Addendum: Installation and Service Manual

New Logic Board Assembly, 30-08160

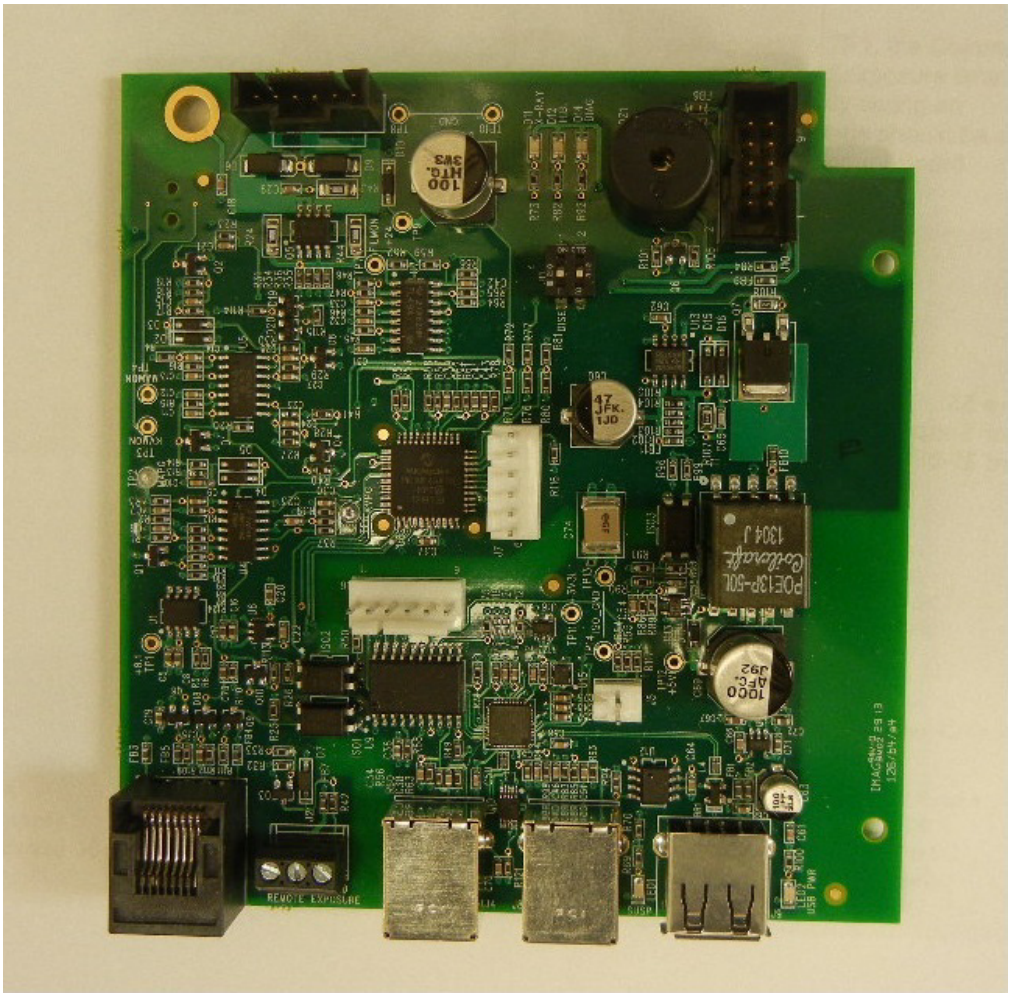

Figure 1

The original design of the Logic Board assembly, 30-08043, is now replaced with 30-08160, shown above. The functionality is the same as the original design. However, the designators for test points, connectors, switches and indicators have changed. A comparison of the two designs is shown below.

30-08043 Designator	30-08160 Designator	Component Type	Function
J1	J1	Connector	Operator Panel Cable
J3	J2	Connector	Remote Switch Connector
J4	J3	Connector	Arm Cable Connector
SW1	J11	DIP Switch	Tube Type Selection
D7	N/A	LED	+12V
D8	N/A	LED	+24V
D9	N/A	LED	+5V
D10	D12	LED	Heart beat
D11	D14	LED	Diag (error indicator)
D12	D11	LED	X-ray Exposure
TP1	TP8/TP10	Test Point	GND (Common)
TP2	N/A	Test Point	+5V
TP3	N/A	Test Point	TXD
TP4	N/A	Test Point	RXD
TP5	TP2	Test Point	mA Program
TP6	N/A	Test Point	I Ctrl
TP7	TP6	Test Point	kV Program
TP8	N/A	Test Point	Filament Monitor
TP9	TP4	Test Point	mA Monitor
TP10	TP3	Test Point	kV Monitor
TP11	TP1	Test Point	+8.1V
TP12	TP9	Test Point	+24V

Due to this change, some of the troubleshooting procedures change slightly. Those are described below. An image of the new Logic Board Assembly is shown in Figure 1 of this document. For images of other components of the unit, please refer to the Installation and Service Manual, 00-02-1577.

No mA Produced

1. On the Logic Board, measure voltages at TP1 (+8.1V) and TP9 (+24V). Use TP8 or TP10 as Common Return. If any of these voltages are not present after power is applied, next check voltages on the Power Supply Board.
2. On the Power Supply Board, use TP2 as a common test point to check TP1 +24 V DC and TP3 8.1 V DC. Then use TP5 as the common test point to check TP4 for the presence of +12 V DC. Should any of these voltages not be present, replace the Power Supply Board. If these voltages are correct, next return back to the Logic Board and check more voltages.
3. On the Logic Board, measure TP2, mA Program, by using TP8 or TP10 as Common Return. This voltage should be between 1 V and 2 V DC. If this voltage is not correct, replace the Logic Board.
4. If this voltage is correct, select 1.5 s of exposure time, measure across pin 1 and pin 2 of the Logic Board at the connector J3. During exposures, this value should be 24 V AC. Also measure across pin 2 and pin 3 of J3. This value should be 24 V AC. If either voltage is missing, replace the Logic Board.
5. If these voltages are present, measure for the same values at the Tubehead Assembly at the connector J5 (black) on the blue and gray conductors and the blue and brown conductors. If the

voltages are not present, inspect the inter-connect cables between the control and Tubehead Assembly. Connections for this cable begin with controls at J1 of the Power Supply Board and J3 of the Logic Board. As shown in Figure 51, an internal set of connections will be accessed below the distal side of the horizontal arm and at the inside top of the Tubehead Yoke. The final set of connections is accessed by removing the Pivot Cap located at the attachment point of the Tubehead to the Yoke.

6. If the voltages are present, replace the Tubehead Assembly.

No kV Produced

1. On the Power Supply Board, observe that the power supply indicator D11 +350 V DC is illuminated. Illumination represents proper stored energy for an exposure. If this indicator is not illuminated, it will be necessary to replace this board.
2. On the Logic Board, measure voltages at TP1 (+8.1V) and TP9 (+24V). Use TP8 or TP10 as Common Return. If any of these voltages are not present after power is applied, next check voltages on the Power Supply Board.
3. On the Power Supply Board, use TP2 as a common test point to check TP1 +24 V DC and TP3 8.1 V DC. Then use TP5 as the common return to check TP4 for the presence of +12 V DC. Should any of these voltages not be present, replace the Power Supply Board. If each voltage is present, check other voltages on the Logic Board.
4. On the Logic Board, measure between TP8 or TP10, the Common Return and, TP6, kV Program. This voltage should be between 3 and 4 V DC. If this voltage is not present, replace the Logic Board. If this voltage is correct, inspect the condition of the ribbon cable between the Power Supply Board and the Logic Board. If the cable is undamaged and seated properly, replace the Logic Board.
5. Check the condition of the cables between the Control Unit and the Tubehead assembly. If no x-ray occurs and no errors are displayed, the problem may lie within the conductors of the white connector (which is primary power to the Tubehead Assembly). If no x-ray occurs and the attempt is accompanied by a “snap” sound, the problem may lie with the conductors of the black connector (which is transmitting the feedback signals). Connections for this cable begin with controls at J1 of the Power Supply Board and J3 of the Logic Board. As shown in Figure 51, an internal set of connections will be accessed below the distal side of the horizontal arm and at the inside top of the Tubehead Yoke. The final set of connections is accessed by removing the Pivot Cap located at the attachment point of the Tubehead to the Yoke.
6. If D11 on the Power Supply Board is illuminated, power supplies are in order, and the cable connections are correct, place an AC voltmeter across the Tubehead connector J1 (white connector) on the black and white conductors, request an exposure time of at least 1.5 seconds, and measure the resulting voltage during the exposure. Presence of 130 V AC will require the replacement of the Tubehead Assembly. Absence of 130 V AC will require re-inspection of the interconnect cables for open conductors.

No Filament (I) Produced

1. On the Logic Board, measure voltages at TP1 (+8.1V) and TP9 (+24V). Use TP8 or TP10 as Common Return. If any of these voltages are not present after power is applied, next check voltages on the Power Supply Board.
2. On the Power Supply Board, use TP2 as a common test point to check TP1 +24 V DC and TP3 8.1 V DC. Then, use TP5 as the common return to check TP4 for the presence of +12 V DC, as shown in Figure 55. Should any of these voltages not be present, replace the Power Supply Board.

High-Voltage Breakdown

High-voltage breakdown is characterized by a loud snap sound during an exposure request.

1. On the Power Supply Board, measure the voltage across TP5, the Common Return, and TP8, +350 V DC, as shown in Figure 58. This voltage will be acceptable if measured between 330 V and 390 V DC. Values above or below this number indicate the need to replace the Power Supply Board.
2. If the voltage is correct, inspect the condition of the cabling between the Power Supply Board, Logic Board, and Tubehead Assembly.

CAUTION!
High voltage present.

Of particular importance are the conductors held by the black connectors. These conductors transmit the feedback values from the Tubehead Assembly and directly affect the control of power to the Tubehead Assembly. Connections for this cable begin with controls at J1 of the Power Supply Board and J4 of the Logic Board. As shown in Figure 51, an internal set of connections will be accessed below the distal side of the horizontal arm and at the inside top of the Tubehead Yoke. The final set of connections is accessed by removing the Pivot Cap located at the attachment point of the Tubehead to the Yoke.

3. If the cabling is found acceptable, select 1.5 s of exposure time, and placing a DC voltmeter on TP8 or TP10, the Common Return on the Logic Board, measure the feedback values at TP4 mA Monitor and TP3 kV Monitor. Look for the following values:
   - TP4 – mA Monitor. This voltage should be between 1.5 V and 3.5 V DC during exposure attempts. The voltage should not oscillate between 1.5 V and 3.5 V; instead the measurement should come to a specific value and stabilize. Oscillating values or absent values will indicate the need to replace the Tubehead Assembly.
4. TP3 – kV Monitor. This voltage should be between 3 V and 4 V DC during exposure attempts. The voltage should not oscillate between 3 V and 4 V; instead the measurement should come to a specific value and stabilize. Oscillating values or absent values will indicate the need to replace the Tubehead Assembly.
   If the feedback voltages are present and stable, replace the Logic Board.

Incorrect kV

At times, non-invasive measurement of an otherwise fully functional system indicates that kilovoltages may be incorrect. Kilovoltage is controlled by the microprocessor and is not adjustable. The device generates kilovoltage by first establishing a reference voltage and then comparing the feedback voltage to the reference. Follow these steps to establish proper operation of the kV controls

1. On the Logic Board, place a voltmeter on TP8 or TP10, the Common Return, and TP6, kV Program. Compare measurements to the following chart (volts DC).

	60 kV	**65 kV**	**70 kV**
4 mA	3.1	3.4	3.7
5 mA	3.2	3.5	3.75
6 mA	3.3	3.8	3.8
7 mA	3.4	3.7	NA

2. To evaluate the feedback voltages that represent the measured kV within the system, compare the observed values in the table below. To properly observe these values, select 1.5 s of exposure time and measure the DC voltages during the exposure only. This measurement is made across TP8 or TP10, the common return and TP3, the kV Monitor.

	60 kV	**65 kV**	**70 kV**
4 mA	3.1	3.4	3.7
5 mA	3.2	3.5	3.75
6 mA	3.3	3.6	3.8
7 mA	3.3	3.65	NA

Values that approximately match the above tables represent a correctly operating system. Other values may indicate that boards need to be replaced. Additional assistance can be obtained from Progeny Technical Support.

Incorrect mA

At times, various measurements of an otherwise fully functional system indicate that milliamperage may be incorrect. Milliamperage is controlled by the microprocessor and is not adjustable. The device generates milliamperage by first establishing a reference voltage and then comparing the feedback voltage to the reference. Follow these steps to establish proper operation of the mA controls.

1. On the Logic Board, place a voltmeter on TP8 or TP10, the Common Return and TP2, mA Program. Compare measurements to the following chart (volts DC).

	60 kV	**65 kV**	**70 kV**
4 mA	3.1	3.4	3.7
5 mA	3.2	3.5	3.75
6 mA	3.3	3.8	3.8
7 mA	3.4	3.7	NA

2. To evaluate the feedback voltages which represent the measured mA within the system, refer to the table below; select 1.5 s of exposure time and measure the DC voltages during the exposure only. This measurement is made across TP8 or TP10, the Common Return, and TP4, the mA Monitor.

	Volts DC
4 mA	2
5 mA	2.4
6 mA	2.9
7 mA	3.4

Values which approximately match the above tables represent a correctly operating system. Other values may indicate that boards need to be replaced. Further assistance can be obtained from Technical Support.