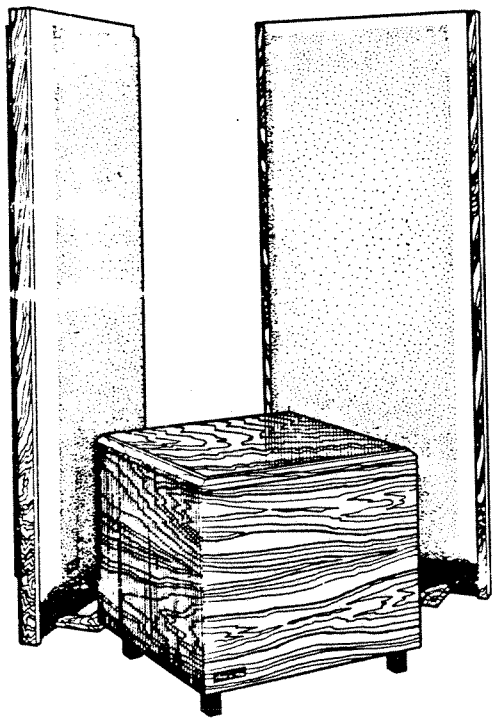
PHASE III LOUDSPEAKER SYSTEM



Service Manual

CONTENTS

Prepared 4/78

1-0.

TECHNICAL SPECIFICATIONS

Driver Compliment:
2 ea. 12" bass drivers
4 ea. 8" midbass drivers
4 ea. 4" midrange drivers
8 ea. 2" cone tweeters
2 ea. 1" soft-dome tweeters

Frequency Response: 24Hz to 20Kz ± 3db

Nominal Impedance: 6 ohms

Maximum Power Input: 350 RMS watts per channel

Maximum Continuous Power Input: 100 RMS watts below 200Hz

Minumum Power Required: 50 RMS watts per channel

Sound Pressure Level: 80db at 1 meter on axis with 1 watt of input at 1,000 HZ

Motion Control Module:

Input Impedance: 22K ohms

Output Inpedance: less that 600 ohms

Maximum Output Voltage: 8 volts RMS

Distortion: less that 0.1%

Hum and Noise: less than 100 microvolts

2-0. CIRCUIT DESCRIPTION
MOTION CONTROL MODULE

In sections B4 and D4 operational amplifiers Z1-C and Z1-D serve as active 12db/octave subsonic filters with high pass gain of 6db. The signal path then splits to section C3, ambience circuitry, and sections B3 and D3 which incorporate high frequency and midrange tone shaping circuits. Front panel-mounted switches S1-A and S1-B allow switchable high frequency response selection. Op amps Z2-A and Z2-B incorporate switchable midrange response through front panel-mounted switches S2-A and S2-B, and also low frequency through front panel-mounted switches S3-A and S3-B.

Z2-C and Z2-D in section 2 are output buffers with high frequency boost.

Z1-A in section C4 is a difference amplifier which supplies a weighted L-R signal to the left channel through Z2-A. Z1-B acts as an inverter buffer supplying a R-L signal to the right channel through Z2-B. The amount of ambience mix is governed by potentiometer R501, front panel-mounted.

Q1 and associated circuitry provides time delay output switching through relay K1. Response time is 1 to 2 seconds after turn-on and instantaneous at turn-off.

3-0. SCHEMATICS AND DESIGN HISTORY

For Panel Serial Numbers 1736 and Earlier:

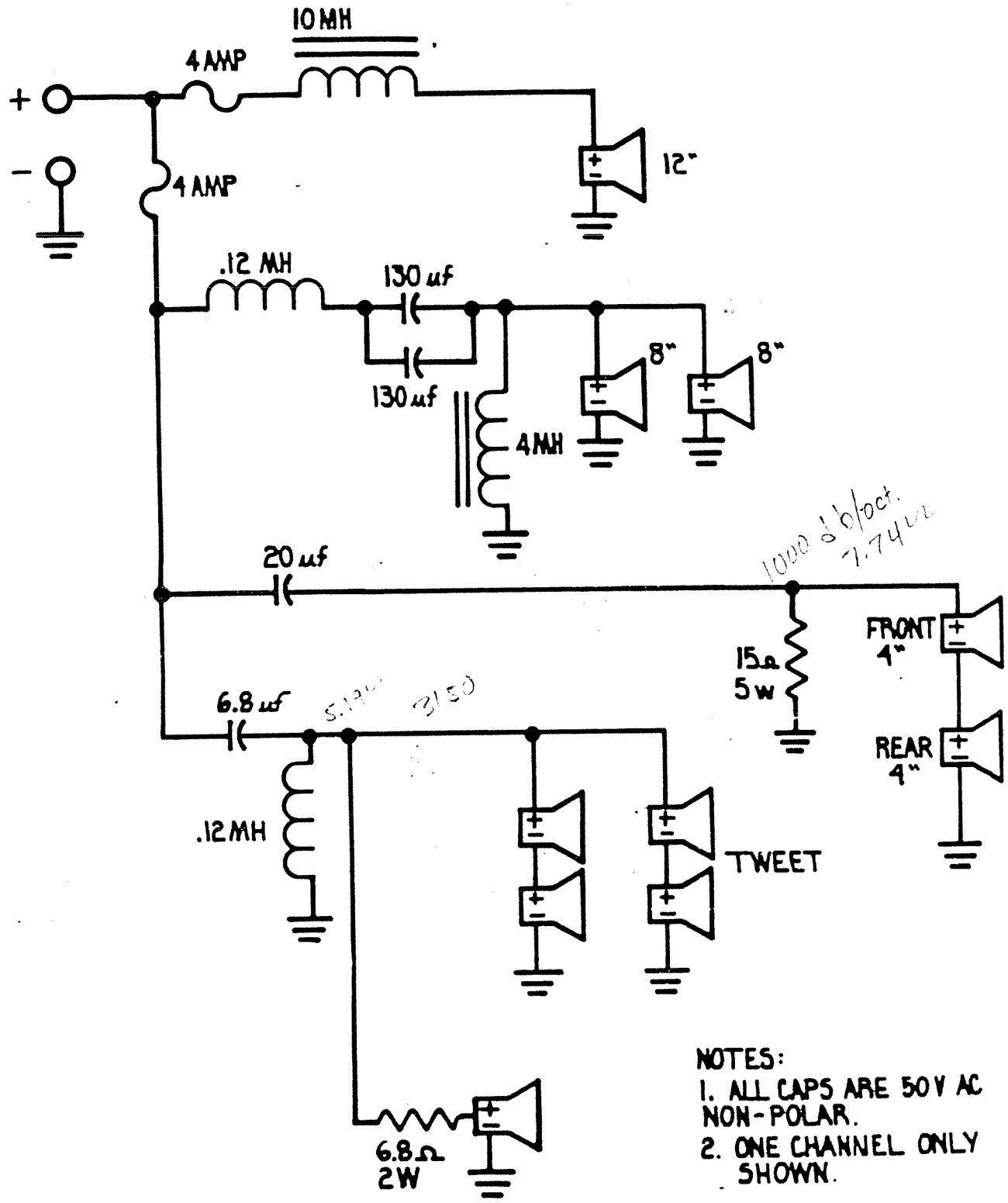
Diagram III-1: Phase III System Schematic
III-2: Crossover Assembly Layout
III-3: Panel Assembly Layout
III-4: Motion Control Module Schematic
III-5: Motion Control Module Assembly Layout (also see Diagram III-11)

For Panel Serial Numbers 1737 and Forward:

Diagram III-6: Phase III System Schematic
III-7: Crossover Assembly Layout
III-8: Panel Assembly Layout
III-9: Motion Control Module Schematic
III-10: Motion Control Module Assembly Layout

For All Panel Serial Numbers:

Diagram III-11: Motion Control Module Chassis Transformer Layout
III-12: Bass Commode Assembly Layout



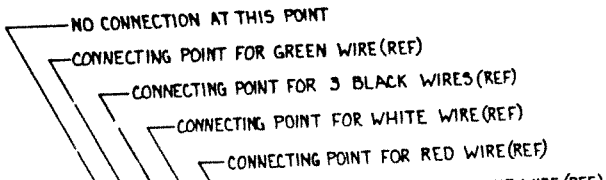
NOTES:
1. ALL CAPS ARE 50 V AC NON-POLAR.
2. ONE CHANNEL ONLY SHOWN.

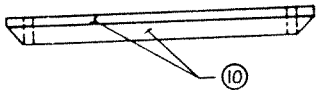
PHASE LINEAR			SCHEMATIC PHASE III SPEAKER		
DRAWN	RAT	1-19-78			
CHECKED			PANEL SERIAL NUMBER 1736 AND EARLIER	REV	
APPROVED					

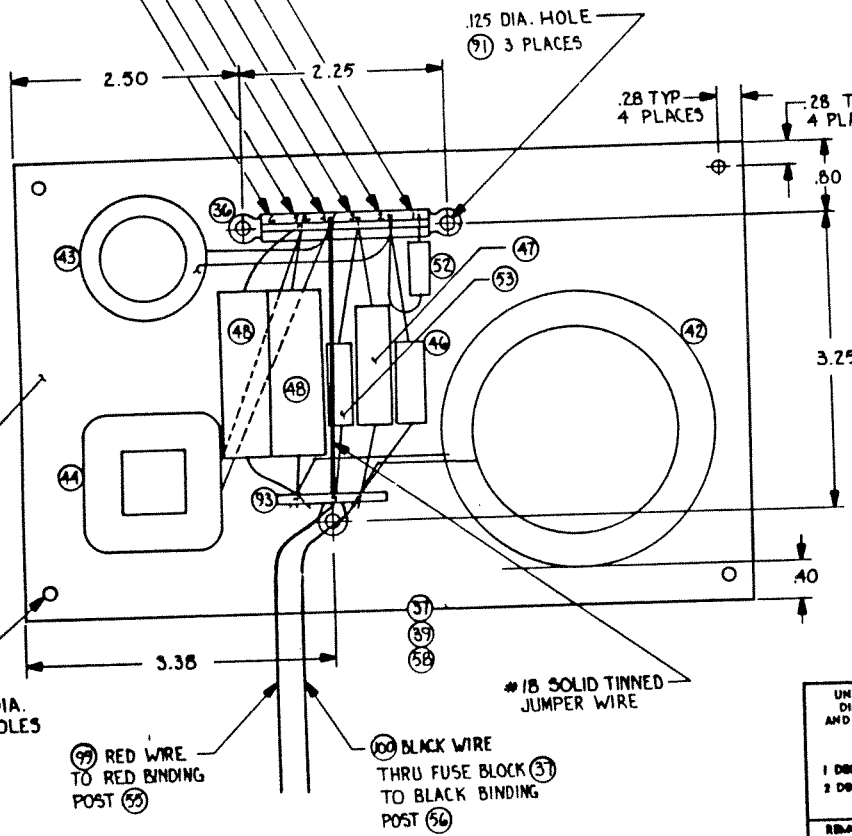
DIAGRAM III-1

REVISIONS				
LTR	DESCRIPTION	BY	DATE	APPROVED
A	1. REVISED SHEET 1	M.D.C.	6-9-76	
B	1 EXTENSIVELY REVISED CROSSOVER	M.D.C.	7-19-76	
C	1 EXTENSIVELY REVISED CROSSOVER	M.D.C.	8-5-76	
D	1 ZN 84 ADDED 2ND (48) TO PICTURE	MDC	10-22-76	

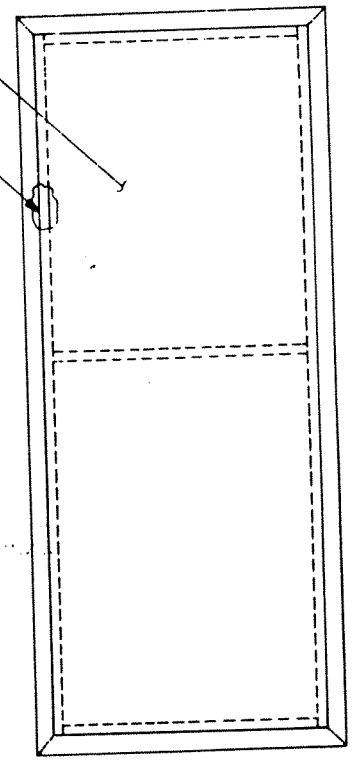
210-0072-0



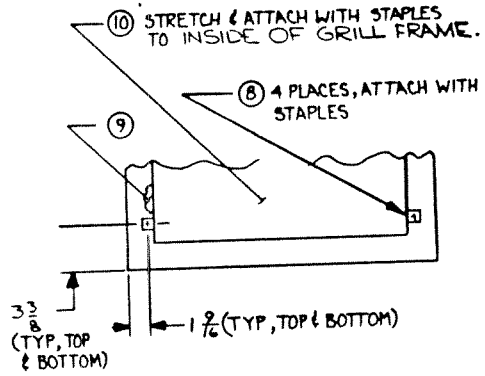




(29) CROSSOVER NETWORK ASSY



(11) GRILL FRAME ASSY
210-0056-0



UNLESS OTHERWISE SPECIFIED DIM. AND TOL. ARE IN INCHES AND SHALL BE INTERPRETED PER (ANSI) Y14.5-1966. TOLERANCES ARE: 1 DEC ±: .1, 3 DEC ±: .005, 2 DEC ±: .01, 4 DEC ±: .0005, ANGLES ±: 0° 30'	DRAWN	MIKE CHANDLER	4/27/76
	CHECKED	P. Lenhausen	5/17/76
	APPROVED		/ /
REMOVE BURRS, BRK SHARP EDGES MACH SURFACES 125	RELEASE STATUS		
MAT'L:	PREL		/ /
FINISH:	FINAL		/ /
HT. TREAT:			/ /
	DO NOT SCALE DWG.		/ /

Phase Linear

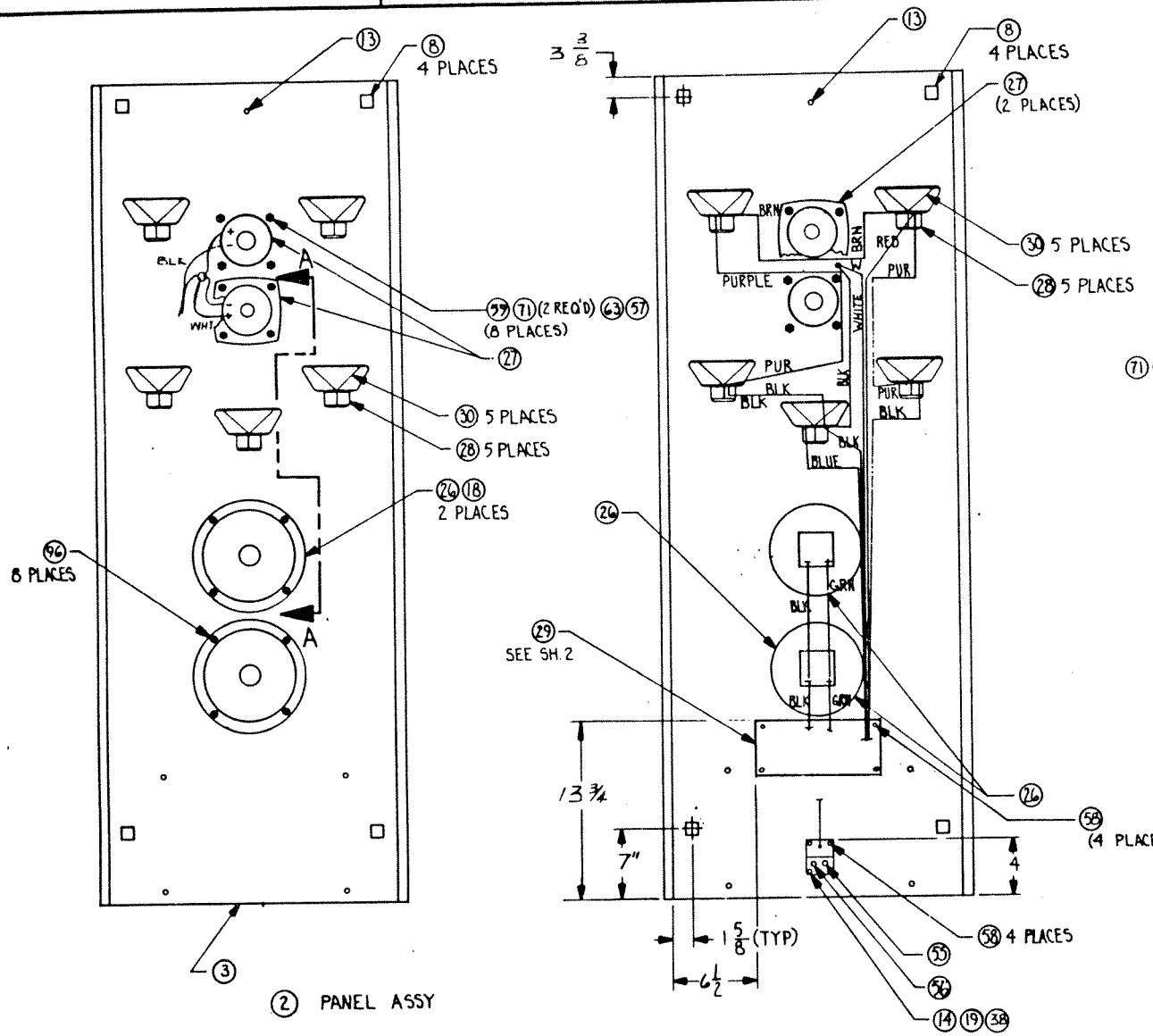
ASSY, SPEAKER SYSTEM
DRIVER III
Ser #1736 and earlier

SIZE	DWG. NO.	REV.
C	210-0072-0	D

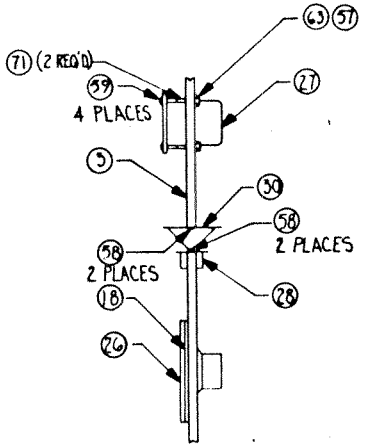
SCALE: NONE SHEET 1 OF 1

ATTACHMENTS 012345

REVISIONS				
LTR	DESCRIPTION	BY	DATE	APPROVED
A	1. ZONE C4: (99) WAS (97)	MDC	6-9-76	
B	1. EXTENSIVELY REVISED ASSY	MDC	7-15-76	
C	1. REVISED SHEET 2	MDC	8-5-76	
D	1. ZONE B2: (97) WAS (59) ____ (57)	MDC	10-20-76	
E	1. ZONE B2: (58) WAS (97) 2. ZONE C3: DELETED NOTE "CROSS-OVER ____" ADDED "SEE SH 2"	MDC	10-22-76	



② PANEL ASSY



SECTION A-A

UNLESS OTHERWISE SPECIFIED DIM. AND TOL. ARE IN INCHES AND SHALL BE INTERPRETED PER (ANSI) Y14.5-1966. TOLERANCES ARE: 1 DEC ±: .1, 3 DEC ±: .005, 2 DEC ±: .01, 4 DEC ±: .0005, ANGLES ±: 0° 30'	DRAWN	MIKE CHANDLER	4/23/76
	CHECKED	P Lindsay	5/17/76
	APPROVED		/ /
	RELEASE STATUS		
REMOVE BURRS, BRK SHARP EDGES MACH SURFACES 125	PREL.		/ /
	FINAL		/ /
MAT'L:			/ /
FINISH:			/ /
HT. TREAT:	DO NOT SCALE DWG.		

Phase Linear

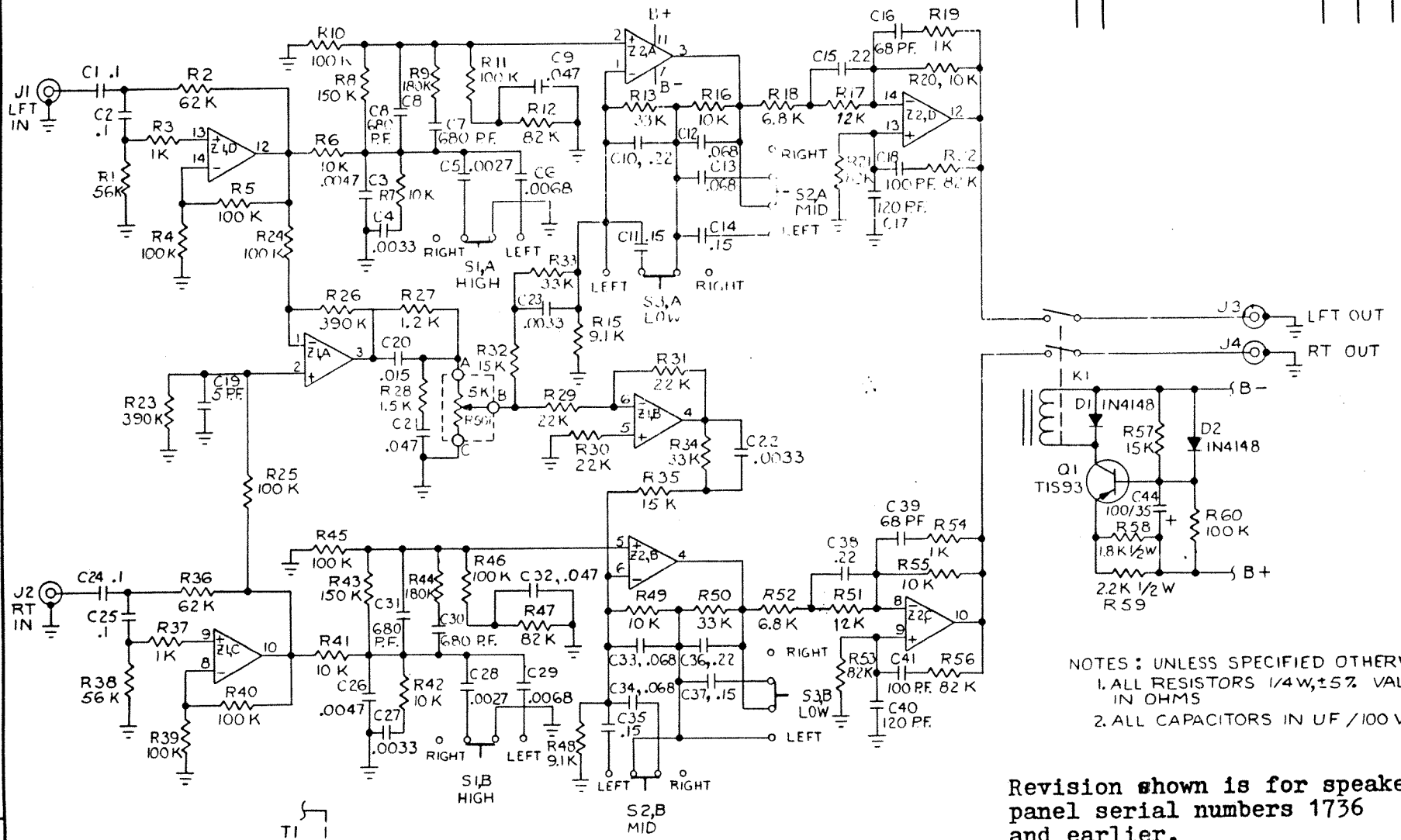
ASSY, SPEAKER SYSTEM, PROMETHEUS III
Ser #1736 and earlier

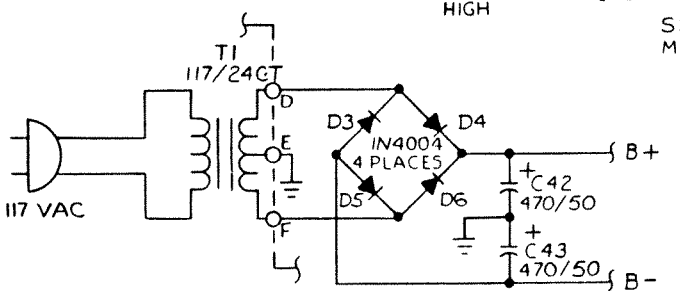
SIZE C | DWG. NO. 300-0025-0 | REV. E

SCALE: NONE | SHEET 1 OF 1

DIAGRAM III-3

ATTACHMENT [redacted] 45





REVISIONS				
LTR	DESCRIPTION	BY	DATE	APPROVED

UNLESS OTHERWISE SPECIFIED DIM. AND TOL. ARE IN INCHES AND SHALL BE INTERPRETED PER (ANSI) Y14.5-1966.
TOLERANCES ARE:
1 DEC ±: .1 3 DEC ±: .005
2 DEC ±: .01 4 DEC ±: .0005
ANGLES ±: 0° 30'
REMOVE BURRS, BRK SHARP EDGES MACH SURFACES
MAT'L:
FINISH:
HT. TREAT:

DRAWN	E REDDEN	11/29/76
CHECKED		12/6/76
APPROVED		12/6/76

RELEASE STATUS

PREL.		/ /
FINAL		/ /
		/ /
		/ /

DO NOT SCALE DWG.

Phase Linear

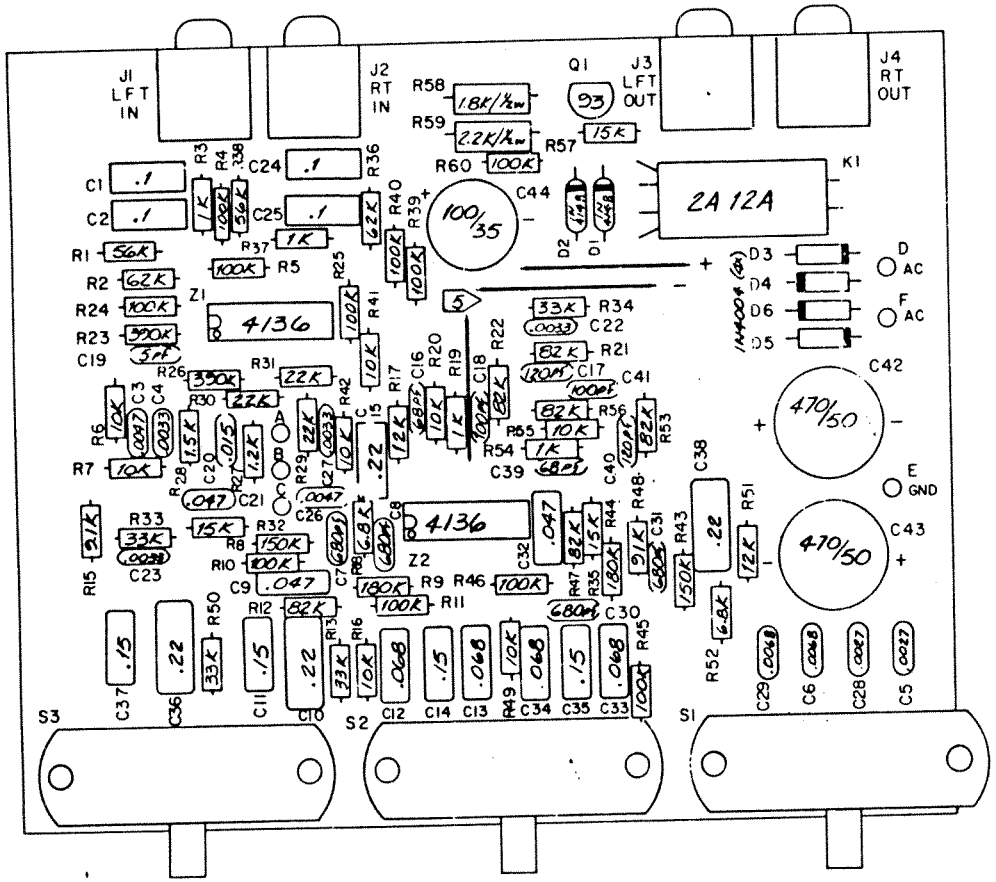
PCB ASSY SCHEMATIC
PL25 SPEAKER
EQUALIZER PIII

SIZE C | DWG. NO. 210-0071-0 | REV. E

SCALE: — | SHEET 2 OF 2

ATTACHMENTS 012345

REVISIONS				
LTR	DESCRIPTION	BY	DATE	APPROVED
E	NEW PCB COMPLETELY REVISED	SMK	11/3/76	



PL25 REVE 06612

NOTES: UNLESS OTHERWISE SPECIFIED
1. FOR SCHEMATIC SEE SHT 2 of 2
2. ALL RESISTORS ¼W 5% VALUE IN OHMS
3. CAPACITORS IN µF (MFD.)
4. C17,18,40,41 ARE 10%
5. JUMPER 22AWG SOLID WHT P/N 124-0082-0

Revision shown is for speaker panel serial numbers 1736 and earlier.

UNLESS OTHERWISE SPECIFIED DIM. AND TOL ARE IN INCHES AND SHALL BE INTERPRETED PER (ANSI) Y14.5-1966. TOLERANCES ARE 1 DEC ±: .1, 2 DEC ±: .01, 3 DEC ±: .005, 4 DEC ±: .0005, ANGLES ±: 0° 30'	DRAWN	SMK	11/30/76
	CHECKED	[illegible]	12/6/76
	APPROVED	APV	12/6/76
	RELEASE STATUS		
REMOVE BURRS, BRK SHARP EDGES MACH SURFACES 125	PREL.		/ /
	FINAL		/ /
			/ /
			/ /
	DO NOT SCALE DWG.		

Phase Linear

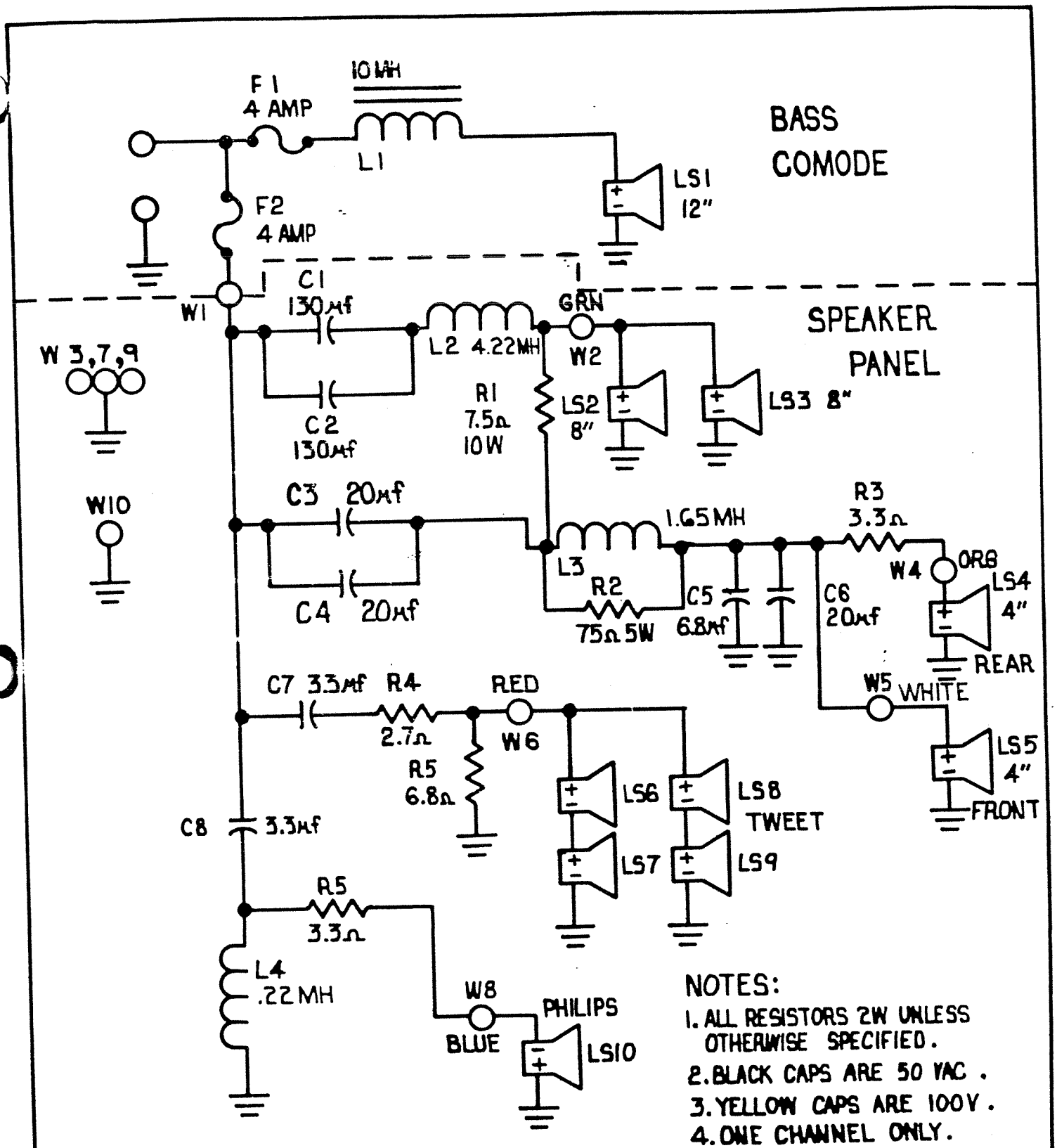
PCB ASS'Y, PL25
SPEAKER EQUALIZER

SIZE C | DWG. NO. 210-0071-0 | REV. E

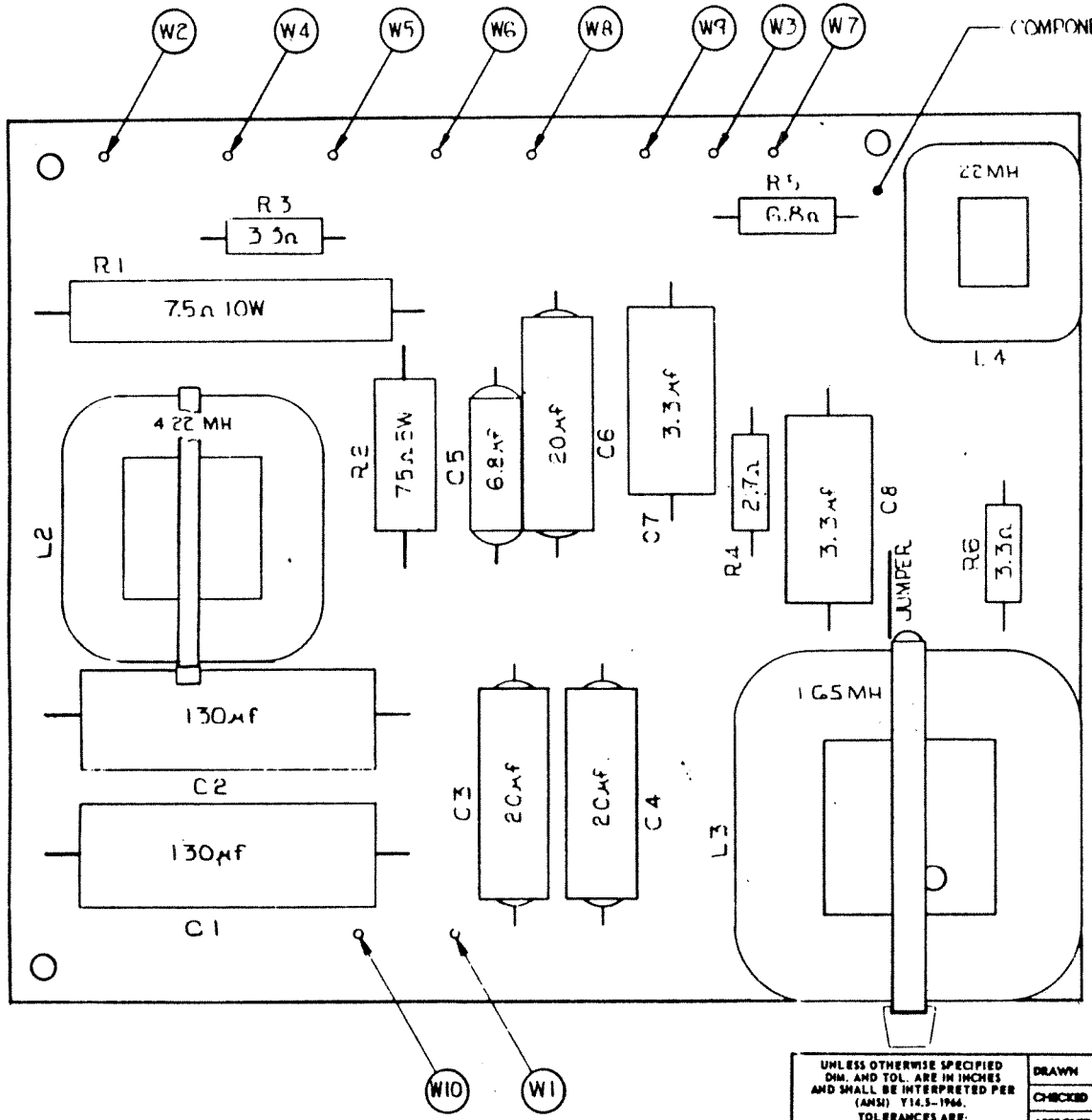
SCALE: | SHEET 1 OF 2

DIAGRAM III-5

ATTACHMENT [redacted]345



PHASE LINEAR		SCHEMATIC PHASE III SPEAKER
DRAWN	R. CLARK	11-22-77
CHECKED		
APPROVED		
Serial Number 1736 Forward		REV



NOTES:

1. ALL RESISTORS 2W UNLESS OTHERWISE SPECIFIED.
2. BLACK CAPACITORS ARE 50 VAC.
3. YELLOW CAPACITORS ARE 100 VAC.

UNLESS OTHERWISE SPECIFIED DIM. AND TOL. ARE IN INCHES AND SHALL BE INTERPRETED PER (ANSI) Y14.5-1966. TOLERANCES ARE: 1 DEC ±: .1 3 DEC ±: .005 2 DEC ±: .01 4 DEC ±: .0005 ANGLES ±: 0° 30'	DRAWN	R. CLARK	11/23/77
	CHECKED		/ /
	APPROVED		/ /
	RELEASE STATUS		
REMOVE BURRS, BRK SHARP EDGES MACH SURFACES 125	PREL		/ /
MATL:	FINAL		/ /
FINISH:			/ /
HT. TREAT:			/ /
	DO NOT SCALE DWG.		

Phase Linear

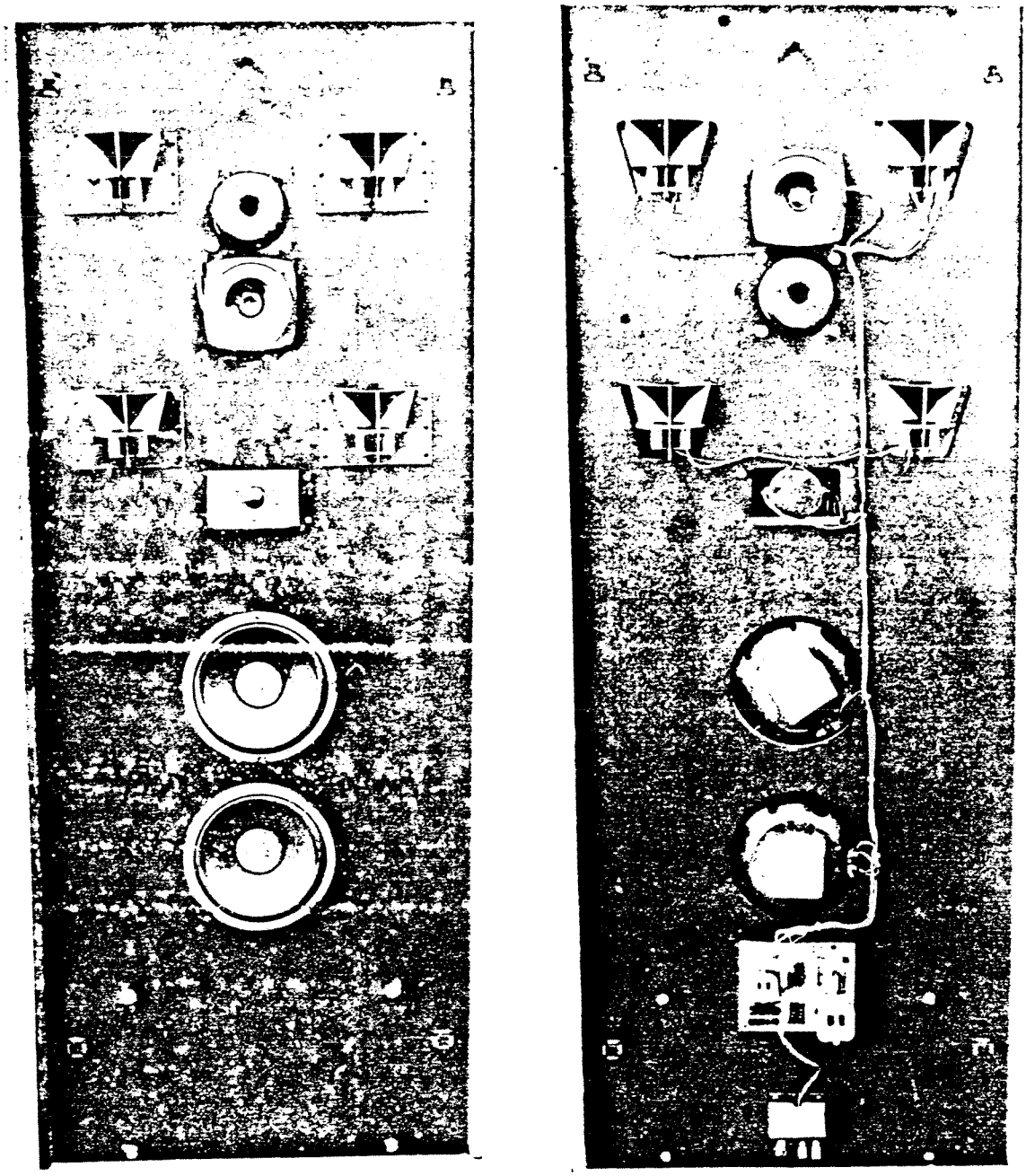
PCB ASSEMBLY

PHASE III . SPEAKER

SIZE C | DWG. NO. 210-0077-0 | REV.

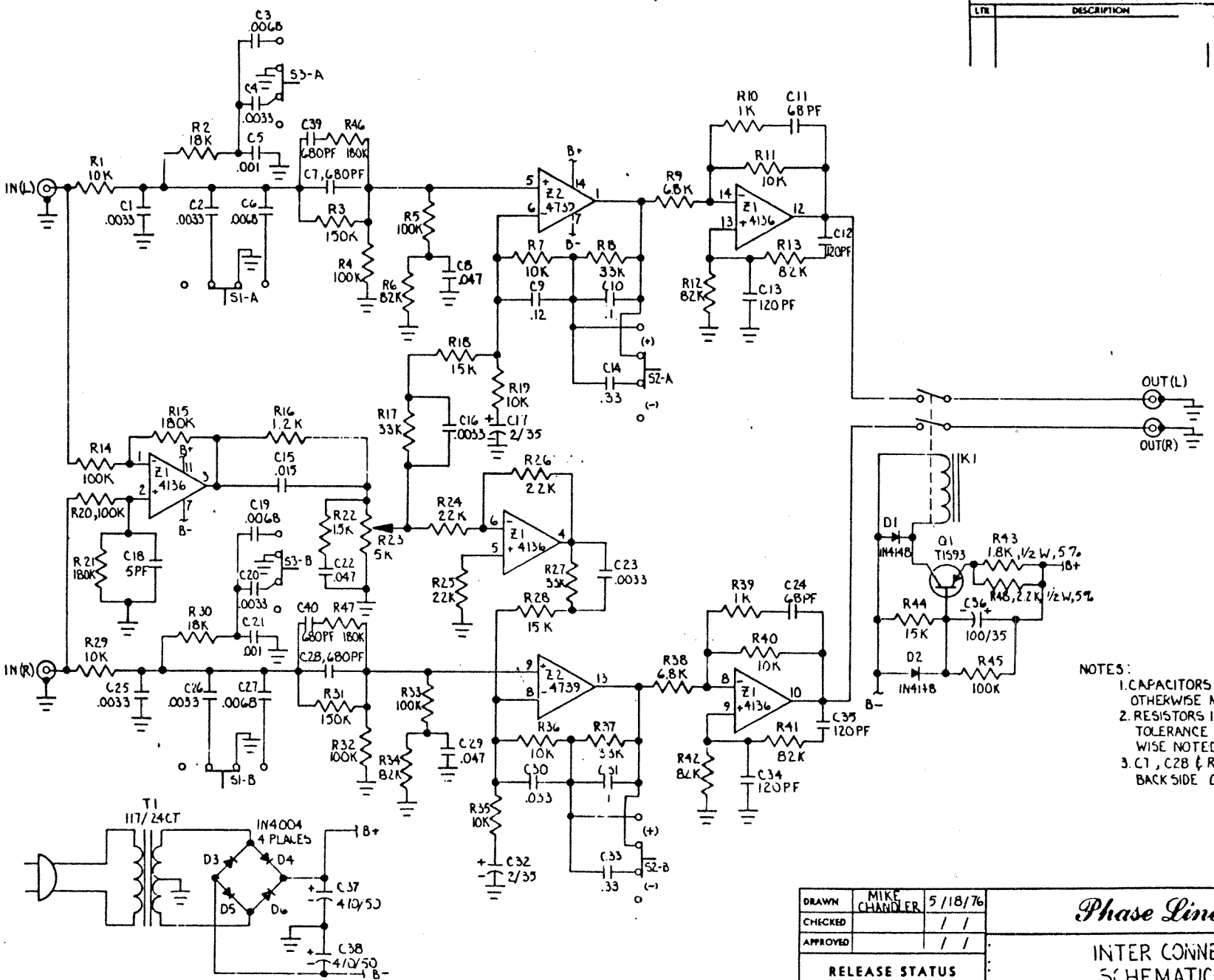
SCALE: 2X | SHEET 1 OF 1

ATTACHMENT 16



Panel, Serial #1736 Forward

DIAGRAM III-8



REVISIONS				
LTR	DESCRIPTION	BY	DATE	APPROVED

NOTES:
1. CAPACITORS IN μF UNLESS OTHERWISE NOTED.
2. RESISTORS IN OHM, 1/4 W, 5% TOLERANCE UNLESS OTHERWISE NOTED. K=KΩ, M=MΩ.
3. C1, C28 & R48 MOUNTED ON BACK SIDE OF BOARD

DRAWN	MIKE CHANDLER	5/18/76
CHECKED		/ /
APPROVED		/ /
RELEASE STATUS		
PREL.		/ /
FINAL		/ /
		/ /
DO NOT SCALE DWG.		

Phase Linear

INTER CONNECT SCHEMATIC P III EQUALIZER

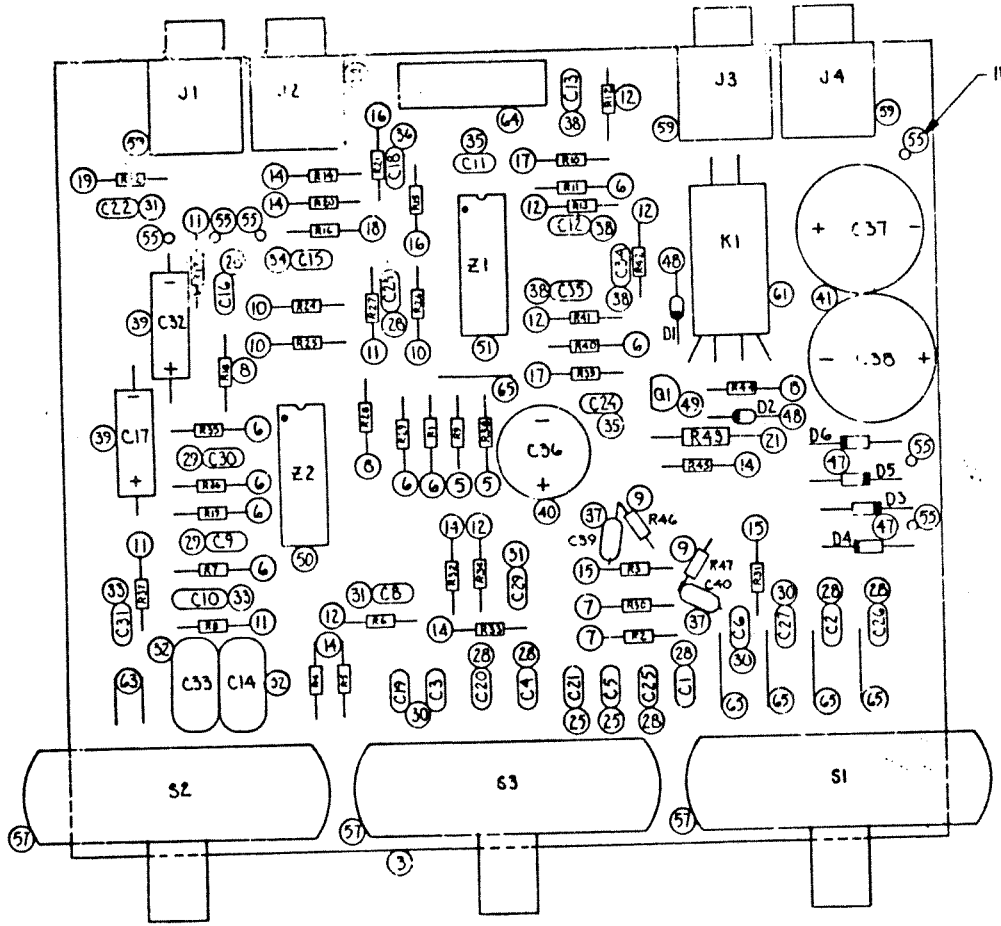
SIZE	DWG. NO.	REV.
C	402634	C

SCALE: NONE SHEET 1 OF 1

DIAGRAM TTT-9

ATTACHMENT 345

REVISIONS				
LTR	DESCRIPTION	BY	DATE	APPROVED



04 ASSY PL25 41600

NOTES:
1. FOR SCHEMATIC SEE DWG 402634
2. C7 & C28 IN SAME LOCATION ON BACK SIDE OF BOARD.
3. R48 MOUNTED ON BACK SIDE OF BOARD PARALLEL TO R43

01-SAME AS 02 EXCEPT C1 & C25 ARE .001 & C14 & C23 ARE .47
02-SAME AS 03 EXCEPT C5 & C21 ARE .0033 AND ALL JUMPER WIRES .4 LG
03-SAME AS 04 EXCEPT C16 C25 ARE .0018, C2 & C26 ARE .0015, C6 & C27 ARE .0033, C9 & C30 ARE .033, C12, C13, C34 & C35 ARE 100 PF, R15 & R21 ARE 220K, C7 & C28 ARE ON TOP OF BOARD & R43 IS 1K, 1/2W
04-SHOWN

UNLESS OTHERWISE SPECIFIED DIM. AND TOL. ARE IN INCHES AND SHALL BE INTERPRETED PER (ANSI) Y14.5-1966.
TOLERANCES ARE:
1 DEC ±: .1 3 DEC ±: .005
2 DEC ±: .01 4 DEC ±: .0050
ANGLES ±: 0° 30'

REMOVE BURRS, BRK SHARP EDGES MACH SURFACES

MAT'L:

FINISH:

HT. TREAT:

DRAWN	MIKE CHANDLER	5/18/76
CHECKED		5/19/76
APPROVED		/ /

RELEASE STATUS

PREL.		/ /
FINAL		/ /
		/ /
		/ /

DO NOT SCALE DWG.

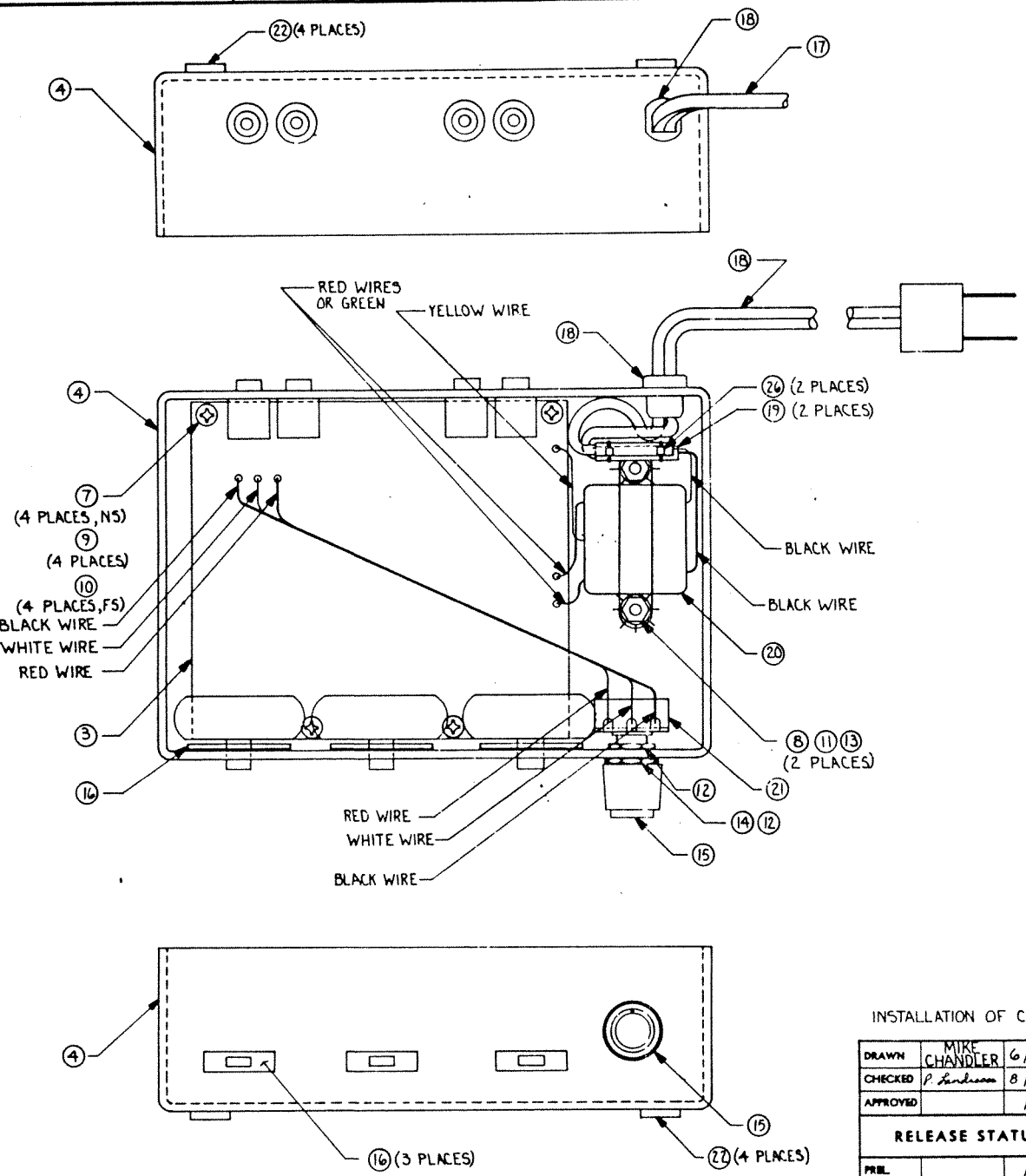
Phase Linear

P.C.B. ASSY, PL25
SPEAKER EQUALIZER
PIII

SIZE C | DWG. NO. 402626 | REV. C

SCALE: NONE | SHEET 1 OF 1

ATTACHMENTS 012345



INSTALLATION OF COVER NOT SHOWN FOR DRAWING CLARITY

REVISIONS				
LTR	DESCRIPTION	BY	DATE	APPROVED

DRAWN	MIKE CHANDLER	6/7/76
CHECKED	P. Sanderson	8/16/76
APPROVED		/ /
RELEASE STATUS		
PREL.		/ /
FINAL		/ /
		/ /
		/ /
DO NOT SCALE DWG.		

Phase Linear

ASSY, EQUALIZER, SPEAKER, PHASE III

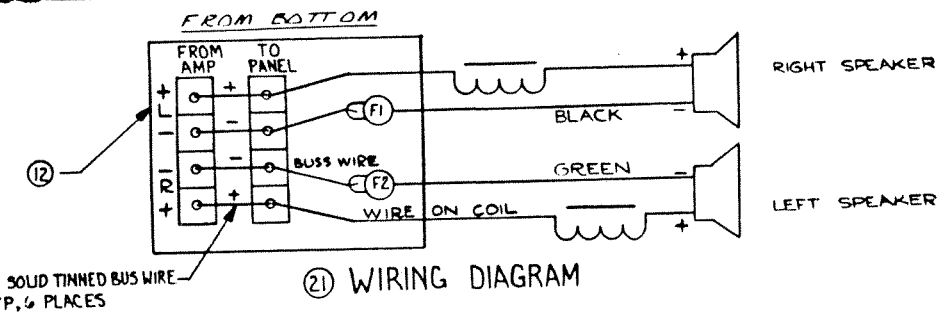
SIZE	DWG. NO.	REV.
C	210-0070-0	B

SCALE: NONE SHEET 1 OF 1

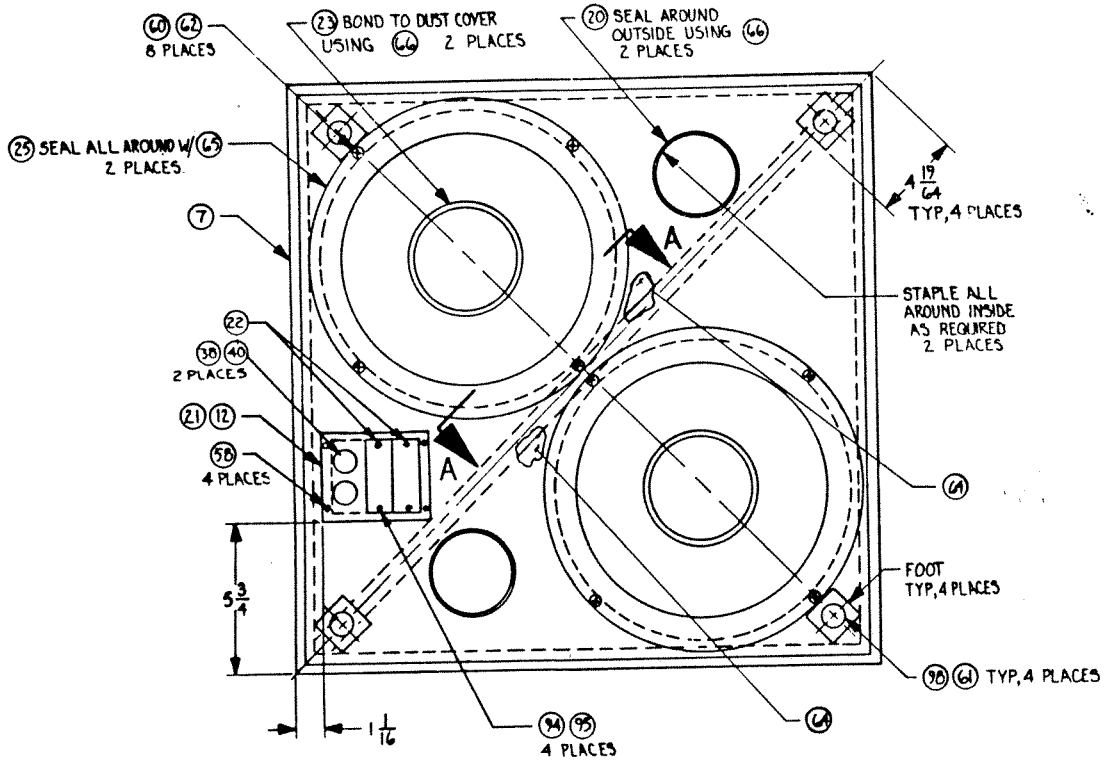
DIAGRAM TT1-11

ATTACHMEN[redacted]345

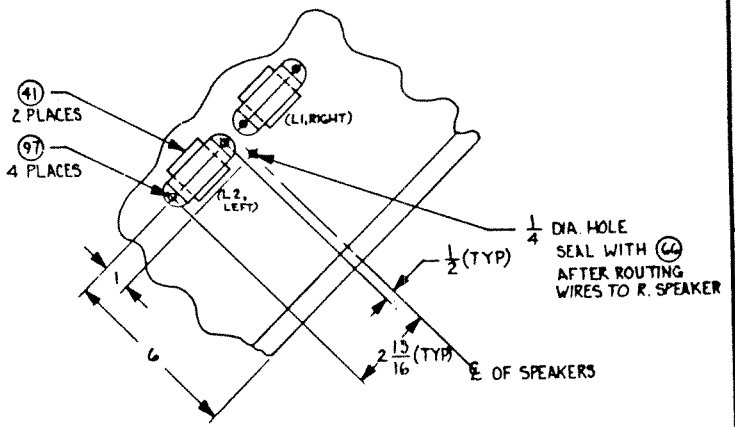
REVISIONS				
LTR	DESCRIPTION	BY	DATE	APPROVED
A	1. REVISED SHEET 1	M.D.C.	6-9-76	
B	1. ZN B2 & B3 DELETED (69) CALLOUTS 2. ZN B2 (41) WAS (59) 3. ZN B4 ADDED (21) TO CALLOUT	M.D.C.	7-15-76	



(21) WIRING DIAGRAM



(6) BASS SPEAKER ASSY



SECTION A-A

UNLESS OTHERWISE SPECIFIED DIM. AND TOL. ARE IN INCHES AND SHALL BE INTERPRETED PER (ANSI) Y14.5-1966.
TOLERANCES ARE:
1 DEC ±: .1 3 DEC ±: .005
2 DEC ±: .01 4 DEC ±: .0005
ANGLES ±: 0° 30'

REMOVE BURRS, BRK SHARP EDGES MACH SURFACES 125

MAT'L:

FINISH:

HT. TREAT:

DRAWN	MIKE CHANDLER	5/4/76
CHECKED	D Anderson	5/17/76
APPROVED		/ /

RELEASE STATUS

PREL.		/ /
FINAL		/ /
		/ /
		/ /

DO NOT SCALE DWG.

Phase Linear

ASSY, SPEAKER SYSTEM, PHASE III

SIZE C | DWG. NO. 210-0069-0 | REV. B

SCALE: NONE | SHEET 1 OF 1

ATTACHMENTS 012345

4-0. MOTION CONTROL MODULE TEST AND ALIGNMENT PROCEDURE

Input signal shall be 250mV @ 2K Hz. Unless otherwise stated all dB measurements are ± 1dB

For Phase III Systems with Panel Serial Numbers 1736 and Earlier:

4-1: With all trim controls set at "0" position drive the inputs with a 250mV 2K Hz signal and obtain a 0dB reference at the outputs.

4-2: Repeat step 4-1 with a 1K Hz signal and verify a signal boost of 2dB from the 0dB reference. Switch the "MID" control to "+" position and verify another signal boost of 1.5dB. Switch control from "+" position to "-" position and verify a signal drop of 2.5dB. Return control to "0" position.

4-3: Repeat step 4-1 with a 30 Hz signal and verify a signal boost of 8.5dB from the 0dB reference. Switch the "LOW" trim control to the "+" position and verify another signal boost of 6dB. Switch control from "+" position to "-" position and verify a signal drop of 7.5dB. Return control to "0" position.

4-4: Repeat step 4-1 with a 20K Hz signal and verify a signal boost of 4dB from the 0dB reference. Switch "HIGH" control to "+" position and verify another signal boost of 6db. Switch control from "+" position to "-" position and verify a signal drop of 9.5dB. Return control to "0" position.

*)4-5: Repeat step 4-1. With the "Spatial Imaging" control set fully counterclockwise unplug the right channel input and verify that the right channel output has dropped 50dB, ± 3dB. Now turn the Spatial Imaging control fully clockwise and verify that the right channel output is now inverted and 10dB lower than the left channel, ± 3dB.

(*) Signal input may have to be increased in order to obtain separation measurements.

For Phase III Systems with Panel Serial Numbers 1736 and Forward:

4-6: With all trim controls set at "0" position drive the inputs with 250mV 2K Hz signal and obtain a 0dB reference.

4-7: Repeat step 4-6 with a 200 Hz signal and verify another boost of 2dB. Switch "MID" control to "+" position and verify another signal boost of 2dB. Switch control from "+" position to "-" position and verify a signal drop of 4dB. Return control to "0" position.

4-8: Repeat step 4-6 with a 30 Hz signal and verify a signal boost of 3dB from the 0dB reference. Switch "LOW" control to "+" position and verify another signal boost of 2dB. Switch control from "+" position to "-" position and verify signal drop of 6db. Return control to "0" position.

4-9: Repeat step 4-6 with a 20K Hz signal and verify a signal boost of 3 db from the 0dB reference. Switch "HIGH" control to "+" position and verify another signal boost of 4dB. Switch control from "+" position to "-" position and verify a signal drop of 8dB. Return control to "0" position.

(*)4-10: Repeat step 4-6. With the "Spatial Imaging" control set fully counterclockwise unplug the right channel input and verify that the right channel output has dropped 50db, ± 3dB. Now turn the Spatial Imaging control fully clockwise and verify that the right channel output is now inverted and 10dB lower than the left channel, ± 3dB.

(*) Signal input may have to be increased in order to obtain separation measurements.

5-0. SPEAKER PANEL AND BASS COMMODE TEST PROCEDURE

Panel Test:

Phase III speaker panels are tested at the factory in a special acoustic environment. The test procedure involves the use of a sweep signal oxcillator, pink noise generator, sound pressure level meter, and realtime analyzer.

Since most repair facilities are not equipped with such speaker testing equipment the easiest method of testing the speakers is to. simply listen to them since most speaker failures are audibly straightforward. A defective driver will normally manifest itself by either giving no audible sound whatsoever, or giving a definite audible distortion or breaking up of the signal.

To give the panels a listening test drive them with a low noise signal source (e.g., sine wave sweep oscillator, or quiet record or tape with fairly dynamic material) at various sound pressure levels and listen to each driver in the panel. In the case of the tweeters it may be necessary to make a "listening tube" by rolling up a piece of paper and listen to each tweeter through this tube as sometimes a tweeter may be hard to hear by merely placing your ear close to it. Verify that there is 1) sound coming from each driver, and 2) that there is no audible break-up or distortion.

If an entire set of drivers goes silent, such as all of the tweeters, both midrange drivers, etc., the problem probably lies with the crossover assembly and it may be necessary to give each component on the crossover board which is in circuit with the set of drivers a continuity check (refer to the appropriate crossover schematic in Section III).

Bass Commode Test:

The bass commode is tested at the factory using a sweep signal oscillator (with amplification) and is driven in a sweep mode from around 100Hz down to 5Hz. This allows not only an audible check of each driver's performance, but offers an audible check for air leaks or vibrations in the cabinet.

To test the bass commode the same sort of test may be utilized, or if a signal oscillator isn't available it may be driven with a low noise record or tape which contains suitable bass material. Verify that both drivers give an audible signal and that the material is free of distortion, break-up, rattles or air leaks.

6-0. PHASE III PARTS LIST

Description	Part No.
12" Bass Driver	129-0039-0
8" Midbass Driver	129-0040-0
4" Midrange Driver	129-0041-0
2" Cone Tweeter	129-0042-0
1" Soft-Dome Tweeter	129-0082-0
Crossover Assy:	
Ser#1736 & Earlier	210-0072-0
Ser#1736 & Forward	210-0077-0
ABS Plastic Tweeter Bracket: 3-pc.	
Left	141-0144-0
Right	141-0145-0
Ring	143-0014-0
Tweeter Cone Deflector	142-0019-0
8" Mounting Gasket	121-0084-0
Speaker Panel (raw)	130-0004-0
Walnut Panel Side Strip	130-0009-0
Walnut Panel Foot	130-0007-0
Metal Panel Foot	141-0047-0
Grille Frame	130-0006-0
Grille Frame Assy	210-0086-0
Bass Cabinet (raw)	130-0005-0
Bass Inductor	125-0014-0
Bass Terminal Board Assy.	210-0074-0
Push-connect Term. Strip.	121-0064-0
Bass Cabinet Foot	130-0010-0

Description	Part No.
Cap, 130/50V NP	127-0087-0
Cap, 20/50V NP	127-0086-0
Cap, 6.8/50V NP	127-0085-0
Cap, 3.3/100V NP	127-0115-0
Res., 75 Ohm 5W	128-0375-0
Res., 15 Ohm 5W	128-0363-0
Res., 7.5 Ohm 10W	128-0376-0
Res., 8.2 Ohm 2W	128-0361-0
Res., 6.8 Ohm 2W	128-0373-0
Res., 3.3 Ohm 2W	128-0360-0
Res., 2.7 Ohm 2W	128-0374-0
Binding Post (red)	121-0007-0
Binding Post (black)	121-0008-0
Fuseholder (AGC)	121-0010-0
Fuse, AGC-4	121-0104-0
Motion Control Module	210-0070-0
IC, RC4136	126-0027-0
IC, RC4739	126-0029-0
Relay, 2V reed	129-0044-0
Jack, RCA, PCB-mount	121-0022-0

NOTE: Whenever ordering parts BE SURE TO INCLUDE THE PANEL SERIAL NUMBER OF THE SPEAKER SYSTEM.

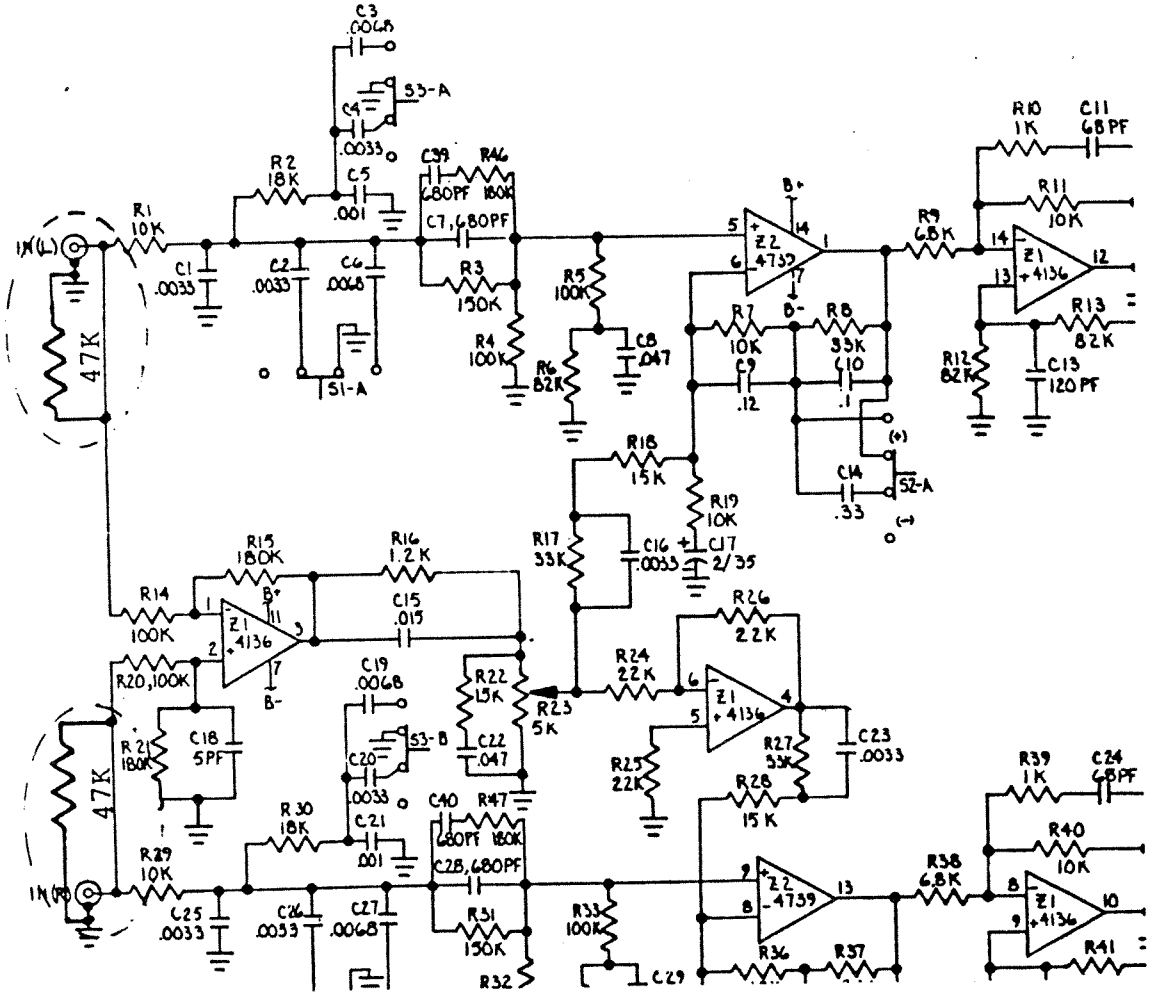
SERVICE BULLETIN

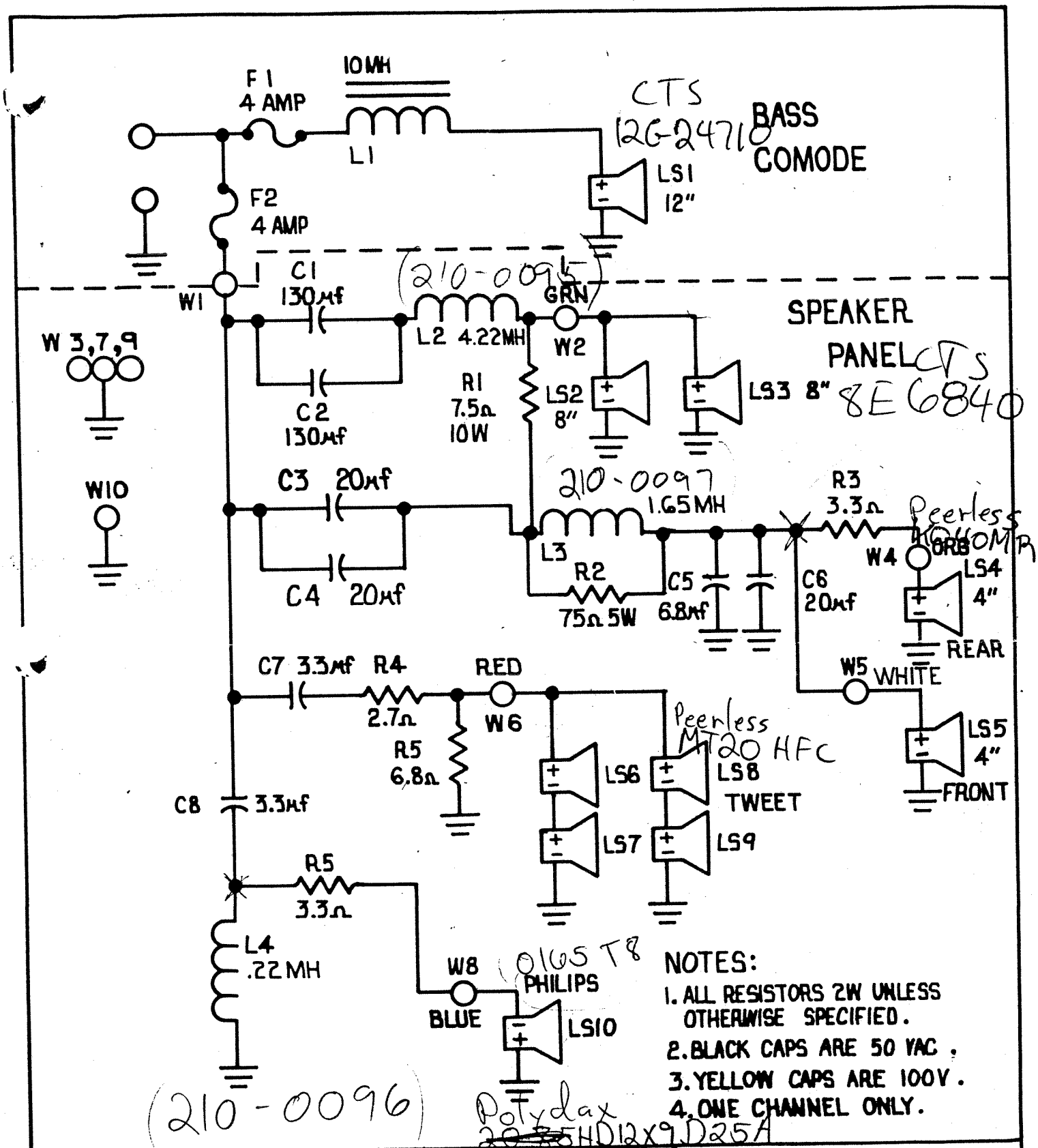
SUBJECT: Phase III Motion Control Module

We have discovered that due to the positive feedback used in one of the frequency contouring stages the Motion Control Module will oscillate (10v AC @ about 200Hz) if the inputs are opened. This can happen when switching the tone controls in and out on a preamp which has a non-shorting tone switch (such as the Phase 2000). To arrest this oscillation the inputs should be referenced to ground through a 47K-ohm resistor. The resistor should be soldered on the foil side of the PC board from each input hot (+) to the ground plane provided for the shorting input jacks.

Thus far the oscillation has proven to be a rare complaint but can be a potential hazard to unfused speakers. If you have any further questions feel free to contact the factory service department at the following address:

PHASE LINEAR
20121-48th AVE. WEST
LYNNWOOD, WA 98036
(206)774-8848





PHASE LINEAR

SCHEMATIC
PHASE III SPEAKER

DRAWN	R. CLARK	11-22-77
CHECKED		
APPROVED		

Serial Number 1736 Forward

REV