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.

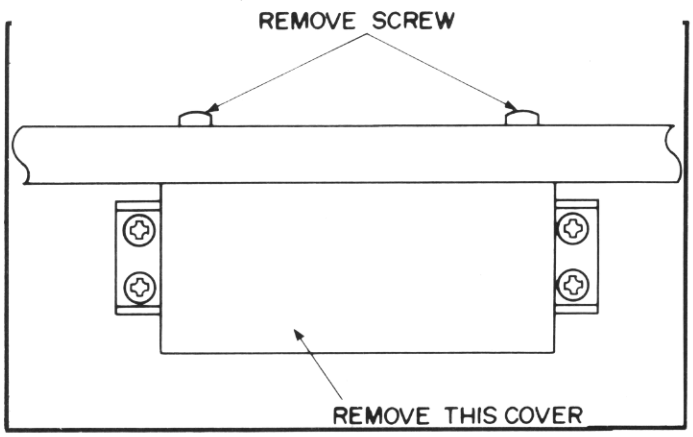
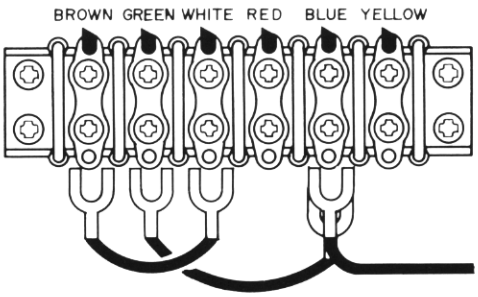
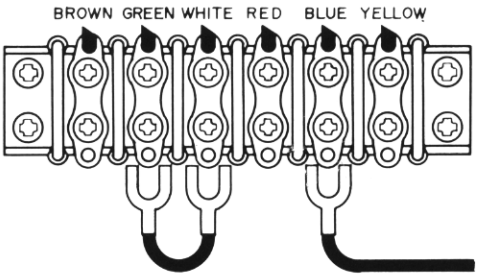


Figure 1 Remove the Terminal Cover

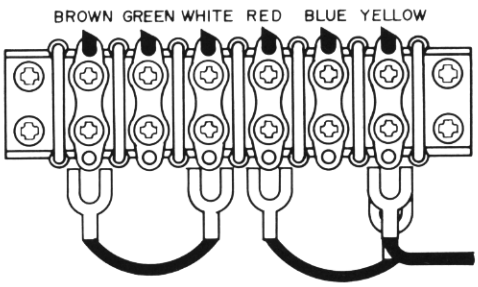
For 100 V Operation
(Use 5A Fuse)



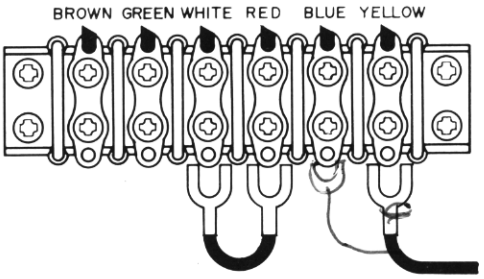
For 200V Operation
(Use 3A Fuse)



For 120 V Operation
(Use 4A Fuse)



For 220 V Operation
(Use 3A Fuse)



For 240V Operation
(Use 3A Fuse)

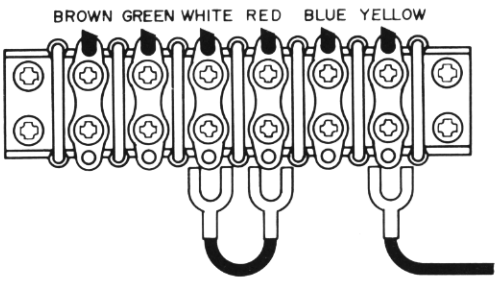


Figure 2 Voltage Conversion Chart

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.

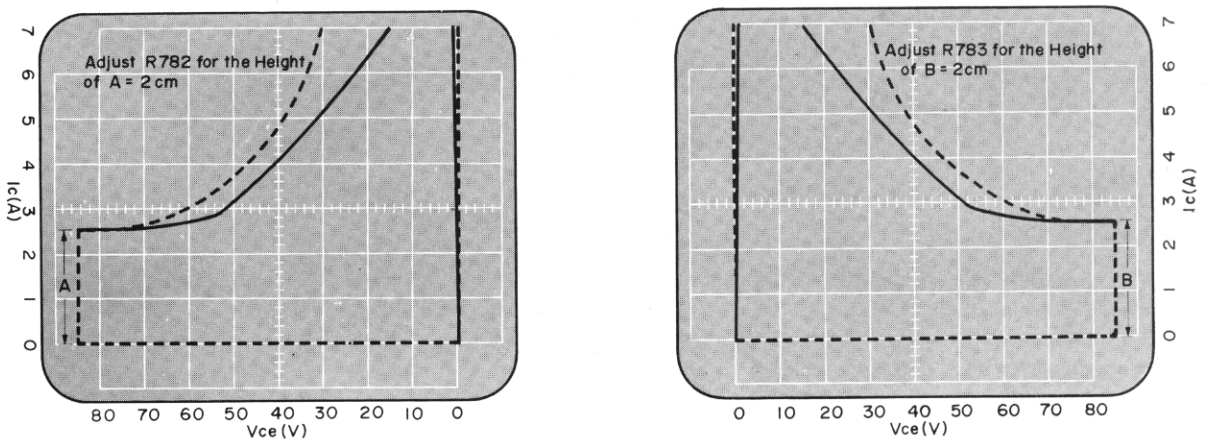


Figure 3 Lissajou Figure on Oscilloscope

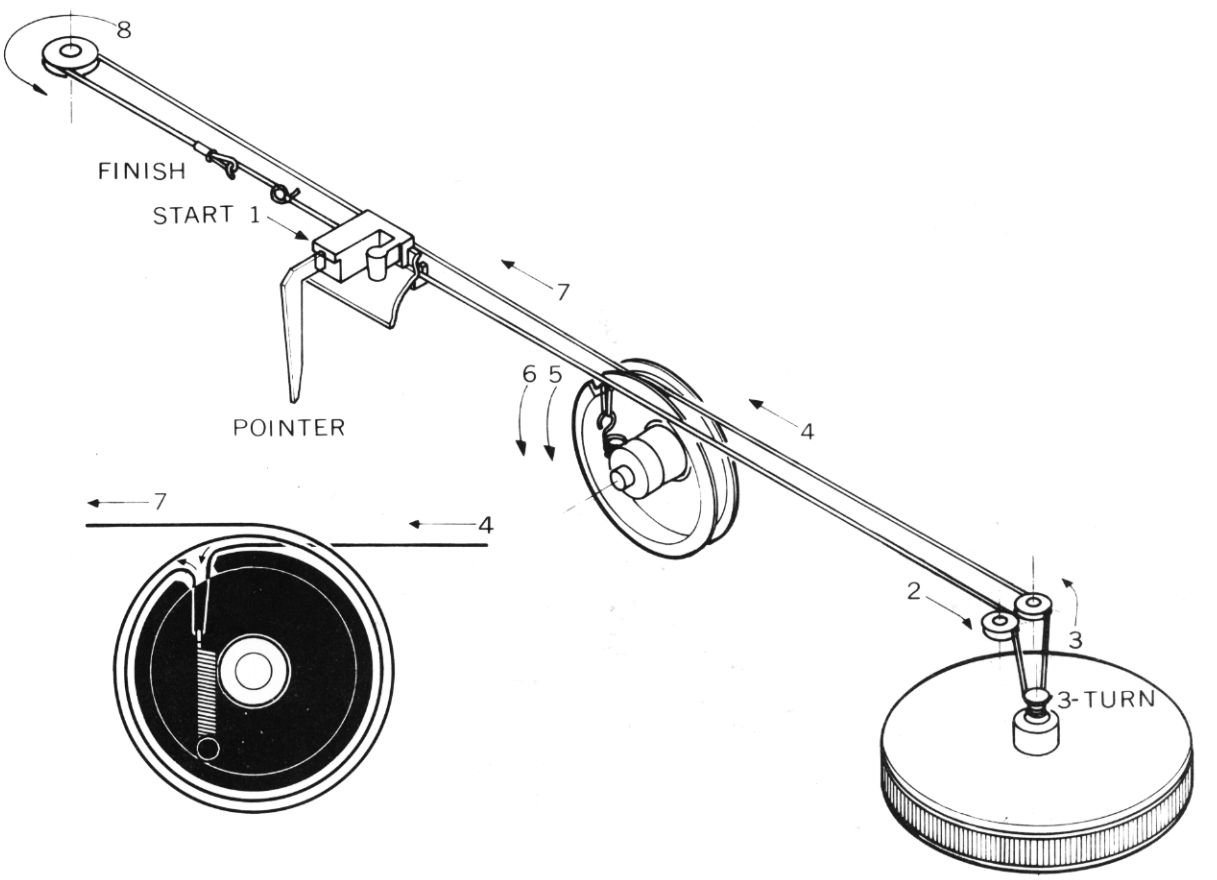


Figure 4 Dial Stringing

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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

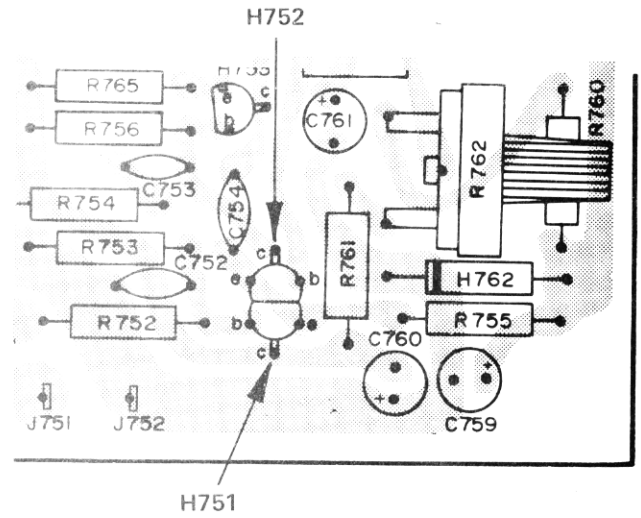
SERVICE BULLETIN

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

marantz®

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)

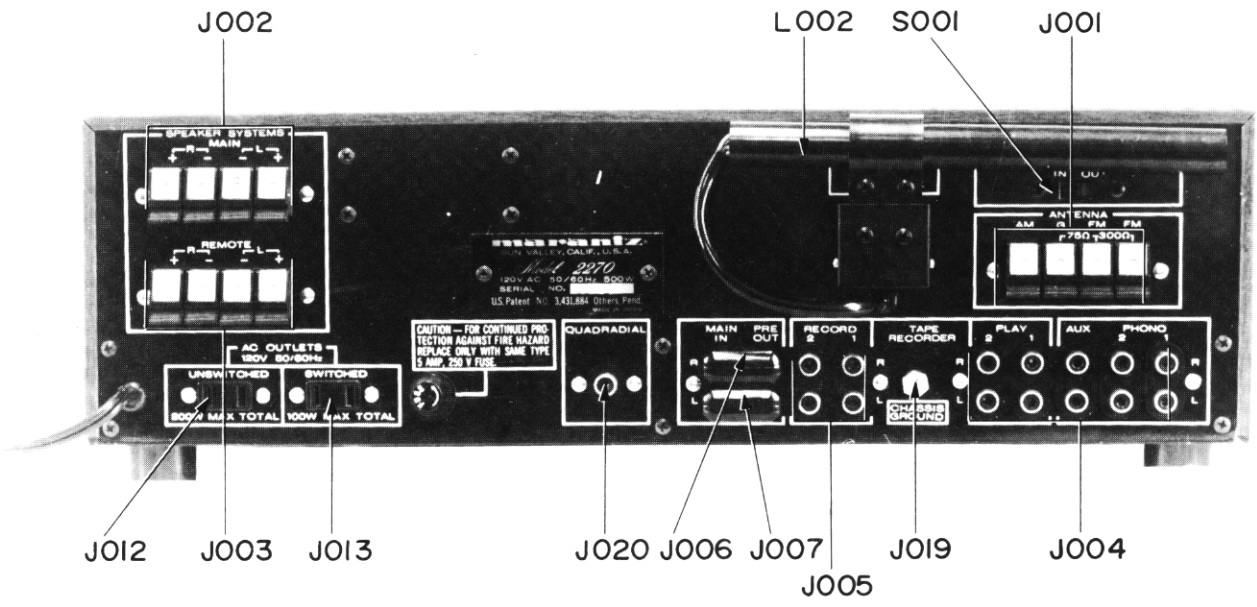

Figure 7 Rear Panel Adjustment and Component Locations

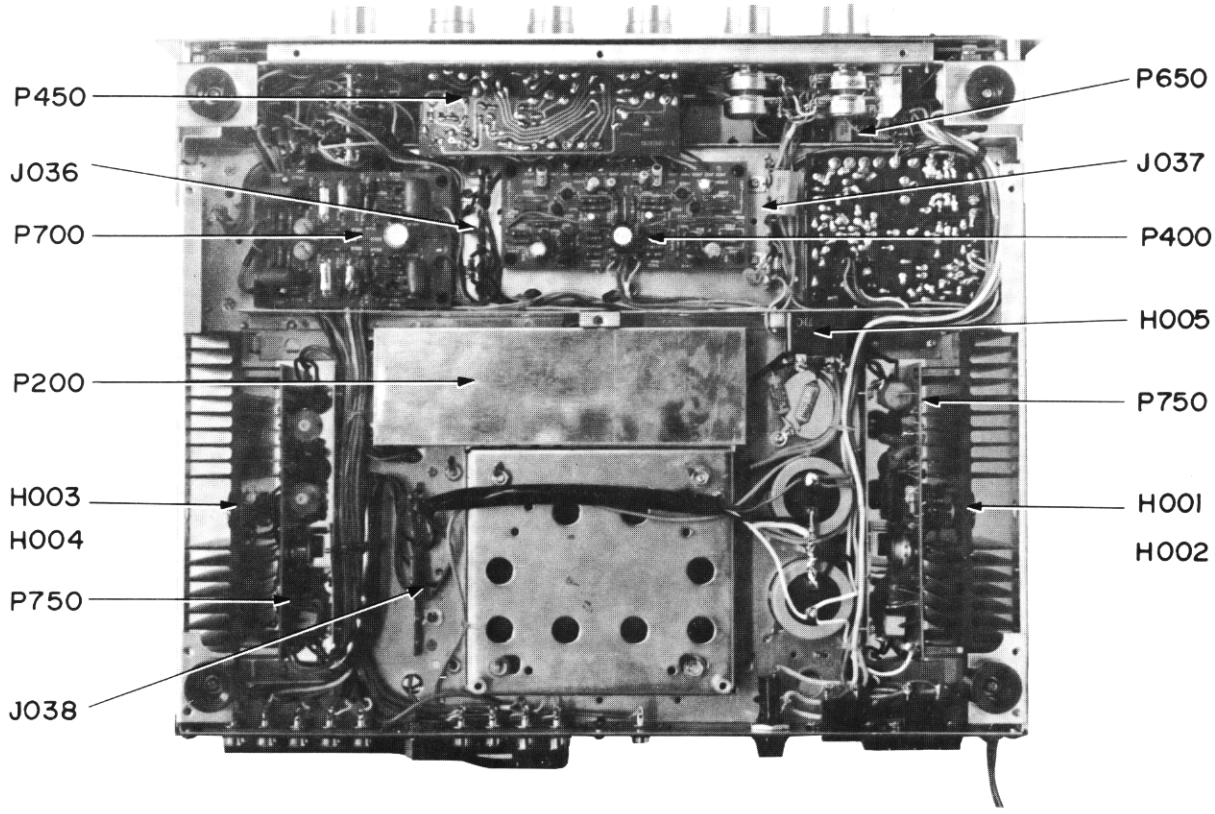

Figure 8 Main Chassis Component Locations (Bottom View)