

PULSAR
250 – 500 – 1KW

TECHNICAL AND MAINTENANCE MANUAL

Scanned and Prepared by
Dale H. Cook

Energy-Onix Broadcast Equipment Co., Inc.
1306 River Street
P.O. Box 801
Valatie, NY 12184

Phone 518-758-1690
Fax 518-758-1476

www.energy-onix.com
energy-onix@energy-onix.com



DANGER

RECYCLE

PLEASE REVIEW THIS SHEET PRIOR TO ANY INSTALLATIONS.

A 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.

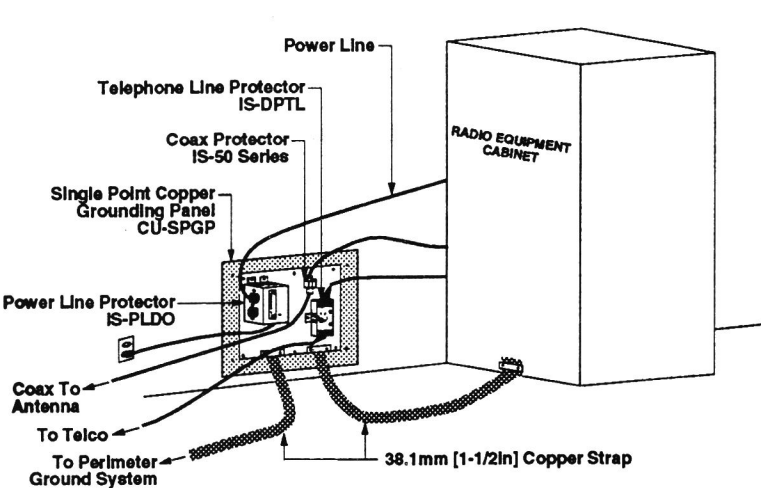
DO NOT CONNECT WHEN A STORM IS NEAR.

DO NOT CONNECT WHEN TRANSMISSIONS ARE OCCURRING.

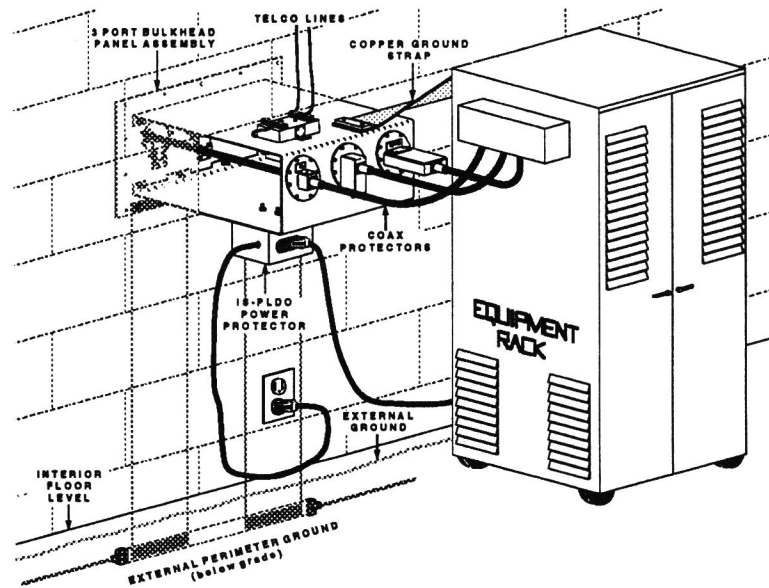
A lightning strike, 50% of the time, occurs in groups of two or three strokes with the first stroke having 20,000 amps and then less for the following strokes. Each stroke may have a rise time of 2.1 microseconds to the peak current and a decay between 10 to 40 microseconds.

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 BE AROUND OPERATING EQUIPMENT IN AN ELECTRICAL STORM. THE IMPULSE SUPPRESSOR MAY SAVE YOUR EQUIPMENT FROM DANGER, BUT SHOULD NOT BE CONSIDERED AS BEING SAFE FOR PRESENT PERSONNEL.



SINGLE POINT GROUNDING PANEL FOR PROPER GROUNDING / PROTECTION



We recommend that the coax, power and telephone protectors, if used, all be mounted/grounded together on a bulkhead plate or wall and that 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

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, 4,409,637, 4,554,608

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



Count on a PolyPhaser®

and other U.S. and Foreign Patents Pending

Phone: (800) 325-7170
(702) 782-2511
FAX: (702) 782-4476

IMPULSE SUPPRESSOR INSTALLATION

PLEASE READ DANGER SHEET BEFORE INSTALLING

IS-VU50HN, IS-VU50HN-MA, IS-VU50HN-ME IS-VU50HU, IS-VU50HU-MA, IS-VU50HU-ME

Your IS-VU50H Series is designed for multichannel VHF and UHF transmitter (crossband) combiner output. The insertion loss is less than 0.05dB with a VSWR of less than 1.1:1 for the bandwidths of 50MHz to 300MHz (VHF) and 380MHz to 550MHz (UHF). The dc turn-on should be between 1500V and 2100V. If it reads less than 1200V, it should be replaced. To calculate the maximum number of channels, the following formula must not exceed 1200 volts for V_T .

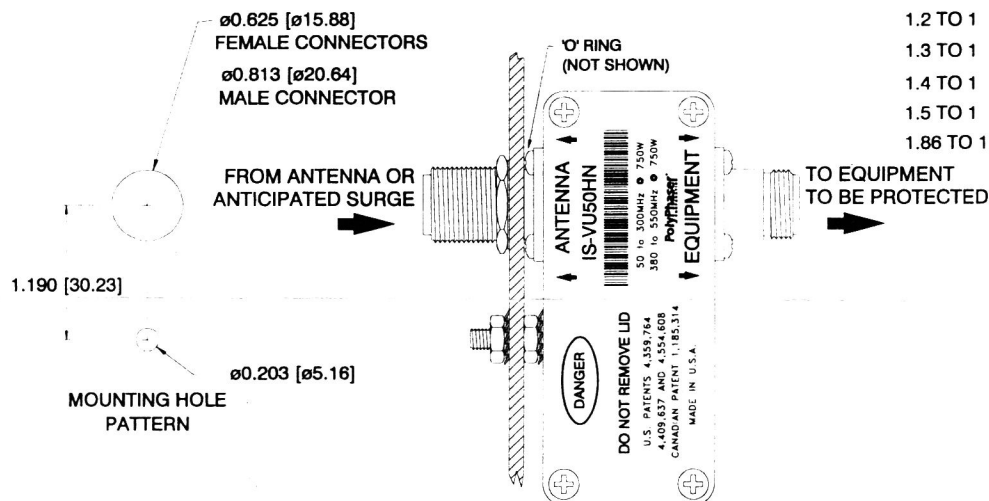
NOTE: Continuous power for a single channel must not exceed 750W.

$V_p = 1.414 \cdot X \cdot \sqrt{P \cdot 50}$ WHERE 'P' IS POWER OUTPUT FOR ONE CHANNEL OUT OF THE COMBINER.

DO THIS FOR EACH CHANNEL. THEN ADD ALL THE V_p 's FOR ALL OF THE CHANNELS TO GET THE V TOTAL (V_T).

$$V_T = V_{P1} + V_{P2} + V_{P3} \dots$$

VSWR	X=
1.1 TO 1	1.05
1.2 TO 1	1.09
1.3 TO 1	1.13
1.4 TO 1	1.17
1.5 TO 1	1.2
1.86 TO 1	1.3



IT IS VERY IMPORTANT THIS UNIT BE GROUNDED 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. 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.

LIMITED TEN YEAR WARRANTY

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, 4,409,637, 4,554,608
2225 Park Place
P.O. Box 9000
Minden, NV 89423 U.S.A.

PolyPhaser
CORPORATION
<http://www.polyphaser.com>

Count on a PolyPhaser®
and other U.S. and Foreign Patents Pending
Tel: (800) 325-7170
(702) 782-2511
Fax: (702) 782-4476

**** 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.
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.**



EnergyOnix

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

MAILING ADDRESS
P.O. Box 801

SHIPPING ADDRESS
1306 RIVER STREET

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.

TABLE OF CONTENTS

<u>TOPIC</u>	<u>PAGE</u>
MUST READ INSTALLATION BULLETIN	FRONT PAGE
SPECIFICATIONS.	1-3
Pulsar 250	1
Pulsar 500	2
Pulsar 1000	3
DESCRIPTION	4-5
General	4
Mechanical	4
Electrical	5
Installation Instructions	6-6A
Lightning Protection Kit Instructions	6A-6D
Preliminary Tuning	7-9
Pulsar Data Sheet (Installation Form)	8A
Normal Operation	10
Remote Control	11
PC-333B, Pulsar AM Remote Interface Bd.	12
PULSAR CABINET	
Pulsar 1000 AC Control Ladder	12A
Pulsar 1000 Cabinet and Connector Details	12B
Pulsar 1000 Cabinet Interconnect (Listing)	12C

Pulsar 1000 User Interface Connections	. . .	12C
Pulsar 1000 Cabinet Interconnect (Diagram)	. . .	12D
Pulsar 1000 Cabinet View (Front)	. . . .	13
Pulsar 1000 Cabinet View (Rear)	. . . .	14
Pulsar CB/Fuse/Meter Panel Component View (Front)		15
Pulsar CB/Fuse/Meter Panel Component View (Rear)	.	16
THEORY OF OPERATION	. . . . .	17
CONTROLLER DRAWER		
Component Layout	. . . . .	24
Interconnect Diagram	. . . . .	28
Non-PC Board Components	. . . . .	29
PC-521 Power Supply Crowbar Board.	. . .	31
PC-509 RF Detector/Enable.	. . . . .	33
PC-507 Control Panel Board (DC Control Ladder)		36
PC-508 Overload Board Schematic	. . .	40
PC-517 4X Recycle Bd.	. . . . .	43
PC-501 RF Exciter	. . . . .	46
PC-506 Audio/PDM Driver	. . . . .	50
PC-505A -72V Sample Bd.	. . . . .	56
PC-502 Intermediate Power Amp	. . . . .	59
PC-503 IPA Tuning Board.	. . . . .	62
PC-333B AM Remote Interface Bd.	. . . . .	65

PULSAR AMP MODULE

Component Layout	.	.	.	.	.	68
Components Not Heat Sink Mounted	.	.				72
PC-511 Modulator	.	.	.	.	.	74
PC-512 Final Modulation Assembly	.	.	.	.	.	77
PC-513 Low Pass Filter	.	.	.	.	.	80
PC-510 Power Amplifier	.	.	.	.	.	83

COMBINER DRAWER

Component Layout	.	.	.	.	.	86
Schematic Diagram	.	.	.	.	.	88
PC-520 Meter Amp/Relay Bd.	.	.	.	.	.	90
PC-515 Multimeter Bd.	.	.	.	.	.	93
PC-519 RF Current Sample Bd.	.	.	.	.	.	96
PC-518 RF Voltage Probe	.	.	.	.	.	99
PC-514 Directional Coupler PCB	.	.	.	.	.	102
PC-516A RF Relay Bd.	.	.	.	.	.	105
Active Devices and Fuses	.	.	.	.	.	108
Troubleshooting Power Amplifier	.	.	.	.	.	111

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).

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.

(OPTIONAL)
ENERGY-ONIX SUPPLIED PolyPhaser
SEE ACCOMPANYING PolyPhaser
INSTALLATION INSTRUCTIONS

(OPTIONAL)
ENERGY-ONIX SUPPLIED
RF TRANSFORMER
INSTALL PER
ACCOMPANYING INSTRUCTIONS

TO AC OUTLET
(115VAC)

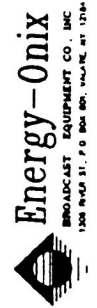
ENERGY-ONIX SUPPLIED
RG142U CABLE and FERRITE
INSTALL PER
ACCOMPANYING INSTRUCTIONS

RF OUT
RG142U CABLE

OUTPUT FROM TRANSMITTER
SEE ACCOMPANYING
INSTRUCTIONS

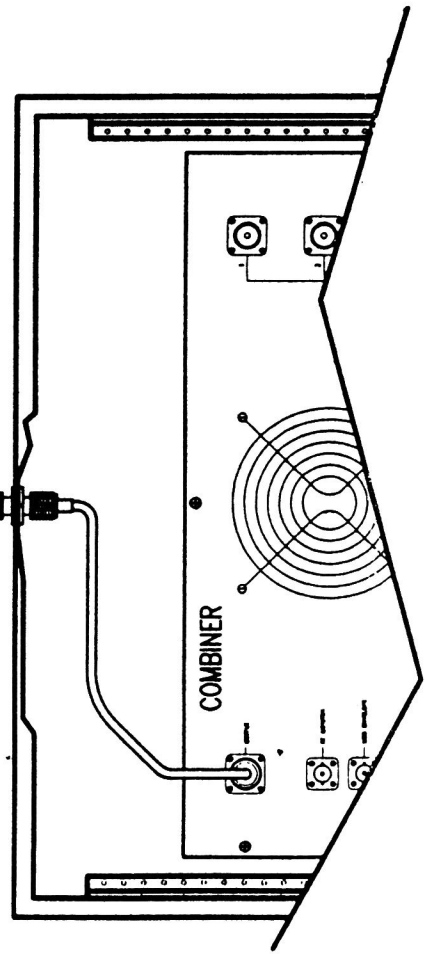
INPUT FROM TRANSMITTER
SEE ACCOMPANYING
INSTRUCTIONS

COPPER CENTRAL GROUND PLATE



PULSAR

LIGHTNING PROTECTION KIT



REAR VIEW OF TRANSMITTER

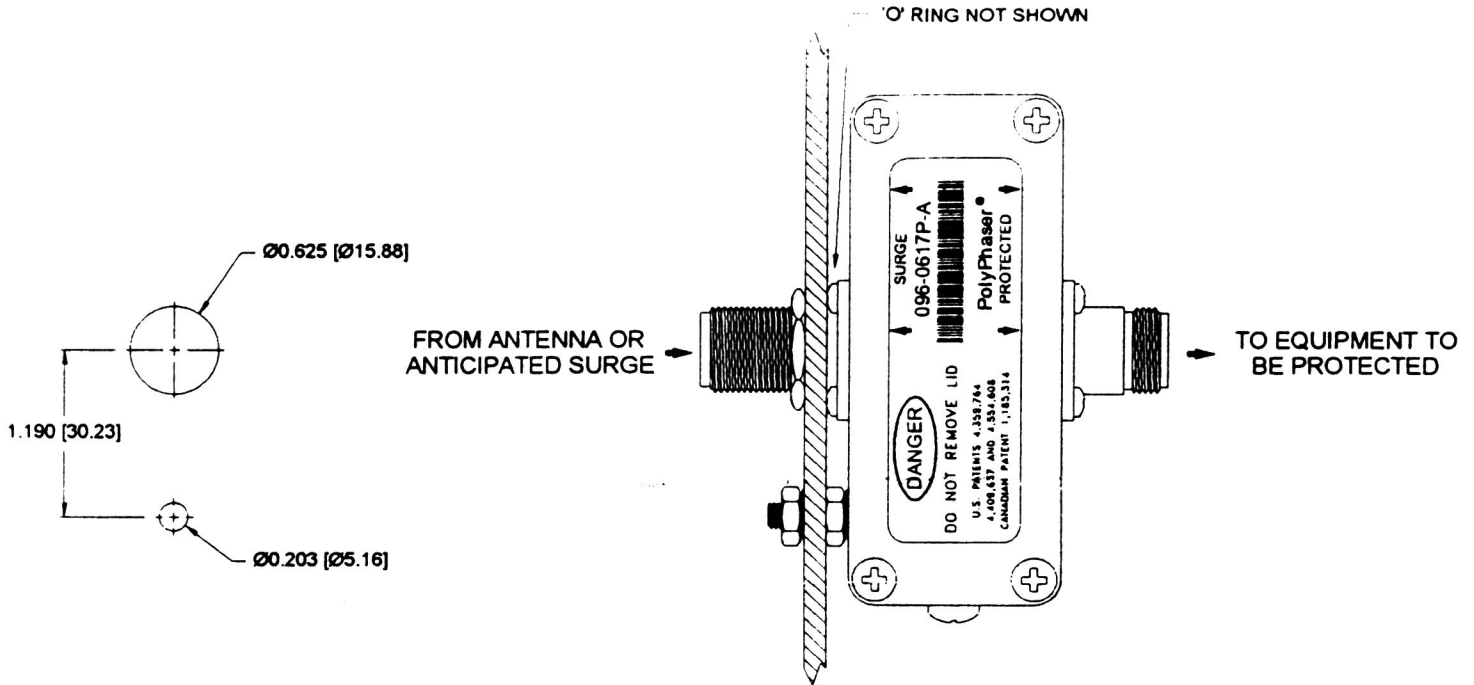
TO ANT.

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 GROUNDED 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, 4,409,637, 4,554,608

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

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

DANGER

PLEASE REVIEW THIS SHEET PRIOR TO ANY INSTALLATIONS.

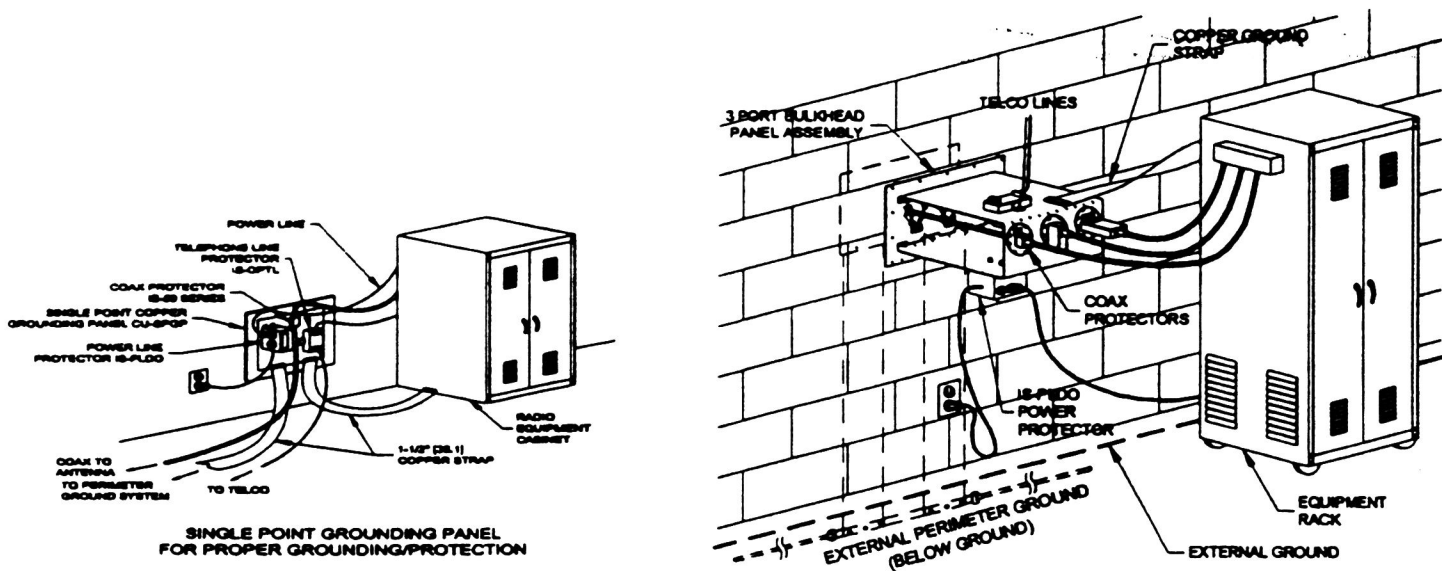
A GOOD GROUND SYSTEM IS REQUIRED FOR PROPER INSTALLATION AND OPERATION. THE IMPULSE SUPPRESSOR IS ONLY AS GOOD AT SUPPRESSING IMPULSES AS THE ELECTRICAL GROUND SYSTEM THAT IS CONNECTED TO THE UNIT.

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 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, 4,409,637, 4,554,608

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

PolyPhaser®

CORPORATION

<http://www.polyphaser.com>

Count on a PolyPhaser®

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

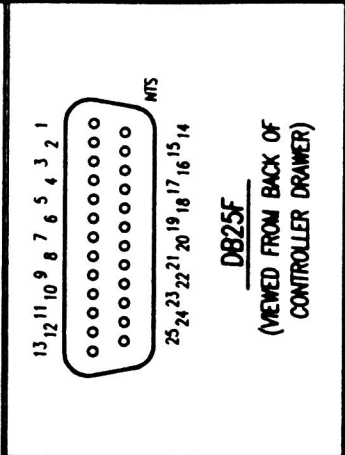
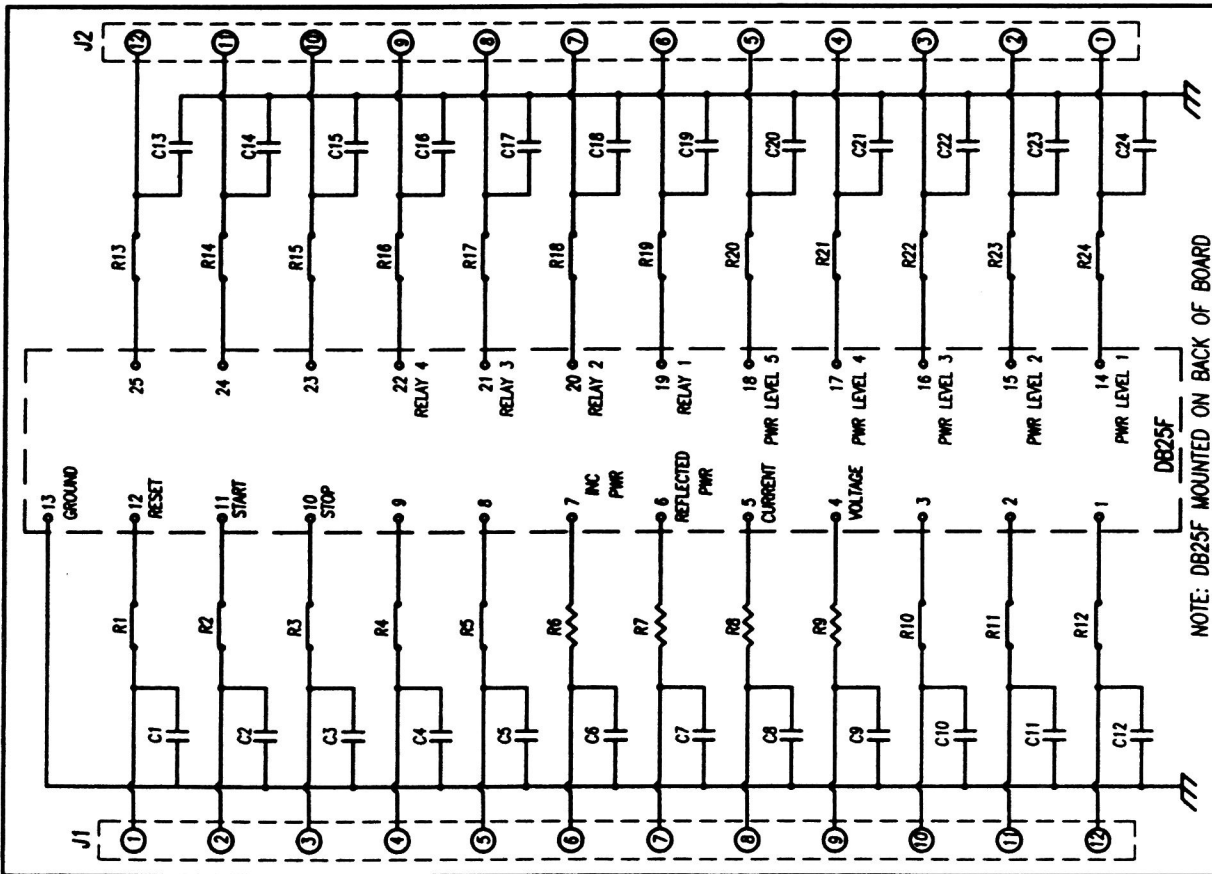
To Select Output Setting #3 – Connect momentary ground to terminal #16

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

<u>Parameter</u>	<u>Terminal # to Ground</u>
RF MODULE VOLTAGE	#4
TOTAL POWER SUPPLY CURRENT	#5
REFLECTED POWER	#6
INCIDENT POWER	#7



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

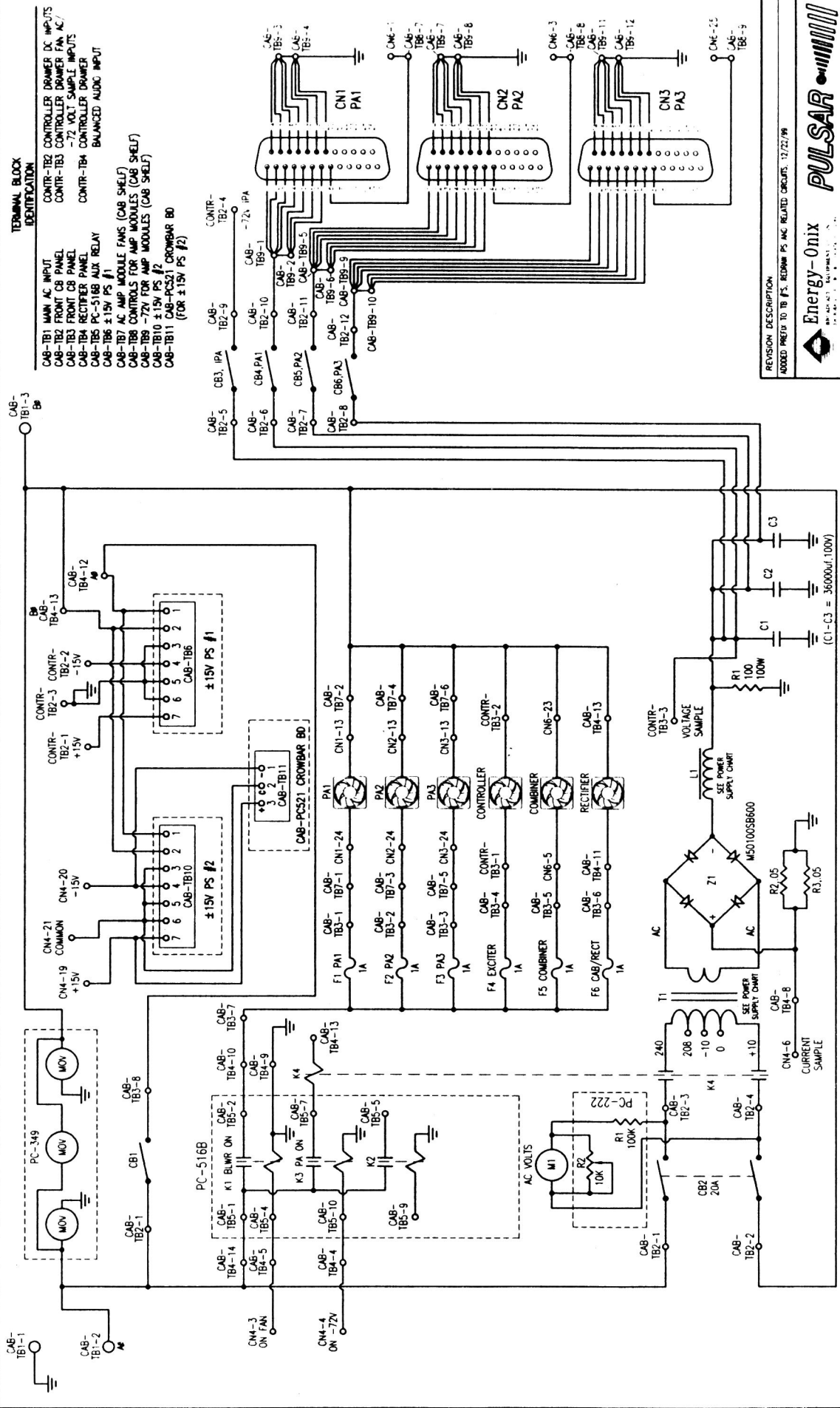
TITLE: PULSAR AM REMOTE INTERFACE BD., PC-333B SCHEMATIC DIAGRAM

DESIGNED BY: NDT	DATE: 6/18/99	DWG. BY: DMC	CHK'D: CKB
CHK'ED:	COO No. AM-2501S		AM-2501S

REVISION: **A**

REVISION DESCRIPTION:
 ROTATE DB25F &
 CHANGE NOTE OF DB25F, 07/20/99

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



TERMINAL BLOCK IDENTIFICATION

CAB-TB1 MAIN AC INPUT
 CONTR-TB2 CONTROLLER DRAWER DC INPUTS
 CONTR-TB3 CONTROLLER DRAWER FAN AC / -72 VOLT SAMPLE INPUTS
 CONTR-TB4 CONTROLLER DRAWER BALANCED AUDIO INPUT

CAB-TB2 FRONT CB PANEL
 CAB-TB3 FRONT CB PANEL
 CAB-TB4 RECIFIER PANEL
 CAB-TB5 PC-516B AUX RELAY
 CAB-TB6 ±15V PS #1
 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-PCS21 CROWBAR BD
 CAB-TB12 ±15V PS #2 (FOR ±15V PS #2)

REVISION DESCRIPTION
 MODEL PREP TO TB F5, REDRAW PS AND RELATED CIRCUITS, 12.22.79

Energy-Onix
 PULSAR

REVISION: **A**

SCALE: N/A
 DESIGNED BY: J.W.
 DATE: 09/23/79
 DRAWN BY: G.A.R.
 CHECKED BY: G.A.R.

TITLE: **PULSAR 1000 AC CONTROL LADDER / CABINET SCHEMATIC DIAGRAM**

CAD: AM-10003
 J/W
 G.A.R.
 AM-10005

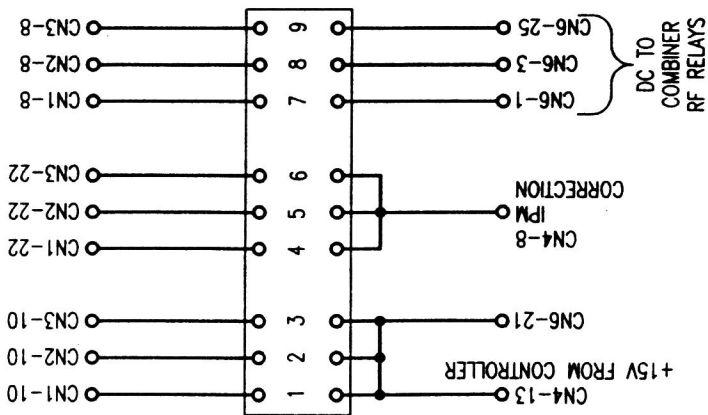
POWER SUPPLY CHART

	250W	500W	1000W	2500W
T1	376-129	376-127	376-125	376-031
L1	376-139	376-138	376-137	(2) x 376-137

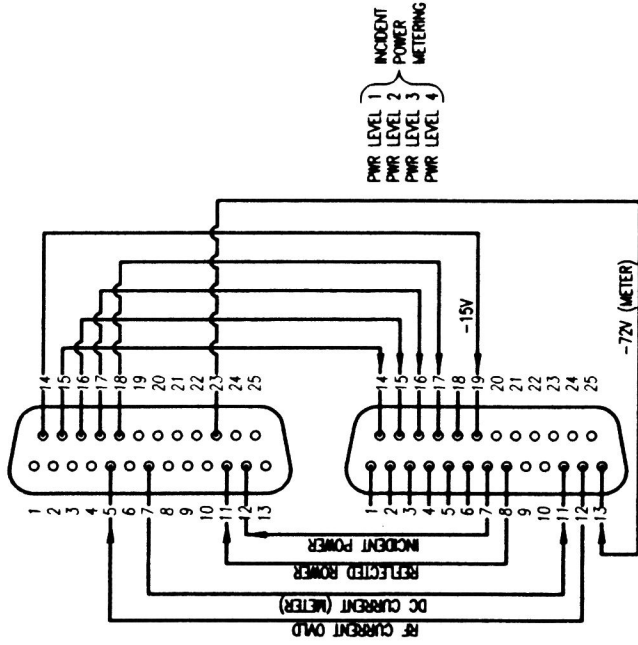
(C1-C3 = 36000uF, 100V)

D-SUB CONNECTOR IDENTIFICATION

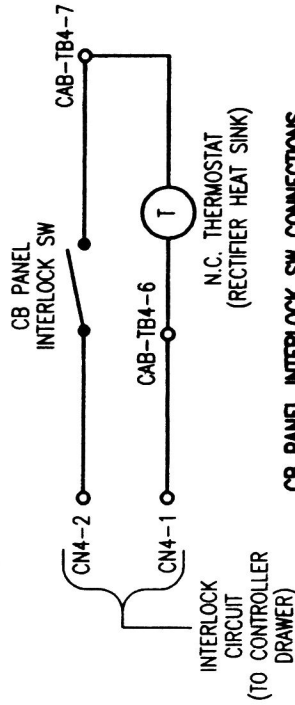
CONNECTOR	TO	JACK	LOCATION
CN1	AMP1-J1		AMPLIFIER MODULE #1
CN2	AMP2-J1		AMPLIFIER MODULE #2
CN3	AMP3-J1		AMPLIFIER #3
CN4	CONTR-J2		CONTROLLER DRAWER
CN5	CONTR-J3		CONTROLLER (REMOTE CONNECTIONS)
CN6	COMB-J4		COMBINER DRAWER



CN4 (TO CONTR-J2, CONTROLLER DRAWER)



CN6 (TO COMB-J4, COMBINER DRAWER)



PULSAR

PULSAR 1000 CABINET AND CONNECTOR DETAILS

REVISION:

REVISION DESCRIPTION:

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



TITLE:

DESIGNED BY: PJ
 DATE: 12/22/99
 DWG. BY: JWB
 DWG. No. AM-1003S
 CHECKED: JWB
 CAD: AM-1003S
 © JWB

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

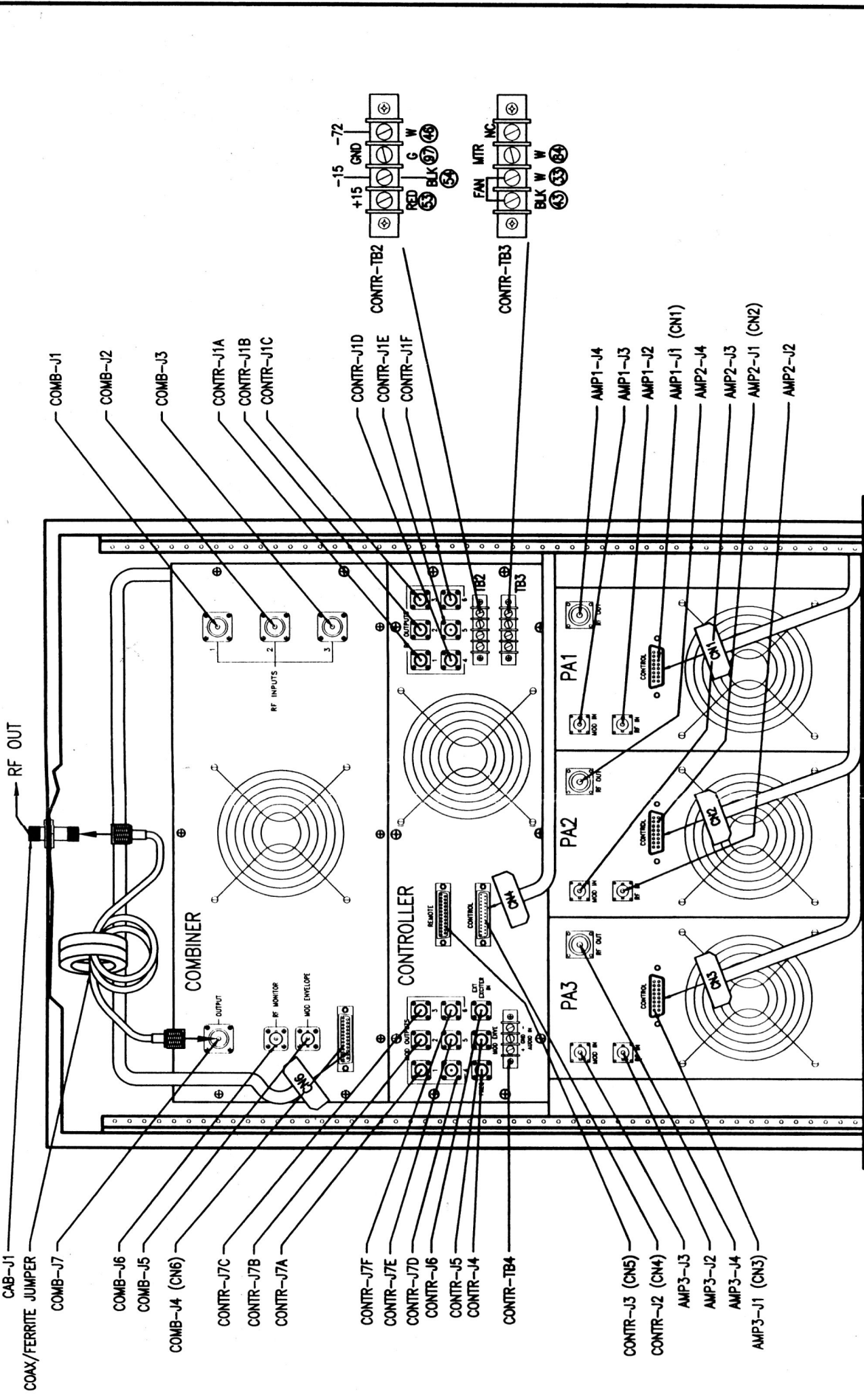
COMBINER: COMB-J6 RF MONITOR (TO STATION MODULATION MONITOR)

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

N.T.S.

PULSAR

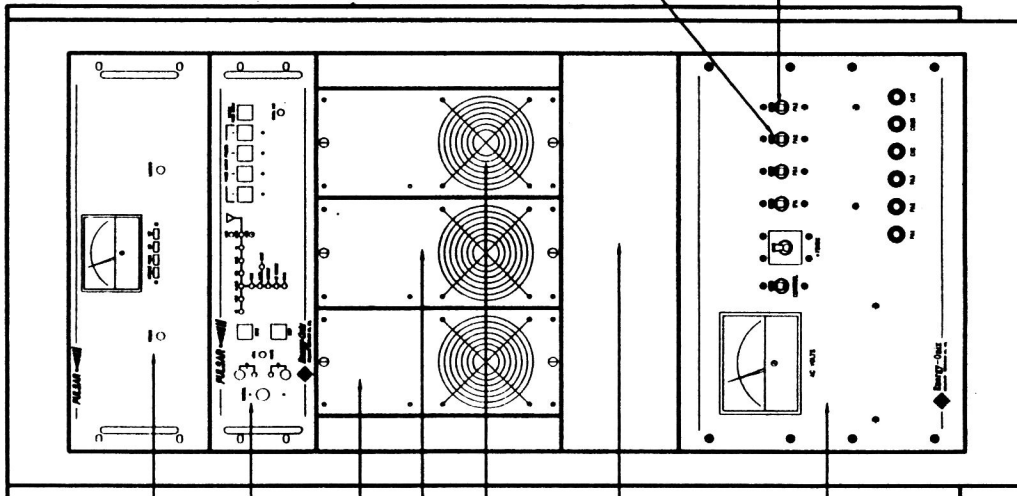
PULSAR 1000 CABINET INTERCONNECTIONS

SCALE: N.T.S.	DESIGNED BY: NDT / II	CHK BY: G.R.B.	DWG. NO: AM-0002A
CAD: AM-0002A			

DATE: 04/28/00

REVISION	DESCRIPTION
0	

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



COMBINER

CONTROLLER

PA1

PA2
USED ONLY IN PULSAR 500 and PULSAR 1000

PA3
ONLY USED IN PULSAR 1000

BLANK PANEL

CB/FUSE/METER PANEL
SEE DWG #00-701 FOR COMPONENT LAYOUT

USED ONLY IN PULSAR 500 and PULSAR 1000

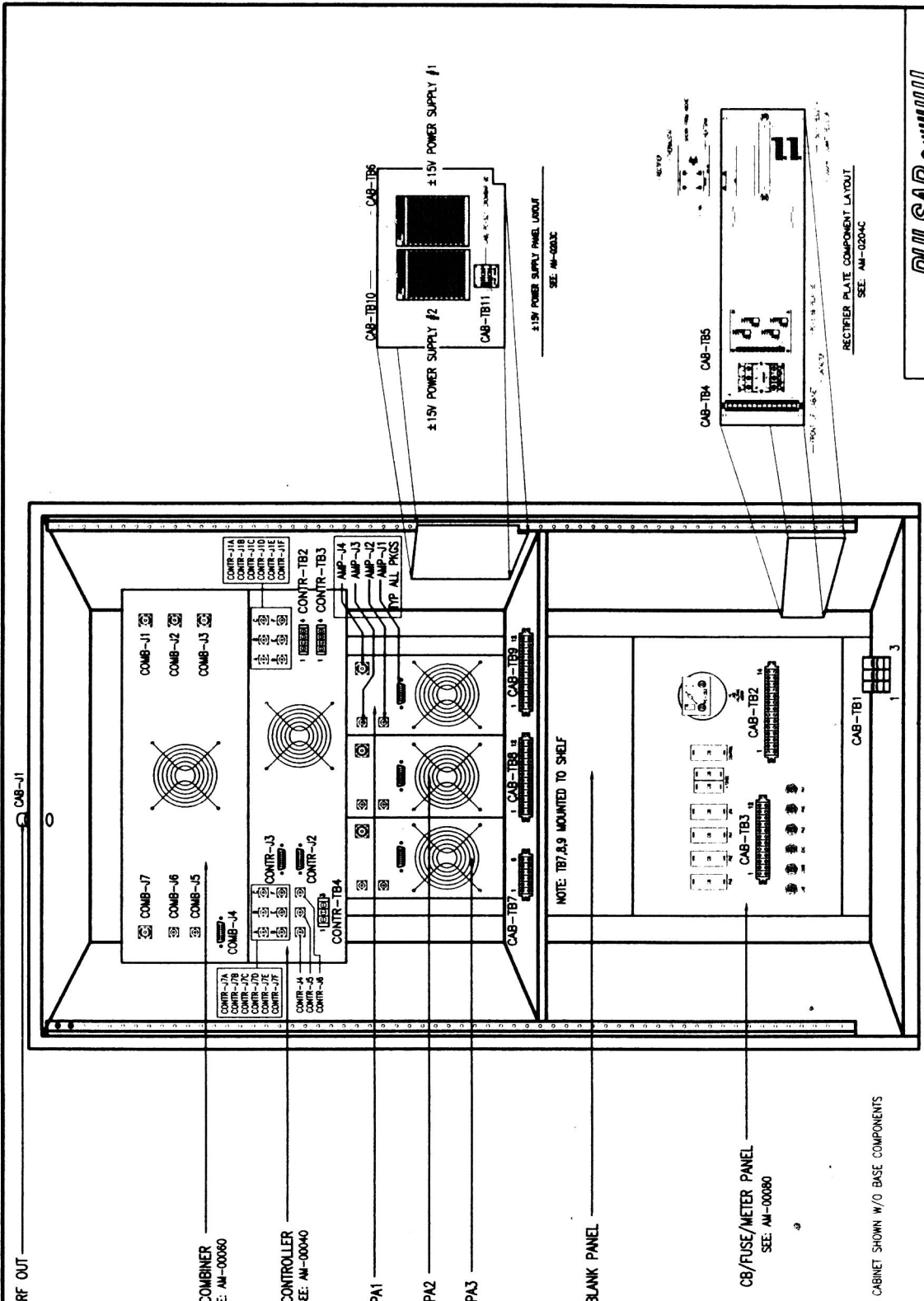
ONLY USED IN PULSAR 1000

PULSAR

TITLE: PULSAR 1000 CABINET VIEW (FRONT)

SCALE: NTS	DESIGNED BY: DATE: 07/19/76	DWG. NO.:
COP. AN-00010	NOT / II	REV. BY: GJB AM-00010

Energy-Onix
BROADCAST EQUIPMENT CO., INC.
1300 RIVER ST., P.O. BOX 801, VALAIE, NY 12184



RF OUT

COMBINER
SEE: AM-00060

CONTROLLER
SEE: AM-00040

PA1

PA2

PA3

BLANK PANEL

CB/FUSE/METER PANEL
SEE: AM-00080

NOTE: CABINET SHOWN W/O BASE COMPONENTS

PULSAR

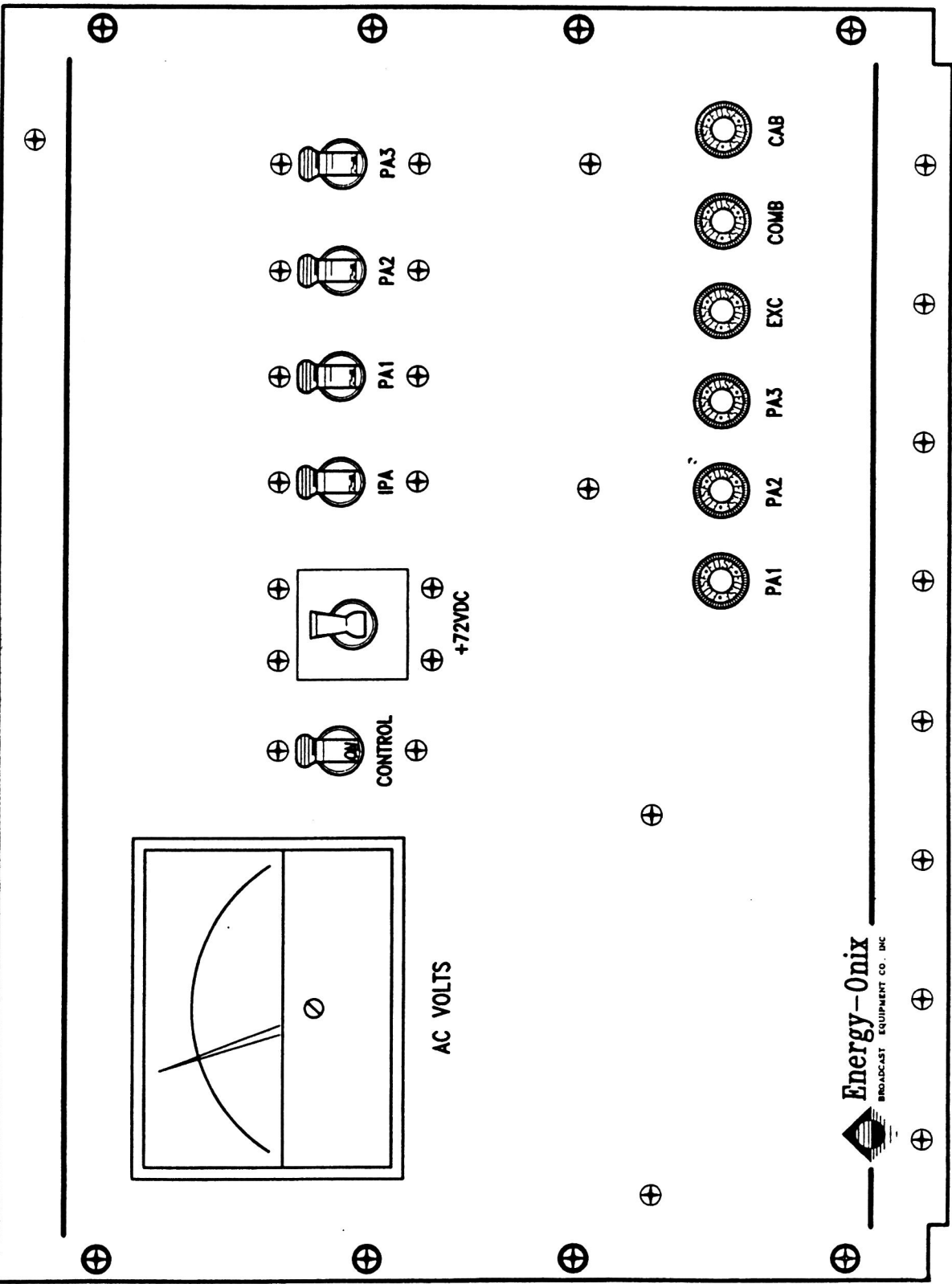
TITLE
PULSAR 1000 CABINET VIEW
(REAR)

REVISION
A

SCALE: NTS
DESIGNED BY: DATE: 07/06/99
DRAWN BY: G.B.B. AM-00020

REVISION DESCRIPTION:
UPDATED TERMINAL BLOCK AND HOLES CALLOUTS
EDITED COMB. CONTROL REAR PANELS. 11/5/99

Energy-Onix
BROADCAST EQUIPMENT CO., INC.
1508 HIVER ST., P.O. BOX 801, VALATE, NY 12184



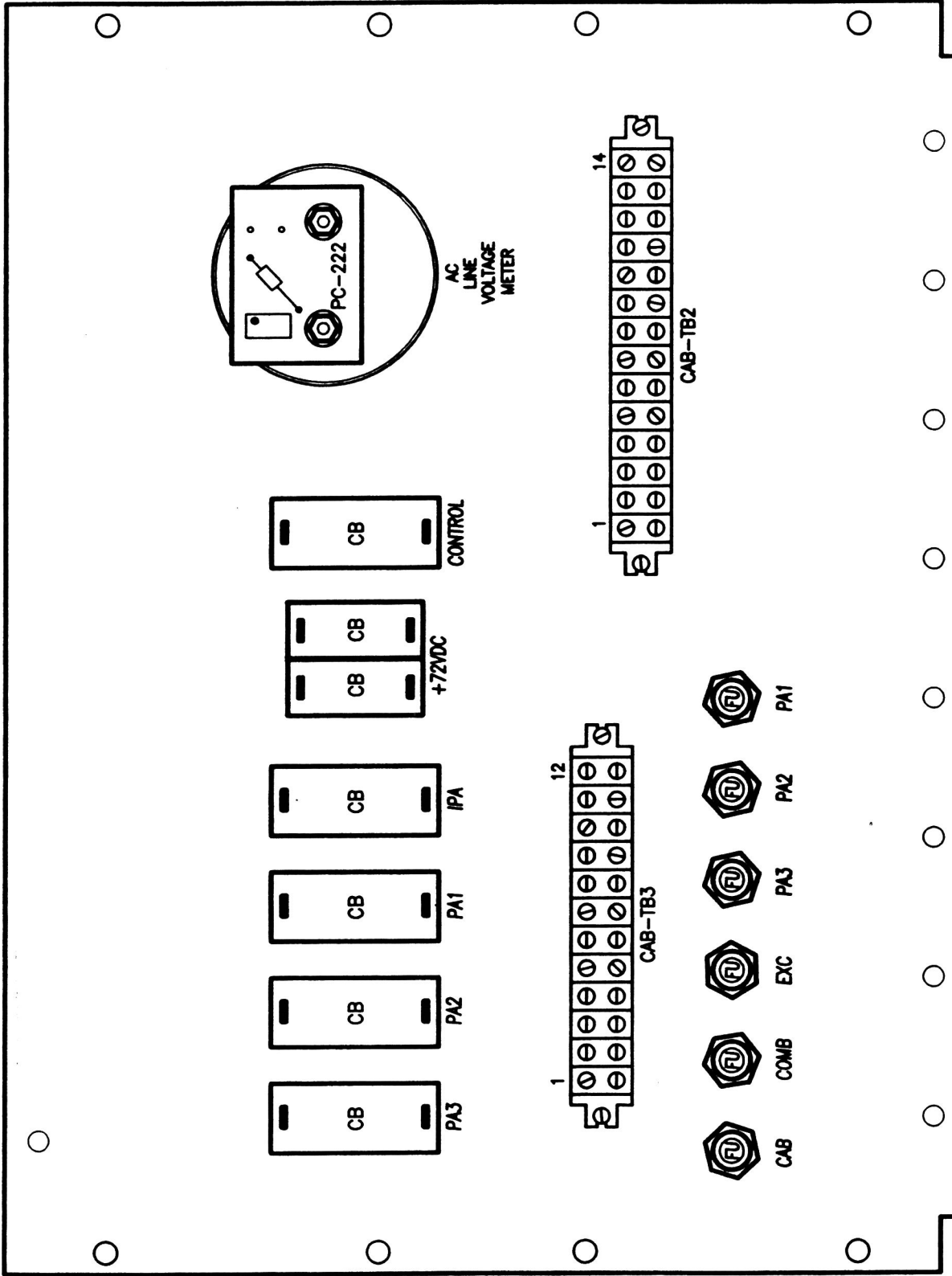
TITLE: PULSAR CB/FUSE/METER PANEL
 COMPONENT VIEW (FRONT)


DESIGNED BY: JW	DATE: 03/26/99	DWG. BY: CKB	DWG. No
CHK'ED:		CAD No. 00-700	00-700

REVISIONS:

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





 Energy-Onix BROADCAST EQUIPMENT CO., INC. 1306 RIVER ST., P.O. BOX 801, VALATIE, 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 CAD No: AM-00080	DWG BY: CKB DATE: 07/21/99 CAD No: AM-00080	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 +15V SUPPLIES. THE 220V AC POWER IS ALSO USED TO POWER THE COOLING FANS AND COIL OF -72V POWER SUPPLY CONTACTOR.

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

+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 +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

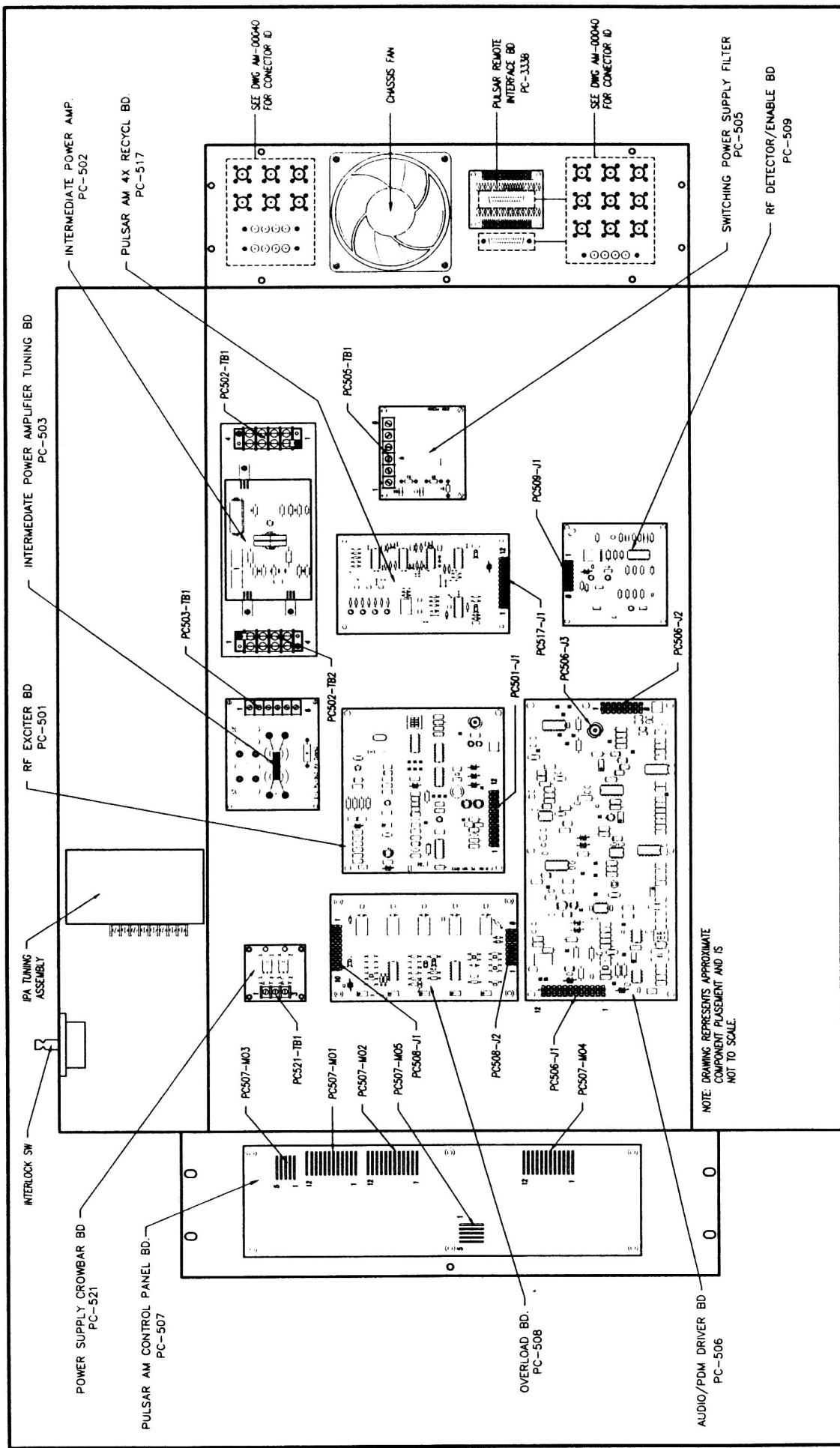
OHM OUTPUT IMPEDANCE IN THE COMB L1-L2-L3/COMB C1 NETWORK. COIL TAPS AND CONNECTIONS TO THE INPUT "N" JACKS ARE USED IN THE RF RELAY BOARD, PC-516A, TO PROVIDE FOR GOOD MATCHING IN A SITUATION WHEN ONE OF THE AMP MODULES IS "OFF". INDIVIDUAL B-SUPPLY VOLTAGE FROM EACH AMP MODULE ENERGIZES THE RESPECTIVE 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.

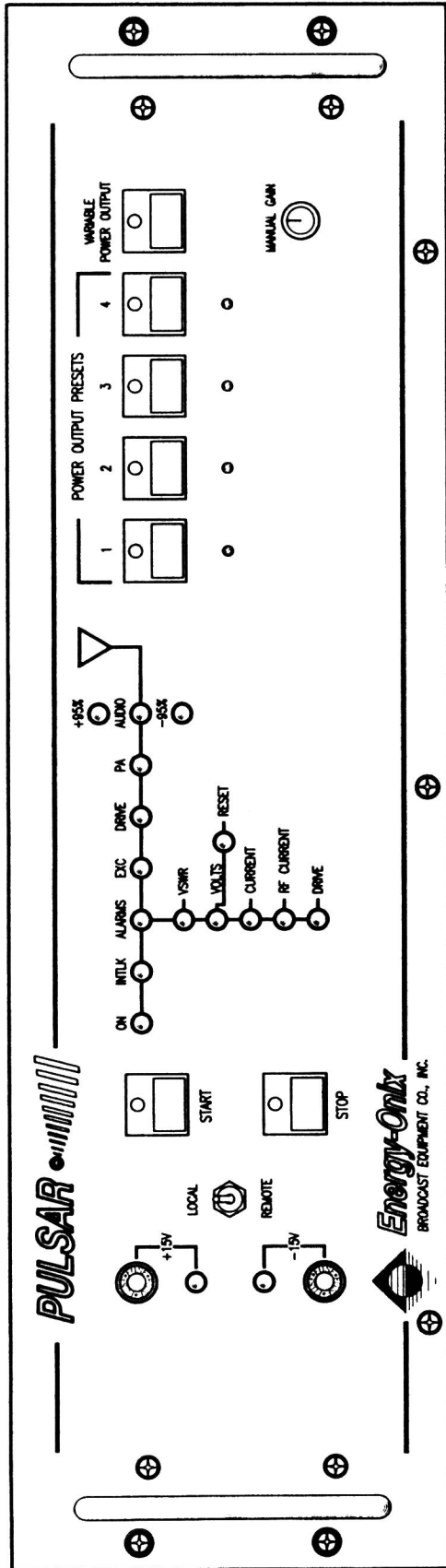
FROM THE OUTPUT TEE, THE RF IS COUPLED THROUGH BLOCKING CAPACITOR COMB-C5 AND SHUNTED BY RF CHOKE COMB-L8. THESE COMPONENTS AFFORD SOME MEASURE OF PROTECTION AGAINST LIGHTNING INDUCED TRANSIENTS.

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.



CHASSIS VIEWED FROM ABOVE

 Energy-Onix BROADCAST EQUIPMENT CO., INC. 1306 RIVER ST., P.O. BOX 801, WA-TRE, N.J. 12184	REVISION: <input type="checkbox"/>	TITLE: PULSAR AM EXCITER/CONTROLLER DRAWER COMPONENT LAYOUT
	DESCRIPTION:	SCALE: N.T.S. DATE: 2/24/94 DESIGNED BY: [Signature] DRAWN BY: [Signature]



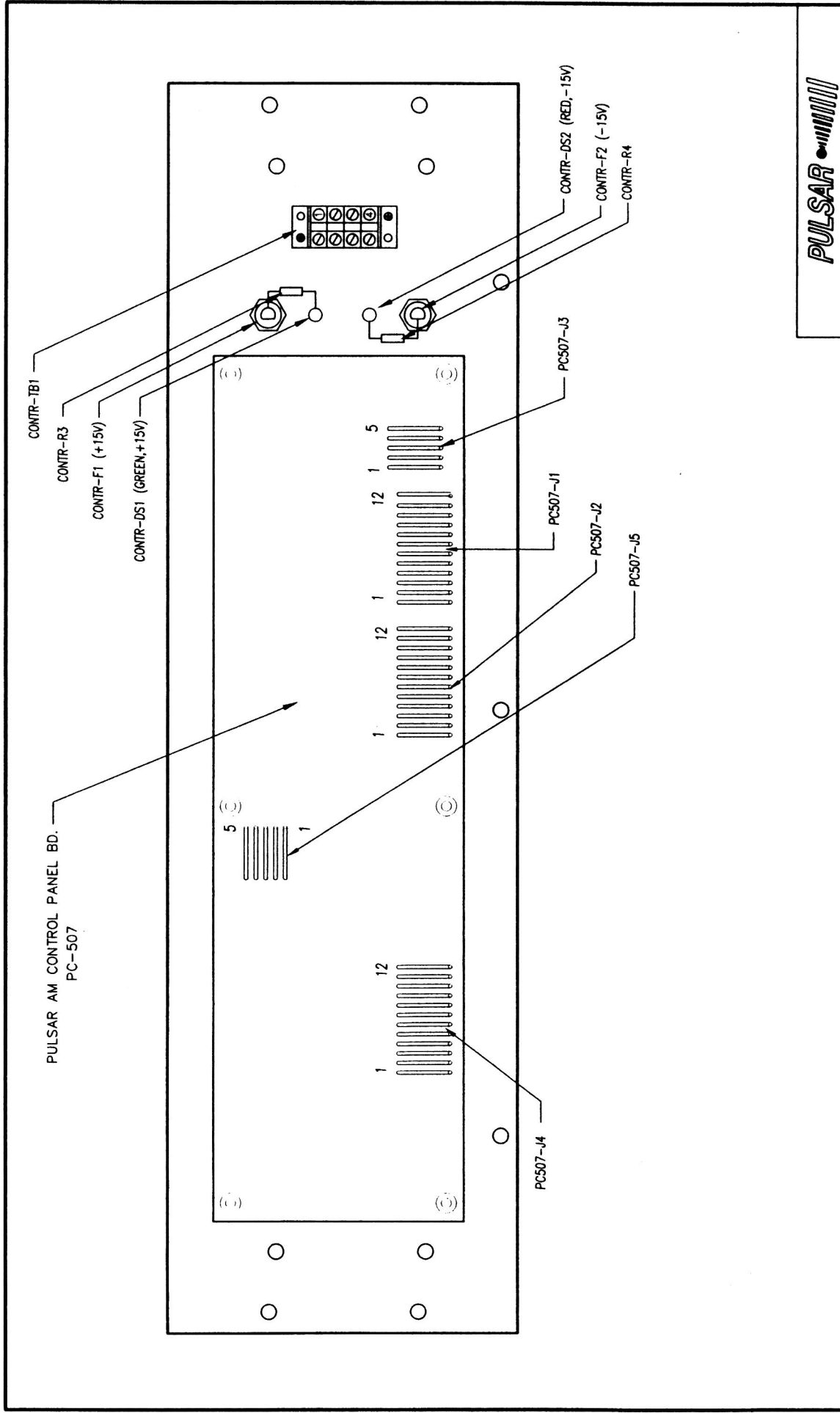
PULSAR

TITLE PULSAR 1000 CONTROL PANEL
FRONT PANEL VIEW

SCALE	NA	DESIGNED BY	DATE	DWG. BY
CAD	AM-00030	NDT	07/21/99	ESB
			Cr. By	AM-00030

Energy-Onix
BROADCAST EQUIPMENT CO., INC.
1305 PINE ST. P.O. BOX 800, VALA, N.J. 07144

REVISION:



PULSAR

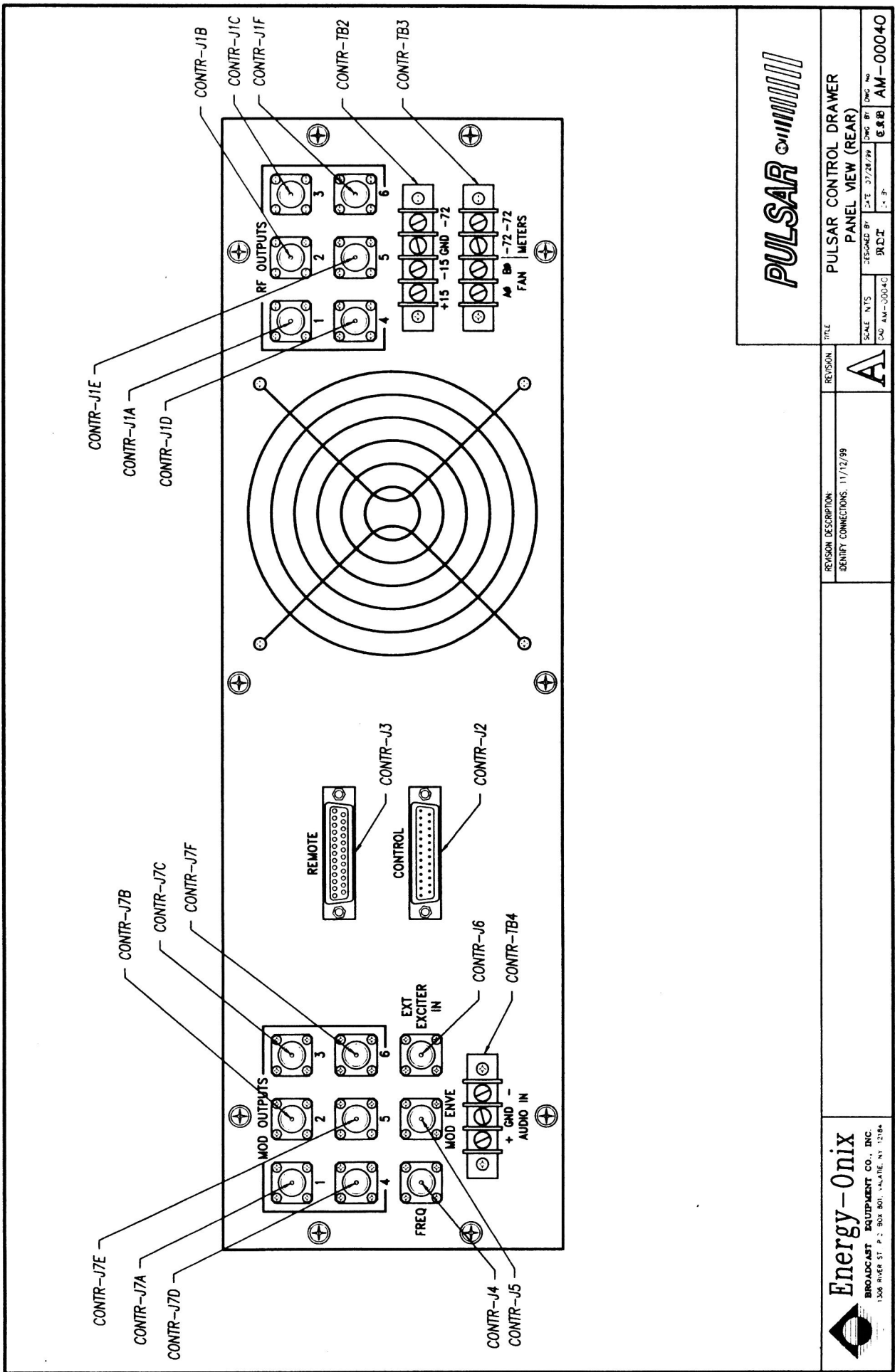
TITLE: PULSAR 1000 CONTROL DRAWER FRONT PANEL VIEW (INSIDE)

SCALE: N/A DESIGNED BY: DATE: 11/25/95 DWG. BY: CHECKED BY:


CAD: AM-00100 Cr. B1: Gr. B1: E.S.B. AM-00100

REVISION:

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



PULSAR

 Energy-Onix BROADCAST EQUIPMENT CO., INC. 1308 RIVER ST. P. O. BOX 801, VALHALL, NY 12164		REVISION DESCRIPTION: VERIFY CONNECTIONS. 11/12/99	REVISION: A	TITLE: PULSAR CONTROL DRAWER PANEL VIEW (REAR)
SCALE: NTS CAG: AM-0004C	DESIGNED BY: RDC	DATE: 3/28/79	DWG BY: DMC	AM-00040

PULSAR

PULSAR CONTROL DRAWER

REAR PANEL VIEW (INSIDE)

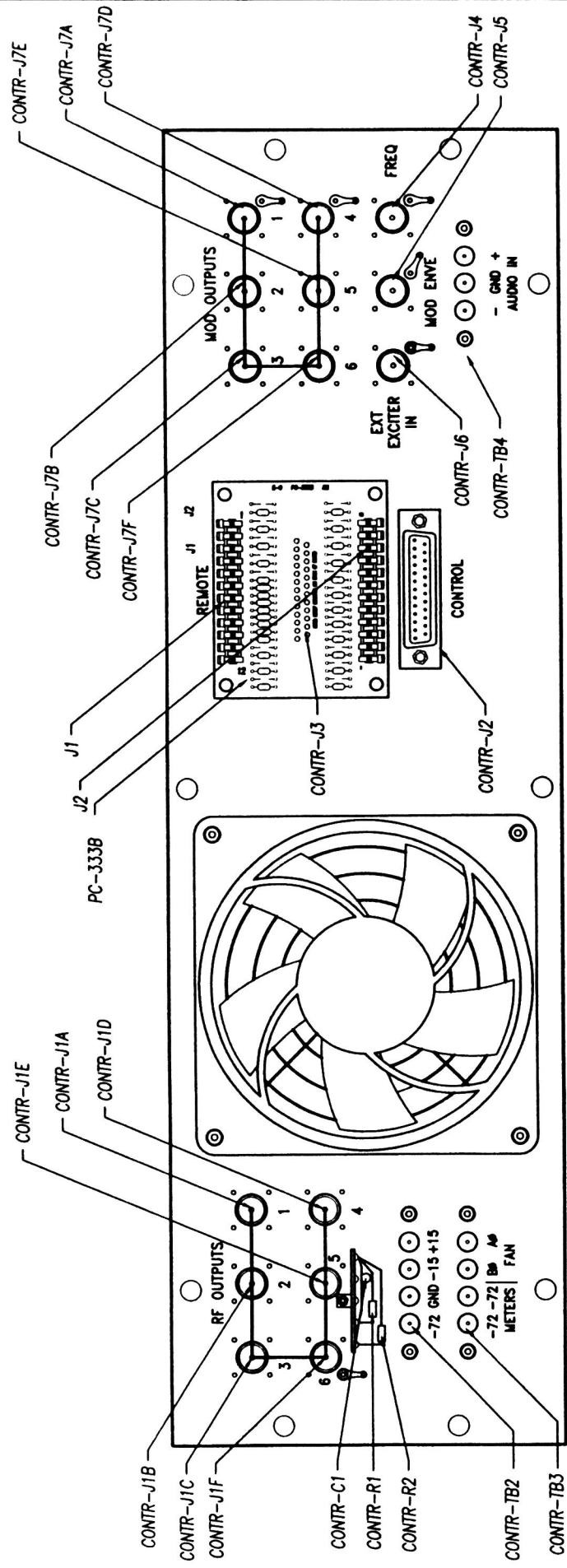
SCALE NTS	DESIGNED BY	DATE	CHK BY
CON AM-00090	ERB	11/28/78	ERB
CON AM-00090		AM-00090	

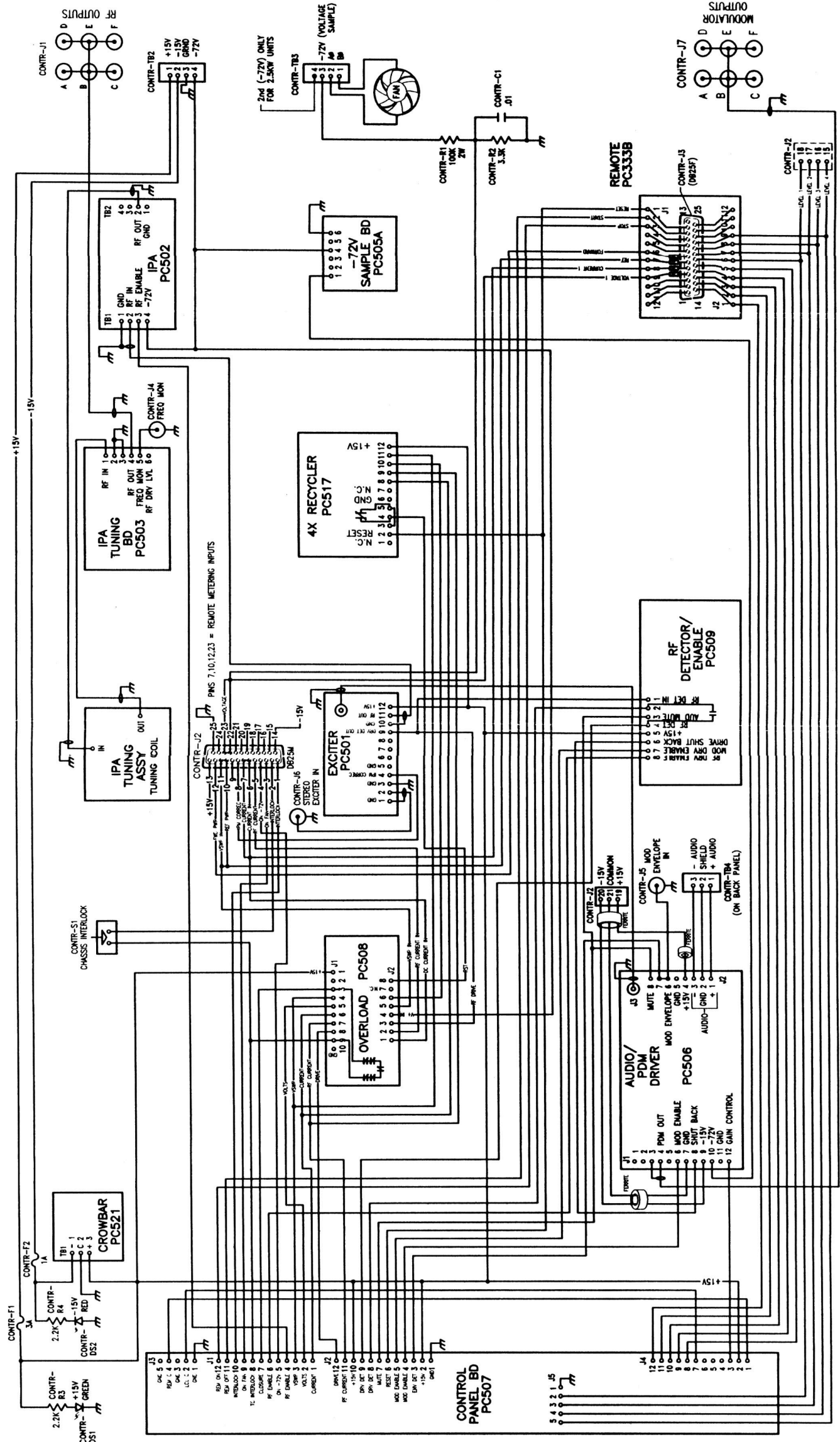
REVISION DESCRIPTION

REVISION	DESCRIPTION
1	

Energy-Onix

BROADCAST EQUIPMENT CO., INC.
1308 RIVER ST., P.O. BOX 801, VALATE, NY 12164



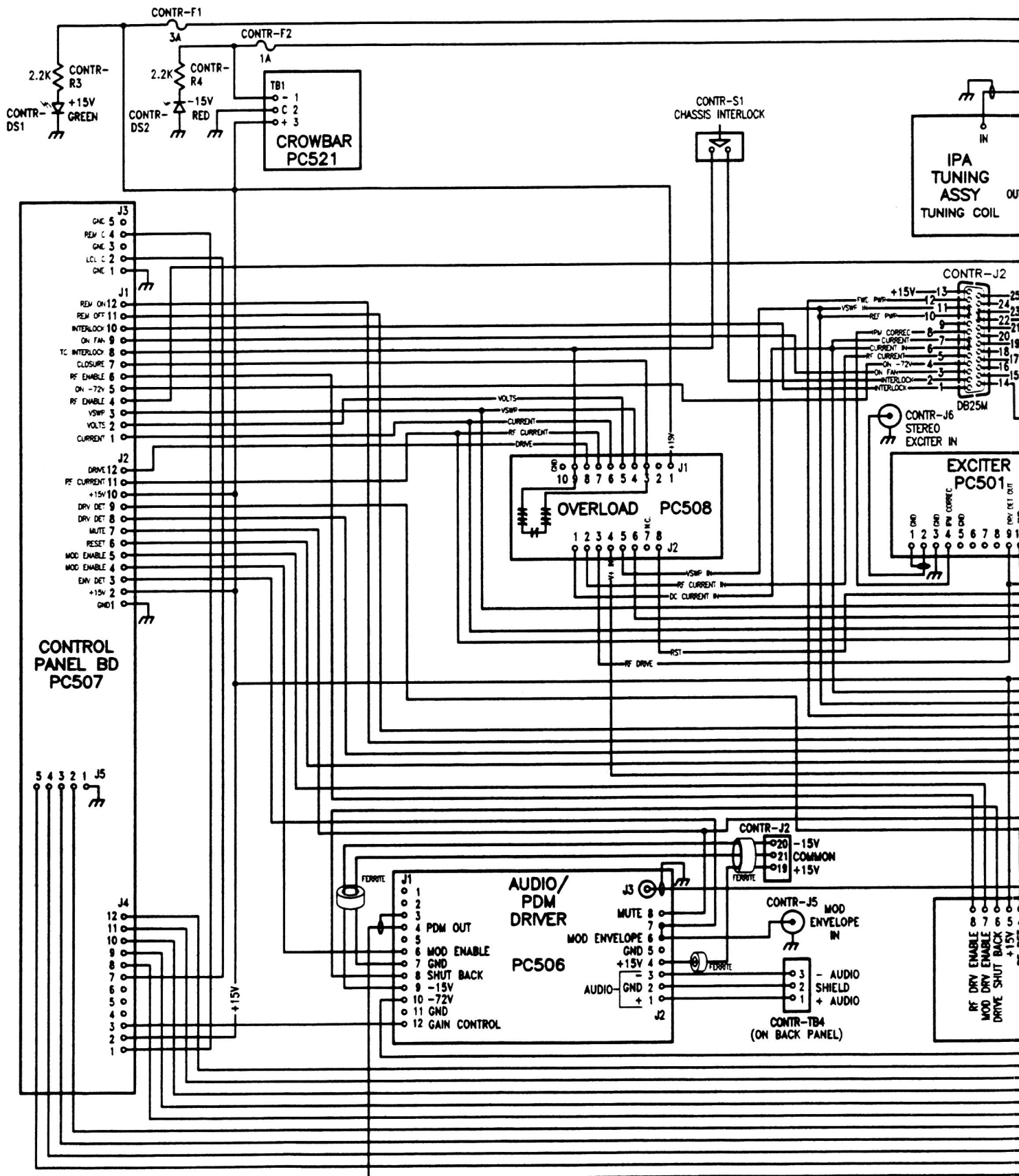


CONTROLLER DRAWER INTERCONNECT DIAGRAM

DESIGNED BY: DATE: 01/05/00 DWG. NO. AM-0001S
 SCALE: NA CAD: AH-0001S CK. BY:

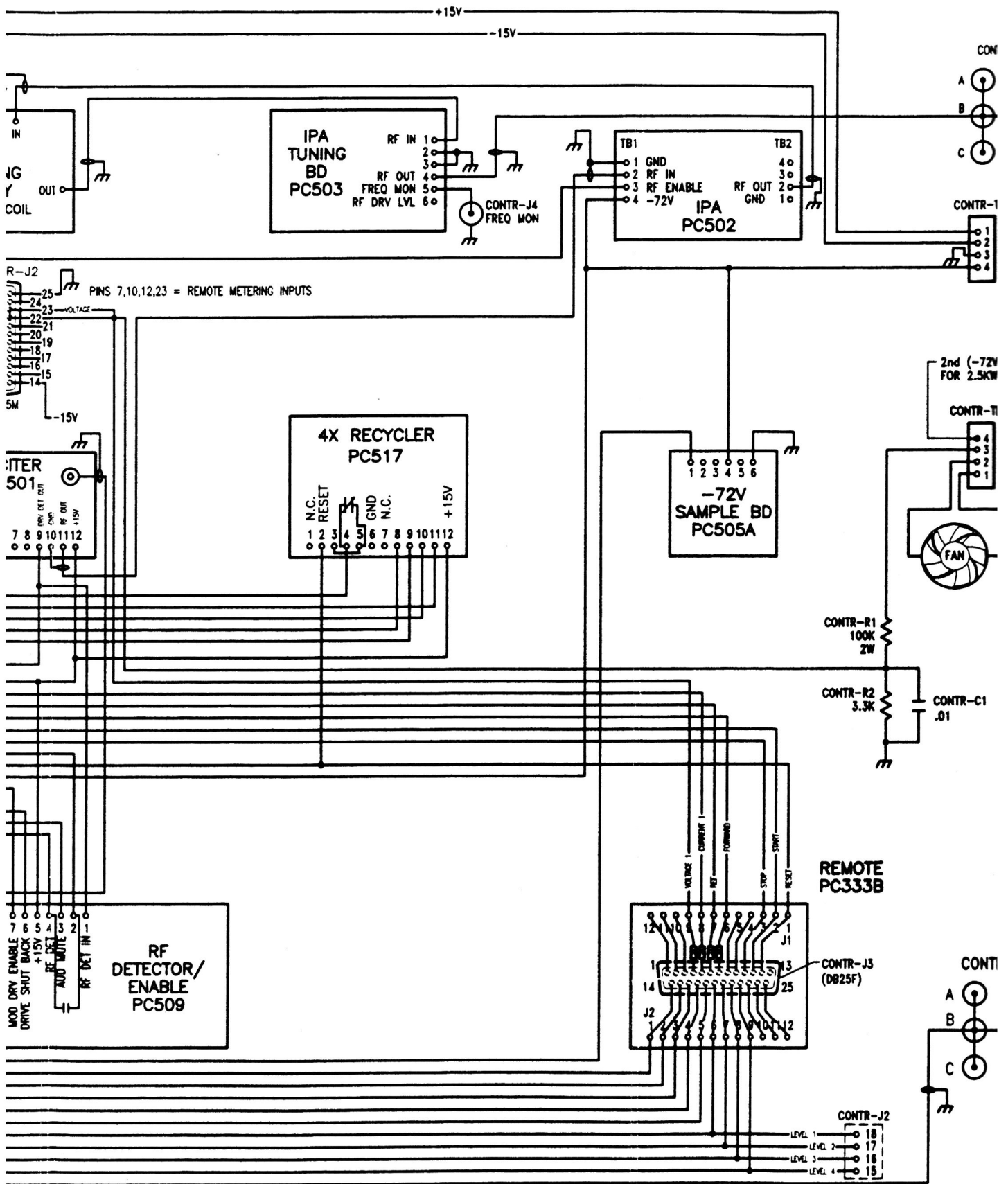


Energy-Onix
 BROADCAST EQUIPMENT CO. INC.
 1506 RIVER ST., P.O. BOX 801, VALATE, NY 12184



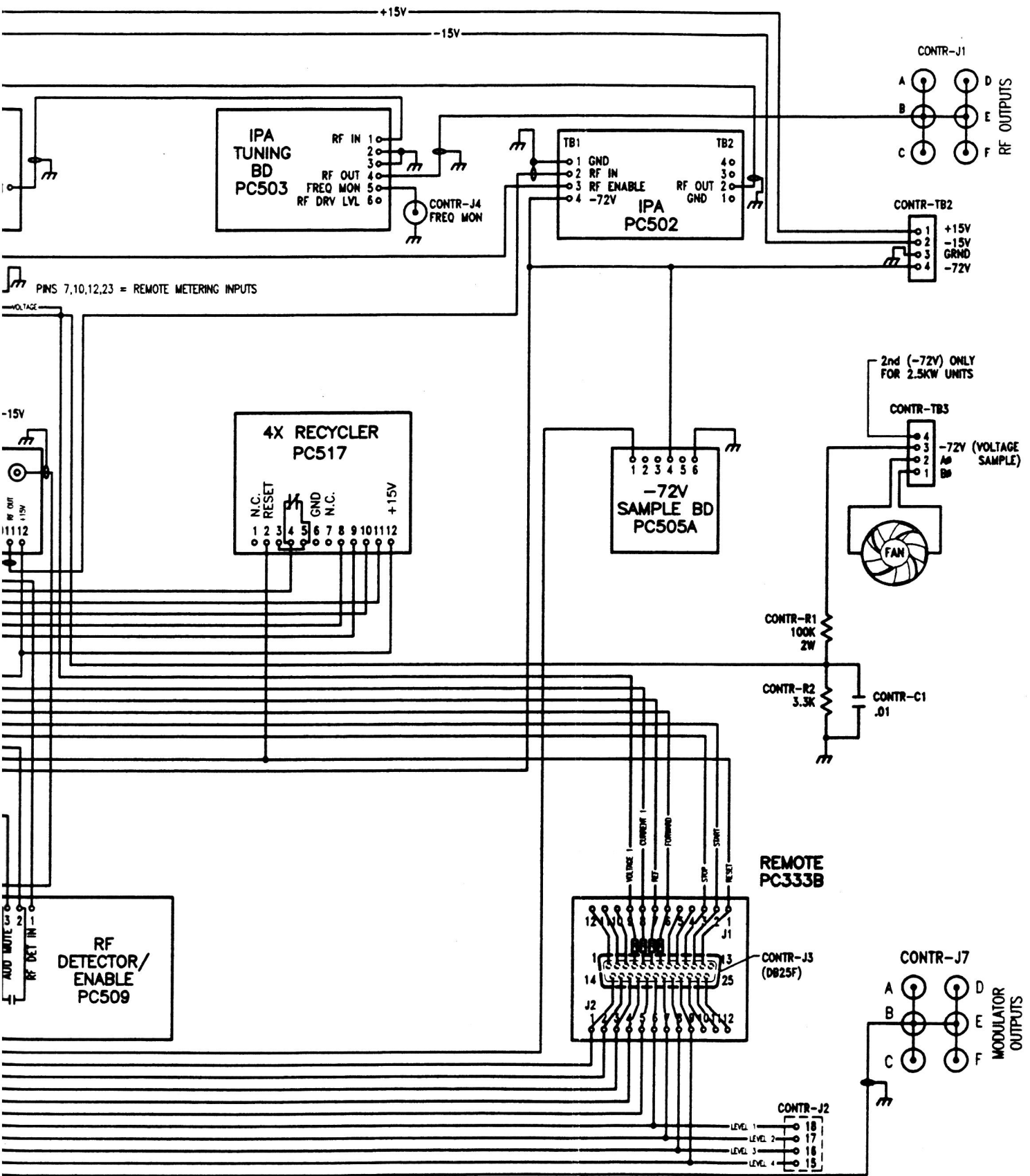
Energy-Onix

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



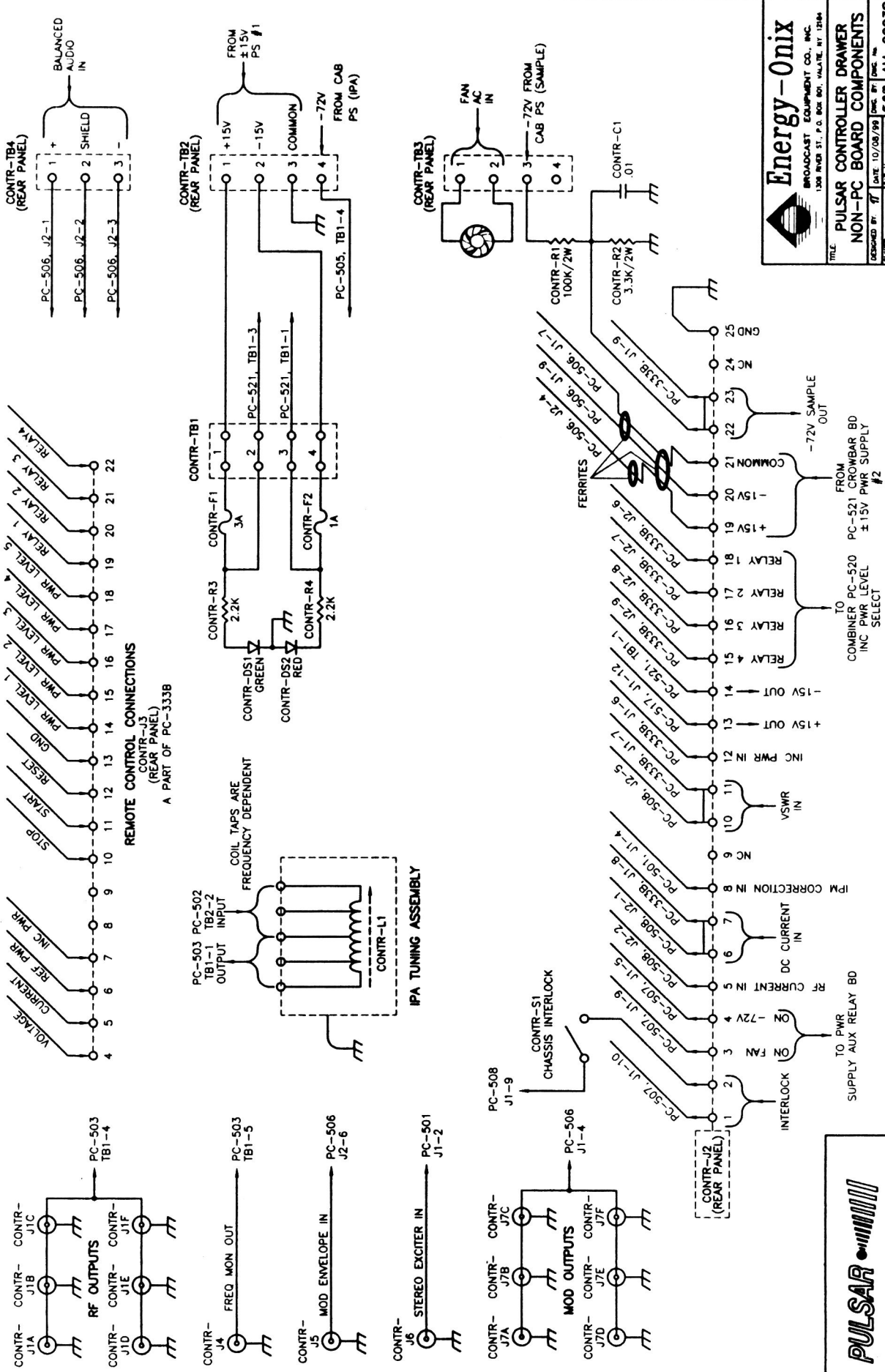
PULSAR

TITLE: CONTROLLER DRAWER INTERCONNECT DIAGRAM			
SCALE: NA	DESIGNED BY:	DATE: 01/05/00	DWG. BY:
CAD: AM-0001S	CK BY:		



TITLE: **CONTROLLER DRAWER INTERCONNECT DIAGRAM**

SCALE: NA	DESIGNED BY: <i>TT</i>	DATE: 01/05/00	DWG. BY: <i>ERD</i>	DWG. No. AM-0001S
CAD AM-0001S		CK BY:		



REMOTE CONTROL CONNECTIONS
 CONTR-J3
 (REAR PANEL)
 A PART OF PC-333B

Energy-Onix
 BROADCAST EQUIPMENT CO., INC.
 1308 N.W. 57 ST., P.O. BOX 801, VALTELE, FL 32784

PULSAR CONTROLLER DRAWER
NON-PC BOARD COMPONENTS

REVISION BY: **TF** DATE: 10/08/98
 DESIGNED BY: **TF** DATE: 10/08/98
 CHECKED BY: **TF** DATE: 10/08/98
 DRAWING NO.: **AM-0903S**

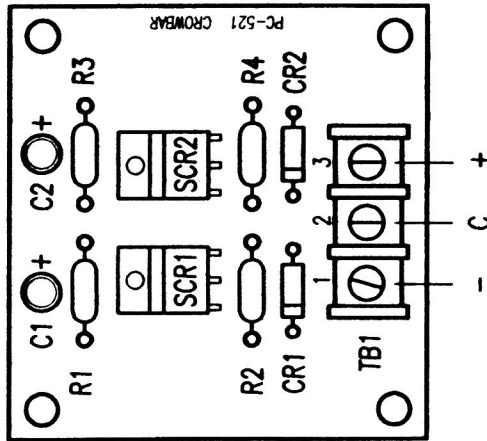
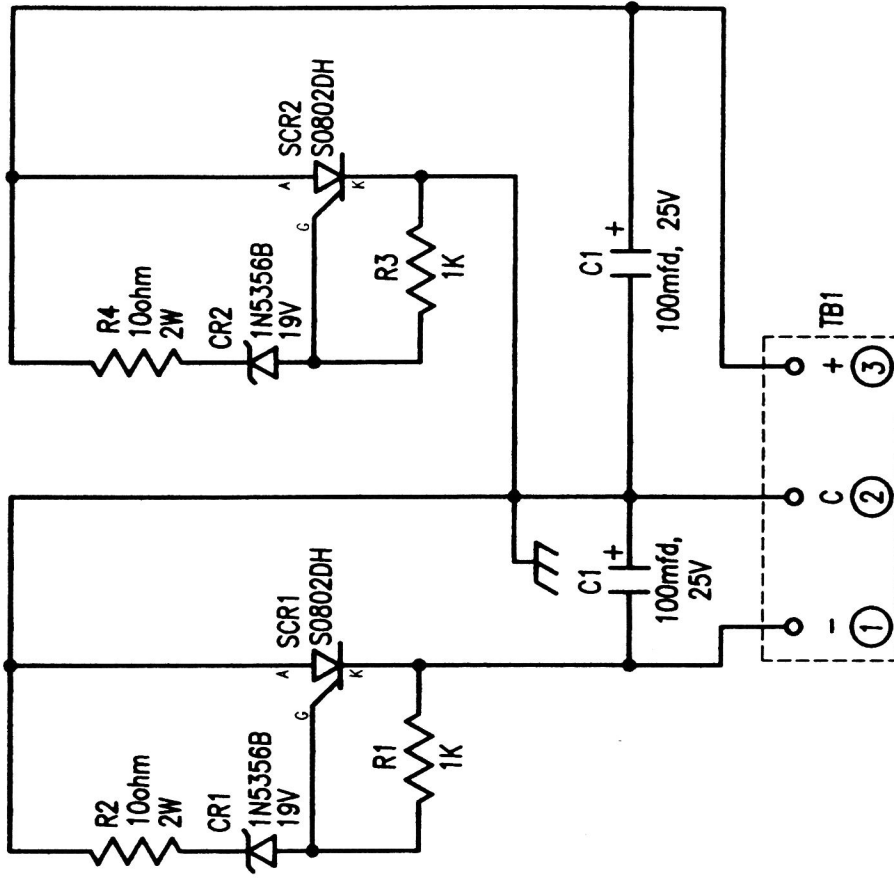
PULSAR

PULSAR CONTROLLER DRAWER

NON - PC BOARD COMPONENTS

PARTS LIST

CONTR C1	.01 μ F/1KV DISC CERAMIC	
CONTR DS1	LED, GREEN	
CONTR DS2	LED, RED	
CONTR F1	FUSE, 3A	
CONTR F2	FUSE, 1A	
CONTR J1A-J1F,)		
CONTR J4-J6,)	BNC FEMALE	
CONTR J7A-J7F)		
CONTR J2	DB 25, MALE	
CONTR J3	DB 25, FEMALE	
CONTR L1	IPA TUNING ASSEMBLY	
CONTR R1	100K, 2W	
CONTR R2	3.3K, 2W	
CONTR R3, R4	2.2K, 1/4W	
CONTR S1	INTERLOCK SWITCH	MICRO SWITCH DM401
CONTR TB1	4 POSITION BARRIER, 15A	
CONTR TB2,TB3	4 POSITION CHASSIS MOUNT, 20A	
CONTR TB4	3 POSITION CHASSIS MOUNT, 20A	



REVISION DESCRIPTION:

REVISION:	TITLE:
□	POWER SUPPLY CROWBAR BD
	PC-521 COMPONENT LAYOUT
DESIGNED BY: NDT	DATE: 5/19/99
CHK'D: CKB	DWG. BY: CKB
CAD NO: AM-0202C	AM-0202C

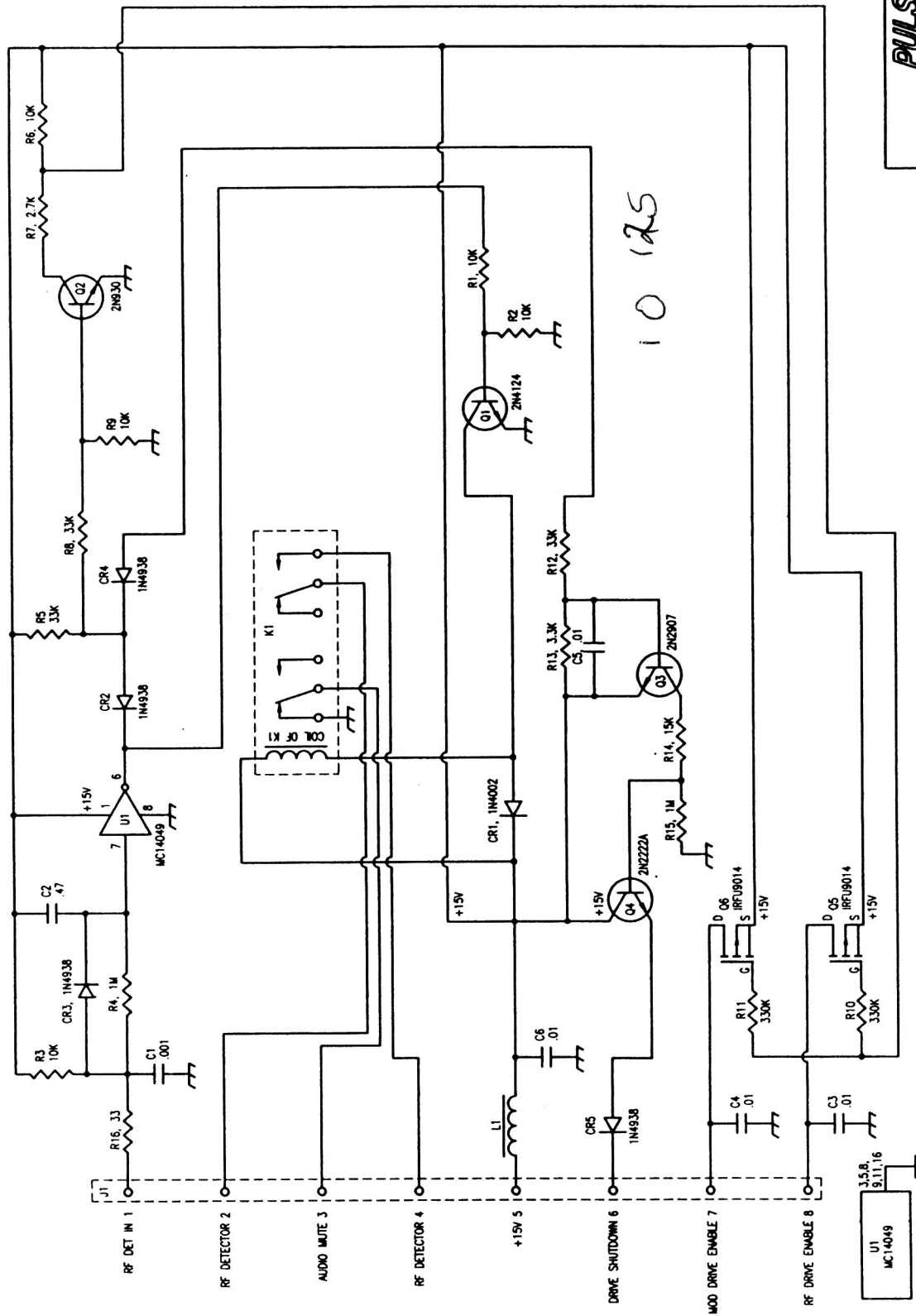
REVISION:	TITLE:
□	POWER SUPPLY CROWBAR BD
	PC-521 COMPONENT LAYOUT
DESIGNED BY: NDT	DATE: 5/19/99
CHK'D: CKB	DWG. BY: CKB
CAD NO: AM-0202C	AM-0202C

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

PC- 521 + 15V PS CROWBAR BOARD

PARTS LIST

C1, C2	100μF, 25V ELECTROLYTIC
CR1, CR2	1N5356B 19V ZENER
R1, R3	1K, 1/4W
R2, R4	10ohm, 2W
SCR1, SCR2	50802DH
TB1	3 POSITION, PC MOUNT



PULSAR

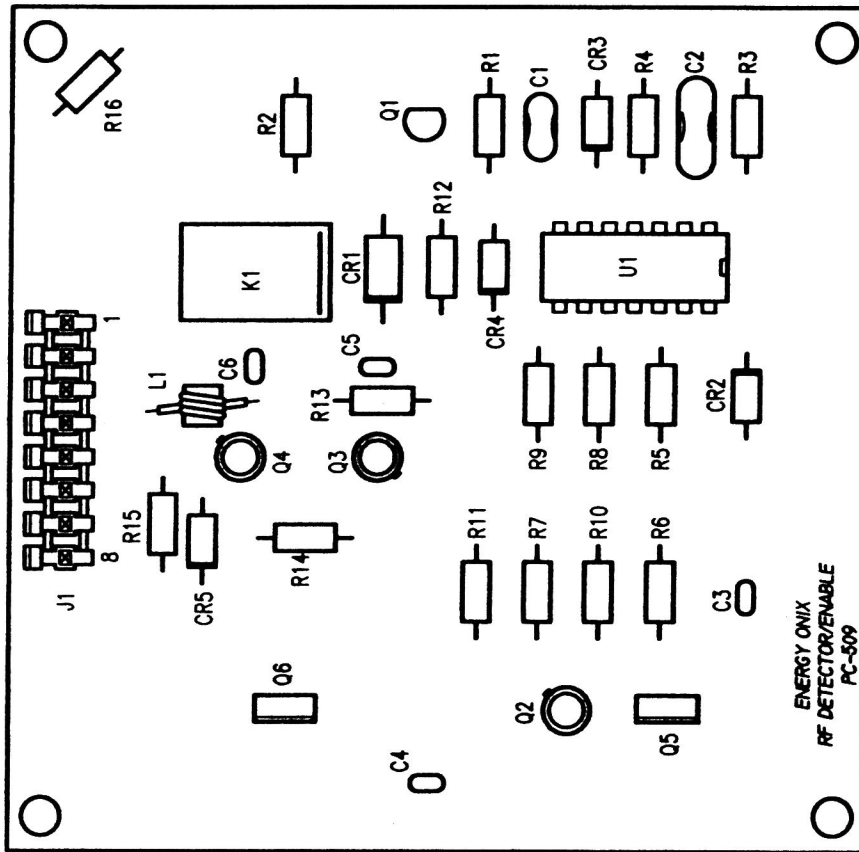
RF DETECTOR / ENABLE
(PC-509)

REVISION:

REVISION DESCRIPTION:

SCALE: NA	DESIGNED BY: DATE: 02/24/79	DRAWN BY: DATE: 02/24/79
CAD: AH-10023	MDT / II	OR: EF
		REV. NO: AM-10025

Energy-Onix
BROADCAST EQUIPMENT CO., INC.
1300 RIVER ST., P. O. BOX 901, VALHALLA, NY 12164



PULSAR

TITLE: RF DETECTOR/ENABLE PCB COMPONENT LAYOUT (PC-509)	
DESIGNED BY: NDT	DATE: 5/12/99
CHK'D:	DWG. BY: DWG. No
	CAD: AM-1002C
	AM-1002C

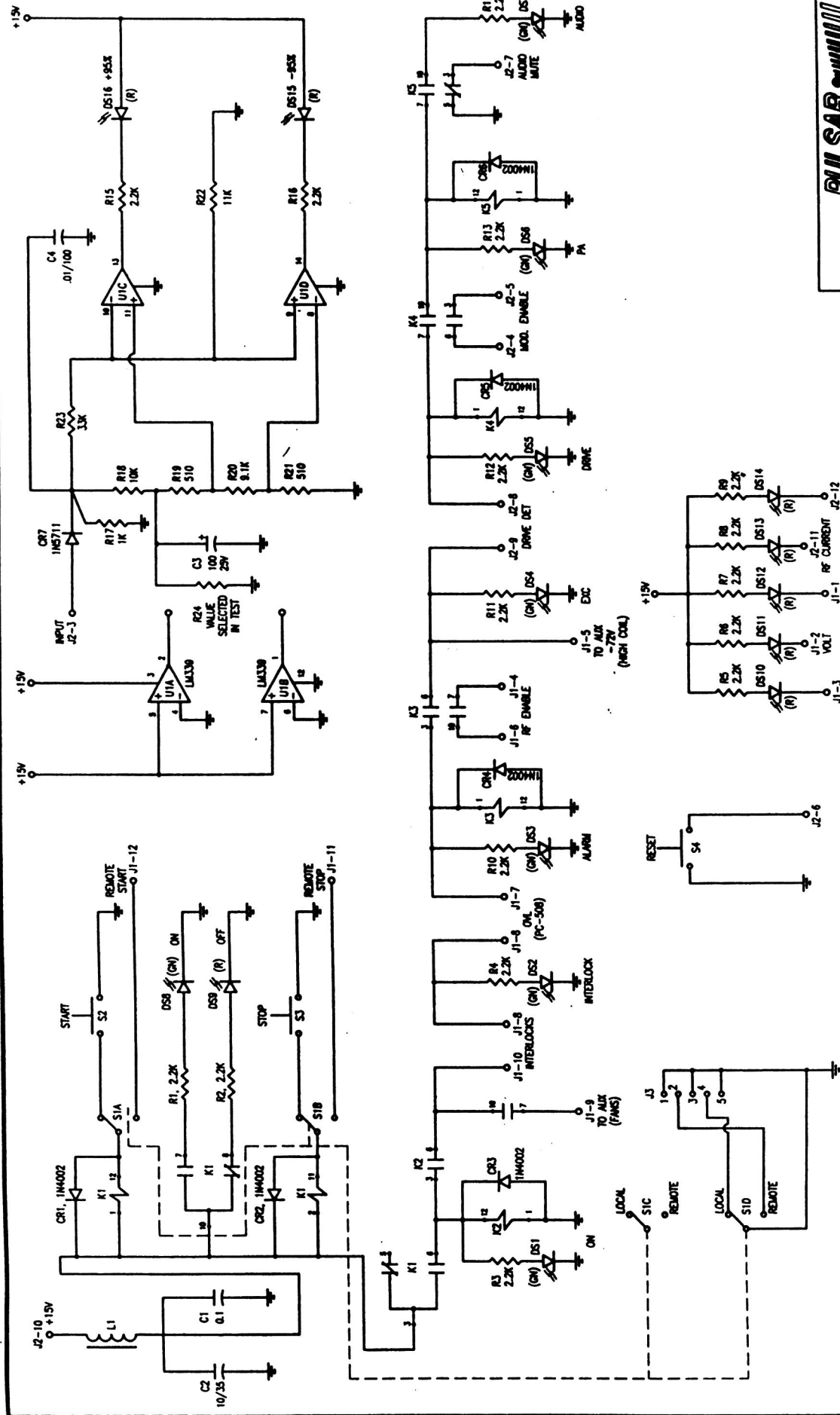
REVISION DESCRIPTION:	REVISION: <input type="checkbox"/>
-----------------------	------------------------------------

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

PC - 509 DETECTOR/ENABLE

PARTS LIST

C1	.001 μ F/1KV DISC CERAMIC	
C2	.47 μ F/100V METAL POLY	EF1474
C3-C6	.01 μ F/100V MONO. CERAMIC	P4904
CR1	1N4002	
CR2-CR5	1N4938	
J1	8-PIN MOLEX HEADER	
K1	AROMAT, NON-LATCHING	
L1	FERRITE BEAD	21-129B
Q1	2N4124	
Q2	2N930	
Q3	2N2907	
Q4	2N2222A	
Q5,Q6	IRFU9014	
R1,R2,R3,R6,R9	10K, 1/4W	
R4,R15	1M,1/4W	
R5,R8,R12	33K, 1/4W	
R7	2.7K, 1/4W	
R10,R11	330K, 1/4	
R13	3.3K, 1/4W	
R14	15K, 1/4W	
R16	33 OHMS, 1/4W	
U1	MC14049	
XU1	16-PIN IC SOCKET	



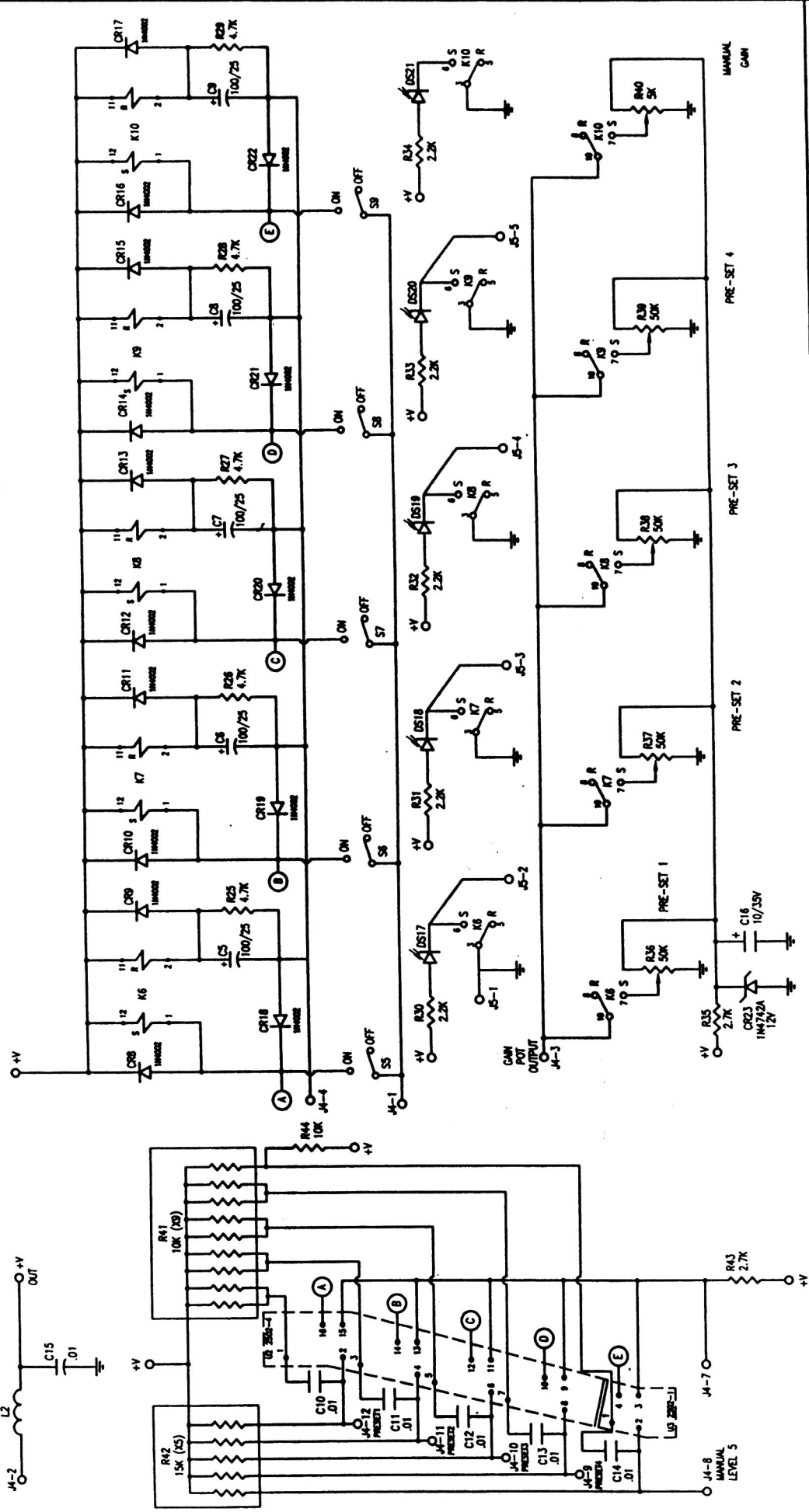
PULSAR

TITLE		PC-507 SCHEMATIC DIAGRAM	
SCALE	DATE	DESIGNED BY	DATE
1/8"	11/20/78	W.S.B.	11/20/78
CAD	REV	NOT	0001S
AM-0901S	REV	0	0001S

REVISION	REVISION DESCRIPTION
1	RELEASABLE UTD, 1/11/79
2	COMPONENT ID REVISIONS, 8/31/79

DC CONTROL LADDER

Energy-Onix
 BROADCAST EQUIPMENT CO., INC.
 1200 WINDY ST., P.O. BOX 801, VALHALLA, NY 12154



PULSAR

CONTROL PANEL BOARD
 PC-507 SCHEMATIC DIAGRAM

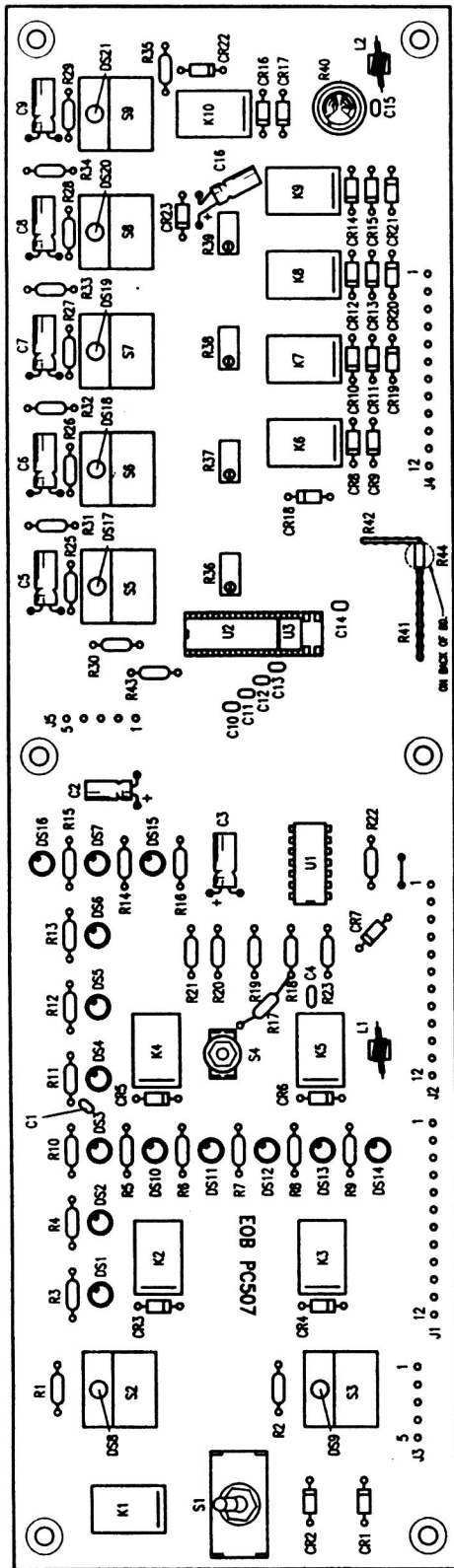
REVISION: NDT
 SCALE: 1/4"=1"

DATE: 11/14/79
 DESIGNED BY: C.R.B.
 DRAWN BY: J.M.
 CHECKED BY: J.M.

REVISION DESCRIPTION:
 CHG S1-15 TO OPEN POSITION, ADDED F.O.H.J
 01-11-99

DC CONTROL LADDER

Energy-Onix
 BROADCAST EQUIPMENT CO., INC.
 1308 RIVER ST., P.O. BOX 801, VALAIRE, N.Y. 12184



NOTE: J1 THRU J5 ON BACK OF BOARD

		TITLE	
		PULSAR AM CONTROL PANEL BD.	
PC-507 COMPONENT LAYOUT		DATE: 09/20/78	
SCALE: NA	DESIGNED BY: NDT	DRAWN BY: G.S.B.	CHECKED BY: AM-0901C
CAD: AM-0901C	NOT	CR: R1	AM-0901C

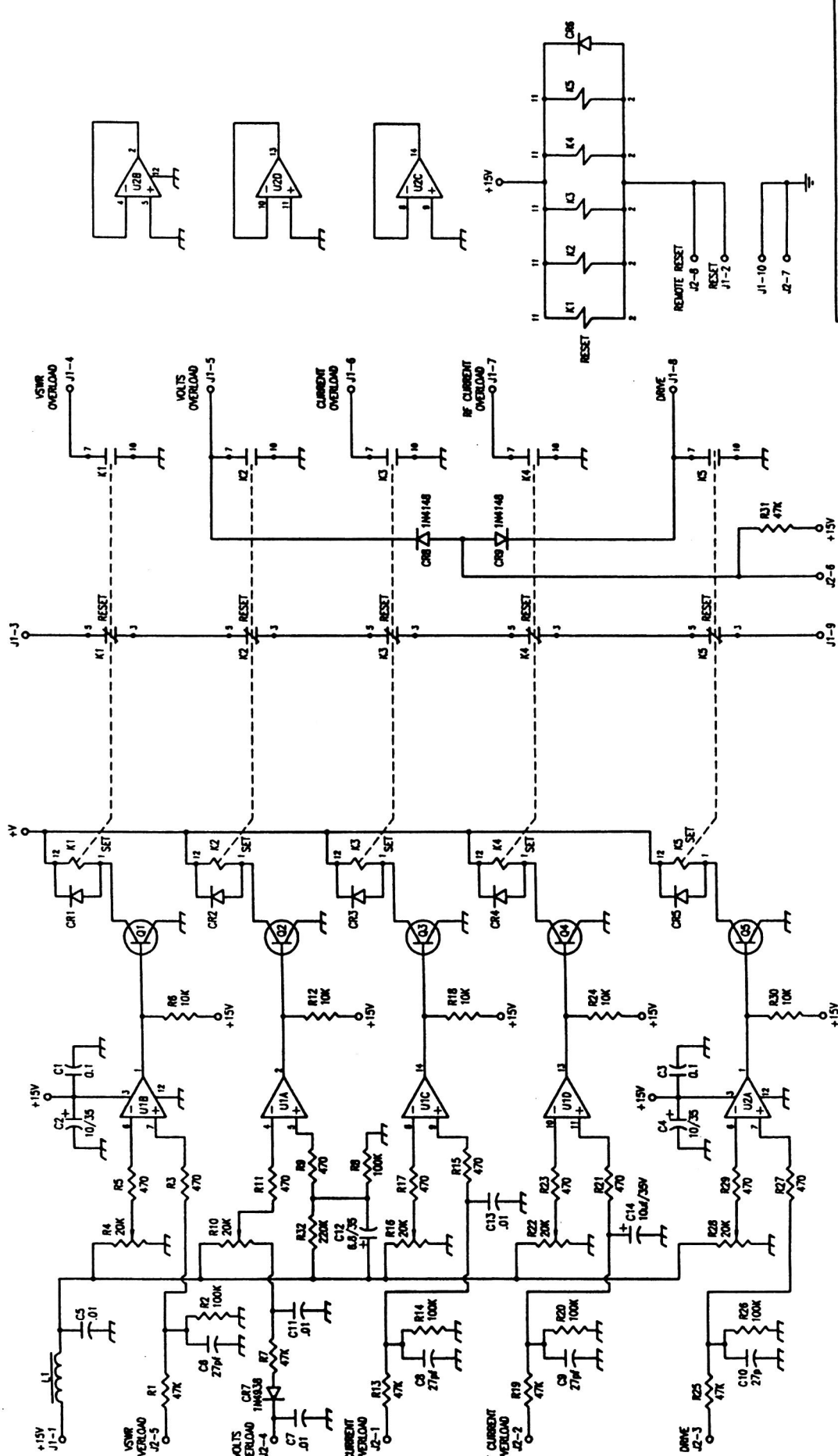
DC CONTROL LADDER

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

PC - 507 CONTROL PANEL BOARD

PARTS LIST

C1,C10-C15	.01 μ F/100V MONO. CERAMIC	P4904
C2,C16, C17	10 μ F/35V ELECTROLYTIC	
C3,C5-C9	100 μ F/25V ELECTROLYTIC	
C4	.01 μ F/100V STACK METAL FILM	
CR1-CR6,CR8-CR22	1N4002	
CR7	1N5711	
CR23	1N4742A, 12V ZENER	
DS1-DS7	LED, GREEN	
DS8,DS17-DS21	LED, GREEN, PART OF S2,S5-S9	
DS9	LED, RED, PART OF S3	
DS10-DS16	LED, RED	
J1,J2,J4	12 - PIN MOLEX HEADER, ANGLE	
J3	5 - PIN MOLEX HEADER, ANGLE	
J5	5 - PIN MOLEX HEADER, STRAIGHT	
K1,K6-K10	AROMAT, LATCHING	
K2-K5	AROMAT, NON-LATCHING	
L1,L2	FERRITE BEAD	21-129B
R1-R16,R30-R34	2.2K, 1/4W	
R17	1K, 1/4W	
R18,R44	10K, 1/4W	
R19,R21	510 OHMS, 1/4W	
R20	9.1K, 1/4W	
R22	11K, 1/4W	
R23	33K, 1/4W	
R24	VALUE SELECTED IN TEST	
R25-R29	4.7K, 1/4W	
R35,R43	2.7K, 1/4W	
R36-R39	50K VARIABLE, MULTI-TURN	
R40	5K VARIABLE, SINGLE TURN	CM46434
R41	10K, 9-ELEMENT	71-CSL10A01-10K
R42	15K, 5-ELEMENT	569-L61-15K
R45	10K VARIABLE, MULTI-TURN	
S1	4PDT TOGGLE	EATON 65F1699
S2,S3,S5-S9	PUSH BUTTON, MOMENTARY W/LED	C & K MP01
S4	PUSH BUTTON, MOMENTARY	C & K 8125
U1	339 OP AMP	
U2	2502-4 OPTO COUPLER	
U3	2502-1 OPTO COUPLER	
XU1	14-PIN IC SOCKET	
XU2	16-PIN IC SOCKET	
XU3	8-PIN IC SOCKET	



PULSAR

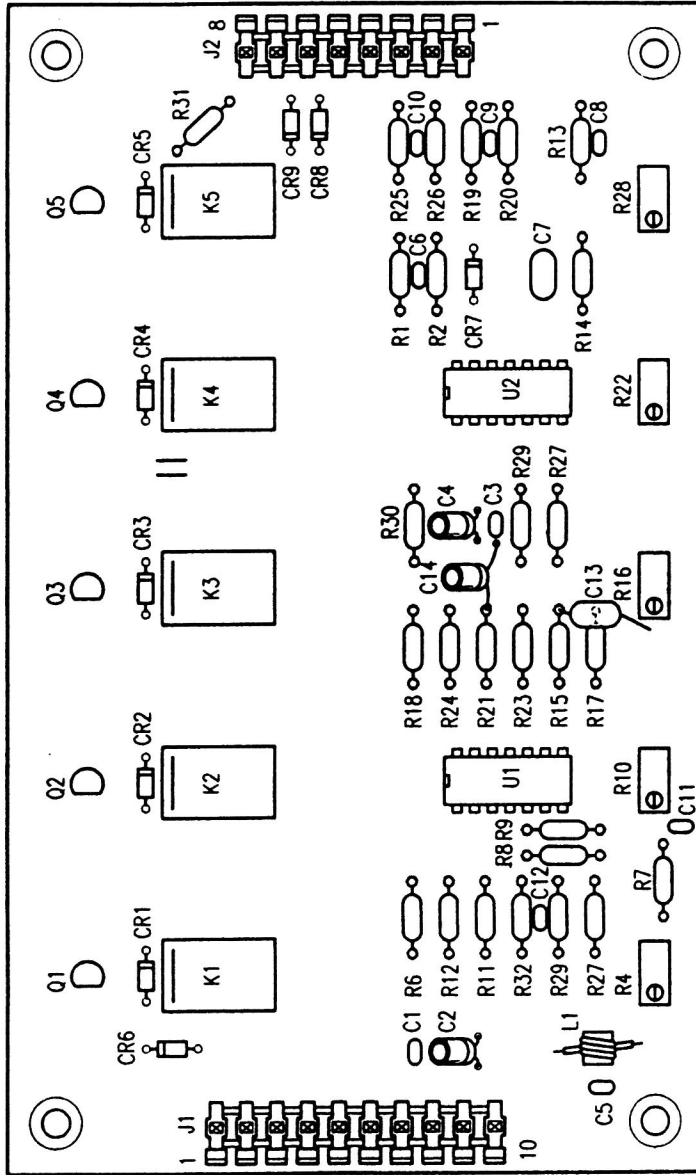
OVERLOAD BOARD SCHEMATIC (PC-508)

REVISION: **C**

REVISION DESCRIPTION:
 REMOVED J2-7 FROM CHG. ADDD CHG. CR1, 07/13/79
 ADDED J2-7 TO CHG. 07/20/79
 CHG. R11 CALLOUT TO R12, CHG. C5, C11 VALUE, CHG. J CHG. 08/13/79

Energy-Onix
 BROADCAST EQUIPMENT CO., INC.
 1308 47th ST., P.O. BOX 801, WILMINGTON, N.J. 07394

SCALE: N/A	DESIGNED BY: NDT /	DATE: 08/27/78	DRW. BY: E.S.B.
CHK: AM-1001S	NDT /	CHK: AM-1001S	



PULSAR

TITLE	PULSAR AM OVERLOAD BD. PC-508 COMPONENT LAYOUT		
DESIGNED BY	NDT	DATE: 06/09/99	DWG. BY: DWG. No
CHK'ED:		CAD: AM-1001C	AM-1001C

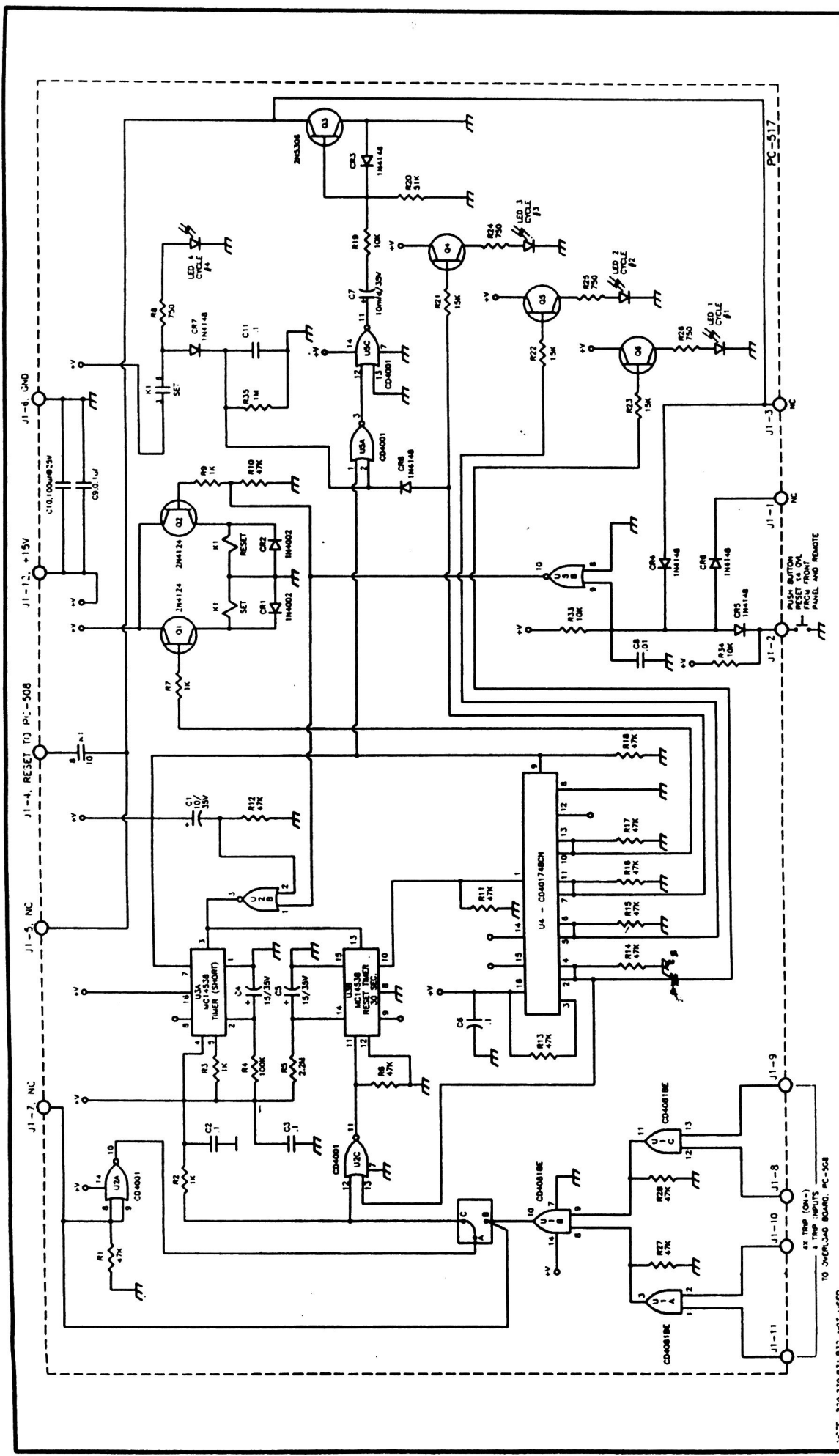
REVISION:	□
REVISION DESCRIPTION:	

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

PC- 508 OVERLOAD BOARD

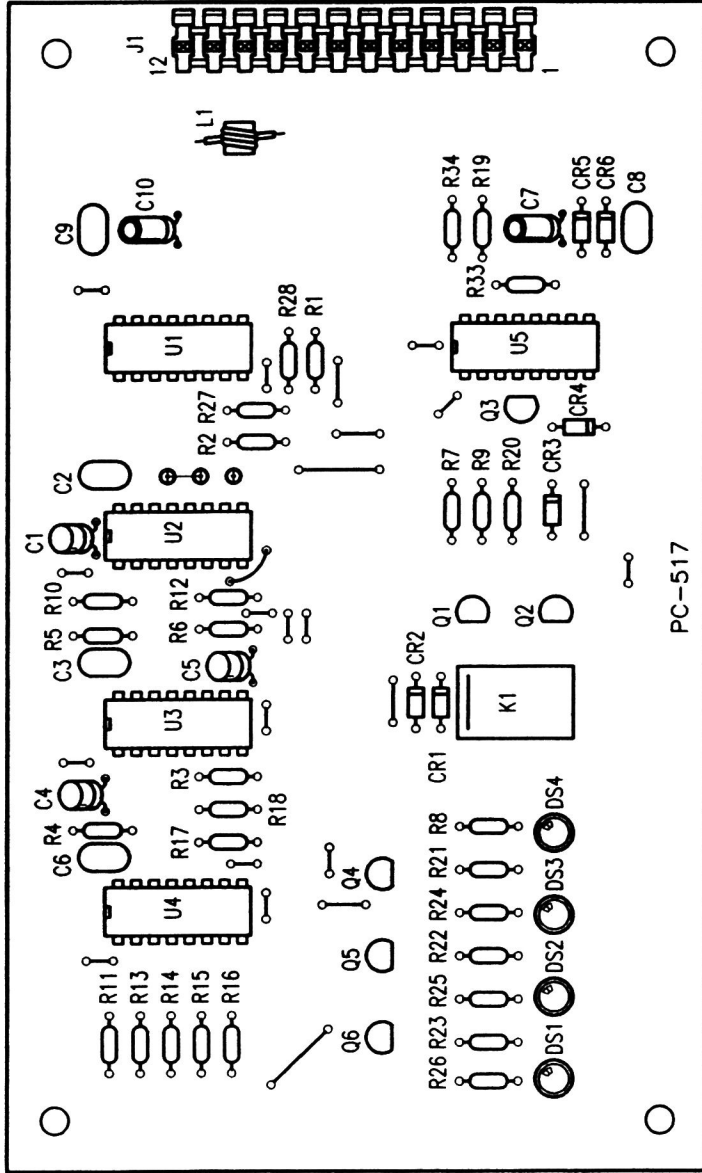
PARTS LIST

C1,C3	0.1 μ F/100V MONO. CERAMIC	P4910
C2,C4,C14	10 μ F/35V ELECTROLYTIC	
C5,C11	.01 μ F/100V MONO. CERAMIC	
C6,C8,C9,C10	27 μ F DISC CERAMIC	1331-PH-ND
C7	.01 μ F DISC CERAMIC	
C12	6.8 μ F/35V TANT.	
C13	.01/100V STACK METAL FILM	
CR1 - CR6	1N4002	
CR7	1N4938	
CR8,CR9	1N4148	
J1	10 PIN MOLEX HEADER	
J2	8 PIN MOLEX HEADER	
K1 - K5	AROMAT RELAY, LATCHING	
L1	5.8MM FERRITE BEAD	21-129B
Q1 - Q5	2N4124	
R1,R7,R13,R19,R25,R31	47K, 1/4W	
R2,R8,R14,R20,R26	100K, 1/4W	
R3,R5,R9,R11,R15,R17, R21,R23,R27,R29	470 OHMS, 1/4W	
R4,R10,R16,R22,R28	20K VARIABLE, MULTI-TURN	
R6,R12,R18,R24,R30	10K, 1/4W	
R32	220K, 1/4W	
U1,U2	339 OP AMP	
XU1,XU2	14-PIN IC SOCKET	



REVISION DESCRIPTION: VALUES CHANGED ON C7,C11,K2A, ADDED CR4, 07/13/78 U4, J1 TERMINALS, 01/20/79 ADDED R3A, 8/12/78		REVISION: 	MODEL: PULSAR OVERLOAD 4X RECYCLER PC-517 SCHEMATIC DIAGRAM
SCALE: NA	DESIGNED BY:	DATE: 02/23/78	CHK. BY:
CHK. NO.: AM-27013	TT	DATE:	AM-27015





PC-517

C11,CR7,CR8,R35 ON BACK OF BOARD

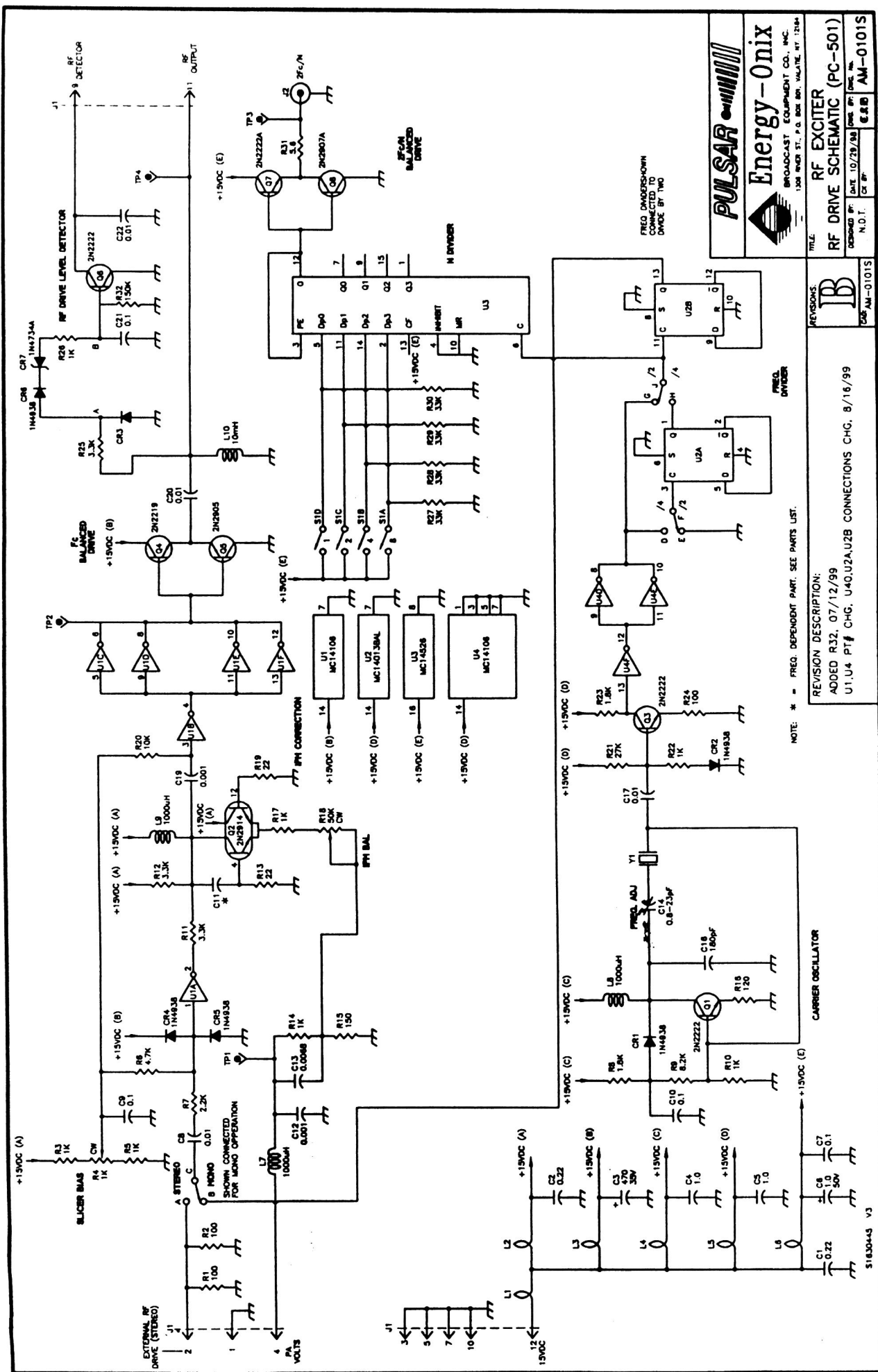


Energy-Onix BROADCAST EQUIPMENT CO., INC. 1306 RIVER ST., P.O. BOX 801, VALATIE, NY. 12184	REVISION DESCRIPTION: 	REVISION: <input type="checkbox"/>
TITLE: PULSAR AM 4X RECYCL BD. PC-517 COMPONENT LAYOUT		
DESIGNED BY: NDT DATE: 06/08/99 CHECKED:	DWG. No. AM-2701C	DWG. BY: AM-2701C

PC-517 4 X RECYCLE BOARD

PARTS LIST

C1,C7	CAPACITOR, ELECTROLYTIC	10mFD/35V
C2,C3,C6,C9,C11	CAPACITOR, STACK METAL FILM	0.1mFD/100V
C4,C5	CAPACITOR, ELECTROLYTIC	15mFD/35V
C8	STACK METAL FILM	.01/100V
C10	CAPACITOR, ELECTROLYTIC	100mFD/25V
CR1,CR2	DIODE,GENERAL PURPOSE	1N4002
CR3-CR8	DIODE,SILICON,FAST SWITCHING 100PRV	1N4148
K1	RELAY,AROMAT 12V, LATCHING	
J1	12 POSITION MOLEX HEADER,STRAIGHT	
L1	FERRITE BEAD, 5.8mm 21-129B	
LED1-LED4	LIGHT EMITTING DIODE, RED	
Q1,Q2,Q4,Q5,Q6	TRANSISTOR, NPN	2N4124
Q3	TRANSISTOR, NPN DARLINGTON	2N5306
R1	RESISTOR, METAL FILM	47K,1/4W
R2,R3	RESISTOR, METAL FILM	1K,1/4W
R4	RESISTOR, METAL FILM	100K,1/4W
R5	RESISTOR, METAL FILM	2.2M,1/4W
R6	RESISTOR, METAL FILM	47K,1/4W
R7	RESISTOR, METAL FILM	1K,1/4W
R8	RESISTOR, METAL FILM	750,1/4W
R9	RESISTOR, METAL FILM	1K,1/4W
R10-R18	RESISTOR, METAL FILM	47K,1/4W
R19	RESISTOR, METAL FILM	10K,1/4W
R20	RESISTOR, METAL FILM	51K,1/4W
R21-R23	RESISTOR, METAL FILM	15K,1/4W
R24-26	RESISTOR, METAL FILM	750,1/4W
R27,R28	RESISTOR, METAL FILM	47K,1/4W
R29,R30,R31,R32	NOT USED	
R33,R34	RESISTOR, METAL FILM	10K,1/4W
R35	RESISTOR, METAL FILM	1M,1/4W
U1	IC,C-MOS,QUAD 2-INPUT AND GATE	CD4081BE
U2,U5	IC,C-MOS,QUAD 2-INPUT NOR GATE	CD4001BE
U3	IC,C-MOS,DUAL PRECISION RETRIGGER- ABLE RESETTABLE MONOSTABLE	
U4	MULTI VIBRATOR	MC14538BE
X1,X2,X5	IC,C-MOS HEX 'D' FLIP FLOP	CD40174BCN
X3,X4	SOCKET, IC 14 PIN	
	SOCKET, 16 PIN	



PULSAR

Energy-Onix
 BROADCAST EQUIPMENT CO., INC.
 1308 ROAD ST., P.O. BOX 801, VALHALLA, NY 12584

FILE: RF EXCITER
 RF DRIVE SCHEMATIC (PC-501)
 DESIGNED BY: DATE: 10/29/83
 N.O.T. CR: E.S.B. AM-01015

REVISIONS: **B**

516304-5 V3

REVISION DESCRIPTION:
 ADDED R32, 07/12/99
 U1, U4 PTH CHG. U40, U2A, U2B CONNECTIONS CHG. 8/16/99

NOTE: * = FREQ. DEPENDENT PART. SEE PARTS LIST.

CARRIER OSCILLATOR

FREQ. UNDESIGNOWN
 CONNECTED TO
 DIVIDE BY TWO

RF-AM
 BALANCED
 DRIVE

N DIVIDER

FREQ. DIVIDER

EXTERNAL RF DRIVE (STEREO)

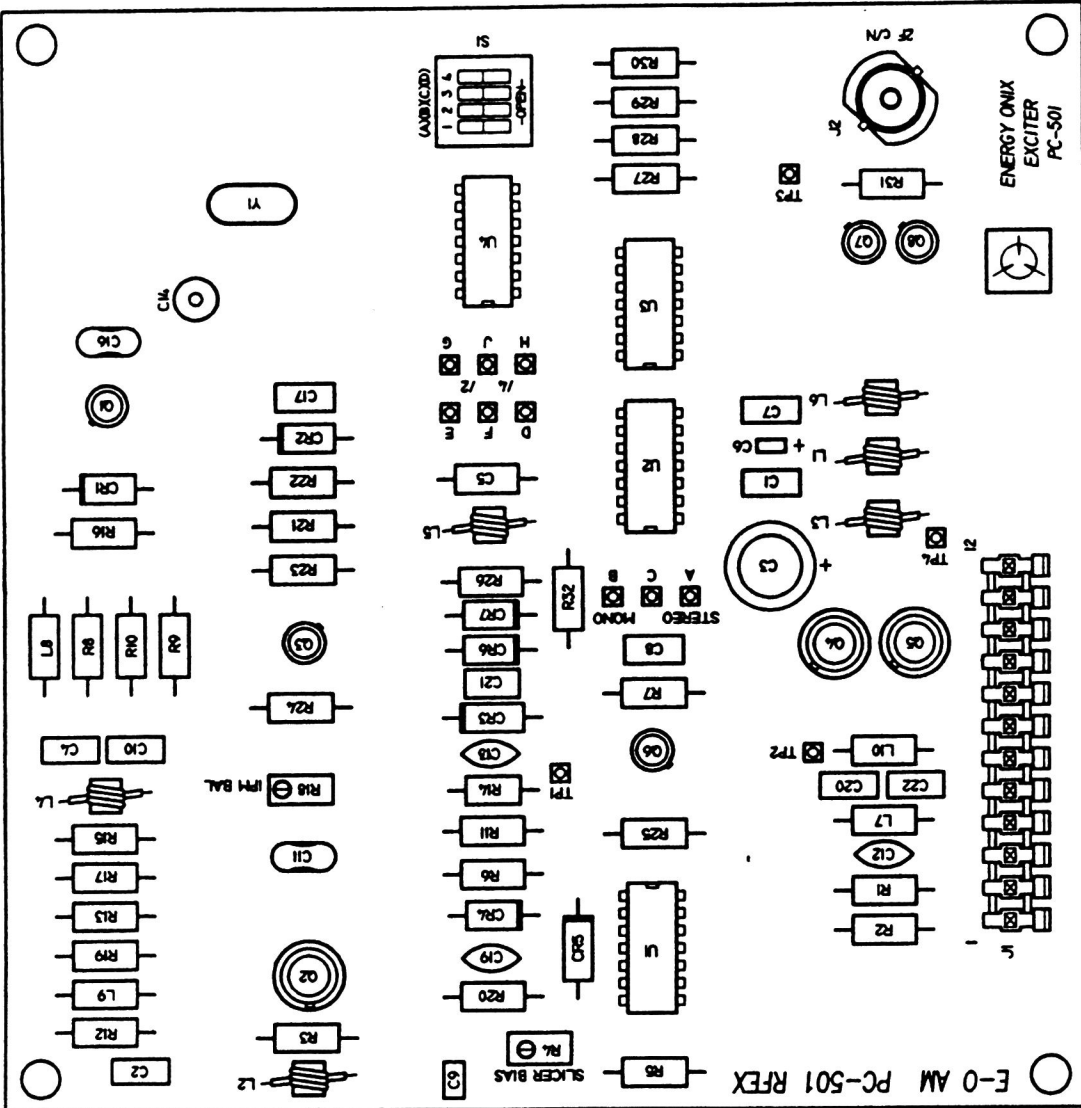
SLICER BIAS

RF DRIVE LEVEL DETECTOR

RF BAL.

RF OUTPUT

PA VOLTS



PULSAR

TITLE: RF EXCITER PCB
 COMPONENT LAYOUT (PC-501)
 DESIGNED BY: NDT
 DATE: 10/30/98
 DWG. BY: DMG
 CHK'D:
 CAD: AM-0101C
 AM-0101C

REVISION:

REVISION DESCRIPTION:
 COMPONENT ADDITIONS, REMOVAL, 5/12/99
 COMPONENT ADDITIONS, REMOVAL, ID, 8/13/99
 ADD Y1, 8/20/99

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

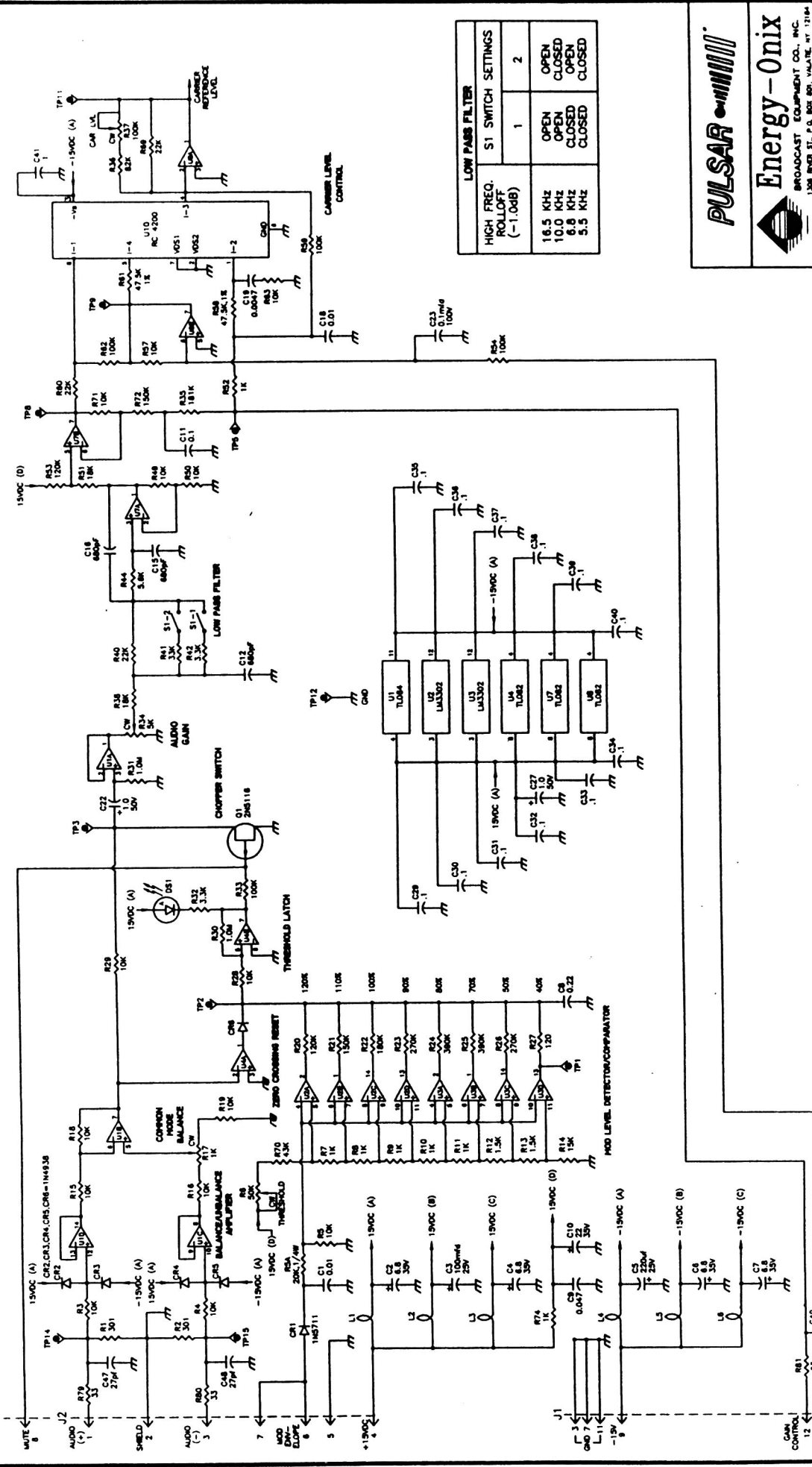
PC - 501 RF EXCITER

PARTS LIST

C1,C2	.22 μ F/50V MONO.CERAMIC	P4958
C3	470 μ F/35V ELECTROLYTIC	140-XRL35V470
C4,C5	1.0 μ F/50V MONO CERAMIC	P4962
C6	1.0 μ F/50V TANT.	P2073
C7,C9,C10, C20, C21	.1 μ F/100V MONO. CERAMIC	P4910
C8,C17, C22	.01 μ F/100V MONO. CERAMIC	P4904
C11(FREQ.DEPENDENT)	535 -589 KHZ 47 μ μ F DIP MICA	
	590-879 KHZ 33 μ μ F	
	880-1324 KHZ 22 μ μ F	
	1325-1710 KHZ 15 μ μ F	
C12,C19	1000 μ μ F/1KV DISC CERAMIC	
C13	6800 μ μ F/100V DISC CERAMIC	
C14	3-36 μ μ F VARIABLE	SG3005
C15	DELETED	
C16	180 μ μ F DIP MICA	
C18	DELETED	
CR1-CR6	1N4938	
CR7	1N4734A	
J1	12 PIN MOLEX HEADER	
J2	BNC JACK	
L1-L6	5.8 MM FERRITE BEAD	21-129B
L7-L9	1000 μ H	DN41105
L10	10,000 μ H	M9263
Q1,Q3,Q6,Q7	2N2222A	
Q2	2N2914	
Q4	2N2219	
Q5	2N2905	
Q8	2N2907A	
R1,R2,R24	100 OHM - 1/2W	
R3,R5,R10,R14,R17,R22,	1K - 1/2 W	
R26		
R4	1K VARIABLE, MULTI-TURN	
R6	4.7K - 1/2 W	
R7	2.2K - 1/2 W	
R8,R23	1.8K - 1/2 W	
R9	8.2K - 1/2 W	
R11,R12,R25	3.3K - 1/2 W	
R13,R19	22 OHM - 1/2 W	
R15	150 OHM - 1/2 W	

PARTS LIST

R16	120 OHM - 1/2 W	
R18	50K VARIABLE, MULTI-TURN	
R20	10K - 1/2 W	
R21	27K - 1/2 W	
R27-30	33K - 1/2W	
R31	5.6 OHM - 1/4 W	
R32	150K - 1/2 W	
S1	4PST DIP	571-4356402
U1,U4	HEX SCHMITT	MC14106BCP
U2	DUAL FLIP-FLOP	MC14013BCP
U3	BINARY COUNTER	MC14526BCP
UX1,UX2,UX4	14-PIN IC SOCKET	
UX3	16 PIN IC SOCKET	
Y1	CRYSTAL, FREQUENCY DEPENDENT	



LOW PASS FILTER	
HIGH FREQ. ROLLOFF (-1.0dB)	S1 SWITCH SETTINGS
16.5 KHZ	1 OPEN
10.0 KHZ	1 OPEN
6.8 KHZ	2 CLOSED
5.5 KHZ	2 CLOSED

PULSAR

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

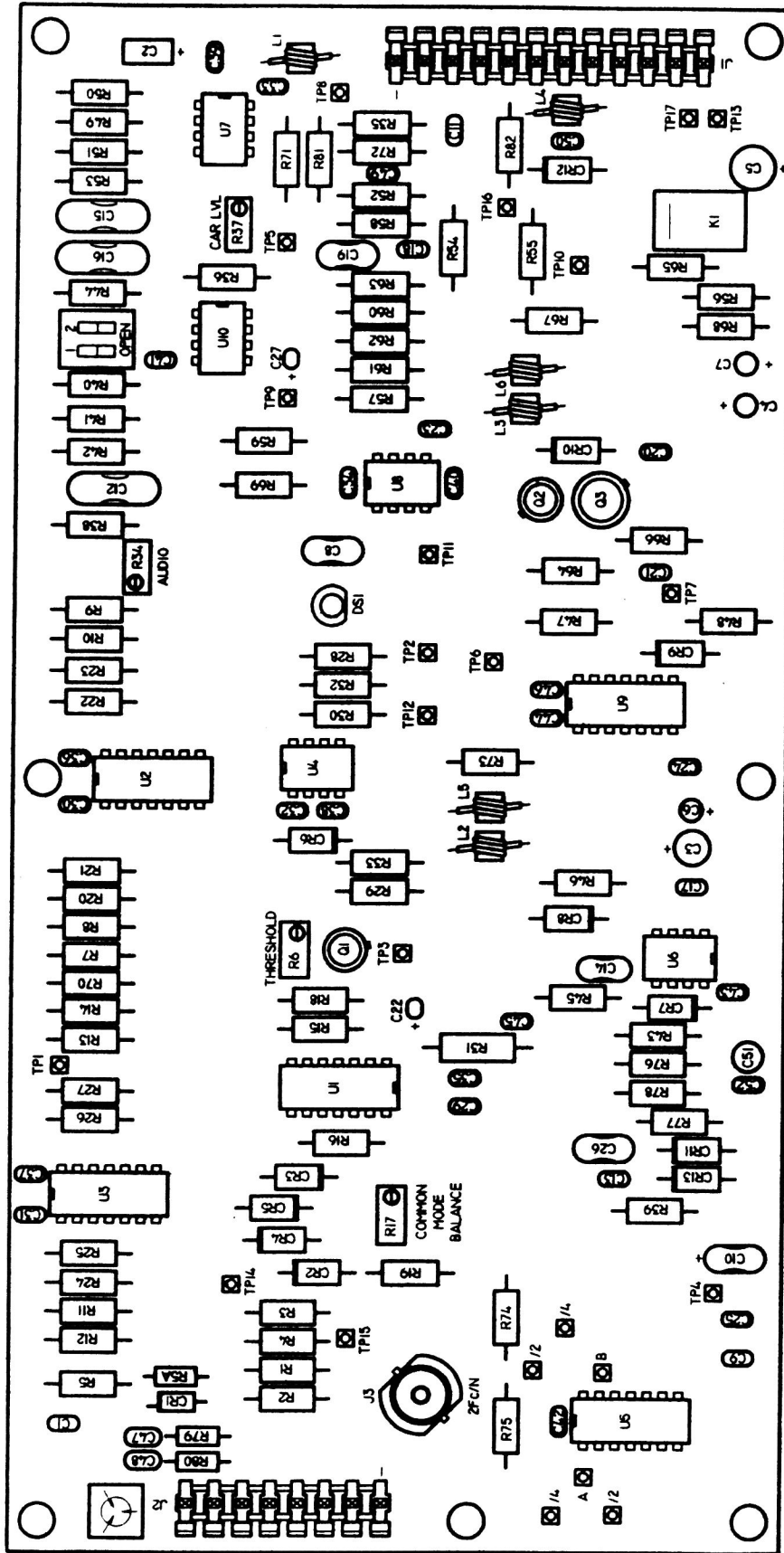
TITLE: **AUDIO/PDM DRIVER SCHEMATIC (PC-506)**

DESIGNED BY: **ST** DATE: **11/12/88** DWG. NO: **PC-506/1/2**

CAD FILE: **08015** E.F. 7-27-94 G.R.B. AM-08015

REVISION: **B**

REVISION DESCRIPTION:
RESEARCH NEW #14, ADD CAPS C29 thro C48, 07/12/99
CHANGE VALUE OF C23, 7/20/99





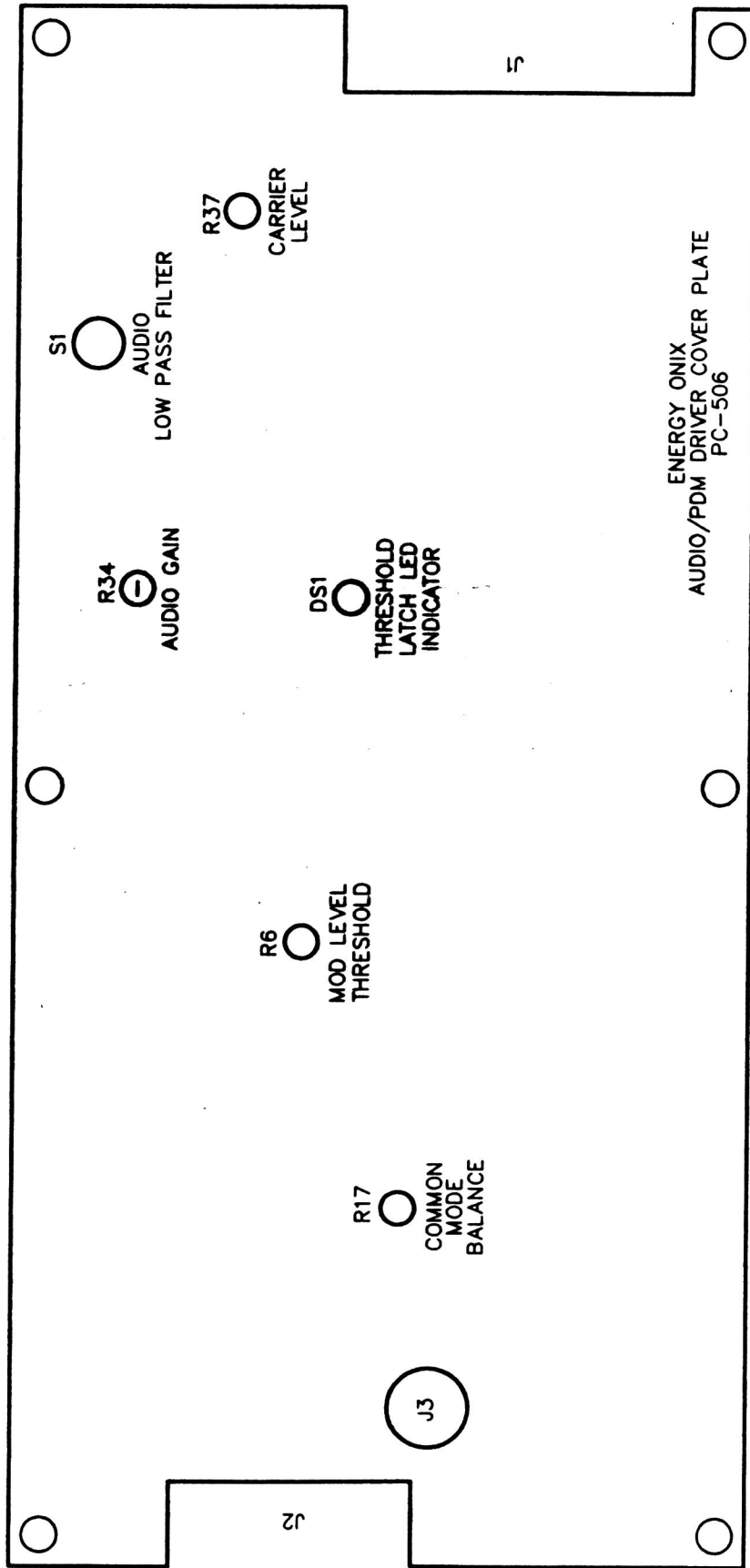
ENERGY ONIX
AUDIO/PDM DRIVER
PC-506

NOTE: C53, R83 ON BACK OF BOARD

MTS



<p>REVISION DESCRIPTION:</p> <p>ADDED C30,C31,C32,C33,C34,C35,C36,C37,C38,C39,C40,C41,C42,C43,C44,C45,C46,C47,C48,C49,C50,C51,C52,R79,R80,R81,R82, 07/14/99 ADD C41, REMOVE C34, 07/21/99 DRAWING # CHANGE, AM-1201C TO AM-0801C, 9/6/99</p>	<p>REVISION: </p>	<p>Energy-Onix BROADCAST EQUIPMENT CO., INC. 1306 RIVER ST., P.O. BOX 801, VALATIE, NY. 12184</p>
<p>TITLE: AUDIO/PDM DRIVER PCB COMPONENT LAYOUT (PC-506)</p> <p>DESIGNED BY: NDT DATE: 11/4/98 DWG. NO. AM-0801C</p> <p>CHK'ED:  CAD: AM-0801C</p>	<p>AM-0801C</p>	<p>AM-0801C</p>



TITLE:		AUDIO/PDM DRIVER COVER PLATE LAYOUT (PC-524)	
DESIGNED BY: PI	DATE: 11/12/99	DWG. BY: DMG.	NO.
CHECKED:	CAD: AM-0802C	DATE: 11/12/99	NO. AM-0802C

REVISION DESCRIPTION:	REVISION:
	0

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

PC - 506 AUDIO/PDM DRIVER

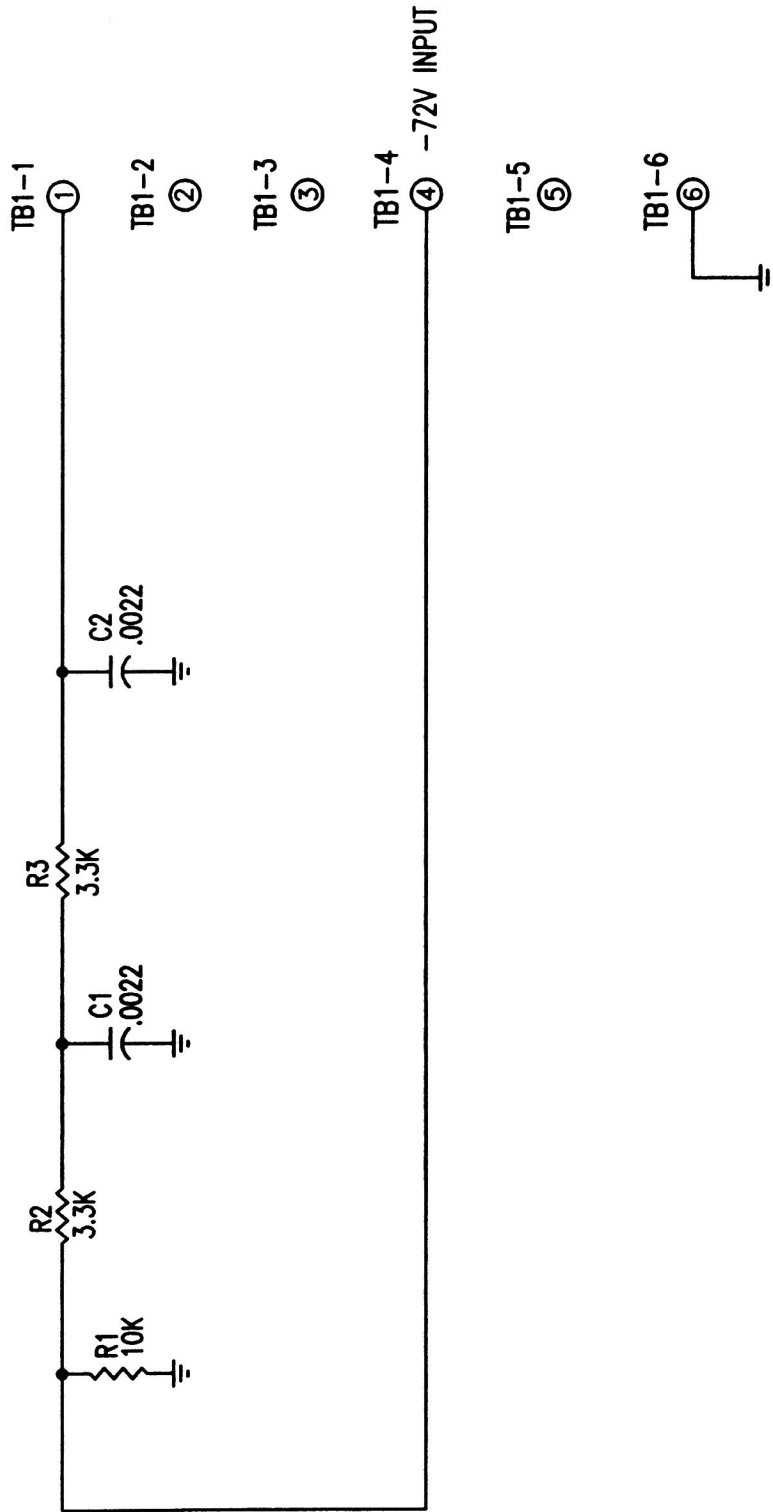
PARTS LIST

C1,C18,C25	.01mF/100V MONO.CERAMIC	P4904
C2,C4,C6,C7	6.8mF/35V TANTALUM	P2064
C3	100mF/25V ELECTROLYTIC	
C5,C51	220mF/25V ELECTROLYTIC	
C8	.22mF/50V MONO.CERAMIC	P4958
C9	.047mF/100V MONO.CERAMIC	P4908
C10	22mF/35V TANTALUM	P2101
C11,C20,C21,C23,C29- C46,C53	0.1mF/100V MONO.CERAMIC	P4910
C12,C15,C16	680pF/300V DIPPED MICA	5982-15300V680
C13	.0022mF/100V DISC CERAMIC	1387PH
C14	120pF/500V DIPPED MICA	5982-15 500V-120
C17,C52	1.0mF/50V MONO CERAMIC	P4968
C19	.0047mF/100V DISC CERAMIC	1391PH
C22,C27	1.0mF/50V TANT.	P2073
C24	.001mF/1KV DISC CERAMIC	1383PH
C26	470pF/500V DIPPED MICA	5982-15-500V 470
C47-C50	27pF DISC CERAMIC	1331PH
C28	NOT USED	
CR1,CR7,CR8	1N5711	
CR2-CR6, CR9-CR15	1N4938	
DS1	LED, AMBER	
J1	12 PIN MOLEX HEADER	
J2	8 PIN MOLEX HEADER	
J3	BNC FEMALE	
K1	AROMAT RELAY, NON-LATCHING	
L1-L6	5.8mm FERRITE BEAD	21-129B
Q1	P CHAN. FET.2N5116	
Q2	NPN TRANSISTOR 2N2222A	
Q3	NPN TRANSISTOR 2N2219A	
R1,R2	300 OHM, 1/2W	
R3,R4,R15,R16,R18,R19, R28,R29,R49,R50,R55, R57,R63,R71	10K, 1/2W	
R5,R7,R8,R9,R10,R11, R52,R56,R74	1K. 1/2W	
R5A	20K, 1/4W	
R6	50K, VARIABLE, MULTI-TURN	
R12,R13,R73	1.5K, 1/2W	
R14,R78	15K,1/2W	
R17	1K,VARIABLE,MULTI-TURN	

PC 506 AUDIO/PDM DRIVER

PARTS LIST

R20,R27,R53	120K, 1/2W	
R21,R67,R68,R72,R77	150K, 1/2W	
R22,R35	180K, 1/2W	
R23,R26	270K, 1/2W	
R24,R25	390K, 1/2W	
R30,R31	1M, 1/2W	
R32,R42	3.3K, 1/2W	
R33,R39,R43,R54,R59, R62,R76	100K, 1/2W	
R34	5K, VARIABLE, MULTI-TURN	
R36,R47	82K, 1/2W	
R37	100K, VARIABLE, MULTI-TURN	
R38,R51	18K, 1/2W	
R41,R48	33K, 1/2W	
R44	5.6K, 1/2W	
R45	1.8M, 1/2W	
R46	10M, 1/2W	
R58,R61	47.5K, 1%, 1/2W	
R60,R69	22K, 1/2W	
R64	560 OHMS, 1/2W	
R65	10 OHMS, 1/2W	
R66	330K, 1/2W	
R70	43K, 1/2W	
R75	100 OHMS, 1/2W	
R79-R82	33 OHMS 1/4W	
R83	1K, 1/4W	
R84,R85	1K, 1/4W	
R86,R87	6.8K, 1/4W	
S1	DIP SWITCH, DPST	571-24356409
U1	QUAD OP AMD TL084IN	
U2,U3	QUAD COMPARATOR LM3302N	
U4,U6,U7,U8	DUAL OP AMP TL082MJG	
U5	DUAL CMOS TYPE D FLIP-FLOP	MC14013BCP
U9	DUAL HIGH SPEED COMPARATOR	LM319N
U10	ANALOG MULTIPLIER	RC4200AN
XU1,XU2,XU3,XU5,XU9	14 PIN IC SOCKET	
XU4,XU6,XU7,XU8,XU10	8 PIN IC SOCKET	

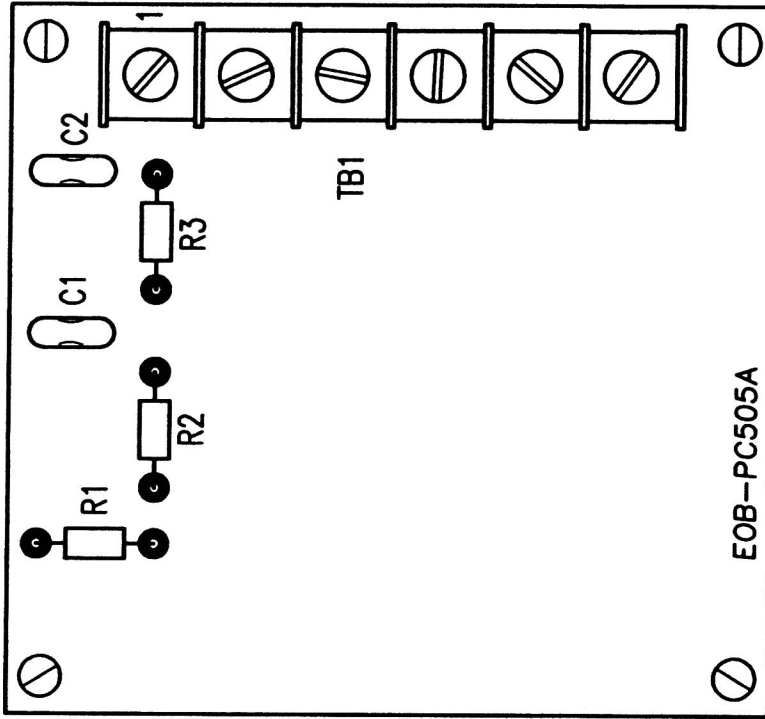


PULSAR

TITLE: -72V SAMPLE BD
 SCHEMATIC DIAGRAM (PC-505A)
 DESIGNED BY: FI
 DATE: 11/17/99
 DWG. BY: G&B
 DWG. No: AM-0702S
 CHECKED: G&B
 CAD No: AM-0702S

REVISION:	REVISION DESCRIPTION:
□	-

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



PULSAR

TITLE: **-72V SAMPLE BD
COMPONENT LAYOUT (PC-505A)**

DESIGNED BY: NDT DATE: 11/17/99 DWG. BY: E.S.B. AM-0702C
 CHECKED: CAD: AM-0702C

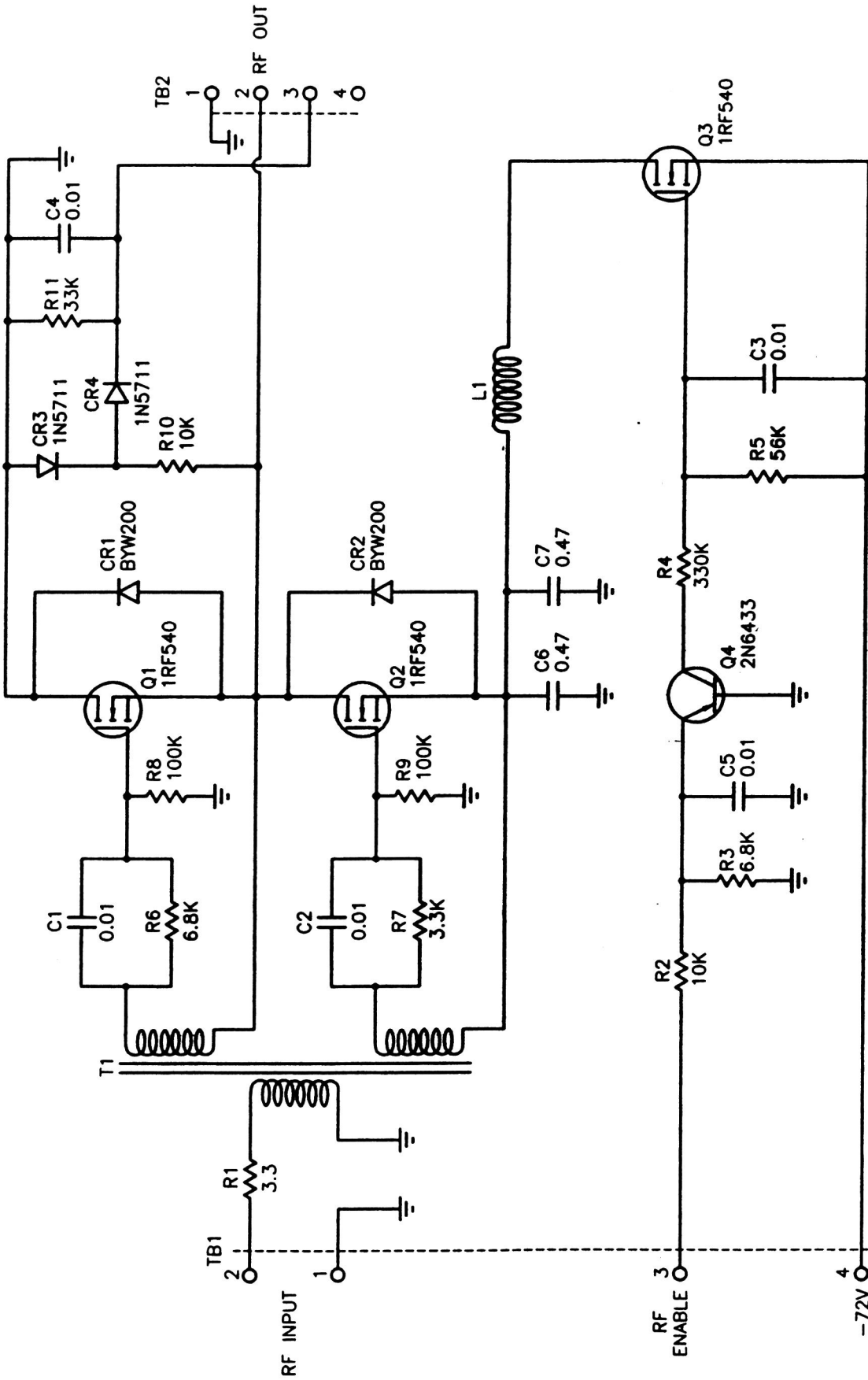
REVISION DESCRIPTION:	REVISION:
-	0

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

PC- 505A -72V SAMPLE BOARD

PARTS LIST

C1, C2	.0022uf, 100V DISC CERAMIC	1387PH
R1	10K, 1/2W	
R2, R3	3.3K, 1/2W	



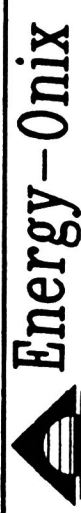
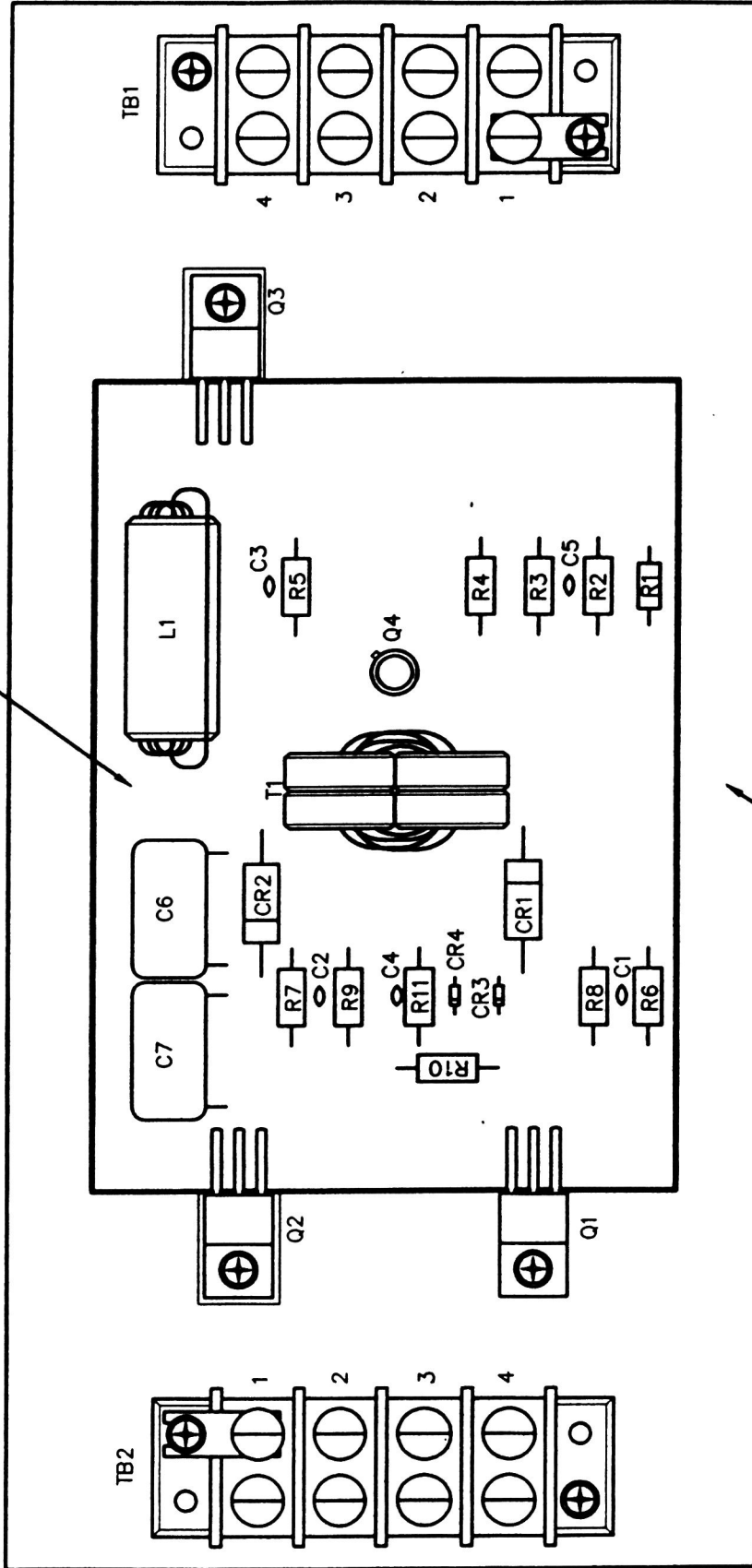
PULSAR

TITLE: INTERMEDIATE POWER AMP.
SCHEMATIC DIAGRAM (PC-502)

DESIGNED BY: N.D.T. DATE: 5/23/87 DWG. BY: DWG. No.
CHECKED: G.D. No. AM-0301S
E.R.B. AM-0301S

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

PRINTED CIRCUIT BOARD



BROADCAST EQUIPMENT CO., INC.
1308 RIVER ST., P.O. BOX 801, VALATE, NY 12184

TITLE: INTERMEDIATE POWER AMP. COMPONENT LAYOUT (PC-502)	
DESIGNED BY: PJ	DATE: 9/3/99
CHK'D: CKB	DWG. BY: DMG. No.
CAD No. AM-0301C	AM-0301C

REVISION: A	REVISION DESCRIPTION: COMPLETE BOARD REDESIGN, 5/12/99
-------------	-----------------------------------------------------------

NOTE: Q2, Q3 MOUNTED W/ MICA INSULATOR, Q2 DIRECT MOUNT TO HEATSINK

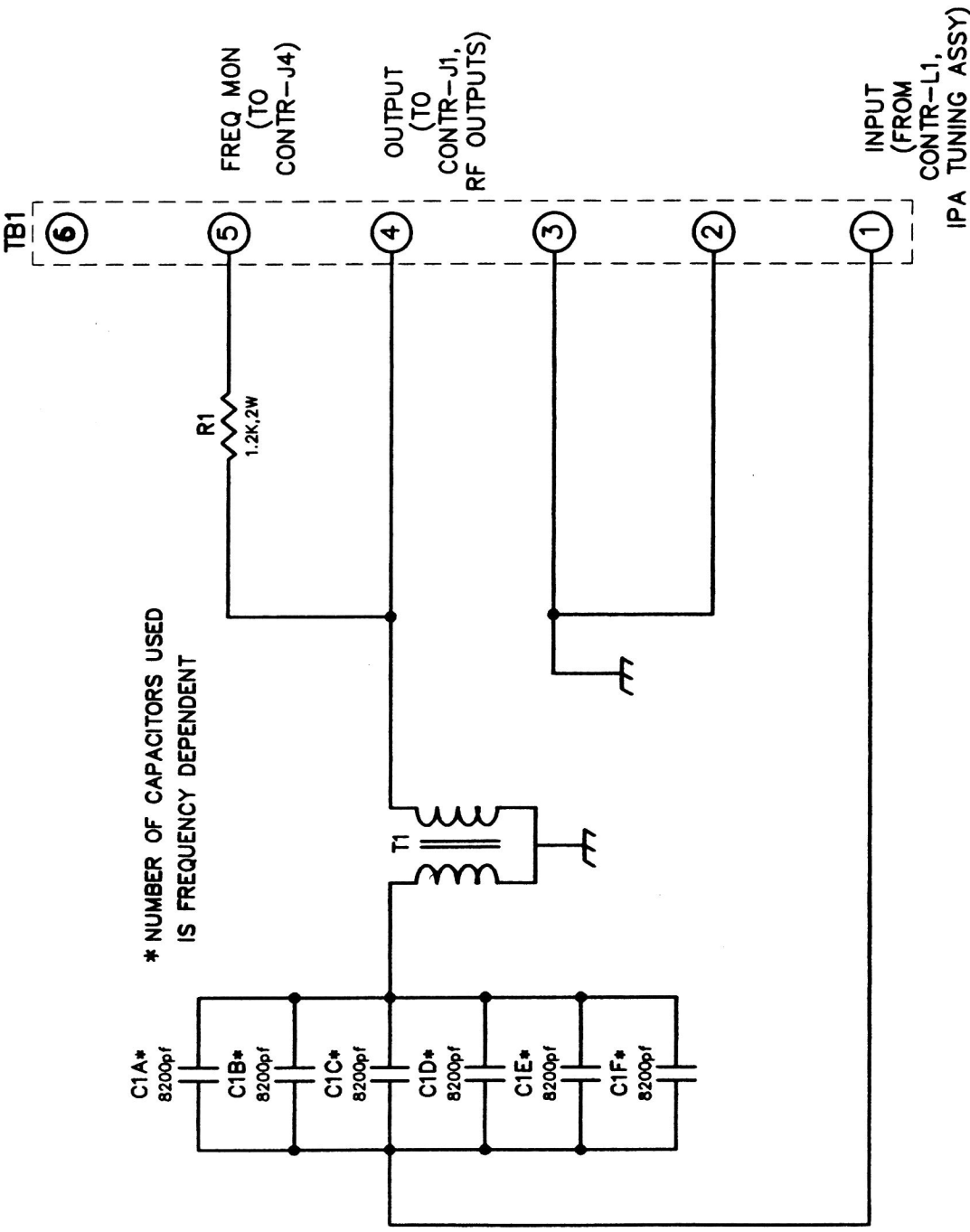


PC- 502 INTERMEDIATE POWER AMPLIFIER

PARTS LIST

C1-C5	.01 μ F/100V MONO. CERAMIC	P4904-ND
C6,C7	.47 μ F/250V POLYPROP.	EF2474-ND
CR1,CR2	BYW 98 - 200	
CR3,CR4	1N5711	
L1	FERRITE TORROID	2643540002
Q1-Q3	IRF 540	
Q4	2N6433	
R1	3.3OHMS, 1/2W	
R2,R10	10K, 1/2W	
R3,R6	6.8K, 1/2W	
R4	330K, 1/2W	
R5	56K, 1/2W	
R7	3.3K, 1/2W	
R8,R9	100K, 1/2W	
R11	33K, 1/2W	
T1	IPA INPUT TRANSFORMER ASSEMBLY	11-250B
TB1,TB2	4-POSITION BARRIER STRIP,15A	CINCH 4-141

Q1-Q3 - Later production uses IRFP460 (higher breakdown voltage)



* NUMBER OF CAPACITORS USED
IS FREQUENCY DEPENDENT



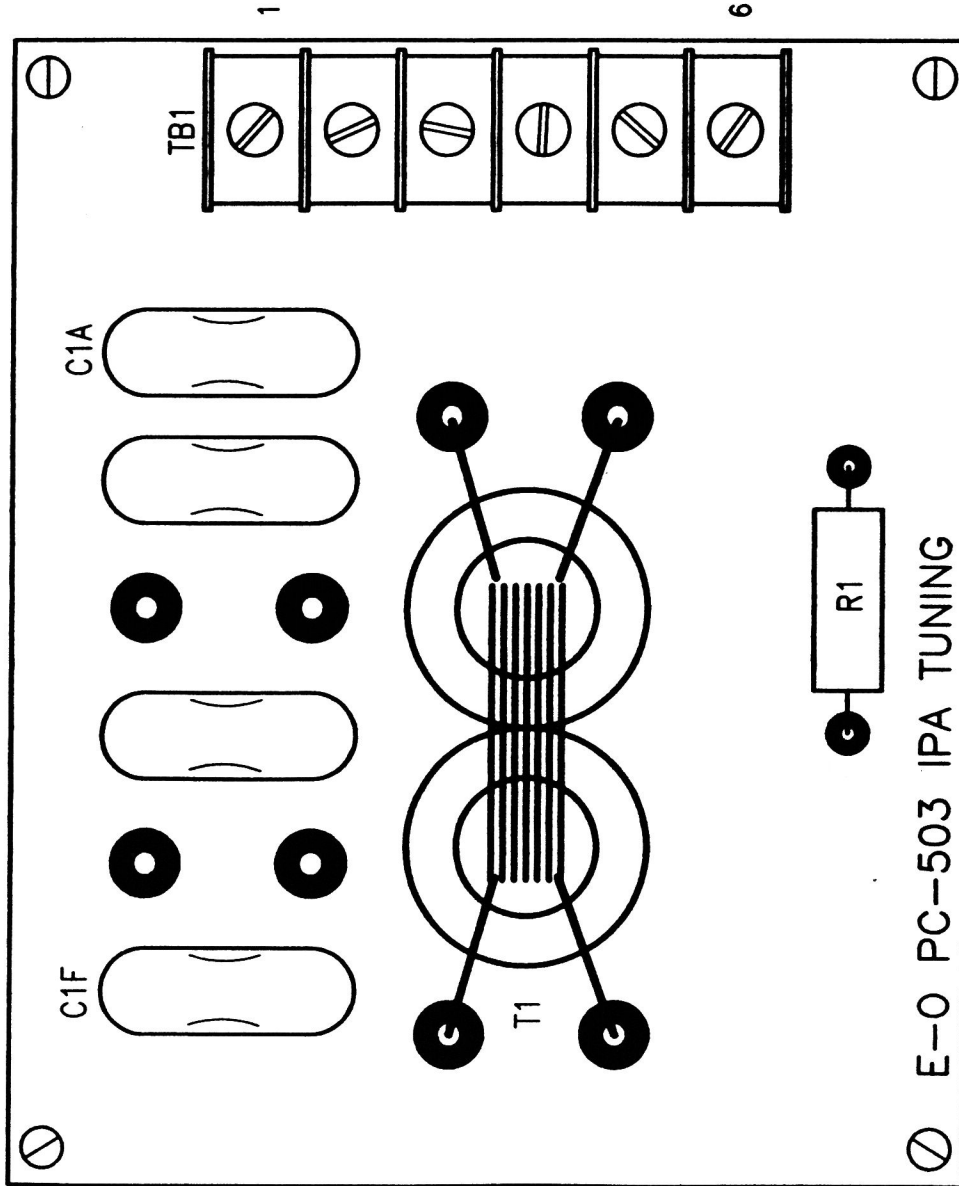
IPA TUNING BOARD
SCHEMATIC DIA. (PC-503)

DESIGNED BY: PI	DATE: 10/26/99	DWG. No.
CHECKED:	CAD No. AM-0501S	CKB
		AM-0501S

PARTS LIST

C1A-C1F	8200pF	DIPMICA/500V
R1	1.2K/2W	
T1	IPA TRANSFORMER ASSY	11-280B
TB1	6 POSITION	PC MOUNT

Energy-Onix
BROADCAST EQUIPMENT CO., INC.
1306 RIVER ST., P.O. BOX 801, VALATE, NY. 12164



NTS

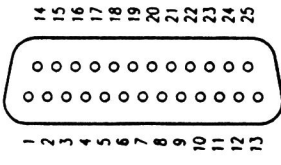
PULSAR

<p>Energy-Onix BROADCAST EQUIPMENT CO., INC. 1306 RIVER ST., P.O. BOX 801, VALATIE, NY, 12184</p>	REVISION DESCRIPTION:	TITLE: INTERMEDIATE POWER AMPLIFIER TUNING PCB COMPONENT LAYOUT (PC-503)
	REVISION: <input type="checkbox"/>	DESIGNED BY: NDT DATE: 11/04/98 DWG. BY: DWG. No. CHK'ED: CAD: AM-0501C E.S.B. AM-0501C

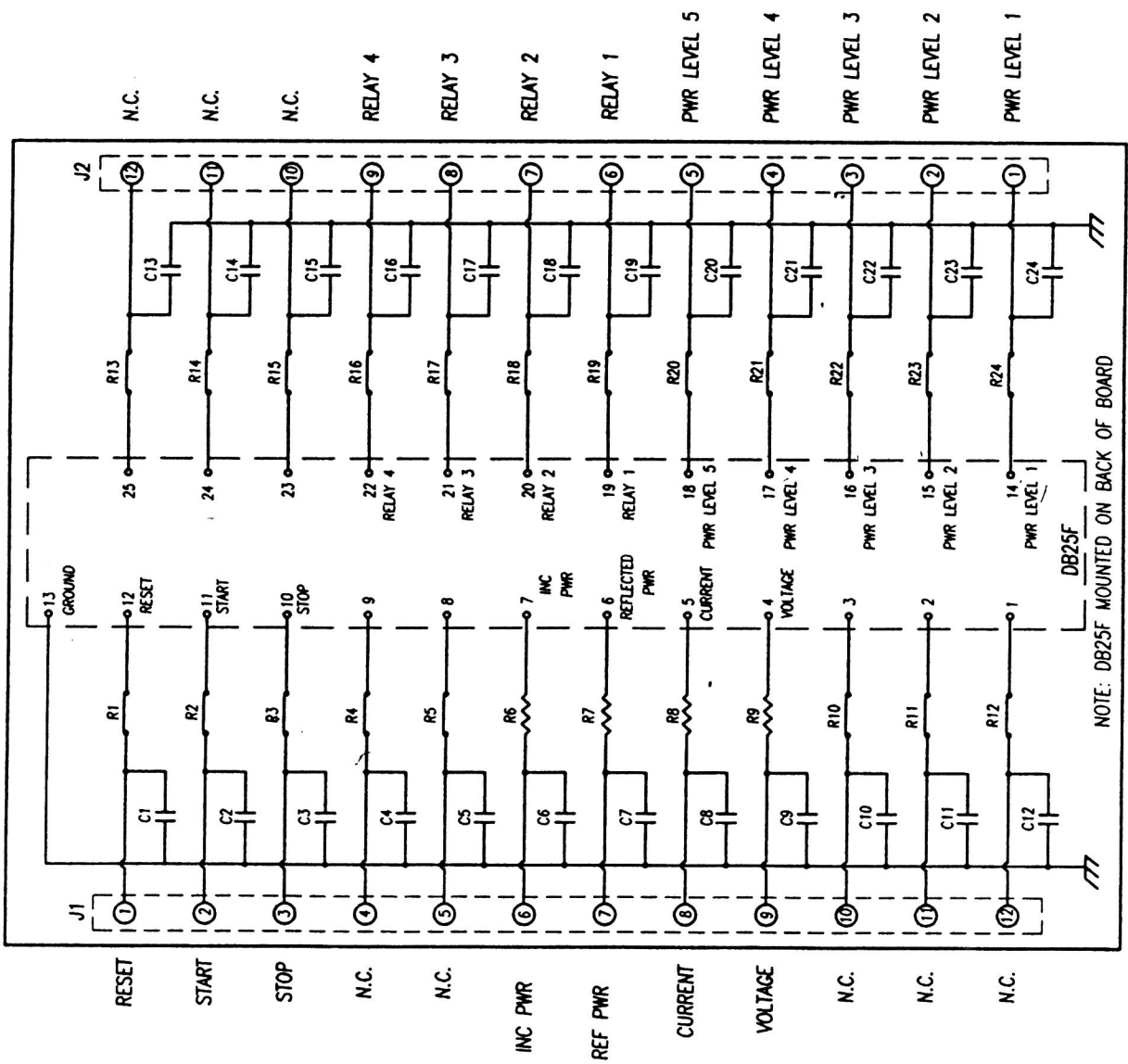
PC- 503 IPA TUNING BOARD

PARTS LIST

C1A - C1F	8200$\mu\mu$F/500V DIP MICA	
R1	1.2K/2W	
T1	IPA TRANSFORMER ASSEMBLY	11-280B
TB1	6 POSITION, PC MOUNT	



DB25F (VIEWED FROM BACK OF BOARD)



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

PULSAR AM REMOTE INTERFACE BD., PC-333B SCHEMATIC DIAGRAM

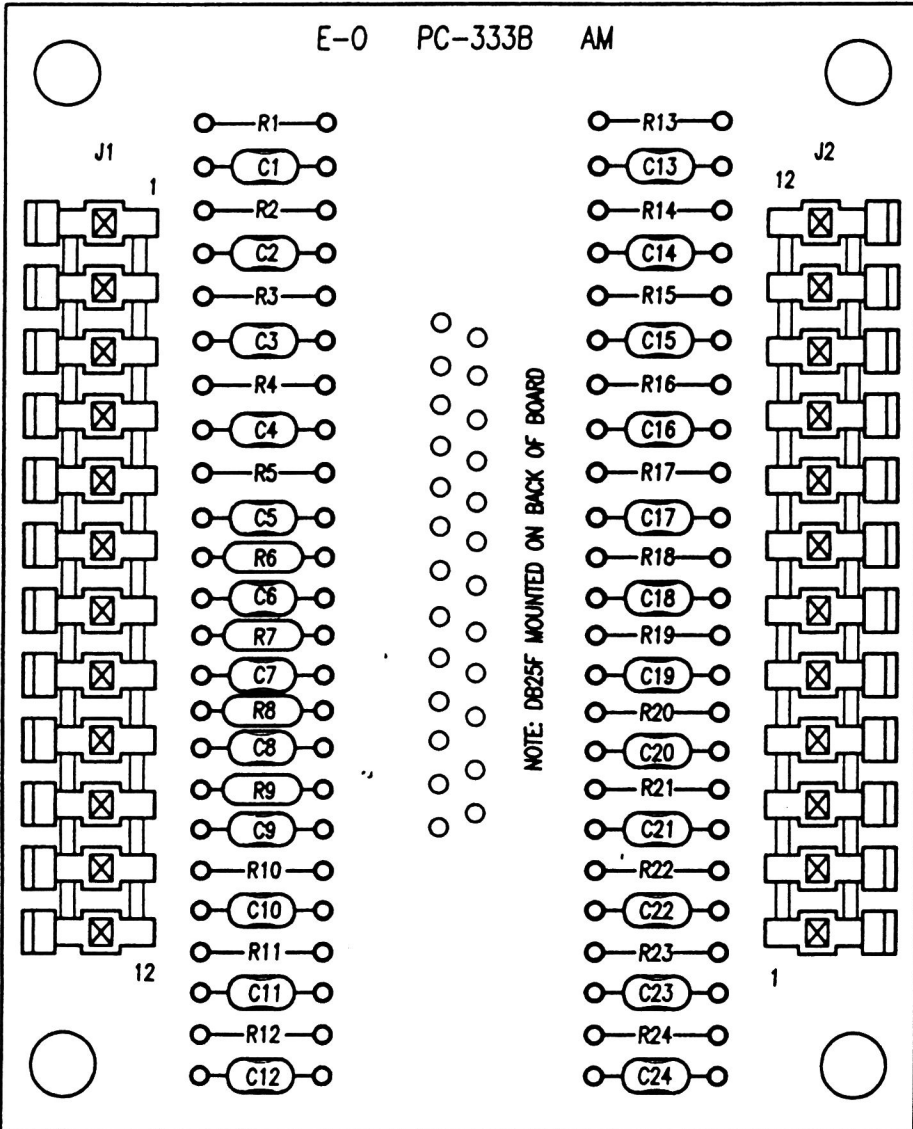
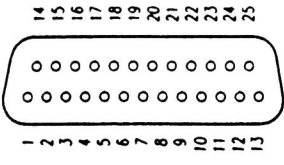
DESIGNED BY: NDT
 DATE: 6/18/99
 CHECKED: 4-19-99


DWG. No: AM-2501S
 CKB
 AM-2501S

REVISION DESCRIPTION:

REVISION:

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





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

REVISION DESCRIPTION:

REVISION:

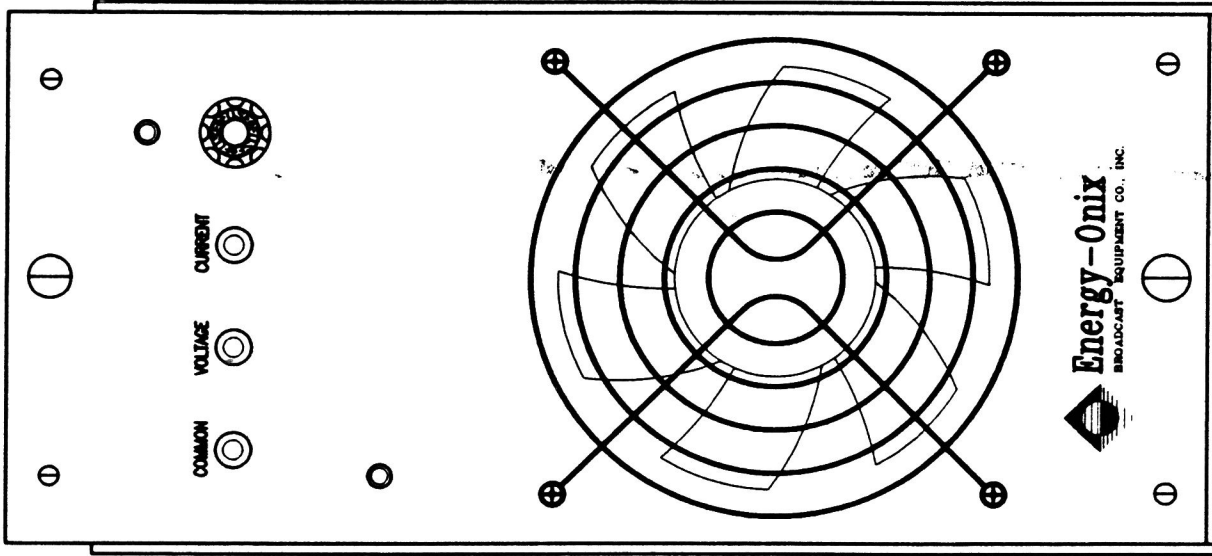
TITLE: PULSAR REMOTE INTERFACE BD.,
PC-333B COMPONENT LAYOUT

DESIGNED BY: NOT
DATE: 6/18/99
DRAWN BY: CKB
CHECKED BY: CKB
CAD No: AM-2501C
DWG. No: AM-2501C

PC- 333B REMOTE INTERFACE BOARD

PARTS LIST

C1-C24	.01 μF/100V STACK METAL FILM	P4713
R1-R5	JUMPER	
R6-R9	1K, 1/4W	
R10-R24	JUMPER	
J1, J2	12 – PIN MOLEX HEADER	
DB25F	D-SUBMIN, 25 PIN FEMALE	



PULSAR

TITLE:
**PULSAR AMP MODULE
 FRONT PANEL (EXTERNAL VIEW)**

DESIGNED BY: PI
 DATE: 11/29/99
 CHECKED: GJB
 DWG BY: GJB
 DWG No: AM-1107C

N.T.S.

REVISION:

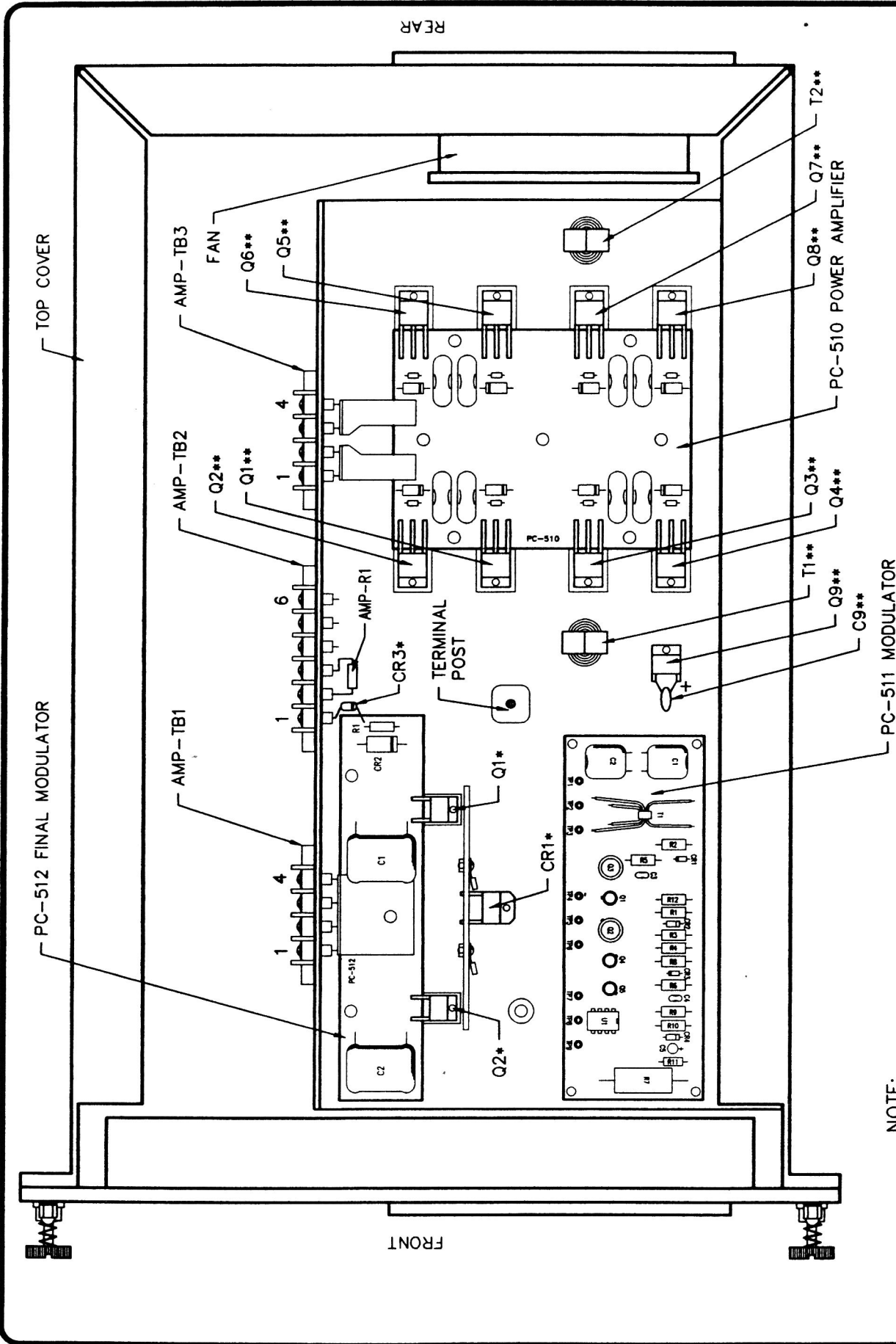
A

REVISION DESCRIPTION:

ADDED (3) TEST POINTS, FUSE & INDICATOR LIGHT, 07/20/00

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





PULSAR

**PULSAR AMP MODULE
COMP LAYOUT, HEATSINK VIEW**

DESIGNED BY: PI	DATE: 10/20/99	DWG. BY: DWG. No.	CAD: AM-1102C
CHK'D:			AM-1102C

N.T.S.

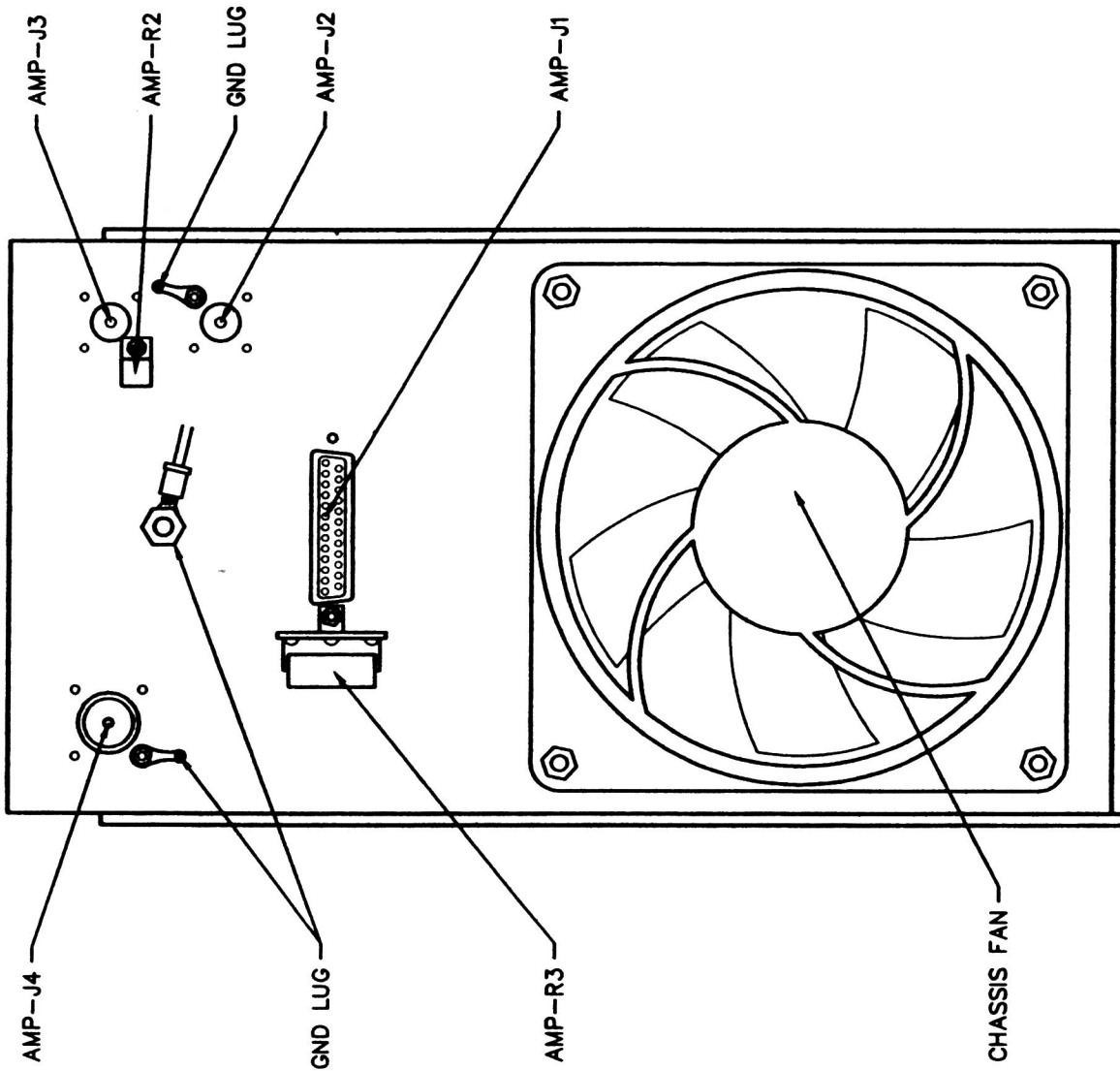
REVISION DESCRIPTION:	REVISION:
	□

NOTE:

- * = A PART OF PC-512 & ASSOCIATED SCHEMATIC
- ** = A PART OF PC-510 & ASSOCIATED SCHEMATIC

Energy-Onix

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



PULSAR

TITLE: PULSAR AMPLIFIER MODULE
 REAR PANEL (VIEWED FROM INSIDE)

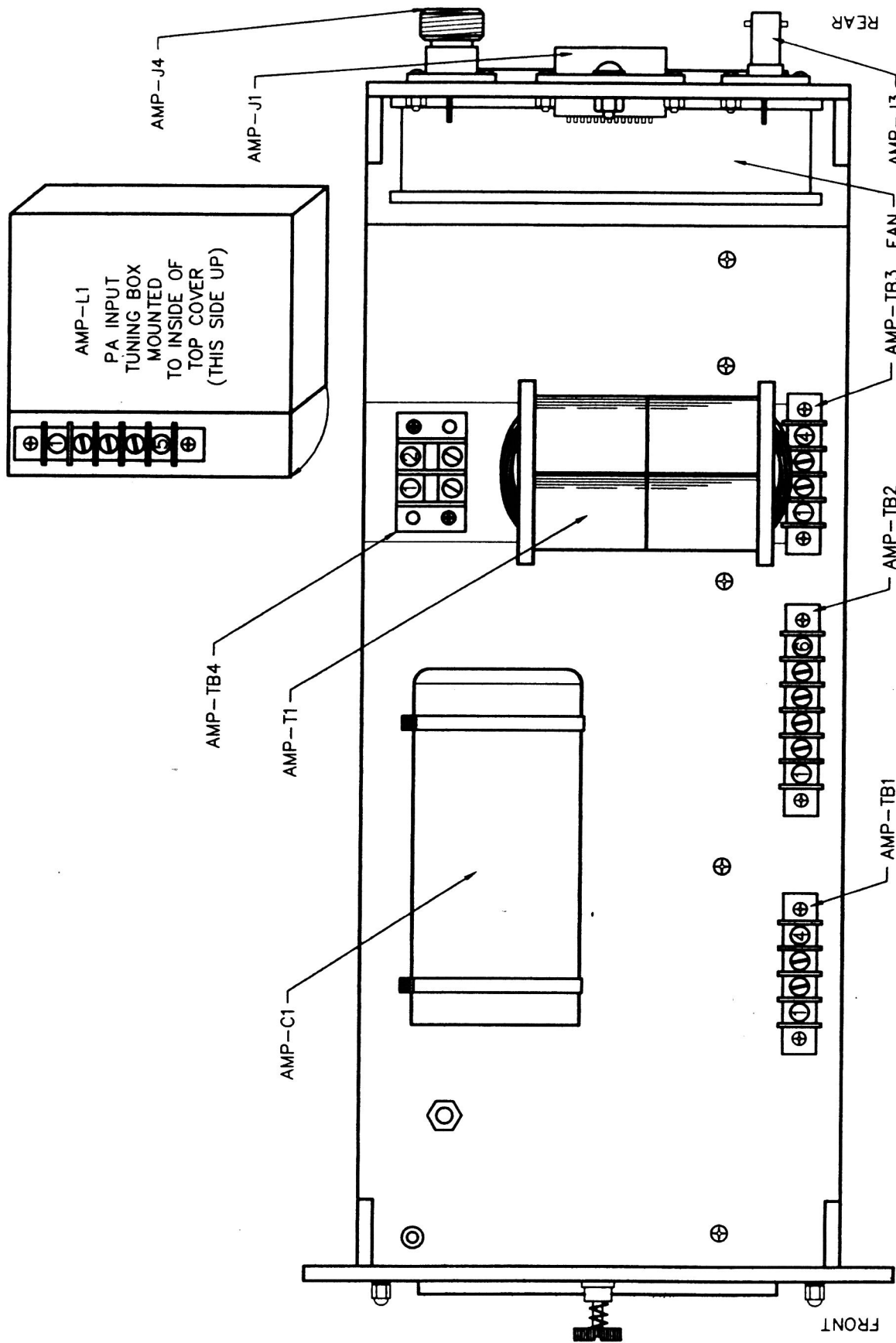
DESIGNED BY: PI DATE: 10/26/99 DWG. BY: DWG. No.
 CHECKED: G.S.B. AM-1103C AM-1103C

N.T.S.

REVISION:

REVISION DESCRIPTION:

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



PULSAR

**PULSAR AMP MODULE
COMP LAYOUT, TOP VIEW**

TITLE:

N.T.S.

REVISION:

REVISION DESCRIPTION:

DESIGNED BY: PI DATE: 10/20/99 DWG. BY: DWG. No.

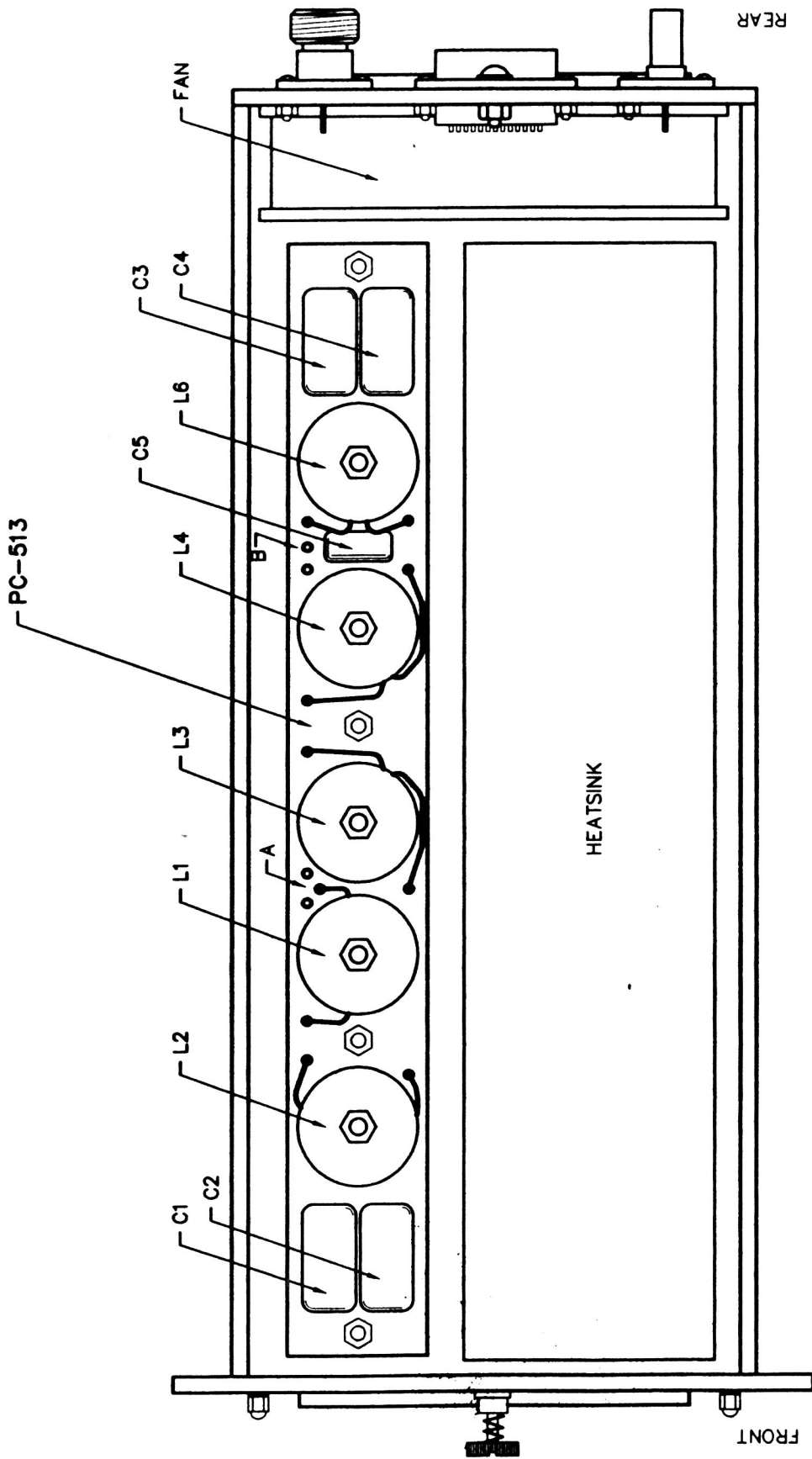
CHAR'ED: CAD: AM-1102C

AM-1103C

Energy-Onix

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





PULSAR

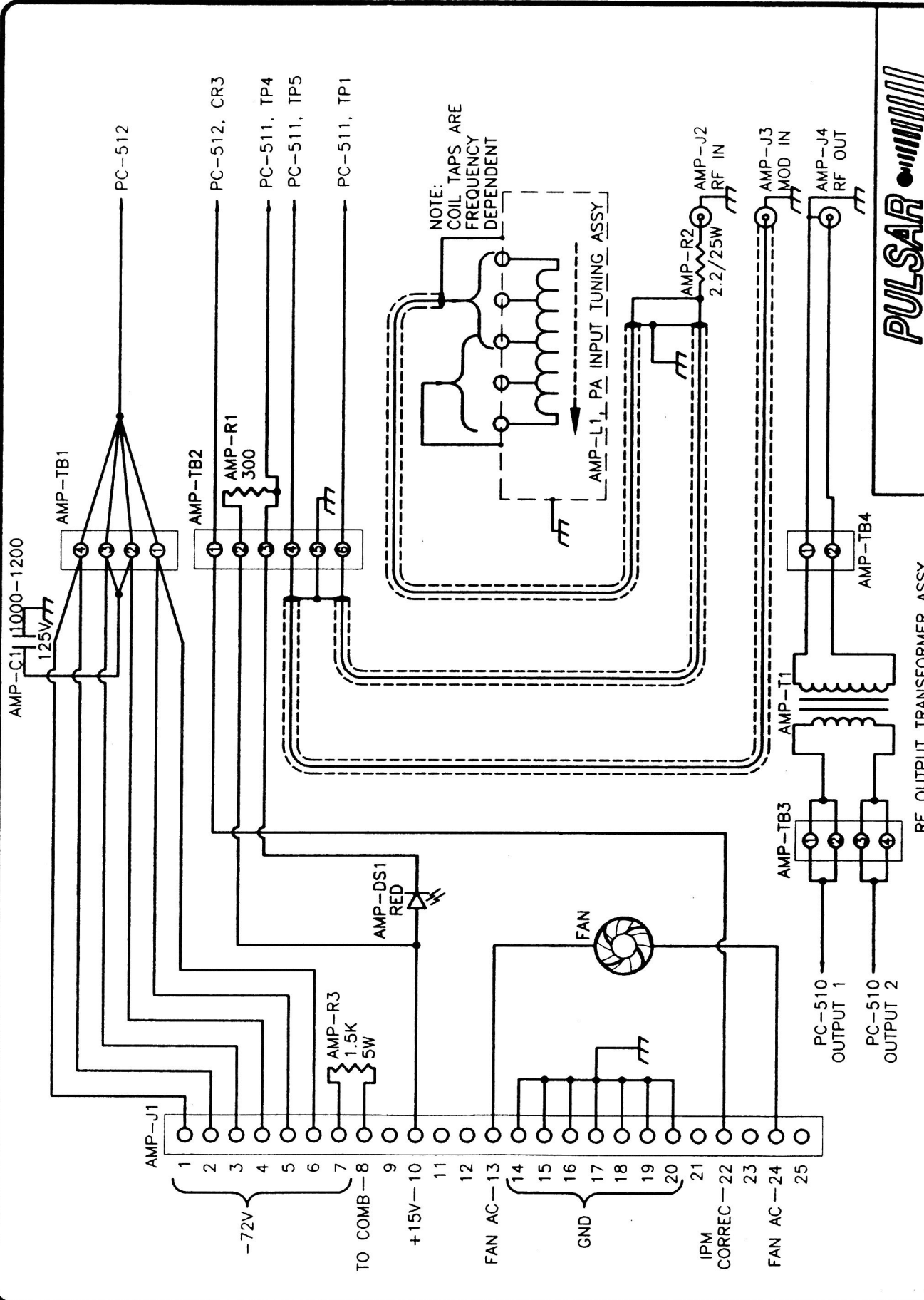
N.T.S.

TITLE: PULSAR AMP MODULE
 COMP LAYOUT, INSIDE BASE VIEW

DESIGNED BY: PI DATE: 10/22/99 DWG. BY: DWG. No.
 CHECKED: G.R.B. AM-1104C

REVISION DESCRIPTION:	
REVISION:	<input type="checkbox"/>

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



TITLE: PULSAR AMPLIFIER MODULE
 SCHEMATIC DIAGRAM (COMP NOT HEATSINK MTD)
 DESIGNED BY: PJ
 DATE: 10/27/99
 DWG. BY: DWG. No.
 CHR'ED: CAD: AM-1102S
 © 1999 AM-1102S

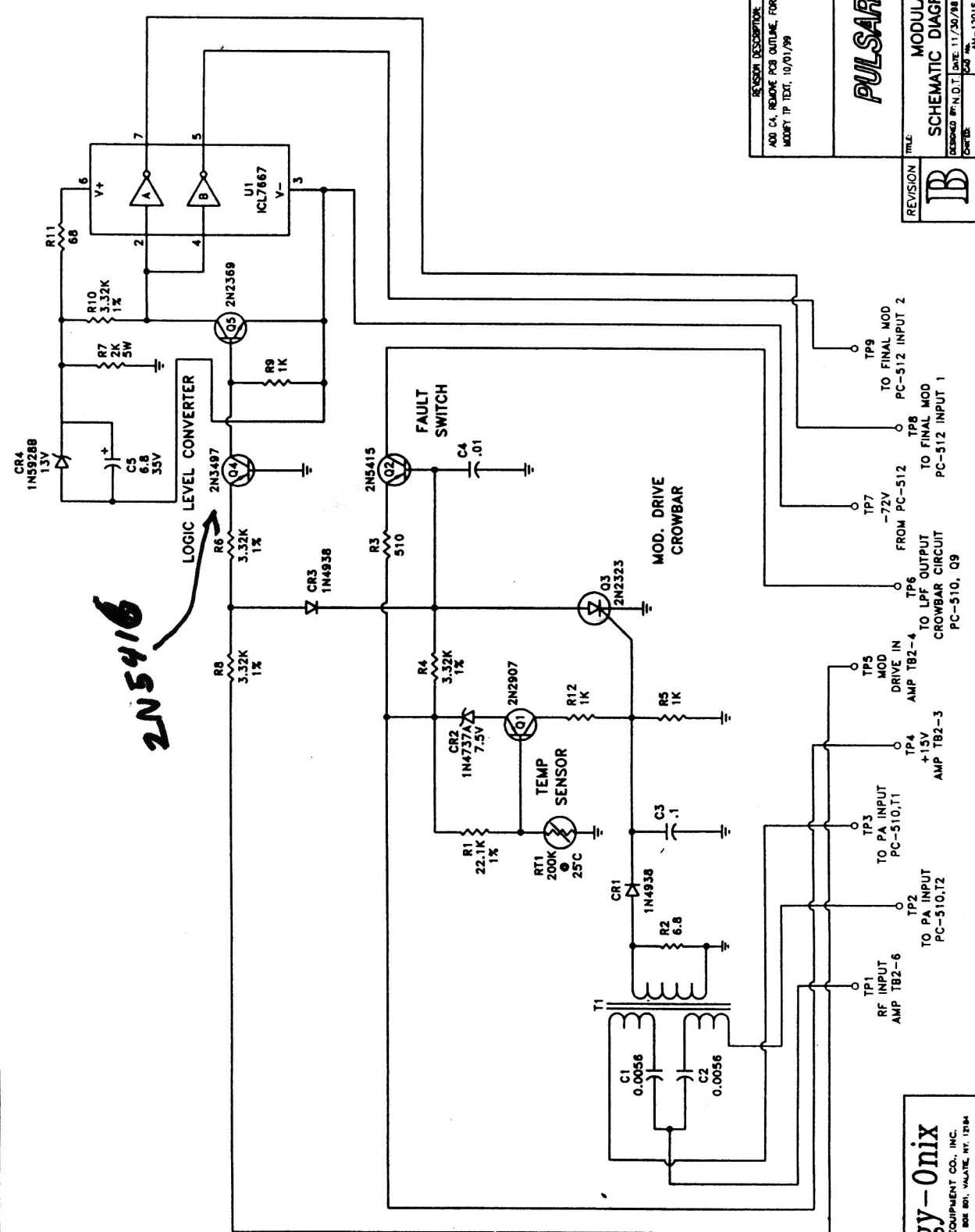
REVISION DESCRIPTION:	REVISION:

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

PULSAR AMPLIFIER MODULE - COMPONENTS NOT HEATSINK MOUNTED

PARTS LIST

AMP C1	1000-1200 μ F/125 VAC MOTOR START	MALLORY PSUI00015A
AMP DS1	LED, RED	
AMP J1	D-SUBMIN 25 PIN MALE	
AMP J2, AMP J3	BNC FEMALE	
AMP J4	N FEMALE	
AMP L1	PA INPUT TUNING ASSEMBLY	
AMP R1	300 OHM, 1/2W	
AMP R2	2.2 OHM, 25W, CADDOCK	
AMP R3	1.5K, 5W	YAGEO 751
AMP T1	RF OUTPUT TRANSFORMER ASSEMBLY	
AMP TB1,		
AMP TB3	4 POSITION, CHASSIS MOUNT 20A	
AMP TB2	6 POSITION, CHASSIS MOUNT 20A	
AMP TB4	2 POSITION, BARRIER 20A	



2N5416

LOGIC LEVEL CONVERTER

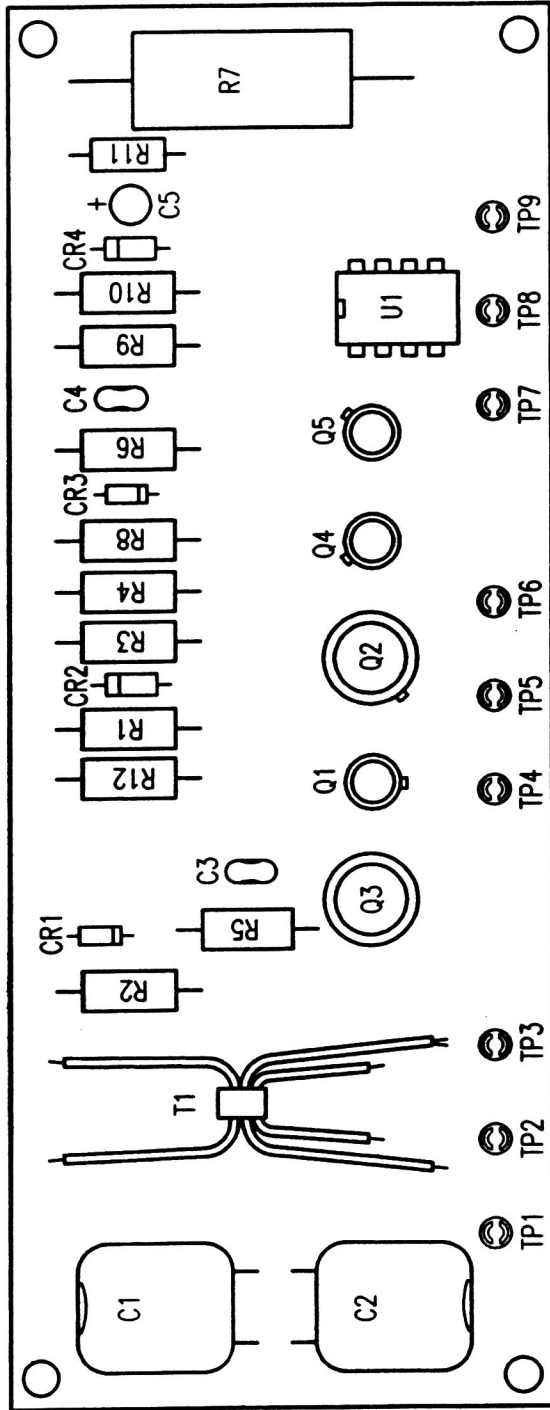
MOD. DRIVE CROWBAR

REVISION DESCRIPTION
 ADD C4, REMOVE PCB OUTLINE, FORM TP STRIP, 9/16/99
 MODIFY TP TEXT, 10/01/99

PULSAR

REVISED BY: N.D.T.	DATE: 11/30/88	DESIGN NO: 6.818	FORM NO: AM-1201S
TITLE: MODULATOR SCHEMATIC DIAGRAM (PC-511)			
REVISED BY: B			

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



NTS

NOTE: RT1 LOCATED ON BACK OF BOARD



REVISION DESCRIPTION:	REVISION:	TITLE:
	□	MODULATOR PCB COMPONENT LAYOUT (PC-511)

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

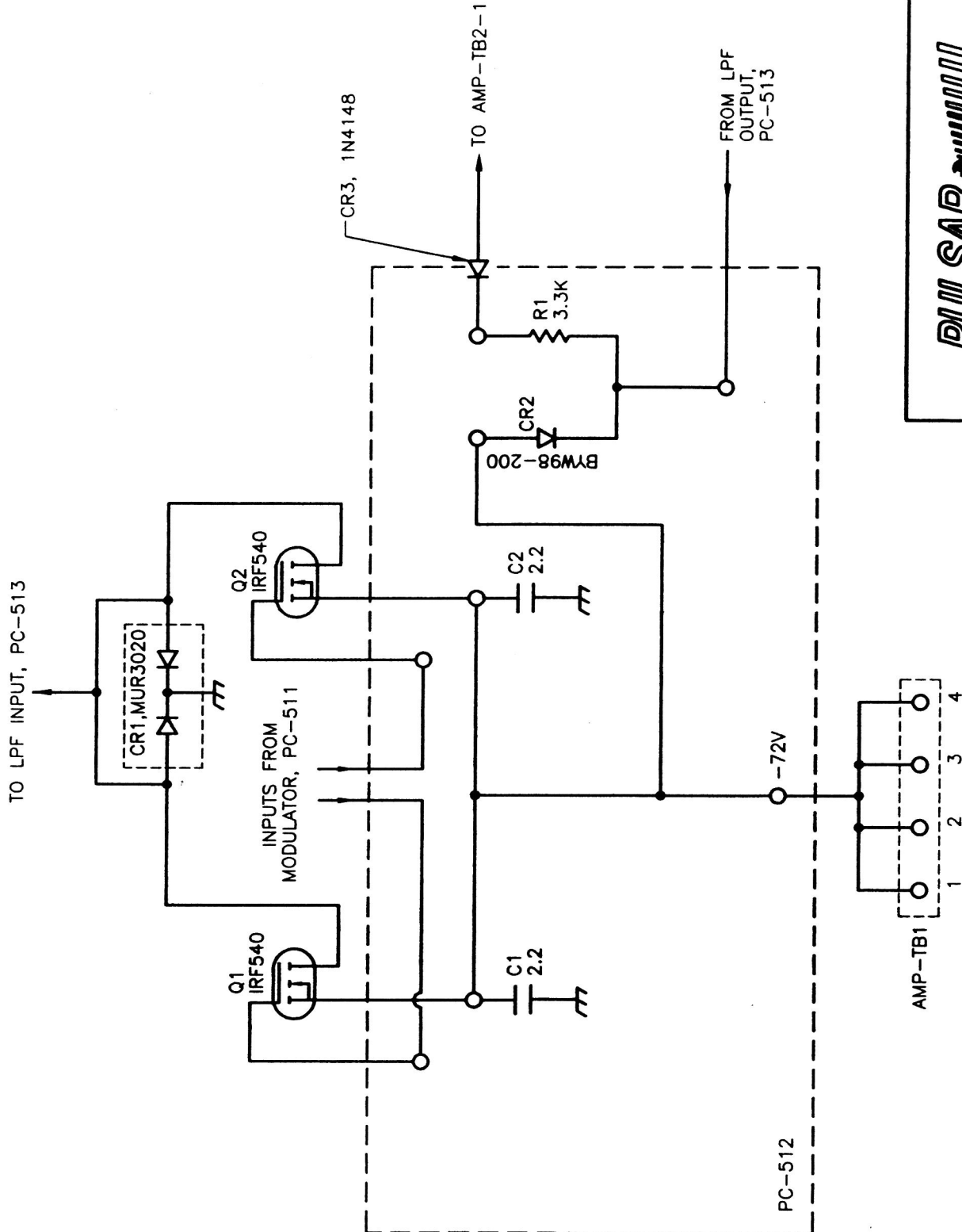
DESIGNED BY: NDT	DATE: 9/8/99	DWG. BY: DWG. No.
CHK'D:	CAO: AM-1201C	© S.B. AM-1201C

PC - 511 MODULATOR

PARTS LIST

C1,C2	.0056 μ F/400V POLYPROP.	P3506-ND
C3	.1 μ F/100V MONO. CERAMIC	P4910-ND
C4	.01 μ F/100V MONO. CERAMIC	P4904-ND
C5	6.8 μ F/35V TANTALUM	P2064-ND
C6	10 μ F/100V ELECTROLYTIC	
CR1,CR3	1N4938	
CR2	1N4737A 7.5V ZENER	
CR4	1N5928B 13V ZENER	
Q1	2N2907	
Q2	2N5415	
Q3	2N2323 THYRISTOR	
Q4	2N3497	
Q5	2N2369	
R1	22.1K/ 1/2W 1%	22.1KH-ND
R2	6.8 OHMS/1/2W	
R3	510/1/2W	
R4,R6,R8,R10	3.32K/1/2W 1%	3320H-ND
R5,R9,R12	1K/1/2W	
R7	2K/5W	YAGEO 719
R11	68 OHMS/1/4W	
R13	43K/1/2 W	
RT1	200K THERMISTOR	KC010N-ND
T1	UNBALANCE TRANSFORMER ASSEMBLY	11-122B
TP1-TP9	PC MOUNT TERMINAL POST	KEYST 1592-2
U1	ICL7667CPA	
XU1	8-PIN IC SOCKET	

Q5 - Has 2N2369 crossed out and 2N5416 written in



PULSAR

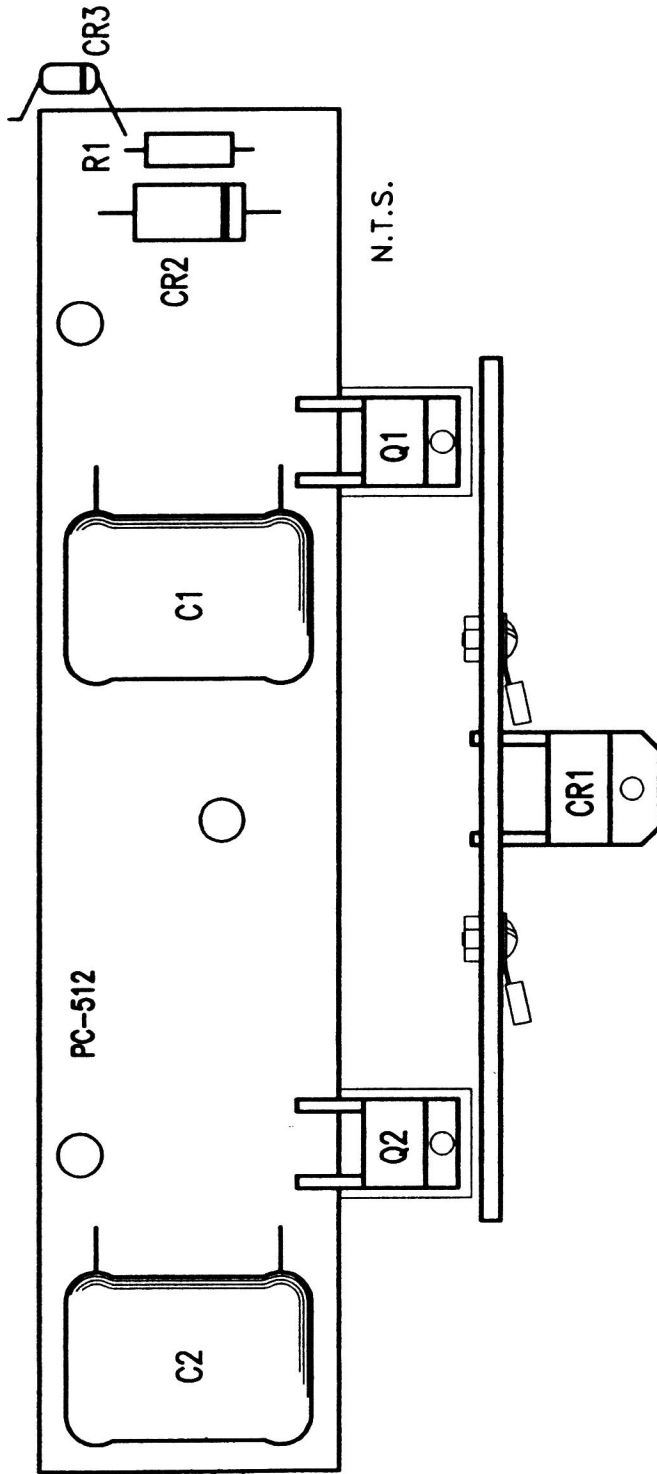
TITLE: **FINAL MODULATOR ASSY, PC-512 AND ASSOCIATED COMPONENTS**

DESIGNED BY: _____ DATE: 11/01/99 DWG. No. _____

CHECKED: _____ CAD No. AM-1301S CKB AM-1301S

REVISIONS:

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



PULSAR

TITLE: **FINAL MODULATOR
COMPONENT LAYOUT (PC-512)**

DESIGNED BY: NDT
DATE: 6/21/99
DWG. BY: DWG. No.
CHECKED: G.R.B.
CAD: AM-1301C
AM-1301C

REVISION DESCRIPTION:	REVISION:
	0

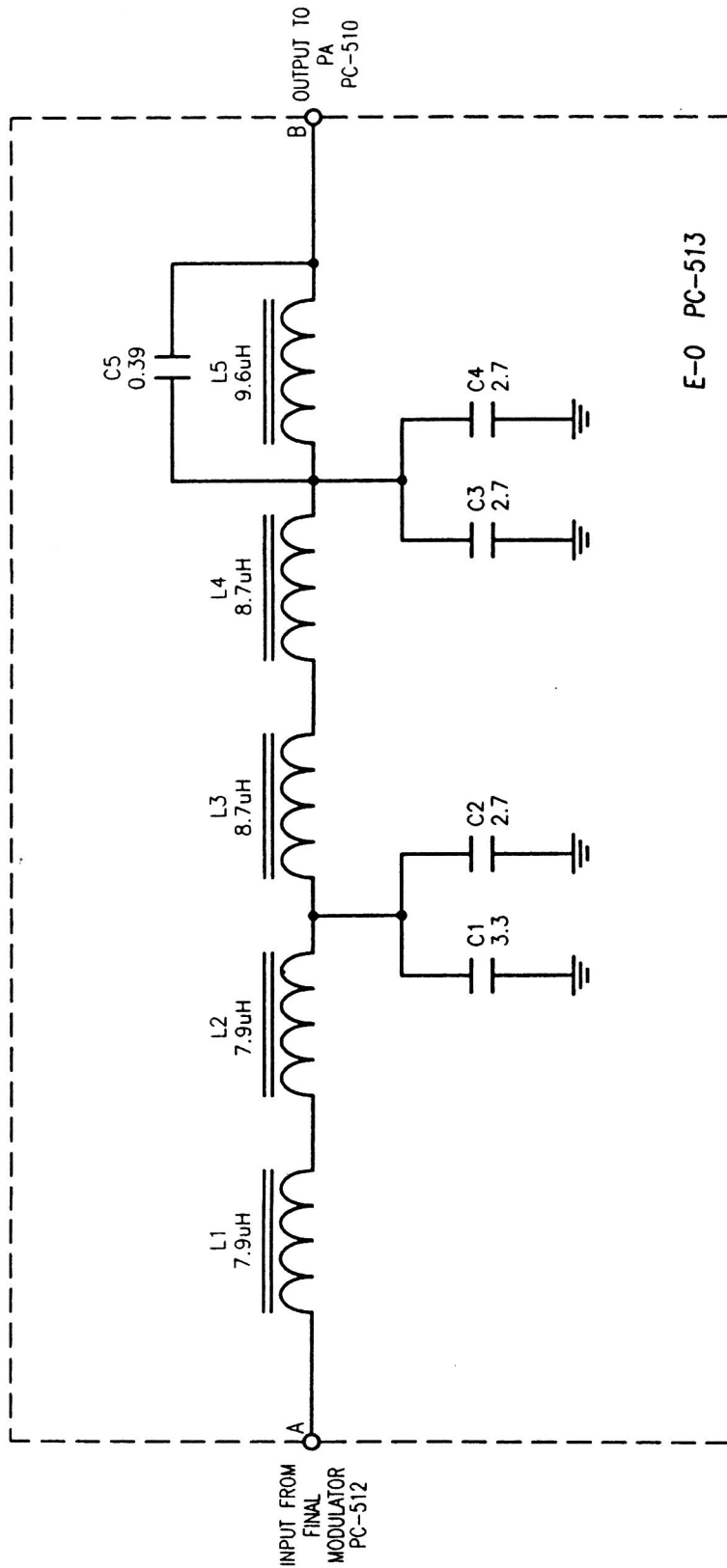
Energy-Onix
BROADCAST EQUIPMENT CO., INC.
1306 RIVER ST., P.O. BOX 801, VALATIE, NY 12184

PC-512 FINAL MODULATOR ASSEMBLY & ASSOCIATED COMPONENTS

PARTS LIST

C1,C2	2.2μF/250V METALIZED POLYPROP	PF2225-ND
CR1	MUR 3020	
CR2	BYW 98 - 200	
CR3	1N4148	
Q1,Q2	IRF 540	
R1	3.3K, 1/2W	
AMP TB1	4-POSITION, CHASSIS MOUNT 20A	

Q1-Q2 - Later production uses IRFP460 (higher breakdown voltage)




REVISIONS:

TITLE:

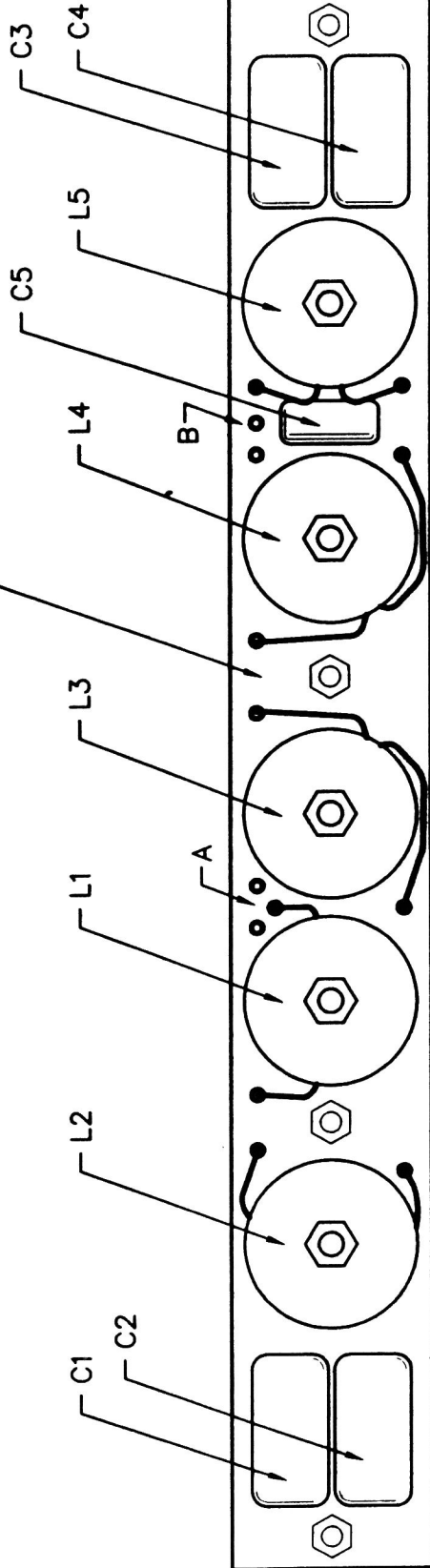
LOW PASS FILTER
SCHEMATIC DIAGRAM (PC-513)

DESIGNED BY: BW	DATE: 12/01/98	DWG. BY: CKB	DWG. No. AM-1601S
CHK'ED:	CAD No.		



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

PC-513



PULSAR

**LOW PASS FILTER
COMP LAYOUT, PC-513**

N.T.S.

REVISION:

A

REVISION DESCRIPTION:

L6 CALLOUT CHG. TO L5, 03/10/00

Energy-Onix
BROADCAST EQUIPMENT CO., INC.
1,306 RIVER ST., P.O. BOX 801, VALATIE, NY, 12184



DESIGNED BY: PI

DATE: 10/22/99

ENG. BY: DWG. NO.

CAD: AM-1105C

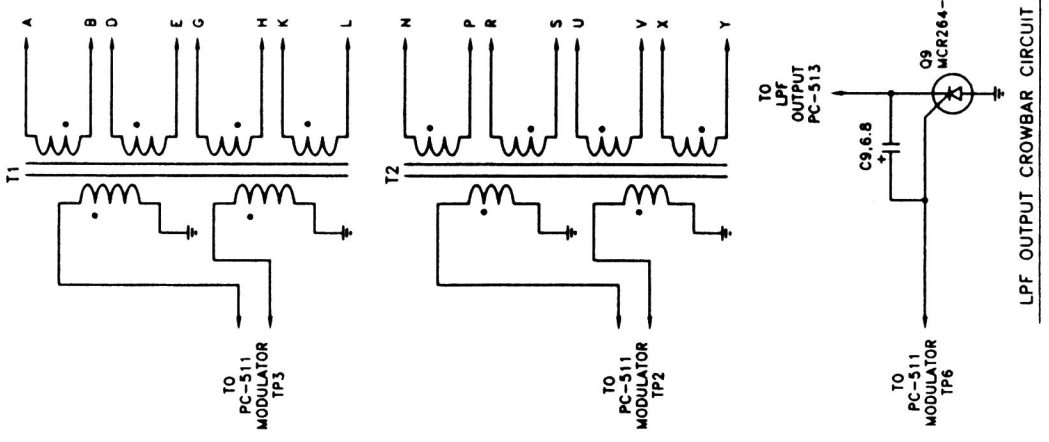
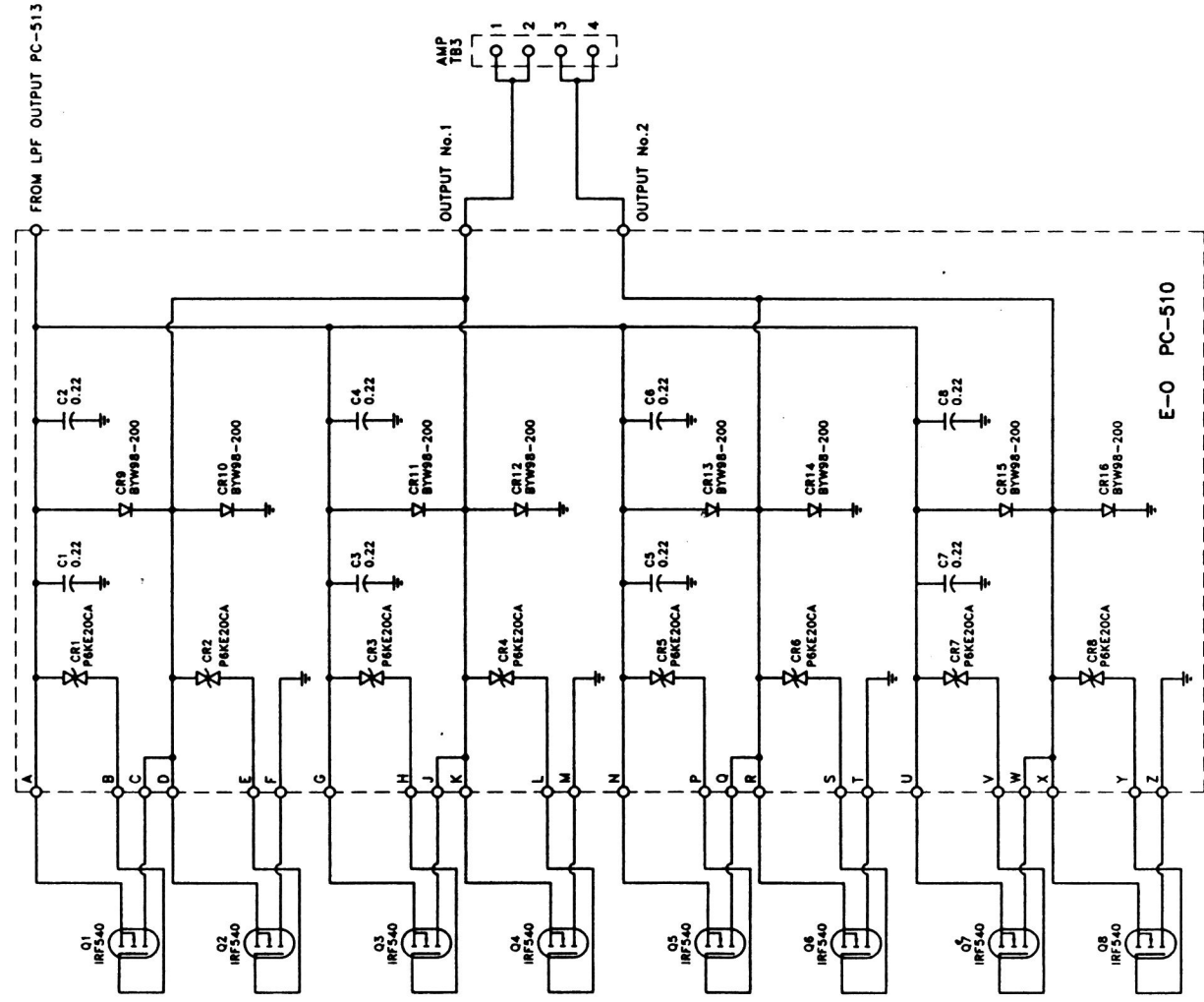
AM-1105C

PC – 513

LOW PASS FILTER

PARTS LIST

C1	3.3 μ F/250V METALLIZED POLYPROP	PF2335-ND
C2,C3,C4	2.7 μ F/250V METALLIZED POLYPROP	PF2275-ND
C5	.39 μ F/250V METALLIZED POLYPROP	PF2394-ND
L1,L2	7.9 μ H POT CORE ASSEMBLY	5678-362221
L3,L4	8.7 μ H POT CORE ASSEMBLY	5678-362221
L5	9.6 μ H POT CORE ASSEMBLY	5678-362221



PULSAR

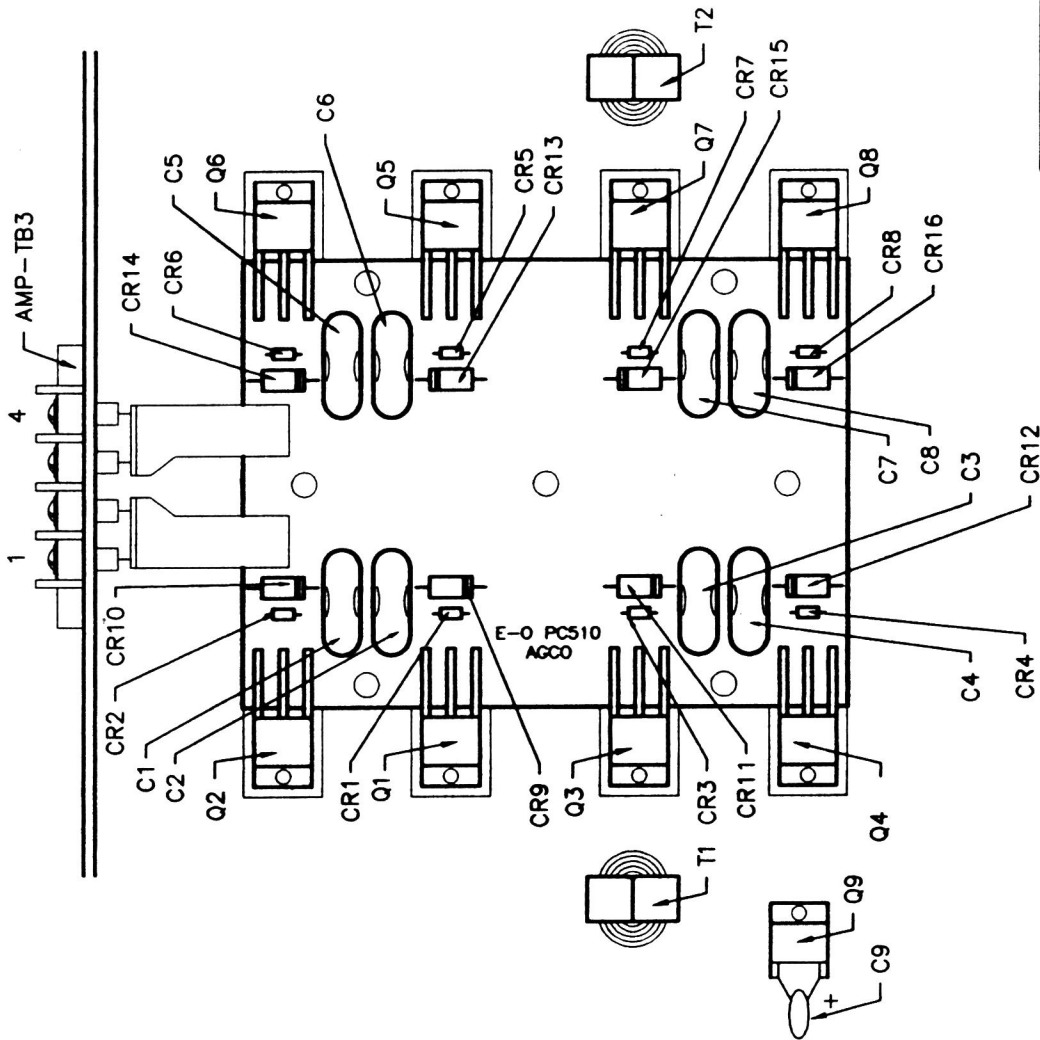
PC-510 POWER AMPLIFIER
AND ASSOCIATED COMPONENTS

DESIGNED BY: JT DATE: 11/25/50
DRAWN BY: JMC No. 11/28/50
REVISED BY: G.R.B. No. AM-1101S

REVISION

E-O PC-510

Energy-Onix
BROADCAST EQUIPMENT CO., INC.
1506 RIVER ST., P.O. BOX 801, WAUWATONIA, WIS. 53186



PULSAR

TITLE: **POWER AMPLIFIER
COMPONENT LAYOUT (PC-510)**

DESIGNED BY: NDT DATE: 6/18/97 DWG. BY: DWG. No
 CHECKED: C.S.B. AM-1101C © S.B. AM-1101C

REVISION DESCRIPTION:	REVISION:
	□

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

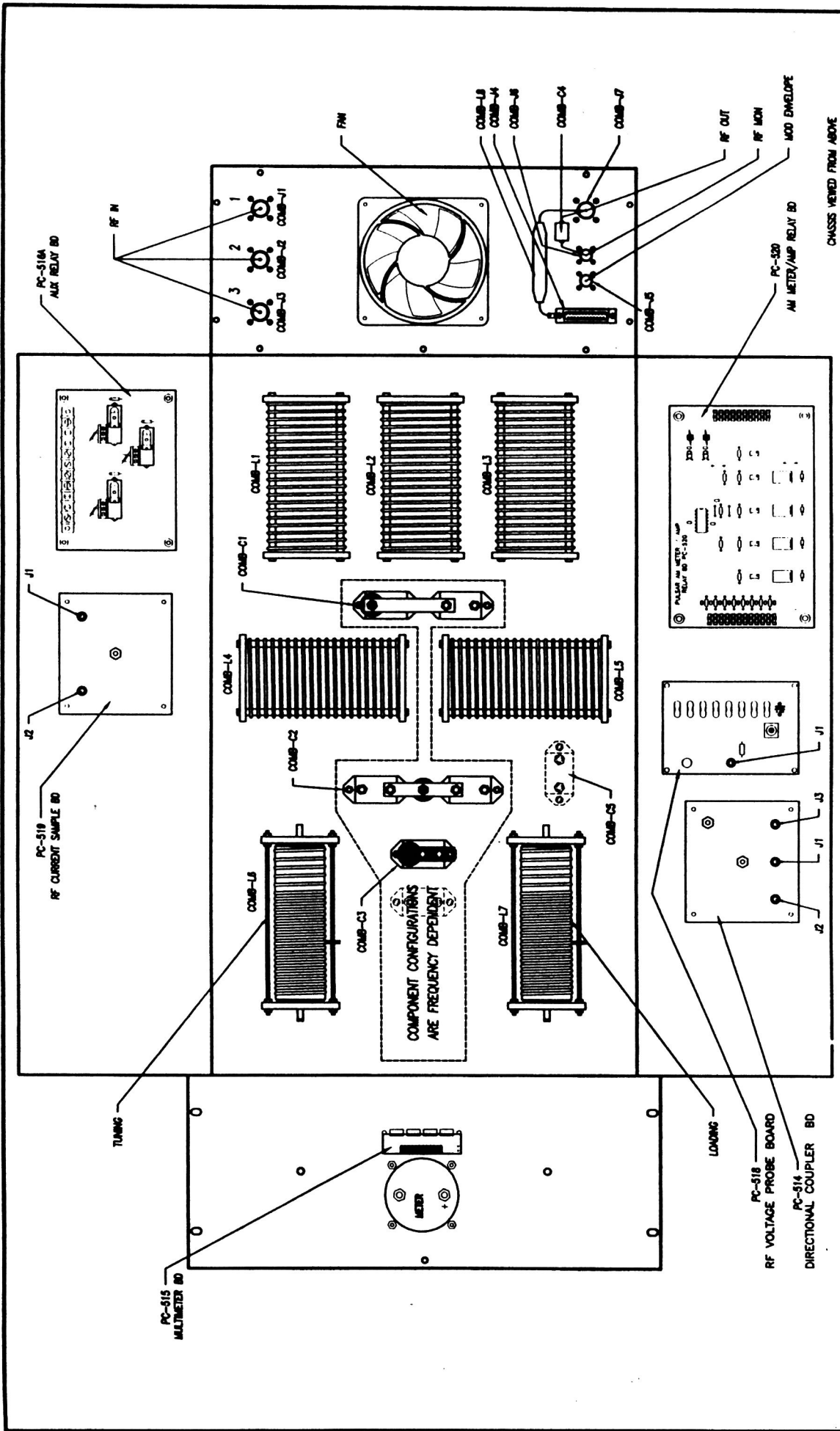
PC - 510

POWER AMPLIFIER AND ASSOCIATED COMPONENTS

PARTS LIST

C1-C8	.22 μ F/250V METALIZED POLYPROP.	PF2224-ND
C9	6.8 μ F/6V TANTALUM	
CR1-CR8	P6KE20CA ZENER TRANSIENT SUPPRESSOR	
CR9-CR16	BYW 98 - 200	
Q1-Q8	IRF540	
Q9	MCR264-8 SCR	
T1,T2	INPUT TRANSFORMER ASSEMBLY	11-250B
AMP TB3	4-POSITION, CHASSIS MOUNT 20A	

Q1-Q8 - Later production uses IRFP460 (higher breakdown voltage)



CHASSIS VIEWED FROM ABOVE

**PULSAR AM COMBINER
DRAWER COMPONENT LAYOUT**

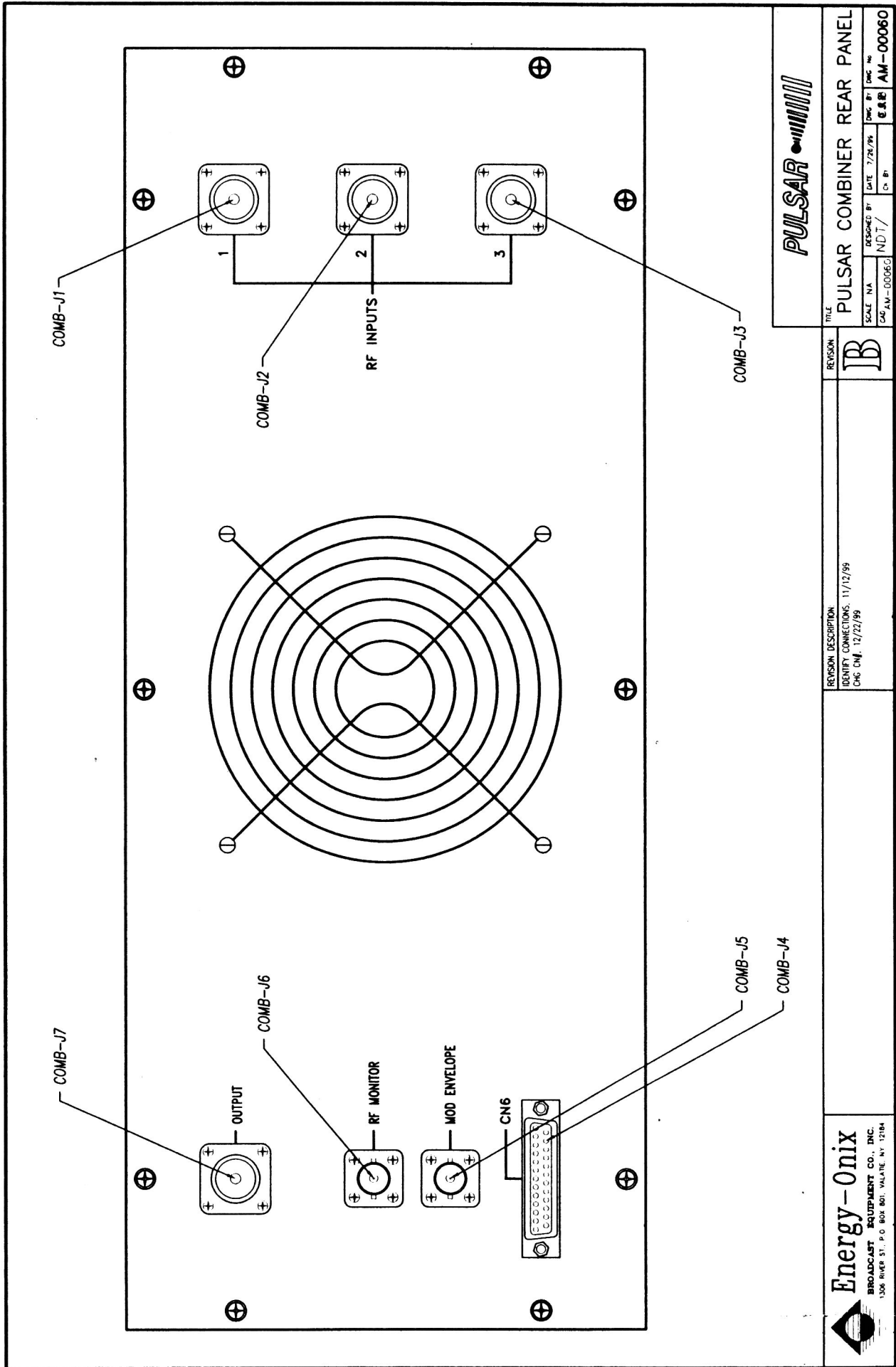
SCALE: NTS
 DESIGNED BY: DATE: 7/28/74
 DRAWN BY: BIV
 CHECKED BY: E.S.B. AM-0002C
 CR. #:

REVISION DESCRIPTION:

REVISION:

Energy-Onix PULSAR

BROADCAST EQUIPMENT CO., INC.
 1300 POND ST., P.O. BOX 801, VALAIE, NY 12164



PULSAR

PULSAR COMBINER REAR PANEL

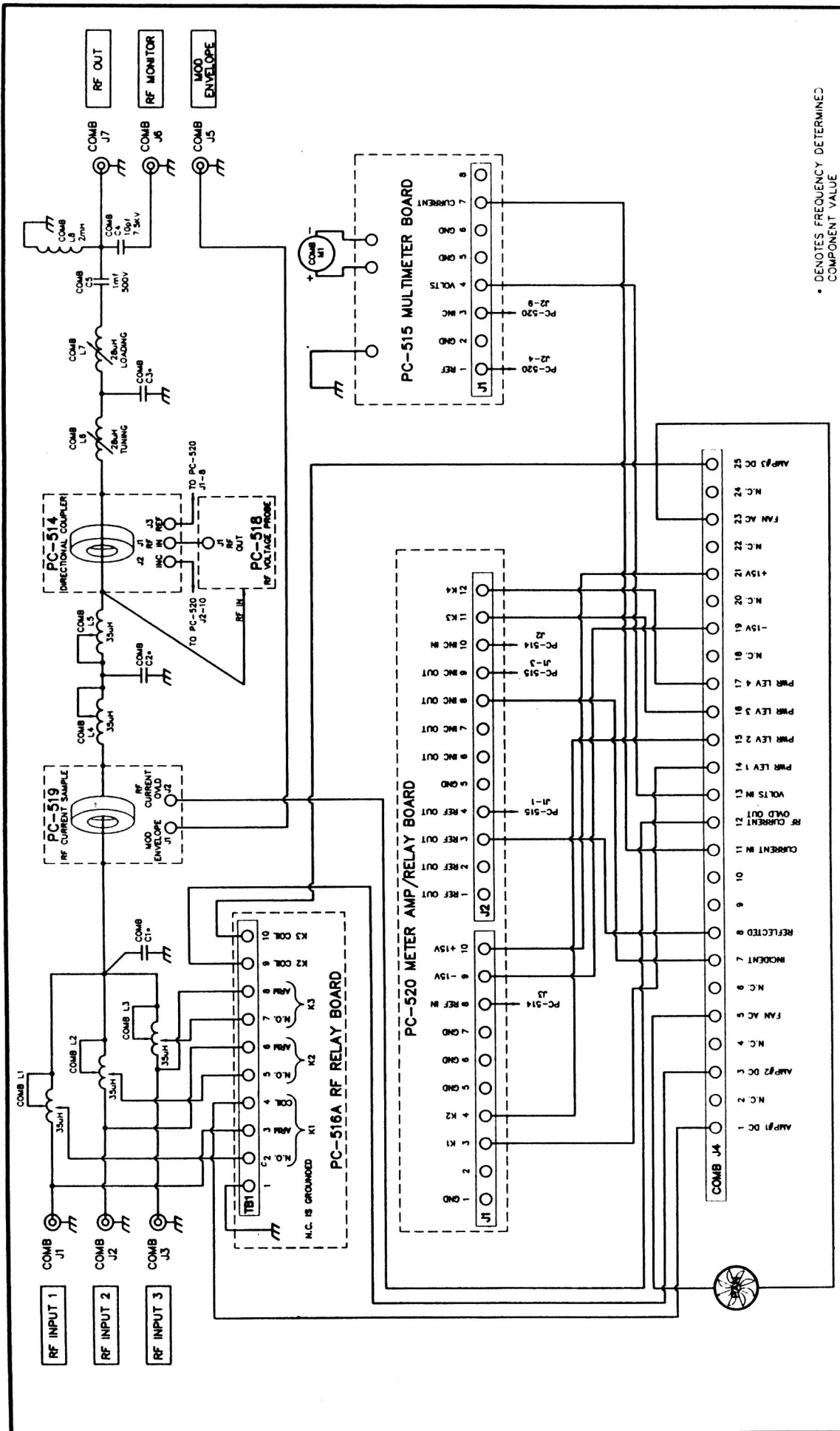
SCALE: NA
 CACAV-00060

DESIGNED BY: DATE: 7/26/95
 ND/T/

INC. #1: INC. #2: G.J.R. AM-00060

REVISION	TITLE	REVISION DESCRIPTION
B	PULSAR COMBINER REAR PANEL	IDENTIFY CONNECTIONS. 11/12/95 C.R.C. CNF. 12/22/95

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



* DENOTES FREQUENCY DETERMINED COMPONENT VALUE

PULSAR 1000	
COMBINER DRAWER SCH DIA	
SCALE: N/A	DESIGNED BY: PI
DATE: 10/14/98	CHK BY: G.S.B.
COM: AM-00025	DR: 0025

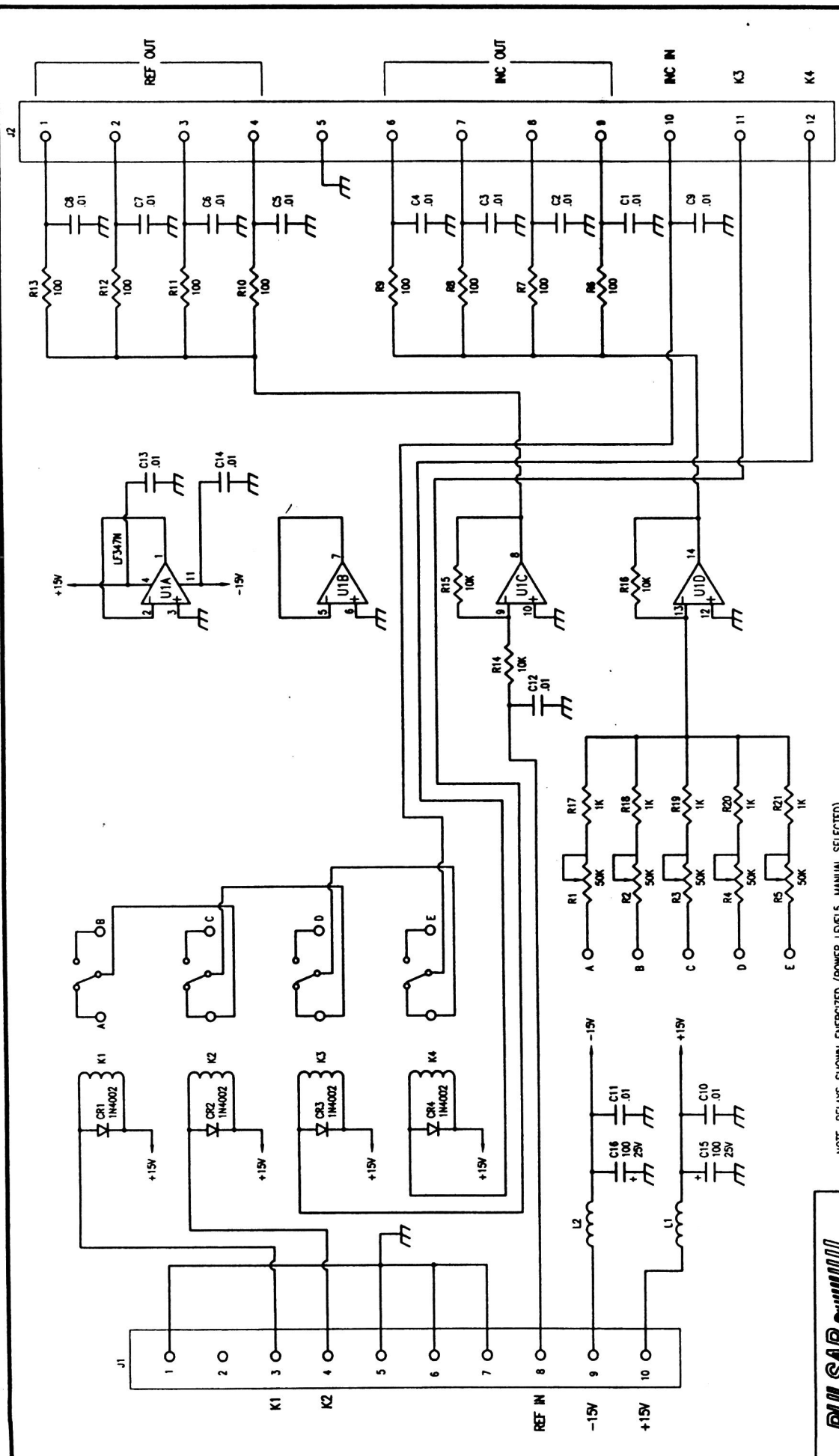
REVISION:	MTL:
-----------	------

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

COMBINER DRAWER - PULSAR 1000

PARTS LIST

COMB C1	F2 TYPE TRANSMITTING CAPACITOR, FREQUENCY DETERMINED	
COMB C2	F2 TYPE TRANSMITTING CAPACITOR, FREQUENCY DETERMINED	
COMB C3	F2 TYPE TRANSMITTING CAPACITOR, FREQUENCY DETERMINED	
COMB C4	10μF/7.5KV DOORKNOB	
COMB C5	.1μF / 500V	F2 TYPE
COMB J1-J3, COMB J7	N-FEMALE	
COMB J4	DB25-MALE	
COMB J5, COMB J6	BNC FEMALE	
COMB L1-COMB L5	35μH	B & W 2006T
COMB L6, COMB L7	28μH VARIABLE	CRC 229—203
COMB L8	2mH CHOKE	C - B 6400 - 8
COMB M1	100μA	TRANSCAT/EIL

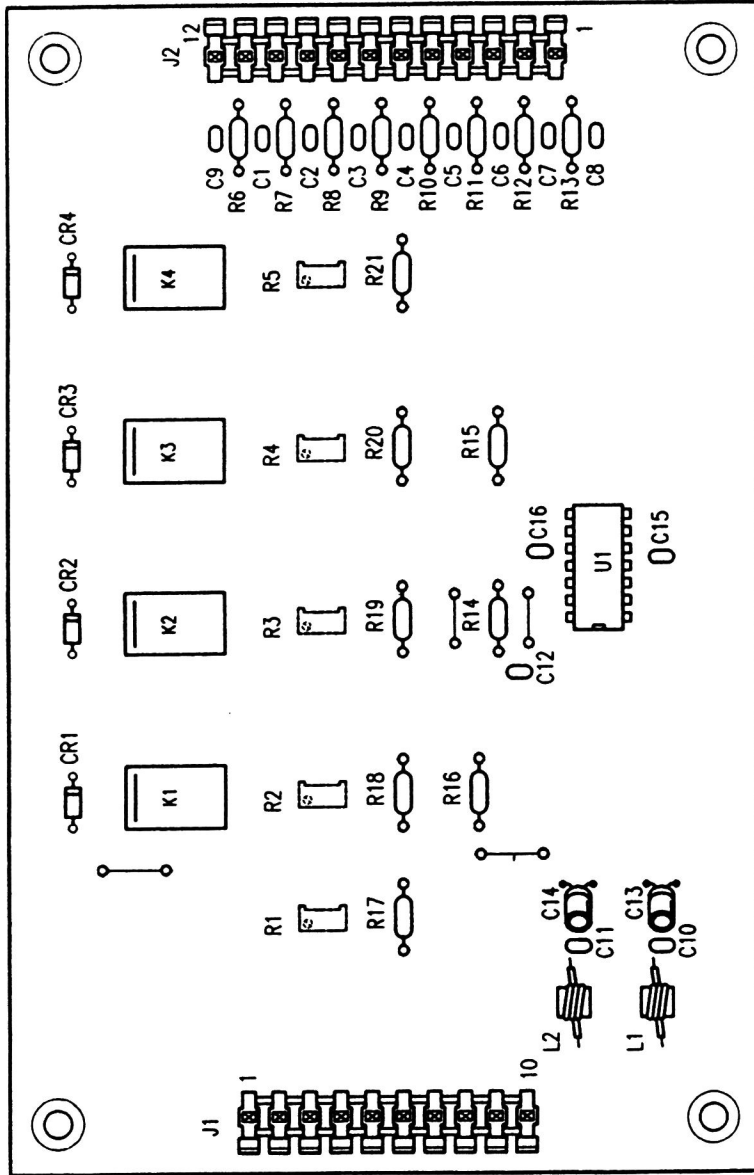


NOTE: RELAYS SHOWN ENERGIZED (POWER LEVELS, MANUAL SELECTED).

TITLE		METER AMP/RELAY BOARD	
SCALE		PC-520 SCHEMATIC DIAGRAM	
DATE	DESIGNED BY	DATE	CHK. BY
8/7/79	PI	8/7/79	AM-2002S
CAD	PI	8/7/79	AM-2002S



Energy-Onix
 BROADCAST EQUIPMENT CO., INC.
 1308 RIVER ST., P.O. BOX 801, VALHALLA, NY 12154



NOTE: R1 THRU R5 ON BACK OF BOARD

PULSAR

**PULSAR AM METER AMP/
RELAY BD PC-520**

TITLE:

REVISION:

REVISION DESCRIPTION:

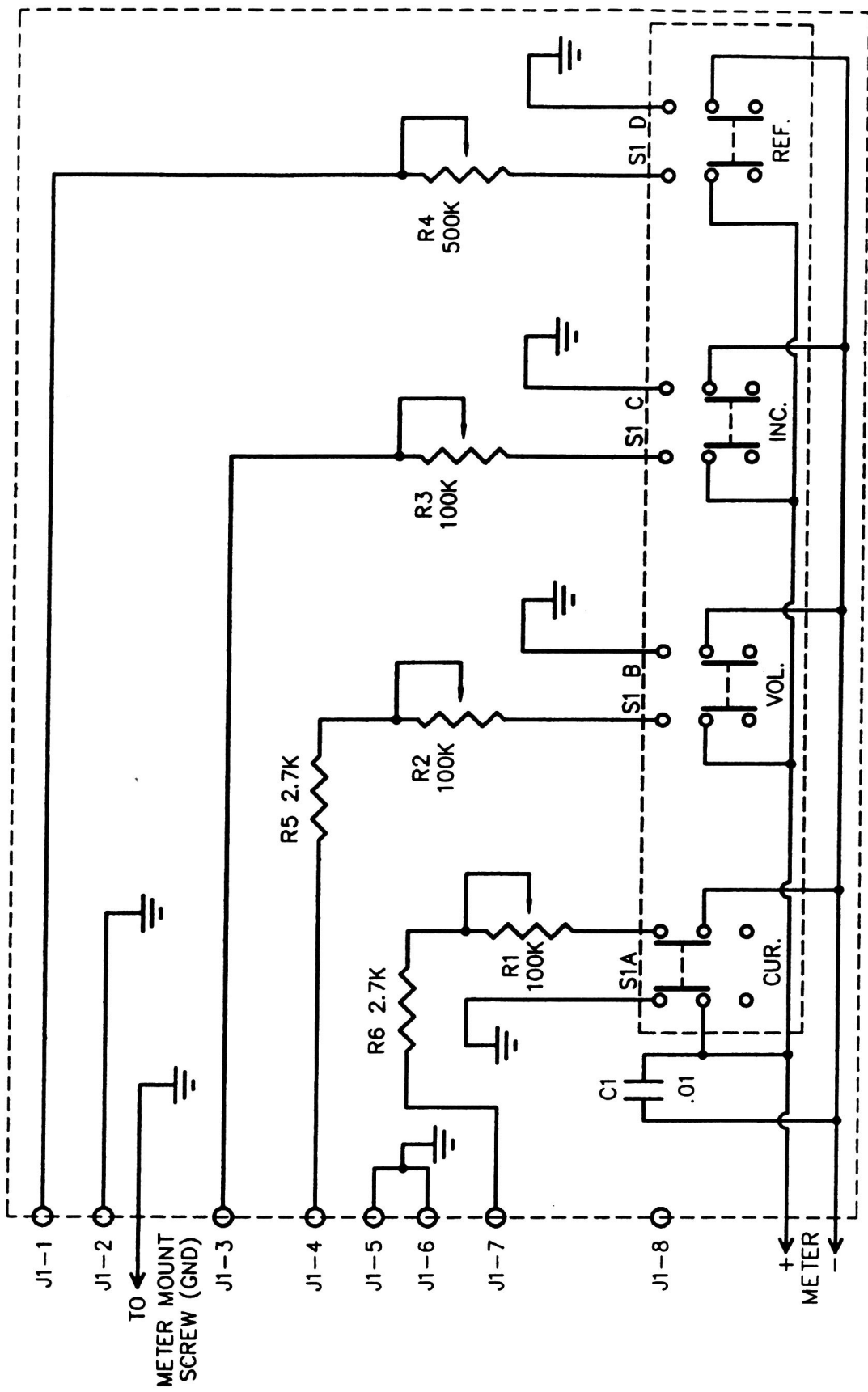
DESIGNED BY: NDT	DATE: 07/27/99	DRG. BY: DMG. No	AM-2002C
CHECKED:	CAD: AM-2002C		

Energy-Onix
BROADCAST EQUIPMENT CO., INC.
1,306 RIVER ST., P.O. BOX 801, VALATIE, NY, 12184

PC – 520 METER AMP/RELAY BOARD

PARTS LIST

C1-C14	.01μF/100V STACK METAL FILM	P4713-ND
C15,C16	100μF/25V ELECTROLYTIC	
CR1-CR4	1N4002	
J1	10 PIN MOLEX HEADER	
J2	12 PIN MOLEX HEADER	
K1-K4	AROMAT, NON-LATCHING	DF2E-DC12
L1,L2	FERRITE BEAD	21-129B
R1-R5	50K VARIABLE, MULTI-TURN	
R6-R13	100 OHM, 1/4W	
R14-R16	10K, 1/4W	
R17-R21	1K, 1/4W	
U1	LF347N	
XU1	14-PIN IC SOCKET	



PULSAR

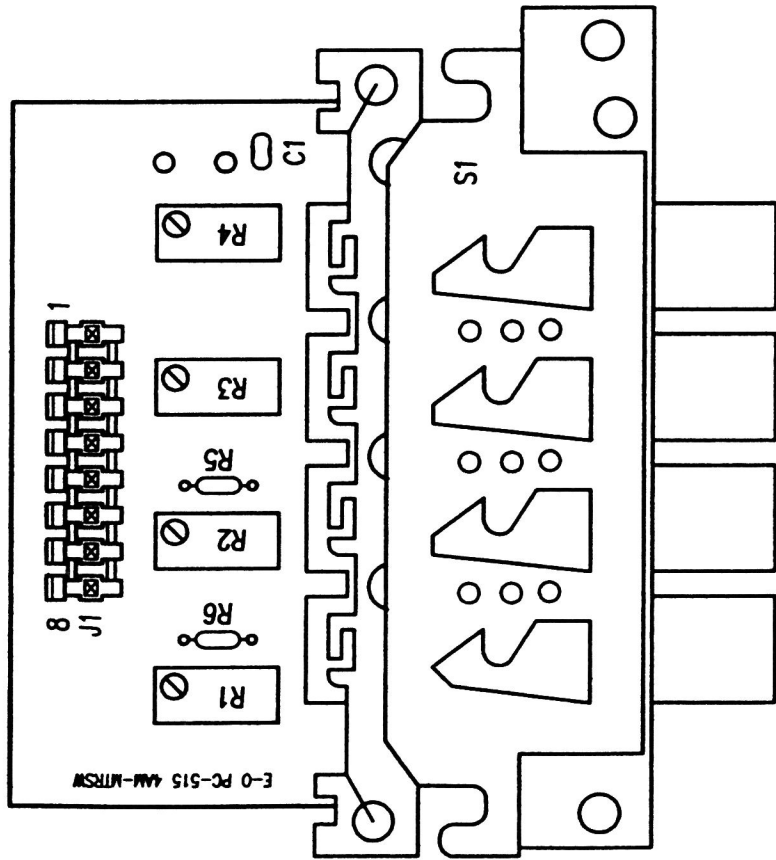
TITLE: MULTIMETER BOARD
SCHEMATIC DIA. (PC-515)

DESIGNED BY: NDT
DATE: 11/04/98
DWG. BY: DMC No. CKB
CAD No.: AM-2001S
AM-2001S

REVISION: **A**

REVISION DESCRIPTION:
 RE ID J1's, TITLE CHANGED, 9/22/99

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



E-0 PC-515 4MM-MTRSM

CURRENT VOLTS INC. REF.

REVISION DESCRIPTION:

REVISIONS:



TITLE
**MULTIMETER BD, PC-515
 COMPONENT LAYOUT**

DESIGNED BY: NOT
 DATE: 9/22/99
 DWG. BY: CKB
 CKB

CHK'ED:
 CAD No AM-2001C
 DWG. No AM-2001C

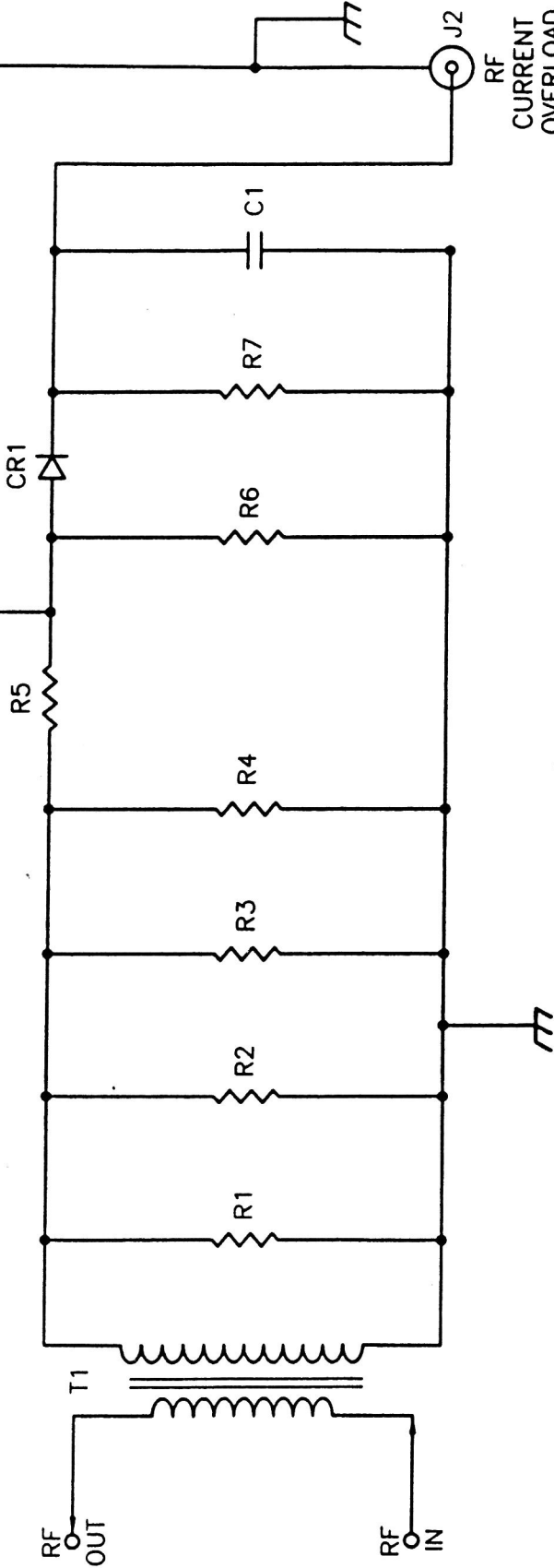
Energy-Onix
 BROADCAST EQUIPMENT CO., INC.
 1306 RIVER ST., P.O. BOX 801, VALATIE, NY, 12184

PC- 515 MULTIMETER BOARD

PARTS LIST

C1	.01/1KV DISC CERAMIC	
J1	8-PIN MOLEX HEADER	
R1-R3	100K VARIABLE, MULTI-TURN	
R4	500K VARIABLE, MULTI-TURN	
R5,R6	2.7K, 1/4W	
S1	SWITCHCRAFT 4-POSITION	65041K-206

MOD
ENVELOPE



RF
CURRENT
OVERLOAD

PARTS LIST

- C1 .01uf/100V STACK METAL FILM 1N4938
- J1 BNC JACK, LOCATED ON PC-523 (COVER BOARD)
- J2 RCA JACK, LOCATED ON PC-523 (COVER BOARD)
- R1-R5 47ohm, 2W
- R6,R7 .100K, 1/2W
- T1 10 TURNS WOUND ON 5943003801 FERRITE TORROID

PULSAR

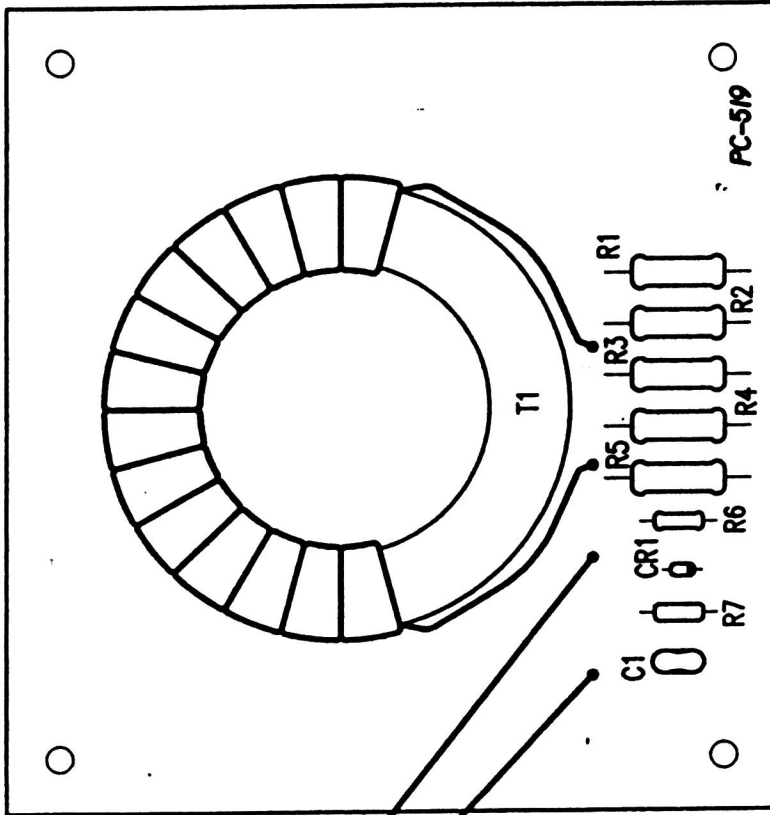
REVISIONS:

Energy-Onix

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

TITLE: RF CURRENT SAMPLE BD
(PC-519)

DESIGNED BY: NDT/TF	DATE: 07/15/99	DWG. No.
CHECKED: TT 8/5/99	DWG. No.	CKB
		AM-1901S



TO J1
TO J2

PULSAR 

TITLE: RF CURRENT SAMPLE BD COMPONENT LAYOUT (PC-519)		DESIGNED BY: <u>JT</u>	DATE: 7/9/99	DWG. BY: <u>DMC</u>	DWG. No
CHK'ED: <u>JT</u>	8/9/99	DATE: 7/9/99	DATE: 7/9/99	DATE: 7/9/99	DATE: 7/9/99
					AM-1901C
					AM-1901C

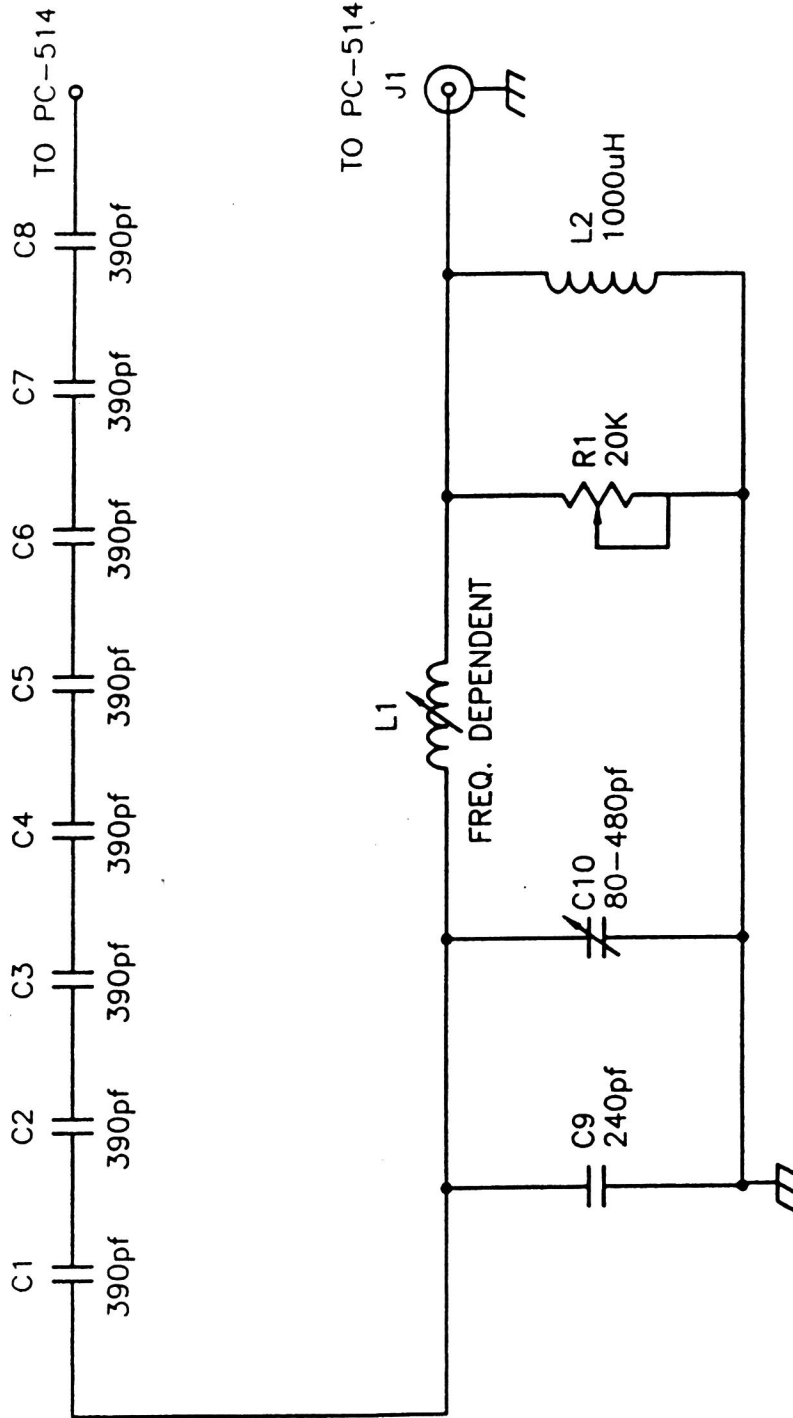
REVISIONS:

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

PC- 519 RF CURRENT SAMPLE

PARTS LIST

C1	.01uf/100V STACK METAL FILM	
CR1	1N4938	
J1	BNC JACK, LOCATED ON PC-523 (COVER BOARD)	
J2	RCA JACK, LOCATED ON PC-523 (COVER BOARD)	
R1-R5	47ohm, 2W	
R6, R7	100K, 1/2W	
T1	10 TURNS WOUND ON	5943003801
	FERRITE TORROID	

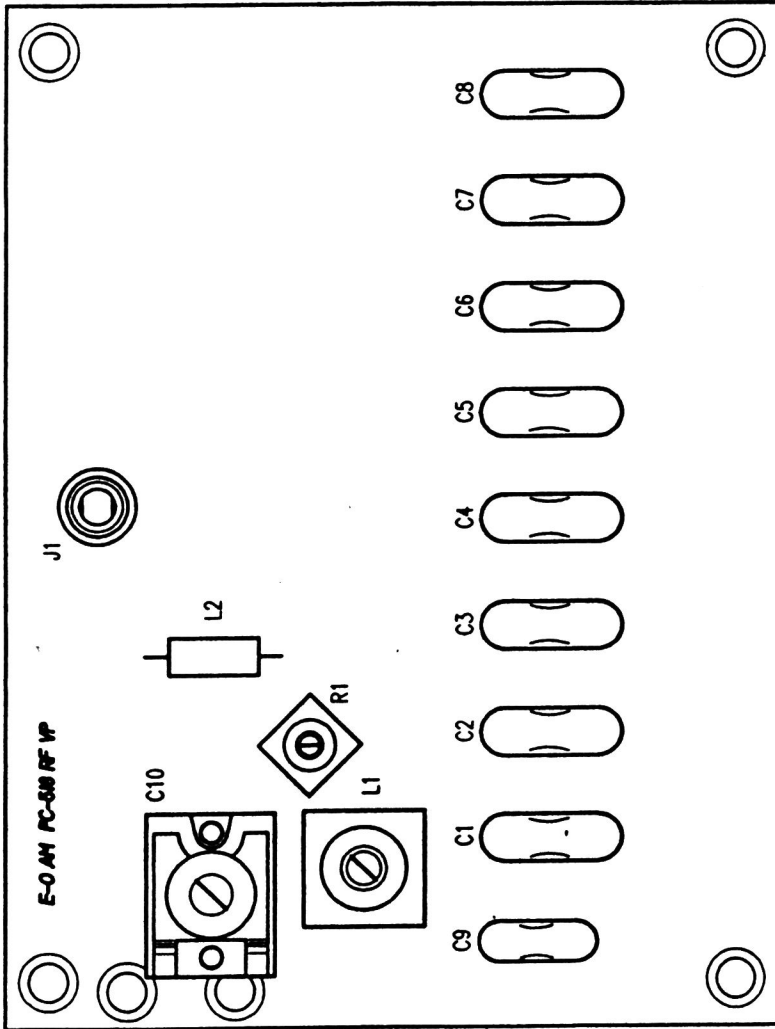


PARTS LIST

- C1-C8 390pf DIP MICA
- C9 240pf, DIP MICA
- C10 80-480pf TRIMMER, EL-MENCO 466
- J1 RCA JACK
- L1 530-627kHz, 28-30uH, MILLER 9054
- L2 628-887kHz, 14-28uH, MILLER 9053
- 888-1255kHz, 7-14uH, MILLER 9052
- 1256-1710kHz, 3-7uH, MILLER 9051
- L2 1000uH, DN41105ND
- R1 20K VARIABLE, SINGLE TURN

PULSAR

<p>Energy-Onix BROADCAST EQUIPMENT CO., INC. 1306 RIVER ST., P.O. BOX 901, VALAITE, NY 12184</p>	REVISION DESCRIPTION: ADDED R1, REMOVED C11, 8/12/99	REVISION: A	TITLE: RF VOLTAGE PROBE (PC-518)
	DESIGNED BY: NDT/TT DATE: 07/15/99 CAD No. AM-1903S	CHECKED: CKB DWG. No. AM-1903S	AM-1903S



N.T.S.

PULSAR

TITLE: RF VOLTAGE PROBE BOARD
COMPONENT LAYOUT (PC-518)

DESIGNED BY: NDT	DATE: 10/30/98	DWG. BY: DWG. No.
CHK'ED:	CAD: AM-1903C	AM-1903C

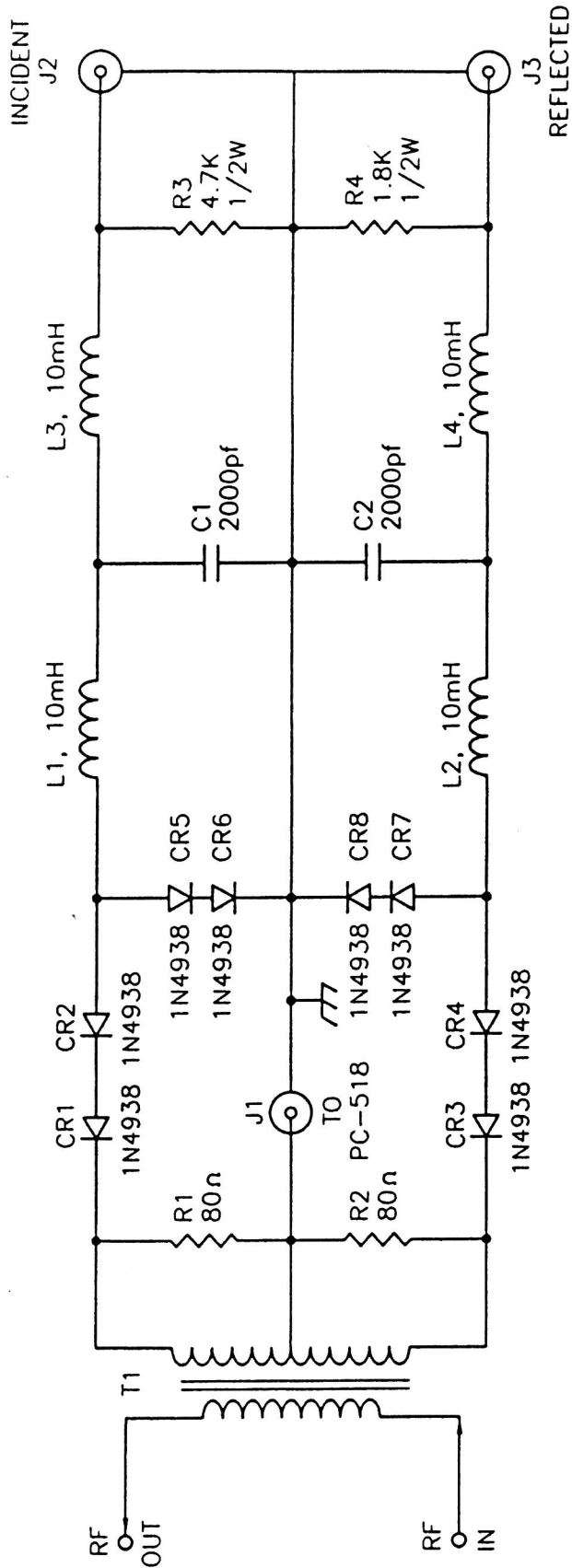
REVISIONS:

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

PC- 518 RF VOLTAGE PROBE

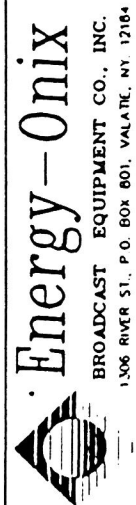
PARTS LIST

C1-C8	390pf DIP MICA	
C9	240pf DIP MICA	
C10	80-480pf TRIMMER	EL-MENCO 466
J1	RCA JACK	
L1	530-627kHz, 28-30uH	MILLER 9054
	628-887kHz, 14-28uH	MILLER 9053
	888-1255kHz, 7-14uH	MILLER 9052
	1256-1710kHz, 3-7uH	MILLER 9051
L2	1000uH, DN41105ND	
R1	20K VARIABLE, SINGLE TURN	



PARTS LIST

- C1,C2 2000pf/500V DIP MICA
- CR1-CR8 1N4938
- J1-J3 RCA JACK, LOCATED ON PC-523 (COVER BOARD)
- L1-L4 10mH RF CHOKE, M9263-ND
- R1,R2 80ohm, CADDOCK
- R3 4.7K, 1/2W
- R4 1.8K, 1/2W
- T1 20 TURNS, CENTER TAPPED, WOUND ON 5943003801 FERRITE TORROID



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

REVISION DESCRIPTION:

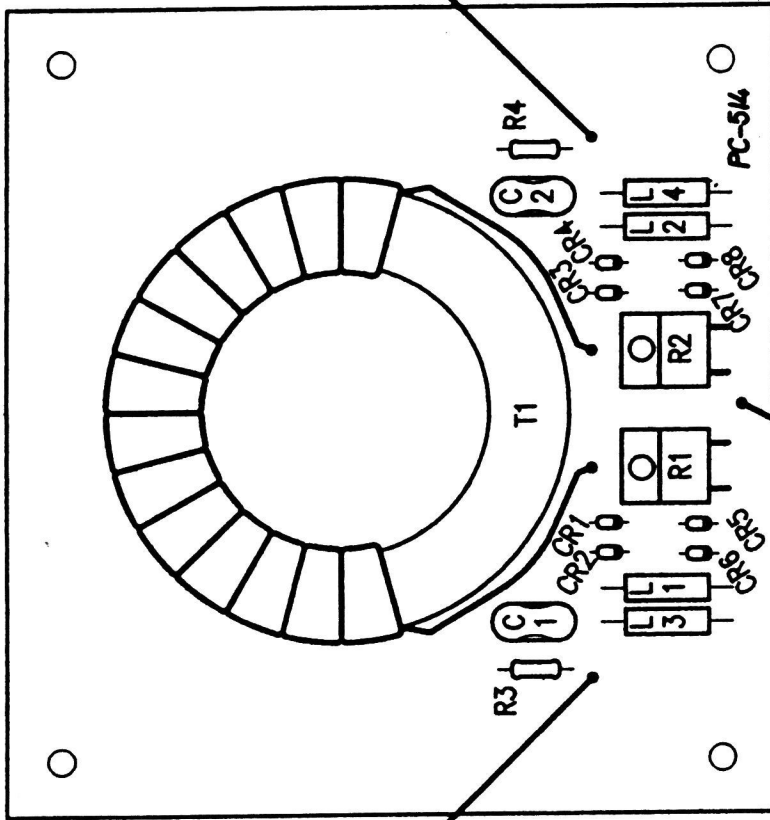
CORRECTED J CALLOUT, 8/9/99

REVISION:

A

TITLE: DIRECTIONAL COUPLER PCB
 (PC-514)

DESIGNED BY: NDI/TT	DATE: 07/14/99	DWG. BY:	AM-1902S
CHECKED: TT	8/9/99	CAD NO:	CKB
			AM-1903S



PULSAR

TITLE: DIRECTIONAL COUPLER BD COMPONENT LAYOUT (PC-514)		DESIGNED BY: NDT	DATE: 6/21/99	DWG. BY: G.S.B	DWG. No: AM-1902C
CHANGED: 7-20-99					AM-1902C

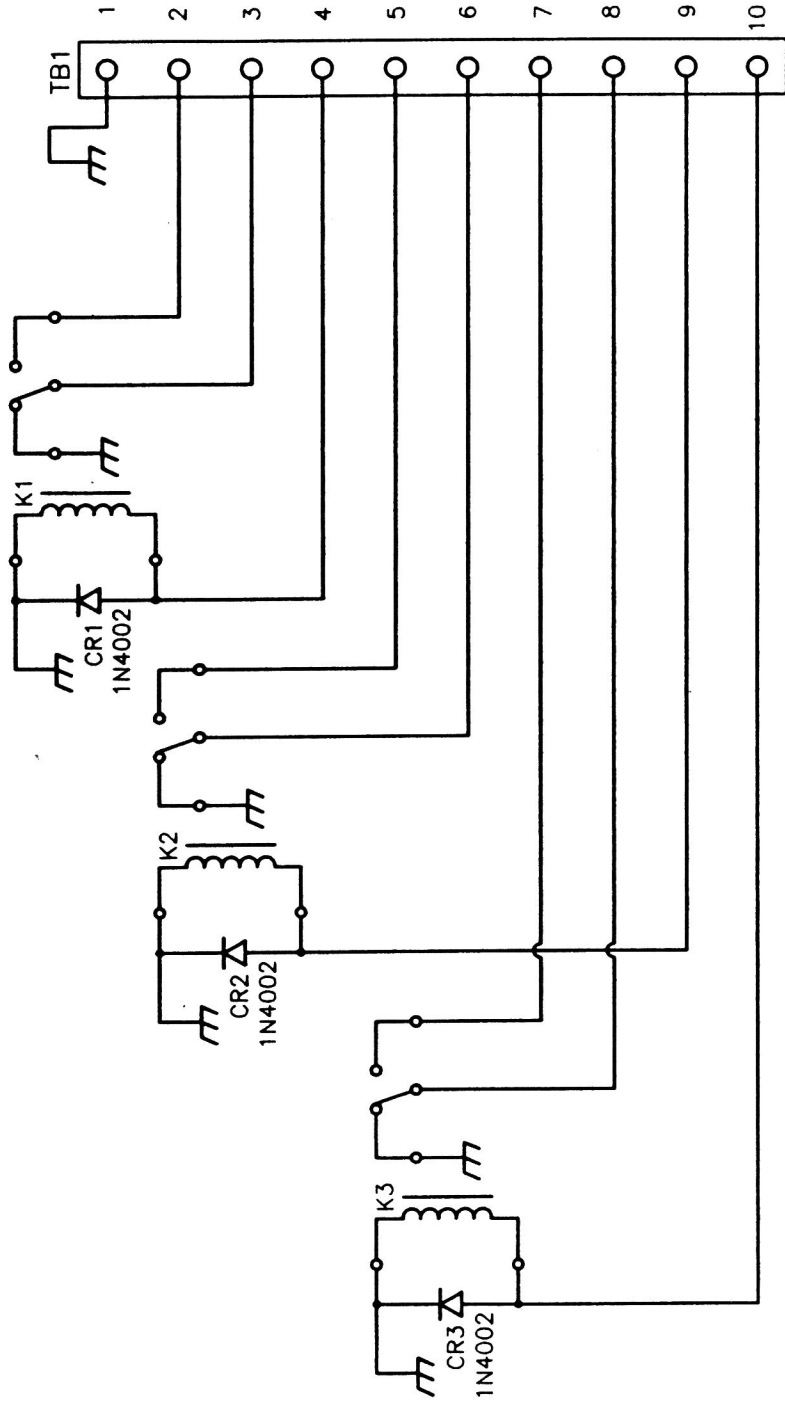
REVISIONS:

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

PC- 514 DIRECTIONAL COUPLER

PARTS LIST

C1, C2	2000PF/500V DIP MICA	
CR1-CR8	1N4938	
J1-J3	RCA JACK, LOCATED ON PC-523 (COVER BOARD)	
L1-L4	10mH rf CHOKE, M9263-ND	
R1, R2	80ohm, CADDOCK	
R3	4.7K, 1/2W	
R4	1.8K, 1/2W	
T1	20 TURNS, CENTER TAPPED, WOUND ON FERRITE TORROID	5943003801

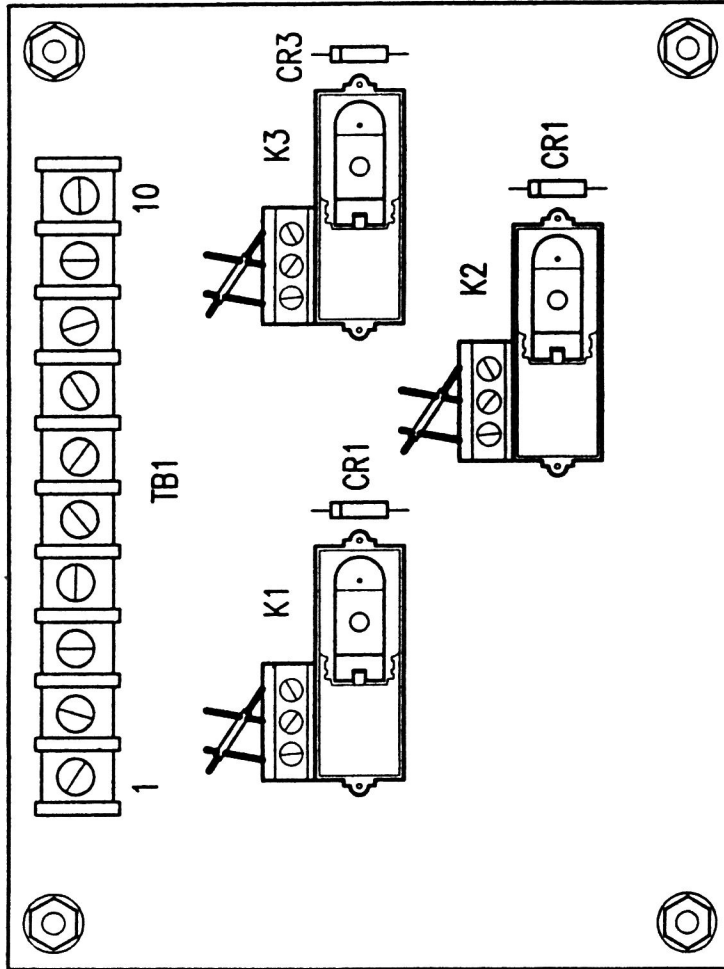


TITLE: PULSAR RF RELAY BD PC-516A
 SCHEMATIC DIAGRAM

DESIGNED BY: PI
 DATE: 11/12/99
 CHECKED: G.R.B.
 DWG. BY: DWG. No
 AM-2102S

REVISION DESCRIPTION:	REVISION:
	□

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



PULSAR

TITLE: PULSAR RF RELAY BD.
PC-516A

DESIGNED BY: PI DATE: 07/27/99 DWG. BY: G.S.B. AM-2102C
CHK'ED: CAD: AM-2102C

REVISION:

REVISION DESCRIPTION:

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

PC- 516A RF RELAY BOARD

PARTS LIST

**CR1-CR3
K1- K3
TB1**

**1N4002
HENGSTLER
10 POSITION, 20A, PC MOUNT**

H00-550-1569

PULSAR 1000

PARTS LIST: ACTIVE DEVICES AND FUSES

TRANSISTORS

<u>PART DESC.</u>	<u>NUMBER PER TRANSMITTER</u>	<u>PC BOARD/DESIGNATION</u>
2N2222A	(6)	501 - Q1,Q3,Q6,Q7 506 - Q2 509 - Q4
2N2914	(1)	501 - Q2
2N2219A	(2)	501 - Q4 506 - Q3
2N2905	(1)	501 - Q5
2N2907A	(5)	501 - Q8 509 - Q3 511 - Q1 (1 X 3 MODULES)
IRF540	(32)	502 - Q1,Q2 510 - Q1-Q8 (8 X 3 MODULES) 512 - Q1,Q2 (2 X 3 MODULES)
Later production uses IRFP460 (higher breakdown voltage)		
2N3497	(3)	511 - Q4 (1 X 3 MODULES)
2N5116	(1)	506 - Q1
2N4124	(11)	508 - Q1,Q2,Q3,Q4,Q5 509 - Q1 517 - Q1,Q2,Q4,Q5,Q6
2N930	(1)	509 - Q2
IRFU9014	(2)	509 - Q5,Q6 TRANSISTORS
MCR264-8	(3)	510 - Q9 (SCR) (1 X 3 MODULES)
2N5415	(3)	511 - Q2 (1 X 3 MODULES)
2N2323	(3)	511 - Q3 (THYRISTOR) (1 X 3 MODULES)
2N2369	(3)	511 - Q5 (1 X 3 MODULES)
2N5306	(1)	517 - Q3
S0802DH	(4)	521 - SCR1,SCR2

Board numbers on this page sometimes differ from diagrams

INTEGRATED CIRCUITS

PARTS LIST

<u>PART DESC.</u>	<u>NUMBER PER TRANSMITTER</u>	<u>PC BOARD/DESIGNATION</u>
MC14106BCP	(2)	501 - U1,U4
MC14013BCP	(2)	501 - U2 506 - U5
MC14526BCP	(1)	501 - U3
ICL7667CPA	(3)	511 - U1 (1 X 3 MODULES)
TL084IN	(1)	506 - U1
LM3302N	(2)	506 - U2,U3
TL082MJG	(4)	506 - U4,U6,U7,U8
LM319N	(1)	506 - U9
RC4200AN	(1)	506 - U10
339 OP AMP	(3)	507 - U1 508 - U1,U2
2502-4	(1)	507 - U2
2502-1	(1)	507 - U3
MC14049	(1)	509 - U1
CD4081BE	(1)	517 - U1
CD4001BE	(2)	517 - U2,U5
MC14538BE	(1)	517 - U3
CD40174BCN	(1)	517 - U4
LF347N	(1)	520 - U1

Board numbers on this page sometimes differ from diagrams

FUSES

PARTS LIST

<u>PART DESC.</u>	<u>NUMBER PER TRANSMITTER</u>	<u>PC BOARD/DESIGNATION</u>
3 AMP	(1)	CONTROLLER +15V
1 AMP	(7)	CONTROLLER -15V POWER SUPPLY (FANS): PA1, PA2, PA3, EXC, COMB, CAB

Board numbers on this page sometimes differ from diagrams

TROUBLESHOOTING POWER AMPLIFIER

Power amplifier modules with defective mosfets usually have a fault (red LED lit up on front panel of the module). With the transmitter power OFF, pull out the defective module by:

1. Disconnect the RF output cable, RF input cable, Mod input cable, and the DB-25 connector from the back panel of the module to be pulled out.
2. Loosen the top and bottom screws at the front of the module.
3. Slide the module out to the front, and put it on the bench.
4. Take out the right hand side cover by taking out the 6-32 flat head screws.
5. Physically examine first the components inside. Focus particularly on the eight RF and two modulator mosfets, and look for obvious damage.
6. Make resistance measurements in the following table.

TROUBLESHOOTING TABLE

<u>POSITIVE LEAD</u>	<u>NEGATIVE LEAD</u>	<u>NORMAL</u>	<u>ABNORMAL</u>
6a. Ground	TB 3-1& TB 3-2 or TB 3-3 & TB 3-4	Open	Short
6b. TB 3-1& TB 3-2 or TB 3-3 & TB 3-4	Ground	Greater than 3K ohms	Less than 3K ohms
6c. Ground	Terminal Post	50K ohms or higher	Low Resistance/Short
6d. Terminal Post	Ground	50K ohms or higher	Low Resistance/Short

7. If the reading in line 6a./6b. is a short or lower than 1000 ohms respectively, disconnect the output transformer from TB3 and make the following test to isolate which side of the board has the defective mosfets (left side or the right side).

<u>POSITIVE LEAD</u>	<u>NEGATIVE LEAD</u>	<u>NORMAL</u>	<u>ABNORMAL</u>
7a. Ground	TB 3-1 & TB 3-2 (output 1)	Open	Shorted
7b. TB 3-1 & TB 3-2 (output 1)	Ground	3.0K or above	Shorted
7c. Ground	TB 3-3 & TB 3-4 (output 2)	Open	Shorted
7d. TB 3-3 & TB 3-4 (output 2)	Ground	3.0K or above	Shorted

8. In condition 7a./7b., if it is shorted (left of the PC Board), it is either or both, Q2 and Q4 that is defective (shorted Drain to source).

9. For abnormal condition in 7a./7b. (right side of the PC Board), it is either or both, Q6 and Q8 that is defective (shorted Drain to source).

10. From condition 8, take out the mounting screw from Q2, and lift the mosfet a little bit such that the Drain (body of mosfet) is not touching the heatsink, or just simply insert an insulator underneath the mosfet.

11. Make the same measurement as in 7a./7b. If the short still exists, Q4 is defective. If there is no more short, Q 2 is defective.

12. Measure resistance between TB3-1/2 and Q2 Drain (mosfet body). If the reading is a short then, Q2 is defective.

13. Repeat procedures 8 to 10 for abnormal condition in 7c./7d. (right side of PC Board) to test Q4 and Q6.

13a. With the output transformer disconnected as in step 7 and 8, measure the resistance between TB 3-1 and TB 3-2 and terminal post. Normally it should be open. If there is a short, or very low resistance, either Q1 or Q3 or both are defective.

13b. Measure the resistance between TB 3-3 and TB 3-4 and terminal post. Normally it is open. If there is a short or very low resistance, Q5 or Q7 or both are defective.

NOTE: If readings on procedures 7 to 13 are normal, it doesn't guarantee yet that the mosfets are good. All mosfets input side should be tested.

14. Unsolder the input transformer wires that go into each gate of the eight RF mosfets, Q1 - Q8.

15. Measure the gate to source resistance of each of the eight mosfets. Normally, resistance reading is open or infinite. If there is a low resistance reading or short, that particular mosfet is defective and should be replaced.

16. Replace the defective RF mosfets, and also replace the transorbs (P6KE20CA) that is mounted across the defective mosfet removed in step 14.

17. From the abnormal readings made on 6c./6d. (a short or a low resistance to ground), proceed as follows:

17a.) Disconnect the two output wires from the modulator, to isolate the trouble.

17b.) Measure resistance again between the terminal post to ground (as in table 6c./6d.). If the short still exists, the crowbar Q9 (MCR25D or MCR264-8) is shorted. Verify, and replace Q9. If there are no more short between the terminal post and ground when the modulator wires are disconnected, it is the modulator mosfet, or mosfets, that is causing the short.

17c.) Measure the resistance between the modulator copper strap (strap across the modulator mosfets Q1 and Q2) and ground with positive lead to ground and negative lead on the strap. This should be open. (Initially, the reading might be around 20K and goes higher as capacitor discharges down.)

17d.) If there is a short as shown on the ohmmeter, there might be a punctured insulating pad, or defective shoulder washer.

17e.) Jumper or short out with jumper wire across the gate and source of each of the modulator mosfets (momentarily) to discharge any voltage across the gate and source (the presence of a voltage or charge turns on the mosfet or shorts the source and drain).

17f.) Measure the resistance between the gate and the source of Q1 and Q2. Normally it is open in both directions. Abnormal - it is shorted. If it is shorted, replace mosfet. If it is open, continue.

17g.) Measure resistance between source and drain of Q1 and Q2. Normally - it should be open in both directions.

18. Replace the defective modulator mosfet.

NOTE: Even if only one modulator mosfet is defective, replace both Q1 and Q2. Occasionally, when Q1 and Q2 go, U1 of PC511 (ICL7667) also goes, and sometimes Q9 (MCR25D or MCR264-8) goes. Replace U1 and Q9. In very rare occasions when modulator mosfets go, Q4 and Q5 also go (see component layout PC511).

19. In replacing modulator mosfets, refer to page 5.

20. After the defective mosfets or other defective parts have been replaced, clean up in between the mosfet leads, because there might be small amount of solder of metal across the leads of the mosfets.
21. Make sure that the output transformer, input wires to the RF, and everything else has been restored. Perform a quick check as outlined from 6.
22. Re-install the hardwares to the box and install it to the transmitter.
23. .When testing the repaired amplifier, you should set to variable output and it should be at minimum. Slowly raise the power as you continue on.

REPLACING RF MOSFETS ON PC 512

1. In taking out the defective mosfets in the RF PC 512, unsolder first the transformer input wires at the gate and source of the mosfets to be replaced. Take out the transorbs (P6KE20CA), then take out the defective mosfets.
2. Clean up the mounting pads on the PC Board with solder wick, and also clean up the part of the heatsink where the defective mosfet has been previously mounted.
3. Make sure that there is adequate thermal grease between the device body and the heatsink for RF Q2, Q4, Q6 or Q8. For Q1, Q3, Q5 or Q7, thermal grease should be spread evenly over one side of the insulating pad that is placed against the heatsink. Align properly the insulating pad hole and the heatsink mounting hole. Spread thermal grease also over the back of the body of Q1, Q3, Q5 or Q7.
4. For Q2, Q4, Q6 or Q8, they are mounted directly to heatsink without insulating pad, but for Q1, Q3, Q5 or Q7, it has an insulating pad and requires a shoulder washer.

NOTE: If a mosfet is replaced, replace also the transorb (P6KE20CA) associated with that mosfet.

REPLACING MODULATOR MOSFET

- 1. Remove the defective modulator mosfets by removing the mounting screws on Q1, Q2 and CR1, and then lift up the copper strap, and then unsolder the Q1 and Q2 (unsolder one side of the C1 and C2, if necessary).**
- 2. Clean up old solder on the board surface, remove the old insulating pad, then wipe clean the heatsink.**
- 3. Cut off the drain lead (center leg) of the replacement mosfet (IRF540).**
- 4. Spread thermal grease over one side of insulating pads and lay them properly in place.**
- 5. Install the mosfets one at a time by temporarily putting in a 4-40 screw with a nylon shoulder washer, and align it with the PC Board pad..**
- 6. Solder the leads in place.**
- 7. Remove the temporary screws.**
- 8. Mount the copper strap with 4-40 screws with lock washer and a shoulder washer (take note that the one used here is longer than the one used in the RF section.**
- 9. Mount the CR1 in place.**

PULSAR DATA SHEET

PULSAR 1000

POWER LEVEL 1000 W FREQUENCY 1490 SERIAL NO. 020209

DATE 02/15/02 CUSTOMER _____ AC VOLTS 208 VAC

	POWER LEVEL PRE-SETS				
	# 1	# 2	# 3	# 4	VARIABLE
MODULATION @ 0.0%					
POWER OUTPUT	100	250	500	1000	0-1100
POWER REFLECTED	0	0	0	0	}
CURRENT	3.0	5.0	9.0	15.0	
VOLTAGE	97	96.5	95	94	
REMOTE READINGS:					
INCIDENT (TB12-7 to GND)	1.35	2.05	3.05	4.2	4.2
REFLECTED (TB12- 6 to GND)	0	0	0	0	0
CURRENT (TB12- 5 to GND)	.1	.15	.26	.45	.45
VOLTAGE (TB12-4 to GND)	3.1	3.1	3	2.9	2.9

*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....