



# ***SERVICE MANUAL***

MODEL TYPE: YS1002

## ***ef500p***

**WEB ACCESS:** <http://www.yorkville.com>

### **WORLD HEADQUARTERS CANADA**

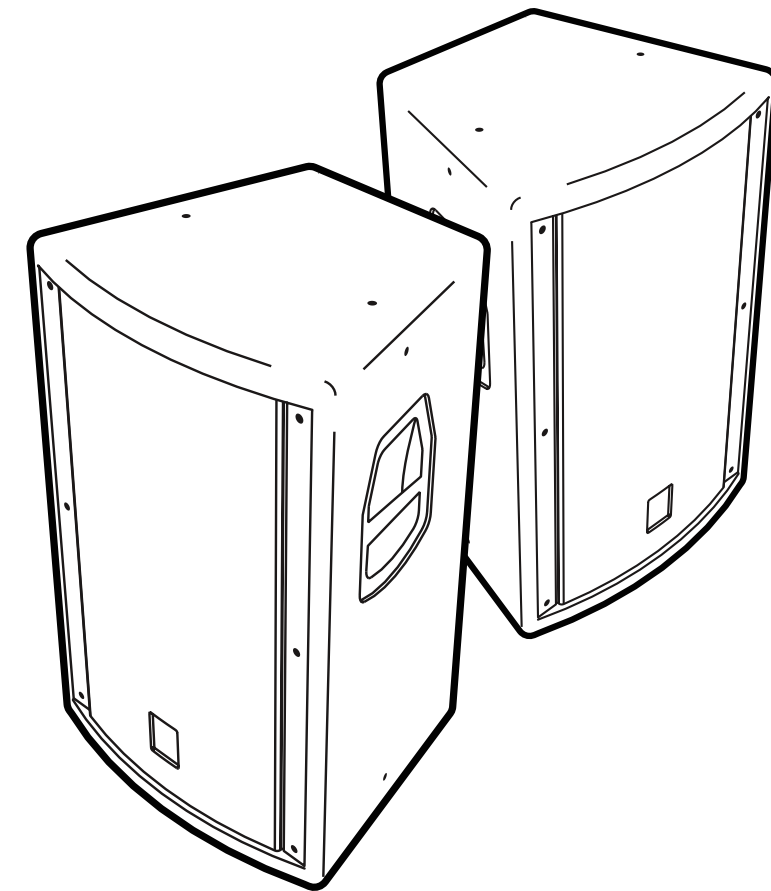
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**Quality and Innovation Since 1963**  
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# IMPORTANT SAFETY INSTRUCTIONS



This lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

Ce symbole d'éclair avec tête de flèche dans un triangle équilatéral est prévu pour alerter l'utilisateur de la présence d'un « voltage dangereux » non-isolé à proximité de l'enceinte du produit qui pourrait être d'ampleur suffisante pour présenter un risque de choc électrique.



## CAUTION AVIS

**RISK OF ELECTRIC SHOCK  
DO NOT OPEN**

**RISQUE DE CHOC ELECTRIQUE  
NE PAS OUVRIR**



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

Le point d'exclamation à l'intérieur d'un triangle équilatéral est prévu pour alerter l'utilisateur de la présence d'instructions importantes dans la littérature accompagnant l'appareil en ce qui concerne l'opération et la maintenance de cet appareil.



SZ125A

### FOLLOW ALL INSTRUCTIONS

**Instructions pertaining to a risk of fire,  
electric shock, or injury to a person**

**CAUTION: TO REDUCE THE RISK OF ELECTRIC  
SHOCK, DO NOT REMOVE COVER (OR BACK).**

**NO USER SERVICEABLE PARTS INSIDE.**

**REFER SERVICING TO QUALIFIED  
SERVICE PERSONNEL.**

### SUIVEZ TOUTES LES INSTRUCTIONS

**Instructions relatives au risque de feu,  
choc électrique, ou blessures aux personnes**

**AVIS: AFIN DE REDUIRE LES RISQUE DE CHOC  
ELECTRIQUE, N'ENLEVEZ PAS LE COUVERT (OU LE  
PANNEAU ARRIERE) NE CONTIENT AUCUNE PIECE**

**REPARABLE PAR L'UTILISATEUR.**

**CONSULTEZ UN TECHNICIEN QUALIFIE  
POUR L'ENTRETIEN**

**Read Instructions:** The Owner's Manual should be read and understood before operation of your unit. Please, save these instructions for future reference and heed all warnings.

Clean only with dry cloth.

**Packaging:** Keep the box and packaging materials, in case the unit needs to be returned for service.

**Warning:** To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture. *Do not use this apparatus near water!*

**Warning:** When using electric products, basic precautions should always be followed, including the following:

#### Power Sources

Your unit should be connected to a power source only of the voltage specified in the owners manual or as marked on the unit. This unit has a polarized plug. Do not use with an extension cord or receptacle unless the plug can be fully inserted. Precautions should be taken so that the grounding scheme on the unit is not defeated. An apparatus with CLASS I construction shall be connected to a Mains socket outlet with a protective earthing ground. Where the MAINS plug or an appliance coupler is used as the disconnect device, the disconnect device shall remain readily operable.

#### Hazards

Do not place this product on an unstable cart, stand, tripod, bracket or table. The product may fall, causing serious personal injury and serious damage to the product. Use only with cart, stand, tripod, bracket, or table recommended by the manufacturer or sold with the product. Follow the manufacturer's instructions when installing the product and use mounting accessories recommended by the manufacturer. Only use attachments/accessories specified by the manufacturer

Note: Prolonged use of headphones at a high volume may cause health damage on your ears.

The apparatus should not be exposed to dripping or splashing water; no objects filled with liquids should be placed on the apparatus.

Terminals marked with the "lightning bolt" are hazardous live; the external wiring connected to these terminals require installation by an instructed person or the use of ready made leads or cords.

Ensure that proper ventilation is provided around the appliance. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

No naked flame sources, such as lighted candles, should be placed on the apparatus.

#### Power Cord

Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet. The AC supply cord should be routed so that it is unlikely that it will be damaged. Protect the power cord from being walked on or pinched particularly at plugs. If the AC supply cord is damaged DO NOT OPERATE THE UNIT. To completely disconnect this apparatus from the AC Mains, disconnect the power supply cord plug from the AC receptacle. The mains plug of the power supply cord shall remain readily operable.

Unplug this apparatus during lightning storms or when unused for long periods of time.

#### Service

The unit should be serviced only by qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

**Veillez Lire le Manuel:** Il contient des informations qui devraient être comprises avant l'opération de votre appareil. Conservez. Gardez S.V.P. ces instructions pour consultations ultérieures et observez tous les avertissements.

Nettoyez seulement avec le tissu sec.

**Emballage:** Conservez la boîte au cas où l'appareil devait être retourner pour réparation.

**Avertissement:** Pour réduire le risque de feu ou la décharge électrique, n'exposez pas cet appareil à la pluie ou à l'humidité. *N'utilisez pas cet appareil près de l'eau!*

**Attention:** Lors de l'utilisation de produits électrique, assurez-vous d'adhérer à des précautions de bases incluant celle qui suivent:

#### Alimentation

L'appareil ne doit être branché qu'à une source d'alimentation correspondant au voltage spécifié dans le manuel ou tel qu'indiqué sur l'appareil. Cet appareil est équipé d'une prise d'alimentation polarisée. Ne pas utiliser cet appareil avec un cordon de raccordement à moins qu'il soit possible d'insérer complètement les trois lames. Des précautions doivent être prises afin d'éviter que le système de mise à la terre de l'appareil ne soit désengagé. Un appareil construit selon les normes de CLASS I devrait être raccordé à une prise murale d'alimentation avec connexion intacte de mise à la masse. Lorsqu'une prise de branchement ou un coupleur d'appareils est utilisée comme dispositif de débranchement, ce dispositif de débranchement devra demeurer pleinement fonctionnel avec raccordement à la masse.

#### Risque

Ne pas placer cet appareil sur un chariot, un support, un trépied ou une table instables. L'appareil pourrait tomber et blesser quelqu'un ou subir des dommages importants. Utiliser seulement un chariot, un support, un trépied ou une table recommandés par le fabricant ou vendus avec le produit. Suivre les instructions du fabricant pour installer l'appareil et utiliser les accessoires recommandés par le fabricant. Utilisez seulement les attachments/accessoires indiqués par le fabricant

Note: L'utilisation prolongée des écouteurs à un volume élevé peut avoir des conséquences néfastes sur la santé sur vos oreilles. .

Il convient de ne pas placer sur l'appareil de sources de flammes nues, telles que des bougies allumées.

L'appareil ne doit pas être exposé à des égouttements d'eau ou des éclaboussures et qu'aucun objet rempli de liquide tel que des vases ne doit être placé sur l'appareil.

Assurez que l'appareil est fourni de la propre ventilation. Ne procédez pas à l'installation près de source de chaleur tels que radiateurs, registre de chaleur, fours ou autres appareils (incluant les amplificateurs) qui produisent de la chaleur.

Les dispositifs marqués d'une symbole "d'éclair" sont des parties dangereuses au toucher et que les câblages extérieurs connectés à ces dispositifs de connexion extérieure doivent être effectués par un opérateur formé ou en utilisant des cordons déjà préparés.

#### Cordon d'Alimentation

Ne pas enlever le dispositif de sécurité sur la prise polarisée ou la prise avec tige de mise à la masse du cordon d'alimentation. Une prise polarisée dispose de deux lames dont une plus large que l'autre. Une prise avec tige de mise à la masse dispose de deux lames en plus d'une troisième tige qui connecte à la masse. La lame plus large ou la tige de mise à la masse est prévu pour votre sécurité. La prise murale est désuète si elle n'est pas conçue pour accepter ce type de prise avec dispositif de sécurité. Dans ce cas, contactez un électricien pour faire remplacer la prise murale. Évitez d'endommager le cordon d'alimentation. Protégez le cordon d'alimentation. Assurez-vous qu'on ne marche pas dessus et qu'on ne le pince pas en particulier aux prises. **N'UTILISEZ PAS L'APPAREIL** si le cordon d'alimentation est endommagé. Pour débrancher complètement cet appareil de l'alimentation CA principale, déconnectez le cordon d'alimentation de la prise d'alimentation murale. Le cordon d'alimentation du bloc d'alimentation de l'appareil doit demeurer pleinement fonctionnel.

Débranchez cet appareil durant les orages ou si inutilisé pendant de longues périodes.

#### Service

Consultez un technicien qualifié pour l'entretien de votre appareil. L'entretien est nécessaire quand l'appareil a été endommagé de quelque façon que se soit. Par exemple si le cordon d'alimentation ou la prise du cordon sont endommagés, si il y a eu du liquide qui a été renversé à l'intérieur ou des objets sont tombés dans l'appareil, si l'appareil a été exposé à la pluie ou à l'humidité, si il ne fonctionne pas normalement, ou a été échappé.

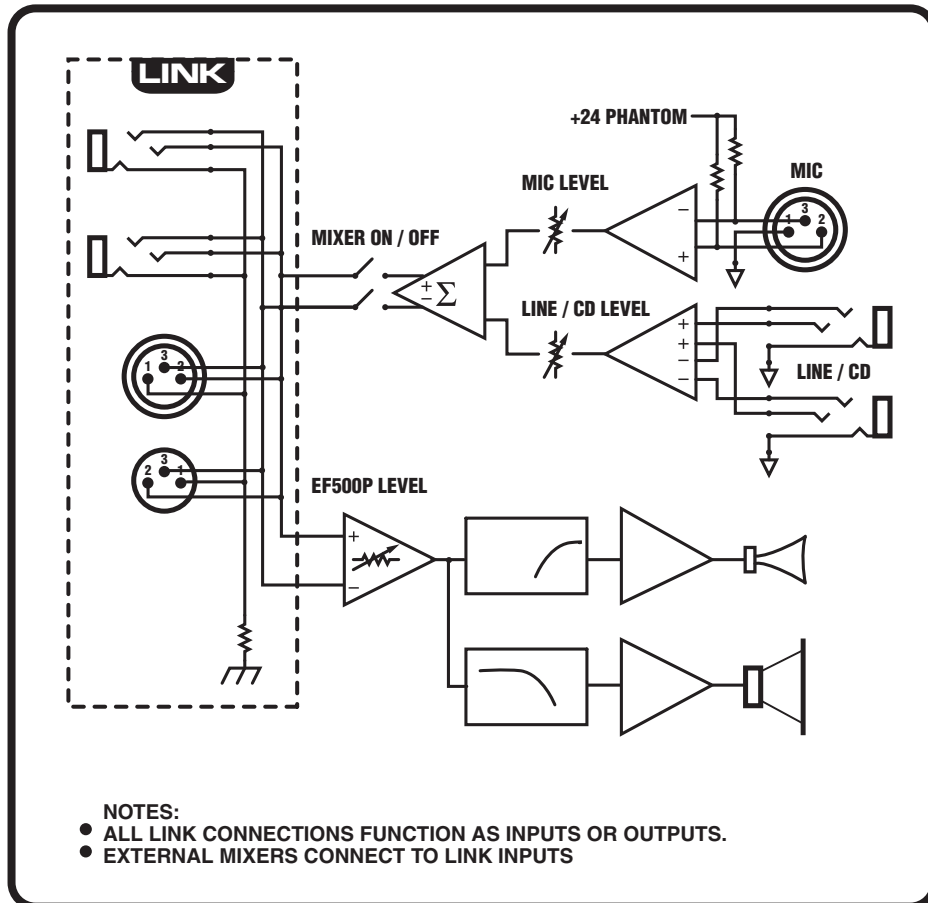
EF500P Parts List 11/11/2009

YS #	Description	Qty.	YS #	Description	Qty.	YS #	Description	Qty.	YS #	Description	Qty.
5906	RED 3MM LED 1V9 20MA.4SPCER T&R	1	5951	_3U3 250DC10%CAP BLK MPOLYP FLM	1	4921	1/4W 100R 5% 2U T&R RES	1	8811	#6 X 1 1/4 FLAT HD SQ SCKT WS ZN CL	22
5907	YEL 3MM LED 1V9 20MA.4SPCER T&R	1	5260	22U 50V 20%CAP T&R RAD .2"EL	1	4984	1/4W 150R 5%MINI T&R RES	1	8803	8-32 X 3/8 PAN PHIL TAPTITE JS500	7
5908	GRN 3MM LED 1V9 20MA.4SPCER T&R	1	5282	10U 16V 20%CAP T&R 5X7MM .2"NP	2	4944	1/4W 220R 5% 2U T&R RES	3	8785	#8 X 3/4 OVAL PH TYPE A BLACK OXIDE	19
8421	MR752 200V 6A0 DIODE	4	5631	22U 50V 20%CAP T&R 6X7MM .2"EL	4	4977	1/4W 220R 5%MINI T&R RES	2	8804	8-32X1.25 PAN PH MS ZINC CLEAR	4
6438	1N4007 1000V 1A0 DIODE T&R	2	5945	10U 63V 20%CAP T&R RAD .2"EL	3	2024	1/8W 249R 2%FLAME PROOF T&R RES	2	8756	#10 X 3/4 PAN PH TYPE A BLACK OXIDE	40
6733	BAT85 30V 0A2 DIODE SCHK T&R	6	5961	_33U 16V 20%CAP T&R RAD .2"NP	6	4945	1/4W 270R 5% 2U T&R RES	1	8781	#10 X 7/8 FLAT QUAD TYPE A JS500BLK	4
6825	1N4148 75V 0A45 DIODE T&R	21	5265	_68U 25V 20%CAP T&R RAD .2"EL	1	2025	1/8W 274R 1%FLAME PROOF T&R RES	1	8727	#10 X 1" PAN PH TYPE A JS500 BLACK	26
6827	1N5402 200V 3A0 DIODE	8	5858	2700U 180V 20%CAP RAD 35X63MM ELS	2	4789	1/4W 324R0 0.1% *** T&R RES	1	8786	10-32 X 1 1/4 PAN OD MS JS500 BLACK	4
6892	UF4004 200V 1A0 DIODE ULTRAFAS	1	5887	2200U 50V 20%CAP BLK 18X27MM EL	2	2026	1/4W 332R0 1%FLAME PROOF T&R RES	1	8777	#14 X 1FLAT PH TYPE A JS500 M6 HEAD	4
6934	MR854 400V 3A0 DIODE FASREC	2	5912	2200U 63V 20%CAP RADIAL ELECT BULK	2	4690	1/2W 442R 1% T&R RES	2	8928	#14X11/4 ALLEN FLHD WOOD SCRW JS500	6
6426	1N5254B 27V0 0W5 ZENER 5% T&R	1	4432	_10K B LIN 9MM P32	2	4933	1/4W 470R 5% 2U T&R RES	2	8709	1/4-20 X 1.5 PAN PHIL MS ZINC CLEAR	4
6432	1N5248B 18V0 0W5 ZENER 5% T&R	2	4434	_10K B LIN 9MM DETENT P32	2	4980	1/4W 470R 5%MINI T&R RES	1	8926	5/16-18X3 CARRIAGE BOLT ZINC	1
6436	1N753ARL 6V2 0W5 ZENER 5% T&R	2	4435	_50K B LIN 9MM DETENT P32	1	2028	1/8W 475R 1%FLAME PROOF T&R RES	3	8739	M6 X 30 PAN PHIL M/S ZINC CLEAR	4
6440	1N750ARL 4V7 0W5 ZENER 5% T&R	3	713	25 X 20 X 50 2 MIL PLASTIC BAG	1	4799	1/4W 562R 1% T&R RES	2	3751	SNAP IN 5/16 SPACER RICHCO	9
6450	1N5242B 12V0 0W5 ZENER 5% T&R	3	6492	1300UH COIL COMMON MODE 4AMP	1	5014	1/4W 562R0 0.1% *** T&R RES	2	3851	1/2 PCB PLASTIC SPACER	6
6461	1N5240BRL 10V0 0W5 ZENER 5% T&R	1	8467	2X2-IB-3/8" FLYING HARDWARE BRACKET	4	4994	1/4W 590R 1% T&R RES	1	3859	1/2 PLASTIC HEX SPACER #4	2
6463	1N5251BRL 22V0 0W5 ZENER 5% T&R	1	8483	ADAPTOR,SPEAKER STAND,METAL,BLACK	1	2030	1/8W 681R 1%FLAME PROOF T&R RES	4	7468	15" 8R 500WPGM SPKR NET	1
6465	1N5250B 20V0 0W5 ZENER 5% T&R	1	8547	PLASTIC FOOT BLACK, POLYETHYLENE	4	4743	1/4W 681R0 0.1% *** T&R RES	2	8921	#3MM ID3.2MM OD7.0MM THICK 5MM	4
6728	MC780L05ACP TO92 P 5V0 REG TR V4	1	8562	CORNER, 3 LEGS, BLK POWDER COAT	4	4923	1/4W 680R 5% 2U T&R RES	1	8667	SHOULDER WASHER SWS-229 LENGTH 1/8	4
6824	1N5246B 16V0 0W5 ZENER 5% T&R	2	8569	CORNER 2 LEGS/NO LIP BLACK POWDER C	4	4925	1/4W 820R 5% 2U T&R RES	1	8482	3/8 1D FLAT WASHER	4
6871	MC7915CT TO220 N 15V0 REG V2	1	8888	NEOPRENE DRIVER GASKET 4.4 X 4.4	1	4934	1/4W 1K 5% 2U T&R RES	1	8818	3/4 OD X 3/8 ID X .080 THICK WASHER	13
6872	MC7815CT TO220 P 15V0 REG V1	1	3485	CLIP 250X032 18-22AWG RIGHT ANGL	4	6110	1/4W 1K 1%MINI MF T&R RES	17	8489	1/4-20 SPLIT WASHER BLACK OXIDE	4
5101	BC550C TO92 NPN TRAN T&R TB	1	3489	CLIP 250X032 18-22AWG DISCO/INSL	7	4996	1/4W 1K070 0.1% *** T&R RES	1	3522	DPDPT MINI PC VERT SNP ALT	2
5102	BC560C TO92 PNP TRAN T&R TB	3	3490	CLIP 250X032 14-16AWG DISCO/INSL	6	4585	1/4W 1K2 5%MINI T&R RES	2	3585	DPDPT ROKR SW QUIK 250" AC/PWR IEC65	1
5103	MPSA06 TO92 NPN TRAN T&R TA	1	3921	1/4" JCK PCB MT VERT STER RT SWT	4	4611	0.6W 18K7 1% MF T&R RES	2	3392	250 MALE TAB .2IN T&R	4
5105	MPSA13 TO92 NPN DARL T&R TA	1	3453	XLR MALE PCB MT VERT	1	4802	1/4W 1K21 1% T&R RES	1	3682	250 MALE PCB TAB REEL	13
5107	2N5551 TO92 NPN TRAN T&R TA	2	4010	XLR FEML PCB MT VERT 24MM AA-SERIES	2	4769	1/4W 1K4 1% T&R RES	4	3887	ADHESIVE LINED GRONOMET EDGING	0.35
5108	2N5401 TO92 PNP TRAN T&R TA	4	3451	EYELET SMALL .089 OD PLATED	19	2034	1/8W 1K5 5%FLAME PROOF T&R RES	2	3395	THERMO/BRKR/N-CLOSED OPEN@82C	1
5114	MPSA92 TO92 PNP TRAN T&R TA	2	3482	LOWPROFILE FUSEHOLDER 1/4" BUSSMANN	1	4935	1/4W 1K5 5% 2U T&R RES	4	CH1255	EF500P PWR TRAN 120VAC TRD	1
5119	2N5638 TO92 NCH JFET T&R TC	2	2465	_7.0 AMP FAST-BLO .25X1.25 FUSE	1	4993	1/4W 1K87 1% T&R RES	3			
6873	1MJE340 TO126 NPN TRAN TG	1	2487	_7.0 AMP SLO-BLO T&R FUSE	2	4683	1.0W 1K8 5% T&R RES	1			
6911	BDX54C TO220 PNP TRAN DARL TE	1	8565	BAR HANDLE ALL METAL RECTANGULAR	2	4946	1/4W 2K 5% 2U T&R RES	1			
6912	BDX53C TO220 NPN TRAN DARL TE	1	7401	_8R 120W 1.50" DRIVER TI DE72P B&C	1	6113	1/4W 2K 5%MINI T&R RES	3			
6931	IRFP140N TO247 NCH MFET TM	1	3501	B52200F006 COMP WASH #4 SMALL	9	4705	2.0W 2K2 5% BLK RES	2			
6932	IRFP9140N TO247 PCH MFET TM	1	8721	3/8-16X11/4 GRDS FLAT SCKT HD JS500	9	6104	1/4W 2K2 5%MINI T&R RES	6			
6967	IRFP23N50L TO247 NCH MFET TM	2	8726	3/8-16X11/2 GRDS FLAT SCKT HD JS500	9	6114	1/4W 2K49 1%MINI MF T&R RES	2			
6603	74HC14N IC HEX INV SCHMID	2	9897	CABINET COVER, BLACK, 54" WIDE	22	6124	1/4W 3K 5%MINI T&R RES	2			
6605	74HC86N IC QUAD 2INP XOR	1	3552	NYLON SPRING CLAMP	1	4788	1/4W 3K160 0.1% *** T&R RES	2			
6640	LM311 IC VOLTAGE COMPARATOR	3	3645	AC SOCKET RECEPTACLE WITH 0.250 TAB	1	4850	1/4W 3K9 5% T&R RES	1			
6745	LM1360N IC XCONDUCTANCE AMP	1	3803	NYLON SECUR-A-TACH MINI PLASTIC TIE	1	4774	1/4W 4K12 1% T&R RES	1			
6804	MC33079P IC QUAD OP AMP	1	3810	4" NYLON CABLE TIE	11	4943	1/4W 4K7 5% 2U T&R RES	9			
6840	MC33078P IC DUAL OP AMP	1	3841	5.5" NYLON CABLE TIE	2	4982	1/4W 4K7 5%MINI T&R RES	5			
6884	NE5532N IC DUAL OP AMP	16	3852	STICK ON CABLE WRAP ANCHOR	1	6141	1/4W 5K6 5%MINI T&R RES	2			
6887	IR2110 IC HILO FET DRIVER	1	3558	TERM HOUSING 4 CIR .156/RAMP	1	4978	1/4W 6K8 5%MINI T&R RES	3			
6964	74HC74N IC DUAL FLIPFLOP	1	3559	TERM HOUSING 8 CIR .156/RAMP	1	4768	5.0W 12K 5% BLK RES	5			
5190	MBS4992 TO92 8V5 DIAC T&R	1	3674	9 CIR CABLE HOLDER .098	1	4940	1/4W 10K 5% 2U T&R RES	11			
6517	STM-BTB-600BRG TO220 ??A TRIAC 600V	1	4004	9 CIR WAFER W/LCK VT 0.1"	1	6116	1/4W 10K0 1%MINI MF T&R RES	10			
6858	NSL-32SR2 OPTO-COUPLER LDR	2	3538	24 PIN BREAKAWAY LOCK .156	0.493	4979	1/4W 15K 5%MINI T&R RES	2			
5401	_10P 500V 5%CAP T&R RAD CER.2"NPO	1	3549	TRIFURCON TERM .156	12	4954	1/4W 18K 5% 2U T&R RES	2			
5406	_33P 50V 10%CAP BLK BEAD NPO	2	8632	KNOB ROUND PUSHBUTTON 1/4" GREY	2	6125	1/4W 18K 5%MINI T&R RES	2			
5817	_15P 100V 2%CAP T&R RAD CER.2"NPO	1	9915	KNOB 0-DEG RED SOFT GRAY RIB	2	6118	1/4W 22K 5%MINI T&R RES	3			
5199	100P 100V 2%CAP T&R RAD CER.2"NPO	1	9916	KNOB 0-DEG GRY SOFT GRAY RIB	1	4956	1/4W 27K 5% 2U T&R RES	2			
5203	_47P 100V 2%CAP T&R RAD CER.2"NPO	2	9917	KNOB 0-DEG GRN SOFT GRAY RIB	2	4890	1/4W 30K 5% T&R RES	1			
5410	100P 100V 10%CAP T&R BEAD NPO	1	3426	8 3/16 SJT AC LINE CORD REMOV-B-CSA	1	4941	1/4W 30K 5% 2U T&R RES	1			
5412	220P 100V 10%CAP T&R BEAD NPO	2	3828	STRAIN RELIEF HEVCO #1150	1	4947	1/4W 33K 5% 2U T&R RES	4			
5201	470P 100V 5%CAP T&R RAD CER.2"NPO	5	8259D	LOGO ELITE SERIES LARGE DOME	1	4868	1/4W 36K 5% T&R RES	1			
5208	_2N2 400V 5%CAP T&R RAD .2"FLM	2	3792	_288UH CHOKE 89T20AWG/77091MAGNTKS	1	4686	1/4W 37K4 1% METAL FILM T&R RES	3			
5275	_3N3 100V 5%CAP T&R RAD .2"FLM	2	3792CO	77091-A7 KOOL-MU TOROID CORE	1	4878	1/4W 43K 5% T&R RES	1			
5422	_1N 50V 10%CAP T&R BEAD NPO	2	8701	4-40 KEPS NUT ZINC	8	4927	1/4W 47K 5% 2U T&R RES	7			
5816	680P 100V 5%CAP T&R RAD CER.2"NPO	4	8793	4-40 HEX NUT ZINC	1	6119	1/4W 47K 5%MINI T&R RES	4			
5204	_10N 100V 10%CAP T&R RAD .2"FLM	3	8800	6-32 KEPS NUT ZINC	2	4928	1/4W 56K 5% 2U T&R RES	1			
5209	_4N7 250V 5%CAP T&R RAD .2"FLM	2	8787	8-32 KEPS NUT ZINC	3	4942	1/4W 100K 5% 2U T&R RES	4			
5210	_22N 100V 10%CAP T&R RAD .2"FLM	1	8604	10-32 T NUT	4	4839	1/4W 150K 5% T&R RES	1			
5224	_47N 100V 10%CAP T&R RAD .2"FLM	4	8602	1/4-20 T NUT	4	4796	1/4W 180K 5%MINI T&R RES	1			
5271	_5N6 100V 5%CAP T&R RAD .2"FLM	1	8797	5/16-18 KEPS NUT JS500	1	4949	1/4W 180K 5% 2U T&R RES	2			
6435	_22N 275V 20%CAP BLK 'X2' 15MM AC	1	8724	3/8-16 T-NUT (SCREW MOUNT)	2	4679	1/2W 270K 5% T&R RES	1			
6451	_4N7 250V 20%CAP BLK 'Y' 10MM AC	1	3884	SARCON THERMAL GASKET 4.58"X1.00"	1	6135	1/4W 270K 5%MINI T&R RES	1			
5212	100N 63V 5%CAP T&R RAD .2"FLM	48	4599	22AWG SOLID SC WIR T&R JMP	5	6127	1/4W 470K 5%MINI T&R RES	1			
5226	68N 100V 5%CAP T&R RAD .2"FLM	5	5299	24AWG SOLID SC WIR RAD JMP	2	4948	1/4W 1M 5% 2U T&R RES	1			
5229	150N 63V 10%CAP T&R RAD .2"FLM	2	4660	5.0W 0R47 5% BLK RES	2	3535	10.0" 9C-26AWG RIB 1 W/LCK HDR 098"	1			
5230	180N 63V 5%CAP T&R RAD .2"FLM	4	2005	1.0W 0R47 5%FLAME PROOF T&R RES	4	3696	RELAY 1C 02AMP DC24 006MA PC-S	1			
5231	220N 63V 10%CAP T&R RAD .2"FLM	1	4682	1/2W 1R 5%PHILIPS SMAL T&R RES	1	3790	EMI FILTER FOR RIBBON CABLE	1			
5234	470N 63V 10%CAP T&R RAD .2"FLM	1	4911	1/4W 2R2 5% T&R RES	1	8842	#4 X 5/16 PAN QUAD TYPE A JS500 BLK	6			
5314	100N 50V 10%CAP T&R BEAD X7R	2	4813	1/4W 6R2 5% T&R RES	2	8865	4-40 X 5/16 PAN PH MS JS500	4			
5254	_1U 63V 20%CAP T&R RAD .2"EL	1	2010	1/8W 10R0 2%FLAME PROOF T&R RES	4	8871	4-40 X 5/8 PAN PH MS JS500	9			
5255	_1U 63V 20%CAP T&R RAD .2"EL	2	4930	1/4W 10R 5% 2U T&R RES	1	8799	#6 X 1/4 PAN PH TYPE B JS500	1			
5257	_2U2 63V 20%CAP T&R RAD .2"EL	2	2038	1/4W 11R FUSIBLE T&R RES	2	8832	6-32 X 1/4 PAN PH TAPTITE JS500	19			
5258	_4U7 63V 20%CAP T&R RAD .2"EL	4	6134	1/4W 47R 5%MINI T&R RES	1	8801	6-32 X 3/8 PAN PH TAPTITE JS500	13			
5266	680N 250V 20%CAP BLK 'X2' 30MM AC	1	2018	1/8W 75R 2%FLAME PROOF T&R RES	3	8829	6-32 X 3/8 FLAT PH TAPTITE BO#C HEA	4			
5949	_3U3 140AC10%CAP BLK RAD POLYP FLM	3	2019	1/8W 100R0 1%FLAME PROOF T&R RES							



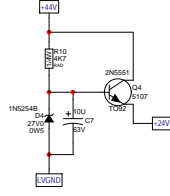
# élite EF500P

**800 WATT POWERED LOUDSPEAKER ENCLOSURE**



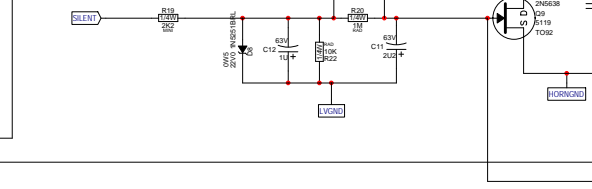


### PHANTOM SUPPLY

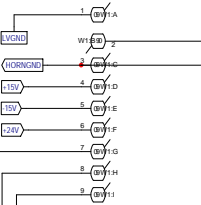


# HORN AMP

### SILENT ON/OFF

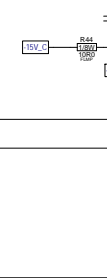


### FROM INPUT PCB

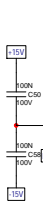


# WOOFER AMP

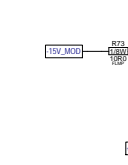
### +/-15V\_C



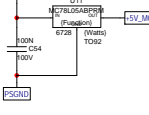
### FROM POWER SUPPLY

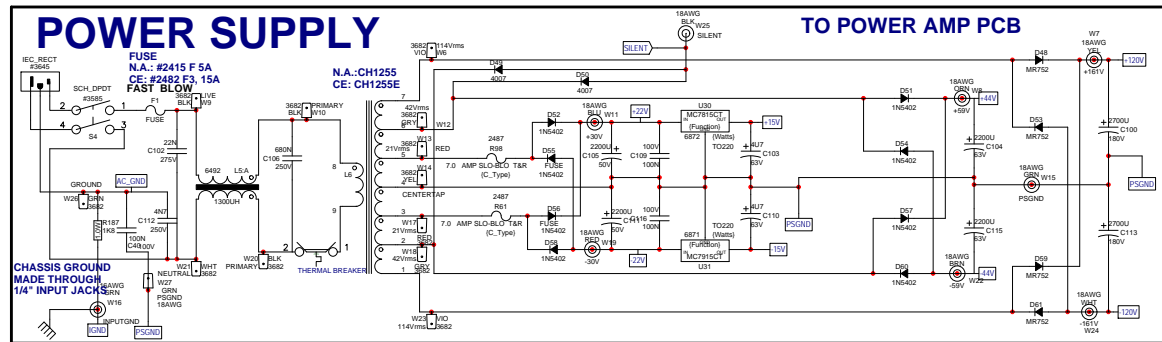


### +/-15V\_MOD



### +5V\_MOD





M1159		
MODEL(S):-	EF500P	
#	DATE	VER# DESCRIPTION OF CHANGE
1	AUG 22 2001	2.00 1ST RUN CHANGES FOR VER.200
2	D	11-APR-2002 2.00 PC#6523 UPDATE TABS. REMOVE COPPER UNDER XFMR BOARD NOT USED FOR NX520P - REMOVE M1159A
3	SEPT 18 2001	2.00 CHANGE R28 FROM 10K TO 4K7 AND R34 FROM 33K TO 47K
4	SEPT 20 2001	2.10 PC#6443 R39 682 TO 2R2
5	OCT 22 2001	3.00 REPOUR CHASSIS GROUND FOR CSA STANDARD 4mm CLEARANCE.
6	D	NOV 06 2001 3.10 ADD COPPER POURS UNDER ALL OUTPUT DEVICES.
7	D	NOV 29 2001 4.00 PC#6444 R17 70K TO 150R PC#6463 R130 4K7 TO 2K
8	D	NOV 29 2001 4.00 MOVED TRACES UNDER 1/4 JACKS #3921
9	D	14V.10 MOVE R24, ADD D21 AND C144, R27 FROM 47R TO 100R.
10	MAR/27/2002	V4.10 CHANGE R208 3K TO JUMPER, R204 3K TO 47K, R206 1K TO 220R, C140 1N5 TO 2N2
11	D	V AND C31 FROM 680P TO 100N.
12	D	V
13	D	V -INVERT BOTH AMP OUTPUT WIRE COLORS-INVERT BOX
1	1-APR-2002	4.20 PC#6513 R130 2K TO R123 1K TO 470R
2	11-APR-2002	5.00 PC#6523 UPDATE TABS. REMOVE COPPER UNDER XFMR BOARD NOT USED FOR NX520P - REMOVE M1159A
3	23-OCT-2003	6.00 BOARD NOT USED FOR NX520P - REMOVE M1159A
4	19-FEB-2004	7.00 PC#6871 P.S. MODIFIED TO MEET CE SPACING STNDS.
5	OCT-07-2004	7.10 PC#6894 CHANGE POTS TO P32 STYLE
6	D	PC#6743 CHANGE C23, C19, C30 TO "DO NOT STUFF"
7	OCT/15/2004	8.00 UPDATE TABS FOR DS PCB'S
8	SEP-13-2005	9.00 PC#9864-INCREASE SPACING OF PADS AT POW. DIODES
9	D	PC#6879-GT-R54R23 #4615 12R->#2036 11R FUSIBLE
10	OCT-31-2005	10.00 PC#7092-GT-R9 #4979 15K->#6104 24K, ADD 8921 WASHER
11	APR-27-2006	11.00 PC#7098-GT-Q14&Q15 6914 IRFP350->6967 IRFP23N50LPBF
12	AUG-16-2006	9.01 HA, PC#7136, REPLACE R77, R81 AND R82 WITH #4686 37K4 1% 1/4W. REPLACE R78 WITH TWO #4611
13	D	V
1	OCT-31-2006	10.00 ROUTE TRACE FROM R22 TO R20 AROUND Q1T MOUNT
2	D	PC#7167, ENLARGE HOLE SIZE FOR R322
3	D	PC#7178, Updated limiter for RoHS compliance
4	D	PC#7245, CHANGE VCD PARTS VALUE, HEAD LIMITATION
5	28-MAY-2007	11.00 FIX AUTO INSERT PROGRAM
6	05-JUL-2007	12.00 FIX AUTO INSERT PROGRAM
7	06-FEB-2008	13.00 PC#7290, CE VERSION ONLY, REPLACE R157 10K #4940 WITH 3K3 #4938, REPLACE D34 AND D43 1N4148 #6825 WITH BAT85 #6733
8	D	PC#7454, ONLY FOR N.A. REMOVE C77, R128 AND R124.
9	D	BA WILL PUT 33K 470R, 100N AND 10U AS SHOWN, PAGE3
10	D	PC#7398, ADD CROWBAR CIRCUIT AND CHANGE FUSE AT THE SAME TIME SEE PRODUCTION NOTE
11	D	D
12	D	D
13	D	D

	WITHOUT CROWBAR		WITH CROWBAR	
	N.A.	CE	N.A.	CE
TRANSFORMER	CH1255	CH1255E	CH1255	CH1255E
FUSE F1	#2415 F 5A	#2482 F3.15A	#2465 F 7A	#2479 F 5A

N.A.m.	CE
R145 4k7(#4982)	5k1(#6138)
R152 150k(#4639)	56k(#4825)
R157 10k(#4940)	3K3(#4938)
C89 22u(#5631)	33u(#5961)
C77 PC7454	4U7(#5238)
D34 1N4148(#6825)	BAT85(#6733)
D43 1N4148(#6825)	BAT85(#6733)
R128 1k(#4981)	220k(#6126)
R89 2k(#6113)	DNS
R124 1K0(#110)	(#4599)
U15 (#6858)	DNS
R127 2k2(#6104)	DNS
U23 (#6858)	DNS
W5 DNS	(#3709)
W29 DNS	(#4036)
_X64 DNS	(#4599)
_X65 (#4599)	DNS





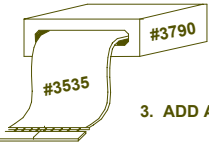




## PRODUCTION NOTES

1. NOTE THAT THIER IS SEVERAL LINES ON THE DSBOTMASK LAYER. THESE MAY BE USED FOR MARCONI TEST POINTS SO HAVE THIS LAYER ON IF DOING ANY MODIFICATIONS.

2. SLIDE EMI FILTER OVER RIBBON BEFORE INSERTING INTO P.C.B.



\*\*\*\*\*IMPORTANT\*\*\*\*\*

3. ADD AMPLE RTV UNDER ENTIRE BASE OF OUTPUT COIL L1

4. LEADS FOR 5 WATT RESISTORS MUST BE BENT ON THE MACHINE LEAD LOOP MUST NOT BE ABOVE TOP OF RESISTOR



5. #5858 Apply a ring of RTV on cap's sleeve as shown



6. Q11 ONLY: Mount #8871 4-40 screw with head on bottom. #8793 nut and 3501 washer on top

7. FIT #8921 FLAT WASHER BETWEEN #3501 BELL WASHER AND #8667 SHOULDER WASHER FOR Q2, Q10 U30 AND U31

\*NOTE: IF THE NX520P MODEL IS BEING USED AS A REFERENCE, NOTE THAT THE HORN OF THE EF500P IS WIRED OPPOSITE TO THAT OF THE NX520P.

8. NOTE: COMPONENTS R183, C114, C117, R215, C30, C19 AND C23 ARE ALL DNS (DO NOT STUFF). THEY ARE FIXED SO THAT THEY WILL NOT GET FORCE UPDATED.

9. PC7454, RESTORE HORN LIMITTER, CHECK THE PRODUCTION NOTES ON NEXT PAGE, PAGE 3. THIS IS ONLY FOR NORTH AMERICAN UNITS

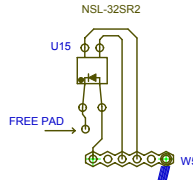
10. PC7398, ADD CROWBAR CIRCUIT AND CHANGE THE FUSE VALUE AT THE SAME TIME.

### 11. M1159, PARTS REPLACEMENT TABLE

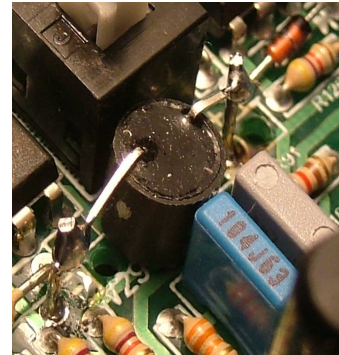
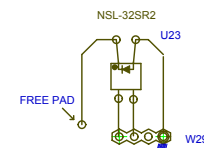
	M1159A CE	M1159B N. AMERICA
C77	#5258, 4U7 63V 20%	DNS, SEE NOTE ON PAGE 3, PC7454
C89	#5961, 33U 16V 20%	#5631, 22U 50V 20%
R89	DNS	#6113, 2K 1/4W 5% MINI
R124	#6110, 1K 1/4W 1% MINI MF	#4599, 22AWG SOLID
R127	DNS	#6104, 2K2 1/4W 5% MINI
R128	#6126, 220K 1/4W 5% MINI	DNS, SEE NOTE ON PAGE 3, PC7454
R145	#6138, 5K1 1/4W 5% MINI	#4982, 4K7 1/4W 5% MINI
R152	#4835, 56K 1/4W 5%	#4839, 150K 1/4W 5%
R157	#4938, 3K3 1/4W 5%	#4940, 10K 1/4W 5%
D34	#6733, BAT85 30V 0A2	#6825, IN4148 75V 0A45
D43	#6733, BAT85 30V 0A2	#6825, IN4148 75V 0A45
U15	DNS	#6858 OPTO-COUPLER
U23	DNS	#6858 OPTO-COUPLER
W5	#3709, 7in 6C-26AWG RIB 1 W/LCK HDR	DNS
W29	#4036, 8in 4C-28AWG RIB 1 W/LCK HDR	DNS
X64	DNS	#4599, 22AWG SOLID
X65	#4599, 22AWG SOLID	DNS

12. M1159B, U15 AND U23 ARE HAND INSERTED AFTER WAVE SOLDERING, PUT OPTOCOUPLERS AS SHOWN IN THE PHOTOS.

### PHOTO 1 U15



### PHOTO 2 U23



	WITHOUT CROWBAR		WITH CROWBAR	
	N.A.	CE	N.A.	CE
XFRM	CH1255	CH1255E	CH1255	CH1255E
FUSE F1	#2415 F 5A	#2482 F3.15A	#2465 F 7A	#2479 F 5A





SEE LAYOUT DIAGRAM



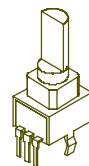
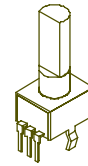
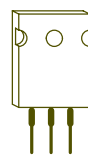
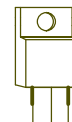
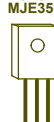
M1159			
MODEL(S):-		EF500P	
#	DATE	VER#	DESCRIPTION OF CHANGE
1	AUG 22 2001	2.00	1st RUN CHANGES FOR VER.2.00
2	D	V	SEE ATTACHED NOTES ON DATA BASE.
3	SEPT 18 2001	2.00	CHANGE R28 FROM 10K TO 4K7 AND R34 FROM 33K TO 47K
4	SEPT 20 2001	2.10	PC#6453 R39 6R2 TO 2R2
5	OCT 22 2001	3.00	REPOUR CHASSIS GROUND FOR CSA STANDARD 4mm CLEARANCE
6	D	V	ADD COPPER POURS UNDER ALL OUTPUT DEVICES.
7	NOV 06 2001	3.10	PC#6464 R37 75R TO 150R PC#6469 R130 4K7 TO 2K
8	NOV 29 2001	4.00	MOVED TRACES UNDER 1/4" JACKS #3921
9	D	&V4.10	MOVE R24. ADD D21 AND C144. R27 FROM 47R TO 100R.
10	MAR/27/2002	V4.10	CHANGE R208 3K TO JUMPER. R204 3K TO 47K. R206 1K TO 220R. C140 1N5 TO 2N2
11	D	V	AND C91 FROM 680P TO 100N.
12	D	V	-INVERT BOTH AMP OUTPUT WIRE COLORS-INVERT BOX
13	D	V	
1	1-APR-2002	4.20	PC#6513 R130 2K TO R123 1K TO 470R
2	11-APR-2002	5.00	PC#6523 UPDATE TABS, REMOVE COPPER UNDER XFMR
3	23-OCT-2003	6.00	BOARD NOT USED FOR NX520P - REMOVE M1159A
4	19-FEB-2004	7.00	PC#6671 P.S. MODIFIED TO MEET CE SPACING STNDS.
5	OCT-07-2004	7.10	PC#6694 CHANGE POTS TO P32 STYLE
6			PC#6743 CHANGE C23, C19, C30 TO "DO NOT STUFF"
7	OCT/15/2004	8.00	UPDATE TABS FOR DS PCB'S
8	SEP-13-2005	9.00	PC#6964:INCREASE SPACING OF PADS AT POW. DIODES
9			PC#6979:GT:R6&R23 #4815 12R->#2038 11R FUSIBLE
10	OCT-31-2005		PC7003:GT:R9 #4979 15K->#6104 2K2, ADD 8921 WASHER
11	APR-27-2006		PC#7098:GT:Q14&Q15 6914 IRFP350->6967 IRFP23N50LPBF
12	AUG-16-2006	9.01	HA, PC#7136, REPLACE R77, R81 AND R82 WITH #4686
13			37K4 1% 1/4W. REPLACE R78 WITH TWO #4611
1	OCT-31-2006	10.00	ROUTE TRACE FROM R22 TO R20 AROUND Q11 MOUNT
2			PC# 7167, ENLARGE HOLE SIZE FOR #3522
3			PC#7178, Updated limiter for RoHS compliance
4			PC#7245, CHANGE VCD PARTS VALUE, HEAD LIMITATION
5	28-MAY-2007	11.00	FIX AUTO INSERT PROGRAM
6	05-JUL-2007	12.00	FIX AUTO INSERT PROGRAM
7	06-FEB-2008	13.00	PC#7290,CE VERSION ONLY, REPLACE R157 10K #4940
8			WITH 3K3 #4938. REPLACE D34 AND D43 1N4148 #6825
9			WITH BAT85 #6733
10			PC#7454, ONLY FOR N.A. REMOVE C77, R128 AND R124.
11			BA WILL PUT 33K,470R,100N AND 10U AS SHOWN, PAGE3
12			PC#7398, ADD CROWBAR CIRCUIT AND CHANGE FUSE
13			AT THE SAME TIME SEE PRODUCTION NOTE

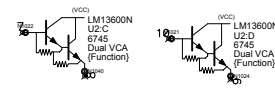
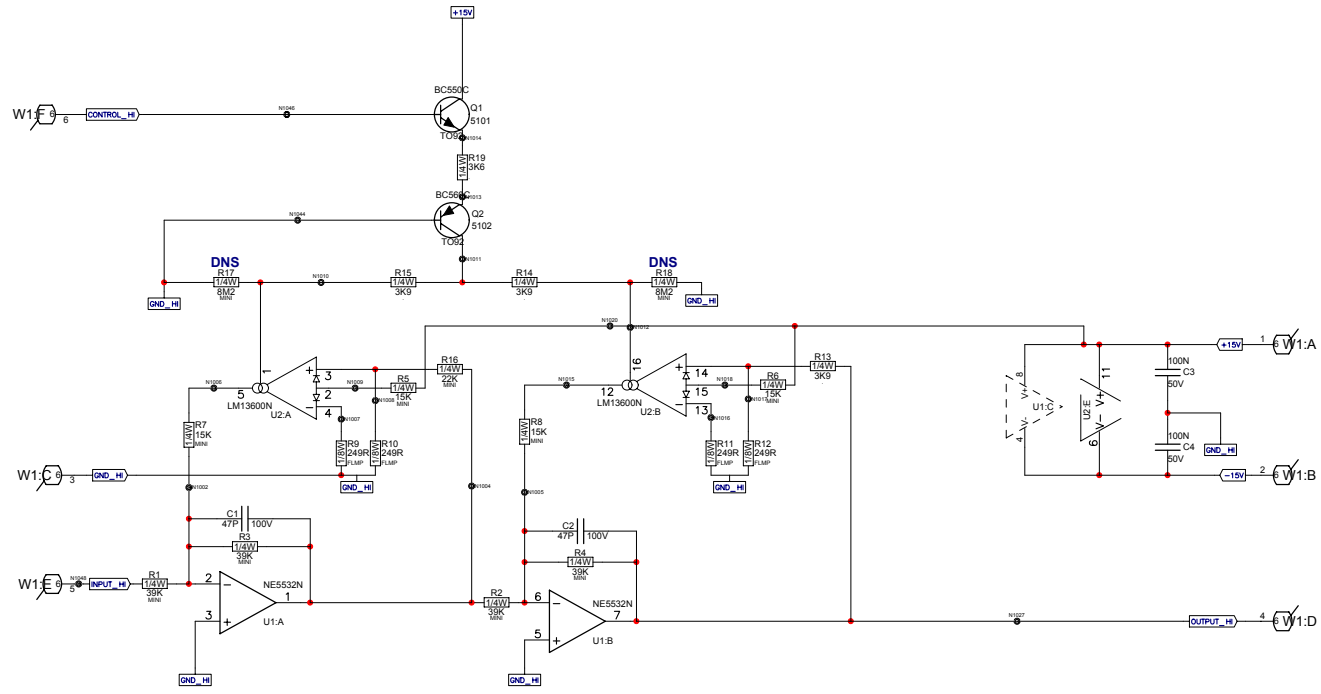
M1159					
MODEL(S):-		EF500P			
REF	FUNCTION	OLD PART	NOB	NEW PART	NOB
P1	MAIN GAIN	4537	8393	4434	9916
P2	MIC GAIN	4566	8392	4432	9915
P3	BASS TONE	4546	8394	4435	9917
P4	LINE GAIN	4566	8392	4432	9915
R	HORN TONE	4537	8394	4434	9916
R	F	O	K	N	K
R	F	O	K	N	K
R	F	O	K	N	K
R	F	O	K	N	K
R	F	O	K	N	K
R	F	O	K	N	K
R	F	O	K	N	K
R	F	O	K	N	K

M1159 PENDING CHANGES		
MODEL(S):-		EF500P
#	PC#	PENDING CHANGE
1	7244	CHANGING #4599 TO #4597 IS NOT EXECUTABLE
2	PC	.
3	PC	.
4	PC	X
5	PC	X
6	PC	X
7	PC	X
8	PC	X
9	PC	X
10	PC	X
11	PC	X
12	PC	X
13	PC	X

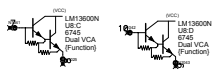
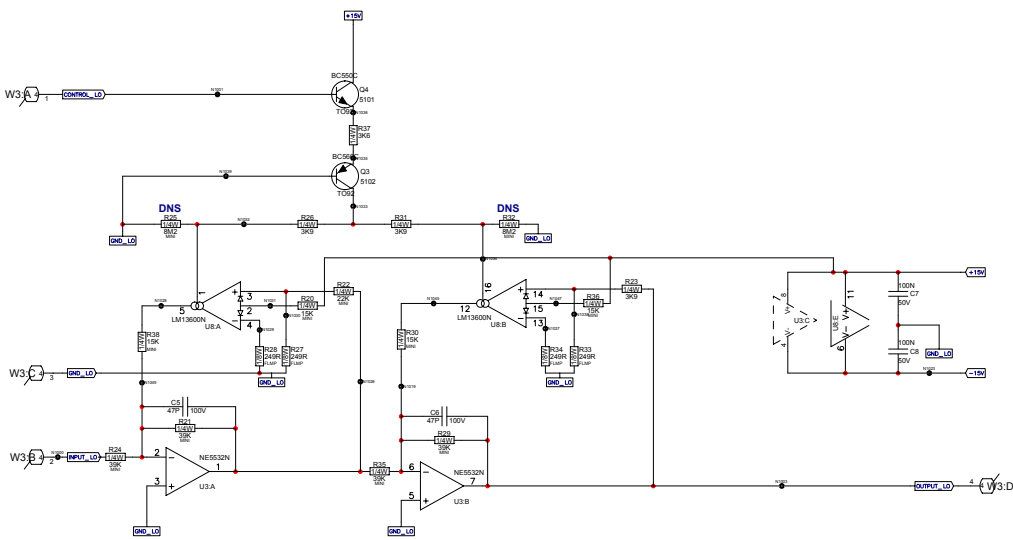
\*PLACE IMPLEMENTED CHANGES INTO BOARD HISTORY

## PIN CONFIGURATION

"STYLE\_P25"  
OLD"STYLE\_P32"  
NEWIRFP9140N  
IRFP23N50LG D S  
TO-247BDX54B-54C  
BDX53B-53CB C E  
TO-220MJE270  
MJE271  
MJE340  
MJE350E C B  
TO-1262N5401  
2N5551  
MPSA06  
MPSA13  
MPSA43  
MPSA56  
MPSA63  
MPSA92E B C  
TO-92J109  
2N5638  
D S G  
TO-92BC550C  
BC560C  
C B E  
TO-92



<b>Product</b> RoHS Limiter		
Limit_HI	PCB# M1339	Sheet 1 of 3
Date: Wed Mar 28, 2007	Rev: 1V10	YsType: YsType
Filename: M1339-1V10 sch.sch2002		







M____PCB_DATABASE_HISTORY			
MODEL(S):-		MODEL	
#	DATE	VER#	DESCRIPTION OF CHANGE
1	19SEP2006	1V00	FIRST PROTO
2	20OCT2006	1V10	ADDED BEC LOC
3	24JAN2008		PC 7447, CHANGE W1, #3661 TO #3026
4	D	V	N
5	D	V	N
6	D	V	N
7	D	V	N
8	D	V	N
9	D	V	N
10	D	V	N
11	D	V	N
12	D	V	N
13	D	V	N
1	D	V	N
2	D	V	N
3	D	V	N
4	D	V	N
5	D	V	N
6	D	V	N
7	D	V	N
8	D	V	N
9	D	V	N
10	D	V	N
11	D	V	N
12	D	V	N
13	D	V	N
1	D	V	N
2	D	V	N
3	D	V	N
4	D	V	N
5	D	V	N
6	D	V	N
7	D	V	N
8	D	V	N
9	D	V	N
10	D	V	N
11	D	V	N
12	D	V	N
13	D	V	N



SEE LAYOUT DIAGRAM



# PRODUCTION NOTES

1. Do not stuff parts R17,18,25,32

M____PCB_DATABASE_HISTORY				
MODEL(S):-		MODEL		
#	DATE	VER#	DESCRIPTION OF CHANGE	
1	D	V	N	
2	D	V	N	
3	D	V	N	
4	D	V	N	
5	D	V	N	
6	D	V	N	
M____PENDING CHANGES				
MODEL(S):-		MODEL		
#	PC#	PENDING CHANGE		
1	PC	X		
2	PC	X		
3	PC	X		
4	PC	X		
5	PC	X		
6	PC	X		
*PLACE IMPLEMENTED CHANGES INTO BOARD HISTORY				
{TITLE}				
MODEL(S):- {MODEL}				
REF	FUNCTION	PART#	NOB	{NEW}
R	F	P	K	N
R	F	P	K	N
R	F	P	K	N
R	F	P	K	N
R	F	P	K	N
R	F	P	K	N
R	F	P	K	N
R	F	P	K	N
R	F	P	K	N
R	F	P	K	N
R	F	P	K	N

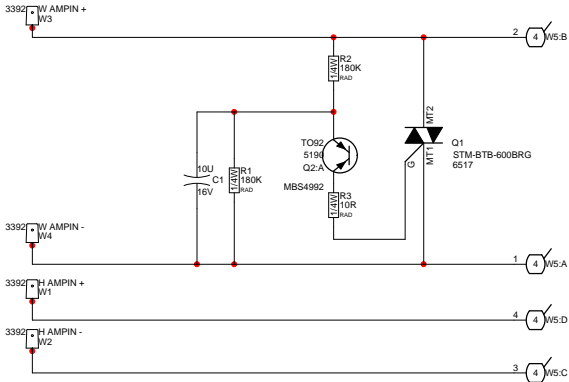
LEAD/PIN REFERENCE

MPSA56 BC560C  
MPSA06 BC550C



E B C  
TO-92

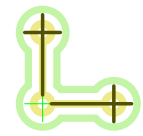
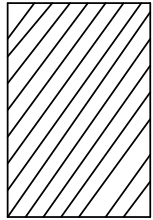
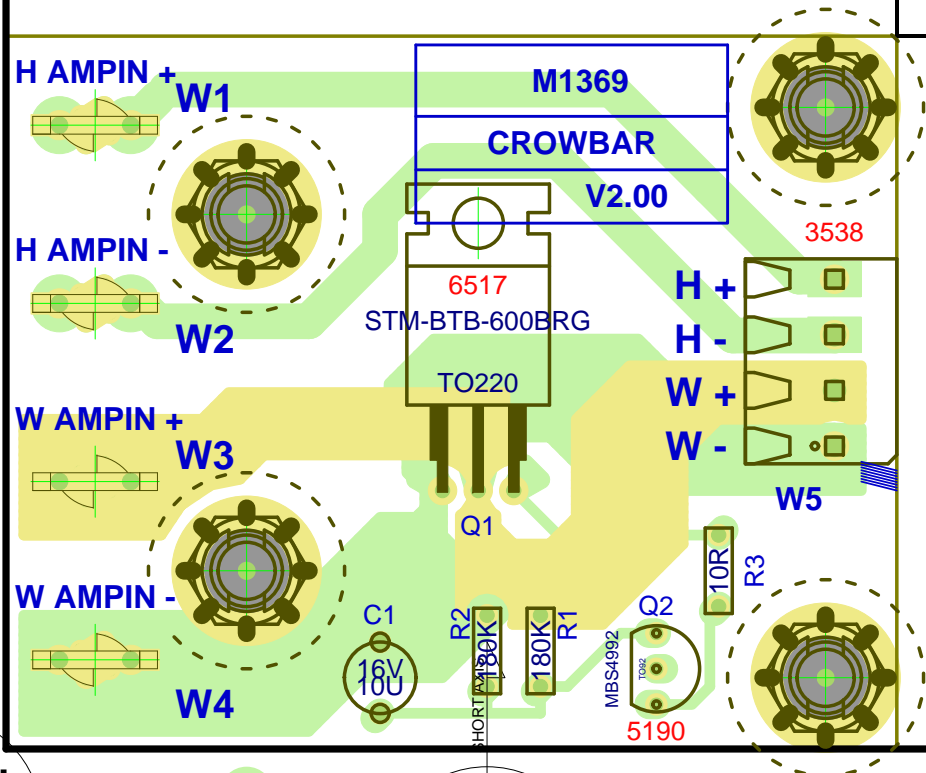
C B E  
TO-92



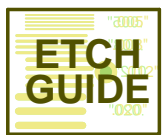
M1369 PCB_DATABASE_HISTORY			
MODEL(S):-		CROW BAR	
#	DATE	VER#	DESCRIPTION OF CHANGE
1	28-NOV-2007	1.00	FIRST DESIGN
2	02-JUN-2008	2.00	UPDATE TABS
3	D	V	N
4	D	V	N
5	D	V	N
6	D	V	N
7	D	V	N
8	D	V	N
9	D	V	N
10	D	V	N
11	D	V	N
12	D	V	N
13	D	V	N



Product <b>CROW BAR</b>		
Sheet1	PCB# M1369	Sheet 1 of 1
Date: Mon Jun 02, 2008	Rev:2.00	YsType:YsType
Filename: M1369V200sch.sch2002		



LONG AXIS



**2ozCopper**



SEE LAYOUT DIAGRAM



# PRODUCTION NOTES

1. USE #8799, #6 1/4 PAN SCREW FOR TRIAC Q1

M1369 PCB_DATABASE_HISTORY			
MODEL(S):-		CROW BAR	
#	DATE	VER#	DESCRIPTION OF CHANGE
1	28-NOV-2007	1.00	FIRST DESIGN
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8	D	V	N
9	D	V	N
10	D	V	N
11	D	V	N
12	D	V	N
13	D	V	N

## LEAD/PIN REFERENCE

0.128" NPT HOLES MUST NOT BE SECOND DRILLED

STM-BTB-600BRG



MT1 G MT2  
TO-220



We have experienced some failures with the short pilot runs of 520P and EF500P due to an incorrectly mounted resistor on the power board. There are only about a dozen of each of these in each of our market territories. These failures at first sight will seem somewhat intimidating due to the blackening soot which is produced when the resistor arcs out to the printed high voltage rails under the resistor designated R60. The damage looks far worse than it really is and is generally repairable by anyone with basic electronics and soldering skills.

The greatest difficulty with servicing class "D" amplifiers is that most service people have never serviced one before. And, like all things new, they don't like being in unfamiliar water. When you have done a couple of these kinds of amps, you will realize that they are probably easier to repair than their linear counterparts. But there are two dramatic differences to be observed in testing this class of amp. They are:

- 1) You cannot soft start this type of amplifier as it has an error amplifier, which will deny start up at low voltage.
- 2) You must have a load connected to the output upon startup. The amp sends a test pulse upon startup which must be registered in the feedback loop before it will activate the driver chip. If there is no load there is no current in the output, if there is no current, there is no voltage and consequently no feedback pulse.

The good news is that this class of amp will generally not cook off if you failed to repair it and then try to fire it up. It usually just sits there dumbfounded waiting for you to find the missing faulty bits.

The process for repair of units suffering from an R60 arc over is as follows.

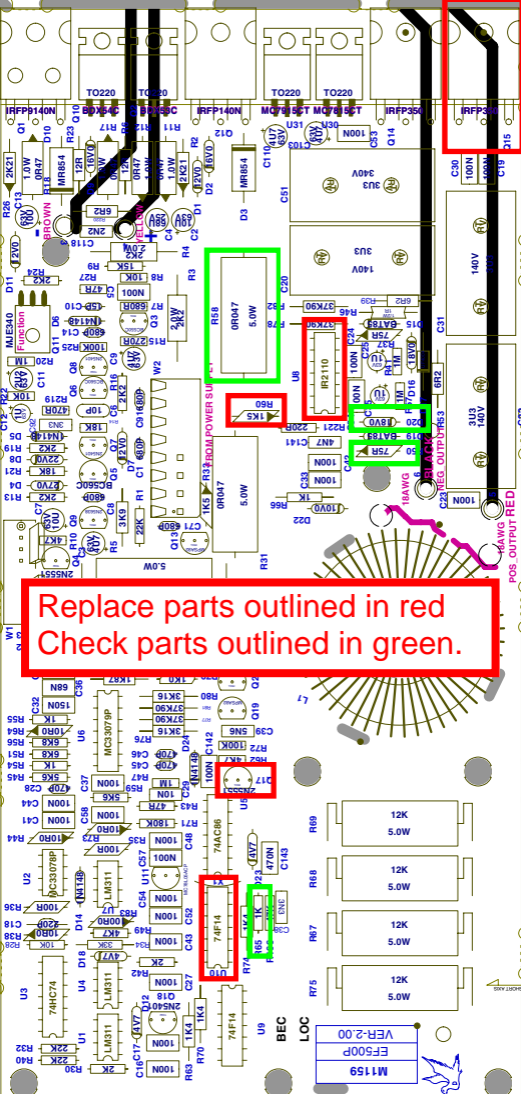
- A) Remove the remains of R60 and clean the soot from the board. Please remember this is a double-sided circuit board with thru plated component holes. Do not use excess force to remove the component leads from their solder holes. They will come out easy enough when you have enough heat on the joint.
- B) Replace the following components : 1) Q15 , IRFP350 2) Q17 , 2N5551 3) U10 , 74HC14N 4) U8 , IR2110 And finally, R60 , 1K5 , which should be installed about ¼" above the board so as not to arc out to the high voltage traces again.
- C) Measure the following parts; just to be sure we don't have any stragglers. 1) R58, .47ohms 2) R50 , 75R 3) R65 , 1K and 4) D20 , 18 volt zener.
- D) Yorkville Part #'s (Q15 = 6914) (Q17 = 5107) (U10 = 6603) (U8 = 6887) (R60 = 2034)

When all the bits have been replaced and the other parts measured, you are ready to fire it up.

**Do not forget the startup rules mentioned above** and you should have a 95% chance of a first shot success on the job.

Address any further questions to: Guy Beresford ([gberesford@yorkville.com](mailto:gberesford@yorkville.com)) or 905-837-8481 extension 236.

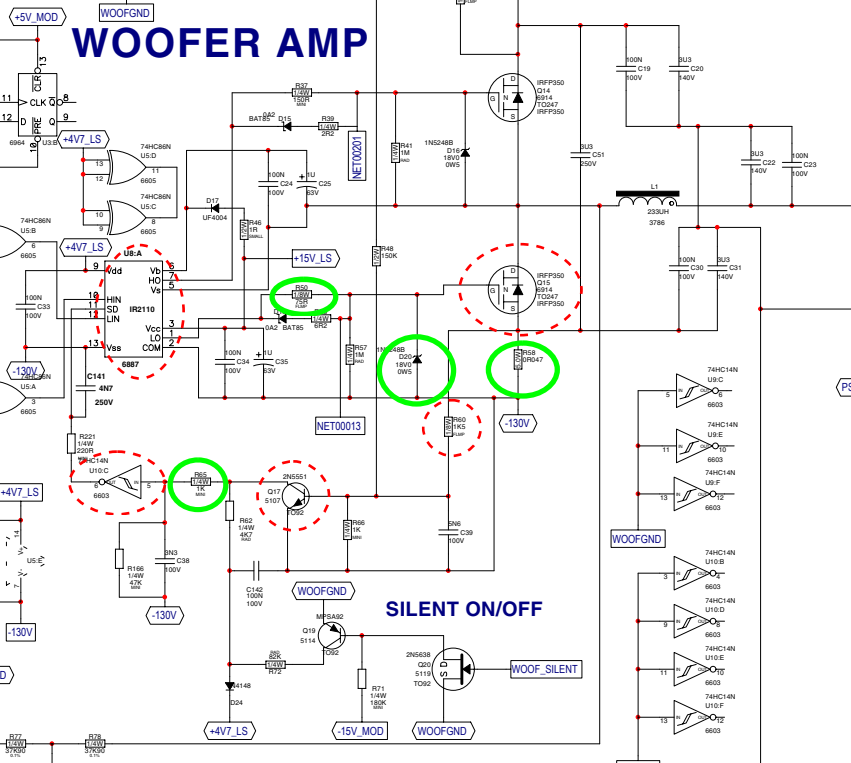
Replace parts outlined in red  
Check parts outlined in green.



M1159  
EF50P  
VER-2.00



# WOOFER AMP





**YS#9916 Gray Knob (qty: 1)**



**YS#9917 Green Knob (qty: 2)**



**YS#89915 Red Knob (qty: 2)**