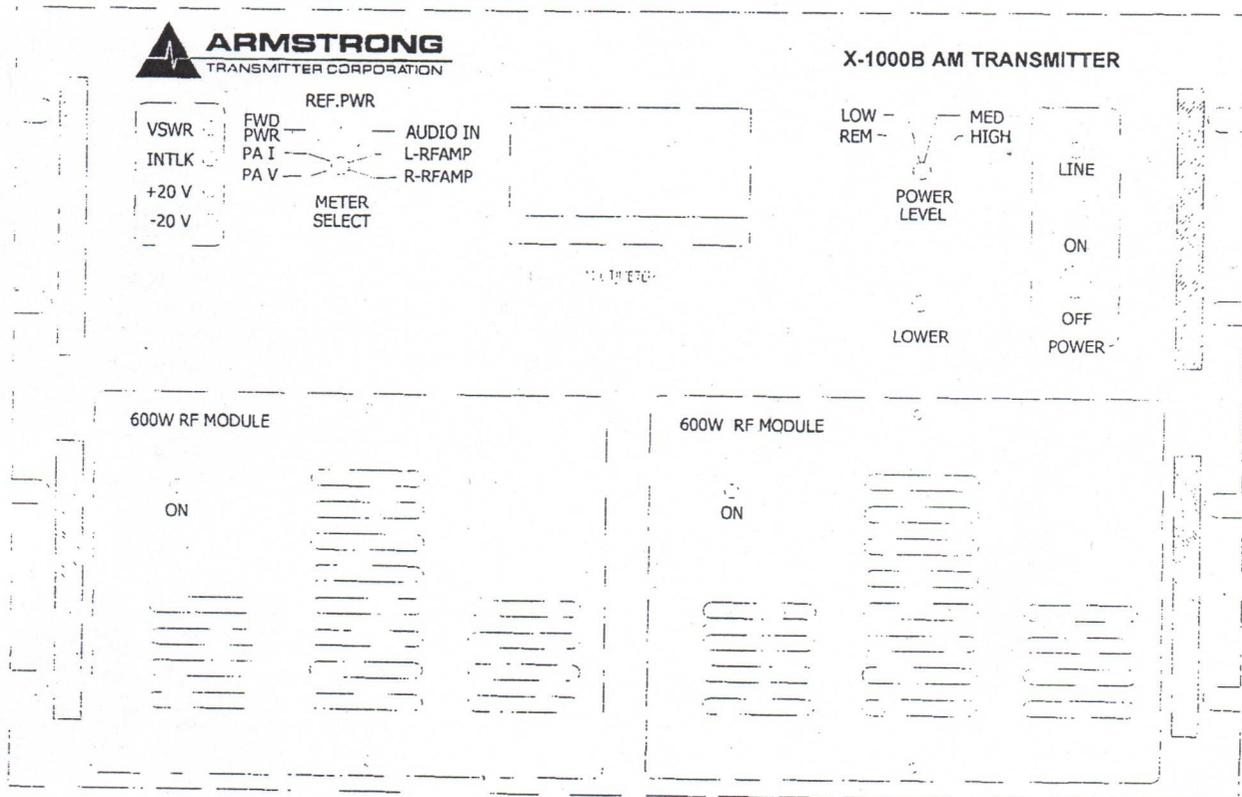


# X-1000B

IBOC Ready

1,000 Watt Digital IBOC Ready Solid State AM Transmitter



## Features

- +90% RF PA efficiency
- Optimized multiphase modulator (flat group delay, low source impedance)
- Capable of +150% positive modulation
- Compact design, UPS shippable
- Hot pluggable modules
- Designed to easily accept the new digital IBOC signal
- Three preset power levels and full remote control capability
- Two 600 Watt RF modules for extra reliability and headroom
- Two high efficiency switching power supplies
- Fully redundant RF, modulator, cooling system and power supplies



**ARMSTRONG**

TRANSMITTER CORPORATION

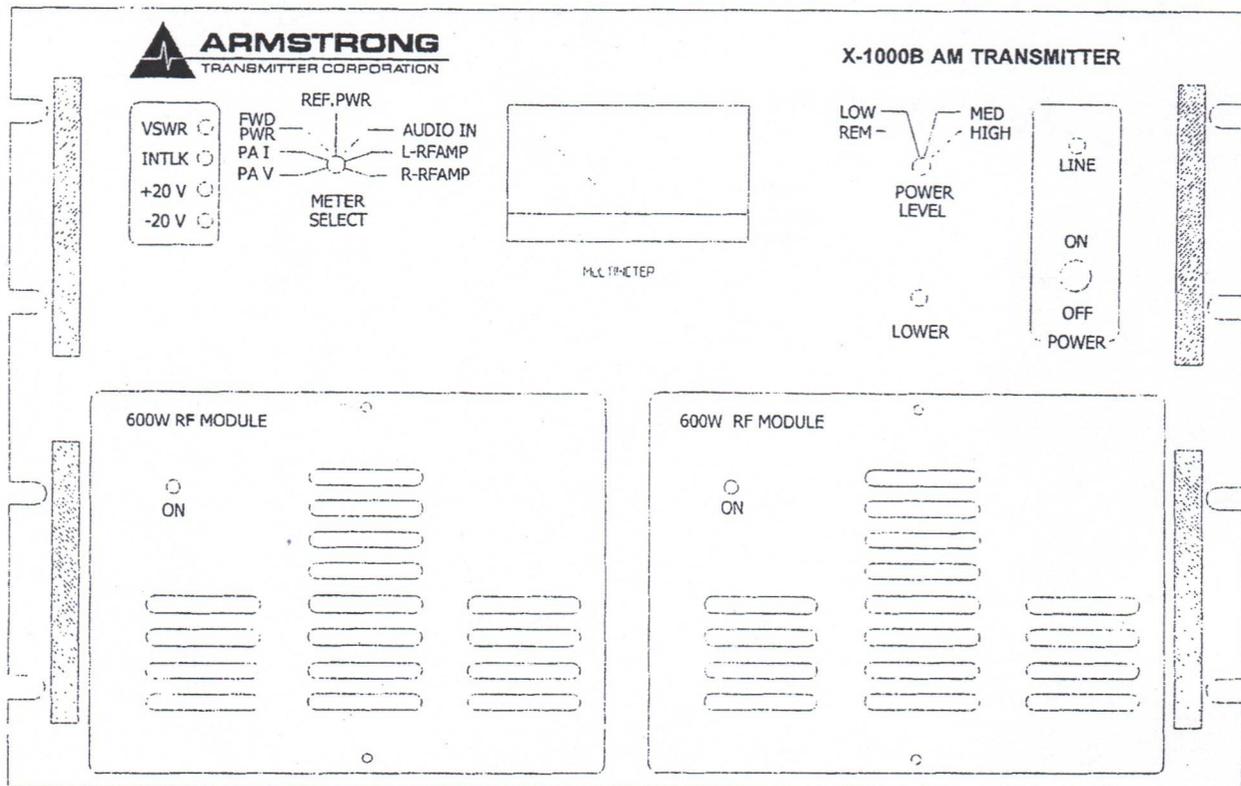
[www.armstrongtx.com](http://www.armstrongtx.com)

4835 North Street, Marcellus, NY 13108 Tel: 315-673-1269 Fax: 315-673-9972

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# X-1000B

## TECHNICAL SPECIFICATIONS

### Electrical:

Power Output	1200 Watts Continuously adjustable Three power level presets
Frequency Range	530kHz to 1700kHz
Output Impedance	50 ohms unbalanced, Type N
Modulator Type	Pulse Duration Modulation (PDM)
RF Amplifier	High Efficiency switching amplifier
Audio Response	+/- 1db, 20-10,000Hz
Audio Harmonic Distortion	< 2% at 80% modulation 50-12,000Hz
Modulation Capability	+125% factory set; 150%(capable)
Carrier Shift	<1% with normal audio programming
RF Harmonics	<-73dB at 1KW
Spurious Outputs:	meets FCC requirements with external NRSC filter
Noise and Hum	<-60db below reference at 1KW
Frequency Stability	+/-5ppm
Audio Input	600 ohms active balanced +3dBm nominal
Power Input:	190-260 VAC, single phase
Power Consumption	1480 Watts at 1KW no modulation
Remote control/monitor Connector	DB-25M

### Mechanical and Environmental:

Ambient Temperature	-10°C to 50°C
Humidity Range	95% max, non-condensing
Altitude	8,000 feet
Size	12.25" high x 19" wide x 20" deep
Weight	96 lbs.



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## ***K.1 RF REFLECTOMETER***

The RF Reflectometer is located on the back panel of the transmitter cabinet, next to the rf output connector. Its function is to measure the amount of rf energy being produced by the transmitter and the amount of energy coming back in the form of VSWR. These values are read on the front panel metering. The values are also sent to a protection circuit, which controls the power supply voltage (power foldback).

03/10/10Rev. **RF Antenna Current Feedback Test Kit**

Attn Chief Engineer,

A problem which frequently occurs while installing a new transmitter can be caused by RF current loops. Even if you are replacing an existing transmitter, careful attention to this issue is essential in order to have trouble free operation.

To make sure the transmitter is terminated properly we have included 3 toroid cores which should be placed on the coaxial cable very close to the RF output connector of the transmitter. Heating of these toroids during normal operation of the transmitter will alert you to a possible current loop problem. To troubleshoot this problem, use the following procedure.

1. Do not connect the remote control cable at this time. Use the DB-25 jumper connector provided.
2. Do not connect any audio connector to the transmitter. Only the AC power and RF output should be connected.
3. Isolate the transmitter by placing it on a wooden table or chair and disconnect all ground connections except the safety AC ground on the AC power connector.
4. Install the 3 toroid cores provided on the RF coaxial cable and test the transmitter in this configuration. Note any heating of the cores. They can get warm but not hot.
5. Insure that any ground connections previously attached to the transmitter are not tied to the antenna ground system. This could cause a current loop between the outside shield of the RF output cable and the ground connection. It is important to realize that the currents in a coax cable should be equal in magnitude and opposite in phase. Any imbalance caused by the RF current having 2 possible return paths will cause problems with the transmitter. ( RF distortion, RF in the audio, a RF "hot" cabinet, heating of the RF output transformers in the plug in modules )
6. If the toroids are cool or slightly warm, reinstall the transmitter in the rack cabinet and retest. If toroid heating occurs, you have an RF ground loop on the rack cabinet. Correct this and test again until the problem is solved. If you have a ground strap connected to the equipment rack, do not connect it to the antenna ground system, use a separate ground rod for this.
7. Transmitters located very close to the antenna(tower) are particularly troublesome. The RF fields generated can be quite strong and isolating the transmitter from these fields is difficult. One tip is to use about 50' of 1/2" heliax coax cable coiled up between the transmitter and ATU. This will provide a little more isolation.
8. Never use a matching network on the output of the transmitter. The transmitter output is 50 ohms which should be connected to 50 ohm coaxial cable (1/2" heliax). The coax is connected to the ATU where all tuning should occur. You will otherwise risk tuning the transmitter into a mismatch.
9. Continue to add all of the external sources to the transmitter and insure after each connection is added that no heating of the 3 toroids mounted on the RF coaxial cable occurs.
10. If you are replacing a tube transmitter with a newer solid state transmitter you may need to reconfigure your grounding. Many old tube units used a single RF connection stud. Since coaxial cable wasn't used the ground return was a large ground strap connected to the base of the tower. During installation many engineers never removed this strap and connected coaxial cable and this ground strap to a new transmitter. This creates an RF ground loop and should be avoided. The exception to this is when a Phasor unit is located near the transmitter. Again, only one RF ground connection can be connected to the transmitter.

Sources of RF ground loops;

Equipment rack grounded to the antenna ground with the transmitter mounted in the rack

Remote control connections

Audio input cable

AC power cable

RF output cable

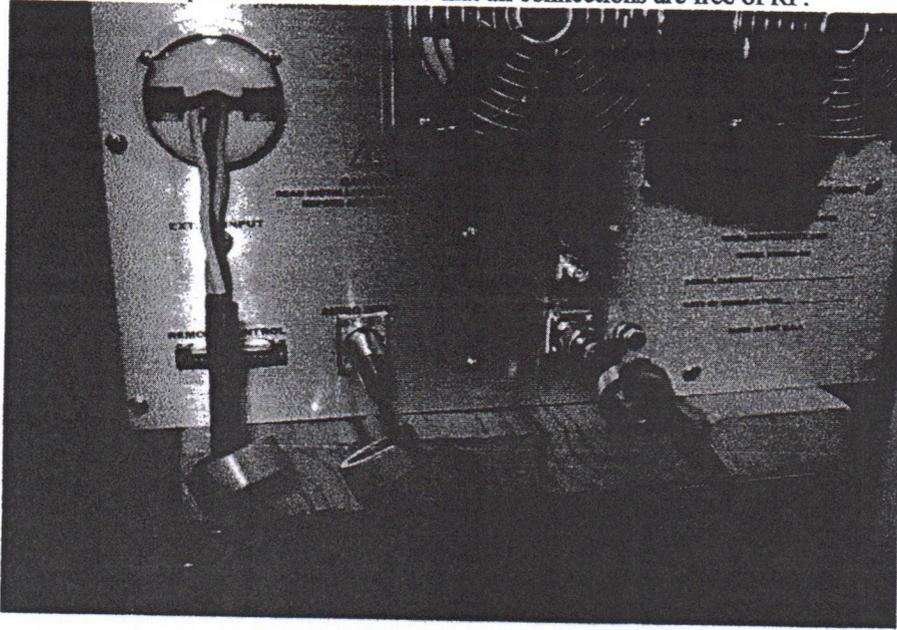
Any additional grounding connections made to the transmitter cabinet.

Single point grounding with short leads work the best with termination as close as possible to the RF generator (the transmitter) Try to isolate any problem by removing as many connection sources as possible.

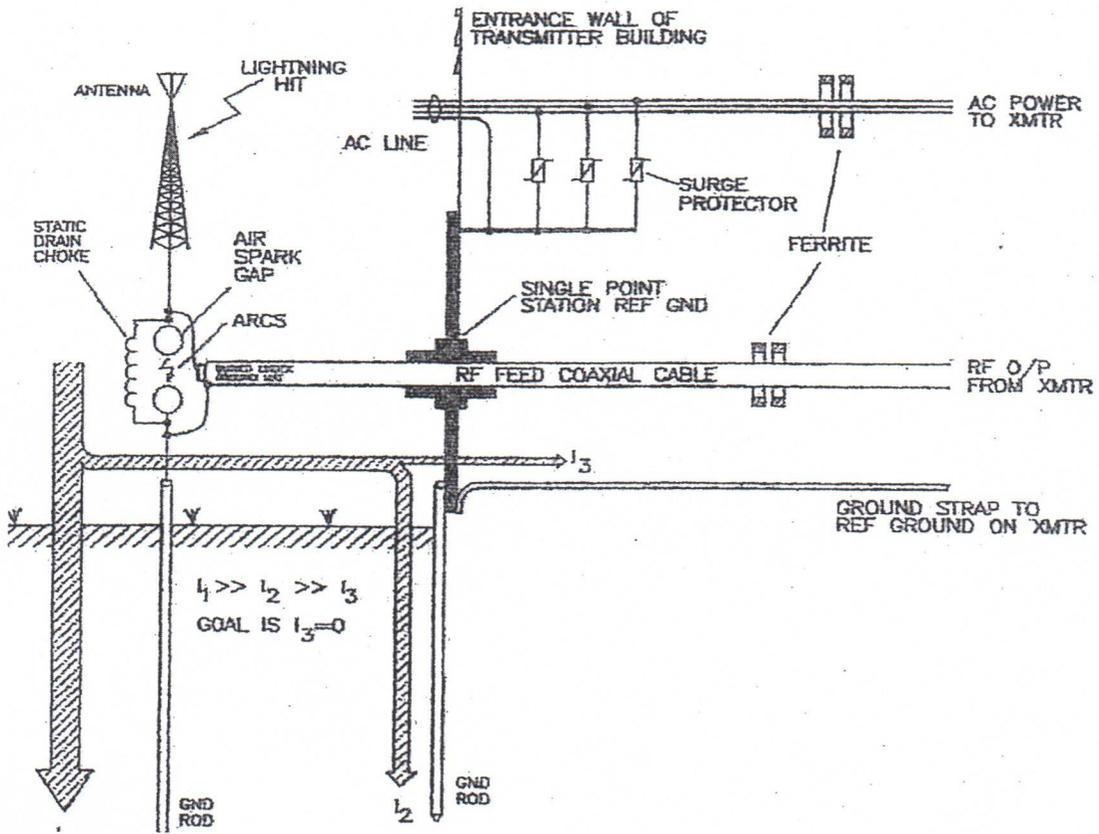


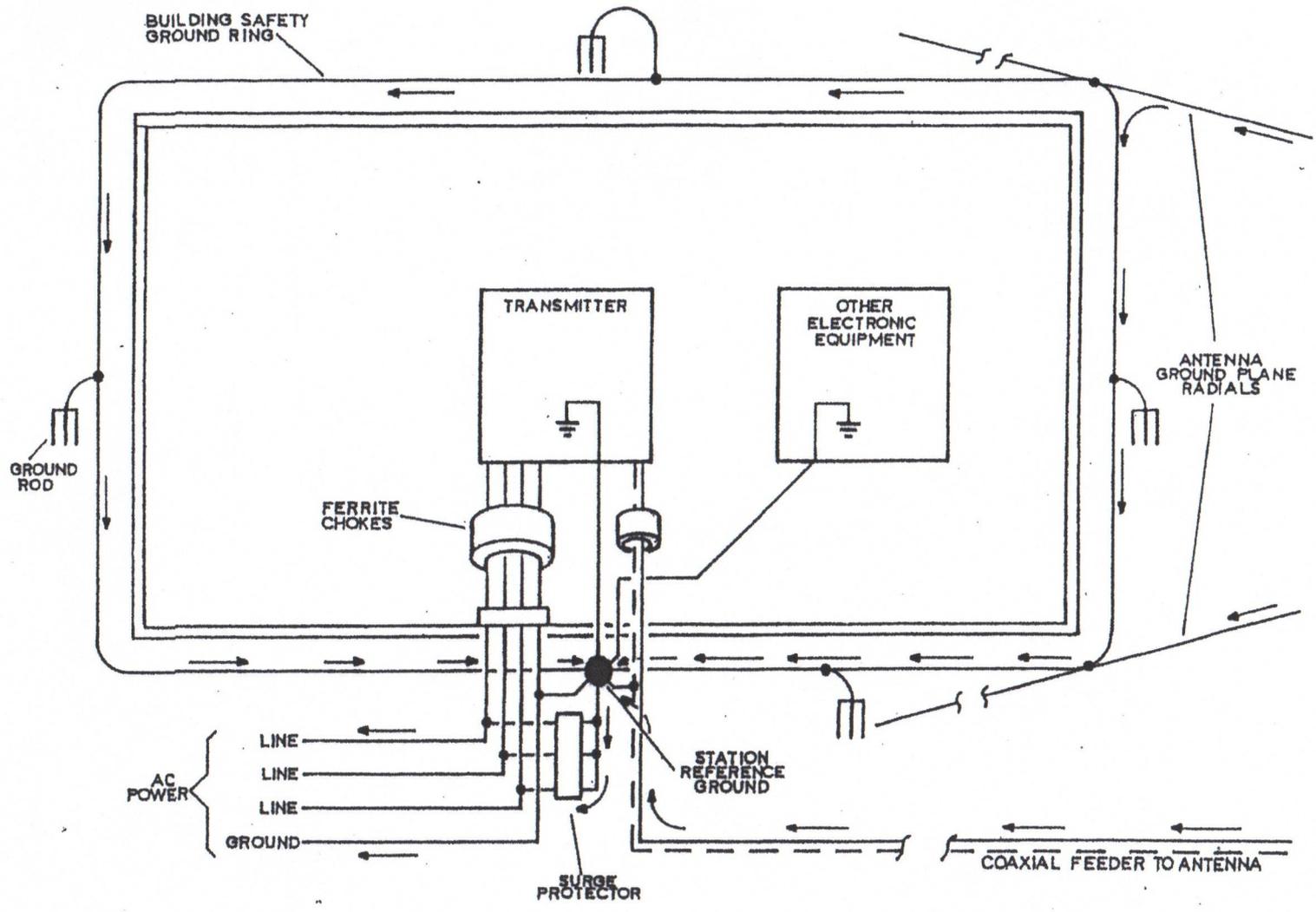
Start with AC power and RF output (remove the transmitter from the rack and isolate the transmitter cabinet). Add sources back one at a time. Note any toroid heating each time another source is added.

The picture below illustrates the use of the toroids for detecting RF ground loops. In most cases the first test is to use all 3 toroids connected to the RF output connector. When that test is successful connect the toroids as in the picture below to insure that all connections are free of RF.



P2. Diagram of proper RF current distribution in a typical medium wave transmitter site.





Customer Test Data Sheet

Date: 8-16-2015

Call Letters: \_\_\_\_\_

Serial #: 12155-2 Frequency: 999 Khz

Audio input impedance: 600 ohms \_\_\_\_\_ 10k ohms

Audio Input (Balanced) for 100% Modulation: 2.0 dBm.

Positive Clip level: 120 % Negative Clip level: -93 %

AC power input (<sup>UNBAL</sup>Balanced): 230 VAC / 50 Hz

AC Current at 1KW (unmodulated): 7.0 Amps

Power Output:      1000watts                  500watts                  250watts

DC voltage                  155 V                  \_\_\_\_\_ V                  \_\_\_\_\_ V

DC current                  8.2 A                  \_\_\_\_\_ A                  \_\_\_\_\_ A

DC Efficiency                  79 %                  \_\_\_\_\_ %                  \_\_\_\_\_ %

VSWR Light tripset: 60 W

Power foldback at 2:1 load mismatch: 250 Watts

RF amp Mosfet type APT-6025BVR IRFP 22N50A

Modulator Mosfet type IXFH52N30

HVPS Mosfet type APT30M61BLLG

Max. Linearity measured (30Hz - 10KHz) +/- 1.1 dbm

Max. Distortion measured .7 % at 1 khz

Measured Ave. noise level ; 1000w ; M=0 -60 dbc

Spurious emission check OK

Harmonic content: 2<sup>nd</sup> -79 dbm; 3<sup>rd</sup> -76 dbm

Customer Test Data Sheet

Date: \_\_\_\_\_

Call Letters: \_\_\_\_\_

Serial #: \_\_\_\_\_ Frequency: \_\_\_\_\_ Khz

Audio Input (Balanced) for 100% Modulation: \_\_\_\_\_ dBm.

Positive Clip level: \_\_\_\_\_ % Negative Clip level: \_\_\_\_\_ %

AC power input (Balanced): \_\_\_\_\_ VAC

AC Current at 1KW (unmodulated): \_\_\_\_\_ Amps:

Power Output:      1000watts              500watts              250watts

DC voltage                      \_\_\_\_\_ V                      \_\_\_\_\_ V                      \_\_\_\_\_ V

DC current                      \_\_\_\_\_ A                      \_\_\_\_\_ A                      \_\_\_\_\_ A

DC Efficiency                      \_\_\_\_\_ %                      \_\_\_\_\_ %                      \_\_\_\_\_ %

VSWR Light tripset: \_\_\_\_\_ W

Power foldback at 2:1 load mismatch: \_\_\_\_\_ Watts

RF amp Mosfet type \_\_\_\_\_

Modulator Mosfet type \_\_\_\_\_

HVPS Mosfet type \_\_\_\_\_

Max. Linearity measured (30Hz -10KHz) \_\_\_\_\_ dbm

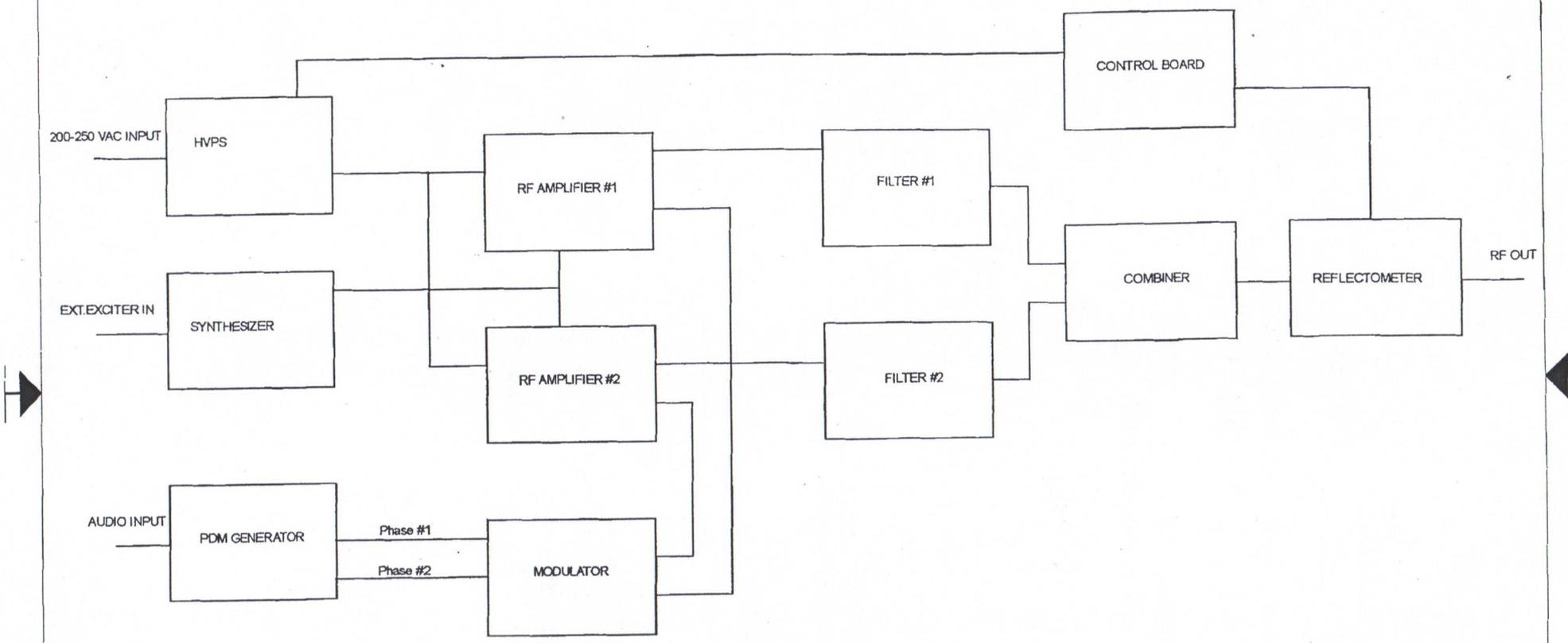
Max. Distortion measured \_\_\_\_\_ % at \_\_\_\_\_ khz

Measured Ave. noise level ; 1000w ; M=0 \_\_\_\_\_ dbm

Spurious emission check \_\_\_\_\_

Harmonic content: 2<sup>nd</sup> \_\_\_\_\_ dbm; 3<sup>rd</sup> \_\_\_\_\_ dbm

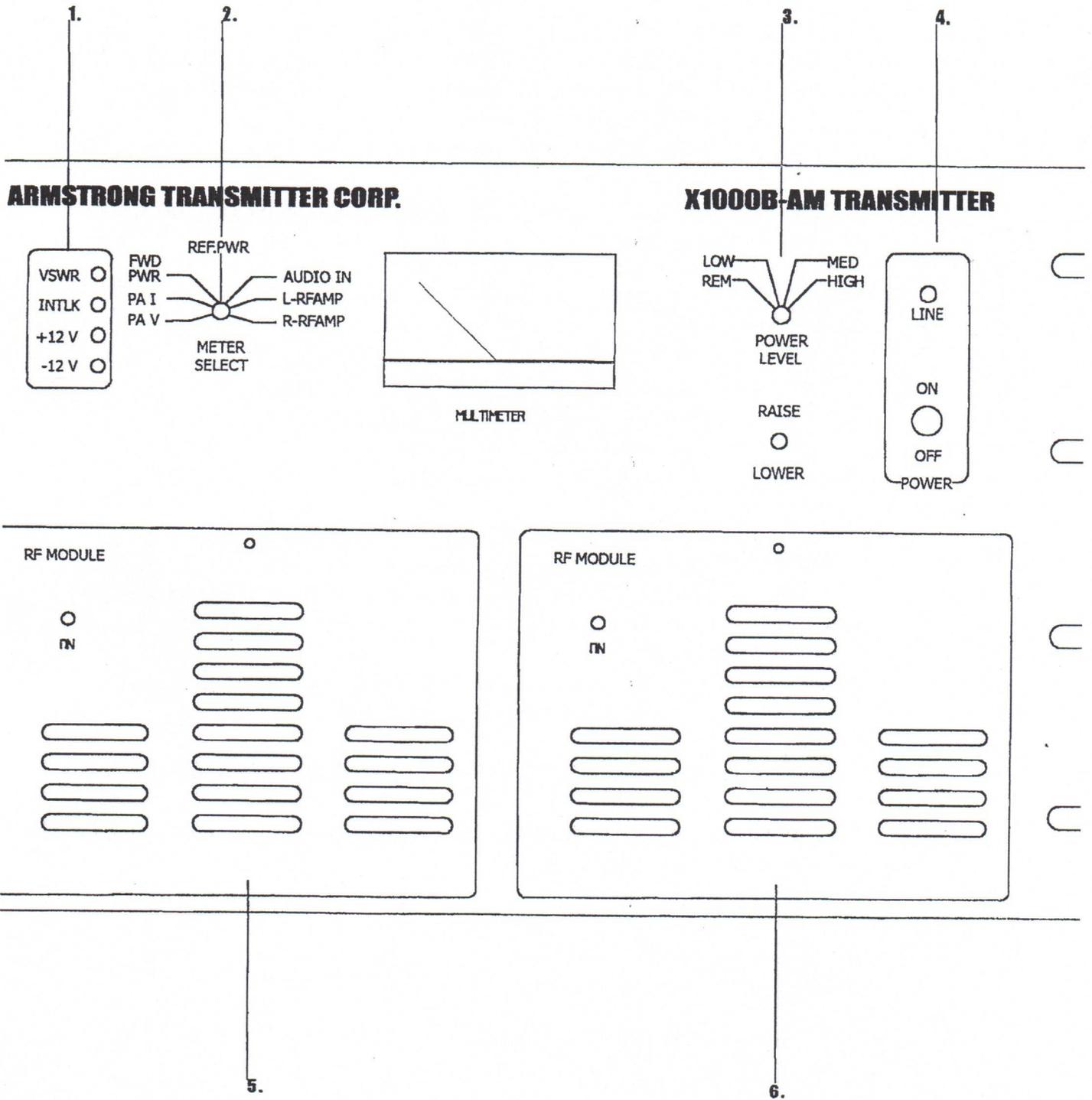
REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



LOW VOLTAGE  
POWER SUPPLY

Date: 11/21/2001		X1000B AM BLOCK DIAGRAM		
		ARMSTRONG TRANSMITTER CORP.		
SIZE A	FSCM NO.	DWG NO.	REV	

# FRONT PANEL CONTROLS AND INDICATIONS



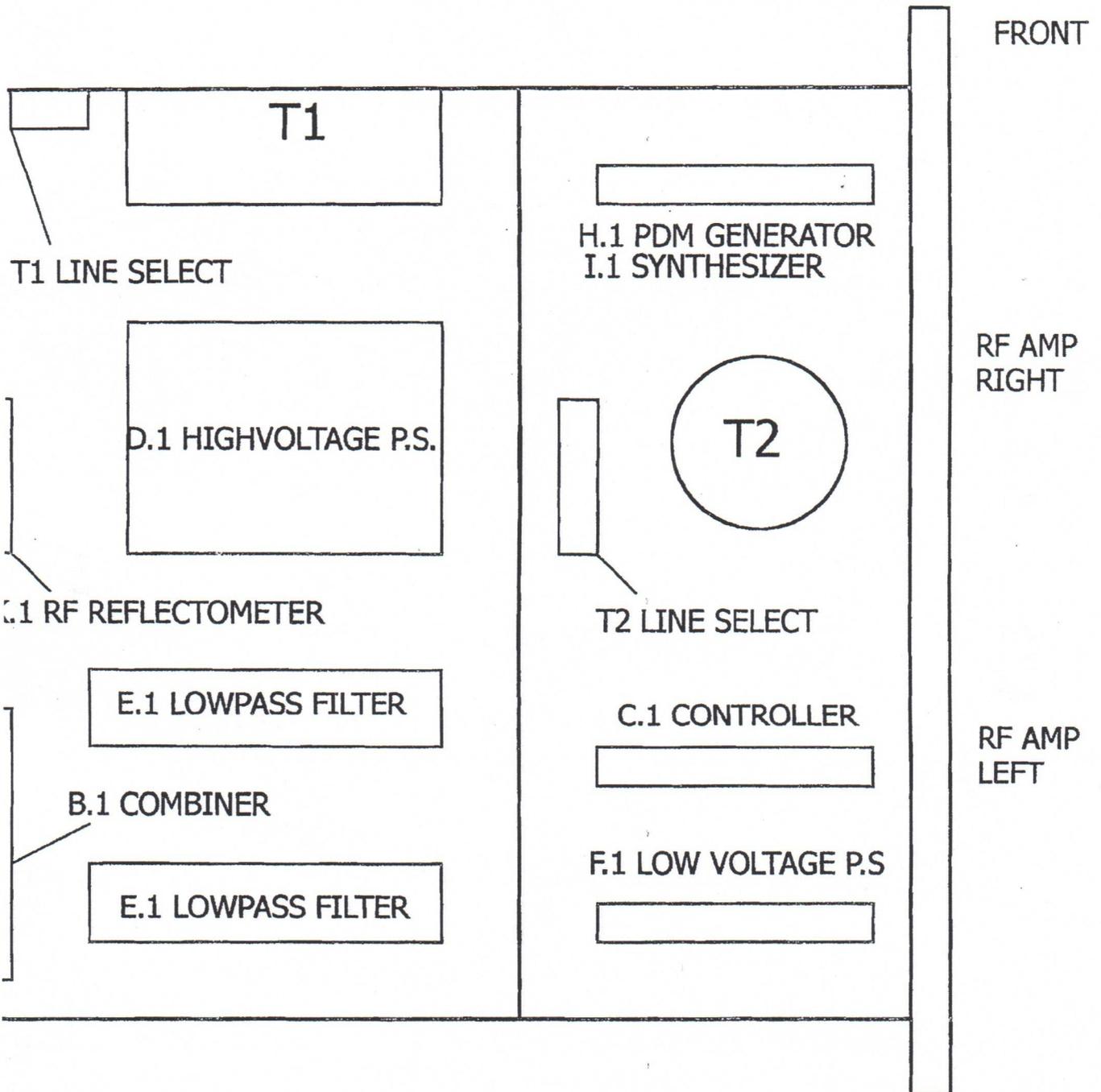
## ***FRONT PANEL CONTROL AND INDICATION***

1.
  - A. VSWR Indicator: Indicator lights when the reflected power exceeds 125 watts. The transmitter will automatically fold back power when this lamp is on.
  - B. Interlock Indicator: Indicator lights when the internal temperature exceeds 65 degrees C. The transmitter will also automatically shutdown. The indicator will also light when the Remote control interlock connection is open.
  - C. +12 V: Indicates when the unregulated +12vdc is present on the low voltage power supply.
  - D. -12v: Indicates when the unregulated -12 vdc is present on the low voltage power supply.
2.
  - A. Metering selector for the Power Amplifier Voltage.
  - B. Metering selector for the Power Amplifier Current.
  - C. Metering selector for the Forward Power Output
  - D. Metering selector for the Reflected Power Output
  - E. Metering selector for Audio Modulation input
  - F. RF Amplifier current for Left amplifier
  - G. RF Amplifier current for Right amplifier.
3.
  - A. Low Power selector (Select any power level from 100w to 1200w)
  - B. Medium Power Selector (Select any power lever from 100w to 1200w)
  - C. High Power selector ( Select any power lever from 100w to 1200w)
  - D. Remote power selector ( Select to enable the remote control power selector control)
  - E. Raise/ Lower: Momentary toggle switch, which will raise or lower power at any of the 3 power levels selected.
4.
  - A. Power Indicator: Indicates when the main ac power is present in the cabinet.
  - B. Power Switch: Momentary toggle switch used to turn the High voltage power supply on and off.
5.

RF Power Amplifier module Left
6.

RF Power Amplifier module Right

# TOP VIEW X1000B-AM



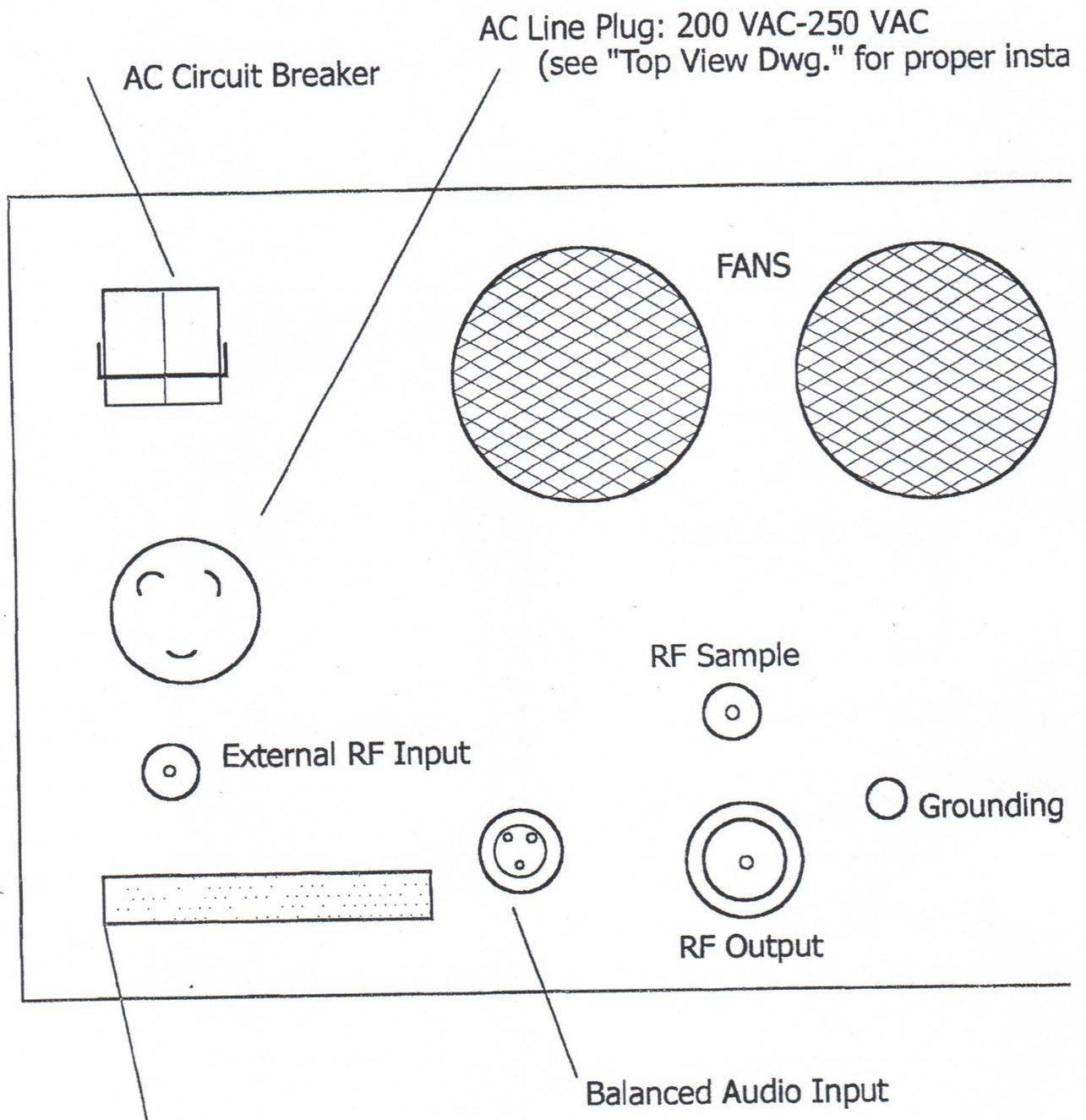
T1: AC Line Selector

Blue	0 VAC
Black	200 VAC
Orange	208 VAC
Brown	220 VAC
Red	240 VAC

T2: AC Line Selector

Blue	0 VAC
Orange	200 VAC
	208 VAC
Brown	220 VAC
Red	240 VAC

# **Rear View X1000B-AM**



Remote Control DB-25F Connector  
(see " final checkout" sheet for connection information)

## **Installation Instructions**

Prior to installation, please check all of the operational specifications. These include the AC power supply voltage and current, audio input level and impedance, RF output impedance, mounting and cooling requirements.

The transmitter is shipped with the (2) AC transformer taps set at 240vac. Please check your single-phase voltage and adjust the transformer taps to the proper voltage settings.

See drawing "Top View" (page 7) for details. Please make sure the AC line has the proper circuit breaker and complies with all national, state and local electrical codes. The breaker should be a slow trip type to avoid any nuisance trips. The transmitter contains an internal 20 amp circuit breaker and type HBL2325 (20amp @250VAC) connector. The AC plug is a HBL2323, all manufactured by Hubbell.

There are two ground connections that are required before this transmitter can be operated safely. First, the electrical ground which is required by electrical codes and terminated through the 220VAC electrical service. The second is RF ground which should be tied to your RF grounding system and terminated at the grounding stud mounted on the back of the transmitter. You must use both! Failure to do so will not give you proper lightning protection.

The audio input level is factory set at +3dbm into 600 ohms balanced. This will produce approximately 100% modulation. Impedance mismatches or unbalanced audio will produce poor performance. Typical audio consoles or audio processors have outputs compatible with the input of the transmitter. No audio level adjustment is available on the transmitter, audio input level should be adjusted on your audio processor. Use of a modulation monitor or oscilloscope to set the proper audio level is very important. Set the modulation level measuring the positive peaks only, negative peaks will never exceed -90% due to the clipper circuit. Never use the "AUDIO IN" meter selection on the front panel to set modulation. This feature is to allow the technician a visible means of checking the audio input to the transmitter. No attempt is made to calibrate this meter reading. The transmitter contains an audio low pass filter and negative peak clipper, which are installed when shipped from the factory. Installing an audio processor with NRSC filtering should be all that is necessary. If you wish to change this configuration please call the factory for more information.

The RF output of the transmitter must "see" 50 ohms +j 0 . If your antenna system has different impedance or some reactance, you must use a matching network. Typically a "T" network will provide this match. Depending upon the reactance of the antenna (either capacitive or inductive reactance) the "T"

network elements can be selected to both tune out this reactance and provide a 50 ohm match. Please call the factory if you need help with this.

The transmitter has lightning protection on the RF output. Please insure that each tower has a static drain choke, static discharge ball gaps and other methods of reducing the dangerous voltages present during certain weather conditions. Be aware that lightning or dangerous voltages can also enter your audio input, remote control or AC power. Careful grounding can help but protection is needed on all of these inputs external to the transmitter, particularly if the unit is operated by remote control.

The transmitter is small but heavy (about 96 lbs), mounting in a 19" rack should be done with the provided mounting rails. Mounting should be done at a height not too high that may cause the rack to tip over and not too low that the transmitter will suck in all of the dust and dirt on the floor. If your site isn't air conditioned, you must provide proper airflow and air filtering. The transmitter has no filters by design and relies on room or building air filters to keep the unit clean. Periodic cleaning of the transmitter with compressed air should prove sufficient.

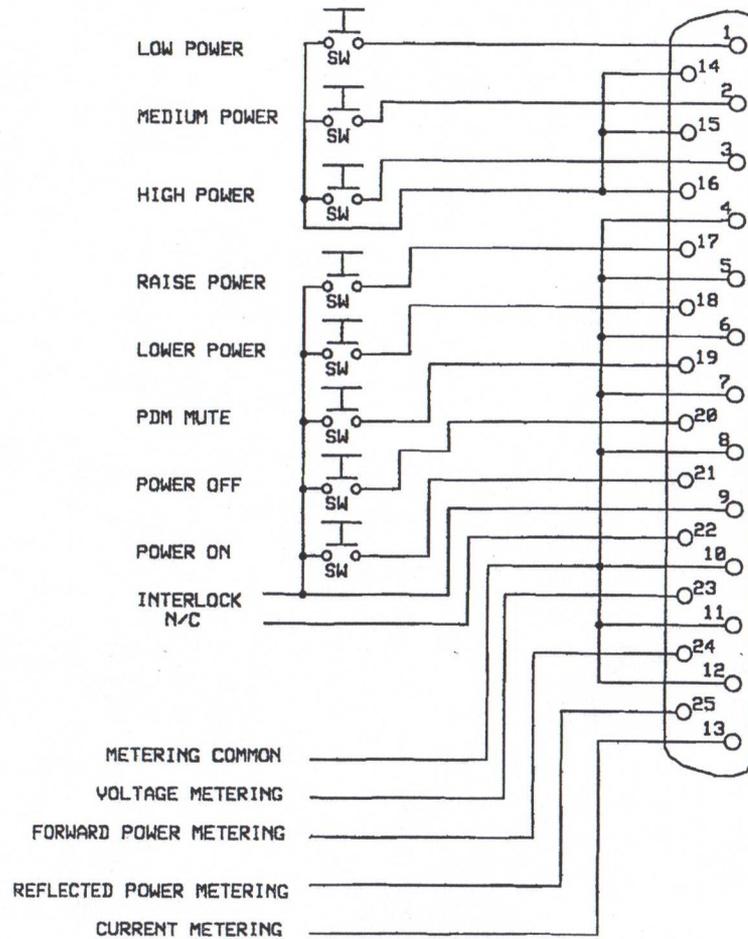
Metering of RF power output using the "direct method" should be done with a calibrated RF ammeter and accurate antenna impedance measurement. The "indirect method" of multiplying voltage, current, and efficiency will yield power output too. Compare these two methods, they should agree. If they don't further investigation is needed. Never use the front panel metering on the transmitter as a sole reference for power measurement.

## **Final Checkout sheet**

1. Attach RF output connection to antenna or tuning network.
2. Attach 2" Ground strap to RF system ground.
3. Connect remote control cabling to the DB-25 connector on the back of the transmitter; note the DB connector must be installed with the failsafe jumper in place in order for the transmitter work. Refer to Remote control connector drawing for details. All control functions are momentary contact closure to ground. No external voltages can be present on any control functions or damage to the transmitter will result. Metering functions are also available on the DB-25 connector, typical full-scale readings are around +4vdc and referenced to ground.
4. An RF sample bnc connector is available for use on the back of the transmitter. This can be used for a modulation monitor or oscilloscope.
5. Remove the transmitter top cover and both RF amp/modulator modules. Inspect the transmitter for any damage due to shipping. Note any loose or broken hardware. Replace both plug in modules.
6. Inspect the power transformer taps to insure the transmitter is set for the proper taps. See dwg: Top View drawing on page 7.
7. Set the power control for medium
8. Set the metering switch to Fwd power.
9. Plug in the AC power connector
10. Switch on the Transmitter circuit breaker mounted in the rear of the transmitter.
11. Push the transmitter power switch to the off position.
12. At this point the transmitter should only show 2 green LED's laminated on the +/- 12vdc power supplies.
13. Turn on the power switch to the transmitter. The Fwd. Power meter should go to about 500 watts. If not, quickly switch the meter to the Ref. Power meter position and note the reading. If the Ref. Power meter shows a movement of greater than 10% there is an antenna mismatch and this must be corrected before any more tests are done. Contact the factory for any other problems.
14. Note the DC voltage, DC current, Fwd power, and Ref. Power meter readings. Compare the values with the factory check out sheet. They should be similar.
15. Attach the audio input connector to the transmitter and set the audio input level initially with the modulation meter on the front of the transmitter to -10dbm. Now use an oscilloscope or external modulation monitor to adjust the audio to the proper modulation level. Disconnect audio connector to transmitter.
16. Place the power level to High power.
17. Adjust the power level to licensed power with the raise/lower switch on the front panel.

18. Set any other power levels using the other 2 presets (medium, low). All three of these presets can be set to any power level.
19. Place power switch in high power and note the meter values for voltage, current, Fwd power and Ref power. Compare with the factor checkout sheet. If there are any discrepancies, please shut down the unit and call the factory.
20. Reconnect the audio connector and operate the unit with the remote control functions if applicable. In certain environments it may be necessary to place RF shielding on the remote control cabling just before it enters the transmitter cabinet.
21. The remote control connector contains a failsafe jumper. It is a normally closed circuit, which could be used for interlocks on a phasor cabinet, or a panic button. It uses a dry contact. Do not place any voltages on this circuit or transmitter damage will result. Refer to the remote control connector drawing for details.
  
22. The remote control connector also contains a PDM mute circuit. This is a very fast muting circuit. It should be used for muting during antenna pattern switching. It does not shut down the HVPS however so do not use it as an on/off function or for service work on the transmitting system.

DB-25 REMOTE CONTROL CONNECTOR



NOTES

All switches are momentary contact closure

Low/med/high power settings can be set anywhere within the entire power range

Pins 14,15,16 are +12vdc and are used only for Low/Med/High control

All other controls are ground seeking

Pins 4-12 are ground

PDM MUTE used for antenna switching

Power on/off turns off the high voltage power supply and RF output, all low voltage circuits remain energized

Interlock jumper must be installed

Metering outputs are 0-5vdc nominal

<b>X1000B-AM Transmitter</b>		
<b>REMOTE CONTROL CONNECTION</b>		
J.WHITNEY	Rev 2.0	PAGE 1 OF 1
	01/20/2004	

## Test Procedure for X1000 and X1000B AM transmitters 2-2-2003

All tests should be done by qualified technical personal. Hazardous voltages are contained in the transmitter which can cause death. Please be careful.

This procedure covers the testing of the modulator, RF amp and High voltage power supply. Testing is done with the High voltage removed. To remove the high voltage, locate the secondary windings of the high voltage power supply transformer. This is the large toroid transformer mounted on the rear /right side of the cabinet. These secondary wires can be disconnected from the high voltage power supply and taped up.

Test equipment needed. A good quality oscilloscope; VOM

1. With the transformer secondary removed, place the front panel meter on the transmitter to volts, plug in the transmitter and turn it on. Measure the DC volts on the transmitter. It must read 0 volts. If it reads 0 volts proceed to step 2
2. Shut off transmitter and unplug. Remove both plug in modules.
3. To check the modulators, take a VOM set it at ohms X1 or diode, place the negative lead to ground and measure the drain resistance of the modulator mosfet. This is the center lead. You should measure infinity. Now switch the VOM leads and measure again. You should measure about 4 ohms. If you measure 0 ohms in both directions the mosfet is bad. Now follow the same procedure with the second module.
4. To test the RF amp, place the VOM negative wire on the source lead of any of the 4 mosfets used on the RFamp. (This is the right most lead of the package). Place the positive lead on any one of the center leads of the mosfets. The VOM should read infinity. Now switch the leads and measure again. You should now read about 4 ohms. If you read 0 ohms in both directions, one or more of the mosfets is bad.
5. To determine which mosfet is bad on the RF amp, place the module in the transmitter (right slot), plug the AC in and turn the transmitter on. With an oscilloscope, probe each gate lead of each mosfet. (the gate lead is the left lead ). Leads are Gate, Drain, Source. NOTE: The high voltage transformer leads are still disconnected!!
6. Any gate that doesn't have at least 20v peak to peak sinewave present is probably bad and needs replacement. Replace the defective mosfet and retest.
7. Test the modulator drive by placing the oscilloscope lead on the gate of the modulator mosfet, you should see about 10vdc squarewave (145khz). Gate is on the left. If the waveform isn't present, the drive IC may be defective. Replace if necessary.
8. To test the High voltage power supply, turn off the transmitter and unplug. Plug in both repaired modules. With a scope probe place the ground lead to cabinet ground and the positive lead to R21. (use a clip lead if its hard to reach). Plug in the transmitter and turn it on. You should see a squarewave of about 10v peak. By rotating the power level switch on the front of the transmitter you should see the duty cycle change. Turn off the transmitter and unplug. Place the probe on R22 and follow the procedure above. Again a 10v peak squarewave should be present. To repair this problem, replace the mosfet (Q1 or Q2). Retest. If retesting fails replace the driver circuit for the mosfet. For Q1 they are R21,Q3,Q4 For Q2 they are R22,Q5,Q6

9. If all of the waveforms above check out, the transmitter should work properly, unplug the unit and reattach the transformer secondary leads and set the transmitter for low power.
10. Plug transmitter in and turn on, set the power output for 250watts and check the voltage and current meter readings against the factory check out sheet to see if they match. Call the factory if you have any problems.
11. 315-673-1269

## ***A.1 Main Cabinet***

This section contains part numbers and descriptions of all of the miscellaneous components mounted on the transmitter cabinet which are not part of any subassembly.

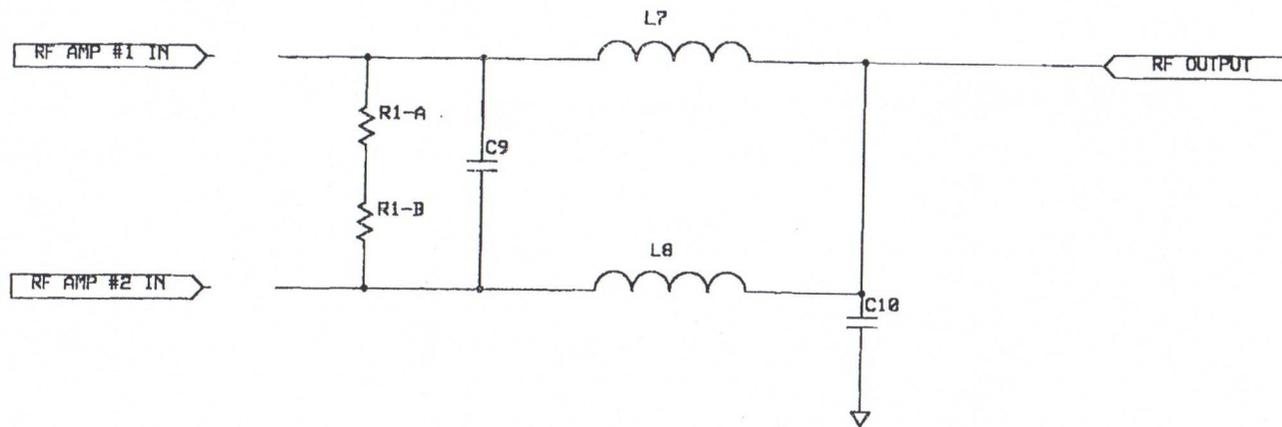
## Main Cabinet Components Rev. 020608JW

Item	Quant.	Description	Part #	Alt.Part#
1	2	Muffin Fan 220vac 110cfm 120x38mm	96C7889	592-0310
1	2	Fan guard	CR210	592-1070
1	2	Fan cord	CR318	592-1140
2	1	XLR-3F connector	SC1009-ND	
3	1	DB25-F Connector	MFR25K-ND	
4	1	N Connector Panel Mount	ARFX1023-ND	
5	2	BNC Connector	89F903	A24525-ND
6	1	Switch On-Off-On Momentary (Raise/Lower Sw)	CKN1007-ND	
7	1	DB25-M Connector (customer use)		89F1463
8	1	Rotary Switch 4 Pos. (Power level Ctrl)	EG1951-ND	
9	1	Rotary Switch 5 Pos. (Meter select)	EG1951-ND	
10	1	Meter- Panel Mount		
11	4	Rail handles	523K	keystone #523
12	1	AC input connector (HBL2323)	81F2907	5A082 Grainger
13	1	AC input Flange input (HBL2325)	46F1303	3D036 Grainger
14	1	Switch On-Off-On Momentary (Power on/off)	50N288	92N4701
15	1	Thermal Switch 70 deg N/C	317-1038	
16	1	MOV 250VAC/6500A D1	P7276	09F2163
17	1	PCB Circuit board-switching, metering, MOV		
18	2	Knob-keystone	8559	95F6991
20	1	XLR-3M connector	SC-1003	
21	2	Cable mount	RP394-nd	
22	1	Grommet /linear	89F1897	
24	2	MOV 130VAC 6500A D2,3	P7229	
25	1	Grommet round	RP454	
26	1	connector for switch pcb	A31185	A26318
27	1	connector for meter pcb	A31183	A26314
28	1	connector socket for switch pcb	CKC16T	
28	1	connector socket for meter pcb	CKC10T	
29	1	Standoff 6x32x.375 for protect.pcb	2209K	

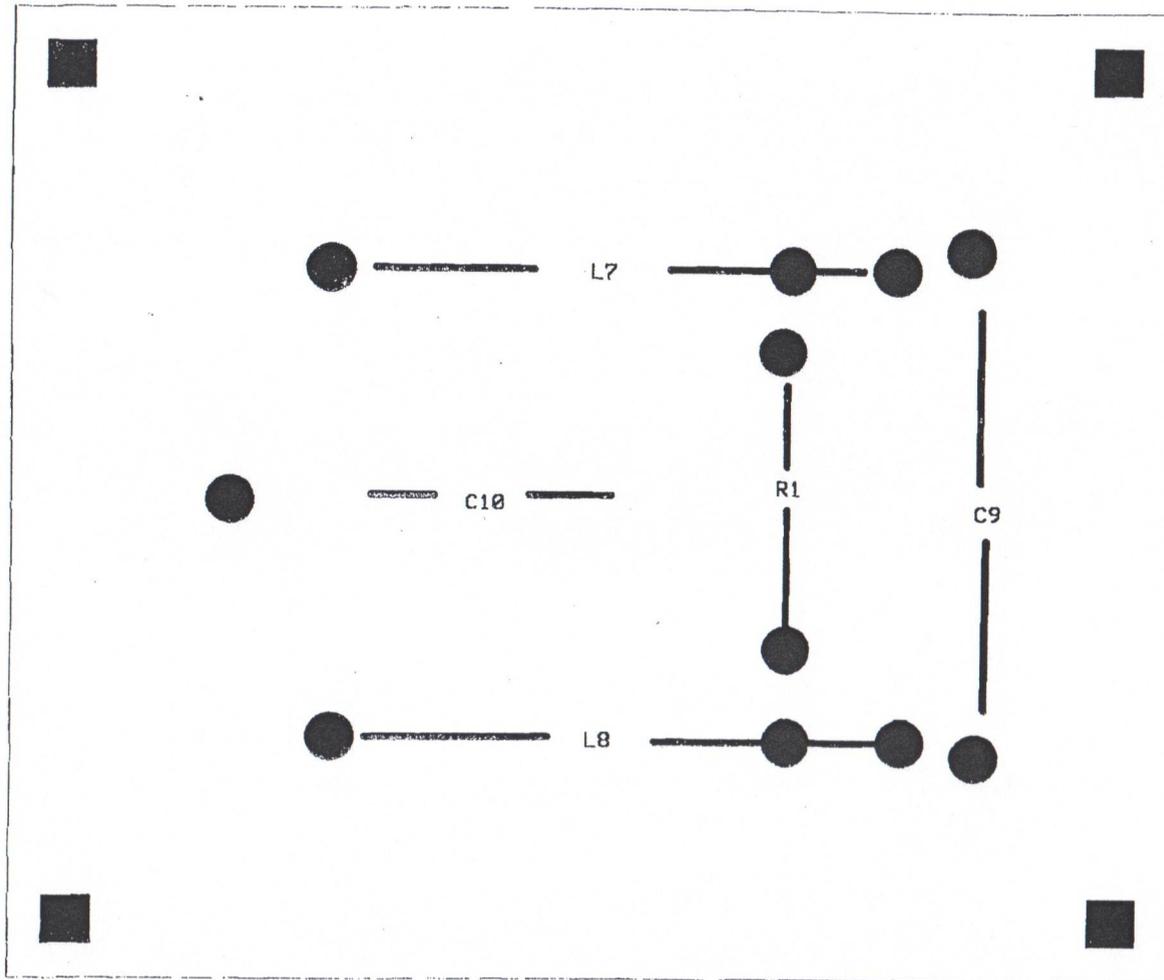
## ***B.1 RF COMBINER***

The RF combiner contains a 90 degree tuning network which combines both 600 watt RF amplifiers into a single 1200 watt output. Components are frequency selectable. The unit also contains 2 global resistors for load reject, allowing a constant impedance for both RF amplifiers under almost any condition.

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RF Combiner		
J. Whitney	Rev 1.0	Page 1 of 1
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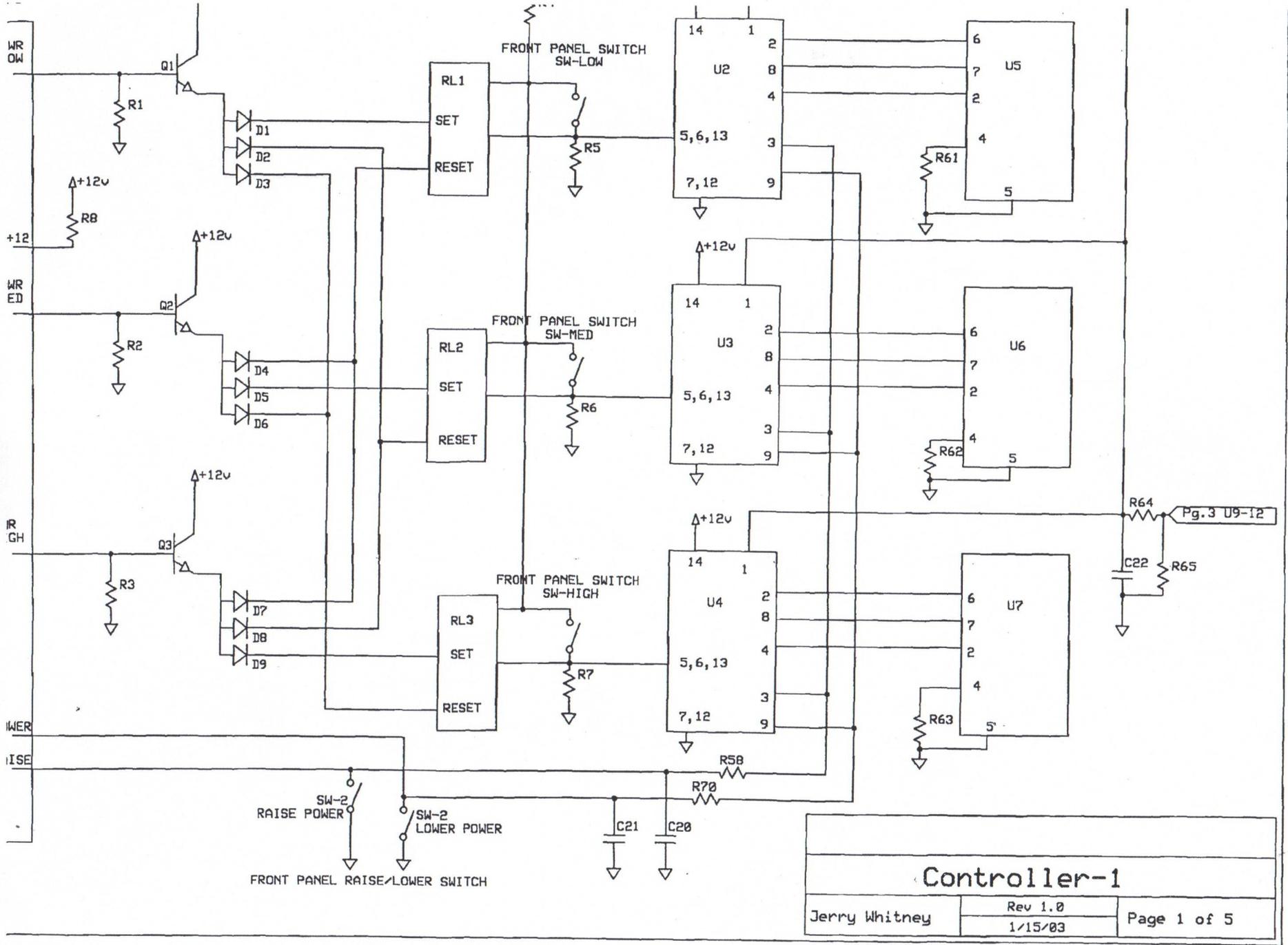


Power Combiner Board Rev.020608JW					
Item	Quant.	Description		Part#	Alt.Part#
1	2	Resistor 50ohm 150W		Kanthol	
2	1	Capacitor Mica TX Freq.Select	C9		
3	1	Capacitor Mica TX Freq.Select	C10		
4	2	Inductor Air wound #10AWG	L7,L8		
5	4	Spacer 1/4"		1457AK-ND	
6	4	6X32X1/2" Screw		H360-ND	
7	4	6X32 Lockwasher		H240-ND	
9	1	Wire #10 AWG 10' Thermaleze Magnet wire			
10	8	Capacitor .01uf 4kv cer.	C19	P4140-nd	
11	3	Ceramic Insulator ;resistor mount		7716K-nd	
12	4	Resistor clips for item 1		35267	
13	2	Standoff 6/32 x2"		2214k	
14	1	GDT CG2-800L		65F1456	

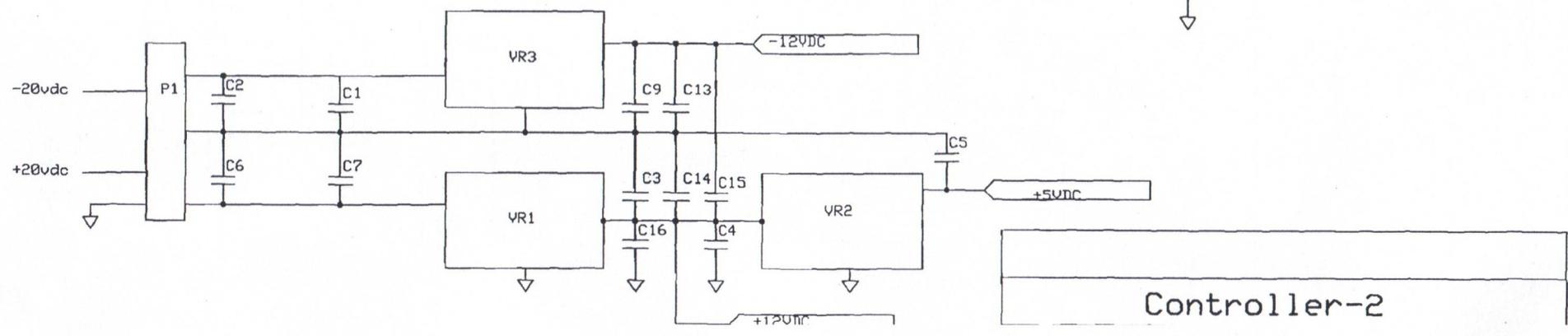
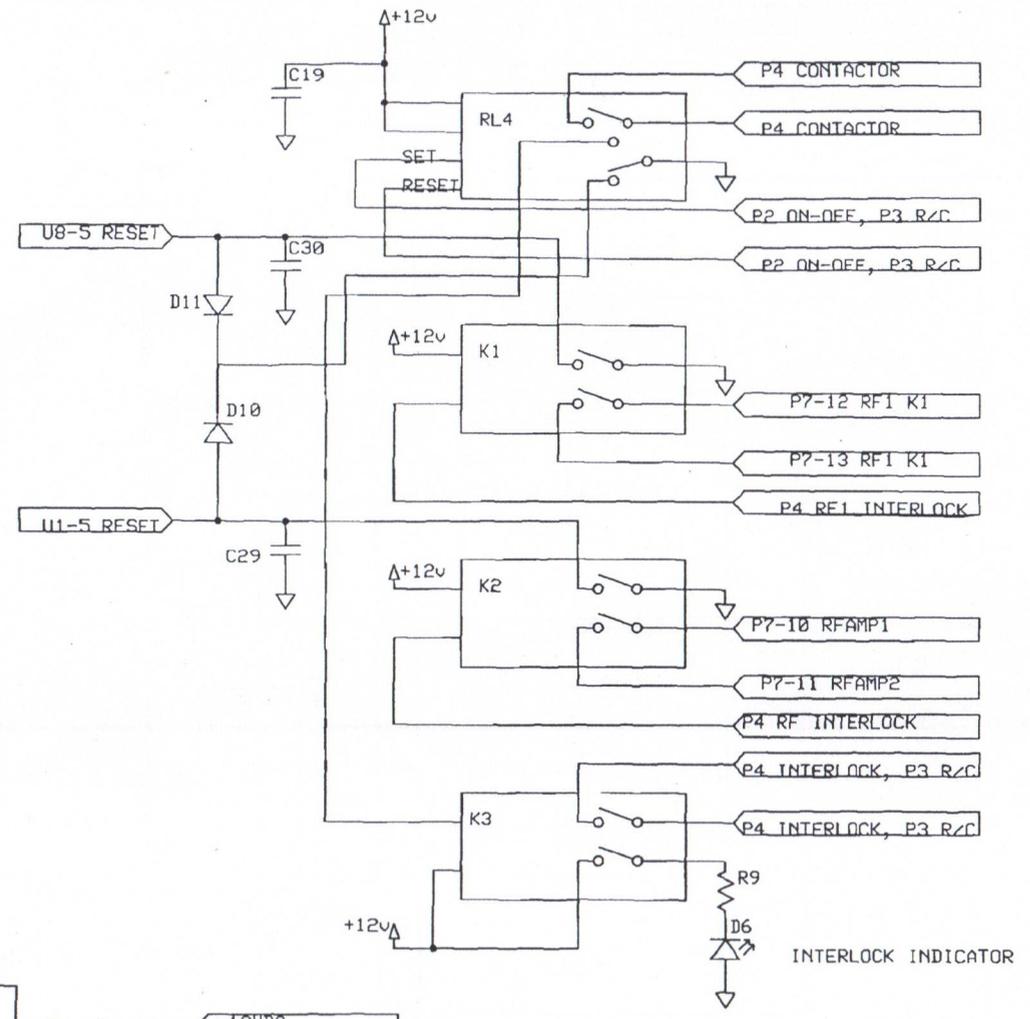
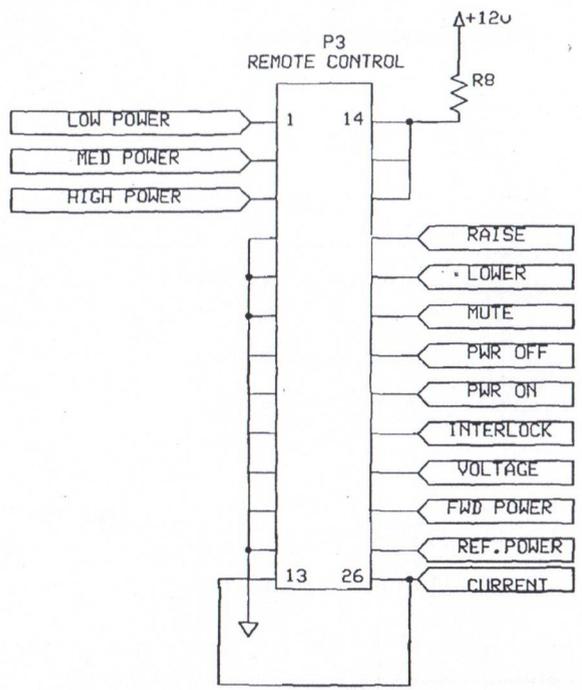
## ***C.1 CONTROLLER***

The controller circuit board located in the upper front compartment of the transmitter is used to provide transmitter metering, power control, remote control and logic control. All metering pots are located at the top of the circuit board for adjustment of the front panel meter. Other controls are used for DC power control (PDM drive) and regulation (vreg). Finally a pot is used for RF power foldback to control transmitter output during high VSWR conditions. (fold refl).

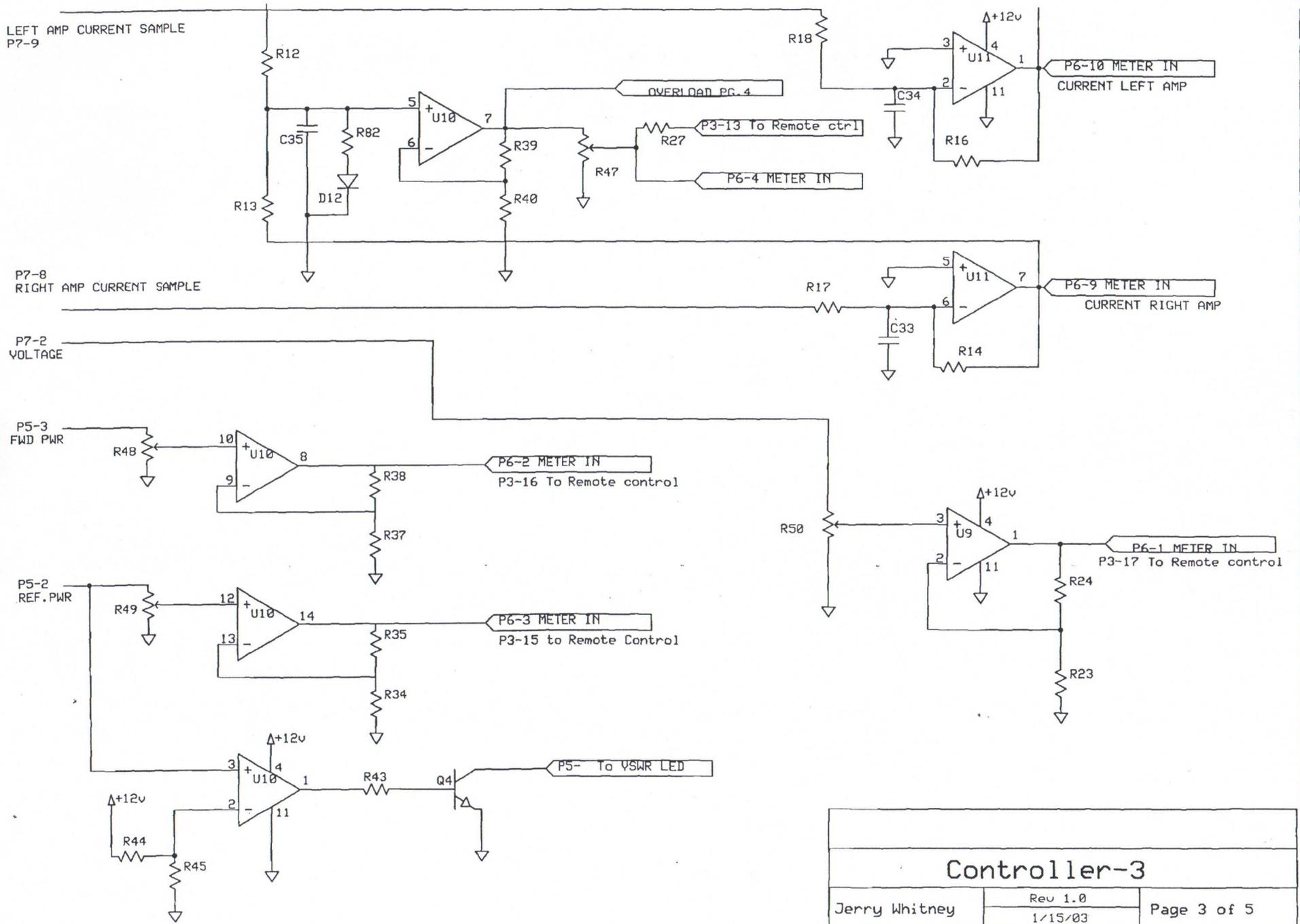
Remote control metering is not adjustable using the metering pots. Values for voltage, current, and power are factory set at 4 vdc. Remote calibration should be done on the remote control unit.



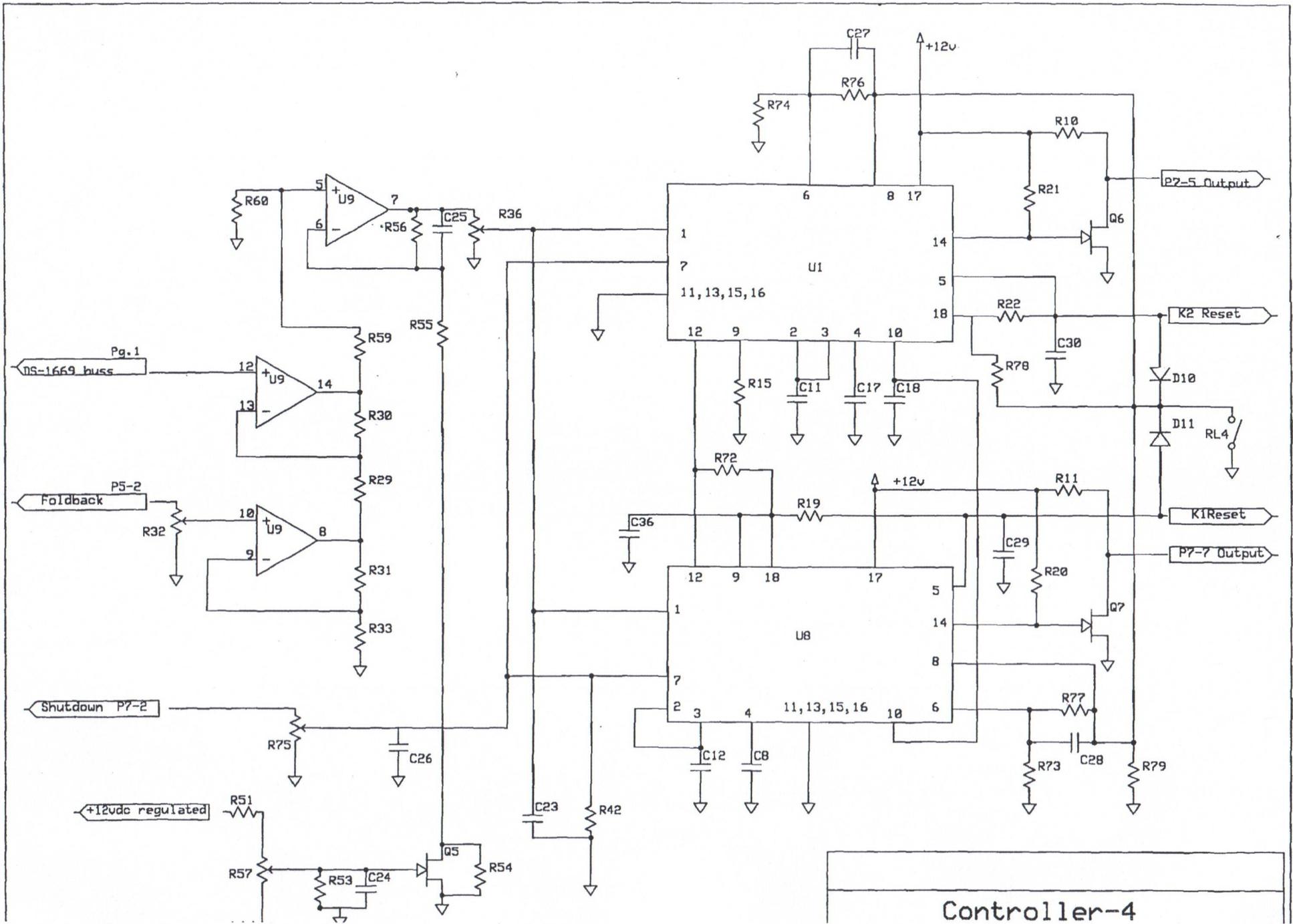
<b>Controller-1</b>		
Jerry Whitney	Rev 1.0	Page 1 of 5
	1/15/03	



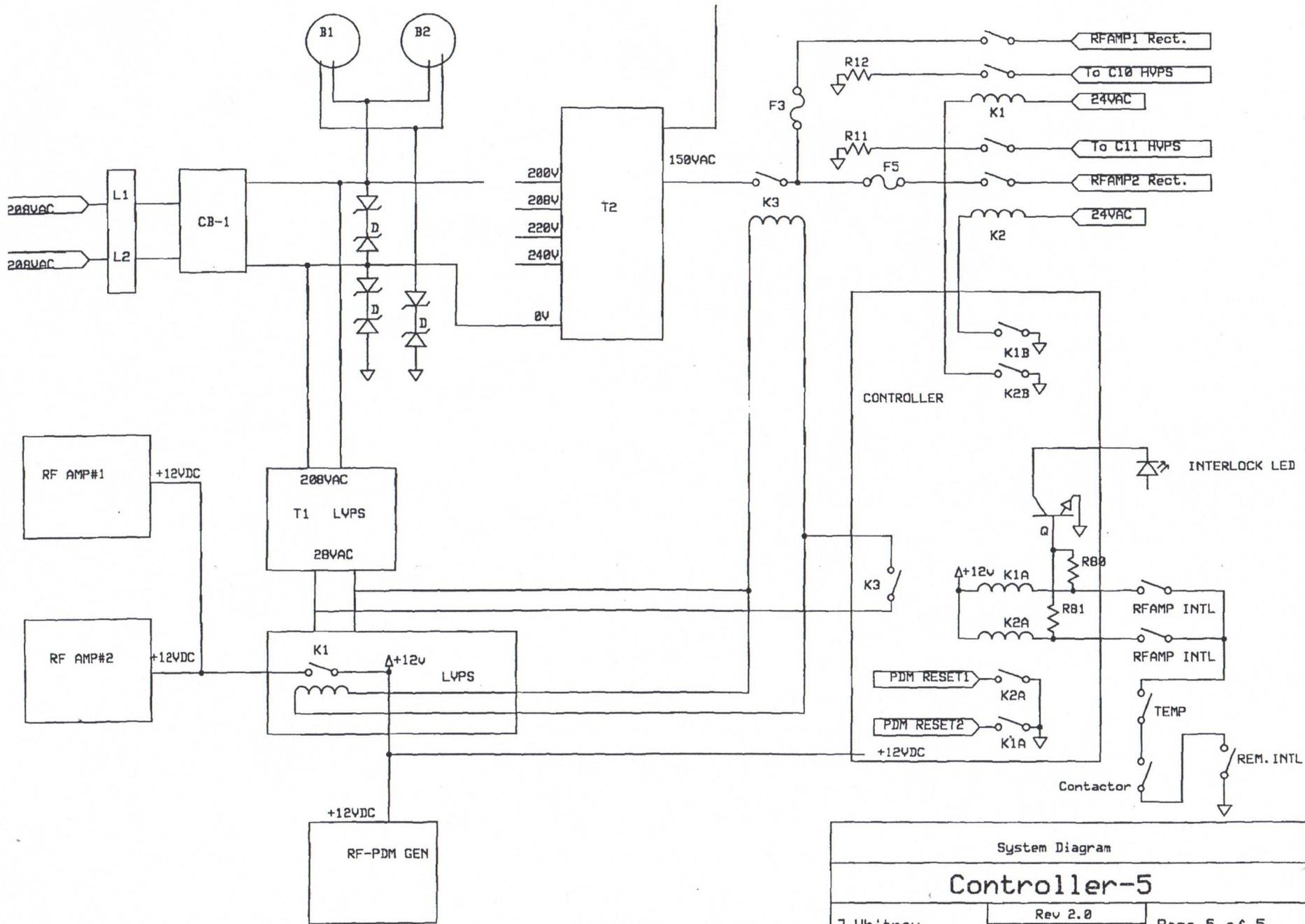
Controller-2



<b>Controller-3</b>		
Jerry Whitney	Rev 1.0	Page 3 of 5
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Controller-4



System Diagram		
<b>Controller-5</b>		
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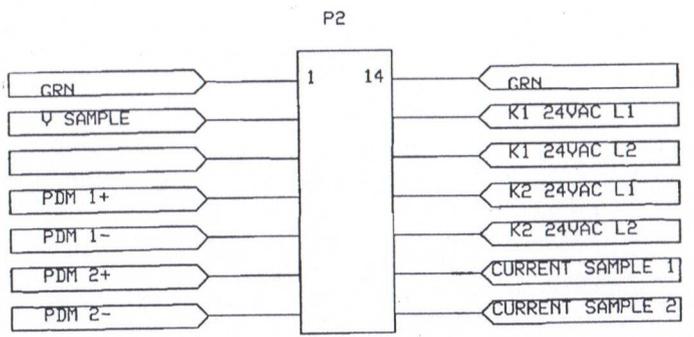
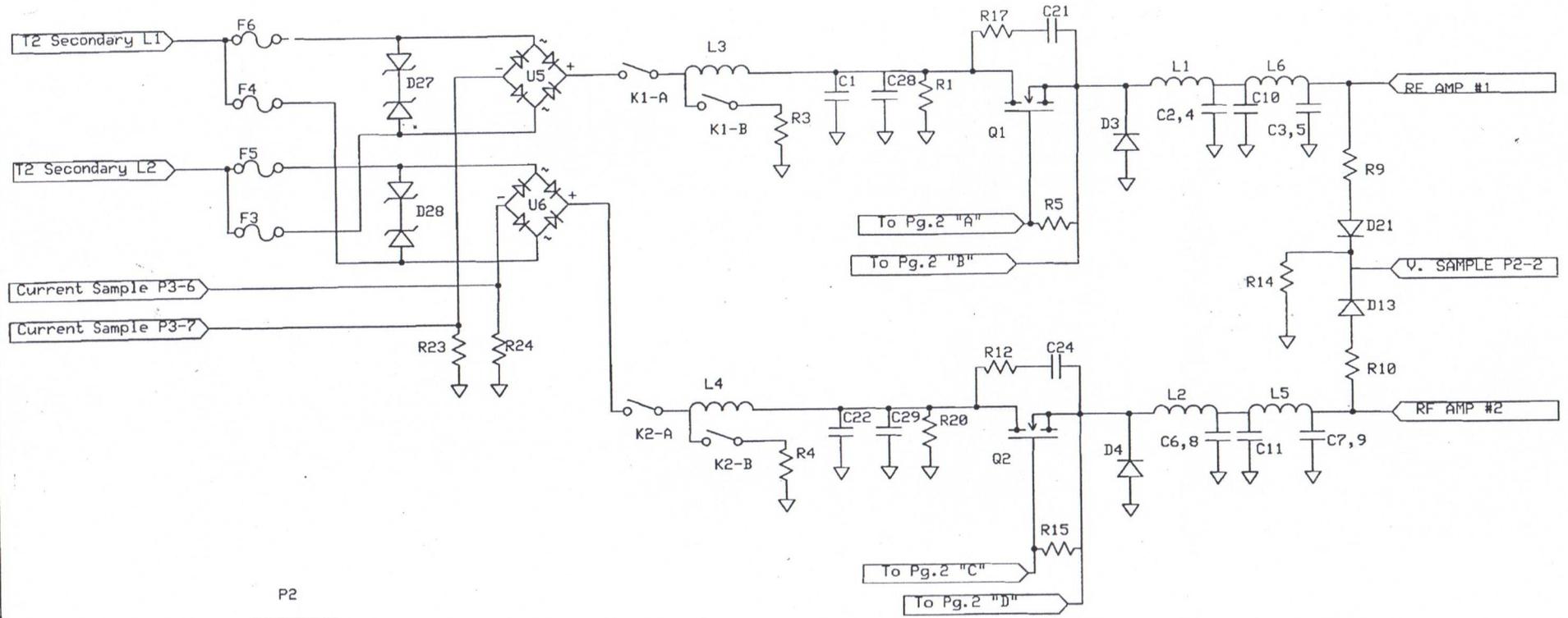


V2 Controller Board Rev.020608JW						
Item	Quant.	Description	Location	Part #		
1	2	PWM IC UG3526AN	U1,8	296-11220-5-nd		
2	4	Dip Socket 8 pin	U5,6,7,11	A24807-ND		
3	5	Dip Socket 14 pin	U2,3,4,9,10	AE8914-ND		
6	3	CMOS IC CD-4066	U2-4	296-2061-5-ND		
7	3	IC Dallas DS-1669-10	U5-7	DS1669-10		
8	4	Relay -latching 12vdc	RL1-4	Z750-ND		
9	12	Diode 1N4148	D1-12	1N4148		
10	5	Transistor 2N5089	Q1-4,8	2N5089-ND		
11	5	Resistor 4.7k 1/4w	R1,2,3,34,42	4.7KQBK-ND		
12	7	Resistor 1.5k 1/4w	R4,27,33,43,45,53,82	1.5KQBK-ND		
13	14	Resistor 15K	R5,6,7,23,24,35,37,38,44,51,54,58,64,70	15KQBK-ND		
14	16	Capacitor .1uf 100v	C2,4,5,6,13,14,15,16,19,23,25,31,32,33,34,36	BC1123CT-nd	P4593	
15	2	Capacitor 100uf 63v	C1,7	4074PHCT-ND		
16	2	Capacitor 10 uf 63v	C3,9	4066PHCT-ND		
17	1	V Reg. 7812	VR1	58K1829	07F7553	
18	1	V Reg. 78L05	VR2	NJM78L05A-ND		
19	2	Connector Header	P4,P5	ED1948-ND		
20	2	Connector Plug	P4,P5	ED1961-ND		
21	1	Connector Header	P3	A31187		
22	3	Capacitor 22uf 16v	C22,24,35	478-1878		
23	2	Dip Socket 18 pin	U1,U8	AE8918-ND		
24	1	Capacitor .004 uf 50v	C18	P4558-ND		
25	4	Capacitor .01uf 50v	C11,12,20,21	P4513		
26	1	V Reg. 79L12	VR3	LM320LZ-12		
27	8	Pot 10K	R32,36,47,48,49,50,57,75	3386H-103-ND		
30	1	IDC Socket-26P	P3	CKC26T	CKC26T	
31	1	IDC Socket-14P	P7	CKC14T	CKC14T	
32	1	IDC Header-14P	P7	A26316-ND		
33	3	Relay 12vdc DPDT	K1,K2,K3	Z768-ND		
34	2	IC Op Amp TL074CN	U9,U10	296-1777-5-ND		

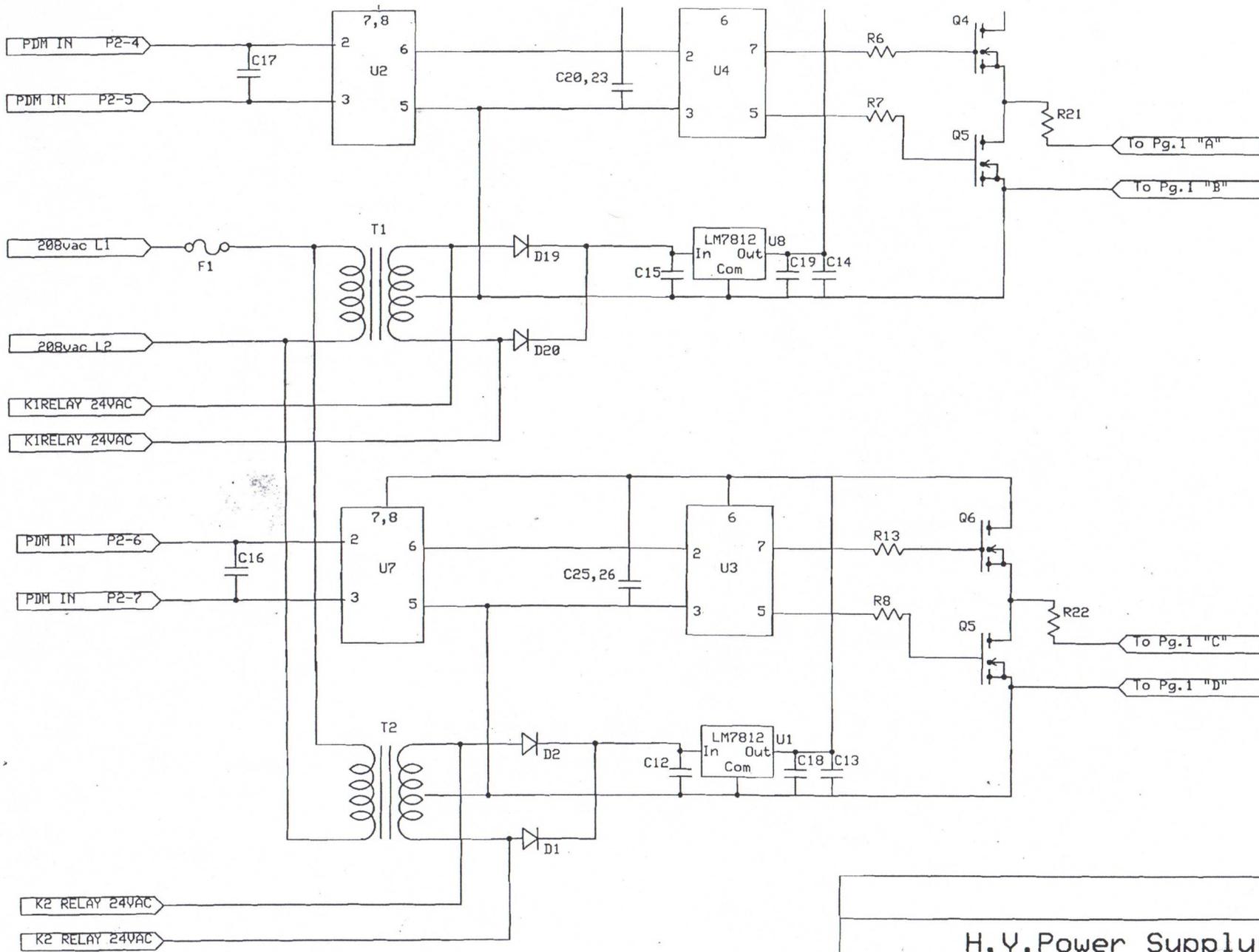
35	1	IDC Socket-10P	P6		CKC10T		CKC10T
36	1	IDC Header-10P	P6		A31183		
37	1	Transistor 2N5457	Q5		2N5457FS		
38	1	Resistor 6.8K 1/4w	R52		6.8KQBK-ND		
39	2	Resistor 5.6K 1/4w	R62,63		5.6KQBK-ND		
40	19	Resistor 10K 1/4w	R12,13,19,22,29,30,31,40,55,56,59,60,73,74,76,77,79,80,81		10KQBK-ND		
43	4	1/4" Spacer			3464k-ND		
44	4	6X32 Lockwasher			H240-ND		
45	4	6X32X1/2" Screw			H360-ND		
46	2	Resistor 47K 1/4w	R39,65		47KQBK-ND		
49	1	Resistor 150 ohm 1/4w	R8		150QBK-ND		
50	2	Mosfet 2N7000	Q6,7		2N7000FS		
51	7	Resistor 2.2k 1/4w	R10,11,20,21,61,72,78		2.2KQBK-ND		
52	2	IDC Header-16P	P1,2		A26318-ND		
53	2	IDC Socket-16P	P1,2		CKC16T		CKC16T
55	2	Capacitor 120p cer.	C27,28		P4926		
56	1	IC op Amp TL072CN	U11		TL072CN		
57	1	Resistor 3.3k 1/4w	R15		3.3KQBK		
59	1	Heatsink for VR1	VR1		HS106		
60	2	Resistor 22k 1/4	R14,16		22kqbk-nd		
61	1	Capacitor 1uf poly	C26		P4675		
62	2	Resistor 12k 1/4w	R17,18		12kqbk		
63	2	Capacitor 120uf 16v	C8,17		493-1520		
64	2	Capacitor 470uf 16v	C29,30		493-1522		

## ***D.1 HIGH VOLTAGE POWER SUPPLY***

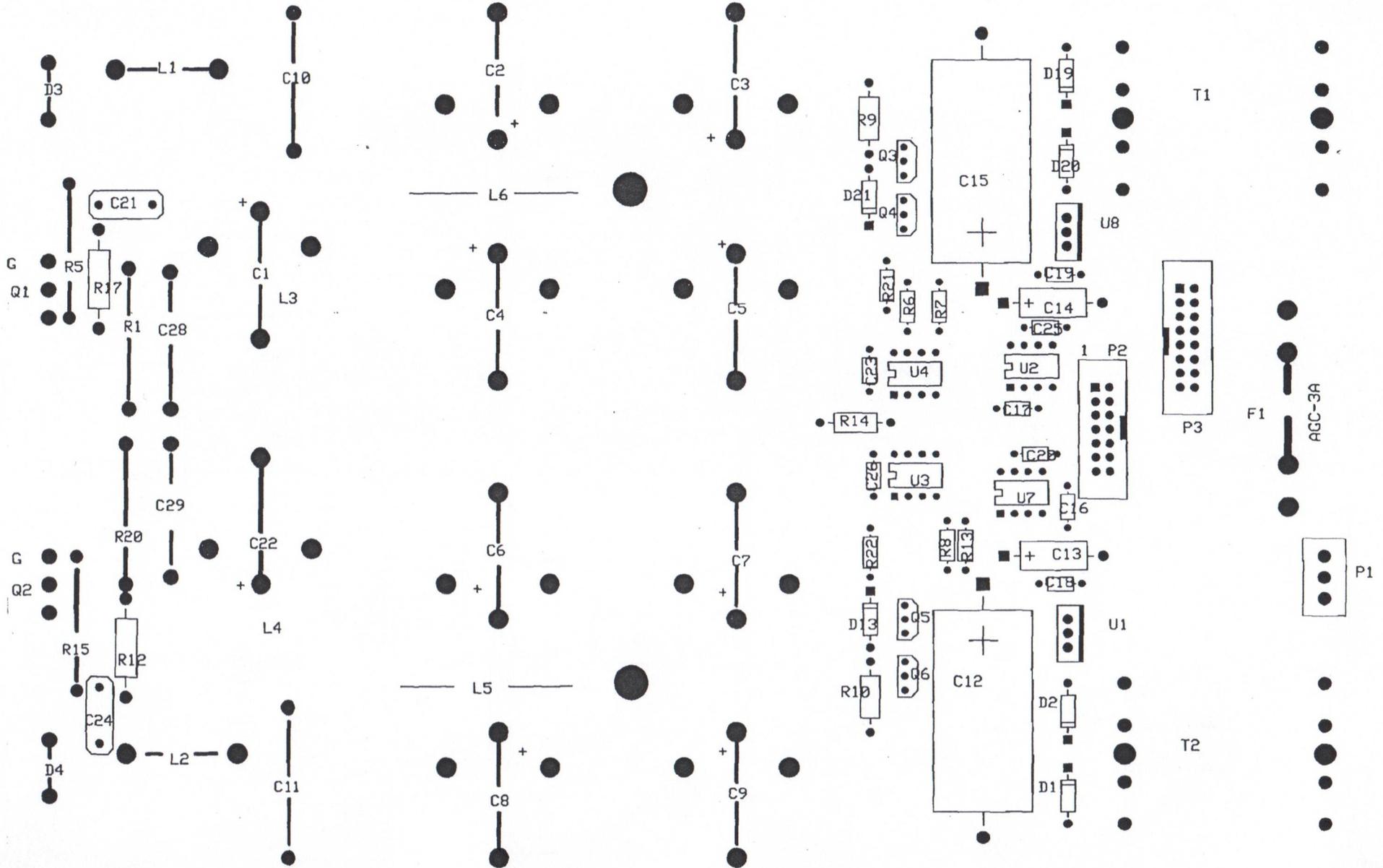
The high voltage power supply, located in the large open area in the back of the transmitter contains 2 separate regulated DC supplies, which feed each RF power amplifier. Each supply can operate independently, controlled by the controller board. All plug in modules are interlocked to the power supplies and are provided a soft start when plugged back into the transmitter cabinet. There are no adjustable components on this assembly.

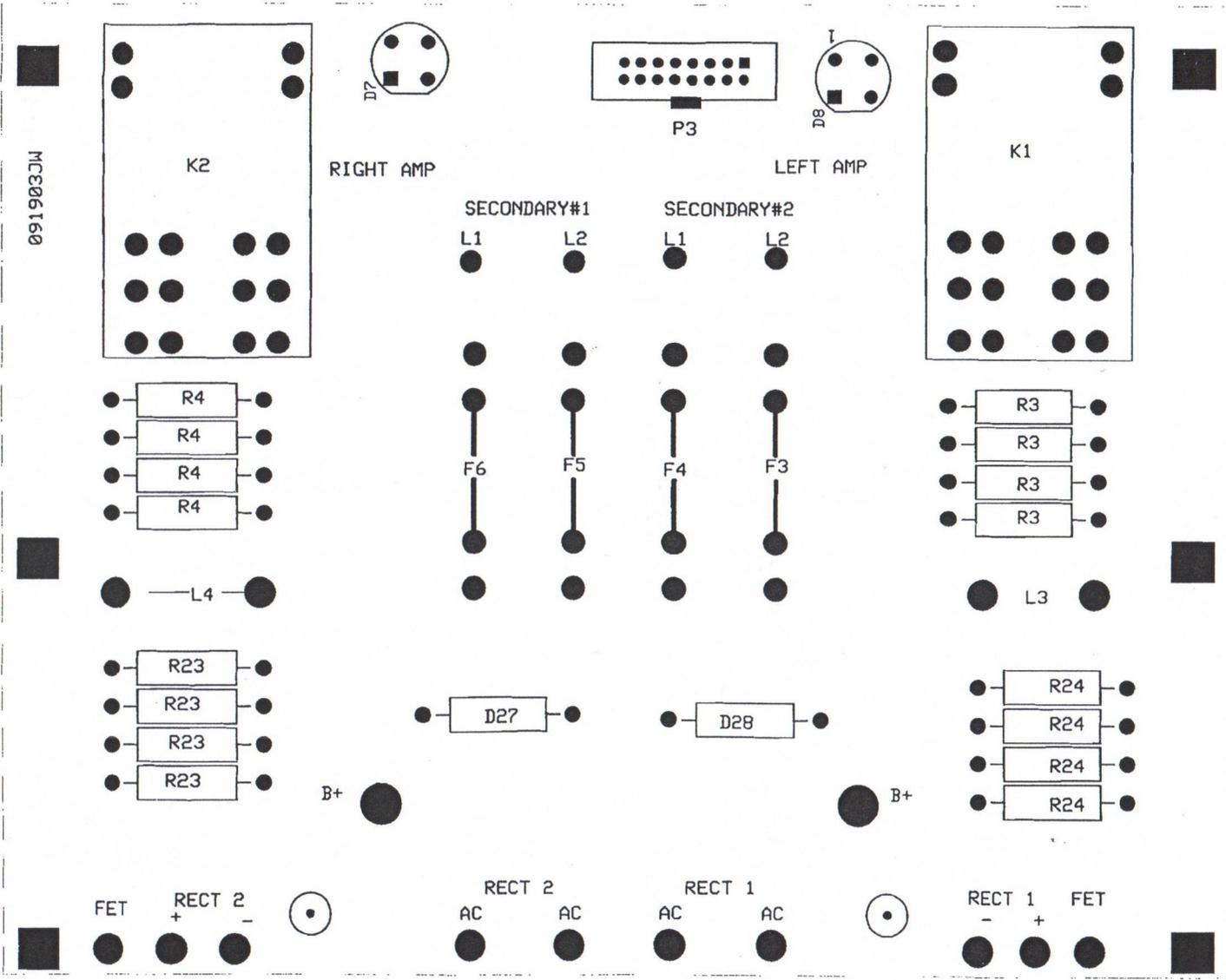


H.V. Power Supply



<b>H.V. Power Supply</b>		
J. Whitney	Rev 1.0 1/26/03	Page 2 of 2





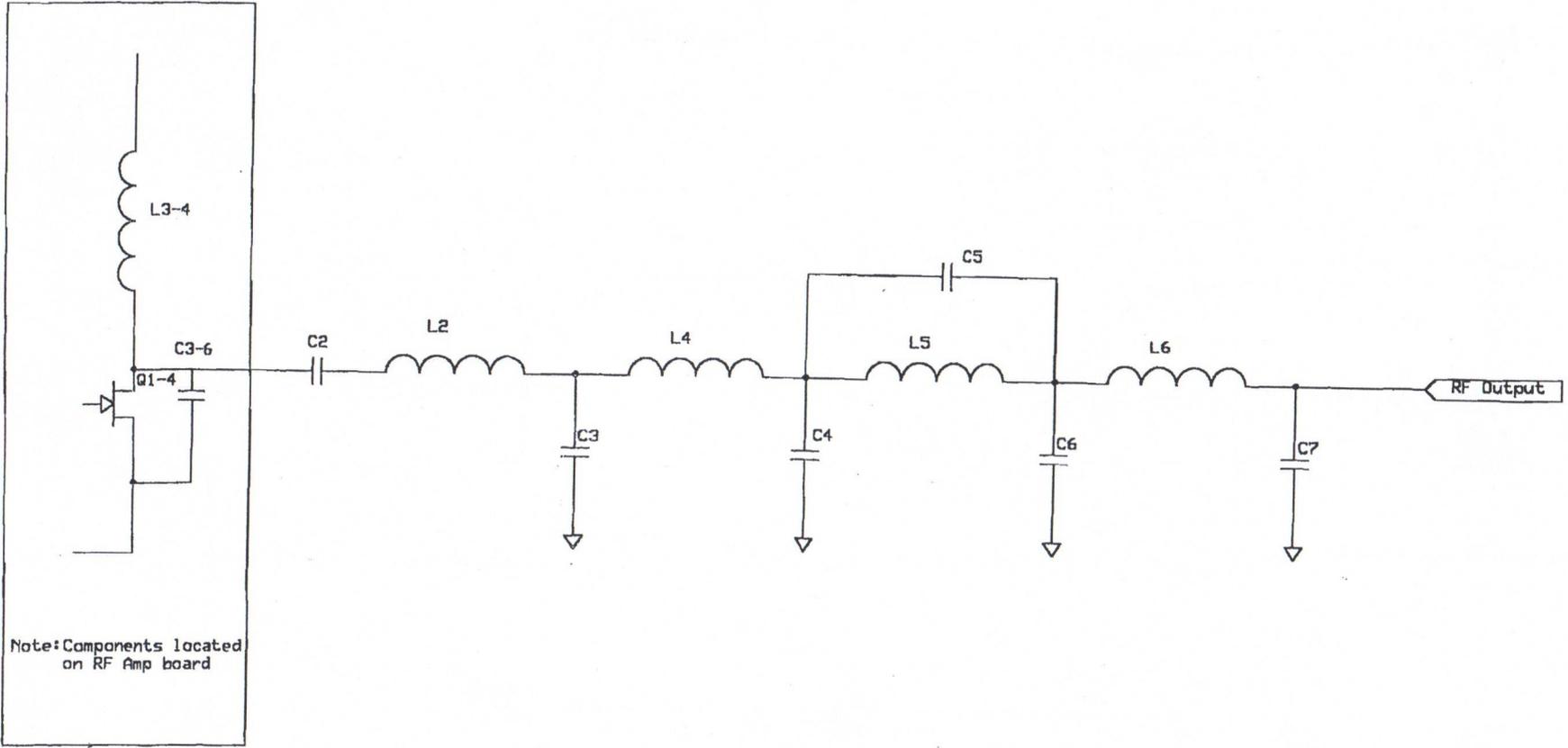
A:\HVPS aux board pcb (Silkscreen & pads)

High Voltage Power Supply Rev.020608JW						
Item	Quantity	Description		Part #	Alt.part #	
1	1	Circuit Breaker 20A 2Pole	CB-1	W68-X2Q110-20	90F1233 (TYCO,P&B)	
2	2	Bridge Rectifier 800V/35A	U5,U6	GBPC3508DI-ND		
3	1	Terminal Block 5 Pole	TB-2	CBB305-ND		
4	2	MOV 175VAC/6500A	D27,28	P7231		
5	10	Capacitor 2200uf/250v	C1-9,22	P10664	P10052	
7	2	Mosfet 300v 50A	Q1,2	IXFH52N30Q		
8	2	Diode Clamp IXYS 30ns	D3,4	DSEI30-06A-ND		
10	4	Resistor 10 ohm 1/4w	R6,7,8,13	10QBK-ND		
11	4	Capacitor .1uf 250v	C10,11,28,29	P3488		
12	2	Transformer 230V:28V,12VA	T1,T2	MT2116-ND	44N3633	
13	2	V Reg. 7812	U1,8	58K1829	07F7558	
14	2	Capacitor 1000uf/63v	C12,15	4081PHBK-ND		
15	2	Capacitor 100uf/63v	C13,14	4074PHCT-ND		
16	6	Capacitor .1uf 50v	C18,19,20,23,25,26	BC1123CT		
17	2	IC TLP-558	U2,7	TLP-558-ND		
18	1	Resistor 2.2K 1/4W	R14	2.2KQBK-ND		
19	2	IC EL7182	U3,4	EL7182		
20	2	Inductor T157-3 40T#16AWG	L1,2			
21	1	Fuse AGC-3A	F1	F121-ND		
22	10	Fuse Clip		F040-ND		
24	2	Switch interlock	S1-2	SW133-ND	52F3643	
25	1	Transformer 230V:150V 2KVA			6869	
26	4	Insulator TO247		BER178		
27	6	6X32X3/8"		H356-ND		
28	6	6X32 lockwasher		H240-ND		
30	4	Fuse AGC-10A	F3,F4,F5,F6	F2519	F127-ND	
31	2	Resistor 47K 1/4w	R9,10	47KQBK-ND		
32	2	Connector 14 socket	P2	CKC14T-ND		
33	2	Connector header 14 Term	P2	A31184	A26316-ND	
37	4	Dip Socket 8 Pin		A24807	AE8908-ND	

38	4	Mosfet 2N7000	Q3-6	2N7000DICT-ND	
40	6	Connector .25 QC Male			50N466
41	12	Connector .25QC Female Crimp		WM18232-ND	
42	1	Connector 3 pin HEADER	P1	ED1948-ND	
43	1	Relay Contactor 25A/ 24VDC		PB516-ND	
45	4	Resistor 2k ohm 5W	R3,4	2.0KW-5	
46	6	Diode 1N4004	D1,2,13,19,20,21	1N4004DICT-ND	
47	4	4X40X1.5" Screw			
48	4	4X40 Nut		H216-ND	
49	4	4X40 Locknut		H236-ND	
50	8	6X32X1/4" Screw		H354-ND	
51	8	6X32 Locknut		H240-ND	
52	1	Wire 10' #12AWG magnet wire L3-6			
54	2	Resistor 3.3 Ohm 1/4w	R21,22	3.3QBK-ND	
57	2	Resistor 43K 3w	R1,R20	P43KW-3BK	
58	4	Inductor 2mh (20t #14awg)	L3-6		
60	2	Capacitor 100p cer. 500v	C16,17	1338PH	
62	4	Fibre Washer	T1,T2	3196K-nd	
63	2	Resistor 4.7k 1/4w	R5,15	4.7KQBK	
64	4	Resistor 22ohm 2w(2in parallel)	R12,17	P22W-3BK	
65	4	Capacitor 470p 2kv(2in parallel)	C21,24	445-2818	P10812-nd(1kv)
66	8	Resistor 1.0 2w	R23,24	25J1R0E	
67	2	Connector IDC 16pin header	P3 on aux board	A31185	A26318-nd
68	2	Connector	P3	CKC16T	
69	2	Banana Plug	J1,J2	39N890	
70	2	Banana Socket	J1,J2	35F865	
71	2	open	D5,6		
72	4	Screw 6X32X1/4"			
74	1	Connector 3 pin plug	P1	ED1961-ND	
75	2	Relay 24vdc DPDT	K1,K2	PB352	
76	2	open	D9,10		
77	2	Rectifier	D7,8	W04G-ND	

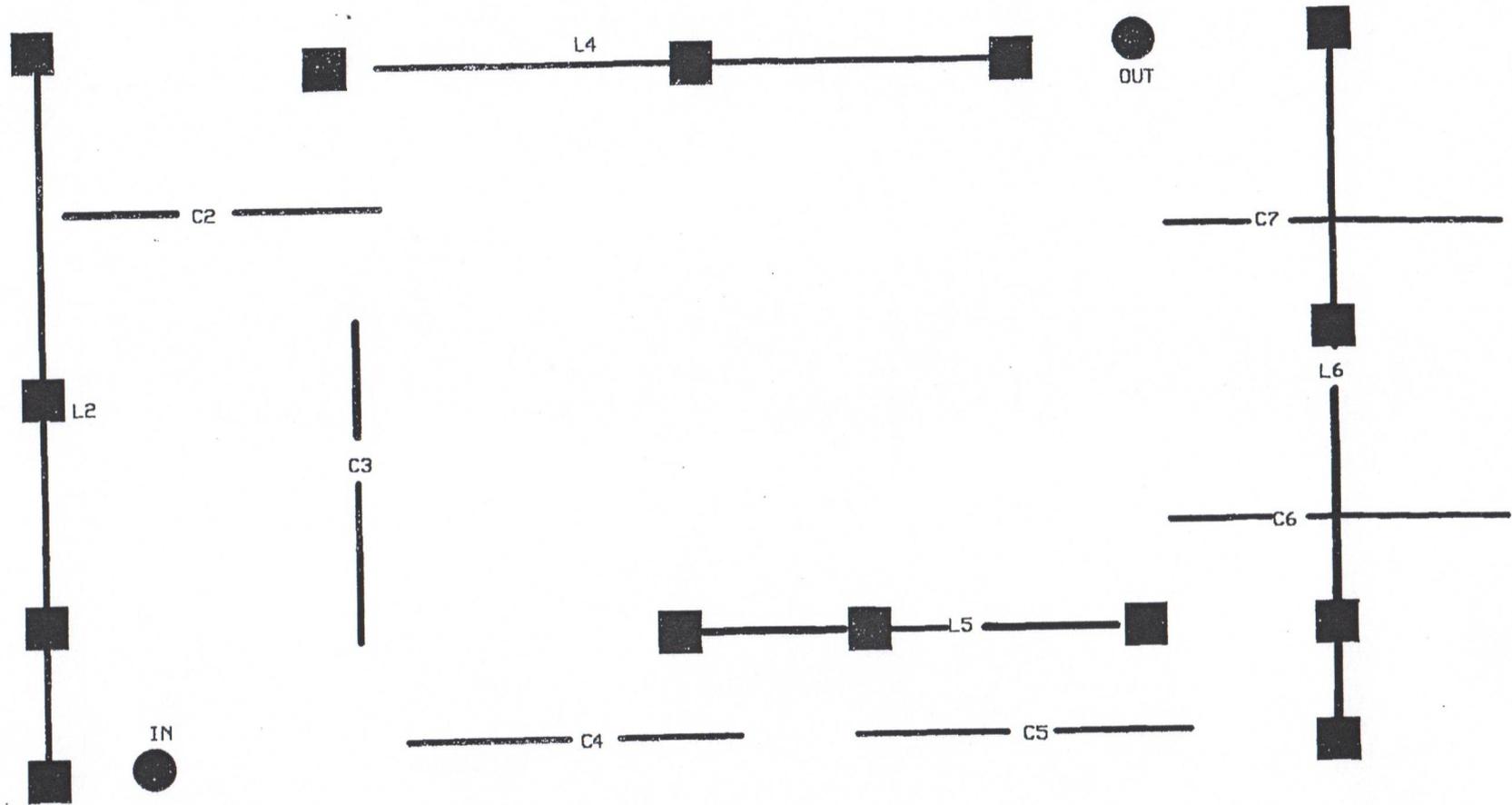
## ***E.1 LOW PASS MATCHING NETWORK***

There are 2 lowpass matching networks located in the large open area of the transmitter cabinet. They contain the matching networks for each of the RF power amplifiers. The output of these boards connect to the combiner board. The components on these boards are frequency selected, and their values are marked on the factory checkout sheet provided with this manual. The networks contain circuits that match the RF amplifier to the antenna load and filter out any harmonics generated elsewhere.



Note: Components located on RF Amp board

Lowpass/Matching Network		
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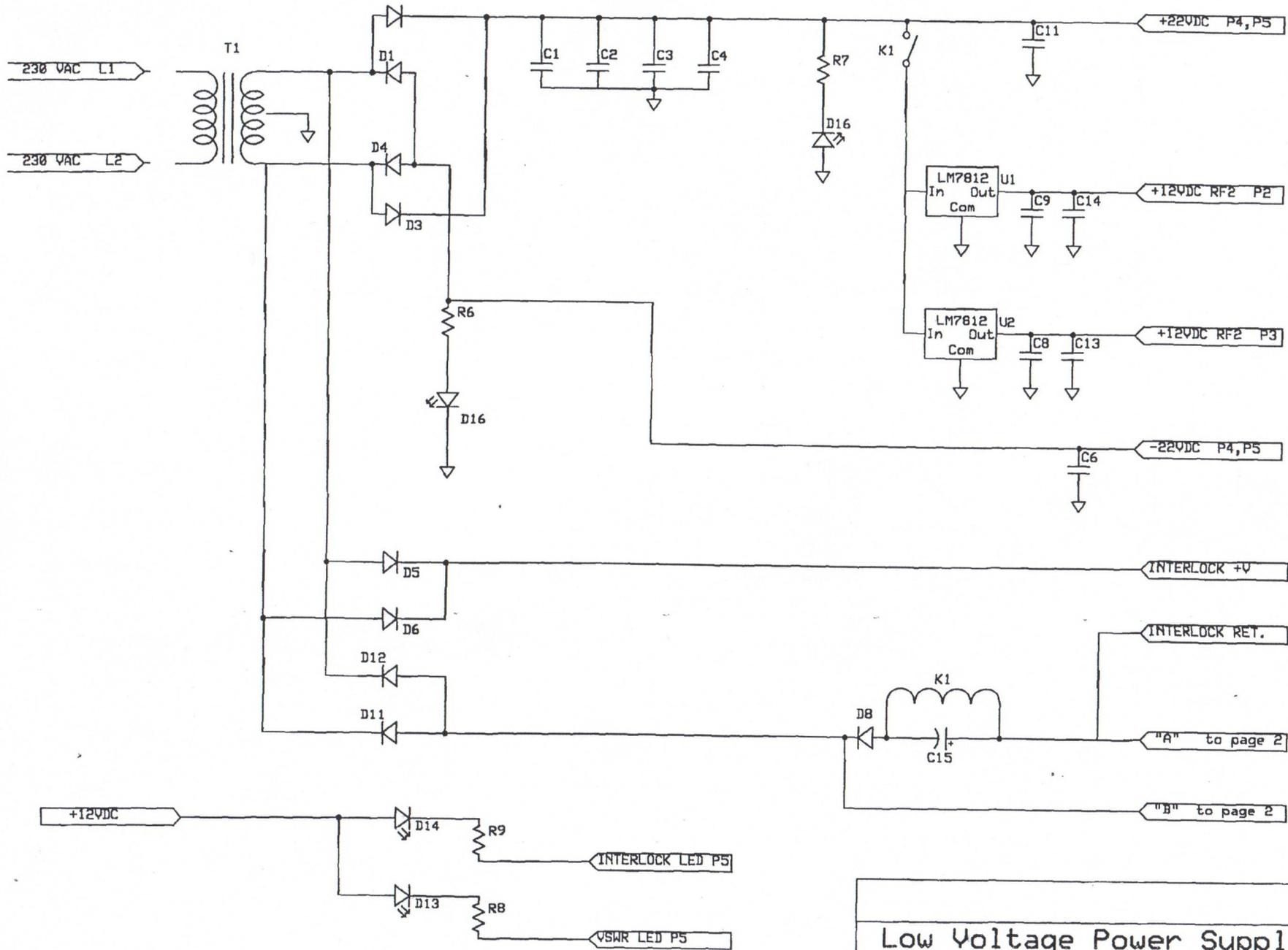
122200JW

RF Match/Lowpass Filter Board Rev.120902JW

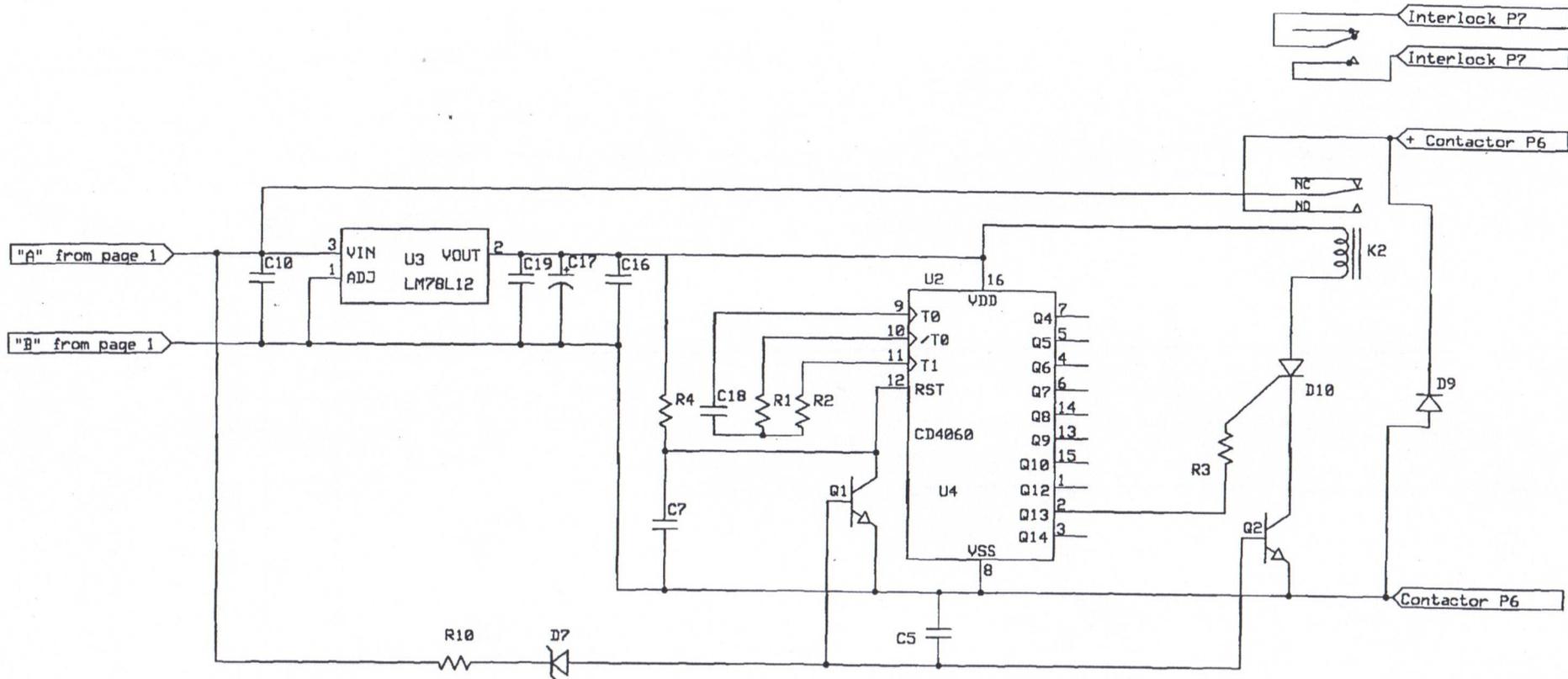
Item	Quant.	Description	Part.#
1	1	Inductor Air 1.25"dia 10AWG Freq.Select	L2
2	1	Capacitor Mica Freq.Select	C2
3	1	Inductor FT-140-61 Freq.Select	L3
4	2	Capacitor Mica Freq.Select	C3,7
5	2	Inductor Air 1.25"dia 10AWG Freq.Select	L4,6
6	2	Capacitor Mica Freq.Select	C4,6
7	1	Inductor Air 1.25"dia 10AWG Freq.Select	L5
8	1	Capacitor Mica Freq.Select	C5
9	6	6X32X3/8" Screw	H356-ND
10	4	6X32 Nut	H220-ND
11	6	6X32 Locknut	H240-ND
12	1	Wire #10AWG Thermaleze 50'	

## ***F.1 LOW VOLTAGE POWER SUPPLY***

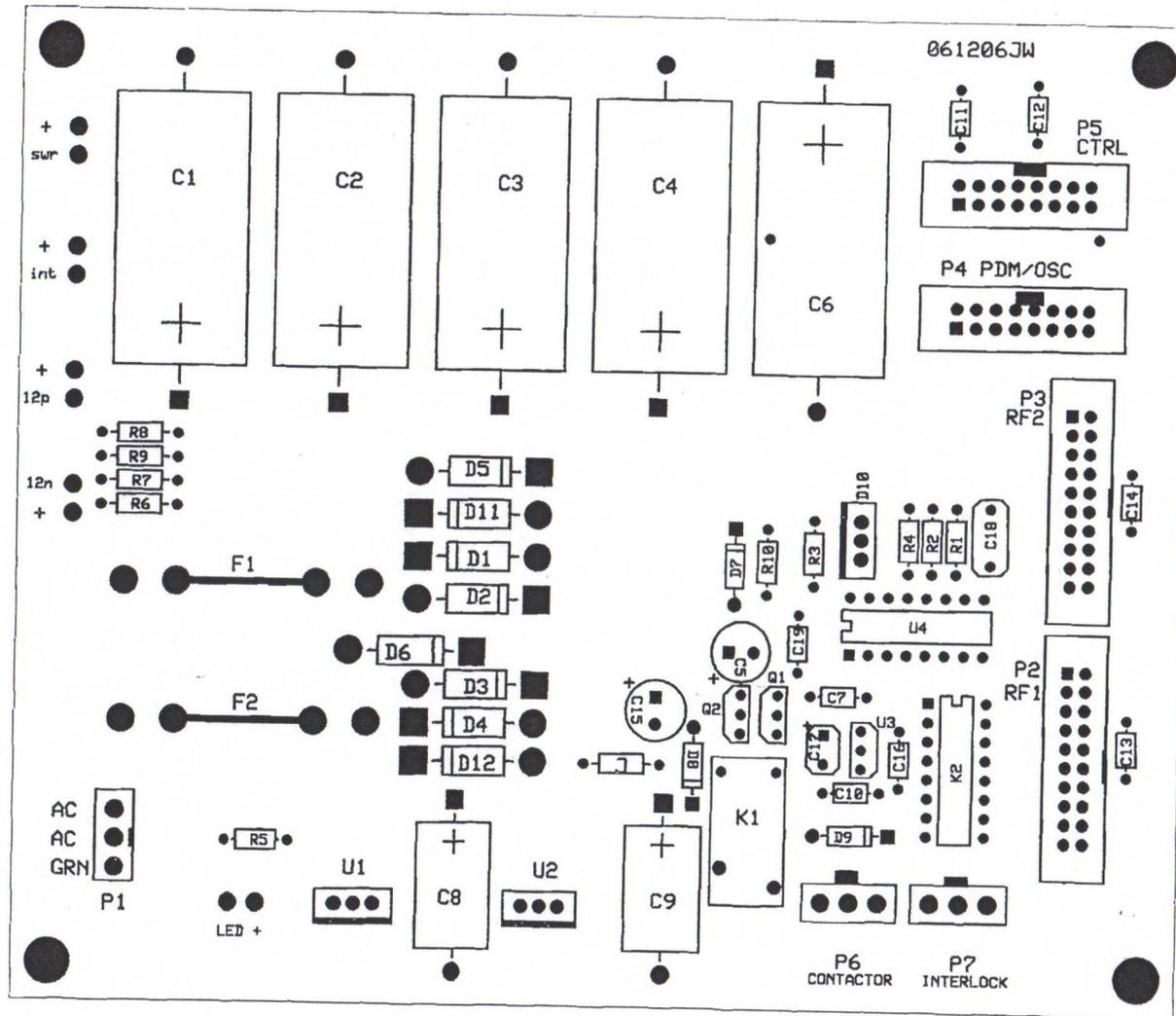
This circuit board, located in the upper front part of the transmitter cabinet supplies unregulated DC to the RF Oscillator, controller and PDM generator. It also supplies regulated +12vdc to both RF amplifiers / modulator plug in modules. The board contains 4 LED indicators, visible from the front panel which indicate VSWR, Interlock, +12v and -12v.



<b>Low Voltage Power Supply</b>		
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Low Voltage Power Supply



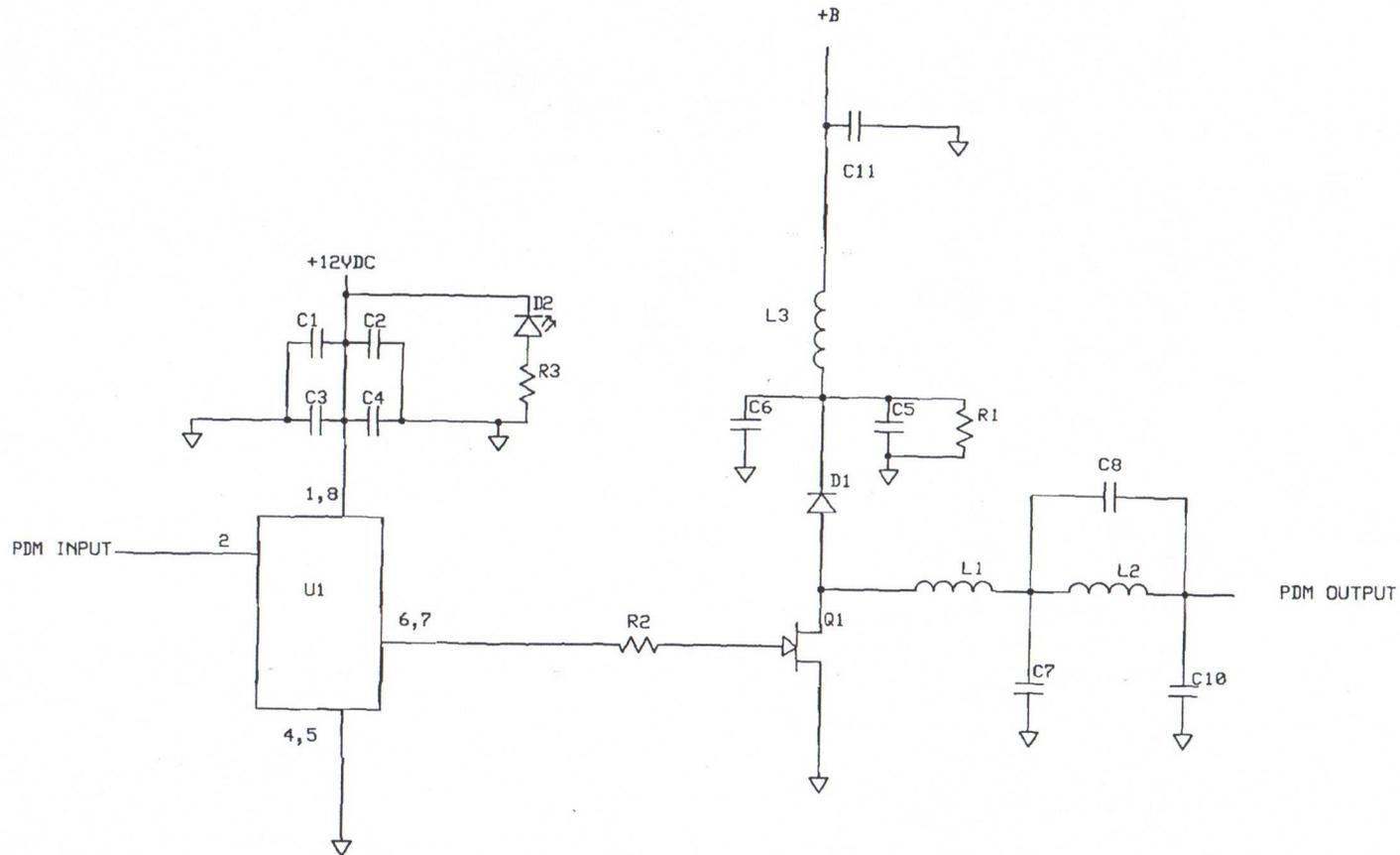
Low Voltage Power Supply Parts Listing Rev. 101205JW

Item	Quant.	Description		Part #	
1	1	Torroid Transformer Custom 230v pri: 28v Sec.		6872-B	
2	6	Diode 1N5404	D1,4,5,6,11,12	1N5404GCT-ND	
3	5	Capacitor 4700uf 40v	C1,2,3,4,6	4060PHBK-ND	4044PHBK (4700/25v)
4	6	Resistor 1k 1/4w	R5-10	1.0KQBK-ND	
5	2	LED-red 5mm	D13,14	67-1188	
6	3	LED-green 5mm	D15,16	67-1189	
7	2	Capacitor 100uf 63v	C8,9	4074PHCT-ND	
8	2	Voltage regulator MC78T12ACT	U1,U2	58K1829	07F7558
9	4	1/4" standoff		3464k-nd	
10	4	6X32X1/2" Screw		H360-ND	
11	4	6X32 locknut		H240-ND	
13	3	6X32 screw 1/4"		H354-ND	
14	3	Header 3 pin	P1,P6,P7	ED1948-ND	
15	4	Fuse Clips		F040-ND	
16	2	Fuse AGC-5A		F123-ND	
17	2	Header 16 Pin IDC	P4,P5	A31185-ND	
18	2	Header 20 Pin IDC	P2,P3	A31186-ND	
19	9	Capacitor .1uf 100v	C7,10-14,16,18,19	BC1123CT-ND	
20	1	Relay 24vdc DIP;DPDT	K1	PB445	
21	2	Socket 16 pin IDC	P4,P5	CKC16T-ND	
22	2	Plug 20 pin IDC	P2,P3	CKC20T-ND	
23	3	Plug 3 pin	P1,P6,P7	ED1961-ND	
24	2	Diode 1N4004	D8,9	1N4004DICT-ND	
25	1	Terminal block (T2) 8 pole		73K0488	
27	5	Led connector		277-1273	
28	1	Capacitor 22uf 50v	C17	P5179	
29	2	Sholder washer (optional)	D2,3	3049	
30	2	Diode 600v/20a (optional)	D2,3	20ETS08 (optional)	
31	2	Diode 200v/6a	D2,3	6A2DICT	
32	1	IC CD4060B	U4	296-2060-5	
33	1	Regulator +12v 100ma	U3	NJM78L12A	

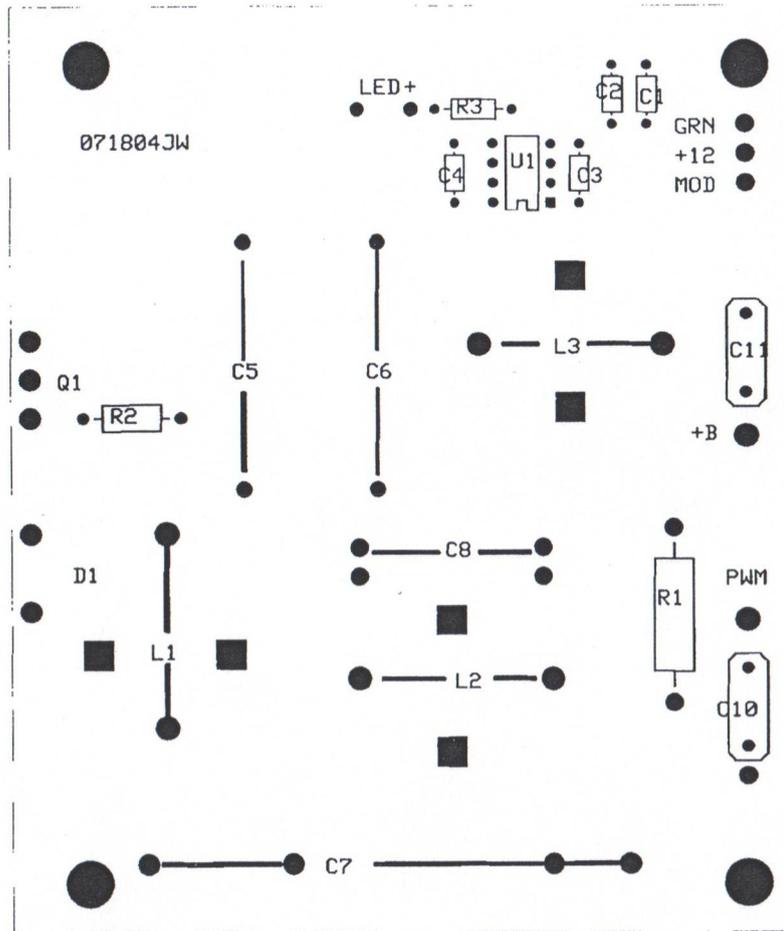
35	1	Resistor 10k 1/4w		R3		10KQBK		
36	1	Resistor 22k 1/4w		R2		22kQBK		
37	1	Relay 12vdc		K2		Z768		
38	1	SCR		D10		T106B1		
39	1	DIP Socket		U4		AE8916		
40	1	Resistor 2.2k 1/4w		R4		2.2kQBK		
41	1	Resistor 4.7k 1.4w		R1		4.7kQBK		
42	2	Transistor 2n5089		Q1,2		2n5089		
43	1	Zener Diode 27v		D7		1N4750		
44	1	Jumper		J		0.0EBK		
45	2	Capacitor 47uf/50v		C5,15		P5181		

## ***G.1 MODULATOR***

There are 2 separate class D modulators in the X1000B transmitter. Each modulator is driven in quadrature by two PDM waveforms generated on the RF/PDM generator board. One modulator card is located on each RF Amp/Modulator plug in module. Removal of one plug in module for service will allow the unit to function but at a reduced power level.



<b>Modulator</b>		
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## Modulator Parts List V2 AM Transmitter

052403JW

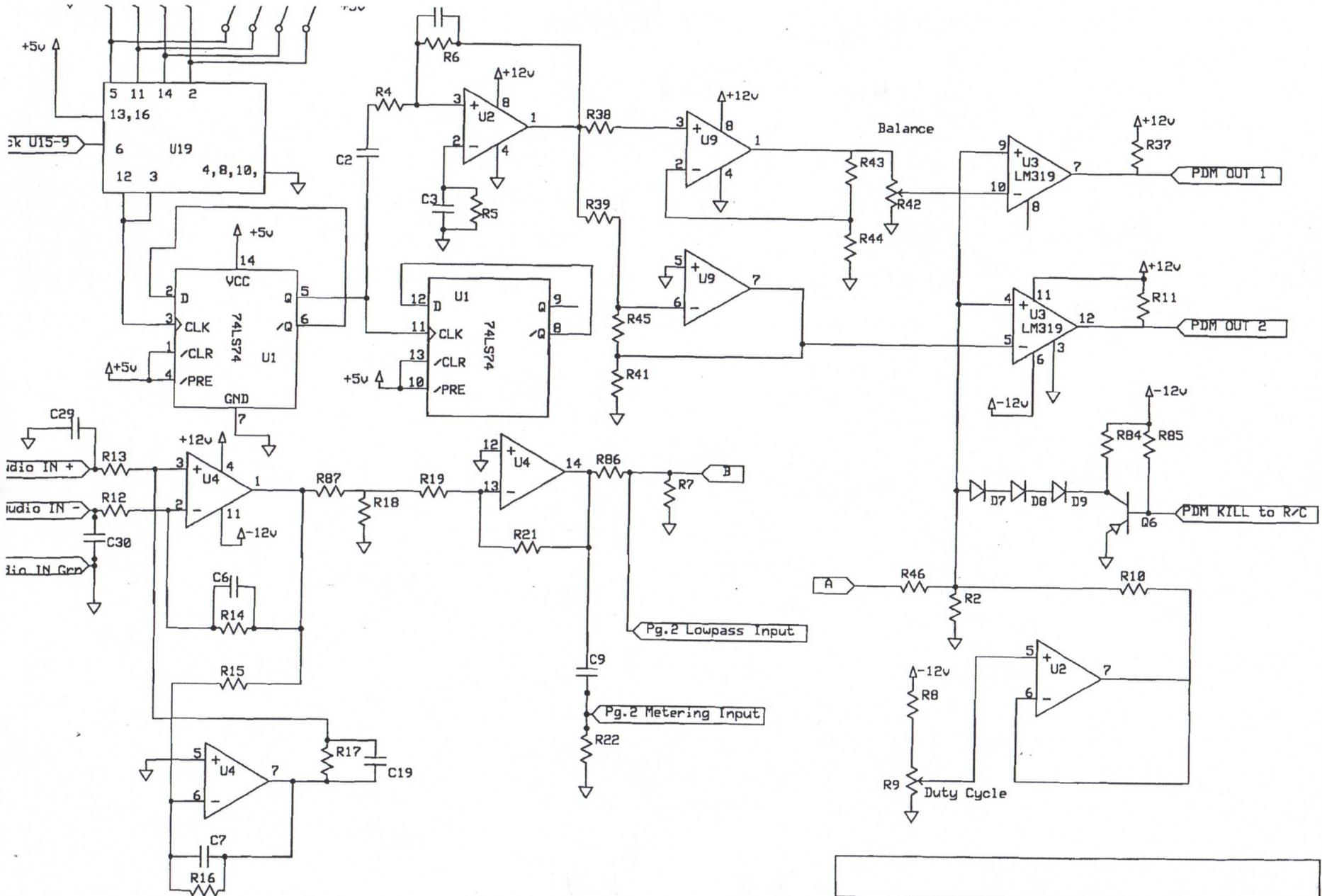
Item	Quantity	Description		Part#	Optional #
1	3	Capacitor .1uf 50v	C2-4	P4593	
2	1	Capacitor 22uf 35v	C1	P2101	P2040
3	2	Capacitor .01uf 1Kv	C8	P4140	
4	2	Capacitor 4uf 250v	C5,6	PF2395-ND	
5	1	Capacitor .047uf 400v	C11	P3484	EF6473 P3517
6	1	Diode Clamp IXYS 30ns	D1	DSEI30-06A	
7	1	Mosfet 250V 32A	Q1	IRFP264	
8	1	IC TC4422 Fet driver	U1	158-1108-ND	
9	1	Resistor 5.6 ohm 1/4w	R2	5.6QBK-ND	
10	1	Inductor T157-3 30T#16AWG	L1	40uh	
11	1	Inductor T157-3 40T, #16awg	L2	75uh	
14	2	Heatsink TO-247		BER178	
19	6	1/4" Spacer		1457AK-ND	
20	4	6X32X3/8" Screw		H356	
22	6	6X32 Locknut		H240-ND	
23	6	6X32 screw 1/2"			
24	1	Dip Socket 8 pin		AE8908-ND	
27	1	Connector 3 pin	P1	ED-1515	
28	2	4X40X1/4" screw		H342	
29	2	4X40 insulator (for TO220)			
30	1	Capacitor 1.5uf 250v	C7	PF2155	
32	2	Inductor 13t/#14awg type w	L3	1mh	
33	1	Capacitor .022uf 400v	C10	P3480	P3513
34	1	Resistor 43k 3w	R1	BC43KW-3CT	

## ***H.1 PDM GENERATOR/RF SYNTHESIZER***

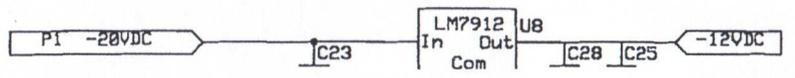
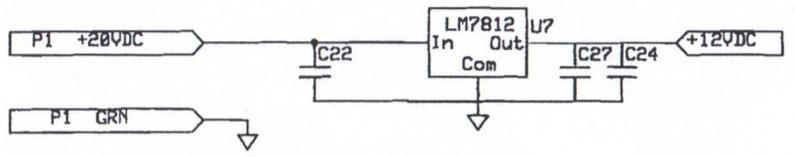
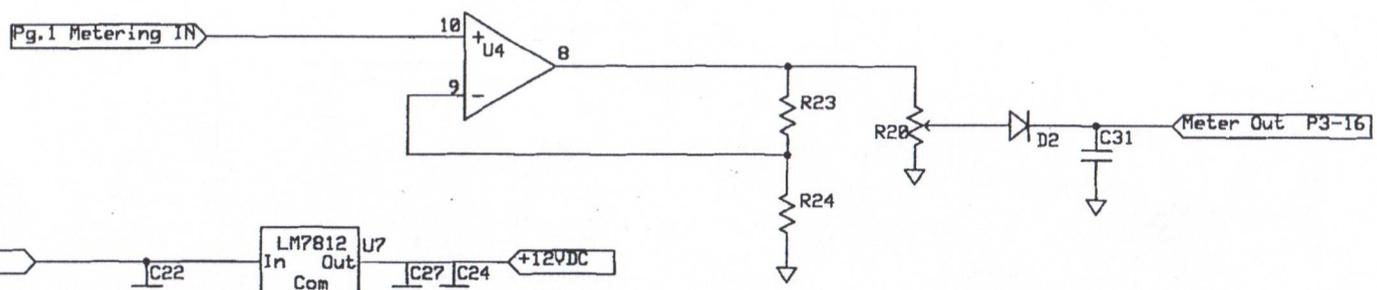
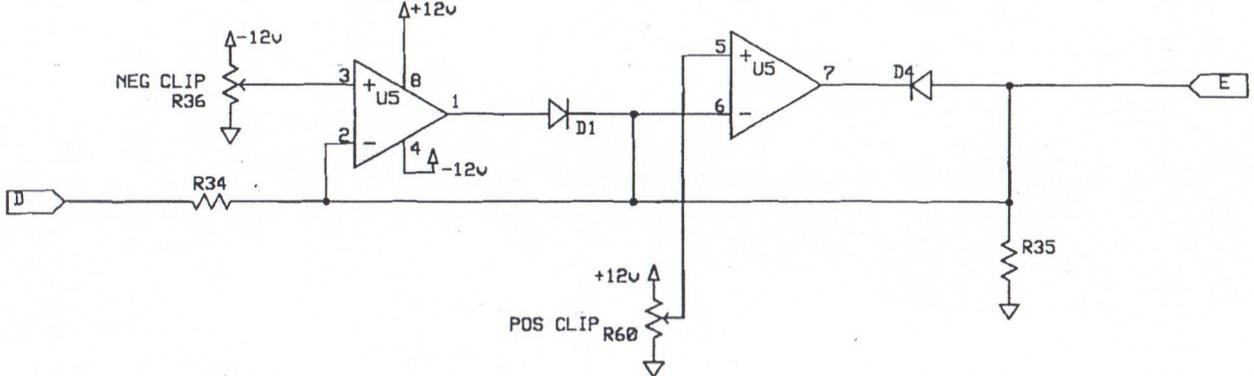
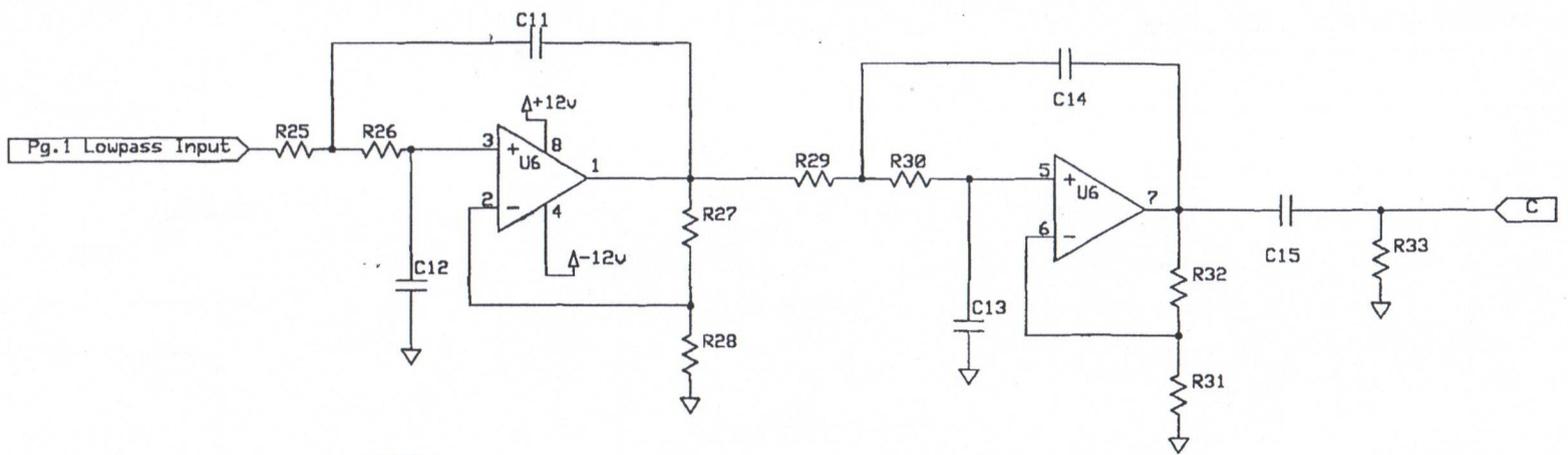
This board is located in the upper front of the transmitter cabinet. The board takes an audio input of approximately +3.0 dbm (balanced) from the back panel XLR audio input connector and converts it to a pulse duration or pulse width as a function of amplitude. Also contained on the board is a low pass filter (10khz), negative peak clipper and duty cycle adjustment circuits. Duty cycle is typically set to 40% which will allow plenty of positive peak headroom. Jumpers are used on the board to permit bypassing of certain elements when external processors are used. It should be noted that external NRSC filtering is needed to comply with current FCC requirements.

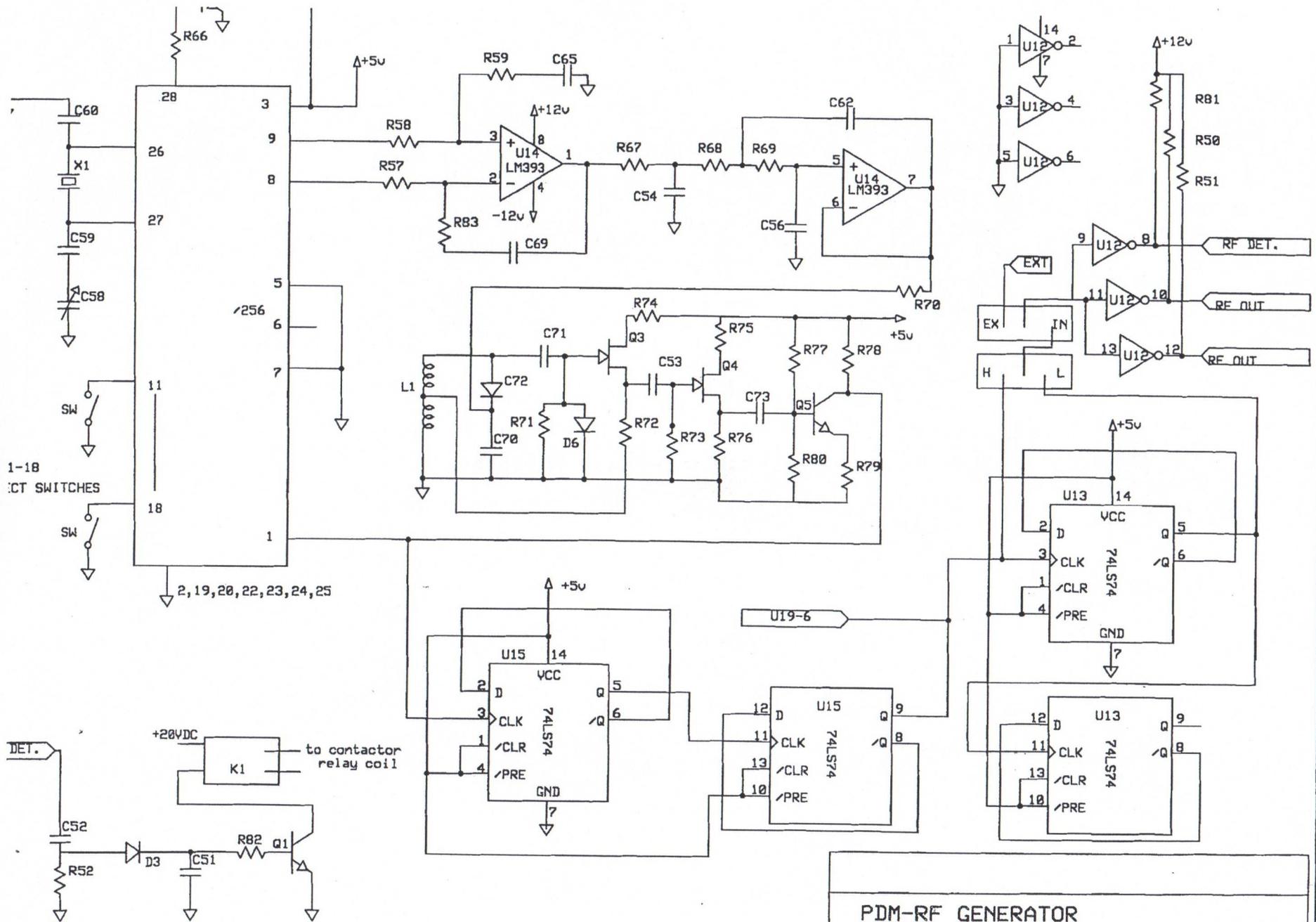
The Rf Synthesizer section of this board generates the RF signal necessary for the RF amps. Programming the frequency involves changing the jumpers on SW1. The transmitter is not frequency adjustable in the field so no attempt should be made to modify the settings. There are provisions to hook up an external oscillator or exciter for digital broadcasting. The external drive level can be from +5v TTL logic to +12v maximum. If this RF drive is lost either from the synthesizer or the external RF driver the unit will not turn on. The interlock light on the front panel labeled "intlk" will light until proper drive is connected.

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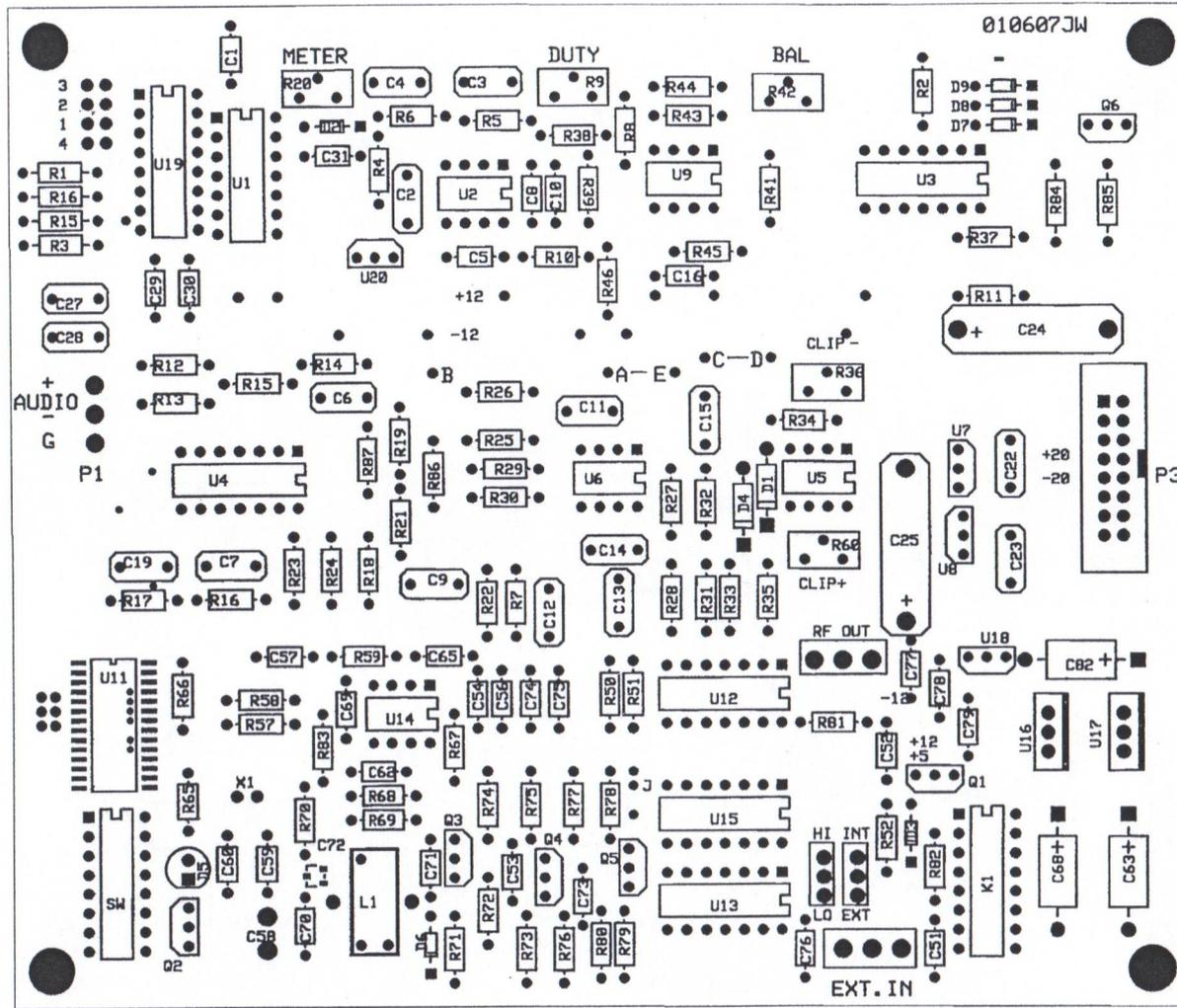


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<b>PDM-RF GENERATOR</b>		
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PDM-RF Synthesizer 112305JW					
Item#	Quant	Description	Item	Part#	
1	1	Crystal 100ppm	X1 10.240Mhz (US) / 9.216Mhz(Europe)	300-5017(US); 300-5013 (Euro)	
2	1	Capacitor 68pf mica	C60	338-1091	
3	1	jumper	C59		
4	1	Capacitor 6-50pf varible	C58	490-1974	
5	1	PLL MC145151	U11	MC145151DW2	
6	2	Capacitor 680p	C11,12	P3681	
7	2	Transistor 2N5089	Q1,2	2N5089	
8	1	Resistor 100 1/4w	R65	100QBK	
9	1	Regulator LM7812	U16	58K1829	
10	1	Regulator LM7805	U17	NJM78M05FA-ND	
11	18	Capacitor .1uf 50v	C1,5,8,10,16,22,23,27,28,57,51,73,74,75,76,77,78,79	BC1123CT-ND	
13	1	Capacitor 470pf	C56	P4933	
14	1	Capacitor 50 pf	C53	P4845	
15	9	Resistor 2.2k 1/4w	R11,24,34,37,50,51,52,81,82	2.2KQBK	
16	2	Capacitor 22uf,35v NP	C15,31	P1188	
18	1	Relay 24vdc spdt	K1	Z769	
19	1	IC 74LS06	U12	296-15069-5	
20	5	DIP Socket 14 pin	U3,4,12,13,15	AE8914	
21	1	LED - Red	D5	160-1131	
22	3	IC 74LS74	U1,13,15	296-1668-5	
24	1	Dip Plug 16 pin(Freq. Selector)	SW1	CT2088	A26238
25	3	Resistor 5.6k 1/4w	R22,59,83	5.6KQBK-ND	
26	19	Resistor 10K 1/4w	R1,3,14-17,25-27,33,39,41,43-45,71,66,84,85	10KQBK-ND	
28	2	Resistor 2M 1/4w	R5,6	2.4MQBK-ND	
29	4	Resistor 6.8K 1/4w	R8,67,68,69	6.8KQBK-ND	
30	2	Pot 1K Bourns	R9,42	3386H-102-ND	
32	1	Resistor open	R18		
33	6	Resistor 4.7K 1/4w	R2,10,12,13,46,77	4.7KQBK-ND	
34	4	Resistor 100K 1/4w	R35,57,58,73	100KQBK-ND	
35	5	Resistor 12k 1/4w	R23,29,30,31,32	12KQBK-ND	

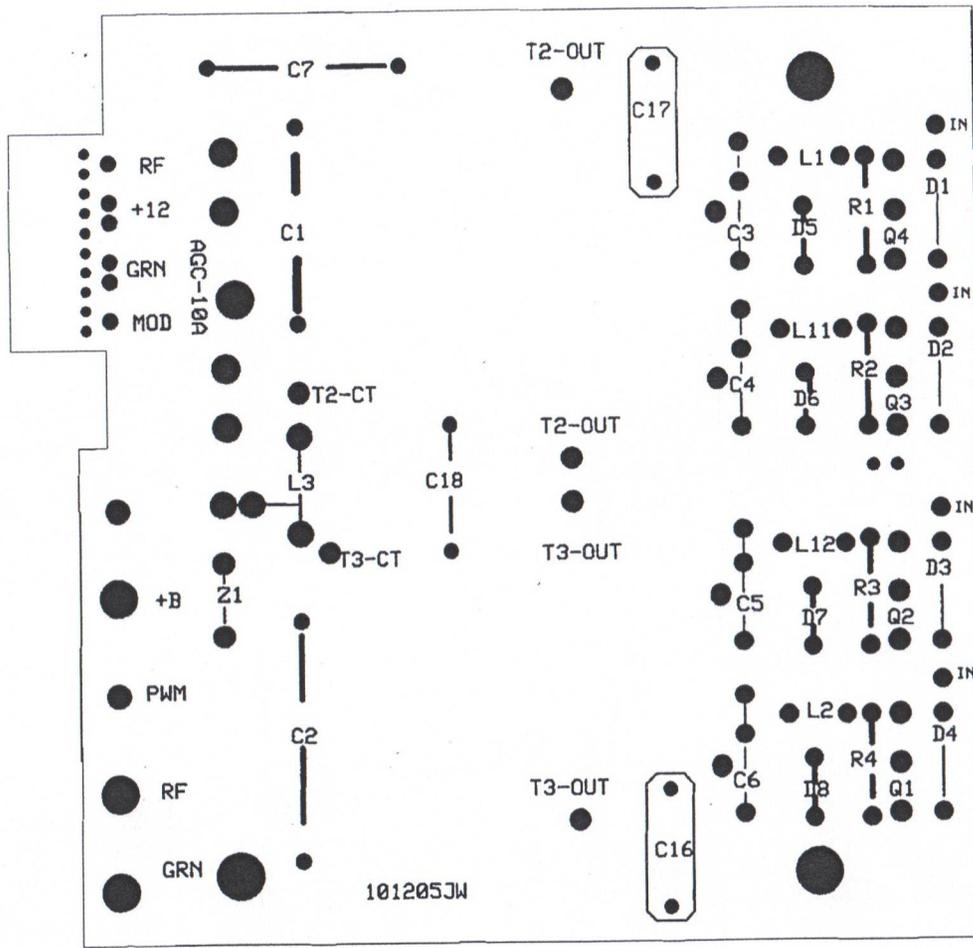
37	2	Resistor 22K 1/4w	R7,28	22KQBK-ND
39	4	Resistor 15K 1/4w	R4,19,21,38	15KQBK-ND
40	4	Pot 10K Bourns	R40,20,36,60	3386H-103-ND
42	2	Capacitor 2200p	C2,3	P4555-ND
43	1	Capacitor 200p s.mica	C4	338-1063-nd
44	2	Capacitor 220p	C6,19	P4929-ND
45	1	Capacitor 22p	C7	P4841-ND]
46	1	Capacitor 1uf 50v	C9	P4675-ND
47	4	Capacitor .001uf 50v	C29,30,52,71	P4551-ND
48	2	Capacitor 560p	C13,14	P3561
49	8	Diode 1N4148	D1,2,3,4,6,7,8,9	1N4148MSCT-ND
52	1	IC LM319CN	U3	LM319N-ND
53	1	IC TL074CN	U4	296-1777-5-ND
54	5	IC LF353N	U2,5,6,9,14	LF353N-ND
55	1	V Reg 78L12	U7	NJM78L12A-ND
56	2	V Reg 79L12	U8,18	AN79L12
57	3	Capacitor 100uf 63v	C63,68,82	4048PHCT
58	3	Connector 3 pin plug	P1,4,5	ED-1961-ND
59	3	Connector 3 pin recept.	P1,4,5	ED-1948-nd
60	5	DIP Socket 8Pin	U2,5,6,9,14	AE8908-ND
61	2	DIP Socket 16 Pin	U1,SW	AE8916-ND
63	4	1/4" Spacer		3464k-ND
68	1	Header 16 pin IDC	P3	A31185
69	1	Plug 16 pin IDC	P3	CKC16T-ND
70	1	Heatsink TO-220	U16	HS106-ND
71	2	FET J310	Q3,4	J310
73	2	Resistor 470 1/4w	R72,76	470QBK-ND
74	3	Resistor 180 1/4w	R74,75,78	180QBK-ND
75	2	Resistor 1.0k 1/4w	R70,80	1.0KQBK-ND
76	1	Resistor 10 1/4w	R79	10QBK-ND
77	4	Capacitor .01uf	C62,65,69,70	P4948
78	1	Capacitor .0047uf	C54	P4944 or P4559
79	1	Inductor T80-2	L1	40T/ CT@10T #24AWG
80	1	Transistor 2N5087	Q6	2N5087
81	1	Resistor 33k 1/4w	R86	33KQBK
82	1	Resistor Jumper	R87	
83	1	Varactor 20-150pf	C72	ZC836ACT-nd

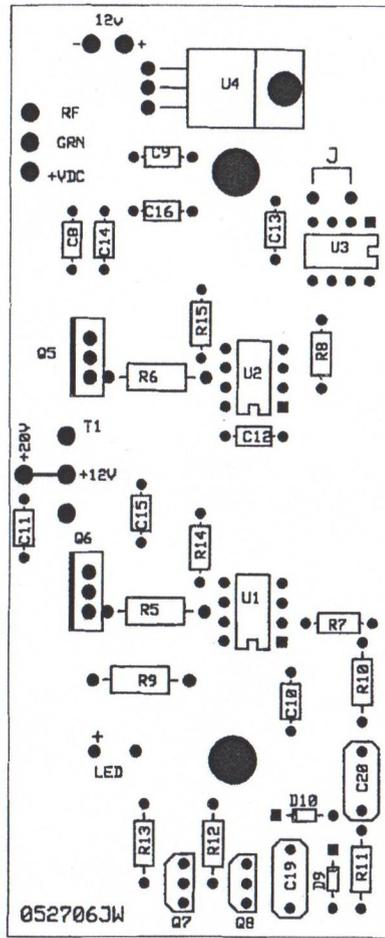
84	1	Transistor 2N2222	Q5	2N2222	
87	1	MC14526B	U19	07F3956	
88	1	Regulator +5v 100ma	U20	NJM78L05	
89	1	Header 8 pin .1"	PDM freq select	A26566	
90	6	.1" shunt 2 pin (10 pcs)	PDM freq select ,High/Low freq, internal/ext. RF	A26227	
91	2	Header 3 pin .1"	High low freq select, Internal/ext RF select	A26544	
92	2	Capacitor 500uf 25v	C24,25	4037PHCT	

## ***J.1 RF AMPLIFIER***

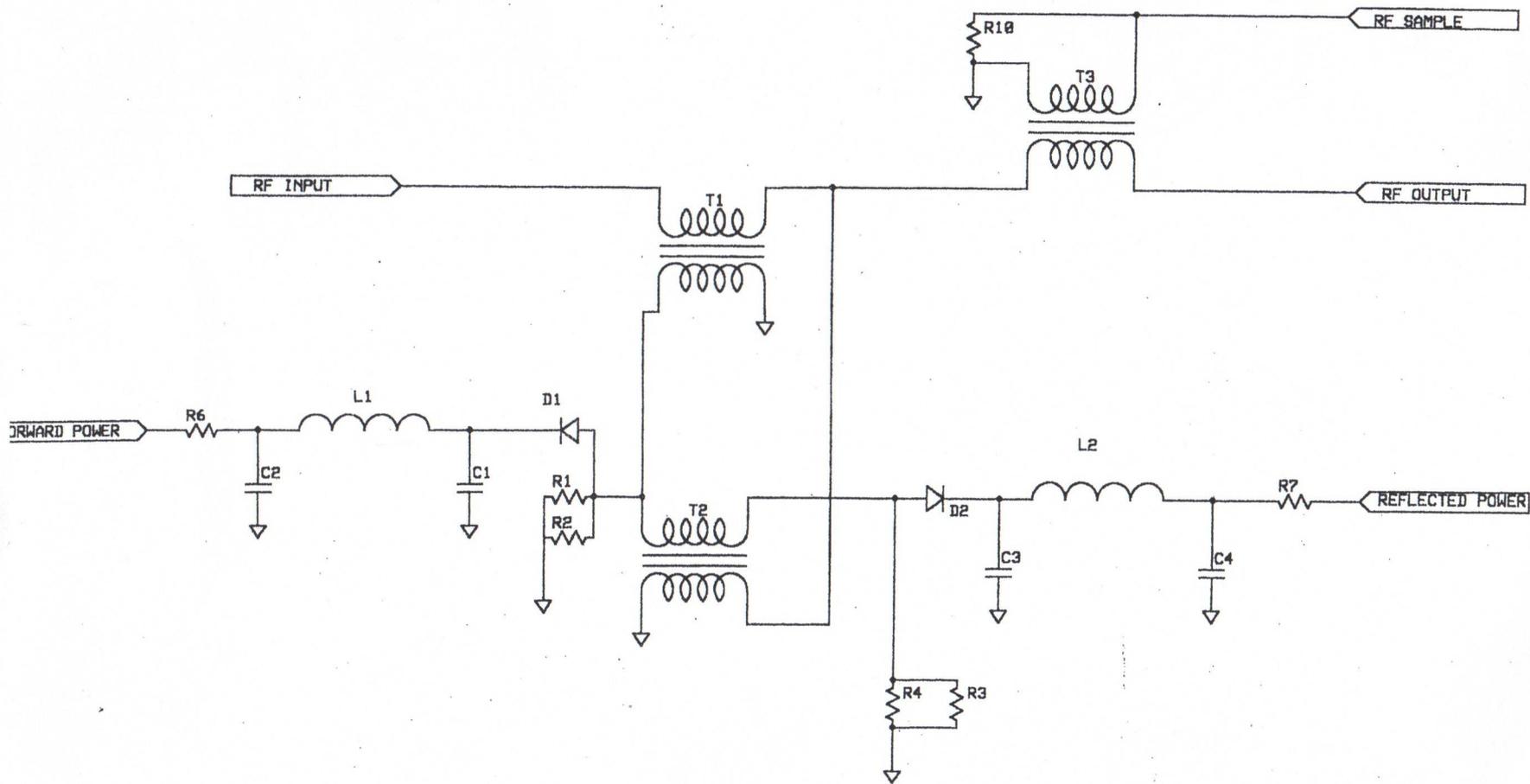
The transmitter contains 2 RF amplifiers (1000-watt transmitters only) and are located on the lower left and right positions of the front panel. These modules also contain a modulator for each RF amp. Each 600-watt RF amplifier can be removed (unplugged) while the transmitter is operating. Interlocks and a soft start circuit provide a safe means of replacing a module while power is still applied. It would be prudent, however to lower the output power of the transmitter before removing modules. In addition, when one module is removed the output power of the remaining module is divided between the output load and the load resistors on the RF combiner circuit. Each module output is connected to its own lowpass/matching board. RF inputs are generated from the RF synthesizer board.



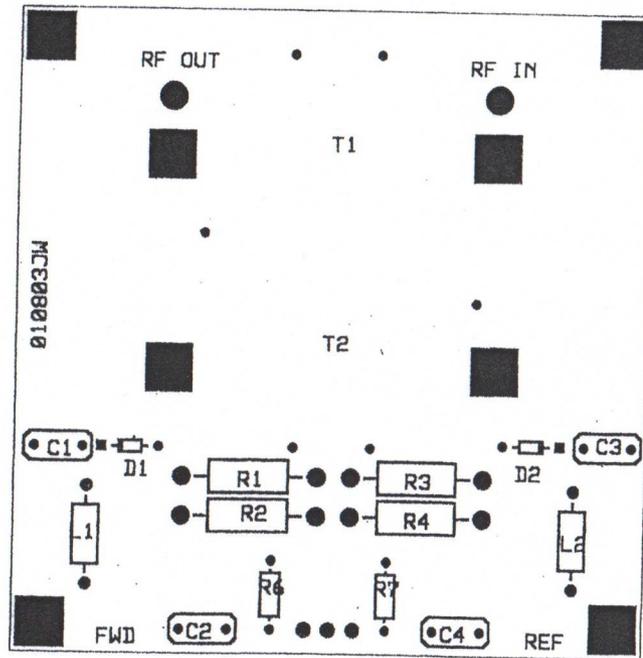




RF Amplifier Parts List V2 AM transmitter						
3/24/03						
Item	Quant	Description		Part#		Optional #
1	3	Capacitor 2.2uf 250v	C1,2,7	PF2225-ND		
2	4	Capacitor Freq.select Mica 1KV	C3-6			CDE Mica
3	7	Capacitor .1uf 50v	C8-13,15	BC1123CT		
4	1	Capacitor 22uf 100v	C14	P2101		
5	4	Transorb 20v bidirectional	D1-4	P6KE20CADICT		
6	4	Transorb 250v bidirectional	D5-8	1.5KE250CA		18C8863
	4	Transorb 300v Bidirectional	D5-8	1.5KE300CA		18C8869
7	1	Connector 20 pin edge conn		MCF20K-nd		
8	3	Connector Banana plug		39N890		
9	2	Connector Banana recepticle#1508-102		35F870		
10	3	Bracket "L" spc#8459-0668				16N950
11	6	1/4" spacer		3464k-ND		
12	6	6X32X3/4" Screw		H368-ND		
13	6	6X32 3/16 screw				
14	11	6X32 Lockwasher		H240-ND		
15	3	Dip Socket 8 pin		A24807		AE8908
16	5	6X32X1/4" Screw		H354-ND		
17	1	Inductor FT-140-43 10t#16AWG(bifilar wound)	L3			FT-140-43
18	2	Inductor T184-15 27t#18AWG Bifilar T2,T3				T157-15
19	1	Inductor BN-61-002 6:1 #20AWG T1				BN61002
20	4	Mosfet 600v 20a	Q1-4	See test data sheet		
21	2	Mosfet 100v 8a	Q5-6	IRF-510		IRF630 (Broadband)
22	2	IC Mosfet driver	U1,U2	IXDD414PI		EL-7104CN
23	1	IC Mosfet Driver	U3	IXDF404PI		EL-7182CN
24	1	LED Green 5mm		67-1189		
25	1	Fuse AGC-10A	F1	F2519		
26	4	Insulator TO-247		BER178		BER120
27	2	Insulator TO-220		4724K-ND		
28	2	4X40X1/4" Screw		H342-ND		



RF Reflectometer		
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RF Sample Board Rev. 100603JW

Item	Quant.	Description		Part #	Alt.Part#
2	2	Inductor 1mh	L1,L2	M7849-ND	
3	2	Diode 1N4148	D1,D2	1N4148MSCT-ND	1N4148DICT-ND
4	4	Resistor 100 3W	R1,2,3,4	P100W3BK-ND	
5	1	Resistor 4.7K 1/4w	R6	4.7KQBK-ND	
6	2	Capacitor .1 50v	C3,4	BC1160CT-ND	P4593
7	4	6X32 spacer 1" long		2212K-ND	
8	4	6X32X1/2" Screw			
9	4	6X32 Lockwasher		H240-ND	
10	1	Connector 3 pin		ED1515-ND	
11	1	Resistor 100 1/4w	R7	100QBK-ND	
13	3	GDT			
14	2	Torroid inductor FT-82-61 1Pri: 45 Sec.#24awg	T1		
15	2	Torroid inductor FT-82-61 1Pri: 45 Sec.#24awg	T2		
16	1	Torroid inductor FT-82-61 1Pri: 45 Sec.#24awg	T3		
17	1	Capacitor 470pf 100v	C1	P4857	
18	1	Capacitor 1.0uf 50v	C2	P4675	
19	1	Resistor 250 ohm 3w	RF sample load	250W-3	