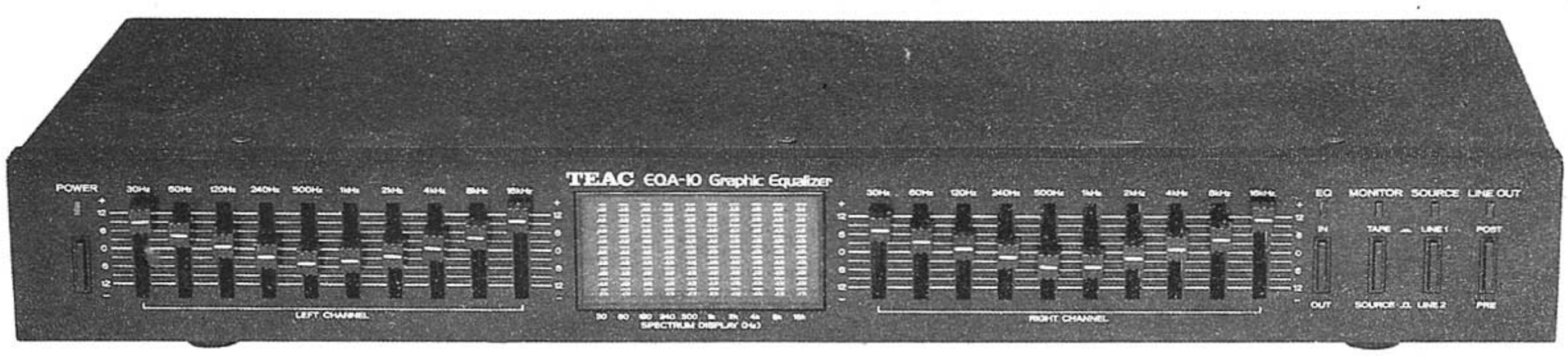
TEAC®

EQA-10 GRAPHIC EQUALIZER



OWNER'S/SERVICE MANUAL

AM00383000

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WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS DEVICE TO RAIN OR MOISTURE.

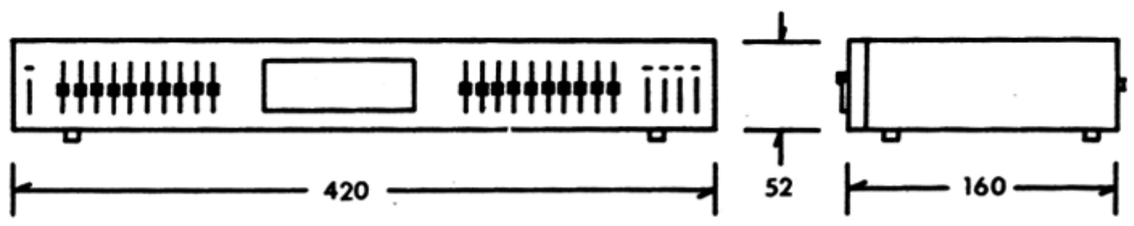
YOUR EQA-10 HAS A SERIAL NUMBER LOCATED ON THE REAR PANEL. PLEASE NOTE THE SERIAL NUMBER HERE IN THE MANUAL AND STORE BOTH WITH YOUR IMPORTANT DOCUMENTS.
SERIAL NUMBER_____

INTRODUCTION

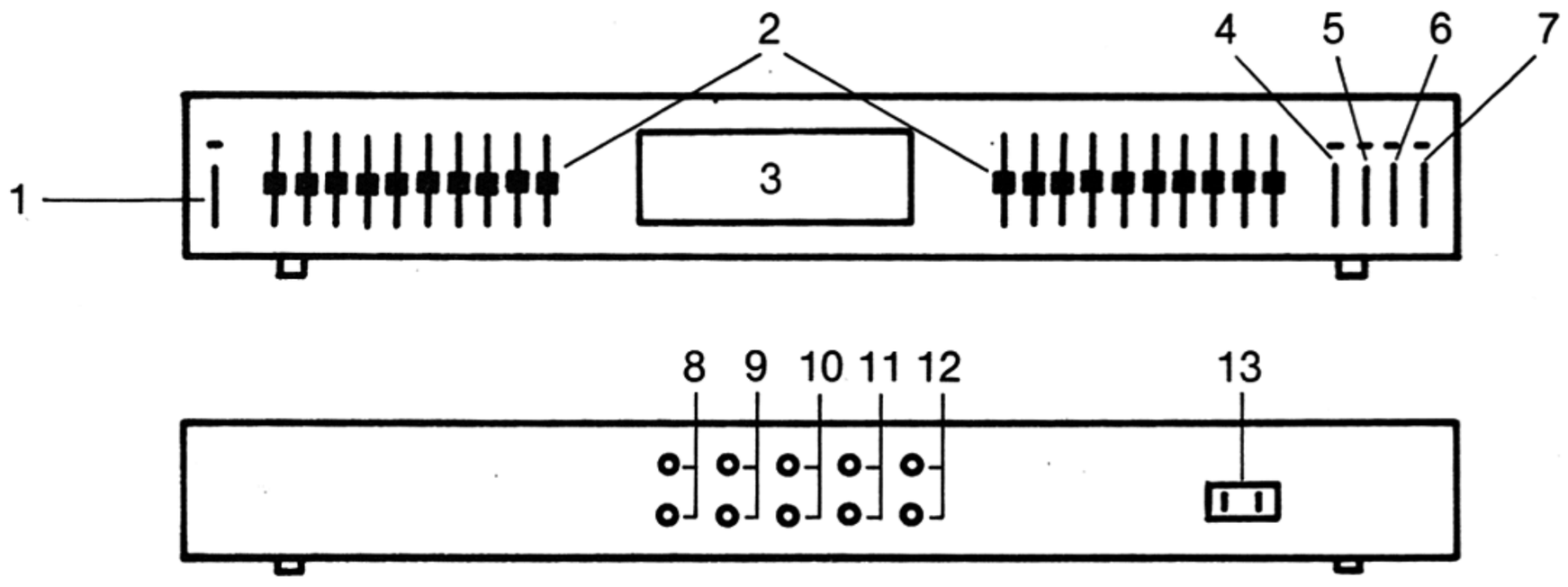
The TEAC Model EQA-10 is a stereo ten-band graphic equalizer with a ten-band audio frequency spectrum analyzer incorporated into the front panel. The EQA-10 has front panel switches that permit the user to choose one of the two input sources or tape, an EQ in/out switch, and a pre/post EQ switch that allows auditioning of equalized or non-equalized signals without disturbing a tape recording in process.

TEAC continually engages in a program of study and improvement of its products and reserves the right to change features and specifications without notice.

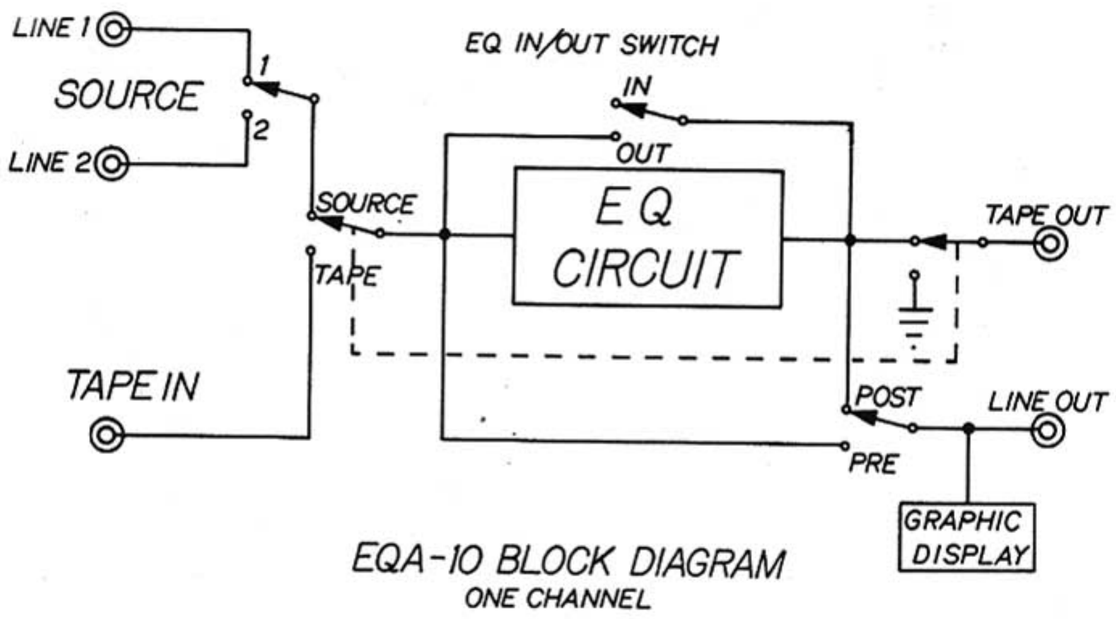
EQA-10 DIMENSIONS (mm)



FEATURES AND CONTROLS

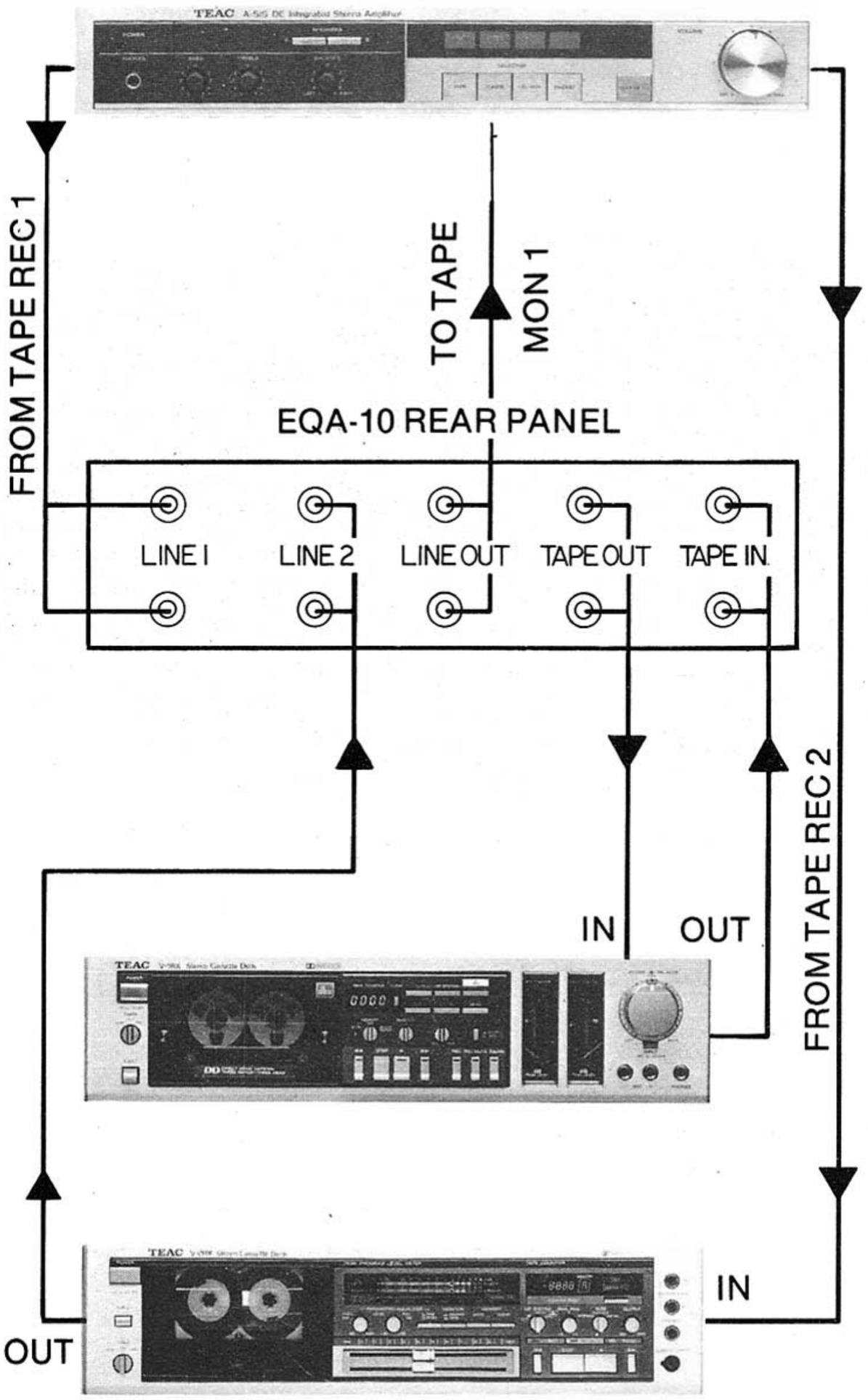


1. POWER SWITCH.
2. EQ BOOST/CUT CONTROLS.
3. REAL TIME OCTAVE SPECTRUM DISPLAY. Displays the relative level of each individual octave of the audio range.
4. EQ IN/OUT SWITCH. When depressed, EQ effect is on and LED lights.
5. SOURCE/TAPE SWITCH. Chooses input of source 1, 2, or tape from the rear panel connectors.
6. LINE 1/LINE 2 SWITCH. Chooses one of two sources plugged into the rear panel connectors.
7. PRE/POST SWITCH. Determines whether the output signal comes from before or after the equalizer circuits, but does not affect the tape circuits.
8. LINE 1 SOURCE INPUT JACKS.
9. LINE 2 SOURCE INPUT JACKS.
10. LINE OUTPUT JACKS. These outputs typically plug into your preamp's "tape monitor" jacks.
11. TAPE OUT JACKS. These outputs feed your tape deck, enabling EQ of recordings being made.
12. TAPE IN JACKS. For playback of tape, allowing EQ of pre-recorded tapes or re-EQ of a tape made using EQ.
13. ACCESSORY AC OUTLET. This unswitched AC outlet replaces the outlet used by the EQA-10 itself.



EQA-10 BLOCK DIAGRAM
ONE CHANNEL

A block diagram is a roadmap of signal flow. Signals usually flow from left to right. As you can see, the EQA-10 is very simple.

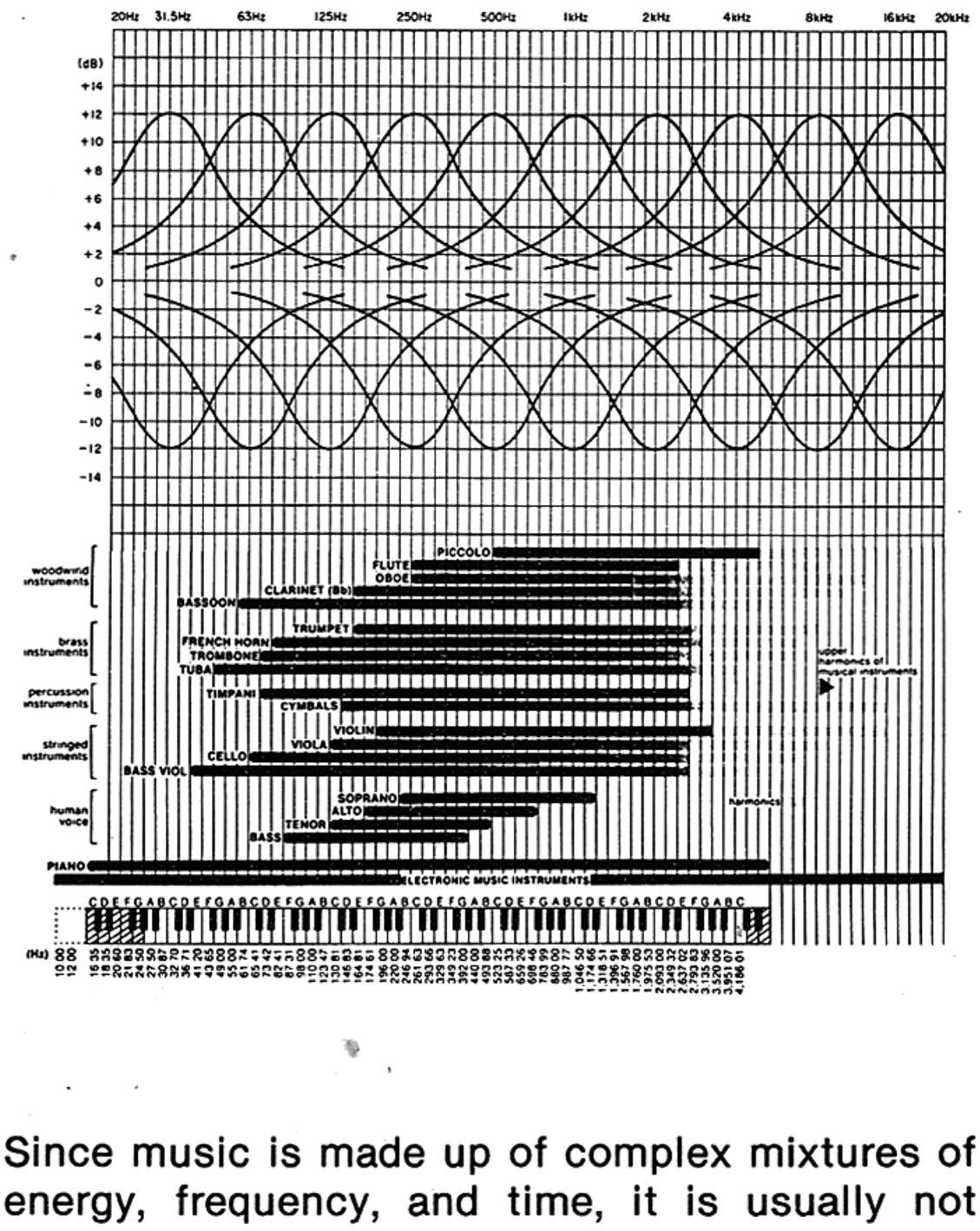


The suggested hookup shows a method of monitoring either of two cassette decks through the EQA-10 so that their recorded programs may be equalized as they are played. The main deck may be used to make equalized copies from the second deck, and if your amplifier or receiver has facilities for dubbing tape 1 to tape 2, you can also switch EQA-10's SOURCE/TAPE SWITCH to tape (down position - LED on) and make an equalized copy from the main deck to the second deck.

REAL TIME SPECTRUM ANALYZER. The EQA-10 features a real time analyzer between the two sets of EQ boost/cut controls. The analyzer gives a visual graph of the levels of each frequency as the audio signals are passing through the circuit (real time). The analyzer may be used to read the amount of energy contained within certain passages of music for comparison, or to check the frequency response of signals being fed through the EQA-10, such as those from test records or tapes, or an external pink noise source. When viewing the analyzer, bear in mind that the right and left channels of the EQA-10 are combined before they enter the analyzer, so if you need to read one channel only, you must unplug the opposite channel while making your reading. As the chart on the next page shows, the EQ bands covered by the EQA-10 are bell-shaped, and do not treat all frequencies equally about the center frequency. This is also true of the analyzer — the filter circuits in the analyzer that separate the audio spectrum into octaves have a similar bell-shaped characteristic. This and other factors limit the accuracy of the analyzer for use as a measurement tool, but careful listening correlation with the analyzer's display will be very useful in adjusting your system for optimum performance. The final result of the use of devices like equalizers and other outboard accessories is always hopefully, better sound reproduction, but since so much of what makes sounds better is subjective, it is wise not to overlook the time-tested method of adjusting for the best sound — by ear. Even though the EQA-10's analyzer can give you visual information about the amount of signal present in each octave of the music being equalized, your ears will still do most of the listening while your eyes look at the display.

OPTIMUM ADJUSTMENT OF THE EQA-10

This chart shows the range and frequancy limits of the EQA-10 compared to the keyboard and frequencies of various musical sources.



Since music is made up of complex mixtures of energy, frequency, and time, it is usually not possible to accurately predict what the optimum display will look like on the face of the EQA-10's spectrum analyzer. There is, however, a sound called "pink noise", which has properties that make it ideal as a reference for the display settings. Pink noise has an equal amount of energy in each band of equal percentage of frequency change, that is, 20 Hz to 40 Hz is only a change of 20 Hz, but it is also an octave. 2000 to 4000 Hz has a change of 2000 Hz, but again, is an octave, hence the same amount of change. Some of the various test records available, contain segments of pink noise, which can be played through the EQA-10 and settings can be made to cause each LED column to light up to the same level on the display. The same pink noise can be put through a cassette deck to help set up the flattest frequency response. If the deck has three heads, adjustment can be done in real time as the deck is recording and monitoring off tape. If the deck has only two heads, you must rewind a recorded section, and play it back through the EQA-10 to see the results of your adjustments as they are made each time you record a small length of tape.

With analyzer sections encompassing octaves, it is not possible to see the effects of aberations in frequency response that are narrow — that are perhaps a few hertz (cycles per second) wide — and so it is important to remember that gradual adjustments are best in almost every case, since it is possible to mistake a narrow aberation and a reading too high or low on the analyzer. A frequency response anomaly such as a peak or dip of say, 10 dB covering a band of frequencies a few hertz wide at 8 kilohertz, may make a reading of one or two dB appear on the analyzer due to the fact that the analyzer's 8 kHz band is simultaneously reading frequencies above and below 8 kHz while reading the anomaly. If there is energy present in the frequency range around a dip in response, only a small percentage of the dip will show up on the analyzer. Conversely, if there is no energy present around a peak in response, only a percentage of the anomaly will be noted on the analyzer.

The equalization capability of the EQA-10 may be augmented by the bass and treble controls on a receiver or preamp for greater flexibility. The analyzer will serve to keep track of the extent of equalization. Sometimes flat frequency response cannot be achieved without help from more than one equalizer — record rumble a case in point — low frequencies of random nature are produced by record rumble. These frequencies can produce reading errors that look like the 30 Hz or 60 Hz bands contain musical energy when in fact the energy is not musical at all. In a case like this, a separate subsonic filter or filter switch on a preamp is better than reducing the frequency controls on the EQA-10. This will reduce the record rumble, most of which lies between 5 Hz and 25 Hz, without affecting the music. As we mentioned before, after you equalize and analyze, the ultimate adjustments should be done by ear. Octave equalizers are useful as ten-band "tone controls", but the room placement of loudspeakers will always produce errors in frequency response that can not be corrected by equalizers that treat only each octave of frequency range. In fact, even third-octave equalizers will not remove room aberations.

SPECIFICATIONS

Nominal Operating Level:	– 10dBV (0.32V)
Frequency Response: (Flat Setting)	5Hz to 100kHz ± 1dB
Control Range:	± 12dB (20 Bands)
Harmonic Distortion:	0.03% of nominal output
Signal/Noise:	80dB
Input Impedance:	100k Ohms
Output Impedance:	600 Ohms
Load Impedance:	10k Ohms or more
Inputs:	Line 1, Line 2, and Tape
Outputs:	Line Out, Tape Out
Power Requirement:	AC 120V, 60 Hz, 6 W
Dimensions:	415W x 58H x 180D (mm)
Weight:	2.3kg

SERVICING INFORMATION

Servicing should be done by qualified personnel. There are no user serviceable parts inside.

TEST EQUIPMENT REQUIRED:

Audio Oscillator
Audio Voltmeter
Oscilloscope
Harmonic Distortion Analyzer

1) Set frequency controls at their "flat" setting. Check for unity gain ±1dB from 20 to 20k Hz.

2) Sweep audio oscillator to check analyzer. Bands should appear to "bounce" across tthe display as the frequency is swept. Each display segment should indicate approximately 3 dB in level, vertically.

3) Set oscillator frequency for the peak reading corresponding to each frequency of the EQA-10, checking to see that the boost and cut range of each band adjusted INDIVIDUALLY, is 12dB ±2dB.

4) Referring to the Block Diagram on page 3, check all switching paths to be sure signals pass properly.

5) Measure harmonic distortion with all settings at flat (centered) with a signal of 1KHz at nominal operating level. Measurement should be 0.05% or less.

6) Measure signal/noise using 1 volt for reference. With inputs shorted, it should measure – 80dBV (0.1mV) or less.

NOTES:

RESISTOR

R101 thru 109	82k
R110	75k
R111 thru 119	3.9k
R120	10k
R121 thru 129	820k
R130	1MΩ
R131 thru 140	180Ω
R141 thru 150	5k6
R152	1.2k
R153	27k
R154	39k
R155	2.2k
R157 thru 158	62k
R159 thru 160	68k
R161 thru 162	18k
R163 thru 164	2.2k
R165 thru 166	560Ω
R167 thru 168	4.7k
R201 thru 209	220Ω
R210	1k
R211	3.9k
R212	2.7k
R213	1.8k
R214	1.2k
R215	1k
R216	680Ω
R217	470Ω
R218	330Ω
R219	820Ω
R220	47k
R221	47k
R222	22k
R301 thru 310	10k
R311	390k
R312	330k
R313 thru 314	22k
R315	100k
R401 thru 403	390
R404 thru 408	330
R409 thru 410	390
R411 thru 413	100k
R414	82k
R415 thru 416	100k
R417 thru 419	82k
R420 thru 421	100k
R422	1k
R423 thru 426	4.7k
R427	10k
R428	1k
R429	12k
R501 thru 503	390
R504 thru 508	330
R509 thru 510	390
R511 thru 513	100k
R514	82k
R515 thru 516	100k
R517 thru 519	82k
R520 thru 521	100k
R522 thru 525	4.7k
R526	4.7k
R527	10k
R528	1k
R529	12k
R602	1.5k
R604	1k
R605	1.5k
R606 thru 611	1k

DIODES

D101 thru 111	1N60
D301	1N4001
D601 thru 602	Zener 12V, ½W
D603 thru 606	1N4001
D608 thru 611 (LED)	25-05002-25
D610 (LED)	25-05001-22
Spectrum Display	25-00627-01

INTEGRATED CIRCUITS

IC13 thru 15	Band Pass Filter	LM324
IC16 thru 17	Comparator	LM324
IC18 thru 20	Analog Switch	CD4066
IC21	Decade Counter	CD4017
IC1 thru 12	OP AMP	JCR4558D

TRANSISTORS

TR101 thru 102	NPN	2SC1815
TR301 thru 310	NPN	P 9013
TR601	NPN	A715C
TR602	NPN	C1162C
TR603	NPN	2SA817A
TR604	NPN	2SC1627A

CAPACITORS

C101	Mylar	0.1μf/50V
C102	"	0.047μf/50V
C103	"	0.022μf/50V
C104	"	0.012μf/50V
C105	"	0.0056μf/50V
C106	"	0.0027μf/50V
C107	"	0.0015μf/50V
C108	Disc	680P
C109	"	330P
C110	"	100P
C111	Mylar	0.1μf/50V
C112	"	0.047μf/50V
C113	"	0.022μf/50V
C114	"	0.012μf/50V
C115	"	0.0056μf/50V
C116	"	0.0027μf/50V
C117	"	0.0015μf/50V
C118	Disc	680P
C119	"	330P
C120	"	100P
C121 thru 130	Electrolytic	47μf/16V
C131 thru 135	"	10μf/16V
C136 thru 137	"	47μf/16V
C201	"	4.7μf/16V
C301	Mylar	0.0033μf/50V
C302, 303	Disc	180P
C401	"	6.8μf/16V
C402	"	3.3μf/16V
C403	"	1.5μf/16V
C404	"	0.47μf/16V
C405	"	0.22μf/16V
C406	Mylar	0.15μf/50V
C407	"	0.1μf/50V
C408	"	0.056μf/50V
C409	"	0.022μf/50V
C410	Mylar	0.01μf/50V
C411	"	0.1μf/50V
C412	"	0.047μf/50V
C413	"	0.033μf/50V
C414	"	0.022μf/50V
C415	"	0.01μf/50V
C416	"	0.0047μf/50V
C417	"	0.0022μf/50V
C418	"	0.001μf/50V
C419	Disc	500P
C420	Disc	250P
C422 thru 423	Electrolytic	10μf/16V
C501	"	6.8μf/16V
C502	"	3.3μf/16V
C503	"	1.5μf/16V
C504	"	0.47μf/16V
C505	"	0.22μf/16V
C506	Mylar	0.15μf/50V
C507	"	0.1μf/50V
C508	"	0.056μf/50V
C509	"	0.022μf/50V
C510	"	0.01μf/50V
C511	"	0.1μf/50V
C512	"	0.047μf/50V
C513	"	0.033μf/50V
C514	"	0.022μf/50V
C515	"	0.01μf/50V
C516	"	0.0047μf/50V
C517	"	0.0022μf/50V
C518	"	0.001μf/50V
C519	Disc	500P
C520	"	250P
C522 thru 523	Electrolytic	10μf/16V
C601	"	47μf/16V
C603	"	100μf/16V
C605 thru 606	"	470μf/25V
C607	"	47μf/16V
C609	"	100μf/16V
C611, C612	"	47μf/16V

MISCELLANEOUS

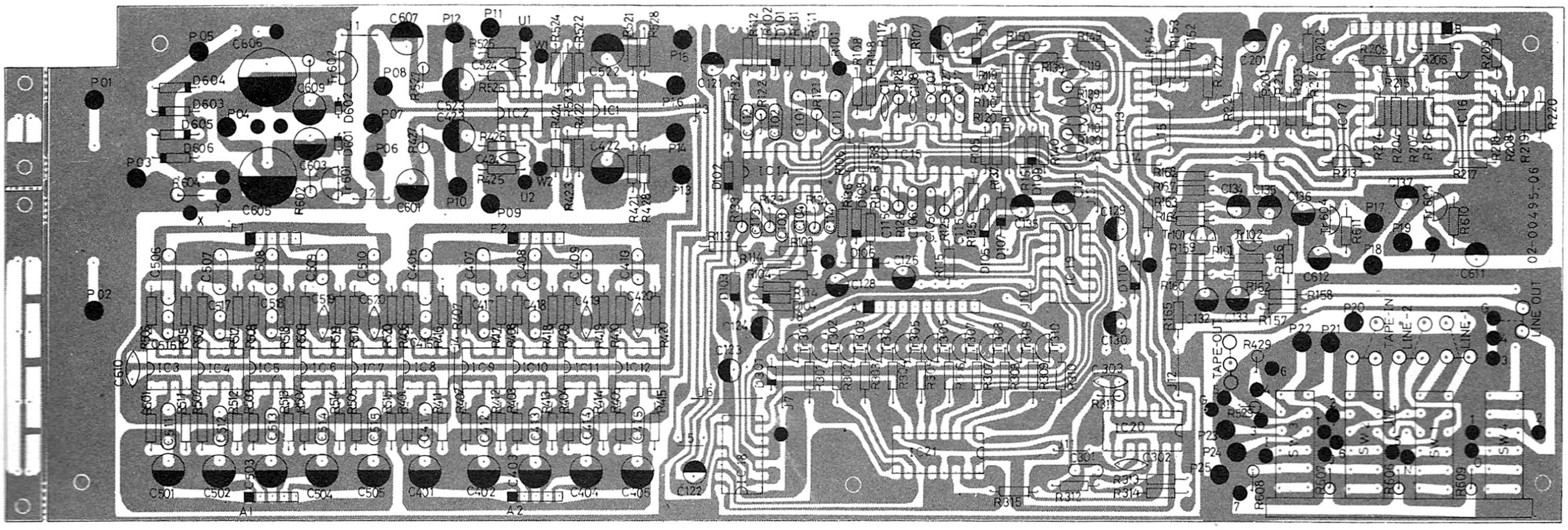
PCB	Main PCB	02-00519-01
	"	02-00495-01
	VR PCB	02-00532-01
	LED PCB	02-00522-01
Signal Switch		18-00636-01
Power Switch		18-00183-01
Switch Button		53-00150
Power Cord		21-00187-01
Transformer		15-00182-01
Fuse 0.5A		29-00666-01
RCA Jacks		26-00200-01
TOP Cover		52-00213
Bottom Cover		52-00214
Front Panel		51-00311
LED Cover		51-00312
VR Slide Button		53-00018
Push Button Socket		55-00289
VR Mask		55-00299
PCB Brass Post		55-00290
	"	55-00309
Rubber Foot		54-00058
Snow Box		61-00303
PE Bag		61-00091-03
Gift Box		61-00304
Export Carton		61-00313

HARDWARE

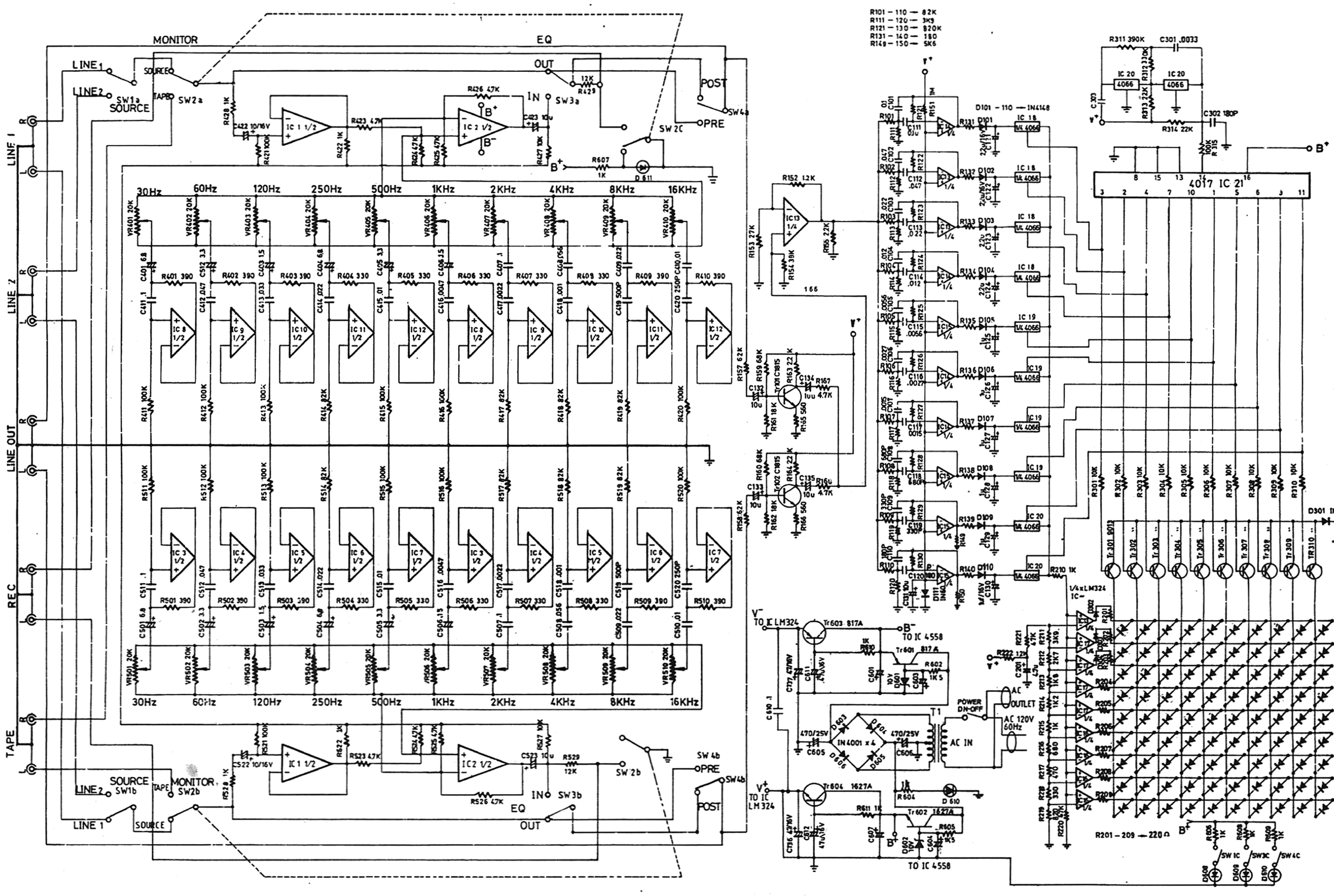
SCREW	QTY	NOTES
M3.0P0.5x5	12	Machine Screw
M3.0P0.5x8	7	"
M2.0P0.4x3	40	"
M3.0P0.5x18	2	"
M2.6x5	4	"
M3.0x6	3	Tapping Screw
M3x24x6	6	Triangular Screw B Type
M3x24x10	4	" "
M3x24x8	3	" "
M3.0	2	Spring Washer

Owner's/Service Manual	AM00383000

PCB LAYOUT

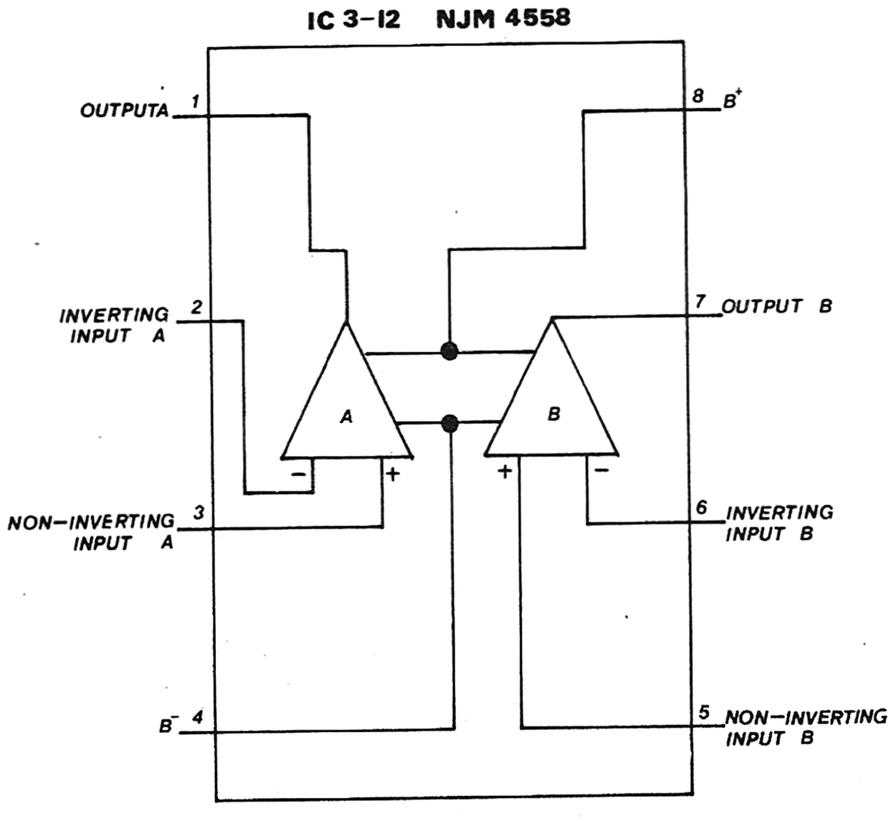


SCHEMATIC

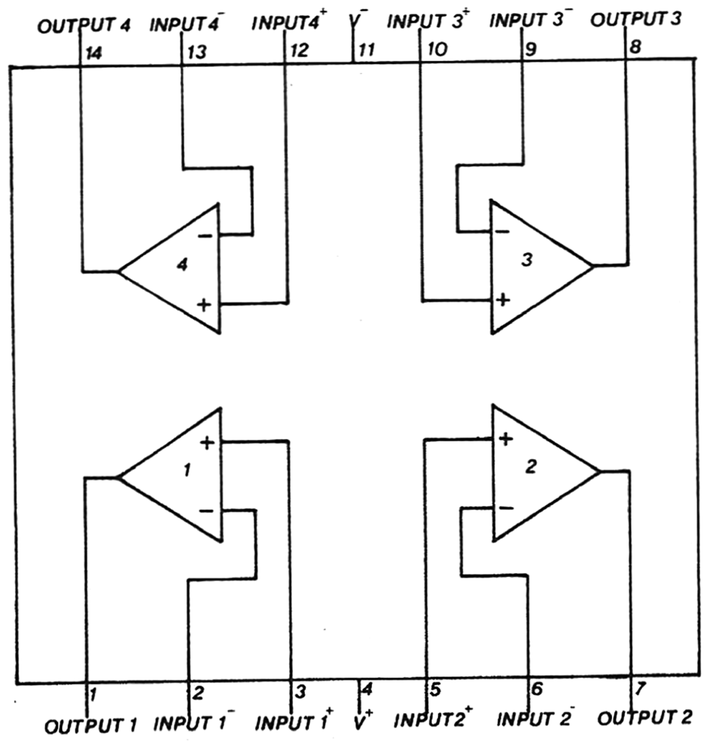


IC Connection Diagrams TOP Views

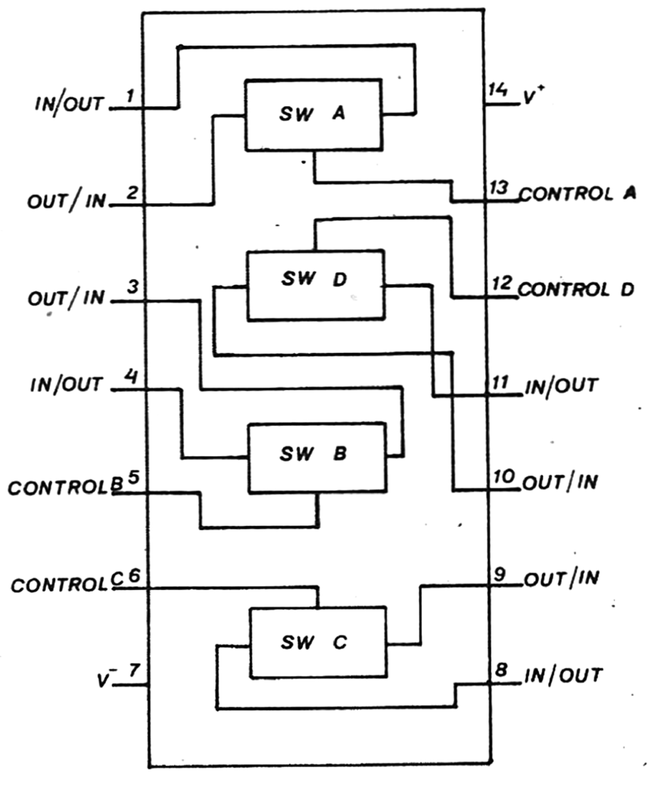
IC 3–12 NJM 4558



IC 13–17 LM 324



IC 18–20 CD4006



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