



Energy-Onix

BROADCAST EQUIPMENT CO., INC.
VALATIE, NEW YORK 12184

MAILING ADDRESS
P.O. Box 801

SHIPPING ADDRESS
1306 RIVER STREET

Congratulations! Enclosed is your new Energy-Onix equipment.

In order to activate the Warranty on your new equipment, please take a few minutes to fill out the information requested below. Please mail or fax this information to us at the numbers below as soon as possible.

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Name & Model No. of Equipment _____

Serial No. _____

If you have any questions concerning your new equipment, please call me.

Thank you for purchasing Energy-Onix equipment.

**Bernard Wise, President
Energy-Onix Broadcast Equipment Co., Inc.**

**** IMPORTANT INSTALLATION BULLETIN ****

"LIGHTNING PROTECTION INSTRUCTIONS"

All solid-state transmitters are inherently more susceptible to lightning damage than their tube-type counterparts. Extensive protection strategies are used in PULSAR transmitters to afford maximum lightning protection, but proper installation is critical for effective operation. To ensure optimum reliability and trouble-free performance, the following installation instructions should be carefully implemented.

AT THE TOWER(S): Ungrounded towers should have arc suppression gaps (ball gaps) at base; ATU should incorporate static drain choke and a "loop" in feeder between ATU and tower; outside of coax should be well-grounded, and this ground must be a part of the antenna ground radial system.

OUTSIDE OF TRANSMITTER BUILDING: Wide copper strap should be run around perimeter of building, grounded at intervals with copper-clad rods (at least 8 feet in length). The perimeter system should be well connected to the antenna ground radial system. The outside of the transmission line coax should be connected by wide copper strap to the perimeter ground system at the point at which it enters the building. This connection should be as short and straight as possible.

INSIDE OF TRANSMITTER BUILDING: A single-point, or "star", grounding system is necessary for proper operation. A copper plate (or metal coax entrance bulkhead) should be located as close as possible to where the transmission line coax enters the building. This central grounding plate (C. G. P.) should be connected by a wide copper strap to the perimeter ground system in as short and straight a route as possible. If the optional

PULSAR LIGHTNING PROTECTION KIT

is not used, the outer shield of the RF Transmission Line should be well grounded to the C. G. P.

The optional

PULSAR LIGHTNING PROTECTION KIT

is highly recommended for maximum protection. It should be well connected electrically and mechanically to the C. G. P. (mounted directly to the C. G. P.). Complete instructions appear in step #9B of the installation instructions on page 6A.

All equipment grounds should be run individually and directly to the C. G. P., rather than being "daisy chained" together. The PULSAR cabinet should be grounded directly to the C. G. P. by wide copper strap in the shortest and straightest route possible. This should be the only ground connection to the PULSAR. Ideally, all other grounds (power, telephone, other coax) should terminate at the C. G. P.



ENERGY-ONIX
BROADCAST EQUIPMENT CO., INC.

PULSAR

250 – 500 – 1KW

TECHNICAL AND MAINTENANCE MANUAL

MANUFACTURED BY:

ENERGY-ONIX BROADCAST EQUIPMENT CO., INC.
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VALATIE, NY 12184

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AUGUST 25, 2003



Energy-Onix

BROADCAST EQUIPMENT CO., INC.
VALATIE, NEW YORK 12184

MAILING ADDRESS
P.O. Box 801

SHIPPING ADDRESS
1306 RIVER STREET

THANK YOU FOR PURCHASING ENERGY-ONIX EQUIPMENT.

**THIS EQUIPMENT HAS BEEN TUNED TO YOUR FREQUENCY
AND TESTED AT THE FACTORY.**

IT IS READY TO BE INSTALLED AND OPERATED.

**WE RECOMMEND INSTALLATION BE PERFORMED ONLY
BY QUALIFIED TECHNICAL PERSONNEL.**

**OUR TECHNICAL STAFF IS READY TO ANSWER QUESTIONS
YOU HAVE OR TO ASSIST WITH TROUBLESHOOTING
TECHNICAL PROBLEMS SHOULD THEY OCCUR.**

**MONDAY THROUGH FRIDAY 9AM TO 5PM EASTERN TIME
CALL 518-758-1690**

AFTER HOURS, WEEKENDS AND HOLIDAYS:

**TRY THE ABOVE NUMBER FIRST. IF NO ANSWER TRY OUR
24 HOUR EMERGENCY TECHNICAL SUPPORT BEEPER
FROM A TOUCH TONE PHONE - 518-822-2644.**

**OUR ON CALL ENGINEER WILL RETURN YOUR CALL SHORTLY
AFTER RECEIVING YOUR PAGE.**



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IMPORTANT WARNING!

**VIBRATIONS WHICH OCCUR DURING SHIPMENT
MAY CAUSE ELECTRICAL AND ELECTRONIC
CONNECTIONS TO BECOME LOOSE!**

**IT IS IMPERATIVE THAT ALL SCREW TYPE CONNECTIONS
BE CHECKED DURING THE INSTALLATION PROCESS TO
ENSURE THEY HAVE REMAINED TIGHT!**

**CONNECTIONS ON ALL ELECTRICAL CONNECTIONS,
INCLUDING THOSE ON CIRCUIT BREAKERS AND
CONTACTORS, SHOULD BE CHECKED AT LEAST TWICE A
YEAR DURING ROUTINE MAINTENANCE ON THE PRODUCT.**

PRELIMINARY INSTRUCTIONS AND WARRANTY INFORMATION

PLEASE OBSERVE SAFETY PRECAUTIONS WHEN HANDLING THIS UNIT. THIS EQUIPMENT CONTAINS DANGEROUS CURRENTS AND HIGH VOLTAGES.

THIS MANUAL IS WRITTEN AS A GENERAL GUIDE FOR THOSE HAVING PREVIOUS KNOWLEDGE AND EXPERIENCE WITH THIS KIND OF EQUIPMENT. IT IS NOT INTENDED TO CONTAIN A COMPLETE STATEMENT OF ALL SAFETY WARNINGS WHICH SHOULD BE OBSERVED BY PERSONNEL IN USING THIS OR OTHER ELECTRONIC EQUIPMENT.

ENERGY-ONIX DOESN'T ASSUME RESPONSIBILITY FOR INJURY OR DAMAGE RESULTING FROM IMPROPER PROCEDURES BY UNTRAINED/UNQUALIFIED PERSONNEL IN THE HANDLING OF THIS UNIT.

PLEASE OBSERVE ALL LOCAL CODES AND FIRE PROTECTION STANDARDS IN THE OPERATIONS OF THIS UNIT.

CAUTION: ALWAYS DISCONNECT POWER BEFORE OPENING COVERS OR REMOVING ANY PART OF THIS UNIT. USE APPROPRIATE GROUNDING PROCEDURES TO SHORT OUT CAPACITORS AND HIGH VOLTAGE POINTS BEFORE SERVICING.

ANY DAMAGE TO THE GOODS MUST BE REPORTED TO THE CARRIER IN WRITING ON THE SHIPMENT RECEIPT.

ANY DISCREPANCY OR DAMAGE DISCOVERED SUBSEQUENT TO DELIVERY, SHALL BE REPORTED TO ENERGY-ONIX WITHIN FIVE (5) DAYS FROM ITS RECEIPT.

WARRANTY

ENERGY-ONIX SHALL NOT BE LIABLE FOR ANY DAMAGE REGARDLESS OF THE NATURE, ARISING OUT OF OR IN CONNECTION WITH THE PRODUCT OR ITS USE THEREOF.

ENERGY-ONIX'S WARRANTY SHALL NOT INCLUDE:

- 1) RE-SHIPMENT OF THE UNIT TO ENERGY-ONIX FOR REPAIR PURPOSES
- 2) ANY UNAUTHORIZED REPAIR/MODIFICATION
- 3) INCIDENTAL/CONSEQUENTIAL DAMAGES AS A RESULT OF ANY DEFECT
- 4) NOMINAL NON-INCIDENTAL DEFECTS
- 5) RE-SHIPMENT COSTS OR INSURANCE OF THE UNIT OR REPLACEMENT OF UNITS/PARTS.

WARRANTY SHALL COME INTO FORCE FROM THE INVOICE DATE AND FOR THE PERIOD OF 12 MONTHS. A COPY OF THE ENERGY-ONIX WARRANTY IS INCLUDED ON THE FOLLOWING PAGE.

Energy-Onix Warranty

Seller guarantees at his option to either replace or repair any product or part found to be defective in material or workmanship under normal use within one (1) year from date of shipment, with the exception of tubes or moving parts (blowers) which will carry the original manufacturer's warranty only. Seller's obligation is limited to replacement or repair of such defective product or part, if delivered, transportation prepaid to seller's factory within thirty (30) days after return is authorized. Repaired or replacement parts will be sent freight collect.

This warranty is in lieu of all other warranties, expressed or implied, and there is specifically no warranty of merchantability of fitness for a particular use, purpose, or otherwise, unless expressly set forth to the contrary herein and no waiver, alteration or modification herein shall be valid unless in writing signed by the executive officer of seller. There is no warranty on merchandise or equipment which has been subjected to abuse, misuse, neglect, accident, improper installation, or application, negligence in use, storage, transportation or handling; nor is there any warranty as to merchandise which has been repaired or altered outside seller's factory.

WARNING!

THE CURRENTS AND VOLTAGES IN THIS EQUIPMENT ARE DANGEROUS!
PERSONNEL MUST AT ALL TIMES OBSERVE SAFETY REGULATION!

THIS MANUAL IS INTENDED AS A GENERAL GUIDE FOR TRAINED AND QUALIFIED PERSONNEL WHO ARE AWARE OF THE DANGERS INHERENT IN HANDLING POTENTIALLY HAZARDOUS ELECTRICAL AND ELECTRONIC CIRCUITS.

IT IS NOT INTENDED TO CONTAIN A COMPLETE STATEMENT OF ALL SAFETY PRECAUTIONS WHICH SHOULD BE OBSERVED BY PERSONNEL IN USING THIS OR OTHER ELECTRONIC EQUIPMENT.

THE INSTALLATION, OPERATION, MAINTENANCE AND SERVICE OF THIS EQUIPMENT INVOLVES RISKS BOTH TO PERSONNEL AND EQUIPMENT, AND MUST BE PERFORMED ONLY BY QUALIFIED PERSONNEL EXERCISING DUE CARE.

ENERGY-ONIX SHALL NOT BE RESPONSIBLE FOR INJURY OR DAMAGE RESULTING FROM IMPROPER PROCEDURES OR FROM THE USE OF IMPROPERLY TRAINED OR INEXPERIENCED PERSONNEL PERFORMING SUCH TASKS.

DURING INSTALLATION AND OPERATION OF THIS EQUIPMENT, LOCAL BUILDING CODES AND FIRE PROTECTION STANDARDS MUST BE OBSERVED.

WARNING!

ALWAYS DISCONNECT POWER BEFORE OPENING COVERS,
DOORS, ENCLOSURES, GATES, PANELS OR SHIELDS.
ALWAYS USE GROUNDING STICKS AND SHORT OUR HIGH
VOLTAGE POINTS BEFORE SERVICING. NEVER MAKE
INTERNAL ADJUSTMENTS, PERFORM MAINTENANCE OR
SERVICE WHEN ALONE OR WHEN FATIGUED.

DO NOT REMOVE, SHORT-CIRCUIT OR TAMPER WITH INTERLOCK SWITCHES ON ACCESS COVERS, DOORS, ENCLOSURES, GATES, PANELS OR SHIELDS.

KEEP AWAY FROM LIVE CIRCUITS, KNOW YOUR EQUIPMENT AND DON'T TAKE CHANCES.

WARNING!

IN CASE OF EMERGENCY ENSURE THAT POWER HAS BEEN DISCONNECTED.

- (1) IN THE EVENT OF MEDICAL EMERGENCY, SUCH AS ELECTROCUTION, CALL EMERGENCY MEDICAL PERSONNEL.
 - (2) TO OBTAIN INFORMATION AND TRAINING ON FIRST AID AND CPR, CONTACT YOUR LOCAL RED CROSS CHAPTER.
-

RETURN AUTHORIZATION

IF IT IS DEEMED NECESSARY TO RETURN EQUIPMENT FOR REPAIR, YOU WILL BE GIVEN A RETURN AUTHORIZATION NUMBER (RA).

WHEN YOU RECEIVE THE AUTHORIZATION, YOU CAN RETURN THE UNIT. PACK IT CAREFULLY FOR THE SHIPMENT, PREFERABLY USING THE ORIGINAL PACKING, AND SEAL THE PACKAGE PERFECTLY. THE CUSTOMER ALWAYS ASSUMES THE RISK OF LOSS (i.e., ENERGY-ONIX IS NEVER RESPONSIBLE FOR DAMAGE OR LOSS), UNTIL THE PACKAGE REACHES THE ENERGY-ONIX PREMISES. FOR THIS REASON, WE SUGGEST YOU TO INSURE THE GOODS FOR THE WHOLE VALUE. SHIPMENT MUST BE EFFECTED C.I.F. (PREPAID) TO THE ADDRESS SPECIFIED BY ENERGY-ONIX SERVICE MANAGER ON THE AUTHORIZATION.

DO NOT RETURN UNITS WITHOUT AUTHORIZATION, AS THEY WILL BE REFUSED.

BE SURE TO ENCLOSE A WRITTEN TECHNICAL REPORT, WHICH MENTIONS ALL THE PROBLEMS FOUND, AND A COPY OF YOUR ORIGINAL INVOICE ESTABLISHING THE STARTING DATE OF THE WARRANTY.

REPLACEMENT AND WARRANTY PARTS MAY BE ORDERED BY CALLING OR FAXING THE FACTORY. BE SURE TO HAVE THE EQUIPMENT MODEL AND SERIAL NUMBER AS WELL AS PART DESCRIPTION AND PART NUMBER ON ALL PART ORDERS.

ENERGY-ONIX RESERVES THE RIGHT TO MODIFY THE DESIGN AND SPECIFICATIONS OF THE EQUIPMENT IN THIS MANUAL WITHOUT PREVIOUS NOTICE.

TECHNICAL SUPPORT

ENERGY-ONIX TECHNICAL STAFF IS AVAILABLE TO PROVIDE TECHNICAL CONSULTATION 24 HOURS A DAY TO TRAINED COMPETENT ENGINEERING PERSONNEL. MONDAY - FRIDAY, 8:00 AM TO 5:00 PM EST CALL THE FACTORY AT 518-758-1690. AFTER HOURS CALL OUR BEEPER AT 518-822-2644.

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PULSAR 250

SPECIFICATIONS:

Configuration	One independent AM Power Module with integral cooling fan.
Power Output	250 watts (rated), 300 watts (capable): Four power levels continuously adjustable between 30 and 300 watts selectable via local or remote control. Automatic power Controller maintains power output at all four preset levels.
Frequency Range	530 kHz to 1700 kHz
RF Terminating Impedance	50 ohms unbalanced-Type "N"
Modulator Type	Pulse duration Modulator (PDM)
Audio Frequency Response	+/-0.5 db, 30-10,000 Hz
Audio Harmonic Distortion	Better than 1% (THD) at 95% modulation with 400 Hz
Modulation Capability	125% positive peak modulation capability to 300 watts..
Carrier Shift	Not exceeding 1%
RF Harmonics	73 db or more below 250 watts
Spurious Outputs	73 db or more below 250 watts
Noise and Hum	60 db more below 100% modulation capability to 300 watts
Frequency Stability	+/-5 Hz or +/-5 PPM, whichever is greater over temperature range.
Audio Input	600 ohms active balanced + 4 dBm nominal
Power Input	Single phase 198-250 V, 50/60 Hz (Other voltages on special order)
Permissible Power Supply Variation	+10%, -5% voltage, +/-5% frequency
Power Consumption	360 W maximum at 250 W, 0% modulation; 530 W maximum at 250 W, 100% continuous sine wave modulation.
Power Factor	0.82 or better
Overall Efficiency	Better than 70%
Metering	Forward/Reflected power, DC current, DC and AC voltage
Remote Control	Transmitter ON/OFF; Power level selection 1,2,3,4; Overload reset
Ambient temperature	-10°C to 50°C
Humidity Range	0-95%
Altitude	0-4000m (0-13,000 ft.)
Size (Cabinet)	50" H x 23 1/4" W x 36" D
Weight (Cabinet)	400 lbs. (approximately)

PULSAR 500

SPECIFICATIONS:

Configuration	Two independent AM Power Modules with integral cooling fans.
Power Output	500 watts (rated), 750 watts (capable): Four power levels continuously adjustable between 50 and 750 watts selectable via local or remote control. Automatic power Controller maintains power output at all four preset levels.
Frequency Range	530 kHz to 1700 kHz
RF Terminating Impedance	50 ohms unbalanced-Type "N"
Modulator Type	Pulse duration Modulator (PDM)
Audio Frequency Response	+/-0.5 dB, 30-10,000 Hz
Audio Harmonic Distortion	Better than 1% (THD) at 95% modulation with 400 Hz
Modulation Capability	125% positive peak modulation capability to 550 watts..
Carrier Shift	Not exceeding 1%
RF Harmonics	73 db or more below 500 watts
Spurious Outputs	73 db or more below 500 watts
Noise and Hum	60 db more below 100% modulation capability to 750 watts
Frequency Stability	+/-5 Hz or +/-5 PPM, whichever is greater over temperature range.
Audio Input	600 ohms active balanced + 4 dBm nominal
Power Input	Single phase 198-250 V, 50/60 Hz (Other voltages on special order)
Permissible Power Supply Variation	+10%, -5% voltage, +/-5% frequency
Power Consumption	720 W maximum at 500 W, 0% modulation; 1.07 kw maximum at 500 W, 100% continuous sine wave modulation.
Power Factor	0.82 or better
Overall Efficiency	Better than 70%
Metering	Forward/Reflected power, DC current, DC and AC voltage
Remote Control	Transmitter ON/OFF; Power level selection 1,2,3,4; Overload reset
Ambient temperature	-10°C to 50°C
Humidity Range	0-95%
Altitude	0-4000m (0-13,000 ft.)
Size (Cabinet)	50" H x 23 1/4" W x 36" D
Weight (Cabinet)	500 lbs. (approximately)

PULSAR 1000

SPECIFICATIONS

Configuration	Three Independent AM power modules with integral cooling fans.
Power Output	1000 watts (rated) 1200 watts (capable). Four power levels continuously adjustable between 100 and 1200 watts selectable via local or remote control. Automatic power Controller maintains power output at all four preset levels.
Frequency Range	530 kHz to 1700 kHz.
RF Terminating Impedance	50 ohms unbalanced, type "N".
Modulator Type	Pulse Duration Modulator (PDM).
Audio Frequency Response	+/-0.5 dB, 30-10,000Hz.
Audio Harmonic Distortion	Better than 1% (THD) at 95% modulation with 400Hz.
Modulation Capacity	125% positive peak modulation capability to 1,100 watts.
Carrier Shift	Not exceeding 1%.
RF Harmonics	73 dB or more below 1kW.
Spurious Outputs	73 dB or more below 1 kW.
Noise and Hum	60 dB or more below 100% modulation capability to 1,100 watts
Frequency Stability	+/-5 Hz or +/-5ppm whichever is greater over temperature range.
Audio Input	600 ohms balanced +4 dBm nominal.
Power Input	Single phase 198-250 V, 50/60 Hz (other voltages on special order).
Permissible Power Supply Variation	+10%, -5% voltage, +/-5% frequency.
Power Consumption	1.43 kW maximum at 1 kW, 0% modulation, 2.14 kW maximum at 1 kW, 100% continuous sine wave modulation.
Power Factor	0.82 or better.
Overall Efficiency	Better than 70%.
Metering	Forward/Reflected Power, DC Current, DC and AC voltage.
Remote Control	Transmitter ON/OFF, Power Level Selection 1,2,3,4; Overload reset
Ambient Temperature	-10°C to 50°C.
Humidity Range	0-95%.
Altitude	0-4,000m (0-13,000 ft).
Size	50"H x 23 1/4"W x 36"D
Weight	600lbs. (approximately).

ADDENDUM PULSAR 1000

The transmitter as supplied, has been modified so that the output of each module is wired in series. The original Pulsar 1000 utilized (3) modules operating in parallel.

This series arrangement results in a reduction of potentially damaging lightning voltages by a factor of three.

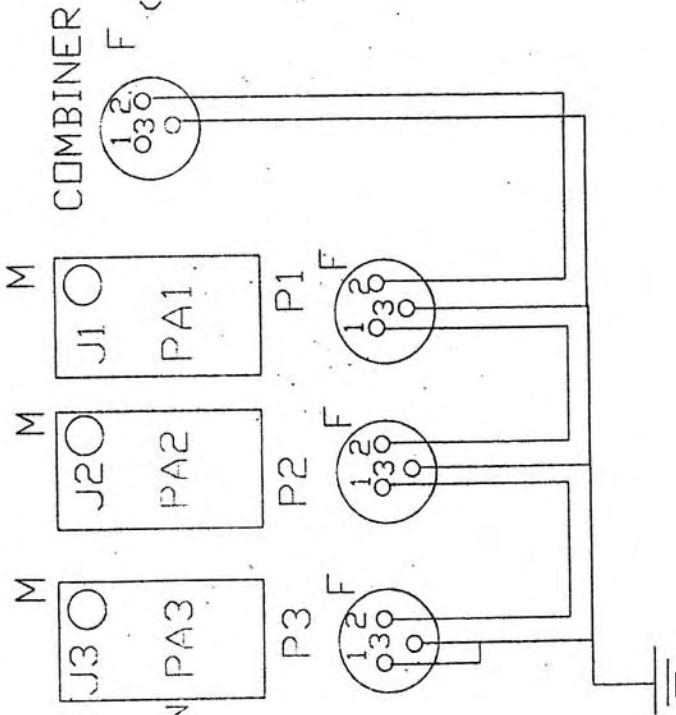
Attached is a drawing which describes the interconnection of all (3) power amplifier outputs. Normally, the interconnecting harness has its (3) plugs (P1, P2 and P3) installed on the PA modules (J1, J2 and J3). Its output plug, P4 is installed on the rear of the combiner chassis.

In the event of a fault, turn off the transmitter. The front panel circuit breaker relating to this module should also be turned off. Remove the plug (P1, P2 or P3) that corresponds to the defective module. Insert the plug in the emergency panel socket mounted just below the modules. Thus, P1 should be installed in J1a, etc.

Remove the remaining plugs on the rear of the defective module and remove the defective module for repair.

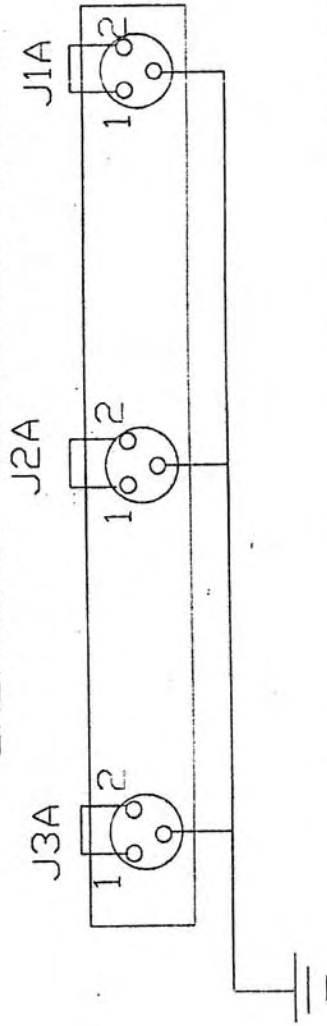
Select position #5 and operate the "start" switch. The transmitter output power should be adjusted to achieve 500 watts output with (2) operating modules and 200 watts with (1) operating module.

NORMAL
REAR
CONNECTION



COMBINER
F (RF OUTPUT HARNESS)

EMERGENCY CONNECTOR PANNEL



REVISIONS:

Energy-Onix
BROADCAST EQUIPMENT CO., INC.
1306 RIVER ST., P.O. BOX 801, VALATIE, NY. 12184

TITLE: PULSAR 1000 PA	
OUTPUT SERIES CIRCUITRY	
DESIGNED BY: BW	DATE: 7/24/03
CHK'ED:	CAD No. JW
DWG. No. S-P1000-1	

PULSAR 250, 500, 1000
Description

General:

The low power Pulsar medium wave, AM broadcast transmitters are available in 250 watts, 500 watts and 1KW versions. The 1KW "Pulsar 1000" utilizes (3) PA/modulator modules, the "Pulsar 500" contains (2) modules, and the "Pulsar 250" contains one module. Each version has the appropriate power supply corresponding to the number of modules. The Pulsar transmitter is a high efficiency, solid state transmitter with excellent modulation performance specifications.

Up to four pre-set power output levels can be selected, as well as a fifth continuously variable front panel power control. This configuration allows convenient and seamless power changes to be accomplished at the transmitter or by remote control. "Daytime", "nighttime", "pre-sunrise", and "post sunset" power changes are quick and require no further adjustment.

Mechanical:

The Pulsar is self contained in a medium sized cabinet 50" H 23 1/4" W x 36" D.

The transmitter contains a "combiner-matcher" drawer; a controller/low level RF/audio driver drawer; independent 400 watt RF amplifier/modulator modules; and a hinged circuit breaker panel. All of the drawers and modules are capable of being withdrawn from the cabinet.

The power supply components are mounted on the base and sides of the cabinet.

Cooling is achieved by having air enter the cabinet through the rear cover. This air then enters the individual chassis and is exhausted through the front door. The air entering the cabinet passes through a removable air filter which should be periodically cleaned.

Electrical Description

Power Supplies:

The Pulsar transmitters utilize a high quality ferroresonant power supply to produce the voltage required to operate the RF AMP/MODULATOR modules and INTERMEDIATE POWER AMPLIFIER (IPA).

In addition, the transmitter utilizes two switching power supplies to produce +15V and -15V. (One is dedicated exclusively to the PDM/Audio Board).

Details on these supplies are included in the "Theory of Operation" section of this book.

RF Section:

The transmitter utilizes a crystal which is at four times the carrier frequency.

The output of the crystal oscillator, after division, is used to drive an IPA. This IPA has a capacity of driving as many as 10 RF modules.

The RF Modules contain (4) Push Pull circuits – the combination is capable of producing 400 watts CW.

The output of each of the RF modules are combined with simple LC circuits. This combined output then passes through a "Tee" network to eliminate harmonics and is followed by a directional coupler and then followed by a "matching Tee" whose tuning and loading controls are available on the front panel for adjustment. Details are available in the "Theory" section of this book.

Audio Section:

The audio section accepts the normal balanced audio input, amplifies it and drives a PDM generator. The width or "pulse duration" of this generator is changed at the audio rate. The basic PDM frequency is from about 70 to 94KHz. The modulator is driven with the PDM signal. The output of the modulator is series connected through a low pass filter to the sources of the RF amplifiers. The low pass filter eliminates the PDM basic switching frequency and produces audio sine waves. Details are available in the "Theory" section.

Installation Instructions

Step #1 Carefully inspect the cabinet for any obvious physical damage.

Step #2 Remove the Rear cover and secure all the retaining hardware on all terminal boards, "D Subminiature" sockets as well as coaxial interconnecting plugs.

Step #3 Turn off the wall breaker dedicated to the transmitter. Then pass the (3) AC power lines through the rear cabinet access hole located on the rear edge of the cabinet. Two of these lines should measure 230 volts (+ 10%, - 15%) between each other while the 3rd wire should be ground. Pass these wires up through the base and connect them to the (3) terminal board located on the base. The ground wire should be secured to the left hand terminal when viewing the cabinet from the rear. It is recommended that #10AWG wire or larger be used to serve as the power lines. A 25 to 30 amp wall breaker should be used.

Step #4 If Pulsar is to be operated by remote control, CN5 (connector to CONTR-J3) should be wired according to instructions on page 11.

Step #5 Pass the audio input line through the rear entrance hole of the cabinet. Attach this 600 OHM line to the audio input terminals located on the rear of the control drawer [2nd chassis down]. These terminals are located on the left hand side of the drawer when facing from the rear.

Step #6 Connect a substantial ground strap between the base of the cabinet side rail and a known station ground. See "Lightning Protection Instructions", front page of this manual.

Step #7 Connect a coax jumper between the "RF monitor" BNC jack on the rear of the combiner chassis, and the station modulation monitor.

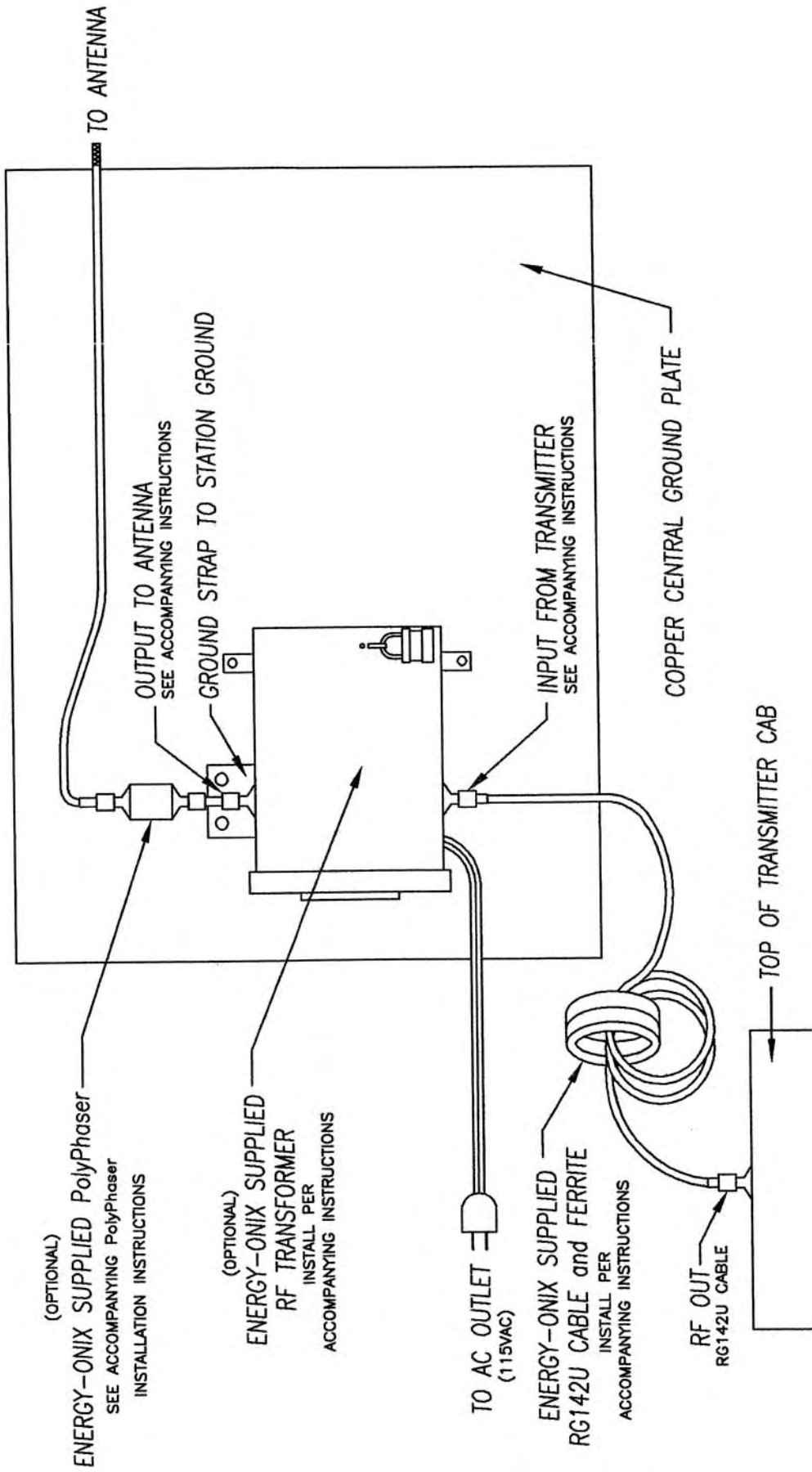
Step #8 Restore the back cover to the cabinet.

BE SURE TO READ AND FOLLOW THE "LIGHTNING PROTECTION INSTRUCTIONS", FRONT PAGE OF THIS MANUAL

Step #9A If the optional Pulsar Lightning Protection Kit is **NOT** used, connect the transmission line coax from antenna to the PULSAR cabinet RF output (roof - mounted bulkhead "N" jack).

Step #9B If the optional Pulsar Lightning Protection Kit is **IS** used, refer to the diagrams on the following pages. Connect the transmission line coax from antenna to the PolyPhaser "N" jack (labeled "surge"). Connect the supplied COAX/FERRITE JUMPER FROM the (insulated) "N" jack on the LIGHTNING PROTECTION KIT ASSEMBLY (labeled "Transmitter") TO the PULSAR cabinet RF output (roof-mounted bulkhead "N" jack). The LIGHTNING PROTECTION KIT contains a small cooling fan, and this must be connected to 110 VAC.

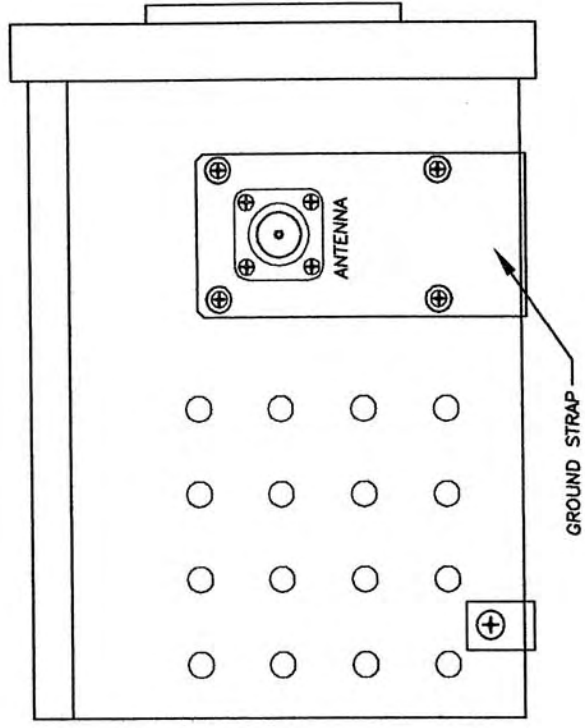
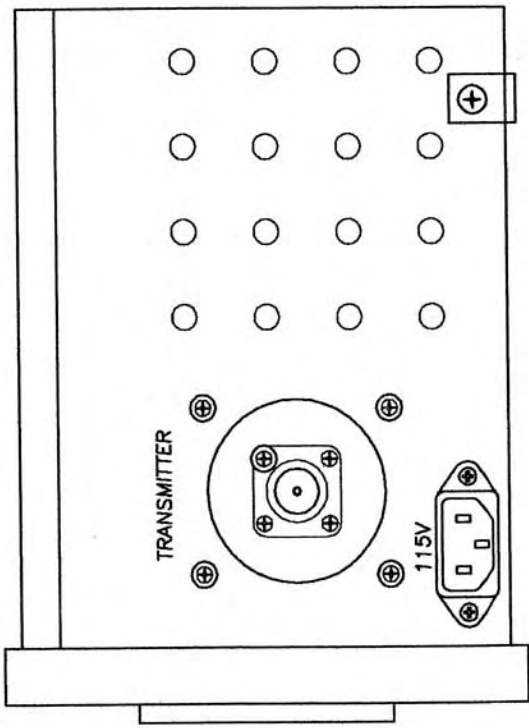
THE INSTALLATION OF THE TRANSMITTER HAS BEEN COMPLETED.



TITLE: LIGHTNING PROTECTION KIT		DWG. No. —
DESIGNED BY: —	DATE: 3/13/07	John McCool
CHK'ED: —	CAD: —	—

N.T.S.

Energy-Onix
 BROADCAST EQUIPMENT CO., INC.
 1306 RIVER ST., P.O. BOX 801, VALATIE, NY, 12184

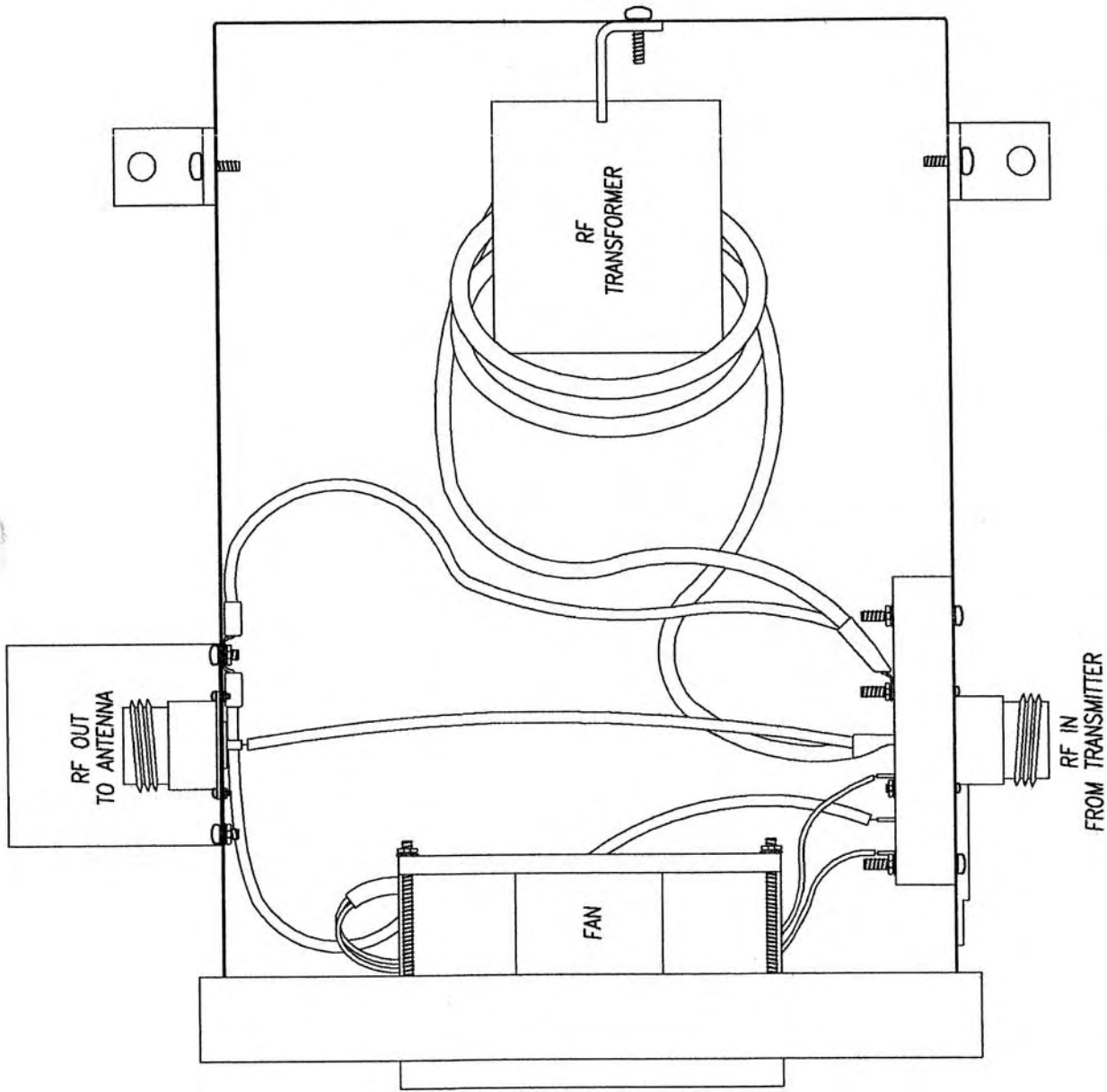


Energy-Onix
 BROADCAST EQUIPMENT CO., INC.
 1308 RIVER ST., P.O. BOX 801, VALATIE, NY. 12184

N. T. S.

TITLE: LIGHTNING PROTECTION KIT
 SIDE VIEWS

DESIGNED BY:	DATE: 3/13/07	DWG. BY:	DWG. No.
CHK'ED:	CAD: -	JMP/MCC	-



Energy-Onix
 BROADCAST EQUIPMENT CO., INC.
 1306 RIVER ST., P.O. BOX 801, VALATIE, NY 12184

N.T.S.

TITLE: LIGHTNING PROTECTION KIT
 TOP VIEW

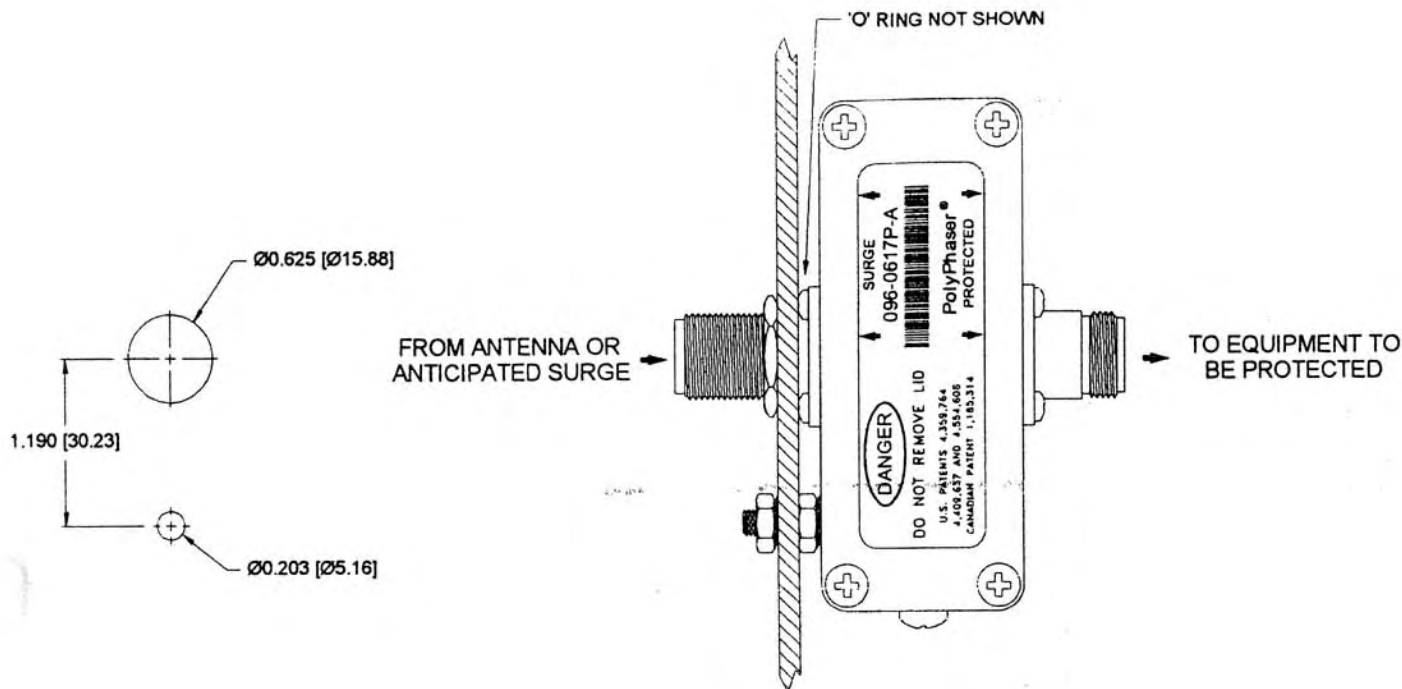
DESIGNED BY:	DATE: 3/14/07	DWG. No.
CHK'ED:	CAD: _	John McCool
		—

IMPULSE SUPPRESSOR INSTALLATION

PLEASE READ **DANGER** SHEET BEFORE INSTALLING

096-0617P-A

The 096-0617P-A is for multichannel HF transmitter (crossband) combiner output. The VSWR is $\leq 1.1:1$ with an insertion loss of $\leq 0.1\text{dB}$ for the bandwidth from 500KHz to over 100MHz. The dc turn-on is 1800V.



IT IS VERY IMPORTANT THIS UNIT BE GROUND TO A LOW IMPEDANCE (LOW R AND LOW L) GROUND SYSTEM IN ORDER TO WORK PROPERLY. When mounting (grounding) stud to panel, use maximum of 20 inch pounds of torque for 10-32 hardware. We strongly recommend this ground be interconnected to the tower ground and power ground to form one system. To minimize the "in-air" interconnect inductance to the ground system since skin effect is present, use as straight and as large a surface area strap as possible. Keep bends to 8" radius or larger.

The transmission line is only one means of having damaging impulse energy enter your equipment. We strongly recommend that power line protectors and telephone line protectors be used on the equipment.

For further information on grounds, ground systems, power line and telephone interconnect protection, order PolyPhaser's book, "The 'Grounds' for Lightning & EMP Protection", 2nd edition, at a cost of \$22.95 or our VHS video, "Grounding - An Overview", at a cost of \$53.95. Please note prices are subject to change. For more information about PolyPhaser Corporation, please refer to our Home Page on the Internet at www.polyphaser.com.

LIMITED TEN YEAR WARRANTY

ENG-F-016 Rev. (A) 12/98

PolyPhaser Corporation warrants this product to meet or exceed the published specifications of the time of manufacturing and to be free of manufacturing defects for a ten year period after proven date of purchase. PolyPhaser Corporation makes no claims, nor extends any warranty to include an "IMPLIED WARRANTY OF MERCHANTABILITY OR IMPLIED WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE". PolyPhaser Corporation assumes no responsibility for personal injury, property damage, and any other losses. This warranty is limited to the repair, replacement or refund of purchased price of this product only and it will be PolyPhaser Corporation's decision as to whether this unit is defective and as to which of the above mentioned actions will be taken. PolyPhaser Corporation extends no obligation to update or modify any of its existing products, as newly developed products are marketed.

The Industry's Finest...

U.S. Patent #'s 4,358,764, 4,409,837, 4,554,808

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PolyPhaser®

www.polyphaser.com

Lightning Protection Products

and other U.S. and Foreign Patents Pending

Tel: (800) 325-7170
(775) 782-2511
Fax: (775) 782-4476

-6E-

DANGER

PLEASE REVIEW THIS SHEET PRIOR TO ANY INSTALLATIONS.

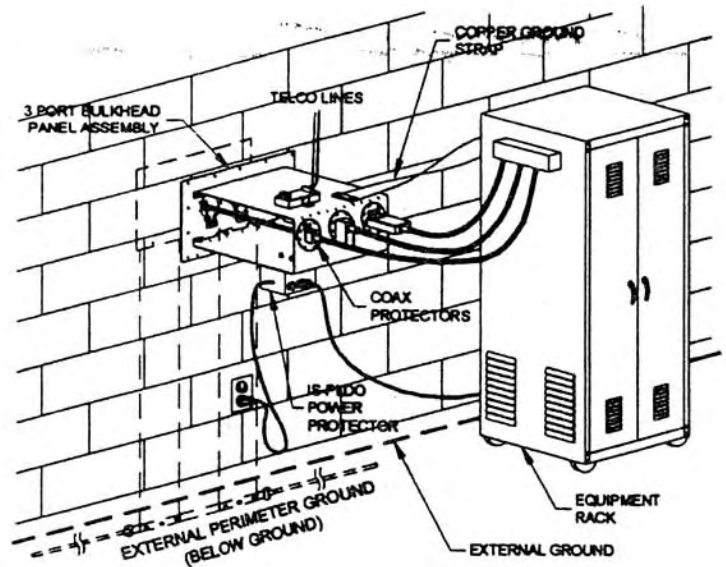
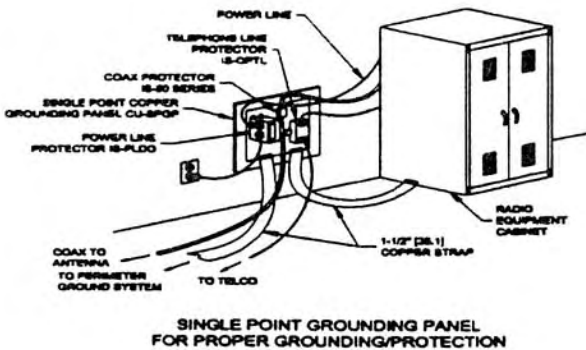
GOOD GROUND SYSTEM IS REQUIRED FOR PROPER INSTALLATION AND OPERATION. THE IMPULSE SUPPRESSOR IS ONLY AS GOOD AT SUPPRESSING IMPULSES AS THE ELECTRICAL GROUND SYSTEM THAT IS CONNECTED TO THE UNIT.

DO NOT CONNECT WHEN A STORM IS NEAR. DO NOT CONNECT WHEN TRANSMISSIONS ARE OCCURRING.

50% of the time a lightning strike occurs in groups of two or three strokes with the first stroke having 20,000 amps and then less for the following strokes. Each stroke may have a rise time of 2.1µs to the peak current and a decay between 10 to 40µs.

Most antenna installations are mounted on a continuously conductive mast or tower which when properly grounded, should conduct the larger share of the strike current, thus leaving only a fraction (50% or less) for the RF transmission line to handle. Therefore, the current capability of the Impulse Suppressor should be sufficient for all but the rare percentage of super strike occurrences when properly installed to a good low impedance ground system.

DO NOT STAY AROUND OPERATING EQUIPMENT IN AN ELECTRICAL STORM. THE IMPULSE SUPPRESSOR MAY SAVE YOUR EQUIPMENT FROM DANGER BUT CANNOT KEEP PERSONNEL IN THE AREA SAFE.



We recommend the coax, power, and telephone protectors, if used, all be mounted/grounded together on a bulkhead plate or wall and the equipment chassis also be grounded only to this plate. The plate is then grounded to your ground system. Only by using this single point ground system can your equipment really survive a direct lightning strike.

LIMITED TEN YEAR WARRANTY

ENG-F-016 Rev. (-) 12/97

PolyPhaser Corporation warrants this product to meet or exceed the published specifications of the time of manufacturing and to be free of manufacturing defects for a ten year period after proven date of purchase. PolyPhaser Corporation makes no claims, nor extends any warranty to include an "IMPLIED WARRANTY OF MERCHANTABILITY OR IMPLIED WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE" PolyPhaser Corporation assumes no responsibility for personal injury, property damage, and any other losses. This warranty is limited to the repair, replacement or refund of purchased price of this product only and it will be PolyPhaser Corporation's decision as to whether this unit is defective and as to which of the above mentioned actions will be taken. PolyPhaser Corporation extends no obligation to update or modify any of its existing products, as newly developed products are marketed.

When Lightning Strikes...

U.S. Patent #'s 4,359,764, 4,409,837, 4,554,608

2225 Park Place
P.O. Box 9000
Minden, NV 89423 U.S.A.

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CORPORATION

<http://www.polyphaser.com>

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and other U.S. and Foreign Patents Pending

Tel: (800) 325-7170
(775) 782-2511
Fax: (775) 782-4476

Preliminary Tuning

Step #1 Be sure that all (6) circuit breakers on bottom front panel are "off" (Down Position), and the "local-remote" switch on the controller panel is in "local".

Step #2 Turn on the wall breaker and observe the voltage on the front panel circuit breaker panel. This voltage should be between 200 and 250 volts.

Step #3 Turn on the "control circuit breaker". (First breaker from the left on CB panel when viewing from the front.) The following lights will register:

- +15 Volts (green)
- 15 Volts (red)
- "Stop Switch" Light (red)
- Variable Power Output Switch (green)

NOTE: The +95% and -95% lights are inoperative when transmitter is not producing power. They may be on or off, in any combination at this time.

If the stop switch does not indicate, depress this switch. Do the same for the variable output switch. The result should be that the lights in the center of the "stop" and variable Power Output switches should indicate.

Step #4 Turn on the "start" switch. All of the fans within the cabinet should be on and, provided all of the interlocks are closed, the (7) green control lights on the control panel will register.

Step #5 Operate the "stop switch" to turn off the controller. Operate the manual gain control to maximum counter clockwise position. (Minimum Power Output)

Step #6 Turn on the +72 volt circuit breaker and operate the "start" switch. The front panel meter on the combiner should register approximately 95 volts (78 volts for Pulsar 500 and Pulsar 250) in its second position from the left.

Step #7 Operate the stop switch and wait until the volt meter falls to zero. Turn "on" the remaining circuit breaker(s) located to the right of the 72 volt breaker.

NOTE: The tuning and loading controls are factory adjusted for a 50 OHM, non-reactive load. **FIELD ADJUSTMENTS SHOULD NOT BE ATTEMPTED UNLESS NECESSARY, AND ONLY BY TECHNICALLY QUALIFIED INDIVIDUALS.** If controls are mis-adjusted, it may be necessary to remove top cover from combiner drawer and return controls to the factory settings, as indicated by black coloring indicator on rotary inductors.

Step #8 The "voltage" position on the output meter should still be selected. Operate the start switch, verify that the plate voltage is correct, and select the "current" position. Slowly rotate the manual gain control to obtain an indication of 3 amps of current. Quickly select the forward power and observe an indication of about 10 to 20% of rated power output. Select the "reflected" position, and observe a negligible reading. Only if the "reflected" reading is significant, should the tuning and loading controls be adjusted.

Tuning and loading controls should be "rocked" back and forth in small increments as the transmitter is adjusted for minimum reflected power on meter.

Step #9 Select "forward" power position and rotate control until about 50% of rated power is indicated. Select "reflected" power and if not negligible, follow procedure in Step #8. **REPEAT FOR APPROXIMATELY 75% OF RATED POWER, AND, FINALLY, 100% OF RATED POWER.**

Step #10 Select each of the power preset positions and enter the meter readings on the data sheet (next page of this manual).

IMPORTANT

Do not rapidly switch from one level to another, as it is possible to "latch" more than one level at the same time. Allow at least a 5-second interval between selections.

Step #11 Compare the resultant readings with the test data sheet. If there are any significant deviations, contact the factory.

Step #12 Provide low level programming – type audio input and slowly increase level until the -95% light is "on" more than half the time. (if using external modulation monitor adjust audio so positive peaks are greater than 95% and less than 125%.)

PULSAR DATA SHEET

POWER LEVEL _____ FREQ _____ S/N _____

DATE _____ CUSTOMER _____

AC VOLTS _____

MODULATION @ 0.0%	PRE-SETS				
	#1	#2	#3	#4	VAR
POWER OUTPUT					
POWER REFLECTED					
CURRENT					
VOLTAGE					

REMOTE READINGS:

INCIDENT (# 7 TO GND) TB12-7					
REFLECTED (# 6 TO GND) TB12-6					
CURRENT (# 5 TO GND) TB12-5					
VOLTAGE (# 4 TO GND) TB12-4					

*START TB12-11 _____ *STOP TB12-10 _____ *RESET TB12-12 _____

*LEVEL 1 TB13-2 _____ *LEVEL 2 TB13-3 _____ *LEVEL 3 TB13-4 _____

*LEVEL 4 TB13-5 _____ *VARIABLE TB13-6 _____

NOTE: (*) Momentary closure to ground

Step #13 Keep the transmitter in this condition for 30 minutes. All readings should be stable. If higher positive modulation levels are required, simply increase the audio levels. It is recommended that program peaks do not exceed +125%.

THE PRELIMINARY TUNING HAS NOW BEEN COMPLETED.

DO NOT ATTEMPT TO ADJUST TRANSMITTER FOR HIGHER THAN RATED POWER. ALTHOUGH ENERGY-ONIX TRANSMITTERS ARE WELL PROTECTED AGAINST OVERLOAD CONDITIONS, THE PROTECTIVE CIRCUITS ARE FACTORY ADJUSTED FOR OPTIMUM PROTECTION AT RATED POWER LEVELS AND EXCEEDING THESE LEVELS MAY RESULT IN TRANSMITTER "RE-CYCLING" AS OVERLOADS ARE DETECTED.

IN ADDITION, THE PULSAR IS PROTECTED AGAINST DAMAGE FROM OVERMODULATION. TWO "CLIPPER" CIRCUITS ARE USED TO EFFECTIVELY PROTECT THE MODULATORS AND AMPS FROM DRAWING EXCESSIVE CURRENT. NONETHELESS, GROSSLY EXCESSIVE AUDIO LEVELS OR PROCESSING MUST NEVER OCCUR.

Normal Operation

Local Operation

Keep all circuit breakers "up" [on position].

To Turn On

Select appropriate power pre-set switch.
Operate the "start" switch.

To Turn Off

Operate the "stop" switch.

To Reset Overload

Operate the front panel reset switch.

To Switch Power Output Level

Operate the appropriate front panel power output preset switch.

IMPORTANT

Do not rapidly switch from one level to another, as it is possible to "latch" more than one level at the same time. Allow at least a 5-second interval between selections.

If it becomes necessary to change a preset power level, adjust the recessed trimpot under the appropriate preset switch to desired power output as observed on meter.

Remote Control

The Pulsar transmitters contain a 25 Pin "D" Subminiature socket on the rear of the controller chassis.

PC-333B, Page 12, describes the wiring to this socket.

Remote Control Functions

Terminal #13 is ground

To Turn On

Provide momentary connection from terminal #11 to ground.

To Turn Off

Momentary connection from terminal #10 to ground.

To Reset

Momentary connection from terminal #12 to ground

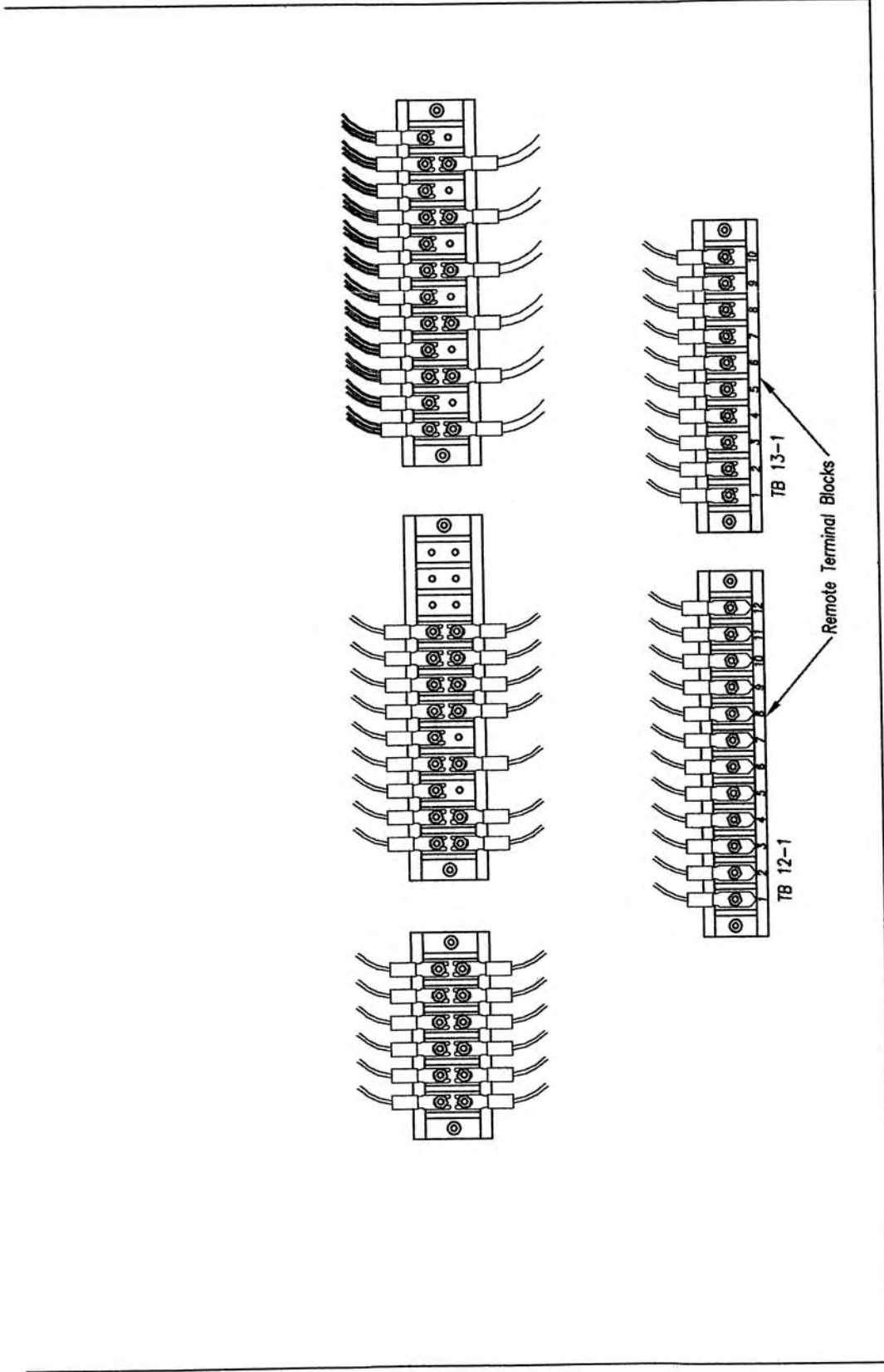
To Select Output Setting #5 – Connect momentary ground to terminal #18
To Select Output Setting #4 – Connect momentary ground to terminal #17
To Select Output Setting #3 – Connect momentary ground to terminal #16
To Select Output Setting #2 – Connect momentary ground to terminal #15
To Select Output Setting #1 – Connect momentary ground to terminal #14

Remote Control Metering

Parameter

Terminal # to Ground

RF MODULE VOLTAGE	#4
TOTAL POWER SUPPLY CURRENT	#5
REFLECTED POWER	#6
INCIDENT POWER	#7



N.T.S.

TITLE: Center Shelf Remote Terminal Blocks Rear View			
DESIGNED BY: PI	DATE: 3/12/07	DWG. BY: John	DWG. NO. AM-10001
CHK'ED:	CAD: AM-10001	McCool	AM-10001

PULSAR

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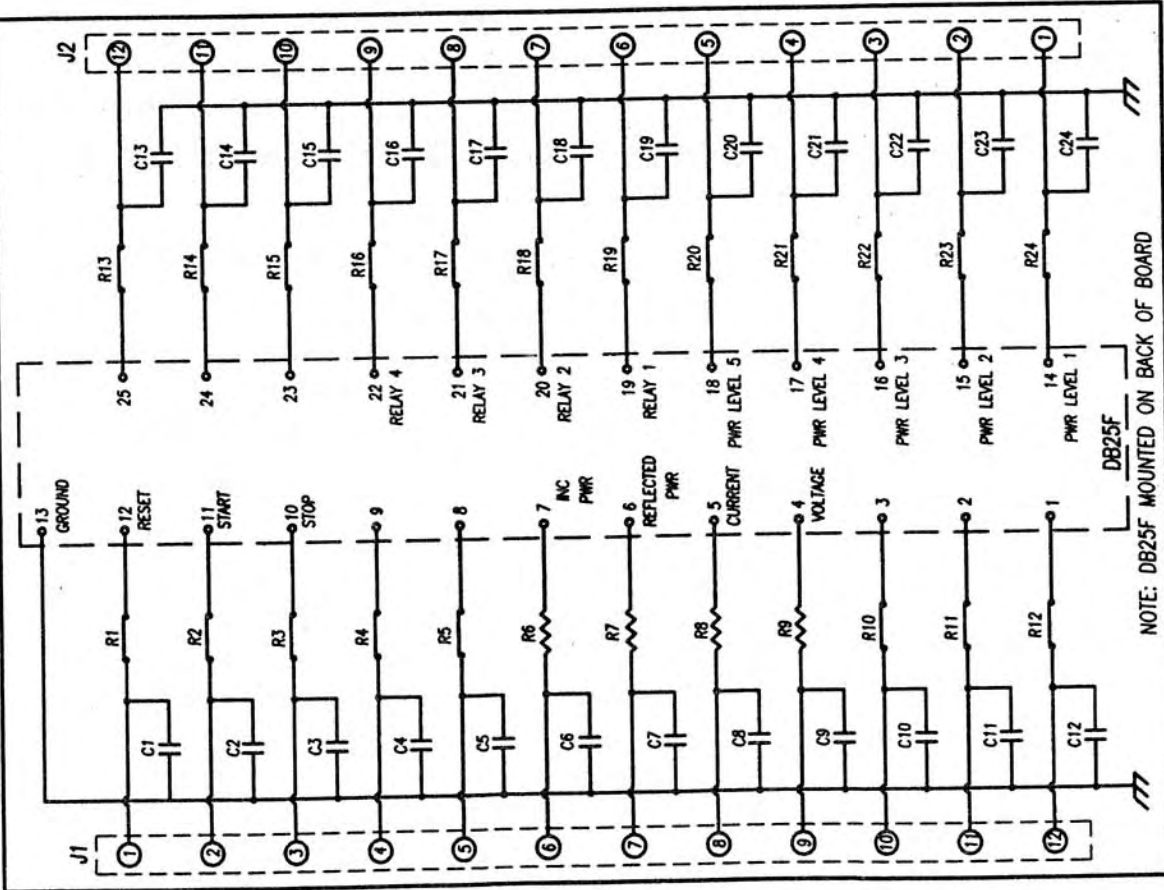


PULSAR REMOTE

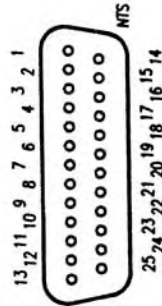
<u>D-SUB POS</u>	<u>COLOR</u>	<u>FUNCTION</u>	<u>TERMINAL BLOCK</u>
1	N/C		
2	ORN/WHT	VOTAGE #2 (2500 ONLY)	TB 12-1
3	YEL/WHT	CURRENT #2 (2500 ONLY)	TB 12-2
4	PURPLE	VOLTAGE	TB 12-4
5	BLACK	CURRENT	TB 12-5
6	GREY	REFL. POWER	TB 12-6
7	BLUE	INC. POWER	TB 12-7
8	N/C	EXT. INTERLOCK	TB 12-8
9	N/C	EXT.INTERLOCK	TB 12-9
10	ORANGE	STOP	TB 12-10
11	PUR/WHT	START	TB 12-11
12	BLUE/WHT	RESET	TB 12-12
13	GREEN	GROUND (MOMENTARY TO GROUND)	TB 12-3, TB 13-1
14	BROWN	PWR LEVEL SELECTION ONE	TB 13-2
15	GREY/WHT	PWR LEVEL SELECTION TWO	TB 13-3

PULSAR REMOTE

<u>D-SUB POS</u>	<u>COLOR</u>	<u>FUNCTION</u>	<u>TERMINAL BLOCK</u>
16	RED/WHT	PWR LEVEL SELECTION THREE	TB 13-4
17	RED	PWR LEVEL SELECTION FOUR	TB 13-5
18	BLK/WHT	PWR LEVEL SELECTION FIVE	TB 13-6
19	BLUE/WHT	RELAY ONE (STATUS TO GND) O= SELECTED	TB 13-7
20	WHITE	RELAY TWO 15V=NC	TB 13-8
21	BRN/WHT	RELAY THREE	TB 13-9
22	YELLOW	RELAY FOUR	TB 13-10
23	N/C		
24	N/C		
25	N/C		



NOTE: DB25F MOUNTED ON BACK OF BOARD

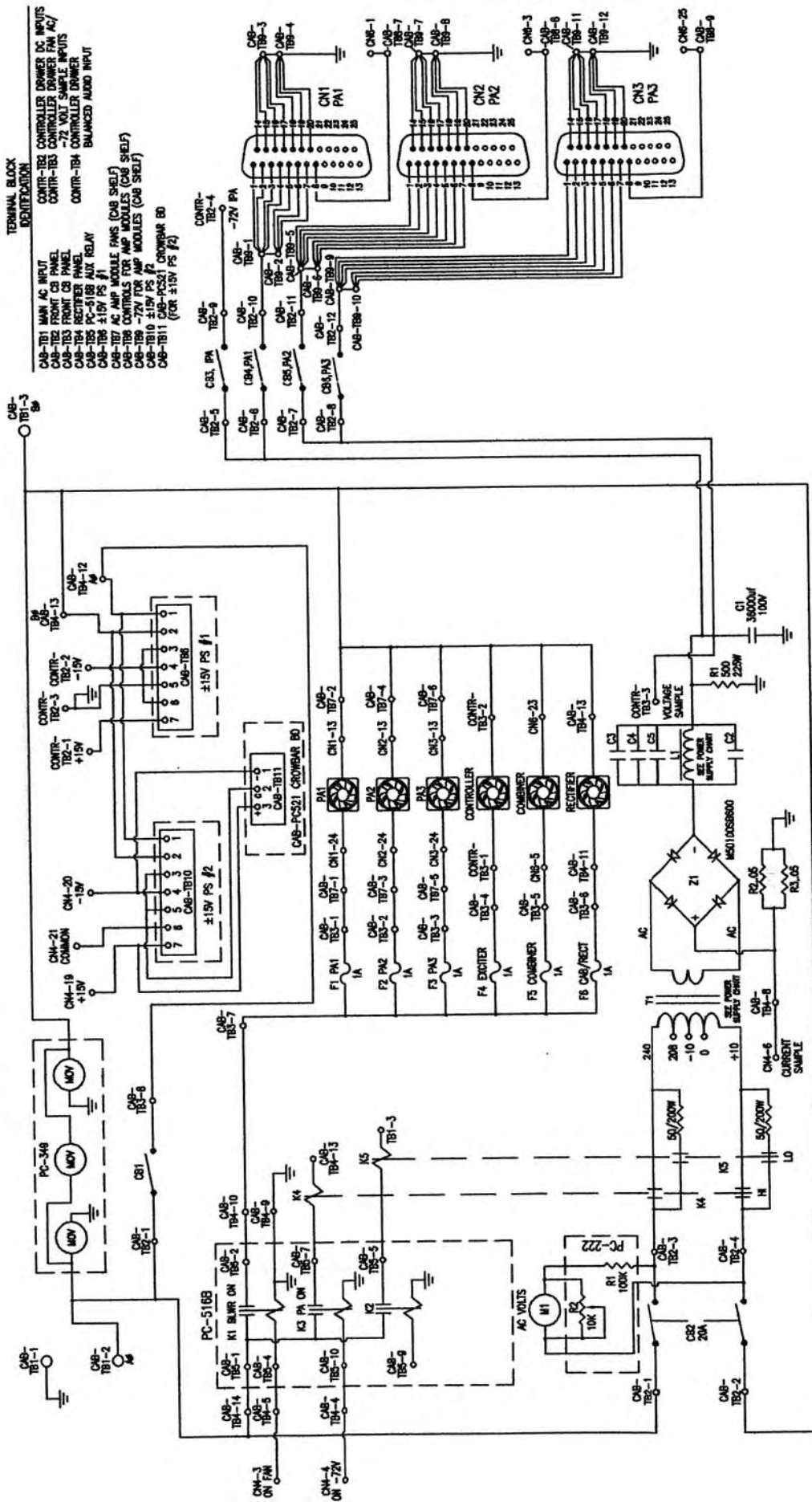


DB25F
(VIEWED FROM BACK OF
CONTROLLER DRAWER)

PARTS LIST

- C1 - C24 = 0.01mfd/100V,
STACK METAL FILM, P4713
- R1 - R5 = JUMPER
- R6 - R9 = 1000 ohm, 1/4W
- R10 - R24 = JUMPER
- J1 & J2 = 12 PIN MOLEX
- DB25F = D-SUBMIN 25 PIN FEMALE

Energy-Onix BROADCAST EQUIPMENT CO., INC. 1306 RIVER ST., P.O. BOX 801, VALATE, NY, 12184		A	REVISION:	TITLE: PULSAR AM REMOTE INTERFACE BD., PC-333B SCHEMATIC DIAGRAM
REVISION DESCRIPTION: ROTATE DB25F & CHANGE NOTE OF DB25F, 07/20/99		DESIGNED BY: NDT DATE: 6/18/99 DWG. BY: DWG. No.		CKB AM-2501S
		CHK'ED: CAD No. AM-2501S		CKB AM-2501S



TERMINAL BLOCK DEFINITION

CAB-TB1	MAIN AC INPUT
CAB-TB2	CONTROLLER DRAWER DC INPUTS
CAB-TB3	CONTROLLER DRAWER FAN AC
CAB-TB4	CONTROLLER DRAWER FAN AC
CAB-TB5	PC-516B AUX RELAY
CAB-TB6	PC-516B AUX RELAY
CAB-TB7	AC AMP MODULE FANS (CAB SHELF)
CAB-TB8	CONTROLS FOR AMP MODULES (CAB SHELF)
CAB-TB9	-72V FOR AMP MODULES (CAB SHELF)
CAB-TB10	±15V PS #2
CAB-TB11	CAB-PC521 CROWBAR BD (FOR ±15V PS #2)

POWER SUPPLY CHART

	250W	500W	1000W	2500W
T1	376-126	376-127	376-125	376-031
L1	376-136	376-138	376-137	(2) x 376-137

TITLE: PULSAR 1000 AC CONTROL LADDER /CABINET SCHEMATIC (2008-PRESENT)

DATE: 6/23/99 REV: A BY: John McCoil

MOIFIED: 1/10/08 DWG. No. AM-1004s

NOTES:

N.T.S.

ADDED PREFIX TO TB #S, REDRAW PS AND RELATED CIRCUITS, 12/22/88

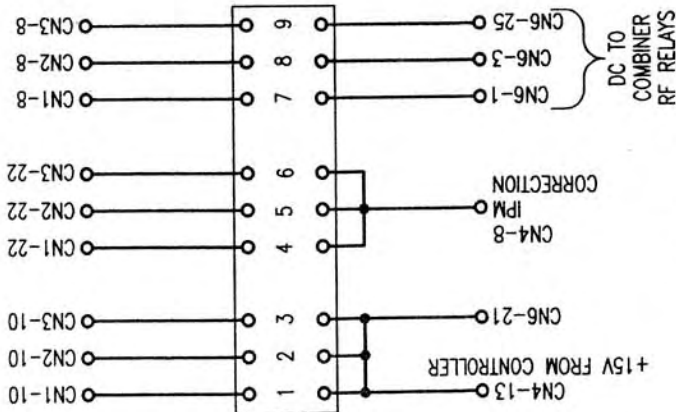
Energy-Onix

BROADCAST EQUIPMENT CO., INC.

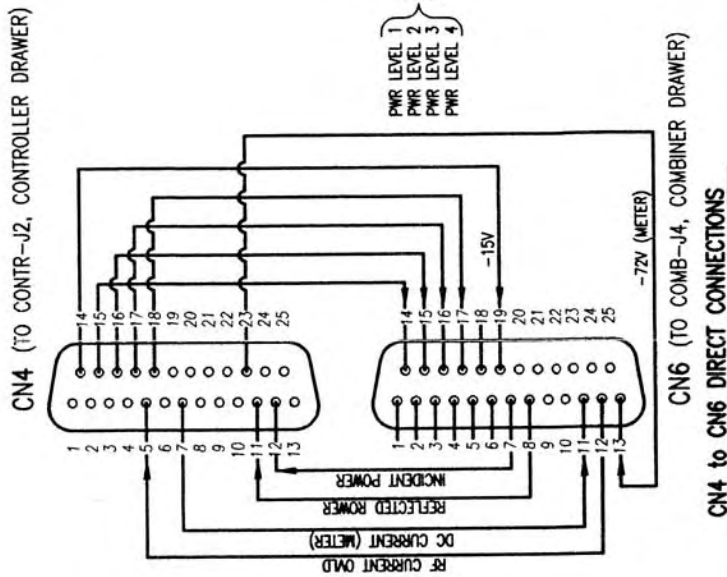
1306 RIVER ST., P.O. BOX 801, VALATIE, NY, 12184

D-SUB CONNECTOR IDENTIFICATION

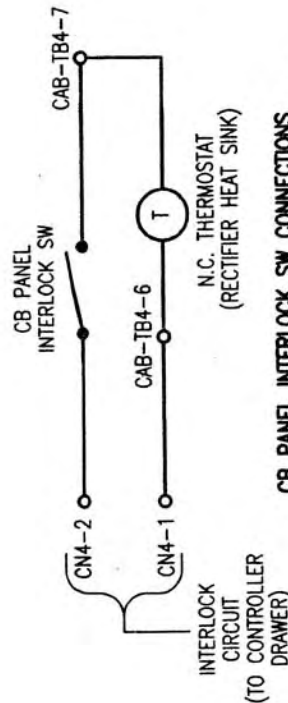
CONNECTOR	TO	JACK	LOCATION
CN1	AMP1-J1		AMPLIFIER MODULE #1
CN2	AMP2-J1		AMPLIFIER MODULE #2
CN3	AMP3-J1		AMPLIFIER #3
CN4	CONTR-J2		CONTROLLER DRAWER
CN5	CONTR-J3		CONTROLLER (REMOTE CONNECTIONS)
CN6	COMB-J4		COMBINER DRAWER



CAB-TB8 CONNECTIONS



CN4 to CN6 DIRECT CONNECTIONS



CB PANEL INTERLOCK SW CONNECTIONS



PULSAR 1000 CABINET AND CONNECTOR DETAILS

TITLE:

REVISION:

REVISION DESCRIPTION:

DESIGNED BY: PI

DATE: 12/22/99

CHK'D:

DWG. BY: DWG. No.

CAD: AM-1003S

AM-1003S

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 1306 RIVER ST., P.O. BOX 801, VALHALLA, NY 12184



PULSAR 1000

CABINET INTERCONNECTS

PA1: AMP1 - J4 (RED) RF OUT TO COMBINER: COMB - J1 (RED) RF INPUT #1
PA2: AMP 2 - J4 (BLUE) RF OUT TO COMBINER: COMB - J2 (BLUE) RF INPUT #2
PA3: AMP 3 - J4 (YELLOW) RF OUT TO COMBINER: COMB - J3 (YELLOW) RF INPUT #3

PA1: AMP1 - J2 (RED) RF IN TO CONTROLLER: CONTR - J1A (RED) RF OUTPUT #1
PA2: AMP 2 - J2 (RED) RF IN TO CONTROLLER: CONTR - J1B (RED) RF OUTPUT #2
PA3: AMP 3 - J2 (RED) RF IN TO CONTROLLER: CONTR - J1C (RED) RF OUTPUT #3

PA1: AMP1 - J3 (BLUE) MOD IN TO CONTROLLER: CONTR - J7A (BLUE) MOD OUTPUT #1
PA2: AMP 2 - J3 (BLUE) MOD IN TO CONTROLLER: CONTR - J7B (BLUE) MOD OUTPUT #2
PA3: AMP 3 - J3 (BLUE) MOD IN TO CONTROLLER: CONTR - J7C (BLUE) MOD OUTPUT #3

PA1: AMP1 - J1 CONTROL TO CN1 (RED) DB-25F CONNECTOR
PA2: AMP 2 - J1 CONTROL TO CN2 (BLUE) DB-25F CONNECTOR
PA3: AMP 3 - J1 CONTROL TO CN3 (YELLOW) DB-25F CONNECTOR

COMBINER: COMB-J7 RF OUTPUT TO CABINET: CAB-J1 (BULKHEAD CONNECTOR, THROUGH TOP OF CABINET) THIS IS A SHORT COAX/FERRITE JUMPER

COMBINER: COMB-J5 (YELLOW) MOD ENVELOPE TO CONTROLLER: CONTR-J5 (YELLOW) MOD ENVELOPE

COMBINER: COMB-J4 CONTROL TO CN6 DB-25F CONNECTOR

CONTROLLER: CONTR-J2 CONTROL TO CN4 DB-25F CONNECTOR

USER INTERFACE CONNECTIONS

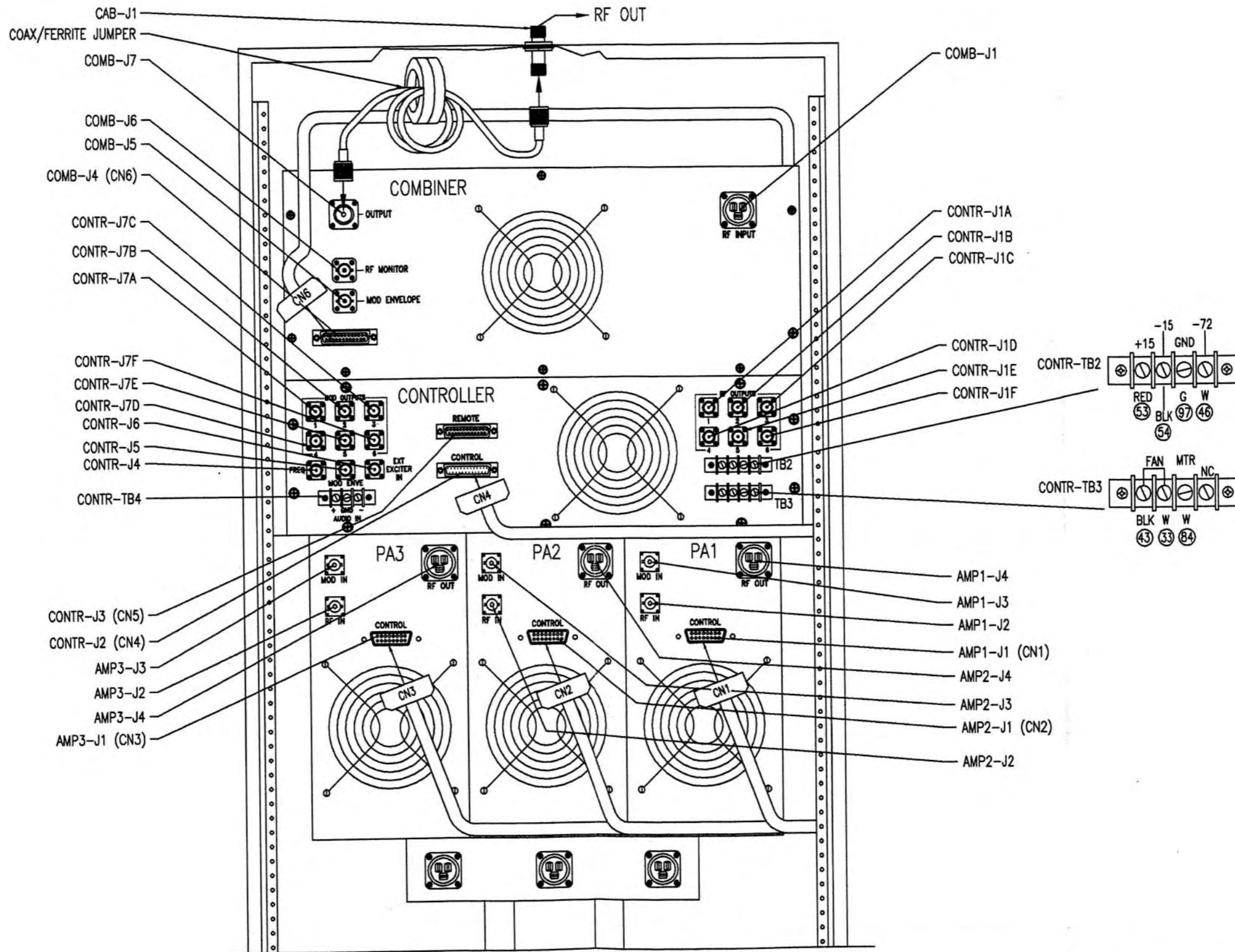
COMBINER: COMB-J6 RF MONITOR (TO STATION MODULATION MONITOR)

CONTROLLER: CONTR-J3 REMOTE TO CN5 DB25-M (REMOTE CONTROL/TELEMETRY)

CONTROLLER: CONTR-J4 FREQUENCY (TO FREQUENCY COUNTER)

CONTROLLER: CONTR-J6 EXT EXCITER (OPTIONAL USER SUPPLIED STEREO EXCITER INPUT)

CONTROLLER: CONTR-TB4 AUDIO INPUT



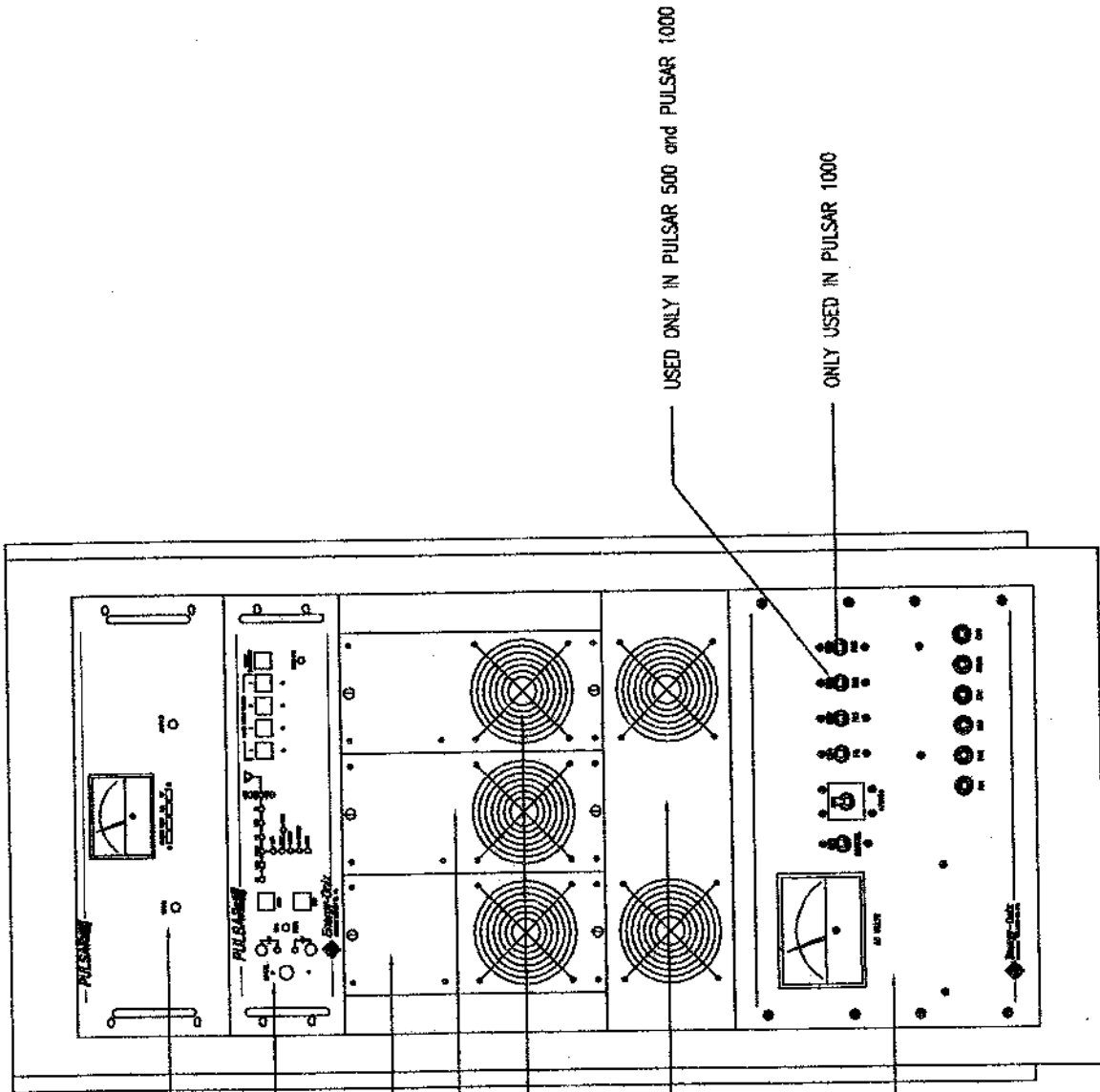
REAR VIEW OF TRANSMITTER

PULSAR

TITLE: PULSAR 1000 CABINET INTERCONNECTIONS				
SCALE: NTS	DESIGNED BY: NDT / Π	DATE: 04/28/00	DWG. BY: JMB	DWG. No. AM-0002A
CAD: AM-0002A	MODIFIED: 2/26/07 by John McCoal			

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REVISION DESCRIPTION:	REVISION:



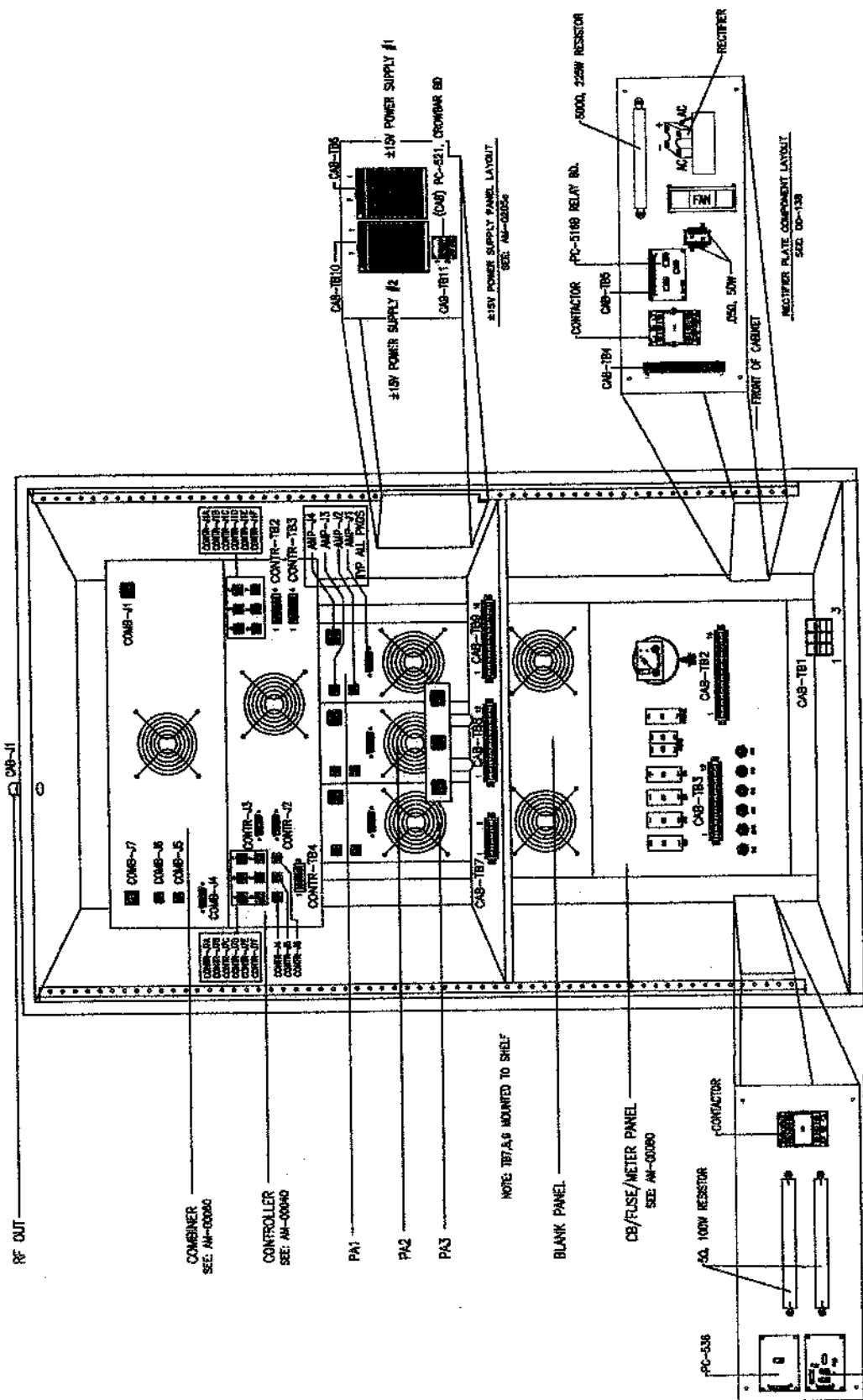
SEE DWG #00-701 FOR COMPONENT LAYOUT

TITLE: PULSAR 1000 CABINET VIEW (FRONT)		DATE: 07/19/99	DWG. BY: G.R.B.	DWG. No. AM-00010
SCALE: NTS	DESIGNED BY: NDT / II	MODIFIED: 2/28/07	by John McCool	
CAD: AM-00010				

PULSAR

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 BROADCAST EQUIPMENT CO., INC.
 1305 RIVER ST., P.O. BOX 801, VALATIE, NY 12184





RF OUT

COMBINER
SEE: AM-00060

CONTROLLER
SEE: AM-00040

PA1

PA2

PA3

NOTE: TB7&8 MOUNTED TO SHELF

BLANK PANEL

CB/FUSE/METER PANEL
SEE: AM-00090

CONDUCTOR

100W RESISTOR

FRONT OF CABINET

NOTE: CABINET SHOWN W/O BASE COMPONENTS

STEP START PLATE COMPONENT LAYOUT
SEE: DD-103

RECIPER PLATE COMPONENT LAYOUT
SEE: DD-138

FRONT OF CABINET

FRONT OF CABINET

FRONT OF CABINET

FRONT OF CABINET

FRONT OF CABINET

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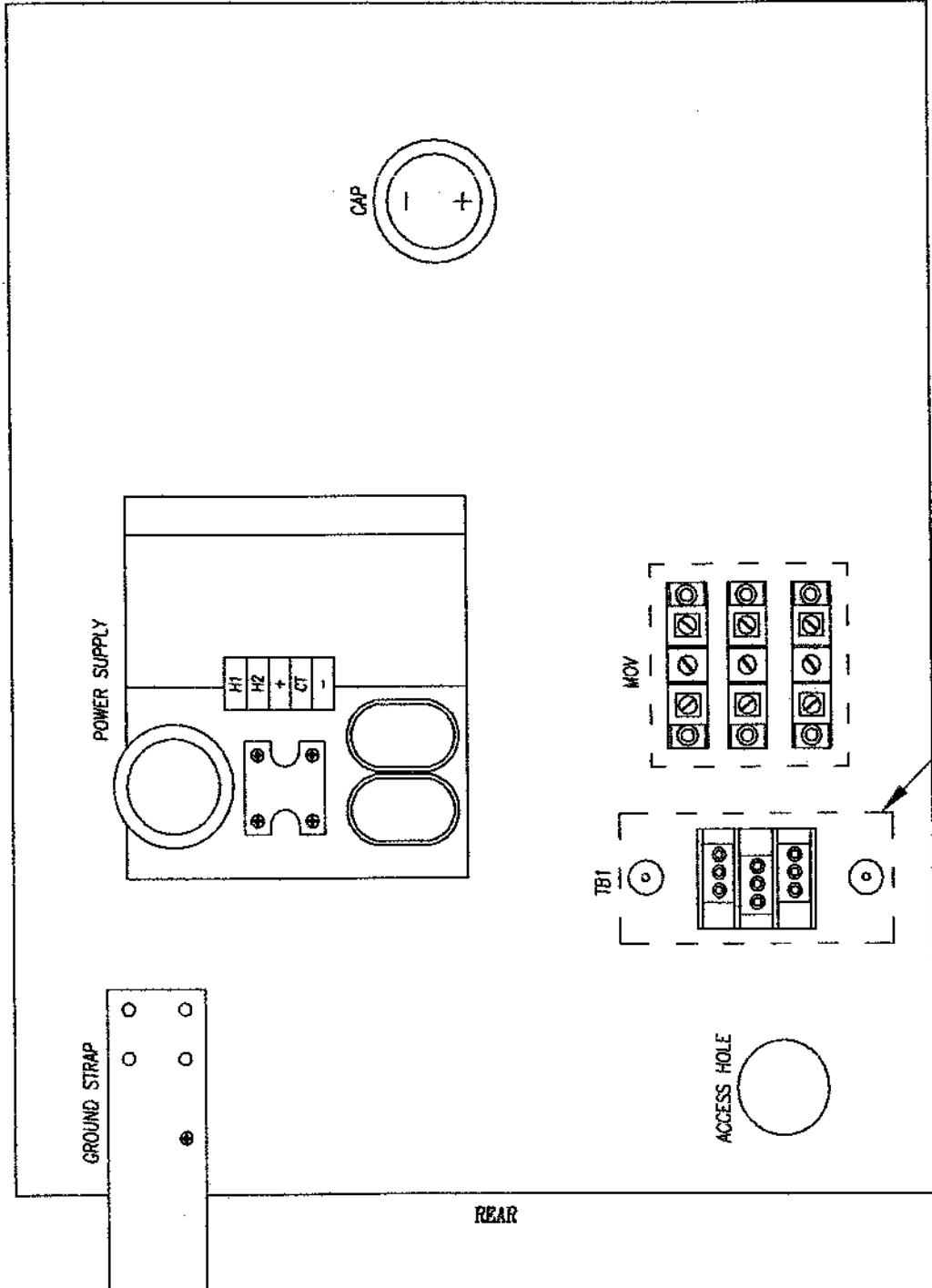
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 1306 RIVER ST., P.O. BOX 501, VALAIE, NY 12164

NOTE:
 N.T.S.
 UPDATED TERMINAL BLOCK AND MOLEX CALLOUTS,
 IDENTIFIED COME, CONTROL REAR PANELS, 11/5/99

TITLE: PULSAR 1000 CABINET REAR VIEW
 (2008 - PRESENT)

REV: A
 DATE: 7/6/98
 BY: CKB
 MODIFIED: 1/10/98
 JOHN McLeod

AM-00330



FRONT

REAR

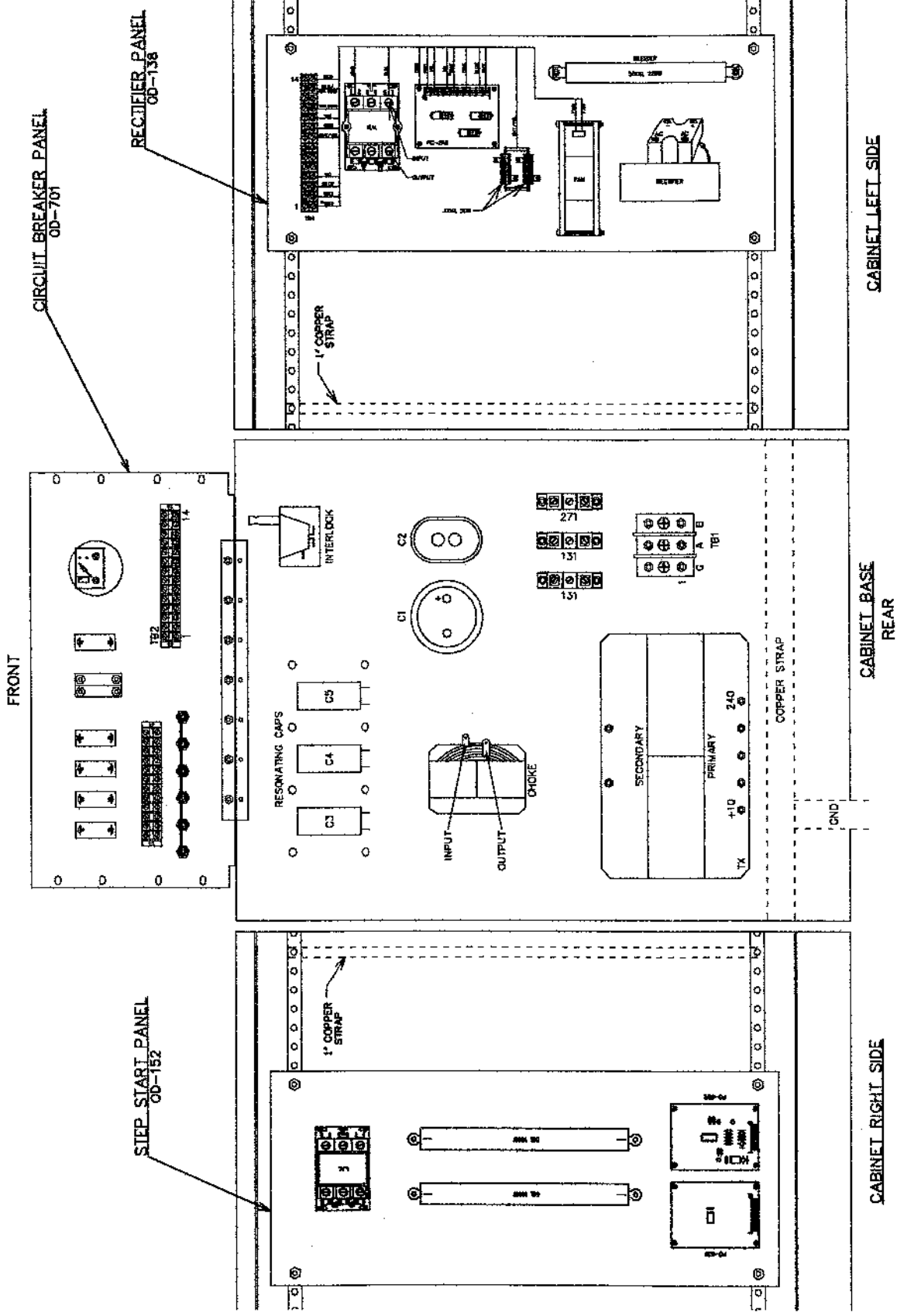
N. T. S.

REVISION:	■	DESIGNED BY: PI	DATE: 3/9/07	DWG. BY: JMG	DWG. No.
		CHECKED:	CAD: AM-00110	McSodl	AM-00110
TITLE:		PULSAR 1000 CABINET BASE VIEW			

PULSAR

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CIRCUIT BREAKER PANEL
OD-701

RECTIFIER PANEL
OD-136

STEP START PANEL
OD-152

CABINET LEFT SIDE

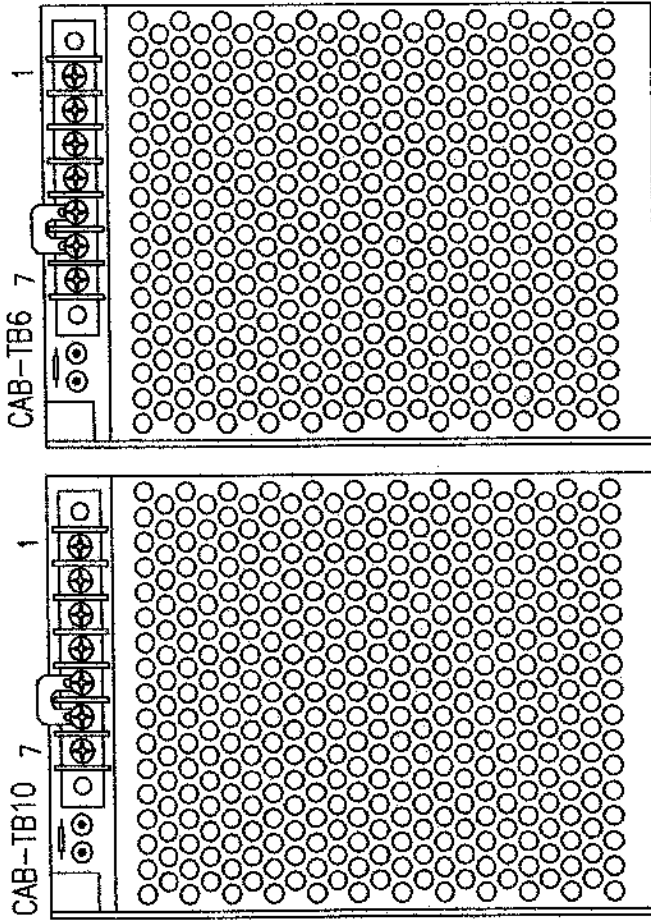
CABINET BASE
REAR

CABINET RIGHT SIDE

TITLE: PULSAR 1000 CABINET BASE LAYOUT	
DWG. BY: John McCool	DATE: 10/8/07
MOOFER: 1/9/08	REV: -
DWG. NO. OD-136	

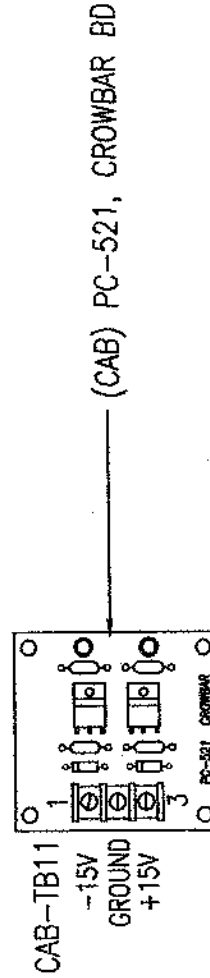
NOTES:
N.T.S.

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POWER SUPPLY No.1


POWER SUPPLY No.2



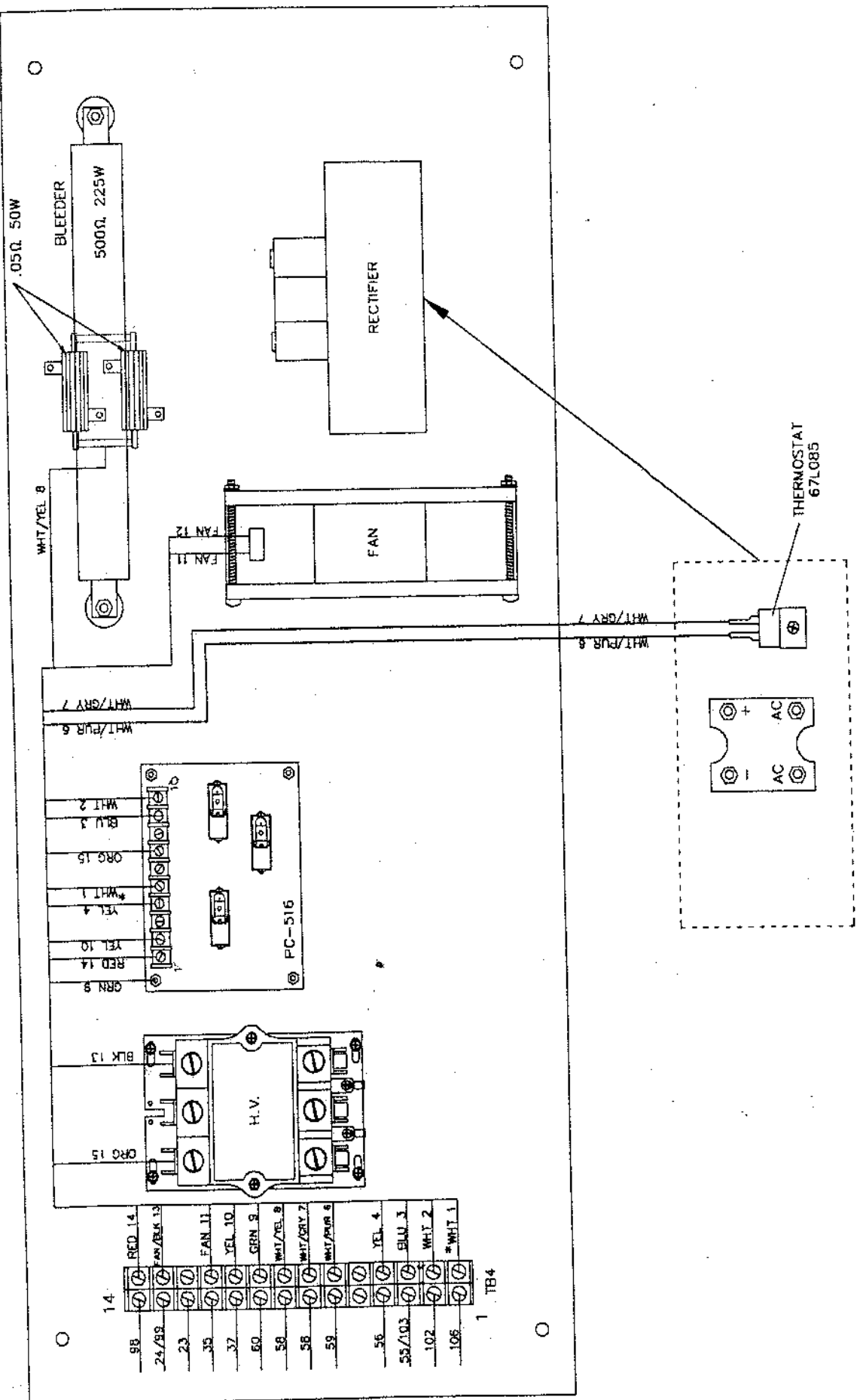
TITLE: PULSAR 1000 ±15V POWER SUPPLY
 PANEL LAYOUT

DWG. BY: CKB	DWG. No.
DATE: 7/16/99	1/3/98
Sheet B	By John McCool
	AM-0205C

REVISIONS:
 ID POWER SUPPLY, CROWBAR BD'S TB'S, DWG# CHANGED.
 FORMER# CL-503A, 7/20/99
 RELABELLED TB'S, 11/12/99
 CHANGED CAB-TB14 TO CAB-TB15, CAB-TB11 TO CAB-TB19, 4/12/07



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98	①	RED 14
24/98	①	24/BLK 13
23	①	
35	①	FAN 11
37	①	YEL 10
60	①	GRN 9
58	①	WHT/YEL 8
58	①	WHT/GRY 7
59	①	WHT/PUR 6
56	①	YEL 4
55/103	①	BLU 3
102	①	WHT 2
106	①	* WHT 1

1 TB4

TITLE: PULSAR 1000 RECTIFIER PANEL

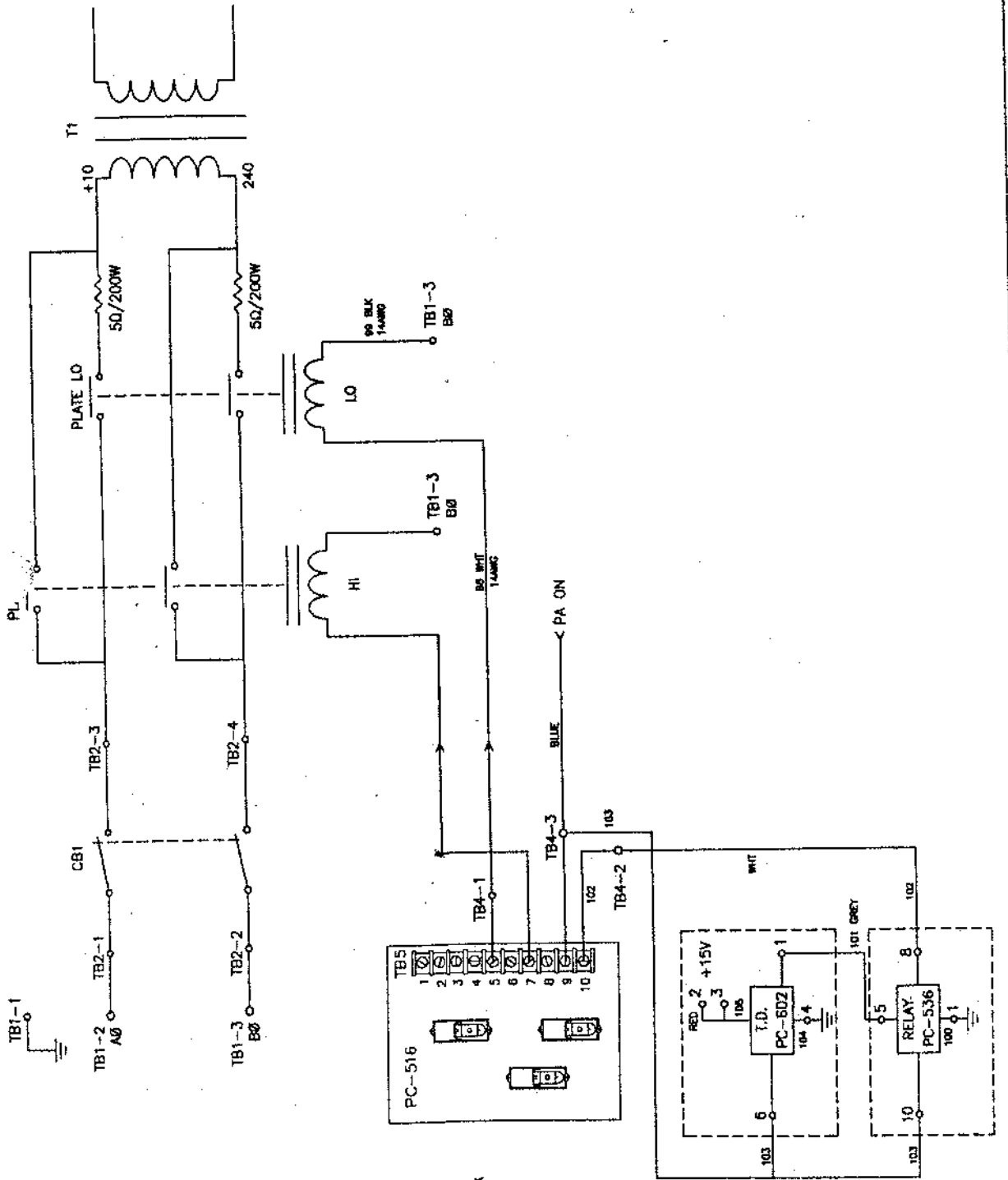
DESIGN: John McCool
DATE: 10/12/07

MODIFIED: 11/19/06
REV: -

DWG. No. OD-138

NOTES:
N.T.S.

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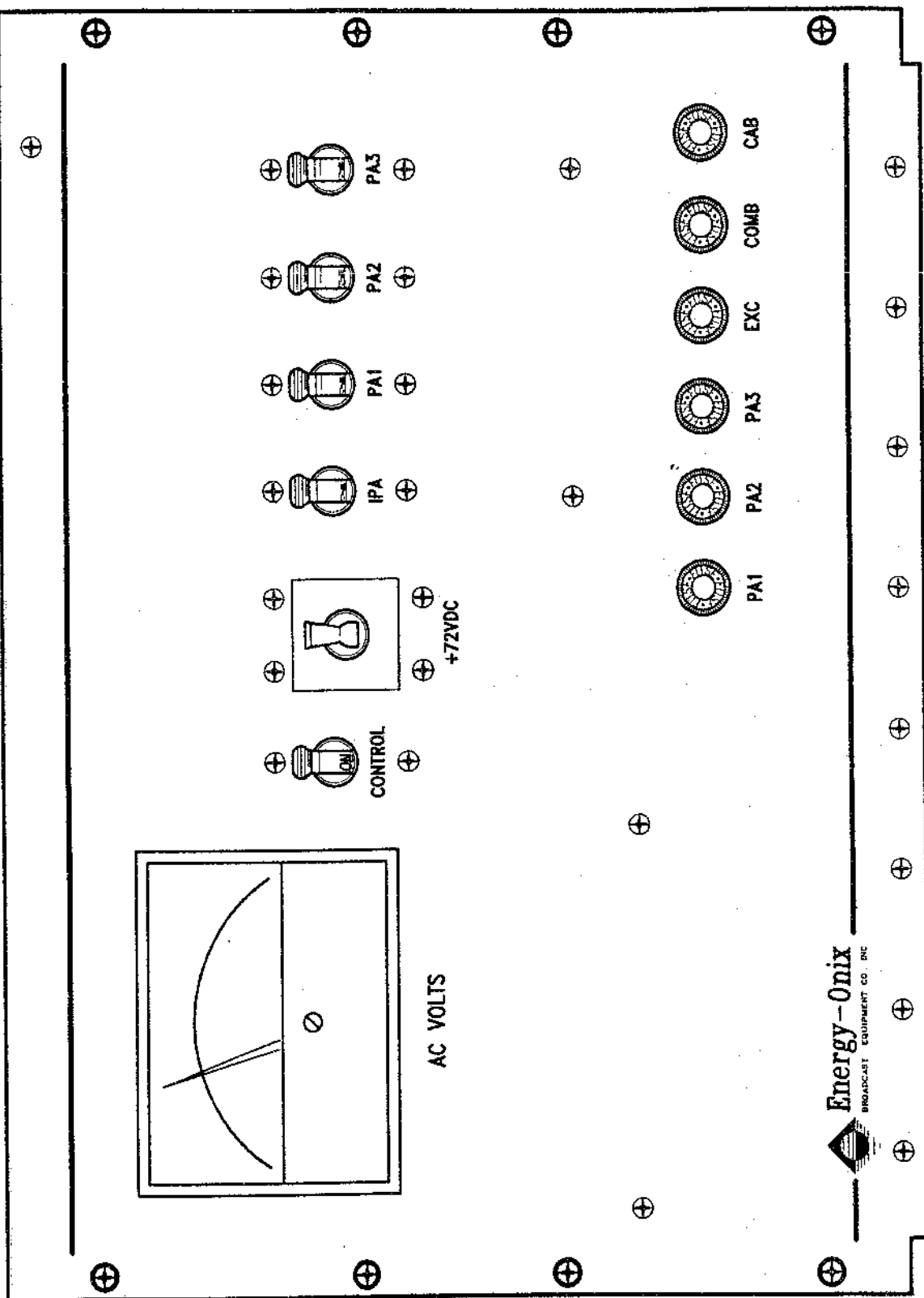


TITLE PULSAR 1000 STEP START SCHEMATIC

DES. BY John McCool	DATE: 1/9/08	REV: -
DRAWN: -		DRG. NO. S-330

NOTES
N.T.S.

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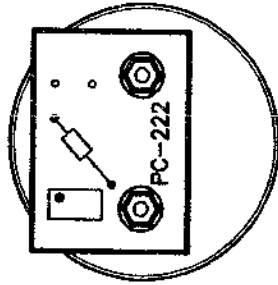
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REVISIONS:

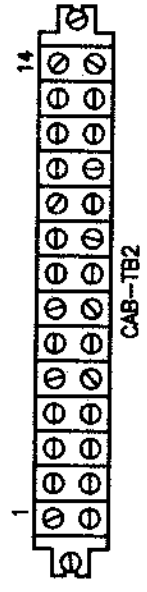
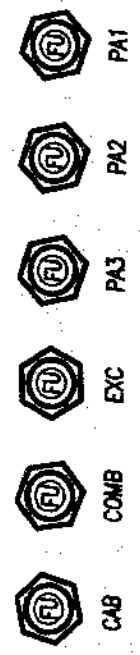
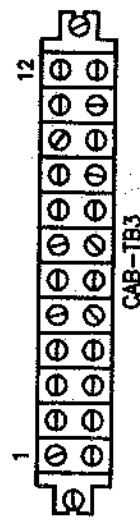
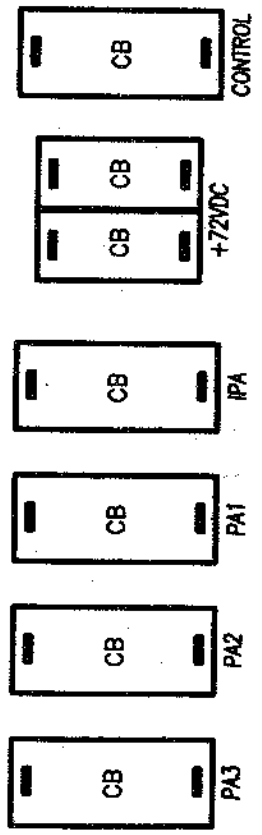
Energy-Onix
BROADCAST EQUIPMENT CO., INC.
1306 RIVER ST., P.O. BOX 803, VALATIE, NY 12184

TITLE: **PULSAR CB/FUSE/METER PANEL
COMPONENT VIEW (FRONT)**

DESIGNED BY: JW	DATE: 03/28/99	DWG. BY: DMC No.
CHK'D:	CAD No. 00-700	CKB
		00-700



AC
LINE
VOLTAGE
METER



Energy-Onix
BROADCAST EQUIPMENT CO., INC.
1306 RIVER ST., P.O. BOX 801, VALATE, NY. 12184

REVISION DESCRIPTION:
RENUMBERED, 00-701 to AM-00080, 07/21/99
RELABELED TB'S, 11/12/99

REVISION: **B**

TITLE: **PULSAR CB/FUSE/METER PANEL
COMPONENT VIEW (REAR)**

DESIGNED BY: JW DATE: 07/21/99 DWG. BY: CKB AM-00080
CHK'D: CAD No. AM-00080

PULSAR-1000

THEORY OF OPERATION

POWER SUPPLIES

THE PULSAR CABINET CONTAINS THREE POWER SUPPLIES: A -72V BRUTE FORCE SUPPLY SIZED TO THE TPO REQUIREMENT (NUMBER OF AMP MODULES) AND TWO INDEPENDENT OEM REGULATED $\pm 15V$ SUPPLIES. THE 220V AC POWER IS ALSO USED TO POWER THE COOLING FANS AND COIL OF -72V POWER SUPPLY CONTACTOR.

$\pm 15V$ PS #1 IS USED TO SUPPLY PC-520, METER AMP/RELAY BOARD, (COMBINER DRAWER) AND THE $\pm 15V$ SUPPLIES ALL OTHER LOW VOLTAGE REQUIREMENTS, EXCEPT FOR PC-506 (CONTROLLER DRAWER). $\pm 15V$ PS #2 IS DEDICATED TO PC-506, AUDIO/PDM BOARD.

THE -72V PS POWERS THE AMP/MODULATOR MODULES AND THE INTERMEDIATE POWER AMPLIFIER (IPA MODULE, CONTROLLER DRAWER).

"STOP" MODE AND DETECTOR/ENABLE

$\pm 15V$ PS #1 & PS #2 ARE POWERED AT ALL TIMES (IF AC IS PRESENT AND "CONTROL" CB IS ON). THUS, WHEN PULSAR IS IN "STOP" MODE, CONTROLLER PC BOARDS RECEIVE $\pm 15V$. THE RF DETECTOR/ENABLE BOARD, PC-509, RECEIVES A GROUND (NO VOLTAGE) FROM EXCITER, PC-501 WHEN RF DRIVE IS PRESENT (+V DISABLES). PC-509 THEN OUTPUTS FIVE "ENABLES". THREE OF THESE GO THROUGH PC-507, CONTROL PANEL BOARD AND WILL BE DESCRIBED LATER. THE FOURTH ENABLE (PC-509, K1) LIFTS A GROUND FROM GATE OF Q1 ON PC-506, AUDIO/PDM BOARD. (THIS IS NOT SUFFICIENT TO DE-MUTE AUDIO, AS PC-507, K5 ((N. C.)) IS IN PARALLEL.) THE FIFTH ENABLE REMOVES VOLTAGE FROM MOD DRIVE INHIBIT CIRCUIT (Q2, PC-506), ENABLING PDM GENERATOR. THIS MOD DRIVE INHIBIT CIRCUIT IS ALSO ACTIVATED BY PC-506 PDM FAULT DETECTOR CIRCUIT, WHICH SENSES FAULT AT OUTPUT OF PC-506 PDM DIVIDER CIRCUIT.

CONTROL

A LOCAL OR REMOTE "START" LATCHES PC-507, K1 (CONTROL PANEL BOARD) LIGHTING "START" AND "ON" LED'S AND ENERGIZING 507-K2. K2 ENERGIZES A RELAY ON CABINET AUX RELAY BOARD WHICH POWERS THE COOLING FANS. IF INTERLOCKS ARE CLOSED (AN N.C. THERMOSTAT MOUNTED ON -72V PS RECTIFIER HEATSINK IS IN SERIES WITH INTERLOCKS), THE "INTLK" LED LIGHTS AND IF NO OVERLOAD ALARMS ARE PRESENT, THE "ALARMS" LED IS LIT AND 507-K3 IS ENERGIZED. K-3 LIGHTS THE "EXC" LED AND ENERGIZES A RELAY ON CABINET AUX RELAY BOARD WHICH ENERGIZED THE -72V POWER SUPPLY CONTACTOR. IF 509-K1 (DRIVE DET.) IS ENABLED, THE "DRIVE" LED IS LIT AND

507-K4 IS ENERGIZED. 507-K4 LIGHTS THE "PA" LED, ENERGIZES 507-K5 AND, PROVIDED 509 "MOD DRIVE" IS ENABLED, SENDS A VOLTAGE TO 506-K1 CLOSING THE PDM OUTPUT CONNECTION FROM PC-506. 507-K5 LIGHTS THE "AUDIO" LED AND LIFTS A GROUND FROM GATE OF Q1 ON PC-506, DE-MUTING THE AUDIO. THE PULSAR IS NOW OPERATIONAL AND WILL POWER UP TO A LEVEL DETERMINED BY WHICH OF THE FIVE POWER OUTPUT LEVELS (FOUR PRESETS, ONE MANUAL) IS SELECTED.

POWER OUTPUT CONTROL/POWER OUTPUT REGULATION

CARRIER OUTPUT POWER CONTROL IS DETERMINED BY THE GAIN OF AUDIO/PDM DRIVER, PC-506-U10 CIRCUITRY. U10 AMP GAIN IS LINEAR AND PROPORTIONAL TO THE GAIN CONTROL VOLTAGE. THIS GAIN CONTROL VOLTAGE IS DETERMINED BY CONTROL PANEL BOARD (PC-507) POWER CONTROL CIRCUITRY. THIS CONSISTS OF SWITCHABLE VOLTAGE REFERENCES ADJUSTED BY RECESSED TRIM POTS CORRESPONDING TO POWER OUTPUTS 1 THROUGH 4, AND THE VARIABLE POWER OUTPUT MANUAL GAIN CONTROL. LOCAL SWITCHING IS BY 507-S5 THROUGH 507-S9 (FRONT PANEL PUSH BUTTONS) AND REMOTE SWITCHING IS BY OPTO ISOLATED SWITCHES 507-U2 AND 507-U3. TRIM POT R45, LOCATED ON THE BACK OF PC-507, IS FACTORY SET TO PREVENT EXCESSIVE POWER OUTPUT, IRRESPECTIVE OF FRONT PANEL SETTINGS.

506-U10/U8 CIRCUITRY ALSO MAINTAINS CONSTANT POWER OUTPUT WITHIN AC POWER VARIATIONS OF $\pm 10\%$. THIS IS ACCOMPLISHED BY USING A $-72V$ POWER SUPPLY REFERENCE SAMPLE WHICH INVERSELY CHANGES U10 GAIN, PROPORTIONAL TO SAMPLE VOLTAGE CHANGE.

METERING/INDICATORS/OVERLOAD-RESET

AN AC VOLTMETER (LOCATED ON BOTTOM FRONT PANEL) IS ALWAYS CONNECTED ACROSS AC POWER INPUT. $-72V$ POWER SUPPLY VOLTAGE SAMPLE IS DERIVED FROM CONTR-R1/CONTR-R2 DIVIDER LOCATED INSIDE CONTROLLER BACK PANEL, AND $-72V$ POWER SUPPLY CURRENT SAMPLE IS DERIVED ACROSS SERIES RESISTOR IN GROUND RETURN OF CABINET SUPPLY.

FORWARD AND REFLECTED RF POWER SAMPLES ARE DERIVED FROM PC-514, DIRECTIONAL COUPLER; PC-518, VOLTAGE PROBE; AND PC-520, METER AMP/RELAY BOARD. THESE ARE LOCATED IN THE COMBINER DRAWER. 518-C10, 518-L1 AND 518-R1 ADJUST AMPLITUDE AND PHASE OF RF SAMPLE USED TO NULL REFLECTOMETER CIRCUIT IN PC-514. THE DC FORWARD AND REFLECTED SAMPLES DRIVE OP AMP U1 IN PC-520: REFLECTED DIRECTLY AND FORWARD THROUGH K1-K4 AND R1-R5. THIS PERMITS FORWARD POWER READINGS TO BE CALIBRATED TO EACH OF THE FIVE POWER LEVEL CONTROL SETTINGS(4 PRESETS, 1 MANUAL).

THE DC VOLTAGE, DC CURRENT, REFLECTED POWER AND FORWARD POWER SAMPLES ARE USED FOR BOTH THE MULTIMETER (COMBINER FRONT PANEL) AND TELEMETRY SAMPLES (THROUGH PC-333B, REMOTE INTERFACE). PC-515, R1-R4, MULTIMETER BOARD (BACK OF COMBINER FRONT PANEL) ADJUST MULTIMETER CALIBRATION. IN ADDITION, THE DC VOLTAGE, DC CURRENT AND REFLECTED POWER (VSWR) SAMPLES ARE ALSO USED AS INPUTS TO PC-508, OVERLOAD BOARD (CONTROLLER DRAWER).

PC-519, RF CURRENT SAMPLE BOARD IS LOCATED IN COMBINER DRAWER, IMMEDIATELY AFTER AMPS ARE COMBINED. IT OUTPUTS TWO SAMPLES: AN RF "MOD ENVELOPE" WHICH WILL BE DESCRIBED LATER AND A DC SAMPLE PROPORTIONAL TO THE TOTAL RF CURRENT IN THIS 25Z SECTION OF THE MATCHING NETWORK. THE "RF CURRENT" SAMPLE IS USED AS THE FOURTH INPUT TO PC-508.

THE FIFTH INPUT TO THE OVERLOAD BOARD IS AN (RF) "DRIVE" ALARM FROM PC-501, PREVIOUSLY DESCRIBED IN THE "DETECTOR/ENABLE" SECTION. A VOLTAGE ON THIS INPUT CONSTITUTES AN ALARM CONDITION. PC-508 R4, R10, R16, R22 AND R28 ADJUST THE OVERLOAD THRESHOLDS ("TRIP POINTS"). UPON DETECTION OF AN OVERLOAD CONDITION, THE APPROPRIATE LATCHING RELAY (K1-K5) WILL "SET". AN "N. C" WILL OPEN THE CONTROL LADDER AT THE "OVERLOAD ALARMS" POINT (PC-507, DESCRIBED IN "CONTROL" SECTION), SHUTTING DOWN THE TRANSMITTER. AT THE SAME TIME, AN "N. O." WILL CLOSE, ILLUMINATING THE APPROPRIATE CONTROLLER FRONT PANEL LED ("VSWR", "VOLT", "CURRENT", "RF CURRENT", OR "DRIVE"). THIS SAME N. O. ALSO ENABLES AN INPUT TO PC-517, 4X RECYCLE BOARD. THIS WILL START TWO TIMERS. AFTER THE SHORT TIMER DELAY (517-U3A), A "RESET" PULSE WILL RESET 508-K1 THROUGH K5, RE-STARTING THE TRANSMITTER. THE SECOND TIMER (517-U3B) IS CONFIGURED FOR A 30 SECOND PERIOD. IF A SECOND OVERLOAD INPUT IS RECEIVED WITHIN THIS INTERVAL, CYCLE #2 IS INITIATED, RESULTING IN A SECOND TRANSMITTER RESET. A THIRD OVERLOAD (WITHIN THE TIMING WINDOW) INITIATES CYCLE #3, RESULTING IN A THIRD TRANSMITTER RESET. A FOURTH OVERLOAD (WITHIN THE TIMING WINDOW) INITIATES CYCLE #4, RESULTING IN 517-K1 LATCHING, OPENING THE TRANSMITTER RESET CIRCUIT. AT THIS POINT, A MANUAL RESET IS NECESSARY TO RESTART THE TRANSMITTER. THIS CAN BE ACCOMPLISHED THROUGH "LOCAL" CONTROL (CONTROLLER FRONT PANEL "RESET" SWITCH), OR BY "REMOTE" CONTROL ("RESET" ON CONTR-J3).

THE "MOD ENVELOPE" OUTPUT FROM PC-519 IS USED IN PC-507 IN THE +95% AND -95% MODULATION INDICATOR CIRCUIT. THE RF WAVEFORM IS RECTIFIED AND A FILTERED OFFSET IS PRODUCED. RESISTIVE DIVIDER NETWORK R17-R23 DETERMINE THE INPUTS TO COMPARATORS U1C AND U1D WHICH DRIVE THE CONTROLLER FRONT PANEL +95% AND -95% LED'S. (THESE ARE INTENDED TO BE A CONVENIENT "AT A GLANCE" INDICATOR, NOT AS A SUBSTITUTE FOR A STATION MODULATION MONITOR).

A SECOND USE OF THE "MOD ENVELOPE" SAMPLE IS TO DRIVE A MODULATION LEVEL "CLIPPER" CIRCUIT IN PC-506, AUDIO/PDM DRIVER. THE "MOD ENVELOPE" SAMPLE IS RECTIFIED AND USED WITH REFERENCE VOLTAGES IN A COMPARATOR CIRCUIT WHICH CONTROLS THE DISCHARGE CURVE OF 506-C8. THRESHOLD CONTROL, R6, ADJUSTS THE CIRCUIT SUCH THAT OVERMODULATION WILL CAUSE C8 TO DISCHARGE, CAUSING U4B TO OUTPUT A NEGATIVE VOLTAGE WHICH WILL FORWARD BIAS Q1, CLAMPING AUDIO TO GROUND (FOR THE REMAINDER OF THE POSITIVE HALF CYCLE.) THIS EFFECTIVELY PROTECTS THE POWER AMPS FROM DRAWING EXCESS CURRENT. (THIS SHOULD BE USED AS A "LAST DEFENSE". INPUT AUDIO LEVEL SHOULD BE SUCH THAT THE "CLIPPER" RARELY IS REQUIRED).

EXCITER

PC-501, RF EXCITER, HAS TWO BASIC FUNCTIONS: PROVIDE RF DRIVE AT THE CARRIER OPERATING FREQUENCY AND PROVIDE AN OUTPUT TO PC-506, AUDIO/PDM DRIVER, WHICH WILL BE USED TO PRODUCE THE PDM FREQUENCY. BOTH OF THESE OUTPUTS ARE SQUARE WAVE.

REFER TO PC-501 DRAWINGS FOR THE FOLLOWING: CRYSTAL, Y1, IS FOUR TIMES CARRIER FREQUENCY OF BELOW 1000KHZ (JUMPER F TO D AND J TO H) AND TWO TIMES CARRIER FREQUENCY OF 1000KHZ AND ABOVE (JUMPER F TO E AND J TO G). FOR MONO AUDIO (NORMAL CONFIGURATION), JUMPER C TO B. A C TO A JUMPER PROVIDES INPUT FOR AN EXTERNAL STEREO EXCITER AT CONTR- J6 (CONTROLLER REAR PANEL).

DIP SWITCH S1 DETERMINES THE DIVIDER WHICH WILL DETERMINE THE SQUARE WAVE FREQUENCY OUTPUT TO PC-506. SETTINGS ARE CARRIER FREQUENCY DEPENDENT ACCORDING TO THE FOLLOWING TABLE:

S1 SETTINGS

<u>OPERATING FREQUENCY</u>	<u>1(A)</u>	<u>2(B)</u>	<u>3(C)</u>	<u>4(D)</u>
531-559-KHZ	OPEN	CLOSED	CLOSED	OPEN
560-749KHZ,1280-1439KHZ	CLOSED	OPEN	OPEN	OPEN
750-909KHZ,1440-1710KHZ	CLOSED	OPEN	CLOSED	OPEN
910-1099KHZ	CLOSED	CLOSED	OPEN	OPEN
1100-1279KHZ	CLOSED	CLOSED	CLOSED	OPEN

TRIMMER CAPACITOR C14 IS USED TO ADJUST TRANSMITTER TO EXACT FREQUENCY. TRIM POT R18 USES A (SUMMED) SAMPLE OF POWER AMPLIFIER VOLTAGES TO ADJUST FOR MINIMUM INCIDENTAL PHASE MODULATION. TRIM POT R4, SLICER BIAS, IS USED TO ADJUST WAVEFORM TO A SYMMETRICAL SQUARE WAVE.

AUDIO/PDM DRIVER

THE FUNCTION OF PC-506, AUDIO/PDM BOARD, IS TO PRODUCE A VARIABLE, RECTANGULAR PDM OUTPUT DEPENDENT UPON AUDIO INPUT AND PRECURSOR PDM INPUT FROM PC-501.

JUMPERS AT U5 ("A" AND "B") ARE SET TO DIVIDE PRECURSOR PDM FREQUENCY BY TWO FOR CARRIER FREQUENCIES BELOW 1280KHZ AND DIVIDE BY FOUR FOR CARRIER FREQUENCIES OF 1280KHZ AND HIGHER. THIS WILL RESULT IN A PDM OUTPUT FREQUENCY BETWEEN 70.0KHZ AND 93.63KHZ.

AUDIO INPUT IS 600 OHMS, BALANCED AND TRIM POT R17 ADJUSTS COMMON MODE BALANCE TO NULL OUT-OF-PHASE AUDIO. R86/R84/CR14 AND R87/R85/CR15 COMPRISE A "SOFT" AUDIO CLIPPER CIRCUIT. THE THRESHOLD OF CLIPPING OCCURS AT AN AUDIO INPUT OF +8DBM. THE MODULATION LEVEL "CLIPPER" HAS BEEN PREVIOUSLY DESCRIBED AT END OF "METERING" SECTION. TRIM POT R34 ADJUSTS AUDIO GAIN WHICH SETS MODULATION PERCENTAGE. S1 ADJUSTS AUDIO LOW PASS FILTER HIGH FREQUENCY ROLLOFF (SEE TABLE ON PC-506 SCHEMATIC DIAGRAM).

THE LOWPASS FILTERED AUDIO IS SUMMED WITH A DC OFFSET VOLTAGE AT THE INPUT OF U7B AND IS THE CARRIER REFERENCE LEVEL FOR THE U10 CIRCUIT, PREVIOUSLY DESCRIBED IN THE "POWER OUTPUT CONTROL" SECTION. CARRIER LEVEL TRIM POT, R37, IS INCLUDED AS A FINE VOLTAGE ADJUSTMENT.

THE (NOW DIVIDED) PDM SQUARE WAVE IS USED AS THE INPUT OF U6A, PDM RAMP INTEGRATOR TO PRODUCE A TRIANGULAR WAVEFORM (AT THE PDM FREQUENCY). THE VARIABLE PULSE DURATION GENERATOR (Q3 CIRCUIT) PRODUCES A RECTANGULAR WAVEFORM (AT THE PDM FREQUENCY) BY COMPARING THE CARRIER REFERENCE VOLTAGE TO THE INSTANTANEOUS PDM RAMP VOLTAGE. THE ON/OFF RATIO IS PROPORTIONAL TO THE CARRIER LEVEL AND INSTANTANEOUS AUDIO MODULATION LEVEL, RANGING FROM 45/55, CARRIER ONLY, TO 90/10 WITH 100% MODULATION (HIGHER WITH OVER 100% POSITIVE MODULATION). THIS PDM OUTPUT IS USED TO DRIVE THE POWER AMPLIFIER MODULES.

THE PDM FAULT DETECTOR/MOD DRIVE INHIBIT CIRCUITS HAVE BEEN PREVIOUSLY DESCRIBED IN THE "STOP" MODE SECTION.

IPA

THE INTERMEDIATE POWER AMPLIFIER (IPA MODULE) CONSISTS OF PC-502, TB1, AND TB2 MOUNTED ON THE IPA HEATSINK ASSEMBLY IN THE CONTROLLER DRAWER.

PC-502 INPUTS RF AT CARRIER FREQUENCY FROM PC-501. SECONDARIES OF 502-T1 ALTERNATELY DRIVE Q1/Q2 SWITCHING AMP WHICH OUTPUTS THROUGH CONTR-L1 ASSEMBLY (IPA TUNING ASSEMBLY) TO PC-503, IPA TUNING BOARD, CONSISTING OF C1 (FREQUENCY DEPENDENT) AND T1. THIS (NOW SINE WAVE) DRIVE IS USED AS THE RF DRIVE FOR AMPLIFIER MODULES. A SAMPLE (THROUGH 503-R1) IS MADE AVAILABLE AT CONTR-J4 AS A FREQUENCY MONITOR INPUT.

POWER AMP MODULE

THE PDM OUTPUT FROM CONTROLLER DRAWER IS THE MOD DRIVE INPUT TO PA AT AMP-J2. IT ENTERS PC-511 AT TP5 AND IS USED IN THE Q4/Q5/U1 LOGIC LEVEL CONVERTER CIRCUIT TO PRODUCE LOGIC 0 OF B-V(NOM.-72V) AND LOGIC 1 OF NOM. -59V.

THE FINAL MODULATOR, PC-512, USES PARALLEL MOSFETS Q1 AND Q2 AS A HIGH SPEED SWITCH WHICH APPLIES THE B-V TO LOW PASS FILTER INPUT (PC-513) WHEN LOGIC 1 IS PRESENT AT GATES.

LOW PASS FILTER, PC-513, REMOVES PDM FREQUENCY AND OUTPUTS A NEGATIVE VOLTAGE PROPORTIONAL TO INSTANTANEOUS MODULATING AUDIO AND WITH A DC COMPONENT THAT REPRESENTS THE RF CARRIER LEVEL. (OUTPUT WILL BE AT CONSTANT LEVEL WITH NO MODULATION).

RF DRIVE FROM CONTROLLER DRAWER ENTERS AT AMP-J2, PASSES THROUGH AMP-R2, IS SHUNTED BY AMP-L1 (PA INPUT TUNING ASSEMBLY) AND IS CONNECTED TO THE (OUT-OF-PHASE) PRIMARIES OF 511-T1, WHICH DRIVE THE PRIMARIES OF 510-T1 AND 510-T2. THE SECONDARIES OF 510-T1 AND 510-T2 DRIVE POWER AMPLIFIER PC-510, CONSISTING OF Q1-Q8 CONFIGURED AS TWO (PARALLEL) PUSH-PULL CIRCUITS. THE B- SUPPLY IS THE OUTPUT OF MODULATION LOW PASS FILTER (PC-513). THE LOW IMPEDANCE RF OUTPUT IS TRANSFORMED TO A NOMINAL 25 OHMS BY AMP-T1 AND IS CONNECTED TO THE OUTPUT "N" JACK, AMP-J4.

PC-511 CONTAINS TWO FAULT DETECTORS. A PA MOSFET FAILURE WILL RESULT IN CURRENT FLOW IN THE SECONDARY OF T1. THE SECOND FAULT IS HEATSINK OVER TEMPERATURE, WHICH WILL DECREASE RESISTANCE OF RT1, FORWARD BIASING Q1. EITHER OF THESE CONDITIONS WILL APPLY VOLTAGE TO THE GATE OF THE MOD DRIVE CROWBAR, Q3, TURNING IT ON. THIS WILL HAVE THREE RESULTS: PC-511 MOD DRIVE INPUT WILL BE CLAMPED; FRONT PANEL "FAIL" LED WILL BE ILLUMINATED; AND 510-Q9 (SCR LOCATED ON HEATSINK) WILL TURN ON, GROUNDING MODULATOR LOW PASS FILTER OUTPUT.

COMBINER-MATCHER

INDIVIDUAL RF OUTPUTS FROM EACH AMP MODULE ENTER COMBINER DRAWER AT COMB-J1, COMB-J2, AND COMB-J3. THEY ARE COMBINED AND MATCHED TO 25

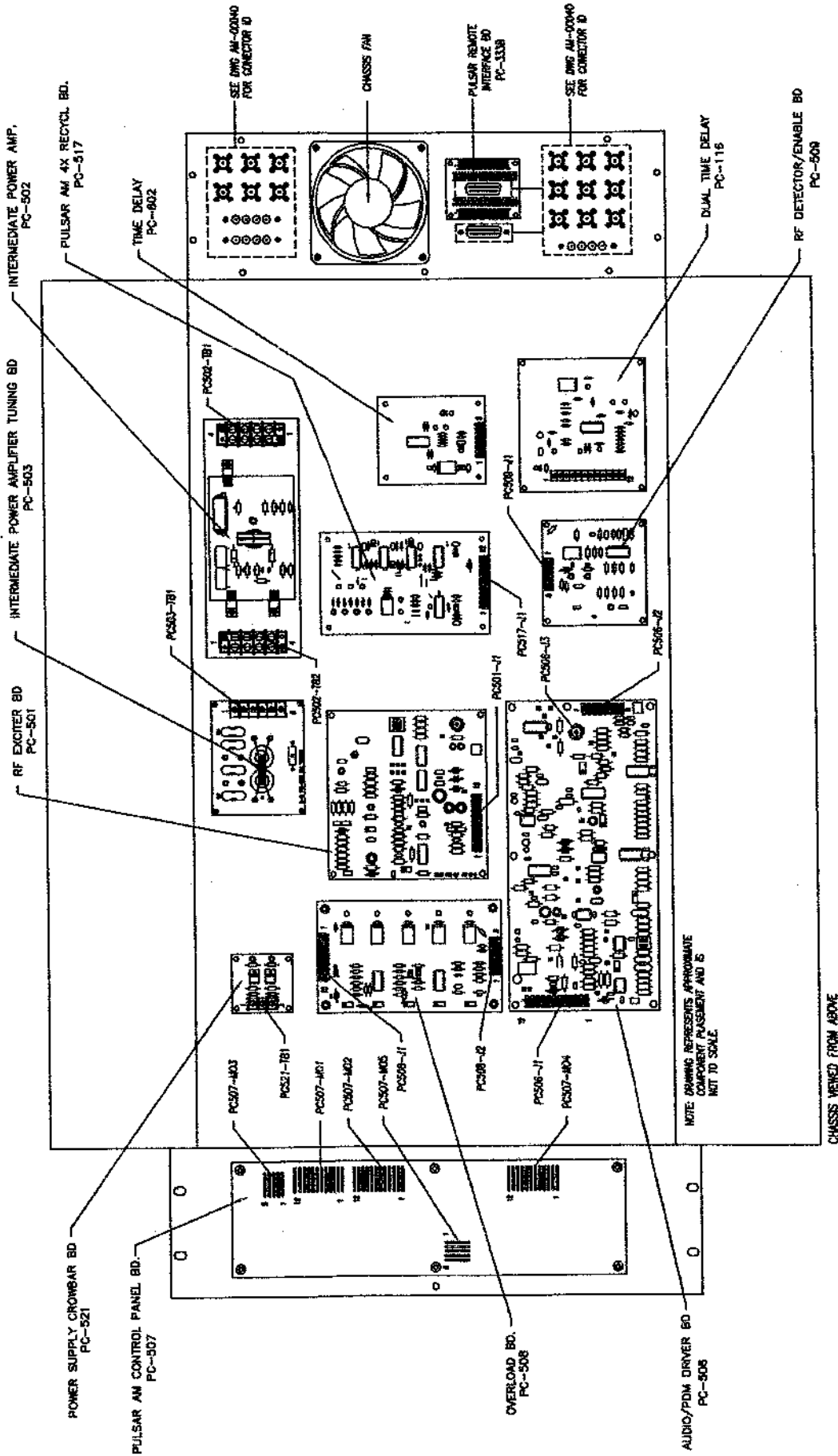
OHM OUTPUT IMPEDANCE IN THE COMB L1-L2-L3/COMB C1 NETWORK. COIL TAPS AND CONNECTIONS TO THE INPUT "N" JACKS ARE USED IN THE RF RELAY BOARD, PC-516A, TO PROVIDE FOR GOOD MATCHING IN A SITUATION WHEN ONE OF THE AMP MODULES IS "OFF". INDIVIDUAL B-SUPPLY VOLTAGE FROM EACH AMP MODULE ENERGIZES THE RESPECTIVE 516A RELAY. IN NORMAL OPERATION (ALL AMP MODULES "ON") THE INDIVIDUAL "N" JACK IS CONNECTED TO THE COIL TAP. IF AN AMP MODULE IS "OFF", ITS RELAY IS NOT ENERGIZED, THE COIL TAP IS DISCONNECTED, AND THE "N" JACK IS GROUNDED (GROUNDING THE END OF ITS COIL). IN THIS SITUATION, THE REMAINING (FUNCTIONAL) AMP MODULES STILL SEE THE PROPER (25 OHM) IMPEDANCE.

THE OUTPUT OF THE COMBINER NETWORK PASSES THROUGH THE TORROID OF PC-519 AS THE PRIMARY OF THE RF CURRENT SAMPLE TRANSFORMER. IT IS THEN CONNECTED TO THE COMB-L4/COMB-C2/COMB-L5 TEE NETWORK. THIS BAND PASS/MATCHING NETWORK INPUTS A 25 OHM IMPEDANCE AND OUTPUTS A 50 OHM IMPEDANCE. THE OUTPUT PASSES THROUGH THE TORROID OF PC-514 AS THE PRIMARY OF THE DIRECTIONAL COUPLER TRANSFORMER TO THE OUTPUT TEE NETWORK.

THE COMB-L6/ COMB-C2/ COMB-L7 OUTPUT TEE IS ADJUSTABLE WITH THE COMBINER FRONT PANEL "TUNING" AND "LOADING" CONTROLS. THIS ALLOWS CONSIDERABLE LATITUDE IN MATCHING TO A LESS THAN IDEAL (REACTIVE) ANTENNA SYSTEM.

FROM THE OUTPUT TEE, THE RF IS COUPLED THROUGH BLOCKING CAPACITOR COMB-C5 AND SHUNTED BY RF CHOKE COMB-L8. THESE COMPONENTS AFFORD SOME MEASURE OF PROTECTION AGAINST LIGHTNING INDUCED TRANSIENTS.

RF OUTPUT IS AT COMBINER REAR PANEL "N" JACK, COMB-J7. COMB-C4 PROVIDES AN RF SAMPLE (FOR MODULATION MONITOR, ETC.) AT REAR PANEL BNC JACK, COMB-J6.



REVISION:

TITLE: PULSAR AM EXCITER/CONTROLLER
DRAWER COMPONENT LAYOUT

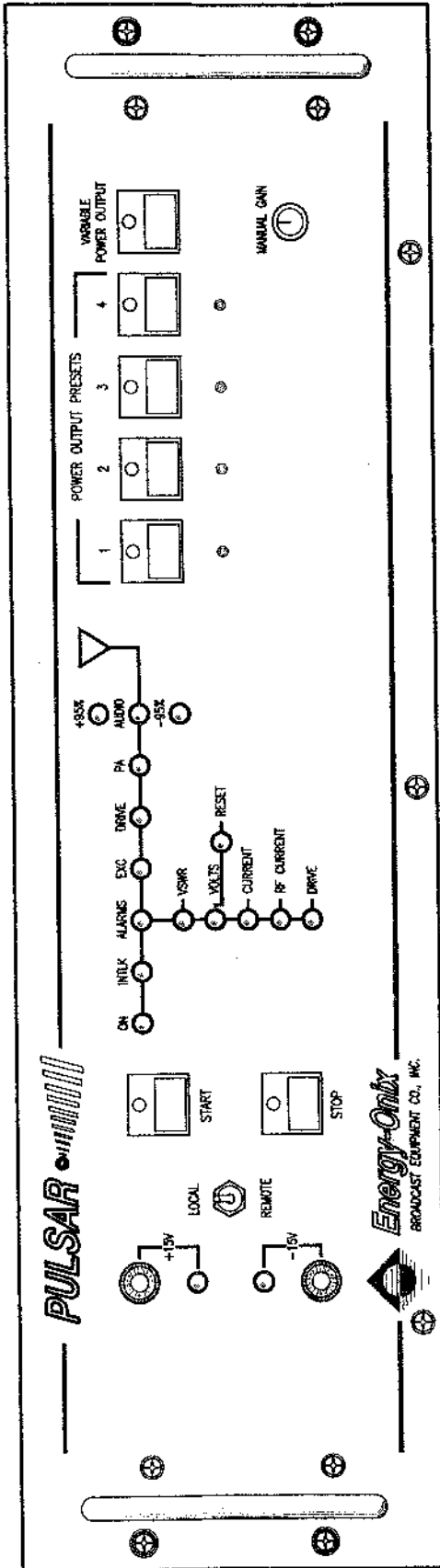
DESIGNED BY: BW	DATE: 3/29/99	DWG. BY: DWG. No.
MODIFIED: 2/27/07	CAB: AM-0001C	AM-0001C
by John McCoof		

Energy-Onix

PULSAR

BROADCAST EQUIPMENT CO., INC.
1306 RIVER ST., P.O. BOX 801, VALATIE, NY, 12184





PULSAR

TITLE PULSAR 1000 CONTROL PANEL FRONT PANEL VIEW

SCALE: N/A DESIGNED BY: DATE: 07/21/88 DWG. NO: AM-00030
 CK. BY: NOT. C&S

REVISION:

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 BROADCAST EQUIPMENT CO., INC.
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