



SERVICE MANUAL

**DC-300A SERIES II
DUAL-CHANNEL POWER AMPLIFIER**



SERVICE MANUAL

DC-300A SERIES II DUAL-CHANNEL POWER AMPLIFIER

CROWN INTERNATIONAL, INC. 1718 W. MISHAWAKA RD. ELKHART, INDIANA 46517

Note: The information in this manual is written for the experienced technician and is intended for their use only.

Should you need additional technical assistance, please contact the Technical Service Department, Crown International, Inc., 1718 W. Mishawaka Road, Elkhart, Indiana 46517. Phone (219) 294-8000.

Caution: Unauthorized service performed during the Crown Warranty Period could result in voiding the warranty. Refer servicing during this period to a Crown Authorized Service Center.

Table of Contents

RVW Sec. Review

I.	Introduction	R-1
II.	Specifications	R-1
III.	Operating Precautions	R-2
IV.	Controls and Adjustments	R-2

Section 6 Illustrated Parts List

6.1	General Information	6-1
6.2	Standard and Special Parts	6-1
6.3	Ordering Parts	6-1
6.4	Shipment	6-1
6.5	Terms	6-1
6.6	Schematics/Parts Lists/Exploded View Drawings	6-2

Section 7 Maintenance

7.1	Introduction	7-1
7.2	Required Test Equipment	7-1
7.3	Basic Troubleshooting	7-1
7.4	Disassembly Procedure (for Inspection, Troubleshooting, Adjustments and Replacements) . . .	7-2
7.5	Reassembly	7-3
7.6	Electrical Checkout	7-3
7.7	Troubleshooting Chart	7-4
7.8	Detailed Circuit Theory	7-5
7.9	.775VRMS Conversion	7-6
7.10	Voltage Conversion	7-7

List of Illustrations

Fig. RVW.1	DC-300A Series II Front Panel	R-3
Fig. RVW.2	DC-300A Series II Back Panel	R-3
Fig. 6.1	Main Module Component Board Layout; #Q41602J5 (for serial numbers 71024 thru 81323)	6-2
Fig. 6.2	Main Module Foil Board Layout; #Q41602J5 (for serial numbers 71024 thru 81323)	6-3
Fig. 6.3	Main Module Component Board Layout; #Q42532-4 (for serial numbers 81324 and above)	6-7
Fig. 6.4	Main Module Foil Board Layout; #Q42532-4 (for serial numbers 81324 and above)	6-8
Fig. 6.5	Front Panel, Exploded View Drawing "A"	6-15
Fig. 6.6	Back Panel, Exploded View Drawing "B"	6-16
Fig. 6.7	Internal View, Exploded View Drawing "C"	6-18
Fig. 7.1	10kHz Square Wave Response, 8 ohms	7-3
Fig. 7.2	Clipped Waveform	7-3
Fig. 7.3	Inductive Load Waveform, 2 ohms	7-4
Fig. 7.4	Mono Response Waveform	7-4
Fig. 7.5	Voltage Conversion Chart	7-7



REVIEW SECTION

I. Introduction

This manual contains complete service information on the DC-300A Series II. Schematic diagrams, exploded view drawings, parts listings and checkout procedures are provided for the disassembly, inspection and repair of the amplifier. For complete installation and operation procedures refer to the DC-300A Series II Instruction Manual.

NOTE: THE INFORMATION IN THIS MANUAL IS INTENDED FOR USE BY AN QUALIFIED TECHNICIAN ONLY!

II. Specifications

General Specifications

Hum and Noise (20Hz-20KHz): 110dB below rated output.

Phase Response: +0, -15° zero to 20KHz at 1 watt.

Input Impedance: 25K ohms.

Amplifier Output Protection: Short, mismatch, and open circuit proof. Limiting is instantaneous with no flyback pulses, thumps, cutout, etc. No premature limiting on transients.

Overall Protection: AC line fused. Thermal switch in AC line protects against overheating caused by insufficient ventilation. Controlled slewing rate voltage amplifiers protect overall amplifier against RF burnouts. Input overload protection is furnished by internal resistance at inputs of amp.

Turn-on: Instantaneous, with minimum thumps and no program delay.

Power Supply: 1 kilowatt transformer with massive computer-grade filter capacitors storing over 48 joules of energy. Two regulated supplies for complete isolation and stability.

Power Requirements: Requires 50-400Hz AC with selectable taps for 100, 120, 200, 220 and 240V +/-10% operation. Draws 40 watts or less on idle, 500 watts at 300 watts total output.

Heat Sinking: Massive black-anodized heat sinks are thermally joined with the chassis, thereby utilizing the entire amplifier as a heat sink.

Chassis: All aluminum construction for maximum heat conduction and minimum weight. Heavy aluminum front panel is a single extrusion.

Controls: Independent input level controls are on front panel. Power switch with pilot light is on front panel. Non-interacting DC balance controls are mounted behind front panel. A mono-stereo switch is located below the input jacks on the rear panel.

Connectors: Input - ¼ inch phone jack; output - color coded binding posts; AC line - three-wire (grounded) male connector on 5 ft. cable.

Dimensions: 19 inches (48.26 cm) standard rack mount (W.E. hole spacing), 7 inches (17.78 cm) high, 9¾ inches (24.81 cm) deep (from mounting surface).

Weight: 45 pounds (20.25 kg).

Finish: Polyester vinyl coated aluminum, metallic gray, front panel with Lexan insert.

Stereo Specifications

Output Power: 155 watts per channel minimum RMS (both channels operating) into an 8 ohm load over a bandwidth of 1Hz-20KHz at a rated RMS sum total harmonic distortion of 0.05% of the fundamental output voltage.

Frequency Response: +/-0.1dB DC-20KHz at 1 watt into 8 ohms; +/-1dB DC-100KHz.

1KHz Power: 180 watts RMS into 8 ohms, per channel, both channels operating, 0.1% total harmonic distortion.

Harmonic Distortion: Less than 0.001% from 20Hz-400Hz, and increasing linearly to 0.05% at 20KHz at 155 watts RMS per channel into 8 ohms.

I.M. Distortion (60Hz-7KHz 4:1): Less than 0.05% from 0.01 watts to 0.25 watts and less than 0.01% from 0.25 watts to 155 watts into 8 ohms, per channel.

Slewing Rate: 8 volts per microsecond (slewing rate is the maximum value of the first derivative of the output signal, or the maximum slope of the output signal).

Damping Factor: Greater than 750, DC-400Hz into 8 ohms.

Output Impedance: Less than 7 milliohms in series with less than 3 microhenries.

Load Impedance: Rated for 8 ohm usage; safely drives any load including completely reactive loads.

Voltage Gain: 20.6 +/-2% or 26.3 +/-0.2dB at maximum gain.

Input Sensitivity: 1.75 volts +/-2% for 155 watts into 8 ohms.

Output Signal: Unbalanced, dual channel.

Monaural Specifications

Output Power: 310 watts minimum RMS into a 16 ohm load over a bandwidth of 1Hz-20KHz at a rated RMS sum total harmonic distortion of 0.05% of the fundamental output voltage.

Frequency Response: +/-0.15dB, DC-200KHz at 1 watt into 16 ohms; +/-1dB, DC-60KHz at 1 watt into 16 ohms.

1KHz Power: 360 watts RMS into 16 ohms.

Harmonic Distortion: Less than 0.001% from 20Hz-400Hz and increasing linearly to 0.05% at 20KHz at 310 watts into 16 ohms.

I.M. Distortion: Less than 0.05% from 0.01 watts to 0.25 watts and less than 0.01% from 0.25 watts to 310 watts into 16 ohms.

Slewing Rate: 16 volts per microsecond.

Damping Factor: Greater than 700, DC-400Hz into 16 ohms.

Output Impedance: Less than 15 milliohms in series with less than 6 microhenries.

Load Impedance: Rated for 16 ohm usage; safely drives any load including completely reactive loads.

Voltage Gain: 41.2 +/-2% or 32.3 +/-0.2dB at maximum gain.

Input Sensitivity: 1.75 volts for 310 watts into 16 ohms.

Output Signal: Balanced, single channel.

III. Operating Precautions

The following are a number of operating precautions given as an aid to understanding proper and improper amplifier usage.

1. Use care in making connections, selecting signal sources and controlling the output level. Crown is not liable for damaged done to loads.

2. Never parallel the output with any other amplifiers output or parallel the two channels of the DC-300A Series II amplifier. Damage incurred by such operation is not covered under warranty.

3. Never drive a transformer-coupled device or any other device which appears as a low frequency short (less than 3 ohms at DC) without a series isolating capacitor. Such operation may damage the device and/or cause needlessly wasted output power.

4. Do not connect the ground lead of the output cable to the input signal ground as oscillations may result from forming such a loop.

5. Never connect the output to a power supply, battery or power main.

6. Operate the amplifier from AC mains of not more than 10% above or below the selected line voltage and only 50/60Hz AC. Failure to comply with these frequency limits voids the warranty.

7. Tampering in the circuitry by unqualified personnel or the making of unauthorized curcuit modifications may seriously degrade the performance of the amplifier and possibly invalidate the warranty.

IV. Controls and Adjustments

The following paragraphs refer to the front and rear panel diagrams (Fig. RVW.1 and Fig. RVW.2).

A. Power Switch/Indicator

This button, when depressed, will activate the DC-300A Series II and also cause the amber LED indicator to illuminate if proper power requirements are met.

B. Input Level Controls

Both Input Level Controls provide control of the input signal level by channeling the input signal through 25K ohm audio taper potentiometers.

C. IOC Indicators

The IOC (Input Output Comparator) indicators are the two red LED indicators located on the front panel and help the user identify problems the unit may experience such as input signal overload, improper load impedance or even an amplifier based problem. Occasional flashing with music program peaks is normal however, continuous illumination indicates a problem and should be investigated.

D. Input Phone Jacks

Input signal hook-up is through conventional unbalanced 1/4" phone jacks. Refer to the Instruction Manual for complete information on connecting input lines to the unit.

E. Mono/Stereo Switch

This rear panel switch determines whether the unit is to perform as a single (mono) or dual (stereo) channel amplifier.

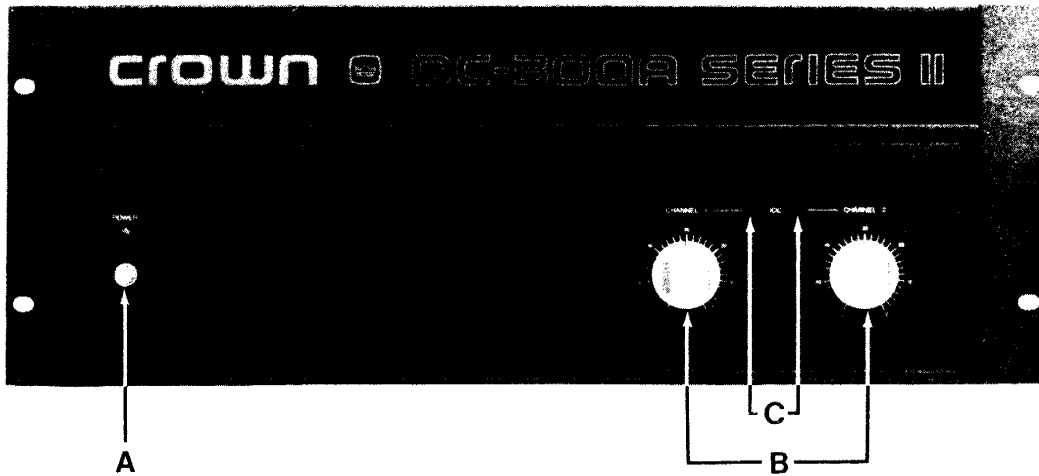


Fig. RVW.1 DC-300A Series II Front Panel

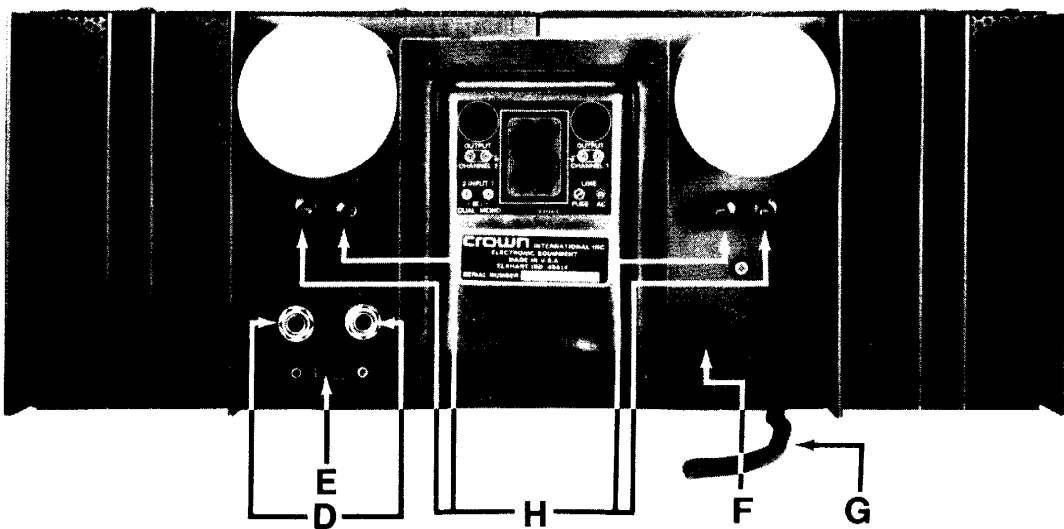


Fig. RVW.2 DC-300A Series II Back Panel

F. Fuse

Fuse replacement should not normally be necessary unless AC main voltage conversion is needed (see Section 7.10) or if the fuse has blown due to improper AC voltage or the amplifier develops an internal problem.

G. AC Line Cord

The DC-300A Series II is furnished with a three-wire, heavy duty AC cord and plug as standard equipment. Use caution with the third wire ground since it may introduce a ground loop in the system. A three-to-two plug adapter may be needed to prevent ground loop problems. Contact Crown Technical Service Dept. for further information if grounding problems are suspected in a particular system hook-up.

Note: Crown assumes no liability whatsoever for operation of ungrounded auxiliary equipment, nor for violation of UL or local electrical codes.

H. Main Output Jacks

The DC-300A Series II main output jacks are of the standard MDP banana style. Refer to the DC-300A Series II Instruction Manual for complete information on connecting output lines and loads to the unit.



SECTION 6

ILLUSTRATED PARTS LIST

6.1 General Information

Section 6 contains illustrations and parts lists for the DC-300A Series II. This information should be used with the service, repair and adjustment procedure in Section 7.

Most of the mechanical and structural type parts are illustrated and indexed on exploded view drawings. Electrical and electronic parts on these illustrations are also identified by the circuit schematic designation next to the illustration. Both the index number and the schematic designation are included in the parts list in separate columns. The schematic designations correspond to those shown in schematic diagrams in the Review Section.

Electrical and electronic parts located on printed circuit boards are illustrated by schematic symbols on the trace side and by component shape symbols on the component side. Schematic designations also appear on these diagrams.

The quantity of each part used in each location is also shown in the parts listing.

6.2 Standard and Special Parts

Many electrical and electronic parts used in the DC-300A Series II are standard items stocked by and available from electronic supply houses. However, some electronic parts that appear to be standard, are actually special. A part ordered from Crown will assure an acceptable replacement. Structural items, covers and panels are available from Crown only.

6.3 Ordering Parts

When ordering parts, be sure to give the model and serial number and include the part description and Crown Part Number (CPN) from the parts list. Price quotes are available upon request.

6.4 Shipment

1. Shipment will be made by UPS or best method unless you specify a preferred method.
2. Shipments are made F.O.B. Elkhart, Indiana only.
3. Established Crown accounts will be freight prepaid and billed unless shipped by truck or air freight.
4. All others will be shipped freight collect.

6.5 Terms

NOTE: Part prices are subject to change without notice.

1. Normal terms are C.O.D. unless the order is prepaid.
2. Net 30 days terms apply only to those firms who have an established line of credit with Crown.
3. If prepaying please add an amount for the freight charge. \$2.50 is average for an order under one pound.
4. New parts returned for credit are subject to a 10% restocking charge.
5. You must receive authorization from the Parts Dept. before returning parts for credit.
6. We are not a general parts warehouse! Parts are available for servicing Crown products only.

6.6 Schematics/Parts Lists/Exploded View /Drawings

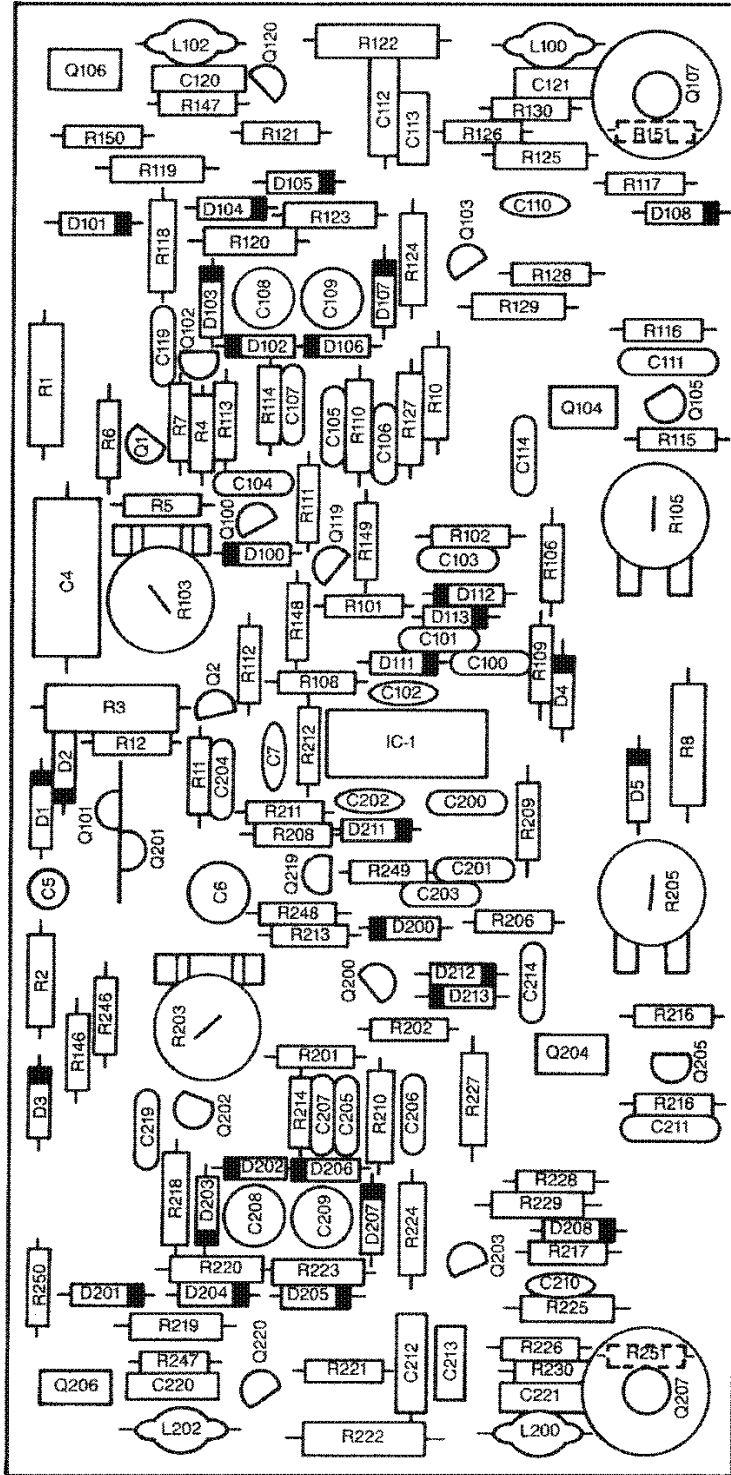


Fig. 6.1 Main Module Component Board Layout; #Q41602J5
(for serial numbers 71024 thru 81323)

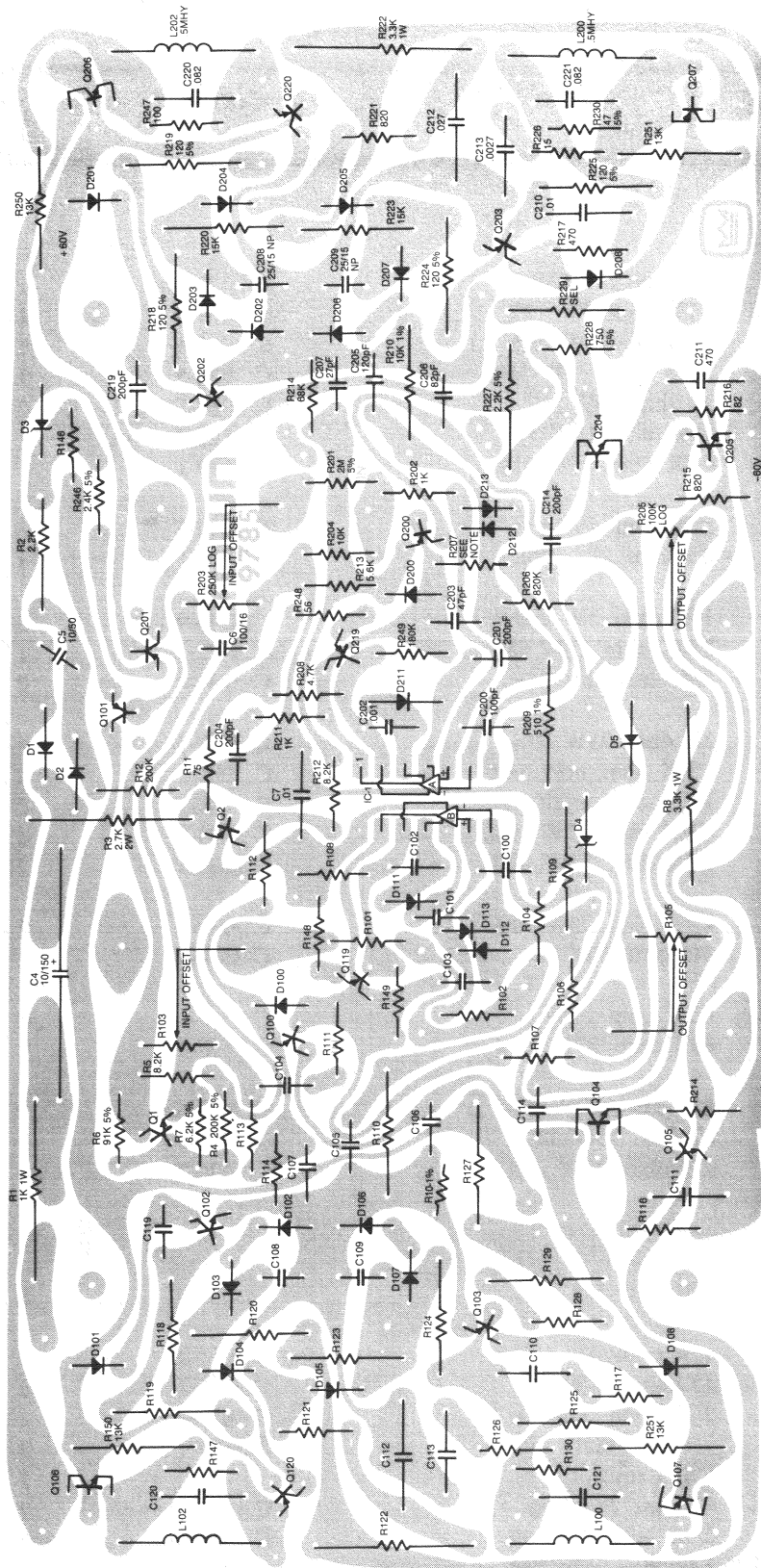


Fig. 6.2 Main Module Foil Board Layout; #Q41602J5
(for serial numbers 71024 thru 81323)

Parts List: Main Module #Q41602J5 (for serial numbers 71024 thru 81323)

Index No.	Schematic Designation	Description	Crown Part No.	Qty.	Other Information
Resistors					
R1		1K ohm 1W 10%	C 3615-9	1	
R2		2.2K ohm .5W 10%	C 1036-0	1	
R3		2.7K ohm 2W 10%	C 4740-4	1	
R4		200K ohm .25W 5%	C 3622-5	1	
R5, R11		75 ohm .25W 5%	C 3798-3	2	
R6		91K ohm .25W 5%	C 3621-7	1	
R7		6.2K ohm .25W 5%	C 3619-1	1	
R8,					
R122, R222		3.3K ohm 1W 5%	C 3617-5	3	
R9		2.7 ohm .5W 10%	C 1067-5	1	
R10,					
R110, R210		10K ohm .5W 1%	C 2343-9	3	
R12		200K ohm .25W 5%	C 3722-5	1	
R101, R201		2M ohm .25W 5%	C 3199-4	2	
R102, R202,					
R111, R211		1K ohm .25W 10%	C 2627-5	4	
R103, R203		250K ohm, horz. pot	C 3087-1	2	
R105, R205		100K ohm, horz. pot	C 1709-2	2	
R106, R206		820K ohm .25W 10%	C 3623-3	2	
R107, R207		3.3K ohm .25W 10%	C 2629-1	2	only used if IC-1 is uA749
R108, R208		4.7K ohm .25W 10%	C 3939-3	2	
R109, R209		510 ohm .5W 1%	C 3304-0	2	
R112, R212,					
R113, R213		8.2K ohm .25W 10%	C 2877-6	4	
R114, R214		68K ohm .25W 10%	C 3620-9	2	
R115, R215,					
R121, R221		820 ohm .25W 10%	C 3301-6	4	
R116, R216		82 ohm .25W 5%	C 3960-9	2	
R117, R217		470 ohm .25W 10%	C 2626-7	2	
R118, R218,					
R119, R219					
R124, R224,					
R125, R225		120 ohm .5W 5%	C 3837-9	8	
R120, R220,					
R123, R223		15K ohm .5W 10%	C 1064-2	4	
R126, R226		15 ohm .25W 10%	C 3614-2	2	
R127, R227		2.2K ohm .5W 5%	C 1036-0	2	
R128, R228		750 ohm .25W 5%	C 3803-1	2	
R129, R229		Select resistor		2	
R130, R230		47 ohm .25W 5%	C 1011-3	2	
R146, R246		2.4K ohm .25W 5%	C 3616-7	2	
R147, R247		100 ohm .25W 10%	C 2872-7	2	
R148, R248		56 ohm .25W 10%	C 3511-0	2	
R149, R249		180K ohm .25W 5%	C 4218-1	2	
R150, R250		13K ohm .25W 5%	C 4300-7	2	

Parts List: Main Module #Q41602J5 (for serial numbers 71024 thru 81323) Contd

Index No.	Schematic Designation	Description	Crown Part No.	Qty.	Other Information
Capacitors					
C4		10 mF, 160V	C 2796-8	1	
C5		10 mF, 50V vertical	C 3728-0	1	
C6		100 mF, 16V vertical	C 3729-8	1	
C7,					
C110, C210,					
C115, C215		.01 mF Disc.	C 1751-4	5	
C100, C200		100 pF Mica.	C 3410-5	2	
C101, C201,					
C104, C204,					
C114, C214,					
C119, C219		200 pF Mica.	C 3411-3	8	
C102, C202		.001 mF Disc.	C 3480-8	2	
C103, C203		47 pF Mica.	C 3409-7	2	
C105, C205		120 pF Mica.	C 3290-1	2	
C106, C206		82 pF Mica.	C 3627-4	2	
C107, C207		27 pF Ceramic	C 2342-1	2	
C108, C208,					
C109, C209		22 mF, 50V NP vertical	C 5311-3	4	
C111, C211		470 pF Mica.	C 2511-1	2	
C112, C212		.012 mF, 200V Film.	C 3219-0	2	
C113, C213		.0027 mF, 200V Film.	C 3481-6	2	
C120, C220		.0082 mF, 200V Film.	C 3063-2	2	
C121, C221		.082 mF, 200V Poly.	C 4133-2	2	
Diodes					
D1, D2		1N4003	C 2851-1	2	
D3, D4, D5		1N961B 10V zener	C 3549-9	3	
D100, D200,					
D101, D201,					
D102, D202,					
D103, D203,					
D104, D204,					
D105, D205,					
D106, D206,					
D107, D207,					
D111, D211		1N4148	C 3181-2	18	
D108, D208		1N270	C 3447-7	2	
Transistors					
Q1,					
Q102, D202,					
Q105, Q205		2N3859A selected	D 2961-7	5	
Q2		2N4250A	C 3786-8	1	
Q100, Q200,					
Q101, Q201		MPSA93	C 3578-9	4	
Q104, Q204		NSD128	C 4061-5	2	
Q106, Q206		D40P3	C 5065-5	2	
Q107, Q207		2N4929 SS7304	D 2923-7	2	

Parts List: Main Module #Q41602J5 (for serial numbers 71024 thru 81323) Contd

Index No.	Schematic Designation	Description	Crown Part No.	Qty.	Other Information
Intergrated Circuits					
	IC1, A, B	uA739	C 3231-5	1	
Miscellaneous					
	L100, L200, L102, L202	.5 mH Axial Lead	C 3510-2	4	
		Main PC Board	P 9785-0	1	
		TO-5 Mounting Pad	C 1250-7	2	
		TO-5 Coolers	C 3175-4	2	
		IC Socket, 14 Pin	C 3450-1	1	
		TO-92 Dual Cooler	C 3493-1	1	

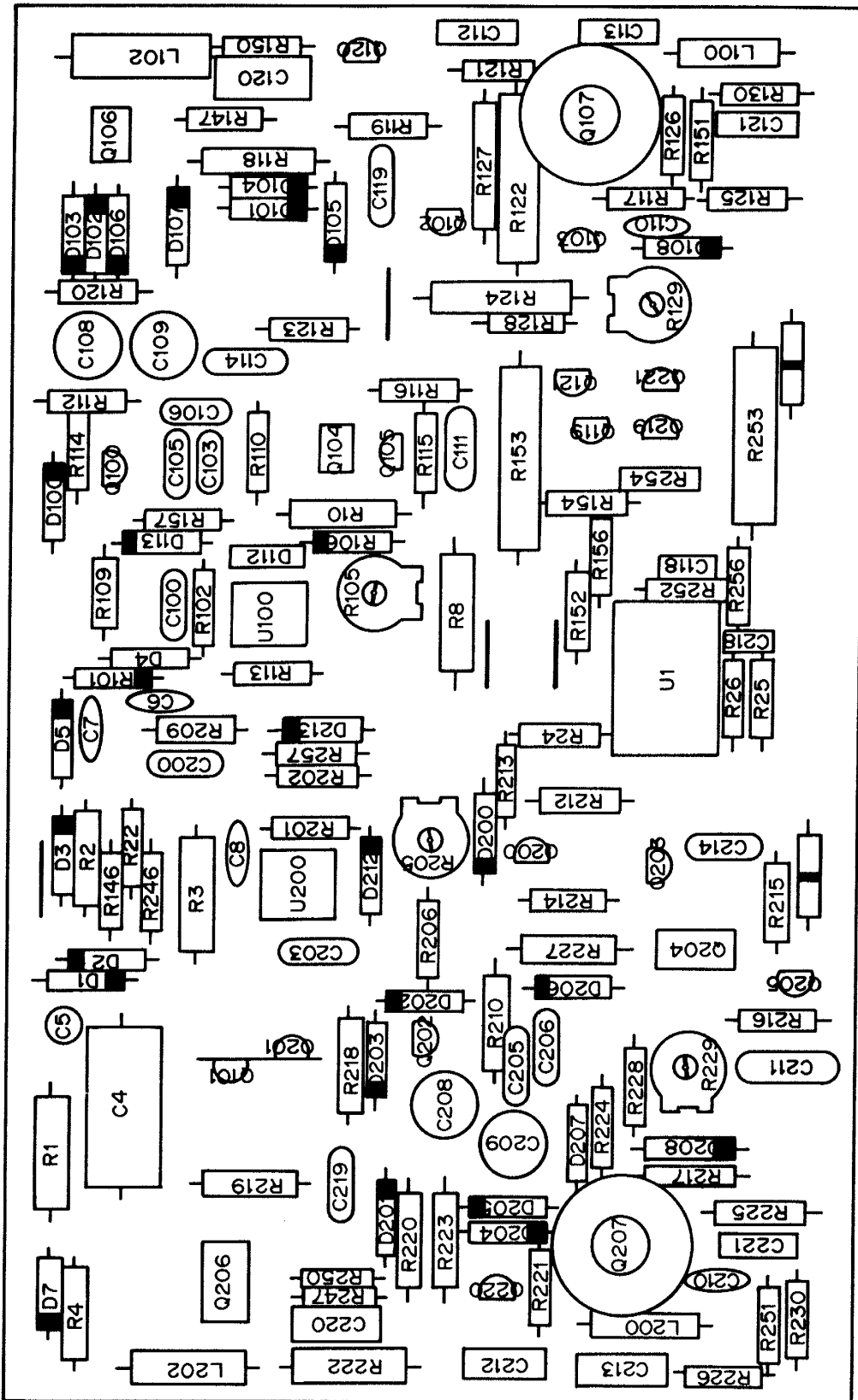


Fig. 6.3 Main Module Component Board Layout; #Q42532-4
(for serial number 81324 and above)

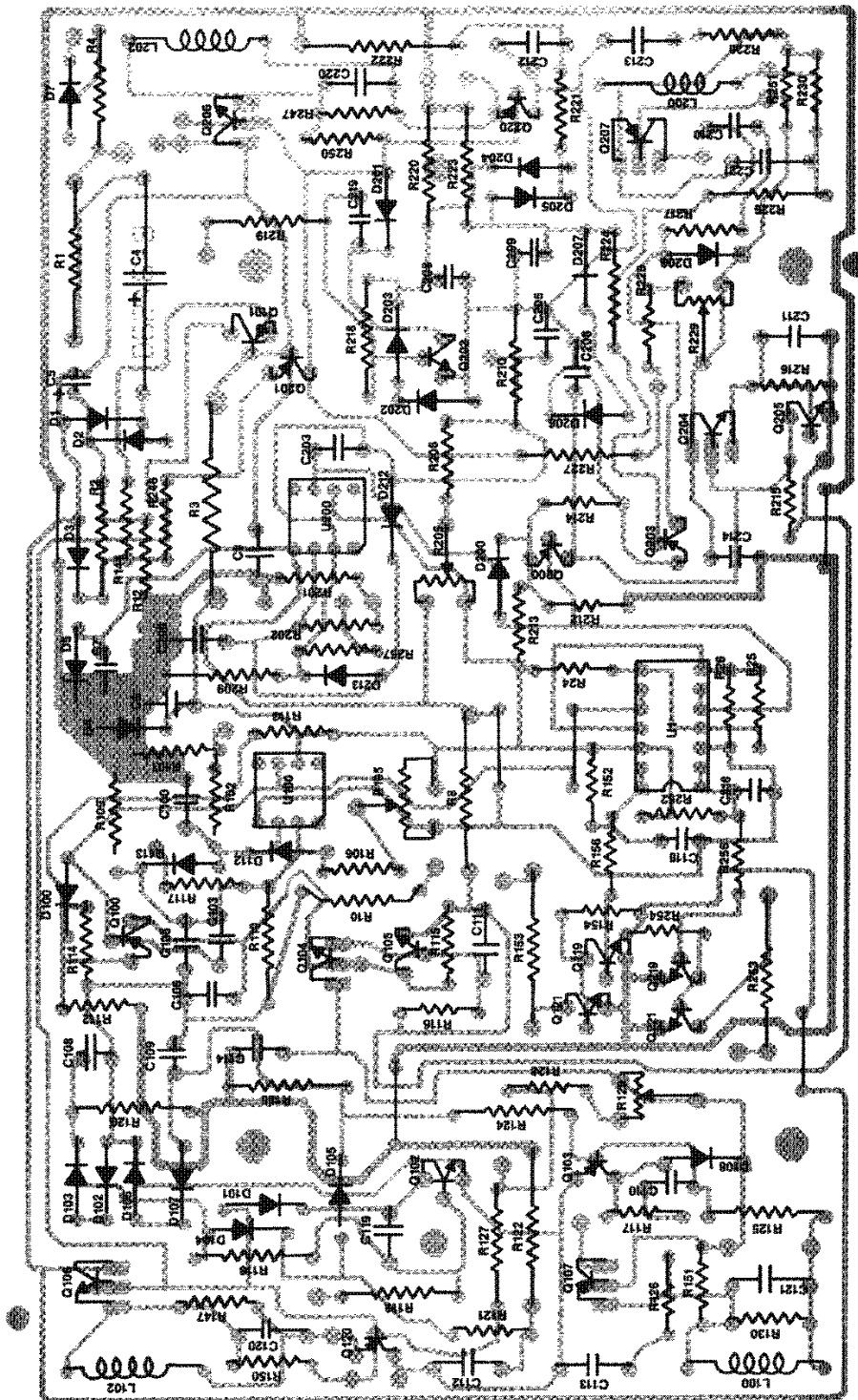


Fig. 6.4 Main Module Foil Board Layout; #Q42532-4
 (for serial number 81324 and above)

Parts List: Main Module #Q42532-4 (for serial number 81324 and above)

Index No.	Schematic Designation	Description	Crown Part No.	Qty.	Other Information
Resistors					
R1		1K ohm 1W 10%	C 3615-9	1	
R2, R4, R127, R227		2.2K ohm .5W 5%	C 1036-0	4	
R3, R8		2.7K ohm 2W 10%	C 4740-4	2	
R10, R110, R210		10K ohm .5W 1%	C 2343-9	3	
R12		200K ohm .25W 5%	C 3622-5	1	
R14, R16		33K ohm .25W 5%	C 4346-0	2	
R15, R152, R252		150K ohm .25W 5%	C 4216-5	3	
R101, R201		2M ohm .25W 5%	C 3199-4	2	
R102, R202		1K ohm .25W 5%	C 2627-5	2	
R105, R205		100K ohm trim pot.	C 5062-2	2	
R106, R206		160K ohm .25W 5%	C 4217-3	2	
R109, R209		511 ohm .5W 1%	C 3304-0	2	
R112, R212		5.6K ohm .25W 5%	C 3220-8	2	
R113, R213		8.2K ohm .25W 5%	C 2877-6	2	
R114, R214		68K ohm .25W 5%	C 3620-9	2	
R115, R215, R121, R221		820 ohm .25W 5%	C 3301-6	4	
R116, R216		82 ohm .25W 5%	C 3960-9	2	
R117, R217		470 ohm .25W 5%	C 2626-7	2	
R118, R218, R119, R219, R124, R224,					
R125, R225		120 ohm .5W 5%	C 3837-9	8	
R120, R220, R123, R223		15K ohm .5W 5%	C 1064-2	4	
R122, R222, R153, R253		3.3K ohm 1W 5%	C 3617-5	4	
R126, R226		15 ohm .25W 5%	C 3614-2	2	
R128, R228		750 ohm .25W 5%	C 3803-1	2	
R129, R229		500 ohm Trim Pot.	C 6048-0	2	
R130, R230		47 ohm .25W 5%	C 1011-3	2	
R146, R246		2.4K ohm .25W 5%	C 3616-7	2	
R147, R247		100 ohm .25W 5%	C 2872-7	2	
R150, R250, R151, R251		13K ohm .25W 5%	C 4300-7	4	
R154, R254		56K ohm .25W 5%	C 2882-6	2	
R156, R256		47K ohm .25W 5%	C 3939-3	2	
R157, R257		402 ohm .25W 1%	C 6554-7	2	
R158, R258					For .775VRMS jumpers
Capacitors					
C4		10mF 160V	C 2796-8	1	
C5		10mF 50V	C 3728-0	1	
C6, C7, C8, C110, C210		.01mF Disc.	C 1751-4	5	

Parts List: Main Module #Q42532-4 (for serial number 81324 and above) Contd

Index No.	Schematic Designation	Description	Crown Part No.	Qty.	Other Information
Capacitors					
C100, C200		100pF Mica.	C 3410-5	2	
C103, C203		47pF Mica.	C 3409-7	2	
C105, C205		120pF Mica.	C 3290-1	2	
C106, C206		82pF Mica.	C 3627-4	2	
C108, C208,					
C109, C209		22mF 50V Vertical	C 5311-3	4	
C111, C211		470pF Mica.	C 2511-1	2	
C112, C212		.012mF 200V Film.	C 3219-0	2	
C113, C213		.0027mF 200V Film.	C 3481-6	2	
C114, C214,					
C119, C219		200pF Mica.	C 3411-3	4	
C118, C218		.1mF 63V	C 5639-7	2	
C120, C220		.0082mF	C 3063-2	2	
C121, C221		.001mF 200V Film.	C 3480-8	2	
Diodes					
D1, D2		1N4004	C 2851-1	2	
D3, D4, D5		1N916B 10V Zener	C 3549-0	3	
D7,					
D100, D200,					
D101, D201,					
D102, D202,					
D103, D203,					
D104, D204,					
D105, D205,					
D106, D206,					
D107, D207,					
D112, D212,					
D113, D213		1N4148	C 3181-2	21	
D108, D208		1N270	C 3447-7	2	
Transistors					
Q100, Q200		2N4250A PNP	C 3786-8	2	
Q101, Q201		MPS A93 PNP	C 3578-9	2	
Q102, Q202,					
Q105, Q205,					
Q119, Q219,					
Q121, Q221		2N3859A NPN	D 2961-7	8	
Q013, Q203,					
Q120, Q220		2N4125 PNP	C 3625-8	4	
Q104, Q204		NSD128 NPN	C 4061-5	2	
Q106, Q206		D40P3	C 5065-5	2	
Q107, Q207		2N4929/SS7304	D 2923-7	2	
Intergrated Circuits					
U1		LM339N	C 4345-2	1	
U100, U200		LF357H	C 6527-3	2	

Parts List: Main Module #Q42532-4 (for serial number 81324 and above) Contd

Index No.	Schematic Designation	Description	Crown Part No.	Qty.	Other Information
Miscellaneous					
		Heatsink TO5	C 4414-6	2	
		Heatsink TO-92	C 3493-1	1	
		Mounting Pad TO-5	C 1250-7	2	
		8-Pin IC Socket	C 3451-9	2	
		14-Pin IC Socket	C 3450-1	1	
		0 ohm Jumper	C 5868-2	6	
L100, L200, L102, L202		.5MH Coil	C 3510-2	4	

Parts List: IOC Board #Q42456J5 (for serial numbers 71024 thru 81323)

Index No.	Schematic Designation	Description	Crown Part No.	Qty.	Other Information
Capacitors					
C8		2.2mF 50V Vertical	C 5362-6	1	
C118, C218		.22mF 100V Film.	C 3218-2	2	
Resistors					
R14, R16, R140, R240		33K ohm .25W 5%	C 4346-0	4	
R15		150K ohm .25W 5%	C 4216-5	1	
R138, R238		2M ohm .25W 5%	C 3199-4	2	
R139, R239		3.3K ohm 1W 10%	C 3617-5	2	
R141, R241		18K ohm .25W 5%	C 2633-3	2	
R144, R244		10K ohm .25W 5%	C 2631-7	2	
Diodes					
D107, D207		1N4148	C 3181-2	2	
D108, D208		Red LED	C 5905-2	2	
Transistors					
Q115, Q215, Q116, D216		2N3859A Select	C 2961-7	4	
Intergrated Circuits					
IC2		LM339	C 4345-2	1	
Miscellaneous					
		IOC LED PC Board	P 9794A0	1	
		14 Pin IC Socket	C 3450-1	1	
		1/2" LED Spacer	C 5914-4	2	

Parts List: IOC Board (for serial number 81324 and above)

Index No.	Schematic Designation	Description	Crown Part No.	Qty.	Other Information
	E300, E400	Red LED	C 5905-2	2	
		IOC LED PC Board	P 9988-0	1	

Parts List: Pilot LED Board (for serial numbers 71024 thru 81323)

Index No.	Schematic Designation	Description	Crown Part No.	Qty.	Other Information
	Resistors				
	R1	2.2K ohm .5W 5%	C 1036-0	1	
		1N4148	C 3181-2	1	
		Pilot LED, Amber	C 4342-9	1	
		Pilot LED PC Board	P 9992A0	1	

Parts List: Pilot LED Board (for serial number 81324 and above)

Index No.	Schematic Designation	Description	Crown Part No.	Qty.	Other Information
	E500	LED, Amber	C 4342-9	1	
		Pilot LED PC Board	P10068B4	1	

Parts List: Output Board #Q41207J3 (for serial numbers 71024 thru 81323)

Index No.	Schematic Designation	Description	Crown Part No.	Qty.	Other Information
Resistors					
	R131, R231, R138, R238	180 ohm .25W 10%	C 2873-5	4	
	R132, R232, R139, R239	5.6 ohm 1W 5%	C 2355-3	4	
	R133, R233, R134, R234, R135, R235, R136, R235, R137, R237, R140, R240, R141, R241, R142, R242, R143, R243	.33 ohm 5W 5% Wire	C 3583-9	18	
	R144, R244	2.7 ohm 2W 10%	C 3613-4	2	
		(Two 5.6 ohm 1W 5% in parallel may be used.)			
		5.6 ohm 1W 5%	C 2355-3	4	
Capacitors					
	C115, C215	.01mF Ceramic Disc.	C 1751-4	2	
	C117, C217	4.7 mF 100V	C 5050-7	2	
	C118, C218	.1mF 200V Film.	C 2938-6	2	
Diodes					
	D109, D209, D110, D210	1N4003	C 2851-1	4	
Miscellaneous					
		Output Module PC Board	P 7954-4	1	

Parts List: Output Board #Q41207J3 (for serial numbers 81324 and above)

Index No.	Schematic Designation	Description	Crown Part No.	Qty.	Other Information
Resistors					
	R300, R400, R301, R401	180 ohm .25W 10%	C 2873-5	4	
	R302, R402, R303, R403	5.6 ohm 1W 5%	C 2355-3	4	
	R304, R404, R305, R405, R306, R406, R307, R407, R308, R408, R309, R409, R310, R410, R311, R411, R314, R414	.33 ohm 5W 5% Wire	C 3583-9	18	
	R312, R412	2.7 ohm 2W 10%	C 3613-4	2	
		(Two 5.6 ohm 1W 5% in parallel may be used.)			
		5.6 ohm 1W 5%	C 2355-3	4	

Parts List: Output Board #Q41207J3 (for serial number 81324 and above)

Index No.	Schematic Designation	Description	Crown Part No.	Qty.	Other Information
Capacitors					
	C300, C400	.01 mF Ceramic Disc.	C 1751-4	2	
	C302, C402	4.7mF 100V	C 5050-7	2	
	C301, C401	.1mF 200V Film.	C 2938-6	2	
Diodes					
	D300, D400, D301, D401	1N4003	C 2851-1	4	
Miscellaneous					
		Output Module PC Board	P 7954-4	1	

Parts List: Front Panel, Exploded View Drawing "A"

Index No.	Schematic Designation	Description	Crown Part No.	Qty.	Other Information
1		Front Panel	F10076-2	1	
2		Inlay, Lexan	B 5473-2	1	
3		Pushbutton Collar	D 4108-3	1	
4		Carrier Strip	D 3638-0	2	
5		Nut, Hex 6-32	C 1889-2	14	
6		Input Level Control	D 5696-6	2	
7		IOC Board	See pg. 6-11	1	S/N 81323 and below
		IOC Board	See pg. 6-12	1	S/N 81324 and above
8		Screw, 6-32x1 Hex	C 4333-8	2	
9		Spacer	C 5903-7	2	
10		Lockwasher #6	C 5594-4	6	
11		Washer, Fiber	C 3575-5	3	
12		Screw, 6-32x.37 Hex	C 3322-2	2	
13		Pilot LED Board	See pg. 6-12	1	S/N 81323 and below
		Pilot LED Board	See pg. 6-12	1	S/N 81324 and above
14		Power Switch, 20 amp	D 5699A8	1	
15		1 Station Plunger	D 4808A6	1	
16		Pushbutton	D 6013-3	1	
17		Switch Bracket	F10043A0	1	
18		Screw 6-32x1	C 2138-3	2	
19		Screw, Self Starting	C 4329-6	2	
20		Knob	D 6011-7	2	
21		Nut, Bright	C 1288-7	2	
22		Washer, Flat	C 2189-6	2	
23		Solder Lug	D 2828-8	2	
24		Faston Flag Housing	C 3297-6	2	
25		AMP Flag Terminal	C 3901-3	2	

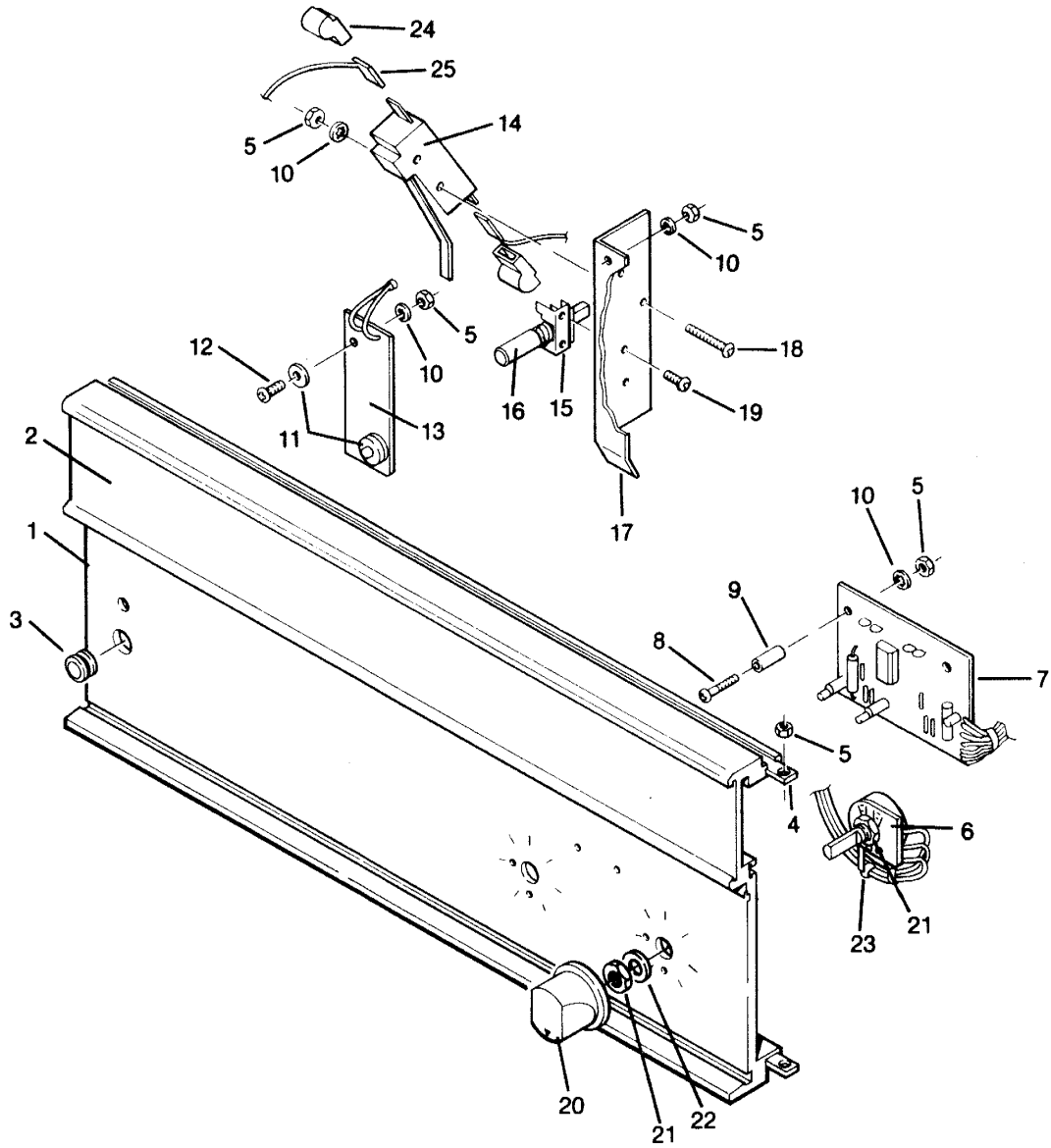


Fig. 6.5 Front Panel, Exploded View Drawing "A"

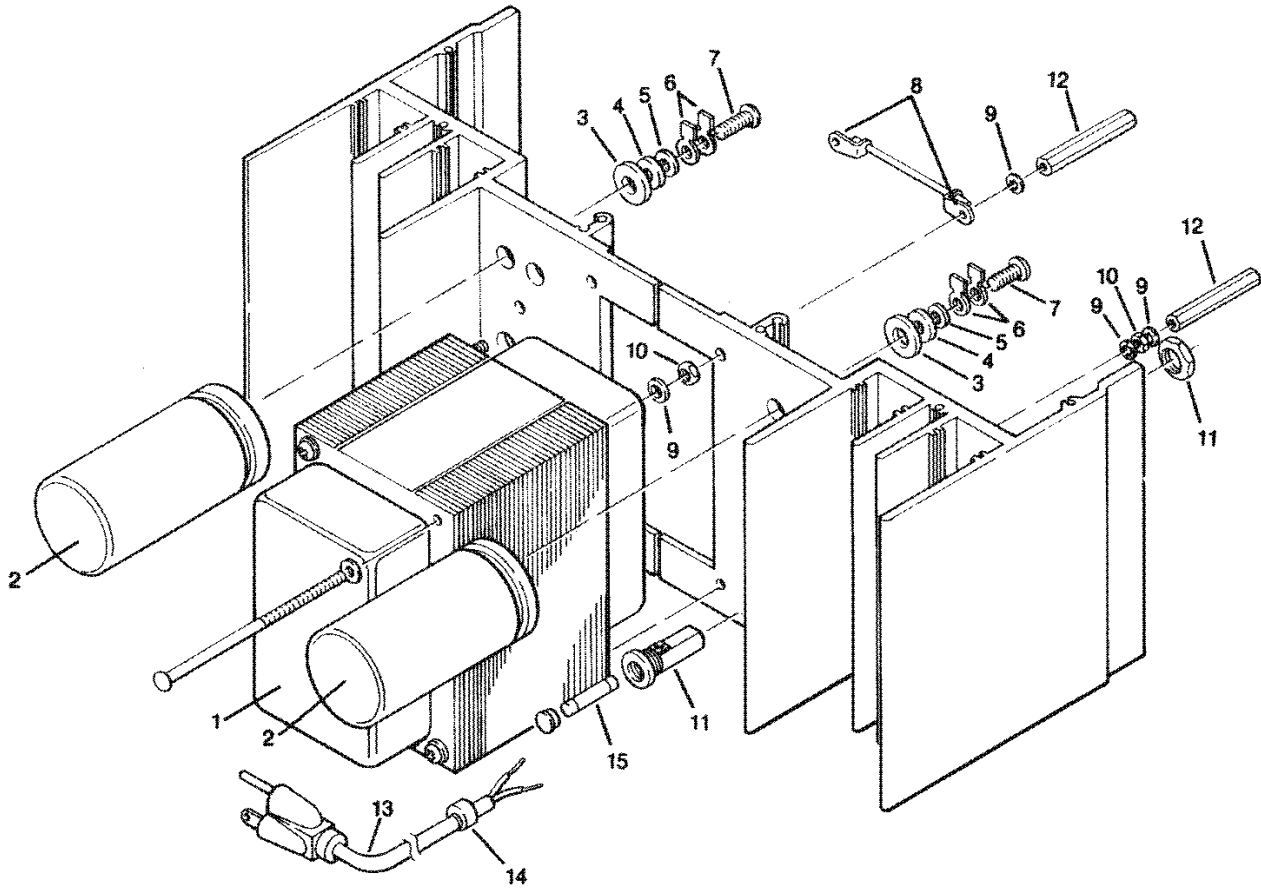


Fig. 6.6 Back Panel, Exploded View Drawing "B"

Parts List: Back Panel, Exploded View Drawing "B"

Index No.	Schematic Designation	Description	Crown Part No.	Qty. Other Information
1		Power Transformer	D 5781-6	1
2		Power Supply Capacitor	C 3436-0	2
3		Washer, Nylon	C 1657-3	4
4		Washer, Fiber	C 3320-6	
5		Washer, Flat	C 3830-4	4
6		Solder Lug	D 2934-4	7
7		Screw 10-32x.5	D 2049-2	4
8		Solder Lug #10	D 3312-2	2
9		Lockwasher #10	C 2279-5	10
10		Nut, 10-32 Hex	C 2170-6	8
11		Fuseholder	C 5597A5	1
12		Hex Spacer	D 3581-2	4
13		AC Power Cord	D 3474-0	1
14		Strain Relief	C 3582-1	1
15		Fuse, 10 Amp	C 2819-8	1

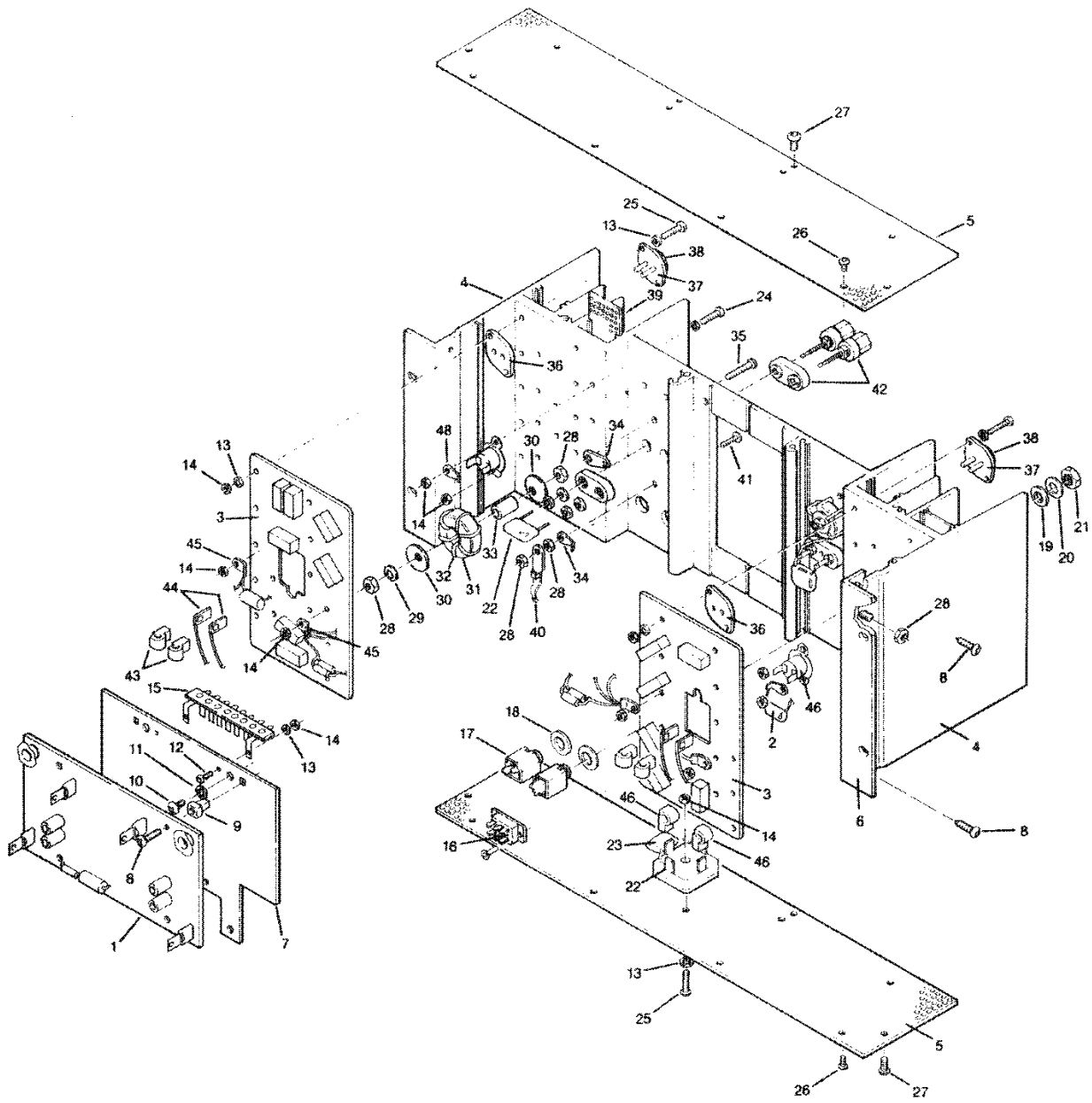


Fig. 6.7 Internal View, Exploded View Drawing "C"

Parts List: Internal View, Exploded View Drawing "C"

Index No.	Schematic Designation	Description	Crown Part No.	Qty.	Other Information
1		Main Board Module	Q41602J5	1	S/N 81323 and below
		Main Board Module	Q42532-4	1	S/N 81324 and above
2		Capacitor 4.7mF 100V	C 5050-7	2	
3		Output Board Module	Q41207J3	1	
4		Chassis Heatsink	D 3561-4	2	
5		Chassis Cover	F 9561-6	2	
6		Rack Mount Bracket	D 5705-5	2	
7		Main Board Shield Plate	F 9592-1	1	
8		Screw #8x.62 Self Starting	C 6014-2	8	
9		Nut, Nylon Expanded	C 2544-2	4	
10		Screw 8-32x.37	C 2155-7	4	
11		Lockwasher #8	C 1951-0	4	
12		Screw 6-32x.375	C 6077-9	2	
13		Lockwasher #6	C 5594-4	89	
14		Nut 6-32	C 1889-2	53	
15		Terminal Strip	D 4985-4	1	
16		Stereo/Mono Switch	C 4110-0	1	
17		1/4" Input Phone Jack	C 3423-8	2	
18		Washer, Fiber	C 1306-7	2	
19		Washer, Fiber	C 1646-6	2	
20		Washer, Flat	C 2189-6	2	
21		Nut, Bright	C 1288-7	2	
22		Bridge Rectifier	C 4305-6	1	
23		Capacitor .1mF 200V	C 2938-6	3	
24		Screw 6-32x.62	C 3879-1	4	
25		Screw 6-32x.75	C 2135-9	40	
26		Screw 6-32x.25	C 4758-6	8	
27		Screw 10-32x.37	C 4035-9	12	
28		Nut 10-32 Hex	C 2170-6	10	
29		Lockwasher #10	C 2279-5	6	
30		Washer, Fiber	D 3609-1	4	
31		Torrif Form	C 2850-3	2	
32		Magnet Wire 13"	B 3630-9	2	
33		Nylon Spacer	C 2762A8	2	
34		Solder Lug #10	D 3312-2	3	
35		Captive Stud	C 3636-5	2	
36		TO-3 Insulator	D 4071-3	20	
37		TO-3 Anodized Insulator	C 4039-1	20	
38		Output Transistor 2N5631 NPN	C 3990-6	16	S/N 72730 and below
		Output transistor MJ15150 NPN	D 5841-8	16	S/N 72731 and above
		Driver Transistor 2SD555 NPN	C 5869-0	4	
39		Output Transistor Cover	F 7959-4	4	
40		Tie Wrap	C 1813-2	1	
41		Screw 10-32x.5	C 2049-2	5	
42		Dual Binding Post	C 2823-0	2	
43		Faston Flag Housing	C 3297-6	8	
44		AMP Flag Terminal	C 3901-3	8	
45		Solder Lug #6	C 3163-0	8	
46		Thermal Switch 160F	C 2799-2	2	



SECTION 7 MAINTENANCE

7.1 Introduction

Section 7 contains technical information required to effectively and efficiently service and repair the Crown DC-300A Series II. Included are disassembly and reassembly procedures, required test equipment lists, checkout procedures and basic troubleshooting tips

This information is intended for use by an experienced technician only!

Use this information in conjunction with the Instruction Manual, schematic/board layout diagrams, parts lists and exploded view drawings (the latter located in Section 6 of this manual).

7.2 Required Test Equipment

Many of the service and repair problems with the DC-300A Series II can be performed with a limited amount of test equipment. However, in order to return the unit to its "factory new" specifications, the following list of required test equipment is recommended.

7.3 Basic Troubleshooting

As is well known, time is an important factor in providing efficient service repair. Therefore, several time-saving troubleshooting steps are listed below. These hints may or may not already be implemented in your service work. If not, you may wish to experiment with them in order to help improve your efficiency. After all, time is money!

A. Establishing Problems

User complaints about defective operation may not always be clear or simple. Furthermore, the trouble the user has experienced may be due to the system and not the unit itself. If possible, talk to the user about this problem. This will usually be simpler than trying to understand written complaints. A first hand account of the problem can help in:

- 1) Getting the problem to re-occur on the service bench.

Equipment	Requirements	Applications
Oscilloscope	Capable of displaying a 10MHz signal.	Monitoring output during service and testing.
Volt-ohmmeter (VOM)	Low-voltage resistance probe (100mv range). High-voltage resistance probe (1.5V range).	Check resistance values (low voltage probe). Check semi-conductor junctions for opens or shorts (high voltage probe). Check DC voltages.
Freq. Counter	20Hz-20KHz	For accurate general monitoring.
Signal Generator	Sine/Square wave available; flat frequency response. THD .1% maximum.	Provide test signals for service and checkout.
Circuit Breaker	15 ampere rating.	In AC line to unit; protects circuitry from overload if power supply has shorted.
AC Line Voltage Monitor	Peak reading meter (displays rms equivalent to a sinusoidal peak from any wave form).	
AC Voltmeter	100mv low range, flat frequency response to 100KHz.	Set output level for testing; check noise level.
Filter	20Hz-20KHz bandpass, low noise 20Hz-20KHz	Between preamplifier and voltmeter in noise test.
I.M. Dist. Analyzer	Residual (.002% or lower)	Check IM distortion.

2) Getting an understanding of the probable cause. Some troubles will be obvious upon visual inspection. When the trouble (or its symptoms) is not so obvious ask:

- a) Exactly what was the problem; how was it noticeable?
- b) How was the unit being used?
- c) Has the system as a whole been carefully examined for possible external problems?
- d) How long had the unit been operating when the problem occurred? Was it heat related?

If the user is unavailable or unable to explain the trouble the next step is a thorough visual inspection.

B. Visual Inspection

A good visual inspection may often save hours of tedious troubleshooting. Make a habit of proceeding in an orderly manner to insure that no vital part of the following procedure is omitted. The visual inspection can be performed in 10 to 15 minutes. It is recommended both as a preventive maintenance procedure and also for its value in determining cause of malfunction.

- 1) Check that all external screws are tight and that none are missing.
- 2) Check all fuses/circuit breakers.
- 3) Check for smooth and proper operation of switches, etc.
- 4) Inspect line cord for possible damage to cap, jacket and conductors.
- 5) Remove protective covers as outlined in disassembly instruction (Section 7.4).
- 6) Check that all attaching parts for internal circuits are tight and that none are missing.
- 7) Inspect all wiring for charred insulation, or discoloration as evidence of previous overheating.
- 8) Check that all electrical connections are secure. This includes wire terminals, screw and stud type terminals, and all soldered connections.
- 9) Check for obvious destruction of internal structural parts. Distortion in any of these parts could mean that the unit has been dropped or subjected to severe shock.

7.4 Disassembly Procedure

(for Inspection, Troubleshooting, Adjustments and Replacements)

Only disassemble as far as is necessary to do the service work required. Do not attempt complete disassembly at any time and avoid disassembly beyond the point at which a full inspection, service, test, adjustment or repair can be made. Illustrations located in Section 6 are referenced to by number in parenthesis throughout this section.

Warning: Disconnect unit from AC power mains.

A. Front Panel Removal

Refer to Fig. 6.5.

Most servicing of internal components can be performed after the front panel has been removed. It is not necessary to remove the power switch from the front panel to service the unit but care must be taken to avoid damage to the AC wires going to the switch.

Place the amplifier on a flat surface with the front panel facing upward. Remove the four screws (8C), two on each end of the amplifier below the rack mount brackets. Remove the eight screws (26C) that secure the front panel to the chassis covers. The front panel can now be carefully lifted away from the unit. Use care to insure that no damage is done to the cables connected to the level controls, IOC indicators and power switch.

B. Chassis Cover Removal

Refer to Fig. 6.7.

Remove front panel as described in paragraph A. Remove screw (25C) and its associated hardware that secure the bridge rectifier (22C) to the chassis cover. Remove the eight screws (27C) that secure both chassis covers to the amplifier chassis. Lift off both chassis covers.

C. Main Board Removal and Repair

Refer to Fig. 6.7.

Remove front panel as described in paragraph A. To facilitate easier access to the main board, remove one or both of the chassis covers as described in paragraph B. Remove the four screws (8C) that mount the main board to the main board shield plate. Carefully lift the edge of the PC board that is opposite the end that the cable assemblies are attached to. The foil side of the PC board is now accessible for component repair. For complete removal of the main board assembly, draw a diagram noting where the various wires are connected to the PC board. Remove the wires by unsoldering them from the foil side of the board. The main board assembly can now be removed for replacement.

D. Power Switch Removal

Refer to Fig. 6.5.

Remove the front panel as described in paragraph A. Remove AC wires from the switch by gently pulling them off. Remove the screw that secures the switch mounting bracket to the front panel. The switch can now be removed from the mounting bracket for replacement.

E. Filter Capacitor Removal

Refer to Fig. 6.7.

Remove the front panel as described in paragraph A. With unit on a flat surface and the front of the amplifier facing upward, remove screws and mounting hardware from the filter capacitor. It should not be necessary to unsolder any of the wires connected to the capacitor.

F. Power Transformer Removal

Refer to Fig. 6.6.

Remove the front panel as described in paragraph A. Remove the main board from the main board shield as described in paragraph C. Remove the main board shield (7C) from its hex spacer mounts (12B). Remove the hex spacers and transformer mounting nuts (10B). Carefully note the orientation of the wires coming from the transformer so they are routed and secured in the proper location. Remove the wires coming from the transformer and remove the transformer from the chassis.

G. Output and Driver Transistor Replacement

Refer to Fig. 6.7.

Remove the front panel as described in paragraph A. Remove the top chassis cover as described in paragraph B. Remove the perforated transistor cover (39C) covering the transistor to be replaced. Remove the hardware securing the transistor to the heat sink. Unsolder the transistor and gently pull it away from the heat sink. When installing the new transistor, insure that the insulator has new heat sink compound applied to it for proper thermal conduction. Install the transistor and hardware making sure that the transistor is snugly mounted to the heat sink to insure good thermal conduction is maintained.

7.5 Reassembly

Reassembly is essentially the reverse of disassembly. To check the type or size of attaching parts, refer to the appropriate illustration in Section 6.

7.6 Electrical Checkout

The following outlines an orderly check out and adjustment procedure for the DC-300A Series II. Refer to Section 7.2 for the test equipment required for these procedures.

1. Quiescent DC offset

Using a DC voltmeter, measure the voltage at the output of the amplifier. It should not exceed $\pm 10\text{mV}$. Should the offset need to be adjusted use the following procedure.

(For units with serial numbers 71024 through 81323.)

- Allow amplifier to warm-up for 15 minutes.
- Set input level control located on the front panel fully CCW.
- Adjust output offset R105 or R205 for 0 (zero) reading on the DC voltmeter.
- Slowly rotate the input level control CW until the reading on the DC voltmeter peaks in value.
- Adjust input offset R103 or R203 for 0 (zero) reading on the DC voltmeter.

(For units with serial numbers higher than 81324.)

- Allow amplifier to warm-up for 15 minutes.
- Set input level control located on the front panel fully CW.
- Adjust output offset R105 or R205 for 0 (zero) reading on the DC voltmeter.

2. Bias Level Adjustment

With the amplifier power on and no input signal present, check the base-emitter bias voltage using a DC voltmeter. It should fall between .31VDC to .35VDC. To adjust use the following procedure.

(For units with serial number 71024 through 81323.)

- Bias voltage is varied by changing the value of select resistors R129 and R229. If bias voltage is high, increase the value of the resistor. If bias voltage is low, decrease the value of the resistor. The select resistor should have a value between 30 and 300 ohms.

(For units with serial numbers greater than 81324.)

- Adjust bias pot R129 and R229 for correct bias voltage.

3. Power Tests (one channel driven)

- Inserting a 1kHz sine wave signal into the channel under test, the 8 ohm power rating of 180 watts (37.9Vrms) and the 4 ohm power rating of 300 watts (34.6Vrms) should be obtained before clipping occurs.
- Inserting a 20kHz sine wave signal into the channel under test, an 8 ohm power rating of 155 watts (35.2Vrms) should be obtained before clipping occurs.
- Inserting a 10kHz square wave input signal with an 8 ohm load on the output of the amplifier, adjust the input level for a 40V peak to peak output level. The output waveform should be clean with no overshooting or ringing occurring (see Fig. 7.1).

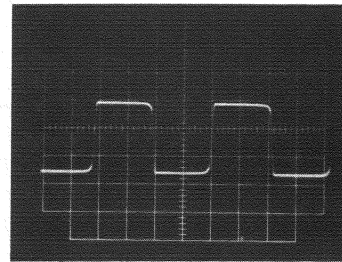


Fig. 7.1 10kHz Square Wave Response, 8 ohms

4. Protection Circuit Tests

- Insert a 1kHz sine wave signal into the channel under test and adjust the output level for 35Vrms.
- Place a 2 ohm load on the output of the amplifier and observe the output waveform. It should clip the signal evenly on both the positive and negative portion of the waveform (see Fig. 7.2).

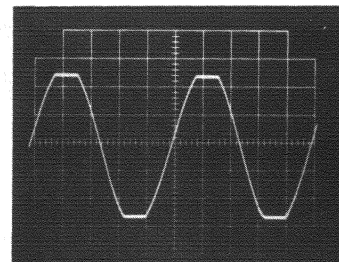
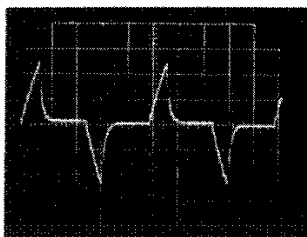


Fig. 7.2 Clipped Waveform

- c. Remove the 2 ohm load and place a 159 microhenry inductive load on the output. Observe the output waveform. It should be similar to that in Fig. 7.3.



*Fig. 7.3 Inductive Load Waveform,
2 ohms*

5. Intermodulation Distortion

- a. Using a 60Hz/7kHz signal summed in a 4:1 ratio (S.M. P.T.E. method) on the input of the amplifier with a 8 ohm load on the output, insure that the following specs are within tolerance at a rated power output of 155 watts.
 - 0dB through -25dB less than .01%
 - 30dB through -40dB less than .05%

6. IOC Circuit

The IOC indicator should illuminate when the output signal is driven into clip.

7. Signal to Noise

- a. With the input level controls fully CCW, use a 20Hz to 20kHz bandpass filter on the output of the amplifier to measure the signal to noise ratio. Insure that it's greater than 110dB below the rated output power.

8. Quiescent AC Power

- a. Quiescent power should be less than 40 watts with a line voltage of 120VAC. 30 watts is typical.

9. Mono Operation

- a. Using only channel one for an input signal, insert a 1kHz sine wave with the stereo/mono switch in the mono position. Observe that channel two is 180 degrees out of polarity from channel one. Channel one input level control should vary both channel one and two output signal. (See Fig. 7.4).

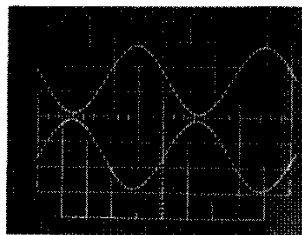


Fig. 7.4 Mono Response Waveform

7.7 Troubleshooting Chart

1. AC fuse blown	Wrong size fuse. Replace with correct value. Wrong line voltage, check AC line voltage. Shorted wires in the power supply. Make a visual inspection of power supply wiring. Short in AC power cord or transformer primary. With power switch on the contacts of the plug should show about .35 ohms of resistance. Miswiring of the transformer primary. Check voltage conversion chart in Section 7.10 for correct wiring. Short in the bridge rectifier. Replace bridge rectifier.
2. No AC power; fuse OK	Defective power switch. Replace. Defective thermal switch. Replace.
3. DC offset voltage out of specification	Check for +/- 10V power to IC. Check for defective input op amp IC.
4. Low or no bias	Check components in the bootstrap power supply. (D1, D2, D3, C4, C5, R1, R2). Check bias servo circuitry. (Q108, Q208 for SN 71024-81323.) (Q310, Q410 for S/N greater than 81324.) Check for leaky driver transistor.
5. High bias on positive output transistors	Check for leaky output transistor in negative bank.
6. High bias on negative transistors	Check for leaky output transistors in positive bank.

- | | |
|---|--|
| 7. DC voltage present on outputs | Output transistors shorted.
Driver transistors shorted.
Predriver transistors shorted.
Flyback diode shorted (D109, D209, D110, D210).
Defective bias servo transistor (Q108, Q208) or (Q310, Q410). |
| 8. Oscillation on output | Alternately heat and cool components on the circuit board to pinpoint significant changes in the oscillation.
Check capacitors by paralleling them with a known good capacitor of the same value. If oscillation stops, an open capacitor may be indicated. |
| 9. Positive signal does not clip on 2 ohm load | Check components in positive current limit circuit (Q102, Q202). |
| 10. Negative signal does not clip on 2 ohm load | Check components in negative current limit circuit (Q103, Q203). |
| 11. High IM distortion | Check for deteriorating components.
Check wire dress of wires in output section.
Change the positive predriver.
Change the last voltage amplifier. |
| 12. High signal to noise level | Bad solder joints. Visually inspect the defective channel.
Poor ground connections. Check all ground connections. Check output jack ground.
Insure insulated washers are on input jacks. |

7.8 Detailed Circuit Theory

The following explanation refers to schematic diagram MI250D located in Section 6. For amplifiers with serial numbers 81323 and greater the circuit is basically the same with the only major difference being the input stage. For simplicity, the description refers to channel one only.

A. Input Stage

After entering the unbalanced 1/4" input jack, the input signal level is adjusted to a desired input amplitude through R100 and then applied to the dual IC operation amplifier IC1A. The direct input signal is applied to the noninverting input (Pin 5) of IC1A and the feedback signal is applied to the inverting input (Pin 6).

Both signals entering IC1A will be in polarity with each other because of the feedback path and will thus produce an output (Pin 1) of almost zero. The IC op amp will always try to keep a zero potential difference between both inputs. Any type of non-linearity will cause the op amp to produce a large output, and therefore a substantial size correction signal in order to retain the small output level.

B. Voltage Amplification

The operation of the DC-300A Series II front end circuitry (IC op amp through Q104) is to basically provide voltage amplification. However, the signal translator transistor (Q100) provides no voltage amplification itself, but rather converts the ground referenced input signal to a signal with a reference to the negative supply (-60V). The result is higher voltage swing capabilities from Q104 the final voltage amplifier.

The final voltage amplification transistor (Q104) is the main source of voltage amplification in the DC-300A Series II. R115 in the base circuit of this transistor serves two purposes:

1. It provides collector current for Q100.
2. It allows the signal on the collector of Q100 to be developed across it and thus amplified.

As this development is in process, Q104 emitter voltage is developed across R116. When this voltage reaches a positive 0.6V, Q106 turns on and pulls the drive away from the last voltage amplifier, thus acting as a current limiter for Q104.

C. Output Stage

Basically, the output of the final voltage amplifier provides the signal drive to the predriver (Q106, Q107), driver (Q109, Q114), and the output transistors (Q110, Q111, Q112, Q113, Q115, Q116, Q117, Q118) in order to amplify the current for final output power. The correct bias supply bias transistor (Q108) voltage of 2.15VDC is distributed throughout the current amplification stages in the following manner:

1. Base to emitter junction of negative predriver (Q107) is .6V.
2. Base to emitter junction of positive driver (Q109) and predriver (Q106) is .6V. Negative driver (Q114) and output transistors have a fixed base-emitter bias in reference to the negative supply and are not involved with the bias servo circuitry.

3. .315V is present across the positive output base to emitter resistor R132.

As previously mentioned, the predrivers and drivers are biased at .6V but also, the output transistors have a .315 DC voltage from base-emitter and are therefore at a sub-turn-on voltage. This form of biasing is known as class AB+B; the driver transistors carry the bias current, while the output transistors sense when the driver transistors develop significant current, drawn from the load, and thus take over and deliver the needed current.

The result of this format is maximum efficiency with minimum crossover notch distortion and idling amplifier heat. Thus there is no bias current adjustment, as the output circuit is not temperature-tolerance critical.

D. Protection Circuitry Stage

The DC-300A Series II protection circuitry is the Crown developed SPACE (Signal Programmed Automatic Current Executor) control circuit. R133 and R134 are current sensing resistors which carry the output current from the output transistors to the positive and negative limiting transistors (Q102, Q103). Before the output current becomes dangerously high, the limiting transistor is activated which in turn limits the drive voltage at the base of the predriver. When the predriver current and the limiter current are equal to the current available from Q101, a limit point is reached and the protection circuitry remains in this state until the overload is removed.

E. Bootstrap Supply

The bootstrap supply is a voltage doubler network that consists of C4, C5, D1 and D2. From the 42VAC, C4 is charged through D1 during 1/2 of the AC cycle. During the next AC cycle C5 is charged to approximately twice the voltage that was on C4 through D2. This provides a constant current source for the predriver, bias and voltage amplifier source for the predriver, bias and voltage amplifier sections of the DC-300A Series II. A ten volt zener diode (D3) is primarily responsible for providing a constant 10V distribution across the combination R146 and Q101. This allows Q101 to remain on providing a current path to the predriver, bias and voltage amplifier sections.

The constant current source is necessary in order to attain maximum voltage swing from the voltage amplifier stage as well as help to isolate the front-end input stage supply from the rail supply. This, in turn, helps prevent front-end overload.

F. Temperature Compensation/Offset Circuitry

The input and output offset adjustments (R103, R105) provide a bias voltage for the noninverting (Pin 5) and inverting (Pin 6) inputs of op amp IC1A. The output offset adjustments are set (with the level control fully CCW) so there is zero DC voltage across the output of the amplifier. With the level control either open or closed, the noninverting input is at 0 volts. The output offset

adjustments (R105) then can vary the bias voltage on the inverting input to match this for zero output.

With the level control set for maximum offset at the amplifier output, the input offset (R103) adjustments varies the bias to the noninverting input in order to match the 0 volts on the inverting input.

Q1 is used as a heat compensation transistor similar to that of the bias servo transistor. As the temperature of the amplifier rises, bias voltages tend to drift causing a DC offset within the IC op amp and thus DC voltage across the output of the amplifier.

As the temperature to Q1 changes, the base to emitter voltage changes and a compensation voltage of 2.2 millivolts per centigrade is applied to the offset adjustment potentiometers.

G. IOC (Input Output Comparator)

The IOC display is actually a window comparator circuit using two operation amplifiers (IC2C, D) and LED indicator (D108). Any small nonlinearity in the amplifier causes an error in the feedback loop to appear at the inverted input of the main IC op amp (IC1A). This means the main IC output (Pin 1) will rise above its normal value in an attempt to correct the problem. This signal is then responsible for raising the bias voltage on IC2 and in turn activating Q116 which illuminates D108.

7.9 .775VRMS Conversion

On amplifiers with a serial number greater than 81756 there has been incorporated into the main board the option of a .775Vrms (0dBm) input sensitivity. Use the following procedure to incorporate the .775Vrms input sensitivity option.

1. Disconnect the amplifier from AC power.
2. Place amplifier upside down on a flat surface. Remove the eight phillips screws on the top and bottom of the front panel (four on the top and four on the bottom). Next remove the two screws behind each rack mount bracket. Carefully pull the front panel straight off the unit.
3. Remove the four screws mounting the main board to the main board shield plate. The main board can now be gently hinged forward to expose both sides.
4. Solder #22 buss wire at the locations marked R158 and R258 on the main board. See circuit board layout for locations.
5. Reassemble the unit in the reverse order of disassembly.

Specification Changes:

Stereo Voltage Gain: 45.4 +/- 2% or 33.1dB +/- .02dB at maximum gain.

Monaural Voltage Gain: 90.8 +/- 2% or 39.2dB +/- .02dB at maximum gain.

Input Sensitivity: .775 volts +/- 2% for 155 watts into 8 ohms stereo or 310 watts into 16 ohms mono.

7.10 Voltage Conversion

Often Crown products are purchased in one country and later moved to another requiring an AC mains conversion. For this reason, the following procedure and chart as well as a world-wide voltage map is provided.

The DC-300A Series II power supply may be connected for any of five voltages. Converting from one to the other is accomplished by unsoldering and reconnecting wire jumpers between terminal connectors.

1. Remove front panel and top chassis cover as described in Section 7.4.
2. Locate the voltage conversion terminal strip below the main board shield plate. Unsolder and move the jumper wires as necessary by referring to Fig. 7.5 for desired AC line voltage.
3. For all voltages 200V and higher, the fuse must be changed from a 10 amp to 5 amp.
4. Install the front panel and chassis cover.

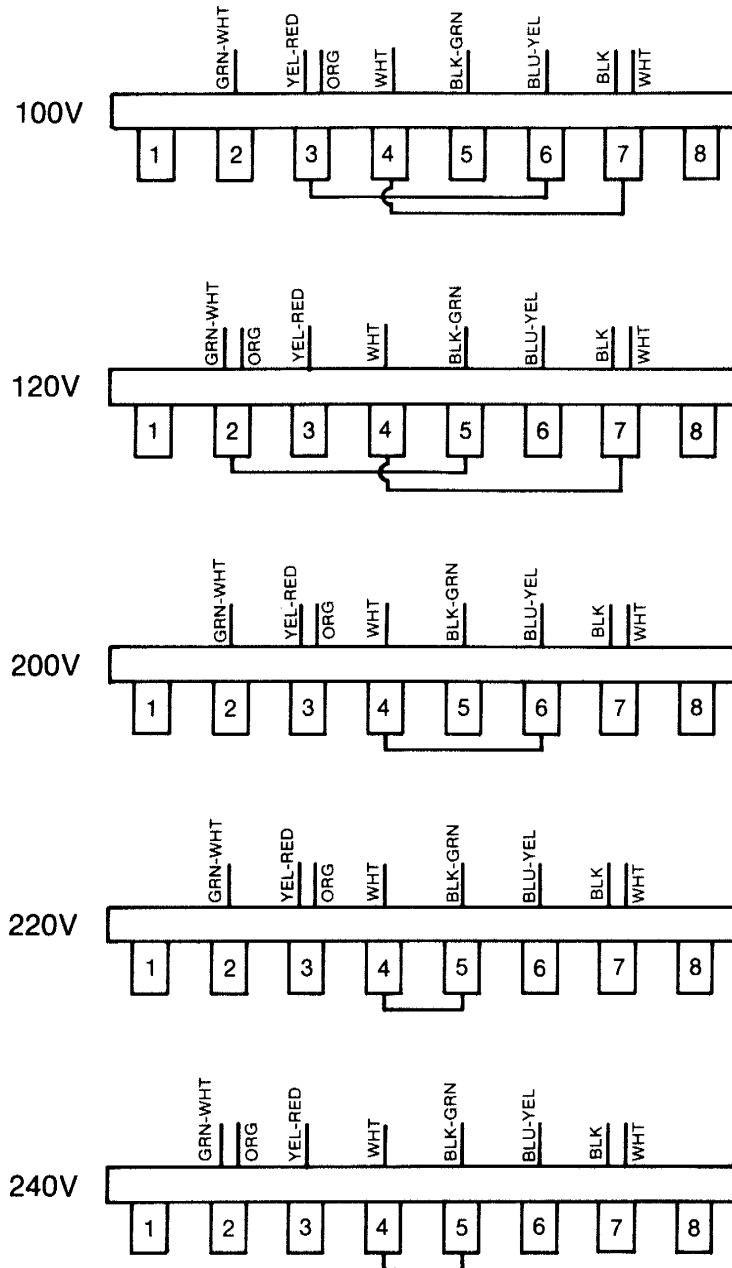
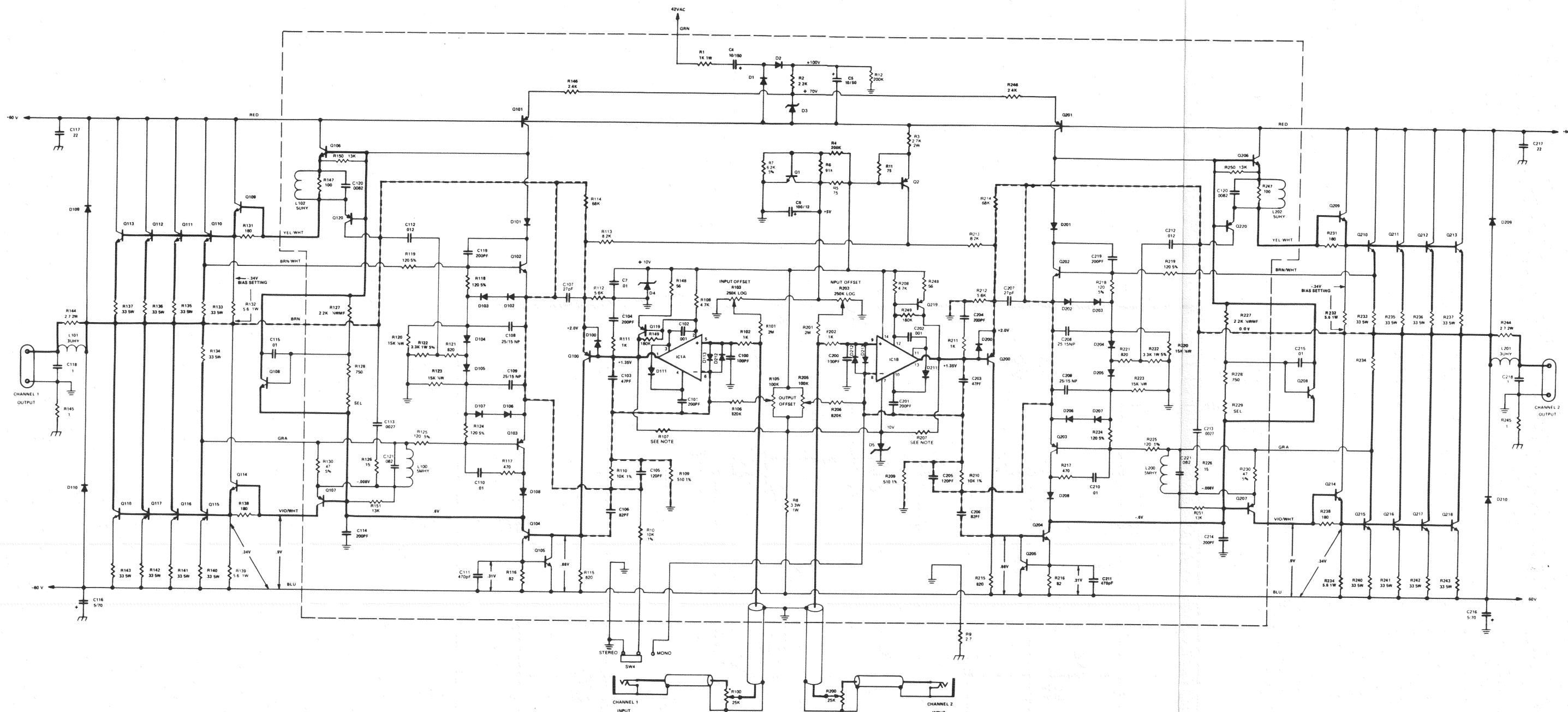
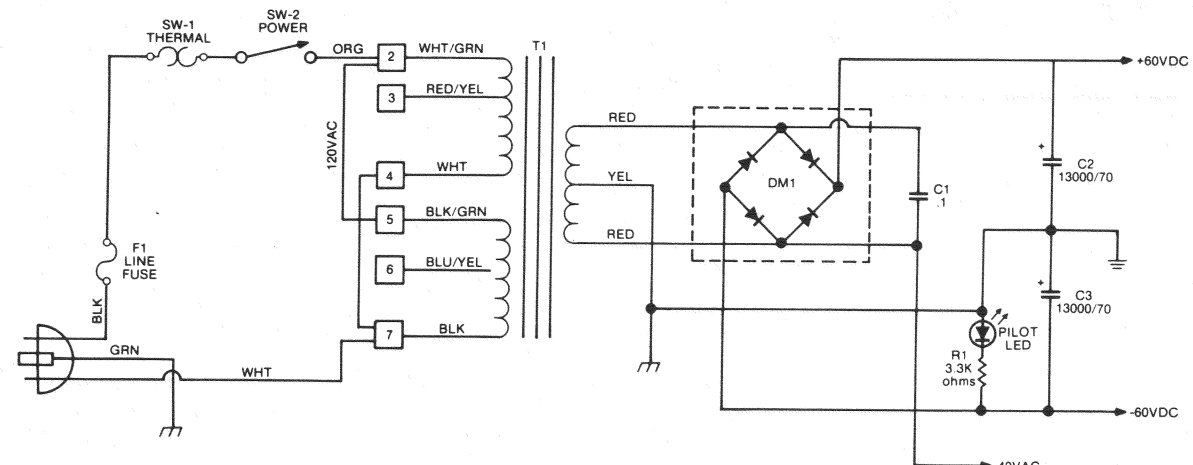


Fig. 7.5 Voltage Conversion Chart



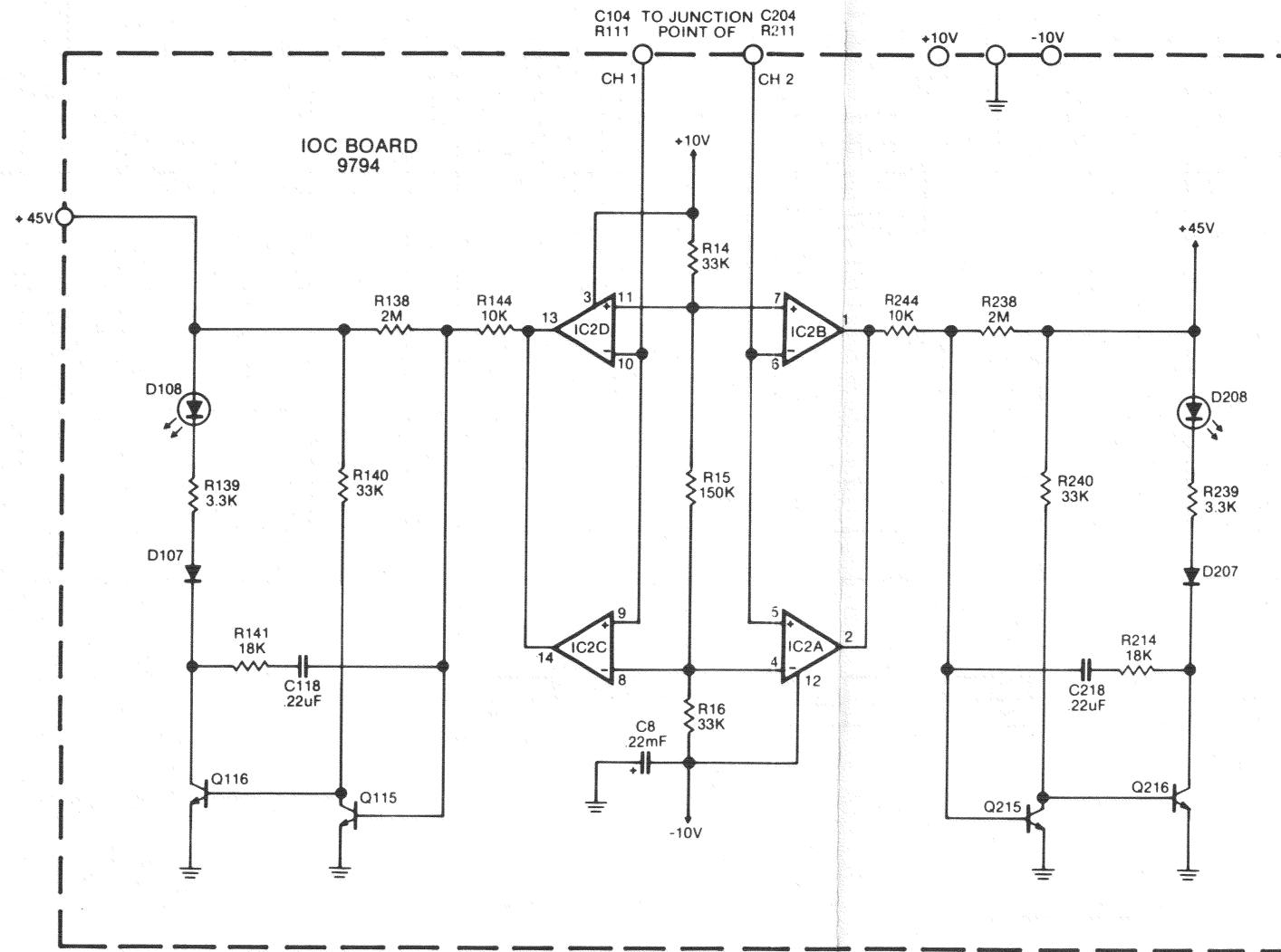
DC300A SERIES II POWER AMPLIFIER MI 250D

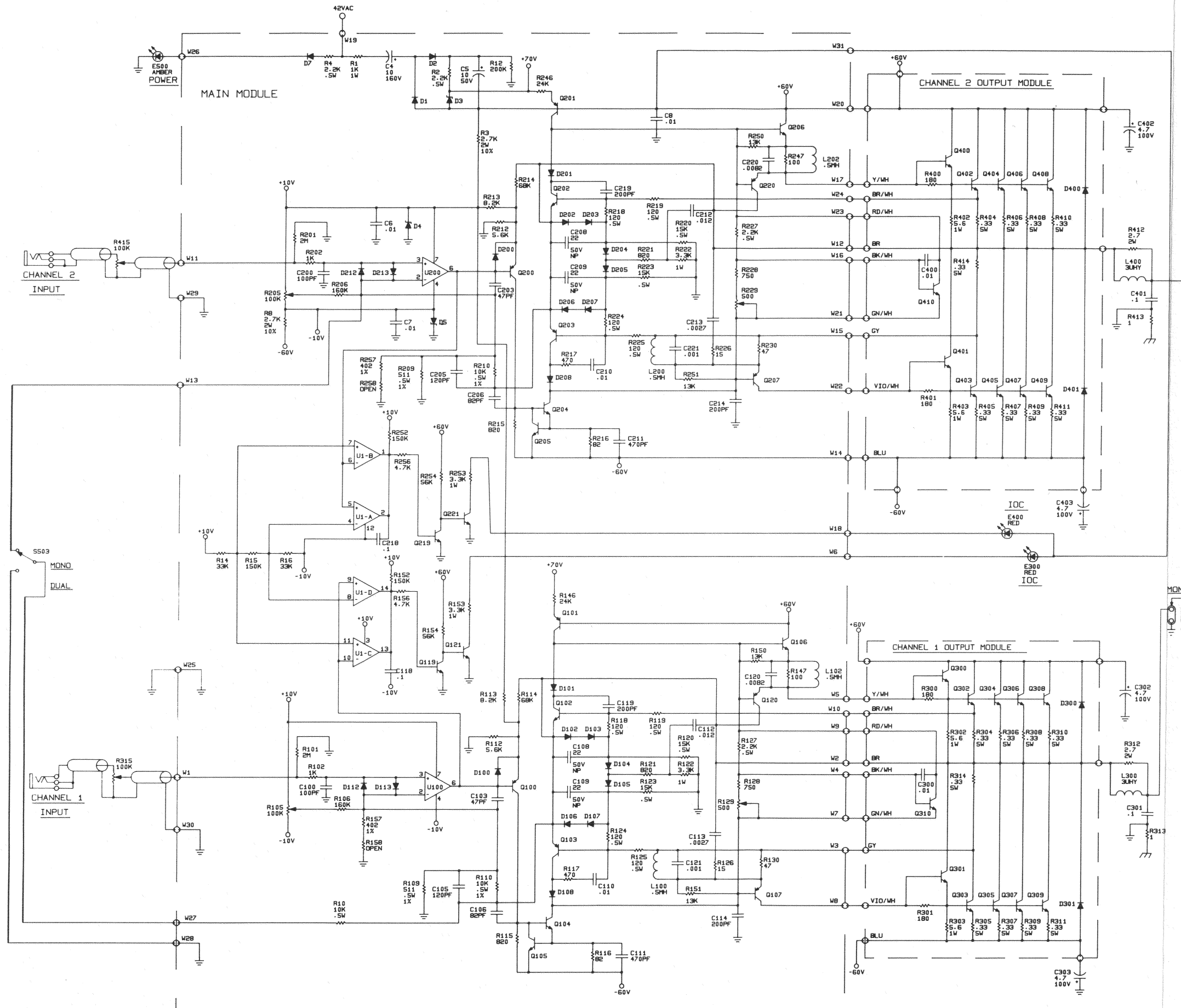


NOTES:

- THIS IS A REPRESENTATIVE SCHEMATIC ONLY AND DOES NOT NECESSARILY REFLECT THE EXACT CIRCUITRY OF YOUR UNIT. REFER TO SERVICE MANUAL FOR FURTHER TECHNICAL INFORMATION.
- THIS SCHEMATIC APPLIES TO AMPLIFIERS NUMBERED 71024 AND ABOVE.
- CIRCUIT SHOWN APPLIES TO PC BOARDS #9785 (MAIN BOARD) AND #9794 (IOC BOARD).
- DC VOLTAGES ARE SHOWN FOR VARIOUS POINTS. THESE ARE NORMAL OPERATING VOLTAGES FOR ZERO INPUT.
- THE HEAVY CONTINUOUS TRACE FOLLOWS THE PRIMARY SIGNAL PATH THROUGH THE CIRCUIT. THE HEAVY BROKEN TRACE SHOWS FEEDBACK PATHS.

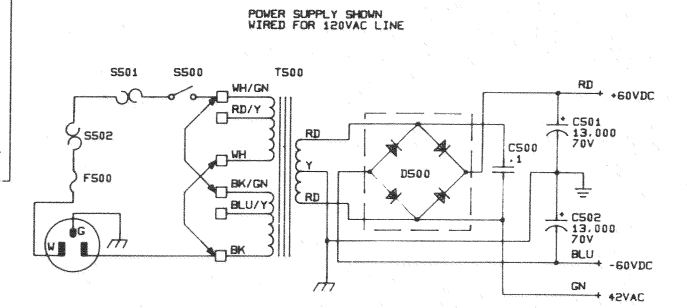
- WIRE COLOR CODES ARE GIVEN FOR THE MAIN POWER SUPPLY AND SOME BOARD WIRES.
- ALL RESISTORS IN OHMS UNLESS OTHERWISE STATED.
- ALL CAPACITORS IN MICRO-FARADS UNLESS OTHERWISE STATED.
- COMPONENTS COMMON TO BOTH CHANNELS ARE NUMBERED FROM 1 TO 99.
- CHANNEL ONE COMPONENTS ARE NUMBERED FROM 100 TO 199.
- CHANNEL TWO COMPONENTS ARE NUMBERED FROM 200 TO 299.
- R107, R207 ARE OMITTED IF IC-1 IS μ A739, 3.3K IF IC-1 IS μ A749.





NOTE:
 THIS IS A REPRESENTATIVE SCHEMATIC ONLY AND DOES NOT NECESSARILY REFLECT THE EXACT CIRCUITRY OF YOUR UNIT. PLEASE REFER TO THE RESPECTIVE SERVICE MANUAL FOR FURTHER TECHNICAL INFORMATION.

- NOTE:**
1. ALL RESISTORS IN OHMS, CAPACITORS IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
 2. ALL RESISTORS .25W, 5% UNLESS OTHERWISE SPECIFIED.
 3. THIS SCHEMATIC APPLIES TO UNITS WITH S/N 81324 AND FOLLOWING.
 4. MAIN FEEDBACK PATH DENOTED BY HEAVY TRACE.
 5. CHANNEL 1 MAIN BOARD COMPONENTS NUMBERED 100-199.
 6. CHANNEL 2 MAIN BOARD COMPONENTS NUMBERED 200-299.
 7. COMMON MAIN BOARD COMPONENTS NUMBERED 1-99.
 8. CHANNEL 1 OUTPUT BOARD COMPONENTS NUMBERED 300-399.
 9. CHANNEL 2 OUTPUT BOARD COMPONENTS NUMBERED 400-499.
 10. OTHER COMPONENTS NUMBERED 500-599.



**DC-300A II
 J0124-8**