

**PLUG-N-PLAY 1000
1000 WATT DIGITAL
FM TRANSMITTER**

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INSTRUCTION MANUAL

MARTI ELECTRONICS

PNP 1000 FM TRANSMITTER

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INTRODUCTION.

The MARTI Electronics PLUG-N-PLAY 1000 (PNP 1000) is a 1000 watt digital solid-state FM transmitter designed for continuous operation in the 87.5 MHz to 108 MHz broadcast band (refer to Figure 1). The PNP 1000 is equipped with: 1) a digital exciter, 2) a two stage up-converter system, 3) a broadband exciter amplifier module, 4) a broadband 1000 watt power amplifier module, 5) a switching power supply unit, 6) a low pass filter, and 7) a front panel circuit board containing display and power control circuitry. The unit can be configured to operate from 95–132VAC 50/60Hz or 180–264VAC 50/60Hz. All the components are housed in a 19 inch chassis requiring 21 inches of rack space (refer to Figure 1).



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FIGURE 1. PLUG-N-PLAY 1000

- **Digital Exciter** – The PNP 1000 is equipped with a digital exciter. The exciter provides outstanding audio performance and reliability. The exciter is designed with a wide variety of audio inputs to meet almost any audio input configuration: 1) analog left and right channel, 2) digital AES/EBU wire, 3) digital AES/EBU optical, 4) digital S/PDIF, and 5) composite. Additional features include an SCA audio input, 50/75 uS preemphasis, and built-in audio compression.

The exciter is designed using the latest digital technology. Two DSP integrated circuits and a large programmable PLD integrated circuit provide the processing power for the circuitry. A high performance analog circuit provides the analog interface to the digital circuitry for analog left and right channel audio.

- **SCA Audio Input** – The exciter is equipped with a built-in 67 kHz SCA encoder. The circuit allows the direct input of SCA audio without the use of a separate encoder. The circuit also allows the selection of 5 or 7.5 kHz deviation.
- **Built-In Audio Compression** – The digital circuitry in the exciter is equipped with built-in audio compression. The compression circuitry is built into the DSP circuitry and allows audio to be applied at a maximum level without clipping. A front-panel indicator illuminates when the compression circuitry is engaged. This is approximately 2 dB above the nominal audio level.
- **2-Stage Up-Converter System** – The output of the digital exciter is converted to the output frequency using a 2-stage up-converter system. The system uses crystal circuitry and two high performance RF mixers to generate the 87.5 MHz to 108 MHz RF signal. The up-converter system also contains a gain stage to provide the required level for the final power amplifier module.

- **Exciter Amplifier Module** – The exciter amplifier module is a broadband design that outputs 45 watts to drive the input of the FM amplifier module. The module contains two amplifier stages with all coupler and metering circuitry contained on a single circuit board. DC power for the amplifier is provided by the main +48V power supply.
- **RF Amplifier Module** – The RF amplifier module is a broadband design that outputs 250 to 1000 watts of RF power. The amplifier module contains two RF circuit boards that have 4 RF devices paralleled and contains the metering circuitry. DC power for the amplifier is provided by the +48 V dc switching power supply.

Control and monitoring of the RF amplifier module is provided by the front panel circuit board. Samples such as PA voltage, currents and temperature are routed to the front panel circuitry. This circuit automatically adjusts the output power level in response to high current and temperature conditions.
- **Low Pass Filter** – The low pass filter provides suppression of harmonic content and a directional coupler. Samples of the forward and reflected power are routed to the control circuitry on the front panel board. The front panel circuitry adjusts the output power level in response to high reflected power.
- **Remote Control Operation** – The PNP 1000 is designed for remote control operation. Control functions include on/of, raise/lower power, fault reset, and failsafe. Status functions include: 1) on/off status, 2) VSWR, 3) temperature fault 4) PS fault, 5) exciter PA fault, and 6) PA fault. Sample functions include: 1) forward and reflected power, 2) PA voltage, and 3) PA current.
- **Power Supply Operation** – The PNP 1000 can be operated from a wide variety of ac input voltages. The unit can be operated from a 190–264V AC 50/60 Hz power source or can be configured to operate from a 95–132V AC 50/60Hz power source.
- **Mounting** – The PNP 1000 components are contained in a single chassis. The unit requires 21 inches (53.3 cm) of a 19 inch (48.3 cm) rack cabinet.

ORDERING INFORMATION.

The PNP 1000 can be ordered in four configurations along with a 1" 5/8 RF output connector option. Refer to the following text for the PNP 1000 ordering information.

MODEL NO.	DESCRIPTION	PART NO.
PNP 1000	PNP 1000 Solid State FM Transmitter For Operation In The 87.5 MHz to 108 MHz FM Broadcast Band, 250 to 1000 Watts, 190–264V AC 60 Hz Power Supply Operation.	909–1000–205
PNP 1000	PNP 1000 Solid State FM Transmitter For Operation In The 87.5 MHz to 108 MHz FM Broadcast Band, 250 to 1000 Watts, 95–132V AC 60 Hz Power Supply Operation.	909–1000–215
PNP 1000	PNP 1000 Solid State FM Transmitter For Operation In The 87.5 MHz to 108 MHz FM Broadcast Band, 250 to 1000 Watts, 190–264V AC 50 Hz Power Supply Operation.	909–1000–225
PNP 1000	PNP 1000 Solid State FM Transmitter For Operation In The 87.5 MHz to 108 MHz FM Broadcast Band, 250 to 1000 Watts, 95–132V AC 50 Hz Power Supply Operation.	909–1000–225
RF Output Option	RF output connector option to change from standard female "N" type connector to a 1" 5/8 EIA connector.	N/A

SPECIFICATIONS.

TABLE 1. PNP 1000 ELECTRICAL, PHYSICAL, AND ENVIRONMENTAL SPECIFICATIONS
(Sheet 1 of 3)

PARAMETER	SPECIFICATION
<i>ELECTRICAL</i>	
RF POWER OUTPUT	250–1000 watts.
FREQUENCY RANGE	87.5 to 108MHz. Selectable in 50kHz steps.
OUTPUT IMPEDANCE	50 Ohms nominal.
OUTPUT CONNECTOR	Type–N female. 1” 5/8 Optional
VSWR	Rated power into a 1.5:1 VSWR maximum. Open and short circuit protected at all phase angles.
FREQUENCY STABILITY	+/-300Hz, -10 degrees C to +50 degrees C.
MODULATION TYPE	Digital.
MODULATION CAPABILITY	Greater than 150 kHz. 350 kHz maximum.
ASYNCHRONOUS AM SIGNAL–TO–NOISE RATIO	55dB below rated power reference carrier with 100% AM modulation at 400Hz and 75 uS de–emphasis. No modulation present.
SYNCHRONOUS AM SIGNAL–TO–NOISE RATIO	50dB below rated power reference carrier with 100% AM modulation at 400Hz and 75 uS de–emphasis. FM modulation equal to ± 75 kHz at 400Hz.
SPURIOUS AND HARMONIC SUPPRESSION	73 dB or greater.
AC POWER REQUIREMENTS	95–132V or 190–264V AC, 50/60 Hz, single phase.
SAFETY	Meets IEC 215 Specifications.
SURGE PROTECTION	Tested with IEEE C62.41–1991 recommended waveforms for location category B3 and IEC 801–4 standard waveforms for severity level 4.
<i>LEFT/RIGHT ANALOG AUDIO INPUT</i>	
CONNECTOR	D–Type, 15–Pin, female.
INPUT LEVEL	Jumper selectable -10, 0, +4, and +8 dBm for 100% modulation @ 400 Hz.
IMPEDANCE	Balanced 600 Ohms or 10 k Ohms, resistive, selectable.
FREQUENCY RESPONSE	± 0.5 dB, 30 Hz to 15 kHz, flat, 50 uS preemphasis, or 75 uS preemphasis. ± 0.55 dB at -10dBm audio input.
TOTAL HARMONIC DISTORTION	0.05% or less, 30 Hz to 15 kHz. 0.06% at -10dBm input.
FM SIGNAL–TO NOISE	73 db below 100% modulation at 1kHz measured in a 22Hz to 22kHz bandwidth with CCIR weighted filter.
CHANNEL SEPARATION	50 dB or greater; 30Hz to 15kHz, left into right or right into left.

TABLE 1. PNP 1000 ELECTRICAL, PHYSICAL, AND ENVIRONMENTAL SPECIFICATIONS
(Sheet 2 of 3)

PARAMETER	SPECIFICATION
<i>COMPOSITE INPUT</i>	
CONNECTOR	BNC.
INPUT LEVEL	3.5V peak-to-peak for 100% modulation @ 400 Hz.
IMPEDANCE	50 Ohms or 10 k Ohms, resistive, jumper selectable.
FREQUENCY RESPONSE	±0.5dB, 30 Hz to 10 kHz.
TOTAL HARMONIC DISTORTION	0.07% or less at 1 kHz.
FM SIGNAL-TO NOISE	73 db below 100% modulation at 1kHz measured in a 22Hz to 22kHz bandwidth with CCIR weighted filter.
CHANNEL SEPARATION	45 dB or greater; 30Hz to 15kHz, left into right or right into left.
<i>DIGITAL INPUT</i>	
CONNECTOR	
AES/EBU	D-Type 15 Pin or Toshiba TORX173 optical connector.
S/PDIF	RCA Phono, female.
FREQUENCY RESPONSE	±0.5dB, 30 Hz to 15 kHz, flat.
TOTAL HARMONIC DISTORTION	0.05% or less, 30 Hz to 15 kHz.
FM SIGNAL-TO NOISE	76 db below 100% modulation at 1kHz measured in a 22Hz to 22kHz bandwidth with CCIR weighted filter.
CHANNEL SEPARATION	50 dB or greater; 30Hz to 15kHz, left into right or right into left.
AUDIO OVERSHOOT	2 dB maximum.
LINEAR CROSSTALK	40 dB minimum below 100% modulation. Main to Sub/ Sub to Main due to distortion products.
57 kHz, 76 kHz, and 95 kHz SUPPRESSION	80 dB below 100% modulation.
<i>SCA INPUT (INTERNALLY GENERATED)</i>	
CONNECTOR	D-Type, 15-Pin, female.
INPUT LEVEL	+8 dBm.
IMPEDANCE	600 Ohms or 10 k Ohms, resistive, jumper selectable.
FREQUENCY	67 kHz.
DEVIATION	5 kHz or 7.5 kHz.
FM SIGNAL-TO NOISE	50 db or greater.

TABLE 1. PNP 1000 ELECTRICAL, PHYSICAL, AND ENVIRONMENTAL SPECIFICATIONS
(Sheet 3 of 3)

PARAMETER	SPECIFICATION
<i>ENVIRONMENTAL</i>	
TEMPERATURE RANGE	+14 Degrees F to +122 Degrees F (–10 Degrees C to +50 Degrees C).
HUMIDITY	95% maximum, non–condensing.
ALTITUDE	
50 Hz	7500 feet (2286 m).
60 Hz	10,000 feet (3048 m).
<i>PHYSICAL</i>	
HEIGHT	21 inches (53.3 cm).
WIDTH	19.0 inches (48.3 cm).
DEPTH	19.0 inches (48.3 cm).
WEIGHT (unpacked)	126 pounds (11.3 kg).
NOTE	The PNP 1000 system performance is specified using the model FMSA–1 Precision Digital FM stereo modulation analyzer and Audio Precision APWin. Measured at 100% modulation where applicable.

UNPACKING AND INSPECTING.

The equipment becomes the property of the customer when the equipment is delivered to the carrier. Carefully unpack the equipment. Perform a visual inspection to determine that no apparent damage has been incurred during shipment. All shipping materials should be retained until it is determined that the unit has not been damaged. Claims for damaged equipment must be promptly filed with the carrier or the carrier may not accept the claim.

The contents of the shipment should be as indicated on the packing list. If the contents are incomplete, or if the unit is damaged electrically or mechanically, notify both the carrier and MARTI Electronics immediately.

SAFETY/OPERATING CONSIDERATIONS.

The PNP 1000 transmitter meets the IEC 215 safety standard. However, good judgement, care, and common sense must be practiced to prevent accidents. Procedures contained in this manual should be performed only by experienced and trained maintenance personnel.

PNP 1000 – QUICK INSTALL.

The PNP 1000 transmitter is assembled, operated, tested, and inspected at the factory prior to shipment and is ready for installation when received. Prior to installation, this publication should be studied to obtain an understanding of the operation, circuitry, nomenclature, and installation requirements.

The following text presents a quick installation procedure. The procedure presents a brief description of the steps required to install the transmitter. Refer to Figures 2–9 during the Quick Install procedure. The steps are explained in further detail following the procedure.

STEP 1 – PRE-INSTALLATION.



WARNING

WARNING

***ENSURE NO PRIMARY POWER IS CONNECTED TO
THE TRANSMITTER BEFORE PROCEEDING.***

STEP 2 – PREEMPHASIS PROGRAMMING.

The transmitter is programmed from the factory for 75 uS preemphasis. If a flat response or 50 uS preemphasis is required program SW2 as required. SW2 Position 7 OFF = 75uSec, ON=50uSec. SW2 position 8 ON = Pre-emphasis OFF, OFF = Pre-emphasis ON. Refer to Figure 4.

STEP 3 – AUDIO INPUT.

The transmitter is equipped with the following audio inputs: 1) analog left channel and right channel, 2) AES/EBU wire, 3) AES/EBU optical, 4) S/PDIF, and 5) composite. The following text presents the procedure to connect and program the unit for the desired type of audio input.

ANALOG LEFT AND RIGHT CHANNEL –

1. Left and right channel audio is interfaced to the PNP 1000 at remote audio connector J2, connect the audio to J2 as follows:

AUDIO SIGNAL	J2
Left Channel +	J2-9
Left Channel –	J2-10
Left Channel Shield	J2-11
Right Channel +	J2-1
Right Channel –	J2-2
Right Channel Shield	J2-3

2. The analog input can be programmed for a 600 Ohm or 10 k Ohm impedance. The unit is shipped from the factory configured for a 600 Ohm audio impedance. J8 and J10 jumpers ON = 600 Ohm, OFF = 10k Ohm. Refer to Figure 6.
3. The analog input must be programmed for the audio input level to be used. The input can be programmed for an input of –10 dBm, 0 dBm, +4 dBm, or +8 dBm. The unit is shipped from the factory configured for a 0 dBm audio input level. J24/J25/J31/J32 jumpers at position 1 = –10dBm, position 2 = 0dBm, position 3 = 4dBm, position 4 = 8dBm. Refer to Figure 6.

AES/EBU WIRE –

1. An AES/EBU wire input is interfaced to the PNP 1000 at remote interface connector J2. Connect the AES/EBU signal to J2-8 and J2-7. The AES/EBU signal is polarity independent. Therefore, the signal cables can be connected to J2-8 and J2-7 in any combination. Refer to Figure 3.

AES/EBU OPTICAL –

1. An AES/EBU optical input is interfaced to the PNP 1000 at DIGITAL IN OPTICAL connector U1. Connect the AES/EBU signal to DIGITAL IN OPTICAL connector U1. Refer to Figure 3

S/PDIF –

1. An S/PDIF input is interfaced to the PNP 1000 at DIGITAL IN S/PDIF connector J2 . A BNC-to-RCA pho no adapter is provided in the accessory kit. Refer to Figure 3 to install the adapter and connect the S/PDIF cable to DIGITAL IN S/PDIF connector J2.

COMPOSITE –

1. An composite input is interfaced to the PNP 1000 at COMPOSITE IN connector J4. Connect the composite signal to COMPOSITE IN connector J4. Refer to Figure 3.
2. The composite input can be programmed for a 50 Ohm or 10 k Ohm impedance. The unit is shipped from the factory configured for a 50 Ohm input impedance. Program header J6 to position 1–2 for 50 Ohms and positions 2–3 for 10k Ohms. Refere to Figure 7.
3. The PNP 1000 is designed to automatically detect and select the composite input when a pilot is present. If no pilot is detected, the analog left/right channel input will be selected. However, the unit can be pro grammed toselect: 1) only the composite input (J5 on positions 2–3) or 2) only the analog left/right channel input (J5 on removed) or 3) autodetect (J5 on positions 1–2). The unit is shipped from the factory for auto matic switching between the composite input and the analog left/right channel input. If the unit is to be con figured for composite only or left/right channel only operation, program header J5 as desired. Refer to Figure 7.

STEP 4 – FAILSAFE INPUT.



NOTE

ENSURE A FAILSAFE JUMPER OR CONTROL DEVICE IS CONNECTED TO FAILSAFE INPUT. THE UNIT IS EQUIPPED

NOTE

WITH A PRE-WIRED INTERFACE CONNECTOR TO PERMIT IMMEDIATE ON-AIR OPERATION.

The transmitter is equipped with a failsafe input and the status is displayed on the front panel of the PNP-1000. This input is designed for the connection of a control device such as a remote control unit failsafe connection. The polarity of the input is controlled by a jumper going from J1-15 to J1-14 for negative control or J1-15 to J1-16 for positive control. If a failsafe connection is not required, a jumper must be connected at J1-17. To permit immediate on-air operation, the unit is equipped with a pre-wired 25-Pin D-Type interface connector. The connector is located in the accessory kit and contains a failsafe input jumper. To permit immediate operation, install the connector on J1. The unit will not operate unless the failsafe is closed. Refer to Figure 3.

STEP 5 – MODULATION MONITOR CONNECTION.

The PNP 1000 is equipped with an **RF SAMPLE** receptacle. The sample port is for the connection of a modulation monitor or test equipment. The receptacle will provide 3.1V RMS at 1000 watts. Connect the desired equipment to the **RF SAMPLE** receptacle as required. Refer to Figure 3.

STEP 6 – ANTENNA CONNECTION.

A Type-N RF output receptacle is provided for the connection of the antenna to the transmitter. Connect the antenna to the RF output receptacle. Refer to Figure 3.

STEP 7 – AC POWER AND GROUND.



WARNING

ENSURE THE TRANSMITTER IS CONNECTED TO AN APPROPRIATE VOLTAGE RANGE WITH A GROUNDED AC RECEPTACLE.

WARNING

The transmitter requires connection to a 95–135V or 190–264V AC 50/60 Hz power supply. The unit requires 26 amperes at 120 volts or 13 amperes at 220V.

The transmitter must be connected to a grounded and circuit breaker/fused protected ac receptacle with a time delay for turn on surge current.

The transmitter is also equipped with a rear-panel ground lug. Connect an earth ground to the ground lug using a 2 inch wide (5.05 cm) copper strap or equivalent.

STEP 8 – AUDIO INPUT LEVEL ADJUSTMENT.

The transmitter audio input level must be properly adjusted to provide the desired modulation level and prevent over-driving/clipping of the audio circuitry. Refer to AUDIO INPUT LEVEL ADJUSTMENTS later in this document to adjust the audio input level.

STEP 9 – RF OUTPUT LEVEL ADJUSTMENT.

The PNP 1000 transmitter RF output is adjusted for a 1000 watt output at the factory. To re-adjust the RF output, proceed as follows while referring to Figure 2:

1. Operate the front-panel menu to read forward power by pushing the menu up or menu down buttons.
2. Turn the transmitter on by pressing the TX ON button.
3. Use the raise and lower buttons on the front panel to adjust to desired power level.

STEP 10 – MOUNTING.

The unit requires 21 inches (53.3 cm) of a 19 inch (48.3 cm) rack cabinet. Do not mount the transmitter directly above or below heat generating equipment. Once a rack location is determined, mount the chassis in the rack using 10 screws.

END OF QUICK INSTALL.

The transmitter is ready for on-air operation.

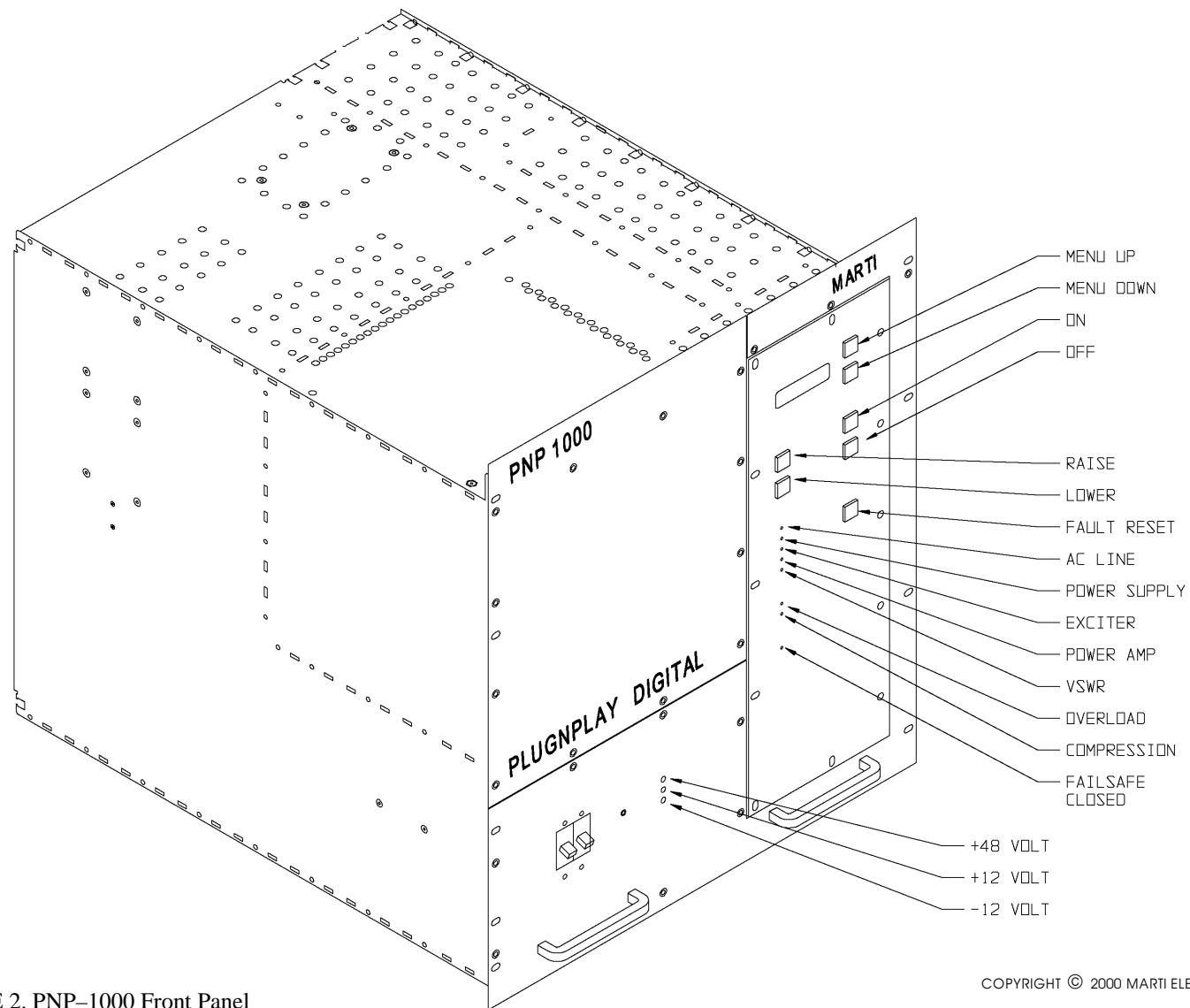


FIGURE 2. PNP-1000 Front Panel

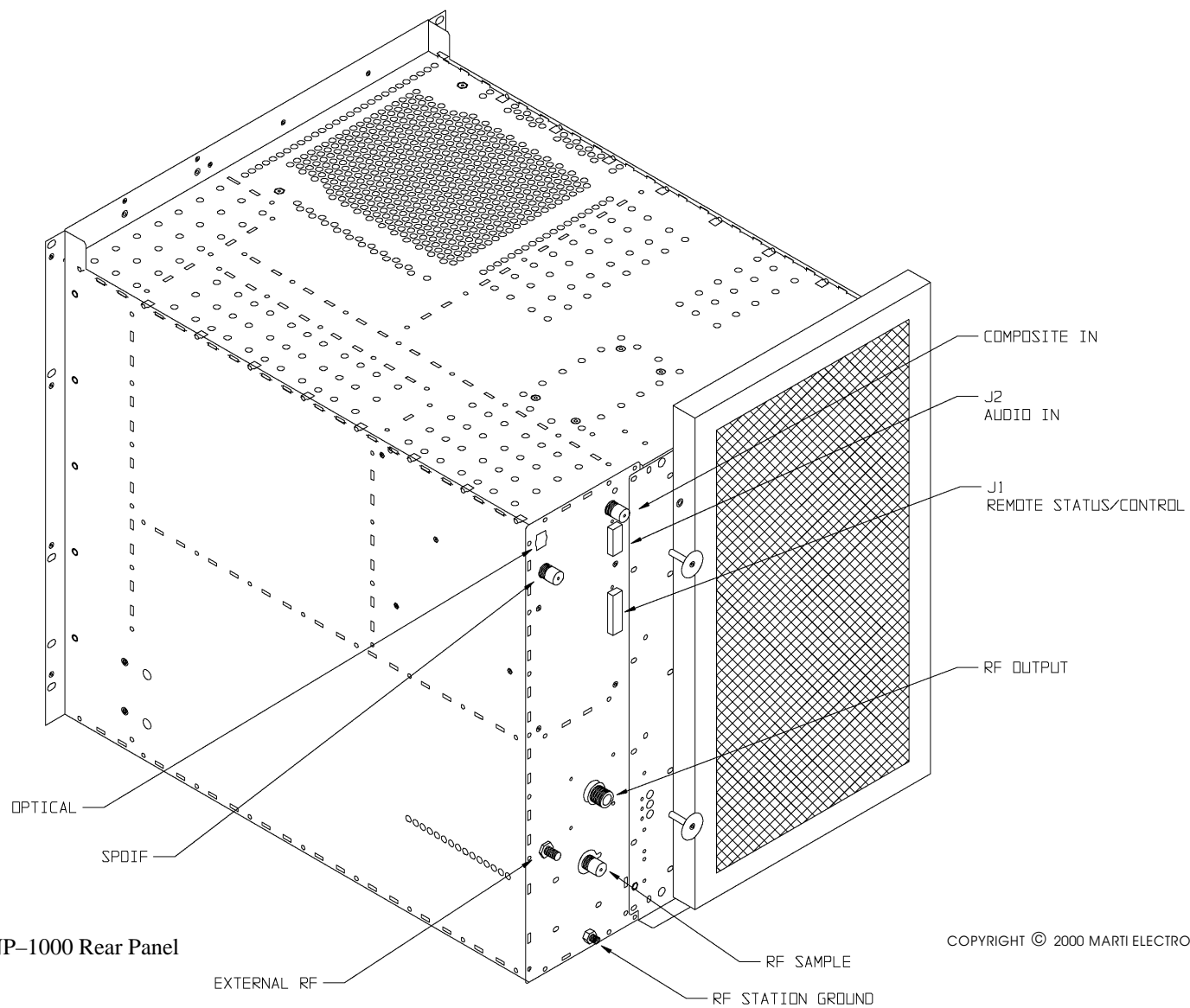


FIGURE 3. PNP-1000 Rear Panel

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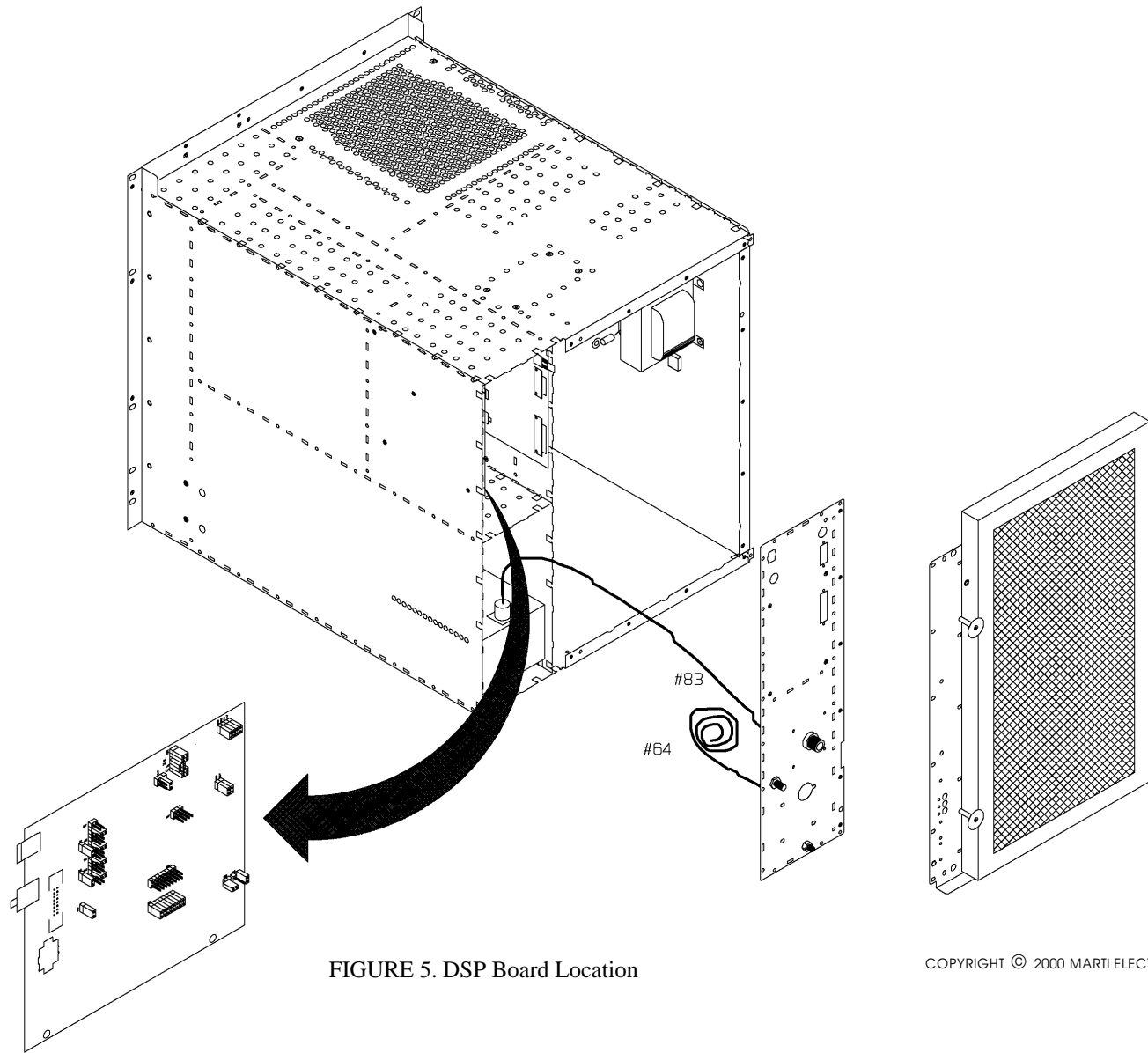


FIGURE 5. DSP Board Location

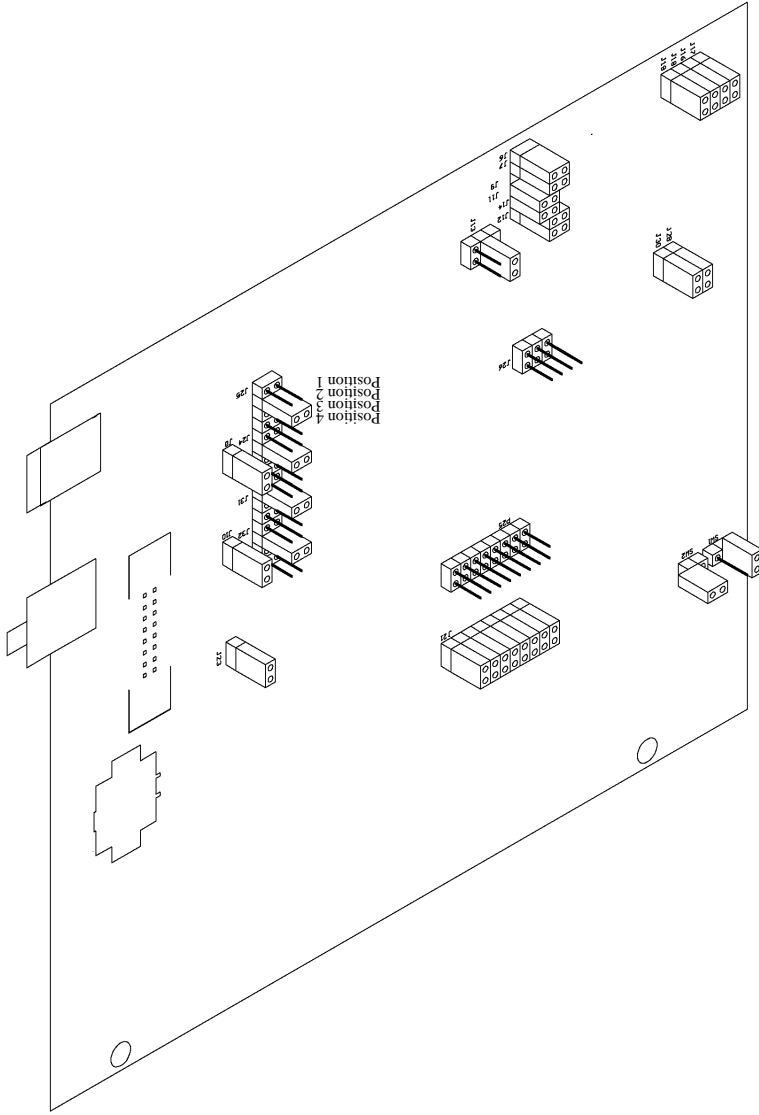
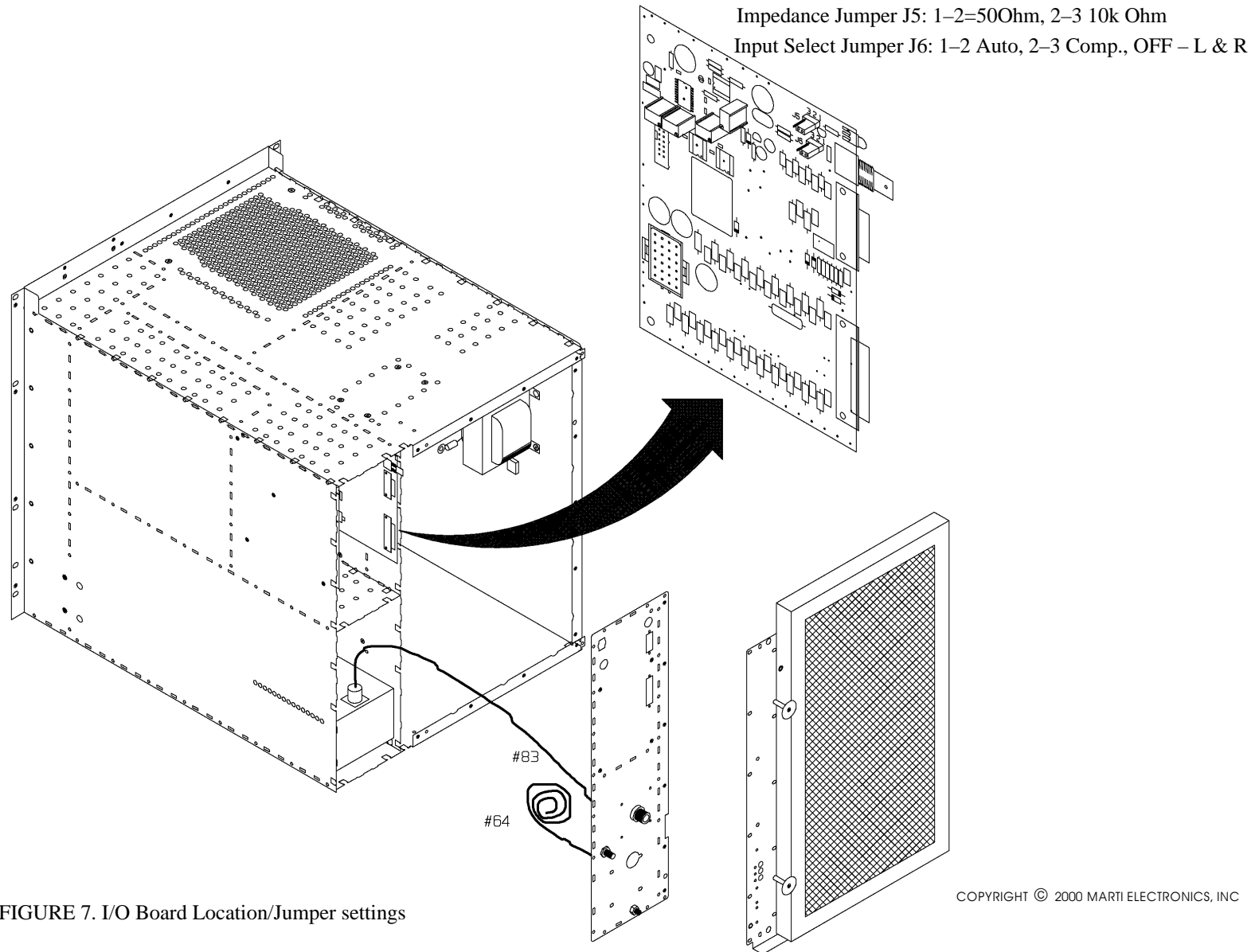


FIGURE 6. DSP Board Jumpers



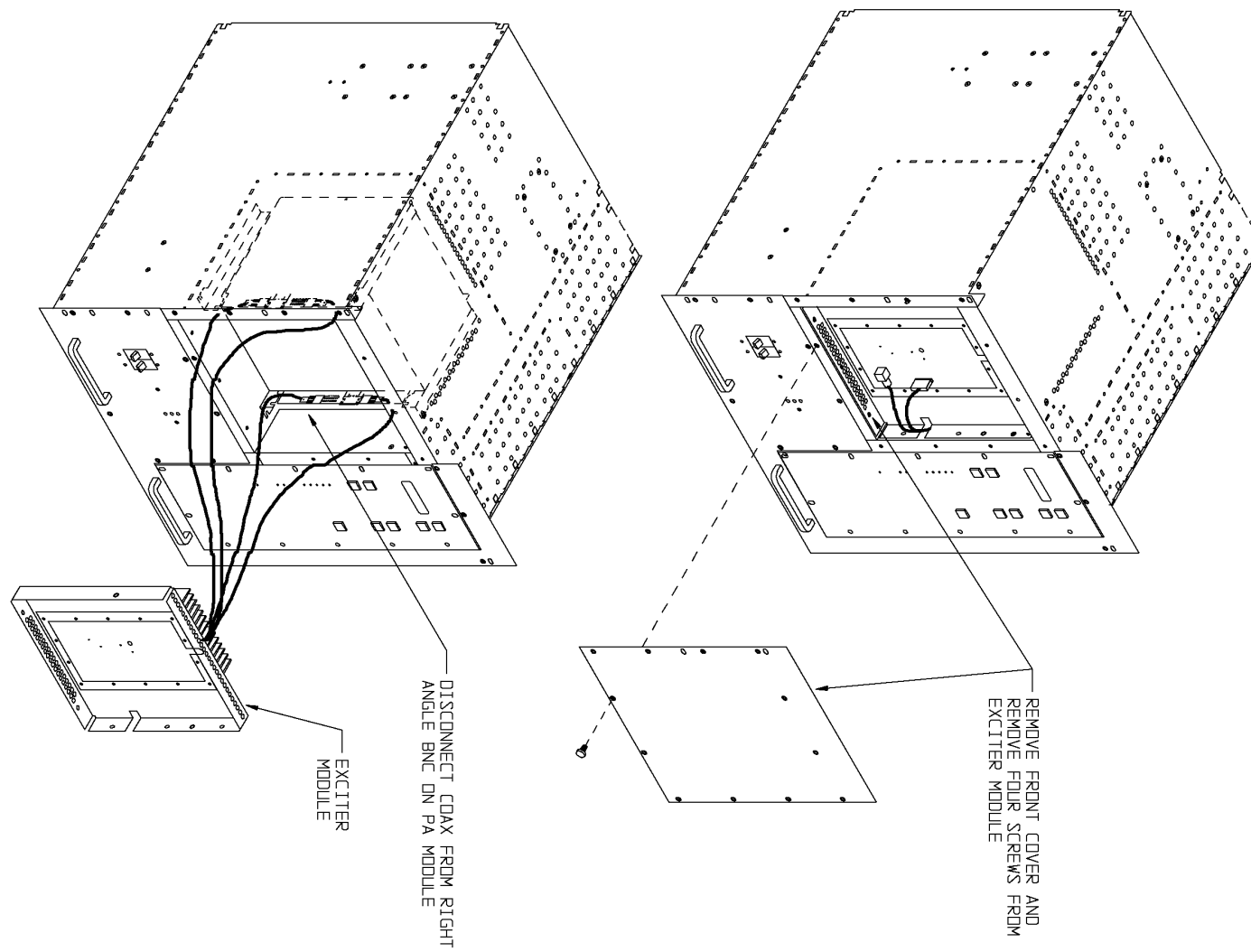


FIGURE 8. PNP-1000 Exciter PA Removal

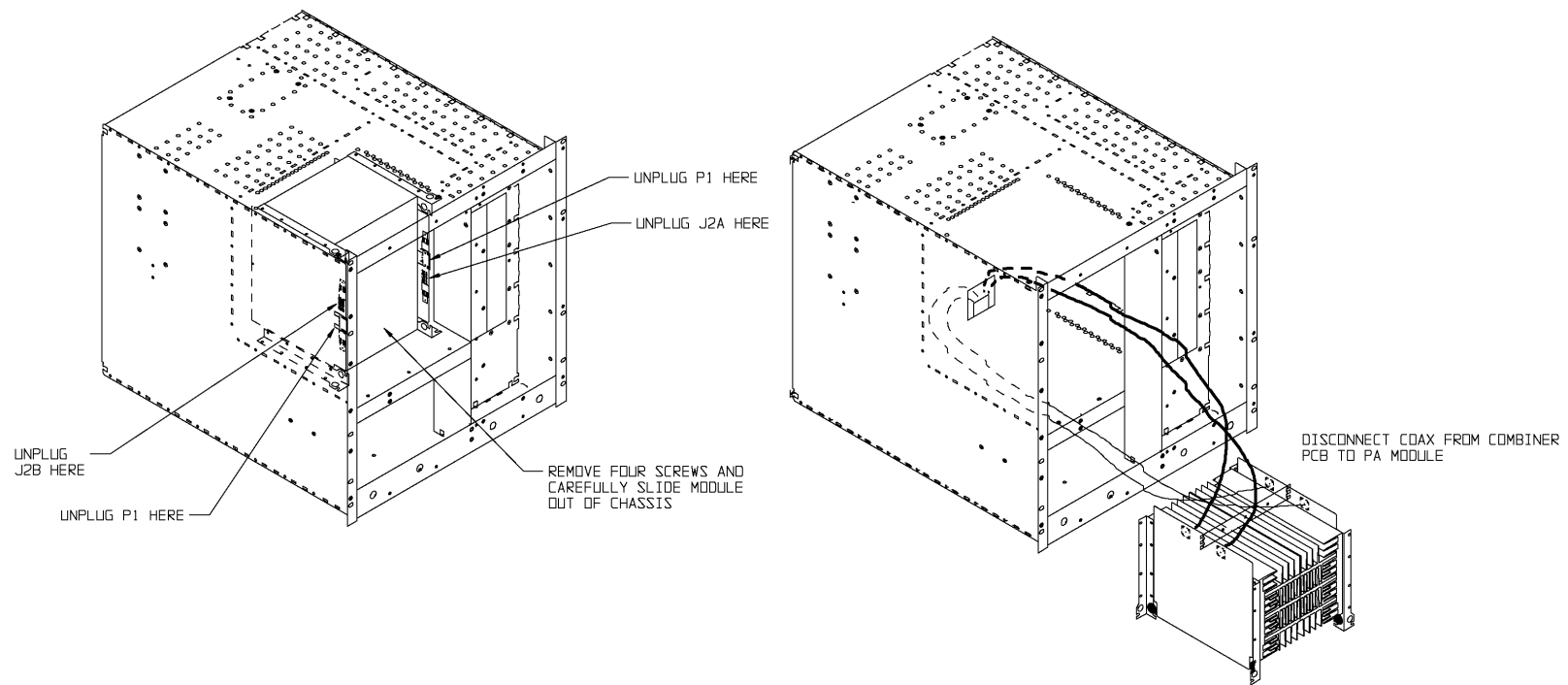


FIGURE 9. PNP-1000 PA Removal

OPERATION/FEATURE PROGRAMMING.

The PNP 1000 allows the user to select many types of different operating parameters and features. Many of the operating parameters and features are programmed on the DSP and front-panel interface circuit boards. Refer to the following text to program the transmitter for the desired operating characteristics.

OPERATING PARAMETERS/FEATURES/INDICATORS – DSP CIRCUIT BOARD.

Many of the operating parameters and features are programmed on the DSP circuit board. Refer to the following text to program the transmitter for the desired operating characteristics. Refer to Figure 6.

AUDIO INPUT SELECT HEADER –

Header J13 controls the selection of the audio input signal. The unit can be configured for: 1) an analog only input, 2) a digital only input, or 3) auto mode. The auto mode automatically switches between the analog and digital inputs. The unit is shipped from the factory configured for auto mode. Program J13 for the desired mode of operation as follows: 1–2 Analog, 2–3 Auto, 5–6 Digital.

DIGITAL INPUT STATUS –

Indicator D1 presents the status of the digital input. The indicator will illuminate when the digital input is missing.

ANALOG INPUT –

Header J8 controls the right channel audio impedance. Headers J24/J25 program the right channel audio input level. Header J10 controls the left channel audio impedance. Headers J31/J32 program the left channel audio input level. Refer to AUDIO INPUT CONNECTIONS/PROGRAMMING and the ANALOG INPUT procedures for information associated with the analog input.

POWER SUPPLY INDICATORS –

The DSP circuit board is equipped several power supply status indicators. Indicator D15 illuminates when the –10V dc supply is operational. Indicator D5 illuminates when the +1.8V dc supply is operational. Indicator D7 illuminates when the +2.5V dc supply is operational. Indicator D4 illuminates when the +3.3V dc supply is operational. Indicator D11 illuminates when the +5V dc supply is operational. Indicator D12 illuminates when the +12V dc supply is operational.

OPERATING PARAMETERS/FEATURES – FRONT PANEL INTERFACE CIRCUIT BOARD.

Some of the operating parameters and features are programmed on the front-panel interface circuit board. Refer to the following text and Figure 4 to program the transmitter for the desired operating characteristics.

SCA OPERATION –

SCA operation is controlled by SW2 on the controller interface circuit board. The SCA input can be configured for ON/OFF operation and can be set for 5 kHz or 7.5 kHz deviation. Position 6 on SW2 controls the ON/OFF operation and position 5 controls the deviation setting.

FREQUENCY PROGRAMMING –

The PNP 1000 carrier frequency is programmed by SW1 and SW2 on the controller interface circuit board. Refer to FREQUENCY PROGRAMMING for information associated with programming the transmitter carrier frequency. See Table 2.

PREEMPHASIS –

The transmitter can be configured for flat, 50 uS preemphasis, or 75 uS preemphasis via SW2 on the controller interface circuit board. Position 8 on SW2 turns pre-emphasis ON/OFF and position 7 sets pre-emphasis at 50 uS or 75 uS. The unit is programmed from the factory for 75 uS preemphasis. SW2 Position 7 OFF = 75uS, ON=50uS. SW2 position 8 ON = Pre-emphasis OFF, OFF = Pre-emphasis ON. Refer to Figure 4.

OPERATING PARAMETERS/FEATURES – FRONT-PANEL CIRCUIT BOARD.

Some of the operating parameters and features are programmed on the front-panel circuit board . Refer to the following text and Figure 2 to program the transmitter for the desired operating characteristics.

AC POWER ON/OFF BREAKER –

Provides primary ac power control for the transmitter.

MENU UP/DOWN CONTROLS –

Steps through the following readings for the PNP 1000 transmitter. 1) Forward Power. 2) Reflected Power. 3) PA Voltage. 4) Total PA Current. 5) PA Currents 1–4. 6) PA Heatsink Temperature. 7) Exciter Forward Power. 8) Exciter Reflected Power. 9) Exciter Current. 10) Exciter Heatsink Temperatures.

POWER RAISE/LOWER CONTROLS –

Adjusts the transmitter RF output power from 250 watts to 1050 watts.

ON SWITCH/INDICATOR –

SWITCH – Enables the transmitter RF output by unmuting the exciter and final power amplifier module.

INDICATOR – Illuminates to indicate the transmitter RF output is enabled.

OFF SWITCH/INDICATOR –

SWITCH – Disables the transmitter RF output by muting the exciter and final power amplifier module.

INDICATOR – Illuminates to indicate the transmitter RF output is disabled.

POWER SUPPLY VOLTAGE INDICATORS –

Illuminates to indicate the +48, +12 AND –12 volt dc from the power supply is operational.

AC LINE FAULT INDICATOR –

The AC line fault indicator illuminates when the AC voltage is outside the operating range required for the power supply. This range is 95–132 or 190–264 depending on the AC input configuration.

POWER SUPPLY FAULT INDICATOR –

The power supply fault indicator will illuminate when the power supply registers a fault condition. The power supply fault conditions are as follows. 1) 48V is out of regulation (+8V or –1V). 2) +/-12V supply is out of regulation (+/-0.5Volts). 3) A surge current from the +48Volt supply occurs. 4) Heatsink temperature on the power supply exceeds 70C.

EXCITER AMPLIFIER FAULT INDICATOR –

The exciter fault indicator illuminates when one of the following conditions exists. 1) Exciter heatsink temperature is above 77C. 2) Exciter current is above 4.0 amps. 3) Exciter power falls below 40 watts. 4) Exciter reflected power is above 20 watts when the transmitter total power is above 200 watts. 5) Exciter reflected power is above 25 watts when the transmitter total power is below 200 watts. The transmitter will shut down if any of the above conditions occur.

POWER AMPLIFIER FAULT INDICATOR –

The PA fault indicator illuminates when one of the following conditions exists. 1) PA heatsink temperature around any device is above 93C. 2) The bias voltage is maximized but desired output power is not achieved. 3) Any PA device current is above 11.5 amps. 4) The total PA current is above 42 amps. The transmitter will maximize power output just below the thresholds defined if any of the above conditions occur.

HIGH VSWR FAULT INDICATOR –

The high VSWR fault indicator illuminates when the reflected power back into the PNP 1000 RF output exceeds 40 watts. The transmitter will maximize power output just below the 40W threshold when high reflected power is detected.

INPUT AUDIO OVERLOAD INDICATOR –

Illuminates to indicate the audio input level is approximately 4 dB above nominal. This level may cause clipping at the digital-to-analog converter and result in high audio distortion.

AUDIO COMPRESSION INDICATOR

Illuminates to indicate the automatic-gain-control circuit on the DSP circuit board is engaged. This will occur when the audio input level is approximately 2 dB above nominal. The circuit is designed to compress higher than nominal levels to prevent clipping at the digital-to-analog converter.

FAILSAFE CLOSED INDICATOR

Illuminates to indicate the failsafe is properly connected on the remote D-sub connector J1-17. If the remote control common is configured for positive logic, J1-17 requires a +5 to +12 volt input. If negative logic is chosen then J1-17 requires a ground connection.

AUDIO INPUT CONNECTIONS/PROGRAMMING.

The PNP 1000 is equipped with several audio inputs: 1) analog left channel and right channel, 2) AES/EBU wire, 3) AES/EBU optical, 4) S/PDIF, and 5) composite. The following text along with Figure 3 presents the procedure to connect and program the unit for the desired audio input.

ANALOG INPUT.

CONNECTIONS –

Analog left and right channel audio is interfaced to the PNP 1000 at connector J2. Connect the analog left and right channel audio to J2 as follows:

<i>AUDIO SIGNAL</i>	<i>J2</i>
Left Channel +	J2-9
Left Channel –	J2-10
Left Channel Shield	J2-11
Right Channel +	J2-1
Right Channel –	J2-2
Right Channel Shield	J2-3

IMPEDANCE PROGRAMMING –

The analog left and right channel audio impedance is controlled by headers J8 and J10 on the DSP circuit board. The unit can be programmed for a 600 Ohm or 10 k Ohm audio impedance. The unit is shipped from the factory configured for a 600 Ohm audio impedance. Program the unit for the desired audio impedance. J8 and J10 jumpers ON = 600 Ohm, OFF = 10k Ohm. Refer to Figure 6.

LEVEL PROGRAMMING –

The analog left and right channel audio level is controlled by headers J24/J25/J31/J32 on the DSP circuit board. The unit can be programmed for a –10 dBm, 0 dBm, +4 dBm, or a +8 dBm audio input level. The unit is shipped from the factory configured for a 0 dBm Ohm audio input level. Program the unit for the desired audio level. J24/J25/J31/J32 jumpers at position 1 = –10dBm, position 2 = 0dBm, position 3 = 4dBm, position 4 = 8dBm. Refer to Figure 6.

AES/EBU WIRE.

An AES/EBU wire input is interfaced to the PNP 1000 at remote interface connector J2. Connect the AES/EBU signal to J2-7 and J2-8. The AES/EBU signal is polarity independent. Therefore, the signal cables can be connected to J2-7 and J2-8 in any combination. Refer to Figure 3.

AES/EBU OPTICAL.

An AES/EBU optical input is interfaced to the PNP 1000 at DIGITAL IN OPTICAL connector U1. Connect the AES/EBU signal to DIGITAL IN OPTICAL connector U1. Refer to Figure 3.

S/PDIF.

An S/PDIF input is interfaced to the PNP 1000 at DIGITAL IN S/PDIF connector J2. A BNC-to-RCA phono adapter is provided in the accessory kit. Install the adapter and connect the S/PDIF cable to DIGITAL IN S/PDIF connector J2. Refer to Figure 3.

COMPOSITE.

CONNECTIONS –

A composite input is interfaced to the PNP 1000 at COMPOSITE IN connector J4. Connect the composite signal to COMPOSITE IN connector J4. Refer to Figure 3.

IMPEDANCE PROGRAMMING –

The composite input can be programmed for a 50 Ohm or 10 k Ohm impedance. The unit is shipped from the factory configured for a 50 Ohm input impedance. Program header J6 as desired. Program header J6 to position 1-2 for 50 Ohms and positions 2-3 for 10k Ohms. Refer to Figure 7.

AUTOMATIC SWITCHING BETWEEN COMPOSITE AND ANALOG LEFT/RIGHT CHANNEL PROGRAMMING –

The PNP 1000 is designed to automatically detect and select the composite input when a pilot is present. If no pilot is detected, the analog left/right channel input will be selected. However, the unit can be programmed to select: 1) only the composite input (J5 on positions 2-3) or 2) only the analog left/right channel input (J5 on removed) or 3) autodetect (J5 on positions 1-2). The unit is shipped from the factory for automatic switching between the composite input and the analog left/right channel input. If the unit is to be configured for composite only or left/right channel only operation, program header J5 as desired. Refer to Figure 7.

SCA.

The transmitter is equipped with a built-in 67 kHz SCA encoder. The encoder is controlled by SW2 on the controller interface board and J23 on the DSP board.

CONNECTIONS –

SCA audio is interfaced to the PNP 1000 at connector J2. Connect: 1) SCA + to J2-12, 2) SCA – to J2-13, and 3) SCA shield to J2-14.

IMPEDANCE PROGRAMMING –

The SCA audio impedance is controlled by header J23 on the DSP circuit board. The unit can be programmed for a 600 Ohm (J23 installed) or 10 k Ohm audio impedance (J23 removed). The unit is shipped from the factory configured for a 600 Ohm audio impedance. Program the unit for the desired audio impedance. Refer to Figure 6.

ON/OFF CONTROL –

SCA ON/OFF operation is controlled by SW2 position 6 on the controller interface board. The unit is shipped from the factory with the SCA operation disabled. Set SW2 position 6 to OFF to enable SCA operation or ON to disable the SCA operation.

5 kHz/7.5 kHz DEVIATION –

5 kHz or 7.5 kHz deviation is controlled by SW2 position 5 on the controller board. The unit is shipped from the factory with the unit configured for 7.5 kHz deviation. Set SW2 position 5 to ON for 7.5kHz deviation or OFF for 5kHz deviation.

REMOTE CONTROL AND INDICATIONS.

The PNP 1000 is designed for remote control/indication operation. The transmitter will interface with almost any remote control unit or panel. The following text along with Figure 3 presents a description of the remote control and indicator functions.

TRANSMITTER ON COMMAND –

The transmitter on command is located at J1-1. The command allows the transmitter to be enabled from a remote location. The command can be activated using positive or negative control. Positive control requires: 1) the use of a momentary or sustained contact to a +5 volt to +12 volt dc signal to enable transmitter operation. Negative control requires: 1) the use of a momentary or sustained contact to ground to enable transmitter operation. The positive or negative control is established with the R. C. IN Common pin located at J1-15. If this pin is grounded the logic is positive if it is tied to +5 volt to +12 volt dc signal the logic is negative.

TRANSMITTER OFF COMMAND –

The transmitter off command is located at J1-2. The command allows the transmitter to be disabled from a remote location. The command can be activated using positive or negative control. Positive control requires: 1) the use of a momentary or sustained contact to a +5 volt to +12 volt dc signal to disable transmitter operation. Negative control requires: 1) the use of a momentary or sustained contact to ground to disable transmitter operation. The positive or negative control is established with the R. C. IN Common pin located at J1-15. If this pin is grounded the logic is positive if it is tied to +5 volt to +12 volt dc signal the logic is negative.

TRANSMITTER RAISE COMMAND –

The transmitter raise command is located at J1-3. The command allows the forward power to be raised from a remote location. The command can be activated using positive or negative control. Positive control requires: 1) the use of a momentary or sustained contact to a +5 volt to +12 volt dc signal to disable transmitter operation. Negative control requires: 1) the use of a momentary or sustained contact to ground to disable transmitter operation. The positive or negative control is established with the R. C. IN Common pin located at J1-15. If this pin is grounded the logic is positive if it is tied to +5 volt to +12 volt dc signal the logic is negative.

TRANSMITTER LOWER COMMAND –

The transmitter lower command is located at J1-4. The command allows the forward power to be lowered from a remote location. The command can be activated using positive or negative control. Positive control requires: 1) the use of a momentary or sustained contact to a +5 volt to +12 volt dc signal to disable transmitter operation. Negative control requires: 1) the use of a momentary or sustained contact to ground to disable transmitter operation. The positive or negative control is established with the R. C. IN Common pin located at J1-15. If this pin is grounded the logic is positive if it is tied to +5 volt to +12 volt dc signal the logic is negative.

TRANSMITTER FAULT RESET COMMAND –

The transmitter fault reset command is located at J1-5. The command allows a fault condition to be reset from a remote location. If the fault has went away the fault will be cleared, if teh fault is still valid the fault will remain. The command can be activated using positive or negative control. Positive control requires: 1) the use of a momentary or sustained contact to a +5 volt to +12 volt dc signal to disable transmitter operation. Negative control requires: 1) the use of a momentary or sustained contact to ground to disable transmitter operation. The positive or negative control is established with the R. C. IN Common pin located at J1-15. If this pin is grounded the logic is positive if it is tied to +5 volt to +12 volt dc signal the logic is negative.

TRANSMITTER ON INDICATOR –

The transmitter on indicator presents the transmitter on status. The indicator will go LOW (0 volts dc) when the transmitter is enabled. The transmitter on indicator is located at J1-6. Current limiting resistors required.

TRANSMITTER OFF INDICATOR –

The transmitter off indicator presents the transmitter off status. The indicator will go LOW (0 volts dc) when the transmitter is disabled. The transmitter off indicator is located at J1–7.

EXCITER AMPLIFIER FAULT INDICATOR –

The exciter fault indicator is located at J1–8 and is active low. This fault is active when one of the following conditions exists. 1) Exciter heatsink temperature is above 77C. 2) Exciter current is above 4.0 amps. 3) Exciter power falls below 40 watts. 4) Exciter reflected power is above 20 watts when the transmitter total power is above 200 watts. 5) Exciter reflected power is above 25 watts when the transmitter total power is below 200 watts. The transmitter will shut down if any of the above conditions occur.

PA FAULT INDICATOR –

The PA fault indicator is located at J1–9 and is active low. This fault is active when one of the following conditions exists. 1) PA heatsink temperature around any device is above 93C. 2) The bias voltage is maximized but desired output power is not achieved. 3) Any PA device current is above 11.5 amps. 4) The total PA current is above 42 amps. The transmitter will maximize power output just below the thresholds defined if any of the above conditions occur.

HIGH VSWR FAULT INDICATOR –

The high VSWR fault indicator is located at J1–10 and is active low. This fault is active when the reflected power back into the PNP 1000 RF output exceeds 40 watts. The transmitter will maximize power output just below the 40W threshold when high reflected power is detected.

FORWARD POWER METER OUTPUT –

The remote forward power meter output is located at J1–11. The forward power meter will output +2 volts dc when the transmitter output is 1000 watts. Circuit ground is recommended for remote metering connections.

REFLECTED POWER METER OUTPUT –

The remote reflected power meter output is located at J1–12. The reflected power meter will output +2 volts dc when the reflected power is 40 watts. Circuit ground is recommended for remote metering connections.

TOTAL CURRENT METER OUTPUT –

The remote total current meter output is located at J1–13. The total current meter will output +2 volts dc when the total current is 35 amps. Circuit ground is recommended for remote metering connections.

+12V DC –

+12 volts dc is located at J1–14. The supply is used for remote control and indicator connections.

R.C. IN COMMON –

The R.C. in common input is located at J1–15. The remote control common input determines the polarity of remote control operation. For negative control operation, connect a jumper between J1–14 and J1–15. For positive control operation, connect a jumper between J1–16 and J1–15.

CIRCUIT GROUND –

Circuit ground is located at J1–16. The ground is recommended for remote control, indicator, and metering connections.



NOTE

NOTE

ENSURE A FAILSAFE JUMPER OR CONTROL DEVICE IS CONNECTED TO FAILSAFE INPUT J1–17. THE UNIT IS EQUIPPED WITH A PRE-WIRED INTERFACE CONNECTOR TO PERMIT IMMEDIATE ON-AIR OPERATION.

FAILSAFE INPUT –

The transmitter failsafe input is located at J1-17. The failsafe input is used to mute and unmute the transmitter RF output. This input is designed for the connection of a control device such as a remote control unit failsafe connection. To permit immediate on-air operation, the unit is equipped with a pre-wired 25-Pin D-Type interface connector. The connector is located in the accessory kit and contains a failsafe input jumper. To permit immediate operation, install the connector on J1.

POWER SUPPLY FAULT INDICATOR –

The power supply fault is located at J1-23 and is active low. This fault occurs when the power supply registers a fault condition. The power supply fault conditions are as follows. 1) 48V is out of regulation (+8V or -1V). 2) +/-12V supply is out of regulation (+/-0.5Volts). 3) A surge current from the +48Volt supply occurs. 4) Heat-sink temperature on the power supply exceeds 70C.

PAV SAMPLE –

A PAV (power amplifier voltage) sample is provided at J1-24. The sample will output 2 volts for a PA voltage of 50 volts.

ANALOG RIGHT CHANNEL INPUT –

The analog right channel input + is located at J2-1. The analog right channel input – is located at J2-2. The analog right channel input ground is located at J2-3. The input impedance can be configured for 600 Ohms or 10 k Ohms. The input level can be configured for -10 dBm, 0 dBm, +4 dBm, or +8 dBm.

ANALOG LEFT CHANNEL INPUT –

The analog left channel input + is located at J2-9. The analog left channel input – is located at J2-10. The analog left channel input ground is located at J2-11. The input impedance can be configured for 600 Ohms or 10 k Ohms. The input level can be configured for -10 dBm, 0 dBm, +4 dBm, or +8 dBm.

AES/EBU INPUT –

The AES/EBU input + is located at J2-8. The AES/EBU input – is located at J2-7. The AES/EBU signal is polarity independent. Therefore, the signal cables can be connected to J2-8 and J2-7 in any combination.

SCA AUDIO INPUT –

The SCA audio input + is located at J2-12. The SCA audio input – is located at J2-13. The SCA audio input ground is located at J2-14. The input impedance can be configured for 600 Ohms or 10 k Ohms.

MODULATION MONITOR CONNECTION.

The PNP 1000 is equipped with an **RF SAMPLE** receptacle. The sample port is for the connection of a modulation monitor or test equipment. The receptacle will provide 3.1V RMS at 1000 watts. Connect the desired equipment to the **RF SAMPLE** receptacle as required.

ANTENNA CONNECTION.

A Type-N RF output receptacle is provided for the connection of the antenna to the transmitter. Connect the antenna to the RF output receptacle.

GROUND CONNECTION.



WARNING

WARNING

ENSURE THE TRANSMITTER AC LINE CORD IS CONNECTED TO A GROUNDED AC RECEPTACLE AND AN EARTH GROUND IS CONNECTED TO THE CHASSIS GROUND LUG.

The transmitter must be connected to a grounded and circuit breaker/fused protected ac receptacle. Ensure the transmitter is connected to a grounded ac receptacle.

The transmitter is also equipped with a rear-panel ground lug. Refer to Figure 4 and connect an earth ground to the ground lug using a 2 inch wide (5.05 cm) copper strap or equivalent.

AC POWER.



WARNING

WARNING

ENSURE THE TRANSMITTER IS CONNECTED TO AN APPROPRIATE VOLTAGE RANGE WITH A GROUNDED AC RECEPTACLE.

The transmitter requires connection to a 95–135V or 190–264V AC 50/60 Hz power supply. The unit requires 26 amperes at 120 volts or 13 amperes at 220V.

The transmitter must be connected to a grounded and circuit breaker/fused protected ac receptacle with a time delay for turn on surge current.

RF OUTPUT LEVEL ADJUSTMENT.

The PNP 1000 transmitter RF output is adjusted for a 1000 watt output at the factory. To re-adjust the RF output, proceed as follows: Refer to Figure 2.

1. Operate the front-panel menu to read forward power by pushing the menu up or menu down buttons.
2. Turn the transmitter on by pressing the TX ON button.
3. Use the raise and lower buttons on the front panel to adjust to desired power level.

AUDIO INPUT LEVEL ADJUSTMENTS.

AUDIO INPUT LEVEL ADJUSTMENT.

The transmitter audio input level must be properly adjusted to provide the desired modulation level and prevent over-driving/clipping of the audio circuitry. It is strongly recommended a modulation monitor be used to adjust the audio level. This ensures the transmitter will provide maximum modulation without over-modulation. If a modulation monitor is not available, the level can be adjusted using the PNP 1000 front panel **COMPRESSION** indicator. However, the adjust will not ensure a 100% modulation level from the transmitter.

ANALOG INPUT – AES/EBU WIRE – AES/EBU OPTICAL – S/PDIF.

The analog input, AES/EBU wire, AES/EBU optical, and S/PDIF audio level is adjusted by using the output level control on the audio source. For the analog input, the level is coarse adjusted by the analog audio input level headers on the DSP circuit board. To fine adjust the level to obtain the desired modulation, proceed as follows:

ADJUSTMENT WITH MODULATION MONITOR –

1. Connect the modulation monitor to the **RF SAMPLE** receptacle.
2. Operate the front-panel breaker to ON.
3. Depress the front-panel ON switch/indicator to illuminate the switch/indicator.
4. Operate the audio source to output a 400 Hz tone at: 1) –2 dBfs for digital sources or 2) the selected nominal level for analog sources.
5. Adjust the audio source output level for 100% modulation on the modulation monitor.

ADJUSTMENT WITHOUT MODULATION MONITOR –



NOTE

WITHOUT A MODULATION MONITOR, THE FOLLOWING ADJUSTMENT WILL NOT ENSURE A 100% MODULATION LEVEL FROM THE TRANSMITTER.

NOTE

1. Operate the front panel breaker to ON.
2. Depress the front-panel ON switch/indicator to illuminate the switch/indicator.
3. Operate the audio source with normal program music audio such as a CD.
4. Adjust the audio source output level until the front-panel COMPRESSION indicator blinks at a rate of approximately once per second. This will provide a modulation level of less than 100%. However, the audio input will be adjusted to a level ensuring audio input overload and clipping will not occur.

COMPOSITE.

The composite input level is adjusted at the factory for 100% modulation with a 3.5 volt peak-to-peak input level. The input level is adjusted by composite input level control R11 on the rear-panel circuit board. If re-adjustment of the input level is required, proceed as follows:

ADJUSTMENT WITH MODULATION MONITOR –

1. Refer to Figure 3 and connect the modulation monitor to the **RF SAMPLE** receptacle.
2. Operate the rear-panel ON/OFF switch to ON.
3. Depress the front-panel ON switch/indicator to illuminate the switch/indicator.
4. Operate the audio source to output a 400 Hz tone at the nominal level.
5. Ensure pilot indicator DS1 is illuminated. If the indicator is not illuminated, the composite signal is not present at the transmitter.
6. Adjust the composite source output level control for 100% modulation on the modulation monitor. If the composite source does not contain an output level control, refer to Figure 6 and adjust composite input level control R11 for 100% modulation on the modulation monitor. Ensure the level does not exceed 3.5 volts peak-to-peak.

ADJUSTMENT WITHOUT MODULATION MONITOR –



NOTE

WITHOUT A MODULATION MONITOR, THE FOLLOWING ADJUSTMENT WILL NOT ENSURE A 100% MODULATION LEVEL FROM THE TRANSMITTER.

NOTE

1. Operate the front-panel breaker to ON.
2. Depress the front-panel ON switch/indicator to illuminate the switch/indicator.
3. Operate the audio source with normal program music.
4. Ensure pilot indicator DS1 is illuminated. If the indicator is not illuminated, the composite signal is not present at the transmitter.
5. Adjust the composite source output level control until the front-panel **COMPRESSION** indicator blinks at a rate of approximately once per second. This will provide a modulation level of less than 100%. However, the audio input will be adjusted to a level preventing audio input overload and clipping. Ensure the level does not exceed 3.5 volts peak-to-peak.

SCA.

The SCA input audio level is adjusted by using the output level control on the audio source. To adjust the level to obtain the desired modulation, proceed as follows:

1. Connect an SCA decoder to the modulation monitor.
2. Operate the front-panel breaker to ON.
3. Depress the front-panel ON switch/indicator to illuminate the switch/indicator.
4. Operate the audio source to output a 400 Hz tone.
5. Adjust the audio source output level for approximately 15% modulation on the SCA decoder. Indicator D8 on the DSP circuit board illuminates to indicate the overload of the SCA input. If D8 illuminates decrease the audio level until D8 extinguishes.

MOUNTING.

The PNP 1000 transmitter requires 21 inches (53.3 cm) of a 19 inch (48.3 cm) rack cabinet. Do not mount the transmitter directly above or below heat generating equipment. Once a rack location is determined, mount the chassis in the rack using 4 screws.

FREQUENCY PROGRAMMING.

The transmitter is programmed for the desired carrier frequency from the factory. The carrier frequency is determined by: SW1 and SW2 on the controller interface board. Refer to Figure 4.

Table 2 text presents the information required to re-program the transmitter frequency. Some of the carrier frequencies can be programmed using 2 different oscillator circuits. For those frequencies, use the oscillator circuit which provides optimum performance from the transmitter. Use the information only when the transmitter carrier frequency must be changed.

TABLE 2. FREQUENCY PROGRAMMING													
	Band Selection SW2 Positions 1–4					Frequency SW1 Positions 1–8							
FREQUENCY	<i>Band 1</i>	<i>Band 2</i>	<i>Band 3</i>	<i>Band 4</i>		<i>Freq 7</i>	<i>Freq 6</i>	<i>Freq 5</i>	<i>Freq 4</i>	<i>Freq 3</i>	<i>Freq 2</i>	<i>Freq 1</i>	<i>Freq 0</i>
87.0	OFF	ON	ON	ON		ON	ON	ON	ON	ON	ON	ON	ON
87.05	OFF	ON	ON	ON		ON	ON	ON	ON	ON	ON	ON	OFF
87.1	OFF	ON	ON	ON		ON	ON	ON	ON	ON	ON	OFF	ON
87.15	OFF	ON	ON	ON		ON	ON	ON	ON	ON	ON	OFF	OFF
87.2	OFF	ON	ON	ON		ON	ON	ON	ON	ON	OFF	ON	ON
87.25	OFF	ON	ON	ON		ON	ON	ON	ON	ON	OFF	ON	OFF
87.3	OFF	ON	ON	ON		ON	ON	ON	ON	ON	OFF	OFF	ON
87.35	OFF	ON	ON	ON		ON	ON	ON	ON	ON	OFF	OFF	OFF
87.4	OFF	ON	ON	ON		ON	ON	ON	ON	OFF	ON	ON	ON
87.45	OFF	ON	ON	ON		ON	ON	ON	ON	OFF	ON	ON	OFF
87.5	OFF	ON	ON	ON		ON	ON	ON	ON	OFF	ON	OFF	ON
87.55	OFF	ON	ON	ON		ON	ON	ON	ON	OFF	ON	OFF	OFF
87.6	OFF	ON	ON	ON		ON	ON	ON	ON	OFF	OFF	ON	ON
87.65	OFF	ON	ON	ON		ON	ON	ON	ON	OFF	OFF	ON	OFF
87.7	OFF	ON	ON	ON		ON	ON	ON	ON	OFF	OFF	OFF	ON
87.75	OFF	ON	ON	ON		ON	ON	ON	ON	OFF	OFF	OFF	OFF
87.8	OFF	ON	ON	ON		ON	ON	ON	OFF	ON	ON	ON	ON
87.85	OFF	ON	ON	ON		ON	ON	ON	OFF	ON	ON	ON	OFF
87.9	OFF	ON	ON	ON		ON	ON	ON	OFF	ON	ON	OFF	ON
87.95	OFF	ON	ON	ON		ON	ON	ON	OFF	ON	ON	OFF	OFF
88.0	OFF	ON	ON	ON		ON	ON	ON	OFF	ON	OFF	ON	ON
88.05	OFF	ON	ON	ON		ON	ON	ON	OFF	ON	OFF	ON	OFF
88.1	OFF	ON	ON	ON		ON	ON	ON	OFF	ON	OFF	OFF	ON
88.15	OFF	ON	ON	ON		ON	ON	ON	OFF	ON	OFF	OFF	OFF
88.2	OFF	ON	ON	ON		ON	ON	ON	OFF	OFF	ON	ON	ON
88.25	OFF	ON	ON	ON		ON	ON	ON	OFF	OFF	ON	ON	OFF
88.3	OFF	ON	ON	ON		ON	ON	ON	OFF	OFF	ON	OFF	ON
88.35	OFF	ON	ON	ON		ON	ON	ON	OFF	OFF	ON	OFF	OFF
88.4	OFF	ON	ON	ON		ON	ON	ON	OFF	OFF	OFF	ON	ON
88.45	OFF	ON	ON	ON		ON	ON	ON	OFF	OFF	OFF	ON	OFF

TABLE 2. FREQUENCY PROGRAMMING													
	Band Selection SW2 Positions 1–4					Frequency SW1 Positions 1–8							
FREQUENCY	Band 1	Band 2	Band 3	Band 4		Freq 7	Freq 6	Freq 5	Freq 4	Freq 3	Freq 2	Freq 1	Freq 0
88.5	OFF	ON	ON	ON		ON	ON	ON	OFF	OFF	OFF	OFF	ON
88.55	OFF	ON	ON	ON		ON	ON	ON	OFF	OFF	OFF	OFF	OFF
88.6	OFF	ON	ON	ON		ON	ON	OFF	ON	ON	ON	ON	ON
88.65	OFF	ON	ON	ON		ON	ON	OFF	ON	ON	ON	ON	OFF
88.7	OFF	ON	ON	ON		ON	ON	OFF	ON	ON	ON	OFF	ON
88.75	OFF	ON	ON	ON		ON	ON	OFF	ON	ON	ON	OFF	OFF
88.8	OFF	ON	ON	ON		ON	ON	OFF	ON	ON	OFF	ON	ON
88.85	OFF	ON	ON	ON		ON	ON	OFF	ON	ON	OFF	ON	OFF
88.9	OFF	ON	ON	ON		ON	ON	OFF	ON	ON	OFF	OFF	ON
88.95	OFF	ON	ON	ON		ON	ON	OFF	ON	ON	OFF	OFF	OFF
89	OFF	ON	ON	ON		ON	ON	OFF	ON	OFF	ON	ON	ON
89.05	OFF	ON	ON	ON		ON	ON	OFF	ON	OFF	ON	ON	OFF
89.1	OFF	ON	ON	ON		ON	ON	OFF	ON	OFF	ON	OFF	ON
89.15	OFF	ON	ON	ON		ON	ON	OFF	ON	OFF	ON	OFF	OFF
89.2	OFF	ON	ON	ON		ON	ON	OFF	ON	OFF	OFF	ON	ON
89.25	OFF	ON	ON	ON		ON	ON	OFF	ON	OFF	OFF	ON	OFF
89.3	OFF	ON	ON	ON		ON	ON	OFF	ON	ON	ON	ON	OFF
89.35	OFF	ON	ON	ON		ON	ON	OFF	ON	OFF	OFF	OFF	OFF
89.4	OFF	ON	ON	ON		ON	ON	OFF	OFF	ON	ON	ON	ON
89.45	OFF	ON	ON	ON		ON	ON	OFF	OFF	ON	ON	ON	OFF
89.5	OFF	ON	ON	ON		ON	ON	OFF	OFF	ON	ON	OFF	ON
89.55	OFF	ON	ON	ON		ON	ON	OFF	OFF	ON	ON	OFF	OFF
89.6	OFF	ON	ON	ON		ON	ON	OFF	OFF	ON	OFF	ON	ON
89.65	OFF	ON	ON	ON		ON	ON	OFF	OFF	ON	OFF	ON	OFF
89.7	OFF	ON	ON	ON		ON	ON	OFF	OFF	ON	OFF	OFF	ON
89.75	OFF	ON	ON	ON		ON	ON	OFF	OFF	ON	OFF	OFF	OFF
89.8	OFF	ON	ON	ON		ON	ON	OFF	OFF	OFF	ON	ON	ON
89.85	OFF	ON	ON	ON		ON	ON	OFF	OFF	OFF	ON	ON	OFF
89.9	OFF	ON	ON	ON		ON	ON	OFF	OFF	OFF	ON	OFF	ON
89.95	OFF	ON	ON	ON		ON	ON	OFF	OFF	OFF	ON	OFF	OFF
90.0	OFF	ON	ON	ON		ON	ON	OFF	OFF	OFF	OFF	ON	ON
90.05	OFF	ON	ON	ON		ON	ON	OFF	OFF	OFF	OFF	ON	OFF
90.1	OFF	ON	ON	ON		ON	ON	OFF	OFF	OFF	OFF	OFF	ON
90.15	OFF	ON	ON	ON		ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
90.2	OFF	ON	ON	ON		ON	OFF	ON	ON	ON	ON	ON	ON
90.25	OFF	ON	ON	ON		ON	OFF	ON	ON	ON	ON	ON	OFF
90.3	OFF	ON	ON	ON		ON	OFF	ON	ON	ON	ON	OFF	ON
90.35	OFF	ON	ON	ON		ON	OFF	ON	ON	ON	ON	OFF	OFF

TABLE 2. FREQUENCY PROGRAMMING													
	Band Selection SW2 Positions 1–4					Frequency SW1 Positions 1–8							
FREQUENCY	<i>Band 1</i>	<i>Band 2</i>	<i>Band 3</i>	<i>Band 4</i>		<i>Freq 7</i>	<i>Freq 6</i>	<i>Freq 5</i>	<i>Freq 4</i>	<i>Freq 3</i>	<i>Freq 2</i>	<i>Freq 1</i>	<i>Freq 0</i>
90.4	OFF	ON	ON	ON		ON	OFF	ON	ON	ON	OFF	ON	ON
90.45	OFF	ON	ON	ON		ON	OFF	ON	ON	ON	OFF	ON	OFF
90.5	OFF	ON	ON	ON		ON	OFF	ON	ON	ON	OFF	OFF	ON
90.55	OFF	ON	ON	ON		ON	OFF	ON	ON	ON	OFF	OFF	OFF
90.6	OFF	ON	ON	ON		ON	OFF	ON	ON	OFF	ON	ON	ON
90.65	OFF	ON	ON	ON		ON	OFF	ON	ON	OFF	ON	ON	OFF
90.7	OFF	ON	ON	ON		ON	OFF	ON	ON	OFF	ON	OFF	ON
90.75	OFF	ON	ON	ON		ON	OFF	ON	ON	OFF	ON	OFF	OFF
90.8	OFF	ON	ON	ON		ON	OFF	ON	ON	OFF	OFF	ON	ON
90.85	OFF	ON	ON	ON		ON	OFF	ON	ON	OFF	OFF	ON	OFF
90.9	OFF	ON	ON	ON		ON	OFF	ON	ON	OFF	OFF	OFF	ON
90.95	OFF	ON	ON	ON		ON	OFF	ON	ON	OFF	OFF	OFF	OFF
91	OFF	ON	ON	ON		ON	OFF	ON	OFF	ON	ON	ON	ON
91.05	OFF	ON	ON	ON		ON	OFF	ON	OFF	ON	ON	ON	OFF
91.1	OFF	ON	ON	ON		ON	OFF	ON	OFF	ON	ON	OFF	ON
91.15	OFF	ON	ON	ON		ON	OFF	ON	OFF	ON	ON	OFF	OFF
91.2	OFF	ON	ON	ON		ON	OFF	ON	OFF	ON	OFF	ON	ON
91.25	OFF	ON	ON	ON		ON	OFF	ON	OFF	ON	OFF	ON	OFF
91.3	OFF	ON	ON	ON		ON	OFF	ON	OFF	ON	OFF	OFF	ON
91.35	OFF	ON	ON	ON		ON	OFF	ON	OFF	ON	OFF	OFF	OFF
91.4	OFF	ON	ON	ON		ON	OFF	ON	OFF	OFF	ON	ON	ON
91.45	OFF	ON	ON	ON		ON	OFF	ON	OFF	OFF	ON	ON	OFF
91.5	OFF	ON	ON	ON		ON	OFF	ON	OFF	OFF	ON	OFF	ON
91.55	OFF	ON	ON	ON		ON	OFF	ON	OFF	OFF	ON	OFF	OFF
91.6	OFF	ON	ON	ON		ON	OFF	ON	OFF	OFF	OFF	ON	ON
91.65	OFF	ON	ON	ON		ON	OFF	ON	OFF	OFF	OFF	ON	OFF
91.7	OFF	ON	ON	ON		ON	OFF	ON	OFF	OFF	OFF	OFF	ON
91.75	OFF	ON	ON	ON		ON	OFF	ON	OFF	OFF	OFF	OFF	OFF
91.8	OFF	ON	ON	ON		ON	OFF	OFF	ON	ON	ON	ON	ON
91.85	OFF	ON	ON	ON		ON	OFF	OFF	ON	ON	ON	ON	OFF
91.9	OFF	ON	ON	ON		ON	OFF	OFF	ON	ON	ON	OFF	ON
91.95	OFF	ON	ON	ON		ON	OFF	OFF	ON	ON	ON	OFF	OFF
92.0	OFF	ON	ON	ON		ON	OFF	OFF	ON	ON	OFF	ON	ON
92.0	ON	OFF	ON	ON		ON	ON	ON	ON	ON	ON	ON	ON
92.05	OFF	ON	ON	ON		ON	OFF	OFF	ON	ON	OFF	ON	OFF
92.05	ON	OFF	ON	ON		ON	ON	ON	ON	ON	ON	ON	OFF

TABLE 2. FREQUENCY PROGRAMMING													
	Band Selection SW2 Positions 1–4					Frequency SW1 Positions 1–8							
FREQUENCY	Band 1	Band 2	Band 3	Band 4		Freq 7	Freq 6	Freq 5	Freq 4	Freq 3	Freq 2	Freq 1	Freq 0
92.1	OFF	ON	ON	ON		ON	OFF	OFF	ON	ON	OFF	OFF	ON
92.1	ON	OFF	ON	ON		ON	ON	ON	ON	ON	ON	OFF	ON
92.15	OFF	ON	ON	ON		ON	OFF	OFF	ON	ON	OFF	OFF	OFF
92.15	ON	OFF	ON	ON		ON	ON	ON	ON	ON	ON	OFF	OFF
92.2	OFF	ON	ON	ON		ON	OFF	OFF	ON	OFF	ON	ON	ON
92.2	ON	OFF	ON	ON		ON	ON	ON	ON	ON	OFF	ON	ON
92.25	OFF	ON	ON	ON		ON	OFF	OFF	ON	OFF	ON	ON	OFF
92.25	ON	OFF	ON	ON		ON	ON	ON	ON	ON	OFF	ON	OFF
92.3	OFF	ON	ON	ON		ON	OFF	OFF	ON	OFF	ON	OFF	ON
92.3	ON	OFF	ON	ON		ON	ON	ON	ON	ON	OFF	OFF	ON
92.35	OFF	ON	ON	ON		ON	OFF	OFF	ON	OFF	ON	OFF	OFF
92.35	ON	OFF	ON	ON		ON	ON	ON	ON	ON	OFF	OFF	OFF
92.4	OFF	ON	ON	ON		ON	OFF	OFF	ON	OFF	OFF	ON	ON
92.4	ON	OFF	ON	ON		ON	ON	ON	ON	OFF	ON	ON	ON
92.45	OFF	ON	ON	ON		ON	OFF	OFF	ON	OFF	OFF	ON	OFF
92.45	ON	OFF	ON	ON		ON	ON	ON	ON	OFF	ON	ON	OFF
92.5	OFF	ON	ON	ON		ON	OFF	OFF	ON	OFF	OFF	OFF	ON
92.5	ON	OFF	ON	ON		ON	ON	ON	ON	OFF	ON	OFF	ON
92.55	OFF	ON	ON	ON		ON	OFF	OFF	ON	OFF	OFF	OFF	OFF
92.55	ON	OFF	ON	ON		ON	ON	ON	ON	OFF	ON	OFF	OFF
92.6	OFF	ON	ON	ON		ON	OFF	OFF	OFF	ON	ON	ON	ON
92.6	ON	OFF	ON	ON		ON	ON	ON	ON	OFF	OFF	ON	ON
92.65	OFF	ON	ON	ON		ON	OFF	OFF	OFF	ON	ON	ON	OFF
92.65	ON	OFF	ON	ON		ON	ON	ON	ON	OFF	OFF	ON	OFF
92.7	OFF	ON	ON	ON		ON	OFF	OFF	OFF	ON	ON	OFF	ON

TABLE 2. FREQUENCY PROGRAMMING													
	Band Selection SW2 Positions 1–4					Frequency SW1 Positions 1–8							
FREQUENCY	Band 1	Band 2	Band 3	Band 4		Freq 7	Freq 6	Freq 5	Freq 4	Freq 3	Freq 2	Freq 1	Freq 0
92.7	ON	OFF	ON	ON		ON	ON	ON	ON	OFF	OFF	OFF	ON
92.75	OFF	ON	ON	ON		ON	OFF	OFF	OFF	ON	ON	OFF	OFF
92.75	ON	OFF	ON	ON		ON	ON	ON	ON	OFF	OFF	OFF	OFF
92.8	OFF	ON	ON	ON		ON	OFF	OFF	OFF	ON	OFF	ON	ON
92.8	ON	OFF	ON	ON		ON	ON	ON	OFF	ON	ON	ON	ON
92.85	OFF	ON	ON	ON		ON	OFF	OFF	OFF	ON	OFF	ON	OFF
92.85	ON	OFF	ON	ON		ON	ON	ON	OFF	ON	ON	ON	OFF
92.9	OFF	ON	ON	ON		ON	OFF	OFF	OFF	ON	OFF	OFF	ON
92.9	ON	OFF	ON	ON		ON	ON	ON	OFF	ON	ON	OFF	ON
92.95	OFF	ON	ON	ON		ON	OFF	OFF	OFF	ON	OFF	OFF	OFF
92.95	ON	OFF	ON	ON		ON	ON	ON	OFF	ON	ON	OFF	OFF
93.0	OFF	ON	ON	ON		ON	OFF	OFF	OFF	OFF	ON	ON	ON
93.0	ON	OFF	ON	ON		ON	ON	ON	OFF	ON	OFF	ON	ON
93.05	OFF	ON	ON	ON		ON	OFF	OFF	OFF	OFF	ON	ON	OFF
93.05	ON	OFF	ON	ON		ON	ON	ON	OFF	ON	OFF	ON	OFF
93.1	OFF	ON	ON	ON		ON	OFF	OFF	OFF	OFF	ON	OFF	ON
93.1	ON	OFF	ON	ON		ON	ON	ON	OFF	ON	OFF	OFF	ON
93.15	OFF	ON	ON	ON		ON	OFF	OFF	OFF	OFF	ON	OFF	OFF
93.15	ON	OFF	ON	ON		ON	ON	ON	OFF	ON	OFF	OFF	OFF
93.2	OFF	ON	ON	ON		ON	OFF	OFF	OFF	OFF	OFF	ON	ON
93.2	ON	OFF	ON	ON		ON	ON	ON	OFF	OFF	ON	ON	ON
93.25	OFF	ON	ON	ON		ON	OFF	OFF	OFF	OFF	OFF	ON	OFF
93.25	ON	OFF	ON	ON		ON	ON	ON	OFF	OFF	ON	ON	OFF
93.3	OFF	ON	ON	ON		ON	OFF	OFF	OFF	OFF	OFF	OFF	ON
93.3	ON	OFF	ON	ON		ON	ON	ON	OFF	OFF	ON	OFF	ON

TABLE 2. FREQUENCY PROGRAMMING													
	Band Selection SW2 Positions 1–4					Frequency SW1 Positions 1–8							
FREQUENCY	Band 1	Band 2	Band 3	Band 4		Freq 7	Freq 6	Freq 5	Freq 4	Freq 3	Freq 2	Freq 1	Freq 0
93.35	OFF	ON	ON	ON		ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
93.35	ON	OFF	ON	ON		ON	ON	ON	OFF	OFF	ON	OFF	OFF
93.4	ON	OFF	ON	ON		ON	ON	ON	OFF	OFF	OFF	ON	ON
93.45	ON	OFF	ON	ON		ON	ON	ON	OFF	OFF	OFF	ON	OFF
93.5	ON	OFF	ON	ON		ON	ON	ON	OFF	OFF	OFF	OFF	ON
93.55	ON	OFF	ON	ON		ON	ON	ON	OFF	OFF	OFF	OFF	OFF
93.6	ON	OFF	ON	ON		ON	ON	OFF	ON	ON	ON	ON	ON
93.65	ON	OFF	ON	ON		ON	ON	OFF	ON	ON	ON	ON	OFF
93.7	ON	OFF	ON	ON		ON	ON	OFF	ON	ON	ON	OFF	ON
93.75	ON	OFF	ON	ON		ON	ON	OFF	ON	ON	ON	OFF	OFF
93.8	ON	OFF	ON	ON		ON	ON	OFF	ON	ON	OFF	ON	ON
93.85	ON	OFF	ON	ON		ON	ON	OFF	ON	ON	OFF	ON	OFF
93.9	ON	OFF	ON	ON		ON	ON	OFF	ON	ON	OFF	OFF	ON
93.95	ON	OFF	ON	ON		ON	ON	OFF	ON	ON	OFF	OFF	OFF
94	ON	OFF	ON	ON		ON	ON	OFF	ON	OFF	ON	ON	ON
94.05	ON	OFF	ON	ON		ON	ON	OFF	ON	OFF	ON	ON	OFF
94.1	ON	OFF	ON	ON		ON	ON	OFF	ON	OFF	ON	OFF	ON
94.15	ON	OFF	ON	ON		ON	ON	OFF	ON	OFF	ON	OFF	OFF
94.2	ON	OFF	ON	ON		ON	ON	OFF	ON	OFF	OFF	ON	ON
94.25	ON	OFF	ON	ON		ON	ON	OFF	ON	OFF	OFF	ON	OFF
94.3	ON	OFF	ON	ON		ON	ON	OFF	ON	OFF	OFF	OFF	ON
94.35	ON	OFF	ON	ON		ON	ON	OFF	ON	OFF	OFF	OFF	OFF
94.4	ON	OFF	ON	ON		ON	ON	OFF	OFF	ON	ON	ON	ON
94.45	ON	OFF	ON	ON		ON	ON	OFF	OFF	ON	ON	ON	OFF
94.5	ON	OFF	ON	ON		ON	ON	OFF	OFF	ON	ON	OFF	ON
94.55	ON	OFF	ON	ON		ON	ON	OFF	OFF	ON	ON	OFF	OFF
94.6	ON	OFF	ON	ON		ON	ON	OFF	OFF	ON	OFF	ON	ON
94.65	ON	OFF	ON	ON		ON	ON	OFF	OFF	ON	OFF	ON	OFF
94.7	ON	OFF	ON	ON		ON	ON	OFF	OFF	ON	OFF	OFF	ON
94.75	ON	OFF	ON	ON		ON	ON	OFF	OFF	ON	OFF	OFF	OFF
94.8	ON	OFF	ON	ON		ON	ON	OFF	OFF	OFF	ON	ON	ON
94.85	ON	OFF	ON	ON		ON	ON	OFF	OFF	OFF	ON	ON	OFF
94.9	ON	OFF	ON	ON		ON	ON	OFF	OFF	OFF	ON	OFF	ON
94.95	ON	OFF	ON	ON		ON	ON	OFF	OFF	OFF	ON	OFF	OFF
95.0	ON	OFF	ON	ON		ON	ON	OFF	OFF	OFF	OFF	ON	ON
95.05	ON	OFF	ON	ON		ON	ON	OFF	OFF	OFF	OFF	ON	OFF
95.1	ON	OFF	ON	ON		ON	ON	OFF	OFF	OFF	OFF	OFF	ON

TABLE 2. FREQUENCY PROGRAMMING													
	Band Selection SW2 Positions 1–4					Frequency SW1 Positions 1–8							
FREQUENCY	Band 1	Band 2	Band 3	Band 4		Freq 7	Freq 6	Freq 5	Freq 4	Freq 3	Freq 2	Freq 1	Freq 0
95.15	ON	OFF	ON	ON		ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
95.2	ON	OFF	ON	ON		ON	OFF	ON	ON	ON	ON	ON	ON
95.25	ON	OFF	ON	ON		ON	OFF	ON	ON	ON	ON	ON	OFF
95.3	ON	OFF	ON	ON		ON	OFF	ON	ON	ON	ON	OFF	ON
95.35	ON	OFF	ON	ON		ON	OFF	ON	ON	ON	ON	OFF	OFF
95.4	ON	OFF	ON	ON		ON	OFF	ON	ON	ON	OFF	ON	ON
95.45	ON	OFF	ON	ON		ON	OFF	ON	ON	ON	OFF	ON	OFF
95.5	ON	OFF	ON	ON		ON	OFF	ON	ON	ON	OFF	OFF	ON
95.55	ON	OFF	ON	ON		ON	OFF	ON	ON	ON	OFF	OFF	OFF
95.6	ON	OFF	ON	ON		ON	OFF	ON	ON	OFF	ON	ON	ON
95.65	ON	OFF	ON	ON		ON	OFF	ON	ON	OFF	ON	ON	OFF
95.7	ON	OFF	ON	ON		ON	OFF	ON	ON	OFF	ON	OFF	ON
95.75	ON	OFF	ON	ON		ON	OFF	ON	ON	OFF	ON	OFF	OFF
95.8	ON	OFF	ON	ON		ON	OFF	ON	ON	OFF	OFF	ON	ON
95.85	ON	OFF	ON	ON		ON	OFF	ON	ON	OFF	OFF	ON	OFF
95.9	ON	OFF	ON	ON		ON	OFF	ON	ON	OFF	OFF	OFF	ON
95.95	ON	OFF	ON	ON		ON	OFF	ON	ON	OFF	OFF	OFF	OFF
96	ON	OFF	ON	ON		ON	OFF	ON	OFF	ON	ON	ON	ON
96.05	ON	OFF	ON	ON		ON	OFF	ON	OFF	ON	ON	ON	OFF
96.1	ON	OFF	ON	ON		ON	OFF	ON	OFF	ON	ON	OFF	ON
96.15	ON	OFF	ON	ON		ON	OFF	ON	OFF	ON	ON	OFF	OFF
96.2	ON	OFF	ON	ON		ON	OFF	ON	OFF	ON	OFF	ON	ON
96.25	ON	OFF	ON	ON		ON	OFF	ON	OFF	ON	OFF	ON	OFF
96.3	ON	OFF	ON	ON		ON	OFF	ON	OFF	ON	OFF	OFF	ON
96.35	ON	OFF	ON	ON		ON	OFF	ON	OFF	ON	OFF	OFF	OFF
96.4	ON	OFF	ON	ON		ON	OFF	ON	OFF	OFF	ON	ON	ON
96.45	ON	OFF	ON	ON		ON	OFF	ON	OFF	OFF	ON	ON	OFF
96.5	ON	OFF	ON	ON		ON	OFF	ON	OFF	OFF	ON	OFF	ON
96.55	ON	OFF	ON	ON		ON	OFF	ON	OFF	OFF	ON	OFF	OFF
96.6	ON	OFF	ON	ON		ON	OFF	ON	OFF	OFF	OFF	ON	ON
96.65	ON	OFF	ON	ON		ON	OFF	ON	OFF	OFF	OFF	ON	OFF
96.7	ON	OFF	ON	ON		ON	OFF	ON	OFF	OFF	OFF	OFF	ON
96.75	ON	OFF	ON	ON		ON	OFF	ON	OFF	OFF	OFF	OFF	OFF
96.8	ON	OFF	ON	ON		ON	OFF	OFF	ON	ON	ON	ON	ON
96.85	ON	OFF	ON	ON		ON	OFF	OFF	ON	ON	ON	ON	OFF
96.9	ON	OFF	ON	ON		ON	OFF	OFF	ON	ON	ON	OFF	ON
96.95	ON	OFF	ON	ON		ON	OFF	OFF	ON	ON	ON	OFF	OFF

TABLE 2. FREQUENCY PROGRAMMING													
	Band Selection SW2 Positions 1–4					Frequency SW1 Positions 1–8							
FREQUENCY	Band 1	Band 2	Band 3	Band 4		Freq 7	Freq 6	Freq 5	Freq 4	Freq 3	Freq 2	Freq 1	Freq 0
97.0	ON	OFF	ON	ON		ON	OFF	OFF	ON	ON	OFF	ON	ON
97.0	ON	ON	OFF	ON		ON	ON	ON	ON	ON	ON	ON	ON
97.05	ON	OFF	ON	ON		ON	OFF	OFF	ON	ON	OFF	ON	OFF
92.05	ON	ON	OFF	ON		ON	ON	ON	ON	ON	ON	ON	OFF
97.1	ON	OFF	ON	ON		ON	OFF	OFF	ON	ON	OFF	OFF	ON
97.1	ON	ON	OFF	ON		ON	ON	ON	ON	ON	ON	OFF	ON
97.15	ON	OFF	ON	ON		ON	OFF	OFF	ON	ON	OFF	OFF	OFF
97.15	ON	ON	OFF	ON		ON	ON	ON	ON	ON	ON	OFF	OFF
97.2	ON	OFF	ON	ON		ON	OFF	OFF	ON	OFF	ON	ON	ON
97.2	ON	ON	OFF	ON		ON	ON	ON	ON	ON	OFF	ON	ON
97.25	ON	OFF	ON	ON		ON	OFF	OFF	ON	OFF	ON	ON	OFF
97.25	ON	ON	OFF	ON		ON	ON	ON	ON	ON	OFF	ON	OFF
97.3	ON	OFF	ON	ON		ON	OFF	OFF	ON	OFF	ON	OFF	ON
97.3	ON	ON	OFF	ON		ON	ON	ON	ON	ON	OFF	OFF	ON
97.35	ON	OFF	ON	ON		ON	OFF	OFF	ON	OFF	ON	OFF	OFF
97.35	ON	ON	OFF	ON		ON	ON	ON	ON	ON	OFF	OFF	OFF
97.4	ON	OFF	ON	ON		ON	OFF	OFF	ON	OFF	OFF	ON	ON
97.4	ON	ON	OFF	ON		ON	ON	ON	ON	OFF	ON	ON	ON
97.45	ON	OFF	ON	ON		ON	OFF	OFF	ON	OFF	OFF	ON	OFF
97.45	ON	ON	OFF	ON		ON	ON	ON	ON	OFF	ON	ON	OFF
97.5	ON	OFF	ON	ON		ON	OFF	OFF	ON	OFF	OFF	OFF	ON
97.5	ON	ON	OFF	ON		ON	ON	ON	ON	OFF	ON	OFF	ON
97.55	ON	OFF	ON	ON		ON	OFF	OFF	ON	OFF	OFF	OFF	OFF
97.55	ON	ON	OFF	ON		ON	ON	ON	ON	OFF	ON	OFF	OFF
97.6	ON	OFF	ON	ON		ON	OFF	OFF	OFF	ON	ON	ON	ON
97.6	ON	ON	OFF	ON		ON	ON	ON	ON	OFF	OFF	ON	ON

TABLE 2. FREQUENCY PROGRAMMING													
	Band Selection SW2 Positions 1–4					Frequency SW1 Positions 1–8							
FREQUENCY	Band 1	Band 2	Band 3	Band 4		Freq 7	Freq 6	Freq 5	Freq 4	Freq 3	Freq 2	Freq 1	Freq 0
97.65	ON	OFF	ON	ON		ON	OFF	OFF	OFF	ON	ON	ON	OFF
97.65	ON	ON	OFF	ON		ON	ON	ON	ON	OFF	OFF	ON	OFF
97.7	ON	OFF	ON	ON		ON	OFF	OFF	OFF	ON	ON	OFF	ON
97.7	ON	ON	OFF	ON		ON	ON	ON	ON	OFF	OFF	OFF	ON
97.75	ON	OFF	ON	ON		ON	OFF	OFF	OFF	ON	ON	OFF	OFF
97.75	ON	ON	OFF	ON		ON	ON	ON	ON	OFF	OFF	OFF	OFF
97.8	ON	OFF	ON	ON		ON	OFF	OFF	OFF	ON	OFF	ON	ON
97.8	ON	ON	OFF	ON		ON	ON	ON	OFF	ON	ON	ON	ON
97.85	ON	OFF	ON	ON		ON	OFF	OFF	OFF	ON	OFF	ON	OFF
97.85	ON	ON	OFF	ON		ON	ON	ON	OFF	ON	ON	ON	OFF
97.9	ON	OFF	ON	ON		ON	OFF	OFF	OFF	ON	OFF	OFF	ON
97.9	ON	ON	OFF	ON		ON	ON	ON	OFF	ON	ON	OFF	ON
97.95	ON	OFF	ON	ON		ON	OFF	OFF	OFF	ON	OFF	OFF	OFF
97.95	ON	ON	OFF	ON		ON	ON	ON	OFF	ON	ON	OFF	OFF
98.0	ON	OFF	ON	ON		ON	OFF	OFF	OFF	OFF	ON	ON	ON
98.0	ON	ON	OFF	ON		ON	ON	ON	OFF	ON	OFF	ON	ON
98.05	ON	OFF	ON	ON		ON	OFF	OFF	OFF	OFF	ON	ON	OFF
98.05	ON	ON	OFF	ON		ON	ON	ON	OFF	ON	OFF	ON	OFF
98.1	ON	OFF	ON	ON		ON	OFF	OFF	OFF	OFF	ON	OFF	ON
98.1	ON	ON	OFF	ON		ON	ON	ON	OFF	ON	OFF	OFF	ON
98.15	ON	OFF	ON	ON		ON	OFF	OFF	OFF	OFF	ON	OFF	OFF
98.15	ON	ON	OFF	ON		ON	ON	ON	OFF	ON	OFF	OFF	OFF
98.2	ON	OFF	ON	ON		ON	OFF	OFF	OFF	OFF	OFF	ON	ON
98.2	ON	ON	OFF	ON		ON	ON	ON	OFF	OFF	ON	ON	ON
98.25	ON	OFF	ON	ON		ON	OFF	OFF	OFF	OFF	OFF	ON	OFF

TABLE 2. FREQUENCY PROGRAMMING													
	Band Selection SW2 Positions 1–4					Frequency SW1 Positions 1–8							
FREQUENCY	Band 1	Band 2	Band 3	Band 4		Freq 7	Freq 6	Freq 5	Freq 4	Freq 3	Freq 2	Freq 1	Freq 0
98.25	ON	ON	OFF	ON		ON	ON	ON	OFF	OFF	ON	ON	OFF
98.3	ON	OFF	ON	ON		ON	OFF	OFF	OFF	OFF	OFF	OFF	ON
98.3	ON	ON	OFF	ON		ON	ON	ON	OFF	OFF	ON	OFF	ON
98.35	ON	OFF	ON	ON		ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
98.35	ON	ON	OFF	ON		ON	ON	ON	OFF	OFF	ON	OFF	OFF
98.4	ON	ON	OFF	ON		ON	ON	ON	OFF	OFF	OFF	ON	ON
98.45	ON	ON	OFF	ON		ON	ON	ON	OFF	OFF	OFF	ON	OFF
98.5	ON	ON	OFF	ON		ON	ON	ON	OFF	OFF	OFF	OFF	ON
98.55	ON	ON	OFF	ON		ON	ON	ON	OFF	OFF	OFF	OFF	OFF
98.6	ON	ON	OFF	ON		ON	ON	OFF	ON	ON	ON	ON	ON
98.65	ON	ON	OFF	ON		ON	ON	OFF	ON	ON	ON	ON	OFF
98.7	ON	ON	OFF	ON		ON	ON	OFF	ON	ON	ON	OFF	ON
98.75	ON	ON	OFF	ON		ON	ON	OFF	ON	ON	ON	OFF	OFF
98.8	ON	ON	OFF	ON		ON	ON	OFF	ON	ON	OFF	ON	ON
98.85	ON	ON	OFF	ON		ON	ON	OFF	ON	ON	OFF	ON	OFF
98.9	ON	ON	OFF	ON		ON	ON	OFF	ON	ON	OFF	OFF	ON
98.95	ON	ON	OFF	ON		ON	ON	OFF	ON	ON	OFF	OFF	OFF
99	ON	ON	OFF	ON		ON	ON	OFF	ON	OFF	ON	ON	ON
99.05	ON	ON	OFF	ON		ON	ON	OFF	ON	OFF	ON	ON	OFF
99.1	ON	ON	OFF	ON		ON	ON	OFF	ON	OFF	ON	OFF	ON
99.15	ON	ON	OFF	ON		ON	ON	OFF	ON	OFF	ON	OFF	OFF
99.2	ON	ON	OFF	ON		ON	ON	OFF	ON	OFF	OFF	ON	ON
99.25	ON	ON	OFF	ON		ON	ON	OFF	ON	OFF	OFF	ON	OFF
99.3	ON	ON	OFF	ON		ON	ON	OFF	ON	ON	ON	ON	OFF
99.35	ON	ON	OFF	ON		ON	ON	OFF	ON	OFF	OFF	OFF	OFF
99.4	ON	ON	OFF	ON		ON	ON	OFF	OFF	ON	ON	ON	ON
99.45	ON	ON	OFF	ON		ON	ON	OFF	OFF	ON	ON	ON	OFF
99.5	ON	ON	OFF	ON		ON	ON	OFF	OFF	ON	ON	OFF	ON
99.55	ON	ON	OFF	ON		ON	ON	OFF	OFF	ON	ON	OFF	OFF
99.6	ON	ON	OFF	ON		ON	ON	OFF	OFF	ON	OFF	ON	ON
99.65	ON	ON	OFF	ON		ON	ON	OFF	OFF	ON	OFF	ON	OFF
99.7	ON	ON	OFF	ON		ON	ON	OFF	OFF	ON	OFF	OFF	ON
99.75	ON	ON	OFF	ON		ON	ON	OFF	OFF	ON	OFF	OFF	OFF
99.8	ON	ON	OFF	ON		ON	ON	OFF	OFF	OFF	ON	ON	ON
99.85	ON	ON	OFF	ON		ON	ON	OFF	OFF	OFF	ON	ON	OFF

TABLE 2. FREQUENCY PROGRAMMING													
	Band Selection SW2 Positions 1–4					Frequency SW1 Positions 1–8							
FREQUENCY	Band 1	Band 2	Band 3	Band 4		Freq 7	Freq 6	Freq 5	Freq 4	Freq 3	Freq 2	Freq 1	Freq 0
99.9	ON	ON	OFF	ON		ON	ON	OFF	OFF	OFF	ON	OFF	ON
99.95	ON	ON	OFF	ON		ON	ON	OFF	OFF	OFF	ON	OFF	OFF
100.0	ON	ON	OFF	ON		ON	ON	OFF	OFF	OFF	OFF	ON	ON
100.05	ON	ON	OFF	ON		ON	ON	OFF	OFF	OFF	OFF	ON	OFF
100.1	ON	ON	OFF	ON		ON	ON	OFF	OFF	OFF	OFF	OFF	ON
100.15	ON	ON	OFF	ON		ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
100.2	ON	ON	OFF	ON		ON	OFF	ON	ON	ON	ON	ON	ON
100.25	ON	ON	OFF	ON		ON	OFF	ON	ON	ON	ON	ON	OFF
100.3	ON	ON	OFF	ON		ON	OFF	ON	ON	ON	ON	OFF	ON
100.35	ON	ON	OFF	ON		ON	OFF	ON	ON	ON	ON	OFF	OFF
100.4	ON	ON	OFF	ON		ON	OFF	ON	ON	ON	OFF	ON	ON
100.45	ON	ON	OFF	ON		ON	OFF	ON	ON	ON	OFF	ON	OFF
100.5	ON	ON	OFF	ON		ON	OFF	ON	ON	ON	OFF	OFF	ON
100.55	ON	ON	OFF	ON		ON	OFF	ON	ON	ON	OFF	OFF	OFF
100.6	ON	ON	OFF	ON		ON	OFF	ON	ON	OFF	ON	ON	ON
100.65	ON	ON	OFF	ON		ON	OFF	ON	ON	OFF	ON	ON	OFF
100.7	ON	ON	OFF	ON		ON	OFF	ON	ON	OFF	ON	OFF	ON
100.75	ON	ON	OFF	ON		ON	OFF	ON	ON	OFF	ON	OFF	OFF
100.8	ON	ON	OFF	ON		ON	OFF	ON	ON	OFF	OFF	ON	ON
100.85	ON	ON	OFF	ON		ON	OFF	ON	ON	OFF	OFF	ON	OFF
100.9	ON	ON	OFF	ON		ON	OFF	ON	ON	OFF	OFF	OFF	ON
100.95	ON	ON	OFF	ON		ON	OFF	ON	ON	OFF	OFF	OFF	OFF
101	ON	ON	OFF	ON		ON	OFF	ON	OFF	ON	ON	ON	ON
101.05	ON	ON	OFF	ON		ON	OFF	ON	OFF	ON	ON	ON	OFF
101.1	ON	ON	OFF	ON		ON	OFF	ON	OFF	ON	ON	OFF	ON
101.15	ON	ON	OFF	ON		ON	OFF	ON	OFF	ON	ON	OFF	OFF
101.2	ON	ON	OFF	ON		ON	OFF	ON	OFF	ON	OFF	ON	ON
101.25	ON	ON	OFF	ON		ON	OFF	ON	OFF	ON	OFF	ON	OFF
101.3	ON	ON	OFF	ON		ON	OFF	ON	OFF	ON	OFF	OFF	ON
101.35	ON	ON	OFF	ON		ON	OFF	ON	OFF	ON	OFF	OFF	OFF
101.4	ON	ON	OFF	ON		ON	OFF	ON	OFF	OFF	ON	ON	ON
101.45	ON	ON	OFF	ON		ON	OFF	ON	OFF	OFF	ON	ON	OFF
101.5	ON	ON	OFF	ON		ON	OFF	ON	OFF	OFF	ON	OFF	ON
101.55	ON	ON	OFF	ON		ON	OFF	ON	OFF	OFF	ON	OFF	OFF
101.6	ON	ON	OFF	ON		ON	OFF	ON	OFF	OFF	OFF	ON	ON
101.65	ON	ON	OFF	ON		ON	OFF	ON	OFF	OFF	OFF	ON	OFF
101.7	ON	ON	OFF	ON		ON	OFF	ON	OFF	OFF	OFF	OFF	ON
101.75	ON	ON	OFF	ON		ON	OFF	ON	OFF	OFF	OFF	OFF	OFF

TABLE 2. FREQUENCY PROGRAMMING													
	Band Selection SW2 Positions 1–4					Frequency SW1 Positions 1–8							
FREQUENCY	Band 1	Band 2	Band 3	Band 4		Freq 7	Freq 6	Freq 5	Freq 4	Freq 3	Freq 2	Freq 1	Freq 0
101.8	ON	ON	OFF	ON		ON	OFF	OFF	ON	ON	ON	ON	ON
101.85	ON	ON	OFF	ON		ON	OFF	OFF	ON	ON	ON	ON	OFF
101.9	ON	ON	OFF	ON		ON	OFF	OFF	ON	ON	ON	OFF	ON
101.95	ON	ON	OFF	ON		ON	OFF	OFF	ON	ON	ON	OFF	OFF
102.0	ON	ON	OFF	ON		ON	OFF	OFF	ON	ON	OFF	ON	ON
102.0	ON	ON	ON	OFF		ON	ON	ON	ON	ON	ON	ON	ON
102.05	ON	ON	OFF	ON		ON	OFF	OFF	ON	ON	OFF	ON	OFF
102.05	ON	ON	ON	OFF		ON	ON	ON	ON	ON	ON	ON	OFF
102.1	ON	ON	OFF	ON		ON	OFF	OFF	ON	ON	OFF	OFF	ON
102.1	ON	ON	ON	OFF		ON	ON	ON	ON	ON	ON	OFF	ON
102.15	ON	ON	OFF	ON		ON	OFF	OFF	ON	ON	OFF	OFF	OFF
102.15	ON	ON	ON	OFF		ON	ON	ON	ON	ON	ON	OFF	OFF
102.2	ON	ON	OFF	ON		ON	OFF	OFF	ON	OFF	ON	ON	ON
102.2	ON	ON	ON	OFF		ON	ON	ON	ON	ON	OFF	ON	ON
102.25	ON	ON	OFF	ON		ON	OFF	OFF	ON	OFF	ON	ON	OFF
102.25	ON	ON	ON	OFF		ON	ON	ON	ON	ON	OFF	ON	OFF
102.3	ON	ON	OFF	ON		ON	OFF	OFF	ON	OFF	ON	OFF	ON
102.3	ON	ON	ON	OFF		ON	ON	ON	ON	ON	OFF	OFF	ON
102.35	ON	ON	OFF	ON		ON	OFF	OFF	ON	OFF	ON	OFF	OFF
102.35	ON	ON	ON	OFF		ON	ON	ON	ON	ON	OFF	OFF	OFF
102.4	ON	ON	OFF	ON		ON	OFF	OFF	ON	OFF	OFF	ON	ON
102.4	ON	ON	ON	OFF		ON	ON	ON	ON	OFF	ON	ON	ON
102.45	ON	ON	OFF	ON		ON	OFF	OFF	ON	OFF	OFF	ON	OFF
102.45	ON	ON	ON	OFF		ON	ON	ON	ON	OFF	ON	ON	OFF
102.5	ON	ON	OFF	ON		ON	OFF	OFF	ON	OFF	OFF	OFF	ON
102.5	ON	ON	ON	OFF		ON	ON	ON	ON	OFF	ON	OFF	ON

TABLE 2. FREQUENCY PROGRAMMING													
	Band Selection SW2 Positions 1–4					Frequency SW1 Positions 1–8							
FREQUENCY	Band 1	Band 2	Band 3	Band 4		Freq 7	Freq 6	Freq 5	Freq 4	Freq 3	Freq 2	Freq 1	Freq 0
102.55	ON	ON	OFF	ON		ON	OFF	OFF	ON	OFF	OFF	OFF	OFF
102.55	ON	ON	ON	OFF		ON	ON	ON	ON	OFF	ON	OFF	OFF
102.6	ON	ON	OFF	ON		ON	OFF	OFF	OFF	ON	ON	ON	ON
102.6	ON	ON	ON	OFF		ON	ON	ON	ON	OFF	OFF	ON	ON
102.65	ON	ON	OFF	ON		ON	OFF	OFF	OFF	ON	ON	ON	OFF
102.65	ON	ON	ON	OFF		ON	ON	ON	ON	OFF	OFF	ON	OFF
102.7	ON	ON	OFF	ON		ON	OFF	OFF	OFF	ON	ON	OFF	ON
102.7	ON	ON	ON	OFF		ON	ON	ON	ON	OFF	OFF	OFF	ON
102.75	ON	ON	OFF	ON		ON	OFF	OFF	OFF	ON	ON	OFF	OFF
102.75	ON	ON	ON	OFF		ON	ON	ON	ON	OFF	OFF	OFF	OFF
102.8	ON	ON	OFF	ON		ON	OFF	OFF	OFF	ON	OFF	ON	ON
102.8	ON	ON	ON	OFF		ON	ON	ON	OFF	ON	ON	ON	ON
102.85	ON	ON	OFF	ON		ON	OFF	OFF	OFF	ON	OFF	ON	OFF
102.85	ON	ON	ON	OFF		ON	ON	ON	OFF	ON	ON	ON	OFF
102.9	ON	ON	OFF	ON		ON	OFF	OFF	OFF	ON	OFF	OFF	ON
102.9	ON	ON	ON	OFF		ON	ON	ON	OFF	ON	ON	OFF	ON
102.95	ON	ON	OFF	ON		ON	OFF	OFF	OFF	ON	OFF	OFF	OFF
102.95	ON	ON	ON	OFF		ON	ON	ON	OFF	ON	ON	OFF	OFF
103.0	ON	ON	OFF	ON		ON	OFF	OFF	OFF	OFF	ON	ON	ON
103.0	ON	ON	ON	OFF		ON	ON	ON	OFF	ON	OFF	ON	ON
103.05	ON	ON	OFF	ON		ON	OFF	OFF	OFF	OFF	ON	ON	OFF
103.05	ON	ON	ON	OFF		ON	ON	ON	OFF	ON	OFF	ON	OFF
103.1	ON	ON	OFF	ON		ON	OFF	OFF	OFF	OFF	ON	OFF	ON
103.1	ON	ON	ON	OFF		ON	ON	ON	OFF	ON	OFF	OFF	ON
103.15	ON	ON	OFF	ON		ON	OFF	OFF	OFF	OFF	ON	OFF	OFF
103.15	ON	ON	ON	OFF		ON	ON	ON	OFF	ON	OFF	OFF	OFF

TABLE 2. FREQUENCY PROGRAMMING													
	Band Selection SW2 Positions 1–4					Frequency SW1 Positions 1–8							
FREQUENCY	<i>Band 1</i>	<i>Band 2</i>	<i>Band 3</i>	<i>Band 4</i>		<i>Freq 7</i>	<i>Freq 6</i>	<i>Freq 5</i>	<i>Freq 4</i>	<i>Freq 3</i>	<i>Freq 2</i>	<i>Freq 1</i>	<i>Freq 0</i>
103.2	ON	ON	OFF	ON		ON	OFF	OFF	OFF	OFF	OFF	ON	ON
103.2	ON	ON	ON	OFF		ON	ON	ON	OFF	OFF	ON	ON	ON
103.25	ON	ON	OFF	ON		ON	OFF	OFF	OFF	OFF	OFF	ON	OFF
103.25	ON	ON	ON	OFF		ON	ON	ON	OFF	OFF	ON	ON	OFF
103.3	ON	ON	OFF	ON		ON	OFF	OFF	OFF	OFF	OFF	OFF	ON
103.3	ON	ON	ON	OFF		ON	ON	ON	OFF	OFF	ON	OFF	ON
103.35	ON	ON	OFF	ON		ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
103.35	ON	ON	ON	OFF		ON	ON	ON	OFF	OFF	ON	OFF	OFF
103.4	ON	ON	ON	OFF		ON	ON	ON	OFF	OFF	OFF	ON	ON
103.45	ON	ON	ON	OFF		ON	ON	ON	OFF	OFF	OFF	ON	OFF
103.5	ON	ON	ON	OFF		ON	ON	ON	OFF	OFF	OFF	OFF	ON
103.55	ON	ON	ON	OFF		ON	ON	ON	OFF	OFF	OFF	OFF	OFF
103.6	ON	ON	ON	OFF		ON	ON	OFF	ON	ON	ON	ON	ON
103.65	ON	ON	ON	OFF		ON	ON	OFF	ON	ON	ON	ON	OFF
103.7	ON	ON	ON	OFF		ON	ON	OFF	ON	ON	ON	OFF	ON
103.75	ON	ON	ON	OFF		ON	ON	OFF	ON	ON	ON	OFF	OFF
103.8	ON	ON	ON	OFF		ON	ON	OFF	ON	ON	OFF	ON	ON
103.85	ON	ON	ON	OFF		ON	ON	OFF	ON	ON	OFF	ON	OFF
103.9	ON	ON	ON	OFF		ON	ON	OFF	ON	ON	OFF	OFF	ON
103.95	ON	ON	ON	OFF		ON	ON	OFF	ON	ON	OFF	OFF	OFF
104	ON	ON	ON	OFF		ON	ON	OFF	ON	OFF	ON	ON	ON
104.05	ON	ON	ON	OFF		ON	ON	OFF	ON	OFF	ON	ON	OFF
104.1	ON	ON	ON	OFF		ON	ON	OFF	ON	OFF	ON	OFF	ON
104.15	ON	ON	ON	OFF		ON	ON	OFF	ON	OFF	ON	OFF	OFF
104.2	ON	ON	ON	OFF		ON	ON	OFF	ON	OFF	OFF	ON	ON
104.25	ON	ON	ON	OFF		ON	ON	OFF	ON	OFF	OFF	ON	OFF
104.3	ON	ON	ON	OFF		ON	ON	OFF	ON	ON	ON	ON	OFF
104.35	ON	ON	ON	OFF		ON	ON	OFF	ON	OFF	OFF	OFF	OFF
104.4	ON	ON	ON	OFF		ON	ON	OFF	OFF	ON	ON	ON	ON
104.45	ON	ON	ON	OFF		ON	ON	OFF	OFF	ON	ON	ON	OFF
104.5	ON	ON	ON	OFF		ON	ON	OFF	OFF	ON	ON	OFF	ON
104.55	ON	ON	ON	OFF		ON	ON	OFF	OFF	ON	ON	OFF	OFF
104.6	ON	ON	ON	OFF		ON	ON	OFF	OFF	ON	OFF	ON	ON

TABLE 2. FREQUENCY PROGRAMMING													
	Band Selection SW2 Positions 1–4					Frequency SW1 Positions 1–8							
FREQUENCY	<i>Band 1</i>	<i>Band 2</i>	<i>Band 3</i>	<i>Band 4</i>		<i>Freq 7</i>	<i>Freq 6</i>	<i>Freq 5</i>	<i>Freq 4</i>	<i>Freq 3</i>	<i>Freq 2</i>	<i>Freq 1</i>	<i>Freq 0</i>
104.65	ON	ON	ON	OFF		ON	ON	OFF	OFF	ON	OFF	ON	OFF
104.7	ON	ON	ON	OFF		ON	ON	OFF	OFF	ON	OFF	OFF	ON
104.75	ON	ON	ON	OFF		ON	ON	OFF	OFF	ON	OFF	OFF	OFF
104.8	ON	ON	ON	OFF		ON	ON	OFF	OFF	OFF	ON	ON	ON
104.85	ON	ON	ON	OFF		ON	ON	OFF	OFF	OFF	ON	ON	OFF
104.9	ON	ON	ON	OFF		ON	ON	OFF	OFF	OFF	ON	OFF	ON
104.95	ON	ON	ON	OFF		ON	ON	OFF	OFF	OFF	ON	OFF	OFF
105.0	ON	ON	ON	OFF		ON	ON	OFF	OFF	OFF	OFF	ON	ON
105.05	ON	ON	ON	OFF		ON	ON	OFF	OFF	OFF	OFF	ON	OFF
105.1	ON	ON	ON	OFF		ON	ON	OFF	OFF	OFF	OFF	OFF	ON
105.15	ON	ON	ON	OFF		ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
105.2	ON	ON	ON	OFF		ON	OFF	ON	ON	ON	ON	ON	ON
105.25	ON	ON	ON	OFF		ON	OFF	ON	ON	ON	ON	ON	OFF
105.3	ON	ON	ON	OFF		ON	OFF	ON	ON	ON	ON	OFF	ON
105.35	ON	ON	ON	OFF		ON	OFF	ON	ON	ON	ON	OFF	OFF
105.4	ON	ON	ON	OFF		ON	OFF	ON	ON	ON	OFF	ON	ON
105.45	ON	ON	ON	OFF		ON	OFF	ON	ON	ON	OFF	ON	OFF
105.5	ON	ON	ON	OFF		ON	OFF	ON	ON	ON	OFF	OFF	ON
105.55	ON	ON	ON	OFF		ON	OFF	ON	ON	ON	OFF	OFF	OFF
105.6	ON	ON	ON	OFF		ON	OFF	ON	ON	OFF	ON	ON	ON
105.65	ON	ON	ON	OFF		ON	OFF	ON	ON	OFF	ON	ON	OFF
105.7	ON	ON	ON	OFF		ON	OFF	ON	ON	OFF	ON	OFF	ON
105.75	ON	ON	ON	OFF		ON	OFF	ON	ON	OFF	ON	OFF	OFF
105.8	ON	ON	ON	OFF		ON	OFF	ON	ON	OFF	OFF	ON	ON
105.85	ON	ON	ON	OFF		ON	OFF	ON	ON	OFF	OFF	ON	OFF
105.9	ON	ON	ON	OFF		ON	OFF	ON	ON	OFF	OFF	OFF	ON
105.95	ON	ON	ON	OFF		ON	OFF	ON	ON	OFF	OFF	OFF	OFF
106	ON	ON	ON	OFF		ON	OFF	ON	OFF	ON	ON	ON	ON
106.05	ON	ON	ON	OFF		ON	OFF	ON	OFF	ON	ON	ON	OFF
106.1	ON	ON	ON	OFF		ON	OFF	ON	OFF	ON	ON	OFF	ON
106.15	ON	ON	ON	OFF		ON	OFF	ON	OFF	ON	ON	OFF	OFF
106.2	ON	ON	ON	OFF		ON	OFF	ON	OFF	ON	OFF	ON	ON
106.25	ON	ON	ON	OFF		ON	OFF	ON	OFF	ON	OFF	ON	OFF
106.3	ON	ON	ON	OFF		ON	OFF	ON	OFF	ON	OFF	OFF	ON
106.35	ON	ON	ON	OFF		ON	OFF	ON	OFF	ON	OFF	OFF	OFF
106.4	ON	ON	ON	OFF		ON	OFF	ON	OFF	OFF	ON	ON	ON
106.45	ON	ON	ON	OFF		ON	OFF	ON	OFF	OFF	ON	ON	OFF
106.5	ON	ON	ON	OFF		ON	OFF	ON	OFF	OFF	ON	OFF	ON

TABLE 2. FREQUENCY PROGRAMMING													
	Band Selection SW2 Positions 1–4					Frequency SW1 Positions 1–8							
FREQUENCY	Band 1	Band 2	Band 3	Band 4		Freq 7	Freq 6	Freq 5	Freq 4	Freq 3	Freq 2	Freq 1	Freq 0
106.55	ON	ON	ON	OFF		ON	OFF	ON	OFF	OFF	ON	OFF	OFF
106.6	ON	ON	ON	OFF		ON	OFF	ON	OFF	OFF	OFF	ON	ON
106.65	ON	ON	ON	OFF		ON	OFF	ON	OFF	OFF	OFF	ON	OFF
106.7	ON	ON	ON	OFF		ON	OFF	ON	OFF	OFF	OFF	OFF	ON
106.75	ON	ON	ON	OFF		ON	OFF	ON	OFF	OFF	OFF	OFF	OFF
106.8	ON	ON	ON	OFF		ON	OFF	OFF	ON	ON	ON	ON	ON
106.85	ON	ON	ON	OFF		ON	OFF	OFF	ON	ON	ON	ON	OFF
106.9	ON	ON	ON	OFF		ON	OFF	OFF	ON	ON	ON	OFF	ON
106.95	ON	ON	ON	OFF		ON	OFF	OFF	ON	ON	ON	OFF	OFF
107.0	ON	ON	ON	OFF		ON	OFF	OFF	ON	ON	OFF	ON	ON
107.05	ON	ON	ON	OFF		ON	OFF	OFF	ON	ON	OFF	ON	OFF
107.1	ON	ON	ON	OFF		ON	OFF	OFF	ON	ON	OFF	OFF	ON
107.15	ON	ON	ON	OFF		ON	OFF	OFF	ON	ON	OFF	OFF	OFF
107.2	ON	ON	ON	OFF		ON	OFF	OFF	ON	OFF	ON	ON	ON
107.25	ON	ON	ON	OFF		ON	OFF	OFF	ON	OFF	ON	ON	OFF
107.3	ON	ON	ON	OFF		ON	OFF	OFF	ON	OFF	ON	OFF	ON
107.35	ON	ON	ON	OFF		ON	OFF	OFF	ON	OFF	ON	OFF	OFF
107.4	ON	ON	ON	OFF		ON	OFF	OFF	ON	OFF	OFF	ON	ON
107.45	ON	ON	ON	OFF		ON	OFF	OFF	ON	OFF	OFF	ON	OFF
107.5	ON	ON	ON	OFF		ON	OFF	OFF	ON	OFF	OFF	OFF	ON
107.55	ON	ON	ON	OFF		ON	OFF	OFF	ON	OFF	OFF	OFF	OFF
107.6	ON	ON	ON	OFF		ON	OFF	OFF	OFF	ON	ON	ON	ON
107.65	ON	ON	ON	OFF		ON	OFF	OFF	OFF	ON	ON	ON	OFF
107.7	ON	ON	ON	OFF		ON	OFF	OFF	OFF	ON	ON	OFF	ON
107.75	ON	ON	ON	OFF		ON	OFF	OFF	OFF	ON	ON	OFF	OFF
107.8	ON	ON	ON	OFF		ON	OFF	OFF	OFF	ON	OFF	ON	ON
107.85	ON	ON	ON	OFF		ON	OFF	OFF	OFF	ON	OFF	ON	OFF
107.9	ON	ON	ON	OFF		ON	OFF	OFF	OFF	ON	OFF	OFF	ON
107.95	ON	ON	ON	OFF		ON	OFF	OFF	OFF	ON	OFF	OFF	OFF
108.0	ON	ON	ON	OFF		ON	OFF	OFF	OFF	OFF	ON	ON	ON
108.05	ON	ON	ON	OFF		ON	OFF	OFF	OFF	OFF	ON	ON	OFF
108.1	ON	ON	ON	OFF		ON	OFF	OFF	OFF	OFF	ON	OFF	ON
108.15	ON	ON	ON	OFF		ON	OFF	OFF	OFF	OFF	ON	OFF	OFF
108.2	ON	ON	ON	OFF		ON	OFF	OFF	OFF	OFF	OFF	ON	ON
108.25	ON	ON	ON	OFF		ON	OFF	OFF	OFF	OFF	OFF	ON	OFF
108.3	ON	ON	ON	OFF		ON	OFF	OFF	OFF	OFF	OFF	OFF	ON
108.35	ON	ON	ON	OFF		ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF

FACTORY DEFAULTS.

The transmitter is equipped with many operating parameters and features. The following text presents the factory programming for the operating parameters/features.

OPERATING PARAMETER/ FEATURE	COMPONENT – LOCATION	FACTORY DEFAULT	POSITION
PREEMPHASIS	SW2 Pos 7 and 8; Controller Interface Board	ENABLED – 75 uS	SW2–7 OFF SW2–8 OFF
ANALOG LEFT CHANNEL LEVEL	J31/J32 – DSP PCB	0 dBm	P31/P32 – INSTALLED IN 0 dB POSITION
ANALOG RIGHT CHANNEL LEVEL	J24/J25 – DSP PCB	0 dBm	P24/P25 – INSTALLED IN 0 dB POSITION
ANALOG LEFT CHANNEL IMPEDANCE	J10 – DSP PCB	600 OHMS	P10 – INSTALLED
ANALOG RIGHT CHANNEL IMPEDANCE	J8 – DSP PCB	600 OHMS	P8 – INSTALLED
SCA ON/OFF	SW2 Pos 6; Controller Interface Board	OFF	SW2–6 ON
SCA IMPEDANCE	J23 – DSP PCB	600 OHMS	P23 – INSTALLED
SCA DEVIATION	SW2 Pos 5; Controller Interface Board	7.5 kHz	SW2–5 OFF
RF OUTPUT POWER	RAISE/LOWER Buttons; Front Panel Controller Board	1000 WATTS	——
AUDIO INPUT	J13 – DSP PCB	AUTO	P13 – INSTALLED IN POSITION 3–4
CARRIER FREQUENCY	SW1 and SW2; Controller Interface Board	STATION FREQUENCY	——
COMPOSITE INPUT LEVEL	——	3.5 VOLTS PEAK–TO– PEAK EQUALS 100% MODULATION	——
DIGITAL INPUT LEVEL	——	–2 dBfs	——
COMPOSITE INPUT IMPEDANCE	J6 – REAR PANEL PCB	10 k Ohms	P6 – INSTALLED IN POSITION 1–2
COMPOSITE INPUT AUTO SWITCH	J5 – REAR PANEL PCB	AUTOMATIC SWITCHING	P5 – INSTALLED IN POSITION 1–2

CONTROLS AND INDICATORS.

Refer to the following text and Figure 2 for a description of the PNP 1000 controls and indicators.

REAR PANEL INDICATORS.

COMPOSITE PILOT INDICATOR.

Illuminates to indicate the composite pilot signal is present at the transmitter.

FRONT PANEL CONTROLS AND INDICATORS.

AC POWER ON/OFF BREAKER.

Provides primary ac power control for the transmitter.

MENU UP/DOWN CONTROL.

Steps through the following readings for the PNP 1000 transmitter. 1) Forward Power. 2) Reflected Power. 3) PA Voltage. 4) Total PA Current. 5) PA Currents 1–4. 6) PA Heatsink Temperature. 7) Exciter Forward Power. 8) Exciter Reflected Power. 9) Exciter Current. 10) Exciter Heatsink Temperatures.

POWER RAISE/LOWER CONTROLS.

Adjusts the transmitter RF output power from 250 watts to 1050 watts.

ON SWITCH/INDICATOR.

SWITCH – Enables the transmitter RF output by unmuting the exciter and final power amplifier module.

INDICATOR – Illuminates to indicate the transmitter RF output is enabled.

OFF SWITCH/INDICATOR.

SWITCH – Disables the transmitter RF output by muting the exciter and final power amplifier module.

INDICATOR – Illuminates to indicate the transmitter RF output is disabled.

POWER SUPPLY VOLTAGE INDICATORS.

Illuminates to indicate the +48, +12 AND –12 volt dc from the power supply is operational.

AC LINE FAULT INDICATOR.

The AC line fault indicator illuminates when the AC voltage is outside the operating range required for the power supply. This range is 95–132 or 190–264 depending on the AC input configuration.

POWER SUPPLY FAULT INDICATOR.

The power supply fault indicator will illuminate when the power supply registers a fault condition. The power supply fault conditions are as follows. 1) 48V is out of regulation (+8V or –1V). 2) +/-12V supply is out of regulation (+/-0.5Volts). 3) A surge current from the +48Volt supply occurs. 4) Heatsink temperature on the power supply exceeds 70C.

EXCITER AMPLIFIER FAULT INDICATOR.

The exciter fault indicator illuminates when one of the following conditions exists. 1) Exciter heatsink temperature is above 77C. 2) Exciter current is above 4.0 amps. 3) Exciter power falls below 40 watts. 4) Exciter reflected power is above 20 watts when the transmitter total power is above 200 watts. 5) Exciter reflected power is above 25 watts when the transmitter total power is below 200 watts. The transmitter will shut down if any of the above conditions occur.

POWER AMPLIFIER FAULT INDICATOR.

The PA fault indicator illuminates when one of the following conditions exists. 1) PA heatsink temperature around any device is above 93C. 2) The bias voltage is maximized but desired output power is not achieved. 3) Any PA device current is above 11.5 amps. 4) The total PA current is above 42 amps. The transmitter will maximize power output just below the thresholds defined if any of the above conditions occur.

HIGH VSWR FAULT INDICATOR.

The high VSWR fault indicator illuminates when the reflected power back into the PNP 1000 RF output exceeds 40 watts. The transmitter will maximize power output just below the 40W threshold when high reflected power is detected.

INPUT AUDIO OVLD.

Illuminates to indicate the audio input level is approximately 4 dB above nominal. This level may cause clipping at the digital-to-analog converter and result in high audio distortion.

COMPRESSION INDICATOR.

Illuminates to indicate the automatic-gain-control circuit on the DSP circuit board is engaged. This will occur when the audio input level is approximately 2 dB above nominal. The circuit is designed to compress higher than nominal levels to prevent clipping at the digital-to-analog converter.

FAILSAFE CLOSED INDICATOR.

Illuminates to indicate the failsafe is properly connected on the remote D-sub connector J1-17. If the remote control common is configured for positive logic, J1-17 requires a +5 to +12 volt input. If negative logic is chosen then J1-17 requires a ground connection.

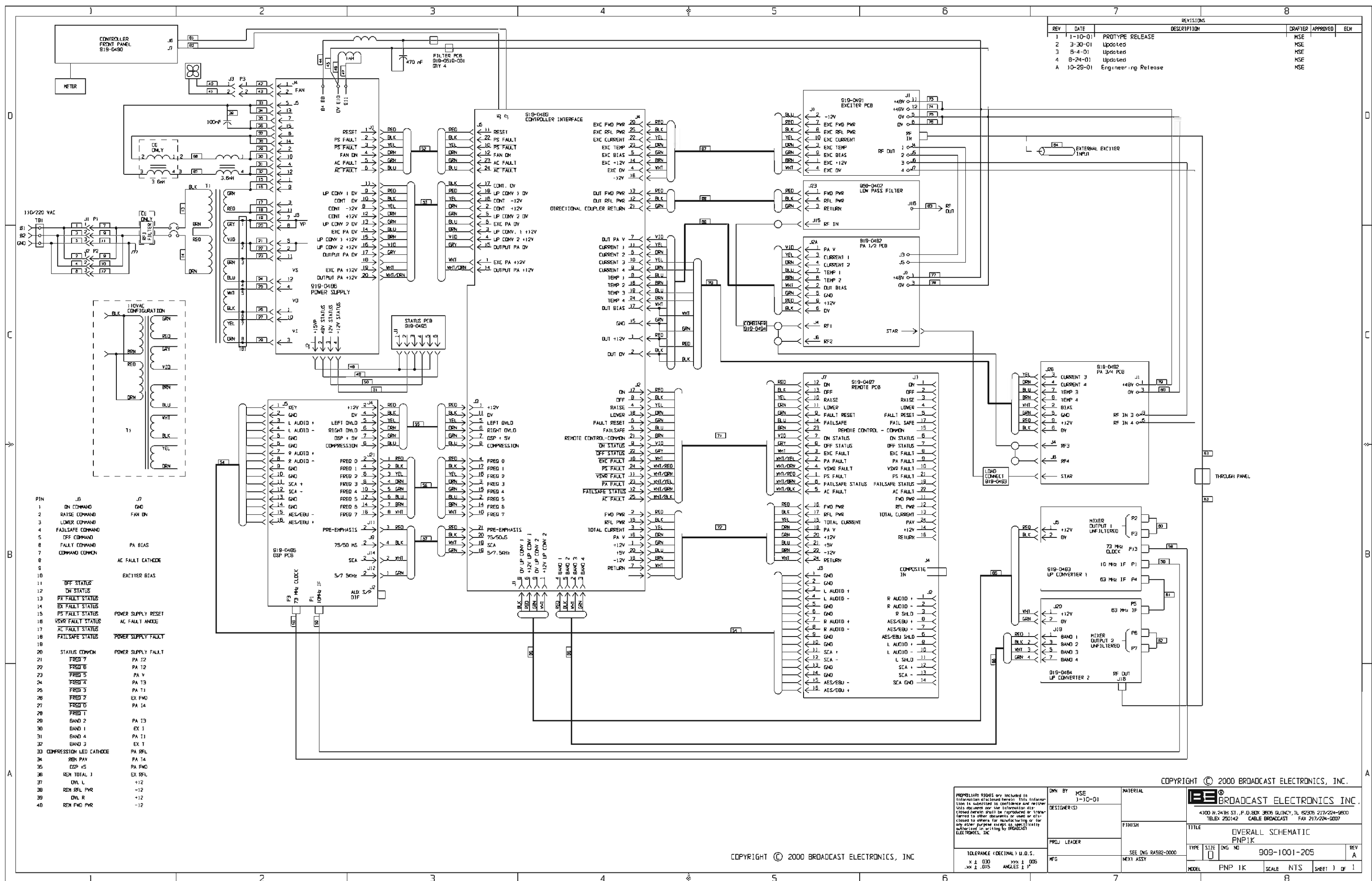
CUSTOMER SERVICE.

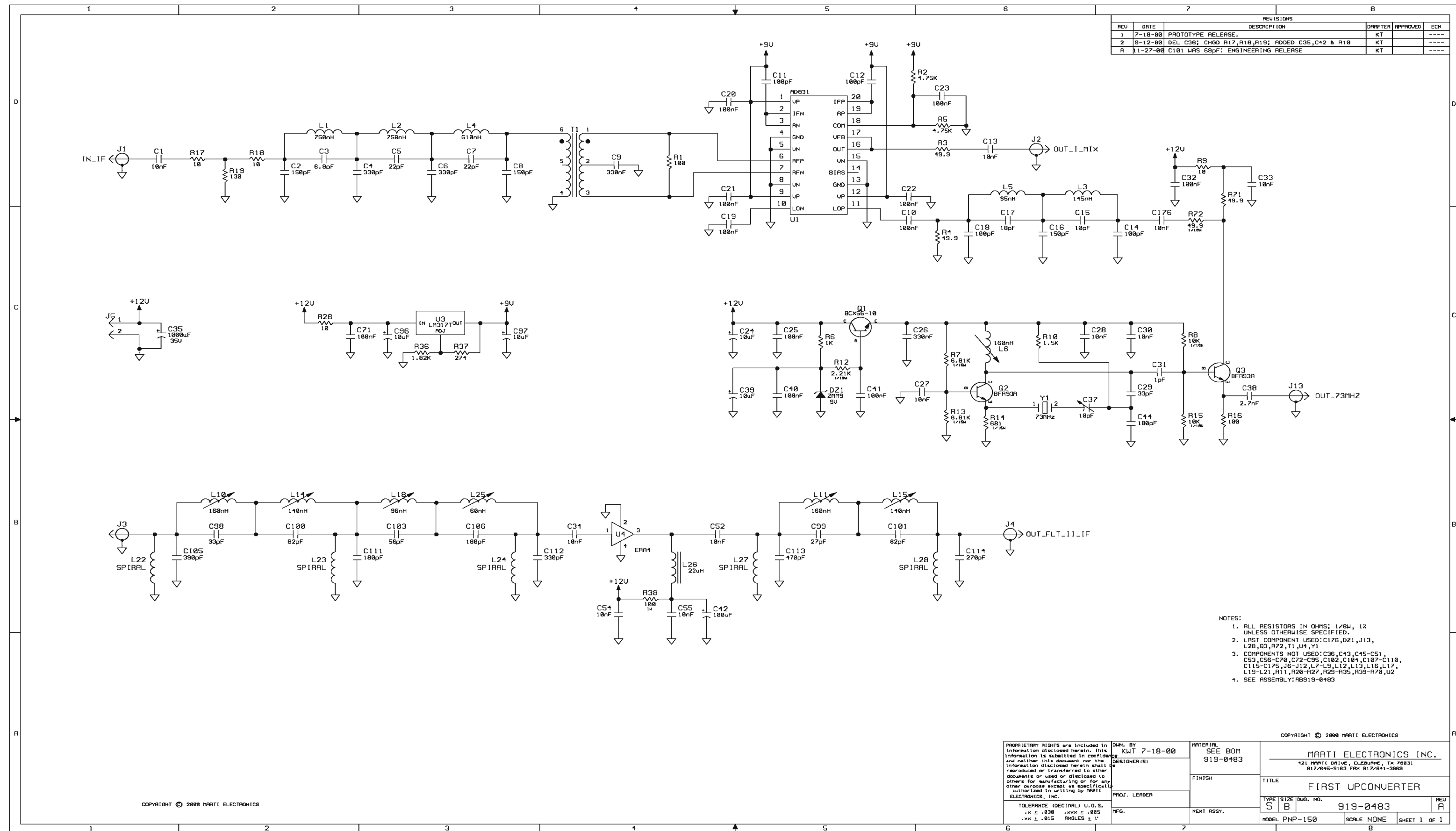
Due to complexity and critical nature of the PNP 1000 circuitry, the transmitter is not considered to be customer repairable in the field. Technical assistance and repair service for the transmitter is provided by MARTI Electronics. The service department can be reached by telephone, e-mail, fax, or letter. Equipment requiring repair or exchange should be sent by common carrier, prepaid, insured, and well protected. Do not mail the equipment. MARTI Electronics can assume no liability for inbound damage and necessary repairs become the obligation of the shipper. Prior arrangement is necessary. Contact the service department for a Return Authorization.

TECHNICAL ASSISTANCE –

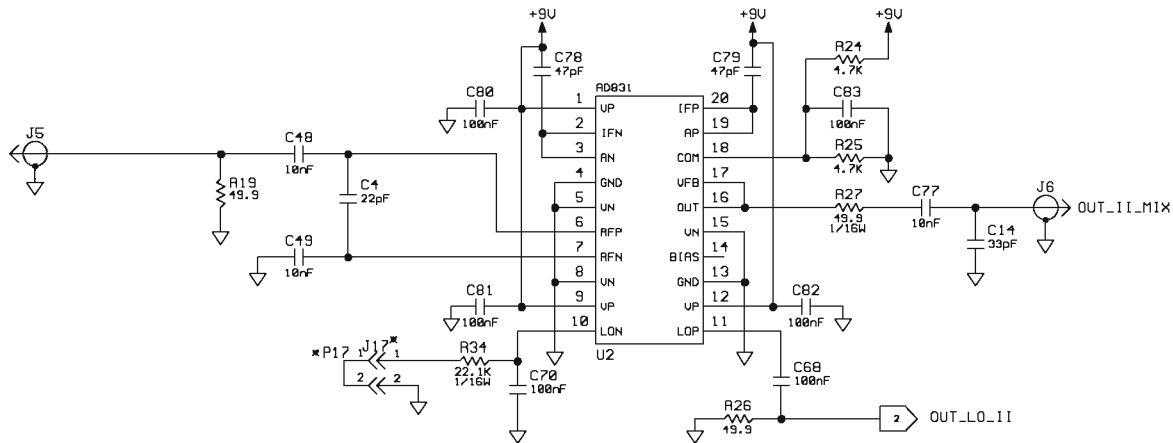
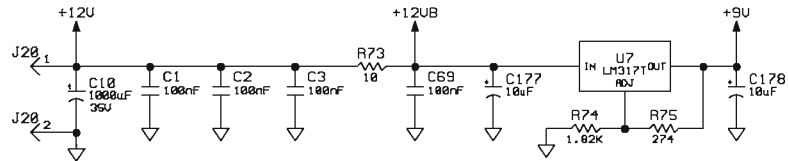
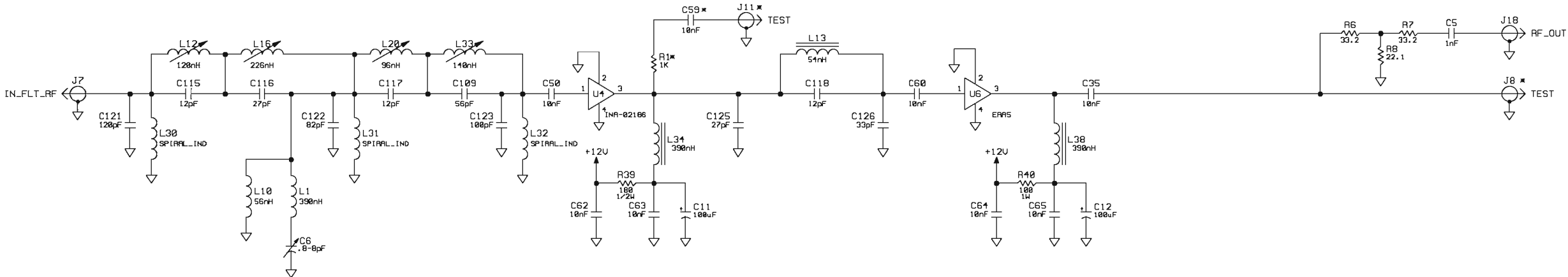
- Telephone – (217) 224-9600
- E-Mail – support@martielectronics.com
- Fax – (217) 224-9607

PNP-1000 SCHEMATICS





REVISIONS				
REV	DATE	DESCRIPTION	DRAWN	APPROVED
1	8-14-00	PROTOTYPE RELEASE.	KT	---
2	9-13-00	ADDED C10-C14; SEE SHEET 2; MODEL RELEASE	KT	---
A	11-27-00	ENGINEERING RELEASE WITH CHANGE	KT	---
C	5-9-01	ADDED C6, L1 & L10	KT	10419

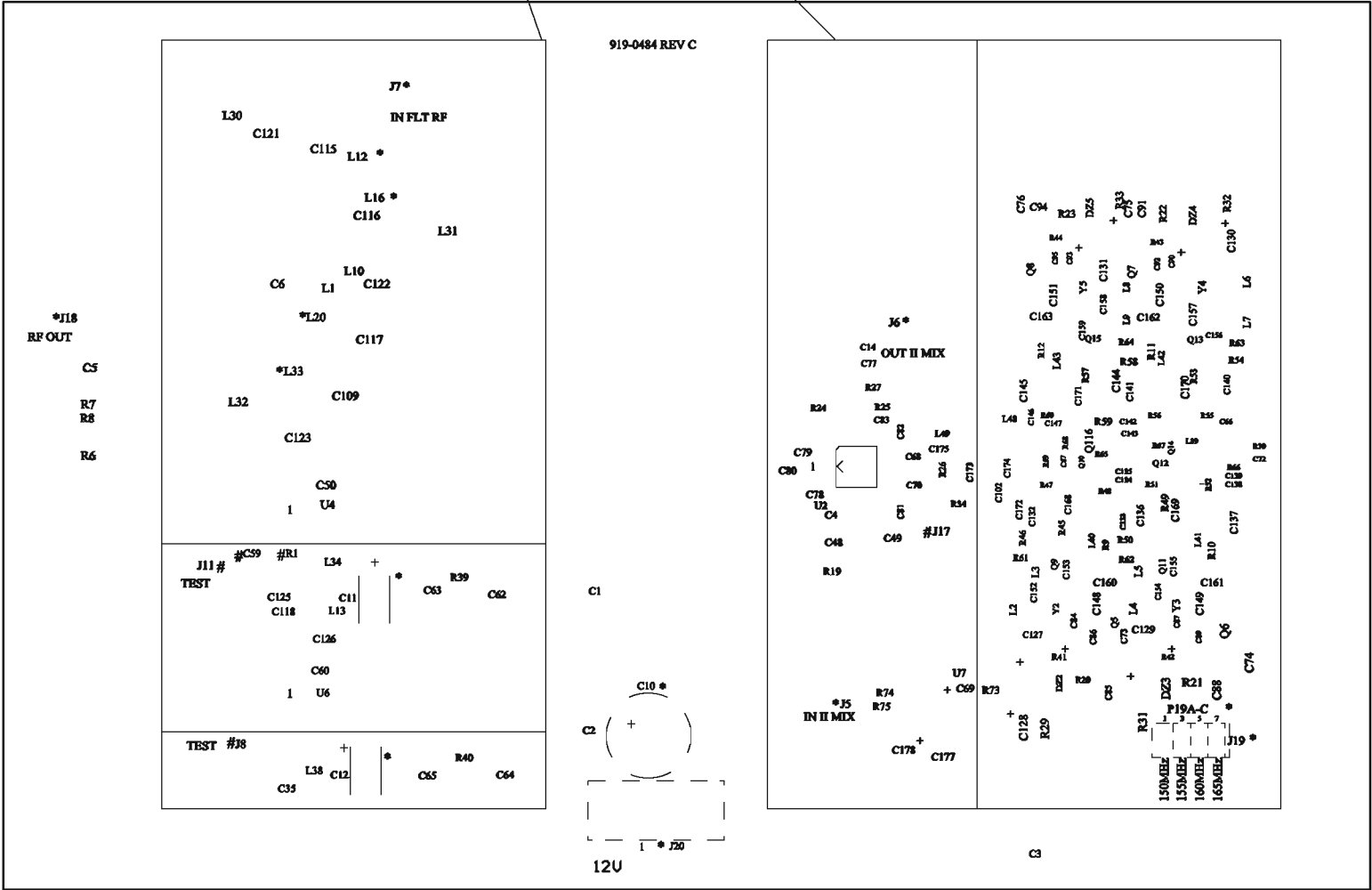


- NOTES:
1. ALL RESISTORS IN OHMS: 1/8W, 1% UNLESS OTHERWISE SPECIFIED.
 2. LAST COMPONENT USED: C170, D25, J20, Q16, R75, U7, Y5
 3. COMPONENTS NOT USED: C7-C9, C13, C15-C17, C36-C49, C51-C58, C61, C71, C96-C101, C102-C108, C110-C114, C119, C128, C129, C154-C157, C176, D21, L11, L14, L15, L17-L19, L21-L29, L35-L37, L44-L47, J1-J4, J9, J10, J12-J16, Q1-Q4, U1, U3, U5, Y1, R2-R6, R13-R18, R28, R35-R38, R70-R73
 4. SEE ASSEMBLY: A8919-0484
 5. * INDICATES PART NOT INSTALLED: (C59, J8, J11, J17, P17, R1)

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		DESIGNER(S) PROJ. LEADER	FINISH NEXT ASSY.				
TOLERANCE (DECIMAL) U.O.S. .XX ± .030 .XXX ± .005 .XX ± .015 ANGLES ± 1		MFG.		MODEL PNP-150		SCALE NONE	SHEET 1 OF 2
				TITLE SECOND UP CONVERTER		REV C	

SOLDER ALL FENCE PINS TO PCB
THEN INSTALL LIDS

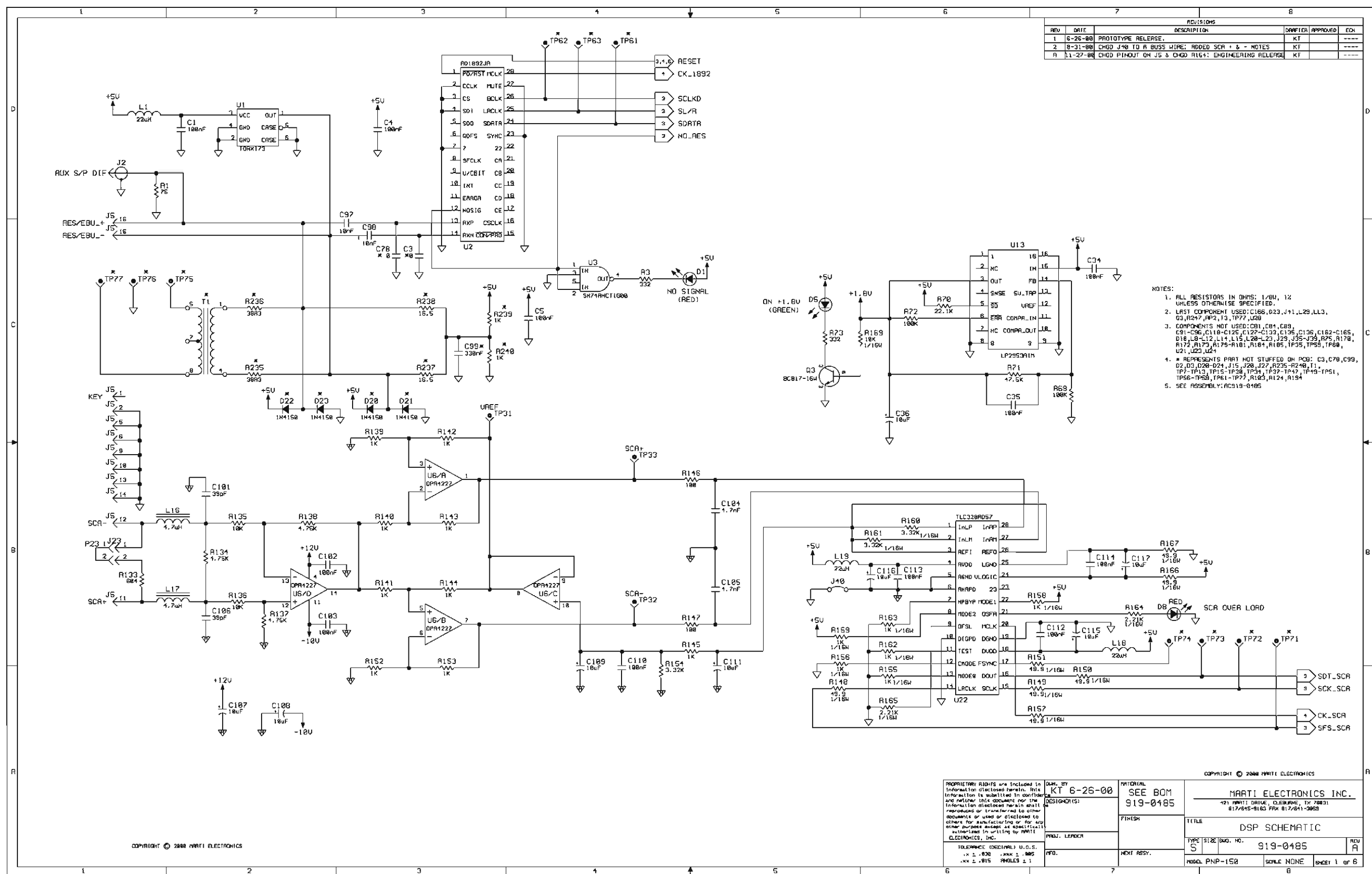


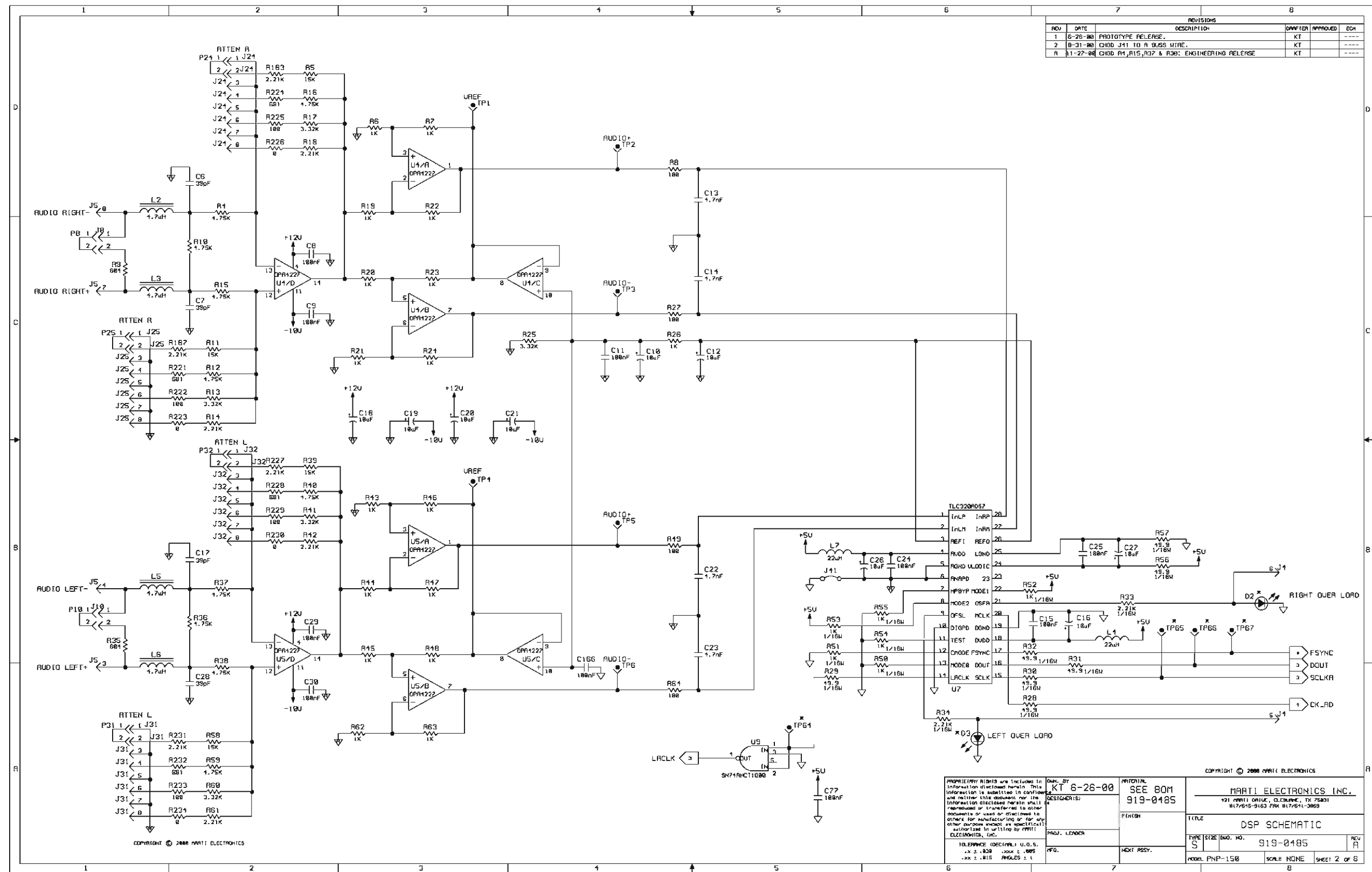
REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
1	8-16-00	PROTOTYPE RELEASE.	KT		-----
2	9-28-00	ADDED C10-C14; CHGD C5-C8; MODEL RELEASE	KT		-----
A	11-27-00	ENGINEERING RELEASE WITH CHANGE	KT		-----
B	4-16-01	CHGD R53 FROM 4.32K TO 6.81K	KT		10437
C	5-9-01	ADDED C6, L1, L10 & LIDS TO FENCES	KT	RJH	10449

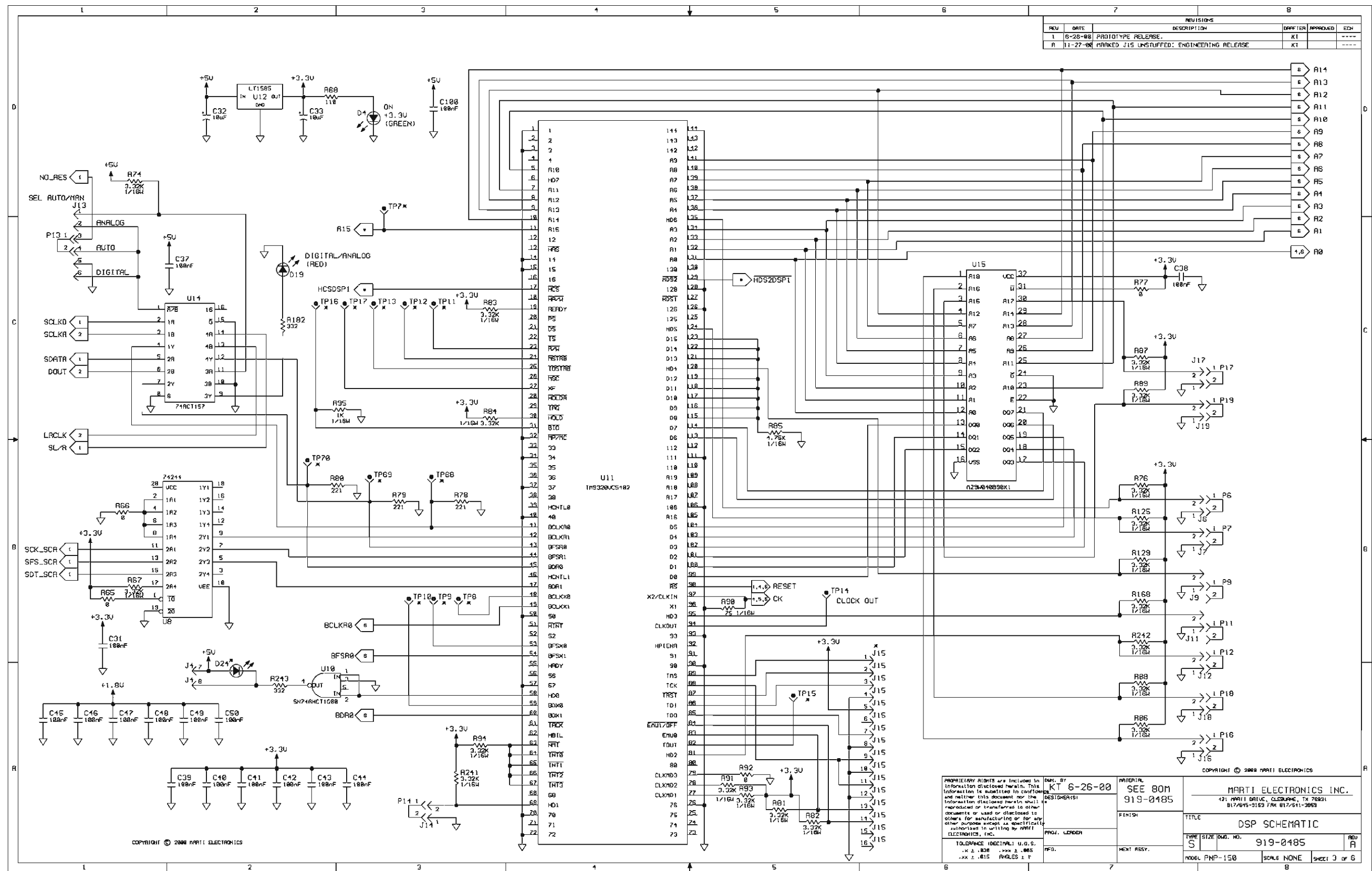
NOTES:
1) * INDICATES PARTS INSTALLED ON SOLDER SIDE OF PCB.
(C10,J5-J7,J18-J20,L12,L16,L20,L33,P19A-C,R39,R40)
2) # INDICATES PARTS NOT INSTALLED (C59,J8,J11,J17,R1)

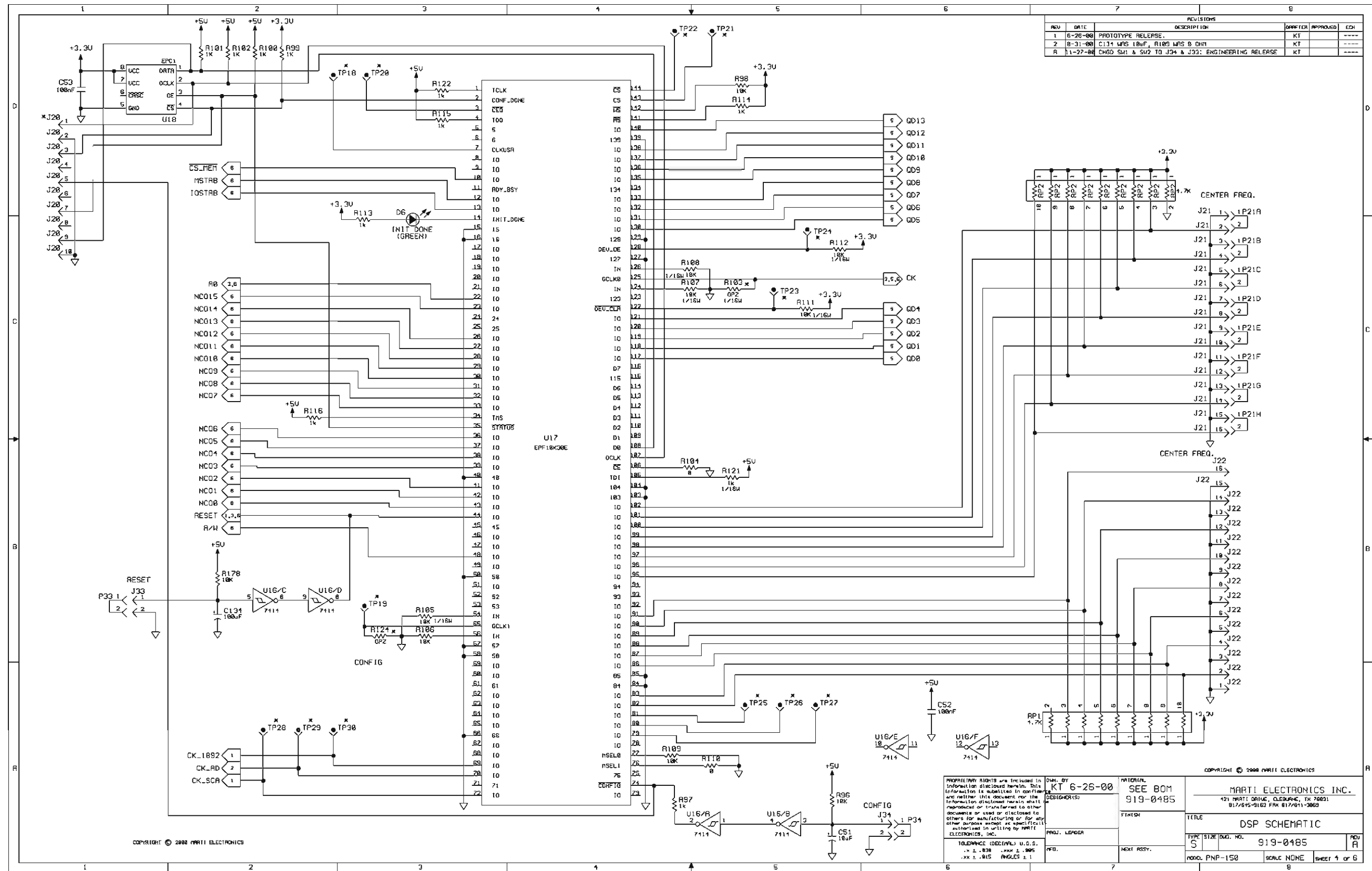
COPYRIGHT © 2000 MARTI ELECTRONICS, INC.

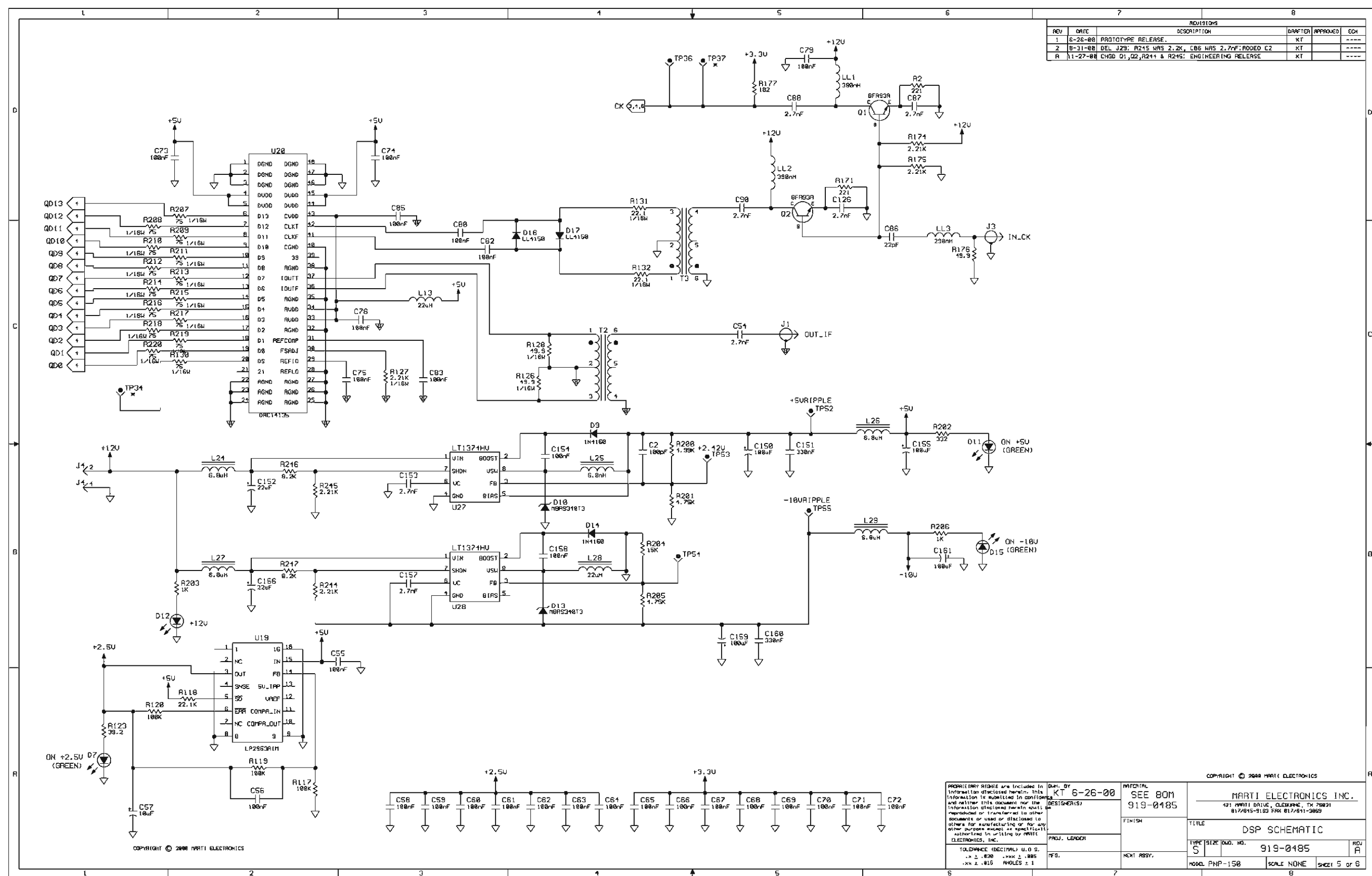
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	DESIGNER(S)		421 MARTI DRIVE, CLEBURNE, TX 76031 817/645-9163 FAX 817/641-3869		
	PROJ. LEADER	FINISH	TITLE SECOND UPCONVERTER		
	MFG.	NEXT ASSY.	TYPE B	SIZE B	DWG No. 919-0484
TOLERANCE (DECIMAL) U.O.S. .X ± .030 .XXX ± .005 .XX ± .015 ANGLES + 1°		REV C		MODEL PNP-150	
		SCALE 1/1		SHEET 1 OF 1	

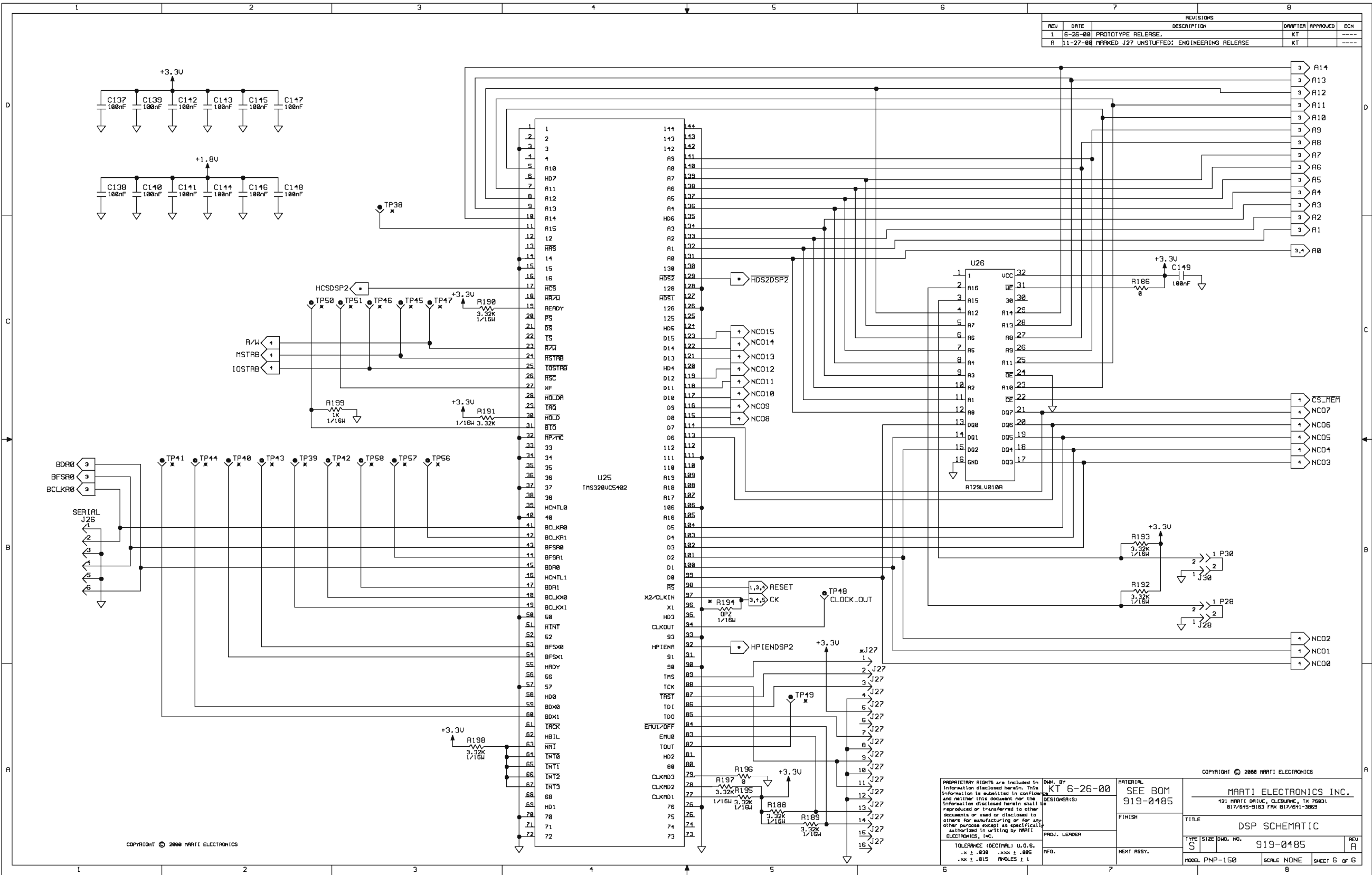












REVISIONS				
REV	DATE	DESCRIPTION	DRAWN	APPROVED
1	6-26-00	PROTOTYPE RELEASE.	KT	
A	11-27-00	MARKED J27 UNSTUFFED: ENGINEERING RELEASE	KT	

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TOLERANCE (DECIMAL) U.O.S. .X ± .030 .X00 ± .005 .X0 ± .015 ANGLES ± 1°		COPYRIGHT © 2000 MARTI ELECTRONICS		MARTI ELECTRONICS INC. 121 MARTI DRIVE, CLOUDBURG, TX 75831 817/615-9163 FAX 817/611-3063	
MODEL: PNP-150		SCALE: NONE		SHEET 6 OF 6	

REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
1	6-30-00	PROTOTYPE RELEASE.	KT		----
2	8-31-00	CHGD C86,C134,R25,R109,R245,ADDED NOTES & C2	KT		----
A	11-37-00	ADDED NOTES & CORRECTED J5: ENGINEERING RELEASE	KT	JLT	----
B	4-16-01	ADDED NOTES & CHGD J5 TO A 408-1602	KT	JW	10438

INSTALL SOFTWARE 979-0485-U26 VER 1.0
& LABEL TOP OF U26 WITH VERSION

INSTALL SOFTWARE 979-0485-U18 VER 1.0
& LABEL TOP OF U18 WITH VERSION

SEE DETAIL "A" FOR HARDWARE STACKUP.

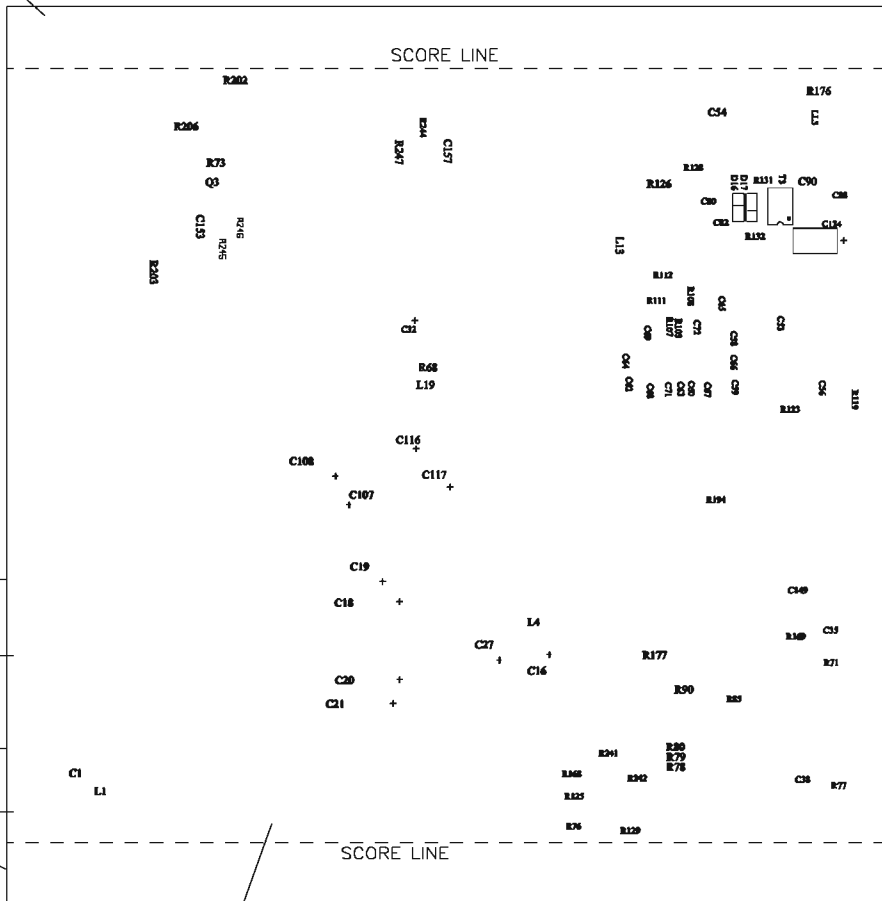
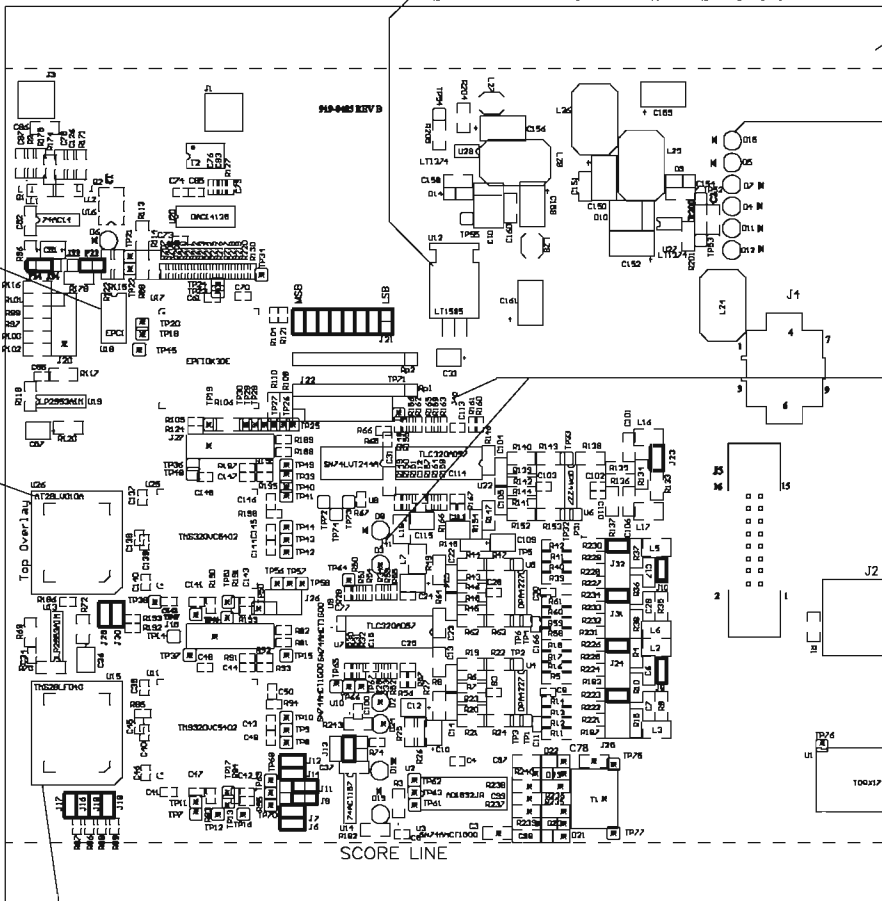
SEE NOTE 4

SEE DETAIL "B" AND NOTE 7


SEE NOTE 1

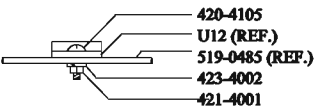
SEE NOTE 4

SEE NOTE 3

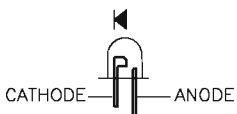


NOTES:

- 1) INSERT BUSS WIRE IN PLACE OF J40 & J41.
- 2) * INDICATES PARTS NOT STUFFED: C3,C78, C99,D2,D3,D20-D24,J15,J27,R235-R240, T1,TP7-TP13,TP15-TP30,TP34,TP37-TP47, TP49-TP51,TP56-TP58,TP61-TP77,R103, R124 & R194.
- 3) REFER TO SOLDER SIDE DRAWING, FOR PARTS STUFFED ON SOLDER SIDE OF BOARD.
- 4) RAILS TO BE BROKEN OFF AT SCORE LINE , AFTER FLOW SOLDER.
- 5)  INDICATES LOCATION OF JUMPER PLUGS
- 6) TRIM ALL LED'S AT SHOULDERS AND MOUNT FLUSH WITH PCB: (D1,D4-D8,D11,D12,D15,D19)



DETAIL "A"



DETAIL "B"

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DWN. BY
KWT 6-30-00
DESIGNER(S)

PROJ. LEADER
JLT 12-13-00
MFG.

MATERIAL
SEE BOM
919-0485

FINISH

NEXT ASSY.

MARTI ELECTONICS, INC.

421 MART DRIVE, CLEBURNE, TX 76031
817/645-9163 FAX 817/641-3869

TITLE
DSP PCB

TYPE
A

SIZE
C

DWG No.
919-0485

REV
B

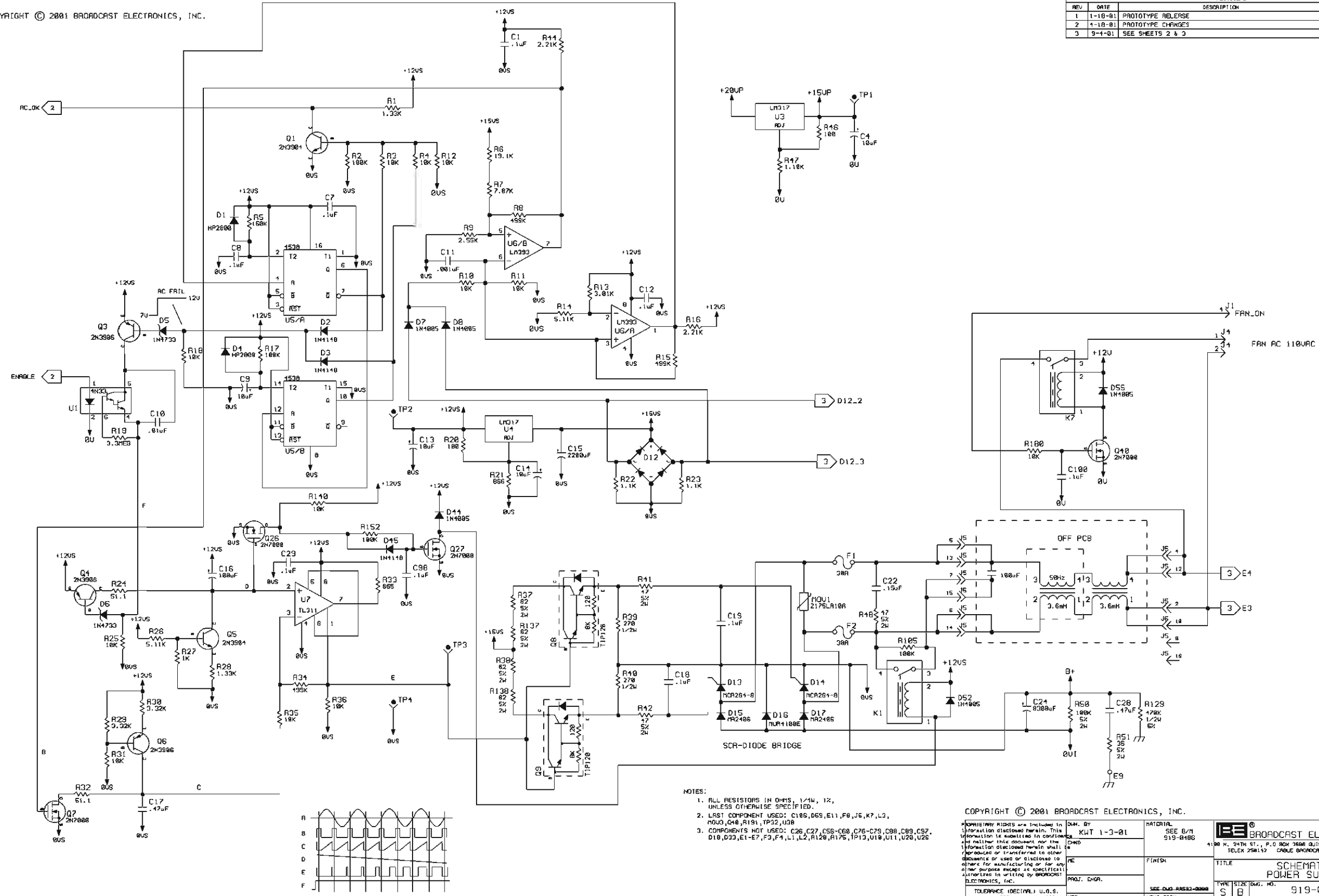
MODEL PNP-150

SCALE 1/1

SHEET 1 OF 1

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REVISIONS				
REV	DATE	DESCRIPTION	DESIGN	ENGR
1	1-18-01	PROTOTYPE RELEASE	KT	---
2	4-18-01	PROTOTYPE CHANGES	KT	---
3	9-4-01	SEE SHEETS 2 & 3	KT	10513



- NOTES:
1. ALL RESISTORS IN OHMS, 1/4W, 1%, UNLESS OTHERWISE SPECIFIED.
 2. LAST COMPONENT USED: C105, D65, E11, F8, J5, K7, L3, M03, Q40, R191, TP32, U38.
 3. COMPONENTS NOT USED: C26, C27, C55-C68, C76-C79, C88, C89, C97, D18, D33, E1-E7, F3, F4, L1, L2, R120, R175, TP13, U18, U11, U28, U29.

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DATE: 1-3-01

DESIGN: KT

ENGR: KT

FINISH: KT

SEE Q105-R352-0000

NEXT ASSY: N/A

TOLERANCE (DECIMAL) U.S.S. .XX ± .038 .XXX ± .045 .XX ± .015 ANGLES ± 1°

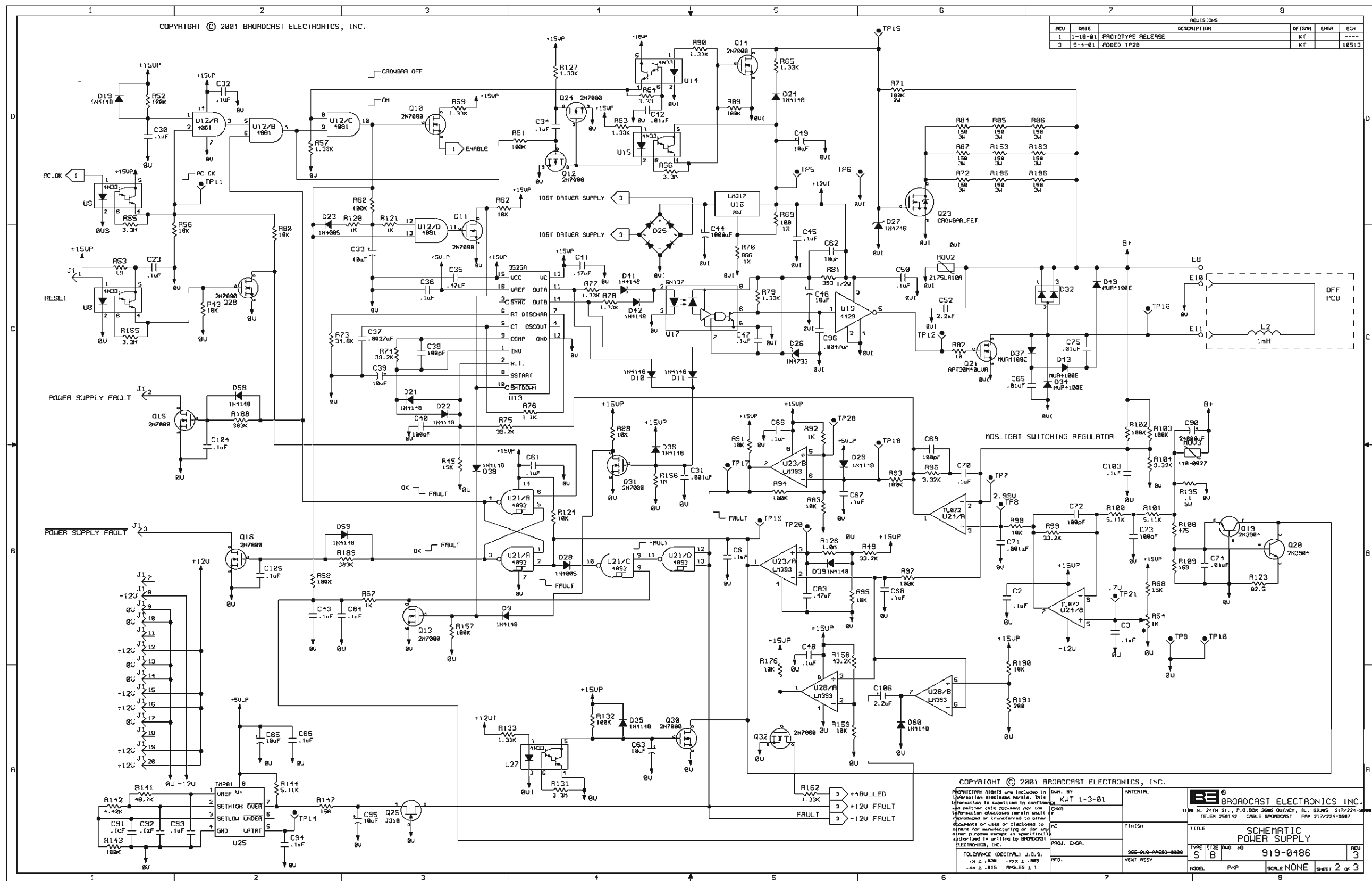
BROADCAST ELECTRONICS, INC.

4100 N. 24TH ST., P.O. BOX 3686 QUINCY, IL 62305 217/224-0600
TELEX 258152 CABLE BROADCAST FAX 217/224-0687

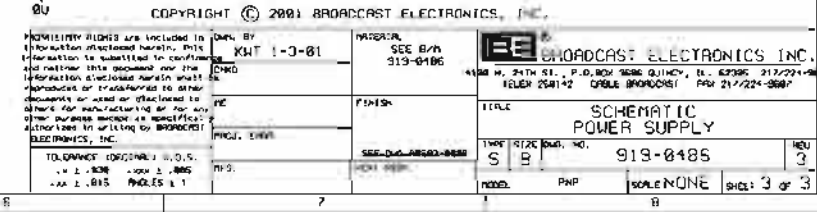
SCHEMATIC POWER SUPPLY

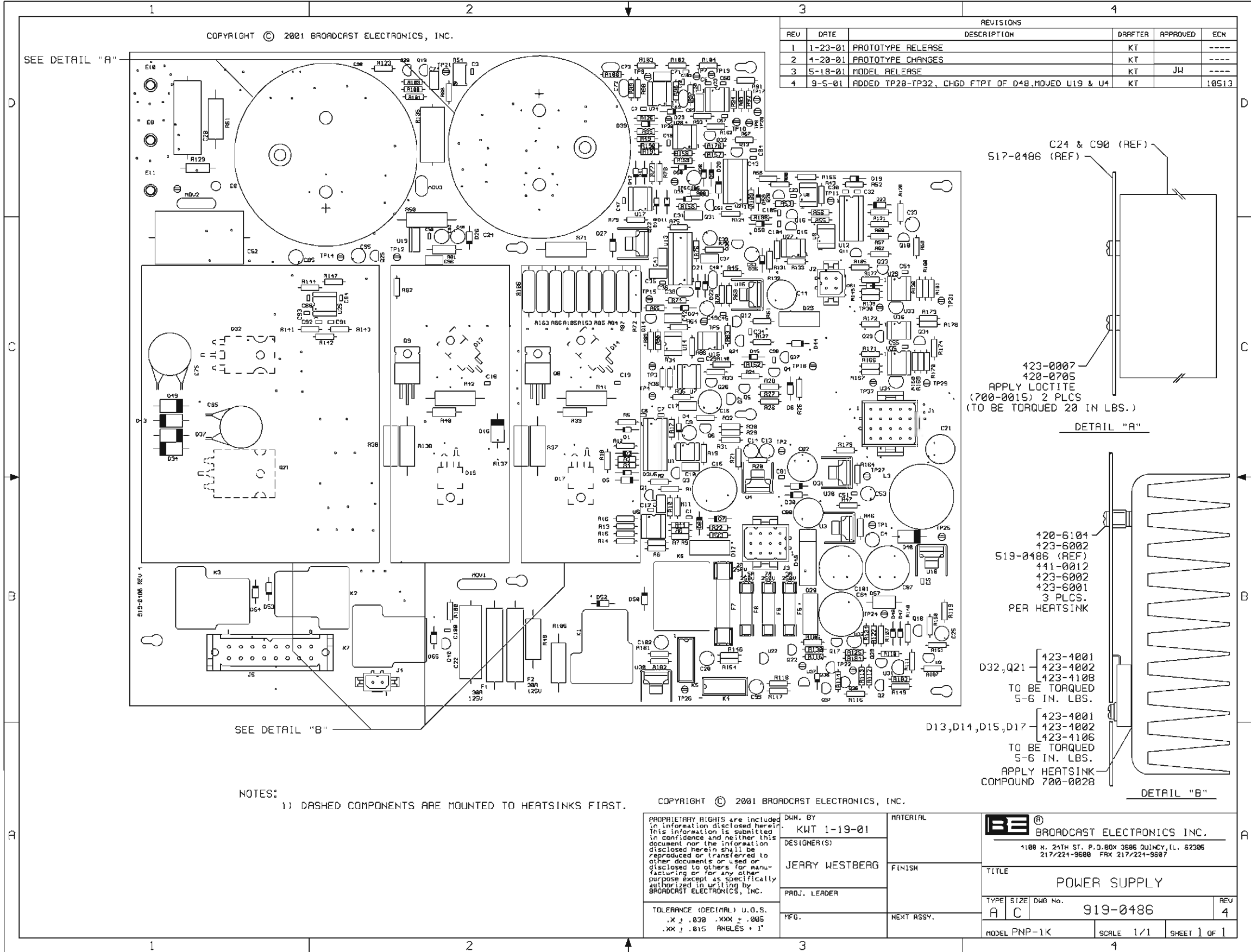
TYPE: S B SIZE: 11x17 DWG. NO.: 919-0486 REV: 3

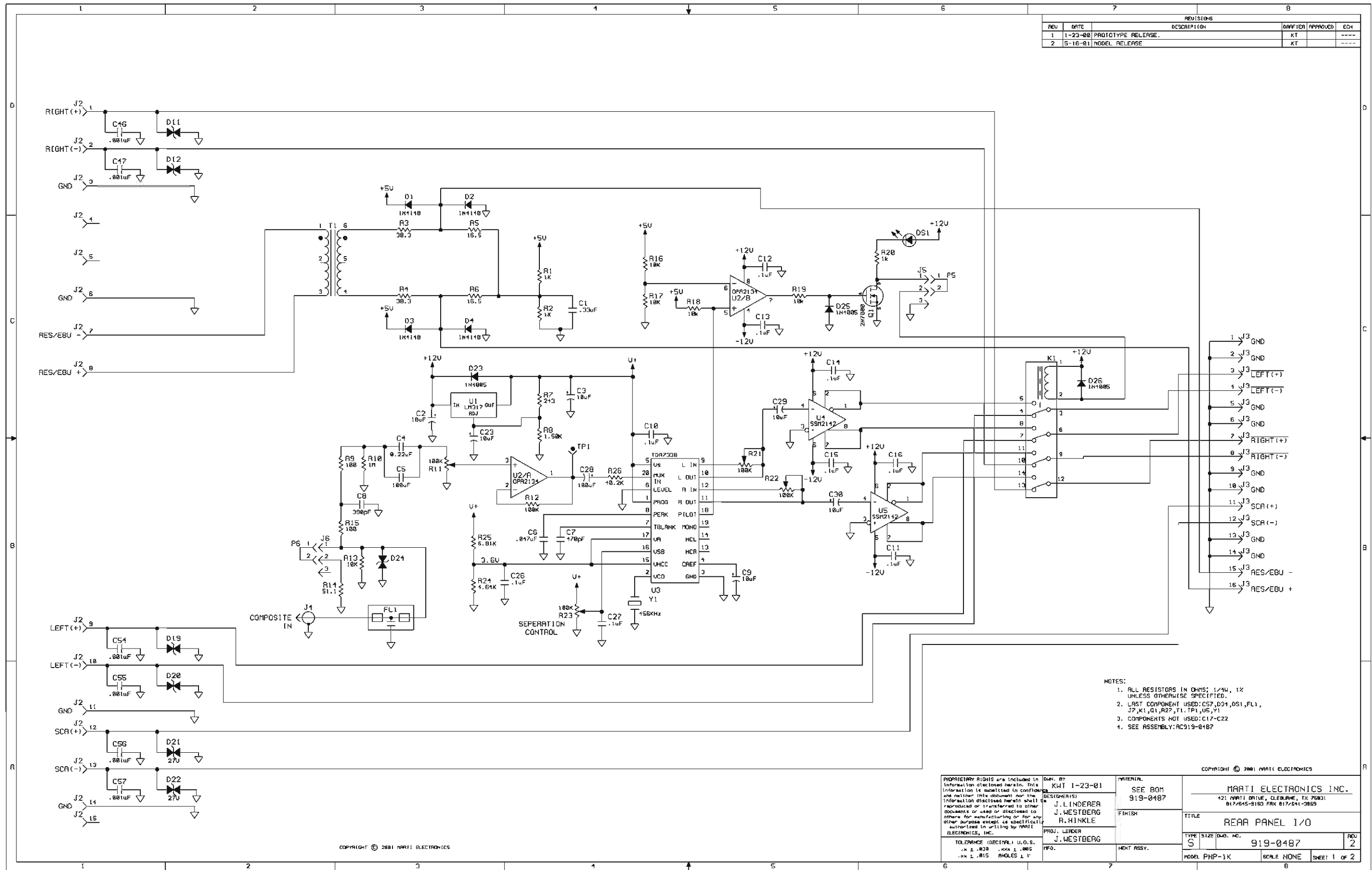
MODEL: PNP SCALE: NONE SHEET 1 OF 3

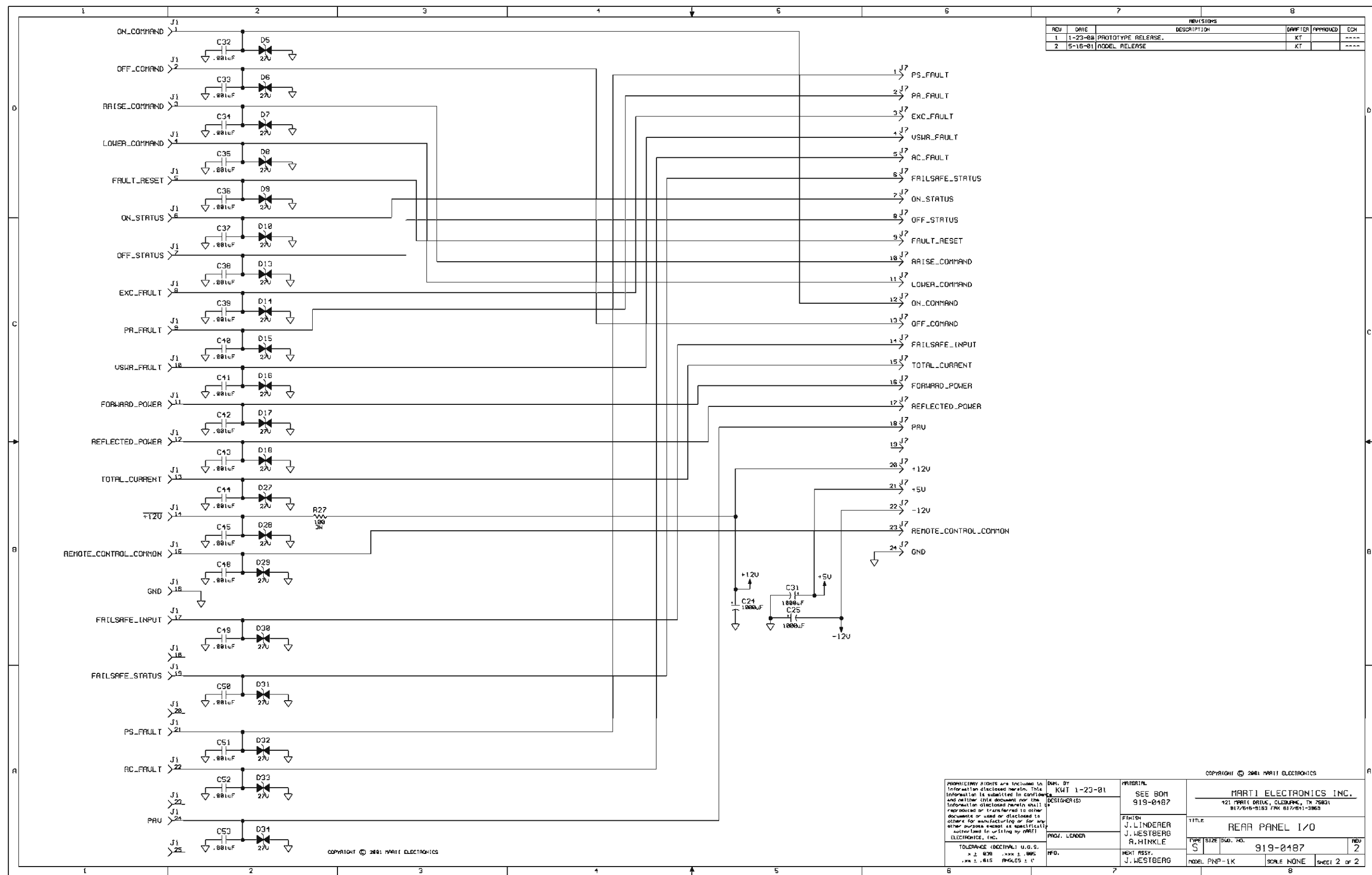


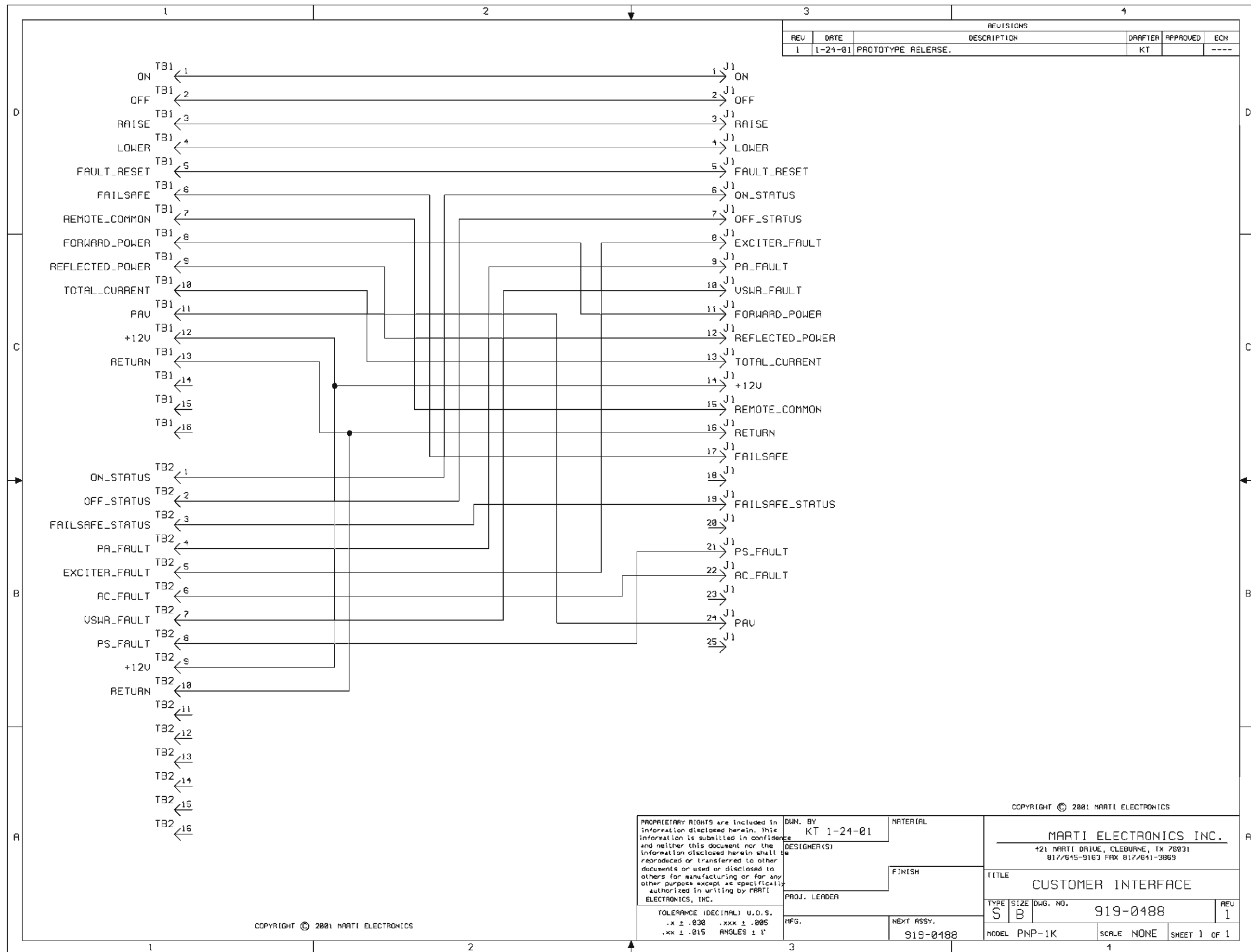
NO	DATE	DESCRIPTION	DEBIT	CREDIT	BALANCE
1	1-1-81	PROFIT ON SALE OF LAND	100		100
2	1-1-81	PROFIT ON SALE OF LAND	100		100
3	1-1-81	PROFIT ON SALE OF LAND	100		100



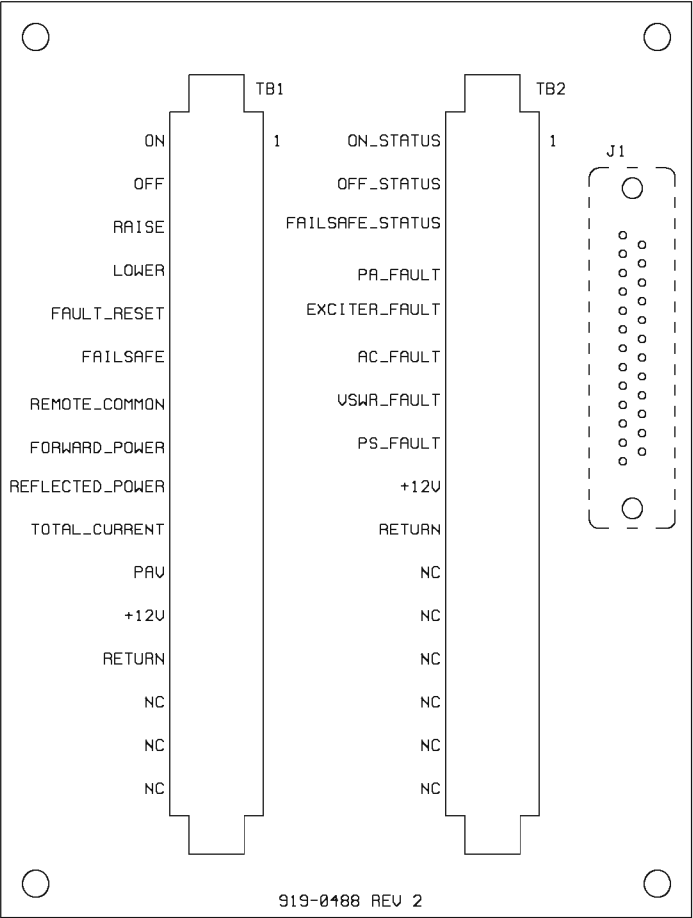






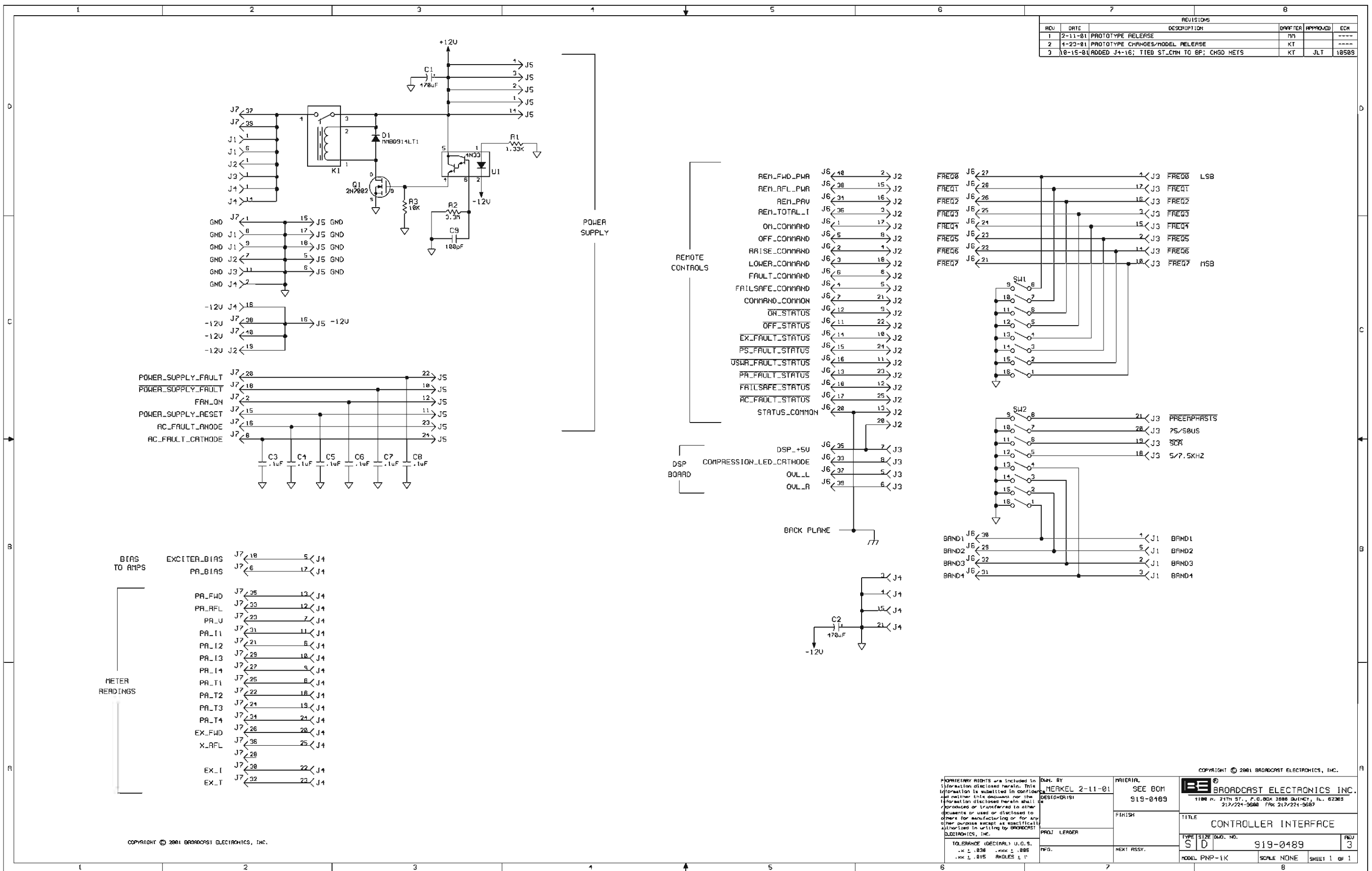


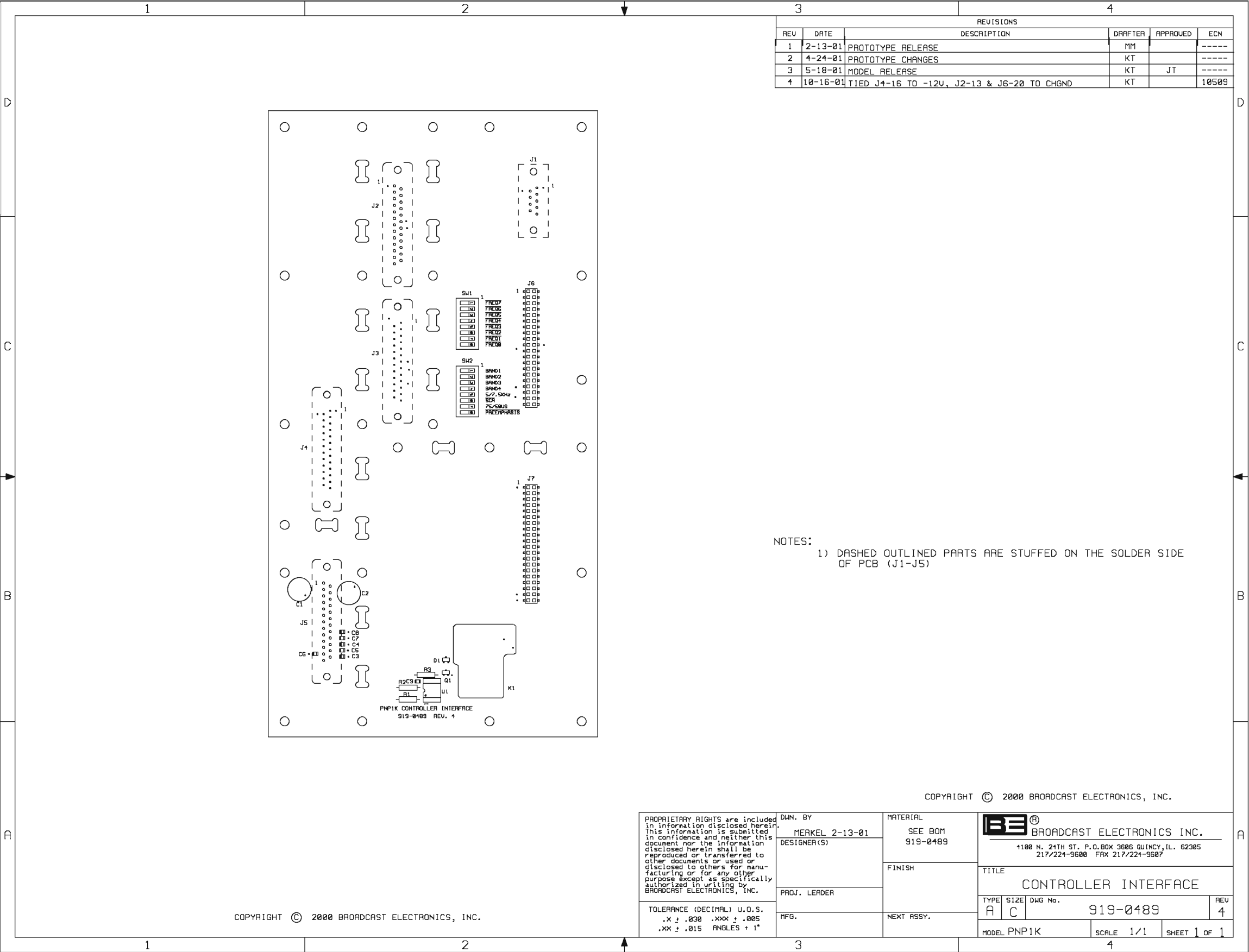
REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
1	1-29-01	PROTOTYPE RELEASE	KT		----
2	5-18-01	MODEL RELEASE	KT		----

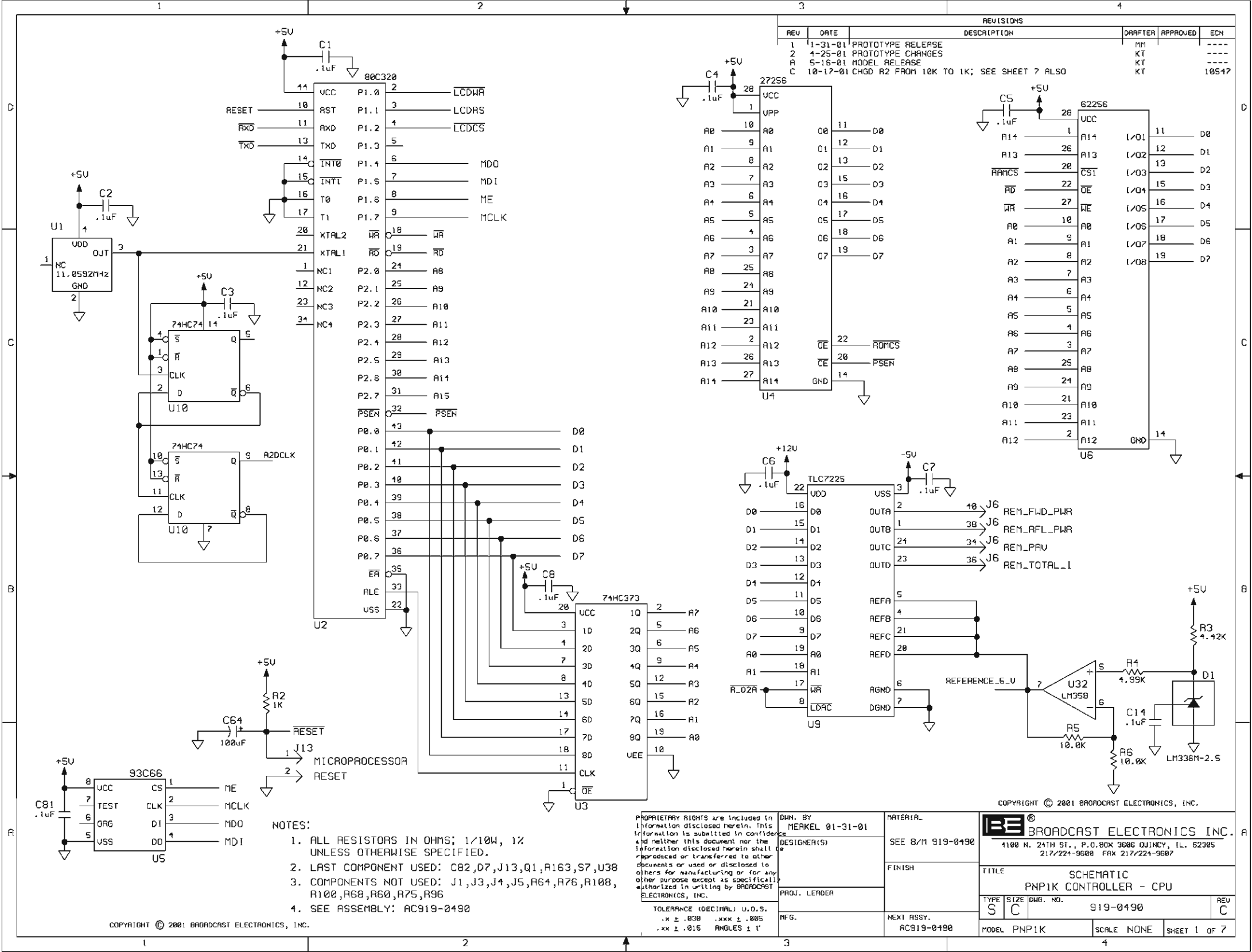


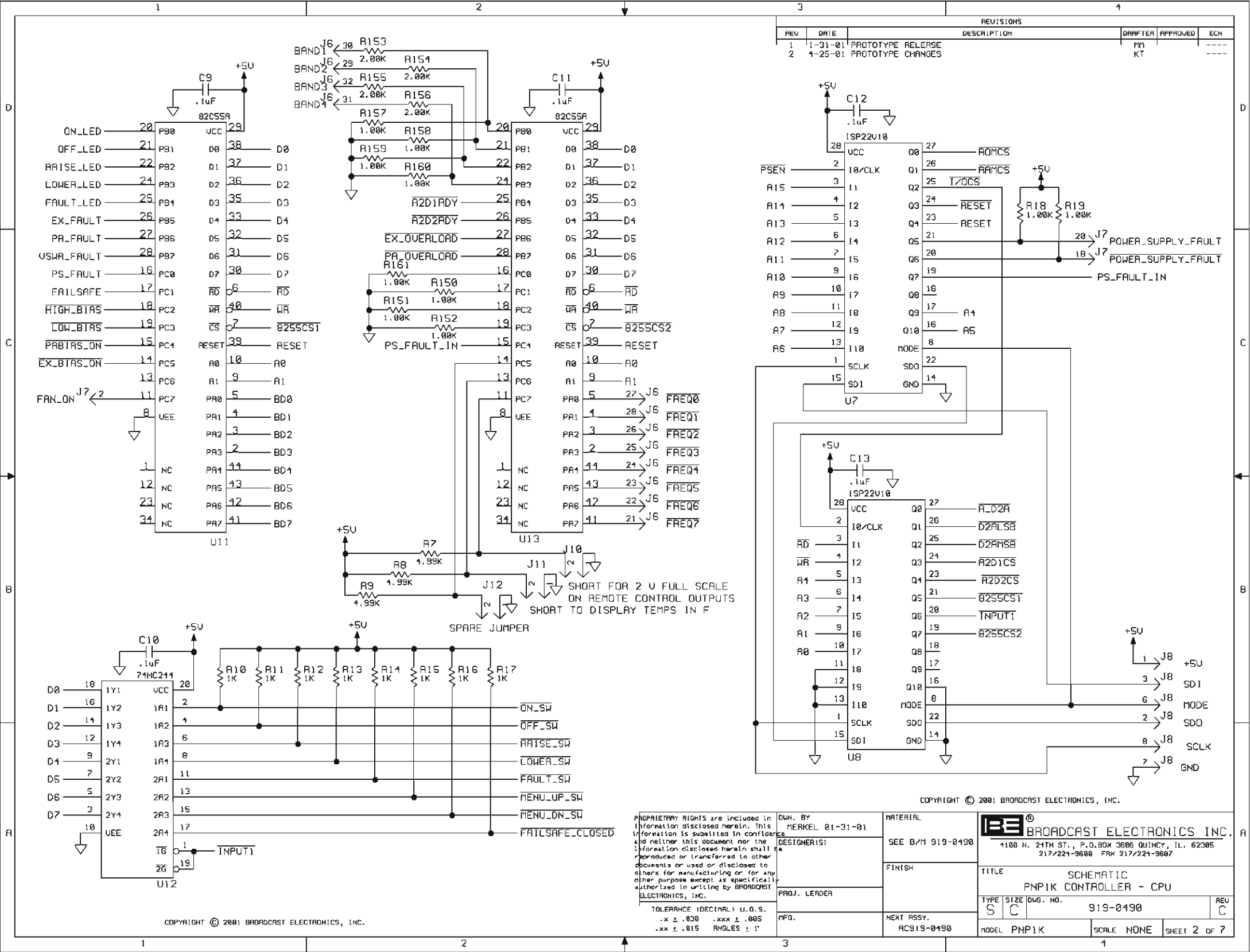
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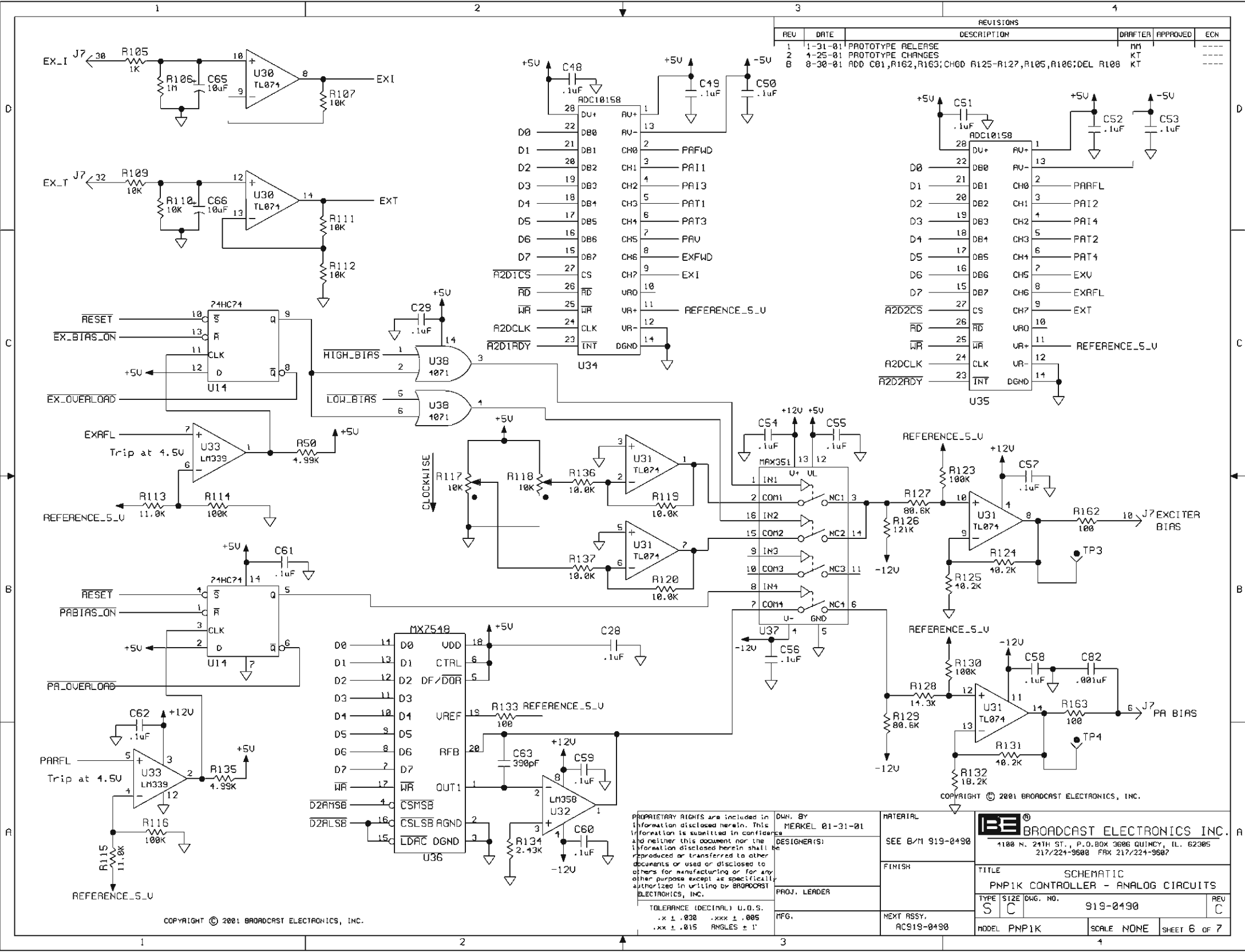
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	DESIGNER(S)		TITLE CUSTOMER INTERFACE		
	PROJ. LEADER	FINISH	TYPE A	SIZE B	DWG No. 919-0488
	MFG.	NEXT ASSY.	REV 2		
TOLERANCE (DECIMAL) U.O.S. .X ± .030 .XXX ± .005 .XX ± .015 ANGLES + 1°		MODEL PNP-1K		SCALE 1/1	SHEET 1 OF 1

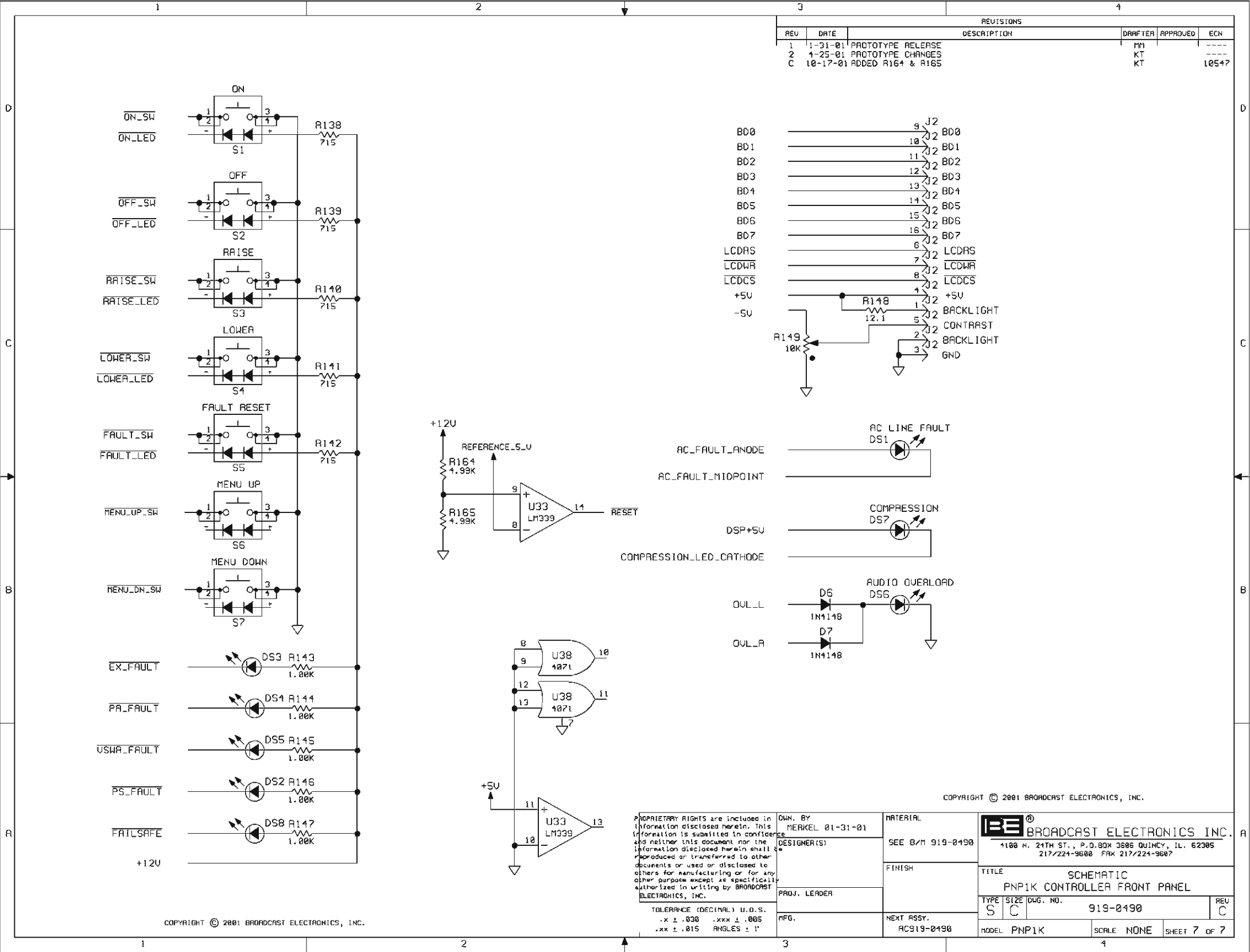


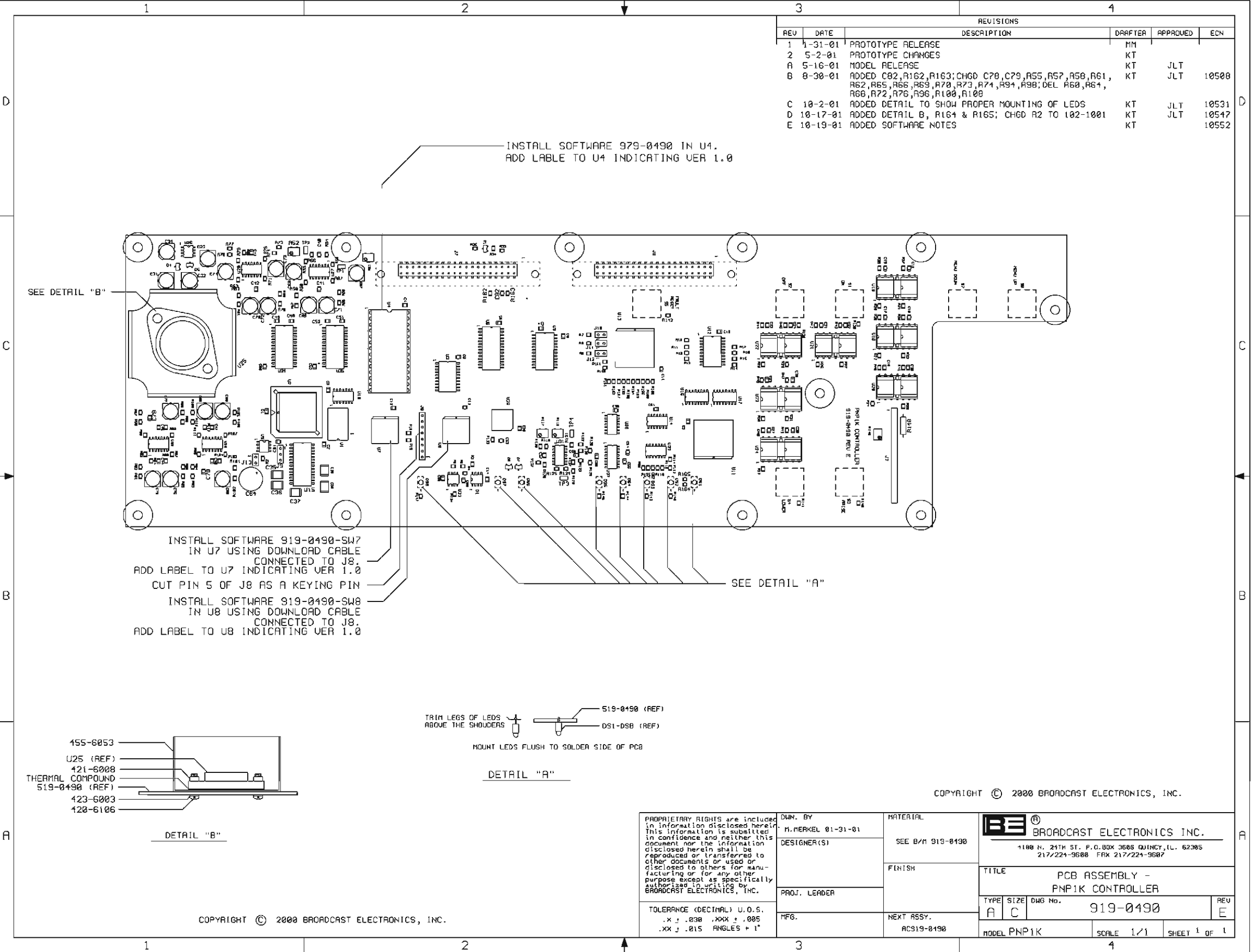


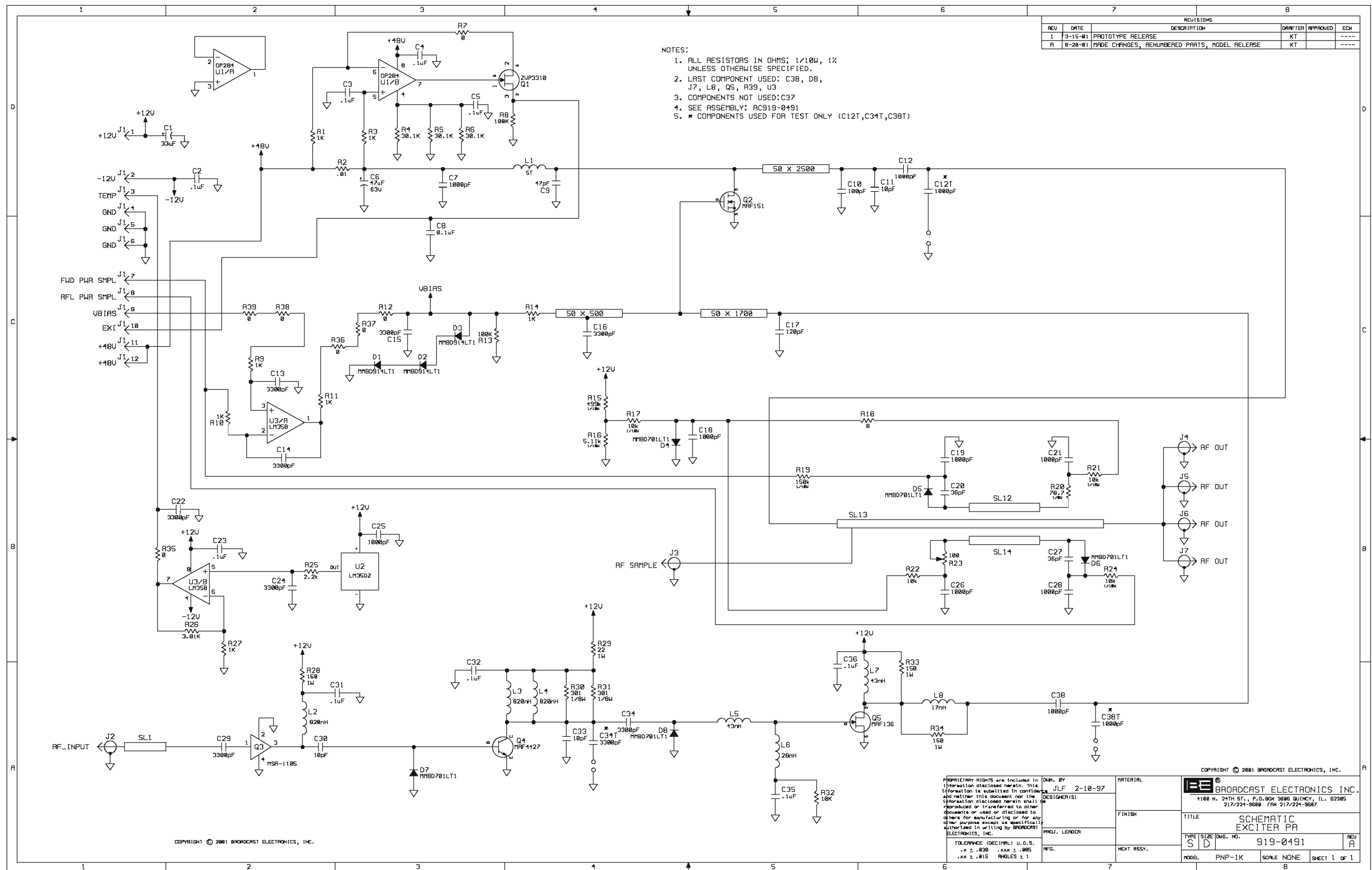


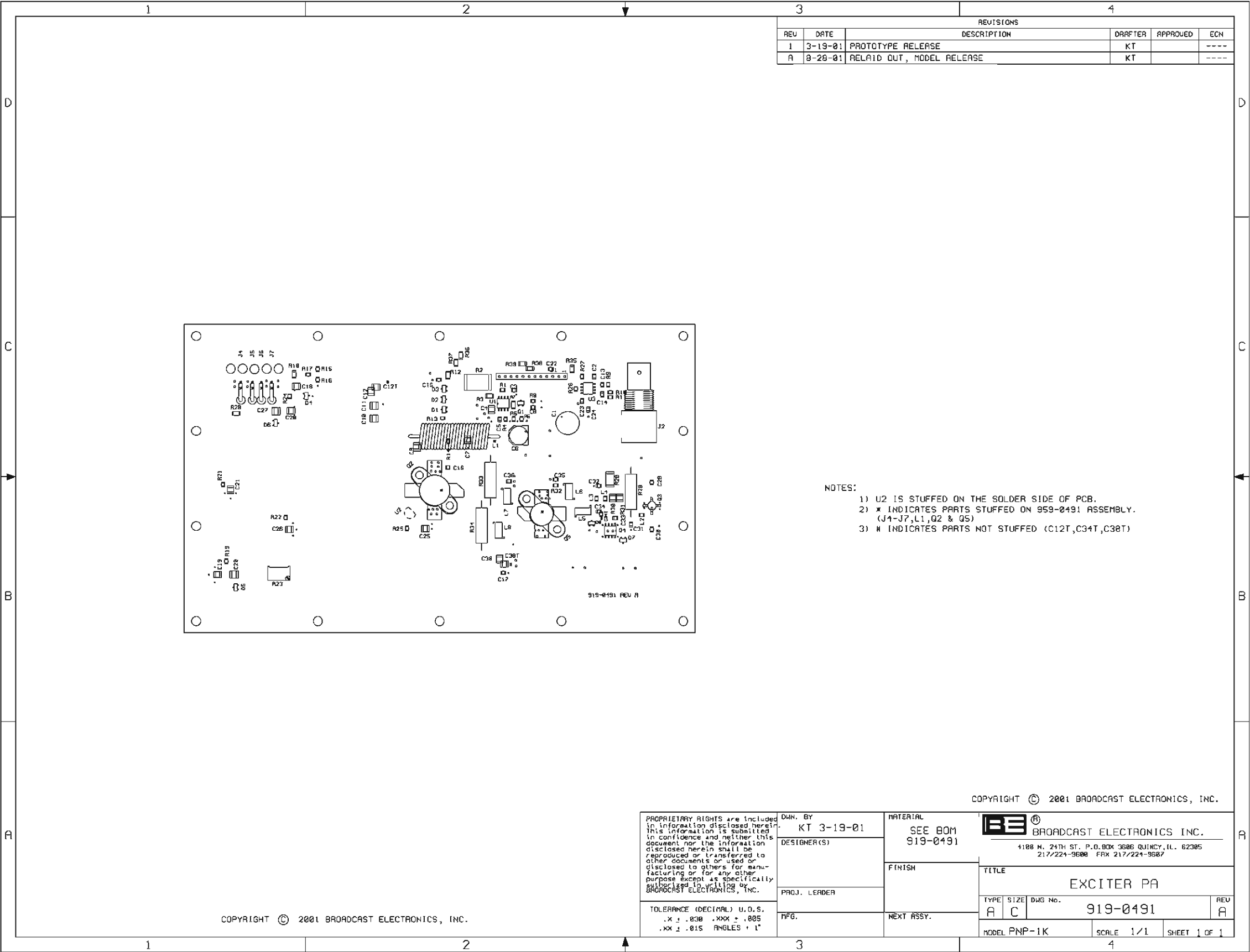












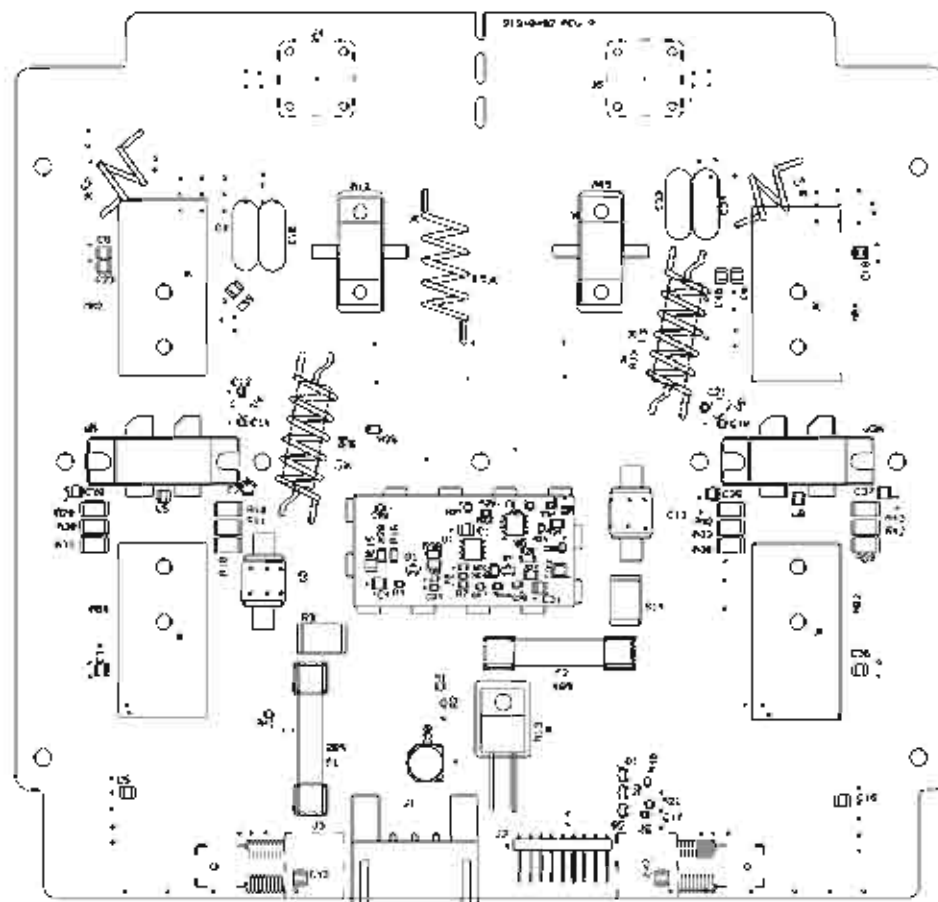
REVISIONS					DRAWN	APPROVED	ECN
REV	DATE	DESCRIPTION					
1	2-2-88	PROTOTYPE RELEASE.			KT		----
A	8-28-81	REL10 OUT. MODEL RELEASE			KT		----

- NOTES:
1. ALL RESISTORS IN OHMS: 1/4W, 1% UNLESS OTHERWISE SPECIFIED.
 2. LAST COMPONENT USED: C43, D3, F2, J6, L9, Q2, R43, U6, U10.
 3. COMPONENTS NOT USED: C22, C41, L7, L8.
 4. SEE ASSEMBLY: AC919-0492

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TOLERANCE (DECIMAL) U.S.S. .XX ± .008 .XXX ± .005 .XX ± .015 ANGLES ± 1°		PROJ. LEADER MFG	FINISH NEXT ASSY.	TITLE AMP BOARD	TYPE SIZE Dwg. NO. S D 919-0492
				MODEL PNP-1K	SCALE NONE
				SHEET 1 OF 1	

REVISIONS				
REV	DATE	DESCRIPTION	DRAWN	APPROVED
1	2-2-81	PROTOTYPE RELEASE	KT	
2	5-11-81	REWORK OUT	KT	
A	8-28-81	REWORK OUT: MODEL RELEASE	KT	



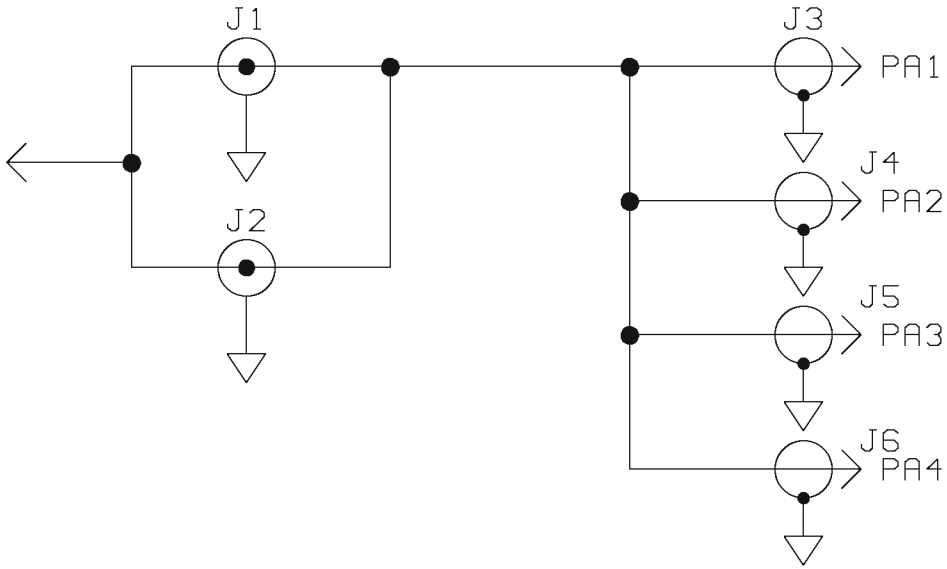
- NOTES:
- 1) DASHED OUTLINED PARTS ARE STUFFED ON SOLDER SIDE OF PCB. (J3, J4, J5, J6, J7 & U5).
 - 2) * INDICATES PARTS STUFFED ON 919-0192 ASSEMBLY. (U1, U2, U3, U4, U9, R11-R13, R12, R13, R19, U2 & U3).
 - 3) # INDICATES PARTS NOT STUFFED (R9 & R17).

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APPROVAL: (SEE NOTE 1) U.S. S. 1.002 XXX 1.005 (SEE NOTE 1)		DESIGNED BY: KT 2-2-81 DRAWN BY: KT CHECKED BY: KT NEXT ASST:		MATERIAL: SEE BOX 919-0192 FINISH:		PARTI ELECTRONICS, INC. 421 PARTI DRIVE, OLSBURN, IN 46061 817/845-5162 FAX 817/845-5165	
TITLE: AMP		TYPE: STRIP Dwg No. 919-0192		REV: A		MODEL: PNP-LK SCALE: 1/21 SHEET 1 of 1	

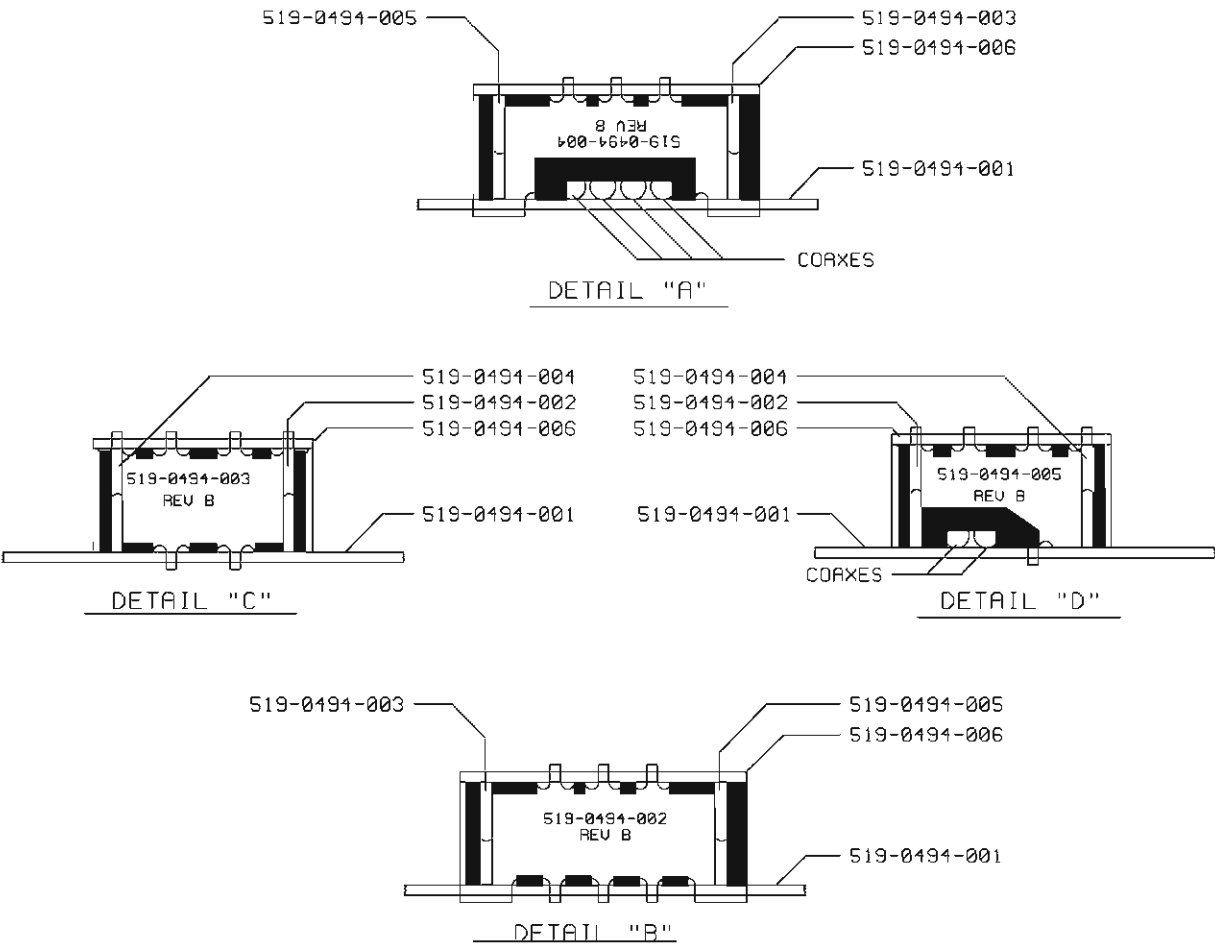
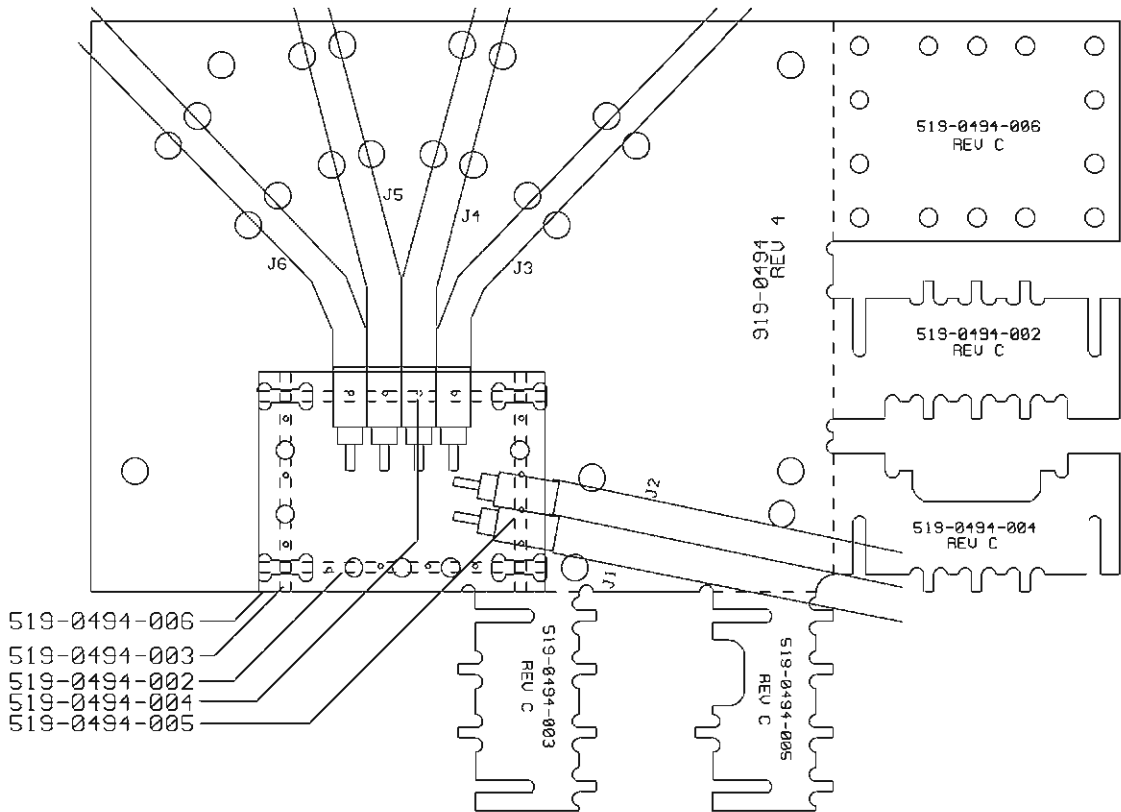
REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
1	1-30-01	PROTOTYPE RELEASE	KT		----
2	6-20-01	MODEL RELEASE	KT		----
3	10-16-01	DELETED C1,C2 & SL1; ADDED J2	KT		10535



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	DESIGNER(S)		421 MARTI DRIVE, CLEBURNE, TX 76031 817/645-9163 FAX 817/641-3869			
	PROJ. LEADER	FINISH	TITLE COMBINER			
	MFG.	NEXT ASSY.	TYPE S	SIZE A	DWG. NO. 919-0494	REV 3
TOLERANCE (DECIMAL) U.O.S. .x ± .030 .xxx ± .005 .xx ± .015 ANGLES ± 1°			MODEL PNP-1K	SCALE NONE	SHEET 1 OF 1	

REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
1	2-16-01	PROTOTYPE RELEASE	KT		----
2	6-20-01	MODEL RELEASE	KT		----
3	9-4-01	RELAI D OUT	KT		----
4	10-4-01	ADDED DETAILS AND NOTES	KT		10535



- NOTES:
- 1) AFTER SOLDERING COAXES IN PLACE, PLACE 519-0494-002 THRU 519-0494-005 ON 519-0494-001.
 - 2) PUT 519-0494-006 ON TOP OF -002 THRU -005.
 - 3) APPLY SOLDER AT SHADED LOCATIONS ON DETAILS "A THRU D".

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TOLERANCE (DECIMAL) U.O.S.
.X ± .030 .XXX ± .005
.XX ± .015 ANGLES + 1°

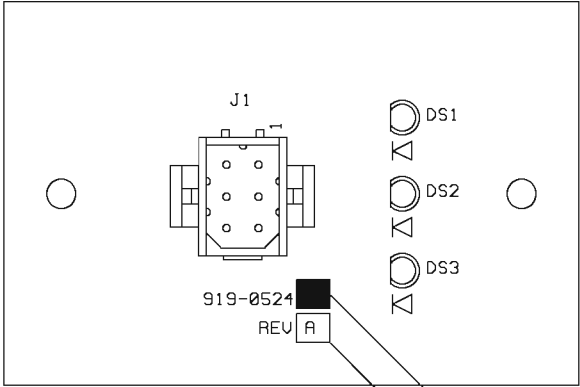
DWN. BY	KWT 2-16-01
DESIGNER(S)	
PROJ. LEADER	
MFG.	

MATERIAL	SEE BOM 919-0494
FINISH	
NEXT ASSY.	

MARTI ELECTRONICS INC.			
121 MARTI DRIVE, CLEBURNE, TX 76031 817/645-9163 FAX 817/641-3869			
TITLE COMBINER			
TYPE	SIZE	DWG No.	REV
A	A	919-0494	4
MODEL PNP-1K		SCALE 1/1	SHEET 1 OF 1


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REVISIONS					
REV	DATE	DESCRIPTION	DRAFTER	APPROVED	ECN
1	11-20-00	PROTOTYPE RELEASE	KT		-----
A	5-9-01	ADDED -100; ENGINEERING RELEASE	KT		-----



WRITE -100 IN BOX FOR 919-0524-100
LEAVE BLANK FOR 919-0524
WRITE REV LEVEL IN BOX

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	DESIGNER(S)	FINISH			
	PROJ. LEADER	NEXT ASSY.	TITLE AC LINE FAULT INDICATOR/ PS VOLTAGE STATUS		
	MFG.		TYPE A	SIZE A	DWG No. 919-0524/-100
TOLERANCE (DECIMAL) U.O.S. .X ± .030 .XXX ± .005 .XX ± .015 ANGLES + 1°		MODEL FM-10S/PNP-1K		SCALE 1/1	SHEET 1 OF 1