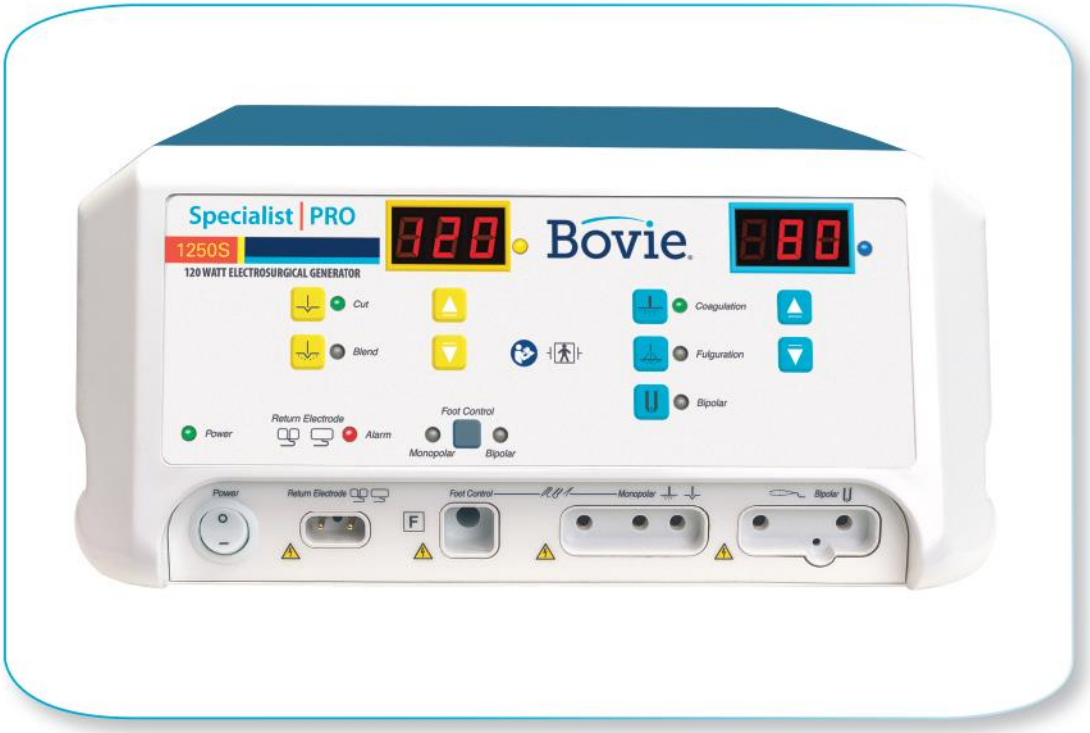
Bovie®



SPECIALIST | PRO

Electrosurgical Generator

Service Guide

Bovie

Intro

SERVICE GUIDE

PREFACE

This Service Guide and the equipment it describes are for qualified technicians who maintain and repair the Bovie® Specialist | PRO Electrosurgical Generator. Additional User information is available in the Bovie® Specialist | PRO Electrosurgical Generator User's Guide.

This document covers technical descriptions of the Bovie® Specialist | PRO including its physical appearance, all operator controls and indications, operational specifications, component functional descriptions (module level), diagrams of the electronic circuits used, and troubleshooting guidelines (with chart comparisons).

The Bovie® Specialist | PRO was constructed with the highest quality components. In the unlikely event that your generator fails within 4 years of purchase date, Bovie Medical Corporation will warranty the product and effect factory repairs. Please refer to Appendix A Warranty for what is covered, how long, and "How to Receive a Return Authorization Number".

Equipment covered in this manual

Bovie® Specialist | PRO Electrosurgical Generator - Model No.: A1250S

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Bovie part number, MC-55-237-002_5-EN

SAFETY PRECAUTIONS WHEN OPERATING THE GENERATOR

The safe and effective use of electrosurgery depends to a large degree on factors solely under the control of the operator. There is no substitute for a properly trained and vigilant medical staff. It is important that they read, understand, and follow the operating instructions supplied with this electrosurgical equipment.

To promote the safe use of the Bovie® Specialist | PRO Electrosurgical Generator, please refer to the User's Guide for standard operating precautions.

CONVENTIONS USED IN THIS GUIDE

WARNING:

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION:

Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE:

Indicates an operating tip, a maintenance suggestion, or a hazard that may result in product *damage.*

TABLE OF CONTENTS

LIST OF FIGURES

BOARD DRAWINGS AND SCHEMATICS

THE BOVIE® SPECIALIST | PRO ELECTROSURGICAL GENERATOR

This section includes the following information:

- Functional Description
- Unit Description
- Safety precautions when Repairing the Generator
- General Warnings, Cautions, and Notices
- Active Accessories
- Fire/Explosion Hazards
- Generator Electric Shock Hazards
- Servicing
- Cleaning

CAUTIONS:
Read all warnings, cautions, and instructions provided with this generator before using including those contained within this service guide document and the associated User Guide provided with each unit which are specific for the intended generator application of Human Use or Veterinary Use
Read the instructions, warnings, and cautions provided with electrosurgical accessories before using. Specific instructions are not included in this manual.

FUNCTIONAL DESCRIPTION

The Bovie® Specialist | PRO is a multipurpose electrosurgical generator for use in physician's offices and surgi-centers. It provides unsurpassed performance, ®flexibility, reliability, and user convenience in one compact package.

The Bovie® Specialist | PRO Electrosurgical Generator includes digital technology. This new technology is evident in the self-checking circuitry and error code readouts. The unit offers monopolar and bipolar electrosurgical operations.

The following are Bovie® Specialist | PRO key advantages and benefits.

Power Capabilities	Up to 120 watts of Pure Cut @ 500 Ω. Up to 90 watts of Blend @ 800 Ω. Up to 80 watts of Coagulation @ 1000 Ω. Up to 40 watts of Fulguration @ 1000 Ω. Up to 30 watts of Bipolar @ 200 Ω.
Two Levels of Coagulation: Pinpoint Coagulation and Fulguration	Pinpoint coagulation provides precise control of bleeding in localized areas. Fulguration provides greater control of bleeding in highly vascular tissue over broader tissue surface areas.
Return Electrode Monitoring System	The unit incorporates a return electrode contact quality monitoring system (RECQMS). This system determines the type of patient return electrode attached (single plate or split plate). It also continuously monitors the contact impedance between the patient and the split plate patient return electrode. Contact impedance is only monitored when approved split plate patient return electrodes are used.
Memory	The unit automatically powers up to the Cut and Coag modes and their last selected power settings. If the Blend, Fulguration or Bipolar mode is selected, the unit will default to that modes' last set power setting.
Floating RF Output	This minimizes the potential of alternate site burns.
Standard Front Panel Connectors	These connectors accept the latest monopolar and bipolar instruments.
Self-Diagnostics	These diagnostics continually monitor the unit to ensure proper performance. Whenever they detect a problem, medical personnel receive audible and visual alarm responses, and the output is suspended until the alarm condition is cleared.

UNIT DESCRIPTION

The Bovie® Specialist | PRO electrosurgical generator is a self-contained unit, consisting of the main enclosure and power cord. The main components incorporated in the generator include:

- FRONT PANEL COMPONENTS Power switch; two sets of toggle membrane switches for controlling power output; membrane switches for selecting modes; receptacles for connecting electrosurgical accessories; and indicators that show the current settings and patient return electrode status.

- REAR PANEL COMPONENTS Volume control; footswitch receptacle; power cable receptacle and fuse holder; and equipotential grounding lug.

- INTERNAL COMPONENTS Display board; main board; pad sensing module; speaker board; and relay board.

SAFETY PRECAUTIONS WHEN REPAIRING THE GENERATOR

Before servicing the Bovie® Specialist | PRO Generator it is important that you read, understand, and follow the instructions supplied with it. Also, be familiar with any other equipment used to install, test, adjust, or repair this generator.

General Warnings, Cautions, and Notices

To promote the safe use of the Bovie® Specialist | PRO Electrosurgical Generator, please refer to the User's Guide for standard operating precautions. Read all warnings, cautions, and instructions provided with this generator before using including those contained within this service guide document and the associated User Guide provided with each unit which are specific for the intended generator application of Human Use or Veterinary Use.

CAUTIONS:

Do not stack equipment on top of the generator or place the generator on top of electrical equipment. These configurations are unstable and / or do not allow adequate cooling.

Provide as much distance as possible between the electrosurgical generator and other electronic equipment (such as monitors). An activated electrosurgical generator may cause electrical interference with them.

Do not turn the activation tone down to an inaudible level. The activation tone alerts the surgical team when an accessory is active.

NOTICES:
If required by local codes, connect the generator to the hospital equalization (grounding) connector with an equipotential cable.

Connect the power cord to a wall receptacle having the correct voltage. Otherwise, product damage may result.

Active Accessories

WARNINGS:
Shock Hazard – Do not connect wet accessories to the generator.
Shock Hazard – Ensure that all accessories and adapters are correctly connected and that no metal is exposed.

CAUTIONS:
Accessories must be connected to the proper receptacle type. In particular, bipolar accessories must be connected to the Bipolar Instrument receptacle only. Improper connection may result in inadvertent generator activation or a Contact Quality Monitor alarm.
Set power levels to the lowest setting before testing an accessory.

Fire / Explosion Hazards

WARNINGS:
Danger: Fire / Explosion Hazard - Do not use the Bovie® Specialist | PRO electrosurgical generator in the presence of flammable anaesthetics.
Fire / Explosion Hazard - The following substances will contribute to increased fire and explosion hazards in the operating room: • Flammable substances (such as alcohol based skin prepping agents and tinctures) • Naturally occurring flammable gases which may accumulate in body cavities such as the bowel • Oxygen enriched atmospheres • Oxidizing agents (such as nitrous oxide [N20] atmospheres). The sparking and heating associated with electrosurgery can provide an ignition source. Observe fire precautions at all times. When using electrosurgery in the same room with any of these substances or gases, prevent their accumulation or pooling under surgical drapes, or within the area where electrosurgery is performed.
The use of flammable anaesthetics or oxidizing gases such as nitrous oxide (N2O) and oxygen should be avoided if a surgical procedure is carried out in the region of the thorax or the head, unless these agents are sucked away.
Non-flammable agents should be used for cleaning and disinfection wherever possible.
Flammable agents used for cleaning or disinfecting, or as solvents of adhesives, should be allowed to evaporate before the application if HF surgery. There is a risk of pooling flammable solutions under the patient or in body depressions such as the umbilicus, and in body cavities such as the vagina. Any fluids pooled in these areas should be mopped up before H.F. surgical equipment is used. Attention should be called to the danger of ignition of endogenous gases. Some materials, for example cotton, wool and gauze, when saturated with oxygen may be ignited by sparks produced in Normal Use of the HF surgical equipment.
No modification of this equipment is allowed.
Electric Shock Hazard - Connect the power cord to a properly polarized and grounded power source with the frequency and voltage characteristics that match those listed on the back of the unit. Do not use power plug adapters.
To avoid risk of electric shock, this equipment must only be connected to a supply mains with protective earth.
Electric Shock Hazard - Always turn off and unplug the generator before cleaning.
Fire Hazard - Do not use extension cords.

Generator Electric Shock Hazards

WARNINGS:
Connect the generator power cord to a properly grounded receptacle. Do not use power plug adapters.
Electric Shock Hazard - Connect the power cord to a properly polarized and grounded power source with the frequency and voltage characteristics that match those listed on the back of the unit. Do not use power plug adapters.
Do not connect a wet power cord to the generator or to the wall receptacle.
To avoid risk of electric shock, this equipment must only be connected to a supply mains with protective earth.
To allow stored energy to dissipate after power is disconnected (caps discharge) wait at least five minutes before replacing parts.
Always turn off and unplug the generator before cleaning.
Do not touch any exposed wiring or conductive surfaces while the generator is disassembled and energized. Never wear a grounding strap when working on an energized generator.
When taking troubleshooting measurements use appropriate precautions such as using isolated tools and equipment, using the “one hand rule,” etc.
Potentially lethal AC and DC voltages are present in the AC line circuitry, high voltage DC circuitry, and associated mounting and heat sink hardware described in this manual. These potentials are not isolated from the AC line. Take appropriate precautions when testing and troubleshooting this area of the generator.
High frequency, high voltage signals that can cause severe burns are present in the RF output stage and in the associated mounting and heat sink hardware. Take appropriate precautions when testing and troubleshooting this area of the generator.
Hazardous Electrical Output - This equipment is for use only by trained, licensed physicians.

Servicing

WARNING:
No modification of this equipment is allowed.

CAUTIONS:
Read all warnings, cautions, and instructions provided with this generator before servicing including those contained within this service guide document and the associated User Guide provided with each unit which are specific for the intended generator application of Human Use or Veterinary Use.
The generator contains electrostatic-sensitive components. When repairing the generator, work at a static-control workstation. Wear a grounding strap when handling electrostatic-sensitive components, except when working on an energized generator. Handle circuit boards by their nonconductive edges. Use an anti-static container for transport of electrostatic-sensitive components and circuit boards.
Provide as much distance as possible between the electrosurgical generator and other electronic equipment (such as monitors). An activated electrosurgical generator may cause interference with them.

NOTICE:
After installing a new low voltage power supply, verify that the voltages are correct.

Cleaning

WARNING:

Non-flammable agents should be used for cleaning and disinfection wherever possible.

Electric Shock Hazard - Always turn off and unplug the generator before cleaning.

NOTICE:
Do not clean the generator with abrasive cleaning or disinfectant compounds, solvents, or other materials that could scratch the panels or damage the generator.

CONTROLS, INDICATORS, AND RECEPTACLES

This section describes:

- The Front and Rear Panels
- Controls, Indicators, Receptacles, and Ports

FRONT PANEL

Figure 2 – 1 Layout of controls, indicators, and receptacles on the front panel

SYMBOLS ON THE FRONT PANEL

SYMBOLS	DESCRIPTION
Cut Controls	
	Cut mode
	Blend mode
Coag Controls	
	Coagulation Mode
	Fulguration Mode
Bipolar Controls	
	Bipolar Mode
Indicators	
	Split Return Electrode
	Solid Return Electrode
Regulatory Symbology	
	Mandatory: Refer to instruction manual/guide.
	Defibrillator Proof Type BF Equipment
	RF Isolated – patient connections are isolated from earth at high frequency.
	Warning: Dangerous voltage.
Power Switch and Handpiece Connectors	
	Patient Return Electrode
	Monopolar Output
	Bipolar Output

CONTROLS AND INDICATORS OVERVIEW

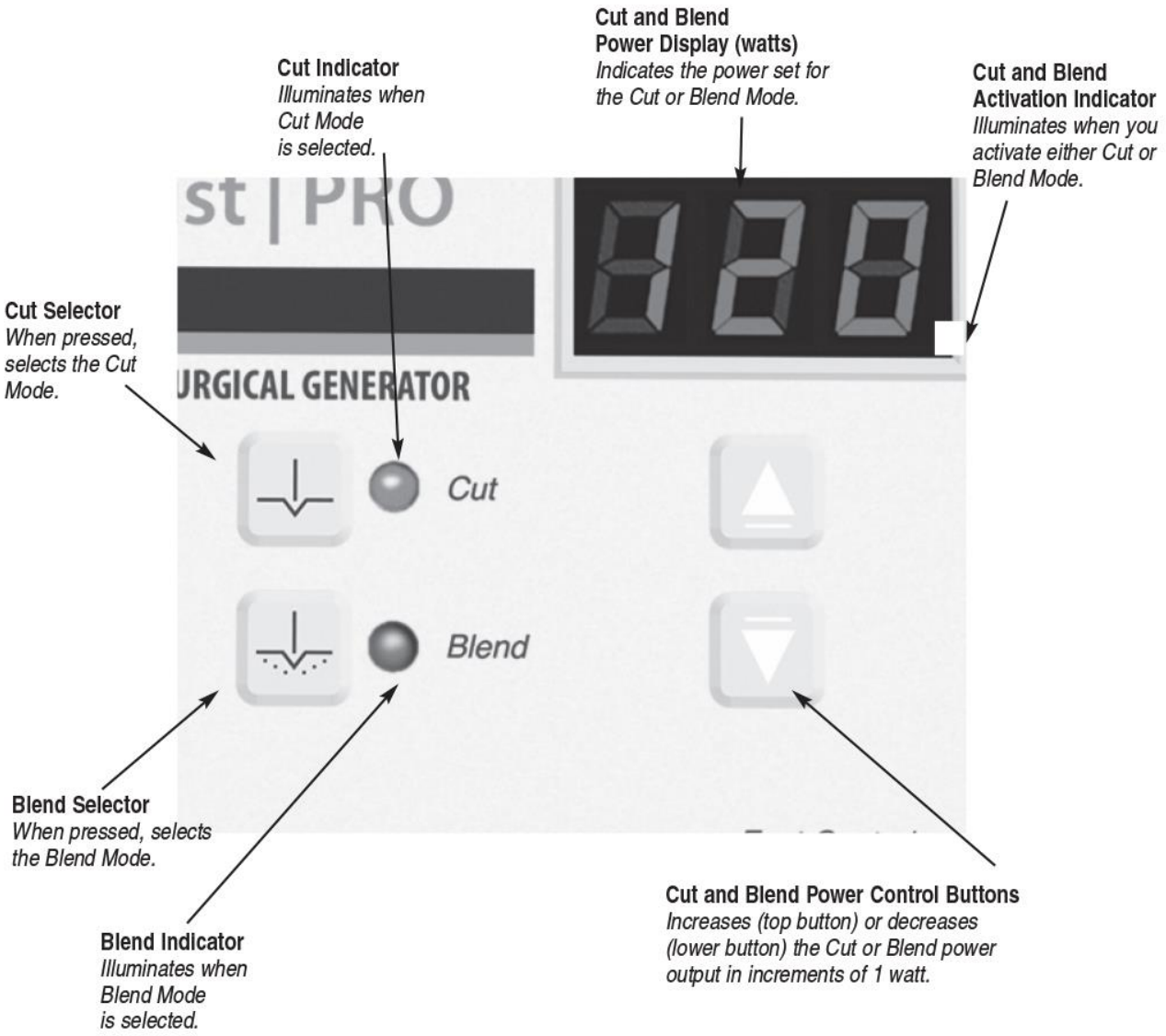
Users may control most Bovie® Specialist | PRO functions from the front panel. Each Control is plainly marked and colored on the front panel for quick reference. Volume control and a footswitch connector are located on the rear panel.

Normal operations involve activating the generator with either a front connected handswitch OR a rear-connected footswitch. The following components are the User Interface for the Bovie® Specialist | PRO Electrosurgical Generator.

Power Switch	The rocker ON / OFF switch on the lower left corner allows the Bovie® Specialist | PRO to be shut off when the unit is not in use.
Membrane Function Switches	The front panel overlay contains 9 membrane function switches (sometimes called matrix switches). These switches toggle the unit between mode settings and power control increments. These power contol switches allow you to toggle up/down to the desired RF power level for all modes of operation. The power control switches advance the generator to a graduated 1 watt per increment.
Watts Display A & B (Cut and Coag)	These large Power Output Displays report the generator's output power setting from 1 to 120 watts in 1 watt increments (at the rated load). During operation, the numeral output of the display gives the surgeon an indication of available generator power.
Visual LED Indictors	Mode LEDs indicate the mode setting. The YELLOW indicators and controls indicate cutting and blending operations. A yellow field LED indicates that either a Cut or Blend mode is activated. The BLUE indicators and controls indicate Coagulation, Fulguration, and Bipolar operation. The blue field LED indicates either Coagulation, Fulguration or Bipolar mode is activated. The Footswitch Control LED Indicator indi cates which mode the footswitch is presently in. Monopolar footswitch control allows the user to activate the monopolar mode when using footswitch controlled accessories. Bipolar footswitch control allows the user to activate the bipolar mode. A Return Electrode Indicator displays which type of patient Return Electrode is attached to the patient. It also has an associated audio alarm that sounds when a patient return electrode is not detected during activation.
Audible Indicators	An activation tone sounds whenever the Bovie® Specialist | PRO Electrosurgical Generator is activated. The volume may beadjusted up or down on the rear of the unit. An Alarm Siren sounds during all alarm conditions. The volume of this alarm cannot be adjusted.

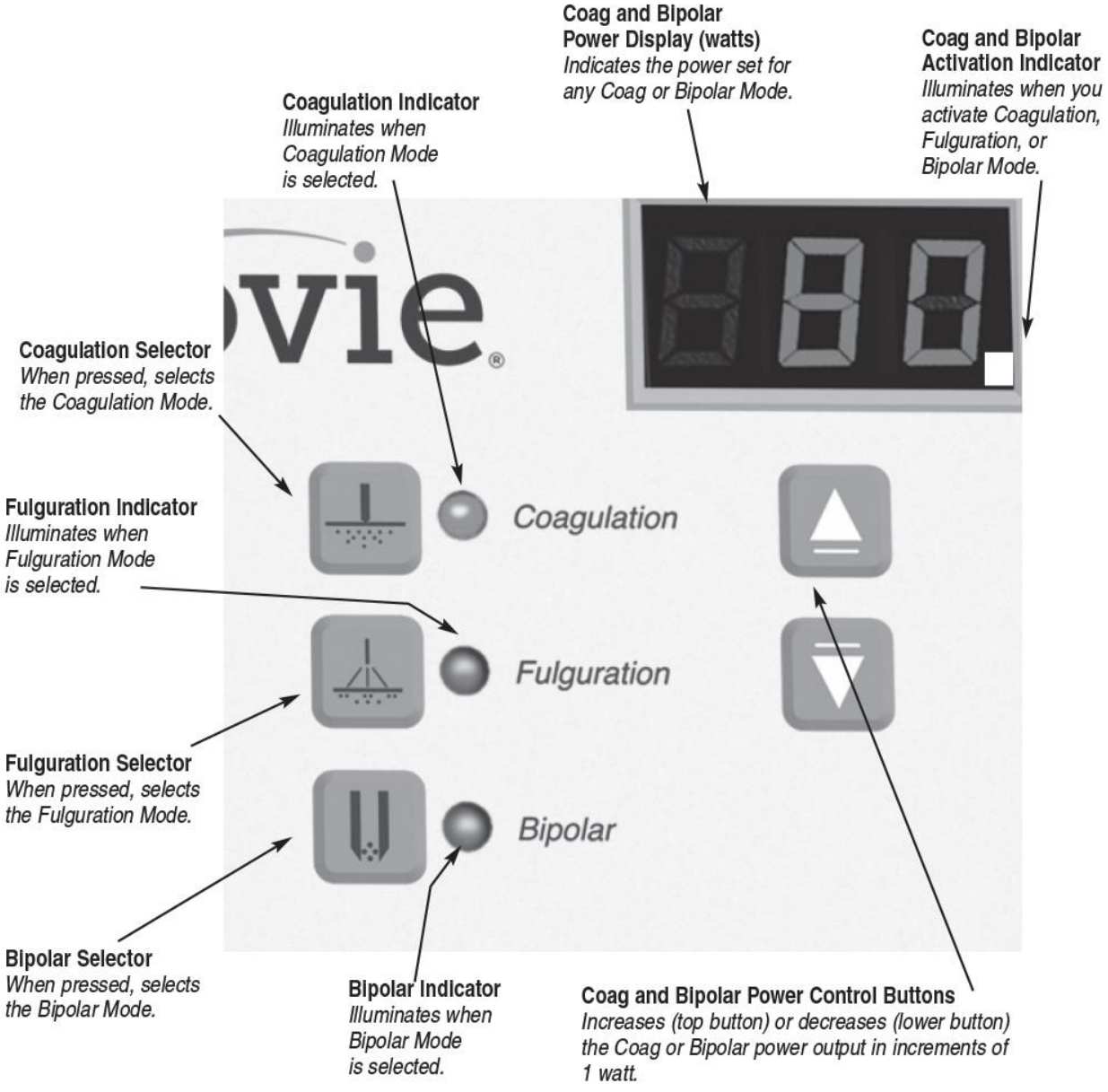
CUT AND BLEND CONTROLS

Figure 2 – 2 Controls for the Cut and Blend Modes



COAG AND BIPOLAR CONTROLS

Figure 2 – 3 Controls for the Coagulation, Fulguration, and Bipolar Modes



INDICATORS

Figure 2 – 4 Indicators for power, return electrodes, and footswitch control

Power Indicator
Illuminates when the unit is on.

Monopolar Footswitch Control Indicator
Illuminates when monopolar footswitch control is selected.

Bipolar Footswitch Control Indicator
Illuminates when bipolar footswitch control is selected.

Split Return Electrode Indicator
Illuminates green when the system detects a split plate is properly placed on the patient.

Single Plate (Solid) Patient Return Electrode Indicator
Illuminates green when the system detects a single plate.

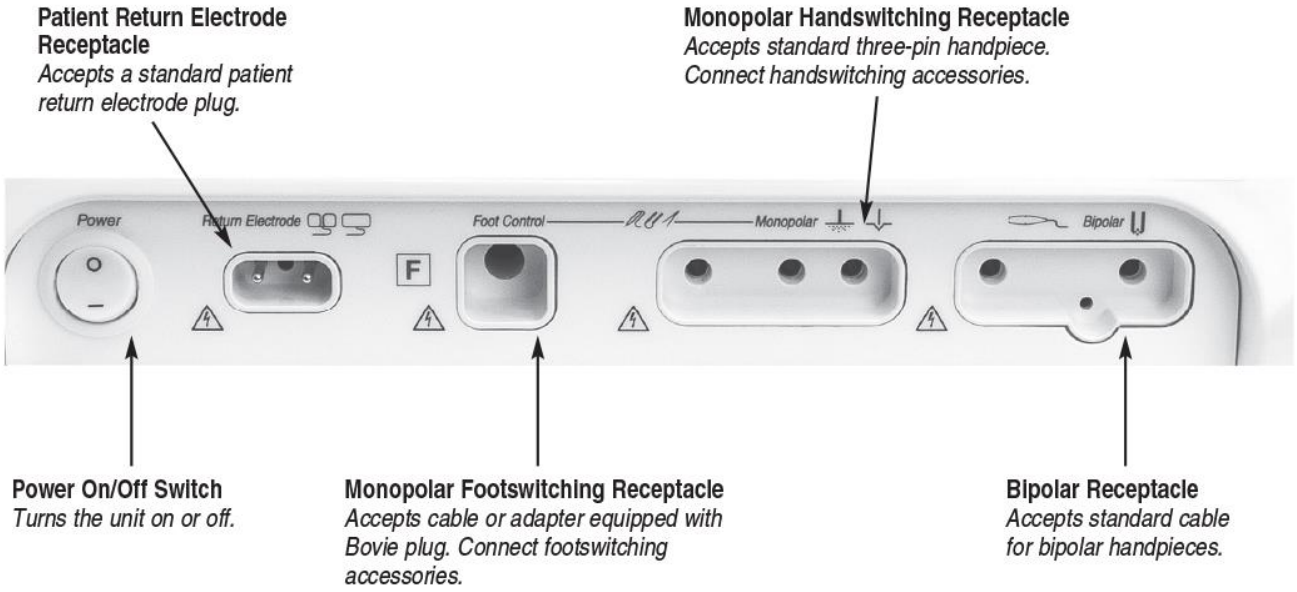
NOTICE:
Only detects that the attached electrode is connected to the unit. The unit does not monitor electrode placement on the patient.

Patient Return Electrode Alarm Indicator
Illuminates when the system detects a patient return electrode alarm condition.

Footswitch Control Selector
When pressed, toggles between monopolar and bipolar foot control.

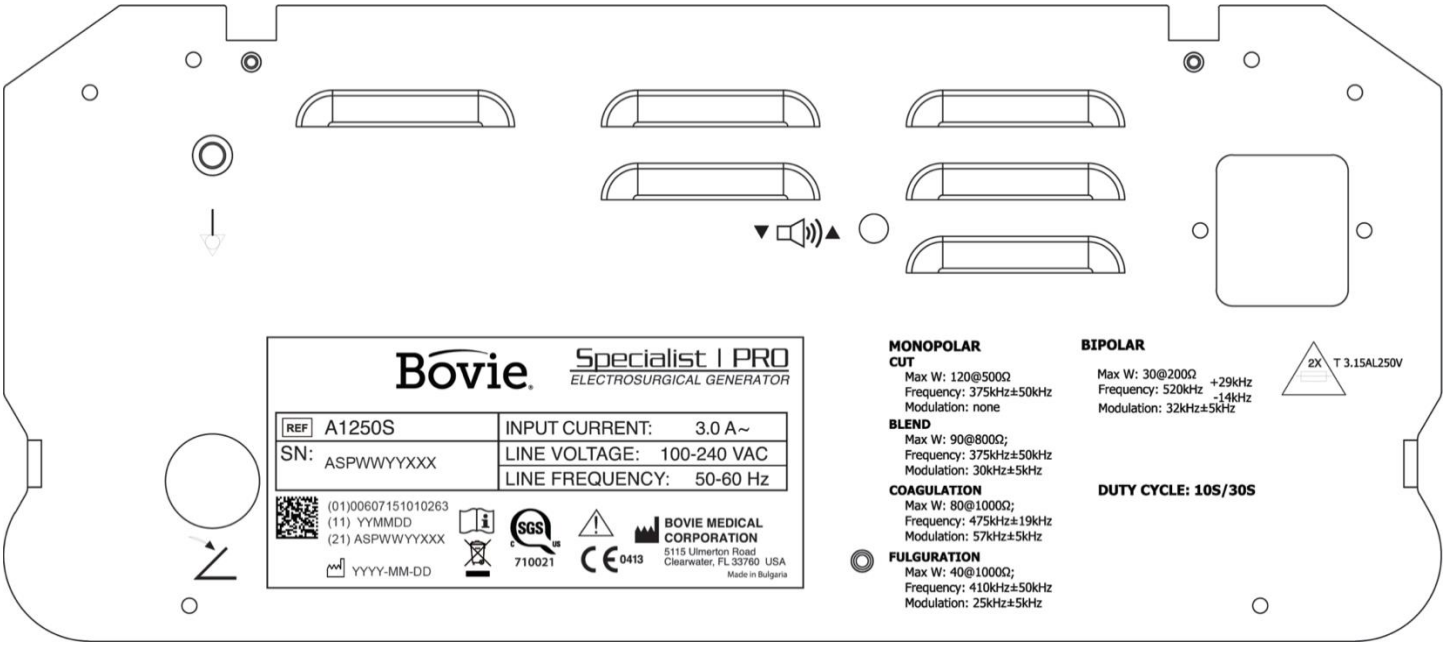
POWER SWITCH AND RECEPTACLES

Figure 2 – 5 Location of the unit power switch and front panel receptacles



REAR PANEL

Figure 2 – 6 Layout of connectors and controls on the rear panel



Symbols on the Rear Panel

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SYMBOLS	DESCRIPTION
	Equipotential Ground Stud
	Caution
▼ ▲	Volume Control
	Fuse Enclosed
	* Do not dispose of this device in the unsorted municipal waste stream.
	Footswitch Input Jack
	Read Instructions Before Use
	Manufacturer
SGS 710021	SGS Certification Mark; Conforms to PART 1 – ANSI/AAMI ES60601-1:2005 + C1:2009 + A2:2010 + A1:2012; CAN/CSA-C22.2 No. 60601-1:08 + C2:2011 PART 2 – AAMI 60601-2-2:2009 and CAN/CSA-C22.2 No. 60601-2-2:2009

* ***NOTICE:***

Please note that infected medical devices must be disposed of as medical/biohazard waste and cannot be included in used electronic equipment disposal/recycling programs. In addition, certain electronic products must be returned directly to Bovie Medical Corporation. Contact your Bovie® sales representative for return instructions.

TECHNICAL SPECIFICATIONS

This section includes the following information:

- Performance Characteristics
- Standards and IEC Classifications
- EMC Compliance
- Output Characteristics
- Output Power Curves and Reference Waveforms

All specifications are nominal and subject to change without notice. A specification referred to as “typical” is within ± 20% of a stated value at room temperature (25° C / 77° F) and a nominal input power voltage.

PERFORMANCE CHARACTERISTICS

Input Power

100 – 240 VAC
Mains line frequency range (nominal): 50 – 60 Hz
Power consumption: 270 VA
Fuses (two): 3.15A (Slow Blow)

Duty Cycle

Under maximum power settings and rated load conditions (Cut, 120 watt @ 500 ohm load), the generator is suitable for activation times of 10 seconds on, 30 seconds off for one hour.

The internal temperature of the unit is continuously monitored. If the temperature rises above 850 C, the alarm will sound and output power will be deactivated.

Dimensions and Weight

Width	26 cm (10.25 in.)	**Depth**	30.5 cm (12 in.)
Height	15.2 cm (6 in.)	**Weight**	< 4 kg (< 9 lbs)

Operating Parameters

Ambient temperature range	10° to 40° C (50° to 104° F)
Relative humidity	30% to 75%, non-condensing
Atmospheric pressure	70kPa to 106kPa
Warm-up time	If transported or stored at temperatures outside the operating temperature range, allow one hour for the generator to reach room temperature before use.

Transport

Ambient temperature range	-40° to +70° C
Relative humidity	10% to 100%, including condensation
Atmospheric pressure	50kPa to 106kPa

Storage

Ambient temperature range	10° to 30° C (68° to 86° F)
Relative humidity	10% to 75%, non-condensing
Atmospheric pressure	50kPa to 106kPa

Audio Volume

The audio levels stated below are for activation tones (bipolar, cut and coag) and alarm tones (return electrode and system alarms) at a distance of one meter. Alarm tones meet the requirements for IEC 60601-2-2.

Activation Tone

Volume (adjustable)	40 to > 65 dBA
Frequency	Cut: 610 Hz ± 10 Hz Blend: 610 Hz ± 10 Hz Pinpoint: 840 Hz ± 10 Hz Spray: 840 Hz ± 10 Hz Bipolar: 840 Hz ± 10 Hz
Duration	Continuous while the generator is activated

Alert Tone

Volume (not adjustable)	65 dBA at a distance of one meter
Frequency	2.44 kHz / 450 ms / 1.22 kHz / 450 ms

Return Electrode Sensing

The system presents audible and visible alarms when it senses no return electrode.

Single Plate	Trip resistance: 0 Ω to 8 Ω ± 1 Ω Continuous measurement: Once the system establishes the single-plate electrode resistance, an increase of 20 Ω ± 25 Ω in resistance will cause an alarm. When the alarm condition exists, the system deactivates output power.
Split Plate	Trip resistance: 10 Ω ± 5 Ω to 135 Ω ± 10 Ω Continuous measurement: Once the system establishes the split-plate electrode resistance, an increase of (35 ± 5)% in resistance will cause an alarm.

Low Frequency (50-60 Hz) Leakage Current

Enclosure source current, ground open	40 to > 65 dBA
	< 300 µA 90 - 120 VAC
Source current, patient leads, all outputs	Normal polarity, intact ground: < 10 µA Normal polarity, ground open: < 50 µA Reverse polarity, ground open: < 50 µA
Sink current at high line, all inputs	< 50 µA

High Frequency (RF) Leakage Current

Bipolar RF leakage current	< 39 mA $_{rms}$
Monopolar RF leakage current (additional tolerance)	< 150 mA $_{rms}$

Operating Conditions
RF energy is generated and passed through an interconnecting cable to an accessory where the energy is delivered to cut, coagulate and ablate tissue.

STANDARDS AND IEC CLASSIFICATIONS

Class I Equipment (IEC 60601-1)
Accessible conductive parts cannot become live in the event of a basic insulation failure because of the way in which they are connected to the protective earth conductor.

Type BF Equipment (IEC 60601-1) / Defibrillator Proof

The Bovie® Specialist | PRO Electrosurgical Generator provides a high degree of protection against electric shock, particularly regarding allowable leakage currents. It is type BF equipment. Patient connections are isolated from earth and resist the effects of defibrillator discharge.

Drip Proof (IEC 60601-2-2)
The generator enclosure is constructed so that liquid spillage in normal use does not wet electrical insulation or other components which, when wet, are likely to affect adversely the safety of the generator.

Electromagnetic Interference
When other equipment is placed on or beneath an activated Bovie® Specialist | PRO Electrosurgical Generator, the unit can be activated without interference. The generator minimizes electromagnetic interference to video equipment used in the operating room.

Electromagnetic Compatibility (IEC 60601-1-2 and IEC 60601-2-2)
The Bovie® Specialist | PRO Electrosurgical Generator complies with the appropriate IEC 60601-1-2 and IEC 60601-2-2 specifications regarding electromagnetic compatibility.

Voltage Transients (Emergency Generator Mains Transfer)
The Bovie® Specialist | PRO Electrosurgical Generator operates in a safe manner when the transfer is made between line AC and an emergency generator voltage source.

EMC COMPLIANCE

Special precautions should be taken regarding the Specialist | PRO. Medical Electrical Equipment needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided in this manual.

WARNINGS:
Use of this equipment adjacent to or stacked with other equipment should be avoided because it could result in improper operation. If such use is necessary, this equipment and other equipment should be observed to verify that they are operating normally.
Use of accessories and cables other than those specified or provided by the manufacturer of this equipment could result in increased electromagnetic emissions or decreased electromagnetic immunity of this equipment and result in improper operation.
Portable RF communications (including peripherals such as antenna cables and extrenal antennas) should be used no closer than 30 cm (12 inches) to any part of the Specialist | Pro, including cables specified by Bovie Medical. Otherwise, degradation of the performance of Specialist | Pro could result.

Understand that only the Accessories supplied with or ordered from Bovie Medical should be used with your device. The Specialist | Pro and its accessories are not suitable for interconnection with other equipment.

The Specialist | Pro is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used in domestic purposes.

For the purposes of EN60601-1-2 the Specialist | Pro has an essential performance which is that there shall be no component failure, change in operating mode or false alarm, the delivered power shall remain within +/-20% of the set power and there shall be no reset or interruption of the HF power unless this is clearly indicated on the product.

The Specialist | Pro must emit electromagnetic energy in order to perform its intended function. Nearby electronic equipment may be affected.

The Specialist | Pro is intended for use in the electromagnetic environment listed below. The customer or the user of the Specialist | Pro should assure that it is used in such an environment. - electromagnetic emissions

Emissions test	**Compliance**	**Electromagnetic environment – guidance**
RF Emissions CISPR 11	Group 1	The Specialist | Pro must emit electromagnetic energy in order to perform its intended function. Nearby electronic equipment may be affected.
RF Emissions CISPR 11	Class A	The Specialist | Pro is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used in domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/flicker Emissions IEC 61000-3-3	Complies	

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

The Specialist | Pro is intended for use in the electromagnetic environment listed below. The customer or the user of the Specialist | Pro should assure that it is used in such an environment. - electromagnetic immunity	
Immunity test	**Compliance Test Level**
IEC 61000-4-2, Electro-Static Discharge	±8kV Contact ±15kV Air
IEC 61000-4-3, Radiated Immunity	10V/m 80MHz – 1000MHz 10V/m 1.4GHz – 2.7GHz(1)
IEC 61000-4-4, Electric Fast Transients Immunity	2kV, AC Mains
IEC 61000-4-5, Surge Immunity	1kV Line-Line 2kV Line-PE
IEC 61000-4-6, Conducted Immunity	6Vrms, 150kHz – 80MHz
RIEC 61000-4-8, Power Frequency Magnetic Field Immunity	30A/m, 50 and 60Hz
IEC 61000-4-11, Voltage Dips & Interruptions	<5 % UT (>95 % dip in UT) for 0,5 cycle and 1.0 cycle 70 % UT (30 % dip in UT) for 25/30 cycles <5 % UT (>95 % dip in UT) for 250/300 cycles

OUTPUT CHARACTERISTICS

Maximum Output for Monopolar and Bipolar Modes

Power readouts agree with actual power into rated load to within 20% or 5 watts, whichever is greater.

Mode	Output Power	Output Frequency	Repetition Rate	Open Circuit Vpeak max	Crest Factor* (Rated Load)
Cut	120 W @ 500 Ω	357 kHz ± 50 kHz	N / A	1250V	2.9 ± 20%
Blend	90 W @ 800 Ω	357 kHz ± 50 kHz	30 kHz ± 5 kHz	1850V	3.3 ± 20%
Coagulation	80 W @ 1000 Ω	475 kHz ± 19 kHz	57 kHz ± 5 kHz	3300V	5.5 ± 20%
Fulguration	40 W @ 1000 Ω	410 kHz ± 50 kHz	25 kHz ± 5 kHz	3900V	7.7 ± 20%
Bipolar	30 W @ 200 Ω	520 kHz (-14 kHz, +29 kHz)	32 kHz ± 5 kHz	1200V	6.9 ± 20%

* an indication of a waveform's ability to coagulate bleeders without a cutting effect.

OUTPUT POWER CURVES

Figure 3–1 and 3–2 illustrates output voltage (Vpeak) versus power setting. Figure 3–3 illustrates output power versus power setting for all modes. Figures 3–4 through 3–8 illustrate specific output power delivered to a range of load resistances for each mode.

Figure 3 – 1 Output voltage (Vpeak) versus power setting (Cut, Coag)

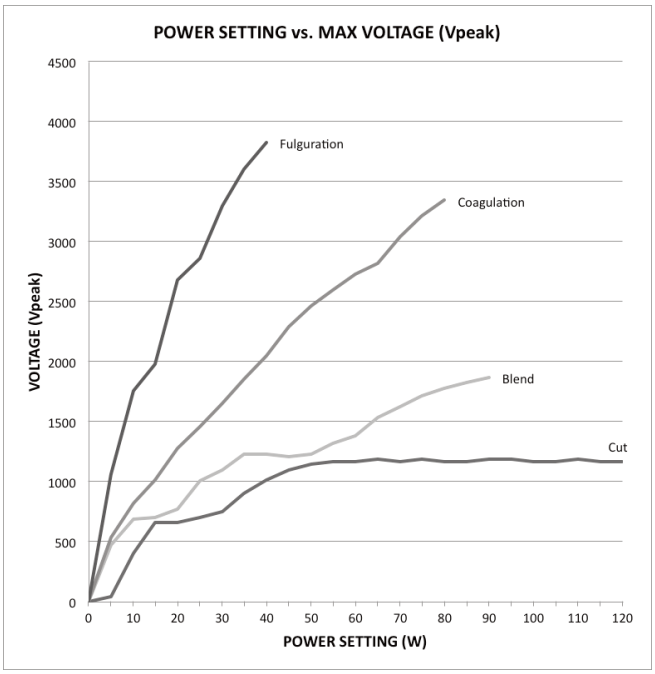


Figure 3 – 2 Output voltage (Vpeak) versus power setting at (Bipolar)

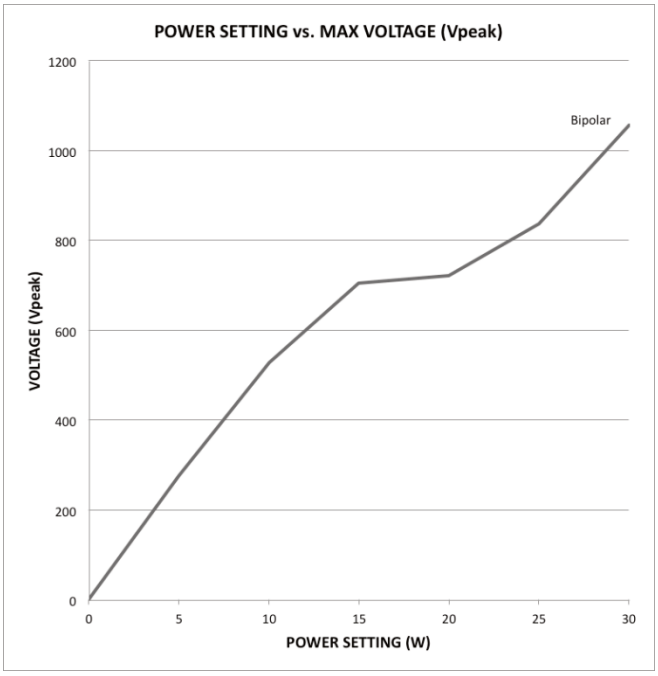


Figure 3 – 3 Output power versus power setting for all modes

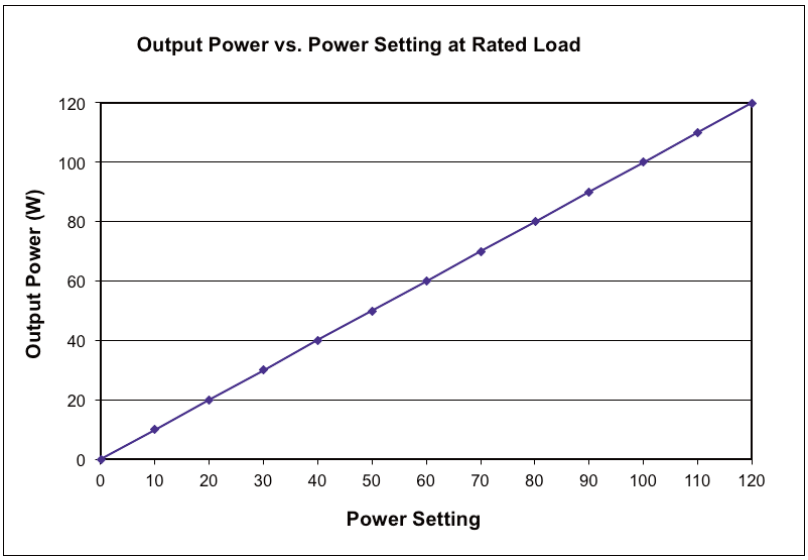


Figure 3 – 4 Output power versus impedance for Cut mode

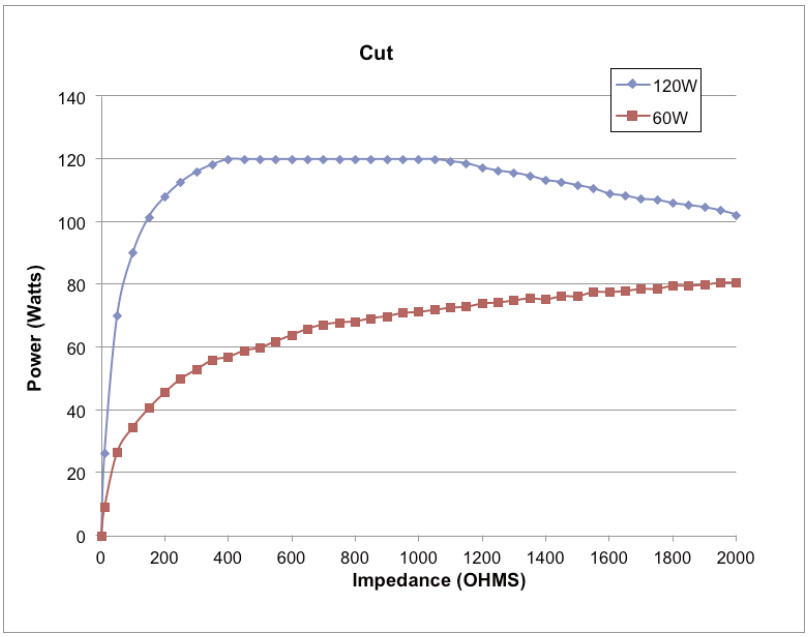


Figure 3 – 5 Output power versus impedance for Blend mode

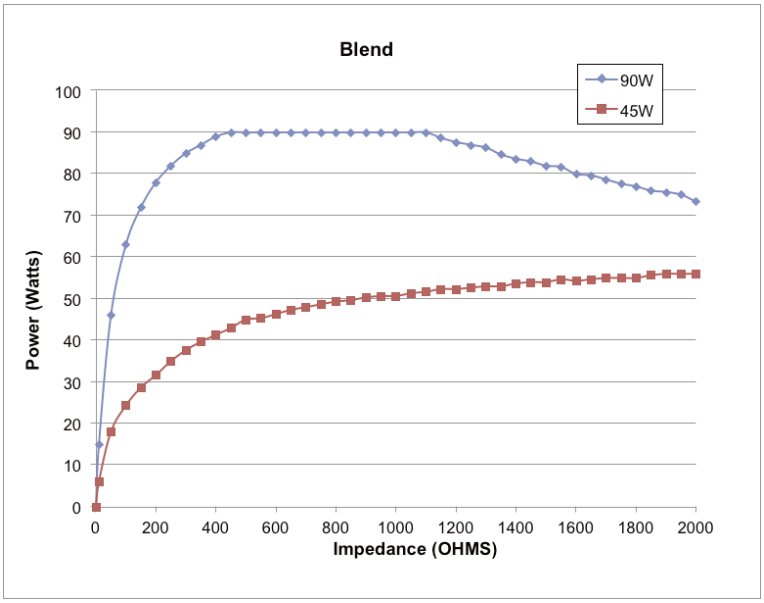


Figure 3 – 6 Output power versus impedance for Coagulation mode

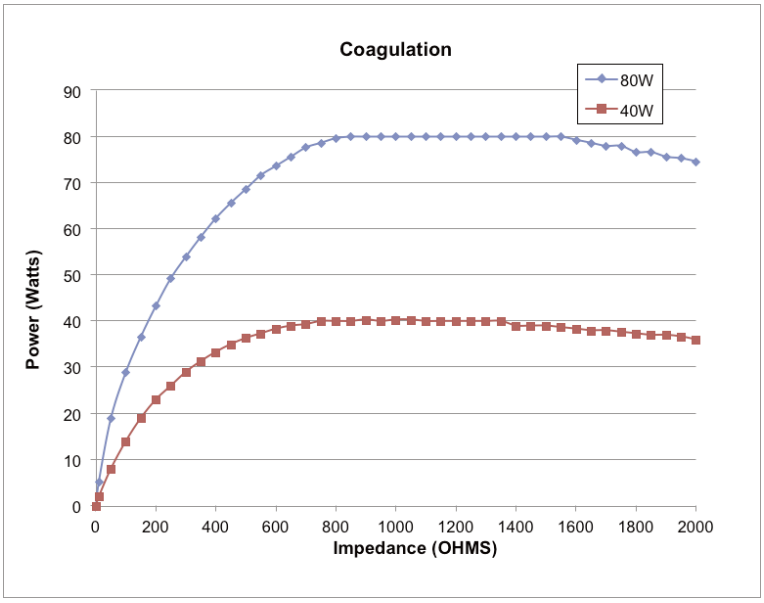


Figure 3 – 7 Output power versus impedance for Fulguration mode

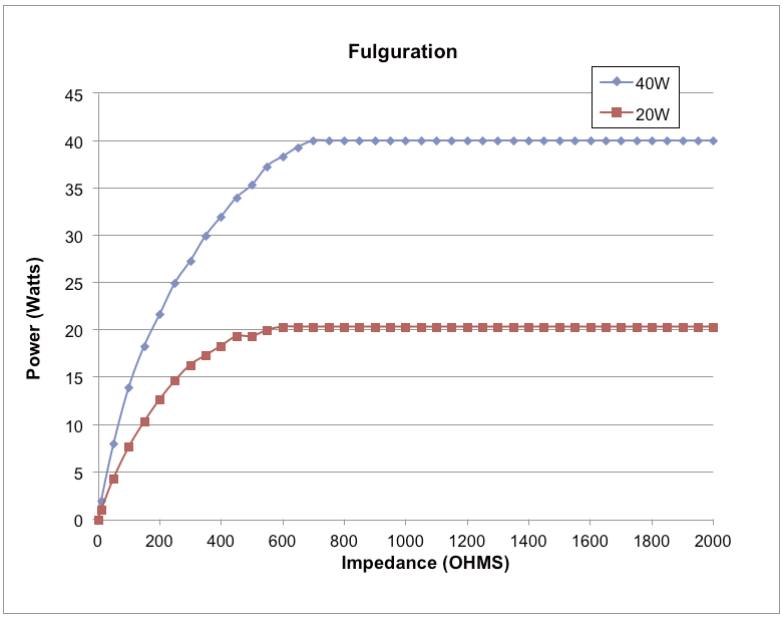
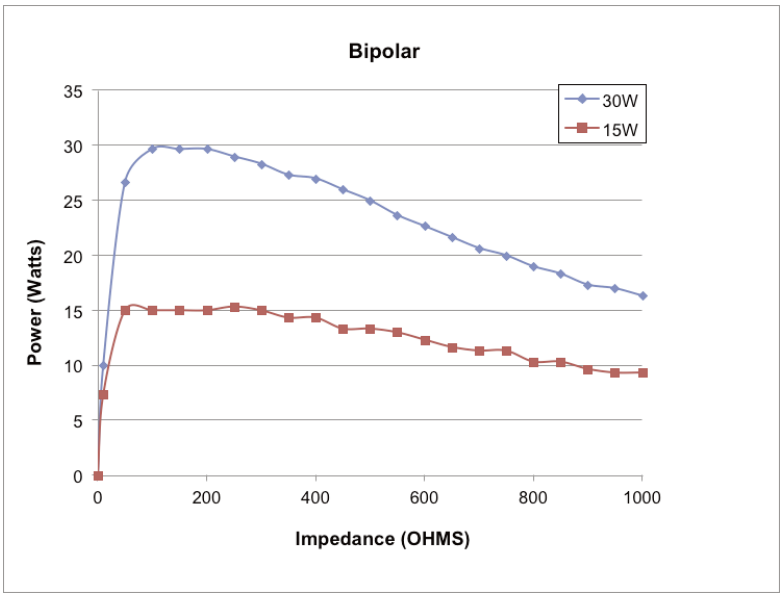


Figure 3 – 8 Output power versus impedance for Bipolar mode



Reference Output Waveforms

The following figures are the output waveforms as viewed on an oscilloscope.

Figure 3 – 9 Cut mode waveform

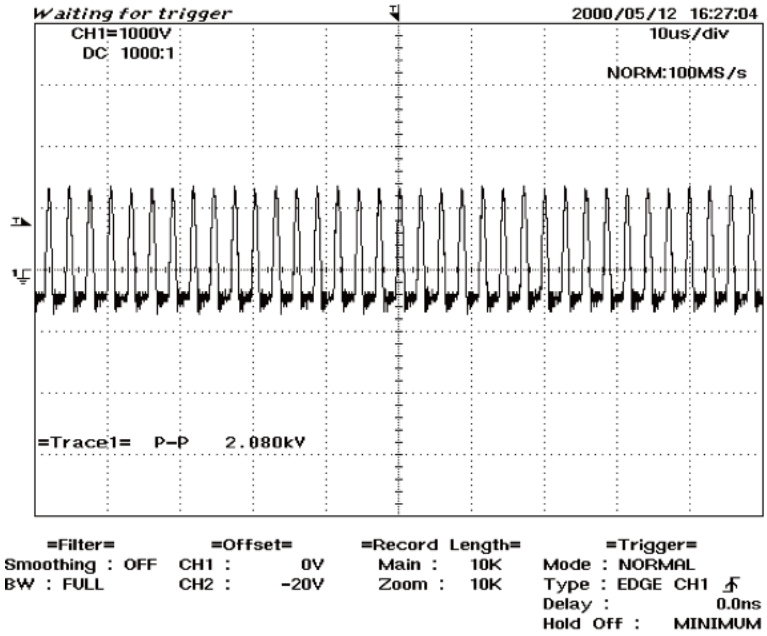


Figure 3 – 10 Blend mode waveform

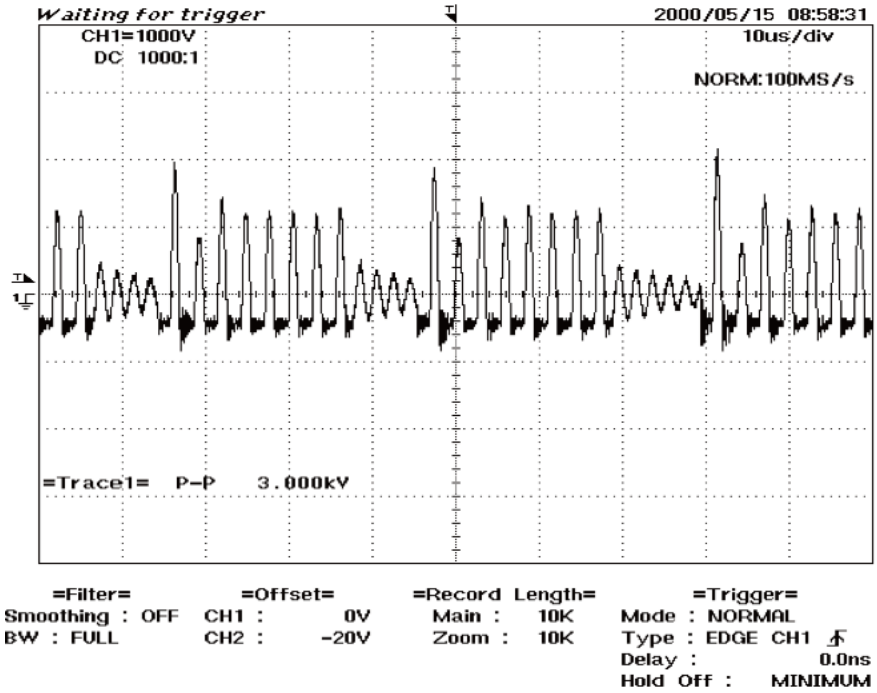


Figure 3 – 11 Coagulation mode waveform

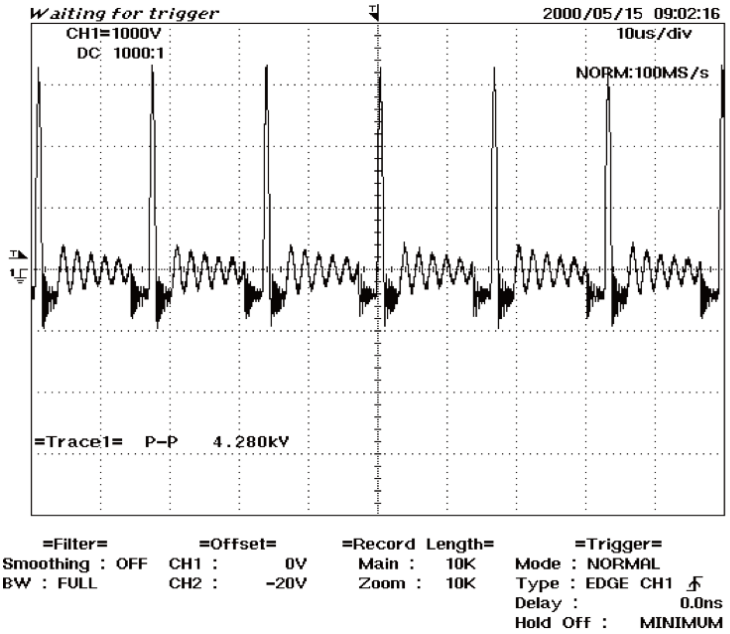


Figure 3 – 12 Fulguration mode waveform

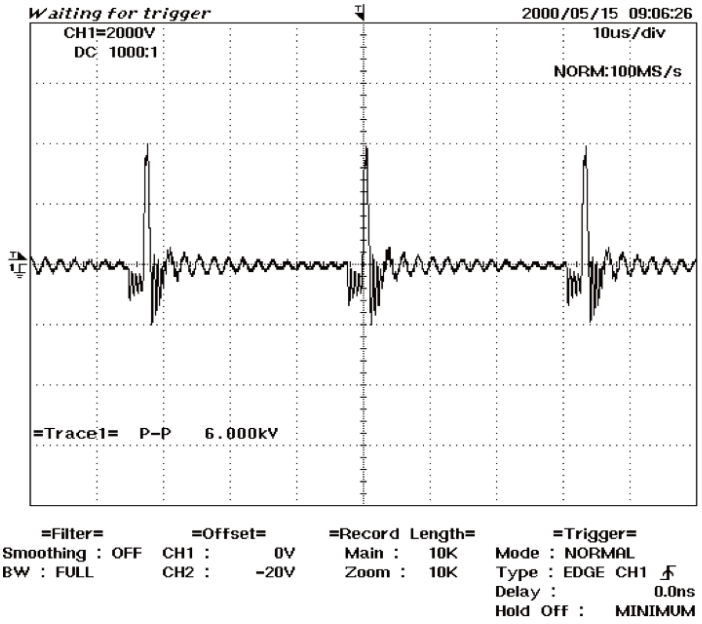
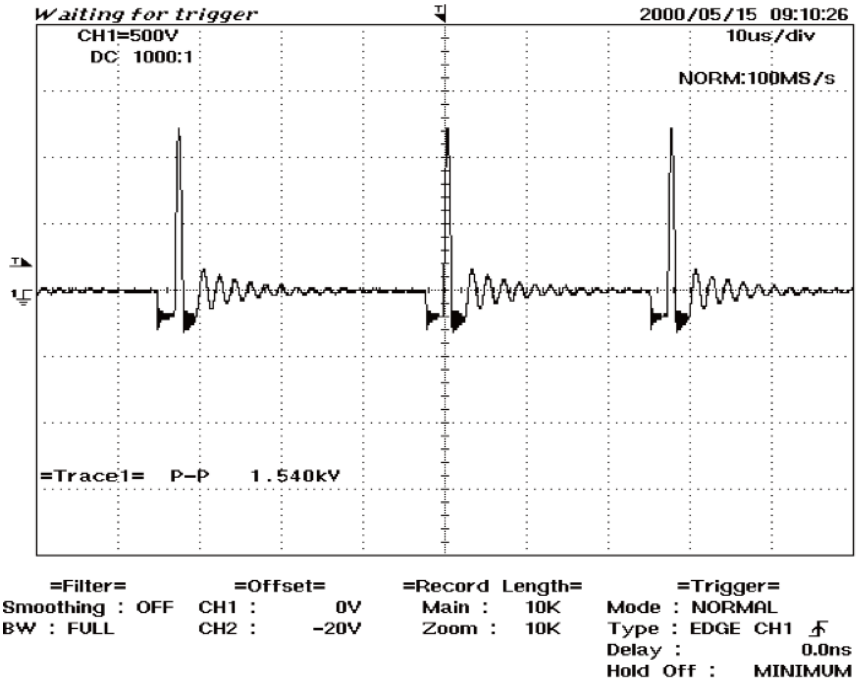


Figure 3 – 13 Bipolar mode waveform



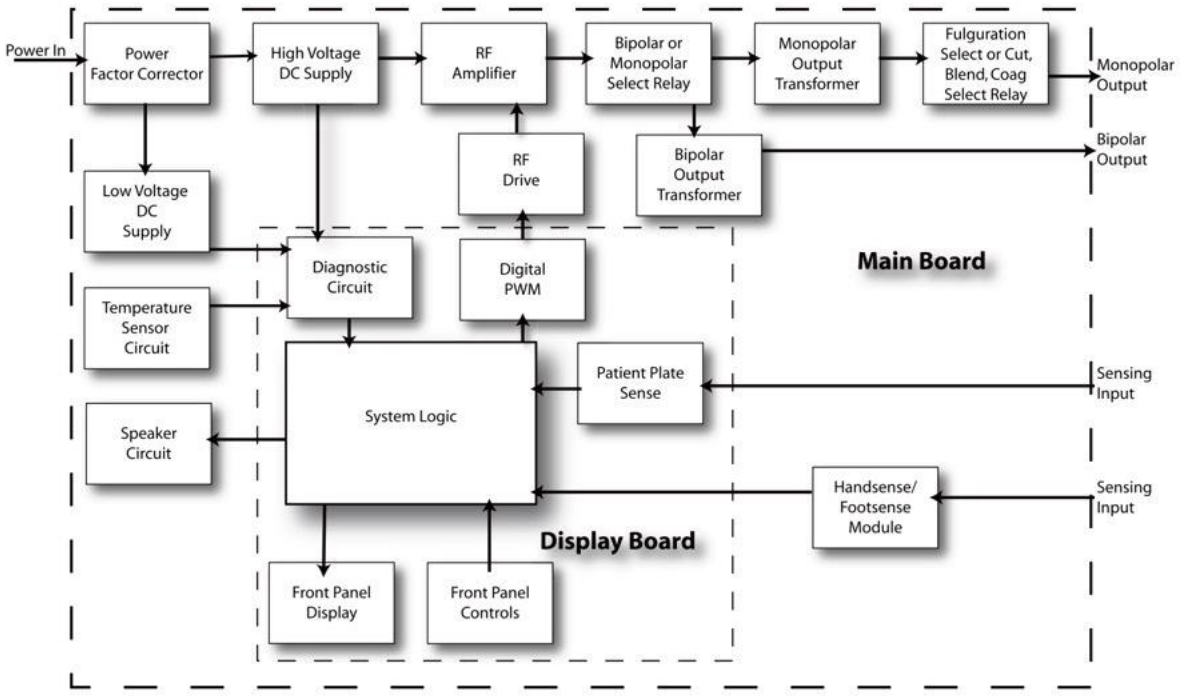
THEORY OF OPERATION

This section includes the following information:

- Block diagram
- Functional overview of key circuits
- System logic
- Bovie® Specialist | PRO control signal inputs and outputs.

BLOCK DIAGRAM

Figure 4 – 1 Functional block diagram of the Bovie® Specialist | PRO system



FUNCTIONAL OVERVIEW OF KEY CIRCUITS

The following descriptions highlight the main circuits in the Bovie® Specialist | PRO Electrosurgical Generator.

Power Factor Correction Circuit (PFC)

The Power Factor Correction Circuit ensures lower power consumption. The circuit is used to correct the power load that is distributed to the unit's capacitors, providing the lowest voltage required for proper operation of the unit. The PFC also regulates the universal input of 100 to 240 volts that power the unit.

High Voltage DC Supply

The unit incorporates a high voltage power supply to generate the RF output power. The high voltage power supply delivers an unregulated DC output for the RF output. The nominal DC voltage from the high voltage power supply is 80 VDC ± 5V.

Low Voltage DC Supplies

The unit incorporates six regulated low voltage levels to control generator operations. They are: +3.3 VDC, +5 VDC, +12 VDC, -12 VDC, 1.2 VDC, and -16 VDC.

Temperature Sensing Circuit

The temperature sensing circuit is used by the system logic to monitor the internal temperature of the unit. If the temperature rises above 85° C, the system displays error code E7 and disables the RF output.

Speaker Circuit
The audio circuit is used by the system logic to generate activation tones and alarm tones. Volume for the activation tones may be adjusted from the back panel of the unit.

NOTICE:
Alarm volume cannot be adjusted up or down.

Diagnostic Circuit
The Diagnostic Circuit converts the Analog temperature and Analog DC Voltage measurements to digital values. This information is sent to the Control Logic for continuous monitoring.

Patient Return Electrode Sensing Circuit
The Patient Return Electrode Sensing Module senses and sends signals to the system logic that displays which type of patient return electrode is attached to the patient.

When you connect a single plate patient return electrode to the unit, the Pad Sensing Module will detect if the resistance is below 25 Ω. If it is, the Bovie® Specialist | PRO will display the green single plate LED on the front of the unit.

When you connect a split plate patient return electrode to a patient, and the Pad Sensing Module detects a resistance between 10 and 135 Ω, then the Bovie® Specialist | PRO will display the green split plate LED on the front of the unit.

The Pad Sensing Module constantly monitors the patient contact quality. If the impedance changes by a specific amount, then the unit will display an alarm, and immediately de-activate the RF output power.

WARNING:

Patient Return Electrode contact quality is only monitored when a split plate patient return electrode is attached to the patient.

RF Amplifier Circuit
The RF Amplifier Circuit generates the RF output energy that is delivered to the patient. It is a single-ended power amplifier incorporating three power MOSFETs, and two step-up transformers.

The initial RF drive pulse is generated by the Digital PWM circuit and the system logic unit. When the RF drive pulse turns the power MOSFETs "ON," current flows from the high voltage supply through one of the output transformers, depending on which mode the unit is in, through the clamping diodes, and then through the MOSFETs to high voltage ground.

The energy developed by the "ON" time is stored in an LC tank circuit. When the MOSFETs are OFF the energy is delivered to the patient through the output capacitors. A longer "ON" time develops more energy in the LC tank circuit; therefore, more energy is delivered to the patient.

Monopolar Select Circuit
The monopolar select circuit is used to switch the Bovie® Specialist | PRO between each of the four-monopolar modes. Selection of the modes is accomplished through the matrix switches on the front panel. High voltage relays are used to switch and isolate the four-monopolar configurations one from the other.

Monopolar / Bipolar Select Relays
The monopolar / bipolar select relays changes which output transformer is used to deliver the RF output to the patient.

Controls and Indicators
The Bovie® Specialist | PRO controls and indicators are listed below:

- MEMBRANE SWITCHES Toggle between modes and output power increments.
- DISPLAYS Seven segment displays indicate the output power in watts.
- MODE INDICATORS Green LEDs indicate the present mode of the unit.
- POWER SWITCH A double pole single throw switch that snaps into the front bezel. This switch supplies the AC mains current to the generator.

Digital PWM Circuit
The Digital Pulse Width Modulation (PWM) Circuit controls the output power of the unit. This digitally controlled signal is used by the system logic to provide a precise signal to the RF drive.

The pulse width is determined by power setting (generated by the user) on the front of the unit.

When a power is selected, the system logic determines what the pulse width needs to be to deliver the requested output.

SYSTEM LOGIC
The control logic uses a Field Programmable Gate Array as the “brain” of the Bovie® Specialist | PRO Electrosurgical Generator. This system interprets all of the inputs and delivers the correct corresponding outputs.

Every operation of the unit is controlled from this system.

A System Clock Circuit, composed of an oscillator, provides the basic operating frequency of 5 MHz.

The Reset Circuit provides a single pulse at the time the Bovie® Specialist | PRO Electrosurgical Generator is turned on.
This pulse resets the Field Programmable Gate Array to ensure proper operation.

BOVIE® SPECIALIST | PRO CONTROL SIGNAL INPUTS AND OUTPUTS

The following table lists the important input and output signals. From a troubleshooting standpoint, the absence (and presence) of these signals will help you isolate problems.

Signal Name	Description
TEMP	This is an input signal from the Temperature Sense Circuit that informs the system logic of the internal temperature of the unit.
AUDIO_DRV	This is an output signal from the system logic that generates the activation tones for all modes of operation. A 610 Hz square wave is generated whenever cut or blend mode is activated. A 840 Hz square wave is generated when the coagulation, fulguration, or bipolar mode is activated. This signal is used by the audio circuit.
ALARM_DRV	This is an output signal from the system logic that generates a 2.44 kHz / 1.25 kHz square wave for activating the alarm siren. This signal is used by the audio circuit
PFC_VSENSE_ACT	This is an input signal from the PFC circuit to measure the High Voltage.
PFC_ON	This is an output signal to the PFC circuit to enable the Power Factor corrector during RF Activation.
PFC_VSENSE_GND	This is an input signal from the PFC circuit to measure the high voltage.
TAP_SEL	This is an output signal from the system logic that controls relays on the main board. The relays select which secondary windings will be used from the monopolar output transformer.
OUT_SEL	This is an output signal from the system logic that controls relays on the main board. They control which output transformer provides the RF output circuit delivered to the patient.

Signal Name	Description
HAND/FOOT_SEL	This is an output signal from the system logic that controls relays on the main board. These relays direct which output jack receives the output RF power. The output power for monopolar modes is switchable from foot-controlled hand piece activation, to a handcontrolled (switching pencil) activation.
RF_DRV	This is an output signal from the digital PWM circuit that controls the pulse width duration for the RF drive.
SENS_HAND_B	This is an input signal from the Hand B request sense circuit. Hand B refers to the Coag button on the handpiece. This signal is generated by a colpitts oscillator located on the main board.
SENS_HAND_A	This is an input signal from the Hand A request sense circuit. Hand A refers to the Cut button on the handpiece. This signal is generated by a colpitts oscillator located on the main board.
SENS_FOOT_B	This is an input signal from the Foot B request sense circuit. Foot B refers to the Coag pedal on the footswitch. This signal is generated by a colpitts oscillator located on the main board.
SENS_FOOT_A	This is an input signal from the Foot A request sense circuit. Foot A refers to the Cut pedal on the footswitch. This signal is generated by a colpitts oscillator located on the main board.
NEM_T1	This is an isolated analog signal used in conjunction to NEM_T2 to measure return electrode contact impedance.
NEM_T2	This is an isolated analog signal used in conjunction to NEM_T2 to measure return electrode contact impedance.

MAINTAINING THE BOVIE® SPECIALIST | PRO

This section includes the following information:

- Cleaning the unit
- Performing periodic inspection
- Replacing fuses.

Bovie Medical Corporation recommends that you complete periodic inspection and performance testing. Perform inspections and performance testing every six months. A qualified biomedical technician should conduct this testing to ensure that the unit is operating effectively and safely.

CLEANING

After each use, clean the unit.

WARNING:

Electric Shock Hazard - Always turn off and unplug the generator before cleaning.

NOTICE:
Do not clean the generator with abrasive cleaning or disinfectant compounds, solvents, or other materials that could scratch the panels or damage the generator.

1. Turn off the generator, and unplug the power cord from the wall outlet.

2. Thoroughly wipe all surfaces of the generator and power cord with a mild cleaning solution or disinfectant and a damp cloth. Follow the procedures approved by your institution or use a validated infection control procedure. Do not allow fluids to enter the chassis. Do not sterilize the generator.

PERIODIC INSPECTION

Every six months, visually inspect the Bovie® Specialist | PRO for signs of wear or damage.
In particular, look for any of the following problems:

- Damage to the power cord
- Damage to the power cable receptacle
- Obvious damage to the unit
- Damage to any receptacle
- Accumulation of lint or debris in or around the unit.

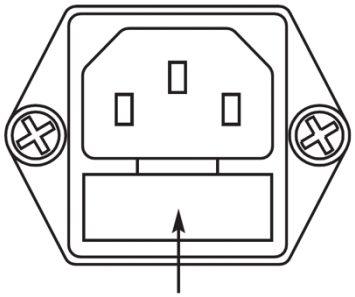
FUSE REPLACEMENT

Fuses for the unit reside directly below the Power Cable Receptacle on the rear of the unit.

To replace the fuses, follow this procedure:

1. Unplug the power cord from the wall outlet.
2. Remove the power cord from the Power Cable Receptacle on the rear panel.
3. To release the fuse drawer, insert a small flathead screwdriver into the slot on the drawer below the power cord receptacle. Then, slide the drawer out.
4. Remove the two fuses and replace them with T3.15AL250V Slow Blow fuses.
5. Insert the fuse holder into the Power Cable Receptacle.

NOTICE:
If the unit does not display an error and does not power on, check fuses.



6 – 1 Fuse Holder

TROUBLESHOOTING

This section includes error code descriptions and actions to take to resolve them.

RECOMMENDED EQUIPMENT FOR TROUBLESHOOTING

The following equipment enables you to troubleshoot and repair the Bovie® Specialist | PRO Electrosurgical Generator.

- Digital multimeter with leads
- Electrosurgical analyzer or a true RMS voltmeter such as a Fluke 8920A
- Wideband current transformer such as a Pearson 4100
- Noninductive RF load resistors 200 W, 500 W, 800 W, 1000 W
- Oscilloscope (dual channel) at 100 MHz
- Oscilloscope probes, (2) 10X and 1000X
- Bovie®/Aaron® footswitch
- Bovie®/Aaron® handswitching pencil (single use or reusable)
- Standard technician's tool kit
- Miscellaneous test leads and cables.

TROUBLESHOOTING THE BOVIE® SPECIALIST | PRO

If the generator is not functioning properly, use the information in this section to perform the following activities:

- Identify and correct the malfunction.
- If an error code was displayed, take the appropriate action(s) to correct the error condition.

Inspecting the Generator

If the Bovie® Specialist | PRO malfunctions, check for obvious conditions that may have caused the problem.

1. Check the generator for visible signs of physical damage.

2. Verify that all accessory cords are properly connected.

3. Check the power cord. Replace the power cord if you find exposed wires, cracks, frayed insulation, or a damaged connector.

4. Open the fuse drawer and inspect the fuse housing and fuses for damage and corrosion.

5. Verify that the fuses are firmly seated. An internal component malfunction in the generator can damage the fuses.

6. You may need to replace the fuses if the generator fails the self-test or stops functioning. Refer to Fuse Replacement in Section 5.

Inspecting the Receptacles

Equipment required:

- Footswitch
- Bipolar cable
- Monopolar instruments (handswitch and footswitch)
- Return electrode cable.

Procedure:

1. Turn off the generator.

2. Disconnect the power cord from the wall receptacle.

3. Check the footswitch receptacle on the rear of the unit for obvious signs of obstruction and damage.

4. Check for a secure fit by inserting the footswitch connector into footswitch receptacle.
   If the footswitch receptacle is damaged, replace the footswitch connector assembly.

5. Check the Bipolar receptacle on the front of the unit for obstruction or damage.

6. Insert a bipolar cable into the bipolar receptacle on the front of the unit. Verify a secure fit.

   If the Bipolar receptacle is damaged, replace the bipolar connector assembly.

7. Check the monopolar handpiece receptacle on the front of the unit for obstruction or damage.

8. Insert a handswitching pencil into the monopolar handpiece receptacle on the front of the unit. Verify a secure fit.

   If the monopolar handpiece receptacle is damaged, replace the monopolar handpiece assembly.

9. Check the monopolar foot controlled receptacle on the front of the unit for obstruction or damage.

10. Insert a monopolar foot controlled handpiece into the monopolar foot control receptacle on the front of the unit. Verify a secure fit.
    If the monopolar foot controlled receptacle is damaged, replace the connector assembly.

11. Check the Patient Return Electrode receptacle on the front of the unit for a broken pin or an obstruction.

12. Insert a return electrode cable into the return electrode receptacle. Verify a secure fit.

    If the return electrode receptacle on the front of the unit is damaged, replace the return electrode cable assembly.

Inspecting Internal Components

CAUTIONS:
The generator contains electrostatic-sensitive (ESS) components. When repairing the generator, work at a static-control workstation.
Wear a grounding strap when handling electrostatic-sensitive components.
Handle circuit boards by their nonconductive edges.
Use an anti-static container for transport of electrostatic-sensitive components and circuit boards.

To inspect the internal components, follow this procedure:

1. Remove the four screws that secure the cover to the chassis.

2. Lift the cover off the chassis. Save the cover and screws for later reinstallation.

3. Visually inspect and verify that all connectors are firmly seated.

4. Inspect each board for damaged components, wires, cracks and corrosion.

5. Reinstall the cover by positioning the cover over the chassis, and securing the four screws.

UNDERSTANDING ERROR CODES AND AUDIO TONES

The Bovie® Specialist | PRO Electrosurgical Generator includes automatic, perpetual, self-diagnostics. If the diagnostics detect an error, the system displays an error code, sounds an audible tone, and deactivates the output power.

Any errors detected will shut down the RF output power.

Error Code	Description	Recommended Action
F1 (on the Cut / Blend display)	Handswitch or monopolar footswitch cut pedal may be stuck.	1. Turn off, then turn on the generator. Do not press buttons or activate accessory devices during the self-test. 2. If the error code reappears, disconnect all accessories. Turn off, then turn on the generator again. 3. If the problem persists, replace the handpiece or footswitch and repeat the restart. 4. If the error code reappears, record the number and call Bovie® Customer Service.
F1 (on the Coagulation / Fulguration Bipolar display)	Handswitch or monopolar footswitch coag pedal may be stuck.	
F2	Cut and Coag buttons activated simultaneously (pencil or footswitch)	Use the Footswitch Control Selector to toggle and select the Bipolar Foot Control. Verify the Bipolar Footswitch Control Indicator Illuminates. Use only the Coag (Blue) pedal on the footswitch.
F3	Footswitch Cut (Yellow) pedal is pressed while Bipolar Mode is selected and Footswitch Control Selector is set to Bipolar Foot Control. Or, Coag (Blue) pedal is pressed while Bipolar Footswitch Control is selected and Bipolar Mode is not selected.	The unit will not allow the footswitch to activate the unit if Bipolar footcontrol is selected, but the Bipolar Mode is not selected.
E4	DC voltage error	1. Turn the unit off. 2.Turn the unit on. 3. If the error code reappears, record the number and contact Bovie® Customer Service.
E6	Delta error	1. Turn the unit off. 2. Verify that the unit is connected to the line voltage. 3. If the error code reappears, record the number and contact Bovie® Customer Service.
E7	Internal temperature of the unit exceeded the limit.	1. Turn the unit off. 2. Allow the unit to cool for 20 minutes. 3. Turn the unit on. 4. If the error code reappears, record the number and contact Bovie® Customer Service.
E8	Connector Sense Error The unit shall monitor the connection of the main cable between the main and display boards.	1. If this cable becomes disconnected an E8 error shall occur and be displayed. 2. The unit cannot be activated while the error condition is present. 3. The unit has to be reset to remove the error condition.

NOTICE:
Internal firmware self-diagnostics continually monitor the unit's operation to ensure proper and safe performance.

Most error codes result from faults in accessories attached to the unit. The following table lists the error codes, describes the error, and recommends actions to take to resolve the error.

CORRECTING COMMON PROBLEMS

If a solution is not readily apparent, use the table below to help identify and correct specific malfunctions. After you correct the malfunction, verify that the generator successfully completes the self-test.

Situation	Possible cause	Recommended action
Generator does not respond when turned on	Disconnected power cord, faulty wall receptacle, or faulty power cord	1. Check power cord connections (generator and wall receptacle). 2. Connect the power cord to a functional wall receptacle. If necessary, replace the power cord.
	Fuse drawer is open or fuses blown	1. Close the fuse drawer. If necessary, replace the fuse(s). 2. If a problem persists, use a backup generator.
	Loose or disconnected internal cables	Check all internal connections.
	Faulty power entry module or Connections	Check the power entry module and its cable connections.
	Faulty power switch	Replace the power switch.
Generator is on, but did not complete the self-test.	An alarm condition exists.	Check the display for an error code. Note the number and refer to Error Code list.
	Loose or disconnected internal cables	Check and correct all internal connections.
	Faulty power switch	Replace the power switch.
	Main board malfunction	Replace the main board.
	Display board malfunction	Replace the display board.
Activation and / or alarm tones do not sound; speaker is malfunctioning.	Loose or damaged connection between speaker board and main board	Check / connect all connections from the speaker board to the main board.
	Loose or disconnected cable between main board and display board	Check / connect ribbon cable from the main board to the display board.
	Main board malfunction	Replace the main board.
	Display board malfunction	Replace the display board.

Situation	Possible cause	Recommended action
Blank or confusing LED display	Faulty ribbon cable between Main board and Display board	Check / connect ribbon cable that connects the display board to the main board.
	Display board malfunction	Replace the display board.
Mode buttons do not operate correctly when pressed	Loose or disconnected cable between main board and display board	Check / connect ribbon cable from the main board to the display board
	Loose or disconnected cable between front panel overlay and display board	Check / connect cable from front panel overlay to the display board
	Damaged front panel overlay	Replace front panel overlay
Generator is on and the accessory is activated, but generator does not deliver output.	Malfunctioning footswitch or handswitching instrument	1.Turn off the generator. Check and correct all accessory connections. 2, Turn on the generator. 3, Replace the accessory if it continues to malfunction.
	Display board malfunction	Replace the display board.
	Power set too low	Increase the power setting.
	An error condition exists	1. Check the Cut and Coag displays for an error code number. 2. Note the number and refer to the error codes descriptions in this section.
	Main board malfunction	Replace the main board.
	RF output stage malfunction	1. Troubleshoot the RF output stage as described below: 2. On the main board, verify output pulses (TP1) during activation. 3. If pulses are not present replace the Main board. Check the power MOSFETs for failure (typically fail as shorted). Check all output relays to verify that they are toggling during operation. If they are not, check the relay drivers.
Footswitch will not activate output.	Malfunctioning or damaged footswitch Receptacle	Replace the Footswitch connector assembly
	Footswitch activation signal lost on main board	Replace the main board.

Situation	Possible cause	Recommended action
Continuous monitor interference	Faulty chassis-to-ground connections	1. Check and correct the chassis ground connections for the monitor and, if applicable, for the generator. 2. Check other electrical equipment in the room for defective grounds.
	Electrical equipment is grounded to different objects rather than a common ground.	Plug all electrical equipment into line power at the same location.
	The generator may respond to the resulting voltage differences between grounded objects.	
	Malfunctioning monitor	Replace the monitor.
Interference with other devices only when generator is activated	Metal-to-metal sparking	Check all connections to the generator, patient return electrode, and accessories.
	High settings used for fulguration	Use lower power settings for fulguration or select the Coagulation mode.
	Electrically inconsistent ground wires in the operating room	Verify that all ground wires are as short as possible and go to the same grounded metal.
	If interference continues when the generator is activated, the monitor is responding to radiated frequencies.	Check with the manufacturer of the monitor. Some manufacturers offer RF choke filters for use in monitor leads. The filters reduce interference when the generator is activated and minimize the potential for an electrosurgical burn at the site of the monitor electrode.

Situation	Possible cause	Recommended action
Pacemaker interference	Intermittent connections or metal-tometal Sparking	1. Check all connections to the generator. 2. It may be necessary to re-program the pacemaker.
	Current traveling from active to return electrode during monopolar Electrosurgery is passing too close to pacemaker.	1. Use bipolar instruments, if possible. If you must use a monopolar instrument, place the patient return electrode as close as possible to the surgical site. 2. Make sure the current path from the surgical site to the patient return electrode does not pass through the vicinity of the heart or the site where the pacemaker is implanted. 3. Always monitor patients with pacemakers during surgery and keep a defibrillator available. 4. Consult the pacemaker manufacturer or hospital. 5. Contact the Cardiology Department for further information when use of electrosurgical appliances is planned on patients with cardiac pacemakers.
Abnormal neuromuscular stimulation (stop surgery immediately)	Metal-to-metal sparking	Check all connections to the generator, patient return electrode, and active electrodes.
	Can occur during coag	Use a lower power setting for the Fulgurate mode or select the Coagulation mode.
	Abnormal 50 Hz - 60 Hz leakage Currents	Inside the generator, carefully inspect for damage that may cause shorting between the AC line voltage and connected patient components.

MAIN BOARD TEST POINTS

Test Point	Description
TP1 (TEMP)	TEMPERATURE SENSE
TP2 (AUDIO_DRV)	AUDIO
TP3 (ALARM_DRV)	ALARM
TP5 (SENS FOOT A)	FOOT ACTIVATION REQUEST A
TP6 (SENS FOOT B)	FOOT ACTIVATION REQUEST B
TP7 (SENS HAND A)	HAND ACTIVATION REQUEST A
TP8 (PFC On)	POWER FACTOR
TP9 (SENS HAND B)	HAND ACTIVATION REQUEST
TP10 (NEM T2)	NEUTRAL ELECTRODE T2
TP11 (NEM T1)	NEUTRAL ELECTRODE T1
TP12 (OUT_SEL)	OUTPUT TRANSFORMER SELECT
TP13 (TAP_SEL)	RF MODE SELECT
TP14 (HAND/FOOT_SEL)	HAND OR FOOT OUTPUT SELECT
TP15 (RF_DRV)	RF DRIVE
TP16 (+8V)	+8 VDC
TP17 (DGND)	DIGITAL GROUND
TP18 (75V_PFC)	+75 VDC
TP41, T19 (HV_GND)	HIGH VOLTAGE GROUND
TP20 (3.3V)	+ 3.3 VDC
TP21 (5V)	+5 VDC
TP22 (12v)	+12 VDC
TP23 (-12V)	-12 VDC
TP25 (1.2V)	+1.2 VDC
TP35 (HVPFC_16V)	+16V PFC
TP37 (GND_PFC)	PFC GROUND

REPAIR POLICY AND PROCEDURES

Refer to this section for information on

- Responsibility of the manufacturer
- Returning the generator for service

RESPONSIBILITY OF THE MANUFACTURER

Bovie Medical Corporation is responsible for the safety, reliability, and performance of the generator only under the following circumstances:

- The user has followed the Installation and Setup Procedures in this Service Guide.
- Persons authorized by Bovie Medical Corporation performed assembly operation, readjustments, modifications, or repairs.
- The electrical installation of the relevant room complies with local codes and regulatory requirements, such as IEC and BSI.
- Equipment use is in accordance with the Bovie Medical Corporation instructions for use.

For warranty information, refer to APPENDIX A - WARRANTY.

RETURNING THE GENERATOR FOR SERVICE

Before you return the generator, call your Bovie Medical Corporation representative for assistance. If instructed to send the generator to Bovie Medical Corporation, first obtain a Returned Materials Authorization Number. Then, clean the Generator and package securely to ensure proper protection of the unit. So as to aid in the processing of the unit, please be sure to include a reference to the Return Materials Authorization Number on the outside of the box and ship directly to Bovie Medical Corporation.

Step 1 – Obtain a Returned Materials Material Number

Call the Bovie Medical Corporation Customer Service Center to obtain a Returned Materials Authorization Number. Have the following information ready when you call:

- Hospital / clinic name / customer number
- Telephone number/fax number
- Department / address, city, state, and zip code
- Model number / Serial number or Lot number
- Description of the problem
- Type of repair to be done
- P.O. number

Step 2 – Clean the Generator

WARNING:

Electric Shock Hazard - Always turn off and unplug the generator before cleaning.

NOTICE:
Do not clean the generator with abrasive cleaning or disinfectant compounds, solvents, or other materials that could scratch the panels or damage the generator.

A. Turn off the generator, and unplug the power cord from the wall outlet.

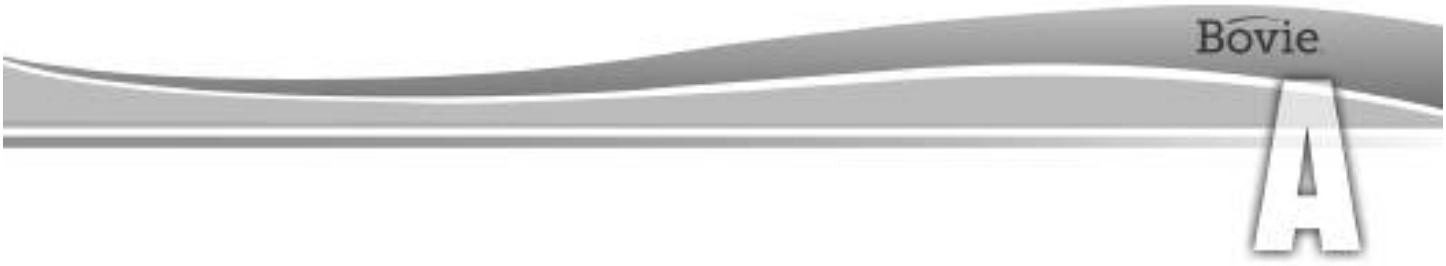
B. Thoroughly wipe all surfaces of the generator and power cord with a mild cleaning solution or disinfectant and a damp cloth. Follow the procedures approved by your institution or use a validated infection control procedure. Do not allow fluids to enter the chassis. You cannot sterilize the generator.

Step 3 – Ship the Generator

A. Attach a tag to the generator that includes the Returned Materials Authorization Number and the information (hospital, phone number, etc.) listed in Step 1 – Obtain a Returned Materials Authorization Number.

B. Be sure the generator is completely dry before you pack it for shipment. Although the preference is to have the Generator repackaged using its original packaging, Bovie understands that this may not always be possible. If necessary, contact Customer Service for the proper packaging to ship the unit. Please be sure to include a reference of the Bovie Return Materials Authorization Number on the outside of the box/container.

C. Ship the generator, prepaid, to the address given to you by the Bovie Medical Corporation Service Center.



WARRANTY

Bovie Medical Corporation warrants each product manufactured by it to be free from defects in material and workmanship under normal use and service for the period(s) set forth below.

Bovie Medical Corporation's obligation under this warranty is limited to the repair or replacement, at its sole option, of any product, or part thereof, which has been returned to it or its Distributor within the applicable time period shown below after delivery of the product to the original purchaser, and which examination discloses, to Bovie Medical's satisfaction, that the product is indeed, defective.

This warranty does not apply to any product, or part thereof, which has been repaired or altered outside Bovie Medical's factory in a way so as, in Bovie Medical's judgment, to affect its stability or reliability, or which has been subjected to misuse, neglect, or accident.

The warranty periods for Bovie Medical products are as follows:

- Electrosurgical Generators: Four years from date of shipment
- Mounting Fixtures (all models): Two years from date of shipment
- Footswitches (all models): One year from date of shipment
- Patient Return Electrodes: Shelf life only as stated on packaging
- Sterile Single Use Accessories: Only as stated on packaging

This warranty is in lieu of all other warranties, express or implied, including without limitation, the warranties of merchantability and fitness for a particular purpose, and of all other obligations or liabilities on the part of Bovie Medical Corporation.

Bovie Medical Corporation neither assumes nor authorizes any other person to assume for it any other liability in connection with the sale or use of any of Bovie Medical Corporation's products.

Notwithstanding any other provision herein or in any other document or communication, Bovie Medical Corporation's liability with respect to this agreement and products sold hereunder shall be limited to the aggregate purchase price for the goods sold by Bovie Medical Corporation to the customer.

There are no warranties which extend beyond the terms hereof.

Bovie Medical Corporation disclaims any liability hereunder or elsewhere in connection with the sale of this product, for indirect or consequential damages.

This warranty and the rights and obligations hereunder shall be construed under and governed by the laws of the State of Florida, USA.

The sole forum for resolving disputes arising under or relating in any way to this warranty is the District Court of the County of Pinellas, State of Florida, USA.

Bovie Medical Corporation, its dealers, and representatives reserve the right to make changes in equipment built and/or sold by them at any time without incurring any obligation to make the same or similar changes on equipment previously built and/or sold by them.

BOARD DRAWINGS AND SCHEMATICS

This supplement contains the assembly drawings and schematics for the following printed circuit boards:

- Main board
- Display board
- Relay board
- Connector board

HOW TO ORDER PARTS FROM BOVIE MEDICAL CORPORATION

Once you have determined what parts you need from the drawings and Bill of Materials, call our Technical Service Department.

Our trained staff will verify the part numbers and arrange immediate delivery. The Technical Service Department can relay cost information, determine parts availability, and suggest any assembly updates available.

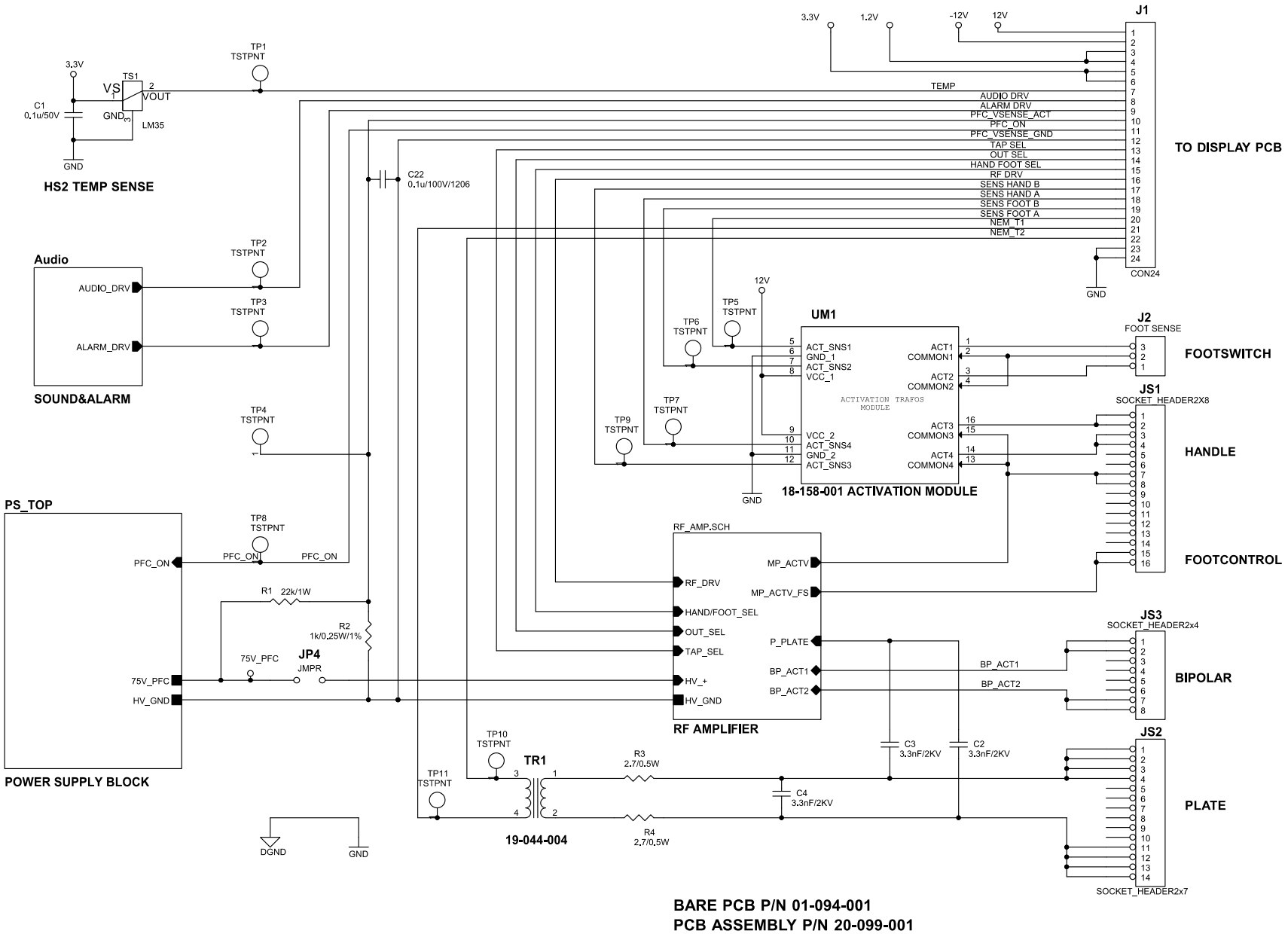
BOVIE® SPECIALIST | PRO DESIGN BREAKDOWN & DRAWING REFERENCE

PCB ASSEMBLIES	
P/N	**Description**
20-099-001	Main PCB Assembly
20-098-001	Display PCB Assembly
20-045-002	Speaker PCB Assembly
20-100-001	Relay PCB Assembly
20-102-001	Connector Panel PCB Assembly
Enclosure	
P/N	**Description**
10-231-001	Back Panel
10-230-001	Bottom Panel
10-232-001	Top Panel
06-294-010	Front Panel, White
FUSES	
P/N	**Description**
02-033-001	Fuse 250 VAC 3.15 Amp, Slow Blow 5x20mm (Power Entry Module for 120 VAC Model Only)
02-280-400	Fuse 250 VAC 4.0 Amp, Slow Blow 5x20mm
02-280-100	Fuse 250 VAC 1.0 Amp, Slow Blow 5x20mm, (F2)
MISCELLANEOUS	
P/N	**Description**
07-244-001	Power Entry Module and Filter
15-369-001	Front Panel Overlay with Membrane Switches
07-215-001	Switch, Non-illuminated, round rocker, RC series
21-078-001	24 Pin Ribbon Cable

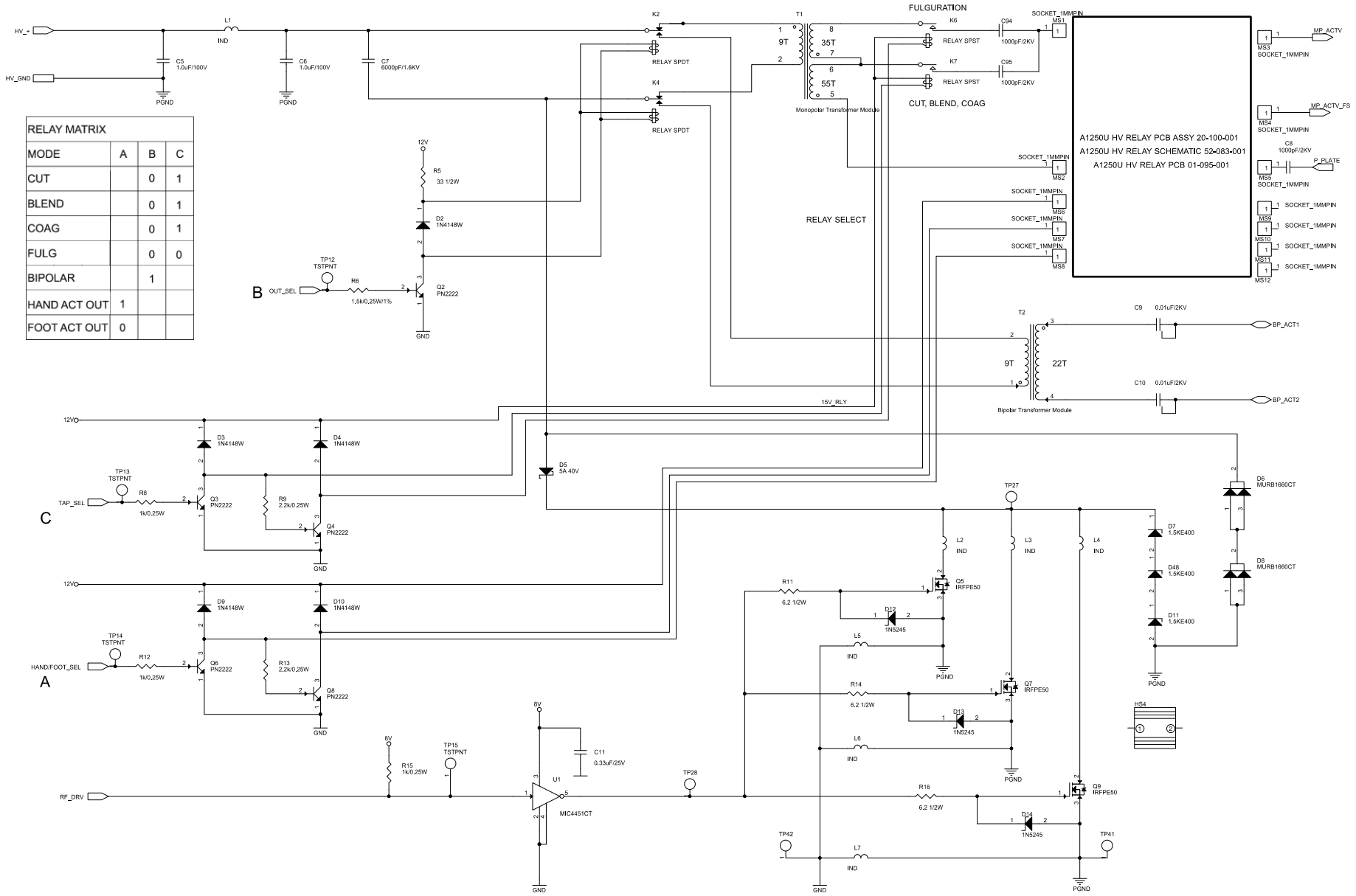
BOVIE DRAWING & SCHEMATIC PACKAGE

Following tri-folds

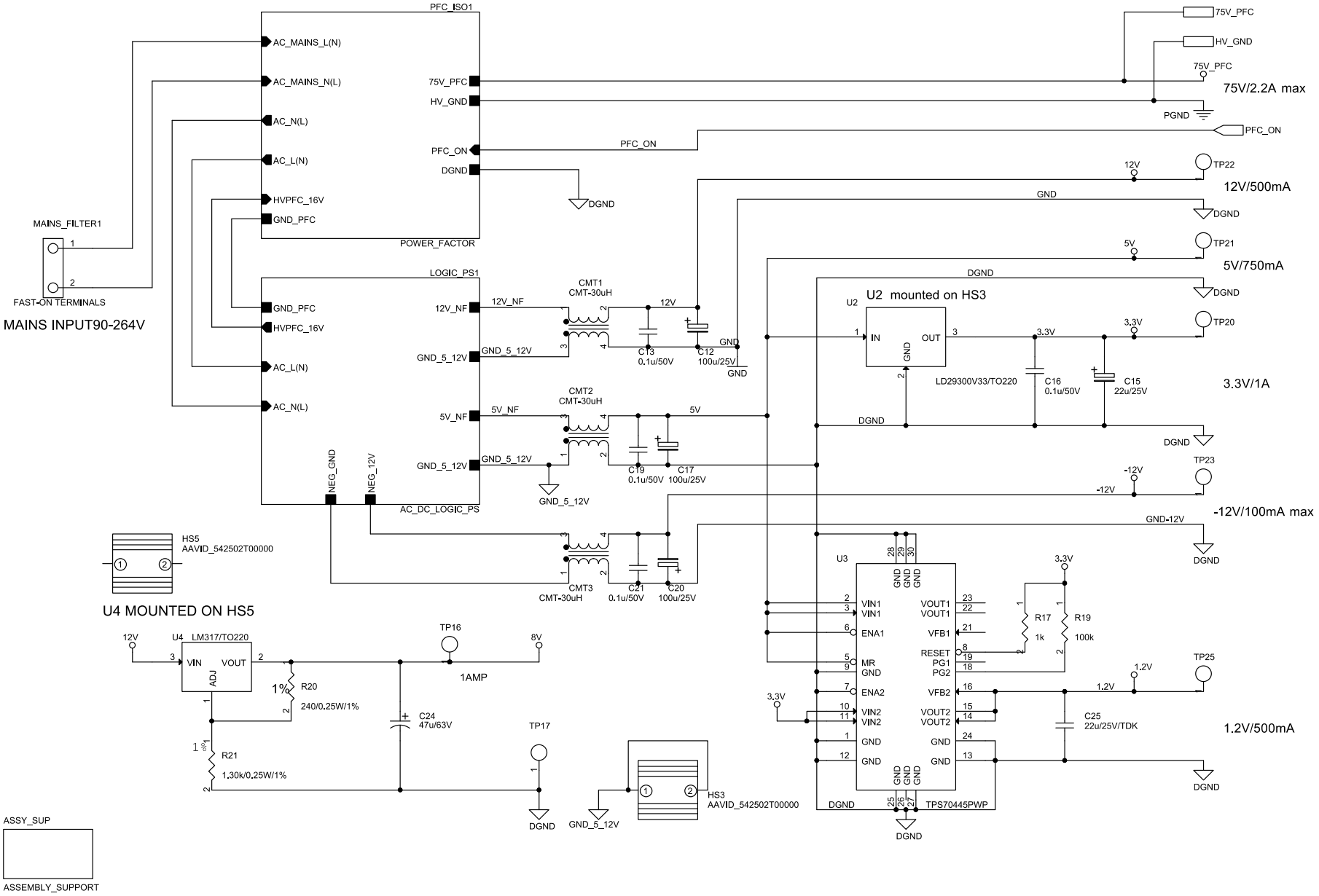
SCHEMATIC 1 MAIN BOARD TOP LEVEL BLOCK



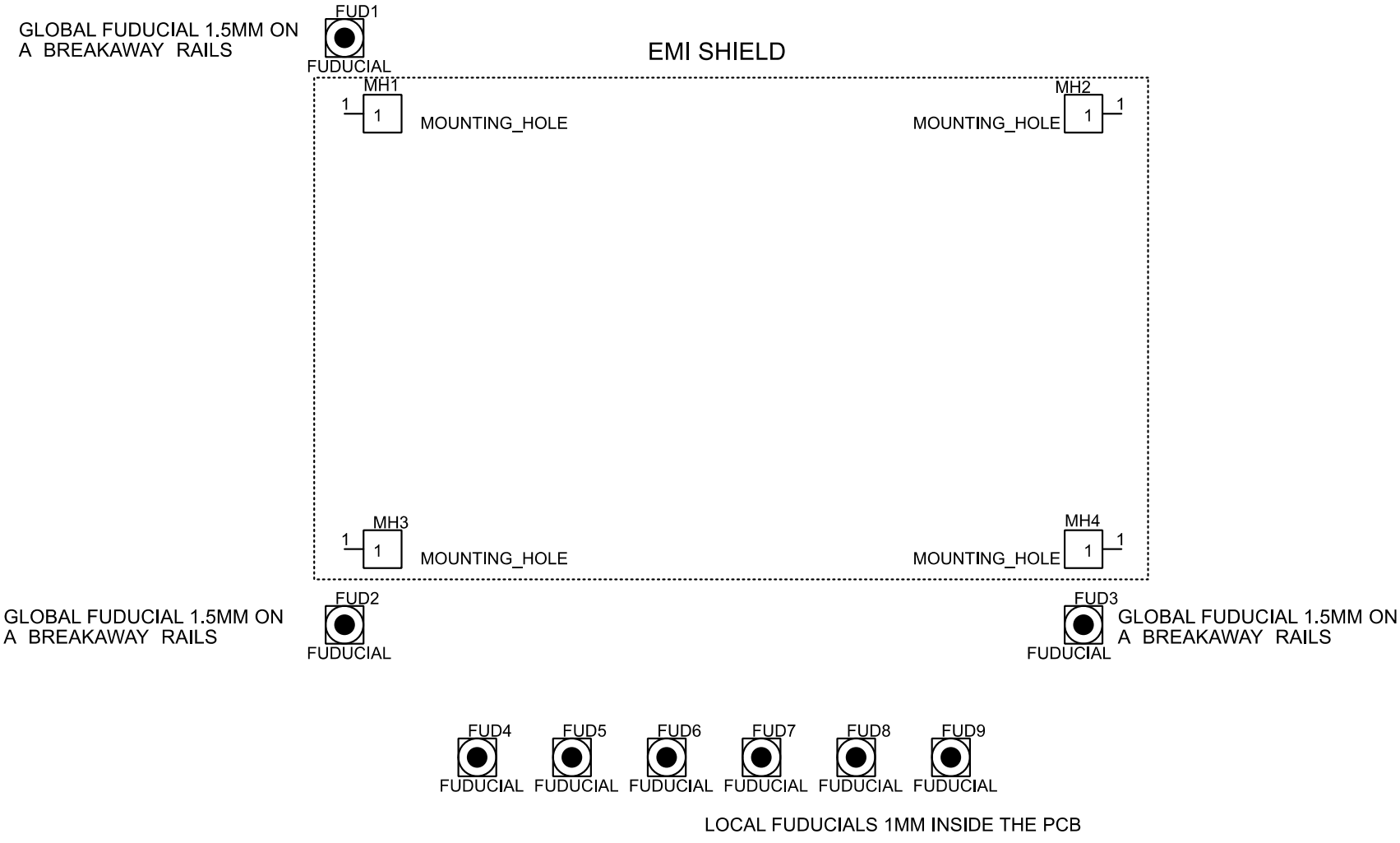
SCHEMATIC 2 MAIN BOARD RF AMPLIFIER CIRCUIT



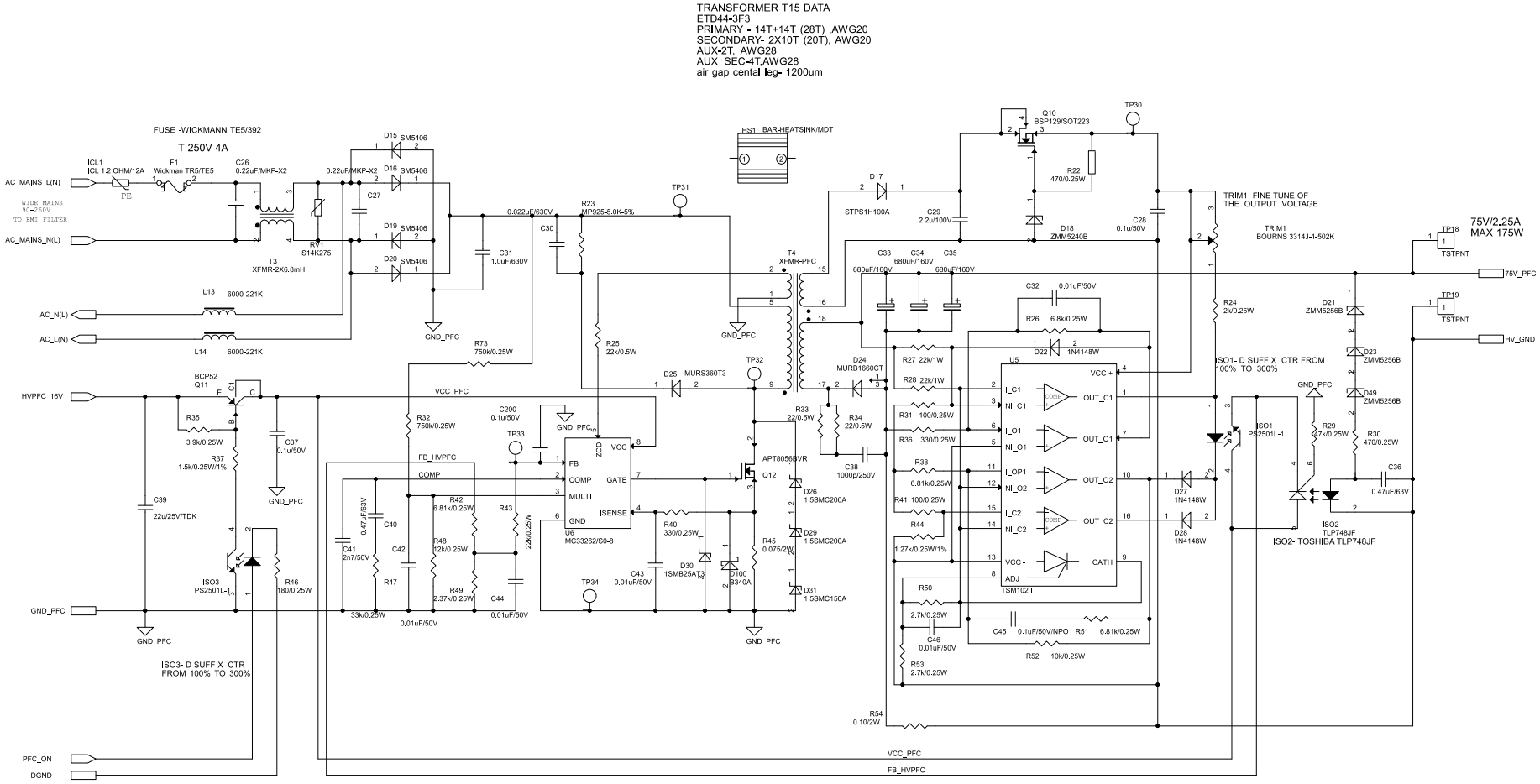
SCHEMATIC 3 MAIN BOARD POWER SUPPLY BLOCK



SCHEMATIC 4 MAIN BOARD ASSEMBLY SUPPORT AND MOUNTING HOLES



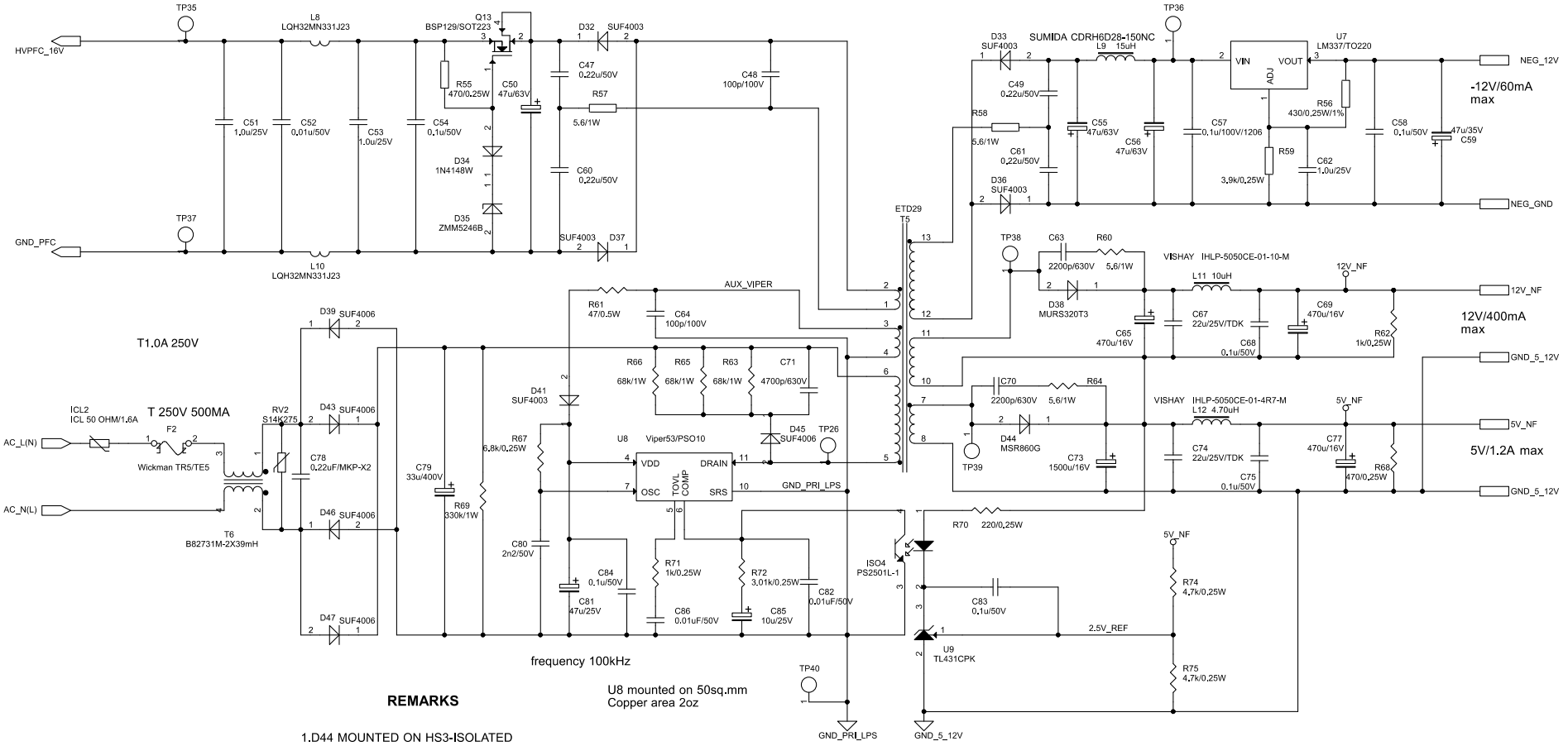
SCHEMATIC 5 MAIN BOARD ISOLATED POWER FACTOR CORRECTOR CIRCUIT



REMARKS

1.Q12 MOUNTED ON HS1-ISOLATED
2.R45 AND R23 MOUNTED ON HS1-ISOLATED
3.D24 MOUNTED ON HS2-ISOLATED
4.R53 MOUNTED ON HS2-ISOLATED

SCHEMATIC 6 MAIN BOARD LOGIC POWER SUPPLY CIRCUIT



REMARKS

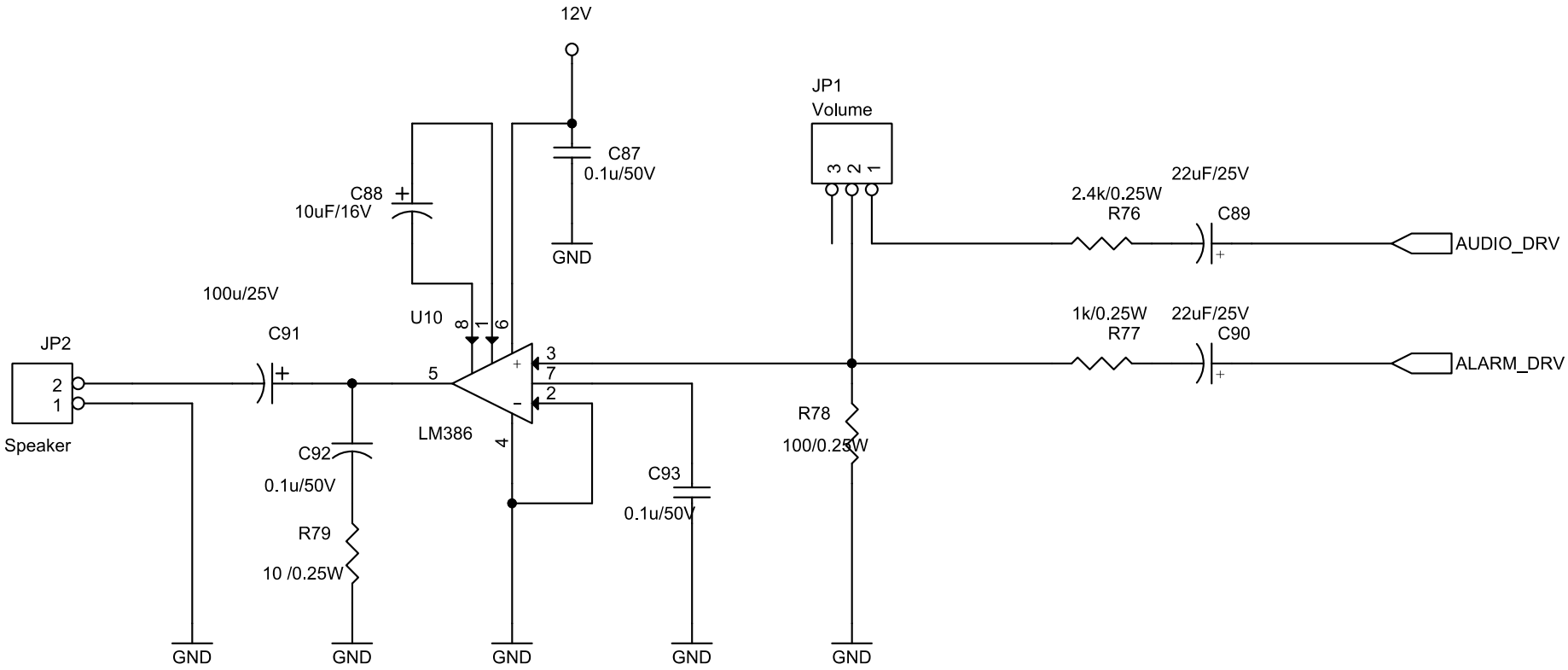
U8 mounted on 50sq.mm
Copper area 2oz

1.D44 MOUNTED ON HS3-ISOLATED

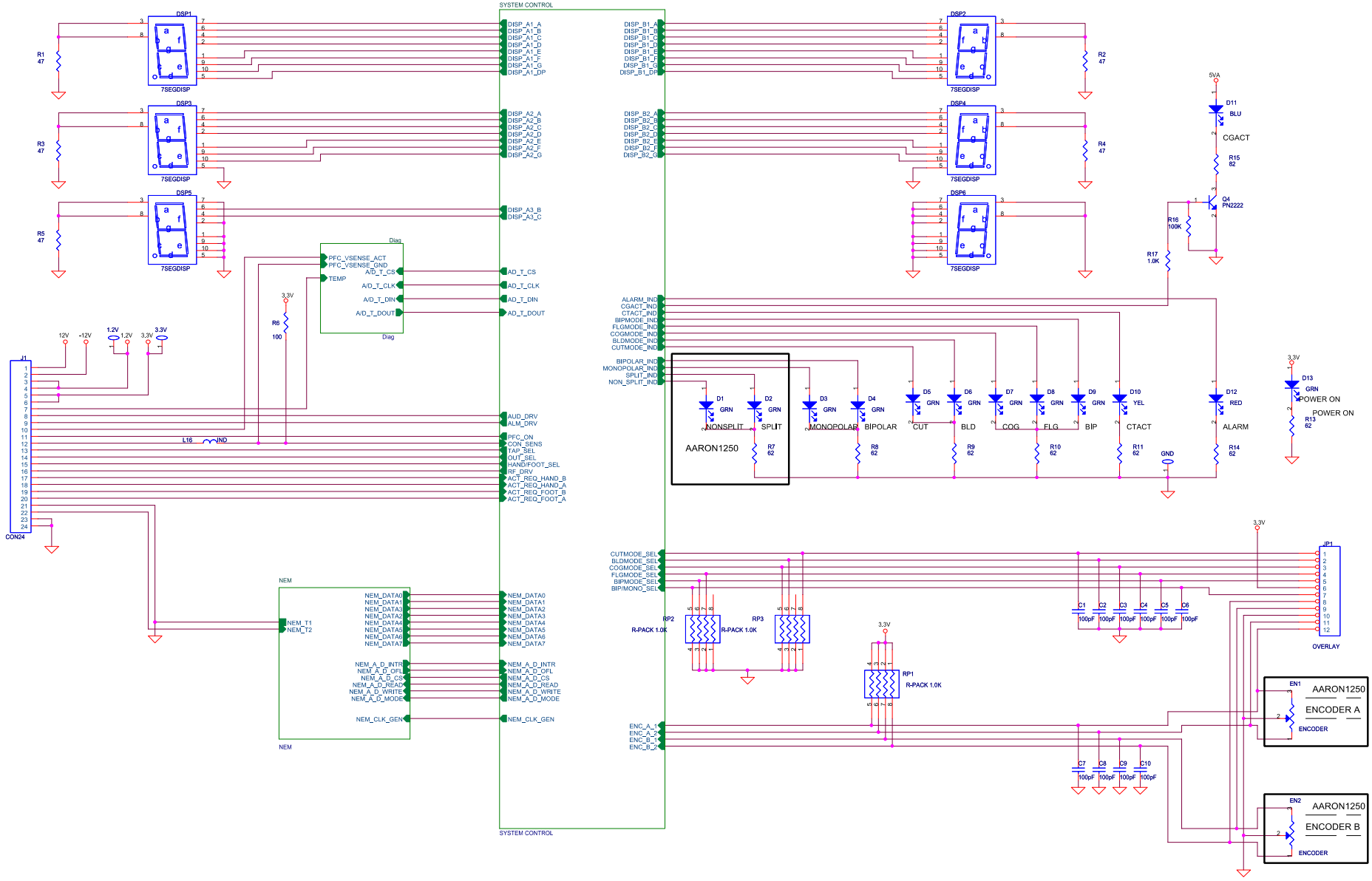
2.U7 MOUNTED ON HS3-ISOLATED

3. ALL ELECTROLITIC CAPACITORS ARE LOW ESR TYPE FK-PANASONIC.C72,C73 - THROUGH HOLE LOW ESR, HIGH RIPPLE CURRENT

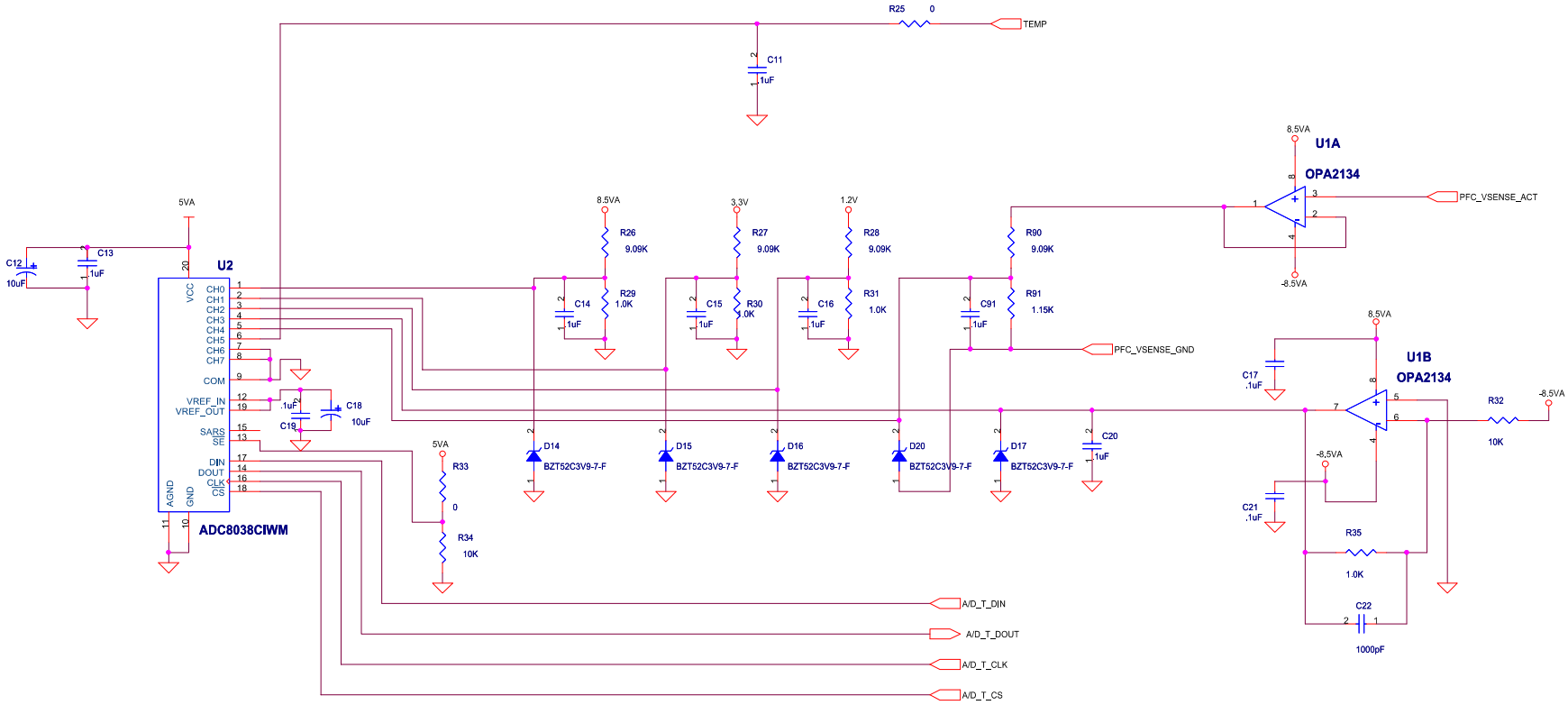
SCHEMATIC 7 MAIN BOARD AUDIO CIRCUIT



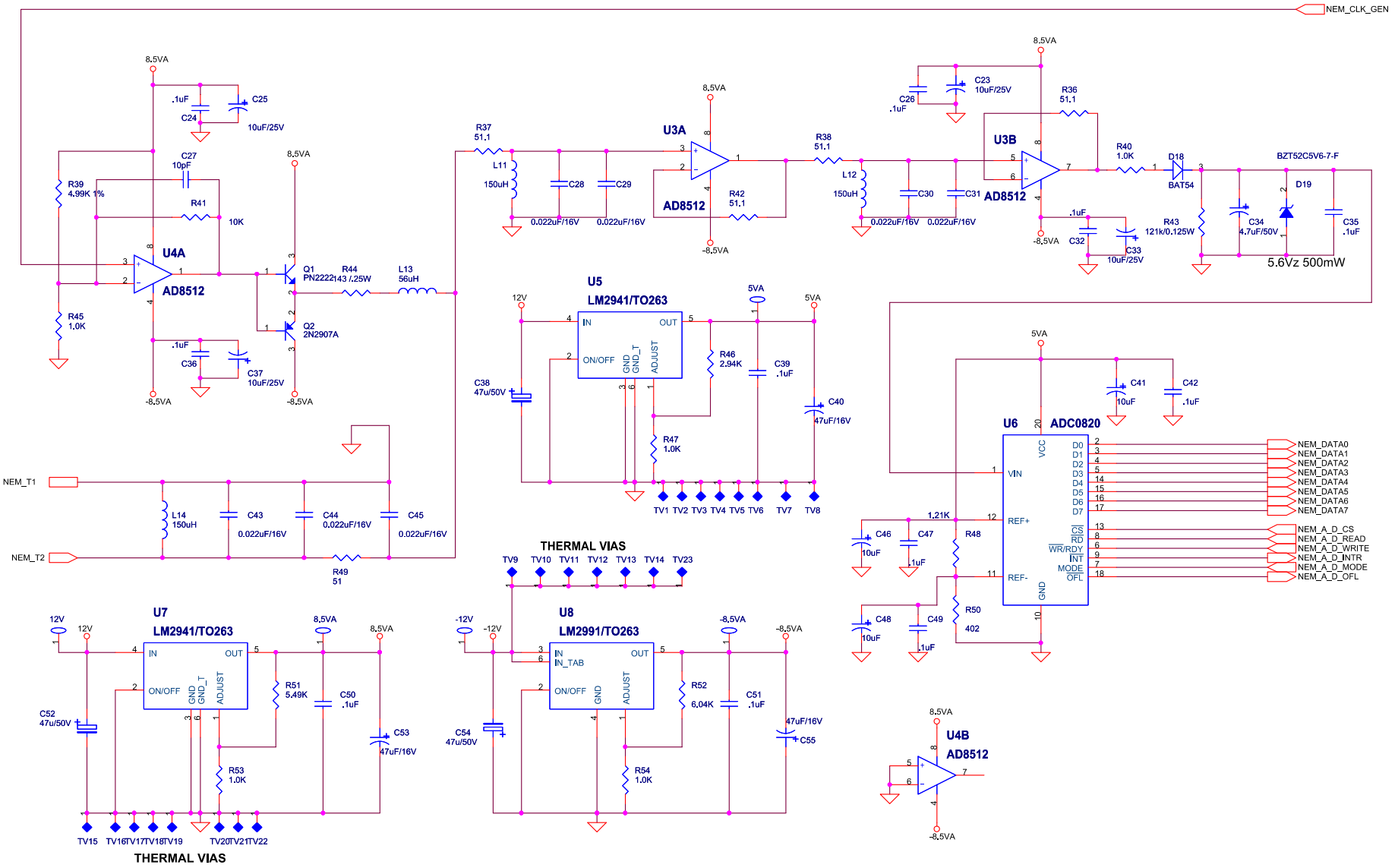
SCHEMATIC 8 DISPLAY BOARD TOP LEVEL BLOCK



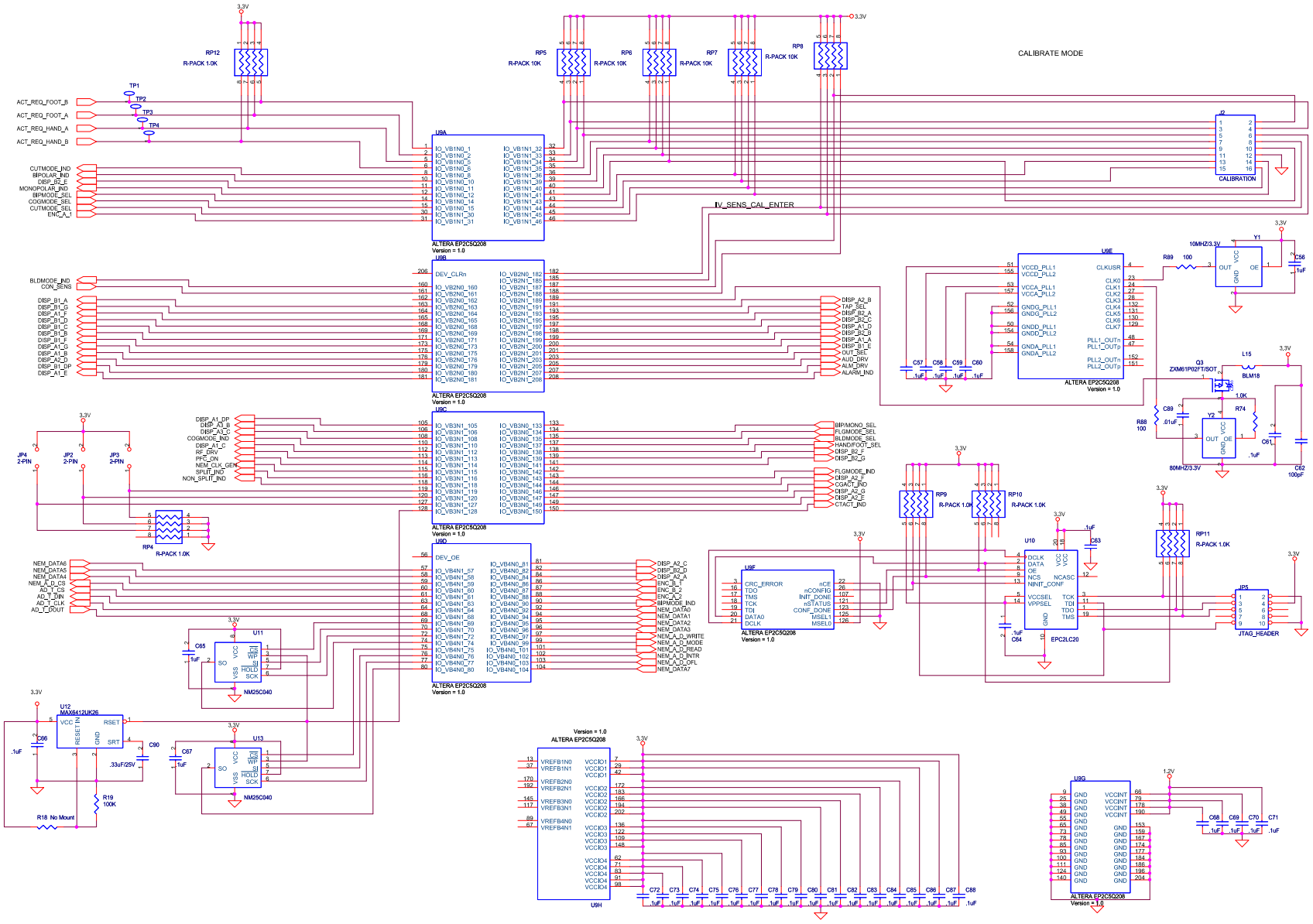
SCHEMATIC 9 DISPLAY BOARD DIAGNOSTIC CIRCUIT



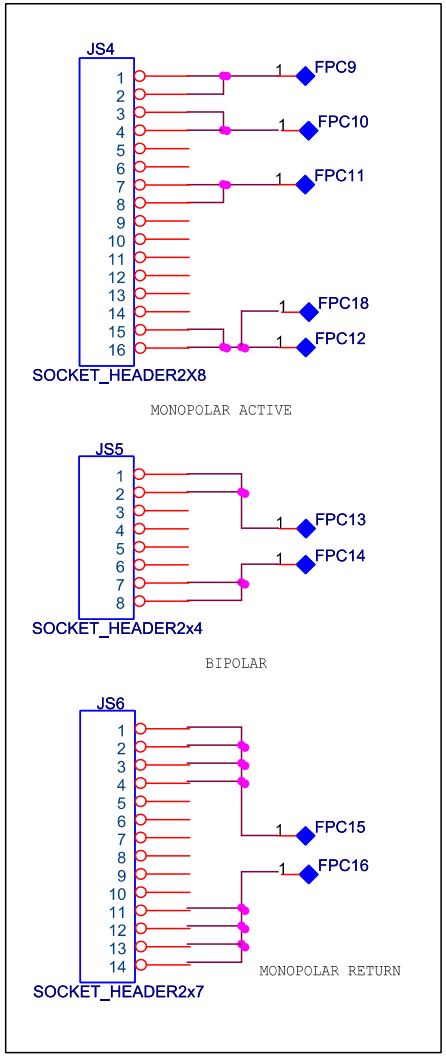
SCHEMATIC 10 DISPLAY BOARD NEUTRAL ELECTRODE MONITORING CIRCUIT



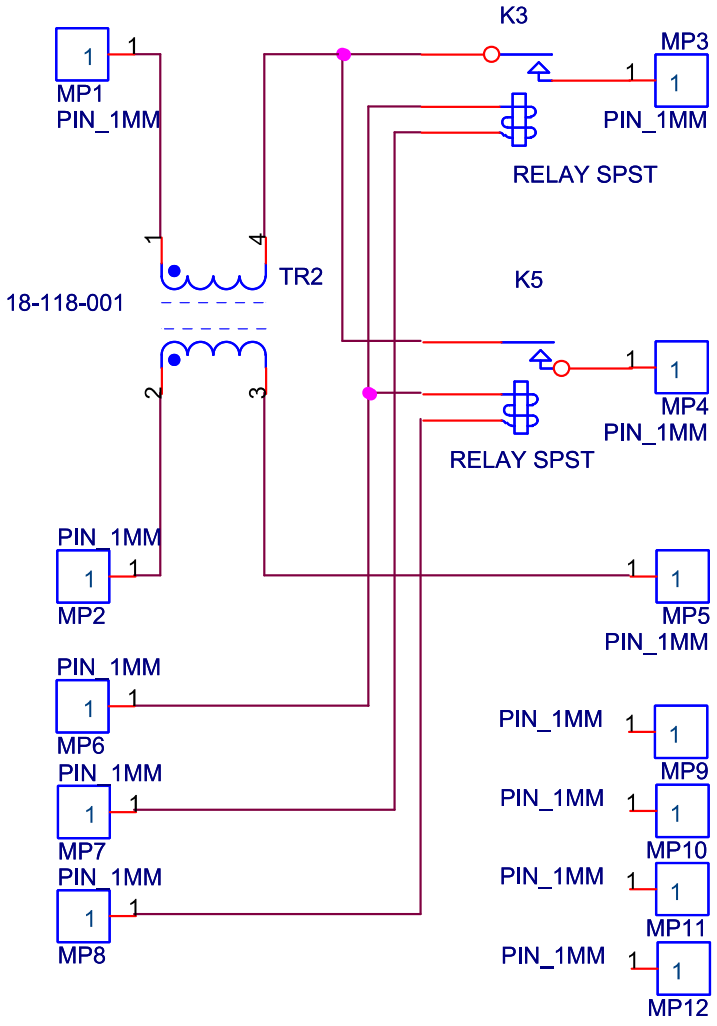
SCHEMATIC 11 DISPLAY BOARD CONTROL LOGIC CIRCUIT



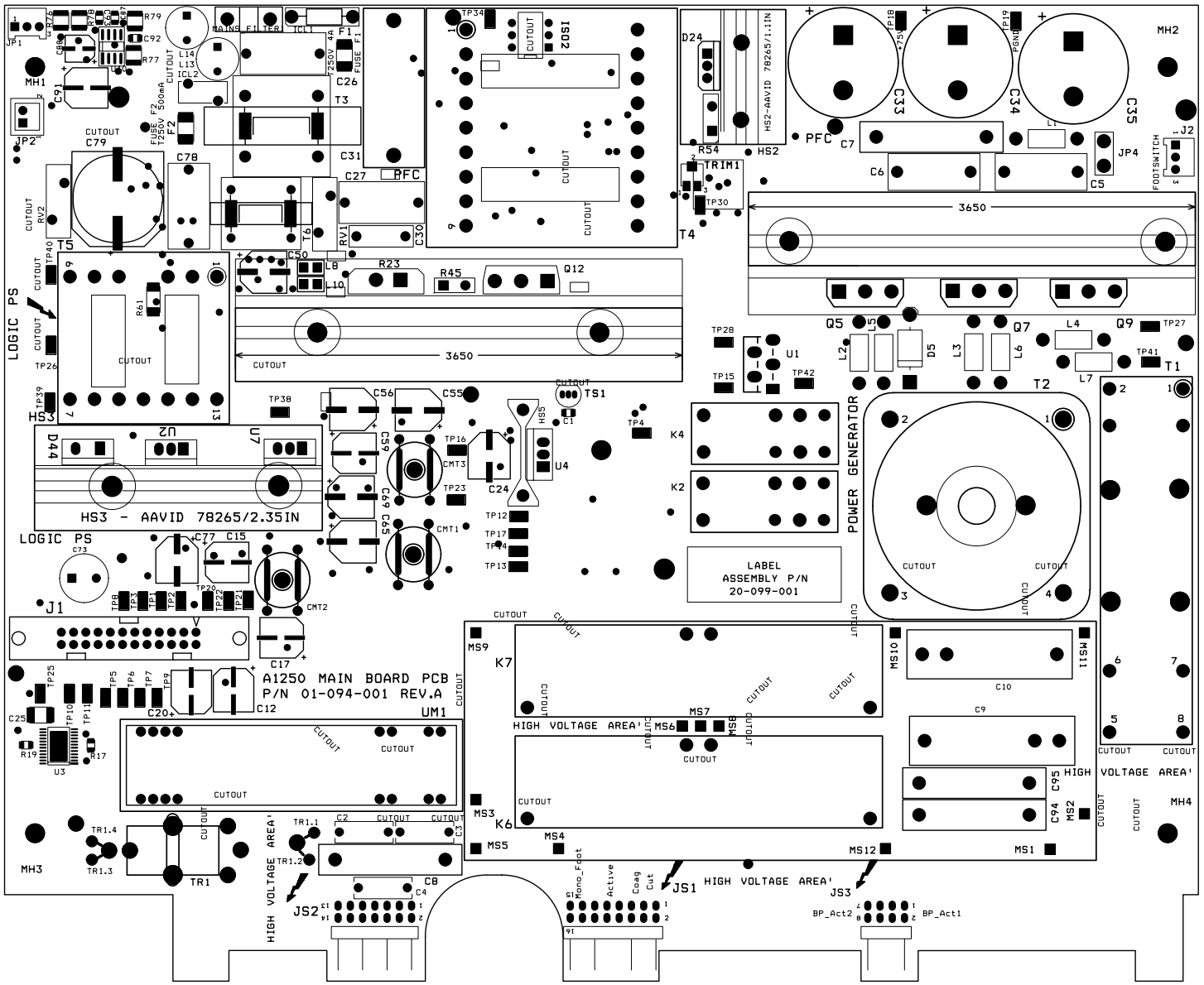
SCHEMATIC 12 CONNECTOR PANEL BLOCK



SCHEMATIC 13 HIGH VOLTAGE RELAY CIRCUIT

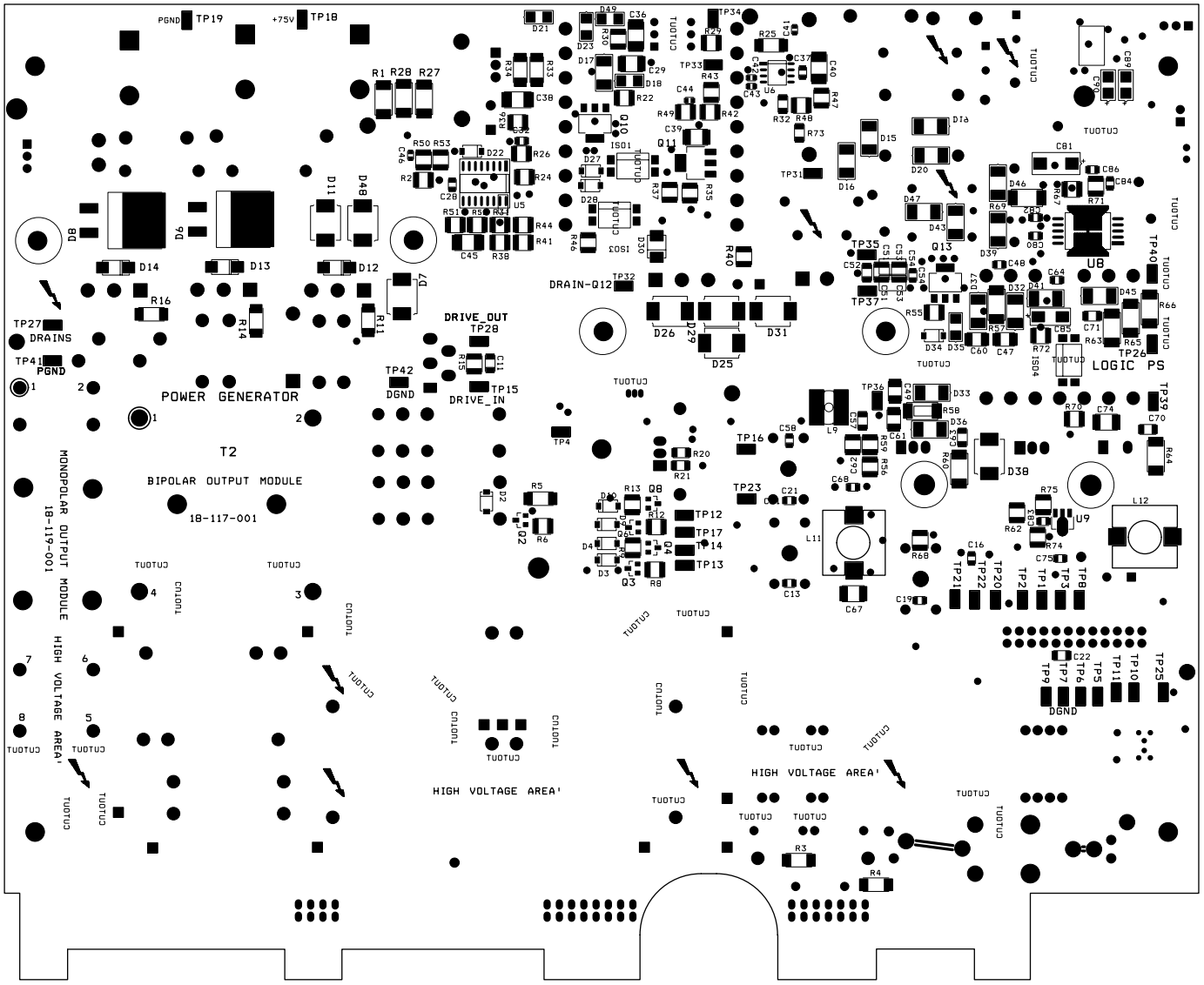


PRINTED CIRCUIT BOARD 1 MAIN BOARD PCB TOP VIEW



Top View

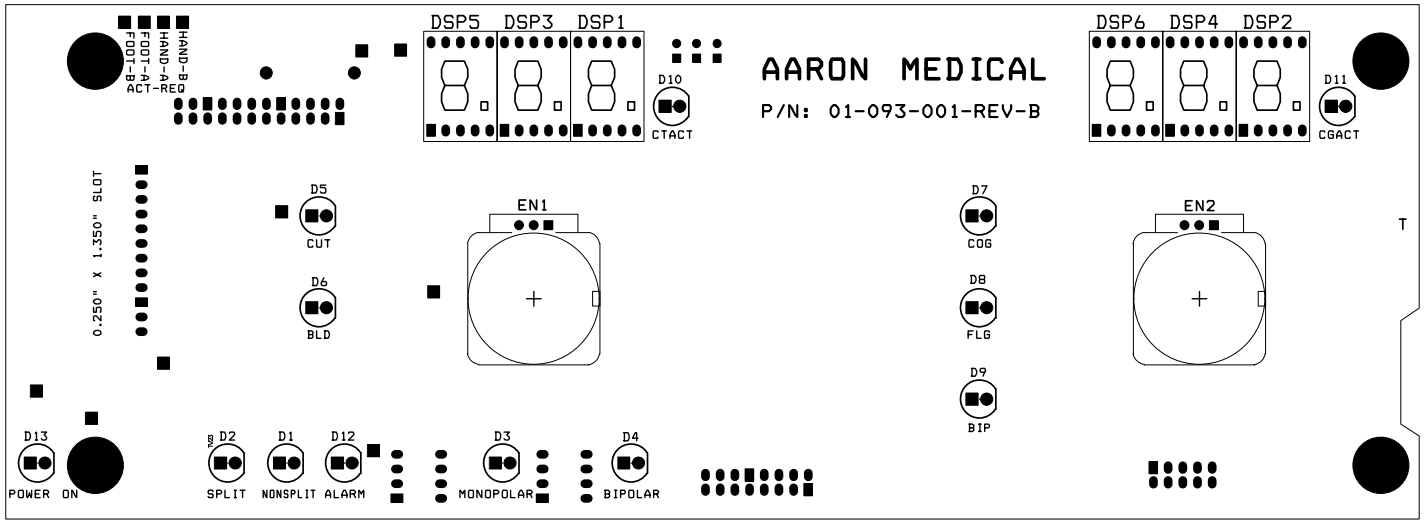
PRINTED CIRCUIT BOARD 2 MAIN BOARD PCB BOTTOM VIEW



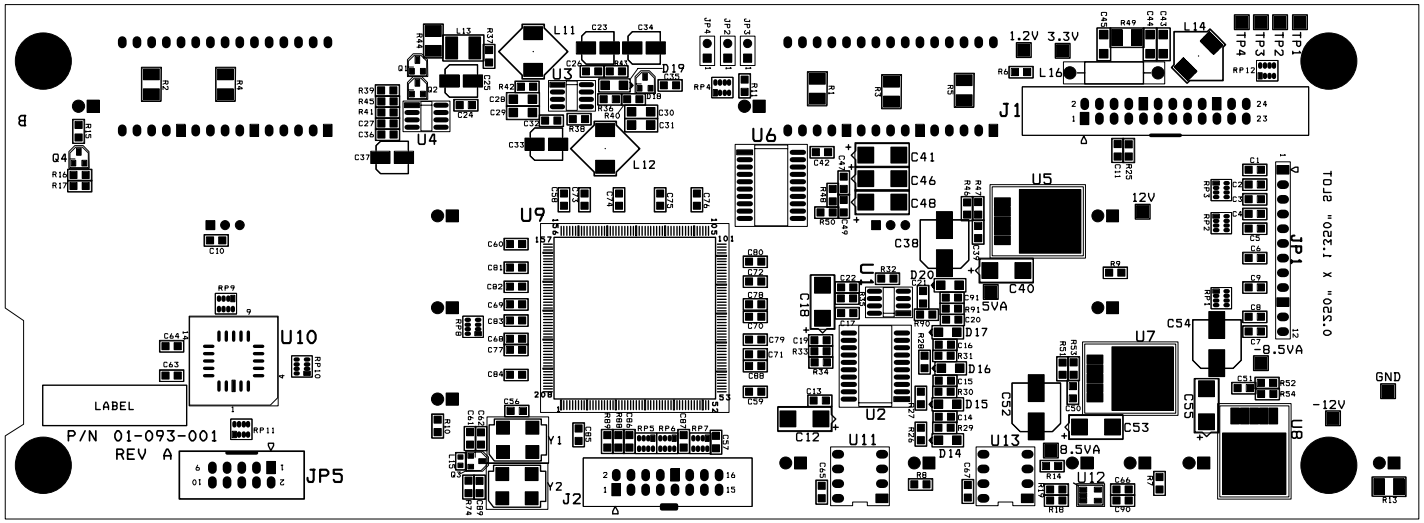
Bottom View

PRINTED CIRCUIT BOARD 3 DISPLAY BOARD PCB (TOP AND BOTTOM VIEWS)

Top

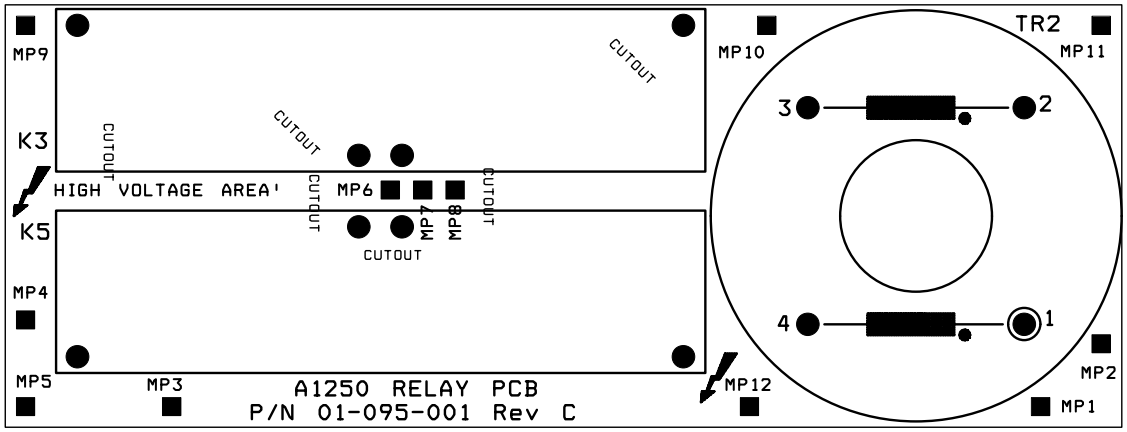


Bottom

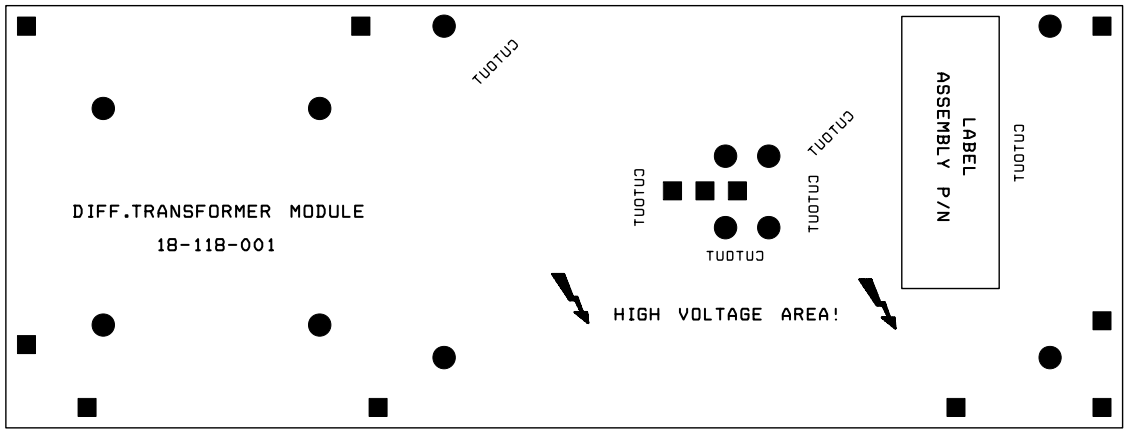


PRINTED CIRCUIT BOARD 4 HIGH VOLATGE RELAY PCB (TOP AND BOTTOM VIEWS)

Top

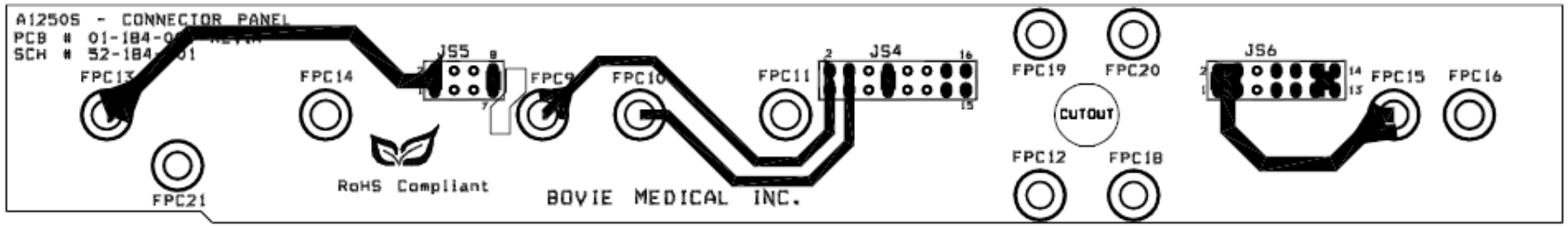


Bottom

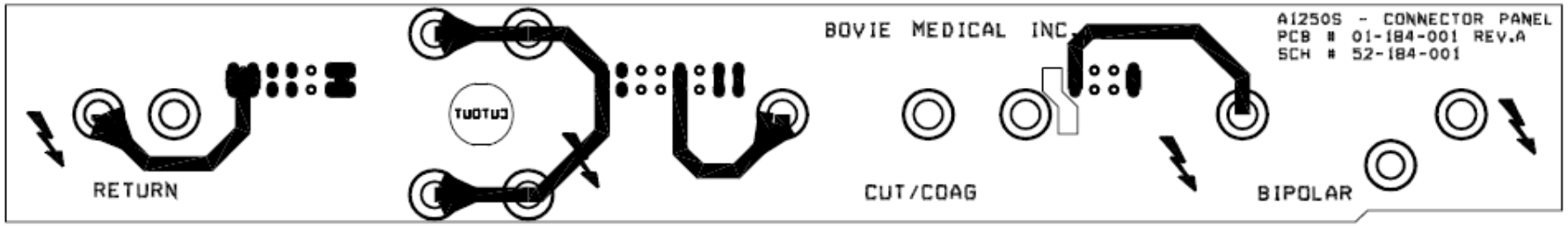


PRINTED CIRCUIT BOARD 5 CONNECTOR PANEL PCB (TOP AND BOTTOM VIEWS)

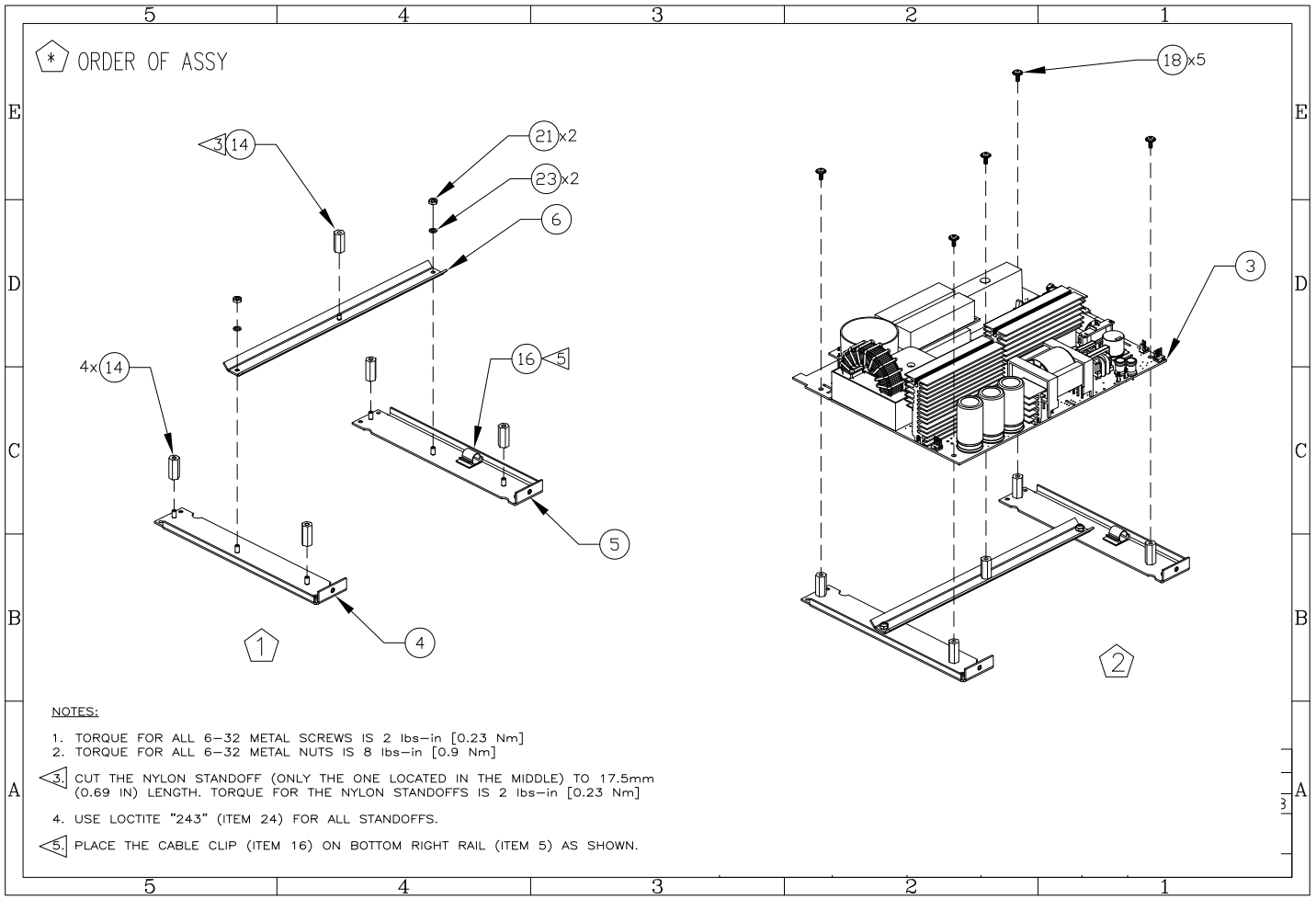
Top



Bottom

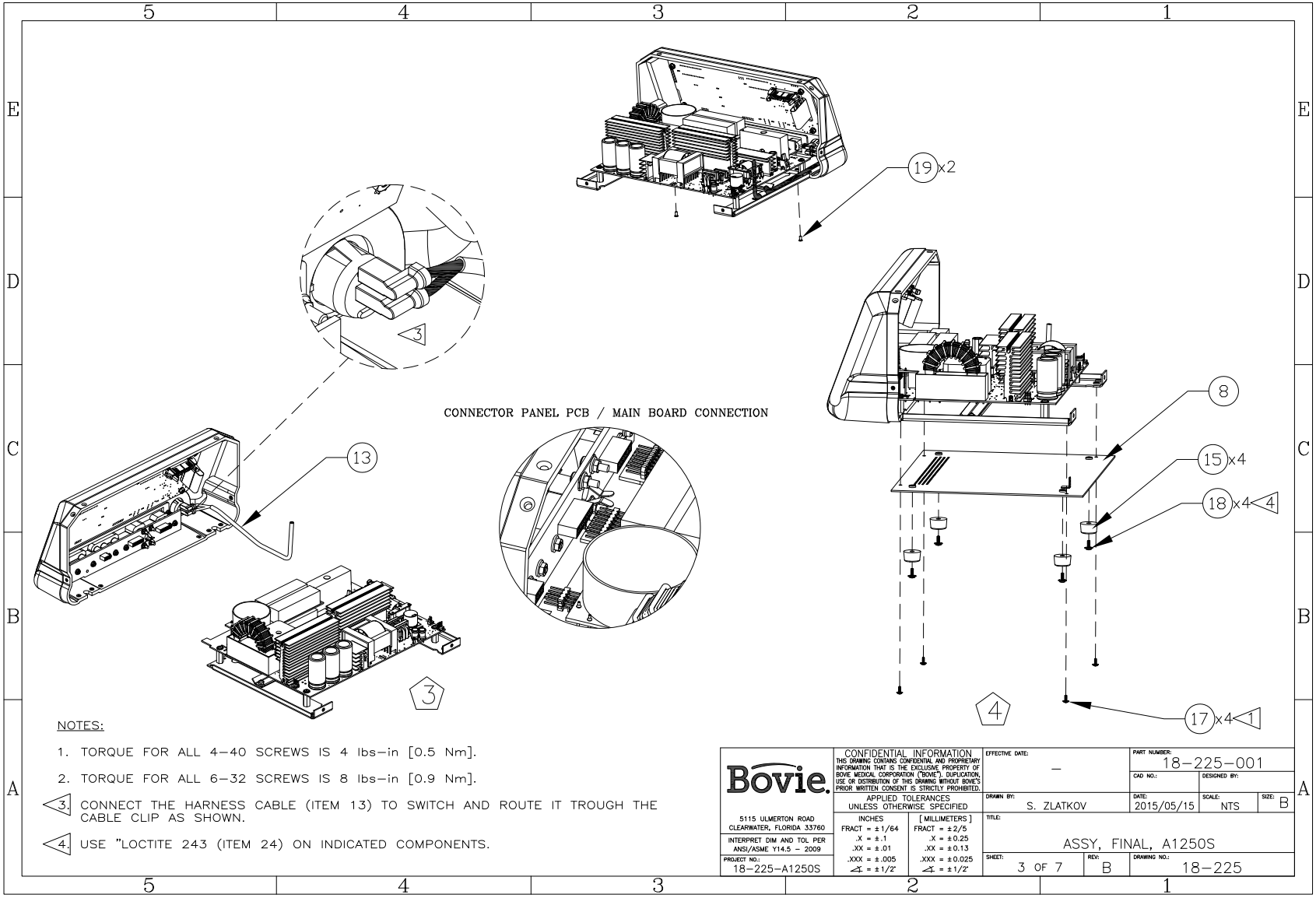


ASSEMBLY DRAWING 1 A1250S FINAL ASSEMBLY



ITEM	QTY	U/M	PART NAME	PART NUMBER
1	1	EA	REAR PANEL ASSEMBLY, A1250S	18-237-001
2	1	EA	FRONT HOUSING ASSEMBLY, A1250S	18-238-001
3	1	EA	PCB ASSY, A1250U MAIN BOARD	20-099-001
4	1	EA	A1250S, BOTTOM LEFT RAIL	10-226-001
5	1	EA	A1250S, BOTTOM RIGHT RAIL	10-227-001
6	1	EA	A1250S, BOTTOM MIDLE RAIL	10-228-001
7	2	EA	A1250S, TOP RAIL	10-229-001
8	1	EA	A1250S, BOTTOM PLATE	10-230-001
9	1	EA	A1250S, TOP PLATE	10-232-001
10	1	EA	A1250S, SPRING PLATE	10-233-001
11	2	EA	FIXATION TAG, A1250S	10-237-001
12	1	EA	CABLE 24 PIN ASSEMBLY FOR A1250	21-078-001
13	1	EA	CABLE ASSY, POWER HARNESS, A1250S	25-123-002
14	1	EA	STANDOFF NYLON HEX-THREADED 6-32 .0,750	05-038-005
15	4	EA	FEET, RUBER	05-039-001
16	1	EA	CLIP, CABLE, 1/4 BUNDLE	05-090-001
17	4	EA	STANDOFF, ALUMINUM 6-32 FULL THREAD, 0,750"	05-143-750
18	20	EA	SCREW, PANHEAD 4-40	04-005-004
19	9	EA	SCREW PHILIPS,PAN HD, 6-32 X 5/16	04-005-104
20	6	EA	SCREW 4-40 X 1/4 FLAT HD SST	04-078-250
21	4	EA	NUT M3 WITH TOOTH WASHER	04-035-003
22	2	EA	NUT, HEX, SMALL PATTERN, 6-32	04-117-006
23	4	EA	WASHER, FLAT, SST,#6	04-024-006
24	2	EA	WASHER, SPLIT,#6 SCREW	04-128-006
25	A/R	OZ	LOCTITE 243	11-026-009
26	A/R	OZ	SENTRY SEAL	11-032-001
27	1	EA	LABEL, REAR PANEL, A1250S ESU	15-395-001

ASSEMBLY DRAWING 2 A1250S FINAL ASSEMBLY



NOTES:

1. TORQUE FOR ALL 4–40 SCREWS IS 4 lbs–in [0.5 Nm].
2. TORQUE FOR ALL 6–32 SCREWS IS 8 lbs–in [0.9 Nm].
3. CONNECT THE HARNESS CABLE (ITEM 13) TO SWITCH AND ROUTE IT TROUGH THE CABLE CLIP AS SHOWN.
4. USE "LOCTITE 243 (ITEM 24) ON INDICATED COMPONENTS.

Bovie.

5115 ULMERTON ROAD
CLEARWATER, FLORIDA 33760

INTERPRET DIM AND TOL PER ANSI/ASME Y14.5 – 2009

PROJECT NO.: 18–225–A1250S

CONFIDENTIAL INFORMATION
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APPLIED TOLERANCES UNLESS OTHERWISE SPECIFIED

INCHES	[MILLIMETERS]
FRACT = ±1/64	FRACT = ±2/5
.X = ±.1	.X = ±0.25
.XX = ±.01	.XX = ±0.13
.XXX = ±.005	.XXX = ±0.025
∠ = ±1/2°	∠ = ±1/2°

EFFECTIVE DATE: –

PART NUMBER: 18–225–001

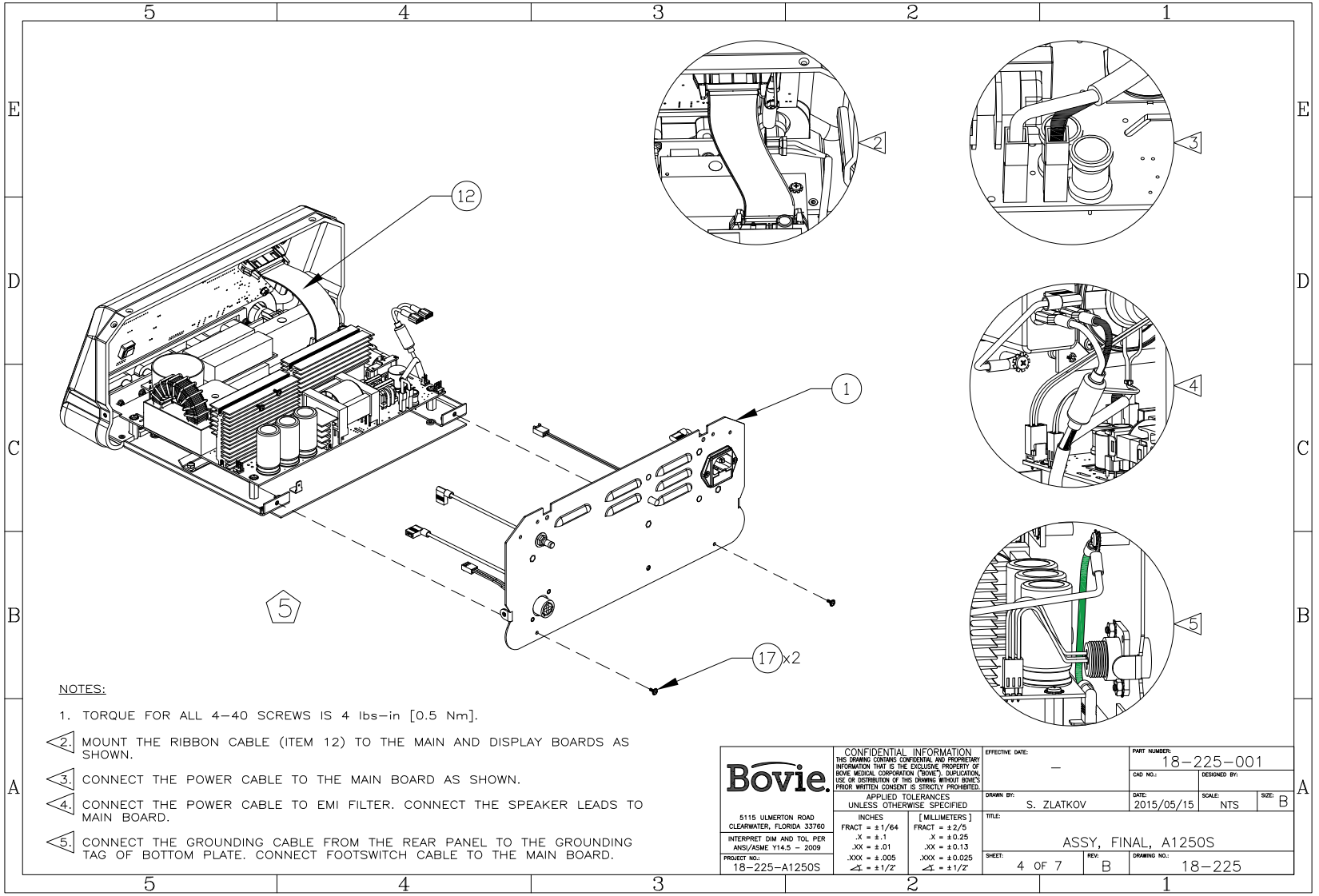
CAD NO.: | DESIGNED BY:

DRAWN BY: S. ZLATKOV | DATE: 2015/05/15 | SCALE: NTS | SIZE: B

TITLE: ASSY, FINAL, A1250S

SHEET: 3 OF 7 | REV: B | DRAWING NO.: 18–225

ASSEMBLY DRAWING 3 A1250S FINAL ASSEMBLY



NOTES:

1. TORQUE FOR ALL 4–40 SCREWS IS 4 lbs–in [0.5 Nm].
2. MOUNT THE RIBBON CABLE (ITEM 12) TO THE MAIN AND DISPLAY BOARDS AS SHOWN.
3. CONNECT THE POWER CABLE TO THE MAIN BOARD AS SHOWN.
4. CONNECT THE POWER CABLE TO EMI FILTER. CONNECT THE SPEAKER LEADS TO MAIN BOARD.
5. CONNECT THE GROUNDING CABLE FROM THE REAR PANEL TO THE GROUNDING TAG OF BOTTOM PLATE. CONNECT FOOTSWITCH CABLE TO THE MAIN BOARD.

Bovie.

5115 ULMERTON ROAD
CLEARWATER, FLORIDA 33760

INTERPRET DIM AND TOL PER ANSI/ASME Y14.5 – 2009

PROJECT NO.: 18–225–A1250S

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.XX = ±.01	.XX = ±0.13
.XXX = ±.005	.XXX = ±0.025
∠ = ±1/2°	∠ = ±1/2°

EFFECTIVE DATE: –

PART NUMBER: 18–225–001

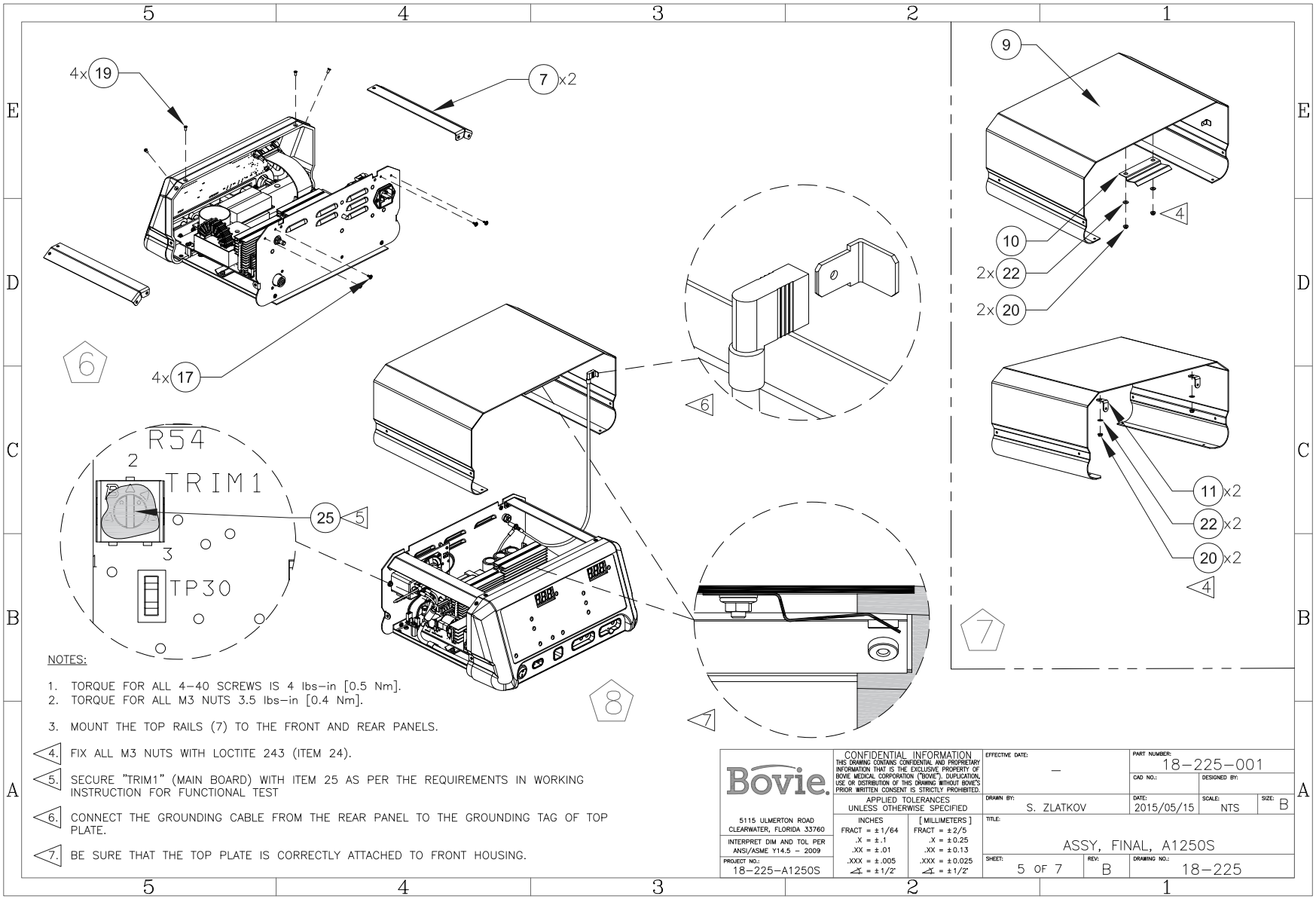
CAD NO.: | DESIGNED BY:

DRAWN BY: S. ZLATKOV | DATE: 2015/05/15 | SCALE: NTS | SIZE: B

TITLE: ASSY, FINAL, A1250S

SHEET: 4 OF 7 | REV: B | DRAWING NO.: 18–225

ASSEMBLY DRAWING 4 A1250S BACK PANEL ASSEMBLY



NOTES:

1. TORQUE FOR ALL 4–40 SCREWS IS 4 lbs–in [0.5 Nm].
2. TORQUE FOR ALL M3 NUTS 3.5 lbs–in [0.4 Nm].
3. MOUNT THE TOP RAILS (7) TO THE FRONT AND REAR PANELS.
4. FIX ALL M3 NUTS WITH LOCTITE 243 (ITEM 24).
5. SECURE "TRIM1" (MAIN BOARD) WITH ITEM 25 AS PER THE REQUIREMENTS IN WORKING INSTRUCTION FOR FUNCTIONAL TEST
6. CONNECT THE GROUNDING CABLE FROM THE REAR PANEL TO THE GROUNDING TAG OF TOP PLATE.
7. BE SURE THAT THE TOP PLATE IS CORRECTLY ATTACHED TO FRONT HOUSING.

Bovie

5115 ULMERTON ROAD
CLEARWATER, FLORIDA 33760

INTERPRET DIM AND TOL PER ANSI/ASME Y14.5 – 2009

PROJECT NO.: 18–225–A1250S

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APPLIED TOLERANCES UNLESS OTHERWISE SPECIFIED

INCHES	[MILLIMETERS]
FRACT = ±1/64	FRACT = ±2/5
.X = ±.1	.X = ±0.25
.XX = ±.01	.XX = ±0.13
.XXX = ±.005	.XXX = ±0.025
∠ = ±1/2°	∠ = ±1/2°

EFFECTIVE DATE: –

PART NUMBER: 18–225–001

CAD NO.:

DESIGNED BY:

DRAWN BY: S. ZLATKOV

DATE: 2015/05/15

SCALE: NTS

SIZE: B

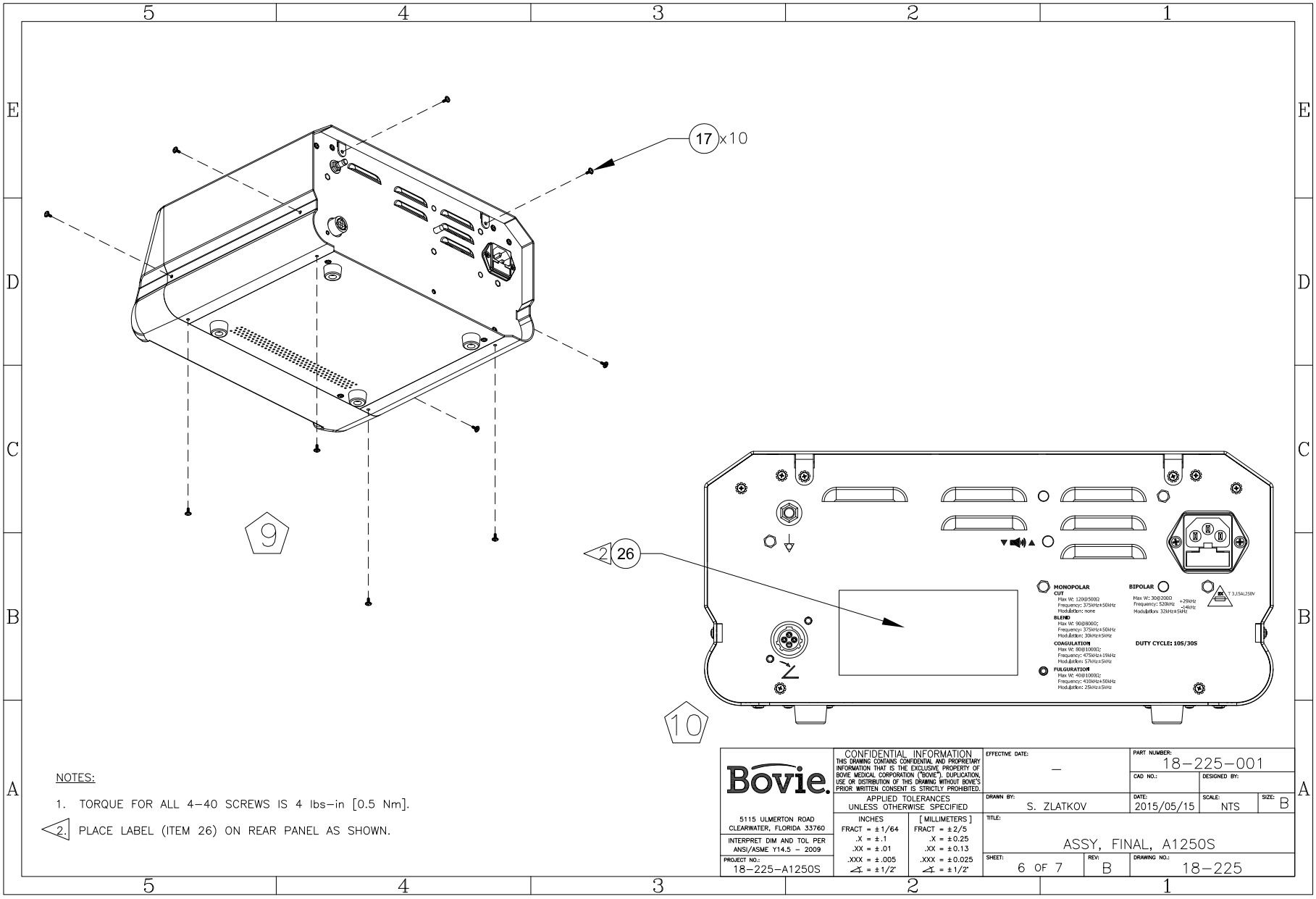
TITLE: ASSY, FINAL, A1250S

SHEET: 5 OF 7

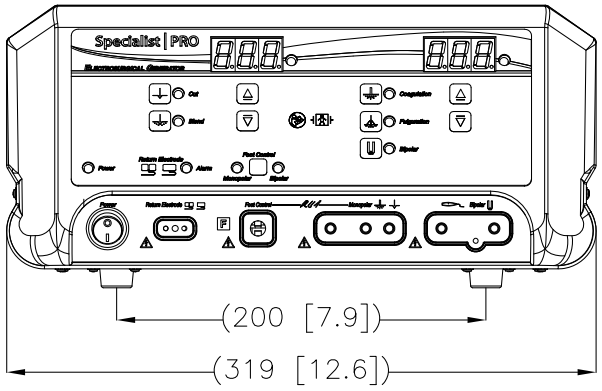
REV: B

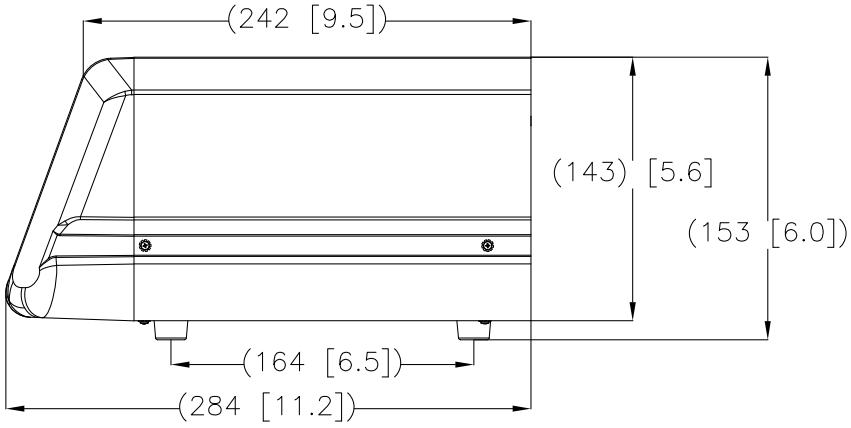
DRAWING NO.: 18–225

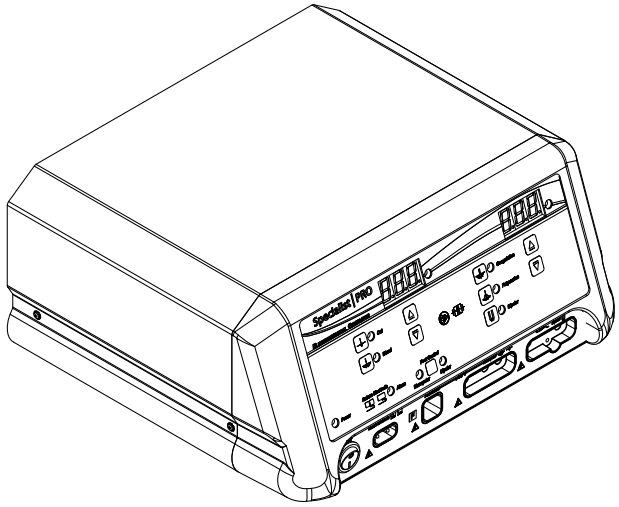
ASSEMBLY DRAWING 5 A1250S FINAL ASSEMBLY



ASSEMBLY DRAWING 6 A1250S BACK PANEL ASSEMBLY





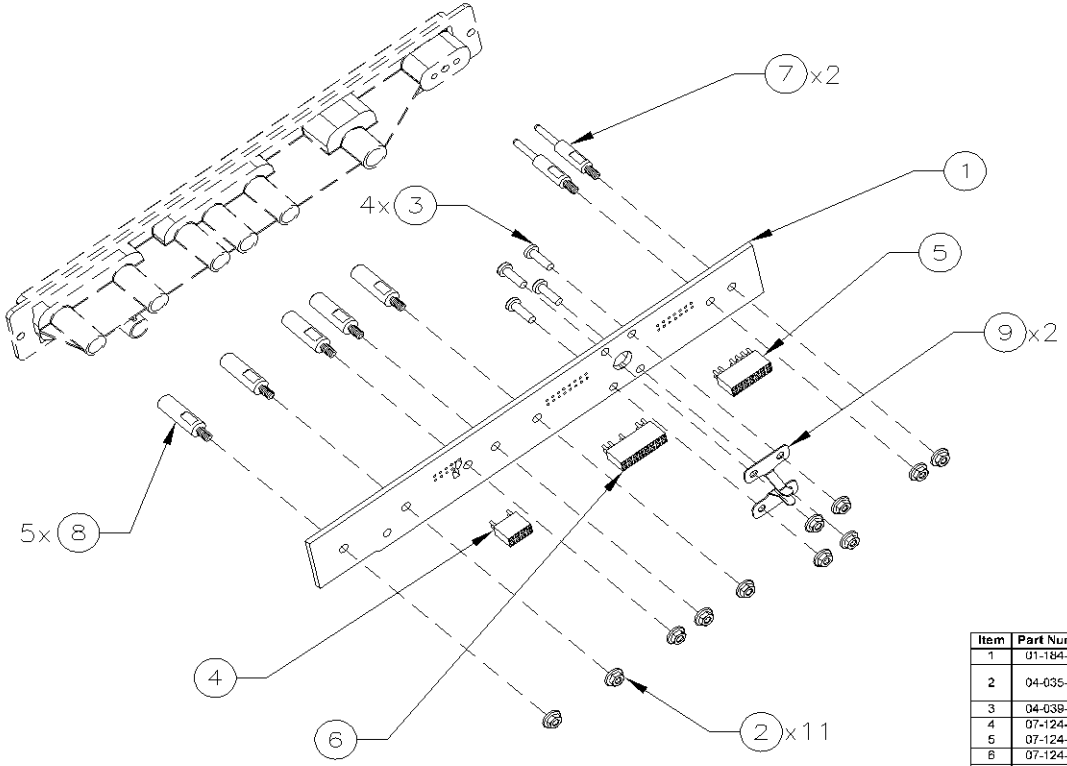


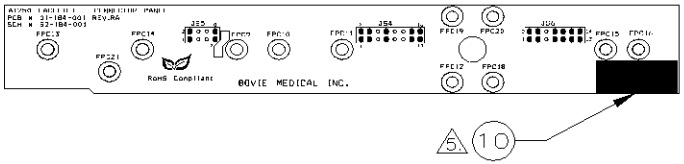
Bovie. 5115 ULMERTON ROAD CLEARWATER, FLORIDA 33760	CONFIDENTIAL INFORMATION THIS DRAWING CONTAINS CONFIDENTIAL AND PROPRIETARY INFORMATION THAT IS THE EXCLUSIVE PROPERTY OF BOVIE MEDICAL CORPORATION ("BOVIE"). DUPLICATION, USE OR DISTRIBUTION OF THIS DRAWING WITHOUT BOVIE'S PRIOR WRITTEN CONSENT IS STRICTLY PROHIBITED.	EFFECTIVE DATE: –	PART NUMBER: 18–225–001		
			CAD NO.:	DESIGNED BY:	
	APPLIED TOLERANCES UNLESS OTHERWISE SPECIFIED	DRAWN BY: S. ZLATKOV	DATE: 2015/05/15	SCALE: NTS	SIZE: B
INTERPRET DIM AND TOL PER ANSI/ASME Y14.5 – 2009	INCHES: FRACT = ± 1/64, .X = ± .1, .XX = ± .01, .XXX = ± .005, ∠ = ± 1/2° / [MILLIMETERS]: FRACT = ± 2/5, .X = ± 0.25, .XX = ± 0.13, .XXX = ± 0.025, ∠ = ± 1/2°	TITLE: ASSY, FINAL, A1250S			
PROJECT NO.: 18–225–A1250S		SHEET: 7 OF 7	REV: B	DRAWING NO.: 18–225	

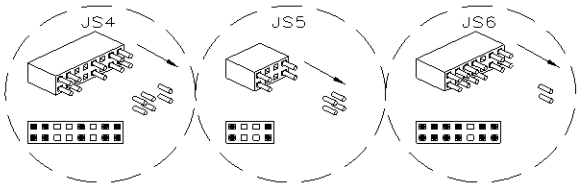
ASSEMBLY DRAWING 7 A1250S CONNECTOR PANEL BOARD

USE 06-295-001
AS ALIGNMENT FIXTURE

REV	DESCRIPTION	REVISED BY/DATE
A	TRANSFERRED FROM R&D.	S.Z. - 10/09/2015







USE LEAD FREE SOLDER

RoHS Compliant

Item	Part Number	U/M	Qty	Reference	Part Name
1	01-184-001	EA	1	(PCB)	PCB, A1250S, CONNECTOR PANEL BOARD
2	04-035-003	EA	11	FPC9, FPC10, FPC11, FPC12, FPC13, FPC14, FPC15, FPC16, FPC18, FPC19, FPC20	NUT M3 WITH LOCKWASHER
3	04-039-006	EA	4	FPC12, FPC18, FPC19, FPC20	M3 x 10mm SCREW
4	07-124-008	EA	1	JS5	CONN C-GRD .100 DUEL ROW 8 PIN
5	07-124-014	EA	1	JS6	CONN C-GRD .100 DUEL ROW 14 PIN
6	07-124-016	EA	1	JS4	CONN C-GRD .100 DUEL ROW 16 PIN
7	07-142-001	EA	2	FPC15, FPC16	CONN, GI FRONT PANEL RETURN PINS
8	07-143-001	EA	5	FPC9, FPC10, FPC11, FPC13, FPC14	CONN, GI FRONT PANEL ACTIVATION
9	07-209-001	EA	2	FPC12 - FPC18, FPC19 - FPC20	5/16 FOOTCONTROL CONTACT, IDS 310
10	15-013-001	EA	1		LABEL, PCB, SERIAL NUMBER, IPL

1. MOUNT ALL COMPONENTS AS SHOWN.
2. TORQUE FOR ALL M3 NUTS/SCREWS IS 6 LBS-IN (0.7 Nm).
3. SOLDER ITEMS 4, 5 AND 6 TO ITEM 1.
4. REMOVE ALL UNNECESSARY PINS FROM CONNECTORS JS4, JS5 AND JS6 AS SHOWN.
5. PLACE THE LABEL (ITEM 10) AS SHOWN.

WORKMANSHIP SHALL COMPLY WITH THE IPC-610 SERIES, CLASS 2 AND INCLUDE IPC-A-600, CLASS 2.
SOLDERABILITY SHALL COMPLY WITH IPC J-STD-003, CLASS 2

BILL OF MATERIALS

Bovie.
5115 ULMERTON ROAD
CLEARWATER, FLORIDA 33760

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APPLIED TOLERANCES UNLESS OTHERWISE SPECIFIED
INCHES: FRACT = ±1/64, .X = ±.1, XX = ±.01, .XXX = ±.005, ∠ = ±1/2°
[MILLIMETERS]: FRACT = ±2/5, .X = ±0.25, .XX = ±0.13, .XXX = ±0.025, ∠ = ±1/2°
INTERPRET DIM AND TOL PER ANSI/ASME Y14.5 - 1994
PROJECT NO.: DHF 18-225-A1250S

EFFECTIVE DATE: -
PART NUMBER: 20-189-001
CAD NO.: -
DESIGNED BY: KIRIL IVANOV
DRAWN BY: STANKO ZLATKOV
DATE: 13/3/2015
SCALE: NTS
SIZE: B
TITLE: PCB ASSY, A1250S, CONNECTOR PANEL BOARD
SHEET: 1 OF 1
REV.: A
DRAWING NO.: 20-189

ASSEMBLY DRAWING 8 A1250S FRONT HOUSING ASSEMBLY

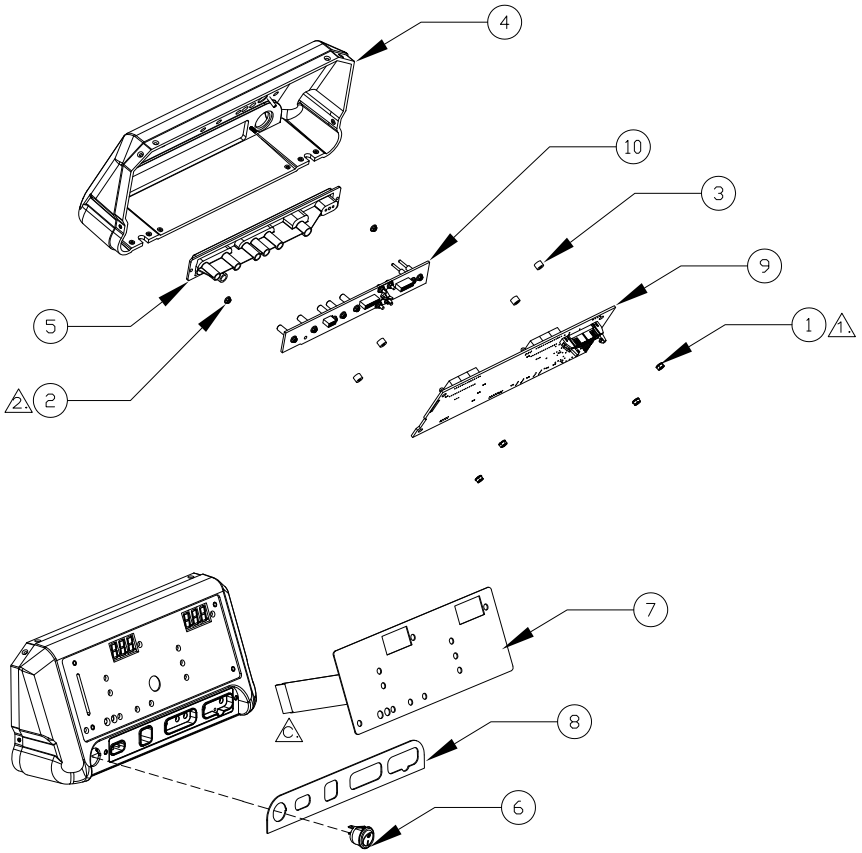
REV	DESCRIPTION	REVISED BY/DATE
A	TRANSFERRED FROM R&D.	S.Z. – 10/09/2015

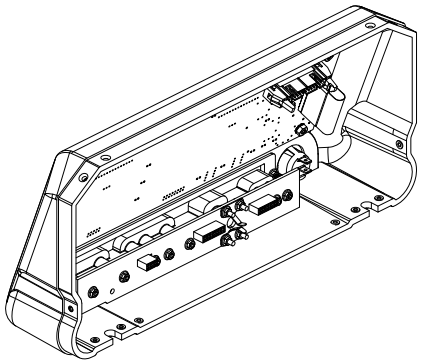
NOTES:

1. TORQUE FOR ALL 6–32 NUTS IS 7 lbs–in (0.8 Nm).
2. TORQUE FOR ALL M3 NUTS IS 7.9 lbs–in (0.9 Nm).

ASSEMBLY INSTRUCTIONS:

A. FIX CONNECTOR PANEL TO FRONT PANEL WITH TWO NUTS (ITEM 2)
B. ATTACH DISPLAY PCB (ITEM 9) WITH STANDOFFS (ITEM 3) TO FRONT PANEL (ITEM 4) AND FIX IT WITH FOUR NUTS (ITEM 1)
C. PEEL OFF ADHESIVE BACKING ON ITEM 7 (*IMPORTANT* ALSO PEEL OFF THE SMALL PIECE OF ADHESIVE BEHIND THE FLEX CABLE.), SLIDE DISPLAY CABLE THRU SLOT IN THE UPPER HALF OF FRONT PANEL, AFFIX ITEM 7 TO THE UPPER HALF OF FRONT PANEL.
D. ATTACH OVERLAY FLEX CABLE ONTO BACK OF THE DISPLAY PCB (J1).
E. AFFIX ITEM 8 TO THE FRONT PANEL AND CONNECTOR PANEL.
F. INSERT THE CONNFIG. PROM (ITEM 11) TO KEYED U10 SOCKET.





ITEM	QTY	U/M	PART NAME	PART NUMBER
1	4	EA	NUT, HEX, W/LOCKWASHER 6-32	04-020-006
2	2	EA	NUT, METRIC, WITH EXTERNAL TOOTH LOCKWASHER, M3	04-035-003
3	4	EA	STANDOFFS FOR DISPLAY PCB	05-040-250
4	1	EA	A1250S FRONT PANEL	06-294-010
5	1	EA	A1250S CONNECTOR PANEL	06-295-001
6	1	EA	SWITCH, NON-ILLUMINATED ROUND ROCKER, RC SERIES, WHITE	07-215-001
7	1	EA	OVERLAY, TOP, A1250S	15-369-001
8	1	EA	OVERLAY, BOTTOM, A1250S	15-370-001
9	1	EA	PCB ASSY, A1250S, DISPLAY BOARD	20-098-004
10	1	EA	PCB ASSY, A1250S CONNECTOR PANEL BOARD	20-189-001
11	1	EA	CONFIGURATION PROM PROGRAMMED, A1250S, DISPLAY	22-066-001

BILL OF MATERIALS

RoHS Compliant

Bovie.
5115 ULMERTON ROAD
CLEARWATER, FLORIDA 33760

INTERPRET DIM AND TOL PER ANSI/ASME Y14.5 – 1994

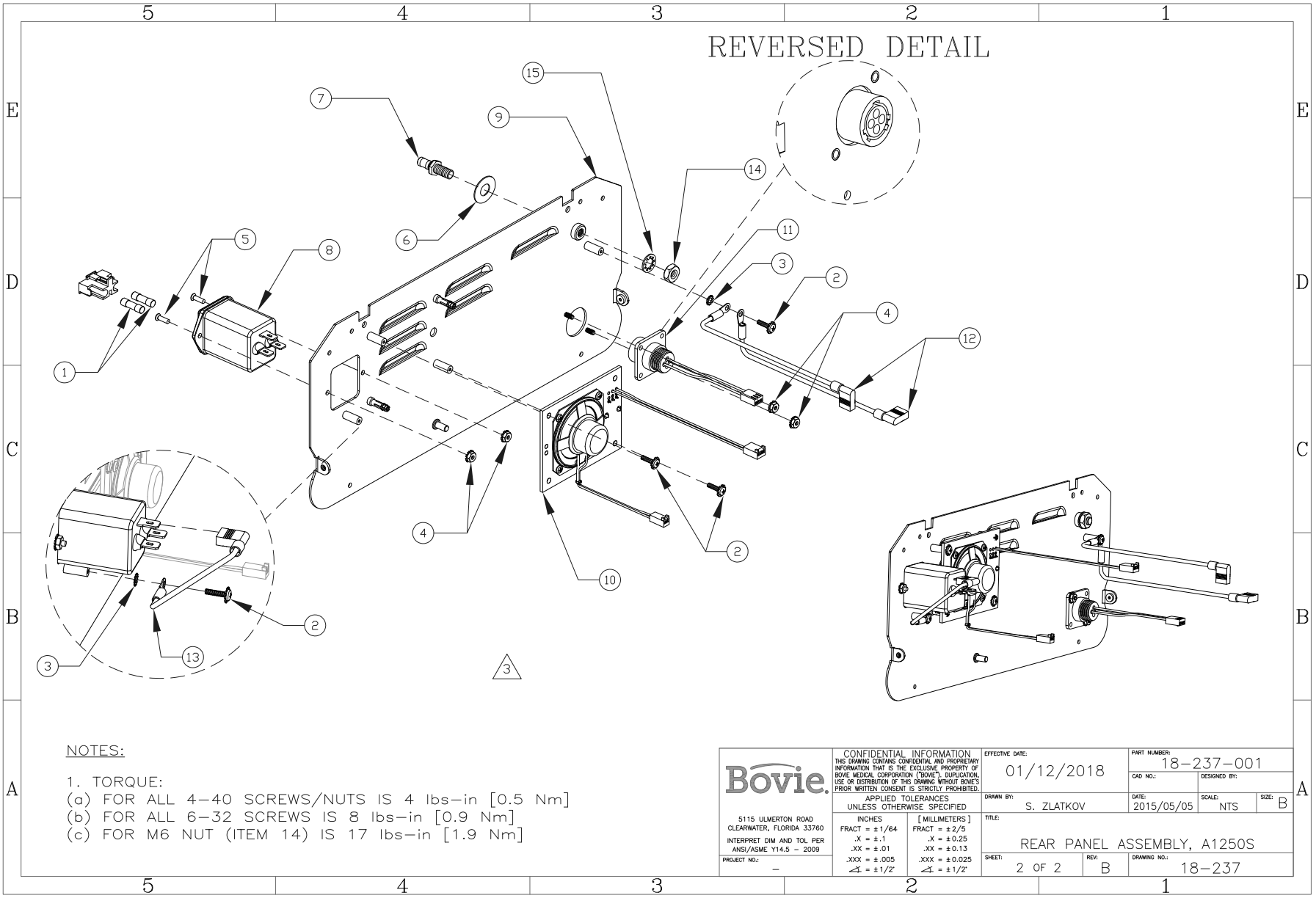
PROJECT NO.: 18–225–A1250S

APPLIED TOLERANCES UNLESS OTHERWISE SPECIFIED

INCHES	[MILLIMETERS]
FRACT = ±1/64	FRACT = ±2/5
.X = ±.1	.X = ±0.25
.XX = ±.01	.XX = ±0.13
.XXX = ±.005	.XXX = ±0.025
∠ = ±1/2°	∠ = ±1/2°

EFFECTIVE DATE: –
PART NUMBER: 18–238–001
CAD NO.:
DESIGNED BY:
DRAWN BY: S. ZLATKOV
DATE: 2015/04/29
SCALE: NTS
SIZE: B
TITLE: FRONT HOUSING ASSEMBLY, A1250S
SHEET: 1 OF 1
REV: A
DRAWING NO.: 18–238

ASSEMBLY DRAWING 9 A1250S REAR PANEL ASSEMBLY



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MC-55-237-002_5-EN
10/2022