BY

DATE

SEDECAL

1/1

NAME

DATE

SEDECAL

EARTHING DIAGRAM

DRAWING

REVISION

REV.

DESCRIPTION

ISSUED BY

DATE

SEDECAL

1/1

NAME

DATE

SEDECAL

EARTHING DIAGRAM

DRAWING

REVISION

REV.

DESCRIPTION

ISSUED BY

DATE

SEDECAL

1/1

NAME

DATE

SEDECAL

EARTHING DIAGRAM

DRAWING

REVISION

REV.

DESCRIPTION

ISSUED BY

DATE

SEDECAL

1/1

NAME

DATE

SEDECAL

EARTHING DIAGRAM

DRAWING

REVISION

REV.

DESCRIPTION

ISSUED BY

DATE

SEDECAL

1/1

NAME

DATE

SEDECAL

EARTHING DIAGRAM

I/F-103

OPERATOR CONSOLE

GND cable (yellow/green, AWG #10)

(1) Central Ground

(2) GND Stud

(3) Cabinet Cover GND

(4) Back Panel GND

(5) Front Panel GND

(6) Filter LF1 Cover GND

(7) Adaptations Panel GND

(8) Console GND (Bottom Panel)

(9) Console Support GND

(10) Pedestal Tube GND

(11) Pedestal Cover GND

(12) GND STUD

Note.- (9) applicable only for metallical Box Console
STATOR ROTALIX 350/351 CONNECTIONS

100
- AUXILIARY
  1
  2
  3
  4
  5
  6
  7
  9

200
- MAIN
  2
  4
  3
  6
  5
  8
  7
  10

COMMON

STATOR SUPER ROTALIX 350 CONNECTIONS

100
- AUXILIARY
  1
  4
  3
  6
  5
  8
  7
  9

200
- MAIN
  2
  4
  3
  6
  5
  8
  7
  10

COMMON

Interconnection Interconexion
STATOR 100 CONNECTIONS (BIANGULIX and OPTILILIX TUBES)

Estator 100
BIANGULIX and OPTILIX (SIEMENS)

Output connector

0  Ia  I  Ib  II
COMMON  AUXILIARY  MAIN

Make jumper
Make jumper

NOTE
CONNECT THE STATOR CABLE AS SHOWN.
CHECK THE CABLE SUPPLIED WITH THE TUBE.
Interconnection 1.- For Generator Interface with control relay and externally powered

![Diagram of Interconnection 1]

Interconnection 2.- For Generator Interface with control relay and internally powered

![Diagram of Interconnection 2]

Interconnection 3.- Additional option to meet some Local Electrical Codes

![Diagram of Interconnection 3]

* Select the power supply on TS1 according to the lamp voltage. Add jumper to TS1-26 for 220 VAC or to TS1-27 for 115 VAC.
### TABLE BUCKY INTERFACE

<table>
<thead>
<tr>
<th>Semi-Automatic Bucky</th>
<th>Interface Control Board</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXP INT</td>
<td>+24 VDC</td>
</tr>
<tr>
<td>B2</td>
<td>K4</td>
</tr>
<tr>
<td>B3</td>
<td>J4-11</td>
</tr>
<tr>
<td>B4</td>
<td>K2</td>
</tr>
<tr>
<td>B8</td>
<td>J4-8</td>
</tr>
<tr>
<td>C2</td>
<td>K2</td>
</tr>
<tr>
<td>R2</td>
<td>BUCKY EXP</td>
</tr>
<tr>
<td>0 VAC</td>
<td>TS1-5</td>
</tr>
<tr>
<td>115/220 VAC</td>
<td>TS1-6</td>
</tr>
<tr>
<td>GND</td>
<td>TS1-4</td>
</tr>
<tr>
<td>ADD JUMPER</td>
<td>TS1-3</td>
</tr>
<tr>
<td></td>
<td>TS1-2</td>
</tr>
<tr>
<td></td>
<td>TS1-1</td>
</tr>
</tbody>
</table>

### GENERATOR POWER MODULE

**INTERFACE PANEL**

- **Interface Control Board**
  - +24 VDC
  - K4
  - J4-11
  - K2
  - J4-8
  - K2

### Notes:

**NOTE 1:** Be sure that B2 terminal is not connected to B3 terminal.

**NOTE 2:** Select correct voltage in the Bucky according to AC input.

**NOTE 3:** In the case of noise due to Bucky, add R2=22 ohm, 1/2w, 5%; and C2=470 nF, 250 VAC as shown. Don’t add that R2-C2 for Liebel-Flarsheim 8000 Series Bucky, and remove resistor R36 and R37 in the INTERFACE CONTROL board.

**NOTA 1:** Asegurarse que el terminal B2 no está conectado al B3.

**NOTA 2:** Seleccionar la tensión del Bucky según la entrada AC.

**NOTA 3:** En caso de ruidos debido al Bucky, añadir R2=22 ohm, 1/2w, 5%, y C2=470 nF, 250 VAC según se muestra. Para Bucky Liebel-Flarsheim Series 8000, no añadir esa R2-C2, y quitar las resistencias R36 y R37 en la tarjeta INTERFACE CONTROL.
NOTE 1: Be sure that B2 terminal is not connected to B3 terminal.

NOTE 2: Select correct voltage in the bucky according to AC input.

NOTE 3: In the case of noise due to Bucky, add R2=22 ohm, 1/2w, 5%; and C2=470 nF, 250 VAC as shown. Don’t add that R2-C2 for Liebel-Flarsheim 8000 Series Bucky, and remove resistor R36 and R37 in the INTERFACE CONTROL board.

NOTA 1: Asegurarse que el terminal B2 no está conectado al B3.

NOTA 2: Seleccionar la tensión del bucky según la entrada AC.

NOTA 3: En caso de ruidos debido al Bucky, añadir R2=22 ohm, 1/2w, 5%, y C2=470 nF, 250 VAC según se muestra. Para Bucky Liebel-Flarsheim Series 8000, no añadir esa R2-C2, y quitar las resistencias R36 y R37 en la tarjeta INTERFACE CONTROL.
### Table: Bucky Interface

<table>
<thead>
<tr>
<th>Bucky Start</th>
<th>Jumper</th>
<th>115/220 VAC</th>
<th>GND</th>
</tr>
</thead>
<tbody>
<tr>
<td>(See Note 2)</td>
<td>ADD JUMPER</td>
<td>TS1-1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>TS1-2</td>
<td></td>
</tr>
<tr>
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<td>TS1-4</td>
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<tr>
<td></td>
<td></td>
<td>TS1-7</td>
<td></td>
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</tbody>
</table>

### Generator Power Module

- **Interface Control Board**
- **+24 VDC**
- **K4 Bucky Exp**
- **J4-4, K2**
- **J4-8, K2**
- **J4-11**

**Note 1:** Be sure that the 2 terminal is not connected to the 4 terminal.

**Note 2:** Select the correct voltage in the Bucky according to AC input.

**Note 3:** In the case of noise due to Bucky, add R2=22 ohm, 1/2w, 5%; and C2=470 nF, 250 VAC as shown.

### Additional Notes

- **Nota 1:** Asegurarse que el terminal 2 no está conectado al 4.
- **Nota 2:** Seleccionar la tensión del Bucky según la entrada AC.
- **Nota 3:** En caso de ruidos debido al Bucky, añadir R2=22 ohm, 1/2w, 5%; y C2=470 nF, 250 VAC según se muestra.
### Table Bucky Interface

<table>
<thead>
<tr>
<th>Name</th>
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<th>Sheet/Of</th>
<th>Interconnection Cable</th>
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<tbody>
<tr>
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<td>08/09/92</td>
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<td>I/F-001</td>
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<td>08/06/98</td>
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</tr>
<tr>
<td></td>
<td>29/03/96</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE 1:** Be sure that 6 terminal is not connected to 4 terminal.

**NOTE 2:** Select correct voltage in the bucky according to AC input.

**NOTE 3:** In the case of noise due to Bucky, add R2=22 ohm, 1/2w, 5%; and C2=470 nF, 250 VAC as shown.

---

**NOTA 1:** Asegurarse que el terminal 6 no está conectado al 4.

**NOTA 2:** Seleccionar la tensión del bucky según la entrada AC.

**NOTA 3:** En caso de ruidos debido al Bucky, añadir R2=22 ohm, 1/2w, 5%; y C2=470 nF, 250 VAC según se muestra.
NOTE 1: Be sure that B2 terminal is not connected to B3 terminal.

NOTE 2: Select correct voltage in the bucky according to AC input.

NOTE 3: In the case of noise due to Bucky, add R2=22 ohm, 1/2w, 5%; and C2=470 nF, 250 VAC as shown. Don't add that R2-C2 for Liebel-Flarsheim 8000 Series Buck, and remove resistor R36 and R37 in the INTERFACE CONTROL board.

NOTA 1: Asegurarse que el terminal B2 no está conectado al B3.

NOTA 2: Seleccionar la tensión del bucky según la entrada AC.

NOTA 3: En caso de ruidos debido al Bucky, añadir R2=22 ohm, 1/2w, 5%, y C2=470 nF, 250 VAC según se muestra. Para Bucky Liebel-Flarsheim Series 8000, no añadir esa R2-C2, y quitar las resistencias R36 y R37 en la tarjeta INTERFACE CONTROL.
NOTE 1: Be sure that B2 terminal is not connected to B3 terminal.

NOTE 2: Select correct voltage in the bucky according to AC input

NOTE 3: In the case of noise due to Bucky, add R2=22 ohm, 1/2w, 5%; and C2=470 nF, 250 VAC as shown.

Don’t add that R2-C2 for Liebel-Flarsheim 8000 Series Bucky, and remove resistor R36 and R37 in the INTERFACE CONTROL board.

NOTA 1: Asegurarse que el terminal B2 no está conectado al B3.

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Para Bucky Liebel-Flarsheim Series 8000, no añadir esa R2-C2, y quitar las resistencias R36 y R37 en la tarjeta INTERFACE CONTROL.
NOTE 1: Be sure that 2 terminal is not connected to 4 terminal.

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NOTA 2: Seleccionar la tensión del bucky según la entrada AC.

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Note.- Occasionally, the +24 V supply could be obtained from TS1 interface of the Generator Power Module cabinet (see +24V UNR output terminal).
Note. - Occasionally, the +24 V supply could be obtained from TS1 interface of the Generator Power Module cabinet (see +24V UNR output terminal)
Modul 1A
ATP Console

Modul 6

Modul 3
Power Cabinet

Modul 7 X1
Interface adaptation
Bucky TS Table

SZ1
Table control
standard

VA1
Bucky control
table

SEDECAL
Interface Adaptation
**NOTE**: In the case of noise due to Bucky, add R2=22 ohm, 1/2w, 5%; and C2=470 nF, 250 VAC as shown.

**NOTA**: En caso de ruidos debido al Bucky, añadir R2=22 ohm, 1/2w, 5%, y C2=470 nF, 250 VAC según se muestra.
NOTE: In the case of noise due to Bucky, add R2=22 ohm, 1/2w, 5%; and C2=470 nF, 250 VAC as shown.

NOTA: En caso de ruidos debido al Bucky, añadir R2=22 ohm, 1/2w, 5%, y C2=470 nF, 250 VAC según se muestra.
NOTE 1. - CABLE COMPATIBLE FOR ONE ION CHAMBER (STANDARD COMMUNICATION). THE CABLE HAS TWO SEPARATED PARTS: CONTROL AND POWER.

NOTE 2. - THE A.E.C. CABLE IS FACTORY CONNECTED FOR ION CHAMBER 1 (J5-1). IF ION CHAMBER 2 OR ION CHAMBER 3 IS USED, REMOVE THE CONNECTION TO J5-1 AND CONNECT TO J5-6 OR J5-2 RESPECTIVELY.

NOTE 3. - THE ASSOCIATION BETWEEN FIELD SELECTION AND AREA DEPENDS ON TYPE OF ION CHAMBER. CHECK THAT THE FIELD SELECTION IN THE ION CHAMBER IS ACCORDING TO THE AREA SELECTION ON THE OPERATOR CONSOLE.
Note.– Compatible interface with preamplifier for Ion Chamber types:
- Expos–AID
- Vacutec 70145/70151
- Comet Ion Chambers with PA–021 Preamplifier
Amplimat Adaptation TB1 TS1

AEC ADAPTATION BD. (A3263-03)

---

**NOTE**
Compatible interface with amplifier of 8mm measuring chamber.

**JUMPERS JP9, JP10, JP11, JP12**
POS. A - NO OFFSET ADJUSTMENT
POS. B - OFFSET ADJUSTMENT

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>IC1=IC2=IC3=IC4</td>
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<td>B</td>
<td>A</td>
</tr>
<tr>
<td>IC1=IC2=IC3</td>
<td>B</td>
<td>B</td>
<td>A</td>
</tr>
<tr>
<td>IC1=IC2</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
</tbody>
</table>

---

**REVISED**
IM-014
AEC-PHILIPS COMPATIBILITY
(FOUR ION CHAMBERS)
The +300 VDC only required for old GE Ion Chambers (not generated on preamplifier board).
GENERATOR CABINET

R & F ADAPTATION Board (A3514-04)

TOMO/BUCKY ADAPTATION Board (A3261-03/05)

AEC ADAPTATION Board (A3263-03)

GENERATOR CONSOLE

ATP CONSOLE Board (A3024-XX)

AEC Interface Cable (A3251-01)

THIS SHEET ONLY APPLIES WHEN AEC ADAPTATION BOARD AND/OR TOMO/BUCKY ADAPTATION BOARD ARE REQUIRED

NOTE
Depending on the Ion Chamber, make jumper configuration and interface as specific schematic IM-XXX

NOTE
Depending on the Tomo Device, make jumper configuration and interface as specific schematic IM-XXX

REV DESCRIPTION ISSUED BY DATE
DRAWING REVISED NAME DATE SHEET / OF

R & F INTERFACE

SEDECAL
Illustration 1 – ABC System for TV Camera
(with AEC CONTROL board A3012–02)

Note: Some TV Cameras have already the brightness signal adapted to Generator, so no adaptation is required.

Note: PT INPUT to TS3–4 for VERTICAL Generator

Note: See jumpers position and window adjusting in the board schematic

POWER MODULE CABINET

HT TRANSFORMER

HT CONTROL board

Ribbon Cable

Console–Communication Cable

Console–Interface Cable

OPERATOR CONSOLE

AEC CONTROL board (A3012–02)

WINDOW COMPARATOR

FILTER

RS – C11

WINDOW ADJ.

R14 – UP

U8

WINDOW ADJ.

R11 – DWN

Note: PT INPUT to TS3–4 for VERTICAL Generator

PATIENT

X–RAY TABLE

X–RAY TUBE

IMAGE TUBE

LIGHT

VIDEO IN

ADAPTATION Board

VIDEO OUT

PT INPUT
(brightness signal)

MONITOR

TV CAMERA

Note: Some TV Cameras have already the brightness signal adapted to Generator, so no adaptation is required.

Note: See jumpers position and window adjusting in the board schematic

Illustration 1.– ABC System for TV Camera
(with AEC CONTROL board A3012–02)

Note: Some TV Cameras have already the brightness signal adapted to Generator, so no adaptation is required.

Note: See jumpers position and window adjusting in the board schematic
Illustration 2.— ABC System for TV Camera (with AEC CONTROL board A3012–06/07)

Note: Some TV Cameras have already the brightness signal adapted to Generator, so no adaptation is required.

Note: See jumpers position and window adjusting in the board schematic.

Illustration: ABC Interface Diagram
Illustration 3.– ABC System with Photomultiplier Tube
(with AEC CONTROL board A3012–06/07)

OPERATOR CONSOLE
AEC CONTROL board (A3012–06/07)

Console–Interface Cable
PT INPUT

OPERATOR CONSOLE
AEC CONTROL board (A3012–06/07)

Note: See jumpers position and window adjusting in the board schematic.
**R&F ADAPTATION Board (A3514-04)**

**WARNING:** Configure jumpers position according to the System used with the Generator prior to connecting mains power.

- **Fluoro Foot-Switch**
  - FLUORO FT SW
  - FLUORO FT SW CLR

- **Video Cable (A6765-01)**
  - VID IN
  - VID OUT

- **Table Cable**
  - EXP ON
  - GEN READY
  - COMMON

- **Fluoro Adaptation Cable (A3267-01/02)**
  - J1 connector of the board is J10 on the Console.

- **Tomo Cable (A6742-01/02)**
  - VID IN
  - VID OUT

- **Integrated Fluoro CPU Board (A3213-XX)**
  - J1
  - -4 IN SEL
  - -5 IN SEL
  - -6 IN SEL
  - -7 IN SEL
  - -8 IN SEL
  - -9 IN SEL

- **ATP Console Board (A3024-XX)**
  - J13
  - -1 IN SEL
  - -2 IN SEL
  - -3 IN SEL
  - -4 IN SEL
  - -5 IN SEL

- **R&F Interface Harness (A6760-01)**
  - J3
  - -10 IN SEL
  - -11 IN SEL
  - -12 IN SEL
  - -13 IN SEL

- **Video Cable (A6765-01)**
  - TV MONITOR
  - VIDEO

- **C.C. TV (Standard)**
  - CONTROL

- **Imaging System Cable**
  - ABC SIGNAL (option to use)

- **Generator Ready**
  - Actual Exposure
  - Common

**Note:** When using a Compact Generator, connect READY to TS3-6, and ALOE to TS3-9.

**WARNING:** Configure jumpers position according to the System used with the Generator prior to connecting mains power.
**EVOLUTION TABLE with CD-100 SYSTEM**

**R&F ADAPTATION Board (A3514-04)**

- **JUMPERS CONFIGURATION**
  - JP2 - REMOVED
  - JP7 - B
  - JP11 - B
  - JP15 - A
  - JP17 - A
  - JP18 - B
  - JP19 - C
  - JP22 - REMOVED
  - JP24 - B
  - JP25 - C
  - JP21 - B
  - JP22 - REMOVED
  - JP23 - REMOVED
  - JP24 - B

**WARNING:** Verify Jumpers configuration before connecting power.

**Table Cable**

- PREP ORDER
- RAD ORDER
- GEN READY
- TOOM TIME 1
- TOOM TIME 2
- TOOM TIME 3
- TOOM TIME 4
- GEN READY

**Video Cable**

- COMMON (+24 VDC)
- FLUORO FOOT SW
- IMP FLUORO

**Image System CD - 100**

- TV MONITOR
- VIDEO OUT
- VIDEO IN

---

**Notes:**
- Remove wires on P1-1 and P1-2 from Console, and connect as shown (ABC OUT signal on TS3:18 is not used).
- For Tall Generator, connect -READY to TS3:6, and -ALOE to TS3:9.

---

**TOMO TIME CODE**

<table>
<thead>
<tr>
<th>TIME1</th>
<th>TIME2</th>
<th>TIME3</th>
<th>TIME4</th>
<th>Back-up Time</th>
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<tbody>
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<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>4000 ms</td>
</tr>
</tbody>
</table>

1 = log "1" (open)  0 = logic "0" (GND)  x = logic "1" or "0"
Note: The connections shown are for Compact Generator. For Tall Generator, connect BRG to TS3-6 and ALOE to TS3-9.

WARNING: Verify Jumpers configuration before connecting power.

1 = log "1" (open)    0 = logic "0" (GND)      x = logic "1" or "0"

Note 1: You could use VID UNBLANK & RTN signal (TB2-10 & TB2-11) to remove power supply of the TV Camera when RAD mode.
NOTES

PHOTOMULTIPLIER AMPLIFIER BOARD (A3168-02) REQUIRES AEC CONTROL BOARD (A3012-06), FOR ADEQUATE OPERATION WITH PHOTOMULTIPLIER TUBE.

CONNECTIONS FROM TS I.I. TO BOARD AND PMT SOCKET ARE FIELD SUPPLIED.

PHOTOMULTIPLIER AMPLIFIER BOARD (A3168-02)

locate board as close as possible to the PMT socket

PHOTOMULTIPLIER AMPLIFIER BOARD (A3168-02) REQUIRES AEC CONTROL BOARD (A3012-06), FOR ADEQUATE OPERATION WITH PHOTOMULTIPLIER TUBE.

CONNECTIONS FROM TS I.I. TO BOARD AND PMT SOCKET ARE FIELD SUPPLIED.

PHOTOMULTIPLIER AMPLIFIER BOARD (A3168-02)

locate board as close as possible to the PMT socket

Photomultiplier cable (A3351-02)

See Note

PT INPUT in TS3-4 for Tall Generators

PHOTOMULTIPLIER AMPLIFIER BOARD (A3168-02) REQUIRES AEC CONTROL BOARD (A3012-06), FOR ADEQUATE OPERATION WITH PHOTOMULTIPLIER TUBE.

CONNECTIONS FROM TS I.I. TO BOARD AND PMT SOCKET ARE FIELD SUPPLIED.

PHOTOMULTIPLIER AMPLIFIER BOARD (A3168-02)

locate board as close as possible to the PMT socket

Photomultiplier cable (A3351-02)

See Note

PT INPUT in TS3-4 for Tall Generators

PHOTOMULTIPLIER AMPLIFIER BOARD (A3168-02) REQUIRES AEC CONTROL BOARD (A3012-06), FOR ADEQUATE OPERATION WITH PHOTOMULTIPLIER TUBE.

CONNECTIONS FROM TS I.I. TO BOARD AND PMT SOCKET ARE FIELD SUPPLIED.
Note. - Version as per CN 04/169