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OWNERS MANUAL
MODELS 201/202
STEREO SYSTEM CONTROL CENTER

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Section 1. Description

The BGW Model 201/202 Stereo System Control Center is designed and built to provide totally accurate reproduction of all types of program material while allowing an almost unlimited selection of presentation formats to suit your requirements.

All controls are easy to adjust, and indicate their settings at a glance. Complete freedom in signal equalization is provided by four active baxandal type sliding tone controls and active 3-pole high and low pass filters. Total Input and Output switching flexibility is facilitated by a two-by-two push-button matrix. Up to seven separate inputs may be connected to the rear panel and individually selected from the front panel. Material may be copied from one tape machine to another by pushing a single button on the front panel, and an auxiliary tape machine may be quickly connected to the system through easily accessible jacks on the front panel. Separate switches on the front panel with built-in LED indicators control power to the preamp and the power amp. The sliding gain controls, much easier to read and operate than standard rotary pots, provide the dual functions of balancing and level adjustment.

On the rear panel, connections may be made easily and quickly through the use of RCA-type phono jacks. A separate metal binding post is provided for grounding the turntable tone-arm. Provisions for both a remote control accessory and a moving coil phono cartridge preamp accessory have been made in the form of multipin sockets for these accessories. The preamp may be changed from 90-120 volt- to 180-240 volt-operation with a switch, and two separately switched outlets are available for accessory use.

From every standpoint, the Model 201/202 represents a significant advance in the field of audio technology.

Section 2. Specifications

Gain:

Phono to tape output: 42dB at 1kHz

High level input to line output:

Front Panel switch in High position: 22dB

Front Panel switch in Low position : 10dB

Input Impedance:

Phono: 47 K ohms

High level inputs: 90 K ohms

Input Overload:

Phono: 100 millivolts at 1 kHz

High level: 10 volts

Dynamic Range (Phono Section): 100dB

Maximum Output Voltage:

Line out 8 volts RMS into 600 ohms (+20dBm).

Phono at tape output: 10 volts RMS into 5 K ohms

Rated output: 4 volts RMS into 5 K ohms

Total harmonic distortion:

Less than 0.01% at rated output 20Hz - 20kHz.

Noise:

Phono equivalent input noise = .8 microvolt with input shorted over 20Hz - 20kHz. S/N ratio = 82dB (unweighted).

High level to line output greater than 90dB below rated output in low gain mode, greater than 80dB below rated output in high gain mode.

Tone Control Equilization:

+ 18dB at 50Hz and 15kHz at 3dB per step, front panel defeat switch removes tone controls from circuit.

High and Low Pass Filters:

Active 3-pole, 18dB per octave; low frequency at 40Hz, high frequency at 12kHz.

Frequency Response:

+ .2dB 20Hz to 20kHz from high level inputs.

- .25dB of RIAA 20Hz to 20kHz from phono inputs.

Inputs:

Five high level inputs (1 tuner, 2 auxiliary, 2 tape), two equalized phono.

AC outlets:

One switched by PRE and PWR switches

One switched by PRE switch only

Power Requirements:

Approximately 10 watts at 120 VAC or 240 VAC, 50 - 400Hz

Semiconductor Complement:

1 low noise dual integrated circuit, 2 power transistors, 43 low noise selected signal transistors.

Section 3. Installation

3.1 Preliminary

DO NOT PLUG THE AMPLIFIER IN YET! SAVE BOTH
CARTONS AND MOLDED CORNERS

The container should be saved in the event the unit is moved or shipped at some future date.

Inspect the unit for damage in transit immediately upon receipt. Only the consignee may institute a claim with the carrier for shipping damage. BGW will cooperate fully in such event. Be sure to save the container as evidence of damage for the shipper to inspect.

All connections should be made before power is applied!

3.2 Mounting and Set-Up

Position the preamplifier in its normal operating location, allowing access to the rear panel so that inputs and outputs may be connected. If the preamplifier is to be rack mounted, the four feet on the bottom of the unit may be removed. (There will be no loose hardware inside the amplifier if the feet are removed.)

3.3 Connecting Input and Output Cables

On the back of the preamplifier, note the diagram showing the designation of the jacks. Note that all the left channel jacks are in one row and all the right channel jacks are in another. All connections should be made with the power off and the preamplifier unplugged from the power mains. All connecting cables going to one unit should be of the same length and the same gauge wire.

One or two phonographs may be connected to the inputs marked "PHONO". If a separate ground wire is provided on the phonograph, connect it to the metal binding post next to these inputs. Simply unscrew the post until the wire can be inserted through the hole in the bottom, and then tighten it down.

The "TUNER" input should be connected to the main (high or line level) output of the tuner. The auxiliary inputs ("AUX") are also intended for high level inputs.

One or two three-head tape machines may be connected to the inputs and outputs marked "TAPE". The tape machines' line outputs should be connected to the preamplifier's "TAPE" inputs, and the preamplifier's "TAPE" outputs should be connected to the tape machines' line inputs.

Consult the Tape Recorder Instruction Manual for preamplifier connection instructions if tape machines which use the same head for record and playback are to be used.

An external equalizer, such as a speaker equalizer, a full octave equalizer, or a 1/3 octave equalizer may be connected to the connectors marked "EXT. EQUALIZER". Connect the input of the equalizer to the connector marked "TO", and connect the output of the equalizer to the connector marked "FROM". Remove the signal jumpers connecting the "TO" and "FROM" jacks only if an external equalizer is used.

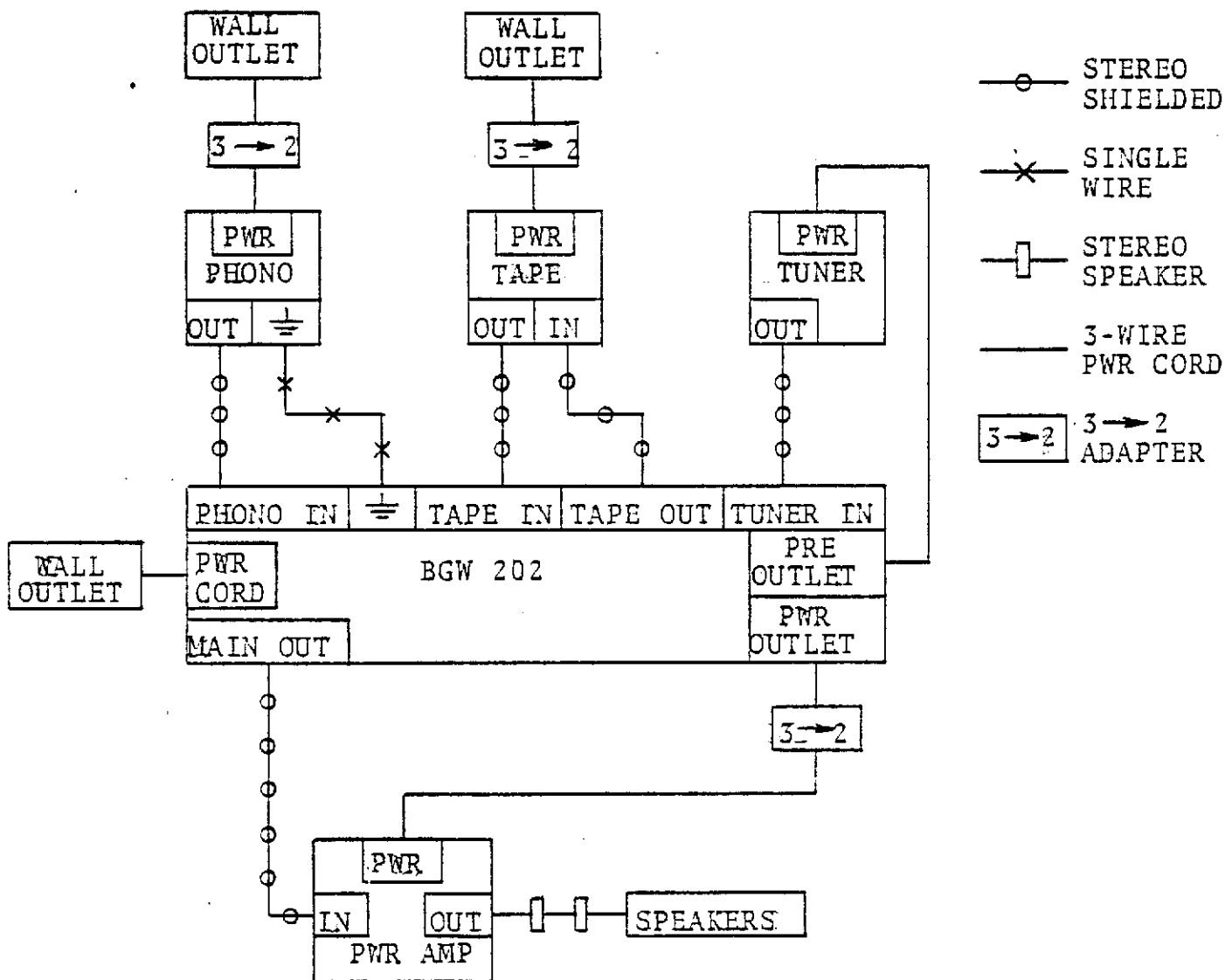
The inputs of the power amplifier to be used should be connected to the "MAIN" output connectors. Two sets of "MAIN" output connectors are provided; the extra set may be used for connecting another power amplifier, a separate headphone amplifier, etc.

3.4 Connecting the Power Mains

All input and output connections should be made before power is applied. The mains (AC line) voltage is indicated by the switch to the right of the fuse on the rear panel. For use in the United States, the switch should read "115". This allows normal operation with line voltages ranging from 90 ~ 130 VAC as indicated on the rear panel. For use with line voltages ranging from

220 - 240 VAC, simply slide the plastic insert in the switch with a ball point pen so it reads, "230".

In order to avoid "ground loops", there should be no more than one cable connecting ground to any particular unit used in the system. This means that care must be taken in connecting grounded power cables because input and output connections also carry the ground connection. The following connection plan should eliminate all ground loop problems:



1. If the power amplifier, tuner, phonograph, tape machine, or any other device used in the system has a three-prong grounding cable, install a three-to-two prong adapter on that cable and do not connect the green wire from the adapter to anything.

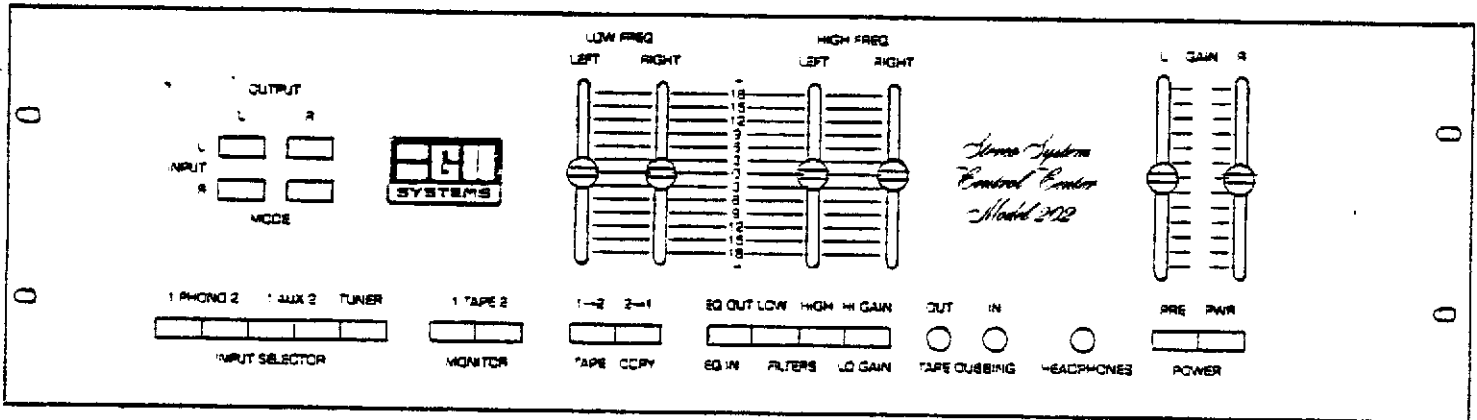
2. Now, using all two-prong non-grounding power cables (as they have now been converted to same), connect all motorized devices (tape machine, phonograph) to a constant power source, such as a

wall socket. Connect all non-motorized devices that are to be used only with the preamplifier to the outlet marked "PRE" on the back of the preamplifier. This way, if the individual on-off switches are left in the "on" position, these devices will automatically come on with the preamplifier. Connect your power amplifier to the outlet marked "PWR" on the back of the preamplifier. This will allow the speakers to be shut off for headphone use by turning off the "PWR" switch on the front panel.

Section 4. Operation

Proceed with this section only after all connections to the preamplifier have been made.

4.1 Front Panel Controls:



In the following descriptions, the terms "input" and "output" are as referenced to the preamplifier.

INPUT SELECTOR - This bank of five pushbuttons selects which of the PHONO, AUX, or TUNER inputs will appear at the MAIN outputs (unless one of the MONITOR buttons is depressed) and the TAPE outputs (unless one of the TAPE COPY buttons is depressed).

MONITOR - These pushbuttons override the INPUT SELECTOR and select one of the TAPE machine inputs for the MAIN outputs. They have no effect on the TAPE outputs.

TAPE COPY - These pushbuttons override the INPUT SELECTOR and select one or both TAPE machine inputs for the TAPE machine outputs. If 1 - 2 is depressed, the TAPE 1 input will appear at the TAPE 2 output; this setting would be used for recording the material of tape machine 1 on to tape machine 2.

If 2 - 1 is depressed, the TAPE 2 input will appear at the TAPE 1 output; this setting would be used for recording the material of tape machine 2 on to tape machine 1. These pushbuttons have no effect on the MAIN output, unless one of the MONITOR pushbuttons is depressed. Use the appropriate MONITOR pushbutton to listen to the signal being copied.

MODE - This 2 by 2 pushbutton matrix assigns the left and right channels of an input selected by the INPUT SELECTOR or MONITOR pushbuttons to the left and right channels of the MAIN output. A total of sixteen different channel assignments are possible. Examples are listed below:

Shaded rectangle indicates depressed pushbutton.



Stereo - Normal



Stereo - Reversed



Left & Right Input to Right Speaker



Left Input to Right & Left Speakers



Left & Right Input to Left Speaker, Right Input to Right Speaker



Mono

EQ OUT/EQ IN - When depressed, the outputs of the MODE matrix are unaffected by the tone controls or the external equalizer, if there is one. When not depressed, these equalizers are in the path of the MAIN output signal.

LOW FILTER - When depressed, the outputs of the MODE matrix are passed through an active low roll-off filter before appearing at the MAIN output. When not depressed, the filter is not connected to any part of the preamplifier's signal path.

HIGH FILTER - When depressed, the outputs of the MODE matrix are passed through an active high roll-off filter before appearing at the main output. When not depressed, the filter is not connected to any part of the preamplifier's signal path.

HI GAIN/LOW GAIN - When depressed, the preamplifier's high-level-input-to-line-output gain is 22dB; when not depressed, it is 10dB. The difference between the LOW setting and the HIGH setting is 12 dB; this means the output voltage is four times as high in the HIGH setting, so operate this switch with the GAIN controls at low settings to avoid damage to speakers.

GAIN controls - L control attenuates signal going to left MAIN output, R control attenuates signal going to right MAIN output. When both controls are moved together, the overall volume level is changed; when one control is moved separately, the balance of the system may be adjusted. Both these controls and the HI GAIN/LOW GAIN pushbutton adjust the overall gain.

LOW FREQ and HIGH FREQ tone controls - These sliding step switches adjust the treble and bass contours of the signals going to the MAIN output, with individual controls provided for both the right and left channels. They may be removed from the signal path by depressing the EQ OUT/EQ IN pushbutton. Moving one of these controls away from its initial 0 setting provides a 3dB boost or cut at 50 Hz (LOW FREQ) or 15 kHz (HIGH FREQ) for every "click" the control is moved up or down.

POWER - The PRE pushbutton is the main switch controlling the preamplifier and the PRE and PWR outlets on the rear panel. The PWR pushbutton controls the PWR outlet individually when the PRE pushbutton is depressed. The LED indicators in the pushbuttons light when the power is on. Do not exceed 440 watts maximum load from each outlet. If a power amplifier with output of more than 100 watts per channel is to be used, a BGW remote control accessory should be employed to prevent damage to the preamplifier's switches.

TAPE DUBBING - These are stereo $\frac{1}{4}$ " phone jacks for connecting a tape machine without having to access the rear panel. They are in parallel with (in this case meaning "the same as") the TAPE 2 jacks on the rear panel.

HEADPHONES - This is a stereo $\frac{1}{4}$ " phone jack for stereo headphones. It is connected to the preamplifier output before the muting relay which operates with the PWR pushbutton. Therefore, to listen to headphones only, the PWR pushbutton should be in the off (out) position.

Section 5. Circuit Description

5.1 Phono Section, Input Matrix/Voltage Follower, Low and High Filters

5.1.1 Phono Section

One of the two phono inputs is chosen by S1 or S2 and is passed through isolation capacitor C5 to the differential pair formed by Q1 and Q3. Current gain for the output of Q1/Q3 is provided by emitter follower Q5; voltage gain is provided by compound voltage amplifier Q7/Q9. These three stages, Q1/Q3, Q5, and Q7/Q9, provide the low frequency boost required for the RIAA curve and have a flat gain of 12dB above 1kHz.

The signal is then passed to the differential pair Q11/Q13, and compound voltage amplifier Q15/Q17 which provides the necessary voltage gain. These two stages provide the high frequency roll-off required for the RIAA curve and has a flat gain of 30dB below 1kHz.

5.1.2 Input Matrix/Voltage Follower

The output of the phono section or one of the high level inputs is passed through a network of 47K resistors and switches which assigns input channels to output channels.

The output of this matrix is coupled through isolation capacitor C29 to the voltage follower stage composed of Q19 and Q21, which acts as an impedance converter.

5.1.3 Low (High Pass) and High (Low Pass) Filters

The output of the voltage follower, after passing through the equalizer, may be rolled off at either the high or low end (or both) by two three-pole Chebishev active filters. These filters are placed in the signal path by S11 and S12.

5.2 Line Amplifier

The output of the master gain control on sheet 1 is applied to the inverting input (PIN 8) of the operational amplifier (op amp) IC1 through the coupling network C101, R101 and R103. This network provides a high input impedance to the amplifier and prevents any DC from appearing at the op amp input.

The output of the op amp is divided by networks C111/R133 and C113/R135 and is applied to the bases of Q101 and Q103. The amplifier output appears at the collectors of Q101 and Q103.

The R/C networks R109/C103 and R111/C105 condition the feedback signal for application to the non inverting input (PIN 9) of the op amp, IC1.

The HI GAIN/LO GAIN switch shorts out R107 in the hi gain position which decreases the feedback applied to IC1 and therefore increases the op amp gain. The switch also removes C115 from the circuit, which corrects the compensation of the output stage for the higher op amp output.

Depressing the PRE switch, in addition to energizing the power supply (Section 5.3), lights CR104 and enables the PWR switch. Depressing the PWR switch lights CR105 and allows C120 to charge through R143 by reverse biasing CR103. When the potential across C120 is great enough, Q105 is turned on which energizes relay K101. This connects the output of Q101/Q103 to the main output connectors through R141. When the power to the unit is removed, CR103 is forward biased and discharges C120.

5.3 Regulated Power Supply

The appropriate AC line voltage is selected by the input voltage selector switch (S403) which connects the two transformer (T401) primary windings in parallel (120V) or series (240V). The center-tapped secondary winding is connected to a full-wave rectifier (CR401-CR404) and is then filtered by C404-C405. The $\pm 28V$ unregulated supply is tapped off here. The regulated $\pm 20V$ supplies are referenced by CR404 (negative) and CR405-CR406 (positive). C406-C407 filter noise caused by the zener diodes. Q401 and Q402 are connected in a Darlington emitter-follower configuration, Q401 providing the current amplification necessary to drive Q402, which regulates the +20V. Q403 and Q404 are similarly connected in a quasi-Darlington emitter follower configuration to provide the regulated -20V. The combinations R407-C408 and R408-C409 provide further filtering of the regulated +20V and form two +18V supplies used in the RIAA phono preamplifier stage. A similar negative supply is formed by R77-C55 which are located on the main PC board.

5.4 Tone Control

The output of the voltage follower (Section 5.1) is coupled to the input of the tone control circuit when S10 is in the "EQ IN" position.

The active Baxandal-type filter is composed of differential amplifier Q201/Q203 and voltage amplifier Q205. The input to these amplifiers passes through isolation capacitor C201 to resistor networks R203-R225 (treble) and R227-R249 (bass). In-

creasing the number of resistors in the signal path increases feedback to the amplifier and decreases its output. Capacitor C203 determines the effectiveness of the treble control at high frequencies. Capacitors C205 and C207 decrease the effectiveness of the bass control at high frequencies.

Section 6. Service Procedures

6.1 Warranty

BGW Systems warrants all units for a period of three years from date of sale. This warranty covers both defects in workmanship and materials. If malfunction does occur, the product will be replaced or repaired, at our option, without charge for materials or labor; if returned prepaid to BGW Systems. This warranty does not cover equipment damaged due to negligence, misuse, shipping damage or accident, or if the serial number is defaced, altered or removed, or if the factory lead seal has been broken, or if the equipment has been altered or modified. Please fill out the warranty registration form on the next page and return to the factory within 2 weeks of purchase.

6.2 Service Options

6.2.1 Factory Service

Should service be required, contact the dealer from whom the unit was purchased. Chances are that he will be able to service the unit himself by changing one of the unit's modules. If he is unable to service the unit, he will direct you to return the unit either to the nearest authorized factory service station or the factory itself.

Whenever service is required, the Service Authorization Form on the next page should be filled out and sent to whomever will be servicing the amplifier.

If the dealer directs you to return the unit to the factory for service, follow this procedure:

1. Fill out the Service Authorization Form and mail it to BGW Systems.
2. Repack the unit in the factory supplied shipping container. All units to be returned for factory service must be shipped in this container in order to prevent damage in transit. Replacement containers are available from BGW Systems.
3. Ship the unit prepaid to BGW Systems. Units will be returned by freight collect.

Service performed on units which are covered by warranty will be performed with no charge for parts and labor. If the unit is no longer covered by warranty a nominal charge will be made for parts and labor.

6.2.2 User Service

The service information included in this manual is intended for those who wish to service their own units with full understanding that in doing so they render their units ineligible for warranty service; units which are not covered by the warranty will not be repaired without charge.

There is nothing within the preamplifier that is user serviceable; service by anyone other than factory instructed service personnel is not recommended.

The BGW Stereo System Control Center is a state of the art preamplifier and, as such, is fairly complex. Without the proper equipment and knowledge of the preamplifier's operation, one risks both unnecessary loss of warranty service privileges and damage to the preamplifier.

6.3 General Disassembly for Servicing

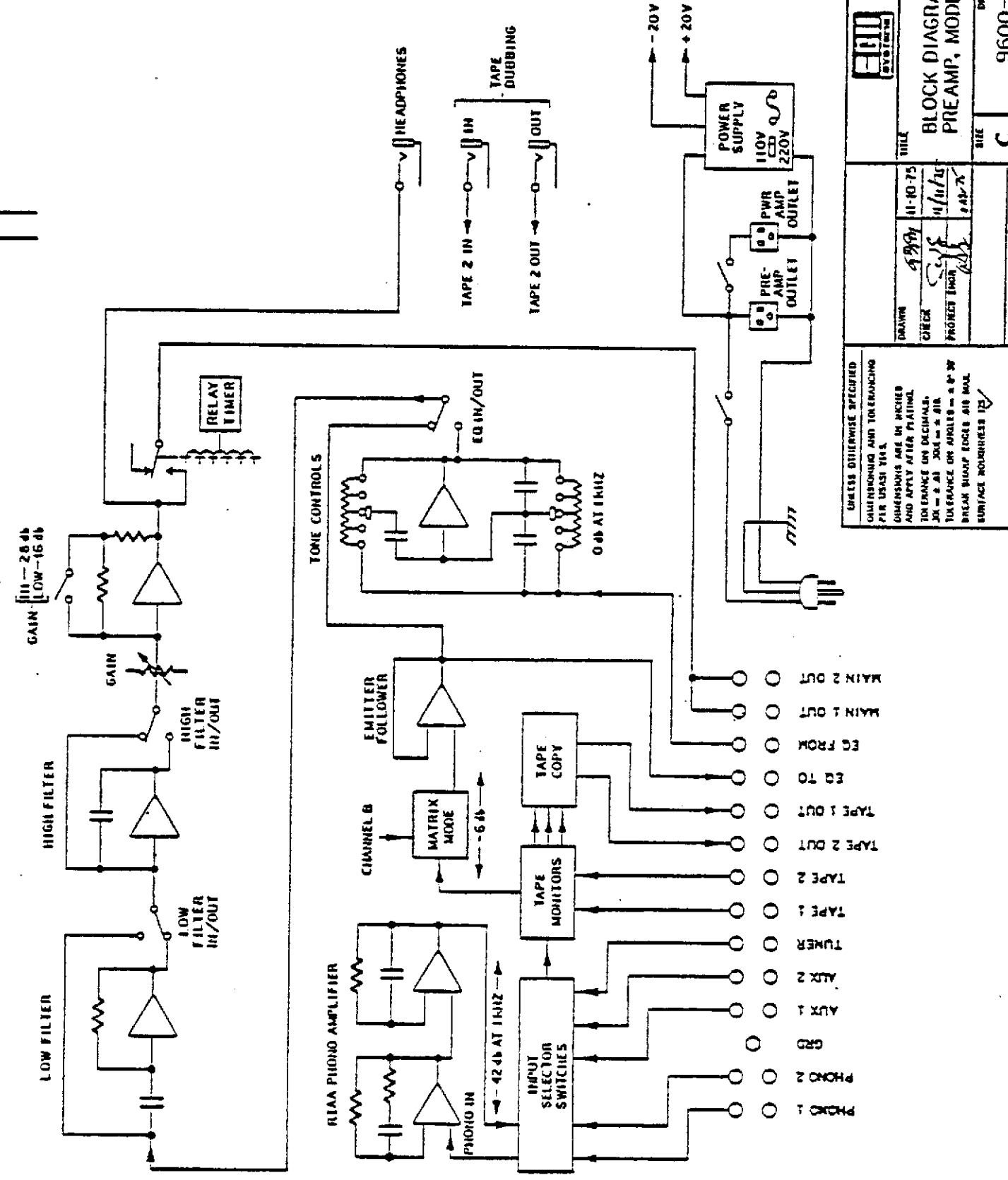
1. Remove the seven top cover screws and lift off the top cover. In this position, measurements may be made on all circuits except the tone control and line amplifier.
2. Remove the nine bottom cover screws on the sides and rear of the unit using a quarter inch nut driver or flat blade screwdriver. Turn the unit up side down and lift out the bottom cover by grasping and pulling on the rubber feet. In this position, components may be replaced in all circuits except the tone control and line amplifier.
3. Remove the six knobs from the gain and tone controls on the front panel by grasping and gently pulling them away from the panel. Using a 7/16" nut driver, remove the four front panel bolts taking care not to scratch the front panel. Do not lose the small nylon washers. Lift off the front panel. The tone control board is now exposed for measurements.
4. To remove the tone control board for component replacement, simply unscrew the four securing screws using, as required, a Phillips, flat blade, or quarter inch hex driver. Gently pull the panel away from the sub panel.
5. To remove the main board, which must be done to service the line amp:
 - a. Unscrew the ground binding post on the rear panel using a 5/16" open end wrench (don't lose the lock washer);
 - b. Remove any and all connectors plugged into the rear panel;

- c. Unplug the 7 white wires connecting the main board to the power supply board and the 1 violet wire connecting the main board to inside the transformer shield by gripping the molex connectors with a pair of long nose pliers and gently pulling each connector off its pin;
 - d. Remove the 3 Phillips head screws in line with the ground binding post on the rear panel;
 - e. Remove the 4 slotted screws on the sides of the unit using a flat blade screwdriver;
 - f. The 3 wires connecting the AC switches to inside the transformer shield may be disconnected inside the shield by pulling the 3 blue lugs at the ends of the wires off the barrier strips with a pair of long nose pliers, and then pulling the wires through the grommetted hole in the transformer shield.
6. To remove the power supply board for component replacement, remove the 4 screws holding the plastic transistor covers on the rear panel, then remove the three black Phillips head screws securing the board to the rear of the chassis. Gently pull the board away from the chassis and the transistors will unplug themselves from the board.

-NOTES ON REASSEMBLY-

1. The binding post on the rear panel is the main grounding connection for the entire unit, so when replacing it, tighten it down securely and remember to include the lockwasher.
2. When replacing the power supply board, note that the power transistors require mica insulators to isolate their cases from the chassis and that the transistor leads are not symmetric about the transistor center, that is, there is an "up" and a "down" to the transistor case.

REV. NO.	DESCRIPTION	DATE	APPROVED



BLOCK DIAGRAM,
 PRE-AMP, MODEL 202

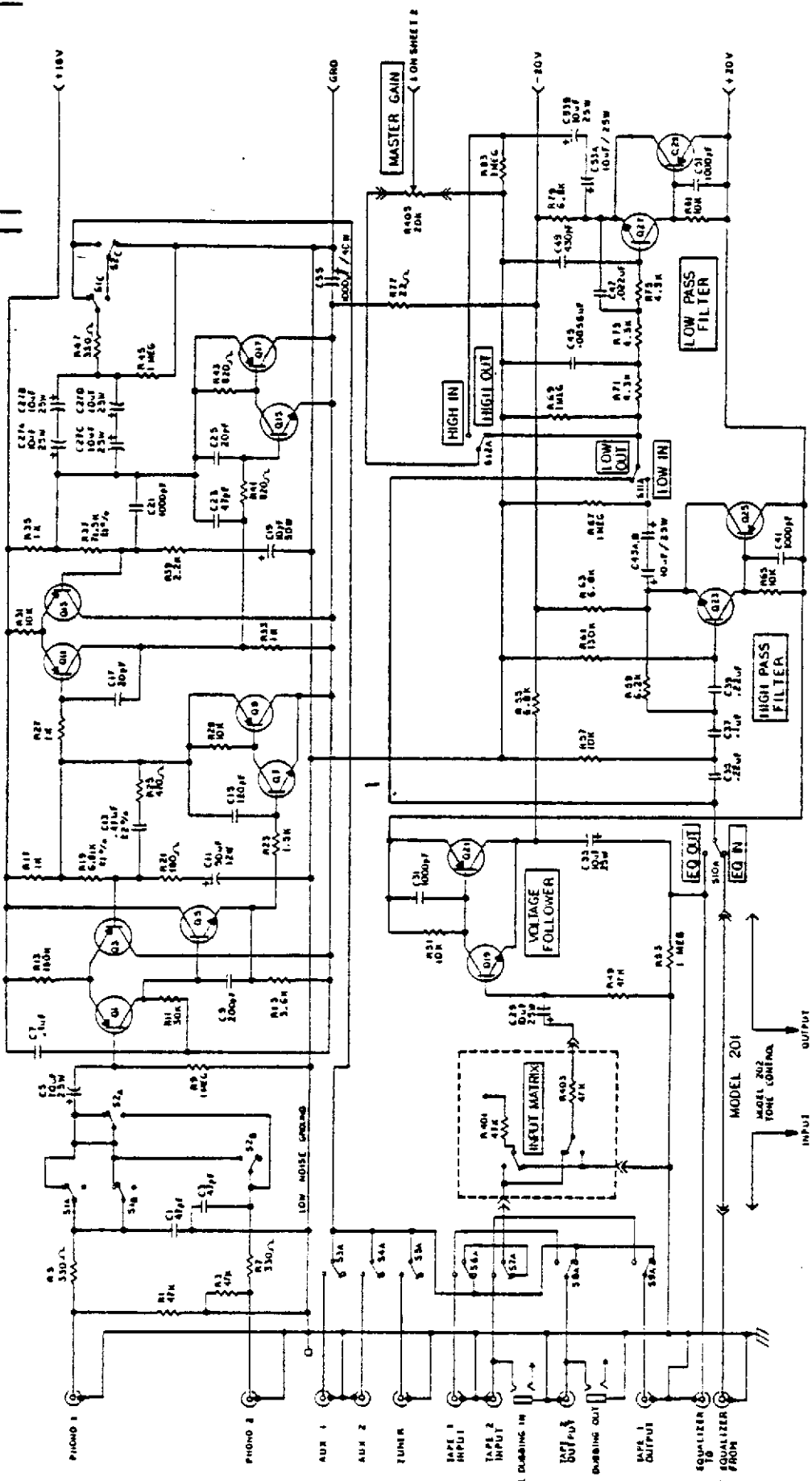
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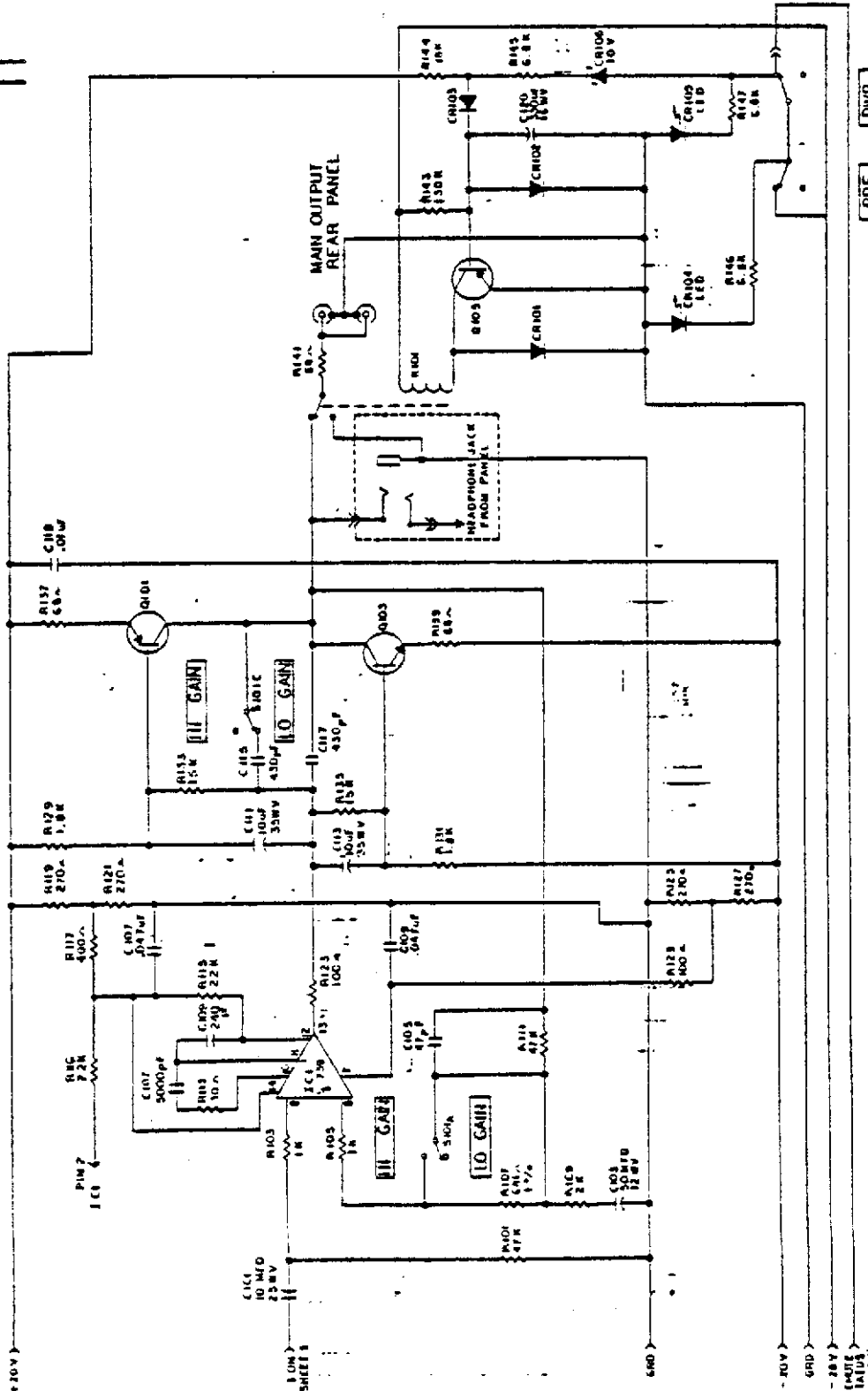
DO NOT SCALE DRAWING

RIAA EQUALIZED MAGNETIC PHONO PREAMPLIFIER



NOTE: ALL COMPONENTS SHOWN ARE STANDARD VALUES UNLESS OTHERWISE SPECIFIED. ALL RESISTORS ARE 1% TOLERANCE UNLESS OTHERWISE SPECIFIED. ALL CAPACITORS ARE 5% TOLERANCE UNLESS OTHERWISE SPECIFIED. ALL TRANSISTORS ARE 2N2904 UNLESS OTHERWISE SPECIFIED.

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PART: D				
QUANTITY: 91600 1202				
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SHEET: 1 OF 1				



PRE | PWR
POWER SWITCH
FRONT PANEL

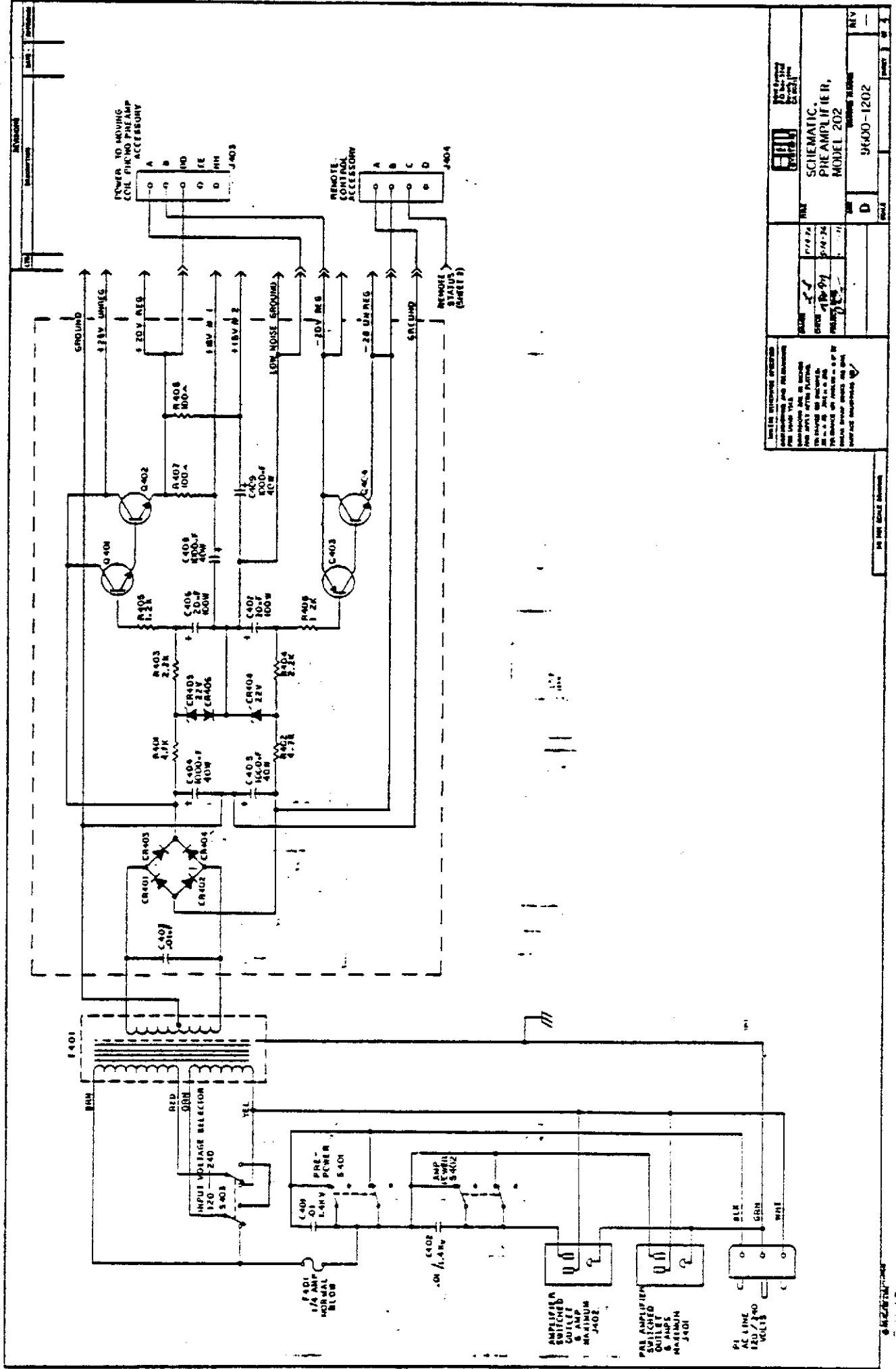
(ALLS COMPONENTS UNLESS OTHERWISE SPECIFIED ARE MIL-SPEC)
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PROJECT NO.	9600-1202

SCHEMATIC
PRE AMPLIFIER
MODEL 202

9600-1202-100

100%



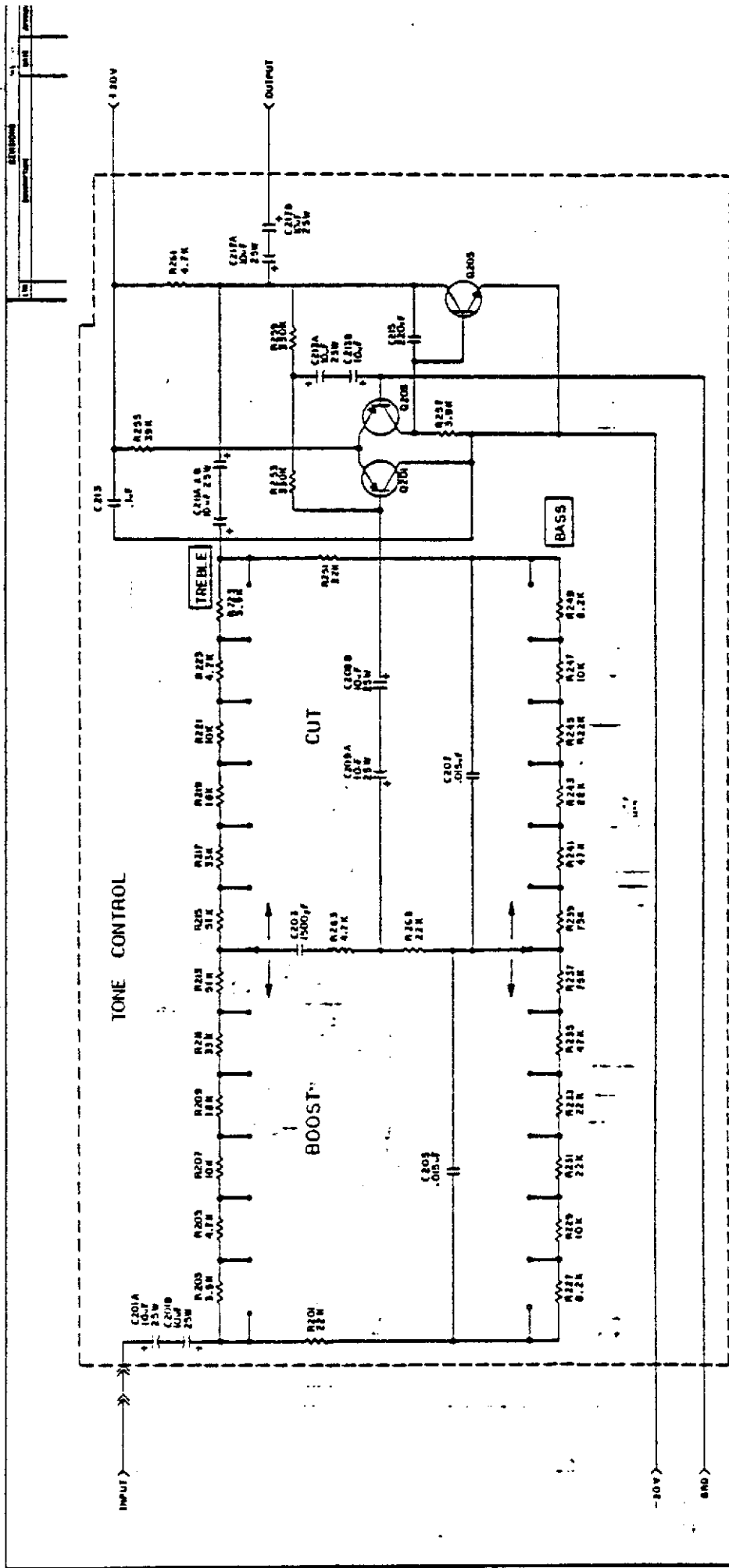
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 UNLESS OTHERWISE SPECIFIED, ALL
 DIMENSIONS ARE IN INCHES.

Section 7,2

P A R T S L I S T

REFERENCE NUMBER (S)

MAIN PC BOARD

PART NO.

QUANTITY

-CAPACITORS-

REFERENCE NUMBER (S)	DESCRIPTION	QUANTITY
C117-C49-C115	430PF 100V Mica	6
C21-C31-C41-C51	1000PF 100V Mica	8
C15	120PF 500V Mica	2
C9	240PF 500V Mica	2
C107A	.005UF 1KV Disc	2
C17-C25-C1-C3	20PF 1KV Disc	8
C105-C23-	47PF 1KV Disc	4
C109A	220PF 1KV Disc	2
C401-C402	.01 UF 1.4KV Disc	2
C107B-C109B	.0471F 25V Disc	2
C113-C111	10UF 35V Tant	2
C101-C43A-C43B-C33-C29-C27A-D-C53A-B-C5	10UF 25V Tant	4
C47	.022UF 100V Mylar	24
C45	.0056UF 100V Mylar	2
C119-C37-C7	.1UF 100V Mylar	2
C39-C35	.22UF 100V Mylar	5
C13	.47UF 100V Mylar	4
C120	330UF 0-10V Electro	2
C103-C11	50UF 12V TE1133	1
C55	1000UF 40V Electro	4
C19	10UF 50V TE1304	1

-RESISTORS-

REFERENCE NUMBER (S)	DESCRIPTION	QUANTITY
R107-R19	6.81KR 1/2W 1%	4
R37	71.5KR 1/2W 1%	2
R123A-R123B-R117	100R 1/2W 5%	4
R105-R103-R35-R33-R27-R17	1K R 1W 5%	12
R81-R65-R57-R51-R31-R29	10KR 1/2W 5%	12
R49-R83-R69-R67-R53-R45-R9	1MEGR 1/2W 5%	14
R143-R61	130KR 1/2W 5%	3
R23	1.5KR 1/2W 5%	2
R135-R133	15KR 1/2W 5%	4
R21	180R 1/2W 5%	2

Parts List

REFERENCE NUMBER(S)

MAIN PC BOARD, Cont'd.

R131-R129
 R144
 R13
 R109
 R77
 R39
 R115
 R127-R125-R121-R119
 R113
 R11
 R47-R7-R5
 R15
 R75-R73-R71
 R25
 R111-R101-R3-R1
 R59
 R141-R139-R137
 R147-R146-R145-R79-R63-R55
 R43-R41

PART NO.

DESCRIPTION

-RESISTORS-
 Cont'd.
 5005-1802C 1.8KR 1/2W 5%
 5005-1803C 18KR 1/2W 5%
 5005-1804C 180KR 1/2W 5%
 5005-2003C 2K R 1/2W 5%
 5005-2200C 22 R 1/2W 5%
 5005-2202C 2.2KR 1/2W 5%
 5005-2203C 22KR 1/2W 5%
 5005-2701C 270R 1/2W 5%
 5005-3001C 30R 1/2W 5%
 5005-3004C 30KR 1/2W 5%
 5005-3301C 330R 1/2W 5%
 5005-3602C 3.6KR 1/2W 5%
 5005-4302C 4.3KR 1/2W 5%
 5005-4701C 470R 1/2W 5%
 5005-4703R 47KR 1/2W 5%
 5005-6202C 6.2KR 1/2W 5%
 5005-6800C 68R 1/2W 5%
 5005-6802C 6.8KR 1/2W 5%
 5005-8201C 820R 1/2W 5%

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-SEMICONDUCTORS-

IC1
 Q29-R25-R21-Q13-Q11-Q3-Q1
 Q105
 Q103
 Q101-Q17-Q9
 Q27-Q23-Q19-Q15-Q7-Q5
 CR103-CR102-CR101
 CR106

1820-0739 UA739 Integrated Circuit
 1853-4250 2N4250 Transistor PNP
 1853-5023 2N5023 Transistor PNP
 1854-0409 40409 Transistor NPN (65544)
 1854-0410 40410 Transistor PNP (65545)
 1854-4010 SE4010 Transistor NPN
 1900-4004 1N4004 Diode
 1900-4740 1N4740A Diode

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 1

-MISCELLANEOUS-

S402-S401
 S101-S12-S11-S10
 S9-S8-S7-S6
 S5-S4-S3-S2-S1

0670-2152 Switch Push Power (Group of 2)
 0670-4154 Switch Push Function (Group of 4)
 0670-5154 Switch Push Tape Selector (Group of 4)
 0670-5155 Switch Push Input Selector (Group of 5)

1
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 1

Parts List
 2
 7

QUANTITY

MAIN PC BOARD, Cont'd.

-MISCELLANEOUS- Cont'd.

0770-1312	Stand Off B1532B 5/16 Alum	2
0772-1375	Stand Off B1531B 3/8 Alum	2
0800-2024	Relay 24VDC NF2-24V	1
1200-0007	Socket IC US 2-14-110-N-B	2
1349-9312	Pin Molex R93-12A	41
2315-2375	4-40x3/8 FH MS Phil Cad	2
8022-0500	AWG 22 Solid Tinned Buss	1.5'
8902-0022	Tubing Teflon #22 White	.5'
9007-0202	PCB Main	1
9010-1212	Jack Panel Assy. 201/202	1
9011-1212	Shield AC Switch Model 202	1

PHONE CONTROL BOARD

-CAPACITORS-

0060-1500	1500PF 100V Mica	2
0100-0220	220PF 1KV Disc	2
0226-0010	10UF 25V Tant	20
0369-0015	.015UF 100V Mylar	4
0369-0100	.1UF 100V Mylar	2

-RESISTORS-

5005-1004C	10KR 1/2W 5%	8
5005-1803C	18KR 1/2W 5%	4
5005-2203C	22KR 1/2W 5%	14
5005-3303C	33KR 1/2W 5%	4
5005-3304C	330KR 1/2W 5%	4
5005-3902C	3.9KR 1/2W 5%	6
5005-3903C	39KR 1/2W 5%	2
5005-4702C	4.7KR 1/2W 5%	8
5005-4703C	47KR 1/2W 5%	4
5005-5103C	51KR 1/2W 5%	4
5005-7503C	75KR 1/2W 5%	4
5005-8202C	8.2KR 1/2W 5%	4

R247-R229-R221-R207	
R219-R209	
R265-R251-R245-R243-R233-R231-R201	
R217-R211	
R259-R253	
R257-R225-R203	
R255	
R263-R261-R223-R205	
R241-R235	
R215-R213	
R239-R237	
R249-R227	

REFERENCE NUMBER (S)

TONE CONTROL BOARD, Cont'd.

QUANTITY

DESCRIPTION

PART NO.

-SEMICONDUCTORS-

Q203-Q201 2N4250 Transistor PNP 4
 Q205 1854-4010 Transistor NPN 2

-MISCELLANEOUS-

S203-S201 0620-1302 Switch Slide 13 Term SSH11302 4
 1349-9312 Pin Molex R93-12A 7
 8018-0500 AWG 18 Solid Tinned Buss .8'
 8022-0500 AWG 22 Solid Tinned Buss .2'
 9007-0222 PCB Tone Control 1.0'

POWER SUPPLY BOARD

-CAPACITORS-

C403 .1UF 100V Mylar 1
 C409-C408-C405-C404 1000UF 40V Electro 4
 C407-C406 20UF 100V TE1409 2

-RESISTORS-

R407-8 100R 1/2W 5% 2
 R405-6 1.2KR 1/2W 5% 2
 R403-4 2.2KR 1/2W 5% 2
 R401-2 4.7KR 1/2W 5% 2

-SEMICONDUCTORS-

Q401 1854-0409 Transistor NPN (6S544) 1
 Q403 1854-0410 Transistor PNP (6S545) 1
 CR406-CR401-4 1N4004 Diode 5
 CR405 1N4747A 22V Zener 2

-MISCELLANEOUS-

0772-1375 Stand Off B1531B 3/8 Alum 3

POWER SUPPLY BOARD, Cont'd.

-MISCELLANEOUS-, Cont'd.

1201-2001	Socket Transistor 2TS1	2
1349-9312	Pin Molex R93-12A	17
9007-0232	PCB Pwr Supply	1

CHASSIS

1231-1102	Lug Molex 02-08-1102	6
8020-1190	AWG 20 19 Str Teflon White E	.8
9004-1202	Bracket Mounting	1
9999-0112	Jack Input N112B	3
0721-1222	Barrier Fish Paper T/C PCB	1
2155-2250	4-40X1/4 PH MS Phil Cad	4
3625-3312	6X5/16 Hex H Wash SMS Cad	4
7069-2004	Res 20KR Slide Pot	2
8520-0250	4-40X1/4 Hex Nut	4
9007-1242	PCB Matrix Assy w/1SW-1BD	2
9010-0202	Panel Sub Mod 202	1
0620-6206	Switch Slide 115/230V	1
0720-6993	Barrier Strip 3 Lug 699-3	1
0721-1232	Barrier Fish Paper XFMR Shield	1
0722-2147	Grommet Smith 2147	1
0722-2186	Grommet Smith 2186	1
0723-0321	Insulator Mica Transistor LG	2
0723-3347	Insulator Shoulder Transistor	4
0723-4632	Cover Transistor TO-3	2
0900-1202	Transformer 150 MA Assy	1
1100-1202	PSH Assy 202	1
1100-1212	Remote Control Harness Assy	1
1202-1370	Socket Receptacle Leviton	2
1235-6034	Clamp Strain Relief SR6-P3-4	1
1321-5305	Lug Slip-On 16-14 Wire Blue T1	4
1854-0636	40636 Transistor NPN	2
2111-3312	6-32X5/16 PH MS Phil Black	7
2111-3625	6-32X5/8 PH MS Phil Black	2
2155-2250	4-40X1/4 PH MS Phil Cad	2
3111-3312	6X3/8 PH SMS Phil Black	6
3125-3625	6X5/8 PH SMS Slot Cad	4

CHASSIS, Cont'd.

8022-1100	AWG 22 19 Str Teflon Black	E	.5'
8022-1190	AWG 22 19 Str Teflon White	E	.83'
8122-0000	#4 ITL Washer		2
8132-0000	#6 ITL Washer		2
8520-0250	4-40X1/4 Hex Nut		2
8530-0250	6-32X1/4 Hex Nut		2
8706-1183	Cable Pwr Assy 18/3 Gray		1
9002-0202	Chassis Mod 202		1
9011-1202	Shield Transformer Mod 202		1
9999-0025	Fuse 3AG 1/4 Amp		1
9999-0550	Tie Wrap 5 1/2" Wrn 5 1/2		8
9999-8877	Fuse Holder with Cap		1
0700-0306	Knob Push Button Blk		17
0700-1306	Push Button W/LED Assy 202		2
0700-2101	Knob Brush Alum & Blk		6
0723-0010	Insulator Polyolefin P/S		6
0723-1202	Barrier Felt 5.00X3.00		1
0723-1212	Barrier Felt 3.30X2.00		1
1231-0873	Connector Binding Post Metal		1
1231-1102	Lug Molex 02-08-1102		43
2111-3312	6-32X5/16 PH MS Phil Black		5
2605-6625	1/4-20X5/8 Hex H MS Brush Alum		4
3115-4500	8X1/2 PH SMS Phil Cad		4
3115-4625	8X5/8 PH SMS Phil Cad		2
3625-3312	6X5/16 Hex H Wash SMS Cad		9
8018-1110	AWG 18 19 Str Teflon Brn	E	.830'
8018-1180	AWG 18 19 Str Teflon Gray	E	.830'
8020-1100	AWG 20 19 Str Teflon Blk	E	.670'
8020-1190	AWG 20 19 Str Teflon Wht	E	15.5'
8132-0000	#6 ITL Washer		2
8530-0312	6-32X5/16 Hex Nut		2
9000-1202	Panel Fr Mod 202 Finished		1
9006-1202	Plate Bot Mod 202		1
9999-2085	Feet Rubber 2085S		4
3111-3312	6X3/8 PH SMS Phil Blk		6
9005-1202	Cover Mod 202		1

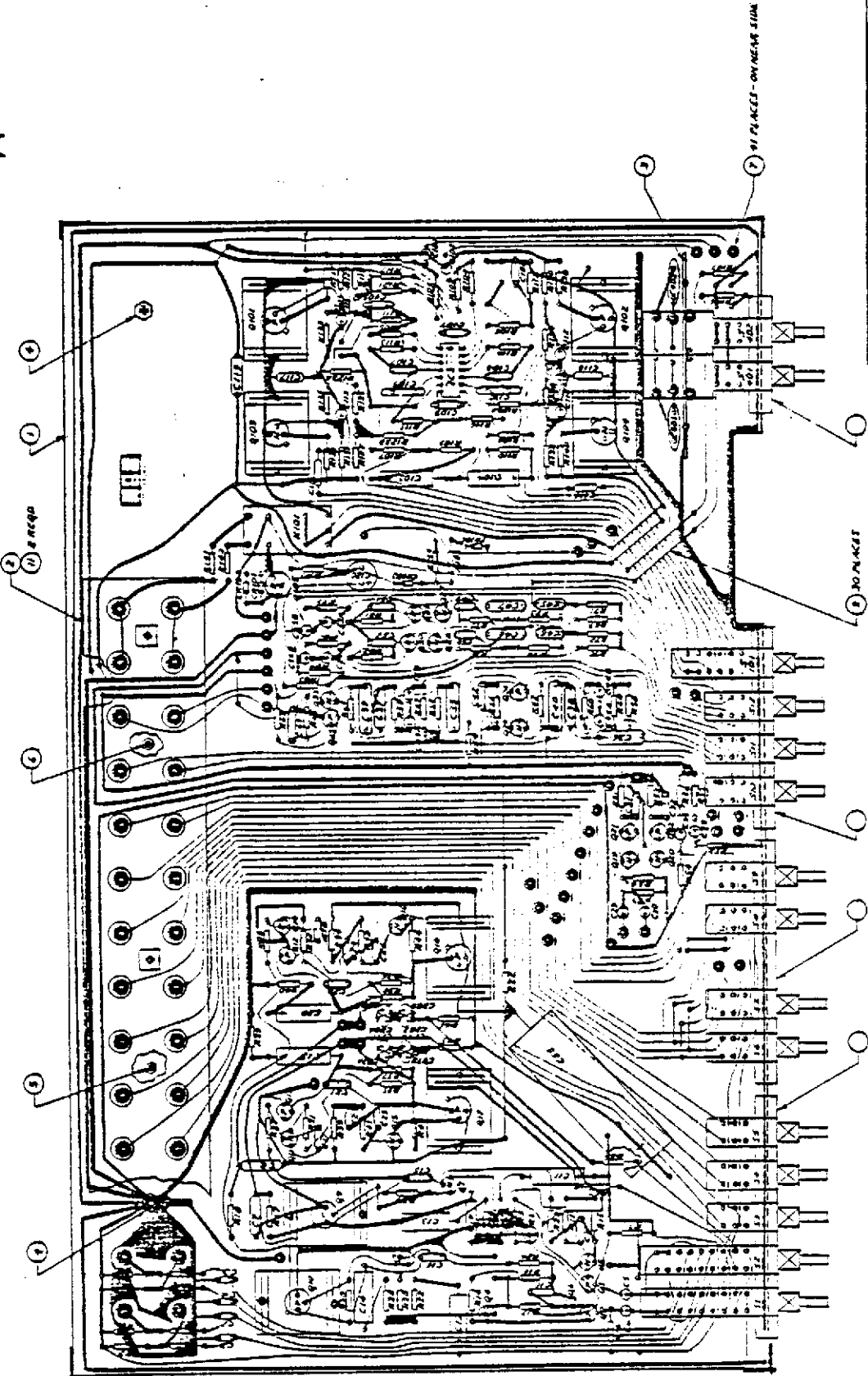
CHASSIS, Cont'd.

9999-1000	Nameplate Serial Nbr.	1
1231-1212	Connector Jumper Cable	202 2
9700-1202	Manual Model	202 1
9850-1250	Ctn 193/4X145/8X51/4 Plain	1 1
9851-1250	Ctn 23X177/8X87/8 Printed	1 1
9852-1250	Rail Block 5X141/2X13/8	2 2
9854-0150	Corner Block 11/2 Foam	8
9860-0002	Tape 3" Eggshell WH 61M03P	.010 roll

PACKING CONTAINER

REVISIONS	
NO.	DESCRIPTION
1	REVISED & REDESIGNED
2	ADDED 2ND & 3RD WIRE
DATE	BY
4-28-74	W.R. 22
4-28-74	W.R. 22

REVISED & REDESIGNED
ADDED 2ND & 3RD WIRE



REVISED & REDESIGNED	
ADDED 2ND & 3RD WIRE	
DATE	BY
4-28-74	W.R. 22
4-28-74	W.R. 22
ASSTY. ADMIN. P.C. BOARD, PREAMP	
DATE	BY
4-28-74	W.R. 22
4-28-74	W.R. 22
9007-1202	
D	B
9007-1202	9007-1202
PAGE 1 OF 1	

USE THE DIMENSION INDICATOR
CONNECTIONS AND TERMINATIONS
FOR THIS WIRE

CONNECTIONS ARE TO BE MADE
AS SHOWN ON THE BOARD.
TOLERANCE ON DIMENSIONS
IS ± 0.005 IN. MAX.
TOLERANCE ON ANGLES IS ± 0.5°
MAX. HOLE DIMENSIONS ARE THE
SURFACE DIMENSIONS UNLESS
OTHERWISE SPECIFIED.

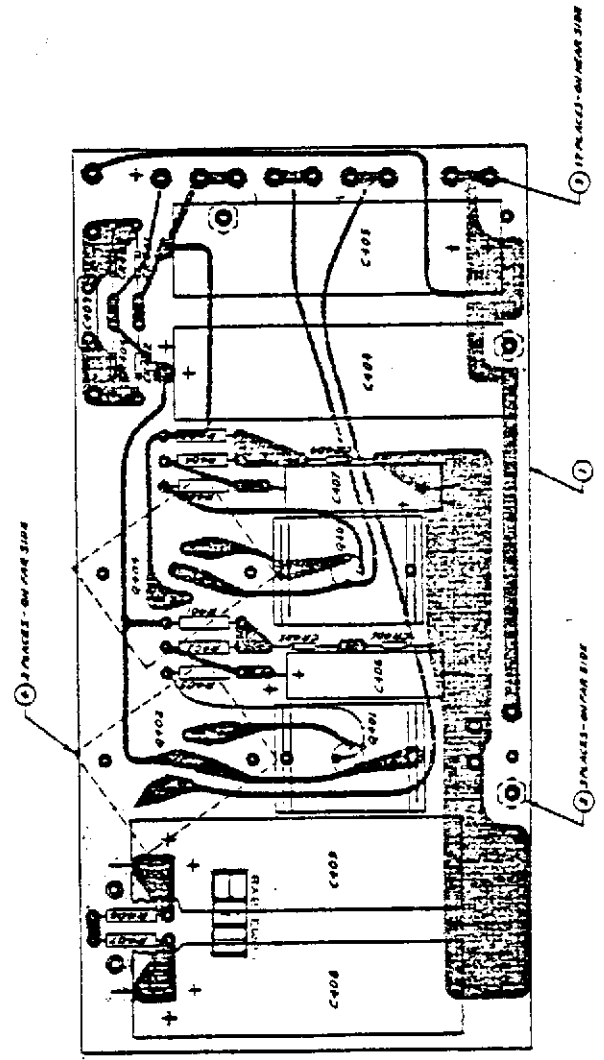
NO DIM SCALE DRAWING

NOTE: DIMENSIONS DIMENSIONS UNLESS OTHERWISE SPECIFIED

REV	DATE	BY
1	11-15-54	STB
2		
3		
4		

STATION

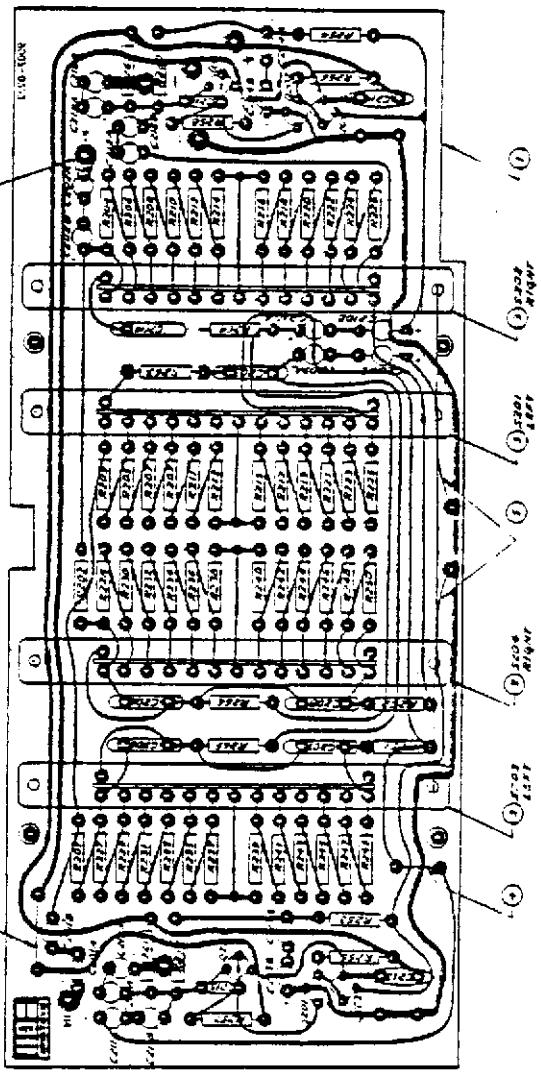
DESCRIPTION
APPROXIMATE REVISION



	DATE	REV
	11-15-54	A
TITLE ASSY POWER SUPPLY P.C. BOARD PREAMP		
DRAWN CHECKED INSP. APPROVED	DATE 11-15-54 11-15-54 11-15-54	REV D 9007-1232
SCALE: 3/1		

UNLESS OTHERWISE SPECIFIED
 DIMENSIONS ARE IN INCHES
 DIMENSIONS ARE TO CENTER
 UNLESS OTHERWISE SPECIFIED
 DIMENSIONS ARE TO CENTER
 UNLESS OTHERWISE SPECIFIED
 DIMENSIONS ARE TO CENTER

④ PLACES TO PROTECT ON CASE EDGE



		PREPARED BY: [Signature] DATE: [Blank]	
DRAWN: [Signature] CHECKED: [Signature] APPROVED: [Signature]	PART NO.: 9007-1222 REV: D	TITLE: ASST. TONE CONTROL P.C. BOARD, PREAMP, MODEL 202	SHEET 1 OF 1

UNLESS OTHERWISE SPECIFIED
 DIMENSIONS AND TOLERANCES
 ARE IN INCHES
 AND DECIMALS THEREOF
 UNLESS OTHERWISE SPECIFIED
 DIMENSIONS ARE IN MILLIMETERS
 UNLESS OTHERWISE SPECIFIED
 DIMENSIONS ARE IN MILLIMETERS
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