

HANDBOOK

*FM SERIES*

BROADCAST FM EXCITERS

**IPTEK**

## ***Limited Warranty***

PTEK (SELLER) warrants that products are free from defects in material and workmanship and meet performance specifications provided, however, that:

- (A) SELLER' liability under this Warranty is limited to repairing or replacing, at its option, any product delivered here under not conforming to this Warranty;
- (B) This Warranty is limited to a period of two years;
- (C) Minor deviations from specifications which do not affect performance are excluded from this Warranty; and
- (D) SELLER shall be liable under this Warranty only if:
  - (1) It is promptly notified in writing by the Buyer upon discovery of the failure of any product to conform to this Warranty,
  - (2) The product is returned to SELLER, transportation charges prepaid by the Buyer,
  - (3) The product is received by SELLER not later than ten days after the last day of the one-year period of this Warranty, and
  - (4) SELLER' examination of the Product discloses to SELLER'S reasonable satisfaction that such defects or failures as may exist have not been caused by misuse, neglect, improper installation, repair, alteration, accident or shipping.

The Buyer will prepay freight to and from SELLER on products serviced here under at SELLER' plant; but SELLER may, at its option, elect to perform any repairs here under at the Buyer's place of business.

The foregoing constitutes SELLER'S entire Warranty expressed, implied and/or statutory, except as to title, and states the full extent of SELLER'S liability to the Buyer or to any other party for any breach of such Warranty and for damages, whether direct, special, incidental or consequential; and, other than as expressly provided in this document. No Warranties, expressed or implied, including any Warranty or merchant ability or of fitness for a particular purpose, are made. No employee, representative or agent of SELLER has any authority, expressed or implied, to alter or to supplement the terms of this Warranty.

## ***Warranty Service***

The Limited Warranty covers parts and labor to the original purchaser for one year. Damage caused by misuse or shipping is excluded from the warranty. Before returning units or material, contact the factory for a Returned Material Authorization (RMA) number. Ship all material prepaid. Defective material should be addressed to:

**PTEK**

**Customer Service Manager  
1814 Schooldale Drive  
San Jose, CA. 95124  
(408) 448-3342**

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## Rev record

PROVISIONAL.....	11/25/96
REV A.....	1/16/97
REV B.....	10/7/97
REV C.....	4/13/99
REV D.....	5/24/99

# Safety

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## **BEFORE APPLYING POWER**

Verify that the line voltage is 115V

## **GROUND THE EXCITOR.**

To minimize shock hazard, the excitor chassis must be connected to an electrical ground. the excitor must be connected to the ac power mains through a three-conductor power cable, with the third wire firmly connected to an electrical ground (safety ground) at the power outlet. Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury. If the excitor is to be energized by any other source be certain the that chassis is connected to a separate safety ground.

## **Fuses**

Only fuses with the same required current, voltage rating, and specified type (normal blow, time delay, etc.) should be used. Do not use repaired fuses or short-circuited fuseholders. To do so could cause a shock or fire hazard.

## **DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE**

Do not operate the power amplifier in the presence of flammable gases or fumes.

## **DO NOT REMOVE THE EXCITOR COVER**

Operating personnel must not remove the exciter cover. Component replacement and internal adjustments must be made only by qualified service personnel.

## **Output connector**

The type N output connector carries dangerously high RF voltages which present a shock and burn hazard. *NEVER* operate this excitor with out the out put connector properly terminated in either an adequately rated load or antenna.

# Specifications

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## MONAURAL

**Audio Input Impedance:**

600 ohms, balanced

**Audio Input Level:**

+10 dBm (6.93 volts peak-to-peak) at 600 ohms for 75 kHz deviation

**Audio Frequency Response:**

+/-0.5 dB; flat or 75 microsecond pre-emphasis, 20 Hz to 15kHz (other time const. available)

**Total Harmonic Distortion:**

0.15% max.; 20 Hz to 15 kHz

**FM S/N Ratio (FM Noise):**

70 dB min. below 75 kHz deviation at 400 Hz, measured within a 20 Hz to 15 kHz bandwidth with 75 microsecond de-emphasis

**Asynchronous AM S/N Ratio (AM Noise):**

60 dB RMS. below carrier; reference: 100% AM modulation, at 400 Hz with 75 microsecond de-emphasis, no FM modulation

**Synchronous AM SIN Ratio (Incidental AM Noise):**

57 dB below carrier; reference: 100% AM modulation, full power at 400 Hz with 75uS de-emphasis, FM +/- 75 kHz, 400Hz

## ENVIRONMENT

**Altitude:**

0-10,000 ft

**Ambient Temperature**

-10 to +50 °C

## WIDEBAND

**Inputs:**

Composite Unbalanced 75 Ohms  
SCA 1 Unbalanced 75 Ohms

**Input Level:**

3.5 V RMS. (10 Volts peak-to-peak) for 75 kHz deviation

**Wideband Amplitude Response:**

+/-0.5 dB, 20 Hz to 100 kHz

## GENERAL

**Rated Power Output:**

10W, 25W, 50W, 150W, 300W

**Power Consumption:**

750 W (for 300W model)

**Frequency Range:**

87.7 to 108 MHz, in 200 kHz steps (other step size to order)

**Frequency Control:**

Phase locked loop frequency synthesis from high stability master oscillator

**Frequency Stability:**

+/- 1.2 kHz

**Output Impedance:**

50 ohms

**Output Connector:**

Type -"N" female

**VSWR:**

1.5:1 for full power, derate to 0 at inf.

**Modulation Type:**

Direct carrier frequency modulation

**Modulation Capability:**

Internally limited to 100 kHz deviation

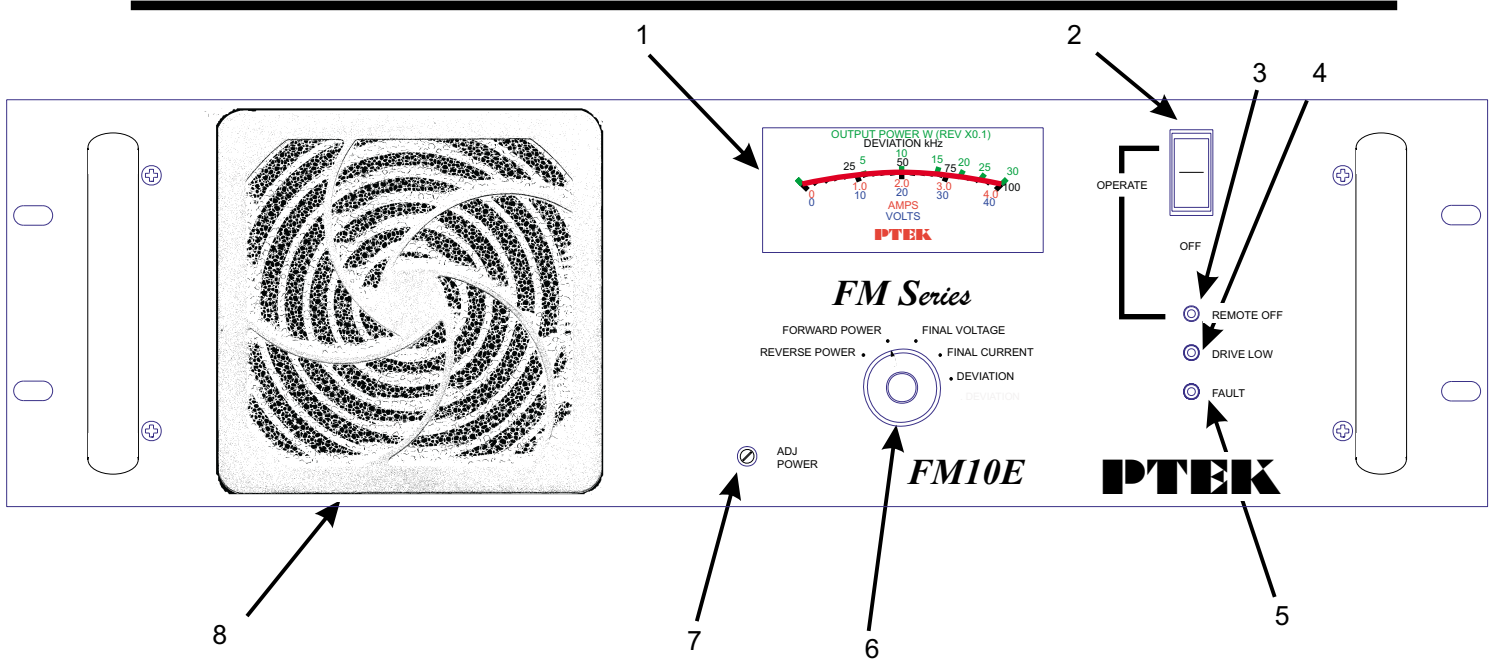
**Multi-Meter Indication:**

Deviation, Forward Power, Reverse Power, Final I & V

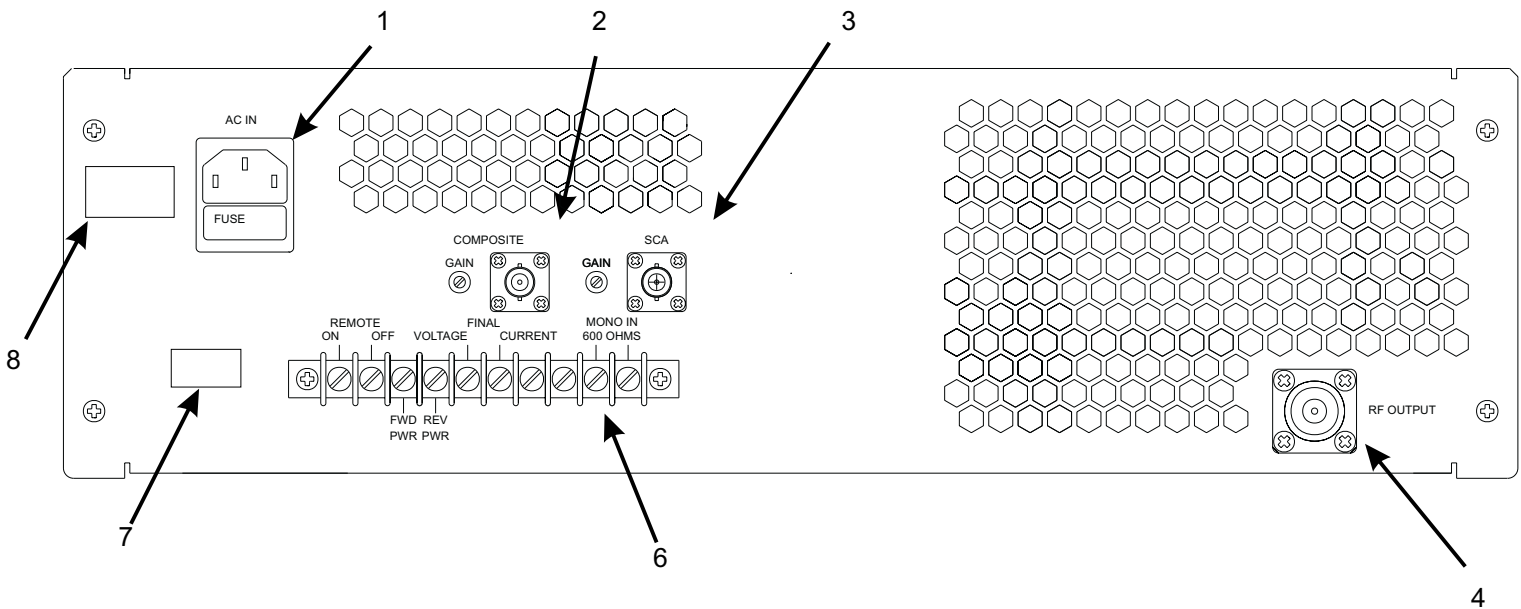
**Harmonic Attenuation:**

-70 dB, min.

# Front panel layout



# Rear panel layout



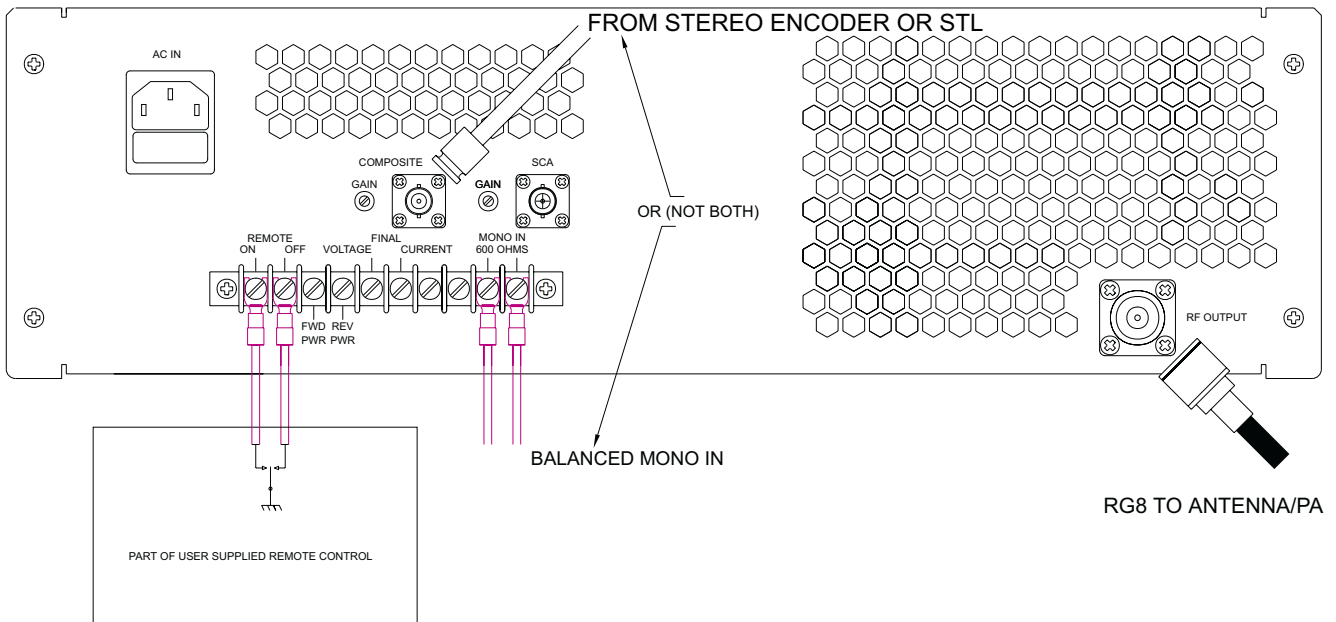
Key	Element	Description
1	<b>METER</b>	Indicates Forward Power, Reverse Power, Final Voltage, Final Current and Deviation
2	<b>OPERATE</b> Switch and Indicator	This switch sets the FM Broadcast Amplifier to the Operate Mode; 110 VAC is applied to the line transformers and this amber indicator is lit.
3	<b>REMOTE OFF</b> Indicator	This red LED indicator is lit when the FM Broadcast Amplifier remote off terminals (rear panel) are open circuit.
3	<b>DRIVE LOW</b> Indicator	This red LED indicator is lit when the FM Broadcast Amplifier can not make the power requested, because for example low drive power.
5	<b>FAULT</b> Indicator	This red LED indicator is lit when the FM Broadcast Amplifier is in a fault condition. This can be for one or combination of the following:- Over drive, High supply Voltage, High load VSWR, Over temperature.
6	Meter Select Switch	This switch selects one of the following to be presented on the meter (1):- Forward Power, Reverse Power, Final Voltage, Final Current and Deviation.
7	<b>ADJ POWER</b> control	This control adjust the output power from rated full power to less than 50%.
8	Ventilation Filter	This provides for filtering the environmental air as it is drawn into the cabinet by the internal fan (not used on FM10E).

Key	Element	Description
1	<b>AC IN &amp; FUSE</b>	110 VAC input and Fuse 10A
2	<b>COMPOSITE</b>	Unbalanced wide band composite input
3	<b>SCA</b>	Unbalanced wide band input
4	<b>RF OUT</b>	TYPE N RF Output
5	<b>GAIN ADJUSTMENT</b>	Composite & wide band level adjustment
6	<b>Accessory connector</b>	Connections for; Remote off and DC indications of Forward Power, Reverse Power, Final Voltage, Final Current and Deviation.
7	<b>FCC ID</b>	Type approval number
8	<b>SERIAL NUMBER</b>	Serial number for reference purposes

# Installation-Electrical

Refer to the Table below for the following description. The installer should assure the ac line voltage is turned OFF before performing this procedure. The electrical connections are installed at the Exciter rear panel.

Step	Procedure
1	Connect the load RF line to RF OUT connector.
3	Connect the ac line power to the ac line in connector.
4	Optional. Connect the remote site metering, to the rear terminal block.
5	Connect either the composite input to the output from a stereo encoder or the balanced mono input to a program source



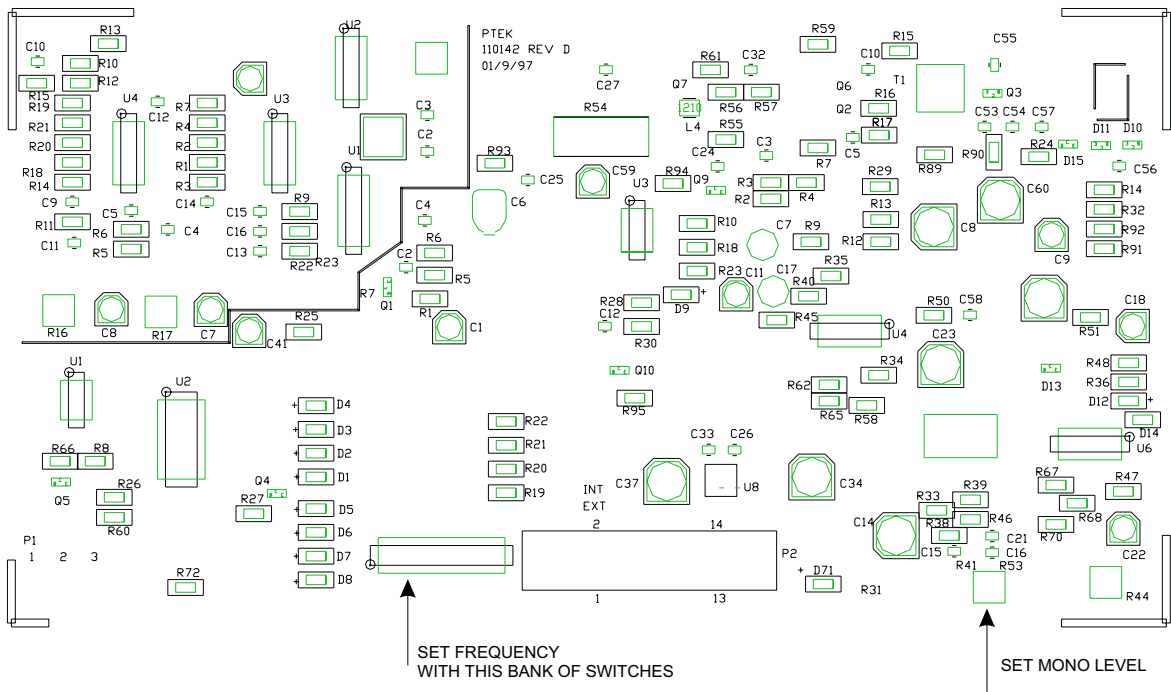


# Turn-On Checkout

Refer to the Table below for the following procedure.

Step	Action	Verification
1	Switch the RF out to a dummy load.	DRIVE LOW indicator is out. FAULT indicator is on initially then out after 30 seconds. REMOTE OFF indicator is out.
2	Turn on the ac line power to excitor.	
3	Select Meter to read FORWARD POWER.	The Meter reads 15~50V. Note the exact value. The The Meter reads 1~8A. Note the exact value. $P=VI$ and note the exact value.
4	Adjust the ADJ POWER CONTROL to the rated power.	
5	Select Meter to read FINAL VOLTAGE.	
6	Select Meter to read FINAL CURRENT.	Check that there is no appreciable reading of reverse power Step 6 value divided by the value in step 7 or about 50 percent.
7	Calculate the dc power input to the PA from the values of step 4 and 5.	
8	Select the Meter to read REVERSE POWER.	
9	Calculate the PA efficiency.	
10	Adjust the ADJ POWER Knob to set the output to the required output power.	

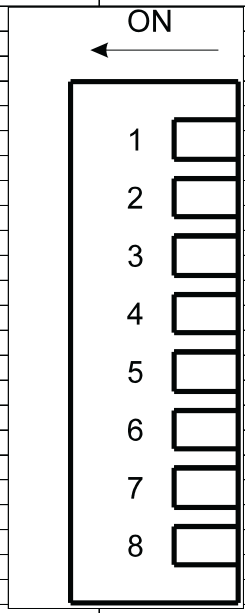
# Component Layout Synthesizer Module



# Frequency Selection

FREQUENCY		DIP SWITCH								FREQUENCY		DIP SWITCH							
MHz		SETTING								MHz		SETTING							
		1	2	3	4	5	6	7	8			1	2	3	4	5	6	7	8
87.7		0	0	0	0	0	0	0	0	97.9		0	0	1	1	0	0	1	1
87.9		0	0	0	0	0	0	0	1	98.1		0	0	1	1	0	1	0	0
88.1		0	0	0	0	0	0	1	0	98.3		0	0	1	1	0	1	0	1
88.3		0	0	0	0	0	0	1	1	98.5		0	0	1	1	0	1	1	0
88.5		0	0	0	0	1	0	0	0	98.7		0	0	1	1	0	1	1	1
88.7		0	0	0	0	0	1	0	1	98.9		0	0	1	1	1	0	0	0
88.9		0	0	0	0	0	1	1	0	99.1		0	0	1	1	1	0	0	1
89.1		0	0	0	0	0	1	1	1	99.3		0	0	1	1	1	0	1	0
89.3		0	0	0	0	1	0	0	0	99.5		0	0	1	1	1	0	1	1
89.5		0	0	0	0	1	0	0	1	99.7		0	0	1	1	1	1	0	0
89.7		0	0	0	0	1	0	1	0	99.9		0	0	1	1	1	1	0	1
89.9		0	0	0	0	1	0	1	1	100.1		0	0	1	1	1	1	1	0
90.1		0	0	0	0	1	1	0	0	100.3		0	0	1	1	1	1	1	1
90.3		0	0	0	0	1	1	0	1	100.5		0	1	0	0	0	0	0	0
90.5		0	0	0	0	1	1	1	0	100.7		0	1	0	0	0	0	0	1
90.7		0	0	0	0	1	1	1	1	100.9		0	1	0	0	0	0	1	0
90.9		0	0	0	1	0	0	0	0	101.1		0	1	0	0	0	0	1	1
91.1		0	0	0	1	0	0	0	1	101.3		0	1	0	0	0	1	0	0
91.3		0	0	0	1	0	0	1	0	101.5		0	1	0	0	0	1	0	1
91.5		0	0	0	1	0	0	1	1	101.7		0	1	0	0	0	1	1	0
91.7		0	0	0	1	0	1	0	0	101.9		0	1	0	0	0	1	1	1
91.9		0	0	0	1	0	1	0	1	102.1		0	1	0	0	1	0	0	0
92.1		0	0	0	1	0	1	1	0	102.3		0	1	0	0	1	0	0	1
92.3		0	0	0	1	0	1	1	1	102.5		0	1	0	0	1	0	1	0
92.5		0	0	0	1	1	0	0	0	102.7		0	1	0	0	1	0	1	1
92.7		0	0	0	1	1	0	0	1	102.9		0	1	0	0	1	1	0	0
92.9		0	0	0	1	1	0	1	0	103.1		0	1	0	0	1	1	0	1
93.1		0	0	0	1	1	0	1	1	103.3		0	1	0	0	1	1	1	0
93.3		0	0	0	1	1	1	0	0	103.5		0	1	0	0	1	1	1	1
93.5		0	0	0	1	1	1	0	1	103.7		0	1	0	1	0	0	0	0
93.7		0	0	0	1	1	1	1	0	103.9		0	1	0	1	0	0	0	1
93.9		0	0	0	1	1	1	1	1	104.1		0	1	0	1	0	0	1	0
94.1		0	0	1	0	0	0	0	0	104.3		0	1	0	1	0	0	1	1
94.3		0	0	1	0	0	0	0	1	104.5		0	1	0	1	0	1	0	0
94.5		0	0	1	0	0	0	1	0	104.7		0	1	0	1	0	1	0	1
94.7		0	0	1	0	0	0	1	1	104.9		0	1	0	1	0	1	1	0
94.9		0	0	1	0	0	1	0	0	105.1		0	1	0	1	0	1	1	1
95.1		0	0	1	0	0	1	0	1	105.3		0	1	0	1	1	0	0	0
95.3		0	0	1	0	0	1	1	0	105.5		0	1	0	1	1	0	0	1
95.5		0	0	1	0	0	1	1	1	105.7		0	1	0	1	1	0	1	0
95.7		0	0	1	0	1	0	0	0	105.9		0	1	0	1	1	0	1	1
95.9		0	0	1	0	1	0	0	1	106.1		0	1	0	1	1	1	0	0
96.1		0	0	1	0	1	0	1	0	106.3		0	1	0	1	1	1	0	1
96.3		0	0	1	0	1	0	1	1	106.5		0	1	0	1	1	1	1	0
96.5		0	0	1	0	1	1	0	0	106.7		0	1	0	1	1	1	1	1
96.7		0	0	1	0	1	1	0	1	106.9		0	1	1	0	0	0	0	0
96.9		0	0	1	0	1	1	1	0	107.1		0	1	1	0	0	0	0	1
97.1		0	0	1	0	1	1	1	1	107.3		0	1	1	0	0	0	1	0
97.3		0	0	1	1	0	0	0	0	107.5		0	1	1	0	0	0	1	1
97.5		0	0	1	1	0	0	0	1	107.7		0	1	1	0	0	1	0	0
97.7		0	0	1	1	0	0	1	0	107.9		0	1	1	0	0	1	0	1

ON="0"



## FCC Compliance statement

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THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES OPERATION IS SUBJECT TO THE TWO CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIREED OPERATION.

## Accessory connector

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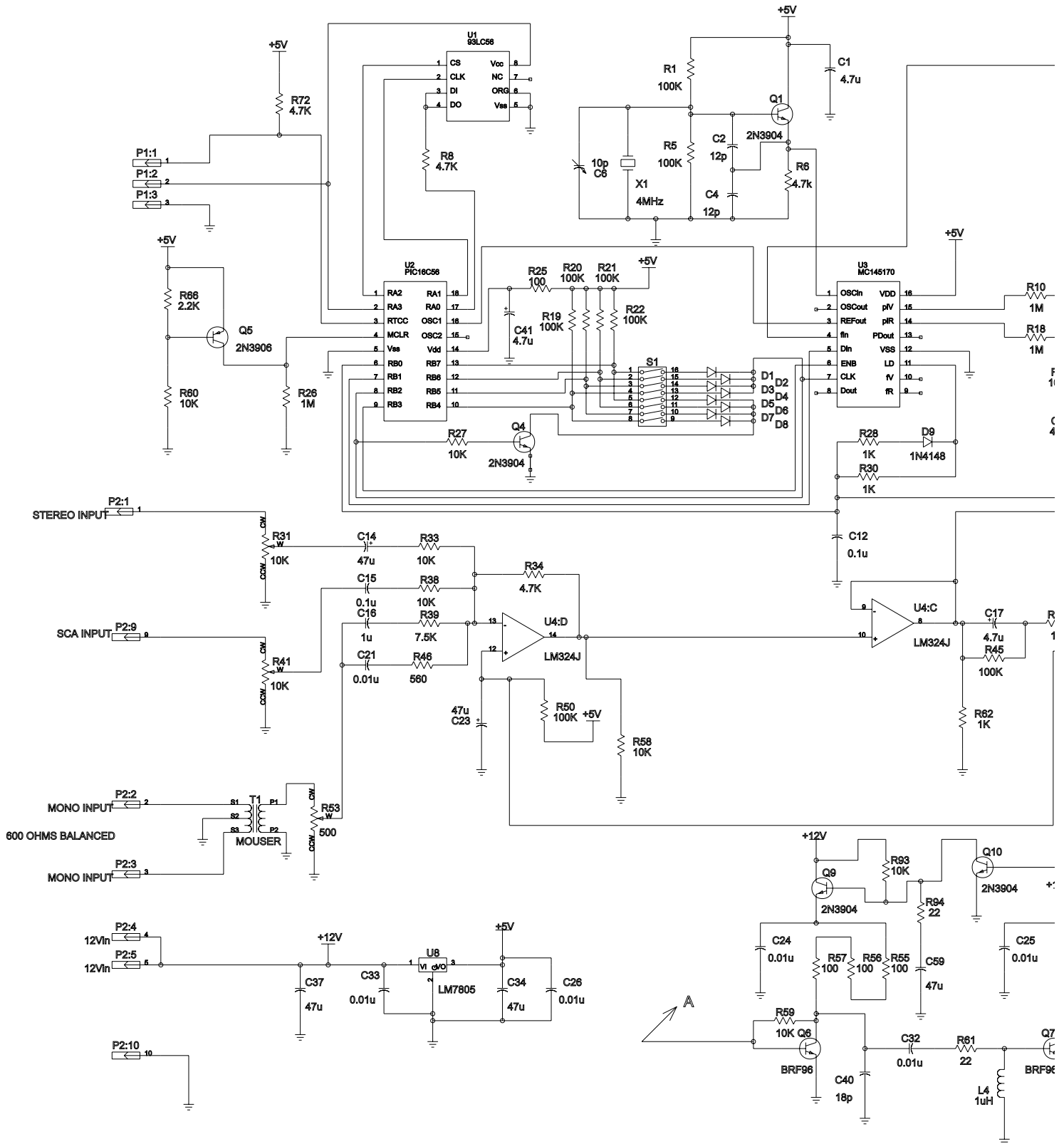
Pos	Function
1	Remote on; Momentary ground to turn the unit on.
2	Remote off; Momentary ground to turn the unit off.
3	Forward Power DC indication 2.4V=12W
4	Reverse Power DC indication 2.4V=1.2W
5	Final Current 1A=0.1V
6	Final Voltage DC indication V=Vsupply/10
7	Raise Ground to Raise Output Power (Option 01) <b>OR</b> Left channel in (stereo Option)
8	Lower Ground to Lower Output Power (Option 01) <b>OR</b> Right channel in (stereo Option)
9	600 ohms balanced mono input
10	600 ohms balanced mono input

## Efficiency V Output Power

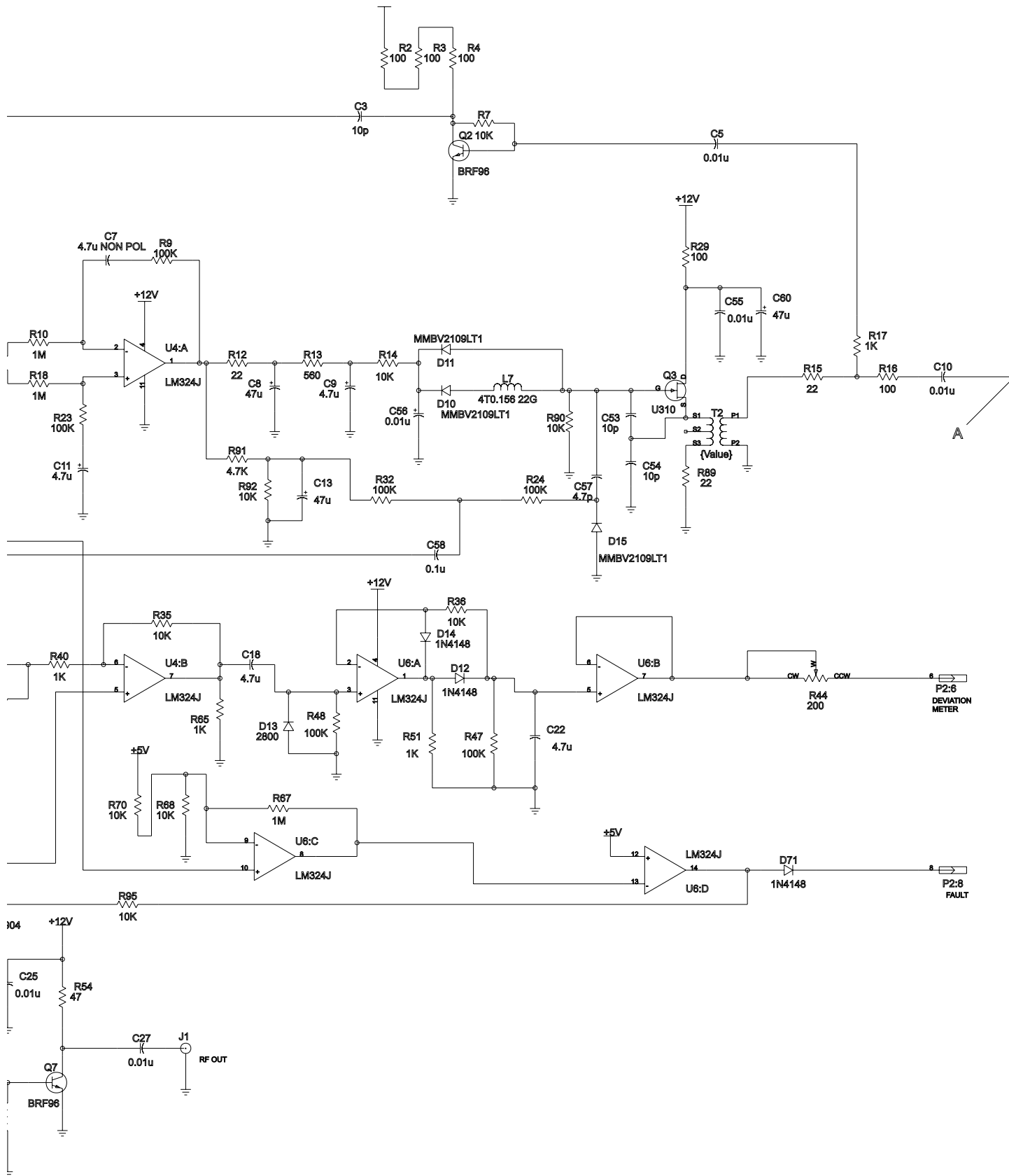
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FM10E		FM25E	
Power Output (Watts)	Efficiency (%)	Power Output (Watts)	Efficiency (%)
10.0	41%	25.0	52%
9.0	39%	22.5	49%
8.0	38%	20.0	47%
7.0	36%	17.5	46%
6.0	35%	15.0	44%
5.0	33%	12.5	42%
		10.0	33%

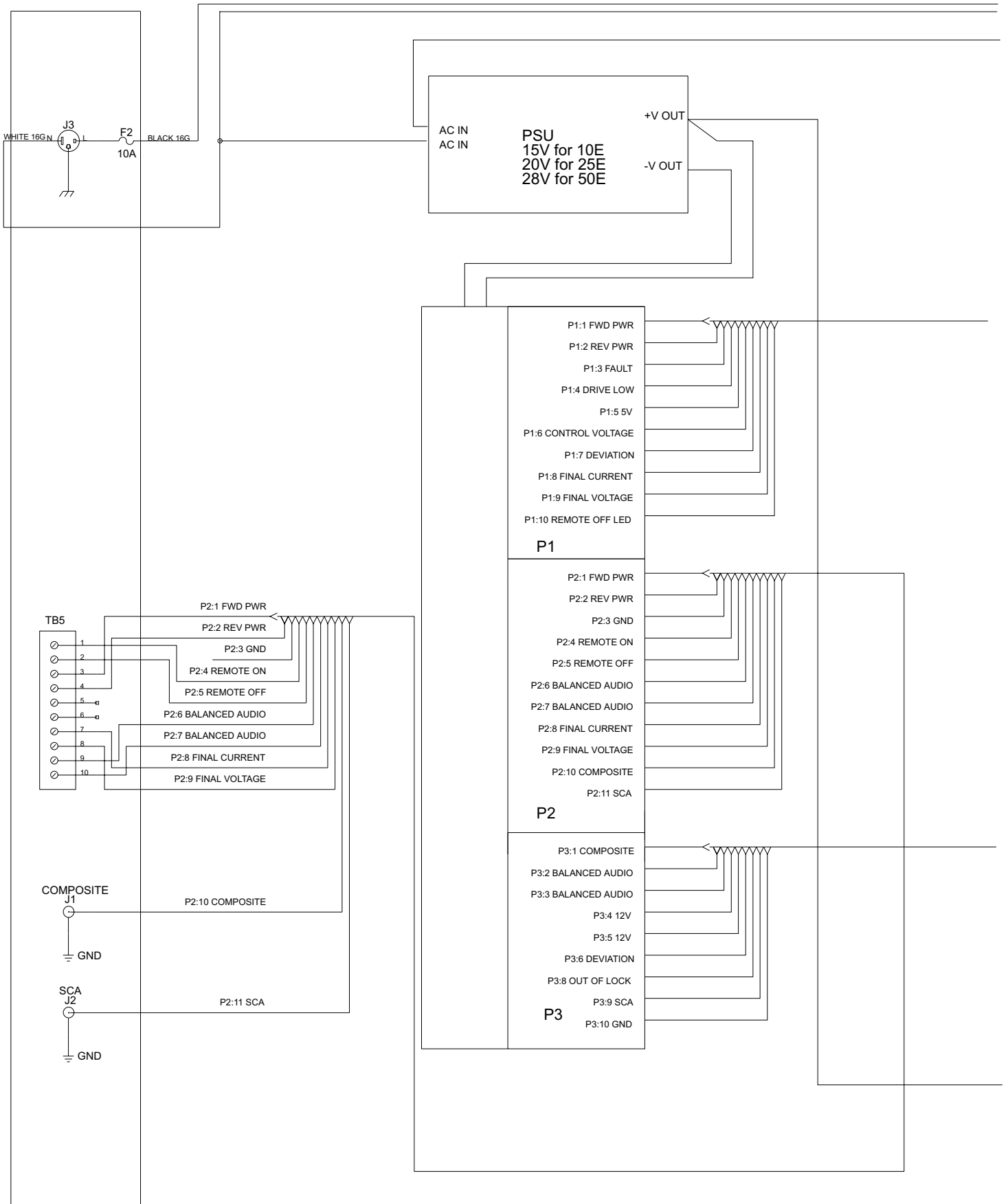
# SYNTHESIZER SCHEMATIC



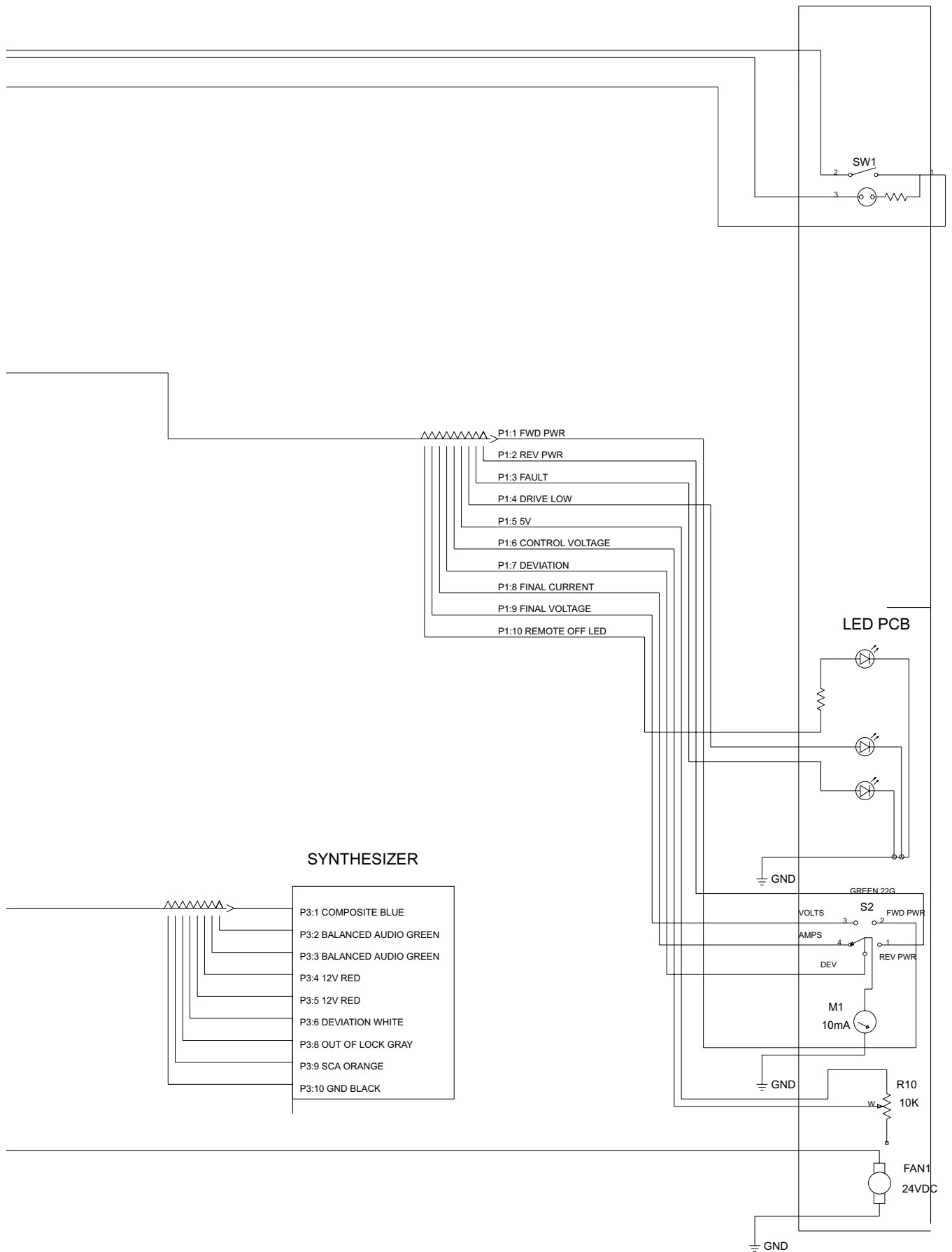
# SYNTHESIZER SCHEMATIC



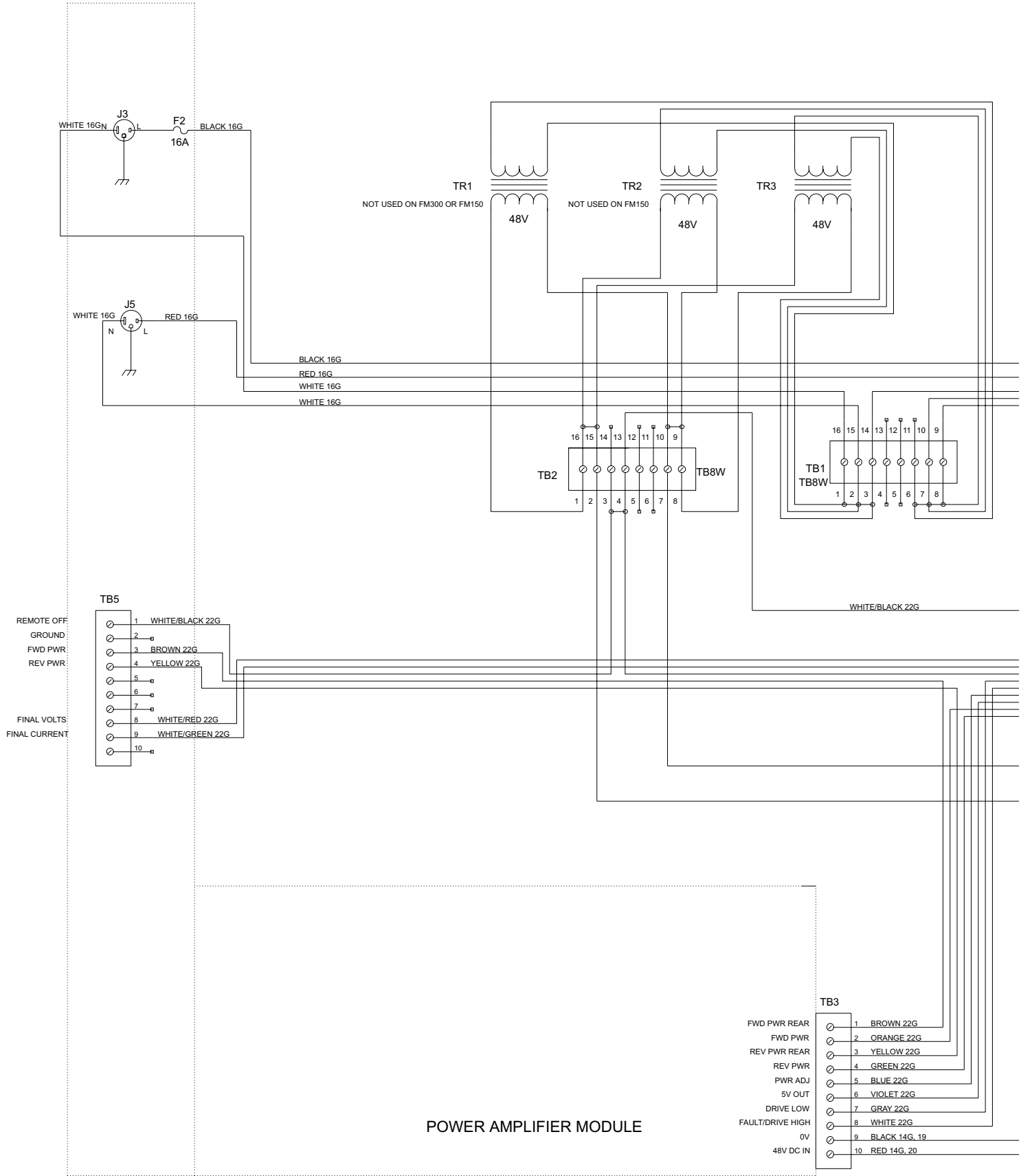
# WIRING DIAGRAM



# WIRING DIAGRAM



# Schematic chassis FM150E

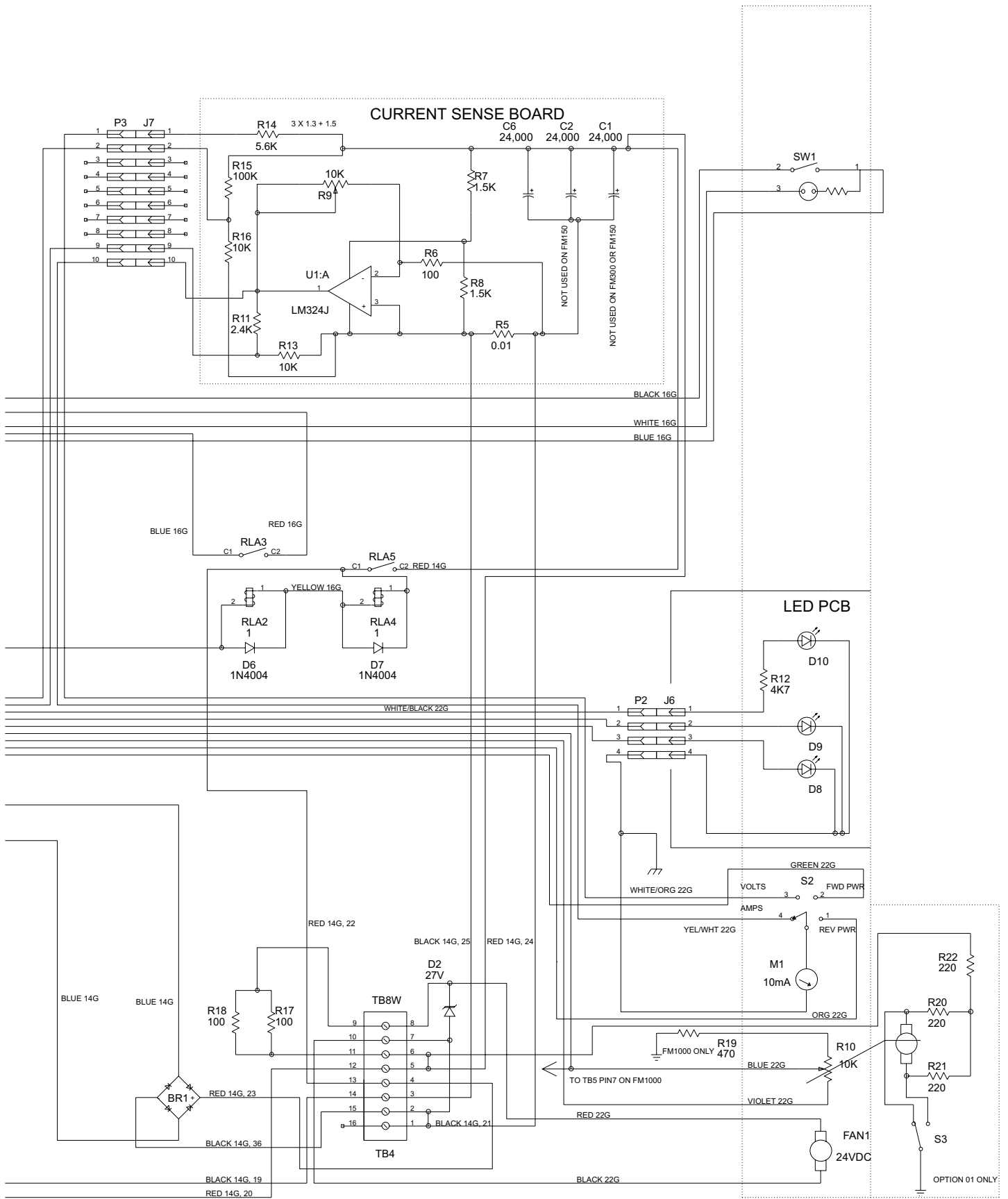


## POWER AMPLIFIER MODULE

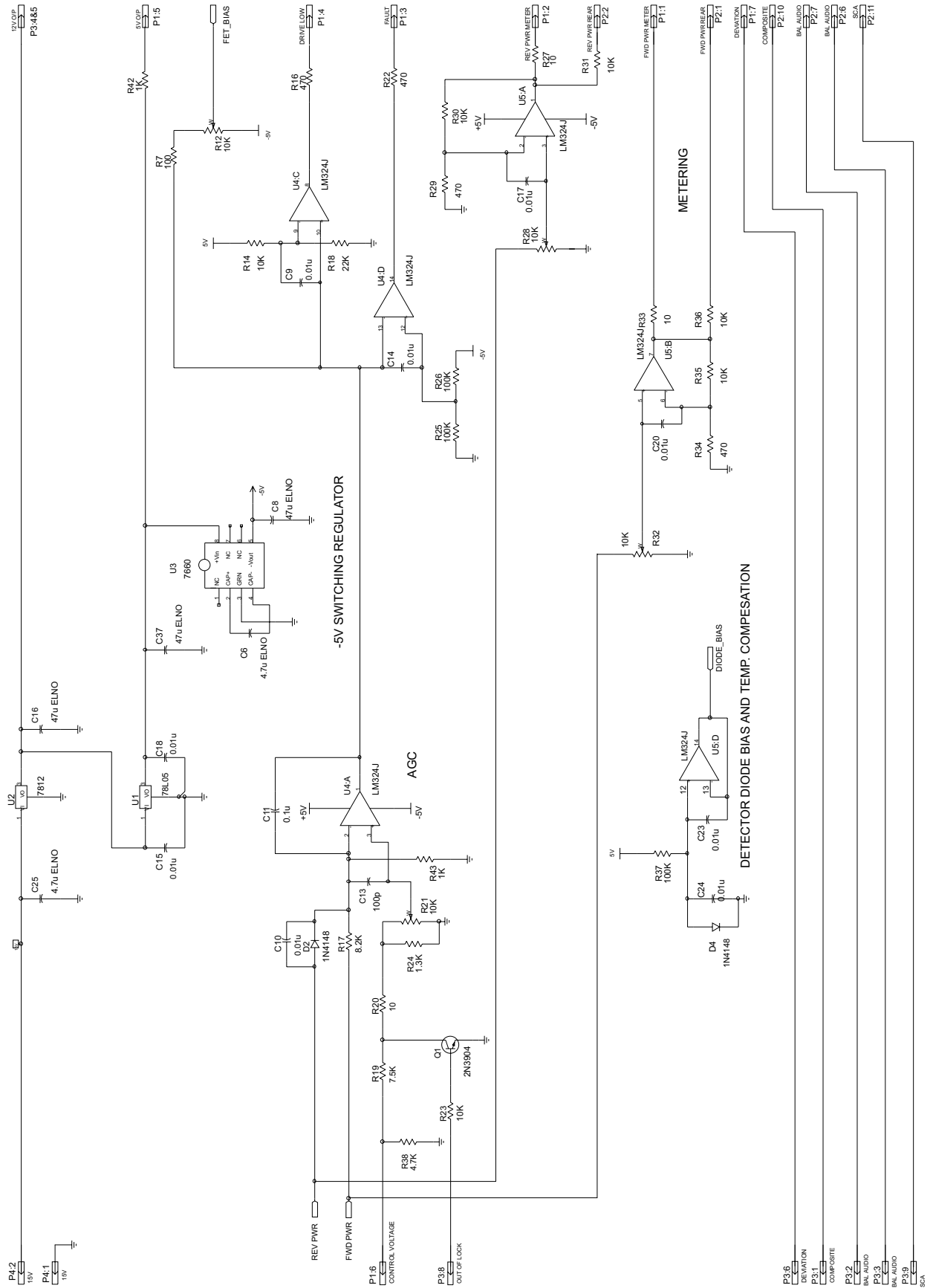
- | Terminal | Color  | Wire Gauge |
|----------|--------|------------|
| 1        | BROWN  | 22G        |
| 2        | ORANGE | 22G        |
| 3        | YELLOW | 22G        |
| 4        | GREEN  | 22G        |
| 5        | BLUE   | 22G        |
| 6        | VIOLET | 22G        |
| 7        | GRAY   | 22G        |
| 8        | WHITE  | 22G        |
| 9        | BLACK  | 14G, 19    |
| 10       | RED    | 14G, 20    |



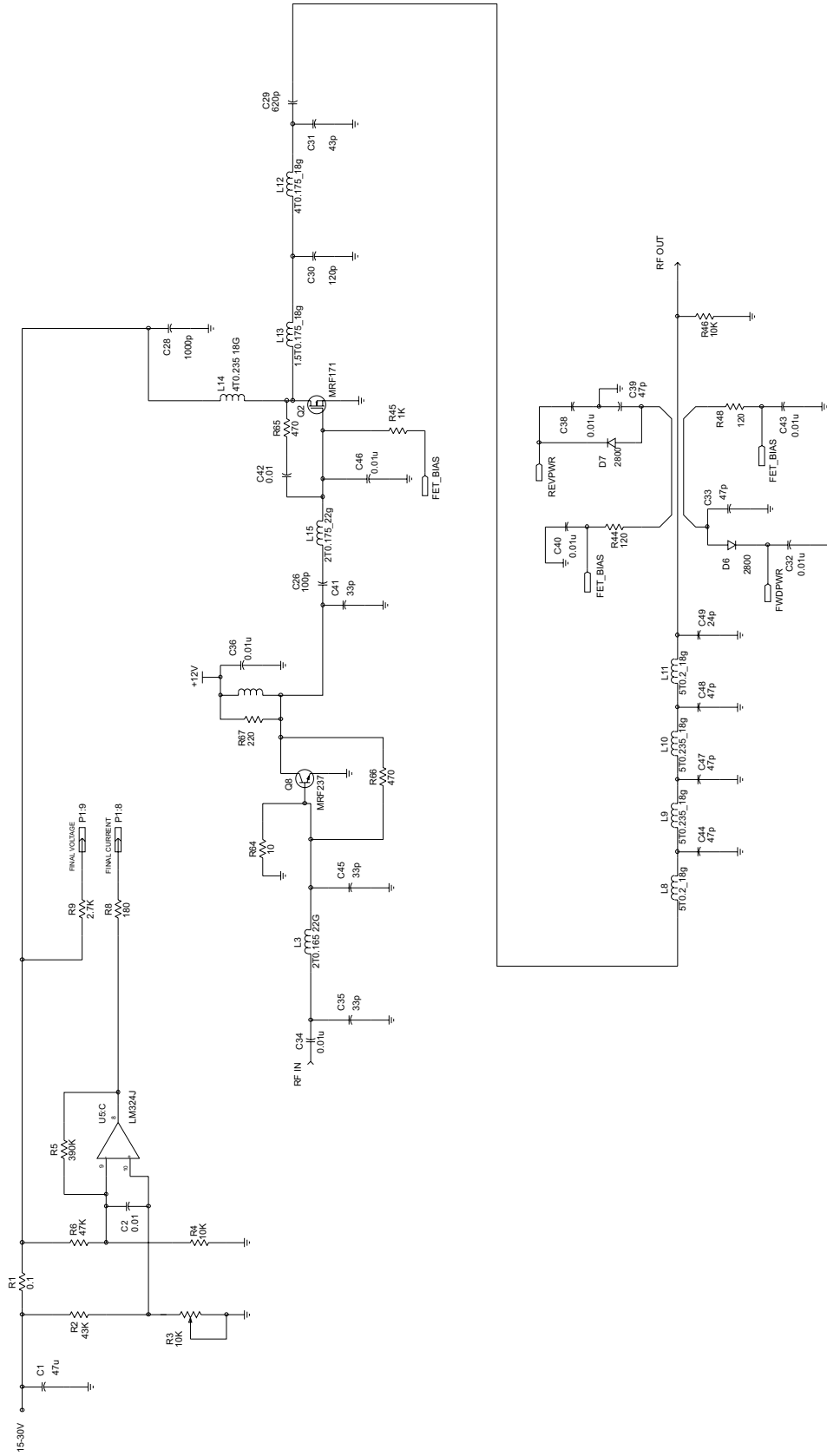
# Schematic chassis FM150E



# Power Amplifier Module Schematic Drawing

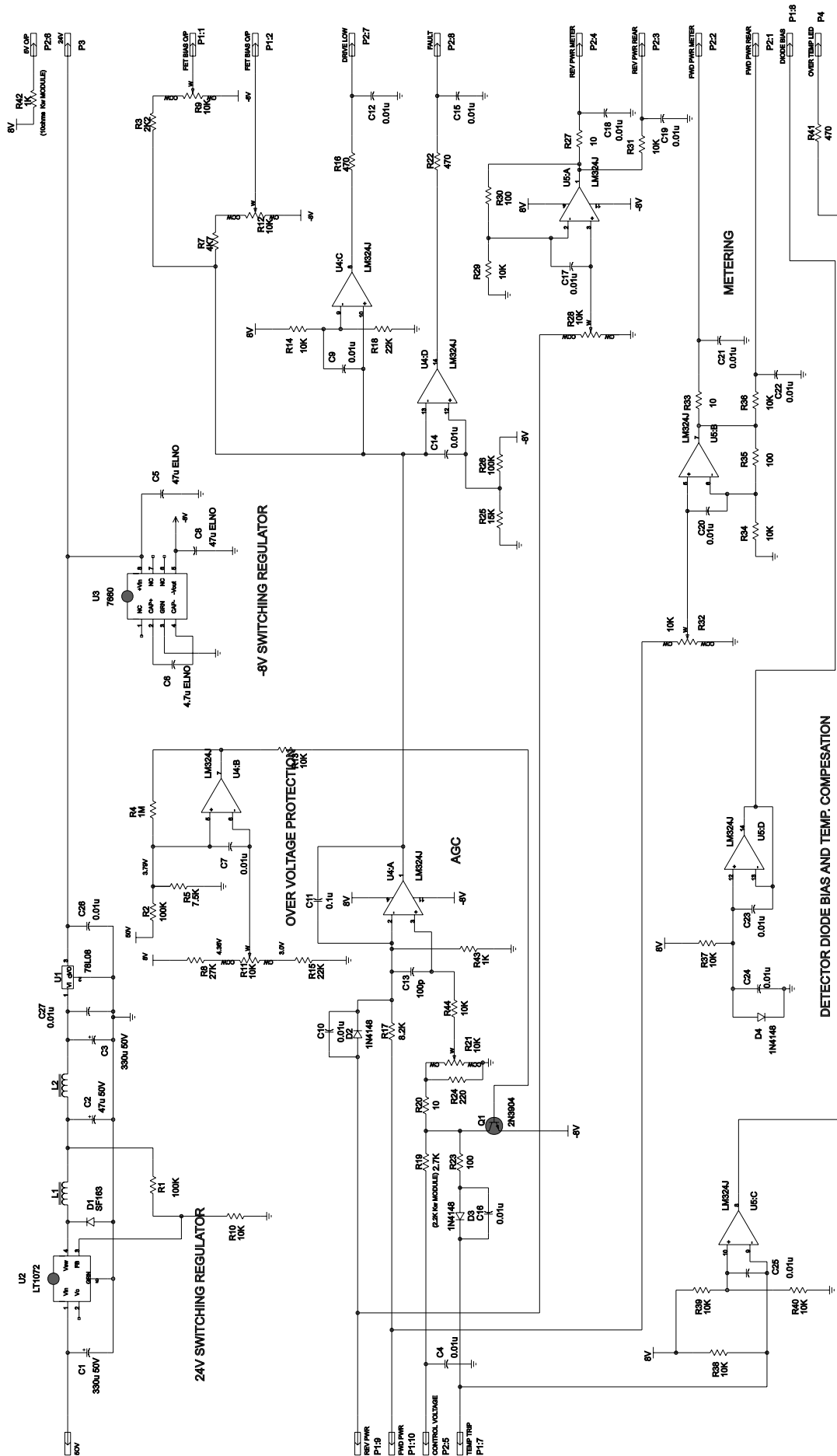


# Power Amplifier Module Schematic Drawing





# Module Schematic Control (150 only)



D3 SILKSCREEN BACKWARDS

# Parts list Chassis

**PTEK** BILL of MATERIALS PART NUMBER: 110131

Saturday, May 22, 1999

PART_NUM	QTY	REF	VALUE	DESCRIPTION	MAN	MAN_PART
100156	2			HANDLE	BUD	H-9174-B
100615	1			FILTER 3" FAN	DIGIKEY	CR212
100679	1			JUMPER @ 438	CINCH	141J
100752	1			#4 SOLDER TAG	H.H. SMITH	1485-4
103	2			CONN,BNC F/MALE PNL MNT	RF INDUST	RFB-1115 BNC
110057	1			FRONT PANEL SHT MET FM SERIES	PTEK	110057
110147	1			EXCITER FM PCB ASSY		
110505	1			SPST AC SWITCH		
110510	1			METER	MODUTEC	541-MS-DMA-010
110530	1			REAR PANEL SHT MET EXCITER		
110566	1			PAN FM EXCITER		
110639	1			ASSY PA 10/25W FM		
110666	1			COVER SYNTH		
110669	1			PCB ASSY EXCITER FRONT/REAR F		
110687	1			CABLE PACKAGE EXCITER		
110688	1			HARDWARE PACKAGE OLANDER E		
14F2025	1			TERM STRIP 10W chasis		
26F155	1			KNOB BLK 0.75		
28F717	1			BAR TER BLK 8W		
31F2018	2			31F2018 0.75 HOLE PLUG		
47F2034	1			47F2034 CAP 26,000 30V		
539-VR8	1			CAPACITOR CLAMP 2"		
89F5315	1			SNAP IN AC INLET FUSED		
GBPC3502	1			RECTIFIER 35A		
R250103	1		10K	RES 1/4W CARBON FILM 5%	TRANSOHI	29SJ250-103
RFN10212	1			TYPE N BULK HEAD	RF INDUST	RFN-1021-2
TR2182A	1			TRANSFORMER 17V 3A		

# Parts list PA Board

**PTEK** BILL of MATERIALS PART NUMBER: 110639

Saturday, May 22, 1999

PART_NUM	QTY	REF	VALUE	DESCRIPTION	MAN	MAN_PART
100280	1			4-40 1/4 PPSS	OLANDER	4C25PPMS
100282	7			4-40 SPLIT LOCK	OLANDER	
100700	6			4-40 X 3/8 PPSS	OLANDER	4C37PPMS
100746	7			FLAT WASHER #4 SMALL	OLANDER	620C4
110562	1			PCB PA 10/25W FM		
110640	1			BASE PLATE PA 10/25W FM		
110661	1	RLA		PC LATCHIN RELAY 255-1009-ND		
1N4148S	1	D2 D4		DIODE SMALL SIG LL34 SMT	ROLM	RLS4148
225	4			SWAGE SPACER 1/8"	HH-SMITH	4607A
2N3904S	1	Q1		TRANSISTOR NPN SMT	MOT	2N3904S
78L05SMT	1	U1	5V	VOLTAGE REG SMT	EXL SEMIC	78L05F
8049	1			BELDEN 8049 MAG WIRE 18 G		
8051	1			BELDEN 8051 MAG WIRE 22 G		
ATC102	1	C28	1000p	CAP CER CHIP 100B CASE	ATC	100B102
ATC121	1	C30	120p	CAP CER CHIP 100B CASE	ATC	100B121
ATC240	1	C49	24p	CAP CER CHIP 100B CASE	ATC	100B240
ATC430	1	C31	43p	CAP CER CHIP 100B CASE	ATC	100B430
ATC470	3	C44 C47 C48	47p	CAP CER CHIP 100B CASE	ATC	100B470
ATC621	1	C29	620p	CAP CER CHIP 100B CASE	ATC	100B621KP
C0805101	2	C13 C26	100p	CAP CER 0805 X7R 10% 100p	KCK	CE101K2NR
C0805103	18	C2 C10 C14 C15 C17 C18 C20 C23 C24 C32 C34 C36 C38 C40 C42 C43 C46 C9	0.01u	CAP CER 0805 X7R 10% 0.01u	KCK	CE103K2NR
C0805104	1	C11	0.1u	CAP CER 0805 X7R 10% 0.1u	KCK	CE104K2NR
C0805330	2	C41 C45	33p	CAP CER 0805 NPO 5%	KCK	CE330J2NO
C0805470	2	C33 C39	47p	CAP CER 0805 X7R 10% 47p	KCK	CE470J2NO
C0805680	1	C35	68p	CAP CER 0805 NPO 5%	KCK	CE680J2NO
C103100V	1	C46	0.01u	MONLITHIC CERAMIC CAP 100V	PANASONI	ECU-S1J103KBA
C47663	1	C1A	47u	RADIAL LEAD ALUMINUM 47u 63V	PANASONI	ECE-A1JGE470
CE22616	1	C8	220u	CAP AL ELEC 20% 16V SMT	ELNA	ECE-V1CA221P
CE47550	2	C6 C37	4.7u	CAP AL ELEC 20% 50V SMT	ELNA	555-50V4.7
CE47616	3	C16 C1 C25	47u	CAP AL ELEC 20% 16V SMT	ELNA	555-16V47
FMMD914	2	D6 D7		DIODE SOT 23		
LM324SM	2	U4 U5		OP AMP QUAD SO14	MOT	LM324AD
LM7812	1	U2	12V	VOLTAGE REG 1A	PANASONI	AN7812-ND
MHS14K	2	P1 P2 P3		14W HEADER LATCHED		
MLKS01	4			EJECTOR LATCH		
MRF171	1	Q2		TRANSISTOR RF POWER	MOT	MRF171
MRF237	1	Q8		TRANSISTOR RF POWER	MOT	MRF237
R1206100	3	R27 R33 R64	10	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-100
R1206101	3	R24 R7 R8	100	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-101
R1206102	3	R42 R43 R45	1K	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-102
R1206103	7	R14 R23 R30 R31 R35 R36 R46	10K	RES CHIP 1206 1/8W 5%	ROLM	MCR18J-103
R1206104	2	R26 R37	100K	RES CHIP 1206 1/8W 5%	ROLM	MCR18J-104
R1206105	1	R25	1M	RES CHIP 1206 1/8W 5%	ROLM	MCR18J-105

# Parts list PA Board

Saturday, May 22, 1999

PART_NUM	QTY	REF	VALUE	DESCRIPTION	MAN	MAN_PART
R1206105	1	R25	1M	RES CHIP 1206 1/8W 5%	ROLM	MCR18J-105
R1206121	2	R44 R48	120	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-121
R1206182	1	R9	1.8K	RES CHIP 1206 1/8W 5%	ROLM	MCRJJ-182
R12061R0	10	R1	1	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-1R0
R1206223	1	R18	22K	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-223
R1206394	1	R5	390K	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-394
R1206471	6	R16 R19 R20 R22 R29 R34	470	RES CHIP 1206 1/8W 5%	ROLM	MCR18J-471
R1206472	1	R38	4.7K	RES CHIP 1206 1/8W 5%	ROLM	MCR18J-472
R1206473	2	R6 R2	47K	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-473
R1206682	1	R3	6.8K	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-682
R1206752	1	R4	7.5K	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-752
R1206822	1	R17	8.2K	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-822
R250471	1	R39	470	RES 1/4W CARBON FILM 5%	TRANSOH	29SJ250-470
R3221	1	R67	220	RES 220 OHM 3W METAL OXIDE	PANASONI	P220-W3
R3471	2	R65 R66	470	RES 470 OHM 3W METAL OXIDE	PANASONI	P470-W3
SMP102	1	R10	1K	CERMET SINGLE TURN SMT	PHILIPS	ST-4TB 102
SMP103	4	R12 R21 R28 R32	10K	CERMET SINGLE TURN SMT	PHILIPS	ST-4TB 103
TC7660	1	U3		SOIC -8 V CONVERTER	HARRIS	ICL7660CBA
WM4601	1			3W HEADER 0.156"		



# Parts list Synth Board

**PTEK** BILL of MATERIALS PART NUMBER: 110147

Saturday, May 22, 1999

PART_NUM	QTY	REF	VALUE	DESCRIPTION	MAN	MAN_PART
110142	1			EXCITER 10W FM PCB		
16C56	1	U2		BASIC STAMP CHIP	PARALLAX	PIC16C56
1N4148S	12	D1 D2 D3 D4 D5 D6 D7 D8 D9 D12 D14 D71		DIODE SMALL SIG LL34 SMT	ROLM	RLS4148
2109	3	D15 D11 D10	33p	VERACTOR DIODE	MOT	MMBV2109LT1
225	4			SWAGE SPACER 1/8"	HH-SMITH	4607A
2N3904S	4	Q1 Q4 Q9 Q10		TRANSISTOR NPN SMT	MOT	2N3904S
2N3906S	1	Q5		TRANSISTOR PNP SMT	MOT	SN3906S
4T0.156	1	L7		INDUCTOR AIR WOULD 22G		
78L05SMT	1	U8	5V	VOLTAGE REG SMT	EXL SEMIC	78L05F
93LC56/P	1	U1		EEPROM	MICROCHI	93LC56/P
BFR96	3	Q2 Q6 Q7		TRANSISTOR RF BFR96	MOT	BFR96
C0805101	5	C11A C12A C2A C3A C5A	100p	CAP CER 0805 X7R 10% 100p	KCK	CE101K2NR
C0805103	15	C10 C16A C21 C24 C25 C26 C27 C3 C32 C33 C5 C55 C56	0.01u	CAP CER 0805 X7R 10% 0.01u	KCK	CE103K2NR
C0805104	4	C12 C15 C15A C58	0.1u	CAP CER 0805 X7R 10% 0.1u	KCK	CE104K2NR
C0805105	1	C16	1u	CAP CER 0805 Y5V +80 -20%	ROHM	MCH213F105ZP
C0805120	2	C4 C53 C57	12p	CAP CER 0805 NPO 5%	KCK	CE120J2NO
C0805182	2	C10A C9A	1800p	CAP CER 0805 X7R 10%	KCK	CE182K2NR
C0805220	1	C54	22p	CAP CER 0805 NPO 5%	KCK	CE220J2NO
C0805330	1	C2	33p	CAP CER 0805 NPO 5%	KCK	CE330J2NO
C0805471	1	C14A	470p	CAP CER 0805 NPO 5%	KCK	CE471J2NO
C0805680	1	C4A	68p	CAP CER 0805 NPO 5%	KCK	CE680J2NO
CE47550	10	C1 C18 C22 C11 C41 C59 C6A C7A C8A C9	4.7u	CAP AL ELEC 20% 50V SMT	ELNA	555-50V4.7
CE47616	8	C34 C37 C13 C14 C23 C8 C59 C60	47u	CAP AL ELEC 20% 16V SMT	ELNA	555-16V47
DIP8S	1	S1		DIP SWITCH 8W SIDE ACT 8W	CTS	194-8MST
DN12102	1	L4	1uH	INDUCTOR CHIP		
HP2800S	1	D13		DIODE HOT CARRIER	HP	HSMS-2800
LM324SM	2	U4 U6		OP AMP QUAD SO14	MOT	LM324AD
MC145170	1	U3		SYNTH CHIP SO14	MOT	MC145170D1
MCL503	1	T1		RF Transformer SMT	MINI CIRCU	T4-1-KK81
MHS14K	1	P2		14W HEADER LATCHED		
P1186	2	C17 C7	4.7u	P1186-ND 4.7 U 35V BI POLAR		ECE-A1VN4R7U
R1206101	11	R2 R25 R29 R3 R4 R55 R56 R57 R16 R89 R9A	100	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-101
R1206102	11	R17 R28 R30 R40 R62 R65 R51 R7A R11A R12A R23A	1K	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-102
R1206103	18	R14 R22A R24 R27 R33 R36 R38 R4A R58 R59 R60 R68 R7 R70 R90 R92 R93 R95	10K	RES CHIP 1206 1/8W 5%	ROLM	MCR18J-103

## Parts list Synth Board

Saturday, May 22, 1999

PART_NUM	QTY	REF	VALUE	DESCRIPTION	MAN	MAN_PART
R1206104	14	R1 R18A R19A R19 R20 R21 R22 R23 R45 R47 R48 R5 R50 R9	100K	RES CHIP 1206 1/8W 5%	ROLM	MCR18J-104
R1206105	4	R10 R18 R67 R26	1M	RES CHIP 1206 1/8W 5%	ROLM	MCR18J-105
R1206125	2	R20A R21A	1.2M	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-125
R1206220	4	R61 R15 R94 R12	22	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-220
R1206222	1	R66	2.2K	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-222
R1206273	3	R32 R5A R6A	27K	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-273
R1206472	10	R72 R8 R91 R34 R35 R6 R10A R13A R1A R2A	4.7K	RES CHIP 1206 1/8W 5%	ROLM	MCR18J-472
R1206473	3	R14A R15A R3A	47K	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-473
R1206561	2	R46 R13	560	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-561
R1206752	1	R39	7.5K	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-752
R3470	1	R54	47	RES 47 OHM 3W METAL OXIDE	PANASONI	P47-W3
SMP102	1	R53	1K	CERMET SINGLE TURN SMT	PHILIPS	ST-4TB 102
SMP103	1	R44	10K	CERMET SINGLE TURN SMT	PHILIPS	ST-4TB 103
SST310	1	Q3		FET RF SMT		
VC151	1	C6	15p	TRIMMER CAP	PHILIPS	2807S0R815-NHC4TAA
WM4901	1	P1		CONNECTOR 3W MALE	MOLEX	705-53-0002
XFMRCTI	1	T1		TRANSFORMER 600 OHMS CT	MOUSER	
XTAL0400	1	X1	4.0	4.0MHz HC18U XTAL WIRE END		

## Parts list LED Board

**PTTEK** BILL of MATERIALS PART NUMBER: 110669

Saturday, May 22, 1999

PART_NUM	QTY	REF	VALUE	DESCRIPTION	MAN	MAN_PART
110507	1		10K	PANEL POT 1/8"		
110624	1			PCB EXCITER FRONT/REAR PANEL		
CKC7003	1			6 WAY SWITCH PCB		
MHS14K	2			14W HEADER LATCHED		
MLKS01	4			EJECTOR LATCH		
P374-ND	3			RED LED		
R1206102	2	R4 R5	1K	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-102
SMP103	2		10K	CERMET SINGLE TURN SMT	PHILIPS	ST-4TB 103
XFMRCTI	2			TRANSFORMER 600 OHMS CT	MOUSER	



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