

4240  
69

SERVICE  
MANUAL 4240

**marantz**

model 4240

*Stereo 2 + Quadradial 4 Receiver*

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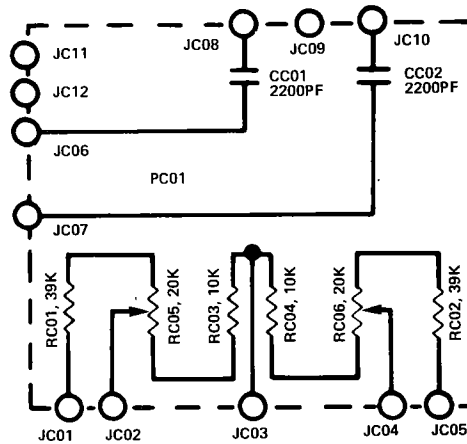
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<b>marantz®</b>  <b>SERVICE BULLETIN</b> <small>SS-MAR0234</small>	model number 4240	bulletin number <b>M-4240-3</b>
	for serial numbers SEE BELOW	
	subject DELETION OF FM DE-EMPHASIS SWITCH	
	engineering approval <i>D. Williams</i> 7-3-76	date 5/19/76

The rear panel FM de-emphasis switch (SC01), part number SS0-2020-170, will no longer be incorporated in the Marantz Model 4240. A bracket, part number 288-6160-130, has been added to replace the deleted switch.

The schematic below reflects the changes in PC01:



The FM equalization turnover will now change from 75 u sec to 25 u sec when the front panel Dolby switch (S003) is in the FM Dolby mode.

The effective serial numbers showing a deleted FM de-emphasis switch are shown below:

USA	12701
CANADA	61001
EUROPE	54901
AUSTRALIA	500001
DEMKO, SEMKO	200001
PX	80901
HONG KONG	500001

Albert Almeida, Manager  
 Technical Services



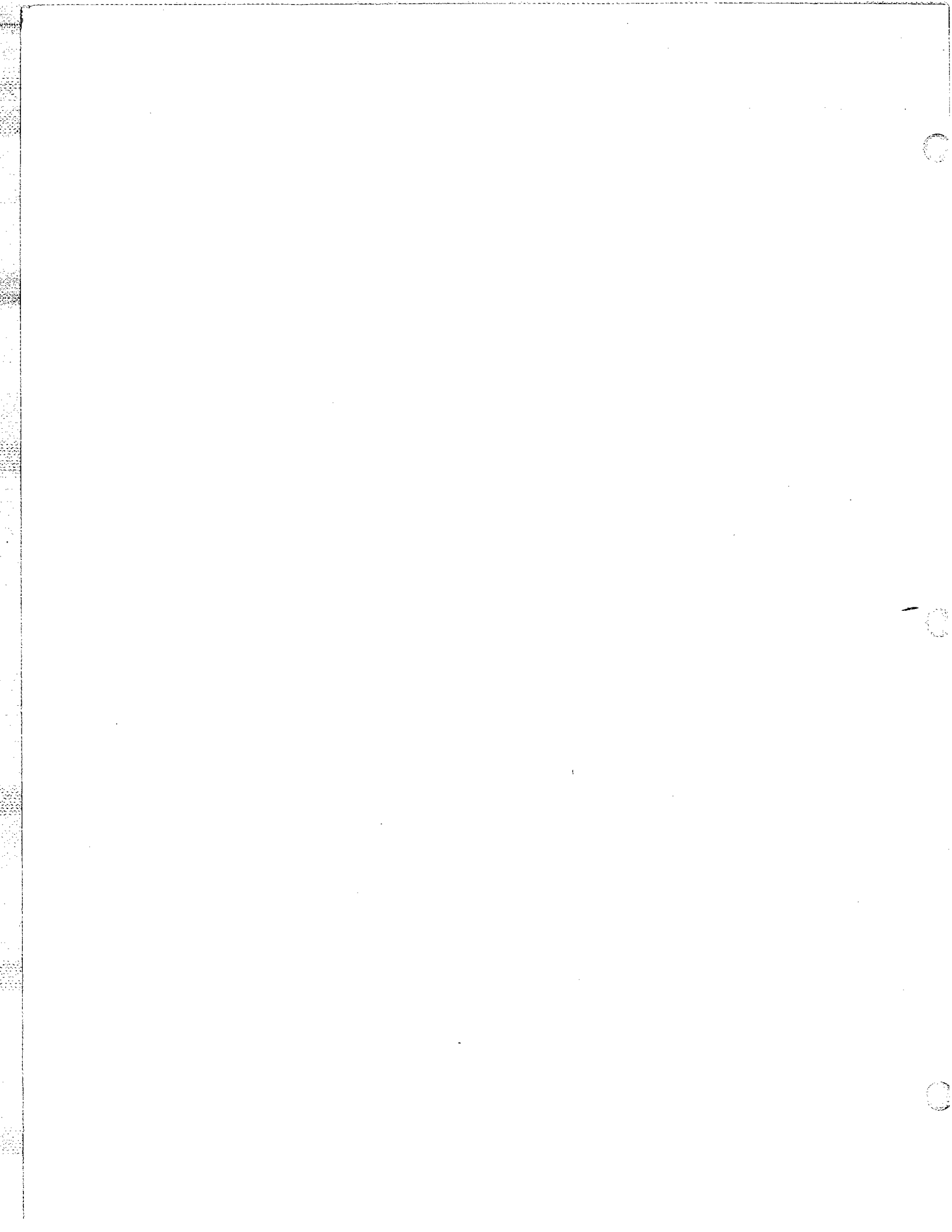
<b>marantz®</b>  <b>SERVICE BULLETIN</b> SS-MAR0234	model number 4240	bulletin number M-4240-4
	for serial numbers WHERE APPLICABLE	
	subject UPDATE OF P300 CIRCUIT BOARD ASSEMBLY	
	engineering approval <i>12-14-76</i> <i>DVL</i>	date 11-15-76

Should you receive a Marantz Model 4240 requiring repair of the multiplex/muting circuit, it should be noted that there have been production changes in the MPX Decoder PCB Assembly (P300) for improved reliability.

Incorporate the following changes in the service manual to ensure proper reference information.

1. Resistor R334 has been removed.
2. Resistor R336 has been relocated to the foil side of the circuit board.
3. Diode H314 has been replaced by a jumper wire.
4. Resistor R343 has been changed to 100 ohms.

*Albert Almeida*  
 Albert Almeida, Manager  
 Technical Services



<b>marantz</b>  <b>SERVICE BULLETIN</b>	model number	4240 (USA)	bulletin number
	for serial numbers	1001 to 5600	<b>M-4240-1</b>
	subject	DOLBY FREQUENCY RESPONSE	
engineering approval	<i>[Signature]</i>		date
			11-6-73

You may receive customer complaints regarding loss of high frequencies in the overall response of the Dolby circuits for intermediary settings of the DOLBY RECORD LEVEL and PLAY CAL controls.

Perform the following modification in the Dolby unit PCB (P600):

Remove capacitors C615 and C616.

Replace resistors R607 and R608 with resistors of 1K ohms,  $\pm 10\%$ ,  $\frac{1}{4}W$ .

Perform the following modification in the FM de-emphasis switch PCB (PC01):

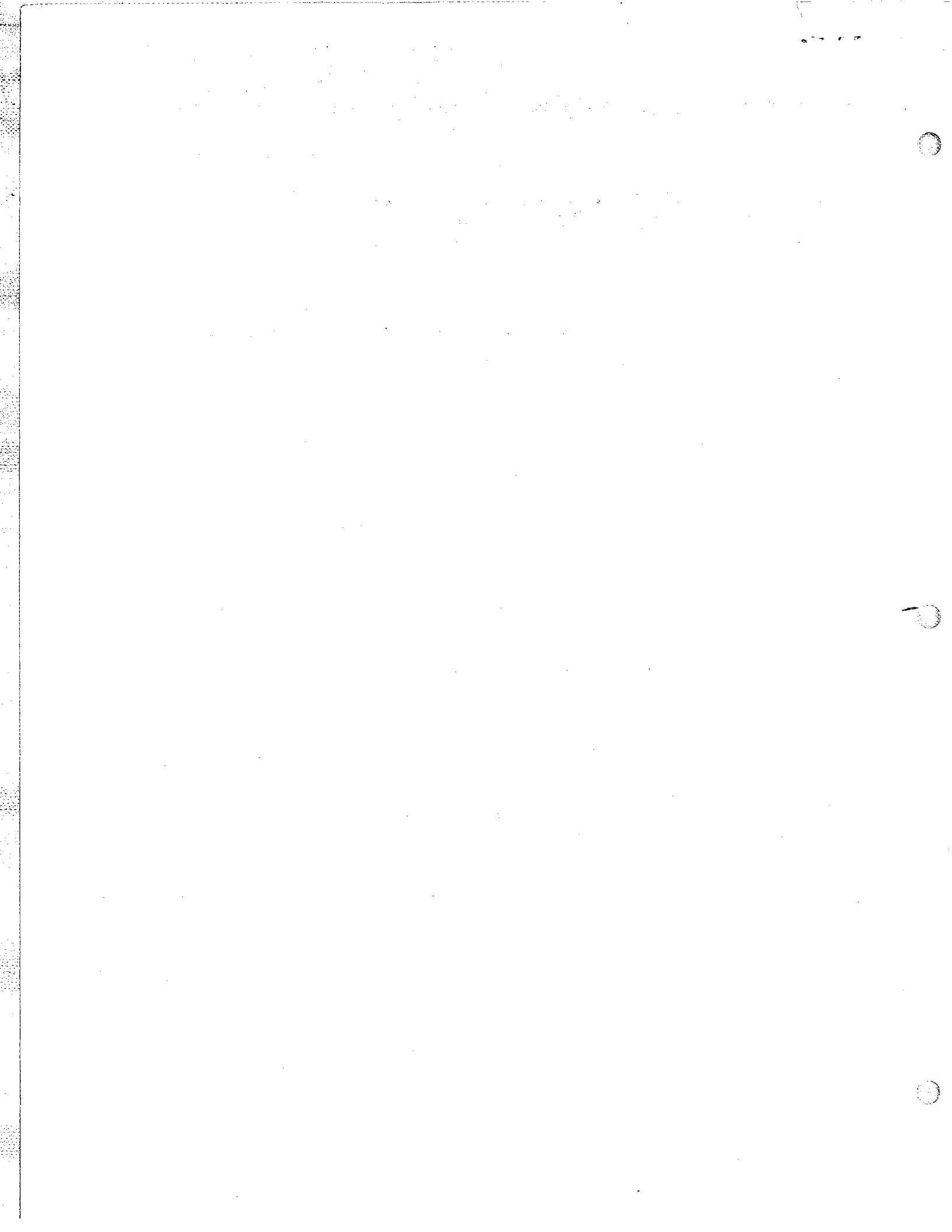
Replace resistors RC01 and RC02 with resistors of 68K ohms,  $\pm 5\%$ ,  $\frac{1}{4}W$ .

NOTE: In some units resistors RC01 and RC02 use combined resistors for specific value. These resistors may be located in both sides of the PCB. All such resistors must be removed when performing the above modification.

After the above modification is completed perform the following test in the numbered sequence listed below:

1. Set Dolby switch to REC 1 and depress the 400Hz TONE push-button on the front panel.
2. Adjust RL11 located on the 400Hz oscillator and meter PCB (PL01) to obtain 580mV RMS at the FRONT TAPE OUTPUT jacks.

cont ...



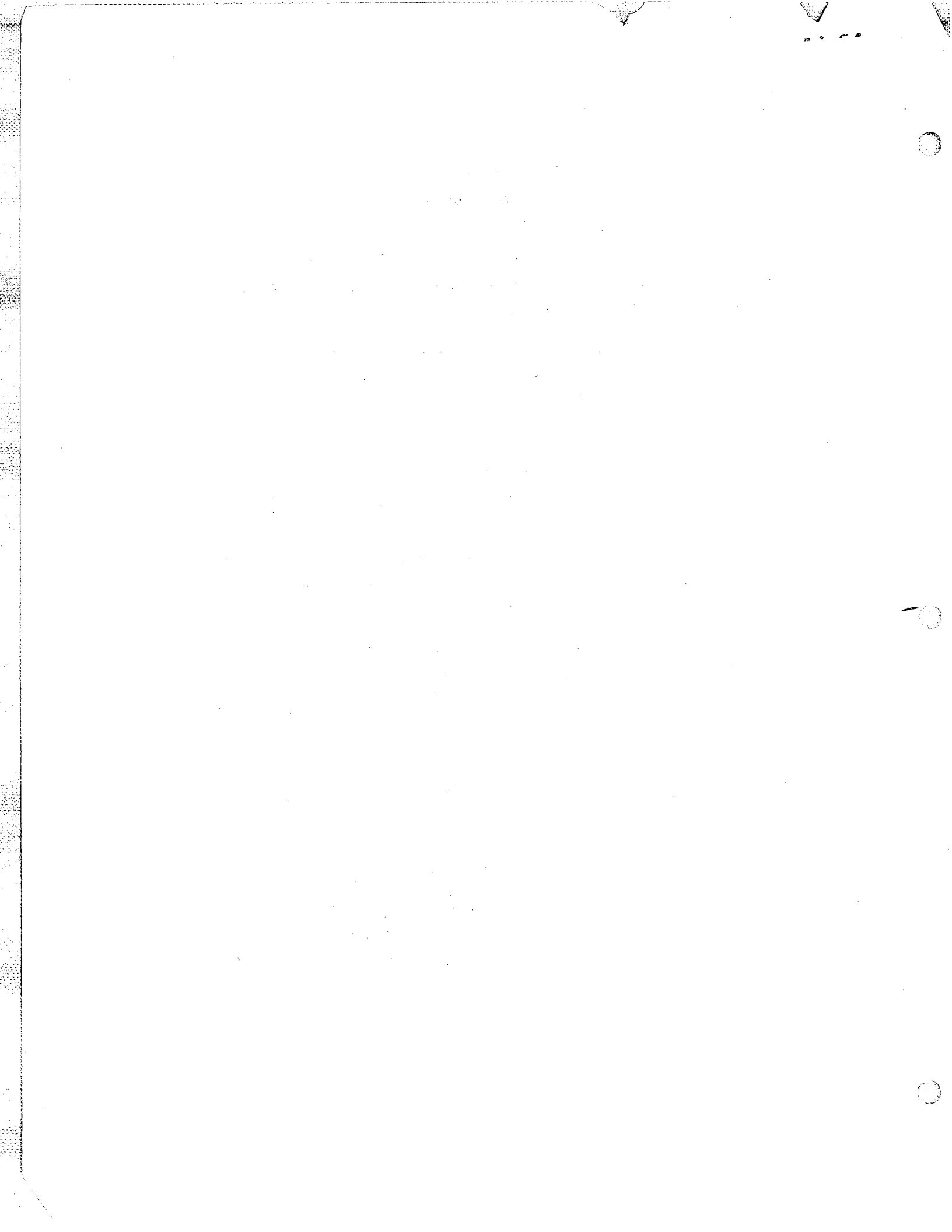


3. Set selector switch to FM mode.  
Set Dolby switch to FM Dolby mode.  
Release 400Hz TONE SWITCH.  
Feed an FM RF signal modulated 50% (37.5 kHz deviation) with 400Hz audio to the antenna terminals and tune the receiver to this frequency.
4. Adjust FM PRESET Dolby level controls (R005 and R006) located on the rear panel, to obtain 580mV (RMS) output at the FRONT TAPE OUTPUT jacks.
5. Set Dolby switch to REC 1 mode.  
Set SELECTOR switch to CD4/Aux. mode.  
Feed 1kHz audio signal 580mV RMS to the FRONT RIGHT and FRONT LEFT AUX input jacks.  
Adjust DOLBY REC LEVEL controls (located on the front panel) to obtain 580mV RMS output at the FRONT RIGHT and FRONT LEFT TAPE OUTPUT jacks.
6. Switch the input audio signal generator to 10kHz, verify the output at TAPE OUT. It should be within  $\pm .5$ dB of 580mV, that is, TAPE OUT level at 10kHz should be from 545 to 614mV.

This modification has been incorporated in units, S/N 5601 and later.



Hector E. Gervasio, Manager  
Technical Services



## INTRODUCTION

This service manual was prepared for use by Authorized Warranty Stations and contains service information for Marantz Model 4240 Stereo 2+Quadradial 4 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 4240 consists of 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 and AM Tuner                            | mounted on P.W. Board, P100 |
| 2. FM IF Amplifier                                      | mounted on P.W. Board, P200 |
| 3. MPX Stereo Decoder, Noise and DC Amplifier           | mounted on P.W. Board, P300 |
| 4. Phono Amplifier                                      | mounted on P.W. Board, P400 |
| 5. Vari-Matrix Unit                                     | mounted on P.W. Board, P500 |
| 6. Dolby Unit   | mounted on P.W. Board, P600 |
| 7. Power Amplifier                                      | mounted on P.W. Board, P700 |
| 8. Power Supply   | mounted on P.W. Board, P800 |
| 9. FM De-emphasis Switch Unit                           | mounted on P.W. Board, PC01 |
| 10. Buffer Amplifier                                    | mounted on P.W. Board, PD01 |
| 11. Tone Amplifier                                      | mounted on P.W. Board, PE01 |
| 12. Tone Control Unit                                   | mounted on P.W. Board, PF01 |
| 13. Balance Control Unit                                | mounted on P.W. Board, PG01 |
| 14. 400Hz Oscillator and Meter Driver                   | mounted on P.W. Board, PL01 |
| 15. Loudness, Hi Filter, Speaker, and Power Switch Unit | mounted on P.W. Board, PS01 |
| 16. Tape Monitor Switch Unit                            | mounted on P.W. Board, PT01 |
| 17. Indicator Lamps                                     | mounted on P.W. Board, PY01 |
| 18. Dial Lamps  | mounted on P.W. Board, PZ01 |

### 2. AM TUNER

All components except ferrite bar antenna are mounted on a printed circuit board P100.

The AM signals induced in a ferrite bar antenna are applied to the RF amplifier section of the AM tuner IC H104 through a capacitor of C129 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 input circuit of the RF amplifier assure very high image and spurious rejection performance. Thus amplified and selected AM signals are then applied to the converter section through a coupling capacitor C132. While the local oscillator voltage is injected through a capacitor C131, both AM signals and oscillating voltage are mixed and converted into 455KHz intermediate frequency. The resulting IF signal is applied to the first IF transformer L110 consisting of one ceramic filter and two tuned circuits.

The output of L110 is led to the IF amplifier/detector section of H104. The detected audio signal is obtained from PIN ⑪ of H104 and applied to the function switch through the emitter follower by H105.

#### 2.1 Suggestions for AM Tuner Trouble Shooting

Check for broken AM bar antenna, next connect an oscilloscope to the pin ⑪ of H104 or J112 and check for audio signals with the tuning meter deflected. If detected audio signal is

obtained at pin ⑪ of H104, no failure may exist in the AM tuner IC H104 and its associated circuit. If no audio signal is obtained at pin ⑪ of H104, check all voltage distribution in the AM circuits by using a DC VTVM.

### 3. FM TUNER

The FM Tuner section of Model 4240 is divided into four functional blocks: FM Front End, IF Amplifier and Detector, Muting Control and MPX Stereo Decoding Circuit. FM signals induced by an FM antenna are led to FM antenna coil L101 through a balun coil. These signals are then applied to the FET RF amplifier which in turn applies its output to the mixer transistor H102 through the double tuned high selective circuits. The 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 base of H102. The 10.7MHz front end output is led to the next IF amplifier unit through a coaxial cable.

The IF amplifier unit consists of five stages of IF amplifier. Three pieces of dual elements ceramic filters are used to obtain high selectivity and four stages of symmetrical diode limiters are also employed for the best limiting characteristics, improved capture ratio and good AM suppression.

A part of H201 output is rectified into DC and fed back to the gate of FET RF amplifier to decrease the gain with increased signal strength.

The IF signal sufficiently amplified through every stage of IF amplifier is finally applied to the transistor limiter. The detected audio output is led to the buffer amplifier H207 and its buffered output is led to; (a) noise amplifier H301 through resistor R301 and capacitor C301, (b) QUADRADIAL jack on the rear panel through resistor R322, (c) MPX stereo decoding circuit through R324.

#### 3.1 Audio Muting and Stereo Mode Auto-Selecting Circuit

The muting circuit consisting of all solid-state electrical switching has been incorporated in the Model 4240. 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 rectifying a part of IF output signals from H204 and H205 is applied to the base of H308 and turns on it, if the IF output is greater than predetermined level (muting threshold level). When the H308 is turned on the H309 is turned off, allowing the emitter-collector resistance increasing and the collector voltage rises about 9V. The increased collector voltage increases the gate bias voltage and turns on the switching FET H311, decreasing the source-drain resistance to near zero ohm and allowing the audio signal applied to the source to flow to pin ① of the MPX decoding IC H303 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 H308, thus the H308 keeps its turn-off state and this makes H309 turn on, decreasing the collector voltage and turning off H311. 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 C301 and amplified by the noise amplifier transistor H301 and its output is rectified by 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 H302, decreasing the emitter-collector resistance to zero. This means the collector of H309 is short-circuited to the ground, therefore the H311 is turned off and any audio signals having excessive high frequency noises can not go through the FET's source-drain path.

The transistor H310 connected between pin ⑮ of H303 and the ground is also turned off (when the transistor H302 or H309 is turned on.) and no current flows from pin ⑮ of H303, resulting in turning off the stereo 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 H304 through a resistor R249 and dividing network (R325 & R326). 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 H304 makes the transistor H307 turn on, and this makes the H308 turn off, ... H309 turn on, ... H311 turn off, ... H310 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 H305 which in turn makes the H306 turn on and the H308 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 H304 is adjusted so that both transistor H306 and H307 are not turned on, giving no effect on the transistor H308.

### 3.2 MPX Stereo Decoding Circuit

A Non-equalized audio signal from the FM detector is applied through the phase adjuster network of C330 and R351 to input terminal pin ① on the MPX decoder IC H303. The MPX decoder IC consists of a stereo decoder and postamplifier for the output. The right and left channel signals decoded by the stereo decoder H303, appear at pin ⑩ (right channel) and pin ⑪ (left channel), respectively. These signals are passed through the low-pass filters and de-emphasis networks to eliminate undesirable residual switching signals and are then delivered to postamplifier input pin ⑤ (right channel) and pin ⑦ (left channel), respectively. The signals amplified in the postamplifiers to the required level (approximately 10dB) are delivered to pin ⑥ (right channel) and pin ⑧ (left channel), and are then passed through C324 and C325 to pin terminals J308 and J309, hence, through the SELECTOR switch to the audio amplifier section. Pin ⑮ on the MPX IC H303 is connected through R309 to the collector of the autostereo switch transistor H310, which turns on or off according to the incoming FM signal strength, thereby automatically switching between the stereophonic and monaural operations. The H310 turns on or off in accordance with whether the FM signal strength is more or less than approximately 25 $\mu$ V.

### 3.3 Suggestion for Trouble Shooting of FM Tuner

#### 3.3.1 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 SIGNAL STRENGTH meter. If the SIGNAL STRENGTH meter deflect at several frequencies received, the tuner circuits preceding the discriminator circuit may have no failure. When no reading is obtained in the meter, check FM local oscillator circuit, using an 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. When SIGNAL STRENGTH meter deflects but no sound is obtained, check audio circuits, using high sensitive oscilloscope.

#### 3.3.2 Symptom: No Stereo Separation

Connect an FM 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 PRE-AMPLIFIER**

Signals from the PHONO jacks are applied to the phono-amplifier mounted on P400. The amplified and RIAA equalized phono signals and signals from the tuner section, CD-4/AUX and TAPE MONITOR IN jacks are applied to the SELECTOR switch which, in turn, leads the selected signals to the TAPE MON switch and TAPE MONITOR OUT jacks. Applied to the other section of the TAPE MON. switch are signals from the TAPE MONITOR IN jacks. The TAPE MON. switch selects the signals from the SELECTOR switch or those from the TAPE MONITOR IN jacks and the selected signals go to the DOLBY and MODE switches. Signals are then mode processed by the MODE switch and its associated circuit and applied to the tone control amplifier through the buffer amplifier and BALANCE and VOLUME controls. The bass and treble controlled signals from the tone control amplifier pass through the hi filter before they reach the main amplifier.

**4.1 Mode Switch**

MODE switch S002 has positions of MONO, 2 CH, DISCRETE, VARI-MATRIX, and SQ DECODER.

In the MONO position, all input signals are mixed together and delivered to all four channels.

In the 2 CH position, each pair of input signals right-front (RF) and right-rear (RR), and left-front (LF) and left-rear (LR) are mixed together. The resultant signals (RF + RR) and (LF + LR) are delivered to the pairs of RF and RR, and LF and LR channels, respectively.

In the DISCRETE position, each channel signal is separately routed to the corresponding channel.

In the VARI-MATRIX position, 2-channel stereo input signals are converted into quadraphonic signals through the vari-matrix circuit; the input right and left channel signals are fed directly to the LF and RF channels, while the signals to the LR and RR channels are synthesized from the 2-channel input signals under the control of the DIMENSION control. The LR and RR channel signal components are controlled by the DIMENSION control as shown below.

DIMENSION Control Setting	LR Output	RR Output
Minimum (FCCW)	LF + RF	RF + LF
Center	LF	RF
Maximum (FCW)	LF - RF	RF - LF

When the DIMENSION control is set to the minimum position the LR and RR channel signals become monophonic, to the center are stereophonic, and to the maximum are out of phase, thus providing vanished sound image positioning.

In the SQ DECODER position, signal sources encoded by the CBS SQ system are ideally decoded into 4-channel signals. Required for this operation is incorporation of the SQ Adaptor, Model SQA-1, into the Model 4240.

**4.2 Balance Control**

Signals from the buffer amplifiers are fed into the balance control circuit, in which the signals are controlled by three balancers: FRONT L-R, REAR L-R, and FRONT-REAR. By setting the FRONT-REAR balancer to the "FRONT" side and the FRONT L-R balancer to the "L" side, for example, only the front left channel is driven.

The balance control circuit is provided with the REMOTE CONTROL switch which makes the Model RC-4 Remote Control Box operative when set to the "REMOTE" position. In the "REMOTE" position the BALANCE and VOLUME controls on the Model 4240 become

