

HANDBOOK

FM SERIES

BROADCAST FM EXCITERS

FM25E

FM50E

FM150E

FM250E

PTEK

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 two-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 two 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
REV E.....	12/14/99
REV G.....	7/7/03

Safety

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

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 10k Ohms
SCA 1 Unbalanced 10k 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

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.

FM25E

Rated Power Output:

2 TO 30W

Power Consumption:

100W

FM50E

Rated Power Output:

5 TO 60W

Power Consumption:

200W

FM150E

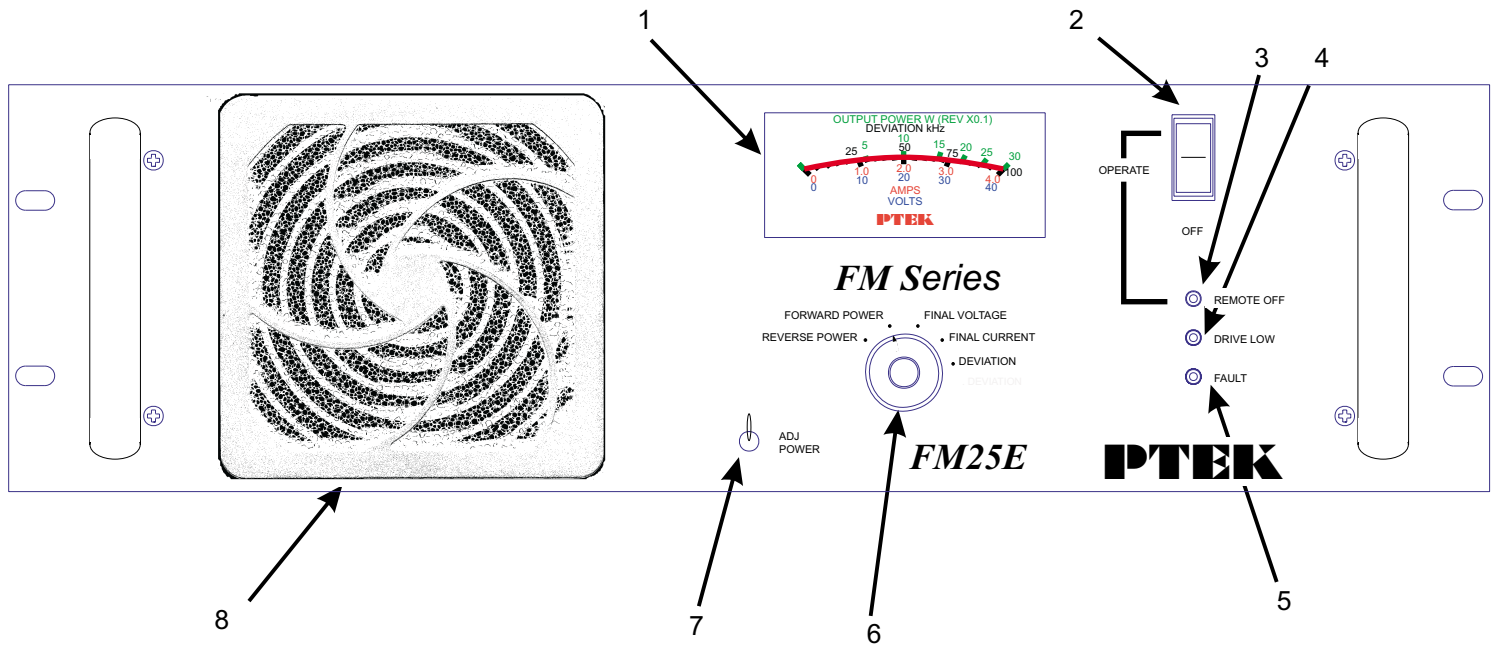
Rated Power Output:

10 TO 200W

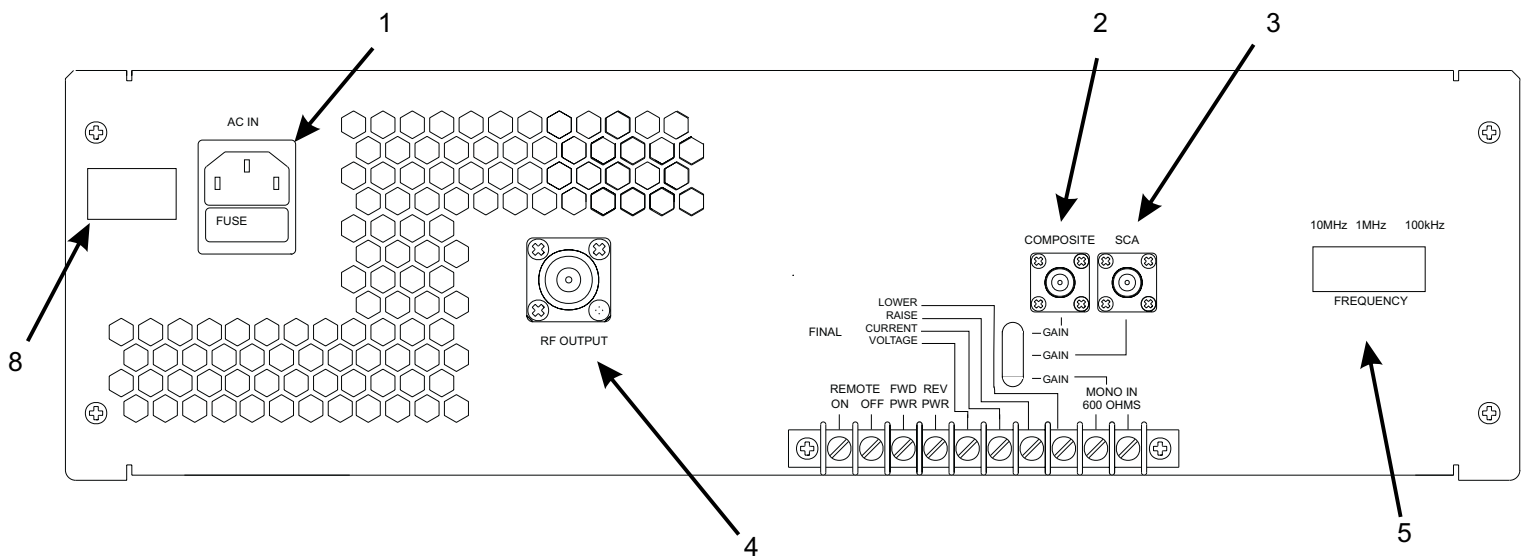
Power Consumption:

500W

Front panel layout



Rear panel layout



Key	Element	Description
1	METER	Indicates Forward Power, Reverse Power, Final Voltage, Final Current and Deviation
2	OPERATE 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	REMOTE OFF Indicator	This red LED indicator is lit when the FM Broadcast Amplifier remote off terminals (rear panel) are open circuit.
3	DRIVE LOW 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	FAULT 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	ADJ POWER 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).

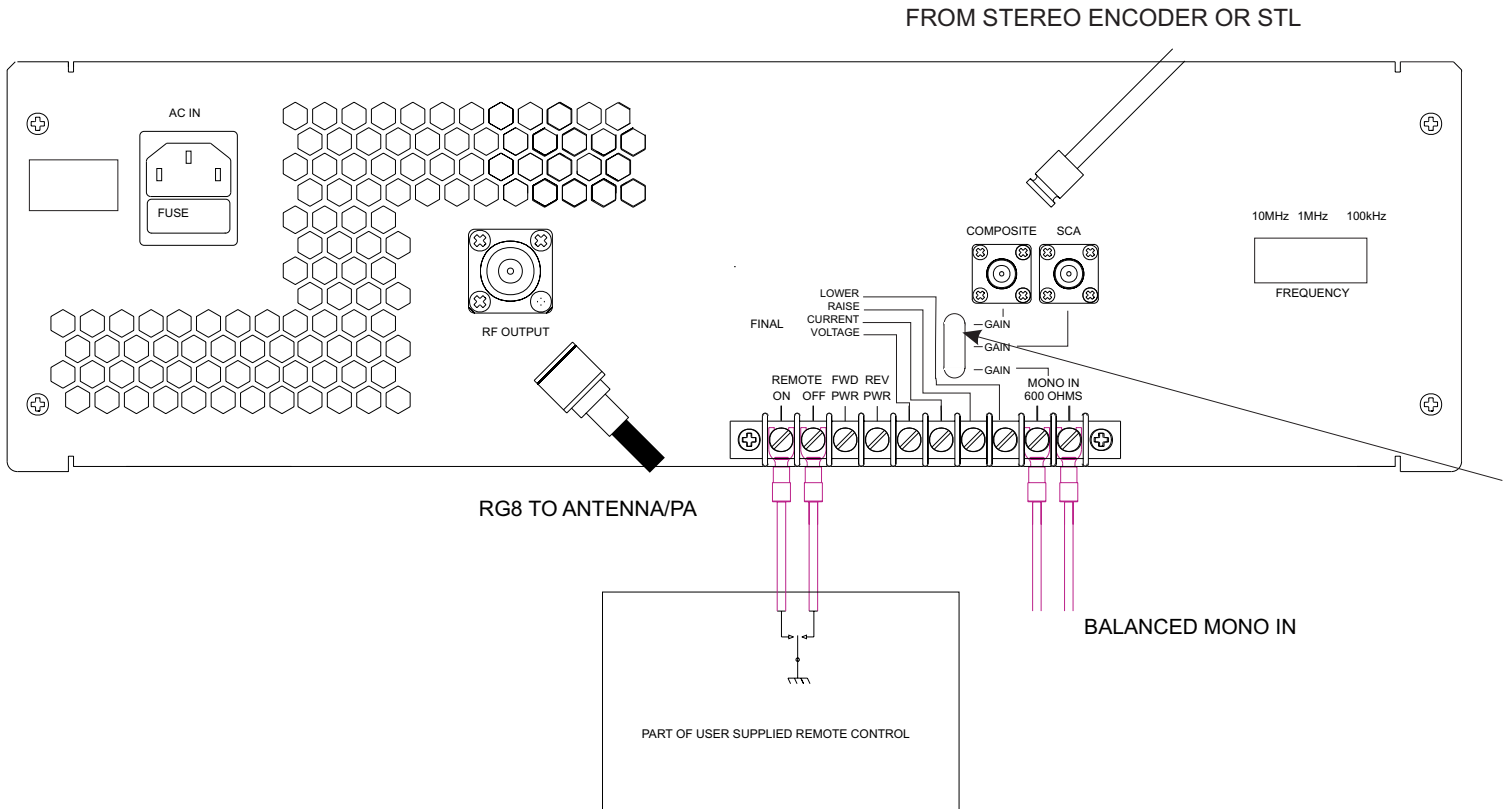
Key	Element	Description
1	AC IN & FUSE	110 VAC input and Fuse 10A
2	COMPOSITE	Unbalanced wide band composite input
3	SCA	Unbalanced wide band input
4	RF OUT	TYPE N RF Output
5	FREQUENCY SELECTION	Set switches for frequency selection (only takes effect when unit is switched from off to on)
6	Accessory connector	Connections for; Remote off and DC indications of Forward Power, Reverse Power, Final Voltage, Final Current and Deviation.
8	SERIAL NUMBER	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

OR (NOT BOTH)

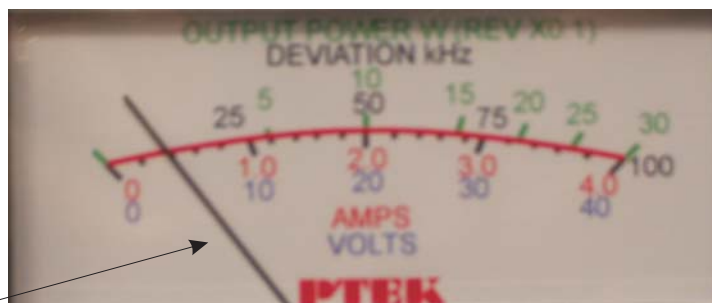


Turn-On Checkout

Refer to the Table below for the following procedure.

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

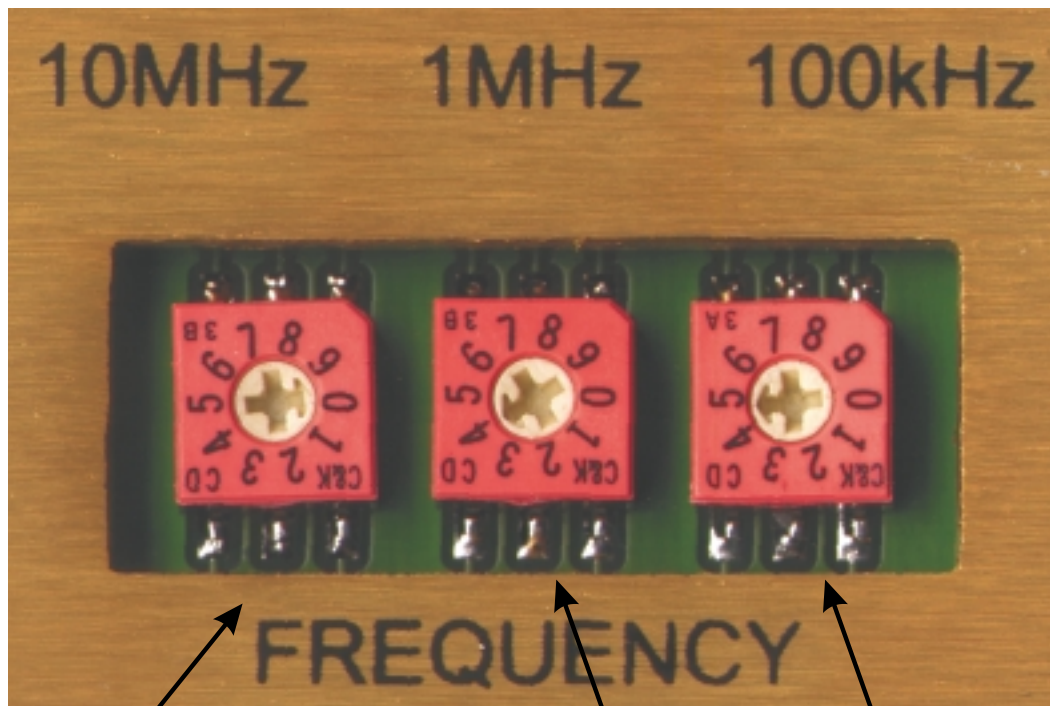
Stereo pilot level adjustment



With Stereo encoder (optional) connected to composite input, adjust composite gain control to give deviation meter reading shown (aprox 7.5kHz)

Frequency Selection

PLEASE NOTE, FREQUENCY CHANGES
SHOULD BE MADE WITH THE UNIT TURNED
OFF



10s MHz Switch

"0" is 10 (100MHz)

1MHz Switch

100kHz Switch

Example Shown 104.5MHz

FCC Compliance statement

THIS DEVICE HAS BEEN VERIFIED TO COMPLY WITH PART 73 OF THE FCC RULES.

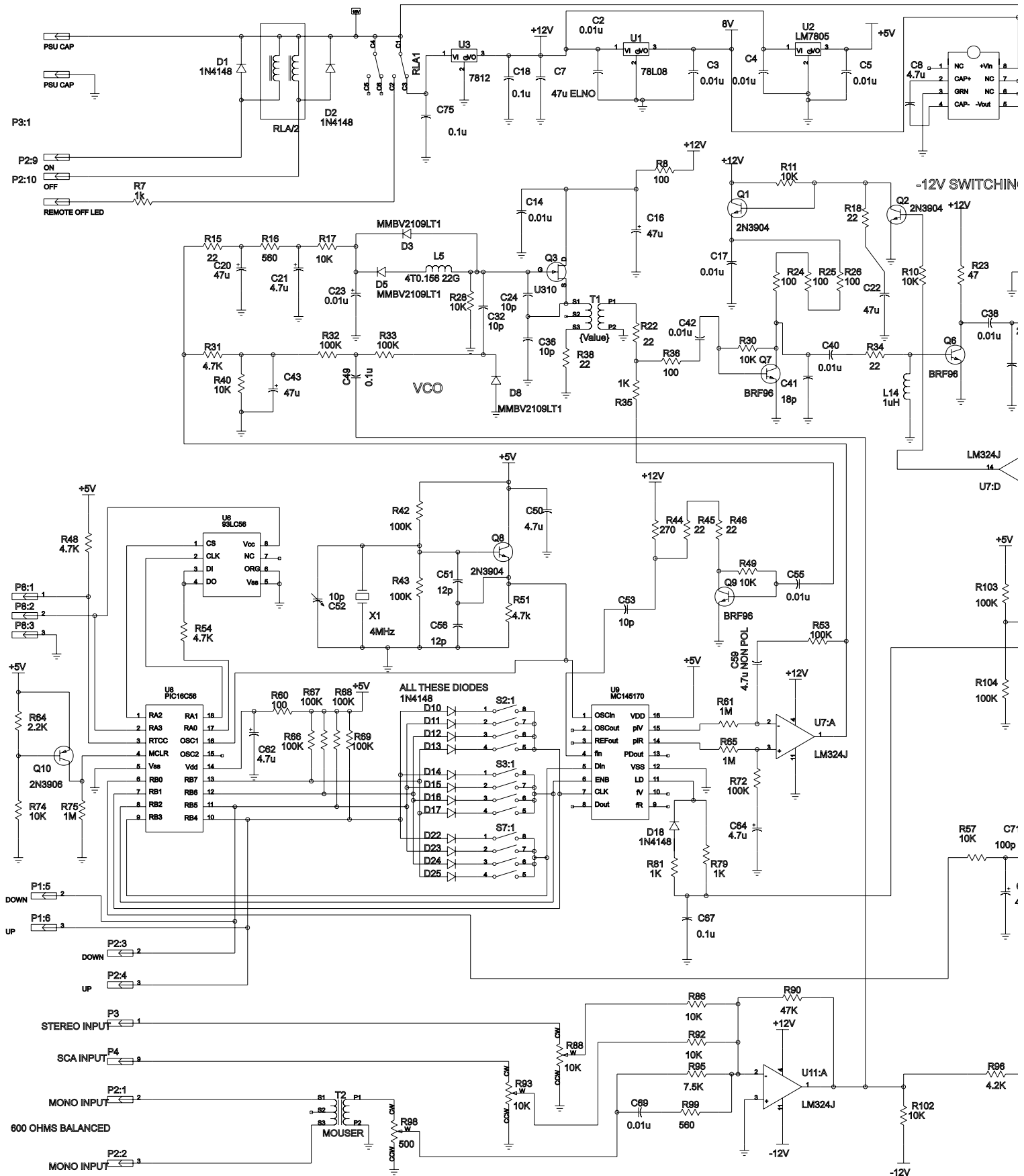
Accessory connector

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 Voltage DC indication $V=V_{supply}/10$
6	Final Current 1A=0.1V
7	Raise Ground to Raise Output Power
8	Lower Ground to Lower Output Power
9	600 ohms balanced mono input
10	600 ohms balanced mono input

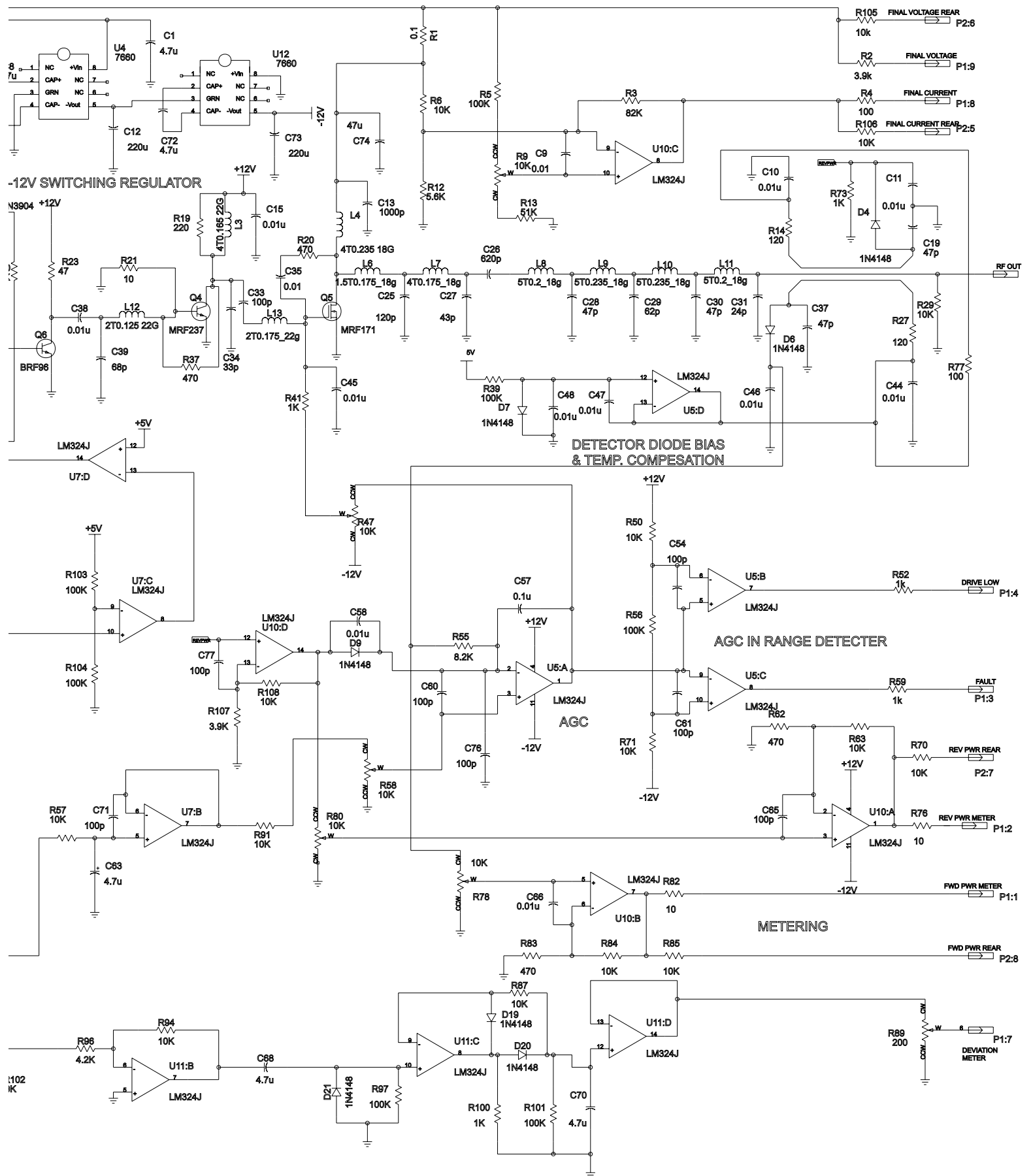
Efficiency V Output Power

FM25E		FM50E		FM150E	
Power Output (Watts)	Efficiency (%)	Power Output (Watts)	Efficiency (%)	Power Output (Watts)	Efficiency (%)
25.0	52%	50.0	48%	150.0	57%
22.5	49%	40.0	42%	120.0	51%
20.0	47%	32.0	38%	96.0	45%
17.5	46%	25.6	33%	76.8	40%
15.0	44%	20.5	30%	61.4	35%
12.5	42%	16.4	26%	49.2	32%
10.0	33%	13.1	23%	39.3	28%

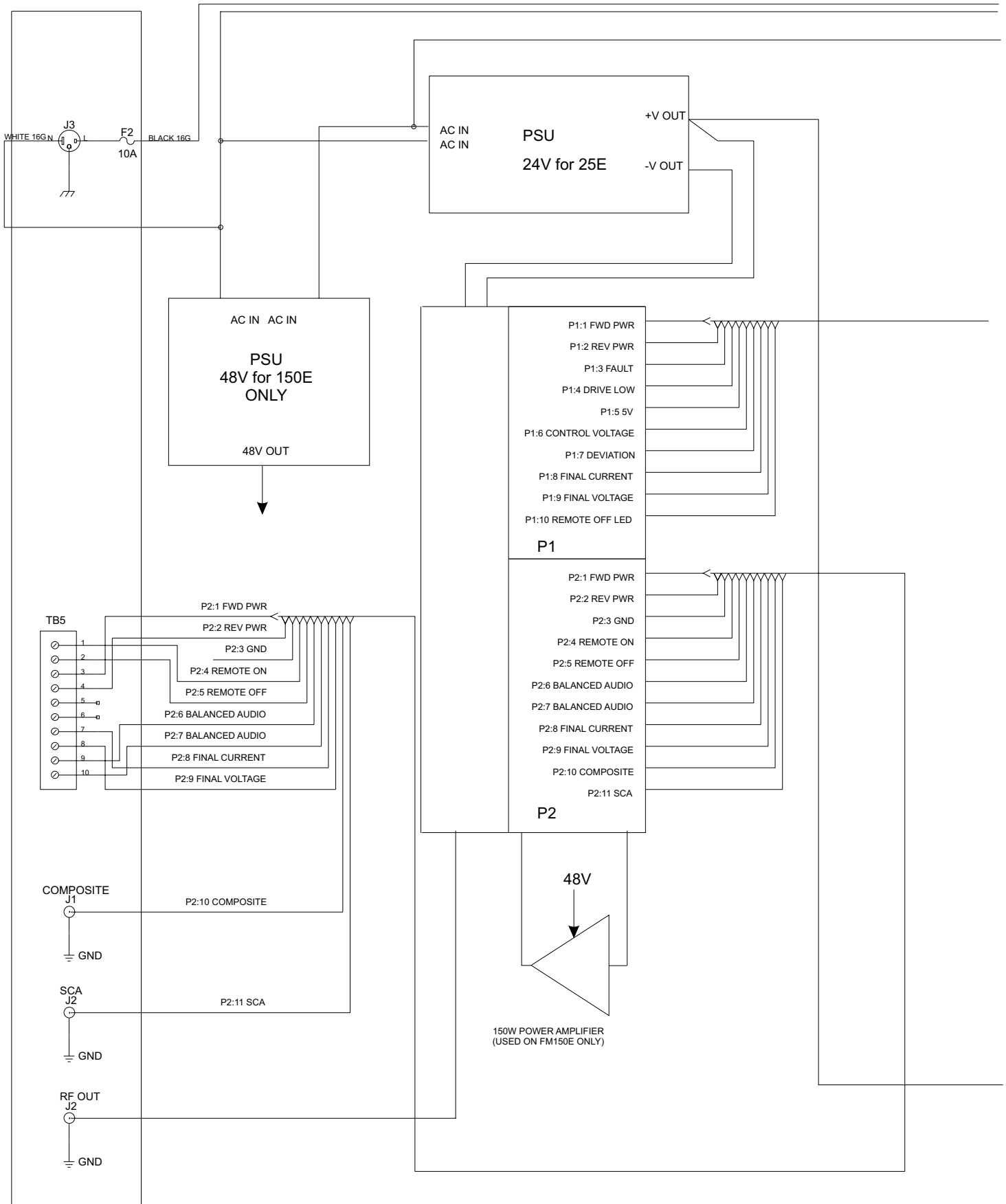
EXCITER SCHEMATIC



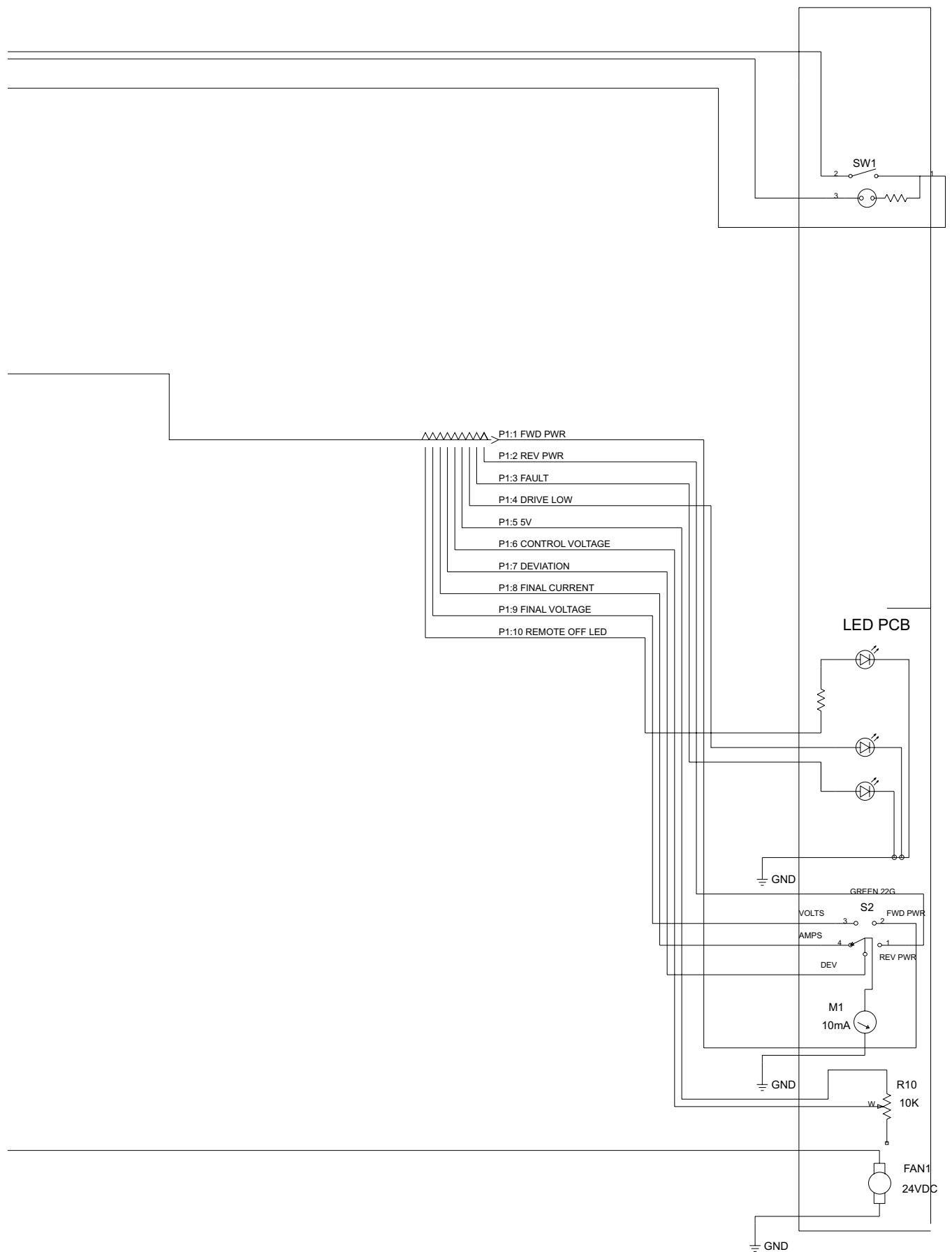
EXCITER SCHEMATIC



WIRING DIAGRAM



WIRING DIAGRAM



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 chassis		
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 Exciter Board

PTEK BILL of MATERIALS PART NUMBER: 110715

Monday, December 13, 1999

PART_NUM	QTY	REF	VALUE	DESCRIPTION	MAN	MAN_PART
110661	1	RLA		PC LATCHIN RELAY 255-1009-ND		
110707	1			10/25W EXCITER PCB		
110714	3	S2 S3 S7		BCD ROTARY SWITCH	C&K	CD1-RK1SK
16C56	1	U8		BASIC STAMP CHIP	PARALLAX	pbasic1/so
1N4148S	20	D1 D10 D11 D12 D13 D14 D15 D16 D17 D22 D23 D24 D25 D18 19 D2 D20 D21 D7 D9		DIODE SMALL SIG LL34 SMT	ROLM	RLS4148
2109	3	D3 D5 D8	33p	VERACTOR DIODE	MOT	MMBV2109LT1
2N3904S	3	Q1 Q2 Q8		TRANSISTOR NPN SMT	MOT	2N3904S
2N3906S	1	Q10		TRANSISTOR PNP SMT	MOT	SN3906S
78L05SMT	1	U2	5V	VOLTAGE REG SMT	EXL SEMIC	78L05F
78L08SMT	1	U1	8V	VOLTAGE REG SMT	EXL SEMIC	78L08F
93LC56SN	1	U6		93LC56/SN-ND, EEPROM		
BFR96	3	Q6 Q7 Q9		TRANSISTOR RF BFR96	MOT	BFR96
C0805100	3	C24 C36 C53	10p	CAP CER 0805 X7R 10% 10p	KCK	CE100K2NR
C0805101	6	C33 C54 C60 C61 C65 C71	100p	CAP CER 0805 X7R 10% 100p	KCK	CE101K2NR
C0805102	5	C13A C13B C26A C26B C26C	1000p	CAP CER 0805 X7R 10%	KCK	CE102K2NR
C0805103	24	C10 C11 C14 C15 C17 C2 C23 C3 C35 C38 C4 C40 C42 C44 C45 C46 C47 C48 C5 C55 C58 C66 C69 C9	0.01u	CAP CER 0805 X7R 10% 0.01u	KCK	CE103K2NR
C0805104	3	C49 C57 C67	0.1u	CAP CER 0805 X7R 10% 0.1u	KCK	CE104K2NR
C0805120	2	C51 C56	12p	CAP CER 0805 NPO 5%	KCK	CE120J2NO
C0805150	12	C27A C27B C28A C28B C28C C29A C29B C29C C30A C30B C30C C27C	15p	CAP CER 0805 NPO 5%	KCK	CE150K2NR
C0805180	1	C41	18p	CAP CER 0805 NPO 5%	KCK	CE180J2NO
C0805330	1	C34	33p	CAP CER 0805 NPO 5%	KCK	CE330J2NO
C0805390	3	C25A C25B C25C	39p	CAP CER 0805 NPO 5%	KCK	CE390J2NO
C0805470	2	C19 C37	47p	CAP CER 0805 X7R 10% 47p	KCK	CE470J2NO
C08054P7	1	C32	4.7p	CAP CER 0805 NPO +- .5pF	KCK	CE4R7D2NO
C0805680	1	C39	68p	CAP CER 0805 NPO 5%	KCK	CE680J2NO
C08058P2	3	C31A C31B C31C	8.2p	CAP CER 0805 NPO +- .5pF	KCK	CE8p2D2NO
CE22616	2	C12 C73	220u	CAP AL ELEC 20% 16V SMT	ELNA	ECE-V1CA221P
CE47550	10	C1 C21 C50 C62 C63 C64 C68 C70 C72 C8	4.7u	CAP AL ELEC 20% 50V SMT	ELNA	555-50V4.7
CE47616	5	C16 C20 C22 C43 C7	47u	CAP AL ELEC 20% 16V SMT	ELNA	555-16V47
DN12102	1	L14	1uH	INDUCTOR CHIP		
FMMD914	2	D4 D6		DIODE SOT 23		
LM324SM	4	U10 U11 U5 U7		OP AMP QUAD SO14	MOT	LM324AD
LM7812	1	U3	12V	VOLTAGE REG 1A	PANASON	AN7812-ND
MC145170	1	U9		SYNTH CHIP SO14	MOT	MC145170D1
MCL503	1	T1		RF Transformer SMT	MINI CIRCI	T4-1-KK81

Parts list Synth Board

Monday, December 13, 1999

PART_NUM	QTY	REF	VALUE	DESCRIPTION	MAN	MAN_PART
P1186	1	C59	4.7u	P1186-ND 4.7 U 35V BI POLAR		ECE-A1VN4R7U
PCE3202	2	C22 C74	47uF	47UF 63V ELECT SMD		
R1206100	3	R21 R76 R82	10	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-100
R1206101	11	R24 R25 R26 R36 R4 R44 R45 R46 R60 R77 R8	100	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-101
R1206102	12	R9 R100 R102 R35 R41 R52 R59 R7 R73 R79 R81 R96	1K	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-102
R1206103	23	R10 R105 R106 R11 R17 R28 R29 R30 R40 R49 R50 R57 R63 R70 R71 R74 R84 R85 R86 R87 R91 R92 R94	10K	RES CHIP 1206 1/8W 5%	ROLM	MCR18J-103
R1206104	16	R101 R103 R104 R32 R33 R39 R42 R43 R53 R56 R66 R67 R68 R69 R72 R97	100K	RES CHIP 1206 1/8W 5%	ROLM	MCR18J-104
R1206105	3	R61 R65 R75	1M	RES CHIP 1206 1/8W 5%	ROLM	MCR18J-105
R1206121	2	R14 R27	120	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-121
R1206182	1	R2	1.8K	RES CHIP 1206 1/8W 5%	ROLM	MCRJJ-182
R12061R0	10	R1A R1B R1C R1D R1E R1F R1G R1H R1I R1J	1	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-1R0
R1206220	5	R15 R18 R22 R34 R38	22	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-220
R1206222	1	R64	2.2K	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-222
R1206394	1	R3	390K	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-394
R1206471	2	R62 R83	470	RES CHIP 1206 1/8W 5%	ROLM	MCR18J-471
R1206472	7	R5 R6 R90 R31 R48 R51 R54	4.7K	RES CHIP 1206 1/8W 5%	ROLM	MCR18J-472
R1206561	2	R16 R99	560	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-561
R1206682	1	R13	6.8K	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-682
R1206752	2	R12 R95	7.5K	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-752
R1206822	1	R55	8.2K	RES CHIP 1206 1/8W 5%	ROLM	MCR18JJ-822
R3221	1	R19	220	RES 220 OHM 3W METAL OXIDE	PANASON	P220-W3
R3470	1	R23	47	RES 47 OHM 3W METAL OXIDE	PANASON	P47-W3
R3471	2	R20 R37	470	RES 470 OHM 3W METAL OXIDE	PANASON	P470-W3
SMP103	6	R47 R58 R78 R80 R88 R93	10K	CERMET SINGLE TURN SMT	PHILIPS	ST-4TB 103
SMP201	1	R89	200	CERMET SINGLE TURN SMT	PHILIPS	ST-4TB 201
SMP501	1	R98	500	CERMET SINGLE TURN SMT	PHILIPS	ST-4TB 501
SST310	1	Q3		FET RF SMT		
TC7660	2	U12 U4		SOIC -8 V CONVERTER	HARRIS	ICL7660CBA
VC151	1	C52	15p	TRIMMER CAP	PHILIPS	2807S0R815-NHC4TAA
WM4601	1			3W HEADER 0.156"		
WM4901	1	P8		CONNECTOR 3W MALE	MOLEX	705-53-0002
X405-ND	1	X1		4.0MHz crystal		
XFMRCTI	1	T2		TRANSFORMER 600 OHMS CT	MOUSER	

Parts list LED Board



PTK BILL of MATERIALS PART NUMBER: 110669

Saturday, May 22, 1999

PART_NUM	QTY	REF	VALUE	DESCRIPTION	MAN	MAN_PART
110507	1	R4 R5	10K	PANEL POT 1/8"	ROLM PHILIPS MOUSER	MCR18JJ-102 ST-4TB 103
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		1K	RES CHIP 1206 1/8W 5%		
SMP103	2		10K	CERMET SINGLE TURN SMT		
XFMRCTI	2			TRANSFORMER 600 OHMS CT		

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