SERVICE MANUAL 2270

marantz

model 2270

Stereophonic Receiver

SPECIFICATIONS

AUDIO CIRCUITS:

Rated continuous (RMS) power output per channel,
both channels operating simultaneously, 20Hz to 20,000Hz ..... 70 Watts at 4 and 8 ohms
40 Watts at 16 ohms
Comparable Total Music Power (IHF) ..... 210 Watts at 8 ohms
High-level hum and noise (ref. 40W at 8 ohms) ..... −80 dB
Phono hum and noise ..... 1.5 μV equivalent input
Dynamic range (phono input to tape recording output) ..... 96 dB
I. M. Distortion (SMPTE), at rated power 0.3%
Distortion decreases as output is lowered
Total Harmonic Distortion, at rated Power ..... 0.3% Maximum
Distortion decreases as output is lowered
Power Bandwidth (IHF) for 0.3% THD ..... 7Hz to 50,000Hz
Damping Factor (ref. 8 ohms) ..... Greater than 45
Frequency Response
Through phono ..... ±1 dB
Input Sensitivity (for 40W at 8 ohms)
High-level ..... 180 mV
Phono (1,000 Hz) ..... 1.8 mV
Input Impedance
High-level ..... 100,000 ohms
Phono ..... 47,000 ohms
Channel Separation 20 Hz to 20,000 Hz ..... 35 dB Minimum

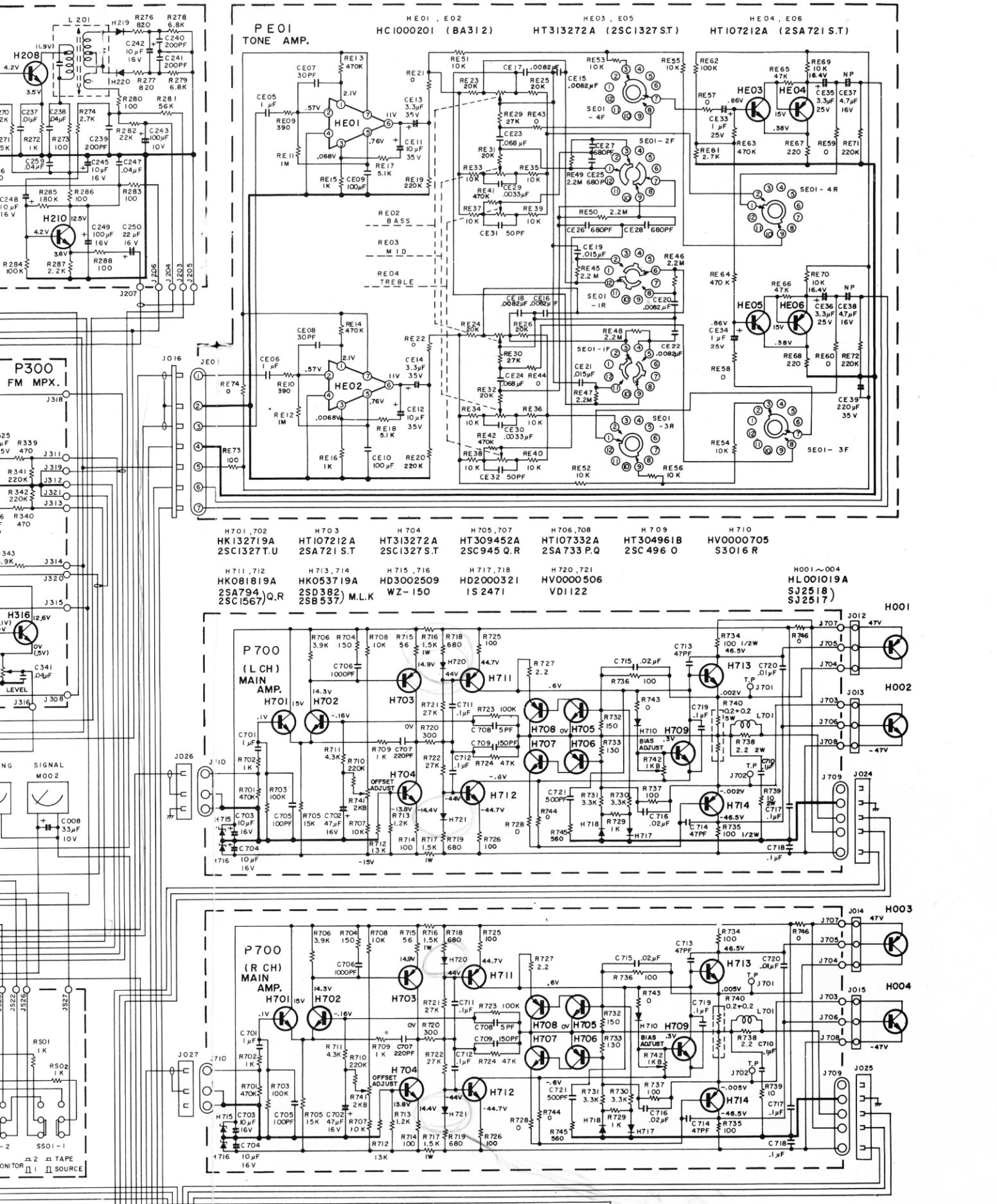
FM SECTIONS:

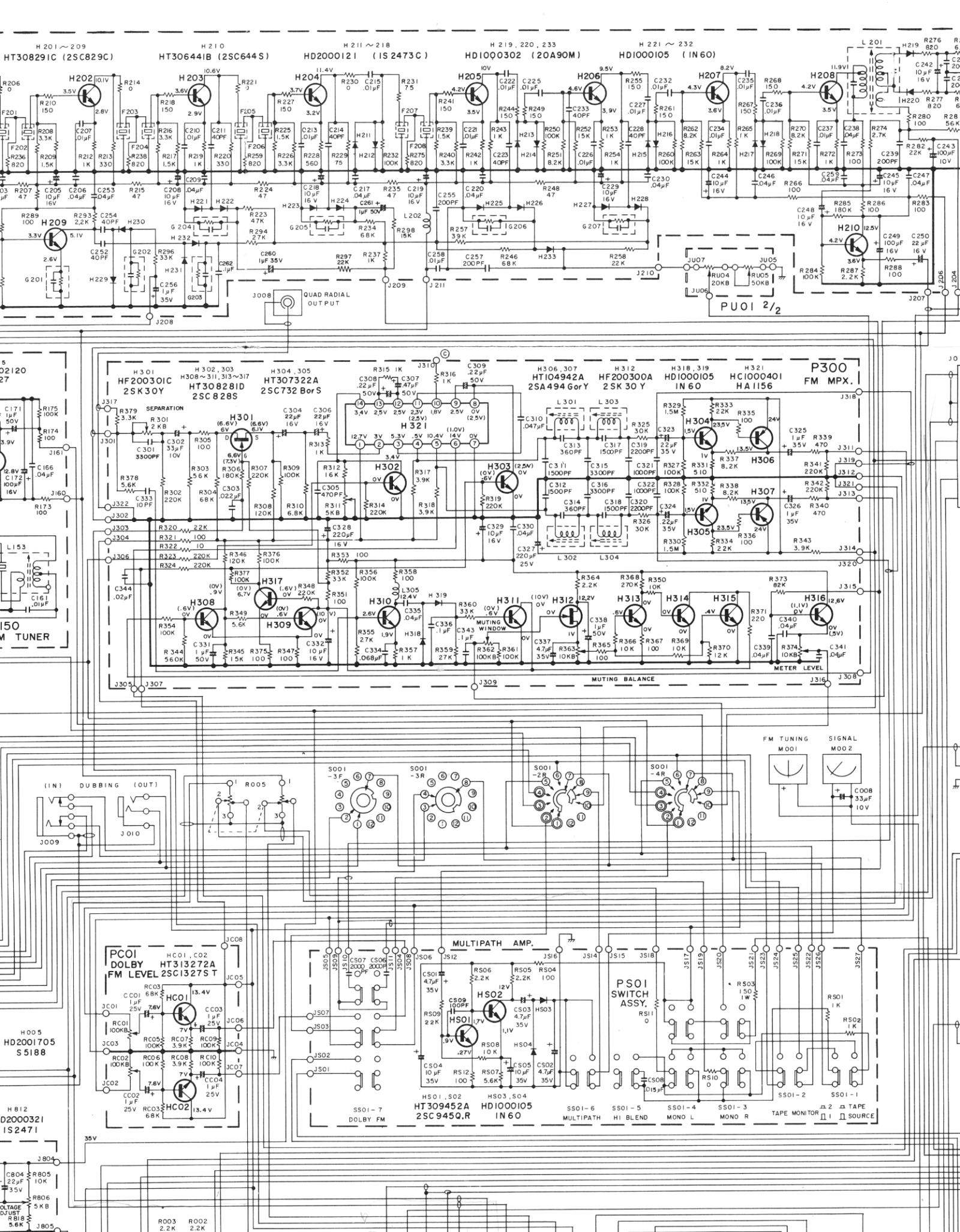
IHF Usable Sensitivity ..... 2.3 μV
Selectivity ..... 80 dB
Noise Quieting ..... −55 dB at 5 μV
−60 dB at 10 μV
−65 dB at 50 μV
Total Harmonic Distortion, 400 Hz, 100% Mod. ..... (Mono) 0.2% (Stereo) 0.4%
Frequency Response (ref. 75 μ sec. de-emphasis) ..... ± 1 dB 50 Hz to 15 KHz
Stereo Separation ..... 1,000 Hz 40 dB
Sub-Carrier (38 KHz) Suppression 60dB

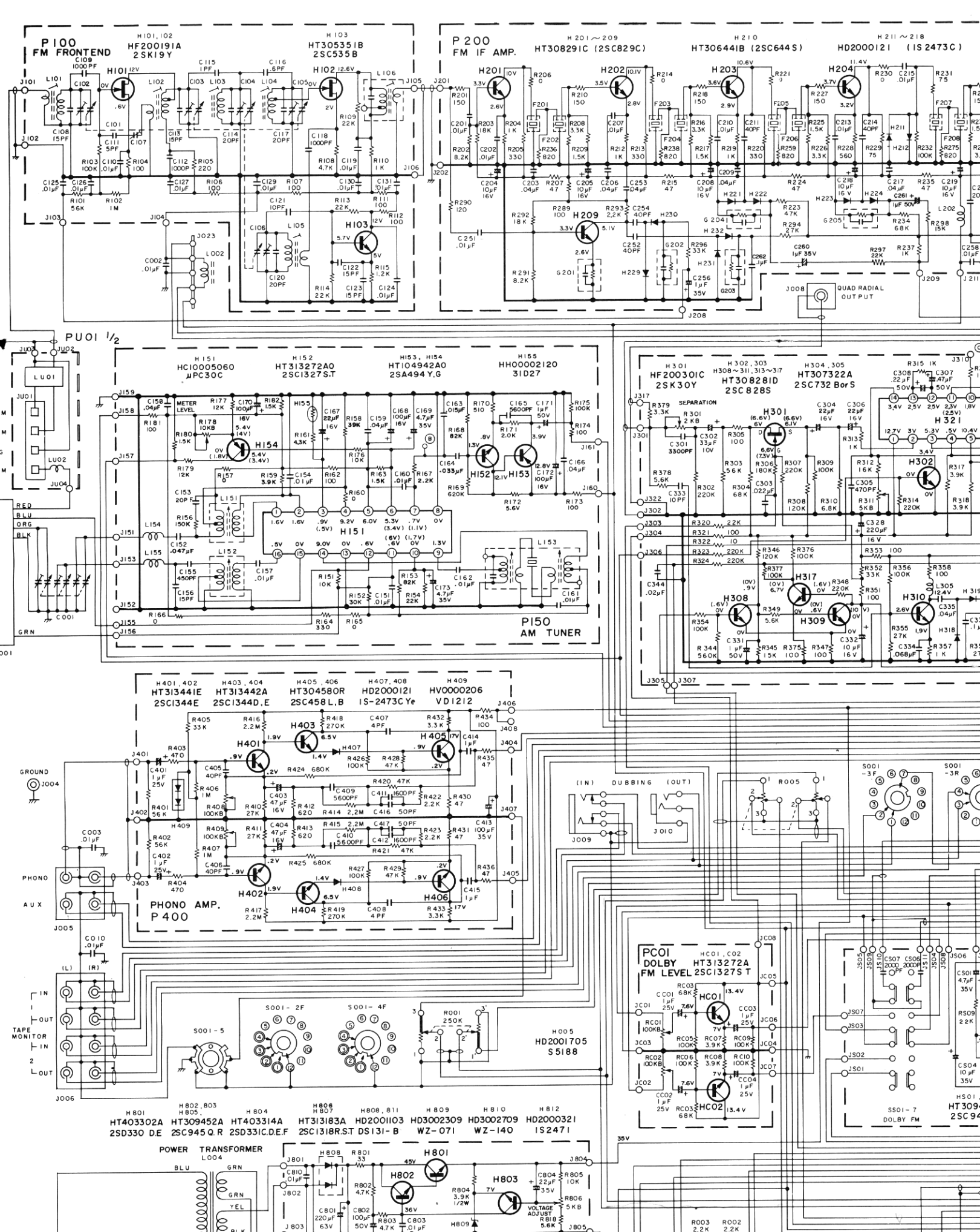
GENERAL:

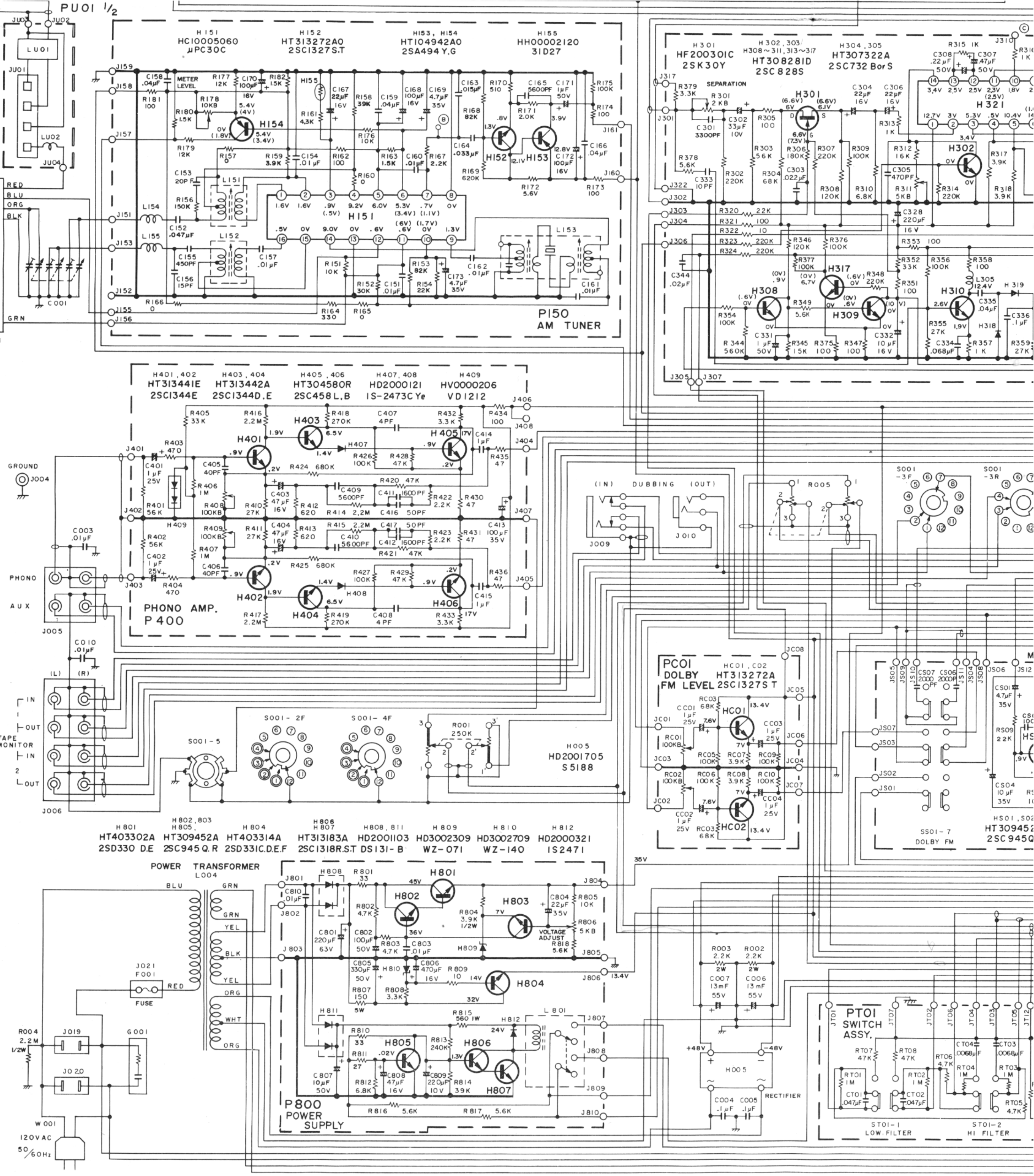
Power Requirements ..... 100/120/200/220/240V AC
50 to 60 Hz
At rated output, both channels operating ..... 500 Watts
Idling Power (Volume Control at zero) ..... 38 Watts
Dimensions
Panel Width ..... 17 21/64 Inches
Panel Height ..... 5 25/64 Inches
Depth ..... 14 Inches
Weight
Unit alone 38.5lbs
Packed for shipment 49.5lbs

* These specifications and exterior designs may be changed for improvement without advance notice.

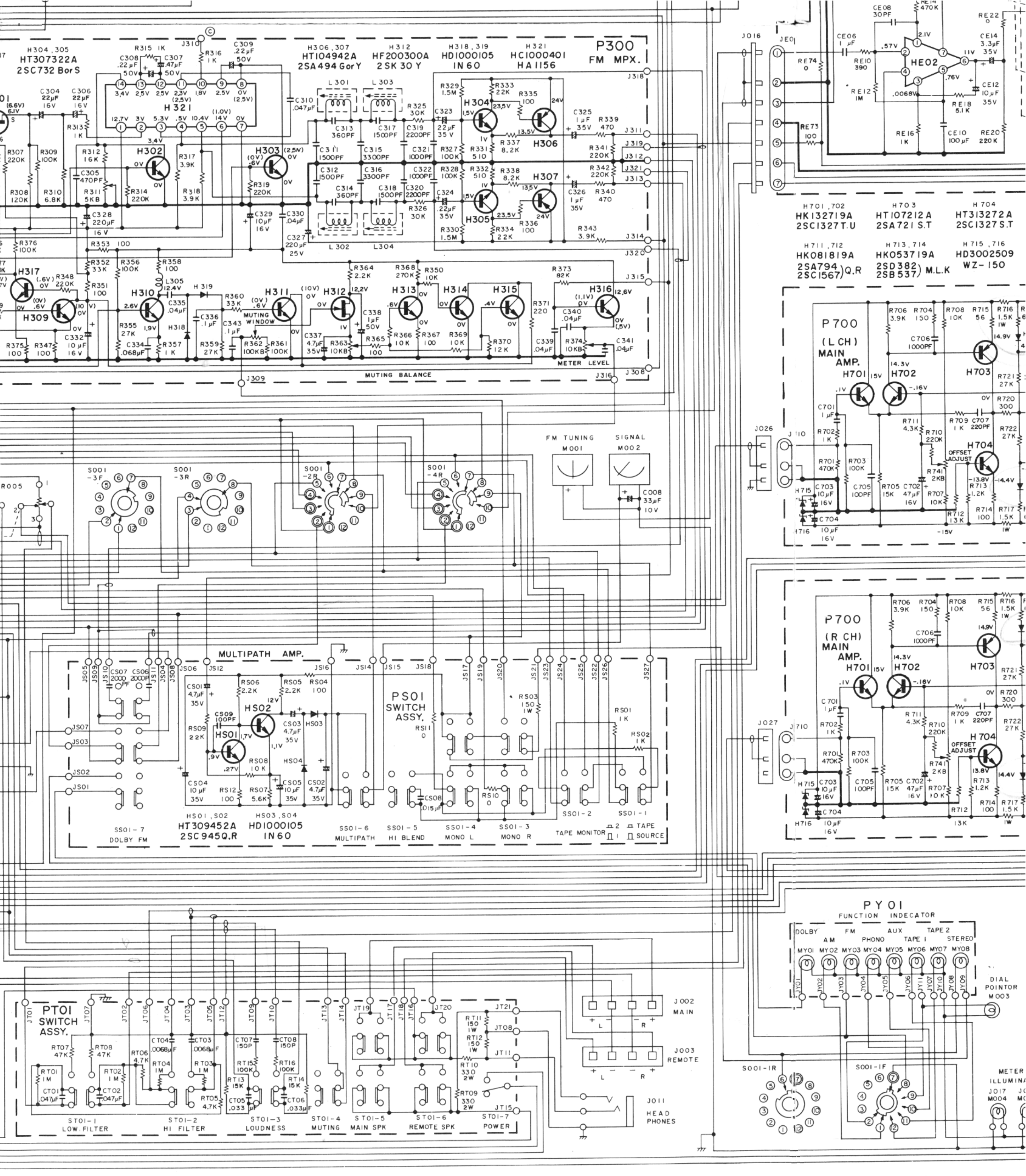

P E01
TONE AMP.
HE01 , E02
HC1000201 (BA312)
HE03 , E05
HT313272A (2SC1327S.T)
HE04 , E06
HT107212A (2SA721S.T)
HE01
HE02
HE03
HE04
HE05
HE06
BASS
MID
TREBLE
P300
FM MPX.
P700
(L CH)
MAIN
AMP.
P700
(R CH)
MAIN
AMP.
H701 , 702
HK1327I9A
2SC1327T.U
H703
HT107212A
2SA721 S.T
H704
HT313272A
2SC1327S.T
H705 , 707
HT309452A
2SC945 Q.R
H706 , 708
HT107332A
2SA733 P.Q
H709
HT304961B
2SC496 O
H710
HV0000705
S3016 R
H711 , 712
HK081819A
2SA794)Q.R
2SC1567)
H713 , 714
HK053719A
2SD382)M.L.K
2SB537)
H715 , 716
HD3002509
WZ-150
H717 , 718
HD2000321
IS2471
H720 , 721
HV0000506
VD1122
H001～004
HL001019A
SJ2518)
SJ2517)
H001
H002
H003
H004
SIGNAL
M002
TAPE
MONITOR
SOURCE


H201~209 HT30829IC (2SC829C)
H210 HT30644IB (2SC644S)
H211~218 HD2000121 (IS2473C)
H219, 220, 233 HD1000302 (20A90M)
H221~232 HD1000105 (IN60)
PU01 2/2
QUAD RADIAL OUTPUT
P300 FM MPX.
H301 HF20030IC 2SK30Y
H302, 303 H308~311, 313~317 HT30828ID 2SC828S
H304, 305 2SC732 BorS
H306, 307 HT104942A 2SA494 GorY
H312 HF200300A 2SK30Y
H318, 319 HD1000105 IN60
H321 HC1000401 HA1156
SEPARATION
MUTING WINDOW
MUTING BALANCE
METER LEVEL
FM TUNING M001
SIGNAL M002
(IN) DUBBING (OUT)
PC01 DOLBY FM LEVEL HT313272A 2SC1327S T
HC01, C02
MULTIPATH AMP.
PS01 SWITCH ASSY.
HS01, S02 HT309452A 2SC945Q,R
HS03, S04 HD1000105 IN60
SS01-7 DOLBY FM
SS01-6 MULTIPATH
SS01-5 HI BLEND
SS01-4 MONO L
SS01-3 MONO R
SS01-2
SS01-1
TAPE MONITOR
TAPE SOURCE
MUTING
H005 HD2001705 S5188
H812 D2000321 IS2471
VOLTAGE DJUST

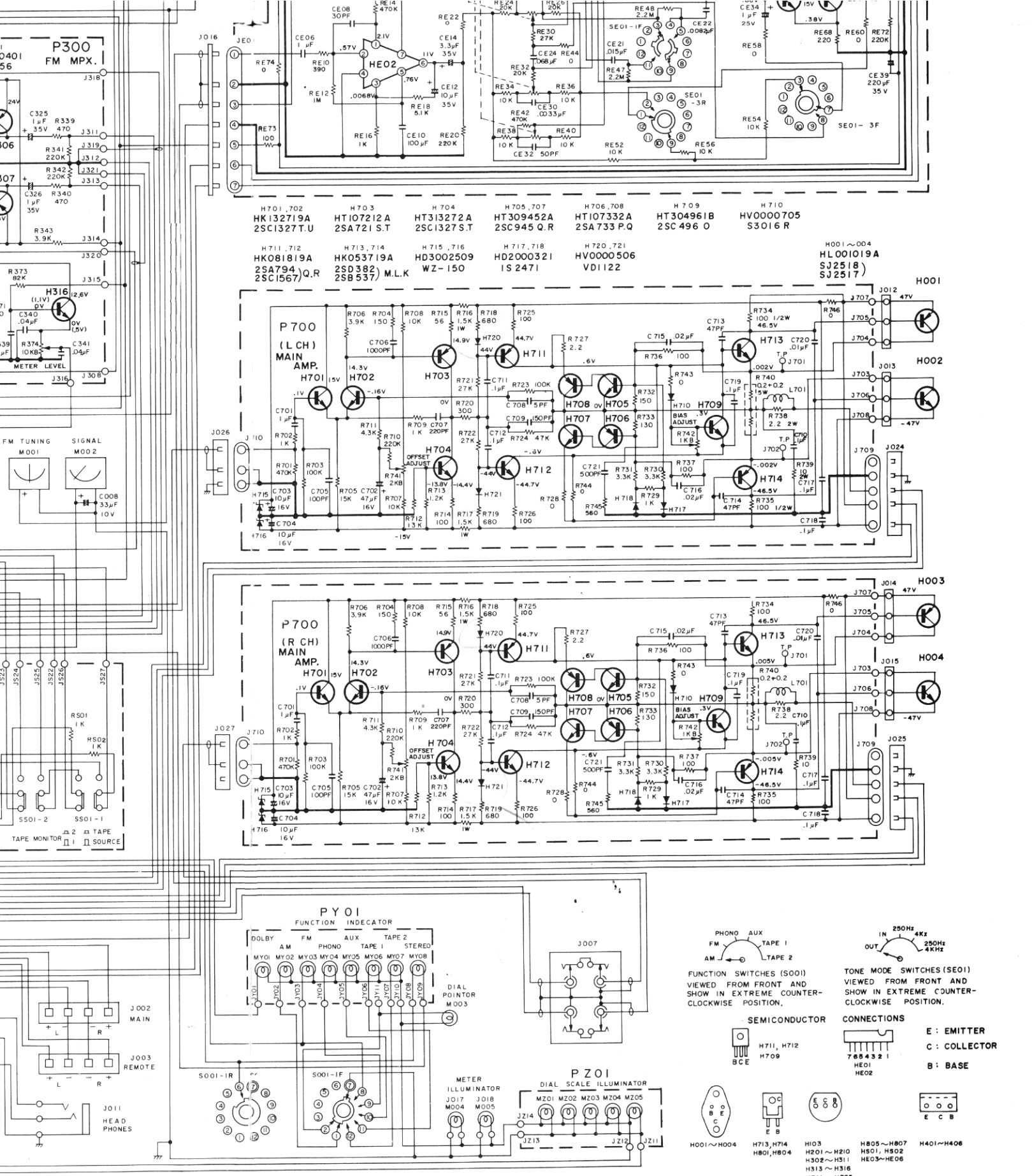

P100
FM FRONTEND
H101,102
HF200191A
2SK19Y
H103
HT305351B
2SC535B
P200
FM IF AMP.
H201~209
HT30829IC (2SC829C)
H210
HT30644IB (2SC644S)
H211~218
HD2000121 (IS2473C)
QUAD RADIAL OUTPUT
PU01 1/2
H151
HC10005060
μPC30C
H152
HT313272A0
2SC1327S.T
H153, H154
HT104942A0
2SA494Y,G
H155
HH00002120
31D27
P150
AM TUNER
H301
HF20030IC
2SK30Y
H302,303
H308~311,313~317
HT30828ID
2SC828S
H304,305
HT307322A
2SC732 BorS
H321
H401,402
HT313441E
2SC1344E
H403,404
HT313442A
2SC1344D,E
H405,406
HT304580R
2SC458L,B
H407,408
HD2000121
IS-2473C Ye
H409
HV0000206
VD1212
PHONO AMP.
P400
PC01
DOLBY
FM LEVEL
HT313272A
2SC1327S T
S001-7
DOLBY FM
H005
HD2001705
S5188
H801
HT403302A
2SD330 D.E
H802,803
H805
HT309452A
2SC945 Q.R
H804
HT403314A
2SD331C.D.E.F
H806
H807
HT313183A
2SC1318R.S.T
H808,811
HD2001103
DS131-B
H809
HD3002309
WZ-071
H810
HD3002709
WZ-140
H812
HD2000321
IS2471
POWER TRANSFORMER
L004
VOLTAGE ADJUST R818 5.6K
SEPARATION
METER LEVEL
DUBBING
(IN)
(OUT)
GROUND
PHONO
AUX
TAPE MONITOR
RED
BLU
ORG
BLK
GRN
YEL



PU01 1/2
LU01
LU02
H151 HC10005060 μPC30C
H152 HT313272A0 2SC1327S.T
H153, H154 HT104942A0 2SA494 Y.G
H155 HH00002120 31D27
P150 AM TUNER
H301 HF200301C 2SK30Y
H302, 303, H308~311, 313~317 HT308281D 2SC828S
H304, 305 HT307322A 2SC732 Bor S
H321
SEPARATION
METER LEVEL
H401, 402 HT313441E 2SC1344E
H403, 404 HT313442A 2SC1344D.E
H405, 406 HT304580R 2SC458L.B
H407, 408 HD2000121 1S-2473C Ye
H409 HV0000206 VD1212
PHONO AMP. P400
GROUND J004
PHONO
AUX
TAPE MONITOR
IN
OUT
(IN) DUBBING (OUT)
R005
J009
J010
S001-3F
S001-3R
S001-5
S001-2F
S001-4F
R001 250K
H005 HD2001705 S5188
PC01 DOLBY FM LEVEL
HC01, C02 HT313272A 2SC1327S T
SS01-7 DOLBY FM
HS01, S02 HT309452 2SC945Q
H801 HT403302A 2SD330 D.E
H802, 803 H805, HT309452A 2SC945Q.R
H804 HT403314A 2SD331C.D.E.F
H806 H807 HT313183A 2SC1318R.S.T
H808, 811 HD2001103 DS131-B
H809 HD3002309 WZ-071
H810 HD3002709 WZ-140
H812 HD2000321 1S2471
POWER TRANSFORMER L004
FUSE
J021 F001
R004 2.2M 1/2W
J019
J020
G001
W001 120VAC 50/60Hz
VOLTAGE ADJUST
P800 POWER SUPPLY
L801
H005 RECTIFIER
+48V
-48V
PT01 SWITCH ASSY.
ST01-1 LOW. FILTER
ST01-2 HI FILTER



P300
FM MPX.
H304, 305
HT307322A
2SC732 Bor S
H306, 307
HT104942A
2SA494 Gor Y
H312
HF200300A
2 SK 30 Y
H318, 319
HD1000105
IN60
H321
HC1000401
HA1156
MUTING WINDOW
MUTING BALANCE
METER LEVEL
FM TUNING
M001
SIGNAL
M002
H701, 702
HK132719A
2SC1327 T.U
H703
HT107212A
2SA721 S.T
H704
HT313272A
2SC1327 S.T
H711, 712
HK081819A
2SA794
2SC1567) Q.R
H713, 714
HK053719A
2SD382
2SB537) M.L.K
H715, 716
HD3002509
WZ-150
P700
(L CH)
MAIN
AMP.
P700
(R CH)
MAIN
AMP.
OFFSET ADJUST
MULTIPATH AMP.
PS01
SWITCH
ASSY.
HS01, S02
HT309452A
2SC945Q.R
HS03, S04
HD1000105
IN60
SS01-7
DOLBY FM
SS01-6
MULTIPATH
SS01-5
HI BLEND
SS01-4
MONO L
SS01-3
MONO R
SS01-2
SS01-1
TAPE MONITOR
2 TAPE
1 SOURCE
PY01
FUNCTION INDICATOR
DOLBY
AM
FM
PHONO
AUX
TAPE 1
TAPE 2
STEREO
DIAL POINTOR
M003
PT01
SWITCH
ASSY.
ST01-1
LOW FILTER
ST01-2
HI FILTER
ST01-3
LOUDNESS
ST01-4
MUTING
ST01-5
MAIN SPK
ST01-6
REMOTE SPK
ST01-7
POWER
J002
MAIN
J003
REMOTE
J011
HEAD
PHONES
S001-IR
S001-IF
METER
ILLUMINA
J017
M004

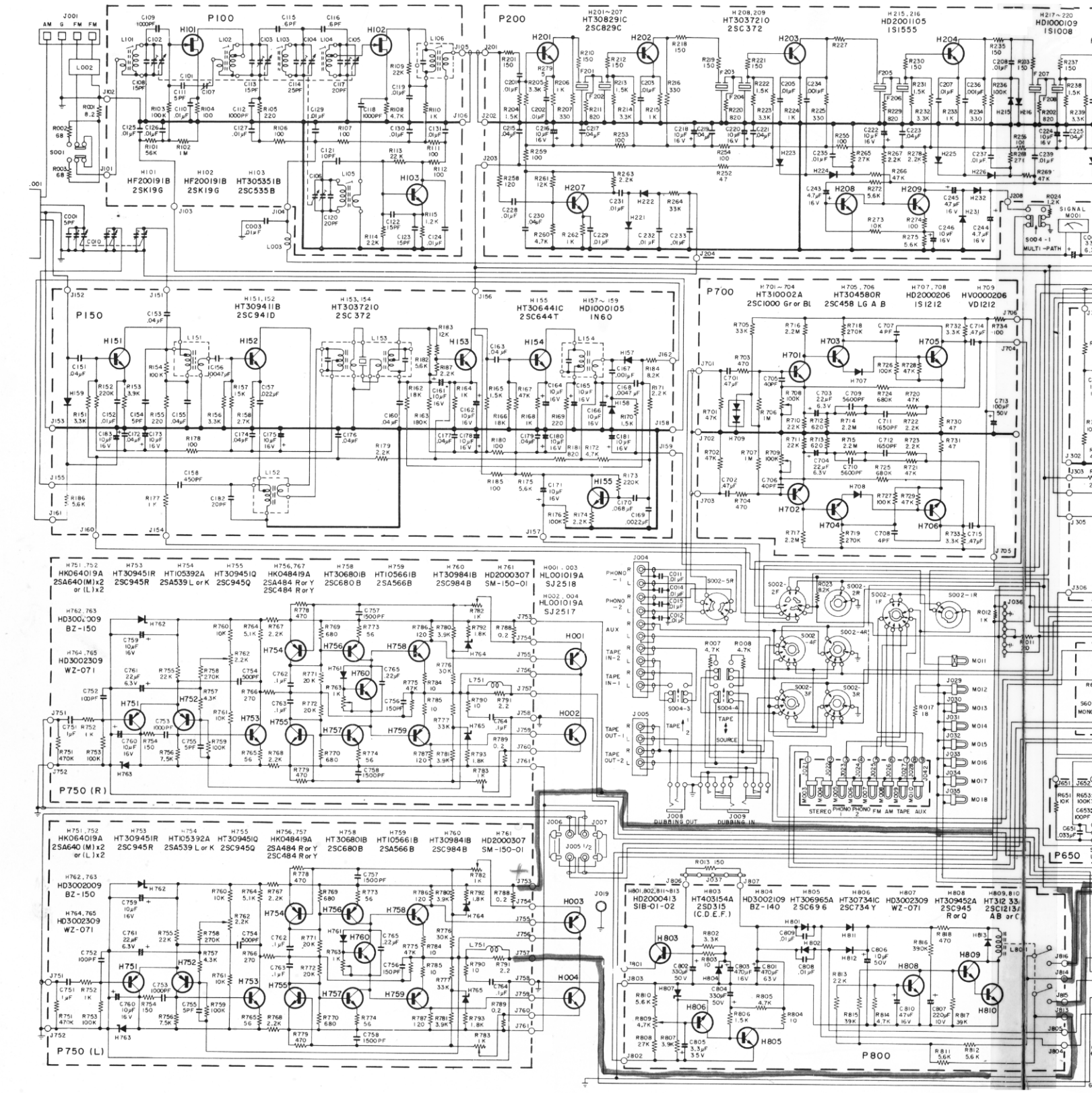


H701,702 HK132719A 2SC1327T.U | H703 HT107212A 2SA721S.T | H704 HT313272A 2SC1327S.T | H705,707 HT309452A 2SC945Q.R | H706,708 HT107332A 2SA733P.Q | H709 HT304961B 2SC496O | H710 HV0000705 S3016R

H711,712 HK081819A 2SA794 2SC1567 Q.R | H713,714 HK053719A 2SD382 2SB537 M.L.K | H715,716 HD3002509 WZ-150 | H717,718 HD2000321 IS2471 | H720,721 HV0000506 VD1122

H001~004 HL001019A SJ2518 SJ2517

Figure 26. Schematic Diagram for U.S.A. Model



Applied to production Serial No. from 1001 to 3900.

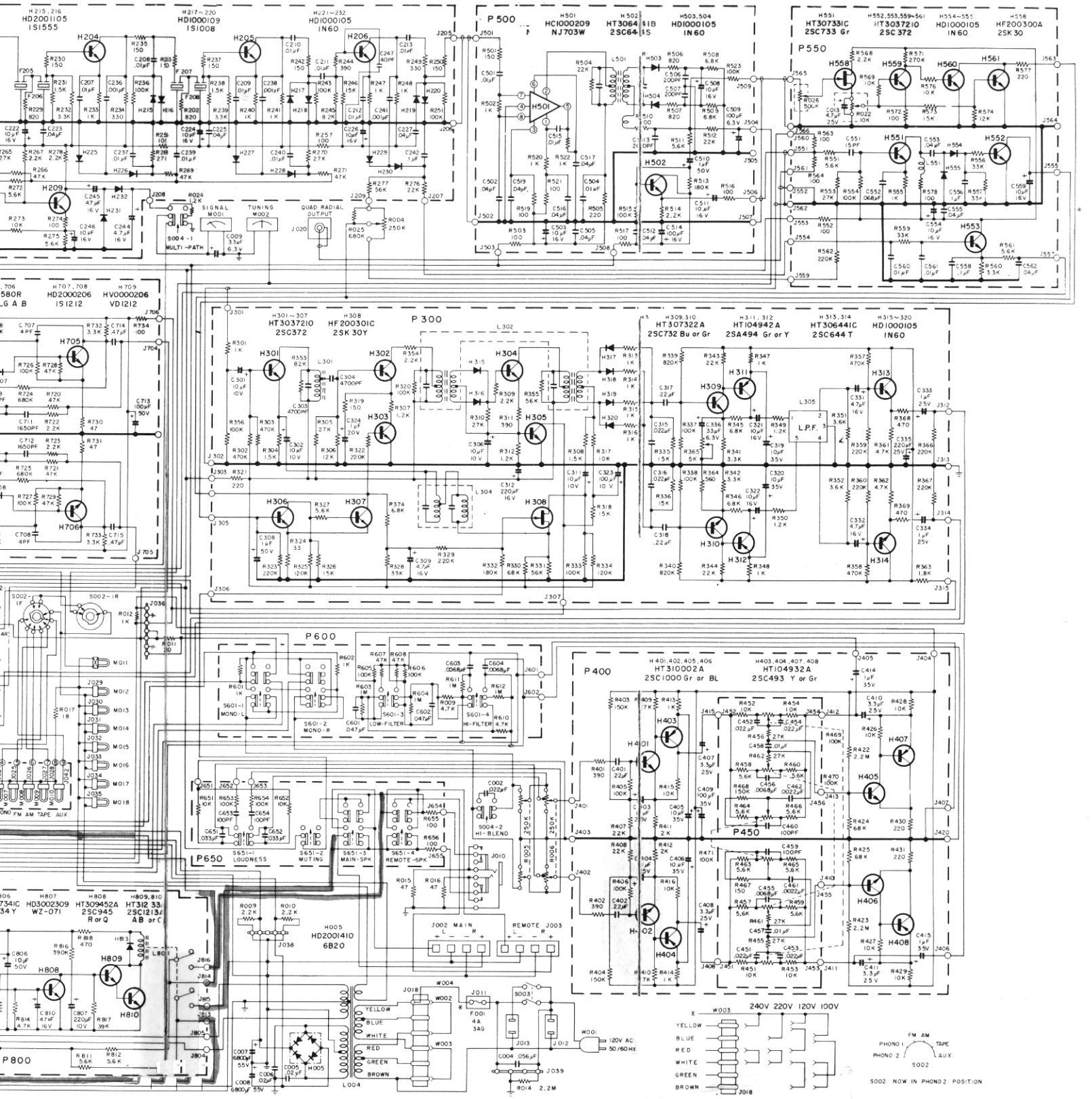
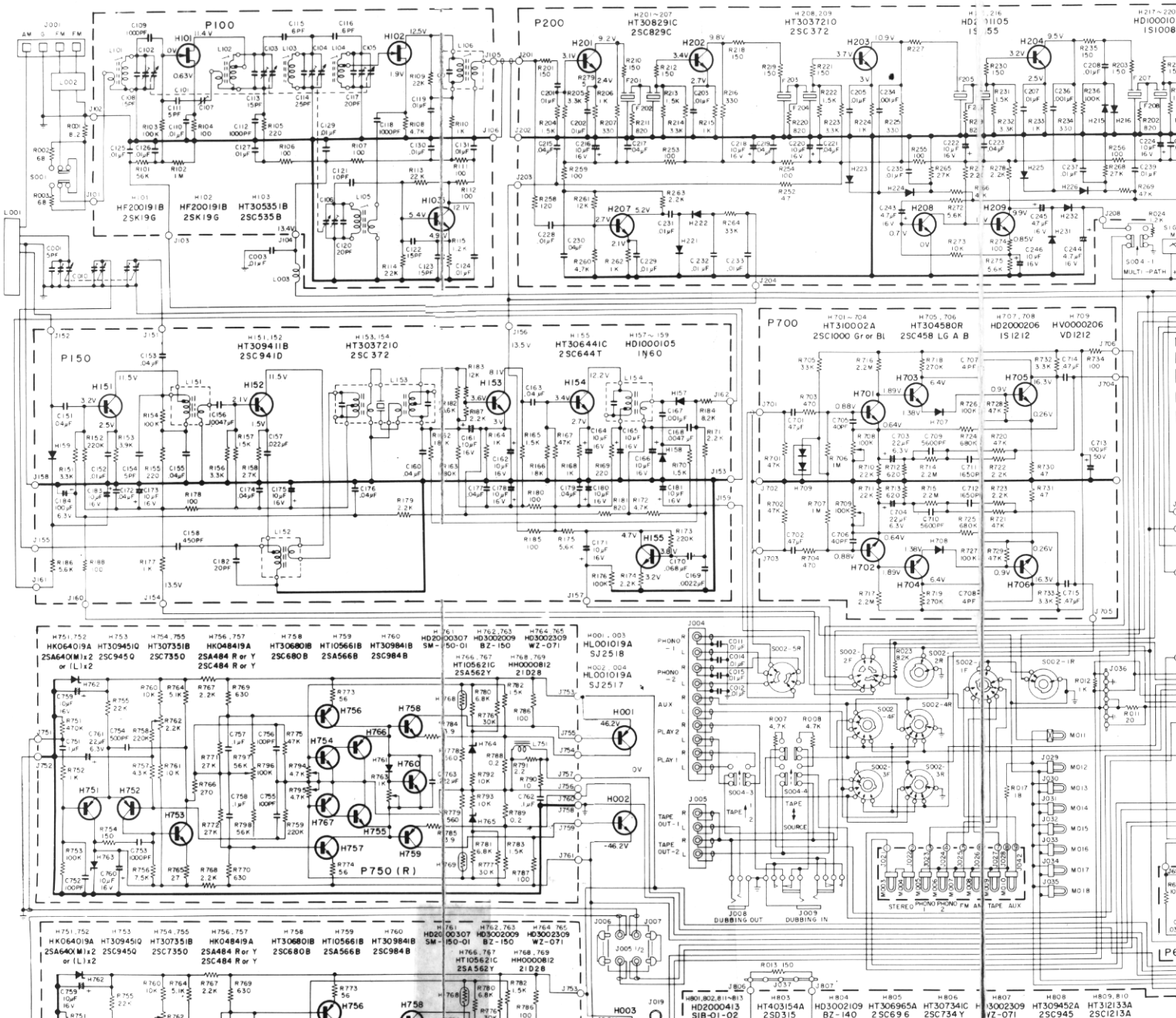
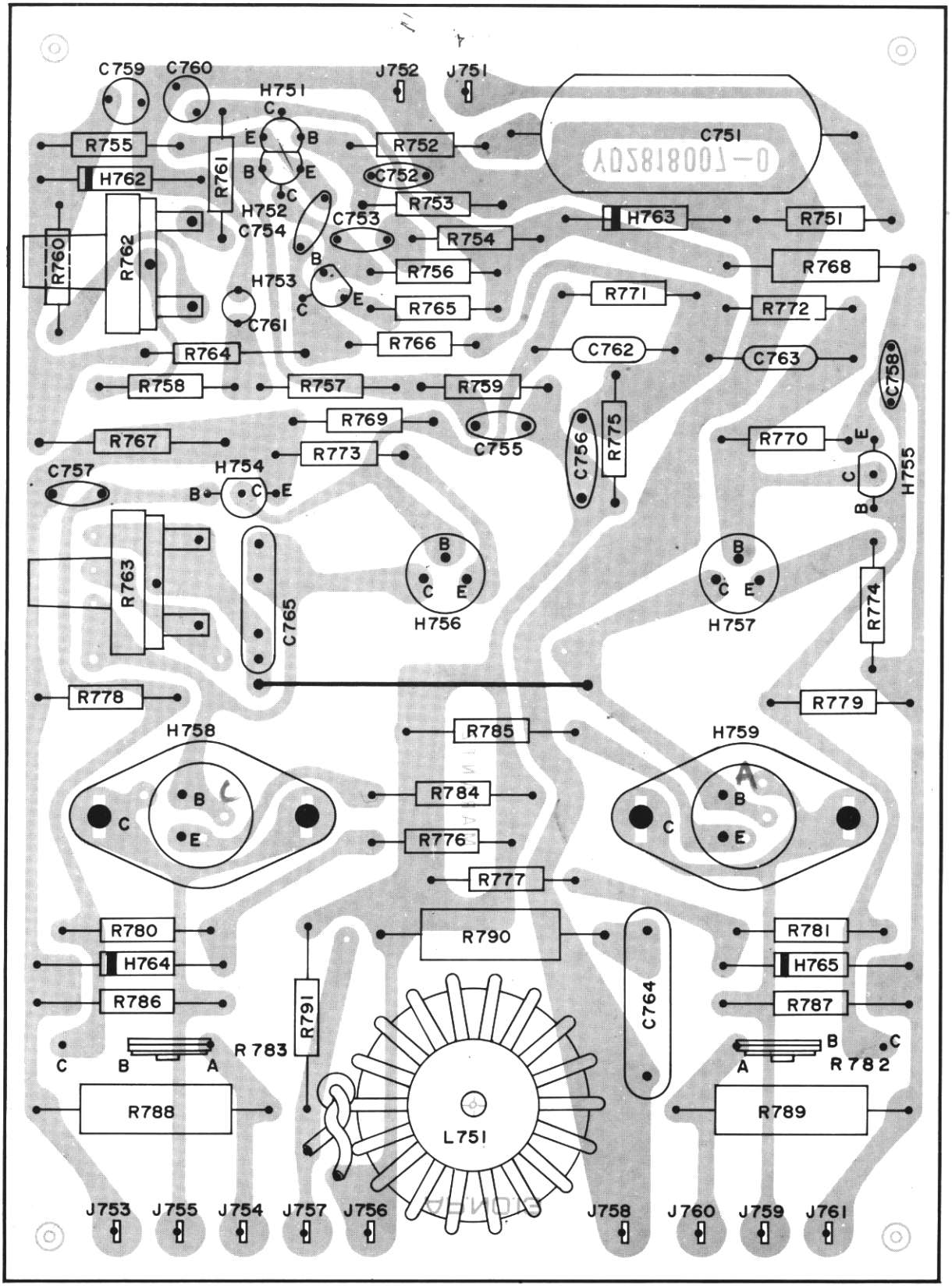


Figure 1 Schematic Diagram



Applied to production Serial No. from 3901 to 4900.


C759
C760
H751
J752
J751
C751
R755
R761
R752
C752
H762
R753
H763
R751
H752
C754
C753
R754
R760
R762
R768
R756
H753
R771
R765
R772
C761
R764
R766
C762
C763
C758
R758
R757
R759
R769
R775
R767
R773
C755
C756
R770
H755
C757
H754
R763
C765
H756
H757
R774
R778
R779
H758
R785
H759
R784
R776
R777
R780
H764
R786
R790
C764
R781
H765
R787
R791
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R789
J753
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J754
J757
J756
J758
J760
J759
J761

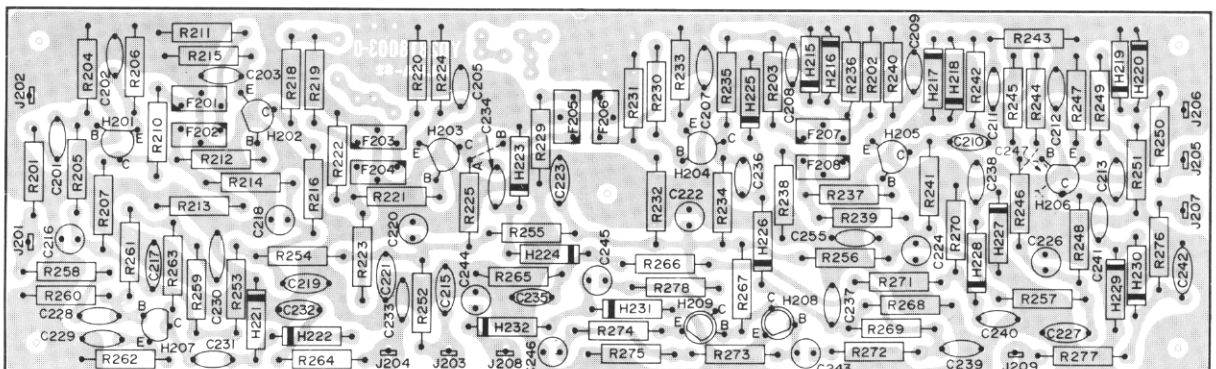


Figure 4 FM IF Amplifier Assembly P200 Component Locations

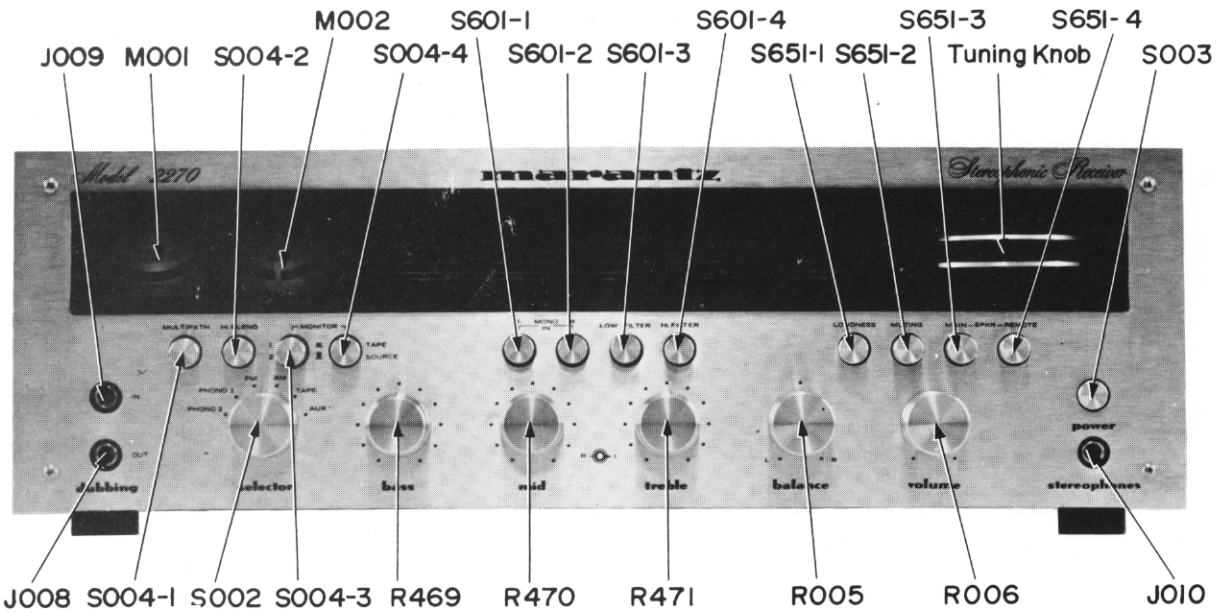


Figure 5 Front Panel Adjustment and Component Locations

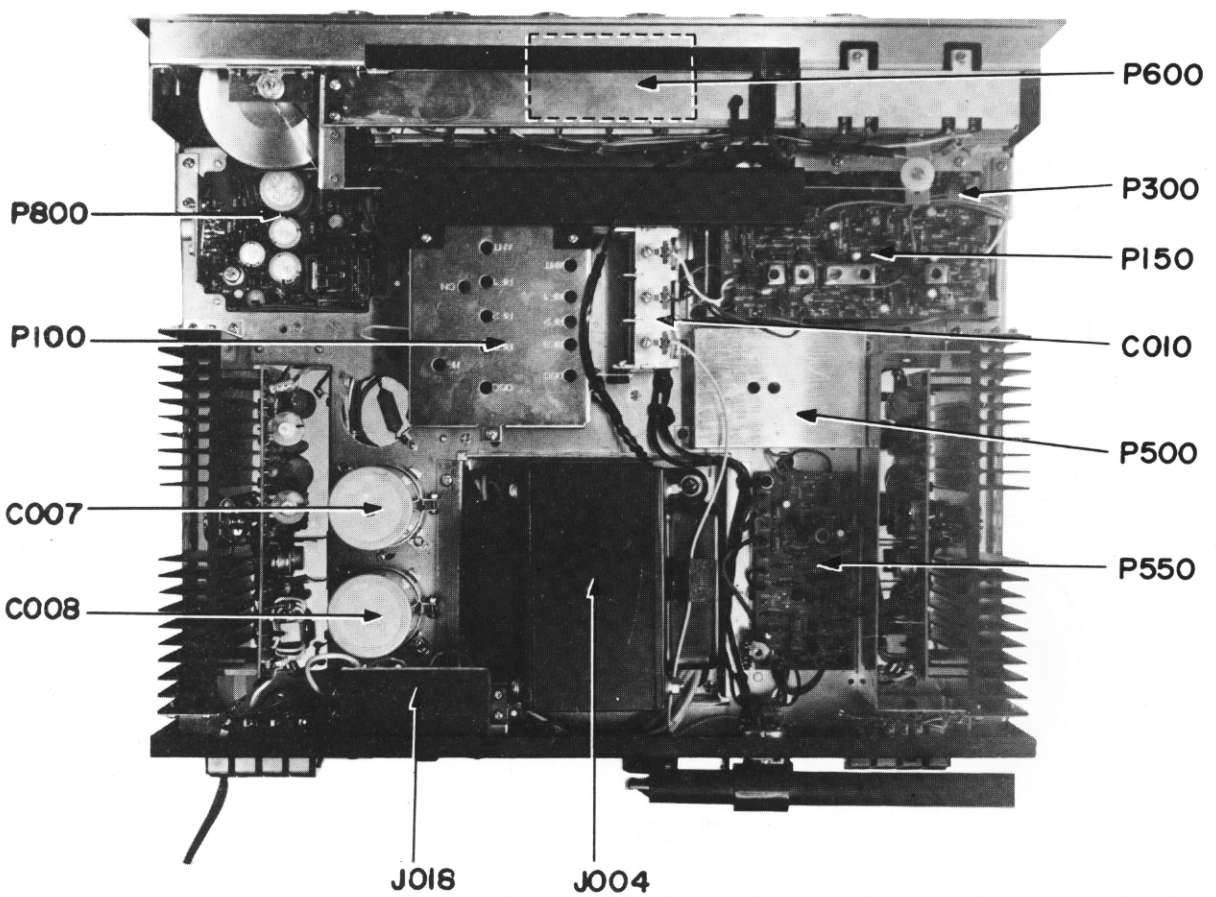


Figure 6 Main Chassis Component Locations (Top View)

INTRODUCTION

This service manual was prepared for use by Authorized Warranty Stations and contains service information for Marantz Model 2270 Stereophonic Receiver.

Servicing information and voltage data included in this manual are intended for use by the knowledgeable and experienced technician only. All instruction should be read carefully. No attempt should be made to proceed without a good understanding of the operation in the receiver.

The parts list furnish information by which replacement part may be ordered from the Marantz Company. A simple description is included for parts which can be usually be obtained through local suppliers.

1. Service Notes

As can be seen from the circuit diagram the chassis of Model 2270 consists of the following units. Each unit mounted on a printed circuit board is described within the square enclosed by a bold dotted line on the circuit diagram.

1. FM Front End ..... mounted on P.C. Board P100
2. FM IF Amplifier ..... mounted on P.C. Board P200
3. FM Detector ..... mounted on P.C. Board P500
4. MPX Stereo Decoding Amplifier ..... mounted on P.C. Board P300
5. Muting Control Amplifier ..... mounted on P.C. Board P550
6. AM Tuner Unit ..... mounted on P.C. Board P150
7. Phono Amplifier ..... mounted on P.C. Board P700
8. Tone Amplifier ..... mounted on P.C. Board P400
9. Tone Control Unit ..... mounted on P.C. Board P450
10. Power Amplifier ..... mounted on P.C. Board P750
11. Regulated Power Supply and Protection Relay Circuit ..... mounted on P.C. Board P800
12. Mono, High and Low Filter Switch unit ..... mounted on P.C. Board P600
13. Loudness, Muting and Speakers Switch unit ..... mounted on P.C. Board P650

2. AM Tuner

All components except Tuning capacitor and ferrite bar antenna are mounted on a printed circuit board P150.

The AM signals induced in a ferrite bar antenna are applied to the base of RF amplifier transistor H151 through a capacitor of C151 and amplified to the level required for overcoming the conversion noises, thus giving good S/N performance. The tuned circuits inserted in both out-and in-put circuit of the RF amplifier assure very high image and spurious rejection performance. Thus amplified and selected AM signals are then applied to the base of converter transistor H152 through a coupling capacitor C156. While the local oscillator voltage is injected to the emitter of H152 through a capacitor C157. Both AM signals and oscillating voltage are mixed at the base-emitter junction and converted into 455KHz intermediate frequency. The resulting IF signal is applied to the first IF transformer L153 consisting of one ceramic filter and two tuned circuits.

The output of L153 is led to the transistor H153 which in turn apply its output to the transistor of next stage H154. The fully amplified IF output is then applied to the diode H157 to detect audible signal through the detector transformer L154. The detected audio signal is filtered and amplified and the final audio output is obtained from the collector of H155 and applied: one to the tape out jacks through monitor switch on the front panel and the other to the function rotary switch.

The DC component of the detected IF signal is used as a AGC voltage to control emitter current of H153 which in turn control the bias current of the RF amplifier through the resistor R179 and R151. A part of IF signal output is also applied to the diode H158 through a capacitor C167 and rectified to obtain DC current for energizing the AM signal strength meter M001.

2.2 Suggestions for AM Tuner trouble shooting

Check for broken AM bar antenna, next try to tune station by rotating fly-wheel tuning knob slowly and observe the AM signal strength meter whether it deflects or not. If the signal strength meter gives a deflection at several frequencies received, no failure may exist in the stages at least preceding final IF transformer L154. Next connect a oscilloscope to the pin terminal J162 or J157 and check for audio signals with the tuning meter deflected. If the signal strength meter does not deflect, check the local oscillator circuit. Normal oscillating voltage at the hot end of the oscillator tuning capacitor is about 2 or 3 volts, varying with tuning capacitor position. When measuring oscillating voltage use a RF VTVM, no circuit tester gives correct indication. If the local oscillator voltage is normal, check all voltage distribution in the AM circuits by using a DC VTVM and compare the measured values with those given in the schematic diagram.

3. FM TUNER

The FM Tuner section of Model 2270 is divided into five functional blocks: FM Front End, IF Amplifier, Detector, Muting Control and MPX Stereo Decoding Circuit.

FM signals induced by a FM antenna are led to FM antenna coil L101 through an attenuator switch and a balun coil. These signals are then applied to the FET RF amplifier which in turn applies its output to the next FET Mixer H102 through the triple tuned high selective circuits. The FET Mixer convert its input signal into 10.7MHz intermediate frequency and amplifies it at the same time. The H103 is a local oscillator and its output is injected into the source of the FET Mixer, the injection voltage is about 700mV. The 10.7MHz front end output is led to the next IF amplifier unit through a coaxial cable.

The IF amplifier unit consists of six stages of IF amplifier, one stage of AGC amplifier and two stages of multipath signal amplifiers. Eight pieces of ceramic filters are also used to obtain high selectivity three stages of symmetrical diode limiters are also employed for the best limitting characteristics, improved capture ratio and good AM suppression.

A part of FM Front End output is applied to the AGC amplifier H207 and rectified its output is fed back to the gate of FET RF amplifier to decrease the gain with increased signal strength.

The signals required for multipath indication are obtained from the three stages of IF amplifiers through coupling capacitors C234, C236 and C238 respectively and rectified by three pair of full wave diode circuits. Thus obtained AM components of the FM signal is amplified by the transistor H208 and H209 and its output is again rectified to obtain DC current required for actuating the Multipath indication meter.

The IF signal sufficiently amplified through every stage of IF amplifier is finally applied to the IC limiter on the Detector Unit. The detected audio output is led to the buffer amplifier H502 and its buffered output is led to; (a) noise amplifier H551 through resistor R551 and capacitor C551, (b) Quad Radial Jacks on the rear panel through resistor R564, (c) MPX stereo decoding circuit through R563.

The DC current caused at the third windings of the discriminator transformer is directly applied to the FM center tuning meter.

Audio Muting and Stereo mode auto-selecting circuit

The muting circuit consisting of all solid-state electrical switching has been incorporated in the Model 2270. Three inputs control the muting function. The first is related to signal strength, the second to the noise condition at the detector and the third is derived from the DC component of the detector output. These inputs are properly matrixed and gated to provide muting free from noise and transients.

The first input of DC voltage obtained by rectifing a part of IF output signal from the H206 is applied to the base of H306 and turns on it, if the IF output is greater than predetermined level (muting threshold level). When the H306 is turned on the H307 is turned off, allowing the emitter-collector resistance increasing and the collector voltage rises about 9.7V. The increased

collector voltage increases the gate bias voltage and turns on the switching FET H308, decreasing the source-drain resistance to near zero ohm and allowing the audio signal applied to the source to flow to the center of 38KHz switching transformer through the source-drain path.

When the input signal is lower than predetermined level, the DC output obtained is small and can not turn on the H306, thus the H306 keeps its turn-off state and this makes H307 turn on, decreasing the collector voltage and turning off H308. Thus no audio signals can pass through the FET. This is the fundamental principle of the muting operation but for more elaborate muting operation the second and the third inputs are necessary.

The second input is used to protect the muting operation and MPX stereo beacon lamps from misoperation due to undesirable noises. The high frequency noises included in the detected audio signals are separated by a small capacitor C551 and amplified by the noise amplifier transistor H551 and its output is rectified by the two diodes. The rectified DC output is proportional to the noise components in the audio signals.

When there are excessive noises in the audio signals such as obtained with a station incorrectly tuned in, the rectified DC output turns on the transistor H522, decreasing the emitter-collector resistance to zero. This means the collector of H307 is short-circuited to the ground, therefore the H308 is turned off and any audio signals having excessive high frequency noises can not go through the FET's sourcedrain path.

The transistor H303 connected in series with the 19KHz pilot signal amplifier transistor H302 is also turned off (when the transistor H522 or H307 are turned on.) and no current flows in the H302, resulting in turning off the streo beacon lamps. Thus misoperation due to undesirable noises is also avoided.

The third input is obtained from the FM discriminator circuit. The DC output so called "S" curve is applied to the gate of H558 through a resistor R523 and deviding network (R565 & R566). The DC output is zero with a station correctly tuned in, but will vary from negative to positive values or vice versa when the tuning point is deviated toward either plus or minus frequency from the correct tuning frequency.

When the DC output is increased to a greater level than that of predetermined, the increased source potential of H558 makes the transistor H561 turn on, and this makes the H306 turn off,....H307 turn on, ... H308 turn off, ... H303 turn off (this means no 19KHz pilot signal is amplified and no stereo beacon is turned on.) When the DC output is increased to the negative predetermined level, the decreased source potential turns off the H559 which in turn makes the H560 turn on and the H306 is turned off. The subsequent changes are exactly the same as that just described above.

Thus when the tuning is shifted or deviated to the certain frequencies in which undesirable noisy side-audio signals are produced, both muting and 19KHz switching transistors are operated automatically and open the circuits.

With the station correctly tuned in, the bias current of the FET H558 is adjusted so that both transistor H560 and H561 are not turned on, giving no effect on the transistor H306.

MPX Stereo Decoding Circuit

The buffered and non-equalized audio signals are applied to the first amplifier H301 which serve as a tuned amplifier for the pilot signal in the composite signals and as a buffer amplifier for the audio signals. The amplified 19KHz pilot signal is led to the second 19KHz amplifier H302 and further amplified if switching transistor H303 in turned on by the controlling DC signal as described in the preceding chapter. The final 19KHz pilot signal is rectified by the doubler circuit consisting of the H315 and H316 to obtain synchronized 38KHz amplifier driving signal.

The H304 is the 38KHz tuned amplifier and supplies its output to the switching matrix circuit consisting of four diodes. While the composite signals are applied to the center tap of switching transformer 1/2 L302. The right and left stereo signals decoded by the switching circuit are led to the crosstalk cancelling amplifier which utilizes complementary configuration with NPN and PNP

transistors through de-emphasis network consisting of C315 and R335, and C316 and R336. L305 is a low-pass filter networks having very sharp cut off characteristics and eliminates undesirable residual switching signals. Transistors H313 and H314 are buffer amplifiers and their outputs are led to the function switch.

3.2 Suggestion for Trouble Shooting of FM Tuner

3.2.1 Symptom: No FM Reception

First turn on the power switch and try to tune FM stations. Rotate the fly-wheel tuning knob slowly and observe the FM signal strength meter and FM center tuning meter. If the center tuning meter deflect at several frequencies received, the tuner circuits preceding the discriminator circuit may have no failure. If the signal strength meter deflect but no deflection is obtained on the center meter, there may be some defects around the detecting circuit consisting H501, L501, H503, H504, etc. When no reading is obtained in both meters, check FM local oscillator circuit, using a RF VTVM. The normal local oscillator voltage is one or two volts (rms) at the tuning capacitor, depending on the tuning capacitor position. If the local oscillator voltage is normal, next check all voltage distribution in the FM Front End and IF amplifier unit and compare them with those shown in the circuit diagram. When both meters deflect but no sound is obtained, check audio circuits, using high sensitive oscilloscope.

3.2.2 Symptom: No Stereo Separation

First check the "MONO" switches are in normal out position. Connect a FM RF signal generator output modulated by a stereo modulator to the rear FM antenna terminals, and check the stereo beacon is turned on or not. If not turned on, check for 19KHz pilot signal and 38KHz switching signal, using an oscilloscope.

4. Phono and Tone Amplifiers

Program source signals from the PHONO jacks on the rear panel are supplied to the input circuit of the Phono Amplifier through the selector switch and the output of the Phono Amplifier is applied to another section of the selector switch. This amplifier provides a gain of 40dB.

All signals selected by the function switch (S002-3F, 4F) are led to the balance and volume controls through the MONO(L,R) and Hi-Blend switches.

Signals properly attenuated by the volume control are applied to the tone amplifier and subjected to the tone control networks such as bass, mid, treble control and high and low cut filters.

Thus controlled audio signals are then led to the PRE OUT jacks on the rear panel.

5. Power Amplifier

The signal from the tone amplifier is applied to the differential amplifier (base of H751) through the coupling capacitor C751. The differential amplifier provides very high input impedance and its collector output (H752) is applied to the base of H753 which in turn applies its output to the next stage; to the H756 through the network R766, C762 and R771, and to the H757 through the network R776, C763 and R772. The outputs of H756 and H757 are applied to the H758 and H757 respectively. H001 and H002 are power transistors used in complementary symmetry configulation and mounted on the heat sink.

To maintain overall amplifier stability and linearity, degenerative feed back is utilized throughout the amplifier. This feed back is also necessary to reduce distortion to within specified limit. The RC network R775 and C756 condition the feed back signal for the audio signals. R759 and C755 are also a feed back loop provided to obtain a stable zero DC off set voltage at the speaker output terminals. The R762 is a trimming resistor to adjust the DC offset voltage.

Dynamic bias is applied to the base of driver transistors H758 and H757. This dynamic bias circuit is comprised of H761, H760 and R763. This provides a variable base bias for driver

transistors that automatically maintains the proper base voltage with temperature change. The temperature sensitive biasing components of the dynamic circuit are thermally coupled through a heatsink to the power amplifier transistors.

6. Power Protection Circuit

Protection circuit for the amplifier is provided by sensing resistor networks and two switching transistors. When the output transistors are over-driven, the current increase through the power output transistor causes an increased current flow through R789 (or R788) and the potential across the R789 will be increased. This increased voltage potential is applied to the base of H755 through the resistor R783 and turns on the H755. Since the collector of H755 is directly connected to the base of H757, this means that the base of H757 is by-passed to the ground through emitter-collector path of H755. Thus the input signal to the H757 is restricted to the value which maintains the operation of power transistor with in the safety area. A resistor network R777 and R781 also works as a sensing network. When the center voltage (collector voltage of power transistors) is excessively increased to a positive value by certain troubles, the voltage applied to the base of H755 makes the H755 turn on, making bypass circuit, and protects the power transistor. For the other half cycle of driving signal, the same operating principle is applied provided.

7. Speaker Protector Relay circuit

The speaker protection circuit consisting of H808, H809, H810, etc protects the speaker systems against any loud "pop" sound developed. This circuit is so designed that no sound is heard for the first three or five seconds after the power switch is turned on by the time constant circuit consisting of C807 and R816. This circuit also portects the speaker systems against some troubles due to DC off balance between the speaker system terminals by instantly operating the relay and cut off the speaker systems from the circuit. When DC off balance voltage (positive) is developed between speaker terminals by possible defects such as broken power transistor, short-circuits, or broken potentio meter R762, as the base of H808 is connected to the speaker terminal, the transistor H808 is turned on by this offset voltage developed and this makes the transistor H809 and H810 turns off, thus cutting off the relay and disconnecting the speaker from the output circuit. When negative offset voltage is developed, this voltage directly turns off the H809 and H810, thus speaker is cut off from the circuit and protected.

The circuit also protects the speaker systems from the possible damage when the amplifier is over-driven by very low frequencies such as 7 or lower cycles.

8. Suggestions for Trouble Shooting of Power Amplifier

8.1 Excessive line consumption

a. Check for shorted rectifiers H005; also check C007 and C008.

b. Check for shorted transistors H758 and H759, H001 and H002, or check H760. Check for open control R763, and bias diode H761. Check L004 for short.

CAUTION: BECAUSE THE DRIVER AND OUTPUT STAGES ARE DIRECT COUPLED COMPONENTS MAY FAIL AS A DIRECT RESULT OF AN INITIAL COMPONENT FAILURE. IF A SHORTED TRANSISTOR OR ZENER DIODE IS FOUND, OR CONTROL OR BIAS DIODE, BE SURE TO CHECK THE REMAINING DRIVER AND OUTPUT COMPONENTS FOR SHORT OR OPEN CIRCUIT BEFORE RE-ENERGIZING THE AMPLIFIER.

8.2 No Line Consumption or Zero Bias

a. Check line cord, fuse, transistors H760, H001, H002, H003 and H004, bias diode H761.

b. Check for open rectifier H005, or open L004.

8.3 No DC Balance

a. Check R762 and Zener diodes H762 and H763.

9. Voltage Conversion

This model is equipped with a universal power transformer to permit operation at 100, 120, 220 and 240 V AC 50 to 60Hz.

To convert the Model 2270 to the required voltage perform the following steps:

(1) Remove the top cover.

(2) Remove the Transformer Wire Connection Terminal Cover, loosen two Cover mounting screws on the rear panel, see Fig. 1

(3) Change the jumper wires as illustrated in Fig. 2 for the required AC voltage and replace the fuse as instructed.

CAUTION: DISCONNECT POWER SUPPLY CORD FROM AC OUTLET BEFORE CONVERTING VOLTAGE.

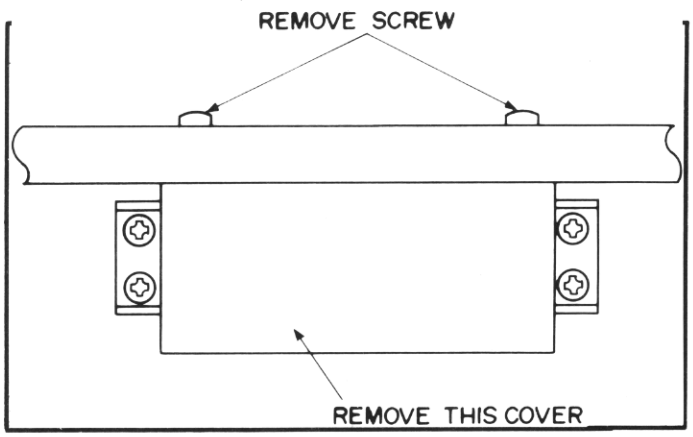
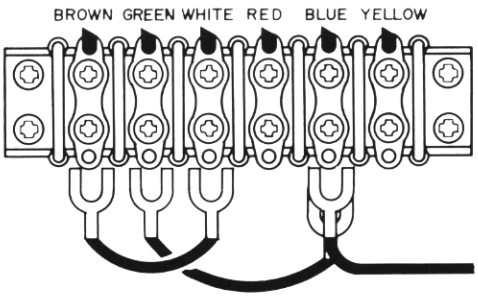
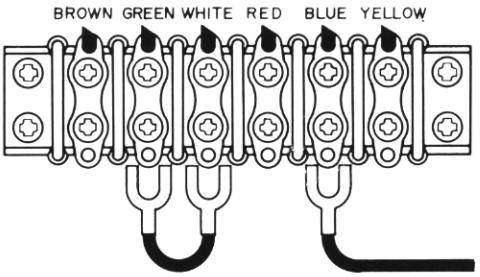


Figure 1 Remove the Terminal Cover

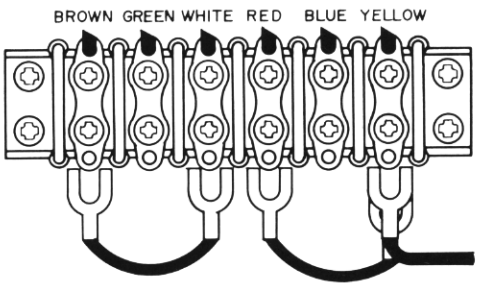
For 100 V Operation
(Use 5A Fuse)



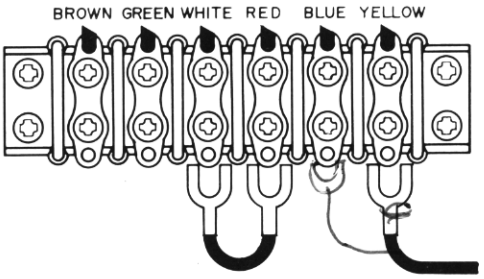
For 200V Operation
(Use 3A Fuse)



For 120 V Operation
(Use 4A Fuse)



For 220 V Operation
(Use 3A Fuse)



For 240V Operation
(Use 3A Fuse)

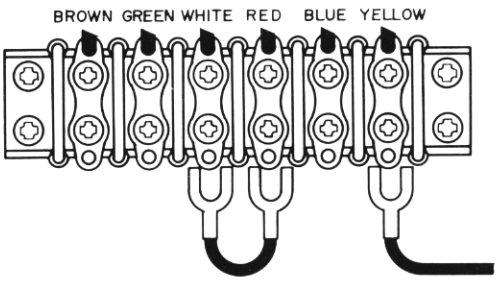


Figure 2 Voltage Conversion Chart

10. Test Equipment Required for Servicing

Table 1 lists the test equipment required for servicing the Model 2270 Receiver.

Item	Manufacturer and Model No.	Use
AM Signal Generator		Signal source for AM alignment
Test Loop		Used with AM Signal generator
FM Signal Generator	Less than 0.3% distortion	Signal source for FM alignment
Stereo Modulator	Less than 0.3% distortion	Stereo separation alignment and trouble shooting
Audio Oscillator	Weston Model CVO-100P, less than 0,02% residual distortion is required.	Sinewave and squarewave signal source.
Oscilloscope	High sensitivity with DC horizontal and vertical amplifiers.	Waveform analysis and trouble shooting, and ASO alignment.
VTVM	With AC, DC, RF range	Voltage measurements.
Circuit Tester		Trouble Shooting
AC Wattmeter	Simpson, Model 390	Monitors primary power to Amplifier.
AC Ammeter	Commercial Grade (1-10A)	Monitors amplifier output under short circuit condition.
Line Voltmeter	Commercial Grade (0-150VAC)	Monitors potential of primary power to amplifier.
Variable Autotransformer (0-140VAC, 10 amps.)	Powerstat, Model 116B	Adjusts level of primary power to amplifier.
Shorting Plug	Use phono plug with 600 ohm across center pin and shell.	Shorts amplifier input to eliminate noise pickup.
Output Load (8 ohms, 0.5%, 100W)	Commercial Grade	Provides 8-ohm load for amplifier output termination.
Output Load (4 ohms, 0.5%, 100W)	Commercial Grade	Provides 4-ohm load for amplifier output termination.

11 AM Alignment Procedure

AM IF Alignment

1. Connect a sweep generator to the J151 and an alignment scope to the J162.
2. Rotate each core of IF transformer L153 and L154 for maximum height and flat top symmetrical response.

AM Frequency Range and Tracking Alignment

1. Set AM signal generator to 525 KHz. Turn the tuning capacitor fully closed (place the tuning pointer at the low end.) and adjust the oscillator coil L152 for maximum audio output.
2. Set the signal generator to 1650 KHz. Place the tuning pointer in the high frequency end and adjust the oscillator trimmer on the oscillator tuning capacitor for maximum audio output.
3. Repeat the Step 1 and 2 until no further adjustment is necessary.
4. Set the generator to 600 KHz and tune the receiver to the same frequency and adjust a slug core of AM ferrite rod antenna and RF coil L151 for maximum output.
5. Set the generator to 1400 KHz and tune the receiver to the same frequency and adjust both trimming capacitors of Antenna and RF tuned circuit for maximum output.
6. Repeat the step 4 and 5 until no further adjustment is necessary.

Note: During tracking alignment reduce the signal generator output as necessary to avoid AGC action.

12 FM Alignment Procedure

1. Connect a FM signal generator to the FM antenna terminals and a oscilloscope and an audio distortion analyzer to the tape output jacks on the rear panel.
2. Set the FM SG to 87.5 MHz and provide about 3 to 5 μV. Place the tuning pointer at the low frequency end by rotating the tuning knob and adjust the core of oscillator coil L105 to obtain maximum audio output.
3. Set the FM SG to 108.5 MHz and provide about 3 to 5 μV output. Rotate the tuning knob and place the tuning pointer at the high frequency end and adjust the trimming capacitor C106 for maximum output.
4. Repeat the step 2 and 3 until no further adjustment is necessary.
5. Set the FM SG to 90 MHz and tune the receiver to the same frequency. Decrease signal generator output until the audio output level decreases with the decreasing generator output. Adjust the antenna coil L101, RF coil L102, L103 and L104 and IF transformer L106 for minimum audio distortion.
6. Set the FM SG to 106 MHz and tune the receiver to the same frequency. Adjust the trimming capacitor C102, C103, C104 and C105 for minimum distortion.
7. Adjust the secondary core (black) of discriminator transformer L501 so that the center tuning meter pointer indicates its center at no signal applied. Set the FM SG to 98 MHz and increase its output level to 1KμV and tune the receiver to the same frequency so that the center tuning meter pointer indicates its center. Adjust the primary core (pink) of L501 for minimum distortion.

13 STEREO Separation Alignment

1. Set the FM SG to provide 1 kuV at 98 MHz. Tune the receiver to the same frequency so that the center tuning meter pointer indicates its center.
2. Modulate the FM SG with stereo composite signal consisting of only subchannel signal (of course a pilot signal must be included). Adjust the core of L301 for maximum audio output, then, modulate the signal generator with a stereo composite signal consisting of only L channel signal and again adjust the core of L301 for maximum audio output.
3. Adjust the trimming resistor R365 for maximum and same separation in both channels.

14 Muting Circuit Alignment

1. Connect a VTVM across the resistor R022 and adjust the resistor R022 until the meter reads 0.75 V DC at no signal.
2. Set the FM SG to provide 1 KμV at 98 MHz and tune the receiver to the same frequency correctly.
3. Turn on MUTING pushswitch. Shift the FM signal generator frequency to plus and minus and note both plus and minus shifted frequencies at which undesirable audio side responses are muted out. Adjust the R022 so that the same shifted frequencies mute the undesirable side response.

15 Audio Adjustment

1. Voltage adjustment
   Connect a DC voltmeter between pin terminal J802 and J803, and adjust the trimming resistor R809 for 35V DC.
2. Main Amplifier DC off-set alignment
   Connect a DC voltmeter with 0.5 or 1 V range between the speaker terminals and adjust the trimming resistor R762 for "zero" DC output on the meter.
   Repeat the same procedure for the other channel.
   Note: During this alignment no load should be connected to the speaker terminals.
3. Idle-current adjustment
   Connect a VTVM between pin terminals J~~753~~ 756 and J754. Next, rotate the trimming resistor R763 fully counterclockwise, then rotate it clockwise again until the VTVM reads 5 mV DC.
   Repeat the same procedure for the other channel.
   Note: During this alignment no load should be connected to the speaker terminals.
4. Check DC off-set voltage aligned in the procedure 2 and if any DC output is observed on the DC voltmeter, adjust the R762 again for "zero" output.
5. Phono-amplifier adjustment
   Connect a oscilloscope to the TAPE OUT jacks and an audio signal generator to the PHONO jacks. Place the selector switch in the PHONO position. Increase 1 KHz audio signal gradually until a slight clipping on top of the sine-wave is observed on the oscilloscope. Adjust the trimming resistor R708 for equal clipping level.
   For the other channel adjust R709.
6. Main Amplifier ASO adjustment
   For this alignment two DC oscilloscopes are necessary.

6.1 First, make calibration on each oscilloscope gain for;
Vertical Sensitivity 0.2 V/cm
Horizontal Sensitivity 10 V/cm

6.2 Connect pin J753 to the scope vertical input terminal. Connect pin J754 to the scope ground terminal. Connect pin J756 to the scope horizontal input terminal. Adjust the horizontal and vertical position knobs so that a "spot" on the scope is placed on the lower right corner.

6.3 Connect pin J760 to the scope vertical input terminal. Connect pin J761 to the scope ground terminal. Connect pin J756 to the scope horizontal input terminal. Adjust the horizontal and vertical position knobs so that a "spot" on the scope is placed on the lower left corner.

6.4 Remove two jumper plugs connected between the PRE OUT and MAIN IN jacks on the rear panel. Connect a low-loss oil paper capacitor of 6μF (or equivalent) to the speaker terminals being adjusted.

6.5 Connect an audio signal generator to the MAIN IN jack. Increase the audio signal (1 KHz) input level until the Lissajou Figures as shown below are obtained on the scopes. Adjust the trimming resistors R782 and R783 for the height of 2.0cm.

6.6 Change the audio input frequency from 1 KHz to 20 Hz and check whether the speaker

protection relay has been operated or not. (When the relay has been operated, no signal is provided to the speaker terminals.) If there is no signal at the speaker terminals, turn off the system power of the amplifier for about one minutes, then again turn on the power and adjust the R782 and R783 for a slight increased height of A and B.

6.7 For the another Main Amplifier, repeat the procedures 6.2 to 6.6.

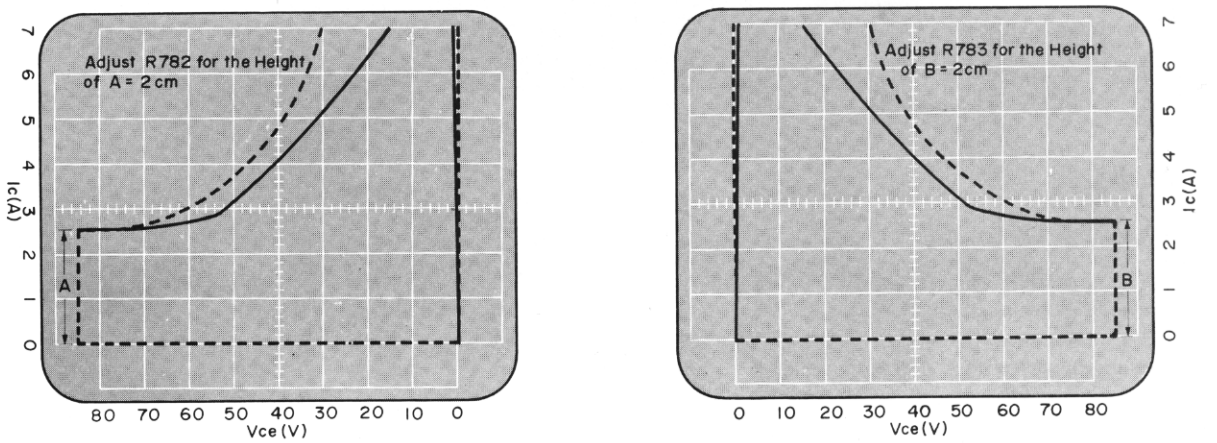


Figure 3 Lissajou Figure on Oscilloscope

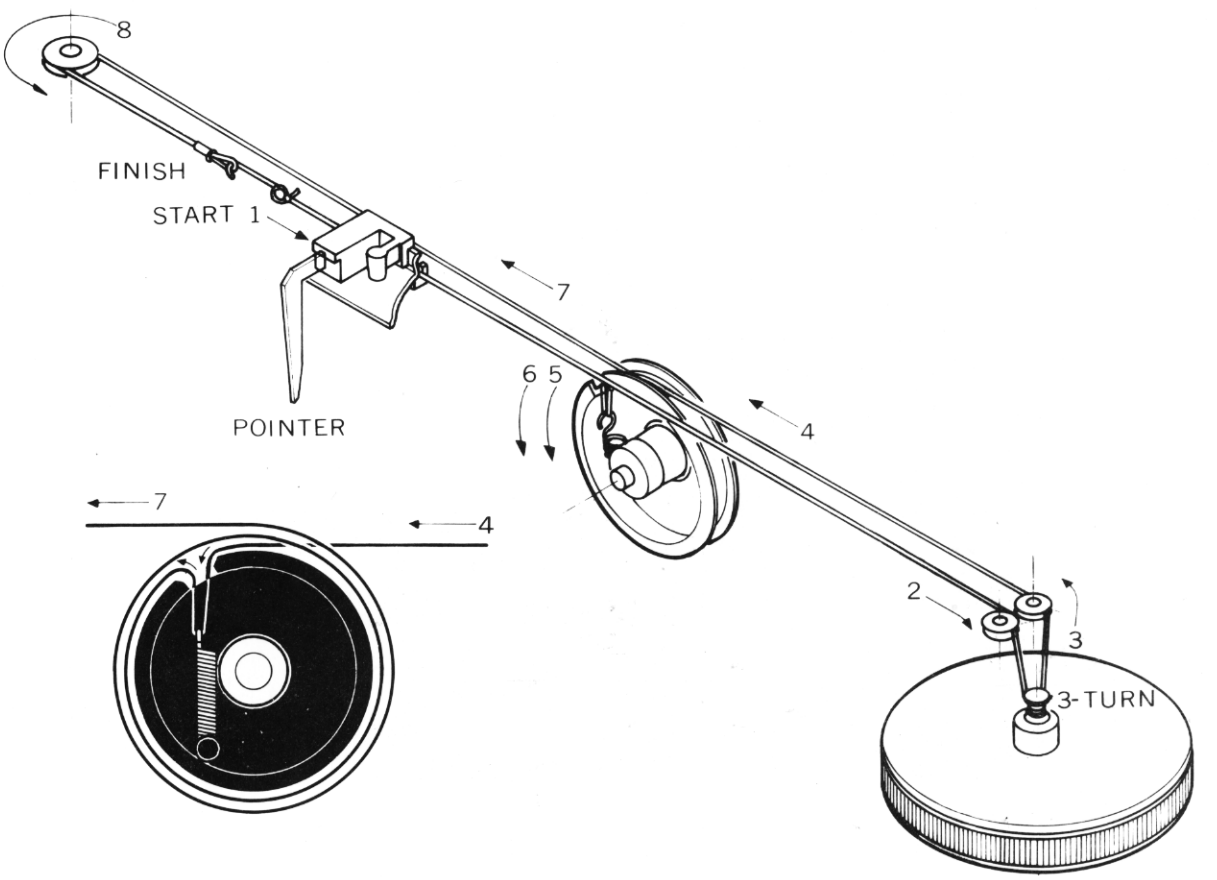


Figure 4 Dial Stringing

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SERVICE BULLETIN

model number 2270	bulletin number M-2270-1
for serial numbers see text	
subject: REPLACEMENT TRANSISTOR	
engineering approval	date 10-31-73

Early production of the Model 2270 used the temperature compensating transistor, reference no. H760, part no. HT 309841B-0 (2SC984-B).

A new transistor, part no. HT 304961E-0 (2SC496-0) has been incorporated in production units from serial no. as follows:

2270U	(USA)	serial number	25261	and	higher
2270E	(Europe)	"	56471	"	"
2270C	(Canada)	"	61411	"	"
2270K	(Far East)	"	81301	"	"
2270P	(Post Exchange)	"	81301	"	"

You will note that the above two types of transistors are NOT interchangeable because of different mounting hardware and circuit components.

The new part changes are summarized below with part numbers for your reference.

DESIGNATION	PART NUMBER
Transistor (2SC496-0)	HT 304961E-0
Heatsink and Insulator	2818267020
Screw	5110261250

Hector E. Gervasio, Manager
Technical Services

marantz

SERVICE BULLETIN

model number 2270	bulletin number M-2270-2
for serial numbers 3901 and Above	
subject: SERVICE MANUAL CORRECTION	
engineering approval	date 7-16-74

On page 10, item 15-3 should read "Idle Current Adjustment: Connect a VTVM between pin terminals J754 and J756". (For serial numbers 3901 and above only). Incorporate this change into the service manual as soon as possible to ensure proper servicing information.

Albert Almeida, Manager
Technical Services

marantz

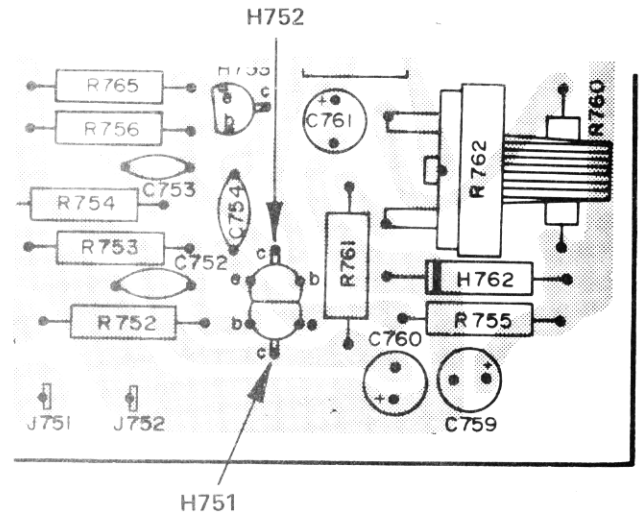
SERVICE BULLETIN

SS-MAR0234

model number	bulletin number
2270	M-2270-3
for serial numbers: ALL	
subject: SERVICE MANUAL ADDENDA	
engineering approval: N/A	date: 9-24-75

This Service Bulletin is issued to update the Marantz Model 2270 Receiver Service Manual. Print this data in the Service Manual upon receipt of this bulletin to ensure current reference information.

On Page 19, Figure 18, (lower right corner of the illustration shown) print missing reference designators H751 and H752 above and below the paired transistors, respectively.



On Page 31, Parts List, lower left column under SEMICONDUCTORS, print H752 after H751 in the REF. DESIG. column. On the upper right column, print H757 after H756 in the REF. DESIG. column.

On Page 32, Part List, upper left column, under J811 - J812 etc., print L801, LY4024004, Relay, speaker protection.

On Outside Back Cover, lower right corner, print 2818855010, (Marantz Part Number).

Albert Almeida, Manager
Technical Services

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SERVICE BULLETIN

SS-MAR0234

model number: 2270	bulletin number: M-2270-4
for serial numbers: SEE BELOW	
subject: PROTECTION RELAY REPLACEMENT	
engineering approval	date: 5-14-76

If you receive customer complaints concerning malfunction of the Speaker Protection Relay (L801) in the Marantz Model 2270 and replacement is required, it is recommended that L801 be replaced with an improved twin contact relay part number LY2-0240-090.

This improved relay has been incorporated into units with serial number 50261 (USA); 62811 (Canada); 512521 (Europe) and later.

Albert Almeida, Manager
Technical Services

Marantz Company, Inc., P.O. Box 577, Chatsworth, California 91311 (213) 998-9333 873-2000 A Subsidiary of Superscope, Inc.

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SERVICE BULLETIN

SS-MAR0234

model number 2270	bulletin number M-2270-5
for serial numbers SEE BELOW	
subject PHONO PRE-AMPLIFIER TRANSISTOR REPLACEMENT	
engineering approval	date 10-14-76

OBJECTIVE

In current production of the Model 2270, the phono pre-amplifier transistor 2SC458 (Reference Designation H705 and H706) has been replaced by a 2SC1775A transistor of a C, D or E beta range (h_{fe}).

The 2SC1775A transistor offers greater reliability and is available as a spare parts item.

APPLICATION

Upon receipt of a unit for repair due to a failure in the phono pre-amplifier section;

A. Use the new 2SC1775A transistor for replacement purposes should it become necessary to replace H705 (2SC1775A) or H706 (2SC1775A) in current production units OR

B. In earlier production units referenced below, when replacing either H705 (2SC458) or H706 (2SC458), always replace both transistors even though only one transistor is defective.

USA	CANADA	EUROPE
Below 470001	Below 080001	Below 280001

PARTS ORDERING

Ref. Desig.	Part Number	Description
H705 - H706	HT3-1775-2DO	Transistor, 2SC1775A (beta range D*)

* A transistor of C or E beta range may be substituted in either channel if necessary without affecting equipment performance.

Please retain this bulletin for future reference.

Albert Almeida, Manager
Technical Services

marantz®

SERVICE BULLETIN

model number: 2270	bulletin number: M-2270-6
for serial numbers: ALL	
subject: SERVICE MANUAL CORRECTION	
technical services approval: [signature]	writer: [signature]
engineering approval: [signature]	date: 3-4-77

OBJECTIVE

This bulletin is issued to inform you of a misprint in the Marantz Model 2270 Service Manual.

APPLICATION

Incorporate this change into your Service Manual as soon as possible to ensure correct service information.

PROCEDURES

A. Refer to the Service Manual, page 22, Schematic Diagram. Locate P800 (the Power Supply PC Board) and reverse the polarity of the Diode H801.

B. Refer to the Service Manual Addendum, page 3, Schematic Diagram. Locate P800 (the Power Supply PC Board) and reverse the polarity of Diode H801.

Marantz Company, Inc., 20525 Nordhoff St., Chatsworth, CA 91311 (213) 998-9333 873-2000 A Subsidiary of Superscope, Inc.

SS-MAR0234 (12-76)

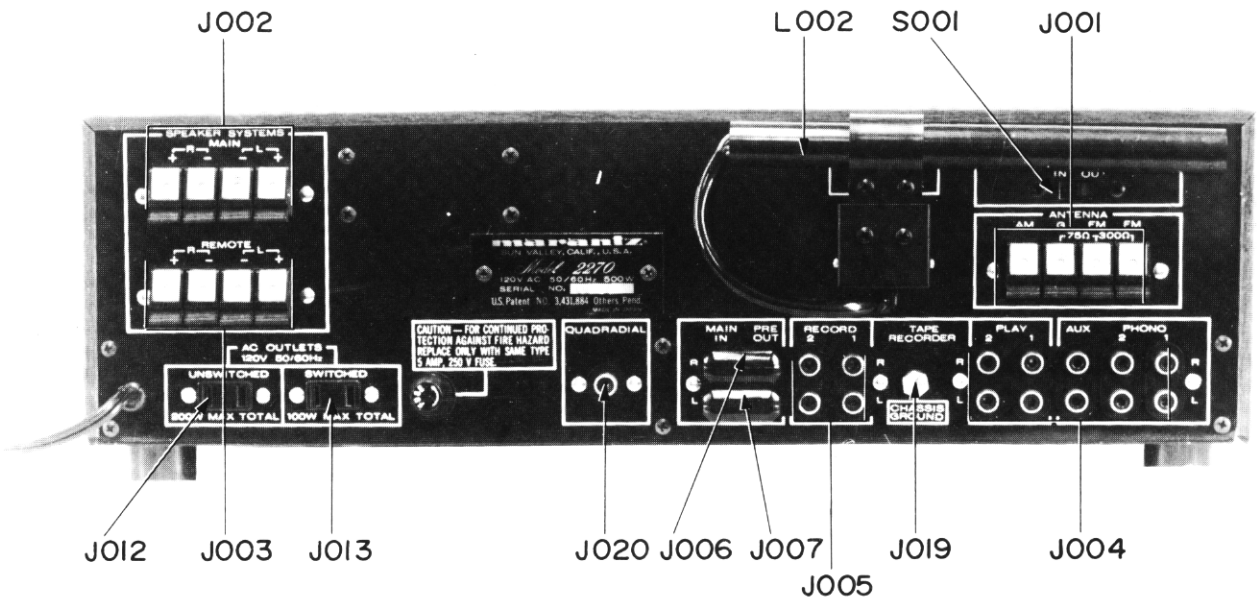

Figure 7 Rear Panel Adjustment and Component Locations

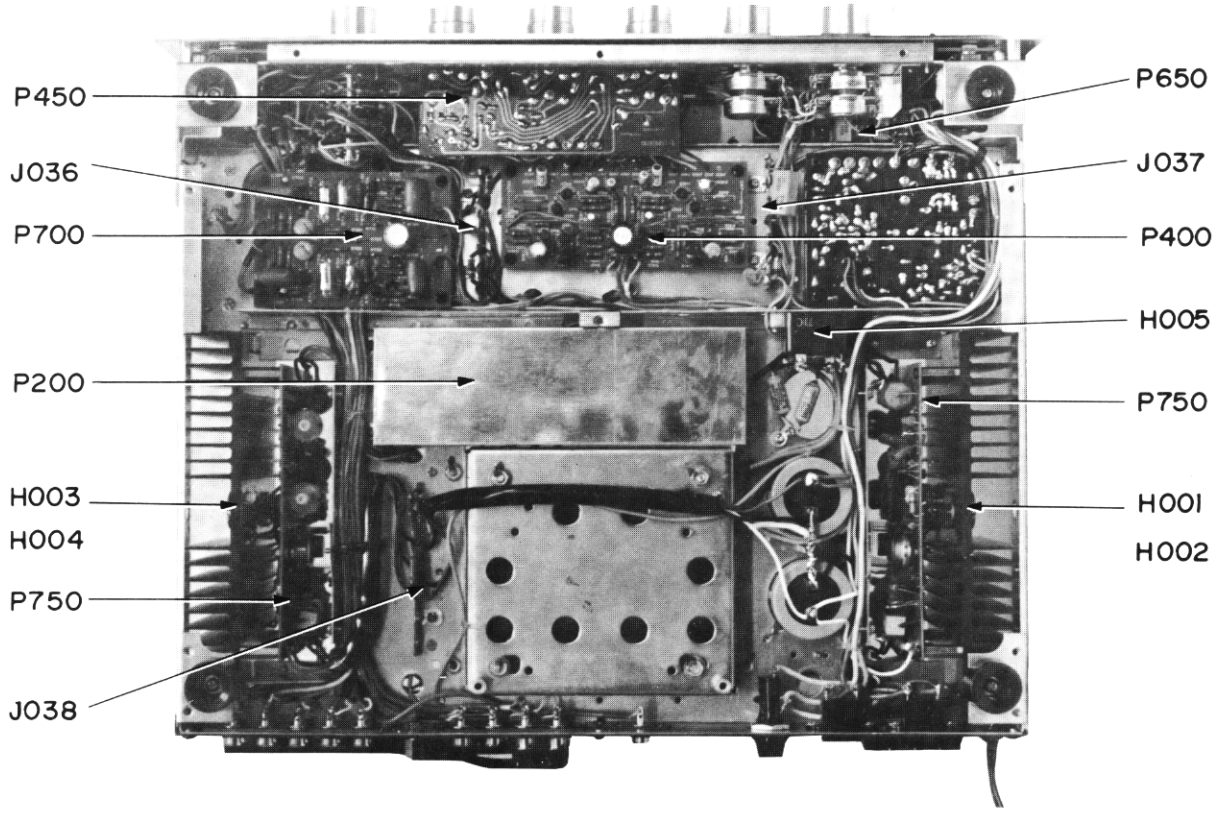

Figure 8 Main Chassis Component Locations (Bottom View)